



TECHNICAL PUBLICATION



PHOTOGRAPHIC
EVALUATION REPORT
MISSION 1031-1

7-14 APRIL 1966

MISSION 1031-2

15-18 APRIL 1966

AUGUST 1966

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NATIONAL PHOTOGRAPHIC INTERPRETATION CENTER

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SYNOPSIS

Mission 1031 (J-30) is a two-part satellite reconnaissance mission. The vehicle was programmed to achieve photographic coverage for intelligence purposes. The satellite was launched into a nearly synchronous orbit on 7 April 1966. The first capsule contained 53 photographic passes and was recovered in an air catch on revolution 113, 14 April 1966. The second capsule contained 29 photographic passes and was retrieved in an air catch during revolution 177, 18 April 1966.

The image quality of the photography from the panoramic cameras is generally better than that of Mission 1030. However, approximately 45 percent of the film from both buckets is degraded due to haze and other weather factors. The remaining portion of the mission is generally free of degradations, and some targets are rated as good as any observed in recent missions. Both buckets of Mission 1031 were assigned an MIP rating of 85.

The master (fwd-looking) panoramic camera functioned properly throughout the mission. The slave (aft-looking) panoramic camera functioned properly throughout Mission 1031-1, but an undetermined malfunction prevented the acquisition of any photography record for this camera on Mission 1031-2. The horizon cameras were operational throughout the mission, but due to the absence of photography from the slave camera of Mission 1031-2 the horizon imagery for this portion of the mission is also missing.

The stellar and index cameras of Mission 1031 were operational throughout. The stellar images of both portions are slightly smeared. The shutter of the stellar camera was open during the film transport procedure on the majority of frames in the last 50 percent of Mission 1031-2. The frames exposed during this anomaly are very dense, with approximately 12 stellar images detectable on each frame. Before the malfunction, approximately 20 stellar images could be observed on each frame.

One resolution target was imaged by the master camera on Mission 1031. Poor weather conditions prevailed over the target. A resolution value of 9 feet was read along track and 12 feet was resolved cross track. The target was not recorded by the slave camera.

- 1 -

GENERAL FLIGHT DATA

1. Launch and Recovery Dates

Launch Date, Mission 1031	7 April 1966
Recovery Date, Mission 1031-1	14 April 1966
Recovery Date, Mission 1031-2	18 April 1966

2. Orbital Parameters (Actual)

	<u>Mission 1031-1</u> <u>(Rev 52)</u>	<u>Mission 1031-2</u> <u>(Rev 145)</u>
Period	89.550 min	89.388 min
Perigee	104.550 nm	105.494 nm
Apogee	170.390 nm	166.470 nm
Eccentricity	0.00919	0.00853
Inclination Angle	75.072°	75.072°
Perigee Latitude	23.303°N	39.362°N

3. Photographic Operations

	<u>Mission 1031-1</u>	<u>Mission 1031-2</u>
Operational Passes	44	25
Domestic/Operational Passes	1	0
Domestic Passes	7*	3
Engineering Passes	1	1
Total Photographic Passes	53	29
Recovery Revolutions	113	177

*Includes cut and wrap pass

PART I. CAMERA OPERATIONS

1. Master (Fwd-Looking) Panoramic Camera No 184

The master panoramic camera functioned properly throughout the mission. The imagery is of good quality and high resolution. Detriments to the material, caused by the camera operation, are comparable to those of previous missions. These minor degradations include:

a. The usual camera inherent rail scratches are present on both edges of the film. These scratches are outside the format and are continuous throughout the mission.

b. Fine scratches, parallel to the major axis, appear just inside the format at each edge, under the camera number and at the take-up end of most frames. These scratches are also inherent in the camera design and cause very minor degradations to the photographic record.

c. Numerous very fine emulsion scratches are under the binary and at the take-up end of most frames.

d. Fog, caused by the sit period between camera operations, is present on the first and last frame of most passes. This pattern of higher density is generally referred to as film transport. A splash-type fog pattern is present on the next to last frame of most passes. Examples of the fog may be found on pass 17D. A narrow band of fog, parallel to the minor axis, is near the supply end of the fifth frame of most passes of Mission 1031-2. All fog patterns are relative to the solar elevation and to the duration of the sit period between camera operations.

e. The cut and wrap procedure was initiated on pass 111D. Frame 5 was cut clean approximately 10 inches from the take-up end of the frame, and this portion was received in the first recovery capsule. The remaining portion of frame 5 was slightly abraided and scratched. The end of the film from Mission 1031-2 was also abraided and scratched due to film exhaustion.

2. Slave (Aft-Looking) Panoramic Camera No 185

The slave panoramic camera functioned properly throughout Mission 1031-1. Good quality, high resolution photography was acquired, and the imagery is approximately equal to that of the master camera. Due to a camera malfunction, no material was received from the slave camera in the second recovery capsule.

Recovery of the "A" bucket indicated a clean slave payload cut during the cut and wrap procedure. The analysis of the malfunction, according to the camera manufacturer, indicated several facts concerning the failure. The slave instrument failed due to a lack of film cassetting; that is to say, the failure resulted from film accumulating within the slave instrument. The telemetry data indicated that the film was not being removed from the camera system. This resulted in a loss of tension and the subsequent film wrap-up around the metering rollers. This was the first mission to contain a chute to protect the panoramic film during sit periods. It was added to the system to eliminate the light leaks due to the translucent characteristic of the ablative shield. The construction of the chute, its use, and all possible areas of film hang-up in the thrust cone area are under investigation by the camera manufacturer.

Other detrimental features caused by the camera operation which are present on the film record of Mission 1031 are as follows:

- a. Continuous scratches, parallel to the edge of the film and outside the format, are present throughout the mission. These scratches are attributed to the rails which support the film during transport.
- b. A scratch is present just inside the format of both edges of the take-up end of each frame and on both edges of the format beneath the camera number.
- c. Light leaks caused fog on the first, second, fourth, third from the end, and the last frames of most passes. The fog on the first and last frames is usually referred to as film transport. The fog on the second frame is near the supply end and frequency mark edge. A small band of fog is at the supply end and binary edge of the fourth frame of most passes. The fog on the third frame from the end of most passes is under the binary. The degree of the fog density is relative to the solar elevation and duration of the sit period between camera operations. In most cases, the density is low and causes little degradation, but at times the imagery encompassed by the added density is degraded to the extent that it hampers interpretation.

3. Master Horizon Cameras

The port (supply) and starboard (take-up) horizon cameras were operational throughout the mission. The port horizon imagery is sharp and well-defined, and the arcs are useable for attitude determination. The starboard horizon imagery is veiled on passes 1D through 31D. On the majority of the affected frames, the horizon arcs are very indistinct. After pass 31D, the horizon imagery and arcs are well-defined.

The cause of the veiling has not been determined. However, studies of the anomaly are still being conducted by the camera manufacturer and by NPIC. It is hoped that the correlary data from the Gemini missions will help explain the situation.

The fiducials of both cameras are slightly bloomed, but still useable. A small static discharge was noted at the fiducial nearest the titled edge. Vignetting was minor and did not affect the horizon arcs.

4. Slave Horizon Cameras

The port (take-up) and starboard (supply) horizon cameras were operational throughout Mission 1031-1. The port horizon arcs are sharp and well-defined. The starboard horizon arcs on pass 1D are sharp and well-defined. However, after pass 1D the remaining starboard horizon images are extremely veiled and unsuitable for attitude determination. Other degradations to the horizon images of Mission 1031-1 consisted of intermittent longitudinal emulsion scratches and minor minus density streaks.

Due to the slave panoramic camera malfunction, described in Section 2, Part I, no film was acquired from the slave horizon cameras for Mission 1031-2.

5. Stellar Camera Unit No D83/101/89 (Mission 1031-1)

The stellar camera functioned properly throughout and recorded 419 titled frames. The flare level was low and the film record yielded approximately 20 stellar images per frame. Instead of the optimum point-type images, most images are slightly smeared. This not only causes an increase in attitude reduction time, but the resulting data is not as reliable.

Multi-directional, plus density streaks are present on the first several frames of the stellar formats. The condition is repetitive in each mission and only degrades the first few frames of the mission. The cause of this anomaly is still unknown.

6. Stellar Camera Unit No D86/106/86 (Mission 1031-2)

The stellar camera was operational throughout the mission and recorded 410 titled frames. The first frame is a double exposure. The shutter was open during all or part of the film transport procedure between the normal exposed frames on the last 50 percent of the mission. This resulted in a higher flare level and an associated loss of some previously detectable star images. Approximately 20 stellar images are detected in each frame prior to the malfunction and only 12 thereafter. The malfunction does not seem to have had a significant effect on the shape of the images, which are slightly smeared throughout the take.

The cause of the malfunction has been attributed to excessive friction in the stellar camera shutter. A possible remedy, which is under investigation by the camera manufacturer, is the use of a stronger shutter closing spring.

Severe flare was prominent throughout Mission 1031-2, in addition to the flare which occurred during the camera shutter malfunction. The reason is unknown but it is also under investigation.

The last 13 inches of the stellar material was seriously fogged, possibly due to the cracking of the fiberglass recovery capsule cover.

7. Index Camera Unit No D83/101/89 (Mission 1031-1)

The index camera functioned properly throughout and recorded 419 titled frames. The exposure and processing were good. The imagery is comparable to that of recent missions in this series. The film was very clean throughout with only minor detectable degradations.

8. Index Camera Unit No D86/106/86 (Mission 1031-2)

The index camera was operational throughout the mission and recorded 426 titled frames. Exposure and processing were good except for the double exposure of the first frame. A continuous longitudinal plus density streak is present between the camera number and the frame format on the last 50 frames of the mission. Several random abrasions are present on the last 3 feet of film associated with film supply exhaustion. The last 13 inches of film is seriously fogged, possibly due to the cracking of the fiberglass recovery capsule cover.

A noticeable fall-off in image quality is present at the format edge on each frame. This is probably due to an error in positioning the focal plane for maximum awar. The camera manufacturer is investigating the criterion used for the focus setting.

FIGURE 1. DESCRIPTION OF PHOTOGRAPHIC DATA

The data pertaining to photographs contained in this publication are defined as follows:

PASS: A pass is the operational portion of an orbital revolution. A suffix D indicates that the photography was acquired during the descending portion, a suffix A indicates that the photography was acquired during the ascending portion, and a suffix M indicates that the photography was acquired during a pass that includes both ascending and descending portions. An additional suffix E indicates that the pass was an engineering operation or that a portion of the pass has been edited.

DATE OF PHOTOGRAPHY: The date of photography indicates the day, month, and year (GMT) that the photography was acquired.

UNIVERSAL GRID COORDINATES: These coordinates are included to locate the illustrated photography within the panoramic format.

ENLARGEMENT FACTOR: The enlargement factor is included to indicate the number of diameters the original material has been enlarged in the photographic illustration.

GEOGRAPHIC COORDINATES: These coordinates are included to indicate the latitude and longitude of the panoramic format.

ALTITUDE: This measurement is the vertical distance from the vehicle to the Hough Ellipsoid at the time of the acquisition of the photography.

PITCH: Rotation of the camera about its transverse axis. Using appropriate aeronautical terminology, positive readings indicate nose-up attitude and negative readings indicate nose-down attitude.

ROLL: Rotation of the camera about its longitudinal axis. Using appropriate aeronautical terminology, positive readings indicate left wing-up attitude and negative readings indicate right wing-up attitude.

YAW: Rotation of the camera about its vertical axis. Positive readings indicate counterclockwise rotation when viewing the ground nadir from the vehicle mounted camera in-flight.

LOCAL SUN TIME: This time is included to present to the viewer a realistic time of acquisition of the photography illustrated.

SOLAR ELEVATION: The solar elevation is the angular elevation of the sun above a plane tangent to the surface of the earth at the center of the panoramic format. A negative solar elevation indicates that the sun is below the plane.

SOLAR AZIMUTH: The solar azimuth is the angular measurement of the rays of the sun measured from true north in a clockwise direction.

EXPOSURE: The exposure is the duration of the photographic exposure expressed in a fraction of a second and computed from the scan rate and slit width.

VEHICLE AZIMUTH: The clockwise measurement from true north to the longitudinal axis of the vehicle heading.

PROCESSING LEVEL: The processing level is pertinent to the reference frame and is extracted from the contractor's processing reports.

FIGURE 2. VEILED STARBOARD HORIZON IMAGERY, MASTER CAMERA

The starboard horizon imagery of the master camera is veiled on passes 1D through 31D. The horizon arcs, which are affected by the veiling, are very indistinct. This anomaly is illustrated by the following photograph. After pass 31D, the imagery becomes sharp and well-defined.

NPIC K-8831 (8/66)

- 6c -



Camera Horizon Camera
Pass 6D
Frame 81 1/1
Date of Photography 8 Apr 65
Enlargement Factor 3X
Processing Level Full

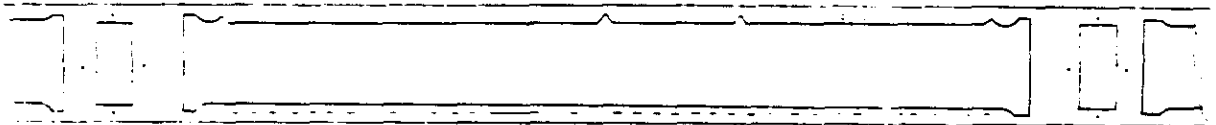


Approximate flight direction
on photograph



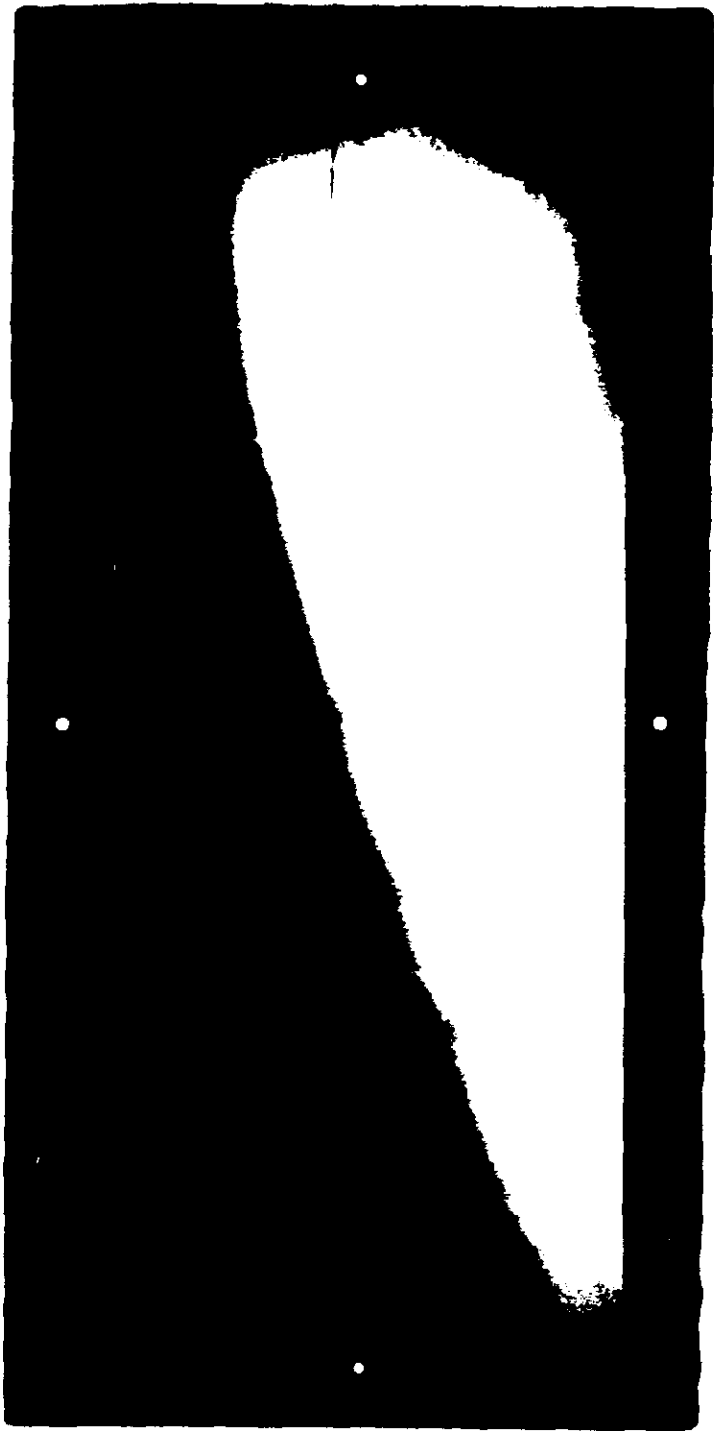
Approximate scan direction
on photograph

Approximate location of photograph in format. Negat viewed with emulsion side down.



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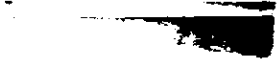


FIGURE 3. VEILED STARBOARD HORIZON IMAGERY, SLAVE CAMERA

After pass 10, the remaining horizon images from the slave starboard horizon camera appear out-of-focus. The following photograph indicates the severity of the phenomenon.

NPIC K-8633 (8/66)

- 6e -

Camera Horizon Camera
Pass 7D
Frame 10 aft
Date of Photography 8 Apr 66
Enlargement Factor 3X
Processing Level Full



Approximate flight direction
on photograph



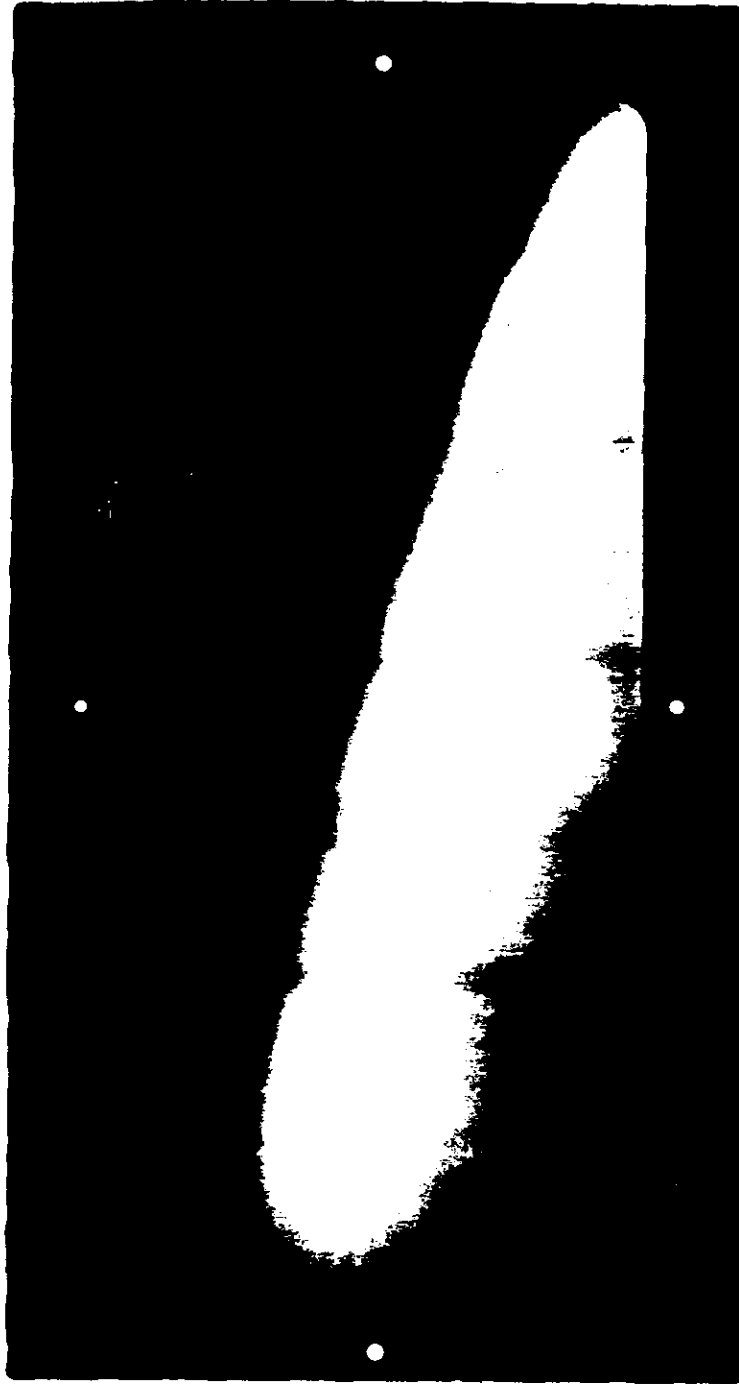
Approximate scan direction
on photograph

Approximate location of photograph in format. Negative viewed with emulsion side down.



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FIGURE 4. STELLAR PHOTOGRAPH, SHUTTER MALFUNCTION

The stellar camera shutter remained open during all or part of the film transport procedure between the normal exposed frames on the last 50 percent of Mission 1031-2. This resulted in a higher flare level and an associated loss of some previously detectable star images. Approximately 20 stellar images are detected in most frames prior to the malfunction and only 12 thereafter. The malfunction has been attributed to excessive friction in the stellar camera shutter. The photograph is typical of the imagery produced during the malfunction.

NPIC K-8834 (8/66)

- 6g -



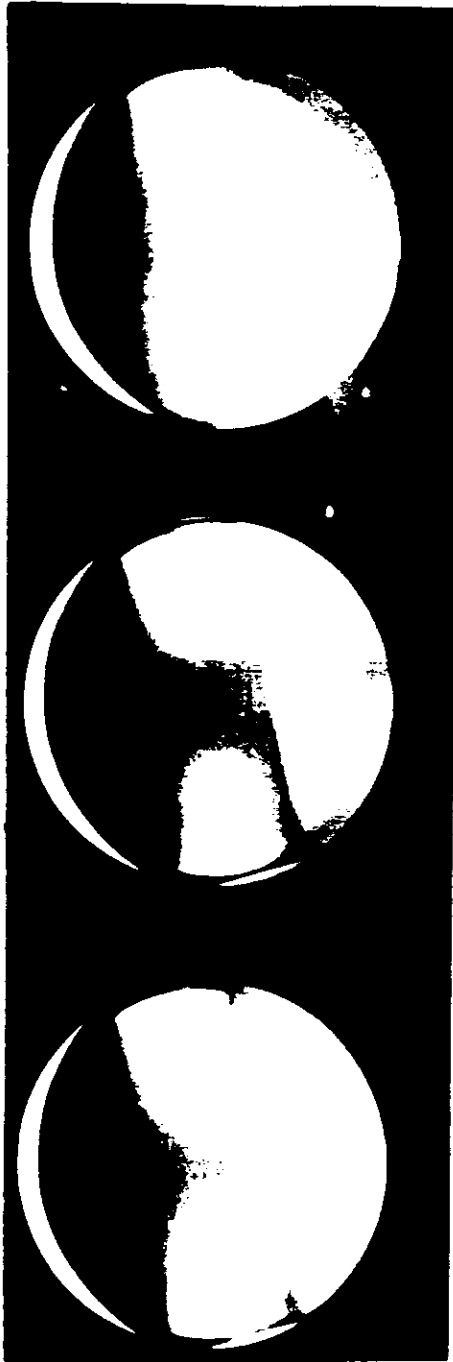
MISSION 1031-2

Stellar Frame Numbers	Correlates with Fwd-Looking Camera 184	
	Pass	Frame
298	153D	18
299	159D	3
300	159D	10
Date of Photography	17 Apr 66	
Enlargement Factor	2X	
Exposure Time	2 seconds	



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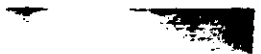


FIGURE 5. INDEX PHOTOGRAPH, GOOD QUALITY

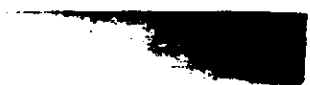
This photograph is indicative of the normal good-quality imagery that is within the capabilities of the index cameras used in the "J" systems. It is included in this report not only as an example of the good quality of Mission 1031-1 but for a comparison with the index photography of Mission 1031-2.

NPIC K-8835 (8/88)

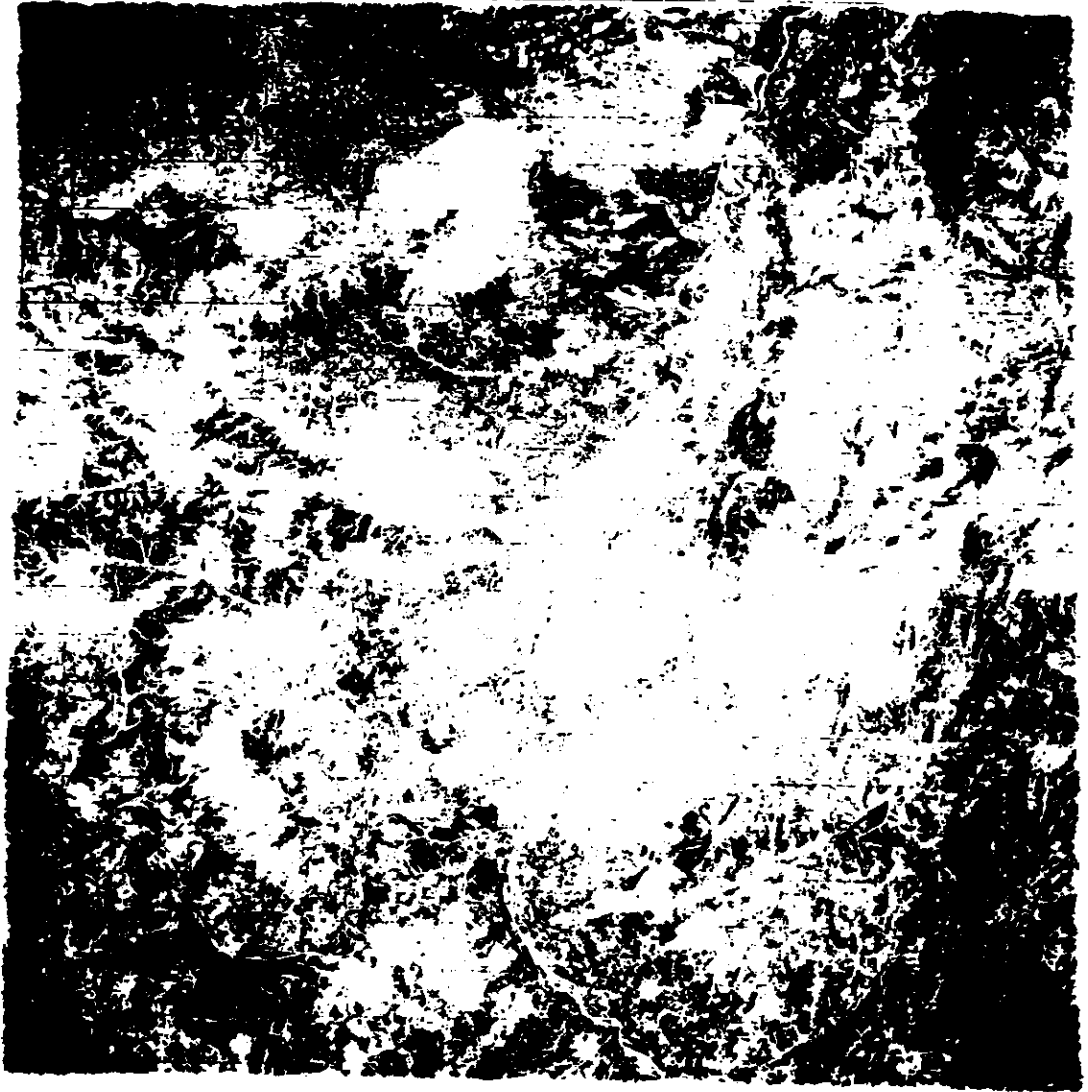


MISSION 1031-1

Index Frame Number 17
Correlates with:
 Fwd-Looking Camera 184
 Pass 6D
 Frame 48
Date of Photography 8 Apr 66
Enlargement Factor 2.5X
Exposure Time 1/500 second



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FIGURE 6. INDEX PHOTOGRAPHY, IMAGE FALL-OFF

The following photograph was exposed by the index camera on Mission 1031-2. Evidently, the camera was focused for the center of the lens instead of the normal procedure of focusing for maximum awar. A noticeable amount of image sharpness fall-off toward the edge of the format results from this anomaly.

Figure 5 is included in this report for a comparison with the following photograph.

NPIC K-8836 (8/66)

- 6k -



MISSION 1031-2

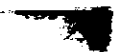
Index Frame Number 203
Correlates with:
 Fwd-Looking Camera 184
 Pass 149D
 Frame 1
Date of Photography 17 Apr 66
Enlargement Factor 2.5X
Exposure Time 1/500 second



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9. Associated Equipment

The associated equipment generally operated satisfactorily. However, several problems were encountered in the binary reduction procedure. After an examination of the clock correlation data and the binary clock time imaged on the film, it was established that the vehicle clock suddenly gained time between passes 65D and 68D. The passes affected by this jump were 68D, 69D, 71D and 72D. By the beginning of pass 74D, the clock drifted back to normal and agreed with the correlation data furnished. A similar anomaly occurred again between passes 143D and 151D. In order to correct the discontinuity caused by the anomaly, NPIC interpolated a pair of new clock interrogation values for revolutions 67/68 and 147/148.

The binary read-out was accomplished by machine on a duplicate positive. Listed below is an itemized list of the problems confronted:

Mission 1031-1

Fwd

- Pass 11D - Binary missing on frames 24 and 34 (index lights were on).
- Pass 37D - Number 29 light was faint on frames 1 - 5.
- Pass 39D - Number 18 light was faint on frame 36.
- Pass 48D - Number 29 light was faint on frame 1.
- Pass 50D - Number 29 light was faint on frames 1 and 26.
- Pass 52D - Number 29 light was faint throughout the pass.
- Pass 68D - Number 29 light was faint on frames 1 - 5.
- Pass 103D - Binary missing on frame 33.

- Pass 6D - Number 27 light was faint throughout the pass.
- Pass 8D - Number 27 light was faint throughout the pass.
- Pass 37D - Number 16 light was faint on frame 10.
- Pass 104D - Number 27 light was faint throughout the pass.

Mission 1031-2

Fwd

- Pass 130D - Number 22 light was faint on frames 22 and 23.
- Pass 133D - Number 22 light was faint throughout the pass.
- Pass 149D - Number 29 light was faint throughout the pass.
- Pass 151D - Number 29 light was faint throughout the pass.
- Pass 162D - Number 29 light was faint throughout the pass.
- Pass 163D - Number 29 light was faint throughout the pass.

In addition to the problems listed above, some of the binary lights were missing on several frames in the mission due to film misalignment during the original duplicating procedure.

PART II. FILM

1. Film Footage

Listed below is the processed film footage from the cameras used in Mission 1031.

<u>Camera</u>	<u>Mission 1031-1</u>	<u>Mission 1031-2</u>
Master (Fwd-Looking) Panoramic No 184	8,136	7,871
Slave (Aft-Looking) Panoramic No 185	8,133	*
Stellar No D83/101/89	51	NA
Stellar No D86/106/86	NA	47
Index No D83/101/89	97	NA
Index No D86/106/86	NA	91

2. Frame Totals

Following is the number of titled frames received from the cameras used in Mission 1031.

<u>Camera</u>	<u>Mission 1031-1</u>	<u>Mission 1031-2</u>
Master (Fwd-Looking) Panoramic No 184	2,944	2,980
Slave (Aft-Looking) Panoramic No 185	2,930	*
Stellar No D83/101/89	419	NA
Stellar No D86/106/86	NA	410
Index No D83/101/89	419	NA
Index No D86/106/86	NA	426

*Not applicable due to the absence of photography acquired by the slave camera in Mission 1031-2.

NA - Not Applicable.

3. Film Processing

This section provides an evaluation of the processing, exposure, density, contrast, and special printing of the original negative.

a. Infrared densitometry was used in an attempt to determine the optimum levels of development for the panoramic material from Mission 1031. Three separate levels of development are afforded by the Trenton Processor which was used in processing the panoramic material. The levels of development available and the percentage of film processed at each level are given below.

<u>Development Level</u>	Mission 1031-1		Mission 1031-2	
	<u>Master</u>	<u>Slave</u>	<u>Master</u>	<u>Slave</u>
Primary	18	15	7.6	*
Intermediate	34	43	53.2	*
Full	48	42	39.2	*

*Not applicable due to the absence of photography acquired by the slave camera in Mission 1031-2.

The stellar and index records were adequately processed at one development level employing a Trenton and EH-6A Processor, respectively.

b. The filter/slit width combination used on Mission 1031 provided adequate exposure except where low solar elevations prevailed. A Wratten 23A filter combined with a 0.225 inch slit width was employed by the master panoramic camera for the first time. The new filter enabled the slit width to be reduced from the more common 0.250 inch slit width in an attempt to minimize the effects of vibrations and IMC errors. The slave camera employed the Wratten 21 filter with a 0.150 inch slit width.

The characteristics of the Wratten 21 and 23A filters used in this mission and the Wratten 25 filter which has been used in the master camera of previous missions are listed at the end of Part II.

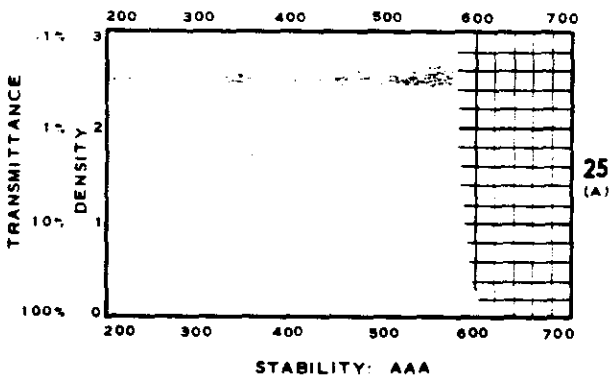
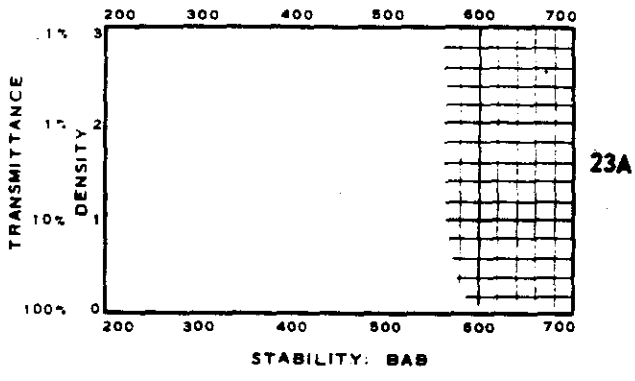
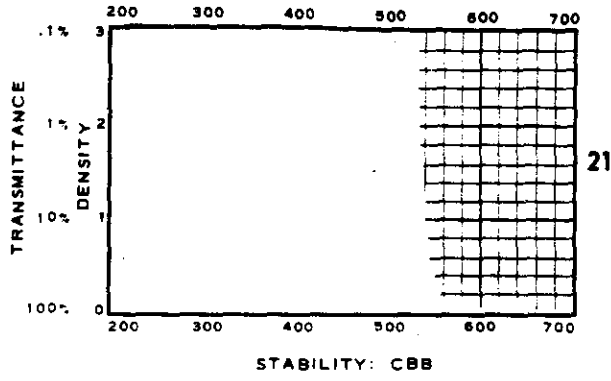
The exposure of the index camera photography was generally adequate. However, as usual, where low solar elevations prevailed the density was less than optimum and in areas of high reflectivity, such as snow-covered terrain, the density is often higher than desired. The stellar camera photography was adequately exposed to detect stellar images.

c. The "J" camera system provides the intelligence community with photographic coverage of large land masses from various portions of the world. Although this type of coverage is desired, it also presents numerous problems in obtaining the optimum exposure and density of the original negative. Numerous attempts are made throughout the acquisition, processing, and reproduction procedures to obtain maximum value from the mission. Exposure and processing level changes are being made when deemed necessary. However, the variables encountered in obtaining the finished original negative are such that exposure and processing changes are not sufficient. In the reproduction stage, various printing levels are used to improve the value of the photography. Special printing is required when the range of the negative of an individual can be such that 2 levels of printing duplicate positives are required for greater intelligence value to be obtained from the original negative. Included below are the number of processing level changes and special prints made on the original negative from Mission 1031.

	<u>Processing Level Changes</u>	<u>Special Prints</u>
Mission 1031-1 Fwd	70	17
Mission 1031-1 Aft	60	15
Mission 1031-2 Fwd	46	9

4. Physical Film Degradations

The majority of the physical film degradations on the original negative are covered under the respective cameras in Part I. In general, the photographic record is relatively clean. However, minor degradations consisting of intermittent pinholes, slight abrasions, and scratches are present. The most severe degradation is the longitudinal intermittent scratch present throughout the slave camera record of Mission 1031-1. The scratches are possibly caused by the interference of the film chute which is located in the "A" bucket recovery system. As a precautionary measure, future film chutes have been designed with additional film clearance.



PART III. IMAGE QUALITY

1. Photographic Interpretation (PI Suitability)

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. Details in the highlight areas, as well as details in the shadow areas, are readily detectable. Observation of small objects and a high order of mensuration are made possible by the consistently superior 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 or highlight areas. Detection and identification of small objects are possible but accuracy of mensuration is limited by the fall-off in image quality and the less-than-optimum contrast that prevails.

Poor: Camera-induced degradations or weather limitations severely reduce the effectiveness of the photography. Definition of edges and corners are not well-defined. 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.

2. PI Suitability, Mission 1031

Mission 1031 was launched into a nearly synchronous orbit and approximately the same land mass was covered by every 16th orbit. This resulted in multiple coverage of some targets while other programmed targets were missed altogether. The photo interpreter's view of this coverage by Mission 1031 is that the disadvantages caused by the missed targets at times outweighed the advantages afforded by the multiple coverage.

Mission 1031 was the first system to utilize the delay circuit for elimination of mono photography. This circuit delays both the start-up and shut-down of the slave camera for 12 seconds following the start-up and shut-down of the master camera. As a result of the delay circuit, much of the photography which would normally have been mono is afforded the added advantage of stereo coverage.

The PI suitability of this mission is good. Some of the targets covered by Mission 1031 were rated by the photo interpreters as good as any observed in recent mission. The photo interpreters and the PET team considered the overall quality of Mission 1031 slightly superior to Mission 1030.

Although the PI suitability is good, Mission 1031, like Mission 1030, contains an overall reduction in quality due to atmospheric conditions. The affect of atmospheric on the individual targets is well represented by the large number of poor and fair quality ratings assigned by the photo interpreters. Although some of these ratings are due to the usual low solar elevations and obliquity angles, the majority are caused by haze. In an attempt to discover the reason for the fair and poor quality ratings, 200 targets were randomly selected and analyzed. Listed below are the number of targets analyzed, the PI rating under which they fall, and the number of targets affected by each contributing factor.

Number of Targets in Each Category Which Affected the PI Rating

Total Targets Analyzed	PI Rating		Haze	Heavy Clouds	Scattered Clouds	Semi-Darkness	Snow	Obliquity	
	Good	Fair Poor							
200	11	102	87	83	22	19	41	15	9

FIGURE 7. GOOD PI SUITABILITY TARGET

FIGURE 8. STEREO COVERAGE OF GOOD PI SUITABILITY TARGET

Stereo coverage was obtained on the following two photographs during pass 22D. The photo interpreters assigned the target a good quality rating. This same area was photographed one day later in stereo on pass 38D and is illustrated in Figures 9 and 10. Similar parameters were experienced on both passes, but the target on pass 38D was assigned a poor quality rating. The target on both passes is located within the satisfactory limits of the film format, but at different coordinates. The varying locations could contribute to the different quality ratings.

Microdensitometric traces of this target area are located in Appendix B.

NPIC K-8837 (8/66)

NPIC K-8838 (8/66)

- 14a -

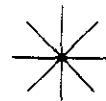
FIGURE 7

FIGURE 8

Camera	Master	Slave
Pass.	22D	22D
Frame	17 Fwd	19 Aft
Date of Photography	9 Apr 66	9 Apr 66
Universal Grid Coordinates.	23.2 - 9.8	68.2 - 14.7
Enlargement Factor.	20X	20X
Geographic Coordinates.	25-49N 104-32E	25-48N 104-29E
Altitude (feet)	646,812	645,630
Local Sun Time.	1357	1357
Solar Elevation	56°12'	56°12'
Solar Azimuth	119°	119°
Exposure (fractions of second).	1/252	1/400
Processing Level.	Full	Intermediate
Vehicle Azimuth	166°25'	166°34'

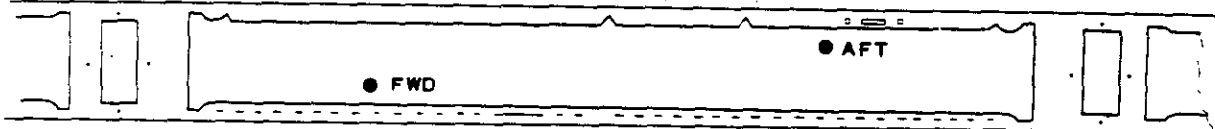


Approximate flight direction
on photograph



Approximate scan direction
on photograph

Approximate location of photograph in format. Negative viewed with emulsion side down.



Handle Via
~~TALENT KEYHOLE~~
Control System Only

~~TOP SECRET - RUFF~~
NO FOREIGN DISSEM



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NO FOREIGN DISSEM

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FIGURE 9. POOR PI SUITABILITY TARGET

FIGURE 10. STEREO COVERAGE OF POOR PI SUITABILITY TARGET

The target on the following 2 photographs was assigned a poor quality rating by the photo interpreter. The same target was photographed during pass 22D and the photo interpreter assigned it a good quality rating. For a comparative analysis, see Figures 7 and 8.

Microdensitometric traces of this target area are located in Appendix B.

NPIC K-8839 (8/66)

NPIC K-8840 (8/66)

- 14c -

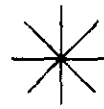
FIGURE 9

FIGURE 10

Camera	Master	Slave
Pass	38D	38D
Frame	60 fwd	61 aft
Date of Photography	10 Apr 66	10 Apr 66
Universal Grid Coordinates	66.5 - 14.6	24.3 - 11.4
Enlargement Factor	20X	20X
Geographic Coordinates	25-17N 103-08E	25-28N 103-02E
Altitude (feet)	642,662	641,898
Local Sun Time	1346	1346
Solar Elevation	59°02'	58°59'
Solar Azimuth	121°	121°
Exposure (fractions of second)	1/280	1/424
Processing Level	Full	Full
Vehicle Azimuth	166°30'	166°37'



Approximate flight direction
on photograph



Approximate scan direction
on photograph

Approximate location of photograph in format. Negative viewed with emulsion side down.

