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# PHOTOGRAPHIC EVALUATION REPORT

## MISSION 1006

### 5-12 JUNE 1964

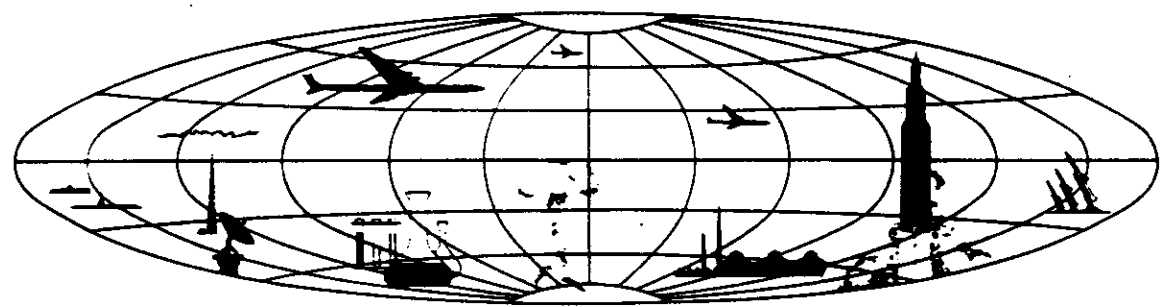
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NATIONAL PHOTOGRAPHIC INTERPRETATION CENTER





TECHNICAL PUBLICATION

PHOTOGRAPHIC EVALUATION REPORT  
MISSION 1006  
5-12 JUNE 1964



February 1965

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## SYNOPSIS

Mission 1006 (system J-09) was a two-part satellite reconnaissance mission. Photography was accomplished on 5 - 12 June 1964. The "A" bucket was ejected and recovered dry in an air catch on pass 65D, 8 June 1964. A "confidence run" of 17 frames was cycled to check the camera system. Telemetry indicated everything was in good working order and the mission continued. The "B" bucket was recovered dry in an air catch on orbit 12b, 12 June 1964.

A lower than average orbit was attained (approximately 84 nm at perigee), giving rise to speculation that image motion compensation (IMC) might be inadequate near perigee. However, the photography displayed no image smear that could be credited to inadequate IMC. The low orbit, in fact, enhanced image quality due to the larger scale of photography. The only adverse effect of the low altitude was an in-

herent loss in forward overlap. There were targets covered that could not be viewed stereoscopically. This is a definite detriment to the PI suitability of the affected targets.

The door of the Slave (AFT) panoramic camera failed to jettison during the first two passes, resulting in a complete loss of imagery on the aft camera prior to frame 1 of pass 3D.

All auxiliary equipment related to the Master (FWD) panoramic camera became erratic in operation at the second camera operation of pass 103D. The binary is intermittently smeared; the horizon imagery is intermittently smeared; the horizon fiducials and the camera number appear intermittently; and the Stellar Index camera exposed only four more frames.

No significant difference in image quality of the panoramic camera photography was observed between the "A" and "B" buckets.

## GENERAL FLIGHT DATA

Date of Launch: 5 June 1964

### Orbital Parameters

<u>Planned</u>	<u>Actual (revolution 01)</u>
Period: 90.87 min	90.59 min
Perigee: 89.92 nm	84.0 nm
Perigee Latitude: 40.60°N	63.20°N
Apogee: 270.50 nm	261.00 nm
Eccentricity: 0.0209	0.0239
Inclination Angle: 80.00°N	79.97°N

## PART I. CAMERA OPERATION

### 1. Master (FWD) Panoramic Camera No 148:

Minus density streaks approximately parallel to the major axis of the film are intermittent throughout the mission. The presence of these streaks is of little consequence; however, they

do represent a potentially serious degradation.

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 every frame of the mission. Because

of their location the scratches are a minor degradation. Severe emulsion scratches are present along the major axis of pass 15D.

Light leaks resulted in areas of fog on the first and last three frames of most passes. The density of the fog is commensurate with the duration of the camera off period and solar elevation. The last five feet of film is fogged.

Dendritic static discharges caused fog along both edges intermittently throughout the mission. On rare occasions the fog intrudes into the format. Example: pass 9D, frames 05-26).

Flare at the supply end of pass 52D, frames 13-19, degrades the imagery in an area up to six square inches on each affected frame. The flare tends to be smeared along the major axis of each format and appears to be associated in that respect with "cloud smearing" as reported in previous missions.

A corona burst associated with the film wrap-up of the "A" bucket caused minor fog on pass 56D, frame 65. Due to corona discharges there is a small area of fog between the third and fourth frame of nearly every pass after pass 56D.

#### 2. Slave (AFT) Panoramic Camera No 149:

The camera door failed to jettison on command and remained in a closed position during the first two operational passes.

The binary word, camera number, and horizon camera fiducials were inoperative between pass 1D, frame 09, and pass 3D, frame 18.

Emulsion scratches appear just inside the format at the same four locations as described as being present on the photographs of the Master panoramic camera. Rail scratches are continuous along both edges throughout the mission.

Light leaks result in fog on the first and last few frames of most passes. This fog occurs during camera off periods and the intensity of it is dependent on the duration of the camera

off period and the solar elevation. The last nine feet of film is fogged in varying degrees.

Flare, associated with solar azimuth and scan, degrades the imagery of pass 70D, frame 66-71. The flare is smeared along the major axis much the same as "cloud smearing."

#### 3. Master (FWD) Horizon Cameras:

The port (supply) horizon camera was operational through the first camera operation of pass 103D. The horizon imagery is intermittently smeared thereafter. It appears that the film was being advanced during exposure. The amount of smear varies from very little to extreme. The imagery not affected by the malfunction is generally good.

The starboard (take-up) horizon camera was adversely affected in the same degree and on the same frames as the port horizon camera. The exposure was adequate on most passes but a veiling of the imagery is present from the beginning of the mission through pass 56D. The veiling is very pronounced at the beginning of the mission but gradually dissipates and finally disappears at pass 65D. A probable cause of the diffusion of the imagery is jettisoned fuel hanging near the starboard horizon camera window during the flight.

#### 4. Slave (AFT) Horizon Cameras:

The port (take-up) horizon camera was operational throughout the mission. The exposure varied from under to adequate and generally good horizons were recorded.

The starboard (supply) horizon camera operated throughout the mission. The imagery of the first 56 passes is veiled like that of the Master starboard horizon camera. The exposure was usually adequate and the frames not degraded by the veiling, display good horizon imagery.

#### 5. Stellar Camera No 45 (1006-1):

The stellar photography is degraded by a variety of malfunctions. The shutter failed to



FIGURE 1. EXAMPLE OF IMAGE QUALITY - MASTER CAMERA.

NPIC 0-8146 (2/65)

FIGURE 2. EXAMPLE OF IMAGE QUALITY - SLAVE CAMERA.

NPIC 0-8146 (2/65)

The following two photographs show a comparison of image quality between the Master (FWD) and Slave (AFT) panoramic cameras.

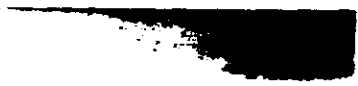
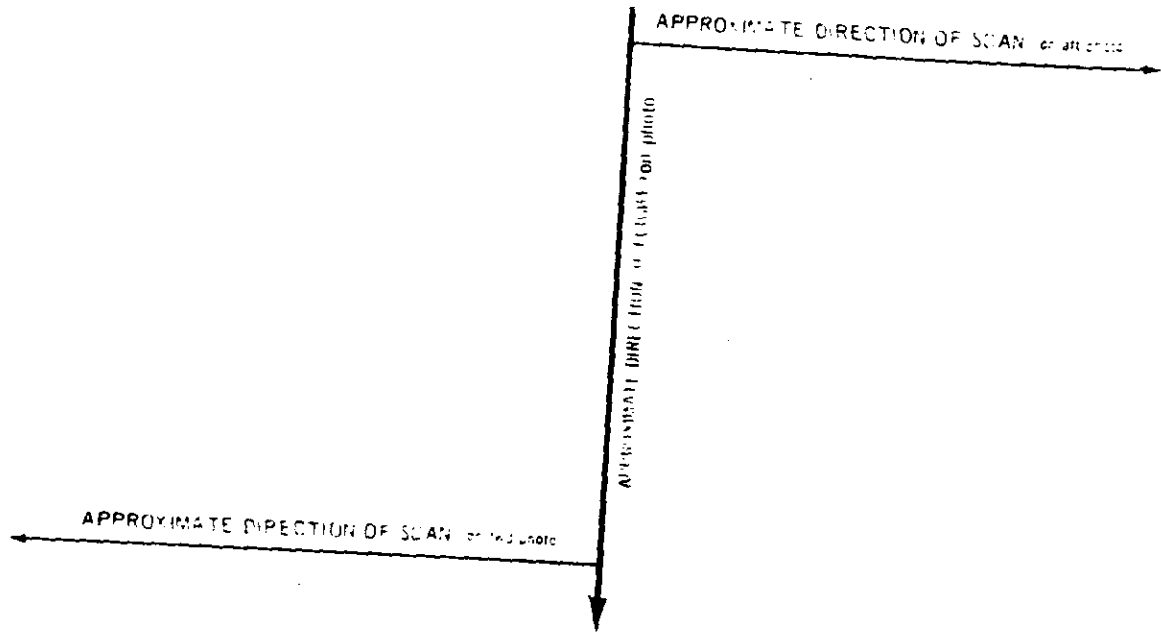






	Figure 1	Figure 2
Pass	21D	21D
Frame	83 FWD	87 AFT
Enlargement Factor	20X	20X
Solar Elevation	53°	53°
Solar Azimuth	257°	257°
Altitude	92.4 nm	92.4 nm

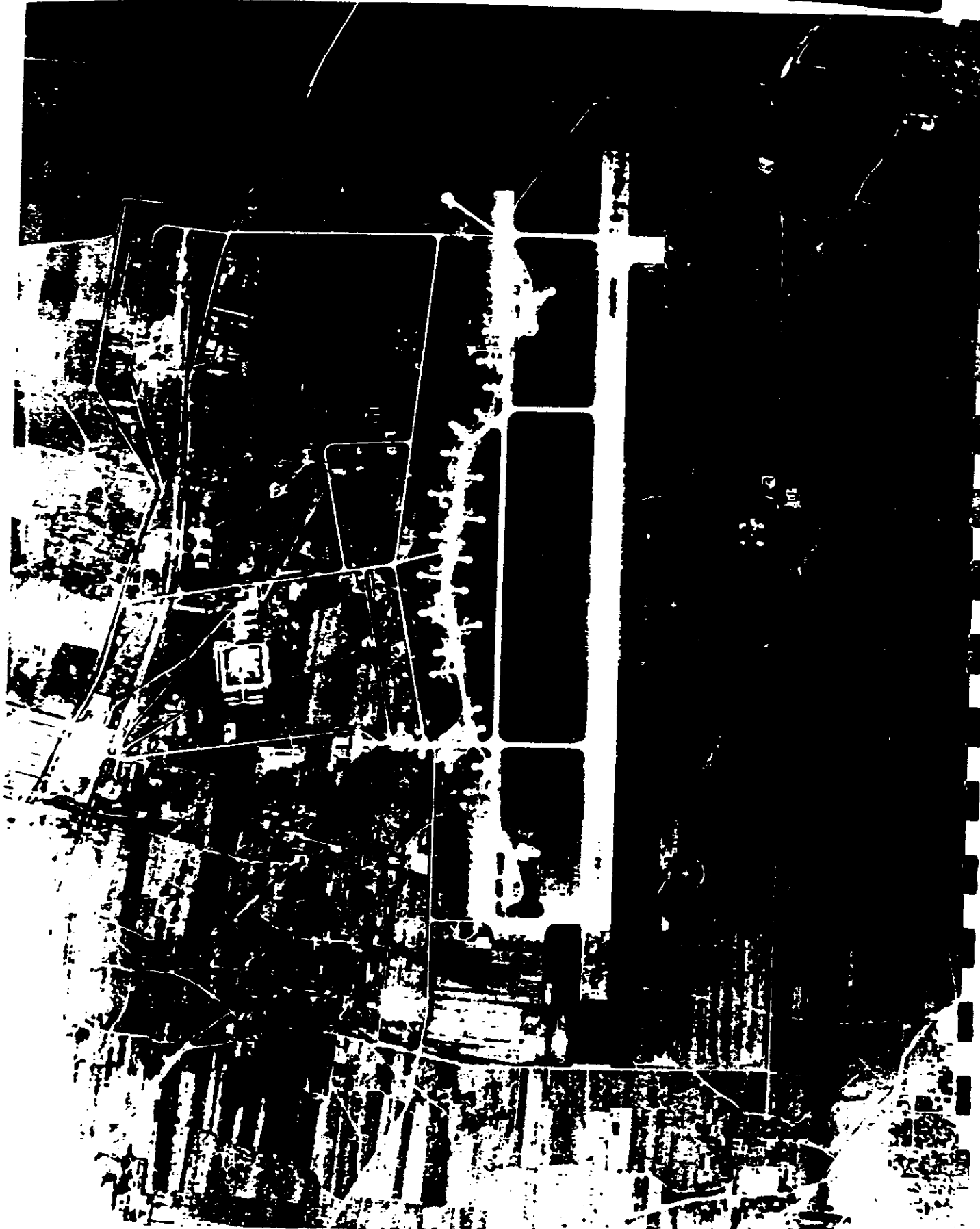


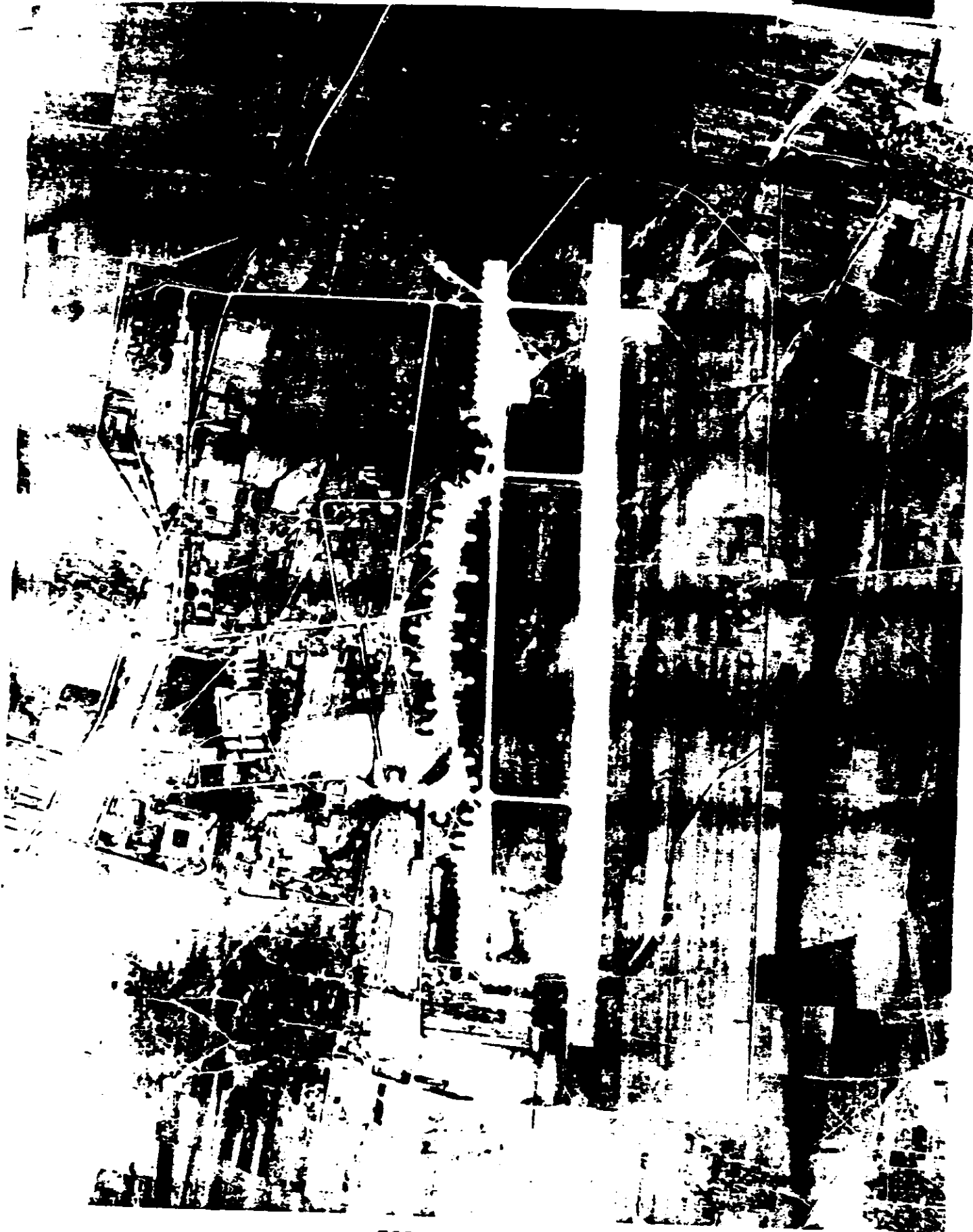
APPROXIMATE CENTER OF PHOTO RELATIVE TO FORMAT

Figure 1 •

• Figure 2







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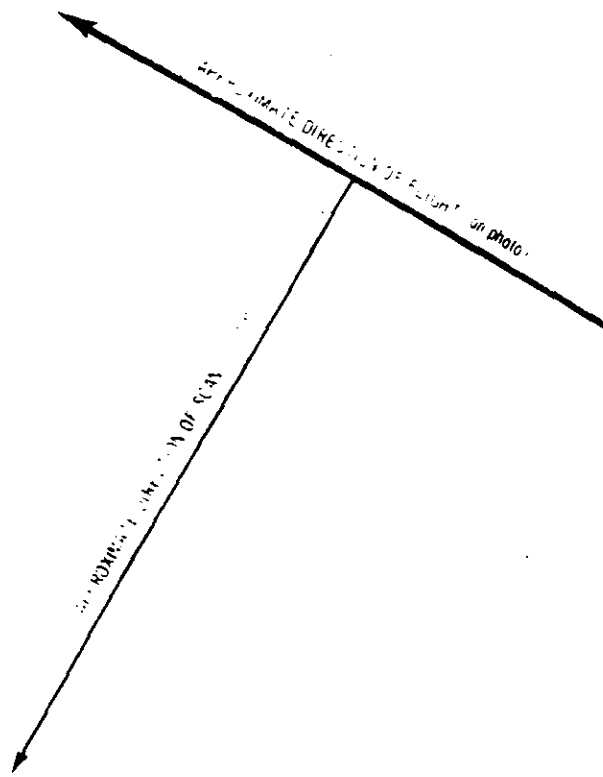
FIGURE 3. GOOD IMAGE QUALITY NEAR END OF MISSION.

NPIC J-8147 (2/88)





Pass	119D
Frame	96 AFT
Enlargement Factor	20X
Solar Elevation	52.2°
Solar Azimuth	140°
Altitude	93.11 nm



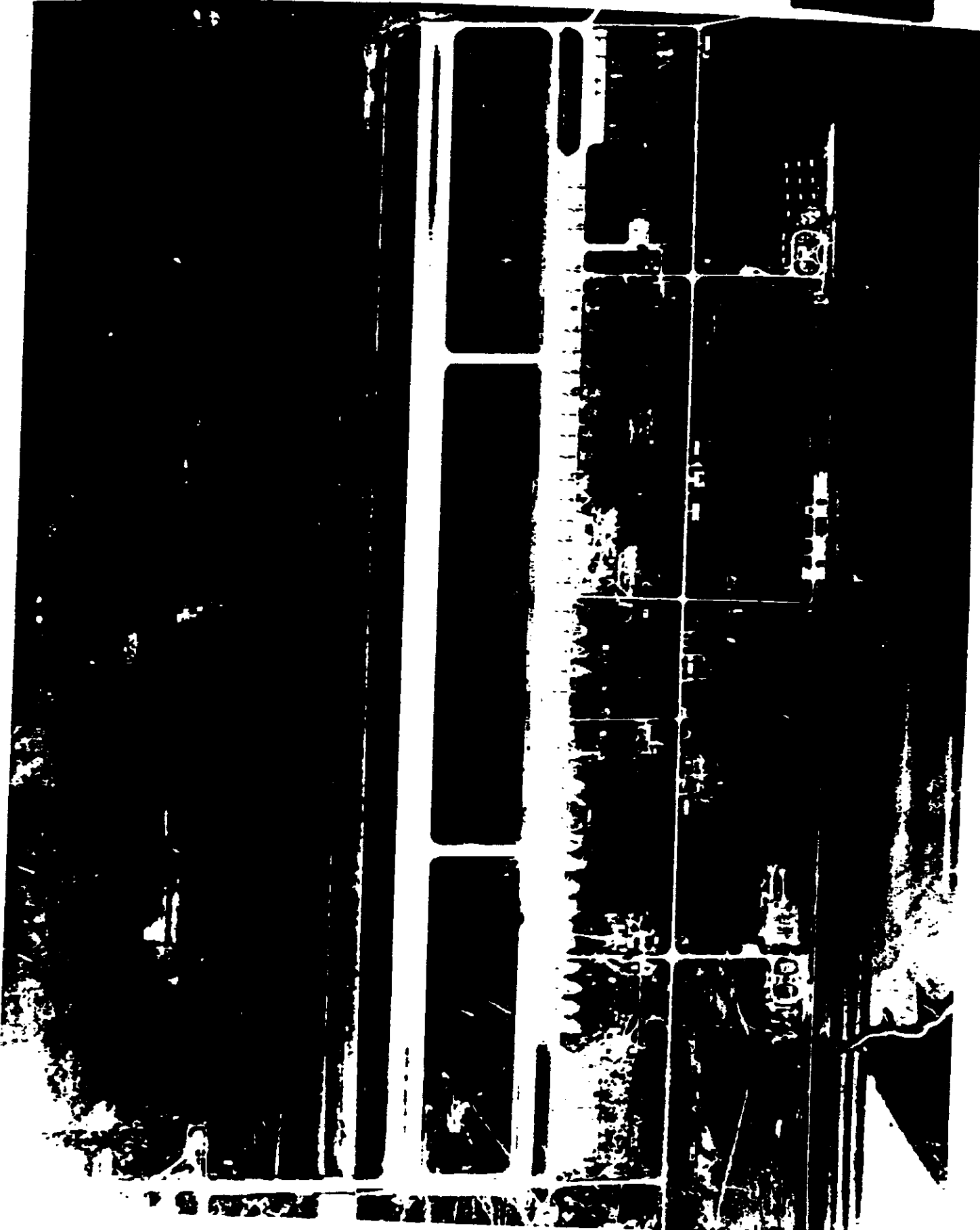
APPROXIMATE CENTER OF PHOTO RELATIVE TO FORMAT

VIEWED WITH NEGATIVE EMULSION DOWN



REF ID: A7600 12/801





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FIGURE 4. EFFECT OF FLARE.

NOFC J-8148 2100

The following photograph shows the degradation of PI suitability caused by flare.





Pass	52D
Frame	19 FWD
Enlargement Factor	Contact
Solar Elevation	53°
Solar Azimuth	230°
Altitude	88.99 nm

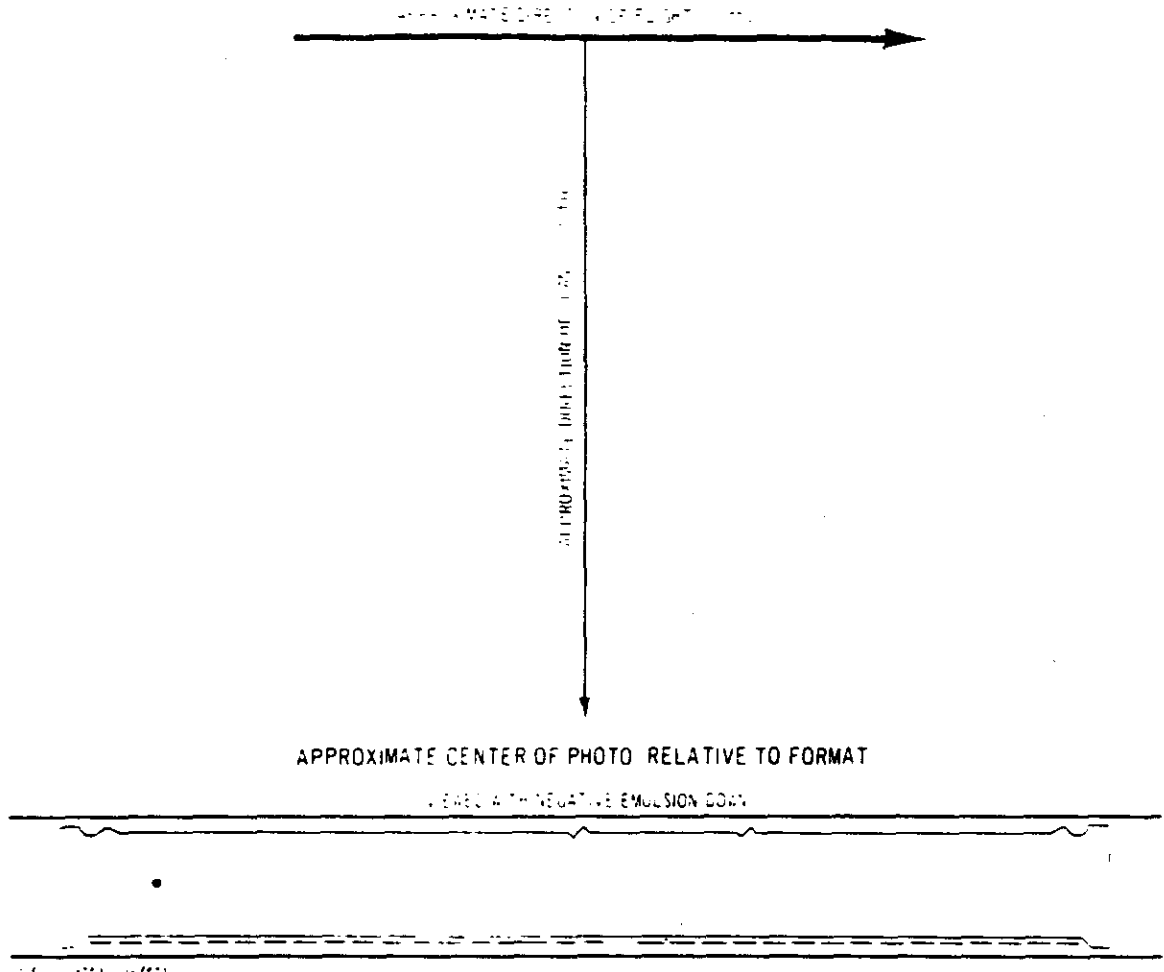








FIGURE 5. EXAMPLE OF IMAGE QUALITY - PORT HORIZON CAMERA.

NPIC J-8148 (2/88)

FIGURE 6. EXAMPLE OF IMAGE QUALITY - STARBOARD HORIZON CAMERA.

NPIC J-8180 (2/88)

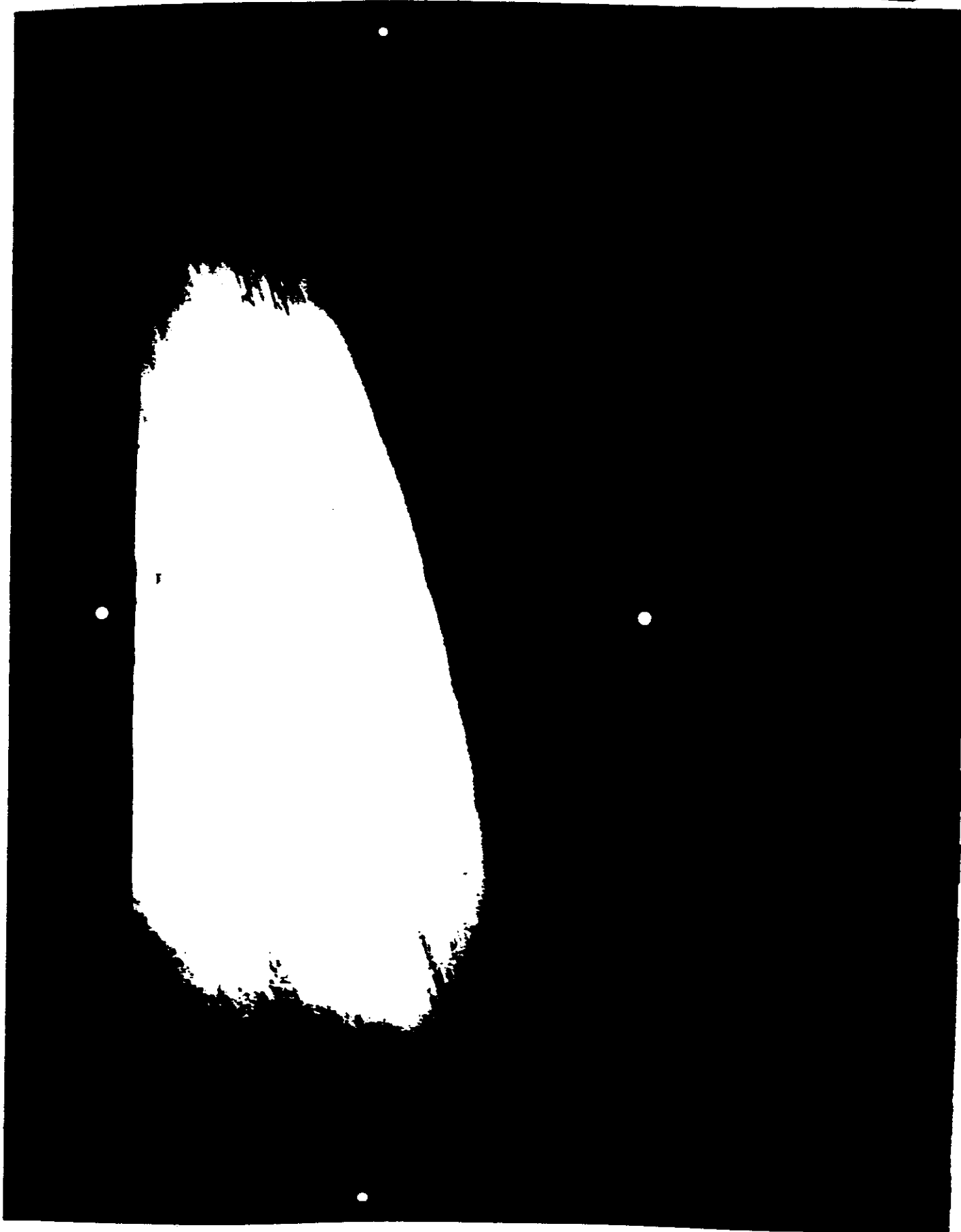
The following two photographs provide a comparison of horizon image quality from the starboard and port horizon cameras.





Pass	01D
Panoramic Frame	04 FWD
Enlargement Factor	04X
Solar Elevation	Not available
Solar Azimuth	Not available
Altitude	Not available





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FIGURE 7. HORIZON IMAGERY BEFORE MALFUNCTION.

NPIC J-8191 (2/68)

FIGURE 8. HORIZON IMAGERY AFTER MALFUNCTION.

NPIC J-8192 (2/68)

The first photograph is the last good horizon exposure preceding the horizon camera malfunction. The second photograph is the first frame affected by image smear.

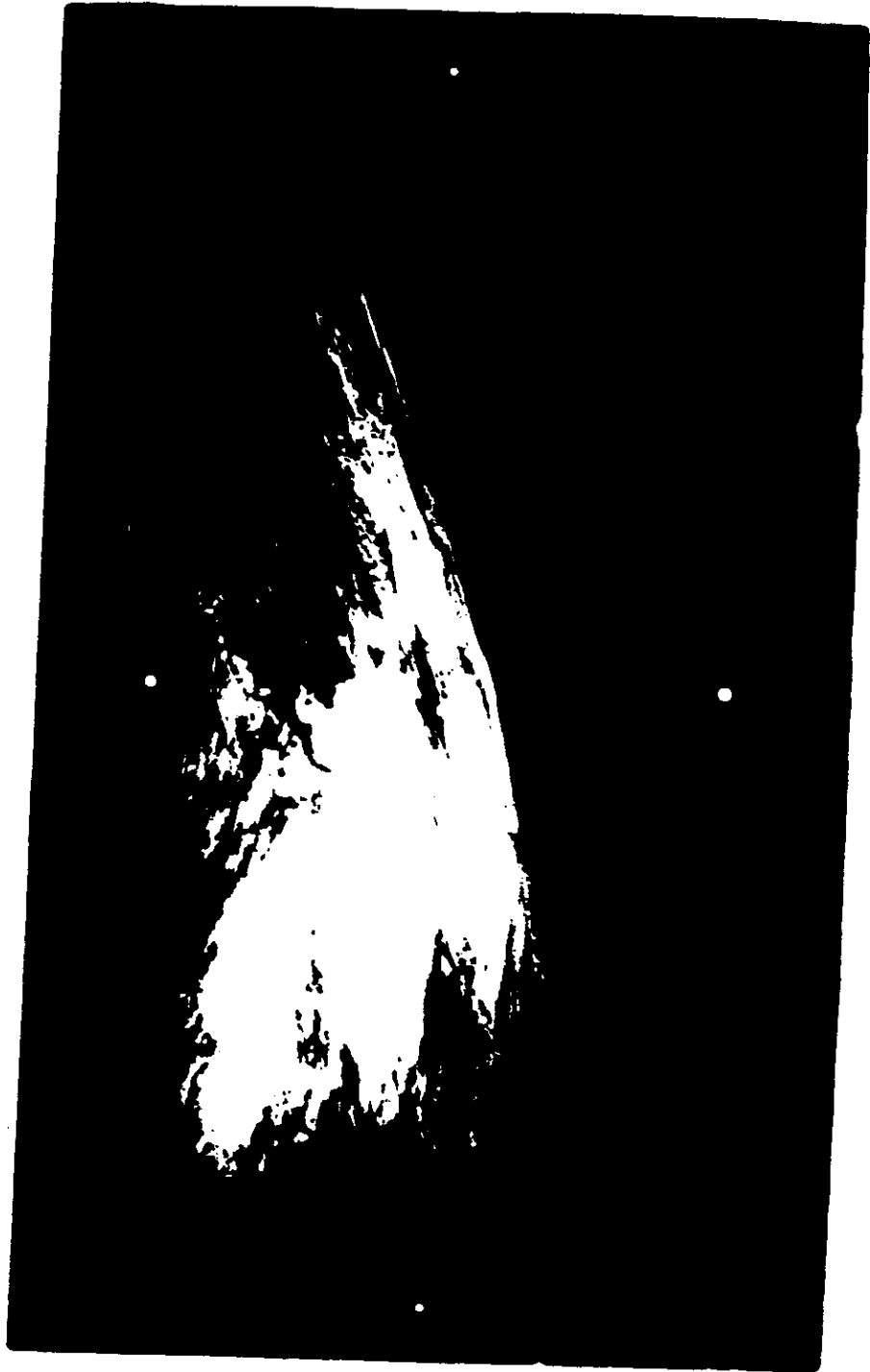


	Figure 7	Figure 8
Pass	103D	103D
Panoramic Frame	60 FWD	62 FWD
Enlargement Factor	3.5X	3.5X
Solar Elevation	56.3°	56.3°
Solar Azimuth	135°	135°
Altitude	96.5 nm	96.5 nm

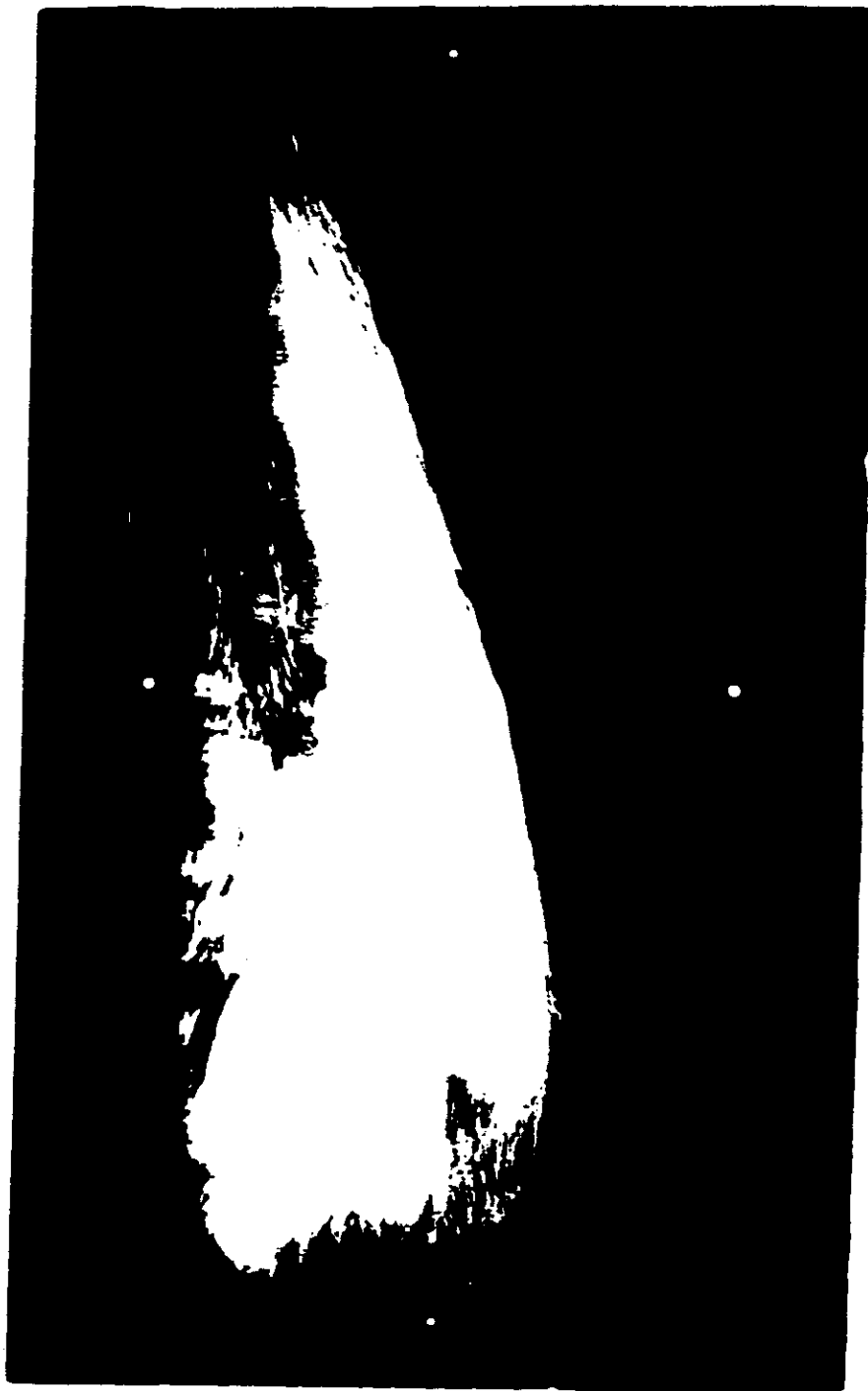


REF ID: A7811 12/001









open 33 times and it remained open during film transport 36 times. There is a ghost stellar image offset slightly from each true image on several frames of the photography. The stellar reduction process was not seriously impaired because it is possible to segregate the true image from the ghost image. A study of the doubled imagery follows the stellar film density readings in Appendix D.

The reseau is well defined and is not double exposed.

When viewing the film through the base, the fiducial to the right of the frame correlation fiducial is grossly overexposed. It is bloomed into the format and degrades the stellar imagery. Due to this flare and the more common flares (side curtain and earth flare) approximately 40 percent of each format is obscured.

Edge fog due to static discharges is intermittent along the edge opposite the frame correlation fiducial.

Emulsion scratches parallel to the major axis of the film are continuous on the first 20 frames and intermittent thereafter.

Where not affected by degradations, contrast and density are sufficient to determine the presence of stellar images.

6. Stellar Camera No 42 (1006-2):

The exposure and contrast are adequate to determine the presence of stellar images.

Flare affects 30 percent of each frame. Semicircles, associated with the four fiducials, are imaged in the format of each frame. This is probably caused by halation from the mounting plates of the fiducial lamps.

Due to a malfunction which affected all of the auxiliary equipment keyed to the "center of format switch," there are only four frames after the first camera operation of pass 103D. The four frames following the malfunction are randomly located (not in sequence).

A streak of fog due to a light leak extends into each format from the camera number edge.

The fog is degrading only on the frames that were at rest in the platen during a camera off period.

Emulsion cracks along the minor axis are present throughout.

There is a slight fogging each 8.0 inches along the major axis. The fog appears to be the result of corona discharges.

7. Index Camera No D47 (1006-1):

The first frame is double exposed.

Static discharge traces are heavy on the last five frames of photography. Throughout the rest of the mission, fog due to static is intermittent and minor.

The density and acuity of the imagery is good throughout.

8. Index Camera No D49 (1006-2):

Frame 1 is double exposed. Beginning at frame 22 there is a wavering minus density streak approximately 0.5 inches from and roughly parallel to the edge of the film opposite the frame correlation fiducial mark. The density of the frame correlation fiducial mark is quite low; however, it is readable throughout the mission.

Static discharges intermittently cause minor fog along the camera number edge of the film. There is fog due to a corona discharge on frame 185.

A light leak results in a streak of fog projected about 0.1 inches into the format from the camera number edge of each frame. The fog is very faint except at camera off periods.

9. Associated Equipment:

The frequency marks of both cameras are imaged outside the format and are readable. However, a reflected image does appear just inside the format edge.

The binary data block of the Slave panoramic camera failed to operate between Pass 1D, frame 09, and Pass 3D, frame 18. Throughout the remainder of the mission it is slightly bloomed but readable. The binary data block of the Master

panoramic camera is slightly bloomed but readable through the first camera operation of Pass 103D. Beginning at the second camera operation of Pass 103D a variety of malfunctions began. The binary randomly failed to operate, was imaged during film transport causing it to be smeared, or appear twice on a single frame. There are occasions when the binary word is properly imaged, but more often than not a malfunction occurred.

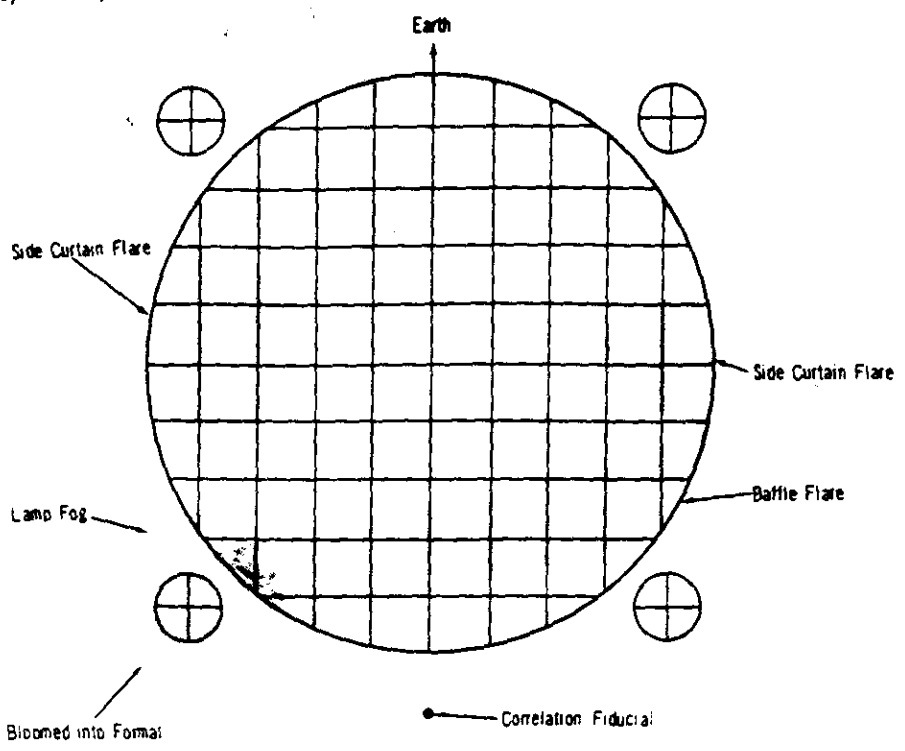
The camera number of the Slave panoramic

camera failed to operate between Pass 1D, frame 9, and Pass 3D, frame 18. The camera number of the Master camera and binary data block malfunctioned simultaneously.

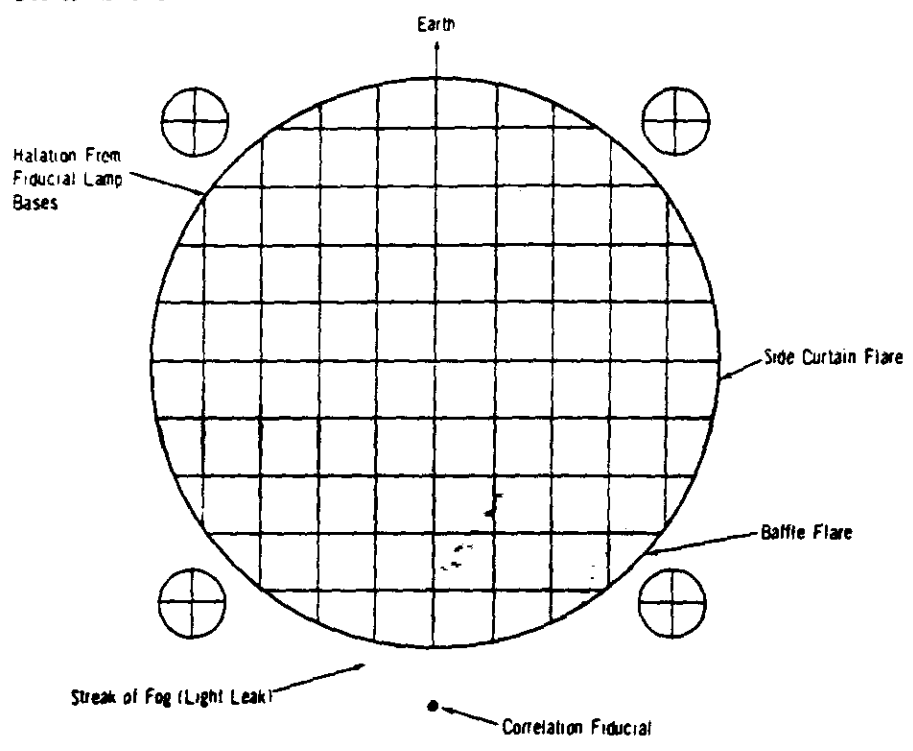
The horizon camera fiducial marks of the Master camera were also inoperative when the binary word and camera number failed.

An end-of-pass marker appears twice on the last frame of each camera operation, once at the binary word and again near the end of the frame.

MISSION 1006-1



MISSION 1006-2



NRIC J-7812 (R/68)

FIGURE 9. TYPICAL STELLAR FORMAT FLARES AND DENSITIES.



FIGURE 10. EFFECT OF STELLAR CAMERA SHUTTER MALFUNCTION.

NRIC J48183 (2/78)

The following photograph illustrates the image degradation caused by the shutter remaining open during film transport. Note the severely bloomed fiducial.





Stellar Frame	249	250
Pass	37D	37D
Panoramic Frame	17 FWD	24 FWD
Enlargement Factor	4X	4X
Solar Elevation	49°	50°
Solar Azimuth	228°	231°
Altitude	86 nm	87 nm





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FIGURE 11. EXAMPLE OF FUEL PARTICLE IMAGES.

REF ID: A664 2 66

The following photograph shows the images of fuel particles that are photographed during the vehicle fuel jettison procedure. This usually occurs during the first few orbits of each mission.

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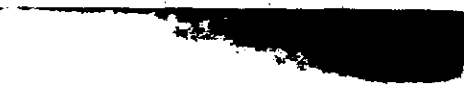
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Stellar Frame	02 (1006-1)
Pass	01D
Panoramic Frame	15 FWD
Enlargement Factor	4X
Solar Elevation	Not available
Solar Azimuth	Not available
Altitude	Not available





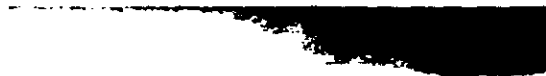
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FIGURE 12. GOOD QUALITY INDEX CAMERA PHOTOGRAPHY.

NPIC J-8185 -2/85.





Index Frame	81
Pass	09D
Panoramic Frame	27 FWD
Enlargement Factor	2X
Solar Elevation	53°
Solar Azimuth	234°
Altitude	86.11 nm





## PART II. FILM

### 1. Film Processing:

This section evaluates processing, exposure, and density of the original negatives.

The exposure of the Panoramic, Stellar, Index, and Horizon cameras was generally good throughout the mission.

The film exposed in the panoramic cameras and retrieved in the "A" bucket received approximately 50 percent full and 50 percent intermediate development. The "B" bucket panoramic photography received about 30 percent full, 40 percent intermediate, and 30 percent primary development.

A much greater variation in density is present in the panoramic photography of the

A bucket than on that of the "B" bucket. Atmospheric conditions and terrain reflectance were the apparent reason for the large density spread. As a result of variations in exposure, the density difference within a single frame or between adjacent frames sometimes is large. According to the processing contractor the

range of densities (exposure latitude) of some frames taxed the capabilities of the straight line portion of the characteristic curve for type 4404 film. Even though these large variations in density exist, a large majority of the film was judged to be good with respect to density.

Approximately 7.0 inches of film was destroyed in the processor at a cut between two processing parts. The accident occurred on Pass 18D, frame 17, of the Slave panoramic photography.

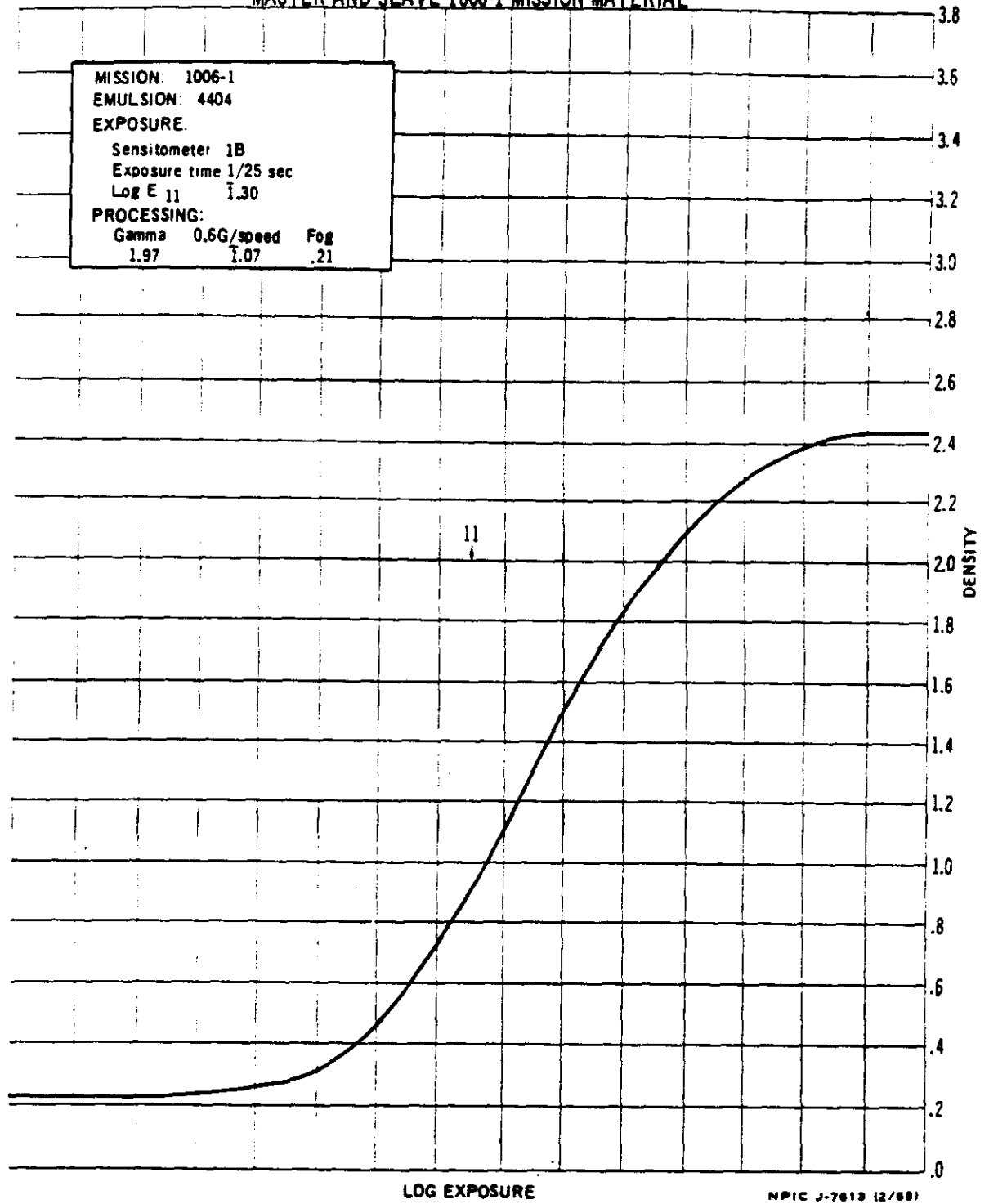
Film footage processed per camera (approximate):

Camera	45 (stellar)	75 ft	412 frames
Camera	D47 (index)	135 ft	392 frames
Camera	42 (stellar)	75 ft	279 frames
Camera	D49 (index)	135 ft	276 frames
Camera	145 (1006-1)	7943 ft	2663 frames
Camera	149 (1006-1)	7862 ft	2647 frames
Camera	145 (1006-2)	7879 ft	2971 frames
Camera	149 (1006-2)	8005 ft	3021 frames

The following processing curves were produced by the processing contractor.

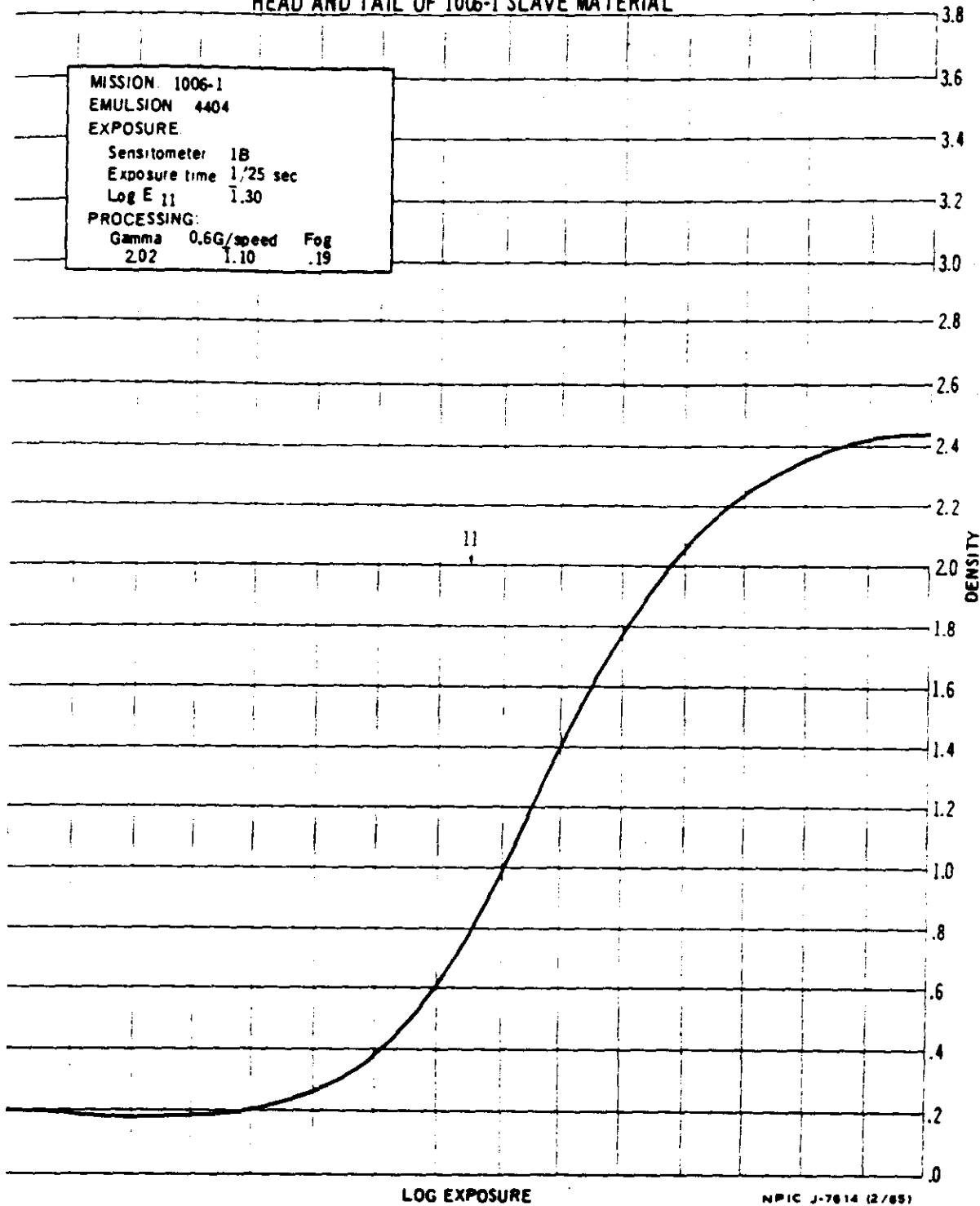


### SENSITOMETRIC CURVE FROM MASTER AND SLAVE 1006-1 MISSION MATERIAL



### SENSITOMETRIC CURVE FROM HEAD AND TAIL OF 1006-1 SLAVE MATERIAL

MISSION: 1006-1		
EMULSION: 4404		
EXPOSURE:		
Sensitometer:	1B	
Exposure time:	1/25 sec	
Log E 11:	1.30	
PROCESSING:		
Gamma:	0.6G/speed	Fog
2.02	1.10	.19



NPIC J-7614 (2/65)

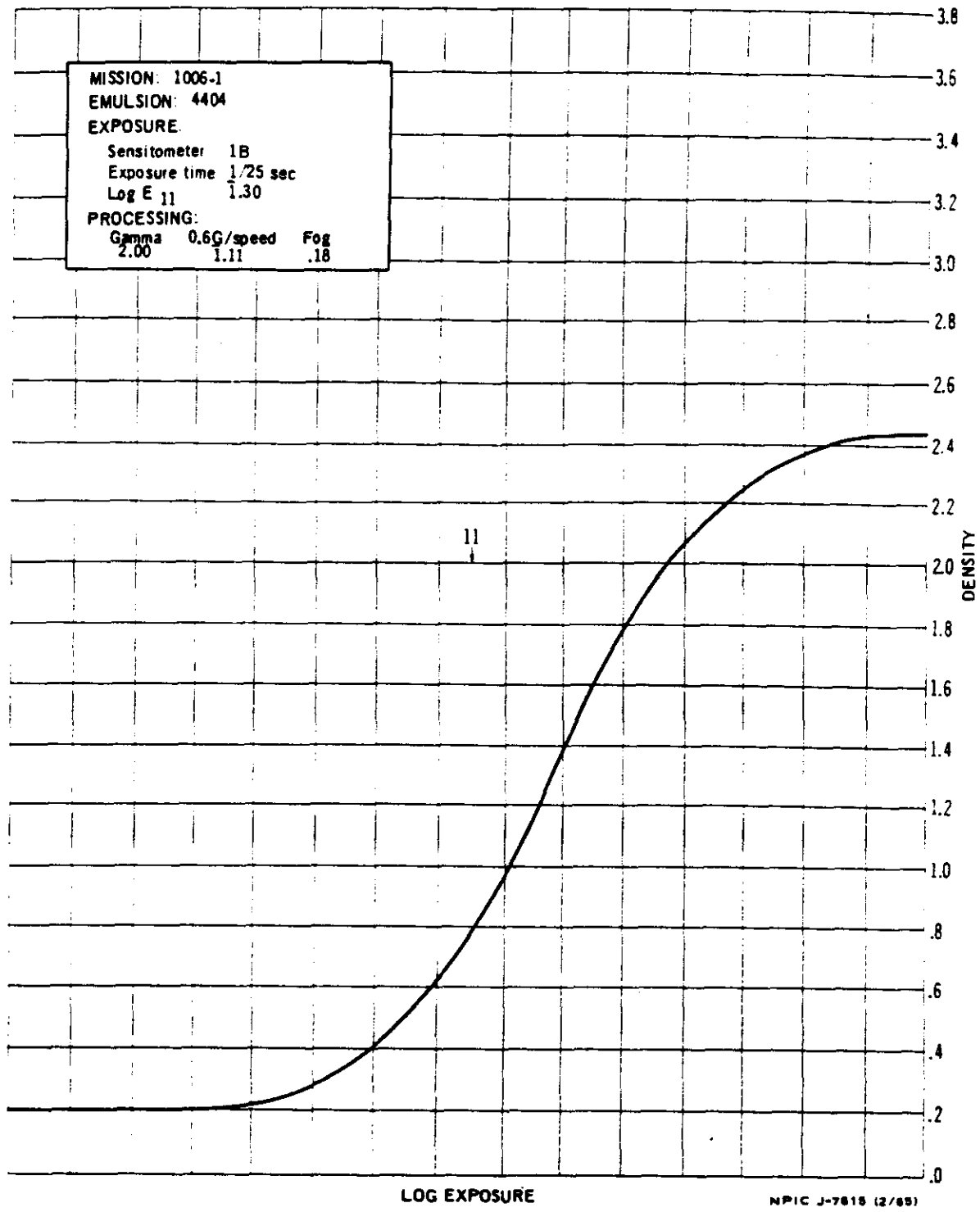
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### SENSITOMETRIC CURVE FROM HEAD AND TAIL OF 1006-1 MASTER MATERIAL

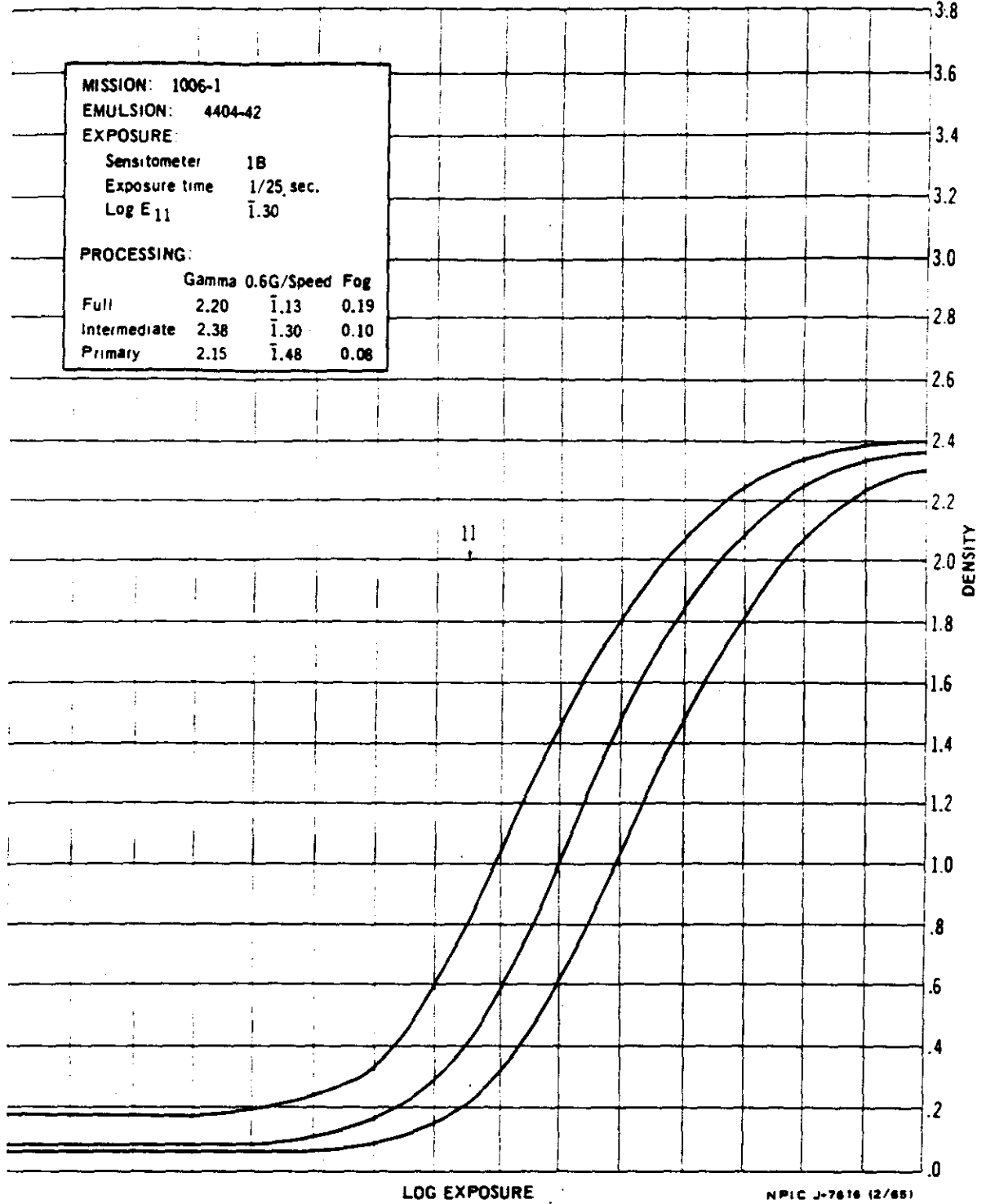


NPIC J-7815 (2/85)

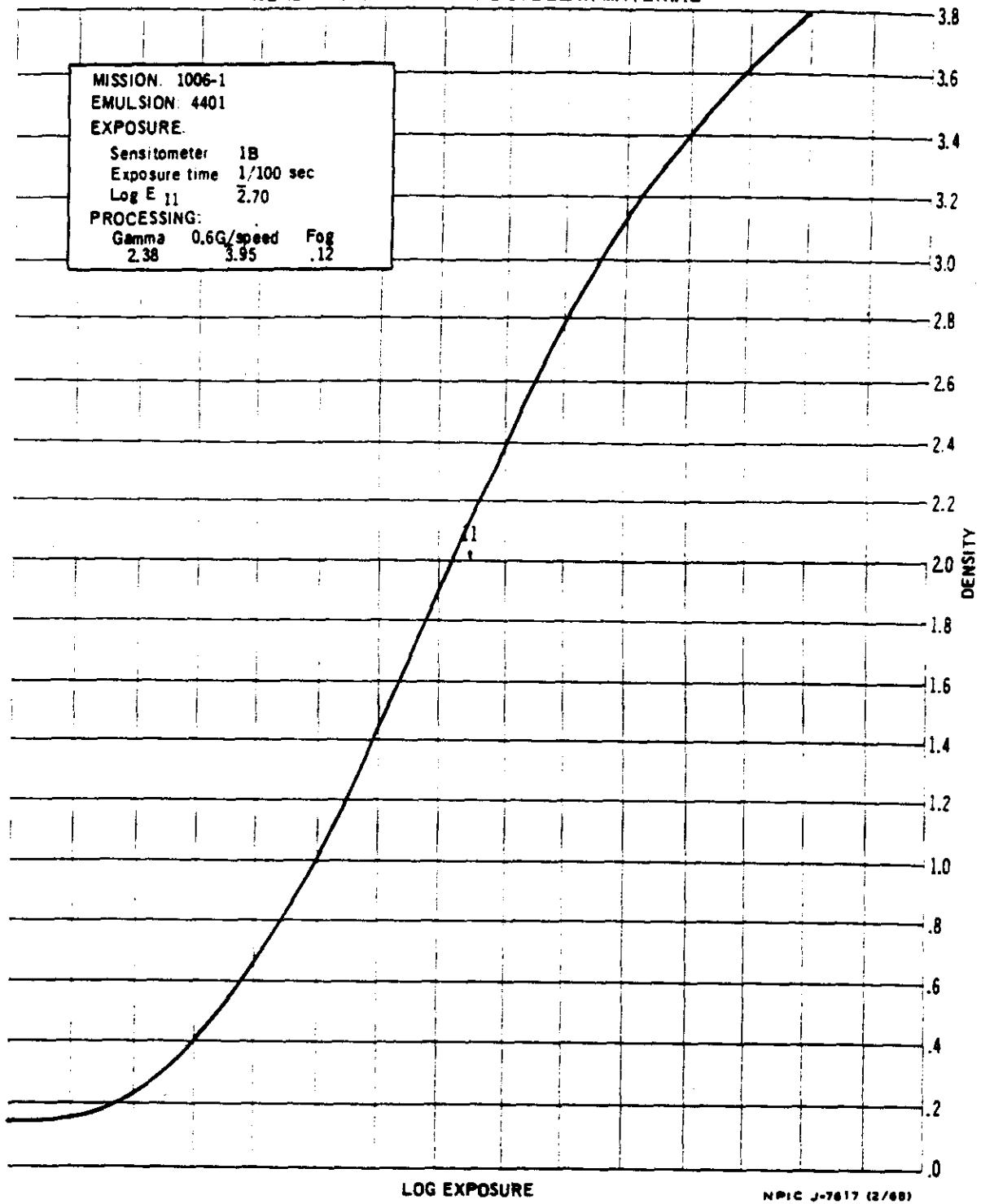


### STANDARD SENSITOMETRIC CONTROL CURVES

MISSION: 1006-1			
EMULSION: 4404-42			
EXPOSURE:			
Sensitometer	1B		
Exposure time	1/25 sec.		
Log E <sub>11</sub>	1.30		
PROCESSING:			
	Gamma	0.6G/Speed	Fog
Full	2.20	1.13	0.19
Intermediate	2.38	1.30	0.10
Primary	2.15	1.48	0.08



SENSITOMETRIC CURVE FROM  
HEAD AND TAIL OF 1006-1 STELLAR MATERIAL



NPIC J-7617 (2/68)



2. Stellar Densities:

The Dmax and Dmin of the first and last frame of each operational pass were measured on a Macbeth QuantaLog densitometer Model EP 1000 with a 0.5mm aperture and an ET 20 attachment. All readings include gross fog.

The gross fog of each frame of this mission was read in conjunction with a radiation study conducted on this mission. The gross fog of each stellar frame follows the radiation study (appendix D).

Stellar Camera Number 45 (Mission 1006-1)

Reading	Pass	Frame	Limiting		Reading	Pass	Frame	Limiting	
			Dmin	Dmax				Dmin	Dmax
1	01D	1	0.57	2.64	32	25AE	204	0.25	0.26
2	01D	2	0.52	2.24	33	25D	205	0.35	2.05
3	02D	3	0.72	2.34	34	25D	222	0.55	2.55
4	02D	7	0.34	2.02	35	31D	223	0.64	2.66
5	03D	8	0.37	2.25	36	31D	227	0.26	0.29
6	03D	13	0.39	2.30	37	35D	228	0.24	0.25
7	05D	14	0.43	2.45	38	35D	233	0.25	0.30
8	05D	27	0.34	2.22	39	36D	234	0.32	0.35
9	06D	28	0.47	2.61	40	36D	246	0.62	2.71
10	06D	47	0.34	2.08	41	37D	247	0.20	0.20
11	07D	48	0.47	2.43	42	37D	275	0.42	2.52
12	07D	75	0.41	2.30	43	38D	276	0.75	2.82
13	09AE	76	0.25	0.25	44	38D	304	0.41	0.42
14	09AE	77	0.30	0.31	45	40AE	305	0.40	0.42
15	09D	78	0.38	2.61	46	40D	306	0.55	2.92
16	09D	86	0.40	2.39	47	40D	312	0.57	2.65
17	15D	87	0.40	2.37	48	49D	313	0.45	2.67
18	15D	93	0.45	2.43	49	49D	315	0.39	2.26
19	15D	94	0.53	2.45	50	52D	319	0.75	2.94
20	15D	101	0.64	2.17	51	52D	332	0.19	0.20
21	19D	102	0.51	2.55	52	53D	333	0.20	0.20
22	19D	113	0.40	2.44	53	53D	362	0.50	2.75
23	21D	114	0.47	2.58	54	54D	363	0.65	2.52
24	21D	141	0.34	2.30	55	54D	365	0.44	2.62
25	22D	142	0.42	2.51	56	55D	353	0.70	2.55
26	22D	160	0.36	2.46	57	55D	400	1.06	3.15
27	23D	161	0.33	2.14	58	56AE	401	0.34	0.60
28	23D	175	0.38	2.36	59	56AE	402	0.40	0.53
29	24D	176	0.40	2.42	60	56D	403	0.56	2.94
30	24D	202	0.51	2.65	61	56D	412	0.35	2.40
31	25AE	203	0.24	0.25					

3. Index Densities:

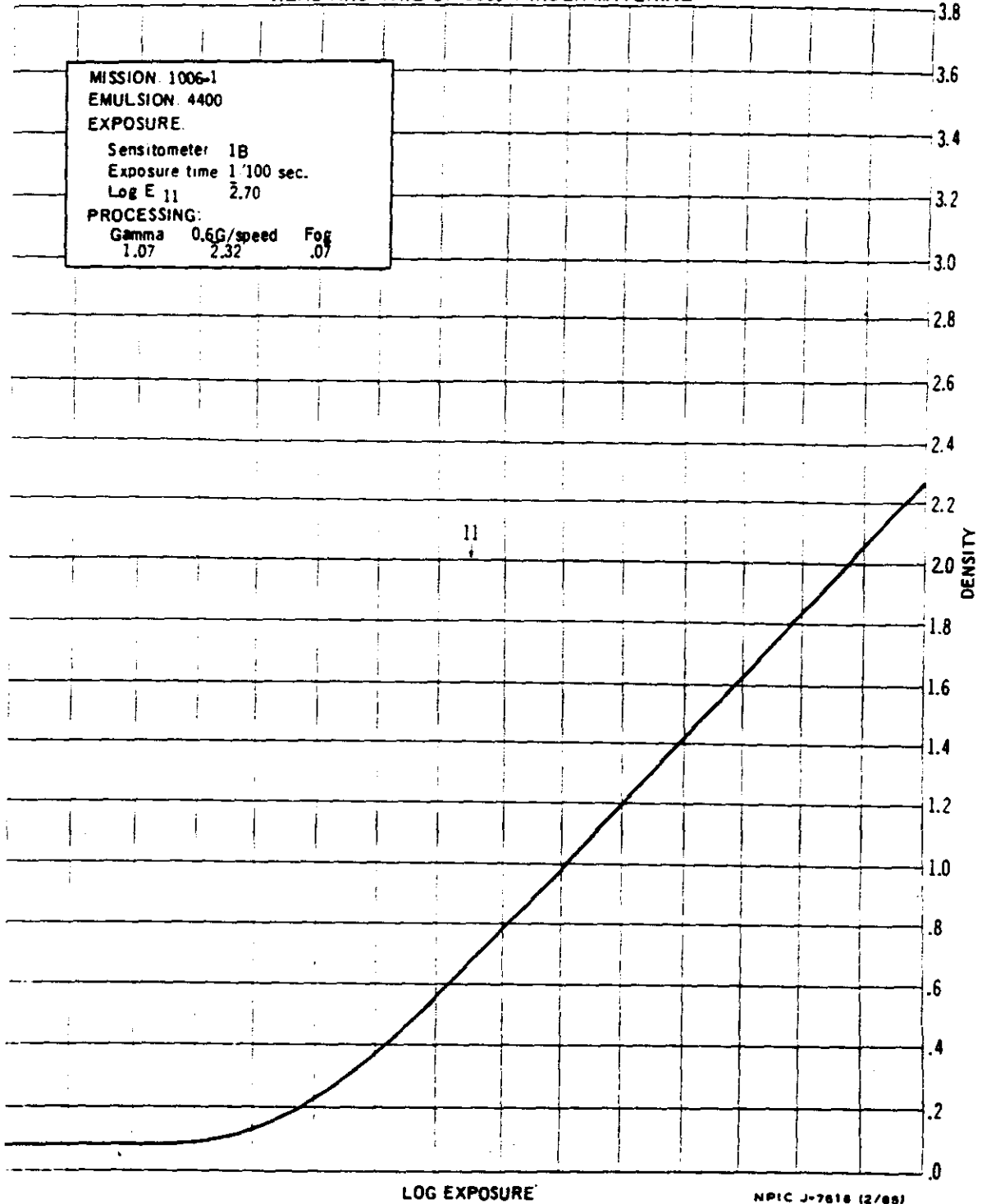
The terrain and limiting Dmax and Dmin values, together with three gross fog readings, were made on the first and last frame of each

pass. The densities were read with a Macbeth QuantaLog densitometer model EP 1000 with a 0.5mm aperture and an ET 20 attachment. The terrain and limiting densities include gross fog.





### SENSITOMETRIC CURVE FROM HEAD AND TAIL OF 1006-1 INDEX MATERIAL



LOG EXPOSURE

NPIC J-7818 (2/68)



Camera Number D-47 (Mission 1006-1)

Reading	Pass	Frame	Terrain		Limiting		Gross Fog		
			Dmin	Dmax	Dmin	Dmax	Title Edge	Center Btwn Frs	Cam No Edge
1	01D	1	NR	NR	1.16	2.30	0.09	0.09	0.09
2	01D	2	NR	NR	0.46	1.93	0.09	0.09	0.09
3	02D	3	0.44	1.76	0.25	1.80	0.06	0.06	0.06
4	02D	7	NR	NR	0.16	1.47	0.14	0.14	0.13
5	03D	5	0.26	1.97	0.21	1.97	0.14	0.15	0.16
6	03D	13	NR	NR	0.16	1.63	0.10	0.10	0.10
7	03D	14	0.30	0.99	0.16	1.92	0.06	0.06	0.06
8	05D	27	0.26	0.57	0.16	1.92	0.07	0.07	0.07
9	06D	25	0.46	0.62	0.44	2.03	0.07	0.07	0.07
10	06D	47	NR	NR	0.42	1.95	0.06	0.06	0.06
11	07D	46	0.13	0.66	0.13	1.93	0.06	0.06	0.06
12	07D	75	0.40	1.32	0.24	1.72	0.06	0.06	0.06
13	09AE	76	NR	NR	0.06	0.09	0.06	0.06	0.06
14	09AE	77	NR	NR	0.06	0.06	0.06	0.06	0.06
15	09D	76	0.45	0.54	0.40	1.95	0.06	0.06	0.06
16	09D	86	0.35	1.22	0.29	1.99	0.07	0.07	0.07
17	15D	87	0.50	1.02	0.31	1.95	0.06	0.06	0.06
18	15D	93	0.61	1.30	0.32	2.12	0.06	0.06	0.06
19	16D	94	0.22	1.68	0.22	1.66	0.07	0.07	0.07
20	15D	101	0.62	1.37	0.12	2.05	0.06	0.06	0.06
21	19D	102	0.36	1.45	0.56	1.75	0.06	0.05	0.05
22	19D	113	NR	NR	0.40	1.73	0.06	0.06	0.06
23	21D	114	NR	NR	0.42	1.55	0.06	0.05	0.05
24	21D	141	NR	NR	0.51	1.63	0.06	0.06	0.06
25	22D	142	NR	NR	0.56	1.55	0.06	0.06	0.06
26	22D	160	0.20	0.62	0.20	1.96	0.06	0.06	0.06
27	23D	161	0.20	1.06	0.20	1.51	0.07	0.07	0.07
28	23D	175	0.30	1.67	0.30	2.03	0.06	0.06	0.06
29	24D	176	NR	NR	0.12	2.00	0.06	0.07	0.06
30	24D	202	0.51	1.34	0.16	1.34	0.06	0.06	0.06
31	25AE	203	NR	NR	0.06	0.06	0.06	0.06	0.06
32	25AE	204	NR	NR	0.06	0.06	0.06	0.06	0.06
33	25D	205	0.23	0.66	0.23	1.90	0.06	0.06	0.06
34	25D	222	0.16	0.94	0.16	2.06	0.06	0.06	0.06
35	31D	223	0.79	0.92	0.54	2.01	0.06	0.06	0.06
36	31D	227	0.43	1.47	0.36	2.00	0.06	0.05	0.06
37	35D	228	0.20	1.69	0.20	1.69	0.10	0.10	0.10
38	35D	233	NR	NR	0.13	1.57	0.06	0.06	0.06
39	36D	234	0.12	0.60	0.12	1.91	0.06	0.06	0.06
40	36D	246	NR	NR	0.34	1.97	0.06	0.06	0.06
41	37D	247	NR	NR	0.53	1.63	0.06	0.07	0.07
42	37D	275	NR	NR	0.22	2.01	0.06	0.06	0.06
43	38D	276	NR	NR	0.30	1.62	0.06	0.06	0.06
44	38D	304	0.50	0.94	0.40	2.04	0.06	0.06	0.06
45	40AE	305	NR	NR	0.06	0.06	0.06	0.06	0.06
46	40D	306	0.24	0.72	0.21	1.55	0.06	0.06	0.06
47	40D	312	0.16	1.14	0.16	1.17	0.06	0.06	0.06
48	49D	313	NR	NR	0.15	1.94	0.10	0.10	0.10
49	49D	318	NR	NR	0.14	1.62	0.06	0.06	0.06
50	52D	319	0.20	0.76	0.20	2.43	0.06	0.07	0.07
51	52D	332	NR	NR	0.20	1.97	0.06	0.06	0.06
52	53D	333	NR	NR	0.45	1.78	0.06	0.06	0.06
53	53D	362	0.24	0.76	0.24	2.03	0.06	0.06	0.06
54	54D	363	0.23	1.60	0.23	1.60	0.06	0.06	0.06
55	54D	362	0.44	1.62	0.44	2.11	0.06	0.06	0.06
56	55D	383	0.52	0.66	0.40	1.92	0.06	0.06	0.06
57	55D	392	0.54	0.92	0.50	2.06	0.20	0.30	0.34

Note: NR denotes no reading made

Camera Number D-49 (Mission 1006-2)

Reading	Pass	Frame	Terrain		Limiting		Gross Fog		
			Dmin	Dmax	Dmin	Dmax	Title Edge	Center Btwn Frs	Cam No Edge
1	65D	1	NR	NR	0.46	2.14	0.06	0.06	0.06
2	65D	2	0.28	0.54	0.14	2.10	0.06	0.06	0.06
3	66D	3	0.16	0.83	0.16	2.02	0.10	0.10	0.10
4	65D	17	0.16	0.84	0.16	1.89	0.10	0.06	0.09
5	69D	18	0.16	0.72	0.16	1.84	0.10	0.10	0.10
6	69D	33	NR	NR	1.04	1.93	0.09	0.09	0.09
7	70D	34	0.15	0.50	0.15	2.64	0.10	0.09	0.10
5	70D	61	0.26	1.80	0.12	1.92	0.06	0.06	0.06
9	71D	62	0.12	0.60	0.12	1.56	0.10	0.10	0.10
10	71D	75	0.36	1.30	0.16	1.81	0.10	0.10	0.10
11	72AE	76	NR	NR	0.10	0.10	0.10	0.10	0.10
12	72AE	77	NR	NR	0.10	0.10	0.10	0.10	0.10
13	72D	78	0.34	0.66	0.24	2.04	0.10	0.10	0.10
14	72D	86	0.35	0.76	0.16	2.00	0.06	0.06	0.06
15	73D	67	0.20	0.80	0.12	1.96	0.10	0.10	0.10
16	73D	92	0.26	0.65	0.24	1.94	0.10	0.10	0.10
17	76D	93	0.20	1.05	0.20	1.36	0.10	0.10	0.10
18	76D	96	0.20	0.72	0.20	1.87	0.09	0.09	0.09
19	81D	99	NR	NR	0.14	1.98	0.06	0.06	0.06
20	51D	100	NR	NR	0.14	2.05	0.06	0.06	0.06
21	54D	101	0.30	0.92	0.30	2.05	0.06	0.06	0.06
22	54D	116	NR	NR	0.55	1.86	0.06	0.07	0.07
23	55D	119	NR	NR	0.24	1.93	0.09	0.06	0.06
24	55D	144	NR	NR	0.36	1.84	0.06	0.06	0.06
25	56D	145	0.26	0.62	0.17	1.96	0.06	0.06	0.06
26	56D	159	0.46	1.94	0.22	1.95	0.06	0.06	0.06
27	57D	160	0.52	0.67	0.36	1.75	0.06	0.06	0.06
28	67D	185	0.40	1.37	0.32	2.07	0.10	0.10	0.10
29	55AE	186	NR	NR	0.06	0.10	0.09	0.09	0.09
30	55AE	167	NR	NR	0.06	0.10	0.10	0.09	0.09
31	96D	166	0.27	0.35	0.12	1.82	0.06	0.06	0.06
32	96D	192	NR	NR	0.12	1.87	0.09	0.09	0.09
33	99D	193	0.35	0.63	0.14	1.83	0.06	0.06	0.06
34	99D	205	NR	NR	0.12	1.68	0.10	0.09	0.10
35	100D	206	0.27	1.19	0.25	2.04	0.10	0.10	0.10
36	100D	221	NR	NR	0.11	1.44	0.06	0.06	0.06
37	101D	222	0.20	0.64	0.16	1.70	0.10	0.10	0.10
38	101D	242	0.21	1.72	0.17	2.11	0.10	0.10	0.10
39	102D	243	0.27	0.66	0.16	1.90	0.10	0.10	0.10
40	102D	258	0.40	1.82	0.29	2.02	0.10	0.06	0.10
41	103AE	259	NR	NR	0.06	0.13	0.06	0.06	0.06
42	103AE	260	NR	NR	0.06	0.10	0.09	0.09	0.09
43	103D	261	0.25	0.46	0.20	1.96	0.09	0.09	0.09
44	103D	273	0.33	1.26	0.26	1.82	0.09	0.06	0.06
45	104D	274	0.17	0.75	0.17	1.74	0.10	0.09	0.09
46	110D	275	0.30	1.85	0.30	2.04	0.10	0.09	0.10
47	112D	276	NR	NR	0.15	1.95	0.10	0.09	0.10
48	112D	277	NR	NR	0.09	0.10	0.10	0.09	0.09
49	115D	278	0.14	1.06	0.14	1.80	0.10	0.10	0.10
50	115D	279	0.23	0.64	0.22	1.94	0.10	0.10	0.10

Note: NR denotes no reading made.

4. Film Degradations:

A. Master (FWD) Panoramic Camera

Light Leaks - Minor and few. The normal fog associated with camera off periods appears on the first and last three frames of most passes (Example: pass 2D). The density of the fog is commensurate with the duration of the camera off period and the solar elevation. The last few feet of film from the "A" bucket and the first few feet from the "B" bucket are heavily fogged.

Corona Static - Fog due to corona static is usually present between the third and fourth frame following a camera on (Example: pass 70D). A single corona burst appears on frame 13 of pass 88.4E. The presence of this static induced fog is apparent only because the frame is clear no imagery. This fact may suggest that corona discharges occur at other places on the film but the resultant fog is obscured by the presence of imagery.

Dendritic Static - Fog from minor dendritic static discharges originates at both film edges intermittently throughout the mission. On rare occasions it intrudes into the format (Example: pass 18D).

Manufacturing Splices - Occur on passes 65D, frame 04; 87D, frame 36; and 118D, frame 140.

Emulsion Scratches - There are emulsion scratches on both edges of each frame just inside and parallel to the format edge at the camera number and at the supply end. There are numerous longitudinal emulsion scratches on pass 15D. Severe scratches and abrasions on pass 18D, frame 17, are associated with the heat splice on frame 16. Other scratches are minor and intermittent throughout the mission.

Blisters and Pinholes - Minor and intermittent.

B. Slave (AFT) Panoramic Camera

Light Leaks - Fogged areas caused by minor light leaks affect the first and last three frames of each camera operation. This light leak is characteristic of this camera system. The last few feet of film recovered in the "A" bucket and the first few feet recovered in the "B" bucket are fogged.

Corona Static - There is a small area of fog induced by corona static between the third and fourth frames of most passes (Example: pass 110D). Other randomly located corona discharges are rare and minor (Example: 85D, frames 41 and 61).

Dendritic Static - Fog induced by dendritic static discharges is present on both edges of pass 71D and intermittently thereafter throughout the mission.

Manufacturing Splices - Occur on passes 5D, frame 59; 23D, frame 62; and 85D, frame 44.

Emulsion Scratches - The scratches, described as being just inside the format of the Master panoramic photography, are also present on the photography of this camera. Rail scratches are continuous along each edge (outside the format).

Pinholes and Blisters - Minor and intermittent.

C. Stellar Camera No 45 ("A" bucket)

Dendritic Static - There are intermittent fogged spots caused by dendritic static discharges along the edge opposite the frame correlation fiducial. The degradation is minor.

Heat or Radiation - Areas of general fog associated with camera off periods are intermittent throughout the mission. The fog is minor and has only the effect of raising the gross fog level. The fog is believed to be the result of nuclear energy radiation. A correlation of the afore-



mentioned fog and its association to an area of known radiation in the outer atmosphere is contained in the appendix of this report.

Scratches - Longitudinal emulsion scratches are continuous throughout the mission. They are intermittently severe (Example: frames 01 - 20).

Camera Number - Sharp and well defined.

Reseau - Sharp and well defined.

Fiducials - With the film oriented emulsion down and the camera number at the bottom, the fiducial to the right of the frame correlation fiducial is severely bloomed and intermittently intrudes into the format.

D. Stellar Camera No 42 ("B" bucket)

Dendritic Static - Fog induced by dendritic static discharges is present along an emulsion scratch which runs through the last two feet of the film.

Light Leaks - There is a diagonal streak of fog entering the format of one frame at each camera off period. The fog streak has its genesis at the camera number edge.

Heat or Radiation - There is no evidence of radiation fog on the film of this camera. Because of the physical position of the camera in the vehicle and the film path, radiation fog would be less likely to exist on the film of the "B" bucket.

Scratches - Minor and few.

Camera Number - Flared but readable.

Reseau - Sharp and well defined.

Fiducials - The fiducials are sharp

and readable, but the circular plate used in the installation of the fiducial lamps is imaged in the format of each frame.

E. Index Camera No D45 ("A" bucket)

Dendritic Static - Fog due to static discharges is frequent and degrading on the last five frames in conjunction with film exhaustion. Other minor discharges occur at each edge intermittently throughout the mission.

Reseau - Sharp and well defined.

Camera Number - Sharp and well defined.

Frame Correlation Fiducial - Sharp and well defined.

F. Index Camera No D49 ("B" bucket)

Dendritic Static - Fog due to dendritic static discharges is present intermittently along the camera number edge.

Corona Static - Fog caused by corona static discharges is present on frame 185 and on the last two frames of the mission.

Light Leaks - A streak of fog caused by a light leak enters each frame from the camera number edge. The presence of the fog is nearly undetectable except on the frames affected while the film was at rest during camera off periods.

Streaks - There is a continuous wavering minus density streak parallel to the major axis of the film beginning at frame 22.

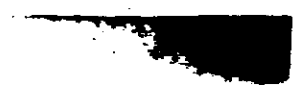
Fiducials - The frame correlation fiducial is recorded faintly, but is readable throughout.



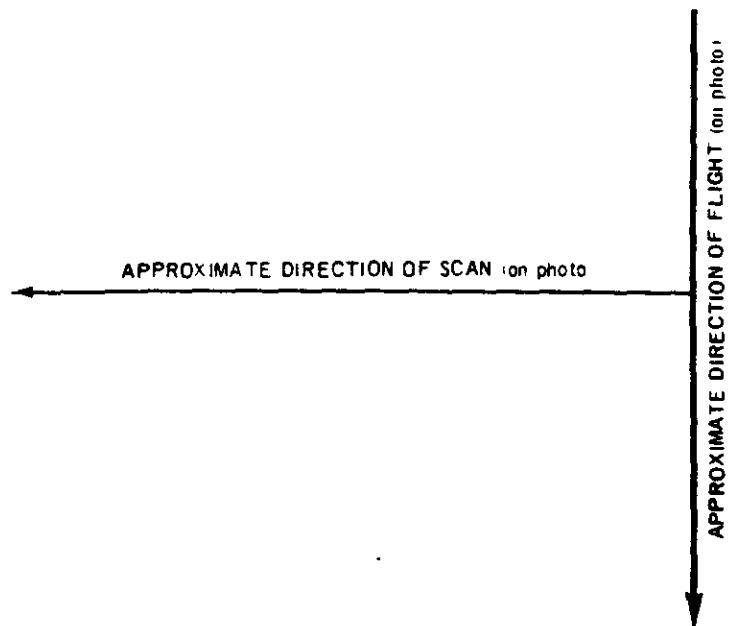
FIGURE 13. EFFECT OF DENDRITIC STATIC.

NPIC J-8188 (2/88)

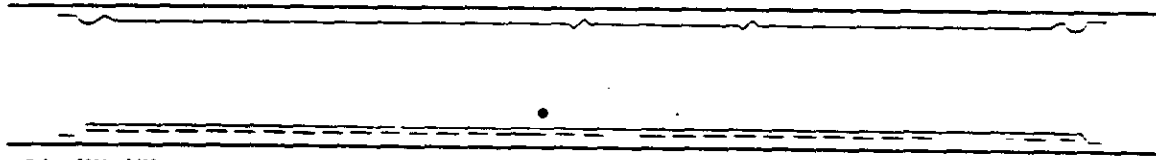
The following is an example of fogging caused by dendritic static discharges entering the format.



Pass	09D
Panoramic Frame	27 FWD
Enlargement Factor	10X
Solar Elevation	53°
Solar Azimuth	234°
Altitude	86.11 nm



APPROXIMATE CENTER OF PHOTO RELATIVE TO FORMAT  
VIEWED WITH NEGATIVE EMULSION DOWN





~~TOP SECRET - RUFF~~

~~NO FOREIGN DISSEM~~

### PART III. IMAGE QUALITY

#### 1. Photographic Interpretation (PI) Suitability:

This 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, weather limitations, and similar considerations. 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 photo interpreter may extract useful and reliable information from the material.

PI suitability ratings are categorized as Excellent, Good, Fair, Poor, and Unusable. 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 if that is necessary or desirable. The standards that determine assignment of the various ratings are as follows:

Excellent: The photography is free of degradation by camera malfunctions or processing faults and weather conditions are favorable throughout. The imagery contains sharp, well-defined edges and corners with no unusual distortions. Contrast is optimal 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 minimal but 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-optimal 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.

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

#### 2. PI Suitability for Mission 1006:

The PI suitability of Mission 1006 is good. The most degrading aspect of the mission is the lack of overlap caused by the low orbit. The low orbit was also a favorable factor because it produced the largest scale photography to date. The low orbit necessitated a faster scan rate resulting in less exposure than normal. The exposure difference from normal amounts to approximately one-fourth of an f stop; however, no under-exposure was noted.

Photo interpreters reported on 103 targets in the preliminary read-out of Mission 1006-1. A quality rating of poor was assigned to 7 targets. Clouds and haze were the degrading factor in 6 of the poor quality ratings, while small scale due to obliquity was the cause of the remaining poor quality rating. There were 109 targets covered on the preliminary scan of Mission 1006-2. Of the 109, a quality rating of poor was given to 9. Eight were degraded by haze and clouds and one by obliquity.



Image streaking along the major axis of the film is present in association with areas of high reflectivity (clouds, beaches, etc). This streaking, caused by reflections within the

camera, has much the same appearance as haze. Examples of image streaking may be observed on pass 49D, frames 1-9.

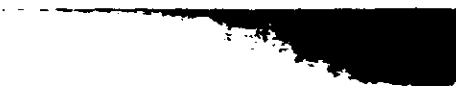




FIGURE 14. DEGRADATION BY HAZE.

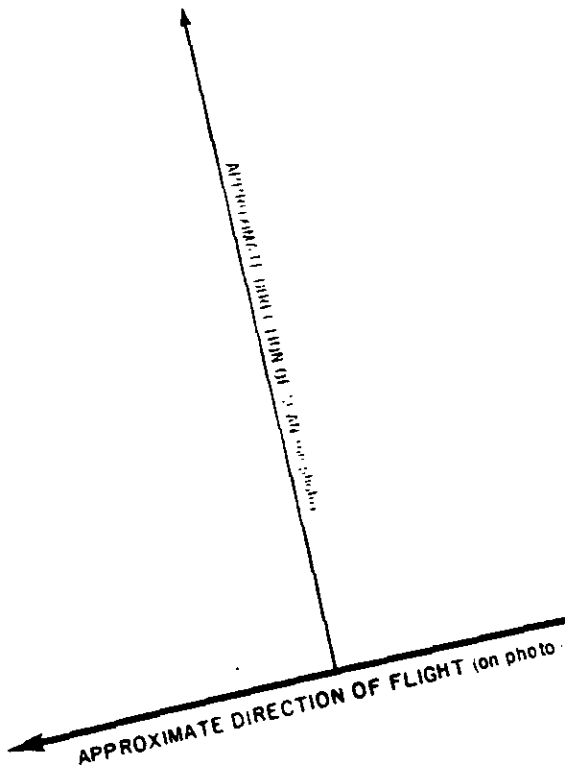
NP C 0-8137 (2/65)

The following photograph of an airfield was assigned a PI suitability rating of poor. Degradation of this target is a result of haze.

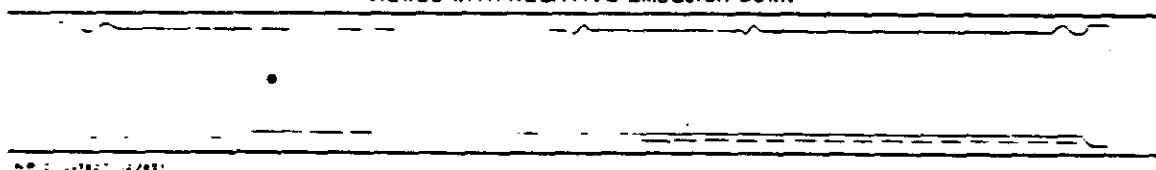




Pass	70D
Panoramic Frame	47 FWD
Enlargement Factor	20X
Solar Elevation	54.3°
Solar Azimuth	123°
Altitude	91.51 nm



APPROXIMATE CENTER OF PHOTO RELATIVE TO FORMAT  
VIEWED WITH NEGATIVE EMULSION DOWN







~~TOP SECRET RUFF~~

NO FOREIGN DISSEM

FIGURE 15. EFFECT OF OBLIQUITY.

NRIC J-8188 (2/68)

The following photograph is an example of a target that received a PI quality rating of poor. Degradation in this case was due to obliquity, which made it difficult to view the target stereoscopically. Low contrast was also a major factor in the assignment of this rating.

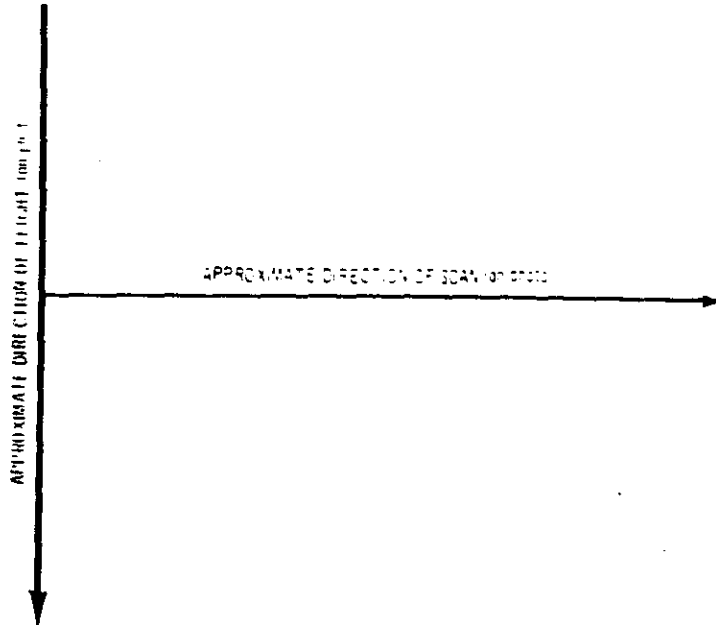
- 20c -

~~TOP SECRET RUFF~~  
NO FOREIGN DISSEM

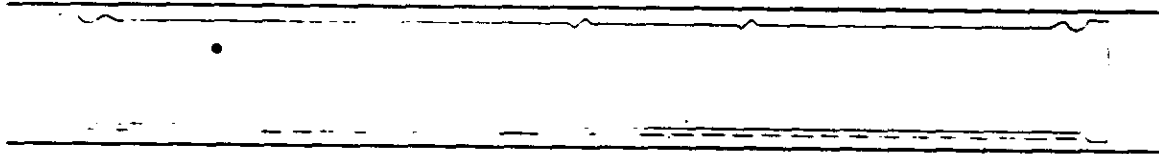
Handle Via  
~~TALENT-KEYHOLE~~  
Control System Only



Pass	24D
Panoramic Frame	180 AFT
Enlargement Factor	20X
Solar Elevation	51°
Solar Azimuth	250°
Altitude	89.55 nm



APPROXIMATE CENTER OF PHOTO RELATIVE TO FORMAT  
VIEWED WITH NEGATIVE EMULSION DOWN



FORM 2 (11/67) (12/68)





TOP SECRET-RUFF  
NO FORN DISSEM



FIGURE 16. IMAGE QUALITY VERSUS OBLIQUITY.

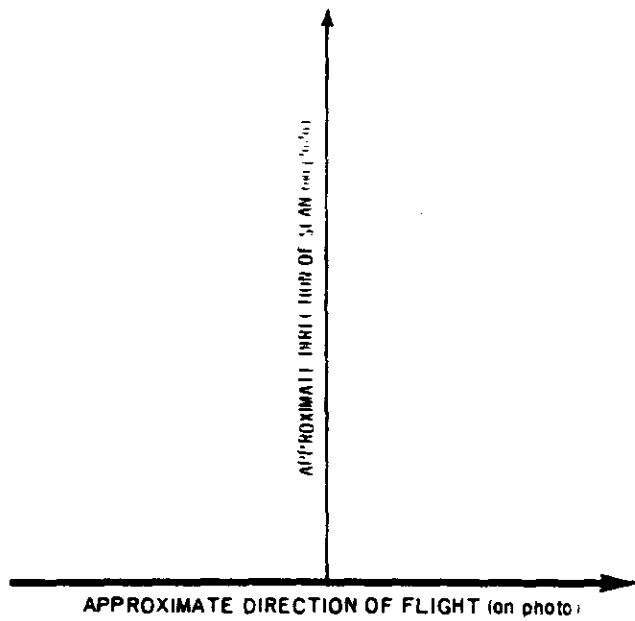
NPIC J-8188 (2/68)

The following photograph, taken from an area near the principal point of the format, illustrates the relationship of image quality and obliquity.





Pass	07D
Panoramic Frame	18 AFT
Enlargement Factor	20X
Solar Elevation	49°
Solar Azimuth	240°
Altitude	86.60 nm



APPROXIMATE CENTER OF PHOTO RELATIVE TO FORMAT  
VIEWED WITH NEGATIVE EMULSION DOWN



NO FOREIGN DISSEM

