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April 1963

TECHNICAL PUBLICATION

PHOTOGRAPHIC EVALUATION REPORT

MISSION 9051

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Project Corona

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NATIONAL PHOTOGRAPHIC INTERPRETATION CENTER

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PART I. MASTER PANORAMIC CAMERA

Mission No: 9051
Camera No: 104
Slit Width: 0.250"
Film Type: 7323-7800 (SO 132)

Filter, Panoramic: Wratten 21
Aperture, Panoramic: F/3.5
Filters, Horizon: Wratten 25
Evaluated By: [redacted]

NOTE: A thorough camera system evaluation of this mission is not possible because of the roll and pitch variation of the vehicle from its desired attitude. Lack of imagery in one or both horizon cameras and in the panoramic format area of some passes, limits evaluation of this system.

1. Shutter Operation (Horizon Cameras): Satisfactory. No malfunctions observed.

2. Horizon Camera Exposure:
   a. Supply (Port): The exposure could not be determined from the small portion of an image present only in passes D07, D09, D14, and D21 (f/6.8, 1/100 second).
   b. Take-Up (Starboard): The exposure varies from slightly underexposed at the beginning of most passes to overexposed at the end of most passes. Approximately 80% of the imagery has good exposure (f/6.8, 1/100 second).

3. Camera Number: A background flare is present throughout the entire film.

4. Data Block: Operated throughout the mission; the index lamps "blossom" in the majority of the data block exposures. Data block lamp number four seems weak in contrast to all of the other lamp images. A double data block is recorded at the end of most passes. Single data blocks are recorded at the camera-off position in split passes.

5. Film Metering:
   a. Metering could be measured on only two passes for the supply (port) horizon camera. These measurements are 0.20" and 0.16".
   b. Metering for the take-up (starboard) horizon camera varies from 0.13" to 0.17", with an average of 0.16".

6. Film Tracking: Normal throughout mission.

7. Frequency Markers: These appear outside of the panoramic format area; however, they have reflected images and are slightly overexposed. The elongated marks, indicating a correlation with the Index Camera exposure, measure as much as 4.5" and extend for a distance of as many as 14 normal marks.

8. Fiducials:
   a. Panoramic Camera: Well defined where exposure is sufficiently dense to provide contrast between panoramic format area and the film border. Where little or no contrast is present, the fiducials are very difficult to see.
   b. Horizon Cameras: Well defined with little or no flare.

9. Light Leaks: An equipment image, the same as that noted in Mission 9041, is present in its entirety in the last or next-to-last frame at the end of most passes. A partial equipment image is usually present in the first or second frame of each pass. Additional light leaks are also present in the first two or three frames and the last

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three frames of each pass. These can be described as a diagonal line or a general film-fogging type as referred to in previous evaluations.

10. Static Electricity: A faint corona discharge is present in a few frames at either the third frame from the beginning of a pass or the third frame from a camera-on position. Examples: pass D22, frame 50; pass D24, frame 3; pass D37, frame 176. Edge static, associated with a manufacturing splice in pass D41, frame 20, extends intermittently in a dendritic pattern into the panoramic format area of frames 7 to 19. Other static may be found in pass D23, frame 50, and titled pass D55, frames 73, 151, 152.

11. Pinholes: A few scattered pinholes are present.

12. Abrasions and Scratches: Small scratches are present in pass D35, frame 62. A small scratch is present at the take-up side and near the trailing edge of all frames in pass D37. Two small scratches, possibly camera-induced, appear 0.125" below the data block in all frames of passes D41 and D53. Severe scratches and abrasions are present in titled pass D55, frames 151 and 152, which are the last frames of the mission.

13. Tearing: A manufacturing splice is present on pass D23, frame 41, and pass D41, frame 20. Transparent splices are present in the following passes between the frames indicated: pass D07, frames 103, 104; pass D22, frames 99, 100; pass D30, frames 34, 35. Film tears are present in titled pass D55, frames 113, 119, 125, 136, 140, 145, 146, 148-152.

14. Water Marks: None are present.

15. Pressure Streaks: None are present.

16. Processing Streaks: Few are present. Examples: pass D06, frames 32, 33, 74, 250, 251, 270; pass D09, frame 108; pass D14, frames 16, 17; pass D37, frames 230-233.

17. Blistering and Crimping: Few blisters are present. Examples: pass D25, frames 40, 41, 43; titled pass D55, frame 120. Crimping is not present.

18. Apparent Graininess: Medium.

19. Photo Quality:

a. Panoramic Camera: Poor, because of vehicle attitude and slightly out-of-focus appearance of imagery present.

b. Horizon Cameras: Poor, because of vehicle attitude and out-of-focus appearance of imagery present.

20. Suitability for PI: Because of the slightly out-of-focus appearance of the panoramic format area and the obliquity of the photographs, this mission is rated as poor and may be considered as unsuitable for photo interpretation.

Remarks

1. No contrast, resolution, or density readings are presented for this mission because of the obliquity of the photography resulting from unusual pitch and roll in vehicle attitude.

2. Plus density streaking is present in pass D05, frames 19, 20, 32, 33, 39, 55; pass D07, frames 96, 97, 151, 152; pass D22, frames 193, 233, 268, 269; pass D23, frames 15, 37, 38; pass D24, along the trailing edge of panoramic format in frames 8-11; pass D53, small, but throughout the pass.

3. Chemical stains are present in pass D25, frame 43; pass D53, frame 278.

4. A desensitized spot and streak associated with foreign matter on the film is present in pass D53, frame 278.

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5. The following changes should be made in the titling of this film: The end of pass D53 should be frame 258; titled frame 259 of pass D53 should be frame 001 of pass D55; titled frame 392 of pass D53 should be frame 134 of pass D55; titled frame 393 of pass D53 should be frame 001 of pass A56E, and titled frame 401 of pass D53 should be frame 0[illegible] of pass A56E. The pass now titled D55 should be titled pass D56.

6. A shortage of film prevented the completion of pass D56, and no photography was obtained for pass D57.

7. The following is a description of film transport for camera number 104, determined from the first and last frames of each pass, when possible. No determination of overlap is made because of vehicle attitude.

FILM TRANSPORT
(From Take-Up Side in Inches)

Pass	First Frame	Last Frame
D05	3.6	15.3
D06	13.5	NM
D07	16.5	16.6
D09	NM	NM
D14	15.5	16.0
D20	16.0	15.5
D21	13.6	NM
D22	17.3	20.1
D23	19.6	17.5
D24	NM	16.3
D25	16.3	NM
D30	16.6	14.0
D35	17.0	15.0
D37	13.3	13.5
D41	17.7	16.6
D52	16.8	19.4
D53	14.2	NM
D55	NM	17.6
D56	NM	End of Mission
D57	No photography obtained because of film exhaustion.	

NOTE: "NM" denotes Not Measurable.

PART II. SLAVE PANORAMIC CAMERA

Mission No: 9051
Camera No: 105
Slit Width: 0.250"
Film Type: 7323-7600 (SO 132)

Filter, Panoramic: Wratten 21
Aperture, Panoramic: f/3.5
Filters, Horizon: Wratten 25
Evaluated By: [redacted]

NOTE: A thorough camera system evaluation of this mission is not possible because of the roll and pitch variation of the vehicle from its desired attitude. Lack of imagery in one or both horizon cameras and in the panoramic format area of some passes limits evaluation of this system.

1. Shutter Operation (Horizon Cameras): Satisfactory. No malfunctions observed.

2. Horizon Camera Exposure:
   a. Take-Up (Port): No horizon imagery is present (f/6.8, 1/100 second).
   b. Supply (Starboard): No imagery is present until pass D20. The exposure varies from slightly underexposed at the beginning of most passes to overexposed at the end of most passes. Approximately 80% of the imagery has good exposure (f/6.8, 1/100 second).

3. Camera Number: A heavy background flare is present through pass D38. From pass D41 to the end of the mission, no camera number is recorded on the film.

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4. Data Block: Operated throughout the mission. The index lamps did not function from pass D41 to the end of the mission. From the beginning of the mission through pass D38, the index lamps "blossomed." The data block lamps also "blossomed" throughout most of the mission. A double data block is recorded at the end of most passes. Single data blocks are recorded at the camera-off position in split passes.

5. Film Metering:

a. Take-Up (Port): No measurement is possible because of lack of imagery in that portion of the panoramic format area adjacent to the horizon camera fiducial.

b. Supply (Starboard): Of the few measurements possible, the range is from 0.14" to 0.22" with an average of 0.20".

6. Film Tracking: Normal throughout mission.

7. Frequency Markers: These appear outside of the panoramic format area; however, they have reflected images and are slightly overexposed. The marks terminate in some passes before the supply edge of the panoramic format is reached. The blank area measures up to 3.9". Examples: pass D06, frame 284; pass D07, frame 165; pass D53, frame 259; pass D56, frame 166.

8. Fiducials:

a. Panoramic Camera: Well defined where exposure is sufficiently dense to provide contrast between the panoramic format area and the film border. Where little or no contrast is present, the fiducials are very difficult to see.

b. Horizon Cameras: Well defined with little or no flare.

9. Light Leaks: An equipment image, the same as that noted on Mission 9041, is present, usually in the first one or two frames of most passes and in the third frame from the end of most passes. Additional light leaks are also present in the first two or three frames and in the last three frames of each pass. These can be described as a diagonal line or a general film-fogging type referred to in previous evaluations.

10. Static Electricity: Corona static, edge static, and spot static discharges are present intermittently within the panoramic format area throughout the film. In pass D05, a static line perpendicular to the direction of film travel is present 6.7" from the supply edge of the panoramic format and extends across the width of the film in frames 1 to 57. Corona static examples are: pass D06, frame 212; pass D25, frame 86; pass D30, frame 39; pass D38, frame 79. Edge static discharges are present in pass D09, frame 100; pass D14, frames 2, 3; pass D25, frame 1.

11. Pinholes: A few scattered pinholes are present.

12. Abrasions and Scratches: Few are present. Examples: pass D05, frame 76; pass D55, frame 1.

13. Tearing: A manufacturing splice is present in pass D21, between frames 81 and 82; pass D38, frame 80. Transparent splices are present in the following passes between the frames indicated: pass D09, frames 1, 2; pass D37, frames

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38, 39, 247, 248; pass D53, frames 70, 71. No film tears are present.

14. Water Marks: The only water marks present are found in pass D53, frames 54, 56, 58.

15. Pressure Streaks: A small base rub is present on pass D38, frame 105.

16. Processing Streaks: None are present.

17. Blistering and Crimping: No crimping is present. A blister is present in pass D20, frame 43.

18. Apparent Graininess: Medium.

19. Photo Quality:

a. Panoramic Camera: Poor, because of vehicle attitude and slightly out-of-focus appearance of imagery present.

b. Horizon Cameras: Poor, because of vehicle attitude and out-of-focus appearance of imagery present.

20. Suitability for PI: Because of the slightly out-of-focus appearance of the panoramic format area and the obliquity of the photographs, this mission is rated as poor and may be considered as unsuitable for photo interpretation.

Remarks

1. No contrast, resolution, or density readings are presented for this mission because of the obliquity of the photography resulting from unusual pitch and roll in vehicle attitude.

2. Numerous plus and minus density streaks are present in pass D05. Plus density streaking is present in pass D56, frame 3.

3. Foreign matter associated with a desensitized streak and chemical stains is present in pass D53, frame 80.

4. The following change should be made in the titling of this film: The end of pass D06 should be frame 284. Titled frame 285 of pass D06 should be frame 001 of pass D07.

5. The following is a description of film transport for camera number 105, determined from the first and last frames of each pass, when possible. No determination of overlap is made because of vehicle attitude.

FILM TRANSPORT
(From Take-Up Side in Inches)

Pass	First Frame	Last Frame
D05	NM	15.1
D06	NM	18.3
D07	NM	15.0
D09	NM	16.5
D14	15.0	8.6
D20	NM	14.6
D21	NM	11.3
D23	16.6	16.8
D24	NM	15.6
D25	NM	17.6
D30	17.6	15.3
D35	16.3	14.6
D37	14.6	16.5
D38	NM	19.3
D41	17.3	18.5
D52	16.5	16.5
D53	14.6	2.6
D55	NM	15.0
D56	NM	16.6
D57	17.0	End of Mission

NOTE: "NM" denotes Not Measurable.

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PART III. STELLAR CAMERA

Mission No: 9051
Camera No: DR
Camera Setting: f/1.9, ½ second

Filter: None
Film Type: 7J3-135 (SO-130)
Evaluated By: [redacted]

1. Shutter Operation: The shutter functioned satisfactorily throughout the mission.

2. Exposure: Considered adequate for stellar imagery.

3. Frame Correlation Fiducial Mark: Operated satisfactorily.

4. Camera Number: The number is present and is clearly registered on all frames where the correlation mark appears.

5. Reseau Calibration Points: The points were satisfactorily recorded throughout the mission.

6. Reseau: The grid is visible except where lack of density precludes its detection.

7. Film Metering: Normal.

8. Film Tracking: Normal.

9. Light Leaks: A triangular-shaped light leak, emanating from the untitled (camera number) edge of the film, occurs on 23 frames. This usually appears on the second or third frame of a pass. Edge fog is present throughout the film.

10. Static Electricity: Numerous "spot" discharges are present on frames 1 to 3 and frames 68 to the end of the mission. Corona static affects 43 frames and is usually associated with the beginning of a pass.

11. Abrasions and Scratches: Numerous minor abrasions are present and are scattered throughout the film. Very few scratches are evident.

12. Pinholes: Few.

13. Water Marks: None.

14. Processing Streaks: None.

15. Pressure Streaks: None.

16. Tearing: None.

17. Blistering and Crimping: Blisters are few, small, and scattered. Example: frame 66. No edge crimping is present.

18. Foreign Matter: Dirt is present on frame 282.

19. Contrast: Contrast is sufficient to record stellar imagery (if present) in areas not degraded by flare or vignetting.

20. Apparent Resolution: Good.

21. Apparent Graininess: Medium.

22. Photo Quality: Poor. Flare, vignetting, and static discharges degrade portions of every frame.

23. Camera Operation: Poor. Vignetting, static, or light leaks degrade portions of every frame.

Remarks

1. Vignetting obstructs approximately 45% of the format area on every frame.

2. Numerous minus density spots and streaks are evident throughout the film.

3. Titling is legible but is slightly smeared on all frames. Frame 424 (the last frame) is not titled.

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4. An equipment shadow image is present on frames 104, 105, 207, 240, 246, 313.

5. Possible [redacted]ellar imagery is evident on frames 312 to 318.

6. The reseau mount is imaged on frames 144 to 147, 190, 191, 299, because of excessive sun flare through the lens.

7. Density readings were not recorded for this mission, as it was felt that they would not add appreciably to the report. Sun flare occurs on a majority of the frames because of an unusual vehicle attitude. Vignetting obscures 45% of every frame, rendering any density readings misleading.

PART IV. INDEX CAMERA

Mission No: 9051
Camera No: D 8
Camera Setting: f/4.5, 1/125 second

Filter: Wratten 21
Film Type: SO 206
Evaluated By: [redacted]

1. Shutter Operation: Functioned throughout.

2. Exposure: Vehicle attitude does not permit a thorough analysis. However, on passes which have some imagery the exposure usually ranges from underexposed at the beginning of a pass to overexposed at the end of a pass.

3. Camera Number: Clearly registered on frames which have imagery within the camera data block.

4. Film Metering: Metering averages 0.13" on frames 51 to 61 and 142 to 147. Metering on other frames of the mission was not measurable because of vehicle attitude.

5. Film Tracking: Normal.

6. Reseau: The grid is well defined within the imagery on frames having partial coverage.

7. Light Leaks: The reseau plate reflected light, causing a thin circular light leak. This light leak occurs on frames 6 to 21 and within the first two frames of camera on positions for the remainder of the mission.

8. Static Electricity: Possible corona static discharges occur on approximately 150 frames. The static varies in intensity. On frames 369 to 372 and 387 to 391, a small fog patch occurs every 3" near the center of the format. Frames 189 and 234 have corona bursts resembling fog and striations. Edge static occurs along the titled edge on 11 frames.

9. Pinholes: Few.

10. Abrasions and Scratches: A few small, possibly camera induced, scratches occur intermittently throughout the film.

11. Tearing: None.

12. Water Marks: A water stain, possibly occurring during the recovery operation, is present along the titled edge on frame 243.

13. Pressure Marks: None.

14. Processing Streaks: None.

15. Blistering and Crimping: None.

16. Contrast: Not determined because of vehicle attitude.

17. Apparent Resolution: Resolution is good where imagery is present.

18. Apparent Graininess: Slightly grainy.

19. Photo Quality: Poor, because of vehicle attitude.

20. Camera Operation: Good.

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Remarks

1. Overlap was not determined because of vehicle attitude.

2. The correlation marker indicating stellar operation is present throughout the mission.

3. A small opaque spot occurs near the eighth line from the camera data block and the third line from the leading edge in the direction of flight, obscuring a small portion of the grid square on frames having imagery in this area.

4. Because of vehicle attitude, 59 frames have no imagery. All other frames have partial coverage which does not range above 50% of the format area.

5. Density readings were not taken as they would not add appreciably to this report. Lack of imagery in 59 frames and only partial coverage in the remainder of the frames render any density readings misleading.

PART V. VEHICLE ATTITUDE DATA

Pass	Pitch Variation		Pitch Range	Roll Variation		Roll Range	No of Frames	Remarks
D07	90°30'	95°43'	5°13'	2°38'	1°39'	0°29'	64	No data 1 - 32
	94 57	98 12	3 15	1 59	1 27	0 32	64	
D09	97 05	99 42	2 37	2 39	1 53	0 46	57	No data 1 - 40
	101 56	103 22	1 26	1 27	1 17	0 10	29	
D14	104 09	106 01	1 52	0 52	0 35	0 17	36	
D20	95 21	97 17	1 56	7 53	6 27	1 26	50	
D21	97 47	102 10	4 23	8 38	5 19	3 19	92	
	109 13	112 24	3 11	1 50	4 49	2 59	71	No data 178 - 199
D22	85 38	85 51	0 13	12 14	9 08	3 06	43	
	96 24	106 19	6 55	7 10	2 16	4 54	141	
	108 40	112 27	3 47	1 24	4 18	2 54	71	No data 269 - 306
D23	99 08	100 45	5 42	13 21	5 48	7 33	141	
D24	84 35	85 35	1 08	14 15	9 46	4 27	58	No data 1 - 17
D25	82 48	85 17	2 29	14 00	10 20	3 40	64	No data 1 - 14
	96 24	102 20	3 46	7 29	4 30	2 59	57	
D30	100 25	102 14	1 49	7 17	5 01	2 16	36	
D35	88 33	89 20	0 48	26 35	20 05	6 30	57	
D37	86 40	87 08	0 23	23 43	22 22	1 21	29	
	89 16	96 05	6 49	20 26	11 42	8 46	127	
	103 13	110 56	7 43	2 54	4 43	1 49	96	
D41	84 59	86 18	1 19	31 49	26 02	5 47	71	
	89 35	92 51	3 16	20 44	16 52	3 52	57	
D42	78 19	78 49	0 30	42 48	37 16	5 32	78	
D43	79 39	79 08	0 87	46 06	42 26	3 40	50	
	79 13	81 48	2 35	40 04	30 18	9 46	108	
	91 27	100 22	8 55	14 43	3 47	10 55	85	
D45	83 15	77 48	5 27	51 57	46 10	5 47	49	
	77 28	77 44	0 21	44 50	38 11	6 39	71	
D46	81 57	76 43	5 14	46 28	41 36	0 47	57	
	78 47	76 18	0 31	45 27	37 05	8 22	85	
D47	No data		No data	50 39	46 22	4 07	71	

NOTE: No data available for other passes of this mission because of erratic vehicle attitude.

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