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Analysis of Photographic Image
to Evaluate System Performance
Mission 1028-1 and 1028-2

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In Accordance with E. O. 12958
on NOV 26 1997

14 January 1965

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 1028-1	BOTH CAMERAS	FORWARD CAMERA	AFT CAMERA
Arithmetic Mean	91.0 l/mm	89.3 l/mm	92.7 l/mm
Standard Deviation	15.3 l/mm	17.0 l/mm	13.6 l/mm
Coefficient of Dispersion	17%	19%	15%
Number of Edges	57	28	29
Mission 1028-2			
Arithmetic Mean	85.1 l/mm	87.4 l/mm	83.7 l/mm
Standard Deviation	21.3 l/mm	20.2 l/mm	22.2 l/mm
Coefficient of Dispersion	25%	23%	27%
Number of Edges	52	20	32

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

Mission 1028-1			
Arithmetic Mean	8.4 μ	8.8 μ	8.0 μ
Standard Deviation	1.8 μ	1.9 μ	1.7 μ
Coefficient of Dispersion	22%	21%	22%
Number of Edges	57	28	29
Mission 1028-2			
Arithmetic Mean	9.4 μ	9.0 μ	9.6 μ
Standard Deviation	2.8 μ	2.4 μ	3.0 μ
Coefficient of Dispersion	29%	27%	31%
Number of Edges	52	20	32

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SECTION II - MISSION 1028

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

Mission 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

Mission 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%

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

SECTION III - MISSION 1028

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 l/mm	1020-1	86.2 l/mm
1015-1	93.1 l/mm	1012-1	86.1 l/mm
1025-2	92.2 l/mm	1027-1	85.8 l/mm
1021-1	92.1 l/mm	1022-2	85.4 l/mm
1024-1	91.6 l/mm	1028-2	85.1 l/mm
1016-2	91.5 l/mm	1018-2	84.8 l/mm
1025-1	91.3 l/mm	1008-2	84.3 l/mm
1026-2	91.1 l/mm	1010-2	84.3 l/mm
1028-1	91.0 l/mm	1012-2	84.0 l/mm
1023-1	90.2 l/mm	1013-1	83.3 l/mm
1022-1	89.9 l/mm	1008-1	83.0 l/mm
1015-2	89.7 l/mm	1014-1	83.0 l/mm
1026-1	89.5 l/mm	1017-2	82.2 l/mm
1010-1	89.4 l/mm	1011-1	80.5 l/mm
1018-1	88.7 l/mm	1009-1	75.3 l/mm
1016-1	88.0 l/mm	1014-2	74.2 l/mm
1021-2	87.6 l/mm	1009-2	74.1 l/mm
1019-1	87.1 l/mm	1023-2	71.9 l/mm
1017-1	86.6 l/mm	1007-2	71.0 l/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.

Section IV Mission 1028-1 40X Enlargement

Selected Frame AFT Gamera

Edge Location: Pass D-046, Frame 011, X30.8 Y13.4

Section IV Mission 1028-2 40X Enlargement

M.I.P. Frame AFT Camera

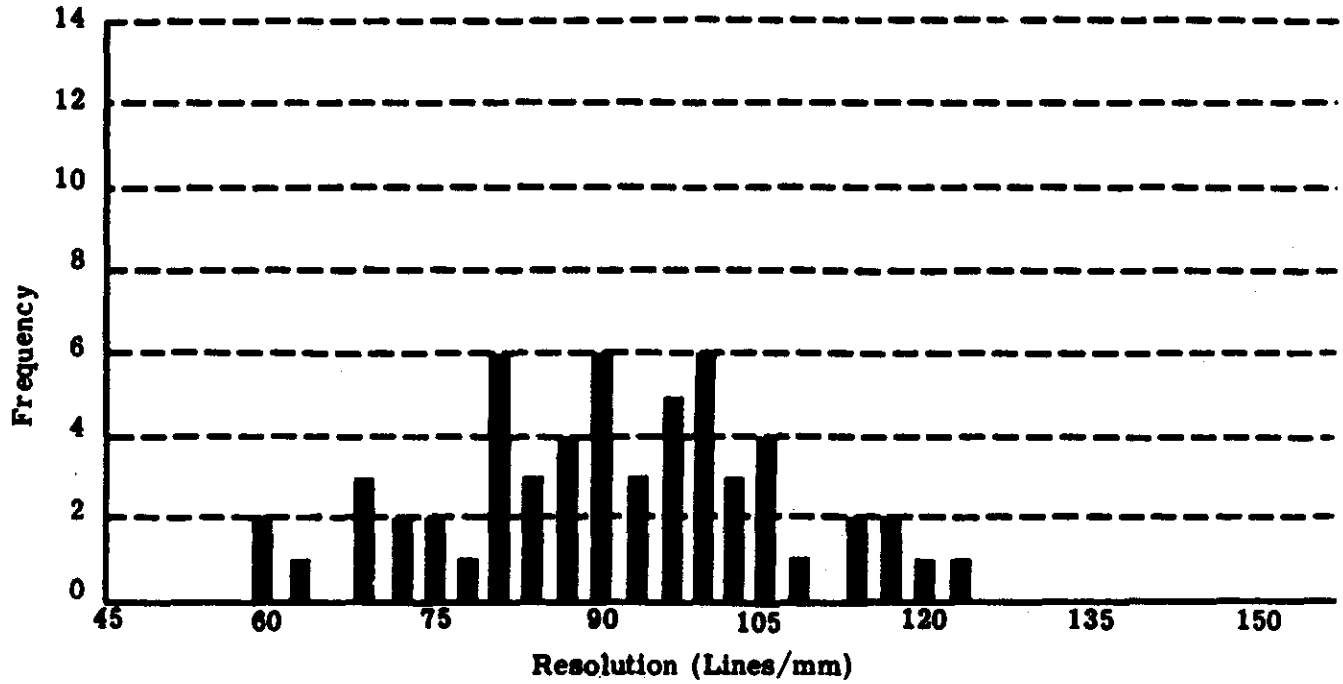
Edge Location: Pass D-126, Frame 016, X40.6 Y12.5

Section V Mission 1028-1 70mm Film

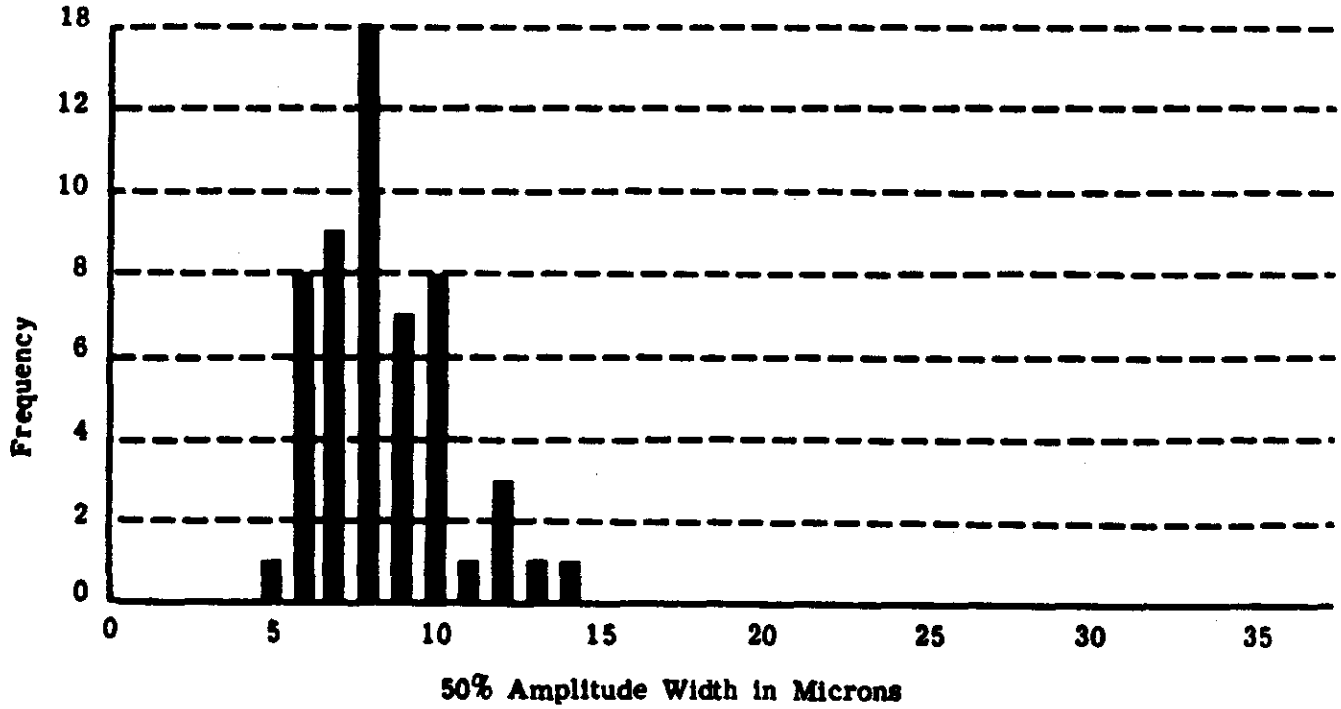
57 Edges

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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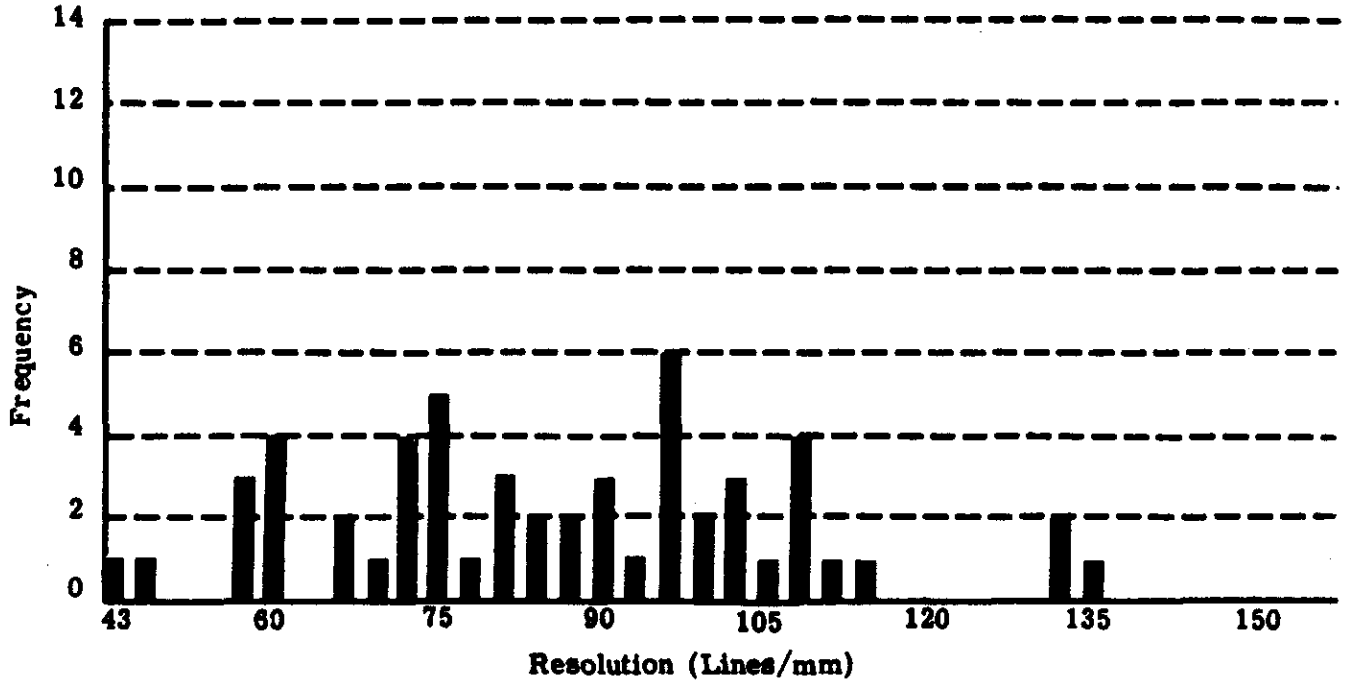
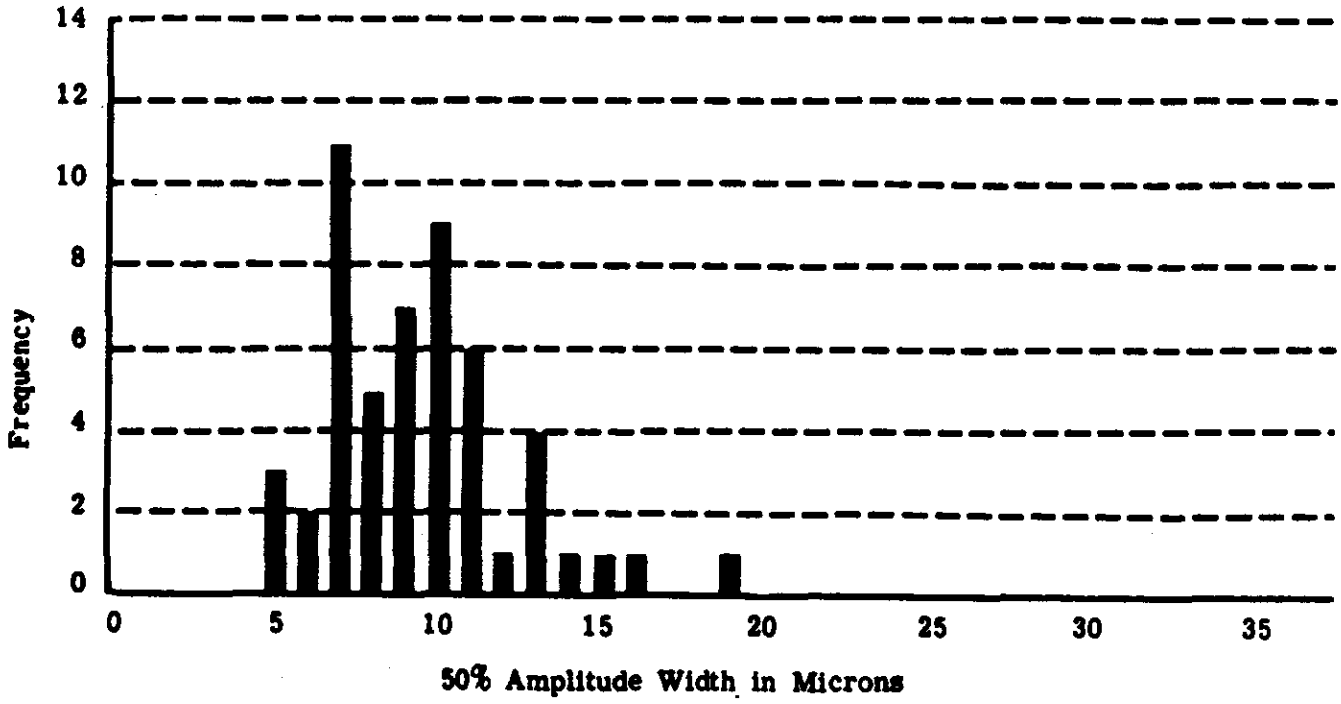
52 Edges

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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Pass	Frame	Location	Orien-tation	Subject*	Spread Function Width (microns)	A. I. M. Resolution (lines/mm)
FORWARD CAMERA						
D-006	139	X 50.0 Y 13.4	155	B	9.3	70
D-006	140	X 25.3 Y 10.8	095	B	11.8	68
D-006	150	X 23.1 Y 11.8	115	B	11.8	62
D-006	151	X 38.3 Y 11.6	155	B	8.4	91
D-006	152	X 22.5 Y 12.2	050	B	10.8	71
D-006	152	X 22.8 Y 13.0	140	B	9.7	90
D-007	48	X 41.6 Y 10.3	045	B	9.1	82
D-007	50	X 49.9 Y 12.1	015	B	9.6	83
D-007	56	X 23.7 Y 12.6	005	B	6.2	117
D-014	20	X 24.3 Y 14.5	095	B	11.6	68
D-014	20	X 24.6 Y 14.3	095	B	6.9	102
D-023	43	X 63.2 Y 12.3	017	B	13.3	59
D-031	14	X 12.0 Y 14.0	110	B	9.1	81
D-046	8	X 30.8 Y 13.9	095	B	8.0	96
D-046	50	X 21.1 Y 10.9	110	B	9.2	93
D-046	52	X 12.9 Y 9.3	090	B	7.2	104
D-046	52	X 12.9 Y 9.2	090	B	7.3	100
D-046	52	X 12.8 Y 9.2	090	B	7.7	97
D-046	52	X 12.8 Y 9.3	090	B	6.1	121
D-046	53	X 12.7 Y 13.8	150	B	8.4	82
D-046	53	X 12.5 Y 13.7	085	B	6.5	115
D-046	53	X 12.6 Y 13.7	085	B	7.6	98
D-046	53	X 12.5 Y 13.8	085	B	6.1	118
D-046	53	X 12.6 Y 13.8	085	B	8.3	87
D-047	4	X 41.6 Y 10.8	100	B	9.2	85
D-047	5	X 35.2 Y 11.2	135	B	8.4	86
D-068	80	X 57.5 Y 14.1	180	B	7.7	99
D-068	95	X 64.2 Y 10.3	070	D	10.4	76

Pass	Frame	Location	Orientation	Subject*	Spread Function Width (microns)	A. I. M. Resolution (lines/mm)
AFT CAMERA						
D-006	158	X 51.9 Y 12.8	050	B	7.9	102
D-006	159	X 67.5 Y 11.5	045	B	6.9	104
D-007	55	X 48.9 Y 9.8	050	B	13.7	61
D-007	56	X 40.8 Y 13.4	020	B	7.1	100
D-007	60	X 52.2 Y 11.2	165	B	9.6	82
D-007	62	X 67.7 Y 13.1	010	B	7.2	96
D-007	63	X 40.2 Y 12.4	180	B	6.5	104
D-007	67	X 39.5 Y 11.8	020	B	6.3	100
D-023	49	X 27.5 Y 13.5	020	B	6.2	101
D-023	50	X 18.0 Y 13.7	030	B	5.9	109
D-045	12	X 52.2 Y 13.8	120	B	8.4	79
D-045	19	X 29.2 Y 12.8	050	B	8.4	93
D-045	20	X 25.4 Y 14.2	140	B	10.3	71
D-045	21	X 14.8 Y 12.6	040	B	7.7	95
D-045	31	X 48.7 Y 12.4	110	A	7.5	98
D-046	8	X 30.5 Y 12.9	020	B	6.6	105
D-046	11	X 30.8 Y 13.5	100	B	7.8	90
D-046	11	X 30.8 Y 13.4	100	B	5.4	124
D-047	8	X 70.3 Y 12.7	105	B	9.5	86
D-047	8	X 70.3 Y 12.6	105	B	7.6	96
D-047	9	X 73.6 Y 12.0	150	B	8.0	89
D-047	10	X 49.1 Y 11.9	090	B	8.5	83
D-068	65	X 34.6 Y 12.3	150	B	10.1	80
D-068	65	X 34.6 Y 13.6	150	B	8.0	91
D-068	66	X 44.8 Y 14.0	160	B	9.6	75
D-068	86	X 33.1 Y 11.4	180	B	5.6	115
D-068	91	X 57.9 Y 12.2	175	B	9.9	86
D-068	93	X 56.0 Y 11.3	005	B	9.0	80

SECTION VI MISSION 1028-1

Pass	Frame	Location	Orientation	Subject*	Spread Function Width (microns)	A.I.M. Resolution (lines/mm)
AFT CAMERA						
D-071	48	X 19.0 Y 12.3	030	B	8.0	90

*SUBJECT

A = Airfield
B = Building
D = Dam

SECTION VI MISSION 1028-2

Pass	Frame	Location	Orientation	Subject*	Spread Function Width (microns	A.C.M. Resolution (lines/mm)
AFT CAMERA						
D-110	12	X 79.4 Y 10.2	100	B	6.9	108
D-110	13	X 77.9 Y 9.7	180	B	7.6	102
D-115	19	X 40.9 Y 13.7	140	B	6.5	111
D-115	27	X 41.0 Y 12.9	020	B	9.8	79
D-115	76	X 56.0 Y 11.3	005	B	10.4	74
D-126	3	X 63.2 Y 10.3	170	B	7.1	107
D-126	3	X 63.2 Y 10.0	170	B	10.2	72
D-126	5	X 57.1 Y 12.0	090	B	10.1	74
D-126	8	X 54.5 Y 12.5	095	B	13.8	57
D-126	9	X 45.6 Y 11.9	100	B	10.6	67
D-126	12	X 24.4 Y 12.2	070	B	7.5	101
D-126	12	X 24.5 Y 12.3	070	B	9.9	75
D-126	12	X 24.1 Y 12.0	065	B	8.8	95
D-126	12	X 24.1 Y 11.4	065	B	7.0	114
D-126	13	X 32.1 Y 13.6	025	B	7.4	95
D-126	14	X 31.2 Y 10.7	160	B	7.2	96
D-126	14	X 30.6 Y 10.1	120	B	9.9	74
D-126	14	X 30.6 Y 10.0	120	B	7.2	98
D-126	14	X 31.5 Y 10.5	115	B	7.4	109
★ D-126	16	X 40.6 Y 12.5	105	B	8.1	94
★ D-126	16	X 40.6 Y 12.4	105	B	12.0	60
★ D-126	16	X 44.0 Y 11.0	100	B	13.1	59
D-126	17	X 37.8 Y 14.2	065	B	12.9	61
D-126	17	X 38.1 Y 13.2	030	B	7.1	96
D-126	17	X 38.1 Y 13.2	040	B	8.0	86

★ M.I.P. Frame

SECTION VI MISSION 1028-2

Pass	Frame	Location	Orientation	Subject*	Spread Function Width (microns)	A. I. M. Resolution (lines/mm)
FORWARD CAMERA						
D-084	53	X 61.2 Y 13.8	015	B	9.3	80
D-084	53	X 38.1 Y 13.2	005	B	8.6	91
D-084	55	X 21.2 Y 9.9	170	B	7.4	102
D-084	70	X 28.4 Y 13.8	010	B	4.9	132
D-084	78	X 25.2 Y 13.5	020	D	6.5	108
D-100	73	X 29.7 Y 11.2	010	B	9.7	73
D-110	7	X 12.2 Y 13.7	005	B	8.9	90
D-110	13	X 31.9 Y 11.8	100	B	9.0	86
D-110	15	X 27.1 Y 12.1	105	E	15.8	56
D-115	10	X 52.9 Y 13.6	015	B	11.0	71
D-115	21	X 49.8 Y 11.6	015	B	5.2	132
D-115	70	X 34.3 Y 13.3	005	B	9.5	80
D-126	8	X 59.0 Y 13.0	025	B	10.6	68
D-126	8	X 59.9 Y 13.3	025	B	8.2	89
D-126	8	X 59.9 Y 13.4	025	B	9.6	71
D-126	10	X 49.5 Y 6.3	030	B	8.6	85
D-126	10	X 49.5 Y 13.2	070	B	11.2	67
D-126	10	X 49.6 Y 11.1	030	B	10.6	80
D-126	10	X 49.6 Y 11.2	030	B	9.6	85
D-126	13	X 46.2 Y 13.1	095	B	6.5	104
AFT CAMERA						
D-084	59	X 52.3 Y 9.8	010	B	14.8	49
D-084	59	X 69.5 Y 12.2	020	B	13.1	58
D-084	61	X 69.9 Y 13.3	175	B	5.1	135
D-084	81	X 45.3 Y 13.1	010	B	12.8	59
D-084	84	X 63.2 Y 10.2	040	D	18.6	42
D-100	80	X 61.6 Y 11.6	075	B	7.4	98
D-110	12	X 78.7 Y 14.0	180	B	10.6	74

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