TCS-8409 64

C00 1389

PHOTOGRAPHIC EVALUATION REPORT

MISSION 4009

6-8 JULY 1964

NPIC TP 28 64

August 1964

NATIONAL PHOTOGRAPHIC INTERPRETATION CENTER

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LIST OF ILLUSTRATIONS

SYNOPSIS

Mission 4009 was launched into a retrograde orbit on 6 July 1964. The payload capsule was recovered dry during revolution 34. There were seven photographic passes for a total of 66 frames. A preliminary review revealed several intelligence targets which could be identified, however, poor image quality precluded detailed analysis. Clouds covered 50 percent of the mission. The attitude of the vehicle was erratic throughout the mission, probably because of a malfunction in the horizon scanner circuits.

The fiducial lines in the main camera photography were not critically sharp. The timing tracks and binary record were operational and the yaw slits recorded properly. The stellar and index camera operated satisfactorily. No color film was included on this mission.

GENERAL FLIGHT DATA

Date and time of Launch: 6 July 1964 2010Z
Orbital Parameters (Revolution 03):

Period:	[illegible] minutes
Perigee:	[illegible] nautical miles
Apogee:	[illegible] nautical miles
Eccentricity:	[illegible]
Inclination Angle:	[illegible]
Date and Time of Recovery:	8 July 1964 [illegible]Z

PART I. CAMERA OPERATION

1. Main Camera No. FM-9: The main camera was operational and functioned properly when commanded. The camera door did not open during the first operational pass (D04). The first 260 inches of pass D08, frame 1, are also clear because the camera door delayed opening. The last 56 inches of D08 frame 01 contain terrain imagery which is smeared because of erratic vehicle attitude and appears to be slightly out of focus. The negatives that were exposed in passes D04, D08, D10, D16, and D19 contain severe creases, tears (D16, frames 09, 11, and [illegible]), crimps, and abrasions attributed to a tool handle being wound up in the take-up spool in the recovery capsule. Passes D24 and D26 are relatively free of abrasions; however, the negatives are degraded by diagonal image smearing and appear to be slightly out of focus. After pass D26 the film was run through the camera with the camera door open while attempts were made to control the vehicle. The negatives acquired during this run-out are of no value and no attempt was made to plot them.

Both time tracks were operational and functioned properly throughout the mission. The bits are of excellent density and well defined. Both yaw slits functioned properly. The fiducial lines appear slightly ragged and out of focus.

2. Stellar Camera No. D23: The stellar camera was operational and functioned throughout the mission. The fiducial lamps operated intermittently. Stellar images to the seventh magnitude were detected. The stellar negatives could not be correlated with the main camera negatives because of erratic vehicle attitude. After the negatives had been titled, additional stellar

images were detected in untitled frames. These additional frames were given arbitrary numbers of 501 to 545 and 601 to 616. The roll, pitch, and yaw attitudes were determined from the stellar imagery and the accompanying graph in Appendix A depicts the erratic behavior of the vehicle during the last nine revolutions.

3. Index Camera No D23: The index camera was operational and functioned throughout the mission. The exposure was adequate and the resolution is satisfactory. Portions of the index negatives that contained horizons were used to determine vehicle attitude. The index negatives could not be correlated with the main camera negatives because of erratic vehicle attitude. The negatives were correlated with the stellar negatives and numbered consecutively wherever either terrain or stellar exposures were detected. After the negatives had been titled, additional stellar images were detected where stellar fiducials were not recorded and terrain imagery was not detectable.

PART II. FILM

1. Capsule Defilming: Because of reported anomalies in the take-up system, contractor representatives were present during defilming operations. The general appearances of the capsule was normal. The signal light was not flashing, indicating a loss of power. Both film guillotines were closed and properly sealed. The electrical harness was discolored in some areas. This was judged to be normal.

Defilming procedures were modified to allow a preliminary inspection of the interior of the capsule with a minimum displacement of the electrical cable. Normally, the cable is removed before lifting the cover. Everything appeared normal during this inspection. As normal defilming procedures continued it was noted that the film on the main take-up roll was elliptical and exceeded the diameter of the flange. The elliptical protrusion of the film physically interfered with the interior wall in the nose section of the recovery capsule.

The take-up spool assembly was removed and the pre-processing inspection was continued. The first 1,714 feet of film from the tail of the roll was undamaged and removed without incident. The next 161 feet contained severe foldovers, creases, wrinkles and abrasions. Six minor edge tears were detected and repaired with tape prior to processing. At this point a black plastic tool bit handle was found wrapped within the take-up roll. The remaining 384 feet of film was undamaged and removed without incident.

2. Film Processing:

a. Main Camera: Approximately 90 percent of the negatives from the main camera were processed at the full development level. The remaining portion received intermediate development except for a small portion in the run-out that received primary development. The density of the negatives is considered thin to normal. Because of the degraded imagery and physical damage no density readings or edge trace data are included in this report.

3. Film Degradations: The numerous abrasions, creases, foldovers, and tears degrade most of the operational material in this mission. Some handling marks from the defilming and pre-processing inspection are evident. Heavy fog was noted on the pre-flight film and occasional transverse bands of fog were detected in the more heavily damaged areas. Extensive creases,

caused by foldovers, which were introduced during take-up, exist throughout except in passes D24 and D26. Six edge tears, which were reinforced with clear mylar tape prior to processing, were noted in passes D16 and D19. There are a profusion of scratches, abrasions, and plus and minus density streaks in the early passes.

PART III. IMAGE QUALITY

Because of vehicle instability and film wrap difficulties, severe image degradations are evident on all operational passes. The imagery obtained was so smeared that identification of only a few targets such as airfields and large plant facilities was possible. Detailed interpretation could not be accomplished, vehicle and aircraft types could not be determined and the usual preliminary report was not produced.

PART IV. EXPERIMENTAL OPERATIONS

No experimental operations were attempted on this mission.

FIGURE 1. QUALITY OF PHOTOGRAPHY

Pass	1008
Frame	027
Planned Roll	-10
Actual Roll	-49
Pitch	-19
Yaw	Not Determined
Enlargement	3X

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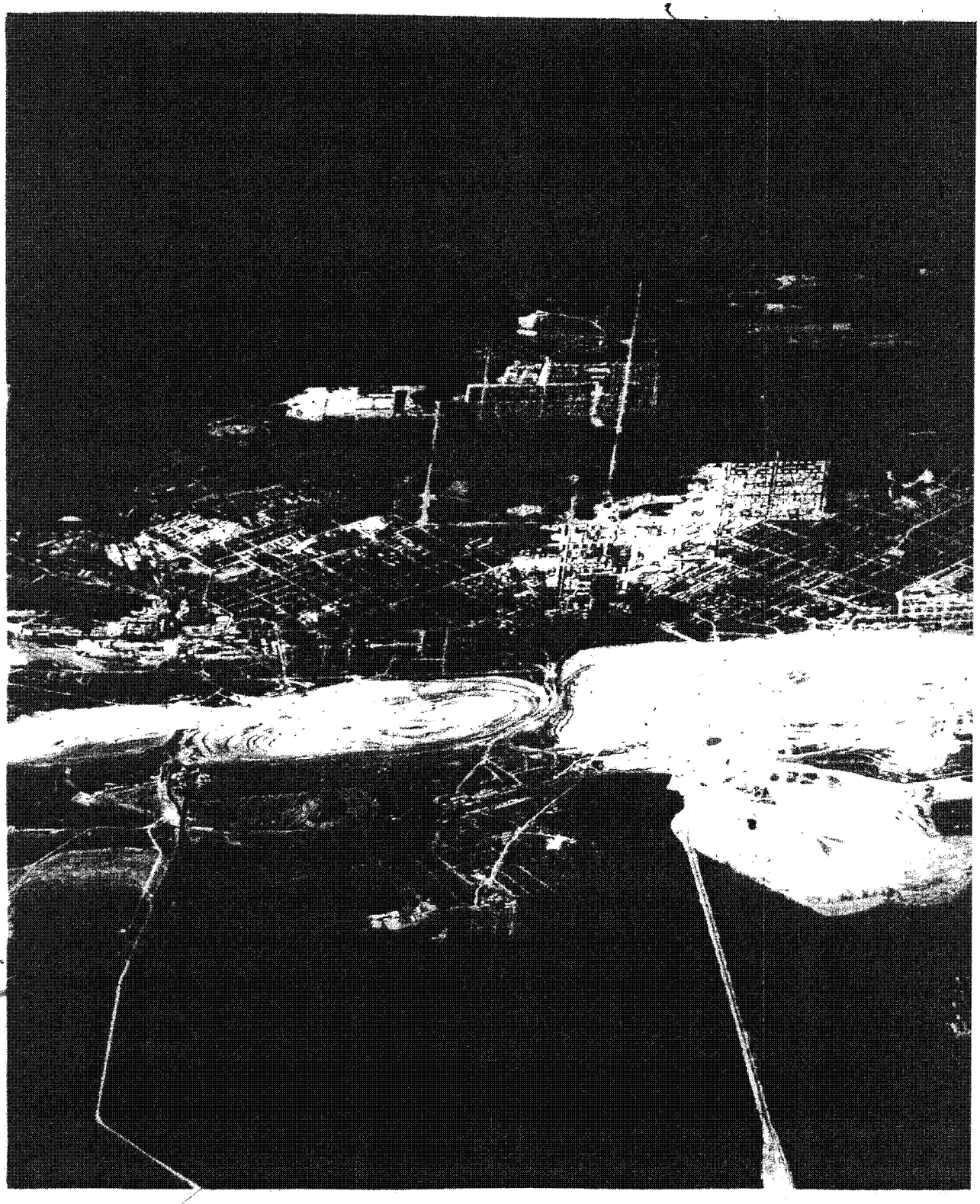

FIGURE 2. QUALITY OF PHOTOGRAPHY.

Pass	1008
Frame	03
Planned Roll	10°
Actual Roll	-50°
Pitch	-20°
Yaw	Not Determined
Enlargement	3X

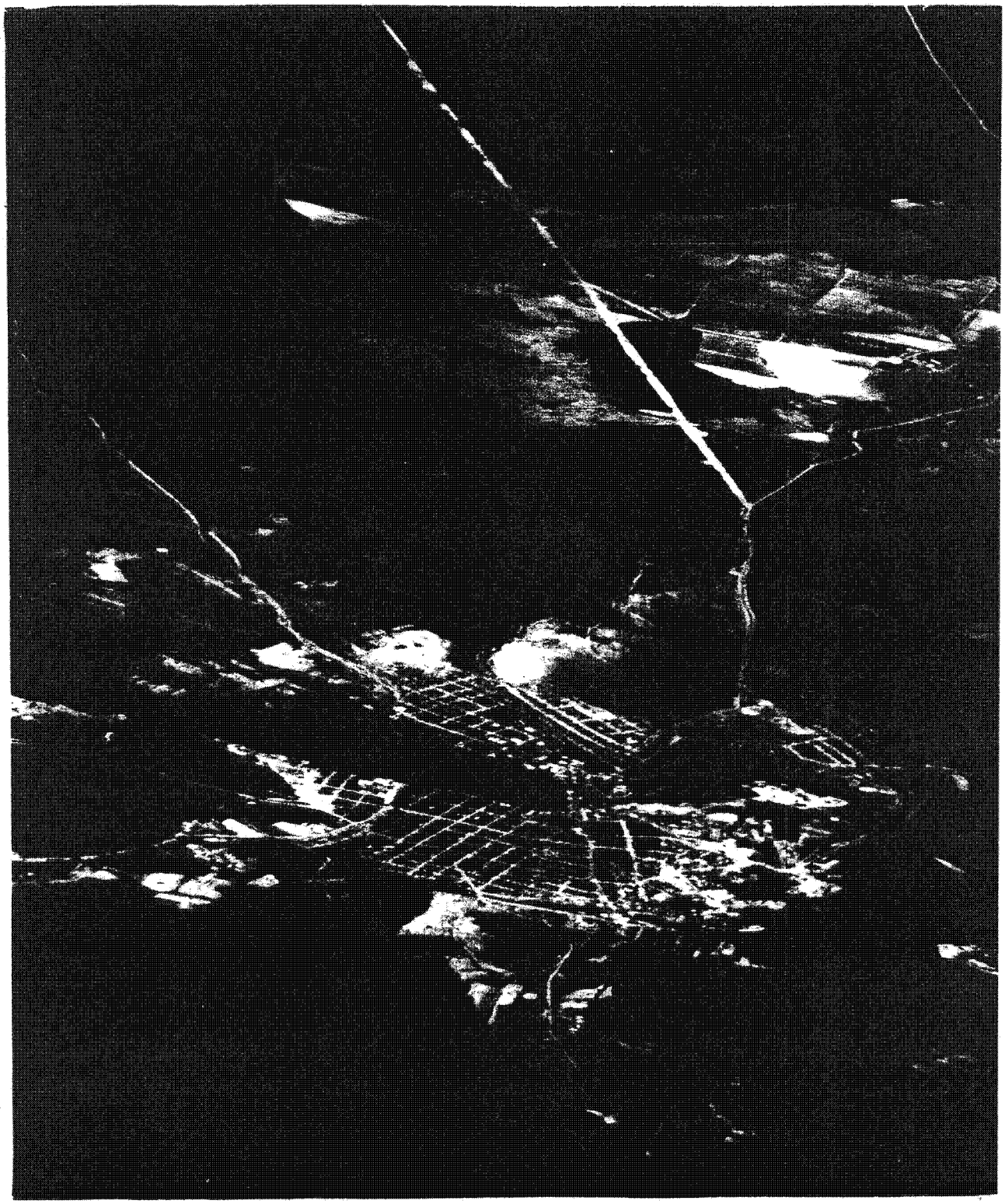

FIGURE 3. QUALITY OF PHOTOGRAPHY.

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Pass	D10
Frame	13
Planned Roll	21°
Actual Roll	Not Determined
Pitch	Not Determined
Yaw	Not Determined
Enlargement	3X

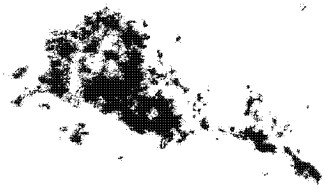

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FIGURE 4. QUALITY OF PHOTOGRAPHY.

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ECS-8409/64
NPIC/TP-28/64

Pass: DIO
Frame: 16
Planned Roll: Not available
Actual Roll: Not Determined
Pitch: Not Determined
Yaw: Not Determined
Enlargement: 3X

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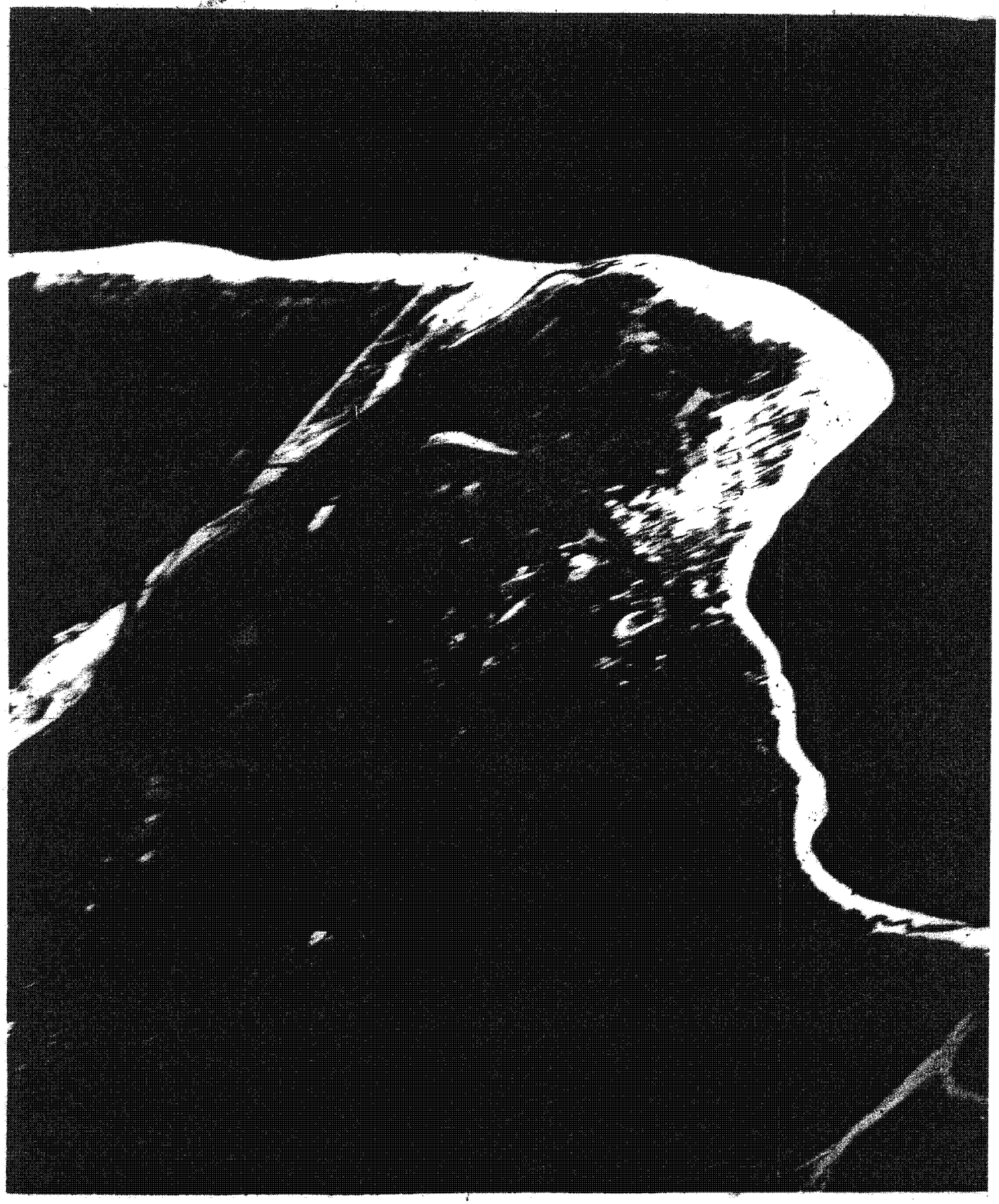

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FIGURE 5. QUALITY OF PHOTOGRAPHY.

NPIC [illegible]5261 (12/64)

Pass	D16
Frame	08
Planned Roll	20°
Actual Roll	Not Determined
Pitch	Not Determined
Yaw	Not Determined
Enlargement	3X

FIGURE 6. QUALITY OF PHOTOGRAPHY.

Pass	D26
Frame	03
Planned Roll	Not Available
Actual Roll	Not Available
Pitch	Not Available
Yaw	Not Available
Enlargement	3X

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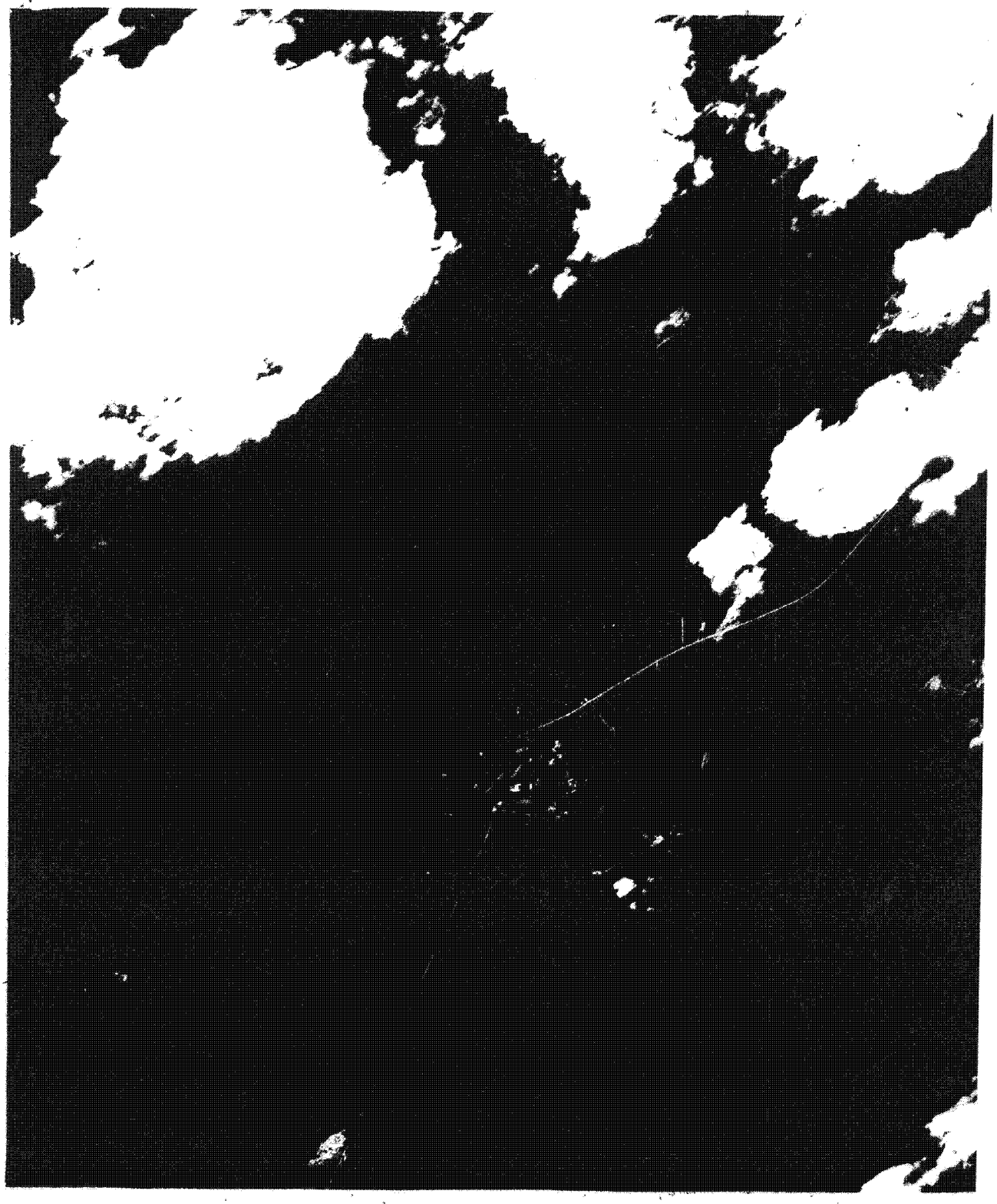
NPIC/TP-28/64
TCS-8409/64



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APPENDIX A. SYSTEM SPECIFICATIONS

Vehicle Number:	7101 4807 959
Main Camera	
Camera Number:	FM-9
Slit Width:	0.0082
Effective T-Stop:	6.16 (with filter)
Filter:	B & L Y-10
Focal Length:	76.881"
Film Type:	4404
Film Length:	2,738'
Emulsion:	4404-49-12-3-4

	Stellar	Index
Camera Number:	D28	D23
Filter:	none	Schott DG-5
Film Type:	4401	4400
Film Length:	75'	135'

APPENDIX B. VEHICLE ATTITUDE

The index photography frames that included horizons were used to determine vehicle attitude during the operational portion of Mission 4009 and the following conclusions were made:

Index Frame	Pass	Main Frame No.	Approximate Pitch*	Vehicle Roll*	Attitude Yaw*
02	D04	001	-90.0°	-106.5°	ND**
03	D04	001	-90.0	-105.6	ND
04	D04	001	-90.0	-106.2	ND
05	D04	001	-90.0	-105.2	ND
06	D04	001	-90.0	-104.5	ND
07	D04	001	-90.0	-108.9	ND
08	D04	001	-90.0	-111.9	ND
09	D04	001	-90.0	-117.3	ND
10	D04	001	-90.0	-119.7	ND
15	D08	001	- 0.9	- 39.5	ND
16	D08	001	- 2.1	- 41.6	ND
17	D08	001	- 4.9	- 44.3	ND
18	D08	001	- 4.5	- 45.0	ND
19	D08	001	- 7.7	- 46.4	ND
20	D08	002	-19.0	- 48.9	ND
21	D08	003	-20.0	- 50.0	ND
24	D08	006	-23.7	- 39.6	ND
25	D08	007	-23.9	- 37.5	ND
26	D08	008	-35.2	- 30.5	ND
27	D08	009	-35.2	- 31.3	ND
28	D08	010	-37.9	- 27.8	ND
29	D08	010	-35.2	- 30.6	ND
30	D08	010	-37.7	- 33.3	ND
31	D10	001	-42.7	- 5.6	+180
32	D10	001	-39.6	- 7.3	+180
47	D16	001	-91.8	- 8.5	+180
48	D16	001	-92.1	- 11.0	+180
49	D16	002	-85.8	- 16.7	+180
50	D16	003	-71.5	- 20.2	+180
51	D16	004	-49.0	- 25.7	+180
58	D16	011	+ 2.5	+ 44.4	+180
69	D19		-63.0	- 13.0	ND
70	D19		-66.6	- 14.6	ND
71	D19	001	-83.5	- 28.7	ND
72	D19	002	-86.3	- 31.0	ND
73	D19	003	-102.0	- 27.8	ND
74	D19	004	-102.0	- 29.7	ND
79	D24		-105.0	- 41.8	ND
84	D24	005	- 8.0	-112.0	ND
85	D24	006	- 6.7	-111.0	ND
86	D24	007	- 27.0	-120.0	ND

*-Pitch Indicates Nose Down.
-Roll Indicates Right Wing Up.
-Yaw Indicates Clockwise Rotation.
**Not Determined.

FIGURE [illegible] INDEX PHOTOGRAPH

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Frame	006
Roll	104
Pitch	-90°
Yaw	Not Determined
Enlargement	3X

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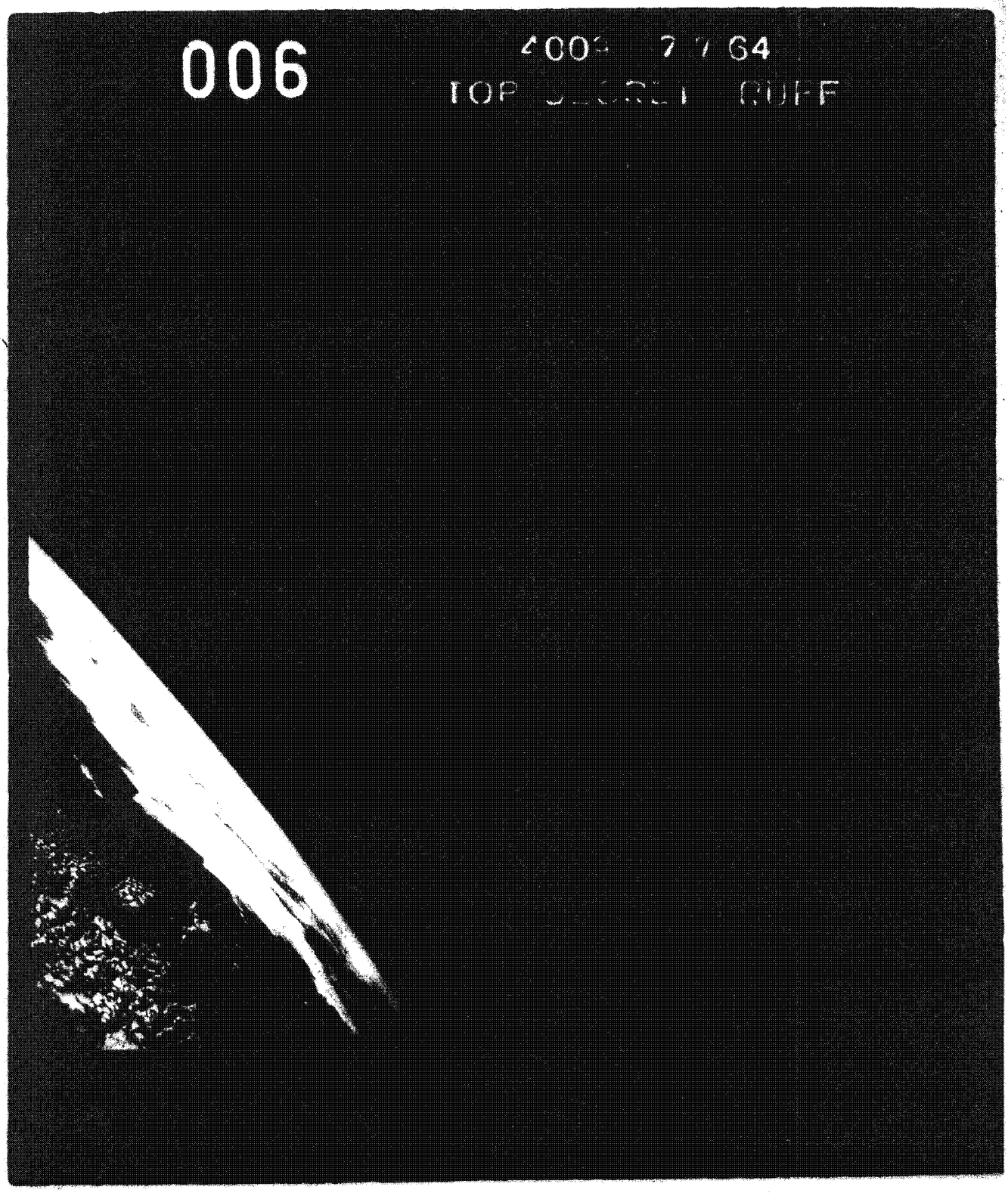
NPIC/TP-28/64
TCS-8409/64



Handle Via
TALENT-KEYHOLE
Control System Only

FIGURE 8. INDEX PHOTOGRAPHY.

NPIC J-5/64 (12/64)

Frame	025
Roll	-37
Pitch	-24
Yaw	Not Determined
Enlargement	3X

Handle Via
TALENT-KEYHOLE
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NPIC/TP-28/64
TCS-8409/64

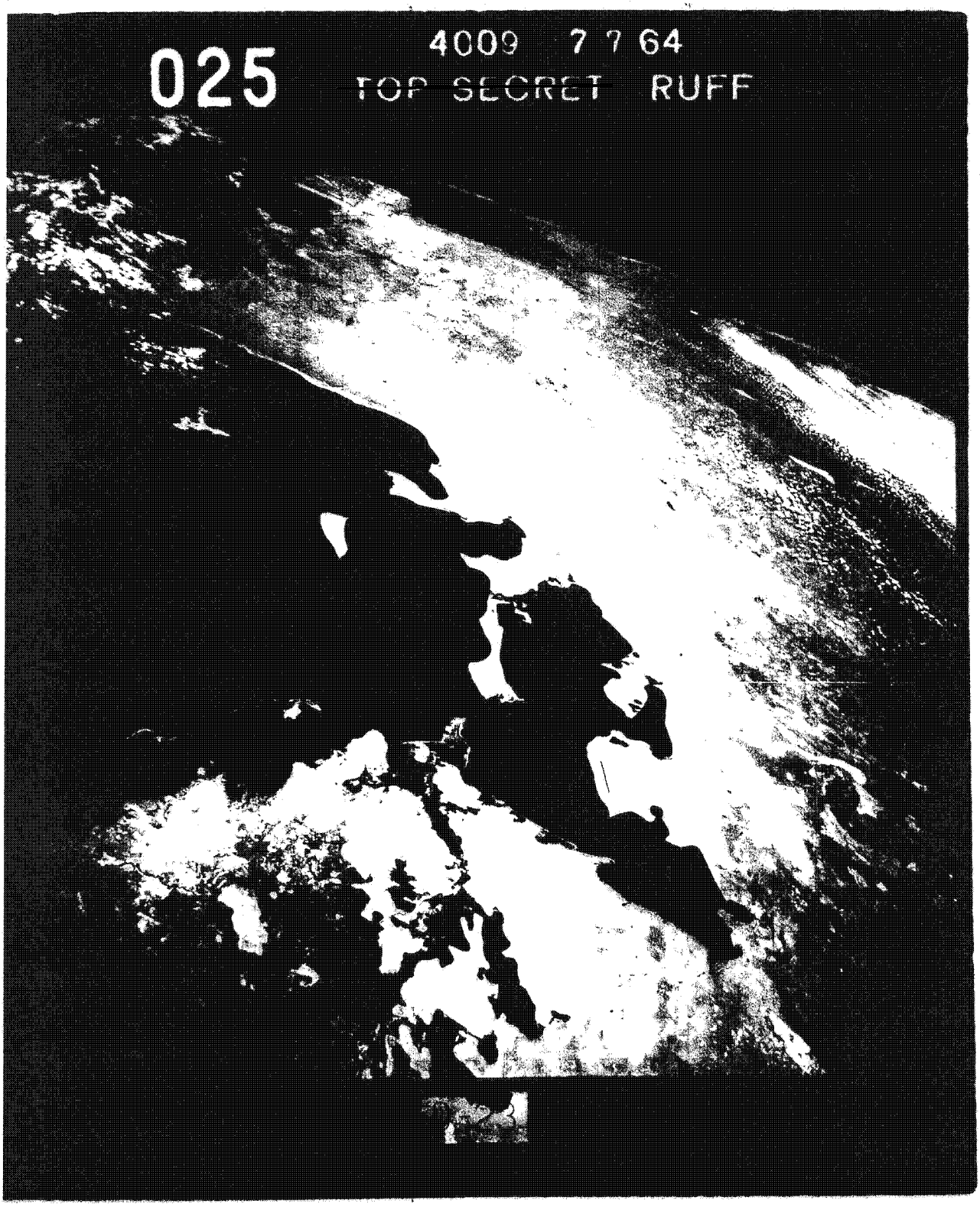

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FIGURE 9. INDEX PHOTOGRAPHY.

Frame	048
Roll	-11°
Pitch	-92
Yaw	±180°
Enlargement	3X

Handle Via
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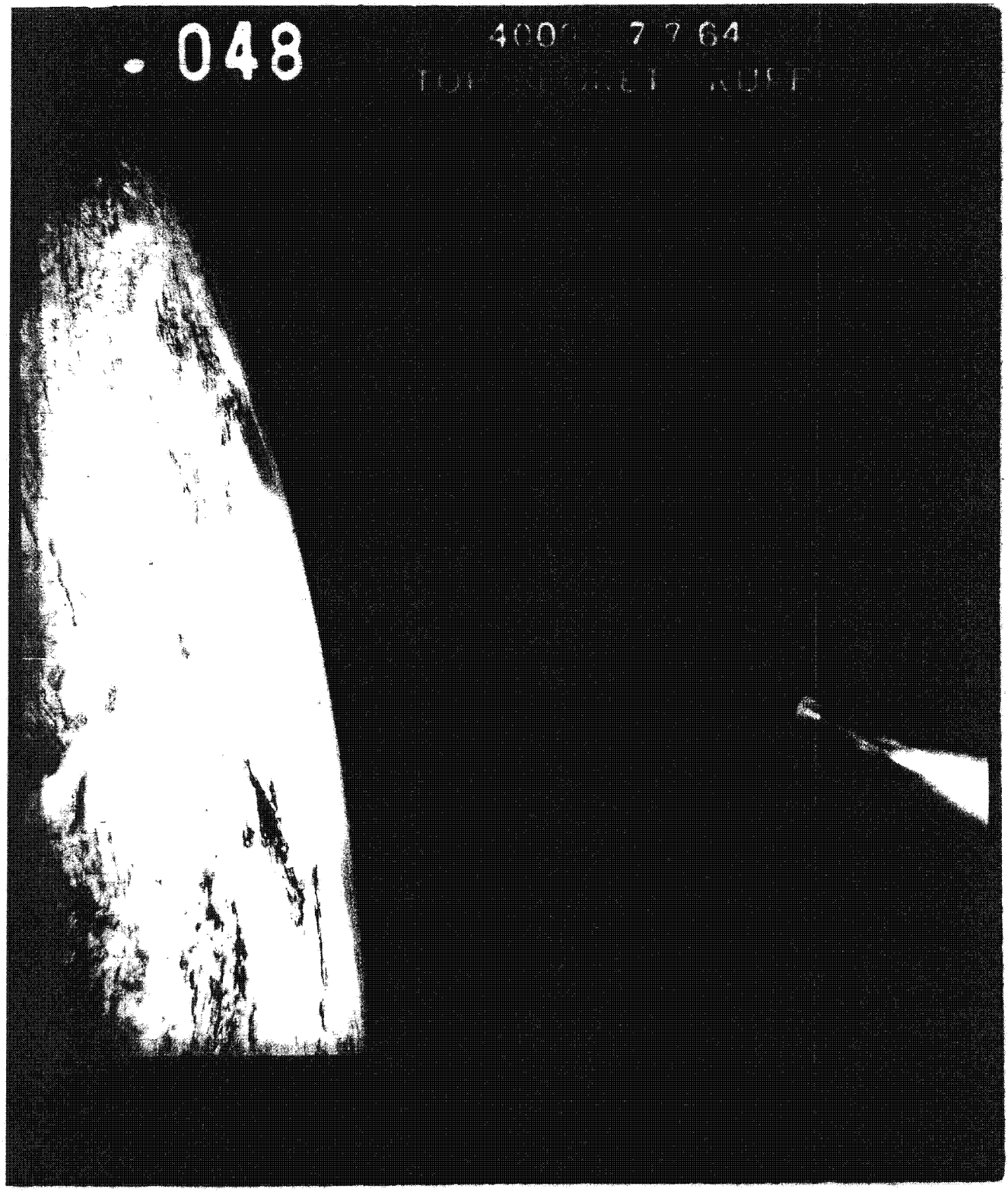
NPIC/TP-28/64
TCS-8409/64



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TCS-8409/64
NPIC/TP-28/64

Frame	051
Roll	-26°
Pitch	-49°
Yaw	±180°
Enlargement	3X

Handle Via
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NPIC/TP-28/64
TCS-8409/64

Handle Via
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FIGURE 11. INDEX PHOTOGRAPHY.

Handle Via
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TCS-8409/64
NPIC/TP-28/64

Frame	058
Roll	44
Pitch	2.5
Yaw	±180
Enlargement	3X

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TCS-8409/64

Handle Via
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FIGURE 12. INDEX PHOTOGRAPHY.

Frame	081
Roll	Not Determined
Pitch	Not Determined
Yaw	Not Determined
Enlargement	3X

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TCS-8409/64

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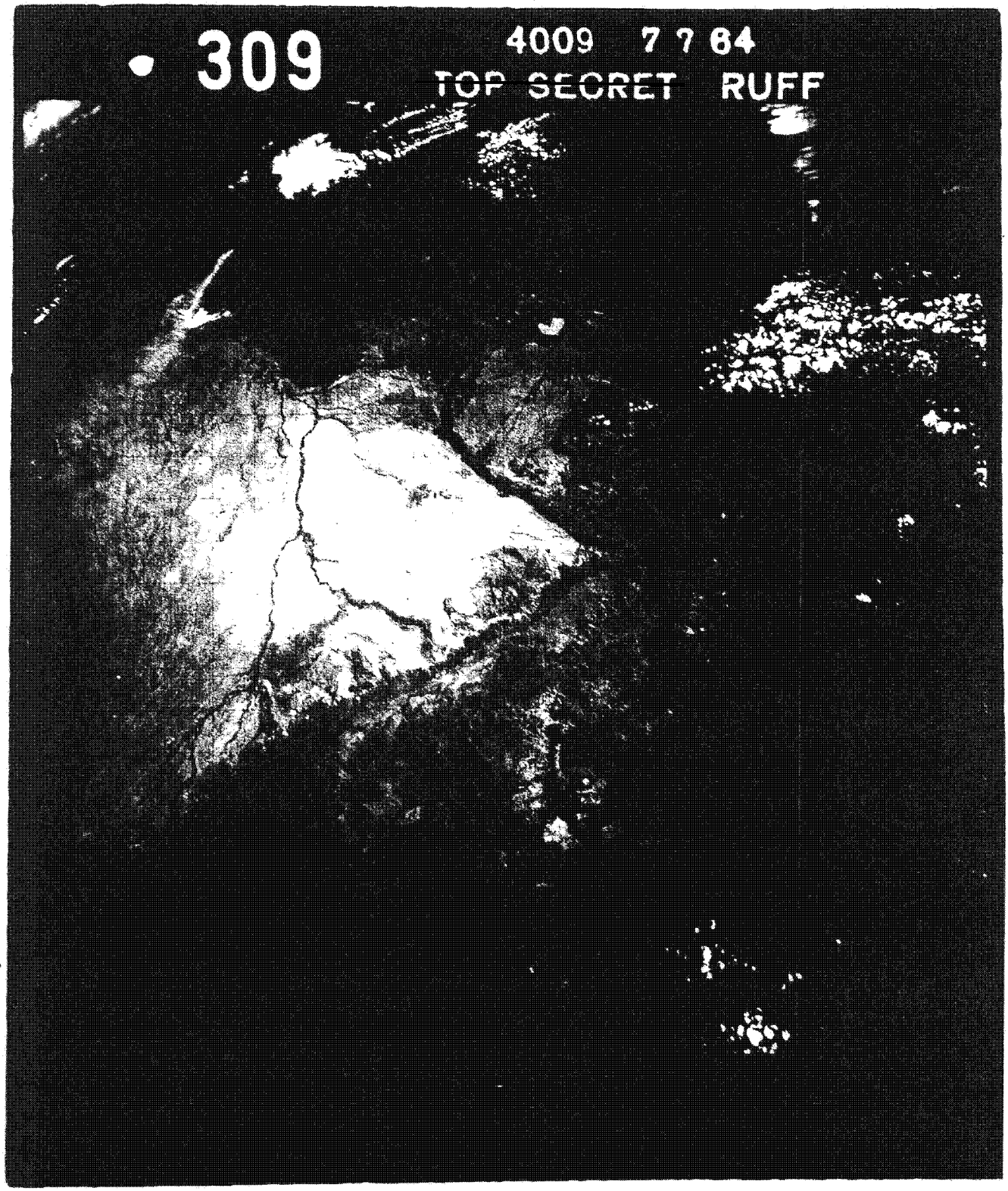

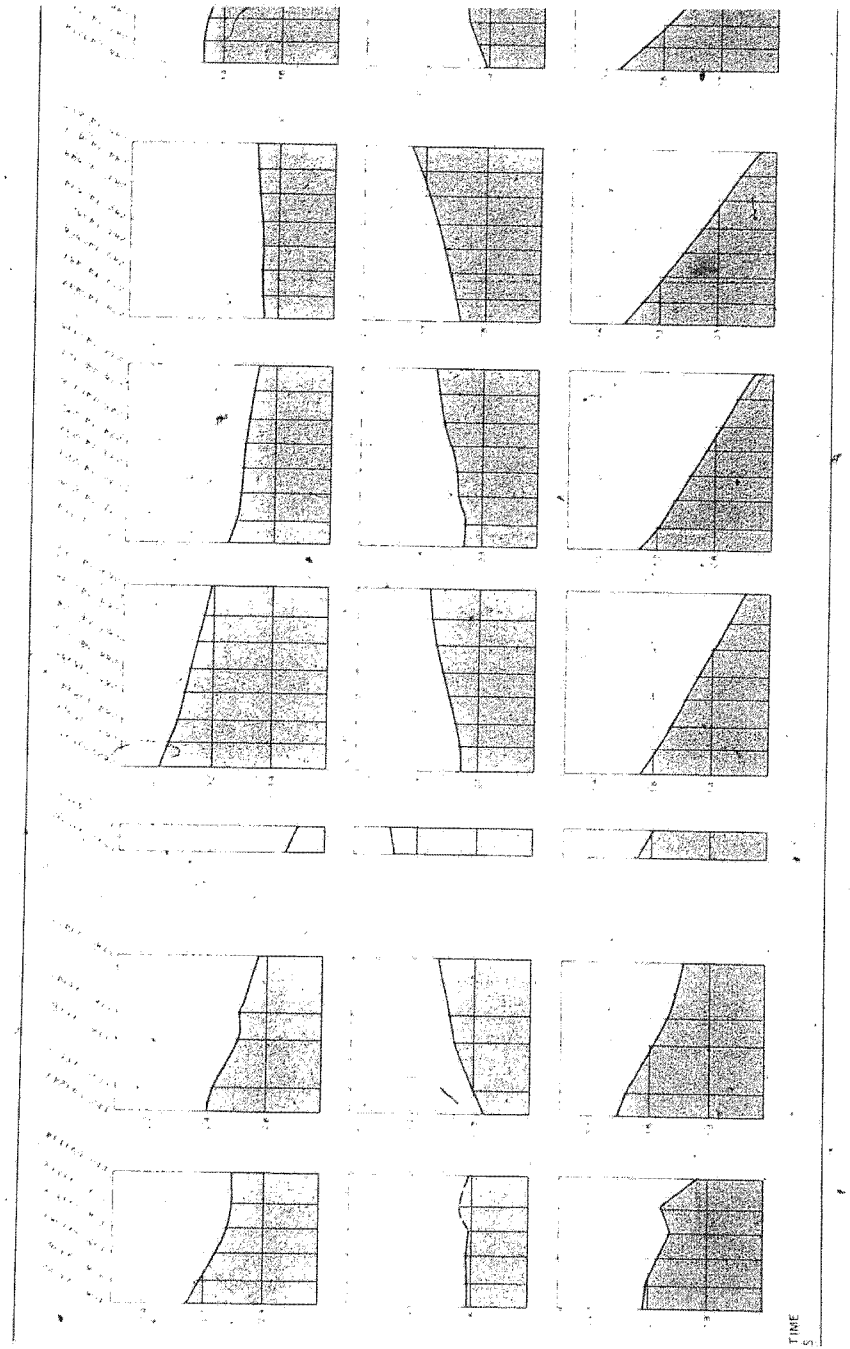

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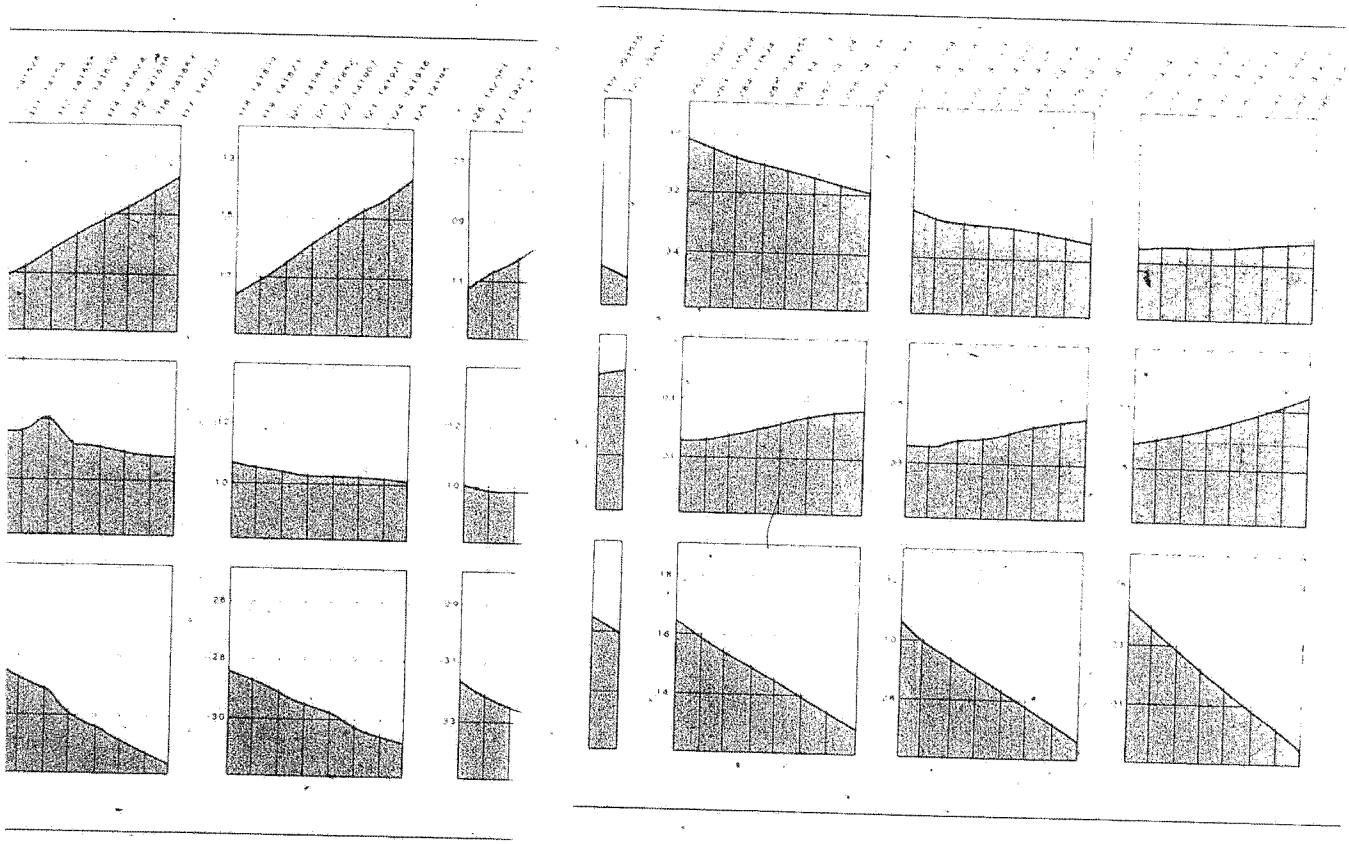

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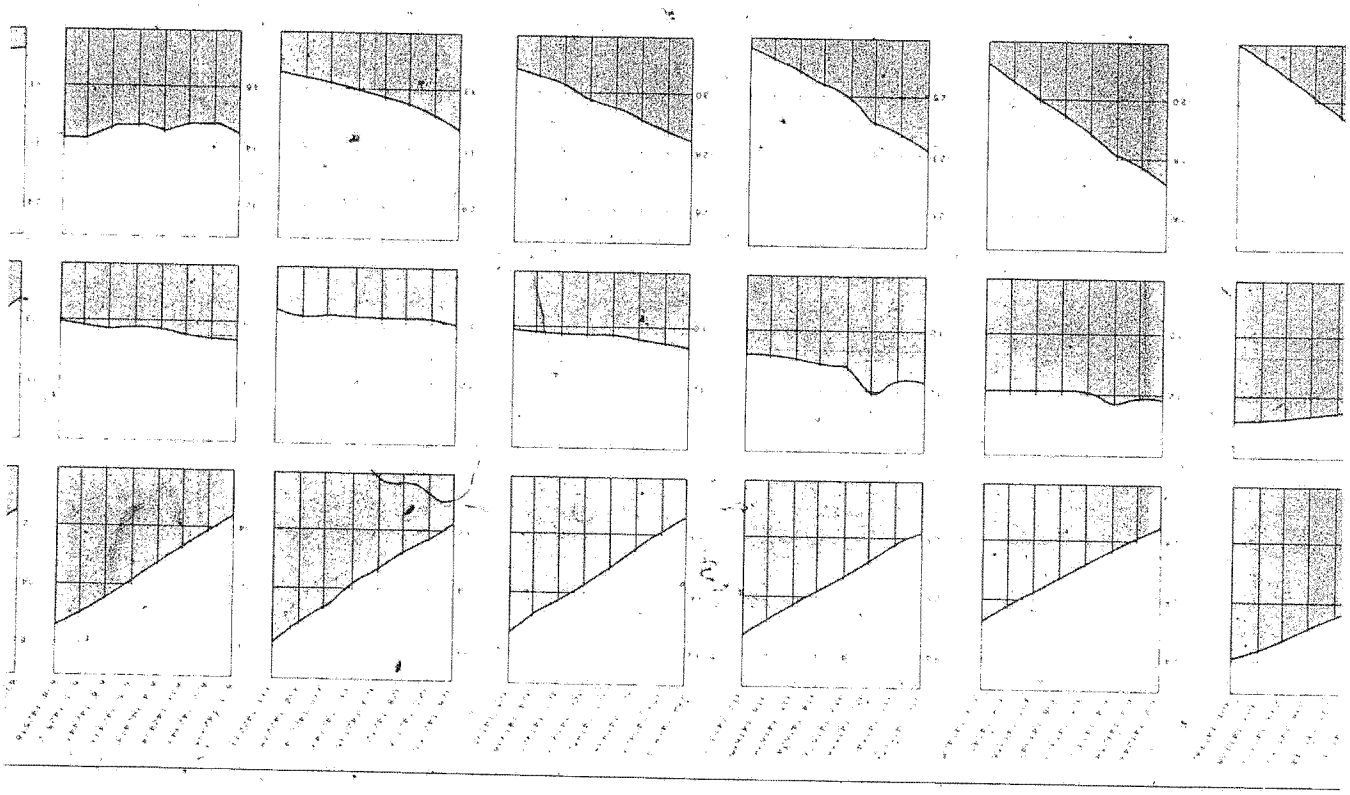
[redacted]



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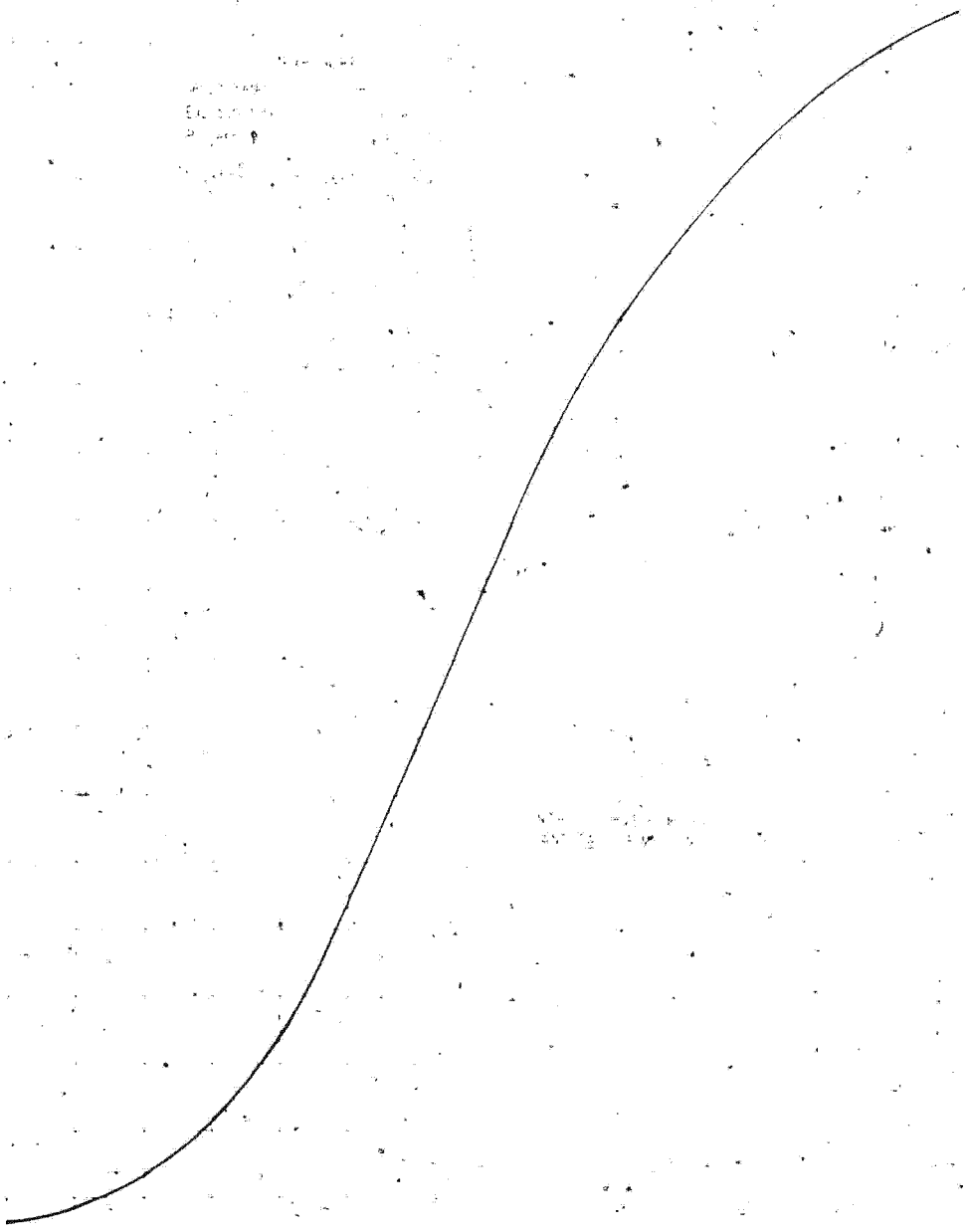
APPENDIX C. PROCESSING CURVES



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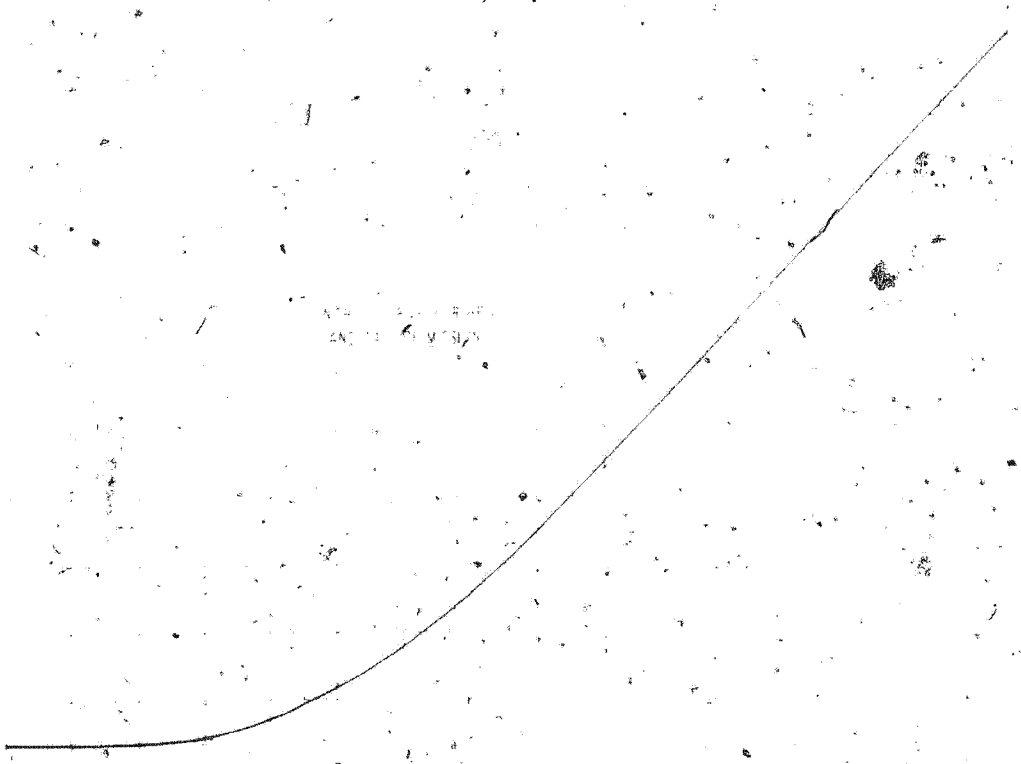
APPENDIX C PROCESSING CURVES

INDEX CAMERA
MISSION 4009

EMULSION 4404

EXPOSURE



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