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NATIONAL PHOTOGRAPHIC
INTERPRETATION CENTER

PHOTOGRAPHIC EVALUATION REPORT

MISSION 1112

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MISSION 1112

MARCH 1971

NATIONAL PHOTOGRAPHIC INTERPRETATION CENTER

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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 RESOULUTION* - 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 semiminor 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/nm, 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.

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* Defined differently than in the Glossary of NPIC Terminology.

[redacted]

SYNOPSIS

Mission 1112, a two-part satellite reconnaissance mission, was launched at 2129Z on 18 November 1970. The first capsule was recovered dry on rev 147 at 1809Z on 27 November 1970. The second capsule was recovered dry on rev 309 at 2244Z on 7 December 1970, terminating the mission.

The fwd camera failed on pass D104 and remained inoperative throughout the rest of the mission. The DISIC cameras failed on pass D107 and remained inoperative thereafter. The tape recorder failed throughout Mission 1112-2.

The overall image quality of the fwd and aft records is good, with the best aft imagery slightly better than the best fwd imagery. Most imagery from both cameras is crisp and retains edge sharpness at magnifications above 50X. A split film load of 3414/3404 was flown. An MIP of 115 was assigned from the film type 3414 portions of the aft records of both buckets.

Random intermittent plus density spots, similar to those present on Missions 1110-2 and 1111-2, are also present on all material after pass D147 of Mission 1112-2.

Approximately 15 percent of the mission is obscured by clouds.

[redacted]

[redacted]

PART I. GENERAL SYSTEM INFORMATION

A. Camera Numbers

Forward-Looking Panoramic	301
Aft-Looking Panoramic	300
DISIC Unit	8

B. Launch and Recovery Dates

	1112-1	1112-2
Launch	18 Nov 70/2129Z	NA
Recovery	27 Nov 70/1809Z	7 Dec 70/2244Z
Recovery Rev	147	309

C. Orbital Elements

Element	Actual 1112-1 (Rev 63)	Actual 1112-2 (Rev 200)	Photo Range
Period (min)	88.544	88.423	NA
Perigee (nm)	97.5	94.2	91.8 (Pass D298)
Apogee (nm)	129.9	129.4	114.5 (Pass D003)
Eccentricity	0.00394	0.00435	NA
Inclination (deg)	82.99	82.99	NA
Perigee Latitude (Geod) (deg-min)	15-52N	18-07N	NA

NA - Not applicable.

[redacted]

D. Photographic Operations

1. Panoramic Cameras:

Type	1112-1 Revs	1112-1 Frames	1112-2 Revs	1112-2 Frames	Total Revs	Total Frames
Operational						
Fwd	34	2,596	0	3	34	2,599
Aft	35	2,716	47	3,067	82	5,783
Operational/Domestic						
Fwd	0	0	0	0	0	0
Aft	0	0	0	0	0	0
Domestic						
Fwd	4	92	0	0	4	92
Aft	4	92	3	41	7	133
Engineering (no imagery)						
Fwd	1	27	0	0	1	27
Aft	1	27	2	26	3	53
Total						
Fwd	39	2,715	0	3	39	2,718
Aft	40	2,835	52	3,134	92	5,969

2. Secondary Cameras:

Camera	Frames
Stellar (1112-1)	2,434 Starboard 2,430 Port
Index (1112-1)	2,441
Stellar (1112-2)	23 Starboard 24 Port
Index (1112-2)	None

E. Film Usage

Camera	Film Load (Total)	Pre-Flight Footage	Processed Footage**	Film Type
Fwd-Looking (1112-1)	16,300*	492	7,647	3414
Aft-Looking (1112-1)	16,300*	484	7,738	3414
			214	3404
Fwd-Looking (1112-2)	NA	NA	6	3414
Aft-Looking (1112-2)	NA	NA	785	3404
			7,473	3414
Stellar (1112-1)	2,000*	19	726	3401
Stellar (1112-2)	NA	NA	7	3401
Index (1112-1)	2,200*	44	1,028	3400
Index (1112-2)	NA	NA	None	3404

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

PART II. CAMERA OPERATION

A. Fwd-Looking Panoramic Camera

1. The fwd camera operated properly throughout Mission 1112-1; however, the loss of the center of format time-track pulse resulted in missing auxiliary data on frames 132-135 of pass D006. This anomaly also caused frames 134 and 135 to be exposed at creep scan speed.

2. On Mission 1112-2, the camera jammed and failed after the cut and wrap sequence on rev 104. Part of frame 83 and all of frames 84 and 85 of pass D103 were the only fwd frames recovered. Parts of frames 82 and 83 were not recovered (approximately 36 inches are missing). The fwd camera failure is apparently the result of a foreign object jamming the system drive mechanism. The input metering roller continued to pass film into the instrument, the film developed slack, and eventually wrapped on the input metering roller. At this point the camera system stalled and was inoperative for the remainder of the mission.

B. Aft-Looking Panoramic Camera

The aft camera operated throughout both Missions 1112-1 and 1112-2; however, at the end of pass D003 the aft camera lost power and coasted past its lens stow position. During this coasting period, the input film started to wrap up on the input metering roller due to lack of takeup tension. Tension was reinstated beginning with pass D004. Fortunately, the film was uncinched from the input metering roller, thus allowing the aft camera to operate normally throughout the remainder of the mission. This anomaly caused the following degradations to frame 21 aft (last frame) of pass D003 and frame 1 aft of pass D004:

1. Output horizon fiducials are smeared.

2. Horizon format is overlapped into pass D004, frame 1.

3. Physical emulsion digs are present on both film edges.

4. Frame 21 is approximately 1 inch longer than normal.

5. Heavy fog is near center of format from lens stow (open shutter).

6. Sharp emulsion to emulsion crease appears 90 degrees to major

axis on frame 1 of pass D003. This anomaly was apparently caused by an electrical relay malfunction.

C. Horizon Cameras

The horizon cameras operated throughout the mission with one exception, Pass D006, frame 134 fwd (see Part II, paragraph A).

D. DISIC Camera

The DISIC camera system operated properly on Mission 1112-1, but failed after frame 32 of pass 107 on Mission 1112-2. The failure occurred immediately after the Mission 1112-1 to Mission 1112-2 transfer and during a programmed 71-cycle, slave-independent operation, with only 32 cycles completed. The failure is attributed to the stoppage of the terrain takeup spool. Failure to take up excess film as it is metered into the system allowed the film to wrap itself around the metering roller; thus the DISIC camera jammed and ceased operation.

E. Tape Recorder

The in-flight tape recorder failed after approximately 13 seconds of Mission 1112-2 operation resulting in loss of all Mission 1112-2 in-flight operational tape data except that acquired over tracking stations. The failure was apparently caused by a Glyptol chip which lodged between the tape belt drive and transport case, jamming the transport system.

PART III. IMAGE ANALYSIS

A. Fwd-Looking Panoramic Camera

1. Density: Generally medium throughout the mission.

2. Contrast: Generally medium throughout the mission.

3. Image Quality: Good overall and comparable to the best ever provided by this system. Most imagery maintains edge sharpness above 50X.

4. Imaged Degradations:

a. Light Leaks:

(1) A fog pattern is present on the ninth frame from the end of most camera operates. The density of this pattern is commensurate with camera sit periods. Degradation to the imagery is generally minor. This fogging apparently occurred in the vicinity of the forebody/fairing interface (see Graphic 1, page 12).

(2) Many instances of roller/equipment shadowgraphs are present intermittently throughout both the fwd and aft records. These shadowgraphs range from 0.5 to 2.0 inches in length and extend across the film web. Degradation to the imagery is minor (see Graphic 2, page 12).

b. Static: None noted.

c. Other: None.

5. Physical Degradations:

a. A 0.1-inch triangular plus density mark is present at a 6.25-inch interval beginning on frame 26 of pass D004 and continuing through frame 61 of pass D005. This mark is apparently the result of physical pressure from the base side of the film.

b. A 0.05-inch-wide, longitudinal film base gouge, seven-eights of an inch from the time-track edge of the film, is continuous from frame 62 of pass D005 through frame 1 of pass D035. This base gouge starts 6.25 inches after the last triangular-shaped plus

density mark that appeared on frame 61 of pass D005 (see Graphic 3, page 12).

c. After frame 1 of pass D035 a series of minor base rubs is present to the end of Mission 1112-1; however, this does not appear on the three frames recovered on Mission 1112-2. This anomaly was apparently the result of a particle of unknown origin impressing the film from the back side causing a plus density mark every 6.25 inches. Measurements made on recovered film indicate that this foreign particle was initially on the input metering roller. It became dislodged from the roller on frame 62 of pass D004 and was carried by the film until it again lodged between a film guide and roller. It remained in this area gouging the film until pass D035. At this time the gouging ceased, but a "rubbing" effect was evident throughout the remainder of Mission 1112-1 material. On Mission 1112-2 approximately 70 inches did not show any abrasions or rubbing that could be correlated with the marking on Mission 1112-1.

d. A sharp crease (base to base), 90 degrees to the major axis and extending across the film web, is present on frame 114 of pass D005. The cause for this crease is unknown, but it has been attributed to post-flight handling.

e. A manufacturer's splice is located in frame 125, pass D023.

B. Aft-Looking Panoramic Camera

1. Density: Generally medium on Mission 1112-1 and medium to heavy on Mission 1112-2.

2. Contrast: Generally medium throughout the mission.

3. Image Quality: Good overall and comparable to the best of this system. Most imagery maintains edge sharpness above 50X with the aft imagery slightly better than the fwd. An MTP of 115 was assigned to frame 11 aft of pass D016 on Mission 1112-1 and frame 12 aft of pass D242 on Mission 1112-2. The MTP chip from Mission 1112-1 is considered to be the best ever achieved by this system.

4. Imaged Degradations:

a. Light Leaks:

(1) A fog pattern is present on the seventh frame from the

end of most camera operates on Mission 1112-1. The density of the fog pattern is commensurate with camera sit periods. Degradation to the imagery is minor (see Part III, paragraph A-4a(1) and Graphic 4, page 12).

(2) A fog pattern is present on the fourth frame of some camera operates on Mission 1112-2. This pattern is minor in nature and appears to have little or no degrading effect on the imagery.

(3) Roller/equipment shadowgraphs are present intermittently throughout the mission (see Part III, paragraph A-4a(2) and Graphic 2, page 12).

b. Static:

(1) Minor dendritic edge static traces are present on passes D007 and D088. Minor corona static traces are present on pass D090.

(2) Random intermittent plus density spots are present on most imagery after frame 8 (last frame) of pass D147 (Mission 1112-1 recovery rev) to the end of the mission. These spots are similar to those noted on Mission 1110-2 and 1111-2 and generally appear on the last eight inches of the supply end of the frame. The size of the spots varies, with the largest approximately five ten-thousandths of an inch. These spots are believed to be caused from static discharges; however, the true source is still under investigation.

c. Other - None.

5. Physical Degradation:

a. A 2.5-inch crease is present parallel to the major axis of the film on frame 1 of pass D103. The cause is attributed to post-flight handling.

b. Locations of manufacturing splices are as follows:

Pass	Frame
D024	14
D102	03
D134	07
D203	92

C. Stellar Camera

1. Density: Generally medium throughout the mission.

2. Contrast: Adequate for detection of stellar images.

3. Image Shape: Generally point-type.

4. Images Per Frame: Approximately 10 to 20 star images are recorded on the starboard formats and 15 to 30 images are recorded on the port formats.

5. Imaged Degradations:

a. Light Leaks - None noted.

b. Static - None noted.

c. Other - None.

6. Physical Degradations: None noted.

D. Index Camera

1. Density: Generally medium throughout the mission.

2. Contrast: Generally medium throughout the mission.

3. Image Quality: Generally good.

4. Imaged Degradations:

a. Light Leaks - None noted.

b. Static - Corona and dendritic static traces are present continuously from rev 37 to the beginning of rev 48. Although the marks continue uninterrupted for all frames in the affected section, degradation to the imagery is minor (all frames prior to pass 37 and following pass 48 are clear of any marks or anomalies). The marks appear to be similar to those observed at the end of Mission 1107. The dendritic static marks are characteristic of de-spooling. The corona static traces appear to have been caused by the film rubbing on some continuous surface. The most likely cause for film rub of this nature is a loop formed by improper film tension, probably due

to a slow DISIC takeup device.

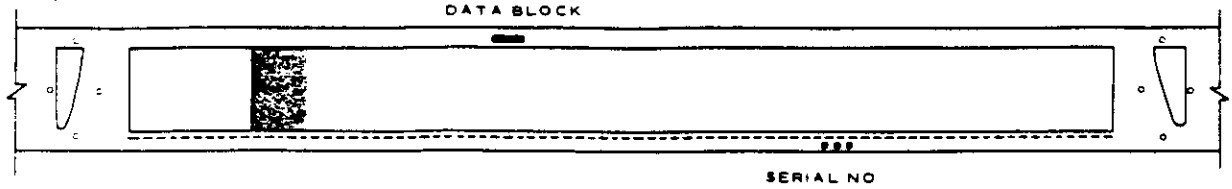
c. Other - None.

5. Physical Degradations: None noted.

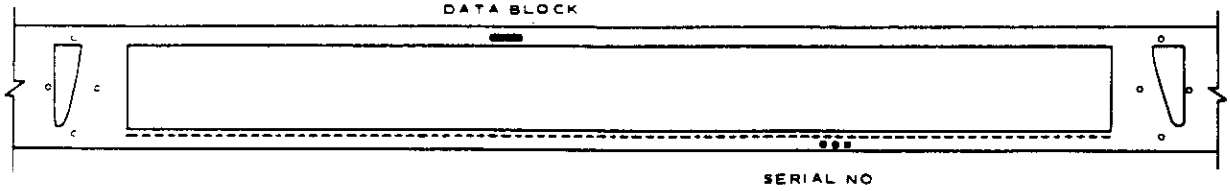
E. Graphic Display

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

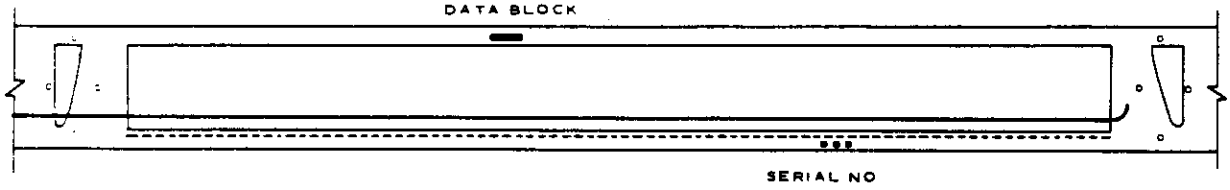
Graphic 1. Ninth frame from end (fwd camera)



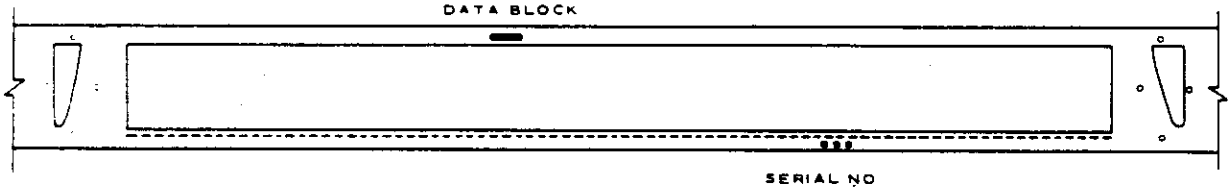
Graphic 2. Fwd and aft cameras



Graphic 3. Pass D005, frame 62 (fwd camera)



Graphic 4. Seventh frame from end (aft camera)



PART IV. IMAGED AUXILIARY DATA

A. Fwd-Looking Panoramic Camera

See Part II, paragraph A.

B. Aft-Looking Panoramic and Stellar Cameras

All auxiliary camera data is imaged properly throughout the mission.

C. Index Camera

The beginning-of-pass indicator (4 bits) is generally underexposed throughout the mission. The independent indicator bit is weakly imaged during many dependent operations.

PART V. MENSURATION QUALITY

Twenty-six 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 very good for mensuration.

PART VI. FILM PROCESSING

A. Processing Data

Camera	Mission	Machine/ Process	Process Chemistry	Film	Average Gamma	Speed AEI
Fwd	1112-1	Yardleigh/ Dual Gamma	XK-30	3414	1.84	5.2
	1112-2	Yardleigh/ Dual Gamma	XK-30	3414	1.92	5.0
Aft	1112-1	Yardleigh/ Dual Gamma	XK-30	3414	1.82	5.2
	1112-1	Yardleigh/ Dual Gamma	XK-3	3404	2.02	3.2
	1112-2	Yardleigh/ Dual Gamma	XK-3	3404	2.00	3.3
	1112-2	Yardleigh/ Dual Gamma	XK-30	3414	1.94	5.0
Stellar	1112-1	Trenton/ Single Level	P-693	3401	2.07	64.4
	1112-2	Trenton/ Single Level	P-693	3401	2.07	60.1
Index	1112-1	Yardleigh/ Dual Gamma	XK-15E	3400	1.58	28.8
	1112-2	Yardleigh/ Dual Gamma	XK-15E	3400	--	--

B. Film Handling Summary: Initial phase handling of Mission 1112-1 was delayed approximately four hours because of the chemistry change-over required for the main camera split film load (see data in table above). In addition, a five-hour delay was experienced on Mission 1112-2 because of the following:

1. Main camera TI film copy was required due to tape recorder failure (see Part II, paragraph E).

2. Chemistry change-over was necessary because of the main camera split film load.

C. Timetable

Mission	Recovered	Received at Processing Site	Priority 1A at NPIC
1112-1	27 Nov 70/1809Z	28 Nov 70/1955Z	1 Dec 70/2129Z
1112-2	7 Dec 70/2244Z	8 Dec 70/2230Z	10 Dec 70/1823Z

PART VII. PI SUITABILITY

A. PI Statistics

1. Target Coverage:

	1112-1	1112-2	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	166	224	390

2. Photographic Interpretability Ratings:

Rating	Missiles	Nuclear Energy	Air Facilities	Ports	Ground Forces	Industry	Complex
Good	13	7	3	0	2	1	1
Fair	53	17	127	23	24	10	18
Poor	31	2	59	12	25	10	3
Total*	97	26	189	35	51	21	22

3. Summary of Photographic Interpretability Ratings (percentage):

Good	27	or	6.1%
Fair	272	or	61.7%
Poor	142	or	32.2%

*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	342 or 77.55%
b.	Scattered Clouds	44 or 9.98%
c.	Heavy clouds	22 or 4.99%
d.	Haze	28 or 6.35%
e.	Snow	4 or 0.91%
f.	Obliquity	1 or 0.22%

2. Product Interpretability: The PI suitability for this mission ranges from poor to good, with the largest portion falling in the fair category. The major factor for the poor ratings is small scale due to high altitudes. The photointerpreters report that most imagery is very sharp but lacks the scale needed for good interpretation suitability.

An examination of the PI ratings for all past 1100 series missions leads to the observation that the percentage of good PI ratings varies with respect to the photographic perigee of the mission. For example, past missions with a photographic perigee greater than 90 nautical miles have an average of 9.5 percent good PI ratings; whereas, those missions with a photographic perigee less than 90 nautical miles have an average of 20 percent good PI ratings. The photographic perigee for Mission 1112 is above 90 nautical miles. The percentage of good PI ratings for this mission is only 6.1 percent regardless of the overall good quality of imagery.

Based on these observations it appears that future missions should be flown at lower altitudes to improve PI suitability. Past missions with photographic perigees near 80 nautical miles display the highest percentage of good PI ratings. A six percent difference exists in the percentage of good PI ratings for Missions 1112-1 and 1112-2 (10 and 4 percent, respectively). This difference is attributed to the lack of stereo photography for Mission 1112-2 (see special study, "Effects of Conjugate Imagery Loss," Photographic Evaluation Report for Mission 1107, [redacted].

PART VIII. RESOLUTION TARGET DATA

Target Designator	1		2	
Pass	D016		D016	
Date of Photography	19 Nov 70		19 Nov 70	
Location	Aguanga, Calif		Aguanga, Calif	
Type	51/51 T-Bar		Vernier	
Contrast	5:1		5:1	
Geographic Coordinates (deg-min)	33-31N 116-48W		33-31N 116-48W	
Local Sun Time	1422		1422	
Solar Elevation (deg)	32.2		32.2	
Vehicle Ground Track Azimuth (deg)	174.5		174.5	
Altitude (nm) (avg fwd and aft)	102.1		102.1	
Processing	Dual Gamma		Dual Gamma	
Weather Conditions	Clear		Clear	
Camera (looking)	Fwd	Aft	Fwd	Aft
Frame	012	018	012	018
Universal Grid Coordinates (deg-min)	37.9-1.9	37.9-4.5	37.9-1.9	37.9-4.5
Exposure	1/349	1/422	1/349	1/422
Filter (Wratten)	W25	W23A	W25	W23A

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

		ORIGINAL NEGATIVE				DUPLICATE POSITIVE			
		Fwd		Aft		Fwd		Aft	
Target	Observer	Along Track	Across Track	Along Track	Across Track	Along Track	Across Track	Along Track	Across Track
1	1	8.0	8.0	7.1	12.0	8.0	8.0	12.0	10.0
	2	12.0	12.0	8.0	12.0	12.0	12.0	12.0	12.0
	3	8.0	8.0	7.1	12.0	8.0	8.0	12.0	12.0
2	1	7.5	8.0	7.0	9.0	8.0	8.5	9.0	9.5
	2	8.0	7.5	8.0	10.0	8.5	8.5	NR	NR
	3	7.5	8.5	9.0	9.5	8.0	8.5	NR	9.5

NR - Not Resolved.

PART VIII. (CONTINUED)

Target Designator	3		4	
Pass	D016		D016	
Date of Photography	19 Nov 70		19 Nov 70	
Location	Edwards		Edwards	
Type	B1		B2	
Contrast	4:1		11:1	
Geographic Coordinates (deg-min)	34-51N 117-45W		34-51N 117-45W	
Local Sun Time	1422		1422	
Solar Elevation (deg)	31.1		31.1	
Vehicle Ground Track Azimuth (deg)	174.3		174.3	
Altitude (nm) (avg fwd and aft)	102.5		102.5	
Processing	Dual Gamma		Dual Gamma	
Weather Conditions	Clear		Clear	
Camera (looking)	Fwd	Aft	Fwd	Aft
Frame	003	009	003	009
Universal Grid Coordinates (deg-min)	16.0-2.7	60.2-3.7	16.3-2.7	59.7-3.7
Exposure	1/347	1/420	1/347	1/420
Filter (Wratten)	W25	W23A	W25	W23A

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

		ORIGINAL NEGATIVE				DUPLICATE POSITIVE			
		Fwd		Aft		Fwd		Aft	
Target	Observer	Along Track	Across Track	Along Track	Across Track	Along Track	Across Track	Along Track	Across Track
3	1	8.0	9.0	8.0	9.0	9.0	11.3	9.0	10.1
	2	8.0	11.3	8.0	10.1	9.0	11.3	9.0	11.3
	3	7.1	NR	9.0	10.1	10.1	11.3	9.0	10.1
4	1	8.0	11.3	8.0	8.0	8.0	11.3	9.0	8.0
	2	8.0	11.3	6.3	8.0	9.0	NR	8.0	7.1
	3	9.0	11.3	7.1	8.0	9.0	11.3	9.0	8.0

NR - Not Resolved.

PART VIII. (CONTINUED)

Target Designator	5		6	
Pass	D048		D048	
Date of Photography	21 Nov 70		21 Nov 70	
Location	Safford, Ariz		Safford, Ariz	
Type	51/51 T-Bar		Vernier	
Contrast	5:1		5:1	
Geographic Coordinates (deg-min)	32-48N 109-42W		32-48N 109-42W	
Local Sun Time	1308		1308	
Solar Elevation (deg)	33.9		33.9	
Vehicle Ground Track Azimuth (deg)	174.6		174.6	
Altitude (nm) (avg fwd and aft)	100.5		100.5	
Processing	Dual Gamma		Dual Gamma	
Weather Conditions	Clear		Clear	
Camera (looking)	Fwd	Aft	Fwd	Aft
Frame	006	012	006	012
Universal Grid Coordinates (deg-min)	38.9-1.7	36.8-4.2	38.9-1.7	36.8-4.2
Exposure	1/441	1/544	1/441	1/544
Filter (Wratten)	W25	W23A	W25	W23A

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

		ORIGINAL NEGATIVE				DUPLICATE NEGATIVE			
		Fwd		Aft		Fwd		Aft	
Target	Observer	Along Track	Across Track	Along Track	Across Track	Along Track	Across Track	Along Track	Across Track
5	1	7.1	7.1	7.1	12.0	8.0	8.0	8.0	12.0
	2	7.1	6.4	12.0	12.0	12.0	8.0	12.0	12.0
	3	5.7	6.4	7.1	7.1	8.0	8.0	8.0	7.1
6	1	7.0	7.0	7.0	7.0	7.5	8.5	7.0	7.0
	2	7.0	7.0	7.5	7.0	7.5	8.5	8.5	8.5
	3	7.0	7.5	7.0	7.0	7.5	8.5	8.5	8.0

PART VIII. (CONTINUED)

Target Designator	7		8	
Pass	D048		D048	
Date of Photography	21 Nov 70		21 Nov 70	
Location	Ft. Huachuca, Ariz		Ft. Huachuca, Ariz	
Type	Leg B		Leg C	
Contrast	1.3:1		17:1	
Geographic Coordinates (deg-min)	31-36N 110-19W		31-36N 110-19W	
Local Sun Time	1308		1308	
Solar Elevation (deg)	35.0		35.0	
Vehicle Ground Track Azimuth (deg)	174.7		174.7	
Altitude (nm) (avg fwd and aft)	100.3		100.3	
Processing	Dual Gamma		Dual Gamma	
Weather Conditions	Clear		Clear	
Camera (looking)	Fwd	Aft	Fwd	Aft
Frame	014	020	014	020
Universal Grid Coordinates (deg-min)	17.4-3.4	58.2-2.3	17.4-3.4	58.2-2.3
Exposure	1/442	1/545	1/442	1/545
Filter (Wratten)	W25	W23A	W25	W23A

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

		ORIGINAL NEGATIVE				DUPLICATE POSITIVE			
		Fwd		Aft		Fwd		Aft	
Target	Observer	Along Track	Across Track	Along Track	Across Track	Along Track	Across Track	Along Track	Across Track
7	1	6.3	7.0	7.9	10.0	7.0	7.9	10.0	12.5
	2	7.0	8.9	10.0	11.2	8.9	8.9	12.5	14.1
	3	7.0	7.9	7.9	10.0	7.9	7.9	10.0	12.5
8	1	7.0	8.9	6.3	10.0	7.9	10.0	7.0	10.0
	2	7.9	8.9	6.3	10.0	8.9	10.0	10.0	11.2
	3	7.9	10.0	6.3	11.2	8.9	12.5	6.3	10.0

PART VIII. (CONTINUED)

Target Designator	9	
Pass	D048	
Date of Photography	21 Nov 70	
Location	Douglas-Bisbee, Ariz	
Type	51/51 T-Bar	
Contrast	5:1	
Geographic Coordinates (deg-min)	31-28N 109-36W	
Local Sun Time	1308	
Solar Elevation (deg)	35.1	
Vehicle Ground Track Azimuth (deg)	174.7	
Altitude (nm) (avg fwd and aft)	100.3	
Processing	Dual Gamma	
Weather Conditions	Clear	
Camera (looking)	Fwd	Aft
Frame	015	021
Universal Grid Coordinates (deg-min)	38.5-1.5	38.2-4.2
Exposure	1/442	1/545
Filter (Wratten)	W25	W23A

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

		ORIGINAL NEGATIVE				DUPLICATE POSITIVE			
		Fwd		Aft		Fwd		Aft	
Target	Observer	Along Track	Across Track	Along Track	Across Track	Along Track	Across Track	Along Track	Across Track
9	1	7.1	8.0	12.0	12.0	12.0	12.0	12.0	16.0
	2	7.1	12.0	12.0	16.0	12.0	12.0	12.0	12.0
	3	7.1	12.0	12.0	12.0	12.0	12.0	12.0	12.0

PART IX. MISSION 1112 DATA

		Forward-Looking ▲ Pan	Forward-Looking Takeup Horizon	Forward-Looking Supply Horizon	Aft-Looking ● Pan	Aft-Looking Takeup Horizon	Aft-Looking Supply Horizon	Stellar Port	Stellar Starboard	Index
Camera Number		301	*	*	300	*	*	8		8
Reseau Number		*	*	*	*	*	*	12P	11	108
Lens Serial Number		I-224	E-40786	E-40775	I-223	E-23756	E-28516	12P	11	108
Slit Position/ Slit Widths (in)	1	0.154			0.125					
	2	0.189	*	*	0.160	*	*	*		*
	3	0.250			0.225					
	4	0.320			0.267					
	FS	0.259			0.219					
Aperture		*	f/8.0	f/6.3	*	f/6.3	f/8.0	f/2.8	f/2.8	f/6.3
Exposure Time (sec)		Variable	0.01	0.01	Variable	0.01	0.01	1.5	1.5	0.002
Filter (Wratten) Primary		W25 (0.037)	W25	W25	W23A (0.037)	W25	W25			W12
Alternate		W25 (0.040)	*	*	W23A (0.040)	*	*	None	None	*
Focal Length (mm)		609.607	55.0	55.0	609.597	55.0	55.0	76.20	76.20	76.20
Film Length (ft)		16,300	*	*	16,300	*	*	2,000		2,200
Splices		4	*	*	4	*	*	0		0
Emulsion		2-11(453-8)2-11-11-0	*	*	2-11(453-8)2-11-11-0	*	*	349-8-5-0		223-1-5-0
Film Type		3414/3404/3414	*	*	3414/3404/3414	*	*	3401		3400
Resolution Data (L/mm)		- - -	187R/166T	187R/166T	- - -	148R/148T	166R/166T	NA	NA	102R/114T
Static										
High Contrast		318	NA	NA	289	NA	NA	NA	NA	NA
Low Contrast		191	NA	NA	188	NA	NA	NA	NA	NA
Dynamic										
I High Contrast		262	NA	NA	263	NA	NA	NA	NA	NA
I Low Contrast		172	NA	NA	171	NA	NA	NA	NA	NA
P High Contrast		308	NA	NA	294	NA	NA	NA	NA	NA
P Low Contrast		206	NA	NA	167	NA	NA	NA	NA	NA

NA - Not available.
* - Not applicable.
R - Radial resolution on axis.
T - Tangential resolution on axis.
▲ - Resolution tested using a W25 filter.
● - Resolution tested using a W23A filter.

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

Mission	MIP#	Pass	Frame	Universal Grid Coord	
1101	85	159D	2 Fwd	39.0	1.5
1102*	90	16D	22 Fwd	26.8	1.3
1103	90	79D	15 Fwd	41.8	3.8
1104*	115	16D	6 Fwd	33.1	4.1
1105*	95	16D	20 Aft	47.3	1.2
1106*	110	32D	8 Fwd	17.9	1.8
1107	95	122D	30 Aft	43.7	2.4
1108-1	105	30D	20 Fwd	28.8	0.5
1108-2	100	242D	20 Fwd	33.7	2.3
1109-1	110	16D	3 Fwd	25.8	3.2
1109-2	100	145D	6 Fwd	40.5	2.5
1110-1	90	122D	55 Fwd	49.1	6.3
1110-2	95	201D	112 Fwd	51.7	4.8
1111-1	105	A10	1 Fwd	36.7	1.9
1111-2	105	A189	14 Fwd	16.9	4.2
1112-1	115	D16	11 Aft	50.8	2.9
1112-2	115	D242	12 Aft	38.0	1.2

*Standards

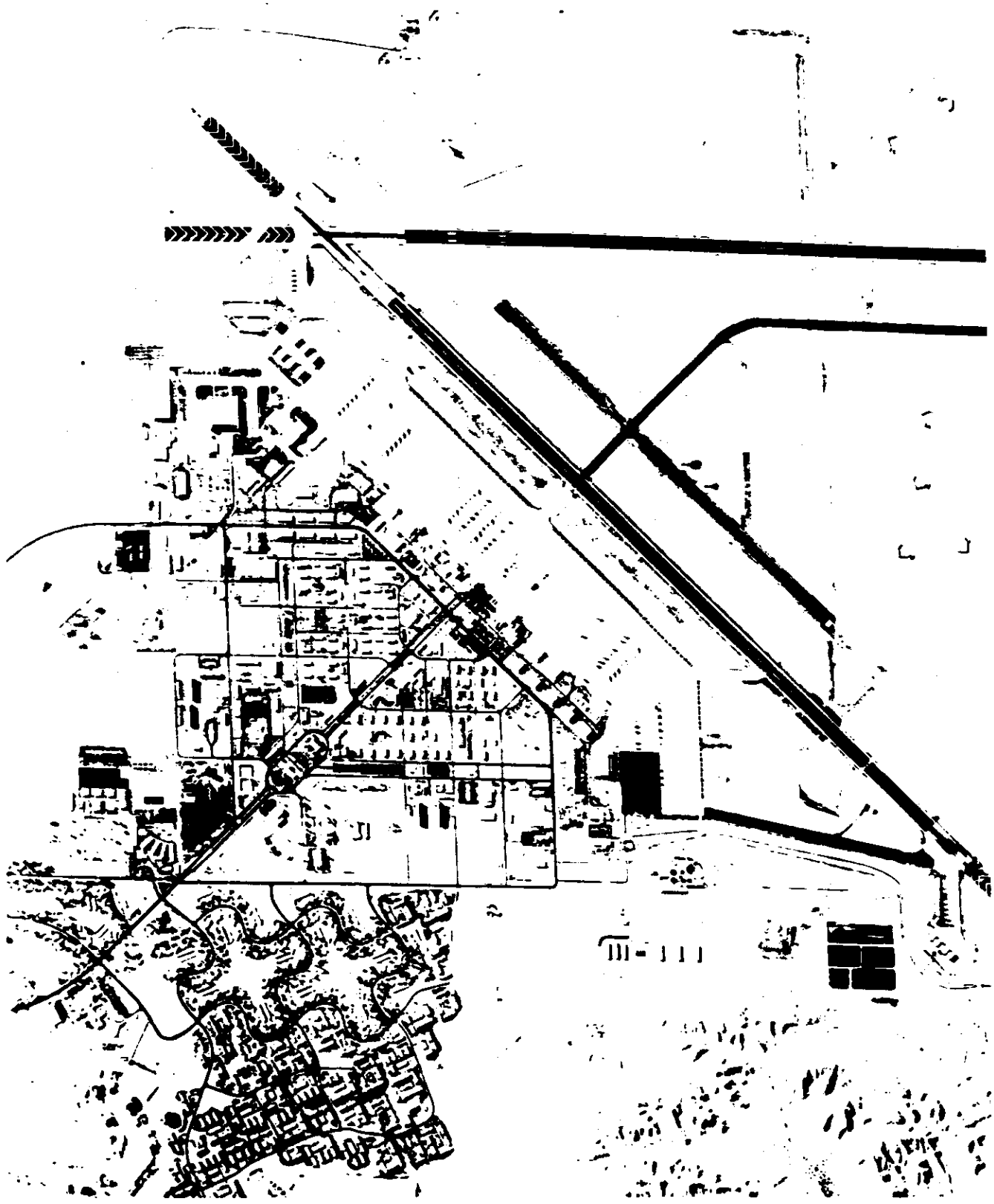
FIGURE 1. BEST IMAGE QUALITY (1112-1 MIP)

FIGURE 2. BEST IMAGE QUALITY (1112-2 MIP)

	Figure 1	Figure 2
Camera	300	300
Pass	D16	D242
Frame	11 Aft	12 Aft
Date of Photography (GMT)	19 Nov 70	3 Dec 70
Universal Grid Coordinates (deg-min)	50.8-2.9	38.0-1.2
Enlargement Factor	20X	20X
Geographic Coordinates (format center) (deg-min)	32-42N 116-49W	33-24N 112-00W
Altitude (ft)	621,855	567,721
Local Sun Time	1324	1856
Solar Elevation (deg-min)	32-08	34-29
Exposure (sec)	1/421	1/461
Filter (Wratten)	W23A	W23A
Vehicle Ground Track Azimuth (deg-min)	174-26	174-34
Processing	Dual Gamma	Dual Gamma

Handle Via
~~Talent-KEYHOLE~~
Control System Only

[redacted]



Handle Via
~~Talent-KEYHOLE~~
Control System Only

~~TOP SECRET - RUFF~~

Handle Via
~~Talent-KEYHOLE~~
Control System Only

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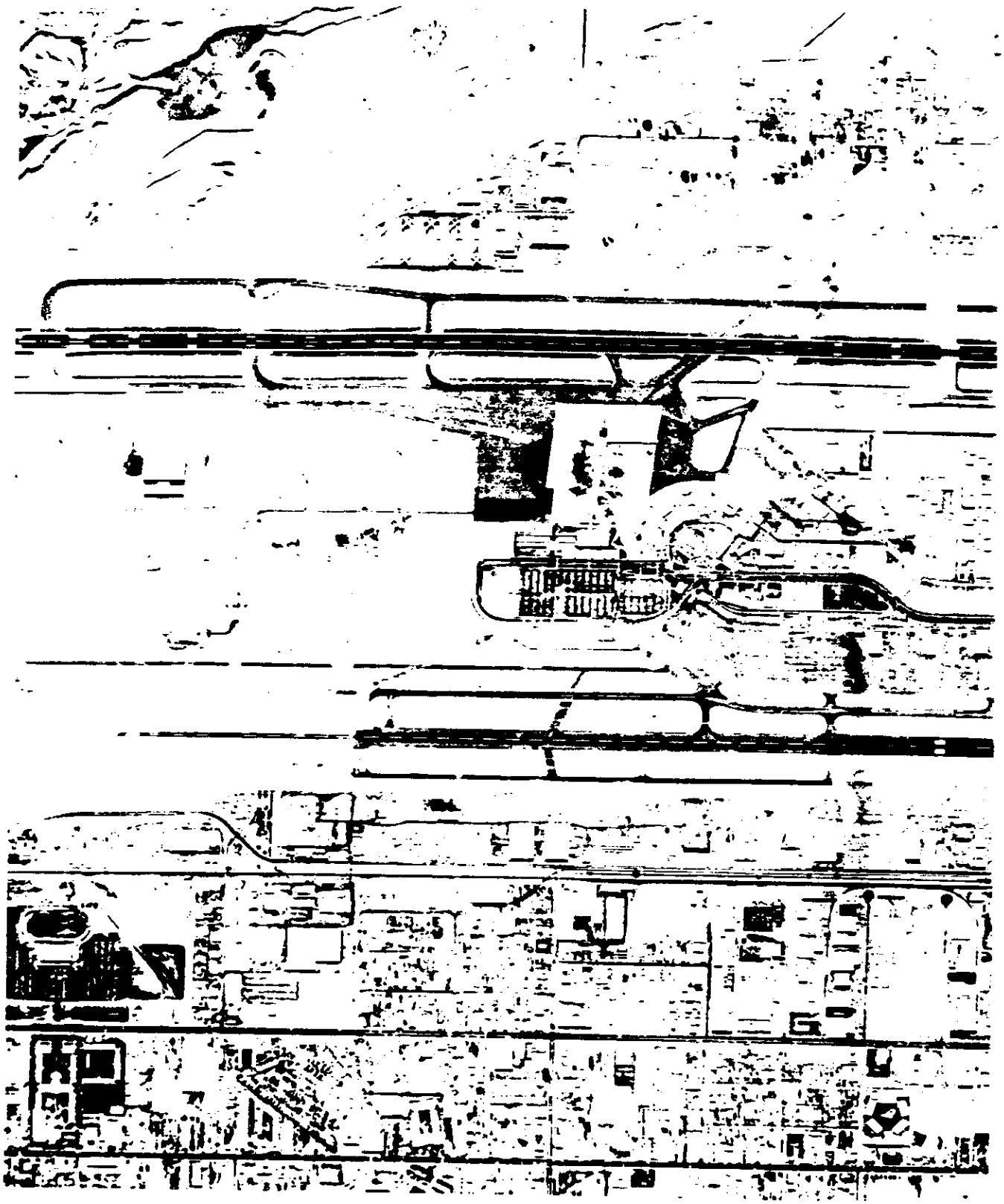

Handle Via
~~Talent-KEYHOLE~~
Control System Only