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TECHNICAL PUBLICATION

PHOTOGRAPHIC EVALUATION REPORT
MISSION 1010-1, 14-19 SEPTEMBER
MISSION 1010-2, 19-23 SEPTEMBER

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TECHNICAL PUBLICATION

PHOTOGRAPHIC EVALUATION REPORT MISSION 1010-1, 14-19 SEPTEMBER 1964 MISSION 1010-2, 19-23 SEPTEMBER 1964

[redacted]

March 1965

NATIONAL PHOTOGRAPHIC INTERPRETATION CENTER

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SYNOPSIS

Mission 1010, a two-part satellite reconnaissance mission, was launched 14 September 1964. The "A" bucket was recovered in an air catch on revolution 65, 19 September 1964, and the "B" bucket was recovered in an air catch on orbit 144, 23 September 1964.

There is an out-of-focus area on the photography of both panoramic cameras beginning at pass 9D. The soft area on the master panoramic camera photography is confined to a narrow band along the camera number edge near the take-up end of each frame. It appears only through pass 47DE. The area on the slave panoramic camera photography is at the frequency mark edge and take-up end. While it is present on most frames, there are frames which appear to be unaffected. The photography of pass 61D is the last to be degraded by the softness. The area is erratic in size and shape, but is generally 1.5 inches wide and extends 4 inches along the edge.

The quality of the panoramic photography not degraded by the out-of-focus condition is good throughout the mission.

The stellar imagery of both stellar cameras is intermittently smeared. While this does not make the process of stellar reduction impossible, it does make it difficult.

A light leak resulted in fogged areas on the photography of the stellar and index cameras of Mission 1010-2. The degradation is minor except on the frames affected during camera-off periods.

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GENERAL FLIGHT DATA

Date of Launch: 14 September 1963

Orbital Parameters
(Revolution 1)

Period	90.971 min	Eccentricity	0.02236
Perigee	97.45 nm	Perigee Latitude	42.567°N
Apogee	259.19 nm	Inclination Angle	84.96°N

(Revolution 107)

Period	90.81 min	Eccentricity	0.02181
Perigee	99.58 nm	Perigee Latitude	68.389°N
Apogee	257.09 nm	Inclination Angle	87.96°N

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FIGURE 1. DEFINITION 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: The pitch is the rotation of the vehicle about the transverse axis. Positive readings indicate nose-up attitude, negative readings indicate nose-down attitude.

ROLL: The roll is the rotation of the vehicle about the longitudinal axis. Positive readings indicate left wing-up attitude. Negative readings indicate right wing-up attitude.

YAW: The yaw is the rotation of the vehicle about the vertical axis. Positive readings indicate counterclockwise rotation when viewing the ground nadir from the vehicle.

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

[redacted]

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 is computed from the scan rate and slit width.

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FIGURE 2. GOOD IMAGE QUALITY NEAR THE BEGINNING OF THE MISSION.

NPIC J-[redacted] (3/68)

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Camera	153 (Aft)
Pass	09D
Frame	116
Date of Photography	15 September 1964
Universal Grid Coordinates	x56.2 y12.7
Enlargement Factor	20X
Geographic Coordinates	47°02'N 32°32'E
Altitude (feet)	593495
Vehicle:	
Pitch	-14°35'
Roll	-00°28'
Yaw	00°13'
Local Sun Time	1441
Solar Elevation	32°05'
Solar Azimuth	281°30'
Exposure	1/338 sec.
Dmax	1.05
Dmin	0.53
Delta	0.52
Gross Fog	0.17

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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PART I. CAMERA OPERATION

1. Master (FWD) Panoramic Camera No 152

a. Minus-density streaks, approximately parallel to the path of the field flattener, are minor and few throughout the first 75 percent of the mission. Although the resulting degradation is still minor, the streaks become more pronounced and frequent after pass 87D. Frames 90-129, pass 88D, are an extreme example of the minus density streaks.

b. Scratches just inside the format at each edge under the camera number and just inside the format at each edge at the take-up end, appear on each frame except on the first frame following a camera-off. These scratches have appeared on all of the "J" Missions to date. There is a multitude of longitudinal emulsion scratches throughout the mission. Most of them are very light and are not believed to be camera induced. One exception is a scratch approximately 0.1 inches inside the format at the camera number edge and supply end. It is about 4 inches long and parallel to the film edges. It is believed to be camera induced and is intermittent on pass 69D and thereafter throughout the remainder of the mission. Rail scratches are continuous.

c. Fog on the first and last frames of most passes is the result of light entering the chimney around the lens housing during camera-off periods.

d. Smearing of highly reflective images (clouds, beaches, etc.) results from reflections within the camera. The smearing is always parallel to the film edges and is believed to be caused by reflections from the field flattener. The resulting degradation is dependent upon the intensity of the light entering the camera, and the principal ray.

e. An out-of-focus area appears on each frame between pass 9D, frame 1, and the last frame of 47DR. The affected imagery is within a band approximately 4 inches long and 0.5 inches wide at the take-up end and camera number edge. It extends along the frequency mark edge in a rather irregular configuration that varies slightly from frame to frame. Due to cloud cover, areas of water, and desert areas, it is impossible to definitely establish the location of presence of the soft imagery on every frame. However, it is definite that the [illegible] on pass 9D and ended prior to pass 52D. The passes immediately preceding pass 9D were 8AR and 7D. Because pass 9AR was [illegible] there is no exposure and it is impossible to tell [illegible] soft area exists. The photography of 7D displayed [illegible] It is interesting to note that the out-of-focus [illegible] between camera rest periods. The [illegible] of each "J" Mission except [illegible] focus condition. [illegible] 90% (on the Missions [illegible]

[redacted]

2. Slave (AFT) Panoramic Camera No 153

a. Minus density streaks parallel to the path of the field flattener are intermittent throughout the mission. The degradation of imagery associated with the streaks is minor. The streaks are most pronounced on the first four operational passes.

b. An emulsion scratch parallel to the major axis of the film is just inside the format, at the camera number edge and take-up end on each frame. There are several longitudinal emulsion scratches, but they are light and of little consequence. Furthermore, their origin cannot be determined.

c. Light leaks caused fog on the first and last frames of most passes. The fog, like that of the master panoramic camera, is a result of light entering the chimney around the lens housing during camera-off periods.

d. Streaking of highly reflective images is present intermittently throughout the mission. Pass 65D, frame 5, is a good example of the smearing. This problem is discussed in Part I, paragraph e, of this report.

e. Out-of-focus areas are present on the film of this camera intermittently on pass 9D through 61D. Although every frame does not display this soft imagery, most frames do. Like the master panoramic camera the out-of-focus area first appears on the photography of Pass 9D. Unlike the photography of the master panoramic camera the area of soft imagery continues intermittently throughout the photography of Mission 1010-1. The out-of-focus area extends about 4 inches along the frequency mark edge at the take-up end of the frames. Unlike the affected area of the master camera photography it is not confined to a narrow band. It has irregular humps which extend up to 1.5 inches into the format. The size and shape are irregular and at times the imagery in the area normally affected is sharp and well defined. It is of interest that again the out-of-focus area disappears following a camera-off (rest) period. Pass 61D, the last pass displaying the soft imagery, is followed by pass 65D.

[redacted]

FIGURES 3 and 4. COMPARISON OF HORIZON IMAGE QUALITY.

NPIC J-6060 (S/SI) NPIC J-[illegible] (S/SI)

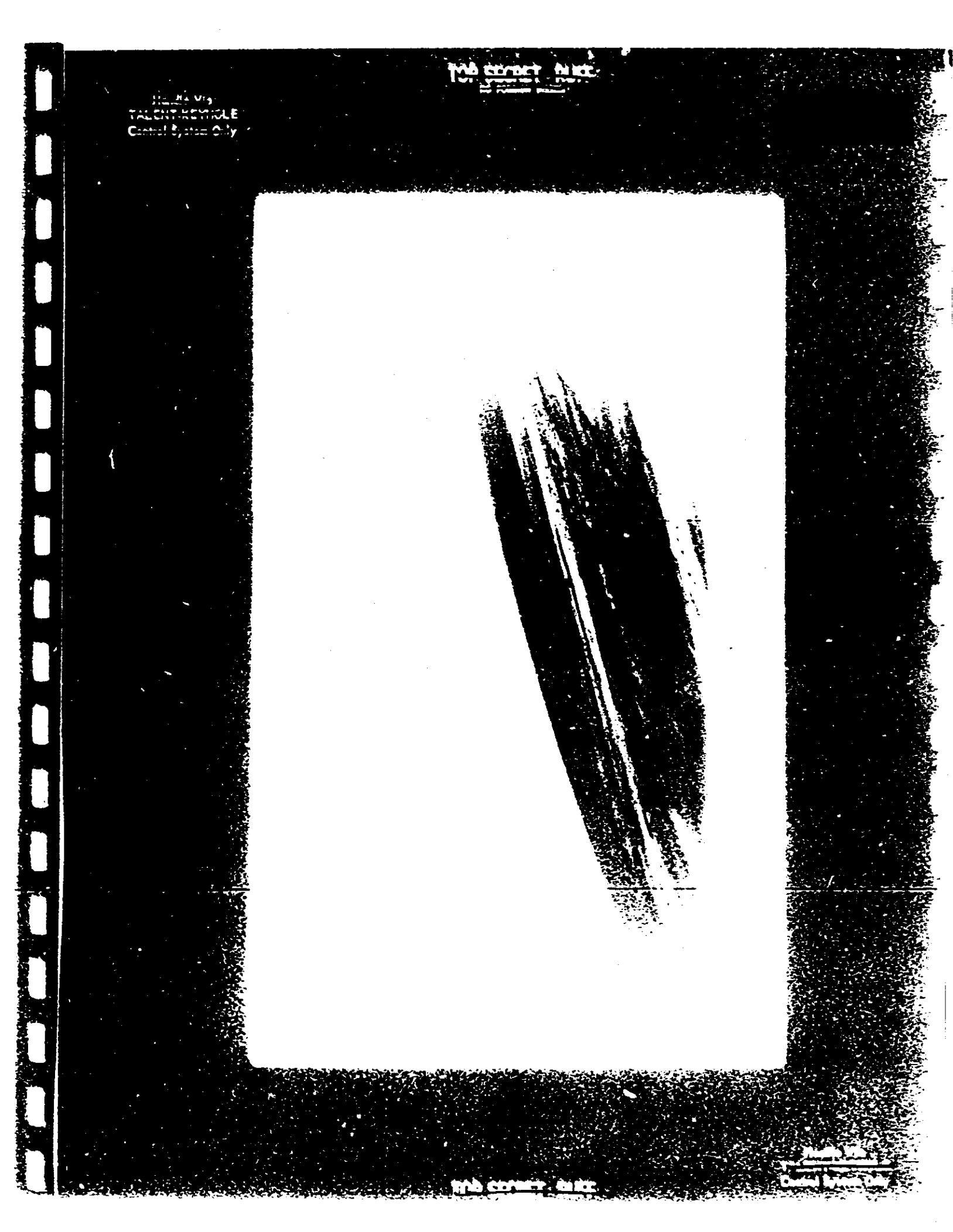
The first photograph is the imagery of the starboard looking horizon camera.

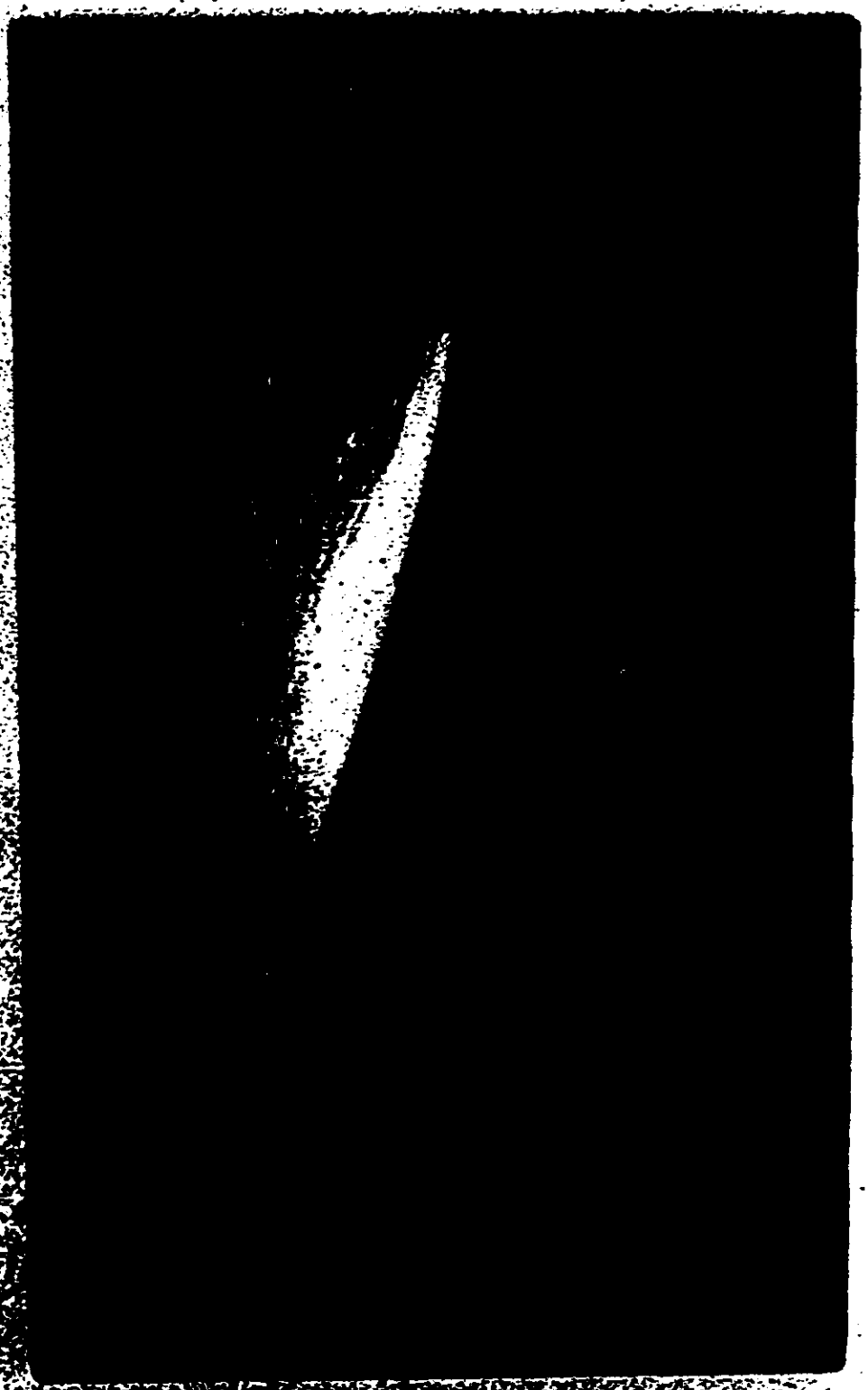
The second is imagery of the port looking horizon camera.

[redacted]

	STARBOARD	PORT
Camera	152 (Fwd)	152 (Fwd)
Pass	380	380
Frame	18	18
Date of Photography	17 September 1964	17 September 1964
Universal Grid Coordinates	Not Applicable	Not Applicable
Enlargement Factor	3X	3X
Geographic Coordinates	56°02'N 88°39'E	56°02'N 88°39'E
Altitude (feet)	601862	601862
Vehicle:		
Pitch	19°24'	19°24'
Roll	-00°25'	-00°25'
Yaw	-00°16'	-00°16'
Local Sun Time	1420	1420
Solar Elevation	27°48'	27°48'
Solar Azimuth	227°00'	227°00'
Exposure	1/100 sec.	1/100 sec.
Delta	1.87	1.56
Dens	0.27	0.24
Delta	1.60	1.32
Gray Fog	0.17	0.17

Approximate flight direction on photograph





3. Master (FWD) Horizon Cameras

a. Both horizon cameras operated well throughout the mission. The imagery is sharp and the arc of the horizon is well defined.

4. Slave (AFT) Horizon Cameras

a. Both horizon cameras of the slave panoramic camera operated well throughout the mission. The imagery is good and there is a good horizon arc.

5. Stellar Camera No 41 (Mission 1010-1)

The stellar imagery is smeared intermittently throughout the mission. The stars are imaged in a barbell configuration: a definite stellar image, a less dense smear, and another definite image. Although it has not been established as fact, it seems that the anomaly is the result of vehicle attitude deviations during exposure. Plus density streaks through the formats (unidentified objects going by the lens) like those noted on previous missions, appear intermittently throughout the mission. When these streaks appear in a straight line through the stellar format, there is no smearing of the stellar images. When the plus density streaks deviate from a straight line, (indicating vehicle instability) the stellar images invariably display smear. In addition, the vehicle manufacturer indicates that preliminary data show that there is a correlation between the smeared imagery and the synchronization of the camera chimneys: when the master and slave panoramic camera chimneys are scanning in the same direction simultaneously, forces are introduced that result in vehicle instability. While the degradation introduced by the smear in the stellar imagery complicates the stellar reduction process, it does not make it impossible.

Emulsion cracks parallel to the minor axis of the film are present throughout the last 50 percent of the mission.

The last 22 frames are fogged and abraded in conjunction with film exhaustion.

There is a continuous plus density streak parallel to the minor axis of the film and in line with the camera master chimney through the last 40 frames. Because of the position of the streak [illegible] degradation of the imagery.

Flare in the format accounted for some [illegible] 30 percent of each frame.