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TECHNICAL PUBLICATION

PHOTOGRAPHIC EVALUATION REPORT

MISSION 1037

MAY 1967

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38 PAGES

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Notice of Missing Page(s)

Pages ii, iv, and xii of the original document were blank and unnumbered.

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PHOTOGRAPHIC EVALUATION REPORT

MISSION 1037

This Photographic Evaluation Report reflects a format revision designed to expedite production, increase information content, and provide reports to the community on a more timely basis.

While the new Photographic Evaluation Report format does not include a depth analysis of all anomalies or malfunctions, provisions have been made to include special studies to dwell upon conditions requiring detailed analysis. These reports will appear, if and when warranted, as attachments to basic PER's. Time permitting, attachments will be made to the mission PER in which the anomaly occurs; otherwise they will be published with a subsequent PER. Each special study will be identified on the cover of the PER to which it is attached. In addition, an index of the PER's and the associated special studies will appear in each report.

Publication schedules may cause some subsequent PER's to appear in the old format.

MAY 1967

NATIONAL PHOTOGRAPHIC INTERPRETATION CENTER

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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.

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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.

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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+.
NCD 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.

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

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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."

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INDEX OF PHOTOGRAPHIC EVALUATION REPORTS AND SPECIAL STUDIES

PER	DOCUMENT NUMBER	SPECIAL STUDY
1035	[redacted]	None
1037	[redacted]	None
1038	[redacted]	None

SYNOPSIS

Mission 1037, a two-part photographic satellite reconnaissance mission, was launched into a retrograde orbit on 8 November 1966/1957Z. The first payload (Mission 1037-1) was recovered dry on 12 November 1966/2247Z. The second part (Mission 1037-2) was recovered dry on 20 November 1966/2234Z. Photography was obtained during 107 orbital revolutions, consisting of 93 operational passes, 12 domestic passes, and 2 engineering passes.

The standard "J" camera configuration with the calibrated pan-geometry modification was employed during the mission. All cameras operated satisfactorily throughout the mission. The overall image quality of the panoramic camera film is considered to be fair-to-good. An MIP of 85 is assigned.

The pan-geometry data was recorded satisfactorily during the mission. A few of the holey rail dots were blocked by emulsion buildup as the mission progressed. The nodal traces were operational on every frame of the mission.

Mission 1037 is the first mission to use the new polished rails. Another first for Mission 1037 is an orbit adjust feature. It was used on pass 86 to change the orbit from a perigee of 91 nm to 98 nm.

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PART I. GENERAL SYSTEM INFORMATION

A. Camera Numbers

Forward-looking Panoramic Camera No 198
Aft-looking Panoramic Camera No 199
Stellar/Index Camera (Mission 1037-1) D101/124/128
Stellar/Index Camera (Mission 1037-2) D106/134/136

B. Launch and Recovery Dates

	(Mission 1037-1)	(Mission 1037-2)
Launch	8 Nov 66/1957Z	-
Recovery	12 Nov 66/2244Z	20 Nov 66/2234Z

C. Orbit Elements

	Planned	(Actual) Rev 32	(Actual) Rev 130**	(Actual) Photo Range
Period (min)	*	89.378	89.239	N/A
Perigee (nm)	*	91.785	98.846	91.65 (Rev 58)
Apogee (nm)	*	171.300	166.830	134.51 (Rev 126)
Eccentricity	*	0.0112	0.00952	N/A
Inclination Angle (deg)	*	100.074	100.074	N/A
Perigee Latitude	*	14.534°N	45.035°N	N/A

*Not Available.
**This shows the elements after the orbit adjust for 1037-2.

[redacted]

D. Photographic Operations

1. Panoramic Cameras

Type	Mission 1037-1 Revs	Mission 1037-1 Frames	Mission 1037-2 Revs	Mission 1037-2 Frames	Total Revs	Total Frames
Operational						
Fwd	35	2,740	56	2,784	91	5,524
Aft	35	2,733	56	2,816	91	5,549
Operational/Domestic						
Fwd	1	54	1	47	2	101
Aft	1	54	1	47	2	101
Domestic						
Fwd	4	89	8	118	12	207
Aft	4	88	8	118	12	206
Engineering (no imagery)						
Fwd	1	13	1	13	2	26
Aft	1	13	1	13	2	26
Totals						
Fwd	41	2,896	66	2,962	107	5,858
Aft	41	2,888	66	2,994	107	5,882

2. Secondary Cameras

Camera	Frames
Stellar (Mission 1037-1)	442
Index (Mission 1037-1)	442
Stellar (Mission 1037-2)	468
Index (Mission 1037-2)	468

[redacted]

E. Film Usage

	Film Load (TOTAL)	Pre-Flight Footage	Processed Footage
Fwd-Looking (Mission 1037-1)	16,000*	391	8,051
Aft-Looking (Mission 1037-1)	16,000*	394	8,025
Fwd-Looking (Mission 1037-2)	NA	NA	7,881
Aft-Looking (Mission 1037-2)	NA	NA	7,928
Stellar (Mission 1037-1)	75	2.08	47
Stellar (Mission 1037-2)	75	4.16	50
Index (Mission 1037-1)	135	4.67	118
Index (Mission 1037-2)	135	5.35	106

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

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PART II. IMAGE ANALYSIS

A. Fwd-Looking Panoramic Camera

1. Density: Seventy-five percent of the fwd camera film is considered to be of medium density, 20 percent thin and 5 percent heavy. The thin density is attributed to low solar elevations and the heavy density to snow cover.

2. Contrast: Seventy percent of the mission is estimated to be of medium contrast, 20 percent of low contrast and 10 percent of high contrast.

3. Acuity: The edge sharpness is not as good as the aft camera. The maximum enlargement for film from this camera is approximately 40X.

4. Imaged Degradations

a. Light Leaks

(1) A 2-inch band of fog is near the binary time word on the first frame of some passes (illustrated in graphic number 1, page 10).

(2) A streak of fog near the take-up end of the fifth frame is present on a few passes (illustrated in graphic number 2, page 10).

(3) General, vague fog patterns are present on the next-to-last frame on many passes (illustrated in graphic number 3, page 10).

b. Static: Dentritic static occurs intermittently along both film edges on passes 26D, 29D, 32D, and 39D and from passes 166D to 181D.

c. High Base Fog: The average base plus fog of the forward film is 0.32 density at the full development level. This is considerably higher than the 0.18 density that should result from the full level of development. The range of base plus fog is from 0.10 at primary development to as high as 0.38 at full development. Part of the high fog can be attributed to a difference between the type 3404 film used for process machine control and the actual mission material. However, there is no apparent explanation for the majority of the density differences.

[redacted]

d. Fog from Holey Rail Light Source: Flare from the light source associated with the holey rails caused plus density streaks along both edges just inside the format area. The fogged streaks are approximately one quarter inch wide and are more discernible over areas of low density and low contrast. Examples of the density of the fogged streaks over the base fog are illustrated in graphic number 4. The density readings are made from a night time engineering pass (illustrated in graphic number 4, page 10).

5. Physical Degradation: Minor rail scratches are present throughout the mission. Minor scratches, abrasions, and pinholes are of normal density and severity for this type of mission. Emulsion buildup caused a ragged format edge along the binary side toward the take-up end of each frame.

6. Product Quality: The effect of the imaged and physical degradations on quality is minor. The high base plus fog was compensated for in the printing of the positives. The fogged streaks cannot be seen where there is good imagery.

B. Aft-Looking Panoramic Camera

1. Density: Seventy percent of the aft-looking camera film is of medium density, 10 percent is thin, and 20 percent is heavy.

2. Contrast: Seventy-five percent of the aft-looking camera film is of medium contrast, with 15 percent of low contrast and 10 percent of high contrast.

3. Acuity: Although the image acuity is considered to be good, it does not equal that which is expected from this camera system. Sixty time enlargements are maximum for the film, and the mission average maximum is approximately 50X.

4. Imaged Degradations

a. Light Leaks

(1) On the third from last frame of most passes near the take-up end is a scattering of fog that sometimes extends into the next frame. Also on the third from last frame is a transverse band of fog extending edge-to-edge near the center of the format (illustrated in graphic number 5, page 11).

(2) On the last frame of most passes is an area of fog near the center of the format. It extends from the time track edge nearly to the center of the format (illustrated in graphic number 6, page 11).

[redacted]

b. Static: Dendritic static caused intermittent fog along both edges from passes 6D to 23D.

c. High Base Fog: The average base plus fog of the aft-looking camera film is 0.26 at full density development. Although less dense than the fwd camera material, the density is still higher than normal.

d. Fog from Holey Rail Light Source: The same type of fogged streaks caused by the holey rail light source, as described for the fwd-looking panoramic camera material, is present on the aft camera film. (A sample of the density readings from an engineering pass is illustrated on graphic number 7, page 11.)

5. Physical Degradation: Minor rail scratches are continuous throughout the mission. An emulsion scratch is just inside the format under the binary and, in the same axis, at the take-up end of most frames. There is also a scratch outside the format area, near the take-up end along the time track edge. Emulsion buildup causes a ragged format edge along the binary side toward the take-up end of each frame.

6. Product Quality: The effect of the imaged and physical degradations on the product quality is minor. The increase in base fog was compensated for in the positive printing.

C. Stellar Camera (Mission 1037-1)

1. Density: The density of most of the stellar frames is lower than on past missions. This is caused by a combination of the one second exposure duration and processing on the Yardleigh processing machine. A few frames are overexposed, causing some stellar imagery to be obscured. These frames were exposed in the southern hemisphere with the stellar camera oriented more toward the sun.

2. Contrast: The contrast appears to be normal for stellar photography.

3. Image Shape: Most stellar images are streaked.

4. Images Per Frame: There are 20 or more images on each frame.

5. Flare Level: The flare level is less dense than normal. On some frames, the grid pattern is indistinguishable at the edge farthest from the flare area.

6. Imaged Degradations

a. Light Leaks: None.

b. Static: There is an area of fog intermittently throughout the mission.

c. Other: Slight edge fog is present along both film edges throughout the mission. Frame 253 is double exposed.

7. Physical Degradations: The first 8 feet of film contain minor scratches and abrasions which were caused by a processor threading problem.

8. Product Quality: The only significant image degradation was caused by the overexposure of a few frames.

E. Stellar Camera (Mission 1037-2)

1. Density: The density is normal for stellar photography. All frames are good with no over or underexposed frames.

2. Contrast: The contrast appears to be normal.

3. Image Shape: Most of the stellar images are streaked, with a few pin point images and some odd-shaped images.

4. Images Per Frame: There are 15 or more stellar images per frame.

5. Flare Level: The flare level is good, with stellar images visible in the area of flare. The flare is adequate for grid identifications across the entire format.

6. Image Degradations

a. Light Leaks: None.

b. Static: None.

c. Other Fog: Edge fog is present along both edges throughout the mission. Frames 1 and 397 are double exposures.

7. Physical Degradations: None.

8. Product Quality: The image quality of the stellar film is not seriously degraded by any of the above anomalies.

E. Index Camera (Mission 1037-1)

1. Density: The density of the index camera film is medium throughout.

2. Contrast: The contrast for most of the mission is medium, with some high contrast in association with snow-covered terrain.

3. Acuity: The image sharpness is considered to be good for this type of photography.

4. Imaged Degradations

a. Light Leaks: None.

b. Static: None.

c. Other: Specular reflections from water or other highlights resulted in image degradations on a few frames of the mission.

5. Physical Degradations: None.

6. Product Quality: The majority of the degradations listed above had no significant effect on the image quality.

F. Index Camera (Mission 1037-2)

1. Density: The density is medium throughout the mission.

2. Contrast: The contrast is medium.

3. Acuity: The image sharpness is considered to be good.

4. Imaged Degradations

a. Light Leaks: None.

b. Static: None.

c. Others: None.

5. Physical Degradations: None.

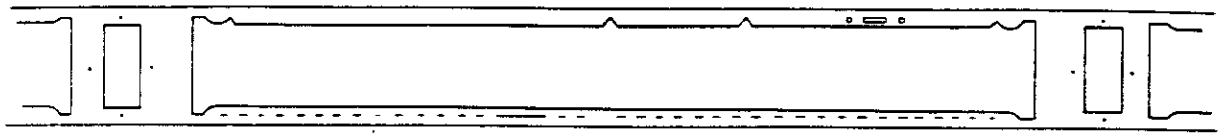
6. Product Quality: Good.

G. Graphic Display

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

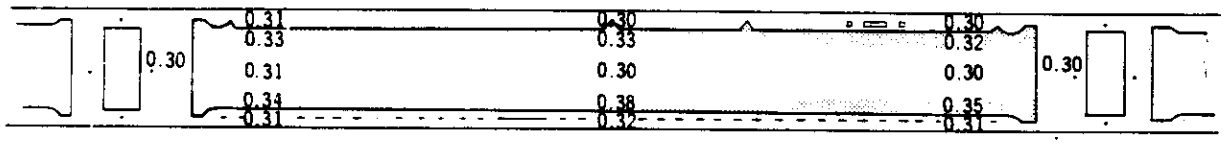
GRAPHIC 1

GRAPHIC 2

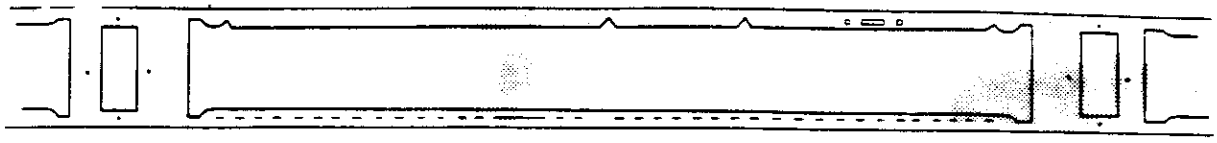


GRAPHIC 3

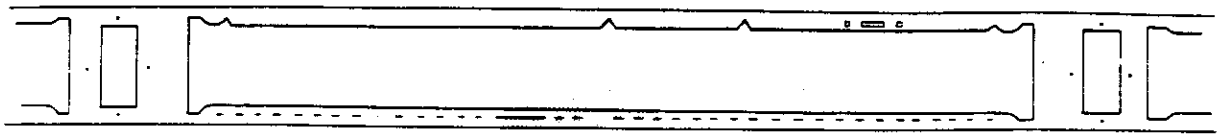
GRAPHIC 4



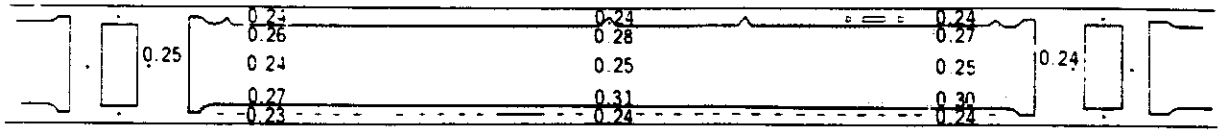
GRAPHIC 5



GRAPHIC 6



GRAPHIC 7



PART III. IMAGED AUXILIARY DATA

A. Fwd-Looking Panoramic Camera

1. Horizon Cameras

a. Starboard-Looking

(1) Imagery: The imagery is good and the earth's curvature is sharp and well defined.

(2) Fiducials: The fiducials are sharp and of good density.

b. Port-Looking

(1) Imagery: The imagery is good and the earth's curvature is sharp and has good density.

(2) Fiducials: The fiducials are sharp and well defined.

2. Frequency Marks: The frequency marks are discernible, but are slightly low in density.

3. Binary Time Word: The forward binary operated properly throughout the mission. The only missing binary was caused by a manufacturing splice on frame 11, pass 145D. The only problems encountered in the reading of the time labels were caused by a drift of the binary word during reproduction.

4. Binary Index: Slightly bloomed, but readable.

5. Camera Number: Readable.

6. Pan-Geometry Dots: The dots vary in shape from round to ellipses. At the beginning of the mission, there is one pan-geometry dot missing and several dots with low density. At the end of the mission, there are 28 dots missing or too low in density to be reproduced on the positives.

7. Nodal Traces: The traces are sharp and well defined. They are slightly more dense than those on Mission 1035.

8. Nod Indicators: N/A.

B. Aft-Looking Panoramic Camera

1. Horizon Cameras

a. Starboard-Looking

(1) Imagery: The imagery is good and the earth's curvature is sharp and well defined.

(2) Fiducials: The fiducials are sharp and of good density.

b. Port-Looking

(1) Imagery: The imagery is good and the earth's curvature is sharp and well defined.

(2) Fiducials: The fiducials are sharp and of good density.

2. Frequency Marks: The frequency marks are good, but are slightly low in density.

3. Binary Time Word: The aft time word operated properly except on frame 50, pass 152D, where it is missing.

4. Binary Index: Good, but slightly bloomed.

5. Camera Number: Readable.

6. Pan-Geometry Dots: The dots vary in shape from round to ellipses. At the beginning of the mission, one dot is missing and several dots are of low density. At the end of the mission, 18 dots are missing.

7. Nodal Traces: The traces are sharp and well defined. The density is heavier than the fwd camera traces and under certain conditions could obliterate small targets.

C. Stellar Camera (Mission 1037-1)

1. Grid Image Quality: The grid is sharp and well defined. On some frames, part of the grid is not detectable due to the low flare level.

2. Correlation Lamp Image Quality: Good.

D. Stellar Camera (Mission 1037-2)

1. Grid Image Quality: The grid is sharp and well defined.

2. Correlation Lamp Image Quality: Good.

E. Index Camera (Mission 1037-1)

1. Grid Image Quality: The grid is sharp and well defined. It is offset along the camera number edge and does not cover approximately 1/16 of an inch of the format.

2. Correlation Lamp Image Quality: The image quality is fair. When lit, the bulb is imaged on the film. When the lamp is not lit, half-moon ground images are visible around the bulb.

3. Camera Number Legibility: Readable.

F. Index Camera (Mission 1037-2)

1. Grid Image Quality: The grid is sharp and well defined.

2. Correlation Lamp Image Quality: Good.

3. Camera Number Legibility: Readable.

PART IV. MENSURATION QUALITY

A. Fwd-Looking Panoramic Camera

Not available.

B. Aft-Looking Panoramic Camera

Not available.

[redacted]

PART V. FILM PROCESSING

A. Processing Machines and Process Gamma

Film	Part: Entire Mission Machine	Gamma	Part: N/A Machine	Gamma
Fwd (Mission 1037-1)	Trenton	2.20		N/A
Aft (Mission 1037-1)	Trenton	2.04		N/A
Fwd (Mission 1037-2)	Trenton	2.12		N/A
Aft (Mission 1037-2)	Trenton	2.09		N/A
Stellar (Mission 1037-1)	Yardleigh	1.98		N/A
Stellar (Mission 1037-2)	Yardleigh	1.79		N/A
Index (Mission 1037-1)	Drape	1.24		N/A
Index (Mission 1037-2)	Drape	1.20		N/A

B. Processing Levels

1. Panoramic Cameras

Film	Primary	Intermediate	Full	Transition	Processing Changes
Fwd (Mission 1037-1)	9%	10%	81%	*%	28
Aft (Mission 1037-1)	0%	24%	76%	*%	38
Fwd (Mission 1037-2)	14%	26%	60%	*%	68
Aft (Mission 1037-2)	9%	31%	60%	*%	66

*Not Available.
NA - Not Applicable.

2. Secondary Cameras

a. Stellar Cameras

No interruption in processing.

b. Index Cameras

No interruption in processing.

[redacted]

C. Film Handling Summary

1. Fwd-Looking Camera

a. Capsule De-Filming

(1) Mission 1037-1: The radio transmitter was still operating when the capsule arrived at the processing site.

(2) Mission 1037-2: No problems encountered.

b. Pre-Processing Inspection

(1) Mission 1037-1: Some static noted.

(2) Mission 1037-2: Some static noted.

c. Manufacturing Splices

(1) Mission 1037-1: Pass 56D, frame 1.

(2) Mission 1037-2: Pass 145D, frame 11.

d. Processing Splices

(1) Mission 1037-1: The film from pass 64D, Part I from the "A" bucket and Part II from the "B" bucket, were combined at the breakdown of Mission 1037-2.

(2) Mission 1037-2: None.

e. Manufacturing Defects

(1) Mission 1037-1: Minimal.

(2) Mission 1037-2: Minimal.

f. Processing Anomalies

(1) Mission 1037-1: None.

(2) Mission 1037-2: None.

g. Breakdown

(1) Mission 1037-1: Normal.

(2) Mission 1037-2: Normal.

2. Aft-Looking Camera

a. Capsule De-Filming

(1) Mission 1037-1: No problems encountered.

(2) Mission 1037-2: No problems encountered.

b. Pre-Spooling

(1) Mission 1037-1: Some static noted.

(2) Mission 1037-2: Some static noted.

c. Manufacturing Splices

(1) Mission 1037-1: Pass 22D, frame 35.

(2) Mission 1037-2: Pass 75D, frame 18; pass 165D, frame 68; and pass 185D, frame 31.

d. Processing Splices

(1) Mission 1037-1: The film from pass 64D, Part I from the "A" bucket and Part II from the "B" bucket, were combined at the breakdown of Mission 1037-1.

(2) Mission 1037-2: None.

e. Manufacturing Defects

(1) Mission 1037-1: Minimal.

(2) Mission 1037-2: Minimal.

f. Processing Anomalies

(1) Mission 1037-1: None.

(2) Mission 1037-2: None.

g. Breakdown

(1) Mission 1037-1: Normal.

(2) Mission 1037-2: Normal.

3. Index Camera

a. Capsule De-Filming

(1) Mission 1037-1: No problems encountered.

(2) Mission 1037-2: No problems encountered.

b. Pre-Spooling

(1) Mission 1037-1: No static discharging reported.

(2) Mission 1037-2: No static discharging reported.

c. Manufacturing Splices

(1) Mission 1037-1: None.

(2) Mission 1037-2: None.

d. Processing Splices

(1) Mission 1037-1: Head and tail only.

(2) Mission 1037-2: Head and tail only.

e. Manufacturing Defects

(1) Mission 1037-1: None noted.

(2) Mission 1037-2: None noted.

f. Processing Anomalies

(1) Mission 1037-1: None.

(2) Mission 1037-2: None.

g. Breakdown

(1) Mission 1037-1: Normal.

(2) Mission 1037-2: Normal.

4. Stellar Camera

a. Capsule De-Filming

(1) Mission 1037-1: No problems encountered.

(2) Mission 1037-2: No problems encountered.

b. Pre-Spooling

(1) Mission 1037-1: No static discharging reported.

(2) Mission 1037-2: No static discharging reported.

c. Manufacturing Splices

(1) Mission 1037-1: None.

(2) Mission 1037-2: None.

d. Processing Splices

(1) Mission 1037-1: Head and tail only.

(2) Mission 1037-2: Head and tail only.

e. Manufacturing Defects

(1) Mission 1037-1: None noted.

(2) Mission 1037-2: None noted.

f. Processing Anomalies

(1) Mission 1037-1: The first 8 feet of film wrapped around the main feed roller causing minor film damage.

(2) Mission 1037-2: None.

g. Breakdown

(1) Mission 1037-1: Normal.

(2) Mission 1037-2: Normal.

D. Timetable

Film	Recovered	Received at Processing Site	Special Shipment Received at NPIC	Priority 1A Received at NPIC
Fwd (Mission 1037-1)	12 Nov 66/2244Z	13 Nov 66	None	16 Nov 66/1630EST
Aft (Mission 1037-1)	"	"	"	"
Stellar (Mission 1037-1)	"	"	"	"
Index (Mission 1037-1)	"	"	"	"
Fwd (Mission 1037-2)	20 Nov 66/2234Z	21 Nov 66/0945EST	"	24 Nov 66/1827EST
Aft (Mission 1037-2)	"	"	"	"
Stellar (Mission 1037-2)	"	"	"	"
Index (Mission 1037-2)	"	"	"	"

TOP SECRET
CORONA
NO FOREIGN DISSEM

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/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/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.

[redacted]

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

B. PI Statistics

1. Target Coverage

	Mission 1037-1	Mission 1037-2	Totals
Priority 1 Targets Programmed	92	*	-
Priority 1 Targets Covered	70	38	108

2. PI Quality Appraisal

Rating	Missiles	Nuclear Energy	Air Facilities	Ports	Elect/ Commo	Military Activity	Complexes
Good	2	1	6	3	None	2	3
Fair	28	6	17	1	None	8	4
Poor	16	2	8	1	None	7	2
Totals	46	9	31	5	-	17	9

48
9
31
5
7
9
19

3. Summary of PI Quality Ratings (Percentage)

Good	17 or 14%
Fair	64 or 54%
Poor	38 or 32%

*Not Available.

C. PI Comments

1. Atmospheric Attenuation

An analysis of atmospheric conditions affecting the priority targets as reported by the photo interpreters during the initial scan of the mission is as follows:

Weather	Number of Targets
Heavy Clouds	19
Scattered Clouds	36
Haze	5
Clear	59

[redacted]

2. Terrain Conditions: Approximately 10 percent of the mission imagery is snow covered.

3. Product Interpretability: The mission is rated as MIP 85. While this figure is based on the best frame of the mission, the overall interpretability is not as good as on many recent missions. Image edges are not as sharp as on some previous missions. This is the first mission where the nodal traces are imaged throughout. Since this is the first time most of the photo interpreters have seen the traces, they were disturbed by them. The traces are not as wide as on Mission 1035, but are of heavier density. The main complaint of the interpreters is that the nodal traces tend to be distracting. Furthermore, it is possible for the traces to obliterate small target images.

4. Resolution Target Analysis

RESOLUTION TARGET DATA

	A	A1	B	B1
Target Designator				
Camera (Looking)	Fwd	Aft	Fwd	Aft
Pass	16D	16D	161D	161D
Frame	21	20	6	5
Date of Photography	9 Nov 66	9 Nov 66	18 Nov 66	18 Nov 66
Universal Grid Coordinates	50.2-13.3	39.8-13.3	46.8-12.7	43.1-14.3
Geographic Coordinate of Format Center	34-50N 117-56W	34-55N 118-03W	31-25N 110-21W	31-41N 110-22W
Altitude (ft)	603,878	601,757	592,981	593,207
Camera				
Pitch (deg)	14°59'	ND	15°11'	ND
Roll (deg)	-00°03'	ND	00°05'	ND
Yaw (deg)	00°55'	ND	00°41'	ND
Local Sun Time	1213	1213	1230	1230
Solar Elevation (deg)	38°07'	38°11'	38°36'	38°30'
Solar Azimuth (deg)	184	184	189	189
Exposure (fraction of second)	1/299	1/382	1/294	1/373
Processing Level	Full	Full	Full	Full
Vehicle Azimuth (deg)	195°05'	194°59'	194°44'	194°40'
Filter (Wratten)	23A	21	23A	21
Target Type	Type C	Type B	3-Bar	3-Bar
Target Contrast	Medium	High	High	High
Weather Conditions	Clear	Clear	Clear	Clear

GROUND RESOLUTION IN FEET AS DETERMINED FROM THE ORIGINAL NEGATIVE

Target Designator	Observer Number 1 Along Track	Observer Number 1 Across Track	Observer Number 2 Along Track	Observer Number 2 Across Track	Observer Number 3 Along Track	Observer Number 3 Across Track
A	14'1"	16'	14'1"	16'	14'1"	16'
A1	8'	8'	8'	8'	8'	8'
B	15'8"	*	17'8"	*	17'8"	*
B1	9'11"	12'6"	12'6"	14'1"	12'6"	14'1"

*Largest bars unreadable.
ND - Not Determined.

PART VII. MISSION DATA

	Fwd-Looking Pan	Fwd Take-up Horizon	Fwd Supply Horizon	Aft-Looking Pan	Aft Take-up Horizon	Aft Supply Horizon	Mission 1037-1 Stellar	Mission 1037-1 Index	Mission 1037-2 Stellar	Mission 1037-2 Index
Camera Number	168	NA	NA	199	NA	NA	D101	D101	D106	D106
Lens Number	NA	NA	NA	NA	NA	NA	124	128	134	136
Lens Serial Number	2112635	12834	12855	2082435	12856	12840	10674	820195	10599	823769
Slit Width	0.225"	NA	NA	0.175"	NA	NA	NA	NA	NA	NA
Aperture	3.5	8.0	6.3	3.5	6.3	8.0	1.8	4.5	1.8	4.5
Exposure Time (sec)	1/250 avg	1/100	1/100	1/300 avg	1/100	1/100	1.0	1/500	2.0	1/500
Filter (Wratten)	23A	25	25	21	25	25	None	21	None	21
Focal Length (mm)	609.628	55.00	54.6	609.628	55.00	55.00	85.00 nom	38.38	85.00 nom	38.46
Film Length (ft)	16,000	NA	NA	16,000	NA	NA	75	135	75	135
Cutters	3	NA	NA	4	NA	NA	None	None	None	None
Emulsion	264-5-9-6	264-5-9-6	264-5-9-6	264-5-9-6	264-5-9-6	264-5-9-6	151-48-4-6	116-8-5-6	151-48-4-6	116-8-5
Film Type	3404	3404	3404	3404	3404	3404	3401	3400	3401	3400
Resolution Data (l/mm)										
Static										
High Contrast	234	209	209	252	209	209	*	74 AWAR	*	73 AWAR
Low Contrast	130	*	*	128	*	*	*	*	*	*
Dynamic										
I High Contrast	184	*	*	209	*	*	*	*	*	*
I Low Contrast	121	*	*	130	*	*	*	*	*	*
P High Contrast	*	*	*	*	*	*	*	*	*	*
P Low Contrast	110	*	*	100	*	*	*	*	*	*

NA - Not Applicable.
* - Not Available.