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207 Pages

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CORONA J

PERFORMANCE EVALUATION REPORT

MISSION 1102-1 and 1102-2

FTV 1642, CR-2

JULY 1, 1968

Approved [redacted]
Advanced Projects

Approved [redacted]
Program

~~TOP SECRET~~ C [redacted]

8 August 1968

TO: [redacted]

THRU: [redacted]

FROM: [redacted]

SUBJECT: MISSION 1102 FINAL REPORT (CR-2)

Enclosed is the Final Evaluation Report for Mission 1102.

[redacted]

Advanced Projects

FOREWORD

This report details the performance of the payload system during the operational phase of the Program [redacted] Flight Test Vehicle 1642.

Lockheed Missiles and Space Company has the responsibility for evaluating payload performance under the Level of Effort and "J" System contracts.

This document is the final payload test and performance evaluation report for Missions 1102-1 and 1102-2, which was launched on 9 December 1967.

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INTRODUCTION

This report presents the final performance evaluation of Missions 1102-1 and 1102-2 of the Corona Program. The purpose of this report is to define the performance characteristics of the CR-2 payload system and to identify the source of in-flight anomalies.

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, 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 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.

SECTION 1

SYSTEM PERFORMANCE

A. MISSION OBJECTIVES

The payload section of Mission 1102, placed into orbit by Flight Test Vehicle #1642 and the THORAD Booster, consisted of two panoramic cameras, one DISIC Camera, two Mark 5A recovery capsules and a space structure to enclose the cameras and provide mounting surfaces for all equipment. Figure 1-1 presents an inboard profile of the CR-2 payload system. This Corona "J" system was designed to acquire search and reconnaissance photography of selected areas of the earth from orbital altitudes. A seven day -1 mission and a seven day -2 mission was planned.

B. MISSION DESCRIPTION

The payload was launched from Vandenberg Air Force Base (VAFB) at 2226Z on 9 December 1967. 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] under central control of the Satellite Test Center at Sunnyvale, California. Mission 1102-1 consisted of a 6-day operation and was completed by air recovery on 14 Dec. 1967. Mission 1102-2 was completed with an air recovery on 22 Dec. 1967,

following an 8-day photographic operation.

The comparison of the planned and actual orbit parameters is shown in Table 1-1.

TABLE 1-1

ORBITAL PARAMETERS

Parameter	Predicted	Actual (Rev. 1)
Period (Min)	88.66	88.56
Perigee (N.M.)	84.7	86.4
Apogee (N.M.)	141.8	135.3
Eccentricity	0.0080	0.0070
Inclination (Deg.)	81.5	81.64
Arg of Perigee (Deg.)	161	161

C. PANORAMIC CAMERAS

Both cameras demonstrated exceptionally high resolution performance in Missions 1102-1 and -2. Each mission was given an MIP rating of 100, the highest rating in the history of the Corona program. However, image smear principally in the scan direction was apparent in some of the photography from both cameras. Image smear in the scan direction was more noticeable in photography from the forward looking camera. Program objectives were attained.

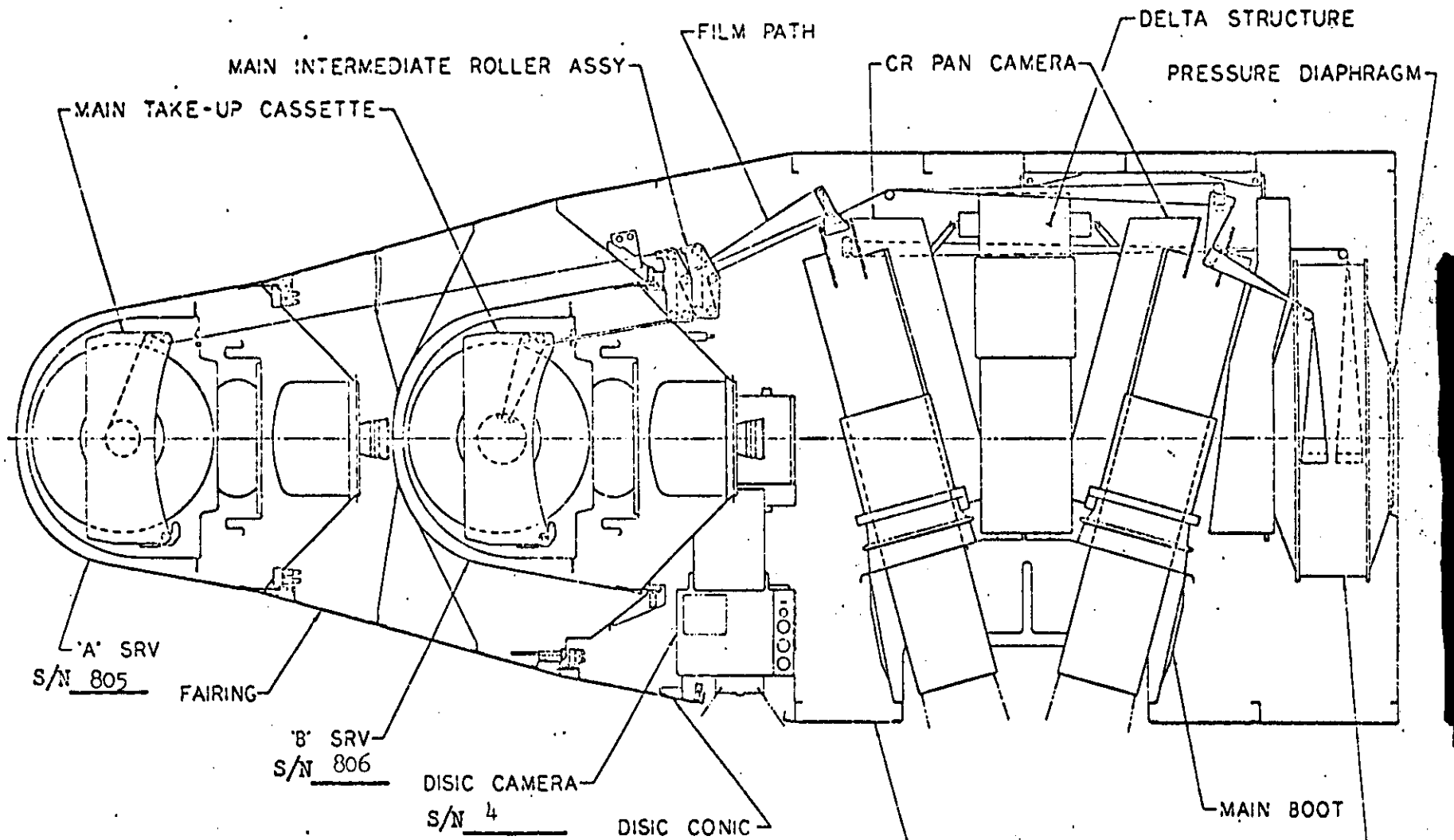
D. DISIC CAMERA

Image detail recorded by the terrain camera during Mission 1102-1 and -2 was noticeably better than that recorded during Mission 1101-1 and -2. Stars through 6.5 magnitude were recorded. Stellar format flare fog was significantly less on Mission 1102-1 and -2 relative to Missions 1101-1 and -2. The reduction of flare fog on Mission 1102 stellar photography is attributed to improved stellar baffles. The basic terrain and stellar program objectives were attained

E. OTHER SUB-SYSTEMS

The clock, instrumentation, pressure make-up, command and thermal control subsystems performed satisfactorily.

PAYLOAD PROFILE AND SERIAL NUMBERS



SYSTEM NO. CR-2

TEST Flight

PMU S/N 1004

SLOPE PROGRAMMER S/N 202

CLOCK S/N 626

FIGURE 1-1. INBOARD PROFILE

F. TABLE 1-2 COMPONENT IDENTIFICATION AND ASSOCIATED DATA

1. GENERAL FLIGHT DATA	
MISSION NO.	1102
VEHICLE NO.	1642
SYSTEM NO.	CR-2
FORWARD LOOKING CAMERA SERIAL NO.	305
AFT LOOKING CAMERA SERIAL NO.	304
DISIC CAMERA SERIAL NO.	4
2. LENS DATA	
FORWARD LOOKING CAMERA (MAIN LENS)	305
LENS SERIAL NO.	I-181
NOMINAL SLIT WIDTH (INCHES	
POSITION 1	.215
POSITION 2	.270
POSITION 3	.340
POSITION 4	.340
FAILSAFE	.340
OPTICS FILTER TYPE	
PRIMARY	W-25 (GELATIN)
ALTERNATE	SF09 POLARIZER +20° GLASS
E.O. FOCAL LENGTH (INCHES)	24.000
RESOLUTION/FILM TYPE	
STATIC(LINES/MILLIMETER)	
FILTER	W-21
HIGH CONTRAST	256
LOW CONTRAST	156

DYNAMIC (LINES/MILLIMETER)	
ITEK POST-VIBRATION	
FILTER	W-21 GELATIN
HIGH CONTRAST	213 at 0.000
LOW CONTRAST	139 at 0.000
A/P TEST	
FILTER	W-21 GELATIN
HIGH CONTRAST	205 at-0.002
LOW CONTRAST	137 at-0.002
DISTORTION/PINCUSHION (MICRONS)	
ANGLE OF AXIS, DEG.	
3	0
2	0
1	0
0	0
359	0
358	1
357	1
AFT LOOKING CAMERA (MAIN LENS)	304
LENS SERIAL NO.	I-165
OPTICS SLIT WIDTH (INCH)	
POSITION I	.134
POSITION 2	.170
POSITION 3	.215
POSITION 4	.270
FAILSAFE	.250

OPTICS FILTER TYPE	
PRIMARY	W-21 GELATIN
ALTERNATE	SF05 GLASS
E.O. FOCAL LENGTH (INCH)	24.001
RESOLUTION (LINES/MM)	
STATIC	
FILTER	W-21 GELATIN
HIGH CONTRAST	248
LOW CONTRAST	149
DYNAMIC (LINES/MM)	
ITEK POST-VIBRATION	
FILTER	W-21 GELATIN
HIGH CONTRAST	198 at 0.000
LOW CONTRAST	128 at 0.000
A/P TEST	
FILTER	W-21 GELATIN
HIGH CONTRAST	185 at -0.002
LOW CONTRAST	122 at -0.002

DISTORTION/PINCUSHION (MICRONS)

ANGLE OFF AXIS DEG.	
3	2
2	1
1	0
0	0
359	0
358	2
357	3

2. LENS DATA (Cont'd)

HORIZON OPTICS

FORWARD LOOKING CAMERA 305

TAKE-UP (STARBOARD)

LENS SERIAL NO.	E23793
EXPOSURE TIME (SEC)	1/100
APERTURE	F/8.0
FILTER TYPE	W-25
OPERATIONAL FOCAL LENGTH MM	55
RADIAL DISTORTION (MM)	
10 DEG. OFF AXIS	.02
20 DEG. OFF AXIS	.05
TANGENTIAL DISTORTION	.018

RESOLUTION (LINES/MILLIMETER)

ANGLE OFF AXIS (DEG.)	0	5	10	15	20	25	30
(RADIAL)	187	208	206	181	162	150	72
(TANGENTIAL)	187	207	181	155	130	121	62

SUPPLY (PORT)

LENS SERIAL NO.	E23774
EXPOSURE TIME (SEC)	1/100
APERTURE	F/6.3
FILTER TYPE	W-25
OPERATIONAL FOCAL LENGTH MM	55
RADIAL DISTORTION (MM)	
10 DEG. OFF AXIS	.02
20 DEG. OFF AXIS	.06
TANGENTIAL DISTORTION	.01

RESOLUTION (LINES/MILLIMETERS)

ANGLE OFF AXIS (DEG.)	0	5	10	15	20	25	30
(RADIAL)	166	186	184	143	78	119	81
(TANGENTIAL)	148	164	161	123	103	96	62

AFT LOOKING CAMERA 304

TAKE-UP (PORT)

LENS SERIAL NO. E23799

EXPOSURE TIME (SEC) 1/100

APERTURE F/6.3

FILTER TYPE W-25

OPERATIONAL FOCAL LENGTH MM 55

RADIAL DISTORTION (MM)

10 DEG. OFF AXIS .01

20 DEG. OFF AXIS .03

TANGENTIAL DISTORTION .0288

RESOLUTION (LINES/MILLIMETER)

ANGLE OFF AXIS (DEG.)	0	5	10	15	20	25	30
(RADIAL)	187	186	184	160	139	139	43
(TANGENTIAL)	166	185	161	123	130	96	52

SUPPLY (STARBOARD)

LENS SERIAL NO. E23785

EXPOSURE TIME (SEC) 1/100

APERTURE F/8.0

FILTER TYPE W-25

OPERATIONAL FOCAL LENGTH MM 55

RADIAL DISTORTION (MM)

10 DEG. OFF AXIS .02

20 DEG. OFF AXIS .05

TANGENTIAL DISTORTION .03

RESOLUTION (LINES/MILLIMETER)

ANGLE OFF AXIS (DEG.)	0	5	10	15	20	25	30
(RADIAL)	209	208	184	181	110	150	57
(TANGENTIAL)	187	185	161	155	130	96	62

2.4 DISIC CAMERA 4

PORT STELLAR CAMERA

LENS SERIAL NO. 4P

RESEAU SERIAL NO. 4P

APERTURE F/2.8

EXPOSURE TIME (SEC) 1.5

NOMINAL FOCAL LENGTH (INCHES) 3.0

FILTER NONE

STARBOARD STELLAR CAMERA

LENS SERIAL NO. 4

RESEAU SERIAL NO. 4

APERTURE F/2.8

EXPOSURE TIME (SEC) 1.5

NOMINAL FOCAL LENGTH (INCHES) 3.0

FILTER NONE

TERRAIN CAMERA

LENS SERIAL NO.			101
RESEAU SERIAL NO.			101
FILTER TYPE			W-12
APERTURE			F/4.5
EXPOSURE TIME (SEC)			1/500
NOMINAL FOCAL LENGTH (INCHES)			3.0
RESOLUTION (HIGH CONTRAST LINES/MILLIMETER)			
ANGLE OFF AXIS (DEG.)	0	17	34
RADIAL	78	76	69
TANGENTIAL	77	68	51
FILM TYPE			3400
FILTER			W-12

FILM TYPES

FORWARD LOOKING CAMERA	NO. 305
SPLIT LOAD	YES
FILM TYPE	3404 (SO-230)
LENGTH (FT.)	16,300
SPLICES	5
LENGTH BETWEEN SPLICES (FT.)	2000-630-5815-5855-(2000)
EMULSION DATA	3404-401-1-11-7 (SO-230-11-1-11-7)
PAYLOAD WEIGHT (LBS)	88.3-83.8
SPOOL NO.	168T
BOX SERIAL NO.	30

AFT LOOKING CAMERA	NO. 304
SPLIT LOAD	YES
FILM TYPE	3404(SO-230)
LENGTH (FT.)	16,300
SPLICES	5
LENGTH BETWEEN SPLICES (FT.)	3300-4175-2322-4003-(2500)
EMULSION DATA	3404-405-4-1-3-11-7 (SO-230-11-1-11-7)
PAYLOAD WEIGHT (LBS)	87.5 - 80.1
SPOOL NO.	215B
BOX SERIAL NO.	30
DISIC CAMERA	
STELLAR CAMERA	
SPLIT LOAD	YES
FILM TYPE	3401(3400)
LENGTH (FT)	1800/(200)
SPLICES	1
LENGTH BETWEEN SPLICES (FT)	1800-200
EMULSION DATA	3401-238-5 (3400-227-8-11-7)
PAYLOAD WEIGHT (LBS)	7.1 - 1.7
TERRAIN CAMERA	
SPLIT LOAD	NO
FILM TYPE	3400
LENGTH (FT)	2000
SPLICES	0
LENGTH BETWEEN SPLICES (FT)	N/A
EMULSION DATA	156-8-7-7
TOTAL FILM WEIGHT (LBS.	20.1-2.4

SECTION 2

PRE-FLIGHT SYSTEMS TEST

As a standard procedure, the J payload systems are subjected to a series of tests with flight type film which demonstrates that the systems will perform as required in their respective missions. The principal tests include the following.

A. Exposure of the J payload to a thermal/altitude environment that approximates flight conditions.

B. System light leak test.

C. Dynamic Resolution determination that shows the high and low contrast resolution capability of each panoramic camera.

D. Flight Readiness.

E. Flight Certification.

A. ENVIRONMENTAL TEST

The CR-2 system was exposed to the first HIVOS environment from 20 September to 5 October 1967 and again from 28 October thru 1 November 1967. The primary purpose of the environmental tests was to determine the corona discharge marking characteristics of the panoramic and DISIC cameras with flight type film during dynamic operation.

The first HIVOS test was interrupted at the end of the A bucket operation during the normal DISIC cut and splice sequence. Interruption of the cut and splice sequence was caused by a New York hand

splice that separated. Splice separation prevented normal take-up of Stellar film into the B bucket. The system was returned to A/P to correct the DISIC film/splice anomaly.

While the CR-2 system was being readied for return to the chamber to complete the B bucket portion of the first HIVOS test, the films from the A bucket were retrieved, processed, and evaluated. Minor acceptable corona fog was present on film from Instrument 305. Corona fog was present on the film up to approximately 40 inches from the start of pass mark toward the take-up. Eight operations were affected by corona fog to a density of 0.08 above the base level. Instrument 304 contained no corona fog in the A bucket material.

Stellar film from the A bucket contained several kinds of fog marks in the film sample. Acceptable skew bead fog marks were present near both edges of the film. Skew marks were located outside the active star recording format area. Minor plus density fog spots were present in the active format area of the majority of port and starboard Stellar formats. Fog spots were associated with the reseau pattern. Fog spots may be caused by static discharge between the reseau plate and the film. Many starboard frames contain one low density metering roller mark per frame. The metering roller mark in the starboard format is not expected to interfere with star imagery because of the low plus density feature of the mark. Minor dendritic static was present at random locations throughout the Stellar film.

Dendritic static was attributed to the film retrieval operation. Large areas of heavy Corona fog, to a density of approximately 0.9 above the base level, affect approximately 22 percent of the Stellar formats. The percentage is based upon Stellar frame count. Stellar corona fog exceeds the CR system acceptance criteria and therefore is unacceptable. Corona fog was present on many frames that did not have the benefit of the gas pressure make-up system. PMU correlation with Stellar photography revealed that corona fog was usually not present during normal operations when the internal camera pressure exceeded approximately 50 microns. However, during the pressure sweep low density corona marking was observed at all pressures between 25 and 90 microns. The cause of the anomaly is unknown.

DISIC terrain photography was relatively free of corona discharge fog. Approximately 3.5 percent of the DISIC terrain frames recovered from the A bucket contained corona fog marks to a density less than 0.4 above the base plus fog level. Minor retrieval static was occasionally present. Occasionally a plus density streak was present at the edge of the format active area 1/16 inch wide and parallel to the edge of the film. The cause of this anomaly is unknown.

The recorded binary time word was frequently unacceptable in Instrument 304 and 305 photography. Incorrect time words were characterized by either all bits present, the index row was missing, or 3 bits were present in some of the rows of the A bucket material. Occasionally the A.O. fiducials were not present. One PG trace of Instrument 304 was faint and unacceptable.

The DISIC splice separation was corrected at A/P and the CR-2 System returned to the HIVOS chamber to complete the B bucket operations of the first HIVOS test.

Auxiliary recording imagery produced in the B bucket films from both pan cameras and the DISIC camera was comparable to the imagery reported for the A bucket. However, unacceptable continuous type corona was observed in Instrument 305 film during the two pressure sweeps; one during 3404 type film operations and the other during SO-230 type film operation from Instrument 305. Continuous type corona marks spaced at 6.25 inches were present when internal camera pressure ranged between approximately 16 to 39 microns for 3404 type film and 14 to 28 microns for SO-230 type film. Corona density reached a maximum of 0.65 for SO-230 film and 0.52 for 3404 type film. No continuous corona marks were observed when internal camera pressure ranged between 50 and 110 microns, the highest pressure attained with the PMU system on.

Prior to subjecting the CR-2 system to a second environmental test the metering rollers of Instrument 305 were removed and replaced with a new set from Boston. The new metering rollers were certified by Boston to be corona free. The binary time word circuit was examined and modified. The DISIC camera was reworked to minimize the corona discharge and static fog marks in the Stellar and terrain film.

The system was returned to the HIVOS chamber from 28 October thru 1 November 1967 for B bucket operation. Internal camera pressures ranged between 1 and 100 microns during pan camera operation. Although more than 2000 feet of 3404 type film was programmed through each pan camera, no corona discharge fog was present on the processed film exhibits.

The percentage of incorrect time words produced on Instrument 305 film was reduced from approximately 25 percent during the first HIVOS test to 1.5 percent during the second test. The percentage of incorrect time words produced on Instrument 304 film remained at approximately 5 percent. Incorrect time words were characterized by either double exposures resulting in incorrect time, or the index row was missing. Time words containing the missing index row are expected to be misread by the automatic reader. However, the magnetic tape recorded time words will provide a secondary source of time data for each panoramic camera.

Examination of processed films from the DISIC camera revealed a significant reduction in the frequency and magnitude of corona fog marks in the Stellar film. However, 30 percent of the terrain frames were affected by corona fog to a maximum density of 0.39 above the base level. The Stellar and terrain corona exceeds the acceptance criteria that states in part, "less than 10 percent of the frames shall be affected by corona fog marks".

Telemetry recording of the A.O. idler roller of Instrument 304 during HIVOS No. 2, Rev 3, Operate 1 revealed a violent upset in the rotation of the idler roller. A manufacturer's film splice became suspect. Examination of the processed HIVOS film revealed the presence of a manufacturer's splice that correlated with the telemetry disturbance. The manufacturer's splice contained significant amounts of adhesive pressed out beyond the splice and attached to the adjacent film wraps. It is believed that the manufacturer's splice stuck momentarily to the adjacent film wrap during off spooling from the supply causing a severe transient in the film path that upset the rotation of the A.O. idler roller on the supply side of Instrument 304 platen.

B. LIGHT LEAK TEST

The system Light Leak test using type 3401 film in Instruments 304 and 305 was completed on 8 November 1967, per Test Procedure CR 240301. The test film was processed to the full level and evaluated on 9 November 1967.

Film from Instrument 304 contained minor light fogging to 0.09 density above the base level. Fog was confined to the input A.O. end of the format that remained in the platen during the light soak. Film from Instrument 305 contained a light fog band 1/8 inch wide and perpendicular to the longitudinal axis of the film. Fog density was 0.05 above the base level. The band was located approximately 82 inches toward the film take-up end of the system in the platen area of Instrument 304. Photomultiplier tests revealed noticeable light leakage past the drum of Instrument 304. Instrument 304 drum light leakage is considered the source of minor light fog on film exhibits from both pan cameras. While the drum leak from Instrument 304 was significantly reduced by corrective applications of RTV, the leak was not entirely eliminated. The present drum light leak is considered acceptable and is expected to have a minor degrading effect on flight imagery when the non-operate period in flight approaches four orbits or more.

The DISIC camera light leak discovered in CR-1 Stellar flight film was corrected on DISIC camera #4. The light leak occurred between the DISIC terrain lens and the camera body. RTV was applied at this interface to seal off the light leak. A special light leak test of DISIC camera #4 demonstrated that the light leak had been eliminated.

C. RESOLUTION TESTS

Standard resolution tests of the CR-2 system were performed on 12 and 16 October 1967. The final thru focus resolution test of Instruments 304 and 305 demonstrated acceptable performance.

Instrument 304 produced a final peak low contrast resolution value of 126 lines per millimeter at a collimator focus position of -0.002 inches. Instrument 305 produced a similar peak resolution value of 134 lines per millimeter at a collimator position of -0.001 inches. Film Type 3404 was used for all resolution tests with a Wratten 21 gelatin filter and a 0.140 inch camera slit. Table 2-1 shows the CR-2 system thru focus low contrast resolution for instruments 304 and 305.

All through-focus low contrast resolution data for Instrument 304 and 305 are shown in the attached table. Resolution values shown are for Boston and A/P collimator focus positions set to compensate for a vacuum focus shift of 0.015 inches. After the first A/P test and before the final resolution test, the scan head of Instrument 304 was shimmed +0.001 inches and the scan head of Instrument 305 was shimmed +0.002 inches. The through focus resolution data from the first A/P test of Instrument 305 is shown adjusted for an A/P collimator bias of +0.001 inches relative to the Boston collimator, as reported by Boston personnel. The collimator setting difference between Boston and A/P has been corrected so that future A/P resolution tests are expected to have zero bias relative to the Boston collimator.

The system was considered acceptable for flight with Wratten 21 gelatin filters.

TABLE 2-1

CR-2 THRU FOCUS LOW CONTRAST RESOLUTION (Li/mm)

INSTRUMENT 304

Collimator Focus Position (Inches)	Boston East Coast	1st A/P Test 10-12-67 Boston	Final A/P Test Boston	10-16-67 Performance Evaluation
-0.004		---	81	79
-0.003		63	114	109
-0.002	92	88	122 P	126 P
-0.001	102	119 P	110	115
0.000	128 P	117	104	108
+0.001	102	104	111	110
+0.002	117	---	112	114
+0.003	119	---	---	---
+0.004	114	---	84	78
+0.005	97	---	---	---

INSTRUMENT 305

-0.004		---	83	81
-0.003		---	118	112
-0.002	73	---	137 P	133
-0.001	111	82	131	134 P
0.000	139 P	131	127	130
+0.001	135	139 P	123	124
+0.002	127	136	106	104
+0.003	125	---	---	---
+0.004	101	---	63	62
+0.005	97	---	---	---

Each resolution value shown is the average of 5 scan plus 5 FMC targets using the 120 inch collimator. The peak resolution value for each thru focus test is shown in the Table above underlined and followed by letter P.

D.1. DISIC #4 FLIGHT READINESS TEST RESULTS

The Flight Readiness Test was completed on 16 November 1967. Film type 3401 was used in the Stellar cameras and film type 3400 was used in the Terrain camera.

Processed test films were evaluated on 17 November with the following results. Examination of the Stellar and Terrain film revealed acceptable reseau, time word, and serial numbers. The two Stellar shutters (modified to operate only at 1/500 sec. per New York ECN BO 564) and Terrain shutter appeared to operate throughout the film test. The Stellar and Terrain active format areas were free of static marking. Minor skew roller marks were present along both edges of the Stellar film outside the active format area. Skew roller marks are not expected to interfere with the Stellar time word recording.

The port and starboard Stellar format fog levels for four consecutive pairs of exposures for Mode 1 and 2 are shown in Table 2-2. Density values include the baseplus fog level. Five density values were obtained from each Stellar format. One density measurement was made in each corner plus one in the format center.

TABLE 2-2

STELLAR FORMAT DENSITY VALUES

MODE 1 (SLAVE)

FRAME NUMBER	PORT DENSITY					STARBOARD DENSITY				
	1	2	Center(3)	4	5	1	2	Center(3)	4	5
1	.35	.34	.39	.34	.37	.35	.33	.39	.34	.33
2	.34	.37	.39	.35	.37	.33	.32	.39	.35	.33
3	.35	.37	.40	.34	.36	.35	.33	.40	.35	.33
4	.33	.37	.40	.35	.36	.35	.35	.38	.34	.33

Base Plus Fog Value 0.19

TABLE 2-2

STELLAR FORMAT DENSITY VALUES

MODE 2 (INDEPENDENT)

FRAME NUMBER	PORT DENSITY					STARBOARD DENSITY				
	1	2	Center(3)	4	5	1	2	Center(3)	4	5
1	.32	.35	.38	.34	.39	.32	.32	.37	.32	.32
2	.35	.40	.42	.35	.36	.33	.33	.39	.33	.34
3	.34	.35	.38	.33	.35	.34	.33	.37	.33	.31
4	.33	.35	.37	.34	.34	.35	.33	.38	.34	.31

Base Plus Fog Value 0.19

These Stellar format fog densities demonstrate acceptable compliance with the requirement that density values shall be approximately 0.2 above the base plus fog level. This density value has been established for the CR-2 system only, and is not the value stated in the System Requirement Specification.

The time word associated with the start of pass frame contained ghost bit imagery in addition to the normal time word. Ghosting was attributed to test conditions only and was not expected to occur in flight.

DISIC #4 was considered acceptable for flight.

D. 2. CR-2 SYSTEM FLIGHT READINESS TEST

The final Flight Readiness Test of CR-2 System, Instruments #304 and #305, was completed on 20 November 1967. The Flight Readiness Test of DISIC camera #4 was completed on 17 November 1967 with test results detailed in the referenced document.

Instruments #304 and #305 were Readiness tested with flight type 3404 film. Test film was processed to the A/P intermediate process level.

The final Readiness test of Instruments #304 and #305 revealed acceptable imagery for the 200 PPS timing track including the slur pulse. Horizon camera fiducials were all present. Horizon camera shutters appear to open and close properly as evidenced by the presence of exposure lamp imagery on each horizon camera format. Imagery of all the rail holes, pan geometry traces, and start of pass mark were excellent at all cycle rates tested ranging from 2 through 4 seconds per cycle for each pan camera.

The final Readiness test film exhibits for Instrument 304 and 305 were free of image degrading scratches, static fog and minus density streaks. Rail scratches in the final Flight Readiness test films were multiple and moderately heavy on the film exhibits from both cameras. Moderately heavy rail scratching is not expected to degrade flight imagery.

One ghosted time word was observed in the final Readiness test of Instrument #304 out of a total of 20 formats. The incorrect time word contained ghost bit imagery in addition to the normal time word. Associated with the ghosted time word was a double instrument serial number with images slightly displaced.

All of the other nineteen time words produced by Instrument #304 appeared correct. Time words with ghost bit imagery with density less than 0.3 above the base plus fog level were expected to be read correctly by the automatic data reader.

One incorrect time word containing 3 bits in several rows of low order bits was present out of the 20 cycles of the final readiness test from Instrument #305. All other time words appeared correct. Correlation of incorrect time words of this type on the film with the tape recorded time revealed that the subject incorrect time word was actually two different time words superimposed upon one another. The tape recorder consistently demonstrated that one of the time word exposures was early plus one time word that is correct. The correct time for the double exposed frame was recoverable from the tape recorder data.

Incorrect time words with the index row missing did not appear on film from either pan camera during any readiness test possibly because the cycle rate during readiness testing is of necessity slow and is approximately 4 seconds per cycle. Prior to readiness testing and specifically in HIVOS test films, less than 1 percent to 3 percent of the formats from Instrument #305 and #304 respectively contained incorrect time words with the index row missing. It has been established that the tape recorded time data may be used to determine the correct time to within 10 milliseconds for incorrect time words recorded in film with the index row missing.

Anomalies observed in one or more of the first three readiness tests but which were not present in the fourth and final readiness test included:

INSTRUMENT #304

Intermittent 200 PPS timing track, minus density streaks, heavy rail scratches. All were corrected by removing emulsion buildup from the rails, replacing the primary flight filters, and cleaning the field flattener. Occasionally the time word showed compliment row only.

INSTRUMENTS #304 and #305

1. Processing streaks in film exhibits from both instruments were eliminated by cleaning the rollers in the first four racks of the RT-12 film processor prior to the final readiness test.
2. Minor variation in bit density and sharpness.
3. Time word contained all ones due to planned ones jumper verification.

INSTRUMENT #305

Heavy rail scratches. Heavy rail scratches were alleviated by removing emulsion buildup from both instrument rails.

Nominal slit widths intended for CR-2 flight use were certified by direct measurement of slit imagery produced by strobe light exposure for Instrument #304 and #305. The time word appeared normal with the ones jumper and 30th bit complement. However, index row and compliment row are all present at lower density. Slit image measurements vs the nominal cam slit size are shown in Table 2-3.

TABLE 2-3

SLIT IMAGE MEASUREMENTS vs NOMINAL CAM SLIT SIZE

INSTRUMENT #304

Cycle Rate: 4 Sec/Cycle
Filter : Primary W-21 Gelatin

Frame Number	Slit Image Width (Inches)	Nominal Cam Slit Width (Inches)
1	0.273	.270
2	0.275	
3	.273	
4	.273	
5	.273	
1	.220	.215
2	.217	
3	.215	
1	.175	.170
2	.173	
3	.175	
4	.173	
5	.170	
1	.137	.134
2	.125	
3	.127	
4	.125	
1	.213	.215 Failsafe
2	.213	
3	.211	
4	.212	
5	.210	
6	.210	

TABLE 2-3 (Cont'd)

SLIT IMAGE MEASUREMENTS VS NOMINAL CAM SLIT SIZE

INSTRUMENT #305

Cycle Rate: 4 Sec/Cycle
Filter : Primary W-25 Gelatin

Frame Number	Slit Image Width (Inches)	Nominal Cam Slit Width (Inches)
1	.335	.340
2	.334	
3	.333	
4	.334	
5	.334	
6	.334	.340
7	.333	
8	.335	
9	.334	
1	.265	.270
2	.265	
3	.264	
4	.263	
5	.265	
1	.214	.215
2	.212	
3	.210	
4	.208	
1	.333	.340 Failsafe
2	.340	
3	.337	
4	.335	
5	.335	

Correlation of the slit settings shown with cam positions verified that the cams were constructed in a sequence opposite to that required for CR-2 flight (Mission 1102).

The alternate solutions to correct this error were:

(1) Modification of the stored flight program commands to create a reverse timing sequence.

(2) Fabrication and installation of cams having the proper slit change sequence.

The latter alternative was selected since it would eliminate potential human errors in flight and data reduction operations.

D.3. FINAL CR-2 FLIGHT READINESS AND FILM LOADING

The final CR-2 System Flight Readiness Test was rerun on 27 November 1967, to verify the functioning of new corrected exposure cams for both main instruments.

Evaluation of the processed 3404 type film exhibits from the final Readiness test of Instruments 304 and 305 revealed that the new cams did provide specified exposure slit widths in the correct sequence.

Measurements of processed slit images produced on successive frames by strobe light exposure are shown in Table 1. These measurements, when compared with the Flight Readiness test procedure, demonstrate that the functional sequence is correct. The measured slit values are considered to be within acceptable tolerances for the specified values.

TABLE 2-4

CORRELATION OF EXPOSURE SLIT WIDTH SEQUENCE,
CAM POSITION AND STEPPER SWITCH POSITION

INSTRUMENT NUMBER 304

Frame Number	Measured Width (Inches)	Stepper Switch Position	Cam Position Number	Nominal Slit Width (Inches)
1	.139			
2	.136			
3	.136	2	1	.134
4	.134			
5	.134			
6	.157			
7	.164			
8	.163	3	2	.170
9	.164			
10	.225			
11	.223			
12	.220	4	3	.215
13	.215			
14	.220			
15	.218			
16	.268			
17	.277			
18	.274	5	4	.270
19	.279			
20	.278			
21	.228			
22	.234			
23	.233			
24	.229	8	Failsafe	.250
25	.235			
26	.230			

INSTRUMENT NUMBER 305

Frame Number	Measured Width (Inches)	Stepper Switch Position	Cam Position Number	Nominal Slit Width (Inches)
1	.204			
2	.200			
3	.200	2	1	.215
4	.200			
5	.200			

INSTRUMENT NUMBER 305 (Continued)

Frame Number	Measured Width (Inches)	Stepper Switch Position	Cam Position Number	Nominal Slit Width (Inches)
1	.204			
2	.200			
3	.200	2	1	.215
4	.200			
5	.200			
6	.256			
7	.258			
8	.258	3	2	.270
9	.260			
10	.331			
11	.334			
12	.335	4	3	.340
13	.330			
14	.333			
15	.334			
16	.330			
17	.333			
18	.335	5	4	.340
19	.337			
20	.330			
21	.334			
22	.335			
23	.331	8	Failsafe	.340
24	.331			
25	.335			

Acceptable auxiliary data recording imagery was present on the film samples from Instruments 304 and 305. Acceptable imagery included the 200 pps track, PG traces, start of pass mark, A.O. fiducials, PG rail holes, and instrument serial number.

Time word imagery complied with MIL-STD 782 relative to microdensitometer measurements. Bit diameters ranged between 6.3 and 7.4 mils at the 50 percent density level. Bits are considered acceptable when bit diameter

is between 6.0 and 10.5 mils with bit density greater than 0.3 above the base plus fog level.

Most time words produced on Instrument 304 and 305 film samples appeared to be correct. However, 4.8 percent of the time words produced on Instrument 304 film have the Index row missing as well as an abnormally low density time word row. The complement row appears correct. The automatic data reader is expected to misread all time words containing the missing index row. Examination of Instrument 305 film samples revealed that 3 percent of the time words had multiple interrogates resulting in incorrect binary time.

All of the Flight Readiness film exhibits were examined for image degrading scratches. None were found. Rail scratches were severe on film from both pan cameras.

DISIC Camera No. 4 and Instruments 304 and 305 were loaded on 29 November 1967 with flight film without incident. All Flight splices were acceptable.

E. CR-2 FLIGHT CERTIFICATION

Final loading of flight film for the CR-2 system was completed on 27 November 1967. Sensitometric measurements made on samples of this flight supply film for the pan cameras and the DISIC Terrain and Stellar cameras demonstrated satisfactory photographic characteristics. Film types 3404, 3400, and 3401 were evaluated.

During dynamic operations film tracking appeared acceptable. One scratch was observed on the backing side of film from Instrument 304. The scratch was

intermittent and was first observed after the film exited the constant tension roller assembly at the supply cassette. The cause of the scratch is unknown. The scratch occurred outside the active format area beyond the PG rail holes and time word imagery and was not expected to interfere in any way with Mission 1102 performance.

The rubber boot of Instrument 305 Port Horizon camera touched lightly on the corner of the platen light shield extension during camera operation. It was concluded that the boot would not be damaged in flight by light contact with the platen light shield extension.

Rail scratches were heavy on the emulsion side of the film from both pan cameras 304 and 305.

Horizon format vignetting was expected to be minimal. The Horizon shutters appeared to open and close in the center of each fiber glass boot. One steel ring was installed in each rubber boot near the interface of the boot with each horizon camera. The steel ring was expected to prevent the possibility of the rubber boot getting into the field of view of the horizon camera. Controlled exposures of both Stellar formats were programmed into the "A" bucket for possible base line use when evaluating Mission 1102 Stellar photography. Five pairs of Stellar formats were fogged at each of the following three brightness levels, measured in foot lamberts.

	Actual	Desired
1.	0.08	0.015
2.	0.3	0.15
3.	1.5	1.5

A final photometer check for light leakage showed that the system was free of such leaks except at the main camera drums. The previous live payload light leak test showed that leakage from this source produced only very minor fogging effects.

The photographic performance of the CR-2 system was certified for flight on 2 December 1967.

programmed. The orbit achieved was well within the 3 sigma predicted dispersions.

Both panoramic cameras operated satisfactorily throughout the flight. Average cycle periods for both cameras were within 1% of the pre-flight calibrations.

The DISIC system operated normally throughout the flight as indicated by the telemetry monitors.

The FMC, exposure control, clock, pressure make-up, instrumentation, and command systems operated satisfactorily throughout the flight.

Accent vibration appeared normal and was within the qualification levels.

The thermal environment of the panoramic camera was within the predicted tolerances and ranged from an average high of 65°F for the -1 mission to an average low of 53°F for the -2 mission for both panoramic cameras. The temperature of the FMC programmer was higher than predicted and ranged from a high of 115°F to a low of 90°F. Table 3-2 presents the temperature summary for T/M sensors located as shown throughout the CR-2 system.

KIK-ZORRO 38 (Panoramic camera -1 to -2 switchover) was commanded on rev. 76. Cut, wrap, and transfer from the first to the second recovery system occurred normally. KIK-ZORRO 39 (DISIC camera -1 to -2 switchover) was commanded on rev. 81. Cut and splice and transfer to the second recovery system occurred normally.

Both recovery systems were successfully recovered by air-catch with all recovery events occurring on time and as programmed. Impact was within tolerance for both systems.

The SRV tape recorder systems operated satisfactorily throughout the flight and all recorded data was retrieved.

SECTION 3

FLIGHT OPERATIONS

A. INTRODUCTION

FTV 1642 Mission 1102 was an Agena vehicle (SS01-B) and a Thorad Booster (SLV-2G)S/N 514. The Agena flew nose first in orbit and included the following special features.

1. Twelve rocket IMU Systems with boost and de-boost capability.
2. Three Control gas spheres for attitude control.
3. UNCLE UHF digital command system.
4. Pyro-diode by-pass by Uncle 110 command.
5. Special telemetry Link IV (A/P).
6. -3 A/P payload,[redacted]
7. Five 1H batteries, one Type VI.

The payload system consisted of a CR dual recovery reconnaissance camera system (CR-2) consisting of panoramic cameras 304 and 305 and DISIC Camera No. 4.

The nominal dual mission was programmed for 15 days. The actual mission length was 13 days with a 5 day -1 mission and an 8 day -2 mission. Both recoveries were successful air catches with all of the film supply being recovered with the exception of the stellar film which was in excess of the flight programming.

B. SUMMARY

Lift-off occurred at 14:26 PST (System Time 80741.2) on 9 December 1967 from SLC-1, west pad. All launch ascent and injection events occurred as

After second recovery the Agena orbital programmer stopped and remained stopped for 16 revs. This did not adversely effect the payload system except to delay the post recovery testing by one day (16 revs). The post recovery testing consisted of: exercising the command system to assure that all commands not used in-flight were operational; operating the panoramic cameras in mono to evaluate Agena response; and to accumulate as much on-orbit running time on the panoramic cameras as possible.

All test objectives were met;however, the No. 2 panoramic camera failed after 1190 cycles of operation. The No. 1 panoramic camera completed 3941 cycles before the end of the programmed tape.

C. ASCENT PERFORMANCE

All ascent events were normal with in-flight reset (Door ejection). A/P to Orbit Mode, Instrumentation switchover, and panoramic camera to orbit mode occurred on time and as programmed. There was no evidence of panoramic camera rotation during ascent.

The pyro current monitor indicated a normal current profile at door ejection.

Ascent vibration was monitored in the areas of the Delta/Barrel Attachments and the Instrument Barrel/DISICONIC Interface.

Random vibration data from flight indicated all excitation frequencies are higher than the payload resonant frequencies obtained during Qualification Tests. The actual input levels during flight were approximately 0.5 g RMS in any 50 H_z bandwidth. The qualification levels in any 50 H_z bandwidth were 1.5 g longitudinally (minimum) and 1.0 g laterally (minimum).

Table I list of excitation frequencies are noted for information only. They were observed along the y-axis during launch and transonic and lie outside the range of concern of the system.

Longitudinal vibration during ascent ([redacted] Levels) are listed in Table 3-1 and are compared with CR-1. The frequency was 18.2 cps, and the maximum value occurred 10.2 seconds before main engine cut-off (THORAD).

TABLE 3-1

RANDOM VIBRATION EXCITATIONS

LOCATION	LAUNCH (G's Freq.)	TRANSONIC (G's Freq.)
Sta. 86	7.2/615 H_z	.8/520 H_z
Left Delta/Barrel Attachment	3.7/680 H_z	.84/40 H_z 1.49/1060 H_z
Right Delta/Barrel Attachment	2.22/750 H_z	2.05/1435 H_z 1.48/1650 H_z

[redacted] LEVELS
(X-axis only)

	CR-1 (G)	CR-2 (G)
Sta. 86	2.42	1.35
Left Delta/Barrel Attachment	3.5	1.60
Right Delta/Barrel Attachment	2.45	1.35

ASCENT TEMPERATURE SUMMARY (°F)

PAYLOAD GR-2

VEHICLE 1642

SECONDS FROM LIFT OFF (L/O)

Sensor Location	No.	L/O	+30	+[illegible]	+250	+300	+350	+350	+300	+350	+400	+470
Pan No. 1 Lens Cell	1	52	51	51	5[illegible]	[illegible]	52	50	50	50	50	50
Lens Cond	2	50	48	48	49	48	48	47	47	47	47	47
Rear Rail	3	50	50	49	49	49	49	49	50	49	49	49
Output Ac	4	51	51	51	51	51	51	51	51	51	51	51
Drive Rin	5	50	50	50	50	50	50	50	50	50	50	49
Front Rail	6	48	48	48	48	48	48	48	48	48	48	48
AVERAGE		50	50	50	50	49	49	49	49	49	49	49
Drum Support	1	50	49	49	49	49	49	49	49	49	49	49
High Efficiency Amp	2	50	50	49	50	50	50	50	51	51	51	52
Pan No. 2 Lens Cell	1	53	50	51	51	51	51	51	51	51	51	51
Lens Cond	2	52	51	49	49	50	49	49	49	50	49	49
Rear Rail	3	51	50	50	50	50	50	50	50	50	50	50
Output Ac	4	51	50	49	49	50	49	49	49	49	50	50
Drive Rin	5	52	51	52	52	52	52	52	52	52	51	52
Front Rail	6											
AVERAGE		52	50	50	50	51	50	50	50	50	50	50
Supply Cassette		60	58	59	59	59	59	59	59	59	59	59
Delta Top Left		50	47	47	47	47	48	49	50	51	53	53
Slope Programmer		67	66	67	67	66	67	67	67	67	67	68
HSI		67	67	67	67	67	67	68	67	69	67	69
SRV A Skin	1	81	81	81	81	81	81	81	81	82	84	84
Batt	2	89	89	89	89	89	89	89	89	89	89	89
T/U	3	112	112	112	112	113	113	113	112	112	112	113
Retro	4	63	59	59	61	63	63	63	65	66	66	70
SRV B T/U	1	96	96	95	96	95	96	96	96	96	96	96
Retro	2	73	70	71	72	73	73	73	73	73	73	74

TEMPERATURE SUMMARY (°F)

SECONDS FROM LIFT OFF (L/O)

PAYLOAD CR-2

VEHICLE 1642

Sensor Location	No.	L/O	+50	+100	+150	+200	+250	+300	+350	+400	+470
Blast Shield	1	47	41	41	41	47	47	47	47	52	52
	2	45	45	45	46	45	52	52	53	63	63
DISIC Platen	1	63	63	63	63	63	63	64	64	64	65
Demo Cell	2	64	64	64	64	64	64	64	64	64	64
Tubing	1	57	62	73	186	242	2[illegible]	277	252	237	234
	2	48	51	74	234	336	3[illegible]	403	389	372	367	359
	3	49	63	87	2 2	405	445	441	442	396	361	326
	4	45	66	96	221	417	444	444	404	355	317	282
	5	45	68	77	195	273	321	321	304	291	278	268
	6	46	57	67	163	135	224	220	190	180	167	158
DISICONIC	1	41	52	62	121	191	216	216	203	195	186	180
	2	41	57	73	223	322	348	388	361	344	326	318
	3	45	62	82	252	336	432	441	445	357	318	283
	4	43	54	75	224	365	413	402	346	305	270	250
	5	40	51	72	181	244	284	268	261	246	223	210
	6	42	54	59	144	169	176	176	154	139	125	115
Forward Barrel	1	66	75	81	139	171	168	182	179	176	171	176
	2	66	81	101	232	OBH	OBH	OBH	270	229	206	191
	3	63	72	84	154	265	OBH	OBH	250	214	191	173
	4	55	65	71	122	130	136	134	117	106	97	91
Aft Barrel	1	68	80	93	134	142	153	150	153	153	152	150
	2	66	81	99	136	242	274	274	256	242	240	235
	3	66	82	103	242	OBH	OBH	OBH	240	212	194	179
	4	61	73	95	201	203	266	250	202	186	186	156
	5	66	81	98	159	190	200	188	182	172	161	156
	6											

D. MISSION DESCRIPTION SUMMARY

Programmed Mission

	Programmed	Actual
Launch Time - PM PST	1:30 - 2:30	2:26
Mission Length - Total (Days)	15	13
-1	N/A	5
-2	N/A	8

TABLE 3-3

FILM CONSUMPTION - CYCLES

	Pan 304	Pan 305	Stellar Port	Stellar Stbd	Terrain	
Sample - Off Spooling	19	19	-	-	-	
Pre-Launch	148	146	326	331	115	
-1 Mission	2926	2918	3656	3662	2360	
-2 Mission	3069	3074	3942	3948	2430	
Total	6162	6157	7924	7931	4790	

TABLE 3-4

DMU ROCKET PERFORMANCE

DMU NO.	Rev. No.	Velocity Change (FPS)	Period Change (Sec.)
1	14	14.8	9.2
2	46	15.3	9.6
3	71	15.8	9.9
4	97	16.7	10.4
5	120	17.1	10.7
6	139	16.8	10.5
7	163	17.1	10.7
8	182	17.1	10.7
9	201	16.85	10.8
10	233	16.55	10.4
*11	239	19.8	12.4
12	Not Fired		

*De-Bost

Figure 3-1 shows the ground track and period error profiles for the flight. Figures 3-2 and 3-3 show the mean altitude and operations densities for the flight.

V/h Match

The V/h ramp to orbit match generally was within 2½% for Mission 1102-1 and within 4% for Mission 1102-2 over the area of interest.

DMU Operation

Nine of the 12 DMU rockets were utilized during the active portion of the flight. Two rockets were fired after the second recovery. The last rocket was not fired due to power depletion. DMU operation was normal in all cases. Table 3-4 is a summary of DMU rocket performance.

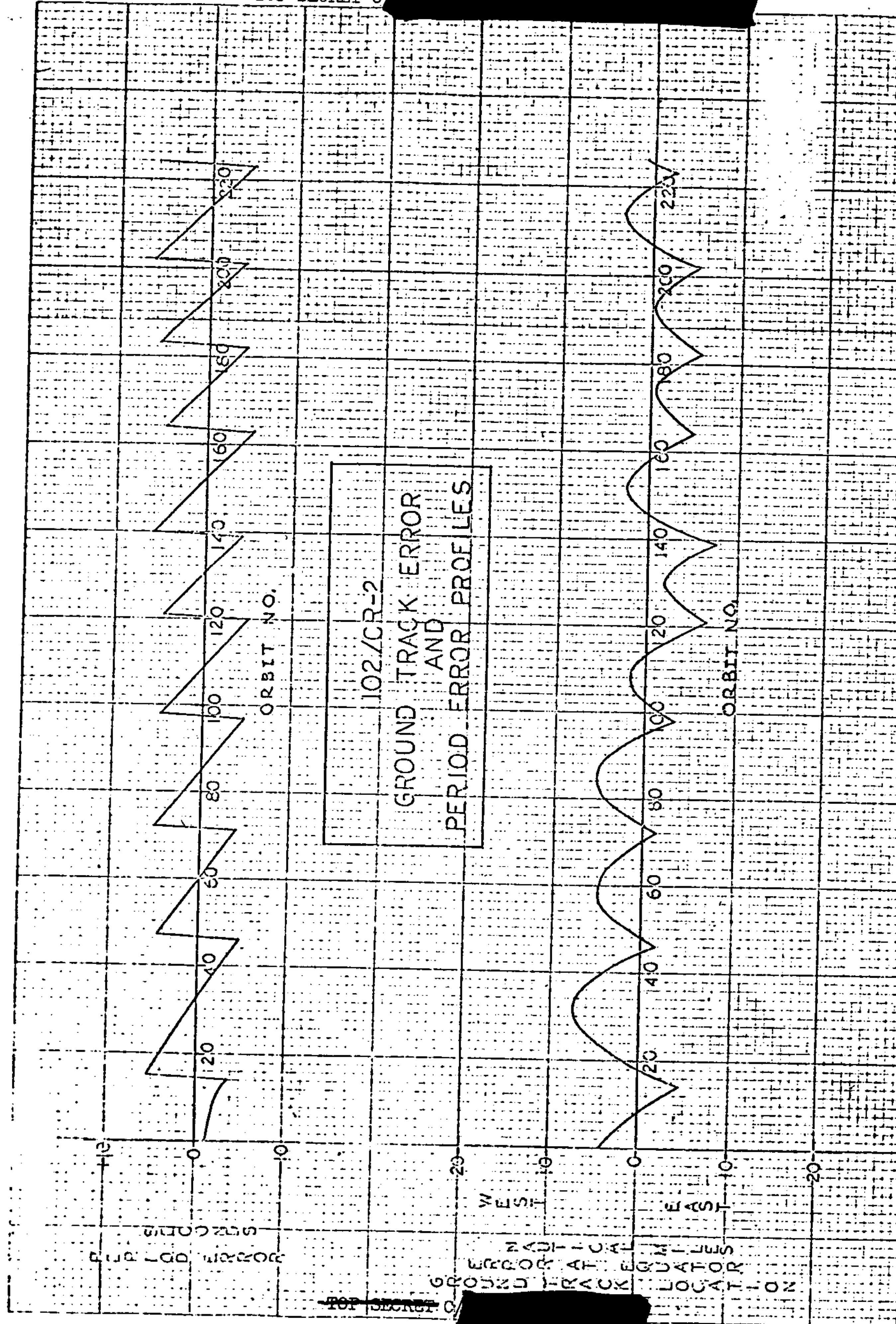

102/CR-2
GROUND TRACK ERROR
AND
PERIOD ERROR PROFILES
ORBIT NO.
ORBIT NO.
SECONDS
PERIOD ERROR
WEST
EAST
NAUTICAL MILES
ERROR AT EQUATOR
GROUND TRACK LOCATION

FIGURE 3-1

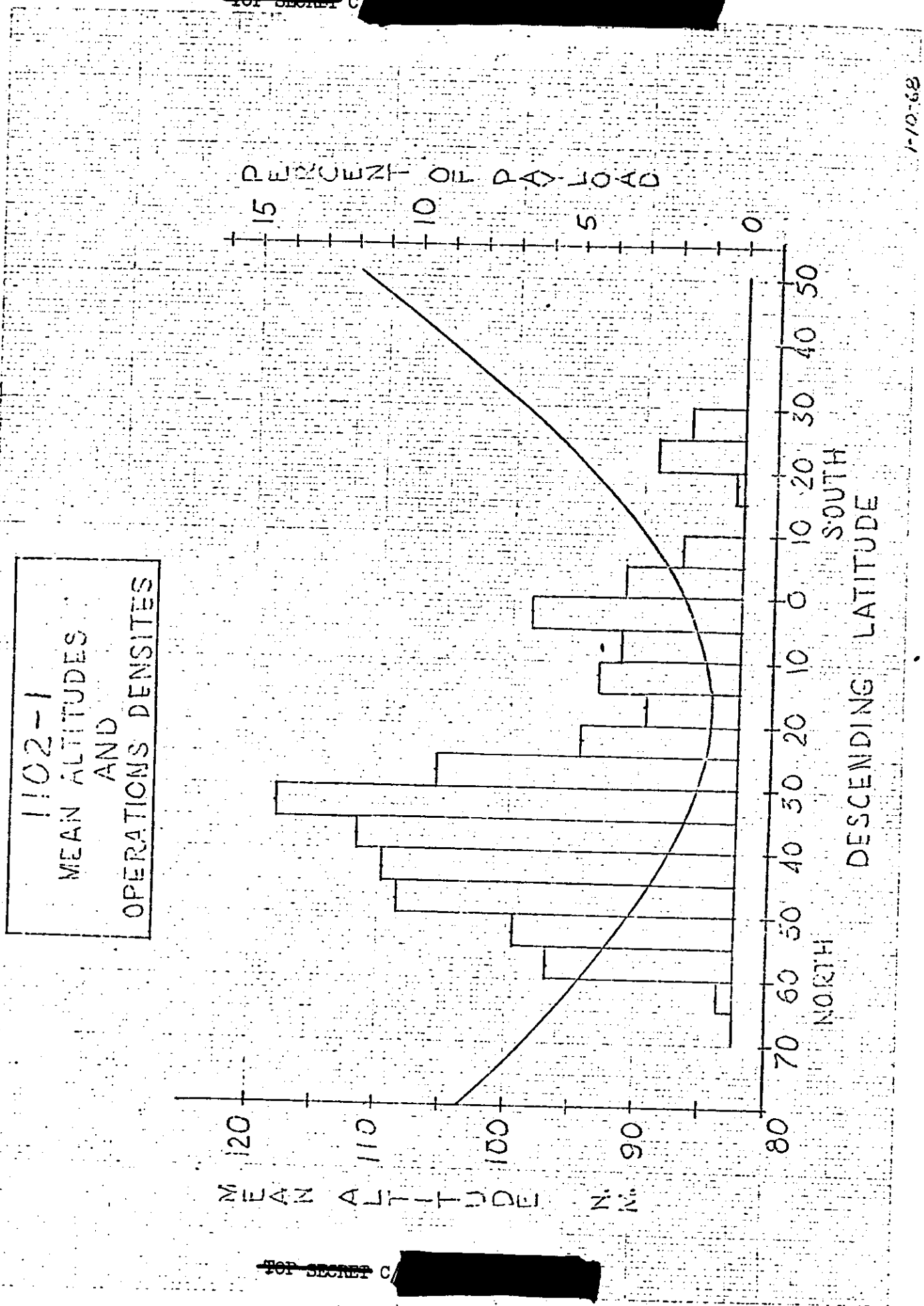

1102-1
MEAN ALTITUDES
AND
OPERATIONS DENSITIES
PERCENT OIL PAYLOAD
15
10
5
0
MEAN ALTITUDE IN
120
110
100
90
80
NORTH
DESCENDING LATITUDE
SOUTH
50
40
30
20
10
0
10
20
30
40
50
60
70
1-10-62

Figure 3-2

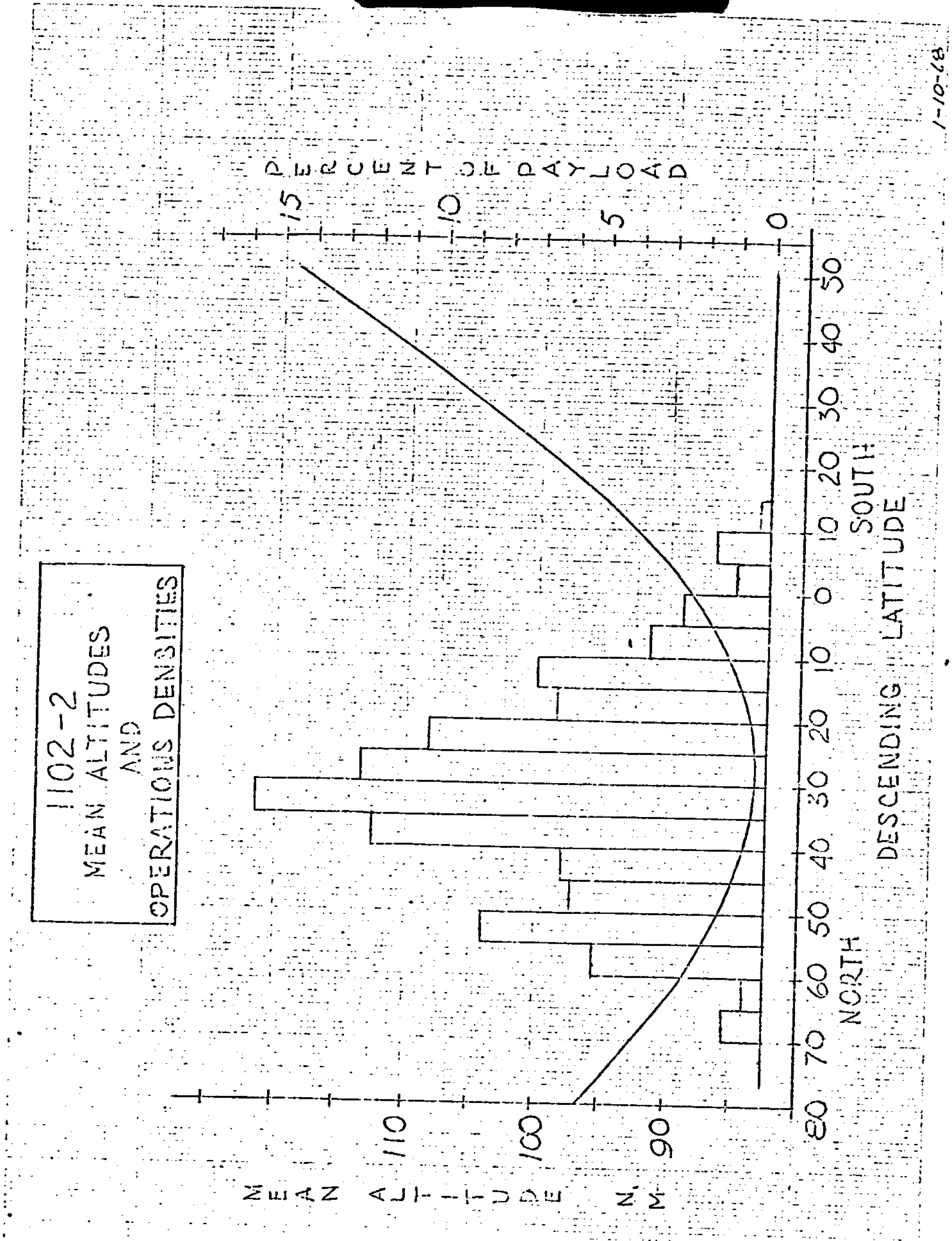

1102-2
MEAN ALTITUDES
AND
OPERATIONS DENSITIES
PERCENT OF PAYLOAD
15
10
5
0
MEAN ALTITUDE N.M.
110
100
90
DESCENDING LATITUDE
NORTH
SOUTH
80
70
60
50
40
30
20
10
0
10
20
30
40
50
1-10-68

FIGURE 3-3

E. PANORAMIC CAMERA PERFORMANCE

Both panoramic cameras operated normally throughout the flight. Camera system dynamic operation, 99/101 percent clutch operation, start-up, shut-down, and transport functions were normal for all passes with telemetry data available. Cycle periods were within 1 percent of the pre-flight calibration. Cut and wrap was commanded on Rev. 76, all switchover and transfer functions were satisfactory.

F. DISIC PERFORMANCE

Telemetry monitors indicated the DISIC system operated normally throughout the flight. All transport and internal camera control monitors indicated normal operation, however the processed film indicated a failure of the terrain capping shutter. Cut and splice and transfer to the second recovery system was initiated on Rev. 81. All events occurred as programmed and were very satisfactory.

The exposure control change mechanism in the DISIC was disabled prior to the flight so that only the 1/500 second exposure time was operative. The telemetry monitor for exposure control was not disabled and indicated correct response to the switch programmer output.

G. INSTRUMENTATION AND COMMAND SYSTEM PERFORMANCE

The instrumentation system operated satisfactorily throughout the flight. However, the DISIC shutter monitor failed to indicate shutter operation on frames 2, 3, and 4 on Rev. 81.

The command system operated normally throughout the flight with no evidence of missed or unexecuted commands. Several echo alarms occurred at various stations due to station problems and/or anomalies.

H. EXPOSURE CONTROL SYSTEM PERFORMANCE

The exposure control system operated normally throughout the flight with all slit width changes occurring as programmed.

I. CLOCK SYSTEM PERFORMANCE

The clock system operated normally throughout the flight. Good correlation between the clock time and system time was obtained. The correlation equations are as follows:

First Order Fit

$$\text{System Time} = A_0 + A_1 \text{ Clock Time}$$

where

$$A_0 = -261324.13347 \quad A_1 = 0.9999999619416$$

J. PRESSURE MAKE-UP SYSTEM PERFORMANCE

The pressure make-up system performance was normal with an average gas consumption of 11.49 PSI per minute. The total operate time was 199.87 minutes and there were 108 PMU operations. There was a pressure of 540 PSI remaining at the end of the flight.

Two pressure gages were installed in the system to monitor internal system pressures. These gages confirmed correct operation of the PMU system by indicating an increase of the internal pressure of the system during PMU operation. Table 3-5 gives a tabulation of the internal pressure from the [redacted] or [redacted] tracking stations during non-operate times.

TABLE 3-5

INTERNAL PRESSURE (MICRONS) WITH PMU OFF

Rev.	Pressure Gage
2	56
18	21
34	17
50	14
66	13
75	13
83	12
99	9
115	9
131	7
140	9
159	7
168	7
182	0
198	0

During instrument operations the gage indicated as follows: (pressure in microns)

Rev.	High Pressure Gage		
	On	Peak	Off
9	27	67	67
210	1	72	57.5

K. THERMAL ENVIRONMENT

Temperature data for the [redacted]acking station acquisitions are included as Table 3-6. These data indicate the payload system temperatures were very near the pre-flight predictions. Data from two orbital profiles

were reduced and included as Tables 3-7 and 3-8. These data are from Revs 24 and 202 respectively. Figures 3-4 and 3-5 show actual vs predicted temperatures. These figures indicate that the temperature change from Beta angle was more severe than predicted.

L. RECOVERY SYSTEM PERFORMANCE

The recovery capsules were recovered by air-catch on Revs 83 and 212 for -1 and -2 respectively. All re-entry events occurred as programmed and within tolerance. The condition of recovered capsules was satisfactory. The predicted versus actual impact points are as follows:

Predicted Impact	23° 1.4'N/168° 51.4'W	18° 59.5'N/163° 12.8'W
Actual Impact	23° 11'N/168° 39'W	19° 5'N/162° 59'W

A sequence of events and event times are given in Table #3-9

TABLE 3-6 MISSION 1102-1 and 1102-2

TEMPERATURE SUMMARY (°F)

PAYLOAD CR-2

VEHICLE 1642

CREW

Sensor Location	No.	9	10	25	32	4	11	26	29	73	81	90	97	106	113	122	2[illegible]	130
Fan No. 1 Lens Coll	1	6[illegible]	7	6[illegible]	70	6[illegible]	[illegible]	6[illegible]	[illegible]	66	68	64	63	66	62	[illegible]	[illegible]	50
Lens Coll	2	[illegible]	[illegible]	81	85	[illegible]	76	78	77	76	74	72	69	69	66	68	65	66
Rear Roll	3	61	62	64	62	63	61	63	61	62	61	61	56	58	55	58	54	57
Output AC	4	47	52	48	47	48	47	47	47	49	47	47	45	45	44	45	43	45
Drive Mot	5	67	62	67	69	65	67	65	67	68	66	58	62	58	60	58	57	56
Front Roll	6	64	62	64	62	64	64	64	62	62	60	62	56	58	55	56	54	57
AVERAGE		63	66	66	66	65	64	65	64	63	63	61	59	58	57	58	56	57
Drum Support	1	63	65	66	65	63	63	65	63	63	62	59	60	56	58	58	56	57
H.E.A.	2	71	73	[illegible]	73	67	69	69	70	65	76	78	71	67	69	74	67	71
Fan No. 2 Lens Coll	1	67	70	68	7[illegible]	67	67	67	67	65	67	73	73	58	61	60	59	58
Lens Coll	2	57	60	58	58	57	58	58	57	60	58	54	53	52	52	52	51	52
Rear Roll	3	65	62	65	61	64	62	64	62	64	62	58	55	60	55	57	54	58
Output AC	4	86	77	84	77	83	75	85	73	81	72	70	67	64	66	71	64	68
Drive Mot	5	67	64	68	68	67	67	66	68	64	66	62	62	58	61	59	59	58
Front Roll	6	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
AVERAGE		68	67	69	67	68	66	67	65	67	67	65	63	58	59	60	57	59
Supply Cassette		58	60	61	61	61	60	63	62	61	60	61	58	58	58	58	56	57
Top Left Delta		55	42	53	46	52	39	58	46	56	38	49	36	42	35	47	33	45
Slope Programmer		110	113	111	115	113	111	112	110	108	108	105	105	102	103	100	99	99
HSW		92	92	92	88	90	90	90	92	90	90	90	86	82	82	86	82	78
SRV A Skin	1	66	59	58	57	56	55	57	55	57	55	--	--	--	--	--	--	--
Batt	2	61	57	58	53	50	52	51	53	48	53	--	--	--	--	--	--	--
T/U	3	72	68	61	58	59	58	59	58	57	58	--	--	--	--	--	--	--
Retro	4	71	66	65	64	65	63	68	65	66	63	--	--	--	--	--	--	--
SRV B T/U	1	82	82	80	81	81	82	83	83	79	82	81	83	--	82	79	79	79
Retro	2	85	87	85	86	85	86	86	87	85	85	81	82	79	80	79	79	79

TEMPERATURE SUMMARY (°F)

PAYLOAD CR-2

ORBIT

VEHICLE 1642

Sensor Location	No.	0	15	25	32	41	49	56	69	73	81	90	97	106	113	122	129	138
Blast Shield	1	73	[illegible]	[illegible]	67	[illegible]	67	75	76	70	73	37	162	37	156	37	156	37
	2	3	[illegible]	[illegible]	73	77	77	82	82	77	77	31	172	27	174	27	162	27
DSSIC Mitten	1	71	72	72	71	72	7	72	7[illegible]	72	72	65	65	64	65	63	62	62
Zone Cell	2	64	73	73	71	73	7	73	71	73	73	65	67	64	66	64	62	63
Fairing	1	81	120	15	133	11	37	31	136	10	133	10	119	8	122	5	123	11
	2	113	140	12	37	[illegible]	12	116	137	110	132	[illegible]	127	82	127	76	127	79
	3	64	113	61	57	56	[illegible]	67	67	61	67	61	57	49	61	46	64	48
	4	64	64	61	7[illegible]	5[illegible]	7[illegible]	67	7[illegible]	61	62	17	113	7	113	4	121	1
	5	45	42	40	42	42	46	50	45	40	45	42	42	36	38	38	42	38
	6	-6	10	- 0	17	-12	-3	-3	30	-10	33	-3	36	-13	36	-13	46	-13
DISCONIC	1	41	130	34	132	31	101	44	133	37	130	37	115	25	115	21	110	18
	2	160	174	11[illegible]	17[illegible]	2[illegible]6	156	18[illegible]	169	122	161	52	145	81	130	78	136	69
	3	60	102	66	89	59	98	69	86	63	93	75	84	50	87	47	84	44
	4	49	46	37	46	38	48	46	49	40	49	38	55	30	46	27	49	28
	5	46	46	46	46	46	46	56	56	49	58	36	43	33	40	33	43	33
	6	3	13	3	13	0	0	13	39	7	30	7	27	0	30	0	40	0
Forward Barrel	1	69	120	63	114	56	66	75	111	69	108	63	86	53	86	47	83	44
	2	69	84	66	78	60	72	72	81	66	75	63	68	50	66	47	66	41
	3	35	38	32	32	32	32	38	42	38	38	45	29	29	35	26	35	23
	4	-1[illegible]	-26	-[illegible]	-26	-23	-26	-12	-26	-12	-26	-12	-26	-[illegible]	-26	-16	-26	-[illegible]
Aft Barrel	1	9[illegible]	10[illegible]	94	105	7	8[illegible]	23	108	97	97	10	65	7	85	4	98	9
	2	140	132	129	172	126	156	145	160	134	150	123	145	112	140	109	134	98
	3	69	91	66	85	60	82	66	88	66	82	60	73	53	76	50	76	49
	4	33	42	30	40	27	37	37	40	37	40	30	43	27	46	27	46	28
	5	38	38	38	41	38	38	41	41	41	45	41	41	35	41	3[illegible]	41	38
	6	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

[redacted]

Page 2-7

TEMPERATURE SUMMARY (°F)

PAYLOAD CR-2

CREW

VEHICLE 1642

Sensor Location	No.	145	152	1[illegible]	170	172	[illegible]6	1 4	202	210
Fan No. 1 Lens Cell	1	57	57	58	56	58	59	59	56	55
Lens Cell	2	61	63	62	62	61	60	57	59	56
Rear Roll	3	54	55	55	55	53	55	50	55	50
Output Mo	4	43	45	45	44	45	47	43	47	43
Drive Mot	5	57	54	56	52	56	53	53	53	52
Front Roll	6	55	56	54	55	53	55	5	56	49
AVERAGE		56	55	55	54	54	54	53	54	51
Drive Chamber [illegible]	1	56	55	55	54	54	54	52	55	51
[illegible] Plenum Fan A [illegible]	2	65	69	64	67	61	65	58	66	57
Fan No. 2 Lens Cell	1	5[illegible]	57	57	56	56	55	54	55	53
Lens Cell	2	51	50	51	49	51	49	48	51	48
Rear Roll	3	54	56	53	56	52	55	49	57	48
Output Mo	4	63	66	62	65	59	63	56	64	53
Drive Mot	5	58	55	58	54	57	53	54	54	53
Front Roll	6	0	0	0	--	--	--	--	--	--
AVERAGE		57	57	56	56	55	55	52	56	51
Supply Cassette		55	55	55	54	55	53	52	55	51
Drive Mot [illegible]		31	45	32	44	32	44	30	49	29
Stage Temperature		97	96	97	94	95	92	92	92	90
EPI		78	78	82	77	78	77	77	82	72
SRV A Sun	1							--	--	--
Data	2							--	--	--
E/U	3							--	--	--
Retro	4							--	--	--
SRV B E/U	1	72	76	78	77	78	77	75	77	76
Retro	2	87	77	78	77	77	76	75	77	74

TEMPERATURE SUMMARY (°F)

PAYLOAD CR-2

ORBIT

VEHICLE 1642

Sensor Location	No.	45	255	160	76	7	166	14	208	210
Mast Shield	1	170	37	177	37	156	37	156	44	151
	2	1[illegible]6	27	177	27	1[illegible]5	28	1[illegible]0	31	167
DISC Platen	1	62	60	61	60	61	60	58	62	61
Lens Cell	2	62	60	60	60	62	60	58	62	61
Fairing	1	96	11	91	2	133	4	122	13	114
	2	105	76	107	69	121	69	107	76	99
	3	69	42	85	41	97	43	82	52	77
	4	122	1	110	1	135	4	132	10	127
	5	37	39	45	40	52	41	43	55	45
	6	21	-13	26	-13	73	-13	70	-3	67
DISICONIC	1	84	13	97	16	121	16	110	21	101
	2	119	64	119	63	122	63	110	72	102
	3	78	42	78	42	75	43	72	53	66
	4	40	24	43	26	46	27	49	40	43
	5	36	33	43	35	46	36	43	49	43
	6	13	0	23	0	52	2	56	13	56
Forward Barrel	1	56	44	56	43	75	43	66	50	59
	2	57	41	47	41	54	41	54	50	47
	3	26	23	32	25	35	25	32	38	32
	4	-32	-19	-27	-16	-3	-1	-32	-3	-5
Aft Barrel	1	43	0	43	0	85	0	71	7	64
	2	113	93	115	96	115	96	104	93	92
	3	60	41	69	41	69	42	60	53	53
	4	33	20	40	18	43	19	43	40	37
	5	35	38	41	40	41	41	41	51	39
	6	--	--	--	--	--	--	--	--	--

TEMPERATURE SUMMARY (°F)

ORBIT 24

PAYLOAD CR-2

VEHICLE 1642

TEMPERATURE SENSOR LOCATION	No.	1-16	1-35	1-55	1-73	2-10	2-63	2-43	2-24	2-03	3-17	3-37	3-56	3-75	4-79	4-62	4-43	4-24
Pan No. 1 Lens Cell	1	52	53	52	52	52	52	52	51	52	52	51	51	52	51	51	52	52
Lens Cone	2	83	84	83	82	82	82	80	76	75	77	77	77	78	79	80	81	82
Rear Rail	3	66	66	67	64	64	62	61	61	61	61	61	62	63	65	66	66	67
Output AC	4	49	49	48	48	48	47	47	47	47	47	47	47	48	48	49	49	49
Drive Mtr	5	67	68	69	68	68	68	68	68	68	67	68	67	68	69	68	68	68
Front Rail	6	66	66	67	64	65	62	61	61	61	60	61	61	62	64	65	66	66
AVERAGE		64	64	64	63	63	62	62	61	61	61	61	61	62	63	63	64	64
Lens Stycast	-	66	67	67	67	67	66	65	64	65	63	63	63	64	65	66	66	67
Main Instrument Arm	1	93	92	89	87	85	83	82	83	83	84	86	88	91	94	95	96	95
Pan No. 2 Lens Cell	1	68	69	69	69	69	68	68	68	68	68	68	67	67	67	68	68	68
Lens Cone	2	58	59	59	59	58	59	58	58	58	58	58	58	58	58	59	59	58
Rear Rail	3	67	66	65	64	62	61	61	59	59	60	61	62	64	66	67	68	68
Output AC	4	89	87	85	83	81	81	77	76	75	77	79	81	84	87	88	89	90
Drive Mtr	5	69	69	69	70	69	69	69	68	69	68	68	68	68	68	68	68	68
Front Rail	6																	
AVERAGE		70	70	69	69	68	68	67	67	67	66	66	66	67	68	68	68	68
Supply Cassette		62	61	61	61	60	60	60-	60	60	60	60	60	60	61	61	62	62
Primary Take-up		61	56	52	48	45	42	40	41	45	53	62	70	77	80	79	75	70
Slope Programmer		114	114	114	114	113	113	112	112	112	112	113	113	114	114	114	114	113
T/U		92	92	94	92	92	90	90	88	88	90	88	90	90	92	88	92	92
SRV A Skin	1	59	59	58	58	57	56	57	56	56	56	56	57	57	57	57	58	58
Batt	2	52	53	52	53	52	53	53	53	53	52	52	52	52	53	52	53	53
T/U	3	61	61	61	61	61	60	61	61	62	62	62	62	62	62	61	61	62
Retro	4	67	66	66	66	64	63	64	63	63	63	63	63	66	67	68	68	68
SRV B T/U	1	81	81	82	82	81	81	81	81	81	81	83	81	81	81	81	82	81
Retro	2	86	86	87	87	86	86	86	86	85	85	85	85	85	86	86	86	86

TOP SECRET C[redacted]

TABLE 3-7

TEMPERATURE SUMMARY (°F)

PAYLOAD CR-2

ORBIT 24

VEHICLE 1642

Sensor Location	No.	1-12	1-35	1-58	1-73	2-10	2-28	2-43	2-28	2-03	3-17	3-37	3-56	3-75	4-79	4-62	4-43	4-24
Mast Shield	1	70	70	73	70	70	[illegible]	70	70	70	70	76	73	75	78	76	78	76
	2	79	80	82	80	77	77	77	77	77	77	80	77	80	83	82	83	83
DISIC Platen	1	73	72	72	72	72	72	72	72	72	72	72	72	72	74	73	73	73
Load Cell	2	75	74	74	74	73	73	73	73	73	73	73	73	73	74	74	74	74
Fairing	1	31	21	11	0	1	40	89	136	173	202	209	204	184	150	108	80	59
	2	124	113	99	91	82	99	121	121	159	172	180	185	185	187	180	172	154
	3	70	64	58	52	48	79	87	87	91	97	94	97	100	100	100	94	85
	4	67	64	52	52	48	84	79	82	82	84	84	84	87	93	87	87	79
	5	45	45	42	36	36	33	36	39	42	45	49	55	58	59	58	55	52
	6	-3	-10	-13	-16	-20	-20	-10	17	40	73	79	73	58	42	30	20	10
DISICONIC	1	47	41	31	25	13	50	99	135	170	196	200	200	190	169	127	95	75
	2	139	128	118	108	99	133	156	119	189	197	205	207	213	210	207	197	169
	3	72	69	62	56	50	93	89	96	96	96	93	93	105	102	102	108	87
	4	40	37	33	33	27	27	37	46	55	58	61	61	8	8	4	-2	-6
	5	46	49	46	46	43	43	43	46	49	49	46	46	59	62	56	56	52
	6	10	7	0	0	-7	-7	-3	17	43	66	72	69	53	43	33	23	17
Forward Barrel	1	84	69	56	47	37	56	88	120	152	184	205	215	218	207	186	157	122
	2	75	69	63	57	54	84	78	78	78	81	81	84	96	99	110	113	90
	3	38	35	29	29	26	23	26	35	42	45	48	51	63	60	51	48	48
	4	-12	-16	-19	-23	-26	-26	-26	-26	-23	-12	-2	4	8	8	4	-2	-6
Aft Barrel	1	30	17	0	0	-3	17	64	111	158	194	212	217	204	180	142	97	68
	2	153	140	129	118	109	142	129	177	195	203	214	222	235	240	240	224	190
	3	73	66	60	56	50	86	88	85	85	85	85	85	97	100	109	115	91
	4	37	33	30	27	24	24	33	43	49	52	56	56	68	69	62	46	43
	5	42	41	38	38	35	32	35	35	38	41	42	41	48	48	45	45	41
	6																	

[redacted]

TEMPERATURE SUMMARY (°F)

PAYLOAD CR-2

CYCLE 202

VEHICLE 1642

Gage Location	No.	1-16	1-36	1-56	1-74	2-12	2-32	2-42	2-62	2-82	3-18	3-38	3-57	3-75	4-12	4-32	4-43	4-24
Duct No. 2 Bond Coat	1	55	55	55	56	54	55	53	52	55	53	54	53	54	53	54	54	55
Bond Coat	2	58	59	59	58	57	57	56	57	57	56	56	56	57	57	57	57	58
Base Metal	3	57	57	57	54	51	52	50	50	50	49	50	52	54	55	54	55	55
Gasket AC	4	48	48	46	45	45	45	43	42	43	42	42	44	44	45	47	47	47
Drive Nut	5	53	53	52	52	52	53	53	53	54	51	52	51	51	51	51	51	51
Front Bolt	6	55	55	54	54	52	52	50	50	50	48	50	50	51	53	55	54	55
AVERAGE		55	54	54	53	52	52	51	51	51	50	50	51	51	52	53	53	54
Dome Support	1	54	54	54	53	53	52	53	53	53	50	51	51	53	51	53	53	53
Dome Reinforcement Ass	2	69	69	64	63	61	60	59	58	58	58	58	61	63	65	67	66	66
Duct No. 2 Bond Coat	1	54	54	54	54	54	54	53	54	54	52	53	53	53	54	54	53	53
Bond Coat	2	51	50	50	50	49	49	47	48	49	47	47	47	48	48	49	49	47
Base Metal	3	56	55	54	54	52	50	48	48	48	48	50	52	53	55	57	56	56
Gasket AC	4	62	63	62	61	58	57	54	54	54	54	56	57	58	62	64	64	64
Drive Nut	5	54	55	54	53	52	53	52	52	53	52	52	52	52	54	52	52	52
Front Bolt	6	[illegible]																
AVERAGE		56	55	55	54	53	52	51	51	51	50	51	52	53	54	55	55	55
Supply Manifold		55	55	55	54	53	52	52 -	51	50	50	49	51	51	53	53	53	53
Bellows Shield		53	49	42	38	35	31	28	29	37	44	55	65	73	77	75	69	63
Flare Temperature		92	91	89	92	91	91	89	90	90	91	91	91	90	91	91	90	91
ECU		80	78	76	76	76	76	72	74	76	74	74	72	76	74	76	78	78
SRM A	Skin	1																
	Nozz	2																
	C/U	3																
	Throa	4																
SRM B	C/U	1	75	75	75	75	75	75	75	75	75	75	75	77	76	75	75	75	75
	Throa	2	75	75	76	75	75	75	74	73	74	73	74	75	74	74	75	75	74

TEMPERATURE SUMMARY (°F)

PAYLOAD CR-2

ORBIT 202

VEHICLE 1642

Sensor Location	No.	1-10	1-28	1-52	1-74	2-10	2-32	2-42	2-22	2-02	3-10	3-38	3-57	3-75	4-10	4-32	4-43	4-24
Blast Shield	1	37	37	37	41	41	120	170	145	125	105	94	88	82	70	57	50	44
	2	37	37	43	56	56	117	174	157	159	114	82	70	57	51	44	37	31
DISCO Plater	1	57	57	58	58	58	58	57	58	59	58	60	60	60	60	60	60	60
Zero Cell	2	58	58	58	58	58	58	58	57	58	58	58	58	58	58	60	58	58
Fairing	1	12	9	-5	-12	-15	28	78	130	161	202	209	199	171	125	85	62	43
	2	70	70	61	52	47	84	89	127	127	135	140	148	148	137	132	116	105
	3	44	42	36	30	30	55	72	82	91	99	94	87	103	97	85	73	67
	4	1	4	1	-6	-6	51	104	135	172	132	95	84	79	74	48	36	26
	5	39	38	36	36	36	33	38	49	84	73	79	91	96	88	82	73	67
	6		-1	-13	-16	-20	-6	30	78	130	152	157	141	110	73	48	36	20
DISICONIC	1	25	22	18	8	8	28	69	113	162	126	105	106	170	127	92	62	50
	2	66	63	60	51	51	75	93	108	169	122	122	120	120	116	110	99	87
	3	44	44	37	31	31	63	66	66	69	78	81	87	93	87	72	63	56
	4	30	27	24	24	21	27	40	49	58	66	71	77	83	74	58	49	40
	5	46	43	36	36	36	36	36	36	43	52	56	62	68	62	56	52	49
	6	13	7	0	-3	0	0	23	66	113	136	144	136	113	78	53	40	30
Forward Barrel	1	50	44	34	21	15	18	37	69	111	141	163	184	179	160	134	111	85
	2	50	4	34	31	30	41	47	54	60	66	68	75	87	72	72	72	60
	3	30	29	26	19	19	16	29	35	45	57	57	63	75	63	51	51	45
	4	1	-6	-16	-19	-23	-26	-26	-6	27	52	71	86	77	52	40	27	21
Aft Barrel	1	37	19	-6	-10	-11	-10	23	80	142	184	202	207	194	153	103	68	36
	2	104	92	74	72	72	78	89	95	106	112	120	145	145	145	145	131	118
	3	58	4	37	40	32	47	56	60	66	73	73	79	91	79	73	73	60
	4	37	3	24	24	17	20	37	43	40	65	62	74	80	74	56	48	43
	5	51	41	41	41	41	35	38	41	45	48	57	60	66	63	60	60	57
	6																	

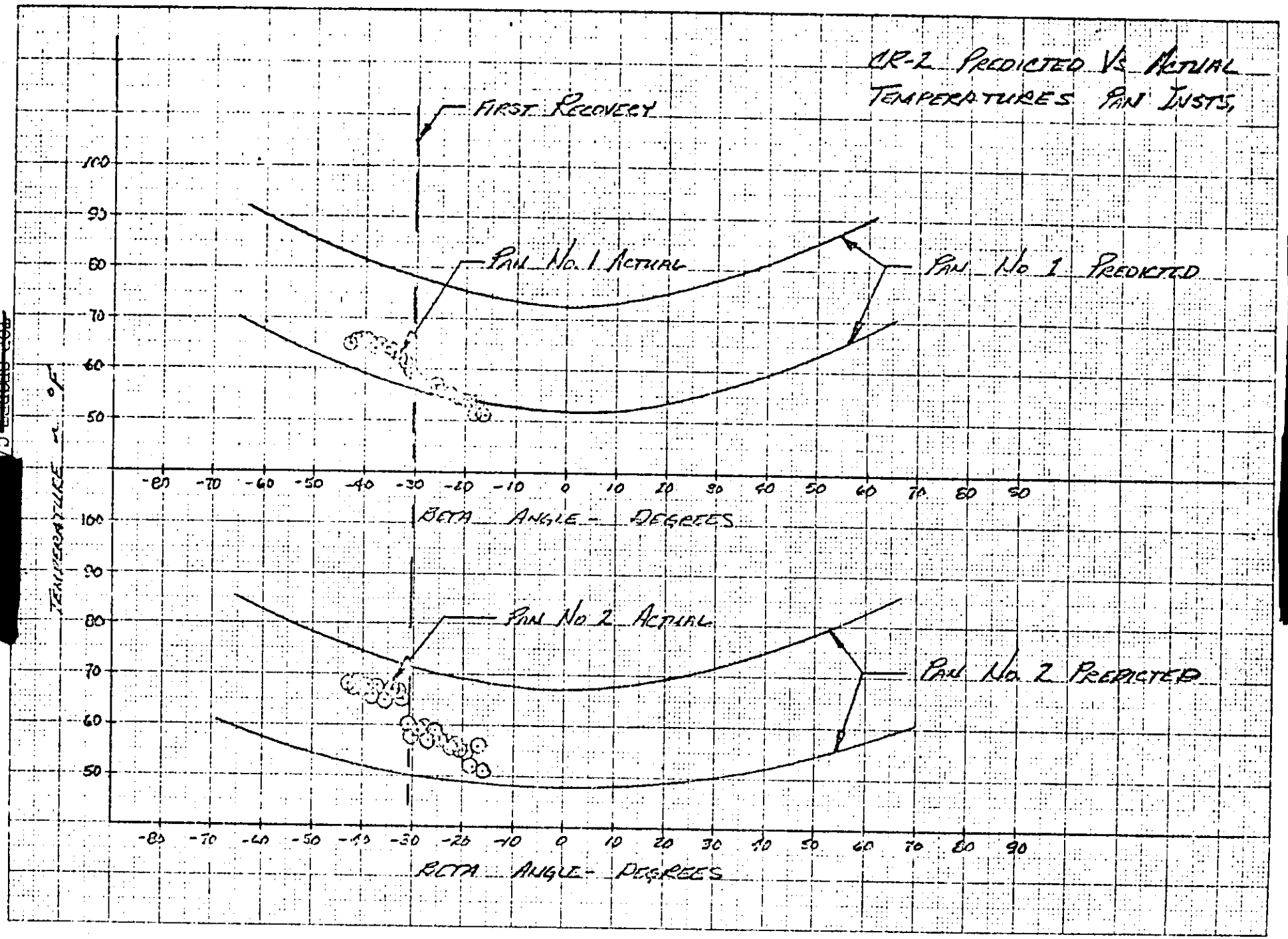

CR-2 PREDICTED VS ACTUAL
TEMPERATURES PAN INSTS,
FIRST RECOVERY
PAN No. 1 ACTUAL
PAN No 1 PREDICTED
PAN No. 2 ACTUAL
PAN No. 2 PREDICTED
TEMPERATURE - °F
BETA ANGLE - DEGREES
100
90
80
70
60
50
-80 -70 -60 -50 -40 -30 -20 -10 0 10 20 30 40 50 60 70 80 90

FIGURE 3-4

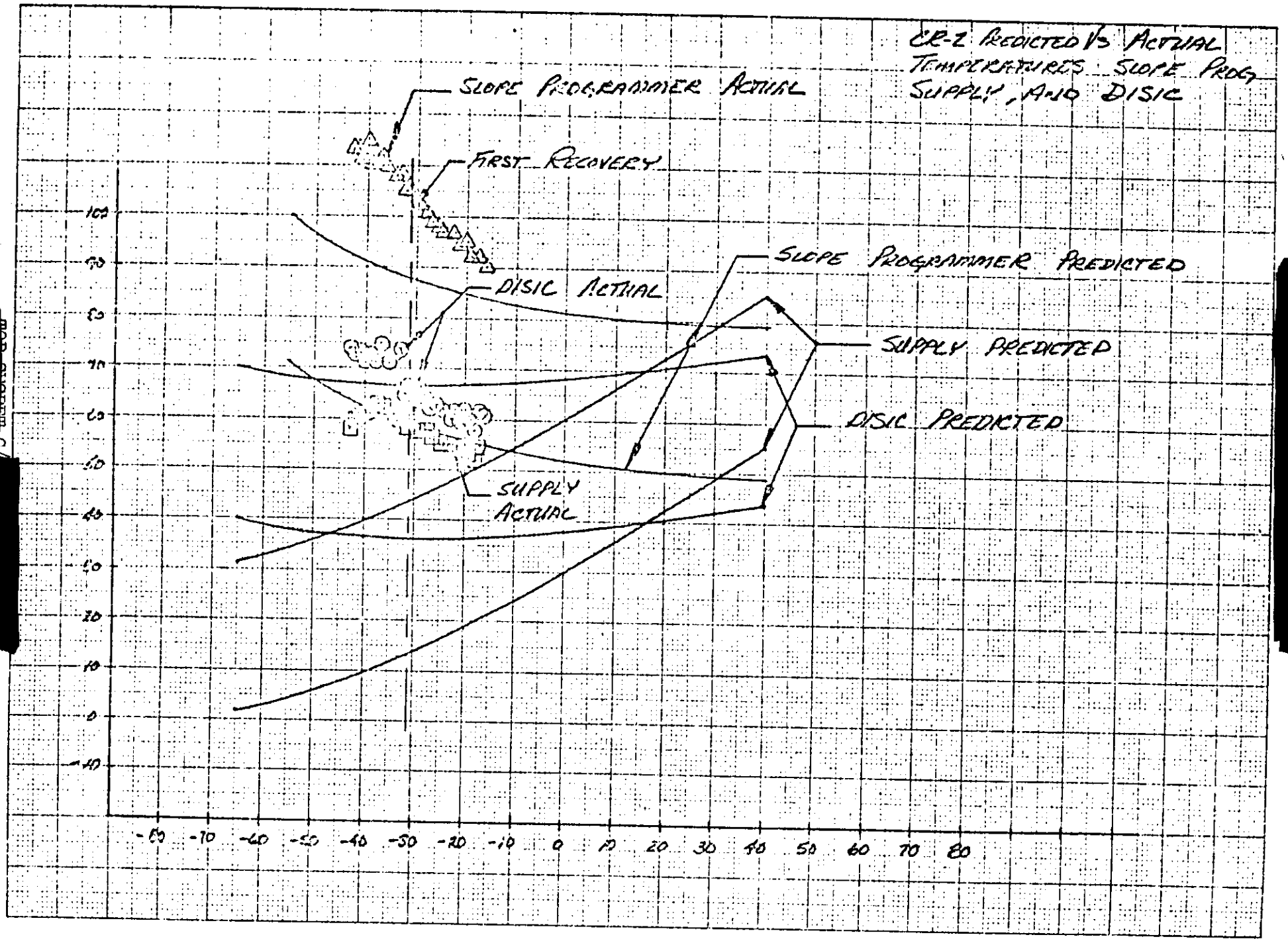

CR-2 PREDICTED VS ACTUAL TEMPERATURES SLOPE PROG SUPPLY, A-10 DISIC
SLOPE PROGRAMMER ACTUAL
FIRST RECOVERY
DISIC ACTUAL
SLOPE PROGRAMMER PREDICTED
SUPPLY PREDICTED
DISIC PREDICTED
SUPPLY ACTUAL
100
90
80
70
60
50
40
30
20
10
0
-10
-60 -50 -40 -30 -20 -10 0 10 20 30 40 50 60 70 80

FIGURE 3-5

TABLE 3-9

RE-ENTRY SEQUENCE OF EVENTS

Event	Delta Time		
	No. 1	No. 2	Nominal
Arm	6.0	N/A	6.0 ± .5
Transfer	80.78	N/A	81.0 ± .5
Electrical Disconnect	81.77	N/A	82.0 ± .5
Separation	82.76	N/A	83.0 ± .5
Spin	3.38	N/A	3.40 ± .3
Retro	7.57	N/A	7.55 ± .45
Despin	10.71	N/A	10.75 ± .54
Thrust Cone Separate	1.50	N/A	1.50 ± .15
G Switch Open	465.64	N/A	---
Parachute Cover Off	26.03	25.66	26.0 ± 1.5
Drogue Chute Deployed	.55	.52	.63 ± .08
Main Parachute Bag Separate	11.00	10.98	10.25 ± 1.5
Main Parachute Deployed	.55	.58	.52 ± .13
Main Parachute Disreef	4.71	4.37	4.5 ± .8
K-10 Reset	27.73	28.78	28.0 ± 1.0

M. SRV TAPE RECORDER PERFORMANCE

The SRV Tape Recorder performance was generally satisfactory. There were, however, data points that created delays in generating the customer tape output. The first problem encountered was that the slit width position monitors were greater than 5% from 3.5 volts in position 4. The customer program was rewritten to accept this high voltage error.

Several instances of manual data changing was necessary because one or both of the first two CF's at startup were either in error or missing. It is estimated that erroneous data caused as much as 8 hours delay completing the customer tape for each SRV.

N. POST RECOVERY TEST RESULTS

Command System

The command system was exercised during post recovery testing to assure that all commands not utilized during the flight were operational. All commands were executed normally with no anomalies noted.

Panoramic Camera Operation

The panoramic camera system was activated on Rev 228. Both cameras operated normally until Rev 232. During 232 the No. 2 panoramic camera failed. A total of 1190 cycles were completed prior to the failure. The No. 1 camera continued to operate until the end of the programmed tape with a total of 3941 cycles.

The following is a sequence of events and data summary from the time of second recovery until the end of the programmed tape.

1) Recovery No. 2 occurred on Rev 212.

2) Payload tape recorder verified film depletion on both pan units to Recovery No. 2

3) Guidance and cycle counter data verified pan No. 2 failed during the first operation on Rev 232.

4) The current monitor indicated the system was consuming 16 amps of power continuously from Rev. 232 until Rev. 249, where it dropped to 6 amps.

5) Rev. 233 telemetry data indicated the lens cell head was positioned at 350 degrees ± 10 degrees (center-of-format would be 90 degree position). There were no indications that the lens cell moved after the failure.

6) Table 3-10 lists available telemetry acquisitions.

7) Table 3-11 is a temperature history after second recovery.

8) Guidance data - the following is a time sequence description of the roll gyro during the operation where Pan No. 2 unit S/N 305 failed.

Seconds	Event
T-0	Stereo turn on, slight roll to RT (+.25 deg) normal
T+122	Start roll to LT (slow rate)
T+177	End of roll to LT (at approx. -.25 deg), start fast roll to RT.
T+182	Peak of RT roll (+1.25 deg.)
T+211	Vehicle returned to -.25 deg, start of roll to RT.
T+218	Peak of RT roll (+.5 deg.), start of roll to LT.
T+226	Peak of LT roll (-.25 deg.), start of roll to RT.
T+231	Peak of RT roll (+1.2 deg.), start of roll to LT.
T+276	Vehicle at -.25 deg., start of fast roll to RT.
T+286	Peak of RT roll (_1.3 deg.), start of roll to Lt, normal vehicle rate.
T+294	Vehicle at 0 deg., slow roll to LT.
T+338	Vehicle at -.25 deg., start of slow roll to RT.
T+346	Vehicle stable at +.4 deg. until unfailed unit shut down at the end of programmed operation.

NOTE: Right Rolls would indicate an acceleration of the failing unit.

9) Most pertinent data appears to be:

a) Vehicle was experiencing primarily acceleration torques during failure.

b) Temperature of drive motor indicates power is being consumed at motor.

c) Reverse Drive Motor Voltage read zero after failure, abnormal even for a stalled unit. Voltage later returned to a level normal for a stalled unit.

From the data available it was impossible to determine the actual cause of the failure.

DISIC Camera Operation

The DISIC camera operated normally during post recovery testing. A jam-up occurred as expected resulting from Stellar wrap-up from film which remained in the system after the flight.

TABLE 3-10

AVAILABLE TELEMETRY ACQUISITIONS

REV 228 [redacted]	(SYSTEM FIRST ACTIVATION AFTER EVENT -2)
REV 231 [redacted]	(SYSTEM APPEARED NORMAL)
REV 233 [redacted]	(PAN #2 IS FAILED - AGENA TAPE RECORDER DUMP OF GUIDANCE DATA, REV. 228 THRU 233)
REV 234 [redacted]	
REV 235 [redacted]	
REV 236 [redacted]	
REV 237 [redacted]	
REV 239 [redacted]	
REV 240 [redacted]	
REV 242 [redacted]	
REV 249 [redacted]	(PAYLOAD UNREG. CURRENT DROPPED FROM 16 AMPS TO 6 AMPS)
REV 251 [redacted]	

TEMPERATURE SCHEDULE (°F)
POST MERGER EVENT II
CR-2

PAYLOAD CR-2

VEHICLES

Station Location	No.	2100	2200	(GP) 2212	(ADS) 2310	2320	2350	2400	2450	2510
Fan No. 1 Tube Cell	1	52	3[illegible]	63	63	74	[illegible]	OBH	OBH	OBH
Inlet Duct	2	56	65	70	70	72	79	82	109	102
Rear Rail	3	2[illegible]	57	56	59	67	77	92	OBH	102
Output Duct	4	48	52	53	53	61	72	86	103	97
Drive Rail	5	52	64	65	65	69	91	OBH	OBH	OBH
Front Rail	6	49	62	58	61	66	75	87	100	98
[illegible]DIATOR										
[illegible] Manifold	1	51	60	[illegible]	60	60	[illegible]	OBH	OBH	103
[illegible] Distributor Ass'y	2	57	61	60	60	65	OBH	OBH	OBH	OBH
Fan No. 2 Tube Cell	1	52	56	54	54	61	OBH	OBH	OBH	OBH
Inlet Duct	2	48	51	51	51	60	8[illegible]	OBH	OBH	OBH
Rear Rail	3	48	59	56	52	61	78	109	OBH	101
Output Duct	4	53	56	57	58	66	8[illegible]	101	OBH	103
Drive Rail	5	53	58	59	59	OBH	OBH	OBH	OBH	OBH
Front Rail	6									
[illegible]DIATOR										
Supply Cassette		51	5[illegible]	52	51	58	66	83 -	97	90
Cable Reel Left		29	34	35	40	62	83	95	OBH	95
Slope Thermometer		69	73	89	89	89	95	105	110	105
[illegible]		72	88	86	88	92	112	118	128	126
SRV A	Skin	1								
	Batt	2								
	T/U	3								
	Retro	4								
SRV B	T/U	1								
	Retro	2								

O. RADIATION DOSAGE

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

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

	Mission 1102-1		Mission 1102-2	
Emulsion	B + F Density	Radiation	B + F Density	Radiation
Type 3401	0.14	0.6R	0.16	0.6R
Royal X Pan	0.18	0.3R	0.20	0.3R

These levels are below that which will degrade the photography.

P. V/H ERROR

Figures 3-6 through 3-9 show the V/H ratio errors for Missions 1102-1 aft looking, 1102-1 forward looking, 1102-2 aft looking, and 1102-2 forward looking cameras respectively.

FRAMES 1-8 OF EACH CP OMITTED 90 PERCENT = 1.9

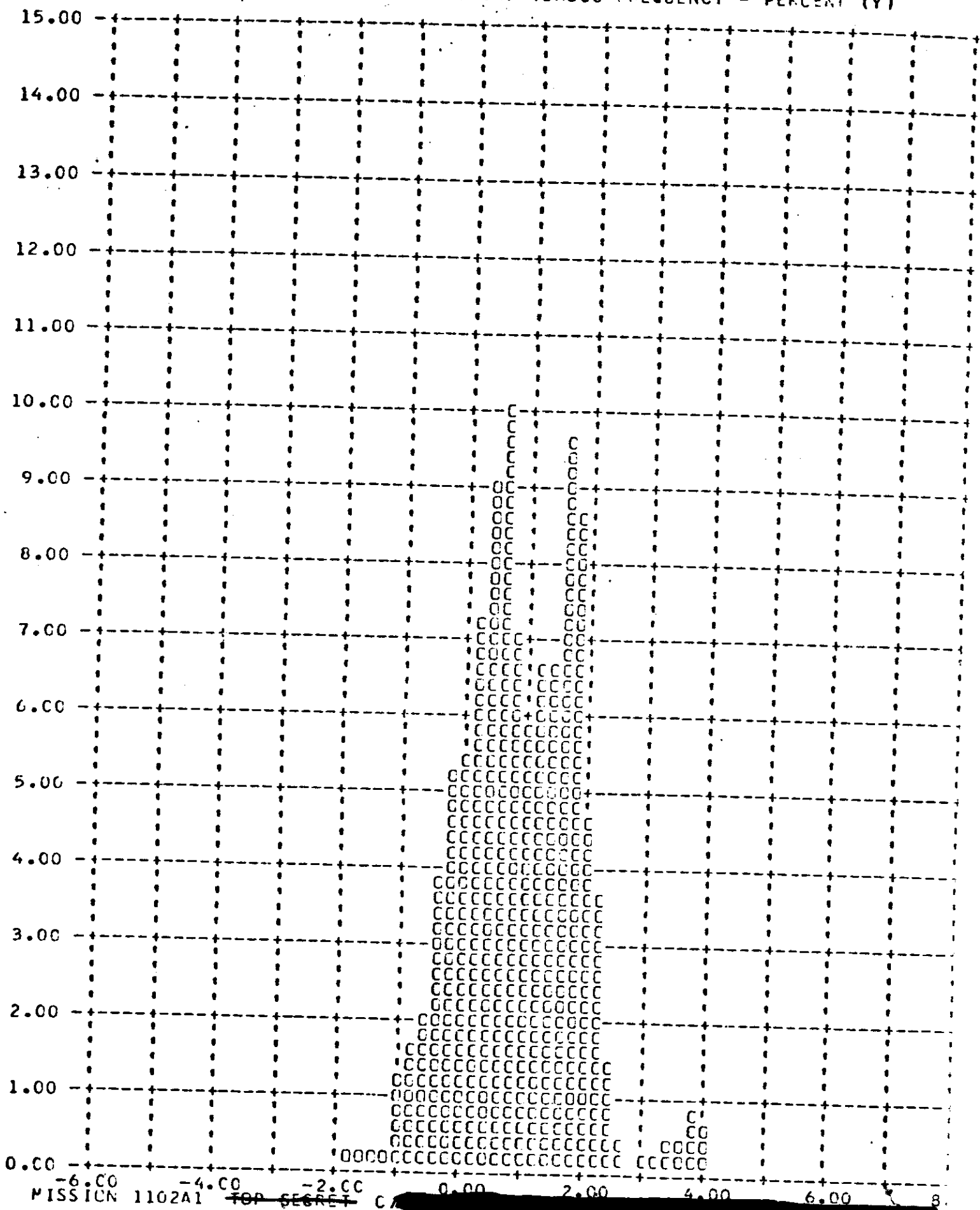


FIGURE 3-6

FRAMES 1-6 OF EACH CP OMITTED 90 PERCENT = 2.0

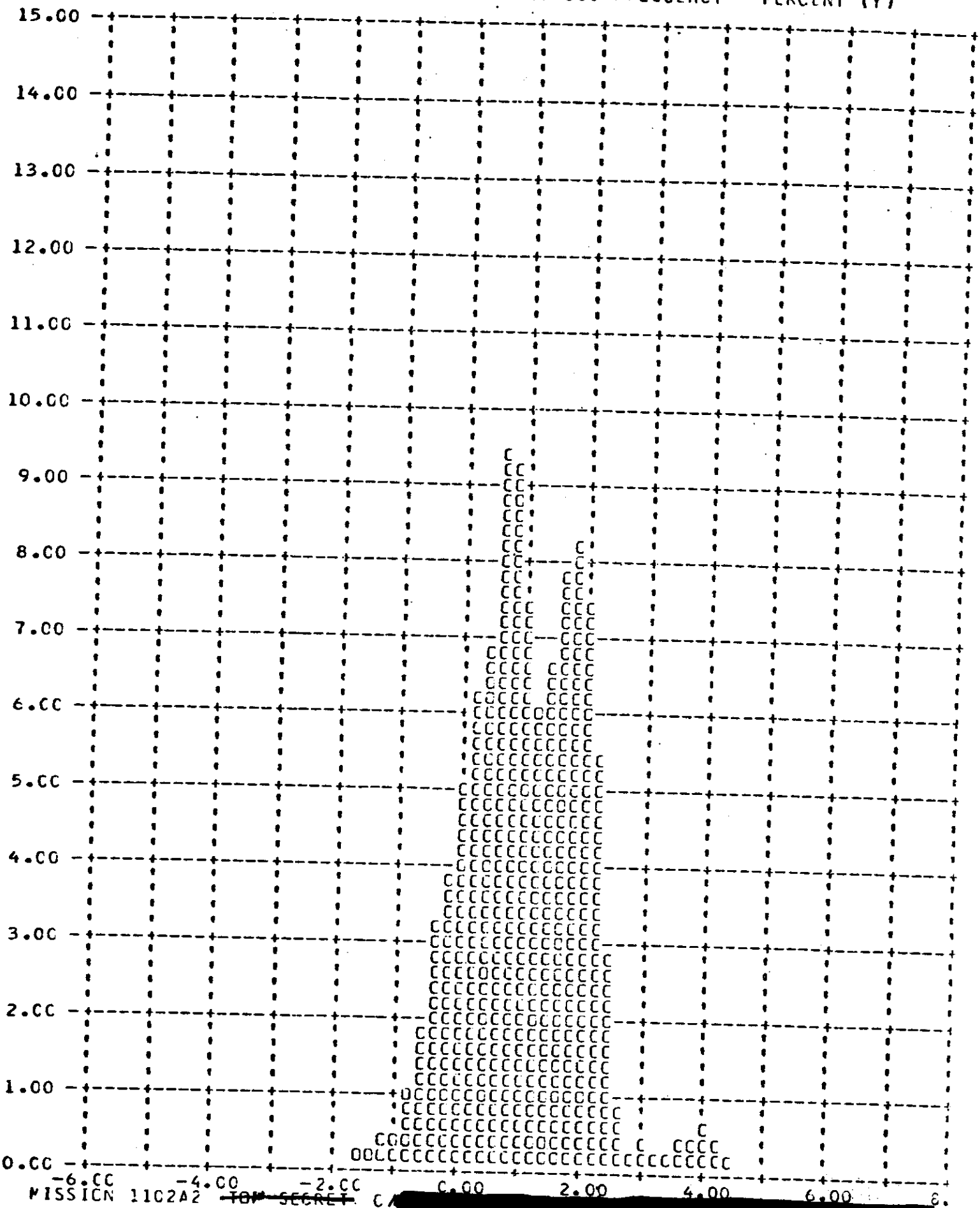


FIGURE 3-7

FRAMES 1-6 OF EACH OP OMITTED 90 PERCENT = 3.36

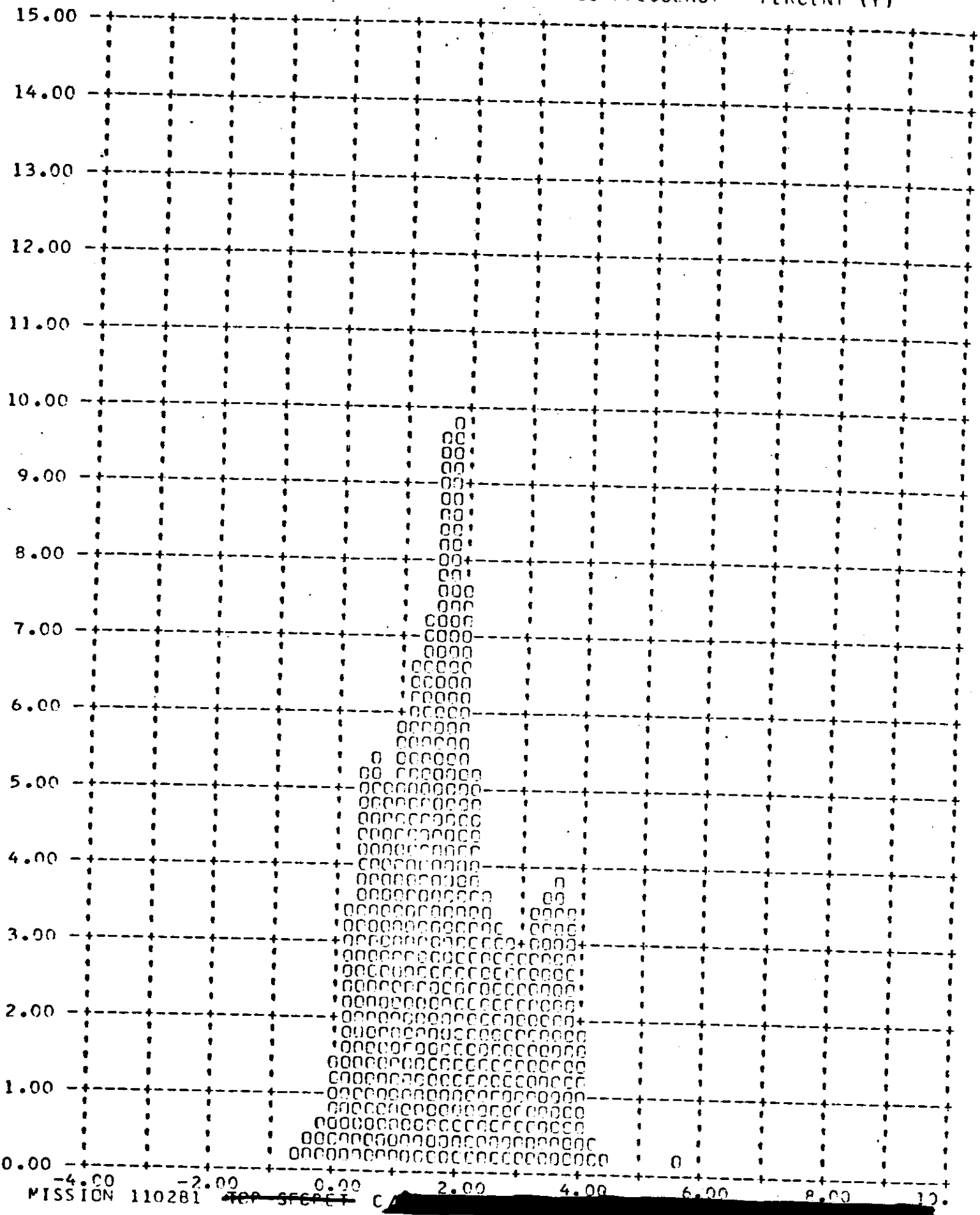


FIGURE 3-8

FRAMES 1-6 OF EACH OP OMITTED 90 PERCENT = 3.42

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

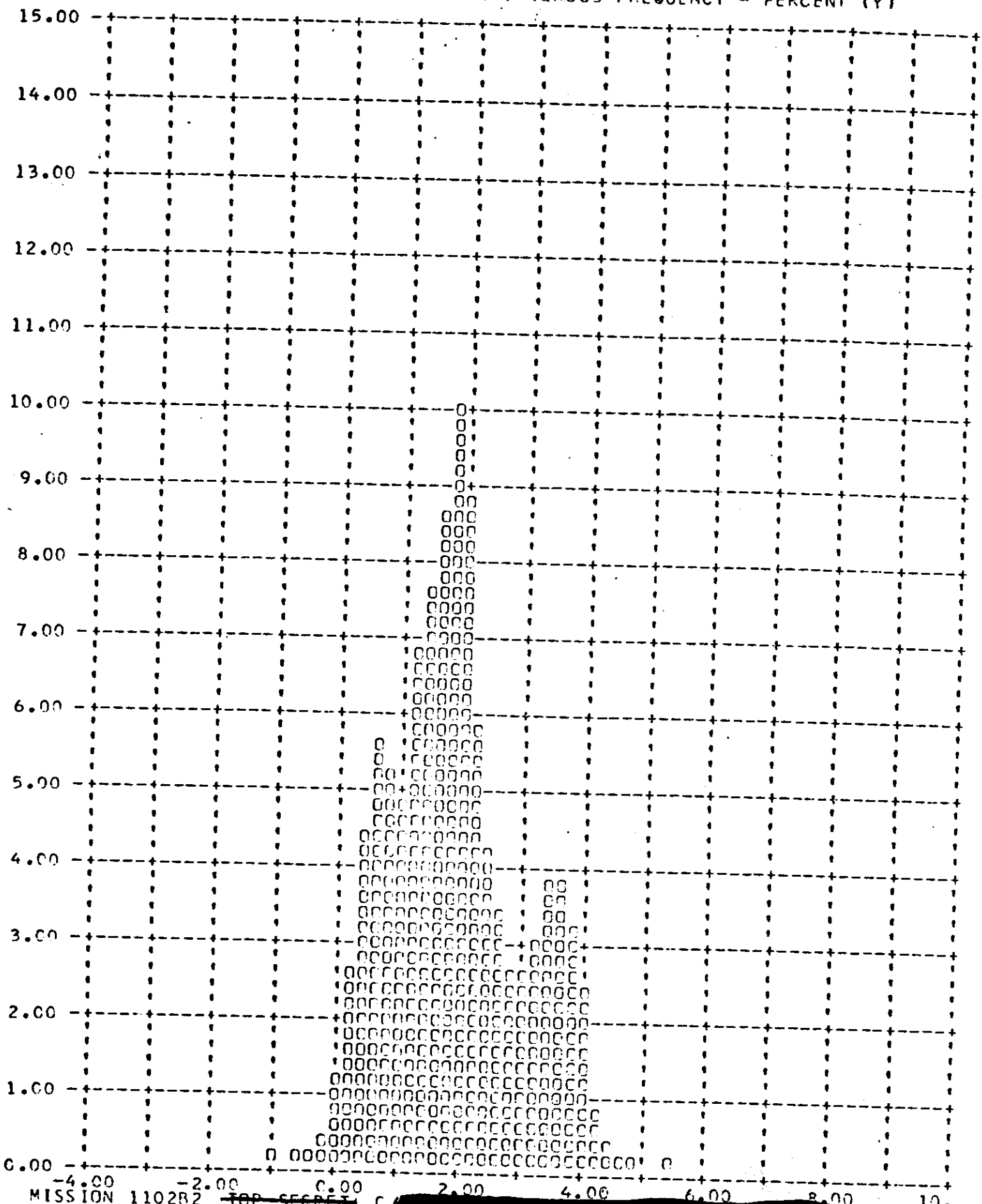


FIGURE 3-9

SECTION 4

PHOTOGRAPHIC PERFORMANCE

A. PANORAMIC CAMERAS

1. Wratten 21/25 Standard Mission Filters

The forward and aft looking cameras operated throughout Mission 1102-1 and -2. Recovered film from Mission 1102-1 consisted of 2918 frames of photography from the forward looking camera and 2926 frames from the aft looking camera. Recovered film from Mission 1102-1 included 3074 frames from the forward looking camera and 3069 frames from the aft looking camera.

Some of the imagery produced by both the forward and aft cameras was better than the best imagery produced by any previous mission. Mission 1102-1 and -2 was given an MIP rating of 100. The best imagery from the forward looking camera was slightly better than the best from the aft looking camera.

The standard Wratten 25 filter used in the forward looking camera produced the imagery that was given an MIP rating of 100. The MIP frame was selected from pass D-016, San Diego, California. Imagery produced by the aft looking camera of the same area in pass D-016 using the Wratten 21 filter was excellent but not quite as sharp as that produced by the forward looking camera. Bar target imagery recorded in pass D-016 is shown in the table 4-1 as ground resolution in feet. Bar target imagery confirms that the forward looking camera was equal to and often slightly sharper than the aft looking camera.

The better imagery produced by the forward looking camera may be attributed to the fact that the forward camera used the first of the second generation lenses having a tested bar target peak resolution greater than any lense flown previously on the Corona program. The tested low contrast (2/1), dynamic, peak, bar target resolution of the forward looking camera was 139 lines per millimeter while that of the aft looking camera was 128 lines per millimeter. The average peak low contrast resolution of Corona J-1 systems is approximately 112 lines per millimeter.

The ground resolution associated with pass D-016 was determined from fixed Type B-2 High Contrast (16/1) Bar targets photographed at Edwards Airforce Base. Ground resolution values shown are in feet and were determined from the original negative and duplicate positive materials from both cameras in the scan and forward motion directions.

Some of the imagery from the forward and aft looking cameras appeared to be somewhat degraded by motion principally in the scan direction. A more detailed analysis of the affected imagery, suggested that image degredation in the forward looking camera was caused by abnormal film motion in the scan direction, film lift that induced additional film motion in the scan direction, and uncompensated cross track smear. Aft camera imagery appeared slightly soft and may have been affected by film lift throughout the format and uncompensated cross track smear.

Forward camera photography frequently contained double imagery of cars and planes in the first half of many consecutive frames that suggested a maximum film movement in the scan direction of approximately

eight feet on the ground. The displacement between double images gradually diminished to zero in the vicinity of the center of format. No double imagery was evidenced from the center of format to the end of scan.

2. Engineering Bar Target Data and Flight Experiments

Several photographic experiments were performed during Mission 1102-1 and -2 including the use of a special polarizer filter (SF09) on the forward looking camera, SF05 green filter for bicolor use on the aft looking camera, slit width exposure series on both the forward and aft looking cameras and the use of film type SO-230 for the first time in the forward and aft cameras beginning with pass D-161.

Mission 1102-1 and -2 negative and positive materials representing in-flight experiments covering bicolor, polarizer, exposure slit series, and film type SO-230 were evaluated at the NPIC facility. In addition the engineering experiments programmed over the zone of the interior (ZI) were evaluated at Advanced Projects.

Table 4-1 presents the results of a visual evaluation of negative and positive bar target and terrain imagery from the forward and aft looking cameras. Camera exposures were made over the ZI during engineering operations.

Bar target ground resolution presented in Table 4-1 indicates that sometimes the positive print image detail is noticeably inferior to the corresponding negative imagery. The ground resolution loss suffered in the positive print appears to be variable and does not correlate well with the magnitude of negative image ground resolution.

MISSIONS 1102-1 and -2

Visual Evaluation of Negative and Positive Bar target and terrain Imagery from Forward and Aft Camera Engineering operations.

Included are bicolor, polorizer filter experiments, and SO-230 vs 3404 film types.

Camera, Rev., Frame #	Target Location In Frame Scan start 0° Center 35° Scan end 70°	Slit Width (Inches)	Filter	Slant Range to Bar Target (n.m.)	Pet Ground Resolution FMC/SCAN(Feet) Negative	Positive	Bar Target Type, Contrast, Location	Comments
AFT,16,12	19°	0.270	W-21 GEL	95	5.7/8	9/9	B2 Hi 16/1 Edwards AFB	Weather Clear, no clouds, slight haze. FWD Terrain has slightly better detail than AFT.
FWD,16,6	51	0.340	W-25 GEL	95	5.7/5.7	8.5/8.5		
AFT,16,12	19°	0.270	W-21	95	8/9	10/10	B1,Low 4/1 Edwards AFB	
FWD,16,6	51	0.340	W-25	95	8/8	11/10		
AFT,16,29	MIP Frame	0.270	W-21		Can easily distinguish between cars, trucks, spaces between parked cars typically 2 to 3 feet apart. FWD detail better than AFT.			
FWD,16,23	MIP Frame	0.340	W-25					
AFT,32,19	35°	0.270	W-21	90	12/10	12/12	Portable T Bar,Med 5/1 Kingman,Ariz. Airport	No clouds, no haze visible.
FWD,32,13	35°	0.340	W-25	90	12/12	12/13		

NOTE: All Imagery is recorded on film type 3404 unless specified otherwise.

TABLE 4-1

AFT,48,27	25°	0.270	Bicolor SF05, Glass	88	-	-	-	Cloud covered
FWD,48,21	45°	0.340	W-25	88	12/15	12/16	T Bar,Med 5/1 Winslow,Ariz.	Highly degraged by clouds and haze.
AFT,48,54	23°	0.270	Bicolor,SF05	89	8/7	10/8	Center Leg Med.11/1 Huachucha, Ariz.	Scattered clouds. Some haze.
FWD,48,48	49°	0.340	W-25	89	6/7	8/9		
AFT,56,1-39		0.270	W-21	-	-	-	-	Print not availabl
FWD,56,1-39		0.340	Polarizer,SF09	-	-	-	-	
AFT,57,1-16		0.270	W-21	-	-	-	-	Print no available
FWD,57,1-16		0.340	Polarizer,SF09	-	-	-	-	
AFT,64,1-16		0.270	Bicolor,SF05	-	-	-	-	Clouds, haze, no culture.
FWD,64,1-16		0.340	W-25	-	-	-	-	
AFT,71,1-119		0.270	W-21	-	-	-	-	Print not availabl
FWD,71,1-119		0.340	Polarizer,SF09	-	-	-	-	
AFT,72,1-74		0.270	W-21	-	-	-	-	Not available.
FWD,72,1-74		0.340	Polarizer,SF09	-	-	-	-	

TABLE 4-1

AFT,75		0.270	W-21	-	-	-	-	Not available
FWD,75		0.340	Polarizer,SF09	-	-	-	-	
REV 76 Cut and Wrap								
AFT,79,14	53°	0.270	Bicolor,SF05	-	Not Resolved		A,Low,2.5/1, Shaw AFB,S.C.	Appears hazy
FWD,79,7	17°	0.340	W-25	-	Not Resolved			FWD noticably more detail than AFT
AFT,79,43	Near Center	0.215	Bicolor,SF05	-	-	-	-	Cape Kennedy
FWD,79,37	Near Center	0.340	W-25	-	-	-	-	FWD Noticable more detail than AFT
AFT,81,1-17		0.270	Bicolor,SF05	-	-	-	-	Print not available
FWD,81,1-20		0.340	W-25	-	-	-	-	
AFT,81,18-20		0.215	Bicolor,SF05	-	-	-	-	
FWD,81,18-20		0.340	W-25	-	-	-	-	Print not available
AFT,97,21	50°	.270	SF05	90	13/16	>16	Portable T-Bar,Med 5/1, Palo Alto, Cal.	Slight haze,36 inch Golden Gate Bridge Cables not detectable on AFT,detectable on FWD. Fwd has smeared Imagery.See detailed Analysis in body of report.
FWD,97,15	20°	.340	W-25	90	12/16	12/16		

TABLE 4-1

AFT,113,26	35°	.270	SF05	88	15/16	16/16	Portable T-Bar	Thin clouds,haze.
FWD,113,19	35°	.340	W-25	88	-	16/16	Med 5/1 Bakersfield, Cal.	FWD Terrain slightly better than AFT. Imagery degraded by weather.
AFT,113,30	68°	.270	SF05	104	-	17/17	C,Low 4/1 Edwards AFB	Weather clear.Sand, Dry Lakes have high light reflections that degrade. D-113 Pass degraded by Bicolor Filter where Atmospherics permit evaluation.
FWD,113,24	2°	.340	W-25	104	-	13/25		
AFT,129,10	22°	.215	W-21	94	-		B,11/1 Hi, Pahrump,Nev.	Slight haze,clouds vicinity of target.
FWD,129,4	44°	.340	W-25	94	-	8/8		
AFT,129,28-53		.215	W-21		-	-	-	Print not available from Frame 27 and up.
FWD,129,28-53		.340	SF09		-	-	-	
AFT,161,1-28		.170	SF05		-	-	-	Film SO-230
FWD,161,1-28		.340	W-25		-	-	-	Film SO-230 All Cloud Covered

TABLE 4-1

AFT,176,32	.170	W-21	-	10.5/>16	B-2,Hi, 16/1, Wright Patterson	SO-230 Both Cameras. Sun Azimuth at optimum polarizer Angle of 20°,AFT slightly more detail than FWD.
FWD,176,26	.340	SF09 POLARIZER	-	11/ >16		
AFT,178,OFF	MONO	OFF	-	-	-	SO-230 Print not available
FWD,178,1-21	.215	W-25	-	-	-	SO-230 Print not available
AFT,208-1-17	.134	W-21	-	-	-	SO-230 Print not available
FWD,208-1-17	.340	SF09	-	-	-	SO-230 Print not available
AFT,210-1-25	.134	SF05	-	-	-	SO-230. No common coverage OFF
FWD,210 OFF	MONO	OFF	-	-	-	
AFT,210,26-51	.134	SF05	-	-	-	SO-230 Clouds,haze
FWD,210,26-51	.215	W-25	-	-	-	SO-230

TABLE 4-1

A preliminary review of Mission 1102-1 and -2 negative and positive films indicate that terrain image detail and scene contrast are somewhat reduced thru use of the SF09 polarizer filter and SF05 Bicolor filter.

Terrain imagery produced by the forward looking camera during pass D-176 is perhaps the best example showing the maximum potential of the SF09 polarizer filter. The SF09 filter was set in the forward camera filter holder in a fixed position so that the axis of polarization of the filter was set at an angle of 20 degrees from the direction of flight measured in a clockwise direction as seen by an observer facing in the direction of flight. The azimuth of the axis of polarization was a nominal 20 degrees at the center of format position. The actual solar azimuth was very nearly optimum being approximately 19.6 degrees during the camera operation of pass D-176.

Evaluation of negative and positive imagery produced from pass D-176 revealed that:

A. Terrain imagery in the half of the format exposed when the lens is toward the sun (Polarizer in optimum direction) was very slightly degraded in fine detail relative to the same imagery produced by the AFT looking camera using the Wratten 21 filter.

B. Terrain imagery in the half of the format exposed when the lens is away from the sun appears noticeably degraded in fine detail relative to the same imagery produced by the AFT looking camera using the Wratten 21 filter.

Overall scene contrast as viewed in either the negative or the positive appears to be reduced to a lower value by the SF09 Polarizer filter. Low light areas appear to contain more negative density when the polarizer filter

is used on the forward looking camera compared to the corresponding imagery recorded by the AFT looking camera using the Wratten 21 filter. Other descending passes containing imagery produced with the SF09 polarizer filter include 56, 57, 71, 72, 75, 129, and 208.

All photography exposed using the SF05 Bicolor filter on the AFT looking camera was evaluated. Negative and positive material was examined. Where clear weather prevailed and small cultural objects were plentiful at a size near the resolution limit of the system, terrain imagery exposed with the SF05 bicolor filter appeared noticeably degraded, with less information content, and lower overall scene contrast compared to the same imagery produced in the forward looking camera with the Wratten 25 filter. Small cultural objects are more difficult to identify in terrain imagery produced with the bicolor filter. In many terrain scenes some fine detail is not present at all in AFT camera photography.

Engineering passes that employed the SF05 bicolor filter in the AFT looking camera include passes 48, 64, 79, 81, 97, 113, 161 and 210.

A preliminary comparison of terrain detail recorded on film types SO-230 and 3404 revealed that recorded imagery appeared roughly similar in regard to fine detail. However, a further comparison in more detail than was possible at the PET meeting, is necessary to form a final conclusion.

3. Miscellaneous Observations

The Drag make-up rocket that was fired during panoramic camera operation on pass D-182 did not appear to affect the terrain imagery produced by either panoramic camera.

Minor very low density light fog was observed on forward looking camera frames 3 and 8 and aft looking camera frames 2 and 7 from the end of most

camera operations. The effect on terrain imagery was minimal.

All Horizon camera imagery was sharp with no significant vignetting.

Time word imagery appeared to be good throughout the mission. A few time words contained missing index and time word rows.

In flight time word imagery was comparable to pre-flight imagery produced during the altitude and flight readiness tests at Advanced Projects.

Intermittent scratches were present in the forward looking camera negative. The cause is unknown. However, the clearance between the film threaded in the film path and flight hardware such as wire bundles, will be checked and increased where appropriate on future systems at Advanced Projects. No film scratches were present prior to flight.

The 200 pulse per second timing track recorded by the forward and AFT cameras was missing for approximately three inches at the take-up end of some frames. Infrequently the timing track was missing on the format of the forward looking camera. The cause is unknown.

All timing track imagery was present and acceptable prior to flight at Advanced Projects.

Imagery of some of the pan geometry rail holes was missing during Mission 1102-2. Missing rail hole imagery is attributed to a build-up of emulsion dust that blocked light transmission thru the rail holes. Future flight systems will have the rail holes filled with transparent plastic that should minimize emulsion dust blockage.

Correlation of panoramic camera photographic performance with image smear analysis is included with Section 8.

B. DISIC CAMERA #4

1. Terrain

Terrain imagery, produced on film type 3400 by DISIC camera #4 during Missions 1102-1 and -2 thru the first part of pass D-182, was noticeably sharper with more detail and information content than comparable terrain imagery produced by DISIC Camera #2 during Missions 1101-1 and -2.

Beginning with Pass D-182 until the end of Mission 1102-2, the rotary shutter failed partly open during camera exposure and during film metering. Up to 25 exposures per frame were present, each slightly displaced from the adjacent one as a result of normal film metering. Highlight imagery was totally lost due to overexposure. Midtone and low light imagery was surprisingly clear but noticeably degraded in fine detail. No corona fog was observed in Mission 1102-1 and -2.

All film exposed during Missions 1102-1 and -2 was recovered. Recovered film consisted of 1051 feet of film type 3400 from Mission 1102-1 and 982 feet from Mission 1102-2.

2. Stellar

Stars through 6.5 magnitude were recorded throughout Mission 1102-1 and -2 by the port and starboard stellar cameras. Approximately 10 to 20 star images were recorded in each frame of Port and Starboard photography.

Sun and horizon light flare fog was significantly reduced through use of the new stellar baffle designed by Advanced Projects. Minor low density flare fog affected some port and starboard stellar frames throughout the active

format area with no apparent degredation to star imagery. In addition a separate dense band of fog approximately 1/16 inch wide was present in most port and starboard formats. Fog was located along the vertical format edges. Occasionally the fog extended around to the top side of the stellar format.

Dense corona fog occurred at infrequent intervals throughout Mission 1102-1 and -2, sometimes degrading star imagery.

Stellar film recovered consisted of 996 feet from Mission 1102-1 and 955 feet from Mission 1102-2. All film was type 3401.

SECTION 5

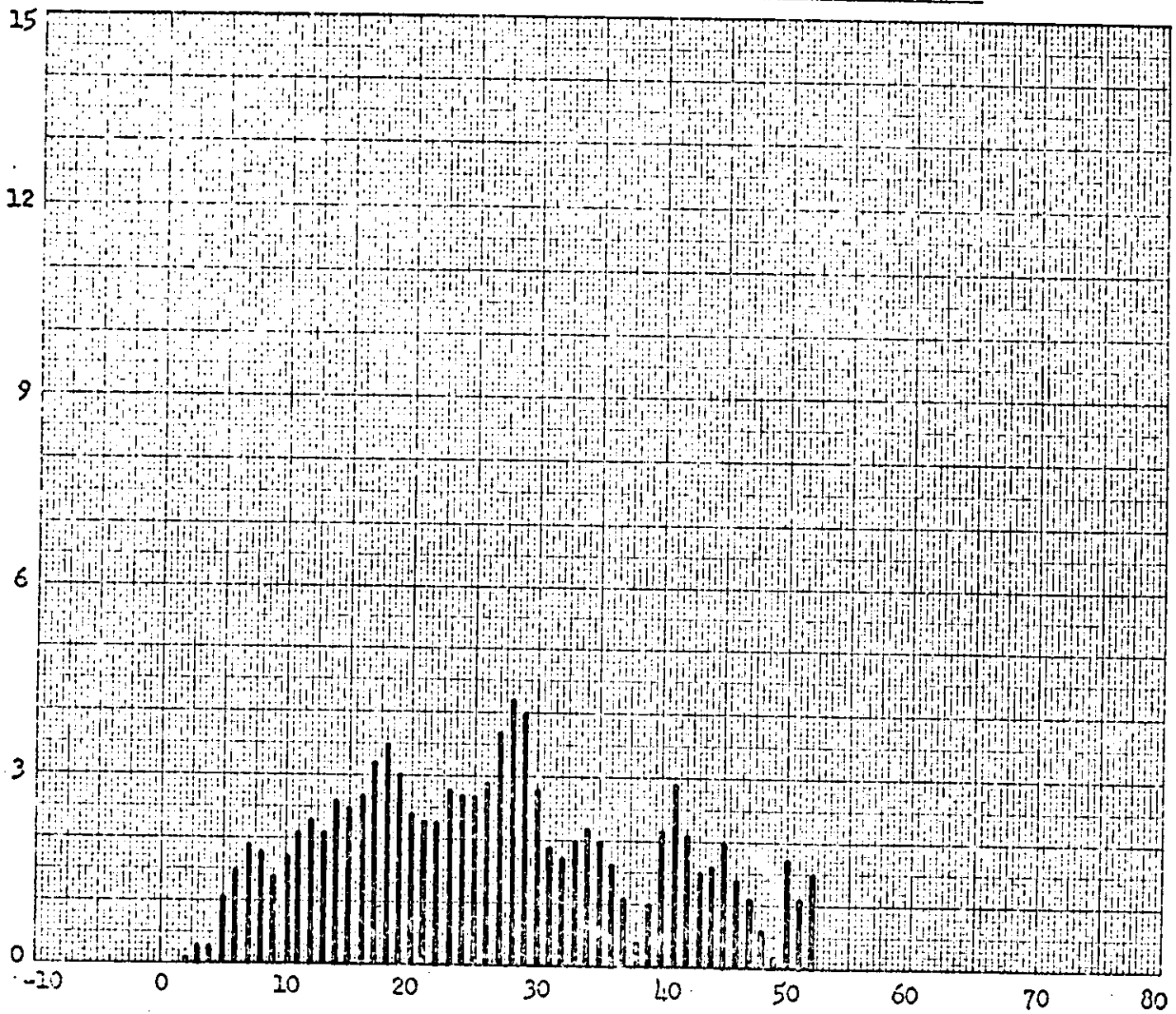
PANORAMIC CAMERA EXPOSURE

The aft looking camera contained an exposure slit series consisting of a 0.134, 0.170, 0.215, 0.270, 0.250 inch slits, and a wratten 21 gelatin filter. The 0.250 inch slit was the failsafe position. The forward looking camera contained a slit exposure sequence as follows: 0.215, 0.270, 0.340, 0.340, and 0.340 inch failsafe. The wratten 25 gelatin filter was employed in the primary position during the forward looking camera operation.

The frequency distributions of the solar elevations and solar azimuths encountered during the photographic operations are shown in Figures 5-1 to 5-4.

The nominal exposure times of the aft and forward looking cameras are shown as a function of latitude for passes D-8, D-85 and D-173 in Figures 5-5 to 5-10. 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]

SOLAR ELEVATION FREQUENCY DISTRIBUTION



Mission No: 1102-1

Payload No: CR-2

Camera No: 304

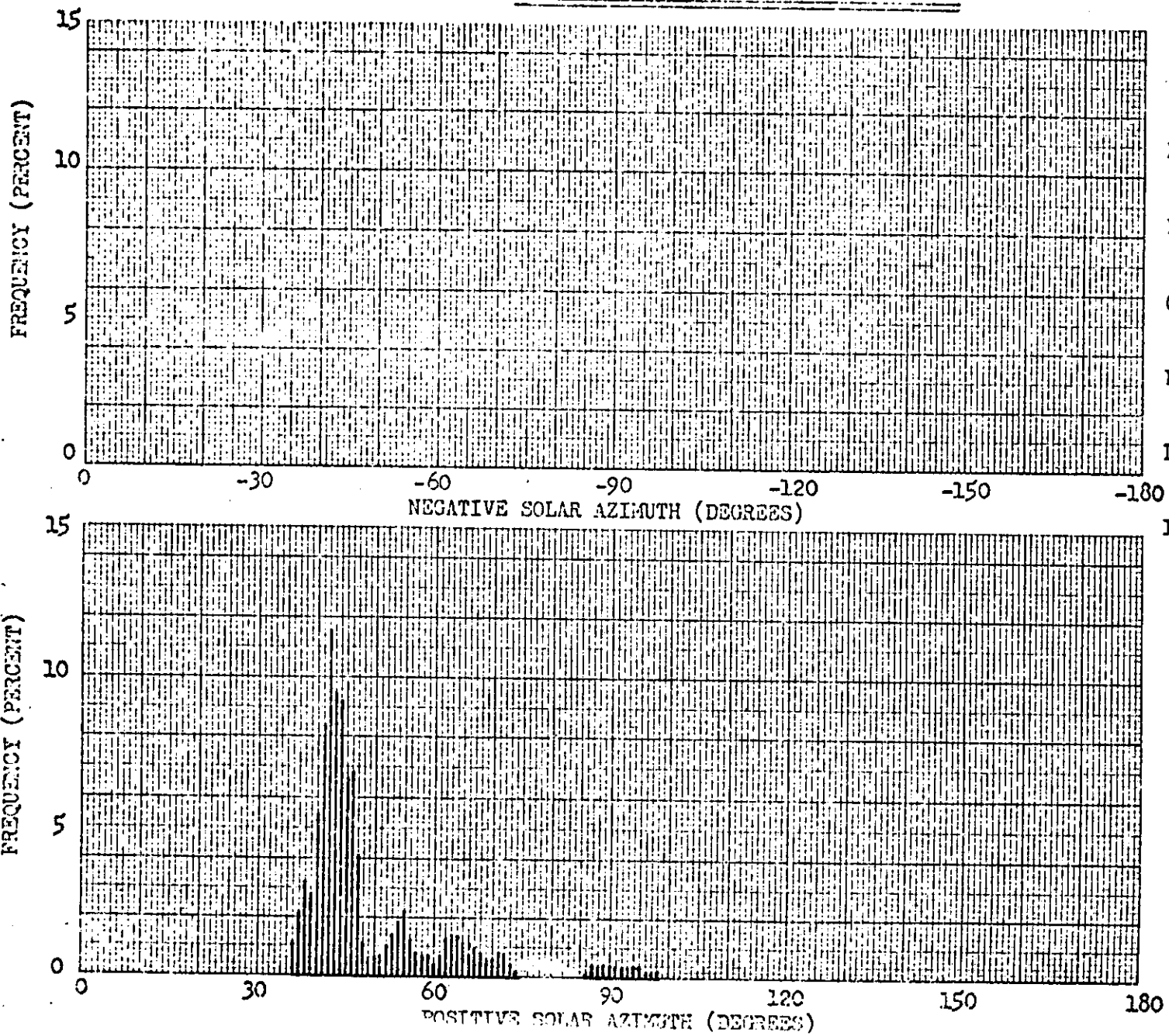
Launch Date: 12/9/67

Launch Time: 2226 Z

Inclination: 81.6°

FIGURE 5-1

SOLAR AZIMUTH FREQUENCY DISTRIBUTION



Mission No: 1102-1

Payload No: CR-2

Camera No: 304

Launch Date: 12/9/67

Launch Time: 2226 Z

Inclination: 81.6°

SIGN NOTATION

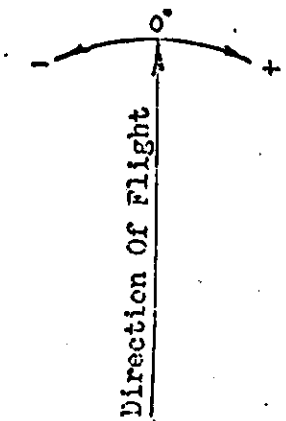
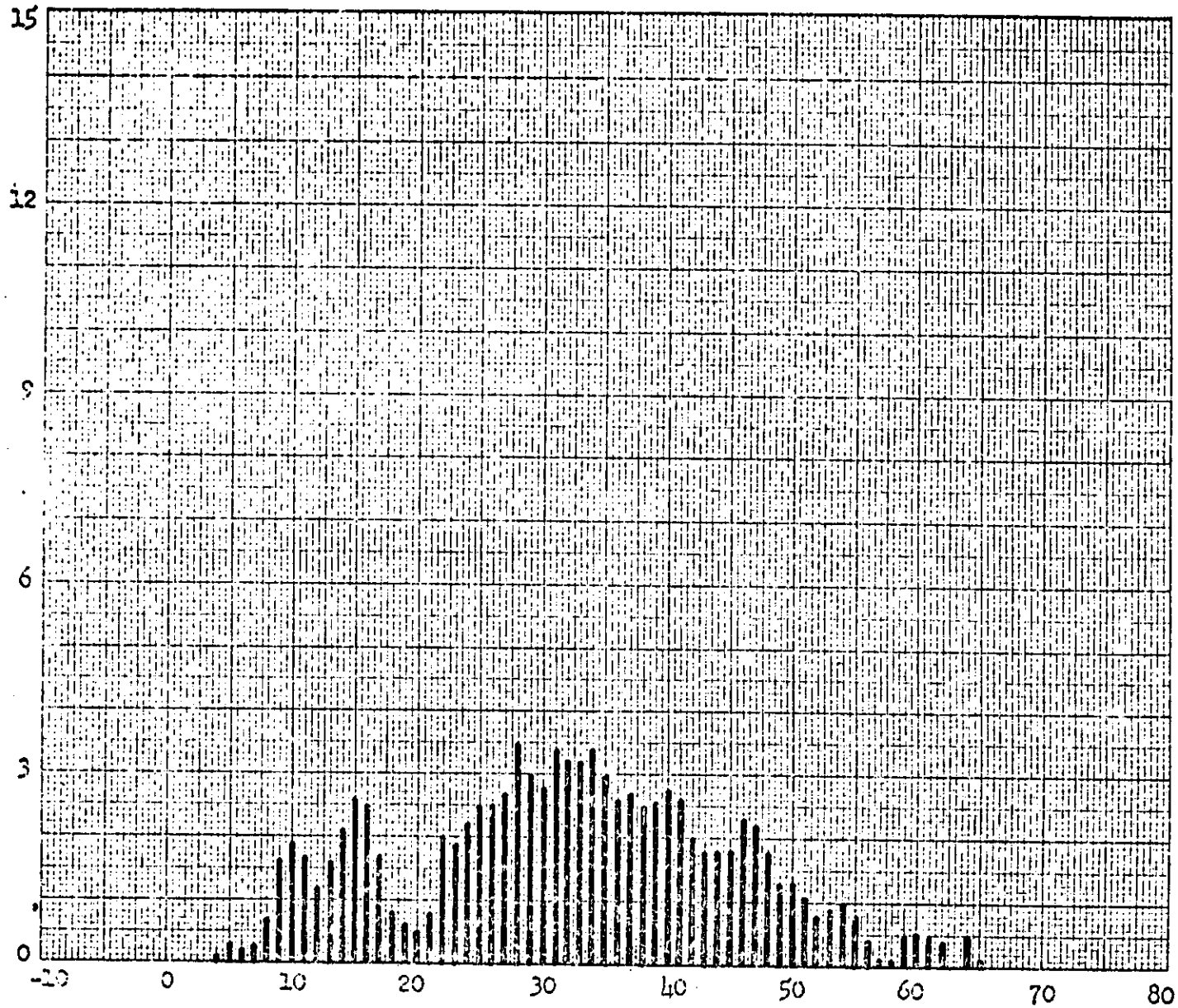


FIGURE 5-2

SOLAR ELEVATION FREQUENCY DISTRIBUTION



Mission No: 1102-2

Payload No: CR-2

Camera No: 304

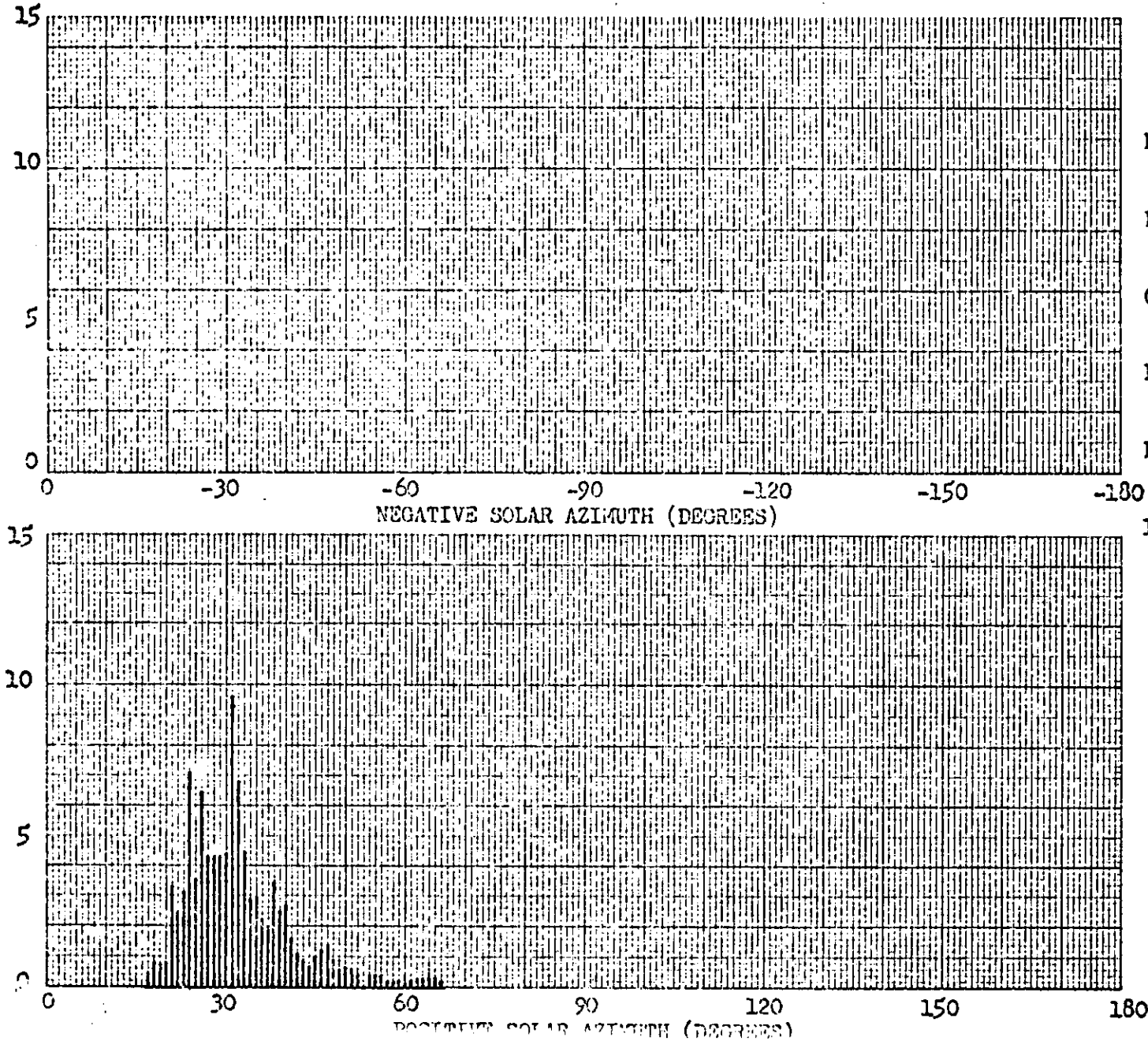
Launch Date: 12/9/67

Launch Time: 2226 Z

Inclination: 81.6°

FIGURE 5-3

SOLAR AZIMUTH FREQUENCY DISTRIBUTION



Mission No: 1102-2

Payload No: CR-2

Camera No: 304

Launch Date: 12/9/67

Launch Time: 2226 Z

Inclination: 81.6°

SIGN NOTATION

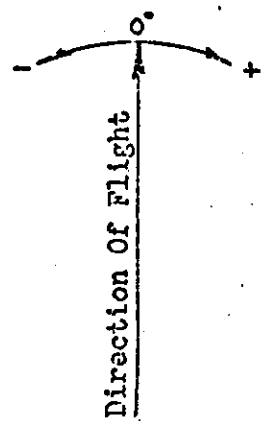
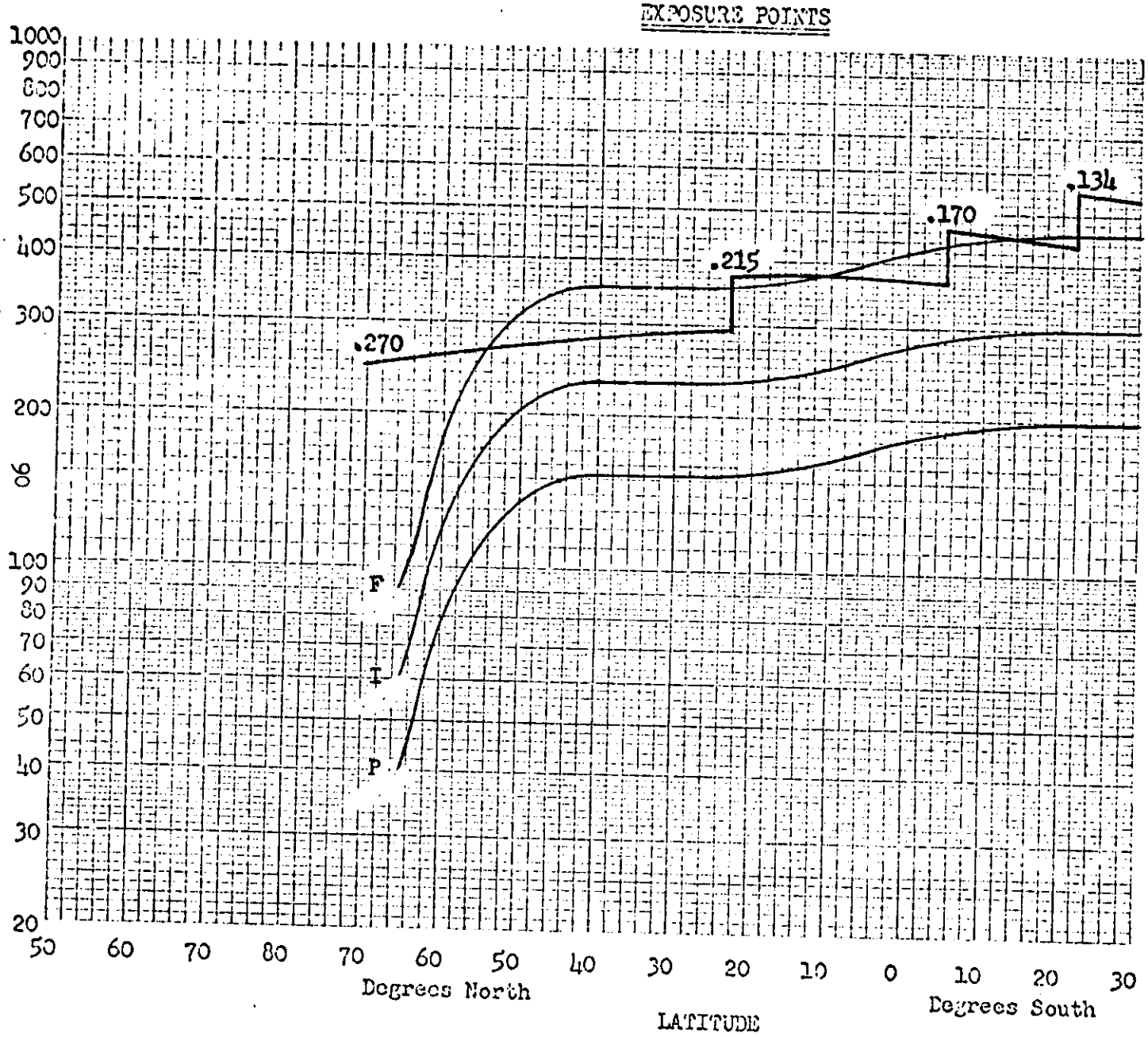


FIGURE 5-4



Mission No: 1102

Payload No: CR-2

Camera No: 304

Pass No: 8

Launch Date: 12/9/67

Launch Time: 2226 Z

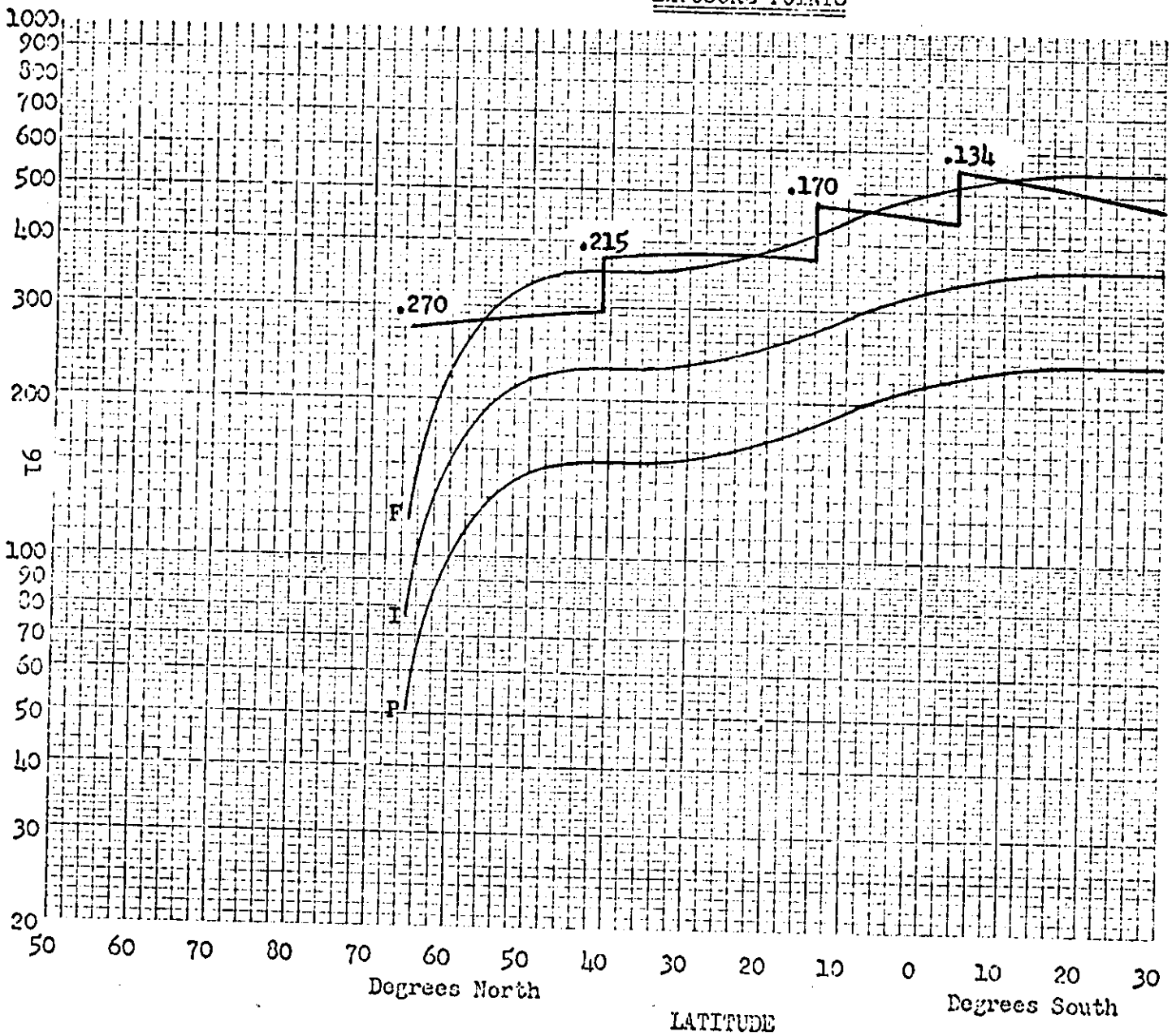
Slit Width: .134/.170/.215/.27

Filter Type: Wratten 21

Film Type: 3404

FIGURE 5-5

EXPOSURE POINTS



FOR CENTRAL C

FIGURE 5-6

Mission No: 1102

Payload No: CR-2

Camera No: 304

Pass No: 85

Launch Date: 12/9/67

Launch Time: 2226 Z

Slit Width: .134/.170/.215/.27

Filter Type: Wratten 21

Film Type: 3404

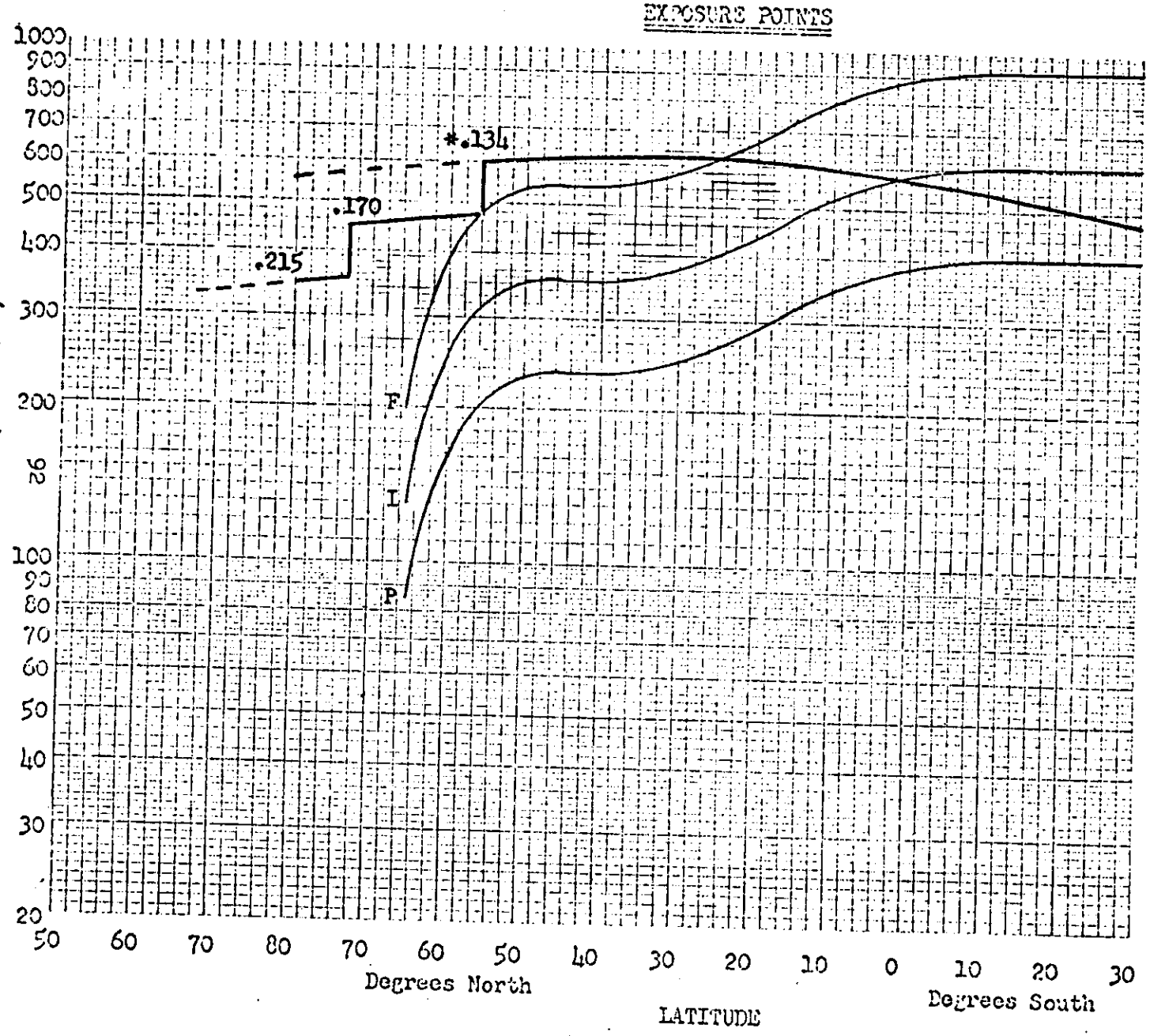


FIGURE 5-7

Mission No: 1102

Payload No: CR-2

Camera No: 304

Pass No: 173

Launch Date: 12/9/67

Launch Time: 2226 Z

Slit Width: (1) (2) (3) .134/.170/.215

Filter Type: Wratten 21

Film Type: S0230

* Fixed slit S_1 used from Rev. 171 through Rev. 196

EXPOSURE POINTS

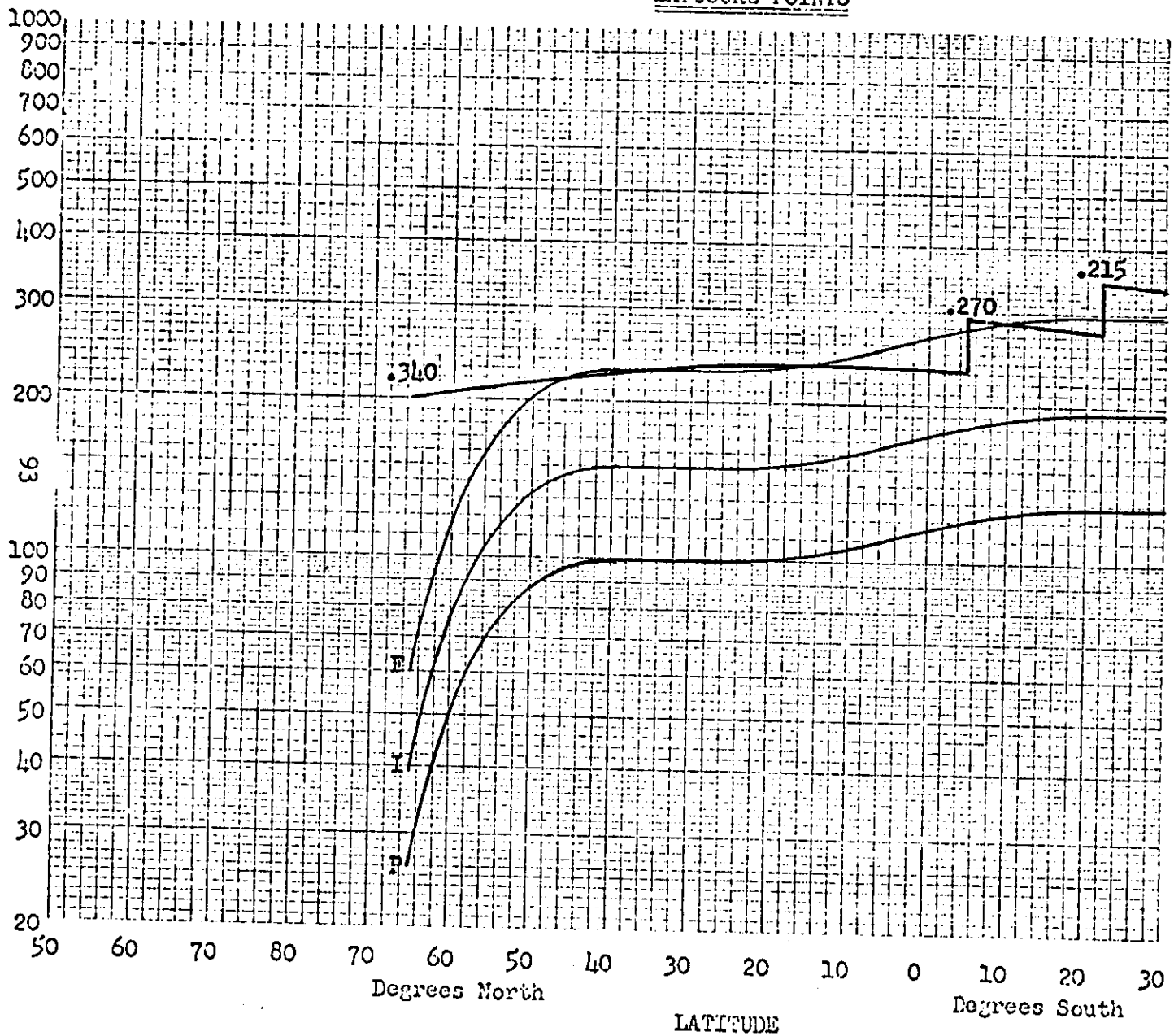


FIGURE 5-8

Mission No: 1102

Payload No: CR-2

Camera No: 305

Pass No: 8

Launch Date: 12/9/67

Launch Time: 2226 Z

Slit Width: (1) .215/(2) .270/(3) .340/(4) .34[illegible]

Filter Type: Wratten 25

Film Type: 3404

EXPOSURE POINTS

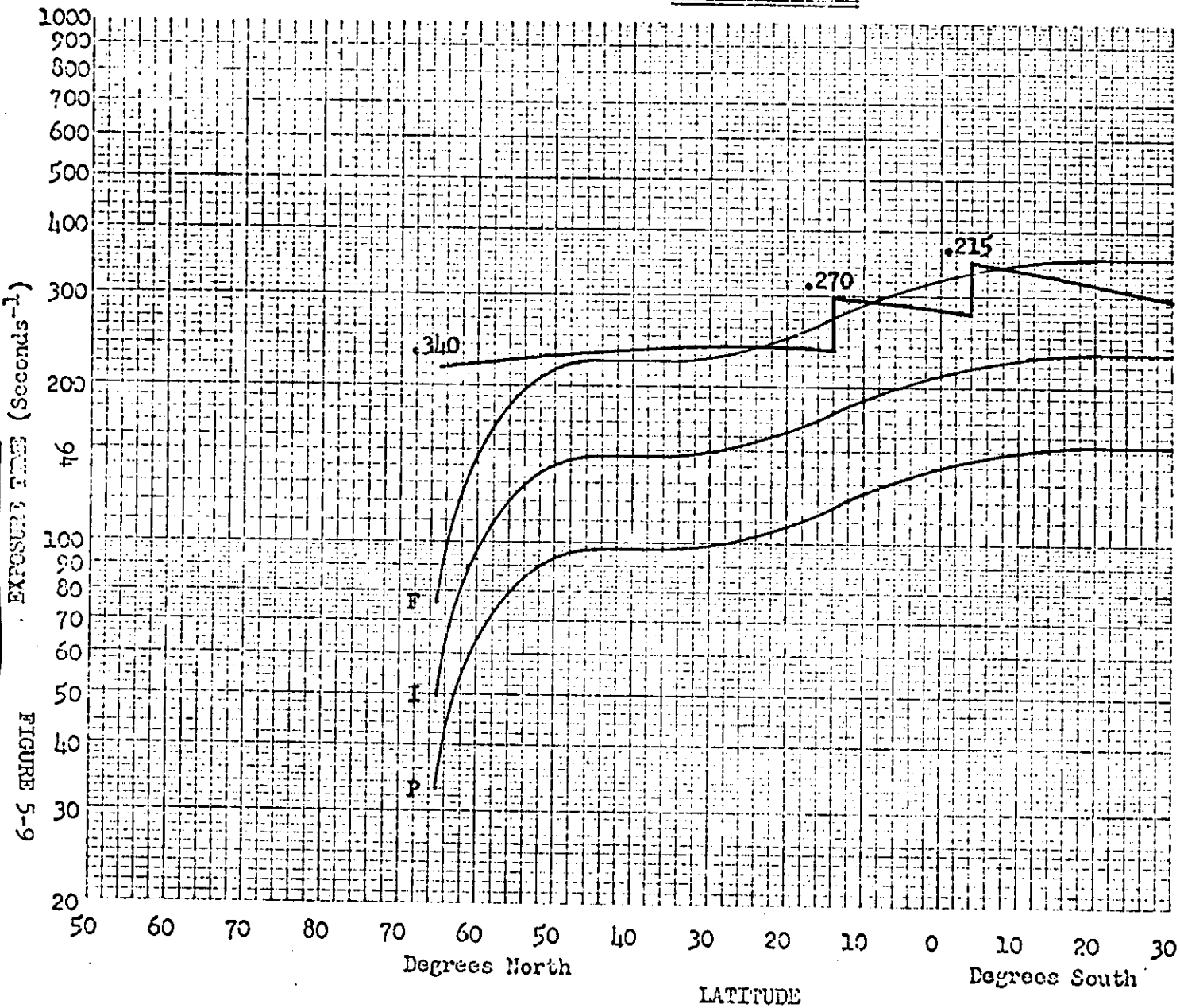


FIGURE 5-9

Mission No: 1102

Payload No: CR-2

Camera No: 305

Pass No: 85

Launch Date: 12/9/67

Launch Time: 2226 Z

Slit Width: (1) .215/(2) .270/(3) .340/(4) .34

Filter Type: Wratten 25

Film Type: 3404

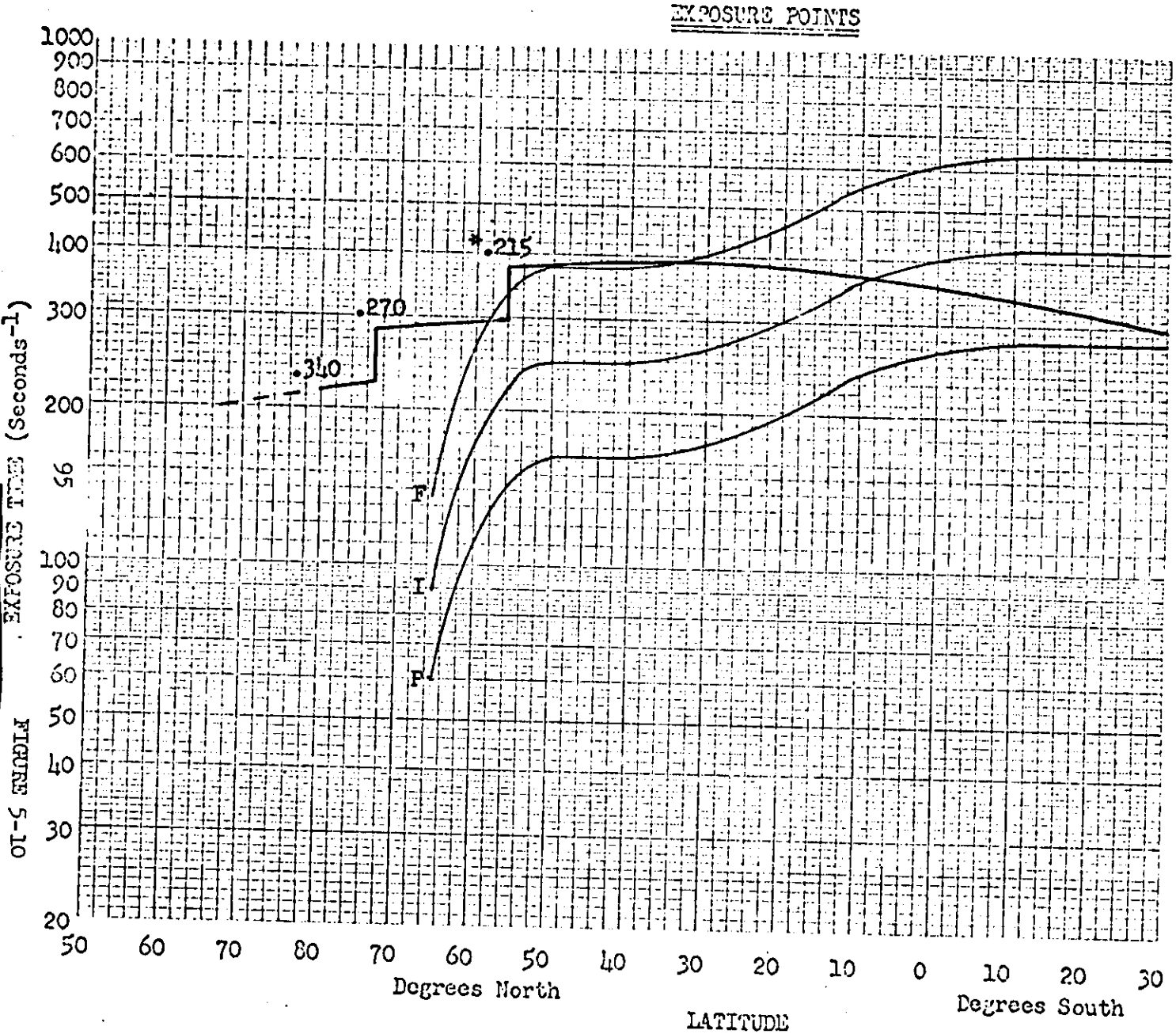


FIGURE 5-10

Mission No: 1102

Payload No: CR-2

Camera No: 305

Pass No: 173

Launch Date: 12/9/67

Launch Time: 2226 Z

Slit Width: (1) (2) (3) .215/.270/.340

Filter Type: Wratten 25

Film Type: SØ230

* Fixed slit S_1 used from Rev. 171 through Rev. 196

SECTION 6

DIFFUSE DENSITY MEASUREMENTS AND PROCESSING

Mission 1102-1 employed the usual 3404 type film with trenton processing following the flight. Mission 1102-2 employed a split roll through both the forward and aft looking panoramic cameras. Film consisted of 6124 feet of 3404 followed by 2012 feet of SO-230 through the aft looking camera and 5613 feet of 3404 followed by 2509 feet of SO-230 through the forward looking camera.

The diffuse density measurements made by AFSPPF were computer sorted at A/P to permit analysis of the density ranges resulting from the three levels of trenton processing. Terrain D min density frequency distribution graphical plots for missions 1102-1 and -2 for all levels of processing are shown in the Appendix section of this report on pages A-1 thru A-57. The sorting technique utilizes the base plus fog density values for the conventionally trenton processed material where base + fog measurements

up to 0.09 density = Primary processing

0.10 to 0.17 density = Intermediate Processing

above 0.17 density = Full processing

The percentage of Mission 1102-1 and -2 that was processed at each processing level, based on the computer sort, is shown in Table 6-1, along with the [redacted] reported processing percentages.

TABLE 6-1

PROCESS PERCENTAGES

Mission	Camera		PROCESS LEVEL							
			Primary		Intermediate		Full		Transition	
			3404	SO-230	3404	SO-230	3404	SO-230	3404	SO-230
1102-1	Fwd Looking	Reported	1	-	9	-	84	-	6	-
		Computed	0	-	13	-	87	-	-	-
1102-1	Aft Looking	Reported	1	-	6	-	84	-	9	-
		Computed	0	-	12	-	88	-	-	-
1102-2	Fwd Looking	Reported	0	8	7	8	85	68	8	16
		Computed	0	0	10	15	90	85	-	-
1102-2	Aft Looking	Reported	1	14	4	2	87	68	8	16
		Computed	0	0	11	21	89	79	-	-

The standard process control curves for primary, intermediate, and full processing are shown in Figure 6-1.

The extent of under, correct, and over exposure and processing is shown in Figure 6-2.

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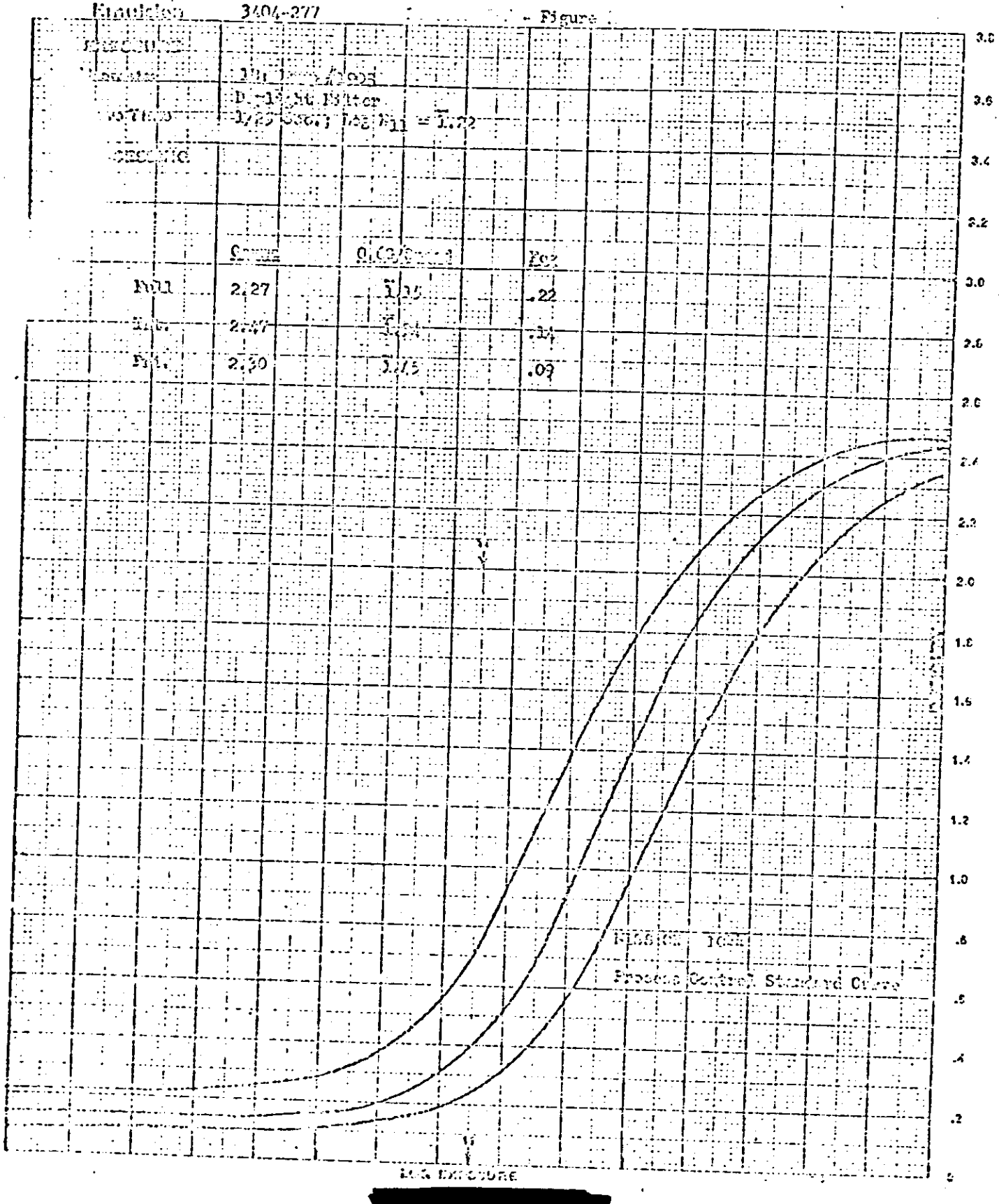
[redacted]

FIGURE 6-1 3404 D LOGE CURVES



[redacted]

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~~TOP SECRET~~ C[redacted]

MISSION 1102-1 INSTR - FWD 2/14/68 PROCESSING AND EXPOSURE ANALYS

PROCESS LEVEL	SAMPLE SIZE	UNDER EXPOSED	UNDER PROCESSED	CORRECT EXP&PROC	OVER PROCESSED	OVER EXPOSED
PRIMARY	0	0 PC	0 PC	0 PC	19 PC	18 PC
INTERMEDIATE	34	0 PC	18 PC	76 PC	3 PC	3 PC
FULL	222	59 PC	0 PC	38 PC	3 PC	0 PC
ALL LEVELS	256	51 PC	2 PC	43 PC	3 PC	0 PC

MISSION 1102-1 INSTR - AFT 2/14/68 PROCESSING AND EXPOSURE ANALYS

PROCESS LEVEL	SAMPLE SIZE	UNDER EXPOSED	UNDER PROCESSED	CORRECT EXP&PROC	OVER PROCESSED	OVER EXPOSED
PRIMARY	1	0 PC	100 PC	0 PC	0 PC	0 PC
INTERMEDIATE	26	0 PC	15 PC	77 PC	8 PC	0 PC
FULL	191	34 PC	0 PC	64 PC	2 PC	0 PC
ALL LEVELS	218	30 PC	2 PC	66 PC	2 PC	0 PC

MISSION 1102-2 INSTR - FWD 3404 PROCESSING AND EXPOSURE ANALYS

PROCESS LEVEL	SAMPLE SIZE	UNDER EXPOSED	UNDER PROCESSED	CORRECT EXP&PROC	OVER PROCESSED	OVER EXPOSED
PRIMARY	0	0 PC	0 PC	0 PC	9 PC	10 PC
INTERMEDIATE	16	0 PC	13 PC	63 PC	19 PC	6 PC
FULL	188	55 PC	0 PC	42 PC	3 PC	0 PC
ALL LEVELS	204	51 PC	1 PC	44 PC	4 PC	0 PC

MISSION 1102-2 INSTR - FWD SC-230 PROCESSING AND EXPOSURE ANALYS

PROCESS LEVEL	SAMPLE SIZE	UNDER EXPOSED	UNDER PROCESSED	CORRECT EXP&PROC	OVER PROCESSED	OVER EXPOSED
PRIMARY	0	0 PC	0 PC	0 PC	6 PC	6 PC
INTERMEDIATE	10	10 PC	20 PC	60 PC	10 PC	0 PC
FULL	45	64 PC	0 PC	33 PC	2 PC	0 PC
ALL LEVELS	55	55 PC	4 PC	38 PC	4 PC	0 PC

MISSION 1102-2 INSTR - AFT 3404 PROCESSING AND EXPOSURE ANALYS

PROCESS LEVEL	SAMPLE SIZE	UNDER EXPOSED	UNDER PROCESSED	CORRECT EXP&PROC	OVER PROCESSED	OVER EXPOSED
PRIMARY	0	0 PC	0 PC	0 PC	7 PC	7 PC
INTERMEDIATE	13	0 PC	0 PC	69 PC	31 PC	0 PC
FULL	167	56 PC	0 PC	42 PC	2 PC	0 PC
ALL LEVELS	180	52 PC	0 PC	44 PC	4 PC	0 PC

MISSION 1102-2 INSTR - AFT SO-230 PROCESSING AND EXPOSURE ANALYS

PROCESS LEVEL	SAMPLE SIZE	UNDER EXPOSED	UNDER PROCESSED	CORRECT EXP&PROC	OVER PROCESSED	OVER EXPOSED
PRIMARY	0	0 PC	0 PC	0 PC	9 PC	8 PC
INTERMEDIATE	15	0 PC	47 PC	47 PC	7 PC	0 PC
FULL	56	36 PC	0 PC	64 PC	0 PC	0 PC
ALL LEVELS	71	28 PC	10 PC	61 PC	1 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 U
INTERMED	0.10-0.17	0.01-0.20	0.21-0.39	0.40-0.90	0.91-1.34	1.35 AND U
FULL	0.18 AND UP	0.01-0.39	----------	0.40-0.90	0.91-1.69	1.70 AND U

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FIGURE 6-2

SECTION 7

VEHICLE ATTITUDE

The vehicle attitude errors for both Mission 1102-1 and 1102-2 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 7-1 through 7-6 show these distributions for Mission 1102-1 and Figures 7-7 through 7-12 for Mission 1102-2.

Table 7-1 lists the maximum attitude errors and rates that were experienced during 90% of the FWD camera photographic operations, excluding the first six frames of each operation, and the total range of the errors and rates.

TABLE 7-1 - ATTITUDE ERRORS AND RATES

	MISSION 1102-1		MISSION 1102-2	
Value	90%	Range	90%	Range
Pitch Error (°)	0.47	-0.28 to +0.64	0.61	-0.22 to +0.84
Roll Error (°)	0.31	-0.38 to +0.46	0.29	-0.02 to +0.40
Yaw Error (°)	0.54	-0.25 to +1.70	0.62	-0.38 to +0.78
Pitch Rate (°/hr.)	24.86	-95 to +95	34.75	-80 to +90
Roll Rate (°/hr.)	25.66	-90 to +75	25.05	-90 to +85
Yaw Rate (°/hr.)	33.51	-80 to +75	39.54	-75 to +95

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

FRAMES 1-6 OF EACH UP OMITTED 90 PERCENT = 0.4

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

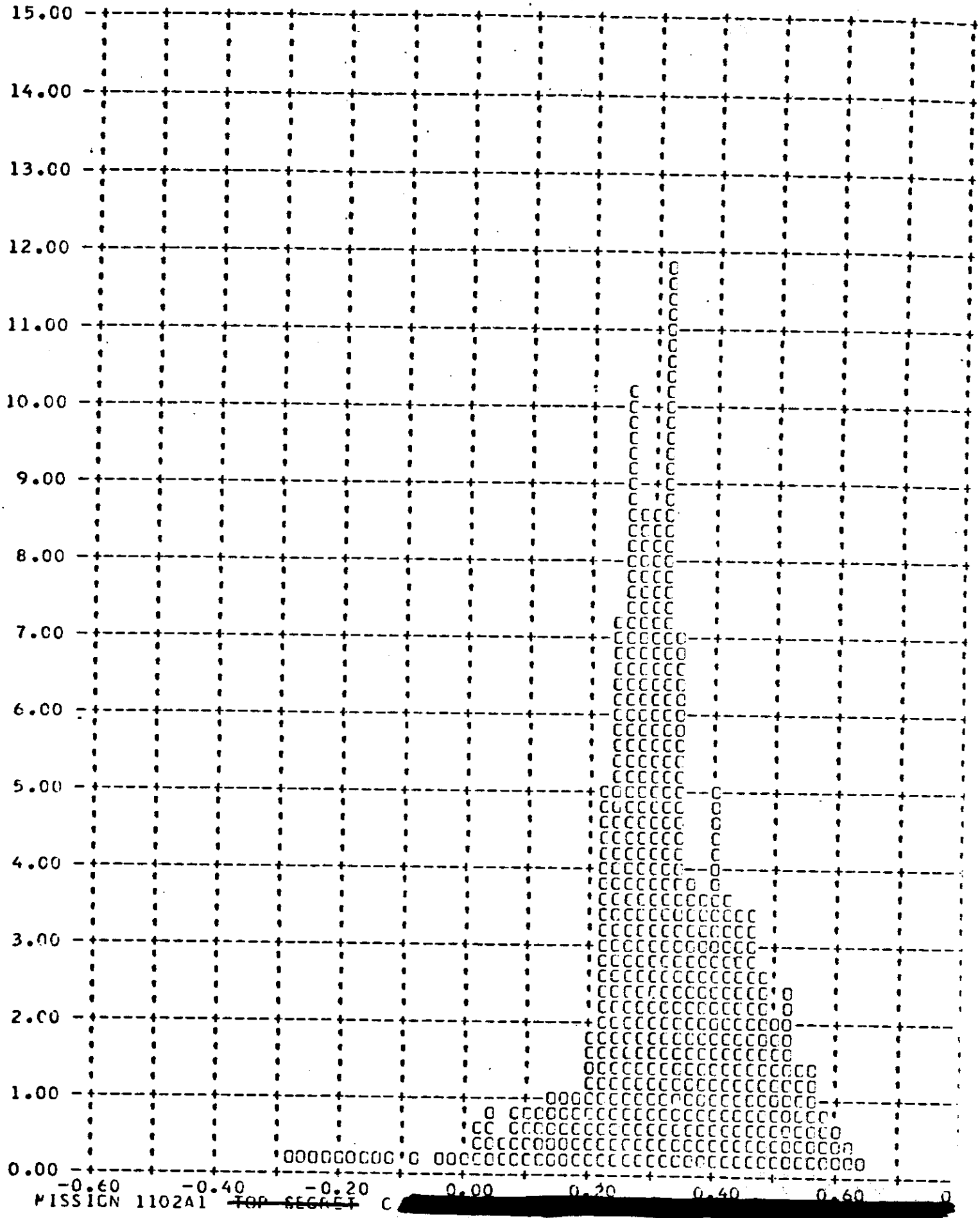
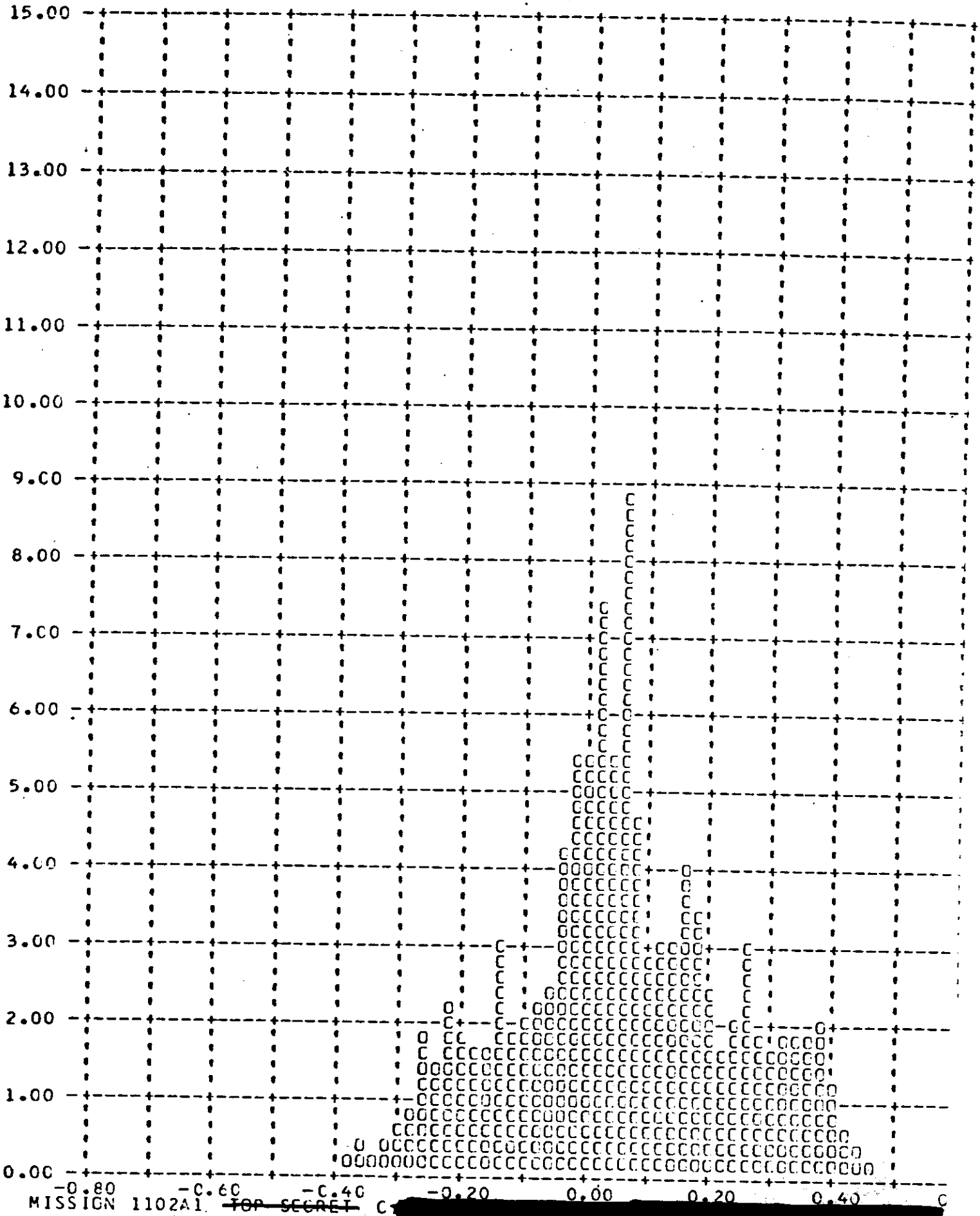


TABLE 7-1

FRAMES 1-6 OF EACH CP OMITTED 90 PERCENT = 0.3

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



FRAMES 1-6 OF EACH CP OMITTED 90 PERCENT = 0.54

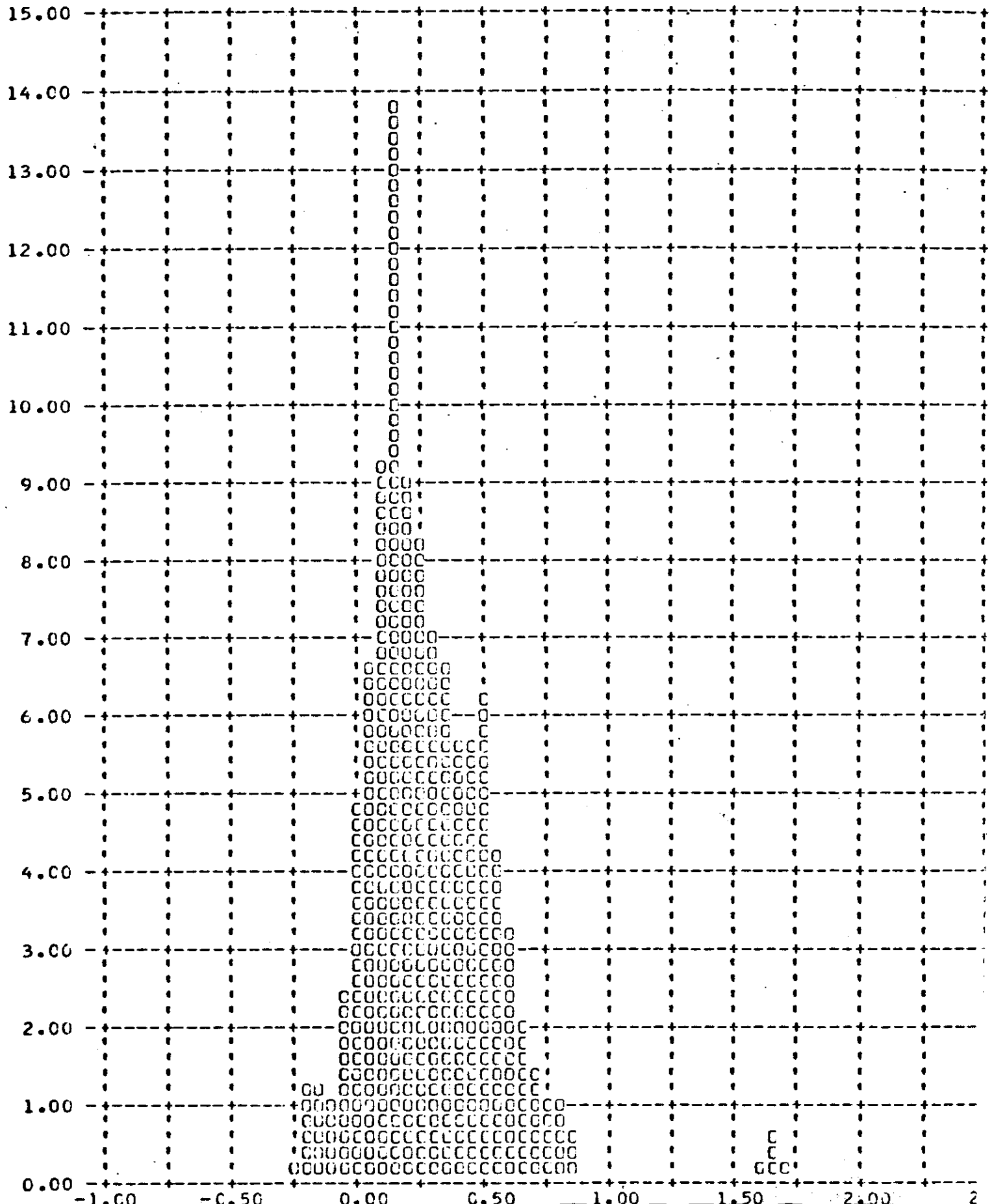
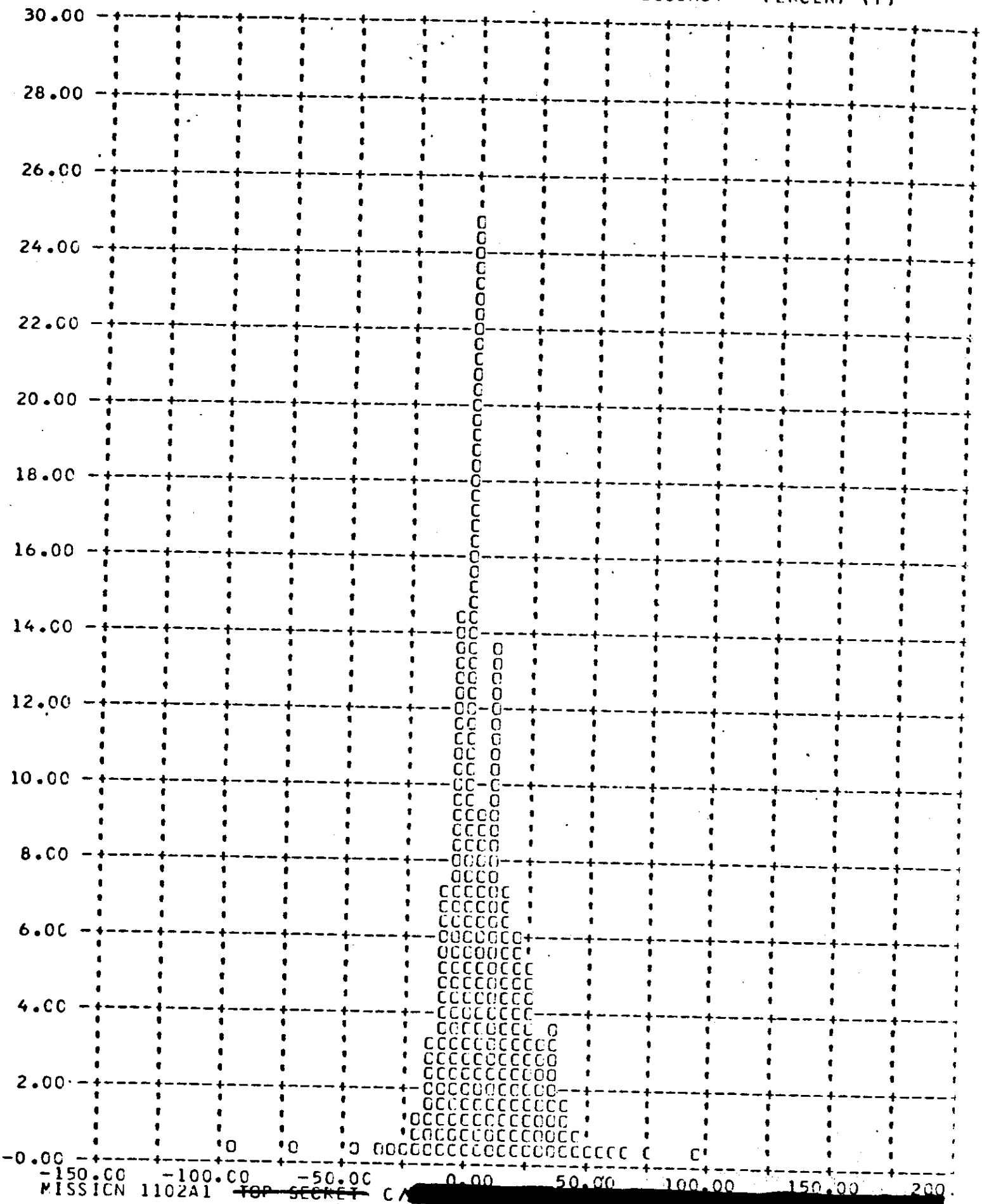


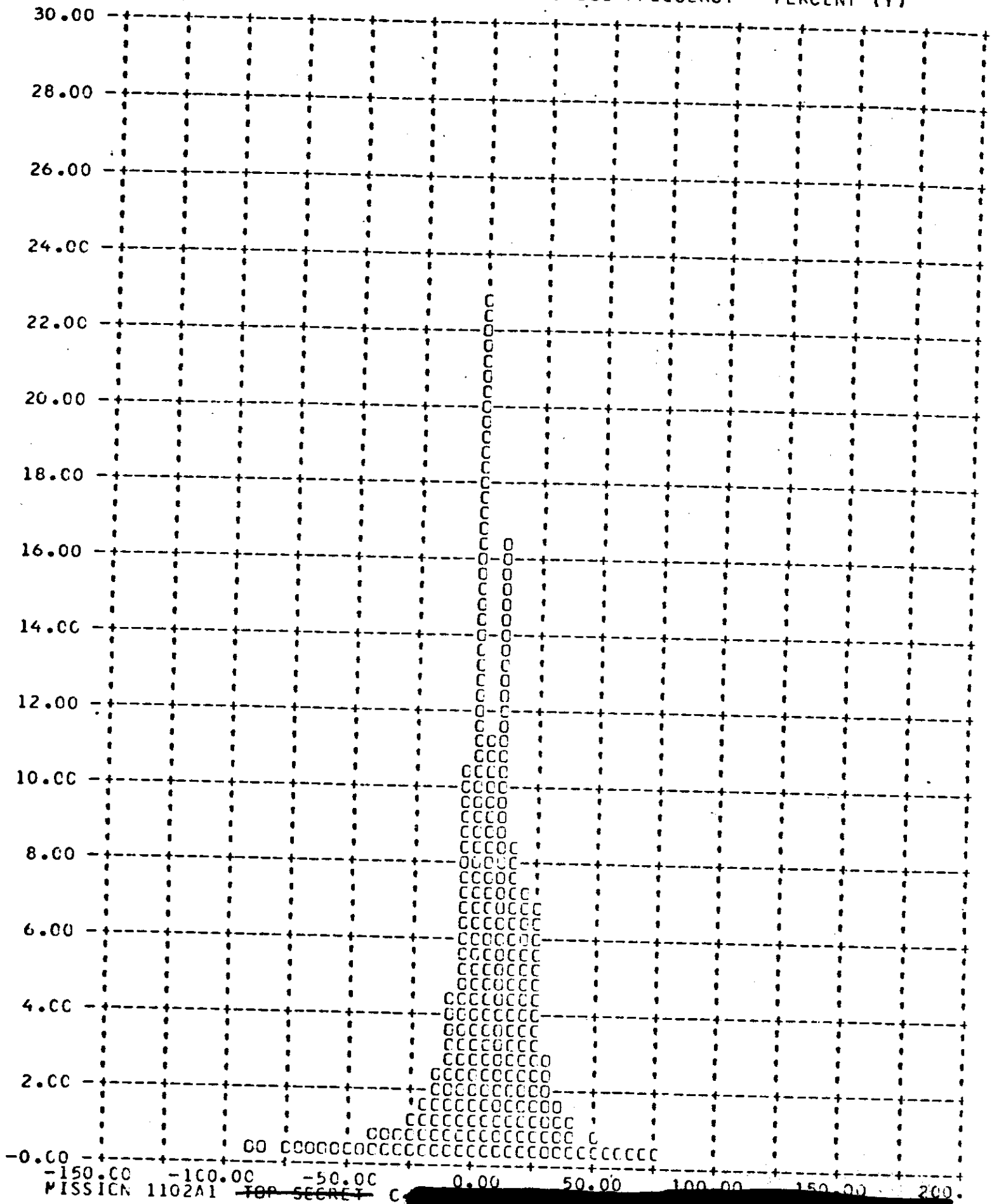
TABLE 7-3

FRAMES 1-6 OF EACH GP OMITTED 90 PERCENT = 24.8

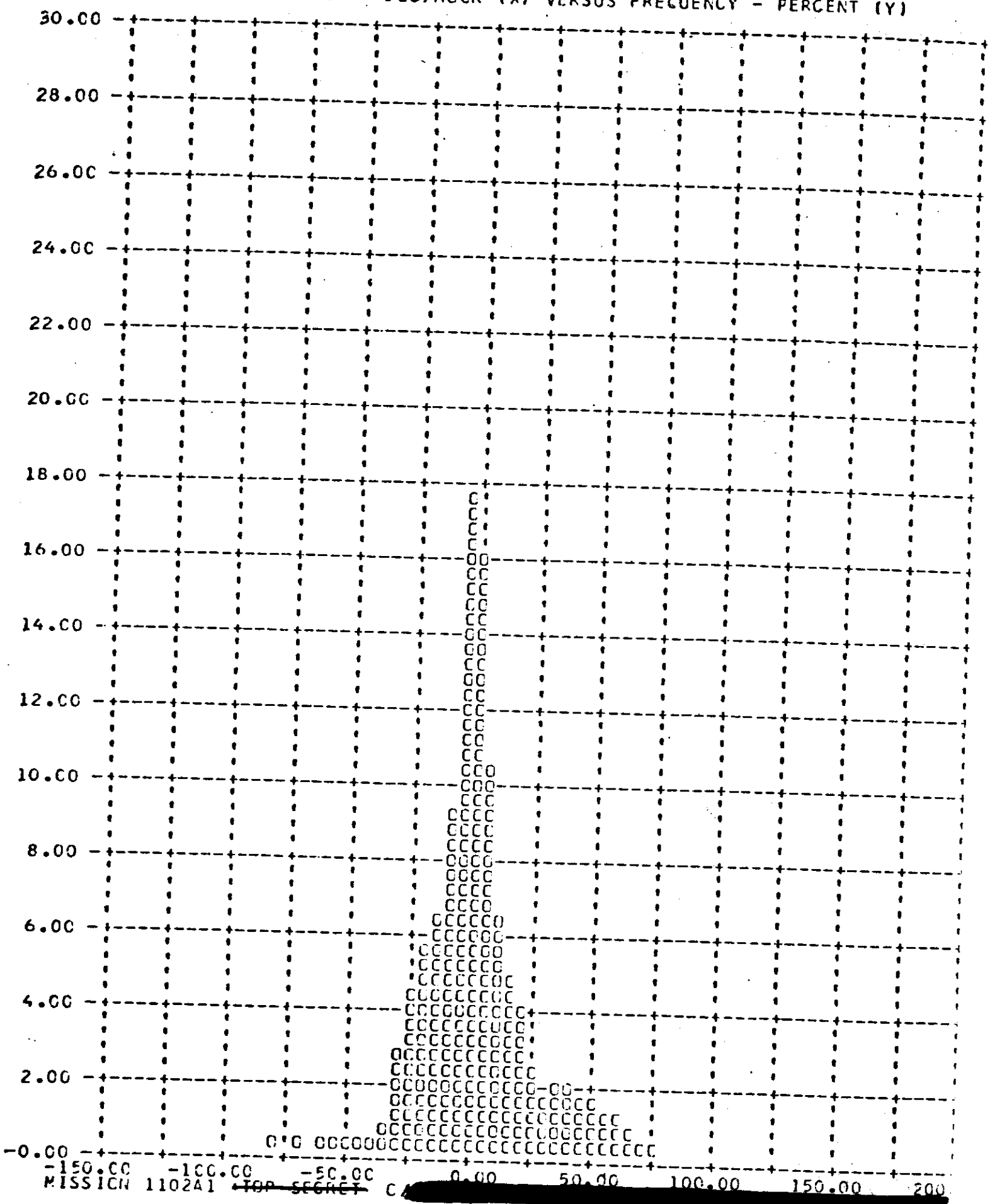
Y PITCH RATE ERROR - DEG/HOUR (X) VERSUS FREQUENCY - PERCENT (Y)



FRAMES 1-6 OF EACH GP OMITTED 90 PERCENT = 25.6

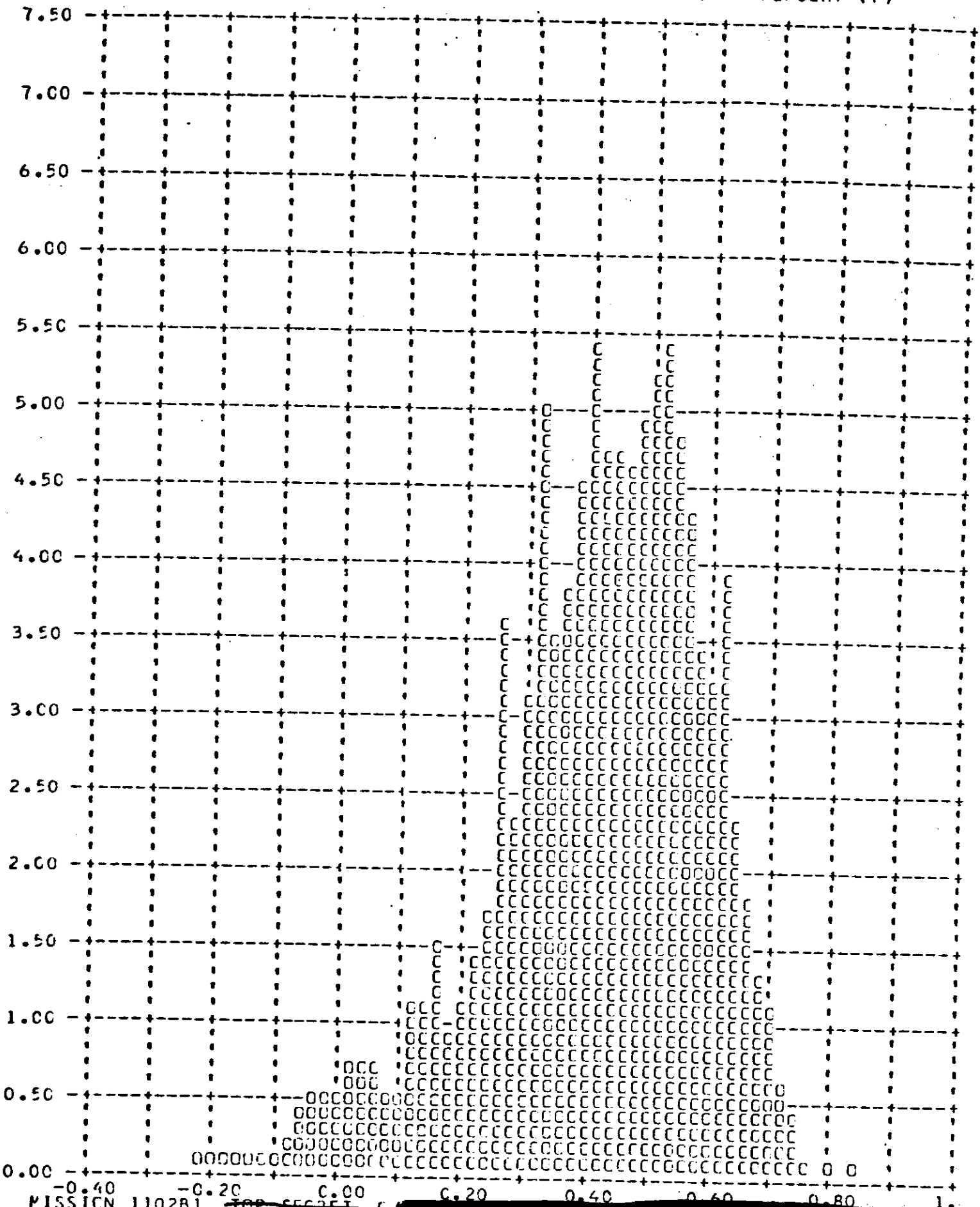


FRAMES 1-6 OF EACH CP OMITTED 90 PERCENT = 33.5

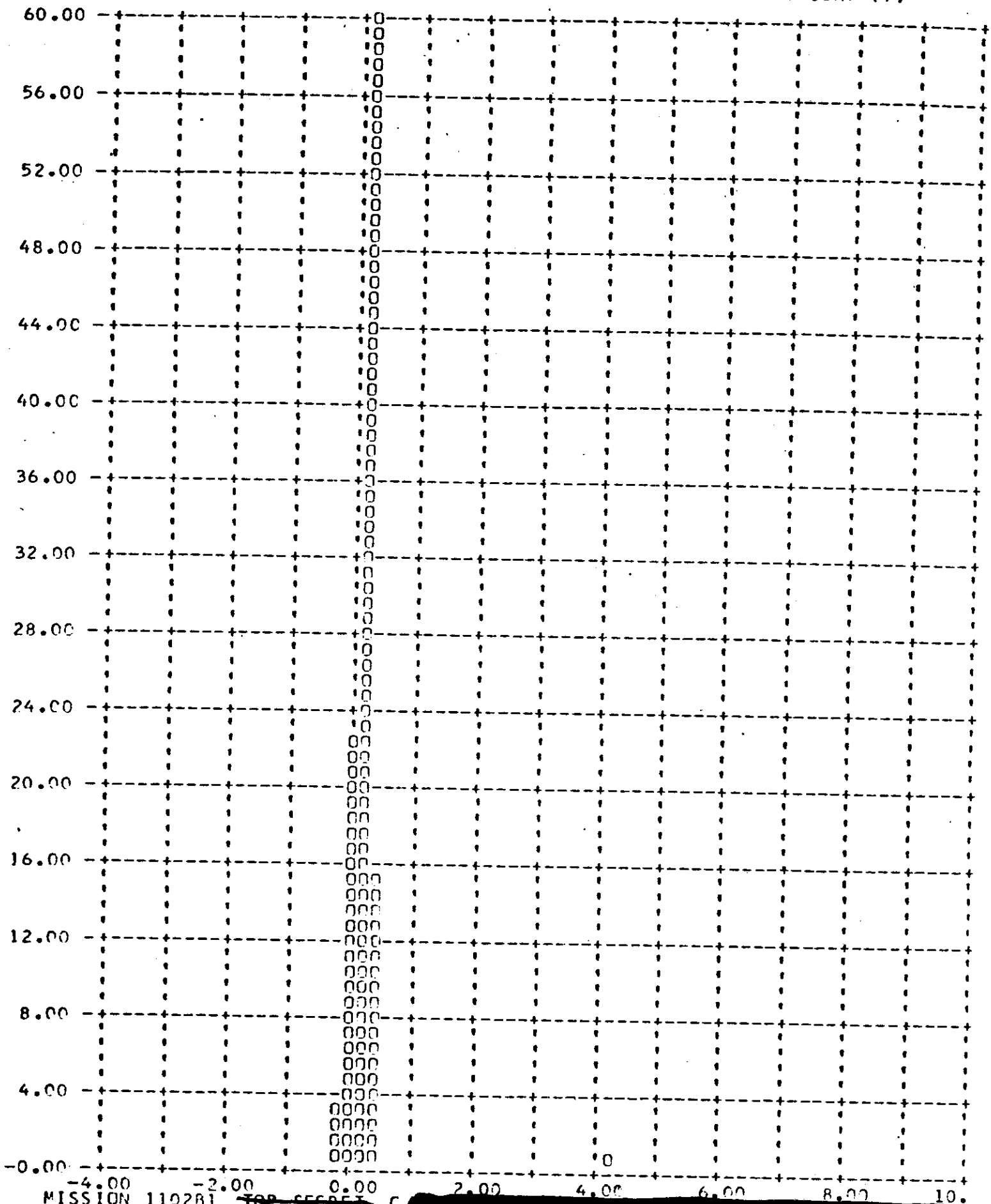


FRAMES 1-6 OF EACH GP OMITTED 90 PERCENT = 0.61

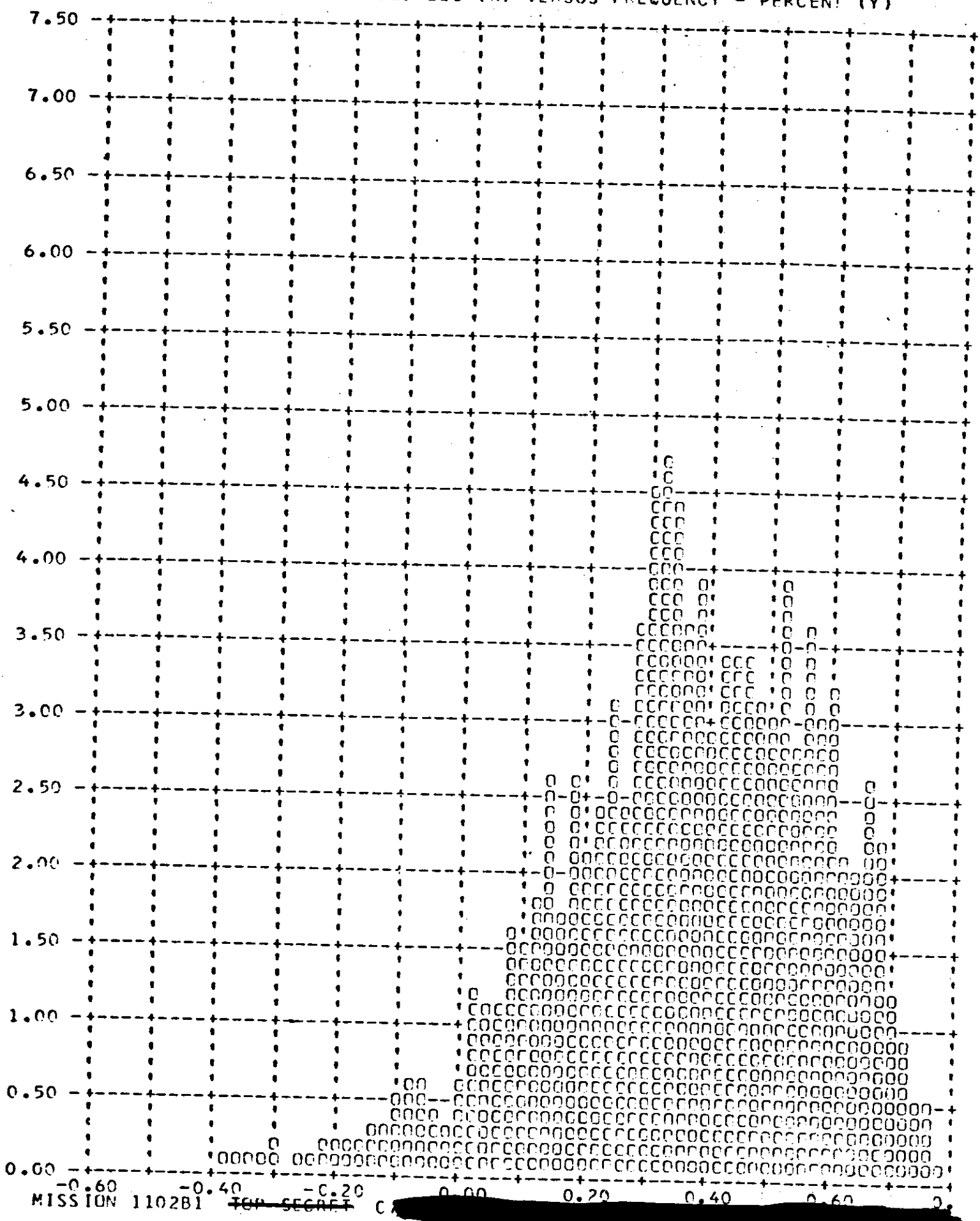
Y PITCH ANGLE ERROR - DEGREES (X) VERSUS FREQUENCY - PERCENT (Y)



FRAMES 1-6 OF EACH CP OMITTED 90 PERCENT = 0.2S

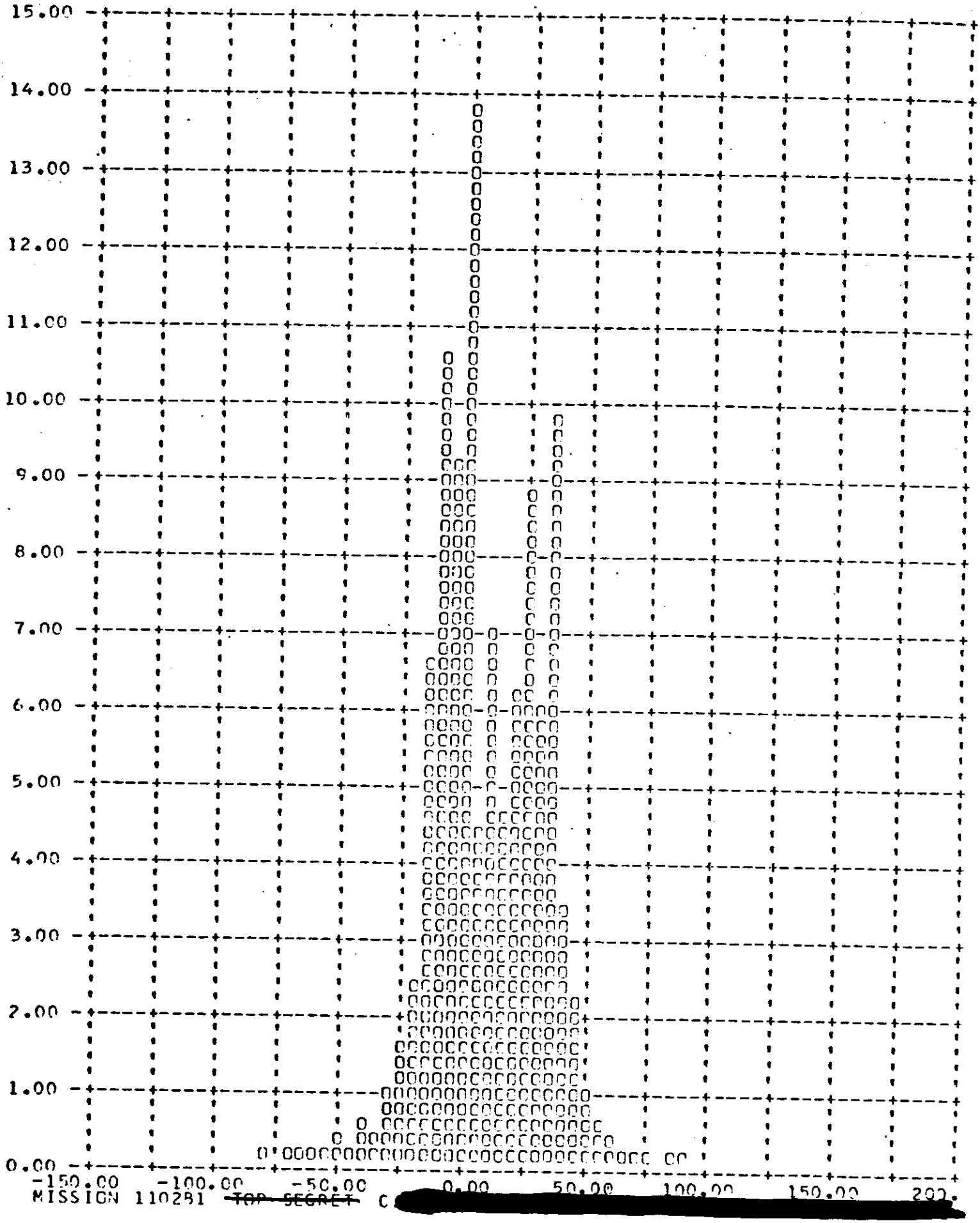


FRAMES 1-6 OF EACH OP OMITTED 90 PERCENT = 0.62

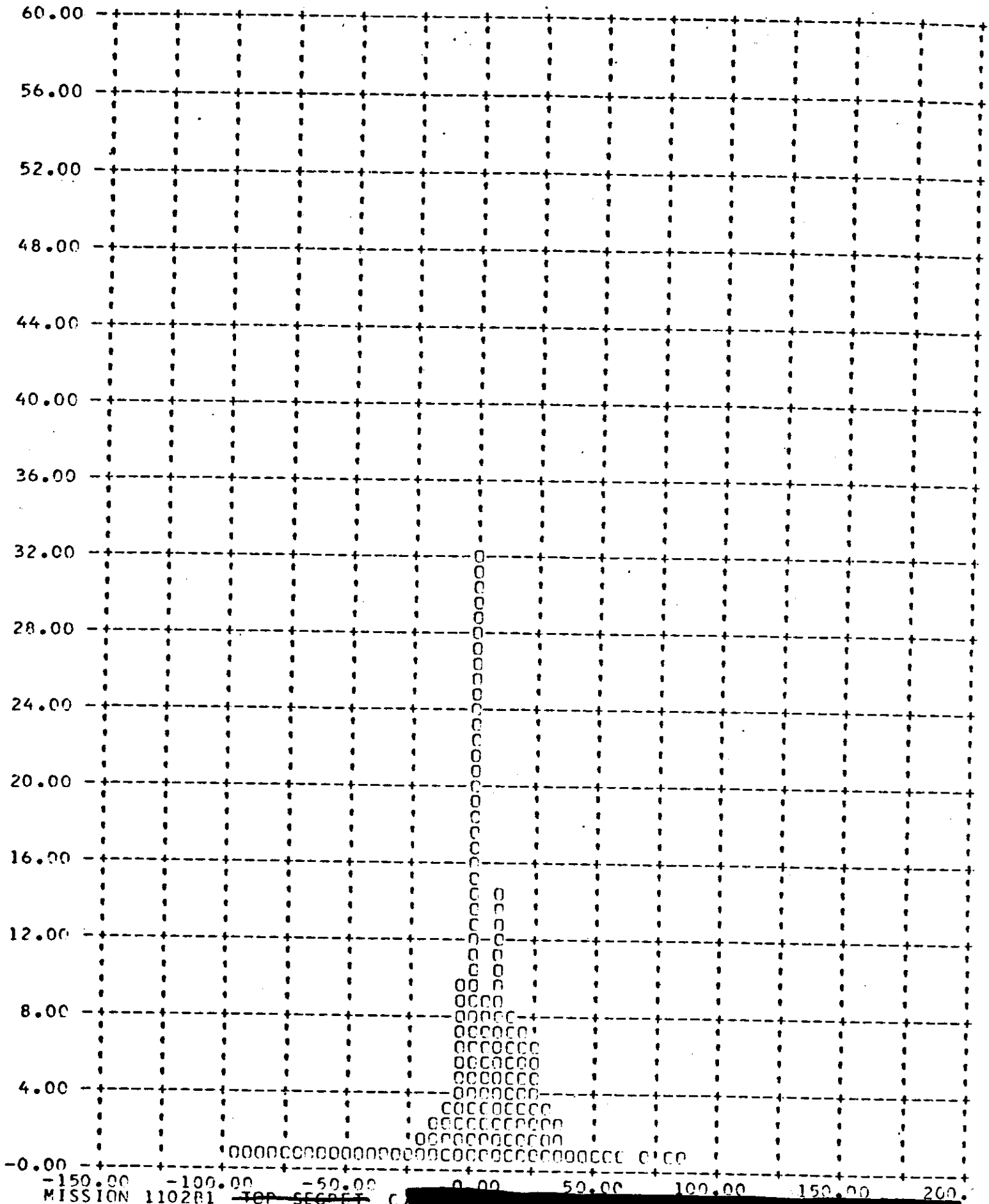


FRAMES [illegible] EACH UP OMITTED 90 PERCENT = 34.7

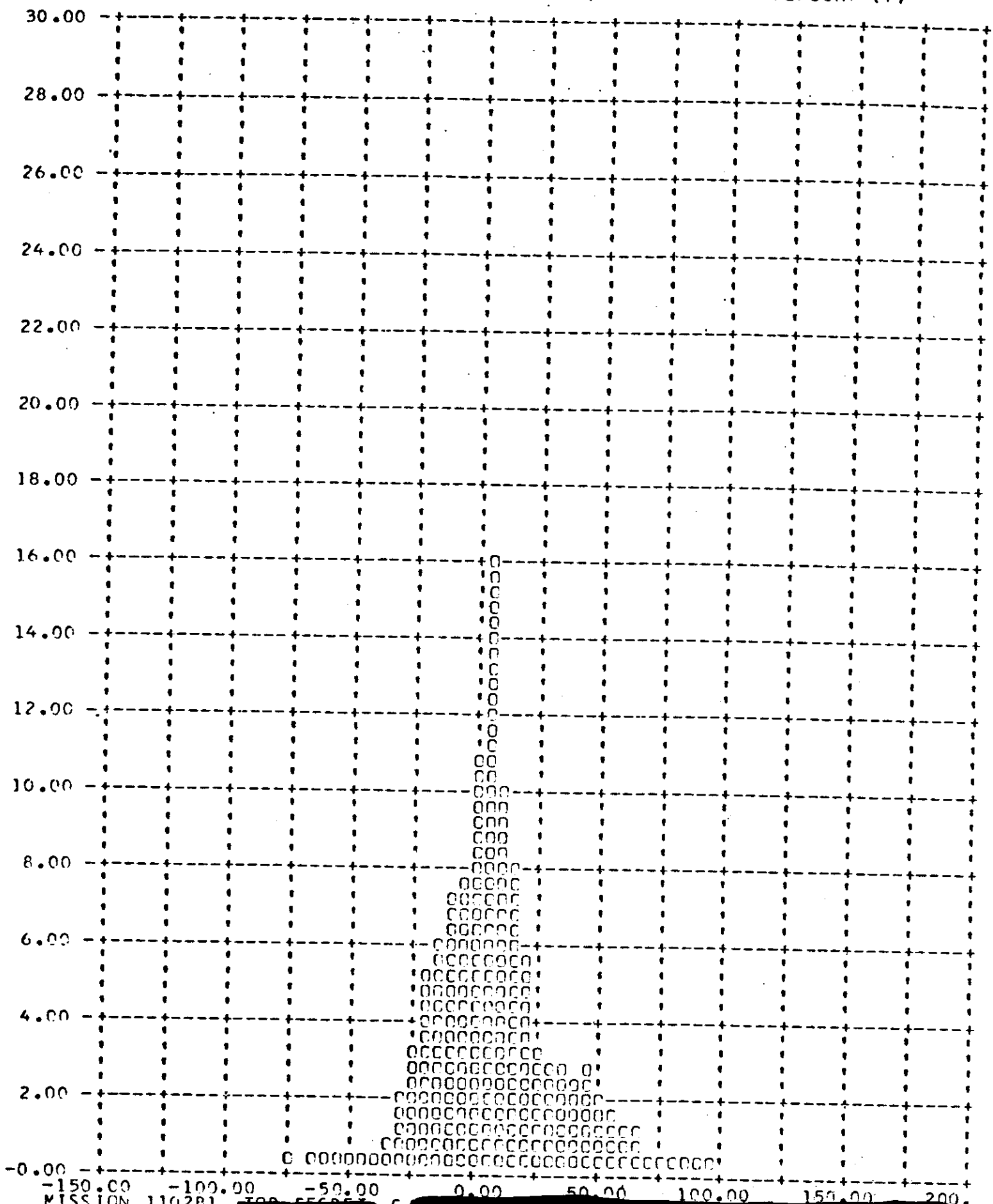
Y PITCH RATE ERROR - DEG/HOUR (X) VERSUS FREQUENCY - PERCENT (Y)



FRAMES 1-6 OF EACH UP OMITTED 90 PERCENT = 25.05



FRAMES 1-6 OF EACH CP OMITTED 90 PERCENT = 39.54



SECTION 8

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 IMC 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 IMC error induced by camera start-up is not representative of the overall system operations. The frequency distribution of the IMC errors and resolution limits are computer plotted and are shown in Figures 8-1 through 8-12.

The summary table 8-1 presents the maximum IMC ratio errors and resolution limits that existed during 90% of the photographic operations and the total range of values during all operations that were computed.

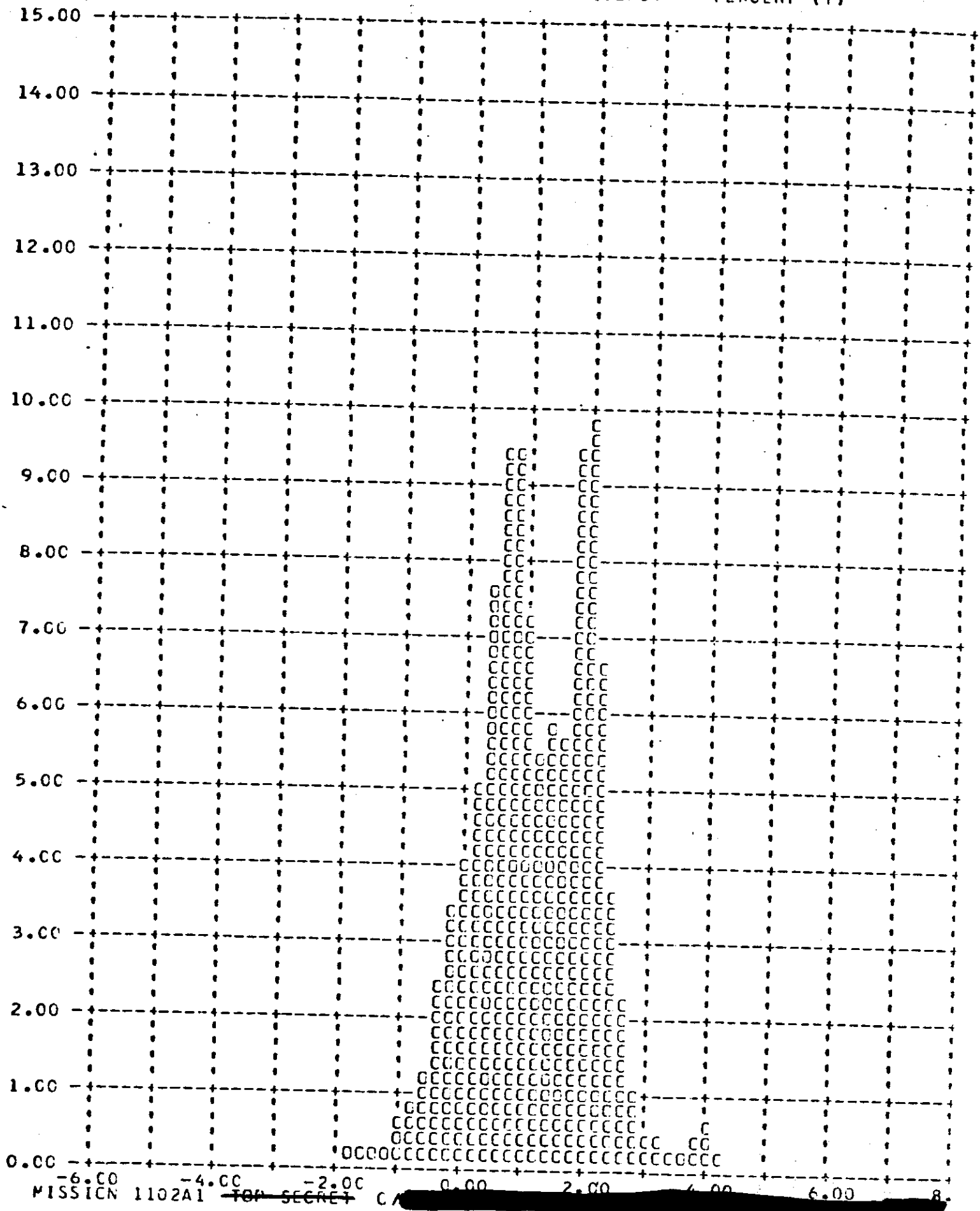
MISSION 1102

IMC RATIO AND RESOLUTION LIMITS

VALUE	UNITS	CAMERA	MISSION 1102-1 90%	MISSION 1102-1 RANGE	MISSION 1102-2 90%	MISSION 1102-2 RANGE
IMC RATIO ERROR	%	FWD	1.77	-1.80 to +4.60	2.95	-1.80 to +4.80
		AFT	2.15	-1.80 to +4.20	3.77	-0.80 to +5.60
ALONG TRACK RESOLUTION LIMIT	Feet	FWD	1.98	+0.05 to +3.25	2.12	+0.20 to +4.20
		AFT	3.21	+0.20 to +4.40	4.11	+0.20 to +7.00
CROSS TRACK RESOLUTION LIMIT	Feet	FWD	0.97	+0.05 to +2.70	0.76	+0.05 to +1.60
		AFT	1.17	+0.05 to +3.15	1.09	+0.05 to +2.85

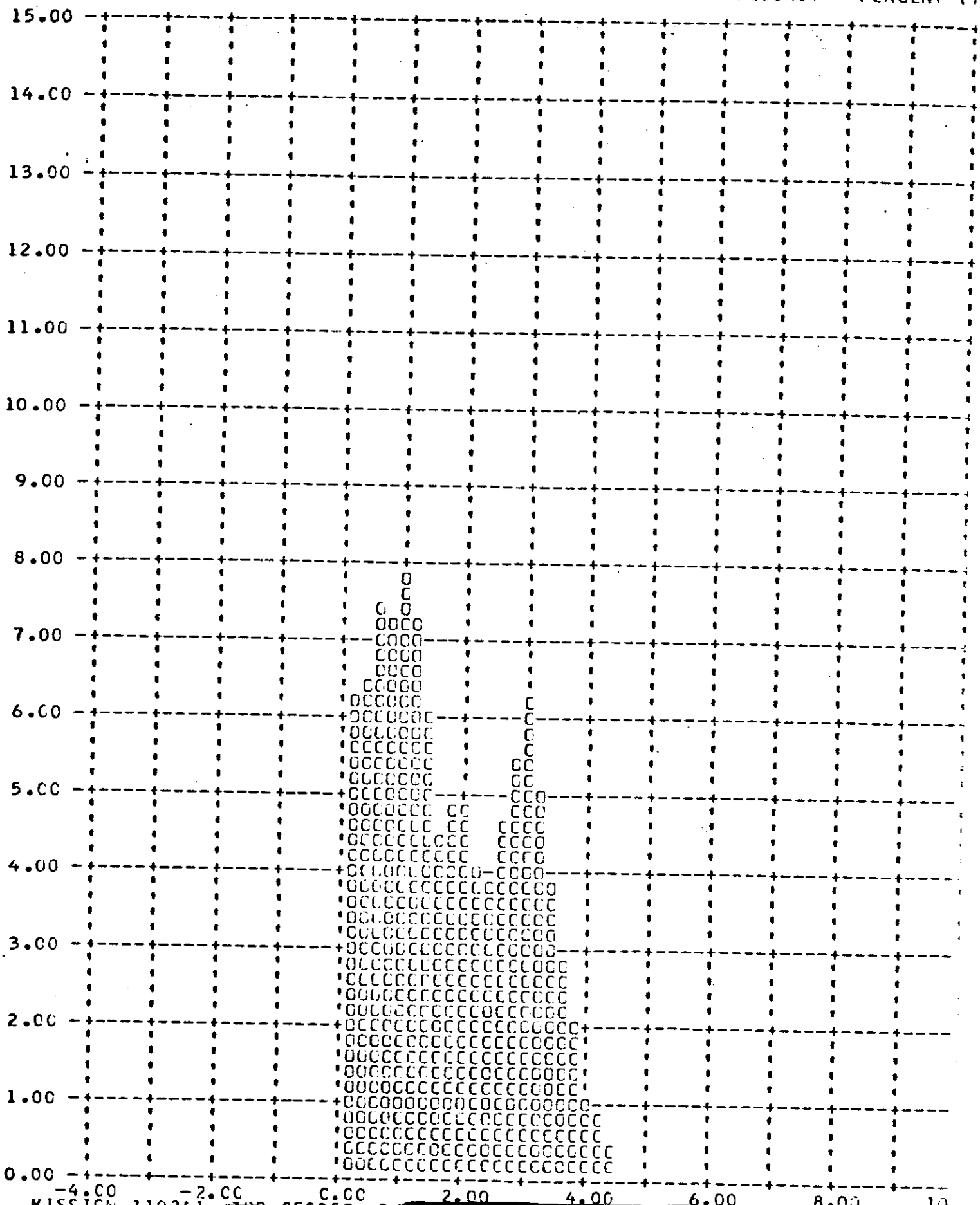
TABLE 8-1

FRAMES 1-6 OF EACH CP OMITTED 90 PERCENT = 2.1

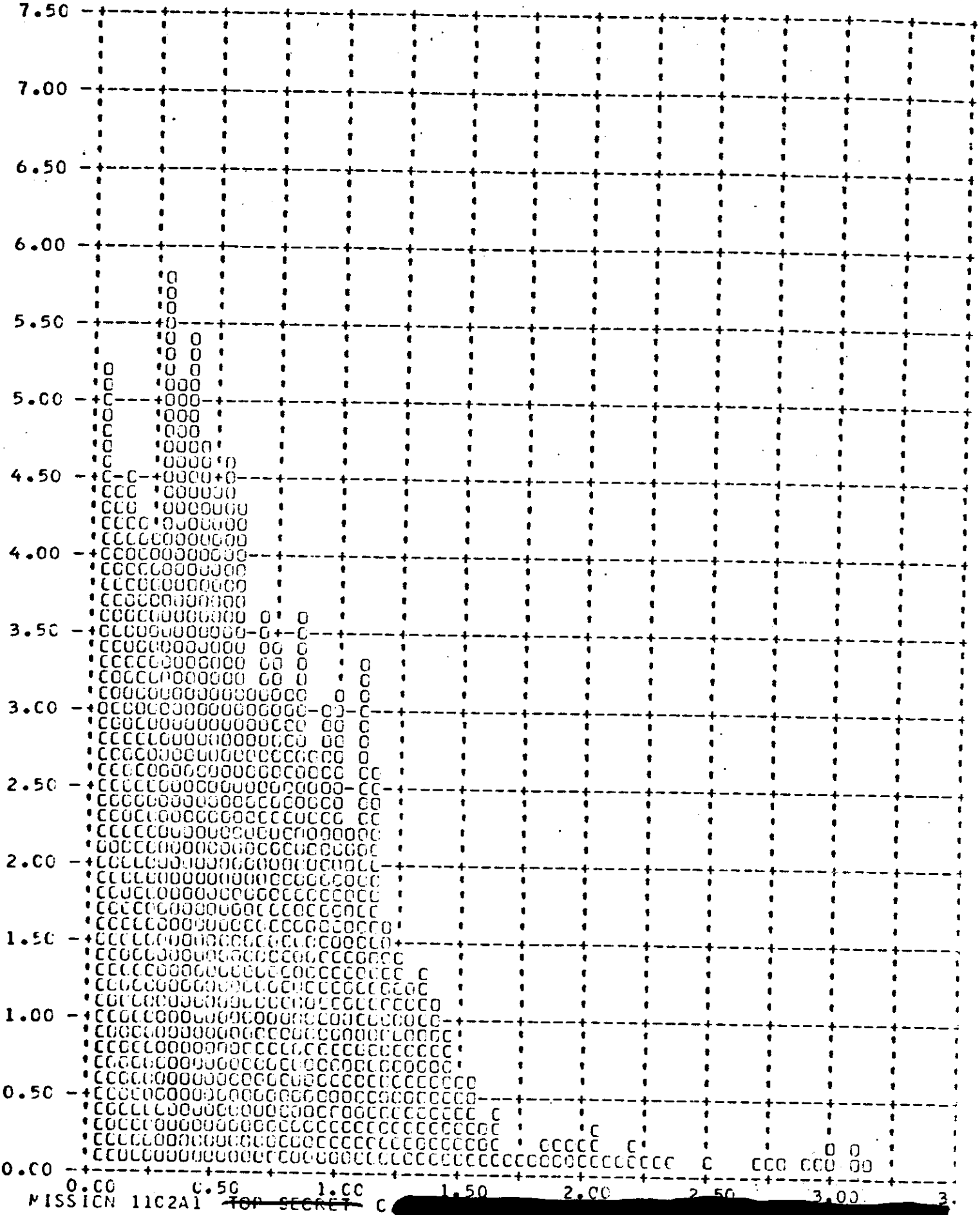


FRAMES 1-6 OF EACH CP OMITTED 90 PERCENT = 3.2

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



FRAMES 1-6 OF EACH UP OMITTED 90 PERCENT = 1.1



FRAMES 1-6 OF EACH OF OMITTED 90 PERCENT = 1.7

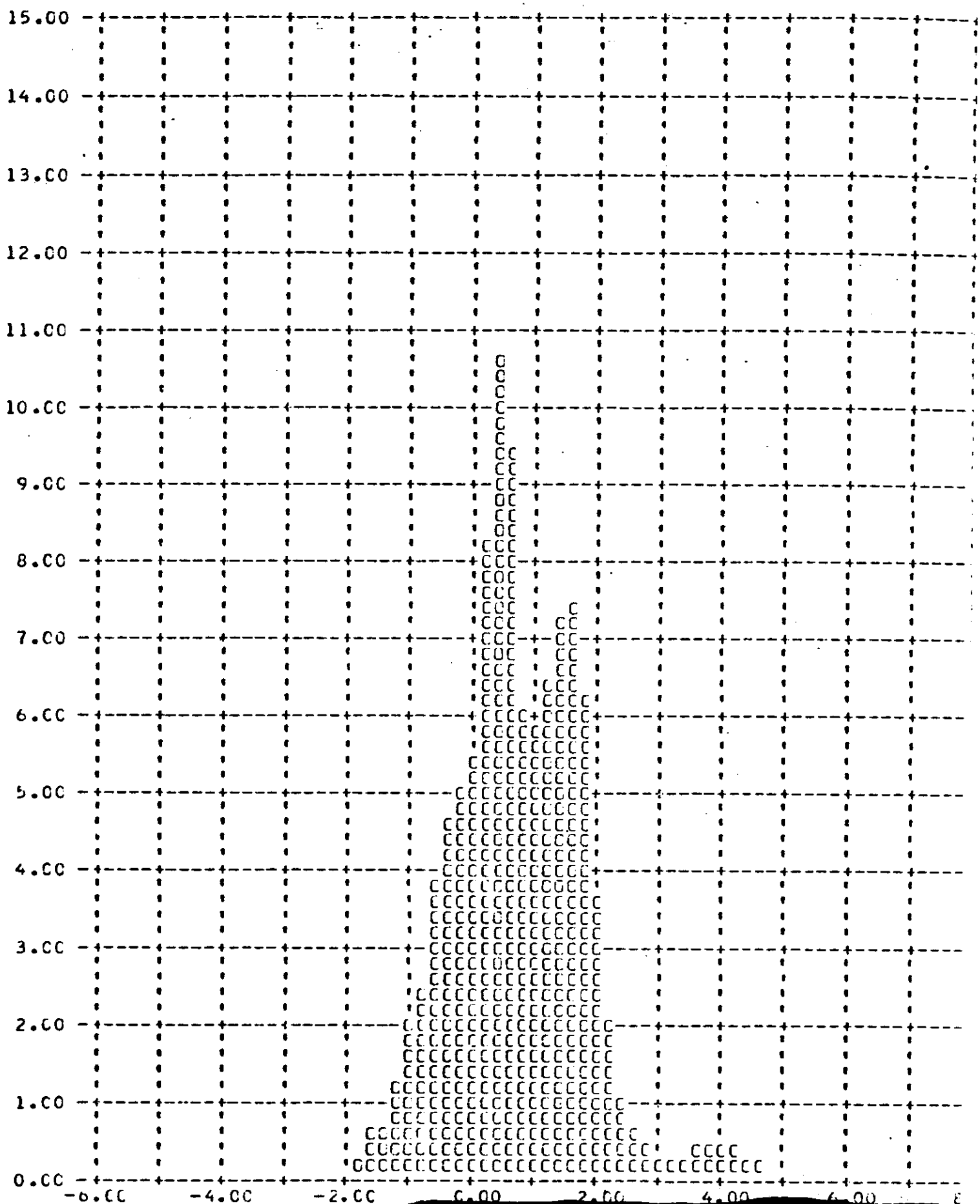
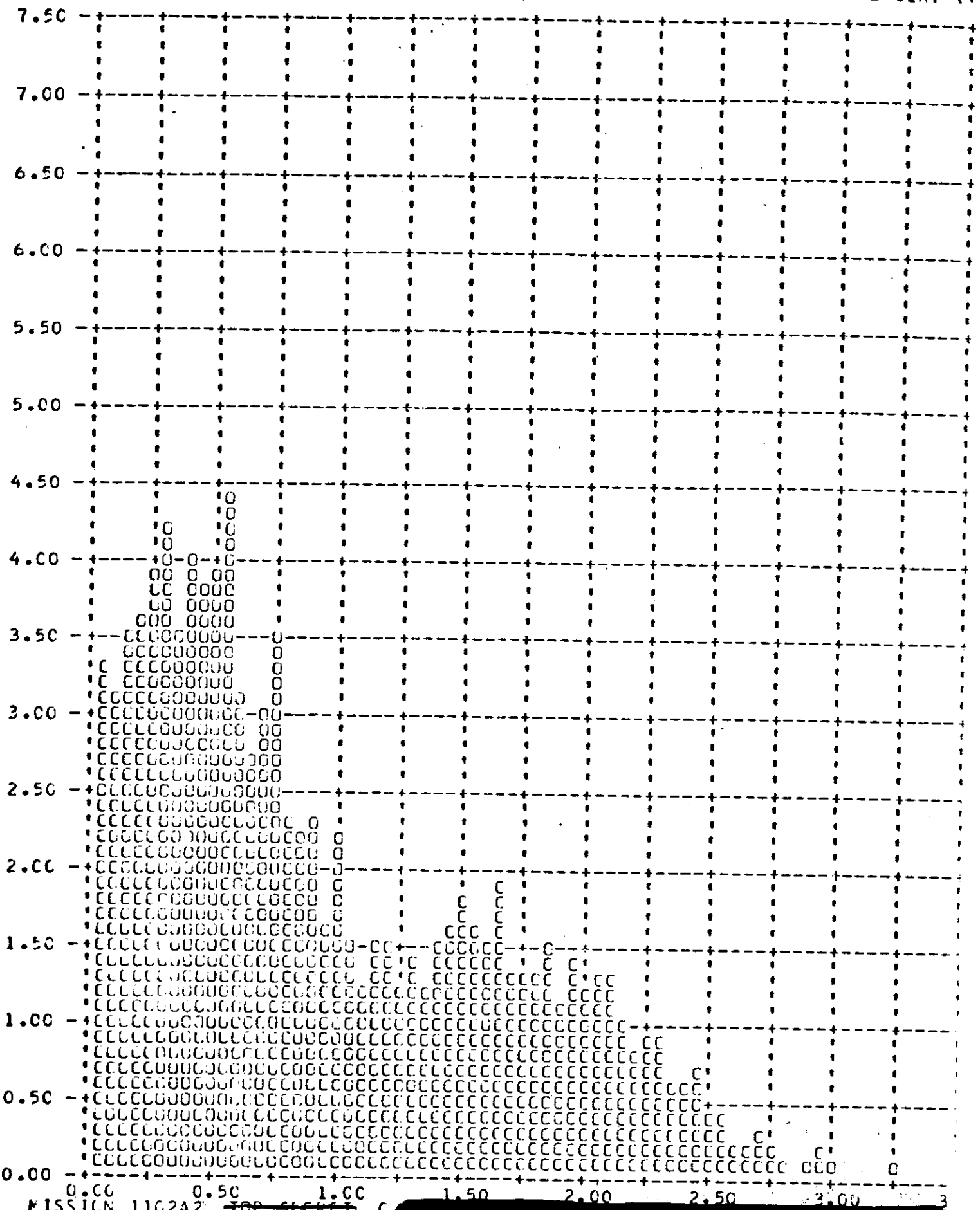


TABLE 8-4

FRAMES 1-6 OF EACH CP OMITTED 90 PERCENT = 1.5



FRAMES 1-6 OF EACH CP OMITTED 90 PERCENT = 0.9

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

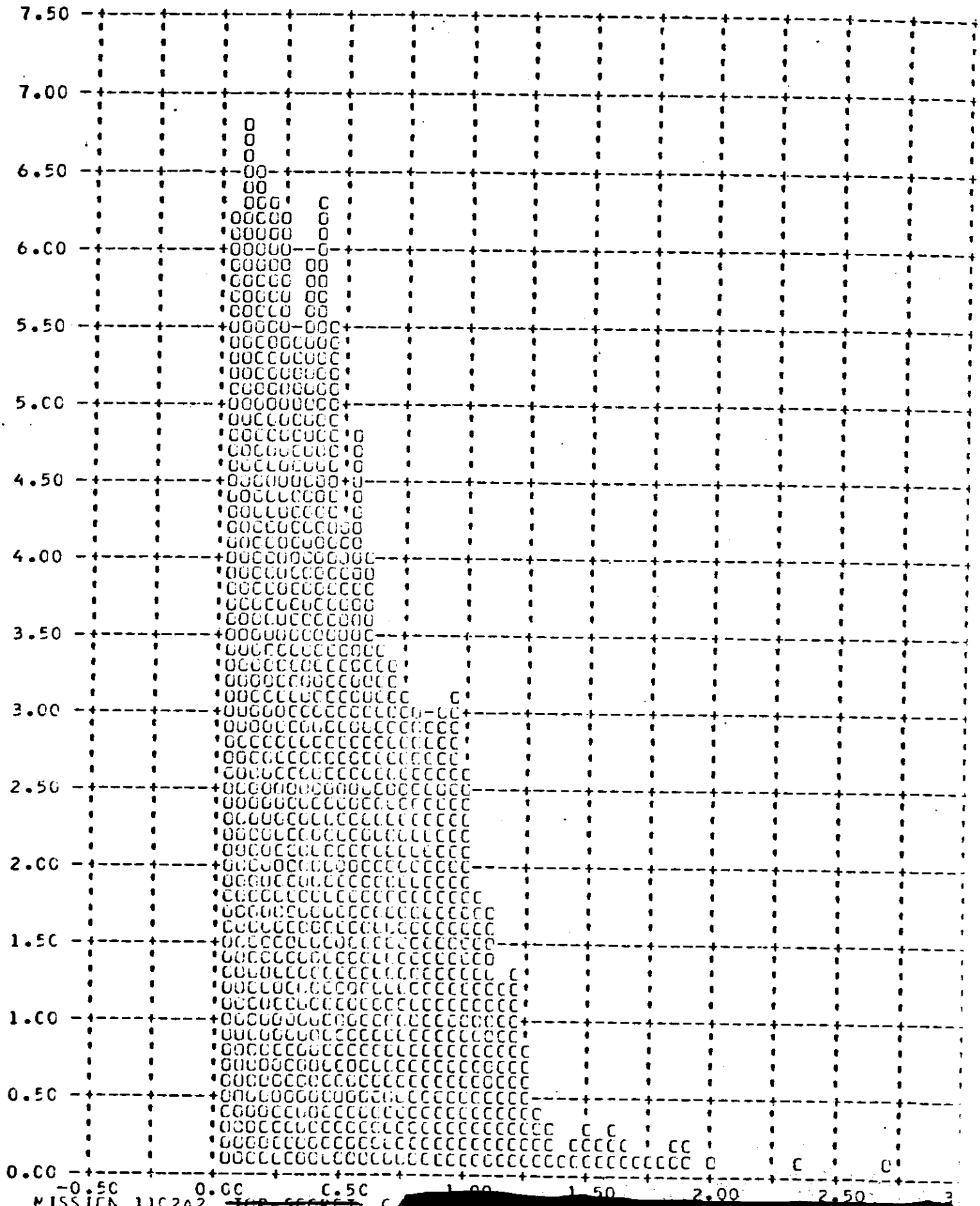
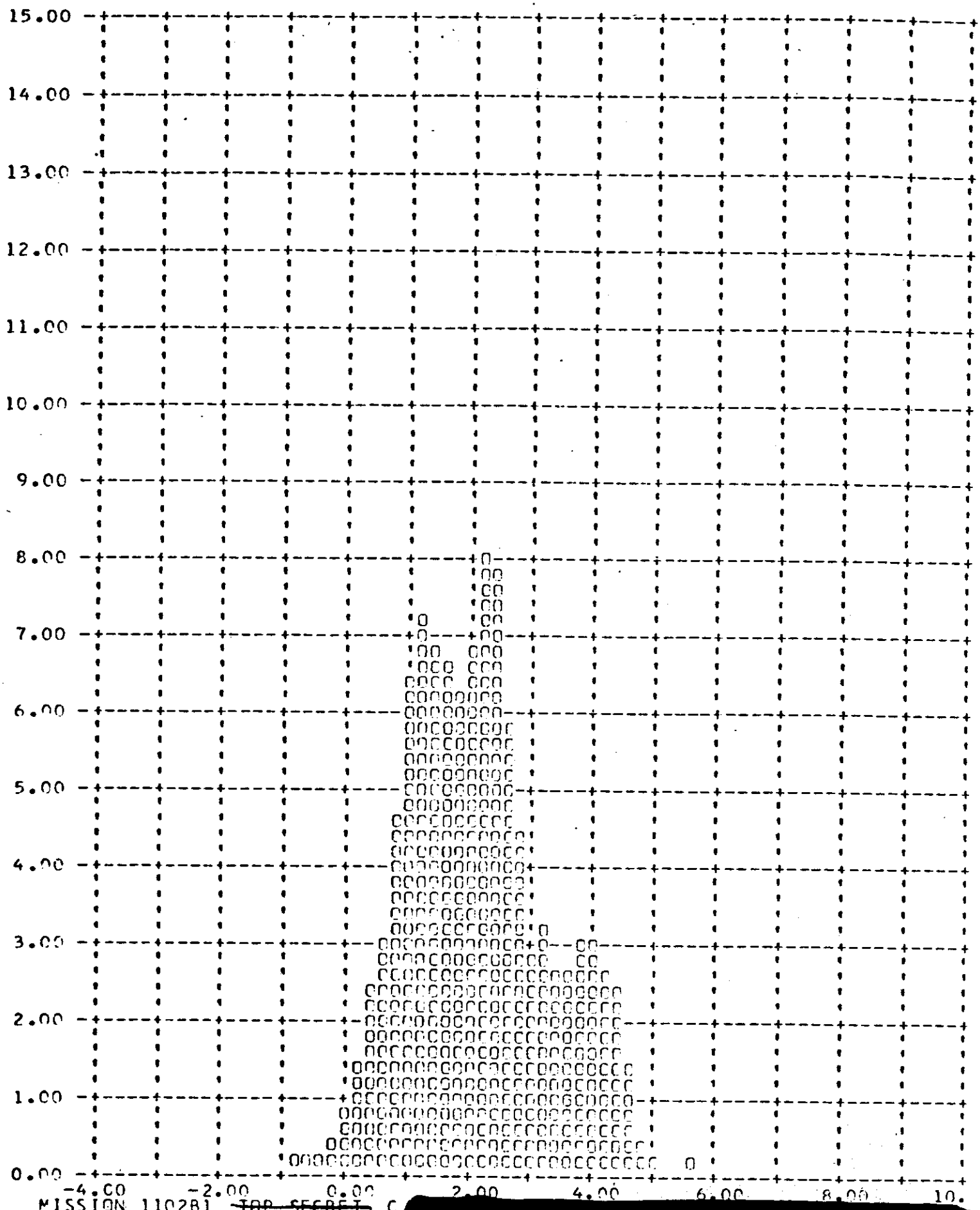


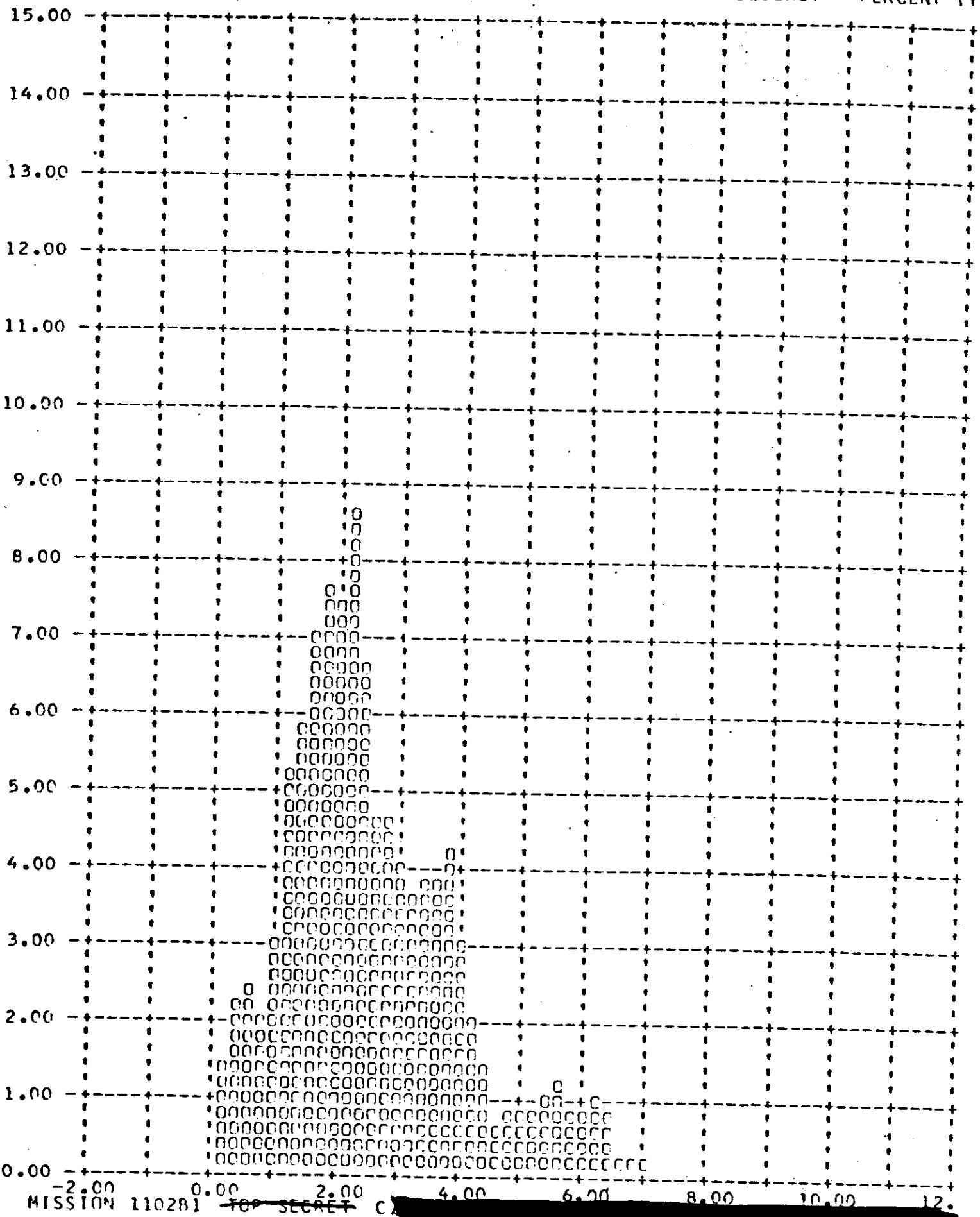
TABLE 8-6

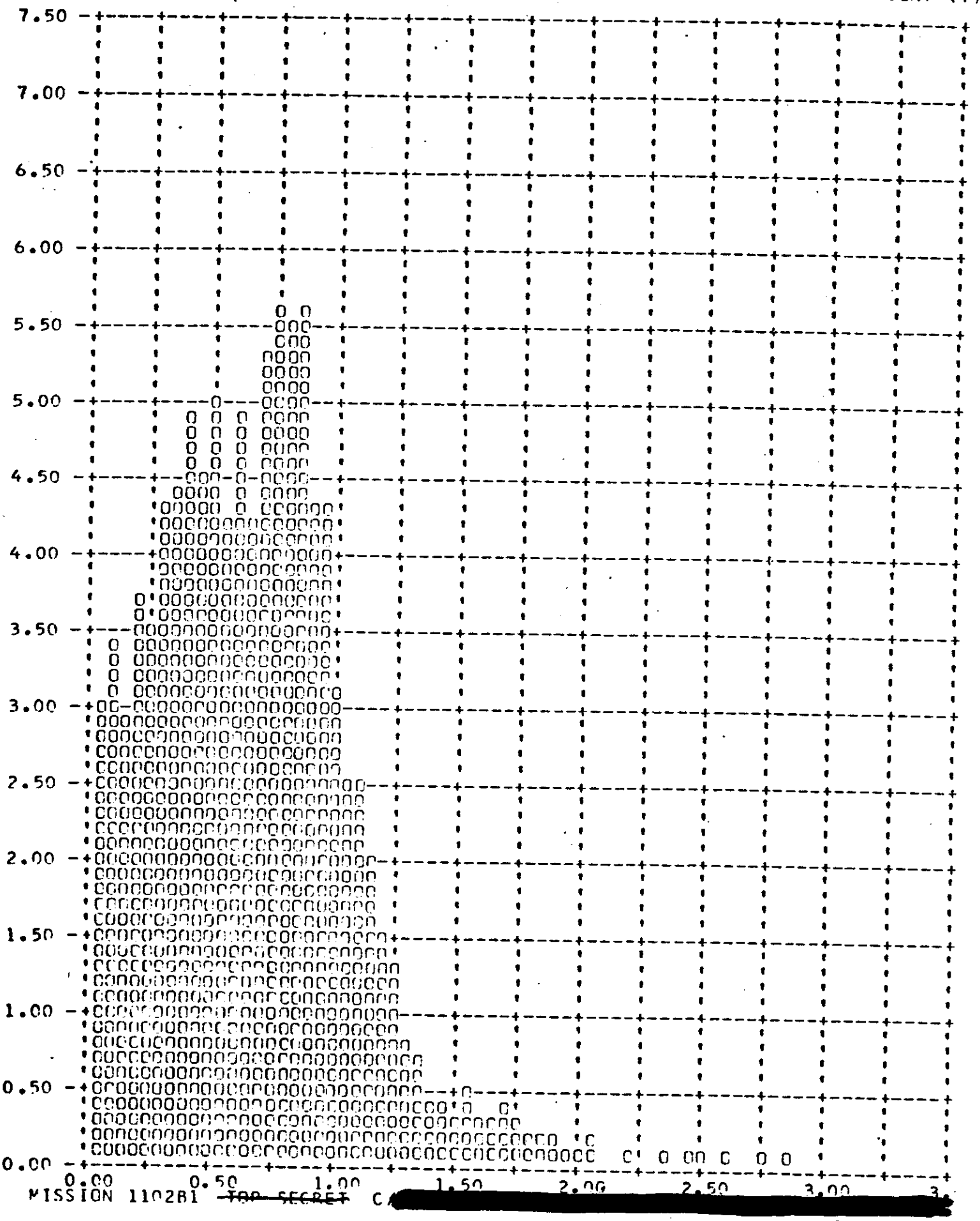
FRAMES 1-6 OF EACH OP OMITTED 90 PERCENT = 3.77



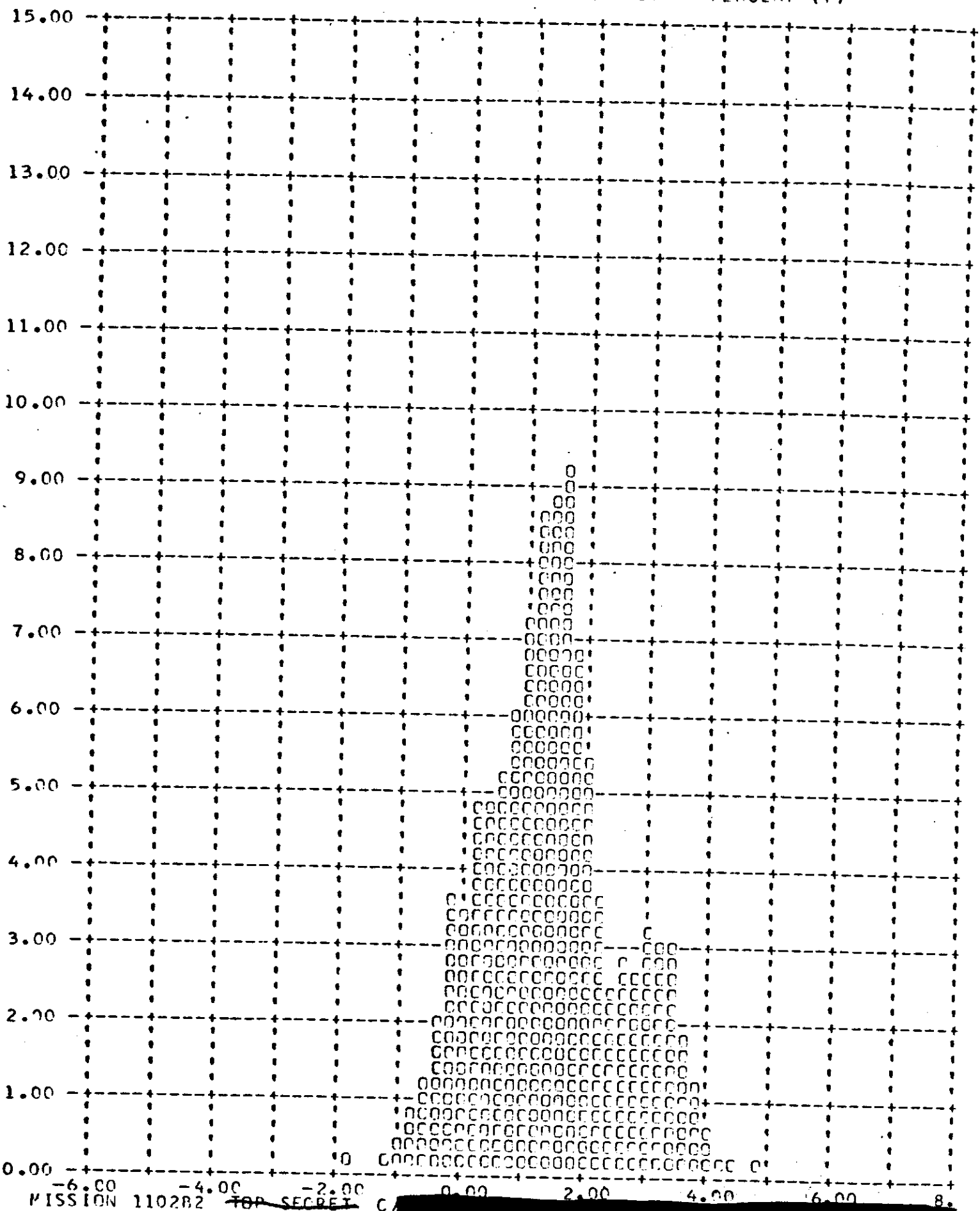
FRAMES 1-6 OF EACH OP OMITTED [illegible] PERCENT = 4.11

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




Y CROSS TRACK RESOLUTION LIMIT - FEET (X) VERSUS FREQUENCY - PERCENT (Y)
7.50
7.00
6.50
6.00
5.50
5.00
4.50
4.00
3.50
3.00
2.50
2.00
1.50
1.00
0.50
0.00
0.00
0.50
1.00
1.50
2.00
2.50
3.00

FRAMES 1-6 OF EACH OP OMITTED 90 PERCENT = 2.95



FRAMES 1-6 OF EACH UP OMITTED 40 PERCENT = 2.12

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

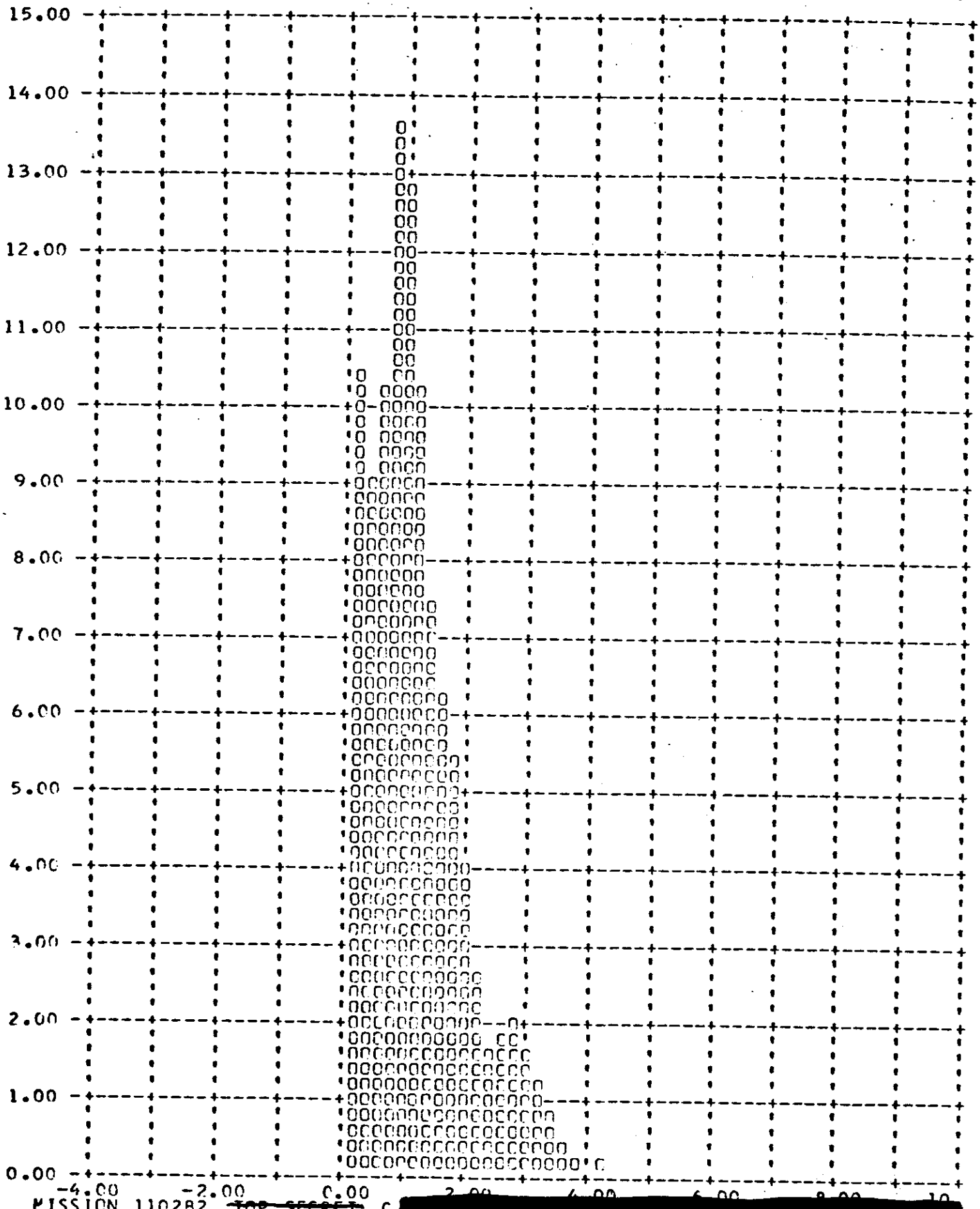
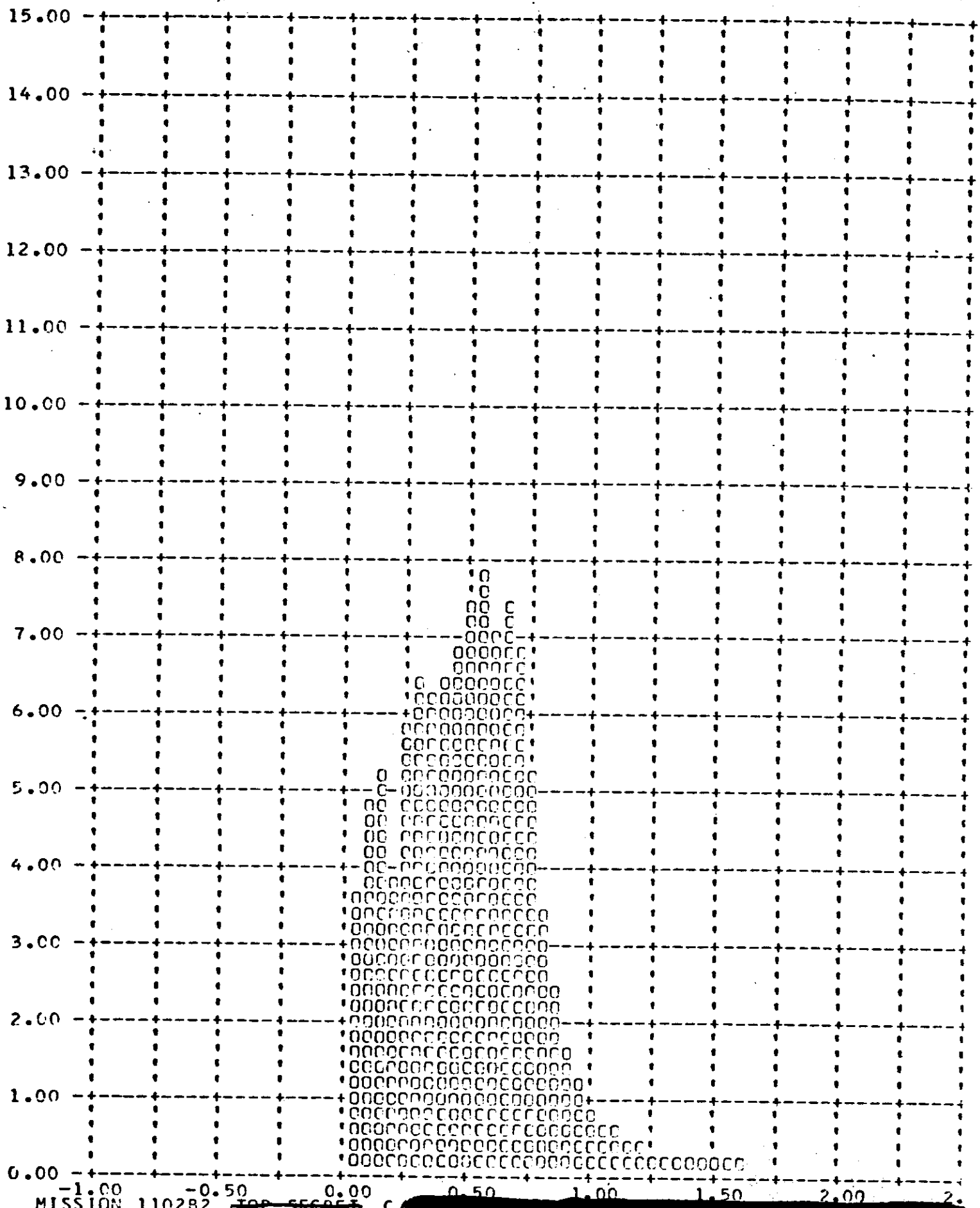


TABLE 8-11

FRAMES 1-6 OF EACH OP OMITTED 90 PERCENT = 0.7?



SECTION 9

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 record-

ing, and stellar-index camera operation. A summary of estimated reliability is shown in Table 9-1.

Panoramic Camera Reliability

Sample Size - 199 opportunities to operate

Two failures - S/I Programmer on System J-19

Film Transport on System J-42

Assume - 3000 cycles per camera per mission

Estimated Reliability = 98.7% at 50% confidence level

Main Camera Door Reliability

Sample Size - 63 vehicles x 2 doors = 126 opportunities to operate

Estimated Reliability = 99.5% at 50% confidence level

Payload Command and Control

Sample Size - 11,736 hours operation in sample

Two failures

Estimated Reliability = 96.2% at 50% confidence level

Payload Clock Reliability

Sample Size - 11,736 hours operation in sample

No failures

Estimated Reliability = 99.0% at 50% confidence level

Estimated Reliability of Payload Functioning on orbit = 96.6% at 50% confidence level

Recovery System Reliability

91 opportunities to recover

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

Estimated Reliability = 98.3% at 50% confidence level

Stellar-Index Camera Reliability

Sample begins with CR-1

Sample size = 17,765 cycles

One failure

Estimated Reliability = 63.5% at 50% confidence level

Horizon Camera Reliability

Sample begins with J5 - 118,000 cycles

Estimated Reliability of Single Camera - 99.1% at 50% confidence level

Estimated Reliability of Four Horizon Cameras at a Parallel Redundant System = 99.9% at 50% confidence level

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	SAMPLE / FAILURES / RELIABILITY	SAMPLE / FAILURES / RELIABILITY	SAMPLE / FAILURES / RELIABILITY
	OPERATIONS	DOORS	HOURS	HOURS		CAPSULES	CYCLES	CYCLES
9038 to 1008	60 / 1 / 97.3	52 / 0 / 98.6	3124 / 0 / 98.0	3124 / 0 / 98.0	96.1	18 / 1 / 90.7	3400 / 3 / 83.1	12,000 / 0 / 91.7
1009	64 / 1 / 97.4	54 / 0 / 98.7	3216 / 0 / 98.0	3216 / 0 / 98.0	96.2	20 / 1 / 91.5	4250 / 3 / 89.3	15,000 / 0 / 93.4
1010	68 / 1 / 97.6	56 / 0 / 98.8	3432 / 0 / 98.1	3432 / 0 / 98.1	96.4	22 / 1 / 92.5	5100 / 3 / 73.7	18,000 / 0 / 94.4
1011	72 / 1 / 97.7	58 / 0 / 98.9	3600 / 0 / 98.1	3600 / 0 / 98.1	96.8	24 / 1 / 93.0	5525 / 0* / 94.7	21,000 / 0 / 95.2
1012	76 / 1 / 97.8	60 / 0 / 98.9	3720 / 0 / 98.2	3720 / 0 / 98.2	96.9	26 / 1 / 93.5	5525 / 0 / 94.7	24,000 / 0 / 95.8
1013	78 / 1 / 97.8	62 / 0 / 99.0	3940 / 1 / 95.9	3940 / 0 / 98.3	96.0	28 / 1 / 94.0	5950 / 0 / 95.1	25,500 / 0 / 96.0
1014	82 / 1 / 97.9	64 / 0 / 99.0	4056 / 1 / 96.1	4056 / 0 / 98.3	96.1	30 / 1 / 94.4	6375 / 1 / 89.6	28,500 / 0 / 96.4
1015	86 / 1 / 98.0	66 / 0 / 99.0	4320 / 1 / 96.3	4320 / 0 / 98.4	96.1	32 / 1 / 94.8	7225 / 1 / 90.4	31,500 / 0 / 96.7
1016	90 / 1 / 98.1	68 / 0 / 99.0	4560 / 1 / 96.5	4560 / 0 / 98.5	96.4	34 / 1 / 95.2	7650 / 1 / 91.0	34,500 / 0 / 97.0
1017	94 / 0* / 99.3	70 / 0 / 99.0	4760 / 1 / 96.7	4760 / 0 / 98.6	97.6	36 / 1 / 95.4	8925 / 1 / 92.3	37,500 / 0 / 97.3
1018	98 / 1 / 98.3	72 / 0 / 99.1	4920 / 1 / 96.8	4920 / 0 / 98.7	96.7	38 / 1 / 95.6	8960 / 1 / 92.3	40,500 / 0 / 97.5
1019	102 / 1 / 98.4	74 / 0 / 99.1	5136 / 1 / 96.9	5136 / 0 / 98.7	96.8	39 / 1 / 95.8	8075** / 1 / 91.5	43,500 / 0 / 97.6

* ... IN NEGATED PREVIOUS FAILURE CONSIDERATIONS

** 1019 SAMPLE OUT OF SEQUENCE

TABLE 9-1

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	SAMPLE / FAILURES / RELIABILITY	SAMPLE / FAILURES / RELIABILITY	SAMPLE / FAILURES / RELIABILITY
1020	108 / 1 / 98.5	78 / 0 / 99.1	5544 / 1 / 97.1	5544 / 0 / 98.9	96.9	43 / 1 / 96.1	10,680 / 2 / 89.9	48,000 / 0 / 97.9
1021	104 / 1 / 98.5	76 / 0 / 99.1	5376 / 1 / 97.0	5376 / 0 / 98.8	96.9	41 / 1 / 96.0	9830 / 2 / 89.1	46,500 / 0 / 97.8
1022	112 / 1 / 98.5	80 / 0 / 99.2	5784 / 1 / 97.3	5784 / 0 / 98.9	96.9	45 / 1 / 96.3	11,550 / 2 / 90.7	51,000 / 0 / 98.0
1023	114 / 1 / 98.6	82 / 0 / 99.2	6000 / 2 / 95.8	6000 / 0 / 98.9	96.2	47 / 1 / 96.5	12,190 / 2 / 91.1	54,000 / 0 / 98.1
1024	118 / 1 / 98.6	84 / 0 / 99.2	6240 / 2 / 96.0	6240 / 0 / 98.9	96.3	49 / 1 / 96.6	13,040 / 2 / 91.6	57,000 / 0 / 98.2
1025	122 / 1 / 98.6	86 / 0 / 99.2	6480 / 2 / 96.1	6480 / 0 / 99.0	96.4	51 / 1 / 96.7	13,890 / 2 / 92.1	60,000 / 0 / 98.3
1026	126 / 1 / 98.7	88 / 0 / 99.2	6720 / 2 / 96.3	6720 / 0 / 99.0	96.5	53 / 1 / 96.8	14,740 / 2 / 92.6	63,000 / 0 / 98.4
1027	128 / 1 / 98.7	90 / 0 / 99.2	6744 / 2 / 96.3	6744 / 0 / 99.0	96.5	55 / 1 / 97.0	15,165 / 3 / 90.0	64,500 / 0 / 98.4
1028	132 / 1 / 98.7	92 / 0 / 99.2	6960 / 2 / 96.4	6960 / 0 / 99.0	96.7	57 / 1 / 97.1	16,015 / 3 / 90.7	67,500 / 0 / 98.5
1029	136 / 1 / 98.8	94 / 0 / 99.3	7200 / 2 / 96.5	7200 / 0 / 99.1	96.8	59 / 1 / 97.1	16,580 / 4 / 88.7	70,500 / 0 / 98.5
1030	140 / 1 / 98.9	96 / 0 / 99.3	7440 / 2 / 96.6	7440 / 0 / 99.1	96.9	61 / 1 / 97.2	17,430 / 4 / 89.3	73,500 / 0 / 98.6
1031	143 / 1	98 / 0	7704 / 2	7704 / 0	96.9	63 / 1	18,280 / 4	76,500 / 0

TABLE 9.1

ESTIMATED RELIABILITY SUMMARY

(AT 50% CONFIDENCE LEVEL)

MISSION NUMBER	PRIMARY FUNCTIONS					SECONDARY FUNCTIONS	
	PANORAMIC CAMERA (SAMPLE / FAILURES / RELIABILITY)	PANORAMIC CAMERA DOORS (SAMPLE / FAILURES / RELIABILITY)	COMMAND & CONTROL SYSTEM (SAMPLE / FAILURES / RELIABILITY)	PAYLOAD CLOCK (SAMPLE / FAILURES / RELIABILITY)	ON-ORBIT FUNCTIONS RELIABILITY	RECOVERY SYSTEM (SAMPLE / FAILURES / RELIABILITY)	STELLAR-INDEX CAMERAS (SAMPLE / FAILURES / RELIABILITY)	HORIZON CAMERAS (SAMPLE / FAILURES / RELIABILITY)
1033	147 / 1 / 98.9	100 / 0 / 99.3	7968 / 2 / 96.8	7968 / 0 / 99.2	97.1	65 / 1 / 97.4	19,130 / 4 / 90.2	79,500 / 0 / 98.7
1034	151 / 1 / 96.9	102 / 0 / 99.3	8208 / 2 / 96.9	8208 / 0 / 99.2	97.2	67 / 1 / 97.5	19,980 / 4 / 90.5	82,500 / 0 / 98.7
1035	159 / 1 / 99.0	106 / 0 / 99.4	8760 / 2 / 97.1	8760 / 0 / 99.2	97.4	71 / 1 / 97.6	21,680 / 4 / 91.3	88,500 / 0 / 98.8
1036	155 / 1 / 98.9	104 / 0 / 99.3	8520 / 2 / 97.0	8520 / 0 / 99.2	97.3	69 / 1 / 97.6	20,830 / 4 / 90.9	85,500 / 0 / 98.8
1037	163 / 1 / 99.0	108 / 0 / 99.4	9048 / 2 / 97.2	9048 / 0 / 99.3	97.4	73 / 1 / 97.7	22,530 / 4 / 91.6	91,500 / 0 / 98.9
1038	167 / 1 / 99.0	110 / 0 / 99.4	9336 / 2 / 97.3	9336 / 0 / 99.3	97.5	75 / 1 / 97.8	23,380 / 4 / 91.9	94,500 / 0 / 98.9
1039	171 / 1 / 99.0	112 / 0 / 99.4	9600 / 2 / 97.4	9600 / 0 / 99.3	97.5	77 / 1 / 97.8	24,230 / 4 / 92.1	97,500 / 0 / 98.9
1040	175 / 1 / 99.0	114 / 0 / 99.4	9840 / 2 / 97.4	9840 / 0 / 99.3	97.5	79 / 1 / 97.9	25,080 / 4 / 92.4	100,500 / 0 / 99.0
1041	179 / 1 / 99.1	116 / 0 / 99.4	10,176 / 2 / 97.5	10,176 / 0 / 99.3	97.6	81 / 1 / 97.9	25,930 / 4 / 92.6	103,500 / 0 / 99.0
1042	183 / 1 / 99.1	118 / 0 / 99.4	10,536 / 2 / 97.6	10,536 / 0 / 99.4	97.7	83 / 1 / 98.0	26,780 / 4 / 92.8	106,500 / 0 / 99.0
1043	187 / 2 / 98.6	120 / 0 / 99.4	10,896 / 2 / 97.7	10,696 / 0 / 99.4	97.2	85 / 1 / 98.0	27,630 / 4 / 93.1	109,000 / 0 / 99.0

RELIABILITY CRITERIA UPDATED FOR SUBSEQUENT MISSIONS

TABLE 9-1

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	SAMPLE / FAILURES / RELIABILITY	SAMPLE / FAILURES / RELIABILITY	SAMPLE / FAILURES / RELIABILITY
1101	191 / 2 / 98.6	122 / 0 / 99.4	11,208 / 2 / ** 96.1	11,209 / 0 / ** 99.9	* * 96.5	87 / 1 / 98.1	12,965 / 0 / * 77.2	112,000 / 0 / 99.1
1044	195 / 2 / 98.6	124 / 0 / 99.5	11,424 / 2 / 96.1	11,424 / 0 / 99.0	96.5	89 / 1 / 98.2	28,480 / 4 / 93.3	115,000 / 0 / 99.1
1102	199 / 2 / 96.7	126 / 0 / 99.5	11,736 / 2 / 96.2	11,736 / 0 / 99.0	96.6	91 / 1 / 98.3	17,765 / 1 / * 63.5	118,000 / 0 / 99.1

TABLE 9-1

SECTION 10

SUMMARY DATA

The comparison of the operating parameters and the performance achieved by previous missions has been difficult due to the large colume of data that results from each mission. Some of the pertinent characteristics from prior missions have been summarized in Tables 10-1 through 10-3.

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, 1005 and 1032 are deleted.

MISSION SUMMARY

MISSION NUMBER	PAYLOAD NUMBER	VEHICLE NUMBER	LAUNCH DATE	LAUNCH TIME	ORBIT INCLINATION (°)	PERIGEE ALTITUDE (NM)	PERIGEE LOCATION (°N)	RECOVERY PASS	MASTER CAMERA CAMERA NUMBER	MASTER CAMERA SLIT (")	MASTER CAMERA FILTER TYPE	SLAVE CAMERA CAMERA NUMBER	SLAVE CAMERA SLIT (")	SLAVE CAMERA FILTER TYPE	STELLAR-INDEX CAMERA NUMBER
1004	J-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	D29/29/29 / D42/42/37
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	D45/47/45 / D49/53/42
1007	J-07	1609	6/19/64	2318 Z	85.0	99.2	41.5	65 / 128	144	0.250	W-25	145	0.200	W-21	D43/43/43 / D54/56/51
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	D48/45/48 / D33/28/33
1009	J-12	1605	8/5/64	2316 Z	80.1	99.6	39.5	49 / 128	154	0.200	W-21	155	0.200	W-21	D56/54/56 / D38/38/34
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	D41/41/41 / D44/46/44
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	D30/30/30 / D57/57/57
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	D51/51/47 / D46/52/53
1013	J-15	1173	11/2/64	2130 Z	80.0	100.0	25.0	65 / 81	158	0.225	W-21	159	0.225	W-21	D52/49/55 / D47/48/54
1014	J-16	1180	11/18/64	2036 Z	70.0	103.2	65.6	81 / 145	162	0.250	W-25	139	0.175	W-21	D53/59/49 / D50/44/46
1015	J-17	1607	12/19/64	2110 Z	74.9	96.7	21.5	81 / 175	138	0.250	W-25	141	0.175	W-21	D61/61/61 / D58/58/58
1016	J-18	1608	1/15/65	2101 Z	74.9	99.4	30.2	81 / 159	132	0.250	W-25	133	0.175	W-21	D55/55/50 / D59/50/59
1017	J-14	1611	2/25/65	2144 Z	75.0	97.2	25.9	81 / 145	140	0.250	W-25	165	0.175	W-21	D21/21/21 / D60/81/1
1018	J-19	1612	3/25/65	2111 Z	96.0	100.2	40.3	66 / 99	122	0.250	W-25	123	0.175	W-21	D20/20/20 / D22/22/22
1019	J-04	1614	4/29/65	2144 Z	85.0	99.1	27.1	80 / —	118	0.250	W-25	119	0.175	W-21	D39/39/35 / D19/18/19
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	D67/65/80 / D62/65/65
1021	J-21	1615	5/18/65	1803 Z	75.0	109.2	24.3	81 / 161	166	0.175	W-21	167	0.250	W-25	D63/69/69 / D25/27/25
1022	J-22	1617	7/19/65	2201 Z	85.0	99.7	30.3	65 / 144	168	0.250	W-25	169	0.175	W-21	D65/77/70 / U24/24/24
1023	J-23	1618	8/17/65	2100 Z	70.0	97.6	29.0	81 / 144	170	0.225	W-25	171	0.150	W-21	D17/19/82 / D66/75/72
1024	J-24	1619	9/22/65	2131 Z	80.0	95.9	18.4	81 / 161	172	0.225	W-25	173	0.150	W-21	D69/72/84 / D64/82/66
1025	JX-28	1616	10/5/65	1746 Z	75.0	112.9	44.3	81 / 161	142	0.175	W-21	127	0.175	W-21	D73/78/88 / D70/88/81
1026	J-25	1620	10/28/65	2117 Z	75.0	93.0	17.0	81 / 160	174	0.225	W-25	175	0.150	W-21	D75/92/93 / D72/89/85
1027	JX-27	1621	12/9/65	2110 Z	80.0	97.4	17.3	17 / 33	164	0.250	W-25	163	0.175	W-21	D71/87/87 / D68/74/83
1028	J-26	1610	12/24/65	2106 Z	80.0	97.6	28.4	81 / 144	176	0.250	W-25	177	0.175	W-21	D77/91/97 / D74/76/95

TABLE 10-1

MISSION SUMMARY

MISSION NUMBER	PAYLOAD NUMBER	VEHICLE NUMBER	LAUNCH DATE	LAUNCH TIME	ORBIT INCLINATION (°)	PERIGEE ALTITUDE (NM)	PERIGEE LOCATION (°N)	RECOVERY PASS	MASTER CAMERA CAMERA NUMBER	MASTER CAMERA SLIT (")	MASTER CAMERA FILTER TYPE	SLAVE CAMERA CAMERA NUMBER	SLAVE CAMERA SLIT (")	SLAVE CAMERA FILTER TYPE	STELLAR-INDEX CAMERA NUMBER
1029	J-27	1623	2/2/66	2132 Z	75.1	99.5	22.5	81 / 160	178	0.275	W-25	179	0.175	W-21	D79/94/91 / D76/70/94
1030	J-29	1622	3/9/66	2202 Z	75.0	97.5	18.7	81 / 159	182	0.275	W-25	183	0.175	W-21	D94/100/107 / D82/95/102
1031	J-30	1627	4/7/66	2202 Z	75.1	104.5	23.3	113 / 177	184	0.225	W-23A	185	0.150	W-21	D83/101/89 / D96/105/86
1032	J-28	1625	5/3/66	1925 Z	—	—	—	— / —	180	0.150	W-21	181	0.150	W-21	D81/97/101 / D60/73/100
1033	J-33	1630	5/24/66	0213 Z	66.1	102.0	60.7	82 / 178	194	0.200	W-21	195	0.200	W-21	D91/105/109 / D84/102/75
1034	J-31	1626	6/21/66	2131 Z	80.1	105.4	18.2	81 / 161	186	0.200	W-23A	187	0.150	W-21	D85/109/76 / D87/107/105
1035	J-36	1628	9/20/66	2114 Z	85.0	99.5	29.1	81 / 160	188	0.225	W-23A	189	0.175	W-21	D95/112/113 / D95/104/116
1036	J-32	1631	8/9/66	2046 Z	100.0	102.4	22.9	115 / 212	190	0.200	W-23A	191	0.150	W-21	D89/110/111 / D83/108/10[illegible]
1037	J-38	1632	11/8/66	1957 Z	100.0	91.8	14.5	66 / 197	198	0.225	W-23A	199	0.175	W-21	D101/128/128 / D106/136/13[illegible]
1038	J-34	1629	1/14/67	2125 Z	80.1	96.9	29.2	81 / 193	192	0.225	W-23A	193	0.175	W-21	D93/106/112 / D90/111/10[illegible]
1039	J-39	1635	2/22/67	2202 Z	80.0	97.0	30.2	81 / 177	206	0.225	W-23A	207	0.175	W-21	D103/131/132 / D100/125/1[illegible]
1040	J-35	1636	3/30/67	1854 Z	85.1	99.7	28.3	81 / 145	196	0.175	W-21	197	0.225	W-23A	D78/95/96 / D92/79/11[illegible]
1041	J-40	1634	5/9/67	2152 Z	85.1	100.1	33.0	93 / 215	208	0.225	W-23A	209	0.175	W-21	D105/134/133 / D102/127/12[illegible]
1042	J-37	1633	6/16/67	2135 Z	80.0	96.5	29.1	97 / 240	204	0.200	W-23A	205	0.150	W-21	D97/120/117 / D98/121/11[illegible]
1043	J-42	1637	8/7/67	2144 Z	80.0	102.1	16.3	113 / 240	200	0.200	W-23A	201	0.150	W-21	D107/135/135 / D112/143/13[illegible]
1101	CR-1	1641	9/15/67	1941 Z	80.0	84.8	5.7	97 / 208	302	*	W-21 / W-23A	303	*	W-23A / W-25	DISIC NO. 3
1044	J-41	1639	11/2/67	2131 Z	81.5	98.9	18.4	97 / 144	202	0.225	W-23A	203	0.175	W-21	D99/122/120 / D104/132/131
1102	CR-2	1642	12/9/67	2226 Z	81.6	86.4	19.0	83 / 212	304	*	W-21 / SF05	305	*	W-25 / SF09	DISIC NO. 4

* 300 SERIES INSTRUMENTS USE VARIABLE SLIT EXPOSURE CONTROL. REFER TO FINAL REPORT SECTION 2

REC/JOM 1/68

TABLE 10-1

PERFORMANCE SUMMARY

MISSION NUMBER	CAMERA	SERIAL NUMBER	M I P VALUE	VISUAL RES	AERIAL MTF/AIM SLIT (μ)	AERIAL MTF/AIM AVERAGE	[redacted] MTF/AIM SLIT (μ)	[redacted] MTF/AIM AVERAGE	SLIT (μ)	MTF/AIM AVERAGE ALL	MTF/AIM AVERAGE HIGH	90% ATTITUDE ERROR (°) PITCH	90% ATTITUDE ERROR (°) ROLL	90% ATTITUDE ERROR (°) YAW	90% ATTITUDE RATES (°/HR) PITCH	90% ATTITUDE RATES (°/HR) ROLL	90% ATTITUDE RATES (°/HR) YAW	90% V/H ERROR (%)	90% RESOLUTION LIMIT (FEET) ALONG TRACK	90% RESOLUTION LIMIT (FEET) CROSS TRACK
1004-1	FWD	124	85	78	350	97	43	109	320	115	127	0.45	0.42	1.08	30.0	25.0	21.0	5.1	7.7	6.1
	AFT			80		80		96		117	124									
1004-2	FWD	125	85	76		88		113		82	90	0.74	0.50	0.91	44.0	30.0	29.0	4.9	6.8	6.5
	AFT			73		83		106		89	95									
1006-1	FWD	148	90	78	350	65	43	88	320	84	97	0.41	0.42	1.14	26.8	28.5	27.8	15.4	13.8	6.7
	AFT			74		71		90		87	92									
1006-2	FWD	149	90	85		64		81		84	90	0.49	0.40	1.08	31.1	27.9	30.0	11.6	10.1	7.0
	AFT			83		72		90		87	94									
1007-1	FWD	144	85	80	350	60	43	87	320	82	91	0.58	0.46	1.43	37.6	23.9	29.9	3.6	3.1	9.4
	AFT			86		63		83		97	110							4.6	2.1	7.6
1007-2	FWD	145	85	79		72		81		68	74	0.64	0.47	—	43.0	25.8	—	3.2	2.4	—
	AFT			81		77		92		74	81							4.2	1.8	—
1008-1	FWD	150	85	80	350	80	43	95	320	81	89	0.59	0.39	0.94	43.8	23.9	29.6	2.9	4.9	5.9
	AFT			76		73		89		86	95									
1008-2	FWD	151	85	82		84		96		83	92	0.63	0.36	0.71	42.9	24.0	32.5	2.8	4.2	5.4
	AFT			79		91		83		85	91									
1009-1	FWD	154	85	92	350	80	—	—	80	75	88	0.65	0.65	0.71	29.2	22.7	27.6	3.3	5.3	5.8
	AFT			89		85				75	83									
1009-2	FWD	155	85	94		85				76	84	0.48	0.65	0.59	33.6	23.9	27.2	2.6	4.9	5.9
	AFT			87		87				72	79									
1010-1	FWD	152	85	90	350	90	80	88	80	87	96	0.93	0.30	0.87	39.1	23.6	30.8	4.5	2.3	4.4
	AFT			88		86		80		92	103									
1010-2	FWD	153	85	92		81		82		82	93	0.59	0.70	1.21	45.4	23.6	30.7	4.6	7.5	3.8
	AFT			90		82		85		87	98									
1011-1	FWD	160	90	84	350	76	80	96	80	78	87	0.77	0.39	0.97	43.1	28.9	31.1	2.3	5.3	5.6
	AFT	161		84		77		86		83	93									
1012-1	FWD	156	85	92	—	—	80	91	80	84	98	0.65	0.51	—	47.1	33.2	—	1.5	4.8	—
	AFT			91				87		89	100									
1012-2	FWD	157	85	91				89		84	91	0.97	0.77	0.51	45.2	30.7	20.4	5.9	3.3	5.9
	AFT			89				96		85	98									
1013-1	FWD	158	85	89	—	—	80	94	80	85	99	0.64	0.32	1.34	36.9	29.0	32.3	3.7	7.8	8.3
	AFT	159		77				97		81	103	0.64	0.32	1.34	36.9	29.0	32.3	4.5	9.6	8.2
1014-1	FWD	162	80	87	—	—	80	78	80	74	86	0.62	0.41	1.46	35.0	36.1	38.5	2.2	6.2	8.8
	AFT			83				80		95	107	0.62	0.41	1.44	34.8	36.0	38.3	3.3	2.8	6.3
1014-2	FWD	139	80	83				75		70	77	1.06	0.55	—	38.4	36.4	—	1.4	6.4	—
	AFT			86				84		80	88	1.06	0.59	—	38.1	36.0	—	3.2	2.2	—
1015-1	FWD	138	85	87	—	—	80	76	80	90		0.65	0.38	0.53	47.0	29.4	38.2	5.0	5.5	7.8
	AFT			87				73		97	—	0.64	0.39	0.53	46.9	29.2	38.2	6.3	3.4	5.5
1015-2	FWD	141	85	83				72		89		0.50	0.61	0.64	39.1	27.1	36.2	3.2	6.8	7.5
	AFT			82				72		90		0.50	0.61	0.64	39.1	27.0	36.3	3.3	4.6	5.3
1016-1	FWD	132	85	85	—	—	80	56	80	81		0.72	0.83	2.01	48.9	30.2	40.4	2.0	5.5	10.5
	AFT			83				61		94	—	0.72	0.83	2.01	48.4	30.1	40.4	2.8	3.4	7.4
1016-2	FWD	133	85	90				55		92		0.83	0.93	2.19	42.2	27.2	39.9	1.5	4.9	8.0
	AFT			91				56		91		0.83	0.93	2.19	42.2	27.3	39.9	2.3	3.3	7.1
1017-1	FWD	140	85	72	—	—	80	57	80	78	86	0.49	0.76	2.50	35.5	32.2	38.4	3.3	9.8	11.6
	AFT			75				70		94	107	0.49	0.76	2.49	35.3	32.0	38.5	4.3	8.3	8.1
1017-2	FWD	165	85	85				65		80	94	0.69	0.45	—	36.5	34.0	—	1.8	6.2	—
	AFT			85				69		86	101	0.69	0.45	—	36.3	33.8	—	2.3	5.3	—
1018-1	FWD	122	85	79	—	—	80	70	80	82	92	0.91	0.48	—	47.4	36.7	—	3.4	5.6	—
	AFT			77				74		96	109	0.90	0.47	—	48.2	36.2	—	3.2	3.7	—
1018-2	FWD	123	85	84				75		77	89	0.84	0.63	—	34.7	30.7	—	3.1	5.6	—
	AFT			83				71		91	103	0.85	0.63	—	34.8	30.7	—	2.8	4.1	—

TABLE 10-2

REC/JOM 4/65

PERFORMANCE SUMMARY

MISSION NUMBER	CAMERA	SERIAL NUMBER	M I P VALUE	VISUAL RES	AFSPPF MTF/AIM SLIT (μ)	AFSPPF MTF/AIM AVERAGE	MTF/AIM SLIT (μ)	MTF/AIM AVERAGE	[redacted] SLIT (μ)	MTF/AIM AVERAGE ALL	MTF/AIM AVERAGE HIGH	90% ATTITUDE ERROR (°) PITCH	90% ATTITUDE ERROR (°) ROLL	90% ATTITUDE ERROR (°) YAW	90% ATTITUDE RATES (°/HR) PITCH	90% ATTITUDE RATES (°/HR) ROLL	90% ATTITUDE RATES (°/HR) YAW	90% V/H ERROR (%)	90% RESOLUTION LIMIT (FEET) ALONG TRACK	90% RESOLUTION LIMIT (FEET) CROSS TRACK
1019-1	FWD	118	85	81	—	—	80	76	80	88	104	0.43	0.36	0.97	31.6	34.7	33.0	3.3	9.3	9.1
	AFT	119		99				63		87	101	0.44	0.37	0.96	31.6	34.9	33.1	3.8	5.0	6.5
1020-1	FWD	136	80	88	—	—	80	69	80	78	90	0.46	0.35	0.78	37.4	31.8	26.7	5.4	5.8	8.4
	AFT			89				02		94	105	0.46	0.35	0.78	37.4	31.8	26.7	5.3	4.2	5.9
1020-2	FWD	137	—	—				—		—	—	0.41	0.17	1.06	42.6	23.8	42.5	3.5	6.4	7.6
	AFT			—				—		—	—	0.41	0.17	1.06	42.6	23.8	42.5	3.4	4.5	2.8
1021-1	FWD	166	85	88	—	—	80	77	80	86	99	0.55	0.37	0.81	34.9	32.6	26.2	2.7	8.8	8.0
	AFT			90				90		98	109	0.55	0.38	0.81	34.8	33.0	26.3	5.4	8.6	5.5
1021-2	FWD	167	85	85				74		88	112	0.59	0.65	—	44.7	50.6	—	3.1	9.2	—
	AFT			74				62		—	—	—	—	—	—	—	—	—	—	—
1022-1	FWD	168	85	88	—	—	80	66	80	78	91	0.47	0.51	0.89	28.3	27.1	23.8	3.5	9.8	8.6
	AFT			91				83		101	111	0.47	0.51	0.90	27.9	26.6	23.8	3.0	6.2	6.1
1022-2	FWD	169	85	90				68		74	84	0.40	0.51	0.90	29.4	27.3	31.0	2.6	8.0	8.4
	AFT			92				92		99	110	0.40	0.51	0.90	29.4	27.3	31.1	1.8	4.9	5.9
1023-1	FWD	170	85		—	—	80	94	80	97	110	0.49	0.33	0.50	33.0	28.7	23.5	3.4	4.0	6.4
	AFT							87		83	101	0.49	0.33	0.50	32.9	28.7	23.5	3.5	2.7	4.3
1023-2	FWD	171	85					71		76	87	0.42	0.36	0.53	29.7	21.0	28.6	2.4	3.9	6.3
	AFT							89		68	76	0.43	0.37	0.53	29.6	21.3	28.6	2.5	2.7	4.2
1024-1	FWD	172	85		—	—	80	79	80	90	102	0.42	0.25	0.62	32.2	24.9	30.5	2.6	5.9	6.8
	AFT							95		94	105	0.42	0.25	0.62	32.2	24.9	30.4	2.1	3.8	4.5
1024-2	FWD	173	85					86		89	101	0.36	0.31	0.93	30.4	24.5	36.4	5.5	4.7	5.4
	AFT							95		100	114	0.36	0.31	0.93	30.6	23.6	36.4	5.1	3.3	3.6
1025-1	FWD	142	85		—	—	80	87	80	80	97	0.50	0.41	0.85	28.1	28.7	25.9	2.0	3.9	6.7
	AFT							97		101	114	0.51	0.42	0.85	28.6	29.7	25.7	3.2	2.8	6.8
1025-2	FWD	127	85					85		96	107	0.52	0.44	0.82	28.0	26.1	29.0	1.7	4.7	6.9
	AFT							91		89	103	0.52	0.44	0.82	28.1	26.0	29.0	1.8	6.7	6.9
1026-1	FWD	174	85		—	—	80	76	80	80	92	0.65	0.24	0.70	37.9	33.2	28.5	6.1	13.5	6.2
	AFT							88		98	113	0.65	0.24	0.70	37.9	33.2	28.5	6.1	9.1	4.1
1026-2	FWD	175	85					85		92	104	0.55	0.56	0.87	41.1	46.5	30.8	6.1	5.5	6.7
	AFT							93		90	103	0.59	0.65	0.88	43.3	50.0	27.7	6.7	3.3	4.5
1027-1	FWD	164	85	—	—	—	80	69	80	80	—	0.51	0.37	0.74	47.2	25.5	26.4	4.7	10.5	7.2
	AFT	163						79		92		0.51	0.37	0.74	47.3	25.2	26.2	3.8	6.0	5.2
1028-1	FWD	176	85		—	—	80	81	80	89	—	0.52	0.37	0.50	36.6	28.0	30.5	3.9	4.8	8.0
	AFT							92		93		0.52	0.37	0.50	36.6	28.0	30.5	3.1	4.0	5.6
1028-2	FWD	177	85					88		87		0.76	0.52	—	42.7	25.7	—	3.2	4.2	—
	AFT							77		84		0.76	0.52	—	42.5	25.6	—	2.9	3.3	—
1029-1	FWD	178	85	—	80	INTERIM 89	80	STANDARD 91	80	77	—	0.67	0.34	0.77	29.1	31.3	34.4	2.9	7.8	7.4
	AFT					91		95		73		0.68	0.33	0.77	28.5	30.8	34.6	4.6	3.3	4.8
1029-2	FWD	179	85			83		82		77		0.64	0.48	0.44	38.8	32.5	25.7	2.3	7.5	7.5
	AFT					91		94		81		0.65	0.48	0.44	37.5	32.1	25.7	3.6	2.9	4.9
1030-1	FWD	182	85	—	80	95	80	76	80	66	—	0.67	0.25	0.69	29.6	22.7	36.1	3.9	8.9	8.6
	AFT					74		79		77		0.67	0.25	0.69	29.6	22.8	35.9	5.4	5.1	5.6
1030-2	FWD	183	85			77		81		71		0.70	0.27	0.87	28.4	22.7	36.3	4.9	11.2	8.6
	AFT					91		74		71		0.70	0.26	0.87	28.2	21.9	36.3	5.0	6.6	5.5
1031-1	FWD	184	85	—	80	65	80	76	80	80	—	0.50	0.47	0.96	16.2	17.3	26.6	6.1	13.8	6.4
	AFT					57		71		66		0.54	0.41	0.91	18.1	18.7	22.8	6.0	12.0	5.6
1031-2	FWD	185	85			91		94		74		0.57	0.20	0.75	19.0	19.3	15.7	5.4	10.3	4.9
	AFT					—		—		—		—	—	—	—	—	—	—	—	—
1033-1	FWD	194	85	—	80	77	80	94	80	87	—	0.11	0.33	0.80	11.3	34.9	27.3	3.5	8.2	6.2
	AFT					67		93		72		0.15	0.27	0.39	8.2	59.6	18.8	4.9	8.1	5.6
1033-2	FWD	195	85			75		90		98		0.21	0.24	1.09	22.3	49.3	17.5	2.6	5.8	6.9
	AFT					93		92		73		0.20	0.24	1.08	22.3	50.7	17.4	2.9	7.3	6.7

[redacted]

TABLE 10-2

REC/JCM
12/69

PERFORMANCE SUMMARY

MISSION NUMBER	CAMERA	SERIAL NUMBER	M I P VALUE	AFSPPF MTF/AIM			90% ATTITUDE ERROR (°)			90% ATTITUDE RATES (°/HR.)			90% V/H ERROR (%)	90% RESOLUTION LIMIT (FEET)		I.M.C ERROR
				AVERAGE	SLIT (μ)	AVERAGE	PITCH	ROLL	YAW	PITCH	ROLL	YAW		ALONG TRACK	CROSS TRACK	
1034-1	FWD	186	80	75	80	81	0.20	0.19	0.99	19.3	20.4	24.9	15.0	17.8	5.9	—
1034-2	AFT			93		90	0.20	0.19	0.99	19.3	20.4	24.9	15.2	13.6	4.5	—
	FWD	187	80	74		89	0.34	0.36	0.33	21.1	28.9	16.2	8.7	10.4	7.1	—
	AFT			69		86	0.34	0.36	0.33	21.1	29.0	16.2	8.9	8.0	5.3	—
1035-1	FWD	188	85	66	80	—	0.16	0.55	2.39	18.9	27.9	33.9	4.0	4.8	3.7	4.0
1035-2	AFT			80			0.17	0.54	2.43	19.3	23.4	32.2	4.1	3.7	2.4	4.1
	FWD	189	85	81			0.16	0.50	3.02	18.4	30.1	27.5	3.2	4.0	3.5	3.2
	AFT			82			0.17	0.51	3.02	19.9	24.7	26.3	3.4	3.3	2.4	3.4
1036-1	FWD	190	85	89	80	—	0.76	0.96	0.60	31.2	25.6	29.5	3.4	5.1	6.6	—
1036-2	AFT			94			0.76	0.96	0.60	31.1	25.5	29.4	3.3	3.6	5.1	—
	FWD	191	85	73			0.94	0.70	0.40	33.0	29.7	23.3	3.3	3.8	6.5	—
	AFT			84			0.94	0.70	0.40	32.9	29.7	23.3	3.1	2.7	4.9	—
1037-1	FWD	198	85	80	80	—	0.25	0.25	1.50	22.8	40.0	29.3	9.5	10.1	8.0	9.8
1037-2	AFT			71			0.25	0.27	1.51	28.7	36.9	32.4	10.1	8.0	6.1	10.3
	FWD	199	85	88			0.24	0.30	1.17	26.5	52.5	26.2	6.3	6.6	7.5	6.5
	AFT			81			0.27	0.32	1.18	33.8	36.6	53.4	6.6	5.4	5.9	7.0
1038-1	FWD	192	80	53	80	—	0.22	0.25	2.98	18.7	33.7	39.9	3.6	4.1	3.7	3.5
1038-2	AFT			76			0.27	0.24	2.99	41.8	27.2	34.4	3.4	3.3	2.5	3.7
	FWD	193	80	63			0.39	0.51	2.87	20.0	46.7	27.8	3.4	3.6	3.8	3.1
	AFT			77			0.39	0.51	2.90	50.4	28.3	27.3	3.4	3.6	2.4	3.9
1039-1	FWD	206	85	59	80	—	0.21	0.43	3.03	19.0	27.8	39.2	5.1	6.2	4.6	5.2
1039-2	AFT			71			0.20	0.41	3.05	37.5	23.0	28.5	5.2	4.8	3.2	5.2
	FWD	207	85	71			0.30	0.54	2.50	33.1	30.2	25.0	4.6	5.5	5.4	4.7
	AFT			65			0.34	0.53	2.52	27.1	24.2	23.9	4.8	4.6	3.8	5.0
1040-1	FWD	196	85	94	80	—	0.33	0.56	2.99	26.0	22.2	28.4	2.6	3.9	2.1	2.8
1040-2	AFT			68			0.30	0.56	3.00	22.1	23.2	28.5	2.1	1.9	2.5	2.1
	FWD	197	85	61			0.32	0.49	2.96	27.5	30.0	32.5	1.6	2.2	2.0	1.7
	AFT			75			0.29	0.46	2.96	27.2	26.4	28.7	2.7	2.5	2.2	2.6
1041-1	FWD	208	85	72	80	—	0.34	0.16	3.05	14.7	14.0	12.7	5.1	6.4	3.4	5.2
1041-2	AFT			82			0.35	0.16	3.05	15.8	13.5	13.0	5.8	5.7	3.0	5.7
	FWD	209	85	73			0.26	0.23	2.94	22.9	15.7	18.8	4.9	6.4	2.1	4.9
	AFT			78			0.28	0.24	3.01	23.9	16.2	21.0	5.6	5.5	2.0	5.5
1042-1	FWD	204	85	79	80	—	0.31	0.22	2.86	22.1	38.3	27.0	3.1	3.3	1.5	3.1
1042-2	AFT			85			0.32	0.24	2.83	23.4	33.0	25.9	3.2	2.7	1.1	3.4
	FWD	205	85	70			0.31	0.38	2.39	16.1	46.1	31.4	2.1	2.5	2.2	2.3
	AFT			74			0.32	0.37	2.31	19.9	33.6	25.6	2.6	2.3	1.8	2.8
1043-1	FWD	200	85	65	80	—	0.28	0.23	3.11	23.9	22.0	41.5	4.2	5.4	1.5	4.2
1043-2	AFT			67			0.31	0.23	3.14	25.4	20.5	34.9	3.3	2.8	0.8	3.3
	FWD	201	85	65			0.30	0.34	2.73	29.2	31.6	47.9	4.3	5.3	2.2	4.4
	AFT			75			0.34	0.34	2.78	27.3	29.9	45.1	3.1	2.8	0.9	3.2
1101-1	FWD	302	95	69	80	—	0.23	0.27	* 0.77	31.4	26.0	32.2	** 8.2	** 6.5	1.2	8.2
1101-2	AFT			50			0.23	0.28	0.73	31.0	26.0	33.6	** 8.3	** 5.2	1.1	8.2
	FWD	303	95	63			0.36	0.27	1.01	40.8	29.1	42.2	2.2	2.3	1.5	2.3
	AFT			45			0.36	0.28	1.01	40.6	29.1	44.0	2.1	1.6	1.3	2.0
1044-1	FWD	202	85	78	80	—	0.30	0.15	3.42	14.6	26.2	51.3	4.2	7.0	9.8	4.6
1044-2	AFT			71			0.30	0.16	3.36	16.1	24.2	42.7	4.1	4.4	6.2	4.1
	FWD	203	85	61			0.37	0.37	3.31	23.6	30.6	29.8	3.0	4.4	8.4	3.2
	AFT			84			0.37	0.38	3.27	23.5	24.5	28.8	3.2	3.3	5.3	3.3
1102-1	FWD	304	100	74	80	—	0.47	0.31	0.54	24.9	25.7	33.5	1.9	3.2	1.2	2.2
1102-2	AFT			110			0.46	0.30	0.55	25.0	25.5	34.5	2.0	2.0	0.8	1.8
	FWD	305	100	84			0.61	0.29	0.62	34.8	25.1	39.5	3.4	4.1	1.1	3.6
	AFT			89			0.60	0.29	0.63	34.8	25.3	39.4	3.4	2.1	0.8	3.0

* YAW STEERING ERROR. PREVIOUS MISSIONS ** RESULT OF INITIAL RAMP MISMATCH. NOT

TABLE 10-2

EXPOSURE - PROCESSING SUMMARY

MISSION NUMBER	CAMERA	SOLAR ELEVATION RANGE (°)		SOLAR AZIMUTH RANGE (°)		PREDICTED PROCESSING (%)			REPORTED PROCESSING (%)			COMPUTED PROCESSING (%)			TERRAIN D-MIN RANGE				TERRAIN D-MAX RANGE				CLOUD D-MAX RANGE				UNDER EXPOSED (%)	UNDER PROCESSED (%)	NOMINAL EXP & PRO (%)	OVER PROCESSED (%)	OVER EXPOSED (%)	CLOUD COVER (%)
		LOW	HIGH	LOW	HIGH	P	I	F	P	I	F	P	I	F	LOW	HIGH	MEAN	MEDIAN	LOW	HIGH	MEAN	MEDIAN	LOW	HIGH	MEAN	MEDIAN						
1004-1	FWD	-3	61	25	124	5	76	19	4	79	17	0	79	21	0 26	1 89	0 83	0 78	0 43	2 43	1 97	2 02	1 00	2.43	2 04	2.08	0	4	60	31	5	35
	AFT	-3	61	25	124	5	74	21	4	79	17	0	80	20	0 22	1.56	0 76	0 70	0 93	2 45	1 92	1 94	1 08	2.43	1 98	2 03	1	4	67	26	3	35
1004-2	FWD	-4	68	10	131	7	76	17	37	50	13	4	83	13	0 29	1 80	0 83	0 78	0 36	2 30	1 84	1 90	0 41	2 37	1 87	1 93	0	4	59	27	9	35
	AFT	-4	68	10	131	7	76	17	37	50	13	4	77	19	0 29	1 91	0 81	0 73	0 36	2 39	1 89	1 99	0 43	2 46	1 89	1 98	0	4	67	20	9	35
1006-1	FWD	38	56	52	140	1	99	0	1	51	48	0	51	49	0 23	1 81	0 71	0 68	0 80	2 31	1 58	1 52	1 31	2 40	2 20	2 24	0	5	72	21	1	60
	AFT	38	56	52	140	1	99	0	0	23	77	0	24	76	0 36	1 66	0 87	0 84	0 96	2 35	1 72	1 72	1 14	2 40	2 24	2 28	0	1	58	40	1	60
1006-2	FWD	32	64	36	147	2	98	0	30	41	29	11	59	30	0 21	1 14	0 53	0 50	0 56	2 29	1 49	1 50	1 30	2 33	2 11	2 16	2	21	72	4	0	45
	AFT	32	64	36	147	2	98	0	35	40	25	21	54	25	0 26	1 34	0 62	0 58	0 65	2 19	1 48	1 47	1 56	2 50	2 12	2 16	0	11	77	9	3	45
1007-1	FWD	12	49	50	103	0	5	95	1	20	79	0	25	75	0 26	1 22	0 52	0 47	0 62	2 20	1 44	1 40	1 22	1 36	2 17	2 21	20	8	67	5	0	60
	AFT	11	49	48	102	0	100	0	10	42	48	6	77	17	0 26	1 76	0 58	0 55	0 78	2 31	1 52	1 52	1 54	2 39	2 20	2 24	1	13	80	5	1	60
1007-2	FWD	32	57	43	112	0	25	75	3	28	69	0	26	74	0 26	1 23	0 51	0 48	0 70	2 32	1 44	1 40	0 90	2 37	2 15	2 20	18	9	71	2	0	65
	AFT	31	57	38	111	0	100	0	19	41	40	3	88	9	0 24	1 56	0 60	0 56	0 44	2 27	1 50	1 52	0 84	2 41	2 17	2 25	1	16	74	9	1	65
1008-1	FWD	30	51	50	102	0	100	0	4	32	64	1	35	64	0 32	1 48	0 66	0 62	0 78	2 24	1 55	1 54	1 46	2 35	2 21	2 24	2	2	86	8	1	45
	AFT	30	51	50	102	0	100	0	4	27	69	0	34	66	0 32	1 57	0 71	0 69	0 81	2 21	1 57	1 58	1 08	2 37	2 21	2 24	1	1	84	13	0	45
1008-2	FWD	29	56	42	105	0	100	0	3	31	66	0	27	73	0 14	1 61	0 76	0 72	0 57	2 10	1 54	1 55	1 09	2 40	2 20	2 25	2	1	73	23	1	65
	AFT	29	56	42	105	0	100	0	3	30	67	0	29	71	0 32	1 64	0 77	0 76	0 73	2 10	1 55	1 55	1 10	2 35	2 18	2 22	1	3	69	27	0	65
1009-1	FWD	12	49	42	132	0	100	0	1	26	73	0	34	66	0 32	1 40	0 65	0 62	0 85	2 41	1 53	1 52	0 83	2 51	2 30	2 36	5	4	77	14	0	50
	AFT	12	49	42	132	0	100	0	0	40	60	0	45	55	0 28	1 42	0 70	0 64	0 92	2 28	1 58	1 55	0 63	2 51	2 32	2 36	1	5	73	20	0	50
1009-2	FWD	23	58	35	138	2	98	0	3	21	76	0	40	60	0 29	1 55	0 69	0 64	0 73	2 37	1 53	1 53	1 06	2 45	2 25	2 30	4	4	74	17	0	55
	AFT	23	58	35	138	2	98	0	4	47	49	0	56	44	0 26	1 47	0 69	0 64	0 44	2 42	1 61	1 60	1 61	2 50	2 31	2 34	1	4	77	18	0	55
1010-1	FWD	18	47	45	83	0	21	79	0	13	87	0	9	91	0 28	1 14	0 52	0 47	0 43	2 32	1 38	1 32	1 11	2 42	2 16	2 20	18	3	75	4	0	48
	AFT	18	47	45	83	0	21	79	0	19	81	0	16	84	0 27	1 25	0 57	0 52	0 78	2 42	1 45	1 41	0 96	2 46	2 20	2 26	9	4	81	6	0	48
1010-2	FWD	15	52	38	76	0	50	50	0	16	84	0	13	87	0 26	1 51	0 55	0 50	0 52	2 36	1 41	1 38	1 00	2 44	2 14	2 20	22	4	67	6	0	45
	AFT	15	52	38	76	0	50	50	0	23	77	0	25	75	0 20	1 48	0 59	0 56	0 30	2 40	1 47	1 45	1 29	2 48	2 18	2 22	13	3	76	8	0	45
1011-1	FWD	2	55	33	66	0	64	36	2	23	75	2	23	75	0 18	0.99	0 50	0 46	0 56	2 36	1 48	1 43	0 78	2 40	2 07	2 16	17	11	70	2	0	40
	AFT	2	55	33	66	0	67	33	3	47	50	0	37	63	0 24	1 48	0 60	0 56	0 50	2 35	1 57	1 55	0 74	2 37	2 11	2 18	3	7	81	8	0	40
1012-1	FWD	0	45	38	71	0	64	36	7	56	37	0	65	35	0 25	1 30	0 59	0 53	0 54	2 39	1 40	1 42	0 90	2 39	1 93	2 00	6	17	68	10	0	60
	AFT	0	45	38	71	0	64	36	0	33	67	0	49	51	0 26	1 40	0 61	0 58	0 47	2 27	1 44	1 40	0 72	2 32	1 89	1 96	5	10	74	11	0	60
1012-2	FWD	0	57	34	106	0	77	23	6	44	50	0	49	51	0 30	1 20	0 58	0 55	0 73	2 32	1 49	1 42	0 67	2 34	1 91	2 00	4	9	80	7	0	40
	AFT	0	57	34	106	0	77	23	3	15	82	0	10	90	0 30	1 27	0 68	0 62	0 48	2 33	1 55	1 58	0 70	2 38	1 96	2 02	4	0	72	23	0	40
1013-1	FWD	0	56	28	83	0	64	36	0	42	58	0	55	45	0 20	1 66	0 56	0 36	0 52	2 29	1 56	1 59	1 21	2 41	2 03	2 10	7	13	76	4	0	47
	AFT	0	56	26	82	0	64	36	2	7	91	0	33	67	0 28	1 56	0 66	0 48	0 64	2 28	1 59	1 63	1 10	2 36	1 97	2 03	5	5	74	16	0	47
1014-1	FWD	0	59	15	71	0	21	79	1	38	61	0	63	37	0 17	0.99	0 40	0 36	0 26	2 36	1 40	1 42	1 01	2 38	1 94	2 05	27	33	39	1	0	40
	AFT	0	59	14	69	0	31	69	0	13	87	0	36	64	0 18	1 26	0 51	0 48	0 25	2 38	1 42	1 49	0 42	2 43	1 91	2 00	19	12	64	5	0	40
1014-2	FWD	0	77	0	36	0	21	79	0	26	74	0	61	39	0 17	1 06	0 36	0 31	0 23	2 32	1 30	1 36	0 42	2 36	1 72	1 80	31	40	27	2	0	40
	AFT	0	76	0	34	0	29	71	0	5	95	0	68	32	0 18	1 49	0 44	0 40	0 27	2 28	1 34	1 45	0 26	2 44	1 71	1 84	19	29	50	2	0	40
1015-1	FWD	5	68	19	68	0	8	92	2	2	96	0	2	98	0 25	1 70	0 54	0 47	0 54	2 28	1 44	1 46	0 46	2 41	1 86	1 90	28	0	65	7	0	45
	AFT	4	68	18	67	0	30	70	0	5	95	0	4	96	0 29	1 20	0 60	0 56	0 46	2 28	1 49	1 50	0 80	2 36	1 86	1 95	14	0	77	8	0	45
1015-2	FWD	0	80	-2	71	0	10	90	0	10	90	0	11	89	0 22	1 10	0 50	0 46	0 34	2 07	1 29	1 30	0 28	2 34	1 69	1 78	28	4	65	3	0	40
	AFT	0	79	-2	71	0	21	79	0	9	91	0	9	91	0 26	1 21	0 59	0 52	0 36	2 22	1 37	1 38	0 38	2 40	1 74	1 80	17	1	70	12	0	40
1016-1	FWD	5	69	13	76	0	7	93	1	41	58	0	59	41	0 13	1 55	0 51	0 45	0 70	2 43	1 67	1 68	0 85	2 44	1 91	1 90	19	17	56	8	1	45
	AFT	4	69	12	76	0	27	73	0	26	74	0	42	58	0 22	1 65	0 64	0 58	0 62	2 34	1 69	1 72	0 98	2 46	1 90	1 92	11	9	62	17	1	45
1016-2	FWD	1	84	-4	76	0	8	92	0	31	69	0	48	52	0 18	1 56	0 48	0 44	0 29	2 35	1 45	1 44	0 34	2 50	1 76	1 82	22	18	58	3	0	40
	AFT	0	84	-4	76	0	19	81	1	27	72	0	40	60	0 20	1 88	0 55	0 49	0 26	2 32	1 52	1 60	0 30	2 49	1 75	1 82	23	5	65	6	1	40
1017-1	FWD	-11	50	21	99	0	0	100	13	63	24	0	82	18	0 20	1 65	0 66	0 61	0 46	2 23	1 74	1 78	0 60	2 32	1 93	2 00	1	8	77	13	1	25
	AFT	-1	57	19	98	0	17	83	24	58	18	4	90	6	0 20	1 62	0 64	0 60	0 60	2 29	1 75	1 75	1 18	2 36	1 89	1 90	1	13	74	11	2	25
1017-2	FWD	1	78	9	139	0	0	100	5	62	33	7	77	16	0 22	1 22	0 58	0 55	0 37	2 30	1 70	1 80	0 86	2 37	1 93	1 94	3	14	74	9	0	30
	AFT	1	79	7	135	0	7	93	18	62	20	0	89	11	0 20	1 54	0 64	0 62	0 30	2 30	1 62	1 68	0 38	2 34	1 85	1 92	2	13	74	10	1	30
1018-1	FWD	6	77	13	134	0	0	100	9	63	28	1	83	16	0 19	1 46	0 56	0 52	0 64	2 22	1 66	1 73	1 00	2 32	1 96	1 99	2	19	71	7	0	35
	AFT	6	78	10	125	0	22	78	9	53	38	5	72	23	0 18	1 36	0 62	0 58	0 68	2 20	1 68	1 80	1 03	2 28	1 95	2 00	1	12	77	9	2	35
1018-2	FWD	8	77	14	134	0	0	100	18	74	8	17	79	4	0 16	1 78	0 57	0 49	0 50	2 24	1 50	1 54	0 90	2 26	1 85	1 91	1	31	56	9	4	45
	AFT	8	77	10	132	0	15	85	1	50	49	0	74	26	0 22	1 50	0 81	0 79	0 94	2 26	1 70	1 74	1 09	2 35	1 98	2 04	0	5	58	35	2	45

REC/JON 4/65

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 D-MAX				UNDER EXPOSED (%)	UNDER PROCESSED (%)	NOMINAL EXP. & PRO (%)	OVER PROCESSED (%)	OVER EXPOSED (%)	CLOUD COVER (%)
															RANGE				RANGE				RANGE									
		LOW	HIGH	LOW	HIGH	P	I	F	P	I	F	P	I	F	LOW	HIGH	MEAN	MEDIAN	LOW	HIGH	MEAN	MEDIAN	LOW	HIGH	MEAN	MEDIAN						
1019-1	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	7	45
	AFT	23	70	21	152	0	92	8	26	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	3	45
1020-1	FWD	30	75	19	156	0	19	81	13	48	39	1	58	41	0.23	1.30	0.55	0.52	0.80	2.28	1.57	1.54	1.40	2.38	2.10	2.16	1	18	78	4	0	42
	AFT	29	75	17	156	0	64	36	15	56	29	0	74	26	0.23	1.20	0.55	0.54	0.70	2.20	1.47	1.46	1.22	2.29	2.04	2.10	0	18	76	5	0	42
1020-2	FWD	47	69	18	35	INSUFFICIENT DATA																										
	AFT	46	68	17	33																											
1021-1	FWD	15	66	-148	-23	0	63	32	14	39	47	1	52	47	0.25	1.90	0.84	0.58	0.74	2.18	1.50	1.50	0.97	2.36	1.92	2.00	5	9	72	11	3	35
	AFT	14	66	-147	-25	0	99	1	15	38	47	0	57	43	0.17	1.70	0.65	0.57	0.54	2.24	1.45	1.42	0.85	2.30	1.90	2.00	5	5	75	12	3	35
1021-2	FWD	13	52	-133	-41	0	29	71	13	41	46	0	57	43	0.18	1.52	0.54	0.50	0.60	2.36	1.36	1.34	1.05	2.23	1.82	1.85	14	13	66	6	0	20
	AFT	13	52	-133	-41	0	100	0	53	25	22	0	50	50	0.33	1.38	0.76	0.76	0.70	2.30	1.52	1.50	1.30	2.36	1.94	1.94	6	0	71	21	1	20
1022-1	FWD	28	67	30	150	0	36	64	8	36	56	0	42	58	0.18	1.49	0.45	0.40	0.54	2.42	1.57	1.60	1.32	2.55	2.24	2.29	30	19	47	3	0	35
	AFT	27	67	26	150	0	89	11	7	42	51	0	53	47	0.24	1.48	0.57	0.50	0.52	2.30	1.63	1.60	1.30	2.47	2.21	2.25	4	15	71	9	1	35
1022-2	FWD	29	74	21	152	0	8	92	1	37	62	0	43	57	0.20	0.99	0.39	0.35	0.62	2.65	1.45	1.45	1.16	2.45	2.23	2.28	35	28	35	1	0	45
	AFT	28	74	19	152	0	100	0	10	44	46	0	53	47	0.21	1.40	0.48	0.44	0.50	2.32	1.51	1.52	1.45	2.49	2.25	2.28	10	25	61	4	0	45
1023-1	FWD	22	82	8	164	0	5	95	19	54	27	0	72	28	0.15	1.20	0.39	0.35	0.43	2.41	1.22	1.22	0.87	2.41	2.06	2.11	20	44	34	2	0	35
	AFT	20	81	5	163	0	11	89	0	39	61	0	42	58	0.20	1.40	0.53	0.48	0.41	2.21	1.31	1.37	0.94	2.45	2.15	2.20	13	14	65	7	0	35
1023-2	FWD	29	81	-13	177	0	7	93	0	19	81	0	18	82	0.22	1.38	0.48	0.42	0.41	2.03	1.18	1.22	0.90	2.41	2.03	2.11	35	2	60	2	1	35
	AFT	28	80	-13	178	0	3	97	0	34	66	0	28	72	0.22	1.60	0.52	0.48	0.44	2.31	1.24	1.24	1.08	2.46	2.10	2.17	13	10	73	4	0	35
1024-1	FWD	10	61	24	137	0	0	100	0	57	43	0	72	28	0.17	1.74	0.35	0.32	0.40	2.25	1.22	1.15	0.58	2.34	1.97	2.03	27	49	23	0	0	35
	AFT	9	61	21	136	0	0	100	0	28	72	0	82	18	0.20	1.22	0.40	0.37	0.48	2.32	1.30	1.24	0.94	2.40	1.97	2.06	13	46	39	2	0	35
1024-2	FWD	9	79	11	151	0	0	100	12	19	69	0	25	75	0.24	1.17	0.46	0.42	0.35	2.40	1.30	1.27	1.01	2.45	1.91	1.99	36	3	58	2	0	35
	AFT	8	79	9	151	0	0	100	1	22	77	0	66	34	0.20	1.39	0.47	0.40	0.29	2.26	1.31	1.32	0.90	2.40	1.89	1.95	20	25	50	5	0	35
1025-1	FWD	1	70	-123	-18	0	68	32	10	41	49	0	56	44	0.18	1.42	0.43	0.37	0.29	2.36	1.37	1.39	0.42	2.35	1.81	1.92	33	25	38	4	1	35
	AFT	0	70	-121	-19	0	72	28	8	49	43	0	61	39	0.18	1.69	0.49	0.42	0.26	2.26	1.33	1.38	0.23	2.32	1.75	1.90	25	20	47	7	1	35
1025-2	FWD	0	56	-124	-31	0	71	29	3	42	55	0	56	44	0.18	1.22	0.45	0.39	0.26	2.24	1.32	1.33	0.63	2.29	1.78	1.89	29	21	45	4	0	22
	AFT	0	56	-122	-33	0	73	27	3	45	52	0	51	49	0.21	1.32	0.53	0.48	0.39	2.16	1.31	1.35	0.48	2.23	1.71	1.79	19	12	61	8	0	22
1026-1	FWD	0	57	23	135	0	4	96	0	21	79	0	24	76	0.20	1.26	0.38	0.33	0.31	2.27	1.22	1.22	0.40	2.28	1.77	1.87	57	13	28	2	0	45
	AFT	0	57	21	135	0	5	95	0	4	96	0	38	62	0.20	1.16	0.39	0.34	0.24	2.36	1.29	1.30	0.37	2.40	1.78	1.86	39	27	33	1	0	45
1026-2	FWD	1	72	8	84	0	0	100	1	5	94	0	5	95	0.19	1.32	0.36	0.30	0.23	2.17	1.05	1.02	0.48	2.24	1.63	1.70	78	2	19	1	0	50
	AFT	0	57	13	78	0	0	100	2	5	93	0	15	85	0.21	1.35	0.30	0.32	0.27	2.20	1.08	1.03	0.30	2.26	1.61	1.70	60	12	25	3	0	50
1027-1	FWD	3	63	26	110	0	0	100	0	0	100	0	3	97	0.26	1.54	0.52	0.46	0.50	2.38	1.45	1.52	0.71	2.39	2.03	2.10	36	2	58	4	0	50
	AFT	2	63	26	108	0	0	100	0	21	79	0	20	80	0.26	1.34	0.58	0.53	0.34	2.30	1.46	1.46	0.40	2.40	1.96	2.06	12	3	78	7	0	50
1028-1	FWD	3	73	15	135	0	4	96	0	4	96	0	11	89	0.22	1.08	0.37	0.32	0.40	2.32	1.42	1.42	0.62	2.30	1.77	1.83	65	6	28	1	0	30
	AFT	1	73	14	133	0	5	95	0	16	84	0	11	89	0.20	1.01	0.41	0.36	0.30	2.23	1.35	1.40	0.68	2.26	1.72	1.77	56	5	37	1	0	30
1028-2	FWD	2	81	5	48	0	3	97	1	9	90	0	15	85	0.23	0.98	0.40	0.35	0.37	2.20	1.36	1.38	0.30	2.33	1.72	1.77	59	3	37	1	0	30
	AFT	1	80	5	43	0	10	90	0	6	94	0	6	94	0.22	1.40	0.50	0.40	0.28	2.21	1.40	1.43	0.30	2.35	1.69	1.75	47	1	44	7	1	30
1029-1	FWD	3	63	18	130	0	8	92	1	16	83	0	14	86	0.25	1.80	0.64	0.54	0.50	2.30	1.72	1.76	0.48	2.39	2.03	2.08	20	0	62	14	3	35
	AFT	2	62	16	128	0	20	80	0	21	79	0	25	75	0.16	1.73	0.57	0.48	0.20	2.32	1.62	1.65	0.36	2.40	1.91	1.95	24	5	59	10	1	35
1029-2	FWD	0	80	4	146	0	4	96	2	28	70	0	20	80	0.22	1.68	0.54	0.45	0.31	2.35	1.52	1.59	0.45	2.40	1.88	2.00	33	5	50	11	2	25
	AFT	0	80	3	145	0	10	90	2	24	74	0	25	75	0.20	1.58	0.56	0.49	0.30	2.34	1.52	1.60	0.34	2.40	1.87	1.93	23	5	59	11	2	25
1030-1	FWD	5	63	27	130	0	58	42	3	32	65	1	52	47	0.30	1.86	0.81	0.75	0.61	2.34	1.75	1.79	0.78	2.38	2.01	2.08	4	3	61	28	5	40
	AFT	4	63	22	129	0	53	47	0	46	54	0	71	29	0.25	1.64	0.76	0.69	0.66	2.30	1.69	1.74	1.00	2.40	1.97	2.05	1	9	64	22	4	40
1030-2	FWD	3	78	10	158	1	42	57	0	53	47	0	70	30	0.24	1.65	0.64	0.57	0.76	2.26	1.69	1.70	1.17	2.36	1.99	2.05	5	9	71	13	2	30
	AFT	2	78	7	157	1	23	76	0	28	72	0	30	70	0.34	1.94	0.82	0.77	0.83	2.40	1.79	1.82	0.63	2.43	2.06	2.10	2	0	66	30	2	30
1031-1	FWD	17	70	20	140	0	99	1	18	34	48	0	51	49	0.25	1.67	0.71	0.63	0.72	2.33	1.74	1.80	1.36	2.44	2.10	2.18	2	8	70	17	3	45
	AFT	17	70	18	140	0	14	86	15	43	42	0	47	53	0.24	1.66	0.71	0.62	0.53	2.35	1.65	1.70	1.15	2.35	2.00	2.05	4	4	70	18	4	45
1031-2	FWD	19	82	6	67	0	99	1	8	53	39	0	60	40	0.26	1.88	0.80	0.72	0.46	2.54	1.73	1.82	1.40	2.57	2.05	2.09	0	5	64	22	9	40
	AFT	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
1033-1	FWD	10	47	46	135	0	89	11	0	3	97	0	2	98	0.28	1.10	0.54	0.50	0.70	2.28	1.35	1.30	1.26	2.42	2.15	2.20	11	1	85	3	0	45
	AFT	11	47	45	135	0	10	90	3	8	89	0	3	97	0.30	1.20	0.53	0.50	0.64	2.32	1.40	1.40	0.84	2.44	2.13	2.20	8	1	90	1	0	45
1033-2	FWD	0	54	34	131	0	84	16	1	4	95	0	0	100	0.30	1.52	0.53	0.49	0.49	2.30	1.30	1.26	0.54	2.41	2.15	2.21	16	0	79	5	0	50
	AFT	0	54	34	131	0	86	14	0	5	95	0	1	99	0.26	1.38	0.54	0.50	0.50	2.32	1.25	1.20	0.38	2.44	2.15	2.24	12	0	84	4	0	50

TABLE 10-3

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 D-MAX				UNDER EXPOSED (%)	UNDER PROCESSED (%)	NOMINAL EXP. & PRO (%)	OVER PROCESSED (%)	OVER EXPOSED (%)	CLOUD COVER (%)
															RANGE				RANGE				RANGE									
		LOW	HIGH	LOW	HIGH	P	I	F	P	I	F	P	I	F	LOW	HIGH	MEAN	MEDIAN	LOW	HIGH	MEAN	MEDIAN	LOW	HIGH	MEAN	MEDIAN						
1034-1	FWD	23	77	16	165	0	96	4	3	21	76	0	20	60	0.25	1.80	0.57	0.50	0.55	2.42	1.58	1.61	0.88	2.45	2.22	2.26	18	3	70	7	2	35
	AFT	23	77	10	165	0	55	45	2	31	67	0	16	84	0.29	1.63	0.56	0.50	0.41	2.35	1.55	1.60	0.97	2.44	2.19	2.25	18	4	71	7	0	35
1034-2	FWD	29	86	0	178	0	88	12	9	26	65	0	27	73	0.19	1.52	0.57	0.52	0.72	2.40	1.63	1.60	1.21	2.47	2.25	2.31	12	4	76	8	0	45
	AFT	30	86	0	179	0	41	59	6	37	57	0	34	66	0.26	1.60	0.54	0.49	0.70	2.32	1.59	1.62	1.08	2.48	2.22	2.29	12	10	73	4	2	45
1035-1	FWD	13	68	19	144	0	17	83	0	11	89	0	5	95	0.28	1.90	0.52	0.45	0.61	2.44	1.40	1.40	1.06	2.43	2.15	2.22	23	1	71	4	1	30
	AFT	13	68	18	144	0	5	95	1	14	85	0	9	91	0.24	1.39	0.50	0.43	0.60	2.42	1.48	1.53	0.90	2.55	2.15	2.24	27	3	66	5	0	30
1035-2	FWD	4	81	10	158	0	22	78	4	18	78	0	18	82	0.21	1.50	0.52	0.47	0.43	2.33	1.32	1.30	0.96	2.50	2.09	2.18	24	5	66	4	0	40
	AFT	3	81	8	158	0	23	77	1	20	79	0	12	88	0.21	1.39	0.55	0.51	0.50	2.25	1.34	1.30	0.74	2.60	2.09	2.16	14	3	76	7	0	40
1036-1	FWD	13	82	7	170	0	66	34	8	14	78	1	14	85	0.20	1.91	0.48	0.42	0.80	2.40	1.54	1.53	1.10	2.47	2.26	2.33	33	5	59	2	1	40
	AFT	15	83	5	171	0	5	95	3	9	88	0	10	90	0.24	1.65	0.55	0.51	0.55	2.25	1.49	1.52	1.20	2.43	2.23	2.29	12	2	80	5	0	40
1036-2	FWD	10	78	12	167	0	15	85	1	19	80	0	18	82	0.26	1.43	0.47	0.42	0.50	2.20	1.30	1.36	1.18	2.60	2.12	2.16	30	6	53	3	0	35
	AFT	12	73	9	168	0	4	96	3	20	77	0	17	83	0.28	1.14	0.48	0.44	0.48	2.10	1.37	1.40	1.54	2.40	2.15	2.20	28	4	64	4	0	35
1037-1	FWD	9	84	-172	-6	0	29	71	8	10	82	0	11	89	0.31	1.47	0.64	0.58	0.61	2.38	1.54	1.53	1.05	2.46	2.07	2.14	4	1	83	12	0	35
	AFT	9	84	-171	-6	0	25	75	0	19	81	0	12	88	0.25	1.45	0.66	0.61	0.84	2.33	1.48	1.44	1.15	2.45	2.02	2.10	3	2	79	16	0	35
1037-2	FWD	8	87	-175	-3	0	25	75	14	26	60	0	12	88	0.26	1.20	0.66	0.61	0.82	2.43	1.51	1.46	0.90	2.50	2.04	2.12	4	0	84	13	0	35
	AFT	8	87	-173	-3	0	24	76	11	33	56	0	23	77	0.25	1.60	0.67	0.64	0.55	2.33	1.51	1.45	1.10	2.43	2.03	2.10	4	5	77	14	0	30
1038-1	FWD	5	68	18	131	0	22	78	2	16	82	1	15	84	0.16	1.11	0.51	0.46	0.84	2.36	1.56	1.52	1.18	2.46	2.11	2.19	29	3	65	3	0	35
	AFT	5	69	18	130	0	22	78	1	13	86	0	14	86	0.25	1.37	0.53	0.47	0.52	2.31	1.53	1.52	1.13	2.43	2.03	2.16	33	3	57	6	0	35
1038-2	FWD	7	80	1	164	1	37	62	0	15	85	0	13	88	0.21	1.40	0.58	0.51	0.55	2.42	1.57	1.54	1.00	2.50	1.99	2.06	23	1	65	10	0	40
	AFT	7	80	1	164	3	29	68	0	27	73	0	26	74	0.19	1.78	0.61	0.49	0.47	2.38	1.56	1.57	0.35	2.48	1.96	2.01	14	12	56	17	1	40
1039-1	FWD	7	65	27	140	0	62	38	8	22	70	1	24	75	0.24	1.53	0.65	0.58	0.79	2.39	1.78	1.80	1.11	2.68	2.14	2.18	3	4	79	14	0	40
	AFT	7	65	25	140	0	60	40	6	30	64	0	31	69	0.27	1.55	0.67	0.62	0.77	2.39	1.75	1.79	1.11	2.47	2.13	2.18	4	3	77	15	0	40
1039-2	FWD	8	75	10	144	4	61	35	19	38	43	3	41	56	0.30	1.38	0.65	0.59	1.06	2.36	1.69	1.66	0.84	2.50	2.04	2.12	2	5	81	12	0	35
	AFT	8	75	10	144	2	47	51	20	45	35	7	57	36	0.27	1.60	0.67	0.65	0.83	2.30	1.61	1.60	0.77	2.51	2.02	2.09	1	4	81	12	2	35
1040-1	FWD	11	73	-149	-15	0	79	21	10	31	59	2	35	63	0.25	1.71	0.71	0.69	0.94	2.38	1.71	1.74	1.18	2.40	2.04	2.10	0	3	79	17	0	25
	AFT	11	73	-149	-16	0	67	33	14	42	44	2	53	45	0.26	1.62	0.66	0.60	0.85	2.38	1.65	1.64	0.96	2.41	2.04	2.15	1	6	79	13	1	25
1040-2	FWD	12	68	-149	-21	0	66	34	7	30	63	3	29	68	0.24	1.67	0.77	0.72	0.77	2.58	1.61	1.61	1.08	2.45	2.01	2.06	1	1	72	25	1	30
	AFT	11	68	-149	-24	1	58	41	3	35	62	0	32	68	0.11	1.43	0.68	0.63	0.90	2.43	1.72	1.74	1.07	2.45	2.08	2.12	3	2	78	16	0	30
1041-1	FWD	10	66	30	129	0	100	0	7	40	53	0	40	54	0.14	2.14	0.56	0.51	0.62	2.33	1.62	1.58	0.17	2.46	2.19	2.26	6	10	79	4	1	45
	AFT	9	69	21	129	0	99	1	9	43	48	0	47	53	0.22	1.62	0.62	0.57	0.92	2.33	1.62	1.58	0.15	2.43	2.15	2.23	1	5	86	8	1	45
1041-2	FWD	28	78	14	126	1	99	0	7	26	67	0	23	77	0.31	1.51	0.66	0.62	0.78	2.38	1.54	1.51	1.40	2.46	2.15	2.19	4	2	80	13	1	45
	AFT	28	80	11	130	1	99	0	6	30	64	0	30	70	0.17	1.42	0.60	0.57	0.62	2.37	1.55	1.54	1.05	2.47	2.19	2.25	9	3	83	5	0	45
1042-1	FWD	9	76	16	163	0	19	81	9	9	82	0	15	85	0.33	1.47	0.63	0.57	0.89	2.33	1.53	1.55	1.45	2.49	2.22	2.26	7	0	80	11	1	37
	AFT	9	76	15	164	0	7	93	5	8	87	0	13	77	0.14	1.44	0.62	0.57	0.61	2.31	1.52	1.53	0.93	2.49	2.15	2.21	5	1	83	11	0	37
1042-2	FWD	37	88	-179	177	0	11	89	5	16	79	0	11	89	0.14	1.26	0.54	0.47	0.52	2.39	1.48	1.55	0.35	2.45	2.17	2.25	24	0	66	9	0	35
	AFT	37	88	-179	177	0	10	90	8	16	76	0	10	90	0.15	1.31	0.52	0.47	0.62	2.37	1.47	1.48	0.85	2.39	2.17	2.25	20	2	75	4	0	35
1043-1	FWD	12	74	16	156	0	20	80	6	26	68	4	26	70	0.15	1.63	0.54	0.47	0.61	2.25	1.40	1.39	0.98	2.41	2.13	2.16	20	4	67	8	1	35
	AFT	12	74	12	157	0	3	97	9	12	79	2	27	71	0.24	1.89	0.59	0.53	0.61	2.28	1.42	1.43	1.11	2.44	2.18	2.23	16	2	71	8	2	35
1043-2	FWD	19	86	-175	179	1	19	80	5	16	79	0	39	61	0.19	1.32	0.54	0.50	0.66	2.39	1.39	1.39	0.84	2.44	2.18	2.23	21	5	66	7	0	35
	AFT	19	86	-175	179	0	7	93	14	21	65	2	36	62	0.25	1.32	0.54	0.50	0.55	2.08	1.27	1.27	1.09	2.46	2.02	2.06	18	11	64	6	1	35
1101-1	FWD	17	86	-179	178				5	7	88	0	14	86	0.20	1.25	0.46	0.39	0.48	2.24	1.31	1.30	1.09	2.30	2.01	2.06	49	3	43	4	0	35
	AFT	16	86	-179	178		*		0	11	89	0	26	74	0.26	1.65	0.52	0.46	0.68	2.23	1.35	1.36	1.01	2.38	2.02	2.06	22	7	67	4	0	35
1101-2	FWD	9	70	-151	-10				4	11	85	0	14	86	0.18	1.29	0.47	0.42	0.34	2.23	1.27	1.29	0.91	2.36	1.93	2.02	41	2	52	6	0	30
	AFT	8	78	-150	-11				5	8	87	0	14	86	0.21	1.20	0.49	0.44	0.54	2.25	1.24	1.24	0.22	2.32	1.90	2.01	34	1	62	3	0	30
1044-1	FWD	4	65	23	134	0	13	87	0	9	91	0	8	92	0.23	1.73	0.58	0.49	0.67	2.36	1.59	1.59	0.31	2.45	2.09	2.16	32	0	53	13	1	35
	AFT	6	65	22	134	0	19	81	5	16	79	0	23	77	0.27	1.45	0.59	0.53	0.76	2.41	1.57	1.57	0.32	2.47	2.08	2.15	21	2	65	10	1	35
1044-2	FWD	7	74	16	138	4	16	80	0	8	92	0	7	93	0.20	1.32	0.53	0.48	0.49	2.37	1.54	1.55	0.76	2.49	2.06	2.23	36	0	57	7	0	35
	AFT	7	74	16	137	8	24	68	6	24	70	0	28	72	0.22	1.31	0.53	0.49	0.50	2.48	1.55	1.57	0.44	2.55	2.05	2.16	22	7	64	6	0	35
1102-1	FWD	2	52	36	98				3	13	85	0	13	87	0.22	1.48	0.44	0.39	0.44	2.26	1.46	1.50	0.32	2.44	2.00	2.16	51	2	43	3	0	30
	AFT	2	52	36	97		*		2	8	83	0	12	88	0.26	1.12	0.49	0.45	0.35	2.41	1.47	1.50	0.68	2.53	2.01	2.16	30	2	66	2	0	30
1102-2	FWD	4	65	17	66				2	12	86	0	10	90	0.19	1.43	0.45	0.39	0.54	2.30	1.43	1.44	0.60	2.42	1.92	1.99	52	2	42	4	0	25
	AFT	4	64	17	65				7	7	86	0	11	89	0.23	1.31	0.45	0.40	0.53	2.34	1.47	1.45	0.91	2.46	1.88	1.98	45	3	49	3	0	25

* NOT APPLICABLE

[redacted]

TABLE 10-3

SECTION A

APPENDIX

MISSION * 1102-1 * INSTR * FWD * 2/14/68 PLOT OF D MIN * TERRAIN * PROCESSING * INTERMEDIATE

ARITH MEAN * 0.59 * MEDIAN * 0.56 * STD DEV * 0.24 * RANGE * 0.29 TO 1.48 WITH 34 SAMPLES

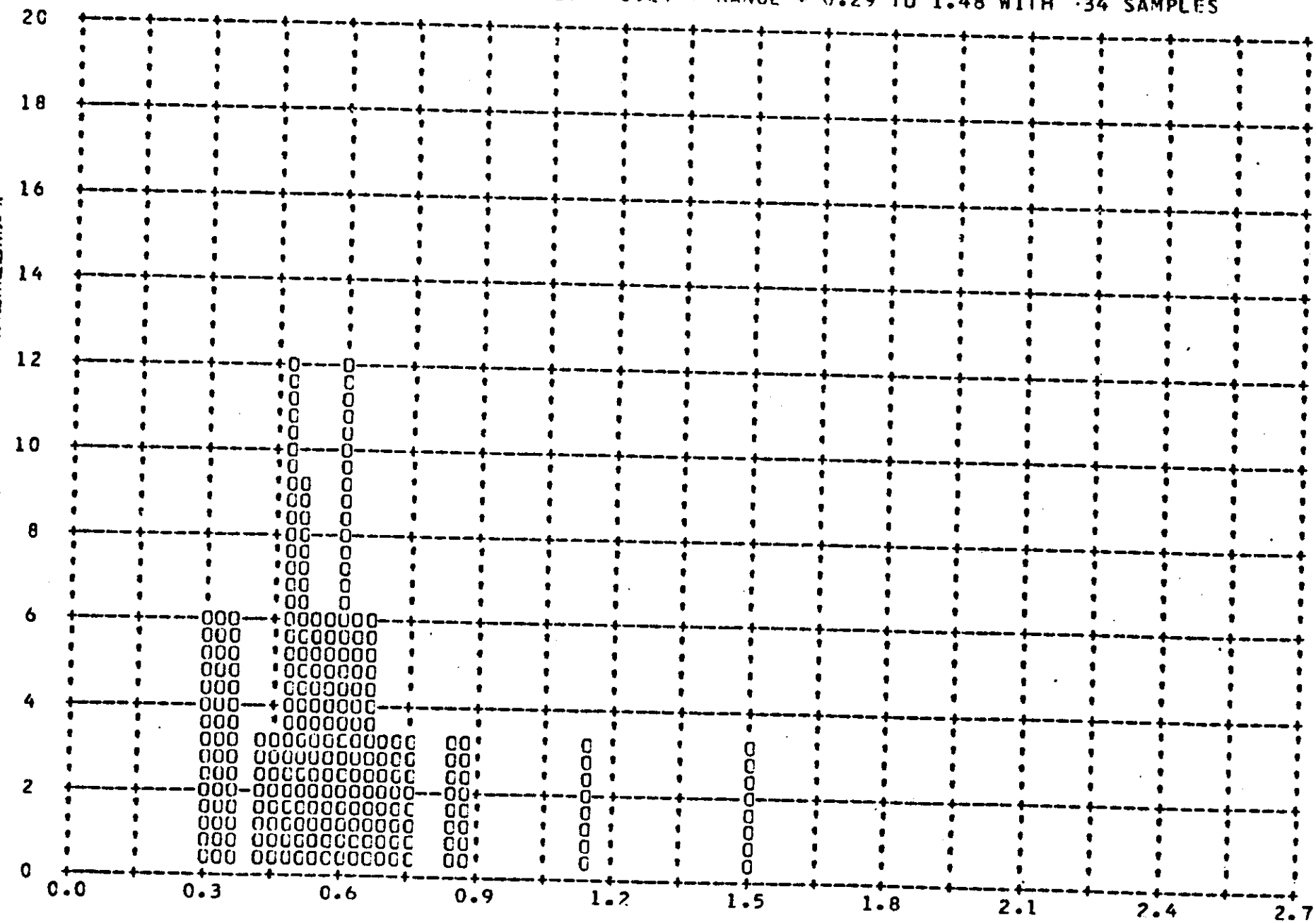


FIGURE A-1

[redacted]

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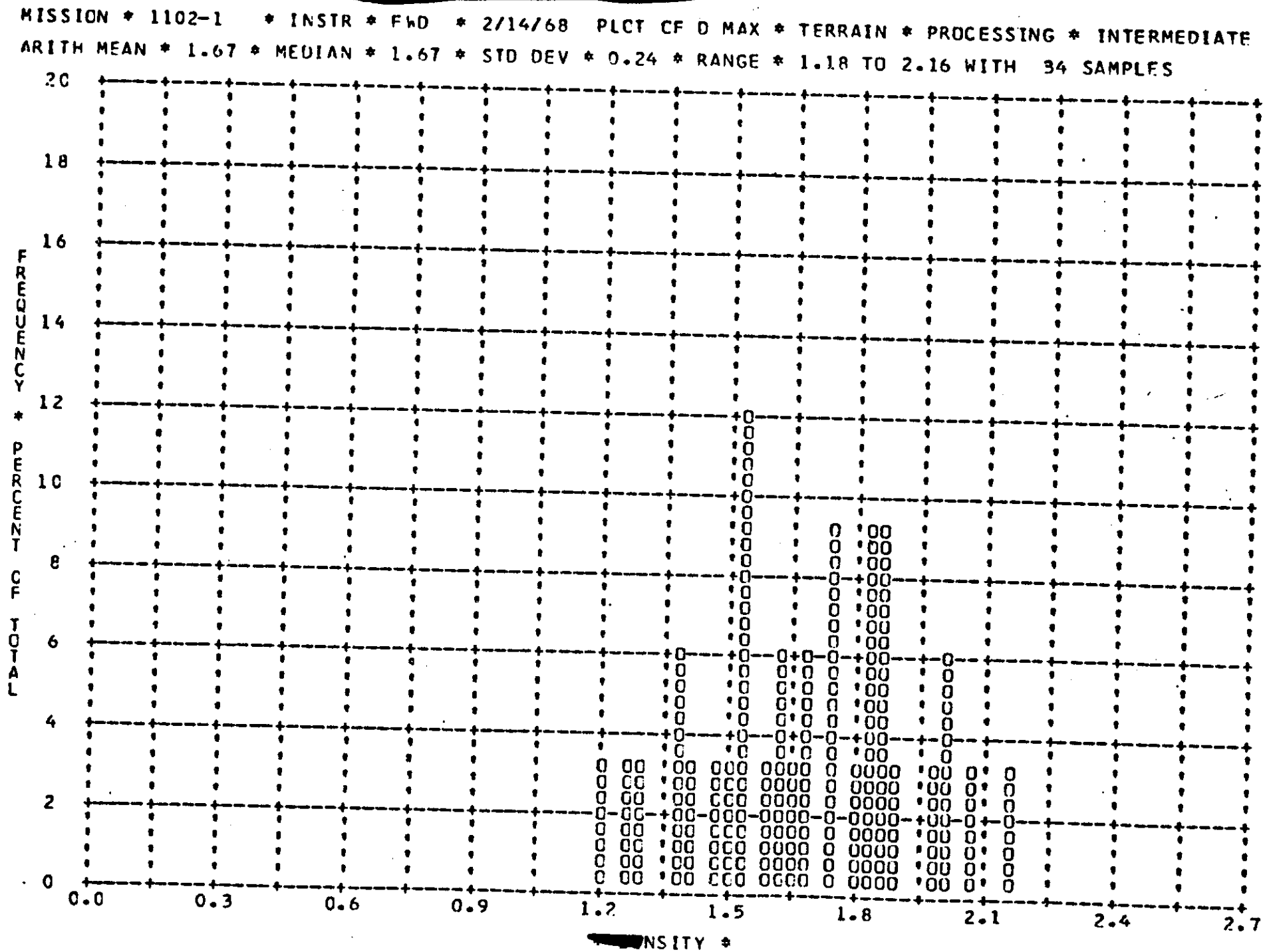

FIGURE A-1

MISSION * 1102-1 * INSTR * FWD * 2/14/68 PLOT OF D MAX * CLOUD * PROCESSING * INTERMEDIATE

ARITH MEAN * 1.89 * MEDIAN * 1.94 * STD DEV * 0.24 * RANGE * 1.21 TO 2.18 WITH 14 SAMPLES

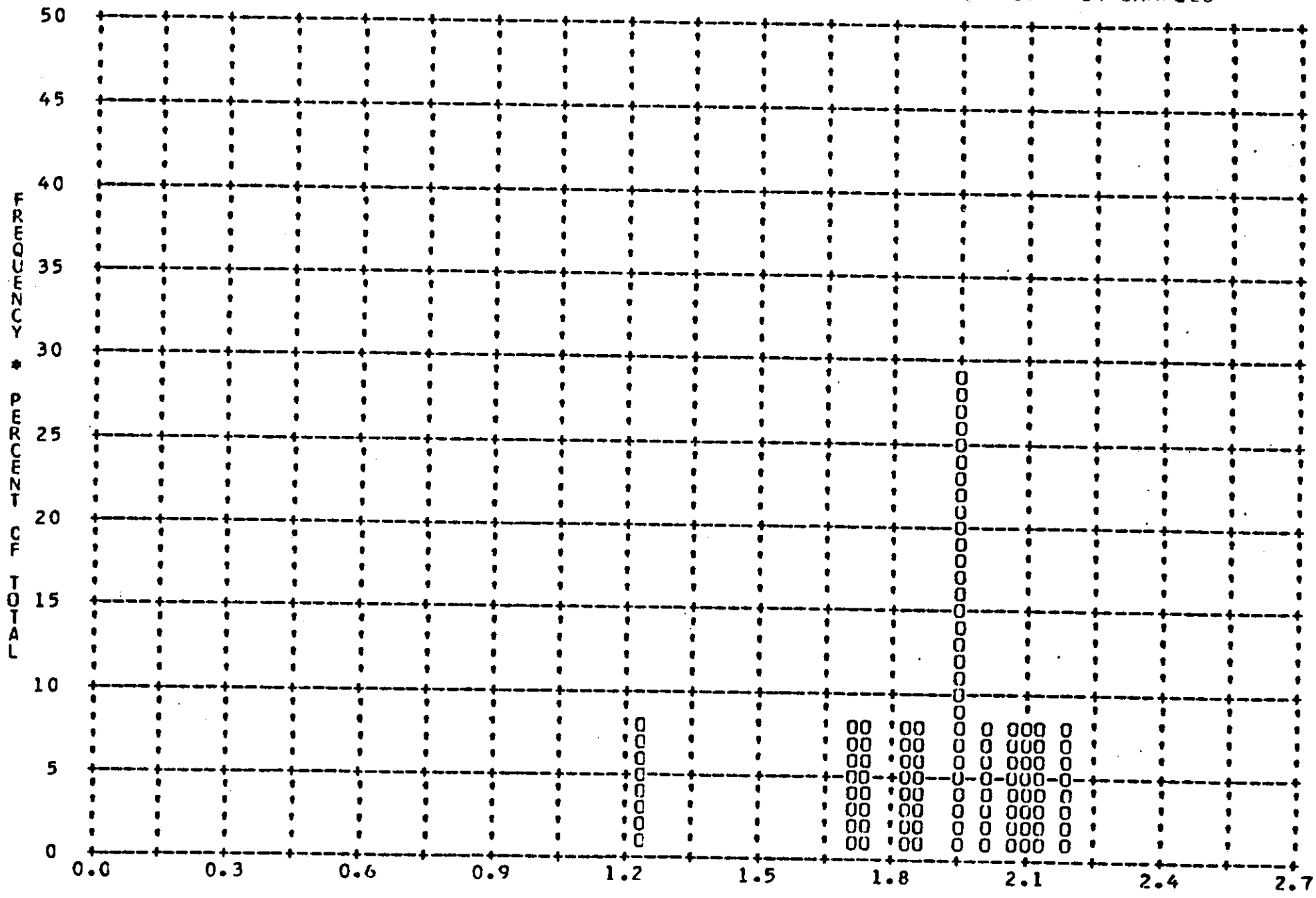

FIGURE A-1

[redacted]

MISSION * 1102-1 * INSTR * FWD * 2/14/68 PLOT OF D MIN * TERRAIN * PROCESSING * FULL

ARITH MEAN * 0.42 * MEDIAN * 0.37 * STD DEV * 0.16 * RANGE * 0.22 TO 1.12 WITH 222 SAMPLES

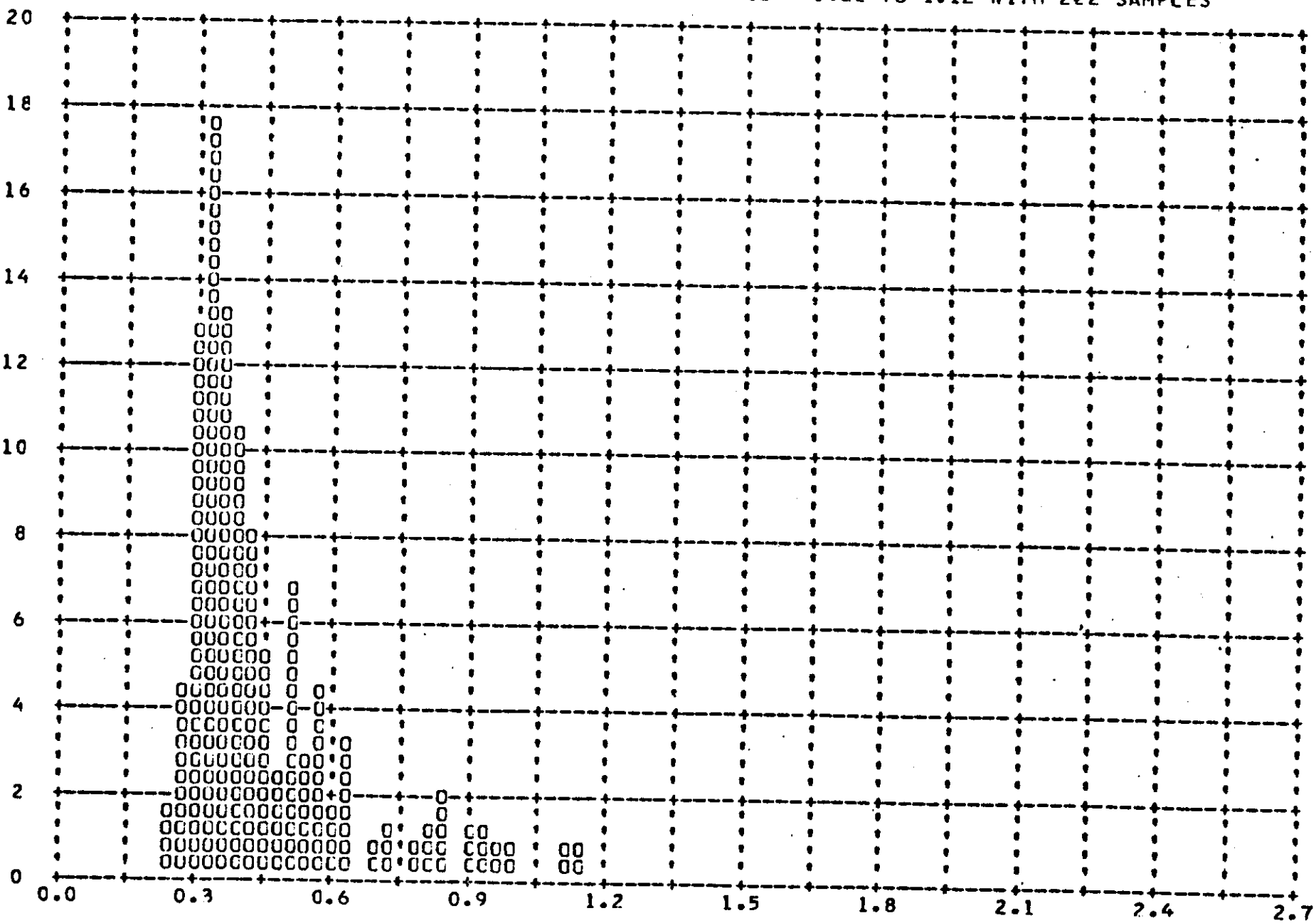

FIGURE A-1

MISSION * 1102-1 * INSTR * FWD * 2/14/68 PLOT OF D MAX * TERRAIN * PROCESSING * FULL

ARITH MEAN * 1.43 * MEDIAN * 1.44 * STD DEV * 0.45 * RANGE * 0.44 TO 2.26 WITH 222 SAMPLES

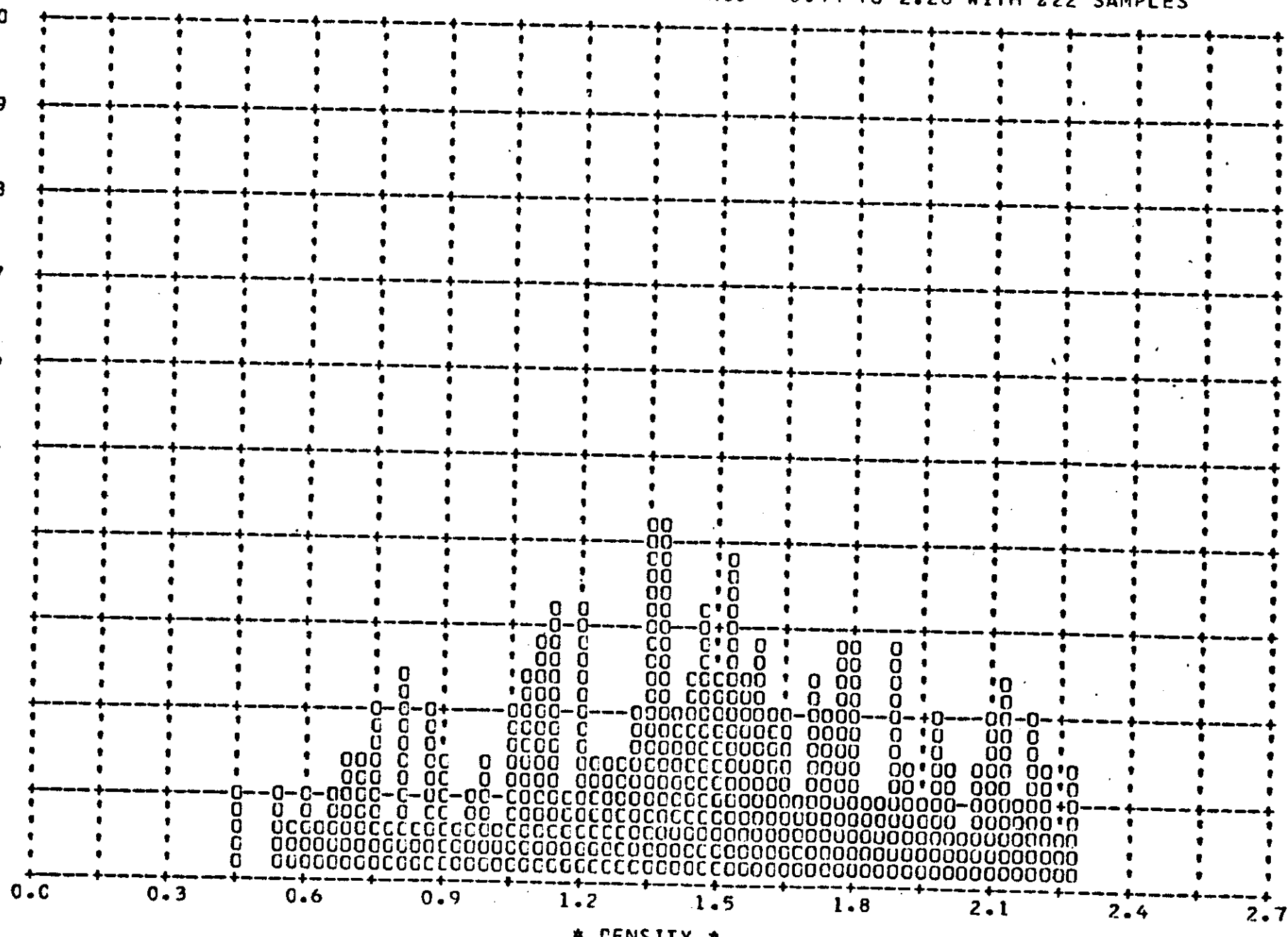

FIGURE A-1

MISSION * 1102-1 * INSTR * FWD * 2/14/68 PLOT OF D MAX * CLOUD * PROCESSING * FULL

ARITH MEAN * 2.01 * MEDIAN * 2.17 * STD DEV * 0.42 * RANGE * 0.32 TO 2.44 WITH 162 SAMPLES

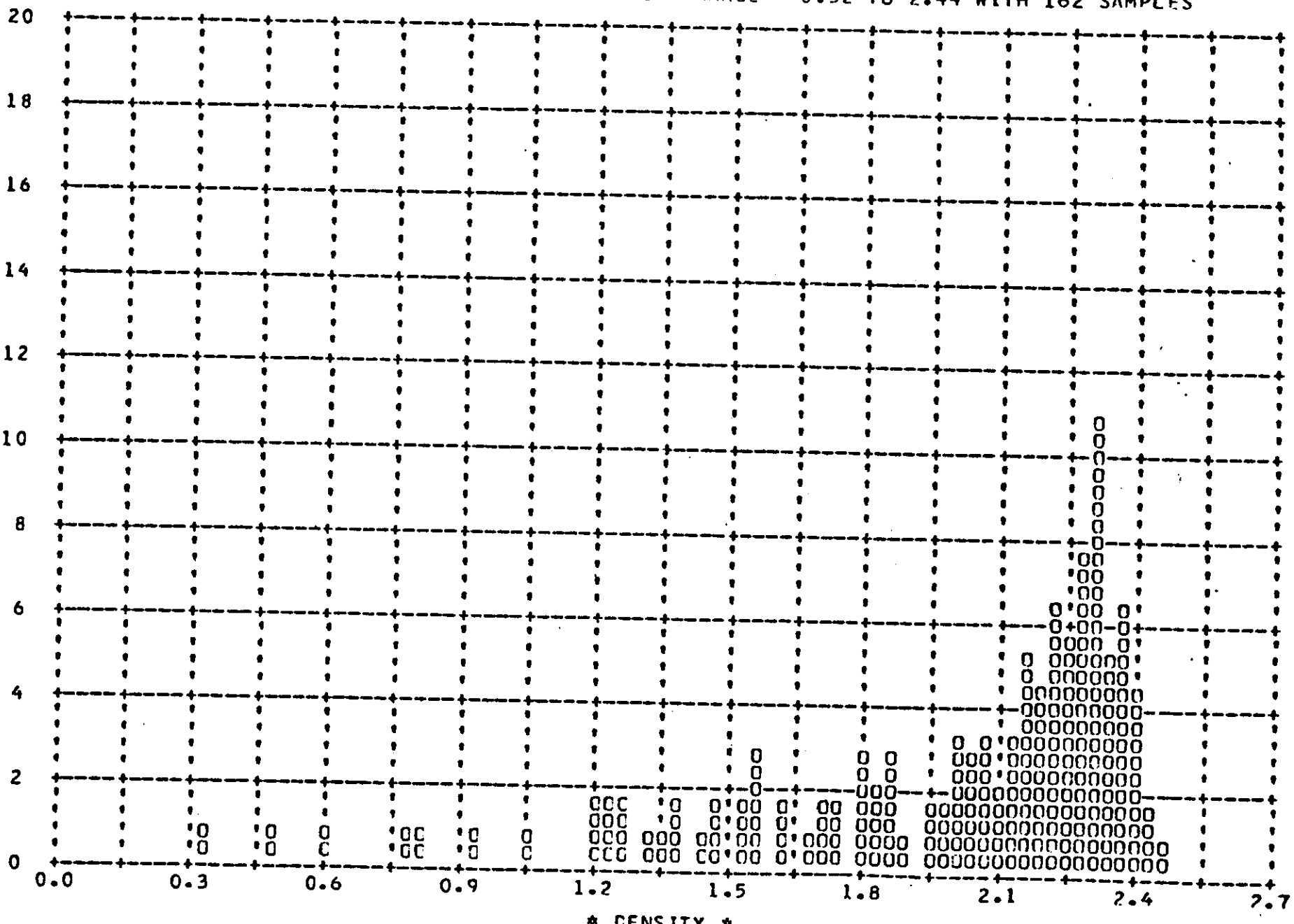

FIGURE A-1

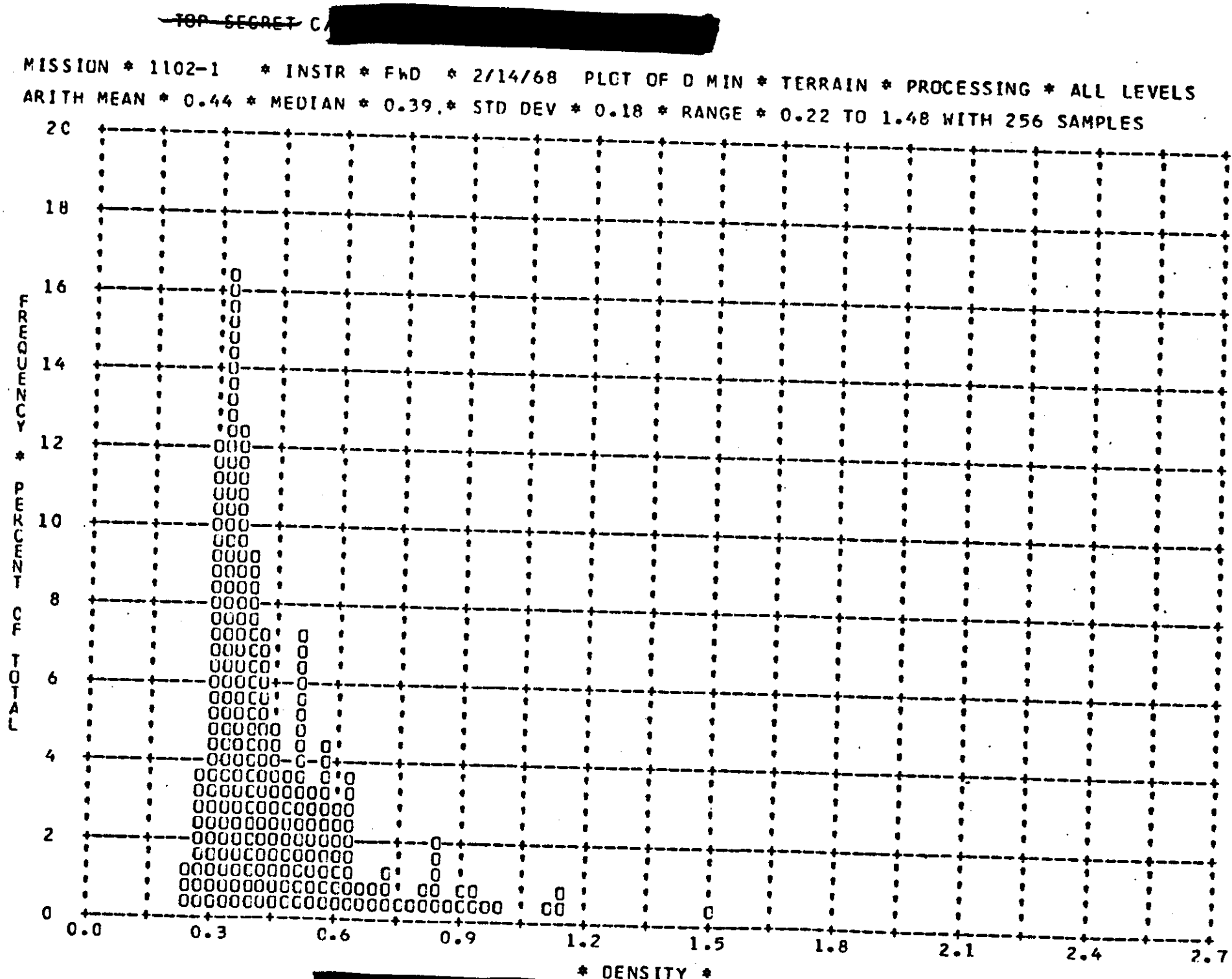
MISSION * 1102-1 * INSTR * FWD * 2/14/68 PLOT OF D MIN * TERRAIN * PROCESSING * ALL LEVELS
ARITH MEAN * 0.44 * MEDIAN * 0.39 * STD DEV * 0.18 * RANGE * 0.22 TO 1.48 WITH 256 SAMPLES
FREQUENCY * PERCENT OF TOTAL
* DENSITY *
0.0
0.3
0.6
0.9
1.2
1.5
1.8
2.1
2.4
2.7
0
2
4
6
8
10
12
14
16
18
20

FIGURE A-1

MISSION * 1102-1 * INSTR * FWD * 2/14/68 PLOT OF D MAX * TERRAIN * PROCESSING * ALL LEVELS

ARITH MEAN * 1.46 * MEDIAN * 1.50 * STD DEV * 0.43 * RANGE * 0.44 TO 2.26 WITH 256 SAMPLES

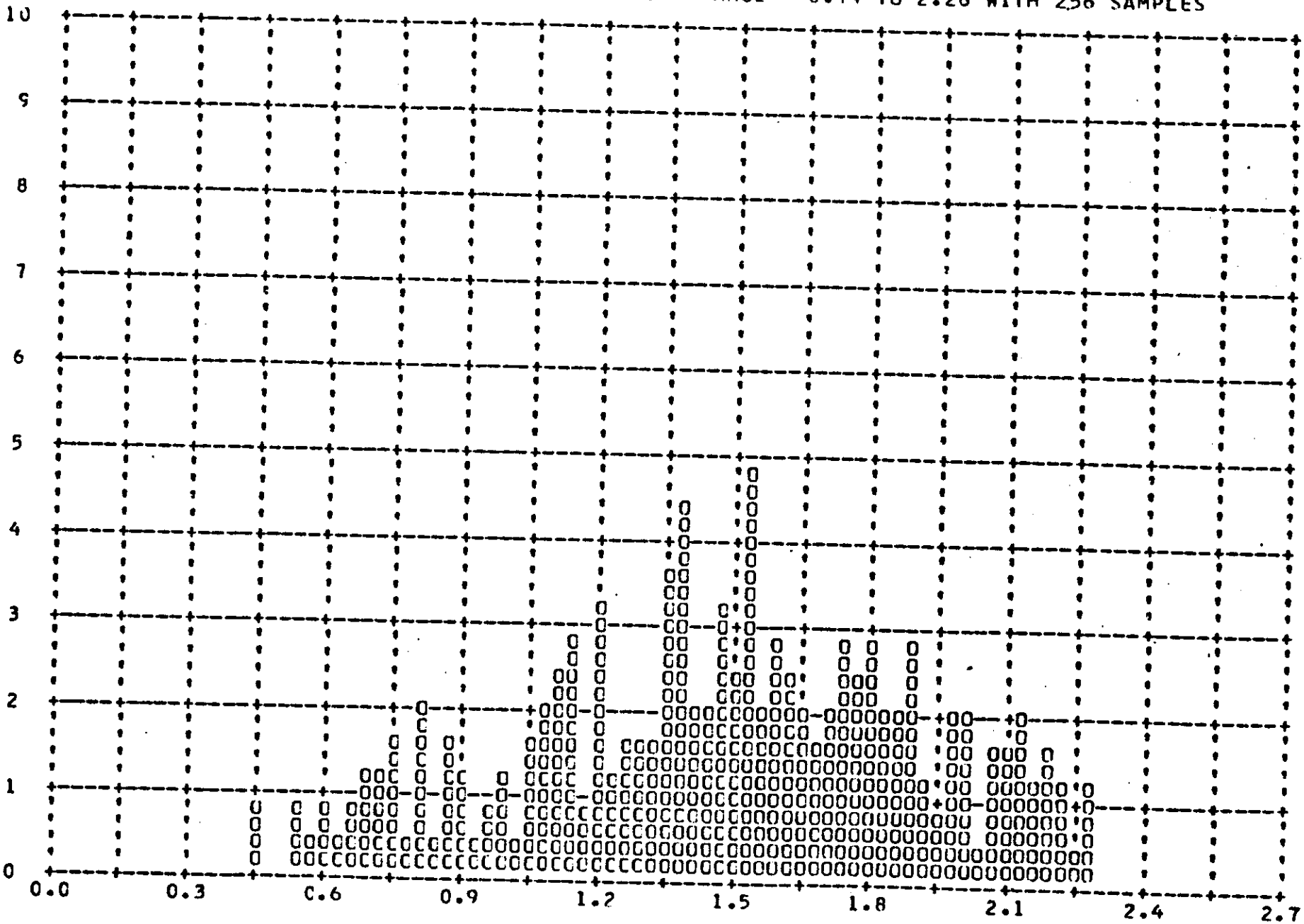

FIGURE A-1

MISSION * 1102-1 * INSTR * FHD * 2/14/68 PLOT OF D MAX * CLOUD * PROCESSING * ALL LEVELS

ARITH MEAN * 2.00 * MEDIAN * 2.16 * STD DEV * 0.41 * RANGE * 0.32 TO 2.44 WITH 176 SAMPLES

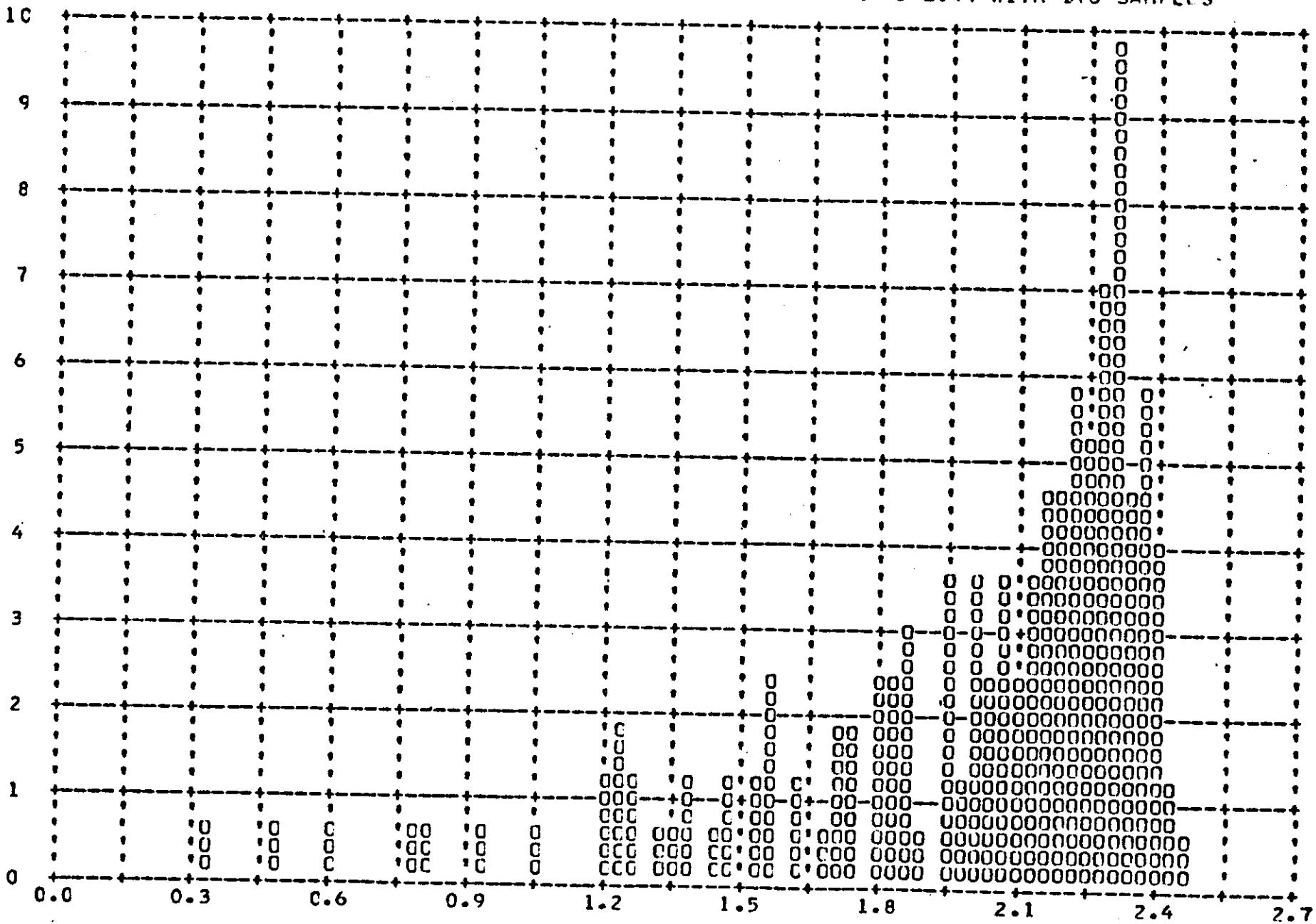

FIGURE A-1

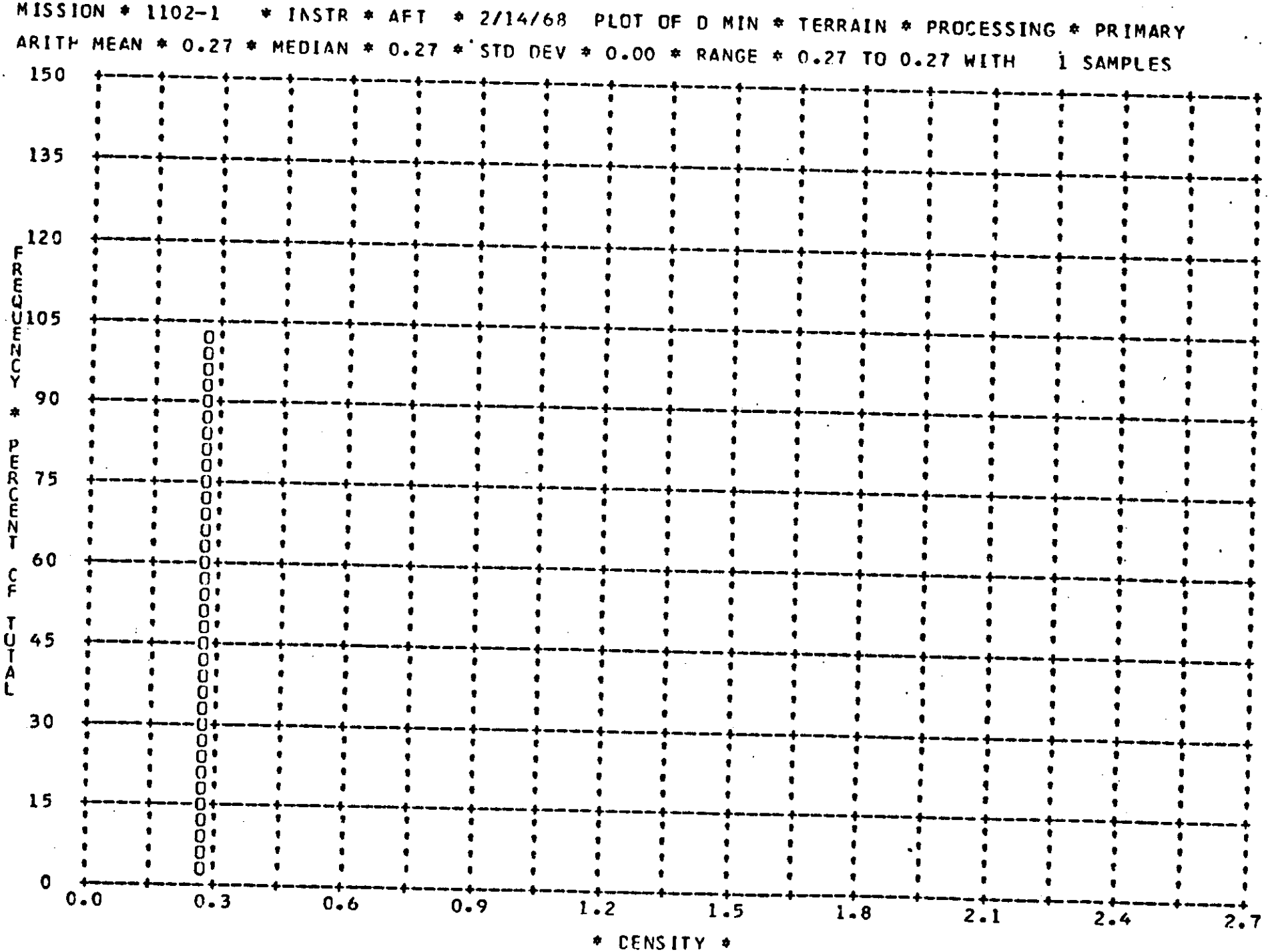
MISSION * 1102-1 * INSTR * AFT * 2/14/68 PLOT OF D MIN * TERRAIN * PROCESSING * PRIMARY
ARITH MEAN * 0.27 * MEDIAN * 0.27 * STD DEV * 0.00 * RANGE * 0.27 TO 0.27 WITH 1 SAMPLES
FREQUENCY * PERCENT OF TOTAL
150
135
120
105
90
75
60
45
30
15
0
0.0
0.3
0.6
0.9
1.2
1.5
1.8
2.1
2.4
2.7
* DENSITY *

FIGURE A-2

MISSION * 1102-1 * INSTR * AFT * 2/14/68 PLOT OF D MAX * TERRAIN * PROCESSING * PRIMARY

ARITH MEAN * 1.21 * MEDIAN * 1.21 * STD DEV * 0.00 * RANGE * 1.21 TO 1.21 WITH 1 SAMPLES

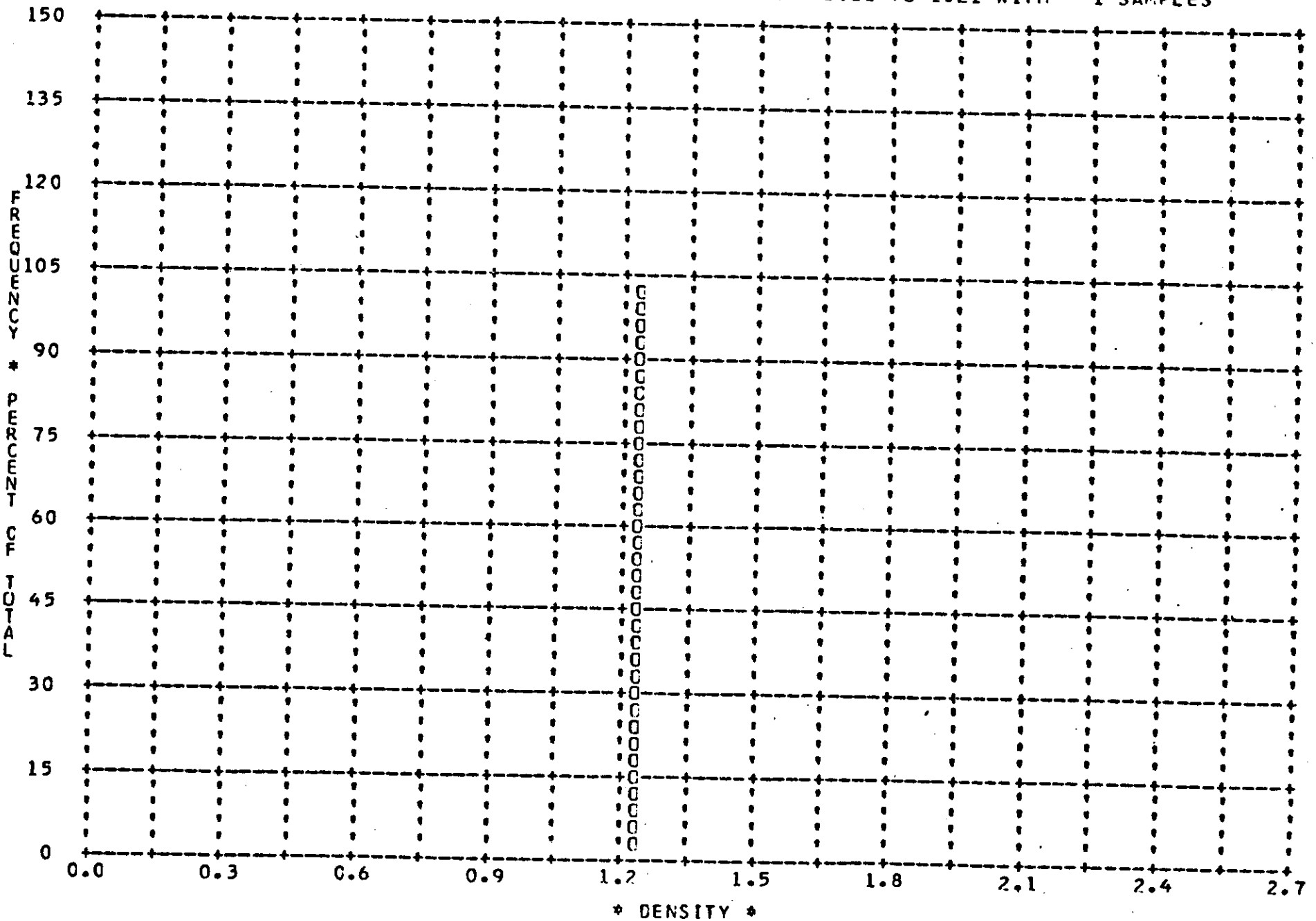

FIGURE A-2

MISSION * 1102-1 * INSTR * AFT * 2/14/68 PLOT OF D MAX * CLOUD * PROCESSING * PRIMARY

ARITH MEAN * 0.0 * MEDIAN * 0.00 * STD DEV * 0.0 * RANGE * 2.70 TO 0.00 WITH 0 SAMPLES

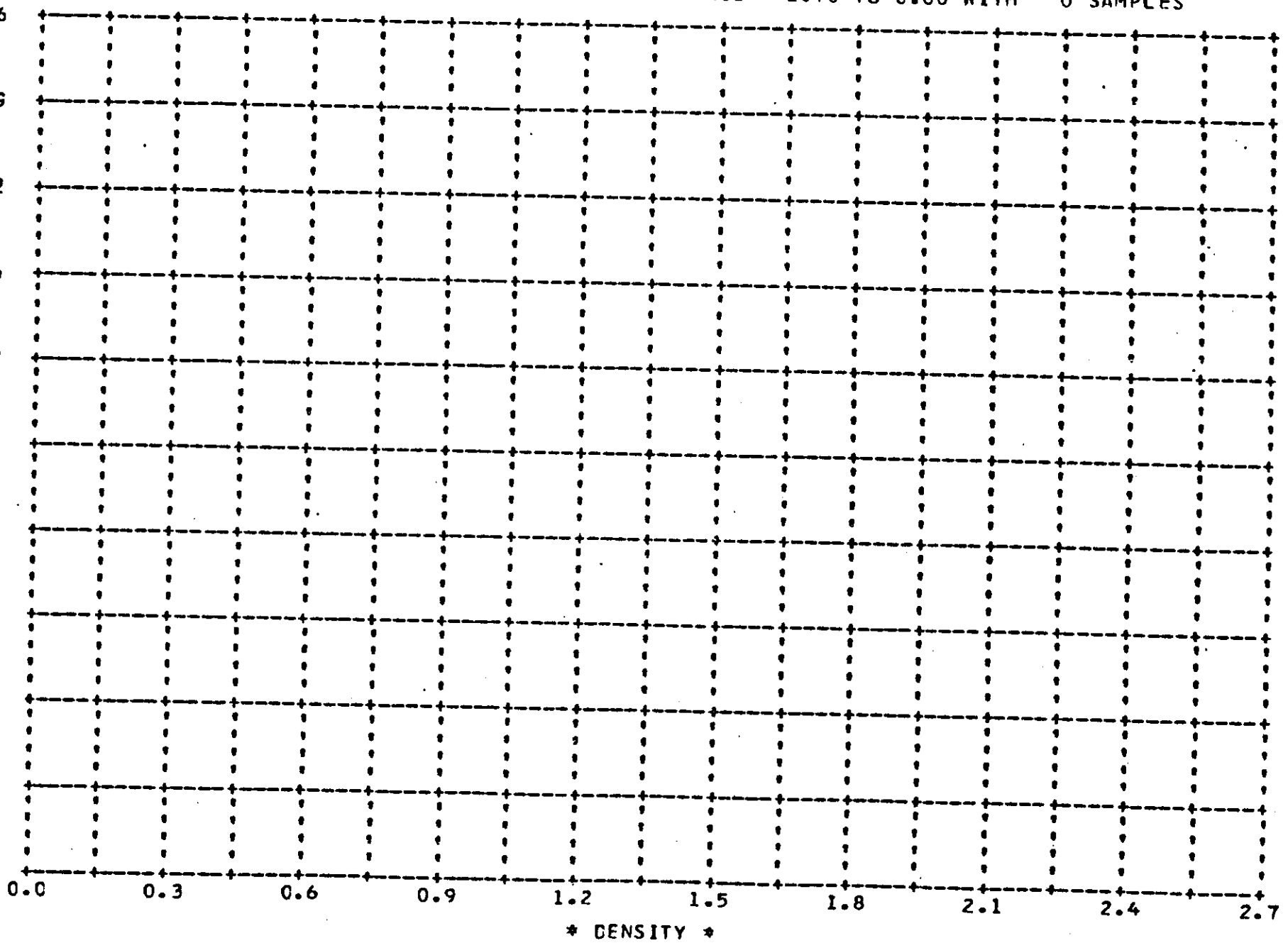

FIGURE A-2

MISSION * 1102-1 * INSTR * AFT * 2/14/68 PLOT OF D MIN * TERRAIN * PROCESSING * INTERMEDIATE

ARITH MEAN * 0.58 * MEDIAN * 0.54 * STD DEV * 0.18 * RANGE * 0.31 TO 0.95 WITH 26 SAMPLES

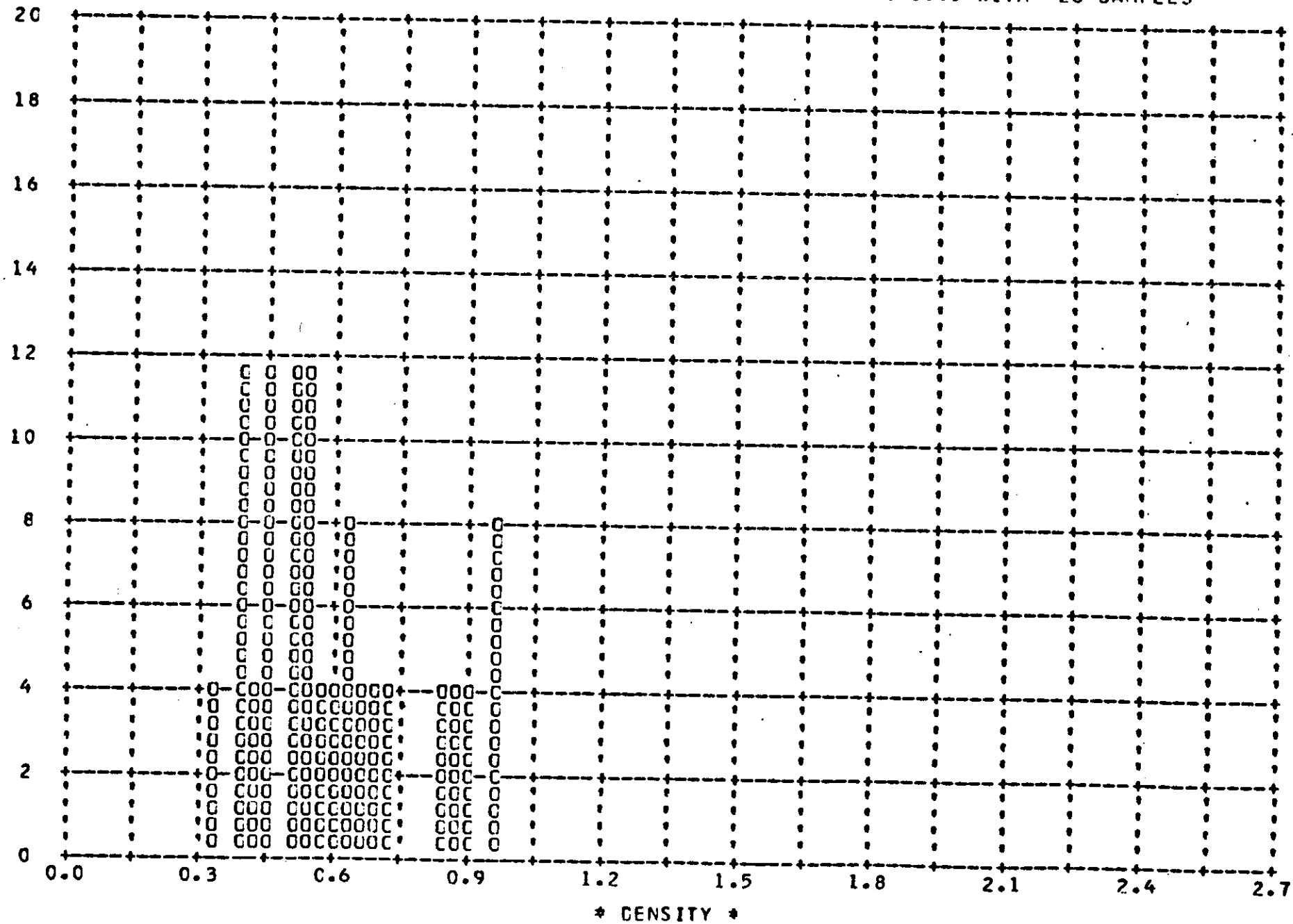

FIGURE A-2

MISSION * 1102-1 * INSTR * AFT * 2/14/68 PLOT OF D MAX * TERRAIN * PROCESSING * INTERMEDIATE

ARITH MEAN * 1.65 * MEDIAN * 1.69 * STD DEV * 0.24 * RANGE * 1.10 TO 2.29 WITH 26 SAMPLES

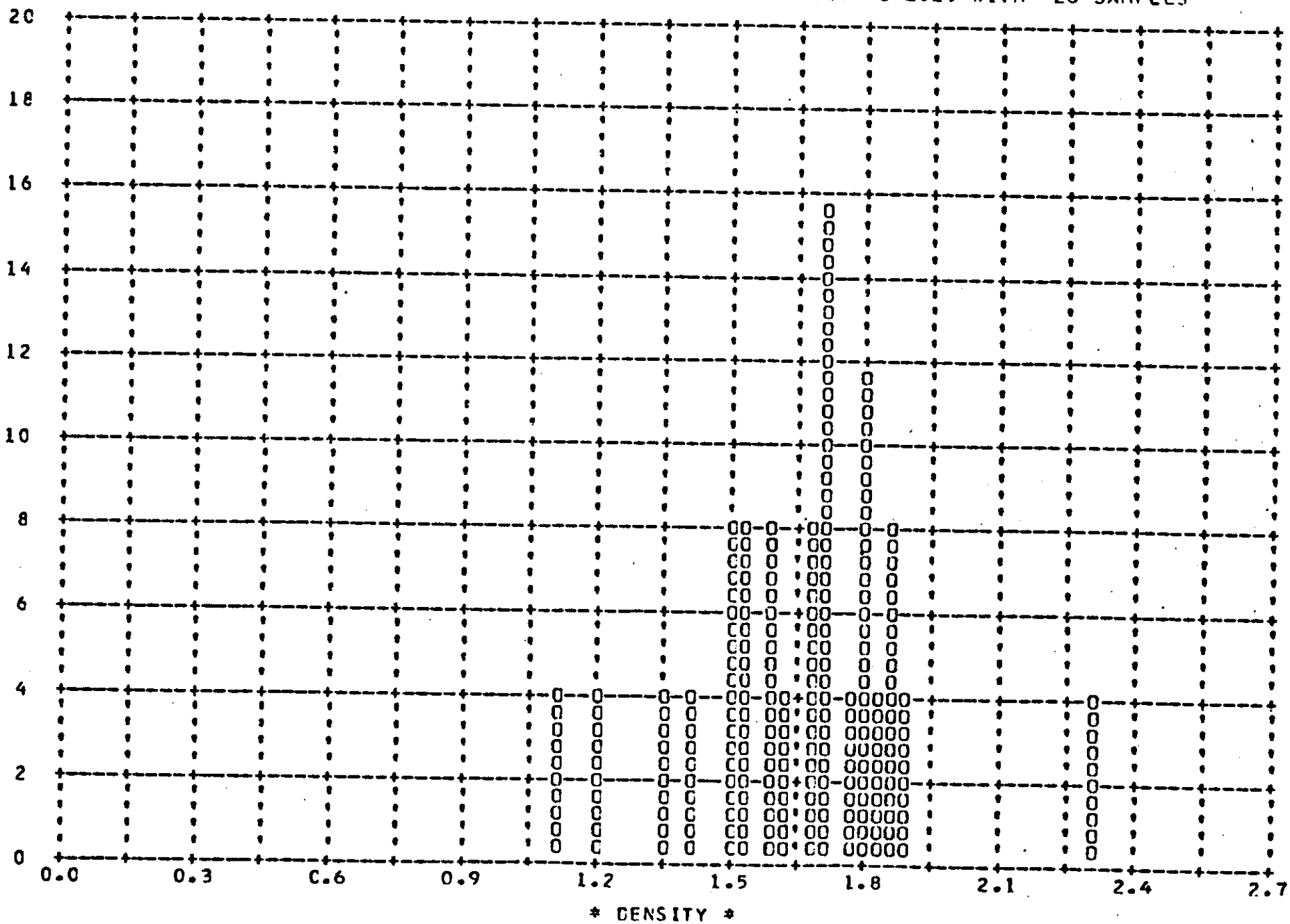

FIGURE A-2

MISSION * 1102-1 * INSTR * AFT * 2/14/68 PLOT OF D MAX * CLOUD * PROCESSING * INTERMEDIATE

ARITH MEAN * 2.00 * MEDIAN * 2.02 * STD DEV * 0.19 * RANGE * 1.72 TO 2.28 WITH 10 SAMPLES

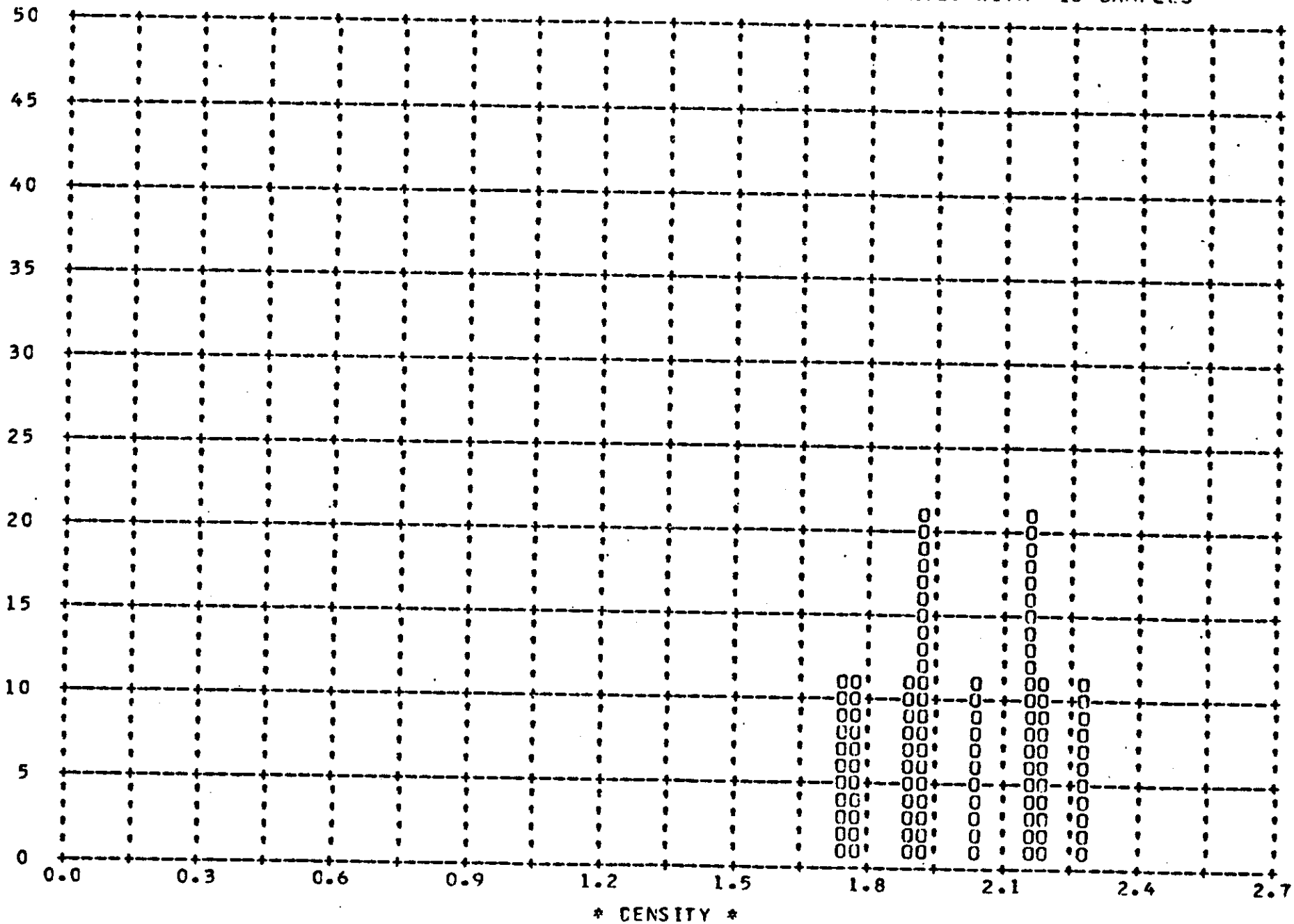

FIGURE A-2

MISSION * 1102-1 * INSTR * AFT * 2/14/68 PLOT OF D MIN * TERRAIN * PROCESSING * FULL

ARITH MEAN * 0.48 * MEDIAN * 0.45 * STD DEV * 0.15 * RANGE * 0.26 TO 1.12 WITH 191 SAMPLES

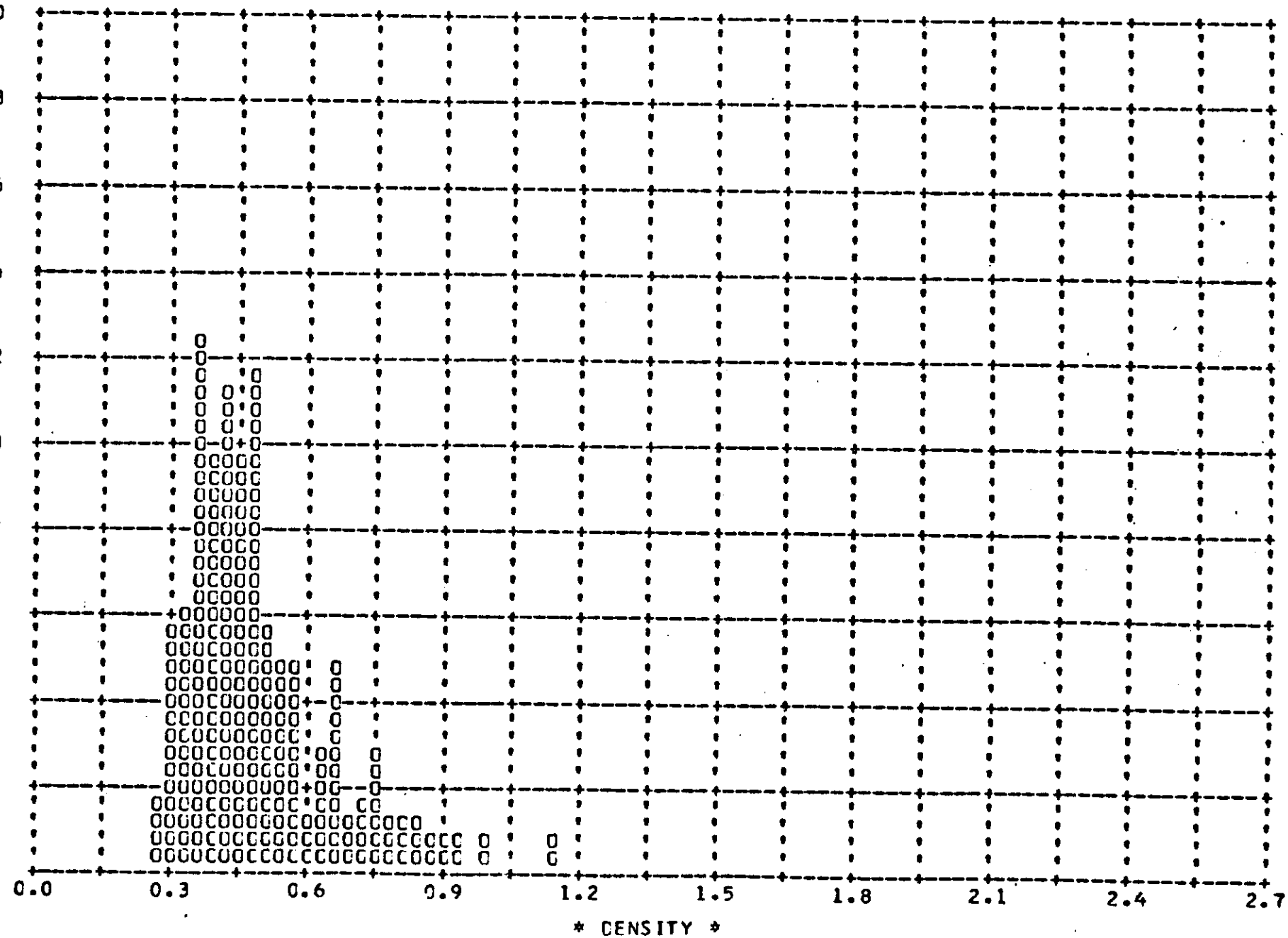

FIGURE A-2

MISSION * 1102-1 * INSTR * AFT * 2/14/68 PLOT OF D MAX * TERRAIN * PROCESSING * FULL

ARITH MEAN * 1.45 * MEDIAN * 1.46 * STD DEV * 0.45 * RANGE * 0.35 TO 2.41 WITH 191 SAMPLES

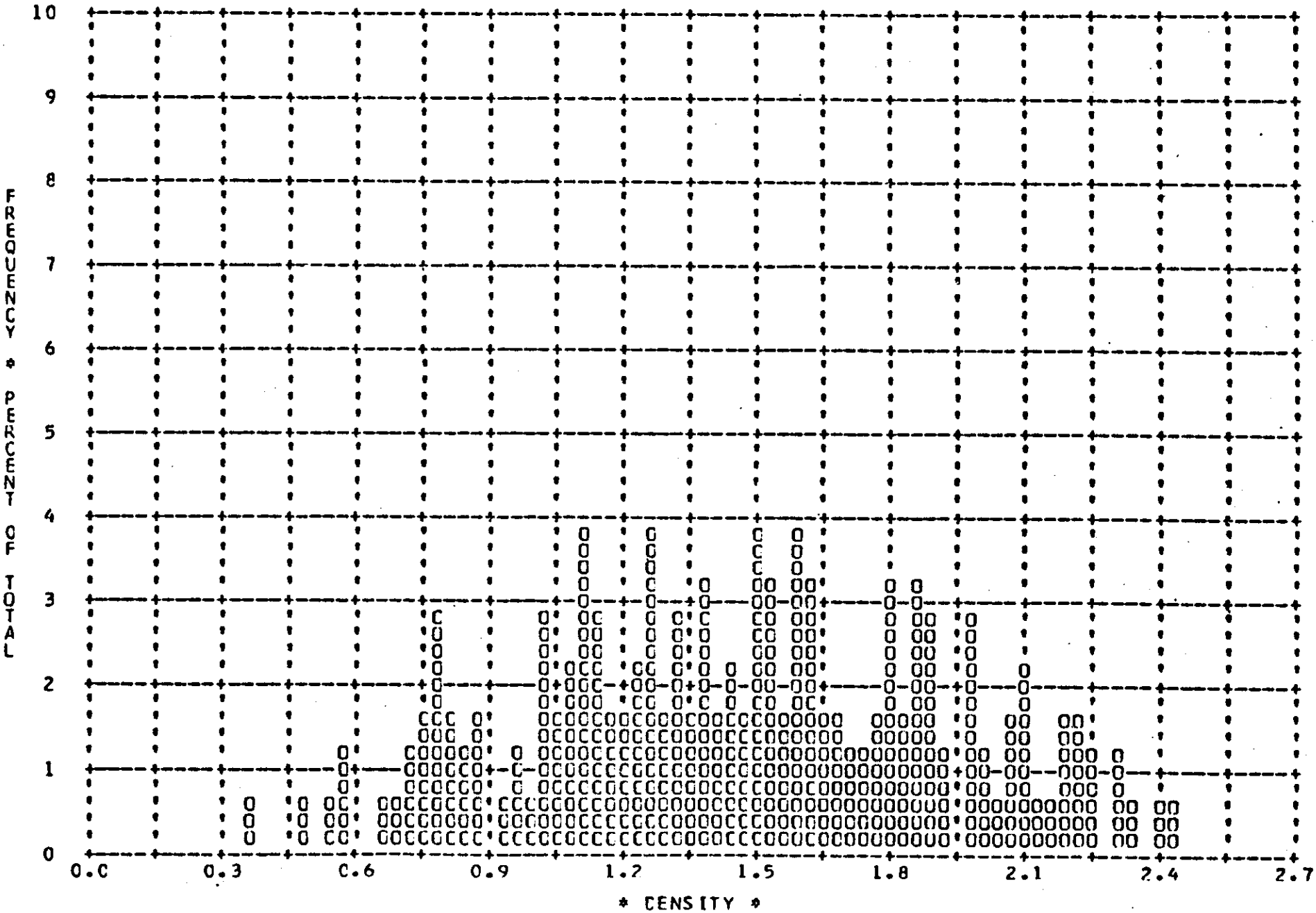

FIGURE A-2

~~TOP SECRET~~ C/[redacted]

MISSION * 1102-1 * INSTR * AFT * 2/14/68 PLOT OF D MAX * CLOUD * PROCESSING * FULL

ARITH MEAN * 2.01 * MEDIAN * 2.17 * STD DEV * 0.43 * RANGE * 0.68 TO 2.53 WITH 174 SAMPLES

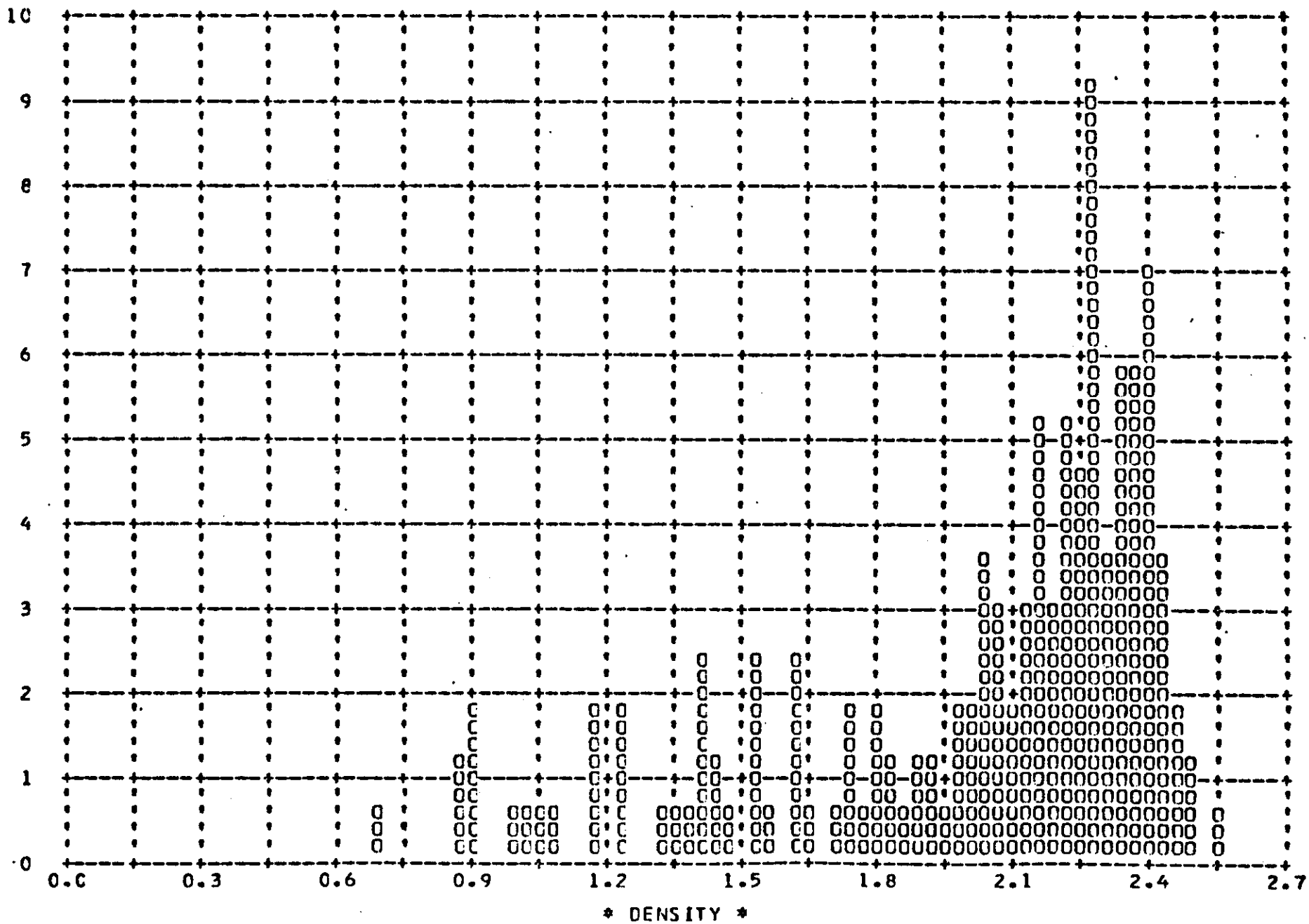

FIGURE A-2

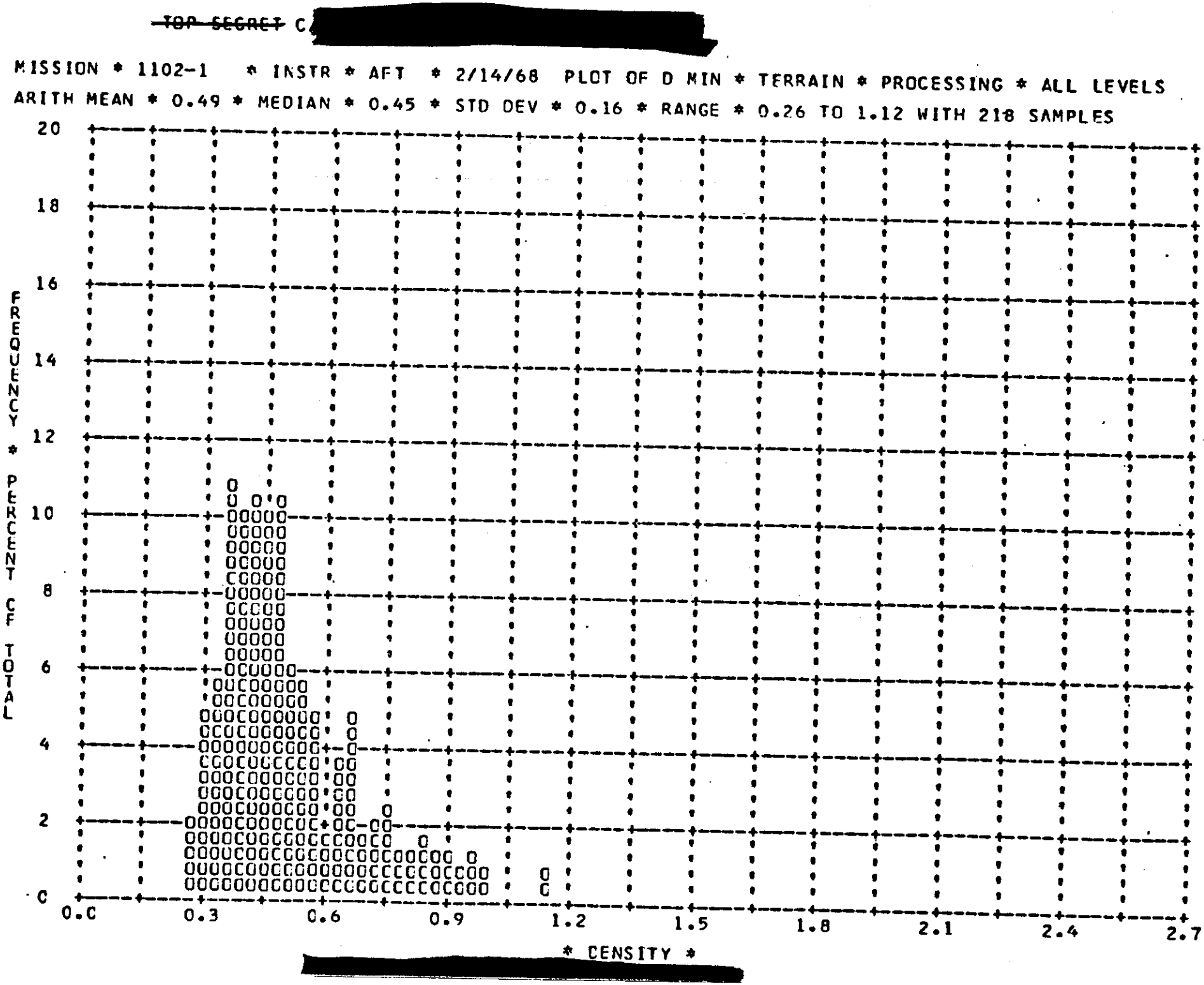
MISSION * 1102-1 * INSTR * AFT * 2/14/68 PLOT OF D MIN * TERRAIN * PROCESSING * ALL LEVELS
ARITH MEAN * 0.49 * MEDIAN * 0.45 * STD DEV * 0.16 * RANGE * 0.26 TO 1.12 WITH 218 SAMPLES
FREQUENCY * PERCENT OF TOTAL
20
18
16
14
12
10
8
6
4
2
0
0.0
0.3
0.6
0.9
1.2
1.5
1.8
2.1
2.4
2.7
* DENSITY *
[redacted]

FIGURE A-2

MISSION * 1102-1 * INSTR * AFT * 2/14/68 PLOT OF D MAX * TERRAIN * PROCESSING * ALL LEVELS

ARITH MEAN * 1.47 * MEDIAN * 1.50 * STD DEV * 0.43 * RANGE * 0.35 TO 2.41 WITH 218 SAMPLES

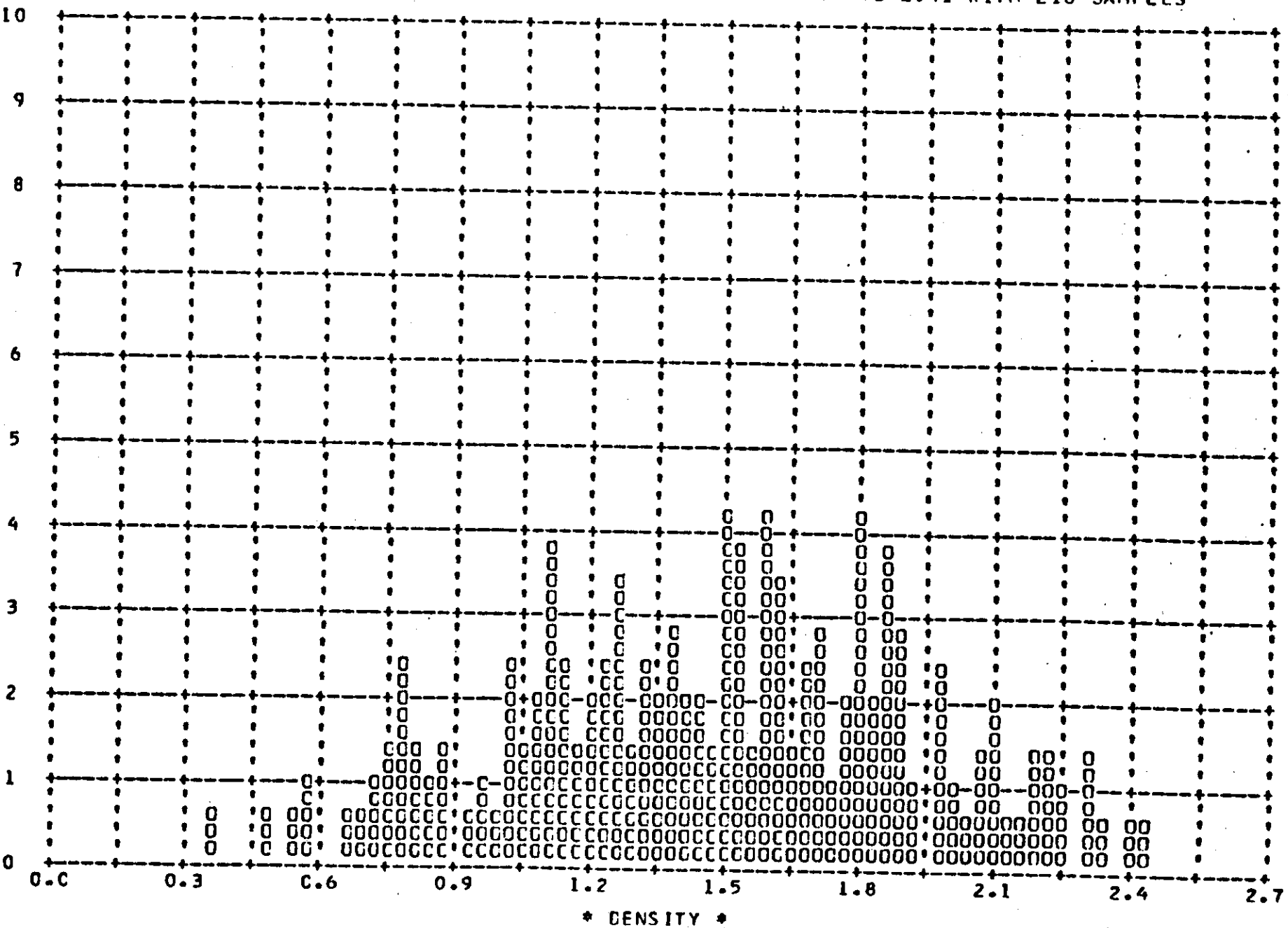

FIGURE A-2

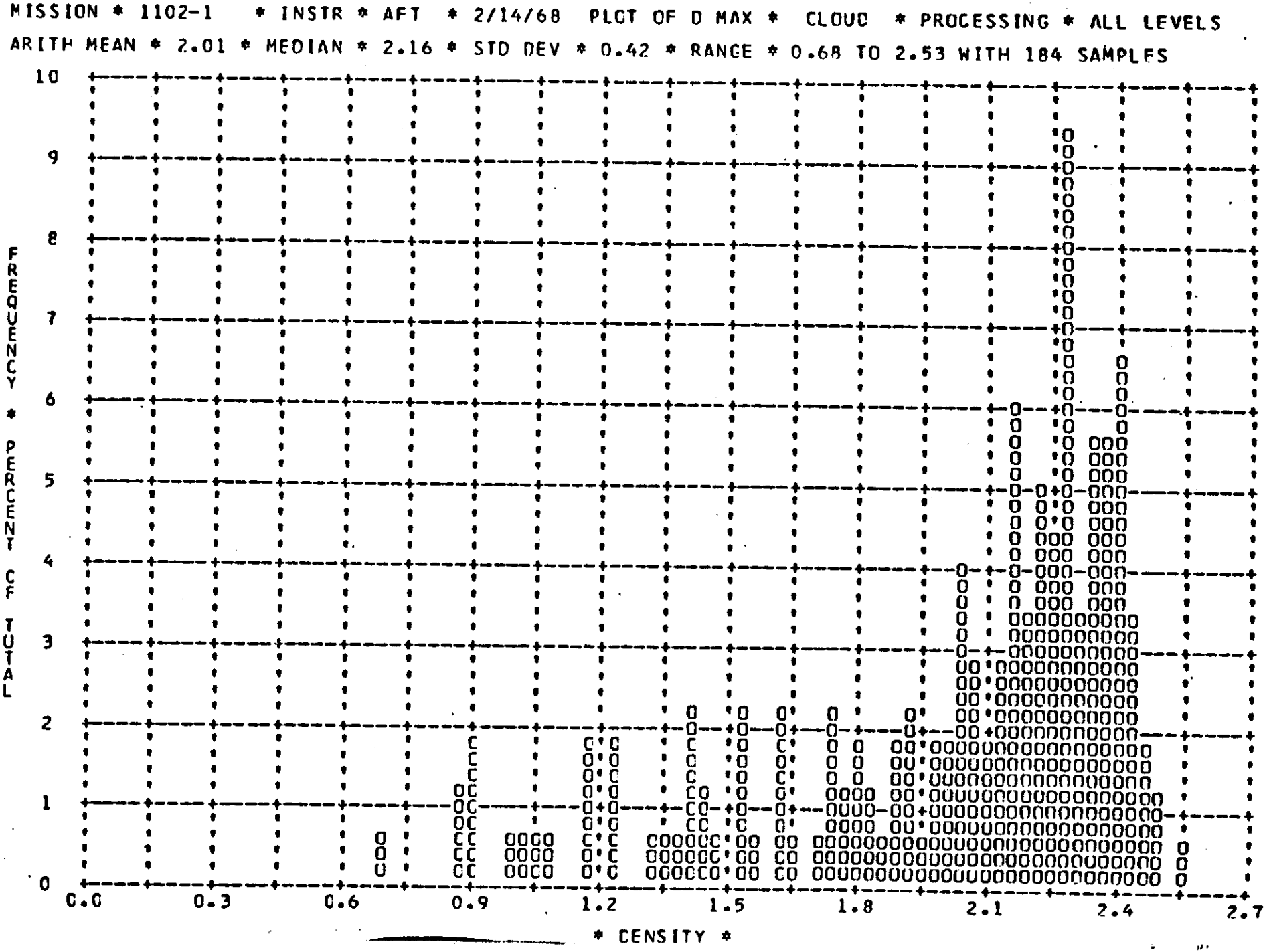
MISSION * 1102-1 * INSTR * AFT * 2/14/68 PLOT OF D MAX * CLOUD * PROCESSING * ALL LEVELS
ARITH MEAN * 2.01 * MEDIAN * 2.16 * STD DEV * 0.42 * RANGE * 0.68 TO 2.53 WITH 184 SAMPLES
FREQUENCY * PERCENT OF TOTAL
10
9
8
7
6
5
4
3
2
1
0
0.0
0.3
0.6
0.9
1.2
1.5
1.8
2.1
2.4
2.7
* DENSITY *

FIGURE A-2

MISSION * 1102-2 * INSTR * FWD * 3404 PLOT OF D MIN * TERRAIN * PROCESSING * INTERMEDIATE

ARITH MEAN * 0.69 * MEDIAN * 0.57 * STD DEV * 0.33 * RANGE * 0.30 TO 1.43 WITH 16 SAMPLES

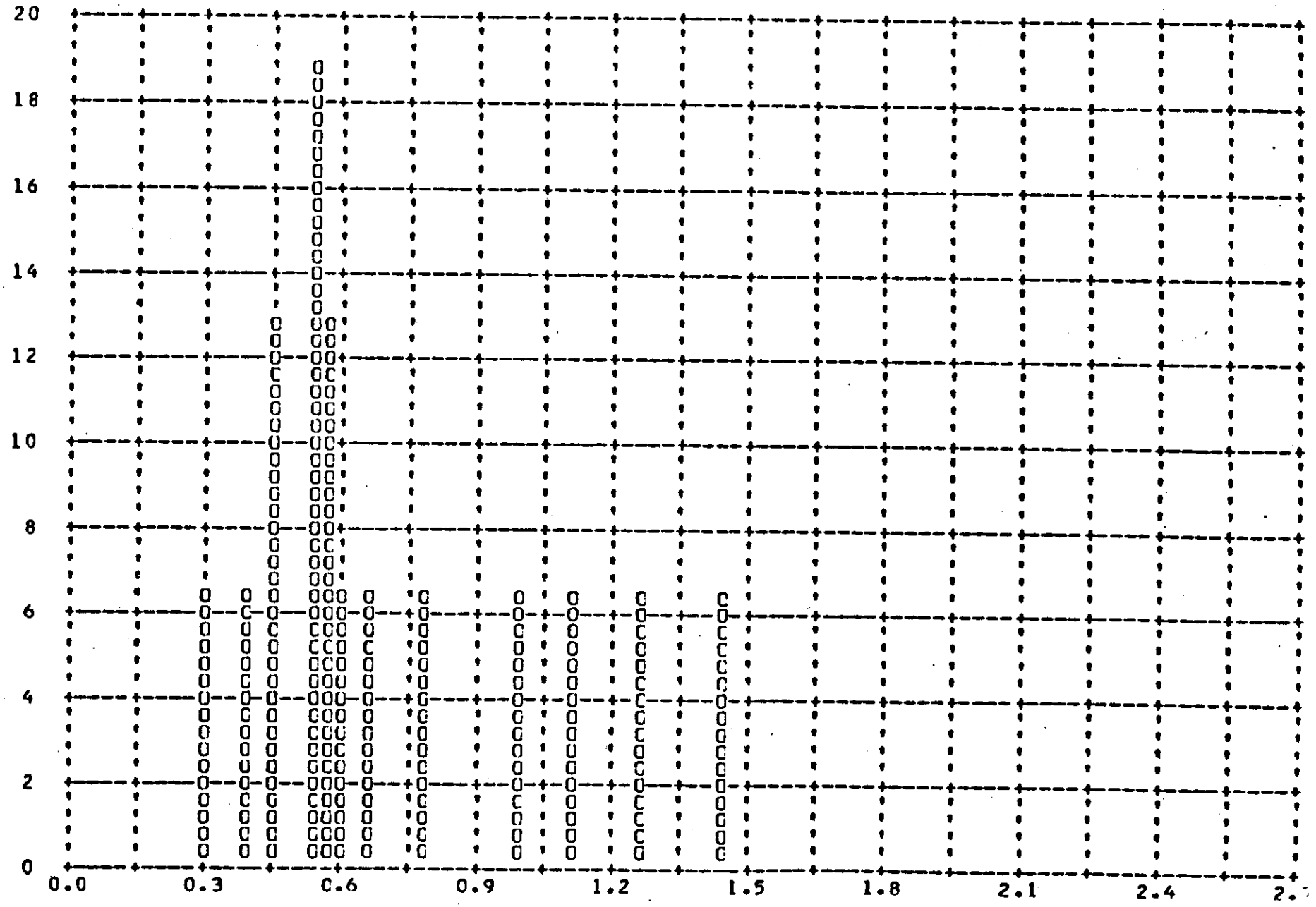

FIGURE A-3

~~TOP SECRET~~ C[redacted]

MISSION * 1102-2 * INSTR * FWD * 3404 PLOT OF D MAX * TERRAIN * PROCESSING * INTERMEDIATE

ARITH MEAN * 1.57 * MEDIAN * 1.61 * STD DEV * 0.13 * RANGE * 1.28 TO 1.76 WITH 16 SAMPLES

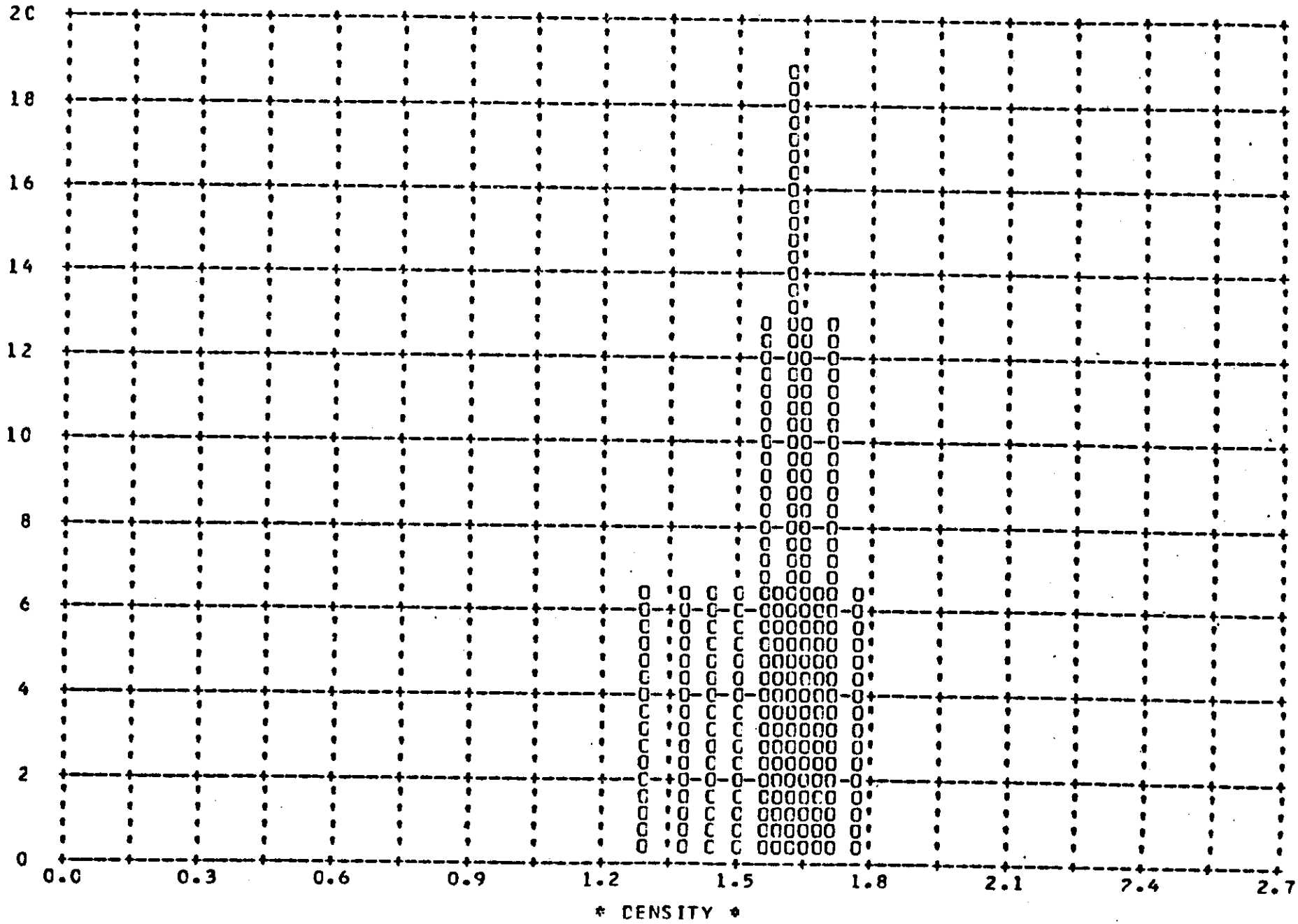

FIGURE A-3

MISSION * 1102-2 * INSTR * FWD * 3404 PLOT OF D MAX * CLOUD * PROCESSING * INTERMEDIATE

ARITH MEAN * 1.81 * MEDIAN * 1.79 * STD DEV * 0.16 * RANGE * 1.59 TO 2.03 WITH 9 SAMPLES

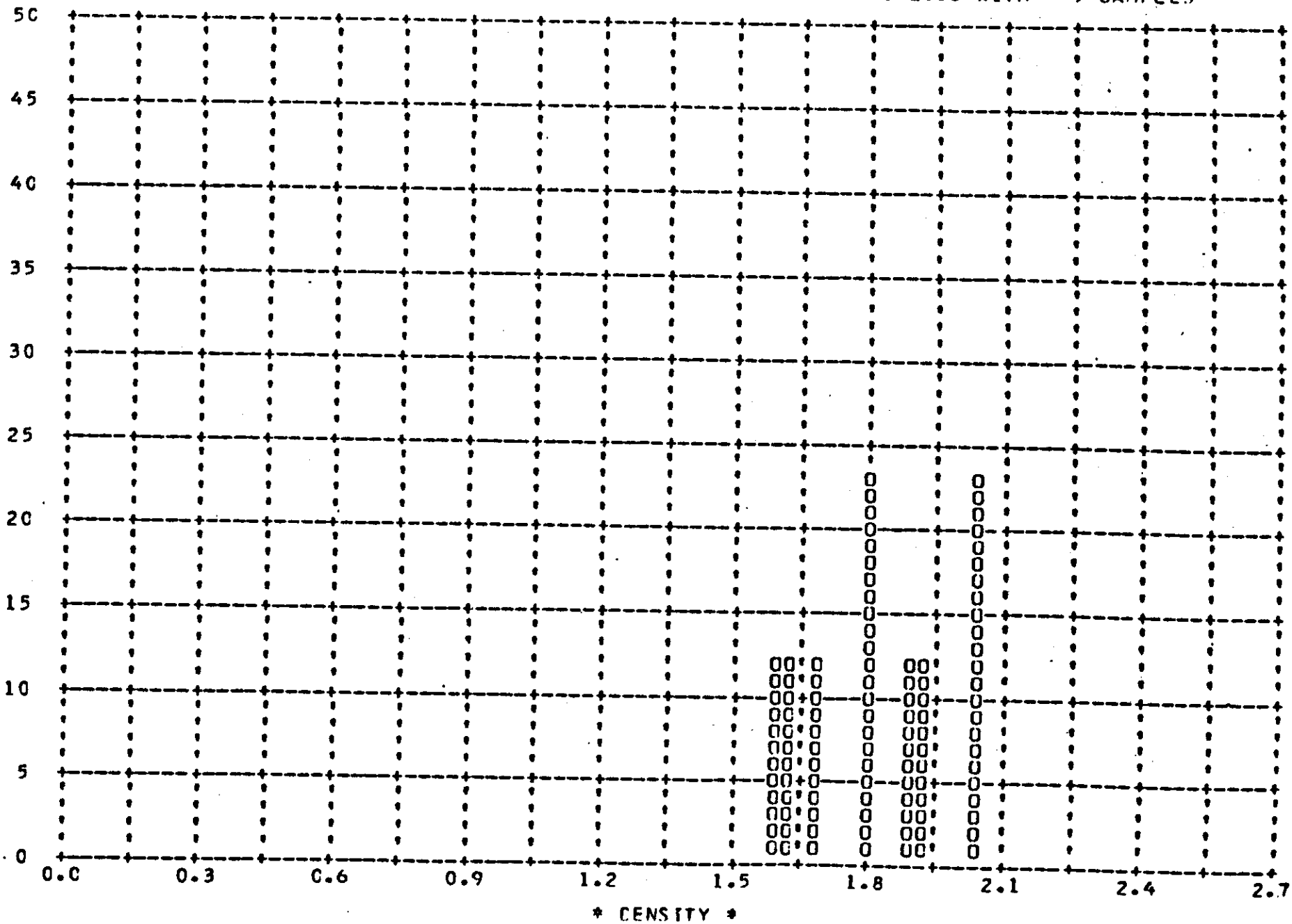

FIGURE A-3

MISSION * 1102-2 * INSTR * FWD * 3404 PLOT OF D MIN * TERRAIN * PROCESSING * FULL

ARITH MEAN * 0.43 * MEDIAN * 0.38 * STD DEV * 0.15 * RANGE * 0.27 TO 1.11 WITH 188 SAMPLES

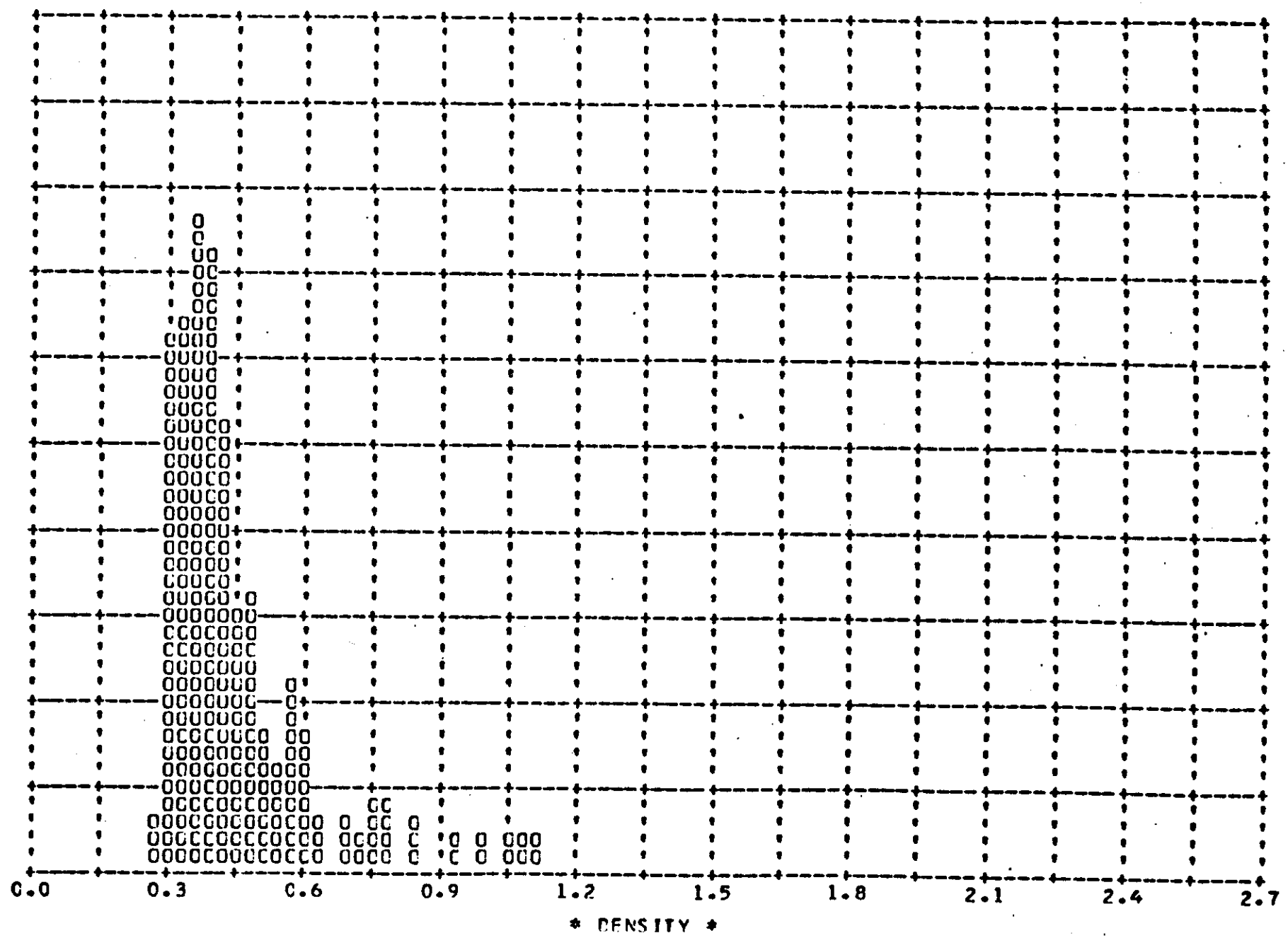

FIGURE A-3

MISSION * 1102-2 * INSTR * FWD * 3404 PLOT OF D MAX * TERRAIN * PROCESSING * FULL

ARITH MEAN * 1.47 * MEDIAN * 1.46 * STD DEV * 0.39 * RANGE * 0.54 TO 2.28 WITH 188. SAMPLES

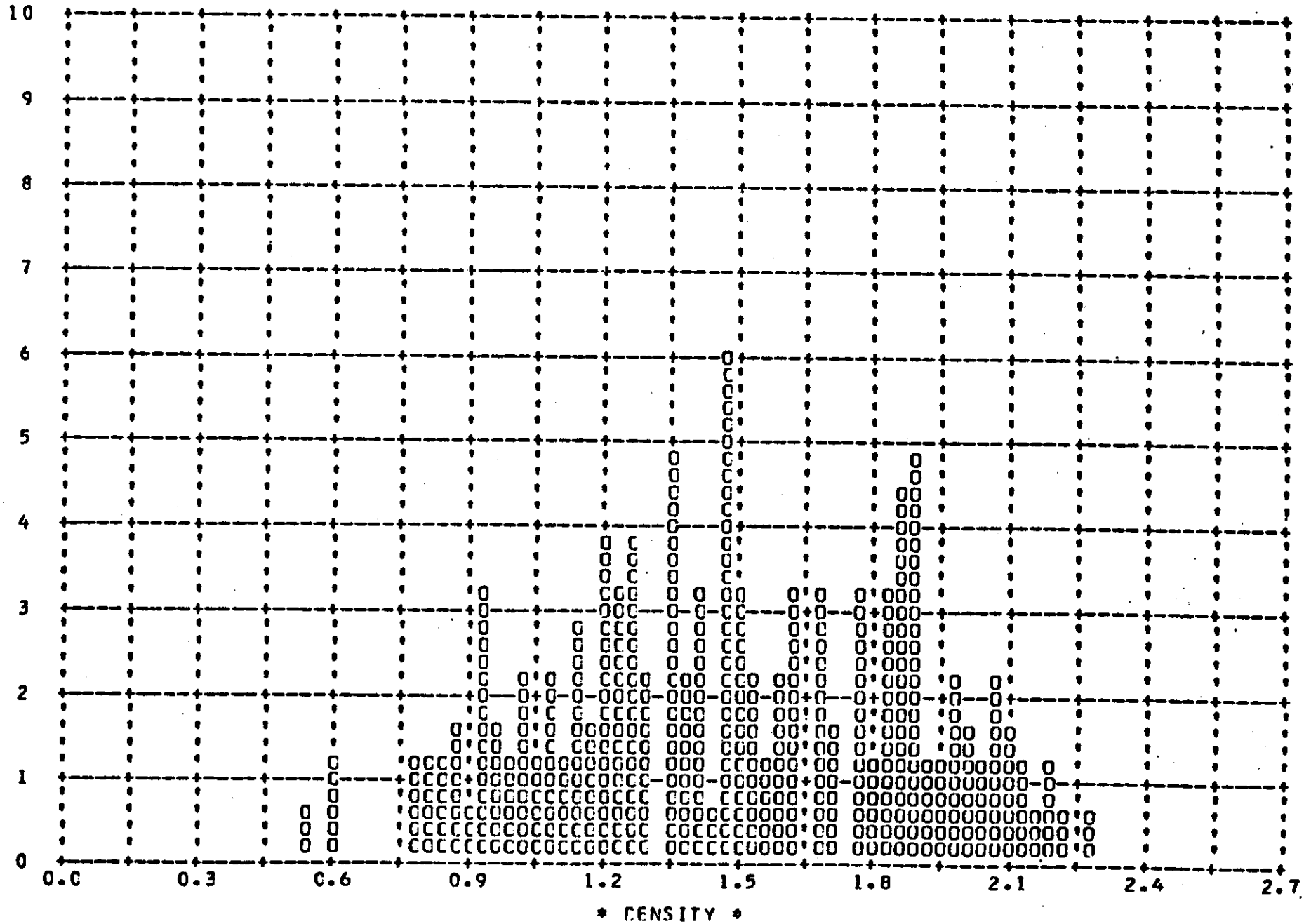

FIGURE A-3.

MISSION * 1102-2 * INSTR * FWD * 3404 PLOT OF D MAX * CLOUD * PROCESSING * FULL

ARITH MEAN * 1.92 * MEDIAN * 1.99 * STD DEV * 0.30 * RANGE * 0.93 TO 2.40 WITH 120. SAMPLES

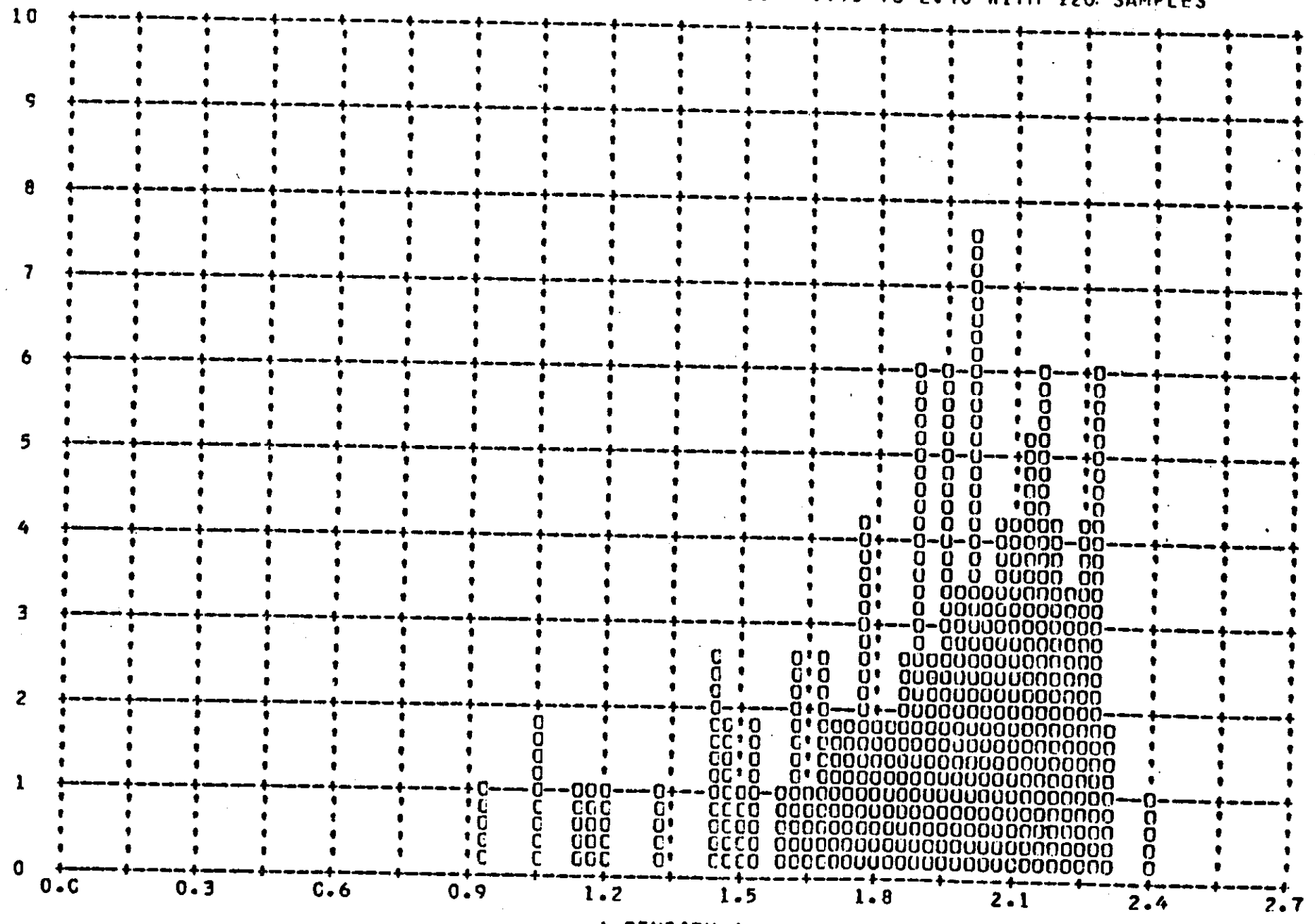

FIGURE A-3

MISSION * 1102-2 * INSTR * FWD * 3404 PLOT OF D MIN * TERRAIN * PROCESSING * ALL LEVELS

ARITH MEAN * 0.45 * MEDIAN * 0.39 * STD DEV * 0.19 * RANGE * 0.27 TO 1.43 WITH 204 SAMPLES

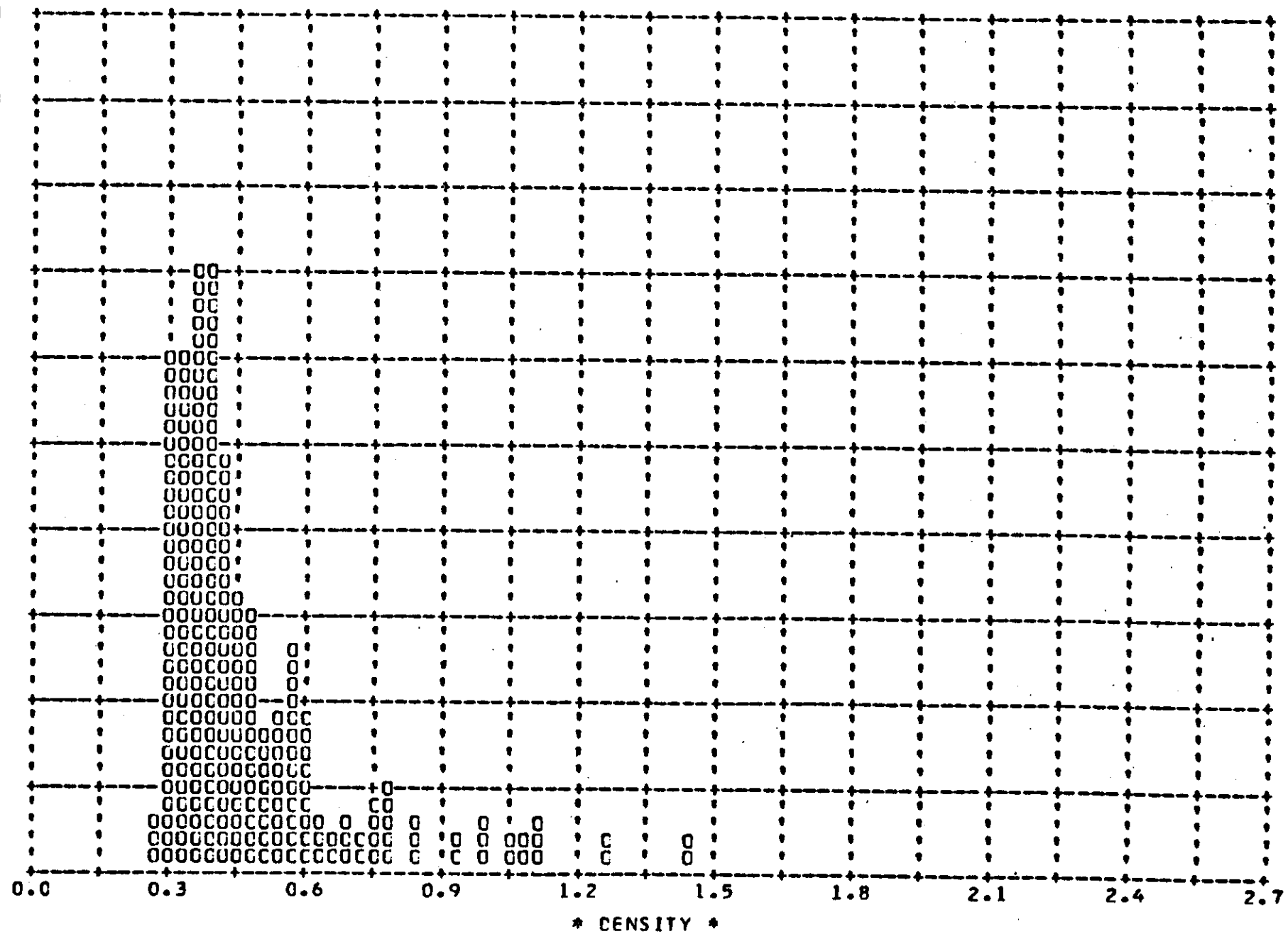

FIGURE A-3

MISSION * 1102-2 * INSTR * FWD * 3404 PLOT OF D MAX * CLOUD * PROCESSING * ALL LEVELS

ARITH MEAN * 1.91 * MEDIAN * 1.98 * STD DEV * 0.30 * RANGE * 0.93 TO 2.40 WITH 129 SAMPLES

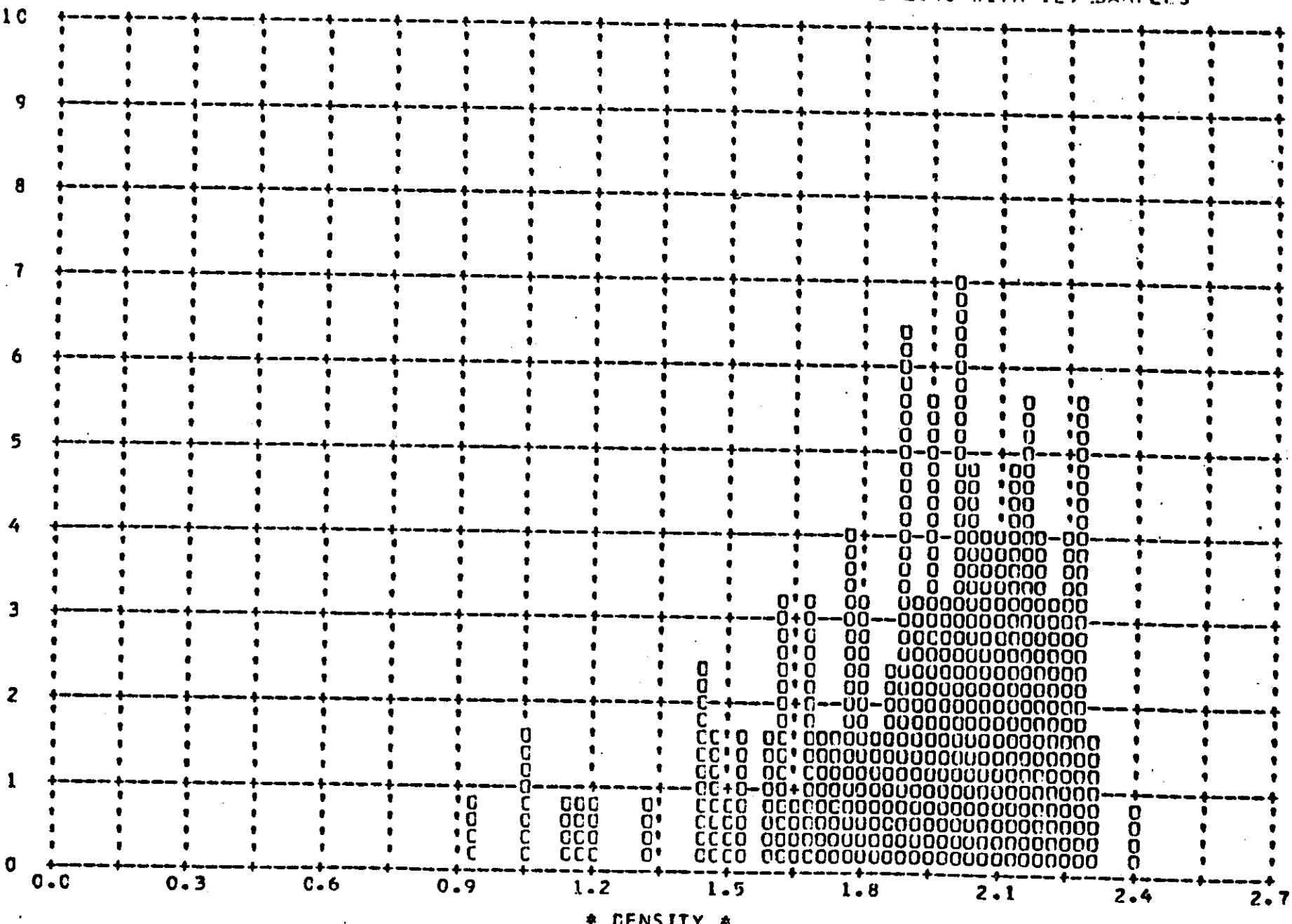

FIGURE A-3

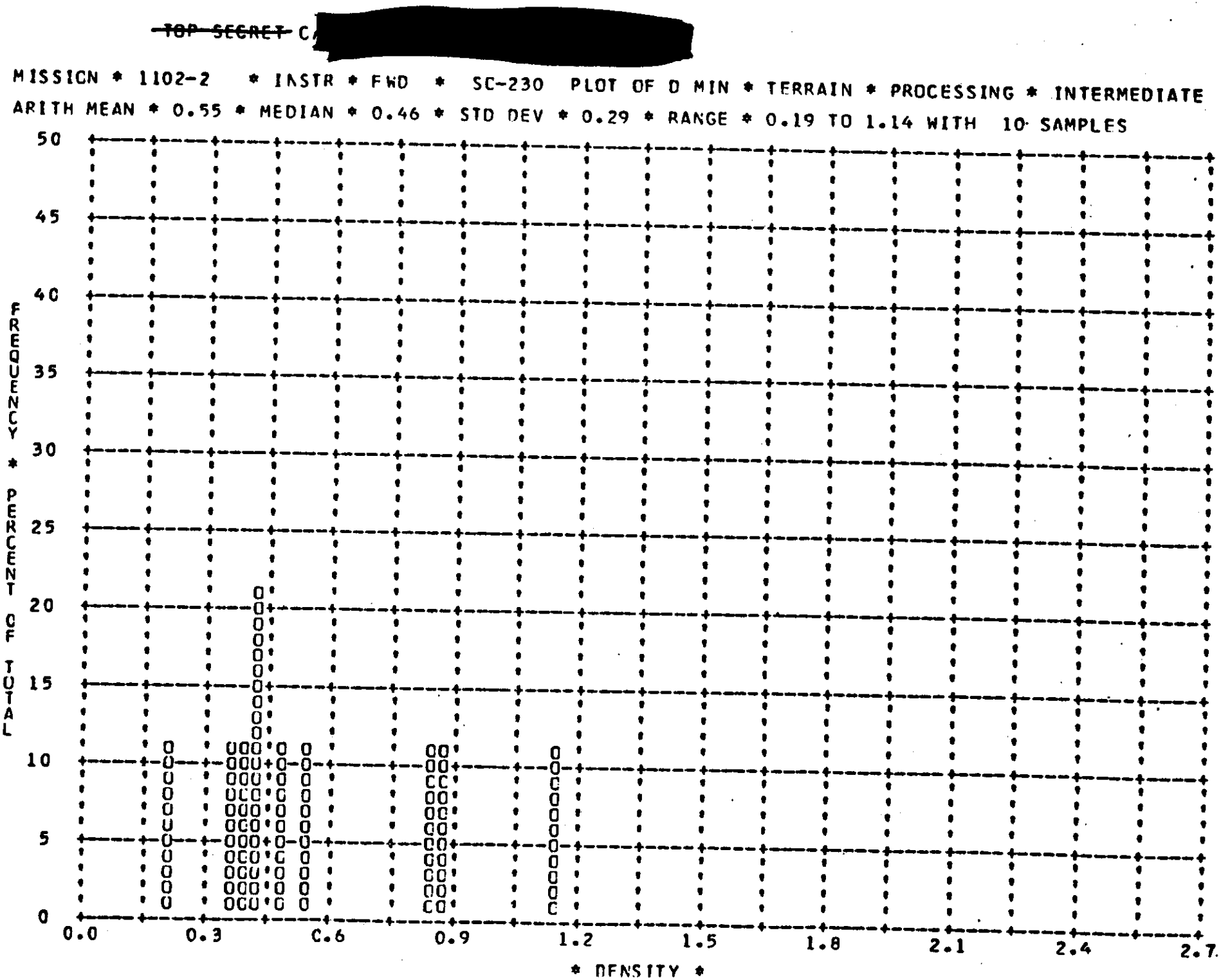
MISSION * 1102-2 * INSTR * FWD * SC-230 PLOT OF D MIN * TERRAIN * PROCESSING * INTERMEDIATE
ARITH MEAN * 0.55 * MEDIAN * 0.46 * STD DEV * 0.29 * RANGE * 0.19 TO 1.14 WITH 10 SAMPLES
FREQUENCY * PERCENT OF TOTAL
50
45
40
35
30
25
20
15
10
5
0
0.0
0.3
0.6
0.9
1.2
1.5
1.8
2.1
2.4
2.7
* DENSITY *

FIGURE A-4

MISSION * 1102-2 * INSTR * FWD * SC-230 PLOT OF D MAX * TERRAIN * PROCESSING * INTERMEDIATE

ARITH MEAN * 1.42 * MEDIAN * 1.44 * STD DEV * 0.29 * RANGE * 1.04 TO 1.97 WITH 10 SAMPLES

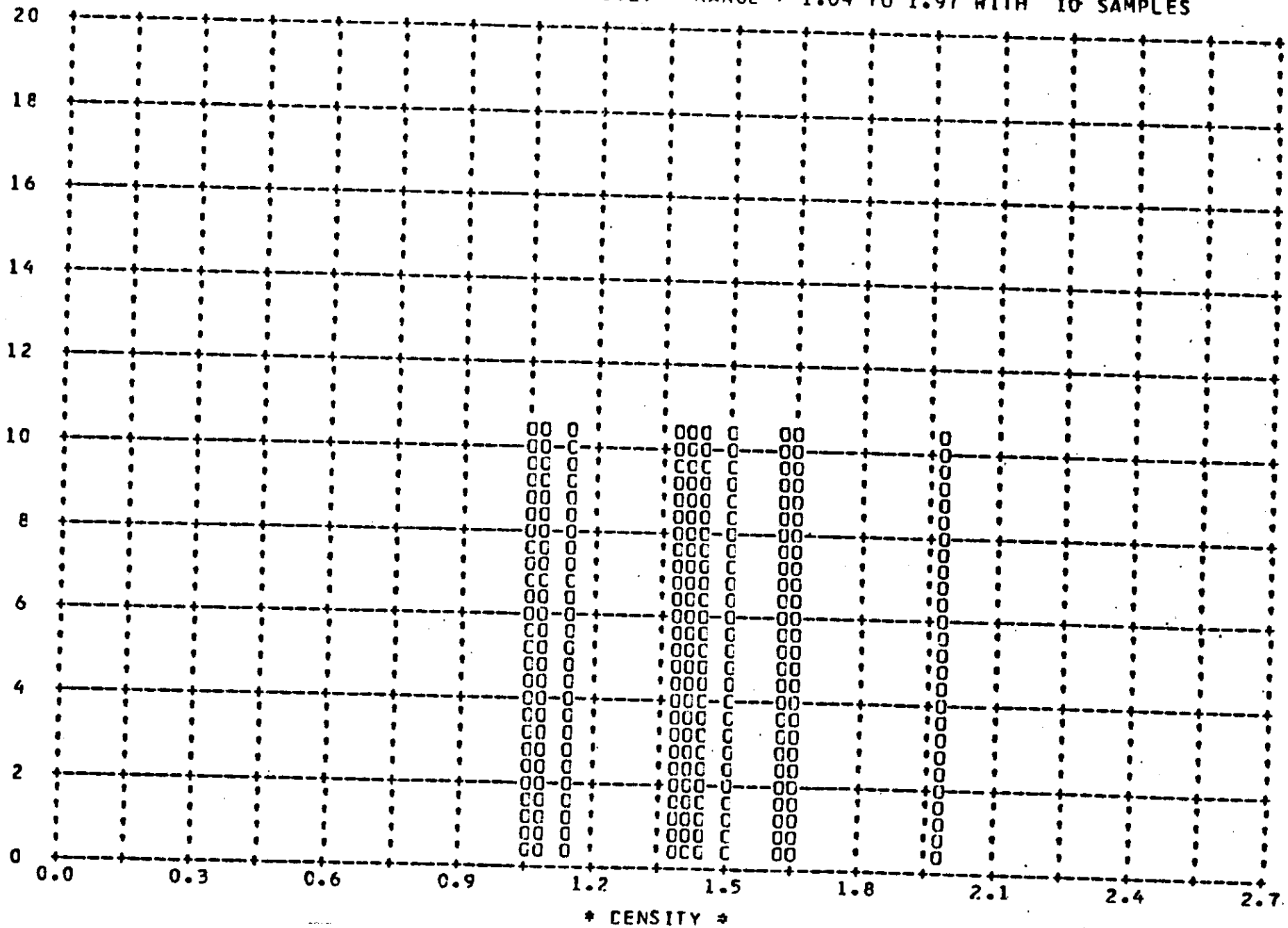

FIGURE A-4

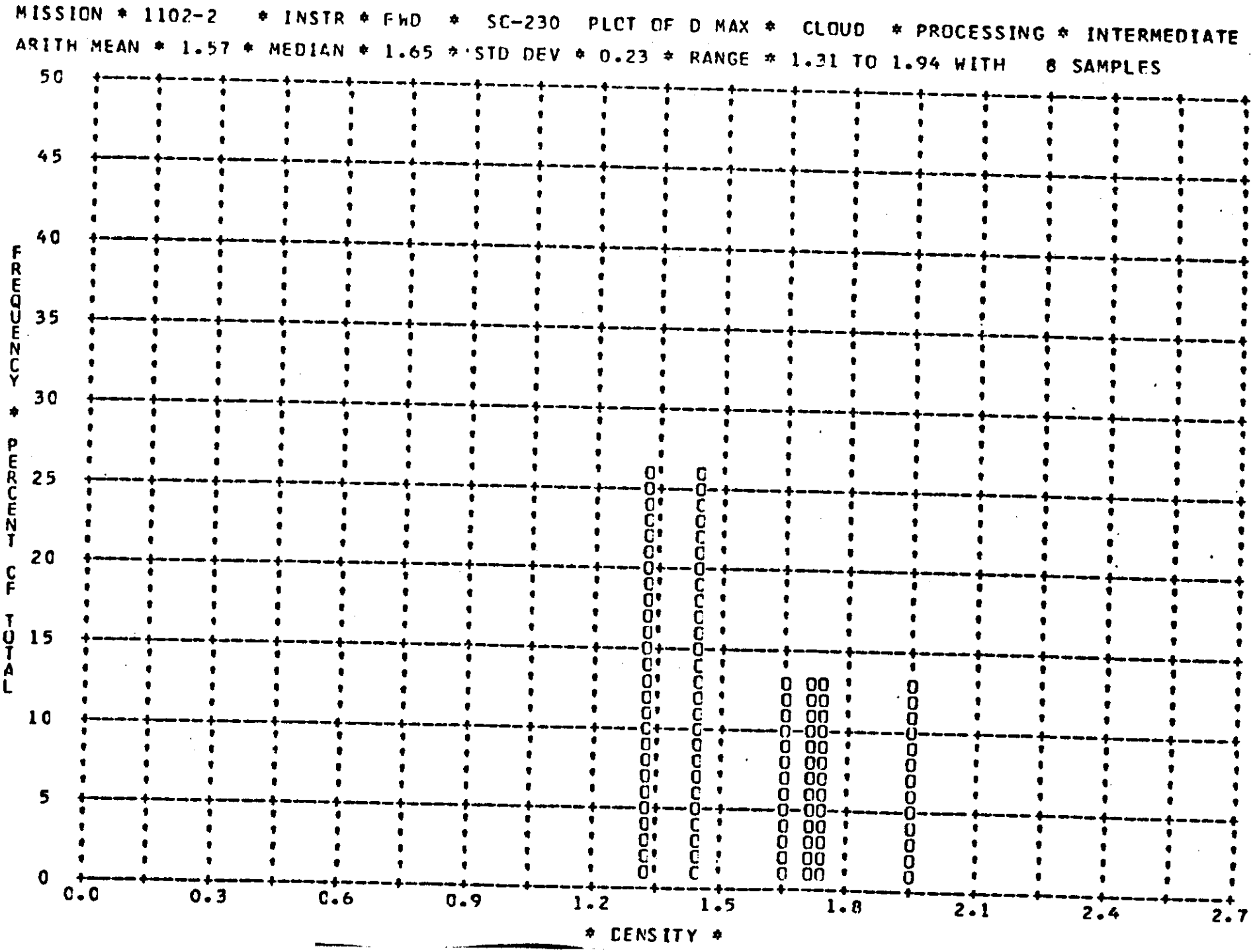
MISSION * 1102-2 * INSTR * FWD * SC-230 PLOT OF D MAX * CLOUD * PROCESSING * INTERMEDIATE
ARITH MEAN * 1.57 * MEDIAN * 1.65 * STD DEV * 0.23 * RANGE * 1.31 TO 1.94 WITH 8 SAMPLES
FREQUENCY * PERCENT OF TOTAL
50
45
40
35
30
25
20
15
10
5
0
0.0
0.3
0.6
0.9
1.2
1.5
1.8
2.1
2.4
2.7
* DENSITY *

FIGURE A-4

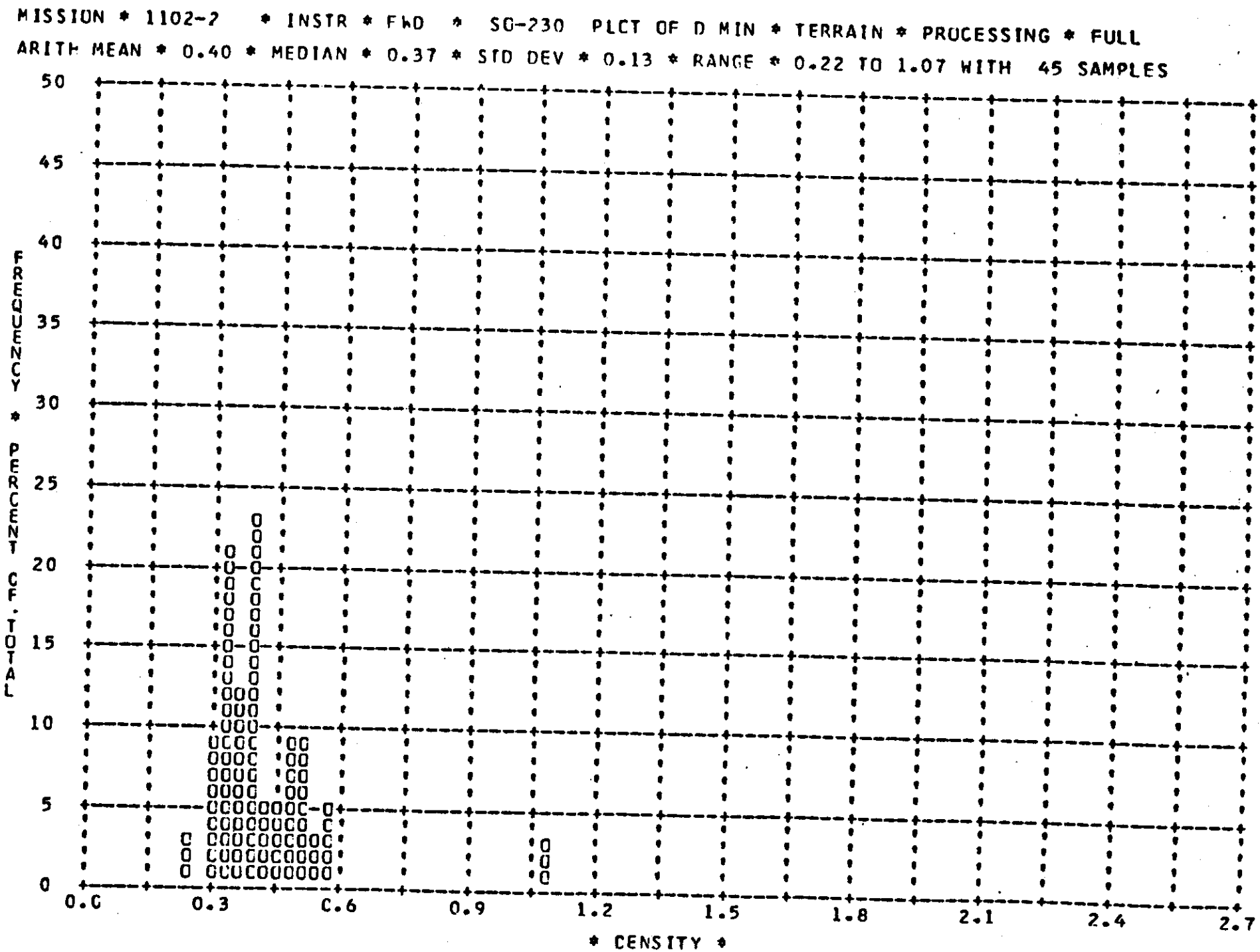
MISSION * 1102-2 * INSTR * FWD * SO-230 PLOT OF D MIN * TERRAIN * PROCESSING * FULL
ARITH MEAN * 0.40 * MEDIAN * 0.37 * STD DEV * 0.13 * RANGE * 0.22 TO 1.07 WITH 45 SAMPLES
FREQUENCY * PERCENT OF TOTAL
50
45
40
35
30
25
20
15
10
5
0
0.0
0.3
0.6
0.9
1.2
1.5
1.8
2.1
2.4
2.7
* DENSITY *

FIGURE A-4

~~TOP SECRET~~ C[redacted]

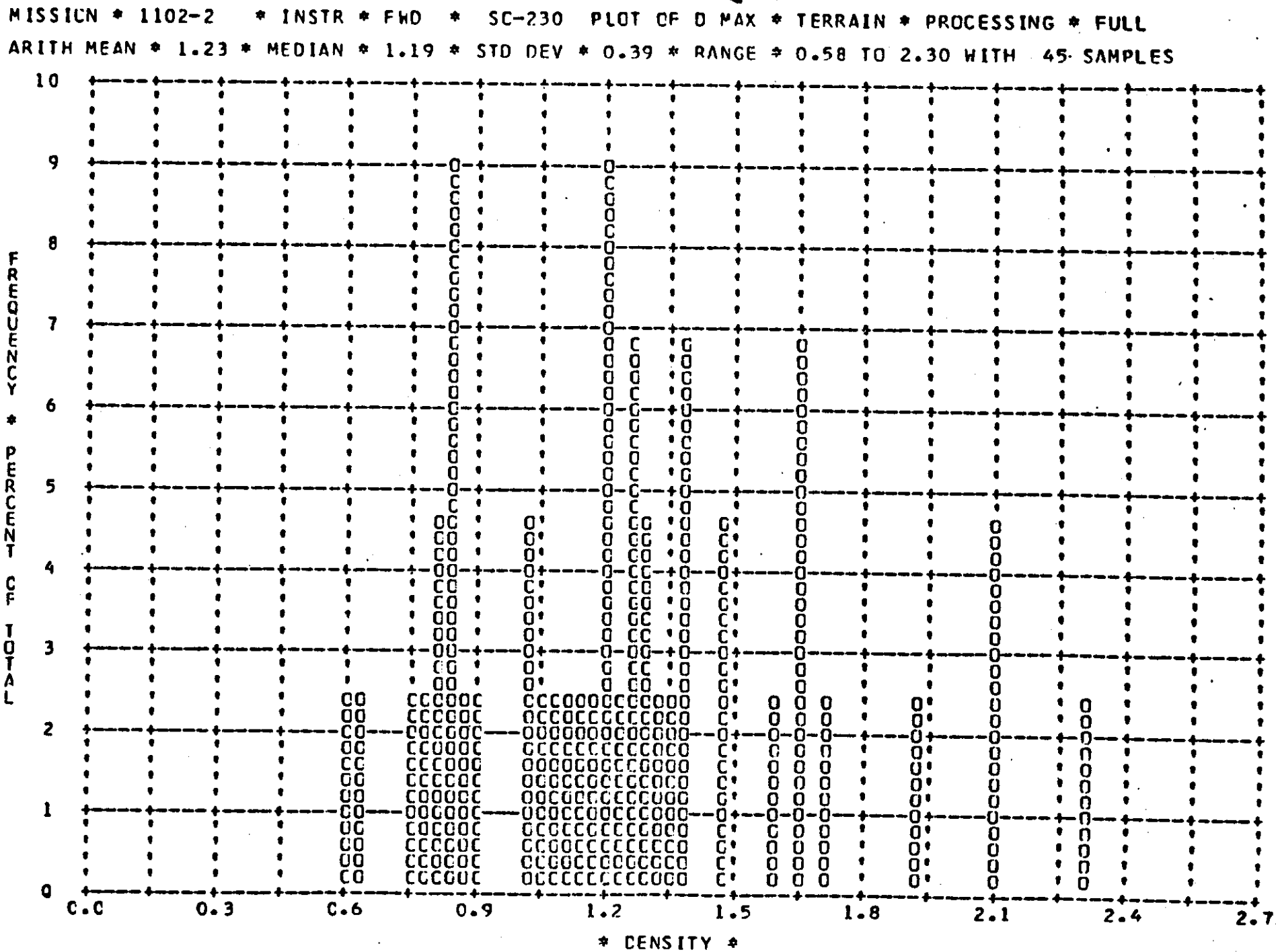

FIGURE A-4

~~TOP SECRET~~ C/[redacted]

MISSION * 1102-2 * INSTR * FWD * SC-230 PLOT OF D MAX * CLOUD * PROCESSING * FULL

ARITH MEAN * 2.02 * MEDIAN * 2.14 * STD DEV * 0.39 * RANGE * 0.60 TO 2.42 WITH 46 SAMPLES

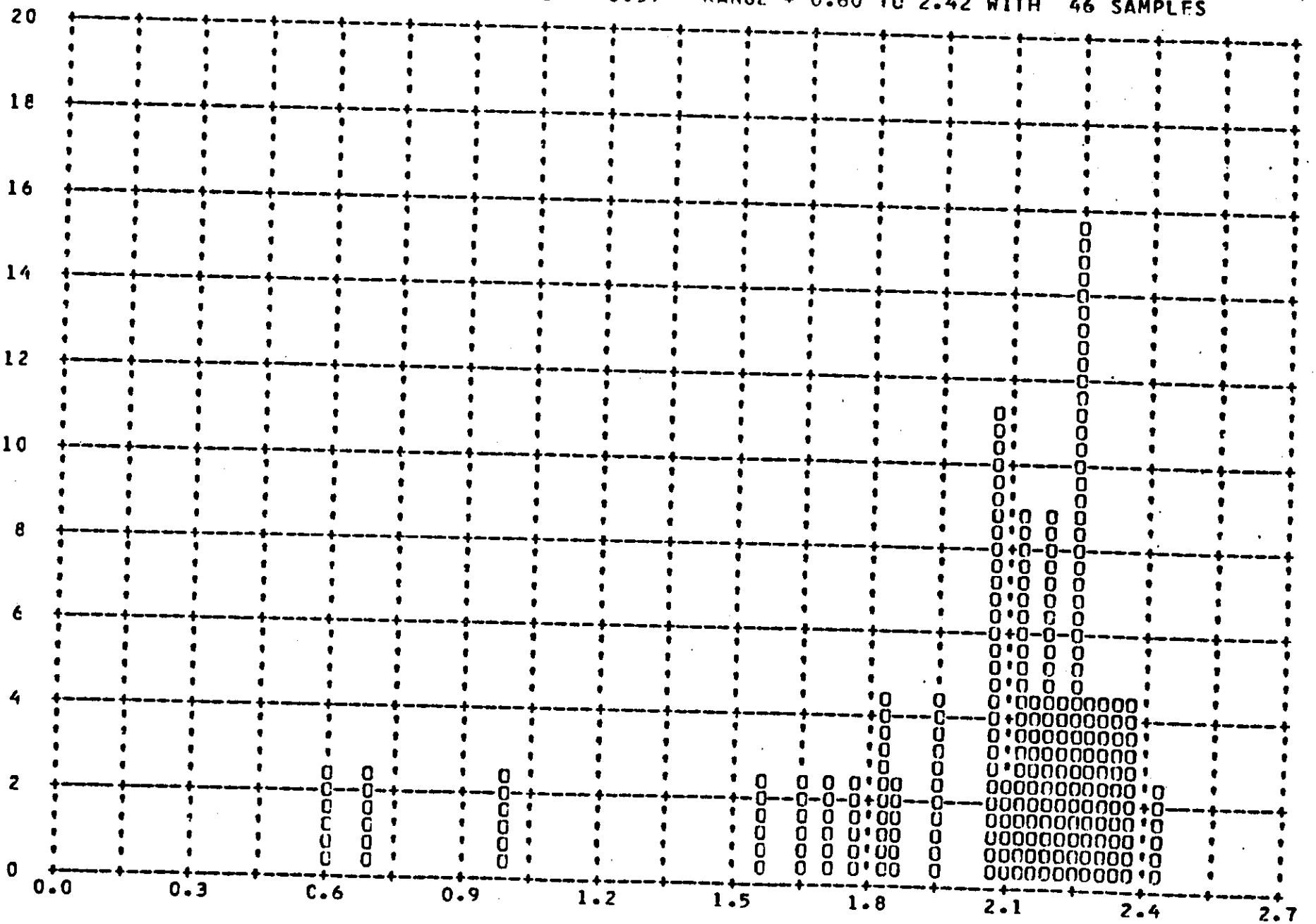

FIGURE A-4

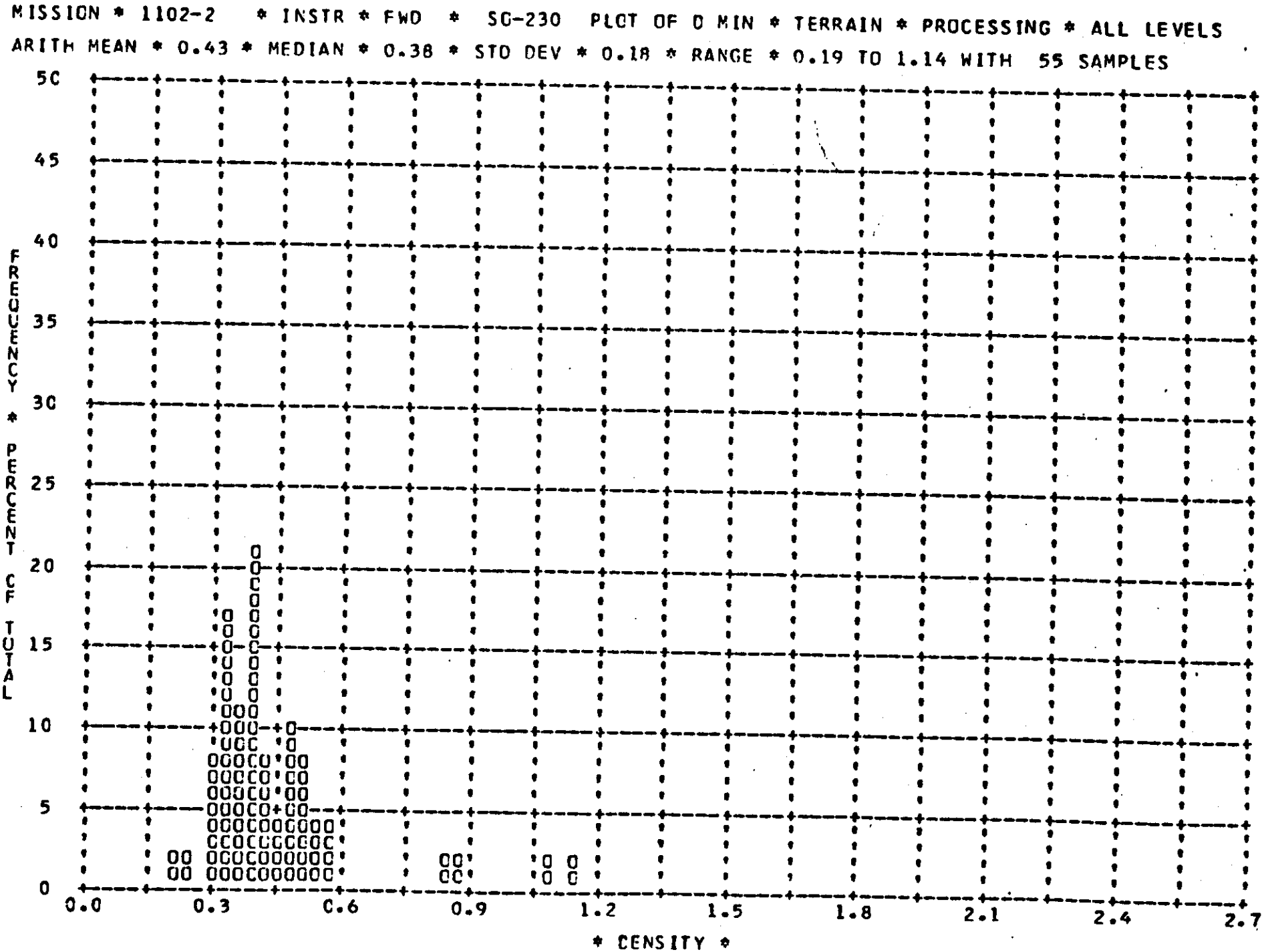
MISSION * 1102-2 * INSTR * FWD * SG-230 PLOT OF D MIN * TERRAIN * PROCESSING * ALL LEVELS
ARITH MEAN * 0.43 * MEDIAN * 0.38 * STD DEV * 0.18 * RANGE * 0.19 TO 1.14 WITH 55 SAMPLES
FREQUENCY * PERCENT OF TOTAL
50
45
40
35
30
25
20
15
10
5
0
0.0
0.3
0.6
0.9
1.2
1.5
1.8
2.1
2.4
2.7
* DENSITY *

FIGURE A-4

~~TOP SECRET~~ C[redacted]

MISSION * 1102-2 * INSTR * FWD * SC-230 PLOT OF D MAX * TERRAIN * PROCESSING * ALL LEVELS

ARITH MEAN * 1.26 * MEDIAN * 1.24 * STD DEV * 0.38 * RANGE * 0.58 TO 2.30 WITH 55 SAMPLES

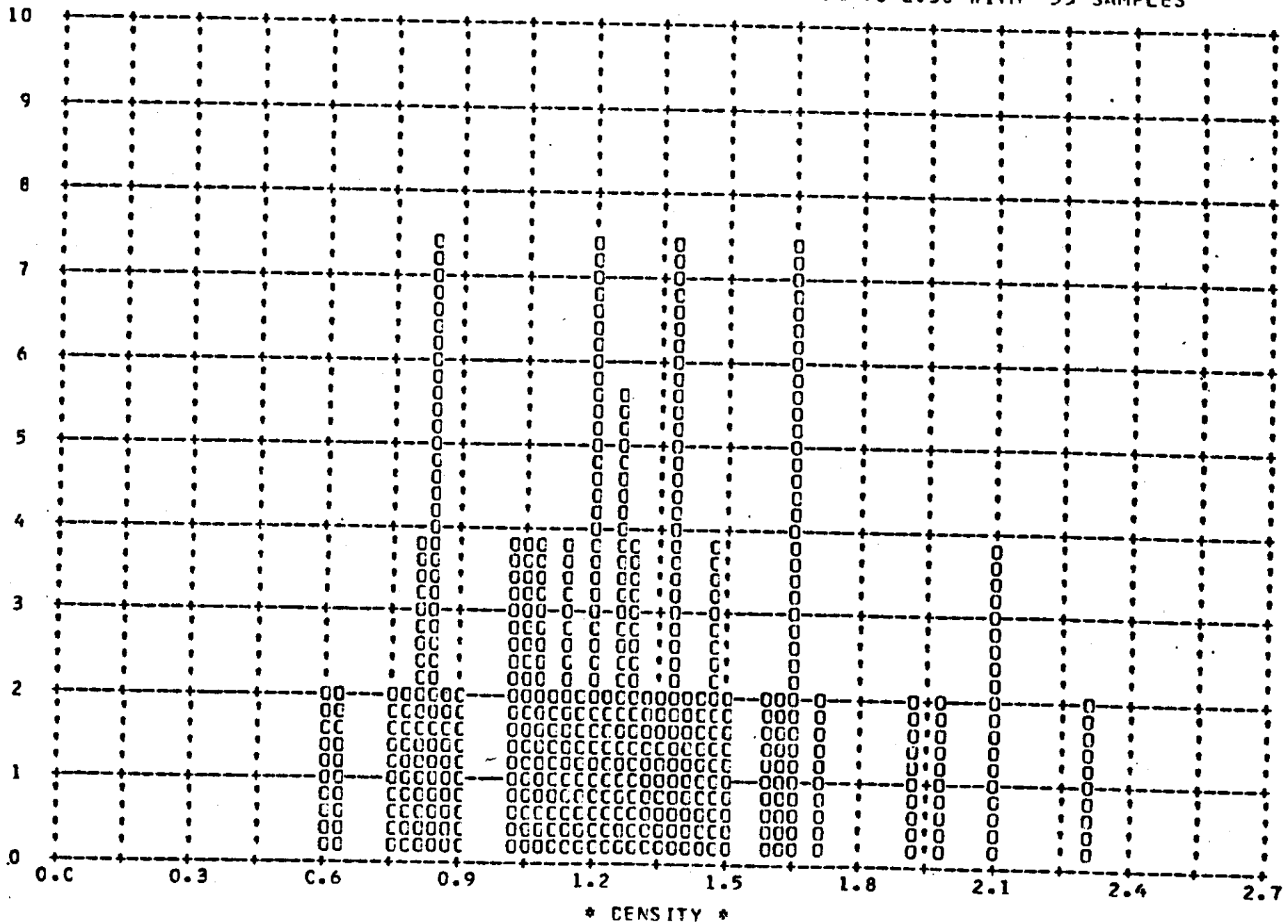

FIGURE A-4

~~TOP SECRET~~ C [redacted]

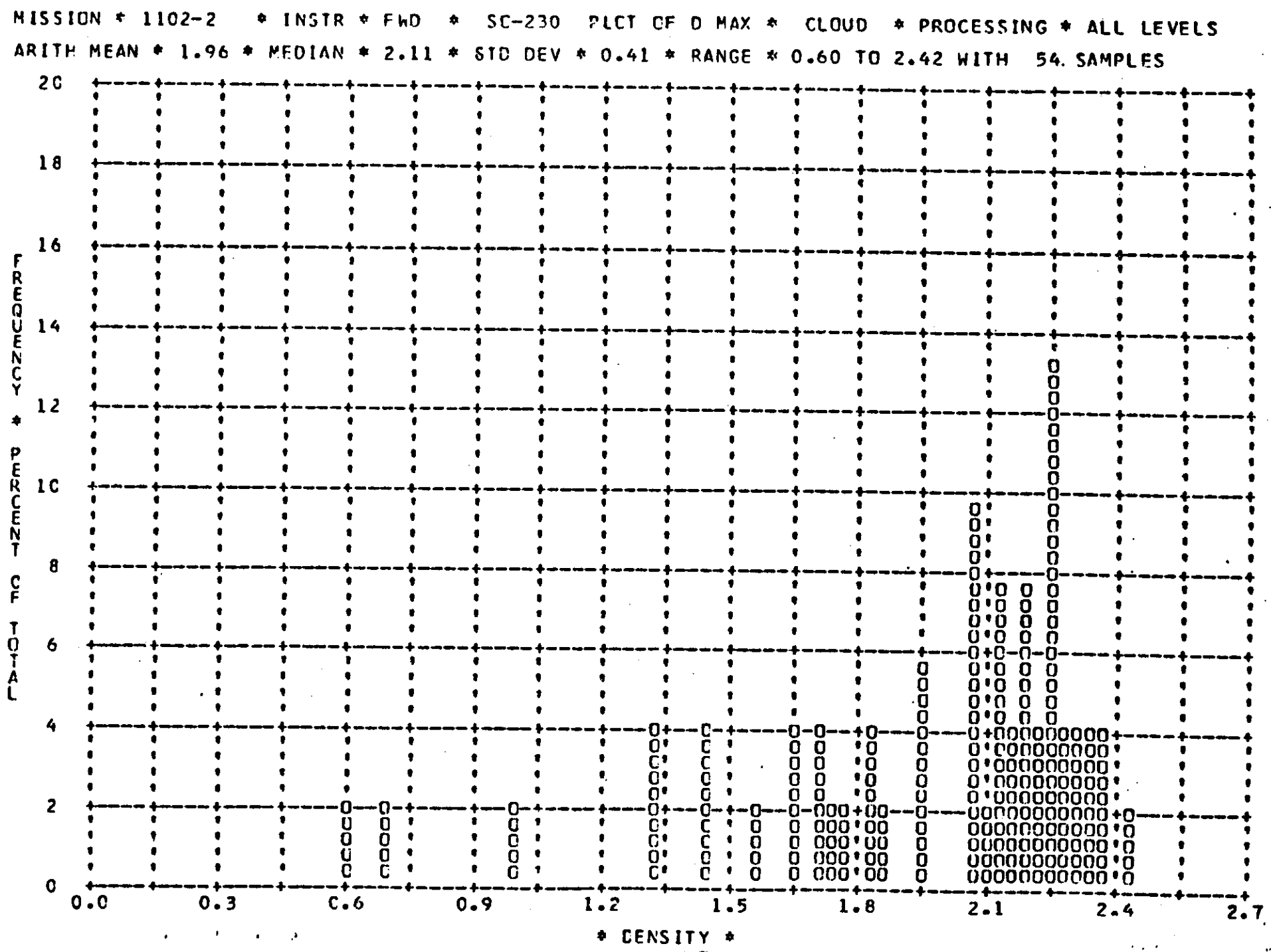

FIGURE A-4

~~TOP SECRET~~ C/[redacted]

MISSION * 1102-2 * INSTR * AFT * 3404 PLOT OF C MIN * TERRAIN * PROCESSING * INTERMEDIATE

ARITH MEAN * 0.78 * MEDIAN * 0.72 * STD DEV * 0.28 * RANGE * 0.40 TO 1.31 WITH 13 SAMPLES

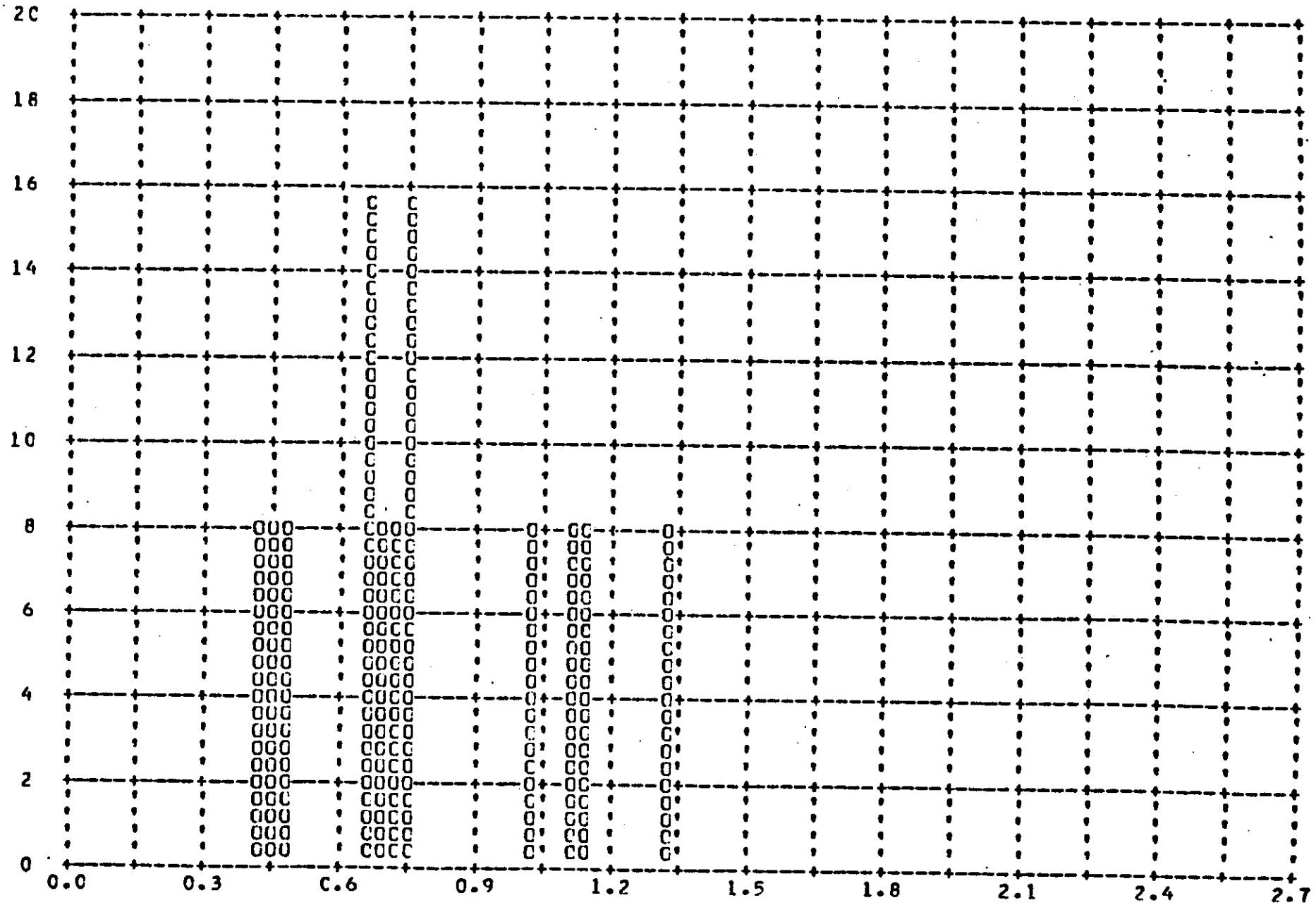

FIGURE A-5

~~TOP SECRET~~ C[redacted]

MISSION * 1102-2 * INSTR * AFT * 3404 PLOT OF D MAX * TERRAIN * PROCESSING * INTERMEDIATE

ARITH MEAN * 1.63 * MEDIAN * 1.71 * STD DEV * 0.26 * RANGE * 1.15 TO 1.96 WITH 13 SAMPLES

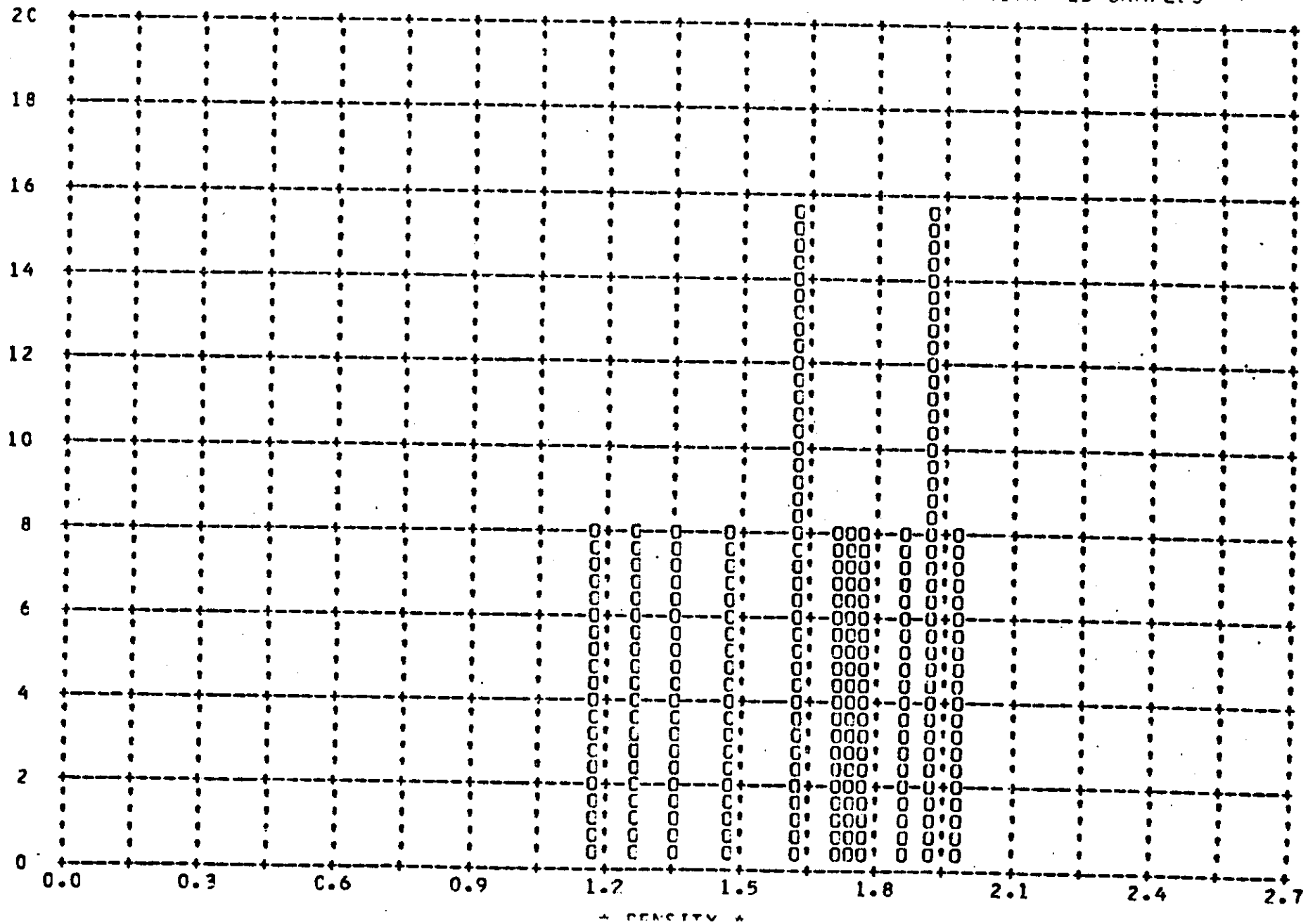

FIGURE A-5

~~TOP SECRET~~ C [redacted]

MISSION * 1102-2 * INSTR * AFT * 3006 * PLOT OF D MAX * CLOUD * PROCESSING * INTERMEDIATE

ARITH MEAN * 1.61 * MEDIAN * 1.67 * STD DEV * 0.18 * RANGE * 1.23 TO 1.86 WITH 11 SAMPLES

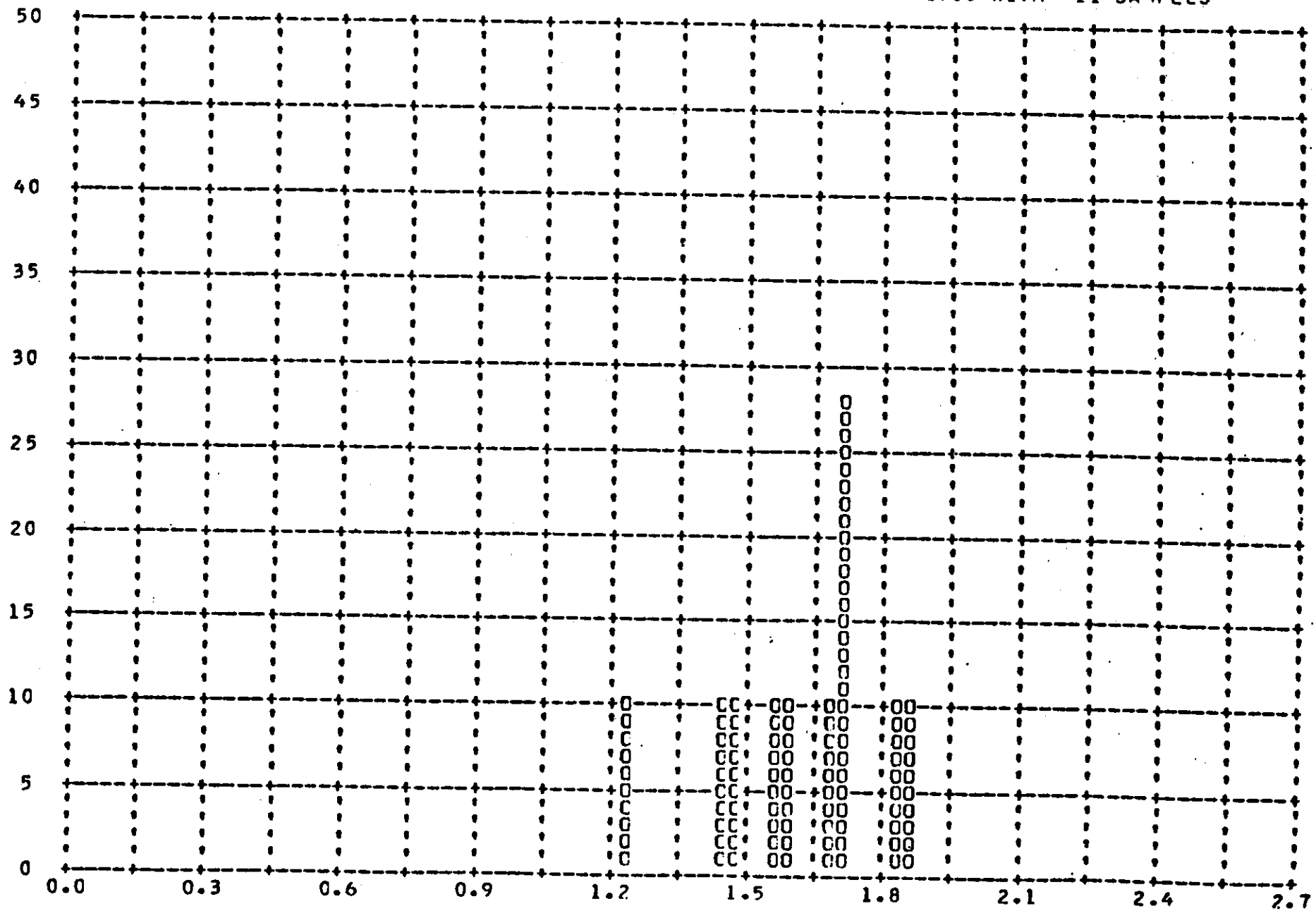

FIGURE A-5

MISSION * 1102-2 * INSTR * AFT * 3404?? PLOT OF D MIN * TERRAIN * PROCESSING * FULL

ARITH MEAN * 0.42 * MEDIAN * 0.38 * STD DEV * 0.14 * RANGE * 0.26 TO 1.08 WITH 167 SAMPLES

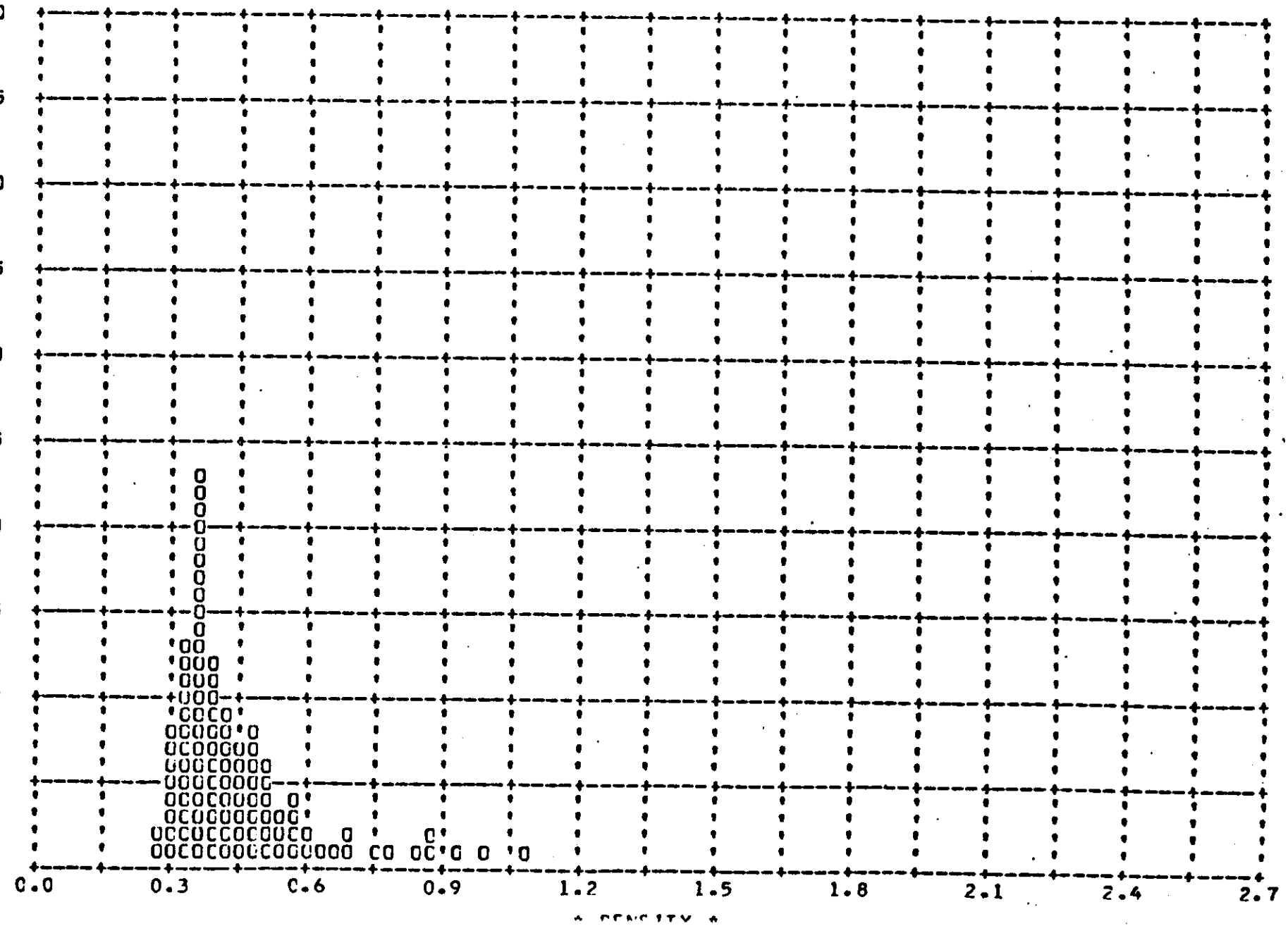

FIGURE A-5

~~TOP SECRET~~ C [redacted]

MISSION * 1102-2 * INSTR * AFT * 3404 * PLOT OF D MAX * TERRAIN * PROCESSING * FULL

ARITH MEAN * 1.49 * MEDIAN * 1.51 * STD DEV * 0.38 * RANGE * 0.53 TO 2.27 WITH 167 SAMPLES

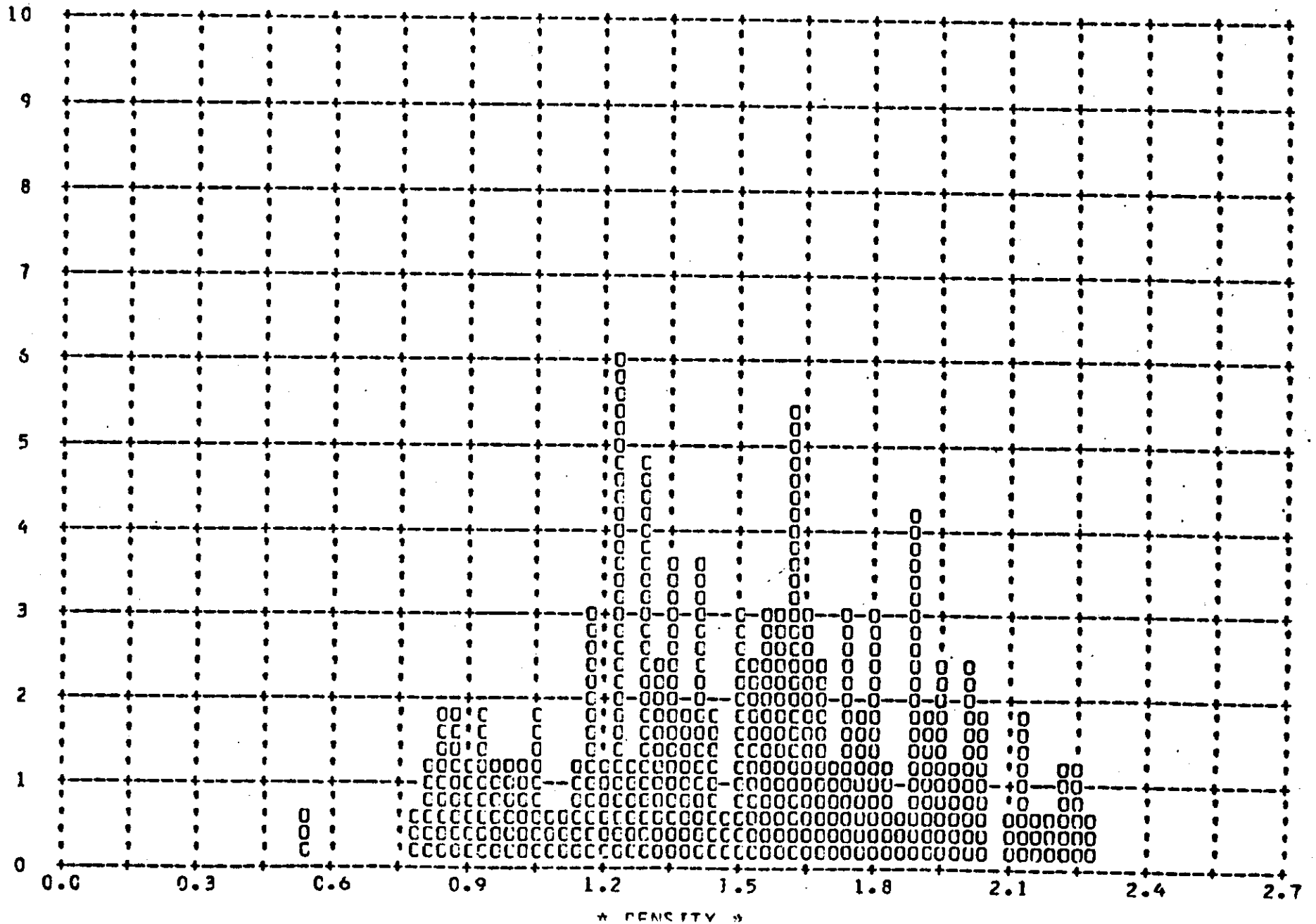

FIGURE A-5

MISSION * 1102-2 * INSTR * AFT * 340[illegible] PLOT OF D MAX * CLOUD * PROCESSING * FULL

ARITH MEAN * 1.89 * MEDIAN * 1.99 * STD DEV * 0.38 * RANGE * 0.91 TO 2.38 WITH 93 SAMPLES

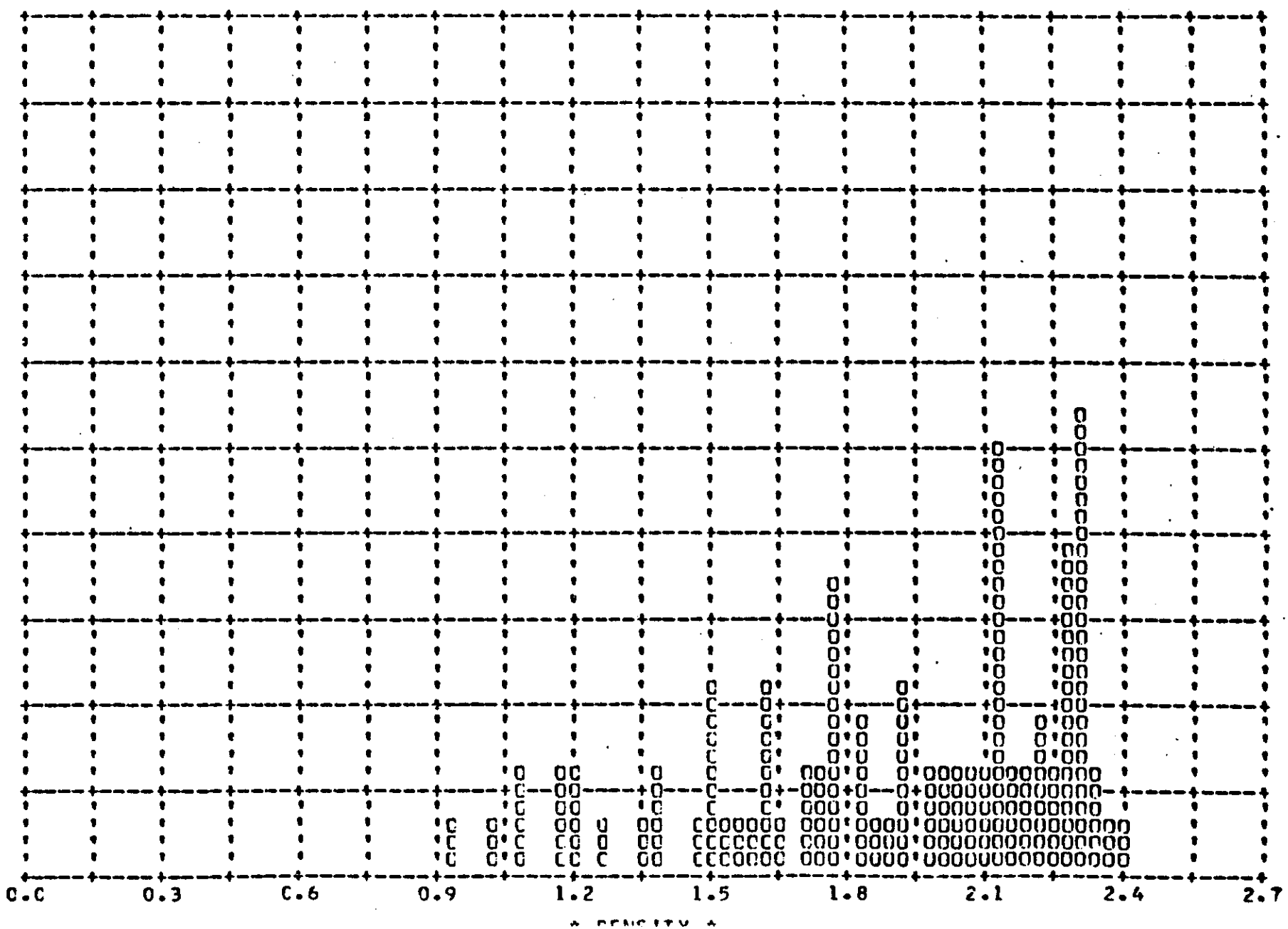

FIGURE A-5

MISSION * 1102-2 * INSTR * AFT * 340[illegible] PLOT OF D MIN * TERRAIN * PROCESSING * ALL LEVELS

ARITH MEAN * 0.45 * MEDIAN * 0.39 * STD DEV * 0.18 * RANGE * 0.26 TO 1.31 WITH 180 SAMPLES

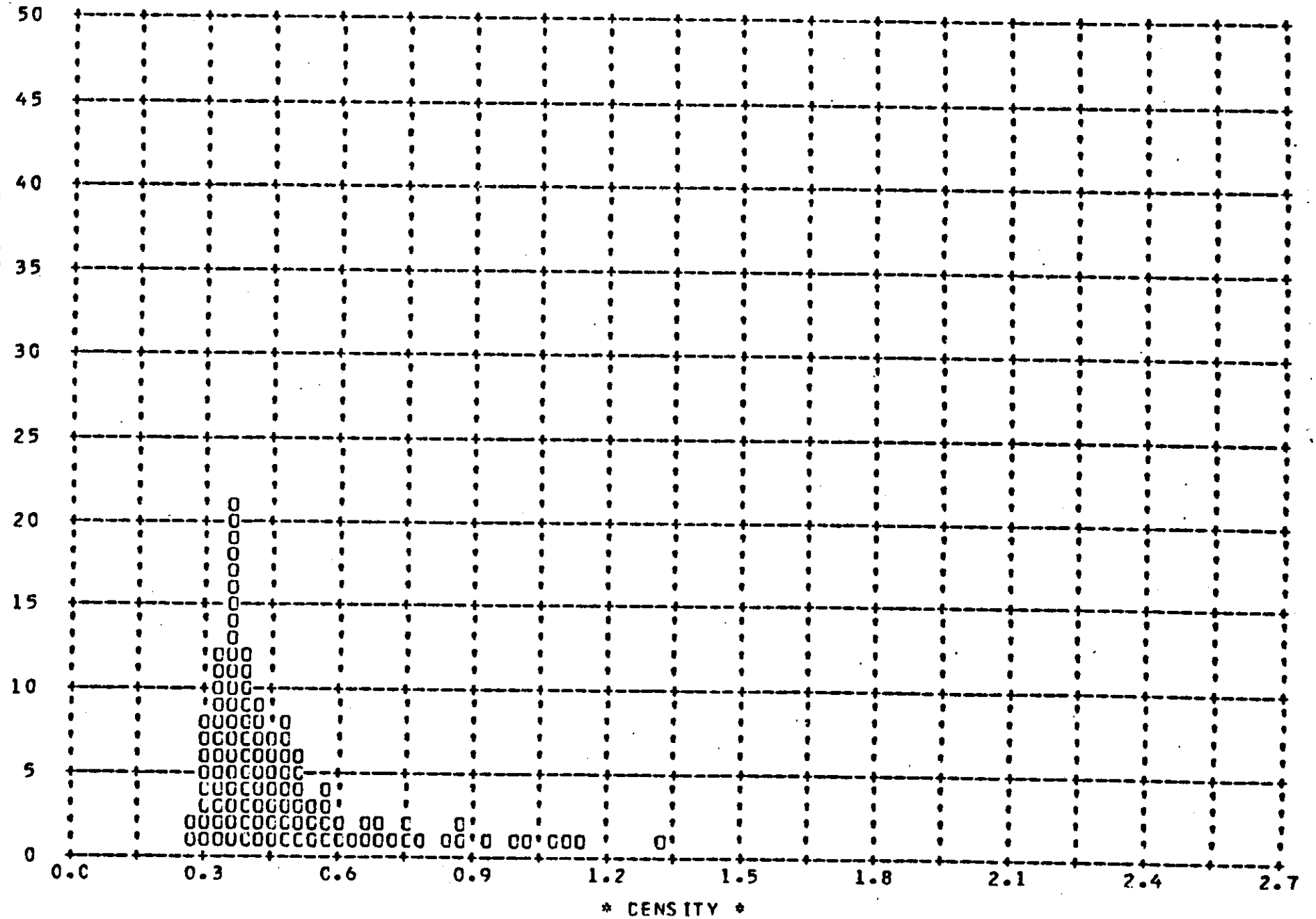

FIGURE A-5

~~TOP SECRET~~ C[redacted]

MISSION * 1102-2 * INSTR * AFT * 3404 PLOT OF D MAX * TERRAIN * PROCESSING * ALL LEVELS

ARITH MEAN * 1.50 * MEDIAN * 1.53 * STD DEV * 0.37 * RANGE * 0.53 TO 2.27 WITH 180 SAMPLES

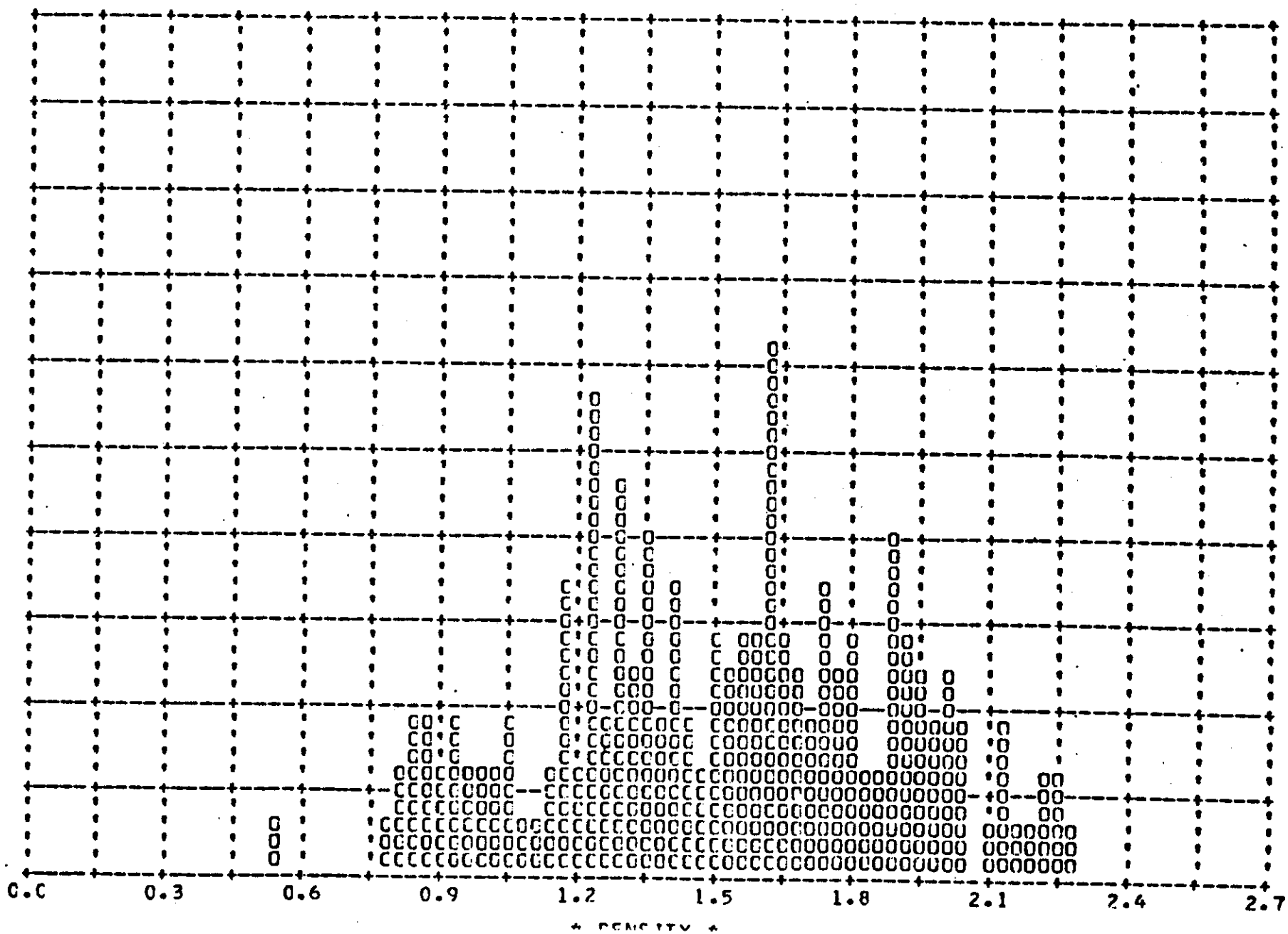

FIGURE A-5

MISSION * 1102-2 * INSTR * AFT * 3405 * PLOT OF D MAX * CLOUD * PROCESSING * ALL LEVELS

ARITH MEAN * 1.86 * MEDIAN * 1.90 * STD DEV * 0.37 * RANGE * 0.91 TO 2.38 WITH 104 SAMPLES

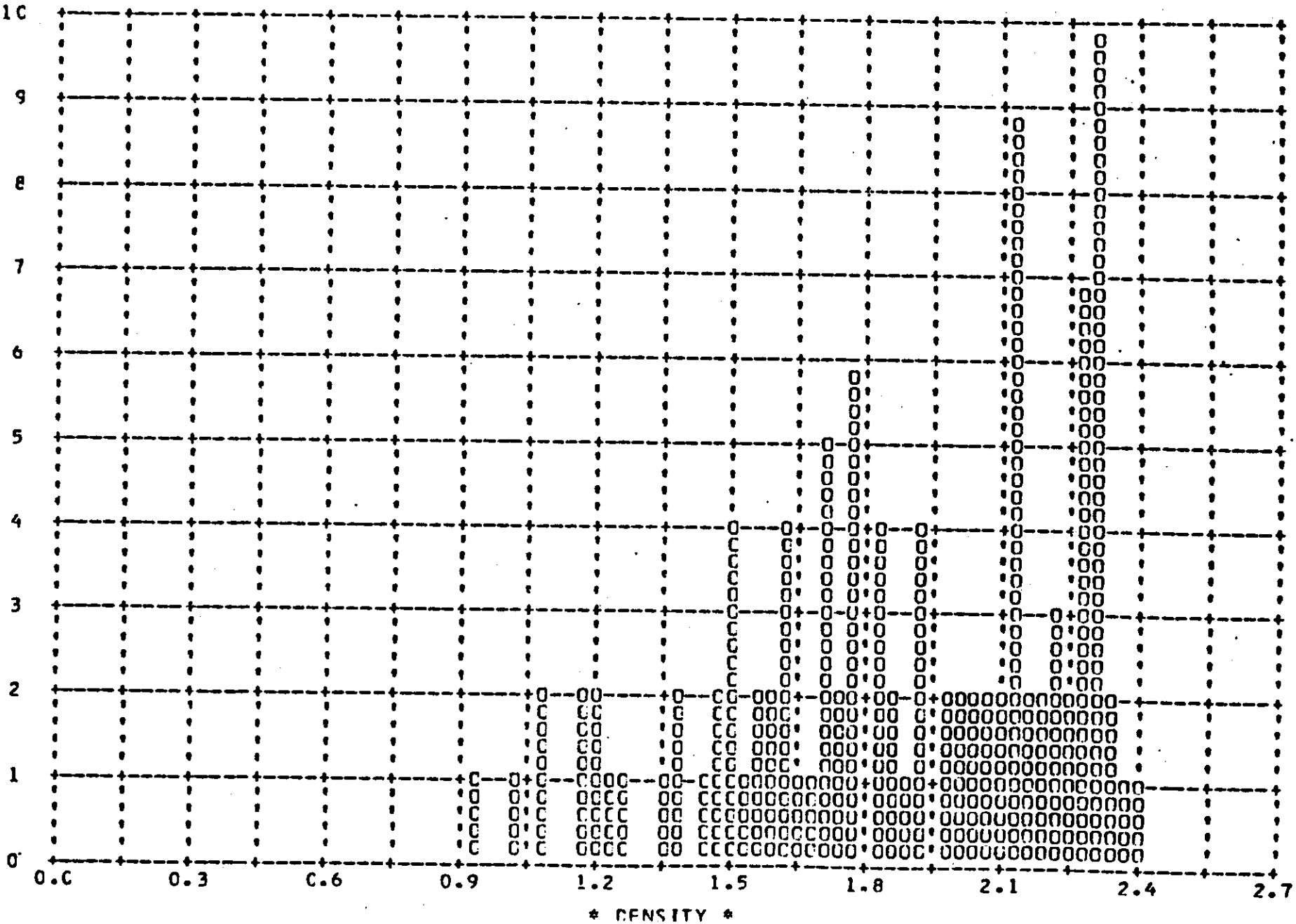

FIGURE A-5

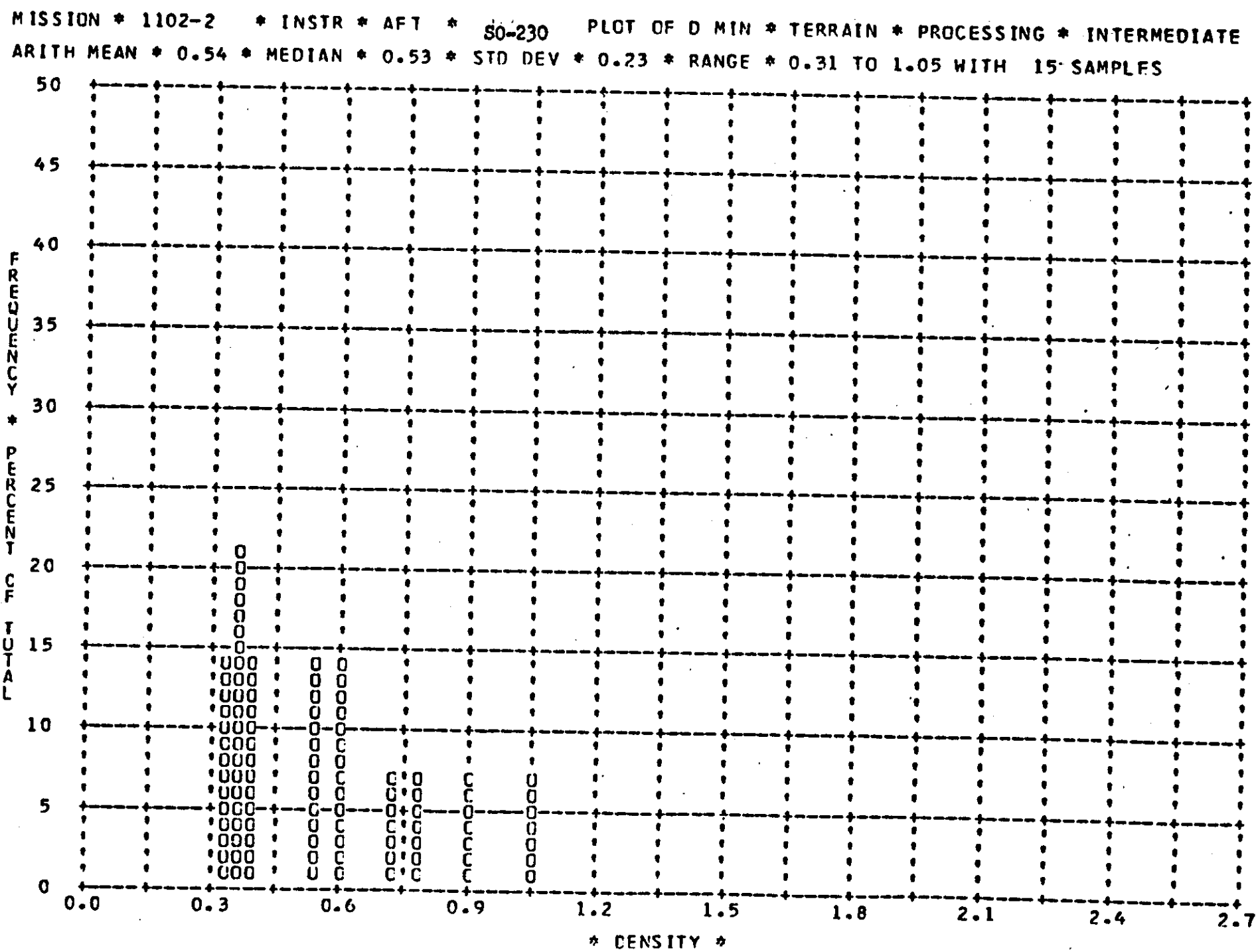
MISSION * 1102-2 * INSTR * AFT * S0-230 PLOT OF D MIN * TERRAIN * PROCESSING * INTERMEDIATE
ARITH MEAN * 0.54 * MEDIAN * 0.53 * STD DEV * 0.23 * RANGE * 0.31 TO 1.05 WITH 15 SAMPLES
FREQUENCY * PERCENT OF TOTAL
50
45
40
35
30
25
20
15
10
5
0
0.0
0.3
0.6
0.9
1.2
1.5
1.8
2.1
2.4
2.7
* DENSITY *

FIGURE A-6

MISSION * 1102-2 * INSTR * AFT * S0-230 PLCT OF D MAX * TERRAIN * PROCESSING * INTERMEDIATE

ARITH MEAN * 1.32 * MEDIAN * 1.33 * STD DEV * 0.18 * RANGE * 1.02 TO 1.67 WITH 15 SAMPLES

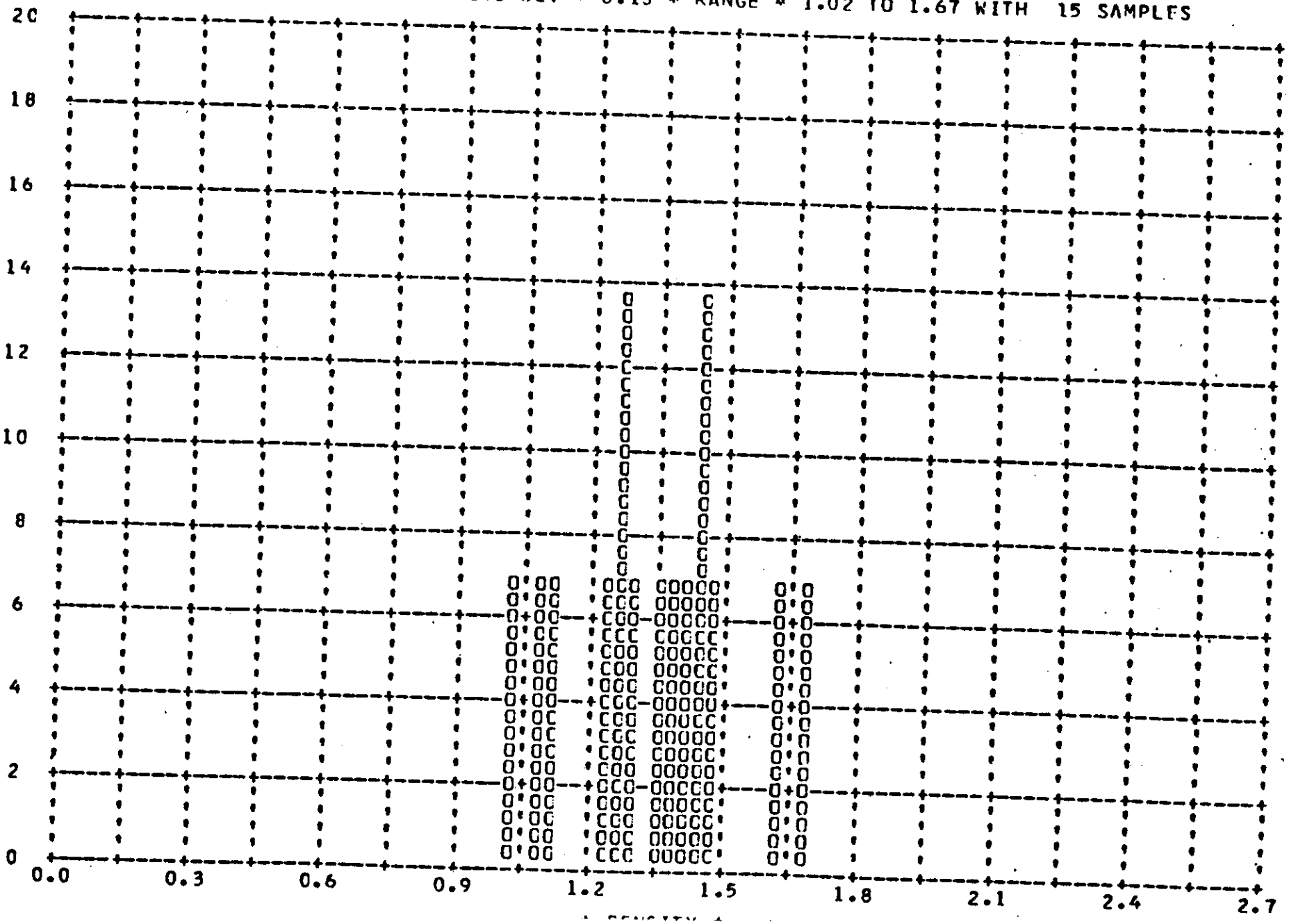

FIGURE A-6

MISSION * 1102-2 * INSTR * AFT * SO-230 PLOT OF D MAX * CLOUD * PROCESSING * INTERMEDIATE

ARITH MEAN * 1.58 * MEDIAN * 1.51 * STD DEV * 0.34 * RANGE * 1.14 TO 2.29 WITH 15 SAMPLES

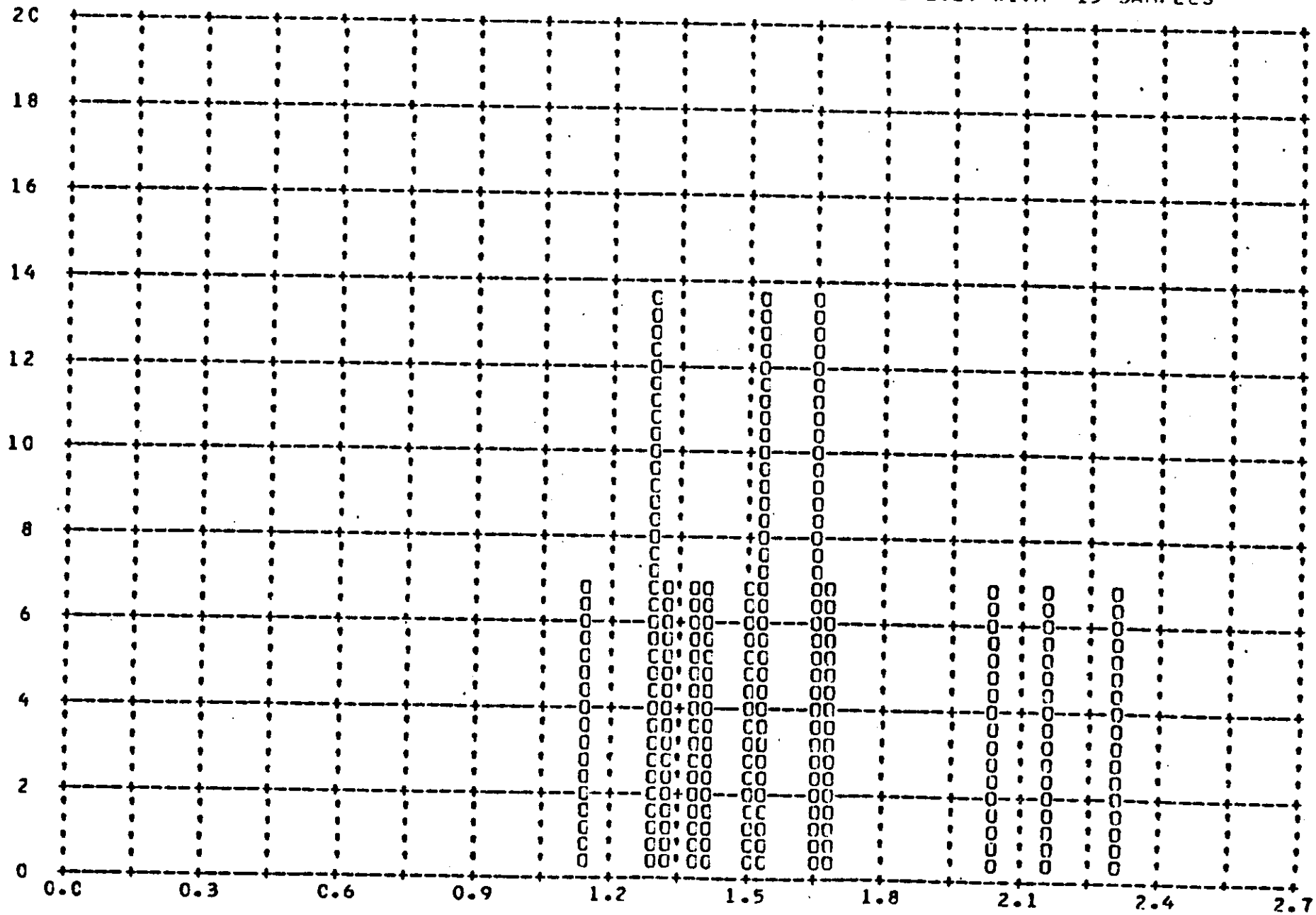

FIGURE A-6

MISSION * 1102-2 * INSTR * AFT * SO-230 PLOT OF D MIN * TERRAIN * PROCESSING * FULL

ARITH MEAN * 0.45 * MEDIAN * 0.43 * STD DEV * 0.12 * RANGE * 0.23 TO 0.79 WITH 56 SAMPLES

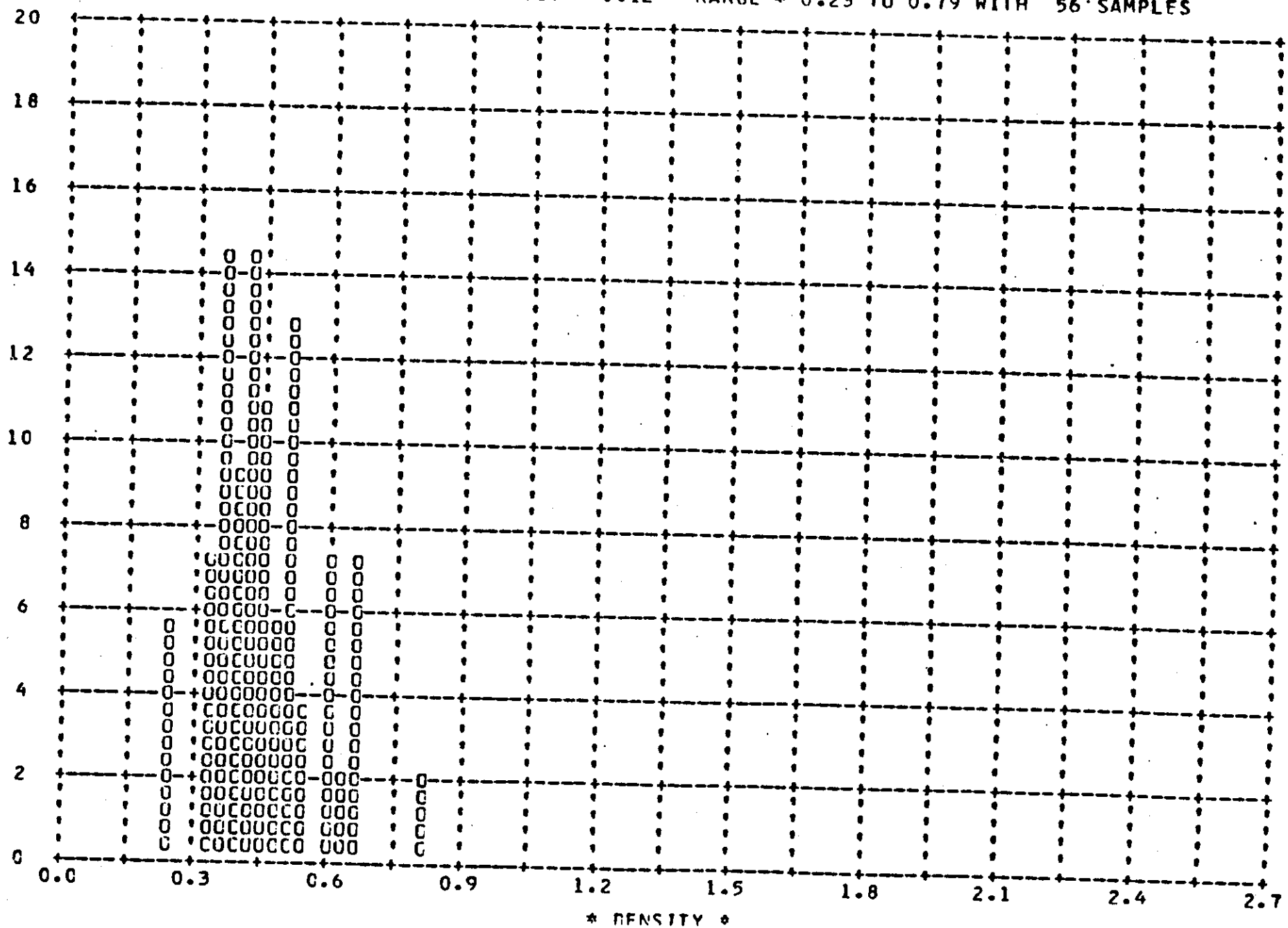

FIGURE A-6

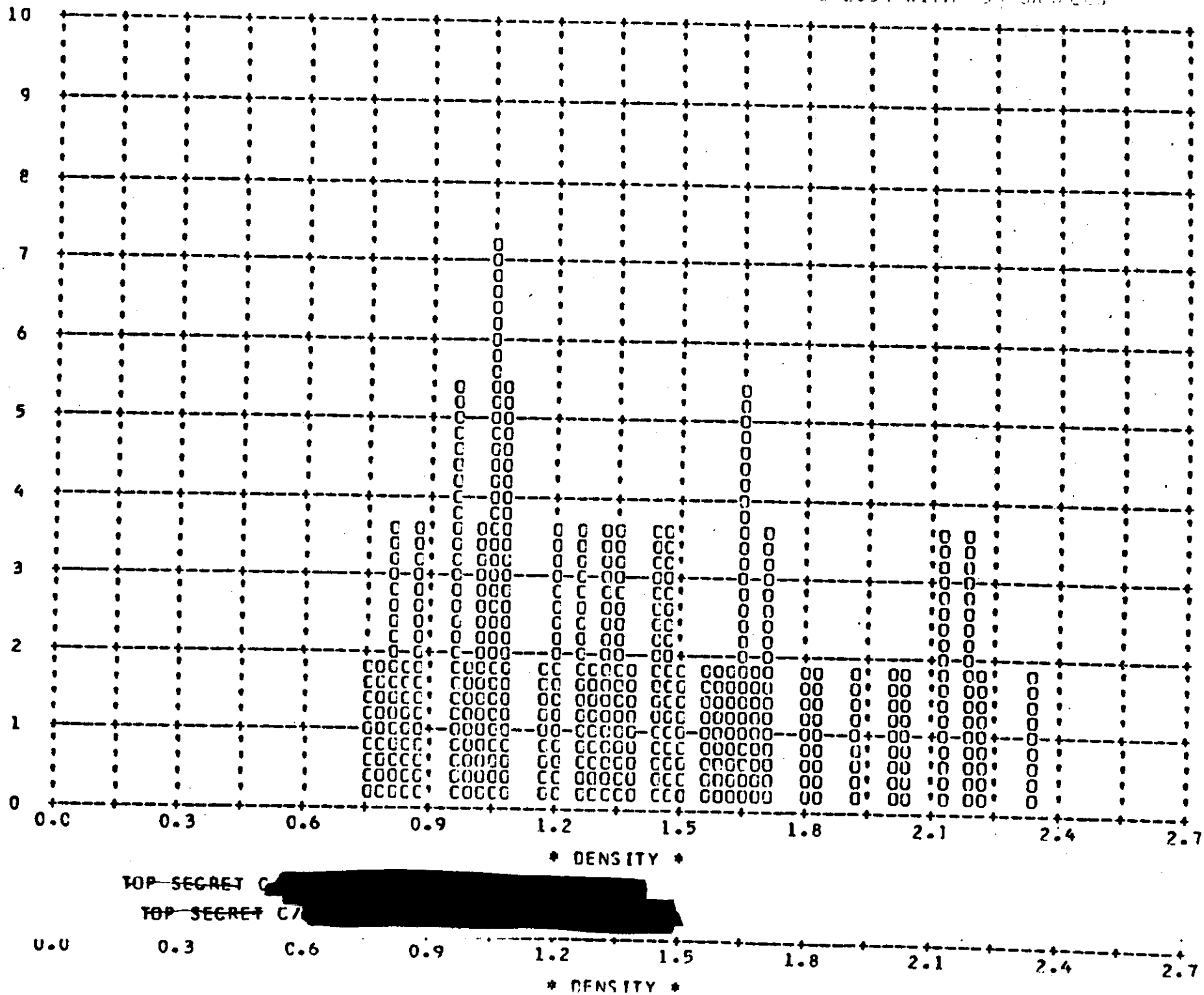

FIGURE A-6

~~TOP SECRET~~ C[redacted]

~~TOP SECRET~~ C/[redacted]

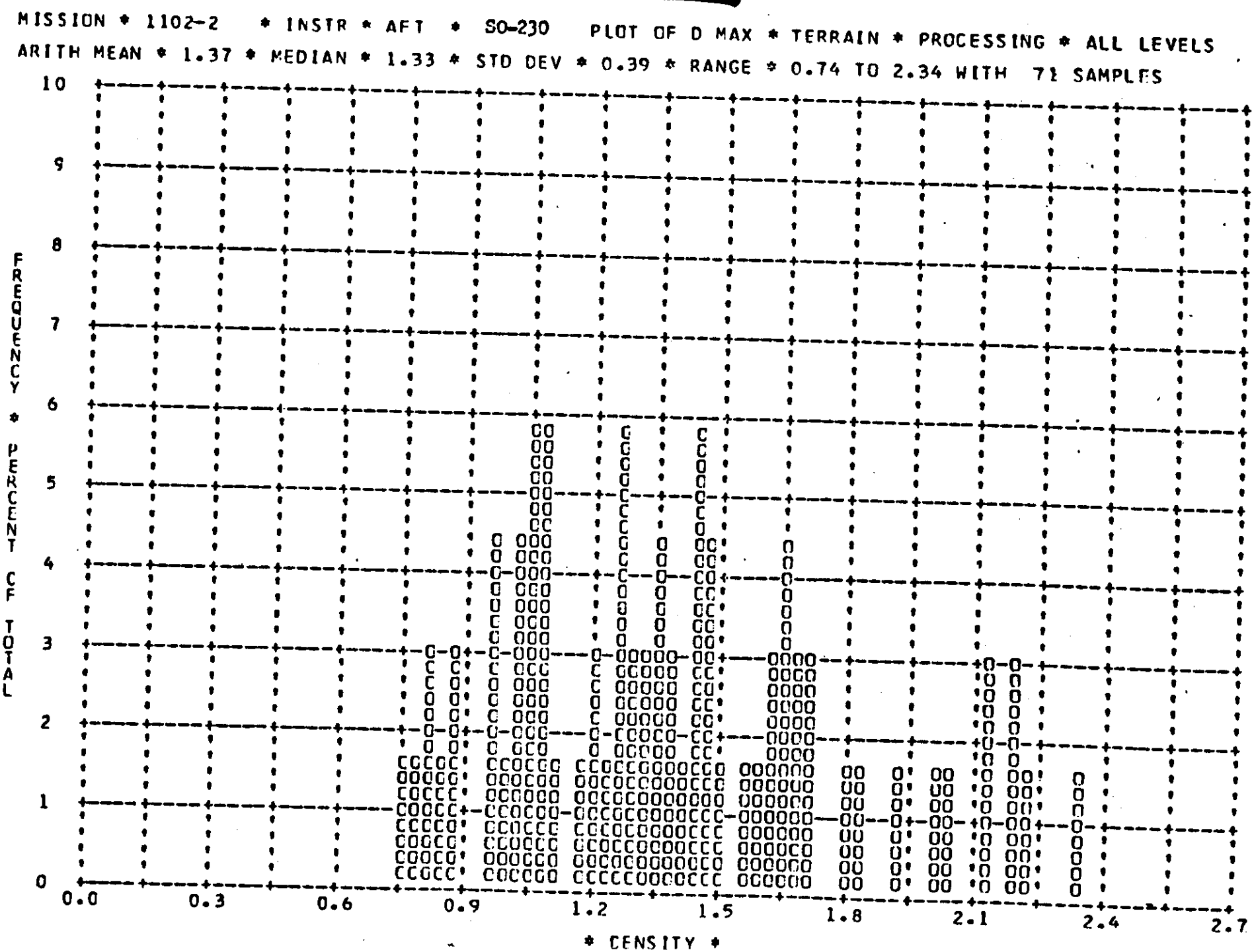
MISSION * 1102-2 * INSTR * AFT * SO-230 PLOT OF D MAX * TERRAIN * PROCESSING * ALL LEVELS
ARITH MEAN * 1.37 * MEDIAN * 1.33 * STD DEV * 0.39 * RANGE * 0.74 TO 2.34 WITH 71 SAMPLES
FREQUENCY * PERCENT OF TOTAL
10
9
8
7
6
5
4
3
2
1
0
0.0
0.3
0.6
0.9
1.2
1.5
1.8
2.1
2.4
2.7
* DENSITY *

FIGURE A-6

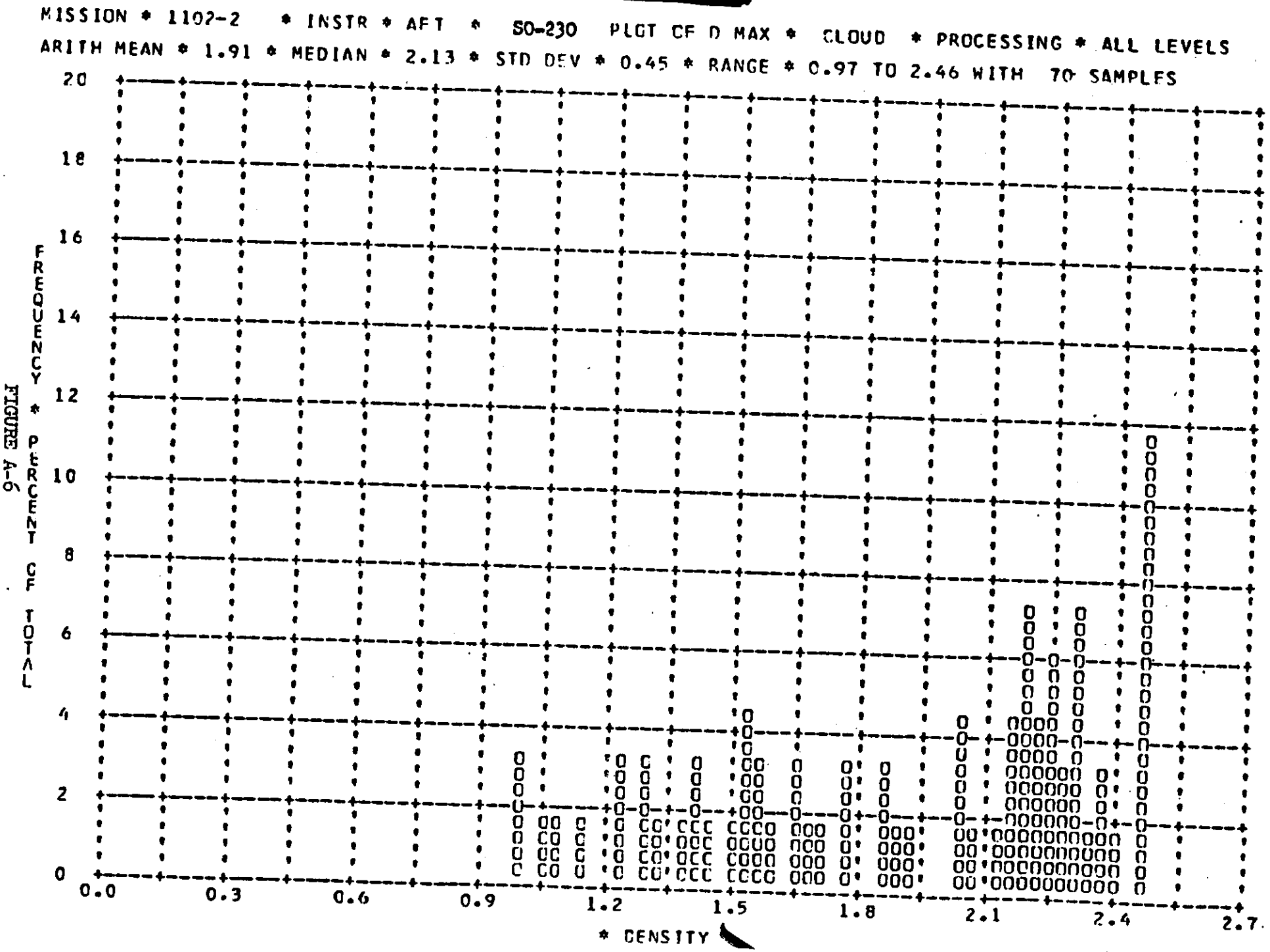
MISSION * 1102-2 * INSTR * AFT * SO-230 PLOT OF D MAX * CLOUD * PROCESSING * ALL LEVELS
ARITH MEAN * 1.91 * MEDIAN * 2.13 * STD DEV * 0.45 * RANGE * 0.97 TO 2.46 WITH 70 SAMPLES
FREQUENCY * PERCENT OF TOTAL
20
18
16
14
12
10
8
6
4
2
0
0.0
0.3
0.6
0.9
1.2
1.5
1.8
2.1
2.4
2.7
* DENSITY [redacted]

FIGURE A-6

Distribution:

[redacted]