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NATIONAL PHOTOGRAPHIC INTERPRETATION CENTER

PHOTOGRAPHIC EVALUATION REPORT

MISSION 1102

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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	Ground distance between 2 exposure stations.
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 altitude 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.
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 co-incident 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.
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."

INDEX OF PHOTOGRAPHIC EVALUATION REPORTS AND SPECIAL STUDIES

PER	DOCUMENT NUMBER	SPECIAL STUDY
1033	[redacted]	None
1034		None
1036		None
1037		None
1038		None
1039		None
1040		None
1041		Slant Range Computations Related to Universal Grid Coordinates for the KH4A Camera System
1042	[redacted]	None
1043		Scan Speed Deviation Analysis of the Forward Camera, Mission 1043
1101	[redacted]	Slant Range Computations Related to Universal Grid Coordinates for the KH4B Camera System
1044	[redacted]	Dual Gamma/Viscose vs Conventional/Spray Processing Analysis (Mission 1044)
1102	[redacted]	None

SYNOPSIS

Mission 1102, a two-part satellite reconnaissance mission, was launched at 2226Z on 9 December 1967. The first capsule was recovered dry on revolution 83, at 0132Z on 15 December 1967. The mission was terminated by air catch of the second satellite re-entry vehicle on revolution 212, at 0000Z on 23 December 1967. A total of 91 photographic passes was accomplished by the 13-day mission.

The best photography of Mission 1102 is considered to be better than any previous photography from this system. The image quality of the fwd-looking camera record appears to be slightly better than the aft-looking camera. However, near the end of Mission 1102-1 and throughout Mission 1102-2 the imagery of the fwd-looking camera is smeared in the scan direction. This smear degrades the imagery on the take-up half of the format.

An MIP of 100 is assigned to this mission. Frame 22 fwd, rev 16D is the MIP frame and frame 29 aft, rev 16D has imagery corresponding to the MIP frame. Approximately 75 percent of the mission contains cloud-free photography.

Nine mobile and fixed CORN targets were recorded on this mission. The best targets observed in the original negatives of the fwd-looking camera produced approximately 5.7 feet ground resolution along the line of

flight (FMC direction) and across the line of flight (scan direction). The aft-looking camera produced approximately 5.7 feet of ground resolution along the line of flight and 6.8 feet across the line of flight.

The use of SO-230 emulsion at the end of Mission 1102-2 shows little difference in image and product quality from 3404-type emulsion.

The photography produced by the Dual Improved Stellar-Index Camera (DISIC) is adequate for attitude determination. The image quality is fair and slightly better than that obtained on Mission 1101. However, there are double exposures throughout the last 300 frames of the index camera photography. This degradation appears to be the result of a faulty capping shutter operation.

The proposed Bi-color and polarizer experiments were conducted on 8 photographic revolutions. A detailed analysis of these experiments is being carried out by NPIC, and the results will be available in the near future.

The through exposure test on Mission 1102-1, pass 32D has been analyzed by NPIC and the results are contained in part VIII, section B of this report.

PART I. GENERAL SYSTEM INFORMATION

A. Camera Numbers

Forward-Looking Panoramic Camera	305
Aft-Looking Panoramic Camera	304
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DISIC Camera (Mission 1102-2)	4

B. Launch and Recovery Dates

	(Mission 1102-1)	(Mission 1102-2)
Launch	2226Z/9 Dec 67	*
Recovery	0132Z/15 Dec 67	0000Z/23 Dec 67
Recovery Rev	83	212

C. Orbit Elements

Element	Planned	Actual 1102-1 Rev 54	Actual 1102-2 Rev 191	Photo Range
Period (min)	NA	88.543	88.525	*
Perigee (nm)	NA	84.641	82.632	82.32, rev 200D
Apogee (nm)	NA	145.016	149.583	100.64, rev 46D
Eccentricity	NA	0.00811	0.00905	*
Inclination (deg)	NA	81.64	81.65	*
Perigee Latitude	NA	24°38'N	33°41'N	*

NA - Not Available.
*Not Applicable.

D. Photographic Operations

1. Panoramic Cameras

Type	Mission 1102-1 Revs	1102-1 Frames	Mission 1102-2 Revs	1102-2 Frames	Total Revs	Total Frames
Operational						
Fwd	34	2,699	42	2,795	76	5,494
Aft	34	2,705	40	2,774	74	5,479
Operational/Domestic						
Fwd	0	0	0	0	0	0
Aft	0	0	0	0	0	0
Domestic						
Fwd	5	208	8	274	13	482
Aft	5	208	8	289	13	497
Engineering (no imagery)						
Fwd	2	25	0	0	2	25
Aft	2	25	0	0	2	25
Totals						
Fwd	41	2,932	50	3,069	91	6,001
Aft	41	2,938	48	3,063	89	6,001

2. Secondary Cameras

Camera	Frames
Stellar (Mission 1102-1)	3,492 starbcard, 3,492 port
Index (Mission 1102-1)	2,207
Stellar (Mission 1102-2)	3,948 starboard, 3,942 port
Index (Mission 1102-2)	2,382

E. Film Usage

	Film Load (Total, ft)	Pre-Flight Footage	Processed Footage
Fwd-Looking (Mission 1102-1)	*16,300	424	8,126 of 3404
Aft-Looking (Mission 1102-1)	*16,300	423	8,154 of 3404
Fwd-Looking (Mission 1102-2)	NA	NA	6,124 of 3404/2,012 of S0230
Aft-Looking (Mission 1102-2)	NA	NA	5,613 of 3404/2,508 of S0230
Stellar (Mission 1102-1)	*2,000	26	996 of 3401
Stellar (Mission 1102-2)	NA	NA	955 of 3401
Index (Mission 1102-1)	*2,000	48	1,051 of 3400
Index (Mission 1102-2)	NA	NA	982 of 3400

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

PART II. IMAGE ANALYSIS

A. Fwd-looking Panoramic Camera

1. Density: A major part of the fwd-looking camera record is of medium density. The high density is attributed to snow and cloud-covered areas.

2. Contrast: The imagery obtained by the fwd-looking camera is generally of medium contrast.

3. Acuity: The image quality of the fwd-looking camera record appears to be slightly better than the aft-looking camera and the best imagery ever obtained from this system. However, near the end of Mission 1102-1 and throughout Mission 1102-2 the fwd-looking camera record exhibits a smear in the scan direction. This smear is present on the take-up half of most frames and is attributed to an unidentified transient which caused film disturbance in the scan direction.

4. Imaged Degradations:

a. Light Leaks: Minor fog patterns are present on the third, fourth, and eighth frame from the end of most camera operations (Graphics 1 and 2, page 16).

b. Static: Dendritic fog patterns resulting from static discharges are present intermittently along both film edges throughout the mission. They vary in size and intensity and at

times enter the active format area.

c. Other: None noted.

5. Physical Degradations: Rail scratches are continuous along both film edges throughout the mission.

6. Product Quality: The previously mentioned image smear on the fwd-looking camera record (Mission 1102-2) causes serious degradation on the take-up half of the format. However, the quality of Mission 1102-1 and the supply half of the format of Mission 1102-2 is considered good and is not adversely affected by imaged or physical degradations noted above.

B. Aft-Looking Panoramic Camera

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

2. Contrast: Same as reported for the fwd-looking camera.

3. Acuity: The image quality of the aft-looking camera record is considered to be better than any previous photography from this system. However, finer detail can be observed in the imagery obtained from the fwd-looking camera.

4. Image Degradations:

a. Light Leaks: Minor fog patterns are present on the second and seventh frames from the end of most aft camera operations (Graphic 3, Page 16).

b. Static: Dendritic fog patterns resulting from static discharges are present intermittently throughout the mission. They are generally confined to the border areas but in some cases enter the active format area.

c. Other: None noted.

5. Physical Degradations: Numerous emulsion scratches are present near the center of the active format intermittently throughout the mission. These scratches diminish in number and severity as the mission progresses.

Rail scratches are continuous along both film edges throughout the mission.

6. Product Quality: The imaged and physical degradations listed for the aft-looking camera record are generally of a minor nature and do not affect the over-all product quality.

C. Stellar Cameras (Mission 1102-1)

1. Density: The starboard camera record is generally of medium density and somewhat heavier than the port-looking camera record. In some instances, heavy density precludes the detection of stellar images. The port camera record is generally thin to medium and adequate for the detection of stellar images.

2. Contrast: Adequate for the detection of stellar images.

3. Image Shape: The stellar images generally appear as point

type but in some cases are slightly elongated.

4. Images per frame: Approximately 10 to 15 stellar images are detectable in each stellar frame. However, the port camera produced more frames with this number of images. The stellar field at which the camera was looking contained Pisces and Cetus.

5. Flare Level: Every port and starboard format is slightly vignetted and/or flared by the boot baffles. The flare appears as narrow bars (approximately one-eighth of an inch wide) along the leading and trailing edges of the formats. Star images are not detectable in these flared areas.

6. Image Degradations:

a. Light Leaks: None noted.

b. Static: Minor dendritic-type fog patterns are present near the end of the stellar record. Corona fog markings are present frequently throughout the mission.

c. Other: All port and starboard camera frames contain repeated patterns of minus density spots which appear to be caused by dirt on the reseau plate.

7. Physical Degradations: Pressure-induced fog patterns are present in the border area on both film edges of the entire stellar record.

8. Product Quality: The product quality is considered to be

good and suitable for attitude determination. No problems were encountered in the reduction process.

D. Stellar Camera (Mission 1102-2)

1. Density: Same as reported for Mission 1102-1.

2. Contrast: Same as reported for Mission 1102-1.

3. Image Shape: Same as reported for Mission 1102-1.

4. Images per Frame: Same as reported for Mission 1102-1.

5. Flare Level: Same as reported for Mission 1102-1.

6. Image Degradations:

a. Light Leaks: None noted.

b. Static: Numerous electrostatic markings of the dendritic and corona types are present intermittently but frequently throughout the stellar camera record. At times, the intensity of these markings is severe enough to impair the detection of stellar images.

c. Other: Same as reported on Mission 1102-1.

7. Physical Degradations: In addition to the physical degradations noted on Mission 1102-1, the last 3 to 4 feet of the stellar record contain numerous base and emulsion scratches, pinholes, and the usual degradations associated with film supply exhaustion.

8. Product Quality: Same as reported for Mission 1102-1.

E. Index Camera (Mission 1102-1)

1. Density: Generally medium to heavy.

2. Contrast: Generally low to medium.

3. Acuity: The image quality is fair to good and slightly better than that obtained from Mission 1101.

4. Imaged Degradations:

a. Light Leaks: None noted.

b. Static: None noted.

c. Other: None noted.

5. Physical Degradations: None noted.

6. Product Quality: The product quality of the index camera record is rated good and suitable for relative orientation.

F. Index Camera (Mission 1102-2)

1. Density: Same as reported on Mission 1102-1.

2. Contrast: Same as reported on Mission 1102-1.

3. Acuity: Same as reported on Mission 1102-1 up to revolution 149 where many terrain frames are seriously degraded by what appears to be multiple exposures. This anomaly is explained under Imaged Degradations.

4. Imaged Degradations:

a. Light Leaks: None noted.

b. Static: Minor dendritic and corona-type fog patterns that extend into the active format are present intermittently throughout the index camera record.

c. Other: Beginning with revolution 182, most terrain frames are seriously degraded by what appears to be multiple exposures at a level significantly less than normal exposure. Between revolutions 149 and 182, some slight degradation was noted intermittently. Measured separations of exposure in the flight and film transport directions are consistent with image, film transport, and shutter velocities. This indicates incomplete closing of the capping shutter as a likely failure. Failure was initially quite intermittent, becoming progressively more frequent until, at the end of the mission, it was prevalent.

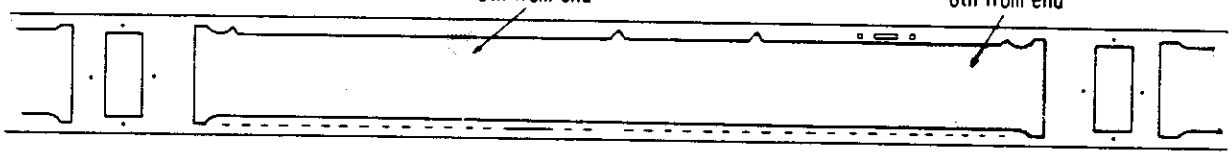
5. Physical Degradations: None noted.

6. Product Quality: Same as reported for Mission 1102-1 up to revolution 149 where the aforementioned multiple exposure intermittenly degrades the image quality. After revolution 182, the terrain camera product is unsuitable for relative orientation.

G. Graphic Display (Mission 1102)

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

Graphic 1



Graphic 2

Graphic 3

PART III. IMAGED AUXILIARY DATA

A. Fwd-Looking Panoramic Camera

1. Horizon Cameras

a. Starboard-looking

(1) Imagery: Sharp and distinct.

(2) Fiducials: Well defined.

b. Port-looking

(1) Imagery: Sharp and distinct.

(2) Fiducials: Well defined.

2. Frequency marks: The frequency marks were occasionally weak or partially missing or completely missing on some frames. This problem has been experienced on other systems and is attributed to the starting characteristics of the neon bulb. This effect is possibly aggravated by low temperatures.

3. *Binary Time Word: Generally well defined. However, there were several frames where the time word row was not imaged. The time word was read on 5 passes of the mission to establish a correlation to the tape recorder data. After this had been accomplished, all subsequent time readings were taken from the tape recorder data. Therefore, this anomaly had little effect on NPIC.

4. *Binary Index: Generally well defined. However, there were several frames where the binary index row was not imaged.

*This anomaly was noted during the flight preparations and was subsequently reported before the mission. The problem was induced by electrical transients on the power line and actually represents an interrogation of the clock just prior to the film becoming stationary.

5. Camera Number: Readable.

6. Pan Geometry Dots: All pan geometry dots are sharp, distinct, and present throughout the mission.

7. Nodal Traces: The nodal traces are generally sharp and well defined. However, midway through Mission 1102-2, the trace on the binary edge of the forward camera record is broken intermittently due to emulsion build up along the film guide rails. The pan geometry information is primarily used in the mapping community and therefore has little or no affect on NPIC.

8. Nod Indicators: Not applicable.

B. Aft-Looking Panoramic Camera

1. Horizon Camera

a. Starboard-looking

(1) Imagery: Sharp and distinct.

(2) Fiducials: Well defined.

b. Port-looking

(1) Imagery: Sharp and distinct.

(2) Fiducials: Well defined.

2. Frequency Marks: Same as reported for the fwd-looking camera record.

3. Binary Time Word: Same as reported for the fwd-looking camera record.

4. Binary Index: Same as reported for the fwd-looking camera record.

5. Camera Number: Readable.

6. Pan Geometry Dots: Same as reported for the fwd-looking camera record.

7. Nodal Traces: The nodal traces are generally sharp and well defined. However, near the end of Mission 1102-1 and throughout Mission 1102-2 the trace on the binary edge of the aft-looking camera record is broken intermittently, due to emulsion build up along the film guide rails. The pan geometry information is primarily used in the mapping community and therefore has little or no affect on NPIC.

8. Nod Indicators: Not applicable.

C. Stellar Camera (Mission 1102-1)

1. Grid Image Quality: Sharp and well defined.

2. Correlation Lamp Image Quality: Not applicable.

3. Binary Time Word: Sharp and well defined.

4. Lens Serial Number Legibility: Good.

D. Stellar Camera (Mission 1102-2)

1. Grid Image Quality: Sharp and well defined.

2. Correlation Lamp Image Quality: Not applicable.

3. Binary Time Word: Sharp and well defined.

4. Lens Serial Number Legibility: Good.

E. Index Camera (Mission 1102-1)

1. Grid Image Quality: Sharp and well defined.

2. Correlation Lamp Image Quality: Not applicable.

3. Binary Time Word: Sharp and well defined.

4. Camera Number Legibility: Good.

F. Index Camera (Mission 1102-2)

1. Grid Image Quality: Sharp and well defined.

2. Correlation Lamp Image Quality: Not applicable.

3. Binary Time Word: Sharp and well defined.

4. Camera Number Legibility: Good.

PART IV. MENSURATION QUALITY

A. Fwd-Looking Panoramic Camera:

There were 22 requests for mensuration on this mission. No problems were encountered. The image quality is considered to be fair to good for mensuration purposes.

B. Aft-Looking Panoramic Camera: Same as above.

PART V. FILM PROCESSING

A. Processing Machines and Process Gamma

	Part: Machine	Entire Mission Gamma	Emulsion	Part: Machine	NA Gamma
Fwd (Mission 1102-1)	Trenton	2.16	3404	NA	NA
Aft (Mission 1102-1)	Trenton	2.10	3404	NA	NA
Fwd (Mission 1102-2)	Trenton	2.20	3404	NA	NA
		2.32	S0230	NA	NA
Aft (Mission 1102-2)	Trenton	2.20	3404	NA	NA
		2.32	S0230	NA	NA
Stellar (Mission 1102-1)	Trenton	2.22	3401	NA	NA
Stellar (Mission 1102-2)	Trenton	2.24	3401	NA	NA
Index (Mission 1102-1)	Yardleigh	1.72	3400	NA	NA
Index (Mission 1102-2)	Drape	1.70	3400	NA	NA

NA - Not Applicable.

B. Processing Levels

1. Panoramic Cameras

Film	Primary	Intermediate	Full	Transition	Processing Changes
Fwd (Mission 1102-1)	1%	10%	84%	6%	16
Aft (Mission 1102-1)	1%	6%	84%	9%	23
Fwd (Mission 1102-2) (Film type 3404)	0%	7%	85%	8%	16
Fwd (Mission 1102-2) (Film type S0230)	8%	8%	68%	16%	11
Aft (Mission 1102-2) (Film type 3404)	1%	4%	87%	8%	14
Aft (Mission 1102-2) (Film type S0230)	14%	2%	68%	16%	12

2. Secondary Camera:

a. Stellar Camera: The stellar camera records were processed with a Trenton processor at a single level of development.

b. Index Cameras: Both missions, 1102-1 and 1102-2, received identical development but in different processors. The index record from Mission 1102-1 was processed in a spray processor (Yardleigh Primary) at a single level of development. The index record from Mission 1102-2 was processed in the Drape processor (immersion) at a single level of development.

C. Film Handling Summary

1. Fwd-Looking Camera

a. Capsule De-Filming:

(1) Mission 1102-1: No problems encountered.

(2) Mission 1102-2: No problems encountered.

b. Pre-Processing Inspection:

(1) Mission 1102-1: No problems encountered.

(2) Mission 1102-2: No problems encountered.

c. Manufacturing Splices:

(1) Mission 1102-1: Frame 37, pass 13D and frame 125, pass 21D.

(2) Mission 1102-2: Frame 19, pass 87D. The forward camera material contained a pre-exposed, pre-processed indicator strip (approx. 3 feet in length) to indicate the film type change from 3404 to SO-230. Part of the last programmed frame (36) of pass 170D and all of programmed frame 1 of pass 171D were exposed on this non-sensitive strip and lost. Therefore, titled frame numbers on pass 171D are one frame off from the programmed frame, i.e. titled frame 1 is actually programmed frame 2, and so forth.

d. Processing Splices:

(1) Mission 1102-1: None other than normal.

(2) Mission 1102-2: None other than normal.

e. Manufacturing Defects:

(1) Mission 1102-1: None noted.

(2) Mission 1102-2: None noted.

f. Processing Anomalies: None.

g. Breakdown: No problems encountered.

2. Aft-Looking Camera:

a. Capsule De-Filming:

(1) Mission 1102-1: No problems encountered.

(2) Mission 1102-2: No problems encountered.

b. Pre-Processing Inspection:

(1) Mission 1102-1: No problems encountered.

(2) Mission 1102-2: No problems encountered.

c. Manufacturing Splices:

(1) Mission 1102-1: Frame 226, pass 22D and frame 102, pass 71D.

(2) Mission 1102-2: Frame 9, pass 106D. The aft camera material contained a pre-exposed, pre-processed indicator strip (approx. 3 feet in length) to indicate the film type change from 3404 to SO-230. Part of programmed frame 62 (titled 62) and all of programmed frame 63 of pass 155D were lost. Programmed frame 64 is titled 63. Therefore, titled frames 63 through 92 are one frame off from the programmed frame.

d. Processing Splices:

(1) Mission 1102-1: None other than normal.

(2) Mission 1102-2: Frame 63, pass 155D. This splice is due to a change in film type. A manufacturing splice was present at this point along with a coded film spacer which was removed prior to processing.

e. Manufacturing Defects:

(1) Mission 1102-1: None noted.

(2) Mission 1102-2: None noted.

f. Processing Anomalies: None.

g. Breakdown: No problems encountered.

3. Index Camera:

a. Capsule De-Filming:

(1) Mission 1102-1: No problems encountered.

(2) Mission 1102-2: No problems encountered.

b. Pre-Processing Inspection:

(1) Mission 1102-1: No problems encountered.

(2) Mission 1102-2: No problems encountered.

c. Manufacturing Splices:

(1) Mission 1102-1: None.

(2) Mission 1102-2: None.

d. Processing Splices:

(1) Mission 1102-1: None.

(2) Mission 1102-2: None.

e. Manufacturing Defects:

(1) Mission 1102-1: None noted.

(2) Mission 1102-2: None noted.

f. Processing Anomalies: None.

g. Breakdown: No problems encountered.

4. Stellar Camera:

a. Capsule De-Filming:

(1) Mission 1102-1: No problems encountered.

(2) Mission 1102-2: No problems encountered.

b. Pre-Processing Inspection:

(1) Mission 1102-1: No problems encountered.

(2) Mission 1102-2: No problems encountered.

c. Manufacturing Splices:

(1) Mission 1102-1: None.

(2) Mission 1102-2: The following stellar frames were lost due to a manufacturing splice: 3231P, 3237S, 3232P, 3238S, 3233P, 3239S, and half of 3234P.

d. Processing splices:

(1) Mission 1102-1: None other than normal.

(2) Mission 1102-2: None other than normal.

e. Manufacturing Defects:

(1) Mission 1102-1: None noted.

(2) Mission 1102-2: None noted.

f. Processing Anomalies: None.

g. Breakdown: No problems encountered.

D. Timetable

Film	Recovered	Received at Processing Site	*Spec Ship at NPIC Recd	Priority 1A at NPIC Recd
Fwd (Mission 1102-1)	15 Dec 67/2226Z	NA	28 Dec 67/8:34	28 Dec 67/10:25 a.m.
Aft (Mission 1102-1)	"	NA	" p.m.	"
Stellar (Mission 1102-1)	"	NA	None	"
Index (Mission 1102-1)	"	NA	"	"
Fwd (Mission 1102-2)	23 Dec 67/0000Z	NA	"	28 Dec 67/12:51 p.m.
Aft (Mission 1102-2)	"	NA	"	"
Stellar (Mission 1102-2)	"	NA	"	"
Index (Mission 1102-2)	"	NA	"	"

*Special Shipment Explanation: A work copy of the entire mission (Mission 1102-1) was dispatched to NPIC on a priority basis to satisfy the highest priority requirements.

NA - Not Available.

[redacted]

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 1102-1	Mission 1102-2	Totals
Priority 1 Targets Programmed	No specific priority 1 targets were programmed on this mission although specific areas were selected for initial readout.		
Priority 1 Targets Covered	148	244	392

2. PI Quality Appraisal

Rating	Missiles	Nuclear Energy	Air Facilities	Naval Activity	Elect Commo	Military Activity	Complex
Good	39	3	12	30	0	17	12
Fair	61	1	51	4	1	98	25
Poor	19	2	14	1	2	18	0
Totals*	119	6	77	35	3	133	37

3. Summary of PI Quality Ratings (Percentage)

Good	113	27.5
Fair	241	58.8
Poor	56	13.7

*A discrepancy exists between the total number of targets covered and the total PI reports because some targets are covered more repeatedly.

C. PI Comments

1. Atmospheric Attenuation: Listed below is the photo interpreter's report of weather conditions for priority 1 targets covered on this mission.

a.	Clear:	333	81.2%
b.	Scattered Clouds:	41	10.0%
c.	Heavy Clouds:	7	1.7%
d.	Haze:	26	6.4%
e.	Cloud Shadow:	3	.7%

2. Terrain Conditions: The terrain has a predominance of snow cover, which is normal for the time of year.

3. Product Interpretability: The photo interpretability of Mission 1102 ranges from poor to good with over half of the mission in the fair range. The photographic interpreters report that Mission 1102 produced the best quality photography to date from this system. The poor ratings are generally a result of atmospheric attenuation.

4. Resolution Target Analysis

Target Designator	A		B	
Camera (Looking)	Fwd	Aft	Fwd	Aft
Pass	16	16	16	16
Frame	6	12	6	12
Date of Photography	10 Dec 67	10 Dec 67	10 Dec 67	10 Dec 67
Universal Grid Coordinates	19.5 - 4.0	56.1 - 2.7	19.5 - 4.0	56.1 - 2.7
Geographic Coordinates of Format Center	34-53N 117-08W	34-54N 117-14W	34-53N 117-08W	34-54N 117-14W
Altitude (ft)	536,862	535,248	536,862	535,249
Camera				
Pitch (deg)	15°32'	-14°55'	15°32'	-14°55'
Roll (deg)	-0°10'	-0°17'	-0°10'	-0°17'
Yaw (deg)	-2°27'	-2°32'	-2°27'	-2°32'
Local Sun Time	1425	1425	1425	1425
Solar Elevation (deg)	23°07'	22°39'	22°40'	23°13'
Solar Azimuth (deg)	46°11'	46°26'	46°32'	46°46'
Exposure (sec)	1/232	1/293	1/232	1/294
Processing Level	Full	Full	Full	Full
Vehicle Azimuth (deg)	172°36'	172°43'	172°36'	172°43'
Filter (Wratten)	W/25	W/21	W/25	W/21
Target Type	B1	B1	B2	B2
Target Contrast	4:1	4:1	16:1	16:1
Weather Conditions	Clear	Clear	Clear	Clear

GROUND RESOLUTION IN FEET AS DETERMINED FROM THE ORIGINAL NEGATIVE

	A					B			
	Along Track		Across Track			Along Track		Across Track	
	Fwd	Aft	Fwd	Aft		Fwd	Aft	Fwd	Aft
Observer 1	9.0	11.3	10.1	10	Observer 1	6.3	6.3	5.7	8.0
Observer 2	11.3	11.3	9.0	10	Observer 2	5.7	6.3	5.7	8.0
Observer 3	9.0	11.3	10.0	10	Observer 3	5.7	5.7	5.7	8.0

NA - Not Available

TOP SECRET RUFF
NO FOREIGN DISSEM

Target Designator	A		B	
Camera (Looking)	Fwd	Aft	Fwd	Aft
Pass	32	32	48	48
Frame	13	19	21	27
Date of Photography	11 Dec 67	11 Dec 67	12 Dec 67	12 Dec 67
Universal Grid Coordinates	37.8 - 3.0	37.8 - 3.1	25.4 - 4.3	NL
Geographic Coordinates of Format Center	35-01N 113-55W	35-01N 113-58W	35-00N 110-20W	35-00N 110-22W
Altitude (ft)	527,953	527,000	522,432	521,751
Camera				
Pitch (deg)	15°33'	-14°54'	15°35'	-14°55'
Roll (deg)	0°01'	-0°01'	-0°09'	-0°08'
Yaw (deg)	-2°46'	-2°41'	-2°31'	-2°35'
Local Sun Time	1415	1415	1407	1407
Solar Elevation (deg)	23°27'	23°27'	24°36'	24°35'
Solar Azimuth (deg)	44°20'	44°15'	42°17'	42°11'
Exposure (sec)	1/233	1/294	1/241	1/304
Processing Level	Full	Full	Full	Full
Vehicle Azimuth (deg)	172°32'	172°39'	172°34'	172°41'
Filter (Wratten)	W/25	W/21	W/25	SF05
Target Type	51/51 T-Bar	51/51 T-Bar	51/51 T-Bar	51/51 T-Bar
Target Contrast	5:1	5:1	5:1	5:1
Weather Conditions	Clear	Clear	Cloudy	Cloudy

GROUND RESOLUTION IN FEET AS DETERMINED FROM THE ORIGINAL NEGATIVE

	A				B				
	Along Track		Across Track			Along Track		Across Track	
	Fwd	Aft	Fwd	Aft		Fwd	Aft	Fwd	Aft
Observer 1	8	12	12	8	Observer 1	12	NL	16	NL
Observer 2	12	12	12	12	Observer 2	12	NL	16	NL
Observer 3	12	12	12	12	Observer 3	12	NL	16	NL

NL - Not Located.

	A		B		
Target Designator					
Camera (Looking)	Fwd	Aft	Fwd	Aft	Aft
Pass	48	48	97	97	97
Frame	48	54	15	21	22
Date of Photography	12 Dec 67	12 Dec 67	15 Dec 67	15 Dec 67	15 Dec 67
Universal Grid Coordinates	22.0 - 2.6	53.8 - 4.3	56.1 - 1.9	19.0 - 5.2	19.4 - 0.5
Geographic Coordinates of Format Center	31-03N 109-50W	31-04N 109-52W	37-26N 122-41W	37-27N 122-42W	37-20N 122-40W
Altitude (ft)	519,633	519,120	514,670	514,102	514,004
Camera					
Pitch (deg)	15°35'	-14°56'	15°23'	-15°00'	-14°59'
Roll (deg)	0°04'	0°01'	-0°05'	-0°04'	-0°03'
Yaw (deg)	-2°53'	-2°50'	-2°29'	-2°28'	-2°29'
Local Sun Time	1410	1410	1323	1323	1323
Solar Elevation (deg)	27°07'	27°05'	25°16'	25°15'	25°21'
Solar Azimuth (deg)	43°24'	43°19'	34°49'	34°42'	34°44'
Exposure (sec)	1/243	1/305	1/246	1/310	1/310
Processing Level	Transition (F-P)	Full	Full	Full	Full
Vehicle Azimuth (deg)	173°05'	173°11'	172°09'	172°17'	172°18'
Filter (Wratten)	W/25	SF05	W/25	SF05	SF05
Target Type	Standard 3 Bar	Standard 3 Bar	51/51 T-Bar	51/51 T-Bar	51/51 T-Bar
Target Contrast	11:1	11:1	5:1	5:1	5:1
Weather Conditions	Cloud Shadow	Cloud Shadow	Haze	Haze	Haze

GROUND RESOLUTION IN FEET AS DETERMINED FROM THE ORIGINAL NEGATIVE

A

	Along Track Fwd	Along Track Aft	Across Track Fwd	Across Track Aft
Observer 1	8	8	9	9
Observer 2	8	8	9	9
Observer 3	8	8	9	9

B

	Along Track Fwd	Along Track Aft	Across Track Fwd	Across Track Aft
Observer 1	16	*	16	*
Observer 2	12	*	*	*
Observer 3	12	*	16	*

*No Reading Possible.

Target Designator	A		B	
Camera (Looking)	Fwd	Aft	Fwd	Aft
Pass	113	113	113	113
Frame	19	26	24	30
Date of Photography	16 Dec 67	16 Dec 67	16 Dec 67	16 Dec 67
Universal Grid Coordinates	36.6 - 1.7	39.0 - 0.5	71.7 - 2.0	3.4 - 5.0
Geographic Coordinates of Format Center	35-22N 118-56W	35-17N 118-58W	34-46N 118-51W	34-47N 118-53W
Altitude (ft)	513,711	513,000	513,207	512,630
Camera				
Pitch (deg)	15°46'	-14°36'	15°51'	-14°34'
Roll (deg)	0°02'	0°03'	0°03'	0°05'
Yaw (deg)	-2°44'	-2°42'	-2°45'	-2°43'
Local Sun Time	1326	1326	1327	1326
Solar Elevation (deg)	27°43'	27°48'	28°14'	28°13'
Solar Azimuth (deg)	33°06'	33°02'	33°17'	33°11'
Exposure (sec)	1/247	1/312	1/246	1/313
Processing Level	Full	Full	Full	Full
Vehicle Azimuth (deg)	172°31'	172°39'	172°37'	172°43'
Filter (Wratten)	W/25	SF05	W/25	SF05
Target Type	51/51 T-Bar	51/51 T-Bar	C	C
Target Contrast	5:1	5:1	4:1	4:1
Weather Conditions	Haze	Haze	Scattered Clouds	Scattered Clouds

GROUND RESOLUTION IN FEET AS DETERMINED FROM THE ORIGINAL NEGATIVE

	A				B				
	Along Track		Across Track		Along Track		Across Track		
	Fwd	Aft	Fwd	Aft	Fwd	Aft	Fwd	Aft	
Observer 1	*	16	*	16	14	16	*	20	
Observer 2	16	16	*	16	12.7	16	20	20	
Observer 3	16	16	16	16	12.7	16	*	20	

*No Reading Possible.

[redacted]

[redacted]

Target Designator	A		B	
Camera (Looking)	Fwd	Aft	Fwd	Aft
Pass	129	129	176	176
Frame	4	10	86	92
Date of Photography	17 Dec 67	17 Dec 67	20 Dec 67	20 Dec 67
Universal Grid Coordinates	26.2 - 3.6	26.2 - 3.3	27.5 - 3.3	28.2 - 4.3
Geographic Coordinates of Format Center	36-20N 115-38W	36-21N 115-40W	34-52N 88-3 W	34-52N 88-42W
Altitude (ft)	512,240	511,550	507,671	507,37[illegible]
Camera				
Pitch (deg)	15°33'	-14°58'	15°54'	-14°34'
Roll (deg)	-0°05'	-0°06'	0°03'	0°07'
Yaw (deg)	-2°56'	-2°50'	-2°23'	-2°30'
Local Sun Time	1315	1315	1245	1245
Solar Elevation (deg)	27°33'	27°32'	25°16'	25°16'
Solar Azimuth (deg)	30°30'	30°24'	22°11'	22°37'
Exposure (sec)	1/247	1/321	1/252	1/309
Processing Level	Full	Full	Full	Full
Vehicle Azimuth (deg)	172°21'	172°28'	171°42'	171°50'
Filter (Wratten)	SF09	W 21	SF09	W/21
Target Type	Standard 3 Bar	Standard 3 Bar	AB	AB
Target Contrast	11:1	11:1	High	High
Weather Conditions	Clear	Clear	Haze	Haze

GROUND RESOLUTION IN FEET AS DETERMINED FROM THE ORIGINAL NEGATIVE

	A					B			
	Along Track		Across Track			Along Track		Across Track	
	Fwd	Aft	Fwd	Aft		Fwd	Aft	Fwd	Aft
Observer 1	7.8	7.8	8.6	6.8	Observer 1	*	9	*	*
Observer 2	7.8	7.8	7.8	6.8	Observer 2	10	10	*	*
Observer 3	7.8	7.8	9.8	6.8	Observer 3	*	9	*	*

*No Readings Possible.

FIGURE 1. BEST IMAGE QUALITY
Image quality comparable to the best of this mission.

FIGURE 2. CORRESPONDING COVERAGE
Corresponding coverage as imaged by the aft-Looking camera.

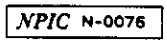


	FIGURE 1	FIGURE 2
Camera	305	304
Pass	16D	16D
Frame	22	29
Date of Photography (GMT)	10 Dec 67	10 Dec 67
KH4B Grid Coordinates	26.8-1.3	48.6-0.7
Enlargement Factor	20X	20X
Geographic Coordinates	32-04N 116-50W	32-04N 116-52W
Altitude (ft)	533,506	532,345
Camera Altitude:		
Pitch (deg)	NA	NA
Roll (deg)	NA	NA
Yaw (deg)	NA	NA
Local Sun Time	1427	1427
Solar Elevation (deg)	24°06'	24°11'
Solar Azimuth (deg)	47°11'	47°08'
Exposure (sec)	1/234	1/295
Vehicle Azimuth (deg)	172°55'	173°02'
Processing Level	Full	Full

NA - Not Available.

2. Bi Spectral, Polarizer, and S0230 Experiments.

The results of these evaluations are not available at this time; however, they will appear as a special study in a later PER.

C. Schedule of Future Experiments

Mission		
1103	Bi-spectral	Wratten 25 and SF 05 (Green Filter), Operational
	Wide Band Filter	Wratten 12
	SO-380	Ultra Thin Base Film
1104	SO-180	Color Infrared Film
	Night	SO-340 (Tri X Type emulsion)

Tentative Experiments

1105	Kodachrome II	High Resolution Color Film
1106 & 1107	Polarizer Through Focus	Winter, Proper Azimuth Stepped Glass Filter

area of both frames is detected.

Frame 21 vs 22 — Frame 22 is more dense and contains more detail and better tonal separation.

Frame 24 vs 25 — Frame 24 is more dense and contains more detail and better tonal separation.

Frame 27 vs 28 — Frame 28 is more dense and contains more detail and better tonal separation.

b. Conclusions:

1. The density of the highlight areas of the frames obtained with narrow slit widths is insufficient. A definite loss of detail occurs in these areas although the loss is minimized when the wider slits are used.

2. Contrary to what may be expected, better separation is available in both the highlight and shadow areas of the more dense frames.

3. When the material is viewed under magnifications of approximately 60X and above, the imagery obtained with the narrow slit widths appears slightly sharper.

4. The increase in detail gained by the higher density outweighs the advantages of the slight increase in image sharpness provided by the narrow slit widths.

A comparison of the density values to the criteria that the minimum density should be 0.40 or greater indicates that each frame is underexposed. The minimum density of each frame in the experiment is below the 0.40 density level. Each frame was processed at the full level of development, indicating that more exposure was needed to place the minimum densities within the established criteria.

2. A subjective image evaluation was performed on each frame of the original negative where the exposure was varied. In each case, the frame which had an exposure change was compared with the preceeding frame. Results from this evaluation are listed below:

Fwd Camera: Exposure changes were initiated on frames 9, 12, and 14 of pass 32D.

Frame 8 vs 9	Frame 9 is less dense, and little detail is prevalent in the highlight area. The maximum density value of 0.85 is less than optimum for this scenery.
Frame 11 vs 12	Frame 12 displays more detail. Building edges and linear lines are more clearly defined. Density differences between the two frames are negligible.

Frame 13 vs 14	Frame 14 contains more detail in the highlight areas. No difference in shadow detail is detectable.

Aft Camera: Exposure changes were initiated on frames 9, 14, 17, 20, 22, 25, and 28 of pass 32D.

Frame 8 vs 9	Frame 8 contains more detail in the highlight areas. Linear lines in cultivated areas are detectable on frame 8 that are not detectable on frame 9.
Frame 11 vs 12	The image quality appears comparable on both frames although frame 12 displays better separation between the highlight and shadow areas.
Frame 13 vs 14	More detail is present in the highlight and shadow areas of frame 14.
Frame 16 vs 17	Objects located along and in the edge of the water are more readily detectable on frame 17.
Frame 19 vs 20	No difference in the image quality of a village located within the overlap

PART VIII. ENGINEERING EXPERIMENTS

A. Mission 1102 Experiments

All proposed engineering experiments on Mission 1102 were accomplished as scheduled. A description of each experiment is presented below.

1. "Through Exposure Test." All available slit widths on the panoramic cameras were used on pass 32D.
2. "Bi Spectral Test." A combination of a Wratten 25 (red filter) and a SF05 (green filter) was used on 8 passes to obtain conjugate imagery suitable for bicolor presentation.
3. "Polarizer Test." A polacoat filter (20 degree alignment angle) was used on 8 passes of the forward camera.
4. "Type SO-230 Film Test." Over 2,000 feet of type SO-230 film was used in each panoramic camera.

B. Analysis of Experiments

1. Through Exposure Test. An experiment was performed on Mission 1102 to more accurately determine exposure criteria for the panoramic cameras. Exposure in the cameras is a direct function of the slit width and the scan rate. The scan rate is predetermined by the vehicle V/H (Velocity/Height). Therefore, the exposure is changed by using different slit widths.

a. Analysis:

1. Three slit widths (0.215, 0.270, and 0.340) on the fwd camera and four slit widths (0.134, 0.170, 0.215, and 0.270) on the aft camera account for the different exposures in the experiment. The slit width, scan rate, exposure, and solar elevation were derived for each frame on which the exposure was changed. In addition, the density (base plus fog, minimum, and maximum) was read from the frames on which the exposure was changed and on each preceding frame. This data is presented below.

PART VII. MISSION DATA

	Fwd Pan	Fwd Take-up Horizon	Fwd Supply Horizon	Aft Pan	Aft Take-up Horizon	Aft Supply Horizon	Mission 1102 Stellar Port	Mission 1102 Stellar Starboard	Mission 1102 Index
Camera Number	305	*	*	306	*	*	4		4
Reseau Number	*	*	*	*	*	*	4P	4	101
Lens Serial Number	I-181	E23793	E23774	I-165	E23799	E23785	4P	4	101
Slit Position/ Slit Widths (in)	1-0.215 2-0.270 3&4-0.340 Fail Safe-0.340	*	*	1-0.134 2-0.170 3-0.215 4-0.270 Fail Safe-0.230	*	*	*	*	*
Aperture	*	f/8.0	f/6.3	*	f/6.3	f/8.0	f/2.8	f/2.8	f/4.5
Exposure Time (sec)	Variable	1/100	1/100	Variable	1/100	1/100	1.5	1.5	1/500
Filter (Wratten) Primary	W-25	W-25	W-25	Primary W-21	W-25	W-25	None	None	W-12
Alternate	SF09 (Polarizer)			Alternate SF05					
Focal Length (mm)	609.600	55	55	609.625	55	55	76.2	76.2	76.2
Film Length (ft)	16,300	*	*	16,300	*	*	2,000		2,000
Splices	4	*	*	4	*	*	1		0
Emulsion 3404/SO-230	401-1-11-7/ 11-1-11-7	*	*	405-4-1-3-11-7/ 11-1-11-7	*	*	238-5		156-8-7-7
Film Type	3404/SO230	*	*	3404/SO-230	*	*	3401		3400
Resolution Data (L/mm)	- - - -	187R 187T	166R 148T	- - - -	187R 166T	209R 187T	NA	NA	78R 77T High Contrast
▲Static									
High Contrast	256	NA	NA	248	NA	NA	NA	NA	NA
Low Contrast	156	NA	NA	149	NA	NA	NA	NA	NA
▲Dynamic									
I High Contrast	213	NA	NA	198	NA	NA	NA	NA	NA
I Low Contrast	139	NA	NA	128	NA	NA	NA	NA	NA
P High Contrast	205	NA	NA	185	NA	NA	NA	NA	NA
P Low Contrast	137	NA	NA	122	NA	NA	NA	NA	NA

NA - Not Available.
*Not Applicable.
R - Radial Resolution on Axis.
T - Tangential Resolution on Axis.
▲ - Resolution Tested using a W-25 filter.

[redacted]

[redacted]

FIGURE 3. STELLAR FORMAT (Mission 1102-1)

FIGURE 4. STELLAR FORMAT (Mission 1102-2)

The following photographs exhibit the flare pattern prevalent throughout the mission.

NPIC N-0078

NPIC N-0079

	FIGURE 3	FIGURE 4
Mission Number	1102-1	1102-2
Stellar Frame Numbers	185P, 191S, 186P	154P, 160S, 155P
Pass	6D	80D
Date of Photography GMT	10 Dec 67	14 Dec 67
Enlargement Factor	2.5X	2.5X
Exposure Time (sec)	1.5	1.5

FIGURE 3. STELLAR FORMAT (Mission 1102-1)

FIGURE 4. STELLAR FORMAT (Mission 1102-2)

The following photographs exhibit the flare pattern prevalent throughout the mission.

NPIC N-0078

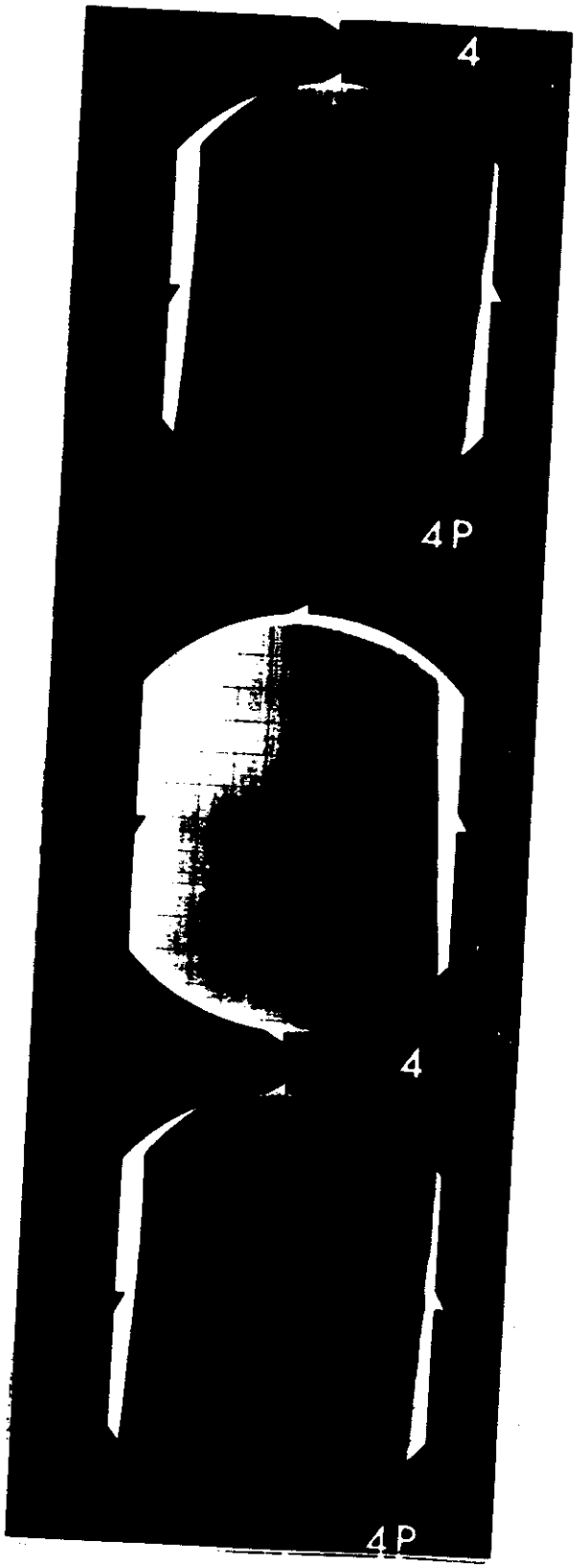
NPIC N-0079

[redacted]

	FIGURE 3	FIGURE 4
Mission Number	1102-1	1102-2
Stellar Frame Numbers	185P, 191S, 186P	154P, 160S, 155P
Pass	6D	80D
Date of Photography GMT	10 Dec 67	14 Dec 67
Enlargement Factor	2.5X	2.5X
Exposure Time (sec)	1.5	1.5

[redacted]

[redacted]



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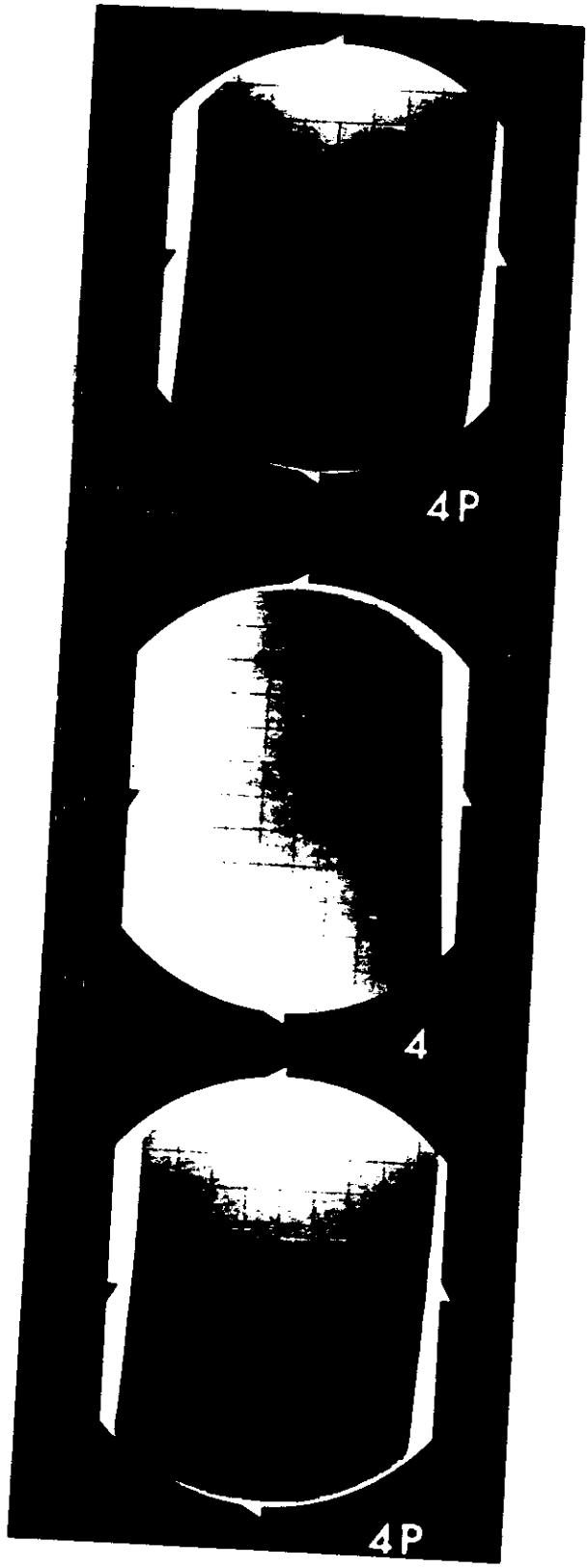

[redacted]

FIGURE 5. INDEX CAPPING SHUTTER MALFUNCTION

Figure 5 is an example of the multiple exposure perturbation present near the end of the Mission 1102-2 index camera record. The imagery also displays a hooked pattern which is due to a DMU firing at the time of exposure.

NPIC N-0080

FIGURE 5

Mission Number	1102-2
Pass	182D
Index Frame Number	5
Date of Photography	21 Dec 67
Enlargement Factor	1:1
Exposure Time (sec)	1/500

[redacted]

[redacted]

FIGURE 6. DISIC Terrain Format (Mission 1101)

FIGURE 7. DISIC Terrain Format (Mission 1102)

Comparison of DISIC terrain photography from Mission 1101 to terrain photography from Mission 1102.

NPIC N-0221 NPIC N-0222

	FIGURE 6	FIGURE 7
Mission Number	1101-1	1102-2
Pass	56D	97D
Index Frame Number	46	04
Date of Photography	19 Sept 67	15 Dec 67
Enlargement Factor	1:1	1:1

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