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This document contains  
16 pages.

Analysis of Photographic Image  
to Evaluate System Performance  
Mission Segments  
1029-1 & 1029-2  
by  
Scientist/Consultant Team

Declassified and Released by the N R O

In Accordance with E. O. 12958

on NOV 26 1997

21 February 1966

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SECTION I SUMMARY SHEET

Resolution in lines/mm based on the aerial image modulation - 3404 curve from edge trace data reduced by computer techniques.

Mission Segment 1029-1

	BOTH CAMERAS	FORWARD CAMERA	AFT CAMERA
Arithmetic Mean	75.2 1/mm	76.9 1/mm	73.1 1/mm
Standard Deviation	15.4 1/mm	16.3 1/mm	14.1 1/mm
Coefficient of Dispersion	20%	21%	19%
Number of Edges	62	34	28

Mission Segment 1029-2

Arithmetic Mean	78.9 1/mm	77.5 1/mm	80.8 1/mm
Standard Deviation	16.5 1/mm	15.7 1/mm	17.6 1/mm
Coefficient of Dispersion	21%	20%	22%
Number of Edges	60	35	25

Spread function width at 50% amplitude in microns from edge trace data reduced by computer techniques.

Mission Segment 1029-1

Arithmetic Mean	11.4 $\mu$	11.6 $\mu$	11.3 $\mu$
Standard Deviation	2.8 $\mu$	3.0 $\mu$	2.5 $\mu$
Coefficient of Dispersion	24%	26%	22%
Number of Edges	62	34	28

Mission Segment 1029-2

Arithmetic Mean	10.6 $\mu$	11.0 $\mu$	10.0 $\mu$
Standard Deviation	2.8 $\mu$	2.6 $\mu$	3.0 $\mu$
Coefficient of Dispersion	27%	24%	30%
Number of Edges	60	35	25

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SECTION II - MISSION 1029

Summary of all C/M/J Missions Traced and Computed  
With the New SWRDR Computer Program

Mission Segment Number	Number of Edges	Spread Function Width at 50% Amplitude in Microns, Computer Calculations			Resolution in lines/mm from A.I.M. 3404 Curve, Computer Calculations		
		Arithmetic Mean	Standard Deviation	Coefficient of Dispersion	Arithmetic Mean	Standard Deviation	Coefficient of Dispersion
1007-2*	106	12.2	3.9	32%	71.0	18.0	25%
1008-1*	103	10.6	3.2	30%	83.0	21.1	25%
1008-2*	123	10.2	3.9	38%	84.3	21.0	25%
1009-1	80	11.7	4.2	36%	75.3	19.9	26%
1009-2	110	13.0	5.0	39%	74.1	21.7	29%
1010-1	119	9.8	3.3	33%	89.4	22.7	25%
1010-2	110	9.8	3.2	32%	84.3	21.4	25%
1011-1	115	10.9	3.8	35%	80.5	21.6	27%
1012-1	94	10.1	3.7	36%	86.1	20.4	24%
1012-2	100	10.2	3.1	31%	84.0	21.4	26%
1013-1	49	10.8	4.1	38%	83.3	27.3	33%
1014-1	92	10.8	4.5	41%	83.0	24.7	30%
1014-2	90	11.7	3.9	34%	74.2	20.1	27%
1015-1	35**	8.8	2.3	26%	93.1	16.5	18%
1015-2	40**	9.2	2.3	25%	89.7	17.8	20%
1016-1	31**	9.7	2.3	24%	88.0	18.6	21%
1016-2	33**	9.8	3.2	32%	91.5	16.1	18%
1017-1	42**	10.2	3.5	34%	86.6	18.8	22%
1017-2	45**	11.4	3.6	31%	82.2	17.8	22%
1018-1	34**	9.6	2.5	26%	88.7	18.3	21%
1018-2	44**	10.1	2.4	23%	84.8	17.4	21%

\*A 1 x 320 micron slit was used

\*\*Each edge was traced three or more times on the microdensitometer

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MISSION 1029

Mission Segment Number	Number of Edges	Spread Function Width at 50% Amplitude in Microns, Computer Calculations			Resolution in lines/mm from A. I. M. 3404 Curve, Computer Calculations		
		Arithmetic Mean	Standard Deviation	Coefficient of Dispersion	Arithmetic Mean	Standard Deviation	Coefficient of Dispersion
1019-1	40**	9.6	2.4	25%	87.1	15.8	18%
1020-1	40**	9.7	2.3	23%	86.2	17.7	21%
1021-1	20**	9.4	2.9	31%	92.1	22.4	24%
1021-2	15**	9.8	1.4	14%	87.6	10.7	12%
1022-1	44**	10.0	2.8	28%	89.9	19.6	22%
1022-2	48**	10.6	3.9	37%	85.4	23.1	27%
1023-1	42**	9.2	2.6	28%	90.2	20.3	23%
1023-2	31**	11.9	3.9	33%	71.9	16.5	23%
1024-1	46**	8.7	2.9	33%	91.6	19.4	21%
1024-2	44**	8.3	2.0	24%	94.1	18.2	19%
1025-1	29**	8.7	2.0	23%	91.3	18.4	20%
1025-2	25**	8.8	2.6	30%	92.2	21.1	23%
1026-1	43**	8.9	2.8	32%	89.5	21.3	24%
1026-2	38**	8.6	2.2	26%	91.1	18.9	21%
1027-1	22**	10.4	3.8	37%	85.8	21.4	25%
1028-1	57**	8.4	1.8	22%	91.0	15.3	17%
1028-2	52**	9.4	2.8	29%	85.1	21.3	25%
1029-1	62**	11.4	2.8	24%	75.2	15.4	20%
1029-2	60**	10.6	2.8	27%	78.9	16.5	21%

\*\*Each edge was traced three or more times on the microdensitometer

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SECTION III - MISSION 1029

Image Quality Ranking of C/M/J Missions

Mission Number	Average Resolution in lines/mm for A.I.M. - 3404 Curve	Mission Number	Average Resolution in lines/mm for A.I.M. - 3404 Curve
1024-2	94.1 1/mm	1012-1	86.1 1/mm
1015-1	93.1 1/mm	1027-1	85.8 1/mm
1025-2	92.2 1/mm	1022-2	85.4 1/mm
1021-1	92.1 1/mm	1028-2	85.1 1/mm
1024-1	91.6 1/mm	1018-2	84.8 1/mm
1016-2	91.5 1/mm	1008-2	84.3 1/mm
1025-1	91.3 1/mm	1010-2	84.3 1/mm
1026-2	91.1 1/mm	1012-2	84.0 1/mm
1028-1	91.0 1/mm	1013-1	83.3 1/mm
1023-1	90.2 1/mm	1008-1	83.0 1/mm
1022-1	89.9 1/mm	1014-1	83.0 1/mm
1015-2	89.7 1/mm	1017-2	82.2 1/mm
1026-1	89.5 1/mm	1011-1	80.5 1/mm
1010-1	89.4 1/mm	1029-2	78.9 1/mm
1018-1	88.7 1/mm	1009-1	75.3 1/mm
1016-1	88.0 1/mm	1029-1	75.2 1/mm
1021-2	87.6 1/mm	1014-2	74.2 1/mm
1019-1	87.1 1/mm	1009-2	74.1 1/mm
1017-1	86.6 1/mm	1023-2	71.9 1/mm
1020-1	86.2 1/mm	1007-2	71.0 1/mm

NOTE: Since this is a research and development effort, modifications and improvements are continually being made in the methods of collecting edge data and in the computer data reduction. Caution is advised in making system comparisons based on lines per millimeter resolution or spread function width until better methods become available for calibration of the edge tracing technique.



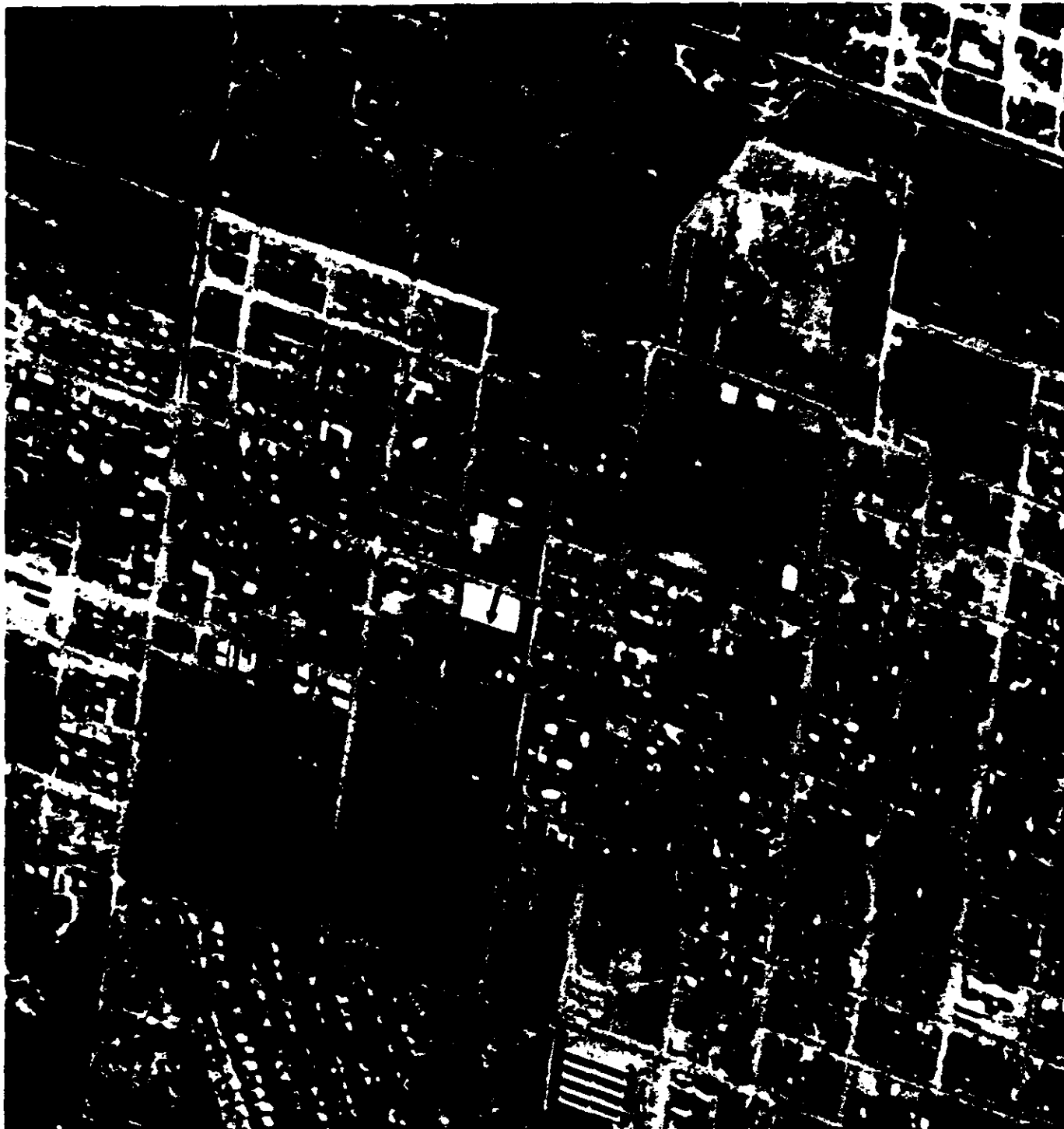
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Section IV Mission Segment: 1029-1 40X Enlargement

Selected Frame FWD Camera

Edge Location: Pass D-31, Frame 017, X14.2 Y10.0



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Section IV Mission Segment 1029-2 40X Enlargement

Selected Frame: FV-1 Camera

Edge Location: Pass 1-127 (0.000-1.0) X32.9 Y10.0



[REDACTED]

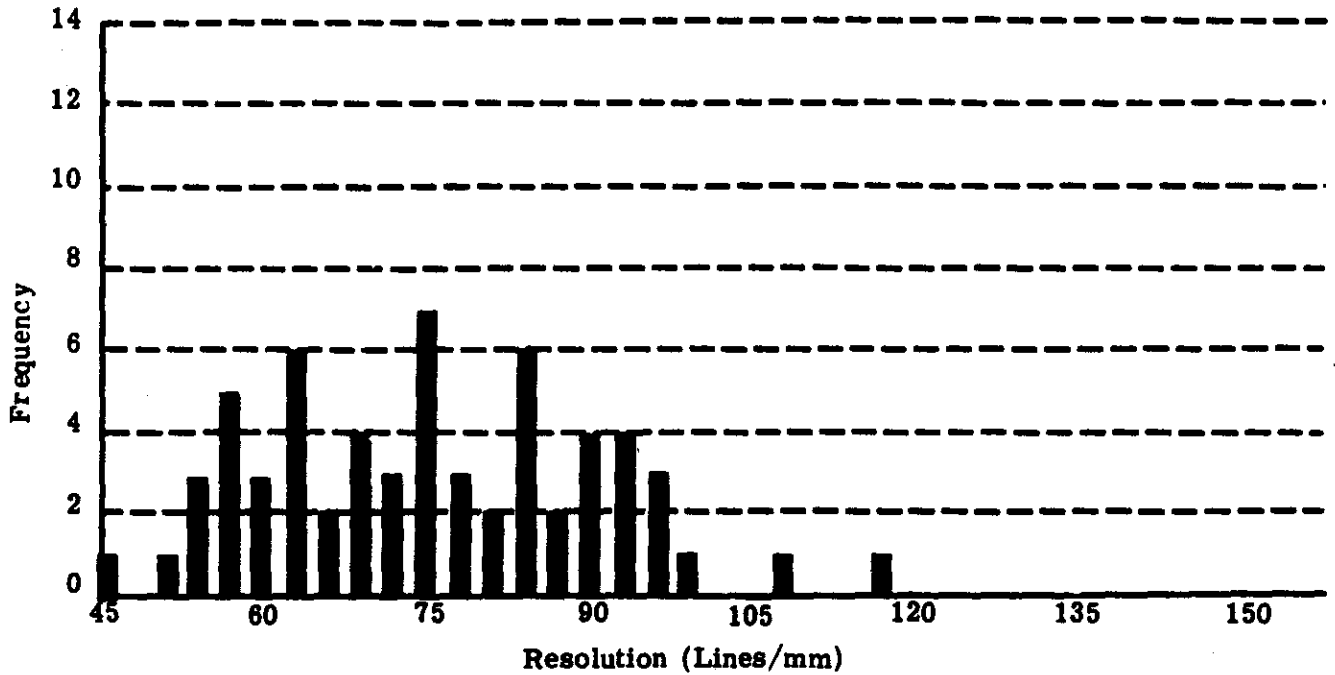
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Section V - Mission Segment 1029-1 70mm Film

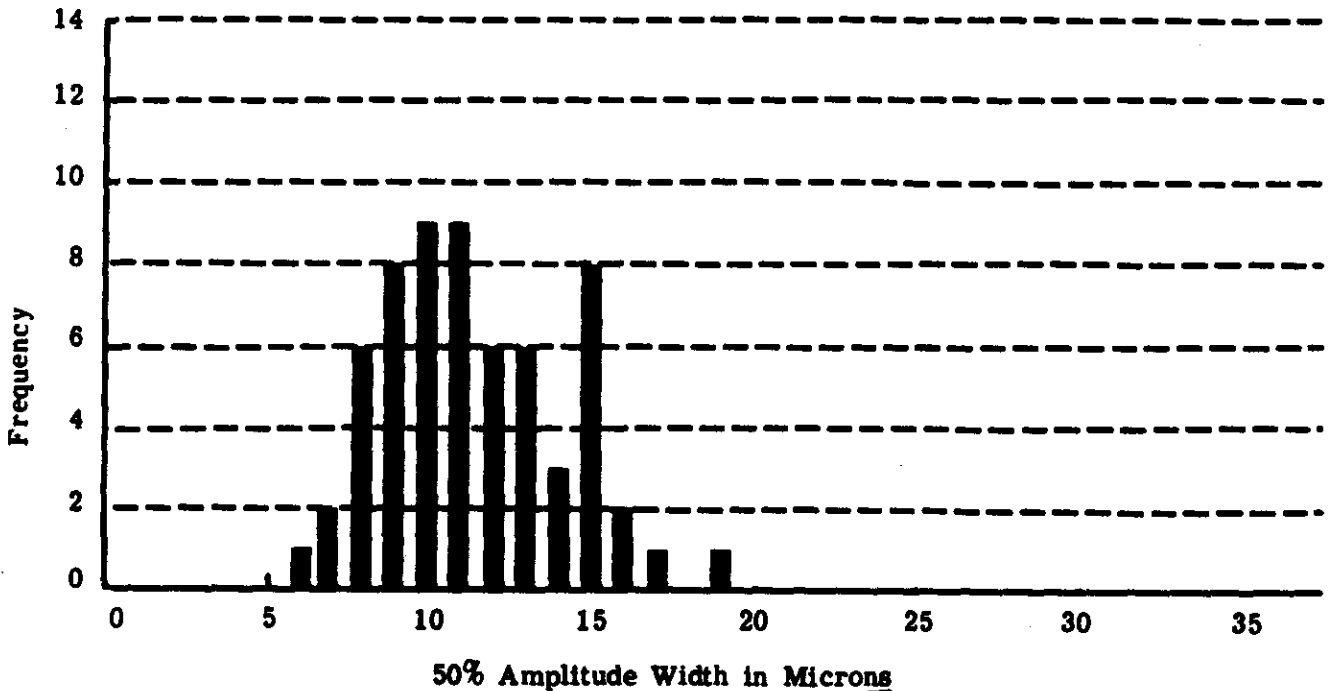
62 Edges

Average of Multiple Tracing

FREQUENCY VS. RESOLUTION A.I.M. 3404 CURVE



FREQUENCY VS. 50% AMPLITUDE WIDTH OF LINE SPREAD FUNCTION







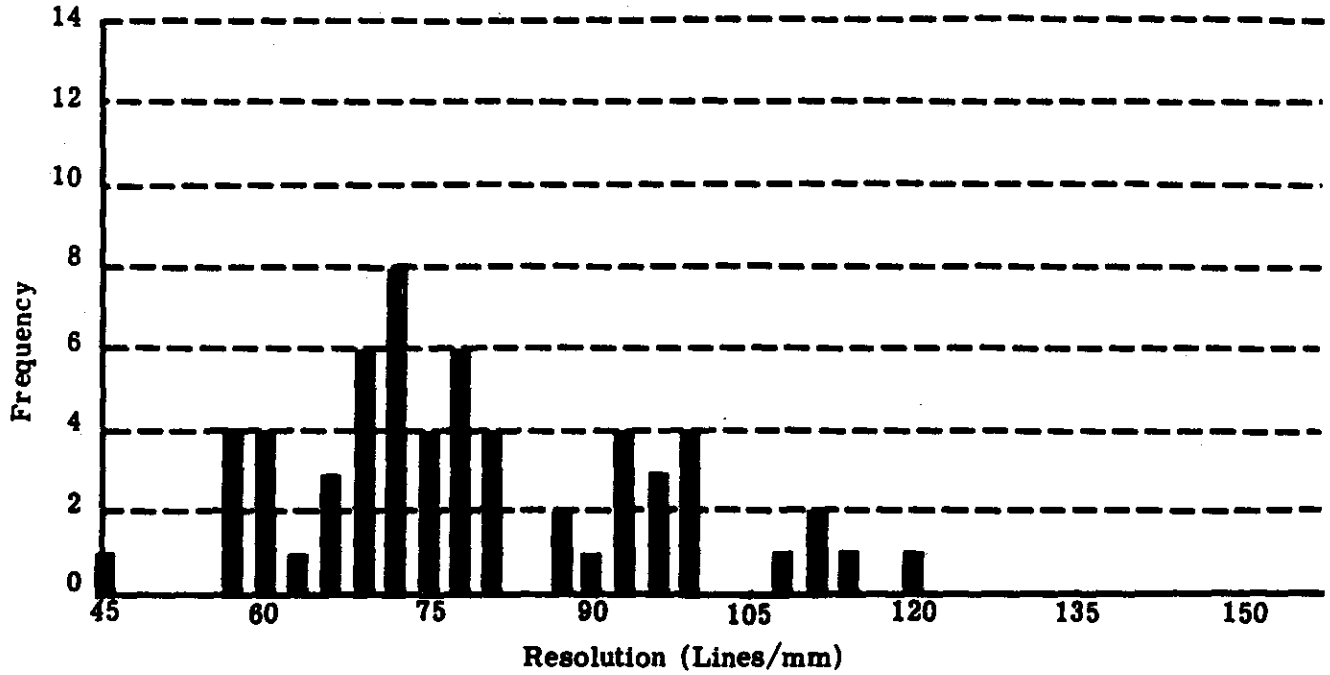
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Section V Mission Segment 1029-2 70mm Film

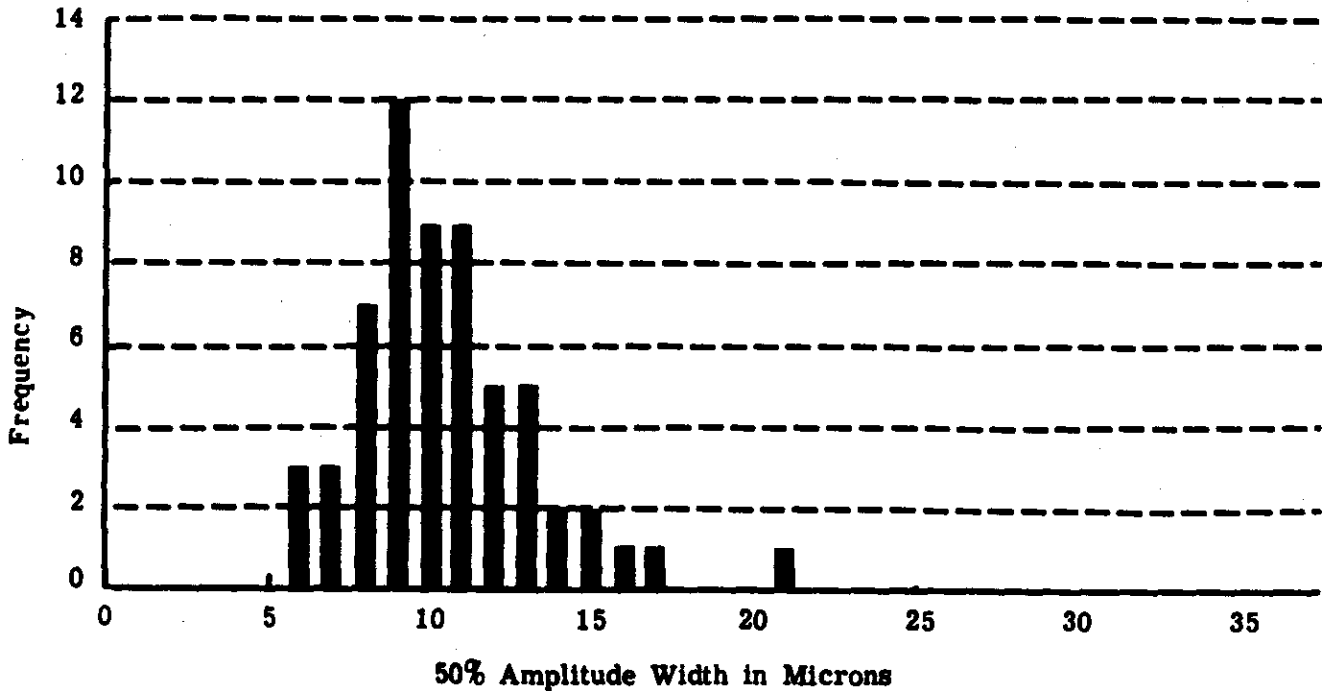
60 Edges

Average of Multiple Tracing

FREQUENCY VS. RESOLUTION A.I.M. 3404 CURVE



FREQUENCY VS. 50% AMPLITUDE WIDTH OF LINE SPREAD FUNCTION



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SECTION VI MISSION SEGMENT 1029-1

Trace No.	Pass	Frame	Location	Orien- tation	Subject*	Spread Function Width (microns)	A. I. M. Resolution (lines/mm)
<b>FORWARD CAMERA</b>							
1	D-009	55	X 51.8 Y 12.0	002	B	11.0	79
2	D-024	55	X 70.1 Y 12.5	160	B	6.4	116
3	D-024	79	X 51.5 Y 12.2	030	B	9.7	83
4	D-024	83	X 46.0 Y 11.2	030	B	7.1	107
5	D-031	17	X 14.2 Y 10.0	015	B	9.6	85
6	D-031	18	X 13.6 Y 14.2	015	B	8.8	90
7	D-037	7	X 56.1 Y 9.5	180	B	19.2	43
8	D-037	7	X 54.5 Y 10.3	175	B	13.2	56
9 *	D-037	27	X 49.0 Y 11.8	010	B	14.2	50
10	D-040	12	X 44.4 Y 10.5	050	B	11.5	74
11	D-040	14	X 49.2 Y 12.8	025	B	11.0	76
12	D-040	44	X 43.9 Y 13.8	170	B	12.4	60
13	D-040	59	X 45.1 Y 13.1	050	B	9.1	89
14	D-040	66	X 46.0 Y 11.1	025	B	9.9	85
15	D-047	6	X 30.5 Y 12.5	015	B	8.0	93
16	D-055	34	X 57.4 Y 10.7	060	B	12.8	72
17	D-055	90	X 54.5 Y 11.2	025	B	12.8	69
18	D-062	7	X 44.7 Y 12.0	055	B	7.7	95
19	D-062	61	X 55.5 Y 13.2	005	B	11.4	74
20	D-062	16	X 31.4 Y 12.4	150	B	11.1	70
21	D-062	16	X 31.6 Y 12.4	050	B	14.7	59
22	D-069	65	X 18.6 Y 12.8	125	B	13.1	63
23	D-070	52	X 32.3 Y 11.3	010	B	11.5	73
24	D-070	64	X 22.0 Y 11.3	030	B	9.4	94
25	D-070	72	X 44.0 Y 11.6	040	B	10.0	80
26	D-070	73	X 42.5 Y 12.2	035	B	9.4	94
27	D-070	76	X 63.2 Y 11.5	060	B	15.0	71
28	D-070	82	X 40.5 Y 14.3	010	B	10.6	76

\* M. I. P. Frame

\*See page [redacted]

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SECTION VI MISSION SEGMENT 1029-1

Trace No.	Pass	Frame	Location	Orientation	Subject*	Spread Function Width (microns)	A.I.M. Resolution (lines/mm)
<b>FORWARD CAMERA</b>							
29	D-070	84	X 54.5 Y 13.5	010	B	9.5	92
30	D-070	59	X 38.1 Y 11.2	160	B	15.3	66
31	D-070	93	X 64.8 Y 10.7	022	B	16.7	56
32	D-070	94	X 59.8 Y 12.5	175	B	15.6	64
33	D-070	97	X 33.5 Y 11.1	175	B	16.3	54
34	D-072	43	X 47.0 Y 11.7	020	B	9.6	89
<b>AFT CAMERA</b>							
35	D-024	50	X 21.2 Y 13.0	165	B	7.8	97
36	D-024	65	X 73.8 Y 13.4	060	B	11.8	69
37	D-024	66	X 75.2 Y 11.2	050	B	8.2	97
38	D-024	83	X 39.5 Y 11.8	045	B	9.5	61
39	D-024	87	X 44.8 Y 12.2	045	B	10.0	83
40	D-037	10	X 34.3 Y 10.9	178	B	11.3	68
41	D-037	33	X 39.8 Y 11.8	045	B	15.4	63
42	D-040	17	X 46.5 Y 14.2	055	B	8.8	84
43	D-040	19	X 41.8 Y 11.8	025	B	14.7	56
44	D-040	48	X 47.1 Y 13.3	165	B	12.7	62
45	D-040	63	X 45.6 Y 12.7	055	B	11.6	78
46	D-040	77	X 54.9 Y 13.6	050	B	11.1	74
47	D-055	59	X 33.4 Y 11.3	070	B	12.4	76
48	D-055	94	X 67.1 Y 14.1	055	B	8.1	88
49	D-068	65	X 35.3 Y 12.0	005	B	9.7	78
50	D-069	68	X 72.2 Y 14.2	130	B	15.0	56
51	D-070	71	X 69.4 Y 12.3	042	B	7.6	90
52	D-070	71	X 51.5 Y 12.8	010	B	15.1	55
53	D-070	74	X 51.6 Y 13.7	025	B	10.3	81
54	D-070	76	X 41.4 Y 11.2	040	B	14.5	53
55	D-070	79	X 27.7 Y 12.2	055	B	14.1	56

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SECTION VI MISSION SEGMENT 1029-1

Trace No.	Pass	Frame	Location	Ori-entation	Subject*	Spread Function Width (microns)	A. I. M. Resolution (lines/mm)
<b>AFT CAMERA</b>							
56	D-070	85	X 50.5 Y 13.6	015	B	9.8	75
57	D-070	86	X 40.3 Y 12.8	020	B	9.0	87
58	D-070	92	X 52.4 Y 11.1	165	B	12.8	62
59	D-070	96	X 25.8 Y 11.5	015	B	12.5	59
60	D-070	99	X 47.7 Y 13.1	175	B	11.9	63
61	D-070	100	X 56.5 Y 10.5	175	B	13.6	57
62	D-072	47	X 43.3 Y 13.3	015	B	7.4	69



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SECTION VI MISSION SEGMENT 1029-2

Trace No.	Pass	Frame	Location	Orientation	Subject*	Spread Function Width (microns)	A. I. M. Resolution (lines/mm)
<b>FORWARD CAMERA</b>							
1	D-084	39	X 23.0 Y 11.6	010	B	10.2	71
2	D-084	46	X 26.9 Y 11.9	030	B	8.6	94
3	D-084	46	X 44.3 Y 12.4	155	B	10.7	96
4	D-084	101	X 53.7 Y 14.6	160	B	10.6	75
5	D-084	103	X 48.6 Y 11.7	010	B	10.5	74
6	D-087	67	X 28.8 Y 10.2	070	B	12.2	70
7	D-087	68	X 28.5 Y 14.8	080	B	17.4	71
8	D-087	70	X 33.1 Y 10.2	175	B	11.5	72
9	D-087	80	X 44.2 Y 12.1	050	B	6.3	110
10	D-087	86	X 55.0 Y 12.9	090	B	13.4	61
11	D-088	20	X 66.8 Y 12.8	160	D	12.8	60
12	D-088	24	X 50.2 Y 10.9	100	B	11.1	73
13	D-088	25	X 56.5 Y 12.8	020	B	12.7	69
14	D-088	34	X 78.7 Y 14.6	175	B	12.3	60
15	D-100	127	X 49.3 Y 12.4	040	B	10.5	72
16	D-102	53	X 23.4 Y 10.1	150	B	14.9	56
17	D-102	96	X 23.9 Y 11.9	050	B	8.9	86
18	D-102	98	X 20.4 Y 10.2	035	B	8.6	73
19	D-102	99	X 41.8 Y 12.3	020	B	13.8	56
20	D-102	102	X 19.9 Y 11.4	095	D	16.5	54
21	D-102	103	X 24.8 Y 13.5	030	B	11.0	70
22	D-102	114	X 24.5 Y 13.7	115	D	15.4	56
23	D-118	75	X 47.8 Y 12.8	010	B	10.3	77
24	D-118	25	X 47.6 Y 10.3	120	B	9.9	74
25	D-118	36	X 37.3 Y 11.7	180	B	10.1	80
26	D-126	7	X 17.8 Y 12.3	020	A	12.6	60
27	D-126	7	X 17.6 Y 11.5	020	B	7.4	93
28	D-126	9	X 32.2 Y 10.7	010	B	12.3	69

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SECTION VI MISSION SEGMENT 1029-2

Trace No.	Pass	Frame	Location	Orien- tation	Subject*	Spread Function Width (microns)	A. I. M. Resolution (lines/mm)
<b>FORWARD CAMERA</b>							
29	D-126	9	X 36.1 Y 12.8	160	B	9.0	78
30	D-126	10	X 32.9 Y 10.8	155	B	7.9	84
31	D-126	10	X 33.3 Y 10.6	025	B	6.2	100
32	D-126	10	X 32.9 Y 10.8	155	B	8.4	70
33	D-126	12	Y 50.8 Y 9.8	040	B	8.7	100
34	D-134	235	X 66.0 Y 14.0	140	B	11.3	50
35	D-135	18	X 33.4 Y 14.2	165	B	9.6	70
<b>AFT CAMERA</b>							
36	D-084	50	X 46.5 Y 14.6	160	B	9.2	79
37	D-084	51	X 61.3 Y 12.2	050	B	9.4	79
38	D-084	107	X 56.4 Y 12.6	020	B	9.3	80
39	D-087	72	X 60.2 Y 12.7	035	B	7.1	96
40	D-087	74	X 57.3 Y 13.9	178	B	10.0	71
41	D-087	86	X 36.2 Y 14.1	040	B	7.9	87
42	D-088	29	X 38.2 Y 7.6	175	B	7.7	89
43	D-102	58	X 47.5 Y 11.0	165	B	21.2	41
44	D-102	100	X 64.8 Y 10.1	050	B	9.3	79
45	D-102	101	X 23.3 Y 11.9	015	B	11.9	65
46	D-102	102	Y 50.8 Y 12.3	020	B	11.9	65
47	D-102	112	X 35.9 Y 13.8	145	B	13.9	56
48	D-102	115	X 51.2 Y 9.5	040	B	13.4	59
49	D-102	116	X 15.2 Y 13.7	155	B	9.2	75
50	D-119	79	Y 43.3 Y 9.7	010	B	9.4	70
51	D-119	39	X 45.4 Y 13.2	115	B	6.3	113
52	D-119	40	X 53.8 Y 12.9	180	B	6.6	111
53	D-126	12	X 72.8 Y 13.4	030	A	9.3	82
54	D-126	12	X 73.4 Y 13.4	020	B	10.6	72
55	D-126	14	X 58.6 Y 14.4	010	B	7.6	107



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SECTION VI MISSION SEGMENT 1029-2

Trace No.	Pass	Frame	Location	Orientation	Subject*	Spread Function Width (microns)	A. I. M. Resolution (lines/mm)
<b>AFT CAMERA</b>							
46	D-126	14	X 57.3 Y 14.8	150	B	9.6	80
47	D-126	15	X 57.8 Y 14.2	155	B	10.7	69
56	D-126	15	X 57.4 Y 14.4	035	B	8.4	80
57	D-135	23	X 63.3 Y 13.5	010	B	5.5	70
6	D-135	24	X 31.2 Y 11.6	015	B	11.0	67

\*SUBJECT

- A = Airfield
- B = Building
- D = Dam



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