~~TOP SECRET~~ - GAMBIT

C001

SYSTEM
PERFORMANCE EVALUATION TEAM
(FLIGHT MISSION CHARACTERISTICS)
MISSION 4009/64

~~TOP SECRET~~ - GAMBIT

~~TOP SECRET~~ - GAMBIT

BCS 24566-64

SPB 4 061

31 Jul 64

Cy 1 of 9 Cys

50 pgs.

SYSTEM

PERFORMANCE EVALUATION TEAM

(FLIGHT MISSION CHARACTERISTICS)

MISSION 4009/64

Handle via Byeman Controls Only

~~TOP SECRET~~ - GAMBIT

BCS 24566-64

PERFORMANCE EVALUATION TEAM
REPORT NO. 4009/64

FOREWORD

THIS REPORT PREPARED FOR AND BY DIRECTION OF

THE DIRECTOR OF SPECIAL PROJECTS

OFFICE OF

THE SECRETARY OF THE AIR FORCE

Preparing Unit:
Performance Evaluation Team
Los Angeles AF Station
Los Angeles 45, California

BC8 24566-64
PERFORMANCE EVALUATION TEAM
REPORT NO. 4009/64

PUBLICATION REVIEW

This report has been reviewed and is approved.

Victor M. Genez

VICTOR M. GENEZ
Colonel, USAF
Team Manager

BCS 24566-64

PERFORMANCE EVALUATION TEAM
REPORT NO. 4009/64

TABLE OF CONTENTS

BCS 24566-64

PERFORMANCE EVALUATION TEAM
REPORT NO. 4009/64

SAFSP PERFORMANCE EVALUATION TEAM

SAFSP

Col Victor M Genez

[redacted] (b)(3)

SSD

[redacted] (b)(3)

6594TH AEROSPACE TEST WING

[redacted] (b)(3)

6594TH TEST SQUADRON (AFSPPL)

[redacted] Commander (b)(3)

Technical Staff

NPIC

[redacted] (b)(3)

ACIC

Mr Randall F Gehrke & Associates

AEROSPACE

Dr John D Sorrels

SPACE TECHNOLOGY LABORATORIES

Dr Winston Royce

v

BCS 24566-64

PERFORMANCE EVALUATION TEAM
REPORT NO. 4009/64

SECTION I

RESUME OF MISSION 4009

Mission 4009, consisting of the Gambit camera and the Orbital Control Vehicle System, was launched into orbit from Point Arguello Launch Complex, Pad 3, at 1851:18Z on 6 July 1964.

The satellite vehicle (OCV) was boosted into orbit by an Atlas D/Agena D combination with the following sequence of ascent events:

	Nominal (sec)	Actual (sec)
Booster Engine Cut-off	138.0	138.0
Split No. 1	141.0	143.0
Sustainer Engine Cut-off	273.5	274.5
Vernier Engine Cut-off	290.9	291.9
Atlas/Agena Separation	293.8	294.8
Agena Ignition	337.7	342.7

The OCV achieved an orbit with the following initial parameters:

	Nominal	Actual
Inclination (degrees)	93.0	93.1
Period (minutes)	89.3	89.31
Apogee (NM)	184.0	180.6
Perigee (NM)	85.0	83.0
Eccentricity	.0138	.0135

At lift-off, a total of 2,738 feet of Eastman Type 4404 film was loaded in the supply spool. This amount was adequate for full four-day operational, R&D and run-out camera operations.

The operational objectives of Mission 4009 were to conduct a four-day photographic mission to obtain high resolution photography of selected targets followed by one day of OCV Solo Operations. During the mission, orbit adjust maneuvers were to be executed to shift the ground track for optimum target coverage after day one through day four as indicated by STL TOSP computer runs. These mission objectives were not satisfactorily achieved due to vehicle attitude anomalies which will be discussed in Section V.

Severely degraded operational and R&D photography, which could be recognized and located, was obtained on five orbital revolutions by means of eight payload command messages, including pad load, which were generated and transmitted to the vehicle. The operational target selection for which commands

for operational photography were generated was performed by the (S) NRO Staff who based their selections on computer outputs of the STL MPGP procedures.

Due to vehicle instability previously mentioned, the mission was terminated on day two. Recovery of the Re-entry Vehicle (R/V) was initiated on Rev D32 and "call-down" was effected by the Back up Stabilization System. The capsule was recovered by air snatch on Rev D34. Thirty seconds after R/V retrofire the OCV engines were ignited to de-orbit the OCV with impact in the southwest Pacific.

The total photographic mission consisted of 14 stereo pairs, and 44 mono strips commanded, including run-out strips with door open. Clouds obscured approximately 40 percent of the frames exposed.

Generally, the quality of the photography was quite poor, with ground resolution of 50 feet to 100 feet.

BCS 24566-64
PERFORMANCE EVALUATION TEAM
REPORT NO. 4009/64

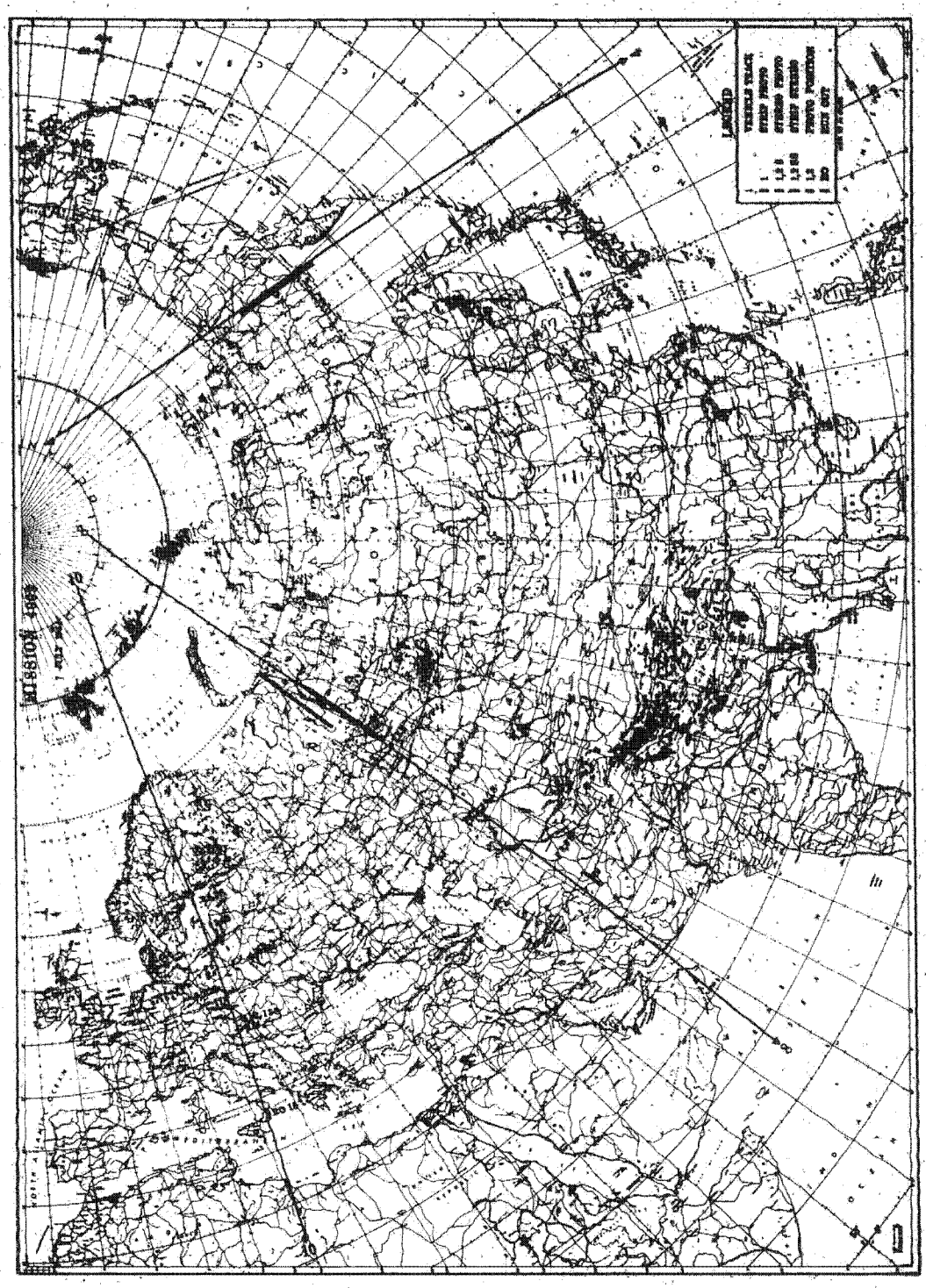


ILLUSTRATION 1

Approved for Release: 2021/05/05 C05133957

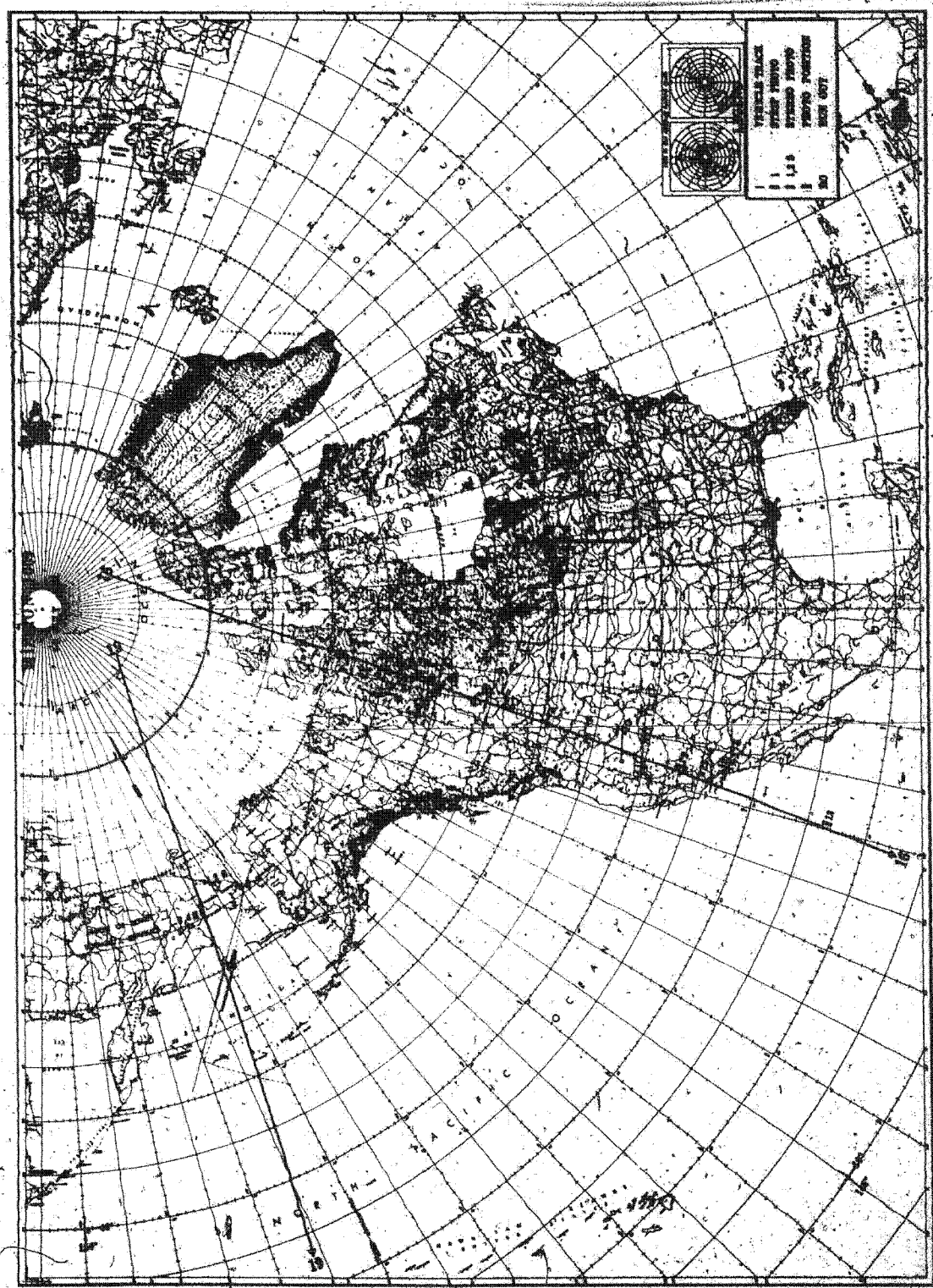


ILLUSTRATION 2

Approved for Release: 2021/05/05 C05133957

BCS 24566-64
PERFORMANCE EVALUATION TEAM
REPORT NO. 4009/64

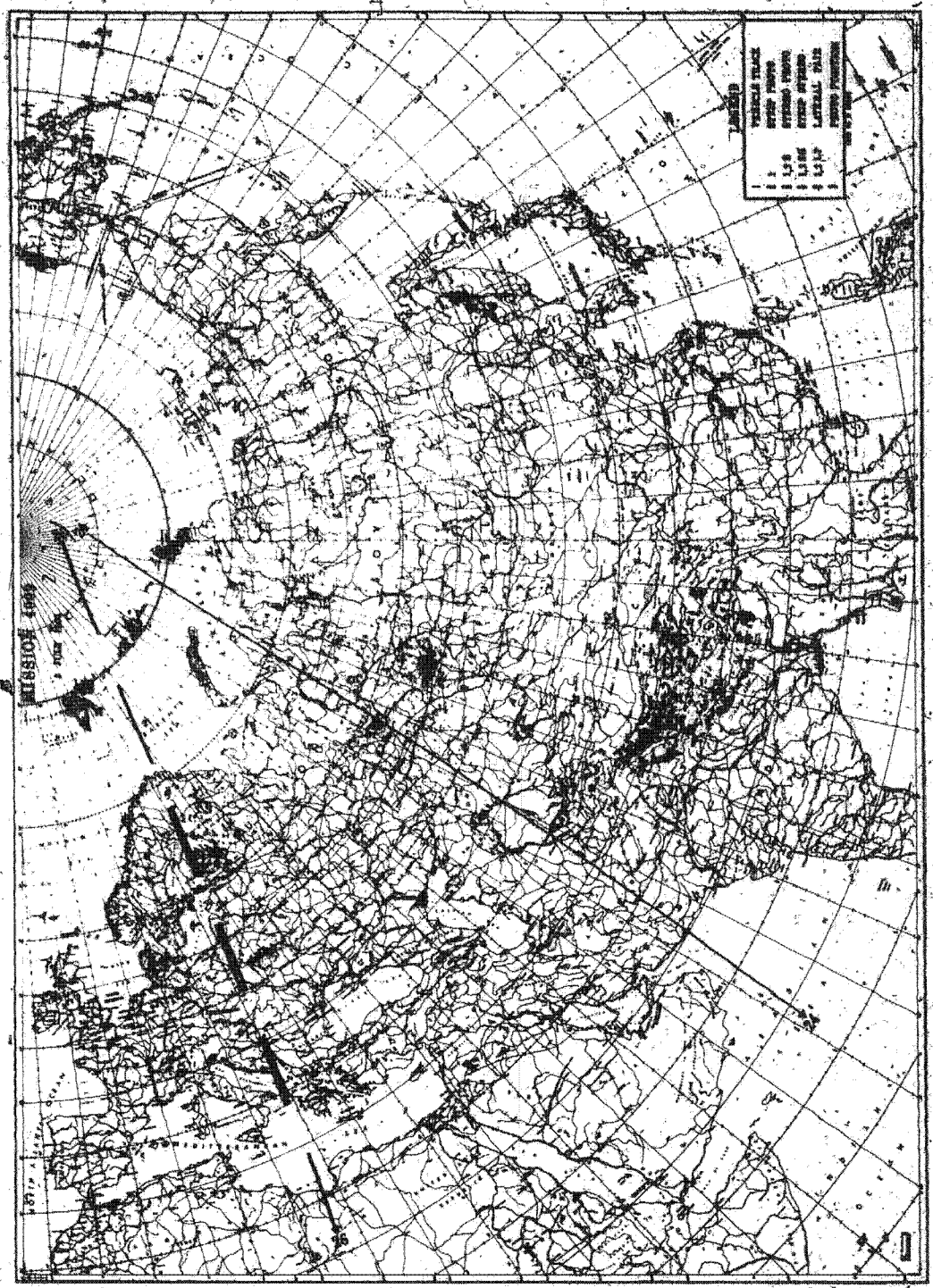


ILLUSTRATION 3

Approved for Release: 2021/05/05 C05133957

Handle via Byeman/
Controls Only

~~TOP SECRET~~ - GAMBIT

ILLUSTRATION 4

BCS 24566-64
PERFORMANCE EVALUATION TEAM
REPORT NO. 4009/64

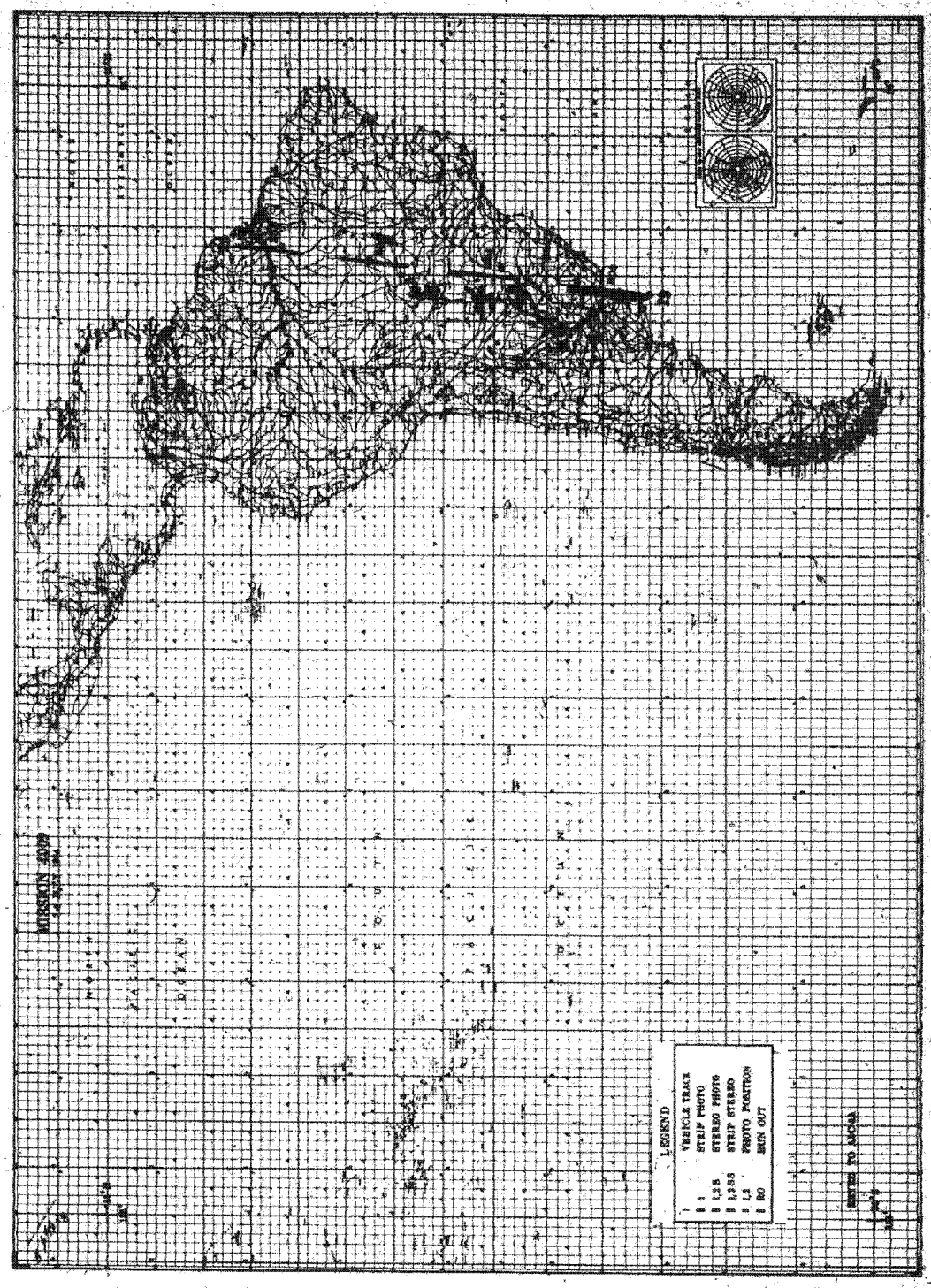


ILLUSTRATION 5

Approved for Release: 2021/05/05 C05133957

SECTION II

FLIGHT PROGRAM

A. Performance of the Command System

1. Input

Command messages generated and loaded in the OCV consisted of two types - payload commands and vehicle attitude diagnostic/experimental commands. Payload commands for Mission 4009 were generated by two methods: the primary method used the STL MPGP and the second was the Pad Load generated by a manual target tape.

2. Command Load Summary

a. Message 101 was loaded on the pad to obtain one mono strip on Rev D04.

b. Message 106, loaded at Vandenberg Tracking Station (VTS) on Rev 08 for operational photography, consisted of 6 strips and 2 stereo pairs, on Rev D08.

c. Message 108 was loaded on Rev 10 at Hawaii Tracking Station (HTS) for payload operations on Rev D10 to obtain 8 strips and 3 stereo pairs.

d. Message 112 was loaded on Rev 16 at Pogo Tracking Station (PTS) for R&D photography on Rev D16 to obtain 12 strips and 2 stereo pairs.

e. Message 113 was loaded on Rev 18 at Kodiak Tracking Station (KTS) and Hawaii Tracking Station (HTS) for operational photography on Rev D19 to obtain 2 stereo pairs and one wrap-up strip with door open.

f. Message 121 was loaded on Rev 24 at VTS for operational photography on Rev D24 to obtain 4 strips and 1 stereo pair.

g. Message 123, loaded on Rev 26 at HTS, contained 60 run-out commands on Rev 26 through Rev 29.

h. Message 124 was loaded on Rev 30 at PTS and contained 17 run-out commands on Rev 31.

B. Geopositioning

1. The photo map match was made for all photographic frames having identifiable imagery. The 200 Series Target Charts selected for use in "Photo Bench Mark" (PBM) location had an accuracy of ± 1,000 feet in most instances. Out of 14 programmed stereo pairs, no two photographs had common imagery; all stereo pairs had considerable separation between each of the photographs. The Attitude Data Sheets reflect these differences.

2. Due to attitude problems (discussed in Section V), the location and identification of PBM's was very difficult. It was unknown that the vehicle was flying backward on Revs 10 and 16. However, the film imagery appeared reversed, and until a unique, positively identifiable bench mark provided the clue that the vehicle was indeed flying backward, the map match was virtually impossible. With this disclosure the map match was expedited by looking in the general areas where the commanded roll would place the photograph with the vehicle in reverse, also knowing the stereo mirror position placed the photograph aft of the vehicle position for the first photograph and ahead of the vehicle position for the second photograph aided in rapid location of identifiable PBM's. Plotting of the photographic frames substantiated the vehicle attitude.

3. After all the photographic frames were plotted and bench marks identified (location and time), in-track and cross-track miss distances were computed. These computations were made by two methods. One used the computer program described in previous PET Reports to correct for slit orientation, height displacement and scale factor. The second used the manual plot technique. In computing the miss distances by the manual method, two sets were computed. One set of miss distances was derived by measuring the difference between the predicted location of the PBM and the actual location of the PBM. This set of measurements is identified as "Commanded Reference" on the Vehicle Data Sheets. The second set of miss distances was derived by measuring the difference between the predicted location of the vehicle nadir for the specific time of the PBM and the actual location of the PBM. This set of measurements is identified as "Inertial Nadir Reference" on the Vehicle Data Sheets.

4. The difference between the in-track and cross-track miss distances of the "Commanded and Inertial Nadir References" was used to compute the "Vehicle Nadir Shift". These differences are shown as absolute magnitude only. The angles presented in the data sheets have not been computed by rigorous trigonometry methods but do indicate in a gross way how the vehicle attitude is projected in terms of in-track and cross-track. When using the "Vehicle Nadir Shift" angle values for performing vehicle analysis, the commanded obliquity and stereo angles must be applied to the data. Caution must be used when using the data for which the vehicle was flying backward.

5. The corrections for slit orientation were not applied to the manual computations because of the uncertainty in vehicle orientation. However, the scale factor correction was applied for the greater roll angles. A comparison of the miss distances derived by each of the two methods shows agreement within $\pm$ two miles. The data sheets reflect the miss distances as computed by the manual method.

6. The results of the miss distances and the computations are shown on the "Calculated Vehicle Attitude" chart.

7. The "Mission Plot" chart for this mission has the plot of the actual location of the photography in addition to the programmed photography. This method of presentation was adopted in order the show the variation in vehicle attitude.

BCS 24566-64

PERFORMANCE EVALUATION TEAM
REPORT NO. 4009/64

SECTION III

PHOTOGRAPHIC CHARACTERISTIC EVALUATION SUMMARY

(SPPL Report No. 101-1-26)

Analysis of the original negatives obtained from Reconnaissance Satellite Mission 4009 leads to the following observations:

A. A crease on the film starts on Frame 001, Rev D04, and continues throughout the mission until the run-out of Rev D24, with the exception of Frame 003, Rev D16. This crease is generally in the image area and has plus-density lines approximately 1/16" on both sides. It is a continuous line with diagonal slashes going off the film approximately every 22". The crease was probably caused by the tool handle found in the take-up spool. Numerous scratches, minor fogging, and scattered dendritic static discharges were noted throughout Revs D04, D08, and D10.

B. Random banding appears on Revs D08, D10, D24, and D26.

C. Blue patches, probably used for torn film, were noted on Frames 006, 011, 012, and 015, Rev D16, and are along the titled edge approximately 7 1/2" from the frame head.

D. A minus-density streak appears intermittently throughout Revs D16, D24, and D26.

E. A titling smear approximately 3" from titling data appears on Rolls 5/8, 6/8, 7/8, and 8/8 of run-out material.

SECTION IV

CAMERA SYSTEM OPERATIONS

A. Primary Camera

1. Film Transport: Stopping transients were about one inch long, shorter than previous experience. A misplaced tool handle was trapped by the film as it wound on the take-up spool. The resulting lump beginning about halfway through Rev 04 operations forced the thin base film against the flange of the take-up. Foldover of film began and lasted into Rev 24, ending with severe crinkling of one edge of the take. The film straightened out and for the remainder of the mission continued to track normally. However, the lump continued to build up. On Rev 16 the take-up stopped for 59 seconds and four frames were lost due to loss of film metering. On Rev 19 the film looper moved slowly and the take-up seemed intermittent. This action did not show on the processed record. The take-up action ceased on Rev 29 during the programmed run-out operation. The lump had finally jammed against the nose of the capsule (see Illustration 6).

2. Slit: The camera slit was clean and the fiducials were clear.

3. Time Track: No malfunction observed in the time track.

4. Double Yaw Slits: The slit areas were clean and unvignetted.

5. Film Footage: The flight load consisted of 2,738 feet of Type 4404 emulsion. There was 240 feet used in ground checkout. Orbital health checks used 60 feet. Orbital operations prior to final run-out used about 185 feet. About 1,700 feet was run out before the take-up stopped. Cutters cut the film properly.

6. Processing: The Processing Summary supplied by the processor was not available as of the date of this report - 27 July 1964.

7. Exposure: The No. 1 slit (.0083") was used on this mission. Tone reproduction was not evaluated due to the masking smear resulting from the attitude anomally.

B. Resolution

Not evaluated due to the masking smear resulting from the mismatch of programmed film velocities and the random attitude of the vehicle. In general, ground resolution varied from 50 to 100 feet.

C. Stellar-Index Camera

1. Stellar Analysis: Stellar images were obtained in some degree throughout the mission but were analyzed only for the run-out photography. The baffle reconfiguration has proven relatively successful but still appears lighted in some frames. No corona fogging was observed. Frames with stellar images are being reduced to develop an attitude history.

BCS 24566-64

PERFORMANCE EVALUATION TEAM
REPORT NO. 4009/64

2. Index Analysis: Good densities were obtained. There were index frames to match stellar frames. There were a few instances of frames without fiducial lamps. There were instances of excessive slewing resulting in lost film. No shutter hang up occurred. Imagery was good. The index frames were used to develop an attitude history for the flight.

D. Capsule Condition:

Both cutters were closed and properly sealed. The capsule external was normal. The film which bulged beyond the flange of the take-up spool did not appear to break wires or connections. No abrasions were found. The film was wound tight and dry. The capsule components appeared to be normal.

FILM VELOCITY VS TIME
MISSION 4009 REV D16, FRAME 014

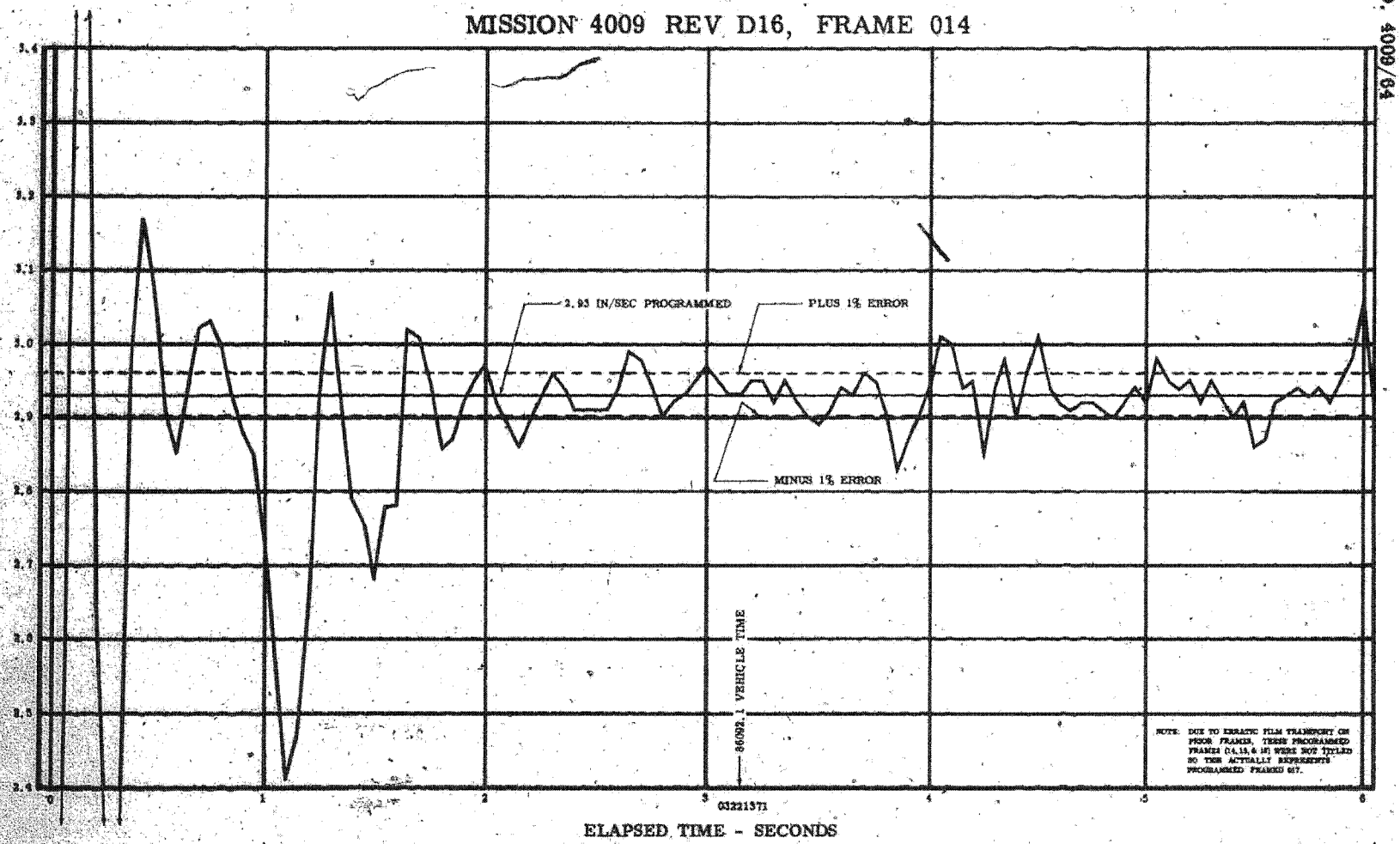


ILLUSTRATION 6

BCS 24566-64

PERFORMANCE EVALUATION TEAM
REPORT NO. 4009/64

SECTION V

VEHICLE ATTITUDE INVESTIGATION

A. Three sources of photographic information were used to derive attitude information for Mission 4009; the stellar and index film, and main camera photography. The stellar/index camera, and integrated unit, is mounted in the OCV with a known axial relationship with the main camera; thus all three photographic axes have a known and calibrated relationship at all times. In determining attitude from the stellar photography, a star image/time relationship is used to provide vehicle attitude at a known point on the orbit; the index photography can be used to determine attitude through photogrammetric reduction or through earth horizon orientation at extreme attitudes; and the main camera photography will provide a limited vehicle attitude determination by analysis of the in-track and cross-track miss distances. In the case of Mission 4009, the three methods were largely complementary, and only occasionally could information from one of the camera sources be used to validate data from another source.

B. The first clues relative to abnormal vehicle attitudes were derived at the Aeronautical Chart and Information Center from the normal routine of geopositioning of the main camera photography (a copy of the stellar/index photography was not available at ACIC at that time). Failure of the stereo photography to record common imagery and the large errors in the location of the predicted photography - in spite of a known accurate ephemeris - verified the earlier on-orbit indications of major vehicle attitude anomalies. When the map match was performed for Revs 10 and 16, no photography could be identified. Finally, an examination of a unique photographic area indicated that the film was reversed, and further observations revealed that the vehicle had to be flying backward in order for the time track to appear in the proper orientation. Now it was possible to identify all photographic areas on these revs. At approximately the same time, an independent analysis at SPPL of the index photography showed quickly that the vehicle was indeed orbiting in a reversed attitude on Revs 10 and 16. With these preliminary indications established, a detailed analysis was undertaken.

C. The "Computed Vehicle Attitude" chart (Illustration 7) provides a graphical presentation of the derived data and also a quick reference to what type of data was obtainable for each rev. The system time shown on the chart is not monotomically increasing.

1. The method of computing miss distances from main camera photography is explained, in detail, in Section IIB, "Geopositioning". This data was available only for Revs 8, 10, 16, 26, and portions of 29. Because no stereo pairs had common bench marks, the PET Computer Program which computes roll, pitch, and yaw errors from miss distances could not be run. However, reflections of the attitude in terms of the in-track and cross-track miss distances can be observed from the chart.

BCS 24566-64

PERFORMANCE EVALUATION TEAM
REPORT NO. 4009/64

2. The "Horizon Measurements" were made from the index photography and were derived from the earth horizon orientation when such was visible in the index format. As the optical axis of the index camera intersects vehicle nadir, a roll or pitch angle in excess of 53° is necessary in order for the earth horizon to appear in the format. A geometric reduction provides attitude information (cross-track and in-track) in much the same manner as geopositioning the main camera photography. Generally, this is labelled roll and pitch, but yaw effects are included in either or both measurements. This method is useful for determining the more anomalous attitudes, where the stellar camera looks below the horizon, and the main camera optical axis does not intersect the earth. Attitude data was derived, using the horizon method, for Revs 4, 19 and 24, and for parts of Revs 8 and 16. Needless to say, where the horizon analysis is possible, ground photographic detail is not necessary; only the horizon need be identified.

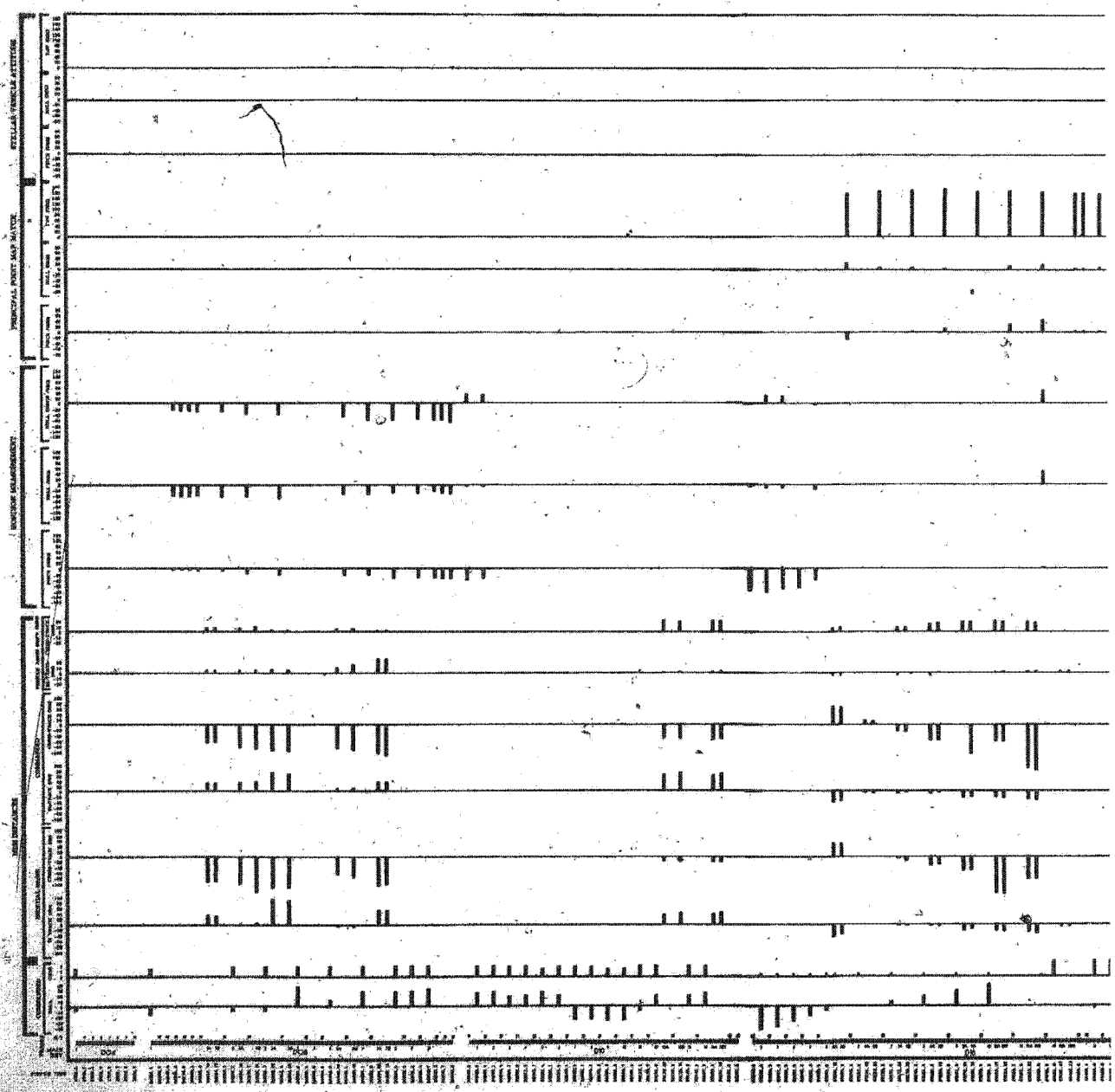
3. Photogrammetric analysis can be performed with index camera photography, using main camera photography to supply time of event; and was accomplished on Rev 16. One advantage of the index photography for this purpose is the large geographical area included in a single frame, and the consequent better change of locating cloud-free bench marks; however, the lack of detail makes this a very slow and relatively imprecise method for photographic orientation, particularly when the exact time of the index photography cannot be determined. It is useful primarily to locate main camera photography which is largely cloud-covered, or over coastal water areas; in these cases time can sometimes be determined with good precision, and valid in-track and cross-track miss distances will result.

4. Attitude data derived from the stellar photography was obtained for Revs 26, 27, 28, 29 and the early portion of 31. Due to the relatively large vehicle motions and extreme attitudes experienced during the "operational" portion of Mission 4009, stellar images were badly streaked or non-existent through Rev 24. During the main camera film "run-out" phase, which began with Rev 26, the IR Sensors were disconnected, and the vehicle perturbing forces were apparently thereby discontinued. In any event, stellar imagery was available for attitude determination for most of the remainder of the flight. Due to the fact that run-out was carried out on both day and night sides of the orbit, some confusion developed in titling the stellar/index frames, and consequent difficulty was encountered in matching the frames with time to perform attitude determination. This effort was not made easier by having to extrapolate a measured index camera cycle time over long periods of time. In this respect, personnel of the National Photographic Interpretation Center, who performed this analysis, did a magnificent job.

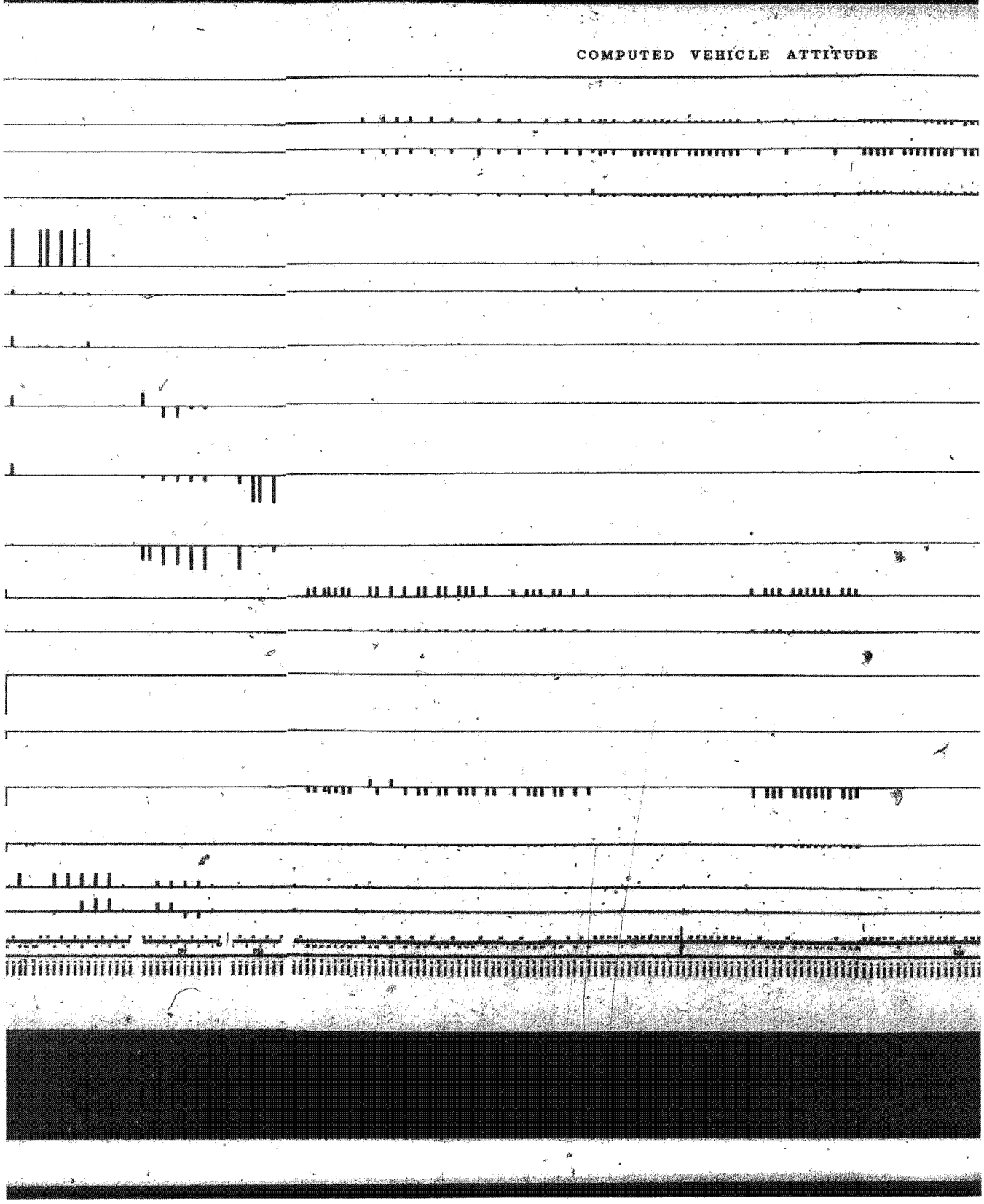
D. Results of all attitude analyses show that the vehicle was unstable and flying in an abnormal condition during the entire "operational" mission, through Rev 24. Image degradation caused by this instability rendered all operational photography unusable for intelligence purposes.

E. On one occasion during the flight, photography indicated a perturbing force as it acted to throw the vehicle out of a relatively stable condition. On Rev 31 (with the IR Sensors on), stellar imagery showed the beginning of a roll/yaw maneuver in the vicinity of 76° South Latitude, with motion rates in the order of 0.1° per second; these rates remained constant until approximately 50° South Latitude on the ascending side, when the last of the stellar film was exhausted. No other examples of the perturbing force in action were found from the photography, although vehicle motion rates in excess of 0.1° per second were seen during the early revs.

F. Although the stellar/index camera has shown itself to be an excellent analytical tool for the Performance Evaluation Team, its usefulness is considerably reduced by the lack of adequate time correlation. Where direct association with main camera frames is not possible - which is a large part of the time - it is necessary to extrapolate the stellar/index cycle time from frame to frame to fix time of photography. This cycle time, nominally 15 seconds, can vary by ± 10 percent, and the variation can and does change with camera controller temperature changes. Thus time errors of the order of 15 seconds are possible in 10 or 20 frames, even after the time cycle is measured. A time track on the stellar/index film, or a source of accurate time from telemetry, is required. If the latter course is chosen, means must be found to provide this information to the Performance Evaluation Team quickly, as well as to the operational using agencies, if a reasonably short reaction time for attitude analysis and intelligence mensuration is desired.

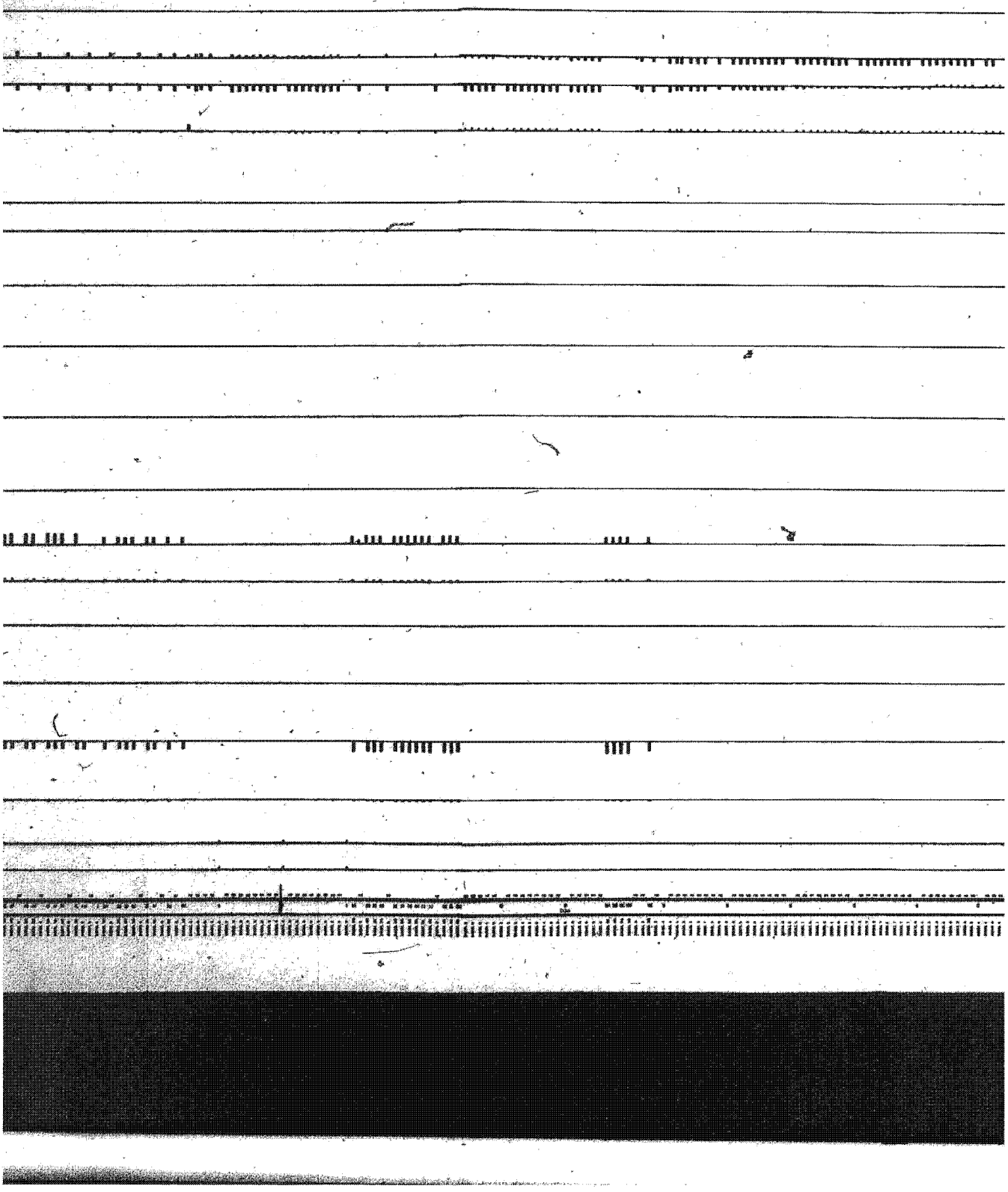


[redacted]

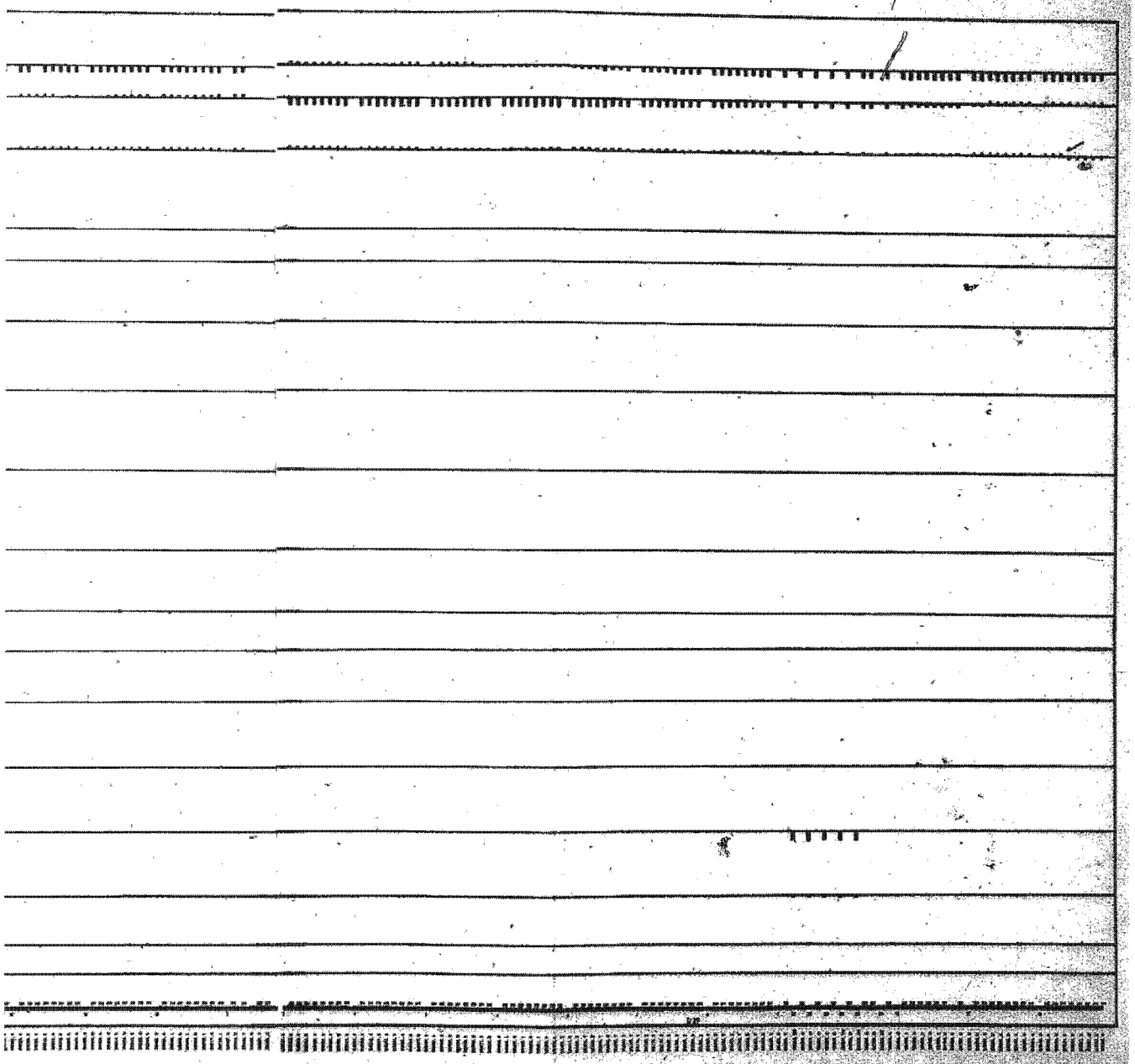


Approved for Release: 2021/05/05 C05133957

COMPUTED VEHICLE ATTITUDE



[redacted]



[redacted]

ILLUSTRATION 7

BCS 24566-64

PERFORMANCE EVALUATION TEAM
REPORT NO. 4009/64

APPENDIX A

~~TOP SECRET~~ - GAMBIT

Handle via Byeman
Controls Only

BCS 24566-64
PERFORMANCE EVALUATION TEAM
REPORT NO. 4009/64

Rev No. D04

VEHICLE ATTITUDE DATA

System Time	Frame No. Main Camera	Index Camera	Stellar Camera	Command Information: Command Position Lat (Deg)	Lat (Min)	Long (Deg)	Long (Min)	Best Ephemeris Lat (Deg)	Lat (Min)	Long (Deg)	Long (Min)	Obliq Angle (Deg)	Roll Angle (Deg)	Crab Angle (Deg)	Main Camera Data: Photo-Map Positioning: Frame Location: Inertial Nadir Reference: In Track (NM)	Inertial Nadir Reference: Cross Track (NM)	Commanded Reference: In Track (NM)	Commanded Reference: Cross Track (NM)	Vehicle Nadir Shift: In Track (Deg)	Vehicle Nadir Shift: Cross T (Deg
2683.1	PPB(on)																			
2687.6		2	2																	
2702.1		3	3																	
2739.2	001(on)			66	11N	156	47E	66	12.9N	156	49.2E	-7.01	-8.51	1.5						
2743.7		4	4																	
2758.2		5	5																	
2772.7		6	6																	
2787.2		7	7																	
2801.7		8	8																	
2816.2		9	9																	
2830.7		10	10																	
2838.2	001(off)																			
2876.2	PB(on)																			

NOTE: All Pre-Processing Blanks (PPH) are 13.1 sec. - door open
All Processing Blanks (PB) are 11.5 sec. - door closed (Rev 04 only - open on all other revs)

Handle via Byeman
Controls Only

~~TOP SECRET~~ - GAMBIT

Handle via Byeman
Controls Only

VEHICLE ATTITUDE DATA

			Main Camera Data						Index Camera Data							Stellar Camera Data		
			Photo-Map Positioning						Horizon Measurement				Principal Point Map Match			Vehicle Attitude		
			Frame Location				Vehicle Nadir Shift											
			Inertial Nadir Reference		Commanded Reference													
Obliq Angle (Deg)	Roll Angle (Deg)	Crab Angle (Deg)	In Track (NM)	Cross Track (NM)	In Track (NM)	Cross Track (NM)	In Track (Deg)	Cross Track (Deg)	Obliquity (Deg)	Pitch (Deg)	Roll (Deg)	Roll Error (Deg)	Pitch (Deg)	Roll (Deg)	Yaw (Deg)	Pitch (Deg)	Roll (Deg)	Yaw (Deg)
									106.55									
									105.70									
-7.01	-8.51	1.5							106.27									
									105.25									
									104.52									
									108.95									
									111.97									
									117.30									
									119.75									
on all other revs)																		

BCS 24566-64
PERFORMANCE EVALUATION TEAM
REPORT NO. 4009/64

VEHICLE ATTITUDE DATA

Rev No. D08

System Time	Frame No. Main Camera	Index Camera	Stellar Camera	Command Information: Command Position Lat (Deg)	Lat (Min)	Long (Deg)	Long (Min)	Best Ephemeris Lat (Deg)	Lat (Min)	Long (Deg)	Long (Min)	Oblig Angle (Deg)	Roll Angle (Deg)	Crab Angle (Deg)	Main Camera Data: Photo-Map Positioning: Frame Location: Inertial Nadir Reference In Track (NM)	Inertial Nadir Reference Cross Track (NM)	Commanded Reference In Track (NM)	Commanded Reference Cross Track (NM)	Vehicle Nadir Shift In Track (Deg)	Vehicle Nadir Shift Cross Tr (Deg)
24043.5	PPB(on)																			
24048.0		11	11																	
24062.5		12	12																	
*24128.0	001(on)			68	22N	68	22E	61	40.5N	65	.03E	-14.1	-15.6	1.5						
24132.5		13	13																	
24147.0		14	14																	
24161.5		15	15																	
24176.0		16	16																	
24190.5		17	17																	
24205.0		18	18																	
24211.7	001A														33.7N	92.1W	33.7N	68.8W	0	8.2
24214.7	001B														30.3N	92.0W	35.7N	68.5W	1.8	8.3
24219.5		19	19																	
24227.1	001(off)																			
*24298.2	002(on)			56	47N	64	38E	55	55.3N	63	59E	- 8.43	-10.63	2.0						
24300.1	002A														7.8N	100.8W	35.7N	88.1W	1.5	6.8
24302.7		20	20																	
24303.6	002B														9.8N	130.4W	38.0N	90.7W	1.3	10.3
24305.1	002(off)																			
*24308.3	003(on)			56	06N	64	26E	55	56.5N	63	56.4E	- 8.43	-10.63	2.0						
24309.9	003A														97.4N	114.4W	75.0N	99.2W	7.6	4.0
24312.8		21	21																	
24314.8	003B														93.3N	114.0W	70.3N	99.7W	7.0	3.9
24316.6	003(off)																			
*24381.0	004(on)			51	07N	63	22E					39.58	37.58	2.0						
24385.5		22	22																	
24386.5	004(off)																			
*24396.0	005(on)																			
24400.5		23	23																	
24401.5	005(off)																			
*24444.6	006(on)			46	45N	62	34E	45	53.3N	62	54.2E	13.13	10.63	2.5						
24446.3	006A														8.8S	69.3W	12.0N	90.0W	12.8	7.3
24449.1		24	24																	
24450.4	006B														9.8S	72.5W	13.8N	92.5W	16.5	7.0

VEHICLE ATTITUDE DATA

Roll Angle (Deg)	Crab Angle (Deg)	Main Camera Data: Photo-Map Positioning: Frame Location: Inertial Nadir Reference: In Track (NM)	Inertial Nadir Reference: Cross Track (NM)	Commanded Reference: In Track (NM)	Commanded Reference: Cross Track (NM)	Vehicle Nadir Shift: In Track (Deg)	Vehicle Nadir Shift: Cross Track (Deg)	Index Camera Data: Horizon Measurement: Obliquity (Deg)	Horizon Measurement: Pitch (Deg)	Horizon Measurement: Roll (Deg)	Horizon Measurement: Roll Error (Deg)	Principal Point Map Match: Pitch (Deg)	Principal Point Map Match: Roll (Deg)	Principal Point Map Match: Yaw (Deg)	Stellar Camera Data: Vehicle Attitude: Pitch (Deg)	Vehicle Attitude: Roll (Deg)	Vehicle Attitude: Yaw (Deg)
15.6	1.5																
								39.82	- .88	-39.8	-25.7						
								41.72	-2.31	-41.6	-27.57						
								43.37	-4.90	-43.1	-29.03						
								45.30	-4.53	-45.1	-31.00						
		33.7N	92.1W	38.7N	68.8W	0	8.2										
		30.3N	92.0W	35.7N	68.5W	1.8	8.3										
								46.90	-7.72	-46.4	-32.32						
10.63	2.0																
		7.8N	100.8W	35.7N	88.1W	1.5	6.8										
		9.8N	130.4W	38.0N	90.7W	1.3	10.3	51.62	-19.00	-48.9	-40.52						
10.63	2.0																
		97.4N	114.4W	75.0N	99.2W	7.6	4.0										
		93.3N	114.0W	70.3N	99.7W	7.0	3.9	52.87	-20.05	-50.0	-41.59						
37.58	2.0																
10.63	2.5																
		8.8S	69.3W	12.0N	90.0W	12.8	7.3										
		9.8S	72.5W	13.8N	92.5W	16.5	7.0	45.15	-23.78	-39.5	-52.71						

BCS 24566-64
PERFORMANCE EVALUATION TEAM
REPORT NO. 4009/64

VEHICLE ATTITUDE DATA

Rev No. D08

System Time	Frame No. Main Camera	Index Camera	Stellar Camera	Command Information: Command Position Lat (Deg)	Lat (Min)	Long (Deg)	Long (Min)	Best Ephemeris Lat (Deg)	Lat (Min)	Long (Deg)	Long (Min)	Oblq Angle (Deg)	Roll Angle (Deg)	Crab Angle (Deg)	Main Camera Data: Photo-Map Positioning: Frame Location: Inertial Nadir Reference In Track (NM)	Inertial Nadir Reference Cross Track (NM)	Commanded Reference In Track (NM)	Commanded Reference Cross Track (NM)	Vehicle Na Shift In Track (Deg)	Vehicle Na Shift Cross (D
24450.8	006(off)																			
*24456.1	007(on)			46	18N	62	55E	45	57.0N	62	24.1E	30.86	28.36	2.5						
24460.6		25	25																	
24461.0	007A														56.2N	100.8W	36.5N	109.0W	26.5	
24462.1	007B														58.2N	102.2W	37.5N	118.0W	26.5	
24462.3	007(off)																			
*24564.0	008(on)			38	32N	61	15E					30.86	28.36	2.5						
24568.5		26	26																	
24571.8	008(off)																			
*24576.9	009(on)			37	39N	61	07E					30.86	28.36	2.5						
24581.4		27	27																	
24584.7	009(off)																			
24612.7	010(on)			35	04N	62	00E	35	09.2N	60	44.5E	36.53	34.03	2.5						
24617.2		28	28																	
24634.7		29	29																	
24646.2		30	30																	
24642.7	010(off)																			
24782.9	PB(on)																			

VEHICLE ATTITUDE DATA

		Main Camera Data						Index Camera Data							Stellar Camera Data		
		Photo-Map Positioning						Horizon Measurement				Principal Point Map Match			Vehicle Attitude		
		Frame Location				Vehicle Nadir Shift											
		Inertial Nadir Reference		Commanded Reference													
Roll Angle (Deg)	Crab Angle (Deg)	In Track (NM)	Cross Track (NM)	In Track (NM)	Cross Track (NM)	In Track (Deg)	Cross Track (Deg)	Obliquity (Deg)	Pitch (Deg)	Roll (Deg)	Roll Error (Deg)	Pitch (Deg)	Roll (Deg)	Yaw (Deg)	Pitch (Deg)	Roll (Deg)	Yaw (Deg)
26.36	2.5																
								46.48	-23.90	-37.5	-68.38						
		56.2N	100.8W	36.5N	109.0W	26.5	2.2										
		58.2N	102.2W	37.5N	118.0W	26.5	3.8										
28.36	2.5																
								44.73	-35.23	-30.5	-61.36						
28.36	2.5																
								45.75	-35.25	-31.3	-62.16						
34.03	2.5																
								45.55	-37.97	-27.3	-63.88						
								47.45	-38.22	-30.6	-67.15						
								49.90	-37.75	-35.4	-71.98						

[redacted]

~~TOP SECRET~~ - GAMBIT

Handle via Byeman
Controls Only

BCS 24566-64
PERFORMANCE EVALUATION TEAM
REPORT NO. 4000/64

Rev No. D10

VEHICLE ATTITUDE DATA

System Time	Frame No. Main Camera	Index Camera	Stellar Camera	Command Information: Command Position Lat (Deg)	Command Position Lat (Min)	Command Position Long (Deg)	Command Position Long (Min)	Best Ephemeris Lat (Deg)	Best Ephemeris Lat (Min)	Best Ephemeris Long (Deg)	Best Ephemeris Long (Min)	Oblig Angle (Deg)	Roll Angle (Deg)	Crab Angle (Deg)	Main Camera Data: Photo-Map Positioning: Frame Location: Inertial Nadir Reference In Track (NM)	Inertial Nadir Reference Cross Track (NM)	Commanded Reference In Track (NM)	Commanded Reference Cross Track (NM)	Vehicle Nadir Shift In Track (Deg)	Vehicle Nadir Shift Cross Track (Deg)
34838.7	PPB(on)																			
34843.2		31	31																	
*34962.9	001(on)			59	11N	22	09E	59	44.7N	20	30.7E	27.52	25.52	2.0						
34967.4		32	32																	
34968.8	001(off)																			
*34975.1	002(on)			59	16N	22	04E	58	54.7N	20	25.4E	27.52	25.52	2.0						
34979.6		33	33																	
34982.0	002(off)																			
*34998.3	003(on)			56	49N	21	02E	57	19.0N	20	25.4E	21.85	19.85	2.0						
35002.8		34	34																	
35006.4	003(off)																			
*35011.2	004(on)			56	48N	20	59E	56	20.7N	19	48.0E	21.85	19.85	2.0						
35015.7		35	35																	
35016.9	004(off)																			
*35023.6	005(on)			55	57N	21	08E	55	35.7N	19	30.8E	28.44	26.94	1.5						
35028.1		36	36																	
35030.3	005(off)																			
*35035.9	006(on)			55	06N	20	34E	54	45.2N	19	25.4E	22.50	20.50	2.0						
35040.4		37	37																	
35043.0	006(off)																			
*35053.6	007(on)			53	19N	19	00E	52	51.3N	19	1.0E	-23.52	-25.52	2.0						
35058.1		38	38																	
35058.9	007(off)																			
*35074.1	008(on)			52	36N	17	52E	52	06.1N	18	52.2E	-23.52	-25.52	2.0						
35078.6		39	39																	
35079.4	008(off)																			
*35085.8	009(on)			51	04N	17	27E	51	38.2N	18	52.2E	-27.57	-29.07	1.5						
35088.3		40	40																	
35089.3	009(off)																			
*35096.7	010(on)			51	04N	17	34E	50	35.1N	18	33.0E	-27.57	-29.07	1.5						
35101.2		41	41																	
35102.8	010(off)																			
*35118.1	011(on)			49	55N	18	08E	49	31.0N	18	21.7E	0.72	9.22	2.5						

Handle via Byeman
Controls Only

~~TOP SECRET~~ GAMBIT

Handle via Byeman
Controls Only

[redacted]

[redacted]

VEHICLE ATTITUDE DATA

Roll Angle (Deg)	Crab Angle (Deg)	Main Camera Data: Photo-Map Positioning: Frame Location: Inertial Nadir Reference: In Track (NM)	Inertial Nadir Reference: Cross Track (NM)	Commanded Reference: In Track (NM)	Commanded Reference: Cross Track (NM)	Vehicle Nadir Shift: In Track (Deg)	Vehicle Nadir Shift: Cross Track (Deg)	Index Camera Data: Horizon Measurement: Obliquity (Deg)	Horizon Measurement: Pitch (Deg)	Horizon Measurement: Roll (Deg)	Horizon Measurement: Roll Error (Deg)	Principal Point Map Match: Pitch (Deg)	Principal Point Map Match: Roll (Deg)	Principal Point Map Match: Yaw (Deg)	Stellar Camera Data: Vehicle Attitude: Pitch (Deg)	Vehicle Attitude: Roll (Deg)	Vehicle Attitude: Yaw (Deg)
								43.43	-42.72	-8.02	36.14						
25.52	2.0							40.23	-39.65	-7.46	34.97						
25.52	2.0																
19.05	2.0																
19.05	2.0																
20.94	1.5																
20.66	2.0																
25.52	2.0																
25.52	2.0																
29.07	1.5																
29.07	1.5																
0.33	2.6																

A-4

[redacted]

[redacted]

S 24566-64
RFORMANCE EVALUATION TEAM
PORT NO. 4009/64

VEHICLE ATTITUDE DATA

y No. D10

stem Time	Frame No. Main Camera	Index Camera	Stellar Camera	Command Information: Command Position Lat (Deg)	Lat (Min)	Long (Deg)	Long (Min)	Best Ephemeris Lat (Deg)	Lat (Min)	Long (Deg)	Long (Min)	Oblq Angle (Deg)	Roll Angle (Deg)	Crab Angle (Deg)	Main Camera Data: Photo-Map Positioning: Frame Location: Inertial Nadir Reference In Track (NM)	Inertial Nadir Reference Cross Track (NM)	Commanded Reference In Track (NM)	Commanded Reference Cross Track (NM)	Vehicle Nadir Shift In Track (Deg)	Vehicle Nadir Shift Cross Track (Deg)	C
116.6		42	42																		
117.4	011(off)																				
133.0	012(on)			48	08N	18	08E	47	05.2N	18	53.3E	23.77	21.27	2.5							
135.0	012A														39.0N	17.7W	62.8N	57.1W	3.4	22.0	
137.5		43	43																		
138.7	012B														43.4N	17.4W	70.6N	56.8W	2.4	21.9	
140.6	012(off)																				
143.8	013(on)			47	42N	18	57E	47	20.9N	17	57.9E	23.77	21.27	2.5							
148.3		44	44																		
156.9	013(off)																				
157.3	014(on)			46	26N	17	48E	46	24.9N	18	52.3E	27.52	25.52	2.0							
159.3	014A														39.0N	17.7W	62.8N	57.1W	3.4	22.0	
161.8	014B														43.4N	17.4W	70.6N	56.8W	2.4	21.9	
161.8		45	45																		
162.6	014(off)																				
268.7	PB(on)			38	45N	16	35E	38	44N	16	35E										
269.4	PBA																0.1N	0.8W			
272.1	PBB																2.8S	0.6W			
273.2		46	46																		
275.5	PBC																4.2N	0.4W			

[redacted]

[redacted]

VEHICLE ATTITUDE DATA

		Main Camera Data						Index Camera Data							Stellar Camera Data		
		Photo-Map Positioning						Horizon Measurement				Principal Point Map Match			Vehicle Attitude		
		Frame Location				Vehicle Nadir Shift											
		Inertial Nadir Reference		Commanded Reference													
Roll Angle (Deg)	Crab Angle (Deg)	In Track (NM)	Cross Track (NM)	In Track (NM)	Cross Track (NM)	In Track (Deg)	Cross Track (Deg)	Obliquity (Deg)	Pitch (Deg)	Roll (Deg)	Roll Error (Deg)	Pitch (Deg)	Roll (Deg)	Yaw (Deg)	Pitch (Deg)	Roll (Deg)	Yaw (Deg)
21.27	2.5																
		39.0N	17.7W	62.8N	57.1W	3.4	22.0										
		43.4N	17.4W	70.6N	56.8W	2.4	21.9										
21.27	2.5																
25.52	2.0																
		39.0N	17.7W	62.8N	57.1W	3.4	22.0										
		43.4N	17.4W	70.6N	56.8W	2.4	21.9										
				0.1N	0.8W												
				2.8S	0.6W												
				4.2N	0.4W												

[redacted]

BCS 24566-64
PERFORMANCE EVALUATION TEAM
REPORT NO. 4009/64

Rev No. D16

VEHICLE ATTITUDE DATA

System Time	Frame No. Main Camera	Index Camera	Stellar Camera	Command Information: Command Position Lat (Deg)	Lat (Min)	Long (Deg)	Long (Min)	Best Ephemeris Lat (Deg)	Lat (Min)	Long (Deg)	Long (Min)	Oblig Angle (Deg)	Roll Angle (Deg)	Crab Angle (Deg)	Main Camera Data: Photo-Map Positioning: Frame Location: Inertial Nadir Reference In Track (NM)	Inertial Nadir Reference Cross Track (NM)	Commanded Reference In Track (NM)	Commanded Reference Cross Track (NM)	Vehicle Nadi Shift In Track (Deg)	Vehicle Nadi Shift Cross T (De
*66866.0	PPB(on)																			
66870.5		47	47																	
66871.0	PPB(off)																			
*66891.0	001(on)			72	04N	108	21W					-44.67	-44.67	0						
66895.5		48	48																	
66896.0	001(off)																			
*66921.0	002(on)			70	03N	109	31W					-39.70	-39.70	0						
66925.5		49	49																	
66926.0	002(off)																			
*66971.0	003(on)			66	40N	111	04W					-29.78	-29.78	0						
66975.5		50	50																	
66976.0	003(off)																			
*67021.0	004(on)			63	16N	112	18W					-19.85	-19.85	0						
67025.5		51	51																	
67026.0	004(off)																			
67071.0	005(on)			59	51N	113	19W	59	32.6N	113	56.1W	- 9.93	- 9.93	0						
67071.7	005A														42.2S	51.8E	41.4S	67.0E	0.3	7.
67073.5	005B														38.0S	50.2E	37.2S	65.9E	0.4	7.
67075.3																				
67075.5		52	52																	
67076.0	005(off)																			
*67121.0	006(on)			56	26N	114	11W	56	05.9N	114	15.9W	0	0	0						
67121.6	006A																10.3S	15.3E		
67124.3	006B																10.0S	12.0E		
67125.3																				
67125.5		53	53																	
67126.0	006(off)																			
*67171.0	007(on)			53	01N	114	56W	52	39.0N	114	35.4W	9.93	9.93	0						
67171.9	007A														4.0S	10.3W	4.3S	26.3W	0	9.
67175.3	007B														5.8S	13.0W	5.8S	29.2W	0	9.
67175.3																				
67176.5		54	54																	
67176.0	007(off)																			

VEHICLE ATTITUDE DATA

Roll Angle (Deg)	Crab Angle (Deg)	Main Camera Data: Photo-Map Positioning: Frame Location: Inertial Nadir Reference: In Track (NM)	Inertial Nadir Reference: Cross Track (NM)	Commanded Reference: In Track (NM)	Commanded Reference: Cross Track (NM)	Vehicle Nadir Shift: In Track (Deg)	Vehicle Nadir Shift: Cross Track (Deg)	Index Camera Data: Horizon Measurement: Obliquity (Deg)	Pitch (Deg)	Roll (Deg)	Roll Error (Deg)	Principal Point Map Match: Pitch (Deg)	Roll (Deg)	Yaw (Deg)	Stellar Camera Data: Vehicle Attitude: Pitch (Deg)	Roll (Deg)	Yaw (Deg)
								92.23	-91.83	- 8.5							
-44.87	0							92.82	-92.17	-11.1	33.57						
-39.70	0							86.03	-85.85	-16.8	22.90						
-29.78	0							72.65	-71.47	-20.2	9.51						
-19.85	0							53.78	-48.98	-25.8	- 6.13						
- 9.93	0	42.2S	51.8E	41.4S	67.0E	0.3	7.0										
		38.0S	50.2E	37.2S	65.9E	0.4	7.1										
												-27.3	22.0	155.0			
0	0																
				10.3S	15.3E												
				10.0S	12.0E												
												- 7.9	5.4	165.2			
9.93	0																
		4.0S	10.3W	4.3S	- 26.3W	0	9.9										
		5.8S	13.0W	5.8S	29.2W	0	9.8										
												8.5	3.24	167.5			

BCS 24556-64
PERFORMANCE EVALUATION TEAM
REPORT NO. 4009/64

Rev No. D16

VEHICLE ATTITUDE DATA

System Time	Frame No. Main Camera	Index Camera	Stellar Camera	Command Information: Command Position Lat (Deg)	Lat (Min)	Long (Deg)	Long (Min)	Best Ephemeris Lat (Deg)	Lat (Min)	Long (Deg)	Long (Min)	Oblig Angle (Deg)	Roll Angle (Deg)	Crab Angle (Deg)	Main Camera Data: Photo-Map Positioning: Frame Location: Inertial Nadir Reference In Track (NM)	Inertial Nadir Reference Cross Track (NM)	Commanded Reference In Track (NM)	Commanded Reference Cross Track (NM)	Vehicle Nadir Shift In Track (Deg)	Vehicle Nadir Shift Cross Tr (Deg)
*67221.0	008(on)			49	35N	115	37W	49	11.8N	114	53.0W	19.85	19.85	0						
67223.3	008A														9.8S	30.3W	10.2S	62.2W	0.2	16.4
67225.3	008B														10.1S	30.1W	12.7S	62.0W	1.6	16.3
67225.5		55	55																	
67226.4																				
67226.0	008(off)																			
*67271.0	009(on)			46	09N	116	14W	45	44.2N	115	07.1W	29.78	29.78	0						
67272.0	009A														21.2S	54.0W	24.1S	111.5W	1.8	20.0
67273.7	009B														19.2S	54.0W	22.0S	111.5W	1.8	21.0
67275.4																				
67275.5		56	56																	
67276.0	009(off)																			
*67321.0	010(on)			42	42N	116	48W	42	16.0N	115	15.6W	39.70	39.70	0						
67323.1	010A														24.9S	134.7W	27.2S	63.2W	2.0	21.1
67324.5	010B														23.5S	138.0W	27.0S	66.5W	2.4	20.2
67325.3																				
67325.5		57	57																	
67326.0	010(off)																			
*67351.0	011(on)			40	38N	117	08W	40	10.8N	115	17.5W	0	0	0						
67353.8	011A														29.3S	80.6W	34.5S	163.7W	2.8	19.1
67355.0	011B														31.3S	83.1W	36.3S	171.5W	2.9	19.1
67355.3																				
67355.5		58	58																	
67356.0	011(off)																			
*67401.0	012(on)			37	12N	117	38W	36	04.9N	117	48.0W	3.71	.71	3.0						
67401.8	012A														1.6S	0.4W	1.6S	0.4W	0	0
67403.1	012B														0.6S	0.3W	0.6S	0.3W	0	0
67405.1																				
67405.5		59	59																	
67420.1		60	60																	
67417.1	012(off)																			
*67426.0	013(on)			35	28N	117	53W	35	28.3N	117	53.2W	3.71	.71	3.0						
67430.5		61	61																	

VEHICLE ATTITUDE DATA

			Main Camera Data						Index Camera Data							Stellar Camera Data		
			Photo-Map Positioning						Horizon Measurement				Principal Point Map Match					
			Frame Location				Vehicle Nadir Shift									Vehicle Attitude		
			Inertial Nadir Reference		Commanded Reference													
q le g)	Roll Angle (Deg)	Crab Angle (Deg)	In Track (NM)	Cross Track (NM)	In Track (NM)	Cross Track (NM)	In Track (Deg)	Cross Track (Deg)	Obliquity (Deg)	Pitch (Deg)	Roll (Deg)	Roll Error (Deg)	Pitch (Deg)	Roll (Deg)	Yaw (Deg)	Pitch (Deg)	Roll (Deg)	Yaw (Deg)
35	19.85	0	9.8S	30.3W	10.2S	62.2W	0.2	16.4										
			10.1S	30.1W	12.7S	62.0W	1.6	16.3										
													16.3	1.31	171.5			
78	29.78	0	21.2S	54.0W	24.1S	111.5W	1.8	20.0										
			19.2S	54.0W	22.0S	111.5W	1.8	21.0										
70	39.70	0	24.0S	134.7W	27.2S	63.2W	2.0	21.1										
			23.5S	138.0W	27.0S	66.5W	2.4	20.2										
													38.4	15.7	167.6			
	0	0	29.3S	80.6W	34.5S	163.7W	2.8	19.1										
			31.3S	83.1W	36.2S	171.5W	2.9	19.1										
									44.47	2.53	44.4	44.4	44.6	20.7	165.4			
71	.71	3.0	1.6S	0.4W	1.6S	0.4W	0	0										
			0.6S	0.3W	0.6S	0.3W	0	0										
													0	3.4	159.5			
													0	.89	160.5			
71	.71	3.0											0	10.2	159.7			

S 24566-64
RFORMANCE EVALUATION TEAM
PORT NO. 4009/64

t No. D16

VEHICLE ATTITUDE DATA

stem Time	Frame No. Main Camera	Index Camera	Stellar Camera	Command Information: Command Position Lat (Deg)	Lat (Min)	Long (Deg)	Long (Min)	Best Ephemeris Lat (Deg)	Lat (Min)	Long (Deg)	Long (Min)	Oblig Angle (Deg)	Roll Angle (Deg)	Crab Angle (Deg)	Main Camera Data: Photo-Map Positioning: Frame Location: Inertial Nadir Reference In Track (NM)	Inertial Nadir Reference Cross Track (NM)	Commanded Reference In Track (NM)	Commanded Reference Cross Track (NM)	Vehicle Nadir Shift In Track (Deg)	Vehicle Nadir Shift Cross Track (Deg)
434.3																				
432.2	013(off)																			
435.4	014(on)			35	10N	117	50W	34	49.4N	117	58.6W	3.71	.71	3.0						
440.9		62	62																	
441.6	014(off)																			
447.7	015(on)			33	58N	118	06W	33	58.4N	118	05.7W	26.40	23.40	3.0						
452.2		63	63																	
455.9																				
453.9	015(off)																			
454.3	016(on)			33	31N	118	09W	33	31.0N	118	09.4W	32.78	29.78	3.0						
458.8		64	64																	
460.5	016(off)																			
465.8	017(on)			33	05N	117	09W	32	43.4N	118	15.9W	32.78	29.78	3.0						
470.2		65	65																	
472.0	017(off)																			
595.2	018(on)			23	46N	119	25W	23	46.5N	119	25.3W	0	0	0						
599.7		66	66																	
606.7	018(off)																			

VEHICLE ATTITUDE DATA

		Main Camera Data						Index Camera Data							Stellar Camera Data		
		Photo-Map Positioning						Horizon Measurement				Principal Point Map Match			Vehicle Attitude		
		Frame Location				Vehicle Nadir Shift											
		Inertial Nadir Reference		Commanded Reference													
oll gle eg)	Crab Angle (Deg)	In Track (NM)	Cross Track (NM)	In Track (NM)	Cross Track (NM)	In Track (Deg)	Cross Track (Deg)	Obliquity (Deg)	Pitch (Deg)	Roll (Deg)	Roll Error (Deg)	Pitch (Deg)	Roll (Deg)	Yaw (Deg)	Pitch (Deg)	Roll (Deg)	Yaw (Deg)
.71	-3.0											.68	4.8	161.5			
.40	3.0											22.2	2.4	162.5			
.78	3.0																
.78	3.0																
)	0																

BCS 24566-64
PERFORMANCE EVALUATION TEAM
REPORT NO. 4009/64

VEHICLE ATTITUDE DATA

Rev No. D19

System Time	Frame No. Main Camera	Index Camera	Stellar Camera	Command Information: Command Position Lat (Deg)	Lat (Min)	Long (Deg)	Long (Min)	Best Ephemeris Lat (Deg)	Lat (Min)	Long (Deg)	Long (Min)	Oblq Angle (Deg)	Roll Angle (Deg)	Crab Angle (Deg)	Main Camera Data: Photo-Map Positioning: Frame Location: Inertial Nadir Reference In Track (NM)	Inertial Nadir Reference Cross Track (NM)	Commanded Reference In Track (NM)	Commanded Reference Cross Track (NM)	Vehicle Nadir Shift In Track (Deg)	Vehicle Nadir Shift Cross Track (Deg)
82890.9	PPB(on)			75	19N	172	52W					45.4	45.4	0						
82895.4		69	69																	
82910.4		70	70																	
*82992.4	001(on)			68	29N	177	15W					21.35	19.85	1.5						
82996.9		71	71																	
82997.9	001(off)																			
*83005.3	002(on)			67	55N	175	51W					21.35	19.85	1.5						
83009.8		72	72																	
83010.8	002(off)																			
*83028.3	003(on)			66	03N	178	17W					-13.39	-14.89	1.5						
83032.8		73	73																	
83034.5	003(off)																			
*83039.8	004(on)			64	51N	179	21W					-13.39	-14.89	1.5						
83044.3		74	74																	
83046.0	004(off)																			
*83109.7	005(on)			60	30N	179	54E					0	0	0						
83114.2		75	75																	
83121.2	005(off)																			

VEHICLE ATTITUDE DATA

			Main Camera Data						Index Camera Data							Stellar Camera Data		
			Photo-Map Positioning						Horizon Measurement				Principal Point Map Match			Vehicle Attitude		
			Frame Location				Vehicle Nadir Shift											
			Inertial Nadir Reference		Commanded Reference													
q le gj)	Roll Angle (Deg)	Crab Angle (Deg)	In Track (NM)	Cross Track (NM)	In Track (NM)	Cross Track (NM)	In Track (Deg)	Cross Track (Deg)	Obliquity (Deg)	Pitch (Deg)	Roll (Deg)	Roll Error (Deg)	Pitch (Deg)	Roll (Deg)	Yaw (Deg)	Pitch (Deg)	Roll (Deg)	Yaw (Deg)
1	45.4	0																
									63.87	-63.12	-13.0	58.47						
15	19.85	1.5							67.50	-66.70	-14.6	60.05						
									84.28	-83.47	-28.7	-50.12						
15	19.85	1.5																
									86.87	-86.35	-31.0	-52.38						
39	-14.89	1.5								apprx								
									103.22	-102	-27.8	-14.48						
39	-14.89	1.5								apprx								
									103.68	-102	-29.7	-16.33						
	0	0																

DCB 24566-64
PERFORMANCE EVALUATION TEAM
REPORT NO. 4009/64

Rev No. 1224

VEHICLE ATTITUDE DATA

System Time	Frame No: Main Camera	Frame No: Index Camera	Frame No: Stellar Camera	Command Information: Command Position Lat (Deg)	Command Position Lat (Min)	Command Position Long (Deg)	Command Position Long (Min)	Best Ephemeris Lat (Deg)	Best Ephemeris Lat (Min)	Best Ephemeris Long (Deg)	Best Ephemeris Long (Min)	Obliq Angle (Deg)	Roll Angle (Deg)	Crab Angle (Deg)	Main Camera Data: Photo-Map Positioning: Frame Location: Inertial Nadir Reference In Track (NM)	Inertial Nadir Reference Cross Track (NM)	Commanded Reference In Track (NM)	Commanded Reference Cross Track (NM)	Vehicle Nadir Shift In Track (Deg)	Vehicle Nadir Shift Cross Tr (Deg)
23485.3	001(on)			67	27N	87	33E													
23489.8		79	79																	
23490.9	001(off)																			
23735.2	005(on)			40	17N	64	19E													
23739.7		84	84																	
23740.7	005(off)																			
23746.0	006(on)			40	17N	64	19E													
23750.5		89	89																	
23751.5	006(off)																			
23784.0	007(on)			36	55N	63	49E													
23788.5		88	88																	
23789.5	007(off)																			

[redacted]

VEHICLE ATTITUDE DATA

Roll Angle (Deg)	Crab Angle (Deg)	Main Camera Data: Photo-Map Positioning: Frame Location: Inertial Nadir Reference: In Track (NM)	Inertial Nadir Reference: Cross Track (NM)	Commanded Reference: In Track (NM)	Commanded Reference: Cross Track (NM)	Vehicle Nadir Shift: In Track (Deg)	Vehicle Nadir Shift: Cross Track (Deg)	Index Camera Data: Horizon Measurement: Obliquity (Deg)	Horizon Measurement: Pitch (Deg)	Horizon Measurement: Roll (Deg)	Horizon Measurement: Roll Error (Deg)	Principal Point Map Match: Pitch (Deg)	Principal Point Map Match: Roll (Deg)	Principal Point Map Match: Yaw (Deg)	Stellar Camera Data: Vehicle Attitude: Pitch (Deg)	Vehicle Attitude: Roll (Deg)	Vehicle Attitude: Yaw (Deg)
								-109.43	-105.0	-41.8							
								-112.55	-8.03	-112.							
								-111.07	-6.75	-111.							
								-121.03	-27.03	-120.							

[redacted]

BCS 24566-64
PERFORMANCE EVALUATION TEAM
REPORT NO. 4009/64

Rev No. D28 (Run Out)

VEHICLE ATTITUDE DATA

System Time	Frame No. Main Camera	Index Camera	Stellar Camera	Command Information: Command Position Lat (Deg)	Lat (Min)	Long (Deg)	Long (Min)	Best Ephemeris Lat (Deg)	Lat (Min)	Long (Deg)	Long (Min)	Oblig Angle (Deg)	Roll Angle (Deg)	Crab Angle (Deg)	Main Camera Data: Photo-Map Positioning: Frame Location: Inertial Nadir Reference In Track (NM)	Inertial Nadir Reference Cross Track (NM)	Commanded Reference In Track (NM)	Commanded Reference Cross Track (NM)	Vehicle Nadir Shift In Track (Deg)	Vehicle Nadir Shift Cross Track (Deg)
*34024.8	003(on)			67	40N	26	16E	67	40.3N	26	25.7E	0	0	0						
34030.3		95	95																	
34076.3	003A														5.8S	28.4W			3.6	17.2
34080.1	003B														8.6S	28.3W			5.4	17.2
34085.3	003C														5.3S	26.2W			3.3	15.7
34091.5	003D														3.7S	29.1W			2.3	17.8
34095.9	003E														5.8S	29.0W			3.6	17.5
34104.8	003F														5.6S	31.6W			3.5	18.9
34109.3	003G														7.6S	29.0W			4.7	17.5
34127.2	003(off)																			
*34167.2	004(on)			56	36N	22	46E	56	33.4N	22	45.1E	0	0	0						
34192.6		103	103																	
34194.5	004A																			
34205.2	004B														0.5N	32.9W			3.3	20.7
34207.0		104	104												1.2S	33.3W			0.8	20.9
34216.5	004C																			
34222.2		105	105												1.5N	33.0W			1.0	20.7
34231.3	004D																			
34236.0		106	106												0.6S	33.4W			0	21.0
34243.2	004E																			
34248.4	004F														2.2S	33.7W			1.5	21.3
34251.0		107	107												2.7S	34.0W			1.8	21.4
34255.3	004G																			
34261.3	004H														3.4S	34.5W			2.3	21.6
34265.4		108	108												3.7S	34.6W			3.5	21.8
34266.1	004I																			
34271.7	004J														5.3S	34.7W			3.4	22.0
34277.6	004K														5.1S	35.2W			3.7	22.2
34279.8		109	109												5.7S	35.5W			4.2	22.2
34283.2	004L																			
34289.2	004M														6.4S	35.5W			2.9	22.5
34294.2		110	110												4.4S	36.0W				
34299.6	004(off)																			

VEHICLE ATTITUDE DATA

		Main Camera Data						Index Camera Data							Stellar Camera Data		
		Photo-Map Positioning						Horizon Measurement				Principal Point Map Match			Vehicle Attitude		
		Frame Location				Vehicle Nadir Shift											
		Inertial Nadir Reference		Commanded Reference													
Roll Angle (Deg)	Crab Angle (Deg)	In Track (NM)	Cross Track (NM)	In Track (NM)	Cross Track (NM)	In Track (Deg)	Cross Track (Deg)	Obliquity (Deg)	Pitch (Deg)	Roll (Deg)	Roll Error (Deg)	Pitch (Deg)	Roll (Deg)	Yaw (Deg)	Pitch (Deg)	Roll (Deg)	Yaw (Deg)
0	0																
		5.9S	28.4W			3.6	17.2										
		8.6S	28.3W			5.4	17.2										
		5.3S	26.2W			3.3	15.7										
		3.7S	29.1W			2.3	17.8										
		5.8S	29.0W			3.6	17.5										
		5.6S	31.6W			3.5	18.9										
		7.6S	29.0W			4.7	17.5										
0	0																
															-5.01	-19.88	21.23
		0.5N	32.9W			3.3	20.7										
		1.2S	33.3W			0.8	20.9								-5.01	-20.40	20.80
		1.5N	33.0W			1.0	20.7								-4.96	-20.34	20.01
		0.6S	33.4W			0	21.0								-4.96	-21.00	20.00
		2.2S	33.7W			1.5	21.3										
		2.7S	34.0W			1.8	21.4								-4.84	-21.38	19.84
		3.4S	34.5W			2.3	21.6										
		3.7S	34.5W			3.5	21.8								-4.84	-21.73	19.02
		5.3S	34.7W			3.4	22.0										
		5.1S	35.2W			3.7	22.2										
		5.7S	35.5W			4.2	22.2								-3.31	-21.90	19.50
		6.4S	35.5W			2.9	22.5										
		4.4S	36.0W												-4.84	-22.43	18.36

BCS 24586-64
PERFORMANCE EVALUATION TEAM
REPORT NO. 4009/64

Rev No. D26 (Run Out)

VEHICLE ATTITUDE DATA

System Time	Frame No. Main Camera	Index Camera	Stellar Camera	Command Information: Command Position Lat (Deg)	Lat (Min)	Long (Deg)	Long (Min)	Best Ephemeris Lat (Deg)	Lat (Min)	Long (Deg)	Long (Min)	Obliq Angle (Deg)	Roll Angle (Deg)	Crab Angle (Deg)	Main Camera Data: Photo-Map Positioning: Frame Location: Inertial Nadir Reference In Track (NM)	Inertial Nadir Reference Cross Track (NM)	Commanded Reference In Track (NM)	Commanded Reference Cross Track (NM)	Vehicle Na Shift In Track (Deg)	Cross
*34349.6	005(on)			45	27N	20	33E	45	29.4N	20	33.0E									
34350.7	005A														3.7S	38.4W			2.5	2
34355.0		111	111																	
34356.2	005B														3.6S	37.8W			2.42	2
34359.5	005C														3.1S	37.5W			2.1	2
34367.1	005D														3.1S	38.2W			2.1	2
34369.4		112	112																	
34373.2	005E														5.3S	38.4W			3.58	2
34379.9	005F														3.2S	38.4W			2.16	2
34383.8		113	113																	
34391.9	005G														4.5S	38.9W			3.04	2
34398.0		114	114																	
34398.1	005H														4.6S	35.0W			3.1	2
34412.4		115	115																	
34428.0		116	116																	
34443.0		117	117																	
34457.4		118	118																	
34452.0	005(off)																			
*34512.0	006(on)			34	16N	18	51E					0	0	0						
34516.2		119	119																	
34531.6		120	120																	
34546.0		121	121																	
34560.4		122	122																	
34574.8		123	123																	
34589.0		124	124																	
34604.4		125	125																	
34619.4		126	126																	
34614.4	006(off)																			
*34674.4	007(on)			23	02N	17	24E					0	0	0						
34679.8		127	127																	
34694.2		128	128																	
34708.6		129	129																	
34723.0		130	130																	

[redacted]

VEHICLE ATTITUDE DATA

Roll Angle (Deg)	Crab Angle (Deg)	Main Camera Data: Photo-Map Positioning: Frame Location: Inertial Nadir Reference: In Track (NM)	Inertial Nadir Reference: Cross Track (NM)	Commanded Reference: In Track (NM)	Commanded Reference: Cross Track (NM)	Vehicle Nadir Shift: In Track (Deg)	Vehicle Nadir Shift: Cross Track (Deg)	Index Camera Data: Horizon Measurement: Obliquity (Deg)	Horizon Measurement: Pitch (Deg)	Horizon Measurement: Roll (Deg)	Horizon Measurement: Roll Error (Deg)	Principal Point Map Match: Pitch (Deg)	Principal Point Map Match: Roll (Deg)	Principal Point Map Match: Yaw (Deg)	Stellar Camera Data: Vehicle Attitude: Pitch (Deg)	Vehicle Attitude: Roll (Deg)	Vehicle Attitude: Yaw (Deg)
		3.7S	38.4W			2.5	24.3										
															-4.61	-23.81	16.53
		3.6S	37.8W			2.42	24.0										
		3.1S	37.5W			2.1	23.8										
		3.1S	38.2W			2.1	24.2										
															-4.50	-24.01	16.01
		5.3S	38.4W			3.58	24.3										
		3.2S	38.4W			2.16	24.3										
															-4.35	-24.40	15.70
		4.5S	38.9W			3.04	24.6										
															-4.26	-24.70	15.25
		4.6S	35.0W			3.1	22.4										
															47.26	-24.9	14.76
															-4.28	-24.98	14.76
															-4.01	-25.26	14.28
															-3.96	-25.56	13.81
															-3.98	-25.81	13.80
0	0																
															-3.40	-26.80	11.61
															-3.61	-27.00	10.88
															-3.00	-27.40	10.00
															-2.96	-27.60	9.46
															-2.84	-27.80	8.94
															-2.71	-27.94	8.41
															-2.51	-28.01	7.96
0	0																
															-1.89	-28.68	5.94
															-1.70	-28.78	5.45
															-1.58	-28.90	4.88
															-1.38	-28.98	4.38

BCS 24566-64
PERFORMANCE EVALUATION TEAM
REPORT NO. 4009/64

Rev No. D26 (Run Out)

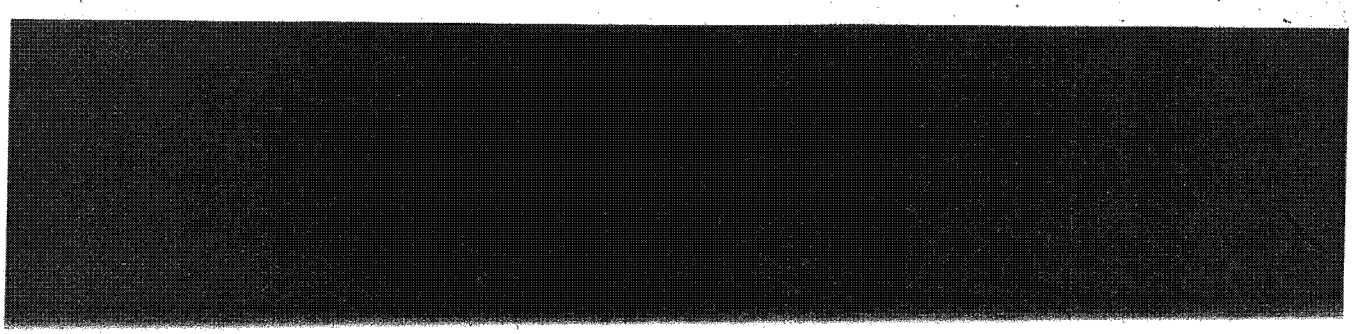
VEHICLE ATTITUDE DATA

System Time	Frame No. Main Camera	Index Camera	Stellar Camera	Command Information: Command Position Lat (Deg)	Lat (Min)	Long (Deg)	Long (Min)	Best Ephemeris Lat (Deg)	Lat (Min)	Long (Deg)	Long (Min)	Oblig Angle (Deg)	Roll Angle (Deg)	Crab Angle (Deg)	Main Camera Data: Photo-Map Positioning: Frame Location: Inertial Nadir Reference In Track (NM)	Inertial Nadir Reference Cross Track (NM)	Commanded Reference In Track (NM)	Commanded Reference Cross Track (NM)	Vehicle Nadir Shift In Track (Deg)	Vehicle Nadir Shift Cross T (Deg)
34737.4		131	131																	
34751.8		132	132																	
34766.2		133	133																	
34776.7		134	134																	
34776.8	007(off)																			
*34836.8	008(on)			11	48N	16	03E					0	0	0						
34840.6	008A														5.0S	48.0W			3.38	29.5
34842.2		135	135																	
34848.4	008B														5.1S	48.9W			3.45	30.(
34851.2	008C														5.7S	48.4W			3.85	29.7
34856.2	008D														6.0S	47.4W			4.05	29.7
34856.6		136	136																	
34859.4	008E														6.8S	47.7W			4.6	29.(
34861.5	008F														6.7S	47.8W			4.54	29.(
34863.1	008G														6.5S	49.0W			4.4	30.(
34865.3	008H														6.1S	48.2W			4.12	29.(
34867.8	008I														6.0S	49.6W			4.05	30.3
34869.6	008J														7.7S	48.0W			5.2	29.(
34871.0		137	137																	
34872.4	008K														8.4S	48.3W			5.68	29.(
34875.6	008L														8.8S	49.0W			5.95	30.(
34878.4	008M														8.0S	48.2W			5.4	29.(
34886.2		138	138																	
34900.6		139	139																	
34915.0		140	140																	
34929.4		141	141																	
34943.9		142	142																	
34939.2	008(off)																			
*34999.2	009(on)			00	34N	14	46E													
35004.6		143	143																	
35019.0		144	144																	
35033.4		145	145																	
35048.6		146	146																	

[redacted]

VEHICLE ATTITUDE DATA

		Main Camera Data						Index Camera Data							Stellar Camera Data		
		Photo-Map Positioning						Horizon Measurement				Principal Point Map Match			Vehicle Attitude		
		Frame Location				Vehicle Nadir Shift											
		Inertial Nadir Reference		Commanded Reference													
Roll Angle (Deg)	Crab Angle (Deg)	In Track (NM)	Cross Track (NM)	In Track (NM)	Cross Track (NM)	In Track (Deg)	Cross Track (Deg)	Obliquity (Deg)	Pitch (Deg)	Roll (Deg)	Roll Error (Deg)	Pitch (Deg)	Roll (Deg)	Yaw (Deg)	Pitch (Deg)	Roll (Deg)	Yaw (Deg)
															-1.23	-29.00	3.88
															-1.01	-29.01	3.38
															-0.86	-29.02	2.90
															-0.81	-29.23	2.46
0	0																
		5.0S	48.0W			3.36	29.5										
															0.01	29.40	0.23
		5.1S	48.9W			3.45	30.0										
		5.7S	48.4W			3.85	29.7										
		6.0S	47.4W			4.05	29.2										
															0.20	-29.40	-0.35
		6.8S	47.7W			4.6	29.4										
		6.7S	47.8W			4.54	29.4										
		6.5S	49.0W			4.4	30.0										
		6.1S	48.2W			4.12	29.6										
		6.0S	49.6W			4.05	30.3										
		7.7S	48.0W			5.2	29.5										
															0.40	-29.33	-0.90
		8.4S	48.3W			5.68	29.7										
		8.8S	49.0W			5.95	30.0										
		8.0S	48.2W			5.4	29.6										
															0.73	-29.30	-1.40
															0.90	-29.20	-1.96
															1.0	-29.01	-2.80
															1.1	-29.01	-3.20
															1.56	-29.00	-3.65
															2.81	-28.86	-6.00
															3.00	-28.81	-6.70
															3.23	-28.76	-7.30
															3.60	-28.75	-7.91



BCS 24566-64
PERFORMANCE EVALUATION TEAM
REPORT NO. 4009/64

Rev No. D26 (Run Out)

VEHICLE ATTITUDE DATA

System Time	Frame No. Main Camera	Frame No. Index Camera	Frame No. Stellar Camera	Command Information: Command Position Lat (Deg)	Command Position Lat (Min)	Command Position Long (Deg)	Command Position Long (Min)	Best Ephemeris Lat (Deg)	Best Ephemeris Lat (Min)	Best Ephemeris Long (Deg)	Best Ephemeris Long (Min)	Obliq Angle (Deg)	Roll Angle (Deg)	Crab Angle (Deg)	Main Camera Data: Photo-Map Positioning: Frame Location: Inertial Nadir Reference In Track (NM)	Inertial Nadir Reference Cross Track (NM)	Commanded Reference In Track (NM)	Commanded Reference Cross Track (NM)	Vehicle Nadir Shift In Track (Deg)	Vehicle Nadir Shift Cross Track (Deg)
35063.0		147	147																	
35077.4		148	148																	
35091.8		149	149																	
35105.3		150	150																	
35101.6	009(off)																			
*35161.6	010(on)			10	38S	13	29E	10	36.6S	13	29.1E	0	0	0						
35167.0		151	151																	
35182.2		152	152																	
35196.6		153	153																	
35211.0		154	154																	
35225.4		155	155																	
35228.2	010A														8.3S	52.1W			4.9	28.2
35229.4	010B														5.6S	54.0W			3.3	29.0
35236.9	010C														11.2S	55.1W			6.6	29.5
35238.7	010D														6.0S	55.4W			3.54	29.7
35239.8		156	156																	
35254.2		157	157																	
35260.0	010E														8.8S	47.8W			5.14	26.0
35269.2		158	158																	
35264.0	010(off)																			
*35488.4	012(on)			33	00S	10	43E													
35493.4		159	159																	
35508.4		160	160																	
35523.2		161	161																	
35538.3		162	162																	
35551.2		163	163																	
35566.7		164	164																	
35581.3		165	165																	
35594.9		166	166																	
35590.8	012(off)																			
*35650.8	013(on)			43	59S	09	04E													
35656.0		167	167																	
35670.5		168	168																	

[redacted]

VEHICLE ATTITUDE DATA

Roll Angle (Deg)	Crab Angle (Deg)	Main Camera Data: Photo-Map Positioning: Frame Location: Inertial Nadir Reference: In Track (NM)	Inertial Nadir Reference: Cross Track (NM)	Commanded Reference: In Track (NM)	Commanded Reference: Cross Track (NM)	Vehicle Nadir Shift: In Track (Deg)	Vehicle Nadir Shift: Cross Track (Deg)	Index Camera Data: Horizon Measurement: Obliquity (Deg)	Pitch (Deg)	Roll (Deg)	Roll Error (Deg)	Principal Point Map Match: Pitch (Deg)	Roll (Deg)	Yaw (Deg)	Stellar Camera Data: Vehicle Attitude: Pitch (Deg)	Roll (Deg)	Yaw (Deg)
															3.83	-28.71	-8.75
															3.95	-28.71	-9.36
															4.16	-28.73	-10.01
															4.21	-28.76	-10.93
0	0																
															4.75	-29.00	-13.00
															4.85	-28.75	-13.53
															4.98	-28.45	-14.00
															5.01	-28.16	-14.45
															5.01	-27.83	-15.00
		8.3S	52.1W			4.9	28.2										
		5.6S	54.0W			3.3	29.0										
		11.2S	55.1W			6.6	29.5										
		6.0S	55.4W			3.54	29.7										
															5.31	-27.56	-15.33
															5.45	-27.23	-15.88
		8.8S	47.8W			5.14	26.0										
															5.71	-26.93	-16.23
															6.00	-21.00	-23.00
															5.96	-20.56	-23.30
															5.95	-20.01	-23.58
															5.85	-19.70	-23.90
															5.78	-19.25	-24.01
															5.85	-18.76	-24.40
															5.90	-19.31	-24.63
															5.85	-17.90	-24.86
															6.01	-16.01	-25.81
															6.01	-15.65	-26.01

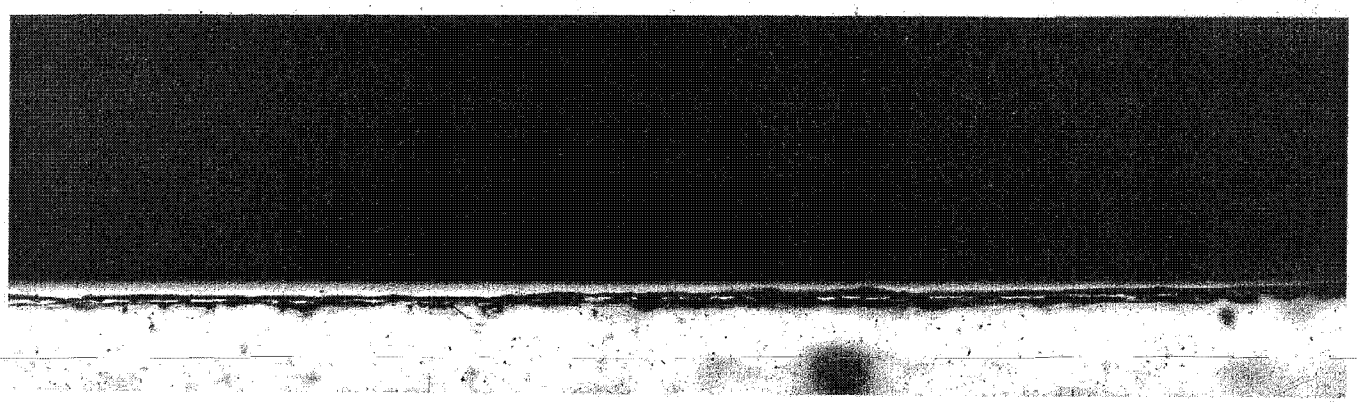
[redacted]

BCS 24566-64
PERFORMANCE EVALUATION TEAM
REPORT NO. 4009/64

VEHICLE ATTITUDE DATA

Rev No. D26 (Run Out)

System Time	Frame No. Main Camera	Index Camera	Stellar Camera	Command Information: Command Position Lat (Deg)	Lat (Min)	Long (Deg)	Long (Min)	Best Ephemeris Lat (Deg)	Lat (Min)	Long (Deg)	Long (Min)	Oblig Angle (Deg)	Roll Angle (Deg)	Crab Angle (Deg)	Main Camera Data: Photo-Map Positioning: Frame Location: Inertial Nadir Reference In Track (NM)	Inertial Nadir Reference Cross Track (NM)	Commanded Reference In Track (NM)	Commanded Reference Cross Track (NM)	Vehicle Na Shift In Track (Deg)	Vehicle Na Shift Cross (D
35691.0		169	169																	
35699.9		170	170																	
35714.2		171	171																	
35726.1		172	172																	
35743.5		173	173																	
35758.0		174	174																	
35753.2	013(off)																			
*35813.2	014(on)			54	54S	06	59E													
35818.6		175	175																	
35833.1		176	176																	
35847.6		177	177																	
35862.1		178	178																	
35876.6		179	179																	
35891.1		180	180																	
35905.6		181	181																	
35920.1		182	182																	
35915.6	014(off)																			
*35975.6	015(on)			65	42S	03	53E													
35981.2		1183	1183																	
35995.7		1184	1184																	
36010.2		1185	1185																	
36024.7		1186	1186																	
36039.2		1187	1187																	
36053.7		1188	1188																	
36068.7		1189	1189																	
36082.7		1190	1190																	
36078.0	015(off)																			
*36138.0	016(on)			76	21S	02	42E													
36143.4		1191	1191																	
36158.3		1192	1192																	
36172.8		1193	1193																	
36187.3		1194	1194																	
36201.8		1195	1195																	



VEHICLE ATTITUDE DATA

Main Camera Data								Index Camera Data							Stellar Camera Data		
		Photo-Map Positioning						Horizon Measurement				Principal Point Map Match			Vehicle Attitude		
		Frame Location				Vehicle Nadir Shift											
		Inertial Nadir Reference		Commanded Reference													
Roll Angle (Deg)	Crab Angle (Deg)	In Track (NM)	Cross Track (NM)	In Track (NM)	Cross Track (NM)	In Track (Deg)	Cross Track (Deg)	Obliquity (Deg)	Pitch (Deg)	Roll (Deg)	Roll Error (Deg)	Pitch (Deg)	Roll (Deg)	Yaw (Deg)	Pitch (Deg)	Roll (Deg)	Yaw (Deg)
															6.01	-15.02	-26.23
															6.01	-14.76	-26.43
															6.02	-14.26	-26.63
															6.01	-13.83	-26.81
															6.20	-13.30	-27.00
															6.20	-12.83	-27.20
															6.50	-10.90	-27.70
															6.61	-10.38	-27.86
															6.56	- 9.85	-28.00
															6.45	- 9.36	-28.26
															6.66	- 8.83	-28.20
															6.60	- 8.33	-28.31
															6.43	- 7.83	-28.43
															6.30	- 7.36	-28.53
															5.76	- 5.50	-28.85
															5.76	- 5.50	-28.85
															5.61	- 5.01	-28.90
															5.35	- 4.65	-28.95
															5.20	- 4.20	-28.98
															5.01	- 3.71	-28.98
															4.81	- 3.21	-29.00
															4.61	- 2.71	-28.98
															4.55	- 2.23	-29.05
															4.01	- 0.01	-29.20
															3.80	0.76	-29.26
															3.65	1.20	-29.30
															3.53	1.66	-29.30
															3.43	2.01	-26.30

BCS 24566-64
PERFORMANCE EVALUATION TEAM
REPORT NO. 4009/64

Rev No. D26 (Run Out)

VEHICLE ATTITUDE DATA

System Time	Frame No. Main Camera	Frame No. Index Camera	Frame No. Stellar Camera	Command Information: Command Position Lat (Deg)	Command Position Lat (Min)	Command Position Long (Deg)	Command Position Long (Min)	Best Ephemeris Lat (Deg)	Best Ephemeris Lat (Min)	Best Ephemeris Long (Deg)	Best Ephemeris Long (Min)	Oblig Angle (Deg)	Roll Angle (Deg)	Crab Angle (Deg)	Main Camera Data: Photo-Map Positioning: Frame Location: Inertial Nadir Reference In Track (NM)	Inertial Nadir Reference Cross Track (NM)	Commanded Reference In Track (NM)	Commanded Reference Cross Track (NM)	Vehicle Nadir Shift In Track (Deg)	Vehicle Nadir Shift Cross Tra (Deg)
36216.3		1196	1196																	
36230.8		1197	1197																	
36245.3		1198	1198																	
36240.4	016(off)																			
*36300.4	017(on)			86	00S	40	31W													
36306.4		1199	1199																	
36320.9		1200	1200																	
36335.4		1201	1201																	
36349.9		1202	1202																	
36364.4		1203	1203																	
36378.9		1204	1204																	
36393.4		1205	1205																	
36407.9		1206	1206																	
36402.8	017(off)																			
*36462.8	018(on)			81	19S	150	54W													
36469.0		1207	1207																	
36483.5		1208	1208																	
36498.0		1209	1209																	
36514.5		1210	1210																	
36529.0		1211	1211																	
36543.5		1212	1212																	
36556.0		1213	1213																	
36570.5		1214	1214																	
36585.2	018(off)																			
*36625.2	019(on)			70	58S	163	09W													
36631.6		1215	1215																	
36645.1		1216	1216																	
36659.6		1217	1217																	
36674.1		1218	1218																	
36688.6		1219	1219																	
36703.1		1220	1220																	
36717.6		1221	1221																	
36732.1		1222	1222																	

VEHICLE ATTITUDE DATA

	Main Camera Data								Index Camera Data							Stellar Camera Data		
			Photo-Map Positioning						Horizon Measurement				Principal Point Map Match			Vehicle Attitude		
			Frame Location															
			Inertial Nadir Reference		Commanded Reference		Vehicle Nadir Shift											
q le g)	Roll Angle (Deg)	Crab Angle (Deg)	In Track (NM)	Cross Track (NM)	In Track (NM)	Cross Track (NM)	In Track (Deg)	Cross Track (Deg)	Obliquity (Deg)	Pitch (Deg)	Roll (Deg)	Roll Error (Deg)	Pitch (Deg)	Roll (Deg)	Yaw (Deg)	Pitch (Deg)	Roll (Deg)	Yaw (Deg)
																3.30	- 2.55	-29.25
																3.00	- 3.17	-29.23
																2.95	4.98	-28.98
																2.80	5.45	-28.88
																2.60	5.90	-28.76
																2.40	6.36	-28.65
																2.30	6.86	-28.50
																2.01	7.35	-28.35
																1.93	7.83	-28.20
																1.80	8.30	-28.03
																1.45	10.13	-27.26
																1.40	10.56	-27.06
																1.16	10.96	-26.80
																1.00	11.36	-26.60
																0.76	11.80	-26.35
																0.73	12.30	-26.01
																0.70	12.76	-25.86
																0.55	13.23	-25.70
																0.30	15.01	-24.96
																0.01	15.51	-24.78
																0	15.93	-24.55
																0.01	16.31	-24.33
																0.01	16.72	-24.01
																0.30	17.01	-23.90
																0.20	17.43	-23.63
																0.26	17.80	-23.45
																0.01	19.23	-22.50

BCS 24566-64
PERFORMANCE EVALUATION TEAM
REPORT NO. 4009/64

Rev No. D26 (Run Out)

VEHICLE ATTITUDE DATA

System Time	Frame No. Main Camera	Index Camera	Stellar Camera	Command Information: Command Position Lat (Deg)	Lat (Min)	Long (Deg)	Long (Min)	Best Ephemeris Lat (Deg)	Lat (Min)	Long (Deg)	Long (Min)	Obliq Angle (Deg)	Roll Angle (Deg)	Crab Angle (Deg)	Main Camera Data: Photo-Map Positioning: Frame Location: Inertial Nadir Reference: In Track (NM)	Inertial Nadir Reference: Cross Track (NM)	Commanded Reference: In Track (NM)	Commanded Reference: Cross Track (NM)	Vehicle Nadir Shift: In Track (Deg)	Vehicle Nadir Shift: Cross Track (De
36727.6	019(off)																			
36787.6	020(on)			60	24S	167	20W													
36794.2		1223	1223																	
36808.7		1224	1224																	
36823.2		1225	1225																	
36837.7		1226	1226																	
36851.2		1227	1227																	

NOTE: Nos. 1183 - 1227's

VEHICLE ATTITUDE DATA

		Main Camera Data						Index Camera Data							Stellar Camera Data		
		Photo-Map Positioning						Horizon Measurement				Principal Point Map Match			Vehicle Attitude		
		Frame Location															
		Inertial Nadir Reference		Commanded Reference		Vehicle Nadir Shift											
Roll Angle (Deg)	Crab Angle (Deg)	In Track (NM)	Cross Track (NM)	In Track (NM)	Cross Track (NM)	In Track (Deg)	Cross Track (Deg)	Obliquity (Deg)	Pitch (Deg)	Roll (Deg)	Roll Error (Deg)	Pitch (Deg)	Roll (Deg)	Yaw (Deg)	Pitch (Deg)	Roll (Deg)	Yaw (Deg)
															0.30	19.50	-22.21
															0.20	20.00	-21.95
															0.43	20.81	-21.43

NOTE: Nos. 1183 - 1227 were used to avoid confusion with numbers titled on film record.

BCS 24566-64
PERFORMANCE EVALUATION TEAM
REPORT NO. 4009/64

VEHICLE ATTITUDE DATA

Rev No. D29 (Run Out)

System Time	Frame No. Main Camera	Index Camera	Stellar Camera	Command Information: Command Position Lat (Deg)	Lat (Min)	Long (Deg)	Long (Min)	Best Ephemeris Lat (Deg)	Lat (Min)	Long (Deg)	Long (Min)	Oblig Angle (Deg)	Roll Angle (Deg)	Crab Angle (Deg)	Main Camera Data: Photo-Map Positioning: Frame Location: Inertial Nadir Reference In Track (NM)	Inertial Nadir Reference Cross Track (NM)	Commanded Reference In Track (NM)	Commanded Reference Cross Track (NM)	Vehicle Nadir Shift In Track (Deg)	Vehicle Nadir Shift Cross T (Deg
*50362.4	002(on)			46	34N	46	08W													
50366.3		262	262																	
50380.8		263	263																	
50395.3		264	264																	
50409.8		265	265																	
50424.3		266	266																	
50438.8		267	267																	
50455.0		268	268																	
50514.4		269	269																	
50464.8	002(off)																			
*50524.8	003(on)			35	22N	47	52W													
50528.9		270	270																	
50543.4		271	271																	
50557.9		272	272																	
50572.4		273	273																	
50586.9		274	274																	
50601.4		275	275																	
50615.9		276	276																	
50677.0		277	277																	
50627.2	003(off)																			
*50687.2	004(on)			24	09N	49	21W													
50691.5		278	278																	
50706.0		279	279																	
50720.5		280	280																	
50734.0		281	281																	
50748.5		282	282																	
50763.0		283	283																	
50777.5		284	284																	
50838.6		285	285																	
50789.6	004(off)																			
*50849.6	005(on)			12	55N	50	42W													
50853.1		286	286																	
50867.6		287	287																	

[redacted]

VEHICLE ATTITUDE DATA

	Main Camera Data							Index Camera Data							Stellar Camera Data		
	Photo-Map Positioning							Horizon Measurement				Principal Point Map Match			Vehicle Attitude		
	Frame Location				Vehicle Nadir Shift												
	Inertial Nadir Reference		Commanded Reference				Crab Angle (Deg)										
	In Track (NM)	Cross Track (NM)	In Track (NM)	Cross Track (NM)	In Track (Deg)	Cross Track (Deg)		Obliquity (Deg)	Pitch (Deg)	Roll (Deg)	Roll Error (Deg)	Pitch (Deg)	Roll (Deg)	Yaw (Deg)	Pitch (Deg)	Roll (Deg)	Yaw (Deg)
															1.52	-30.36	16.40
															1.55	-30.61	15.85
															1.80	-30.85	15.36
															1.95	-31.10	14.91
															2.20	-31.31	14.40
															2.38	-31.50	13.91
															2.46	-31.73	13.35
															2.65	-31.93	12.80
															3.51	-32.53	10.61
															3.51	-32.76	9.86
															3.75	-32.85	9.36
															3.81	-32.98	8.73
															4.03	-33.08	8.23
															4.16	-33.16	7.70
															4.36	-33.25	7.20
															4.55	-33.35	6.61
															5.73	-33.55	4.01
															5.90	-33.53	3.46
															6.16	-33.50	2.85
															6.35	-33.46	2.01
															6.55	-33.41	1.20
															6.86	-33.36	0.86
															7.01	-33.33	0.16
															7.46	-33.30	-0.50
															8.98	-33.33	-3.65
															9.35	-33.40	-4.48

BCS 24566-64
PERFORMANCE EVALUATION TEAM
REPORT NO. 4009/64

Rev No. D29 (Run Out)

VEHICLE ATTITUDE DATA

System Time	Frame No. Main Camera	Index Camera	Stellar Camera	Command Information: Command Position Lat (Deg)	Lat (Min)	Long (Deg)	Long (Min)	Best Ephemeris Lat (Deg)	Lat (Min)	Long (Deg)	Long (Min)	Obliq Angle (Deg)	Roll Angle (Deg)	Crab Angle (Deg)	Main Camera Data: Photo-Map Positioning: Frame Location: Inertial Nadir Reference: In Track (NM)	Inertial Nadir Reference: Cross Track (NM)	Commanded Reference: In Track (NM)	Commanded Reference: Cross Track (NM)	Vehicle Nadir Shift: In Track (Deg)	Vehicle Nadir Shift: Cross T (Deg)
50882.1		288	288																	
50896.6		289	289																	
50911.1		290	290																	
50925.6		291	291																	
50940.1		292	292																	
51001.2		293	293																	
50952.0	005(off)																			
*51012.0	006(on)			01	41N	51	59W													
51001.2		294	294																	
51015.7		295	295																	
51030.2		296	296																	
51044.7		297	297																	
51059.2		298	298																	
51073.7		299	299																	
51088.2		300	300																	
51102.7		301	301																	
51114.4	006(off)																			
*51174.4	007(on)			09	31S	53	16W													
51163.8		302	302																	
51178.3		303	303																	
51192.8		304	304																	
51207.3		305	305																	
51221.8		306	306																	
51236.3		307	307																	
51250.8		308	308																	
51265.3		309	309																	
51276.8	007(off)																			
*51336.8	008(on)			20	40S	54	35W													
51341.3		310	310																	
51355.8		311	311																	
51370.2		312	312																	
51384.7		313	313																	
51399.2		314	314																	

VEHICLE ATTITUDE DATA

			Main Camera Data						Index Camera Data							Stellar Camera Data
			Photo-Map Positioning						Horizon Measurement				Principal Point Map Match			
			Frame Location				Vehicle Nadir Shift									Vehicle Attitude
	Roll Angle (Deg)	Crab Angle (Deg)	Inertial Nadir Reference		Commanded Reference				Obliquity (Deg)	Pitch (Deg)	Roll (Deg)	Roll Error (Deg)	Pitch (Deg)	Roll (Deg)	Yaw (Deg)	Pitch (Deg)	Roll (Deg)	Yaw (Deg)
			In Track (NM)	Cross Track (NM)	In Track (NM)	Cross Track (NM)	In Track (Deg)	Cross Track (Deg)										
																9.86	-33.55	-5.41
																9.70	-33.65	-6.00
																9.90	-34.25	-6.55
																10.08	-34.25	-7.01
																10.23	-33.95	-7.75
																10.45	-33.75	-8.30
																11.20	-32.55	-10.63
																11.30	-32.15	-11.15
																11.40	-31.95	-11.68
																11.50	-31.65	-12.40
																11.65	-31.25	-13.01
																11.50	-30.91	-13.71
																11.70	-30.55	-14.26
																11.76	-30.30	-14.83
																12.01	-28.85	-17.20
																12.01	-28.01	-17.71
																12.25	-27.75	-18.10
																11.91	-27.15	-19.0
																11.90	-26.85	-19.60
																11.96	-26.15	-20.01
																11.88	-25.85	-20.99
																11.81	-25.45	-21.51
																11.80	-23.40	-23.60
																11.82	-23.00	-23.80
																11.96	-22.60	-24.07
																11.93	-21.80	-25.00
																11.80	-21.35	-25.46

BCS 24566-64
PERFORMANCE EVALUATION TEAM
REPORT NO. 4009/64

Rev No. D29 (Run Out)

VEHICLE ATTITUDE DATA

System Time	Frame No. Main Camera	Frame No. Index Camera	Frame No. Stellar Camera	Command Information: Command Position Lat (Deg)	Command Position Lat (Min)	Command Position Long (Deg)	Command Position Long (Min)	Best Ephemeris Lat (Deg)	Best Ephemeris Lat (Min)	Best Ephemeris Long (Deg)	Best Ephemeris Long (Min)	Obliq Angle (Deg)	Roll Angle (Deg)	Crab Angle (Deg)	Main Camera Data: Photo-Map Positioning: Frame Location: Inertial Nadir Reference In Track (NM)	Inertial Nadir Reference Cross Track (NM)	Commanded Reference In Track (NM)	Commanded Reference Cross Track (NM)	Vehicle Nar Shift In Track (Deg)	Vehicle Nar Shift Cross (D
51413.7		315	315																	
51428.2		316	316																	
51442.7		317	317																	
51439.2	008(off)																			
*51499.2	009(on)			31	45S	56	00W	31	44.4S	56	00.2W	0	0	0						
51503.7		318	318																	
51506.2	009F														6.0S	31.5W				
51517.4		319	319																	
51517.8	009E														5.5S	39.0W				
51531.9		320	320																	
51537.4	009D														5.0S	37.4W				
51546.4		321	321																	
51557.7	009C														10.5S	37.5W				
51560.9		322	322																	
51565.1	009B														7.2S	38.2W				
51575.4		323	323																	
51588.9		324	324																	
51590.8	009A																			
51604.4		325	325																	
51601.6	009(off)																			
*51661.6	010(on)			42	45S	57	37W													
51666.1		326	326																	
51680.6		327	327																	
51695.1		328	328																	
51709.6		329	329																	
51724.1		330	330																	
51738.6		331	331																	

VEHICLE ATTITUDE DATA

Main Camera Data								Index Camera Data							Stellar Camera Data		
		Photo-Map Positioning						Horizon Measurement				Principal Point Map Match					
		Frame Location				Vehicle Nadir Shift									Vehicle Attitude		
		Inertial Nadir Reference		Commanded Reference													
Roll Angle (Deg)	Crab Angle (Deg)	In Track (NM)	Cross Track (NM)	In Track (NM)	Cross Track (NM)	In Track (Deg)	Cross Track (Deg)	Obliquity (Deg)	Pitch (Deg)	Roll (Deg)	Roll Error (Deg)	Pitch (Deg)	Roll (Deg)	Yaw (Deg)	Pitch (Deg)	Roll (Deg)	Yaw (Deg)
															10.95	-20.83	-25.90
															10.91	-20.60	-26.60
															10.80	-19.80	-26.70
0	0																
															10.65	-17.55	-28.45
		6.0S	31.5W														
															10.60	-17.00	-28.80
		5.5S	39.0W														
															10.45	-16.46	-29.01
		5.0S	37.4W														
															10.30	-15.93	-29.50
		10.5S	37.5W														
															10.20	-15.36	-29.80
		7.2S	38.2W														
															10.20	-14.80	-30.01
															10.00	-14.26	-30.46
															10.00	-13.73	-30.76
															9.95	-11.60	-31.95
															9.90	-10.75	-32.25
															9.93	-10.20	-32.53
															9.75	- 9.60	-32.80
															9.70	- 9.00	-33.00
															9.60	- 8.45	-33.20

[redacted]

~~TOP SECRET~~ - GAMBIT

Handle via Byeman
Controls Only

BCS 24566-64
PERFORMANCE EVALUATION TEAM
REPORT NO. 4009/64

Rev No. D29 (Run Out)

VEHICLE ATTITUDE DATA

System Time	Frame No. Main Camera	Frame No. Index Camera	Frame No. Stellar Camera	Command Information: Command Position Lat (Deg)	Command Position Lat (Min)	Command Position Long (Deg)	Command Position Long (Min)	Best Ephemeris Lat (Deg)	Best Ephemeris Lat (Min)	Best Ephemeris Long (Deg)	Best Ephemeris Long (Min)	Oblig Angle (Deg)	Roll Angle (Deg)	Crab Angle (Deg)	Main Camera Data: Photo-Map Positioning: Frame Location: Inertial Nadir Reference In Track (NM)	Inertial Nadir Reference Cross Track (NM)	Commanded Reference In Track (NM)	Commanded Reference Cross Track (NM)	Vehicle Nadir Shift In Track (Deg)	Vehicle Nadir Shift Cross Tr (Deg)
51753.1		332																		
51767.6		333																		
51764.0	010(off)																			
*51988.4	012(on)			64	37S	62	36W													
51992.9		1334																		
52007.4		1335																		
52021.9		1336																		
52036.4																				
52050.9																				
52065.4																				
52079.9																				
52094.4		1341																		
52090.8	012(off)																			
*52150.8	013(on)			75	17S	88	33W													
52155.3		1342																		
52169.8																				
52184.3																				
52198.8																				
52213.3																				
52227.8																				
52242.3																				
52256.8		1349																		
52253.2	013(off)																			

Handle via Byeman
Controls Only

~~TOP SECRET~~ - GAMBIT

Handle via Byeman
Controls Only

[redacted]

[redacted]

VEHICLE ATTITUDE DATA

Oblig Angle (Deg)	Roll Angle (Deg)	Crab Angle (Deg)	Main Camera Data: Photo-Map Positioning: Frame Location: Inertial Nadir Reference: In Track (NM)	Inertial Nadir Reference: Cross Track (NM)	Commanded Reference: In Track (NM)	Commanded Reference: Cross Track (NM)	Vehicle Nadir Shift: In Track (Deg)	Vehicle Nadir Shift: Cross Track (Deg)	Index Camera Data: Horizon Measurement: Obliquity (Deg)	Pitch (Deg)	Roll (Deg)	Roll Error (Deg)	Principal Point Map Match: Pitch (Deg)	Roll (Deg)	Yaw (Deg)	Stellar Camera Data: Vehicle Attitude: Pitch (Deg)	Roll (Deg)	Yaw (Deg)
																9.60	-7.86	-33.33
																9.50	-7.30	-33.50
																-0.35	-4.80	-34.50
																-0.55	-4.00	-34.50
																-0.83	-3.45	-34.56
																-1.30	-2.80	-34.50
																-1.25	-2.33	-34.60
																-1.33	-1.80	-34.56
																-1.60	-1.30	-34.55
																-1.73	-0.80	-34.50
																-3.80	1.50	-34.26
																-3.00	2.00	-34.20
																-2.50	2.63	-34.60
																-2.56	3.40	-33.[illegible]
																-2.73	3.73	-33.[illegible]
																-2.30	4.01	-33.50
																-3.60	4.80	-33.50
																-3.36	5.38	-33.36

[redacted]

BC8 24566-64

PERFORMANCE EVALUATION TEAM

REPORT NO. 4009/64

PHOTOGRAPHIC EVALUATION

Rev D08

Acc. No.	Density		Density Base + Fog	Sun Angle (degrees)	Brightness Range	Cloud Dmax	Altitude (NM)
	Dmin	Dmax					
001	--	--	0.21	43.5		--	
002	0.49	1.02	0.21	54.4		--	
003	0.60	1.20	0.20	54.3		1.80	
006	0.53	1.40	0.20	62.9		--	
007	0.48	1.30	0.17	62.9		--	

BC8 24566-64

PERFORMANCE EVALUATION TEAM

REPORT NO: 4009/64

PHOTOGRAPHIC EVALUATION

Rev D10

Acc. No.	Density		Density Base + Fog	Sun Angle (degrees)	Brightness Range	Cloud Dmax	Altitude (NM)
	Dmin	Dmax					
012	0.35	1.02	0.22	62.0		2.10	
014	0.62	2.11	0.22	62.8		1.90	
015	0.54	1.03	0.22			1.64	

BC8 24566-64

PERFORMANCE EVALUATION TEAM

REPORT NO. 4009/64

PHOTOGRAPHIC EVALUATION

Rev D16

Acc. No.	Density		Density Base + Fog	Sun Angle (degrees)	Brightness Range	Cloud Dmax	Altitude (NM)
	Dmin	Dmax					
005	0.35	1.18	0.20	51.2		--	
006	0.31	0.90	0.18	54.3		1.86	
007	0.35	1.12	0.20	57.3		--	
008	0.35	1.18	0.20	60.3		--	
009	0.38	1.04	0.18	63.2		--	
010	0.42	1.56	0.20	66.0		--	
011	0.72	1.78	0.20	67.7		--	
012	0.37	1.64	0.20	68.7		--	

BCS 24566-64

PERFORMANCE EVALUATION TEAM

REPORT NO. 4009/64

PHOTOGRAPHIC EVALUATION

Rev D26 (Run-Out)

Acc. No.	Density		Density Base + Fog	Sun Angle (degrees)	Brightness Range	Cloud Dmax	Altitude (NM)
	Dmin	Dmax					
003	--	--	0.13			1.86	
004	--	--	0.21			1.48	
005	0.35	1.45	0.22			--	
008	0.42	1.06	0.17			--	
010	--	--	0.21			1.48	

BCS 24566-64

PERFORMANCE EVALUATION TEAM

REPORT NO. 4009/64

PHOTOGRAPHIC EVALUATION

Rev D29 (Run-Out)

Acc. No.	Density		Density Base + Fog	Sun Angle (degrees)	Brightness Range	Cloud Dmax	Altitude (NM)
	Dmin	Dmax					
009	--	--	--			--	

END

DATE FILMED

FEB 18 197