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4 August 1966

TO: V. Webb ✓
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FROM: [REDACTED]

SUBJECT: MISSION 1020-1 AND 1020-2 FINAL REPORT

Enclosed is the Final Performance Evaluation Report
for Mission 1020-1 and 1020-2.

[REDACTED] Manager
Advanced Projects

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CORONA J

PERFORMANCE EVALUATION REPORT

MISSION 1020-1 and 1020-2

FTV 1613; J-20

8 July 1966

Approved: [REDACTED]

Manager

Advanced Projects

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FOREWORD

This report details the performance of the payload system during the operational phase of the Program [REDACTED] Flight Test Vehicle 1613.

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 1020-1 and 1020-2 which was launched on 9 June 1965.

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TABLE OF CONTENTS

	Page
TITLE PAGE	
FOREWORD	i
TABLE OF CONTENTS	ii
LIST OF TABLES	iii
LIST OF ILLUSTRATIONS	iv
INTRODUCTION	1
SECTION 1 - SYSTEM PERFORMANCE	2
SECTION 2 - PRE-FLIGHT SYSTEMS TEST	5
SECTION 3 - FLIGHT OPERATIONS	21
SECTION 4 - MISSION 1020-1 RECOVERY SYSTEM	33
SECTION 5 - MISSION 1020-2 RECOVERY SYSTEM	35
SECTION 6 - MASTER (FWD) PANORAMIC CAMERA	37
SECTION 7 - SLAVE (AFT) PANORAMIC CAMERA	41
SECTION 8 - PANORAMIC CAMERA EXPOSURE	44
SECTION 9 - DIFFUSE DENSITY MEASUREMENTS	52
SECTION 10 - PERFORMANCE MEASUREMENTS	54
SECTION 11 - OBSERVED DATA	55
SECTION 12 - MISSION 1020-1 STELLAR-INDEX CAMERA	56
SECTION 13 - MISSION 1020-2 STELLAR-INDEX CAMERA	58
SECTION 14 - VEHICLE ATTITUDE	60
SECTION 15 - IMAGE SMEAR ANALYSIS	67
SECTION 16 - RADIATION DOSAGE	74
SECTION 17 - RELIABILITY	75
SECTION 18 - SUMMARY DATA	79
SECTION A - APPENDIX	85

~~TOP SECRET~~

~~TOP SECRET~~

LIST OF TABLES

Table		Page
2-1	TASC Cycle Rates	9 - 11
2-2	TASC System Temperatures	13
2-3	T/S Self Heating Corrections (TASC)	14 - 15
2-4	TASC Payload Consumption	17
3-1	Flight Cycle Rates	22
3-2	Clock/System Time Correlation	25
3-3	Flight Temperature Summary	28 - 29
4-1	Mission 1020-1 Recovery Sequence	34
5-1	Mission 1020-2 Recovery Sequence	36
9-1	Processing - Exposure Analysis	53
17-1	Estimated Reliability	77 - 78
18-1	Mission Summary	80
18-2	Performance Summary	81 - 82
18-3	Exposure - Processing Summary	83 - 84
A-1	Mission 1020-1 FWD Density Frequency Distribution	A-1 to A-6
A-2	Mission 1020-1 AFT Density Frequency Distribution	A-19 to A-24

~~TOP SECRET~~

~~TOP SECRET~~

LIST OF ILLUSTRATIONS

Figure		Page
1-1	Mission 1020 Inboard Profile	4
2-1	Master Camera Pre-Flight Resolution	18
2-2	Slave Camera Pre-Flight Resolution	19
3-1	PMU Supply Pressure	26
3-2 to 3-4	Predicted vs Actual Temperatures	30-32
8-1	Mission 1020-1 Solar Elevations	45
8-2	Mission 1020-1 Solar Azimuths	46
8-3 to 8-7	Mission 1020-1 Nominal Exposure Points	47-51
14-1 to 14-3	Mission 1020-1 Attitude Error Distributions	61-63
14-4 to 14-6	Mission 1020-1 Attitude Rate Distributions	64-66
15-1 to 15-6	V/h Error and Resolution Limit Distributions	68-73
A-1 to A-12	Mission 1020-1 FWD Graphical Density Distributions	A-7 to A-18
A-13 to A-24	Mission 1020-1 AFT Graphical Density Distributions	A-25 to A-36

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INTRODUCTION

This report presents the final performance evaluation of Missions 1020-1 and 1020-2 of the Corona Program. The purpose of this report is to define the performance characteristics of the J-20 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 AFSPPF. 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 AFSPPF. The vehicle attitude error values, frame correlation times are made at NPIC who also supply the Processing Summary and MTF/AIM resolution reports published by [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 criteria selected for the mission.

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SECTION 1

SYSTEM PERFORMANCE

A. MISSION OBJECTIVES

The payload section of Mission 1020, placed into orbit by Flight Test Vehicle #1613 and LV-2A booster #444, 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-20 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 a six and a five day photographic operation with no deactive period.

B. MISSION DESCRIPTION

The payload was launched from Vandenberg Air Force Base (VAFB) at 21:58:16 Z (14:58:16 PDT) on 9 June 1965. Ascent and injection were normal and the achieved orbit was within nominal tolerances. Tracking and command support was effected by the Air Force Satellite Control Facility consisting of tracking and command stations at [REDACTED]

[REDACTED] under central control of the Satellite Test Center at Sunnyvale, California. Mission 1020-1 consisted of six days operation and was completed by air recovery on orbit 97, 15 June 1965. The second air recovery was accomplished on 16 June 1965 during orbit 113 using the secondary recovery system (Life Boat). Life Boat was used for Mission 1020-2 because unstable vehicle attitude developed after pass 97D.

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

ORBITAL PARAMETERS

<u>Parameter</u>	<u>Predicted</u>	<u>Orbit 1 Actuals</u>
Period (Min.)	90.01	89.88
Perigee (N. M.)	100.00	96.00
Apogee (N. M.)	200.11	199.09
Inclination (Deg.)	75.0	75.07
Perigee Latitude (Deg. N.)	22.24	32.61
Eccentricity	0.01398	0.01437

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C. PANORAMIC CAMERAS

The Master and Slave panoramic cameras operated throughout both missions with no significant problems and Mission 1020 produced fair photographic coverage. The cloud cover (45%) and atmospheric haze observed in the photography was relatively high.

D. STELLAR-INDEX CAMERAS

The Mission 1020-1 Stellar-Index camera operated properly throughout the mission and produced very high quality photography. The Mission 1020-2 Stellar-Index camera operated properly during the mission.

E. OTHER SUB-SYSTEMS

The clock, instrumentation, pressure make-up, command and thermal control sub-systems performed satisfactorily through both missions. The vehicle guidance system became inoperative after pass D-97.

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SCHEMATIC INBOARD PROFILE - CORONA J SYSTEM

MISSION 1020

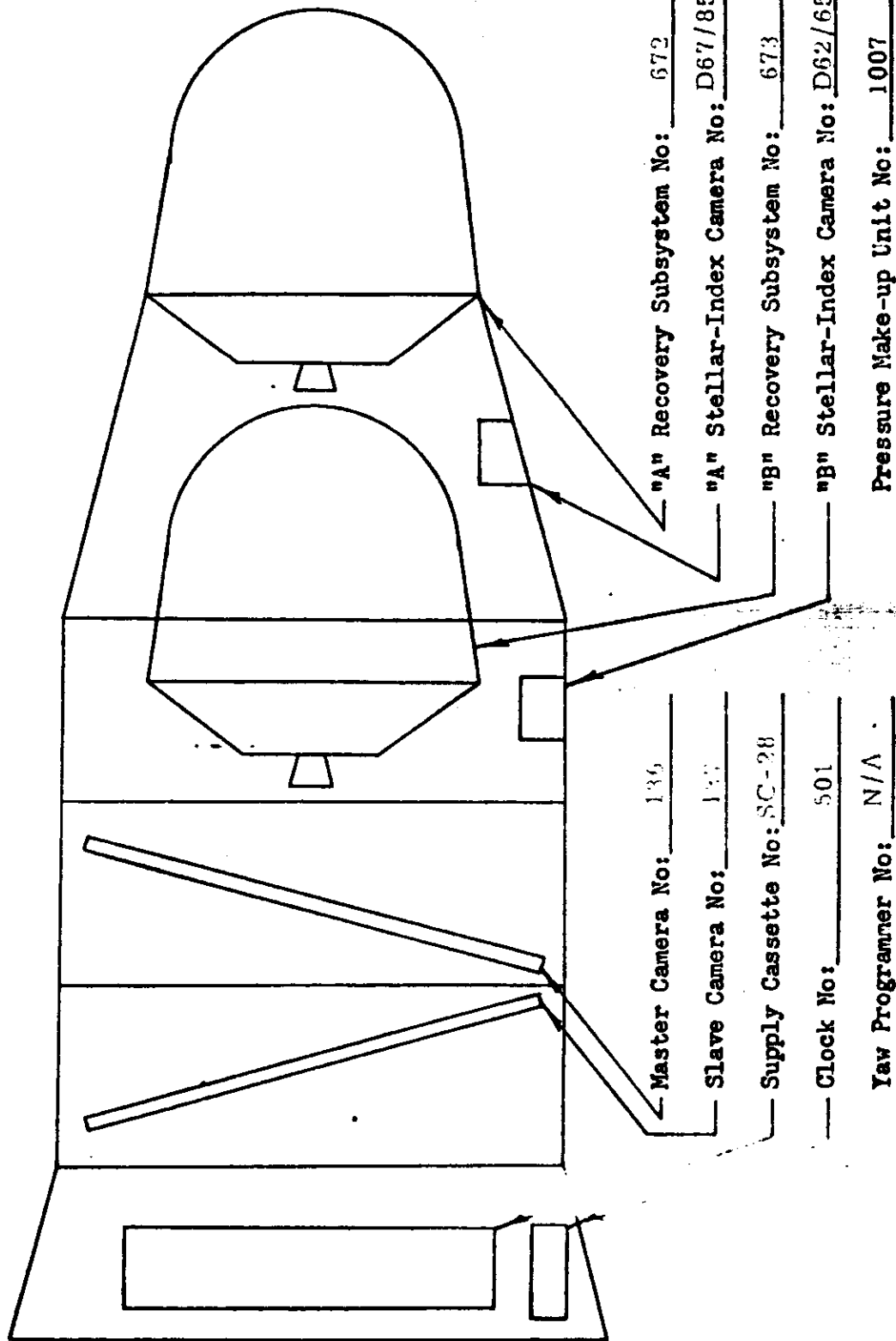


FIGURE 1-1

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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 susceptibility to corona discharge. Such discharge fogs the film thus degrading the operational photography.

2. Test Summary

The J-20 payload system was in the TASC chamber at Sunnyvale for environmental testing three times as follows:

TASC Test 1 - Jan. 26 to 28, 1965

TASC Test 2 - Jan. 30 to Feb. 5, 1965

TASC Test 3 - Mar. 2 to 4, 1965

TASC Test 1 was the first attempt to subject the system to an environmental test. The test was programmed for 16 active orbits in both the "A" and "B" modes with one day soak in between. The test was interrupted by a fail-safe condition at instrument startup on Rev. 4, "A" mode operation. When an attempt to reapply power to the instrument takeup was unsuccessful, the system was returned to A/P for investigation of the problem.

TASC Test 2 was the second effort to complete the programmed testing attempted during TASC Test 1. The system was returned to the TASC chamber after extensive testing at A/P on a system and component level. These tests failed to isolate the problem which caused the fail-safe in TASC Test 1. Further fail-safes occurred during "A" mode operations. Active operations consisted of 11 Revs. in the "A" mode and 12 Revs. in the "B" mode.

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TASC Test 3 was a special test designed primarily to test the system in the "A" configuration to verify that a new "A" takeup unit eliminated the fail-safe problem. The test consisted of 50 cycle bursts of stereo operation at 15 minute intervals for a total of 2500 cycles in the "A" mode and 500 cycles in the "B" mode.

The J-20 system subjected to these tests consisted of panoramic instruments 136 and 137. Stellar/Index cameras D17 ("A" unit) and D24 ("B" unit) were aboard for TASC Test 1. The "B" unit was replaced with D62 prior to TASC Test 2. Takeup cassette unit T13 replaced unit T35 in the SRV "A" system prior to TASC Test 3.

3. Summary

TASC Test 1:

- 1) A fail-safe condition occurred at instrument startup during Rev. 4, "A" mode operation. The following instrument #2 dynamics were observed at and prior to fail-safe:
 - a. Erratic payload takeup throughout operations in the "A" mode.
 - b. The 99/101 clutch ratios of 7/6, 8/6, and 6/5 for the operation prior to the fail-safe.
 - c. The clutch shifted from the 99 position, to the 101 position during the metering portion of the 5th frame.

TASC Test 2:

- 1) Two fail-safes occurred during "A" mode operations, Rev. 10 and 11. The following instrument #2 dynamics were observed:
 - a. Erratic payload takeup throughout "A" mode operations.
 - b. The 99/101 clutch ratios for Rev. 10 operation were 7/5 and 7/7.
 - c. The clutch ratios for Rev. 11 operation was 6/4 for most of the operation and changed to 5/4, 7/6, 4/3, 8/5 and 5/4 prior to fail-safe.

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- d. The clutch shifted from the 99 to 101 position during the metering portion of the cycle prior to fail-safe in both cases.
- 2) A fail-safe occurred during the "B" mode operation after instrument #2 ran out of payload on Rev. 12.
 - 3) Smooth payload transport was observed on instrument #2 takeup monitor during "B" mode operations.
 - 4) Instrument #1 operation was satisfactory throughout the test.
 - 5) Cycle rate predictability error was $\pm 2\%$. Instrument #1 operated at rates up to 2% slower than instrument #2.
 - 6) Both stellar/index cameras operated satisfactorily as indicated by the shutter pulse and payload metering monitors.
 - 7) Clock performance was satisfactory.
 - 8) Both "A" and "B" recovery sequences were satisfactory. Both instruments stowed properly during cut and wrap operation. S/I slewing occurred normally at "arm" signal.
 - 9) The corona marking level met the criteria established for the J-program.
 - 10) Several vehicle deactivate commands were given during both "A" and "B" modes of operation. The instruments operated for 5 cycles and stowed normally in each case.
 - 11) The PMU system operated satisfactorily.

TASC Test 3:

Both panoramic instruments operated satisfactorily. The erratic payload takeup and abnormal changes in 99/101 clutch ratios observed during TASC Test 1 and 2 "A" mode operations were absent from any of the TASC 3 operations.

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There was no recurrence of the "fail-safe" problem after changing the "A" takeup cassette unit prior to the test.

A deactivate command was given successfully between "A" and "B" operations. Both instruments stowed normally after 5 cycles.

4. Panoramic Camera Performance

Throughout the "A" mode operations of TASC Tests 1 and 2 erratic film transport was observed on instrument #2 takeup monitor.

Four fail-safes occurred during TASC Tests 1 and 2 as follows:

Fail-Safe 1 - TASC Test 1 at Instrument #2 startup Rev. 4 operation during second day in "A" mode.

Fail-Safe 2 - TASC Test 2 after 51 cycles of Rev. 10 operation in "A" mode.

Fail-Safe 3 - TASC Test 2 after 142 cycles of Rev. 11 operation in "A" mode.

Fail-Safe 4 - TASC Test 2 after instrument #2 ran out of payload during Rev. 12 in the "B" mode.

The dynamic performance of both instruments was satisfactory for TASC test 3 as indicated by the monitors showing center-of-format, lens rotation and film transport. The average 99/101 percent clutch ratios for this test were 6/6 and 7/6 for Instrument #1 and 6/5 and 7/5 for instrument #2. The erratic payload movement experienced on instrument #2 during TASC Tests 1 and 2 was not observed on TASC Test 3. Neither were there any abnormal changes of 99/101 clutch ratios such as experienced in TASC Test 2 when the fail-safes occurred.

The cycle rate data from TASC Test 2 is summarized in Table 2-1.

During TASC Test 3 the instruments were operated at the R2-All level (zero amplitude) throughout the test. The V/h programmer was not run. Instrument #1 ran 1.3% slower than nominal and instrument #2 ran 1.5% faster. Instrument #1 operated approximately 1% slower than instrument #2 throughout the test.

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J-20.136/137 TASC TEST 2 CYCLE RATES 1-30 TO 2-5-65

REV/MODE	RAMP	T.U.R.	INST 136			INST 137			136/137 DIFF.
			ACT.	NOM.	DEV.	ACT.	NOM.	DEV.	
00 A	7 7	0	3.695	3.638	-1.55	3.655	3.645	-0.29	-1.08
00 A	7 7	0	3.680	3.638	-1.14	3.650	3.645	-0.15	-0.82
01 A	7 7	390	3.545	3.500	-1.28	3.505	3.508	0.07	-1.13
02 A	4 1	1420	2.185	2.205	0.89				
02 A	4 1	1600				2.173	2.195	1.02	
02 A	4 1	2120	2.170	2.189	0.88	2.158	2.192	1.53	-0.55
02 A	5 8	725	2.887	2.867	-0.68	2.857	2.880	0.79	-1.04
03 A	5 8	1545	2.443	2.434	-0.35	2.428	2.448	0.83	-0.61
04 A	7 7	2275	2.590	2.578	-0.46	2.580	2.592	0.45	-0.39
04 A	8 2	345	5.080	5.085	0.10	5.020	5.070	0.98	-1.18
05 A	11 1	1415	2.700	2.680	-0.76	2.687	2.693	0.21	-0.48
06 A	11 1	1950	2.280	2.274	-0.25	2.278	2.289	0.47	-0.09
06 A	5 8	1075	2.733	2.672	-2.27	2.710	2.685	-0.92	-0.84
06 A	5 8	1425	2.520	2.481	-1.59	2.510	2.494	-0.63	-0.40
07 A	7 7	1155	2.896	2.861	-1.23	2.866	2.873	0.25	-1.04
07 A	7 7	1580	2.580	2.551	-1.13	2.566	2.565	-0.05	-0.54
08 A	7 7	2510	2.773	2.739	-1.25	2.757	2.752	-0.19	-0.58
08 A	4 1	995	2.723	2.695	-1.02	2.707	2.708	0.05	-0.59
08 A	4 1	1730	2.195	2.188	-0.33				
09 A	4 1	2605				2.353	2.361	0.32	
09 A	4 1	3195	3.500	3.469	-0.89	3.450	3.477	0.78	-1.43
09 A	11 1	885	4.440	4.373	-1.54	4.380	4.370	-0.24	-1.35

TABLE 2-1

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REV/MODE	RAMP	T.U.R.	INST 136			INST 137			136/137	
			ACT.	NOM.	DEV.	ACT.	NOM.	DEV.	DIFF.	
10 A	11 1	1875	2.308	2.271	-1.61	2.295	2.286	-0.41	-0.56	
01 B	7 7	365	3.550	3.516	-0.98	3.510	3.523	0.37	-1.13	
02 B	4 1	1425	2.210	2.204	-0.26					
02 B	4 1	1605				2.178	2.195	0.78		
02 B	4 1	2135	2.190	2.190	-0.01	2.165	2.192	1.24	-1.14	
02 B	5 8	730	2.910	2.865	-1.58	2.893	2.877	-0.56	-0.58	
03 B	5 8	1545	2.468	2.434	-1.38	2.442	2.448	0.26	-1.05	
04 B	8 2	341	5.100	5.096	-0.08	5.000	5.080	1.57	-1.96	
05 B	8 2	1703	2.230	2.217	-0.61					
05 B	8 2	2246				2.270	2.294	1.04		
05 B	11 1	1452	2.610	2.615	0.19	2.590	2.628	1.46	-0.77	
06 B	11 1	2026	2.280	2.296	0.69	2.280	2.310	1.30	-0.	
06 B	5 8	1084	2.700	2.667	-1.24	2.680	2.680	0.00	-0.74	
06 B	5 8	1433	2.500	2.477	-0.92	2.480	2.491	0.44	-0.80	
07 B	5 8	0	3.160	3.111	-1.59	3.130	3.121	-0.28	-0.95	
07 B	7 7	1177	2.900	2.840	-2.12	2.870	2.852	0.63	-1.03	
07 B	7 7	1584	2.600	2.549	-1.98	2.570	2.563	-0.27	-1.15	
08 B	7 7	0	3.650	3.638	-0.32	3.610	3.645	0.95	-1.10	
08 B	8 2	0	5.560	5.633	1.29	5.440	5.606	2.95	-2.16	
08 B	4 1	1089	2.550	2.539	-0.43	2.520	2.553	1.28	-1.18	
08 B	4 1	1751	2.180	2.187	0.34					
08 B	7 7	2614	2.860	2.831	-1.02	2.860	2.844	-0.58	-0.	

TABLE 2-1

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REV/MODE	RAMP	T.U.R.	INST 136			INST 137			136/137	
			ACT.	NOM.	DEV.	ACT.	NOM.	DEV.	DIFF.	
09	B	11 1	890	4.355	4.351	-0.09	4.311	4.348	0.86	-1.01
09	B	4 1	2784				2.650	2.673	0.87	
09	B	4 1	3211	3.500	3.504	0.11	3.450	3.511	1.75	-1.43
10	B	11 1	1860	2.272	2.273	0.04	2.258	2.287	1.28	-0.62
10	B	11 1	3030	4.905	4.919	0.28	4.815	4.906	1.86	-1.83
10	B	7 7	241	3.550	3.580	0.85	3.510	3.587	2.15	-1.13
11	B	7 7	1910	2.485	2.479	-0.26	2.470	2.492	0.90	-0.60
11	B	7 7	2290	2.587	2.586	-0.03	2.573	2.600	1.03	-0.54
11	B	7 7	0	3.595	3.638	1.19	3.540	3.645	2.87	-1.53
12	B	8 2	1230	2.733	2.740	0.27	2.713	2.753	1.46	-0.73
12	B	8 2	1840				2.175	2.221	2.09	

DEV. AND DIFF. ARE IN PERCENT
 THE (-) SIGN INDICATES THAT THE INST IS SLOWER THAN
 PREDICTED OR THAT INST 1 IS SLOWER THAN INST 2

TABLE 2-1

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5. Stellar/Index Camera Performance

S/I payload metering occurred normally at every 7th cycle of instrument #1. Other S/I events as shutter and platen operations also occurred in the proper sequence. Metering ratios were 7/3, 8/3 for both "A" and "B" units. The "B" index camera metered abnormally during one metering cycle.

The "B" - S/I unit (D24) was changed prior to TASC Test 2. The unit was removed for updating of the shutter assembly for increased reliability. No problem was experienced. This S/I unit will be used on a subsequent payload system.

No S/I units were aboard for TASC Test 3.

6. Clock Performance

Various clock correlation checks with the IRIG-C time indicated differences of -.016 sec. in 28 hours, +.011 sec. in 4 hours, -.006 sec. in 3 hours, and +.017 in 7 hours.

7. Thermal Environment

Table 2-2 lists the system temperatures for several Revs. in the "A" and "B" modes. Instrument temperatures are average values, excluding T/S 11 on the scan arm. Table 2-3 contains the self-heating corrections used for BN 2400 type T/S in "A" and "B" configurations, respectively. The "Time" column represents the time in minutes that the TLM is on while the other columns represent the correction in °F applied to recorded temperature values.

8. Pressure Make-Up System Performance

The PMU system operated satisfactorily for TASC Test 2. The gas was dumped after Rev. 6 of the "B" mode. The pressure level at dump was 740 psig. The gas depletion rate was 6.4 psi per minute of instrument operation during normal usage.

The PMU system was out of gas for TASC Test 3.

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TASC TEST 2 TEMPERATURE SUMMARY

		<u>"A" MODE</u>			<u>"R" MODE</u>	
<u>Orbit</u>	<u>0</u>	<u>5</u>	<u>11</u>	<u>1</u>	<u>I</u>	<u>12</u>
Inst. #1	70	61	67	68	72	73
Inst. #2	69	59	65	66	70	72
Supply Spool	78	60	61	62	68	68
Fairing	86	70	70	-	-	-
Barrel #2	84	67	70	73	69	48
Conic Adapter	85	47	48	51	60	38
Clock	87	79	80	80	85	74
Thrust Cone	68	54	51	59	69	60
T/V Cassette	71	63	60	-	-	-
Stellar/Index	78	64	66	56	65	40
Barrel #1	-	-	-	71	69	45

NOTE:

- 1) Temperature values are average.
- 2) Scan arm temperature (T/S 11) was not included in averages for the instruments.
- 3) Values were not corrected for self-heating.

TABLE 2-2

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VEHICLE 16130 PAYLOAD J-20 SELF HEATING TEST. A

SUMMARY OF SELF HEATING CORRECTION CURVES

53 BAT 09 TC2 33 204 55 213 28 113 50 211
 40 SS2 46 209 15 108 44 CA1 23 111
 38 206 03 103 52 212
 21 SS1 37 TC1 05 104
 13 107 08 105
 20 110 43 208
 41 207
 18 109
 10 106
 48 210
 25 112
 31 203
 36 205

TIME	NO. 1	NO. 2	NO. 3	NO. 4	NO. 5	NO. 6
0.10	0.2	0.8	0.9	0.9	1.8	2.5
0.13	0.3	1.0	1.1	1.1	2.3	3.1
0.16	0.4	1.3	1.4	1.4	2.9	3.9
0.20	0.8	1.8	1.9	1.9	3.5	5.2
0.25	1.5	2.5	2.7	2.6	4.4	7.0
0.32	2.4	3.3	3.6	3.5	5.5	9.2
0.40	3.6	4.4	4.7	4.6	6.8	12.1
0.50	5.0	5.8	6.1	6.0	8.5	15.6
0.63	5.2	6.0	6.4	6.4	9.1	16.7
0.79	5.5	6.3	6.8	6.9	9.7	18.0
1.00	5.8	6.7	7.3	7.6	10.6	19.8
1.26	5.8	6.8	7.5	7.9	11.0	20.6
1.58	5.8	6.8	7.6	8.3	11.4	21.5
2.00	5.7	6.8	7.6	8.6	11.7	22.0
2.51	5.5	6.7	7.7	8.9	12.1	22.7
3.16	5.3	6.7	7.8	9.3	12.4	23.3
3.98	5.1	6.6	7.8	9.6	12.7	23.6
5.01	4.9	6.5	7.8	10.1	13.0	24.1
6.31	4.8	6.5	8.0	10.5	13.2	24.3
7.94	4.7	6.5	8.1	11.0	13.4	24.6
10.00	4.6	6.5	8.3	11.6	13.8	24.9
12.59	4.8	6.8	8.6	12.2	14.0	25.2
15.85	5.0	7.1	9.1	13.0	14.4	25.5
19.95	5.3	7.5	9.6	13.9	14.8	25.9
25.12	5.7	7.9	10.3	15.1	15.4	26.5
31.62	6.2	8.6	11.2	16.4	16.0	27.1
39.81	7.0	9.4	12.2	17.7	16.7	27.8
50.12	8.0	10.5	13.5	19.4	17.5	28.7
63.10	9.2	11.8	15.0	21.4	18.4	29.9
79.43	10.7	13.2	16.7	23.5	19.5	31.1
100.00	12.6	15.1	18.8	26.0	20.8	32.8

TABLE 2-3

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VEHICLE 1613 PAYLOAD J-20 SELF HEATING TEST

SUMMARY OF SELF HEATING CORRECTION CURVES

39 TC2 21 SS1 31 203 08 105 55 213 50 211

40 SS2 37 TC1 15 108 05 104 28 113 29 111

53-BAT-36-205

46 209 48 210

41 207 52 212

38-206

25 112

20 110

43 208

33 204

03 103

18 109

13 107

10 106

TIME	NO. 1	NO. 2	NO. 3	NO. 4	NO. 5	NO. 6
0.10	0.9	1.2	1.3	2.0	1.9	4.2
0.13	1.2	1.5	1.6	2.5	2.4	5.2
0.16	1.5	1.9	2.0	3.1	3.1	6.6
0.20	1.6	2.1	2.2	3.4	3.5	7.6
0.25	1.8	2.2	2.4	3.5	3.8	8.7
0.32	2.0	2.4	2.7	3.7	4.2	10.0
0.40	2.3	2.7	3.0	3.9	4.8	11.7
0.50	2.6	3.0	3.3	4.2	5.5	13.9
0.63	2.8	3.1	3.6	4.4	5.9	14.9
0.79	2.9	3.3	3.9	4.7	6.5	16.2
1.00	3.1	3.6	4.3	5.1	7.3	17.8
1.26	3.2	3.7	4.5	5.4	7.8	18.6
1.58	3.3	3.9	4.8	5.8	8.4	19.8
2.00	3.4	4.2	5.2	6.3	9.2	21.2
2.51	3.5	4.4	5.5	6.7	9.8	22.1
3.16	3.5	4.6	5.9	7.1	10.4	23.2
3.98	3.6	4.8	6.2	7.5	11.0	24.0
5.01	3.7	5.0	6.6	8.0	11.7	25.0
6.31	3.7	5.2	6.9	8.3	12.1	25.5
7.94	3.8	5.4	7.2	8.8	12.6	26.2
10.00	3.8	5.7	7.7	9.3	13.3	27.1
12.59	3.9	5.8	7.9	9.5	13.5	27.3
15.85	3.9	6.0	8.2	9.8	13.8	27.6
19.95	4.0	6.3	8.5	10.2	14.1	27.9
25.12	4.1	6.5	9.0	10.6	14.6	28.4
31.62	4.2	6.9	9.4	11.1	15.0	28.8
39.81	4.2	7.1	9.7	11.3	15.1	28.8
50.12	4.3	7.3	10.1	11.6	15.2	28.8
63.10	4.5	7.6	10.5	11.9	15.3	28.8
79.43	4.6	7.9	10.8	12.1	15.3	28.5
100.00	4.7	8.2	11.2	12.3	15.2	28.2

TABLE 2-3

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9. Instrumentation

Footage pot and cycle counter correlation for several Revs. in the "B" mode is summarized in Table 2-4. Both cycle counters operated satisfactorily throughout all the TASC Testing.

The instrumentation system performance was satisfactory for all TASC tests.

B. RESOLUTION TEST

The final resolution and theodolite tests for J-20 system was completed at A/P on 13 February 1965. Test results are summarized as follows:

1. Theodolite test material was evaluated and found to be acceptable for both instruments.
2. Thru focus resolution tests were completed, graphically plotted (See Figures 2-1, 2-2) and evaluated. The collimator position of peak focus and the peak resolution is shown in the table below:

Master Instrument #136

Max Hi Con 184 Li/MM

Max Lo Con 107 Li/MM Peak focus at $-.001''$

Slave Instrument #137

Max Hi Con 194 Li/MM

Max Lo Con 102 Li/MM Peak focus at $-.001''$

All aspects of the resolution data for both instruments was normal.

Instruments 136 and 137 have demonstrated a resolution performance at A/P and Boston that meet test and flight requirements.

C. FLIGHT READINESS

The flight readiness test was completed without incident. Processed film exhibits from instruments 136 and 137 were analyzed. All data recording was present. Horizon fiducials and the horizon camera shutter function were acceptable. The time word, serial number, index lamps, 200 pps track,

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"B" MODE PAYLOAD CONSUMPTION

INSTRUMENT #1

<u>Rev.</u>	<u>Footage Pot</u>		<u>Cycle Counter</u>	
	<u>Volts</u>	<u>Cycles</u>	<u>Reading</u>	<u>Cycles</u>
4	2.1	720	3945	711
5	2.3	856	4109	875
6	2.48	986	4222	988
7	2.95	1348	4580	1346
8	3.45	1761	5034	1800
9	3.6	1882	5194	1960

INSTRUMENT #2

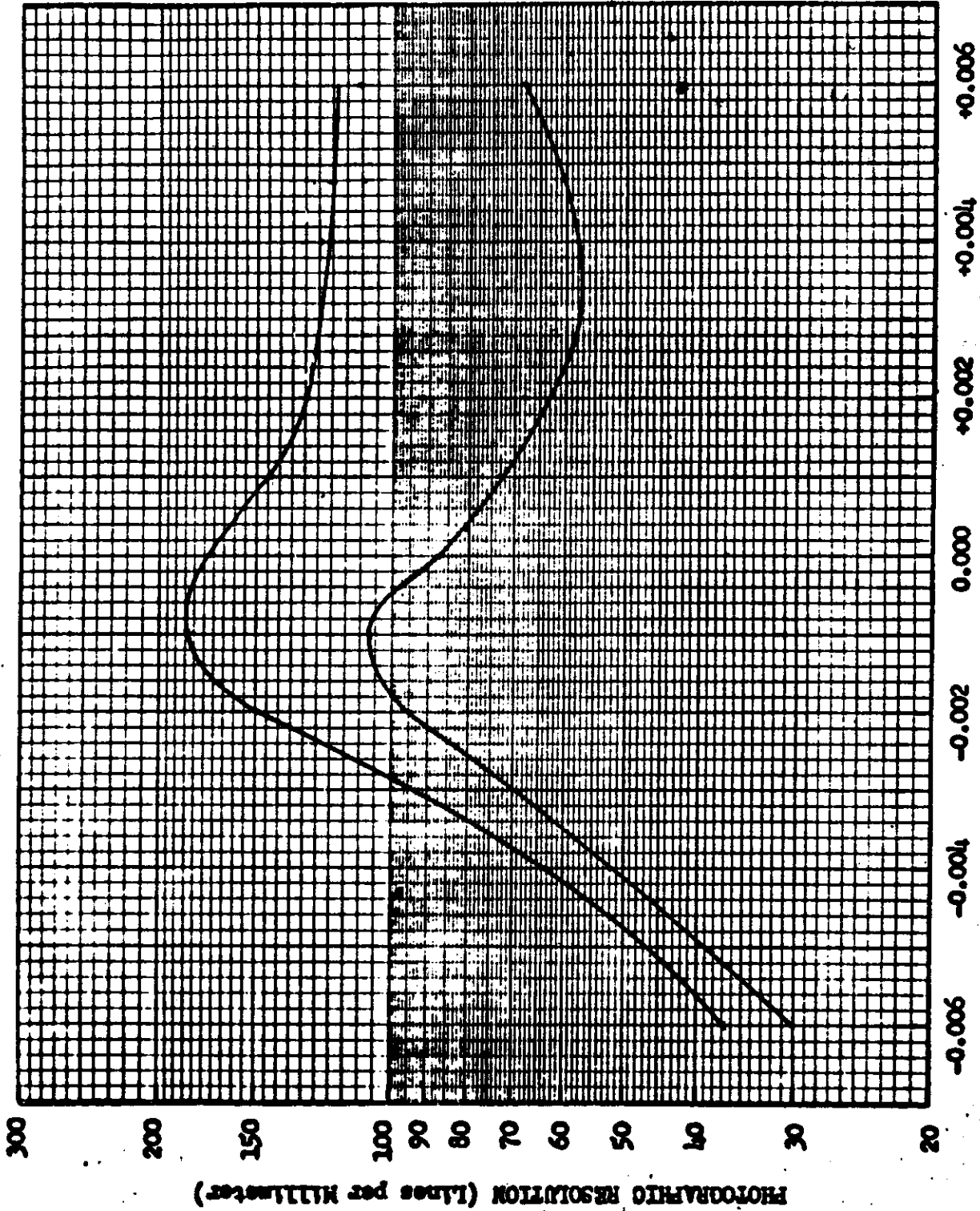
4	2.1	716	3091	718
5	2.35	874	3258	885
6	2.52	989	3372	999
7	3.0	1351	3734	1361
8	3.54	1798	4193	1820
9	3.73	1967	4373	1999

TABLE 2-4

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PRE-FLIGHT DYNAMIC RESOLUTION



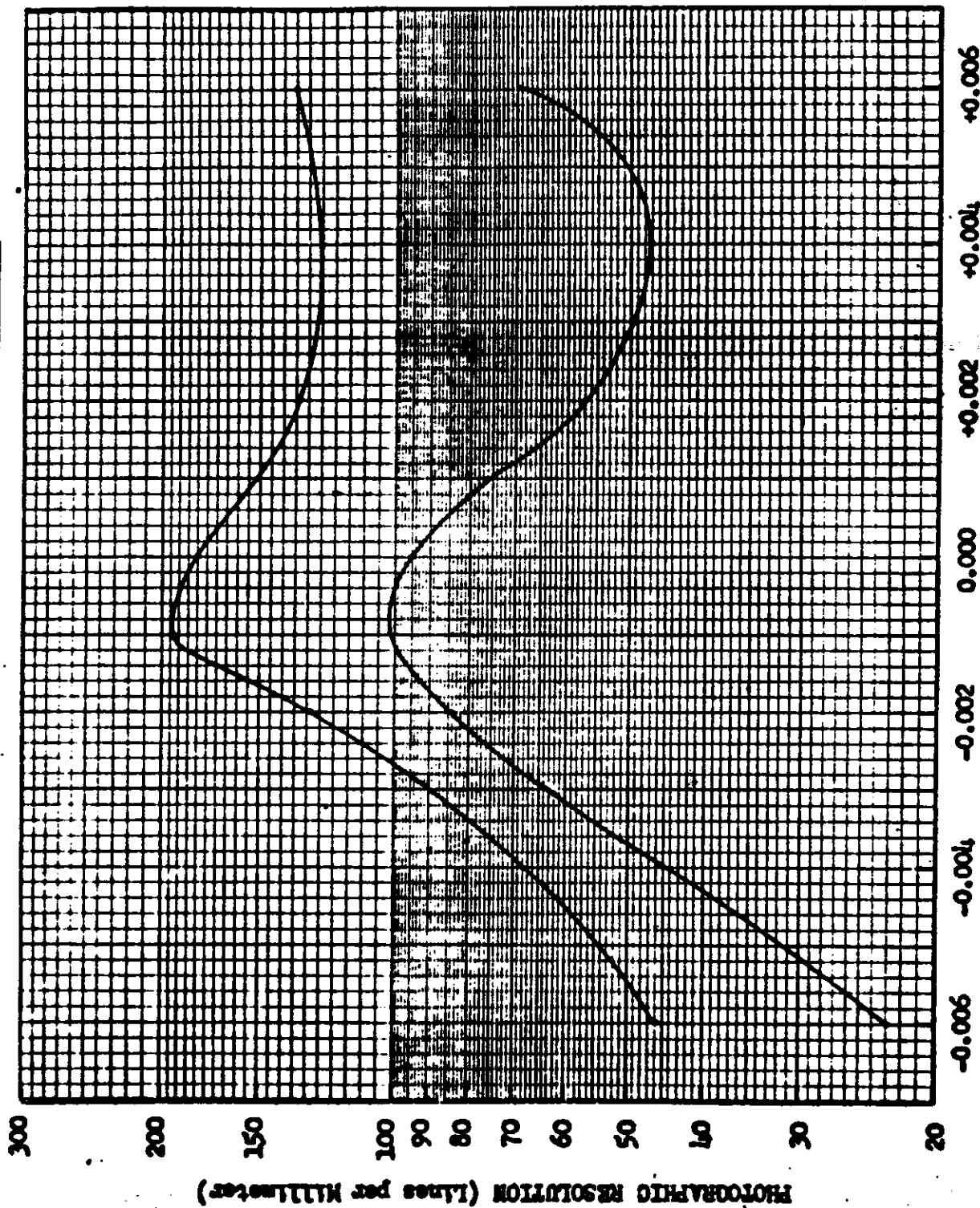
Camera No: 136
Payload No: J-20
Resolution (1/mm) 184
High Contrast: 184
Low Contrast: 107
Film Type: 3404
Test Date: 2/16/65

FIGURE 2-1

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FREE-FLIGHT DYNAMIC RESOLUTION



Camera No: 137
Payload No: J-20
Resolution (1/mm): 194
High Contrast: 102
Low Contrast: 3404
Test Date: 2/6/65

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FIGURE 2-2

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blanked pulse and end of pass mark were present and acceptable in all formats of panoramic photography. Controlled fogging of the panoramic format revealed stove banding to be absent and the 200 pps timing track was outside the active format area. Several very minor minus density streaks parallel to the film edge in both panoramic film exhibits were observed. No other film defects attributable to flight hardware were observed in the final flight readiness film exhibits. Flight readiness film exhibits indicated that J-20 system was ready for flight.

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SECTION 3

FLIGHT OPERATIONS

A. SYSTEM PERFORMANCE SUMMARY

All launch, ascent, and injection events occurred as programmed and the desired orbit was achieved. The Agena vehicle performance was satisfactory through the first mission. Failure in the regulated voltage supply caused the second mission to be terminated early.

Both panoramic cameras operated satisfactorily throughout the flight.

Both Stellar/Index cameras operated satisfactorily for the flight.

The telemetry and command system performance was satisfactory throughout both missions with one exception. The cycle counter on instrument No. 2 randomly lost counts throughout both missions.

The clock system operated normally throughout both missions.

The pressure make-up system operated throughout both missions. However, the gas consumption was higher than any previous systems. The flight data indicates that a possible high-pressure leak was present at the beginning of Phase 1.

The thermal environment for both instruments was within tolerance for the entire flight.

The -1 SRV unit was recovered successfully. The impact point was within tolerance.

The -2 SRV unit was recovered successfully also but the secondary vehicle recovery system (lifeboat) was required because the vehicle guidance system was not functioning. Impact was approximately 200 miles down range of the predicted point.

B. PANORAMIC CAMERA PERFORMANCE

Instrument system dynamics were observed on TLM during several Tracking Station acquisitions. Table 3-1 presents the cycle rate summary of both panoramic cameras for these orbits.

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J-20/1613 MISSION 1020 CYC RATE SUMMARY-ENGR. OPERATIONS

REV/MODE	RAMP	T.U.R.	INST 136			INST 137			136/137 DIFF.
			ACT.	NOM.	DEV.	ACT.	NOM.	DEV.	
9 A	6 5	280	3.815	3.762	-1.41	3.813	3.767	-1.23	-0.05
16 A	6 5	1774	2.280	2.217	-2.83	2.252	2.228	-1.08	-1.23
25 A	6 4	345	3.932	3.900	-0.83	3.931	3.903	-0.72	-0.03
32 A	6 4	1858	2.246	2.211	-1.58	2.249	2.220	-1.33	0.13
41 A	5 4	398	3.682	3.621	-1.69	3.685	3.627	-1.59	0.08
48 A	5 4	1895	2.250	2.204	-2.08	2.240	2.210	-1.34	-0.44
57 A	5 4	435	3.680	3.574	-2.97	3.675	3.581	-2.64	-0.14
63 A	5 4	2002	2.239	2.205	-1.54	2.236	2.211	-1.11	-0.13
79 A	5 4	2037	2.226	2.206	-0.92	2.249	2.212	-1.66	1.03
95 A	5 4	2080	2.248	2.207	-1.87	2.248	2.214	-1.55	-0.
04 B	5 4	545	3.477	3.423	-1.58	3.460	3.431	-0.85	-0.49

DEV. AND DIFF. ARE IN PERCENT
THE (-) SIGN INDICATES THAT THE INST IS SLOWER THAN
PREDICTED OR THAT INST 1 IS SLOWER THAN INST 2

TABLE 3-1

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Instrument dynamics were good for each of the engineering operations observed. Payload transport was smooth as indicated by the supply and horizon idler monitors. Normal instrument start-up and shut-down was indicated in each case.

Cycle rate data obtained for these operations indicated that both instruments were running up to 3% slower than nominal. The instruments operated within + 1% of each other. Average 99/101 clutch ratios were 6/6 and 6/5 for the master and slave, respectively.

Panoramic Film Consumption - Frames

	Nominal	Actual Master	Slave
Pre-Launch	100	101	101
-1 Mission	3000	2912	2910
-2 Mission	2900	*1019	*1010
Total	6000	4032	4021

*These values obtained from cycle counters

FMC Match

Several V/h ramp reference level, amplitude, and delay (RTC 6, 8 and 10) position changes were made during the flight to improve the FMC match, as follows:

<u>Orbit</u>	<u>RTC 6-8-10</u>	<u>Approx. Match</u>	<u>Comments</u>
Launch	6-5-6	9% slow	Settings for nominal conditions
7	6-5-4	4% slow	RTC 10 changed to compensate for non-nominal perigee latitude
17	6-5-4	2% slow	To improve orbit match - Instruments operating slow
39	5-4-3	>1% slow	To adjust for slow instrument rates
97	5-4-4	>1% slow	Increments in delay steps changed from 60 to 80 sec. for second mission

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C. STELLAR/INDEX CAMERA PERFORMANCE

Both the -1 and -2 stellar/index units operated normally during the flight. The frames exposed during the 97 orbits of the first mission were 412 for the stellar and 414 for the index. The second S/I unit exposed approximately 146 frames during the shortened second mission.

S/I events were observed on all of the engineering operations acquired at [REDACTED]. Metering was normal for both units. Shutter pulses were indicated during all of the daytime passes over [REDACTED]. The index camera payload was out prior to the engineering operation on Orbit 95 which was the last time the system was operated during the first mission. All S/I events occurred in the proper sequence for both units.

D. INSTRUMENTATION AND COMMAND SYSTEM

Instrumentation - The telemetry instrumentation operated satisfactorily except for the cycle counter on the slave camera. This counter intermittently failed to advance at the cycle requiring the "tens" digit to advance. This condition was observed on several engineering passes and appeared to be more prevalent after long inactive periods. Similar failures occurred on the two previous missions, 1019 and 1021. Improved cycle counters are being installed on J-25 and up.

Commands - Normal response was obtained from all stored and real time commands throughout both missions. Difficulty was encountered in the receipt of S-band commands after the vehicle became unstable. This was due to vehicle attitude and not the command system.

E. CLOCK PERFORMANCE

Good correlation was obtained between the clock and [REDACTED] system time. Table 3-2 contains the clock/system time correlation.

F. PRESSURE MAKE-UP SYSTEM PERFORMANCE

The PMU supply pressure decay history is plotted on Figure 3-1 as a function of accumulated camera operate time. The gas consumption rate was approximately 12.5 psi/min. during the first 40 orbits of flight.

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J-2C CLCK/SYSTEM TIME CORRELATION
MISSION 102C-1 AND 1020-2

ORDER FIT 1

SYS TIME I/P	CL TIME I/P	COMP SYS TM	DELTA ST	REV	STA
60023.058	77883.51090	60023.06380	-0.00487	0	1
39989.467	144249.92990	39989.46790	0.00005	9	1
79186.582	183447.05790	79186.58710	-0.00413	16	1
39811.258	230471.74090	39811.25950	-0.00056	25	1
79019.317	269679.80890	79019.31870	-0.00074	32	1
39634.097	316694.59490	39634.09410	0.00383	41	1
78825.148	355885.65690	78825.14730	0.00164	48	1
39423.947	402884.46890	39423.94870	-0.00079	57	1
73309.930	436770.45290	73309.92510	0.00582	63	1
33615.817	483476.35090	33615.81260	0.00533	72	1
72882.594	522743.13890	72882.59180	0.00315	79	1
33544.997	32934.63590	33544.99020	0.00774	88	1
72687.902	72077.55990	72687.90540	-0.00246	95	1
33257.067	119046.73390	33257.06890	-0.00090	104	1
72451.257	158240.94490	72451.27100	-0.01309	111	1

A0=-0.1786042962D 05 A1= 0.999999775157D 00

SIGMA=0.00481 NO. POINTS= 15

RATIO OF CLCK TIME TO SYS TIME= 0.100000022484D 01

ORDER FIT 2

SYS TIME I/P	CL TIME I/P	COMP SYS TM	DELTA ST	REV	STA
60023.058	77883.51090	60023.05670	0.00228	0	1
39989.467	144249.92990	39989.46490	0.00306	9	1
79186.582	183447.05790	79186.58610	-0.00311	16	1
39811.258	230471.74090	39811.26040	-0.00148	25	1
79019.317	269679.80890	79019.32090	-0.00290	32	1
39634.097	316694.59490	39634.09730	0.00063	41	1
78825.148	355885.65690	78825.15100	-0.00204	48	1
39423.947	402884.46890	39423.95260	-0.00462	57	1
73309.930	436770.45290	73309.92870	0.00221	63	1
33615.817	483476.35090	33615.81550	0.00240	72	1
72882.594	522743.13890	72882.59380	0.00119	79	1
33544.997	32934.63590	33544.99060	0.00737	88	1
72687.902	72077.55990	72687.90410	-0.00112	95	1
33257.067	119046.73390	33257.06500	0.00293	104	1
72451.257	158240.94490	72451.26480	-0.00680	111	1

A0=-0.1786044287D 05 A1= 0.999999862140D 00

A2=-0.110728097C6040-12

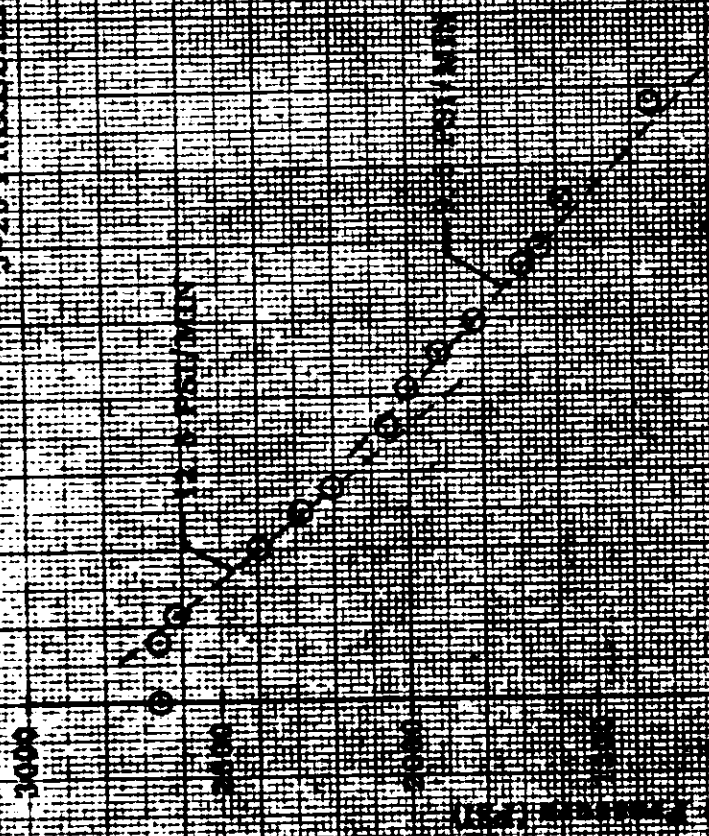
SIGMA=0.00338 NO. POINTS= 15

TABLE 3-2

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J-20 PRESSURE MATCH-UP SYSTEM



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During the rest of mission the average consumption rate was 9.5 psi/min. The consumption rate for the PMU system during the TASC test was 6.4 psi/min.

G. THERMAL ENVIRONMENT

The temperature data obtained on [REDACTED] TLM acquisitions are summarized on Table 3-3. Predicted versus actual flight temperatures are compared in Figures 3-2 to 3-4.

The average instrument temperature for the slave unit was cooler than predicted throughout the flight but was within tolerance, $70 \pm 30^{\circ}\text{F}$.

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TABLE 3-3

J-20 TEMPERATURE SUMMARY

<u>SENSOR</u>		<u>ORBITS ACQUIRED</u>												
<u>Fairing ("A")</u>														
<u>Barrel #1 ("B")</u>		0	9	16	25	32	41	48	57	63	72	79	88	A 95
1	*OBH	14	76	14	69	14	72	14	76	17	76	11	63	B 104 41
2	OBH	2	9	-1	2	-1	5	-1	9	2	9	-1	9	75
3	OBH	0	19	-4	13	-4	16	-7	19	-7	48	-7	19	71
4	OBH	46	61	42	55	43	55	39	55	39	52	36	55	43
5	OBH	61	71	55	61	52	61	45	55	45	52	39	52	34
6	OBH	39	104	36	93	36	90	36	87	36	78	30	62	--
<u>Barrel #2</u>														
1		161	54	70	48	60	41	60	38	54	32	51	28	48
2		105	47	122	44	113	37	108	34	105	34	97	28	85
3		218	50	116	53	113	50	113	50	116	50	113	47	105
4		233	48	51	48	51	44	54	48	57	48	117	48	57
5		222	42	64	42	58	39	58	39	61	42	117	39	61
<u>Conic Adapter</u>														
1		167	44	63	44	57	37	50	37	47	34	41	31	37
<u>Clock</u>														
1		107	77	75	75	75	75	73	73	73	71	71	71	69
2		107	73	71	73	71	71	71	71	69	69	71	67	65
<u>Thrust Cone "A" to "B" SRV</u>														
1	*OBH	37	34	31	32	30	31	29	31	31	39	32	28	71
2	84	60	52	51	48	50	47	48	45	47	42	46	42	71
<u>Stellar/Index "A" to "B"</u>														
1		91	55	55	49	52	49	49	49	49	46	46	42	46
2		82	54	48	51	45	45	46	45	45	45	39	45	42
<u>Recovery Battery "B" SRV</u>														
1		81	76	72	71	69	68	68	67	66	67	65	66	62
<u>Master Cassette "A" SRV</u>														
2		122	57	52	50	50	47	48	46	47	49	46	49	46

*OBH Out of Bounds High

NOTE: Only thrust cone data corrected for self-heating.

TABLE 3-3

J-20 TEMPERATURE SUMMARY

<u>SENSOR</u>		<u>ORBITS ACQUIRED</u>												
<u>Master Camera</u>	<u>0</u>	<u>2</u>	<u>16</u>	<u>25</u>	<u>32</u>	<u>41</u>	<u>48</u>	<u>57</u>	<u>63</u>	<u>72</u>	<u>79</u>	<u>88</u>	<u>A</u> <u>95</u>	<u>B</u> <u>104</u>
3	72	62	58	58	55	56	54	59	53	55	52	53	50	73
4	76	68	63	64	60	62	60	61	56	59	53	58	53	74
5	75	72	68	70	66	67	65	67	62	64	59	63	59	76
6	73	78	74	75	72	71	69	66	68	69	65	66	62	76
7	70	71	68	68	66	65	65	64	64	65	61	61	59	74
8	75	72	67	69	65	65	64	65	61	65	59	62	58	75
9	73	72	69	69	67	66	65	65	62	66	60	62	58	74
10	73	66	68	64	66	62	66	61	64	61	61	59	60	71
11*	103	71	71	68	68	65	60	64	63	64	61	61	59	73
12	81	66	62	64	60	62	59	61	58	61	55	59	54	76
13	77	74	70	69	68	67	63	66	63	63	60	62	60	74
AVG		70	67	67	65	64	63	64	61	63	59	61	56	74
<u>Slave Camera</u>														
3	68	67	65	64	62	60	60	59	58	59	55	55	52	66
4	70	65	61	63	59	59	56	58	55	59	53	55	51	65
5	69	66	62	65	61	62	59	60	58	60	55	58	53	69
6	60	56	53	55	53	51	52	51	51	52	48	51	47	65
7	69	69	68	68	65	66	64	60	63	63	61	62	60	72
8	71	67	63	65	61	63	60	65	59	61	56	59	54	70
9	70	65	60	62	58	60	57	59	56	59	55	58	53	71
10	74	67	69	65	68	62	66	60	65	61	61	60	60	69
11*	100	63	60	62	60	60	62	60	57	61	56	58	55	70
12	76	69	65	67	63	64	61	63	60	61	56	59	54	68
13	70	62	60	60	58	58	58	58	55	55	53	55	53	67
AVG		65	63	63	61	61	59	59	58	59	55	57	54	68
<u>Supply Spool</u>														
1	67	58	60	56	55	54	55	54	54	55	53	54	51	61
2	72	64	61	62	61	60	58	60	57	58	55	57	54	65

* T/S 11 on the master and slave are not used for temp average

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

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3-20 PREDICTED AND ACTUAL TEMPERATURE

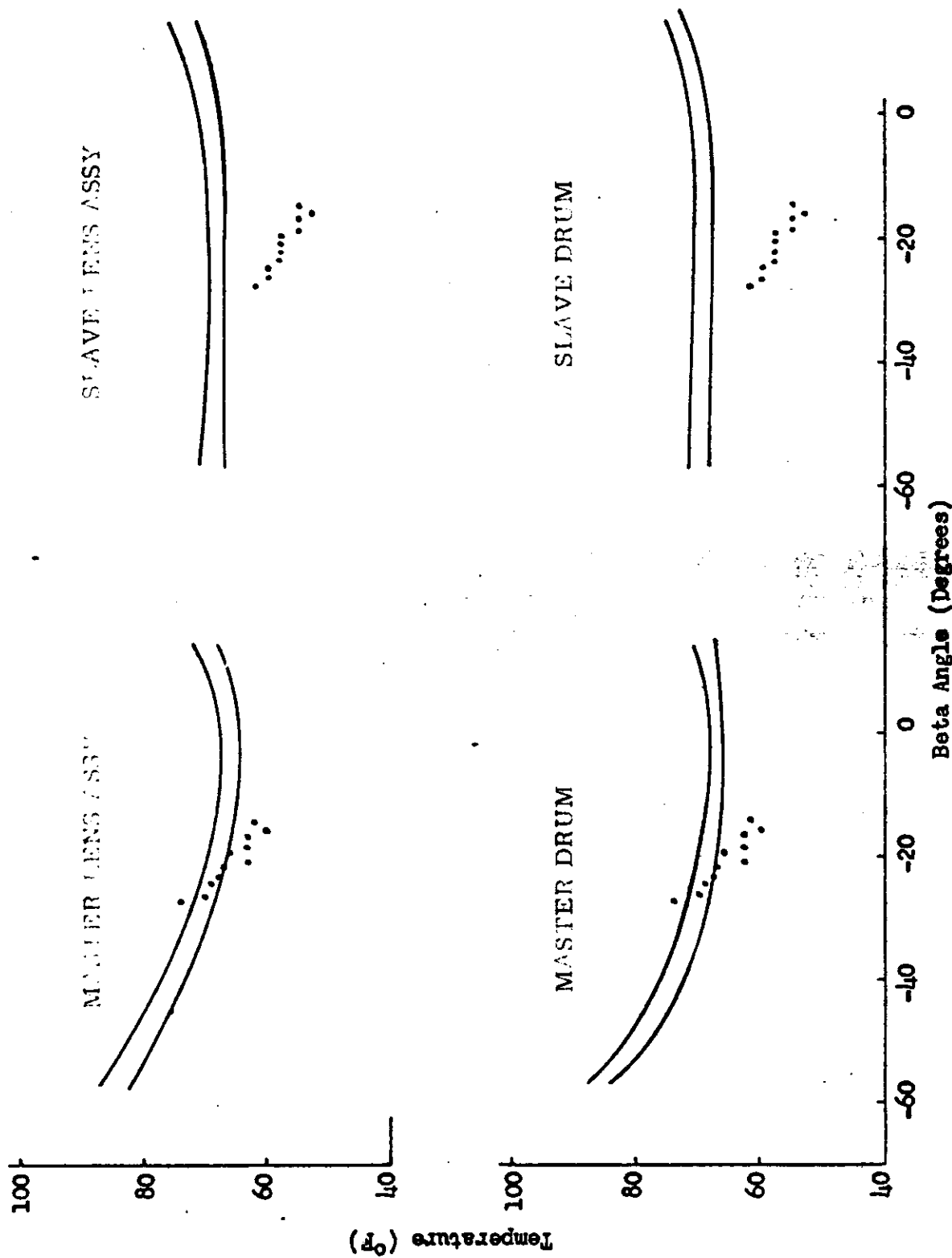


FIGURE 3-2

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1-0 PREDICTED AND ACTUAL TEMPERATURES

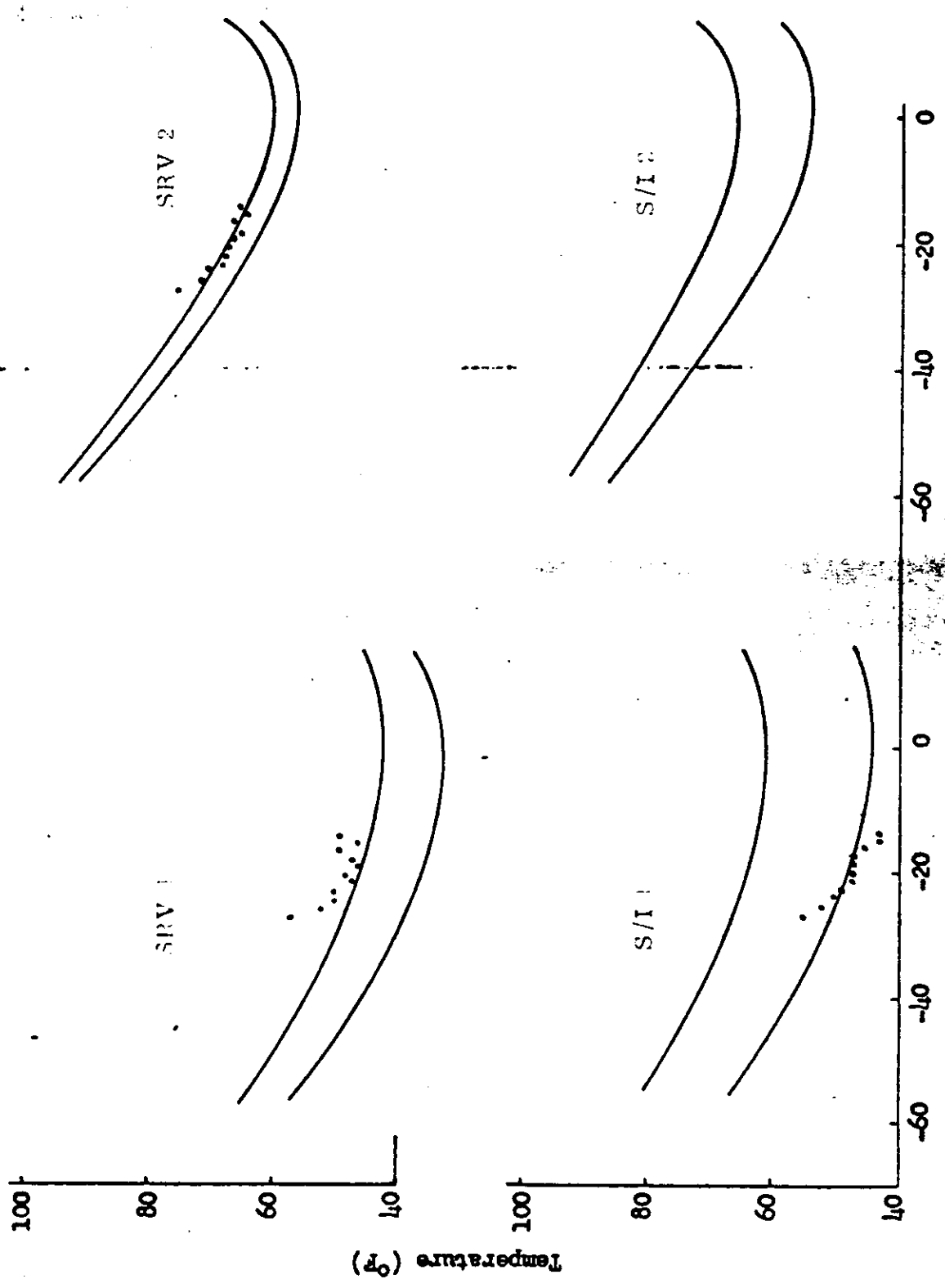


FIGURE 3-3

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COMPARISON OF PREDICTED AND ACTUAL TEMPERATURES

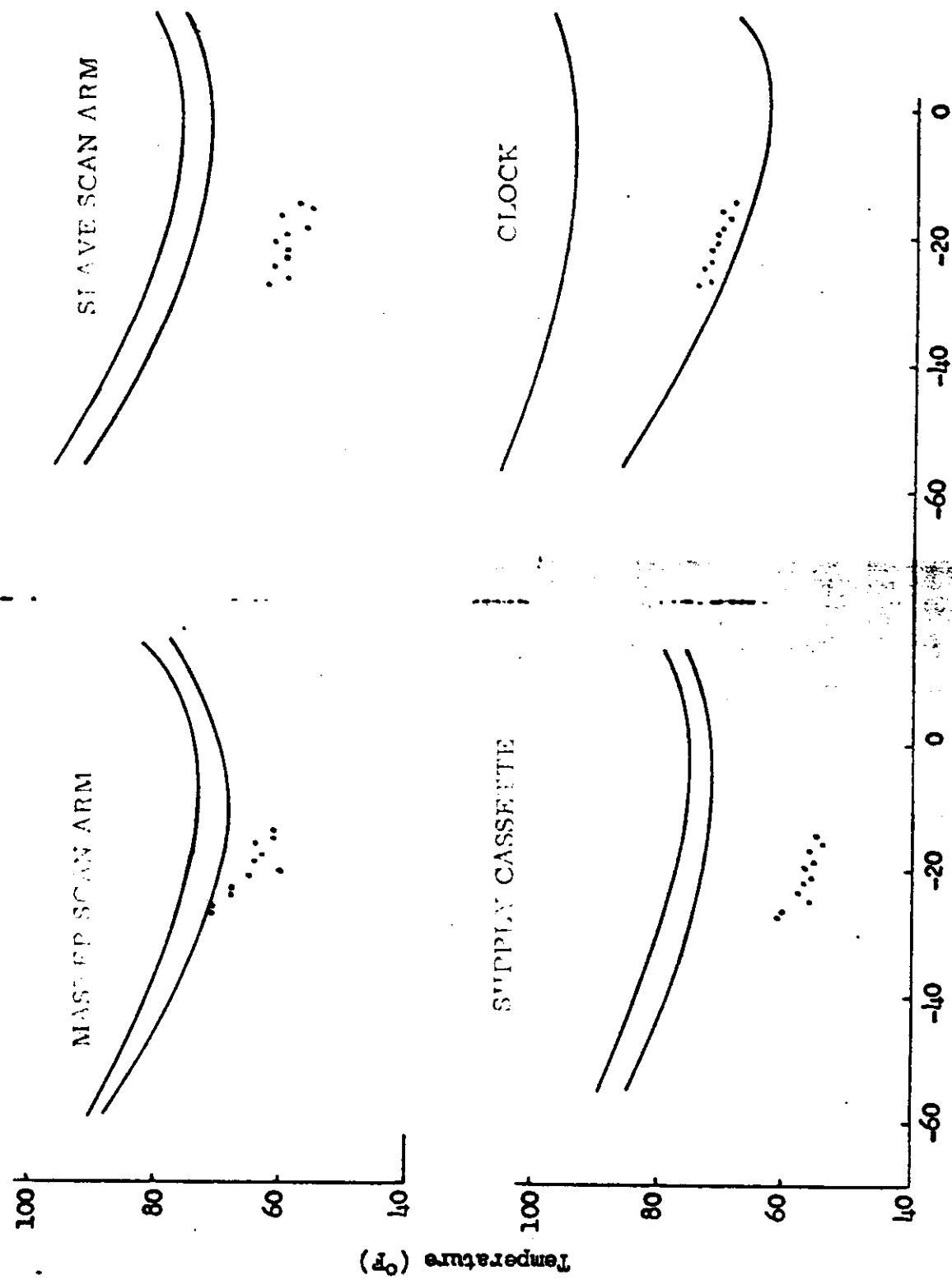


FIGURE 3-4

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SECTION 4

MISSION 1020-1 RECOVERY SYSTEM

SRV #672 was received at A/P on 10 June 1964. Receiving weight was 150.9 pounds. After modifications and incorporation of outstanding Engineering Orders, the unit was delivered to Systems Test for installation in the J-20 system.

The recovery system was shipped to VAFB on 15 March 1965.

The -1 SRV was successfully recovered on Orbit 97 on 15 June 1965. All functions were normal and the impact point was within tolerance. The re-entry sequence of events are listed on Table 4-1.

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MISSION 1020-1
RECOVERY SEQUENCE OF EVENTS

<u>Event</u>	<u>Delta Time (Seconds)</u>	
	<u>Actual</u>	<u>Nominal</u> <u>Events + ΔT</u>
* Arm	76.93	77.0 $\pm$ 1.0
* Transfer	2.0	2.0 $\pm$ 0.25
Electrical Disconnect	0.94	0.900 $\pm$ 0.430 - 0.400
Separation	--	---
** Spin	3.46	3.4 $\pm$ 0.30
Retro	7.55	7.55 $\pm$ 0.45
Despin	10.70	10.75 $\pm$ 0.59
T/C Separation	1.50	1.5 $\pm$ 0.15
V/M Close	180.58	180.0 $\pm$ 0.42
*** "G" Switch Open	482.76	478.7 $\pm$ 430.5
Parachute Cover Off	34.17	34.0 $\pm$ 1.5
Drogue Chute Deployed	0.68	0.63 $\pm$ 0.08
Main Chute Bag Separate	10.44	10.14 $\pm$ 0.48 - 0.40
Main Chute Deployed	0.51	0.52 $\pm$ 0.13
Main Chute Disreefed	4.70	4.46 $\pm$ 0.49 - 0.29

* From Separation

** From Electrical Disconnect

*** From Retro

Spin Rate: 63.0 RPM

Despin Rate: 9.6 RPM

Retro Velocities: 956.8 Ft/Sec.

TABLE 4-1

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SECTION 5

MISSION 1020-2 RECOVERY SYSTEM

SRV #673 was received at A/P on 30 July 1964. Receiving weight was 151.7 pounds. After modifications and incorporation of Engineering Orders the unit was delivered to Systems Test for installation in the J-20 system.

The recovery system was shipped to VAFB on 15 March 1965.

The -2 SRV was successfully air recovered on Orbit 113 on 16 June 1965. The secondary recovery system (lifeboat) was used since the vehicle guidance system was inoperative. Impact was approximately 200 miles down range from the predicted point. Table 5-1 lists the recovery event times.

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MISSION 1020-2
RECOVERY SEQUENCE OF EVENTS

<u>Event</u>	<u>Delta Time (Seconds)</u>	
	<u>Actual</u>	<u>Nominal</u> <u>Events + ΔT</u>
*Arm	77.52	77.0 $\pm$ 1.0
*Transfer	2.50	2.50
Electrical Disconnect	0.96	0.900 $\pm$ 0.430 - 0.400
Separation	- -	- - -
**Spin	3.30	3.4 $\pm$ 0.30
Retro	7.57	7.55 $\pm$ 0.45
Despin	10.67	10.75 $\pm$ 0.59
T/C Separation	1.51	1.5 $\pm$ 0.15
***"G" Switch Open	474.23	478.7 - 430.5
Parachute Cover Off	33.92	34.0 $\pm$ 1.5
Drogue Chute Deployed	0.67	0.63 $\pm$ 0.08
Main Chute Bag Separate	10.10	10.14 $\pm$ 0.48 - 0.40
Main Chute Deployed	0.49	0.52 $\pm$ 0.13
Main Chute Disreefed	4.22	4.46 $\pm$ 0.49 - 0.29

* From Separation

** From Electrical Disconnect

*** From Retro

Spin Rate: 72.0 RPM
Despin Rate: N/A
Retro Velocity: 1225.6 Ft/Sec.

TABLE 5-1

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SECTION 6

MASTER (FWD) PANORAMIC CAMERA

A. COMPONENT ASSIGNMENT

<u>Component</u>	<u>Serial Number</u>
Main Camera	136
Main Camera Lens	1132435
Supply Horizon Camera	146B
Supply Horizon Camera Lens	813518
Take-up Horizon Camera	173A
Take-up Horizon Camera Lens	814017
Supply Cassette	SC-28

B. CAMERA DATA AND FLIGHT SETTINGS

Main Camera:

Lens	24" f/3.5
Slit Width	0.250"
Filter Type	Wratten 25
Film Type	Eastman Type 3404

Supply (Port) Horizon Camera:

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

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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

A total of 2912 frames of photography were recovered from the 1020-1 mission; 2914 frames were predicted based on T/M data accumulation. Photographic definition was judged to be below the average J system capability based on the visual assessment of terrain and cultural detail present in duplicate positive material. Lower than average ground resolution is attributed to lower than average but acceptable dynamic lens resolution performance for both the forward and aft cameras of Mission 1020. The inability to resolve fine ground detail was further aggravated by excessive internal camera flare that was observed in photography from both the FWD and AFT cameras in the form of ghost cloud imagery and highlight exposure streaks across otherwise clear terrain. The net effect of highlight flare fog over terrain imagery was to reduce the apparent contrast of the photography with a corresponding loss in ground detail. Excessive internal camera flare light fog is attributed to the fact that the panoramic cameras 136 (FWD) and 137 (AFT) used in Mission 1020 did not have the anti-flare baffle installed in the scan arm of the panoramic cameras to absorb excess flare light as did two of the better flights; Mission 1017 and Mission 1021, AFT cameras only contained anti-flare baffles.

Excessive moisture in the air and heat wave effects at this time of year over target areas may also have a degrading effect on the quality of ground resolution observed in Mission 1020. Cloud cover for Mission 1020-1 was rated at 40% and 45% for Mission 1020-2. The percentage of cloud cover for Mission 1020 was greater than for recent missions. Soft spot imagery was absent in Mission 1020. Terrain contrast appeared noticeably higher in the duplicate positive (DP) generated from the Master camera original negative than the DP made from the Slave camera negative. The terrain minimum density appeared to be noticeably lower and the maximum density higher in the FWD camera DP compared to the AFT camera DP.

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Minor light fogging affected part of the second to last and fifth to last frames of most photographic operations that were followed by a non-operate period of one pass or more. Occasionally the first and sixth frame from camera start-up were affected by minor light fogging. Light tight improvements to the ablative shield and camera drum are expected to reduce the fog levels in these areas.

Horizon photography was consistently good. The timing track, blanked pulse, binary word, serial number, end of pass mark, binary word index mark, and horizon fiducials were present and appeared to operate normally throughout the mission. The binary word was bloomed, but readable on the material from both cameras. Small dendritic static marks were observed along the camera number edge at random intervals but did not degrade imagery. No corona discharge marking was observed.

Fog extending approximately 1/6 inches into the film from the binary word edge of the film occurred continuously from the start of the mission through pass D-8 frame 50. Edge fog stopped at the first Eastman Kodak splice. Edge fog was observed in the flight film sample removed prior to launch during the J system film loading operation at VAFB. Film edge fog is attributed to film handling operations at Eastman Kodak Co. during film manufacture or spooling operations prior to delivery of the film to Advanced Projects. Edge fog did not extend into the active terrain format area. Terrain imagery was not degraded by edge fogging.

Diagonal crimps were observed in flight film. Approximately 16 frames of terrain and horizon imagery were degraded by diagonal crimp marks that caused minor physical damage to film. Film crimping occurred approximately 6 to 8 times at random intervals. Associated with the crimp marked film were areas of plus and minus density believed to be strain sensitization and desensitization induced by the crimping action in the emulsion. Crimping is believed to have originated at Eastman Kodak Co. during some phase in film handling.

Examples of the crimping defect can be observed in photography acquired from pass D-053 frame 030 and 031.

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Minor banding was present in some frames where terrain exposure permitted detection of density bands. It does not appear that minor banding has a degrading effect on ground resolution.

B. Mission 1020-2

The unstable vehicle attitude that developed near the beginning of this mission rendered photography useless due to gross image smear beginning with pass 101-D and continuing for approximately 1019 frames to the end of the photographic mission. Approximately 2900 frames were predicted based on pre-launch data. Usable photography consisted of the residual material from the last pass (D-95) of Mission 1020-1 and passes D-98 and D-99 from Mission 1020-2.

Ground resolution observed in the usable photography acquired during Mission 1020-2 was comparable in quality to the photography obtained during Mission 1020-1. Light leak patterns, dendritic static, corona, banding and horizon imagery in the usable photography were comparable to Mission 1020-1. Data lamp imagery was comparable to Mission 1020-1.

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SECTION 7

SLAVE (AFT) PANORAMIC CAMERA

A. COMPONENT ASSIGNMENT

<u>Component</u>	<u>Serial Number</u>
Main Camera	137
Main Camera Lens	1142435
Supply Horizon Camera	144B
Supply Horizon Camera Lens	812278
Take-up Horizon Camera	142A
Take-up Horizon Camera Lens	812303
Supply Cassette	SC-28

B. CAMERA DATA AND FLIGHT SETTINGS

Main Camera:

Lens	24" f/3.5
Slit Width	0.175"
Filter Type	Wratten 21
Film Type	Eastman Type 3404

Supply (Starboard) Horizon Camera:

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

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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 produced 2910 frames of photography on "A" mission, 2913 frames were predicted based on T/M acquisitions.

Photographic definition was judged to be comparable to the master camera of Mission 1020-1. Lower than average ground resolution is attributed to several factors including lower than average but acceptable dynamic lens resolution, excessive highlight flare fog due to the absence of the scan arm anti-flare baffle assembly on the slave instrument, and possibly excessive moisture in the air and heat wave effects over target areas at this time of year. Cloud cover was greater during Mission 1020-1 compared to recent flights, Cloud cover during Mission 1020-1 was rated at 40%.

Minor light fogging affected part of the fourth from last frame of most passes. Horizon photography was consistently good.

Data lamp recording was acceptable with the exception of the timing track which did not record during the last two inches of each format. The blanked pulse, binary word, serial number, end of pass mark, binary word index mark, and horizon fiducials appeared to operate normally throughout the mission. Dendritic static and corona discharge marks were absent.

Small minus density dots were observed at several locations throughout the mission and occurred at more frequent intervals at the beginning of the mission. When they occurred minus density dots were spaced approximately 3.0 inches apart and located between one and two inches from the camera number edge of the film.

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Minor banding was present where terrain exposure permitted detection of density bands. It does not appear that minor banding has a degrading effect on ground resolution.

B. Mission 1020-2

Unstable vehicle attitude that developed between the end of pass D-99 and the start of pass D-101 rendered all panoramic photography unusable that was programmed through the camera subsequent to the start of the vehicle attitude problem. Photography was unusable because of gross image smear induced by vehicle instability that blurred terrain detail during exposure.

Usable photography consisted of the residual material from the last pass (D-95) of Mission 1020-1 and passes D-98 and D-99 from Mission 1020-2.

Ground resolution observed in the usable photography acquired during Mission 1020-2 was comparable in quality to the photography obtained during Mission 1020-1. All data lamp imagery was present and appeared to be operating normally. Light leak patterns, dendritic static, corona, banding and horizon imagery in the usable photography were comparable to Mission 1020-1.

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SECTION 8

PANORAMIC CAMERA EXPOSURE

The Master camera contained a 0.250 inch slit and a Wratten 25 filter. The Slave camera employed a 0.175 inch slit and a Wratten 21 filter. These conditions placed the nominal exposure between the intermediate and full level processing curves, as published by [REDACTED] for their type 3404 emulsion.

The frequency distributions of the solar elevations and azimuths encountered during the photographic operations are shown in Figures 8-1 and 8-2.

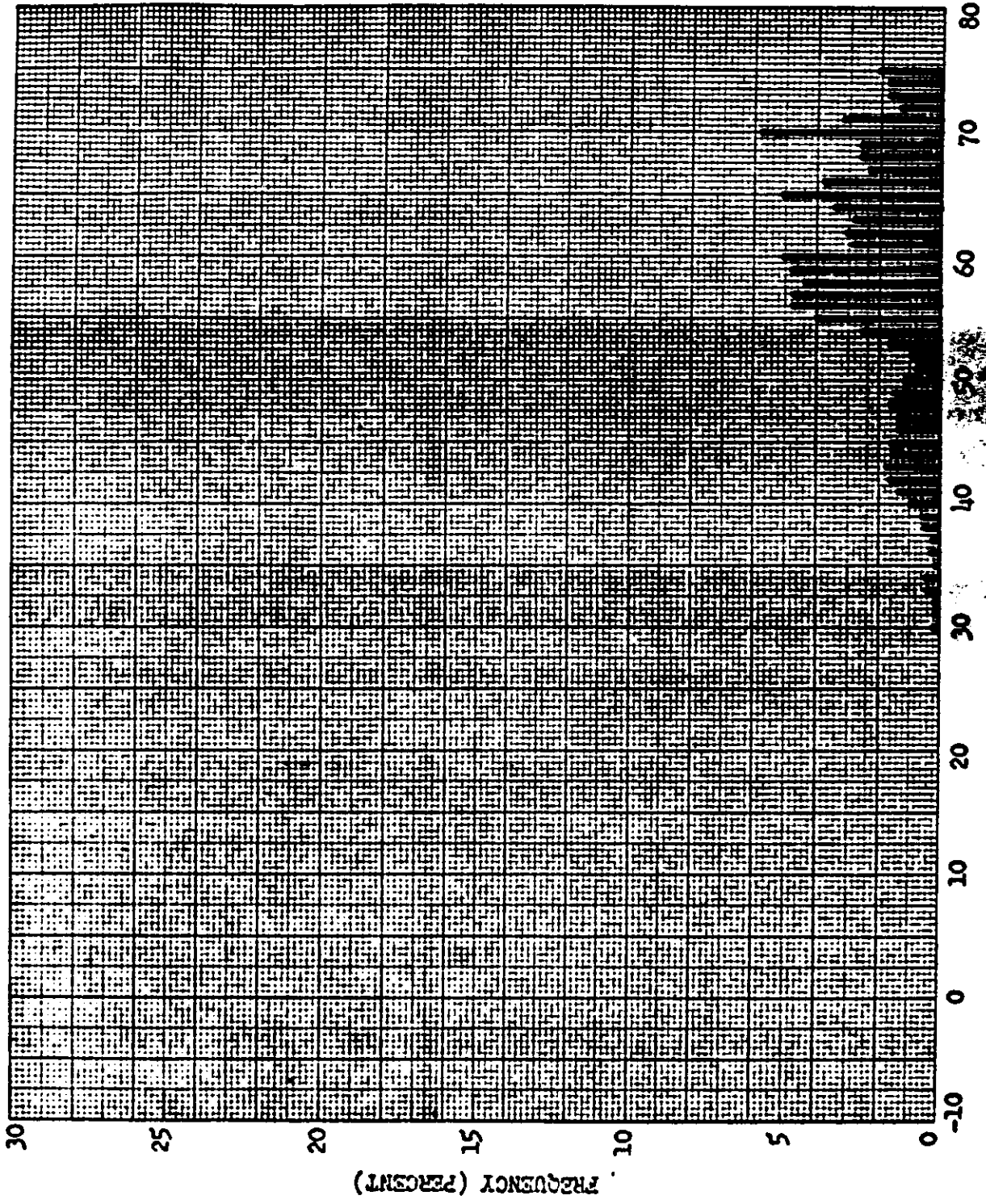
The nominal exposure times are shown as a function of latitude for passes D-48 and D-96 in Figures 8-3 thru 8-7. The predicted level of processing for the original negative is based on the in-flight performance estimate and is tabulated below with the processing levels reported by [REDACTED]

<u>Mission</u>	<u>Camera</u>		<u>Primary</u>	<u>Intermediate</u>	<u>Full</u>
1020-1	FWD	Predicted	0	19	81
		Reported	13	48	39
1020-1	AFT	Predicted	0	64	36
		Reported	15	56	29

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SOLAR ELEVATION FREQUENCY DISTRIBUTION



Mission No: 1020-1

Payload No: J-20

Camera No: 136

Launch Date: 6/9/65

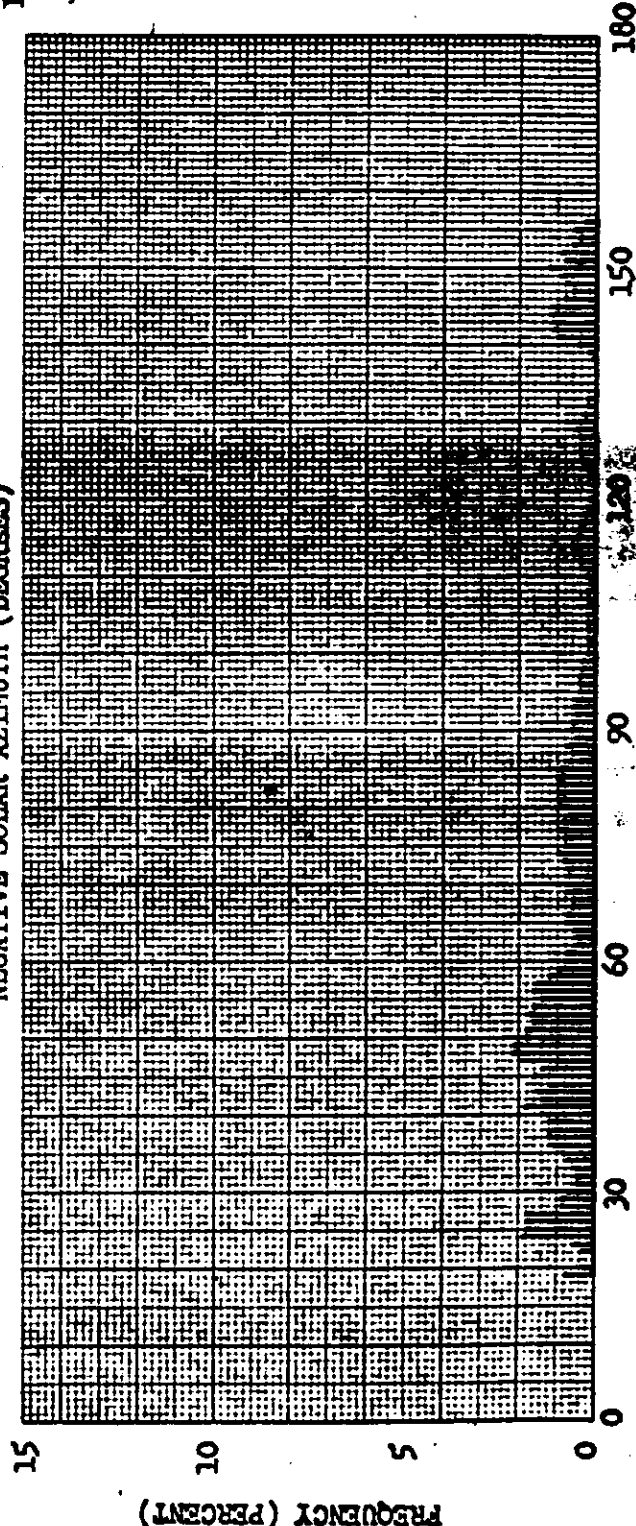
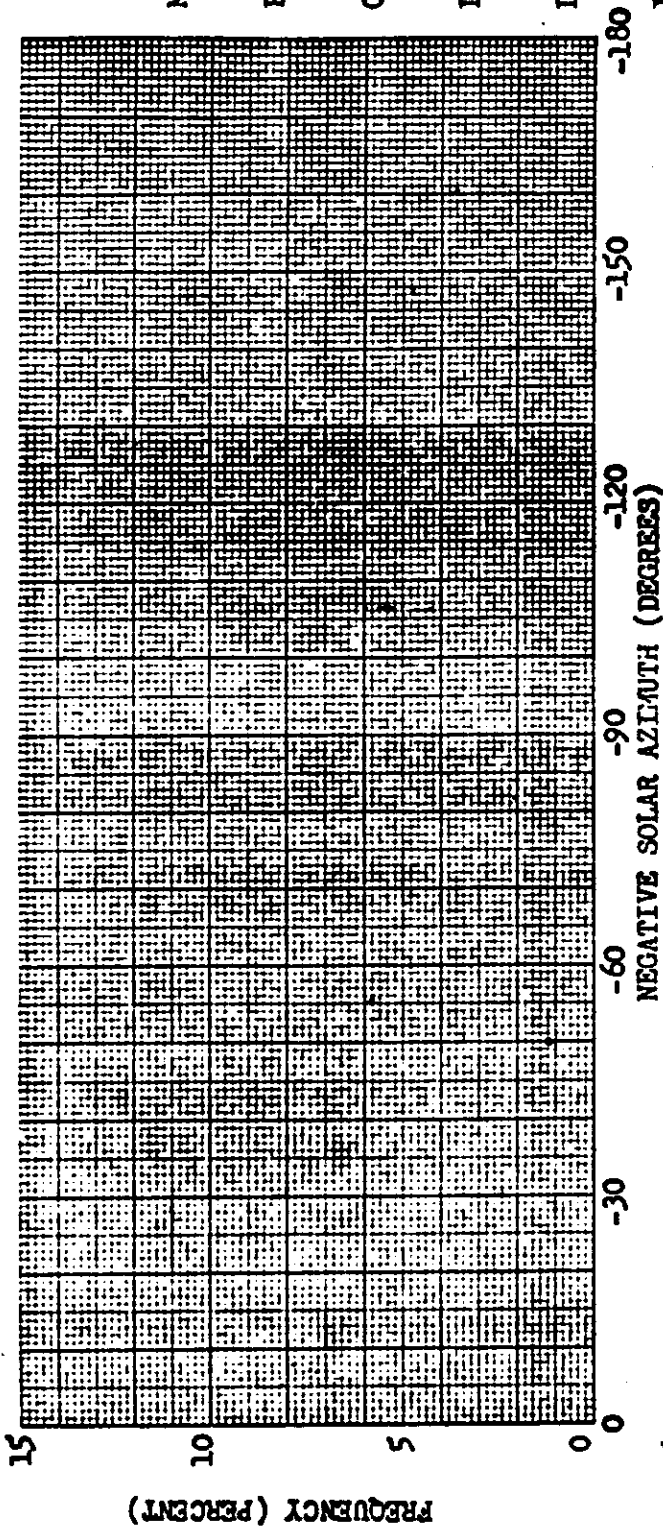
Launch Time: 2156 Z

Inclination: 75°

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FIGURE 1

SOLAR AZIMUTH FREQUENCY DISTRIBUTION



Mission No: 1020-1

Payload No: J-20

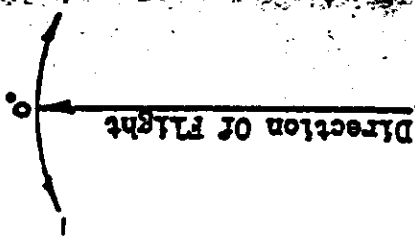
Camera No: 136

Launch Date: 6/7/65

Launch Time: 2158 Z

Inclination: 75°

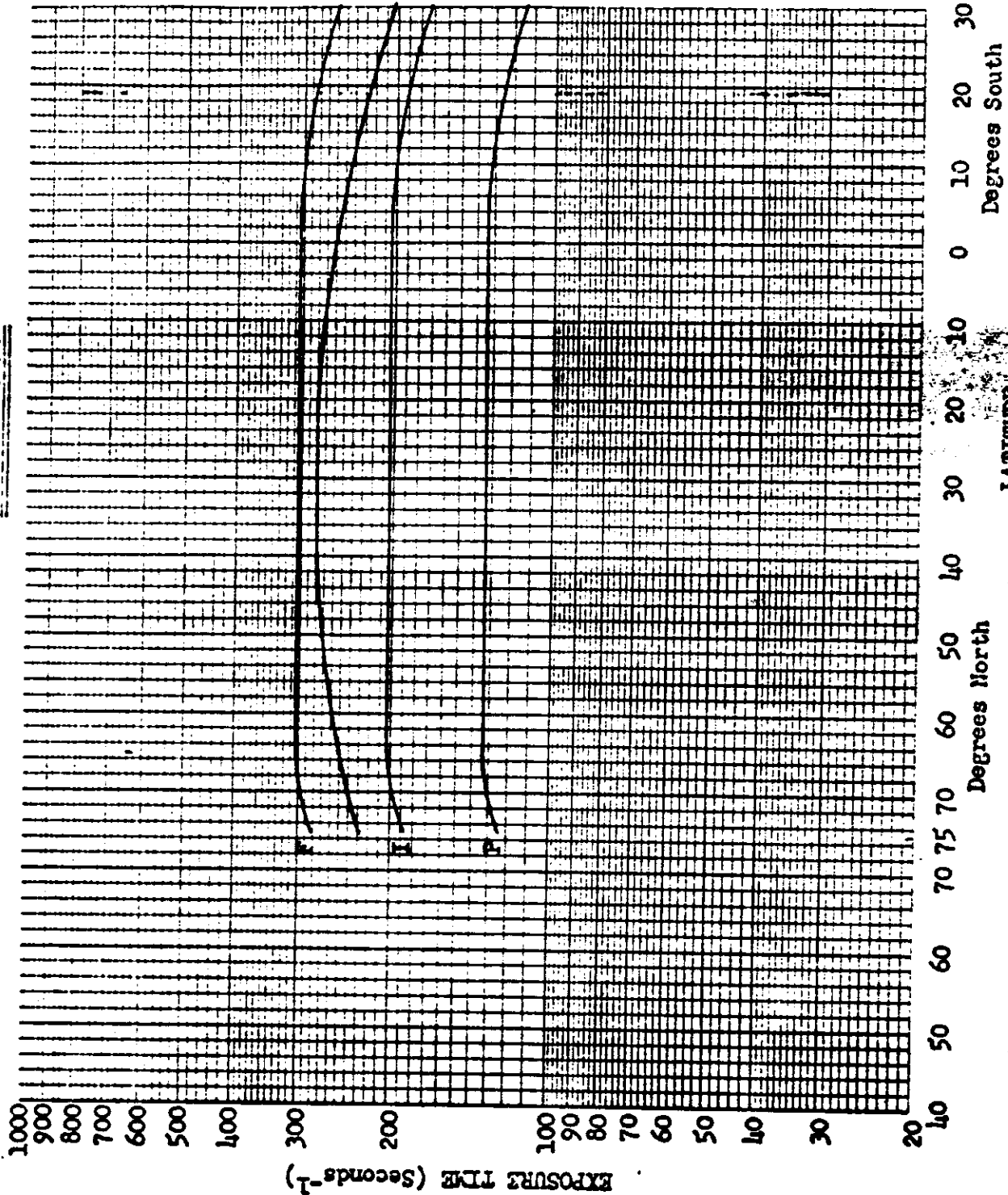
SIGN NOTATION



TOP SECRET

POSITIVE SOLAR AZIMUTH (DEGREES)

EXPOSURE POINTS



Mission No: 1020

Payload No: J-20

Camera No: 136

Pass No: 48

Launch Date: 6/9/65

Launch Time: 2158 Z

Slit Width: .250

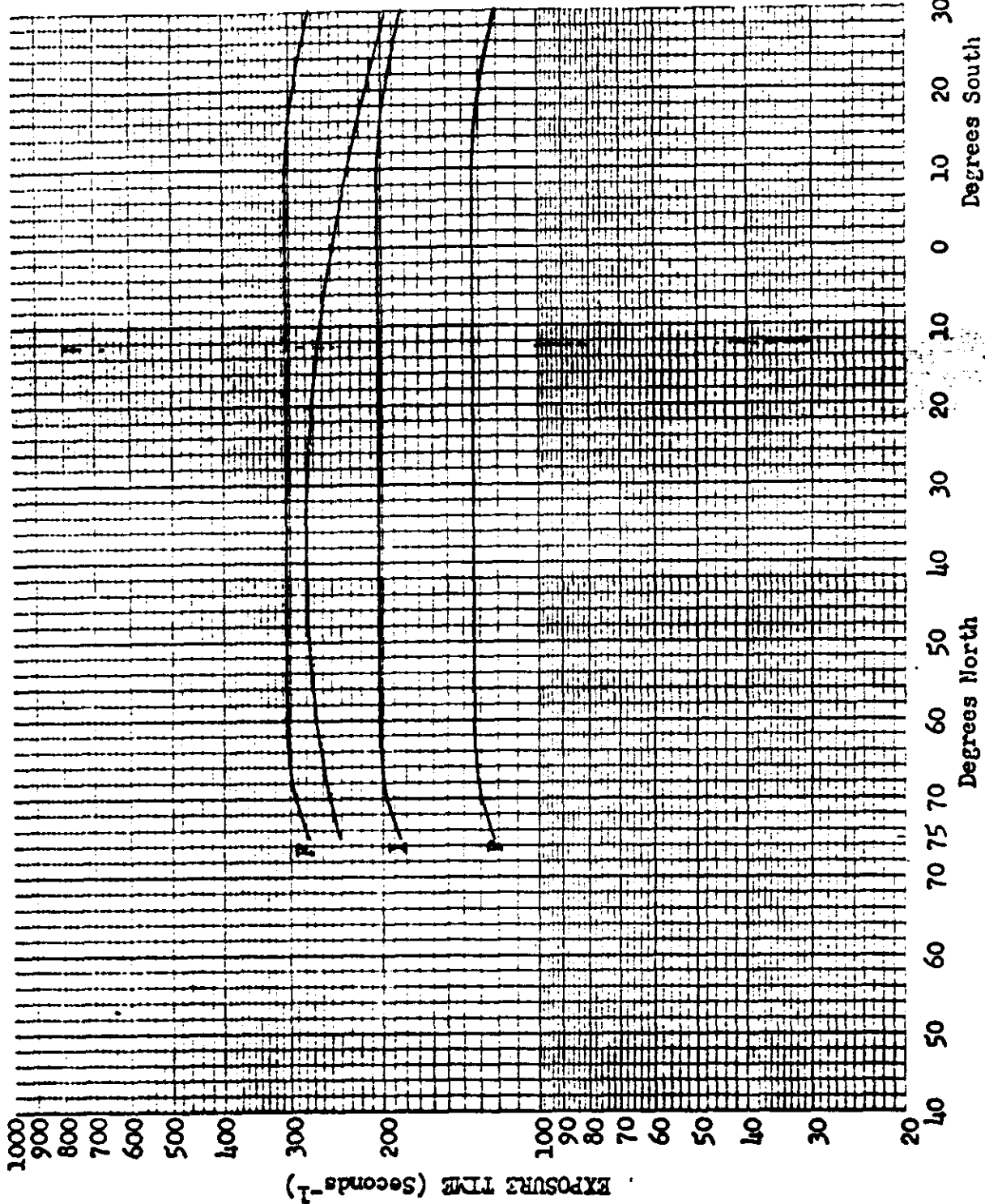
Filter Type: Wratten 25

Film Type: 3404

FIGURE 8-5

TOP SECRET

EXPOSURE POINTS



Mission No: 1020

Payload No: J-20

Camera No: 136

Pass No: 96

Launch Date: 6/9/65

Launch Time: 2158 Z

Slit Width: .250

Filter Type: Wratten 25

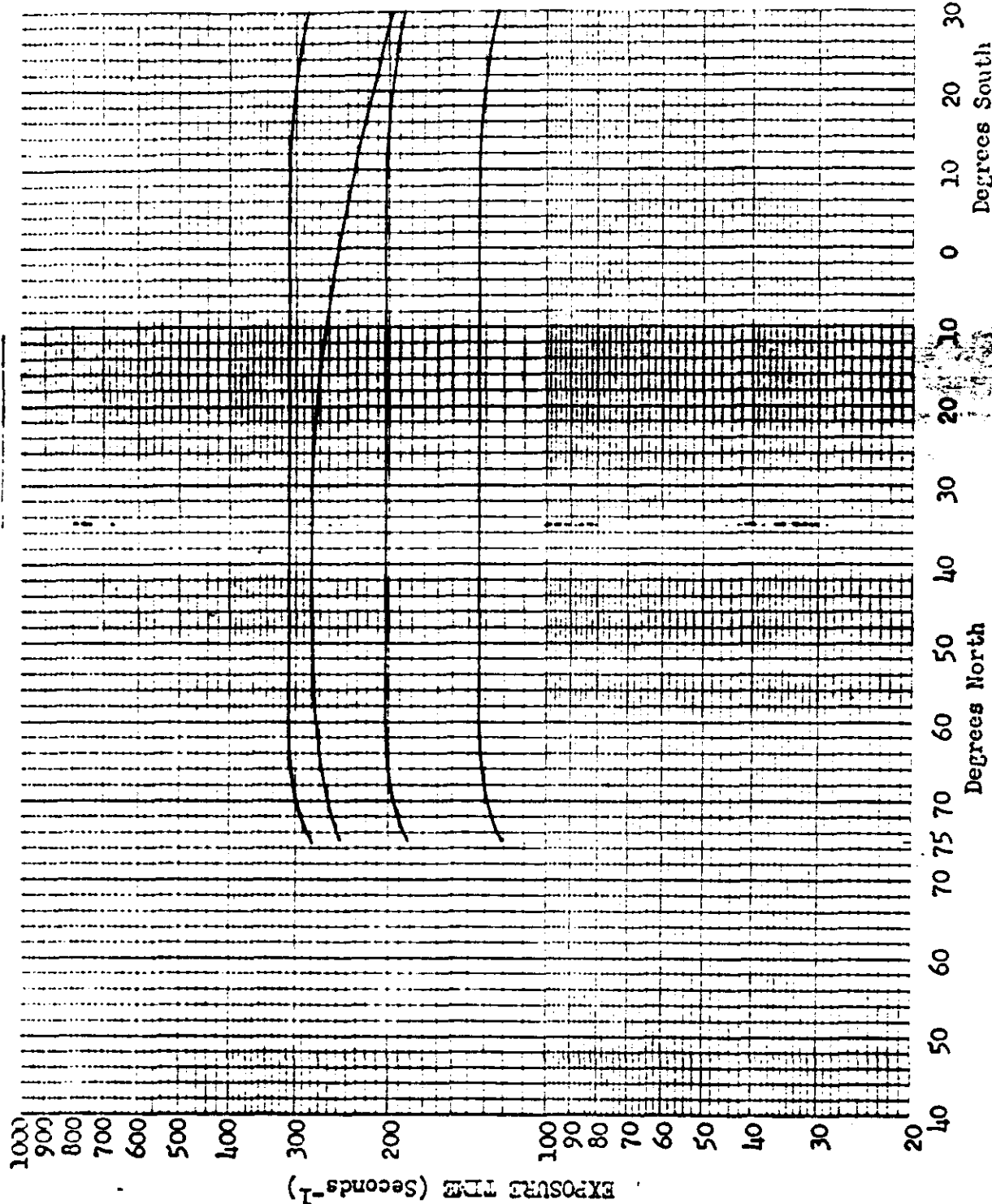
Film Type: 3404

LATITUDE

FIGURE B-4

TOP SECRET

EXPOSURE POINTS



Mission No: 1020

Payload No: J-20

Camera No: 136

Pass No: 111

Launch Date: 6/9/65

Launch Time: 2158 Z

Slit Width: .250

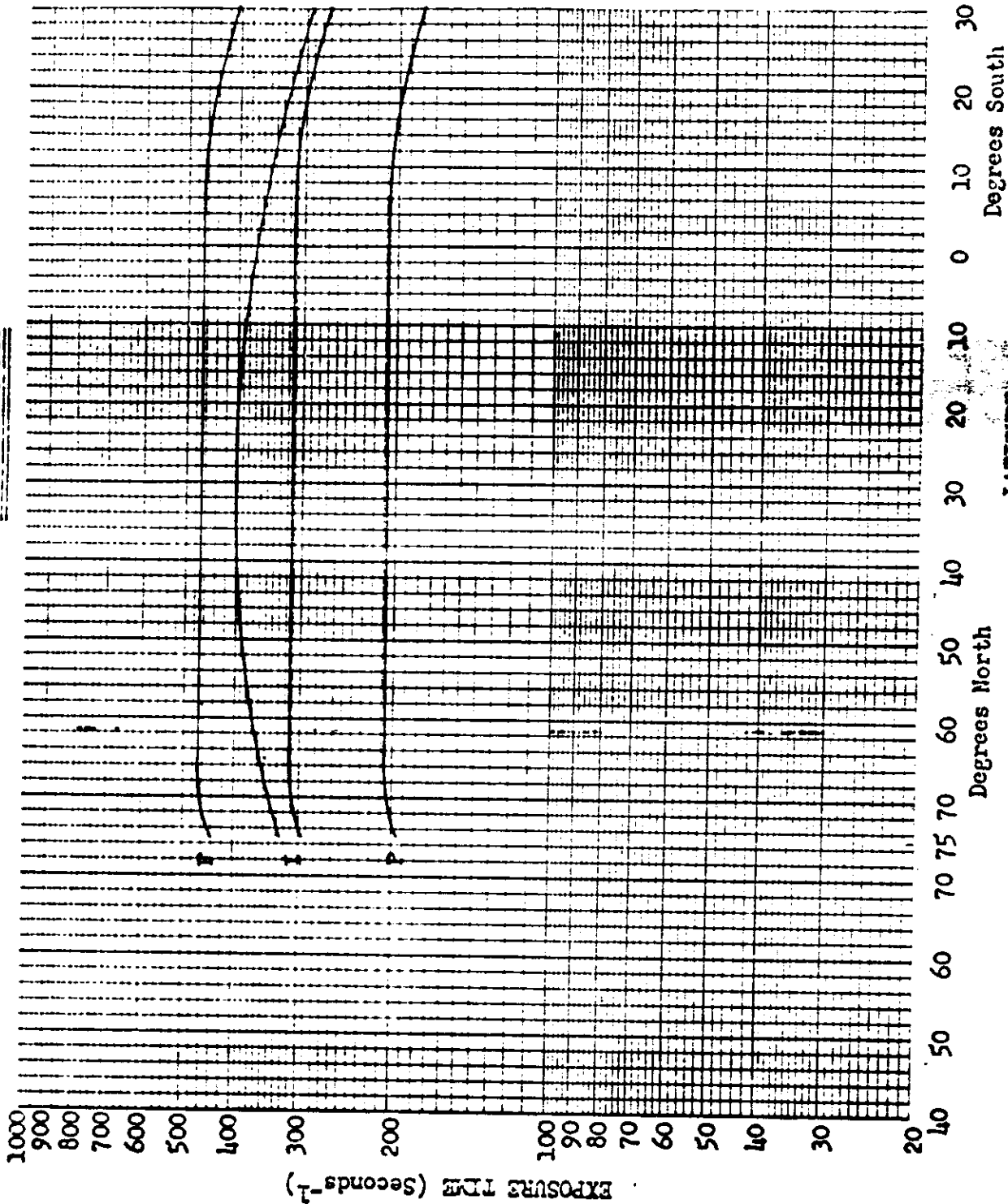
Filter Type: Wratten 25

Film Type: 3404

LATITUDE

FIGURE 8-5

EXPOSURE POINTS



LATITUDE

FIGURE 8-6

Mission No: 1020

Payload No: J-20

Camera No: L37

Pass No: L8

Launch Date: 6/9/65

Launch Time: 2158 z

Slit Width: .175

Filter Type: Wratten 21

Film Type: 3404

EXPOSURE POINTS

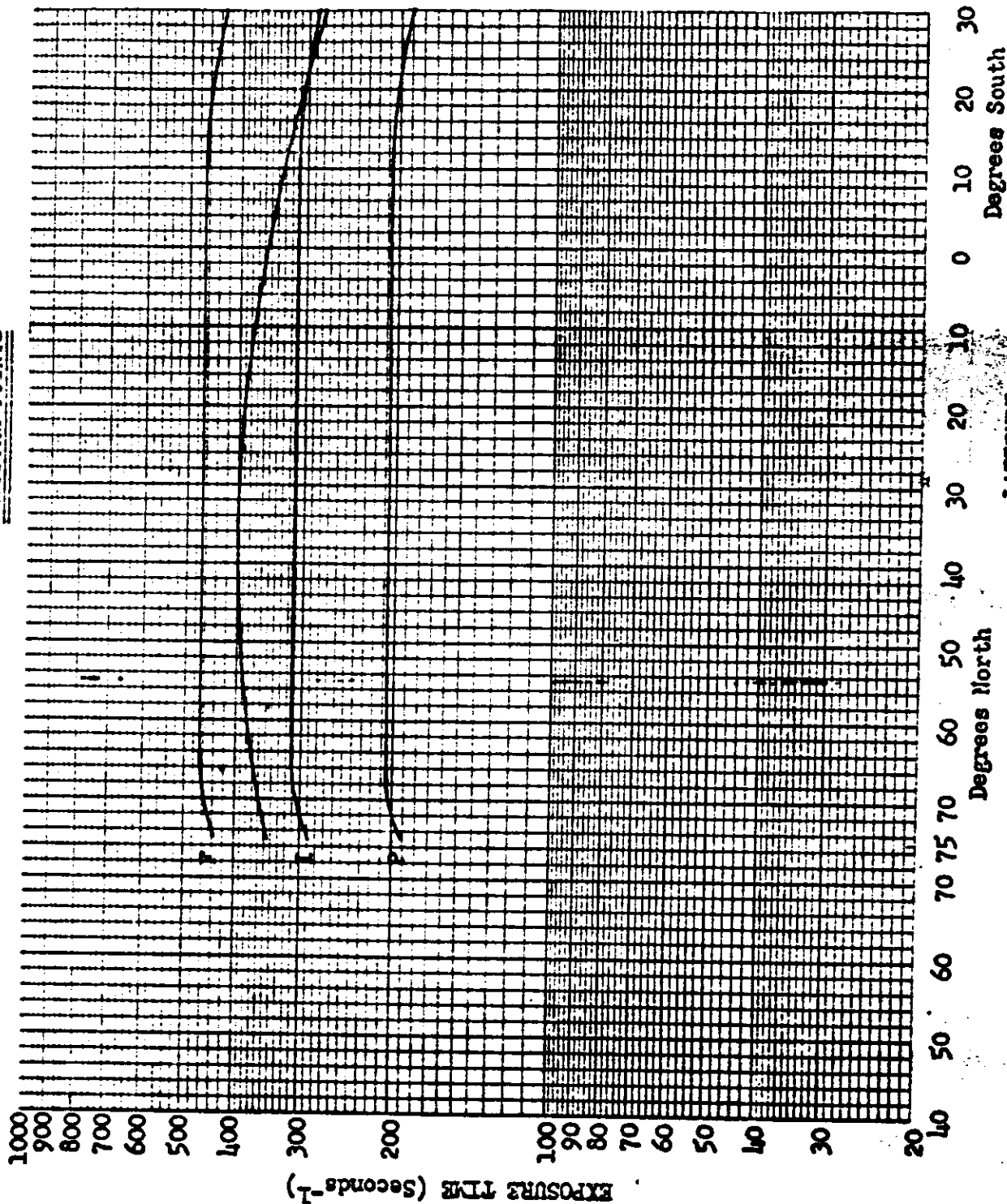


FIGURE 8-7

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Mission No: 1020

Payload No: J-20

Camera No: 137

Pass No: 96

Launch Date: 6/9/65

Launch Time: 2158 Z

Slit Width: .175

Filter Type: Wratten 21

Film Type: 3104

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SECTION 9

DIFFUSE DENSITY MEASUREMENTS

The diffuse density measurements made by AFSPPF 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.

<u>Mission</u>	<u>Camera</u>		<u>Primary</u>	<u>Intermediate</u>	<u>Full</u>
1020-1	FWD	Predicted	0	19	81
		Reported	13	48	39
		Computed	1	58	41
1020-1	AFT	Predicted	0	64	36
		Reported	15	56	29
		Computed	0	74	26

The tabulations of density frequency distributions for Mission 1020-1 are included in Appendix A, Tables A-1 and A-2. The graphical presentation of the density distribution are computer plotted in Appendix A, Figures A-1 through A-24.

A summary of the processing and exposure analysis is shown in Table 9-1. The terrain D-MIN criteria (range) for correct exposure and processing is 0.40 to 0.90 density units.

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SECTION 10

PERFORMANCE MEASUREMENTS

The photography acquired by the FWD panoramic camera (Pass D-84, frame 78) during Mission 1020-1 received an MIP rating of 80. A summary is tabulated below of the average visual RES values and MTF/AIM resolution values measured by AFSPPF and the MTF/AIM resolution values made by [REDACTED]

The slit used by both organizations was 1 x 80 microns.

<u>Mission</u>	<u>Camera</u>	<u>Visual RES</u>	<u>AFSPPF</u>	[REDACTED]
1020-1	FWD	88	72	78
1020-1	AFT	89	82	94

The details of the measurement and computing techniques, targets measured and target locations are fully reported in the evaluation report published by AFSPPF and are not normally included in this report.

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SECTION 11

OBSERVED DATA

Domestic photographic operations were conducted on 5 engineering passes of Mission 1020. Because of cloud cover 3 of these (D16, D30, D95) were unsuitable for evaluation of system performance capability.

Pass D63 was free of clouds and detectable haze but contained no resolution targets and limited culture. A few mining complexes, one near Grants, New Mexico, were examined. 3 - 4 foot catwalks on settling tanks could be clearly seen. Individual autos on a highway were detected.

Pass D79 over Arizona was also cloud free. Photography of the Phelps-Dodge Mining complex at Morenci was not quite as crisp as previous coverage. At Fort Huachuca, the high contrast legs of the fixed target were resolved to 12.5 feet, both along track and cross track.

A short distance to the north of the fixed target a mobile medium contrast target was displayed. Both of these targets appeared in the same frame, fore and aft. Only the largest elements could be resolved on the medium contrast target representing ground resolution of 16 feet.

From the limited engineering material available from this mission, the fore and aft cameras performed about equally and the over-all system performance was not as good as the previous three missions.

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SECTION 12

MISSION 1020-1 STELLAR-INDEX CAMERA

A. COMPONENT ASSIGNMENT

<u>Component</u>	<u>Serial Number</u>
Camera	D 67
Index Reseau	85
Stellar Reseau	80

B. CAMERA DATA AND FLIGHT SETTINGS

Stellar Camera:

Lens	85mm f/1.8
Exposure Time	2 seconds
Filter Type	None
Film Type	Eastman Type 3401

Index Camera:

Lens	38mm f/4.5
Exposure Time	1/500 second
Filter Type	Wratten 21
Film Type	Eastman Type 3400

C. POST FLIGHT EVALUATION

Stellar Camera

The stellar camera operated throughout Mission 1020-1. All 58 feet of film supplied to the camera was transported into SRV #1. Stellar imagery was rated good with 35 to 40 star images present in all of the 412 stellar formats recovered. Approximately 25% of each stellar format

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was degraded by flare light from the extended baffle. Some stellar imagery was present in the light flared area of many formats. Actual flare fog was rated as being less than expected. Stellar fiducials and correlation lamp imagery were good. Stars were recorded through 7th magnitude but 8th magnitude stars were not identified. The mission objective is to record through 6th magnitude. Frames 1 thru 6 show the usual particle traces recorded in the format area. The last three feet of film contained numerous handling defects rated as more severe than usual. Slight edge static was present on the last three feet of film.

The film edge on the data lamp side was intermittently crimped. The last 9 feet of film contained numerous emulsion cracks. Stellar film was expended during pass D-88, master frame 45.

Index Camera

The Index camera produced 414 frames of photography. Overall quality and resolution were rated as exceptional and better than average.

Index film was expended during pass D-95, master frame #4. The Index camera operated throughout Mission 1020-1 without incident.

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SECTION 13

MISSION 1020-2 STELLAR-INDEX CAMERA

A. COMPONENT ASSIGNMENT

<u>Component</u>	<u>Serial Number</u>
Camera	D 62
Index Reseau	65
Stellar Reseau	65

B. CAMERA DATA AND FLIGHT SETTINGS

Stellar Camera:

Lens	85mm f/1.8
Exposure Time	2 seconds
Filter Type	None
Film Type	Eastman Type 3401

Index Camera:

Lens	39mm f/4.5
Exposure Time	1/500 second
Filter Type	Wratten 21
Film Type	Eastman Type 3400

C. POST FLIGHT EVALUATION

Stellar Camera

The Stellar camera operated throughout Mission 1020-2. The first 12 frames of stellar photography contained 35 to 40 stars with stellar imagery rated good. Thereafter all stellar photography was rendered unusable due to unstable vehicle attitude that developed which persisted until

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recovery was effected on pass D-113. No stellar imagery was observed in photography beginning with frame 13 and continuing to the end of the film recovered, 29 feet in all.

Index Camera

The Index camera operated throughout Mission 1020-2. The first 12 frames of index photography were good. Thereafter, index photography included terrain, horizon, sky and sun imagery in consecutive frames as a function of the unstable attitude of the satellite. Fifty-two feet of index film was recovered.

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SECTION 14

VEHICLE ATTITUDE

The vehicle attitude errors for Mission 1020-1 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 1020-1.

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

<u>Value</u>	<u>Mission 1020-1</u>	
	<u>90%</u>	<u>Range</u>
Pitch Error ($^{\circ}$)	0.46	-1.45 to + 0.80
Roll Error ($^{\circ}$)	0.35	-1.10 to + 0.60
Yaw Error ($^{\circ}$)	0.78	-1.15 to + 0.90
Pitch Rate ($^{\circ}$ /hr)	37.4	- 70 to + 80
Roll Rate ($^{\circ}$ /hr)	31.8	- 95 to + 65
Yaw Rate ($^{\circ}$ /hr)	26.7	- 76 to + 50

The performance of the attitude control system on 1020-1 is comparable to the control systems used on recent missions. The panoramic photography was not degraded by the attitude control system. Vehicle attitude became unstable during the beginning of the second mission after pass D-97 and prior to pass D-101. Uncontrolled vehicle yaw motion after guidance system failure was estimated at approximately 2400 degrees per minute; pitch rate at approximately 240 degrees per minute.

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

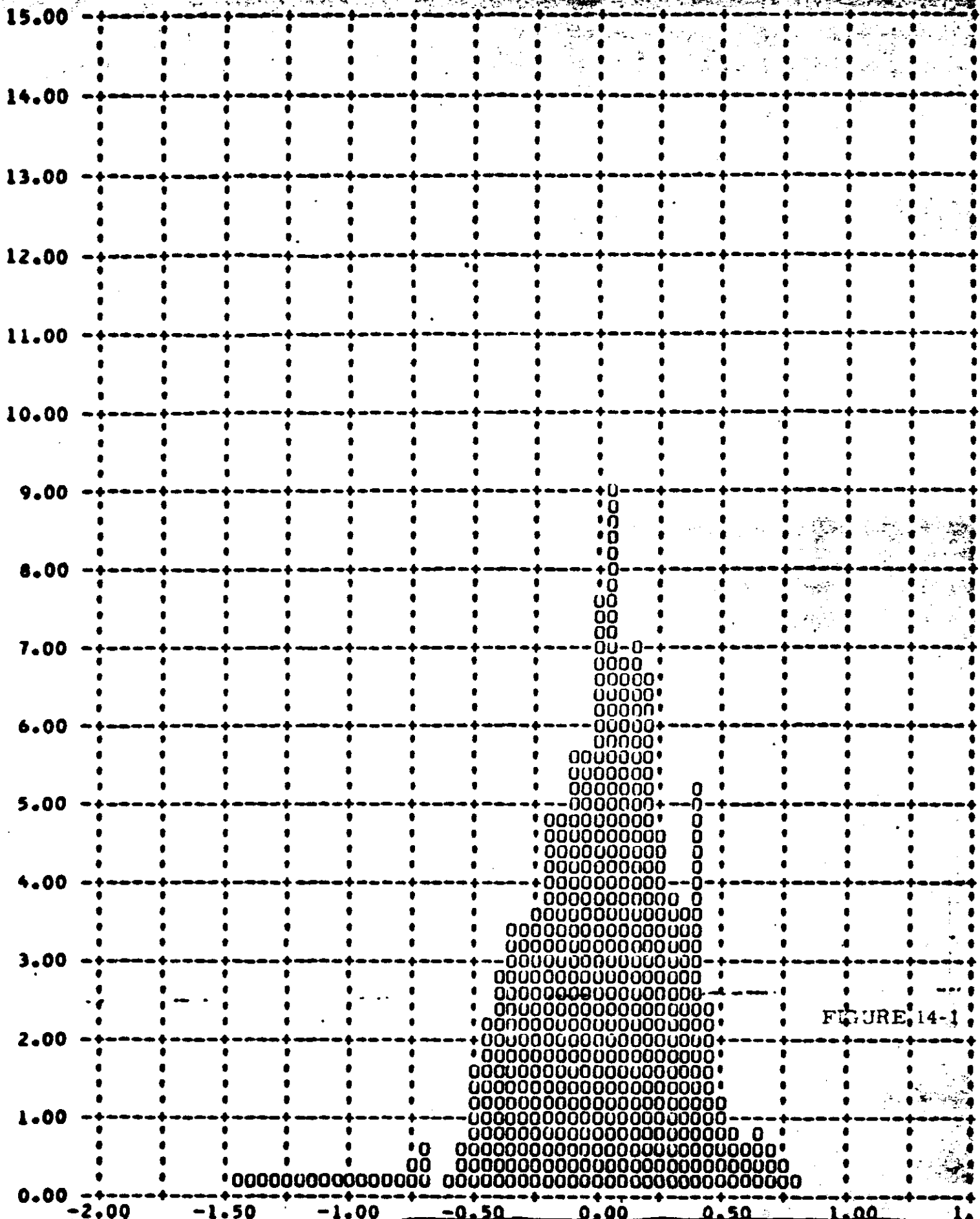


FIGURE 14-1

J-20 A BUCKET - FWD INSTR FRAMES 1-6 OF EACH OP OMITTED 90 PERCENT = (Y)
Y ROLL ANGLE ERROR - DEGREES (X) VERSUS FREQUENCY - PERCENT (Y)

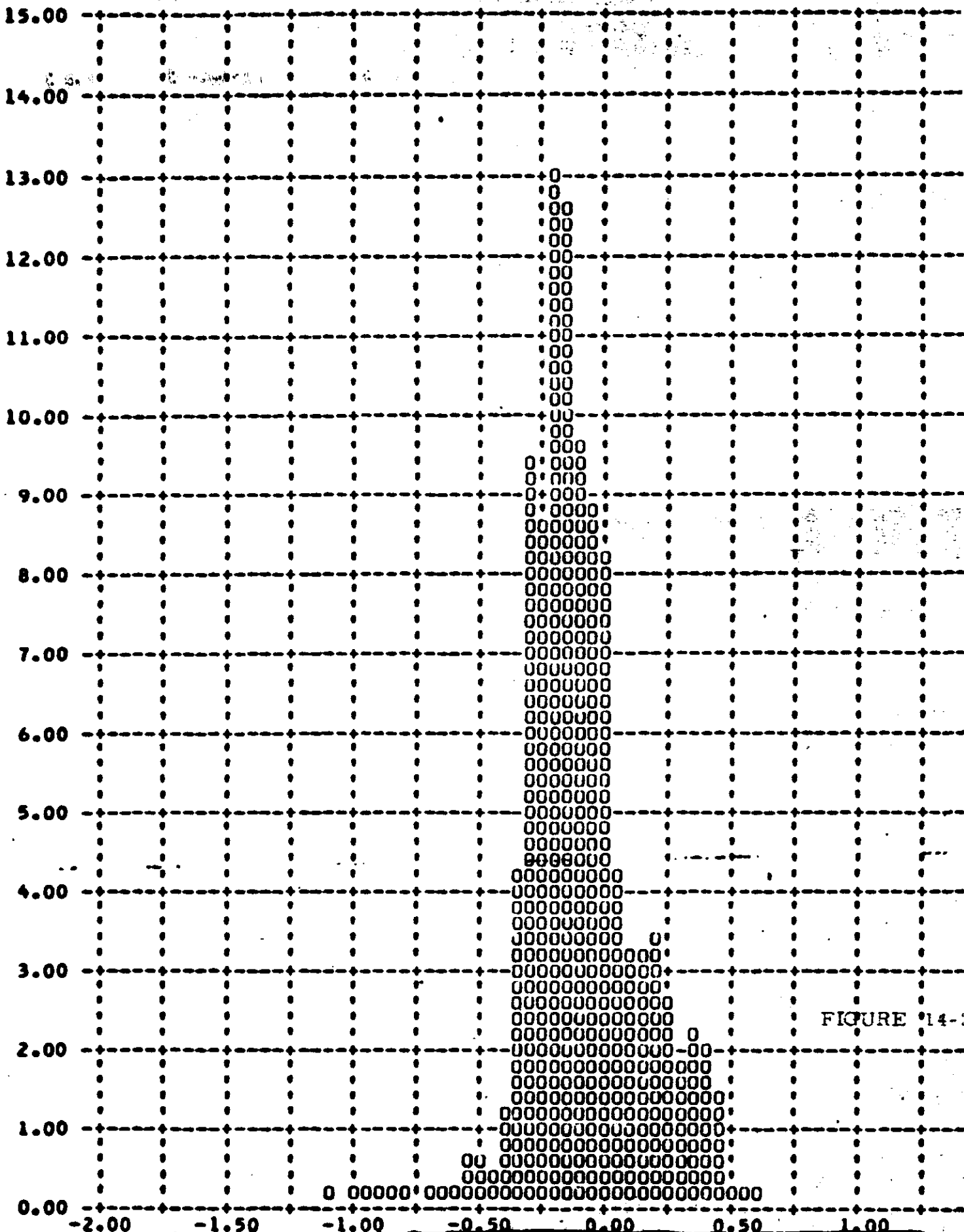


FIGURE 14-1

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

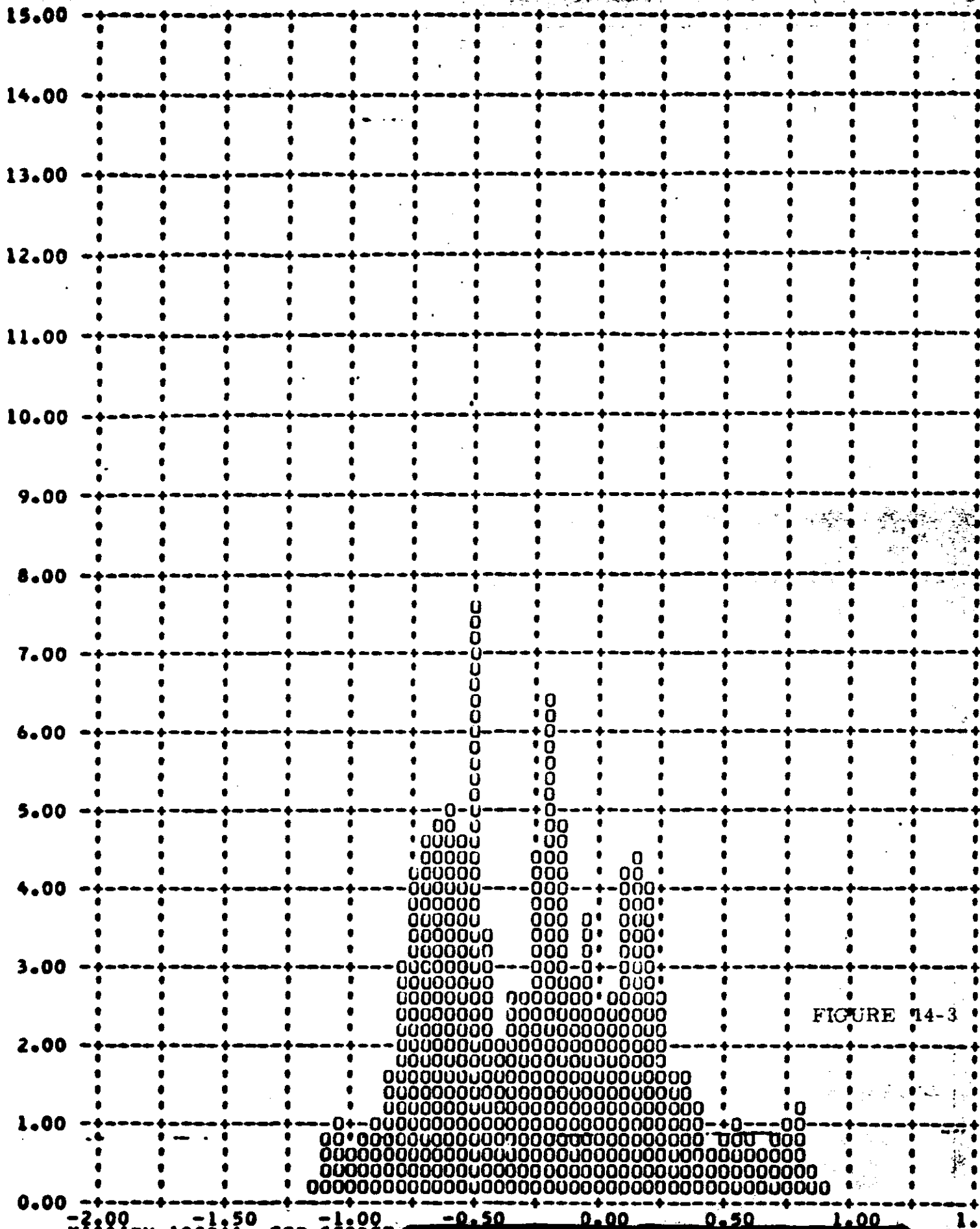


FIGURE 14-3

J-20 A BUCKET - FWD INSTR FRAMES 1-6 OF EACH OP OMITTED 90 PERCENT = 37.40
Y PITCH RATE ERROR - DEG/HOUR (X) VERSUS FREQUENCY - PERCENT (Y)

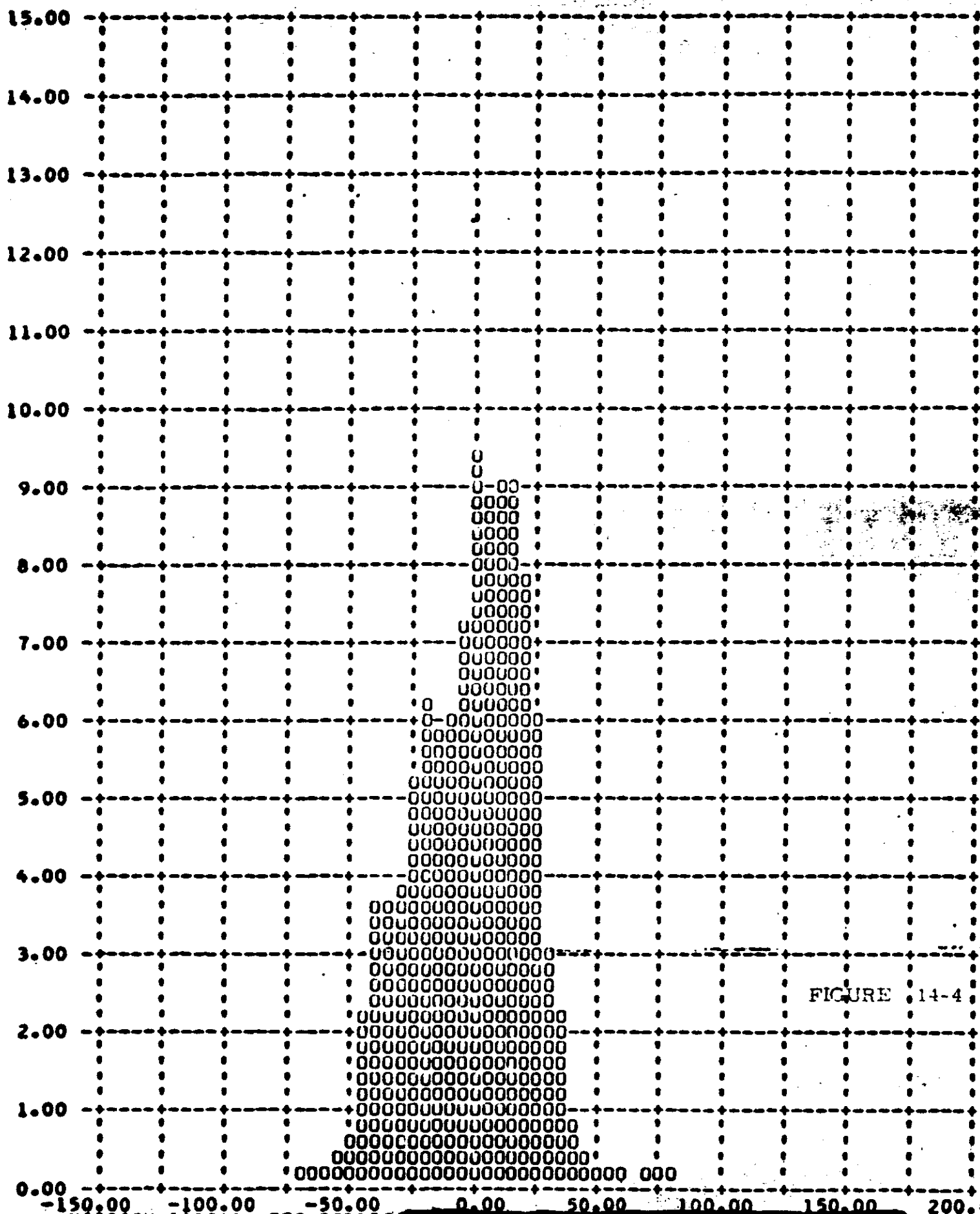


FIGURE 14-4

J-20 A BUCKET - FWD INSTR FRAMES 1-6 OF EACH OP OMITTED 90 PERCENT = 31.6

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

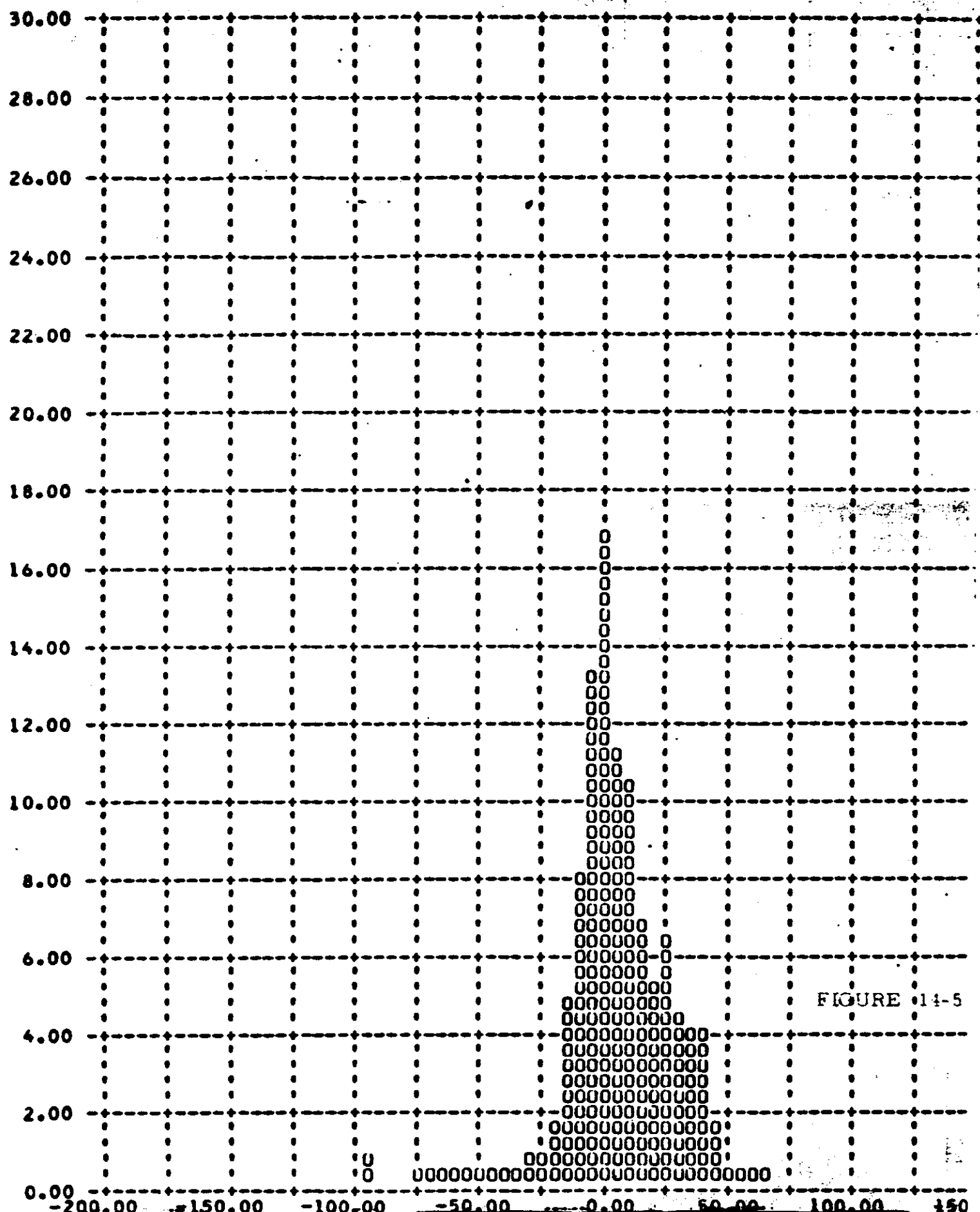


FIGURE 14-5

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

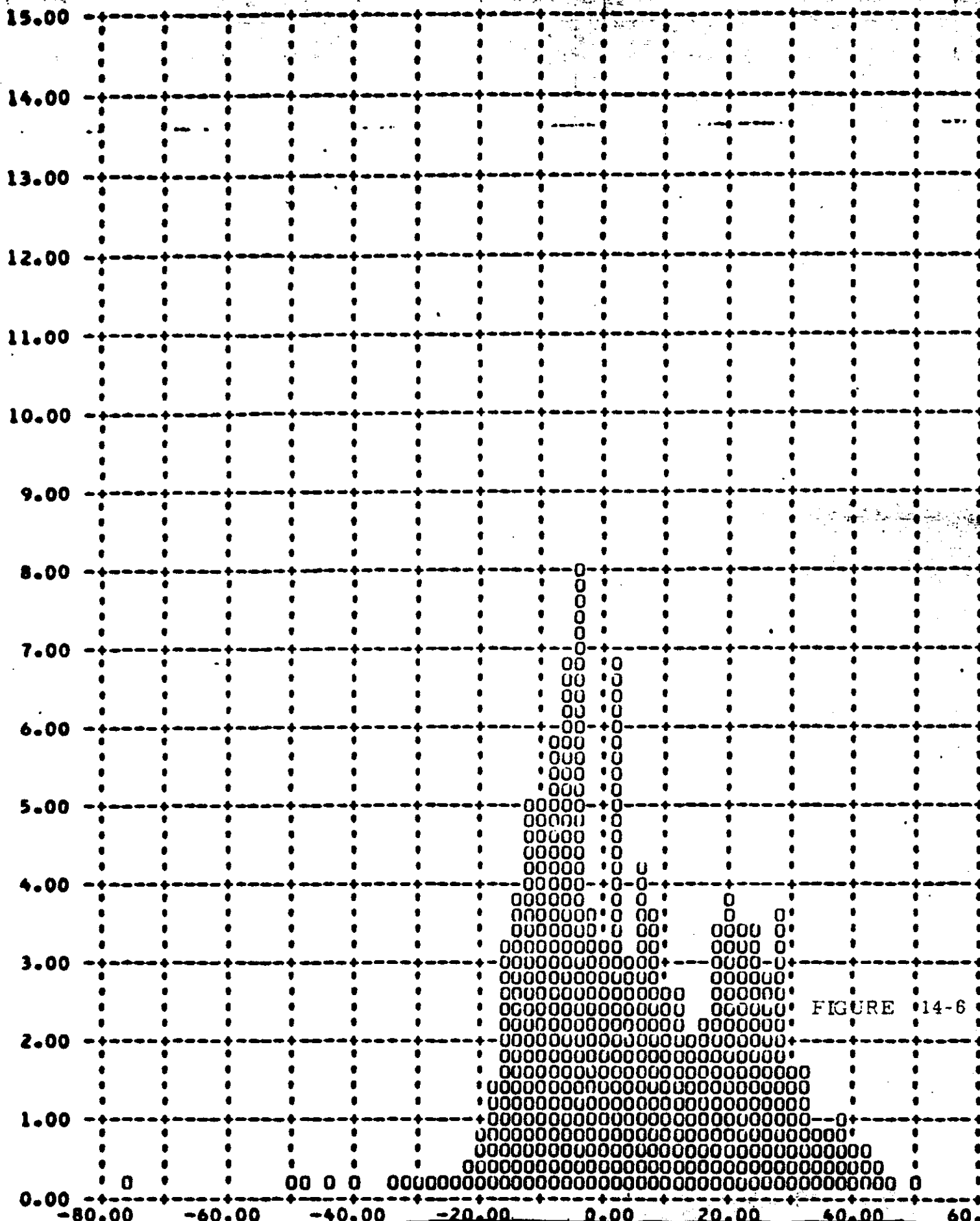


FIGURE 14-6

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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 outputs 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 error and resolution limits 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 and the total range of values during all operations that were computed.

<u>Value</u>		<u>Mission 1020-1</u>	
		<u>90%</u>	<u>Range</u>
V/h Ratio Error (%)	FWD	5.45	-11.0 to + 4.5
	AFT	5.33	-11.5 to + 4.5
Along Track			
Resolution Limit (ft.)	FWD	5.77	0.2 to 11.4
	AFT	4.16	0.2 to 9.4
Cross Track			
Resolution Limit (ft.)	FWD	8.43	0.2 to 10.8
	AFT	5.90	0.2 to 7.6

The calculations show that the panoramic cameras were not smear limited during 90% of Mission 1020-1.

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

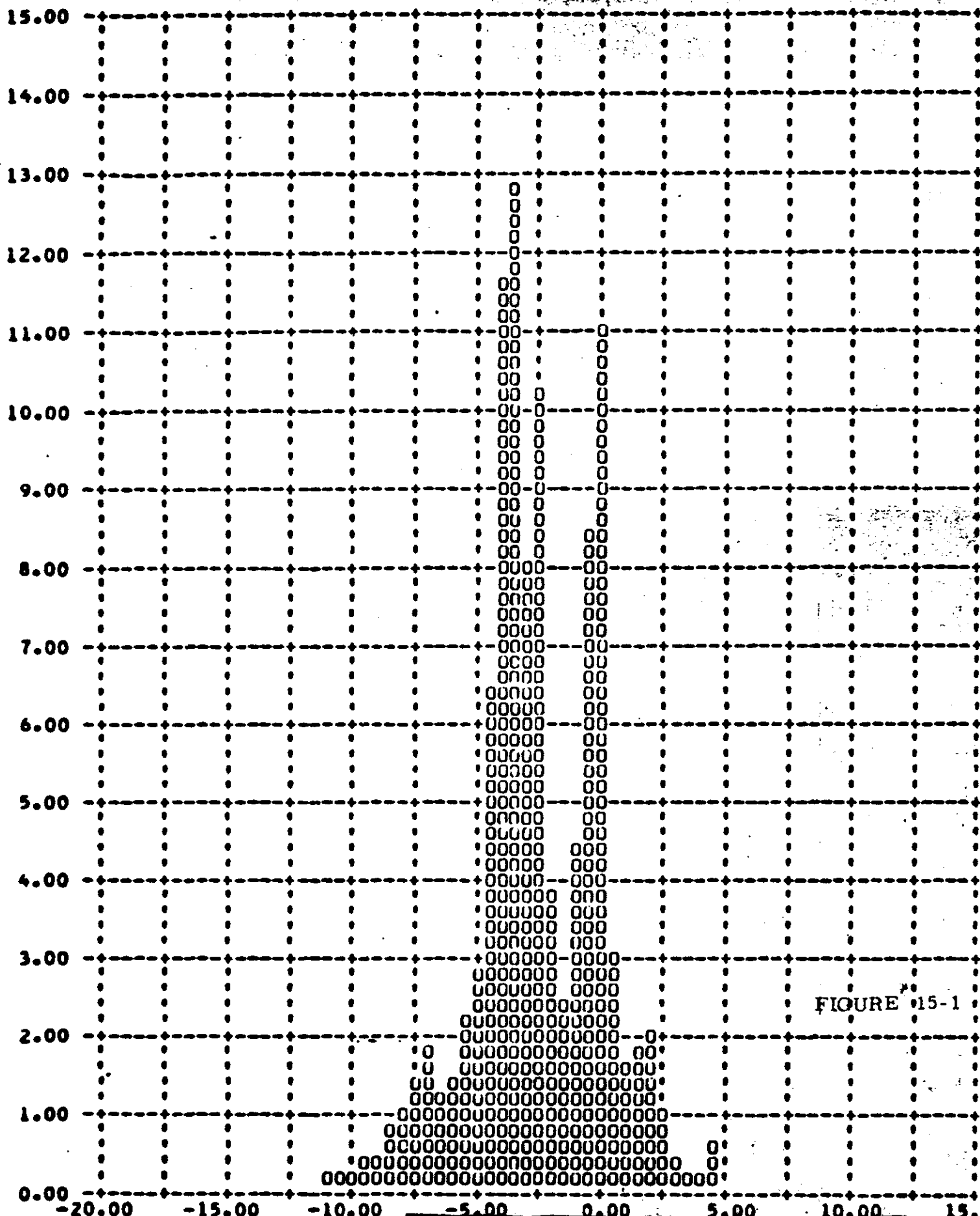


FIGURE 15-1

J-20 A BUCKET - FWD INSTR FRAMES 1-6 OF EACH OP OMITTED 90 PERCENT = 5.77

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

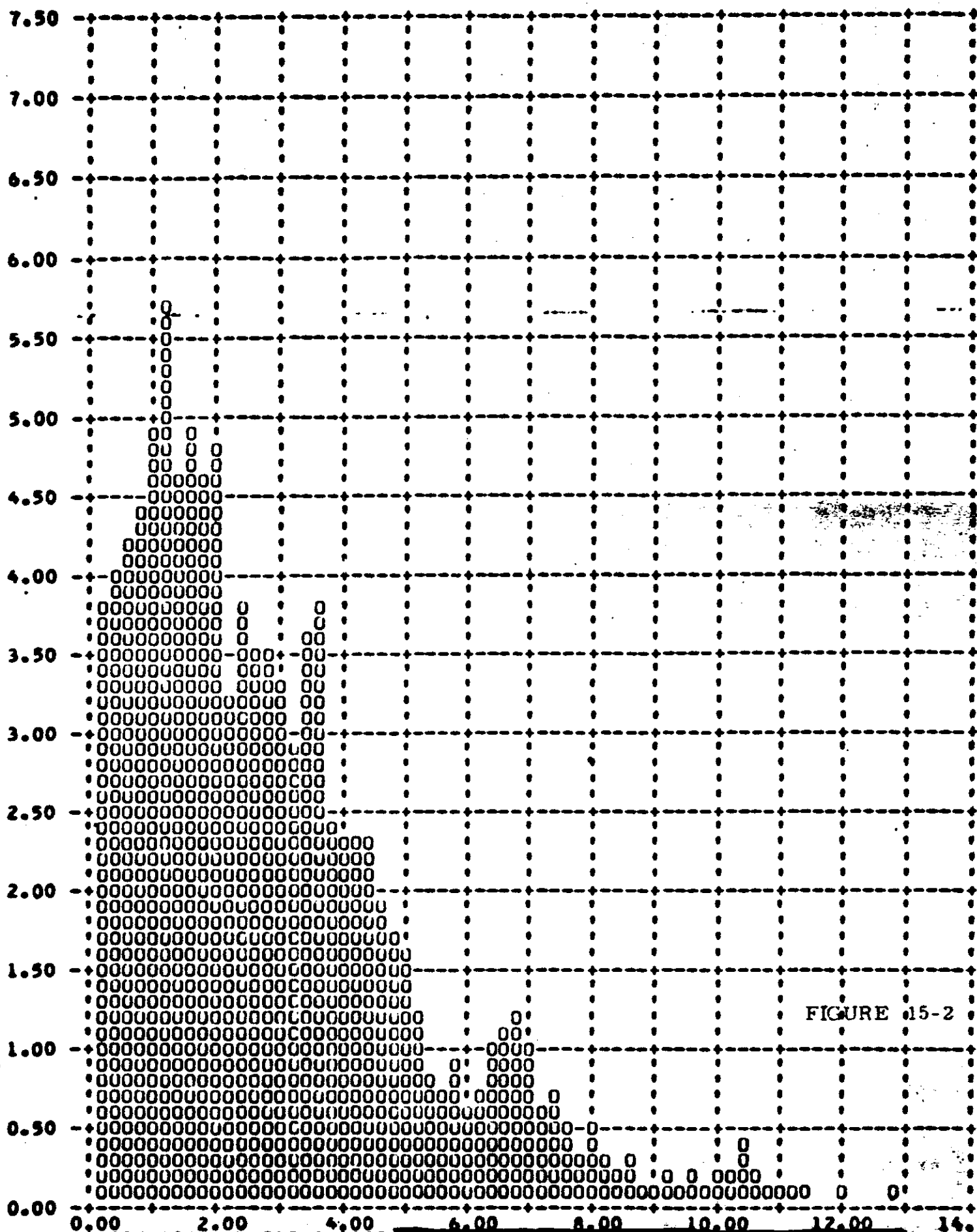


FIGURE 15-2

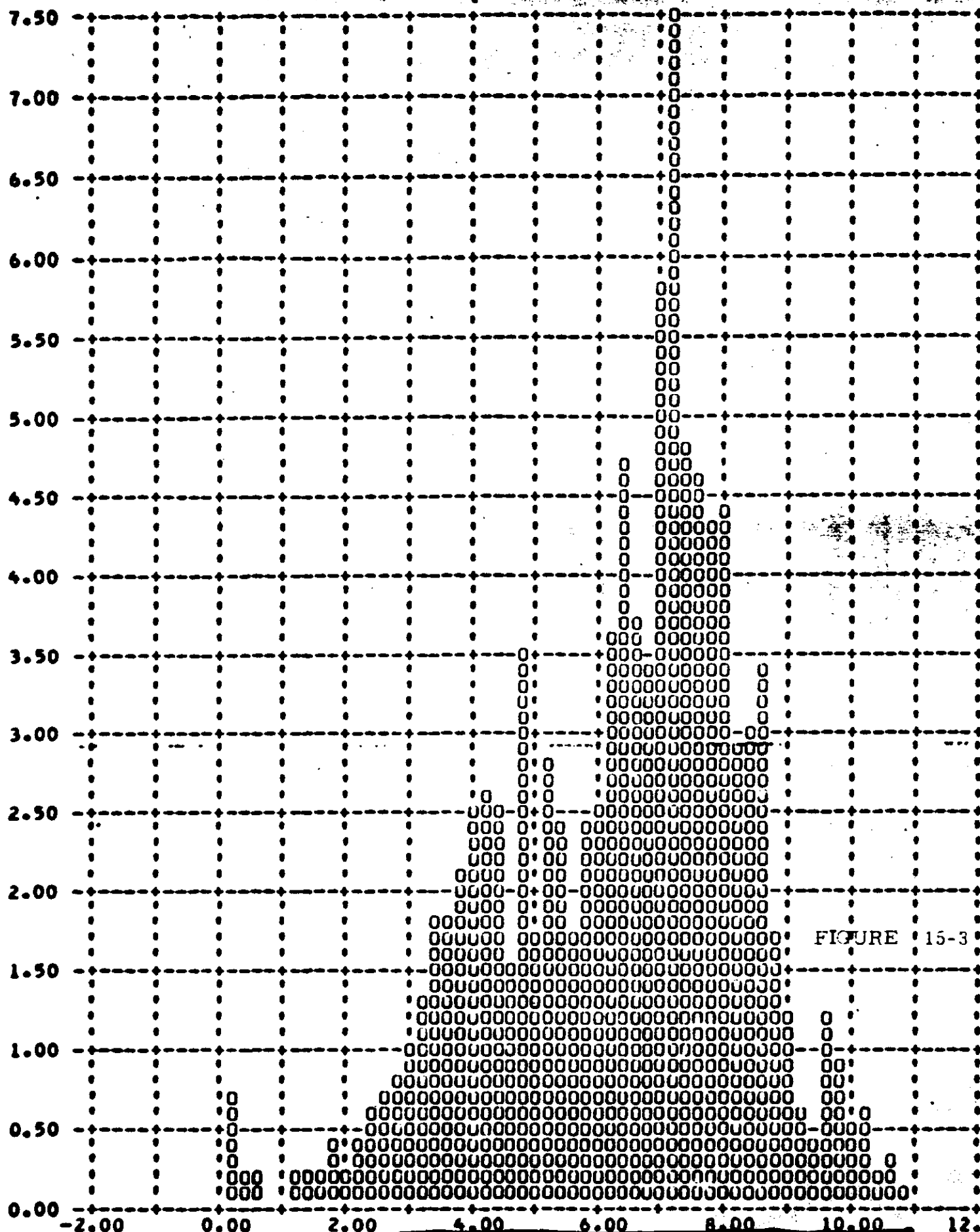


FIGURE 15-3

J-20 A BUCKET - AFT INSTR. FRAMES 1-6 OF EACH OP OMITTED 90 PERCENT = 5.3

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

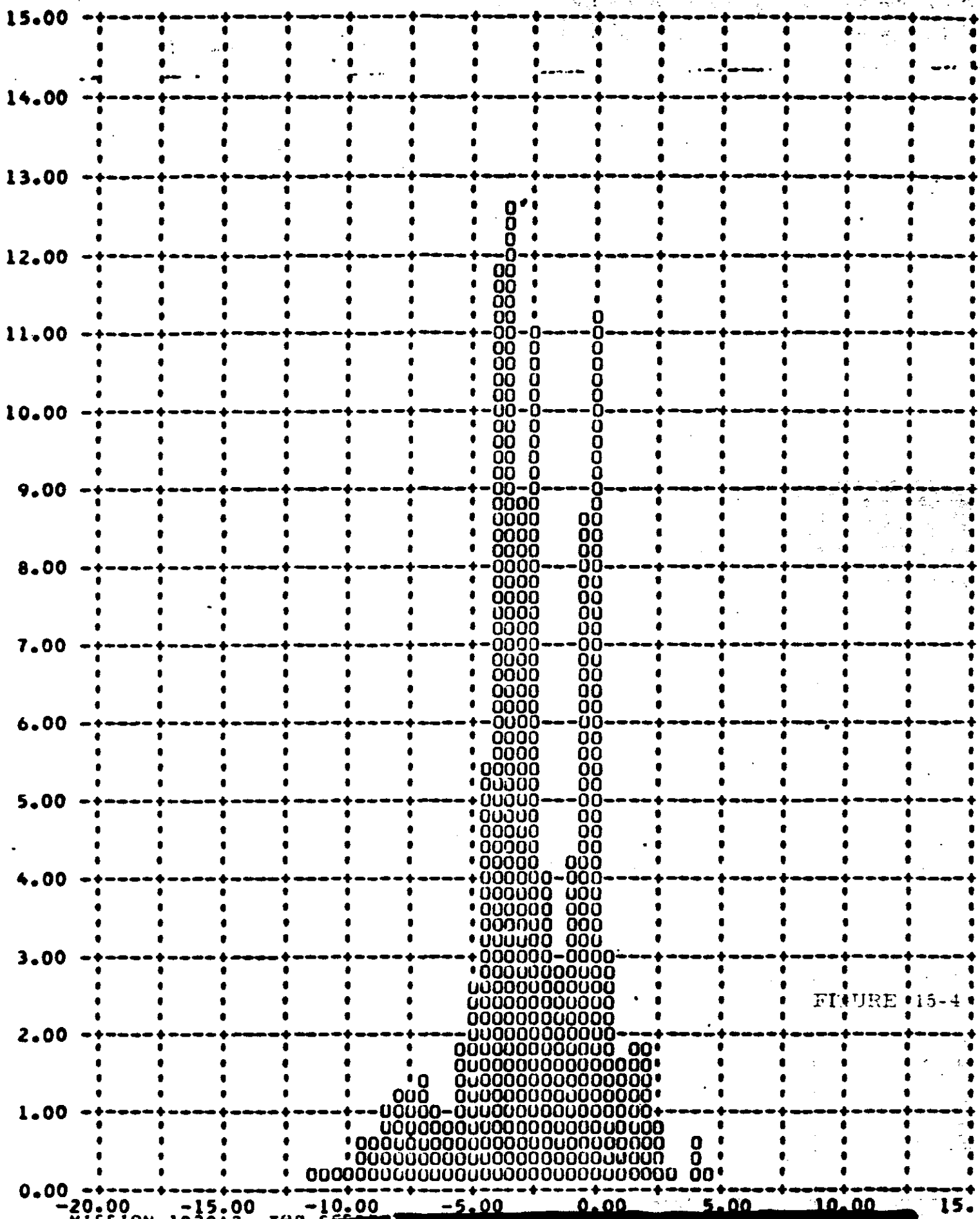


FIGURE 15-4

J-20 A BUCKET - AFT INSTR

FRAMES 1-6 OF EACH OP OMITTED

90 PERCENT = 4.1

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

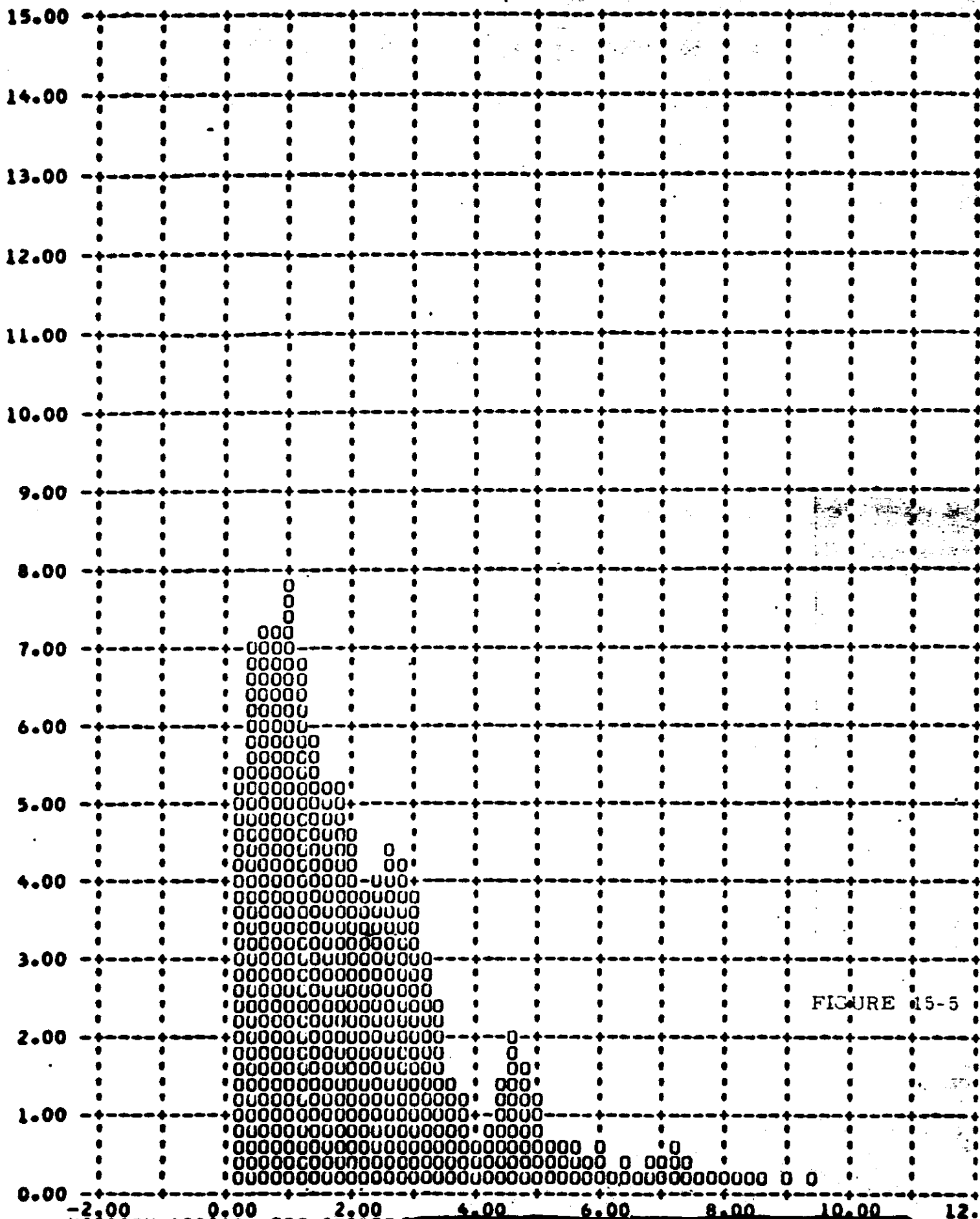


FIGURE 15-5

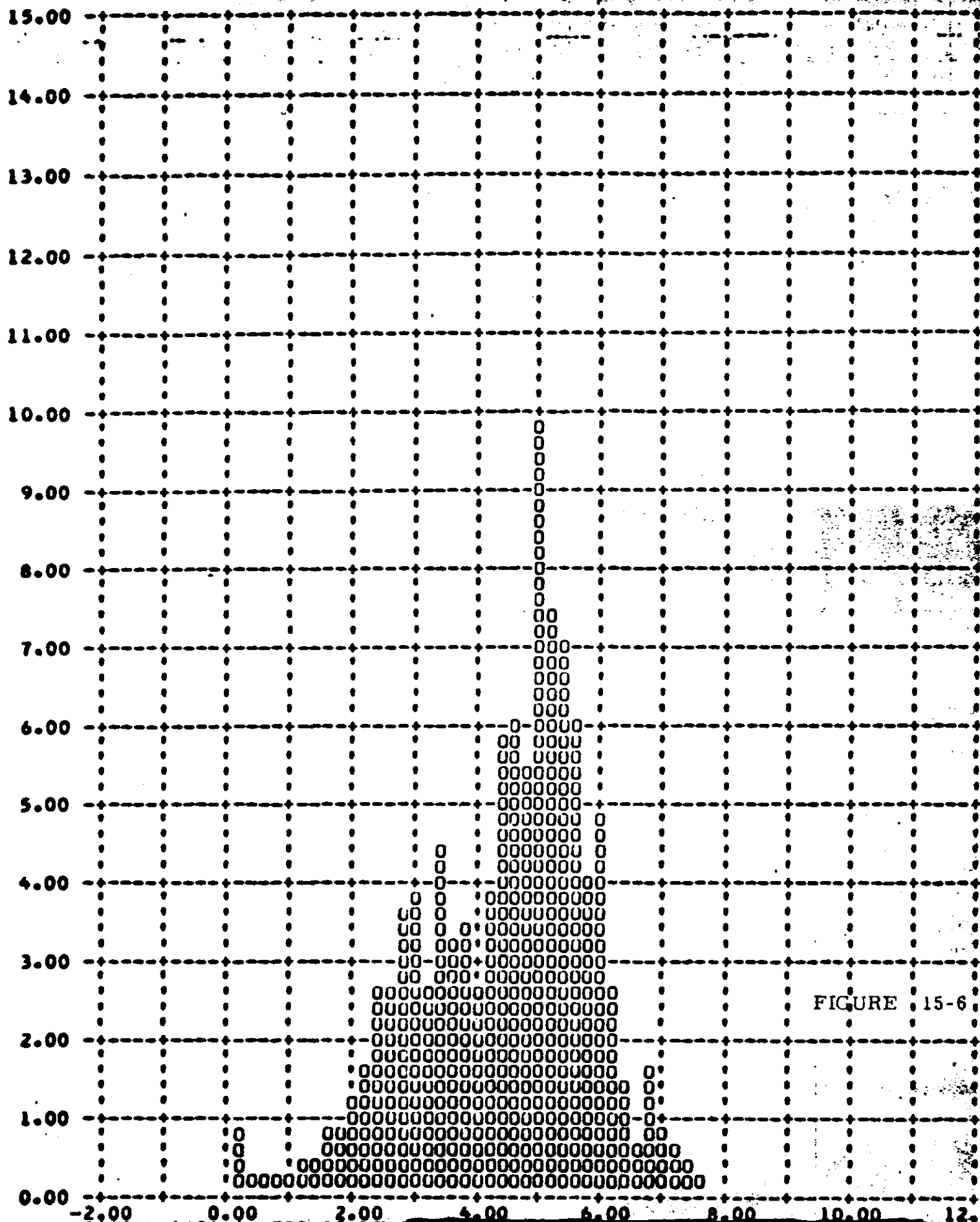


FIGURE 15-6

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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.

<u>Emulsion</u>	<u>Mission 1020-1</u>		<u>Mission 1020-2</u>	
	<u>B + F</u> <u>Density</u>	<u>Radiation</u>	<u>B + F</u> <u>Density</u>	<u>Radiation</u>
Type 3401	0.14	0.3 R	0.16	0.4 R
Royal X Pan	0.17	0.2 R	0.18	0.2 R

The mean total radiation seen by the take-up cassettes during both missions was approximately 0.3 roentgens. This is below the level that will degrade the panoramic photography.

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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. A summary of estimated reliability is shown in Table 17-1.

Panoramic Camera Reliability

Sample Size - 108 opportunities to operate.
One failure - S/I Programmer on J-19
Assume - 3000 cycles per camera per mission
Estimated Reliability = 98.5% at 50% confidence level.

Main Camera Door Reliability

Sample Size - 39 vehicles x 2 doors = 78 opportunities to operate
Estimated Reliability = 99.1% at 50% confidence level.

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Payload Command and Control Reliability

Sample Size: 5544 hours operation

1 Failure

Estimated Reliability = 97.1% at 50% confidence level

Payload Clock Reliability

Sample Size - 5544 hours operation

No failures

Estimated Reliability = 98.9% at 50% confidence level

Estimated Reliability of Payload Functioning on orbit = 96.9% at 50% confidence level

Recovery System Reliability

43 opportunities to recover

1 failure - improper separation due to water seal - cutter failure.

Estimated Reliability = 96.1% at 50% confidence level.

Stellar-Index Camera Reliability

Sample begins with J-5

Sample size = 10,680 cycles

Number of failures = 2

Estimated Reliability = 89.9% at 50% confidence level

Horizon Camera Reliability

Sample includes J5A and up

Sample size = 48,000 cycles

Estimated Reliability of Single Camera = 97.9% at 50% confidence level.

Estimated Reliability of Four Horizon Cameras at a Parallel

Redundant System = 99.9% at 50% confidence level.

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ESTIMATED RELIABILITY SUMMARY

(AT 50% CONFIDENCE LEVEL)

MISSION NUMBER	PRIMARY FUNCTIONS										SECONDARY FUNCTIONS						
	PANORAMIC CAMERA		PANORAMIC CAMERA DOORS		COMMAND & CONTROL SYSTEM		PAYLOAD CLOCK		ON - ORBIT FUNCTIONS		RECOVERY SYSTEM		STELLAR - INDEX CAMERAS		HORIZON CAMERAS		
	SAMPLE FAILURES	RELIABILITY	SAMPLE FAILURES	RELIABILITY	SAMPLE FAILURES	RELIABILITY	SAMPLE FAILURES	RELIABILITY	RELIABILITY	RELIABILITY	SAMPLE FAILURES	RELIABILITY	SAMPLE FAILURES	RELIABILITY	SAMPLE FAILURES	RELIABILITY	
9036 TO 1008	60	97.3	52	96.6	3124	96.0	3124	96.0	96.1	16	90.7	3400	93.1	12,000	91.7		
1009	64	97.4	54	96.7	3216	96.0	3216	96.0	96.2	20	91.5	4280	92.3	15,000	92.4		
1010	66	97.6	56	96.8	3432	96.1	3432	96.1	96.4	22	92.5	8100	93.7	18,000	94.4		
1011	72	97.7	66	96.9	3600	96.1	3600	96.1	96.6	24	93.0	5825	94.7	21,000	95.2		
1012	76	97.8	60	96.9	3750	96.2	3720	96.2	96.9	26	93.5	5825	94.7	24,000	95.8		
1013	78	97.8	62	97.0	3940	96.3	3940	96.3	96.0	28	94.0	5960	95.1	25,500	96.6		
1014	82	97.9	64	97.0	4056	96.1	4056	96.3	96.1	30	94.4	6375	95.5	28,500	96.4		
1015	86	98.0	66	97.0	4320	96.3	4320	96.4	96.1	32	94.8	7225	96.5	31,500	96.7		
1016	90	98.1	68	97.0	4560	96.5	4560	96.5	96.4	34	96.2	7650	97.0	34,500	97.0		
1017	94	98.3	70	97.0	4760	96.7	4760	96.6	97.6	36	96.4	9925	97.3	37,500	97.3		
1018	98	98.3	72	97.1	4920	96.8	4920	96.8	96.7	38	96.6	9960	97.9	40,800	97.9		
1019	102	98.4	74	97.1	5136	96.9	5136	96.9	96.8	39	96.8	9075	98.6	43,500	97.8		

* BASED ON THE REPORTED PREVIOUS FAILURE CONCENTRATIONS

TABLE 17.1

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[REDACTED]

(AT 50% CONFIDENCE LEVEL)

TABLE 17-1

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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.

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MISSION SUMMARY

MISSION NUMBER	PAYLOAD NUMBER	VEHICLE NUMBER	LAUNCH DATE	LAUNCH TIME	ORBIT INCLINATION (°)	PERIGEE		RECOVERY PASS	MASTER CAMERA		SLAVE CAMERA		STELLAR-MOXY CAMERA NUMBER			
						ALTITUDE (NM)	LOCATION (°M)		CAMERA NUMBER	SLIT (°)	FILTER TYPE	CAMERA NUMBER		SLIT (°)	FILTER TYPE	
1004	J-05	1174	2/15/64	2138 Z	74.9	99.9	29.0	49 112	124	0.250	W-21	125	0.250	W-21	029/29/29	045/48/27
1006	J-09	1176	6/4/64	2259 Z	79.9	84.0	63.2	65 128	148	0.200	W-21	149	0.200	W-21	045/47/45	049/23/42
1007	J-07	1609	6/18/64	2318 Z	85.0	99.2	41.5	65 126	144	0.250	W-25	145	0.200	W-21	043/43/43	034/26/21
1008	J-10	1177	7/10/64	2314 Z	85.0	99.4	40.8	49 112	150	0.200	W-21	151	0.200	W-21	048/48/48	033/28/23
1009	J-12	1605	8/5/64	2316 Z	80.1	99.6	39.3	49 126	154	0.200	W-21	155	0.200	W-21	036/36/36	038/36/34
1010	J-11	1178	9/14/64	2254 Z	84.9	97.4	42.5	65 144	152	0.175	W-21	153	0.175	W-21	041/41/41	044/42/44
1011	J-3X	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	037/37/37
1012	J-13	1179	10/17/64	2202 Z	75.0	96.2	32.4	49 81	156	0.200	W-21	157	0.200	W-21	051/51/47	046/42/43
1013	J-15	1173	11/2/64	2150 Z	80.0	100.0	26.0	65 81	158	0.225	W-21	159	0.225	W-21	052/49/55	047/48/54
1014	J-16	1180	11/18/64	2036 Z	70.0	103.2	65.6	81 145	162	0.250	W-25	159	0.175	W-21	053/59/49	050/44/46
1015	J-17	1607	12/19/64	2110 Z	74.9	96.7	21.8	81 178	158	0.250	W-25	141	0.175	W-21	061/61/61	036/36/36
1016	J-18	1608	1/18/65	2101 Z	74.9	99.4	30.2	81 159	132	0.250	W-25	133	0.175	W-21	059/59/50	039/39/39
1017	J-14	1611	2/23/65	2144 Z	75.0	97.2	29.9	81 148	140	0.250	W-25	165	0.175	W-21	021/21/21	020/20/20
1018	J-19	1612	3/23/65	2111 Z	96.0	100.2	40.3	66 99	122	0.250	W-25	123	0.175	W-21	039/39/39	032/32/32
1019	J-04	1614	4/29/65	2144 Z	93.0	99.1	27.1	80 —	118	0.250	W-25	119	0.175	W-21	019/19/19	019/19/19
1020	J-20	1613	6/9/65	2158 Z	75.1	97.1	40.6	97 113	136	0.250	W-25	137	0.175	W-21	067/67/60	062/62/62

TABLE 18.1

TOP SECRET

PERFORMANCE SUMMARY

MISSION NUMBER	CAMERA	SERIAL NUMBER	M I P VALUE	VISUAL RES	SLIT AVERAGE (μ)	MTF/AIM SLIT AVERAGE (μ)	SLIT (μ)	AVERAGE ALL	HIGH	90% ATTITUDE ERROR (")	PITCH	ROLL	YAW	90% V/M ERROR (μ)	90% RESOLUTION UNIT (FEET)	ALONG TRACK	CROSS TRACK
1004-1	FWD AFT	124	85	78	37	109	320	115	127	0.45	0.42	0.42	1.08	5.1	7.7	6.1	
1004-2	FWD AFT	125	85	76	80	113	320	82	90	0.74	0.50	0.50	0.91	4.9	6.8	6.8	
1006-1	FWD AFT	148	90	78	65	88	320	84	97	0.41	0.42	0.42	1.14	15.4	13.8	6.7	
1006-2	FWD AFT	149	90	85	64	90	320	87	92	0.49	0.40	0.40	1.08	11.8	10.1	7.0	
1007-1	FWD AFT	144	85	80	60	87	320	82	91	0.59	0.48	0.48	1.43	3.6	3.1	9.4	
1007-2	FWD AFT	143	85	86	63	83	320	86	110	0.64	0.47	0.47	—	4.6	2.1	7.8	
1008-1	FWD AFT	150	85	80	80	95	320	81	89	0.59	0.39	0.39	0.94	2.9	4.9	5.9	
1008-2	FWD AFT	151	85	79	84	96	320	83	95	0.63	0.36	0.36	0.71	2.8	4.2	9.4	
1009-1	FWD AFT	154	85	92	80	—	80	75	88	0.65	0.65	0.65	0.71	3.3	5.3	5.9	
1009-2	FWD AFT	165	85	89	85	—	80	75	83	0.48	0.65	0.65	0.59	2.6	4.9	9.4	
1010-1	FWD AFT	182	85	90	90	88	80	87	96	0.93	0.30	0.30	0.87	4.5	2.3	9.4	
1010-2	FWD AFT	153	85	92	86	80	80	82	103	0.59	0.70	0.70	1.21	4.6	7.5	3.8	
1011-1	FWD AFT	160	90	84	76	96	80	87	93	0.77	0.39	0.39	0.97	2.3	8.3	6.8	
1012-1	FWD AFT	186	85	92	91	91	80	84	98	0.65	0.51	0.51	—	1.8	4.8	9.4	
1012-2	FWD AFT	157	85	89	89	87	80	84	100	0.97	0.77	0.77	0.51	5.9	3.3	5.3	
1013-1	FWD AFT	158	85	89	89	94	80	85	98	0.64	0.32	0.32	1.34	2.7	2.8	9.4	
1014-1	FWD AFT	162	80	87	78	78	80	74	86	0.62	0.41	0.41	1.46	3.3	3.2	9.4	
1014-2	FWD AFT	139	80	83	80	75	80	95	107	1.06	0.56	0.56	—	3.3	2.8	9.4	
1015-1	FWD AFT	138	85	87	76	76	80	80	88	1.08	0.59	0.59	—	3.2	2.2	9.4	
1015-2	FWD AFT	141	85	83	73	72	80	90	—	0.65	0.38	0.38	0.53	5.0	5.8	7.8	
1016-1	FWD AFT	132	85	85	56	56	80	81	—	0.72	0.83	0.83	2.01	2.0	5.9	10.9	
1016-2	FWD AFT	133	85	80	55	55	80	94	—	0.72	0.83	0.83	2.01	2.8	3.4	7.4	
1017-1	FWD AFT	140	85	72	57	57	80	78	86	0.49	0.76	0.76	2.49	2.3	3.3	7.1	
1017-2	FWD AFT	163	85	85	65	65	80	80	94	0.69	0.45	0.45	—	3.3	3.3	11.6	
1018-1	FWD AFT	182	85	79	70	70	80	82	92	0.91	0.48	0.48	—	3.4	3.8	9.4	
1018-2	FWD AFT	123	85	84	75	75	80	95	109	0.84	0.63	0.63	—	3.1	3.7	9.4	

DATA NOT PRESENTLY AVAILABLE

TABLE 18-2

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PERFORMANCE SUMMARY

MISSION NUMBER	CAMERA	SERIAL NUMBER	M I P VALUE	VISUAL RES	AT SPPL		SLIT AVERAGE (μ)	NTF/AIM		SLIT AVERAGE (μ)	SLIT AVERAGE		HIGH	90% ATTITUDE ERROR (°)			90% ATTITUDE RATES (°/HR)			90% V/H ERROR (°)	90% RESOLUTION LIMIT (FEET)	
					SLIT AVERAGE (μ)	SLIT AVERAGE (μ)		PITCH	ROLL	YAW	PITCH	ROLL	YAW	PITCH	ROLL	YAW	PITCH	ROLL	YAW		ALONG TRACK	CROSS TRACK
1019-1	FWD AFT	118 119	85	81 85	—	—	80	75 63	—	80	87 87	104 101	—	0.43 0.42	0.36 0.37	0.97 0.96	31.6 31.6	34.7 34.9	33.0 33.1	3.3 3.8	3.3 3.0	9.1 6.3
1020-1	FWD AFT	136 137	80	88 89	—	—	80	69 82	—	80	78 94	90 105	—	0.45 0.46	0.33 0.35	0.78 0.78	37.4 37.4	31.8 31.8	26.7 26.7	3.4 3.3	3.8 4.2	8.4 7.8
1020-2	FWD AFT	137	—	—	—	—	—	—	—	—	—	—	—	0.41 0.17	0.17 0.17	—	42.6 23.8	23.8 23.8	42.5 42.5	3.5 3.4	6.4 4.8	7.8 2.8

TABLE 18-2

TOP SECRET

EXPOSURE - PROCESSING SUMMARY

MISSION NUMBER	CAMERA	SOLAR ELEVATION RANGE (°)		SOLAR AZIMUTH RANGE (°)		PREDICTED PROCESSING		REPORTING PROCESSING		COMPUTED PROCESSING		TERRAIN D. MIN				TERRAIN D. MAX				CLOUD RANGE				D. MAX	UNDER EXPOSED (%)	UNDER PROCESSED (%)	NOMINAL EXP. & PROC. (%)	OVER PROCESSED (%)	OVER EXPOSED (%)	CLOUD COVER (%)																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																									
		LOW	HIGH	LOW	HIGH	E	A	E	A	E	A	E	A	LOW	HIGH	MEAN	RANGE	LOW	HIGH	MEAN	RANGE	LOW	HIGH								MEAN																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																								
1004-1	PWD	-3	81	25	124	5	76	19	4	79	17	0	79	21	0	79	21	0	79	21	0	79	21	0	79	21	0	79	21	0	79	21	0	79	21	0	79	21	0	79	21	0	79	21	0	79	21	0	79	21	0	79	21	0	79	21	0	79	21	0	79	21	0	79	21	0	79	21	0	79	21	0	79	21	0	79	21	0	79	21	0	79	21	0	79	21	0	79	21	0	79	21	0	79	21	0	79	21	0	79	21	0	79	21	0	79	21	0	79	21	0	79	21	0	79	21	0	79	21	0	79	21	0	79	21	0	79	21	0	79	21	0	79	21	0	79	21	0	79	21	0	79	21	0	79	21	0	79	21	0	79	21	0	79	21	0	79	21	0	79	21	0	79	21	0	79	21	0	79	21	0	79	21	0	79	21	0	79	21	0	79	21	0	79	21	0	79	21	0	79	21	0	79	21	0	79	21	0	79	21	0	79	21	0	79	21	0	79	21	0	79	21	0	79	21	0	79	21	0	79	21	0	79	21	0	79	21	0	79	21	0	79	21	0	79	21	0	79	21	0	79	21	0	79	21	0	79	21	0	79	21	0	79	21	0	79	21	0	79	21	0	79	21	0	79	21	0	79	21	0	79	21	0	79	21	0	79	21	0	79	21	0	79	21	0	79	21	0	79	21	0	79	21	0	79	21	0	79	21	0	79	21	0	79	21	0	79	21	0	79	21	0	79	21	0	79	21	0	79	21	0	79	21	0	79	21	0	79	21	0	79	21	0	79	21	0	79	21	0	79	21	0	79	21	0	79	21	0	79	21	0	79	21	0	79	21	0	79	21	0	79	21	0	79	21	0	79	21	0	79	21	0	79	21	0	79	21	0	79	21	0	79	21	0	79	21	0	79	21	0	79	21	0	79	21	0	79	21	0	79	21	0	79	21	0	79	21	0	79	21	0	79	21	0	79	21	0	79	21	0	79	21	0	79	21	0	79	21	0	79	21	0	79	21	0	79	21	0	79	21	0	79	21	0	79	21	0	79	21	0	79	21	0	79	21	0	79	21	0	79	21	0	79	21	0	79	21	0	79	21	0	79	21	0	79	21	0	79	21	0	79	21	0	79	21	0	79	21	0	79	21	0	79	21	0	79	21	0	79	21	0	79	21	0	79	21	0	79	21	0	79	21	0	79	21	0	79	21	0	79	21	0	79	21	0	79	21	0	79	21	0	79	21	0	79	21	0	79	21	0	79	21	0	79	21	0	79	21	0	79	21	0	79	21	0	79	21	0	79	21	0	79	21	0	79	21	0	79	21	0	79	21	0	79	21	0	79	21	0	79	21	0	79	21	0	79	21	0	79	21	0	79	21	0	79	21	0	79	21	0	79	21	0	79	21	0	79	21	0	79	21	0	79	21	0	79	21	0	79	21	0	79	21	0	79	21	0	79	21	0	79	21	0	79	21	0	79	21	0	79	21	0	79	21	0	79	21	0	79	21	0	79	21	0	79	21	0	79	21	0	79	21	0	79	21	0	79	21	0	79	21	0	79	21	0	79	21	0	79	21	0	79	21	0	79	21	0	79	21	0	79	21	0	79	21	0	79	21	0	79	21	0	79	21	0	79	21	0	79	21	0	79	21	0	79	21	0	79	21	0	79	21	0	79	21	0	79	21	0	79	21	0	79	21	0	79	21	0	79	21	0	79	21	0	79	21	0	79	21	0	79	21	0	79	21	0	79	21	0	79	21	0	79	21	0	79	21	0	79	21	0	79	21	0	79	21	0	79	21	0	79	21	0	79	21	0	79	21	0	79	21	0	79	21	0	79	21	0	79	21	0	79	21	0	79	21	0	79	21	0	79	21	0	79	21	0	79	21	0	79	21	0	79	21	0	79	21	0	79	21	0	79	21	0	79	21	0	79	21	0	79	21	0	79	21	0	79	21	0	79	21	0	79	21	0	79	21	0	79	21	0	79	21	0	79	21	0	79	21	0	79	21	0	79	21	0	79	21	0	79	21	0	79	21	0	79	21	0	79	21	0	79	21	0	79	21	0	79	21	0	79	21	0	79	21	0	79	21	0	79	21	0	79	21	0	79	21	0	79	21	0	79	21	0	79	21	0	79	21	0	79	21	0	79	21	0	79	21	0	79	21	0	79	21	0	79	21	0	79	21	0	79	21	0	79	21	0	79	21	0	79	21	0	79	21	0	79	21	0	79	21	0	79	21	0	79	21	0	79	21	0	79	21	0	79	21	0	79	21	0	79	21	0	79	21	0	79	21	0	79	21	0	79	21	0	79	21	0	79	21	0	79	21	0	79	21	0	79	21	0	79	21	0	79	21	0	79	21	0	79	21	0	79	21	0	79	21	0	79	21	0	79	21	0	79	21	0	79	21	0	79	21	0	79	21	0	79	21	0	79	21	0	

TABLE 18.3

TOP SECRET

NOT SUFFICIENT

EXPOSURE - PROCESSING SUMMARY

MISSION NUMBER	CAMERA	SOLAR ELEVATION RANGE (°)		SOLAR AZIMUTH RANGE (°)		PREDICTED PROCESSING (%)		REPORTED PROCESSING (%)		COMPUTED PROCESSING (%)		TERRAIN D-MIN			TERRAIN D-MAX			CLOUD RANGE			UNDER EXPOSED (%)	UNDER PROCESSED EMP & PRO (%)	OVER PROCESSED (%)	OVER EXPOSED (%)	CLOUD COVER (%)						
		LOW	HIGH	LOW	HIGH	P	I	P	I	P	I	LOW	HIGH	MEAN	MEDIAN	LOW	HIGH	MEAN	MEDIAN												
1019-4	FWD	24	70	24	152	0	21	79	22	32	46	4	56	40	0.26	1.92	0.71	0.61	0.60	2.15	1.45	1.50	0.84	2.26	1.94	2.00	4	7	64	17	48
	AFT	23	70	21	152	0	92	8	25	55	19	3	87	10	0.13	1.70	0.66	0.60	0.39	2.26	1.46	1.45	0.80	2.30	1.96	2.02	1	13	70	14	48
1020-4	FWD	30	75	19	156	0	19	81	13	48	39	1	58	41	0.23	1.30	0.55	0.32	0.80	2.28	1.57	1.54	1.40	2.38	2.10	2.16	1	18	78	4	42
	AFT	29	75	17	156	0	64	36	15	56	29	0	74	26	0.23	1.20	0.55	0.34	0.70	2.20	1.47	1.46	1.22	2.29	2.04	2.10	0	18	76	8	42
1020-2	FWD	47	68	18	38																										
	AFT	46	68	17	33																										
INSUFFICIENT DATA																															

~~TOP SECRET~~ [REDACTED]

SECTION A

APPENDIX

~~TOP SECRET~~ [REDACTED]

~~TOP SECRET~~

MISSION • 1020-1 • INSTRUMENT • FRWD 10-01-65 DENSITY FREQ DISTR

DENSITY VALUE	PRIMARY			INTERMEDIATE			FULL			ALL LEVELS		
	MIN	MAX	LIM	MIN	MAX	LIM	MIN	MAX	LIM	MIN	MAX	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	0	0	0	0	0	0
0.29	0	0	0	0	0	0	0	0	0	0	0	0
0.30	0	0	0	0	0	0	0	0	0	0	0	0
0.31	0	0	0	0	0	0	0	0	0	0	0	0
0.32	0	0	0	0	0	0	0	0	0	0	0	0
0.33	0	0	0	0	0	0	0	0	0	0	0	0
0.34	0	0	0	0	0	0	0	0	0	0	0	0
0.35	0	0	0	0	0	0	0	0	0	0	0	0
0.36	0	0	0	0	0	0	0	0	0	0	0	0
0.37	0	0	0	0	0	0	0	0	0	0	0	0
0.38	0	0	0	0	0	0	0	0	0	0	0	0
0.39	0	0	0	0	0	0	0	0	0	0	0	0
0.40	0	0	0	0	0	0	0	0	0	0	0	0
0.41	0	0	0	0	0	0	0	0	0	0	0	0
0.42	0	0	0	0	0	0	0	0	0	0	0	0
0.43	0	0	0	0	0	0	0	0	0	0	0	0
0.44	0	0	0	0	0	0	0	0	0	0	0	0
0.45	0	0	0	0	0	0	0	0	0	0	0	0
0.46	0	0	0	0	0	0	0	0	0	0	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	0	0	0	0	0	0	0	0	0
0.50	0	0	0	0	0	0	0	0	0	0	0	0
SUBTOTAL	1	0	0	91	0	0	19	0	0	111	0	0

~~TOP SECRET~~

TABLE A-1.

A-1

~~TOP SECRET~~

~~TOP SECRET~~

MISSION • 1020-1 • INSTRUMENT • FRWD 10-01-65 DENSITY FREQ DISTR

DENSITY VALUE	PRIMARY			INTERMEDIATE			FULL			ALL LEVELS		
	MIN	MAX	LIM	MIN	MAX	LIM	MIN	MAX	LIM	MIN	MAX	LIM
0.51	0	0	0	2	0	0	5	0	0	7	0	0
0.52	0	0	0	3	0	0	5	0	0	8	0	0
0.53	0	0	0	3	0	0	5	0	0	6	0	0
0.54	0	0	0	3	0	0	5	0	0	7	0	0
0.55	0	0	0	2	0	0	2	0	0	3	0	0
0.56	0	0	0	2	0	0	2	0	0	2	0	0
0.57	0	0	0	0	0	0	2	0	0	2	0	0
0.58	0	0	0	1	0	0	9	0	0	10	0	0
0.59	0	0	0	1	0	0	1	0	0	2	0	0
0.60	0	0	0	4	0	0	6	0	0	10	0	0
0.61	0	0	0	2	0	0	7	0	0	3	0	0
0.62	0	0	0	2	0	0	2	0	0	2	0	0
0.63	0	0	0	0	0	0	2	0	0	2	0	0
0.64	0	0	0	2	0	0	4	0	0	6	0	0
0.65	0	0	0	1	0	0	3	0	0	4	0	0
0.66	0	0	0	2	0	0	1	0	0	3	0	0
0.67	0	0	0	2	0	0	1	0	0	3	0	0
0.68	0	0	0	1	0	0	1	0	0	2	0	0
0.69	0	0	0	2	0	0	2	0	0	4	0	0
0.70	0	0	0	0	0	0	3	0	0	3	0	0
0.71	0	0	0	1	0	0	0	0	0	3	0	0
0.72	0	0	0	0	0	0	3	0	0	3	0	0
0.73	0	0	0	1	0	0	0	0	0	1	0	0
0.74	0	0	0	1	0	0	1	0	0	1	0	0
0.75	0	0	0	1	0	0	1	0	0	2	0	0
0.76	0	0	0	3	0	0	2	0	0	5	0	0
0.77	0	0	0	0	0	0	0	0	0	0	0	0
0.78	0	0	0	0	0	0	0	0	0	0	0	0
0.79	0	0	0	0	0	0	0	0	0	0	0	0
0.80	0	0	0	0	0	0	0	0	0	0	0	0
0.81	0	0	0	0	0	0	2	0	0	2	0	0
0.82	0	0	0	1	0	0	0	0	0	0	0	0
0.83	0	0	0	0	0	0	0	0	0	0	0	0
0.84	0	0	0	0	0	0	0	0	0	0	0	0
0.85	0	0	0	2	0	0	0	0	0	1	0	0
0.86	0	0	0	1	0	0	0	0	0	3	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	0	0	0	0	0	0
0.90	0	0	0	2	0	0	0	0	0	2	0	0
0.91	0	0	0	0	0	0	0	0	0	0	0	0
0.92	0	0	0	2	0	0	0	0	0	2	0	0
0.93	0	0	0	0	0	0	0	0	0	0	0	0
0.94	0	0	0	0	0	0	0	0	0	1	0	0
0.95	0	0	0	1	0	0	0	0	0	1	0	0
0.96	0	0	0	0	0	0	0	0	0	1	0	0
0.97	0	0	0	0	0	0	0	0	0	0	0	0
0.98	0	0	0	0	0	0	0	0	0	0	0	0
0.99	0	0	0	0	0	0	0	0	0	0	0	0
1.00	0	0	0	1	0	0	0	0	0	1	0	0
SUBTOTAL	1	0	0	52	4	0	83	3	0	136	7	0

~~TOP SECRET~~

TABLE A-1

A-2

~~TOP SECRET~~

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MISSION • 1020-1 • INSTRUMENT • FRWD 10-01-65 DENSITY FREQ DISTR

DENSITY VALUE	PRIMARY			INTERMEDIATE			FULL			ALL LEVELS		
	MIN	MAX	LIM	MIN	MAX	LIM	MIN	MAX	LIM	MIN	MAX	LIM
1.01	0	0	0	0	0	0	0	0	0	0	0	0
1.02	0	0	0	0	1	0	0	0	0	0	3	0
1.03	0	0	0	0	1	0	0	0	0	0	1	0
1.04	0	0	0	0	1	0	0	0	0	0	1	0
1.05	0	0	0	0	1	0	0	0	0	0	1	0
1.06	0	0	0	0	1	0	0	0	0	0	1	0
1.07	0	0	0	0	0	0	0	0	0	0	0	0
1.08	0	0	0	0	2	0	0	1	0	0	3	0
1.09	0	0	0	0	1	0	0	0	0	0	1	0
1.10	0	0	0	0	0	0	0	0	0	0	0	0
1.11	0	0	0	0	0	0	0	0	0	0	0	0
1.12	0	0	0	0	1	0	0	1	0	0	2	0
1.13	0	0	0	0	0	0	0	0	0	0	0	0
1.14	0	0	0	0	1	0	0	1	0	0	2	0
1.15	0	0	0	0	0	0	0	0	0	0	0	0
1.16	0	0	0	0	0	0	0	1	0	0	1	0
1.17	0	0	0	0	0	0	0	0	0	0	0	0
1.18	0	0	0	0	0	0	0	0	0	0	0	0
1.19	0	0	0	0	0	0	0	0	0	0	0	0
1.20	0	0	0	0	3	0	0	2	0	0	5	0
1.21	0	0	0	0	0	0	0	1	0	0	1	0
1.22	0	0	0	0	3	0	0	4	0	0	7	0
1.23	0	0	0	0	0	0	0	0	0	0	0	0
1.24	0	0	0	0	2	0	0	2	0	0	4	0
1.25	0	1	0	0	0	0	0	0	0	0	1	0
1.26	0	0	0	0	0	0	0	0	0	0	0	0
1.27	0	0	0	0	0	0	0	1	0	0	2	0
1.28	0	0	0	0	1	0	0	2	0	0	3	0
1.29	0	0	0	0	1	0	0	0	0	0	1	0
1.30	0	0	0	0	2	0	0	0	0	0	3	0
1.31	0	0	0	0	0	0	0	0	0	0	0	0
1.32	0	0	0	0	2	0	0	2	0	0	4	0
1.33	0	0	0	0	0	0	0	0	0	0	0	0
1.34	0	0	0	0	2	0	0	2	0	0	4	0
1.35	0	0	0	0	2	0	0	2	0	0	4	0
1.36	0	0	0	0	2	0	0	2	0	0	4	0
1.37	0	0	0	0	0	0	0	1	0	0	1	0
1.38	0	0	0	0	4	0	0	1	0	0	5	0
1.39	0	0	0	0	0	0	0	0	0	0	0	0
1.40	0	0	0	0	1	0	0	1	0	0	2	0
1.41	0	0	0	0	0	0	0	0	0	0	0	0
1.42	0	0	0	0	1	0	0	3	0	0	4	0
1.43	0	0	0	0	1	0	0	1	0	0	2	0
1.44	0	0	0	0	4	0	0	1	0	0	5	0
1.45	0	0	0	0	4	0	0	2	0	0	6	0
1.46	0	0	0	0	1	0	0	3	0	0	4	0
1.47	0	0	0	0	0	0	0	5	0	0	9	0
1.48	0	0	0	0	4	0	0	1	0	0	5	0
1.49	0	0	0	0	2	0	0	1	0	0	3	0
1.50	0	0	0	0	3	0	0	2	0	0	5	0
SUBTOTAL	0	1	0	3	56	1	1	48	0	4	105	1

~~TOP SECRET~~

TABLE A-1

A-2

~~TOP SECRET~~

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MISSION • 1020-1 • INSTRUMENT • FRWD 10-01-65 DENSITY FREQ DISTR

DENSITY VALUE	PRIMARY			INTERMEDIATE			FULL			ALL LEVELS		
	MIN	MAX	LIM	MIN	MAX	LIM	MIN	MAX	LIM	MIN	MAX	LIM
1.51	0	0	0	0	0	0	0	1	0	0	1	0
1.52	0	0	0	0	4	1	0	1	0	0	8	1
1.53	0	0	0	0	2	1	0	1	0	0	3	1
1.54	0	0	0	0	2	1	0	1	0	0	3	1
1.55	0	0	0	0	2	1	0	1	0	0	3	1
1.56	0	0	0	0	3	1	0	1	0	0	4	1
1.57	0	0	0	0	3	1	0	1	0	0	3	1
1.58	0	0	0	0	3	1	0	1	0	0	3	1
1.59	0	0	0	0	2	1	0	1	0	0	3	1
1.60	0	0	0	0	1	1	0	1	0	0	2	1
1.61	0	0	0	0	2	1	0	1	0	0	3	1
1.62	0	0	0	0	5	1	0	1	0	0	6	1
1.63	0	0	0	0	0	1	0	0	0	0	0	1
1.64	0	0	1	0	1	1	0	1	0	0	1	1
1.65	0	0	0	0	2	1	0	1	0	0	3	1
1.66	0	0	0	0	2	1	0	1	0	0	3	1
1.67	0	0	0	0	2	1	0	1	0	0	3	1
1.68	0	0	0	0	3	1	0	5	0	0	8	1
1.69	0	0	0	0	0	1	0	2	0	0	3	1
1.70	0	0	0	0	6	1	0	0	0	0	4	1
1.71	0	0	0	0	4	1	0	0	0	0	4	1
1.72	0	0	0	0	3	1	0	0	0	0	3	1
1.73	0	0	0	0	3	1	0	0	1	0	3	1
1.74	0	0	0	0	1	1	0	2	0	0	1	1
1.75	0	0	0	0	4	1	0	0	0	0	6	1
1.76	0	0	0	0	1	1	0	2	0	0	1	1
1.77	0	0	0	0	1	1	0	1	0	0	2	1
1.78	0	0	0	0	2	1	0	1	0	0	2	1
1.79	0	0	0	0	1	1	0	0	0	0	1	1
1.80	0	0	0	0	3	1	0	4	0	0	4	1
1.81	0	0	0	0	0	1	0	4	0	0	4	1
1.82	0	0	0	0	2	1	0	1	0	0	2	1
1.83	0	0	0	0	0	1	0	1	0	0	1	1
1.84	0	0	0	0	2	1	0	0	1	0	2	1
1.85	0	0	0	0	1	1	0	0	1	0	1	1
1.86	0	0	0	0	0	1	0	0	0	0	0	1
1.87	0	0	0	0	0	1	0	2	0	0	1	1
1.88	0	0	0	0	1	1	0	0	2	0	1	1
1.89	0	0	0	0	0	1	0	0	0	0	0	1
1.90	0	0	0	0	0	1	0	2	0	0	1	1
1.91	0	0	0	0	0	1	0	0	0	0	0	1
1.92	0	0	0	0	4	1	0	0	0	0	4	1
1.93	0	0	0	0	0	1	0	1	0	0	1	1
1.94	0	0	0	0	2	1	0	1	0	0	3	1
1.95	0	0	0	0	2	1	0	1	0	0	2	1
1.96	0	0	0	0	2	1	0	0	0	0	5	1
1.97	0	0	0	0	0	1	0	0	0	0	0	1
1.98	0	0	0	0	0	1	0	3	0	0	5	1
1.99	0	0	0	0	0	1	0	0	0	0	0	1
2.00	0	0	0	0	0	1	0	0	0	0	0	1
SUBTOTAL	0	1	1	0	72	48	0	38	11	0	11	60

~~TOP SECRET~~

TABLE A-1

A-1

~~TOP SECRET~~

~~TOP SECRET~~

MISSION • 1020-1 • INSTRUMENT • FRWD 10-01-65 DENSITY FREQ DISTR

DENSITY VALUE	PRIMARY			INTERMEDIATE			FULL			ALL LEVELS		
	MIN	MAX	LIM	MIN	MAX	LIM	MIN	MAX	LIM	MIN	MAX	LIM
2.01	0	0	0	0	0	0	0	0	0	0	0	0
2.02	0	0	0	0	0	0	0	0	2	0	0	3
2.03	0	0	0	0	1	1	0	0	1	0	2	1
2.04	0	0	0	0	1	1	0	0	1	0	2	4
2.05	0	0	0	0	1	0	0	0	2	0	0	6
2.06	0	0	0	0	1	1	0	0	1	0	3	2
2.07	0	0	0	0	1	0	0	0	3	0	1	0
2.08	0	0	0	0	1	0	0	0	3	0	1	6
2.09	0	0	0	0	1	0	0	0	1	0	0	1
2.10	0	0	0	0	1	1	0	0	4	0	2	7
2.11	0	0	0	0	1	0	0	0	0	0	1	0
2.12	0	0	0	0	0	1	0	0	1	0	1	8
2.13	0	0	0	0	0	2	0	0	3	0	1	2
2.14	0	0	0	0	0	3	0	0	1	0	1	9
2.15	0	0	0	0	2	3	0	0	4	0	2	4
2.16	0	0	0	0	1	3	0	0	1	0	0	8
2.17	0	0	0	0	1	3	0	0	1	0	0	4
2.18	0	0	0	0	1	8	0	2	5	0	3	1
2.19	0	0	0	0	1	1	0	0	1	0	1	2
2.20	0	0	0	0	1	1	0	0	7	0	1	2
2.21	0	0	0	0	0	1	0	0	1	0	0	1
2.22	0	0	0	0	1	1	0	1	8	0	2	1
2.23	0	0	0	0	0	0	0	2	4	0	1	5
2.24	0	0	0	0	0	4	0	2	2	0	2	6
2.25	0	0	0	0	0	3	0	0	1	0	1	3
2.26	0	0	0	0	0	3	0	0	4	0	0	7
2.27	0	0	0	0	0	1	0	1	2	0	1	3
2.28	0	0	0	0	1	1	0	1	7	0	2	2
2.29	0	0	0	0	0	1	0	0	3	0	0	4
2.30	0	0	0	0	0	1	0	0	3	0	0	1
2.31	0	0	0	0	0	0	0	0	5	0	0	5
2.32	0	0	0	0	0	0	0	0	1	0	0	1
2.33	0	0	0	0	0	0	0	0	0	0	0	0
2.34	0	0	0	0	0	0	0	0	0	0	0	0
2.35	0	0	0	0	0	0	0	0	1	0	0	1
2.36	0	0	0	0	0	0	0	0	1	0	0	1
2.37	0	0	0	0	0	0	0	0	0	0	0	0
2.38	0	0	0	0	0	0	0	0	1	0	0	1
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	14	88	0	14	90	0	28	178

~~TOP SECRET~~

TABLE A-1

A-1

~~TOP SECRET~~

~~TOP SECRET~~

MISSION • 1020-1 • INSTRUMENT • FRWD 10-01-65 DENSITY FREQ DISTR

DENSITY VALUE	PRIMARY			INTERMEDIATE			FULL			ALL LEVELS		
	MIN	MAX	LIM	MIN	MAX	LIM	MIN	MAX	LIM	MIN	MAX	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	2	2	1	146	146	137	103	103	101	251	251	239

MISSION 1020-1 INSTR - FRWD 10-01-65 PROCESSING AND EXPOSURE ANALYS

PROCESS LEVEL	SAMPLE SIZE	UNDER EXPOSED	UNDER PROCESSED	CORRECT EXP+PROC	OVER PROCESSED	OVER EXPOSED
PRIMARY	2	0 PC	50 PC	0 PC	0 PC	50 PC
INTERMEDIATE	146	0 PC	29 PC	66 PC	5 PC	0 PC
FULL	103	2 PC	0 PC	96 PC	2 PC	0 PC
ALL LEVELS	251	1 PC	18 PC	78 PC	4 PC	0 PC

PROCESS LEVEL	BASE + FCG	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 L
INTERMED	0.10-0.17	0.01-0.20	0.21-0.39	0.40-0.90	0.91-1.34	1.35 AND L
FULL	0.18 AND UP	0.01-0.39	-----	0.40-0.90	0.91-1.69	1.70 AND L

~~TOP SECRET~~

TABLE A-1

A-5

~~TOP SECRET~~

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MISSION • 1020-1 • INSTR • FRWD • 10-01-65 PLUT OF D MIN • TERRAIN • PROCESSING • PRIMARY
ARITH MEAN • 0.59 • MEDIAN • C.94 • STD DEV • 0.50 • RANGE • 0.23 TO 0.94 WITH 2 SAMPLES

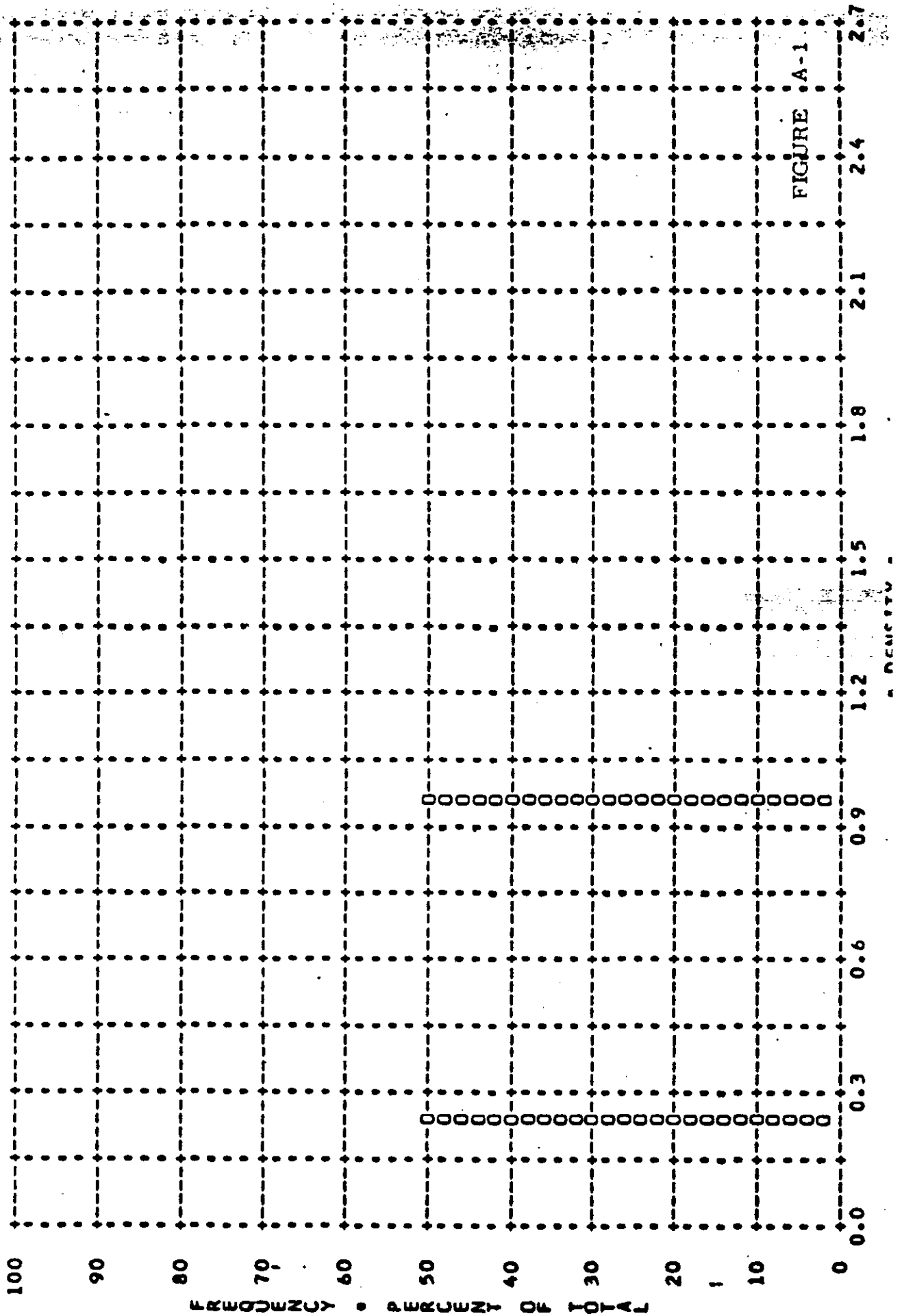
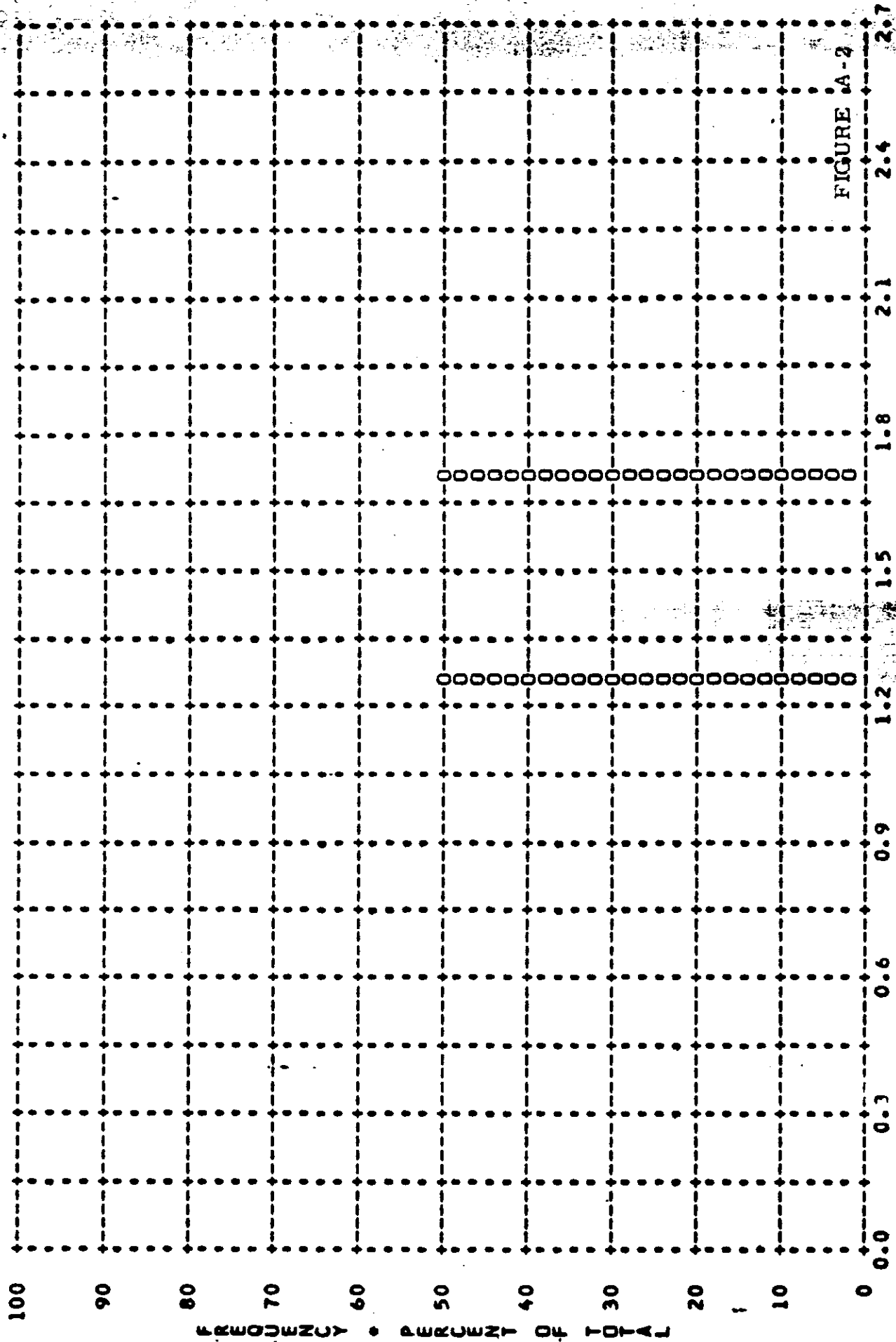


FIGURE A-1

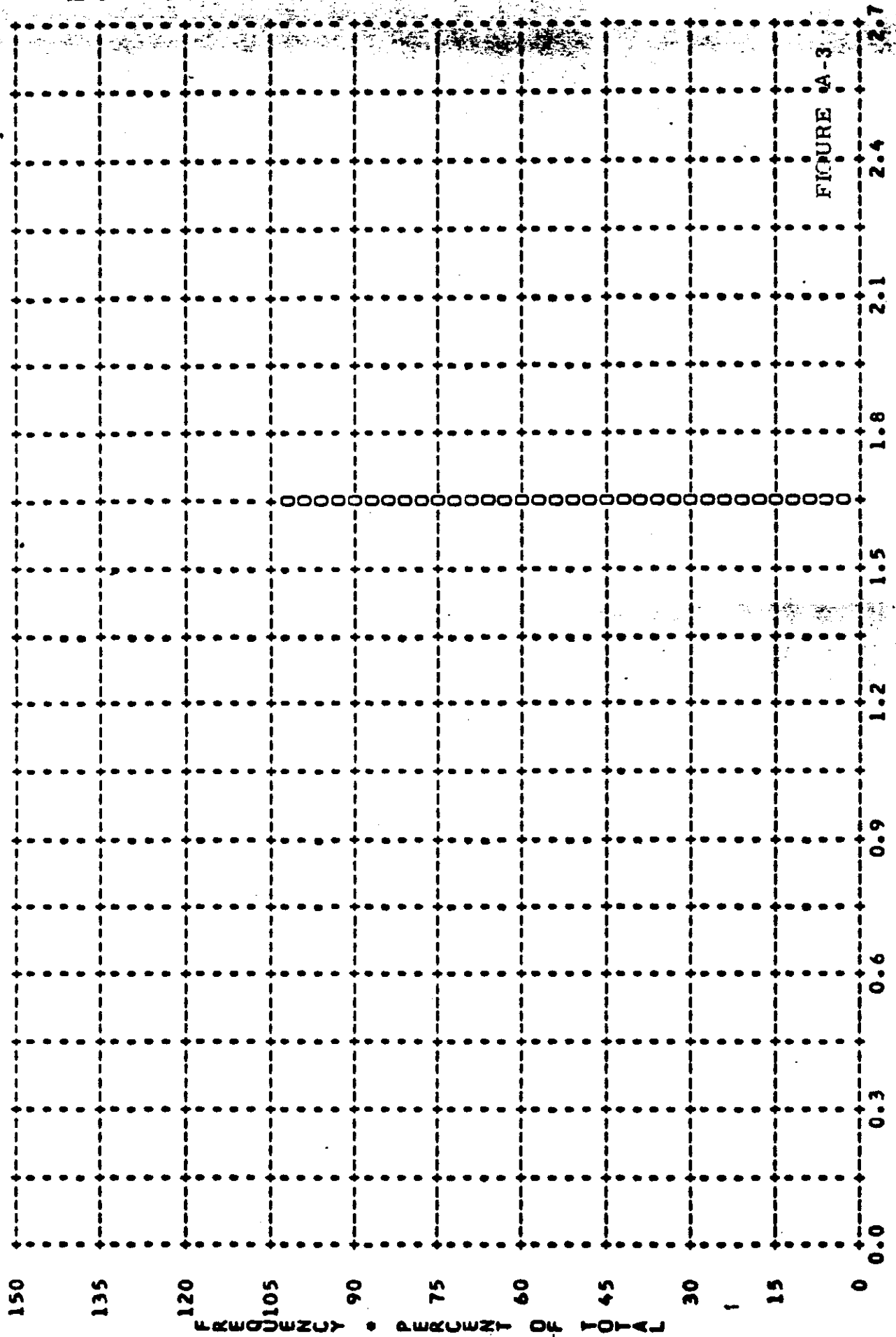
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MISSION • 1020-1 • INSTR • FRWD • 10-01-65 PLOT OF D MAX • TERRAIN • PROCESSING • PRIMARY
ARITH MEAN • 1.47 • MEDIAN • 1.69 • STD DEV • 0.31 • RANGE • 1.25 TO 1.69 WITH 2 SAMPLES



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MISSION • 1020-1 • INSTR • FRWD • 10-01-65 PLOT OF D MAX • CLOUD • PROCESSING • PRIMARY
ARITH MEAN • 1.64 • MEDIAN • 1.64 • STD DEV • 0.00 • RANGE • 1.64 TO 1.64 WITH 1 SAMPLES

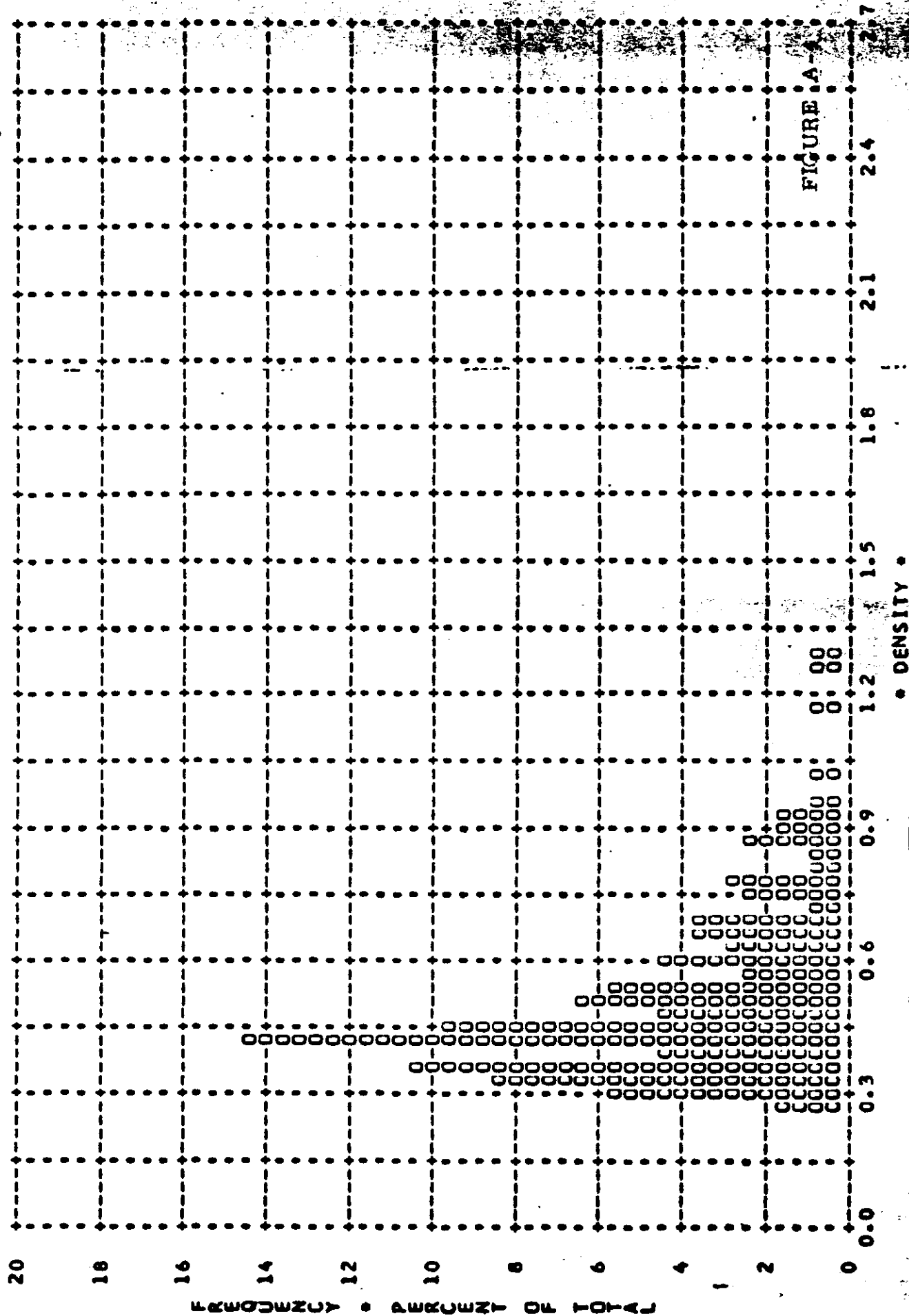


• DENSITY •

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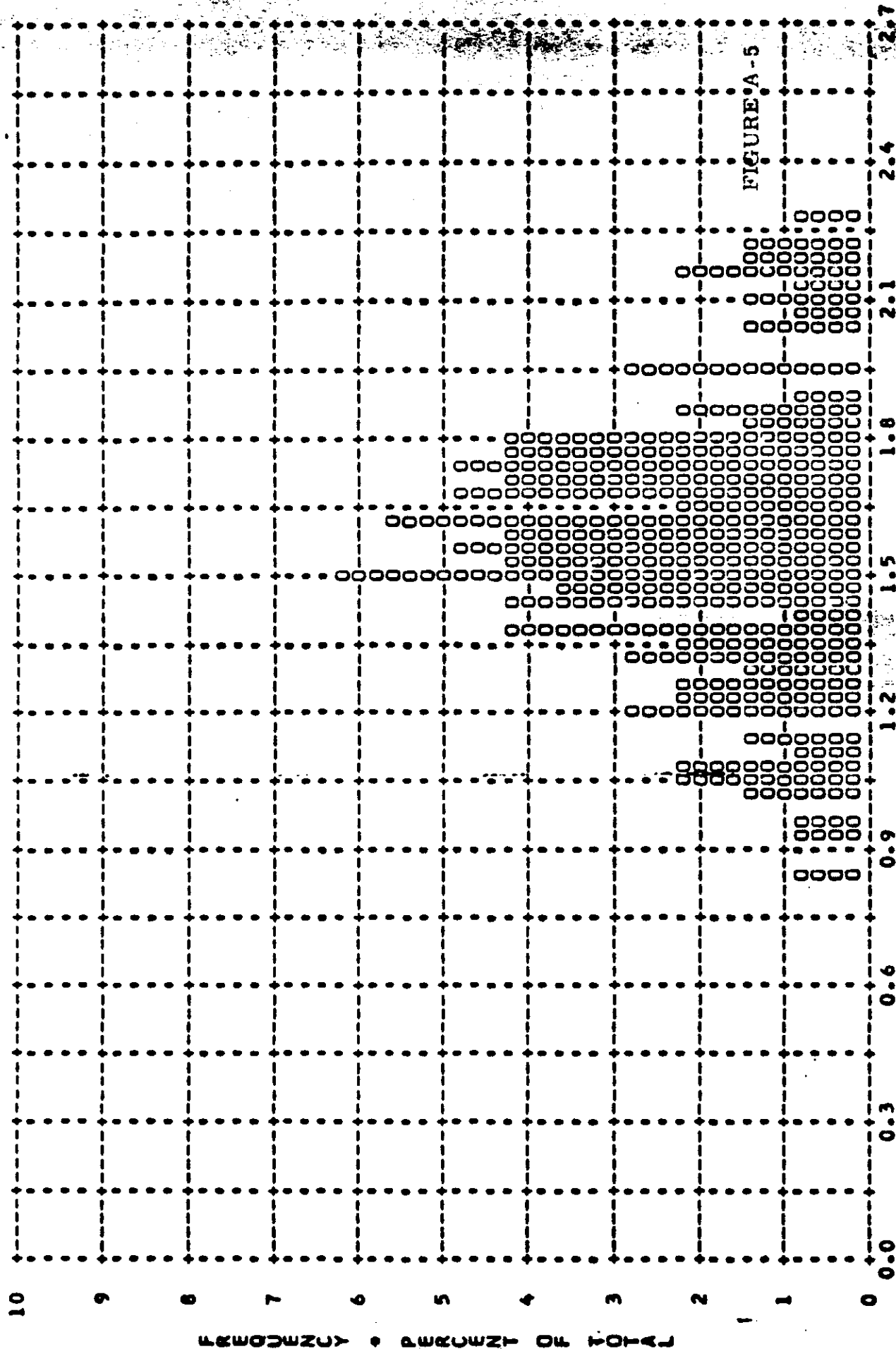
~~TOP SECRET~~

MISSION • 1020-1 • INSTR • FRWD • 10-01-65 PLOT OF 0 MIN • TERRAIN • PROCESSING • INTERMEDIATE
ARITH MEAN • 0.51 • MEDIAN • 0.45 • STD DEV • 0.20 • RANGE • 0.26 TO 1.28 WITH 146 SAMPLES



~~TOP SECRET~~

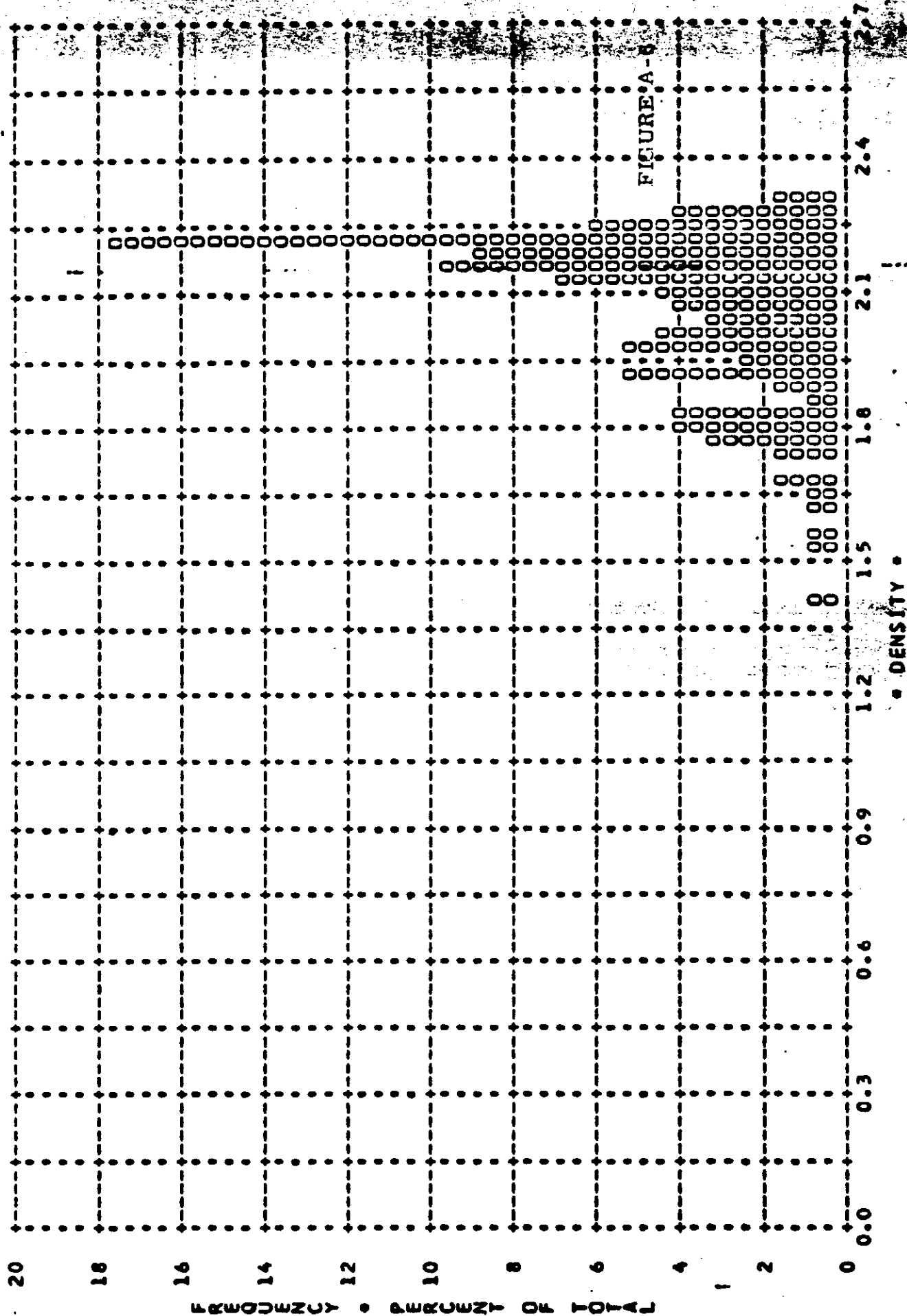
MISSION • 1020-1 • INSTR • FRWD • 10-01-65 PLOT OF D MAX • TERRAIN • PROCESSING • INTERMEDIATE
ARITH MEAN • 1.57 • MEDIAN • 1.57 • STD DEV • 0.30 • RANGE • 0.94 TO 2.28 WITH 146 SAMPLES



~~TOP SECRET~~

~~TOP SECRET~~

MISSION • 1020-1 • INSTR • FRWD • 10-01-65 PLOT OF D MAX • CLOUD • PROCESSING • INTERMEDIATE
ARITH MEAN • 2.05 • MEDIAN • 2.12 • STD DEV • 0.19 • RANGE • 1.40 TO 2.30 WITH 137 SAMPLES



~~TOP SECRET~~

MISSION • 1020-1 • INSTR • FRWD • 10-01-65 PLOT OF D MIN • TERRAIN • PROCESSING • FULL
ARITH MEAN • 0.61 • MEDIAN • 0.58 • STD DEV • 0.13 • RANGE • 0.36 TO 1.30 WITH 103 SAMPLES

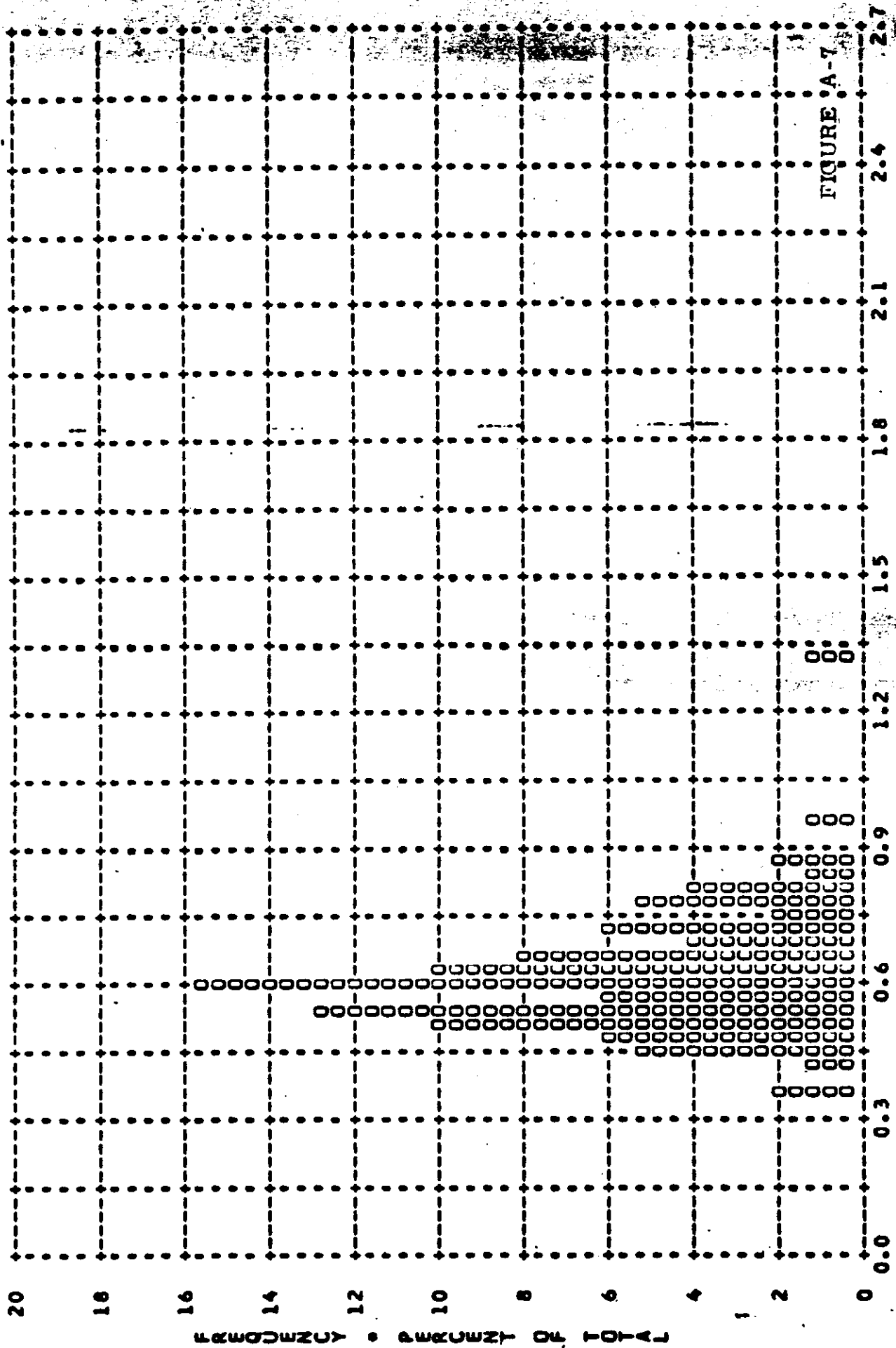
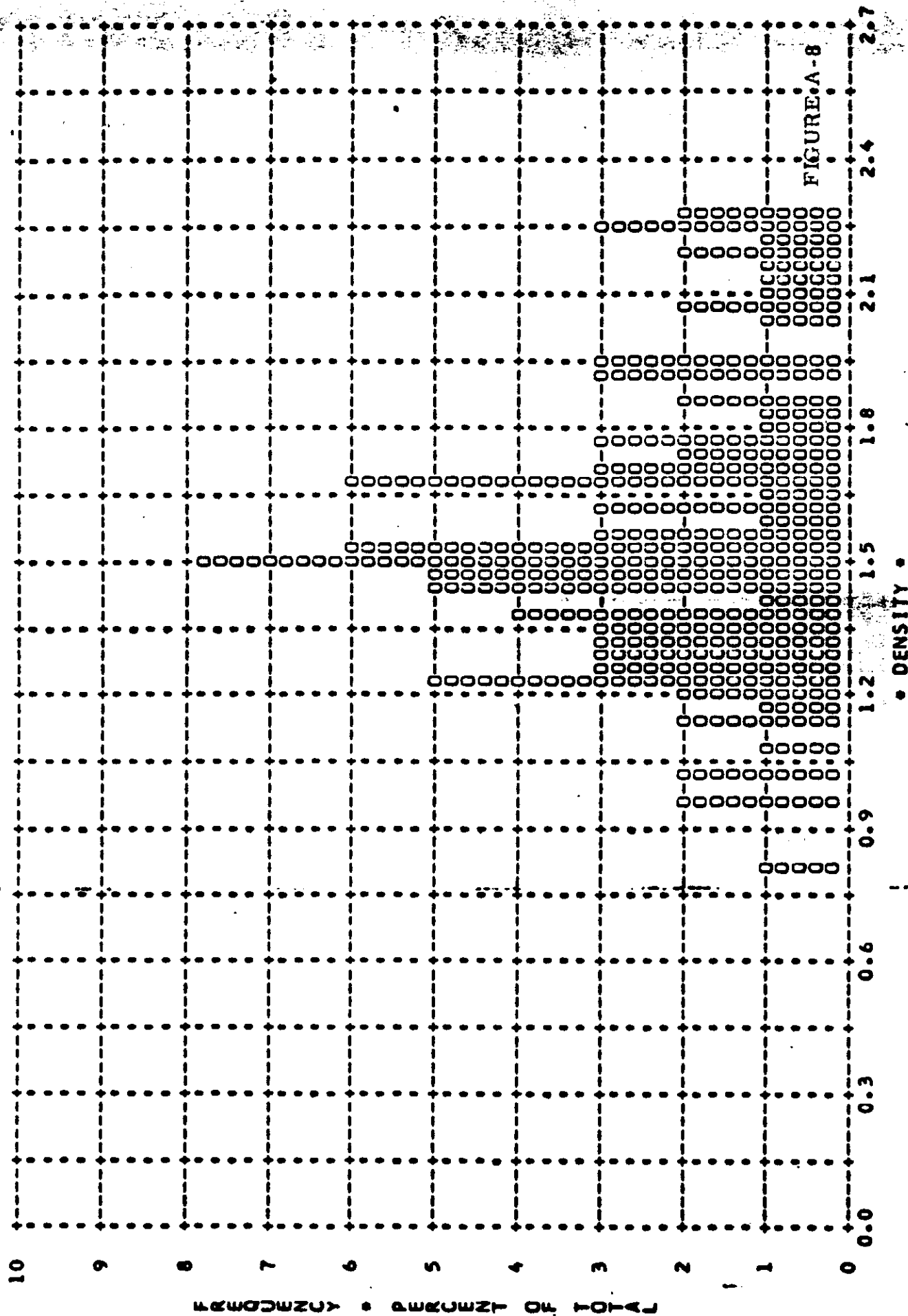


FIGURE A-7

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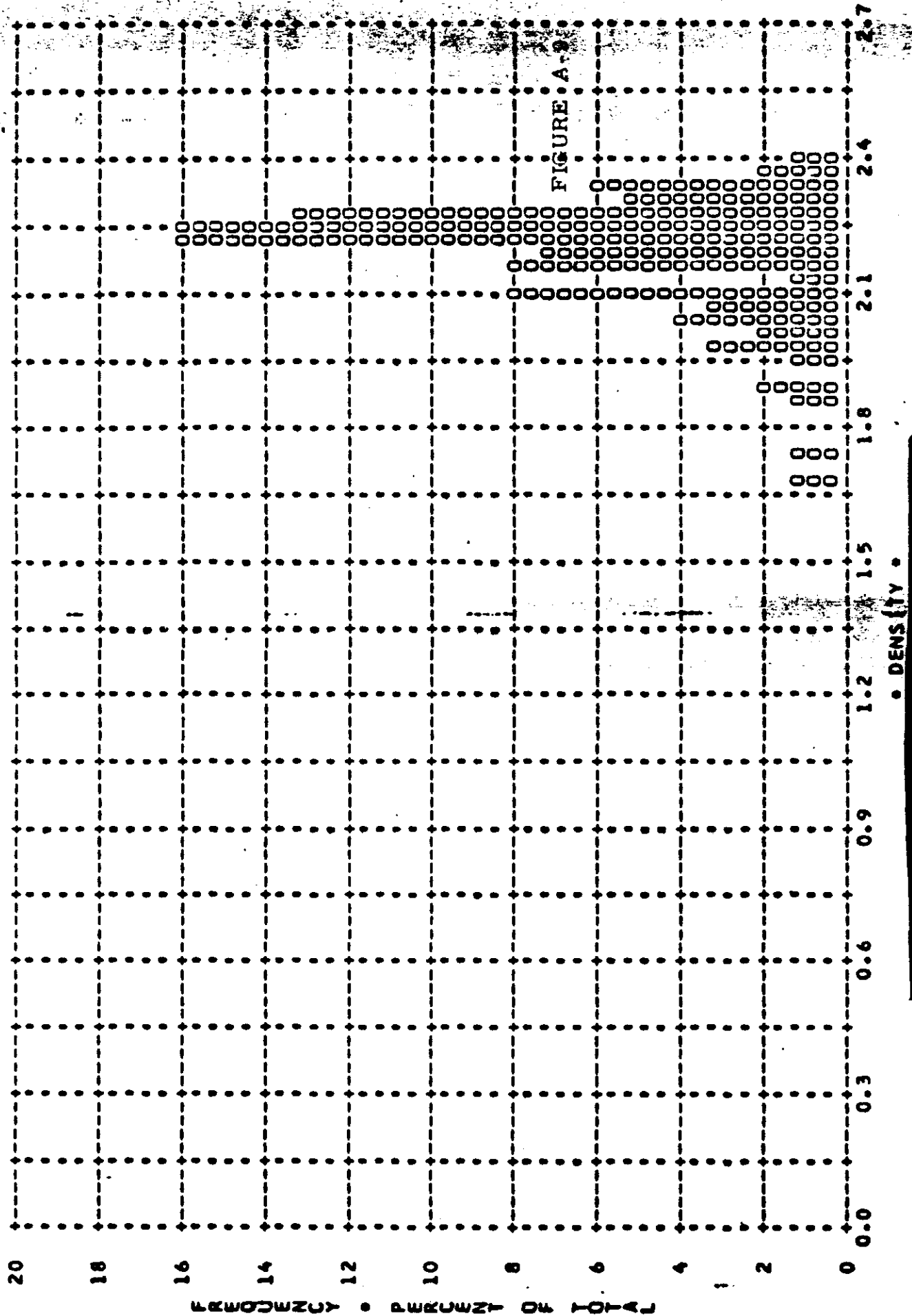
MISSION • 1020-1 • INSTR • FRWU • 10-01-65 PLOT OF D MAX • TERRAIN • PROCESSING • FULL
ARITH MEAN • 1.57 • MEDIAN • 1.51 • STD DEV • 0.34 • RANGE • 0.80 TO 2.28 WITH 103 SAMPLES



~~TOP SECRET~~

~~TOP SECRET~~

MISSION • 1020-1 • INSIR • FRWD • 10-01-65 PLOT OF 0 MAX • CLOUD • PROCESSING • FULL
ARITH MEAN • 2.18 • MEDIAN • 2.22 • STD DEV • 0.13 • RANGE • 1.66 TO 2.38 WITH 101 SAMPLES



~~TOP SECRET~~

MISSION • 1020-1 • INSTR • FRWD • 10-01-65 PLOT OF D MIN • TERRAIN • PROCESSING • ALL LEVELS
ARITH MEAN • 0.55 • MEDIAN • 0.52 • STD DEV • 0.18 • RANGE • 0.23 TO 1.30 WITH 251 SAMPLES

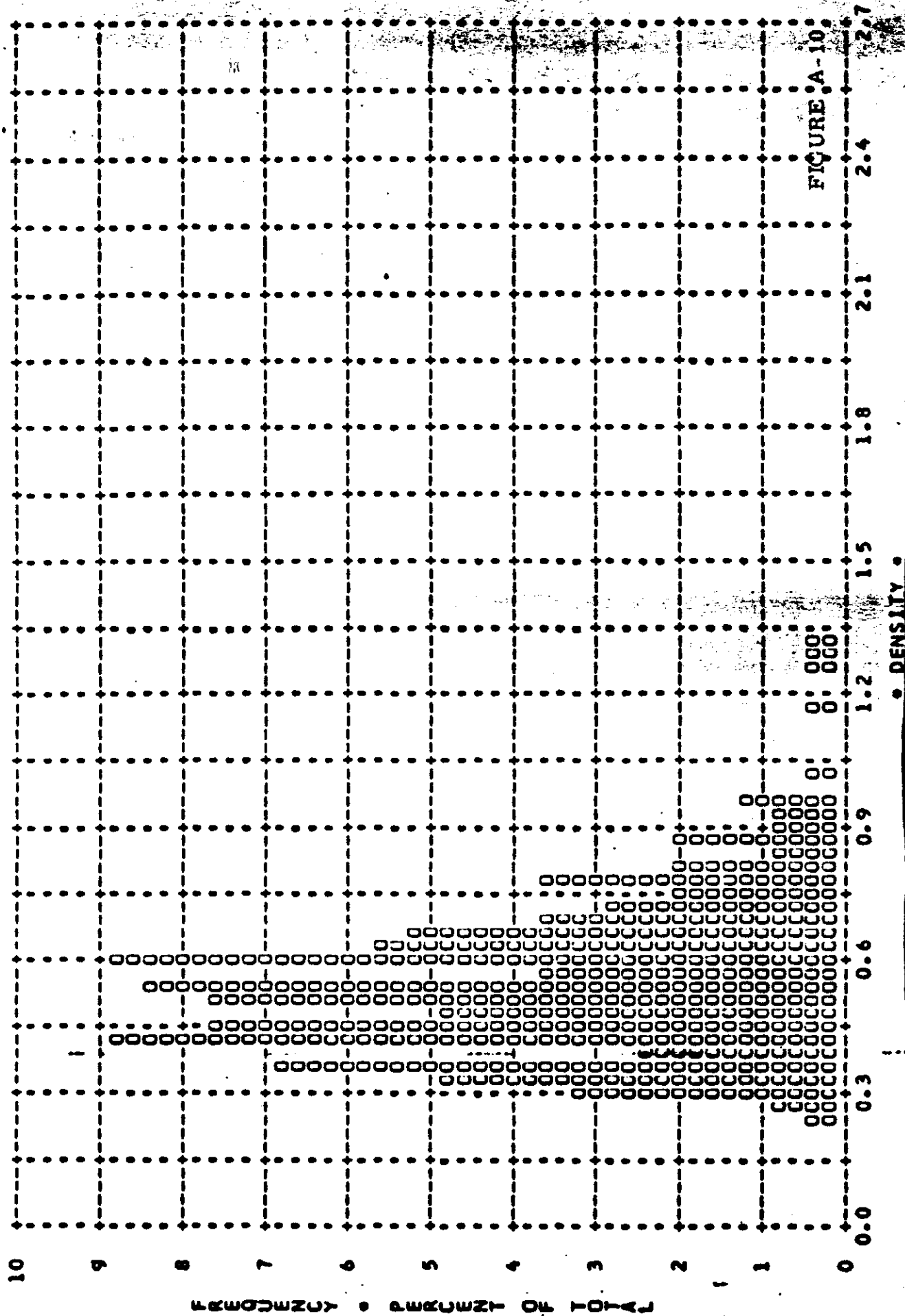
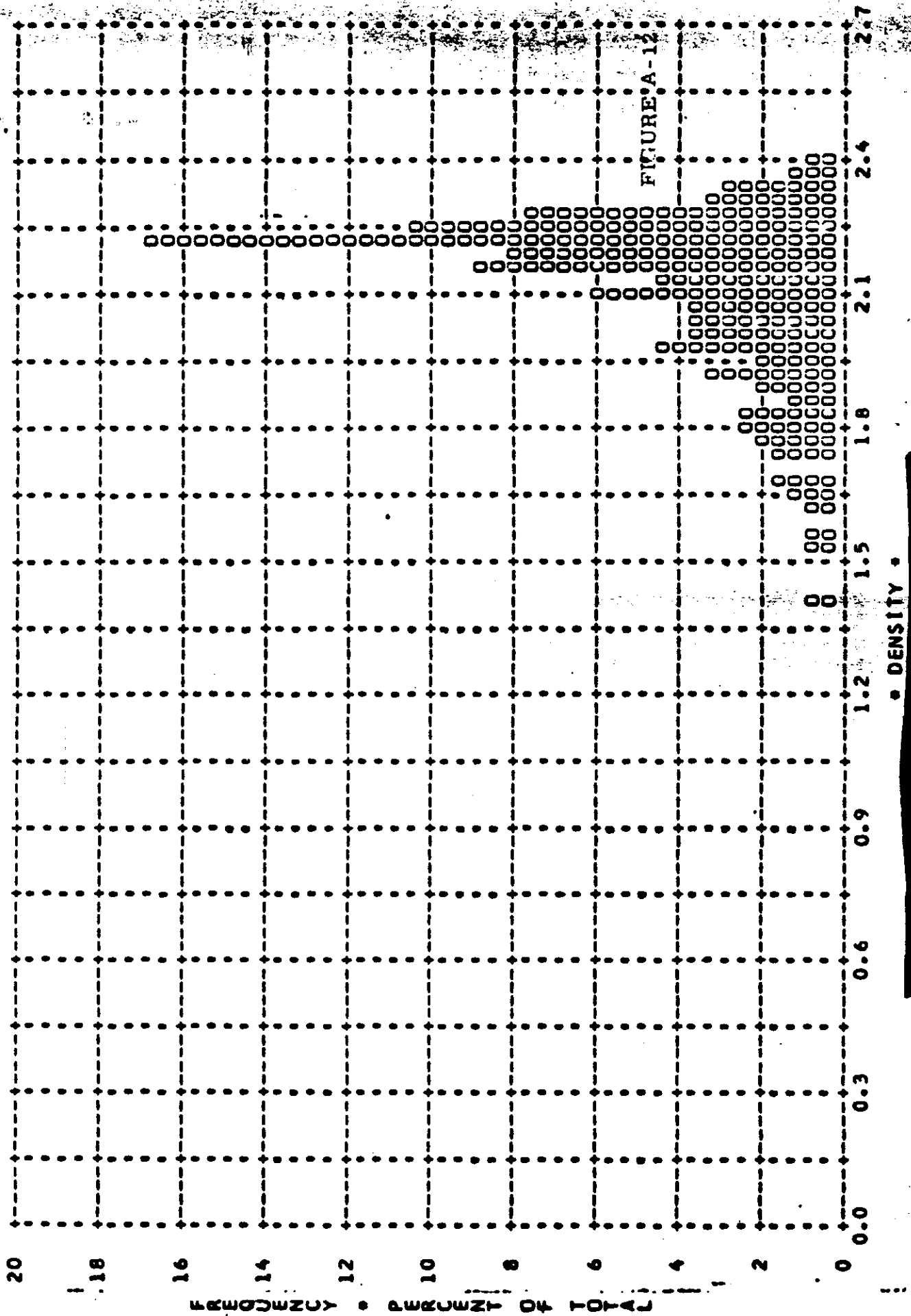


FIGURE A-10

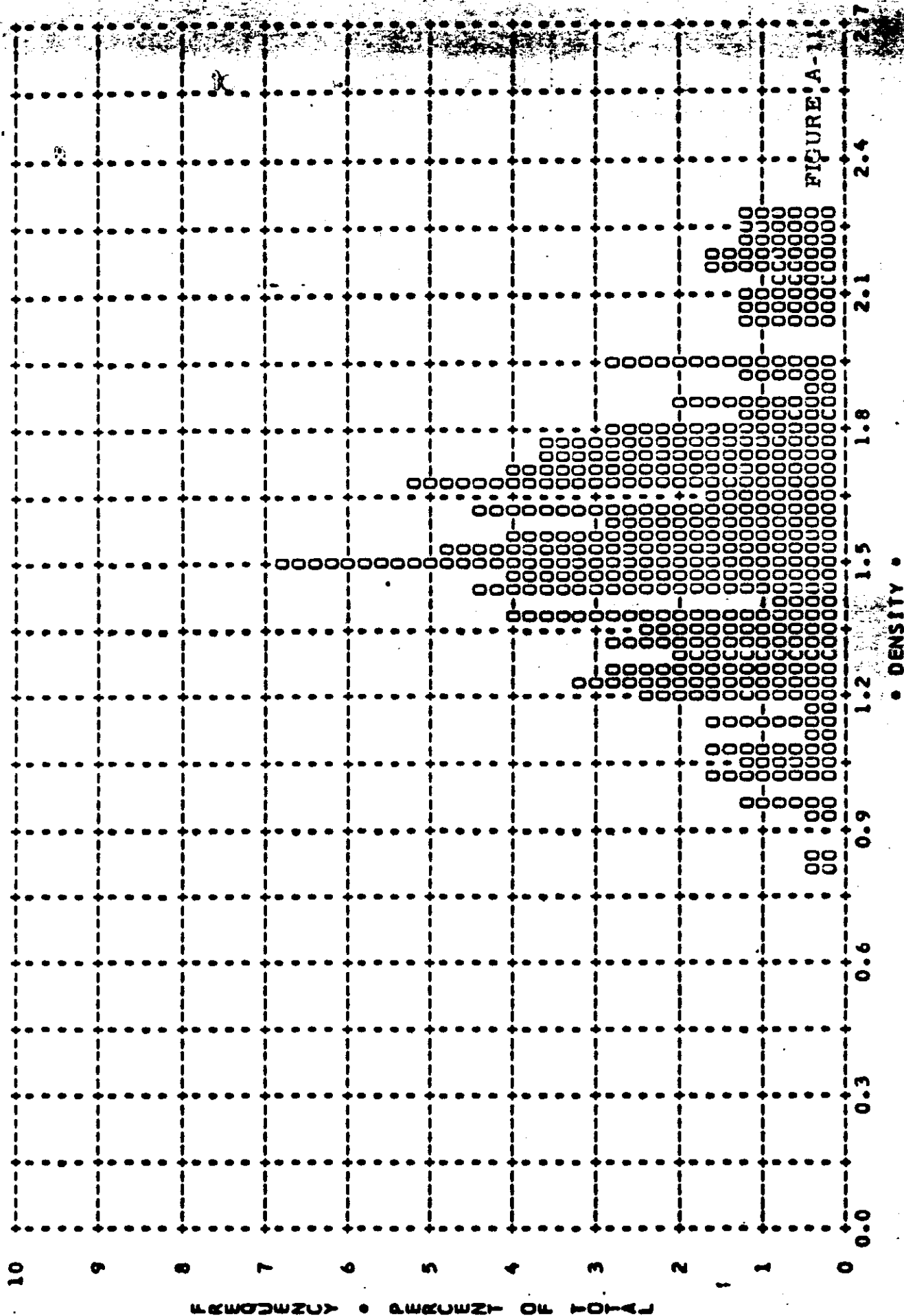
~~TOP SECRET~~

MISSION • 1020-1 • INSTR • FRWD • 10-01-65 PLOT OF D MAX • CLOUD • PROCESSING • ALL LEVELS
ARITH MEAN • 2.10 • MEDIAN • 2.16 • STD DEV • 0.18 • RANGE • 1.40 TO 2.38 WITH 239 SAMPLES



~~TOP SECRET~~

MISSION • 1020-1 • INSTR • FRWD • 10-01-65 PLOT OF D MAX • TERRAIN • PROCESSING • ALL LEVELS
ARITH MEAN • 1.57 • MEDIAN • 1.54 • STD DEV • 0.31 • RANGE • 0.80 TO 2.28 WITH 251 SAMPLES



~~TOP SECRET~~

MISSION • 1020-1 • INSTRUMENT • AFT 10-01-65 DENSITY FREQ DISTR

DENSITY VALUE	PRIMARY			INTERMEDIATE			FULL			ALL LEVELS		
	MIN	MAX	LIM	MIN	MAX	LIM	MIN	MAX	LIM	MIN	MAX	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	0	0	0	0	0	0
0.29	0	0	0	0	0	0	0	0	0	0	0	0
0.30	0	0	0	0	0	0	0	0	0	0	0	0
0.31	0	0	0	0	0	0	0	0	0	0	0	0
0.32	0	0	0	0	0	0	0	0	0	0	0	0
0.33	0	0	0	0	0	0	0	0	0	0	0	0
0.34	0	0	0	0	0	0	0	0	0	0	0	0
0.35	0	0	0	0	0	0	0	0	0	0	0	0
0.36	0	0	0	0	0	0	0	0	0	0	0	0
0.37	0	0	0	0	0	0	0	0	0	0	0	0
0.38	0	0	0	0	0	0	0	0	0	0	0	0
0.39	0	0	0	0	0	0	0	0	0	0	0	0
0.40	0	0	0	0	0	0	0	0	0	0	0	0
0.41	0	0	0	0	0	0	0	0	0	0	0	0
0.42	0	0	0	0	0	0	0	0	0	0	0	0
0.43	0	0	0	0	0	0	0	0	0	0	0	0
0.44	0	0	0	0	0	0	0	0	0	0	0	0
0.45	0	0	0	0	0	0	0	0	0	0	0	0
0.46	0	0	0	0	0	0	0	0	0	0	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	0	0	0	0	0	0	0	0	0
0.50	0	0	0	0	0	0	0	0	0	0	0	0
SUBTOTAL	1	0	0	9	0	0	13	0	0	113	0	0

~~TOP SECRET~~

TABLE A-2

~~TOP SECRET~~

~~TOP SECRET~~

MISSION • 1020-1 • INSTRUMENT • AFT 10-01-65 DENSITY FREQ DISTR

DENSITY VALUE	PRIMARY			INTERMEDIATE			FULL			ALL LEVELS		
	MIN	MAX	LIM	MIN	MAX	LIM	MIN	MAX	LIM	MIN	MAX	LIM
0.51	0	0	0	2	0	0	0	0	0	2	0	0
0.52	0	0	0	6	0	0	2	0	0	8	0	0
0.53	0	0	0	3	0	0	1	0	0	4	0	0
0.54	0	0	0	3	0	0	6	0	0	9	0	0
0.55	0	0	0	4	0	0	6	0	0	10	0	0
0.56	0	0	0	4	0	0	5	0	0	9	0	0
0.57	0	0	0	4	0	0	1	0	0	2	0	0
0.58	0	0	0	2	0	0	2	0	0	4	0	0
0.59	0	0	0	0	0	0	1	0	0	1	0	0
0.60	0	0	0	5	0	0	4	0	0	9	0	0
0.61	0	0	0	5	0	0	1	0	0	4	0	0
0.62	0	0	0	5	0	0	2	0	0	7	0	0
0.63	0	0	0	0	0	0	2	0	0	1	0	0
0.64	0	0	0	3	0	0	0	0	0	3	0	0
0.65	0	0	0	2	0	0	1	0	0	3	0	0
0.66	0	0	0	2	0	0	3	0	0	2	0	0
0.67	0	0	0	4	0	0	0	0	0	2	0	0
0.68	0	0	0	6	0	0	7	0	0	1	0	0
0.69	0	0	0	0	0	0	1	0	0	1	0	0
0.70	0	0	0	4	0	0	0	0	0	4	0	0
0.71	0	0	0	0	0	0	0	0	0	0	0	0
0.72	0	0	0	3	0	0	1	0	0	4	0	0
0.73	0	0	0	0	0	0	0	0	0	0	0	0
0.74	0	0	0	0	0	0	0	0	0	0	0	0
0.75	0	0	0	2	0	0	0	0	0	3	0	0
0.76	0	0	0	0	0	0	0	0	0	0	0	0
0.77	0	0	0	1	0	0	0	0	0	1	0	0
0.78	0	0	0	1	0	0	0	0	0	1	0	0
0.79	0	0	0	0	0	0	0	0	0	0	0	0
0.80	0	0	0	4	0	0	2	0	0	6	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	0	0	0	0	0	0	2	0	0
0.84	0	0	0	2	0	0	0	0	0	2	0	0
0.85	0	0	0	1	0	0	0	0	0	1	0	0
0.86	0	0	0	1	0	0	0	0	0	1	0	0
0.87	0	0	0	1	0	0	0	0	0	1	0	0
0.88	0	0	0	2	0	0	0	0	0	2	0	0
0.89	0	0	0	1	0	0	0	0	0	1	0	0
0.90	0	0	0	1	0	0	0	0	0	1	0	0
0.91	0	0	0	0	0	0	0	0	0	0	0	0
0.92	0	0	0	0	0	0	1	0	0	0	0	0
0.93	0	0	0	1	0	0	0	0	0	1	0	0
0.94	0	0	0	0	0	0	0	0	0	0	0	0
0.95	0	0	0	2	0	0	0	0	0	2	0	0
0.96	0	0	0	1	0	0	0	0	0	1	0	0
0.97	0	0	0	0	0	0	0	0	0	0	0	0
0.98	0	0	0	1	0	0	0	0	0	1	0	0
0.99	0	0	0	1	0	0	0	0	0	1	0	0
1.00	0	0	0	1	0	0	0	0	0	1	0	0
SUBTOTAL	0	0	0	86	18	0	52	5	0	138	23	0

~~TOP SECRET~~

TABLE A-2

~~TOP SECRET~~

~~TOP SECRET~~

MISSION • 1020-1 • INSTRUMENT • AFT 10-01-65 DENSITY FREQ DISTR

DENSITY VALUE	PRIMARY			INTERMEDIATE			FULL			ALL LEVELS		
	MIN	MAX	LIM	MIN	MAX	LIM	MIN	MAX	LIM	MIN	MAX	LIM
1.01	0	0	0	0	0	0	0	1	0	0	1	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	1	0	0	0	0	0	0	0
1.05	0	0	0	1	1	0	0	0	0	1	1	0
1.06	0	0	0	0	1	0	0	1	0	0	2	0
1.07	0	0	0	0	1	0	0	0	0	0	1	0
1.08	0	0	0	0	5	0	0	0	0	0	5	0
1.09	0	0	0	0	0	0	0	1	0	0	1	0
1.10	0	0	0	1	0	0	0	2	0	1	4	0
1.11	0	0	0	0	2	0	0	0	0	0	0	0
1.12	0	0	0	0	1	0	0	0	0	0	1	0
1.13	0	0	0	0	0	0	0	0	0	0	0	0
1.14	0	0	0	0	1	0	0	0	0	0	1	0
1.15	0	0	0	0	0	0	0	0	0	0	0	0
1.16	0	0	0	0	2	0	0	0	0	0	2	0
1.17	0	0	0	0	0	0	0	0	0	0	0	0
1.18	0	0	0	0	0	0	0	0	0	0	0	0
1.19	0	0	0	0	5	0	0	2	0	0	7	0
1.20	0	0	0	2	1	0	0	1	0	2	0	0
1.21	0	0	0	0	0	0	0	0	0	0	0	0
1.22	0	0	0	0	5	1	0	0	0	0	5	1
1.23	0	0	0	0	0	0	0	0	0	0	0	0
1.24	0	0	0	0	4	0	0	0	0	0	4	0
1.25	0	0	0	0	2	0	1	0	0	0	3	0
1.26	0	0	0	0	0	1	0	1	0	0	1	0
1.27	0	0	0	0	0	0	0	0	0	0	0	0
1.28	0	0	0	0	4	0	0	0	0	0	5	0
1.29	0	0	0	0	1	0	0	0	0	0	1	0
1.30	0	0	0	0	5	0	0	2	0	0	7	0
1.31	0	0	0	0	0	0	0	1	0	0	1	0
1.32	0	0	0	0	3	0	1	0	0	0	4	0
1.33	0	0	0	0	1	0	2	0	0	0	3	0
1.34	0	0	0	0	2	0	0	0	0	0	2	0
1.35	0	0	0	0	3	0	0	0	0	0	3	0
1.36	0	0	0	0	1	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	3	0	0	3	0	0	6	0
1.39	0	0	0	0	1	0	0	0	0	0	1	0
1.40	0	0	0	0	4	1	0	1	0	0	5	1
1.41	0	0	0	0	4	0	1	1	0	0	5	0
1.42	0	0	0	0	4	0	0	0	0	0	4	0
1.43	0	0	0	0	2	0	0	0	0	0	2	0
1.44	0	0	0	0	4	0	0	3	0	0	7	0
1.45	0	0	0	0	1	0	0	0	0	0	1	0
1.46	0	0	0	0	5	0	0	3	0	0	8	0
1.47	0	0	0	0	2	0	1	1	0	0	3	0
1.48	0	0	0	0	4	0	0	0	0	0	5	0
1.49	0	0	0	0	0	0	0	0	0	0	0	0
1.50	0	0	0	4	9	5	0	3	0	4	12	5
SUBTOTAL	0	0	0	4	90	5	0	32	0	4	122	5

~~TOP SECRET~~

TABLE A-2

A-31

~~TOP SECRET~~

~~TOP SECRET~~

MISSION • 1020-1 • INSTRUMENT • AFT 10-01-65 DENSITY FREQ DISTR

DENSITY VALUE	PRIMARY			INTERMEDIATE			FULL			ALL LEVELS		
	MIN	MAX	LIM	MIN	MAX	LIM	MIN	MAX	LIM	MIN	MAX	LIM
1.51	0	0	0	0	2	0	0	2	0	0	3	0
1.52	0	0	0	0	3	0	0	2	0	0	5	0
1.53	0	0	0	0	1	0	0	0	0	0	1	0
1.54	0	0	0	0	1	0	0	2	0	0	3	0
1.55	0	0	0	0	1	0	0	1	0	0	2	0
1.56	0	0	0	0	6	0	0	1	0	0	7	0
1.57	0	0	0	0	0	0	0	0	0	0	0	0
1.58	0	0	0	0	1	0	0	2	0	0	3	0
1.59	0	0	0	0	0	0	0	5	0	0	8	0
1.60	0	0	0	0	3	0	0	1	0	0	0	0
1.61	0	0	0	0	0	0	0	1	0	0	1	0
1.62	0	0	0	0	4	0	0	0	0	0	5	0
1.63	0	0	0	0	1	0	0	0	0	0	7	0
1.64	0	0	0	0	5	0	0	2	0	0	1	0
1.65	0	0	0	0	1	0	0	0	0	0	1	0
1.66	0	0	0	0	3	0	0	0	0	0	3	0
1.67	0	0	0	0	0	0	0	0	0	0	5	0
1.68	0	0	0	0	3	0	0	2	0	0	5	0
1.69	0	0	0	0	3	0	0	0	0	0	5	0
1.70	0	0	0	0	3	0	0	1	0	0	5	0
1.71	0	0	0	0	1	0	0	0	0	0	1	0
1.72	0	0	0	0	2	0	0	0	0	0	3	0
1.73	0	0	0	0	0	0	0	0	0	0	0	0
1.74	0	0	0	0	2	0	0	0	0	0	2	0
1.75	0	0	0	0	0	0	0	0	0	0	0	0
1.76	0	0	0	0	0	0	0	0	0	0	0	0
1.77	0	0	0	0	0	0	0	0	0	0	0	0
1.78	0	0	0	0	1	0	0	0	0	0	1	0
1.79	0	0	0	0	0	0	0	0	0	0	0	0
1.80	0	0	0	0	4	0	0	1	0	0	5	0
1.81	0	0	0	0	0	0	0	0	0	0	0	0
1.82	0	0	0	0	5	0	0	0	0	0	5	0
1.83	0	0	0	0	0	0	0	0	0	0	0	0
1.84	0	0	0	0	1	0	0	0	0	0	2	0
1.85	0	0	0	0	0	0	0	0	0	0	3	0
1.86	0	0	0	0	0	0	0	1	0	0	0	0
1.87	0	0	0	0	1	0	0	0	0	0	1	0
1.88	0	0	0	0	0	0	0	0	0	0	0	0
1.89	0	0	0	0	1	0	0	2	0	0	3	0
1.90	0	0	0	0	0	0	0	0	0	0	0	0
1.91	0	0	0	0	0	0	0	0	0	0	0	0
1.92	0	0	0	0	2	0	0	0	0	0	2	0
1.93	0	0	0	0	0	0	0	0	0	0	0	0
1.94	0	0	0	0	3	0	0	1	0	0	4	0
1.95	0	0	0	0	4	0	0	0	0	0	5	0
1.96	0	0	0	0	4	0	0	0	0	0	3	0
1.97	0	0	0	0	2	0	0	0	0	0	1	0
1.98	0	0	0	0	1	0	0	0	0	0	0	0
1.99	0	0	0	0	3	0	0	1	0	0	4	0
2.00	0	0	0	0	0	0	0	0	0	0	0	0
SUBTOTAL	0	1	1	0	62	64	0	27	13	0	90	78

~~TOP SECRET~~

TABLE A-2

A-22

~~TOP SECRET~~

~~TOP SECRET~~

MISSION • 1020-1 • INSTRUMENT • AFT 10-01-65 DENSITY FREQ DISTR

DENSITY VALUE	PRIMARY			INTERMEDIATE			FULL			ALL LEVELS		
	MIN	MAX	LIM	MIN	MAX	LIM	MIN	MAX	LIM	MIN	MAX	LIM
2.01	0	0	0	0	0	0	0	0	0	0	0	0
2.02	0	0	0	0	2	4	0	0	0	0	2	4
2.03	0	0	0	0	0	1	0	0	0	0	0	1
2.04	0	0	0	0	1	3	0	0	0	0	2	6
2.05	0	0	0	0	1	4	0	0	0	0	2	3
2.06	0	0	0	0	1	4	0	0	0	0	1	4
2.07	0	0	0	0	2	0	0	0	0	0	2	1
2.08	0	0	0	0	2	6	0	0	0	0	2	7
2.09	0	0	0	0	3	1	0	0	0	0	3	2
2.10	0	0	0	0	0	1	0	0	0	0	1	1
2.11	0	0	0	0	0	1	0	0	0	0	0	1
2.12	0	0	0	0	2	1	0	0	0	0	2	1
2.13	0	0	0	0	0	4	0	0	0	0	0	1
2.14	0	0	0	0	0	9	0	0	0	0	0	1
2.15	0	0	0	0	1	6	0	0	0	0	1	8
2.16	0	0	0	0	2	9	0	0	0	0	2	1
2.17	0	0	0	0	1	2	0	0	0	0	1	3
2.18	0	0	0	0	1	8	0	0	0	0	1	5
2.19	0	0	0	0	0	0	0	0	0	0	0	0
2.20	0	0	0	0	1	7	0	0	0	0	1	2
2.21	0	0	0	0	0	3	0	0	0	0	0	3
2.22	0	0	0	0	0	8	0	0	0	0	0	1
2.23	0	0	0	0	0	1	0	0	0	0	0	3
2.24	0	0	0	0	0	0	0	0	0	0	0	1
2.25	0	0	0	0	0	2	0	0	0	0	0	3
2.26	0	0	0	0	0	1	0	0	0	0	0	3
2.27	0	0	0	0	0	0	0	0	0	0	0	0
2.28	0	0	0	0	0	0	0	0	0	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	0
2.31	0	0	0	0	0	0	0	0	0	0	0	0
2.32	0	0	0	0	0	0	0	0	0	0	0	0
2.33	0	0	0	0	0	0	0	0	0	0	0	0
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	19	112	0	1	44	0	20	156

~~TOP SECRET~~

TABLE A-2

A-18

~~TOP SECRET~~

~~TOP SECRET~~

MISSION • 1020-1 • INSTRUMENT • AFT 10-01-65 DENSITY FREQ DISTR

DENSITY VALUE	PRIMARY			INTERMEDIATE			FULL			ALL LEVELS		
	MIN	MAX	LIM	MIN	MAX	LIM	MIN	MAX	LIM	MIN	MAX	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	1	189	189	181	65	65	57	255	255	239

MISSION 1020-1 INSTR - AFT 10-01-65 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	189	0 PC	25 PC	70 PC	5 PC	0 PC
FULL	65	2 PC	0 PC	95 PC	3 PC	0 PC
ALL LEVELS	255	0 PC	18 PC	76 PC	5 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

~~TOP SECRET~~

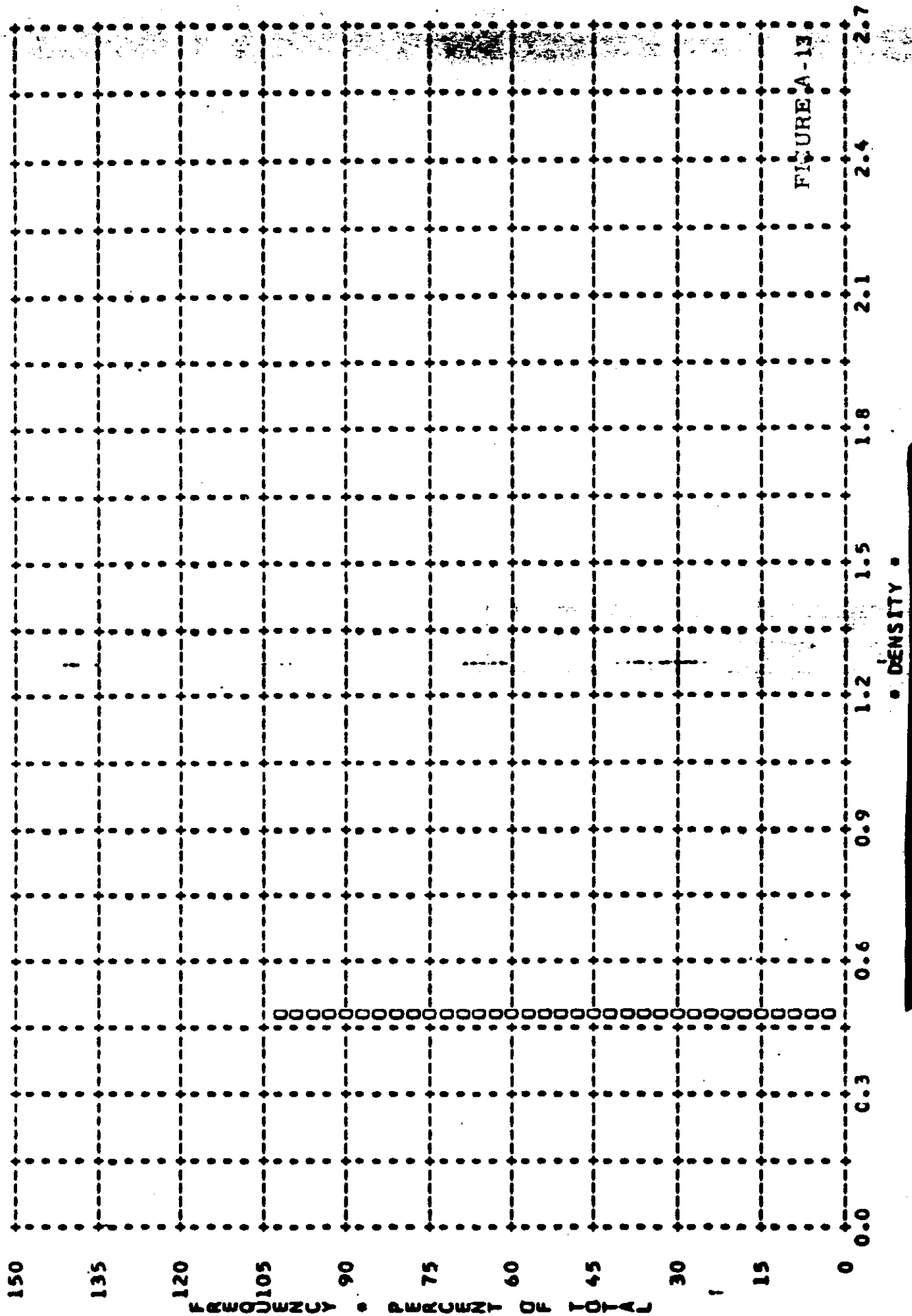
E A-

A-04

~~TOP SECRET~~

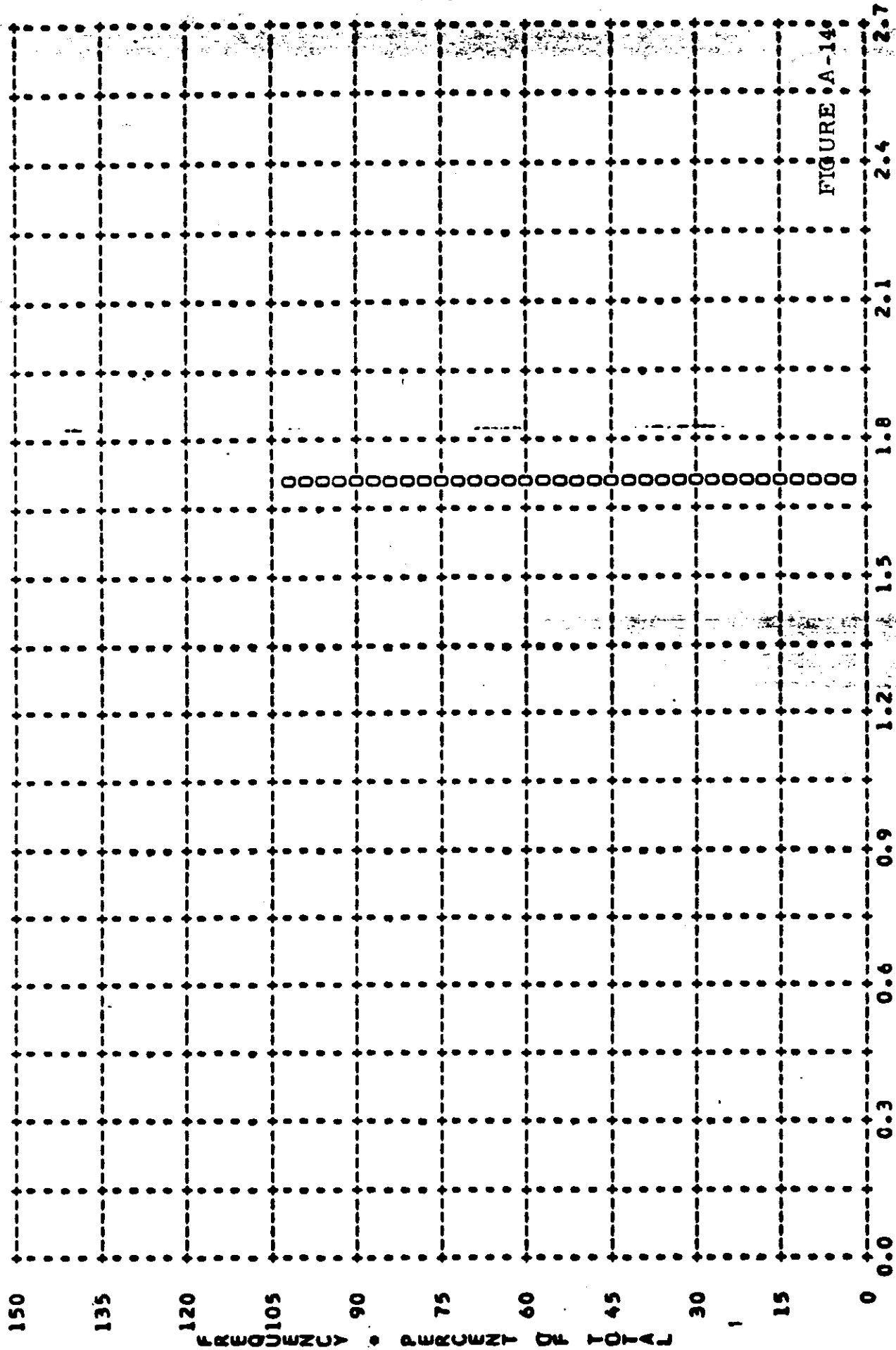
~~TOP SECRET~~

MISSION • 1020-1 • INSTR • AFT • 10-01-65 PLOT OF 0 MIN • TERRAIN • PROCESSING • PRIMARY
ARITH MEAN • 0.46 • MEDIAN • 0.46 • STD DEV • 0.00 • RANGE • 0.46 TO 0.46 WITH 1 SAMPLES



~~TOP SECRET~~

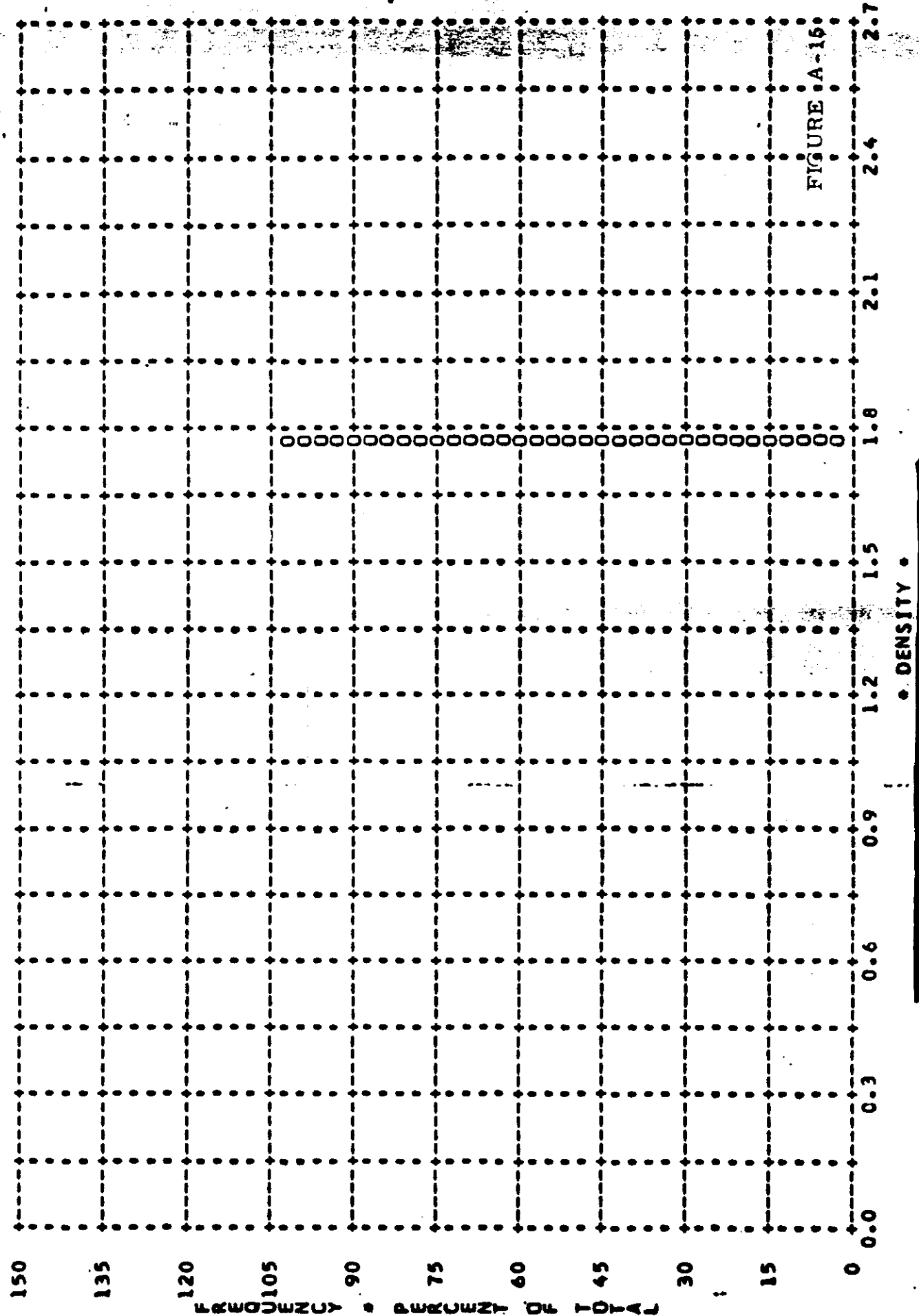
MISSION • 1020-1 • INSTR • AFT • 10-01-65 PLOT OF D MAX • TERRAIN • PROCESSING • PRIMARY
ARITH MEAN • 1.70 • MEDIAN • 1.70 • STD DEV • 0.00 • RANGE • 1.70 TO 1.70 WITH 1 SAMPLES



~~TOP SECRET~~

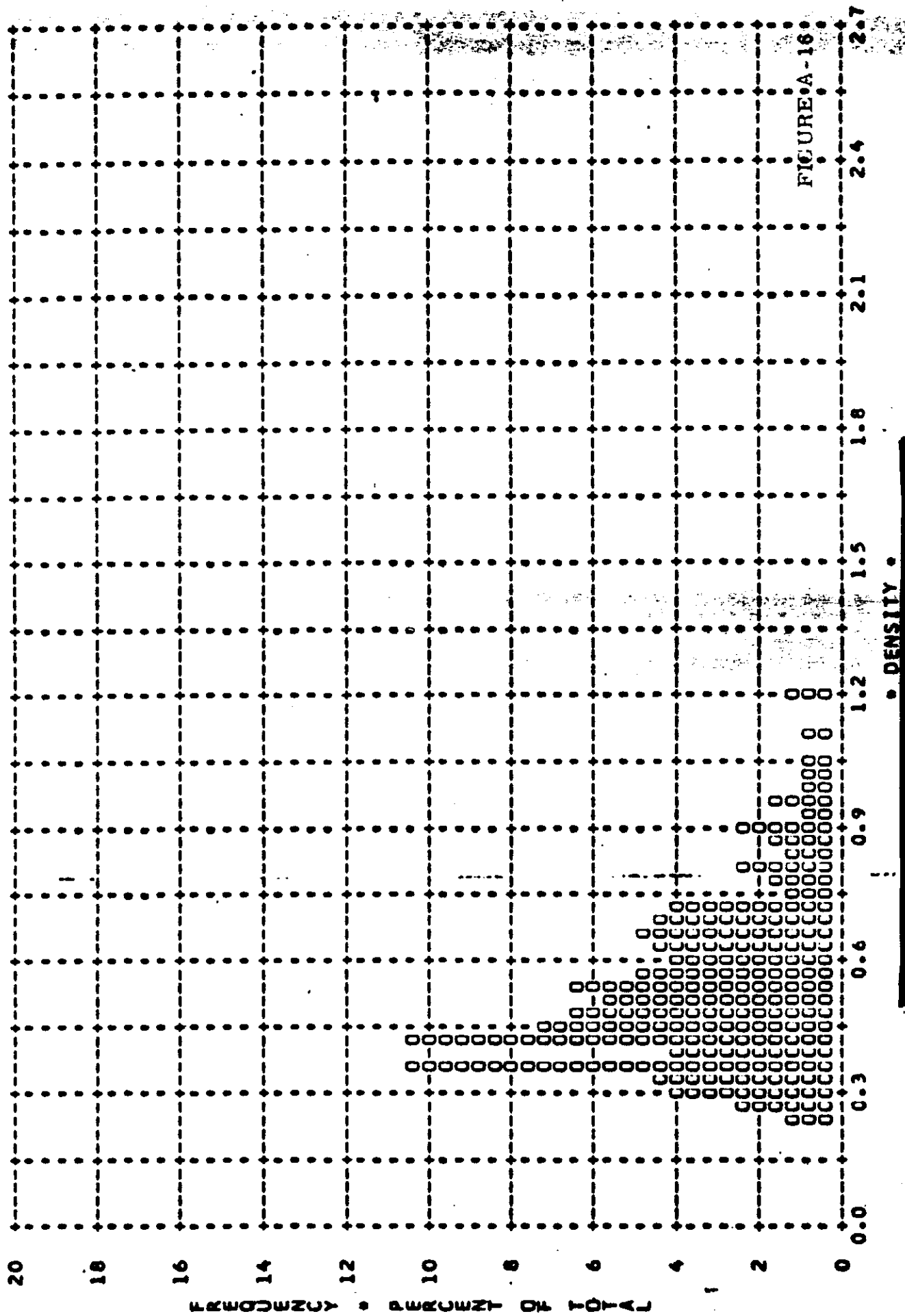
~~TOP SECRET~~

MISSION • 1020-1 • INSTR • AFT • 10-01-65 PLOT OF D MAX • CLOUD • PROCESSING • PRIMARY
ARITH MEAN • 1.76 • MEDIAN • 1.76 • STD DEV • 0.00 • RANGE • 1.76 TO 1.76 WITH 1 SAMPLES



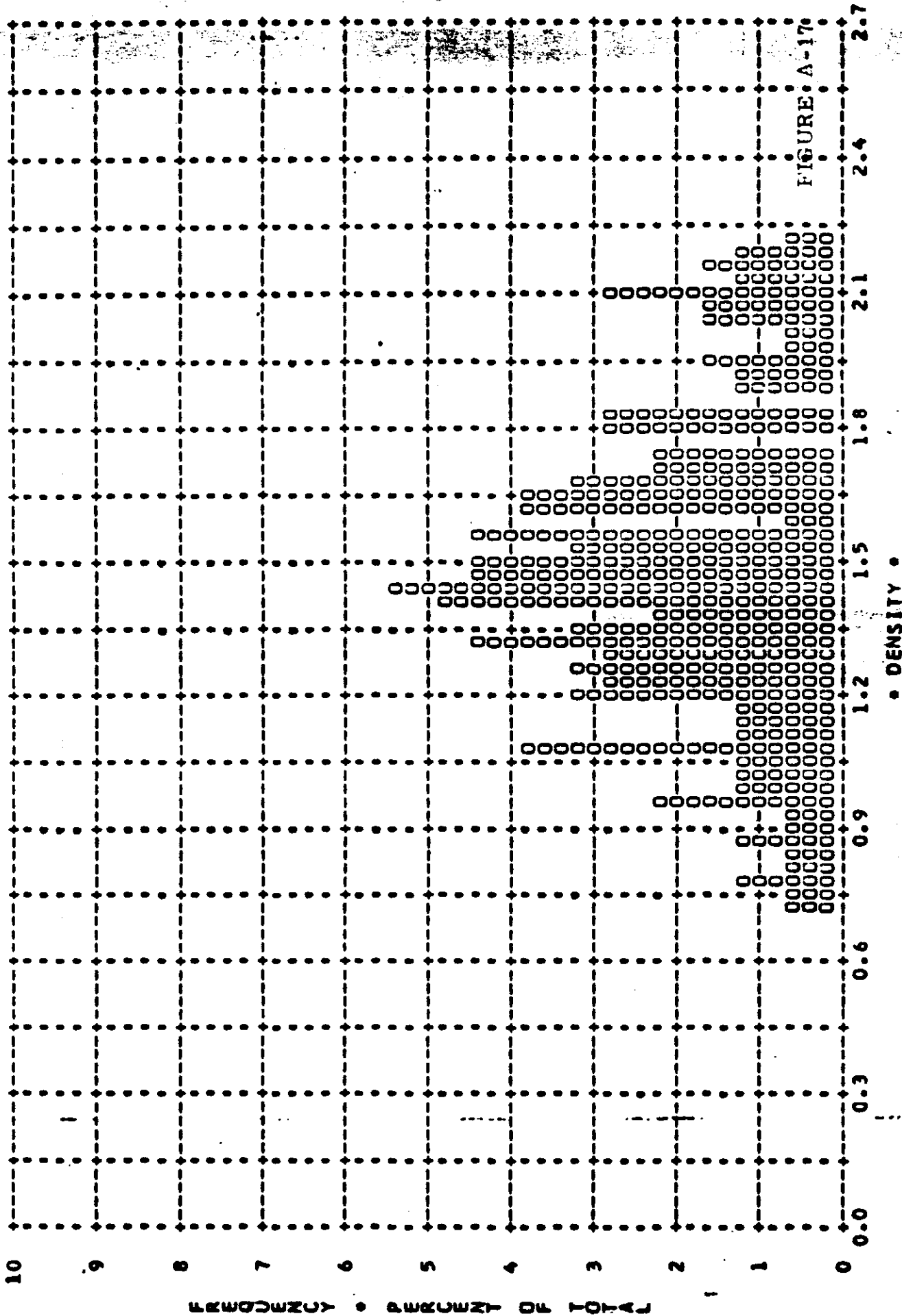
~~TOP SECRET~~

MISSION • 1020-1 • INSTR • AFT • 10-01-65 PLOT OF D MIN • TERRAIN • PROCESSING • INTERMEDIATE
ARITH MEAN • 0.54 • MEDIAN • C.50 • STD DEV • 0.20 • RANGE • 0.23 TO 1.20 WITH 189 SAMPLES



~~TOP SECRET~~

MISSION • 1020-1 • INSTR • AFT • 10-01-65 PLOT OF D MAX • TERRAIN • PROCESSING • INTERMEDIATE
ARITH MEAN • 1.48 • MEDIAN • 1.46 • STD DEV • 0.34 • RANGE • 0.70 TO 2.20 WITH 189 SAMPLES



~~TOP SECRET~~

MISSION • 1020-1 • INSTR • AFT • 10-01-65 PLOT OF D MAX • CLOUD • PROCESSING • INTERMEDIATE
ARITH MEAN • 2.02 • MEDIAN • 2.08 • STD DEV • 0.19 • RANGE • 1.22 TO 2.26 WITH 181 SAMPLES

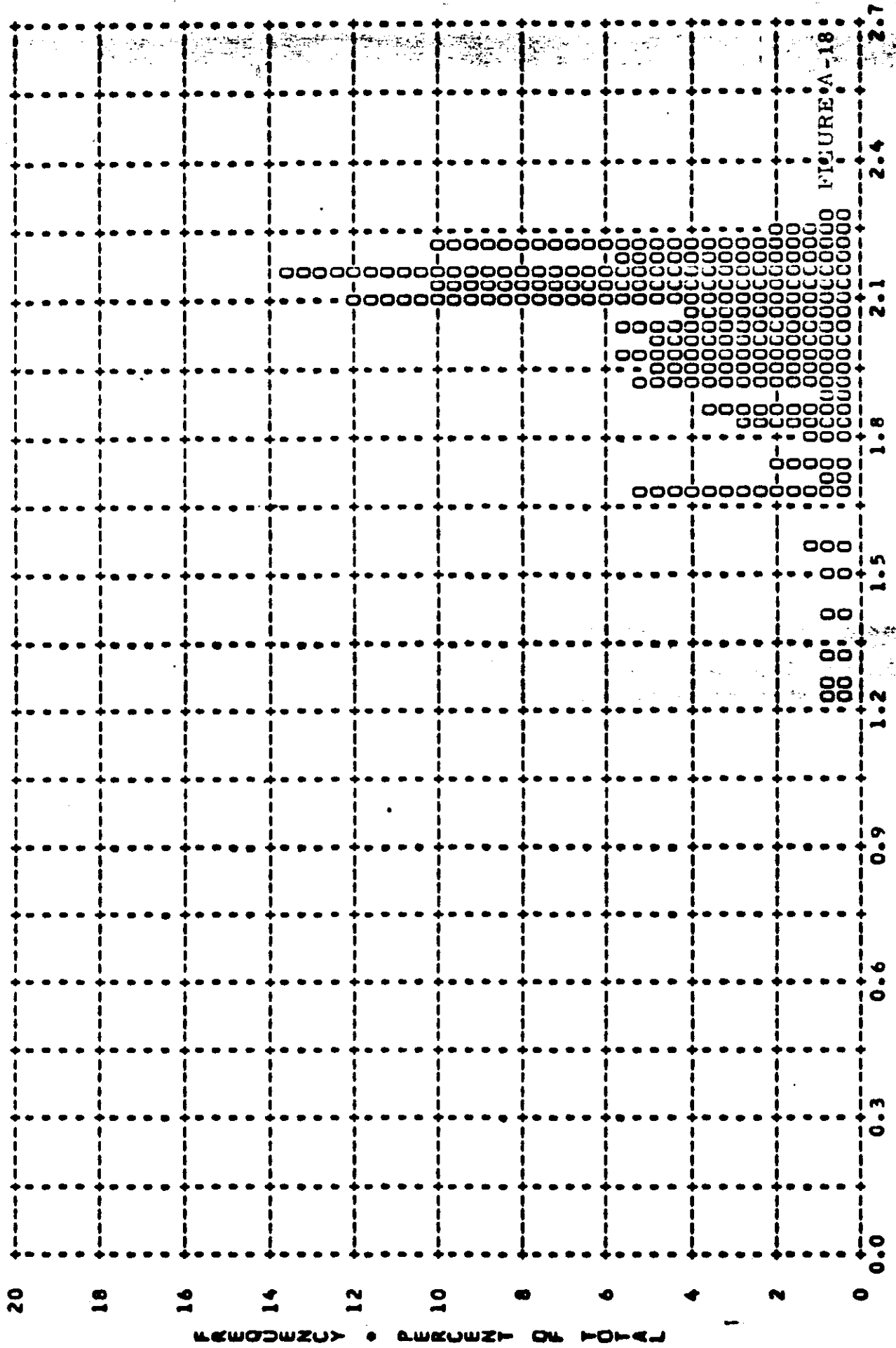
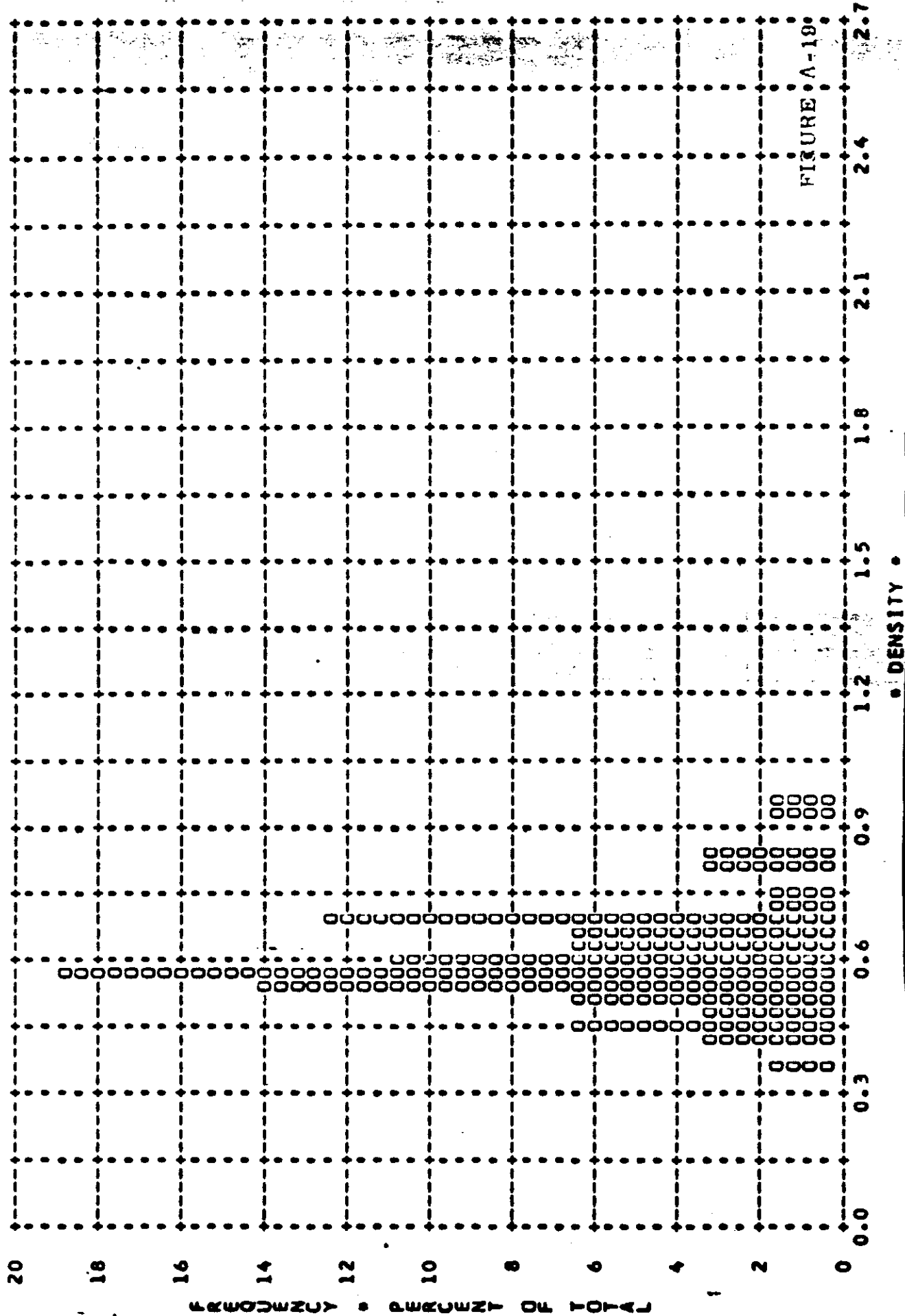


FIGURE A-18

DENSITY

~~TOP SECRET~~

MISSION • 1020-1 • INSIR • AFT • 10-01-65 PLOT OF D MIN • TERRAIN • PROCESSING • FULL
ARITH MEAN • 0.59 • MEDIAN • 0.56 • STD DEV • 0.12 • RANGE • 0.36 TO 0.94 WITH 65 SAMPLES



• DENSITY •

~~TOP SECRET~~

MISSION • 1020-1 • INSTR • AFT • 10-01-65 PLOT OF D MAX • TERRAIN • PROCESSING • FULL
ARITH MEAN • 1.43 • MEDIAN • 1.46 • STD DEV • 0.27 • RANGE • 0.74 TO 2.04 WITH 65 SAMPLES

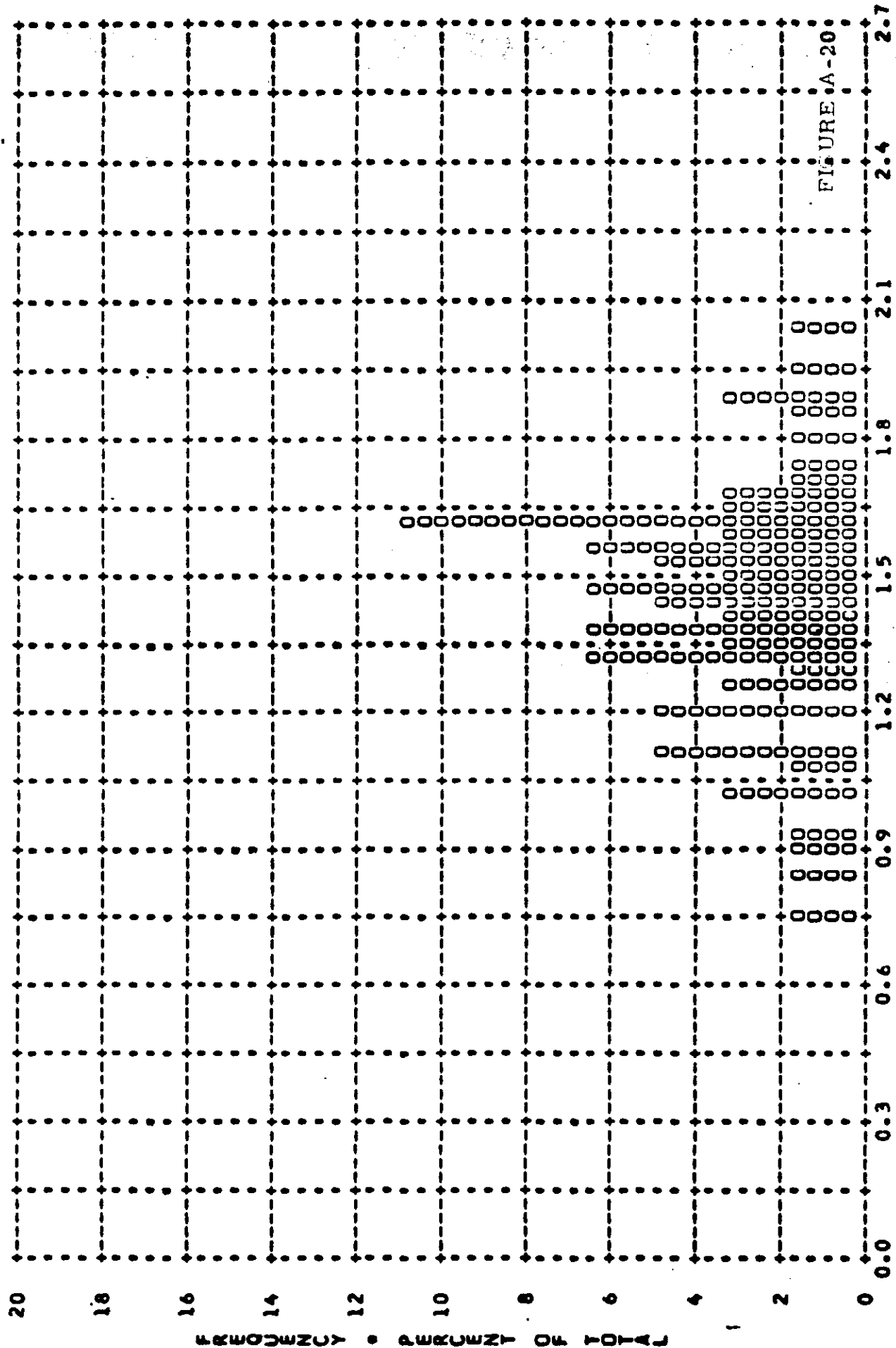
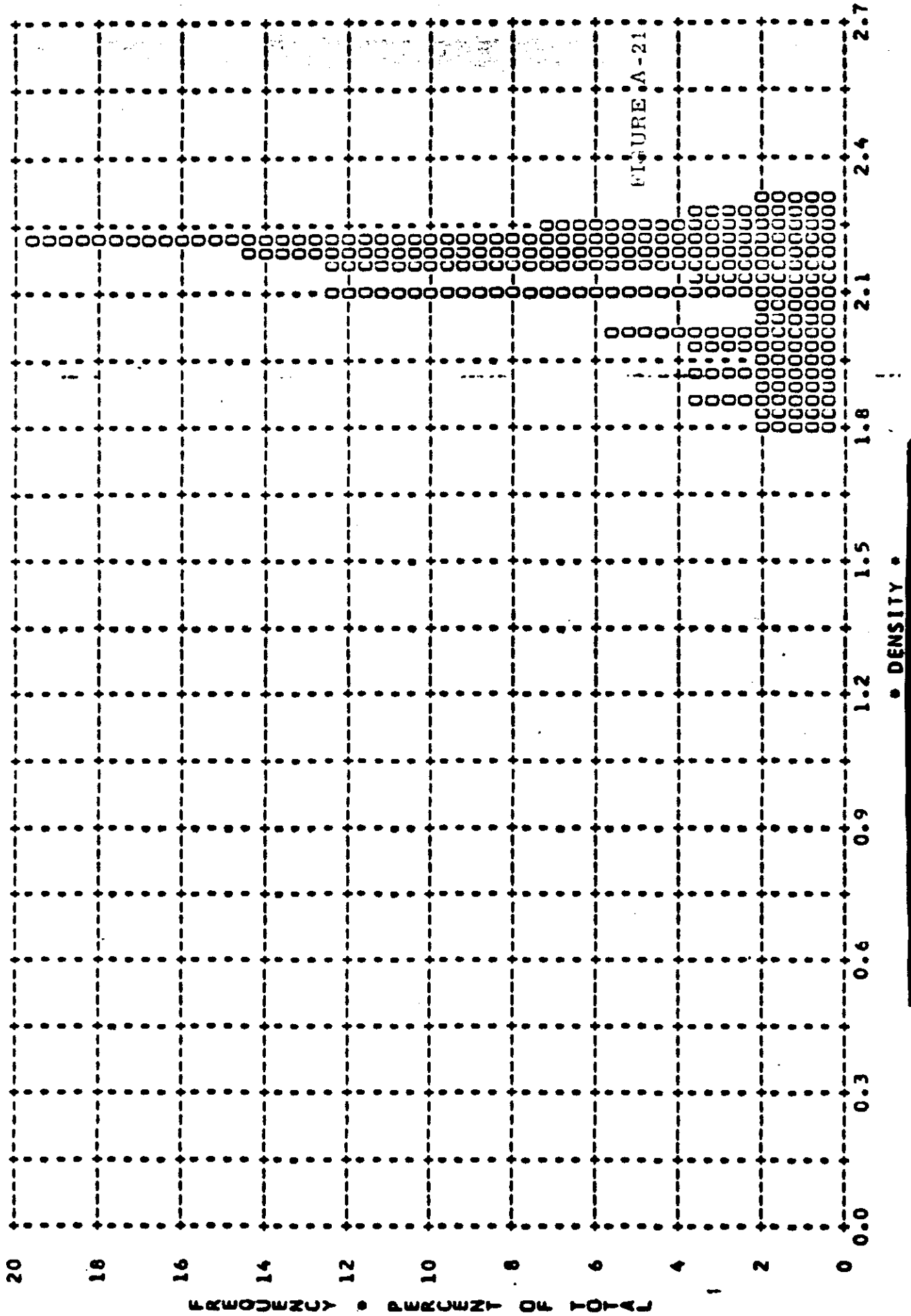


FIGURE A-20

~~TOP SECRET~~

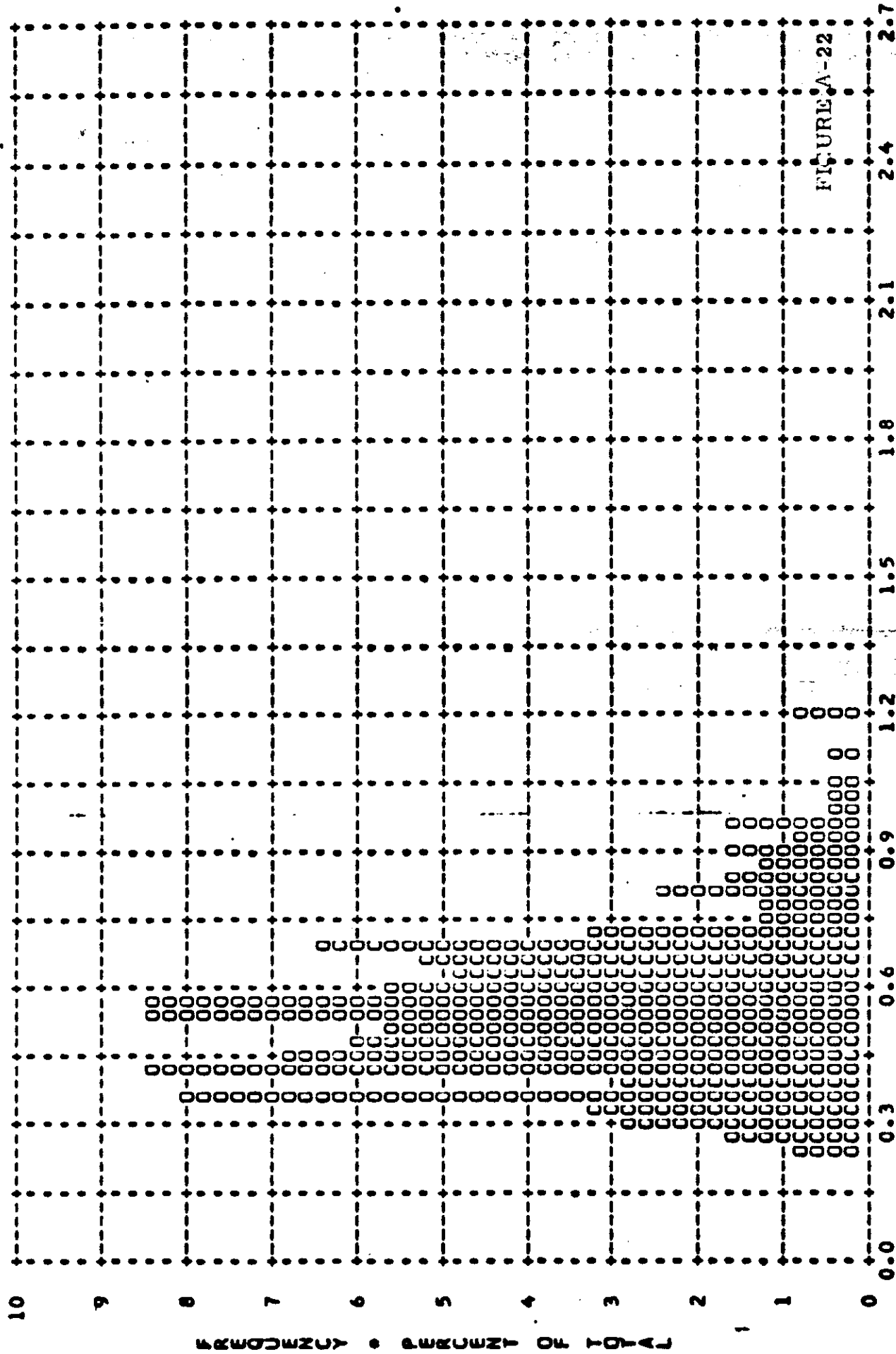
MISSION • 1020-1 • INSTR • AFI • 10-01-65 PLOT OF D MAX • CLOUD • PROCESSING • FULL
ARITH MEAN • 2.11 • MEDIAN • 2.16 • STD DEV • 0.12 • RANGE • 1.80 TO 2.29 WITH 57 SAMPLES



~~TOP SECRET~~

~~TOP SECRET~~

MISSION • 1020-1 • INSTR • AFT • 10-01-65 PLOT OF D MIN • TERRAIN • PROCESSING • ALL LEVELS
ARITH MEAN • 0.55 • MEDIAN • 0.54 • STD DEV • 0.18 • RANGE • 0.23 TO 1.20 WITH 255 SAMPLES

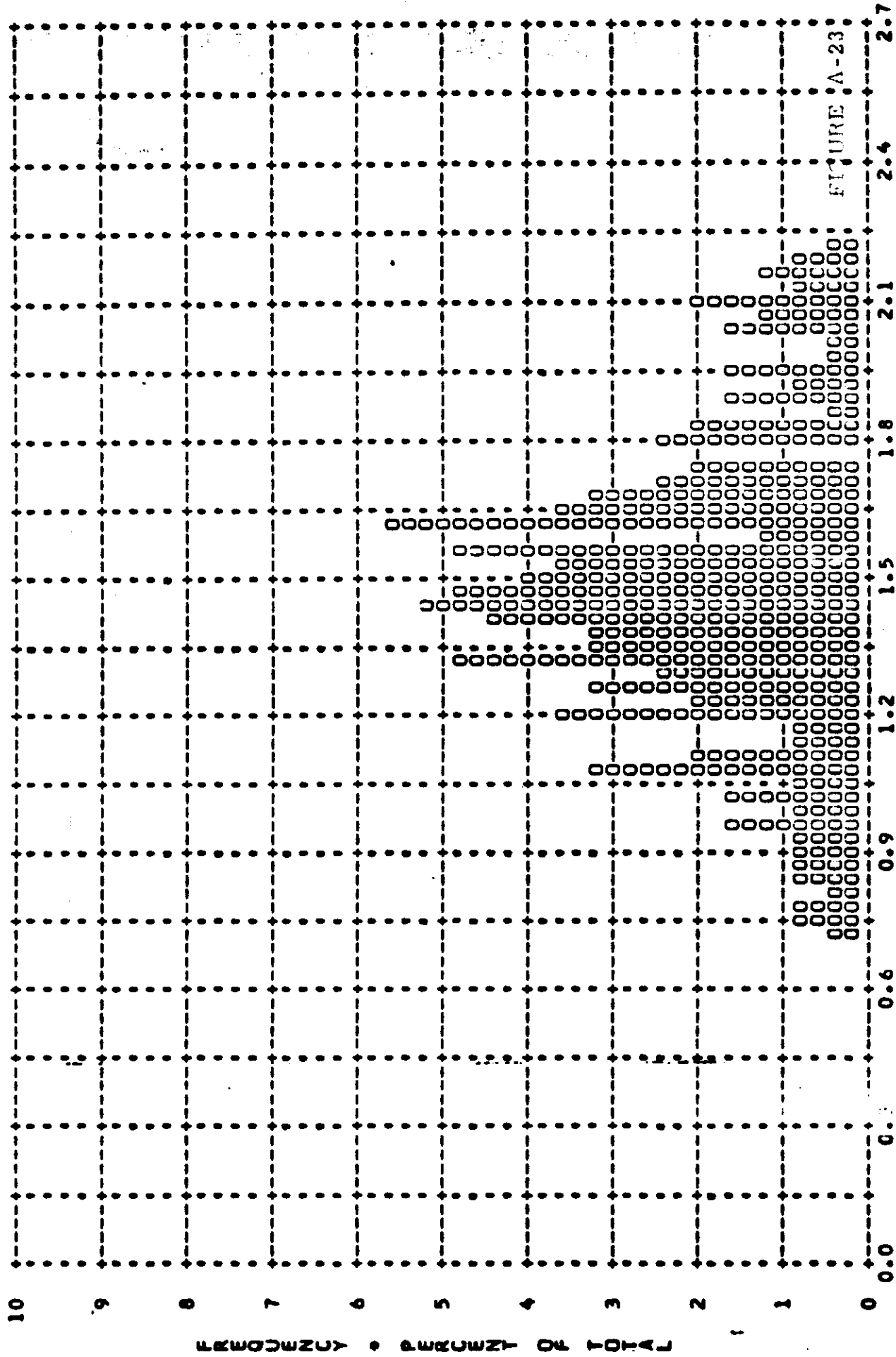


• DENSITY •

~~TOP SECRET~~

~~TOP SECRET~~

MISSION • 1020-1 • INSTR • AFT • 10-01-65 PLOT OF D MAX • TERRAIN • PROCESSING • ALL LEVELS
ARITH MEAN • 1.47 • MEDIAN • 1.46 • STD DEV • 0.33 • RANGE • 0.70 TO 2.20 WITH 255 SAMPLES



• DENSITY •

~~TOP SECRET~~

MISSION • 1020-1 • INSTR • AFT • 10-01-65 PLOT OF D MAX • CLOUD • PROCESSING • ALL LEVELS
ARITH MEAN • 2.04 • MEDIAN • 2.10 • STD DEV • 0.18 • RANGE • 1.22 TO 2.29 WITH 239 SAMPLES

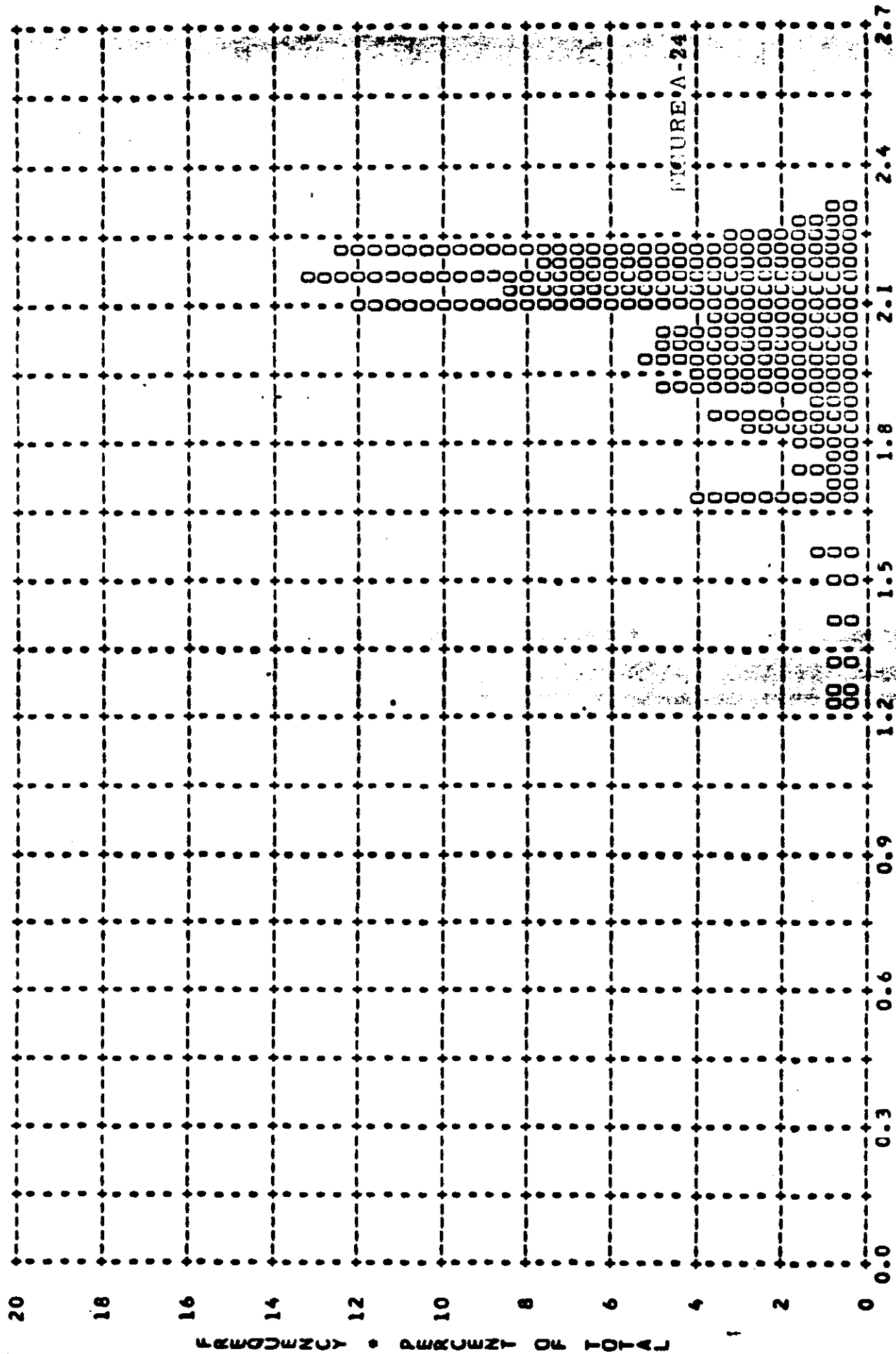


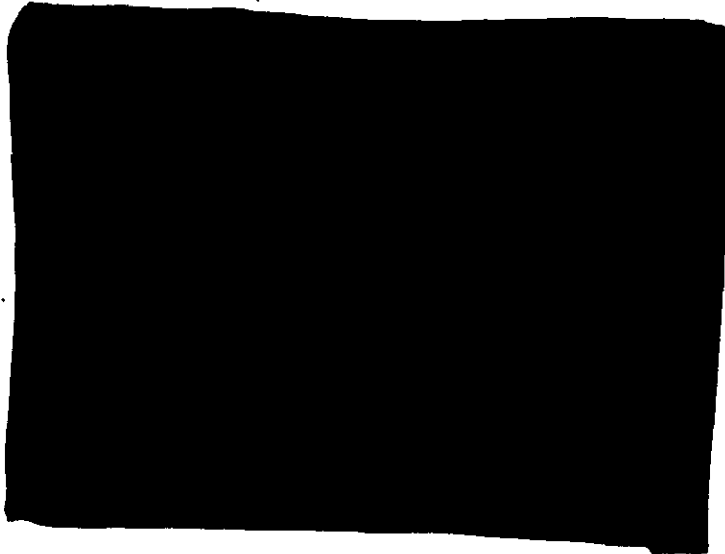
FIGURE A-24

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