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TECHNICAL PUBLICATION

PHOTOGRAPHIC EVALUATION REPORT

MISSION 1034

[redacted]

SEPTEMBER 1967

COPY [redacted]

56 PAGES

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PHOTOGRAPHIC EVALUATION REPORT

MISSION 1034

SEPTEMBER 1967

NATIONAL PHOTOGRAPHIC INTERPRETATION CENTER

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1038		None
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GLOSSARY OF TERMS

ABSOLUTE HEIGHT	Vertical distance from the vehicle to the mean ground level of the area being photographed.
ACUITY	Sharpness - Edge definition.
ACUTANCE	Measure of the ability of a lens to reproduce sharp images.
AIR BASE	The distance between 2 exposure stations. (Points in space occupied by the camera lens at the moment of exposure.)
ALTITUDE	Vertical distance from the vehicle to the Hough Ellipsoid at the time of exposure.
AZIMUTH OF THE PRINCIPAL RAY	Horizontal clockwise angle, measured from true north to the camera principal ray.
BASE HEIGHT RATIO	Ratio between the air base and the absolute attitude of a stereoscopic pair of photographs.
CAMERA NADIR	Geodetic latitude and longitude of a point vertically beneath the perspective center of the camera lens on the Hough Ellipsoid.
CONE ANGLE	Angle between the principal ray and the vehicle nadir.
COPY GENERATION	Number of reproductive steps by which a negative or positive photographic copy is separated from the original, i.e., the original negative is copy 1, a positive made from the original negative is copy 2, etc.
DATE OF PHOTOGRAPHY	Indicates the day, month, and year (GMT) that the photography was acquired.

EXPOSURE*	Total quantity of light received per unit area on a sensitized plate or film.
EXPOSURE DURATION	Time during which a light-sensitive material is subjected to the influence of light. Expressed in this text in fractions of a second. Formula: Exposure Time (sec) = $\frac{\text{Slit Width (in)}}{\text{Scan Rate (in per sec)}}$
EXPOSURE STATION	Position occupied by the camera lens at the moment of exposure.
FIDUCIAL MARK	A standard geometrical reference point imaged at the margin of a photograph. The intersection of the primary fiducial marks usually defines the principal point.
FOCAL LENGTH: CALIBRATED	Adjusted value of the equivalent focal length. Computed to distribute the effect of lens distortion over the entire field.
FOCAL LENGTH: EQUIVALENT	Distance measured along the lens axis from the rear nodal point to the plane of best average definition over the entire field. Points other than the rear nodal point may be used but must be specified for correct interpretation of data.
FOCAL PLANE	Plane perpendicular to the lens axis, in which images of points in the object field of the lens are focused.
FRAME	One of a series of full-format photographs comprising a roll of film.
GROUND RESOLUTION*	Resolved ground distance as determined from standard bar target resolution targets. A target is considered to be resolved when a grouping of 3 bars can be distinguished as 3 distinct lines. The lines need not have linear form.

HOLEY RAIL DOTS

Images of the rail holes associated with the pan-geometry calibration of the camera.

IMC (Image Motion Compensation)

Correction for the forward motion of the vehicle while photographing the terrain.

ISODENSITOMETER

An instrument which is basically a microdensitometer with the capability of repeatedly scanning an image at pre-set intervals. Its output is in the form of a plot representing distance along 2 axes and density differences as code changes within each scan line.

LOCAL SUN TIME

Time of day computed from the position of the sun relative to the imaged terrain.

MICRODENSITOMETER

An instrument which measures the optical density of very small areas in an image. Its output is in the form of a continuous plot of density versus distance across an image. The microdensitometer used in NPIC can accurately measure distances as small as 1 micron and densities up to 5.0+.

NOD INDICATORS

A series of marks imaged in the border area of each frame for the purpose of defining the relative orientation of the optical axis and the ground scene.

NODAL TRACE

A continuous line imaged along the major axis of each frame to define the optical axis of the lens relative to any given instant of exposure.

PANORAMIC CAMERA

Photographs a partial or complete panorama of the terrain in a transverse direction through a scanning motion of the lens system.

PARALLAX — Apparent displacement of the position of an object in relation to a reference point, caused by a change in the point of observation.

PASS — Operational portion of an orbital revolution. A suffix D indicates the descending node and a suffix A indicates the ascending node. An additional suffix E indicates that the associated photography was generated for engineering purposes.

PITCH — Rotation of the camera about its transverse axis. Positive pitch indicates nose-up attitude.

PRINCIPAL RAY — That ray of light which emanates from a point in object space and passes undeviated through the lens to become imaged at the principal point of the camera system. It is coincident with the optical axis of the lens.

PROCESSING LEVEL — Degree of development. Three levels of processing are currently employed--primary, intermediate, and full.

RESOLUTION — Measure of the smallest array of point objects distinguishable as independent point images, expressed in lines/mm.

ROLL — Rotation of the camera about its longitudinal axis. Positive roll indicates left wing-up attitude.

SHADOW FACTOR — A constant for each frame, used to calculate heights from shadow lengths.

SHRINKAGE MARKERS — Calibrated reference points used to calculate deformations of the photographic material.

SOLAR ELEVATION	Vertical angle measured from a plane (tangent to the surface of the earth at the point of intersection of the principal ray) to the sun, the vertex being at the center of the format.
STELLAR CAMERA	Used simultaneously with the index camera to photograph stars in order to determine vehicle attitude.
SYSTEM TIME LABEL	Binary presentation of the accumulative system time.
UNIVERSAL GRID	X, Y coordinate system used to locate images on photographic formats.
VEHICLE AZIMUTH	Clockwise horizontal angle measured from true north to the vehicle ground track.
VIGNETTING	Gradual reduction in density of parts of a photographic image due to the stopping of some of the rays entering the lens.
YAW	Rotation of the camera about its vertical axis. Positive yaw represents nose-left attitude, as viewed from the top of the camera.

*Defined differently than in the "Glossary of NPIC Terminology."

[redacted]

SYNOPSIS

Mission 1034, a 2-part satellite reconnaissance mission, was launched into a pro-grade polar orbit on 21 June 1966/2131Z. The first satellite re-entry vehicle (SRV-1) of the mission was recovered by air catch on 26 June 1966/2350Z. SRV-2 was recovered by air catch on 1 July 1966/2352Z.

The imagery produced by the panoramic cameras of Mission 1034 is not of the high quality normally expected of material from this system. Double or smeared images are apparent at 40X magnification on the photography of several passes. The V/H programmer failed after pass 5D. All segments of the photography after pass 5D were exposed at a constant scan rate considered to be the best average for that segment. The pressure make-up gas was depleted at approximately pass 30D, and corona fog is present on pass 37D, appearing on frame 3 of most passes throughout the rest of the mission.

Other contributing factors to the poor image quality are the presence of atmospherics of a degrading nature and a 10 percent smaller scale than is normally manifested on photography from this system. The stellar and index cameras of Mission 1034 were operational throughout. However, on part 1 the correlation lamp images varied in density and were not reproduced on most of the duplicate positives.

Due to the previously mentioned poor image quality, parts 1 and 2 of Mission 1034 are assigned an MIP rating of 80.

PART I. GENERAL SYSTEM INFORMATION

A. Camera Numbers

Forward-Looking Panoramic Camera	186
Aft-Looking Panoramic Camera	187
Stellar/Index Camera (Mission 1034-1)	D85/109/76
Stellar/Index Camera (Mission 1034-2)	D87/107/105

B. Launch and Recovery Dates

	(Mission 1034-1)	(Mission 1034-2)
Launch	2131Z/21 Jun 66	2131Z/21 Jun 66
Recovery	2350Z/26 Jun 66	2352Z/1 Jul 66

C. Orbit Elements

Element	Rev 40	Rev 130	Photo Range
Period (min)	90.148	90.028	*
Perigee (nm)	105.370	106.591	105.60 Rev 59D
Apogee (nm)	199.590	188.410	151.67 Rev 9D
Eccentricity	0.01310	0.01278	*
Inclination (deg)	80.106	80.104	*
Perigee Latitude (deg)	18.245N	38.170N	*

* - Not available.

D. Photographic Operations

1. Panoramic Cameras

Type	Mission 1034-1 Revs	Mission 1034-1 Frames	Mission 1034-2 Revs	Mission 1034-2 Frames	Total Revs	Total Frames
Operational						
Fwd	44	2,468	46	2,854	90	5,322
Aft	44	2,498	45	2,847	89	5,345
Operational/Domestic						
Fwd	4	118/102	1	14/26	5	132/128
Aft	4	110/104	0	0	4	110/104
Domestic						
Fwd	8	202	4	97	12	299
Aft	8	208	4	101	12	309
Engineering (no imagery)						
Fwd	1	15	2	35	3	50
Aft	1	15	2	37	3	52
Totals						
Fwd	57	2,905	53	3,026	110	5,931
Aft	57	2,935	51	2,985	108	5,920

2. Secondary Cameras

Camera	Frames
Stellar (Mission 1034-1)	415
Index (Mission 1034-1)	415
Stellar (Mission 1034-2)	409
Index (Mission 1034-2)	423

E. Film Usage

	Film Load (TOTAL)	Pre-Flight Footage	Processed Footage
Fwd-Looking (Mission 1034-1)	16,000*	306	7,962
Aft-Looking (Mission 1034-1)	16,000*	320	8,063
Fwd-Looking (Mission 1034-2)	16,000*	NA	8,021
Aft-Looking (Mission 1034-2)	16,000*	NA	7,913
Stellar (Mission 1034-1)	75	19	56
Stellar (Mission 1034-2)	75	30	45
Index (Mission 1034-1)	135	45	90
Index (Mission 1034-2)	135	41	94

* - Total load for both buckets.
NA - Not Applicable.

PART II. IMAGE ANALYSIS

A. Fwd-Looking Panoramic Camera

1. Density: The density of at least 85 percent of the material of the mission is adequate to produce good quality photography, with the remaining 15 percent equally divided between high and low values.

2. Contrast: The overall contrast of the material is slightly higher than recent missions. This condition is attributed to the seasonal change in subject contrast.

3. Acuity: While the image quality produced by this camera is not as good as is normally expected from this camera system, the fault is not necessarily associated with camera operation. The average altitude at which photography was acquired on this mission was 10 percent higher than normal. Atmospheric attenuation was also a very significant degrading factor.

4. Imaged Degradations:

a. Light Leaks: The fog patterns associated with system light leaks are less dense on this mission than on most previous missions. The following list describes the location, density, and image degradation associated with the repetitive fog patterns.

(1) Fog of low to moderate density appears on the first and last frames of several passes in association with the film set between passes or parts thereof. The fog is of only minor consequence since the first and last frames of a pass or part of a pass are considered bonus photography and are not intended for operational target acquisition.

(2) There is a narrow, transverse band of fog near each end of the fifth frame of most passes (Graphic 1, page 11). While the fog is quite dense, it is only about 0.1 inch wide. The density of the fog is commensurate with the duration of camera inactivity and the prevailing solar elevation and azimuth.

b. Static: Due to a leak in the pressure make-up system, the gas was, according to telemetry, depleted at about rev 30. As a result, corona static discharges caused fog at the supply end of the third frame of most passes after pass 37D. The density of the fog varies in size and density throughout the mission. The fog did not appear to get significantly worse as the mission progressed, and the vehicle atmospheric conditions became more arid. The minor

nature of this degradation can probably be attributed to electrostatically balanced rollers of the film transport system. Dendritic static discharges caused fog at both film edges intermittently throughout pass 82D. The discharges were probably the result of a minor tracking problem in the camera or processor.

c. Other: None.

5. Physical Degradation:

a. Longitudinal emulsion scratches appear just inside the format under the camera number and in the same axis at the take-up end on most of the mission. The only frame not effected by the scratches is the first of each camera operation. The scratches are normal to this system and are not considered to be a significantly degrading factor.

b. Rail scratches are continuous throughout the mission. They are outside of the image format and do not degrade the imagery. The intensity of the scratches is only minor compared to most previous missions. There is no evidence of obstructions in the imagery caused by emulsion flakes in the focal path.

6. Product Quality: The general product quality is good. However, the image quality is degraded by atmospherics, the higher than normal altitude of the mission, and improper IMC.

B. Aft-Looking Panoramic Camera

1. Density: Same as reported for the fwd-looking camera.

2. Contrast: Similar to the fwd-looking camera.

3. Acuity: The imagery from the aft-looking camera appears quite similar to that from the fwd-looking camera. Its quality is also poorer than average for the reasons reported in conjunction with the forward camera image evaluation.

4. Imaged Degradations:

a. Light Leaks: The fog patterns associated with system light leaks are less dense on this mission than on most previous missions. Following is the location, density, and image degradation associated with the reoccurring fog patterns.

[redacted]

(1) A band of fog, usually referred to as film transport, is present in the first and last frames of some passes (Graphic 2, page 11). The density of the pattern is relatively low and causes little degradation.

(2) There are occasional equipment images at the take-up end of the second and third frames from the end of a pass (Graphic 3, page 11). These images are of low density and cause little degradation.

(3) Fine minus density streaks are present, parallel to the major axis of the film, intermittently throughout the mission. Their presence can only be detected in areas of low density. There are also occasional wavering minus density streaks. These streaks are wider and were probably caused by an obstruction in the focal path. They do not occur often enough to cause serious degradation.

b. Static: None.

c. Other: None.

5. Physical Degradation:

a. Longitudinal emulsion scratches are present just inside the format under the camera number and in the same axis at the supply end on most frames of the mission. These scratches are normal for this system and are not considered to be a significantly degrading factor.

b. Other scratches, which are normal to the operation of this system, are also present, i.e., rail scratches and other scan head scratches.

6. Product Quality: As with the fwd-looking camera, the image quality produced by this camera is not as good as is expected from the camera system. Also, like the fwd-looking camera, the fault is not necessarily with the camera operation but was the result of several factors, i.e., scale, atmospherics, and incorrect IMC.

C. Stellar Camera (Mission 1034-1)

1. Density: The density of the material is adequate for the detection of stellar images.

Although the gross fog of the stellar/index material does double on passes 37D, 38D, and 47D there does not seem to be any extensive fogging due to radiation. The probable cause of the aforementioned level increase is some form of static discharge.

2. Contrast: The contrast of the material is adequate for the detection of stellar images.

3. Image Shape: The stellar images on this mission are slightly elongated. However, they are useable for attitude determination.

4. Images Per Frame: At least 10 stellar images per frame are present.

5. Flare Level: Approximately 50 percent of the format is of heavy density due to flare.

6. Imaged Degradations:

a. Light Leaks: None.

b. Static: There is an area of corona-type fogging along the edge of the material opposite the correlation lamp images on frames 252 through 264 and 330 through 385. Because of its location along the edge, it does not affect the stellar imagery.

c. Other: None.

7. Physical Degradations: A pressure-induced plus density streak is present along the correlation lamp edge of the material. The streak begins around frame 335 and is present throughout the rest of the mission. It does not cause any degradation to the stellar imagery.

8. Product Quality: The overall quality of the material is good.

D. Stellar Camera (Mission 1034-2)

1. Density: The density of the material is adequate for the detection of stellar images.

2. Contrast: The contrast is adequate for the detection of stellar images.

3. Image Shape: Most of the stellar images appear to be slightly elongated.

4. Images Per Frame: At least 8 stellar images are detectable on each stellar frame.

5. Flare Level: Approximately 35 percent of most stellar formats is effected by flare.

6. Imaged Degradations:

a. Light Leaks: The last 5 stellar formats are degraded by fog associated with film supply exhaustion.

b. Static: Dendritic static fogging begins at frame 20 and is almost continuous along the film edge opposite the correlation lamp image. The fogging enters the formats of frame 160 through 163. However, it does not cause serious degradation to the imagery.

c. Other: None.

7. Physical Degradations: None.

8. Product Quality: The overall quality of the stellar material is good.

E. Index Camera (Mission 1034-1)

1. Density: The majority of the mission material is of medium density.

2. Contrast: Most of the index material exhibits good contrast.

3. Acuity: The acuity of this mission's index photography is comparable to that of past missions.

4. Imaged Degradations:

a. Light Leaks: None.

b. Static: None.

c. Other: None.

5. Physical Degradations: None.

6. Product Quality: The overall quality of the mission material from the index camera is good.

F. Index Camera (Mission 1034-2)

1. Density: The average density of the mission material is medium.

2. Contrast: The majority of the index frames exhibit medium contrast.

3. Acuity: The acuity of the mission index material is good.

4. Imaged Degradations:

a. Light Leaks: None.

b. Static: Slight traces of dendritic static are present intermittently along the camera number edge.

c. Other: None.

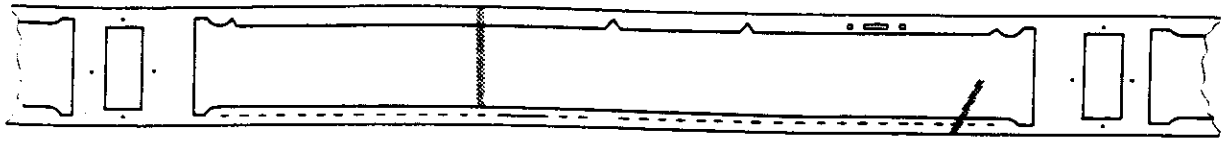
5. Physical Degradations: None.

6. Product Quality: The overall quality of the index record for this mission is good.

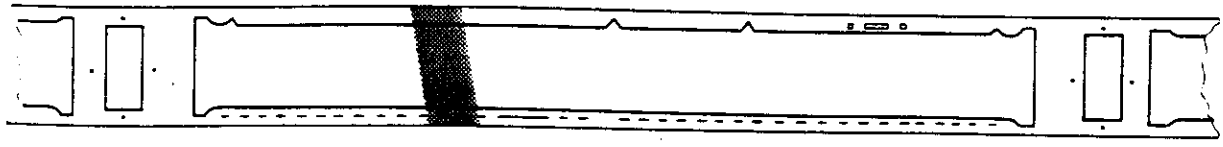
G. Graphic Display

The patterns illustrated below are referenced in the text of this report.

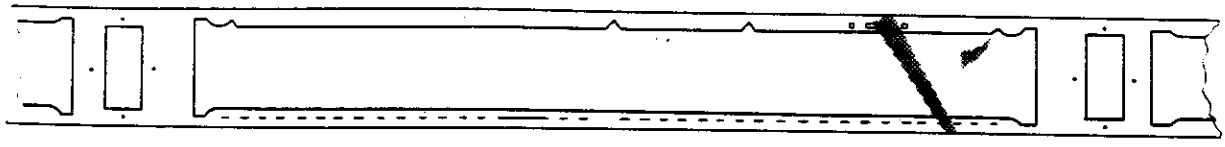
GRAPHIC 1



GRAPHIC 2



GRAPHIC 3



[redacted]

PART III. IMAGED AUXILIARY DATA

A. Fwd-Looking Panoramic Camera

1. Horizon Cameras

a. Starboard-Looking

(1) Imagery: The imagery of the starboard-looking camera is veiled on passes 8D through 35D. The veiling begins and ends very gradually. Its severity is not as great as has been observed on some previous missions.

(2) Fiducials: Sharp and well defined.

b. Port-Looking

(1) Imagery: No veiling evident. The imagery is sharp and distinct.

(2) Fiducials: Sharp and well defined.

2. Frequency Marks: Operational throughout the mission.

3. Binary Time Word: All light images are of good quality. No binary time words were recorded on frame 7 of passes 38D and 124D as well as frame 78 of pass 87D.

4. Binary Index: Readable throughout the mission.

5. Camera Number: The camera number image is slightly bloomed, but readable.

6. Pan Geometry Dots: Not applicable.

7. Nodal Traces: Not applicable.

8. Nod Indicators: Not applicable.

B. Aft-Looking Panoramic Camera

1. Horizon Cameras

a. Starboard-Looking

[redacted]

(1) Imagery: The imagery is sharp throughout, and no veiling is present. The cause of this veiling, when it does occur, is not understood. In an effort to control the veiling on this mission, all surfaces in front of this camera's lens were painted with a dull black material. The usual veiling did not occur.

(2) Fiducials: Sharp and well defined.

b. Port-Looking

(1) Imagery: Good quality imagery is evident throughout the mission.

(2) Fiducials: Sharp and well defined.

2. Frequency Marks: Operational throughout the mission.

3. Binary Time Word: All light images are of good quality. No binary time words were recorded on the following frames: Frame 20 of pass 6D, frame 39 of pass 53D, frame 19 of pass 73D, and a partial binary on frame 27 of pass 156D. The binary of frame 37, pass 63D is not sharp.

4. Binary Index: Readable throughout the mission.

5. Camera Number: The camera number is readable throughout the mission.

6. Pan Geometry Dots: Not applicable.

7. Nod Indicators: Not applicable.

C. Stellar Camera (Mission 1034-1)

1. Grid Quality: Sharp and well defined.

2. Correlation Lamp Image Quality: Sharp and distinct, but low in density, thereby causing printing problems.

D. Stellar Camera (Mission 1034-2)

1. Grid Quality: Sharp and well defined.

2. Correlation Lamp Image Quality: Sharp and distinct.

E. Index Camera (Mission 1034-1)

1. Grid Quality: Sharp and well defined.

2. Correlation Lamp Image Quality: Sharp and distinct.

3. Camera Number Legibility: Sharp and well defined.

F. Index Camera (Mission 1034-2)

1. Grid Image Quality: Sharp and well defined.

2. Correlation Lamp Image Quality: Sharp and distinct.

3. Camera Number Legibility: Sharp and well defined.

PART IV. MENSURATION QUALITY

A. Fwd-Looking Panoramic Camera

Due to a failure in the V/H programmer at the beginning of the mission, the vast majority of the mission material was acquired with incorrect IMC values. Therefore, this photography is of poorer than normal mensuration quality.

B. Aft-Looking Panoramic Camera

Same as the fwd-looking camera.

PART V. FILM PROCESSING

A. Processing Machines and Process Gamma

Film	Part: Entire Mission Machine	Gamma
Fwd (Mission 1034-1)	Trenton	2.08
Aft (Mission 1034-1)	Trenton	2.23
Fwd (Mission 1034-2)	Trenton	2.27
Aft (Mission 1034-2)	Trenton	2.23
Stellar (Mission 1034-1)	Trenton	2.26
Stellar (Mission 1034-2)	Trenton	2.22
Index (Mission 1034-1)	Drape	1.13
Index (Mission 1034-2)	Drape	1.14

B. Processing Levels

1. Panoramic Cameras

Film	Primary	Intermediate	Full	Transition	Processing Changes
Fwd (Mission 1034-1)	2.6%	20.9%	76.5%	*	47
Aft (Mission 1034-1)	1.9%	31.5%	66.6%	*	37
Fwd (Mission 1034-2)	8.9%	25.7%	65.4%	*	46
Aft (Mission 1034-2)	6.1%	37.3%	56.6%	*	49

* - Not Available.

2. Secondary Cameras

a. Stellar Cameras: No interruption in processing.

b. Index Cameras: No interruption in processing.

Film	Primary	Intermediate	Full	Transition	Processing Changes
Index (Mission 1034-1)			Not Applicable.		
Index (Mission 1034-2)			Not Applicable.		

C. Film Handling Summary

1. Fwd-Looking Camera

a. Capsule De-Filming

(1) Mission 1034-1: No problems.

(2) Mission 1034-2: No problems.

b. Pre-Spooling

(1) Mission 1034-1: No problems.

(2) Mission 1034-2: No problems.

c. Manufacturing Splices

(1) Mission 1034-1: None.

(2) Mission 1034-2: Frame 6 of Pass 80D and frame 4 of Pass 144D.

d. Processing Splices

(1) Mission 1034-1: None other than those normal to system operation.

(2) Mission 1034-2: Same as item (1).

e. Manufacturing Defects

(1) Mission 1034-1: None.

(2) Mission 1034-2: None.

f. Processing Anomalies: None.

g. Breakdown: No problems were encountered.

2. Aft-Looking Camera

a. Capsule De-Filming

(1) Mission 1034-1: Normal.

(2) Mission 1034-2: Normal.

b. Pre-Spooling

(1) Mission 1034-1: Normal.

(2) Mission 1034-2: Normal.

c. Manufacturing Splices

(1) Mission 1034-1: Frame 41 of Pass 30D and frame 32 of Pass 69D.

(2) Mission 1034-2: Frame 51 of Pass 108D and frame 40 of Pass 146D.

d. Processing Splices

(1) Mission 1034-1: None other than those normal to system operation.

(2) Mission 1034-2: Same as (1).

e. Manufacturing Defects

(1) Mission 1034-1: None.

(2) Mission 1034-2: None.

f. Processing Anomalies: None.

g. Breakdown: No problems were encountered.

3. Index Camera

a. Capsule De-Filming

(1) Mission 1034-1: Normal.

(2) Mission 1034-2: Normal.

b. Pre-Splicing

(1) Mission 1034-1: Normal.

(2) Mission 1034-2: Normal.

c. Manufacturing Splices

(1) Mission 1034-1: None.

(2) Mission 1034-2: None.

d. Processing Splices

(1) Mission 1034-1: None other than those normal to product processing.

(2) Mission 1034-2: Same as (1).

e. Manufacturing Defects

(1) Mission 1034-1: None.

(2) Mission 1034-2: None.

f. Processing Anomalies: None.

g. Breakdown: No problems were encountered.

4. Stellar Camera

a. Capsule De-Filming

(1) Mission 1034-1: Normal.

(2) Mission 1034-2: Normal.

b. Pre-Spooling

(1) Mission 1034-1: Normal.

(2) Mission 1034-2: Normal.

c. Manufacturing Splices

(1) Mission 1034-1: None.

(2) Mission 1034-2: None.

d. Processing Splices

(1) Mission 1034-1: None other than those normal to product processing.

(2) Mission 1034-2: Same as (1).

e. Manufacturing Defects

(1) Mission 1034-1: None.

(2) Mission 1034-2: None.

f. Processing Anomalies: None.

g. Breakdown: No unusual problems were encountered.

D. Timetable

Film	Recovered	Received at Processing Site	*Spec Ship at NPIC Recd	Priority 1A at NPIC Recd
Fwd (Mission 1034-1)	26 Jun 66/2350Z	27 Jun 66/1345Z	None	30 Jun 66/0340Z
Aft (Mission 1034-1)	"	"	"	"
Stellar (Mission 1034-1)	"	"	"	"
Index (Mission 1034-1)	"	"	"	"
Fwd (Mission 1034-2)	1 Jul 66/2352Z	2 Jul 66/1500Z	"	5 Jul 66/0823Z
Aft (Mission 1034-2)	"	"	"	"
Stellar (Mission 1034-2)	"	"	"	"
Index (Mission 1034-2)	"	"	"	"

*There was no special shipment associated with this mission.

PART VI. PI SUITABILITY

A. Definition of Photographic Interpretation (PI) Suitability

The PI suitability is an assessment of the information content of photographic reconnaissance material and its interpretability. A number of interrelated factors are involved, such as the quality of the photography, the extent of target coverage, scale, and weather limitations. However, the fundamental criteria for assigning a PI suitability rating may be reduced to (a) the scope of the photographic coverage and (b) the degree to which a photographic interpreter may extract useful and reliable information from the material.

PI suitability ratings are categorized as Excellent, Good, Fair, Poor, and Unuseable. These ratings refer to the overall interpretive value of the photography obtained from a particular reconnaissance mission. Individual targets may also be assigned PI suitability ratings. The standards that determine assignment of the various ratings are:

Excellent: The photography is free of degradations by camera malfunctions or processing faults and the weather conditions are favorable throughout. The imagery contains sharp, well-defined edges and corners with no unusual distortions. Contrast is optimum and shadow details, as well as details in the highlight areas, are readily detectable. Observation of small objects and a high order of mensuration are made possible by the consistently good quality of the photography.

Good: The photography is relatively free of degradation or limiting atmospheric conditions. Edges and corners are well defined. No unusual distortions are present. Detection and accurate mensuration of small objects are feasible, but to a lesser degree than in material rated as "Excellent."

Fair: Degradation is present and the acuity of the photography is less than optimum. Edges and corners are not crisply defined and there is loss of detail in shadow and/or highlight areas. Detection and identification of small objects are possible, but accuracy of mensuration is reduced by the fall-off in image quality and the less-than-optimum contrast that prevails.

Poor: Camera-induced degradations and/or weather limitations severely reduce the effectiveness of the photography. Definition of edges and corners is not sharp. Only gross terrain features and culture may be detected or identified and distortion of form may exist. Accurate mensuration of even large objects is doubtful.

Unuseable: Degradation of photography completely precludes detection, identification, and mensuration of cultural details.

B. PI Statistics

1. Target Coverage

	Mission 1034-1	Mission 1034-2	Totals
Priority 1 Targets Programmed	Not available	Not available	Not available
Priority 1 Targets Covered	337	305	642

2. PI Quality Appraisal

Rating	Missiles	Nuclear Energy	Air Facilities	Ports	Elect Commo	Military Activity	Complex
Good	41	0	3	1	1	3	0
Fair	203	8	23	6	5	21	3
Poor	218	26	35	8	2	12	3
Totals	*462	34	61	15	8	36	6

3. Summary of PI Quality Ratings (Percentage)

Good	8%
Fair	44%
Poor	48%

462
34
61
15
8
36
6
622

*A discrepancy exists between the total number of targets covered and the total PI reports because several targets are covered more than once.

C. PI Comments

1. Atmospheric Attenuation: Sixty percent of Mission 1034 is considered to be cloud free photography.

2. Terrain Conditions: The terrain conditions on this mission are normal for this time of year.

3. Product Interpretability: The interpretability of Mission 1034 is considered to be fair. The large number of poor target ratings given by the interpreters and the fact that the mission's image quality is not as good as most previous missions is indicative of this rating. The poor quality seems to be the result of a series of small factors--the failure of the V/H programmer, degrading atmospherics, etc. Taken as a whole, they produced a product of other than good quality.

4. Resolution Target Analysis: No resolution targets were displayed during this mission.

PART VII. MISSION DATA

	Master Pan	Master Take-up Horizon	Master Supply Horizon	Slave Pan	Slave Take-up Horizon	Slave Supply Horizon	Mission 1034-1 Stellar	Mission 1034-1 Index	Mission 1034-2 Stellar	Mission 1034-2 Index
Camera Number	186	NA	NA	187	NA	NA	D85	D85	D87	D87
Reseau Number	NA	NA	NA	NA	NA	NA	76	109	105	107
Lens Serial Number	194235	12875	12846	193235	12833	12843	10683	819960	10592	819956
Slit Width (in)	0.200	NA	NA	0.150	NA	NA	NA	NA	NA	NA
Aperture	F/3.5	F/8.0	F/6.3	F/3.5	F/8.0	F/6.3	F/1.8	F/4.5	F/1.8	F/4.5
Exposure Time (sec)	1/250 avg	1/100	1/100	1/410 avg	1/100	1/100	2.0	1/500	1.0	1/500
Filter (Wratten)	23A	25	25	21	25	25	None	21	None	21
Focal Length (mm)	609.630	54.9	54.9	609.630	55.0	54.92	84 nom	38.46	84 nom	38.44
Film Length (ft)	16,000	NA	NA	16,000	NA	NA	75	135	75	135
Splices	4	NA	NA	4	NA	NA	None	None	None	None
Emulsion	244-6-8-4-6	244-6-8-4-6	244-6-8-4-6	244-6-4-6	244-6-4-6	244-6-4-6	151-48-3-6	113-2-3-6	151-48-3-6	113-2-3-6
Film Type	3404	3404	3404	3404	3404	3404	3401	3400	3401	3400
Resolution Data (L/mm)										
Static										
High Contrast	264	187 avg	209 avg	258	209 avg	187 avg	*	72 (A)	*	73 (A)
Low Contrast	155	*	*	149	*	*	*	*	*	*
Dynamic										
I High Contrast	190	*	*	193	*	*	*	*	*	*
I Low Contrast	116	*	*	117	*	*	*	*	*	*
P High Contrast	162	*	*	168	*	*	*	*	*	*
P Low Contrast	104	*	*	109	*	*	*	*	*	*

* - Not Available.
NA - Not Applicable.
Avg - Average.
Nom - Nominal.

FIGURE 1. BEST IMAGE QUALITY (MISSION 1034-1)

Image quality comparable to the best of this mission.

FIGURE 2. CORRESPONDING COVERAGE (MISSION 1034-1)

Corresponding coverage as imaged by the aft camera.

NPIC L-3853 NPIC L-3854

[redacted]

	FIGURE 1	FIGURE 2
Camera	187	186
Pass	8D	8D
Frame	39 (aft)	37 (fwd)
Date of Photography	22 Jun 66	22 Jun 66
Universal Grid Coordinates	75.0 - 12.0	16.0 - 12.5
Enlargement Factor	20X	20X
Geographic Coordinates	53-34N 52-06E	54-05N 51-53E
Altitude (ft)	754,643	759,375
Camera Attitude:		
Pitch	-30°14'	-0°5'
Roll	-0°11'	-0°5'
Yaw	-0°29'	-0°33'
Local Sun Time	1258	1257
Solar Elevation	57°45'	57°21'
Solar Azimuth (deg)	208	208
Exposure (sec)	1/346	1/261
Vehicle Azimuth	165°32'	165°3'
Processing Level	Full	Full

[redacted]

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Control System Only

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FIGURE 3. BEST IMAGE QUALITY (MISSION 1034-2)

Image quality comparable to the best of this mission.

FIGURE 4. CORRESPONDING COVERAGE (MISSION 1034-2)

Corresponding coverage as imaged by the fwd camera.

NPIC L-3855 NPIC L-3856

	FIGURE 3	FIGURE 4
Camera	187	186
Pass	152D	152D
Frame	24 (aft)	22 (fwd)
Date of Photography	1 Jul 66	1 Jul 66
Universal Grid Coordinates	58.8 - 10.5	32.5 - 12.6
Enlargement Factor	20X	20X
Geographic Coordinates	56-59N 24-58E	57-00N 25-00E
Altitude (ft)	671,655	673,788
Camera Attitude:		
Pitch	-15°18'	14°58'
Roll	-0°21'	-0°22'
Yaw	-0°39'	-0°12'
Local Sun Time	1119	1120
Solar Elevation	55°30'	55°29'
Solar Azimuth (deg)	100	100
Exposure (sec)	1/410	1/306
Vehicle Azimuth	163°49'	163°16'
Processing Level	Full	Full

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FIGURE 5. HORIZON IMAGE BEFORE VEILING

Last clear horizon image before veiling occurred on starboard horizon camera of forward instrument.

NPIC L-3857

FIGURE 5

Camera	186
Pass	5D
Frame	79 (fwd) Stbd Horizon
Date of Photography	22 Jun 66
Universal Grid Coordinates	NA
Enlargement Factor	3.5X
Geographic Coordinates	NA
Altitude (ft)	708,501
Camera Attitude:	
Pitch	$14^{\circ}56'$
Roll	$-0^{\circ}4'$
Yaw	$-0^{\circ}35'$
Local Sun Time	NA
Solar Elevation	NA
Solar Azimuth	NA
Exposure (sec)	1/100
Vehicle Azimuth	$172^{\circ}12'$
Processing Level	Intermediate

NA - Not Applicable.

[redacted]

[redacted]

FIGURE 6. HORIZON IMAGE VEILED

First veiled horizon image on starboard camera of forward instrument.

FIGURE 7. CORRESPONDING CLEAR HORIZON IMAGE

Comparable horizon image coverage from starboard camera of aft instrument. The area around the lens was coated with a dull black material and veiling appears to have been reduced.

NPIC L-3858 NPIC L-3859

	FIGURE 6	FIGURE 7
Camera	186	187
Pass	6D	6D
Frame	1 (fwd) Stbd Horizon	2 (aft) Stbd Horizon
Date of Photography	22 Jun 66	22 Jun 66
Universal Grid Coordinates	NA	NA
Enlargement Factor	3.5X	3.5X
Geographic Coordinates	NA	NA
Altitude (ft)	714,071	713,043
Camera Attitude:		
Pitch	14°49'	-15°19'
Roll	0°10'	-1°15'
Yaw	-1°12'	-0°10'
Local Sun Time	NA	NA
Solar Elevation	NA	NA
Solar Azimuth	NA	NA
Exposure (sec)	1/100	1/100
Vehicle Azimuth	169°3'	169°7'
Processing Level	Intermediate	Intermediate

NA - Not Applicable.

[redacted]

FIGURE 8. EXAMPLE OF CORONA FOG

Example of corona fog which occurred after the gas was depleted from the pressure make-up system.

NPIC L-3860

FIGURE 8

Camera	186
Pass	101D
Frame	3 (fwd)
Date of Photography	28 Jun 66
Universal Grid Coordinates	21.5 - 12.0
Enlargement Factor	Contact
Geographic Coordinates	19-59S 115-01E
Altitude (ft)	741,770
Camera Attitude:	
Pitch	15°20'
Roll	-0°7'
Yaw	-0°0'
Local Sun Time	1308
Solar Elevation	43°21'
Solar Azimuth (deg)	161
Exposure (sec)	1/235
Vehicle Azimuth	172°50'
Processing Level	Full

[redacted]