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February 1964

TECHNICAL PUBLICATION

PHOTOGRAPHIC EVALUATION REPORT

MISSION 4001

13 JULY 1963

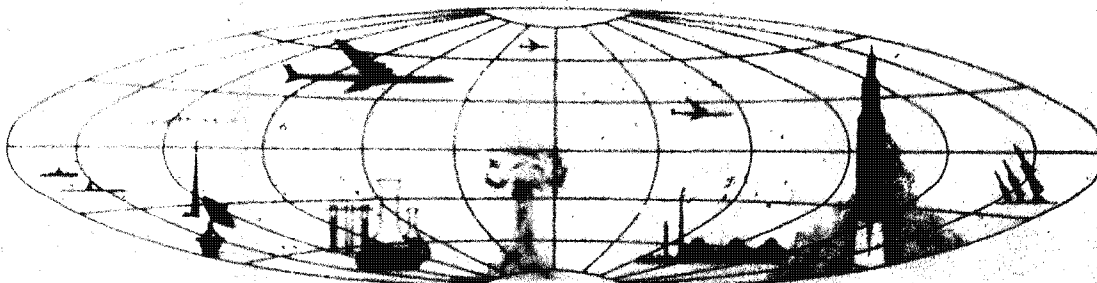
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This document contains information referring to
Project Gambit.

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PART I. PRIMARY CAMERA

Mission No: 4001
Camera No: G.1
Slit Width: 0.0083"Film Type: 4304 (SO 132)-1500'
Filter: B & L Type Y.10 Wratten 12
Aperture: f/3.95

Mission 4001 used a strip camera employing an entirely new satellite photographic system. The mission proved successful in that it provided larger scale satellite photographic coverage than other systems presently in use.

1. Camera Operation: The imagery appears slightly out of focus, probably due to temperature variances encountered by the stereo mirror. Banding occurs along the minor axis of the film at intervals of 12" and 24" alternately, and is associated with looper replenishment. Imagery within these bands is distorted by erratic film travel. Film speed was consistently within one percent of the programmed speed except in the areas of banding.
2. Image Motion Compensation: IMC error is induced by the looper action. There is an error of 30-35 percent at the beginning of the looper action, 5-10 percent in the center and 30-35 percent at the end. The film very quickly reverts to within one percent of its programmed speed upon completion of looper replenishment (see film speed graphs in remarks).
3. Exposure: Exposure is adequate on the majority of the frames. However, exposure differences are apparent within stereo pairs and great changes in the brightness range occur on the long monoscopic frames (see density charts).
4. Frequency Markers: Terrain imagery appears continually in the time track background but the time marks are well defined and legible throughout the mission.
5. Fiducial Lines: Well defined.
6. Yaw Slits: The exposure was adequate; however, contrast was not consistently high enough for accurate detection of attitude. The outboard edge of the yaw slit on the untitled edge of the negative is vignettted throughout the mission.
7. Light Leaks: A malfunction of the guillotine firing mechanism resulted in a major light leak which induced edge fog and severe fogging of the outer wraps of the film throughout the mission.
8. Static Electricity: No evidence of static electricity observed.
9. Pinholes: Numerous throughout the mission. Examples: pass D06, frames 03, 04, 07.
10. Abrasions and Scratches: Scratches and abrasions on both the base and the emulsion sides are numerous throughout the mission. The most persistent scratches are on the emulsion side, 4.52" and 4.65" from and parallel to the titled edge (example: pass D05). There are several eyelash-like abrasions throughout pass D05. Particularly heavy scratches appear along the major axis of pass D06, frames 05, 06, 08. A severe base rub, 0.3" wide, 19.1" long is present on the major axis of pass D07, frame 09. There is a small emulsion dig every 6.3", located 3.95" from the non-titled edge of pass D08, frame 10. In addition, there are many other minor scratches, abrasions, and digs.
11. Tearing: None
12. Stains & Watermarks: There is a repetitive circular stain on the emulsion side, near the titled edge of pass D09, frames 07, 08, 09.

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Lacquer is smeared into the image area on each frame of pass D09. There are no water-marks noted.

13. Processing Streaks: None

14. Blistering & Crimping: None

15. Foreign Matter: There are handling marks (fingerprints) on pass D06, frames 02 and 08. Deposits of foreign matter adhere to the emulsion on pass D06, frames 08 and 09.

16. Contrast: .5% low, 44% medium, 51% high (using limiting density values).

17. Apparent Resolution: Fair. Edge acuity is only fair because an out of focus condition exists throughout the mission; however, the apparent resolution is enhanced by the large scale of the photography.

18. Apparent Graininess: Fine

19. Photo Quality: The photographic quality is degraded by an out of focus condition that exists throughout the mission. The high gross fog level, caused by the guillotine firing mechanism malfunction, also was a degrading factor.

20. Suitability for PI: Fair to good. Linear measurements of approximately five feet can be accomplished which is comparable to other satellite systems. Ground resolution, using vehicle size as a basis for determination, is estimated to be 10-15 feet, leaving considerable room for improvement (see remarks, item 7).

Remarks

1. The system design allows a door in the vehicle to be closed between operational passes, protecting the interior of the vehicle from any exterior influences. Due to a malfunction, this door failed to close and a thermal problem was

encountered that caused slight distortions in the stereo mirror surface.

2. The vehicle door malfunction allowed imagery to occur on the film wrap-up between passes. Although there is an IMC error of approximately ± 30 percent, the film is still usable for photo interpretation of gross features.

3. At pass D10, frame 1, a vehicle attitude problem (positive roll) became apparent, resulting in a complete loss of imagery on pass D10 and degradation of subsequent photography sufficiently to preclude a fair appraisal of the camera performance.

4. Approximately 5% of the total film footage of this mission (prior to the attitude problem) was exposed in mode one and 95% in mode two. Mode three was not used.

5. Of the three stereo pairs programmed for this mission, one was entirely cloud covered. The others had approximately 82% side lap and 94% forward lap.

6. There are 8 to 10 longitudinal minus density streaks that appear intermittently throughout the mission. These are believed to have been caused by particles of dirt in the aperture slit.

7. In the areas of looper action, the accuracy of measurements between the mission take and collateral material fell to approximately $\pm 4\%$ in the area of violent action, and $\pm 2\%$ in the areas of smaller film speed errors.

8. The graphs at the end of this report illustrate the effects of the looper action on IMC.

9. Density readings were taken on each frame using the Macbeth Quantalog Densitometer Model EP 1000, with an ET 20 attachment and a 0.5 mm aperture. Gross fog readings were taken at each end and at both sides of each frame.

- 2 -

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DENSITY READINGS

Reading	Pass	Frame	Terrain		Limiting		Gross Fog	
			D-Min	D-Max	D-Min	D-Max	Titled	Non-Titled
1	D05	1	0.38	1.92	0.38	2.06	0.25	0.25
2	D05	2	0.30	2.03	0.32	2.03	0.25	0.25
3	D05	3	0.33	1.47	0.33	2.12	0.26	0.26
4	D05	4	0.42	1.15	0.37	1.96	0.27	0.27
5	D05	5	0.36	1.28	0.36	2.09	0.25	0.25
6	D05	6	NR	NR	0.66	2.22	0.26	0.27
7	D05	7	NR	NR	NR	NR	0.26	0.26
8	D05	8	NR	NR	NR	NR	0.26	0.26
9	D05	9	0.34	1.62	0.39	2.08	0.27	0.27
10	D06	1	0.42	0.93	0.43	1.85	0.27	0.28
11	D06	2	0.82	1.10	0.82	2.05	0.27	0.27
12	D06	3	0.65	0.73	0.27	2.20	0.27	0.27
13	D06	4	NR	NR	NR	NR	0.27	0.27
14	D06	5	0.67	1.71	0.67	2.07	0.27	0.28
15	D06	6	0.43	1.47	0.43	2.20	0.27	0.27
16	D06	7	0.60	1.64	0.60	2.12	0.27	0.27
17	D06	8	0.84	1.60	0.68	1.75	0.27	0.27
18	D06	9	0.65	1.61	0.65	2.12	0.27	0.27
19	D07	1	0.49	1.70	0.49	2.10	0.27	0.27
20	D07	2	0.49	0.88	0.43	2.09	0.26	0.26
21	D07	3	0.44	0.70	0.44	2.14	0.25	0.27
22	D07	4	0.55	0.87	0.55	2.13	0.25	0.27
23	D07	5	0.39	1.17	0.39	2.17	0.25	0.26
24	D07	6	0.74	1.68	0.74	1.94	0.26	0.26
25	D07	7	0.47	1.84	0.40	1.84	0.25	0.26
26	D07	8	0.37	1.82	0.37	2.07	0.25	0.26
27	D07	9	0.45	1.80	0.45	2.16	0.25	0.25
28	D08	S 1	NR	NR	NR	NR	0.27	0.27
29	D08	S 2	NR	NR	NR	NR	0.27	0.27
30	D08	3	0.41	1.33	0.41	2.14	0.27	0.27
31	D08	4	0.38	1.37	0.38	2.18	0.25	0.27
32	D08	5	0.57	1.30	0.56	2.08	0.26	0.27
33	D08	6	0.43	1.34	0.43	2.10	0.25	0.27
34	D08	S 7	0.80	1.82	0.80	1.82	0.27	0.27
35	D08	S 8	0.81	1.89	0.81	1.89	0.27	0.27
36	D08	9	0.64	1.68	0.64	2.12	0.25	0.27
37	D08	10	0.73	1.68	0.73	1.92	0.25	0.27
38	D09	1	0.80	1.01	0.67	2.14	0.27	0.27
39	D09	2	0.41	1.54	0.41	2.14	0.27	0.27
40	D09	3	0.45	1.38	0.45	2.15	0.26	0.26
41	D09	4	0.44	1.43	0.44	2.11	0.27	0.27
42	D09	5	0.54	1.30	0.54	2.16	0.26	0.27
43	D09	6	0.60	1.52	0.60	2.17	0.27	0.26
44	D09	7	0.46	1.84	0.46	2.17	0.27	0.27
45	D09	S 8	0.68	1.58	0.68	2.22	0.27	0.26
46	D09	S 9	0.89	1.47	0.77	2.22	0.27	0.26
47	D09	10	0.37	1.90	0.32	2.04	0.27	0.27

NR denotes no reading made.
 S denotes stereo mode.

Terrain
 D-Max Range 0.70-2.03
 D-Min Range 0.30-0.89
 Average D-Max 1.48
 Average D-Min 0.53

Limiting
 D-Max Range 1.75-2.22
 D-Min Range 0.27-0.82
 Average D-Max 2.08
 Average D-Min 0.51

Gross Fog Range 0.25-0.28
 Average Gross Fog 0.26

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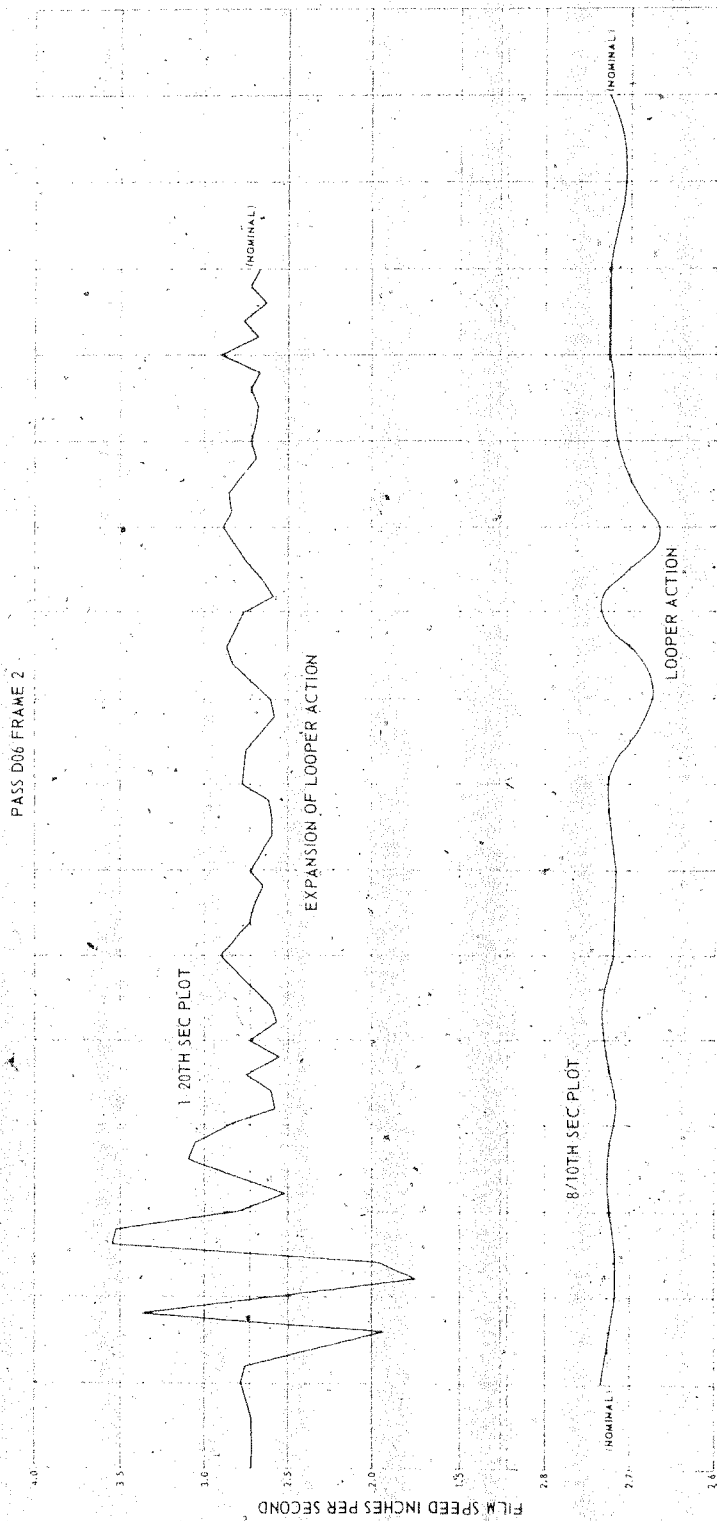
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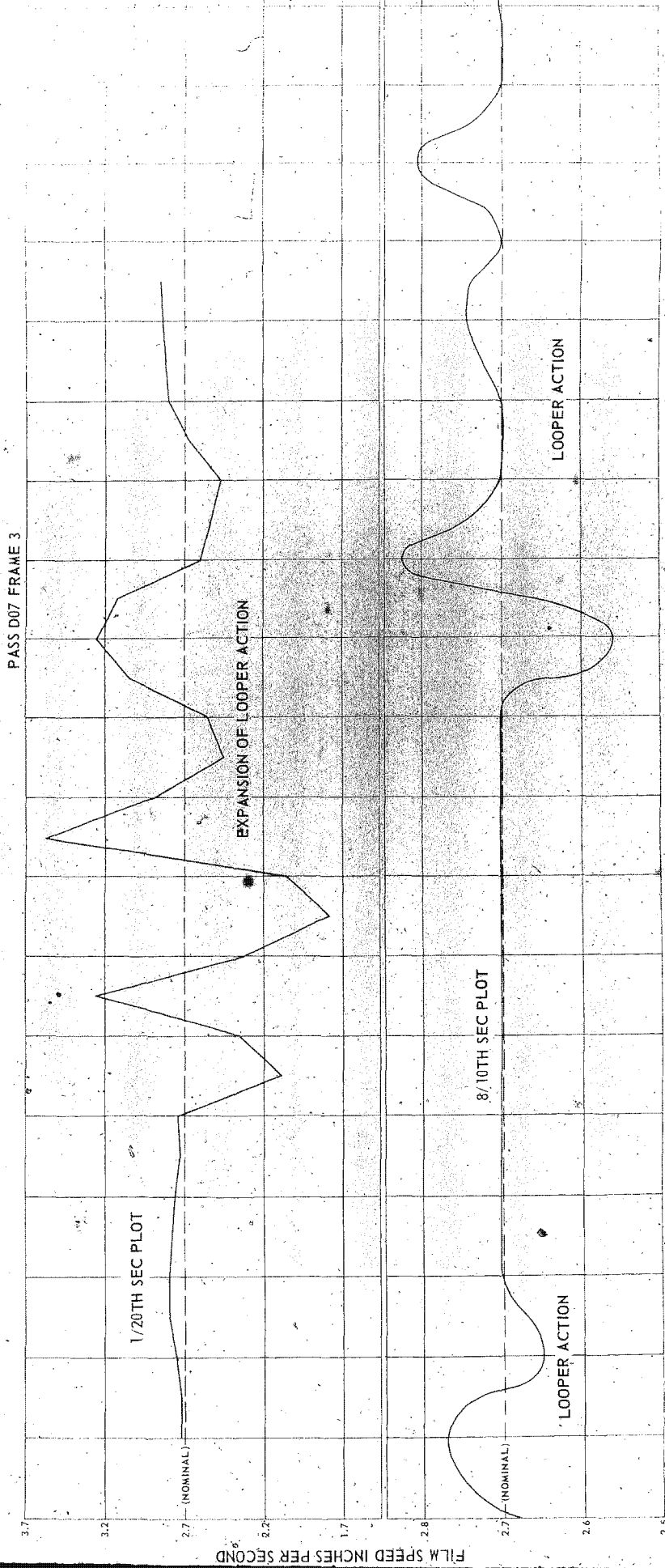


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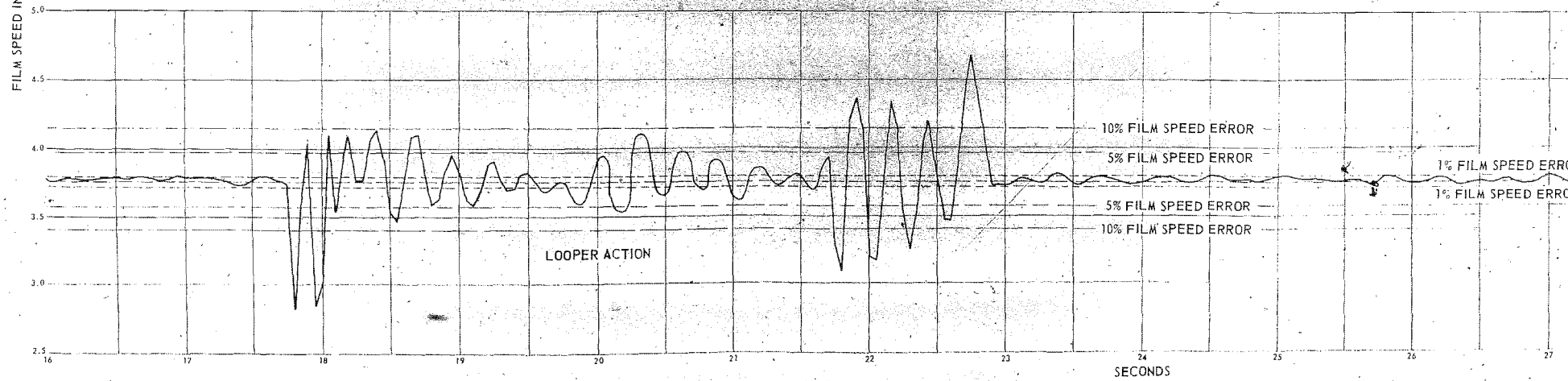
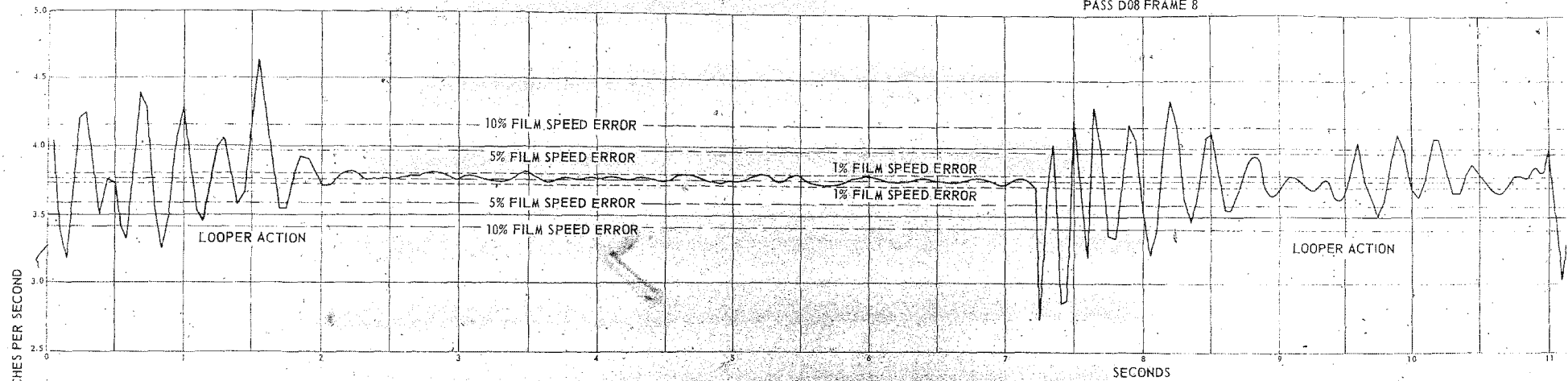
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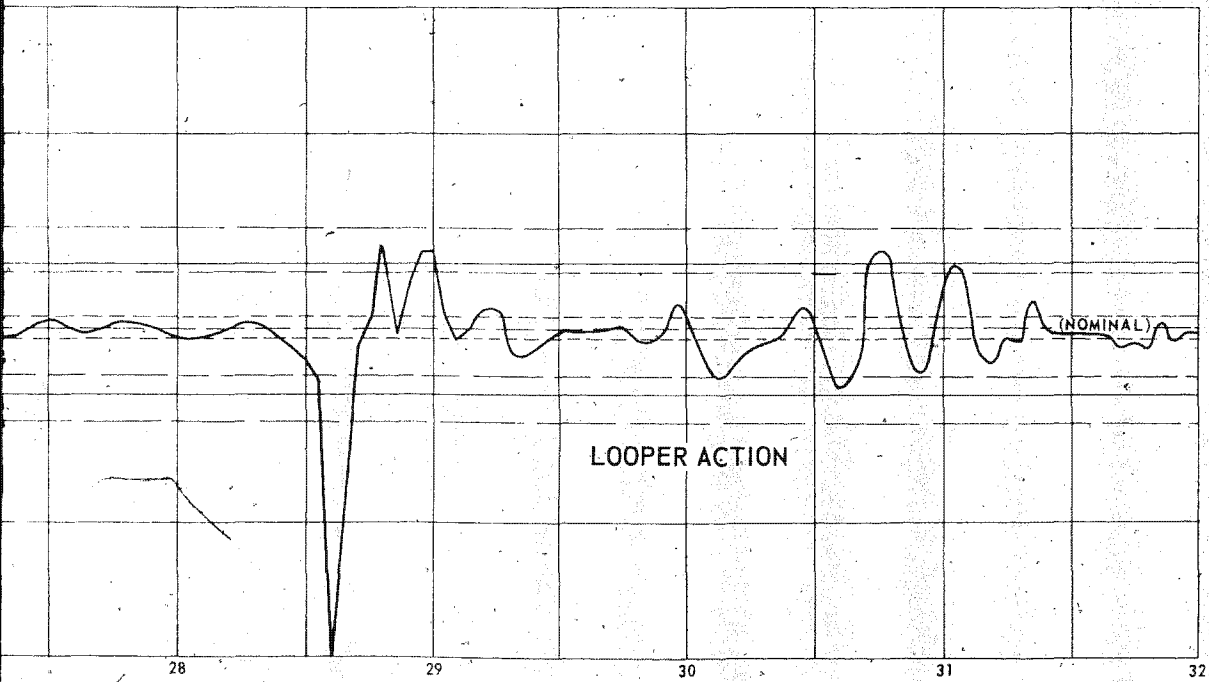
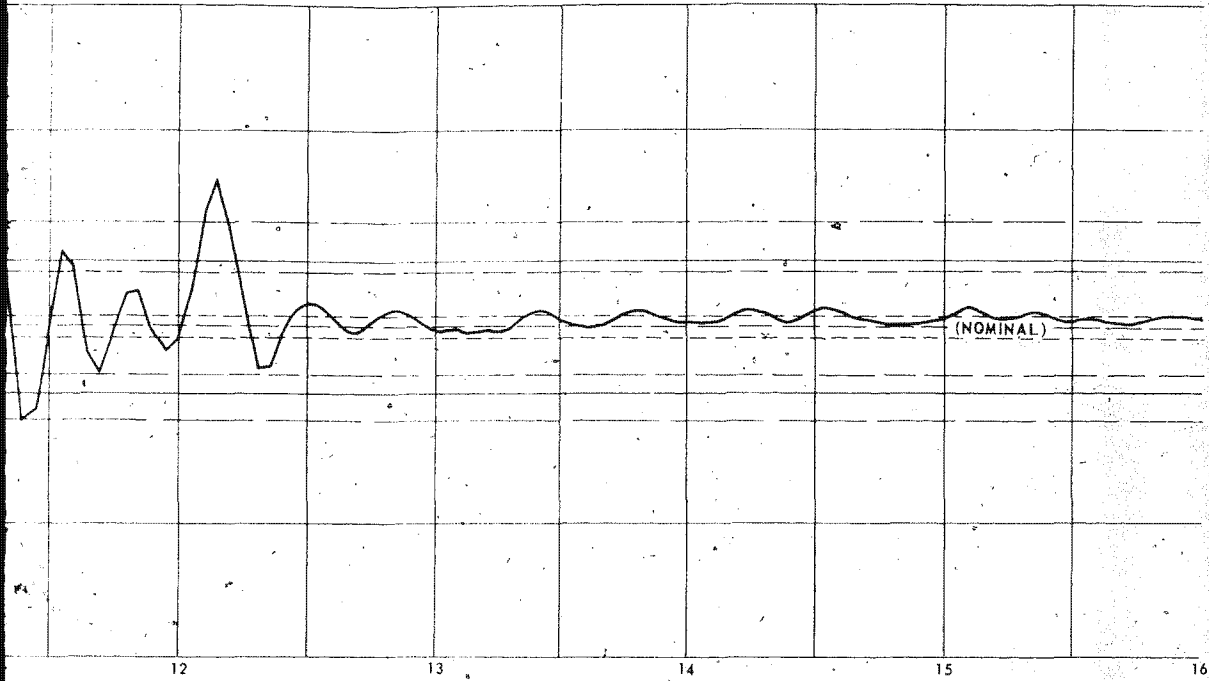


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PASS D08 FRAME 8



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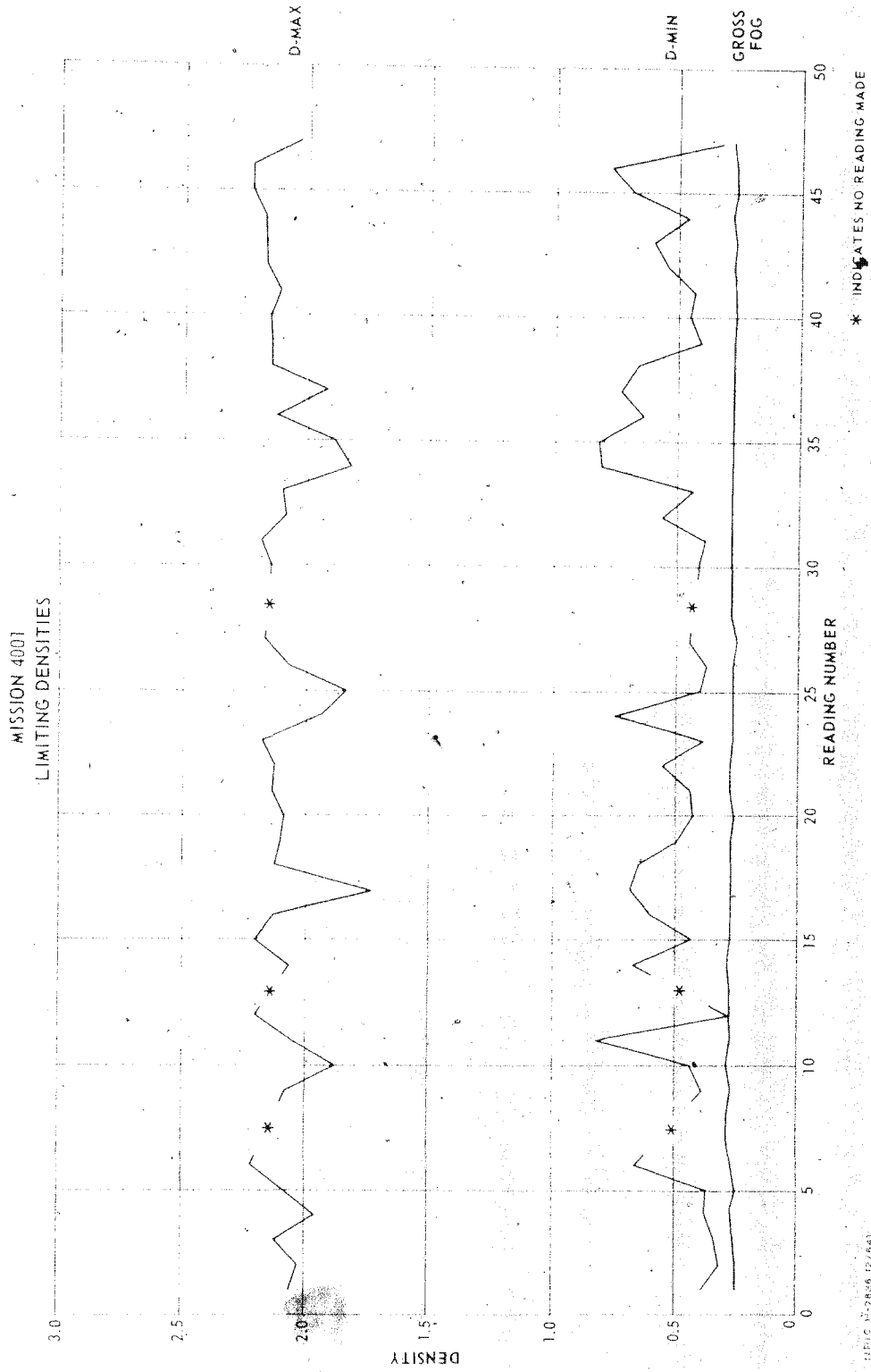
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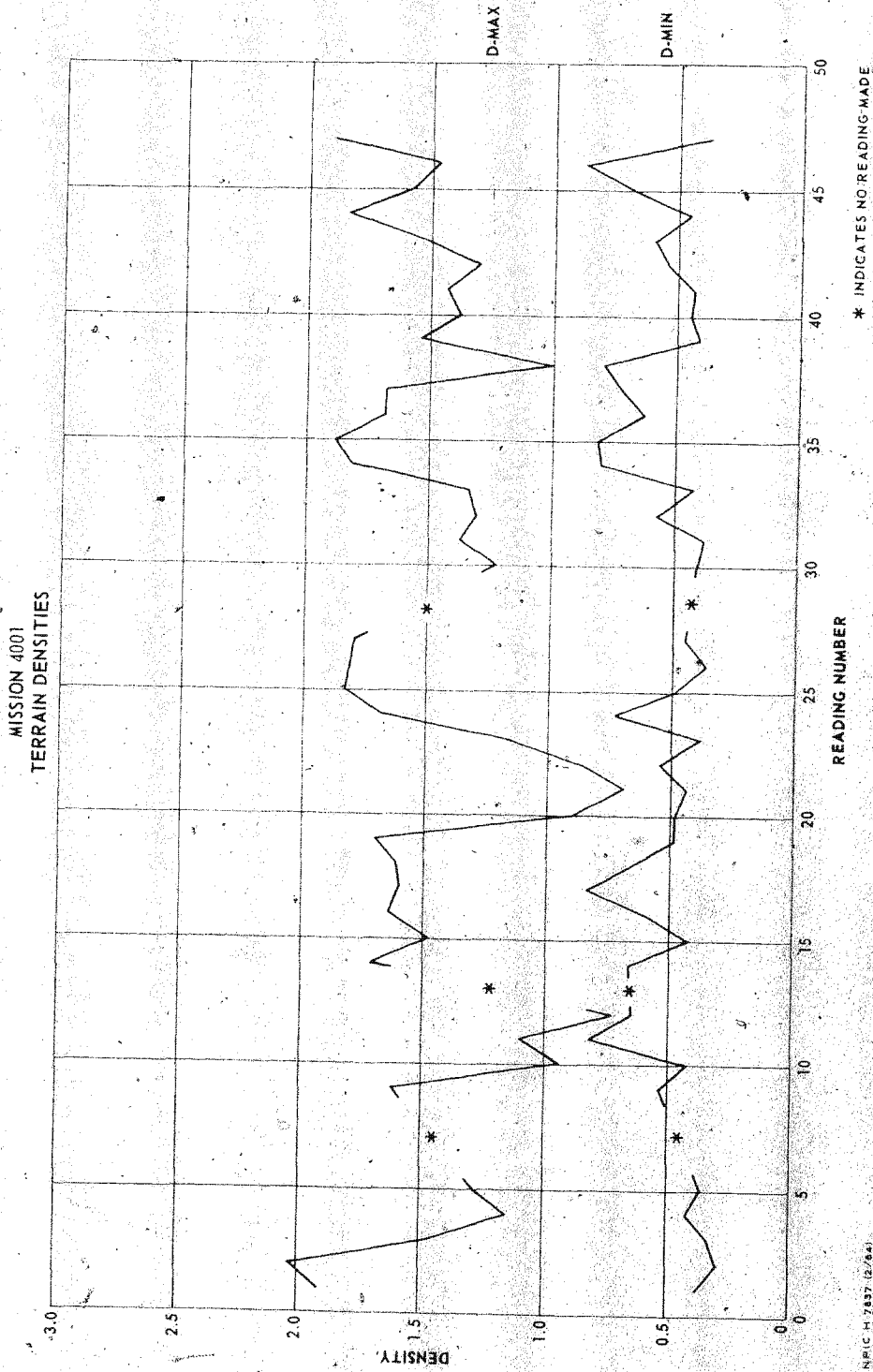
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