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Analysis of Photographic Image to Evaluate System Performance Mission 1027-1

21 December 1965

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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 1027-1	BOTH CAMERAS	FORWARD CAMERA	AFT CAMERA
Arithmetic Mean	85.8 l/mm	80.0 l/mm	91.6 l/mm
Standard Deviation	21.4 l/mm	16.9 l/mm	24.5 l/mm
Coefficient of Dispersion	25%	21%	27%
Number of Edges	22	11	11

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

Mission 1027-1	BOTH CAMERAS	FORWARD CAMERA	AFT CAMERA
Arithmetic Mean	10.4 μ	10.6 μ	10.3 μ
Standard Deviation	3.8 μ	3.4 μ	4.4 μ
Coefficient of Dispersion	37%	32%	43%
Number of Edges	22	11	11

SECTION II MISSION 1027

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 1027

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%

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

SECTION III - MISSION 1027

Image Quality Ranking of C/M/J Missions

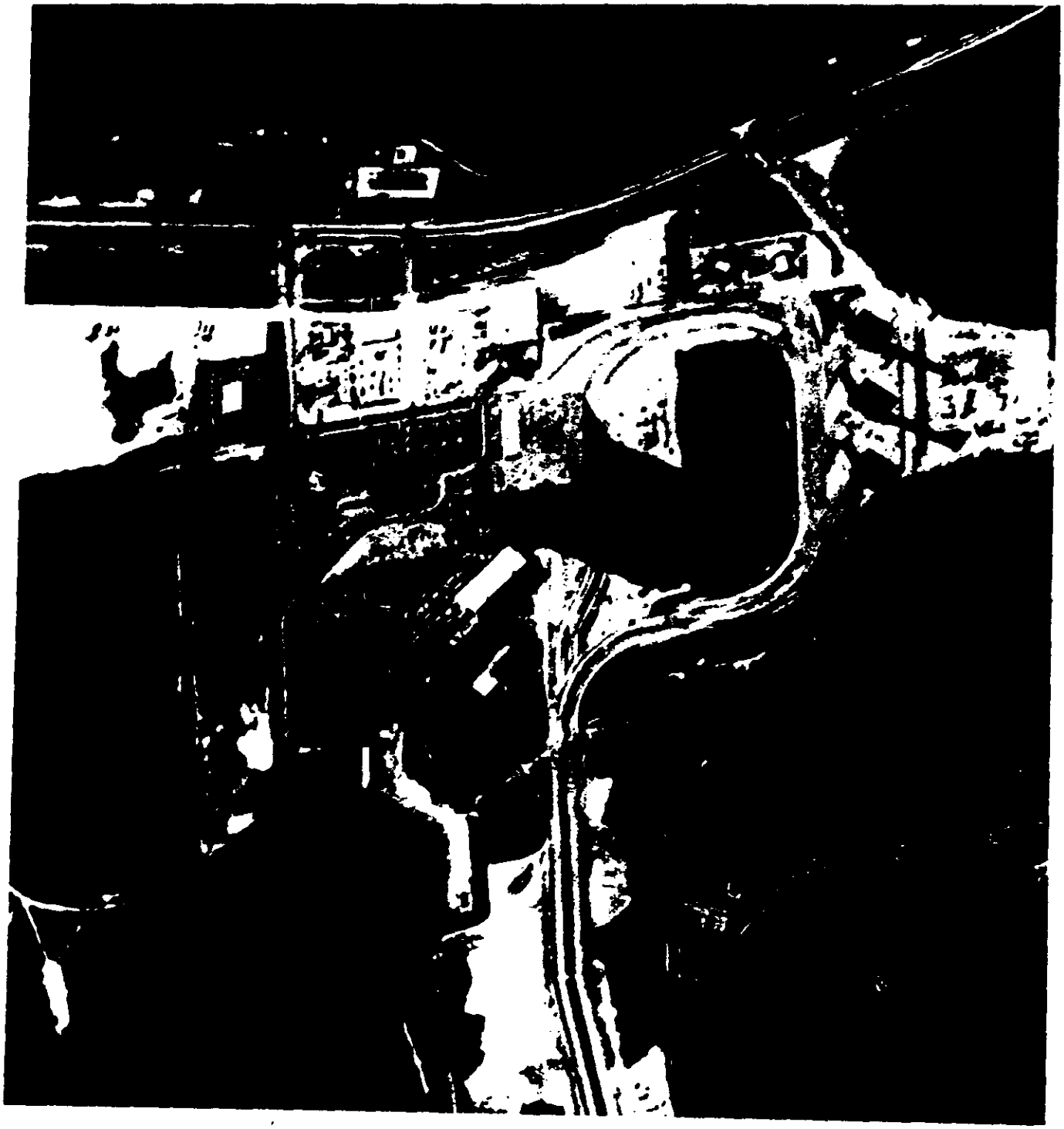
Mission Number	Average Resolution in lines/mm for A.I.M. -3404 Curve	Mission Number	Average Resolution in lines/mm for A.I.M. -3404 Curve
1024-2	94.1 l/mm	1020-1	86.2 l/mm
1015-1	93.1 l/mm	1012-1	86.1 l/mm
1025-2	92.2 l/mm	1027-1	85.8 l/mm
1021-1	92.1 l/mm	1022-2	85.4 l/mm
1024-1	91.6 l/mm	1018-2	84.8 l/mm
1016-2	91.5 l/mm	1008-2	84.3 l/mm
1025-1	91.3 l/mm	1010-2	84.3 l/mm
1026-2	91.1 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 1027-1 40X Enlargement

Selected Frame AFT Camera

Edge Location: Pass D-014, Frame 026, X76.8 Y14.4

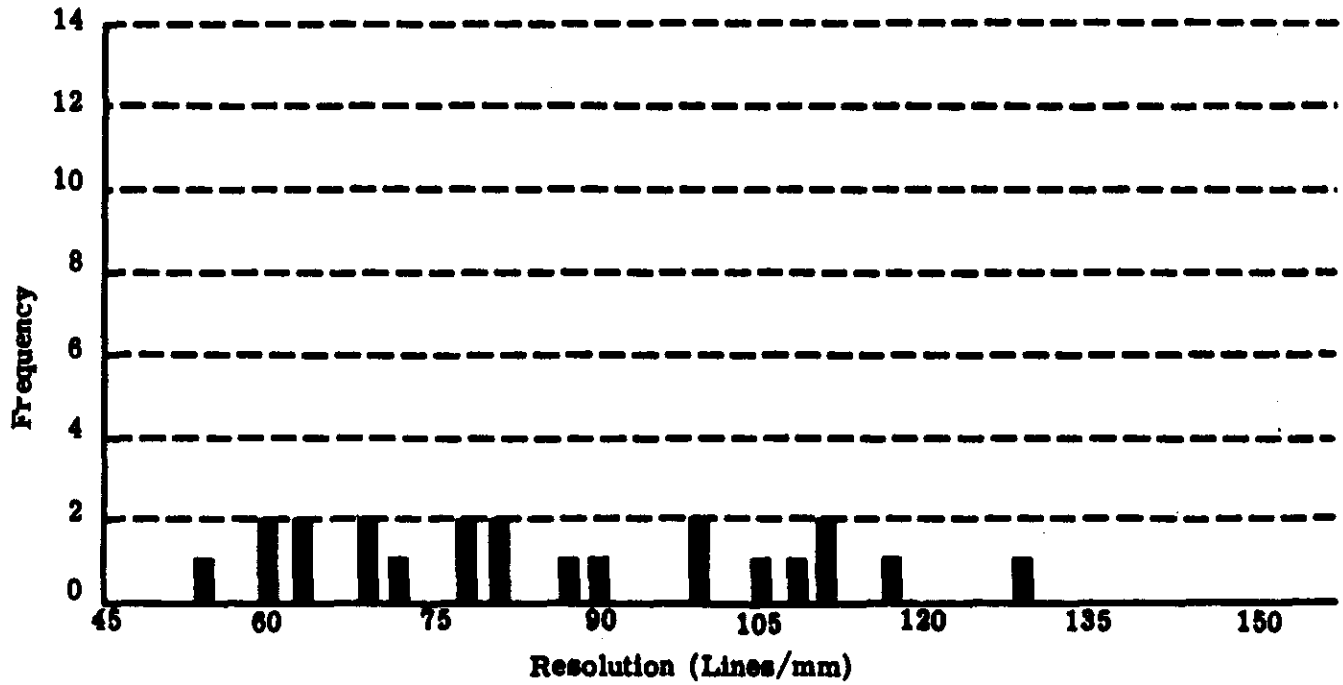


Section V Mission 1027-1 70mm Film

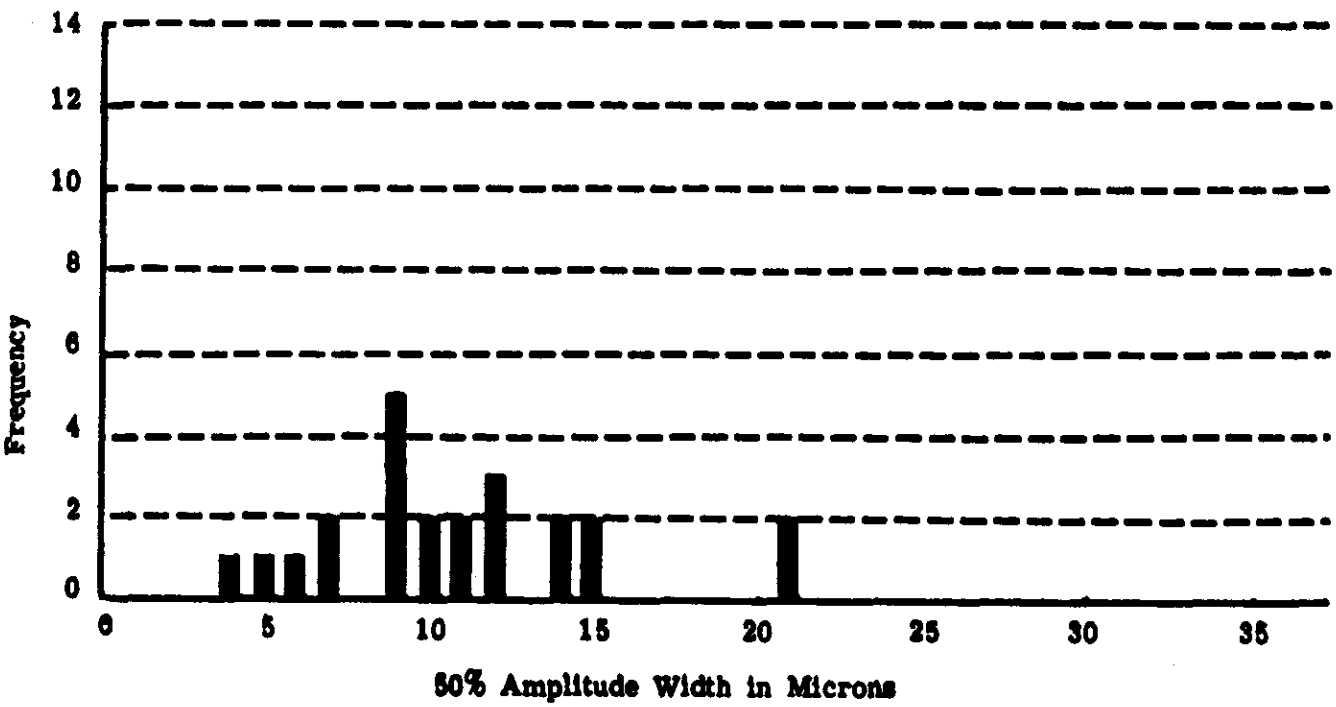
22 Edges

Average of Multiple Tracing

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



FREQUENCY VS. 50% AMPLITUDE WIDTH OF LINE SPREAD FUNCTION



Pass	Frame	Location	Orientation	Subject*	Spread Function Width (microns)	A.I.M. Resolution (lines/mm)
FORWARD CAMERA						
D-006	36	X 47.2 Y 12.2	025	B	4.1	64
D-006	38	X 50.5 Y 10.4	060	B	15.2	100
D-007	215	X 31.1 Y 12.3	030	D	13.8	60
D-007	215	X 31.1 Y 12.3	030	D	14.9	70
D-007	215	X 22.4 Y 13.6	030	B	9.1	87
D-007	218	X 18.8 Y 12.3	035	A	10.1	73
D-007	218	X 18.3 Y 11.9	020	B	10.6	77
D-009	250	X 49.9 Y 13.9	045	B	6.7	111
D-014	21	X 14.7 Y 11.8	050	B	8.6	98
D-014	21	X 14.4 Y 9.8	020	B	11.9	62
D-014	30	X 21.6 Y 9.0	015	B	11.1	78
AFT CAMERA						
D-006	41	X 43.9 Y 12.5	010	B	9.5	81
D-006	41	X 45.0 Y 12.8	045	B	5.4	118
D-006	44	X 42.3 Y 10.9	050	B	6.9	106
D-006	44	X 47.9 Y 10.3	000	B	20.7	60
D-006	198	X 59.2 Y 12.7	100	B	8.5	107
D-007	116	X 17.1 Y 11.3	030	B	9.6	70
D-007	218	X 68.4 Y 10.8	030	B	11.8	111
D-007	218	X 59.4 Y 12.4	005	B	8.6	91
D-009	101	X 26.5 Y 12.2	025	B	14.5	54
D-009	251	X 41.1 Y 13.5	050	B	11.9	82
D-014	26	X 76.8 Y 14.4	050	B	5.8	129

*Subject

A = Airfield
B = Building
D = Dam

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