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CORONA J

PERFORMANCE EVALUATION REPORT

MISSION 1013-1 and 1013-2

FTV 1173; J-15

22 December 1965

Approved: [redacted]
Advanced Projects

Approved [redacted]

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Notice of Missing Page(s)

Pages ii, iv, xiv, xvi, xviii, 4-14, 4-16, 4-18, 4-22, 4-38, 4-48, 4-58, 4-64, and 4-224 of the original document were blank and unnumbered.

FOREWORD

This report details the performance of the payload system during the operational phase of the Program [redacted] Flight Test Vehicle 1173.

Lockheed Missiles and Space Company has the responsibility for evaluating payload performance under the Systems Integration and "J" System contracts.

This document is the final payload test and performance evaluation report for Missions 1013-1 and 1013-2 which was launched on 2 November 1964.

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INTRODUCTION

This report presents the final performance evaluation of Missions 1013-1 and 1013-2 of the Corona Program. The purpose of this report is to define the performance characteristics of the J-15 payload system, to identify the source of in-flight anomalies and recommend the appropriate corrective action.

The performance evaluation was jointly conducted by representatives of Lockheed Missiles and Space Company (LMSC) and ITEK at the facilities of NPIC and AFSPPL. The off-line evaluation using Corona engineering photography acquired over the United States was performed at the individual contractors plants.

The quantitative data used for this report is obtained from government organizations. The diffuse density data, visual RES values and MTF/AIM resolution are produced by AFSPPL. The vehicle attitude error values, frame correlation times are made at NPIC who also supply the Processing Summary and MTF/AIM resolution reports [redacted]

Computer programs developed by A/P are utilized to calculate and plot the frequency distribution of the various contributors to image smear to permit analysis and correlation of the conditions of photography to the information content and quality of the acquired pictures. Computer analysis of the exposure, processing and illumination data provides the necessary data to analyze the exposure cirteria selected for the mission.

SECTION 1

SYSTEM PERFORMANCE

A. MISSION OBJECTIVES

The payload section of Mission 1013, placed into orbit by Flight Test Vehicle #1173 and SLV-2A booster #420, consisted of two panoramic cameras, two Stellar-Index cameras, two Mark 5A recovery capsules and a space structure to enclose the cameras and provide mounting surfaces for all equipments. Figure 1-1 presents an inboard profile of the J-15 payload system. This Corona "J" system is designed to acquire search and reconnaissance photography of selected areas of the earth from orbital altitudes. The planned mission was two, four day photographic periods with no deactive period.

B. MISSION DESCRIPTION

The payload was launched from Vandenberg Air Force Base (VAFB) at 2130:20 Z (1:30:20 PST) on 2 November 1964. Ascent and injection were normal and the achieved orbit within nominal tolerances. Tracking and command support was effected by the Air Force Satellite Control Facility consisting of tracking and command stations at [redacted] under central control of the Satellite Test Center at Sunnyvale, California. Mission 1013-1 consisted of four days operation and was completed by air recovery on 6 November 1964. Telemetry indicated that both panoramic cameras had failed during pass D52. Mission 1013-2 was completed on pass D81, 6 November 1964, with an air recovery.

The comparison of the planned and actual orbit parameters is tabulated as follows:

ORBITAL PARAMETERS

Parameter	Predicted	Orbit 2 Actuals
Period (Min.)	90.87	90.86
Perigee (N.M.)	99.8	100.0
Apogee (N.M.)	244.8	246.0
Inclination (Deg.)	80.0	80.0
Perigee Latitude (Deg.N.)	18.0	25.0
Eccentricity	0.0201	0.0202

SCHEMATIC INBOARD PROFILE - CORONA J SYSTEM

MISSION 1013

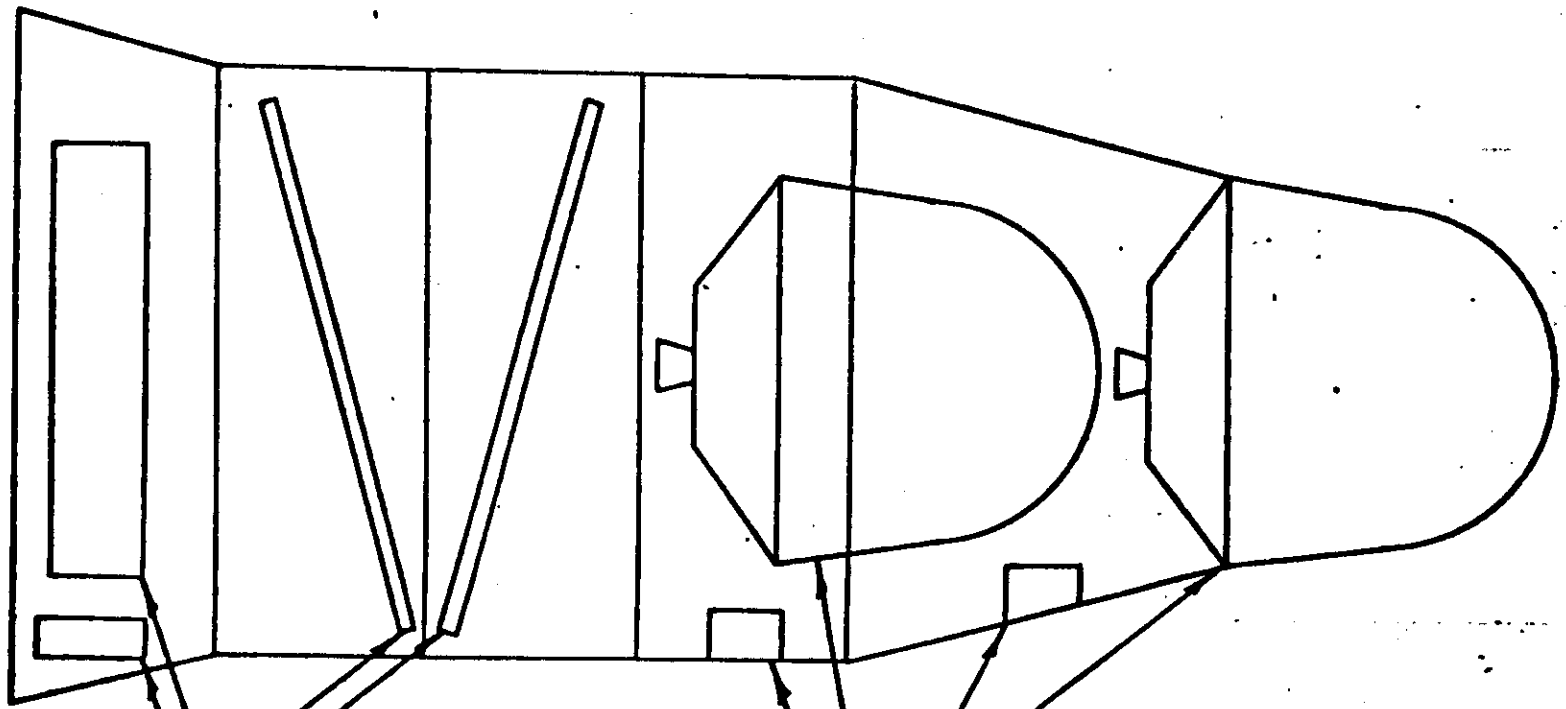

FIGURE 1-1

C. PANORAMIC CAMERAS

The Master and Slave cameras operated through pass D51. Both cameras failed near the start of a programmed operation of pass D52. The quality and information content of the Master camera photography was very good up to the point of failure. The Slave camera photography was comparable to the Master camera up to frame 90 of pass D24. Subsequent photography was out of focus across half of the format parallel and adjacent to the time track edge. This soft area began at a manufacturers splice and continued up to the point of failure.

D. STELLAR-INDEX CAMERAS

The Stellar-Index cameras of both Mission 1013-1 and 1013-2 operated properly during their respective missions. Both cameras produced excellent stellar and terrain photography.

E. OTHER SUB-SYSTEMS

An erroneous signal from the command programmer caused both the Master and Slave cameras to acquire approximately 400 unprogrammed photographic frames during pass A01 and D01. The clock, instrumentation, pressure make-up and thermal control sub-systems performed satisfacorily through both missions.

F. CONCLUSIONS

Missions 1013-1 and 1013-2 did not fully achieve the objective of acquiring high quality search and reconnaissance photography from orbital altitudes.

G. RECOMMENDATIONS

The evaluation and analysis of the data produced by the missions has resulted in the following recommendations:

1. Visually inspect all optical surfaces following delivery to A/P, prior to and after environmental testing.

2. Review the splicing materials and techniques used by the film manufacturer.

SECTION 2

PRE-FLIGHT SYSTEMS TESTS

A. ENVIRONMENTAL TESTING

1. Test Objective

As a standard procedure, the J payload systems are subject to thermal/altitude environmental testing which simulates orbital environment. One of the purposes of this test is to demonstrate the system susceptability to corona discharge. Such discharge fogs the film thus degrading the operational photography.

2. Test Summary

The J-15 Payload System was tested for pressure, thermal and Corona effects in the TASC Chamber starting 14 August 1964. The test consisted of three (3) days active operation with the "A" bucket; one (1) day of de-active soak and two (2) days of active operation with the "B" bucket.

The J-15 system contained a flight pressure make-up system; however, this system failed toward the end of the first day, "A" bucket. Corona markings were reported to be acceptable for flight, without pressure make-up.

Several abnormalities in system performance were evident during the test and are summarized below:

1) Aforementioned pressure make-up failure.
2) Power turned off during "A" Mission caused the clock to experience a re-start.
3) V/h programmer received nine (9) of eleven (11) transmitted commands during "B" Mission, second day - orbit #13.
4) Fogging light problem around pressure make-up failure time.
5) Uneven shutdown on slave instrument on orbits 3 and 4, second day - "A" Mission.

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J-15 TASC TEST

INTERNAL CAMERA PRESSURE

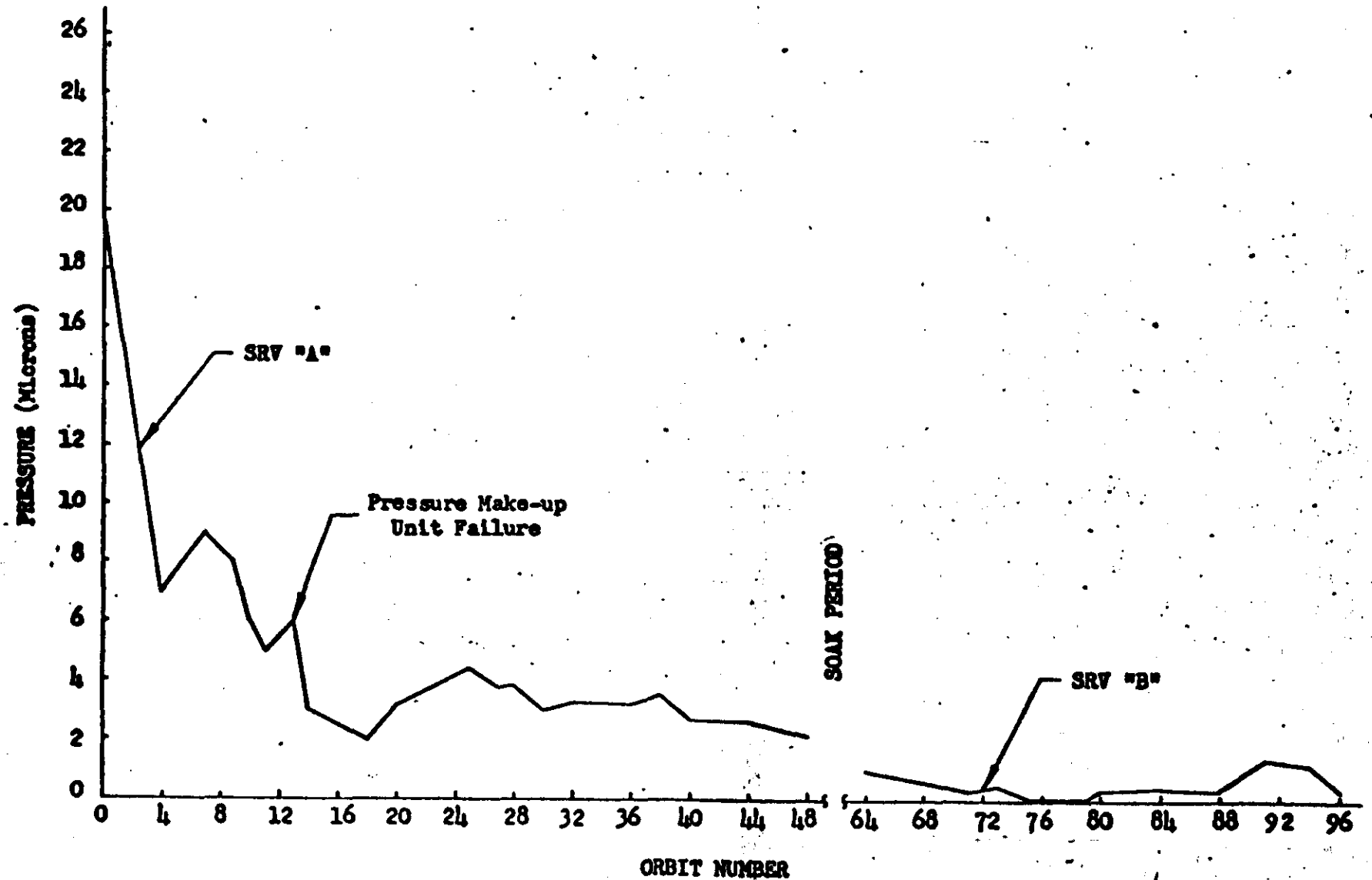

Figure 2-1

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5. Panoramic Camera Performance

The Panoramic Camera system operation was normal throughout the test, with the exception of the uneven metering at shutdown of the Slave instrument on orbits 3 & 4 of the second day of "A" Mission operation. This uneven metering was found to be due to incorrect tension of the telemetry monitor on the Horizon idler. The cycle periods were within ± 1.5% of the calibrated values.

Examination of the film transported through the system during the environmental test showed that minor start-up corona discharge fogging occurred in the Slave camera only. Inspection of the camera systems revealed a film of oil on the field flatteners of both cameras. The source of the oil was not determined hence it is not known whether the oil was present prior to the environmental test. All future systems are to be visually inspected prior to and following the environmental test to assure clean lens surfaces.

6. Stellar-Index Camera Performance

The "A" Mission stellar index operation was normal, with the exception of film movement at platen down time during orbit 15 of the second day.

The "B" mission stellar index metering monitors indicated film motion at platen commands throughout the test. The shutter monitor did not indicate the shutter was opening. The processed film did not indicate any metering anomalies nor shutter failures. The shutter monitor anomaly was caused by insufficient intensity of the fogging lamps, due to instrumentation hook-up.

Post-test examination of the film metered through both cameras showed that the cameras were suitable for flight.

7. Clock Performance

The clock operated throughout both "A" and "B" Missions. The console power was turned off during the "A" Mission, which prevented any clock correlation due to unscheduled clock restart. The clock took four (4) orbits to stabilize during the "B" Mission, after soak,

and thereafter gained approximately 60 milliseconds between orbits 4 and 15. This was attributed to clock offset.

8. Instrumentation and Commanding System Performance

The V/h programmer brush 27 which indicated a failure to acknowledge two of the eleven commands sent was attributed to operate error in failure to wait approximately seventeen (17) seconds for brush filter delay.

The RTC 6 anomaly was traced to a misaligned relay tension spring. Re-alignment of the relay curbed the problem.

B. RESOLUTION TEST

The dynamic resolution test of the J-15 payload system was performed at the A/P facility on 27 August 1964. Each panoramic camera photographed high and low contrast resolution targets. The resulting through focus resolution data is shown in Figure 2-2 for the Master camera and in Figure 2-3 for the Slave camera.

Examination of the resolution data from the Master camera showed that peak performance occurred at -0.002" which is a greater departure from zero focus than normally experienced. Analysis showed that the three sigma focus limits of the A/P collimator are from -0.00225" to +0.00075 hence the peak resolution point of camera #158 is within the expected limits. A re-test of this camera showed no change in the peak resolution setting therefore the test data was approved.

C. LIGHT LEAK TEST

The examination of the film threaded in the J-15 system during the light leak test determined that no film fogging was present. The light leak integrity of the system was considered acceptable for flight.

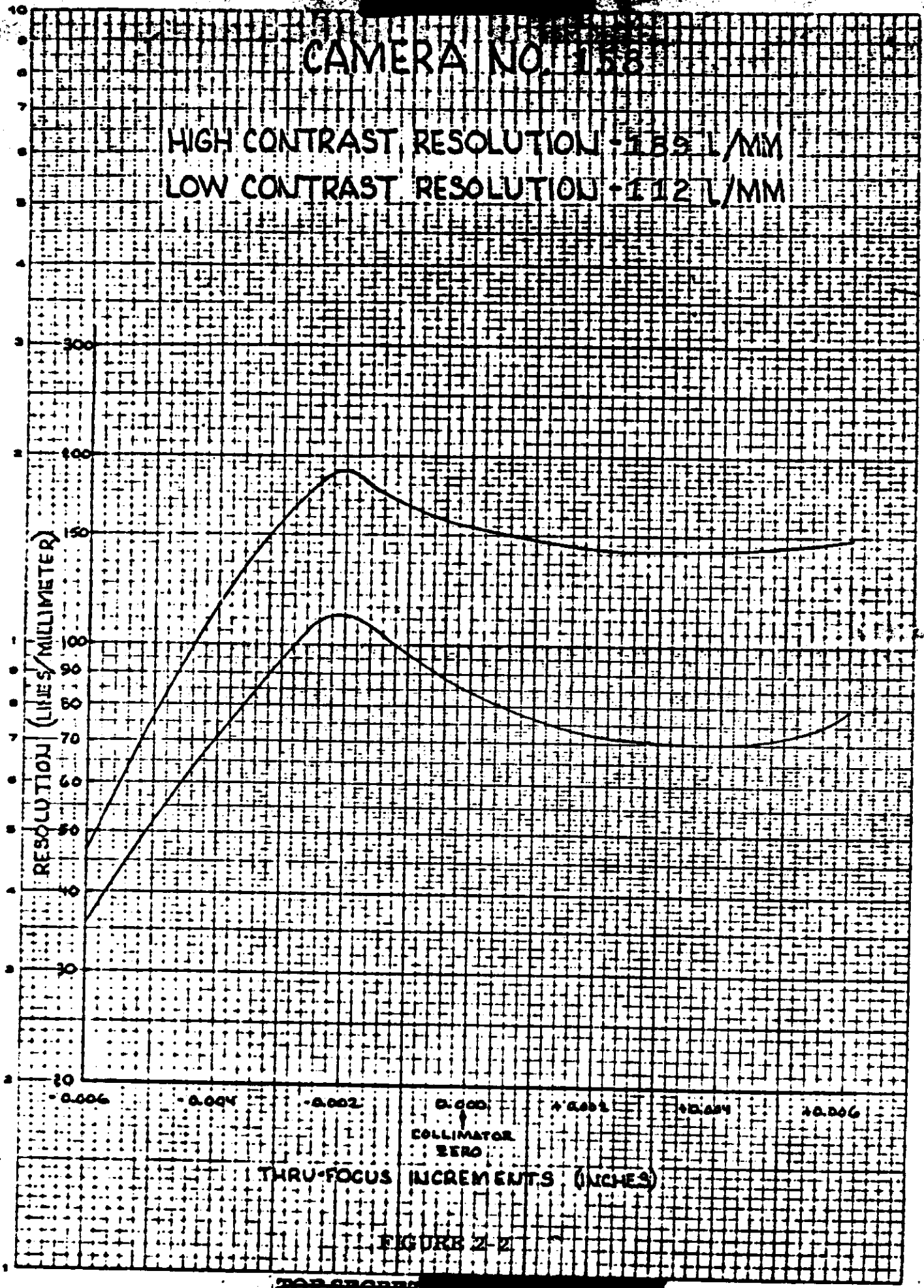

CAMERA NO. 1588
HIGH CONTRAST RESOLUTION +185 L/MM
LOW CONTRAST RESOLUTION +112 L/MM
RESOLUTION (LINES/MILLIMETER)
300
200
150
100
90
80
70
60
50
40
30
20
-0.006
-0.004
-0.002
0.000
COLLIMATOR ZERO
+0.002
+0.004
+0.006
THRU-FOCUS INCREMENTS (INCHES)

FIGURE 2-2

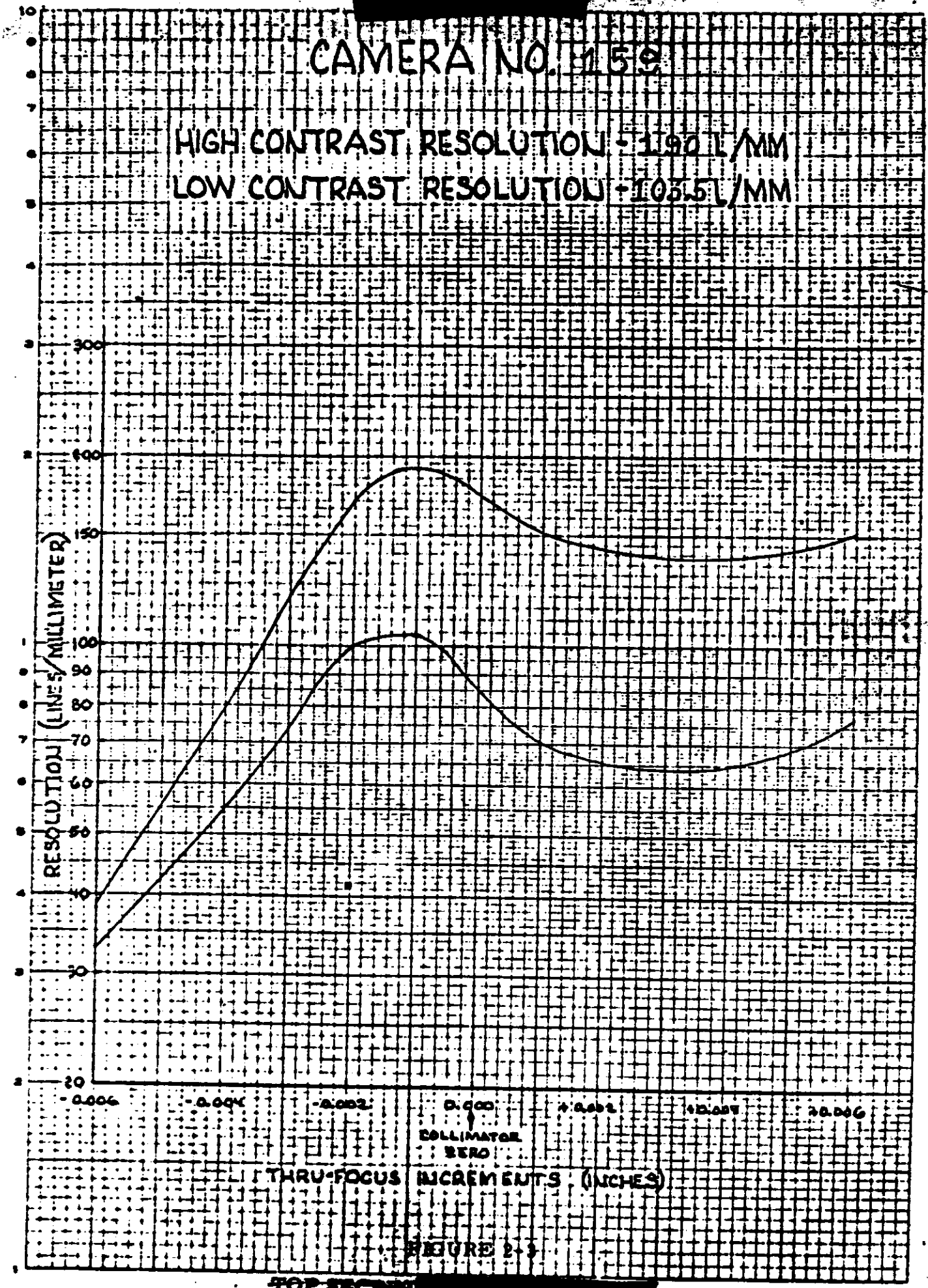

CAMERA NO. 159
HIGH CONTRAST RESOLUTION = 1190 L/MM
LOW CONTRAST RESOLUTION = 1035 L/MM
RESOLUTION (LINES/MILLIMETER)
300
200
150
100
90
80
70
60
50
40
30
20
-0.006
-0.004
-0.002
0.000
COLLIMATOR ZERO
+0.002
+0.004
+0.006
THRU-FOCUS INCREMENTS (INCHES)

FIGURE 2-3

SECTION 3

FLIGHT OPERATIONS

A. INSTRUMENTATION AND COMMAND PERFORMANCE

At acquisition at [redacted]on orbit 1 the camera system was operating and had completed 345 cycles from launch. The system continued to run until an OFF command was received at the end of a programmed 14 cycle engineering operation. A total of 416 cycles were completed with the Master camera and 417 cycles with the Slave camera. The vehicle telemetry signal strength was very low resulting in only 50 to 60 seconds of good telemetry data during this pass. This precluded analysis of the complete operation occurring within the normal acquisition range at the [redacted] Tracking Station. The only anomaly evident in the data was an indicated OFF position on the ON/OFF command monitor. During the time of the normal programmed engineering operation the telemetry was unusable. Therefore, the status of the ON/OFF monitor was not verified during this programmed operation.

The telemetry monitor relay in the command box is in parallel with the operate relay. From an analysis of the circuitry involved to turn the instrument system on it appears that the operate relay was latched without latching the telemetry relay. This was substantiated by an interrupt to the operate signal to the instrument system by the initiation of 2 intermix commands (RTC 12).

These commands caused a normal OFF of the camera system as evidenced by end of pass markers on the processed film coincident with the time the intermix commands were issued. A sequence of programmed events from launch to orbit 1 is tabulated below.

SEQUENCE OF EVENTS (LAUNCH TO [redacted]

Time	Delta Time	Event
T +0		Launch
T +161	161	Inflight reset (door eject)
T +434	273	Burnout (28v reg. to instr. and cassette power switch over)

SEQUENCE OF EVENTS (LAUNCH TO [redacted])
(Continued)

Time	Delta Time	Event
T +3810	3376	1st of 12 programmed brush 27's 1 every 50 sec. (V/h start delay)
T +3910	100	1st recorder center of format on slave
T + 5256	1346	[redacted]acq. start sending 2 RTC 12's (intermix mode change)
T + 5260	4	End of pass marker (frame 344M-345S)
T +5401	141	Programmed brush 36 (on command) frame 400
T +5436	35	Programmed brush 37 (off cmd) end of pass mark frame 416-416S

An attempt to duplicate the "run away" operation was made on the engineering operation on Pass 9. All command settings were the same as the initial command settings for launch. The "run away" operation was not duplicated on this or any other pass during the flight.

The most probable cause of the "run away" operation was a short in the command box operate relay. This short was apparently cleared when the relay was reset by the OFF command.

The instrumentation system performance was satisfactory with the exception of the low signal strength of the telemetry transmitter. This low signal strength did not impair the payload system operation.

No other command or instrumentation anomalies were evident in the telemetry data.

B. PANORAMIC CAMERA PERFORMANCE

The panoramic camera system operation appeared normal during the limited data available on the orbit 1 [redacted] "run away" operation. Cycle periods were 0.8% faster than the pre-flight calibrations. All camera status monitors indicated normal operation during this operation with the exception of command monitor anomaly noted above.

The camera system operation was normal on the engineering operations on orbits 9, 16, and 31. The operation on orbit 47 was normal with the exception of uneven metering at shutdown of the Slave camera indicating possible slack in the film path. Below is a tabulation of the cycle periods observed on the engineering passes as compared to the pre-flight calibrations.

CYCLE PERIOD DATA

Pass	Cycle Period	Error	Cycle Period	Error
1	2.72	.8% Fast	2.70	.8% Fast
9	5.01	0%	4.96	0.4% Fast
16	2.31	1.7% Slow	2.27	1.3% Slow
*31	2.21	2.2% Fast	2.21	.9% Fast
47	2.20	.9% Fast	2.21	.45% Fast

* V/h ramp changed to increase instrument speed after orbit 16.

At the [redacted] acquisition on orbit 56, the film footage monitors indicated the camera system had failed on approximately orbit 52. The engineering operation on pass 63 confirmed the suspected failure. Both cameras were still operating; however, no film was being transported. All status monitors were normal with the exception of the lens rotation/center of format monitor relationship on the Slave camera. This monitor indicated slippage had occurred in the transport system. The cause of the failure was not evident in the telemetry data nor has it been conclusively determined. However, the most probable explanation appears to be a common loss of power to the take-up cassettes. The programmed operations between orbit 47 and the last recovered film are shown below.

J-15 SEQUENCE

ORBIT	ON TIME	OFF TIME	REMARKS
47	74470	74580	Master - 50 cycles (normal operation) Slave - 51 cycles (uneven shutdown)
51	9259	9378	Master - 48 cycles (metering anomaly on frame 20) Slave - 48 cycles (metering anomaly on frame 10)
52 Operation 1	14560	14692	Master - 50 cycles (metering anomaly throughout pass) Slave - 51 cycles (metering anomaly throughout pass)
52 Operation 2	14730	14834	Master - 59 cycles (frame to frame length anomaly) Slave - 59 cycles (metering anomaly throughout pass)
52	14948	15033	Master - 38 cycles (failed at start up) Slave - 38 cycles (failed after 2-1/2 cycle

The camera system transferred to the second recovery system and continued to operate without transporting film after the recovery of the second recovery system.

Several operational command modes were utilized in an unsuccessful attempt to duplicate the "run away" operation on orbit 1 after the recovery of the second recovery system.

C. STELLAR-INDEX PERFORMANCE

The Stellar-Index camera operated normally on engineering passes during Mission 1013-1 with no anomalies evident in the telemetry data. The Stellar-Index camera for Mission 1013-2 operated normally on the engineering pass on orbit 72 prior to second recovery and continued operating after second recovery.

D. CLOCK PERFORMANCE

The clock system operation was satisfactory throughout the mission. The following correlation constants were derived using 8 hand-read data points and performing a least squares linear fit through the data:

SYSTEM TIME I/P	CL TIME I/P	COMP SYS TM
33323.4335	395863.1399	33323.4374
38772.4478	401312.1609	38772.4561
78439.7810	440979.4969	78439.7750
39377.2445	488316.9819	39377.2397
73857.0135	522796.7629	73857.0059
34884.8462	33353.7099	34884.8445
74611.3319	73080.2169	74611.3345
35630.6569	120499.5649	35630.6621

AO = 362539.5526
A1 = 0.999999570617
SIGMA = 0.00511
RATIO OF CLOCK TIME TO SYS TIME = 0.100000042938D 01

The following constants were derived by performing a 2nd order fit:

REV.	SYSTEM TIME I/P	CL TIME I/P	COMP SYS TM
8	33323.4335	395863.1399	33323.4325
9	38772.4478	401312.1609	38772.4521
16	78439.7810	440979.4969	78439.7765
25	39377.2445	488316.9819	39377.2448
31	73857.0135	522796.7629	73857.0117
40	34884.8462	33353.7099	34884.8485
47	74611.3319	73080.2169	74611.3346
56	35630.6569	120499.5649	35630.6546

A0 = 362539.7161
A1 = 1.00000029943
A2 = 0.7013757130203D - 12
SIGMA = 0.00258

E. PRESSURE MAKE-UP SYSTEM PERFORMANCE.

Operation of the pressure make-up system was satisfactory throughout the mission with a surplus of approximately 1700 PSIA of nitrogen at the end of the Mission 1013-1. Figure 3-1 is a plot showing the consumption during the flight.

F. TEMPERATURE ENVIRONMENT

A tabulation of the real time temperature data recorded at the [redacted] Tracking Station are included as Tables 3-1 and 3-2. These data have been corrected for self heating from data obtained from self-heating tests conducted during environmental testing.

Figures 3-2 through 3-4 are plots showing actual versus predicted temperatures for selected temperature sensors throughout the payload system.

J-15 PRESSURE MAKE-UP SUPPLY CONSUMPTION
"A" MISSION ONLY

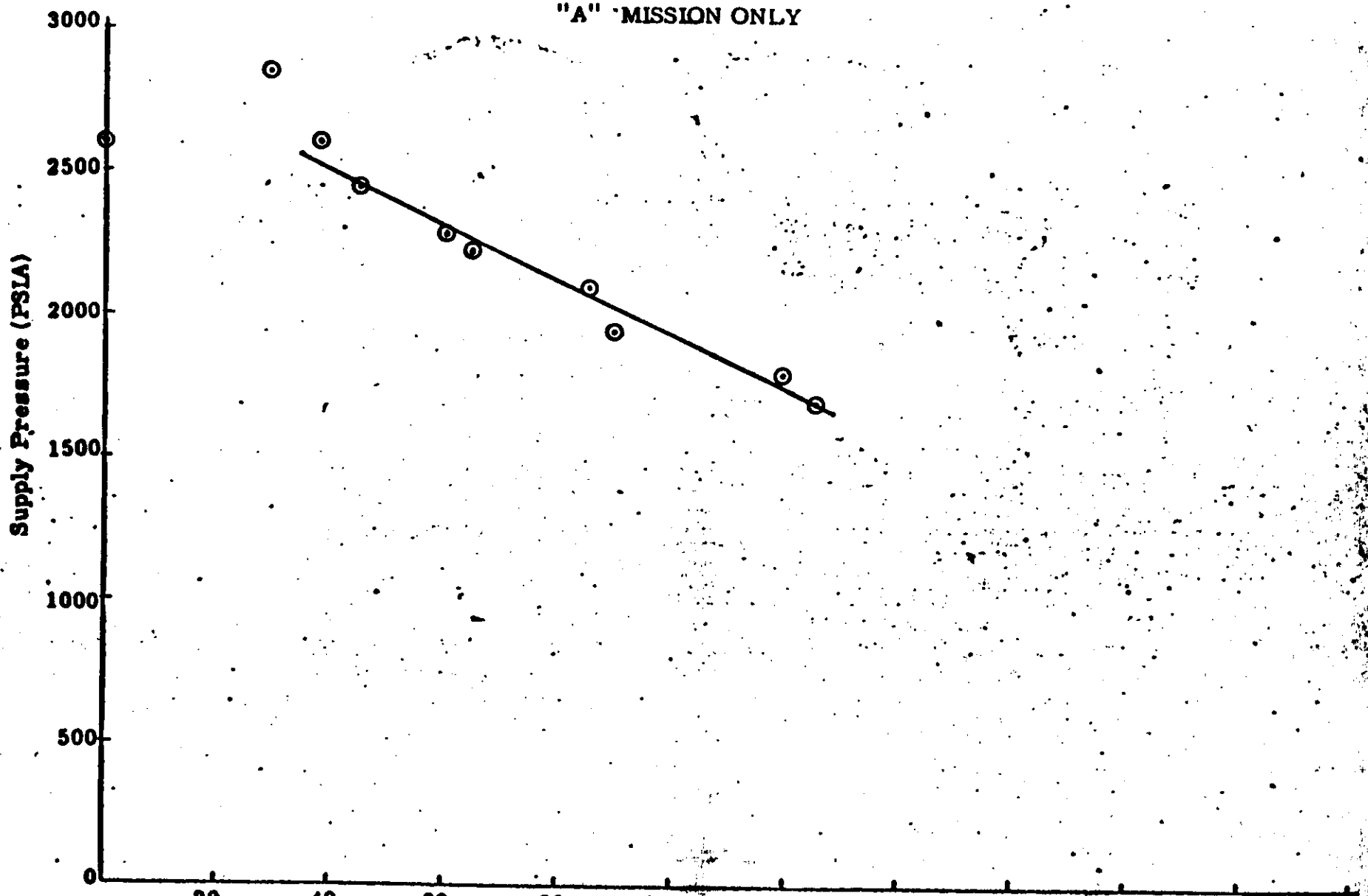


FIGURE 3-1

J-15 1173 TEMPERATURE SUMMARY

SENSOR	ORBIT											
Master	L	08	09	16	25	31	40	47	56	63	72	79
3	70	61	59	54	54	52	56	51	54	49	49	47
4	73	69	68	65	65	61	65	60	66	58	60	54
5	70	72	67	62	63	60	64	58	65	57	59	55
6	68	77	76	69	70	67	70	65	71	64	65	59
7	69	72	71	65	66	63	67	62	68	61	63	57
8	75	77	73	68	68	65	68	64	71	62	65	58
9	73	82	79	72	75	69	74	67	76	66	71	64
10	71	71	67	63	65	59	63	59	64	57	59	55
11	97	81	75	69	72	67	73	65	71	62	65	58
12	77	67	65	58	60	57	62	55	61	52	57	49
13	73	76	71	68	67	65	68	64	66	61	62	57
AVG. INSTR. TEMP.	72	73	70	64	65	62	66	60	66	59	61	56
Slave												
3	68	77	75	69	71	66	69	63	70	63	65	59
4	68	72	68	62	66	59	65	57	66	56	60	51
5	70	72	68	62	64	62	65	59	66	58	60	54
6	68	66	64	58	59	58	60	56	61	53	56	50
7	66	71	68	63	65	61	64	60	65	58	60	54
8	69	67	65	59	61	58	63	56	64	55	58	50
9	71	64	61	56	58	56	59	53	59	51	54	49
10	69	68	67	62	64	59	63	58	64	57	59	53
11	92	63	60	55	58	53	58	52	54	50	52	49
12	71	74	71	63	68	62	67	59	68	57	64	54
13	76	69	66	62	62	61	63	60	62	58	57	56
AVG. INSTR. TEMP.	70	69	67	62	64	60	64	58	64	57	59	53
Supply Spool												
1	69	61	60	56	57	56	57	55	58	55	54	52
2	69	65	64	59	60	59	62	57	62	55	57	52

NOTE: All data corrected for self-heating, except injection

TABLE 3-1

J-15 1173 TEMPERATURE SUMMARY

SENSOR		ORBIT										
Fairing/Barrel #1	L	08	09	16	25	31	40	47	56	63	72	79
1	OBH	49	42	29	52	33	46	29	51	26	-3	4
2	OBH	12	9	-1	12	-1	12	-5	18	-5	-2	-5
3	OBH	3	0	3	-1	3	0	-4	8	-4	27	43
4	256	63	60	51	57	48	57	45	59	41	52	84
5	OBH	87	84	75	90	71	78	65	83	59	46	53
6	OBH	78	72	75	81	75	68	68	74	56	FAIRING	
Barrel #2												
1	156	59	59	72	62	69	56	62	49	56	43	49
2	155	56	56	84	66	84	53	78	50	69	50	75
3	180	23	20	30	27	36	20	33	52	27	20	42
4	189	6	3	-4	6	-4	6	-10	3	-4	3	-4
5	178	17	14	11	11	11	14	11	11	11	4	1
Conic Adapter												
1	163	63	63	63	66	60	57	54	62	50	44	41
Clock												
1	97	71	67	65	67	62	67	60	70	60	60	54
2	105	82	80	73	77	73	77	71	81	71	71	60
Thrust Cone "A" to "B" SRV												
1	110	52	49	41	42	40	43	38	43	38	37	57
2	80	72	72	62	63	59	60	57	60	56	70	66
Stellar/Index "A" to "B"												
1	84	66	62	56	56	56	59	53	65	50	50	43
2	69	66	60	57	57	53	57	53	62	50	58	48
Recovery Batt. "B" SRV												
1	72	76	75	72	68	69	68	67	69	66	80	84
Master Cassette "A" SRV												
2	--	--	--	--	--	--	--	--	--	--	--	--

NOTE: Only thrust Cone Data corrected for self-heating

TABLE 3-2

J-15 PREDICTED AND ACTUAL TEMPERATURES

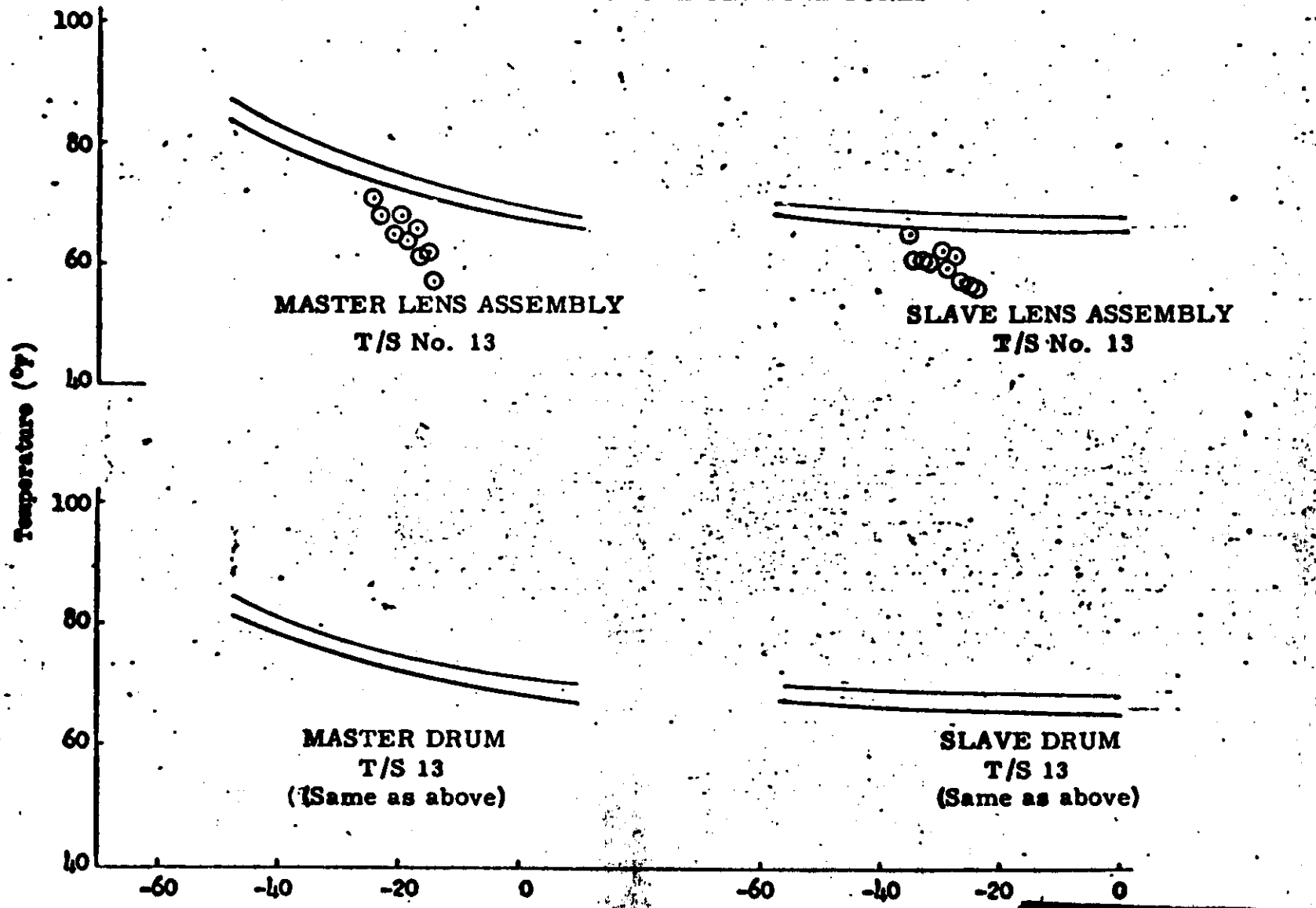


FIGURE 3-2

J-15 PREDICTED AND ACTUAL TEMPERATURES

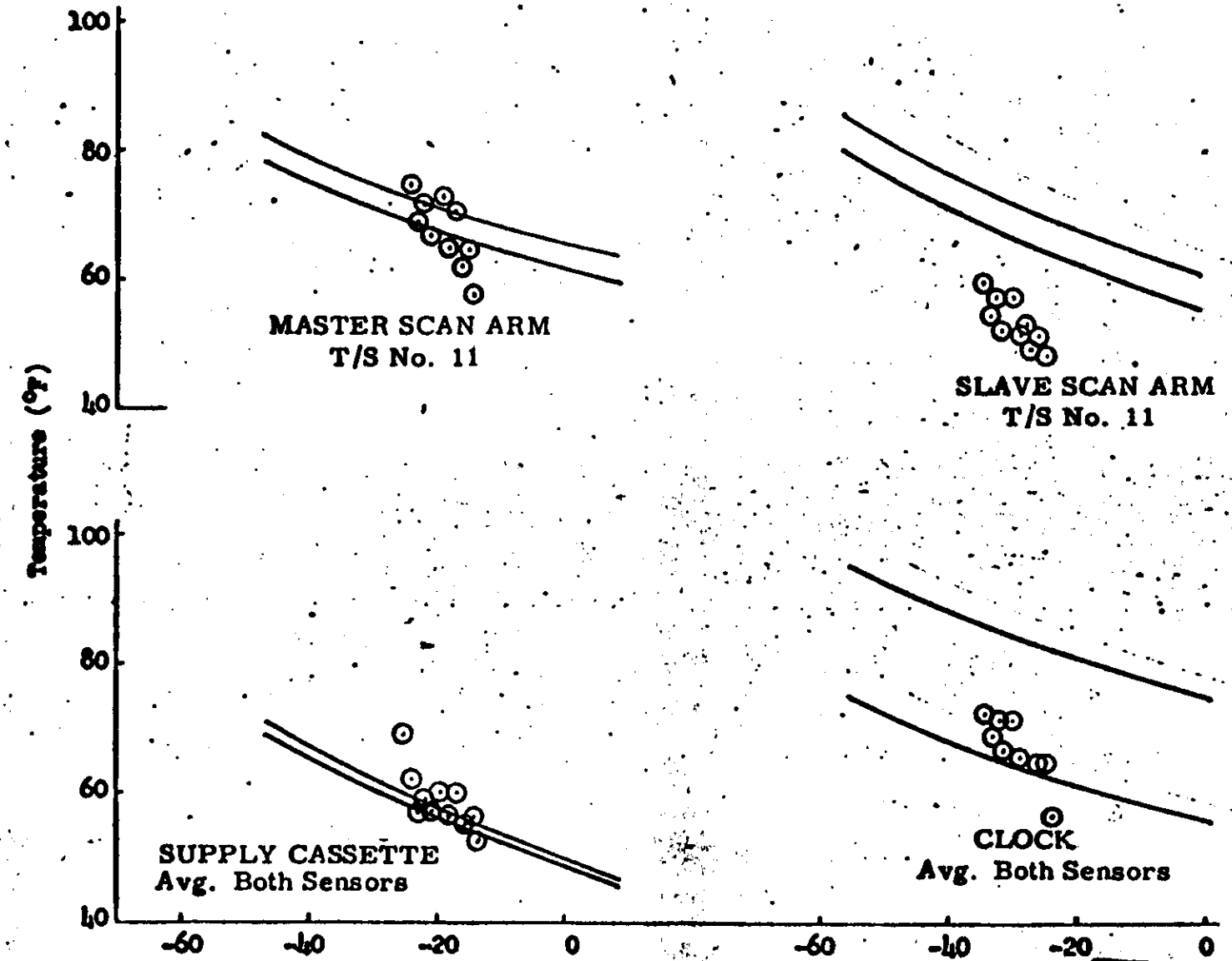


FIGURE 3-3

J-15 PREDICTED AND ACTUAL TEMPERATURES

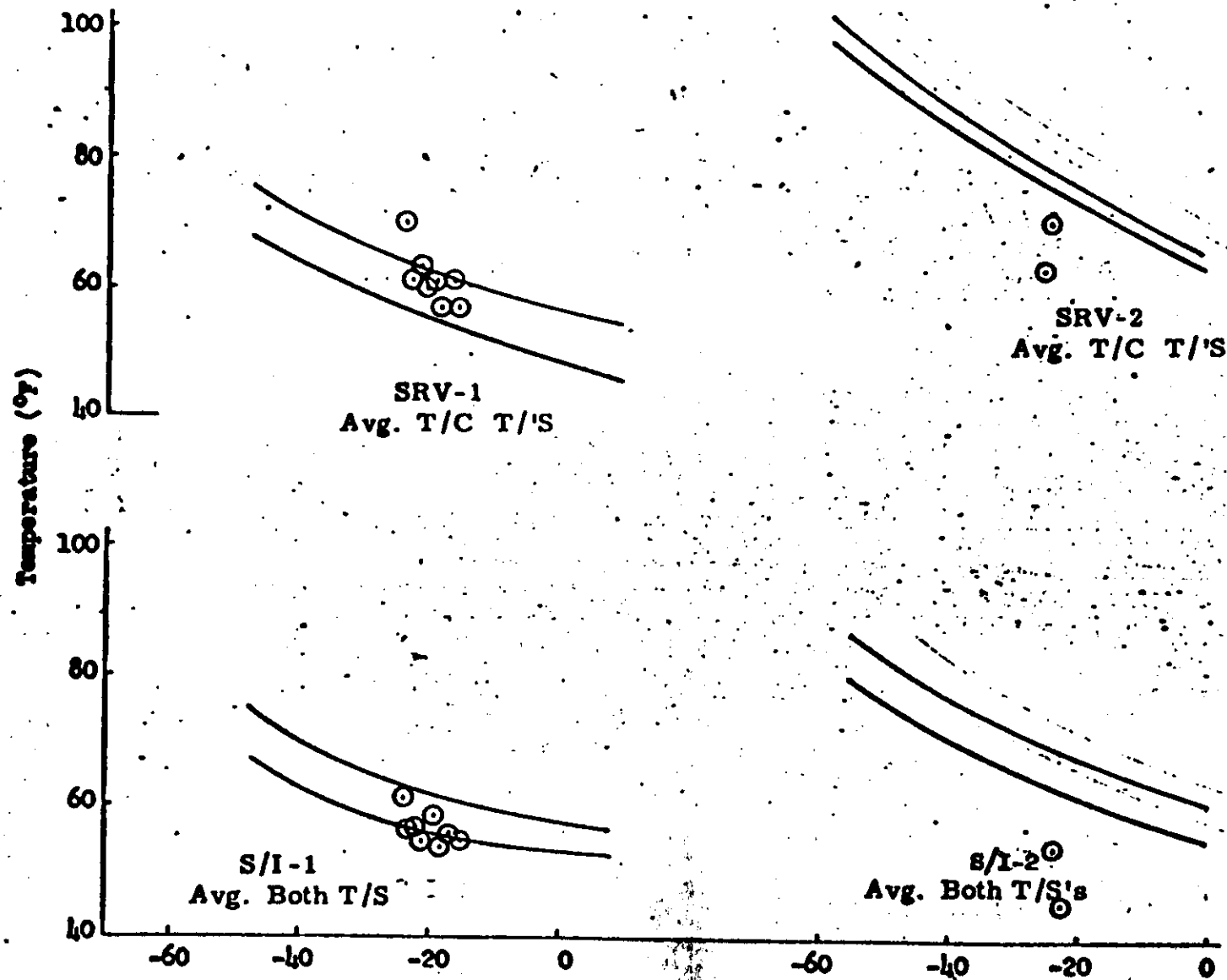


FIGURE 3-4

SECTION 4

MISSION 1013-1 RECOVERY SYSTEM

SRV #656 was received at A/P on 30 December 1963. The receiving inspection weight was 152.2 pounds. After modifications and incorporation of outstanding E.O.'s, the SRV was delivered to Systems Test for incorporation into the J-10 system. The SRV was subsequently found defective and after repair was assigned to J-15.

The Recovery System was shipped to VAFB on 16 September 1964 and finally mated to the J-15 system on 29 October 1964. A successful air catch was made during orbit 65 on 6 November 1964. Table 4-1 gives a tabulation of the sequence of recovery events.

The condition of the recovered capsule was satisfactory with damage limited to normal paint blistering. Figures 4-1 and 4-2 show the location and temperatures encountered by Templates attached to the capsule cover for the recovery system.

A complete post flight recovery sequence was conducted on the recovered capsule including cassettes and all parameters were within specification.

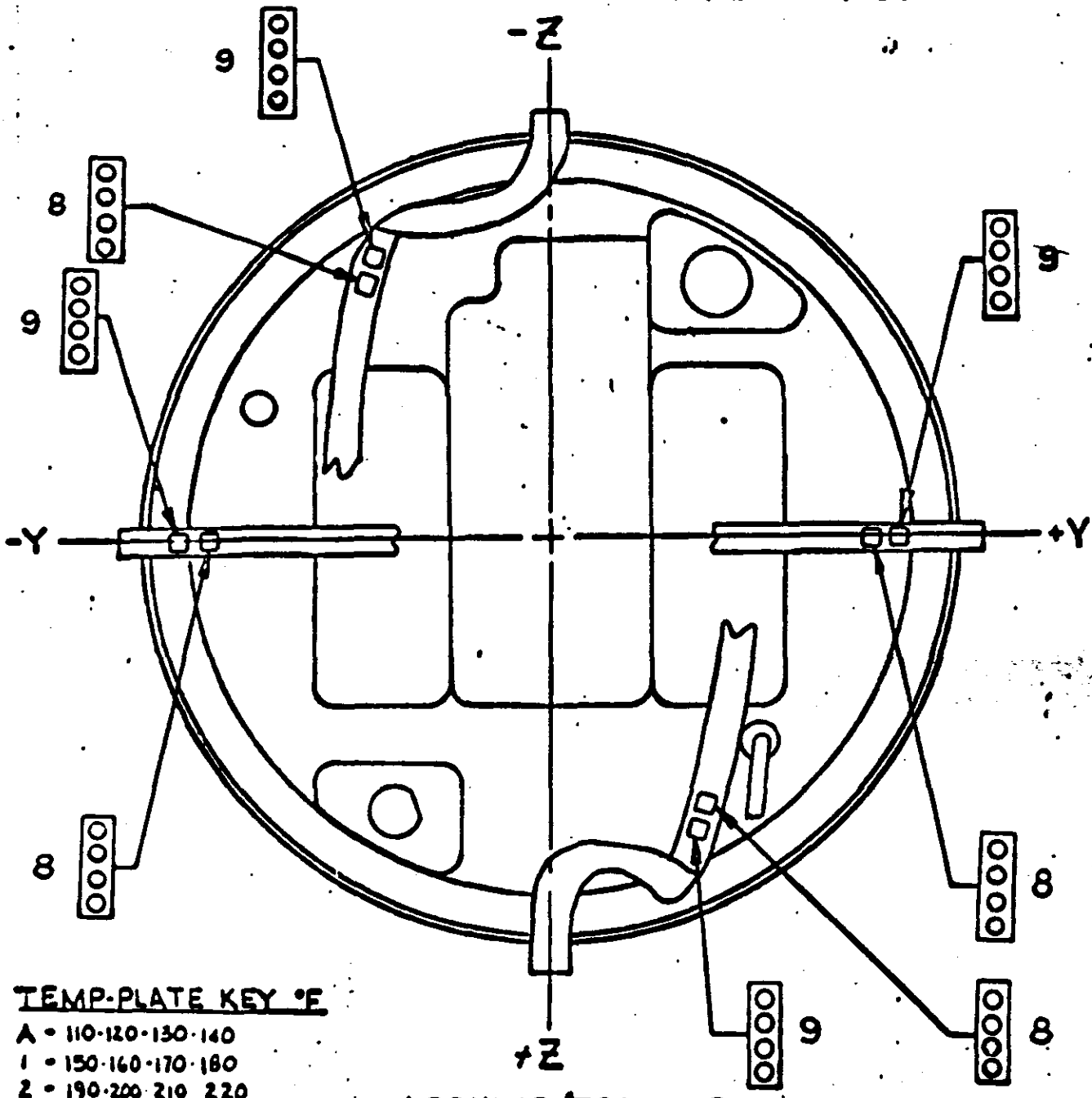
MISSION 1013-1
RE-ENTRY SEQUENCE OF EVENTS

EVENT	SYSTEM TIME	DELTA TIME Actual	DELTA TIME Nominal
Transfer	260.15	-	--
Electrical Disconnect	261.18	1.03	.90 $^{+.43}_{-.40}$
*Separation	262.15	2.00	2.0 ± .25
**Spin	264.60	3.42	3.4 ± .30
Retro	272.13	7.53	7.55 ± .45
Despin	282.82	10.69	10.75 ± .54
T/C Separation	284.49	1.67	1.5 ± .15
"G" Switch Open	677.12	392.63	--
Parachute Cover Off	710.80	33.68	34.0 ± 1.5
Drogue Chute Deployed	711.38	0.58	.63 ± .08
Drogue Chute Release	721.41	10.03	10.05 ± 1.0
Main Chute Deployed	722.04	0.63	.52 ± .12
Main Chute Disreefed	726.40	4.36	4.0 ± 1.7

* From Transfer
** From Elect. Disc.

TABLE 4-1

TEMP-PLATE INSTALLATION - Mk V-A CAPSULE



TEMP-PLATE KEY °F

A • 110-120-130-140
1 • 150-160-170-180
2 • 190-200-210-220
3 • 230-240-250-260
4 • 270-280-290-300
5 • 310-320-330-340
6 • 350-360-370-380
7 • 390-410-435-450
8 • 100-150-800-850
9 • 900-950-1000-1050

LOOKING FORWARD

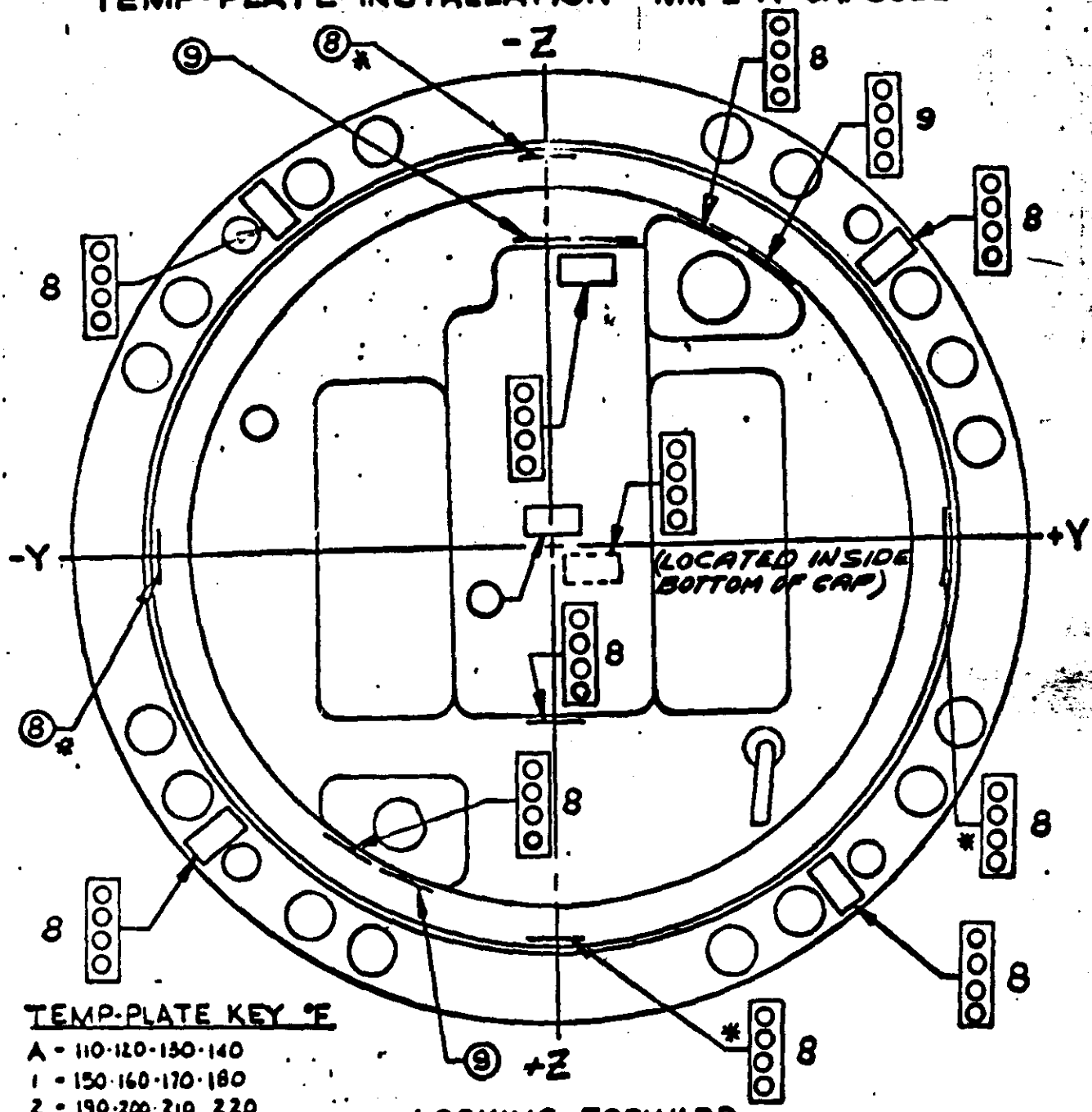
USE OF TEMP PLATES ON PARACHUTE SHROUDS

● INDICATOR TURNED BLACK TEMP REACHED OR EXCEEDED INDICATED LEVEL

1013-1

FIGURE 4-1

TEMP-PLATE INSTALLATION - Mk V-A CAPSULE



TEMP-PLATE KEY °F

A - 110-120-130-140
1 - 150-160-170-180
2 - 190-200-210 220
3 - 230 240-250-260
4 - 270 280-290-300
5 - 310-320 330-340
6 - 350-360-370 380
7 - 390-410-435-450
8 - 100-150-200-250
9 - 300-350-400-450

*LOCATED INSIDE CAPSULE ON NOSE WALL

●INDICATOR TURNED BLACK TEMP REACHED OR EXCEEDED INDICATED LEVEL

1013-1

FIGURE 4-2

SECTION 5

MISSION 1013-2 RECOVERY SYSTEM

SRV #657 was received at A/P on 20 January 1964 at a receiving weight of 149.4 pounds. After modification and incorporation of outstanding E.O.'s the capsule was delivered to systems test for incorporation into the J-10 system. An over-rich resin concentration resulted in cracks in the forebody during TASC testing. Following repair the SRV was assigned to the J-15 payload.

The capsule was shipped to VAFB on 16 September 1964. A successful air catch was made during orbit 81 on 7 November 1964. Table 5-1 lists the recovery sequence of events.

The condition of the recovered capsule was satisfactory with damage limited to normal paint blistering. Figures 5-1 and 5-2 show the location and temperatures encountered by the Templates attached to the capsule.

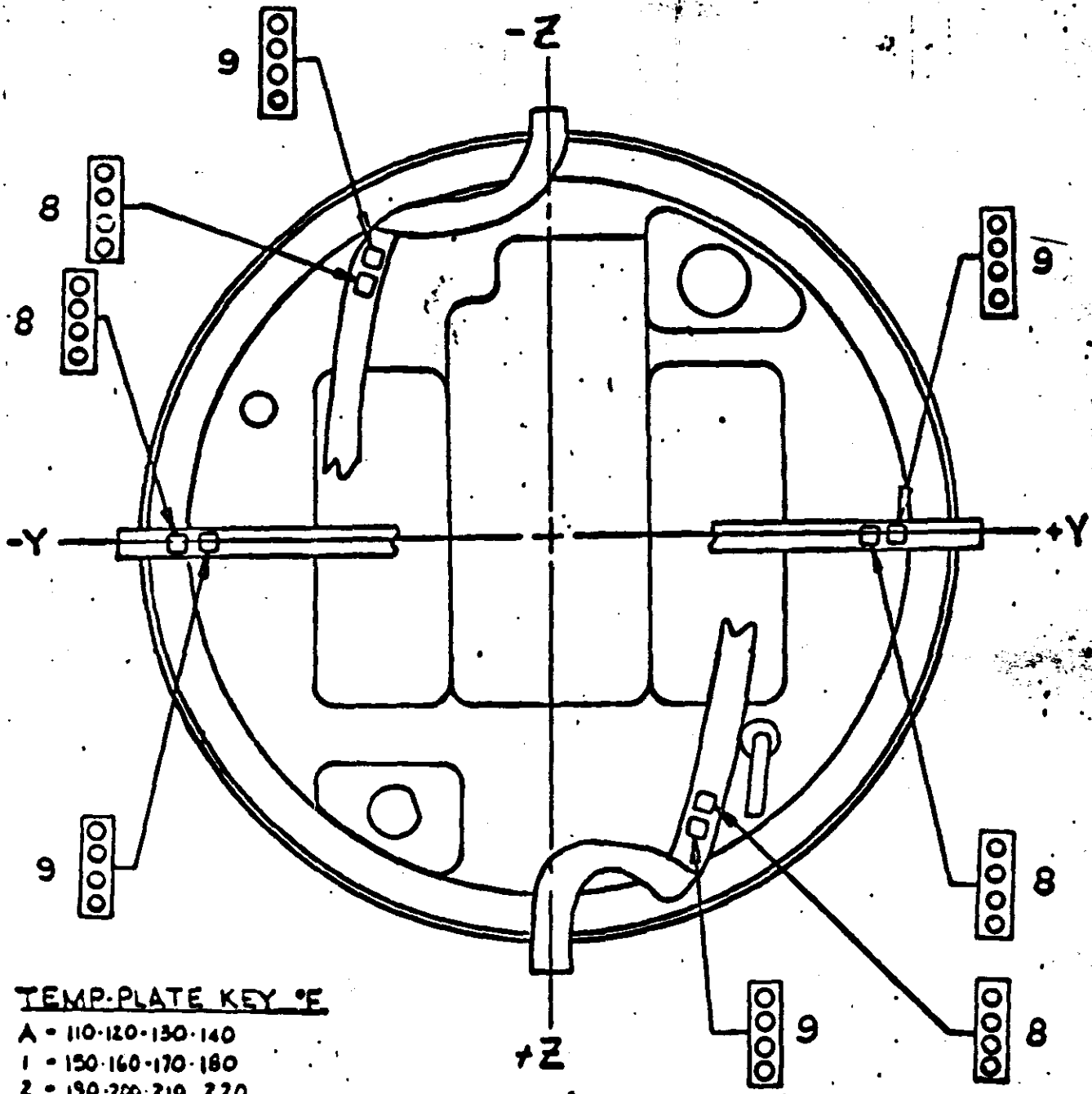
MISSION 1013-2
RE-ENTRY SEQUENCE OF EVENTS

EVENT	SYSTEM TIME	DELTA TIME Actual	DELTA TIME Nominal
Transfer	85881.45	-	--
Electrical Disconnect	85882.56	1.11	.90 $^{+.43}_{-.40}$
*Separation	85883.44	1.99	2.0 ± .25
** Spin	85885.98	3.42	3.4 ± .30
Retro	85893.52	7.54	7.55 ± .45
Despin	85904.19	10.67	10.75 ± .54
T/C Separation	85905.74	1.55	1.5 ± .15
"G" Switch Open	86369.46	463.72	--
Parachute Cover Off	003.71	34.25	34.0 ± 1.5
Drogue Chute Deployed	004.37	0.76	.63 ± .08
Drogue Chute Release	014.43	10.06	10.05 ± 1.0
Main Chute Deployed	014.93	0.50	.52 ± .12
Main Chute Disreefed	019.68	4.75	4.0 ± 1.7

* From Transfer
** From Elect. Disc.

TABLE 5-1

TEMP-PLATE INSTALLATION - Mk V-A CAPSULE



TEMP-PLATE KEY °F

A - 110-120-130-140
1 - 150-160-170-180
2 - 190-200-210 220
3 - 230-240-250-260
4 - 270 280-290-300
5 - 310-320 330-340
6 - 350-360-370 380
7 - 390-410-435-450
8 - 100-150-200-250
9 - 300-350-400-450

LOOKING FORWARD

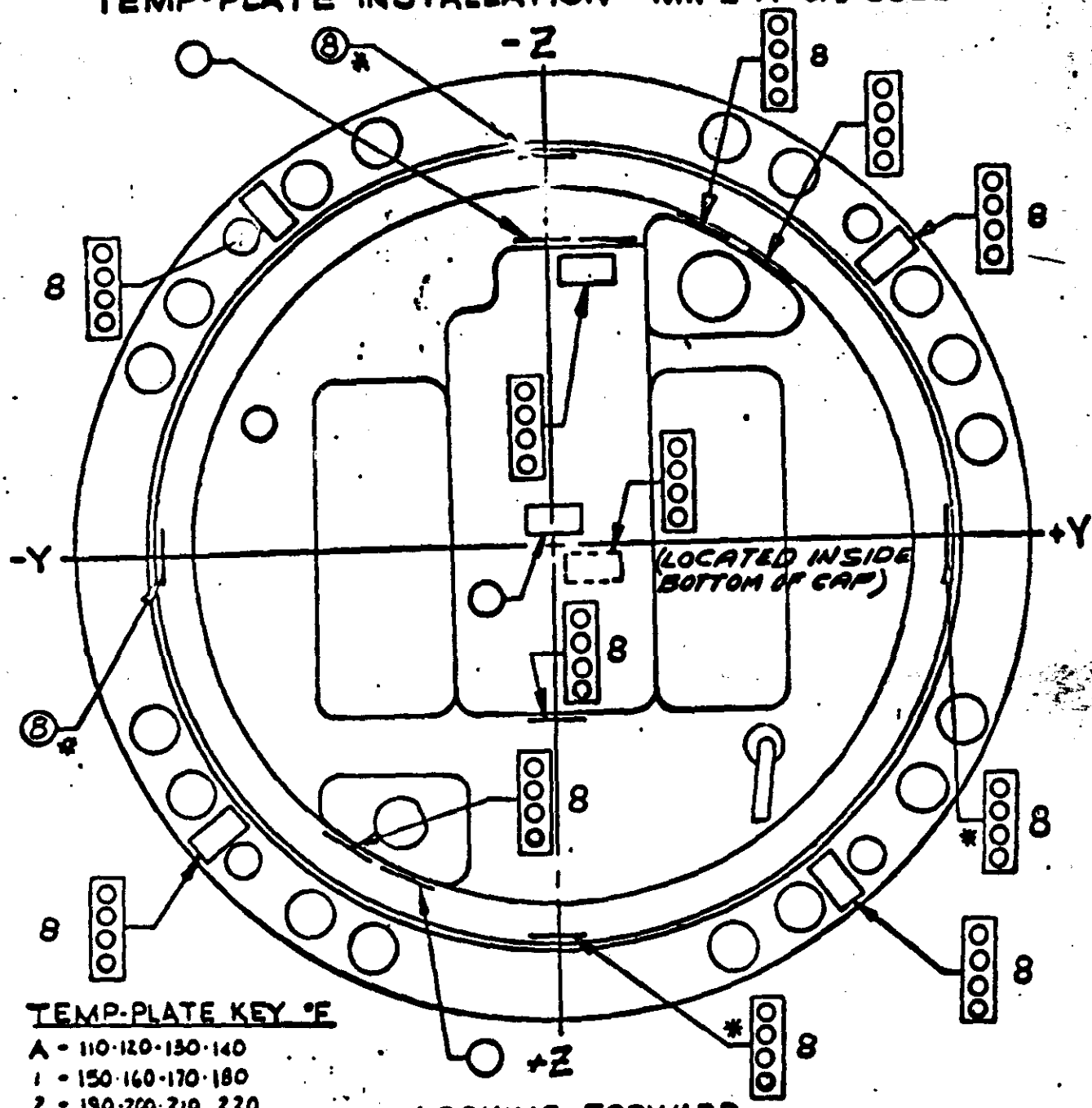
USE OF TEMP PLATES ON PARACHUTE SHROUDS

● INDICATOR TURNED BLACK TEMP REACHED OR EXCEEDED INDICATED LEVEL

1013-2

FIGURE 5-1

TEMP-PLATE INSTALLATION - Mk V-A CAPSULE



TEMP-PLATE KEY °F

A = 110·120·130·140
1 = 150·160·170·180
2 = 190·200·210 220
3 = 230 240·250·260
4 = 270 280·290·300
5 = 310·320 330·340
6 = 350·360·370 380
7 = 390·410·435·450
8 = 100·150·200·250
9 = 300·350·400·450

* LOCATED INSIDE CAPSULE ON NOSE WALL

● INDICATOR TURNED BLACK TEMP REACHED OR EXCEEDED INDICATED LEVEL

1013-2

FIGURE 5-2

SECTION 6

MASTER (FWD) PANORAMIC CAMERA

A. COMPONENT ASSIGNMENT

Component	Serial Number
Main Camera	158
Main Camera Lens	1302435
Supply Horizon Camera	173B
Supply Horizon Camera Lens	813550
Take-up Horizon Camera	164A
Take-up Horizon Camera Lens	813512
Supply Cassette	SC-20

B. CAMERA DATA AND FLIGHT SETTINGS

Main Camera:

Lens	24" f/3.5
Slit Width	0.225"
Filter Type	Wratten 21
Film Type	Eastman Type 4404

Supply (Port) Horizon Camera:

Lens	55mm f/6.8
Aperture Setting	f/6.8
Exposure Time	1/100 second
Filter Type	Wratten 25

Take-up (Starboard) Horizon Camera:

Lens	55mm f/6.8
Aperture Setting	f/8.0
Exposure Time	1/100 second
Filter Type	Wratten 25

C. POST FLIGHT PERFORMANCE EVALUATION

The camera operated properly up to pass D47E of Mission 1013-1. During passes D47E, D51 and D52 film metering was unstable causing intermittent out of focus frames. The soft imagery was present in frames that were longer than nominal by as much as o.090". The camera failed at or near the start of the third programmed operate sequence of pass D52.

Table 6-1 lists the known data at the time that film metering ceased in both panoramic cameras. It is from this data that the time of failure is calculated. The exact cause of the failure is unknown however the most probable cause is a temporary loss of power to the take-up cassettes. The fact that the cameras did not fail at the same time does not fully support this postulate although it is possible for a camera to meter some film without take-up tension. The camera continued to operate properly through Mission 1013-2, as evidenced by the normal operation of both Stellar-Index cameras, however no panoramic camera film was metered after the failure during pass D52.

The second major anomaly encountered by the Master camera was the acquisition of 416 frames of photography during passes A-01 and D-01 of which only the last 14 frames were programmed. The failure and probable cause is discussed in Section 3 of this report.

The overall photographic quality up to pass D47E was considered to be somewhat lower than recently observed. This quality reduction was attributed to an increased cloud and atmospheric haze coverage. In those areas not affected by these conditions the photographic quality and information content rated among the best observed to date.

MISSION 1013-1
PANORAMIC CAMERA FAILURES - PASS D52

	MASTER CAMERA	SLAVE CAMERA
MISSION 1013-1 LAST FRAME	#104 + 3-1/8" of #105	#107 + 15-1/2" of #108
MISSION 1013-2 LAST FRAME	#107 + 10-1/2" of #108	#110 + 22-1/2" of #111
AT END OF PASS MARK AT FAILURE	18-1/2" of #110	1/4" of #114
TIME WORD AT EXPOSURE	#104 - 99957397	#105 - 99957777
PROGRAMMED CAMERA OFF	#109	#110
PROGRAMMED CAMERA ON	#110	#111
CAMERA FAILURE	At or near camera On	Apx. 2-1/2 cycles after camera On

TABLE 6-1

There were some minor light leaks near the beginning and end of most camera operations. The resulting degradation was far less severe than resuslted during recent missions. No dendritic static or corona discharge fogging was observed on the recovered film.

The horizon cameras, binary data block and 200 cycle time track operated properly throughout the mission.

SECTION 7

SLAVE (AFT) PANORAMIC CAMERA

A. COMPONENT ASSIGNMENT

Component	Serial Number
Main Camera	159
Main Camera Lens	1362435
Supply Horizon Camera	166B
Supply Horizon Camera Lens	813553
Take-up Horizon Camera	129A
Take-up Horizon Camera Lens	812272
Supply Cassette	SC-20

B. CAMERA DATA AND FLIGHT SETTINGS

Main Camera:

Lens	24" f/3.5
Slit Width	0.225"
Filter Type	Wratten 21
Film Type	Eastman Type 4404

Supply (Starboard) Horizon Camera:

Lens	55mm f/6.8
Aperture Setting	f/8.0
Exposure Time	1/100 second
Filter Type	Wratten 25

Take-up (Port) Horizon Camera:

Lens	**55mm f/6.8**
Aperture Setting	**f/6.8**
Exposure Time	**1/100 second**
Filter Type	**Wratten 25**

C. POST FLIGHT PERFORMANCE EVALUATION

The camera operated properly up to frame 89 of pass D24. During the exposure of frame 90 one half of the format, along the major film axis, went out of focus as the scan head passed a manufacturers splice. A sketch of frames 89, 90 and 91 acquired during pass D24 is shown in Figure 7-1. Approximately 65% of all frames following frame 91 exhibited this same out of focus condition.

A small out of focus area was noted at the supply end of random frames starting in pass D04. The soft imagery corresponds in area and magnitude to similar anomalies in previous missions. It is not considered that there is any relationship between this degradation and the anomaly that began during pass D24.

The quality of the Slave camera photography was essentially the same as the Master camera in areas that were not degraded by out of focus imagery.

The binary data block and horizon cameras operated properly during the mission. The 200 cycle time track ranged from light to non-existent. The frequency marks were imaged inside the format area and could only be detected where background density conditions were ideal.

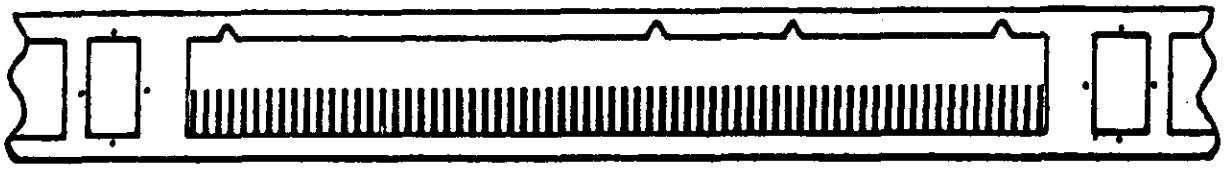
MISSION 1013-1

SLAVE CAMERA FORMATS

CAMERA NO. 159 PASS NO. D24 FRAME NO. 89

CAMERA NO. 159 PASS NO. D24 FRAME NO. 90

CAMERA NO. 159 PASS NO. D24 FRAME NO. 91



DATA KEY:

Sharp focus.

Soft focus.

Manufacturers splice.

FIGURE 7-1

SECTION 8

PANORAMIC CAMERA EXPOSURE

The exposure parameters of both the panoramic cameras were the normal 0.225 inch wide slit and Wratten 21 filter. These conditions place the nominal exposure on the intermediate level processing curve, as published by [redacted] for their 3404 emulsion.

The illumination conditions during the mission were relatively broad as the flight was conducted near the autumnal equinox. The frequency distributions of the solar elevations and solar azimuths encountered during the photographic operations are shown in Figures 8-1 and 8-2.

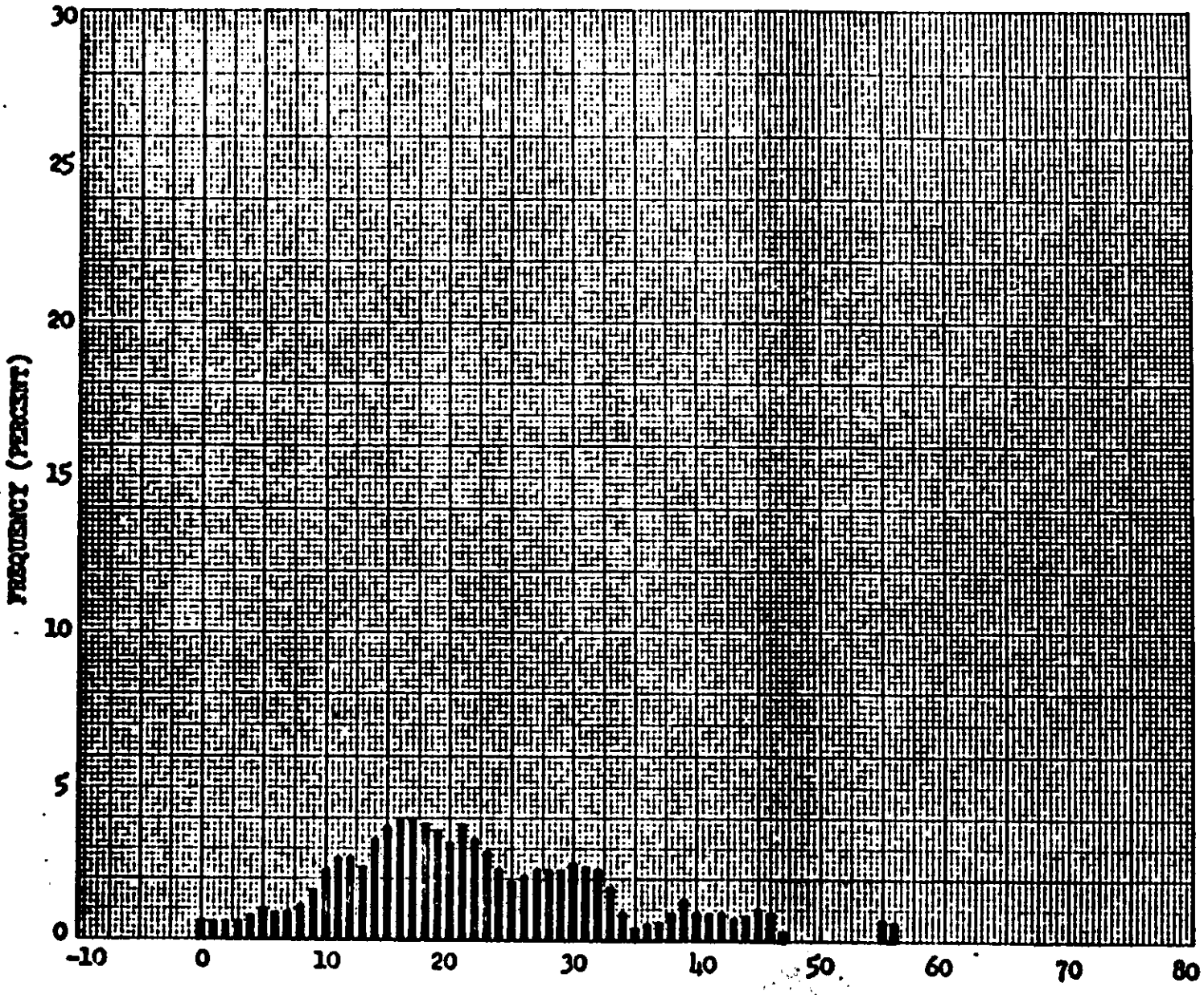
The nominal exposure times are shown as a function of latitude for passes D08 and D56 in Figures 8-3 and 8-4. The predicted level of processing for the original negative is based on the in-flight performance estimate and is tabulated below with the processing levels reported by [redacted]

Mission	Camera		Primary	Intermediate	Full
1013-1	FWD	Predicted	0	64	36
		Reported	0	42	58
1013-1	AFT	Predicted	0	63	37
		Reported	2	7	91

The variation in the predicted and reported processing levels is generally consistent with the data observed from recent missions. The use of greater percentages of full processing has been experienced throughout the Corona program. Further analysis and calculations are in process to attempt to ascertain the optimum exposure-processing conditions.

~~TOP SECRET~~ [redacted]

SOLAR ELEVATION FREQUENCY DISTRIBUTION



Mission No: 1013-1

Payload No: J-15

Camera No: 158

Launch Date: 11/2/64

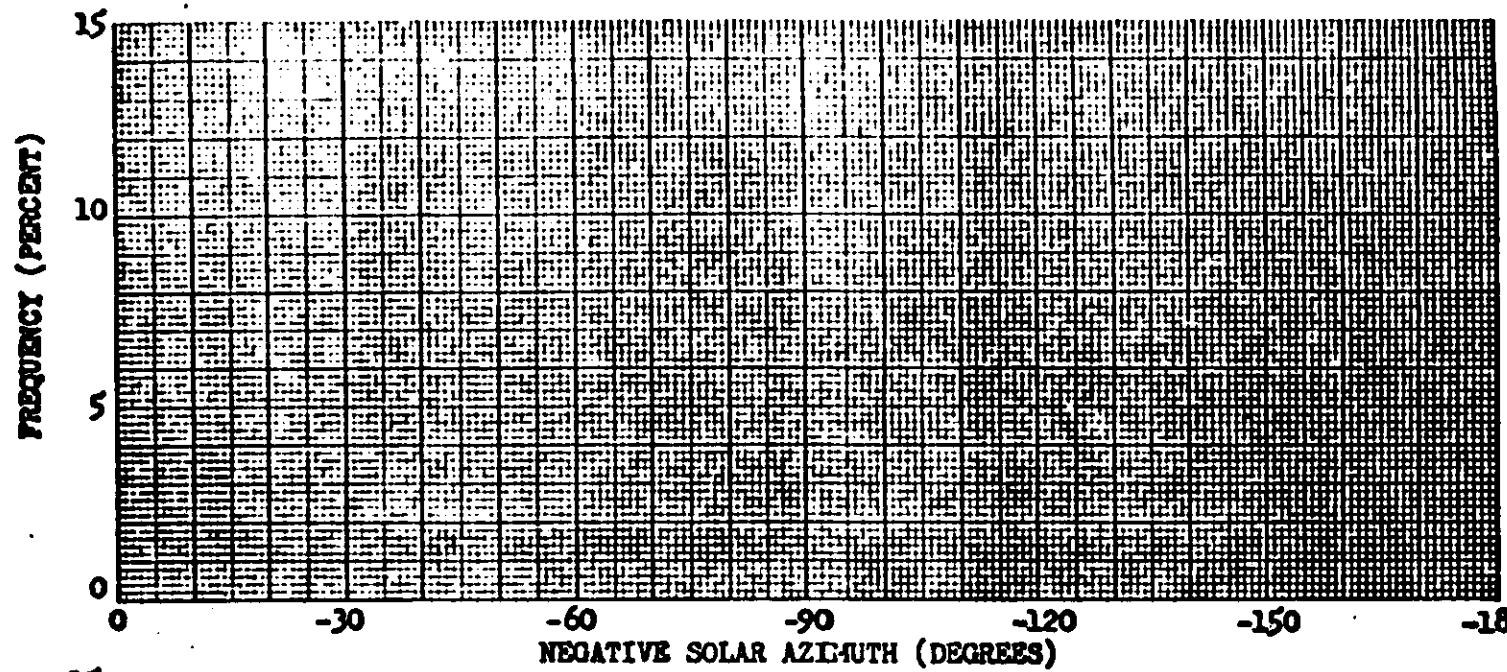
Launch Time: 2130 Z

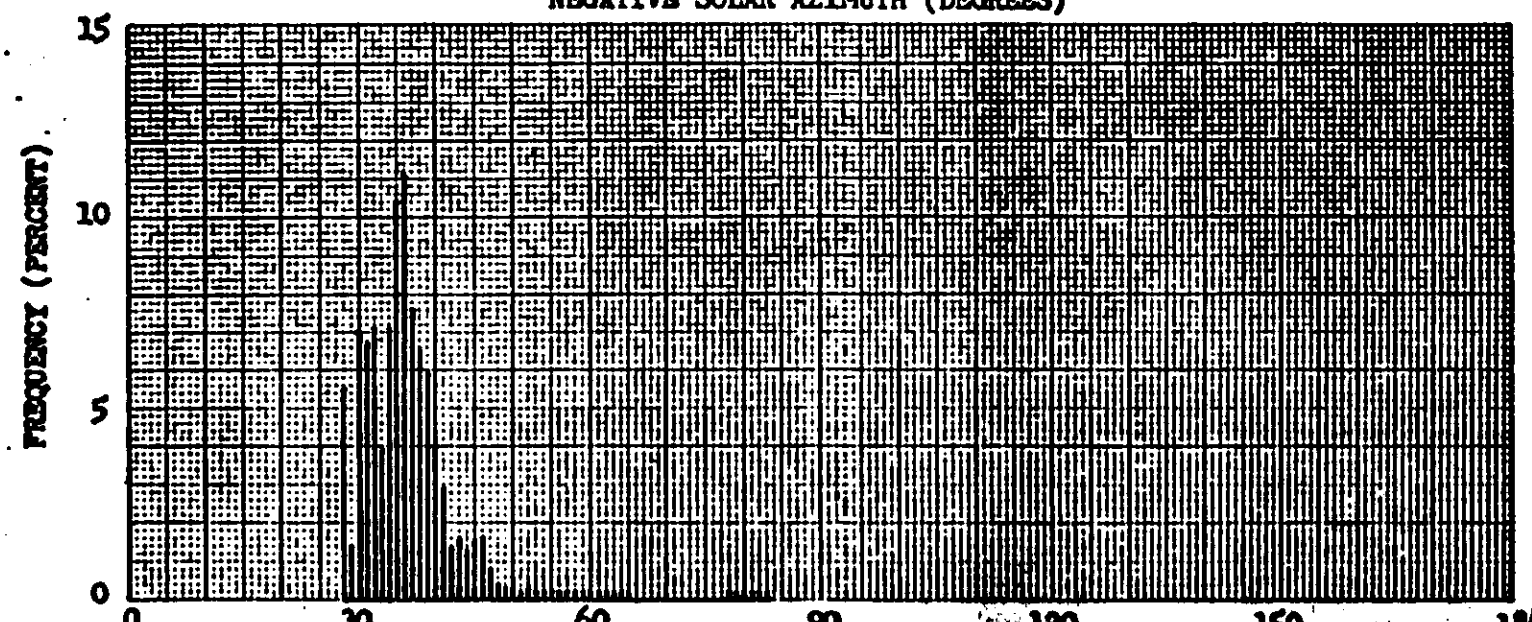
Inclination: 75°

~~TOP SECRET~~ [redacted]

FIGURE 8-1

SOLAR AZIMUTH FREQUENCY DISTRIBUTION





Mission No: 1013-1

Payload No: J-15

Camera No: 158

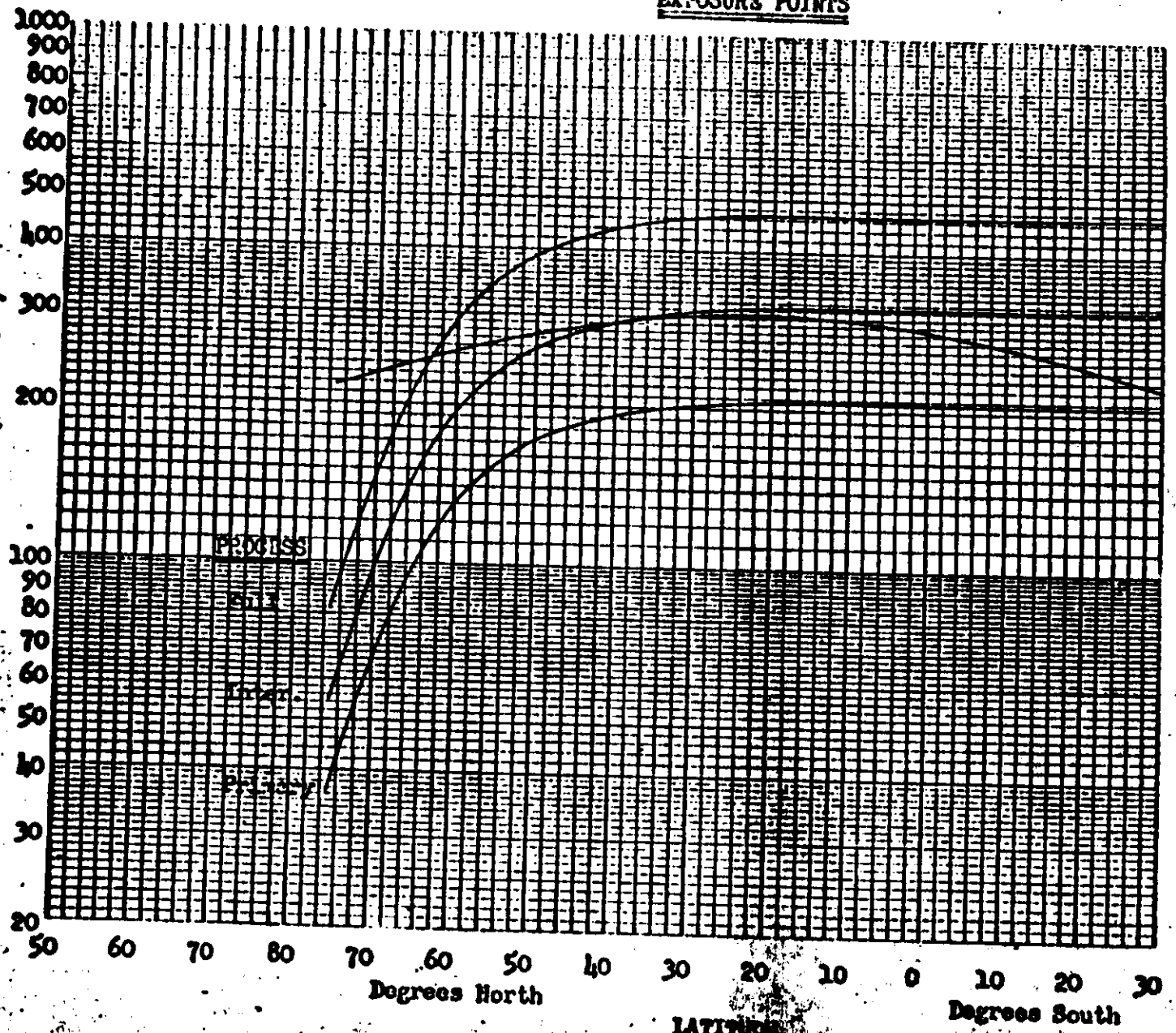
Launch Date: 11/2/64

Launch Time: 2130 Z

Inclination: 75°

SIGN NOTATION

EXPOSURE POINTS



Mission No: 1013

Payload No: J-15

Camera No: 158 & 159

Pass No: 8

Launch Date: 11/2/64

Launch Time: 2130 Z

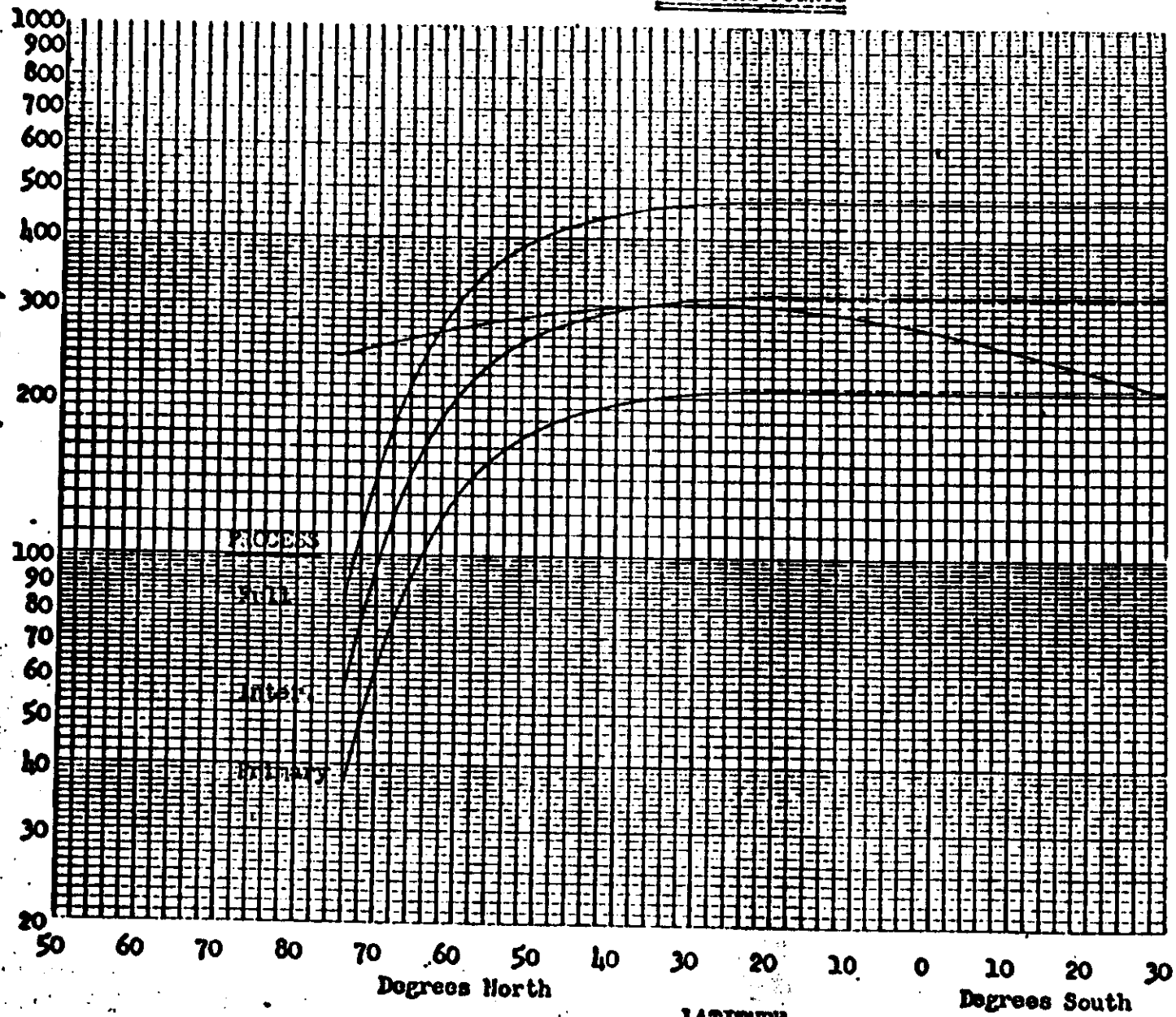
Slit Width: 0.225"

Filter Type: Wratten 21

Film Type: 4404

FIGURE 8-3

EXPOSURE POINTS



Mission No: 1013

Payload No: J-15

Camera No: 158 & 159

Pass No: 56

Launch Date: 11/2/64

Launch Time: 2130 Z

Slit Width: 0.225"

Filter Type: Wratten 21

Film Type: 4404

FIGURE 8-4

The camera slit and filter combination selected for Mission 1013 produced an exposure that was somewhat greater than selected for previous missions. The predominant factor that leads to this choice was the extensive camera operations that were programmed near the solar terminator.

SECTION 9

DIFFUSE DENSITY MEASUREMENTS

Table 9-1 lists mission data supplied by AFSPPL. This data includes the visual Reciprocal Edge Spread (RES) values, the area on the format in which the value was obtained and the general characteristics of the edge as shown on the data key page. The densitometric measurements of the base plus fog, minimum and maximum terrain densities and the maximum cloud densities are also listed with other general data such as solar elevation, altitude and overlap.

The columns are arranged in the following order:

COLUMN NUMBER	HEADING	DATA
1	-	Ascending or Descending pass
2-4	Pas Nbr	Pass Number
5	-	FWD or AFT camera
6-8	Frm Nbr	Frame Number
9-17	Area 1 RES	RES data in area 1
9-11	WWW	With flight RES value
12-14	AAA	Across flight RES value
15	S	Subject - see key
16	T	Terrain - see key
17	Q	Qualifiers - see key
18-26	Area 2 RES	RES data in area 2
27-35	Area 3 RES	RES data in area 3
36-44	Area 4 RES	RES data in area 4
45-53	Area 5 RES	RES data in area 5
54-56	D min	Terrain minimum density
57-59	D max	Terrain maximum density
60-62	D B+F	Base plus fog density
63-65	LIM max	Cloud maximum density

COLUMN NUMBER	HEADING	DATA
66-68	LAT.	Latitude
68	T.	0 = North, 1 = South
69-71	Sun Ele	Solar Elevation
73-74	CLD	Percent cloud cover
75-76	OL	Percent overlap

The data key for the listings of the "Subject", "Terrain" and "Qualifiers" is shown below.

I SUBJECT

1. Buildings
2. Roads, runways
3. Tanks, A/C, other man-made
4. Non-cultural

II TERRAIN

1. Flat
2. Hilly
3. Mountains
4. Flat and snow
5. Hilly and snow
6. Mountains and snow

III EDGE QUALIFIERS

1. Clear
2. Snow
3. Hazy
4. Shadow
5. Snow and Haze
6. Snow and Shadow
7. Haze and Shadow
8. Snow, Haze and Shadow

1013-1

PAS	FRMAREA1	RESAREA2	RESAREA3	RESAREA4	RESAREA5	RES	D	D	D	LIM	SUN
NBR	NBRWWWAAASTQWWWAAASTQWWWAAASTQWWWAAASTQWWWAAASTQMINMAXB+FMAXLATELECLDOL										
											02021459N+1410099
DC03F005											12016002021858N+1409805
DC03F010			099085412								166216020222257N+1609099
DC03F020											02022055N+1710099
DC03F027											080165021210 65N+ 902599
DC04F005				072072431							052210017180 63N+1001099
DC04F015											062208015170 62N+1200507
DC04F025			078085432								052192015187 60N+1301099
DC04F035											050222019231 58N+1501510
DC04F045		104094431									067218022228 53N+1901099
DC04F058											056200022224 51N+2001010
DC04F068			085085411								144218014214 57N+1509099
DC05F005			085072422								046210014000 56N+1600099
DC05F015											030194014000 54N+1800005
DC05F025			104104111								045182014180 53N+1901599
DC05F035											080160014212 45N+2609099
DC05F050	104094112										01422044N+2709899
DC05F060											01322042N+2810099
DC05F070											01322240N+2910099
DC05F080											01322639N+3010099
DC05F087											057090019220 59N+1406003
DC08F007			094090111								042106019178 57N+1501099
DC08F017											040104019210 56N+1701005
DC08F027			099094111								01318049N+2210099
DC08F041											058159018000 48N+2300005
DC08F051			078072412								060171017000 46N+2400099
DC08F061											069198012000 44N+2500005
DC08F071			078090431								074190011000 43N+2700099
DC08F081											072165012000 41N+2800007
DC08F091			104104431								060161011000 40N+2900099
DC08F101											040169011000 38N+3100005
DC08F111			C67072431								028179011000 36N+3200099
DC08F											01200039N-4600009
[illegible]											01620854N+1910099
DC09F005											01721853N+2010099
DC09F015											01621051N+2110099
DC09F025											042052012212 49N+3308099
DC09F035				118104111							048092016222 47N+2409599
DC09F045											074140018218 46N+2509599
DC09F055											072078112054 13401821645N+2509099
DC09F056											01821344N+2705099
DC09F066											01822442N+2808099
DC09F076											098149019239 03S+5507599
DC10F005	094082412										074136012241 05S+5507599
DC10F015											087124013239 06S+5508099
DC10F024				075094412							01619437N+3204099
DC16F005											02012836N+3309099
DC16F012											075190020230 57N+1606099
DC19F005				099090431							056206016218 56N+1708599
DC19F015											056207015218 54N+1805004
DC19F025			111090431								

TABLE 9-1

1013-1

PAS NBR	FRMAREA1 NBRWWWAAASTQ	RESAREA2 WWWAAASTQ	RESAREA3 WWWAAASTQ	RESAREA4 WWWAAASTQ	RESAREA5 WWWAAASTQ	RES WWWAAASTQ	D MINMAX	D B+F	D MAXLAT	LIM ELECLDCL	SUN
D019F035											058 16401722053N+2003099
DC19F047											02424051N+2104099
D021F005			104099111								062192020251N+2106099
D021F015											04218801420650N+2206099
D021F025		094094111									035 18201319848N+2400305
DC21F035											05421401400043N+2800099
D021F045			094082131								02819201400042N+2900005
DC21F055											042 20401421640N+3008599
DC21F064		067063112									072 14001420239N+3105099
DC21F071											08015401421038N+3205099
DC21F081					082082212						045 14801622429N+3802099
DC21F091											060165020232 28N+4007099
DC21F101		090085212									06218001923326N+4105099
DC21F111											01823025N+4209099
DC21F118			094099111								050138018230 24N+4308506
DC23F005											01620156N+1610099
DC23F014		104094111									065106016121 55N+1707599
DC23F024											061122012170 53N+1804099
DC23F034											01017452N+2010099
DC23F044											01118850N+2110099
DC23F050			085094422								058 11901518749N+2209506
DC23F060											074 21601616047N+2301599
DC23FC70		078078421									078 15901620846N+2507507
DC23F080											072 20001519744N+2605099
DC23FC91			111094111								046111011000 40N+3000003
DC23F101											04120801020039N+3107599
DC23F111			099104433								054211010210 37N+3200504
DC23F121											04721401623536N+3300599
DC24FC05			C94090411								05209002015070N+ 403001
DC24F015											059089020182 66N+ 508099
DC24F025			C72085412								05811801917967N+ 708003
DC24FC35											05717402019865N+ 903099
DC24F045			085082411								036174020194 63N+1002505
DC24FC55											05415102021061N+1209599
DC24F066											02021551N+2110099
DC24FC74			078085111								079 12001821850N+2209899
DC24F084											06909401419849N+2309099
DC24F094			134125111								04613001516847N+2401006
DC25FC05					099090111						038060019188 56N+1602099
DC25FC15											06708401820855N+1709099
DC25F025											01821053N+1910099
DC30F005											01422023N+4306099
DC30FC08		099085111									04810001421223N+4407099
D030F018											01222021N+4501599
DC30F025											01222020N+4503599
DC31FC05			094085111								03218001600032N+3700003
DC31FC15											04615201919831N+3800299
DC31F020			094099131								038140019218 30N+3800507
DC35F005			090085433								108224023212 62N+1100508
DC35F015											08922002216061N+1200599

TABLE 9-1

1013-1

PAS	FRMAREA1	RESAREA2	RESAREA3	RESAREA4	RESAREA5	RES D	D	D LIM	SUN
NBR	NBRWWWAAASTQWWWAAASTQWWWAAASTQWWWAAASTQWWWAAASTQMINMAXB+FMAXLATELECLDOL								
D035F025	078078433							07222902321459N+1409099	
D035F035								02320858N+1510099	
D036F005		061065311						05613601800063N+1100006	
D036F015								05214001614062N+1201599	
D036F025								09011601616060N+1409899	
D036F035						090094411	052132	01618258N+1508099	
D036F043								09818501719257N+1608599	
D036F053								07112001720053N+2010099	
D036F062			085094412					08317001621052N+2109099	
D036F072								08414401721150N+2209999	
D036F087		104094111						04911802223145N+2604007	
D036F097								03311102120743N+2700299	
D036F107								02221742N+2910099	
D036F113								02223141N+2910099	
D037F005		067070421						05012402017265N+ 908008	
D037F015								04714601918064N+1007099	
D037F025			059065422					05115401918562N+1206099	
D037F035								05914601921060N+1309099	
D037F043						078078411	056170	01920259N+1409599	
D037F055								01522054N+1909999	
D037F065		085090111						02118801319052N+2004009	
D037F075								03518901916951N+2200099	
D037F085		094085431						03020401917649N+2301506	
D037F095								01922031N+3800099	
D037F105								01522729N+4010099	
D037F115								01222227N+4100099	
D037F125		085078432						06112201222926N+4208599	
D037F135								03310901320624N+4300099	
D037F145		082081412						06020801916023N+4400499	
D037F155								01923221N+4505099	
D037F165								01223020N+4708099	
D038F005								01116357N+1610099	
D038F015			000090211					04409201118956N+1709507	
D038F025								02615201116054N+1802099	
D038F035		094094433						03516101100042N+2900008	
D038F045								09215601317441N+3004099	
D038F055			082078433					05213601321039N+3105508	
D039F005								04413202118564N+ 903507	
D039F015								05413002121863N+1007099	
D039F025								07817002122061N+1109899	
D039F035						054043212	044	19502122960N+1309599	
D039F045								04514602422858N+1408599	
D039F055								07614002223056N+1609899	
D039F065								07210802221855N+1709599	
D039F075								05711001921153N+1909899	
D039F085			049047211					04612601500047N+2500099	
D039F095								05014501417845N+2602099	
D039F105						072072312	065	12901519044N+2802510	
D039F115								06216601518542N+2901599	
D039F125		C72075431						03014801512941N+3001007	

TABLE 9-1

PAS NBR FRM NBR	AREA1 WWWAAASTQ	RES AREA2 WWWAAASTQ	RES AREA3 WWWAAASTQ	RES AREA4 WWWAAASTQ	RES AREA5 WWWAAASTQ	RES D MIN D MAX D B+F LIM MAX LAT ELE SUN CL DCL
DC39F135						02616001400039N+3100099
DC39F145			067072111			04018701400038N+3300010
DC40F005		094099111				04014802121059N+1405006
D040F015						03814802122558N+1503099
DC40F025			094099111			03416202121056N+1702510
DC40F035						04409202121354N+1804599
D041F005	094104111					07410502020451N+2109099
DC41F015						06609902021450N+2309099
DC41F025					118111111	06008401821648N+2408599
DC41F035						01621846N+2510099
DC47F005			085072211			02019001200037N+3300007
DC47F015						03817001200036N+3500099
DC47F025			111099111			03213801100034N+3600007
DC47F035						03016801300032N+3700099
D047F041		075078432				02415701100031N+3800099
DC51F005			082075433			03818001200063N+ 900006
DC51F015						05019601200062N+1000099
DC51F025			094090433			04020401200060N+1200008
DC51F035						04719601200059N+1400009
DC51F044						01619458N+1510099
DC52F005				070067421		03805801913669N+ 404099
DC52F015						04012101800068N+ 500099
DC52F025			078085421			07013801800066N+ 600006
DC52F035						06014101800064N+ 800099
DC52F045			085085421			06113901900063N+ 900005
DC52F055						04617101900059N+1400099
DC52F065			085078421			05216401900058N+1500005
DC52F075						07019101500056N+1600099
DC52F085			094090421			03819601300055N+1800006
DC52F095						04415001300053N+1900099
DC52F104			070067121			03916601300052N+2000006
DC03A005						01720660N+1310099
DC03A015						01820558N+1410099
DC03A021		055075411				12516001721257N+1509899
DC03A025						12019501821557N+1609099
D003A028		082061413				09520501921156N+1608099
DC04A005				078075431		07216201816266N+ 800205
DC04A015						09020901800065N+ 900007
D004A025			090085431			09621301800063N+1100005
DC04A035						09221201817461N+1200208
DC04A045			063067431			08221501719259N+1400208
DC04A058						06613801821854N+1806599
DC04A068		090094413				05420201819253N+2000507
D004A074						06016801820152N+2100707
DC05A005						13821402021458N+1409899
DC05A007			082078411			11818501921050N+1409006
DC05A015						09522002020457N+1503007
DC05A025			070067421			05419801800055N+1700006
DC05A035						06219001800054N+1800006
DC05A041				082075121		05516801921653N+1900007

TABLE 9-1

1013-1

PAS	FRMAREA1	RESAREA2	RESAREA3	RESAREA4	RESAREA5	RES	0	0	0	LIM	SUN
NBR	NBRWWWAAASTQWWWAAASTQWWWAAASTQWWWAAASTQWWWAAASTQMINMAXB+FMAXLATELECLDOL										
DC05A050										01921846N+2510099	
DC05A060				075072411						07215001922044N+2707599	
DC05A070										01822143N+2810099	
DC05A080										01920841N+2910099	
DC05A090										02022640N+3010099	
DC08AC05										01818460N+1310099	
DC08A015				094104111						05908501616558N+1402506	
DC08A025										04412201616656N+1601599	
DC08AC32		094094111								04009401619055N+1701006	
DC08A042										01720850N+2210099	
DC08A052										01721249N+2310099	
DC08A054085090111										09813101621048N+2308599	
DC08A064										06013601600047N+2400099	
DC08AC74		070067411								09720801800045N+2600007	
DC08A084										07521001900044N+2700099	
DC08A094		049063411								09617401200042N+2800006	
DC08A104										05216001200040N+2900099	
DC08A114		072065421								04917601100039N+3100007	
DC08A127										03019001500037N+3200099	
AC09A005										01500038N-4700099	
DC09AC05										01017055N+1810099	
DC09A015										00715854N+1910099	
DC09A025										00815952N+2010099	
DC09AC35										08508211204311400814750N+2209899	
DC09A045										06911401621749N+2309099	
DC09AC55		104099112								05609101621847N+2409599	
DC09A065										01521745N+2507599	
DC09A075										01622044N+2705099	
DC10A005			C72067422							10617501622802S+5406099	
DC10AC15										11016401623204S+5405099	
DC10A025			070070122							10015501623305S+5506010	
DC16AC08										01621638N+3206099	
DC19AC05										01521058N+1506099	
DC19A015		075078412								09019501621157N+1604007	
DC19A025										07818901621155N+1809099	
DC19A035			078085422							06521801521853N+1902007	
DC19A045										08616501521051N+2007599	
DC21A005			094099421							05218201820352N+2000504	
DC21A015										05416001618651N+2109099	
DC21A024			C90082421							05614601619249N+2205007	
DC21A034										06815801700044N+2700099	
DC21AC44			094090111							05616601600043N+2800007	
DC21A054										03815601600041N+2900099	
DC21A064			078082111							07015201700039N+3100008	
DC21A074										01621C38N+3209999	
DC21AC84			078075112							08120001920630N+3807506	
DC21AC94										06015601821829N+3907599	
DC21A104			C85085111							06816201821227N+4003007	
DC21A114										09016001821826N+4209099	
DC21A119063059411										07312601822225N+4208099	

TABLE 9-1

1013-1

PAS NBR	FRMAREA1 NBRWWWAAASTQ	RESAREA2 WWWAAASTQ	RESAREA3 WWWAAASTQ	RESAREA4 WWWAAASTQ	RESAREA5 WWWAAASTQ	RES MIN	D MAX	D B+F	D MAXLAT	LIM ELECLDOL	SUN
DC23A005										01917857N+1510099	
DC23A015										01819156N+1610099	
DC23A020						072070	112058	19801	817855N	+1708099	
DC23A030										08413801815253N+1801099	
DC23A040										01820852N+2010099	
DC23A050										01820250N+2110099	
DC23A055				063057412						07311101820849N+2209599	
DC23A065										05513601920847N+2404599	
DC23A075			072067411							05412001819646N+2505099	
DC23A082										10814601817845N+2607599	
DC23A092			094078111							04218601800041N+3000004	
DC23A102										04420001821240N+3101099	
DC23A112			094085411							06413001822438N+3209599	
DC23A121										06021801822037N+3304099	
DC24A005	067070411									03206401812271N+ 302599	
DC24A015										02806401815069N+ 406599	
DC24A025				082085411						04010001816068N+ 605099	
DC24A035										05611501717566N+ 809599	
DC24A045			085085411							03816301820664N+ 901504	
DC24A055										05815001817562N+1108599	
DC24A067										01520052N+2010099	
DC24A077										01219451N+2110099	
DC24A080										01220151N+2109806	
DC24A090										01821249N+2308599	
DC24A099	090085111									06911402121248N+2407099	
DC25A005		090094111								03508502017457N+1500299	
DC25A015										04508002019456N+1700408	
DC25A025										01920554N+1810099	
DC25A030										02021254N+1910099	
DC30A005										02122424N+4201599	
DC30A015				078067112						07216402023623N+4304099	
DC30A025										02122221N+4401599	
DC31A005		099104111								04420002118033N+3600204	
DC31A015										05219402032N+3799	
DC31A020				082090111						04420802122631N+3700508	
DC35A005		045052432								08017501917063N+1007099	
DC35A015										07020401962N+1100099	
DC35A025		052055432								07521001960N+1300018	
DC35A035										01919359N+1408099	
DC36A005			057049421							07219002063N+1000010	
DC36A015										05415202062N+1100099	
DC36A025	049054411									09414202016860N+1308099	
DC36A035										12016802017059N+1409599	
DC36A044										02018058N+1509899	
DC36A055										10619602020053N+1906099	
DC36A065	065									01820252N+2010099	
DC36A074				067055411						05818201419250N+2206099	
DC36A084										06211001821247N+2508099	
DC36A094			085070111							05810002021445N+2602010	
DC36A104										03411402020844N+2800599	

TABLE 9-1

1013-1

PAS NBR	FRMAREA1 RESAREA2 RESAREA3 RESAREA4 RESAREA5 RES NBRWWWAAASTQWWWAAASTQWWWAAASTQWWWAAASTQWWWAAASTQ	D	D	D	LIM MINMAXB+FMAXLATELECLDOL	SUN
DC36A114					02020842N+2910099	
DC37A005					03604343105816201915065N+ 801009	
DC37A015					05818401913064N+ 901599	
DC37A025	078067421				06016401916462N+1102011	
DC37A035					06614502016261N+1204599	
DC37A045					03604142206813001917659N+1407099	
DC37A055					01920454N+1809899	
DC37A065					10817402019053N+1906599	
DC37A075					046190020 51N+2100099	
DC37A085	028032431				04418501817250N+2200210	
DC37A095					01821831N+3810099	
DC37A105					01823029N+3910099	
DC37A115					01221828N+4110099	
DC37A125					06410001021226N+4209899	
DC37A135	041038422				07217501622425N+4307007	
DC37A145					15617802020324N+4401599	
DC37A155					05615202013022N+4500199	
DC37A165					01921221N+4607099	
DC37A167					01822221N+4708099	
DC38A005					01518857N+1510099	
DC38A015					01318056N+1710099	
DC38A022		065078331			06917901418455N+1809099	
DC38A032					051228020 54N+1900099	
DC38A042	052063433				068207018 54N+1900099	
DC38A052					01919554N+1999999	
DC39A005	067085412				04514001811065N+ 802015	
DC39A015					03614401819264N+ 903599	
DC39A025					01818662N+1010099	
DC39A035					01820161N+1210099	
DC39A039		118099411			05612002019960N+1208599	
DC39A049					05016201819759N+1405099	
DC39A059	078067412				06816801821257N+1508513	
DC39A069					01821655N+1710099	
DC39A084	104094411				07014801800047N+2400010	
DC39A094					08915201800046N+2500099	
DC39A104	094099111				10018001917844N+2602010	
DC39A114					06817401819043N+2702099	
DC39A124	072063411				08216401818442N+2901012	
DC39A134					04616201600040N+3000099	
DC39A144	072065111				03815901400039N+3100008	
DC39A152					03016301200038N+3200099	
DC40AC05	078085111				04209201919060N+1308099	
DC40A015					04112601921059N+1404599	
DC40AC25	085090111				03608201817457N+1502511	
DC40A035					04409401819855N+1705099	
DC40A039	070065111				05213901919655N+1707515	
DC41A005					01821051N+2110099	
DC41A011					08209011105417001820251N+2109099	
DC41A021					08012001721049N+2309599	
DC41A031					09009011108211801821448N+2408599	

TABLE 9-1

1013-1

PAS	ERMAREA1	RESAREA2	RESAREA3	RESAREA4	RESAREA5	RES	D	D	D	LIM	SUN
NBR	NBRWWAAASTQWWAAASTQWWAAASTQWWAAASTQWWAAASTQMINMAXB+FMAXLATELECLDOL										
DC41A041										01722047N+2510099	
DC47A005			094090431							05218601820037N+3202507	
DC47A015										05020401700036N+3400099	
DC47A025			082078431							06219001800035N+3500007	
DC47A035										07519801700033N+3600099	
DC47A043		075072431								07020001700032N+3700008	
DC51A005			075072431							07817001916464N+ 901007	
DC51A015										06220001900063N+1000099	
DC51A025			041047432							09621201900061N+1200010	
DC51A035										09622001900060N+1300099	
DC51A044			C39045432							08222001918259N+1401599	
DC52A005			063061421							03509201700070N+ 300004	
DC52A015										04208301700069N+ 400099	
DC52A025			061054431							04010001800067N+ 600010	
DC52A035										05011401800066N+ 700099	
DC52A045			C52054431							05012201700064N+ 900010	
DC52A055										03715901700061N+1200099	
DC52AC65			050048431							03413801700059N+1400011	
DC52A075										06008501800057N+1500099	
DC52AC85			067070431							07820001600056N+1700010	
DC52A095										05709901700054N+1800099	
DC52A105			078085431							06220001700053N+1900011	
DC52A107										04519001600052N+2000007	
8 F										N+-0	

TABLE 9-1

The diffuse density measurements made by AFSPPL were computer sorted at A/P to permit analysis of the density ranges encountered at the three processing levels. A study of sorting techniques showed that no absolute method was available to separate the density values as the accuracy of the Processing History published by [redacted] appears rather low and processing transition phases are not accounted for. The sorting technique selected uses the base plus fog density values where measurements up to 0.09 density are considered as having received Primary processing, 0.10 to 0.17 as Intermediate and above 0.17 density as Full. The percentage of original negative that was processed at each level, based on the computer sort, is tabulated below with the predicted and reported processing percentages.

Mission	Camera		Primary	Intermediate	Full
1013-1	FWD	Predicted	0	64	36
		Reported	0	42	58
		Computed	0	55	45
1013-1	AFT	Predicted	0	63	37
		Reported	2	7	91
		Computed	0	33	67

The correlation of the reported and computed percentages at the three processing levels is very good for Mission 1013-1 and is more consistent than the normal mission values.

The tabulations of density frequency distributions for Mission 1013-1 are shown in Tables 9-2 and 9-3. The graphical presentation of the density distribution are computer plotted in Figures 9-1 through 9-21. Analysis of these plots and the associated mean and median density values show that the Master camera density values were essentially the same as the Slave camera and the density ranges of both cameras are within the nominal range.

Table 9-4 shows the distribution of the minimum terrain density measurements that are within the outside of the desired control range of 0.40 to 0.90 density. The percentage of values below 0.30 density is approximately 3%.

An extensive study is in process to ascertain the inter-relationship of the conditions of illumination, resulting densities and exposure-processing parameters. The apparent low density of the Master camera photography is of some concern however the high information content rating for the camera indicates that this approach to exposure is valid. It is also noteworthy that no information was lost in shadow areas.

[redacted] TOP SECRET [redacted]

MISSION • 1013-1 • INSTRUMENT • FRWD 01/18/65 DENSITY FREQ DISTR

DENSITY VALUE	PRIMARY MIN	PRIMARY MAX	PRIMARY LIM	INTERMEDIATE MIN	INTERMEDIATE MAX	INTERMEDIATE LIM	FULL MIN	FULL MAX	FULL LIM	ALL LEVELS MIN	ALL LEVELS MAX	ALL LEVELS LIM
0.01	0	0	0	0	0	0	0	0	0	0	0	0
0.02	0	0	0	0	0	0	0	0	0	0	0	0
0.03	0	0	0	0	0	0	0	0	0	0	0	0
0.04	0	0	0	0	0	0	0	0	0	0	0	0
0.05	0	0	0	0	0	0	0	0	0	0	0	0
0.06	0	0	0	0	0	0	0	0	0	0	0	0
0.07	0	0	0	0	0	0	0	0	0	0	0	0
0.08	0	0	0	0	0	0	0	0	0	0	0	0
0.09	0	0	0	0	0	0	0	0	0	0	0	0
0.10	0	0	0	0	0	0	0	0	0	0	0	0
0.11	0	0	0	0	0	0	0	0	0	0	0	0
0.12	0	0	0	0	0	0	0	0	0	0	0	0
0.13	0	0	0	0	0	0	0	0	0	0	0	0
0.14	0	0	0	0	0	0	0	0	0	0	0	0
0.15	0	0	0	0	0	0	0	0	0	0	0	0
0.16	0	0	0	0	0	0	0	0	0	0	0	0
0.17	0	0	0	0	0	0	0	0	0	0	0	0
0.18	0	0	0	0	0	0	0	0	0	0	0	0
0.19	0	0	0	0	0	0	0	0	0	0	0	0
0.20	0	0	0	1	0	0	0	0	0	1	0	0
0.21	0	0	0	1	0	0	0	0	0	1	0	0
0.22	0	0	0	0	0	0	0	0	0	0	0	0
0.23	0	0	0	0	0	0	0	0	0	0	0	0
0.24	0	0	0	1	0	0	0	0	0	1	0	0
0.25	0	0	0	0	0	0	0	0	0	0	0	0
0.26	0	0	0	2	0	0	0	0	0	2	0	0
0.27	0	0	0	0	0	0	0	0	0	0	0	0
0.28	0	0	0	2	0	0	0	0	0	2	0	0
0.29	0	0	0	0	0	0	0	0	0	0	0	0
0.30	0	0	0	3	0	0	1	0	0	4	0	0
0.31	0	0	0	0	0	0	0	0	0	0	0	0
0.32	0	0	0	2	0	0	0	0	0	2	0	0
0.33	0	0	0	1	0	0	1	0	0	2	0	0
0.34	0	0	0	0	0	0	1	0	0	1	0	0
0.35	0	0	0	2	0	0	1	0	0	3	0	0
0.36	0	0	0	0	0	0	1	0	0	1	0	0
0.37	0	0	0	3	0	0	4	0	0	7	0	0
0.38	0	0	0	1	0	0	4	0	0	6	0	0
0.39	0	0	0	3	0	0	3	0	0	6	0	0
0.40	0	0	0	1	0	0	3	0	0	4	0	0
0.41	0	0	0	3	0	0	1	0	0	4	0	0
0.42	0	0	0	2	0	0	3	0	0	5	0	0
0.43	0	0	0	2	0	0	1	0	0	3	0	0
0.44	0	0	0	4	0	0	2	0	0	6	0	0
0.45	0	0	0	2	0	0	1	0	0	3	0	0
0.46	0	0	0	2	0	0	0	0	0	2	0	0
0.47	0	0	0	0	0	0	1	0	0	1	0	0
0.48	0	0	0	2	0	0	0	0	0	2	0	0
0.49	0	0	0	0	0	0	1	0	0	1	0	0
0.50	0	0	0	2	0	0	3	0	0	5	0	0
SUBTOTAL	0	0	0	40	0	0	24	0	0	64	0	0

[redacted] TOP SECRET [redacted]

TABLE 9-2

MISSION • 1013-1 • INSTRUMENT • FRWD. 01/18/65 DENSITY FREQ DISTR

DENSITY VALUE	PRIMARY MIN	PRIMARY MAX	PRIMARY LIM	INTERMEDIATE MIN	INTERMEDIATE MAX	INTERMEDIATE LIM	FULL MIN	FULL MAX	FULL LIM	ALL LEVELS MIN	ALL LEVELS MAX	ALL LEVELS LIM
0.51	0	0	0	0	0	0	1	0	0	1	0	0
0.52	0	0	0	5	1	0	2	0	0	7	1	0
0.53	0	0	0	2	0	0	3	0	0	5	0	0
0.54	0	0	0	2	0	0	3	0	0	5	0	0
0.55	0	0	0	2	0	0	3	0	0	5	0	0
0.56	0	0	0	2	0	0	3	0	0	5	0	0
0.57	0	0	0	2	0	0	3	0	0	5	0	0
0.58	0	0	0	2	0	0	2	1	0	4	1	0
0.59	0	0	0	2	0	0	2	1	0	4	1	0
0.60	0	0	0	2	0	0	4	1	0	6	1	0
0.61	0	0	0	2	0	0	1	0	0	3	0	0
0.62	0	0	0	2	0	0	2	0	0	4	0	0
0.63	0	0	0	2	0	0	0	0	0	2	0	0
0.64	0	0	0	0	0	0	0	0	0	0	0	0
0.65	0	0	0	2	0	0	0	0	0	2	0	0
0.66	0	0	0	2	0	0	1	0	0	3	0	0
0.67	0	0	0	0	0	0	2	0	0	2	0	0
0.68	0	0	0	0	0	0	2	0	0	2	0	0
0.69	0	0	0	2	0	0	0	0	0	2	0	0
0.70	0	0	0	1	0	0	1	0	0	2	0	0
0.71	0	0	0	1	0	0	1	0	0	2	0	0
0.72	0	0	0	3	0	0	2	0	0	5	0	0
0.73	0	0	0	3	0	0	2	0	0	5	0	0
0.74	0	0	0	3	0	0	2	0	0	5	0	0
0.75	0	0	0	3	0	0	1	0	0	4	0	0
0.76	0	0	0	0	0	0	1	0	0	1	0	0
0.77	0	0	0	0	0	0	1	0	0	1	0	0
0.78	0	0	0	1	0	0	1	0	0	2	0	0
0.79	0	0	0	1	0	0	1	0	0	2	0	0
0.80	0	0	0	2	0	0	1	0	0	3	0	0
0.81	0	0	0	0	0	0	0	0	0	0	0	0
0.82	0	0	0	0	0	0	0	0	0	0	0	0
0.83	0	0	0	1	0	0	0	0	0	1	0	0
0.84	0	0	0	1	0	0	0	2	0	1	2	0
0.85	0	0	0	0	0	0	0	0	0	0	0	0
0.86	0	0	0	0	0	0	0	0	0	0	0	0
0.87	0	0	0	1	0	0	0	0	0	1	0	0
0.88	0	0	0	0	0	0	0	1	0	0	1	0
0.89	0	0	0	0	0	0	1	0	0	1	0	0
0.90	0	0	0	1	0	0	0	1	0	1	1	0
0.91	0	0	0	0	0	0	0	2	0	0	2	0
0.92	0	0	0	1	2	0	0	1	0	1	3	0
0.93	0	0	0	0	1	0	0	0	0	0	1	0
0.94	0	0	0	0	1	0	0	0	0	0	1	0
0.95	0	0	0	0	0	0	0	0	0	0	0	0
0.96	0	0	0	0	0	0	0	0	0	0	0	0
0.97	0	0	0	0	0	0	0	0	0	0	0	0
0.98	0	0	0	1	0	0	1	0	0	2	0	0
0.99	0	0	0	0	0	0	0	1	0	0	1	0
1.00	0	0	0	0	1	0	0	0	0	0	1	0
SUBTOTAL	0	0	0	38	5	0	38	9	0	76	14	0

TABLE 9-2

[redacted] TOP SECRET [redacted]

MISSION • 1013-1 • INSTRUMENT • FRWD 01/18/65 DENSITY FREQ DISTR

DENSITY VALUE	PRIMARY MIN	PRIMARY MAX	PRIMARY LIM	INTERMEDIATE MIN	INTERMEDIATE MAX	INTERMEDIATE LIM	FULL MIN	FULL MAX	FULL LIM	ALL LEVELS MIN	ALL LEVELS MAX	ALL LEVELS LIM
1.01	0	0	0	0	0	0	0	0	0	0	0	0
1.02	0	0	0	0	0	0	0	0	0	0	0	0
1.03	0	0	0	0	0	0	0	0	0	0	0	0
1.04	0	0	0	0	0	0	0	1	0	0	1	0
1.05	0	0	0	0	0	0	0	1	0	0	1	0
1.06	0	0	0	0	1	0	0	1	0	0	1	0
1.07	0	0	0	0	1	0	0	1	0	0	2	0
1.08	0	0	0	0	0	0	1	1	0	0	1	0
1.09	0	0	0	0	1	0	1	0	0	0	1	0
1.10	0	0	0	0	1	0	1	1	0	0	1	0
1.11	0	0	0	0	1	0	0	1	0	0	2	0
1.12	0	0	0	0	0	0	0	0	0	0	0	0
1.13	0	0	0	0	0	0	0	0	0	0	0	0
1.14	0	0	0	0	0	0	0	0	0	0	0	0
1.15	0	0	0	0	0	0	0	0	0	0	0	0
1.16	0	0	0	0	0	0	0	0	0	0	0	0
1.17	0	0	0	0	0	0	0	0	0	0	0	0
1.18	0	0	0	0	0	0	0	2	0	0	2	0
1.19	0	0	0	0	0	0	0	1	0	0	1	0
1.20	0	0	0	0	0	0	1	1	0	0	1	0
1.21	0	0	0	0	0	0	1	0	0	0	1	0
1.22	0	0	0	0	0	0	0	0	0	0	0	0
1.23	0	0	0	0	0	0	0	0	0	0	0	0
1.24	0	0	0	0	0	0	0	0	0	0	0	0
1.25	0	0	0	0	0	0	0	0	0	0	0	0
1.26	0	0	0	0	0	0	0	0	0	0	0	0
1.27	0	0	0	0	0	0	0	0	0	0	0	0
1.28	0	0	0	0	0	0	0	0	0	0	0	0
1.29	0	0	0	0	0	0	0	0	0	0	0	0
1.30	0	0	0	0	0	0	0	0	0	0	0	0
1.31	0	0	0	0	0	0	0	0	0	0	0	0
1.32	0	0	0	0	0	0	0	0	0	0	0	0
1.33	0	0	0	0	0	0	0	0	0	0	0	0
1.34	0	0	0	0	0	0	0	0	0	0	0	0
1.35	0	0	0	0	0	0	0	0	0	0	0	0
1.36	0	0	0	0	0	0	0	0	0	0	0	0
1.37	0	0	0	0	0	0	0	0	0	0	0	0
1.38	0	0	0	0	0	0	0	0	0	0	0	0
1.39	0	0	0	0	0	0	0	0	0	0	0	0
1.40	0	0	0	0	0	0	0	0	0	0	0	0
1.41	0	0	0	0	0	0	0	0	0	0	0	0
1.42	0	0	0	0	0	0	0	0	0	0	0	0
1.43	0	0	0	0	0	0	0	0	0	0	0	0
1.44	0	0	0	0	0	0	0	0	0	0	0	0
1.45	0	0	0	0	0	0	0	0	0	0	0	0
1.46	0	0	0	0	0	0	0	0	0	0	0	0
1.47	0	0	0	0	0	0	0	0	0	0	0	0
1.48	0	0	0	0	0	0	0	0	0	0	0	0
1.49	0	0	0	0	0	0	0	0	0	0	0	0
1.50	0	0	0	0	1	0	0	1	0	0	1	0
SUBTOTAL	0	0	0	1	23	3	2	28	3	3	51	6

[redacted] TOP SECRET [redacted]

TABLE 9-2

[redacted] TOP SECRET [redacted]

MISSION • 1013-1 • INSTRUMENT • FRWD 01/18/65 DENSITY FREQ DISTR

DENSITY VALUE	PRIMARY MIN	PRIMARY MAX	PRIMARY LIM	INTERMEDIATE MIN	INTERMEDIATE MAX	INTERMEDIATE LIM	FULL MIN	FULL MAX	FULL LIM	ALL LEVELS MIN	ALL LEVELS MAX	ALL LEVELS LIM
1.51	0	0	0	0	0	0	0	1	0	0	1	0
1.52	0	0	0	0	1	0	0	1	0	0	2	0
1.53	0	0	0	0	1	0	0	1	0	0	2	0
1.54	0	0	0	0	1	0	0	1	0	0	2	0
1.55	0	0	0	0	1	0	0	1	0	0	2	0
1.56	0	0	0	0	1	1	0	0	0	0	1	1
1.57	0	0	0	0	1	1	0	0	0	0	1	1
1.58	0	0	0	0	1	1	0	0	0	0	2	1
1.59	0	0	0	0	1	2	0	0	1	0	2	3
1.60	0	0	0	0	1	2	0	0	1	0	3	3
1.61	0	0	0	0	2	0	0	0	1	0	2	1
1.62	0	0	0	0	2	0	0	0	1	0	2	1
1.63	0	0	0	0	1	1	0	0	1	0	2	2
1.64	0	0	0	0	1	1	0	0	1	0	2	2
1.65	0	0	0	0	1	2	0	0	2	0	3	4
1.66	0	0	0	0	1	2	0	1	0	0	3	4
1.67	0	0	0	0	2	0	0	1	0	0	4	4
1.68	0	0	0	0	2	0	0	1	0	0	4	4
1.69	0	0	0	0	2	1	0	1	1	0	4	5
1.70	0	0	0	0	2	1	0	2	1	0	5	6
1.71	0	0	0	0	2	2	0	2	1	0	5	6
1.72	0	0	0	0	3	0	0	2	1	0	6	6
1.73	0	0	0	0	3	0	0	2	2	0	6	7
1.74	0	0	0	0	3	0	0	3	2	0	7	7
1.75	0	0	0	0	3	1	0	3	2	0	7	8
1.76	0	0	0	0	3	1	0	3	3	0	7	8
1.77	0	0	0	0	3	2	0	3	3	0	8	9
1.78	0	0	0	0	4	0	0	4	3	0	8	9
1.79	0	0	0	0	4	0	0	4	4	0	8	10
1.80	0	0	0	0	4	1	0	4	4	0	9	10
1.81	0	0	0	0	4	1	0	4	4	0	9	10
1.82	0	0	0	0	4	2	0	4	4	0	9	11
1.83	0	0	0	0	4	2	0	4	4	0	9	11
1.84	0	0	0	0	4	2	0	4	4	0	9	11
1.85	0	0	0	0	4	2	0	4	4	0	9	11
1.86	0	0	0	0	4	2	0	4	4	0	9	11
1.87	0	0	0	0	4	2	0	4	4	0	9	11
1.88	0	0	0	0	4	2	0	4	4	0	9	11
1.89	0	0	0	0	4	2	0	4	4	0	9	11
1.90	0	0	0	0	4	2	0	4	4	0	9	11
1.91	0	0	0	0	4	2	0	4	4	0	9	11
1.92	0	0	0	0	4	2	0	4	4	0	9	11
1.93	0	0	0	0	4	2	0	4	4	0	9	11
1.94	0	0	0	0	4	2	0	4	4	0	9	11
1.95	0	0	0	0	4	2	0	4	4	0	9	11
1.96	0	0	0	0	4	2	0	4	4	0	9	11
1.97	0	0	0	0	4	2	0	4	4	0	9	11
1.98	0	0	0	0	4	2	0	4	4	0	9	11
1.99	0	0	0	0	4	2	0	4	4	0	9	11
2.00	0	0	0	0	4	2	0	4	4	0	9	11
SUBTOTAL	0	0	0	0	38	29	1	20	15	1	58	44

[redacted] TOP SECRET [redacted]

TABLE 9-2

[redacted]

MISSION • 1013-1 • INSTRUMENT • FRWD 01/18/65 DENSITY FREQ DISTR

DENSITY VALUE	PRIMARY MIN	PRIMARY MAX	PRIMARY LIM	INTERMEDIATE MIN	INTERMEDIATE MAX	INTERMEDIATE LIM	FULL MIN	FULL MAX	FULL LIM	ALL LEVELS MIN	ALL LEVELS MAX	ALL LEVELS LIM
2.01	0	0	0	0	0	1	0	0	0	0	0	1
2.02	0	0	0	0	0	1	0	0	0	0	0	3
2.03	0	0	0	0	0	0	0	0	0	0	0	0
2.04	0	0	0	0	0	2	0	0	1	0	0	3
2.05	0	0	0	0	0	0	0	0	0	0	0	1
2.06	0	0	0	0	0	1	0	0	0	0	0	1
2.07	0	0	0	0	0	1	0	0	0	0	0	1
2.08	0	0	0	0	0	2	0	0	1	0	0	3
2.09	0	0	0	0	0	2	0	0	0	0	0	3
2.10	0	0	0	0	0	2	0	0	0	0	0	2
2.11	0	0	0	0	0	1	0	0	0	0	0	1
2.12	0	0	0	0	0	1	0	0	0	0	0	1
2.13	0	0	0	0	0	0	0	0	0	0	0	0
2.14	0	0	0	0	0	2	0	0	0	0	0	2
2.15	0	0	0	0	0	0	0	0	0	0	0	2
2.16	0	0	0	0	0	1	0	0	1	0	0	2
2.17	0	0	0	0	0	1	0	0	0	0	0	2
2.18	0	0	0	0	0	1	0	0	1	0	0	2
2.19	0	0	0	0	0	0	0	0	0	0	0	2
2.20	0	0	0	0	0	0	0	0	1	0	0	1
2.21	0	0	0	0	0	0	0	0	0	0	0	1
2.22	0	0	0	0	0	0	0	0	1	0	0	1
2.23	0	0	0	0	0	0	0	0	0	0	0	1
2.24	0	0	0	0	0	0	0	0	1	0	0	1
2.25	0	0	0	0	0	0	0	0	0	0	0	1
2.26	0	0	0	0	0	0	0	0	0	0	0	1
2.27	0	0	0	0	0	0	0	0	0	0	0	1
2.28	0	0	0	0	0	0	0	0	0	0	0	2
2.29	0	0	0	0	0	0	0	0	1	0	0	2
2.30	0	0	0	0	0	0	0	0	0	0	0	5
2.31	0	0	0	0	0	0	0	0	0	0	0	3
2.32	0	0	0	0	0	0	0	0	0	0	0	2
2.33	0	0	0	0	0	0	0	0	0	0	0	1
2.34	0	0	0	0	0	0	0	0	0	0	0	0
2.35	0	0	0	0	0	0	0	0	0	0	0	1
2.36	0	0	0	0	0	0	0	0	0	0	0	0
2.37	0	0	0	0	0	0	0	0	0	0	0	0
2.38	0	0	0	0	0	0	0	0	0	0	0	0
2.39	0	0	0	0	0	0	0	0	1	0	0	2
2.40	0	0	0	0	0	0	0	0	1	0	0	1
2.41	0	0	0	0	0	0	0	0	0	0	0	1
2.42	0	0	0	0	0	0	0	0	0	0	0	0
2.43	0	0	0	0	0	0	0	0	0	0	0	0
2.44	0	0	0	0	0	0	0	0	0	0	0	0
2.45	0	0	0	0	0	0	0	0	0	0	0	0
2.46	0	0	0	0	0	0	0	0	0	0	0	0
2.47	0	0	0	0	0	0	0	0	0	0	0	0
2.48	0	0	0	0	0	0	0	0	0	0	0	0
2.49	0	0	0	0	0	0	0	0	0	0	0	0
2.50	0	0	0	0	0	0	0	0	0	0	0	0
SUBTOTAL	0	0	0	0	13	39	0	8	53	0	21	92

TABLE 9-2

[redacted] TOP SECRET [redacted]

MISSION • 1013-1 • INSTRUMENT • FRWD 01/18/65 DENSITY FREQ DISTR

DENSITY VALUE	PRIMARY MIN	PRIMARY MAX	PRIMARY LIM	INTERMEDIATE MIN	INTERMEDIATE MAX	INTERMEDIATE LIM	FULL MIN	FULL MAX	FULL LIM	ALL LEVELS MIN	ALL LEVELS MAX	ALL LEVELS LIM
2.51	0	0	0	0	0	0	0	0	0	0	0	0
2.52	0	0	0	0	0	0	0	0	0	0	0	0
2.53	0	0	0	0	0	0	0	0	0	0	0	0
2.54	0	0	0	0	0	0	0	0	0	0	0	0
2.55	0	0	0	0	0	0	0	0	0	0	0	0
2.56	0	0	0	0	0	0	0	0	0	0	0	0
2.57	0	0	0	0	0	0	0	0	0	0	0	0
2.58	0	0	0	0	0	0	0	0	0	0	0	0
2.59	0	0	0	0	0	0	0	0	0	0	0	0
2.60	0	0	0	0	0	0	0	0	0	0	0	0
2.61	0	0	0	0	0	0	0	0	0	0	0	0
2.62	0	0	0	0	0	0	0	0	0	0	0	0
2.63	0	0	0	0	0	0	0	0	0	0	0	0
2.64	0	0	0	0	0	0	0	0	0	0	0	0
2.65	0	0	0	0	0	0	0	0	0	0	0	0
2.66	0	0	0	0	0	0	0	0	0	0	0	0
2.67	0	0	0	0	0	0	0	0	0	0	0	0
2.68	0	0	0	0	0	0	0	0	0	0	0	0
2.69	0	0	0	0	0	0	0	0	0	0	0	0
2.70	0	0	0	0	0	0	0	0	0	0	0	0
SUBTOTAL	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL	0	0	0	79	79	71	65	65	71	144	144	142

MISSION 1013-1 INSTR - FRWD 01/18/65 PROCESSING AND EXPOSURE ANALYSI

PROCESS LEVEL	SAMPLE SIZE	UNDER EXPOSED	UNDER PROCESSED	CORRECT EXP+PROC	OVER PROCESSED	OVER EXPOSED
PRIMARY	0	0 PC	0 PC	0 PC	0 PC	0 PC
INTERMEDIATE	79	1 PC	23 PC	72 PC	3 PC	1 PC
FULL	65	14 PC	0 PC	80 PC	6 PC	0 PC
ALL LEVELS	144	7 PC	13 PC	76 PC	4 PC	1 PC

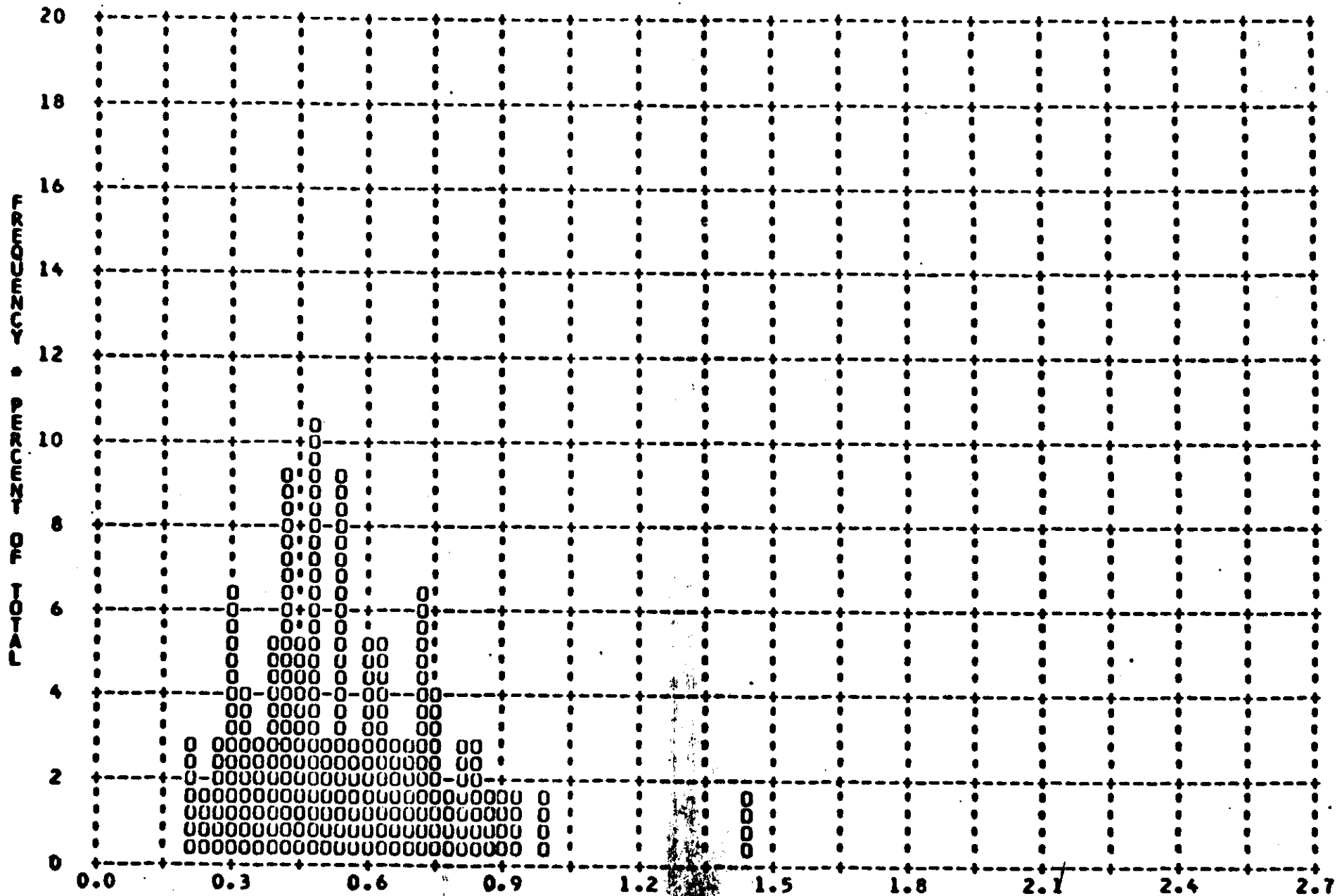
PROCESS LEVEL	BASE + FOG	UNDER EXPOSED	UNDER PROCESSED	CORRECT EXP+PROC	OVER PROCESSED	OVER EXPOSED
PRIMARY	0.01-0.09	0.01-0.13	0.14-0.39	0.40-0.90	---------	0.91 AND UP
INTERMED	0.10-0.17	0.01-0.20	0.21-0.39	0.40-0.90	0.91-1.34	1.35 AND UP
FULL	0.18 AND UP	0.01-0.39	---------	0.40-0.90	0.91-1.69	1.70 AND UP

[redacted] TOP SECRET [redacted]

TABLE 9-2

MISSION • 1013-1 • INSTR • FRWD • 01/18/65 PLOT OF 0 MIN • TERRAIN • PROCESSING • INTERMEDIATE

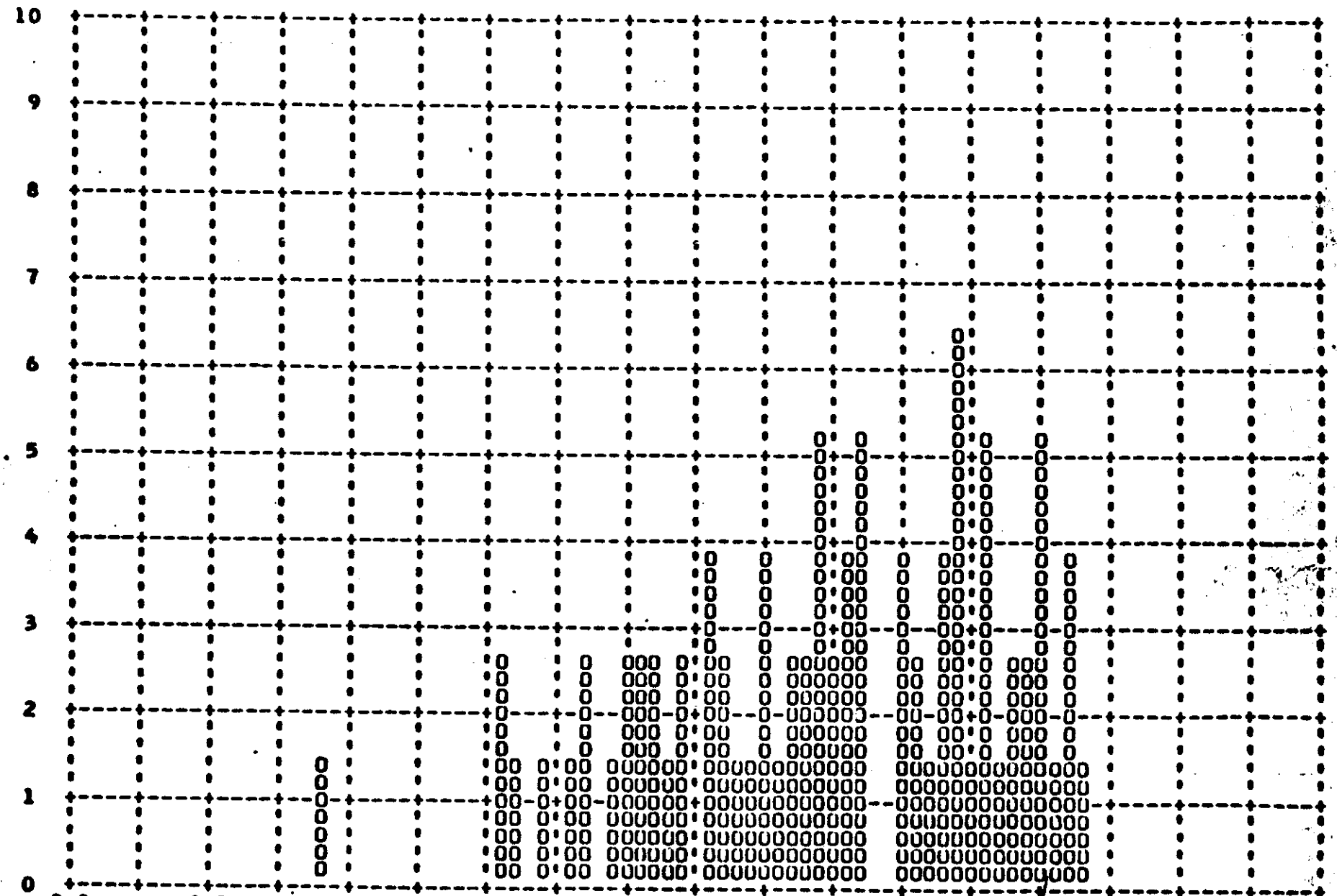
ARITH MEAN • 0.54 • MEDIAN • 0.50 • STD DEV • 0.21 • RANGE • 0.20 TO 1.44 WITH 79 SAMPLES



[redacted] TOP SECRET [redacted]

MISSION • 1013-1 • INSTR • FRWD • 01/18/65 PLOT OF D MAX • TERRAIN • PROCESSING • INTERMEDIATE

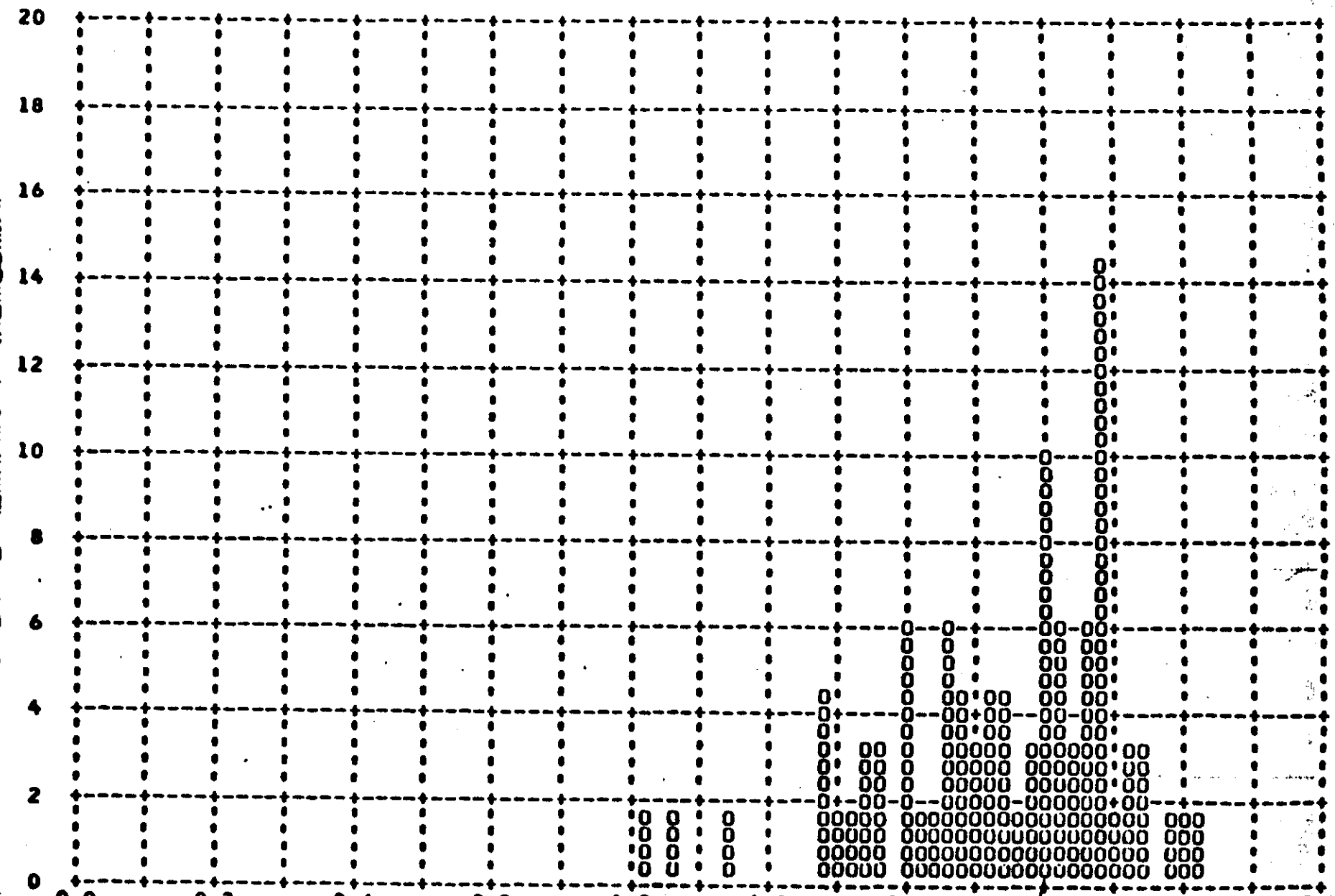
ARITH MEAN • 1.63 • MEDIAN • 1.66 • STD DEV • 0.37 • RANGE • 0.52 TO 2.18 WITH 79 SAMPLES



TOP SECRET [redacted]

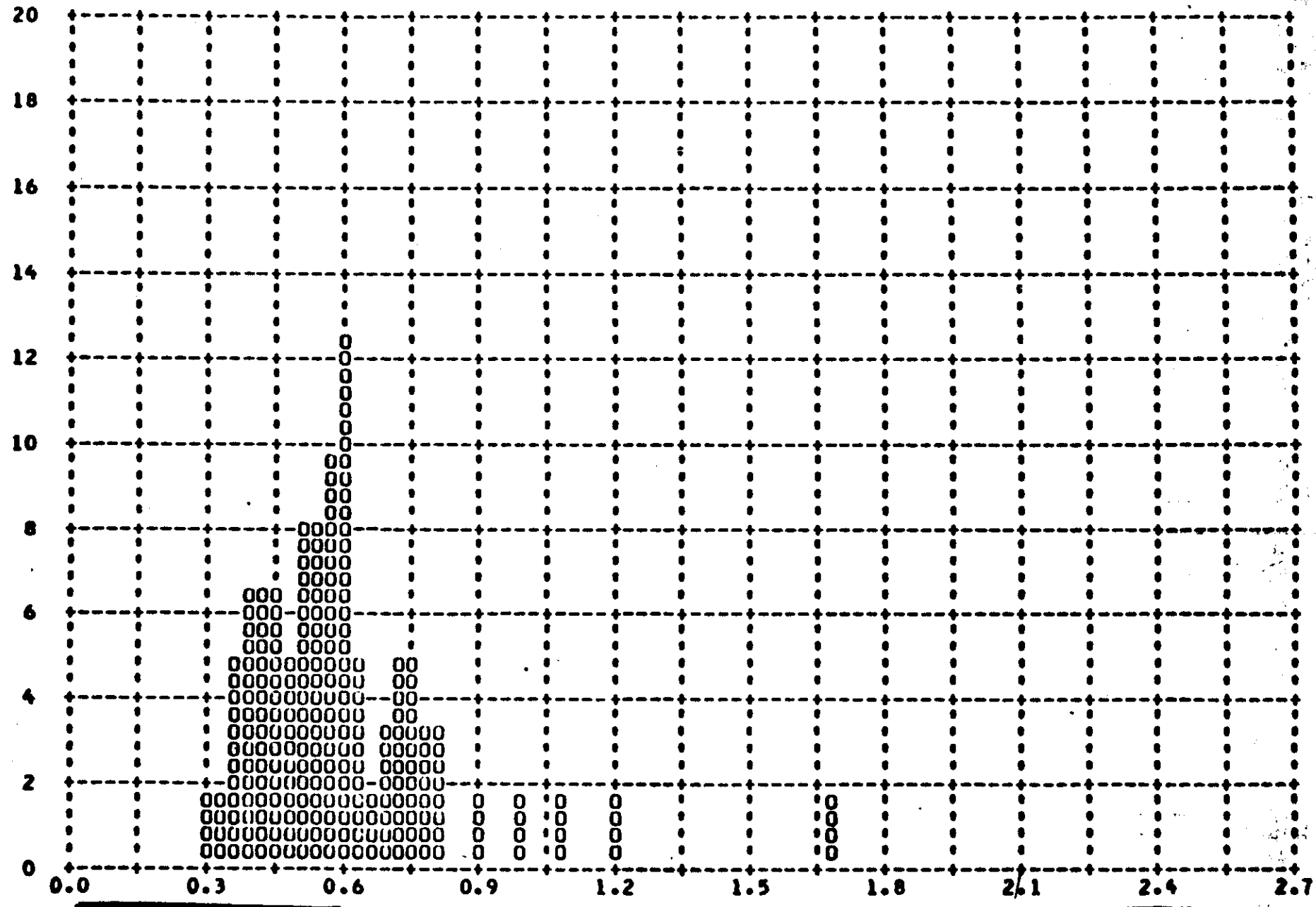
MISSION • 1013-1 • INSTR • FRWD • 01/18/65 PLOT OF D MAX • CLOUD • PROCESSING • INTERMEDIATE

ARITH MEAN • 2.00 • MEDIAN • 2.06 • STD DEV • 0.25 • RANGE • 1.21 TO 2.41 WITH 71 SAMPLES



MISSION • 1013-1 • INSTR • FRWD • 01/18/65 PLOT OF D MIN • TERRAIN • PROCESSING • FULL

ARITH MEAN • 0.59 • MEDIAN • 0.56 • STD DEV • 0.22 • RANGE • 0.30 TO 1.66 WITH 65 SAMPLES



MISSION • 1013-1 • INSTR • FRWD • 01/18/65 PLOT OF D MAX • TERRAIN • PROCESSING • FULL

ARITH MEAN • 1.47 • MEDIAN • 1.46 • STD DEV • 0.41 • RANGE • 0.58 TO 2.29 WITH 65 SAMPLES

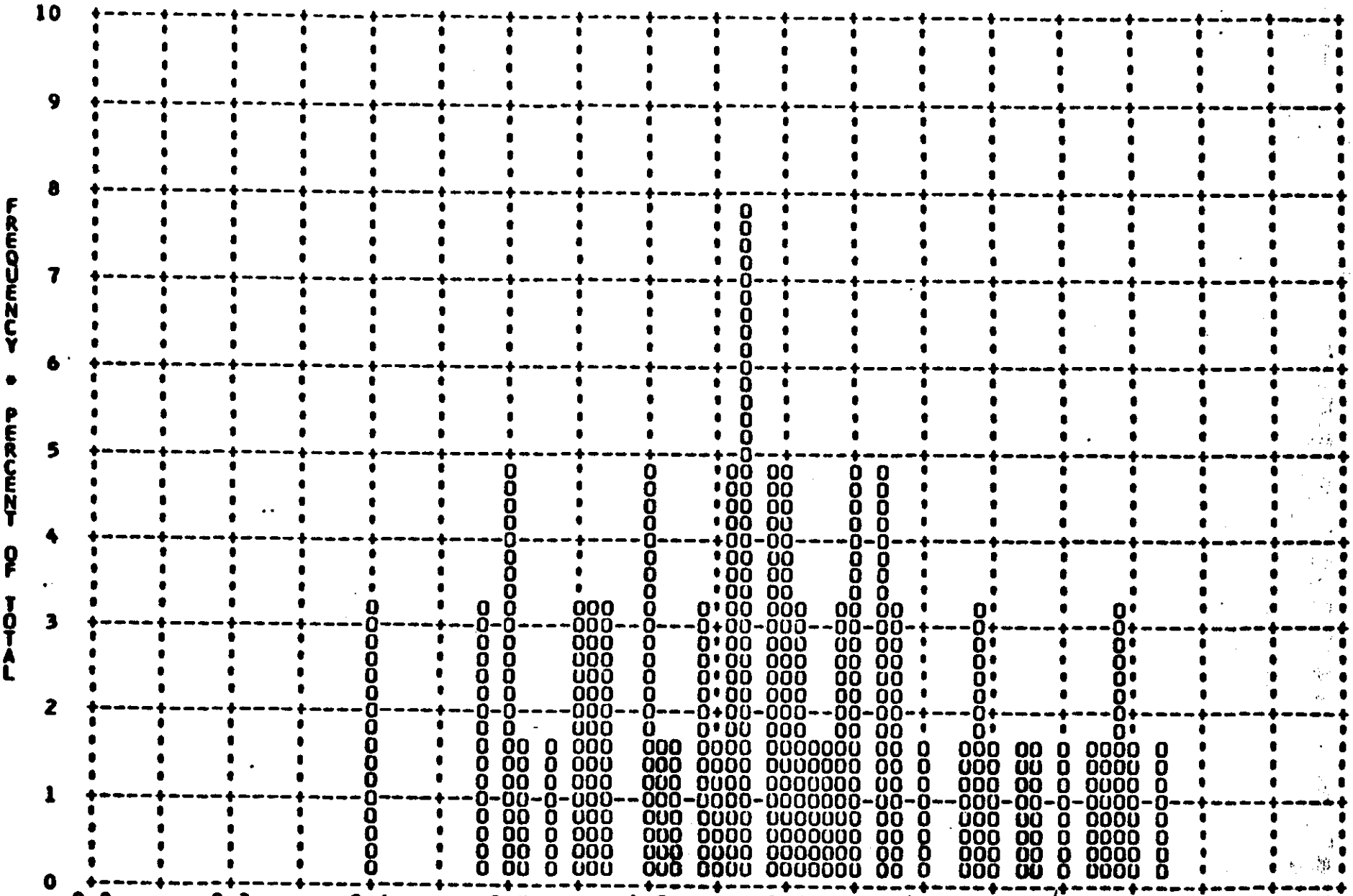
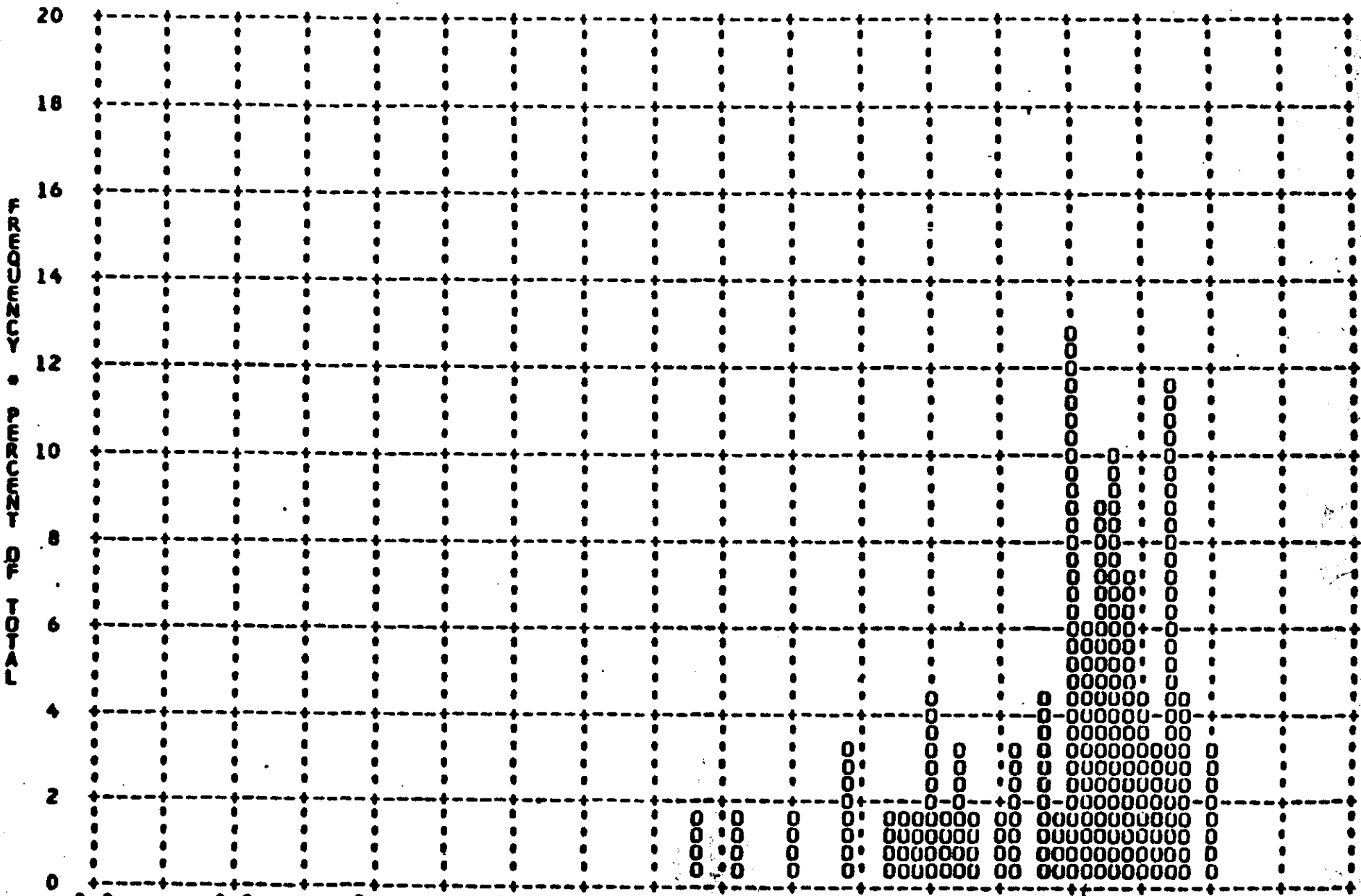


FIGURE D-5

[redacted] TOP SECRET [redacted]

MISSION • 1013-1 • INSTR • FRWD • 01/18/65 PLOT OF D MAX • CLOUD • PROCESSING • FULL

ARITH MEAN • 2.07 • MEDIAN • 2.14 • STD DEV • 0.24 • RANGE • 1.28 TO 2.40 WITH 71 SAMPLES



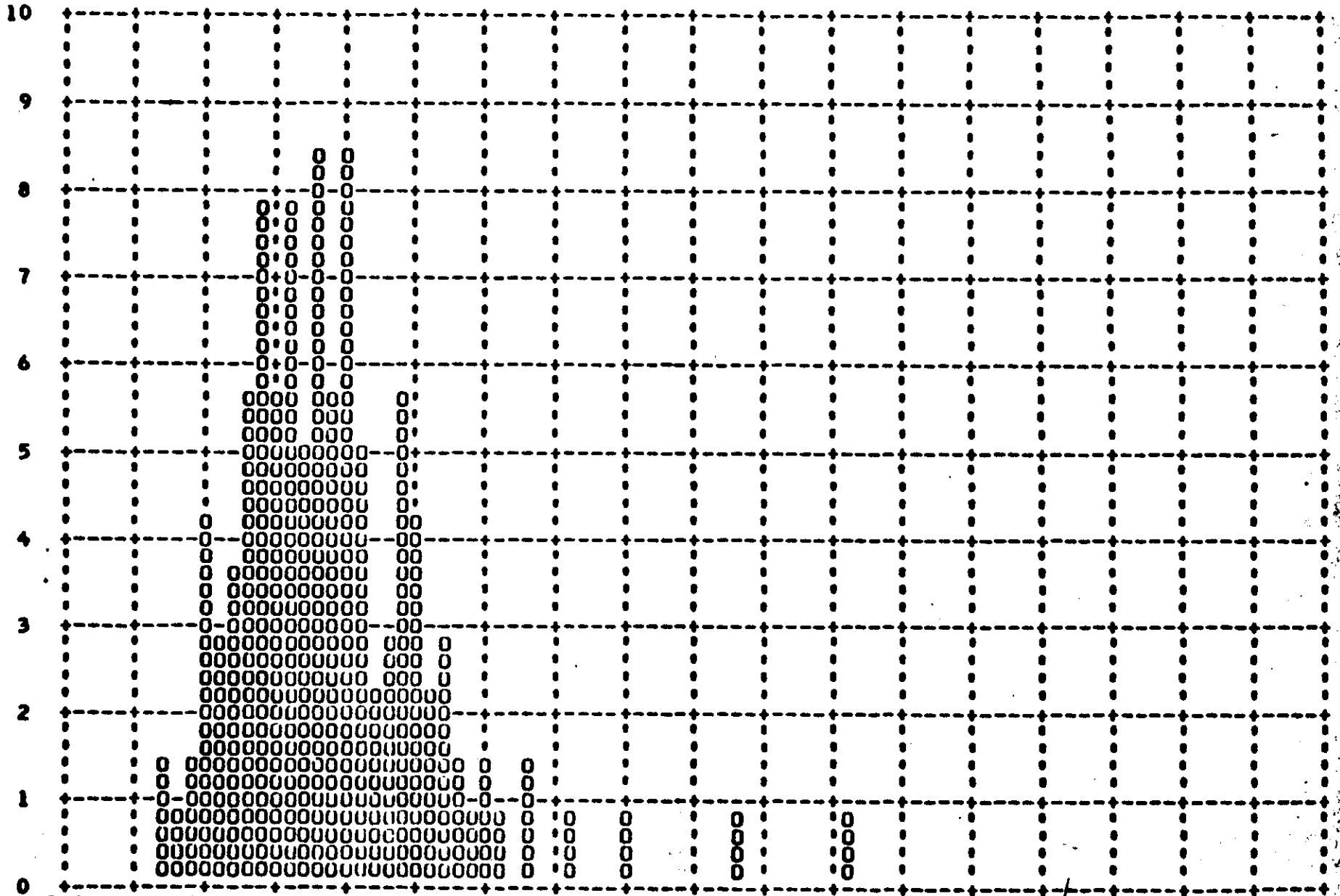
-89-

TOP SECRET [redacted]

FIGURE A-6

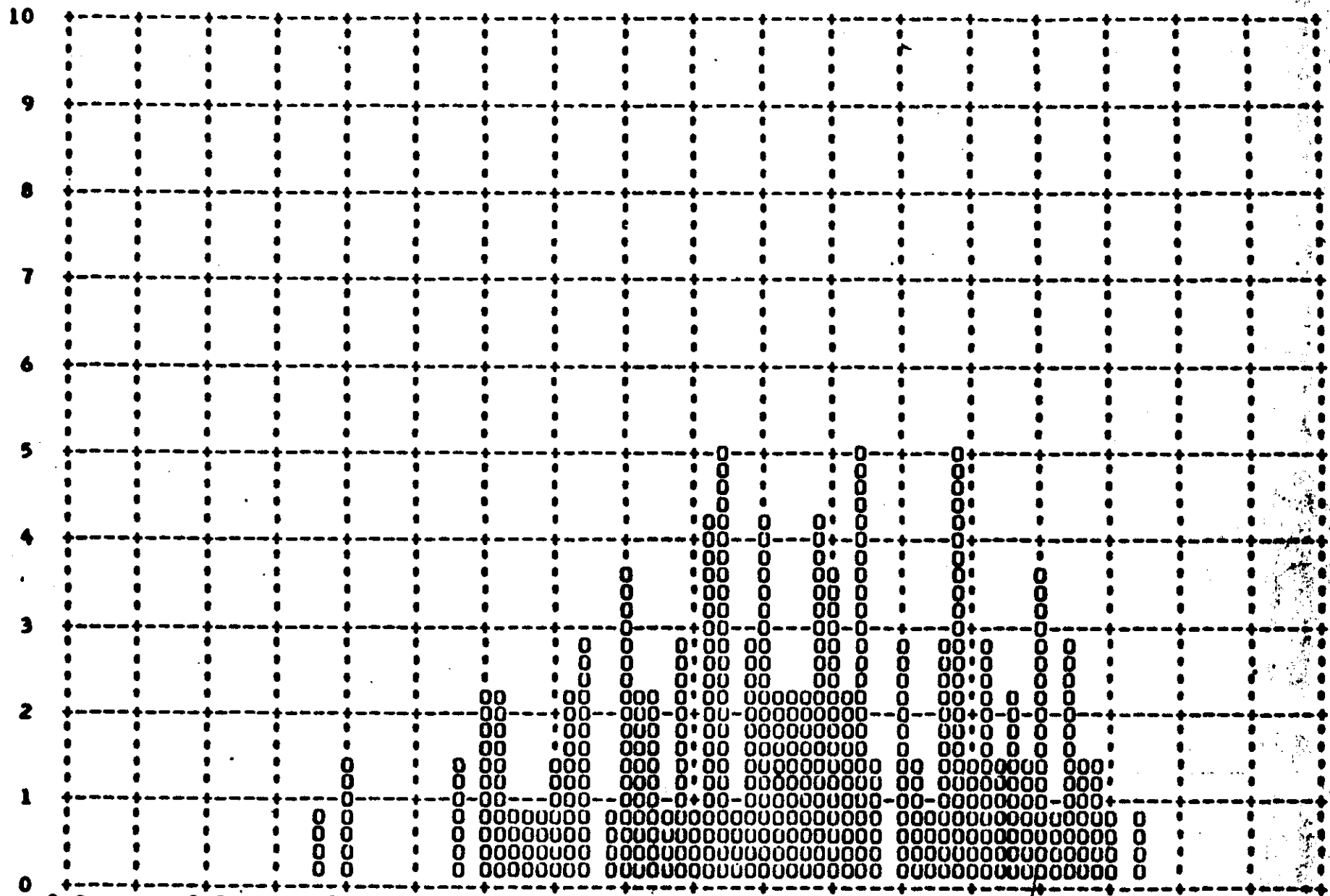
MISSION • 1013-1 • INSTR • FRWD • 01/18/65 PLOT OF D MIN • TERRAIN • PROCESSING • ALL LEVELS

ARITH MEAN • 0.56 • MEDIAN • 0.54 • STD DEV • 0.22 • RANGE • 0.20 TO 1.66 WITH 144 SAMPLES



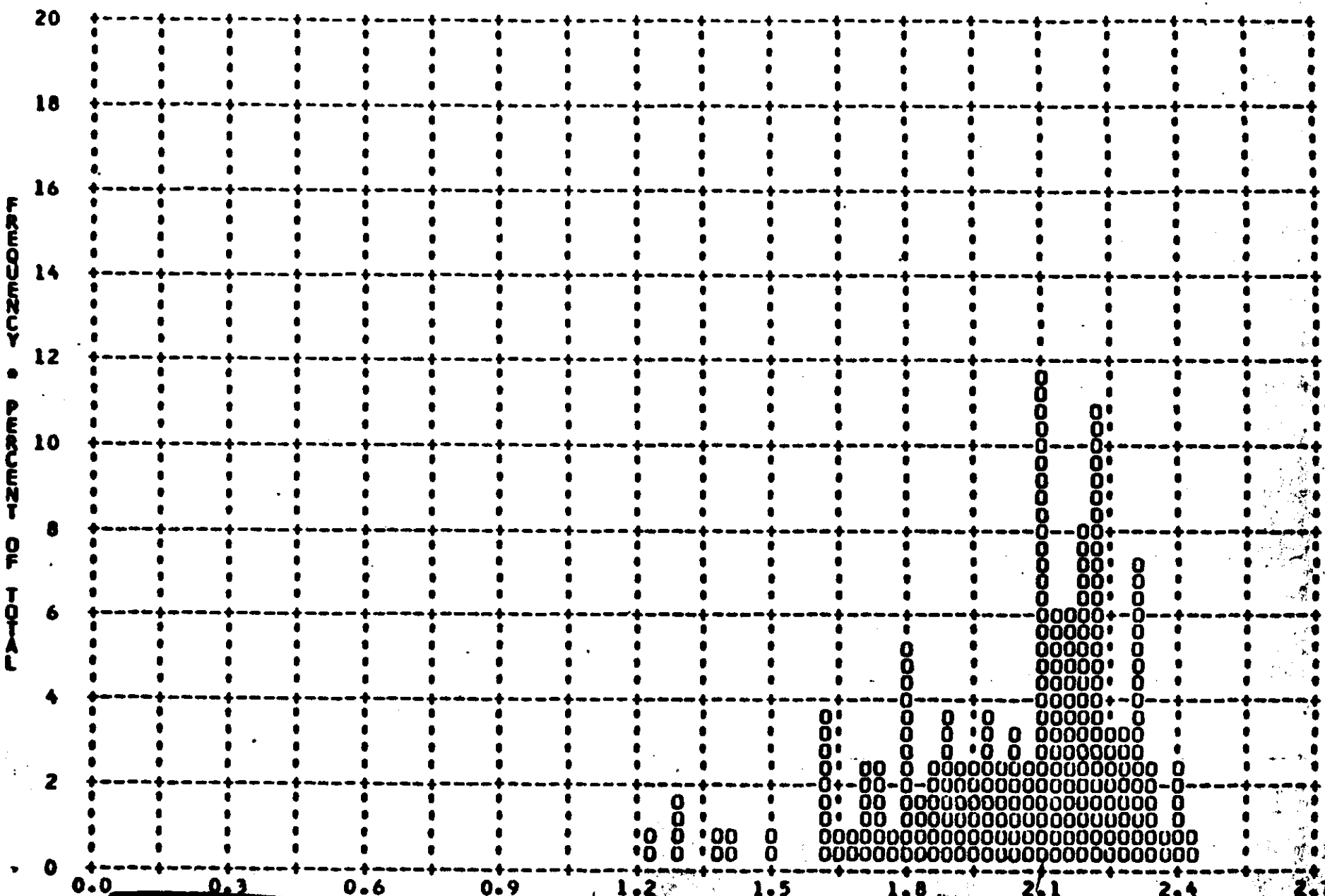
MISSION • 1013-1 • INSTR • FRWD • 01/18/65 PLOT OF D MAX • TERRAIN • PROCESSING • ALL LEVELS

ARITH MEAN • 1.56 • MEDIAN • 1.59 • STD DEV • 0.39 • RANGE • 0.52 TO 2.29 WITH 144 SAMPLES



MISSION • 1013-1 • INSTR • FRWD • 01/18/65 PLOT OF D MAX • CLOUD • PROCESSING • ALL LEVELS

ARITH MEAN • 2.03 • MEDIAN • 2.10 • STD DEV • 0.25 • RANGE • 1.21 TO 2.41 WITH 142 SAMPLES



MISSION • 1013-1 • INSTRUMENT • AFT 01/18/65 DENSITY FREQ DISTR

DENSITY VALUE	PRIMARY MIN	PRIMARY MAX	PRIMARY LIM	INTERMEDIATE MIN	INTERMEDIATE MAX	INTERMEDIATE LIM	FULL MIN	FULL MAX	FULL LIM	ALL LEVELS MIN	ALL LEVELS MAX	ALL LEVELS LIM
0.01	0	0	0	0	0	0	0	0	0	0	0	0
0.02	0	0	0	0	0	0	0	0	0	0	0	0
0.03	0	0	0	0	0	0	0	0	0	0	0	0
0.04	0	0	0	0	0	0	0	0	0	0	0	0
0.05	0	0	0	0	0	0	0	0	0	0	0	0
0.06	0	0	0	0	0	0	0	0	0	0	0	0
0.07	0	0	0	0	0	0	0	0	0	0	0	0
0.08	0	0	0	0	0	0	0	0	0	0	0	0
0.09	0	0	0	0	0	0	0	0	0	0	0	0
0.10	0	0	0	0	0	0	0	0	0	0	0	0
0.11	0	0	0	0	0	0	0	0	0	0	0	0
0.12	0	0	0	0	0	0	0	0	0	0	0	0
0.13	0	0	0	0	0	0	0	0	0	0	0	0
0.14	0	0	0	0	0	0	0	0	0	0	0	0
0.15	0	0	0	0	0	0	0	0	0	0	0	0
0.16	0	0	0	0	0	0	0	0	0	0	0	0
0.17	0	0	0	0	0	0	0	0	0	0	0	0
0.18	0	0	0	0	0	0	0	0	0	0	0	0
0.19	0	0	0	0	0	0	0	0	0	0	0	0
0.20	0	0	0	0	0	0	0	0	0	0	0	0
0.21	0	0	0	0	0	0	0	0	0	0	0	0
0.22	0	0	0	0	0	0	0	0	0	0	0	0
0.23	0	0	0	0	0	0	0	0	0	0	0	0
0.24	0	0	0	0	0	0	0	0	0	0	0	0
0.25	0	0	0	0	0	0	0	0	0	0	0	0
0.26	0	0	0	0	0	0	0	0	0	0	0	0
0.27	0	0	0	0	0	0	0	0	0	0	0	0
0.28	0	0	0	0	0	0	1	0	0	1	0	0
0.29	0	0	0	0	0	0	0	0	0	0	0	0
0.30	0	0	0	2	0	0	0	0	0	2	0	0
0.31	0	0	0	0	0	0	1	0	0	1	0	0
0.32	0	0	0	0	0	0	0	0	0	0	0	0
0.33	0	0	0	1	0	0	1	0	0	2	0	0
0.34	0	0	0	1	0	0	1	0	0	2	0	0
0.35	0	0	0	0	0	0	2	0	0	2	0	0
0.36	0	0	0	1	0	0	0	0	0	1	0	0
0.37	0	0	0	2	0	0	1	0	0	3	0	0
0.38	0	0	0	0	0	0	2	0	0	3	0	0
0.39	0	0	0	1	0	0	1	0	0	3	0	0
0.40	0	0	0	0	0	0	2	0	0	3	0	0
0.41	0	0	0	1	0	0	2	0	0	4	0	0
0.42	0	0	0	1	0	0	2	0	0	4	0	0
0.43	1	0	0	0	0	0	0	0	0	1	0	0
0.44	1	0	0	1	0	0	5	0	0	6	0	0
0.45	0	0	0	1	0	0	2	0	0	3	0	0
0.46	0	0	0	1	0	0	1	0	0	2	0	0
0.47	0	0	0	0	0	0	0	0	0	0	0	0
0.48	0	0	0	0	0	0	0	0	0	0	0	0
0.49	0	0	0	1	0	0	0	0	0	1	0	0
0.50	0	0	0	2	0	0	2	0	0	4	0	0
SUBTOTAL	1	0	0	15	0	0	22	0	0	38	0	0

TABLE 9-3

[redacted] TOP SECRET [redacted]

MISSION • 1013-1 • INSTRUMENT • AFT 01/18/65 DENSITY FREQ DISTR

DENSITY VALUE	PRIMARY MIN	PRIMARY MAX	PRIMARY LIM	INTERMEDIATE MIN	INTERMEDIATE MAX	INTERMEDIATE LIM	FULL MIN	FULL MAX	FULL LIM	ALL LEVELS MIN	ALL LEVELS MAX	ALL LEVELS LIM
0.51	0	0	0	0	0	0	1	0	0	1	0	0
0.52	0	0	0	1	0	0	4	0	0	5	0	0
0.53	0	0	0	0	0	0	0	0	0	0	0	0
0.54	0	0	0	1	0	0	5	0	0	6	0	0
0.55	0	0	0	0	0	0	2	0	0	2	0	0
0.56	0	0	0	4	0	0	2	0	0	6	0	0
0.57	0	0	0	1	0	0	0	0	0	1	0	0
0.58	0	0	0	1	0	0	5	0	0	6	0	0
0.59	0	0	0	1	0	0	0	0	0	1	0	0
0.60	0	0	0	1	0	0	5	0	0	6	0	0
0.61	0	0	0	0	0	0	0	0	0	0	0	0
0.62	0	0	0	1	0	0	4	0	0	5	0	0
0.63	0	0	0	0	0	0	0	0	0	0	0	0
0.64	0	0	0	1	0	0	1	2	0	2	2	0
0.65	0	0	0	0	0	0	0	0	0	0	0	0
0.66	0	0	0	0	0	0	2	0	0	2	0	0
0.67	0	0	0	0	0	0	0	0	0	0	0	0
0.68	0	0	0	1	0	0	5	0	0	6	0	0
0.69	0	0	0	2	0	0	1	0	0	3	0	0
0.70	0	0	0	2	0	0	2	0	0	4	0	0
0.71	0	0	0	0	0	0	0	0	0	0	0	0
0.72	0	0	0	1	0	0	4	0	0	5	0	0
0.73	0	0	0	0	0	0	2	0	0	2	0	0
0.74	0	0	0	1	0	0	2	0	0	3	0	0
0.75	0	0	0	0	0	0	0	0	0	0	0	0
0.76	0	0	0	1	0	0	2	0	0	3	0	0
0.77	0	0	0	0	0	0	0	0	0	0	0	0
0.78	0	0	0	2	0	0	1	0	0	3	0	0
0.79	0	0	0	0	0	0	0	0	0	0	0	0
0.80	0	0	0	1	0	0	1	1	0	2	1	0
0.81	0	0	0	0	0	0	1	0	0	1	0	0
0.82	0	0	0	1	0	0	3	1	0	4	1	0
0.83	0	0	0	0	1	0	0	1	0	0	1	0
0.84	0	0	0	0	1	0	1	0	0	1	1	0
0.85	0	0	0	1	1	0	1	2	0	1	3	0
0.86	0	0	0	1	0	0	0	0	0	1	0	0
0.87	0	0	0	0	0	0	0	0	0	0	0	0
0.88	0	0	0	0	0	0	0	0	0	0	0	0
0.89	0	0	0	0	0	0	1	0	0	1	0	0
0.90	0	0	0	1	0	0	2	0	0	3	0	0
0.91	0	0	0	0	1	0	0	1	0	0	1	0
0.92	0	0	0	0	1	0	1	1	0	1	2	0
0.93	0	0	0	0	0	0	0	0	0	0	0	0
0.94	0	0	0	0	1	0	1	1	0	1	2	0
0.95	0	0	0	1	0	0	2	0	0	2	0	0
0.96	0	0	0	1	0	0	3	0	0	4	0	0
0.97	0	0	0	0	0	0	1	0	0	1	0	0
0.98	0	0	0	1	0	0	0	0	0	1	0	0
0.99	0	0	0	0	1	0	0	0	0	0	1	0
1.00	0	0	0	1	1	0	1	3	0	2	4	0
SUBTOTAL	0	0	0	29	7	0	66	11	0	95	18	0

[redacted] TOP SECRET [redacted]

TABLE 9-3

MISSION • 1013-1 • INSTRUMENT • AFT 01/18/65 DENSITY FREQ DISTR

DENSITY VALUE	PRIMARY MIN	PRIMARY MAX	PRIMARY LIM	INTERMEDIATE MIN	INTERMEDIATE MAX	INTERMEDIATE LIM	FULL MIN	FULL MAX	FULL LIM	ALL LEVELS MIN	ALL LEVELS MAX	ALL LEVELS LIM
1.01	0	0	0	0	0	0	0	0	0	0	0	0
1.02	0	0	0	0	0	0	0	0	0	0	0	0
1.03	0	0	0	0	0	0	0	0	0	0	0	0
1.04	0	0	0	0	0	0	0	0	0	0	0	0
1.05	0	0	0	0	0	0	0	0	0	0	0	0
1.06	0	0	0	1	0	0	1	0	0	2	0	0
1.07	0	0	0	0	0	0	2	0	0	2	0	0
1.08	0	0	0	0	0	0	2	0	0	2	0	0
1.09	0	0	0	0	0	0	0	1	0	0	1	0
1.10	0	0	0	1	0	0	0	1	0	1	1	0
1.11	0	0	0	0	0	0	1	1	0	1	1	0
1.12	0	0	0	0	0	0	0	1	0	0	1	0
1.13	0	0	1	0	0	0	0	3	0	0	5	0
1.14	0	1	0	0	1	0	0	3	0	0	5	1
1.15	0	0	0	0	1	0	0	0	0	0	1	0
1.16	0	0	0	0	0	0	0	0	0	0	0	0
1.17	0	0	0	0	0	0	0	1	0	0	1	0
1.18	0	0	0	0	0	0	1	0	0	1	0	0
1.19	0	0	0	0	0	0	1	0	0	1	0	0
1.20	0	0	0	0	1	0	2	2	0	2	3	0
1.21	0	0	0	0	2	0	0	2	0	0	3	0
1.22	0	0	0	0	2	0	0	0	0	0	2	0
1.23	0	0	0	0	0	0	0	0	0	0	0	0
1.24	0	0	0	0	0	0	0	0	0	0	0	0
1.25	0	0	0	1	0	0	0	0	0	1	0	0
1.26	0	0	0	0	0	0	0	2	0	0	2	0
1.27	0	0	0	0	0	0	0	0	0	0	0	0
1.28	0	0	0	0	0	0	0	0	0	0	0	0
1.29	0	0	0	0	0	0	0	0	0	0	0	0
1.30	0	0	0	0	0	0	0	2	0	0	2	0
1.31	0	0	0	0	1	0	0	0	0	0	1	0
1.32	0	0	0	0	0	0	0	0	0	0	0	0
1.33	0	0	0	0	0	0	0	0	0	0	0	0
1.34	0	0	0	0	0	0	0	0	0	0	0	0
1.35	0	0	0	0	0	0	0	0	0	0	0	0
1.36	0	0	0	0	1	0	0	0	0	0	2	0
1.37	0	0	0	0	0	0	0	1	0	0	2	0
1.38	0	0	0	0	1	0	0	2	0	1	3	0
1.39	0	0	0	0	0	0	1	1	0	1	1	0
1.40	0	0	0	0	0	0	0	1	0	0	1	0
1.41	0	0	0	0	0	0	0	1	0	0	1	0
1.42	0	0	0	0	0	0	0	0	0	0	0	0
1.43	0	0	0	0	0	0	0	1	0	0	1	0
1.44	0	0	0	0	0	0	0	1	0	0	1	0
1.45	0	0	0	0	1	0	0	1	0	0	2	0
1.46	0	0	0	0	1	0	0	0	0	0	2	0
1.47	0	0	1	0	0	0	0	1	0	0	2	1
1.48	0	0	0	0	0	0	0	1	0	0	1	0
1.49	0	0	0	0	0	0	0	0	0	0	0	0
1.50	0	0	0	0	0	0	0	2	0	0	2	0
SUBTOTAL	0	1	1	3	9	0	7	24	6	10	34	7

TABLE 9-3

MISSION • 1013-1 • INSTRUMENT • AFT 01/18/65 DENSITY FREQ DISTR

DENSITY VALUE	PRIMARY MIN	PRIMARY MAX	PRIMARY LIM	INTERMEDIATE MIN	INTERMEDIATE MAX	INTERMEDIATE LIM	FULL MIN	FULL MAX	FULL LIM	ALL LEVELS MIN	ALL LEVELS MAX	ALL LEVELS LIM
1.51	0	0	0	0	0	0	0	0	0	0	0	0
1.52	0	0	0	0	1	0	0	3	0	0	4	0
1.53	0	0	0	0	0	0	0	3	0	0	4	0
1.54	0	0	0	0	0	0	0	0	0	0	0	0
1.55	0	0	0	0	1	0	0	0	0	0	1	0
1.56	0	0	0	0	1	0	1	0	0	1	2	0
1.57	0	0	1	0	0	0	1	0	0	1	2	0
1.58	0	0	1	0	1	0	0	0	0	1	2	0
1.59	0	0	1	0	2	0	0	0	0	1	2	0
1.60	0	0	1	0	3	0	0	1	0	1	4	0
1.61	0	0	0	0	0	0	0	1	0	0	4	0
1.62	0	0	0	0	1	0	0	4	0	0	5	0
1.63	0	0	0	0	1	0	0	1	0	0	2	0
1.64	0	0	0	0	1	0	0	3	0	0	2	0
1.65	0	0	0	0	1	0	0	0	0	0	1	0
1.66	0	0	0	0	1	0	0	0	0	0	1	0
1.67	0	0	0	0	0	0	0	0	0	0	1	0
1.68	0	0	0	0	0	0	0	4	0	0	1	0
1.69	0	0	0	0	0	0	0	0	0	0	0	0
1.70	0	0	0	0	0	0	0	2	0	0	2	0
1.71	0	0	0	0	0	0	0	0	0	0	0	0
1.72	0	0	0	0	0	0	0	0	0	0	0	0
1.73	0	0	0	0	0	0	0	0	0	0	0	0
1.74	0	0	0	0	0	0	0	2	0	0	3	0
1.75	0	0	0	0	2	0	0	1	0	0	3	0
1.76	0	0	0	0	1	0	0	0	0	0	1	0
1.77	0	0	0	0	0	0	0	0	0	0	0	0
1.78	0	0	0	0	0	0	0	1	0	0	1	0
1.79	0	0	0	0	0	0	0	0	0	0	0	0
1.80	0	0	0	0	0	0	0	1	0	0	1	0
1.81	0	0	0	0	0	0	0	0	0	0	0	0
1.82	0	0	0	0	0	0	0	1	0	0	1	0
1.83	0	0	0	0	0	0	0	0	0	0	0	0
1.84	0	0	0	0	0	0	0	0	0	0	0	0
1.85	0	0	0	0	0	0	0	1	0	0	1	0
1.86	0	0	0	0	0	0	0	0	0	0	0	0
1.87	0	0	0	0	0	0	0	0	0	0	0	0
1.88	0	0	0	0	0	0	0	0	0	0	0	0
1.89	0	0	0	0	0	0	0	0	0	0	0	0
1.90	0	0	0	0	1	0	0	0	0	0	1	0
1.91	0	0	0	0	2	0	0	4	0	0	6	0
1.92	0	0	0	0	0	0	0	0	0	0	0	0
1.93	0	0	0	0	0	0	0	0	0	0	0	0
1.94	0	0	0	0	0	0	0	1	0	0	1	0
1.95	0	0	0	0	1	0	0	1	0	0	2	0
1.96	0	0	0	0	0	0	0	1	0	0	1	0
1.97	0	0	0	0	0	0	0	0	0	0	0	0
1.98	0	0	0	0	1	0	0	2	0	0	3	0
1.99	0	0	0	0	0	0	0	0	0	0	0	0
2.00	0	0	0	0	3	1	0	4	2	0	7	3
SUBTOTAL	0	0	2	0	28	14	1	43	41	1	71	57

TABLE 9-3

[redacted] TOP SECRET [redacted]

MISSION • 1013-1 • INSTRUMENT • AFT 01/18/65 DENSITY FREQ DISTR

DENSITY VALUE	PRIMARY MIN	PRIMARY MAX	PRIMARY LIM	INTERMEDIATE MIN	INTERMEDIATE MAX	INTERMEDIATE LIM	FULL MIN	FULL MAX	FULL LIM	ALL LEVELS MIN	ALL LEVELS MAX	ALL LEVELS LIM
2.01	0	0	0	0	0	1	0	0	2	0	0	3
2.02	0	0	0	0	0	0	0	1	3	0	1	3
2.03	0	0	0	0	0	0	0	0	2	0	0	2
2.04	0	0	0	0	0	0	0	0	1	0	0	2
2.05	0	0	0	0	0	0	0	0	1	0	0	2
2.06	0	0	0	0	0	0	0	0	1	0	0	2
2.07	0	0	0	0	0	0	0	0	1	0	0	2
2.08	0	0	0	0	0	0	0	0	2	0	0	2
2.09	0	0	0	0	0	0	0	0	1	0	0	2
2.10	0	0	0	0	0	0	0	0	2	0	0	2
2.11	0	0	0	0	0	0	0	0	2	0	0	2
2.12	0	0	0	0	0	0	0	0	2	0	0	2
2.13	0	0	0	0	0	0	0	0	1	0	0	1
2.14	0	0	0	0	0	0	0	0	1	0	0	1
2.15	0	0	0	0	0	1	0	0	1	0	0	1
2.16	0	0	0	0	0	1	0	0	0	0	0	1
2.17	0	0	0	0	0	1	0	0	0	0	0	1
2.18	0	0	0	0	0	1	0	0	1	0	0	2
2.19	0	0	0	0	0	0	0	0	0	0	0	2
2.20	0	0	0	0	0	0	0	0	3	0	0	3
2.21	0	0	0	0	0	0	0	0	2	0	0	3
2.22	0	0	0	0	0	0	0	0	1	0	0	3
2.23	0	0	0	0	0	0	0	0	0	0	0	3
2.24	0	0	0	0	0	0	0	0	0	0	0	3
2.25	0	0	0	0	0	0	0	0	0	0	0	3
2.26	0	0	0	0	0	0	0	0	0	0	0	2
2.27	0	0	0	0	0	0	0	0	1	0	0	2
2.28	0	0	0	0	0	0	0	0	1	0	0	1
2.29	0	0	0	0	0	0	0	0	0	0	0	1
2.30	0	0	0	0	0	0	0	0	0	0	0	1
2.31	0	0	0	0	0	0	0	0	0	0	0	1
2.32	0	0	0	0	0	0	0	0	0	0	0	1
2.33	0	0	0	0	0	0	0	0	0	0	0	1
2.34	0	0	0	0	0	0	0	0	0	0	0	0
2.35	0	0	0	0	0	0	0	0	0	0	0	0
2.36	0	0	0	0	0	0	0	0	0	0	0	0
2.37	0	0	0	0	0	0	0	0	0	0	0	0
2.38	0	0	0	0	0	0	0	0	0	0	0	0
2.39	0	0	0	0	0	0	0	0	0	0	0	0
2.40	0	0	0	0	0	0	0	0	0	0	0	0
2.41	0	0	0	0	0	0	0	0	0	0	0	0
2.42	0	0	0	0	0	0	0	0	0	0	0	0
2.43	0	0	0	0	0	0	0	0	0	0	0	0
2.44	0	0	0	0	0	0	0	0	0	0	0	0
2.45	0	0	0	0	0	0	0	0	0	0	0	0
2.46	0	0	0	0	0	0	0	0	0	0	0	0
2.47	0	0	0	0	0	0	0	0	0	0	0	0
2.48	0	0	0	0	0	0	0	0	0	0	0	0
2.49	0	0	0	0	0	0	0	0	0	0	0	0
2.50	0	0	0	0	0	0	0	0	0	0	0	0
SUBTOTAL	0	0	0	0	3	25	0	18	54	0	21	79

[redacted] TOP SECRET [redacted]

TABLE 9-3

[redacted] TOP SECRET [redacted]

MISSION • 1013-1 • INSTRUMENT • AFT 01/18/65 DENSITY FREQ DISTR

DENSITY VALUE	PRIMARY MIN	PRIMARY MAX	PRIMARY LIM	INTERMEDIATE MIN	INTERMEDIATE MAX	INTERMEDIATE LIM	FULL MIN	FULL MAX	FULL LIM	ALL LEVELS MIN	ALL LEVELS MAX	ALL LEVELS LIM
2.51	0	0	0	0	0	0	0	0	0	0	0	0
2.52	0	0	0	0	0	0	0	0	0	0	0	0
2.53	0	0	0	0	0	0	0	0	0	0	0	0
2.54	0	0	0	0	0	0	0	0	0	0	0	0
2.55	0	0	0	0	0	0	0	0	0	0	0	0
2.56	0	0	0	0	0	0	0	0	0	0	0	0
2.57	0	0	0	0	0	0	0	0	0	0	0	0
2.58	0	0	0	0	0	0	0	0	0	0	0	0
2.59	0	0	0	0	0	0	0	0	0	0	0	0
2.60	0	0	0	0	0	0	0	0	0	0	0	0
2.61	0	0	0	0	0	0	0	0	0	0	0	0
2.62	0	0	0	0	0	0	0	0	0	0	0	0
2.63	0	0	0	0	0	0	0	0	0	0	0	0
2.64	0	0	0	0	0	0	0	0	0	0	0	0
2.65	0	0	0	0	0	0	0	0	0	0	0	0
2.66	0	0	0	0	0	0	0	0	0	0	0	0
2.67	0	0	0	0	0	0	0	0	0	0	0	0
2.68	0	0	0	0	0	0	0	0	0	0	0	0
2.69	0	0	0	0	0	0	0	0	0	0	0	0
2.70	0	0	0	0	0	0	0	0	0	0	0	0
SUBTOTAL	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL	1	1	3	47	47	39	96	96	101	144	144	143

MISSION 1013-1 INSTR - AFT 01/18/65 PROCESSING AND EXPOSURE ANALY

PROCESS LEVEL	SAMPLE SIZE	UNDER EXPOSED	UNDER PROCESSED	CORRECT EXP+PROC	OVER PROCESSED	OVER EXPOSED
PRIMARY	1	0 PC	0 PC	100 PC	0 PC	0 PC
INTERMEDIATE	47	0 PC	15 PC	72 PC	13 PC	0 PC
FULL	96	7 PC	0 PC	75 PC	18 PC	0 PC
ALL LEVELS	144	5 PC	5 PC	74 PC	16 PC	0 PC

PROCESS LEVEL	BASE + FOG	UNDER EXPOSED	UNDER PROCESSED	CORRECT EXP+PROC	OVER PROCESSED	OVER EXPOSED
PRIMARY	0.01-0.09	0.01-0.13	0.14-0.39	0.40-0.90	---------	0.91 AND
INTERMED	0.10-0.17	0.01-0.20	0.21-0.39	0.40-0.90	0.91-1.34	1.35 AND
FULL	0.18 AND UP	0.01-0.39	---------	0.40-0.90	0.91-1.69	1.70 AND

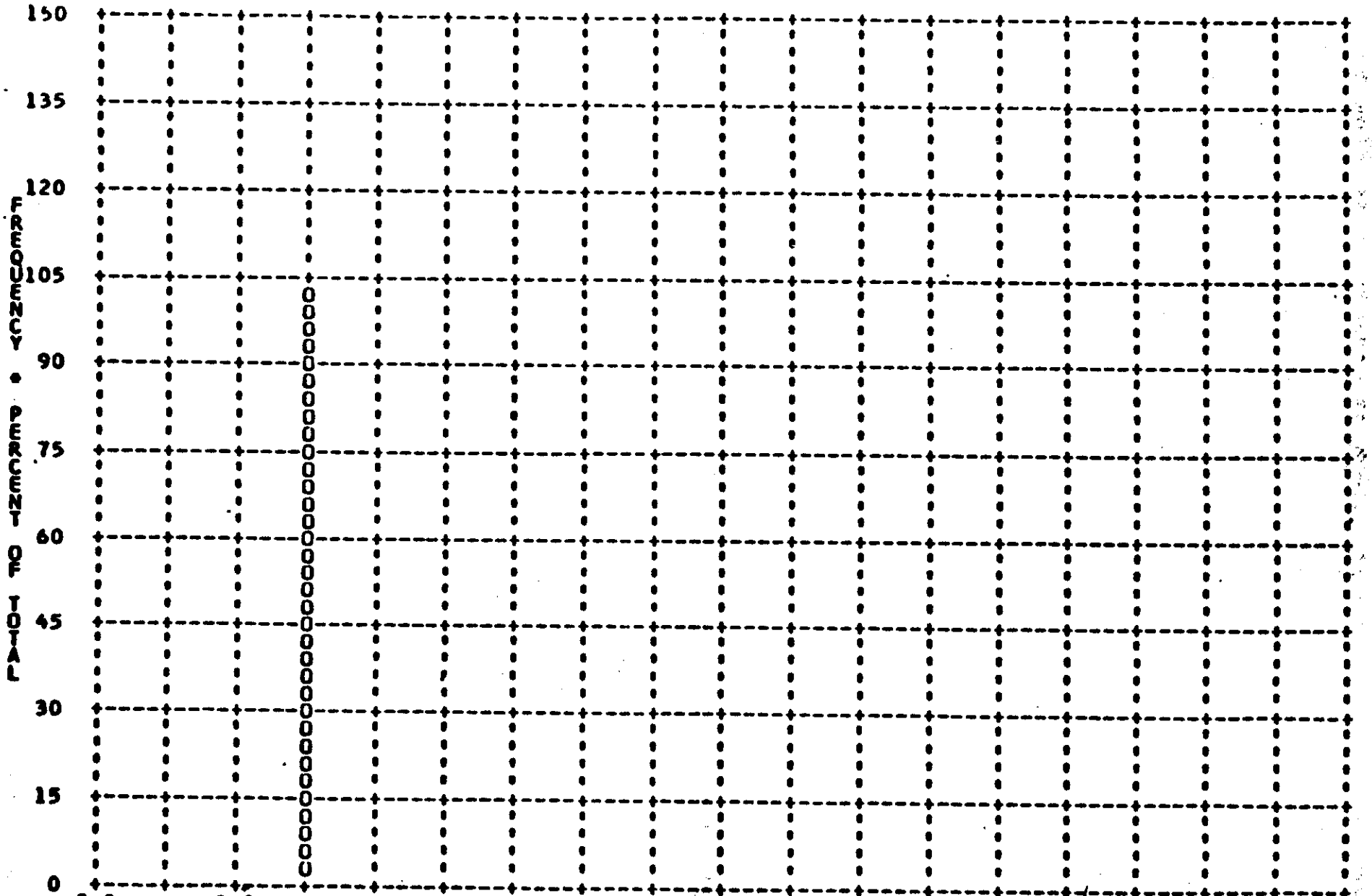
[redacted] TOP SECRET [redacted]

TABLE 9-3

[redacted] TOP SECRET [redacted]

MISSION • 1013-1 • INSTR • AFT • 01/18/65 PLOT OF D MIN • TERRAIN • PROCESSING • PRIMARY

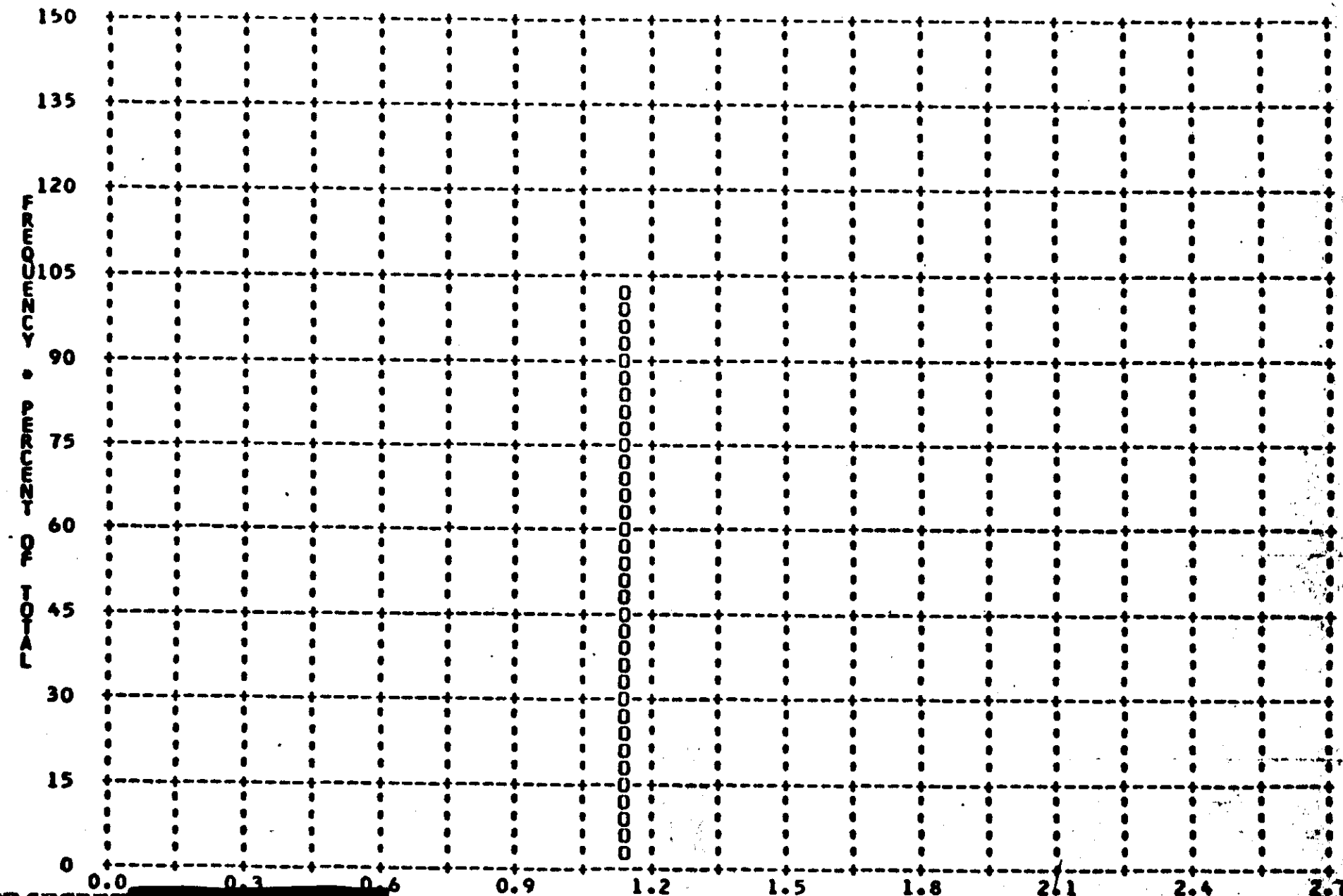
ARITH MEAN • 0.43 • MEDIAN • 0.43 • STD DEV • 0.00 • RANGE • 0.43 TO 0.43 WITH 1 SAMPLES



TOP SECRET [redacted]

MISSION • 1013-1 • INSTR • AFT • 01/18/65 PLOT OF D MAX • TERRAIN • PROCESSING • PRIMARY

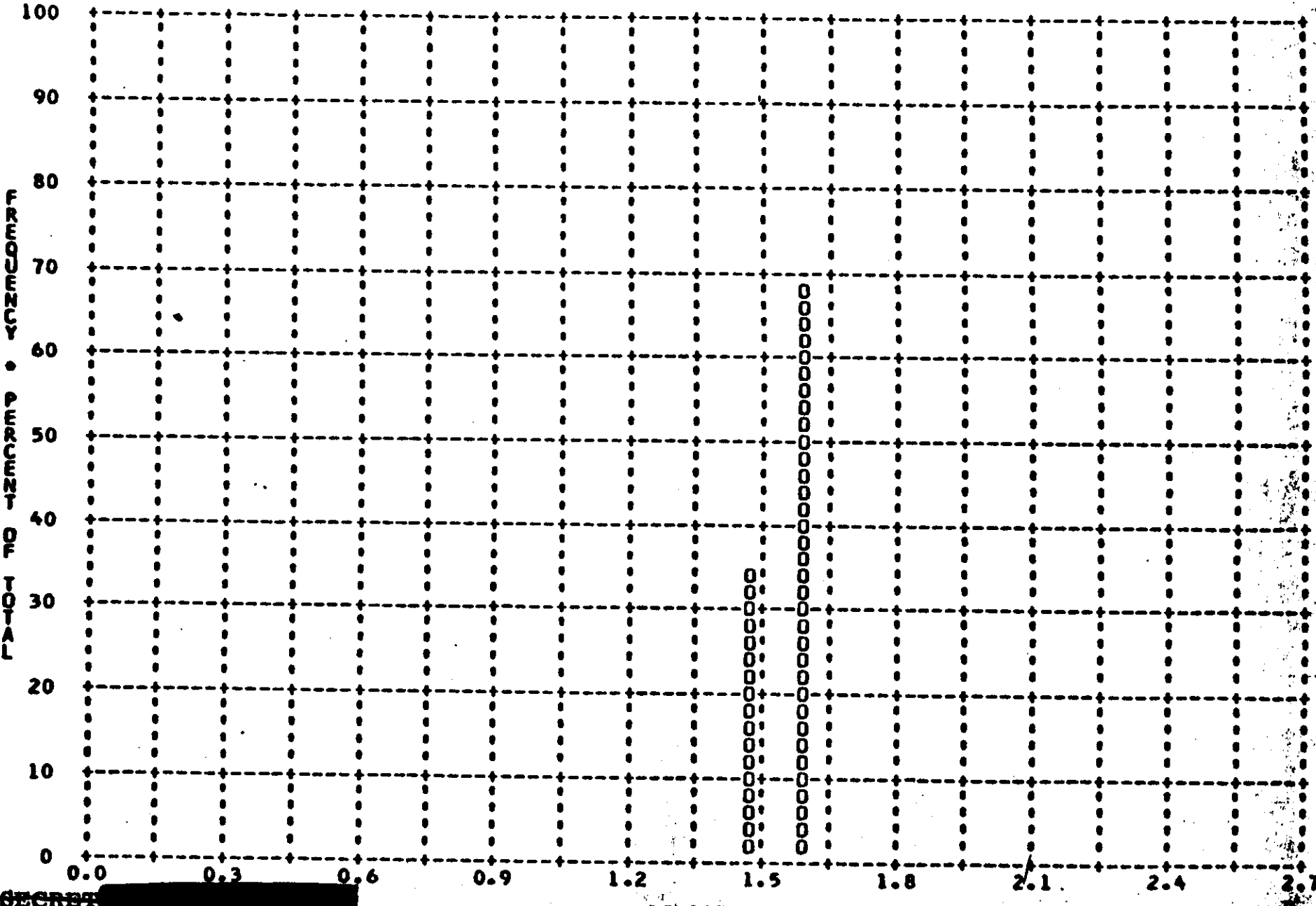
ARITH MEAN • 1.14 • MEDIAN • 1.14 • STD DEV • 0.00 • RANGE • 1.14 TO 1.14 WITH 1 SAMPLES



[redacted] TOP SECRET [redacted]

MISSION • 1013-1 • INSTR • AFT • 01/10/65 PLOT OF D MAX • CLOUD • PROCESSING • PRIMARY

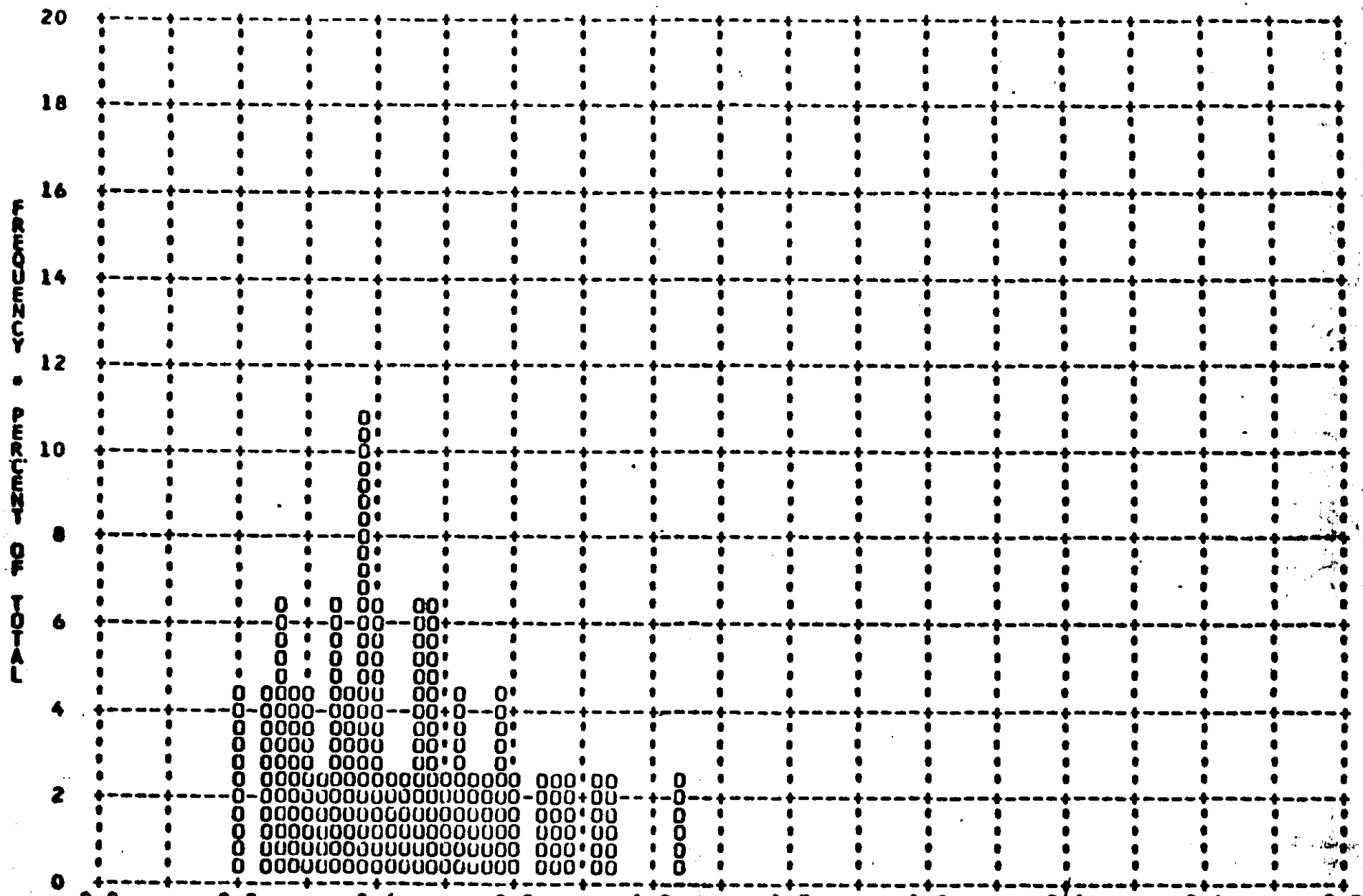
ARITH MEAN • 1.55 • MEDIAN • 1.58 • STD DEV • 0.07 • RANGE • 1.47 TO 1.59 WITH 3 SAMPLES



TOP SECRET [redacted]

MISSION • 1013-1 • INSTR • AFT • 01/18/65 PLOT OF D MIN • TERRAIN • PROCESSING • INTERMEDIATE

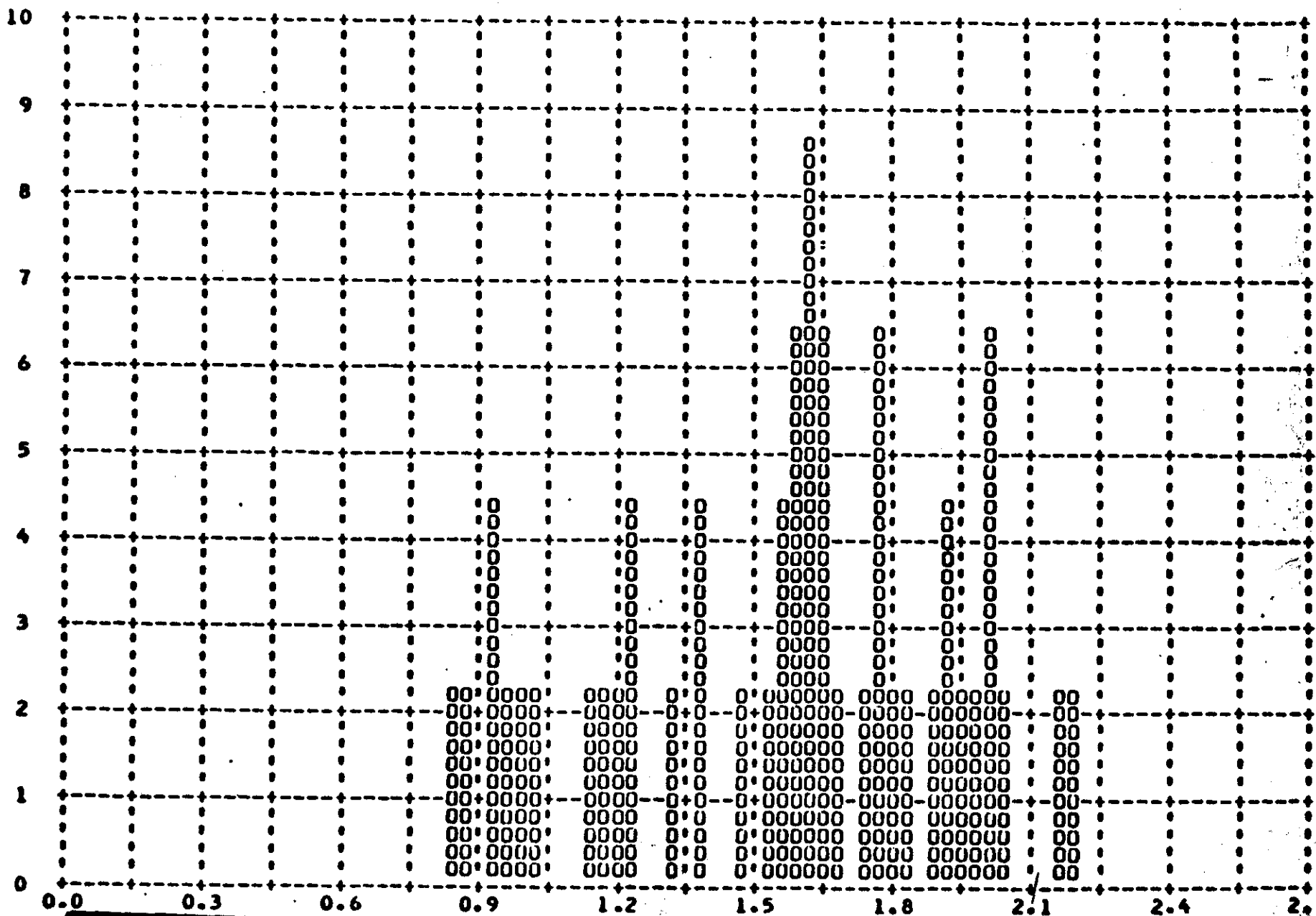
ARITH MEAN • 0.64 • MEDIAN • 0.59 • STD DEV • 0.23 • RANGE • 0.30 TO 1.25 WITH 47 SAMPLES



[redacted] TOP SECRET [redacted]

MISSION • 1013-1 • INSTR • AFT • 01/18/65 PLOT OF D MAX • TERRAIN • PROCESSING • INTERMEDIATE

ARITH MEAN • 1.55 • MEDIAN • 1.60 • STD DEV • 0.37 • RANGE • 0.83 TO 2.18 WITH. 47 SAMPLES



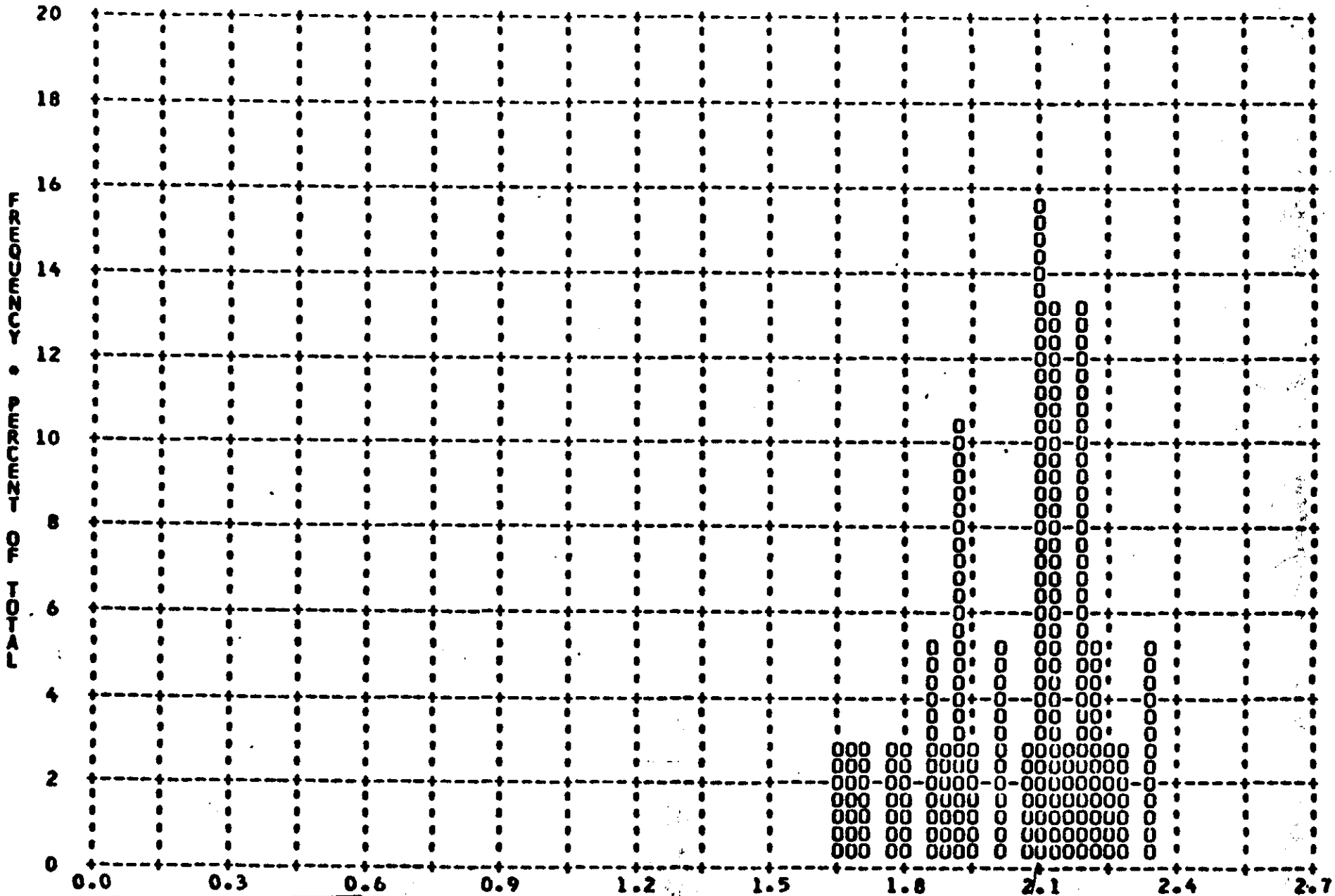
TOP SECRET [redacted]

[redacted]

TOP SECRET [redacted]

MISSION • 1013-1 • INSTR • AFT • 01/18/65 PLOT OF D MAX • CLOUD • PROCESSING • INTERMEDIATE

ARITH MEAN • 2.04 • MEDIAN • 2.10 • STD DEV • 0.18 • RANGE • 1.65 TO 2.33 WITH 39 SAMPLES



TOP SECRET [redacted]

MISSION • 1013-1 • INSTR • AFT • 01/18/65 PLOT OF D MIN • TERRAIN • PROCESSING • FULL

ARITH MEAN • 0.68 • MEDIAN • 0.62 • STD DEV • 0.24 • RANGE • 0.28 TO 1.56 WITH 96 SAMPLES.

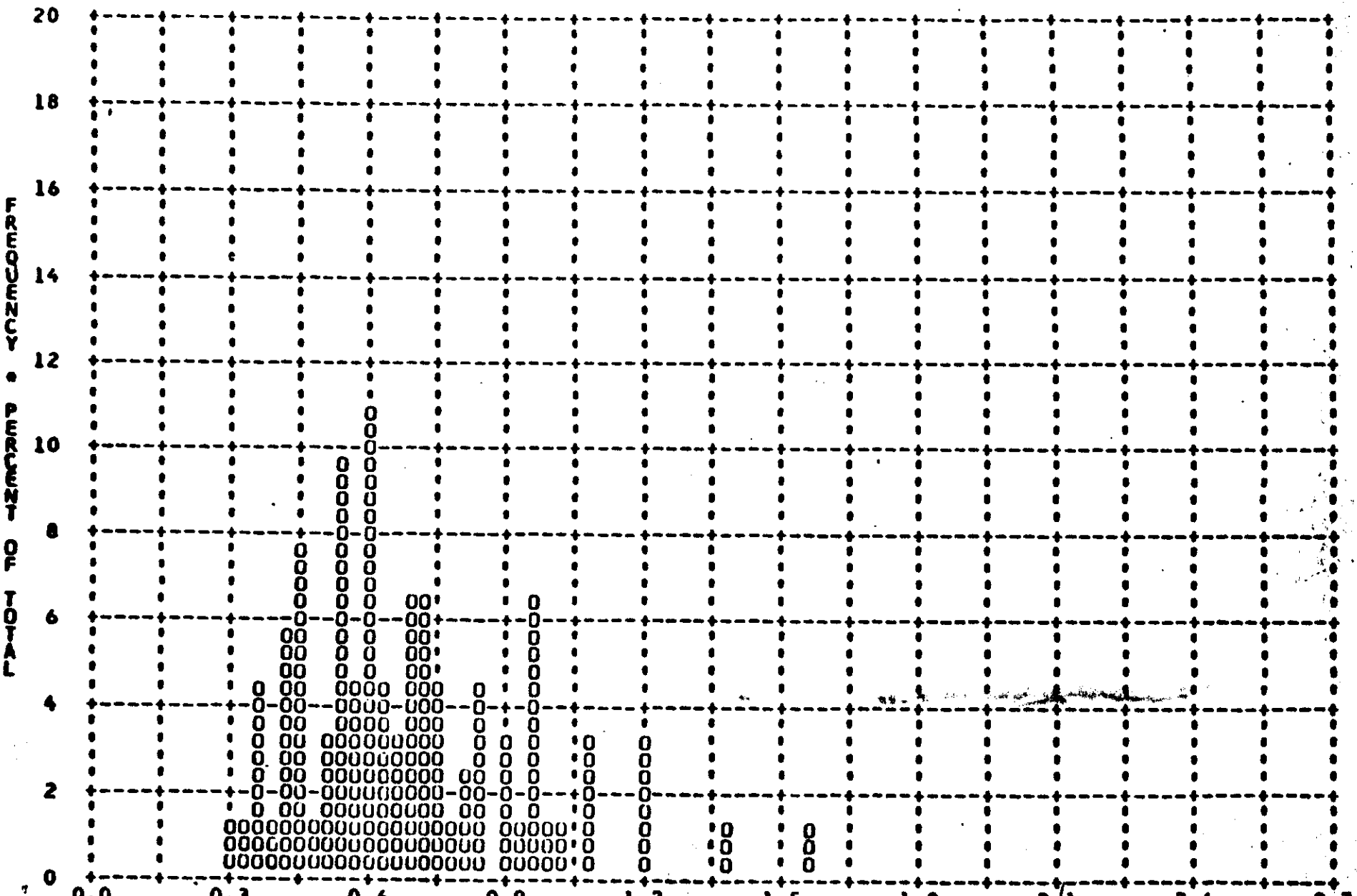
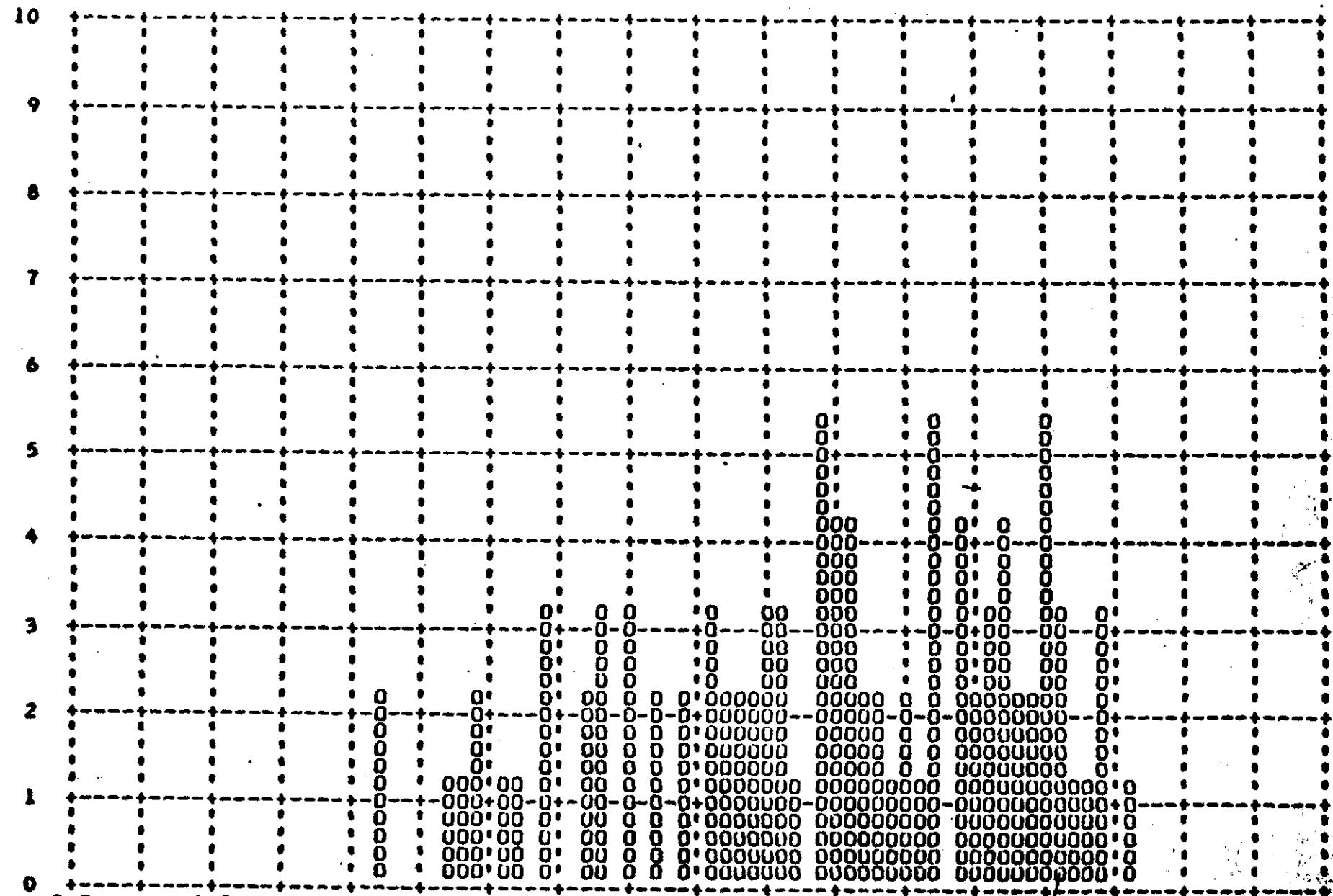


FIGURE 9.16

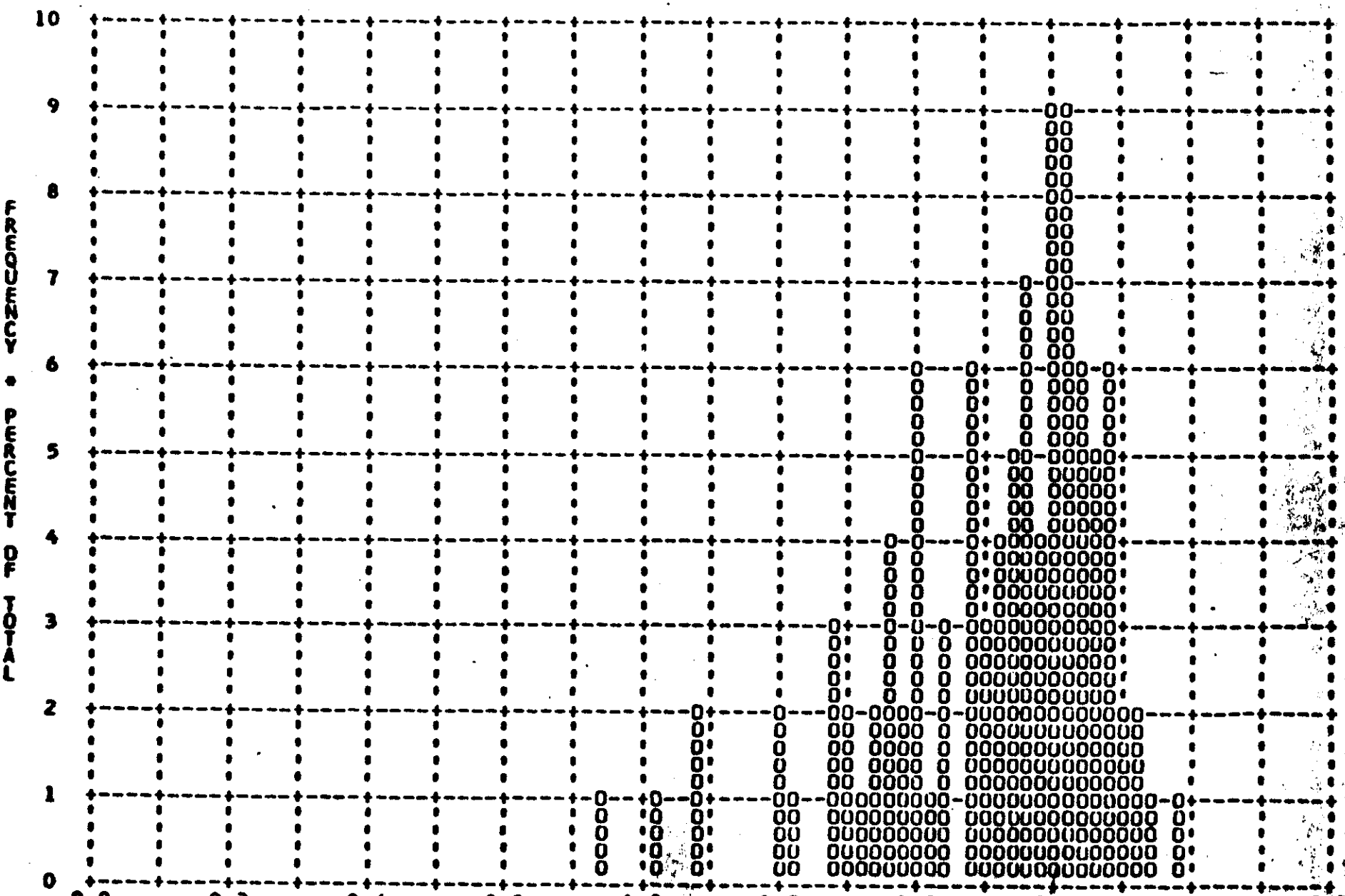
MISSION • 1013-1 • INSTR • AFT • 01/18/65 PLOT OF D MAX • TERRAIN • PROCESSING • FULL

ARITH MEAN • 1.62 • MEDIAN • 1.68 • STD DEV • 0.41 • RANGE • 0.64 TO 2.28 WITH 96 SAMPLES



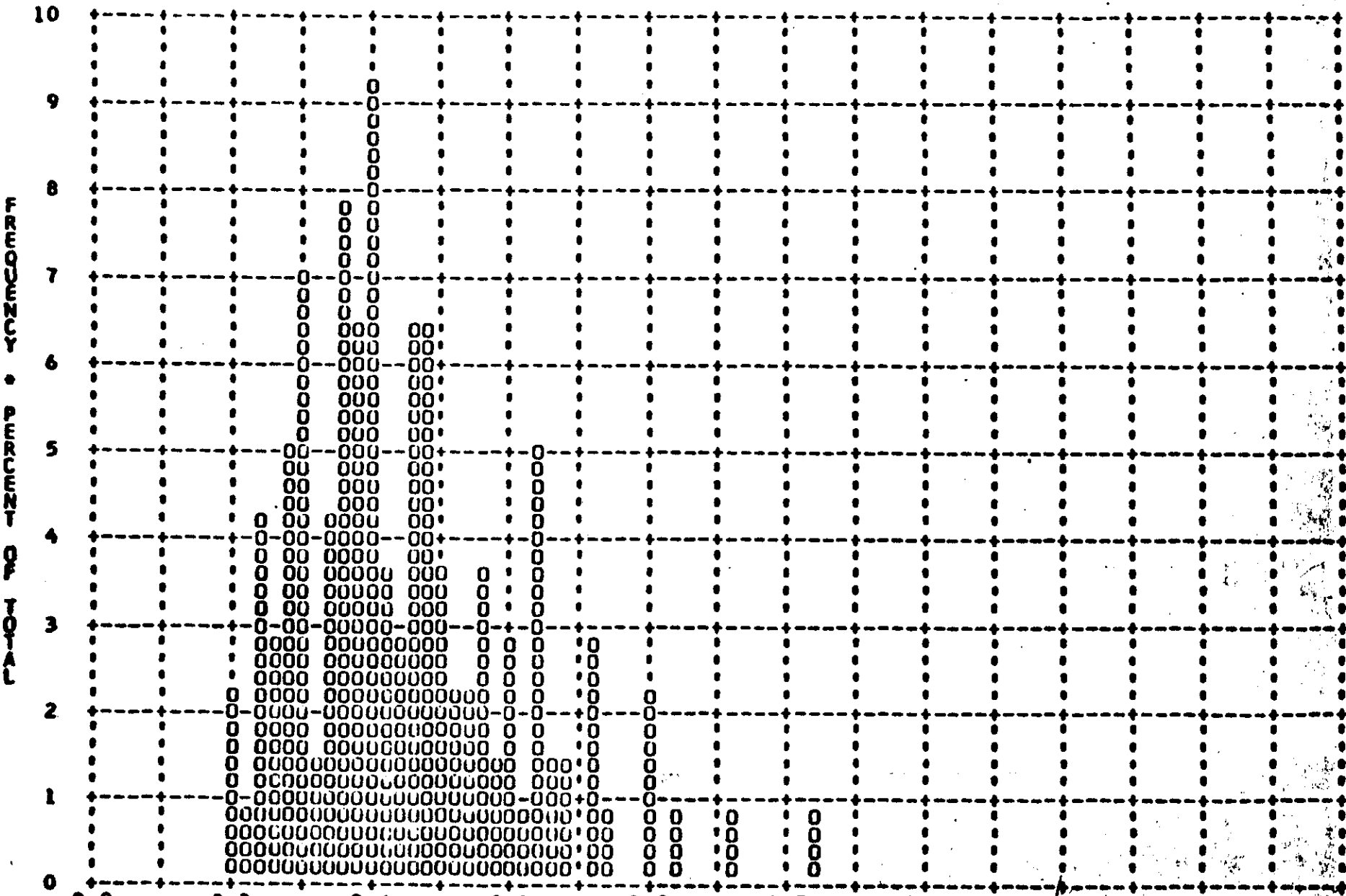
MISSION • 1013-1 • INSTR • AFT • 01/18/65 PLOT OF D MAX • CLOUD • PROCESSING • FULL

ARITH MEAN • 1.95 • MEDIAN • 2.02 • STD DEV • 0.24 • RANGE • 1.10 TO 2.36 WITH 101 SAMPLES



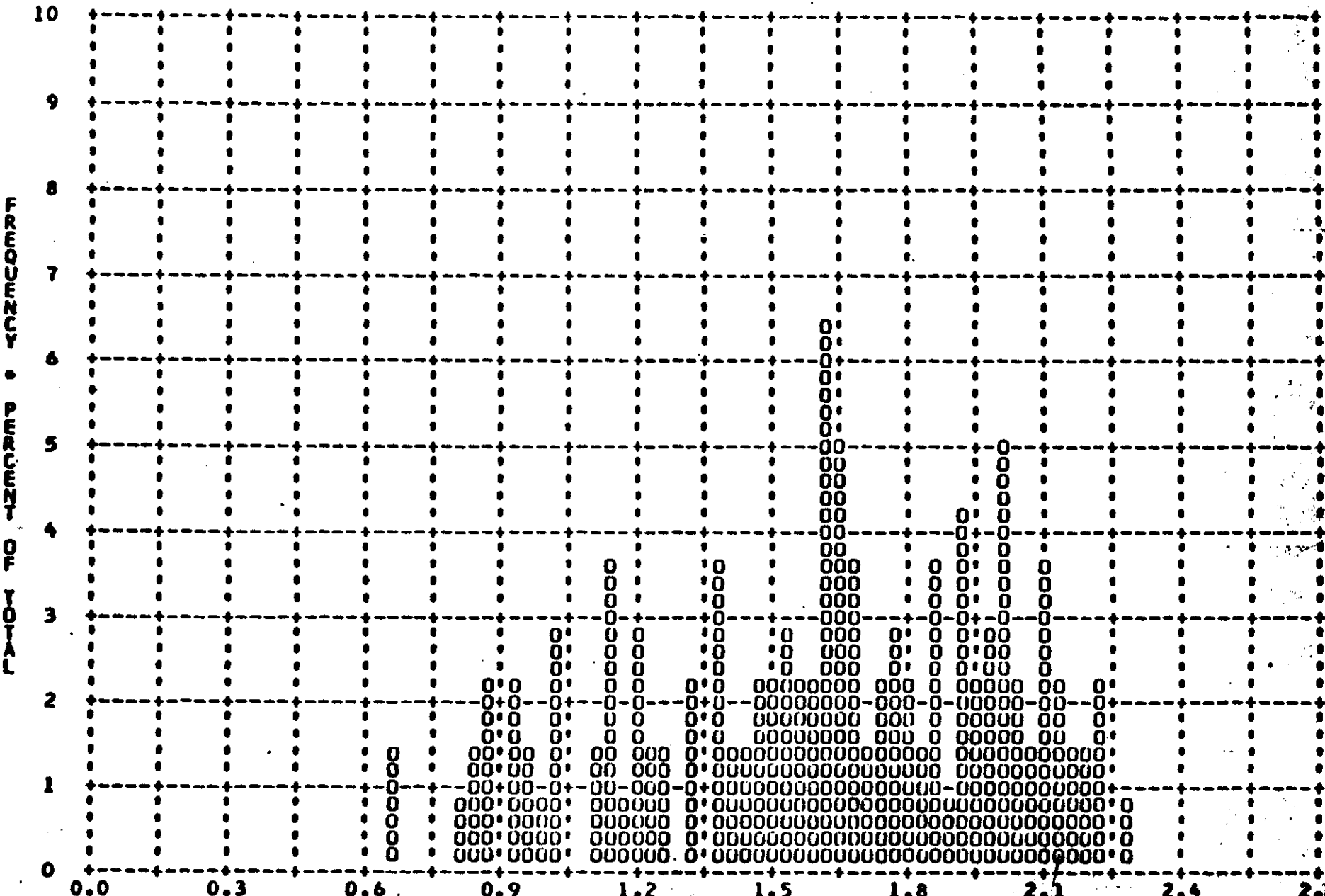
MISSION • 1013-1 • INSTR • AFT • 01/10/65 PLOT OF D MIN • TERRAIN • PROCESSING • ALL LEVELS

ARITH MEAN • 0.66 • MEDIAN • 0.62 • STD DEV • 0.24 • RANGE • 0.28 TO 1.56 WITH 144 SAMPLES



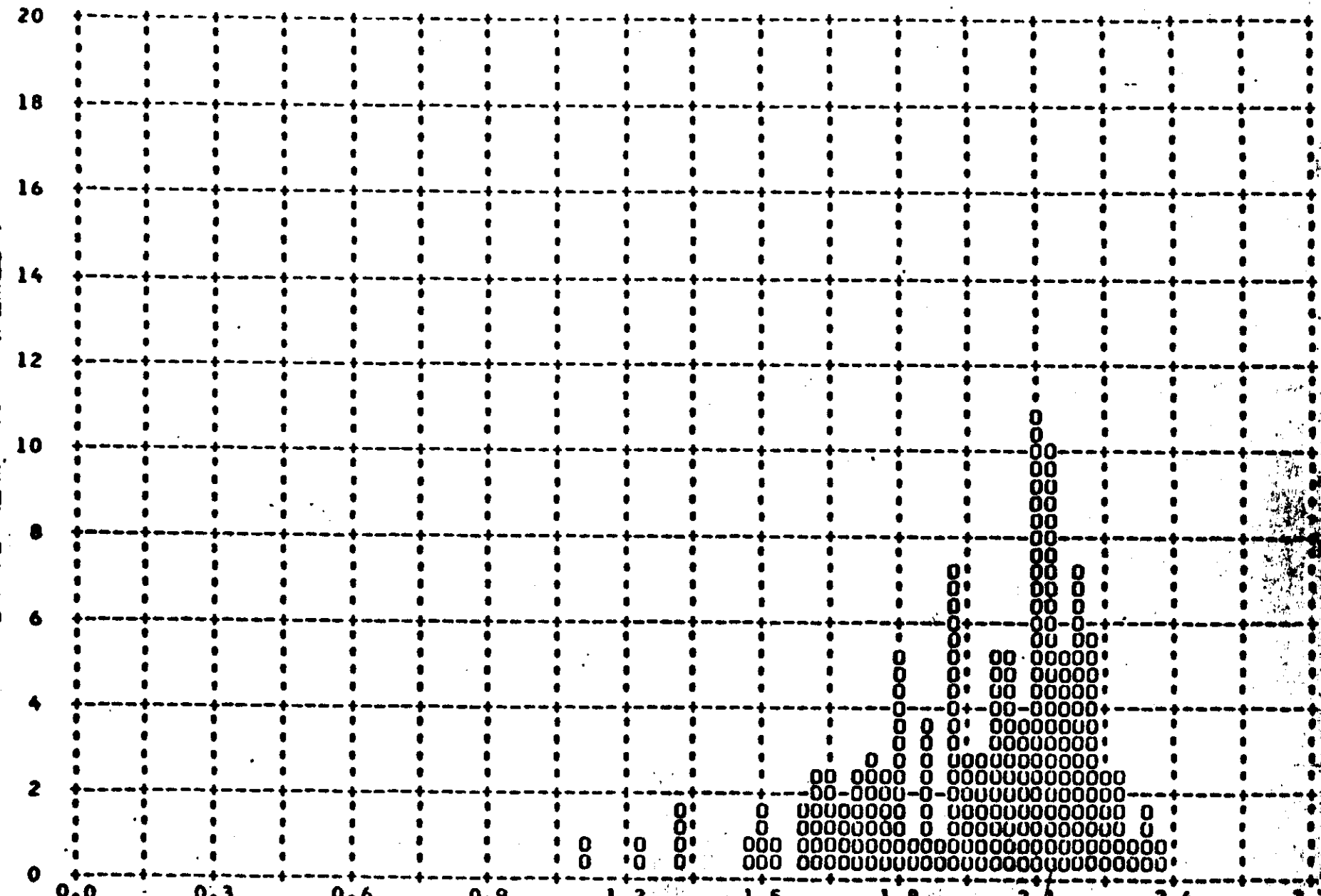
MISSION • 1013-1 • INSTR • AFT • 01/18/65 PLOT OF D MAX • TERRAIN • PROCESSING • ALL LEVELS

ARITH MEAN • 1.59 • MEDIAN • 1.63 • STD DEV • 0.40 • RANGE • 0.64 TO 2.28 WITH 144 SAMPLES



MISSION • 1013-1 • INSTR • AFT • 01/18/65 PLOT OF D MAX • CLOUD • PROCESSING • ALL LEVELS

ARITH MEAN • 1.97 • MEDIAN • 2.03 • STD DEV • 0.24 • RANGE • 1.10 TO 2.36 WITH 143 SAMPLES



[redacted] TOP SECRET [redacted]

MISSION 1013-1 INSTR - FRWD 01/18/65 PROCESSING AND EXPOSURE ANALYSIS

PROCESS LEVEL	SAMPLE SIZE	UNDER EXPOSED	UNDER PROCESSED	CORRECT EXP+PROC	OVER PROCESSED	OVER EXPOSED
PRIMARY	0	0 PC	0 PC	0 PC	0 PC	0 PC
INTERMEDIATE	79	1 PC	23 PC	72 PC	3 PC	1 PC
FULL	65	14 PC	0 PC	80 PC	6 PC	0 PC
ALL LEVELS	144	7 PC	13 PC	76 PC	4 PC	1 PC

MISSION 1013-1 INSTR - AFT 01/18/65 PROCESSING AND EXPOSURE ANALYSIS

PROCESS LEVEL	SAMPLE SIZE	UNDER EXPOSED	UNDER PROCESSED	CORRECT EXP+PROC	OVER PROCESSED	OVER EXPOSED
PRIMARY	1	0 PC	0 PC	100 PC	0 PC	0 PC
INTERMEDIATE	47	0 PC	15 PC	72 PC	13 PC	0 PC
FULL	96	7 PC	0 PC	75 PC	18 PC	0 PC
ALL LEVELS	144	5 PC	5 PC	74 PC	16 PC	0 PC

PROCESS LEVEL	BASE + FOG	UNDER EXPOSED	UNDER PROCESSED	CORRECT EXP+PROC	OVER PROCESSED	OVER EXPOSED
PRIMARY	0.01-0.09	0.01-0.13	0.14-0.39	0.40-0.90	----------	0.91 AND UP
INTERMED	0.10-0.17	0.01-0.20	0.21-0.39	0.40-0.90	0.91-1.34	1.35 AND UP
FULL	0.18 AND UP	0.01-0.39	----------	0.40-0.90	0.91-1.69	1.70 AND UP

[redacted] TOP SECRET [redacted]

TABLE 9-4

SECTION 10

PERFORMANCE MEASUREMENTS

The photography acquired by both panoramic cameras during Mission 1013-1 received an initial MIP rating of 85. A summary is tabulated below of the average visual RES values and MTF/AIM resolution values measured by AFSPPL and the MTF/AIM resolution values computed by [redacted] The microdensimeter slit used by AFSPPL and [redacted] was 80 microns by 1 micron.

Mission	Camera	Visual RES	AFSPPL	[redacted] All	[redacted] High
1013-1	FWD	89	94	85	99
1013-1	AFT	77	97	81	103

The [redacted] data normally contains two readings of the same edge the tabulation shows both the average of all the readings and the average of the highest readings of each edge. The value of the average of all readings is questionable as no valid reason can be ascertained for a measurement being greater than the resolution recorded however many factors can reduce the reading.

The details of the measurement and computing techniques, targets measured and target locations are fully reported in the evaluation report published by AFSPPL and are not normally included in this report. [redacted] has recently completed the re-calibration of the MTF/AIM values from Mission 1007-2 and up. Since this data has not been published in a previous report the corrected measurements for Mission 1013-1 are included in this report.

Analysis of Photographic Image to Evaluate System Performance

Mission 1013-1

Resolution in lines/mm based on the aerial image modulation = 4404 curve from edge trace data reduced by computer techniques.

Arithmetic Mean	83.3 l/mm
Standard Deviation	27.3 l/mm
Coefficient of Dispersion	33%
Number of Edges	49
M.I.P. Frame	95 l/mm

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

Arithmetic Mean	10.8 μ
Standard Deviation	4.1 μ
Coefficient of Dispersion	38%
Number of Edges	49
M.I.P. Frame	9.2 μ

Analysis of Photographic Image to Evaluate System Performance

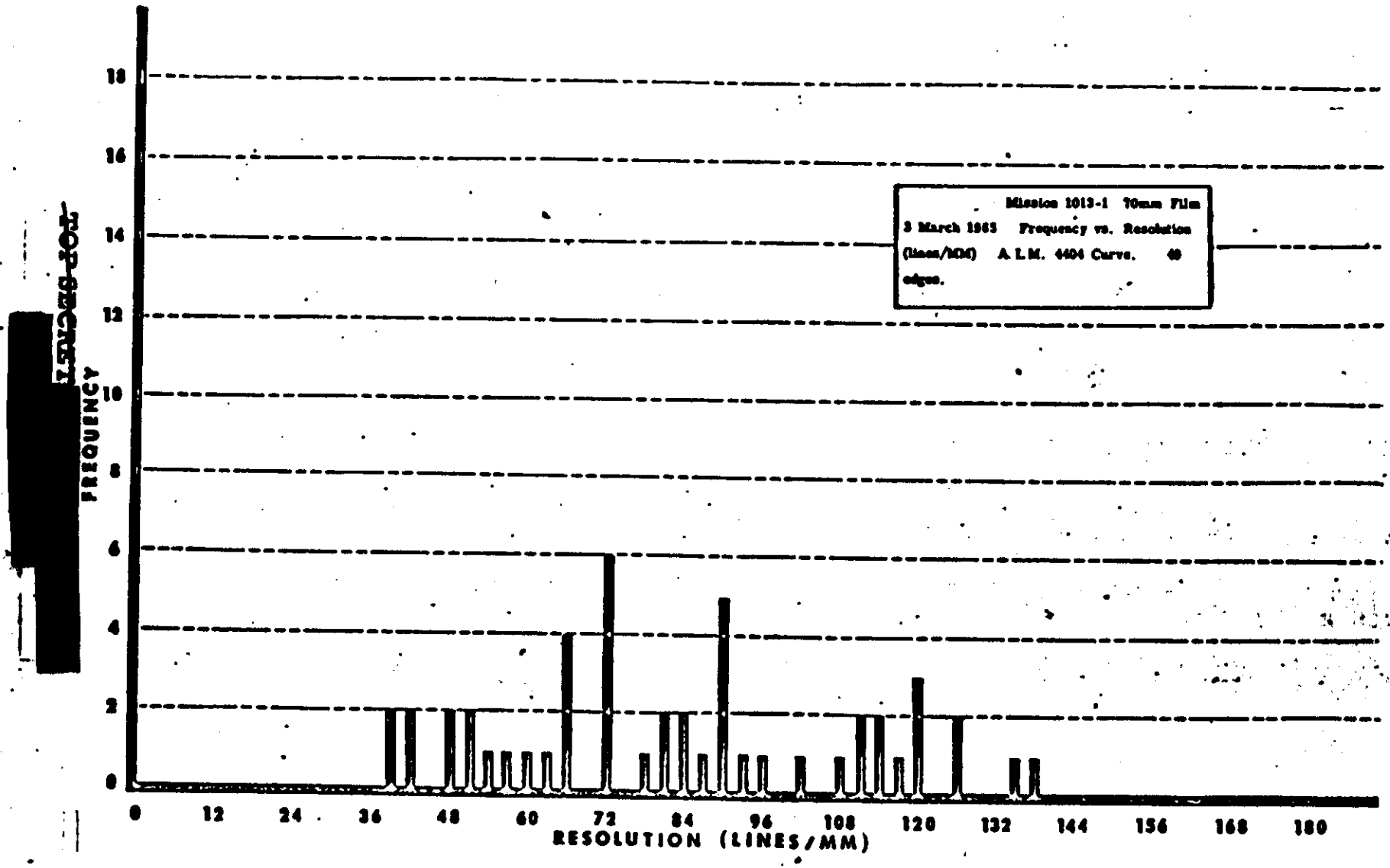
Mission 1013-1

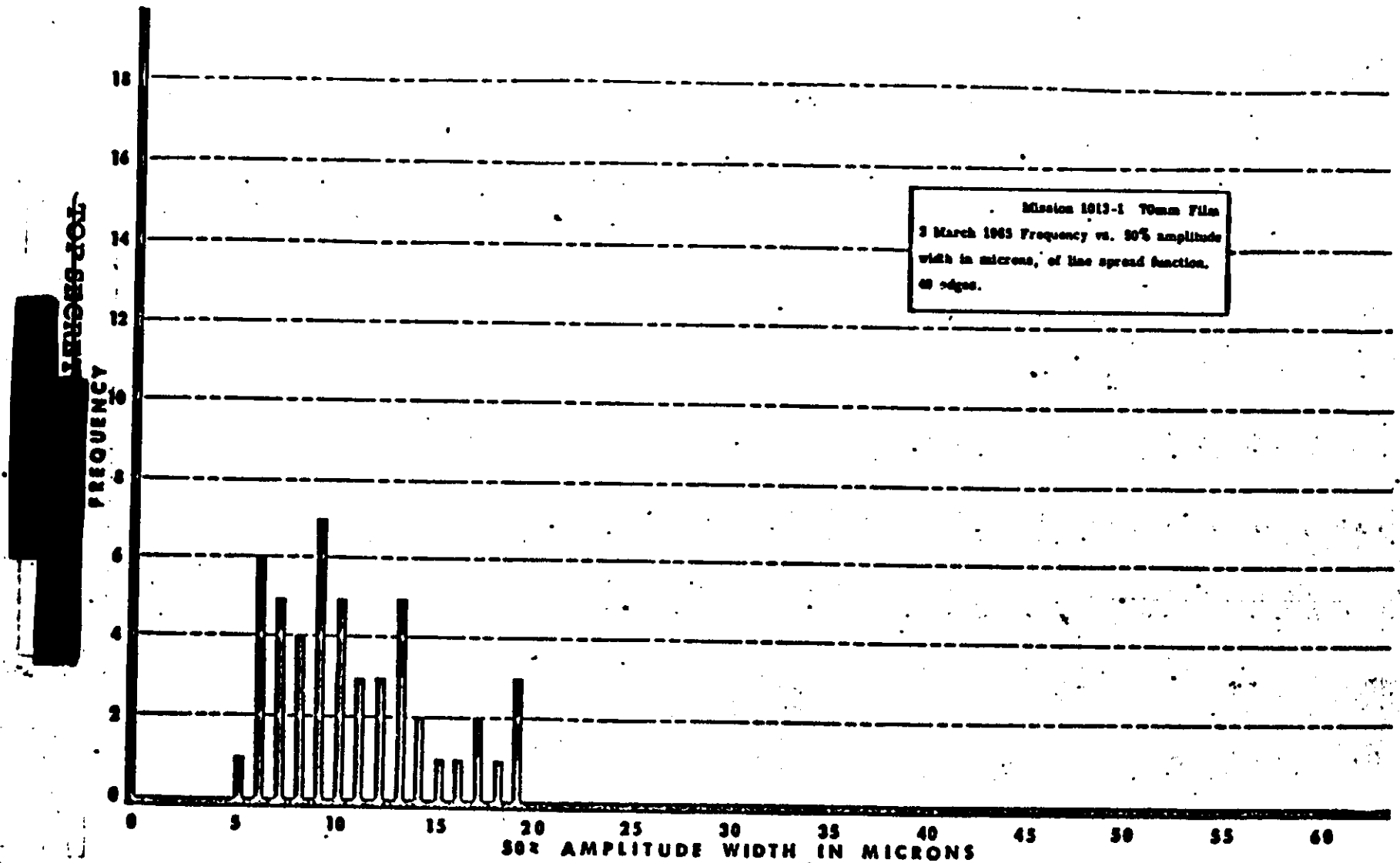
Resolution in lines/mm based on the aerial image modulation = 4404 curve from edge trace data reduced by computer techniques.

	FWD Camera	AFT Camera	Airfields	Buildings
Arithmetic Mean	84.8 l/mm	81.1 l/mm	79.3 l/mm	90.7 l/mm
Standard Deviation	23.1 l/mm	33.0 l/mm	24.9 l/mm	30.8 l/mm
Coefficient of Dispersion	27%	41%	31%	34%
Number of Edges	29	20	32	17

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

	FWD Camera	AFT Camera	Airfields	Buildings
Arithmetic Mean	10.2 μ	11.8 μ	11.4 μ	9.7 μ
Standard Deviation	2.7 μ	5.4 μ	4.2 μ	3.8 μ
Coefficient of Dispersion	27%	46%	36%	39%
Number of Edges	29	20	32	17


Mission 1013-1 70mm Film
3 March 1965 Frequency vs. Resolution
(lines/MM) A.L.M. 4404 Curve. 40
edges.
FREQUENCY
0
2
4
6
8
10
12
14
16
18
0
12
24
36
48
60
72
84
96
108
120
132
144
156
168
180
RESOLUTION (LINES/MM)


Mission 1013-1 70mm Film
3 March 1965 Frequency vs. 50% amplitude width in microns, of line spread function, 40 edges.
FREQUENCY
50% AMPLITUDE WIDTH IN MICRONS
0
2
4
6
8
10
12
14
16
18
0
5
10
15
20
25
30
35
40
45
50
55
60

Analysis of Photographic Image to Evaluate System Performance

Mission 1013-1

FORWARD CAMERA

Pass	Frame	Location	Orientation	Subject	50% Amplitude Spread Function Width (Microns)	A.I.M. Resolution
D-08	024	X35.3 Y11.0	035	Breakwater	9.4	93
D-09	047	X67.5 Y11.3	060	Airfield	12.4	47
D-09	047	X67.5 Y11.3	060	Airfield	7.6	91
D-21	057	X14.5 Y13.6	090	Airfield	15.6	55
D-21	057	X14.5 Y13.6	090	Airfield	13.0	65
D-21	060	X20.2 Y12.8	080	Airfield	9.5	90
D-21	060	X20.2 Y12.8	080	Airfield	8.3	90
D-21	062	X24.3 Y13.7	070	Airfield	14.3	80
D-21	062	X24.3 Y13.7	070	Airfield	12.4	72
D-21	114	X48.0 Y11.0	060	Airfield	8.0	103
D-21	114	X48.0 Y11.0	060	Airfield	11.3	78
D-23	090	X51.8 Y12.8	140	Buildings	12.6	65
D-23	090	X51.8 Y12.8	140	Buildings	6.5	120
D-39	130	X35.3 Y12.8	010	Dam	10.0	73
D-39	130	X35.3 Y12.8	010	Dam	12.0	67
D-39	131	X45.3 Y11.1	035	Buildings	5.8	135
D-39	131	X45.3 Y11.1	035	Buildings	7.4	115
D-39	132	X54.5 Y13.3	065	Buildings	9.5	89
D-39	132	X54.5 Y13.3	065	Buildings	7.0	115
D-40	020	X18.1 Y12.3	055	Buildings	6.4	126
D-40	020	X18.1 Y12.3	055	Buildings	4.8	145
D-40	020	X15.6 Y12.7	088	Airfield	12.6	72
D-47E	009*	X50.5 Y14.5	045	Buildings	11.4	65
D-47E	009*	X50.5 Y14.5	045	Buildings	13.3	61

*M.I.P. Frame

Mission 1013-1

FORWARD CAMERA

Pass	Frame	Location	Orientation	Subject	50% Amplitude Spread Function Width (Microns)	A.I.M. Resolution
D-47E	009*	X50.3 Y12.8	120	Airfield	10.3	71
D-47E	009*	X50.3 Y12.8	120	Airfield	9.5	72
D-47E	025	X48.7 Y10.3	010	Airfield	9.5	80
D-47E	025	X48.7 Y10.3	010	Airfield	9.0	86
D-47E	029	X18.6 Y10.6	060	Airfield	6.2	121
D-47E	029	X18.6 Y10.6	060	Airfield	14.0	62

*M.I.P. Frame

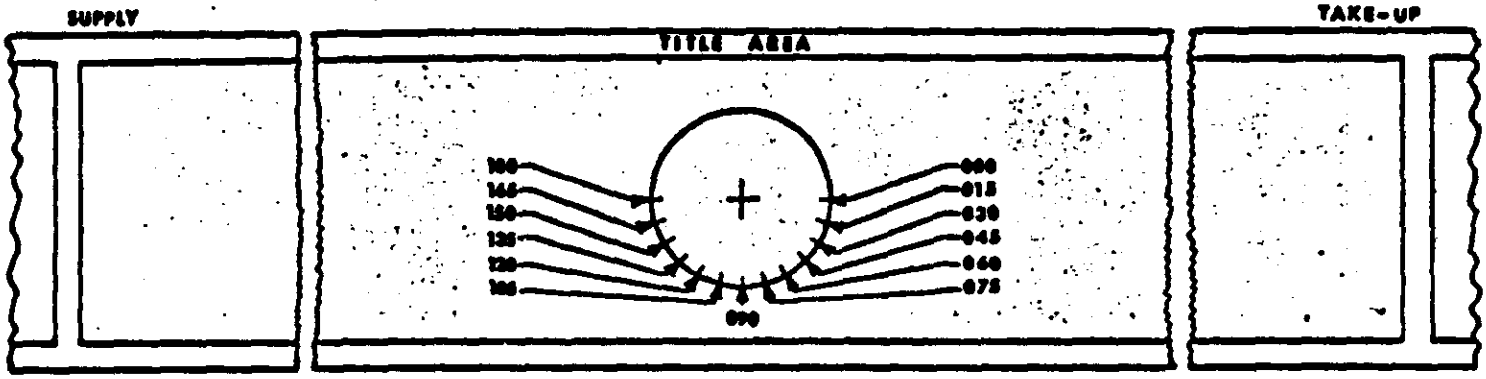
Mission 1013-1

AFT CAMERA

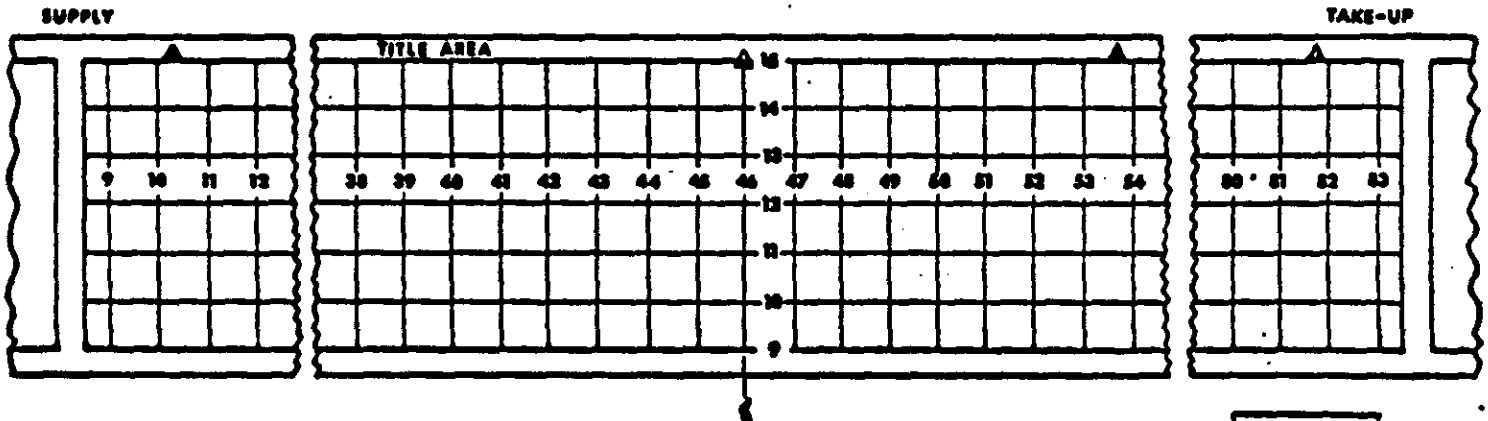
Pass	Frame	Location	Orientation	Subject	50% Amplitude Spread Function Width (Microns)	A.I.M. Resolution
D-08	030	X55.6 Y14.7	040	Breakwater	4.8	137
D-21	063	X76.5 Y12.5	100	Airfield	20.6	39
D-21	063	Y76.5 Y12.5	100	Airfield	20.7	42
D-21	066	X70.4 Y13.5	088	Airfield	15.4	50
D-21	066	X70.4 Y13.5	088	Airfield	13.4	51
D-21	068	X66.2 Y13.2	085	Airfield	17.2	57
D-21	068	X66.2 Y13.2	085	Airfield	20.6	42
D-21	121	X41.8 Y14.7	140	Airfield	7.5	118
D-21	121	X41.8 Y14.7	140	Airfield	5.7	119
D-39	138	X55.3 Y13.3	020	Dam	17.8	40
D-39	138	X55.3 Y13.3	020	Dam	16.7	49
D-40	026	X75.7 Y14.0	100	Airfield	6.3	111
D-40	026	X75.7 Y14.0	100	Airfield	9.0	125
D-47E	015*	X39.8 Y10.3	055	Buildings	6.6	108
D-47E	015*	X39.8 Y10.3	055	Buildings	8.3	84
D-47E	015*	X39.8 Y12.2	080	Airfield	9.2	95
D-47E	015*	X39.8 Y12.2	080	Airfield	10.9	72
D-47E	035	X72.3 Y13.7	055	Airfield	10.1	83
D-47E	035	X72.3 Y13.7	055	Airfield	3.6	159
D-47E	038	X43.8 Y11.1	055	Airfield	8.6	90
D-47E	038	X43.8 Y11.1	055	Airfield	7.4	110

*M.I.P. Frame

Reference System For Orientation Of C/M/J Mission Edges
original negative — emulsion down



Coordinate Locater Grid For C/M/J Mission Edges
original negative — emulsion down



ONE CENTIMETER SQUARES

IMAGE AREA

SECTION 11

OBSERVED DATA

Engineering operation on Mission 1013 provided daylight photography on descending passes 16, 31 and 47.

D16 was off the coast of California and the panoramic frames contained only clouds and water. However, the eastward looking horizon photographs were relatively cloud free and afforded excellent views of the mainland from Moro Bay to Clear Lake and inland beyond Mono and Pyramid Lakes.

The horizon photos are frequently useful for a rough orientation and location of vehicle position by identifying gross geographical features, such as San Francisco Bay Area, Baja California; Cape Cod, the Great Lakes and other distinctive features. The center of the earth image will be approximately 300 miles from vehicle nadir.

The out-of-focus or soft imagery of much film from this mission has been discussed elsewhere in this report.

The Aft photography on D31 supplies an example of the extent of degradation from soft imagery, whatever it's source. In the overlap area of Frames 4 and 5 is a copper mining-smelting complex at Morenci, Arizona, 2-1/2" west of the C/F notch. In the South edge of Frame 4, a group of settling basins with catwalks and flumes is quite sharp, indicating that this system was capable of detecting dimensions of 3 feet or less on objects with a high aspect ratio (greater than 5:1). In the North edge of Frame 5 these basins could scarcely be seen even though the largest one is 300 feet in diameter.

Fort Huachuca fixed targets appeared in the bonus area of Frame 13 Aft. The largest group could not be resolved. The bonus area is always out of focus.

Evaluation of the CORN targets at Indian Springs and Pahrump, Nevada indicates a bar-target resolution of 7 to 10 feet both foreward and aft for prevailing conditions.

SECTION 12

MISSION 1013-1 STELLAR-INDEX CAMERA

A. COMPONENT ASSIGNMENT

Component	Serial Number
Camera	D52
Index Reseau	49
Stellar Reseau	55

B. CAMERA DATA AND FLIGHT SETTINGS

Stellar Camera:

Lens	85mm f/1.8
Exposure Time	2 seconds
Filter Type	None
Film Type	Eastman Type 4401

Index Camera:

Lens	38mm f/4.5
Exposure Time	1/500 second
Filter Type	Wratten 21
Film Type	Eastman Type 4400

C. POST FLIGHT EVALUATION

The camera operated properly throughout the mission. The stellar and index portions each produced 421 photographic frames. The quality of all photography was excellent.

SECTION 13

MISSION 1013-2 STELLAR-INDEX CAMERA

A. COMPONENT ASSIGNMENT

Component	Serial Number
Camera	D47
Index Reseau	48
Stellar Reseau	54

B. CAMERA DATA AND FLIGHT SETTINGS

Stellar Camera:

Lens	85mm f/1.8
Exposure Time	2 seconds
Filter Type	None
Film Type	Eastman Type 4401

Index Camera:

Lens	38mm f/4.5
Exposure Time	1/500 second
Filter Type	Wratten 21
Film Type	Eastman Type 4400

C. POST FLIGHT EVALUATION

The camera operated properly throughout the mission. Both portions produced 102 frames. This small quantity was the result of the early recovery of the mission. The photographic quality was the same as Mission 1013-1.

SECTION 14

VEHICLE ATTITUDE

The vehicle attitude errors for Mission 1013-1 were derived from the reduction of the Stellar camera photography. This attitude data is supplied to A/P by NPIC.

The attitude errors for each frame and the attitude control rates are calculated at the A/P computer facility. The computer also plots the frequency distribution of the rates and errors. Figures 14-1 through 14-6 show these distributions for Mission 1013-1.

The summary table below lists the maximum attitude errors and rates that were experienced during 90% of the photographic operations, excluding the first six frames of each operation, and the total range of the errors and rates.

	Mission 1013-1	
Value	90%	Range
Pitch Error (^{o})	0.64	-0.60 to +1.25
Roll Error (^{o})	0.31	-0.35 to +1.05
Yaw Error (^{o})	1.33	-1.75 to +0.35
Pitch Rate (^{o}/hr)	36.9	-75 to +90
Roll Rate (^{o}/hr)	29.0	-50 to +85
Yaw Rate (^{o}/hr)	32.3	-90 to +100

The performance of the attitude control system is comparable to the control systems used on recent missions. The panoramic photography was not degraded by the attitude control system.

J-15 A BUCKET - FWD INSTR FRAMES 1-6 OF EACH OF OMITTED 90 PERCENT = 0.6

Y PITCH ANGLE ERROR - DEGREES (X) VERSUS FREQUENCY - PERCENT (Y)

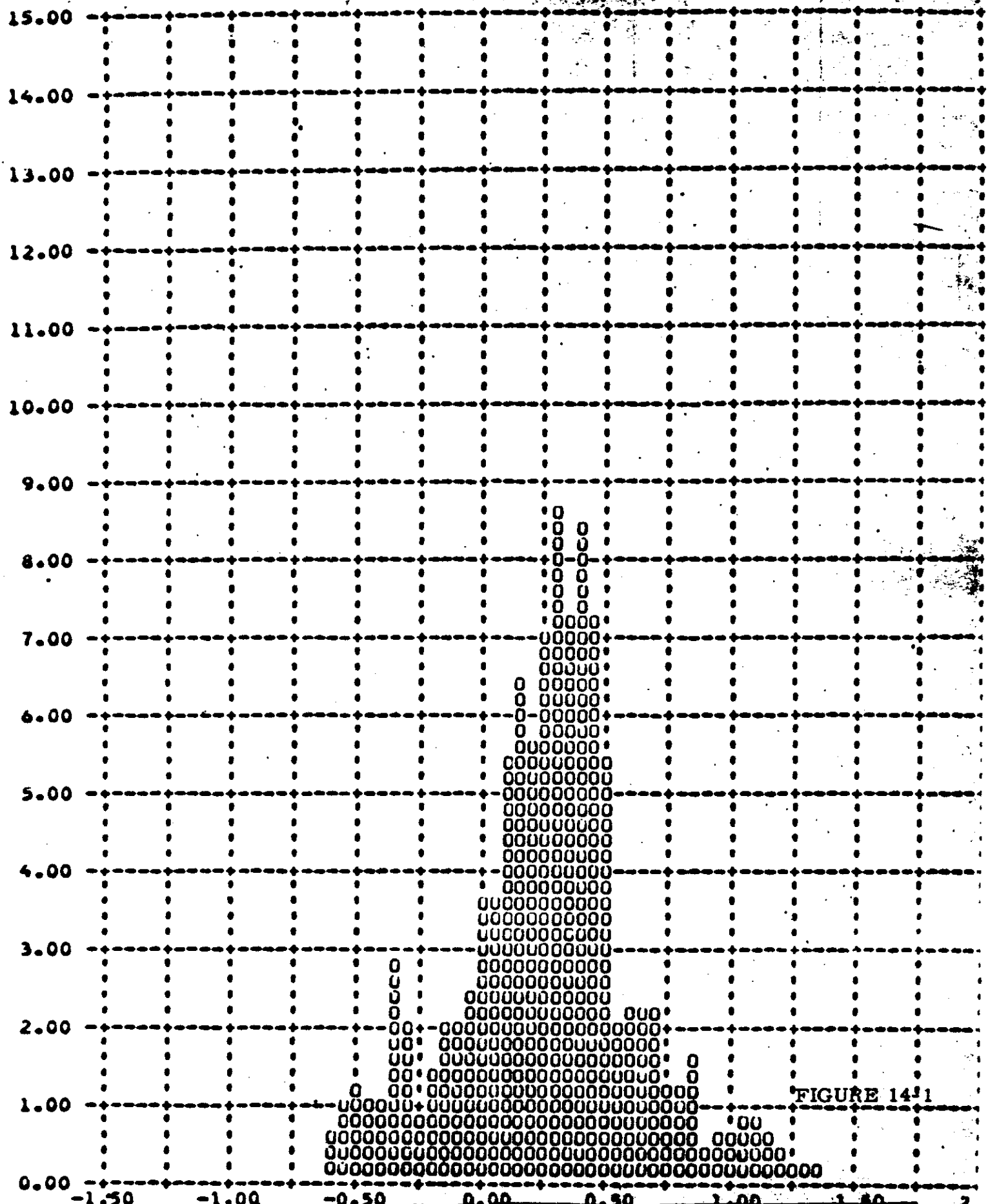


FIGURE 14-1

J-15 A BUCKET - FWD INSTR FRAMES 1-6 OF EACH OP OMITTED 90 PERCENT = 0.

Y ROLL ANGLE ERROR - DEGREES (X) VERSUS FREQUENCY - PERCENT (Y)

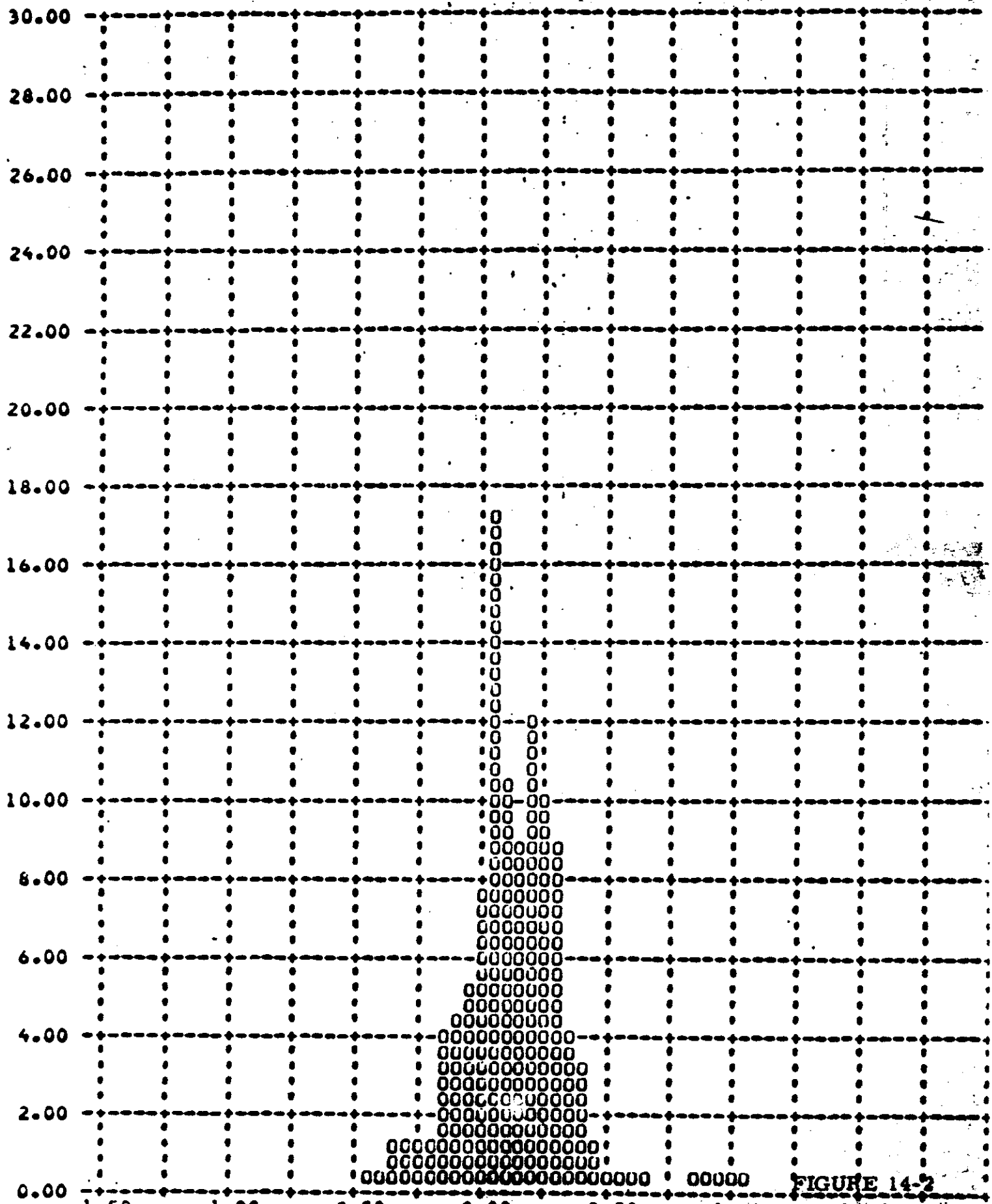


FIGURE 14-2

J-15 A BUCKET - FWD INSTR FRAMES 1-6 OF EACH OP OMITTED 90 PERCENT = 1.

Y YAW ANGLE ERROR - DEGREES (X) VERSUS FREQUENCY - PERCENT (Y)

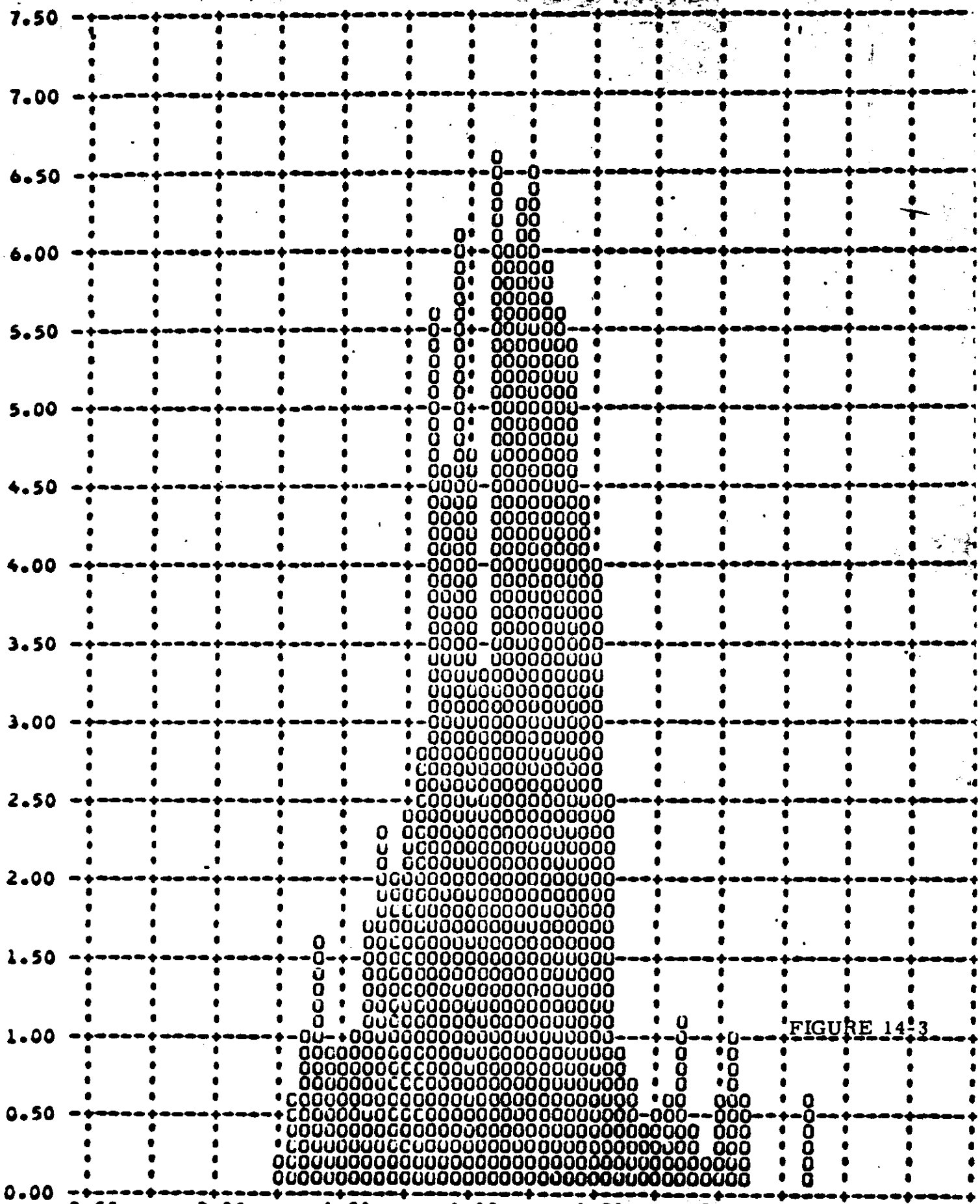


FIGURE 14-3

J-15 A BUCKET - FWD INSTR FRAMES 1-6 OF EACH OP OMITTED 90 PERCENT = 36.6

Y PITCH RATE ERROR - DEG/HOUR (X) VERSUS FREQUENCY - PERCENT (Y)

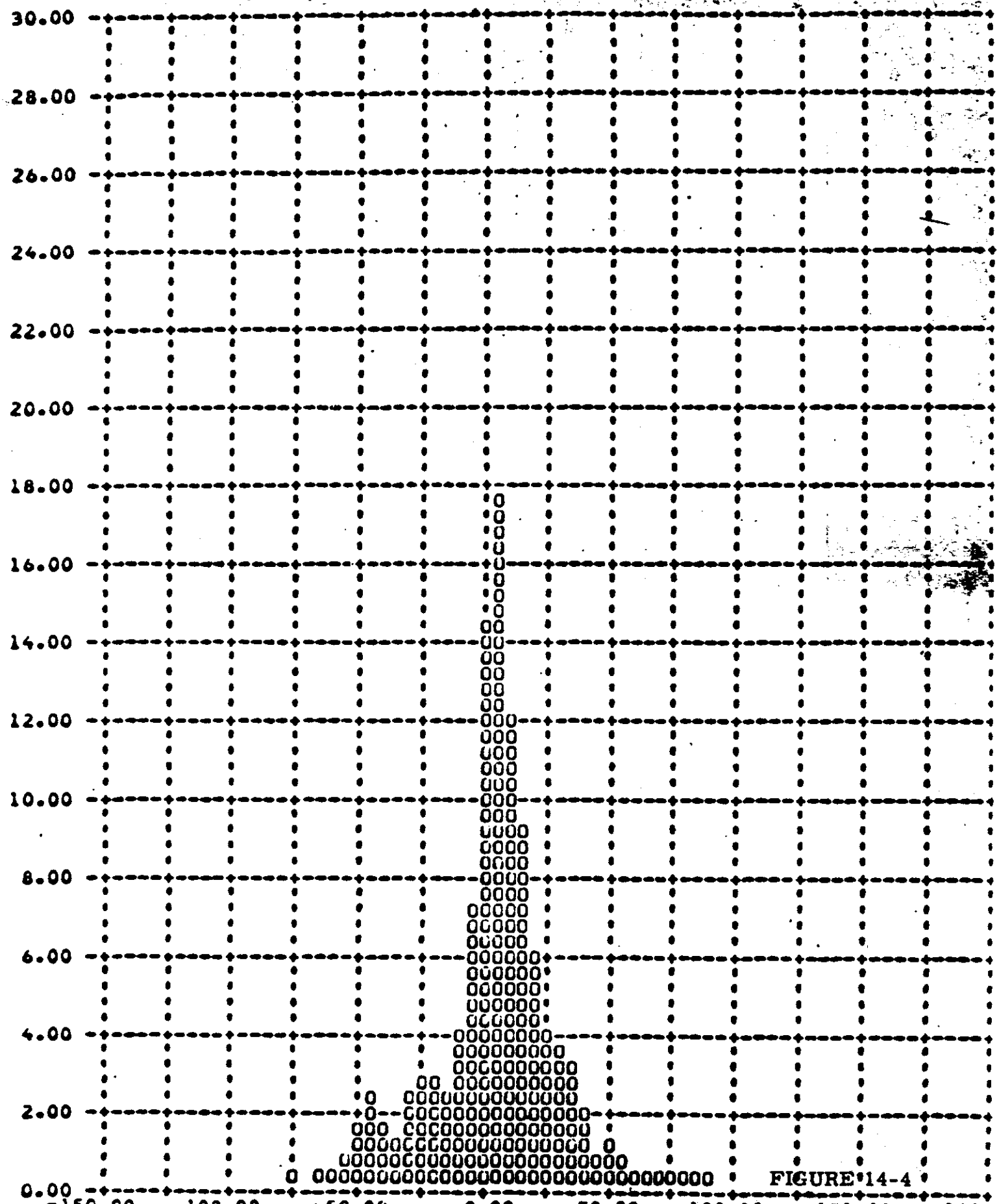


FIGURE 14-4

J-15 A BUCKET - FWD INSTR FRAMES 1-6 OF EACH OP OMITTED 90 PERCENT = 29.

Y ROLL RATE ERROR - DEG/HOUR (X) VERSUS FREQUENCY - PERCENT (Y)

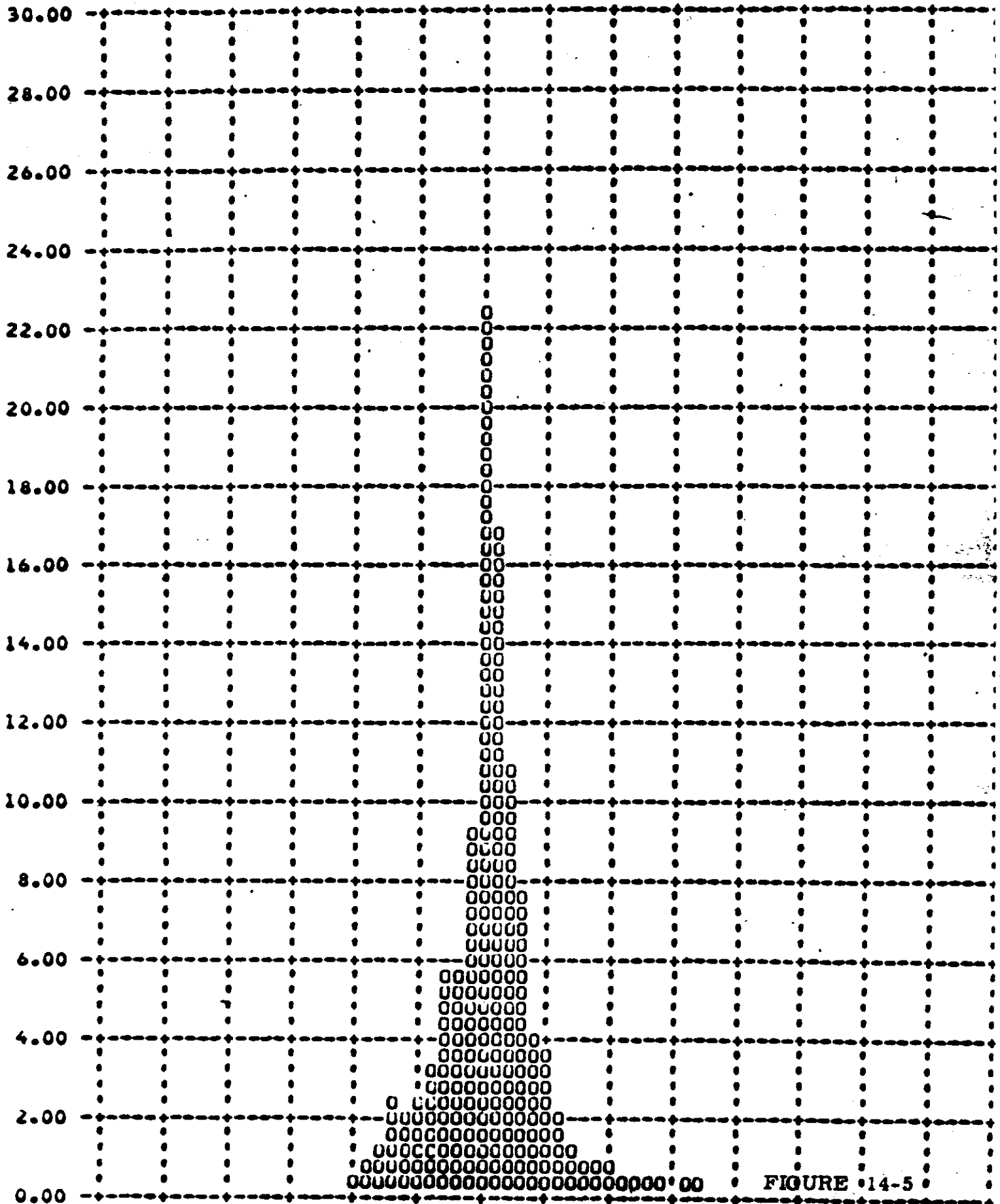


FIGURE 14-5

J-15 A BUCKET - FWD INSTR FRAMES 1-6 OF EACH OP OMITTED 90 PERCENT = 32.

Y YAW RATE ERROR - DEG/HOUR (X) VERSUS FREQUENCY - PERCENT (Y)

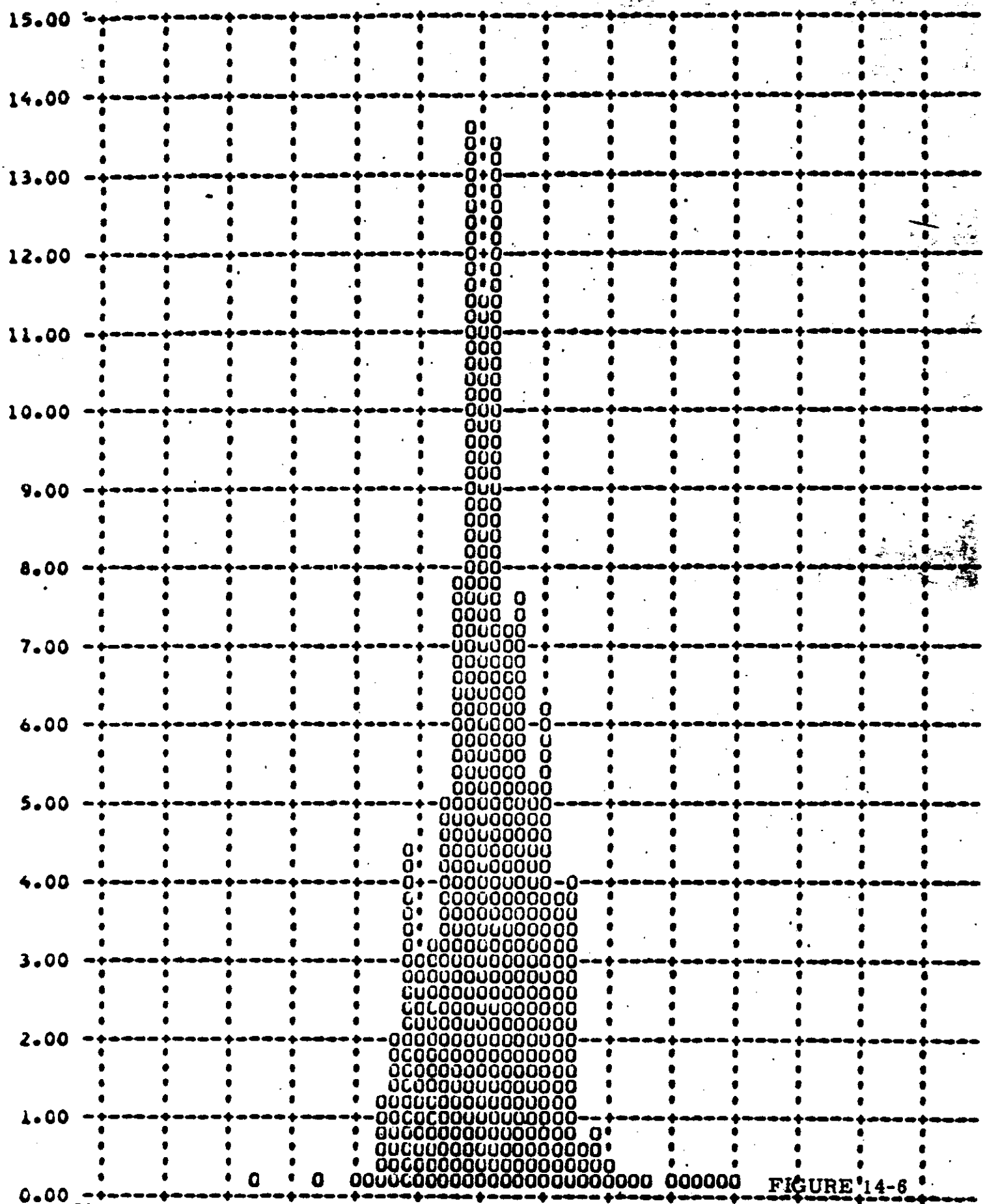


FIGURE 14-6

SECTION 15

IMAGE SMEAR ANALYSIS

The frame correlation tape supplied to A/P by NPIC contains the binary time word of each frame of photography. A computer program has been assembled at A/P which calculates the exposure time of each frame and compares the camera cycle rate with the ephemeris to calculate the V/h mismatch. This data is combined with the vehicle attitude error and rate values of each frame and the crab error caused by earth rotation at the latitude of each frame. The program outpust the total along track and cross track IMC error and the limit of ground resolution that can be acquired by a camera regardless of focal length and system capabilities.

The computer rejects the first six frames of all operations as the large V/h error induced by camera start-up is not representative of the overall system operations. The frequency distribution of the V/h errors and resolution limits for both panoramic cameras are computer plotted and are shown in Figures 15-1 through 15-6.

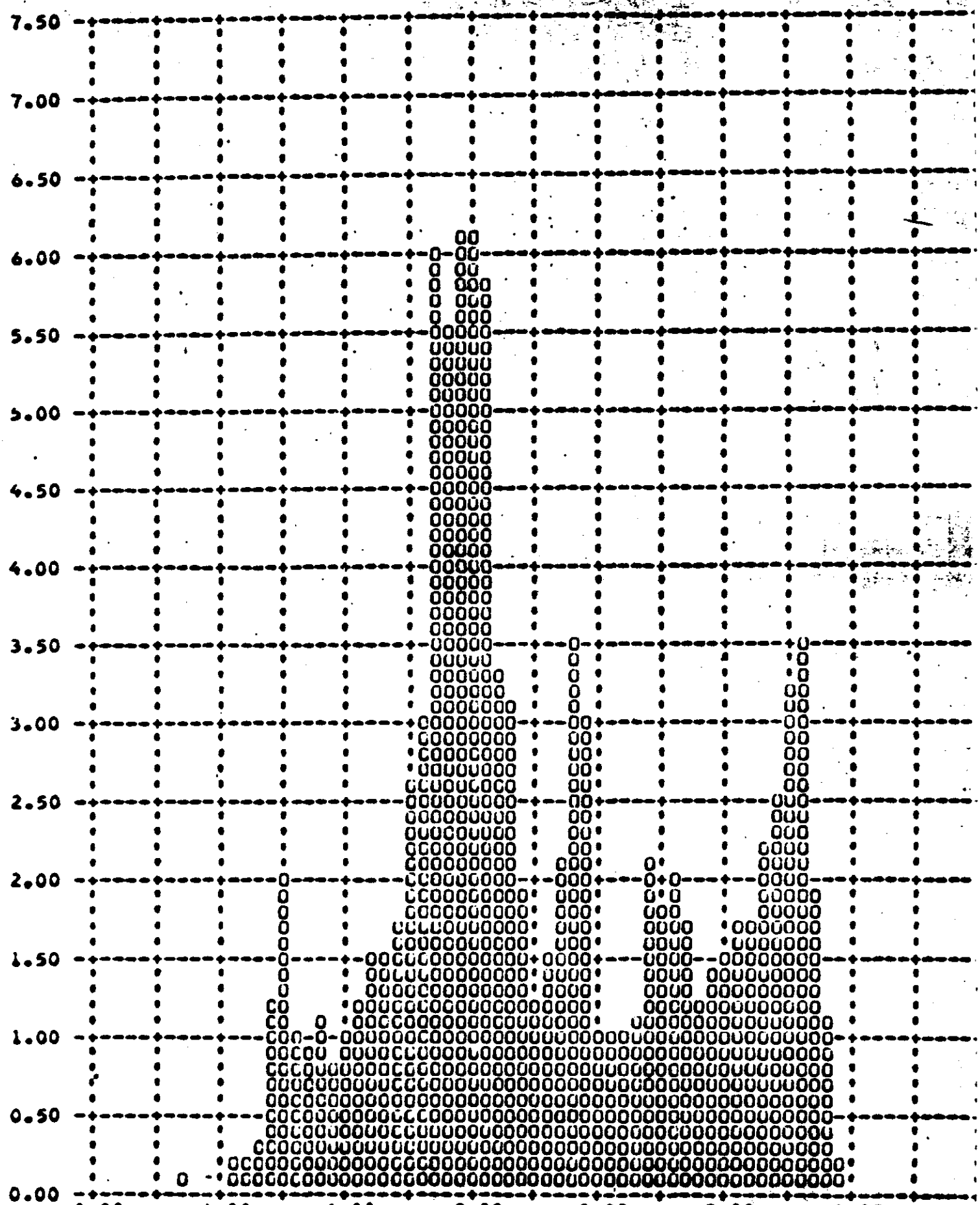
The summary table below presents the maximum V/h ratio error and resolution limits that existed during 90% of the photographic operations of Mission 1013-1 and the total range of values during all operations that were computed.

	FWD Camera		AFT Camera	
Value	90%	Range	90%	Range
V/h Ratio Error (%)	3.7	-6.6 to +3.8	4.5	-5.6 to +5.2
Along Track Resolution Limit (ft.)	7.8	0 to 18.0	9.6	0 to 21.0
Cross Track Resolution Limit (ft.)	8.3	0 to 9.8	8.2	0 to 9.8

The calculations show that the panoramic cameras were not smear limited during the mission. It should be noted that the 90% V/h mismatch value is the lowest that has been experienced during the last several missions.

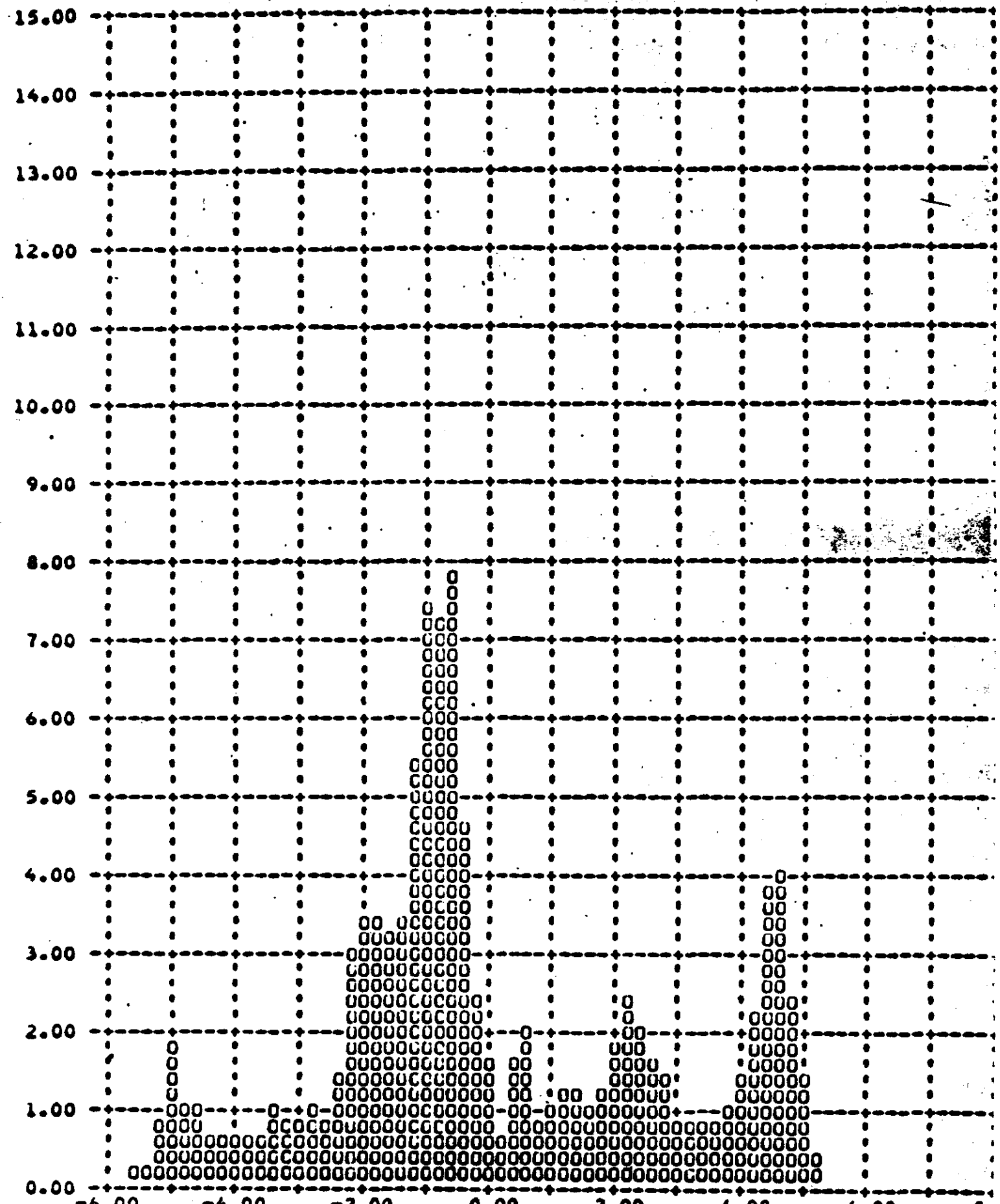
J-15 A BUCKET - FWD INSTR FRAMES 1-6 OF EACH OP OMITTED 90 PERCENT = 3.

Y V/H RATIO ERROR - PERCENT [X] VERSUS FREQUENCY - PERCENT [Y]



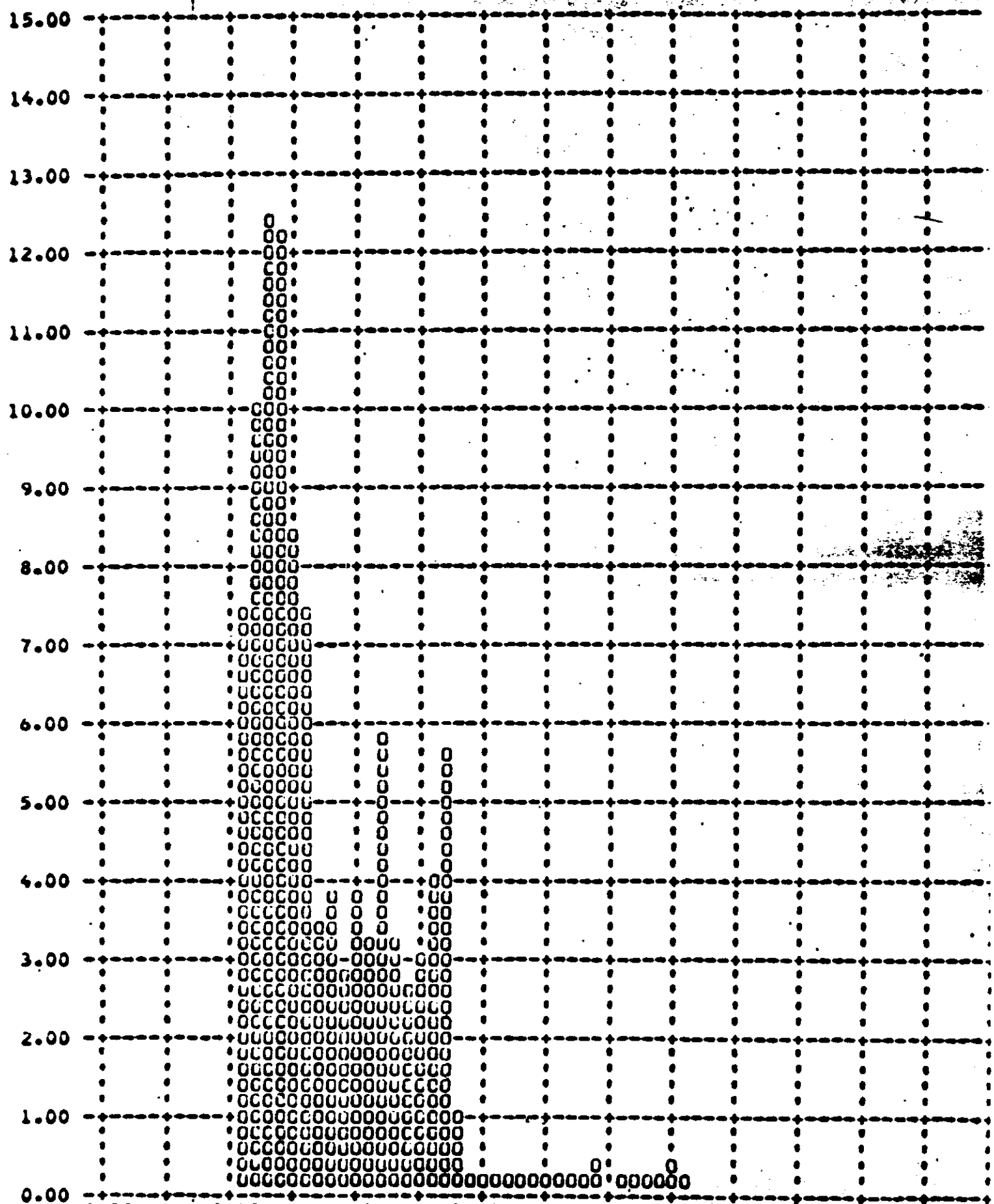
J-15 A BUCKET - AFT INSTR FRAMES 1-6 OF EACH OP OMITTED 90 PERCENT = 4.5

Y V/H RATIO ERROR - PERCENT (X) VERSUS FREQUENCY - PERCENT (Y)



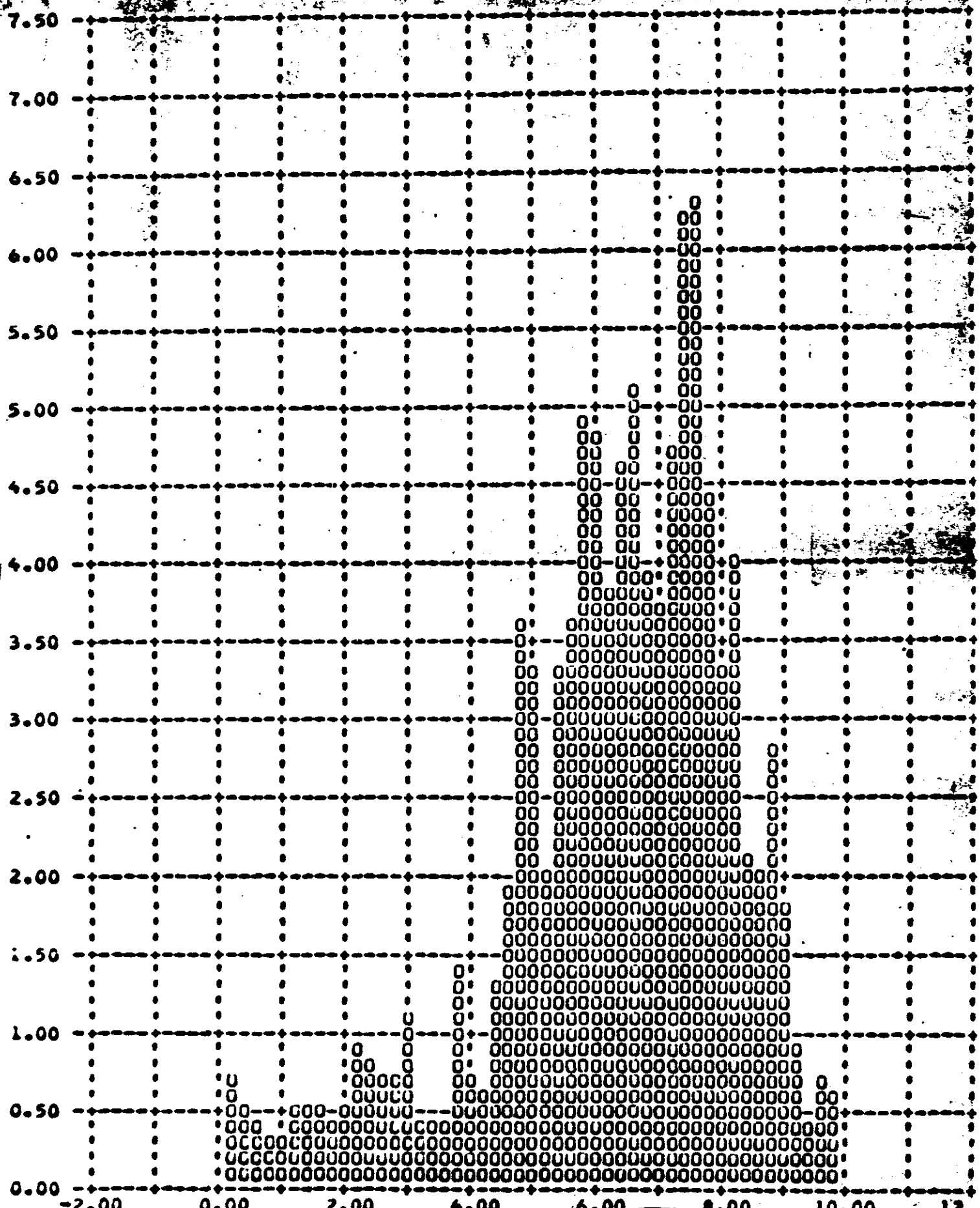
J-15 A BUCKET - FWD INSTR FRAMES 1-6 OF EACH OP OMITTED 90 PERCENT = 7.

Y ALONG TRACK RESOLUTION LIMIT - FEET (X) VERSUS FREQUENCY - PERCENT (



BUCKET - FWD INSTR - FRAMES 1-6 OF EACH OP OMITTED 90 PERCENT = 8.2

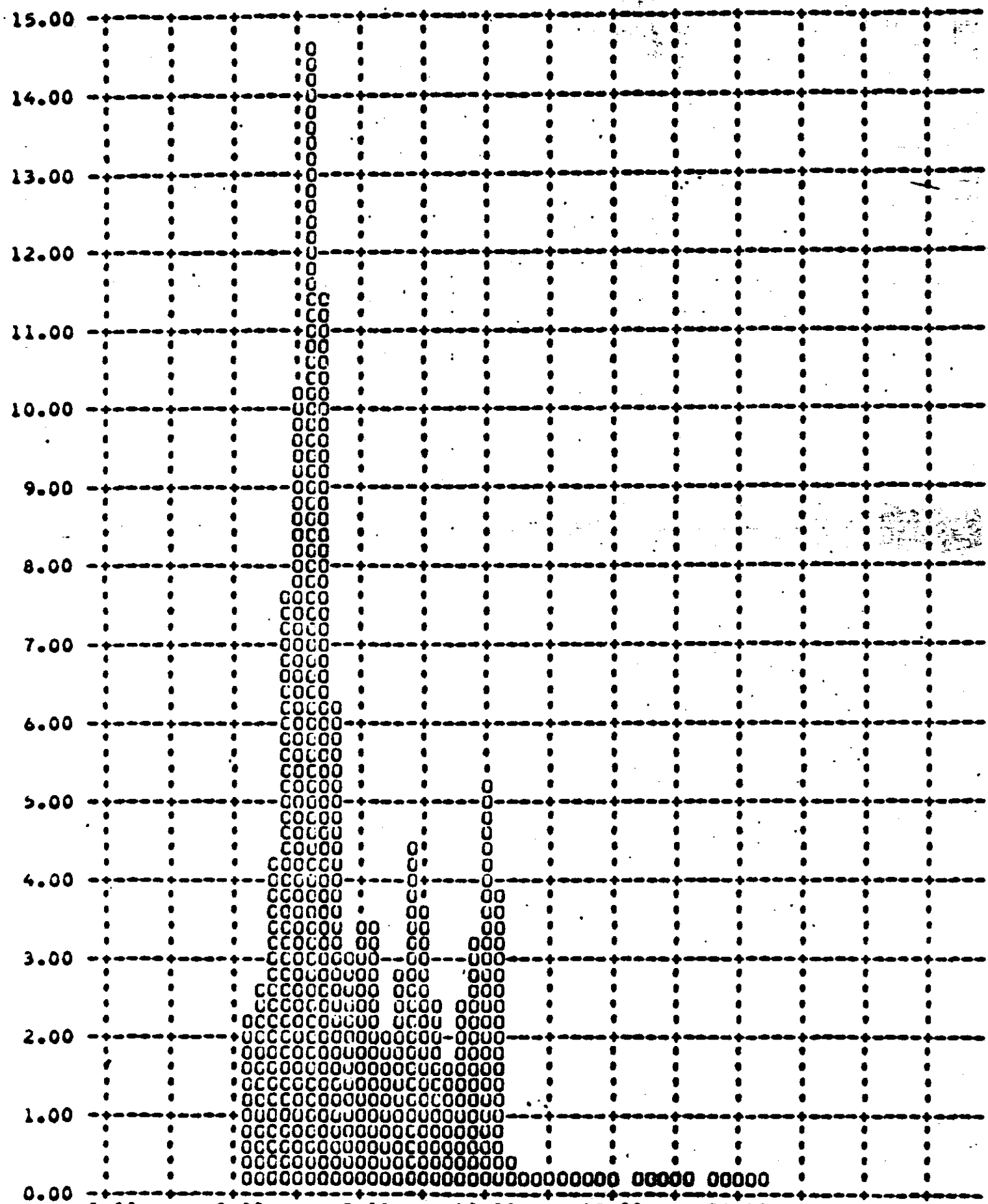
Y CROSS TRACK RESOLUTION LIMIT - PERCENT VERSUS FREQUENCY - PERCENT Y



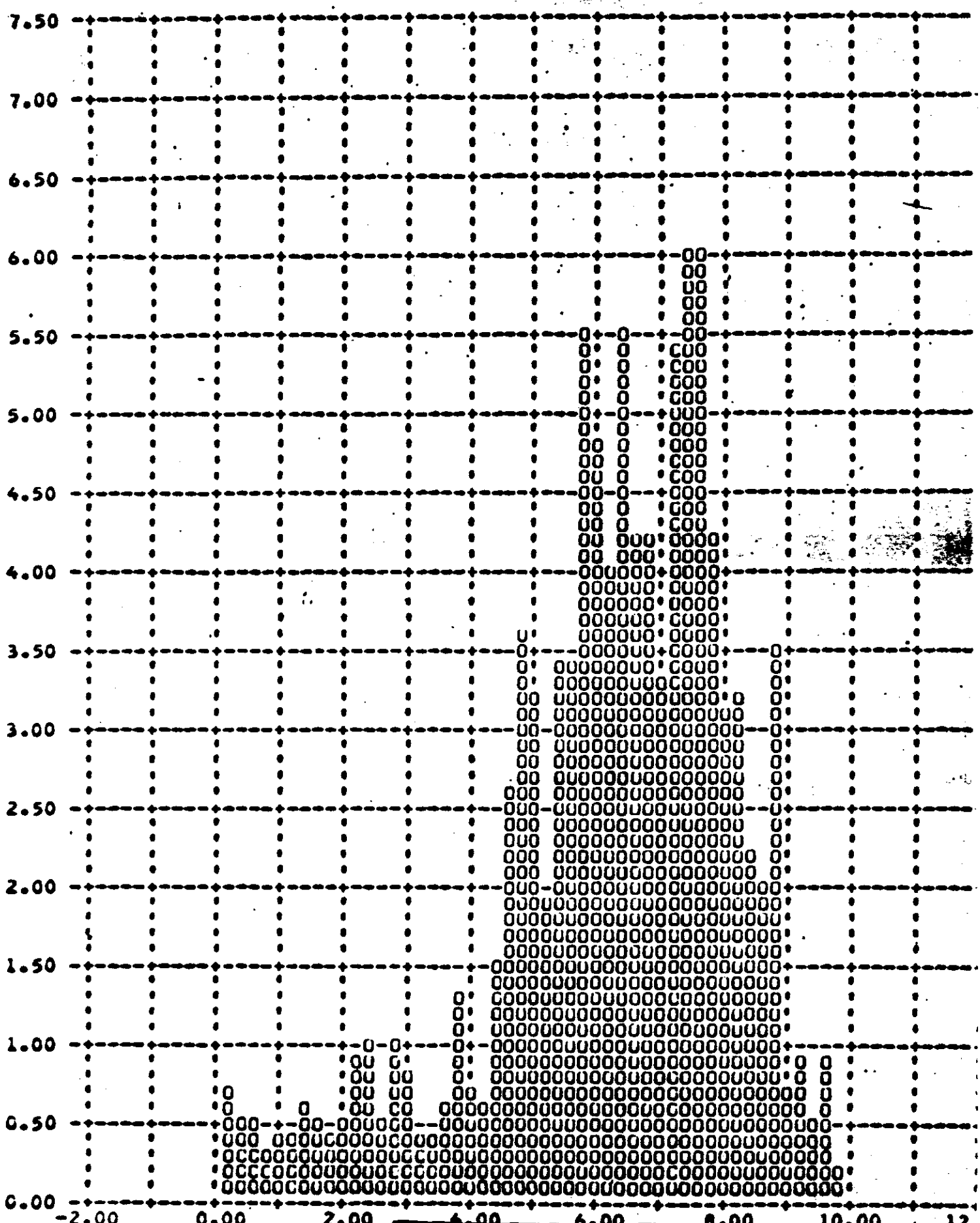
MISSION 1013A2 ~~TOP SECRET~~ [redacted]

J-15 A BUCKET - AFT INSTR FRAMES 1-6 OF EACH OP OMITTED 90 PERCENT = %

Y ALONG TRACK RESOLUTION LIMIT - FEET (X) VERSUS FREQUENCY - PERCENT (



J-15 A BUCKET - AFT INSTR FRAMES 1-6 OF EACH OP OMITTED 90 PERCENT = 8.



SECTION 16

RADIATION DOSAGE

Each recovery system flown on a Corona mission contains a sealed packet of Eastman Type 3401 and Royal X Pan emulsions to determine the total radiation received at the take-up cassette. Both film types have been irradiated by LMSC at various levels and the base plus fog densities recorded after controlled processing.

Following recovery the film dosimeter packets are removed at A/P and processed with a pre-flight sample of the same film type and sensitometric control film. The resulting base plus fog density measurement of the dosimeter strips is used to ascertain the total radiation level. The table below presents the base plus fog readings for the dosimeter strips and the radiation level equivalents.

	Mission 1013-1	
Emulsion	B + F Density	Radiation
Type 3401	0.17	0.5 R
Royal X Pan	0.20	0.3 R

The mean total radiation seen by the take-up cassettes during both missions was approximately 0.5 roentgens. This level is essentially the same as received during recent missions and is below the level that will degrade the panoramic photography.

SECTION 17

SYSTEM RELIABILITY

Reliability calculations for the payload are based on a sample beginning with M-7. Hence both the major part of the Mural Program and the "J" Program are covered in the calculation. For certain auxiliaries, i.e., the stellar-index camera and the horizon cameras, the sample size is changed to recognize incorporation of modified equipment or new designs where reliability was one of the principal reasons for the modification. However, for primary mission function, the sample size is consistent with reliability reporting for the vehicle.

The reliability estimates of this section deal exclusively with the payload. Failures to achieve orbit or vehicle induced failures are thereby excluded. Recoveries before a complete mission has been completed are considered as full missions providing that early termination was caused by reasons not connected with payload operation. Film quality is not considered in the reliability estimate calculation. Hence, only electrical and mechanical functioning are considered.

The reliability estimate is also divided into primary and secondary functions. The primary functions are operation of the panoramic cameras, main camera door operation, operation of the payload clock, and recovery operations. The secondary mission functions are horizon camera operation excluding catastrophic open shutter failure mode, auxiliary data recording, and stellar-index camera operation.

Panoramic Camera Reliability

Sample Size - 78 opportunities to operate.
One failure - capping shutter on slave instrument on system M-7.
Assume - 3000 cycles per camera per mission.
Estimated Reliability = 97.8% at 50% confidence level.

Main Camera Door Reliability

Sample Size - 31 vehicles x 2 doors = 62 opportunities to operate.
Estimated Reliability = 99.0% at 50% confidence level.

Payload Command and Control

Sample Size - 3940 hours operation
1 failure.
Estimated Reliability = 95.9% at 50% confidence level

Payload Clock Reliability

Sample Size - 3940 hours operation
No failures
Estimated Reliability = 93.3% at 50% confidence level.

Estimated Reliability of Payload Functioning on orbit = 96.0% at 50% confidence level.

Recovery System Reliability

28 opportunities to recover
1 failure - improper separation due to water seal - cutter failure.
Estimated Reliability = 94.0% at 50% confidence level.

Stellar-Index Camera Reliability

Sample begins with J-5
Sample Size = 5950 cycles
Number of failures = 0
Estimated Reliability = 95.1% at 50% confidence

Horizon Camera Reliability

Sample includes J5 and up
Sample Size - 25,500 cycles
Estimated Reliability of Single Camera = 96.0% at 50% confidence level.
Estimated Reliability of Four Horizon Cameras at a Parallel Redundant System = 99.8% at 50% confidence level

SECTION 18

SUMMARY DATA

The comparison of the operating parameters and the performance achieved by previous missions has been difficult due to the large volume of data that results from each mission. Some of the pertinent characteristics from prior missions have been summarized in Tables 18-1 through 18-3.

The summary data was started with Mission 1004 as the J-05 camera system was the first to incorporate the major modifications of the titanium drum and scan arm, four roller scan head and Corona J capabilities. Only those missions that culminated in the recovery of some photography have been listed, therefore Missions 1003 and 1005 are deleted.

MISSION SUMMARY

MISSION NUMBER	PAYLOAD NUMBER	VEHICLE NUMBER	LAUNCH DATE	LAUNCH TIME	ORBIT INCLINATION (°)	PERIGEE ALTITUDE (NM)	PERIGEE LOCATION (°N)	RECOVERY PASS	MASTER CAMERA CAMERA NUMBER	MASTER CAMERA SLIT (")	MASTER CAMERA FILTER TYPE	SLAVE CAMERA CAMERA NUMBER	SLAVE CAMERA SLIT (")	SLAVE CAMERA FILTER TYPE	STELLAR-INDEX CAMERA NUMBER
1004	J-03	1174	2/15/64	2136 Z	74.9	99.9	29.0	49 / 112	124	0.250	W-21	125	0.250	W-21	029/29/29 / 042/42/45
1006	J-09	1178	6/4/64	2259 Z	79.9	84.0	63.2	65 / 126	148	0.200	W-21	149	0.200	W-21	049/53/42 / 045/47/45
1007	J-07	1609	6/19/64	2318 Z	85.0	99.2	41.6	65 / 126	144	0.250	W-25	145	0.200	W-21	043/43/43 / 054/56/51
1008	J-10	1177	7/10/64	2314 Z	85.0	99.4	40.8	49 / 112	130	0.200	W-21	181	0.200	W-21	048/45/48 / 033/28/33
1009	J-12	1605	8/5/64	2316 Z	80.1	99.8	39.8	49 / 128	154	0.200	W-21	155	0.200	W-21	036/54/56 / 038/38/34
1010	J-11	1178	9/14/64	2254 Z	84.9	97.4	42.8	65 / 144	152	0.175	W-21	153	0.175	W-21	041/41/41 / 044/46/44
1011	J-03	1170	10/5/64	2150 Z	79.9	99.3	20.9	65 / —	160	0.175	W-21	161	0.175	W-21	030/30/30 / 057/57/57
1012	J-13	1179	10/17/64	2202 Z	75.0	98.2	32.4	49 / 81	156	0.200	W-21	157	0.200	W-21	051/51/47 / 046/52/53
1013	J-15	1173	11/2/64	2130 Z	80.0	100.0	25.0	65 / —	158	0.225	W-21	159	0.225	W-21	052/49/55 / 047/48/54

PERFORMANCE SUMMARY

MISSION NUMBER	CAMERA	SERIAL NUMBER	M I P VALUE	VISUAL RES	AFSPPL MTF/AIM SLIT (μ)	AFSPPL MTF/AIM AVERAGE	[redacted] MTF/AIM SLIT (μ)	[redacted] MTF/AIM AVERAGE	SLIT (μ)	AVERAGE ALL	AVERAGE HIGH	90% ATTITUDE ERROR (°) PITCH	ROLL	YAW	90% ATTITUDE RATES (°/HR) PITCH	ROLL	YAW	90% V/H ERROR (%)	90% RESOLUTION LIMIT (FEET) ALONG TRACK	CROSS TRACK
1004-1	FWD	124	85	78	350	97	43	109	320	115	127	0.48	0.42	1.08	30.0	25.0	21.0	5.1	7.7	6.1
	AFT			86		80		96		117	124									
1004-2	FWD	125	85	76		88		113		82	90	0.74	0.50	0.91	44.0	30.0	29.0	4.9	6.8	6.8
	AFT			73		85		106		89	95									
1006-1	FWD	148	90	78	350	65	43	88	320	84	97	0.41	0.42	1.14	26.8	28.5	27.6	15.4	13.8	6.7
	AFT			74		71		90		87	92									
1006-2	FWD	149	90	85		64		81		84	90	0.49	0.40	1.08	31.1	27.9	30.0	11.6	10.1	7.0
	AFT			83		72		90		87	94									
1007-1	FWD	144	85	80	350	80	43	87	320	82	91	0.88	0.46	1.43	37.6	23.9	29.9	3.6	3.1	9.4
	AFT			86		63		83		97	110							4.8	2.1	7.6
1007-2	FWD	145	88	79		72		81		88	74	0.64	0.47	—	43.0	25.8	—	3.2	2.4	—
	AFT			81		77		92		74	81							4.2	1.8	—
1008-1	FWD	180	85	80	350	80	43	95	320	81	89	0.89	0.38	0.94	43.8	23.9	29.6	2.9	4.9	8.9
	AFT			78		73		89		86	95									
1008-2	FWD	181	88	82		84		96		83	92	0.63	0.36	0.71	42.9	24.0	32.5	2.8	4.2	8.4
	AFT			79		91		83		85	91									
1009-1	FWD	184	85	92	350	80	—	—	80	75	88	0.68	0.65	0.71	29.2	22.7	27.6	3.3	3.3	8.8
	AFT			89		85				75	83									
1009-2	FWD	185	88	94		85				76	84	0.48	0.65	0.89	33.6	23.9	27.2	2.6	4.9	8.9
	AFT			87		87				72	79									
1010-1	FWD	152	85	90	350	90	80	88	80	87	96	0.93	0.30	0.67	38.1	23.6	30.8	4.8	2.3	4.4
	AFT			88		84		80		92	103									
1010-2	FWD	153	85	92		81		82		82	93	0.89	0.70	1.21	46.4	23.6	30.7	4.8	7.8	3.8
	AFT			90		82		85		87	98									
1011-1	FWD	160	90	84	350	78	80	96	80	78	87	0.77	0.39	0.97	43.1	28.9	31.1	2.3	5.3	8.8
	AFT	161		84		77		86		83	93									
1012-1	FWD	186	85	92	—	—	80	91	80	84	98	0.68	0.81	—	47.1	38.2	—	1.8	4.8	—
	AFT			91				87		89	100									
1012-2	FWD	187	88	91				89		84	91	0.97	0.77	0.81	46.2	30.7	30.4	3.9	5.3	8.8
	AFT			89				96		85	98									
1013-1	FWD	198	85	89	—	—	80	94	80	85	99	0.84	0.32	1.34	36.9	23.0	32.3	3.7	7.8	8.3
	AFT	199		77				97		81	103	0.84	0.32	1.34	36.9	23.0	32.3	4.8	5.8	8.8

FIGURE 18-2

~~TOP SECRET~~ [redacted]

EXPOSURE - PROCESSING SUMMARY

MISSION NUMBER	CAMERA	SOLAR ELEVATION RANGE (°) LOW	SOLAR ELEVATION RANGE (°) HIGH	SOLAR AZIMUTH RANGE (°) LOW	SOLAR AZIMUTH RANGE (°) HIGH	PREDICTED PROCESSING (%) P	PREDICTED PROCESSING (%) I	PREDICTED PROCESSING (%) F	REPORTED PROCESSING (%) P	REPORTED PROCESSING (%) I	REPORTED PROCESSING (%) F	COMPUTED PROCESSING (%) P	COMPUTED PROCESSING (%) I	COMPUTED PROCESSING (%) F	TERRAIN D-MIN RANGE LOW	TERRAIN D-MIN RANGE HIGH	TERRAIN D-MIN MEAN	TERRAIN D-MIN MEDIAN	TERRAIN D-MAX RANGE LOW	TERRAIN D-MAX RANGE HIGH	TERRAIN D-MAX MEAN	TERRAIN D-MAX MEDIAN	CLOUD D-MAX RANGE LOW	CLOUD D-MAX RANGE HIGH	CLOUD D-MAX MEAN	CLOUD D-MAX MEDIAN	UNDER EXPOSED (%)	UNDER PROCESSED (%)	NOMINAL EXP & PRO (%)	OVER PROCESSED (%)	OVER EXPOSED (%)	CLOUD COVER (%)
1004-1	FWD	-3	61	28	124	5	76	19	4	79	17	0	79	21	0.26	1.89	0.83	0.78	0.43	2.45	1.97	2.02	1.00	2.43	2.04	2.08	0	4	60	31	5	35
	AFT	-3	61	28	124	5	74	21	4	79	17	0	80	20	0.22	1.56	0.76	0.70	0.93	2.45	1.92	1.94	1.08	2.43	1.98	2.03	1	4	67	26	3	35
1004-2	FWD	-4	60	10	131	7	76	17	37	50	13	4	83	13	0.29	1.80	0.83	0.78	0.36	2.30	1.84	1.90	0.41	2.37	1.87	1.93	0	4	59	27	9	35
	AFT	-4	60	10	131	7	76	17	37	50	13	4	77	19	0.29	1.91	0.81	0.73	0.36	2.39	1.89	1.99	0.43	2.46	1.89	1.98	0	4	67	20	9	35
1006-1	FWD	38	86	82	140	1	99	0	1	51	48	0	91	49	0.23	1.81	0.71	0.68	0.80	2.31	1.58	1.92	1.31	2.40	2.20	2.24	0	5	72	21	1	60
	AFT	38	86	82	140	1	99	0	0	23	77	0	24	76	0.36	1.66	0.87	0.84	0.96	2.35	1.72	1.72	1.14	2.40	2.24	2.28	0	1	58	40	1	60
1006-2	FWD	32	84	36	147	2	98	0	30	41	29	11	53	36	0.21	1.14	0.53	0.50	0.56	2.28	1.49	1.50	1.30	2.33	2.11	2.16	2	21	72	4	0	45
	AFT	32	84	36	147	2	98	0	35	40	25	21	54	25	0.26	1.34	0.62	0.58	0.63	2.19	1.48	1.47	1.56	2.50	2.12	2.16	0	11	77	9	3	45
1007-1	FWD	12	49	80	103	0	5	95	1	20	79	0	25	75	0.26	1.22	0.52	0.47	0.62	2.20	1.44	1.40	1.22	1.36	2.17	2.21	20	6	67	5	0	80
	AFT	11	49	48	102	0	100	0	10	42	48	6	77	17	0.26	1.76	0.58	0.55	0.78	2.31	1.62	1.52	1.54	2.39	2.20	2.24	1	13	80	5	1	80
1007-2	FWD	32	87	43	112	0	25	75	3	28	69	0	26	74	0.26	1.23	0.51	0.48	0.70	2.32	1.44	1.40	0.90	2.37	2.15	2.20	18	9	71	2	0	65
	AFT	31	87	38	111	0	100	0	19	41	40	3	88	9	0.24	1.56	0.60	0.56	0.44	2.27	1.90	1.52	0.84	2.41	2.17	2.23	1	16	74	9	1	65
1008-1	FWD	30	81	80	102	0	100	0	4	32	64	1	35	64	0.32	1.48	0.66	0.62	0.78	2.24	1.55	1.54	1.46	2.35	2.21	2.24	2	2	86	8	1	45
	AFT	30	81	80	102	0	100	0	4	27	69	0	34	66	0.32	1.57	0.71	0.69	0.81	2.21	1.57	1.58	1.08	2.37	2.21	2.24	1	1	84	13	0	45
1008-2	FWD	29	58	42	103	0	100	0	3	31	66	0	27	73	0.14	1.81	0.76	0.72	0.87	2.10	1.54	1.55	1.09	2.40	2.20	2.25	2	1	73	23	1	65
	AFT	29	58	42	103	0	100	0	3	30	67	0	29	71	0.32	1.64	0.77	0.76	0.73	2.10	1.55	1.55	1.10	2.35	2.18	2.22	1	3	69	27	0	65
1009-1	FWD	12	49	42	132	0	100	0	1	26	73	0	34	66	0.32	1.40	0.65	0.62	0.85	2.41	1.53	1.52	0.83	2.51	2.30	2.36	5	4	77	14	0	80
	AFT	12	49	42	132	0	100	0	0	40	60	0	45	55	0.28	1.42	0.70	0.64	0.98	2.28	1.58	1.55	0.83	2.51	2.32	2.36	1	5	73	20	0	80
1009-2	FWD	23	58	38	138	2	98	0	3	21	76	0	40	60	0.29	1.35	0.69	0.64	0.73	2.37	1.53	1.53	1.06	2.45	2.25	2.30	4	4	74	17	0	85
	AFT	23	58	38	138	2	98	0	4	47	49	0	56	44	0.26	1.47	0.69	0.64	0.44	2.42	1.61	1.60	1.61	2.50	2.31	2.34	1	4	77	18	0	85
1010-1	FWD	18	47	48	83	0	21	79	0	13	87	0	9	91	0.28	1.14	0.52	0.47	0.43	2.32	1.38	1.32	1.11	2.42	2.18	2.20	18	3	78	4	0	40
	AFT	18	47	48	83	0	21	79	0	19	81	0	16	84	0.27	1.25	0.57	0.52	0.78	2.42	1.45	1.41	0.98	2.46	2.20	2.26	9	4	81	6	0	40
1010-2	FWD	18	82	38	76	0	50	50	0	16	84	0	13	87	0.26	1.51	0.55	0.50	0.82	2.36	1.41	1.38	1.00	2.44	2.14	2.20	22	4	67	6	0	40
	AFT	18	82	38	76	0	50	50	0	23	77	0	25	75	0.20	1.48	0.59	0.56	0.50	2.40	1.47	1.45	1.29	2.48	2.18	2.22	13	3	76	8	0	40
1011-1	FWD	2	58	33	66	0	64	36	2	23	75	2	23	75	0.18	0.99	0.50	0.46	0.56	2.36	1.48	1.43	0.78	2.40	2.07	2.18	17	11	70	2	0	40
	AFT	2	58	33	66	0	67	33	3	47	50	0	37	63	0.24	1.48	0.60	0.56	0.50	2.35	1.57	1.55	0.74	2.37	2.11	2.18	3	7	81	8	0	40
1012-1	FWD	0	45	38	71	0	64	36	7	56	37	0	65	35	0.25	1.30	0.59	0.53	0.54	2.38	1.40	1.42	0.90	2.39	1.93	2.00	8	17	66	10	0	60
	AFT	0	45	38	71	0	64	36	0	33	67	0	49	51	0.26	1.40	0.61	0.58	0.47	2.27	1.44	1.40	0.72	2.32	1.89	1.96	8	10	74	11	0	60
1012-2	FWD	0	87	34	106	0	77	23	6	44	50	0	49	51	0.30	1.20	0.58	0.55	0.73	2.32	1.49	1.42	0.67	2.34	1.91	2.00	4	9	80	7	0	40
	AFT	0	87	34	106	0	77	23	3	15	82	0	10	90	0.30	1.27	0.68	0.62	0.48	2.33	1.58	1.58	0.70	2.38	1.96	2.02	4	0	72	23	0	40
1013-1	FWD	0	56	28	83	0	64	36	0	42	58	0	55	45	0.20	1.66	0.56	0.36	0.82	2.29	1.86	1.59	1.21	2.41	2.03	2.10	7	13	76	4	0	47
	AFT	0	56	28	82	0	64	36	2	7	91	0	33	67	0.28	1.56	0.66	0.48	0.64	2.28	1.59	1.63	1.10	2.36	1.97	2.03	5	5	74	16	0	47

FIGURE 18-3

Distribution

Copy No.	To
[redacted]	[redacted]