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NATIONAL PHOTOGRAPHIC
INTERPRETATION CENTER

TECHNICAL PUBLICATION

PHOTOGRAPHIC EVALUATION REPORT

MISSION 1109

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DECEMBER 1970

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GLOSSARY OF TERMS

ALTITUDE	Vertical distance from the vehicle to the Hough Ellipsoid at the time of exposure.
APOGEE	That point in an elliptical orbit of a satellite at which the distance is greatest between the orbiting body and the surface of the Hough Ellipsoid.
BINARY TIME WORD	Binary presentation of the accumulated system time.
DATE OF PHOTOGRAPHY	Day, month, and year (GMT) that the photography was acquired.
DISIC	Dual Improved Stellar Index Camera.
ECCENTRICITY	A measure of the deviation of an ellipse from a true circle; expressed by dividing the distance between the foci of the ellipse by the length of its major axis.
EXPOSURE TIME	Time during which a light-sensitive material is subjected to the influence of light; expressed in this text in fractions of a second. Formula: $\text{Exposure time (sec)} = \frac{\text{slit width (in)}}{\text{scan rate (radians per sec)}}$
FIDUCIAL MARK	A standard geometrical reference point imaged within the frame of a photograph. The intersection of the primary fiducial marks usually defines the intersection of the principal ray with the focal plane.
FOCAL LENGTH (CALIBRATED)	Adjusted value of the equivalent focal length. Computed to distribute the effect of lens distortion over the entire field.
FOCAL LENGTH (EQUIVALENT)	Distance measured along the lens axis from the rear nodal point to the plane of best average definition over the entire field. Points other than the rear nodal point may be used but must be specified for correct interpretation of data.

FOCAL PLANE	Plane perpendicular to the lens axis, in which images of points in the object field of the lens are focused.
FORMAT	The portion of the frame that contains imagery produced by the primary optical system of the camera.
FRAME*	A single exposure which contains the format and peripheral border information relevant to the format.
GENERATION	Number of reproductive steps by which a negative or positive photographic copy is separated from the original scene, ie., the original negative is generation one, a positive made from the original negative is generation two, etc.
GROUND RESOLUTION*	The minimum distance (expressed as bar plus space) between two adjacent linear features which can be detected by a photographic system, as determined from standard three bar resolution targets. A target is considered to be resolved when a grouping of three bars can be distinguished as three distinct lines.
HOUGH ELLIPSOID	A reference ellipsoid around the earth having a semi-major axis of 20,925,738.18 feet and a semi-minor axis of 20,855,588.20 feet.
IMAGE MOTION COMPENSATION (IMC)	A correction made to compensate for relative image motion at the camera focal plane.
INCLINATION	The angle between the orbital and equatorial planes measured counterclockwise from the equatorial plane to the orbital plane with the ascending node as the vertex.
INTERPRETABILITY (PHOTOGRAPHIC)	Suitability of the imagery with respect to answering requirements on a given type of target. Various factors such as halation, uncompensated image motion, poor contrast, incorrect focus,

improper film processing, atmospheric conditions (both natural and manmade), ground resolution, and insufficient natural or artificial lighting of the target affect interpretability. The 3 levels of interpretability are:

Poor (P) - Unsuitable for adequately answering requirements on a given type of target.

Fair (F) - Suitable for answering requirements on a given type of target but with only average detail.

Good (G) - Suitable for answering requirements on a given type of target in considerable detail.

INDEX CAMERA	A framing camera used to record terrain imagery. The product is used for relative orientation and mapping purposes.
LOCAL SUN TIME	Time of day computed from the position of the sun relative to the imaged terrain.
MATERIAL CHANGE DETECTOR (MCD)	A pre-exposed pre-processed film strip (approximately three feet long) that is detected by telemetry when it passes through the panoramic camera. This strip is generally spliced between two different film types to signal the film change.
NODAL TRACE	A continuous line imaged along the major axis of each frame to define the optical axis of the lens relative to any given instant of exposure.
PAN GEOMETRY DOTS	Images of the rail holes associated with the pan geometry calibration of the camera.
PANORAMIC CAMERA	Photographs a partial or complete panorama of the terrain in a transverse direction through a scanning motion of the lens system.
PASS	Photographic portion of an orbital revolution. A prefix "D" indicates the descending node, a prefix "A" indicates the ascending node, and a

prefix "M" indicates a continuous camera operation from the ascending node through the descending node. An additional suffix "E" indicates that the associated photography was generated for engineering purposes.

PERIGEE	That point in an elliptical orbit of a satellite at which its distance is nearest the surface of the Hough Ellipsoid.
PERIOD	The time required for a satellite to complete one revolution about the earth.
PITCH	Rotation of the camera about its transverse axis. Positive pitch indicates nose up attitude.
PRINCIPAL RAY	That ray of light which emanates from a point in object space and passes undeviated through the centers of curvature of the lens surfaces. It is coincident with the optical axis of the lens.
RELATIVE ORIENTATION	The determining (analytically or in a photogrammetric instrument) of the position and attitude of one of a pair of overlapping photographs with respect to the other.
RESOLUTION	Measure, expressed in lines/mm, of the smallest array of point objects distinguishable as independent point images.
ROLL	Rotation of the camera about its longitudinal axis. Positive roll indicates left wing up attitude.
SOLAR ELEVATION	The angular distance to the sun measured from a plane tangent to the earth at the intersection of the principal ray of the camera and the earth.
STELLAR CAMERA	A framing camera which records stellar images. The product, in conjunction with the product of the Index camera, is used for attitude determination.
UNIVERSAL GRID	An X - Y coordinate system used to define image location on photographic formats.

VEHICLE GROUND TRACK AZIMUTH	Clockwise horizontal angle measured from the longitudinal meridian's intersection of the earth's surface to the vehicle's ground track.
VIGNETTING	Gradual reduction in density of parts of a photographic image due to the stopping of some of the rays entering the lens.
YAW	Rotation of the camera about its vertical axis. Positive yaw represents nose left attitude, as viewed from top of the camera.

* Defined differently than in the Glossary of NPIC Terminology.

SYNOPSIS

Mission 1109, a two-part satellite reconnaissance mission, was launched at 2215Z on 4 March 1970. The first capsule was recovered dry on rev 115 at 0108Z on 12 March 1970. The second capsule was recovered dry on rev 309 at 2350Z on 23 March 1970, terminating the mission.

The overall image quality of both the fwd and aft records is variable. Most imagery does not maintain edge sharpness when viewed at 50X magnification. Variation of image quality across the format was observed. The best imagery of the mission is good and received an MIP rating of 110. Mission 1109 was the first mission to employ a third generation lens in both main cameras. Previous to this mission, third generation lenses had been used only in the fwd looking instruments.

The Dual Improved Stellar Index Cameras (DISIC) were operational throughout the mission. This was the first mission on which the index record received dual gamma processing.

Approximately 20 percent of Mission 1109-1 and 15 percent of Mission 1109-2 were obscured by clouds.

[redacted]

PART I. GENERAL SYSTEM INFORMATION

A. Camera Numbers

Forward-Looking Panoramic Camera	321
Aft-Looking Panoramic Camera	320
DISIC Unit	9

B. Launch and Recovery Dates

	(1109-1)	(1109-2)
Launch	4 Mar 70/2215Z	*
Recovery	12 Mar 70/0108Z	23 Mar 70/2350Z
Recovery Rev	115	309

C. Orbital Elements

Element	Actual 1109-1 (Rev 60)	Actual 1109-2 (Rev 200)	Photo Range
Period (min)	88.651	88.616	*
Perigee (nm)	91.680	97.640	83.940 (Pass D003)
Apogee (nm)	158.10	143.49	106.30 (Pass D230)
Eccentricity	0.00833	0.00610	*
Inclination (deg)	88.02	88.03	*
Perigee Latitude (geod) (deg-min)	51-54N	38-35N	*

*Not applicable

D. Photographic Operations

1. Panoramic Cameras:

Type	1109-1 Revs	1109-1 Frames	1109-2 Revs	1109-2 Frames	Total Revs	Total Frames
Operational						
Fwd	36	2,874	53	2,923	89	5,797
Aft	36	2,879	52	2,907	88	5,786
Operational/Domestic						
Fwd	0	0	0	0	0	0
Aft	0	0	0	0	0	0
Domestic						
Fwd	6	116	6	117	12	223
Aft	6	116	6	117	12	223
Engineering (no imagery)						
Fwd	1	16	1	6	2	22
Aft	1	16	1	6	2	22
Totals						
Fwd	43	3,006	60	3,046	103	6,052
Aft	43	3,011	59	3,030	102	6,041

2. Secondary Cameras:

Camera	Frames		
Stellar (1109-1)	2,278	Starboard: 2,278	Port
Index (1109-1)		2,278	
Stellar (1109-2)	2,904	Starboard: 2,910	Port
Index (1109-2)		2,828	

E. Film Usage

Camera	Film Load (Total)	Pre-Flight Footage	Processed **Footage	Film Type
Fwd-Looking 1109-1	*16,300	326	8,202	3404
Aft-Looking 1109-1	*16,300	362	8,264	3404
Fwd-Looking 1109-2	NA	NA	8,008	3404
Aft-Looking 1109-2	NA	NA	7,989	3404
Stellar 1109-1	*2,000	30	710	3401
Stellar 1109-2	NA	NA	799	3401
Index 1109-1	*2,200	45	1,064	3400
Index 1109-2	NA	NA	1,128	3400

*Total load for both buckets.
**Values include pre-flight footages.
NA - Not applicable.

PART II. CAMERA OPERATION

All cameras operated satisfactorily throughout both segments of Mission 1109.

PART III. IMAGE ANALYSIS

A. Fwd-Looking Panoramic Camera

1. Density: Generally medium to heavy throughout the mission.

2. Contrast: Generally low to medium throughout the mission.

3. Image Quality: Variable. At magnifications of 50X most of the imagery has an out-of-focus appearance. Examples of variation of image quality across the format were also observed with the poorer image quality exhibited at the time track edge. The best image quality of Mission 1109-1 is good and received an MIP rating of 110. The best image quality of Mission 1109-2 received an MIP rating of 100. Both of these MIPs were chosen from the fwd record.

4. Imaged Degradations:

a. Light Leaks:

(1) A minor light-leak-induced fog pattern is present on the first frame of most camera operations (Graphic 1, page 9).

(2) A minor splash-type fog pattern is present on the ninth frame from the end of some camera operations of Mission 1109-1 (Graphic 1, page 9).

b. Static - None noted.

c. Other - A three quarter inch wide band of out-of-focus imagery, located approximately 12 inches from the takeup end, is present on frames 3 and 4 of most passes. This anomaly is similar to that reported on Mission 1108 and is considered to be characteristic of the system.

5. Physical Degradations:

a. A crease and associated plus density mark are present in frames 26 and 27 of pass D74. This crease begins approximately 15 inches before and extends 36 inches after a manufacturer's splice located in frame 27. The crease is located in the border area at the binary edge of the film.

b. Manufacturer's Splices:

Pass	Frame
D56	21
D74	27
D171	20

B. Aft-Looking Panoramic Camera

1. Density: Generally medium to heavy throughout.

2. Contrast: Generally low to medium throughout.

3. Image Quality: Like the fwd record, the overall image quality of the aft record is variable. The imagery generally does not maintain edge sharpness when viewed at 50X magnification. The best image quality of the aft record is comparable to the best of the fwd record. This is commensurate with the fact that the aft camera employed a third generation lens for the first time.

4. Imaged Degradations:

a. Light Leaks - Minor light-leak-induced fog patterns are present on the first frame and the seventh frame from the end of some camera operations of Mission 1109-1 (Graphic 2, page 9).

b. Static - None noted.

c. Other - Two minus density bands are present at the takeup end of most aft frames of Mission 1109-2. These bands appear to be caused by a fluctuation in scan rate at the start of scan. This anomaly occurred in the bonus area of the format and, therefore, did not adversely affect the product.

5. Physical Degradations:

a. Numerous small minus density spots are present randomly on the preflight footage and continue through the first two passes of the mission. These spots are apparently associated with processing.

b. Manufacturing Splices:

Pass	Frame
D57	68
D150	43
D233	50

C. Stellar Cameras

1. Density: Adequate to detect stellar images.

2. Contrast: Adequate to detect stellar images.

3. Image Shape: Generally point-type.

4. Images per Frame: Most frames contain more than 15 stellar images.

5. Imaged Degradations:

a. Light Leaks - A light-leak-induced fog pattern degrades approximately five frames at the end of most stellar camera operations. The density of this fog pattern is commensurate with camera inoperative periods. This fog pattern is apparently the result of an incompletely baffled terrain lens vent hole.

b. Static - Corona and dendritic fog patterns are present intermittently throughout the last third of the stellar camera record on Mission 1109-1 and throughout all of Mission 1109-2.

c. Other - Several instances of irregular metering were noted throughout the Mission 1109-2 stellar record. Due to this anomaly, adjacent frames are sometimes overlapped a distance of approximately 0.3 inch.

6. Physical Degradations: None noted.

D. Index Camera

1. Density: Generally medium to heavy. The index record was processed in dual gamma chemistry for the first time. The small percentage of photography acquired at low solar elevation precluded extensive evaluation of the potential advantages expected from dual gamma processing. An evaluation of similar index coverage from Missions 1108 and 1109 indicated

the dual gamma process helped to compress the highlight areas. This compression is desirable when high-reflectance terrain such as desert is imaged.

2. Contrast: Generally medium.

3. Image Quality: Good.

4. Imaged Degradations:

a. Light Leaks - None noted.

b. Static - Dendritic and corona edge static traces are present intermittently throughout the index record.

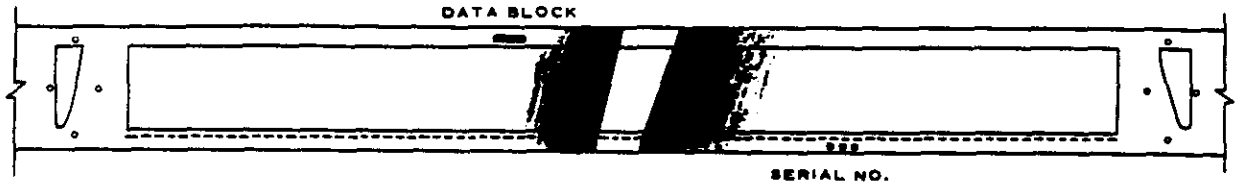
c. Other - None noted.

5. Physical Degradations: None noted.

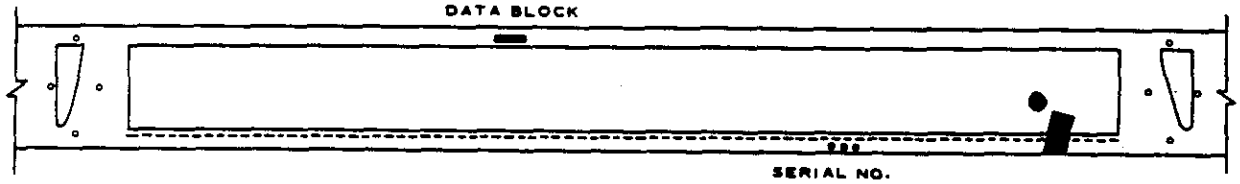
E. Graphic Display

The patterns illustrated below are referenced in the text of this report.

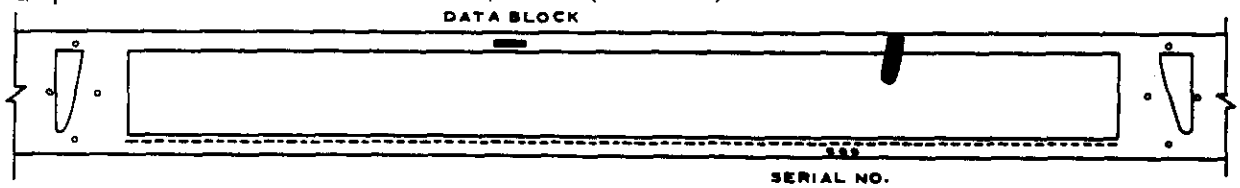
Graphic 1a. Ninth frame from end of operation (fwd record)



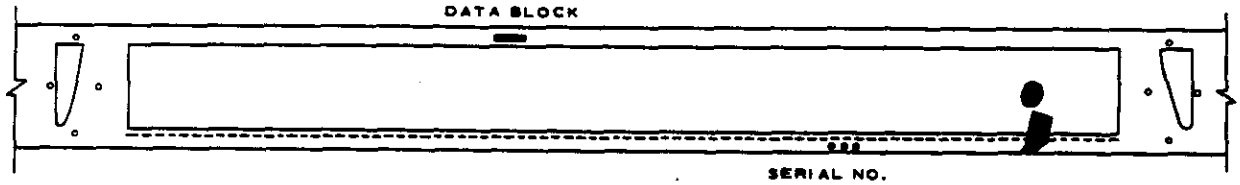
Graphic 1b. First frame (fwd record)



Graphic 2a. Seventh frame from end of operation (aft record)



Graphic 2b. First frame (aft record)



PART IV. IMAGED AUXILIARY DATA

The auxiliary data for all cameras is imaged properly throughout the mission.

PART V. MENSURATION QUALITY

Seventy-four requests for mensuration support were fulfilled during the initial readout of this mission. No mensuration problems were encountered, and the image quality is considered to be good for mensuration.

PART VI. FILM PROCESSING

A. Processing Machines and Process Gamma

Camera	Machine/Process	Average Gamma	Film Type
Fwd (1109-1)	Yardleigh/Dual gamma	1.86	3404
Aft (1109-1)	Yardleigh/Dual gamma	1.87	3404
Fwd (1109-2)	Yardleigh/Dual gamma	1.88	3404
Aft (1109-2)	Yardleigh/Dual gamma	1.76	3404
Stellar (1109-1)	Trenton/Single level	2.14	3401
Stellar (1109-2)	Trenton/Single level	2.06	3401
Index (1109-1)	Yardleigh/Dual gamma	1.61	3400
Index (1109-2)	Yardleigh/Dual gamma	1.72	3400

B. Film Handling Summary

No film handling problems or breakdown delays were encountered on Mission 1109.

C. Timetable

Film	Recovered	Received at Processing Site	*Spec Shipment at NPIC	Priority 1A at NPIC
Fwd (1109-1)	12 Mar 70/ 0108Z	12 Mar 70/ 2145Z	13 Mar 70/ 2111Z	14 Mar 70/ 1653Z
Aft (1109-1)	"	"	"	"
Stellar (1109-1)	"	"	None	"
Index (1109-1	"	"	None	"
Fwd (1109-2)	23 Mar 70/ 2350Z	24 Mar 70/ 2015Z	25 Mar 70/ 2256Z	26 Mar 70/ 2255Z
Aft (1109-2)	"	"	"	"
Stellar (1109-2)	"	"	None	"
Index (1109-2	"	"	None	"

*The following Material was received at NPIC before the Priority 1A shipment.

This special shipment was used to satisfy high priority intelligence requirements.

1109-1: One titled copy of Mission 1109-1 (a portion of the 1A requirement).
One pass of Mission 1109-1 printed on special high contrast film.

1109-2: Two titled copies of Mission 1109-2 (a portion of the 1A requirement).

PART VII. PI SUITABILITY

A. PI Statistics

1. Target Coverage:

	1109-1	1109-2	Total
Priority 1 Targets Programmed	No specific priority 1 targets were programmed on this mission although specific areas were selected for initial readout.		
Priority 1 Targets Covered	99	161	260

2. PI Ratings:

Rating	Missiles	Nuclear Energy	Airbase Facilities	Ports	Ground Force Facilities	Industry	Misc.
Good	8	--	13	3	11	1	3
Fair	32	15	49	8	29	10	10
Poor	21	1	27	25	22	9	9
Totals	61	16	89	36	62	20	22

3. Summary of PI ratings (percentage):

Good 29 or 12.7%
Fair 153 or 50.0%
Poor 114 or 37.3%

*A discrepancy can exist between the total number of targets covered and the total PI reports because some targets are covered more than once.

B. PI Comments

1. Atmospheric Attenuation: Listed below is the photointerpreters' report of weather conditions for Priority 1 targets covered on this mission.

a.	Clear	231	or	75.5%
b.	Scattered clouds	29	or	9.5%
c.	Heavy clouds	18	or	5.9%
d.	Haze	27	or	8.8%
e.	Cloud shadow	1	or	0.3%

2. Product Interpretability: The photointerpretability ranges from fair to good. Small scale due to mission altitude (approximately 95 - 100 nm) adversely affected the PI readout. Special high contrast copies of selected passes greatly contributed to the interpretability of these areas.

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PART VIII. RESOLUTION TARGET DATA

Target Designator	A		B	
Camera (looking)	Fwd	Aft	Fwd	Aft
Pass	32D	32D	145D	145D
Frame	7	13	10	16
Date of Photography	6 Mar 70	6 Mar 70	13 Mar 70	13 Mar 70
Universal Grid Coordinates	19.8-2.2	56.1-3.7	57.5-3.0	18.1-3.0
Geographic Coordinates of Format Center	33-47N 113-02W	33-48N 113-03W	31-36N 110-58W	31-37N 110-59W
Altitude (ft)	569,053	569,589	599,318	599,774
Camera				
Pitch (deg)	+15.6173	-14.8181	NA	-14.5803
Roll (deg)	+00.0655	+00.0378	NA	+00.1305
Yaw (deg)	+00.0920	+00.1062	NA	+00.0478
Local Sun Time	1407	1407	1332	1332
Solar Elevation (deg-min)	42-00	41-58	50-22	50-20
Exposure (sec)	1/351	1/450	1/388	1/426
Processing Level	Dual gamma	Dual gamma	Dual gamma	Dual gamma
Vehicle Ground Track Azimuth (deg-min)	180-4	180-4	179-21	179-18
Filter (Wratten)	W-25	W-23A	W-25	W-23A
Target Type	51-51 T-Bar	51-51 T-Bar	Photo & IR	Photo & IR
Target Contrast	5:1	5:1	17:1	17:1
Weather Conditions	Clear	Clear	Clear	Clear

GROUND RESOLUTION IN FEET AS DETERMINED FROM THE ORIGINAL NEGATIVE AND SECOND GENERATION DUPLICATE POSITIVE

		A				B				
		Along Track		Across Track			Along Track		Across Track	
		Fwd	Aft	Fwd	Aft		Fwd	Aft	Fwd	Aft
Observer 1	ON	7	8	8.5	9.5	Observer 1	8.9	11.2	12.5	14.1
	DP	7.5	8	9	9		10	12.5	11.2	14.1
Observer 2	ON	6.3	6.3	7.1	9.5	Observer 2	10	11.2	14.1	12.5
	DP	10	8	9	8		10	11.2	11.2	12.5
Observer 3	ON	8	8	9.5	9.5	Observer 3	8.9	11.2	12.5	14.1
	DP	10	8	10	12		10	12.5	12.5	14.1

NA - Not available

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PART VIII. (Continued)

Target designator	A		B	
Camera (looking)	Fwd	Aft	Fwd	Aft
Pass	210	210	210	210
Frame	4	10	10	17
Date of Photography	17 Mar 70	17 Mar 70	17 Mar 70	17 Mar 70
Universal Grid Coordinates	22.3-1.0	53.5-5.2	63.6-0.2	11.9-1.3
Geographic Coordinates of Format Center	35-48N 118-42W	35-49N 118-42W	34-55N 118-42W	34-48N 118-42W
Altitude (ft)	591,521	591,739	591,741	592,051
Camera				
Pitch (deg)	+15.47	-14.82	+15.70	-14.76
Roll (deg)	-0.04	-0.10	-0.05	+0.07
Yaw (deg)	+0.17	+0.13	+0.27	-0.24
Local Sun Time	1310	1310	1310	1310
Solar Elevation (deg-min)	50-29	50-27	51-16	51-21
Exposure (sec)	1/341	1/437	1/341	1/437
Processing Level	Dual gamma	Dual gamma	Dual gamma	Dual gamma
Vehicle Ground Track Azimuth (deg-min)	180-23	180-26	180-26	180-30
Filter (Wratten)	W-25	W-23A	W-25	W-23A
Target Type	51/51	51/51	B1 (Edwards)	B1 (Edwards)
Target Contrast	5:1	5:1	4:1	4:1
Weather Conditions	Cloudy	Cloudy	Clear	Clear

GROUND RESOLUTION IN FEET AS DETERMINED FROM THE ORIGINAL NEGATIVE AND SECOND GENERATION DUPLICATE POSITIVE

		A				B					
		Along Track		Across Track				Along Track		Across Track	
		Fwd	Aft	Fwd	Aft			Fwd	Aft	Fwd	Aft
Observer 1	ON	8	9	9	9	Observer 1	ON	8.9	8.9	NR	NR
	DP	16	NR	16	10		DP	11.3	10.1	NR	NR
Observer 2	ON	8	9	8	8.5	Observer 2	ON	8.9	8.9	NR	NR
	DP	9.5	NR	16	10		DP	10.1	10.1	NR	NR
Observer 3	ON	8	9	16	8.5	Observer 3	ON	10.1	10.1	NR	NR
	DP	8	10	16	10		DP	9	10.1	NR	NR

NR = No bar groups readable

PART VIII. (Continued)

Target Designator	A		B	
Camera (looking)	Fwd	Aft	Fwd	Aft
Pass	210	210	210	210
Frame	10	17	10	17
Date of Photography	17 Mar 70	17 Mar 70	17 Mar 70	17 Mar 70
Universal Grid Coordinates	64.0-0.3	11.4-1.2	63.8-0.5	11.8-1.0
Geographic Coordinates of Format Center	34-55N 118-42W	34-48N 118-42W	34-55N 118-42W	34-48N 118-42W
Altitude (ft)	591,741	592,051	591,741	592,051
Camera				
Pitch (deg)	+15.70	-14.76	+15.70	-14.76
Roll (deg)	-0.05	+0.07	-0.05	+0.07
Yaw (deg)	+0.27	+0.24	+0.27	+0.24
Local Sun Time	1310	1310	1310	1310
Solar Elevation (deg-min)	51-16	51-21	51-16	51-21
Exposure (sec)	1/341	1/437	1/341	1/437
Processing Level	Dual gamma	Dual gamma	Dual gamma	Dual gamma
Vehicle Ground Track Azimuth (deg-min)	180-26	180-30	180-26	180-30
Filter (Wratten)	W-25	W-23A	W-25	W-23A
Target Type	B2	B2	C	C
Target Contrast	11:1	11:1	6:1	6:1
Weather Conditions	Clear	Clear	Clear	Clear

GROUND RESOLUTION IN FEET AS DETERMINED FROM THE ORIGINAL NEGATIVE AND SECOND GENERATION DUPLICATE POSITIVE

A

		Along Track		Across Track	
		Fwd	Aft	Fwd	Aft
Observer 1	ON	8.9	8	NR	NR
	DP	11.3	9	NR	NR
Observer 2	ON	8.9	7.1	NR	NR
	DP	11.3	8	NR	NR
Observer 3	ON	8.9	8	NR	NR
	DP	9	9	NR	NR

B

		Along Track		Across Track	
		Fwd	Aft	Fwd	Aft
Observer 1	ON	AG	AG	14.3	14.3
	DP	AG	AG	16	16
Observer 2	ON	AG	AG	14.3	16
	DP	AG	AG	14.3	16
Observer 3	ON	AG	AG	14.3	16
	DP	AG	AG	16	16

AG - All bar groups readable
NR - No bar groups readable

Handle Via TALENT-KEYHOLE Control System Only
TOP SECRET RUFF
NO FOREIGN DISSEM
Handle Via TALENT-KEYHOLE Control System Only

Target Designator	A
Camera (looking)	Fwd
Pass	210
Frame	11
Date of Photography	17 Mar 70
Universal Grid Coordinates	64.3-5.1
Geographic Coordinates of Format Center	34-46N 118-42W
Altitude (ft)	591,782
Camera	
Pitch (deg)	+15.73
Roll (deg)	-0.04
Yaw (deg)	+0.28
Local Sun Time	1310
Solar Elevation (deg-min)	51-24
Exposure (sec)	1/341
Processing Level	Dual gamma
Vehicle Ground Track Azimuth (deg-min)	180-27
Filter (Wratten)	W-25
Target Type	C
Target Contrast	6:1
Weather Conditions	Clear

GROUND RESOLUTION IN FEET AS DETERMINED FROM THE ORIGINAL NEGATIVE AND SECOND GENERATION DUPLICATE POSITIVE

		A	
		Along Track	Across Track
		Fwd	Fwd
Observer 1	ON	AG	14.3
	DP	AG	16
Observer 2	ON	AG	14.3
	DP	AG	16
Observer 3	ON	AG	16
	DP	AG	16

AG - All bar groups readable

TOP SECRET RUFF
NO FOREIGN DISSEM
Handle Via Talent-KEYHOLE Control System Only

PART VIII. (Continued)

Target Designator	A	B
Camera (looking)	Fwd	Fwd
Pass	210	210
Frame	11	11
Date of Photography	17 Mar 70	17 Mar 70
Universal Grid Coordinates	64.2-4.8	64.6-4.9
Geographic Coordinates of Format Center	34-46N 118-42W	34-46N 118-42W
Altitude (ft)	591,782	591,782
Camera		
Pitch (deg)	+15.73	+15.73
Roll (deg)	-0.04	-0.04
Yaw (deg)	+0.28	+0.28
Local Sun Time	1310	1310
Solar Elevation (deg-min)	51-24	51-24
Exposure (sec)	1/341.	1/341
Processing Level	Dual gamma	Dual gamma
Vehicle Ground Track Azimuth (deg-min)	180-27	180-27
Filter (Wratten)	W-25	W-25
Target Type	B1	B2
Target Contrast	4:1	11:1
Weather Conditions	Clear	Clear

GROUND RESOLUTION IN FEET AS DETERMINED FROM THE ORIGINAL NEGATIVE AND SECOND GENERAL DUPLICATE POSITIVE

		A Along Track Fwd	A Across Track Fwd			B Along Track Fwd	B Across Track Fwd
Observer 1	ON	8.9	NR	Observer 1	ON	7.1	NR
	DP	10.1	NR		DP	10.1	NR
Observer 2	ON	8.9	NR	Observer 2	ON	7.1	NR
	DP	10.1	NR		DP	10.1	NR
Observer 3	ON	8.9	NR	Observer 3	ON	8	NR
	DP	9	NR		DP	9	NR

NR - No bar groups readable

NO FOREIGN DISSEM
Control System Only

PART IX. MISSION DATA

	Forward-Looking			Aft-Looking			Stellar		Index
	▲ Pan	Takeup Horizon	Supply Horizon	● Pan	Takeup Horizon	Supply Horizon	Port	Starboard	
Camera Number	321	*	*	620	*	*	13P	9	112
Reseau Number	*	*	*	*	*	*	13P	9	112
Lens Serial Number	I-211	E-23775	E-23769	I-21..	E-237 ..	E-23803			
Slit Position/ Slit Widths (in)	1/0.180	*	*	1/0.150	*	*	*	*	*
	2/0.214	*	*	2/0.197	*	*	*	*	*
	3/0.261	*	*	3/0.238	*	*	*	*	*
	4/0.145	*	*	4/0.267	*	*	*	*	*
	FS/0.210	*	*	FS/0.164	*	*	*	*	*
Aperture	*	F/8	F/8	*	F/8	F/8	F/2.8	F/2.8	F/6.3
Exposure Time (sec)	Variable	1/100	1/100	Variable	1/100	1/100	1.5	1.5	1/500
Filter (Wratten) Primary	W-25	W-25	W-25	W-23A	W-25	W-25	None	None	W-12
Alternate	W-23A	*	*	W-25	*	*	*	*	*
Focal Length (mm)	609.549	55	55	609.585	55	55	76.2	76.2	76.2
Film length (ft)	16,300	*	*	16,300	*	*	2,000		2,200
Splices	3	*	*	3	*	*	None		None
Emulsion	443-1/2-10-9	*	*	443/1/2-10-9	*	*	327-4-8-9		212-52-12-9
Film Type	3404	*	*	3404	*	*	3401		3400
Resolution Data (L/mm)	- - -	209R/187T	209R/187T	- - -	187R/187T	209R/187T	NA	NA	- - -
Static									
High Contrast	255	NA	NA	271	NA	NA	NA	NA	NA
Low Contrast	156	NA	NA	164	NA	NA	NA	NA	NA
Dynamic									
I High Contrast	257	NA	NA	235	NA	NA	NA	NA	NA
I Low Contrast	183	NA	NA	153	NA	NA	NA	NA	NA
P High Contrast	287	NA	NA	280	NA	NA	NA	NA	NA
P Low Contrast	202	NA	NA	154	NA	NA	NA	NA	NA

NA - Not Available
* - Not Applicable
R - Radial Resolution on Axis
T - Tangential Resolution on Axis
▲ - Resolution Tested using a W-21 filter (static) and W-25 filter (dynamic).
● - Resolution Tested using a W-21 filter (static and dynamic I) and a W-23A filter (dynamic P).

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PART X. MISSION INFORMATION POTENTIAL (MIP) HISTORY, 1100 SERIES

Mission	MIP#	Pass	Frame	Universal Grid Coord	
1101	85	D159	2 fwd	39.0	1.5
*1102	90	D16	22 fwd	26.8	1.3
1103	90	D79	15 fwd	41.8	3.8
*1104	115	D16	6 fwd	33.1	4.1
*1105	95	D16	20 aft	47.3	1.2
*1106	110	D32	8 fwd	17.9	1.8
1107-1	95	D122	30 aft	43.7	2.4
1107-2	95	D170	20 aft	42.1	2.9
1108-1	105	D30	20 fwd	28.7	0.5
*1108-2	100	D242	20 fwd	33.3	2.3
1109-1	110	D16	3 fwd	25.8	3.2
1109-2	100	D145	6 fwd	40.5	2.5

* - Standards

FIGURE 1. BEST IMAGE QUALITY (Mission 1109-1)

Image quality comparable to the best of this mission.

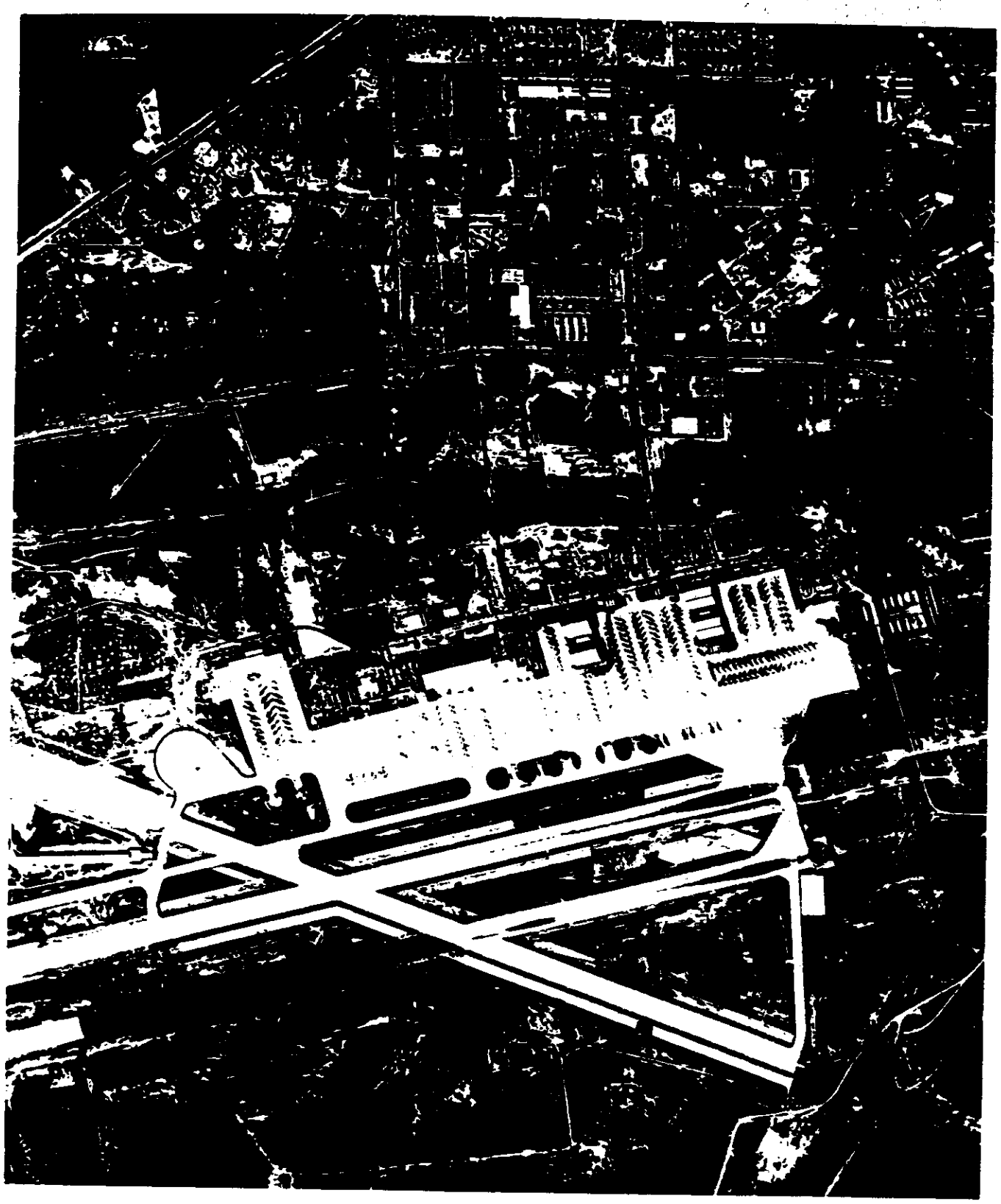
FIGURE 2. CORRESPONDING COVERAGE

Corresponding coverage as imaged by the aft camera.

	FIGURE 1	FIGURE 2
Camera	Fwd	Aft
Pass	16D	16D
Frame	3	9
Date of Photography (GMT)	5 Mar 70	5 Mar 70
Universal Grid Coordinates	25.8-3.2	51.8-2.7
Enlargement Factor	20X	20X
Geographic Coordinates (format center)	32-53N 116-41W	32-53N 116-41W
Altitude (ft)	571,722	572,254
Camera Attitude:		
Pitch (deg)	NA	NA
Roll (deg)	NA	NA
Yaw (deg)	NA	NA
Local Sun time	1413	1413
Solar Elevation (deg-min)	41-56	41-54
Exposure (sec)	1/353	1/447
Filter	W/25	W-23A
Vehicle Ground Track Azimuth (deg-min)	180-33	180-36
Processing	Dual gamma	Dual gamma

NA - Not available.

[redacted]



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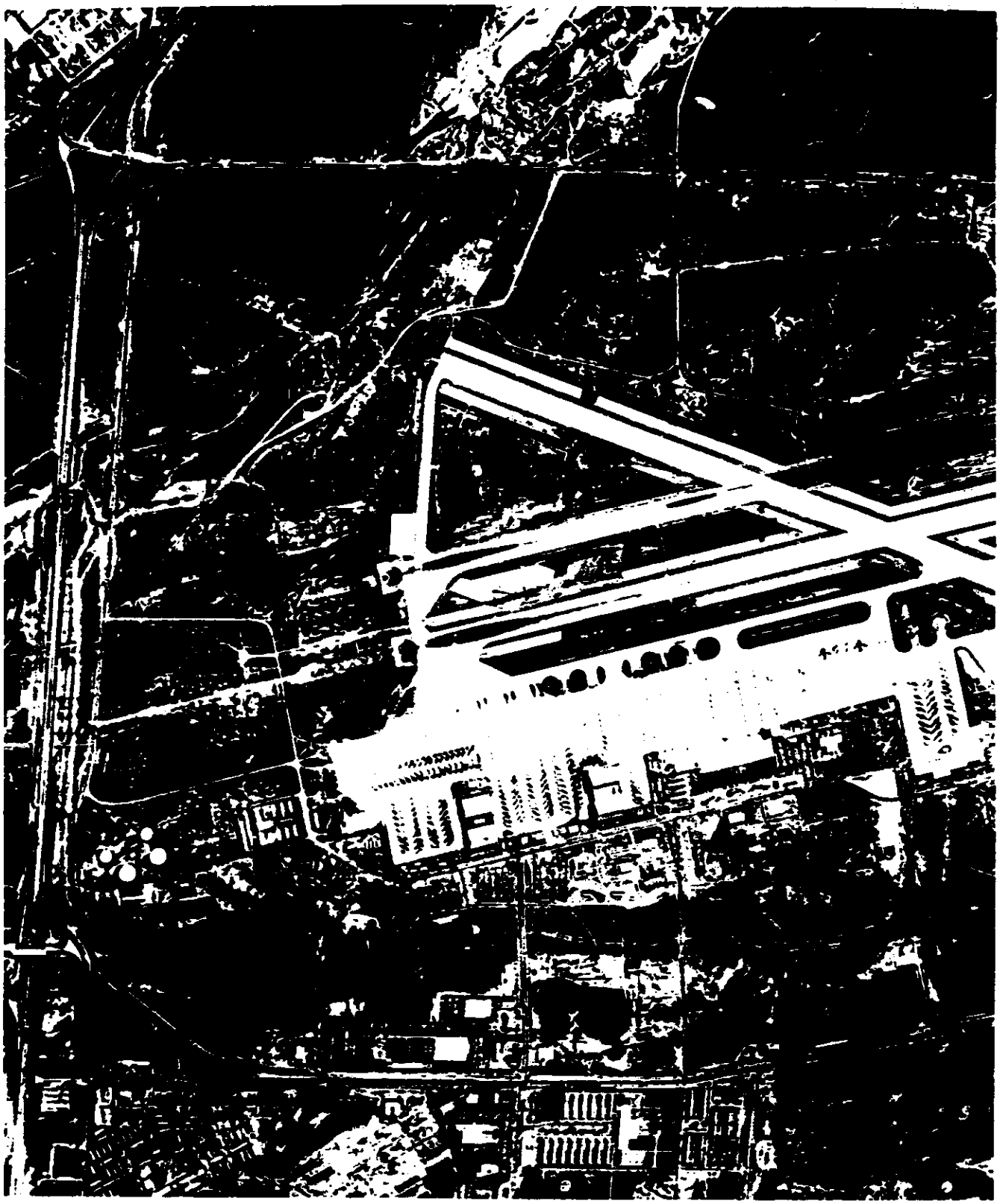


FIGURE 3. BEST IMAGE QUALITY (Mission 1109-2)

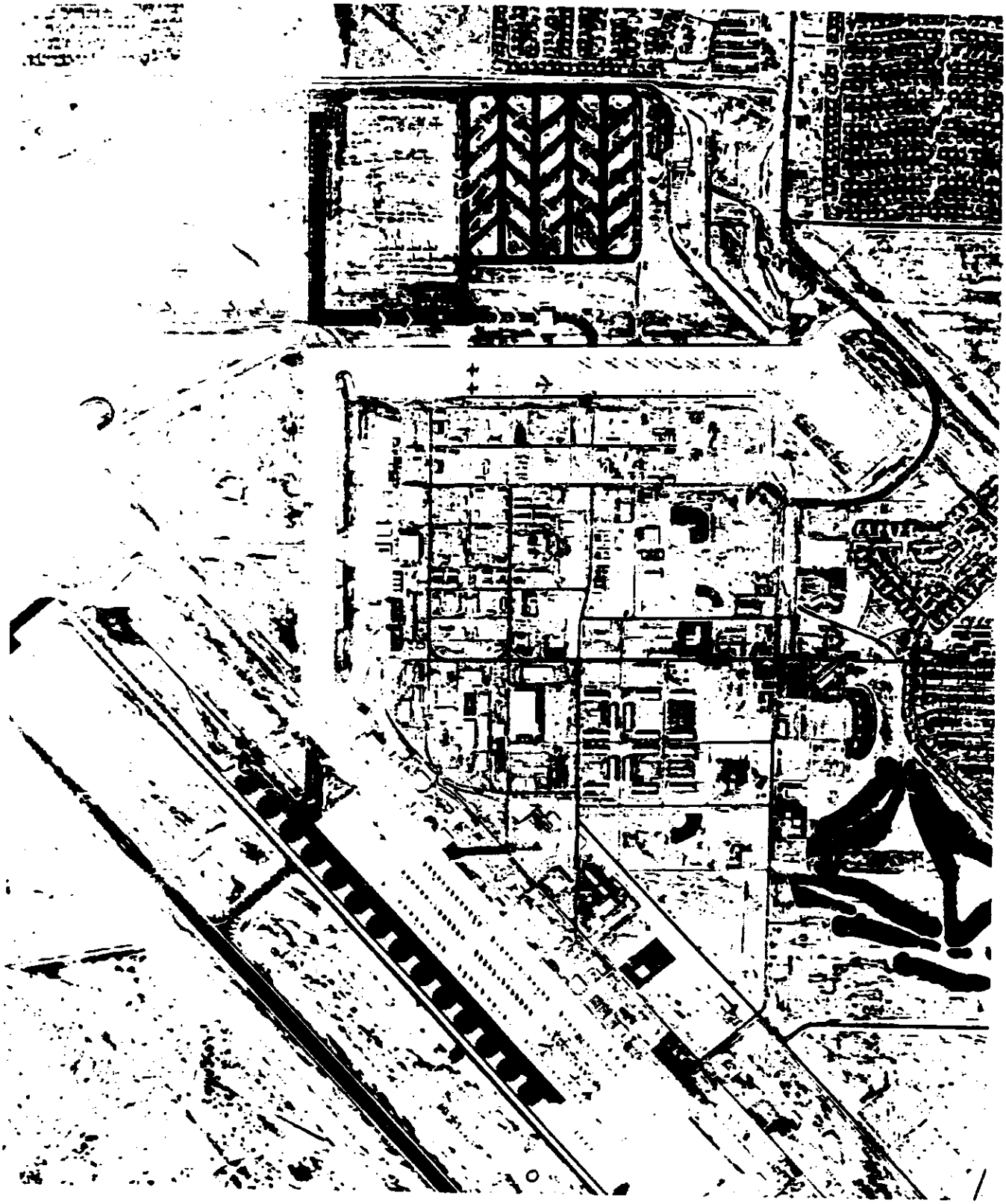
Image quality comparable to the best of this mission.

FIGURE 4. CORRESPONDING COVERAGE

Corresponding coverage as imaged by the aft camera.

	FIGURE 3	FIGURE 4
Camera	Fwd	Aft
Pass	145D	145D
Frame	6	12
Date of Photography (GMT)	13 Mar 70	13 Mar 70
Universal Grid Coordinates	40.5-2.5	35.1-3.7
Enlargement Factor	20X	20X
Geographic Coordinates (format center)	32-11N 110-58W	32-12N 110-58W
Altitude (ft)	599,101	599,568
Camera Attitude:		
Pitch (deg)	+15.75	-14.68
Roll (deg)	+0.01	+0.01
Yaw (deg)	+0.18	+0.16
Local Sun Time	1332	1332
Solar Elevation (deg-min)	50-10	50-08
Exposure (sec)	1/390	1/426
Filter	W-25	W-23A
Vehicle Ground Track Azimuth (deg-min)	180-36	180-30
Processing	Dual gamma	Dual gamma

[redacted]



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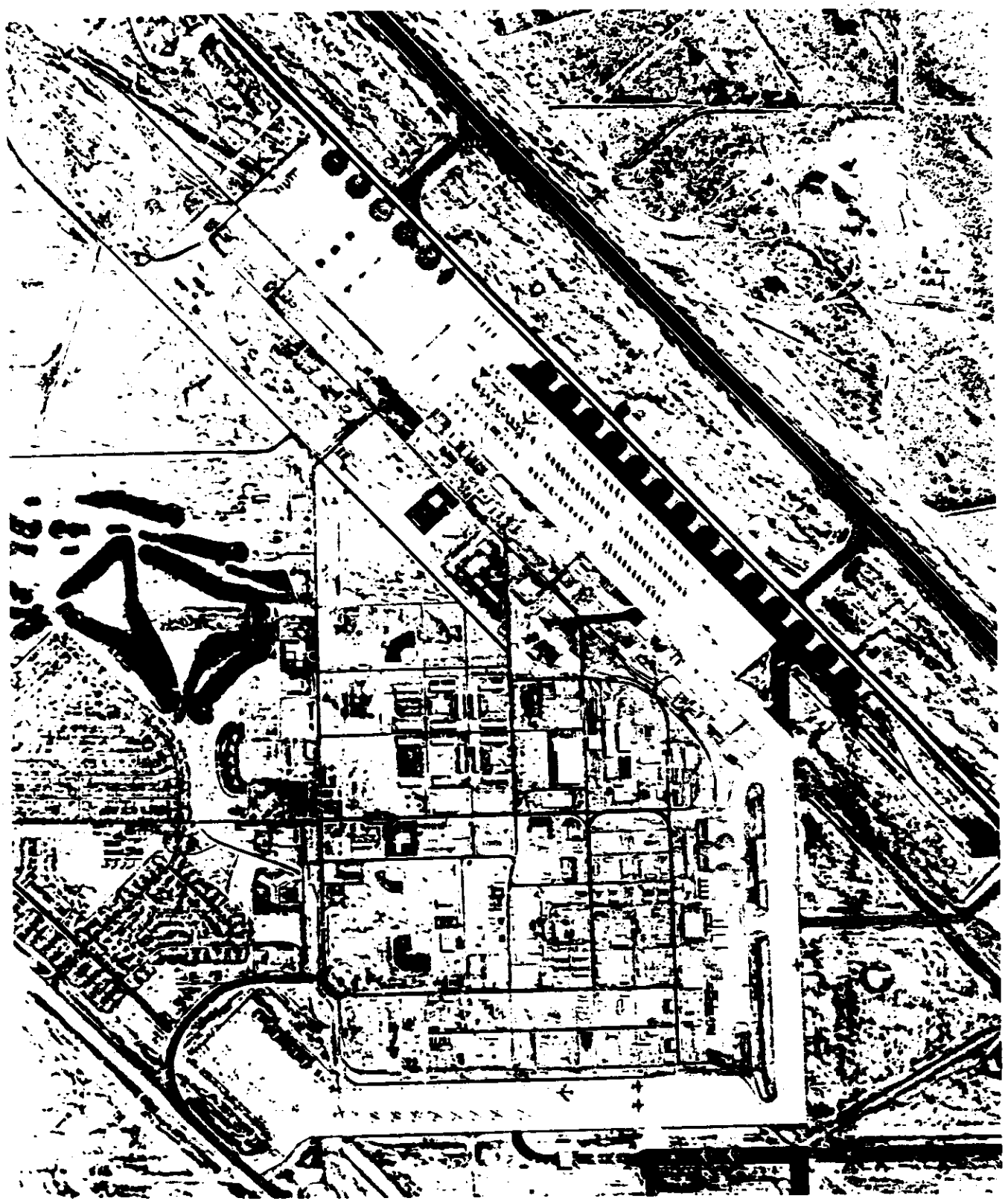

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