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VOLUME II

PROJECT HICAT
AN INVESTIGATION OF HIGH ALTITUDE CLEAR AIR TURBULENCE

WALTER M. CROOKS, FREDERIC M. HOBLIT, DAVID T. PROPHET, et al

LOCKHEED-CALIFORNIA COMPANY

TECHNICAL REPORT AFFDL-TR-67-123
VOLUME II
Appendixes V through VIII

NOVEMBER 1967

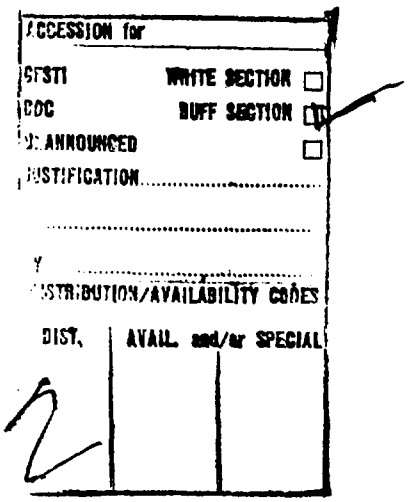
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AIR FORCE FLIGHT DYNAMICS LABORATORY
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PROJECT HICAT
AN INVESTIGATION OF HIGH ALTITUDE CLEAR AIR TURBULENCE

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FOREWORD

This report was prepared by the Lockheed-California Company, Burbank, California, for the Air Force Flight Dynamics Laboratory, Wright-Patterson Air Force Base, Ohio, under Contract AF33(657)-11143. The contract was for "Redirection and Addition of Effort to the Maintenance of Instrumentation and Equipment for Collection of High Altitude Clear Air Turbulence Data", Project No. 1469. Turbulence research is presently being conducted by the Air Force Flight Dynamics Laboratory under the ALLCAT Program, ADP 682E. The Lockheed-California Company report number is LR 20771, dated 10 July 1967. This report covers work conducted from 12 February 1965 through 10 July 1967.

Air Force Flight Dynamics Laboratory management responsibility was under the ALLCAT Program Director, Mr. E. Brazier, with Mr. N. V. Loving as the Technical Coordinator. Initially the Air Force Project Engineer was Mr. N. V. Loving; Mr. J. P. Boone later assumed responsibility for the Project. The Lockheed-California Company Program Manager was Mr. C. B. Fabian with Mr. W. M. Crooks as the Technical Leader.

All HICAT aircraft operations and field team logistics support were under the direction of Lt Col J. J. King, USAF, Air Force Flight Test Center, VSTOL Branch Flight Operations, Edwards Air Force Base, California.

Special acknowledgements are due to the New Zealand Meteorological Services at Wellington and the Christchurch personnel who developed the local forecasts, and in Australia, the Australian Bureau of Meteorology. Particular thanks are due Mr. Anthony Powell of the Australian Bureau of Meteorology who prepared the high altitude forecasts and the flight plans, and to Mr. C. K. Rider of the Structures Division of the Australian Aeronautical Research Laboratories who helped analyze the meteorological data in Australia.

Acknowledgement is made for the valuable assistance of the following Lockheed-California Company personnel: Mr. R. E. Storey, data analysis; Messrs. D. W. Thompson and P. L. Underwood, field team operation; Messrs. R. H. Cook, H. J. Cail, and R. C. Quist, instrumentation; Messrs. R. D. Baker, E. A. Goulette, and P. J. Tersigni, data processing; Messrs. G. E. Abrahms and W. W. Hildreth, meteorology; and Mr. R. P. Boal, editor.

This report consists of three volumes. Volume I contains the main body of the report plus Appendix I, HICAT Test Summary, Appendix II, Instrumentation System, Appendix III, Data Processing, and Appendix IV, Derivation of Gust Velocity Equations. Volume II contains Appendix V, HICAT Flight Test Log, Appendix VI, Time Histories, Appendix VII, Gust Velocity Power Spectra, and

Appendix VIII, Mathematically Defined Gust Velocity Power Spectral Density Curves. Volume III contains Appendix IX, Flight Descriptions and Flight Track Maps and Appendix X, Meteorological Data Tables.

This technical report has been reviewed and is approved.

James C. Horsley Jr.

JAMES C. HORSLEY, JR., Major, USAF
Chief, Experimental Mechanics Branch
Structures Division

ABSTRACT

This report describes the high altitude clear air turbulence (HICAT) flight investigation with primary emphasis upon the results achieved since 15 February 1965. On this date the program was redirected to utilize a new digital instrumentation system for the measurement of CAT in the wavelength range from about 100 feet to 60,000 feet. The program effort required the measurement of CAT velocity components at altitudes of 45,000 to 70,000 feet in seven geographic areas. Instrumentation carried aboard the HICAT aircraft, an Air Force U-2, consisted of a PCM System, an Inertial Navigation System, aerodynamic and aircraft response sensors including a fixed vane gust probe, oscillograph recorder, and a digital magnetic tape recorder.

The program objective is to determine the statistical characteristics of high altitude CAT so as to improve structural design criteria. Overall, 29.2 hours of high altitude CAT were located and recorded in flights covering over 256,000 miles from bases in California, Massachusetts, Alaska, Hawaii, Puerto Rico, New Zealand, and Australia. Actual vertical, lateral, and longitudinal gust velocity time histories have been calculated from the measurements and used to obtain gust velocity power spectra. Derived equivalent gust velocities were also calculated and peak counted. Meteorological factors were considered in categorizing and correlating data. Time histories and power spectra are found in Volume II of this report, while meteorological data and flight track maps are included in Volume III.

Distribution of this Abstract is unlimited.

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APPENDIX V

HICAT FLIGHT TEST LOG

This appendix presents the HICAT Flight Test Log. The log documents for each test the following information:

- Test number.
- Test date.
- Test pilot.
- Purpose of the test.
- Duration of the test in hours and minutes.
- Duration of any CAT encountered above 45,000 feet in hours and minutes.
- Remarks describing significant test details, e.g., maximum cg acceleration response in turbulence, aircraft or instrumentation malfunctions, and other unusual events.

The log encompasses all the tests in the redirected program beginning with Test 34 and ending with Test 179. The log for the HICAT program prior to the redirection is contained in Reference 5, the HICAT Interim Report.

A test appears in the log whenever the HICAT instrumentation package was installed and operated. Flight times were normally established from the quick-look oscillograph by determining the time differential between the start of the takeoff roll and the end of the landing roll. When the oscillograph record was incomplete or unavailable, the time was obtained from the pilot's records. The time in turbulence or HICAT time was determined as described under Editing in Volume I, Section V.

HICAT FLIGHT TEST LOG

Test	Date	Pilot	Test Purpose	Flight Time Hr:Min	HICAT Time Hr:Min	Remarks
34	10-8-65	Maj. W. H. Shawler	Aircraft and instrumentation functional check, Edwards AFB, California	2:04	0	Roller coasters and control pulses performed. First flight with new instrumentation package. Oscillograph only, no tape.
35	10-20-65	Maj. F. J. Cuthill	Instrumentation functional check	2:20	0	Roller coasters and control pulses performed. No data.
36	10-26-65	Maj. F. J. Cuthill	Instrumentation functional check	2:04	0	Roller coasters and control pulses performed. Oscillograph only, no tape data.
37	11-5-65	Maj. F. J. Cuthill	Instrumentation functional check	2:20	0	Roller coasters and control pulses performed. PCM system installed and tape recording made at 3-3/4 inch/sec. Time code generator and oscillograph malfunction.
38	11-12-65	Maj. W. H. Shawler	Roller coaster and control pulse maneuvers	2:33	0	All instrumentation performed satisfactorily.
39	11-16-65	Maj. W. H. Shawler	HICAT search from Edwards AFB, Calif.	2:00	0:10	Light turbulence, central Utah area, 50,000 ft.
40	11-17-65	Maj. W. H. Shawler	HICAT search from Edwards AFB, Calif.	4:00	0:15	Light turbulence, central Utah area, 50 - 60,000 ft.
41	12-2-65	Capt. R. B. Lowell	HICAT search from Edwards AFB, Calif.	4:30	0:01	Negligible turbulence. Oscillograph malfunction after 2-1/2 hr. Altitude system malfunctioned.
42	1-15-66	Capt. R. B. Lowell	Ferry flight, Edwards AFB, Calif., to Patrick AFB, Fla.	5:10	0	Intermittent PCM malfunctions. Oscillograph malfunction, no record.
43	1-30-66	Capt. R. B. Lowell	Ferry flight, Patrick AFB, Fla., to Edwards AFB, Calif.	5:00	0	Dirty tape head, no data.

HICAT FLIGHT TEST LOG (Continued)

Test	Date	Pilot	Test Purpose	Flight Time Hr:Min	HICAT Time Hr:Min	Remarks
44	2-11-66	Maj. W. H. Shawler	HICAT search from Edwards AFB, Calif.	4:00	0:11	Some light turbulence. No tape data.
45	2-16-66	Maj. W. H. Shawler	HICAT search from Edwards AFB, Calif.	0:50	0	Flight aborted. Q-bay pressurization malfunction.
46	2-17-66	Maj. W. H. Shawler	HICAT search from Edwards AFB, Calif.	4:40	0:19	Planned route of B-70 test flight followed. Light turbulence encountered.
47	3-11-66	Maj. W. H. Shawler	Engine functional check	1:55	0	First flight with repaired PCM. LN-3 operation except for directional data. Tape recording at 1-7/8 in./sec found satisfactory.
48	3-17-66	Maj. J. J. King	Roller coaster maneuvers, control pulses, HICAT search from Edwards AFB, Calif.	3:20	0	No turbulence. Roller coasters appear to be satisfactory. French Sparmo radiation particle counter installed.
49	3-18-66	Maj. F. J. Cuthill	HICAT publicity photographs	1:00	0	LN-3 off-base alignment attempt unsatisfactory.
50	3-22-66	Maj. W. H. Shawler	HICAT search from Edwards AFB, Calif.	4:05	0:07	LN-3 system inadvertently switched off after 2 hr. No oscillogram, recorder being repaired. Some light CAT.
51	3-25-66	Capt. R. B. Lowell	HICAT search from Edwards AFB, Calif.	4:10	0	Tape recorder inadvertently switched off for part of flight. LN-3 directional data unsatisfactory.
52	3-28-66	Maj. Rosburg	Roller coaster maneuvers, control pulses, HICAT search	4:00	0	No turbulence. LN-3 off-base alignment attempt unsatisfactory.
53	3-31-66	Maj. W. H. Shawler	HICAT search from Edwards AFB, Calif.	3:53	0:23	Some light turbulence. LN-3 directional output appears to be functioning satisfactorily. Successful off-base alignment of LN-3.

HICAT FLIGHT TEST LOG (Continued)

Test	Date	Pilot	Test Purpose	Flight Time Hr:Min	HICAT Time Hr:Min	Remarks
54	4-1-66	Maj. J. J. King	HICAT search from Edwards AFB, Calif.	4:01	0:11	Light to moderate turbulence near Gallup, N. Mex.
55	4-5-66	Maj. W. H. Shawler	HICAT search from Edwards AFB, Calif.	3:30	0:06	Some light turbulence.
56	4-6-66	Maj. J. J. King	HICAT search from Edwards AFB, Calif.	3:40	0:01	PCM sample rate increased to 50 samples/sec to check aliasing. Tape speed 3-3/4 inch/sec for this test only. Negligible turbulence.
57	4-13-66	Maj. W. H. Shawler	Ferry flight, Edwards AFB, Calif., to Hickam AFB, Hawaii	6:18	0:01	Negligible CAT.
58	4-15-66	Maj. J. J. King	HICAT search from Hickam AFB	3:38	0	Oscillograph jammed. No quick-look record. No CAT.
59	4-18-66	Maj. W. H. Shawler	HICAT search from Hickam AFB	3:10	0:03	Short patch of very light turbulence.
60	4-20-66	Maj. J. J. King	HICAT search from Hickam AFB	3:09	0:01	Some very short patches of light turbulence.
61	4-21-66	Maj. W. H. Shawler	HICAT search from Hickam AFB	3:31	0:22	Light turbulence.
62	4-22-66	Maj. J. J. King	HICAT search from Hickam AFB	3:29	0	No turbulence.
63	4-25-66	Maj. W. A. Shawler	HICAT search from Hickam AFB	4:25	0:42	Large amount of light and light-to-moderate turbulence. Several long runs suitable for long wave analysis.
64	4-26-66	Maj. J. J. King	HICAT search from Hickam AFB	2:54	0	No turbulence.

HICAT FLIGHT TEST LOG (Continued)

Test	Date	Pilot	Test Purpose	Flight Time Hr:Min	HICAT Time Hr:Min	Remarks
65	4-27-66	Maj. W. H. Shawler	HICAT search from Hickam AFB	3:48	0:04	Short patches of very light turbulence.
66	4-28-66	Maj. J. J. King	HICAT search from Hickam AFB	3:43	0	Oscillograph malfunction, traces 1-24 not visible.
67	4-29-66	Maj. J. J. King	HICAT search from Hickam AFB	4:42	0:04	Some light turbulence.
68	5-2-66	Maj. J. J. King	HICAT search from Hickam AFB	3:29	0:09	Light-to-moderate turbulence.
69	5-4-66	Maj. F. J. Cuthill	HICAT search from Hickam AFB	3:16	0:03	Some light turbulence.
70	5-5-66	Maj. F. J. Cuthill	HICAT search from Hickam AFB	4:15	0:15	Continuous light turbulence suitable for long wave analysis.
71	5-6-66	Maj. F. J. Cuthill	HICAT search from Hickam AFB	4:30	0:10	Some light turbulence.
72	5-9-66	Maj. F. J. Cuthill	HICAT search from Hickam AFB	4:17	0	Oscillograph jammed just prior to takeoff. No oscillogram.
73	5-10-66	Maj. F. J. Cuthill	HICAT search from Hickam AFB	4:04	0:26	Considerable light turbulence. Three long samples obtained. Vernier altimeter malfunctioned.
74	5-12-66	Maj. F. J. Cuthill	HICAT search from Hickam AFB	2:52	0:09	Very light long wave samples.
75	5-13-66	Maj. F. J. Cuthill	HICAT search from Hickam AFB	4:27	0:27	Considerable light turbulence. Two long samples.
76	5-16-66	Maj. F. J. Cuthill	HICAT search from Hickam AFB	3:21	0:24	Light and moderate turbulence encountered. Several cg acceleration peaks in excess of 0.5g.

HICAT FLIGHT TEST LOG (Continued)

Test	Date	Pilot	Test Purpose	Flight Time Hr:Min	HICAT Time Hr:Min	Remarks
77	5-17-66	Maj. F. J. Cuthill	HICAT search from Hickam AFB	4:23	0:23	Light to moderate turbulence including two 7-min samples.
78	5-19-66	Maj. F. J. Cuthill	HICAT search from Hickam AFB	3:48	0:43	Mixed light and moderate turbulence including two long samples. Tape inadvertently recorded at fast forward speed - no flight data. X and Y distance into PCM discovered to be bad on Tests 63-78. Platform OK.
79	5-20-66	Maj. F. J. Cuthill	HICAT search from Hickam AFB	4:05	0:11	Light to moderate turbulence. One 0.4g encounter alongside a thunderhead. X and Y distance into PCM OK.
80	5-22-66	Maj. F. J. Cuthill	Ferry flight Hickam AFB, Hawaii, to Edwards AFB, Calif.	6:06	0:12	Some light turbulence enroute. Aircraft returned for periodic inspection.
81	6-2-66	Maj. J. J. King	Aircraft functional check	1:46	0:07	LN-3 X-velocity malfunction. Some moderate turbulence near Sierra Nevada Mountains.
82	6-6-66	Maj. J. J. King	Ferry flight, Edwards AFB, Calif., to Hickam AFB, Hawaii	6:35	0	No IRIG C time code on tape.
83	6-8-66	Maj. J. J. King	HICAT search from Hickam AFB	5:33	0:03	Very little CAT.
84	6-11-66	Maj. J. J. King	Ferry flight, Hickam AFB, Hawaii, to Nadi, Fiji	7:00	0	Tape recorder malfunction. Oscillograph record OK. No turbulence, Sparmo inoperative.
85	6-13-66	Maj. J. J. King	Ferry flight, Nadi to Christchurch, New Zealand	4:30	0	Magnetic tape OK. Oscillograph ran too fast, no data. Sparmo inoperative.

HICAT FLIGHT TEST LOG (Continued)

Test	Date	Pilot	Test Purpose	Flight Time Hr:Min	HICAT Time Hr:Min	Remarks
86	6-15-66	Maj. Rosburg	HICAT search from Christchurch	4:45	0	Magnetic tape OK. Oscillograph ran too fast. No data. Sparmo inoperative.
87	6-17-66	Maj. J. J. King	HICAT search from Christchurch	6:06	0:33	Time code malfunctioning. Tape OK. Sparmo inoperative.
88	6-21-66	Maj. J. J. King	HICAT search from Christchurch	6:15	0:46	Time code malfunctioning. Tape OK. Sparmo inoperative.
89	6-22-66	Maj. Rosburg	HICAT search from Christchurch	4:42	0:03	Tape OK. Oscillograph stalled. Sparmo inoperative.
90	6-24-66	Maj. J. J. King	HICAT search from Christchurch	4:48	0:55	Sparmo repaired. Oscillograph stalled.
91	6-27-66	Maj. J. J. King	HICAT search from Christchurch	2:56	0:09	Oscillograph operation erratic.
92	6-29-66	Maj. J. J. King	HICAT search from Christchurch	4:25	0	Time code noisy.
93	6-30-66	Maj. J. J. King	HICAT search from Christchurch	5:10	0:29	Oscillograph stalled. Some moderate turbulence. Time code noisy.
94	7-1-66	Maj. Rosburg	HICAT search from Christchurch	4:35	0	--
95	7-8-66	Maj. J. J. King	HICAT search from Christchurch	7:00	0:19	Time code unusable on tape.
96	7-11-66	Maj. Rosburg	HICAT search from Christchurch	4:56	0:45	Large amount of light to moderate turbulence. ±0.4g peaks on one sample.
97	7-12-66	Maj. J. J. King	HICAT search from Christchurch	3:47	0	--

HICAT FLIGHT TEST LOG (Continued)

Test	Date	Pilot	Test Purpose	Flight Time Hr:Min	HICAT Time Hr:Min	Remarks
98	7-14-66	Maj. F. J. Cuthill	Ferry flight, Christchurch, N.Z., to Laverton, Victoria, Australia	5:00	0:02	—
99	7-19-66	Maj. F. J. Cuthill	HICAT search from Laverton RAAFB	5:41	0:02	Aircraft diverted to alternate field at Avalon RAAFB because of weather.
100	7-21-66	Maj. F. J. Cuthill	HICAT search from Laverton RAAFB	5:23	0:51	Light and moderate long wave encounter in vicinity of radiosonde launch.
101	7-26-66	Maj. F. J. Cuthill	HICAT search from Laverton RAAFB	4:50	0:12	IRIG C time code malfunctioning on oscillograph.
102	7-28-66	Maj. F. J. Cuthill	HICAT search from Laverton RAAFB	5:46	1:14	Moderate turbulence. Three encounters in excess of 10 min. each. Possible mountain wave.
103	7-29-66	Maj. F. J. Cuthill	HICAT search from Laverton RAAFB	5:26	0:54	Two 16-minute samples of moderate intensity. One +0.4 and -0.7g encounter.
104	8-2-66	Maj. F. J. Cuthill	HICAT search from Laverton RAAFB	5:23	0:17	Patchy light to moderate CAT.
105	8-3-66	Maj. F. J. Cuthill	HICAT search from Laverton RAAFB	4:32	0:06	Light turbulence.
106	8-5-66	Maj. F. J. Cuthill	HICAT search from Laverton RAAFB	5:38	0:02	—
107	8-8-66	Maj. F. J. Cuthill	HICAT search from Laverton RAAFB	5:22	2:24	Extensive light and moderate turbulence with some ±0.5g peaks.
108	8-10-66	Maj. F. J. Cuthill	HICAT search from Laverton RAAFB	5:56	0:14	Some continuous light turbulence.

HICAT FLIGHT TEST LOG (Continued)

Test	Date	Pilot	Test Purpose	Flight Time Hr:Min	HICAT Time Hr:Min	Remarks
109	8-11-66	Maj. F. J. Cuthill	HICAT search from Laverton RAAFB	6:39	0:26	Light to moderate turbulence.
110	8-13-66	Maj. F. J. Cuthill	Ferry flight, Laverton RAAFB, Victoria, Australia, to Nadi, Fiji	6:10	0:02	—
111	8-15-66	Maj. F. J. Cuthill	Ferry flight, Nadi, Fiji, to Hickam AFB, Hawaii	7:07	0	Airspeed transducer failed in flight.
112	8-16-66	Maj. F. J. Cuthill	Ferry flight, Hickam AFB, Hawaii, to Edwards AFB, California	5:58	0	No airspeed measurement.
113	8-24-66	Maj. J. J. King	HICAT search from Edwards AFB	5:41	0	No airspeed measurement. No turbulence.
114	8-29-66	Maj. F. J. Cuthill	HICAT search from Edwards AFB	4:24	1:37	Airspeed OK, extensive light to moderate turbulence. Some incremental peaks up to ±0.5g.
115	8-30-66	Maj. J. J. King	HICAT search from Edwards AFB	4:22	0:34	Light turbulence. Fuel counter installed and working. Tape recorder turned off prematurely.
116	8-31-66	Maj. F. J. Cuthill	HICAT search from Edwards AFB	3:35	0:03	Light turbulence, Q-bay pressure failure.
117	9-14-66	Maj. Rosburg	Aircraft functional check flight	2:00	0	No turbulence.
118	9-15-66	Capt. T. Davey	Pilot training	2:30	0	Airspeed transducer failed.
119	9-15-66	Maj. J. J. King	Pilot training	0:45	0	No airspeed measurement.

HICAT FLIGHT TEST LOG (Continued)

Test	Date	Pilot	Test Purpose	Flight Time Hr:Min	HICAT Time Hr:Min	Remarks
120	9-19-66	Maj. J. J. King	Ferry flight, Edwards AFB, Calif., to Hanscom Field, Mass.	5:34	0:28	No airspeed measurement.
121	9-21-66	Maj. J. J. King	HICAT search, from Hanscom Field	6:29	0:22	No airspeed measurement.
122	9-26-66	Maj. J. J. King	HICAT search, from Hanscom Field	4:47	0	Substitute airspeed-transducer installed. Bad tape.
123	9-27-66	Capt. T. Davey	HICAT search, from Hanscom Field	3:00	0	LN-3 inadvertently shut down prior to takeoff. Bad tape.
124	9-28-66	Maj. J. J. King	HICAT search from Hanscom Field	6:06	0:12	Elevator position malfunction. Bad tape.
125	9-29-66	Capt. T. Davey	HICAT search from Hanscom Field	4:09	0	Elevator position malfunction.
126	9-30-66	Capt. T. Davey	HICAT search from Hanscom Field	3:33	0:20	LN-3 failed. No time code. Radiation dosimeter installed. Light and moderate CAT.
127	10-1-66	Capt. T. Davey	Ferry flight, Hanscom Field, Mass., to Patrick Air Force Base, Fla.	3:00	0	—
128	10-2-66	Capt. T Davey	Ferry flight Patrick AFB, Fla. to Edwards AFB, Calif.	5:22	0	Arbitrary time reference used due to remote operation. Good smooth air run. Moderate CAT below 45,000 ft. No IRIG C.
129	10-17-66	Capt. T. J. Davey	HICAT search from Hanscom Field	3:15	0	Test aborted 30 min. after takeoff due to loss of C-bay pressure. Elevator position inoperative. No tape data or quick-look oscillogram.

HICAT FLIGHT TEST LOG (Continued)

Test	Date	Pilot	Test Purpose	Flight Time Hr:Min	HICAT Time Hr:Min	Remarks
130	10-18-66	Maj. F. J. Cuthill	HICAT search from Hanscom Field	5:23	0:20	Patchy light turbulence.
131	10-20-66	Capt. T. J. Davey	HICAT search from Hanscom Field	5:58	0:07	Light to moderate turbulence.
132	10-21-66	Maj. F. J. Cuthill	HICAT search from Hanscom Field	5:07	0:06	Light turbulence.
133	10-24-66	Capt. T. J. Davey	HICAT search from Hanscom Field	6:15	0:50	Light to moderate turbulence. Oscillograph failed near end of flight.
134	10-25-66	Maj. F. J. Cuthill	HICAT search from Hanscom Field	5:06	0:04	Oscillograph out for repair. Pilot noted light CAT.
135	10-26-66	Capt. T. J. Davey	HICAT search from Hanscom Field	5:35	0	Oscillograph still out. LN-3 failure just prior to landing.
136	10-27-66	Maj. F. J. Cuthill	HICAT search from Hanscom Field	4:52	0:16	Oscillograph still out. Pilot noted light CAT.
137	10-28-66	Maj. F. J. Cuthill	HICAT search from Hanscom Field	3:54	0:01	Repaired oscillograph installed.
138	10-31-66	Maj. J. J. King	Ferry flight, Hanscom Field, Mass., to Patrick AFB, Fla.	4:36	0:30	Patchy light turbulence. Yaw rate gyro failed.
139	11-1-66	Capt. T. H. Smith	Ferry flight, Patrick AFB to Ramey AFB, Puerto Rico	4:40	0	No turbulence. Yaw rate gyro inoperative.
140	11-4-66	Maj. J. J. King	HICAT search from Ramey AFB	5:42	0:40	Extensive light and moderate CAT. Spare yaw rate gyro installed.
141	11-7-66	Capt. T. H. Smith	HICAT search from Ramey AFB	6:02	0:03	Considerable radio transmission interference on gust probe measurement.

HICAT FLIGHT TEST LOG (Continued)

Test	Date	Pilot	Test Purpose	Flight Time Hr:Min	HICAT Time Hr:Min	Remarks
142	11-8-66	Maj. J. J. King	HICAT search from Ramey AFB	5:05	0:10	Some light turbulence. 5-minute continuous roller coasters.
143	11-9-66	Capt. T. H. Smith	HICAT search from Ramey AFB	5:47	0	No turbulence.
144	11-10-66	Maj. J. J. King	HICAT search from Ramey AFB	4:39	0:25	Patchy light to moderate turbulence. Some radio interference on gust instrumentation.
145	11-14-66	Capt. T. H. Smith	HICAT search from Ramey AFB	4:52	0	No turbulence.
146	11-15-66	Capt. T. H. Smith	HICAT search from Ramey AFB	5:27	0:35	Light patchy turbulence, one ±0.4g encounter.
147	11-16-66	Capt. T. H. Smith	HICAT search from Ramey AFB	4:08	0:26	Five moderately rough samples ranging up to 5 minutes in length, Max acceleration, ±0.4g.
148	11-17-66	Maj. J. J. King	HICAT search from Ramey AFB	4:35	0	Considerable 2-1/2 cps noise on LN-3 heading traces.
149	11-21-66	Maj. F. J. Cuthill	HICAT search from Ramey AFB	5:08	0:08	Considerable directional oscillations with very light vertical excitation.
150	11-22-66	Capt. T. J. Davey	HICAT search from Ramey AFB	4:57	0	1 to 2 cps noise on heading traces. LN-3 failed during flight.
151	11-23-66	Maj. F. J. Cuthill	HICAT search from Ramey AFB	5:11	0:39	Considerable moderate turbulence, some ±0.5g accelerations. Good continuous roller coasters. LN-3 inoperative.
152	11-24-66	Capt. T. J. Davey	HICAT search from Ramey AFB	4:58	0:27	Two patchy longwave samples. LN-3 inoperative.

HICAT FLIGHT TEST LOG (Continued)

Test	Date	Pilot	Test Purpose	Flight Time Hr:Min	HICAT Time Hr:Min	Remarks
153	11-28-66	Maj. E. J. Cuthill	HICAT search from Ramey AFB	5:07	0	170 sec pilot induced oscillations. LN-3 inoperative.
154	11-29-66	Capt. T. J. Davey	HICAT search from Ramey AFB	5:13	0	No turbulence. LN-3 inoperative.
155	12-1-66	Capt. T. J. Davey	Ferry flight, Ramey AFB, Puerto Rico, to Patrick AFB, Fla.	6:13	0:16	One ±0.5g jolt, otherwise light to moderate turbulence. LN-3 inoperative. No time code.
156	12-2-66	Maj. E. J. Cuthill	Ferry flight, Patrick AFB, to Edwards AFB, Calif.	6:01	0:28	Mostly light turbulence. LN-3 inoperative. No time code.
157	12-29-66	Lt. Col. King	Aircraft functional check flight	1:33	0	Gust probe not installed. LN-3 fixed.
158	12-31-66	Maj. A. P. Johnson	HICAT search from Edwards AFB	2:40	0	Flight aborted because of hydraulic system failure.
159	1-3-67	Maj. A. P. Johnson	HICAT search from Edwards AFB	3:00	0	No turbulence. Fuel counter inoperative. Tape speed inadvertently set at 3-3/4 inch/sec.
160	1-4-67	Capt. T. J. Davey	HICAT search from Edwards AFB	4:10	0:06	Tape recorder inadvertently turned off. Oscillograph recorder malfunctioned and finally stopped after 1-3/4 hours operation.
161	1-5-67	Maj. A. P. Johnson	HICAT search from Edwards AFB	2:30	0	Flight aborted because of hydraulic system failure.
162	1-8-67	Capt. T. J. Davey	Ferry flight, Edwards AFB, Calif. to Elmendorf AFB, Anchorage, Alaska	6:20	0	No turbulence.

HICAT FLIGHT TEST LOG (Continued)

Test	Date	Pilot	Test Purpose	Flight Time HR:Min	HICAT Time Hr:Min	Remarks
163	1-14-67	Capt. T. J. Davey	HICAT search from Elmendorf AFB	4:25	0	No turbulence.
164	1-16-67	Capt. T. J. Davey	HICAT search from Elmendorf AFB	5:51	0:39	Light to moderate turbulence. Max. cg acceleration ±0.4g.
165	1-17-67	Capt. T. J. Davey	HICAT search from Elmendorf AFB	4:30	0	Engine trouble reduced search time. Oscillograph malfunction.
166	1-25-67	Capt. T. J. Davey	HICAT search from Elmendorf AFB	3:06	0	Engine and oscillograph replaced for this test.
167	1-26-67	Capt. T. H. Smith	HICAT search from Elmendorf AFB	4:57	0	—
168	1-27-67	Maj. A. P. Johnson	HICAT search from Elmendorf AFB	3:25	0	No significant turbulence.
169	1-30-67	Capt. T. H. Smith	HICAT search from Elmendorf AFB	4:35	0	LN-3 failure, new computer installed for this test.
170	1-31-67	Maj. A. P. Johnson	HICAT search from Elmendorf AFB	5:00	0	—
171	2-1-67	Capt. T. H. Smith	HICAT search from Elmendorf AFB	5:10	0	LN-3 computer failed in flight due to lack of cooling air.
172	2-4-67	Maj. A. P. Johnson	HICAT search from Elmendorf AFB	5:30	0:02	LN-3 operation erratic prior to takeoff. 5 minutes of multiple small roller-coasters.
173	2-6-67	Capt. T. H. Smith	HICAT search from Elmendorf AFB	4:37	0:34	Cg normal accelerations in excess of ±0.5g.
174	2-7-67	Maj. A. P. Johnson	HICAT search from Elmendorf AFB	5:24	0:14	Light turbulence.

HICAT FLIGHT TEST LOG (Concluded)

Test	Date	Pilot	Test Purpose	Flight Time Hr:Min	HICAT Time Hr:Min	Remarks
175	2-8-67	Maj. A. P. Johnson	HICAT search from Elmendorf AFB	4:01	0:02	Very light CAT.
176	2-10-67	Maj. A. P. Johnson	HICAT search from Elmendorf AFB	4:45	0	LN-3 no-go light on shortly after takeoff.
177	2-13-67	Capt. T. H. Smith	HICAT search from Elmendorf AFB	4:44	0	--
178	2-14-67	Maj. A. P. Johnson	HICAT search from Elmendorf AFB	4:45	0	Aircraft hydraulic system failed.
179	2-17-67	Capt. T. H. Smith	Ferry flight, Elmendorf AFB, Alaska to Edwards AFB, Calif.	5:15	0	Final flight of redirected program.
Total 146*				649:31	29:12	

*Number of tests with new instrument package (redirected HICAT program).

APPENDIX VI

TIME HISTORIES

In general, gust velocity time histories are presented for all cases in which gust velocities were computed and power spectra were obtained and plotted. These time histories appear on the following pages in order by test and run number. For a particular test and run, the first left hand page presents time histories of the first 360 seconds of the vertical, lateral, and longitudinal gust velocity components, derived equivalent gust velocity, corrected pressure altitude, and ambient air temperature. The right hand facing page presents the corresponding 360 seconds of true airspeed, roll angle, elevator position, cg longitudinal acceleration, cg lateral acceleration, and cg normal acceleration. For longer runs the sequence described above is repeated in 360-second increments until the end of the run is reached. Each page is labeled with the test number, run number, date, and base of operations. Also included in a separate block are the number of data points plotted per second and the start of the run in terms of Greenwich mean time.

The basic time scale on the plots is 10 seconds per major division. The parameter scales can be determined from the individual plots. Normally they are as follows:

Parameter	Scale per Major Division
Vertical, lateral, and longitudinal gust velocities	20 ft/sec
Derived equivalent gust velocity	10 ft/sec
Corrected pressure altitude	1000 ft
Ambient temperature	5°C
True airspeed	20 ft/sec
Roll angle	5 degrees
Elevator position	2 degrees
CG longitudinal acceleration	0.05g
CG lateral acceleration	0.20g
CG vertical acceleration	0.50g

In these cases where the variation of a parameter was unusually large, the plotting program automatically selects the next larger compatible scale. The change of scale logic considers only the parameter variations occurring in 360 seconds so that in a few cases a scale change will occur in the middle of a run.

In all cases, linear trends were removed from the true gust velocity components as well as the elevator position. Since the linear trend of the latter measurement is negligible, the effect is to maintain the average elevator angle excursions very close to zero. In some cases the linear trends were also removed from cg lateral and cg longitudinal acceleration resulting in a near zero mean for these measurements also.

The letter code following the gust velocity component label identifies the measurements used in the gust velocity determination. If the letter code begins with a "P", then inertial platform measurements were used. If the initial "P" is absent then cg or gust probe (GP) accelerations were integrated to obtain aircraft translational velocities and angular changes were obtained from integration of gyro angular rate measurements. This latter computation is used when the platform measurements are unreliable because of some malfunction. These cases are identified by accelerometer location, i.e., either CG or GP.

Unfortunately, an error was made in the plotting of the corrected pressure altitude time history, with the result that altitude changes occurring during a run are shown correctly but the overall level is generally several hundred feet too high.* Also, in a few cases, instrument malfunctions occurred which are evident in the time histories. For example, the elevator position potentiometer was occasionally noisy as manifested by the high frequency oscillations apparent in test 107, run 8 and the random spikes of test 102, run 3 and 107, run 3. Note also that the spikes sometimes cause the plot to be rescaled with a resulting loss in elevator angle resolution. To avoid confusion, known instrument malfunctions appearing in the time histories are so labeled.

*Corrected average pressure altitudes appear in the HICAT test summary tabulations: See Section VI (Volume I).

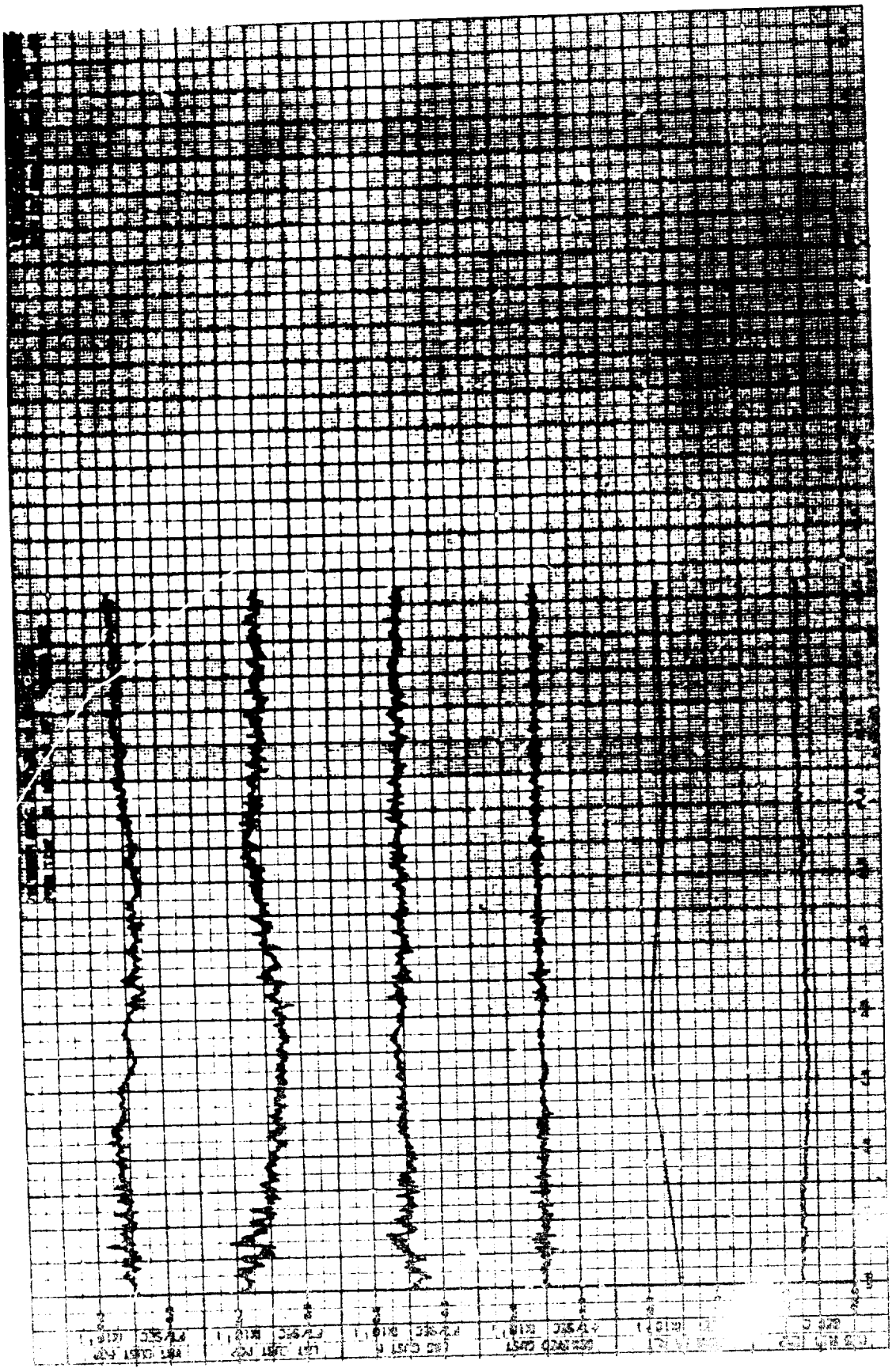


Figure 1A. Gust Velocity Time Histories of Test 54, Run 3 - (Edwards AFB, California, 1 Apr 66).

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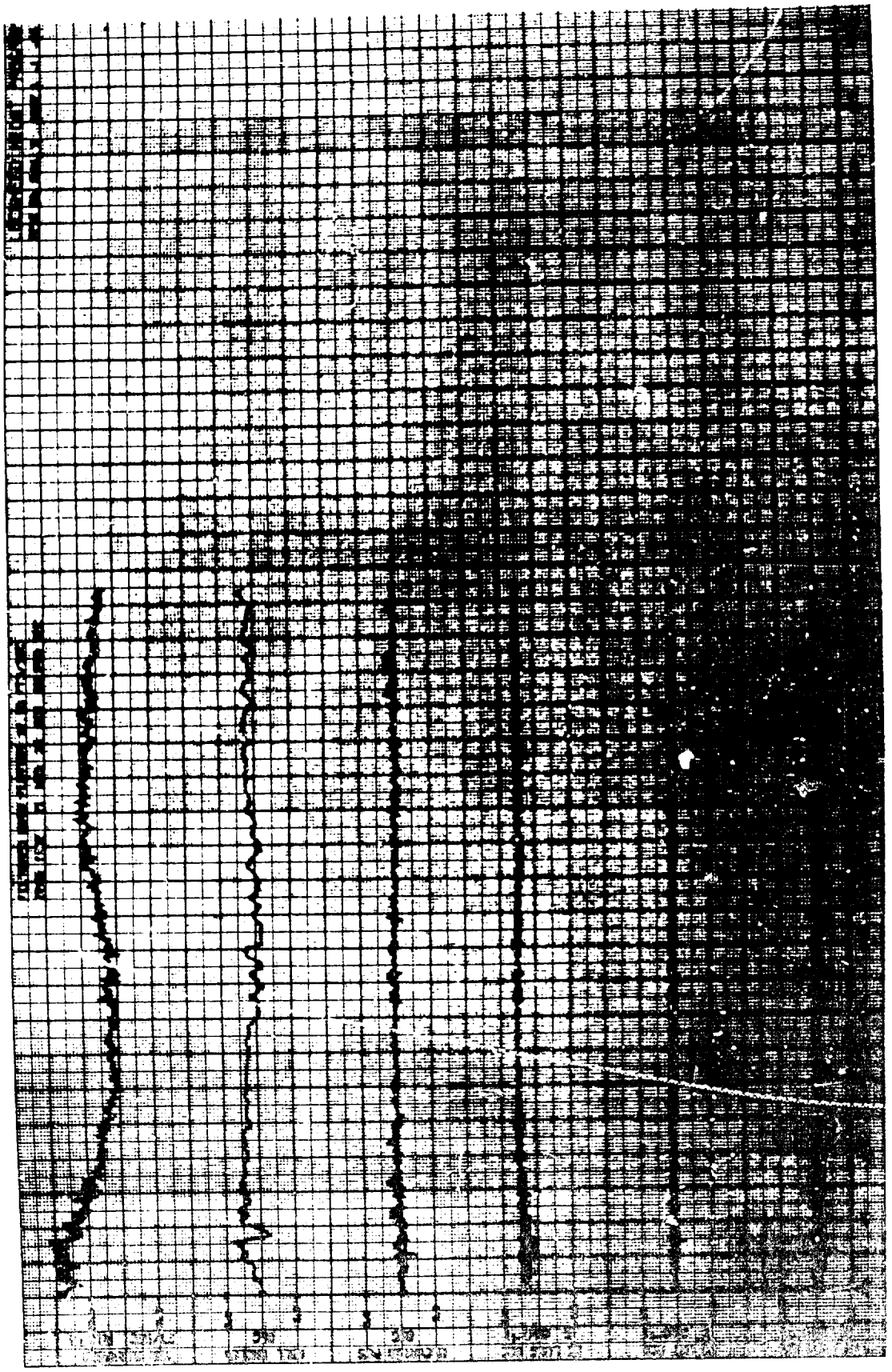


Figure 1B. Flight Parameter Time Histories of Test 54, Run 3.

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Appendix VI

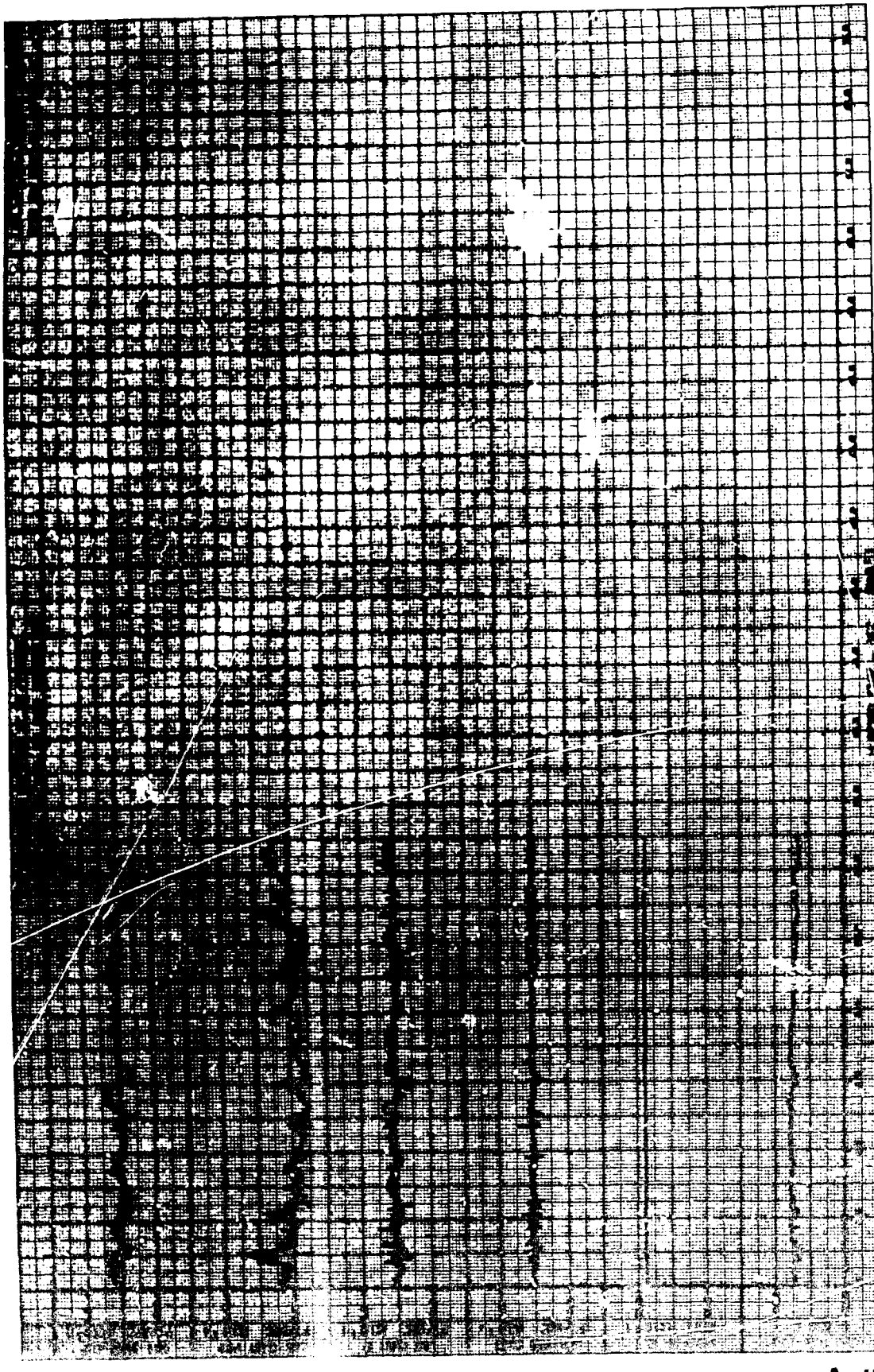


Figure 2A. Gust Velocity Time Histories of Test 54, Run 4 - (Edwards AFB, California, 1 Apr 66).

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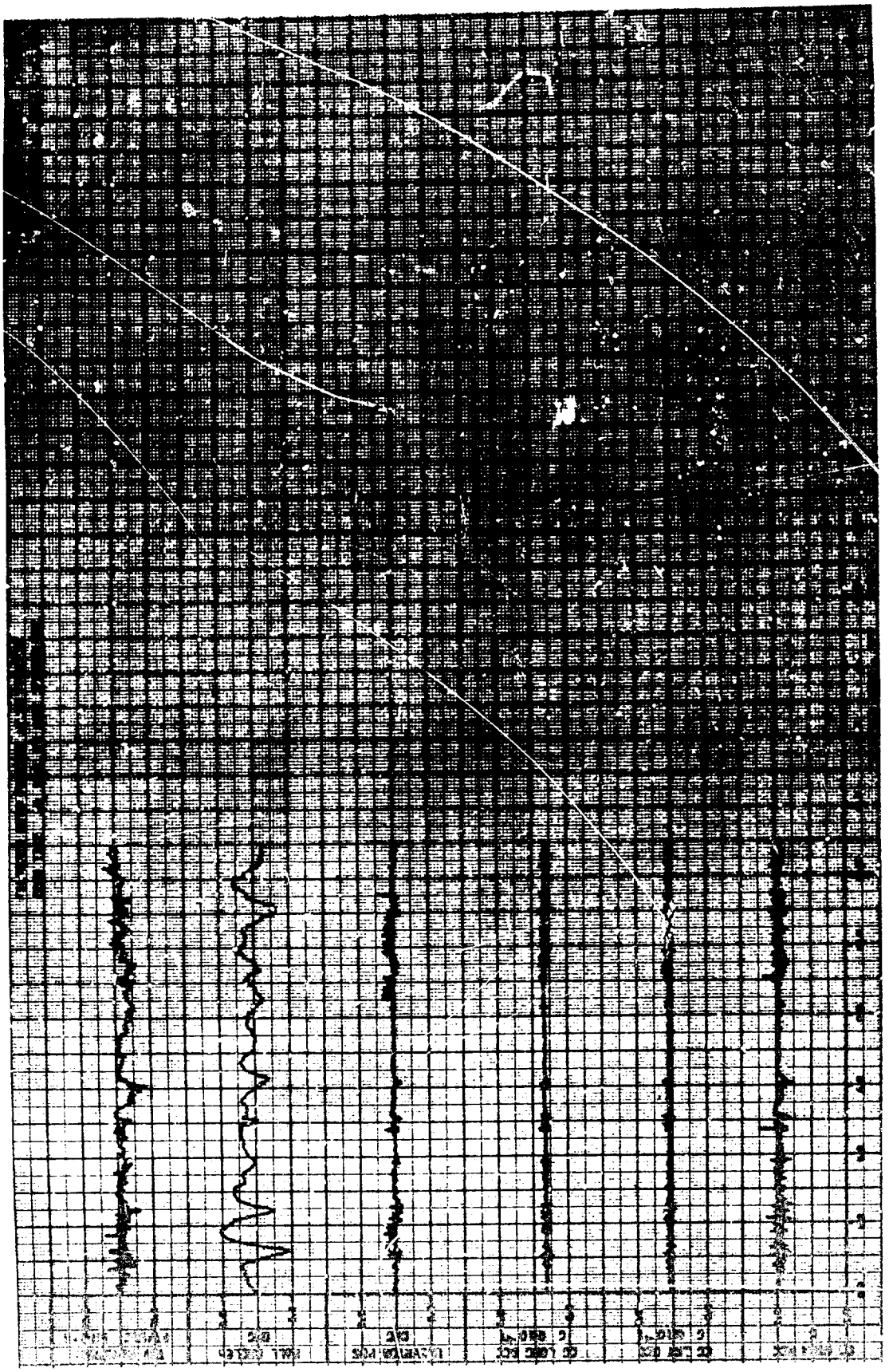


Figure 2B. Flight Parameter Time Histories of Test 54, Run 4.

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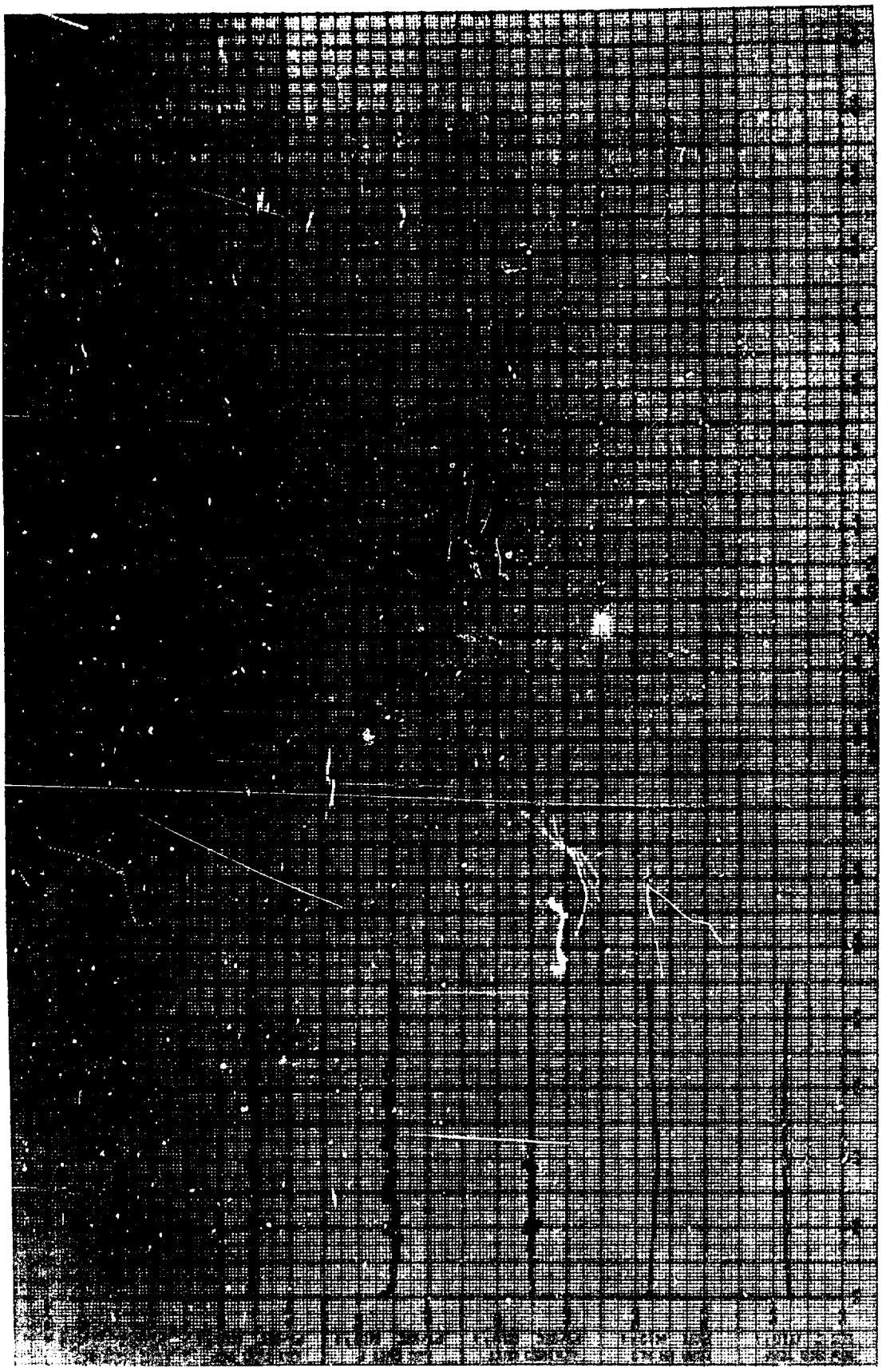


Figure 3A. Gust Velocity Time Histories of Test 54, Run 9 - (Edwards AFB, California, 1 Apr 66).

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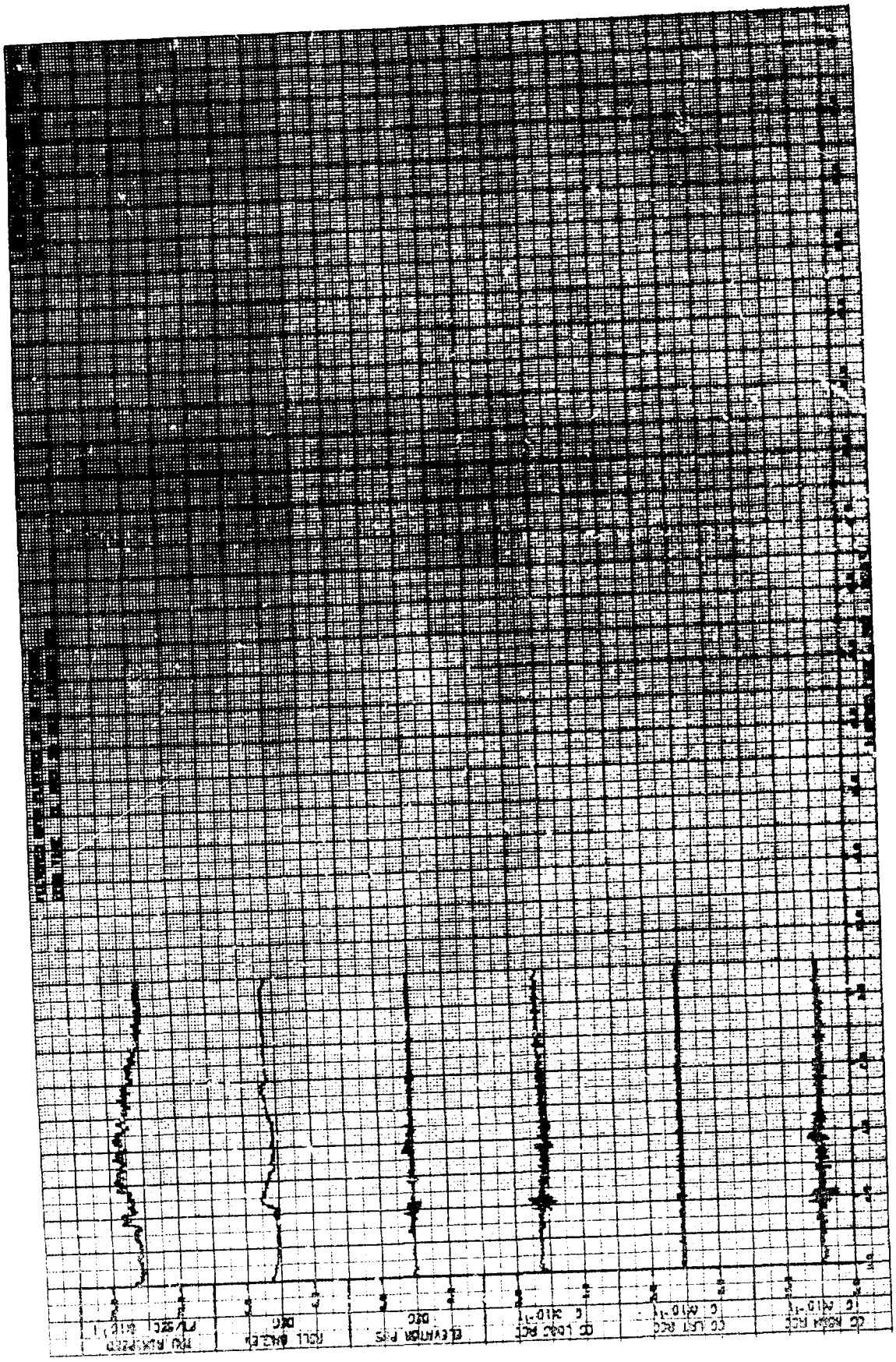


Figure 3B. Flight Parameter Time Histories of Test 54, Run 9.

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Appendix VI

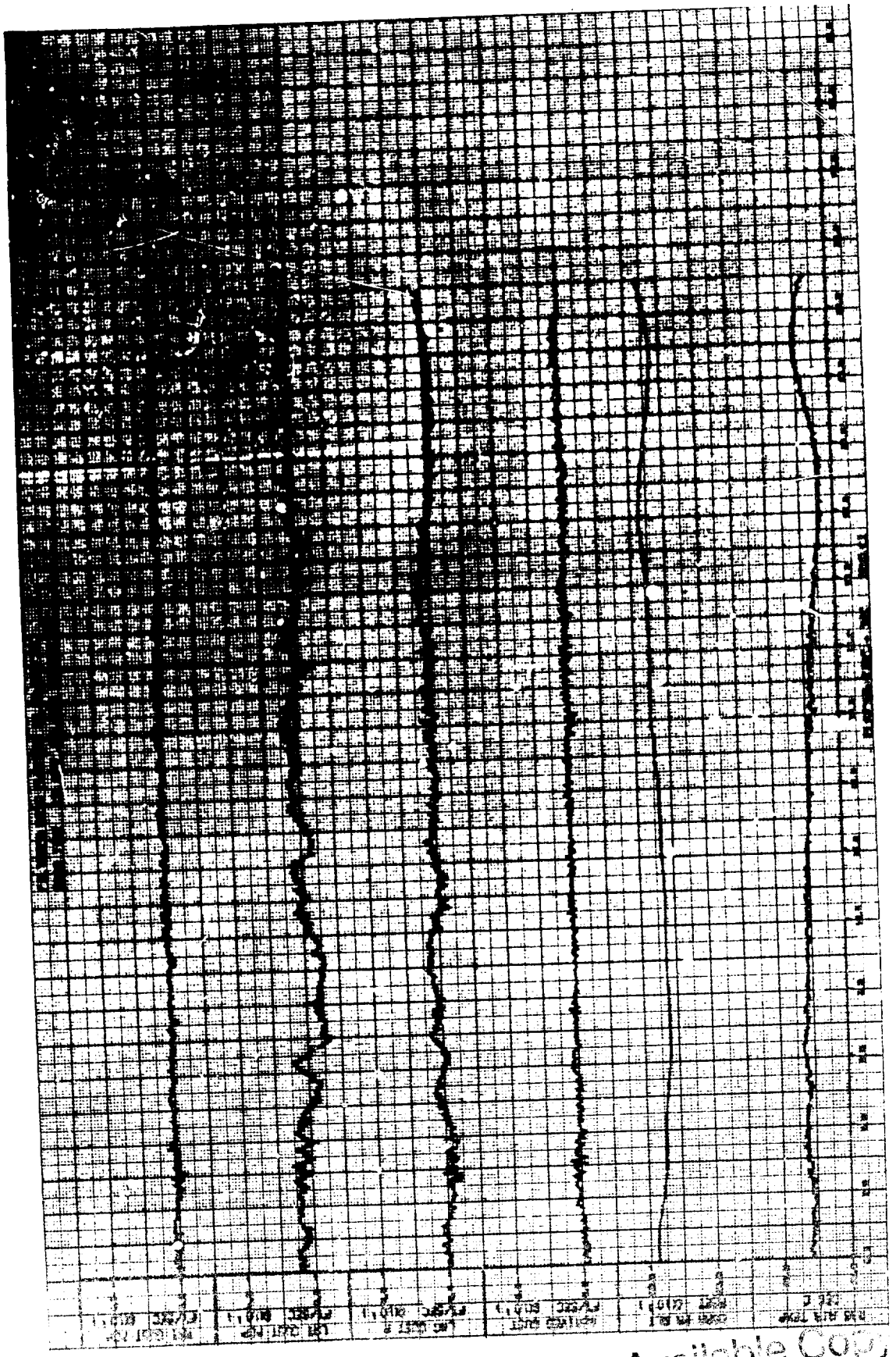


Figure AA. Blast Velocity Time Histories of Test 55, Run 5 - Edwards AFB, Calif., 5 Apr 60).

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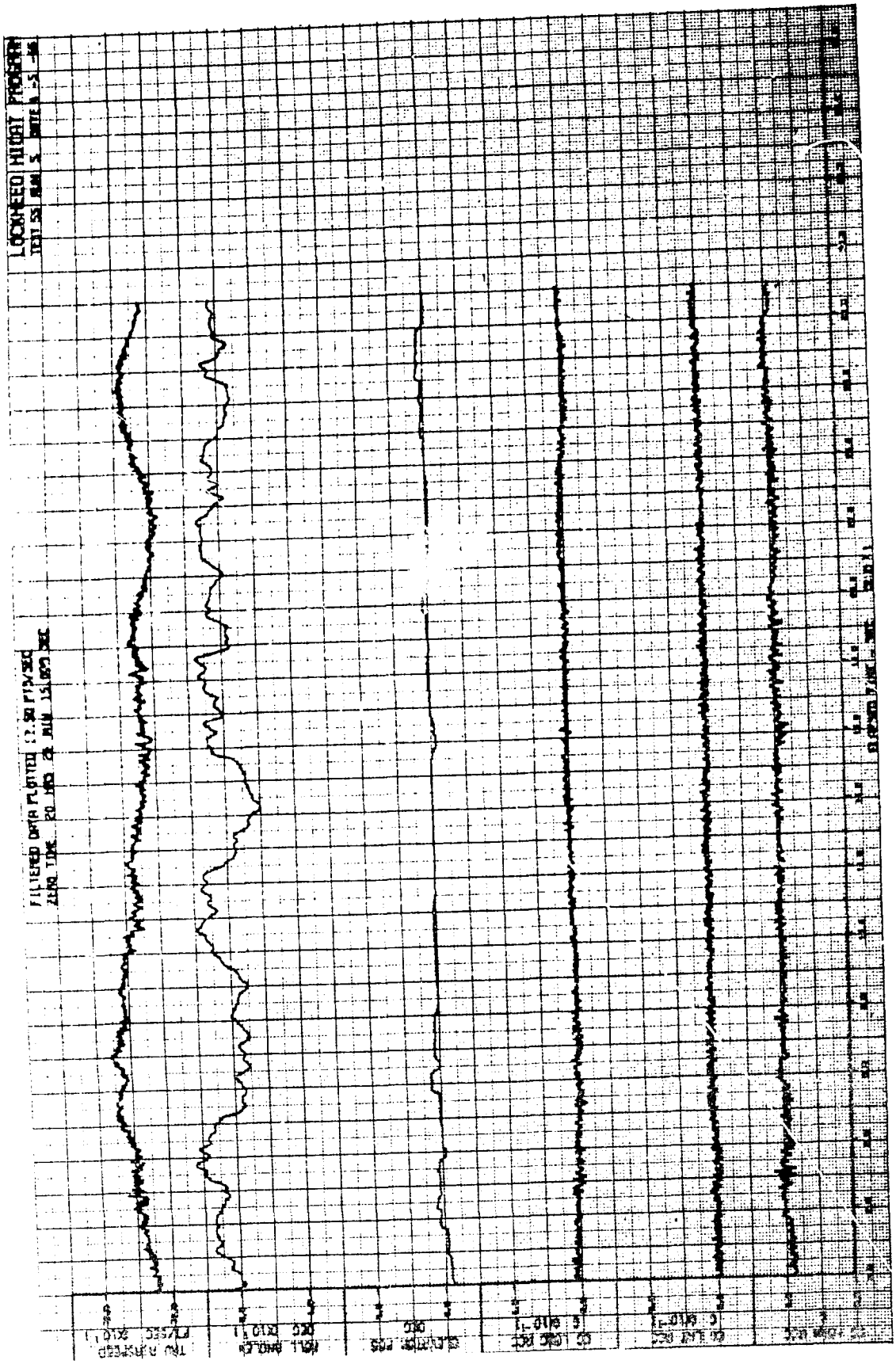
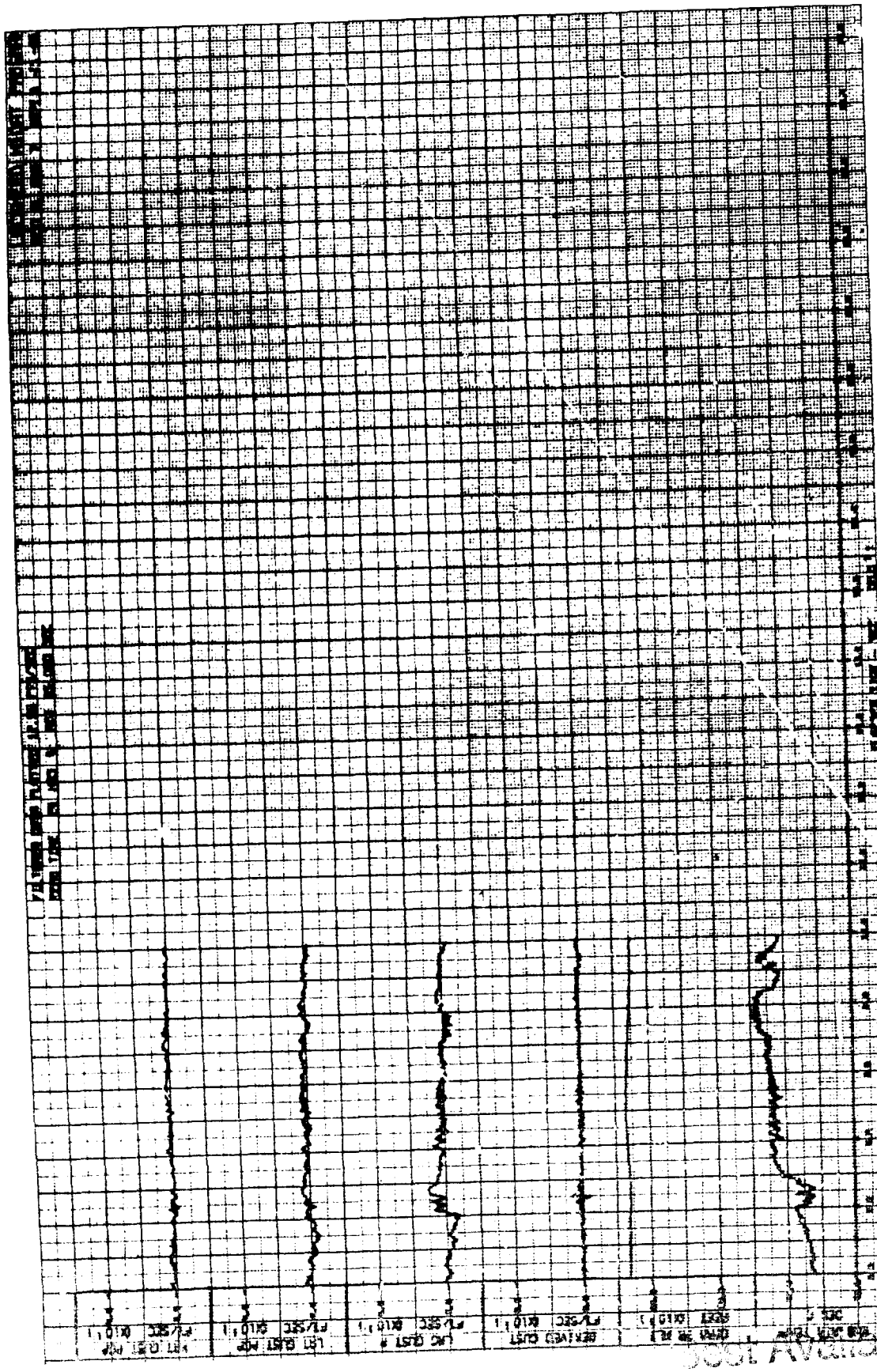


Figure 4B. Flight Test Time History of Test 44, Run 5.

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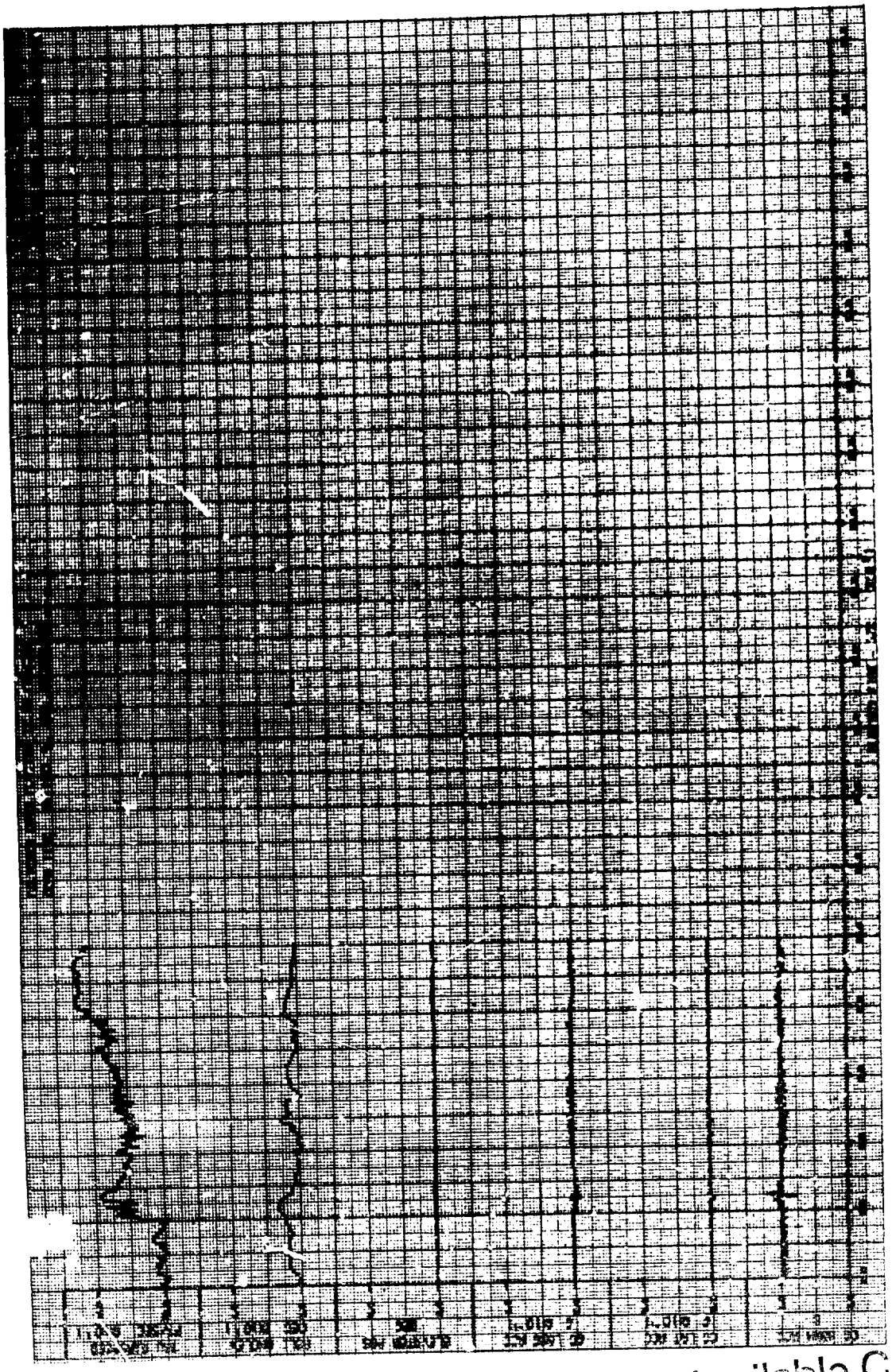
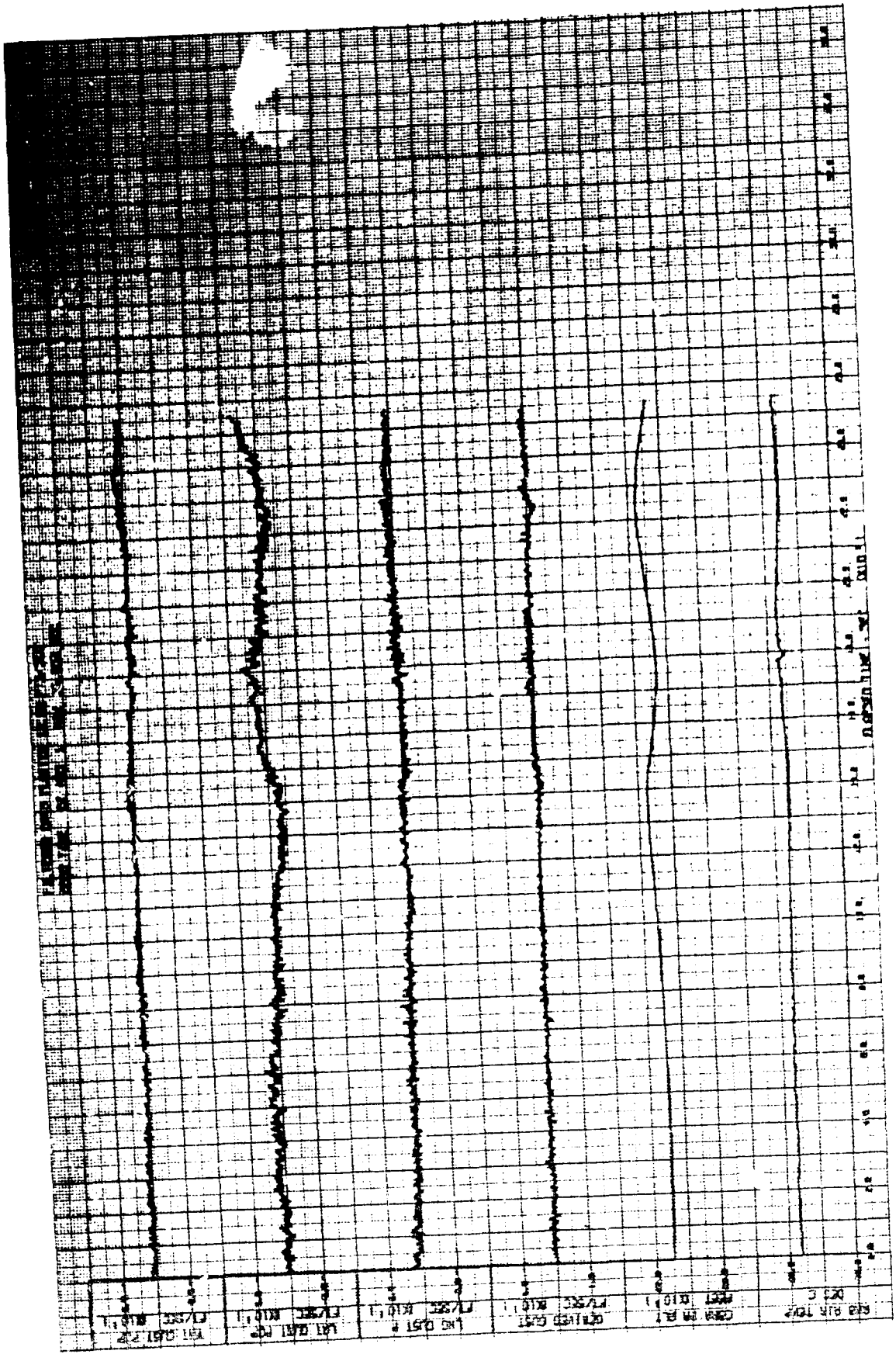


Figure 5B. Ellipse Parameters for Hinderlies et Test 61, Run 7.

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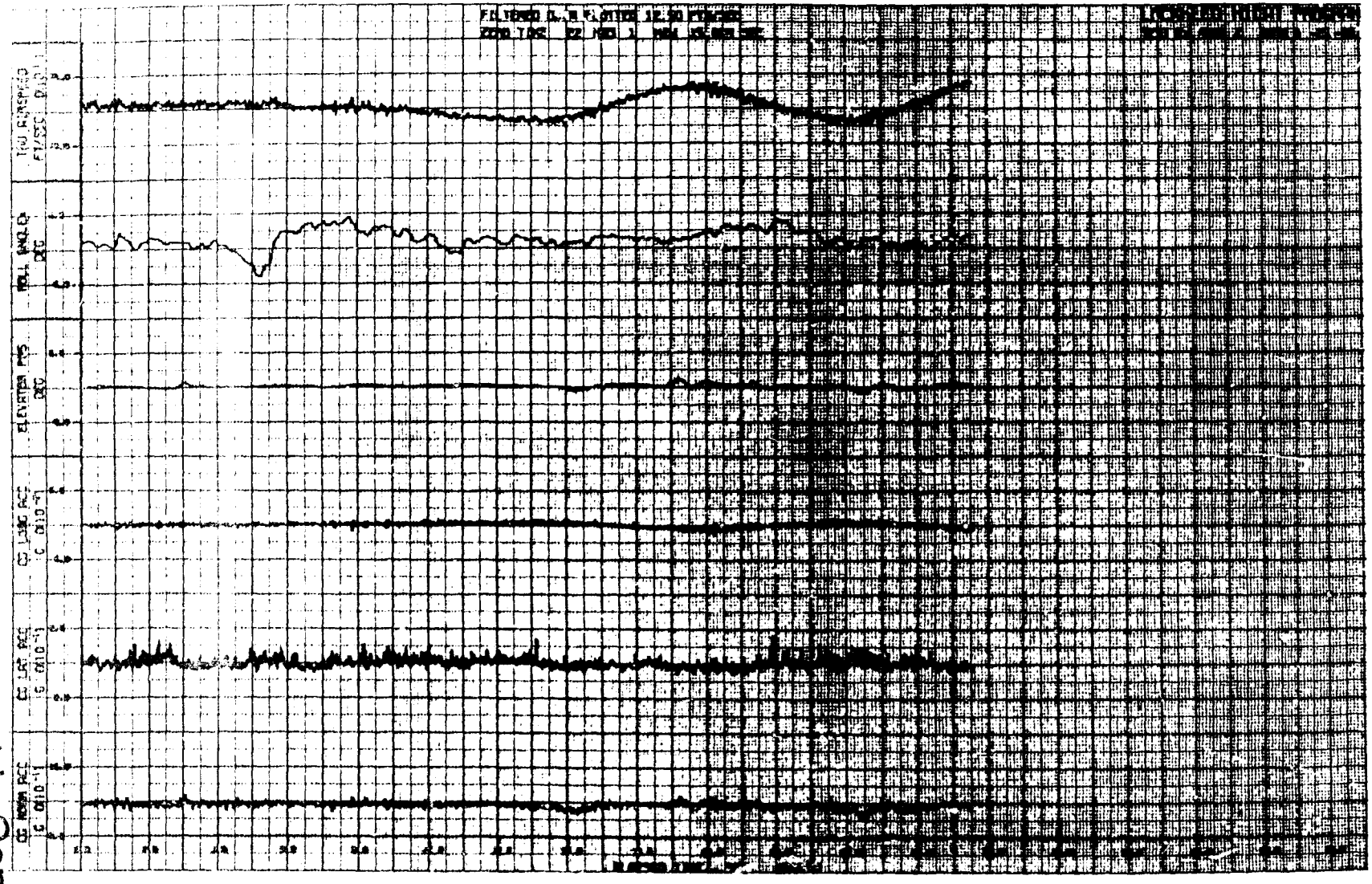
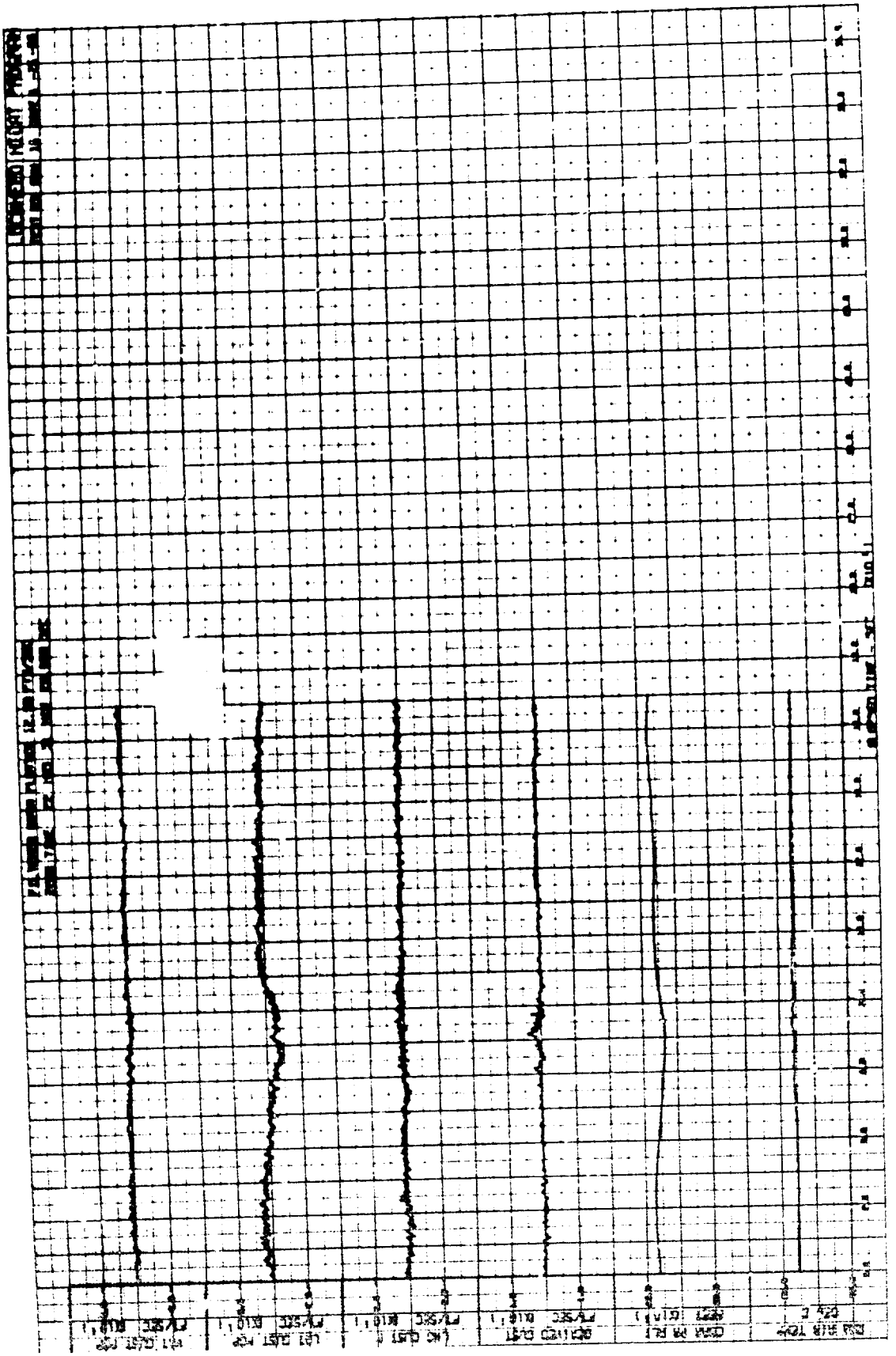


Figure 8B. Flight Parameter Time Histories of Test 63, Run 2.

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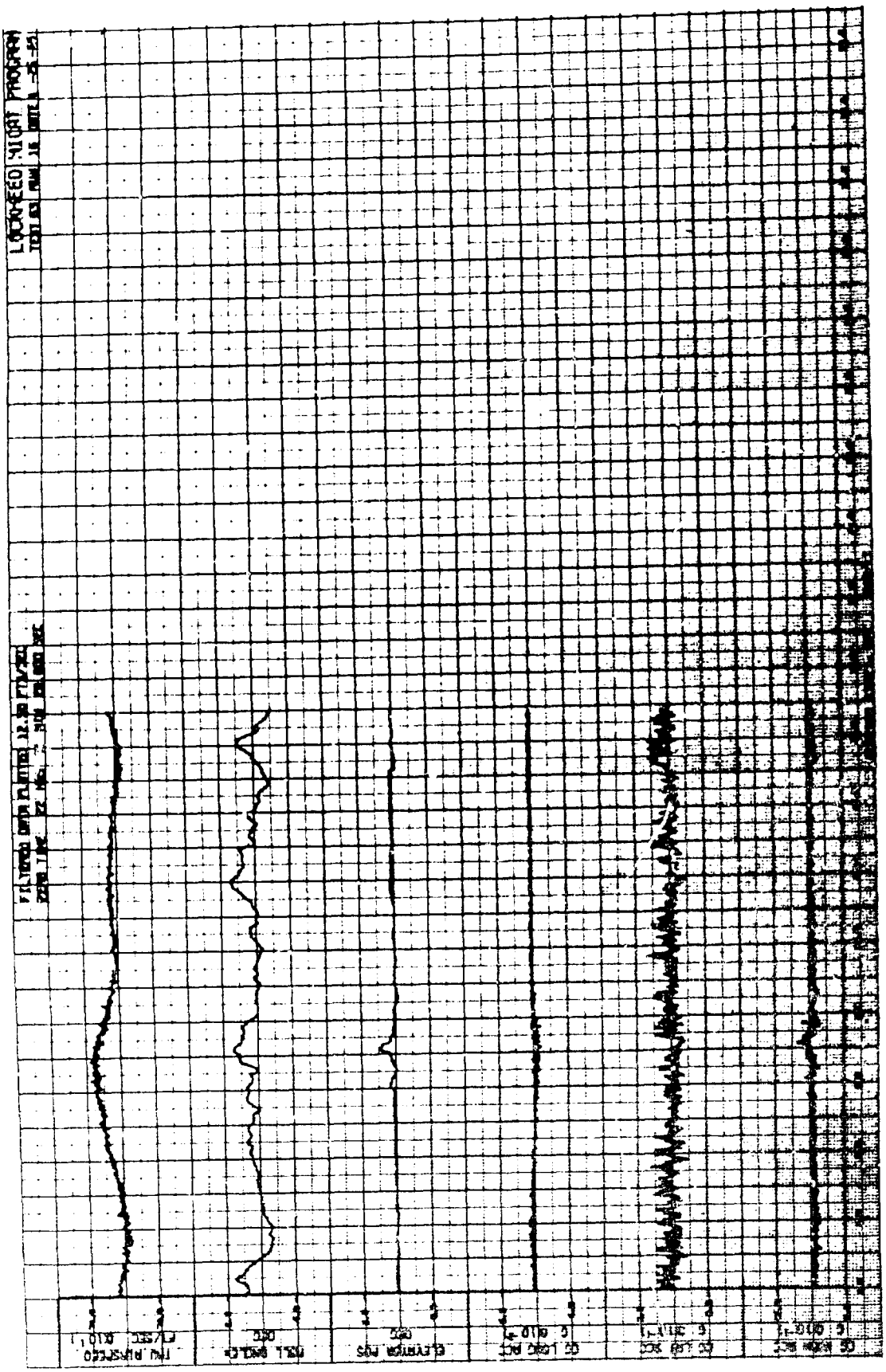


Figure 7B. Flight Parameter Time Histories of Test 63, Run 16.

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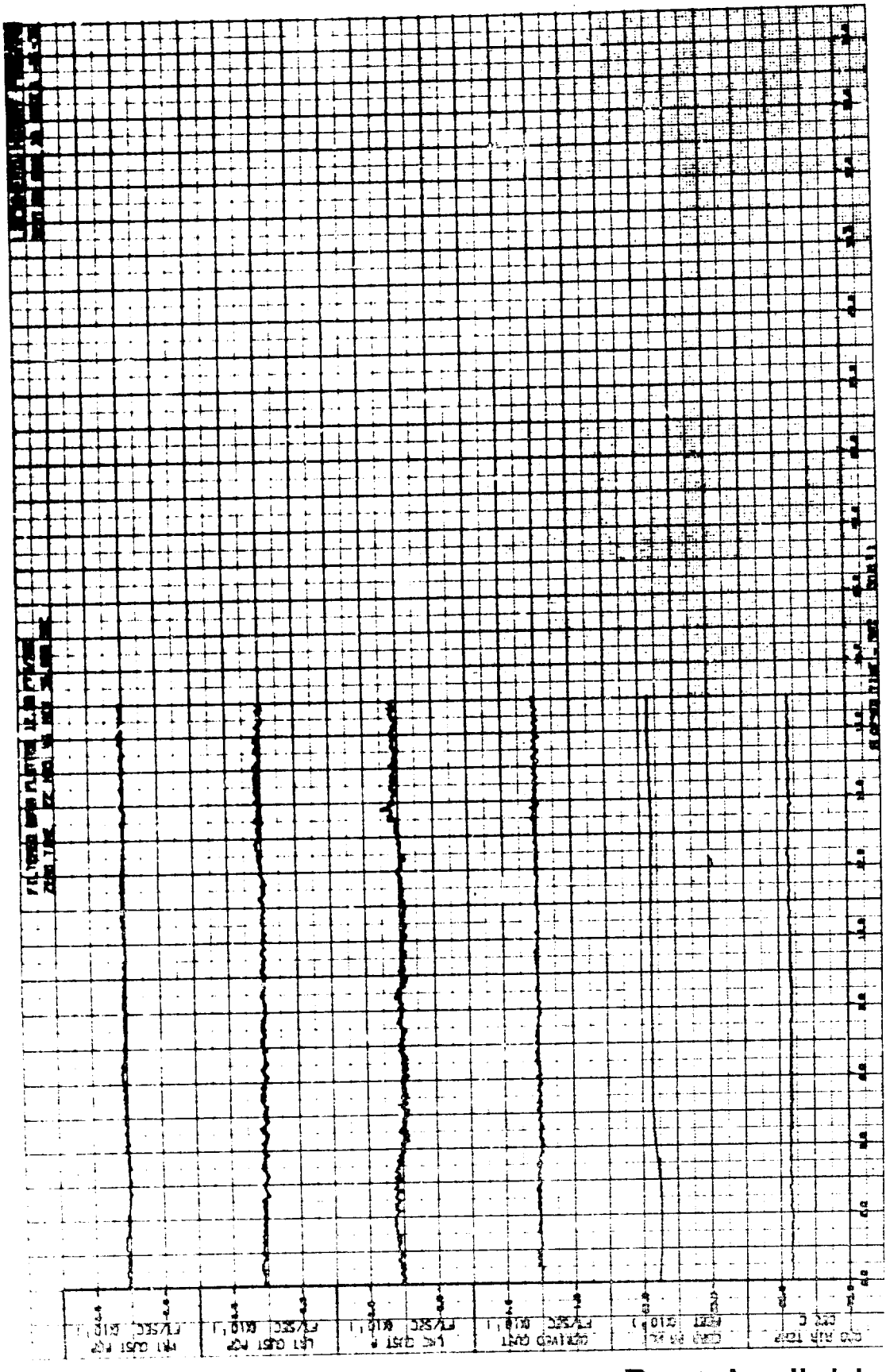


Figure 6.. Jet Velocity Plot Showing of Test 44, Run 19 -
Pressure Ratio, Nozzle Area, and Temperature.

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Figure 6B. Flight Parameter Time Histories of Test 63, Run 19.

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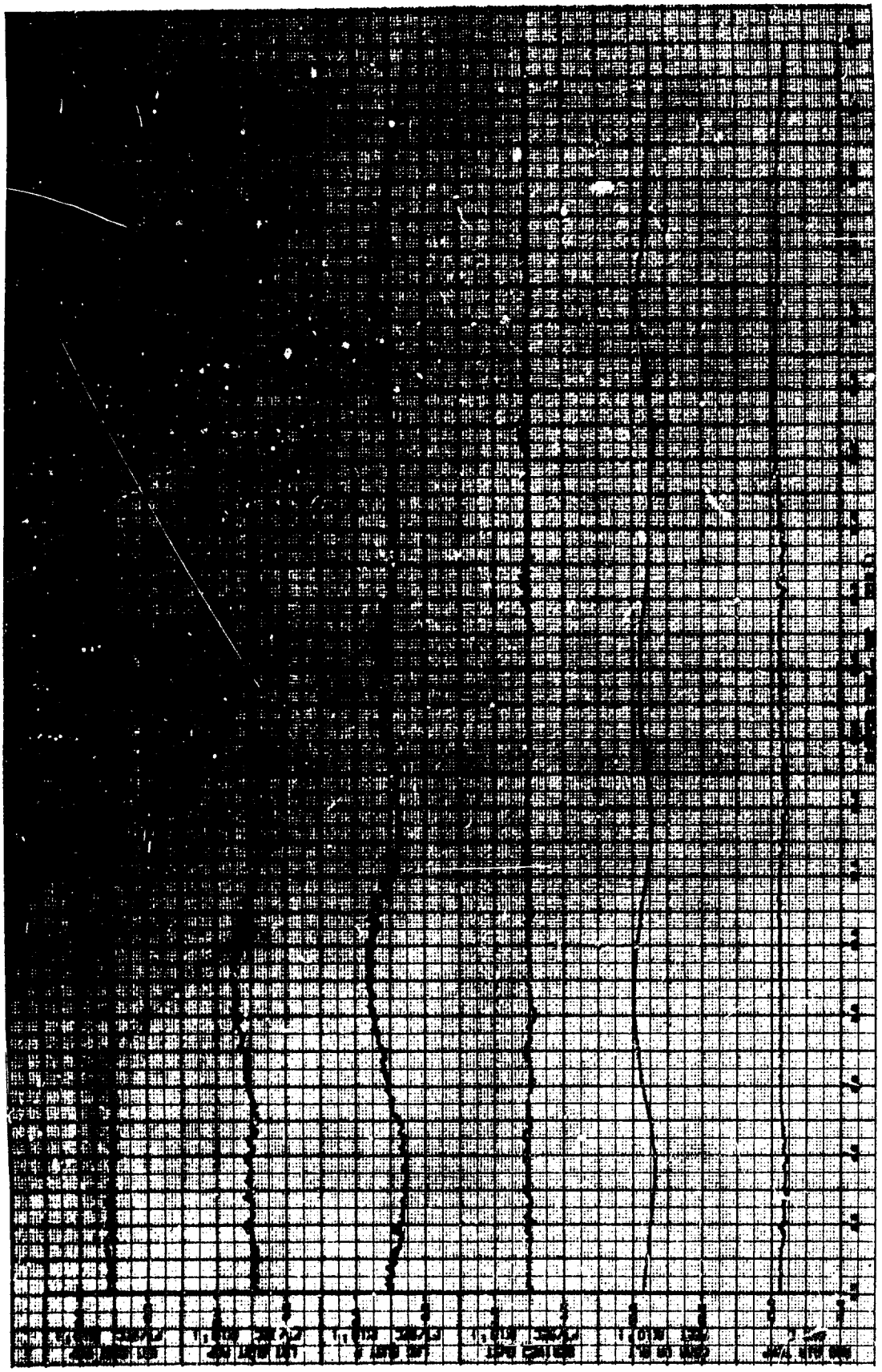


Figure 9A. Gust Velocity Time Histories of Test 63, Run 29 - (Hickam AFB, Hawaii, 25 Apr 66). (Sheet 1 of 2)

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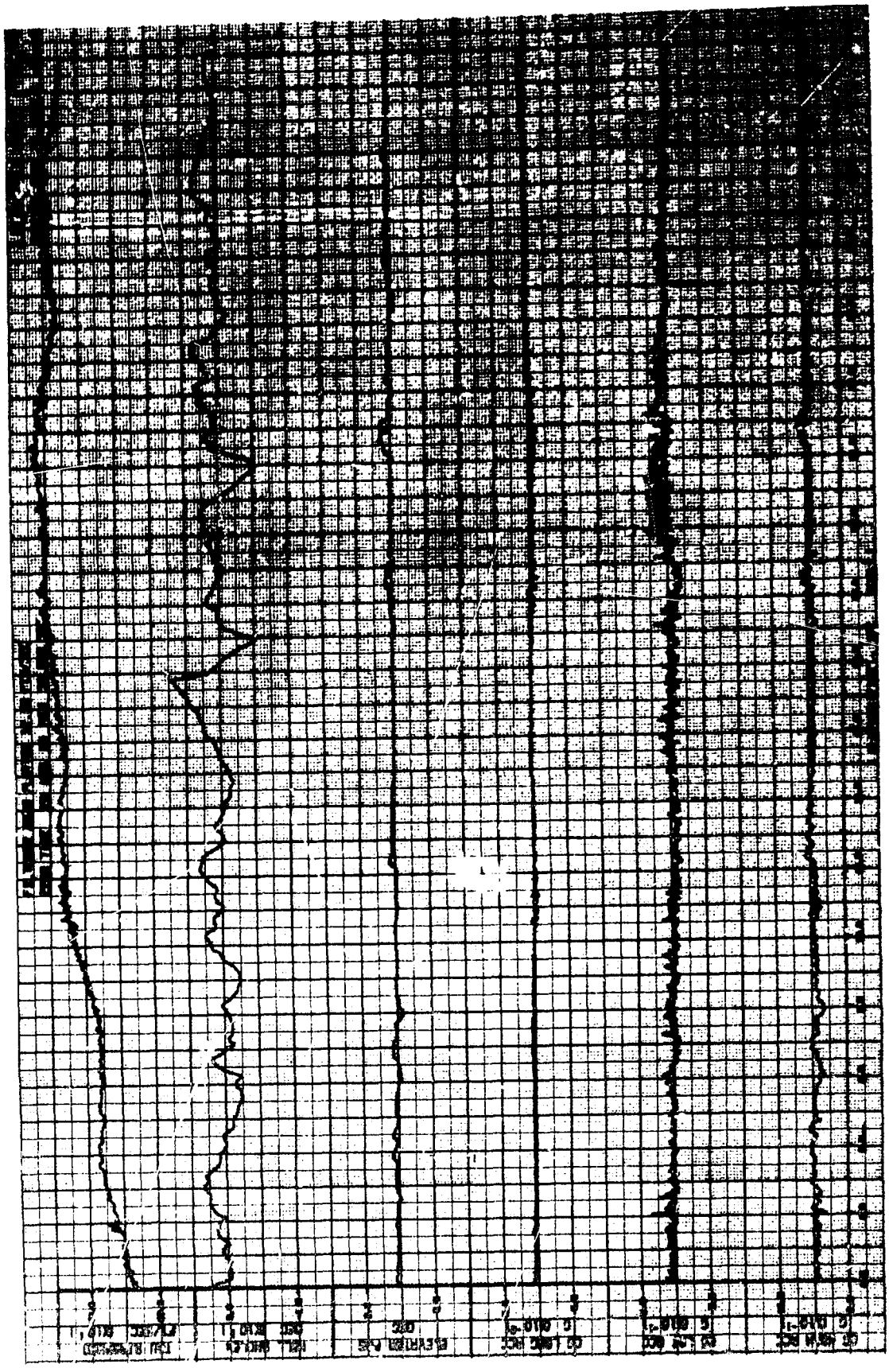


Figure 9B. Flight Parameter Time Histories of Test 63, Run 29 (Sheet 1 of 2).

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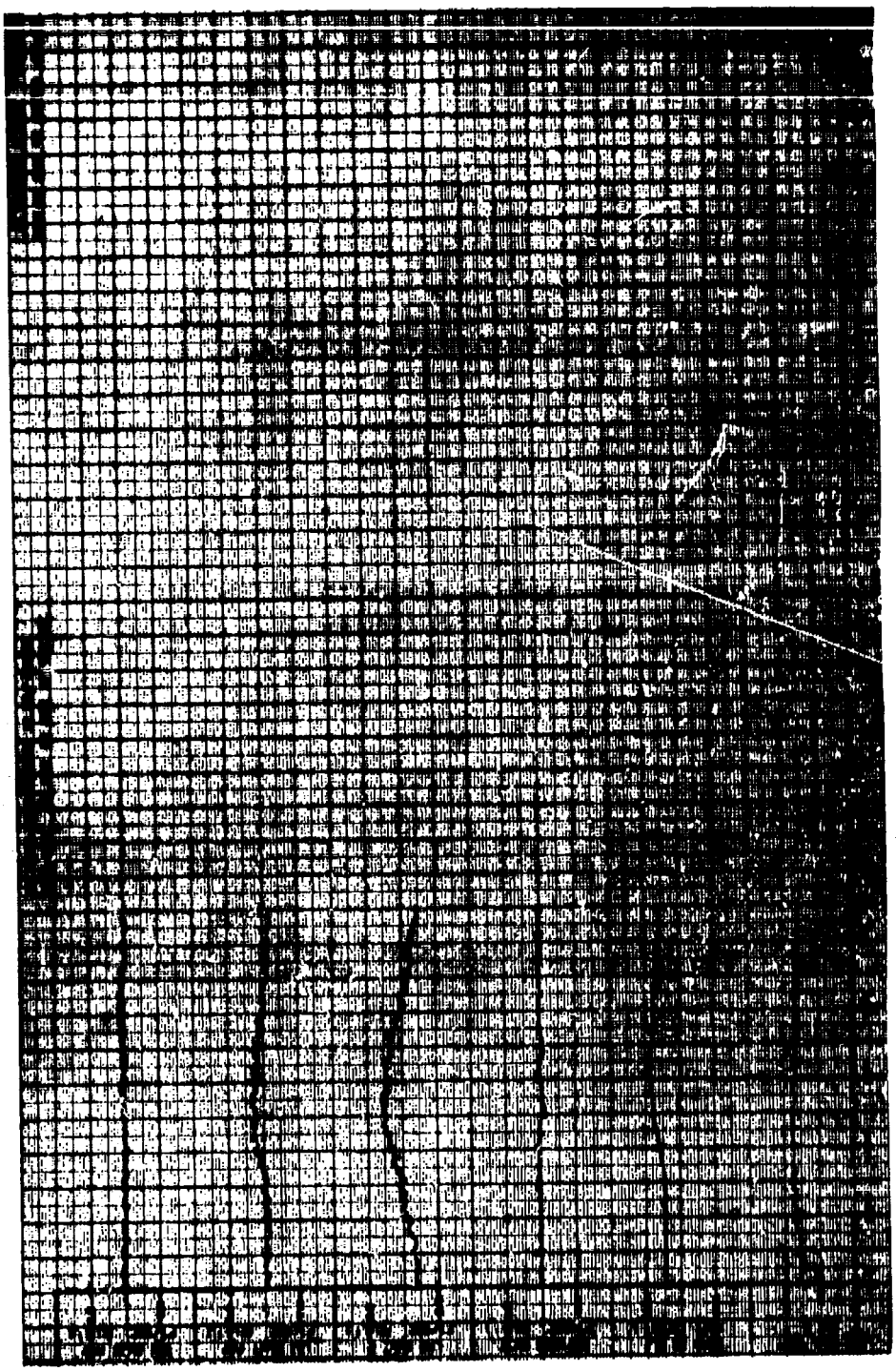


Figure 9A. Gust Velocity Time Histories of Test 63, Run 29 - (Hickam AFB, Hawaii, 25 Apr 63). (Sheet 2 of 2)

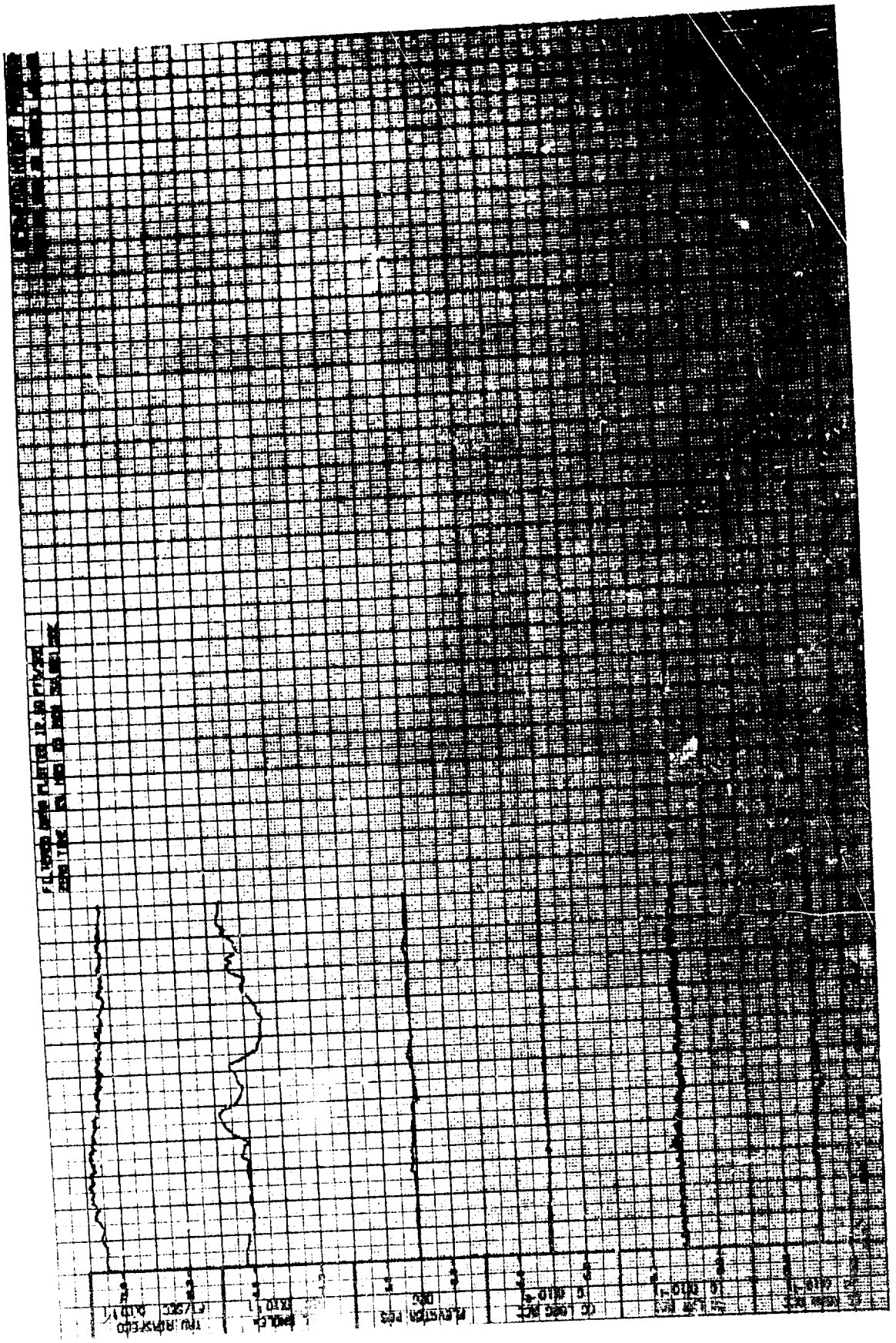


Figure 9B. Flight Parameter Time Histories of Test 63, Run 29 (Sheet 2 of 2).

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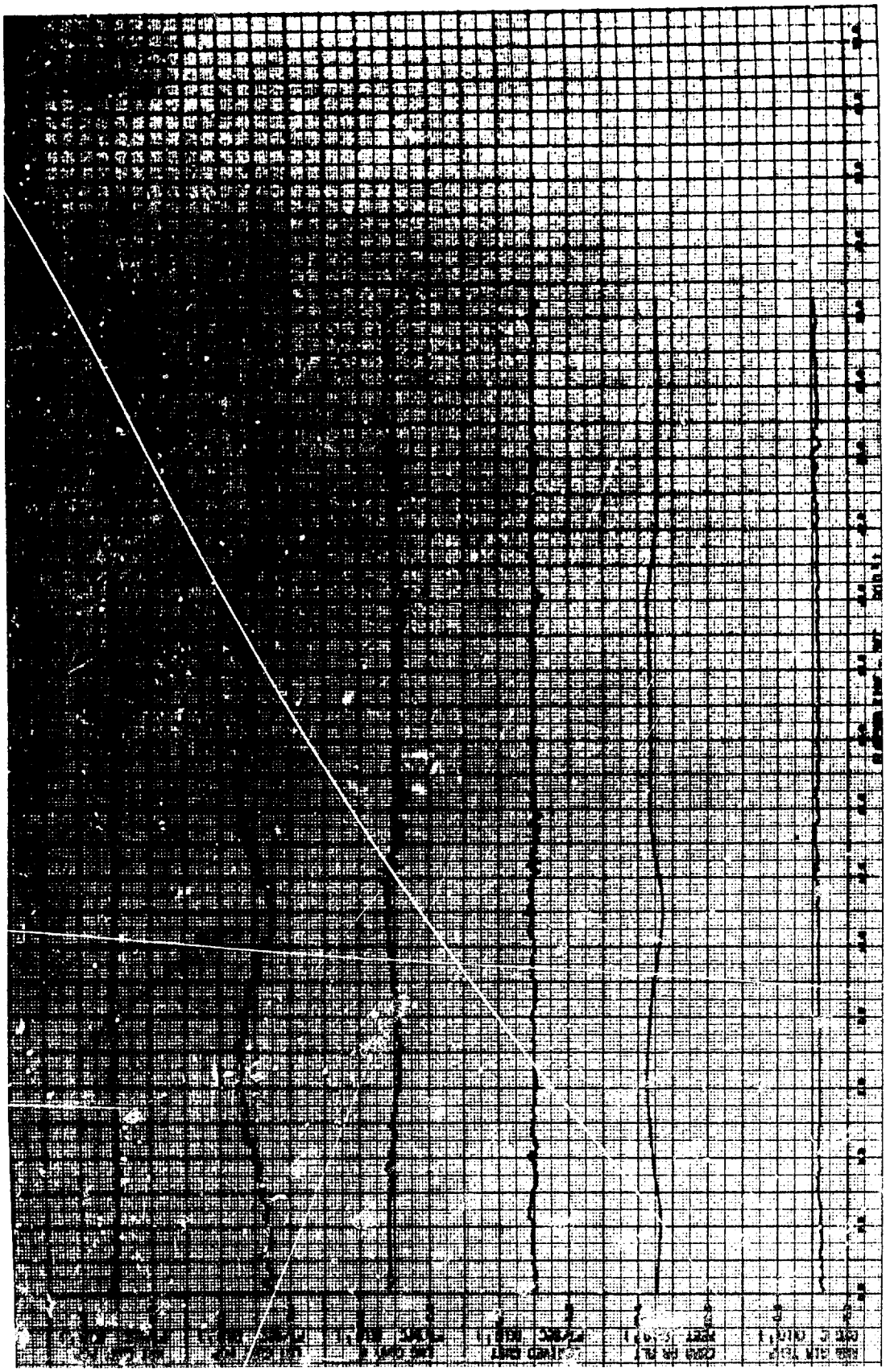


Figure 10A. Dust Velocity Time Histories of Test 63, Run 31 (Hickam AFB, Hawaii, 25 Apr 66).

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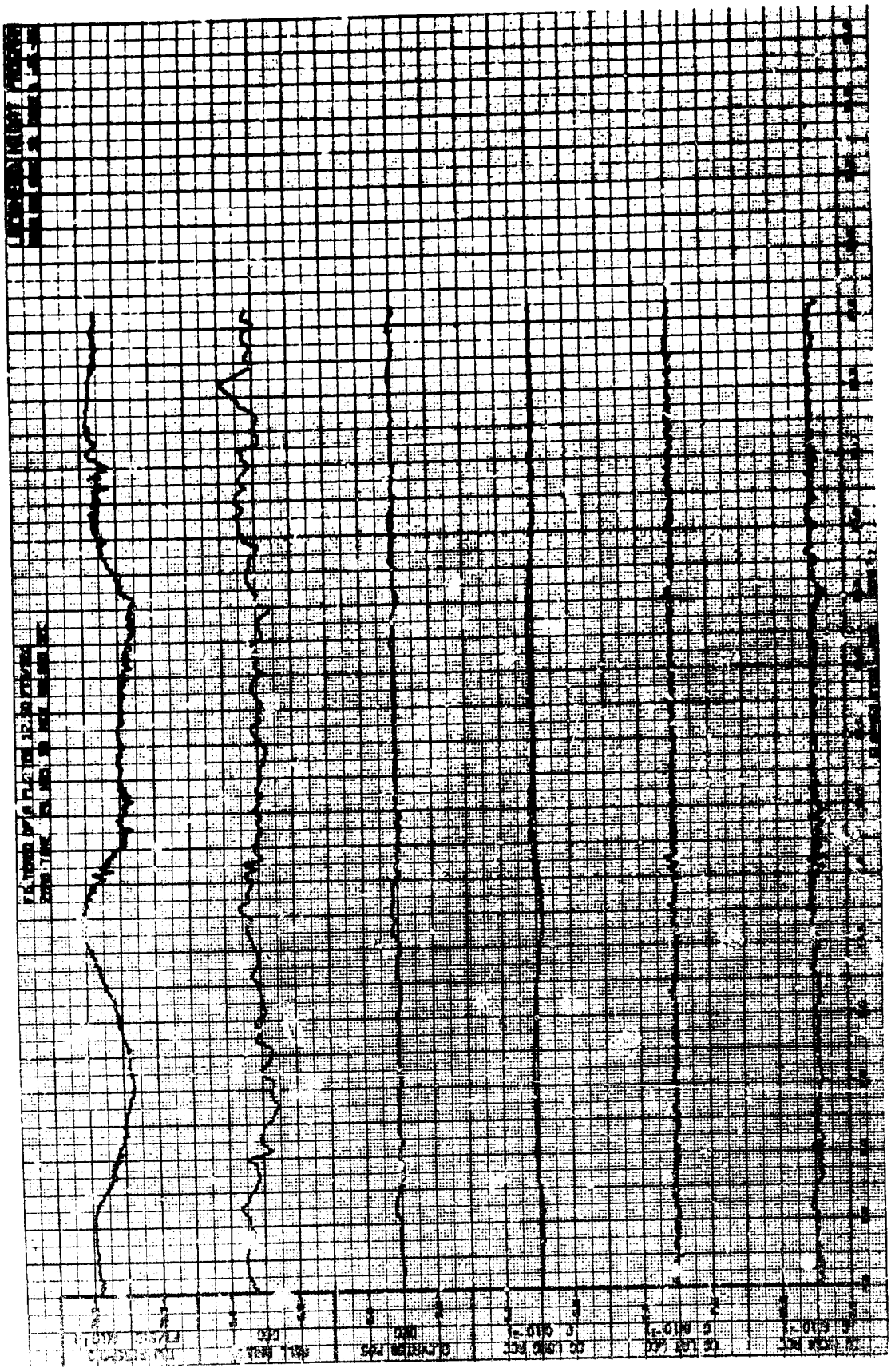


Figure 10B. Flight Parameter Time Histories of Test 63, Run 31.

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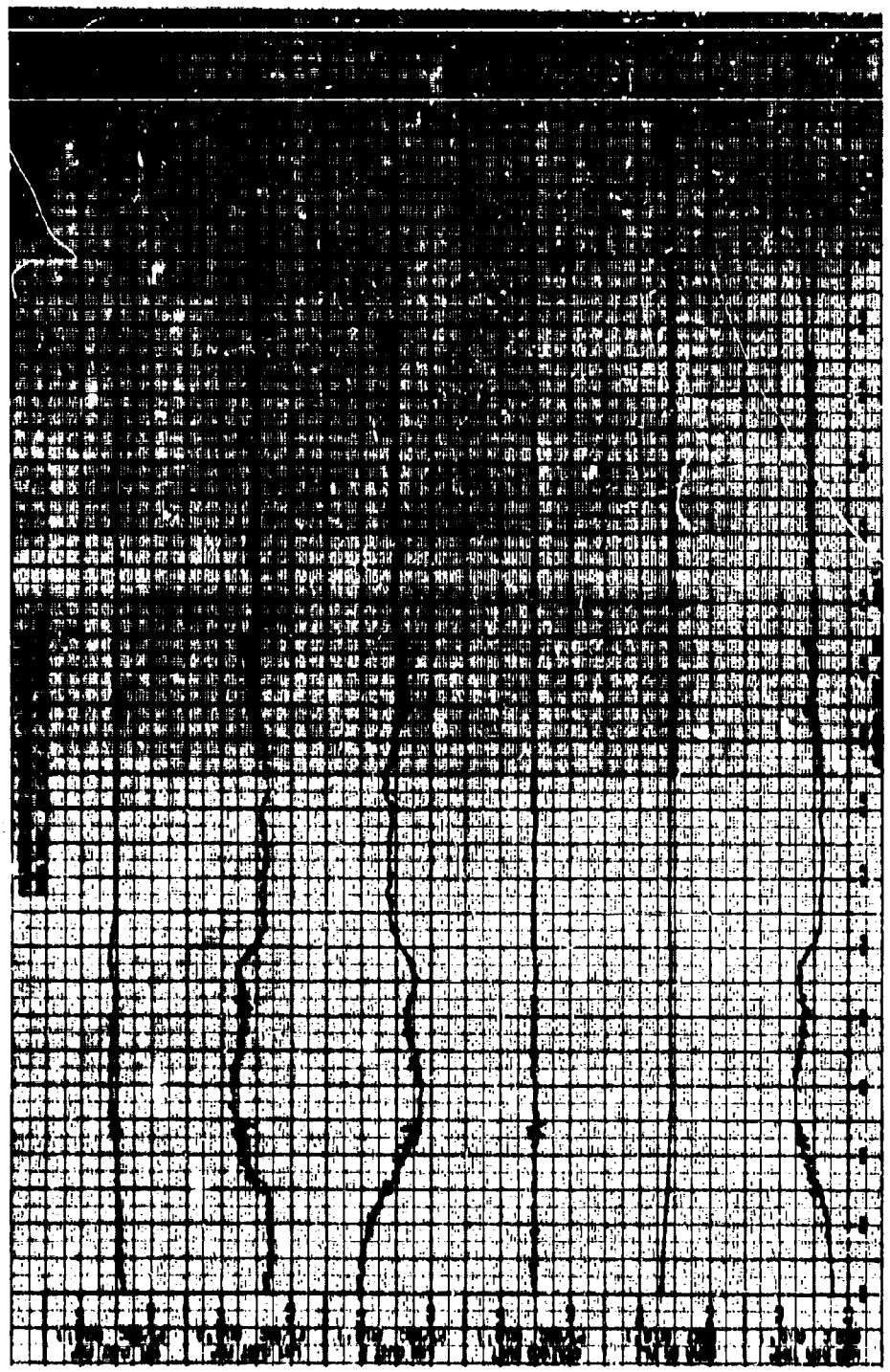


Figure 11A. Gust Velocity Time Histories of Test 73, Run 2 - (Hickam AFB, Hawaii, 10 May 66).

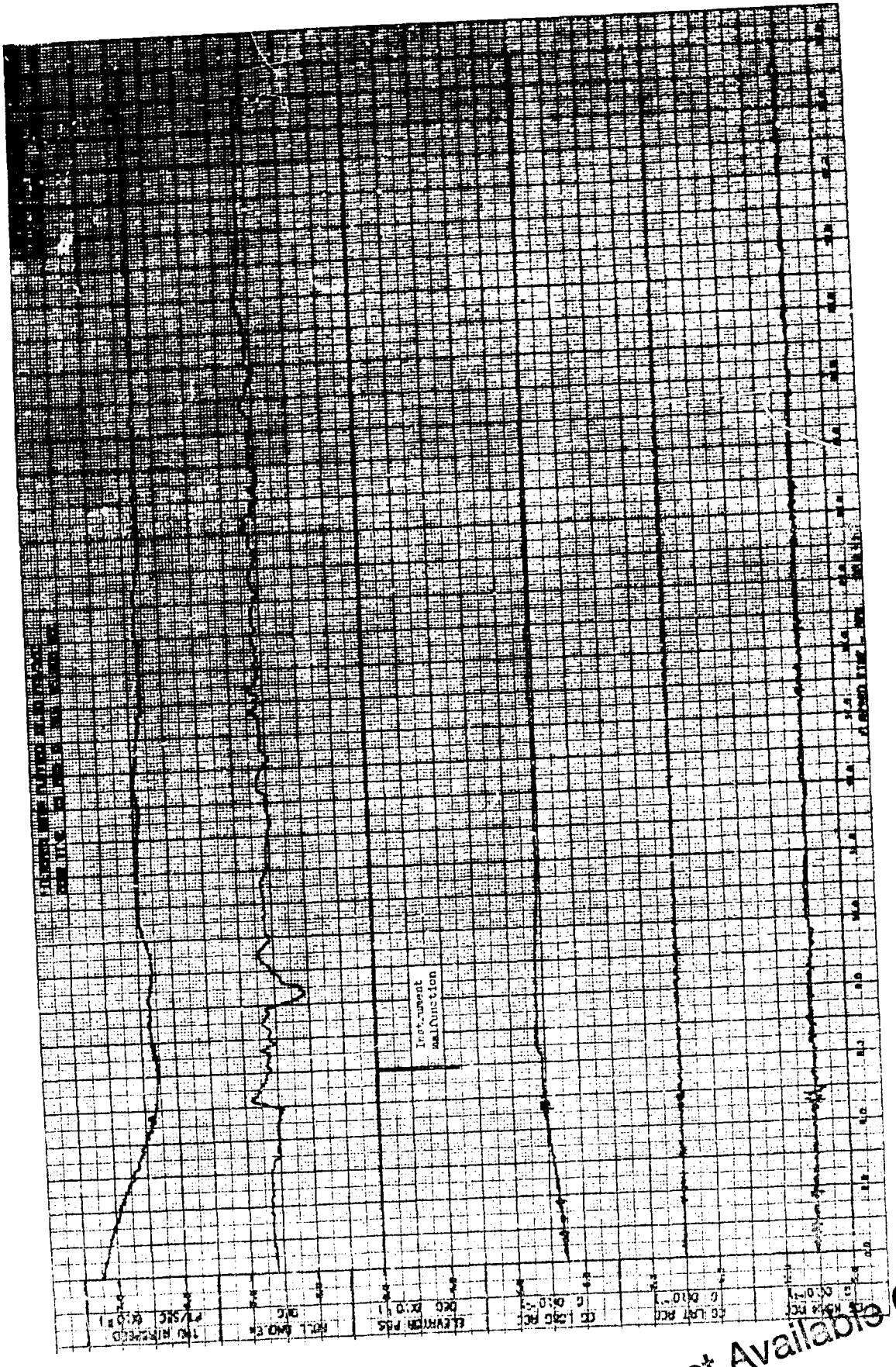


Figure 11B. Flight Parameter Time Histories of Test 73, Run 2.

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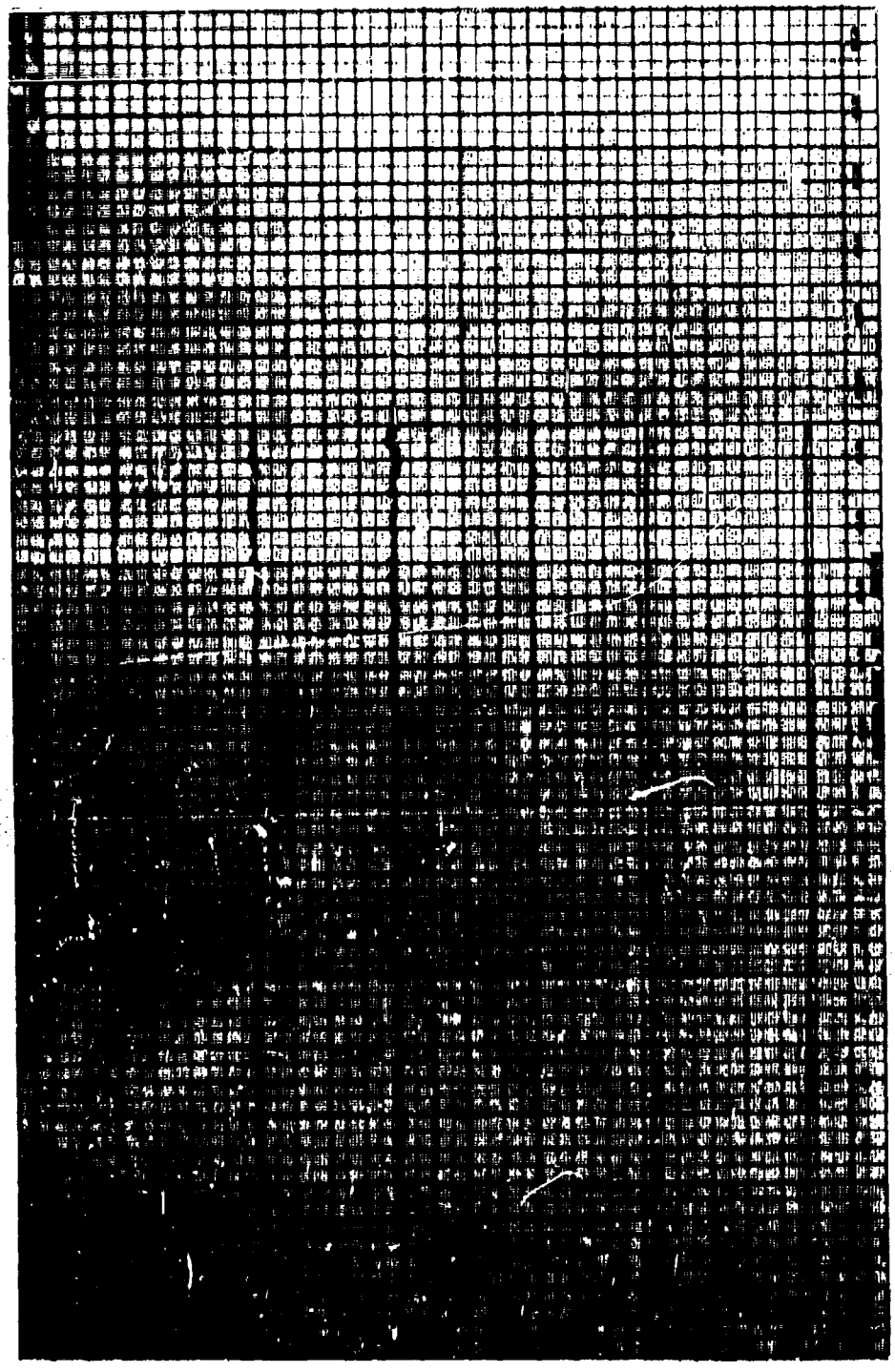


Figure 12A. Gust Velocity Time Histories of Test 73, Run 4 - (Hickam AFB, Hawaii, 10 May 66)

Figure 12B. Flight Parameter Time Histories of Test 73, Run 4.

Appendix VI

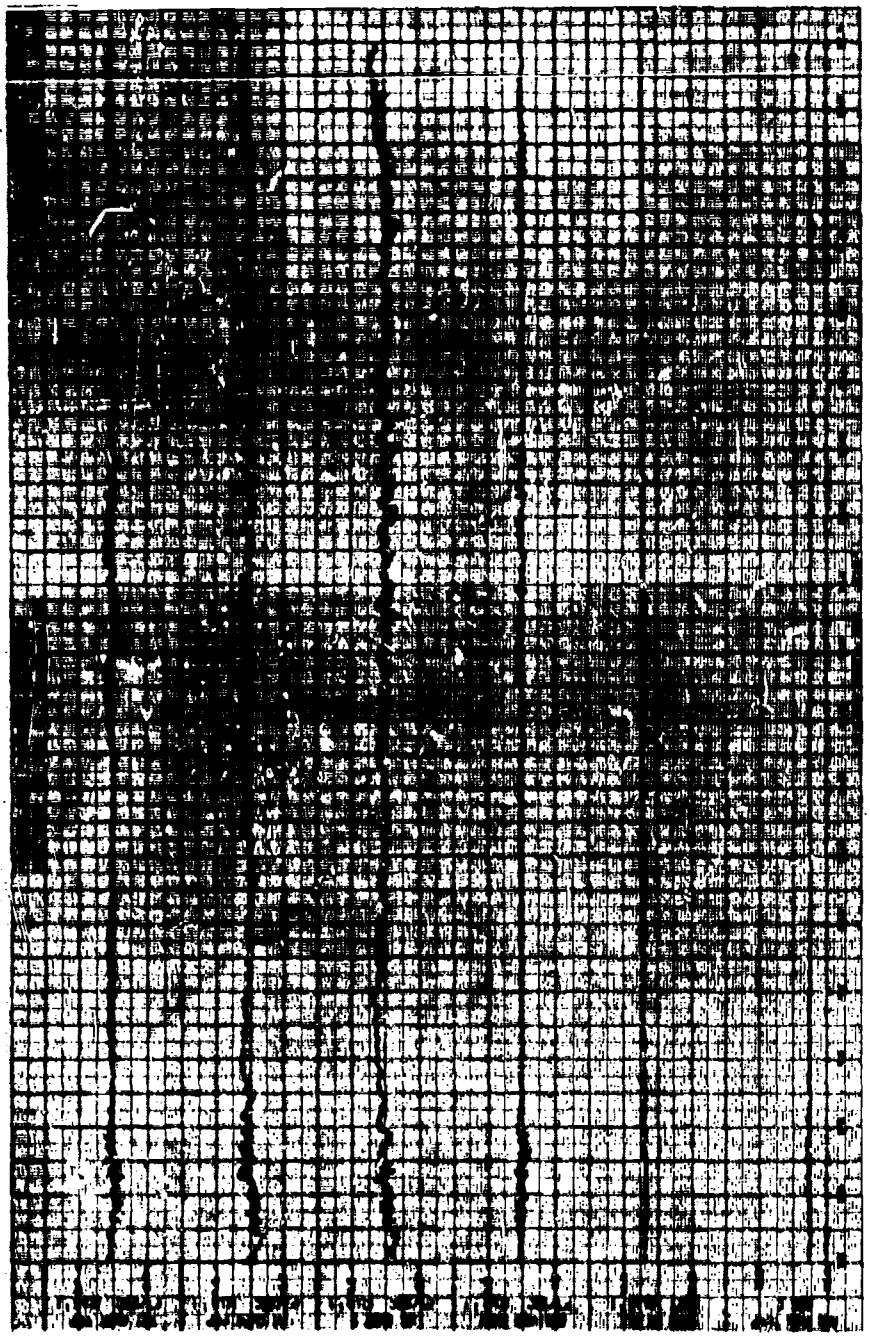


Figure 13A. Dust Velocity Time Histories of Test 75, Run 1 - (Hickam AFB, Hawaii, 11 May 66).



Figure 13B. Flight Parameter Time Histories of Test 75, Run 4.

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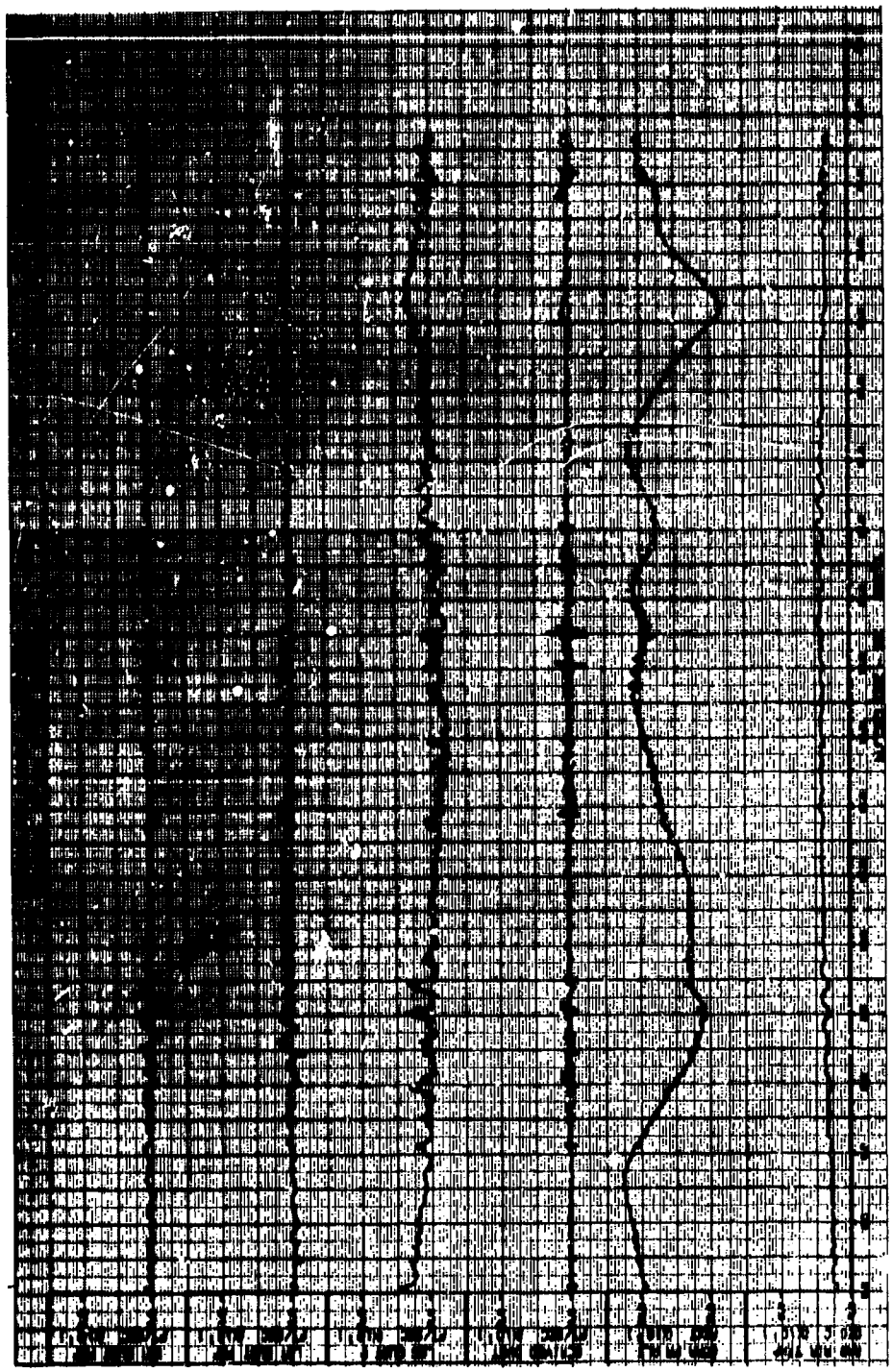


Figure 14A. Gust Velocity Tire Histories of Test 76, Run 1 - (Hickam AFB, Hawaii, 16 May 60).

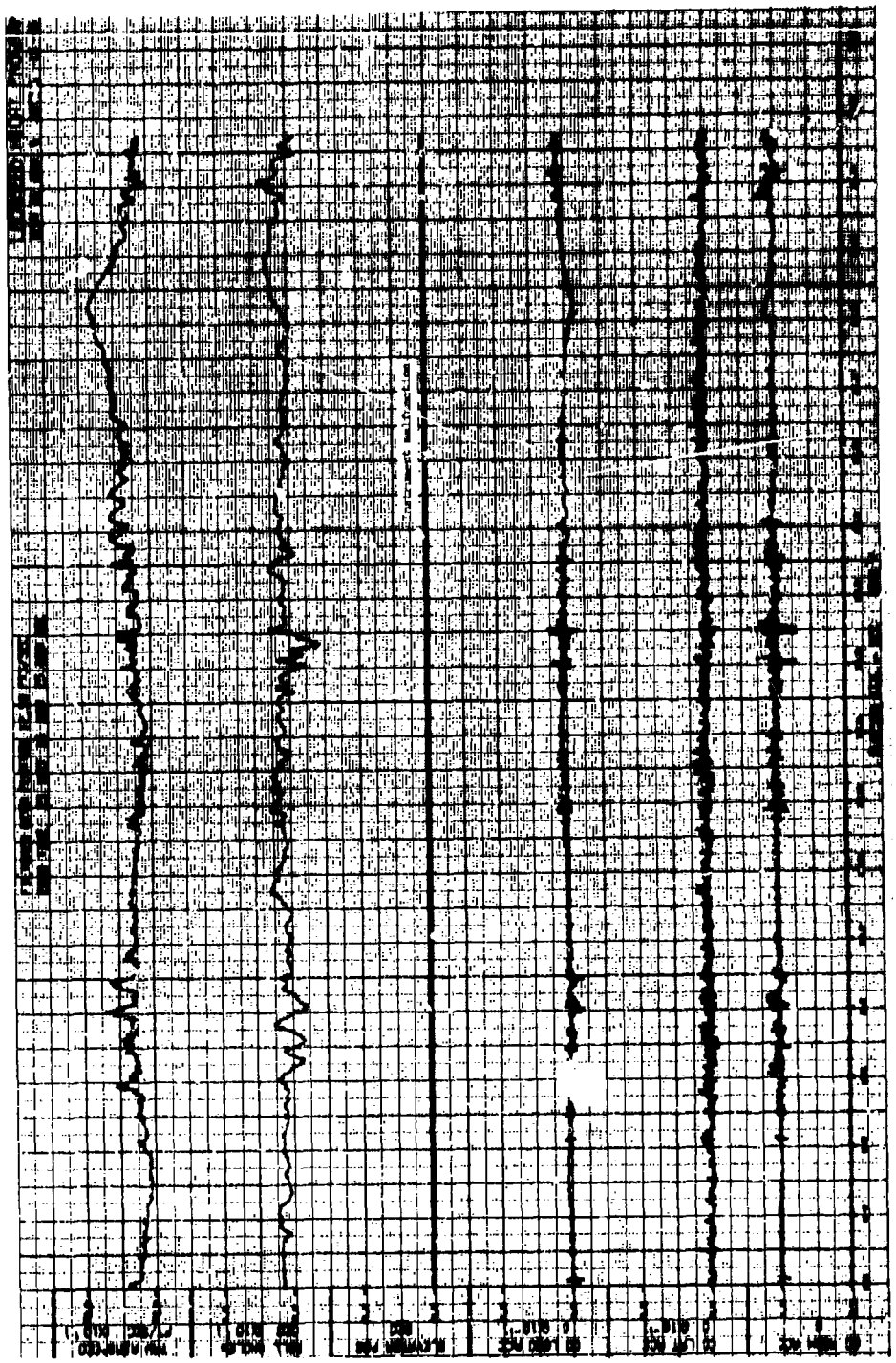


Figure 14B. Flight Parameter Time Histories of Test 76, Run 4.

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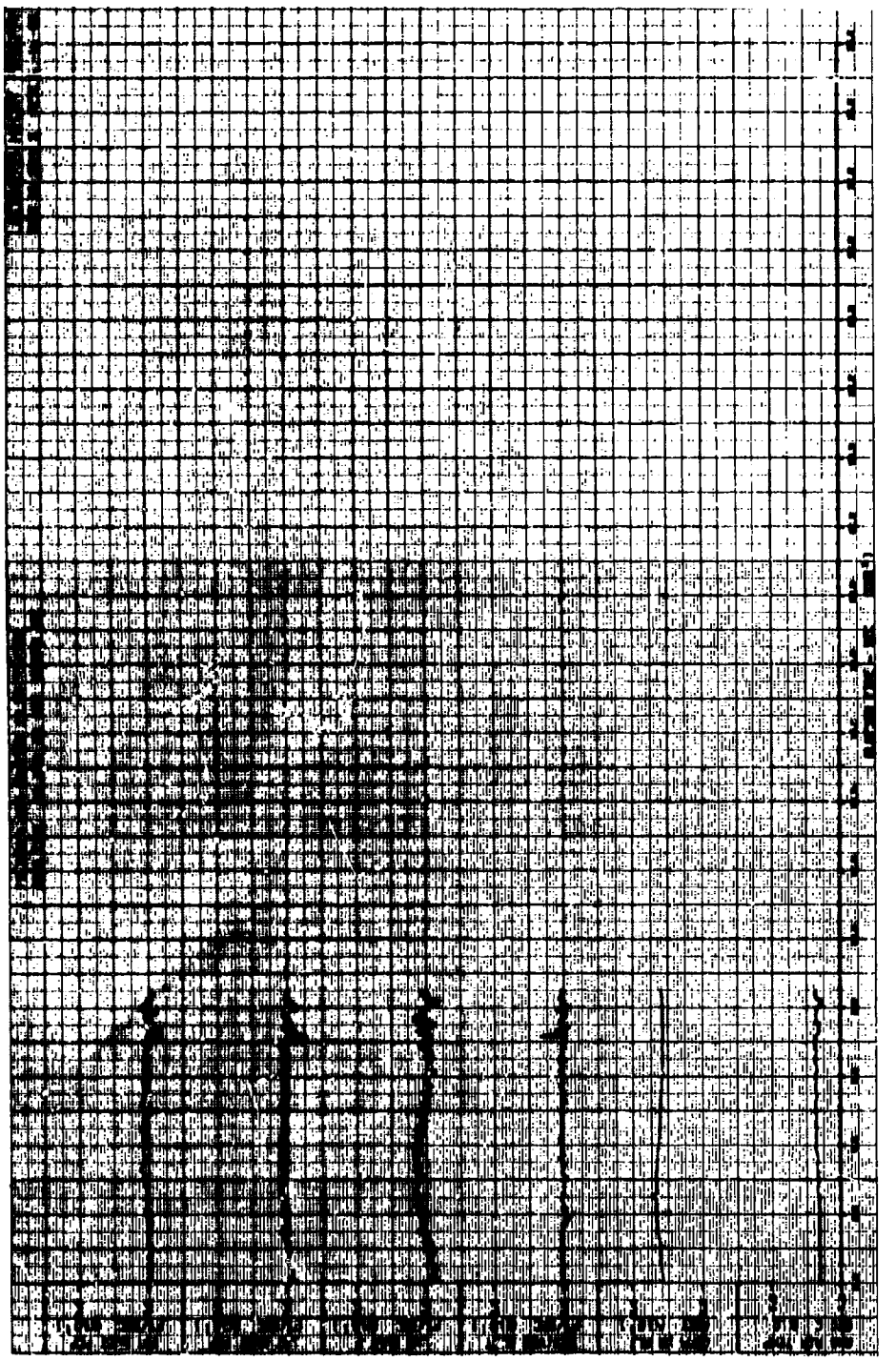


Figure 15A. Gust Velocity Time Histories at Test 76, Run 5 - Hickam AFB, Hawaii, 16 May 66.

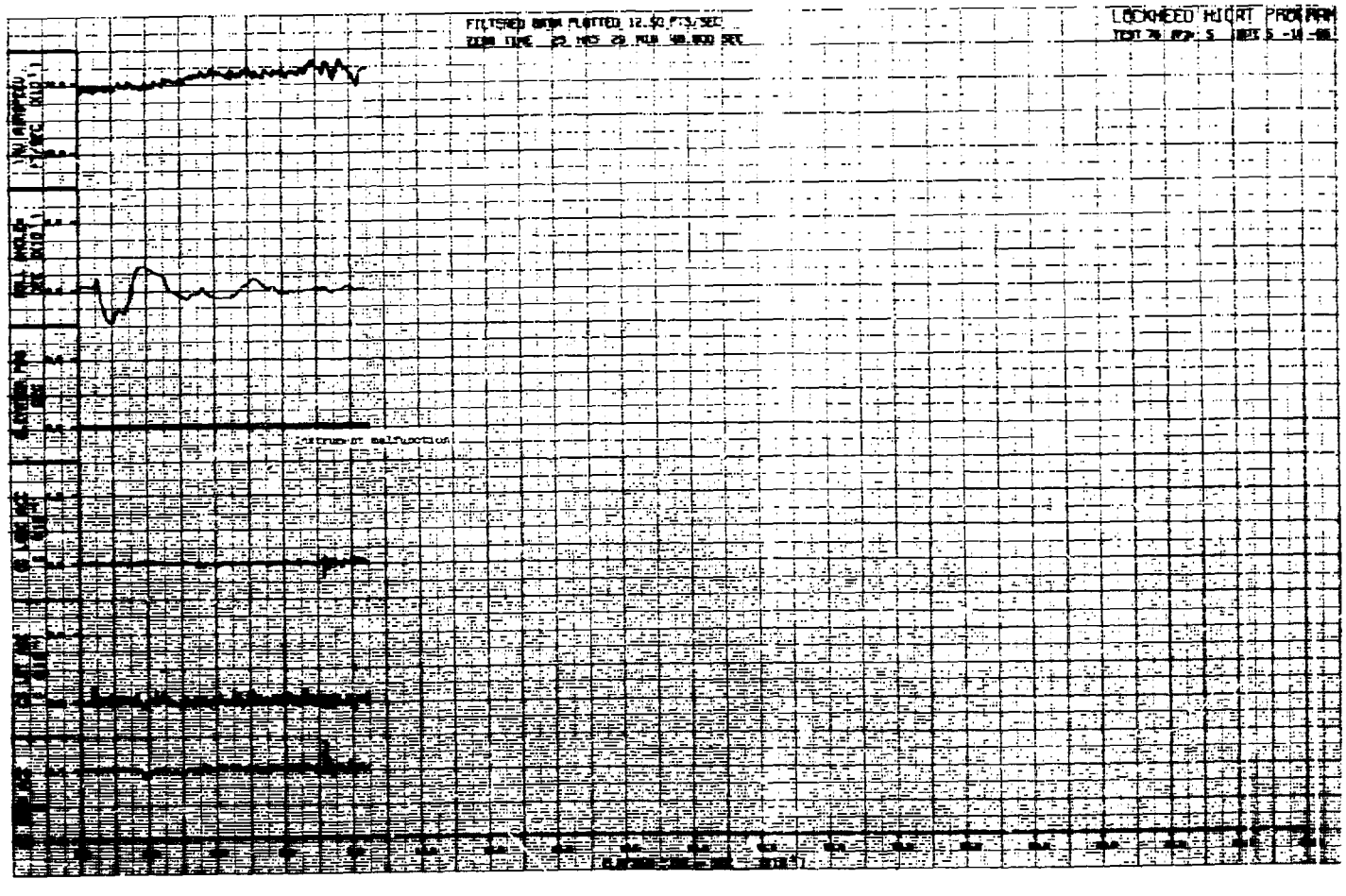


Figure 15B. Flight Parameter Time Hist[illegible]

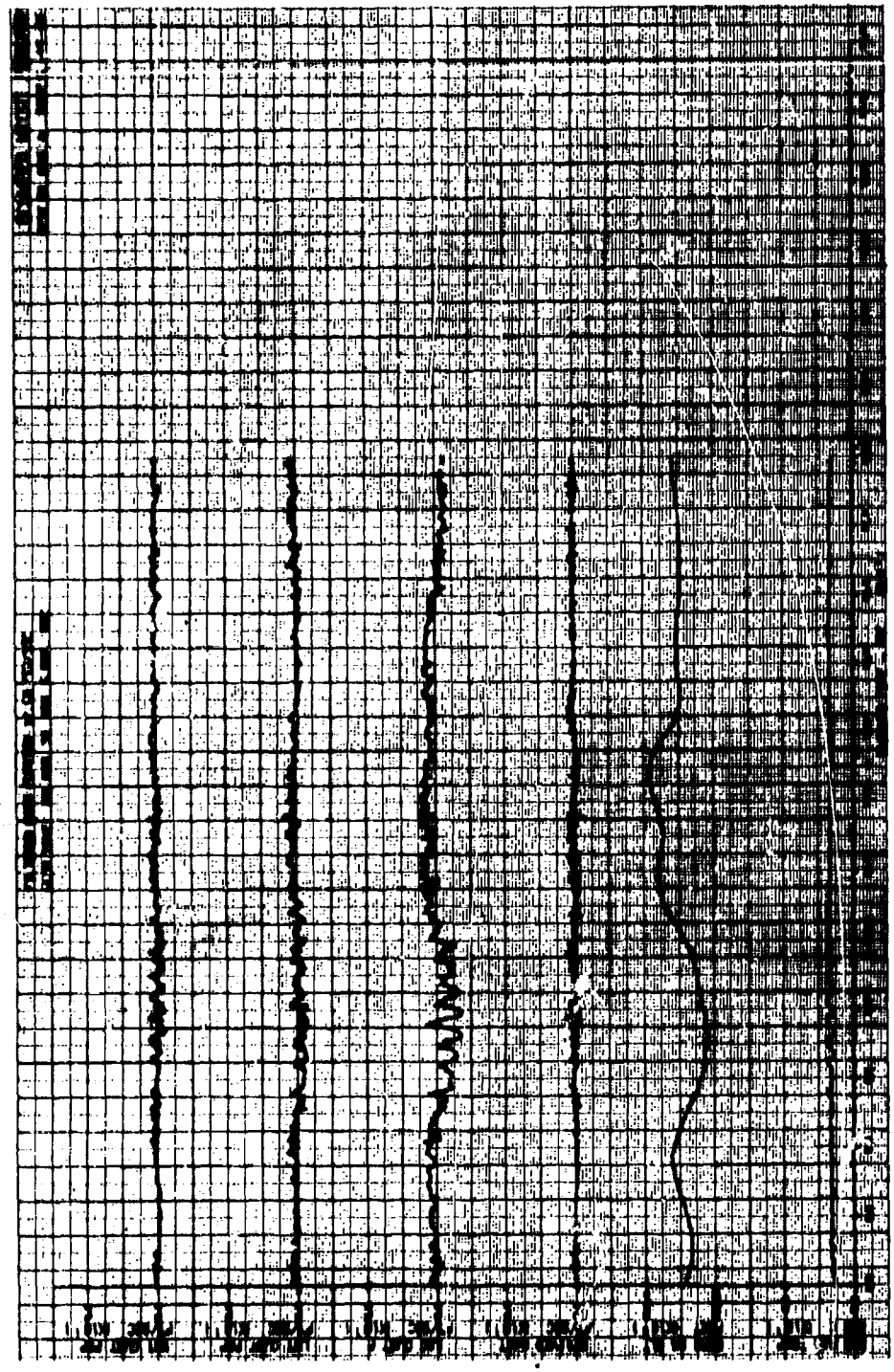


Figure 16A. Gust velocity time historian at Sec 16, Run 6 - (Flight 475, Hawaii, 16 May 66).

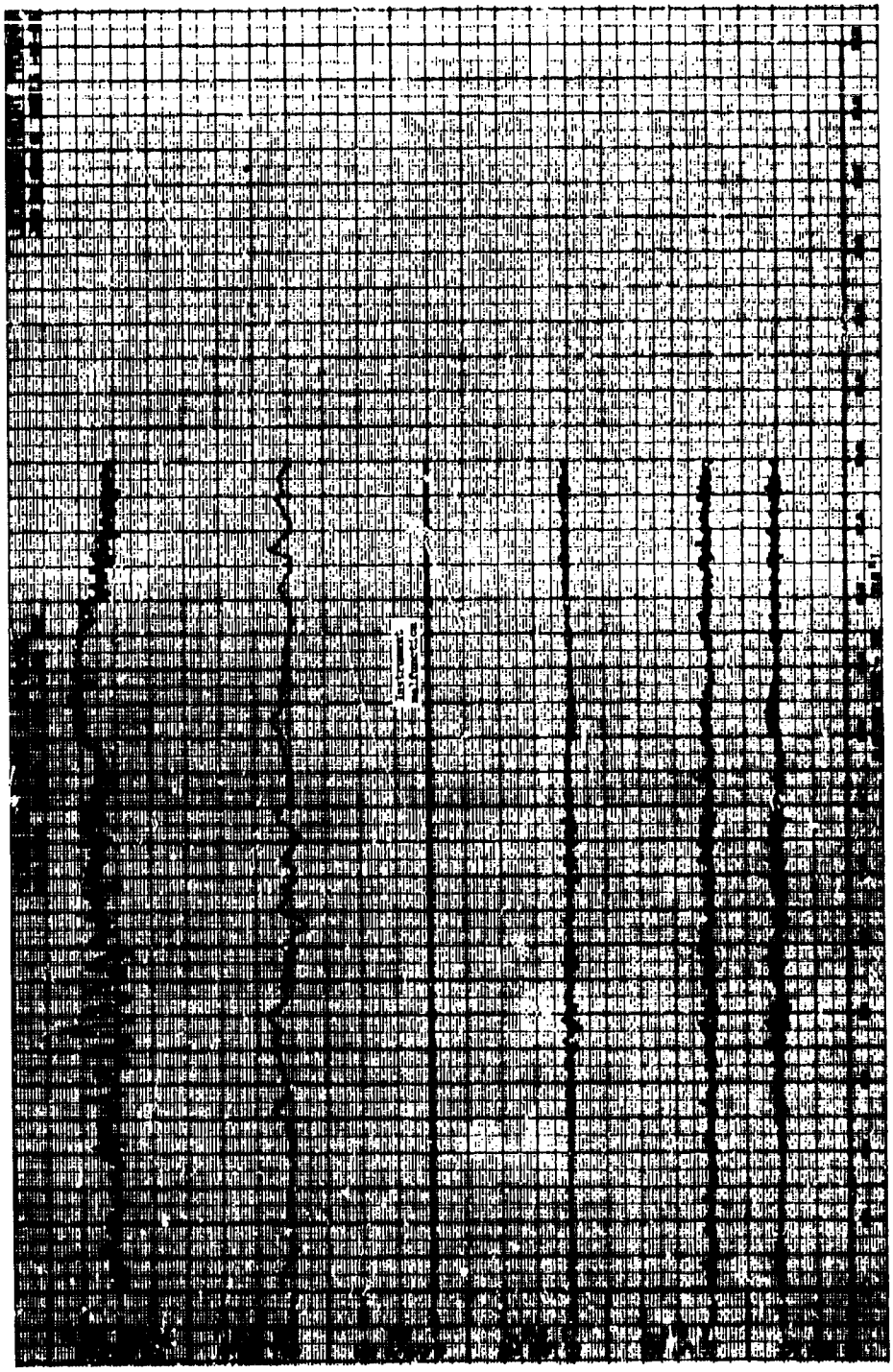
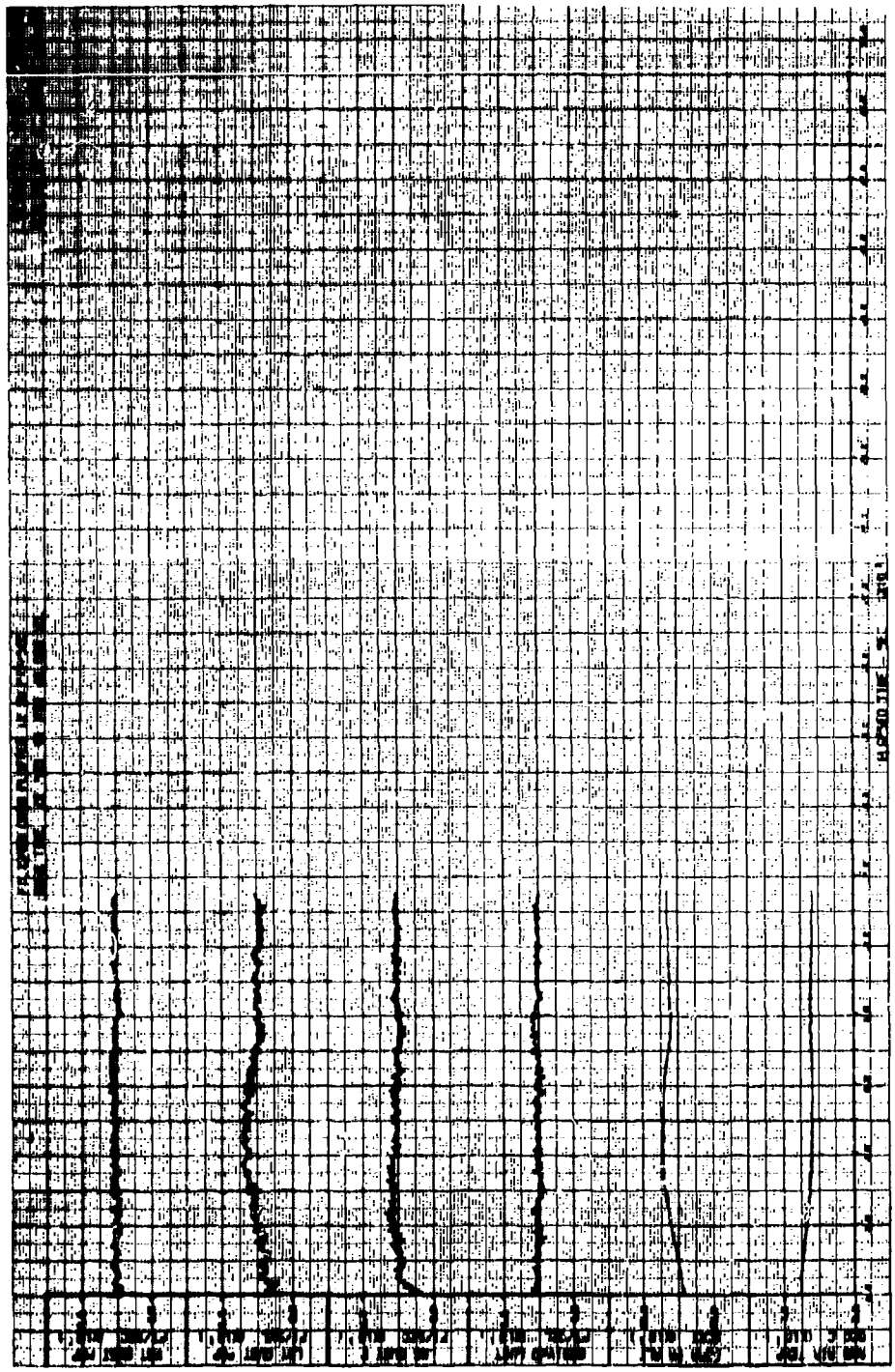


Figure 16B. Flight Parameter Time Histories of Test 76, Run 6.

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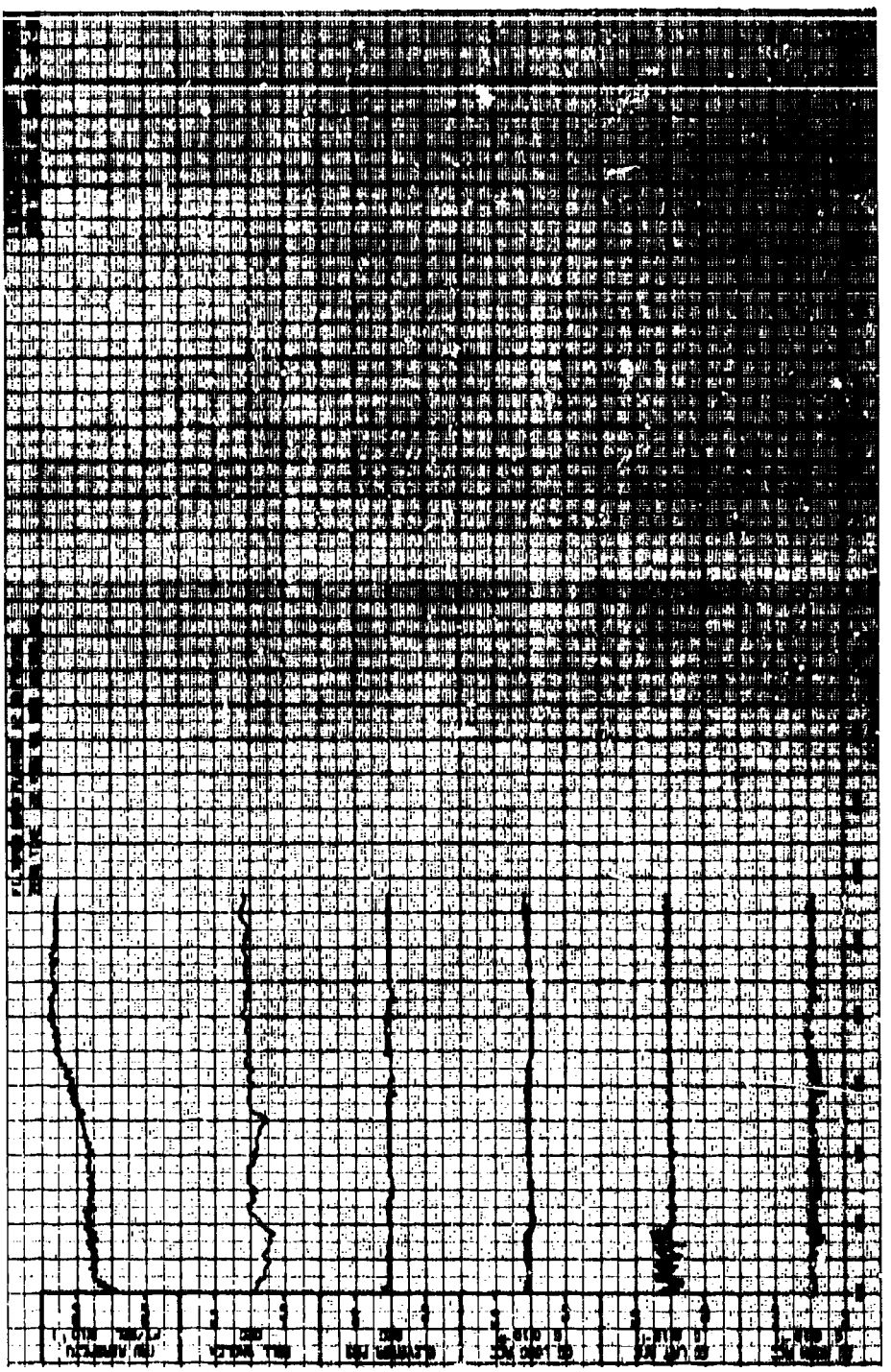


Figure 17B. Flight Parameter Time Histories of Test 79, Run 2.

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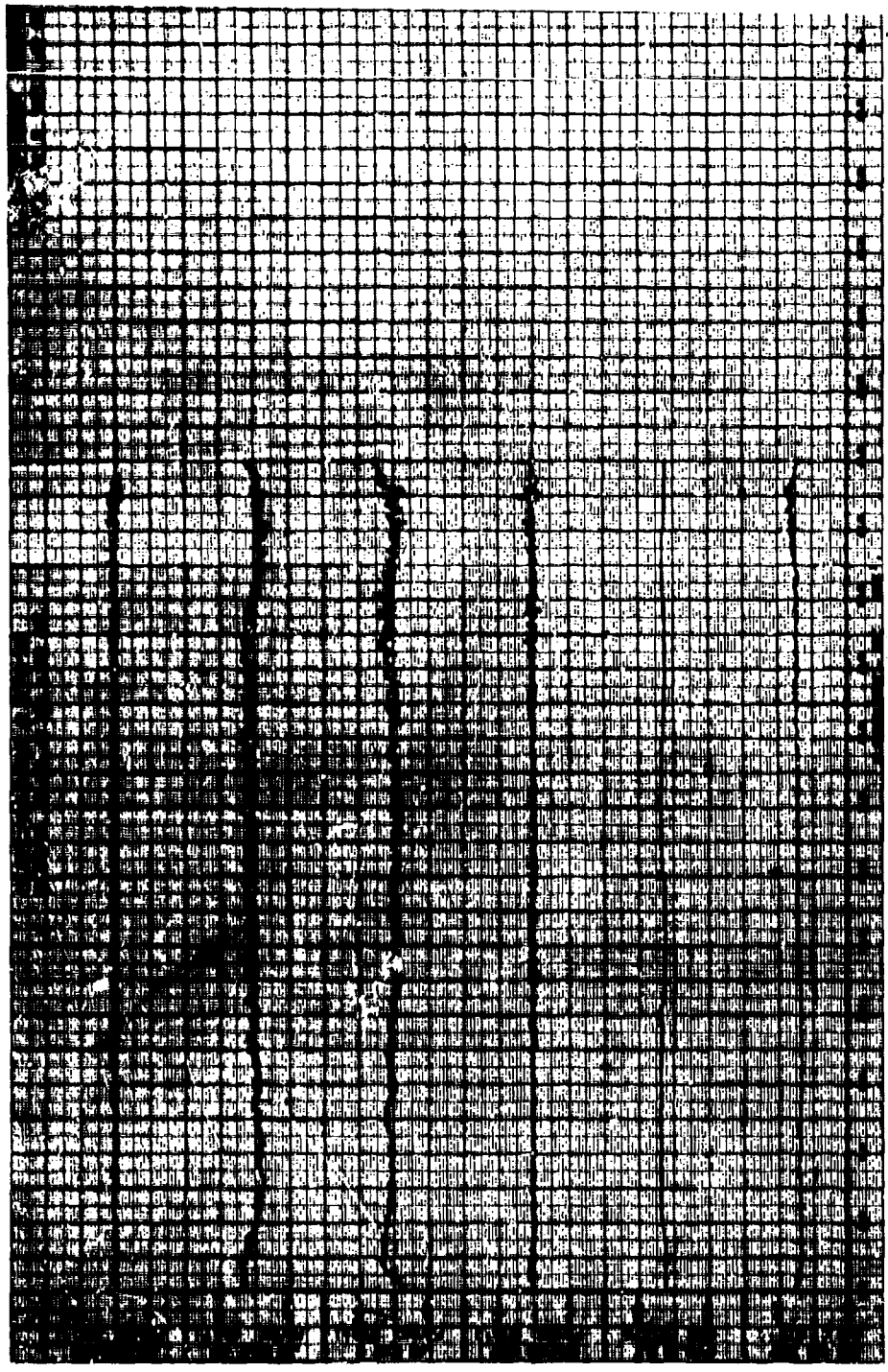


Figure 18A. Gust Velocity Time Histories of Test 79, Run 3 - (Hickam AFB, Hawaii, 20 May 66).

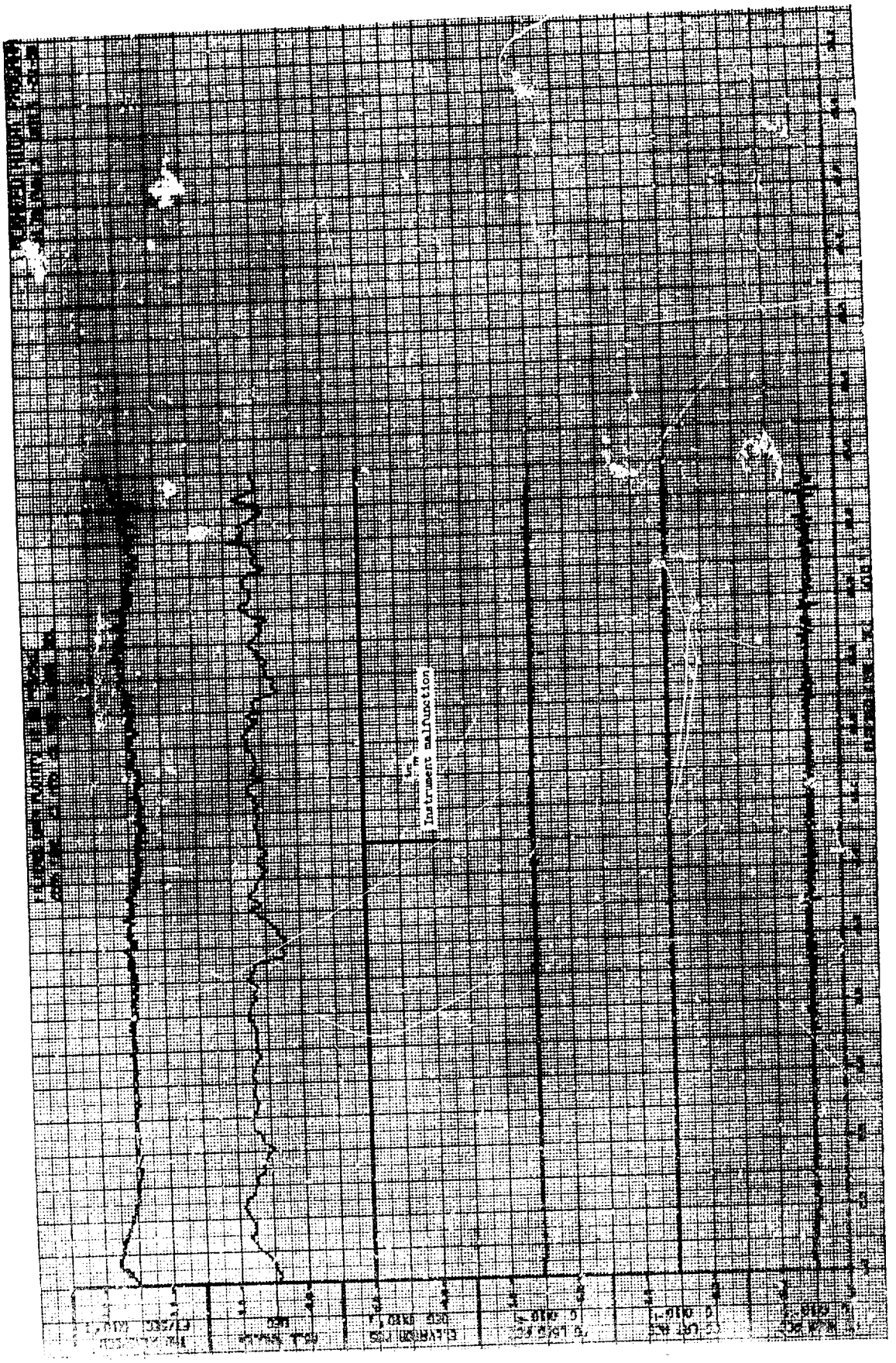


Figure 18B. Flight Parameter Time Histories of Test 79, Run 2.

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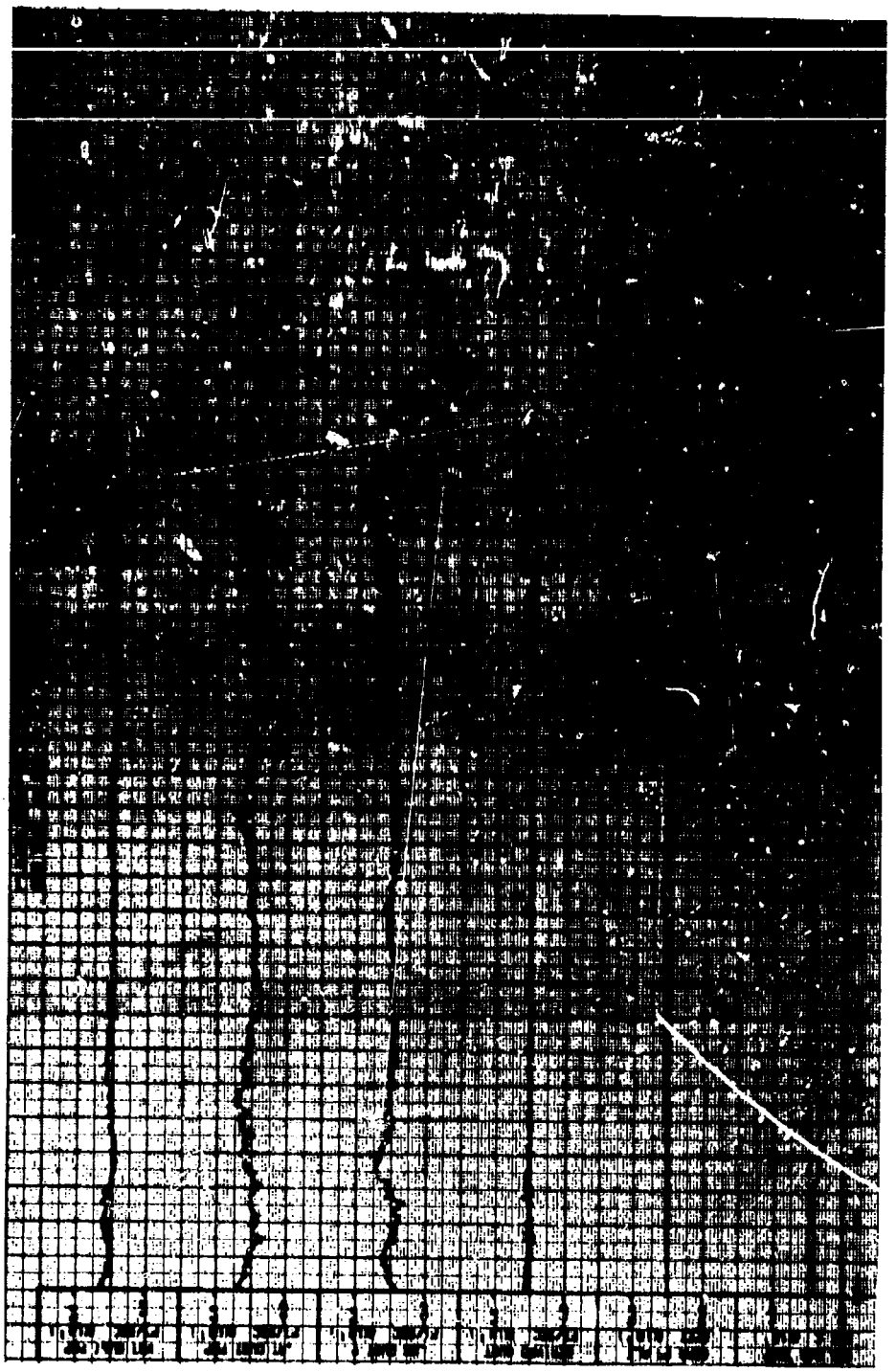


Figure 19A. Gust Velocity Time Histories of Test 79, Run 7 - (Hickam AFB, Hawaii, 20 May 66).

Figure 195. Bridge Parameter Time Histories of Test 73, Run 7.

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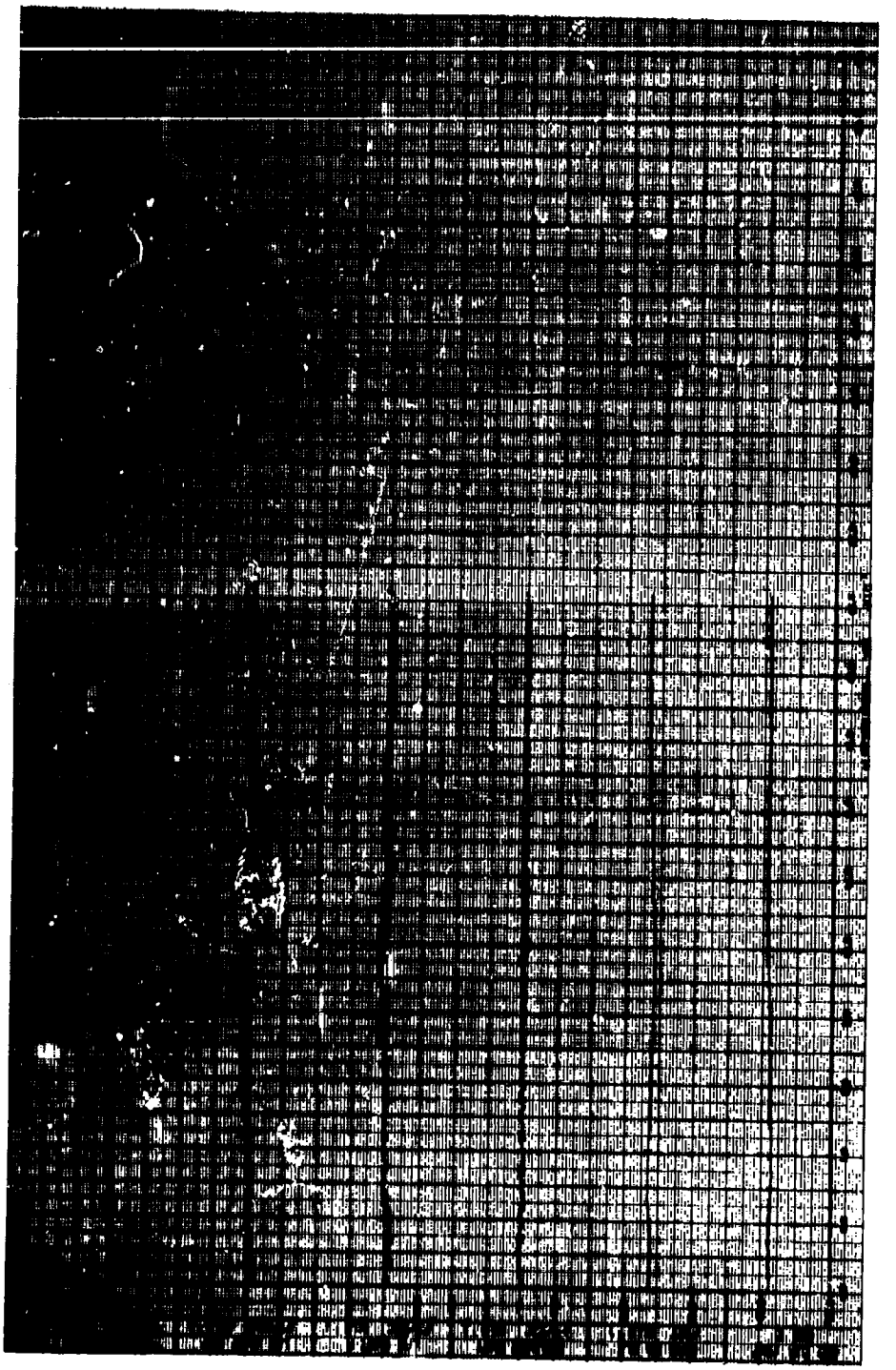


Figure 20A. Gust Velocity Time Histories at Test 88, Run 6 - (Christchurch, New Zealand, 21 Jun 66).

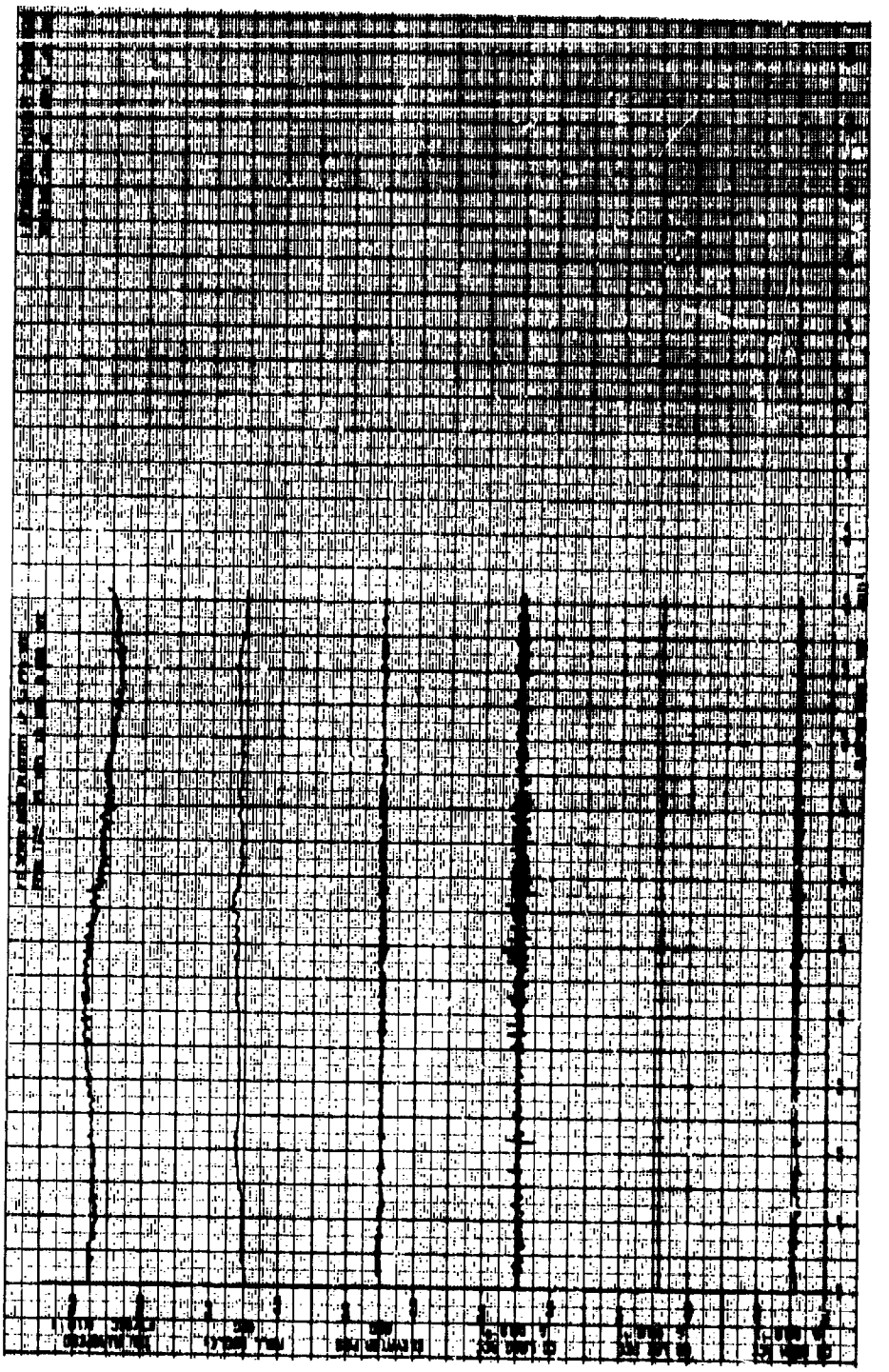


Figure 20B. Flight Parameter Time Histories of Test 66, Run 6.

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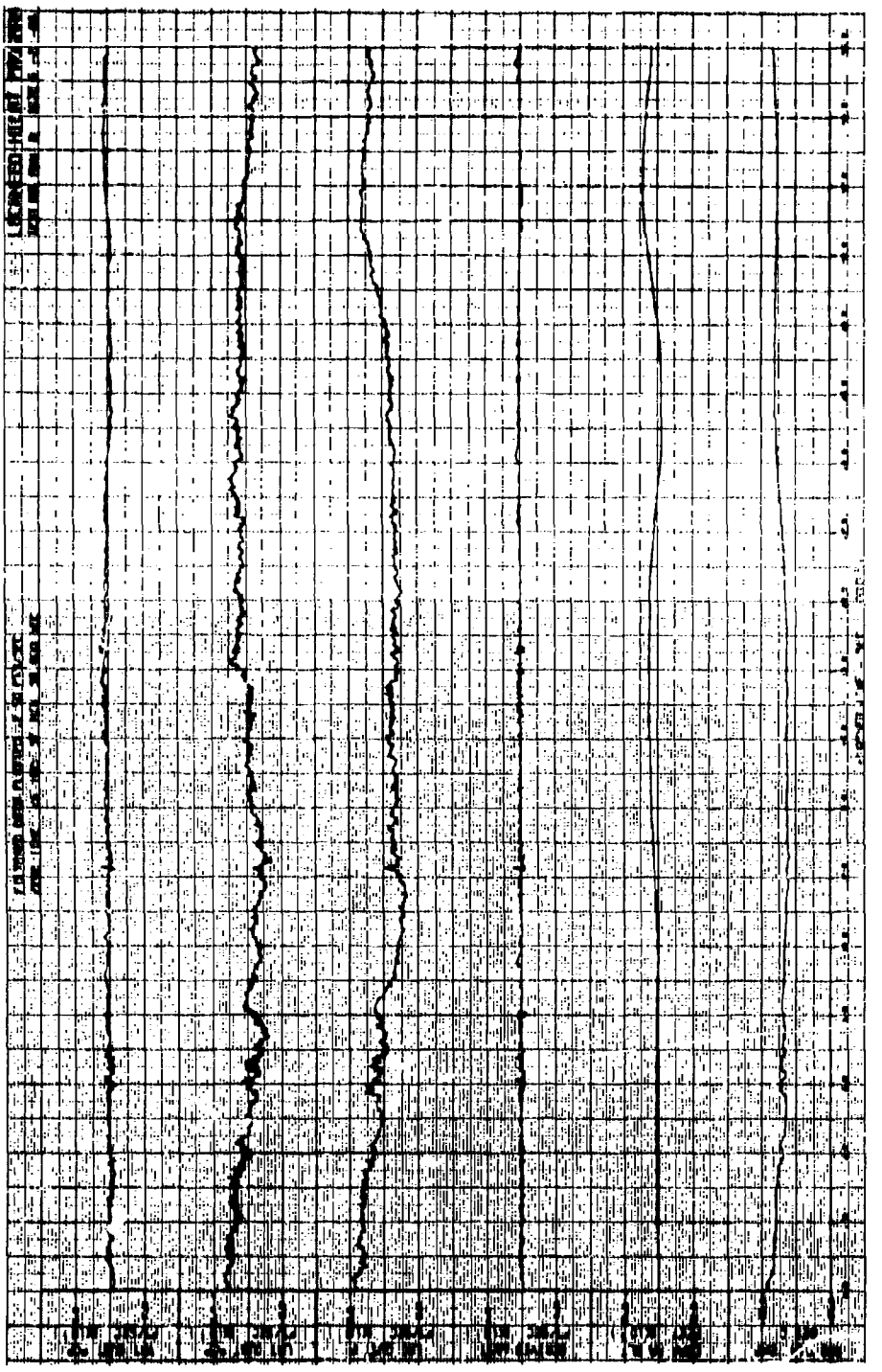


Figure 24. Gas Velocity Time Histories at Test 66 - Run 1 -
(Horizontal, Ex Cabinet, 21 Ft.) (Sheet 1 of 3)

Figure 21B. Flight Parameter Time Histories of Test 88, Run 8 (Sheet 1 of 3)

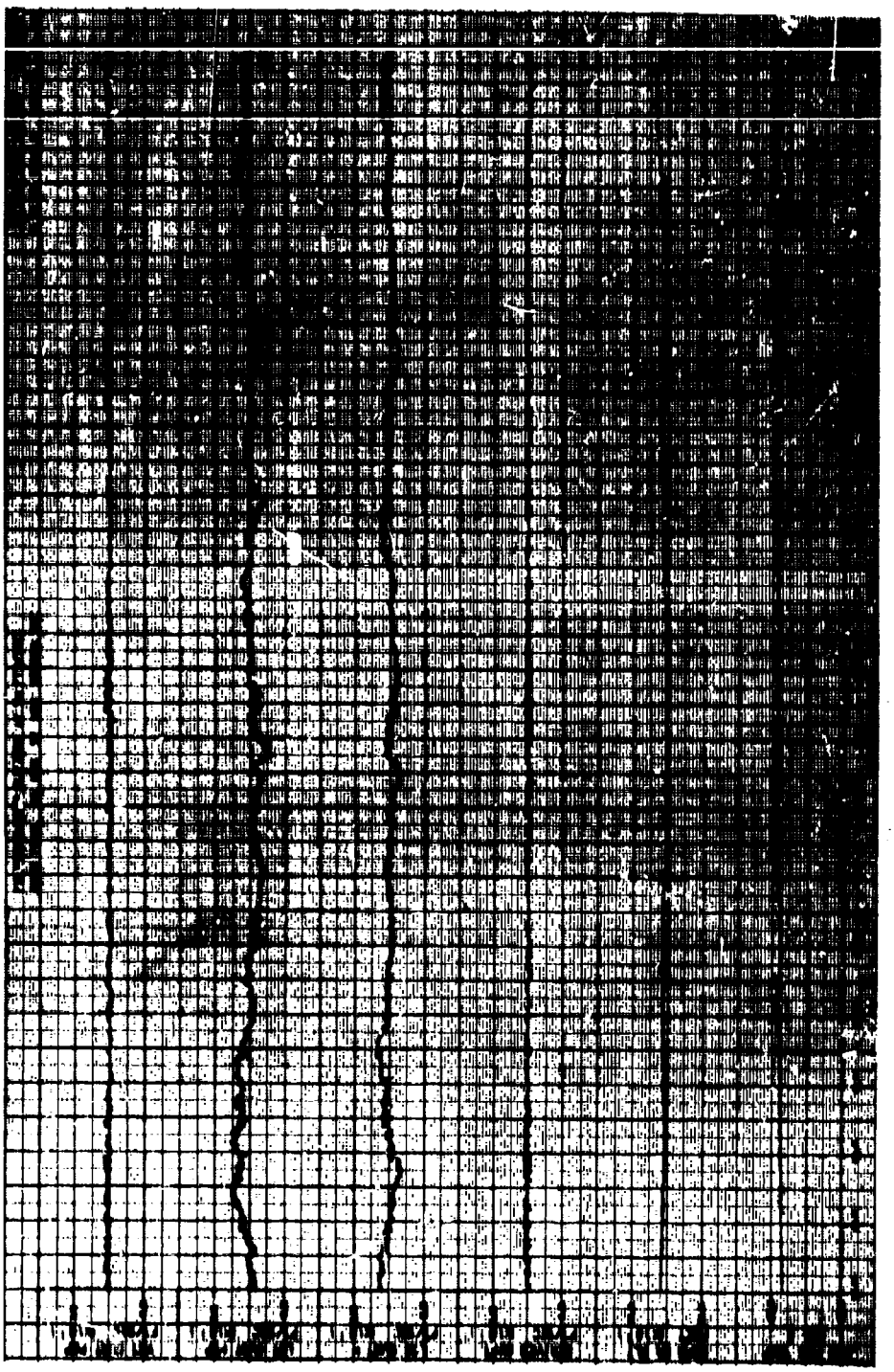
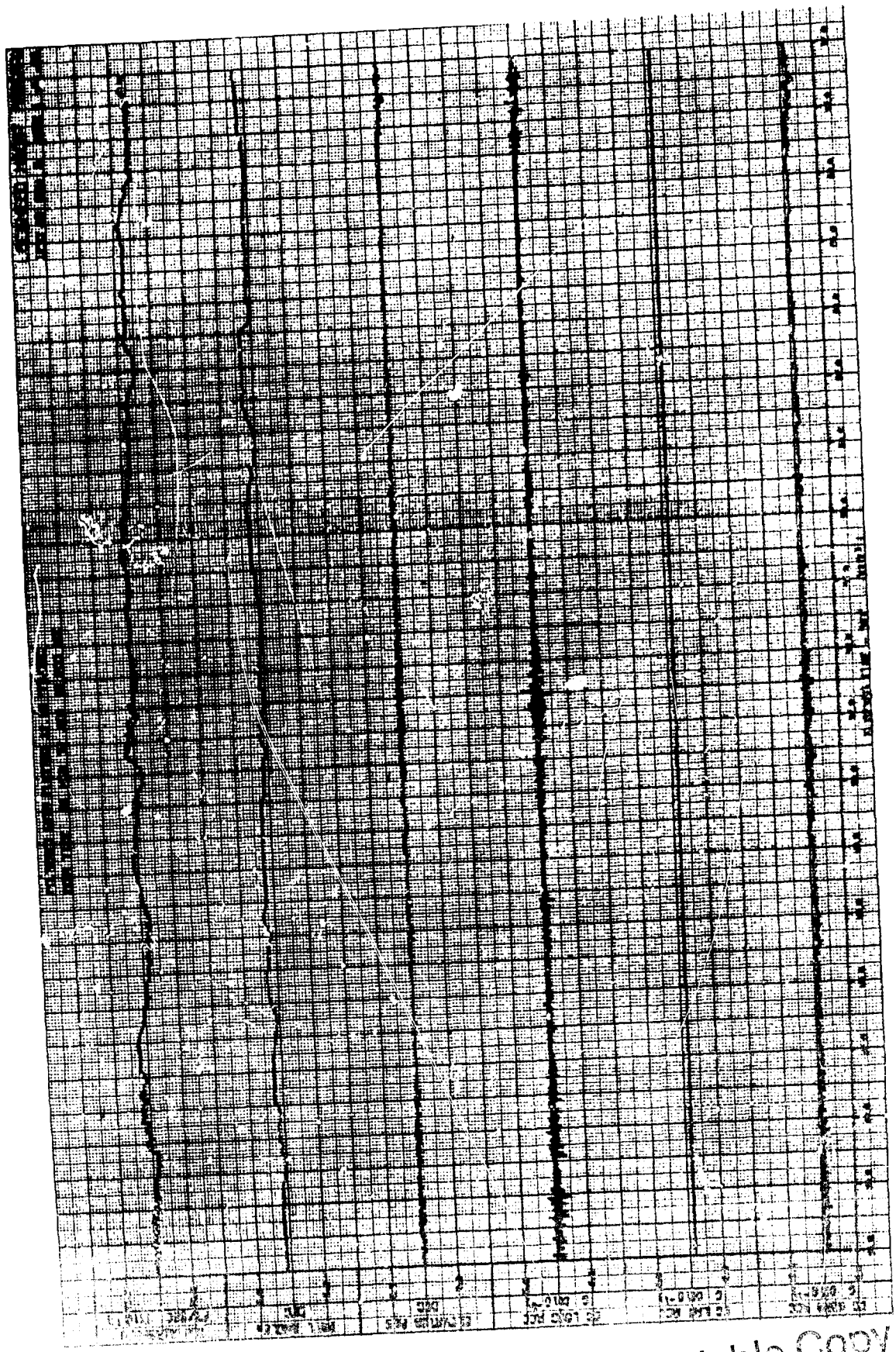


Figure 21A. Gust Velocity Time Histories of Test 88 - Run 8 - (Christchurch, New Zealand, 21 Jun 66) (Sheet 2 of 3)



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Figure 21B. Flight Parameter Time Histories of Test 88, Run 8 (Sheet 2 of 3)

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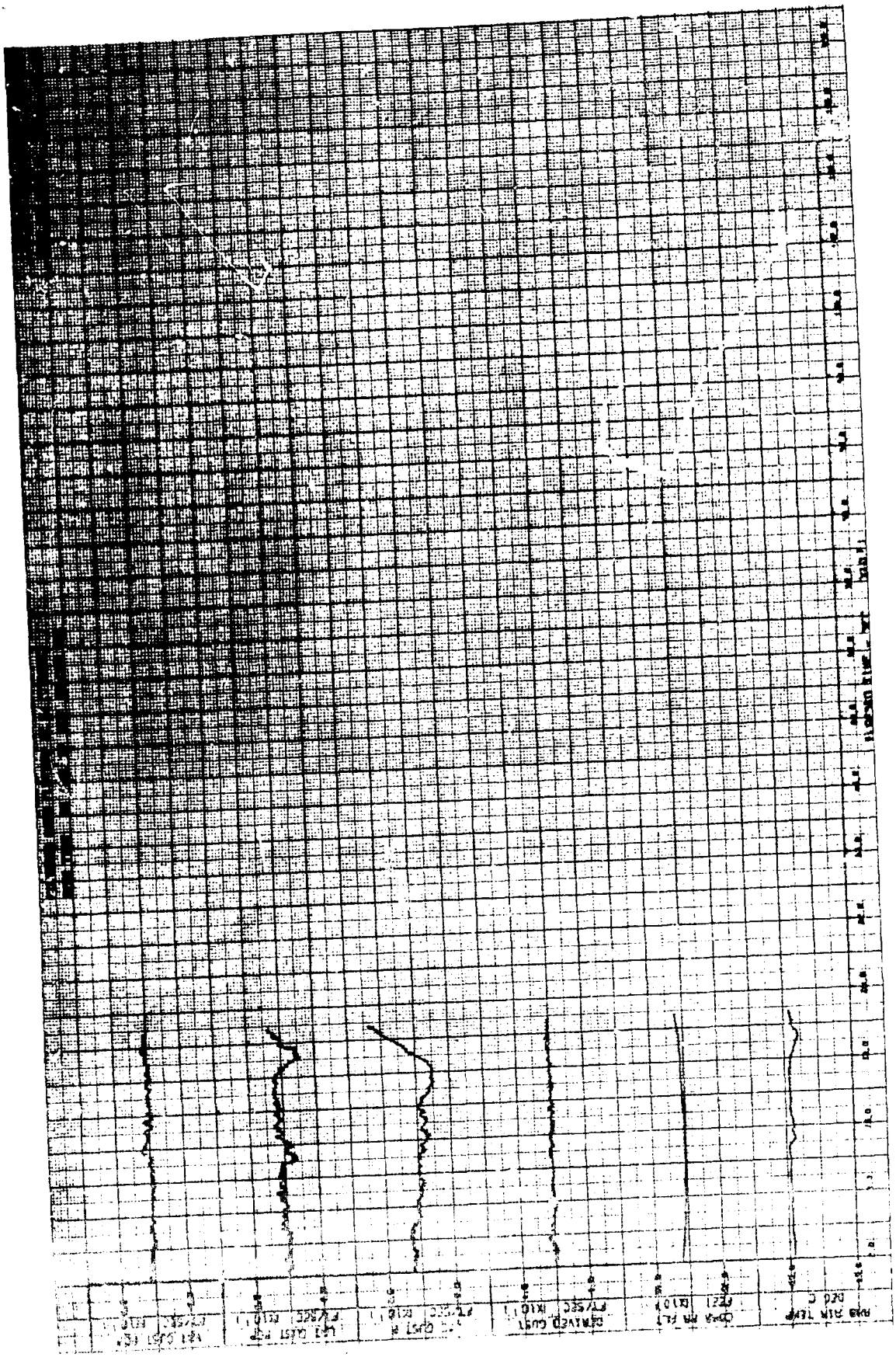


Figure 21A. Gust Velocity Time Histories of Test 65 - Run c -
(Christchurch, New Zealand, 21 Jun 83) (Sheet 3 of 3)

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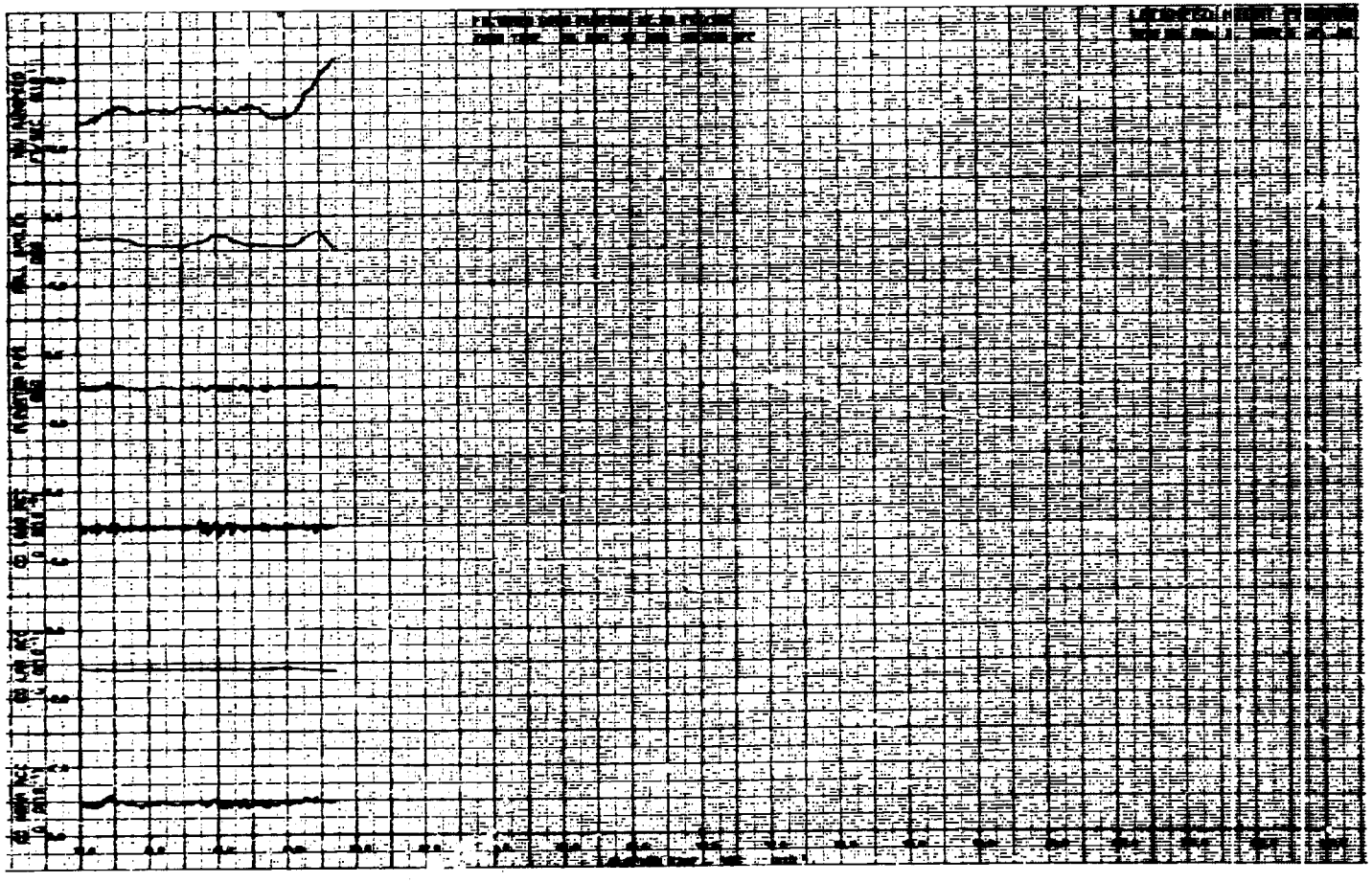


Figure 21B. Flight Parameter Time Histories of Test 88, Run 8 (Sheet 3 of 3)

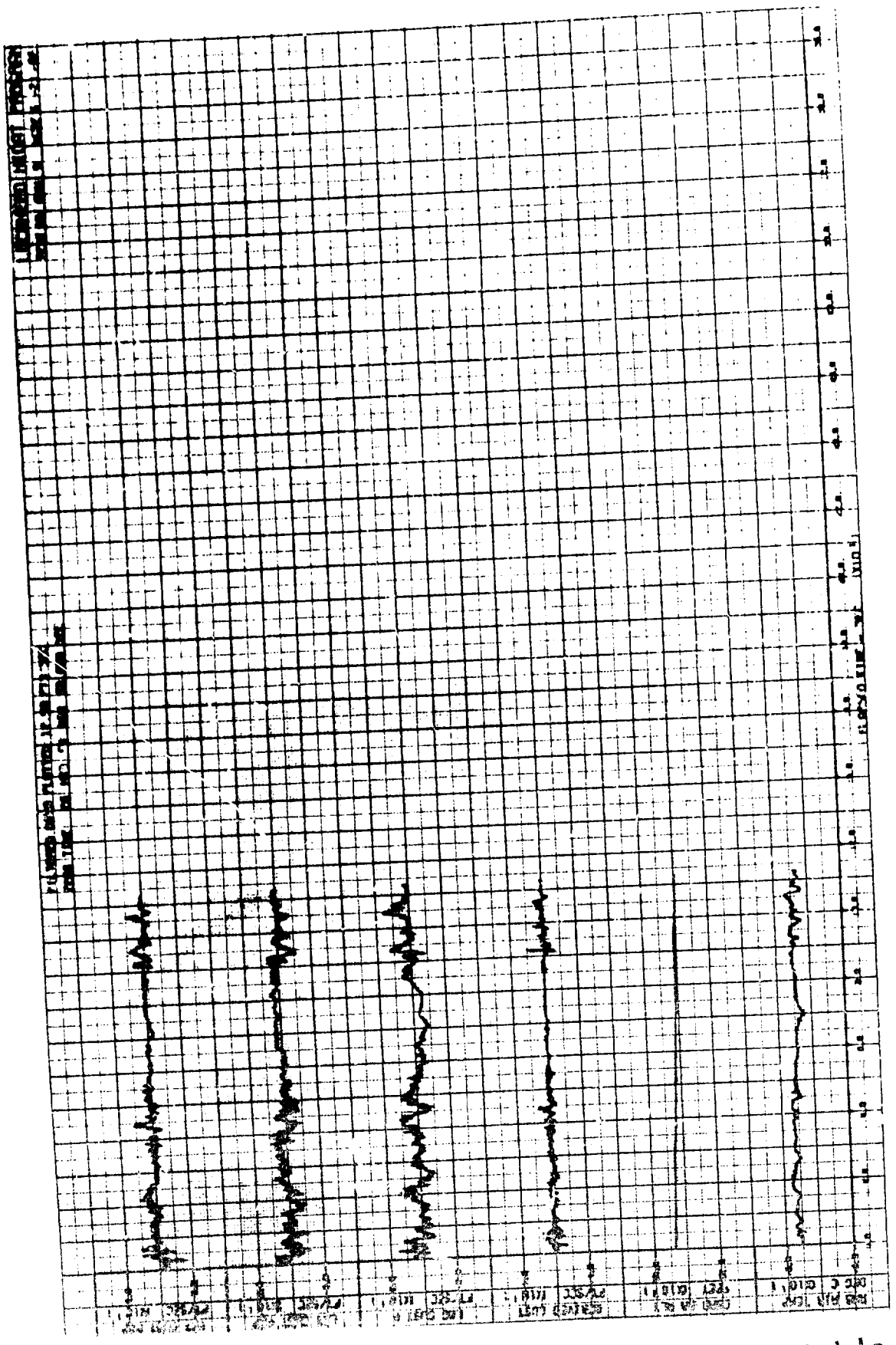


Figure 22A. Gust Velocity Time Histories of Test 88, Run 9 - (Christchurch, New Zealand, 21 Jun 66).

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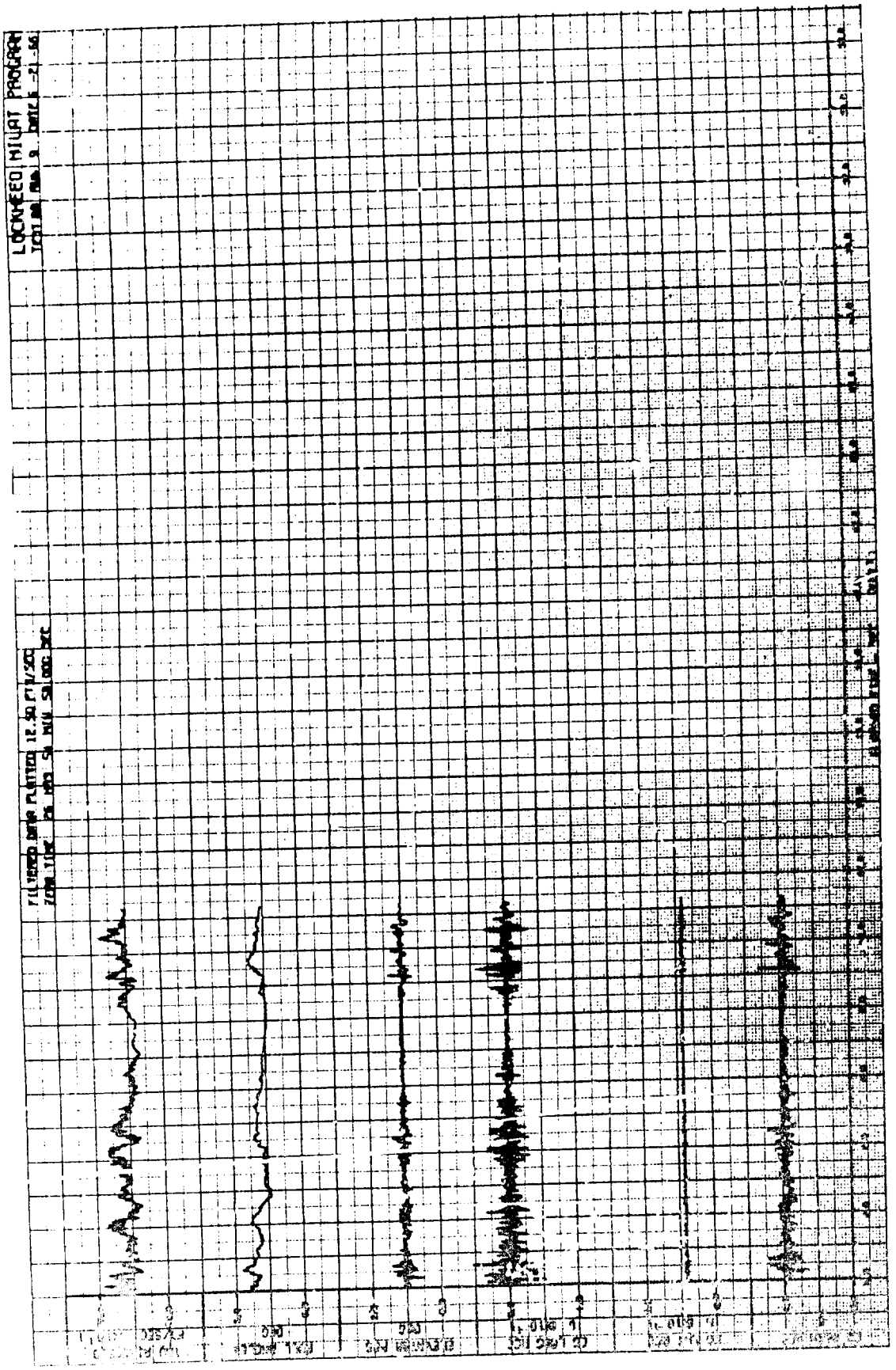


Figure 22B. Flight Parameter Time Histories of Test 88, Run 9.

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Figure 23A. Gust Velocity Time Histories of Test 29, Run 10 - (Christchurch, New Zealand, 21 Jan 66).

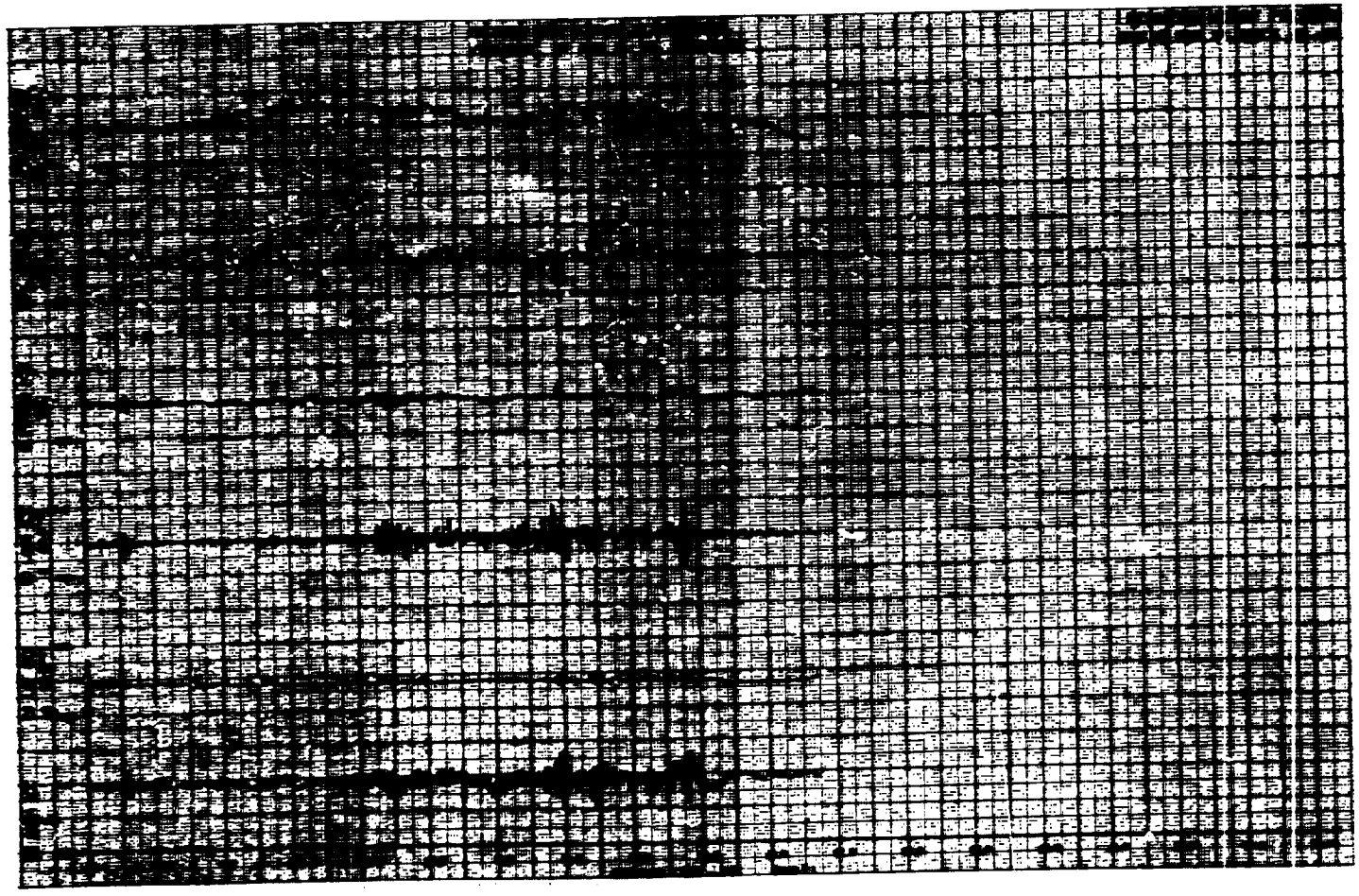


Figure 23B. Flight Parameter Time Histories of Test 88, Run 10.

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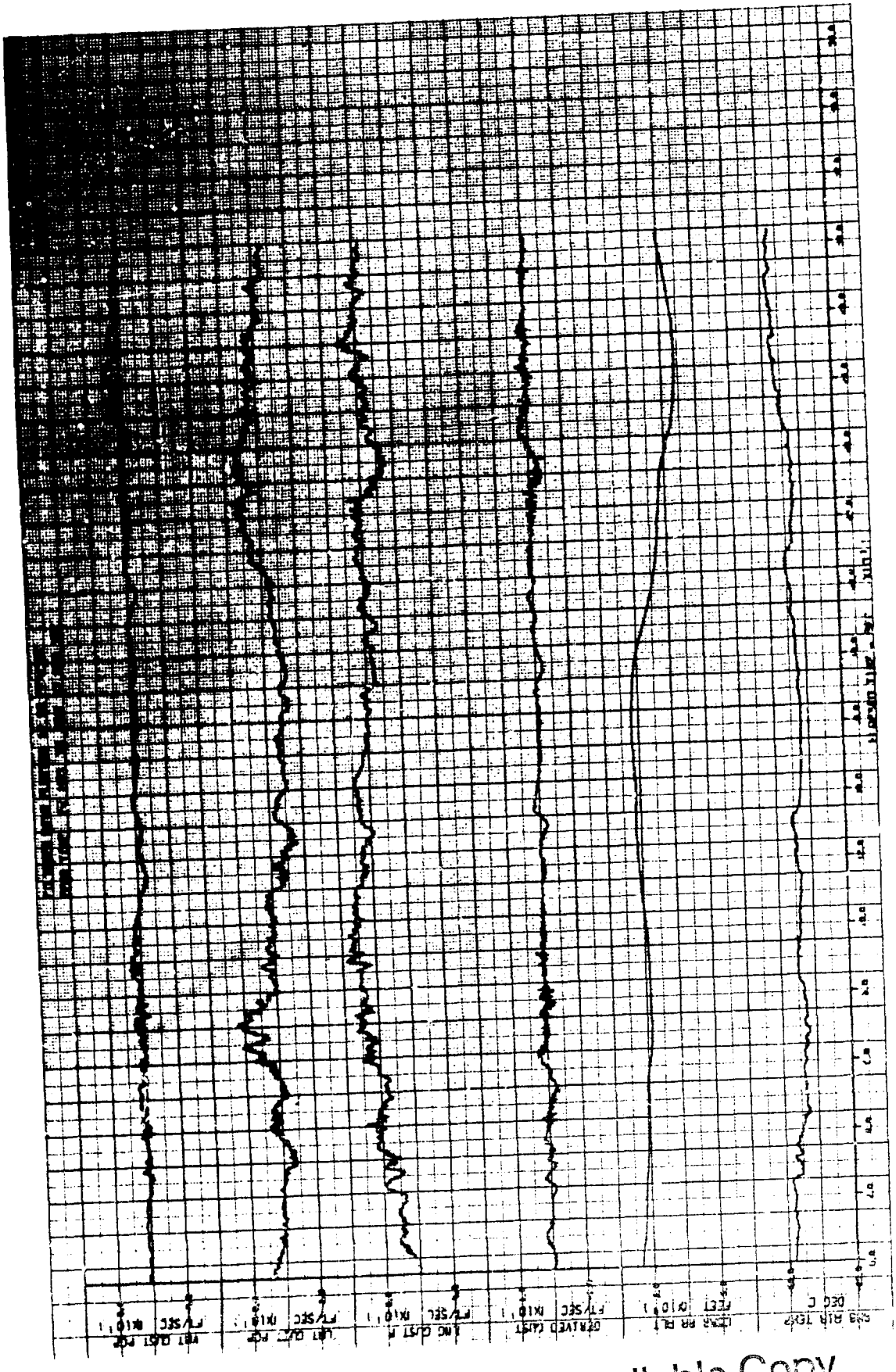


Figure 24A. Gust Velocity Time Histories of Test 20, Run 5 - (Christchurch, New Zealand, 24 Jun 66).

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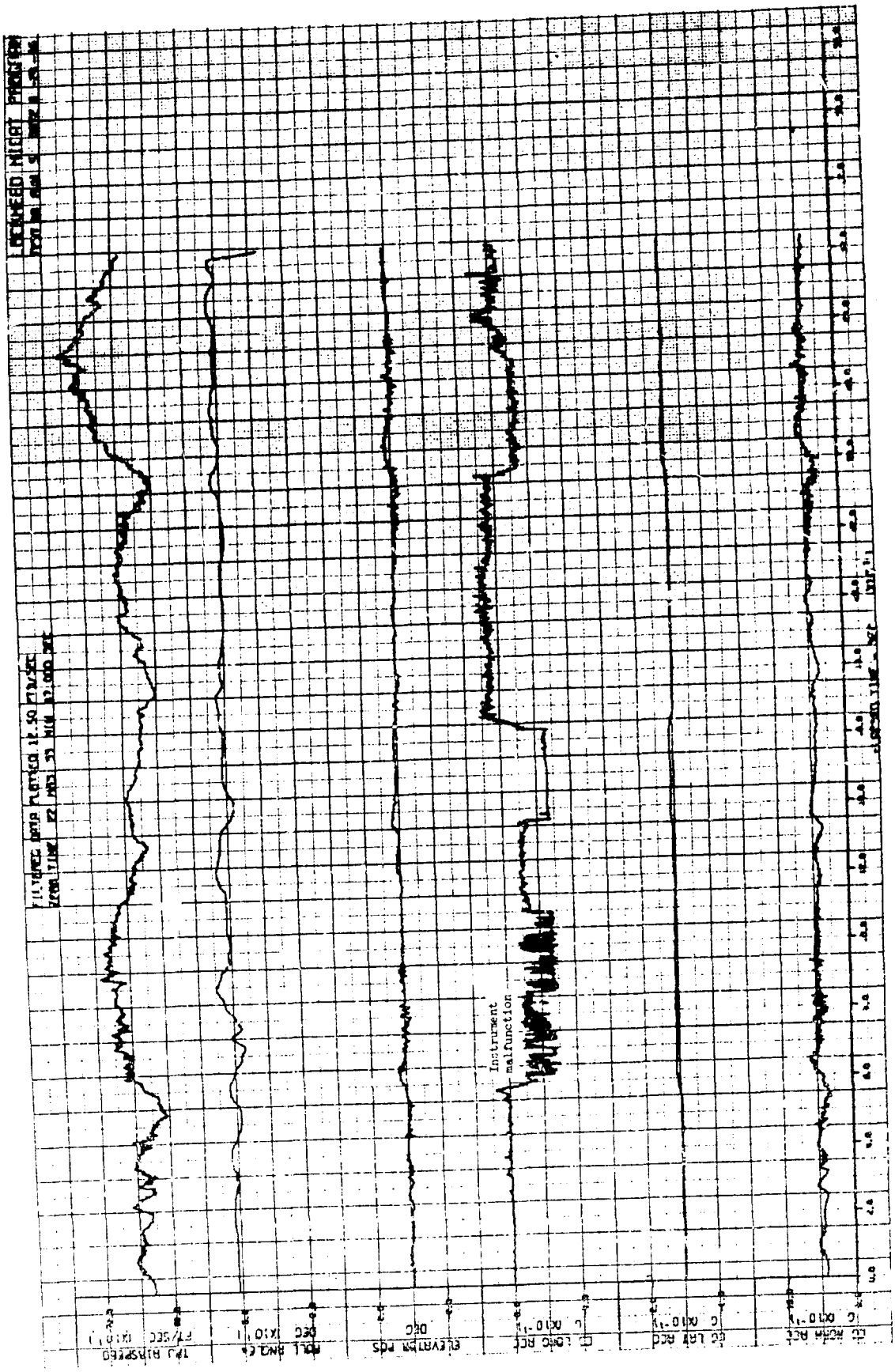


Figure 24B. Flight Parameter Time Histories of Test 90, Run 5.

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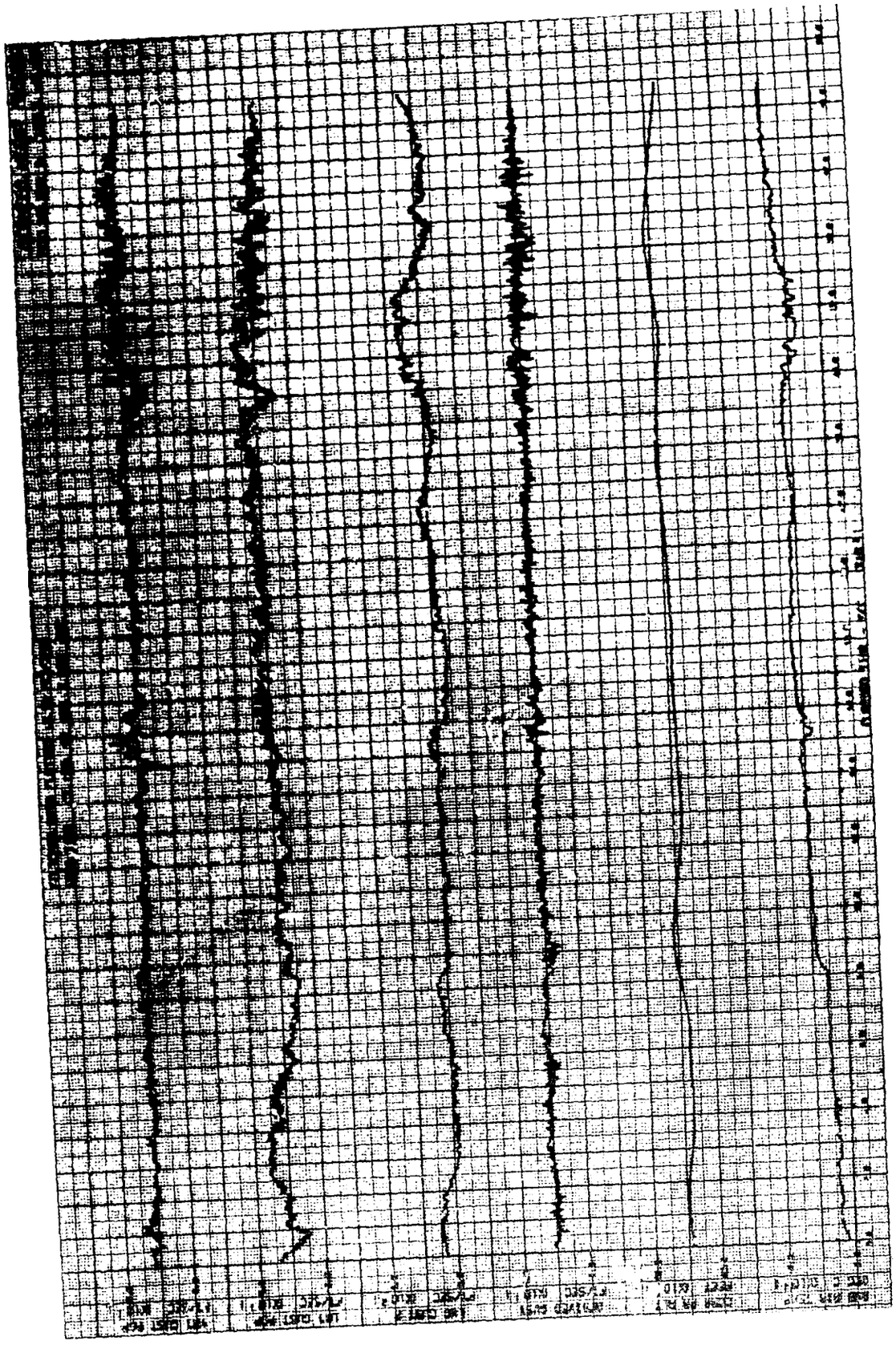


Figure 25A. Gust Velocity Time Histories of Test 21, Run 1 -
(Christchurch, New Zealand, 24 Jun 66).

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Figure 25B. Flight Parameter Time Histories of Test 90, Run 9.

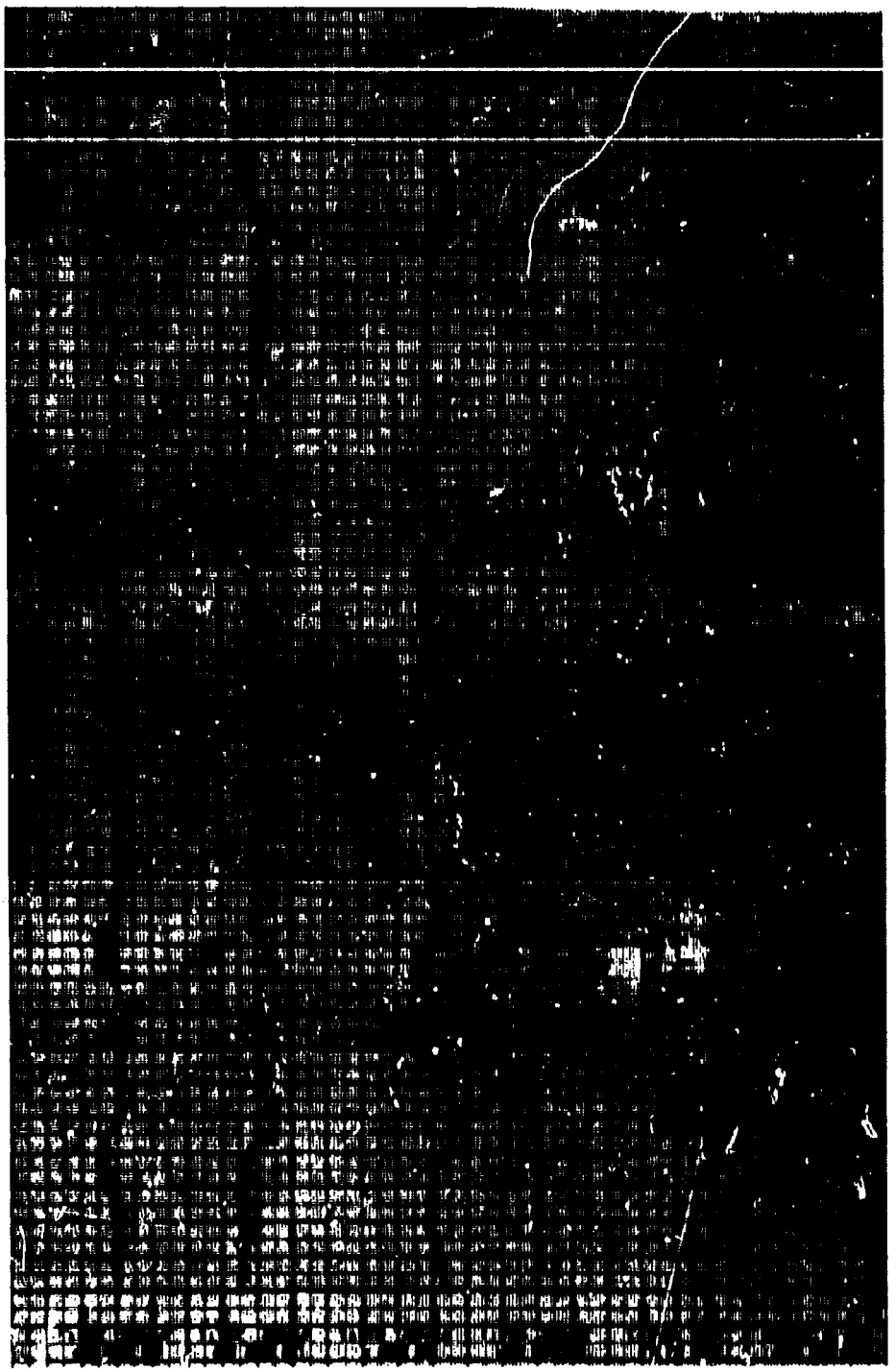


Figure 26A. Gust Velocity Time Histories of Test 90, Run 11 - (Christchurch, New Zealand, 24 Jun 66).

Figure 268. Flight Parameter Time Histories of Test 90, Run 11.

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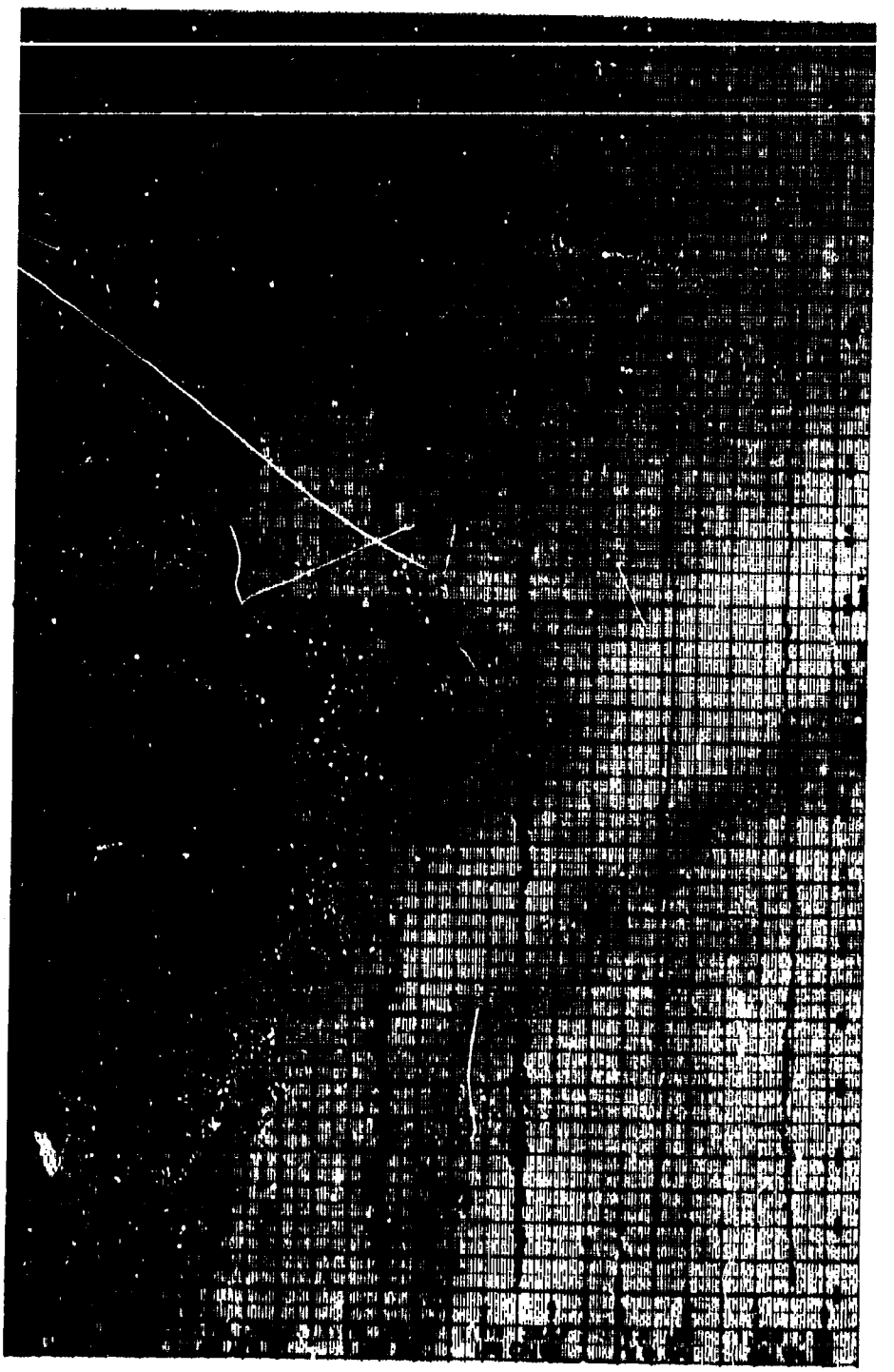


Figure 27A. Gust Velocity Time Histor[illegible] Jan 23, Run 12 -
(Christchurch, New Zealand)

Figure 27B. Flight Parameter Time Histories of Test 90, Run 12.

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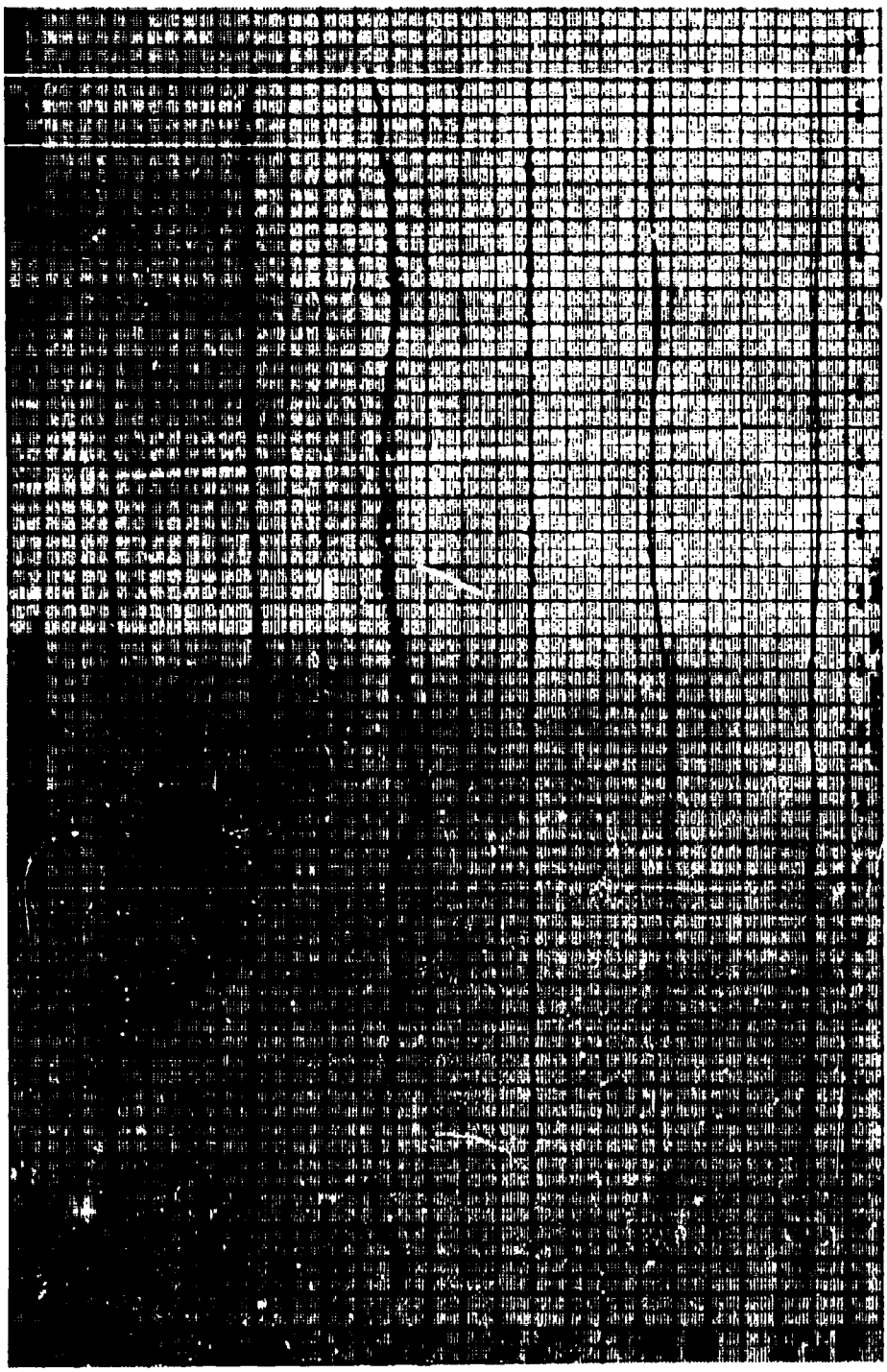


Figure 28A. Gust Velocity Time Histories of Test 36, Run 8 -
(Christchurch, New Zealand, 11 Jul 66).

Figure 28B. Flight Parameter Time Histories of Test 96, Run 2.

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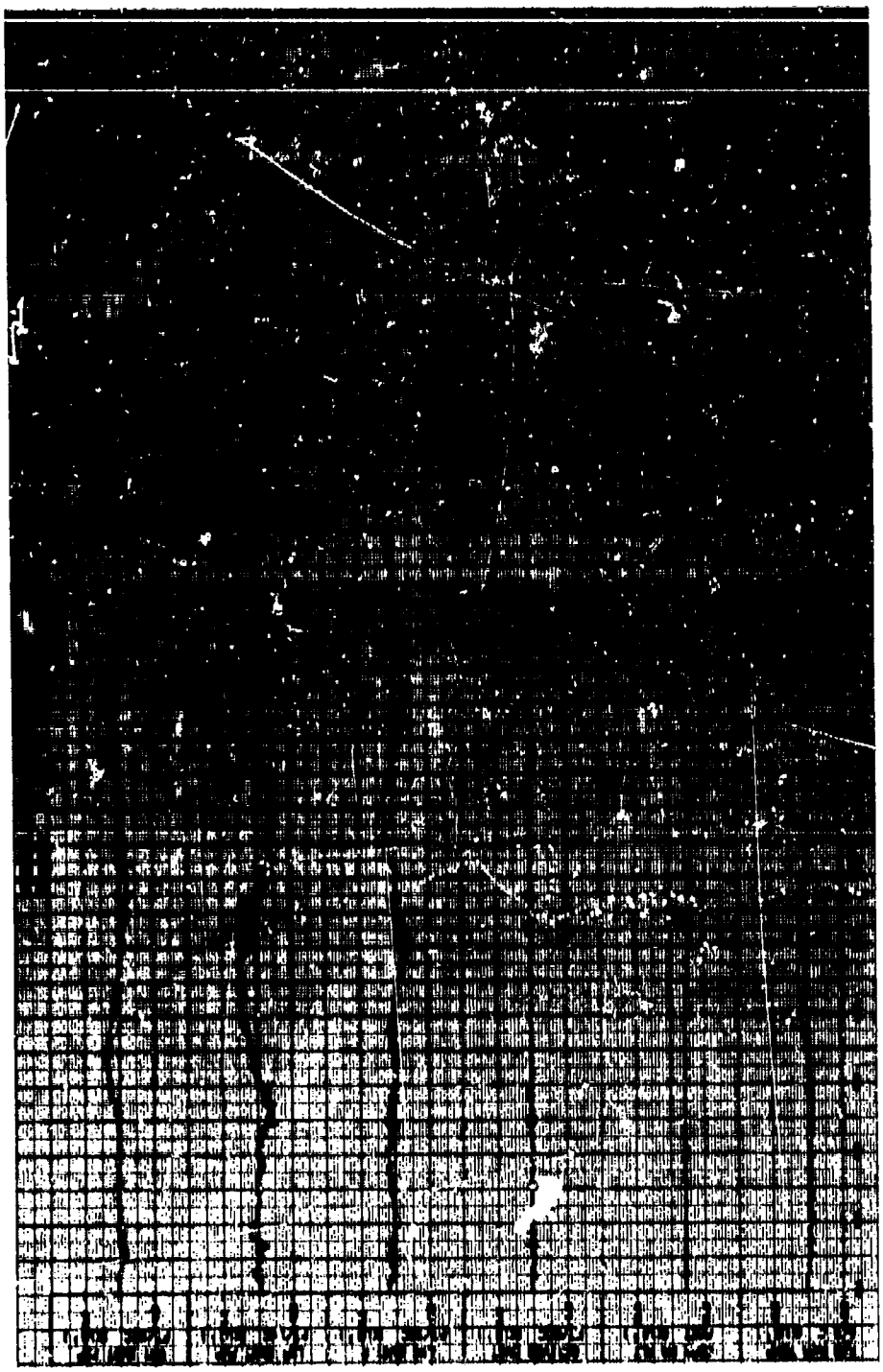


Figure 29A. East Velocity Time Histories of Test 96 - Run 10 - (Christchurch, New Zealand, 11 Jul 66).

Figure 29b. Edge Parameter Plot [illegible] Jan 30, Run 11.

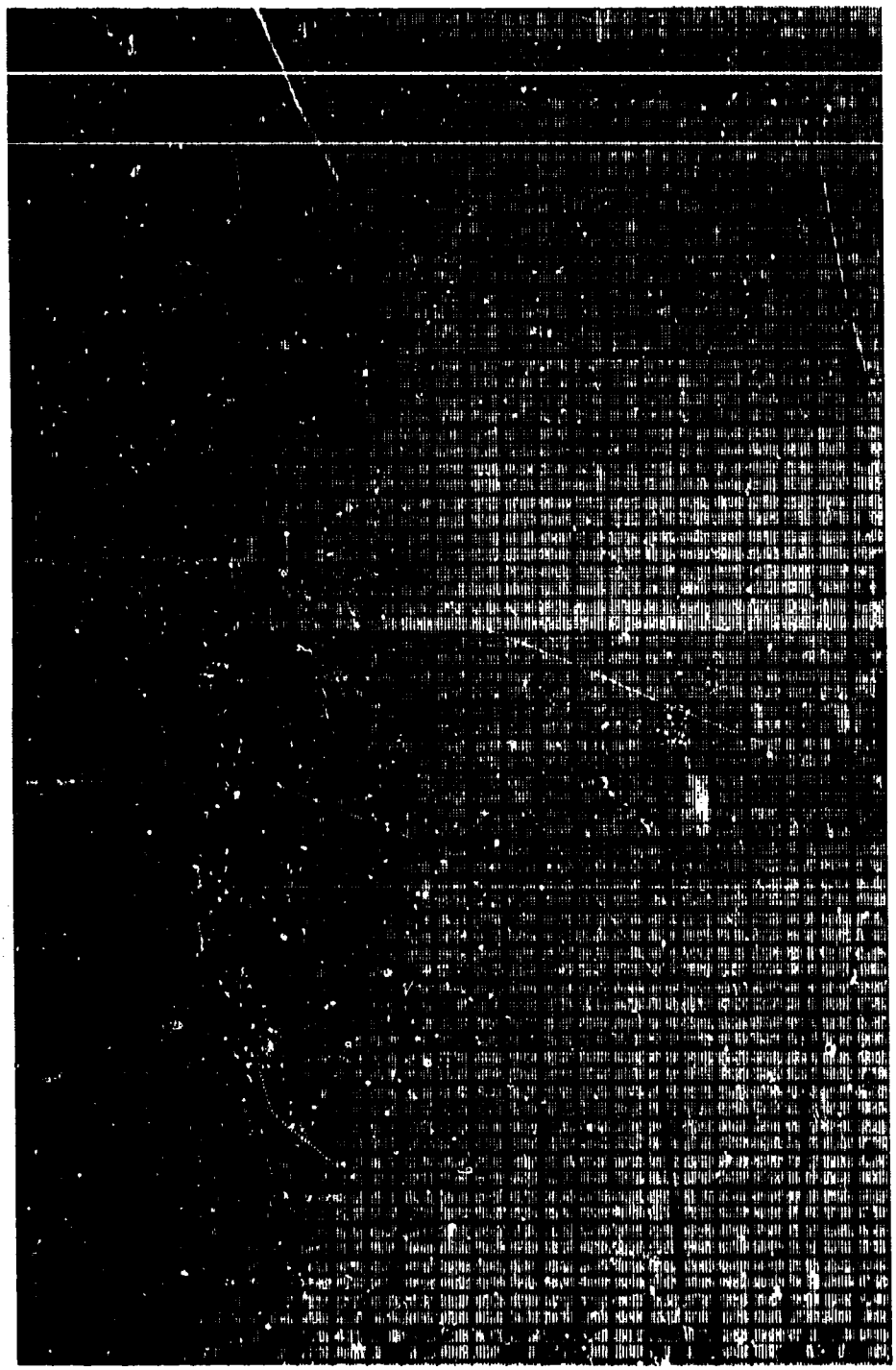
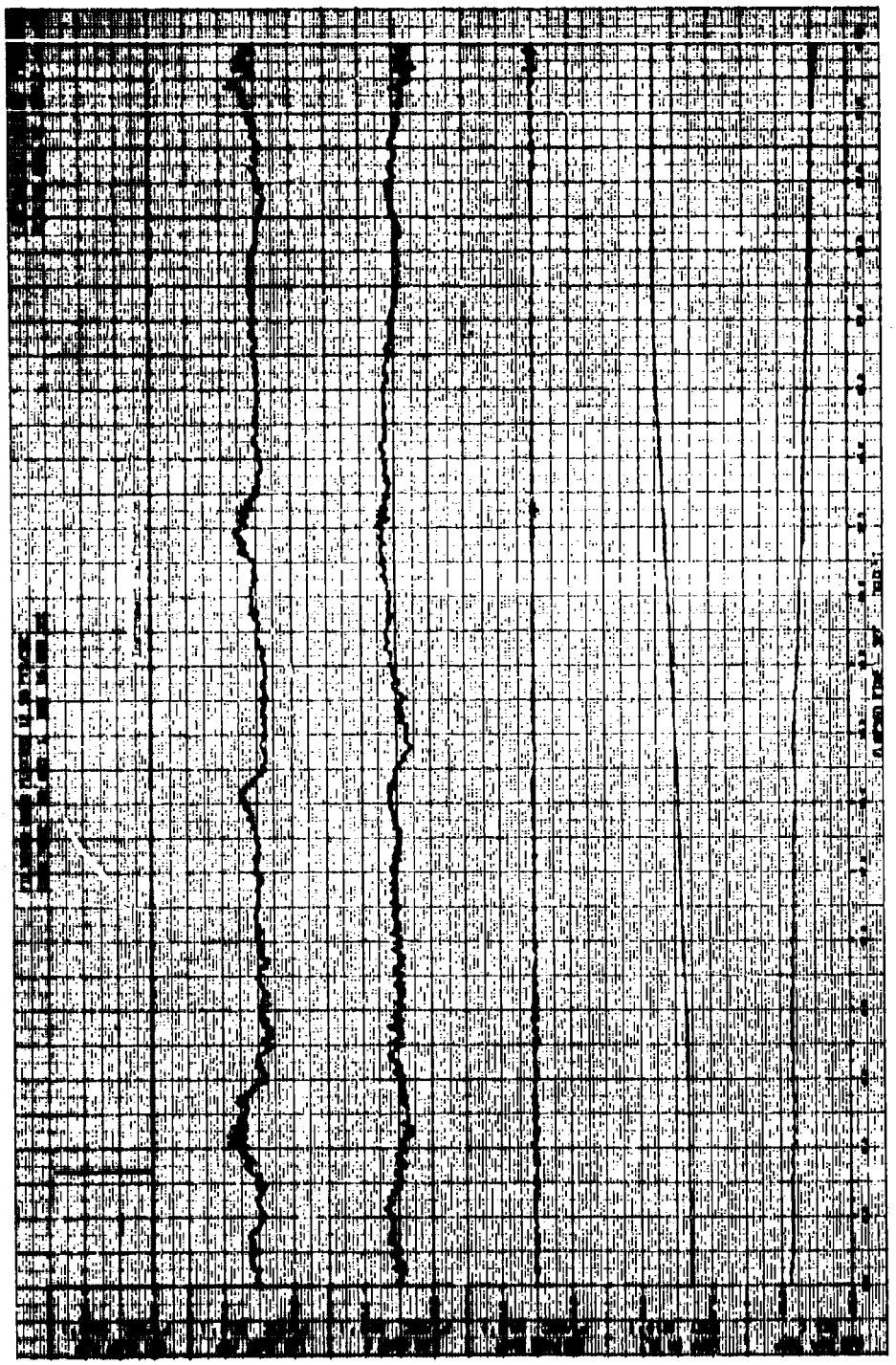


Figure 30A. Gust Velocity Time Histories of Test 56, Run 11 - (Christchurch, New Zealand, 11 Jul 66).

Figure 30B. Flight Parameter Time Histories of Test 96, Run 11.

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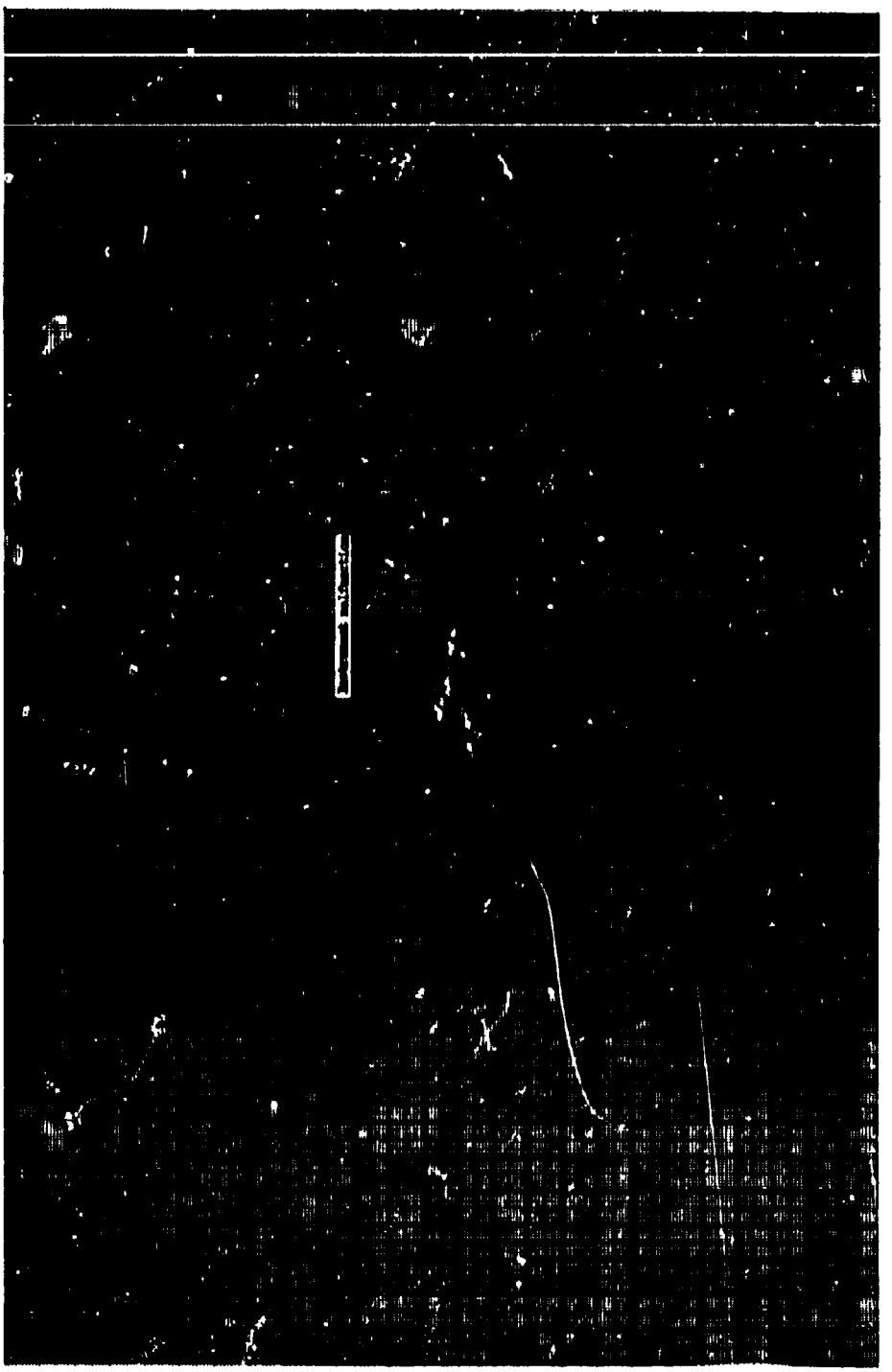


Figure 31B. Flight Parameter Time Histories of Test 96, Run 12.

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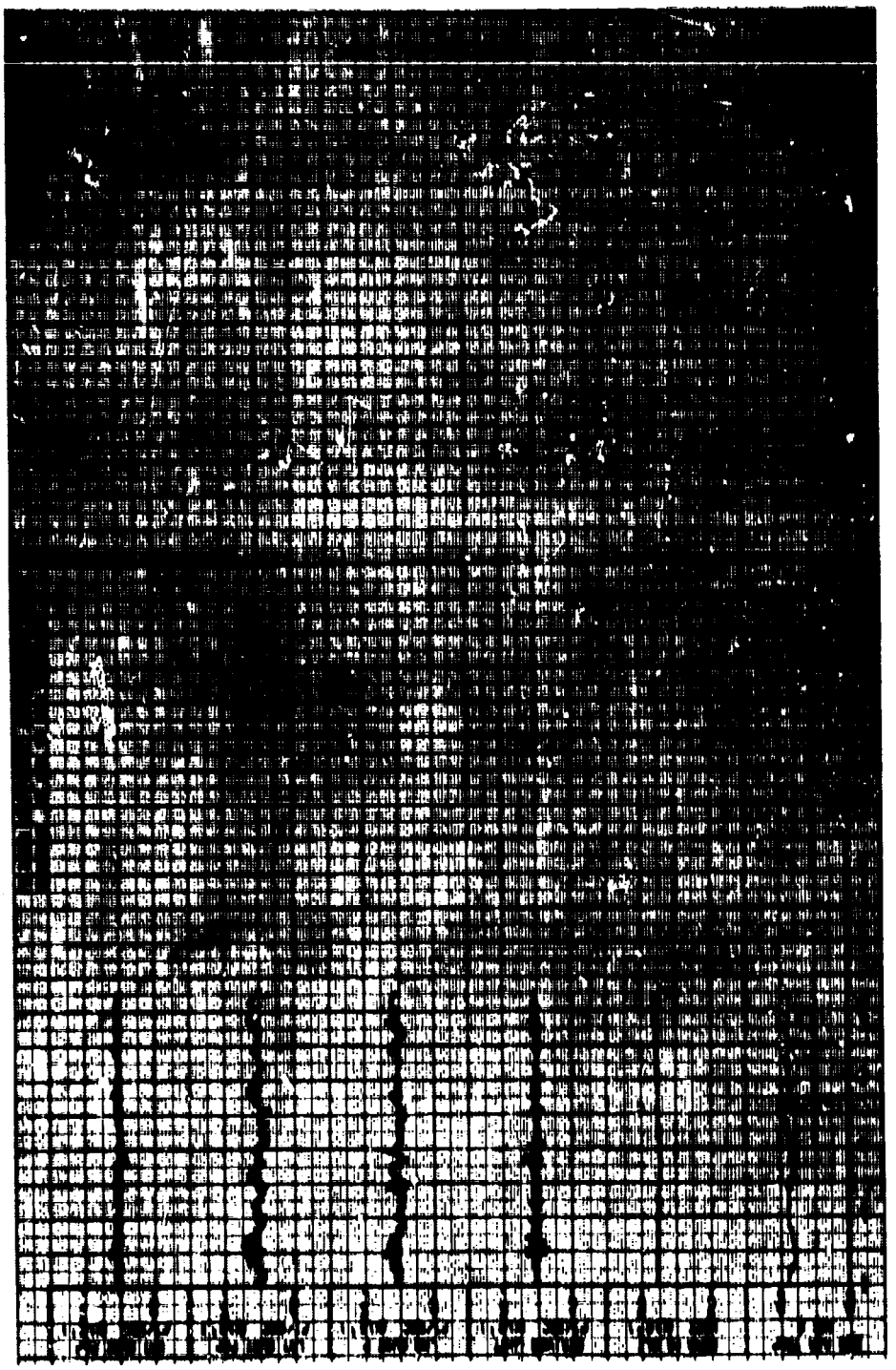


Figure 32A- Gust Velocity Time Histories of Test 103, Run 3 - (Laverton, Australia, 21 Jul 66).

Figure 32B. Flight Parameter Time Histories of Test 130, Run 3.

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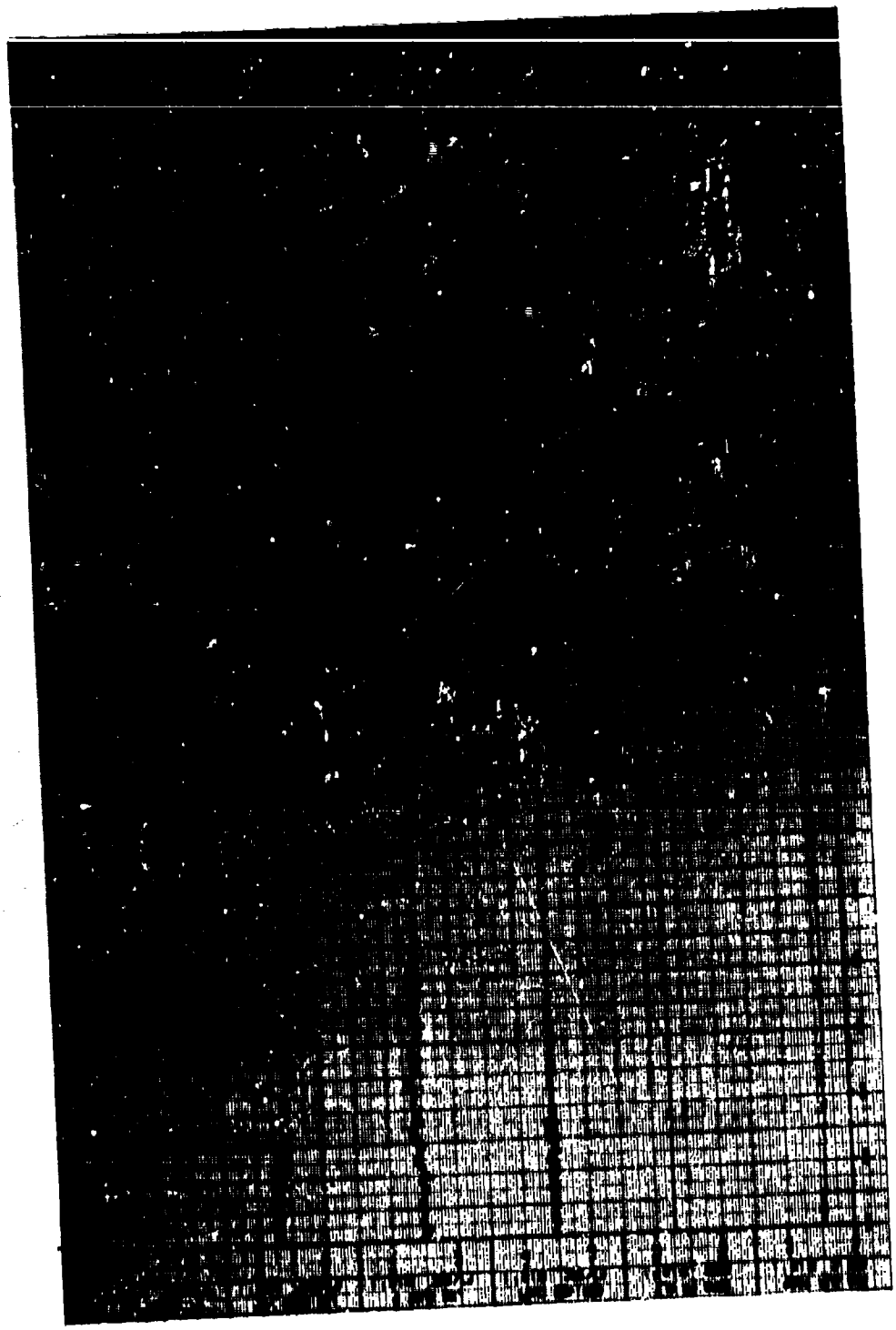


Figure 32A. Dust Velocity Time Histories of Test 100, Run 5 - (Lemarica, Australia, 21 Jul 66).



Figure 33B. Flight Parameter Time Histories of Test 103, Run 5.

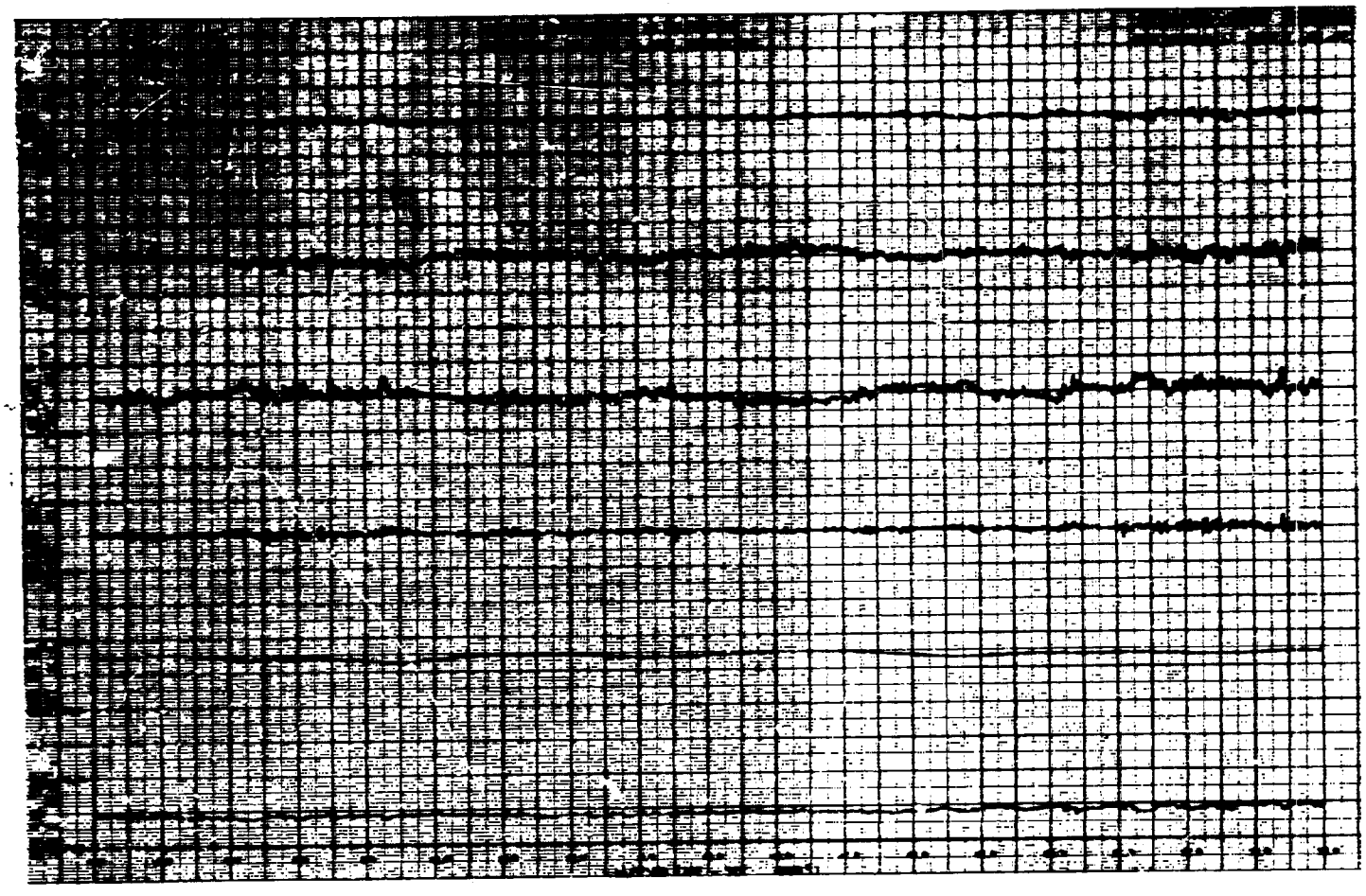


Figure 34A. Gust Velocity Time Histories of Test 100, Run 6 -
(Laverton, Australia, 21 Jul 66) (Sheet 1 of 2)

Figure 34B. Flight Parameter Time Histories of Test 100, Run 6 (Sheet 1 of 2)

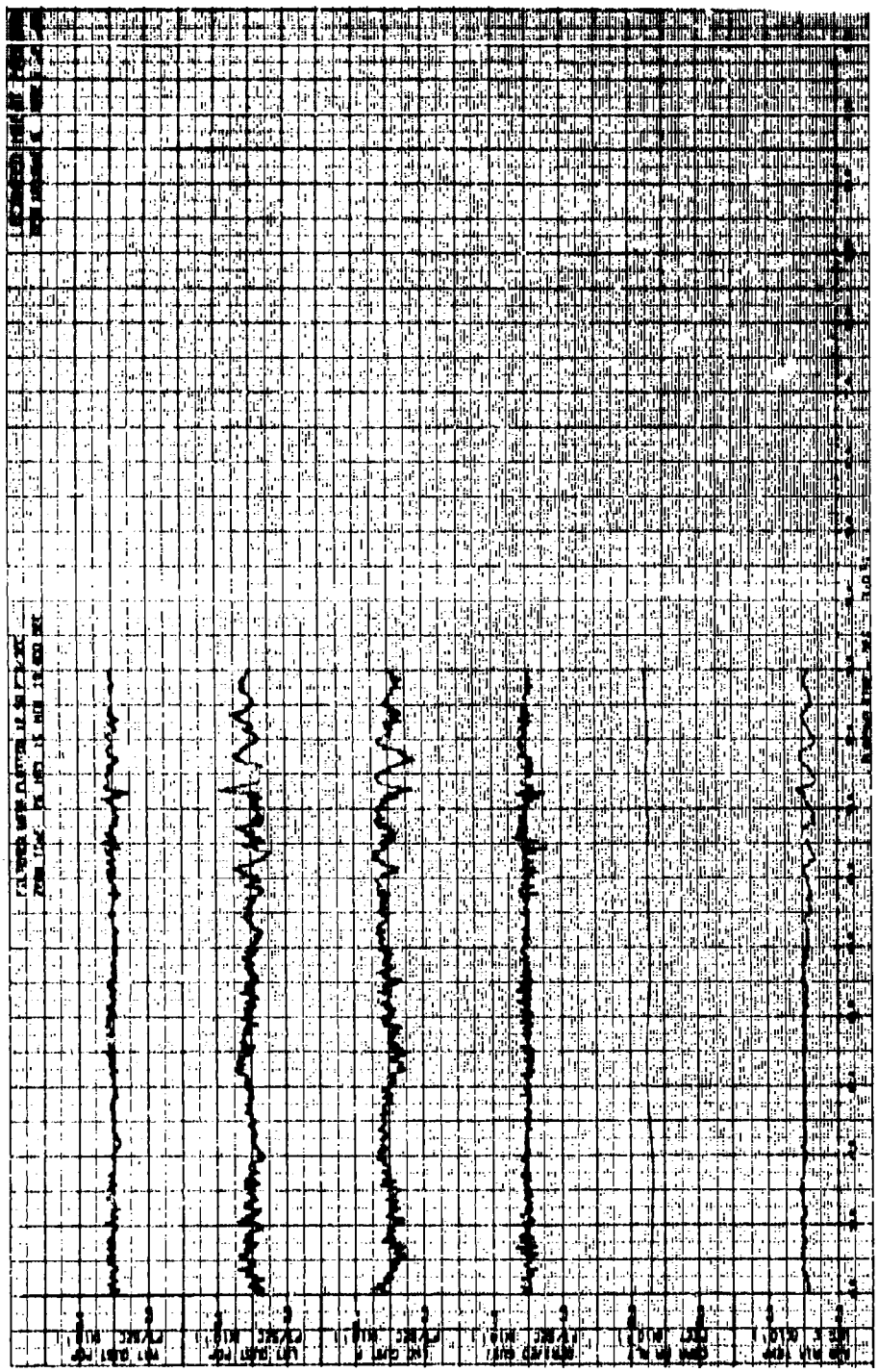


Figure 3(d). Coal Velocity Time History at Test 10c, Run 6 -
(Laverton, Australia 21 Jul 80) (Sheet 2 of 2)

Figure 34B. Flight Parameter Time Histories of Test 100, Run 6 (Sheet 2 of 2)

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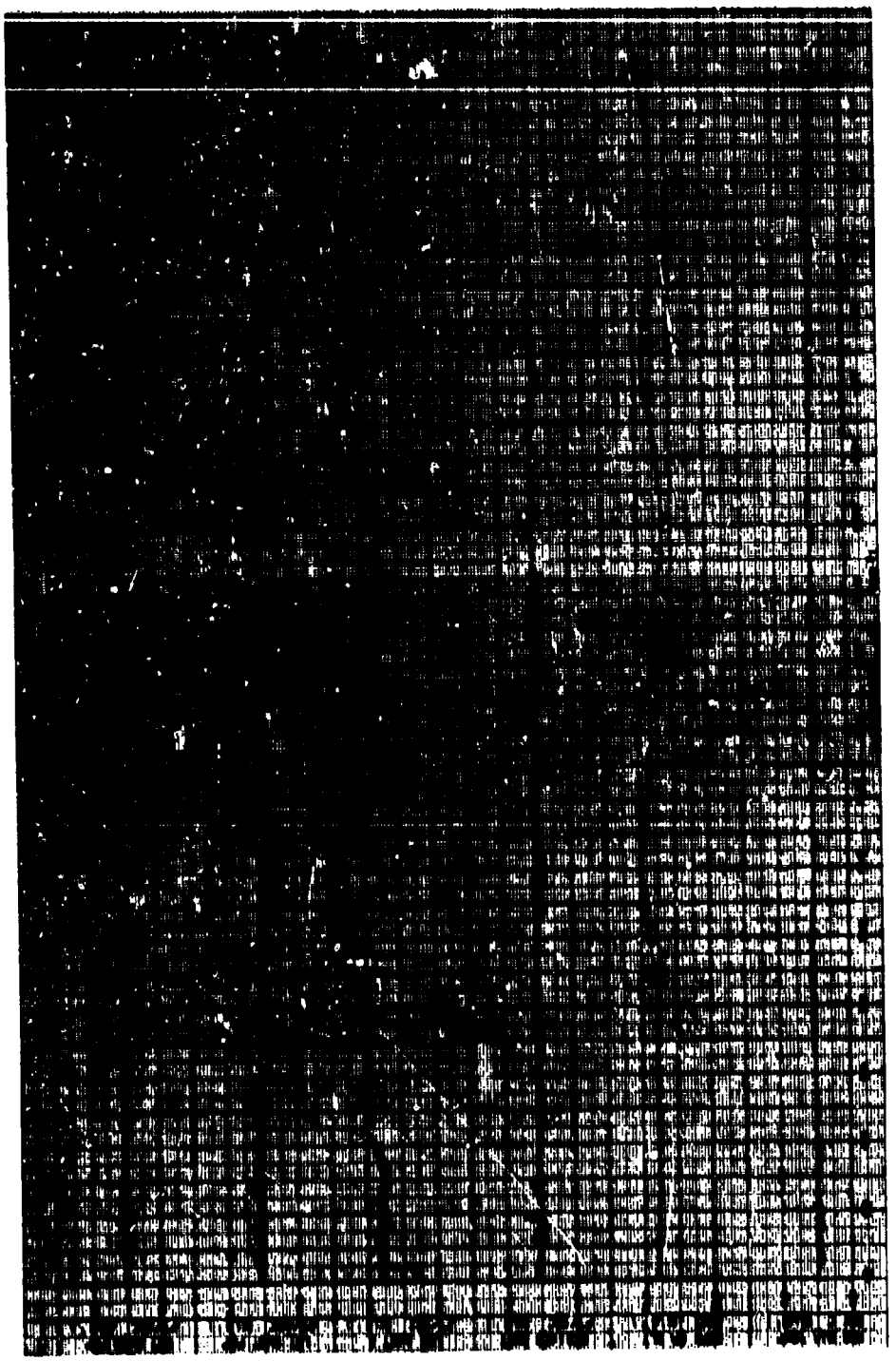


Figure 35A. Gust Velocity Time Histories of Test 100, Run 7 - (Laverton, Australia, 21 Jul 66) (Sheet 1 of 3)

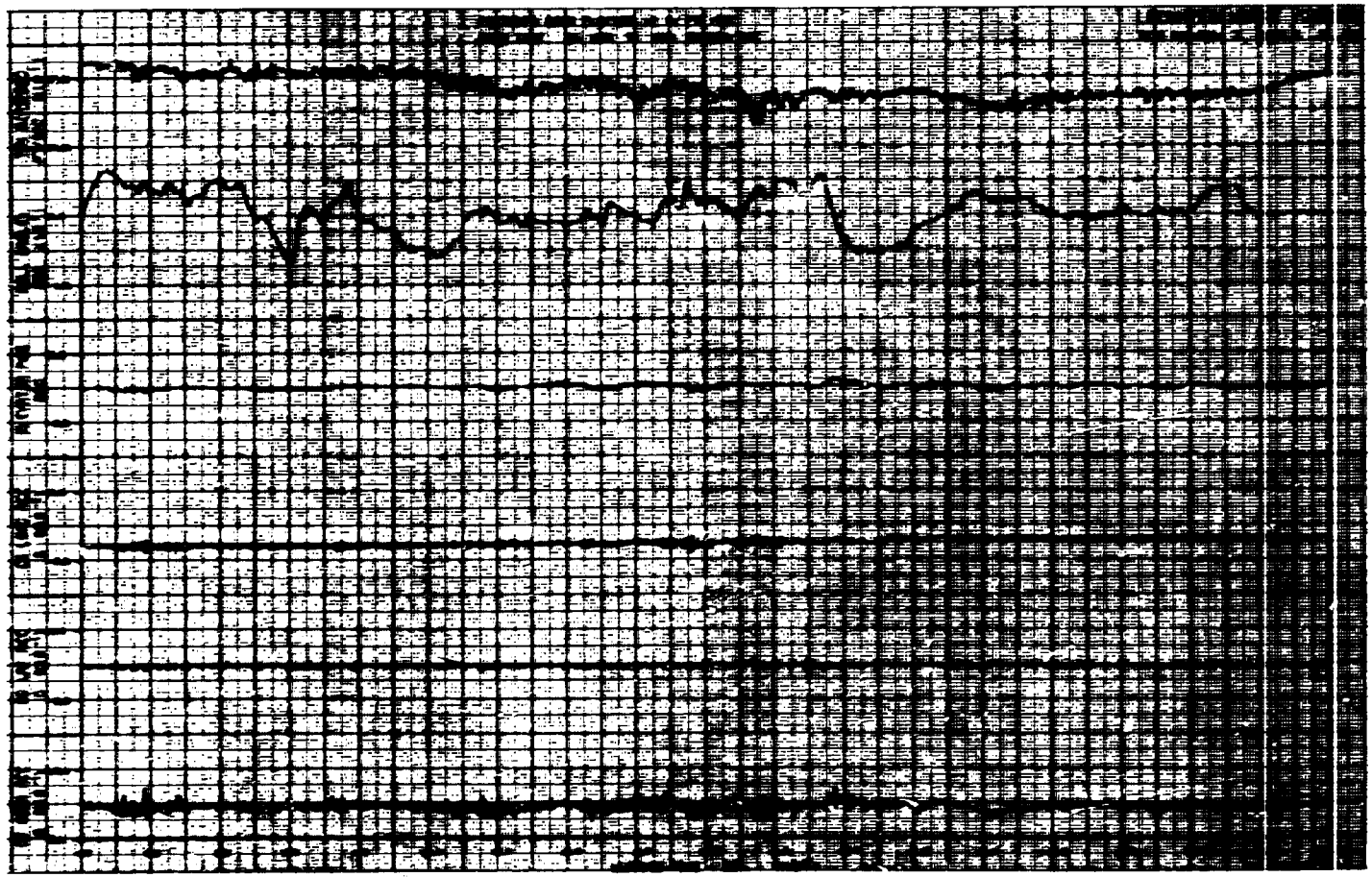


Figure 35B. Flight Parameter Time Histories of Test 100, Run 7 (Sheet 1 of 3)

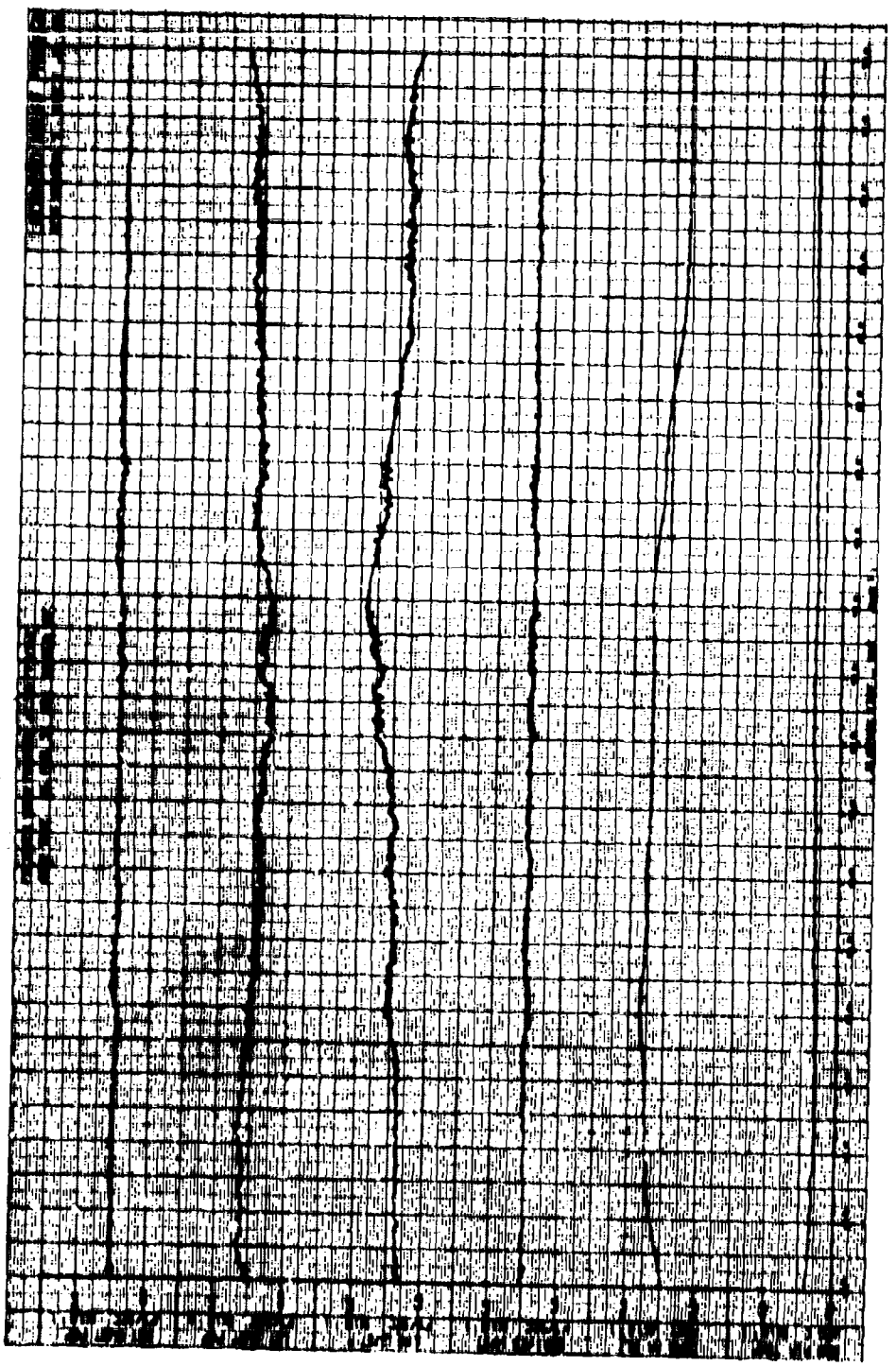


Figure 35A. Gust Velocity Time Histories of Test 10C, Run 7 - (Laverton, Australia, 21 Jul 66) (Sheet 2 of 3)

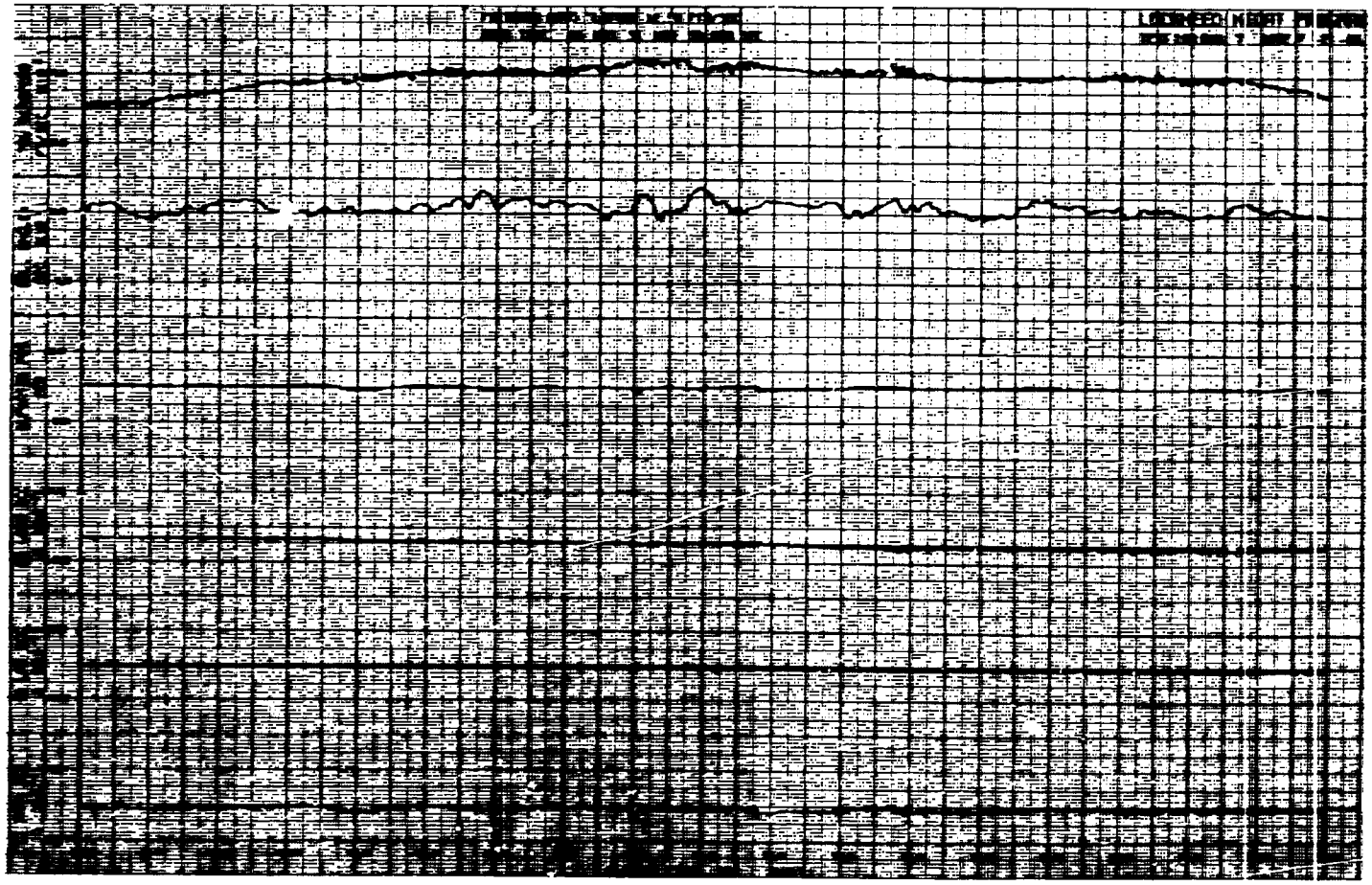


Figure 35B. Flight Parameter Time Histories of Test 100, Run 7 (Sheet 2 of 3)

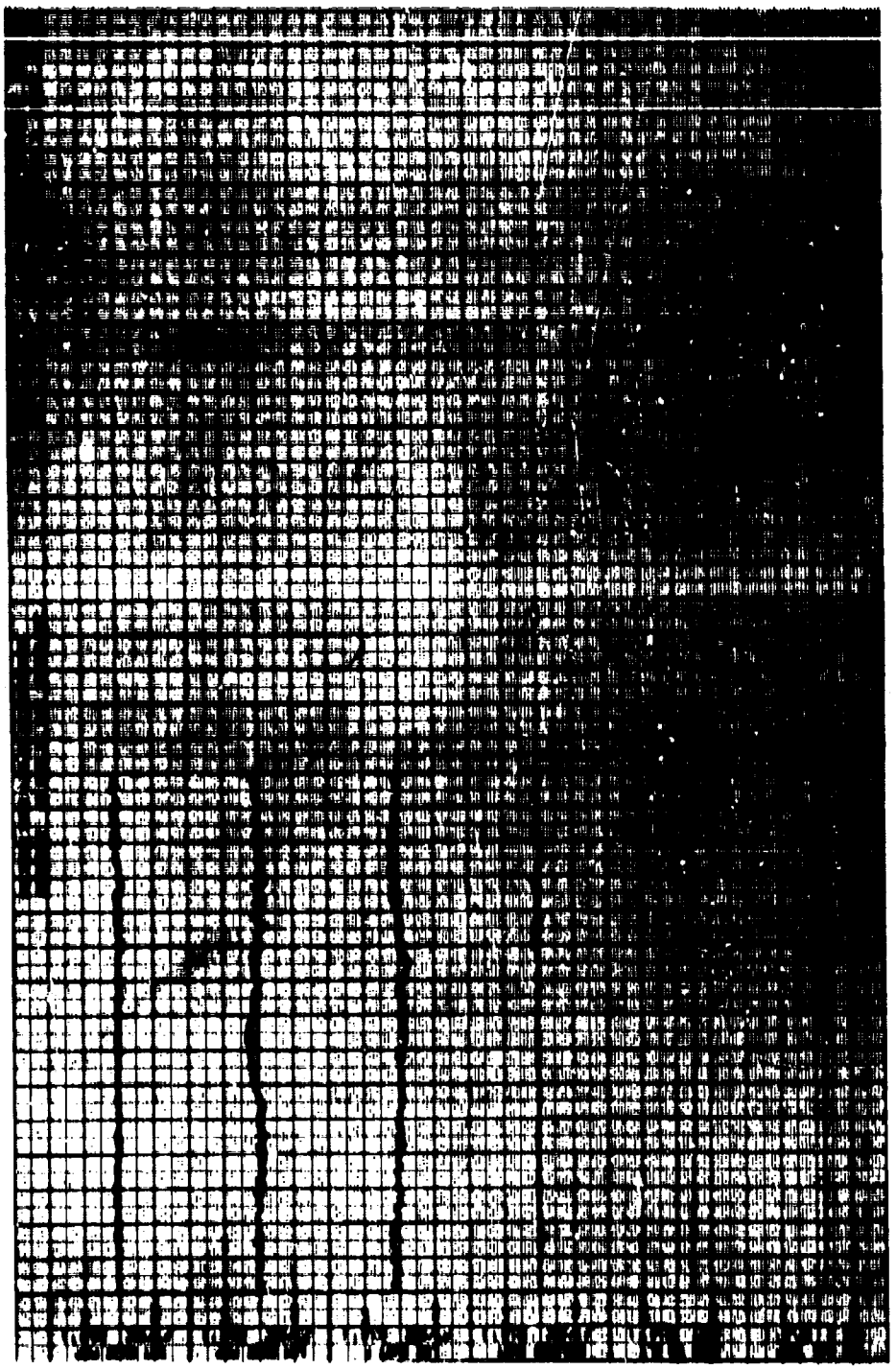


Figure 35A. Gust Velocity Time Histories of Test 100, Run 7 -
(Lerertom, Australia, 21 Jul 66) (Sheet 3 of 3)

Figure 35B. Flight Parameter Time Histories of Test 100, Run 7 (Sheet 3 of 3)

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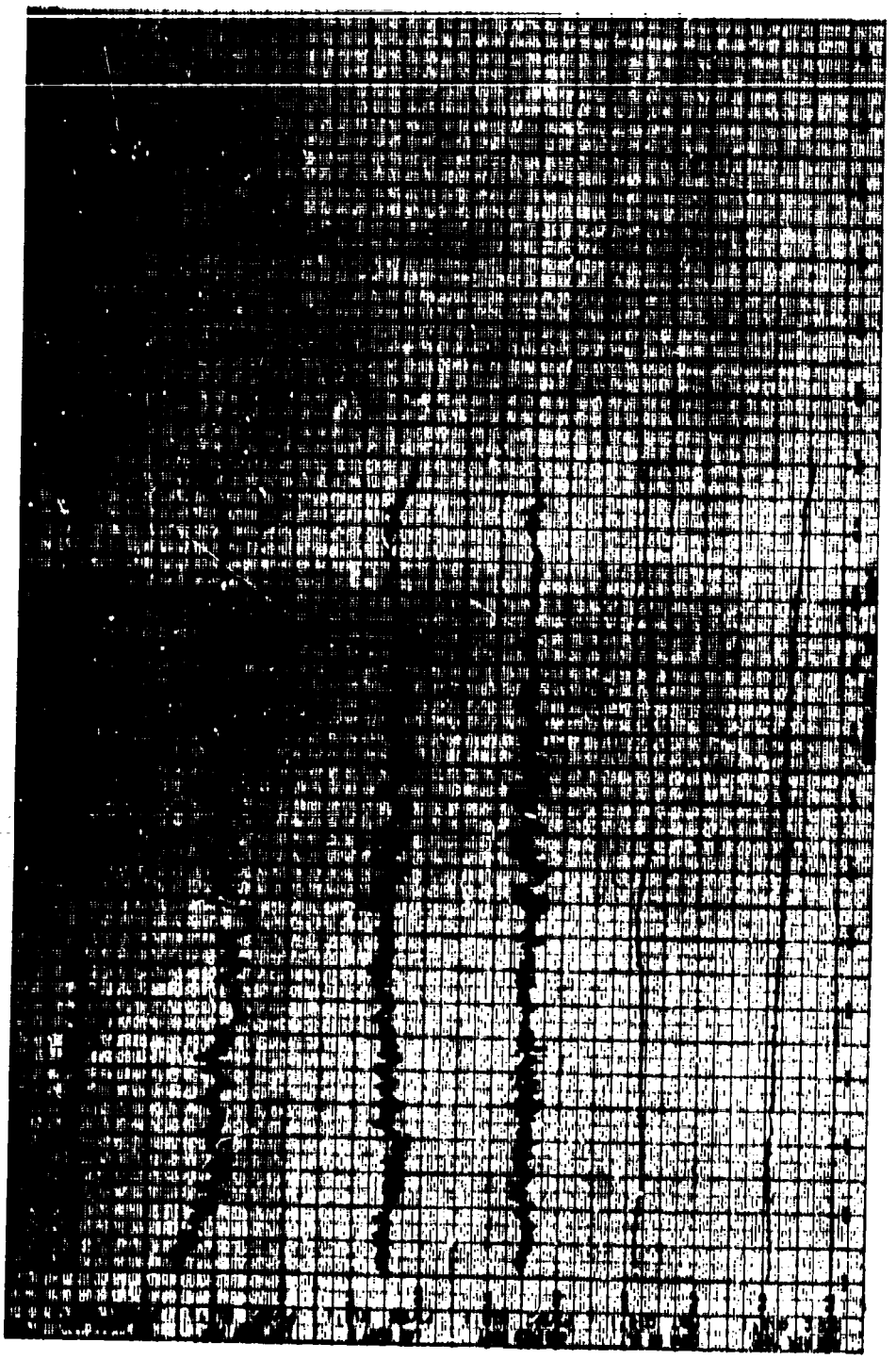


Figure 36A. Crust velocity time histories of test 102, Run 2 - (Weapon, Australia, 28 Jul 66).

Figure 36B. Flight Parameter Time Histories of Test 102, Run 2.

Appendix VI

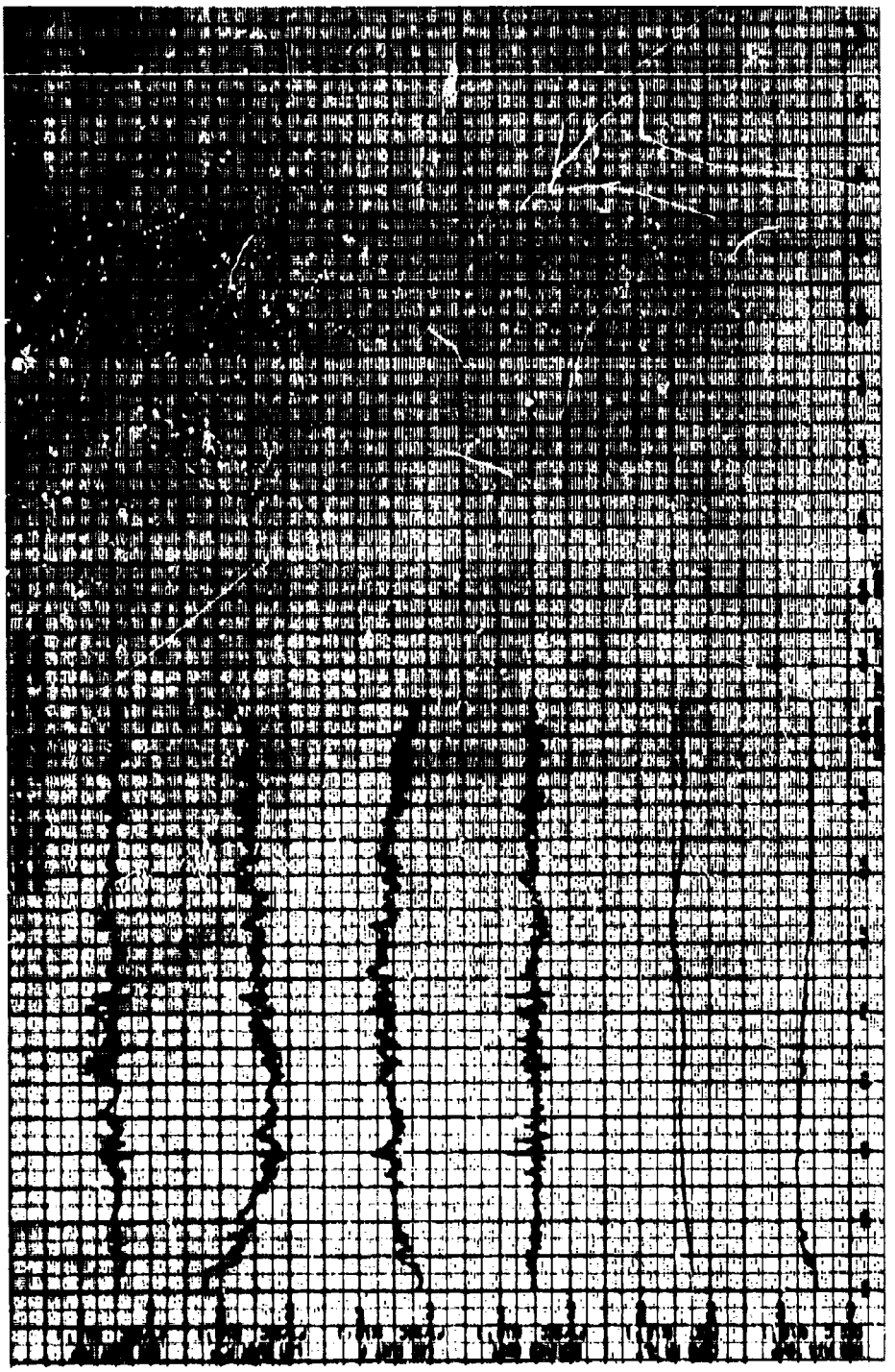


Figure 37A- Gust Velocity Time Histories of Test 142, Run 3 - (Tarrecr, Australia, 26 Jul 60).

Figure 37B. Flight Parameter Time Histories of Test 102, Run 3.

Appendix VI

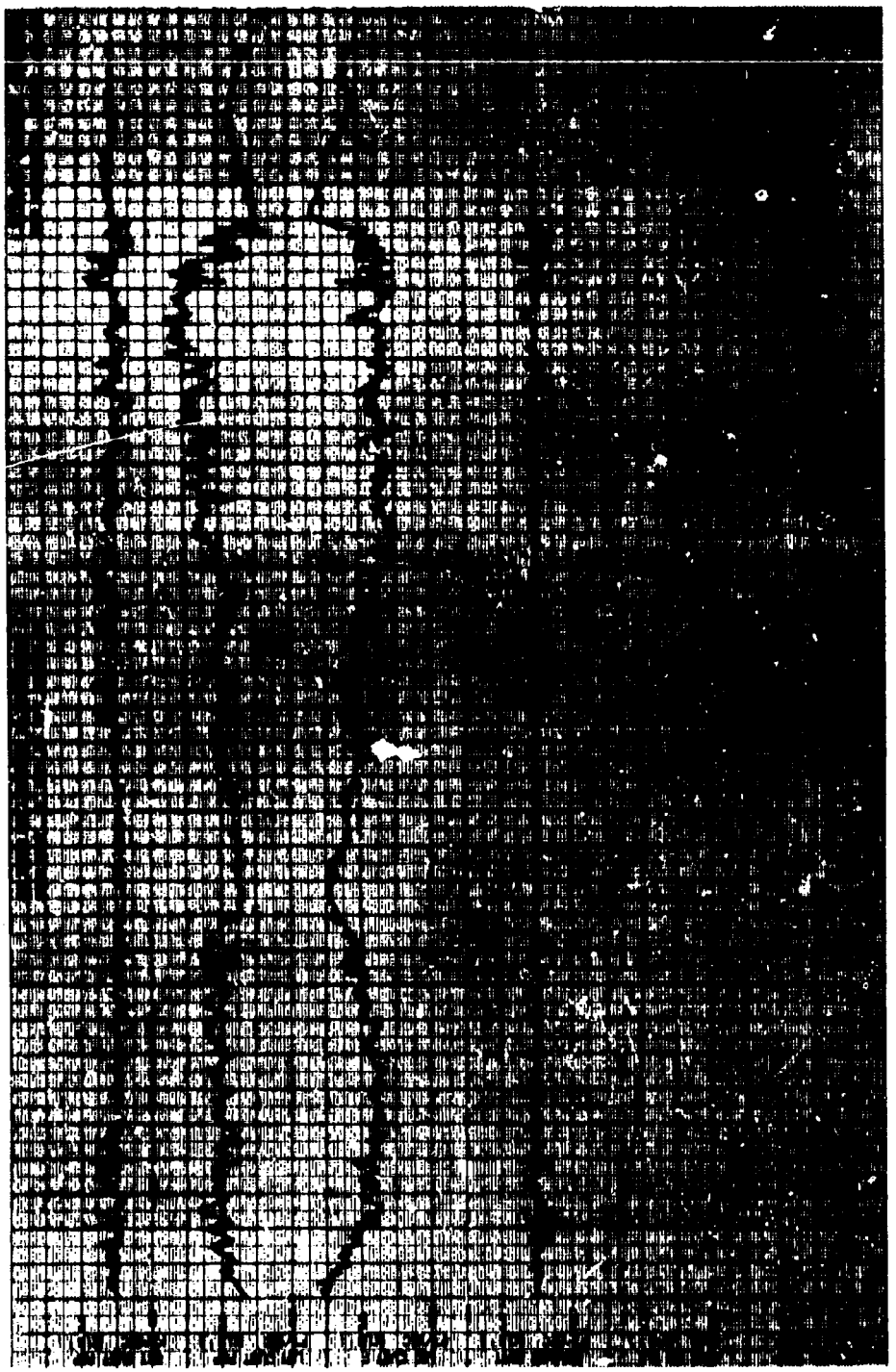


Figure 38A. Gust Velocity Time Histories of Test 102, Run 5 -
(Laverton, Australia, 28 Jul 66) (Sheet 1 of 2)

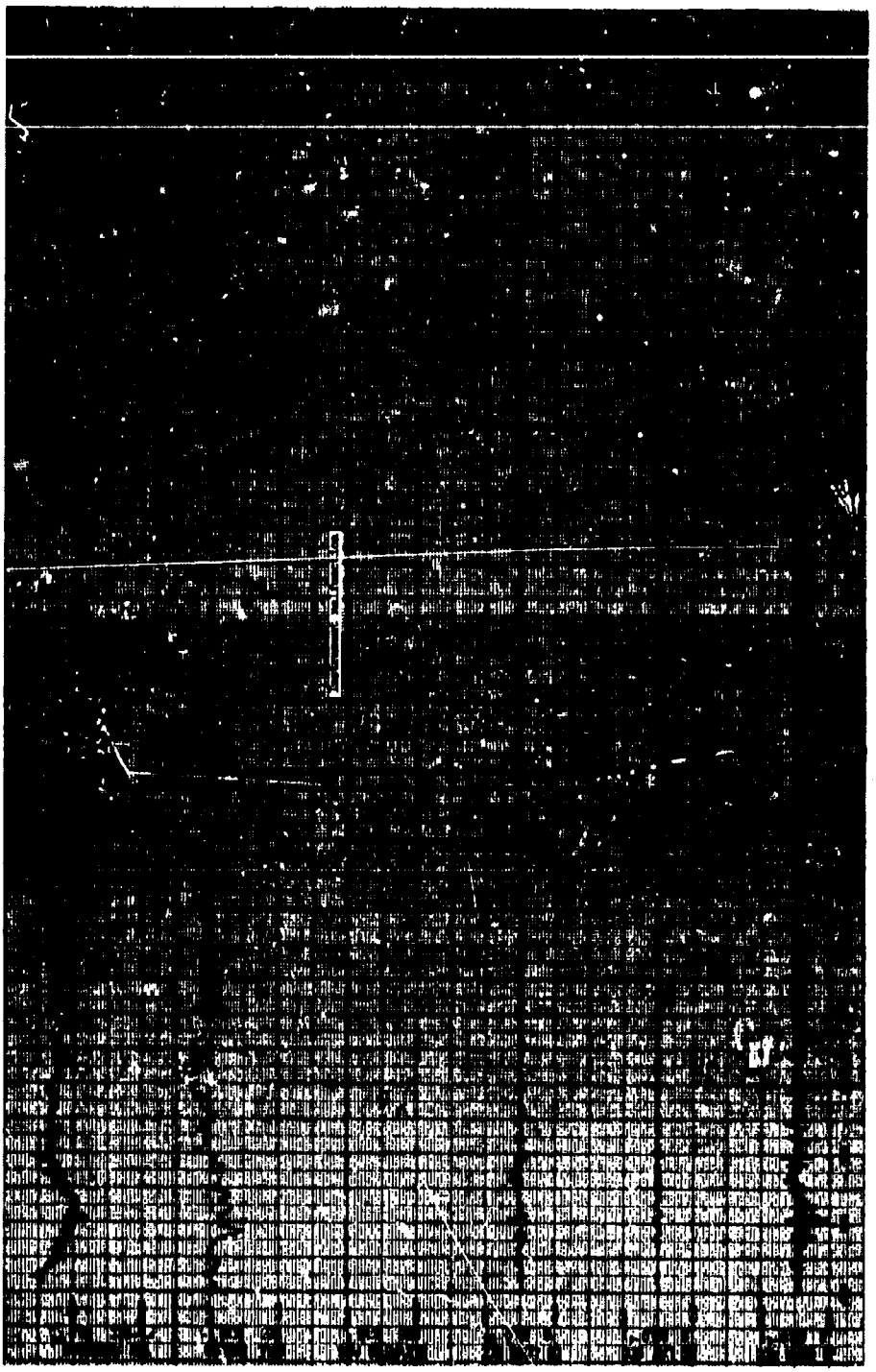


Figure 38B. Flight Parameter Time Histories of Test 102, Run 5 (Sheet 1 of 2)

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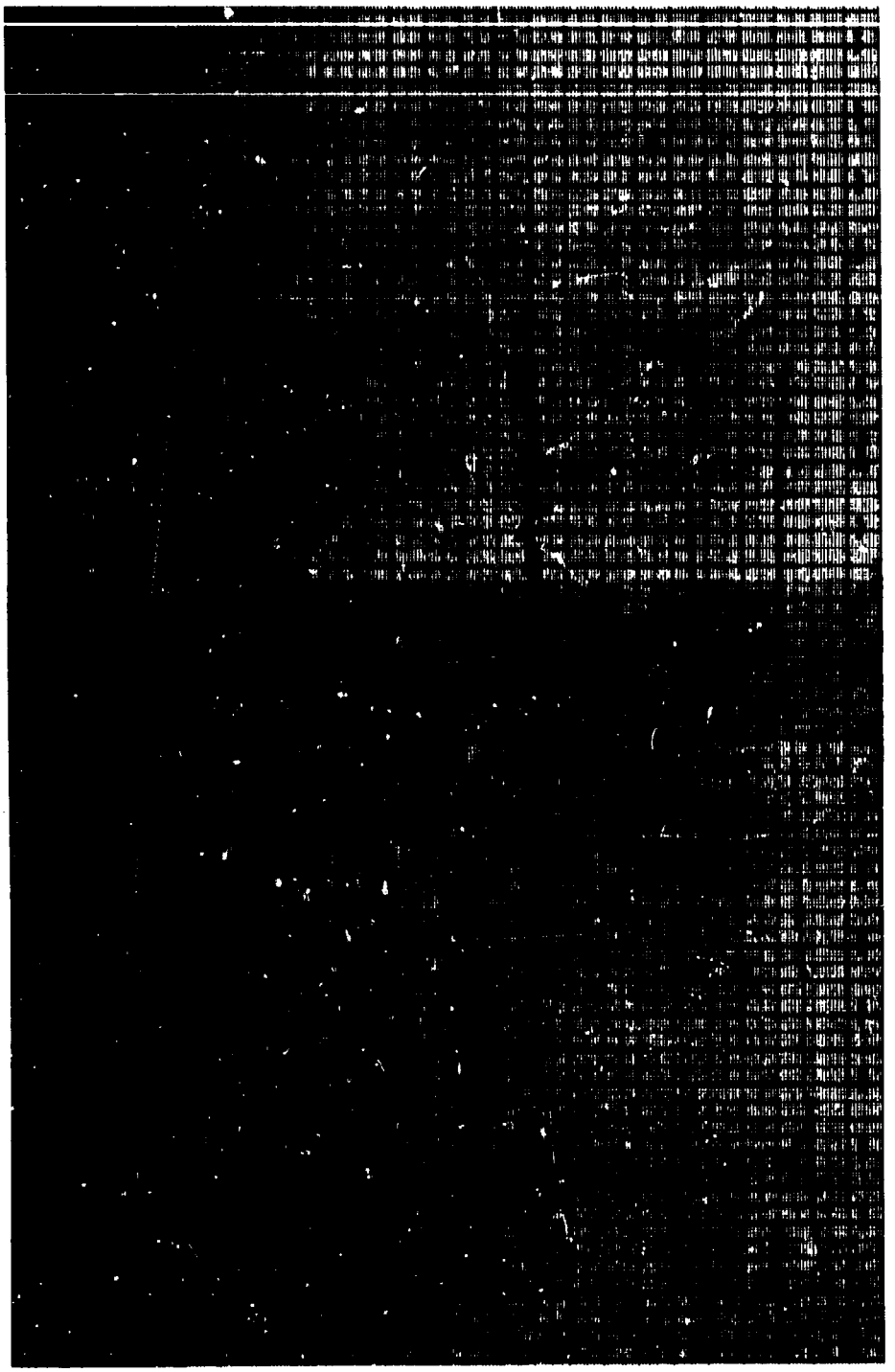


Figure 38A. Gust Velocity Time Histories of Test 102, Run 5 - (Laverton, Australia, 28 Jul 66) (Sheet 2 of 2)

Figure 38b. Flight Parameter Time Histories of Test 10?, Run 5 (Sheet 2 of 2)

Appendix VI

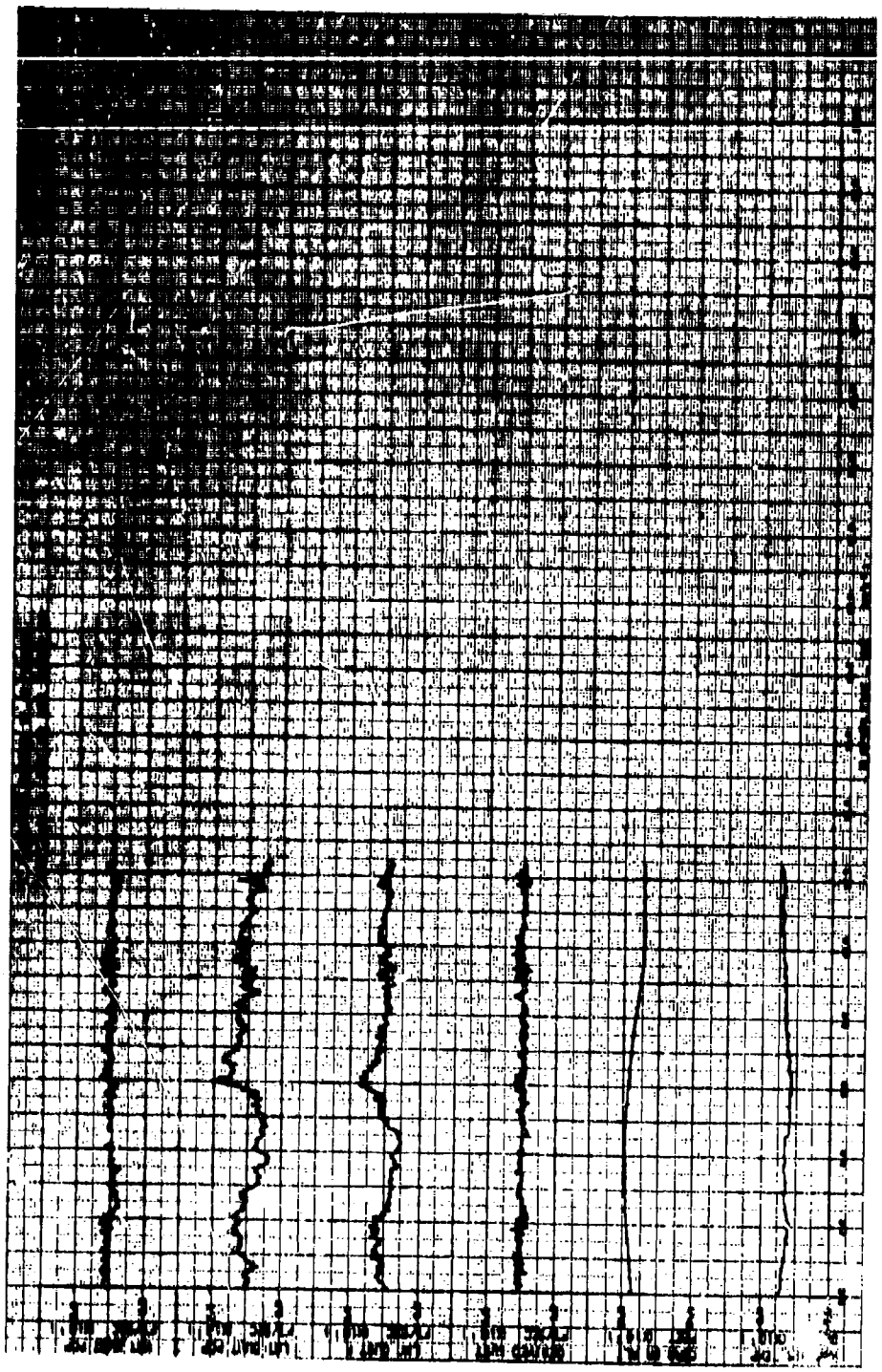


Figure 39A. Gust Velocity Time Histories of Test 102, Run 6 - (Laverton, Australia, 28 Jul 66).

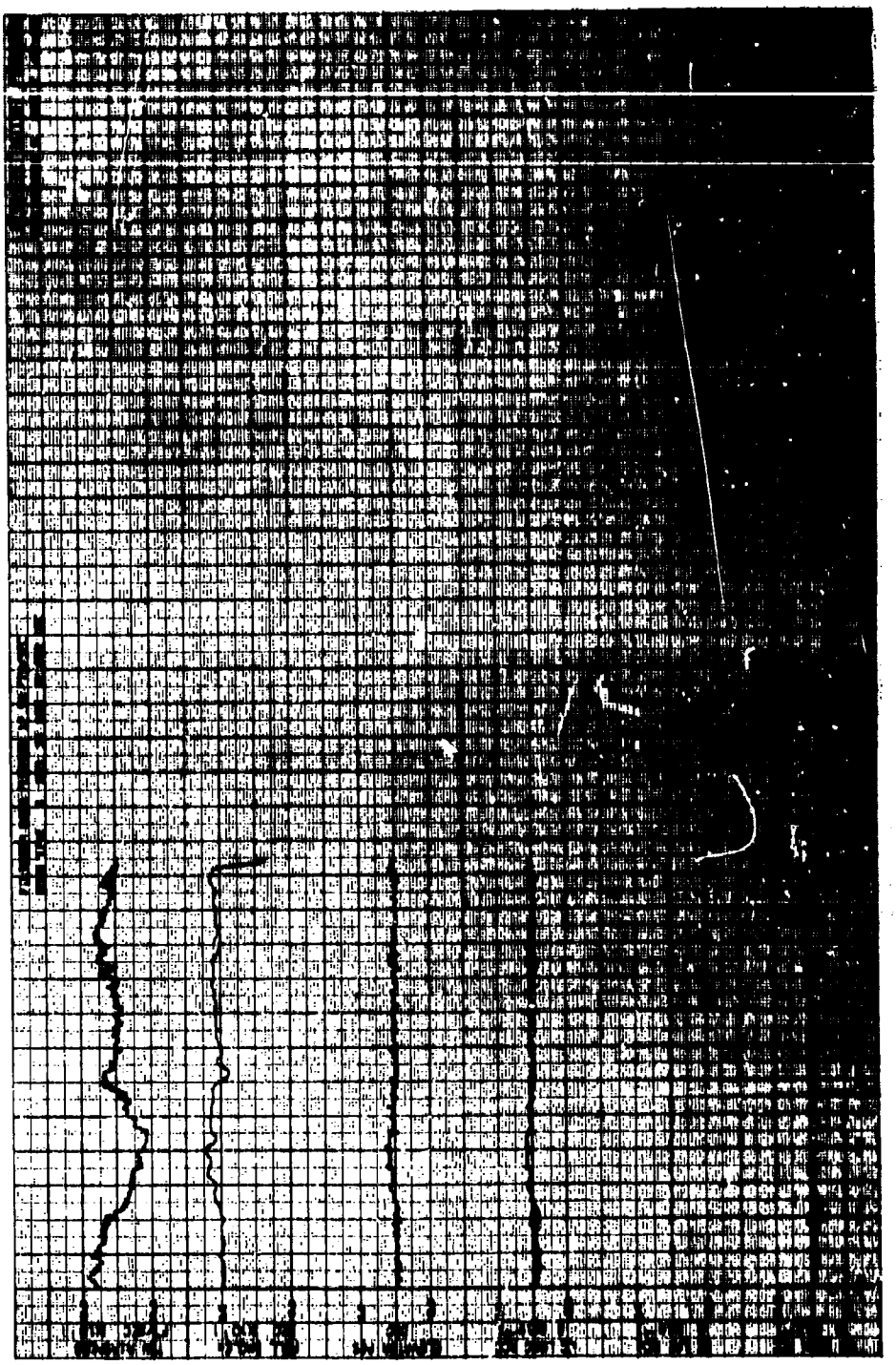


Figure 39B. Flight Parameter Time Histories of Test 102, Run 6.

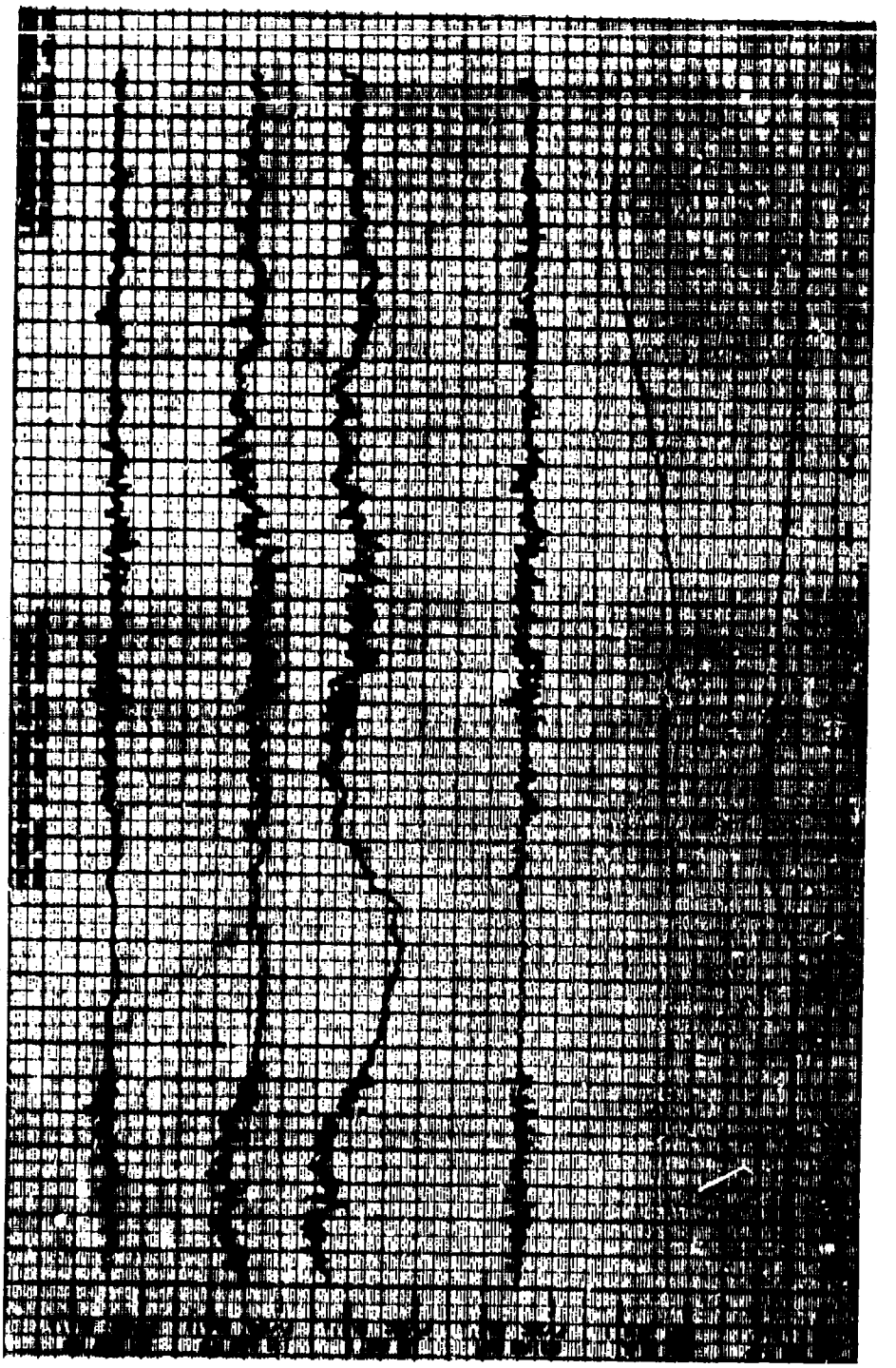


Figure 40A. Gust Velocity Time Histories of Test 102, Run 6 - (Laverton, Australia, 28 Jul 65).

Figure 40B. Flight Parameter Time Histories of Test 102, Run 8.

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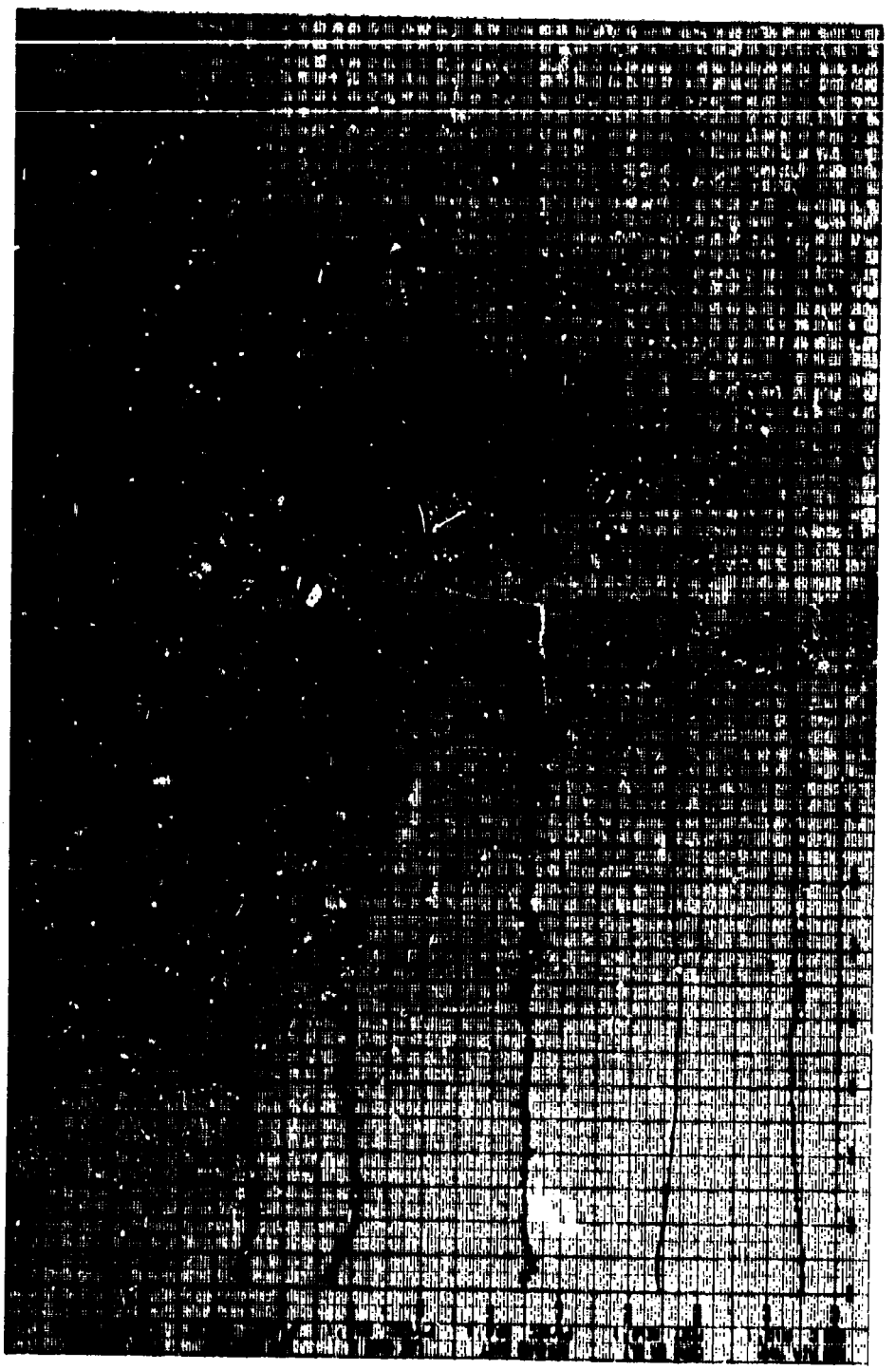


Figure 41A. Gust Velocity Time Histories of Test 102, Run 9 - (Lavarton, Australia, 28 Jul 66) (Sheet 1 of 3)

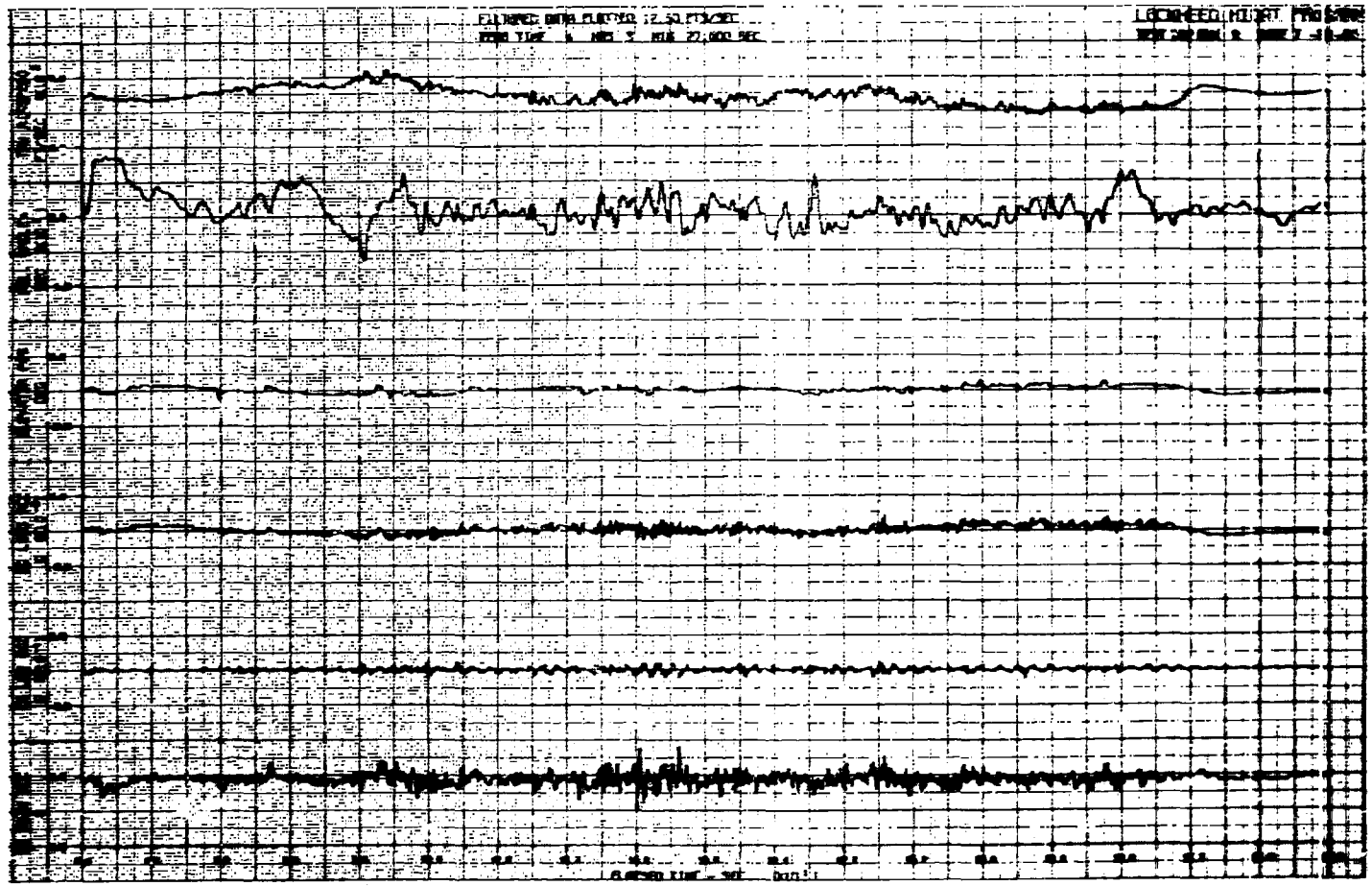


Figure 41B. Flight Parameter Time Histories of Test 102, Run 9 (Sheet 1 of 3)

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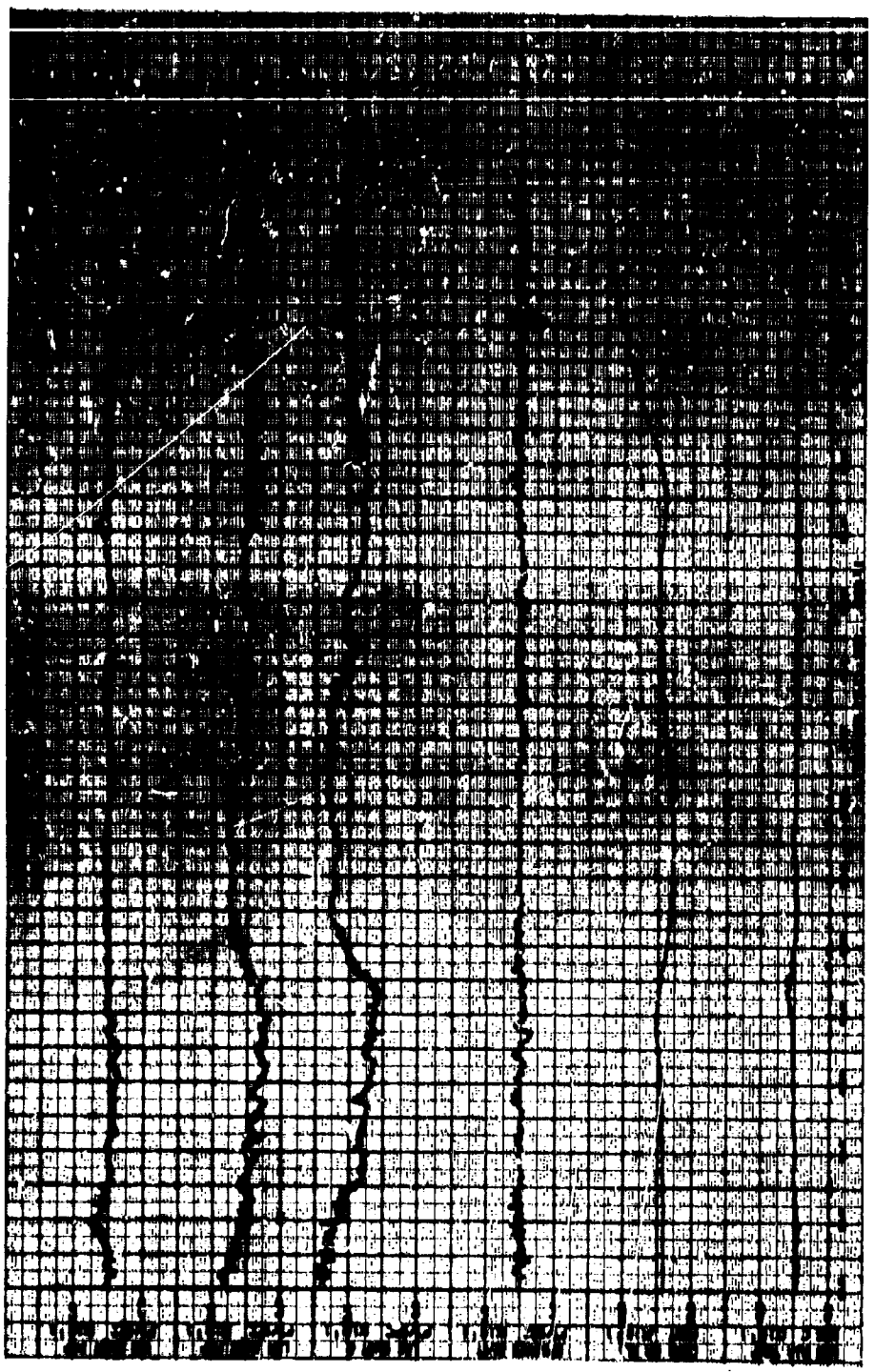


Figure 41A. Gust Velocity Time Histories of Test 102, Run 9 - (Laverton, Australia, 28 Jul 65) (Sheet 2 of 3)

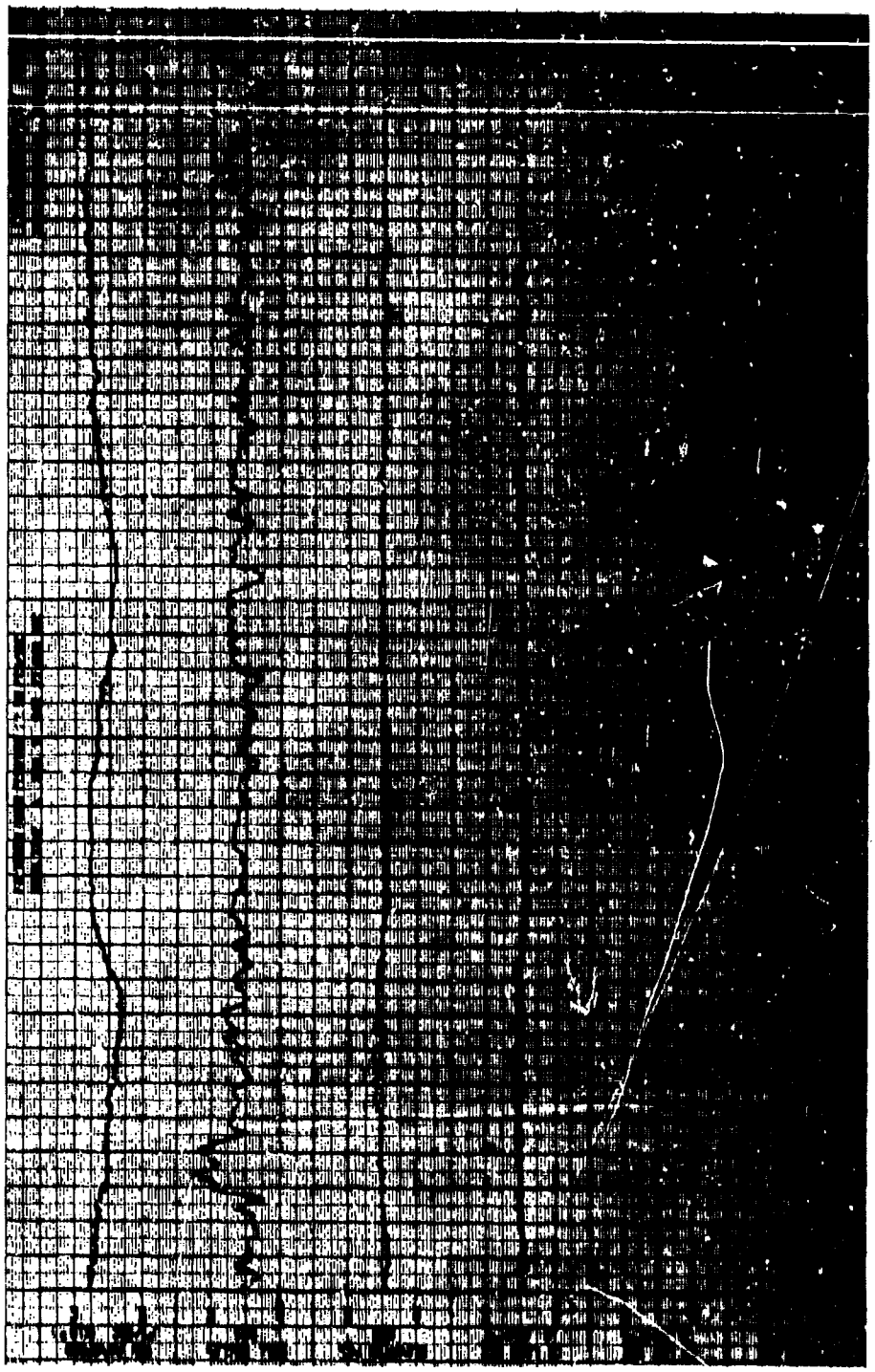


Figure 41B. Flight Parameter Time Histories of Test 102, Run 9 (Sheet 2 of 3)

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Figure 41B. Flight Parameter Time Histories of Test 102, Run 9 (Sheet 3 of 3)

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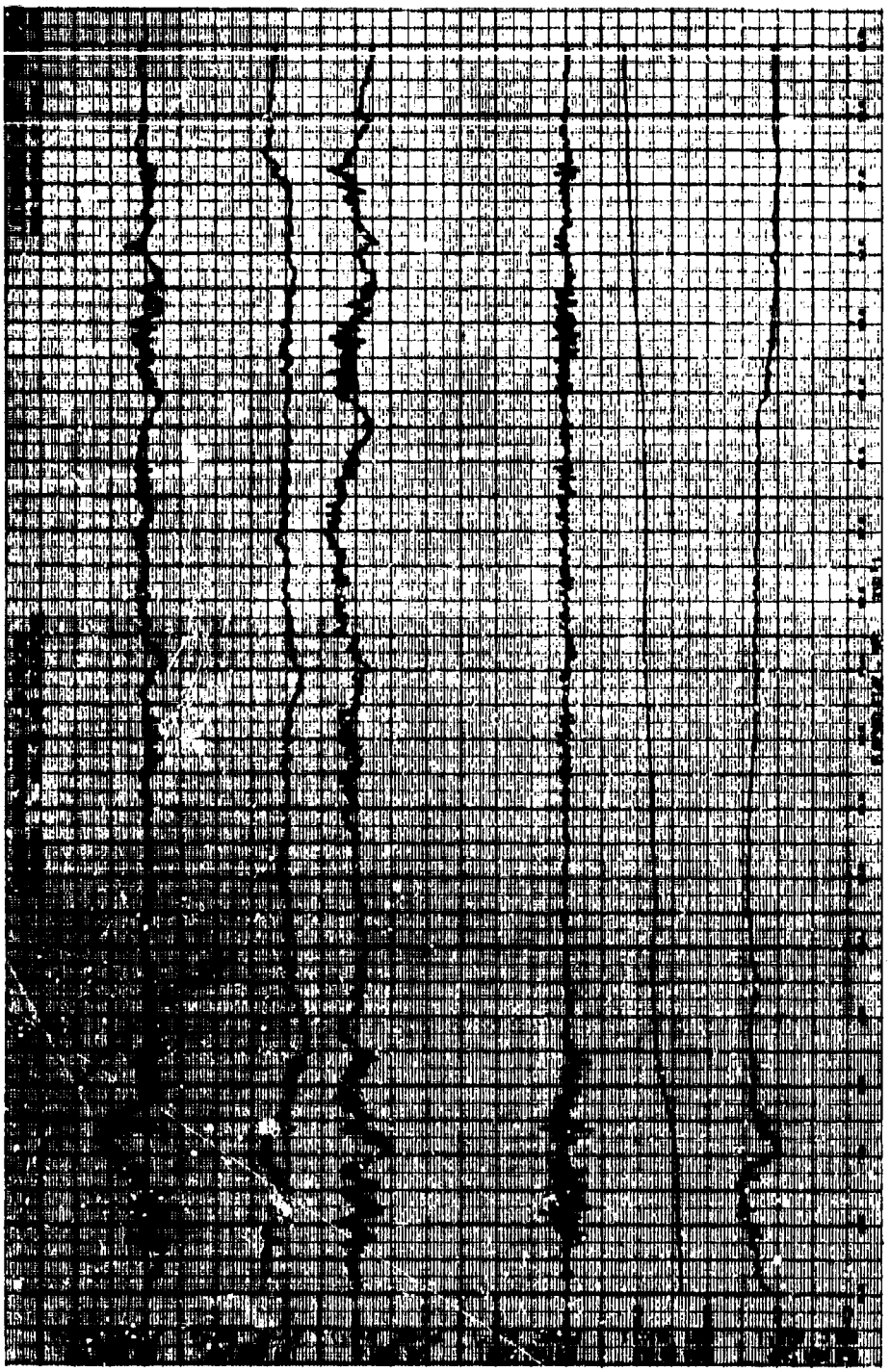


Figure #2A. Gust Velocity Time Histories of Test 102, Run 12 - (Laverton, Australia, 26 Jul ..) (Sheet 1 of 3)

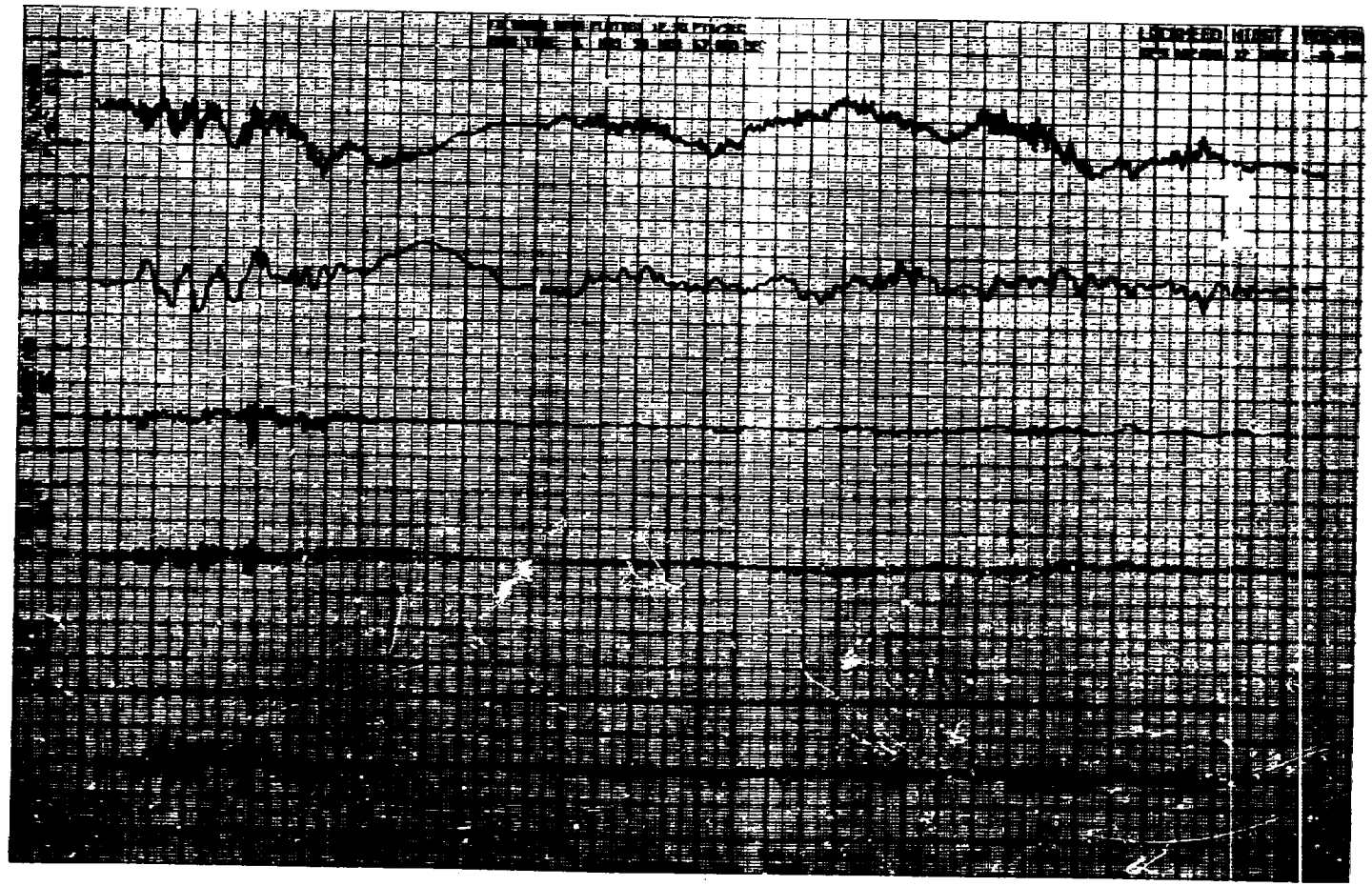


Figure 42B. Flight Parameter Time Histories of Test 102, Run 12 (Sheet 1 Of 3)

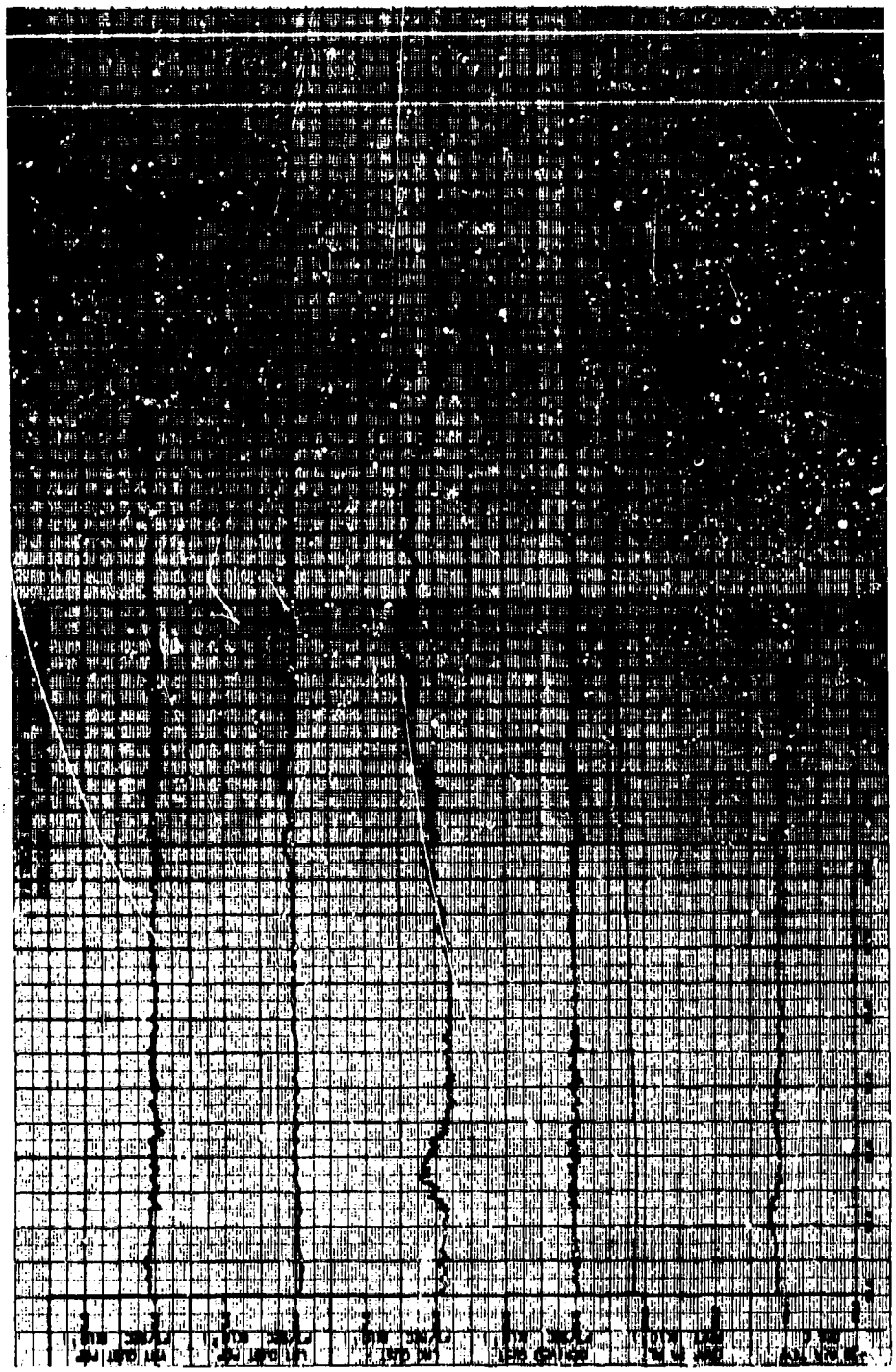


Figure 42A. Gust Velocity Time Histories of Test 102, Run 12 - (Laverton, Australia, 26 Jul 56) (Sheet 2 of 3)

Figure 42B. Flight Parameter Time Histories of Run 12. Run 12 (Sheet 2 of 3)

Figure 42A. Gust Velocity Time Histories of Test 102, Run 12 -
(Laverton, Australia, 28 Jul 66) (Sheet 3 of 3)

Figure #2B. Flight Parameter Time Histories of Test 102, Run 12 (Sheet 3 of 3)

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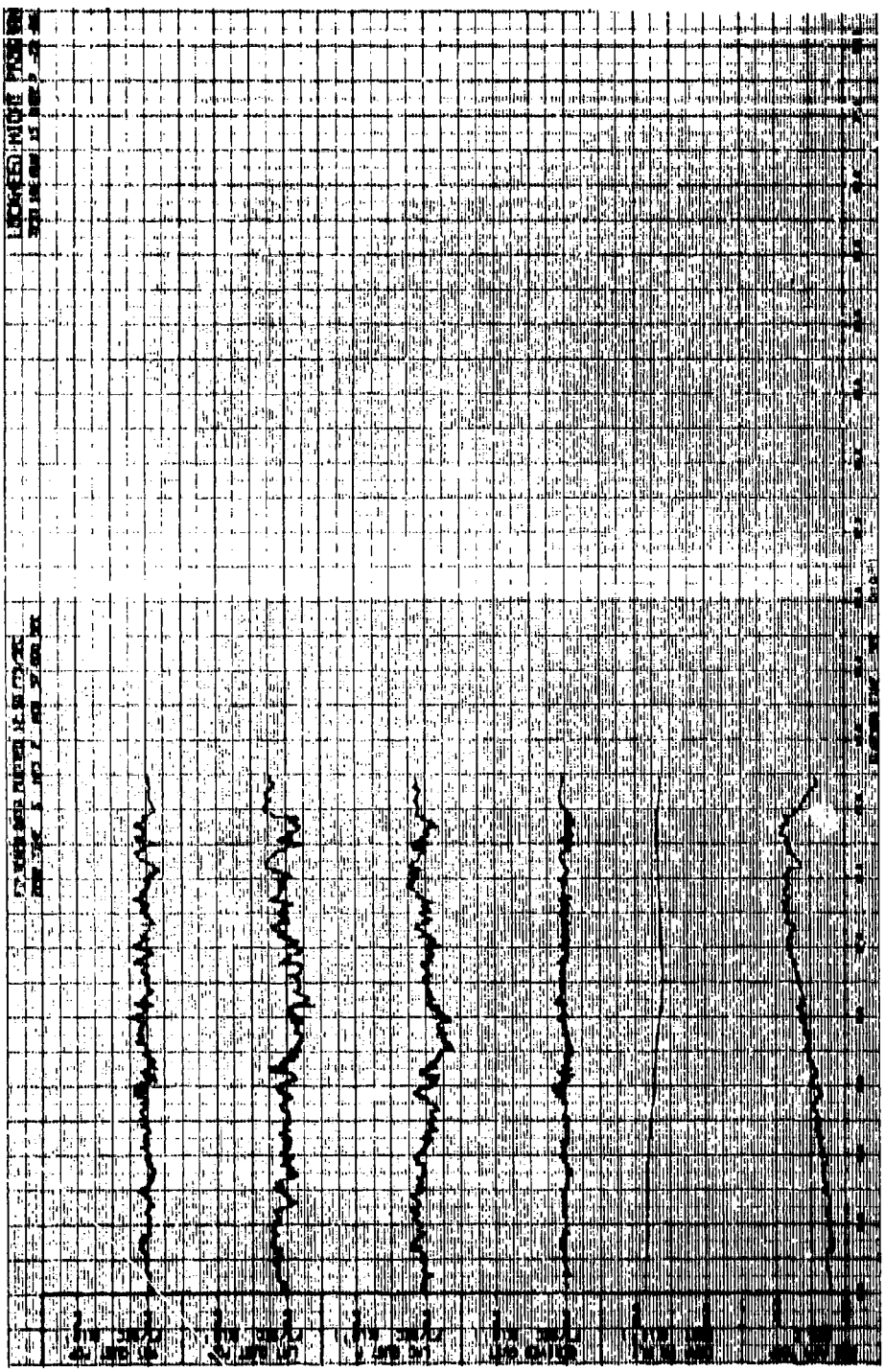


Figure 43B. Flight Parameter Time Histories of Test 102, Run 13.

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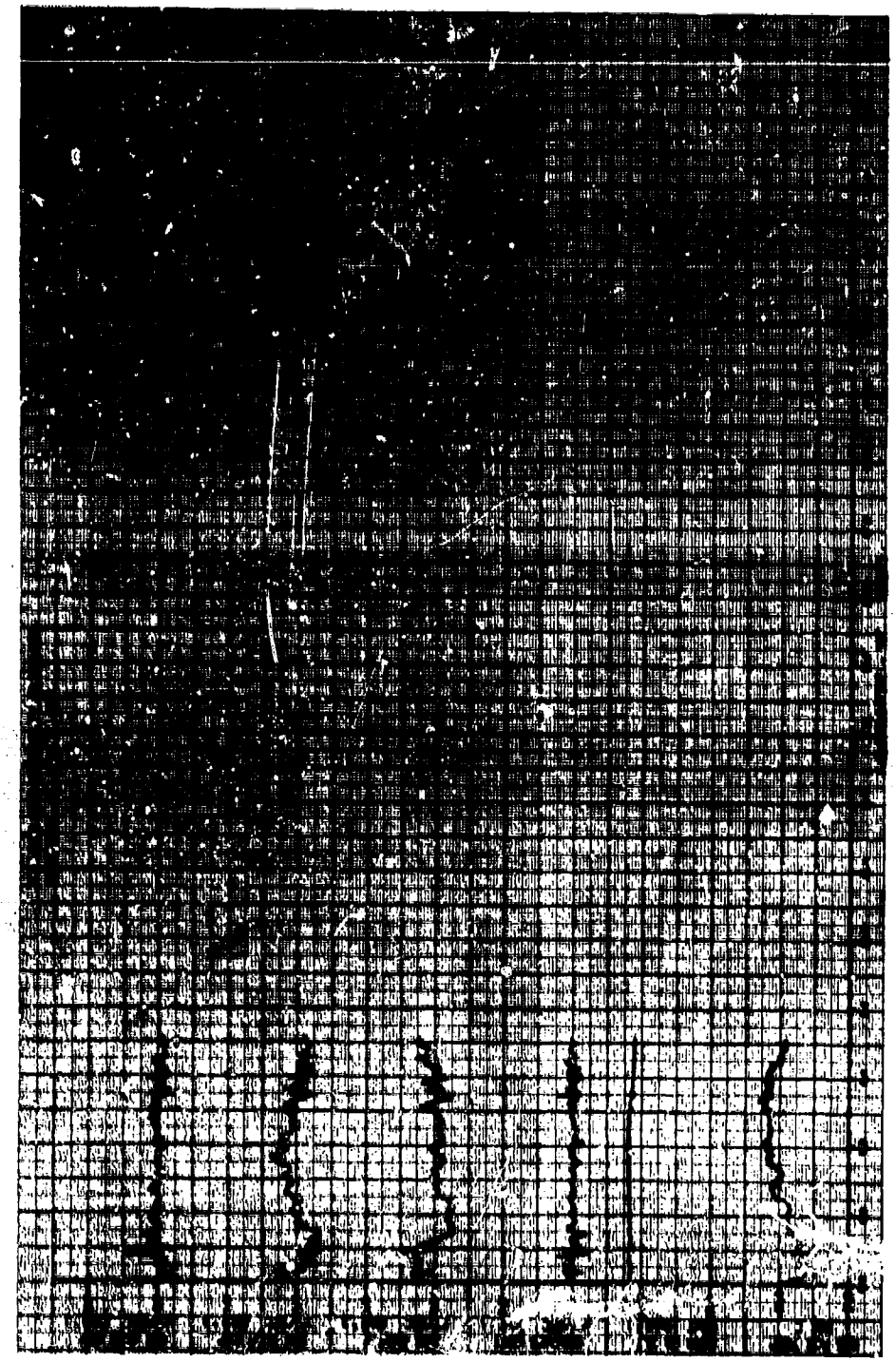


Figure #4. Peak Velocity Time Histories of Test 1/2, Sun 14 - (Larsefor, Australia, 25 Jul 67).

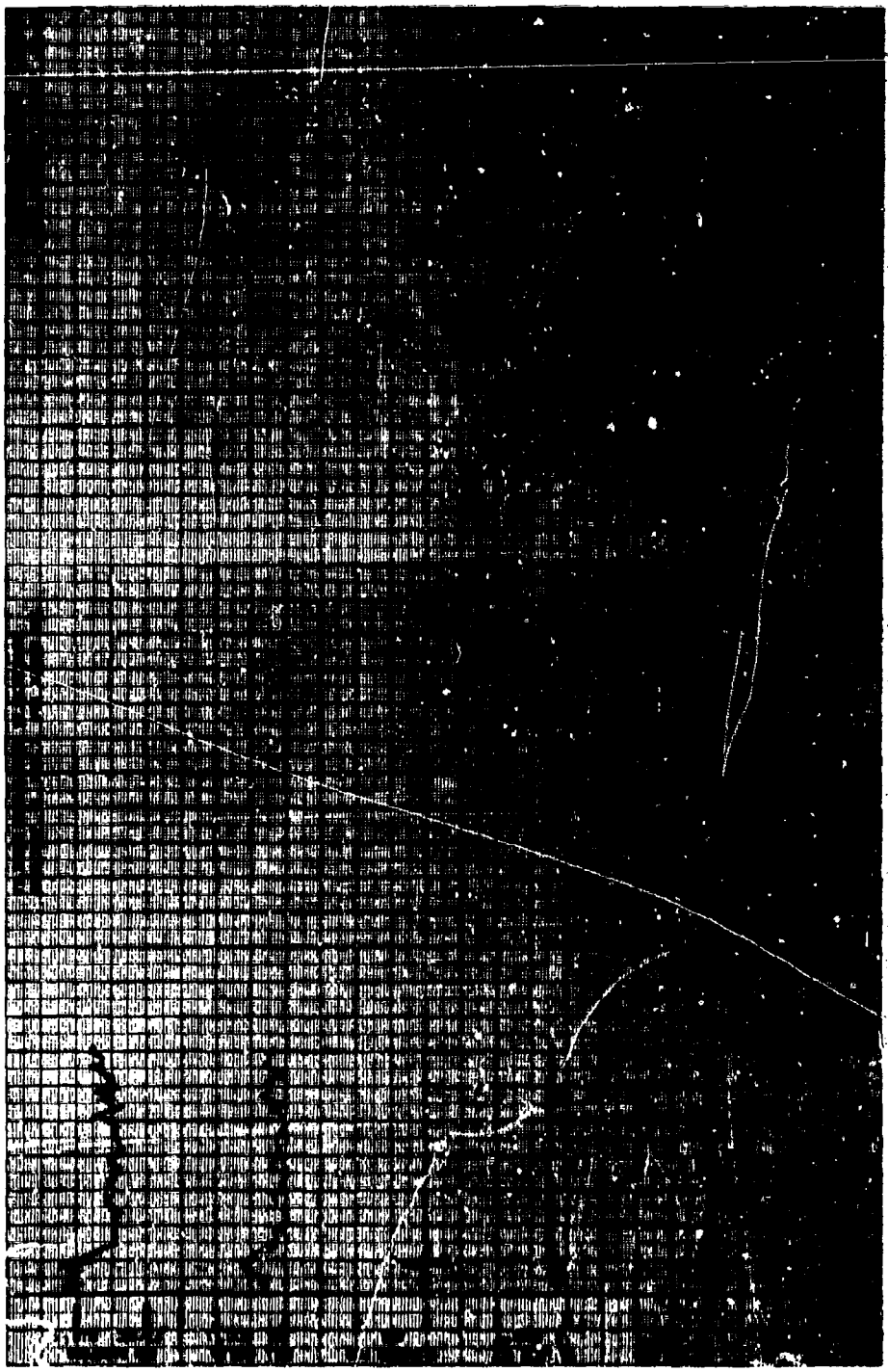


Figure 44B. Flight Parameter Time Histories of Test 102, Run 14.

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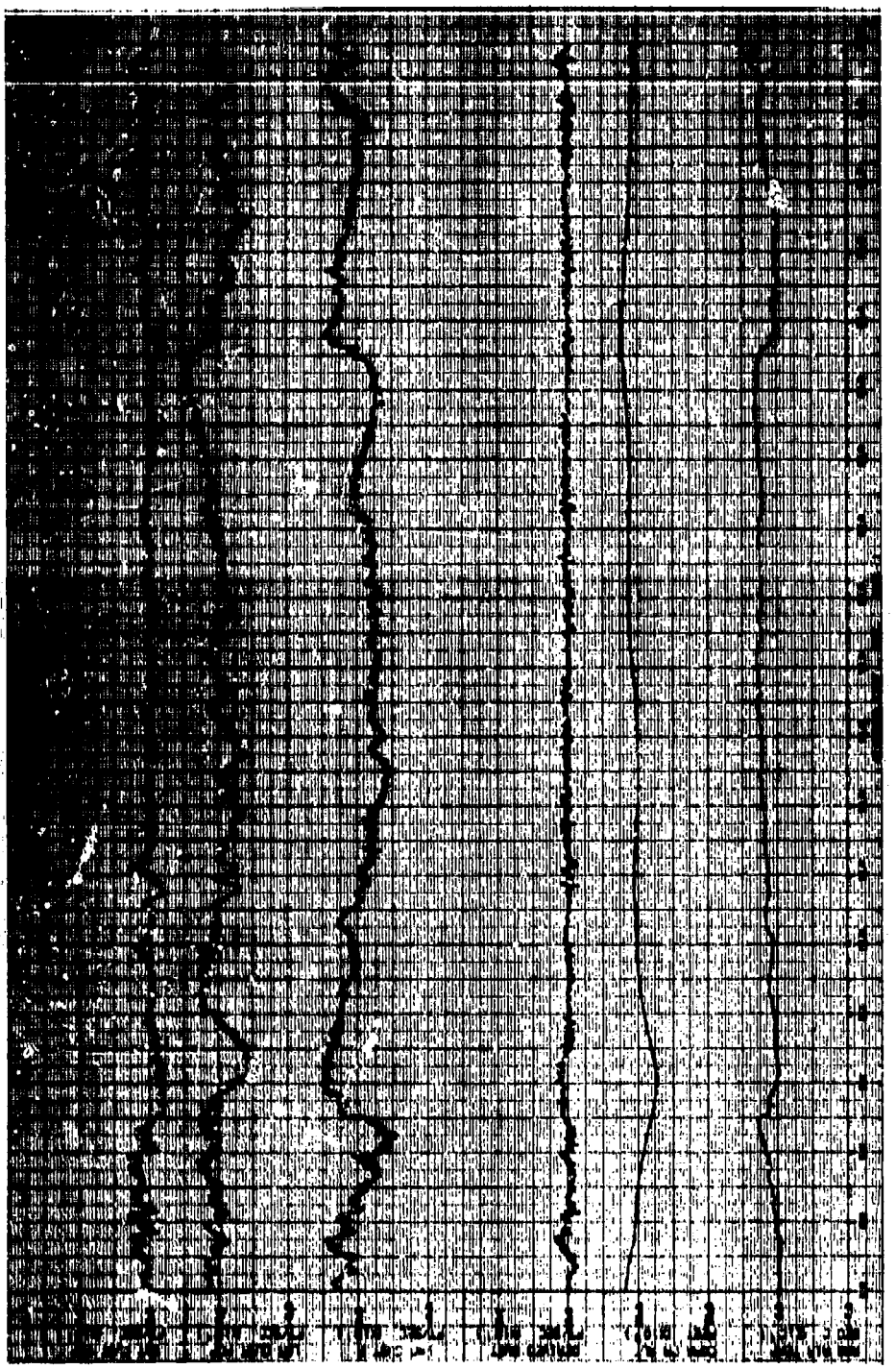


Figure 45A. Gust Velocity Time Histories of Test 102, Run 15 - (Laverton, Australia, 26 Jul 66) (Sheet 1 of 2)

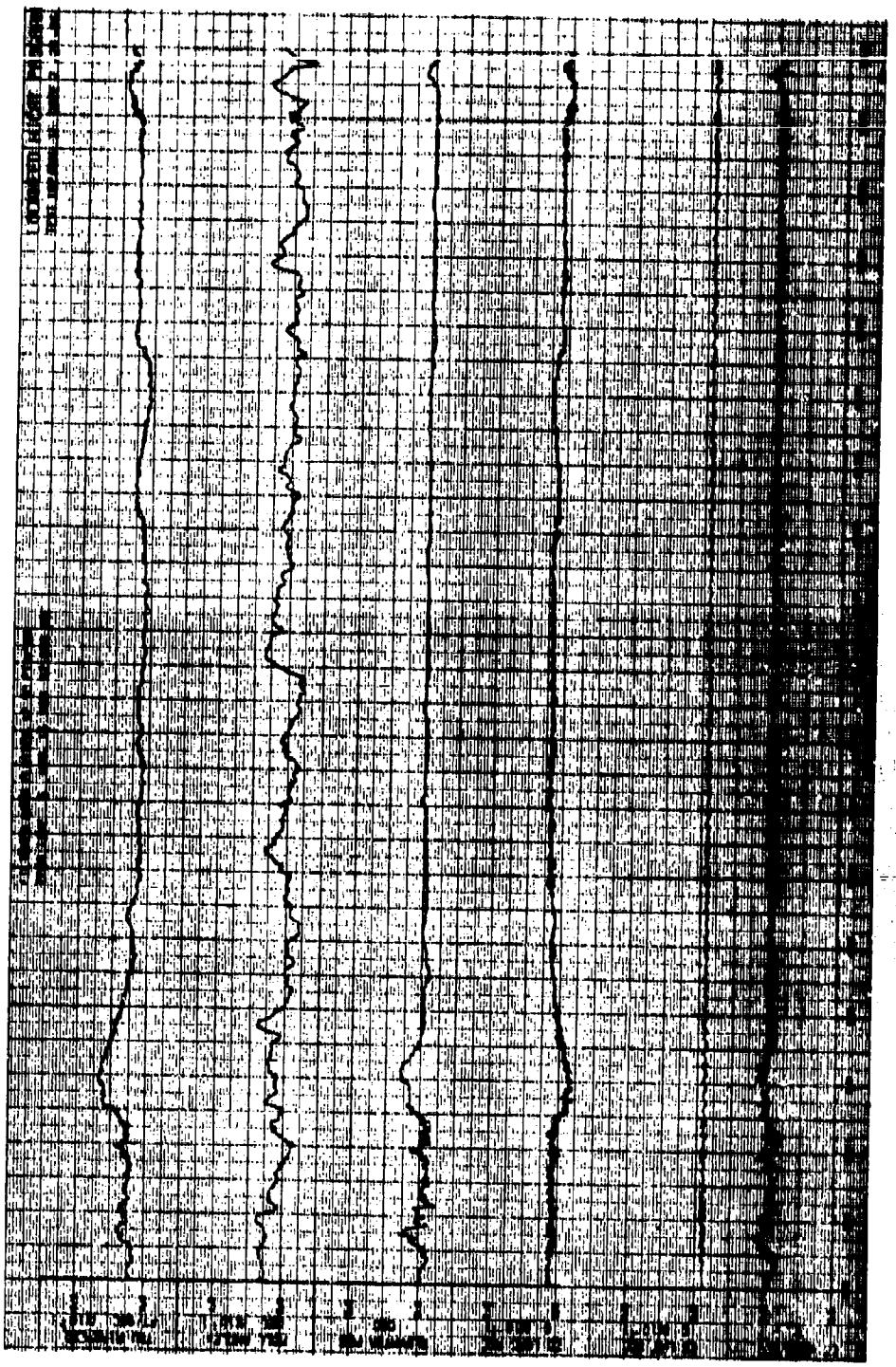


Figure 47B. Flight Parameter Time Histories of Test 102, Run 15 (Sheet 1 of 2)

Figure 45A. Gust Velocity Time Histories of Test 102, Run 15 - (Laverton, Australia, 28 Jul 66) (Sheet 2 of 2)

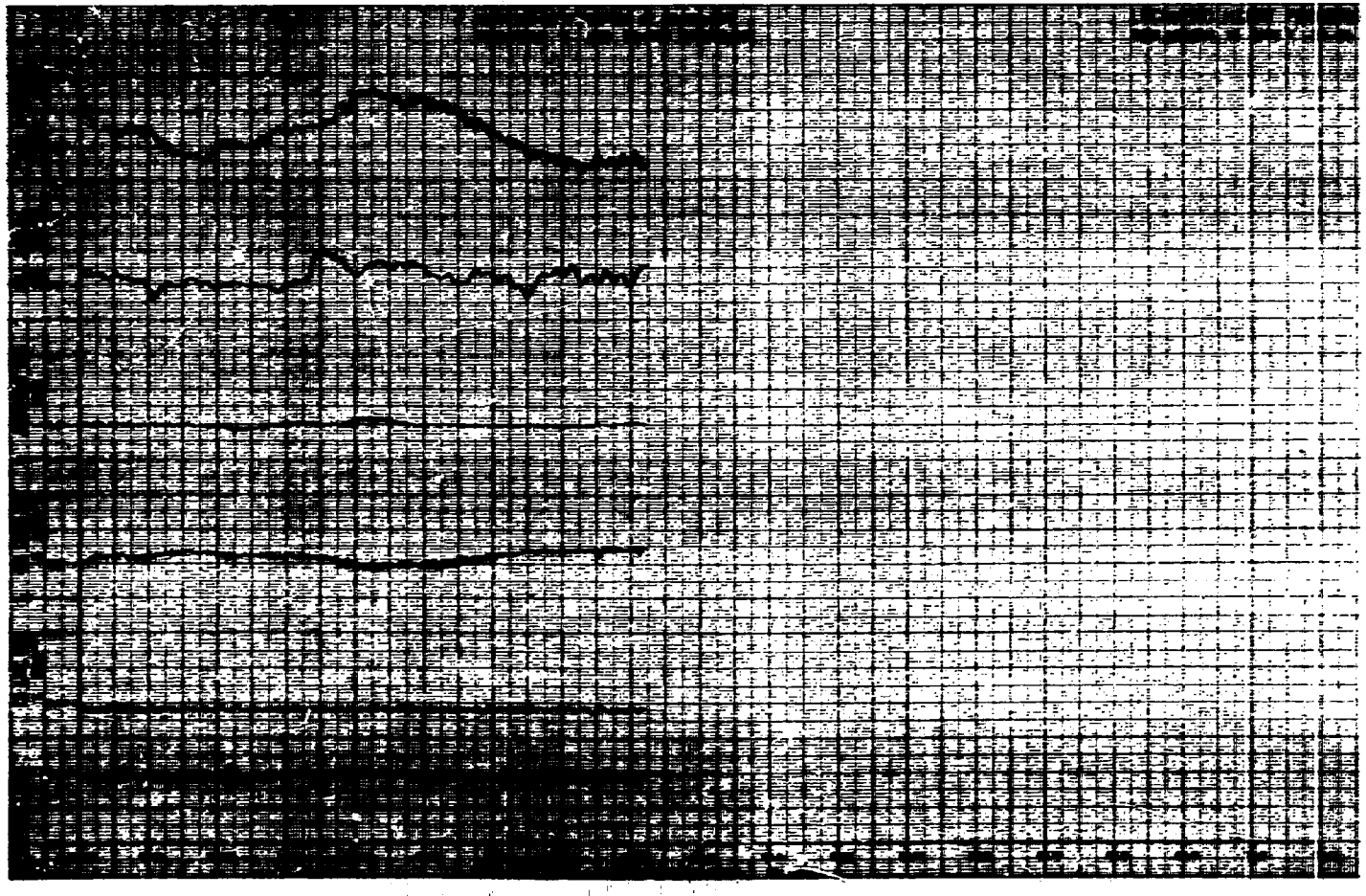


Figure 45B. Flight Parameter Time Histories of Test 102, Run 15 (Sheet 2 of 2)

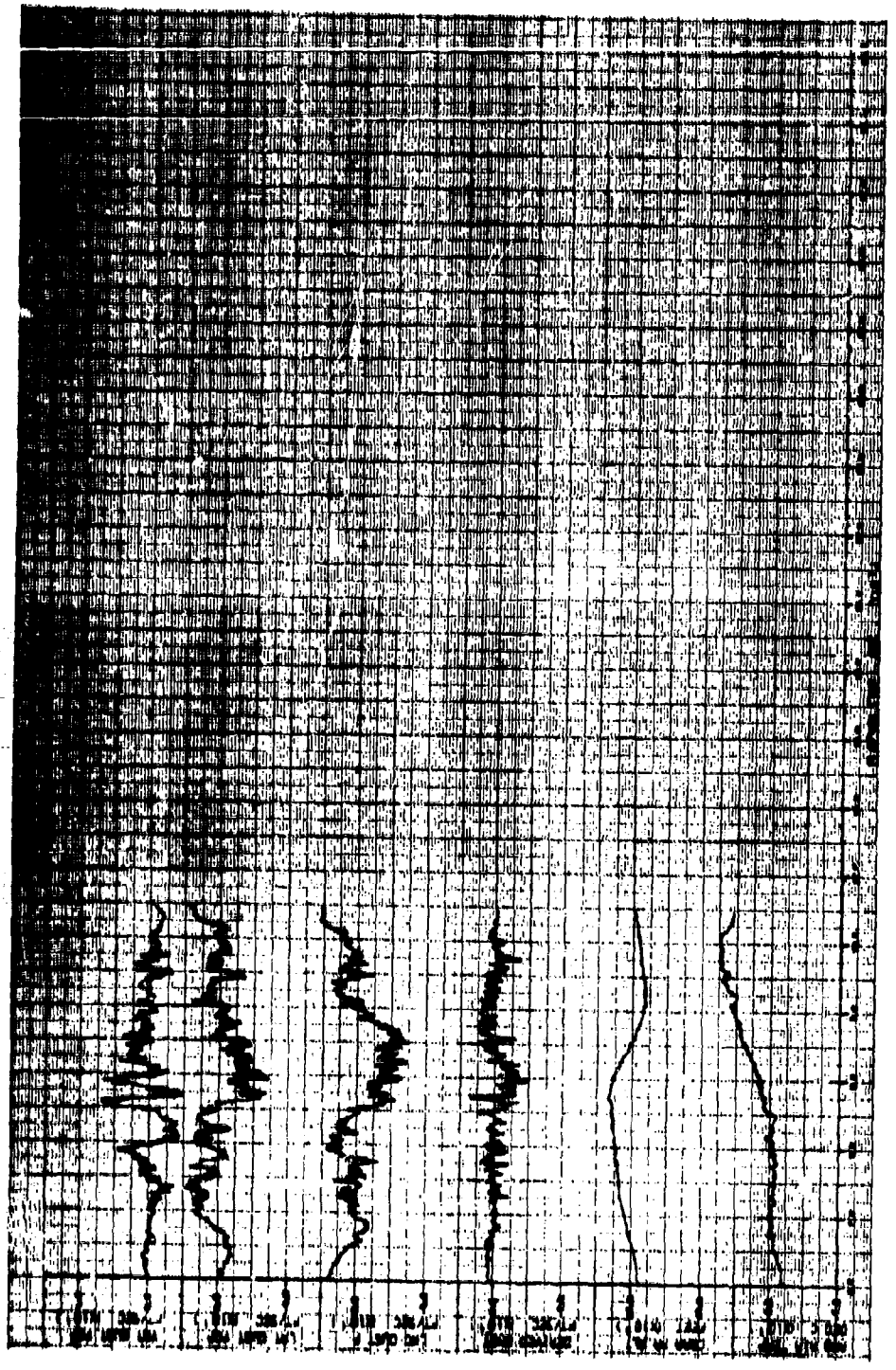


Figure 46A. Gust Velocity Time Histories of Test 102, Run 16 - (Laverton, Australia, 28 Jul 66).

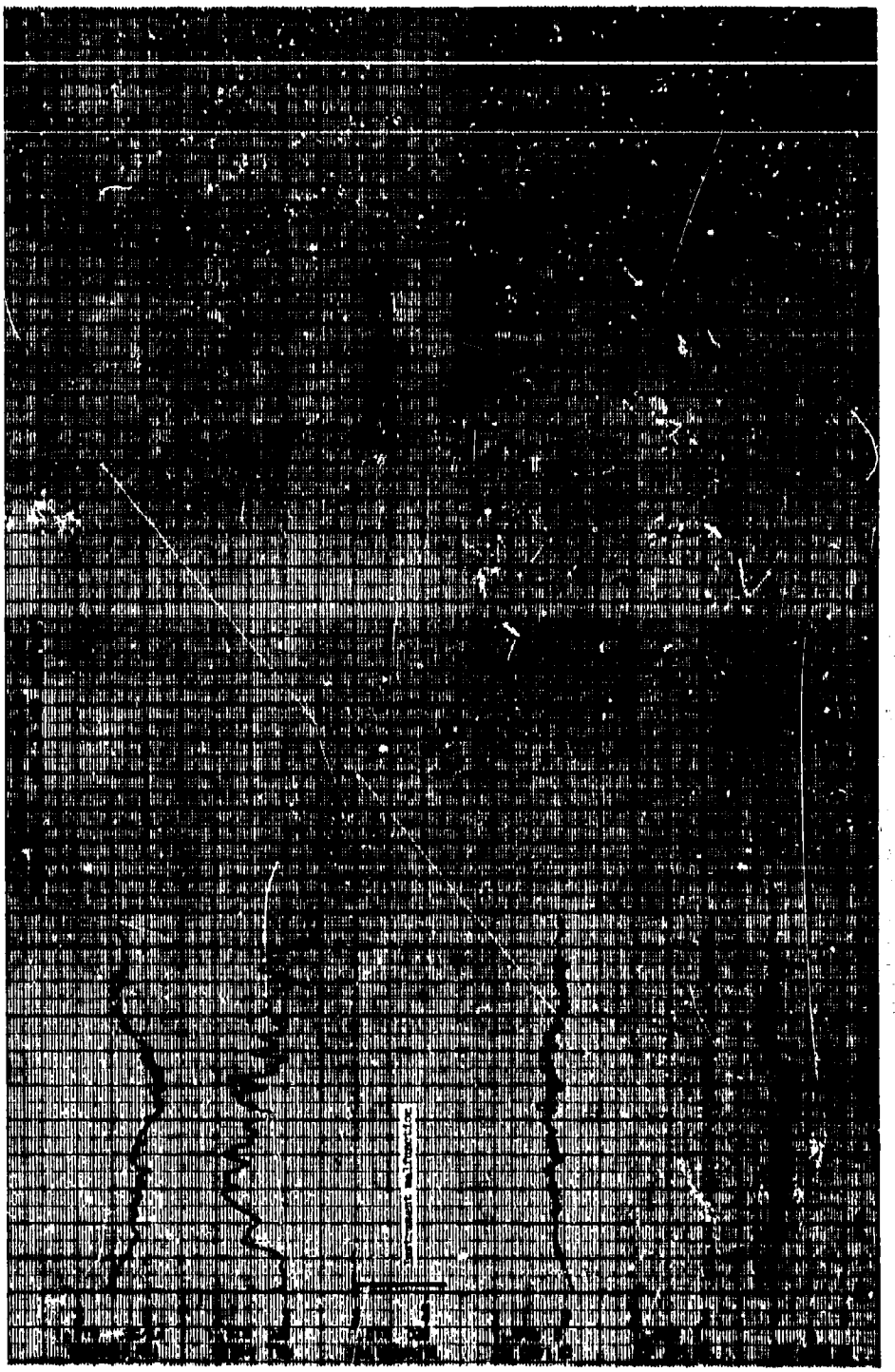


Figure 46B. Flight Parameter Time Histories of Test 102, Run 16.

Appendix VI

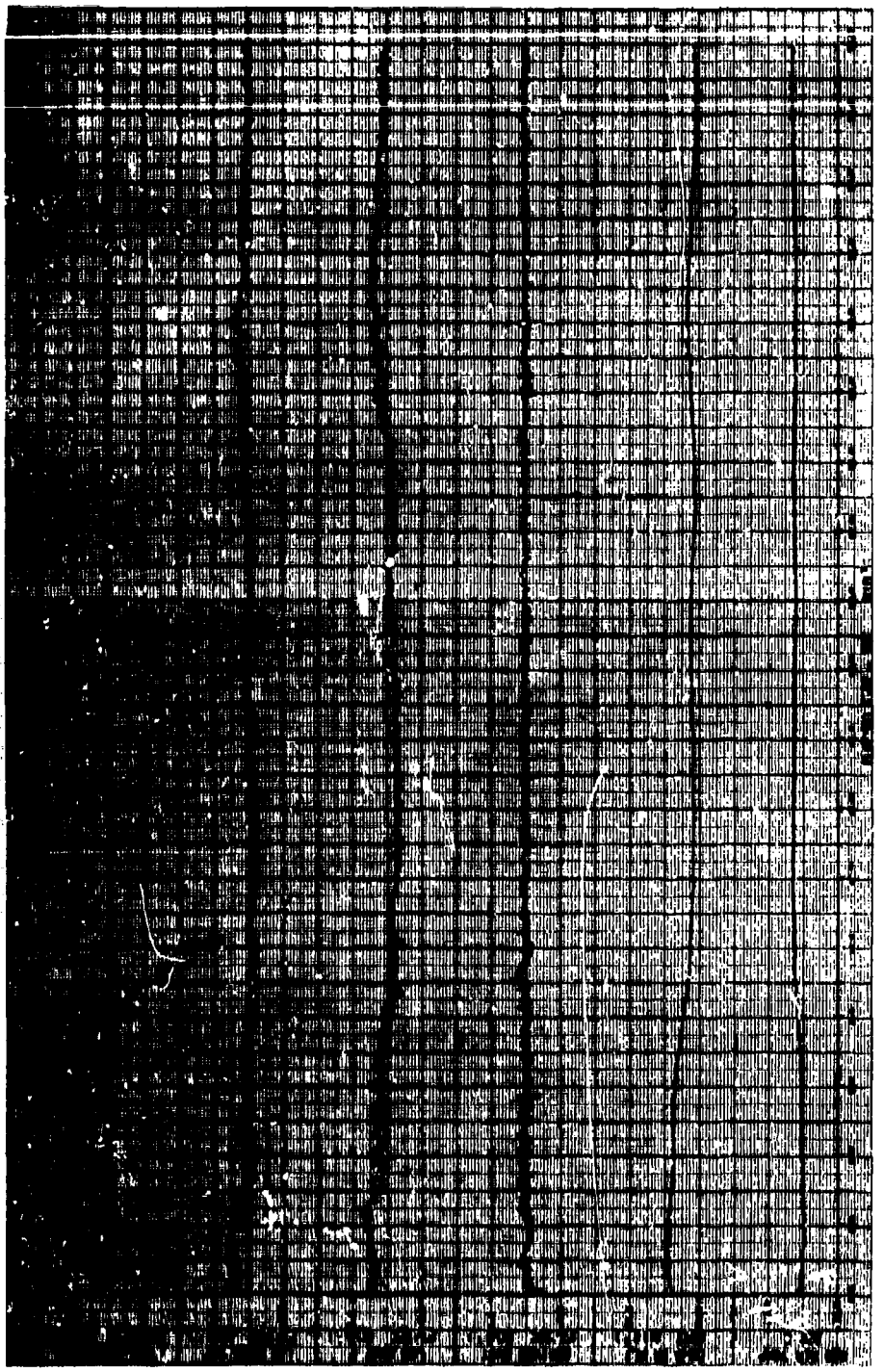


Figure 47A. Gust Velocity Time Histories of Test 107, Run 3 - (Tarrac, Australia, 8 Aug 66).

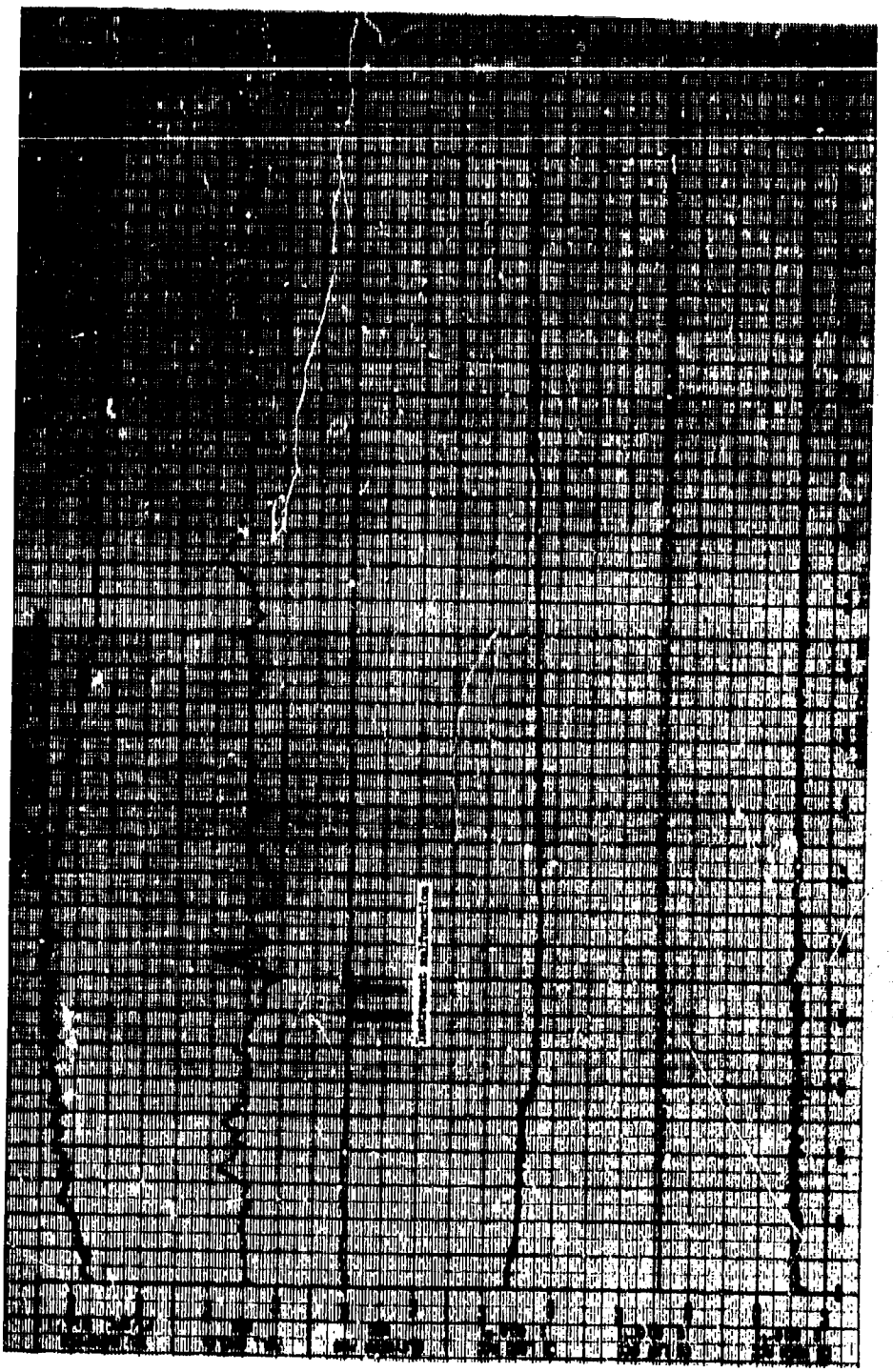


Figure 47B. Flight Parameter Time Histories of Test 107, Run 3.

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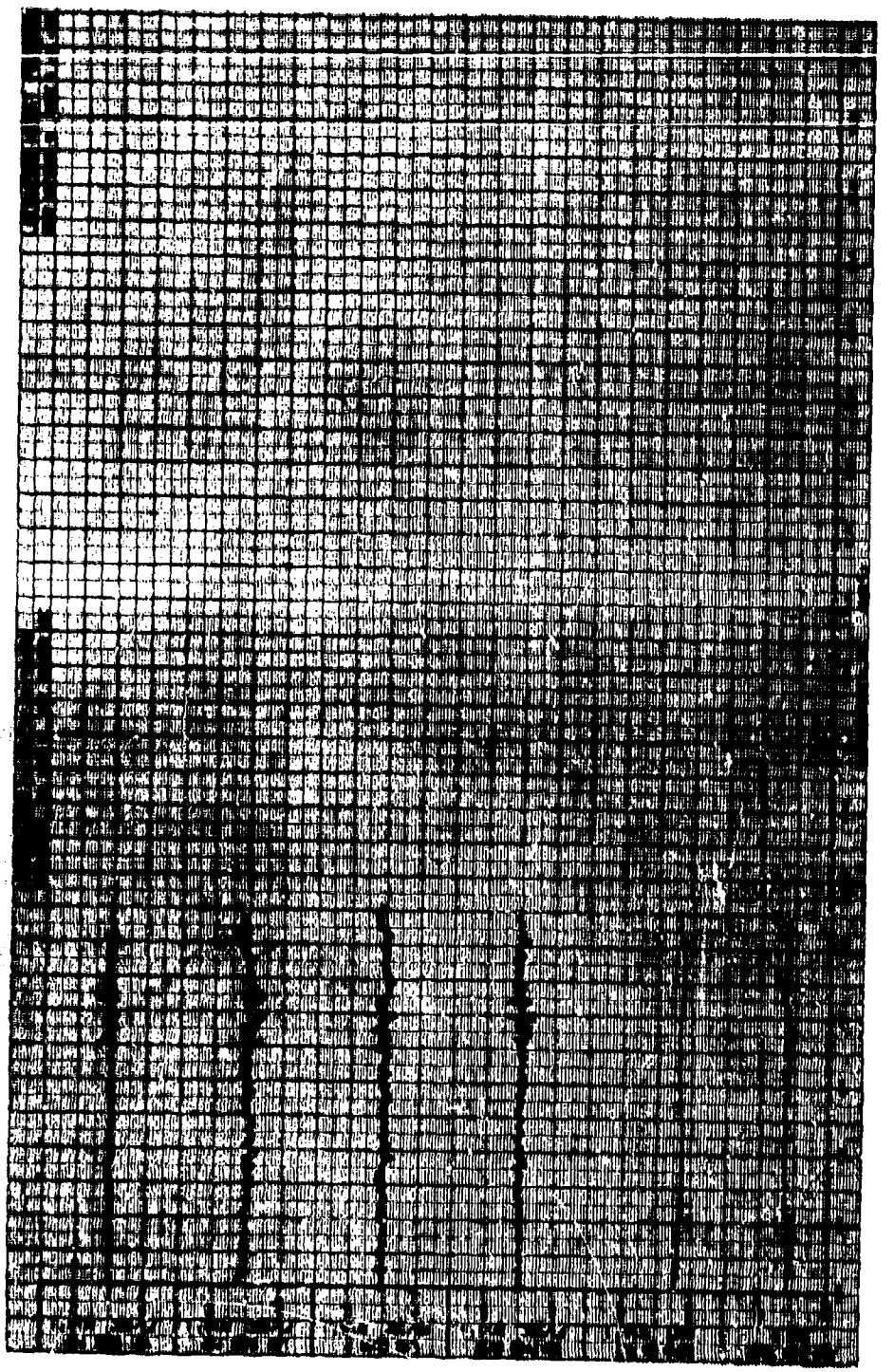


Figure 48A. Gust Velocity Time Histories of Test 107, Run 4 - (Lawrence, Australia, 8 Aug 68).

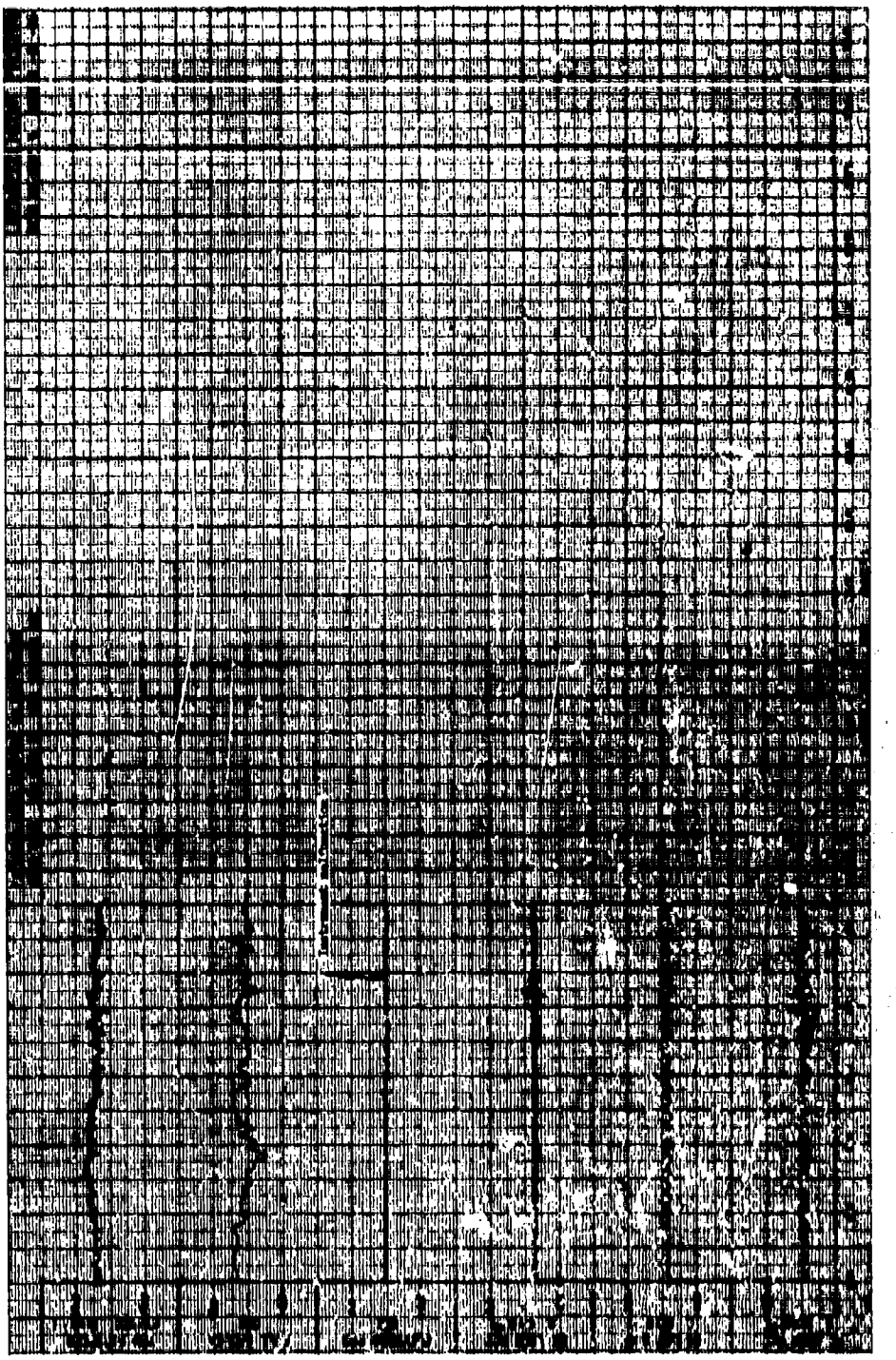


Figure A6P. Flight Parameter Time Histories of Test 107, Run 4.

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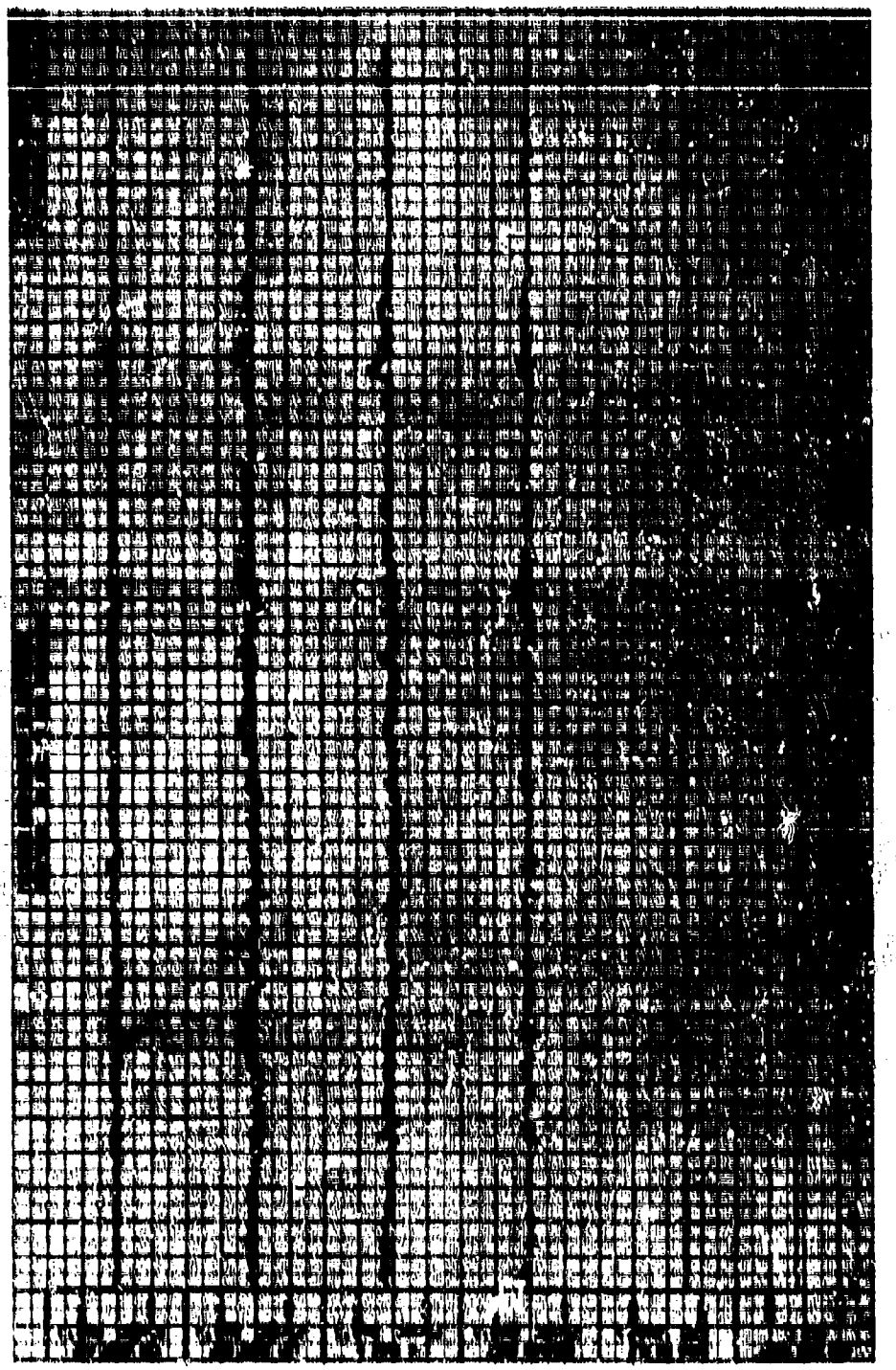


Figure 44. Gust Velocity Time Histories of Test 107, Run 6 -
(Laverton, Australia, 6 Aug 66) (Sheet 1 of 3)

Figure 49b. Flight Parameter Time Histories of Test 107, Run 6 (Sheet 1 of 3)

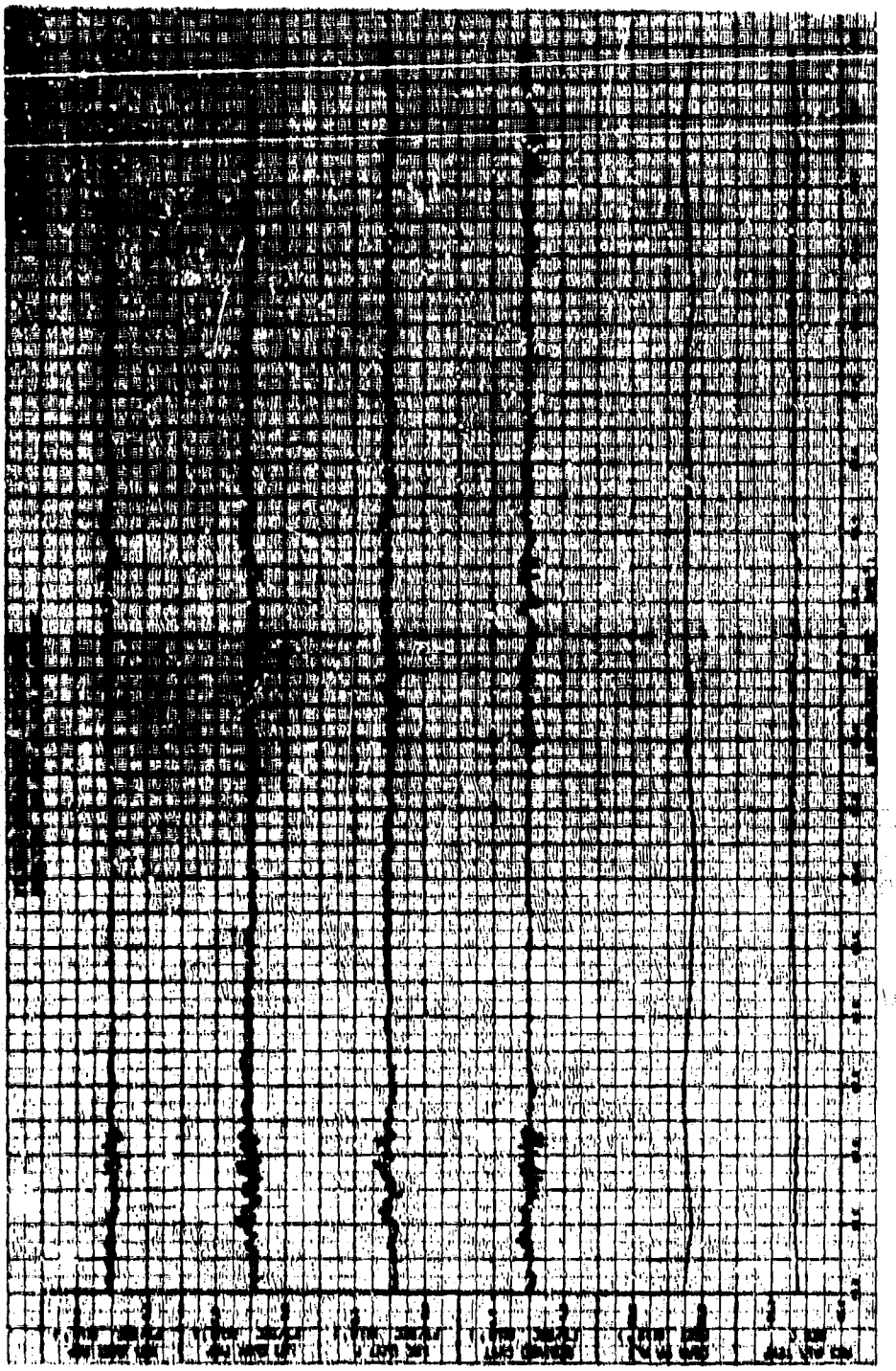


Figure 40A. Gust Velocity Time Histories of Test 107, Run 6 -
(Ieverton, Australia, 8 Aug 66) (Sheet 2 of 3)

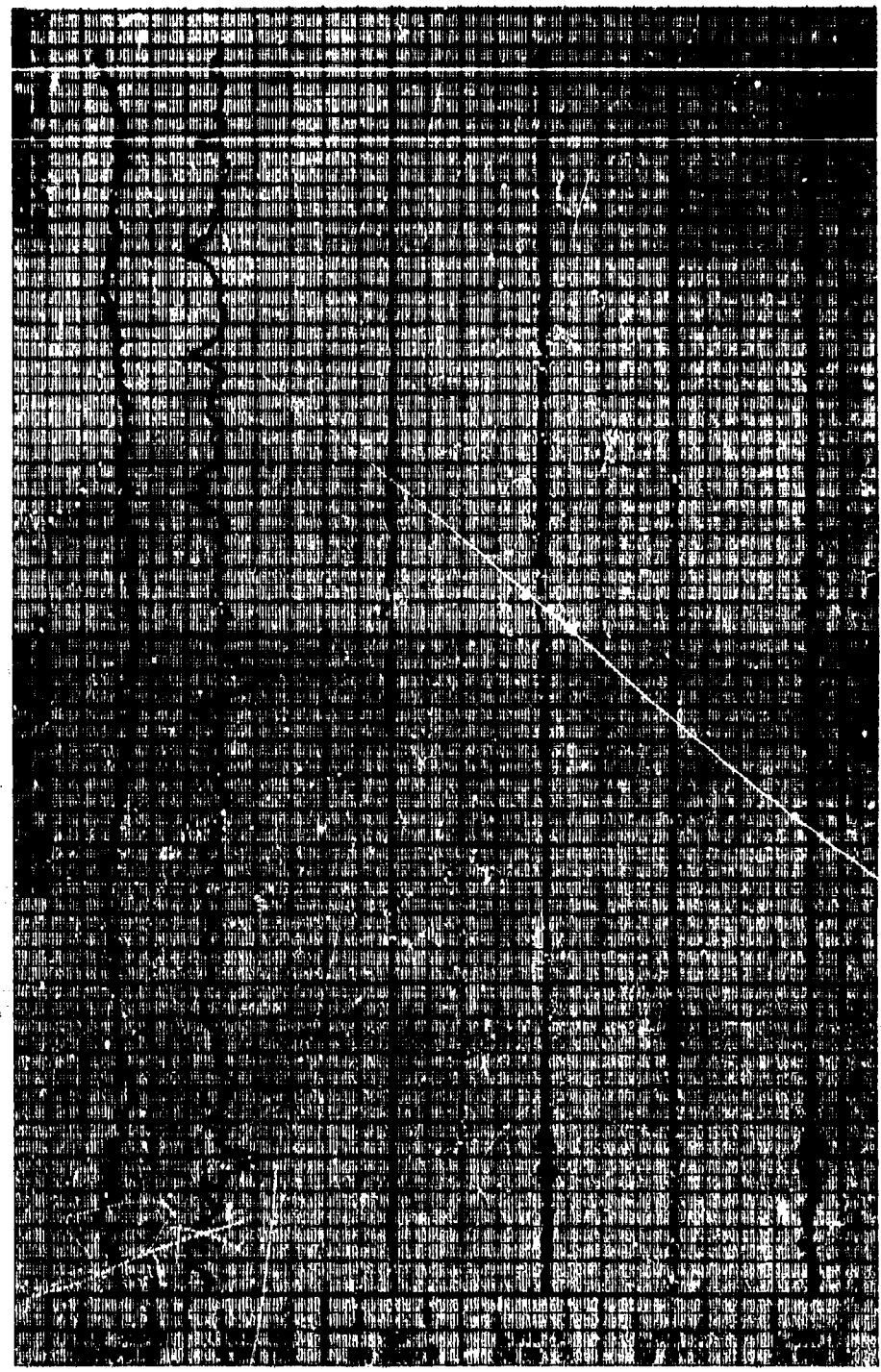


Figure 49B. Flight Parameter Time Histories of Test 107, Run 6 (Sheet 2 of 3)

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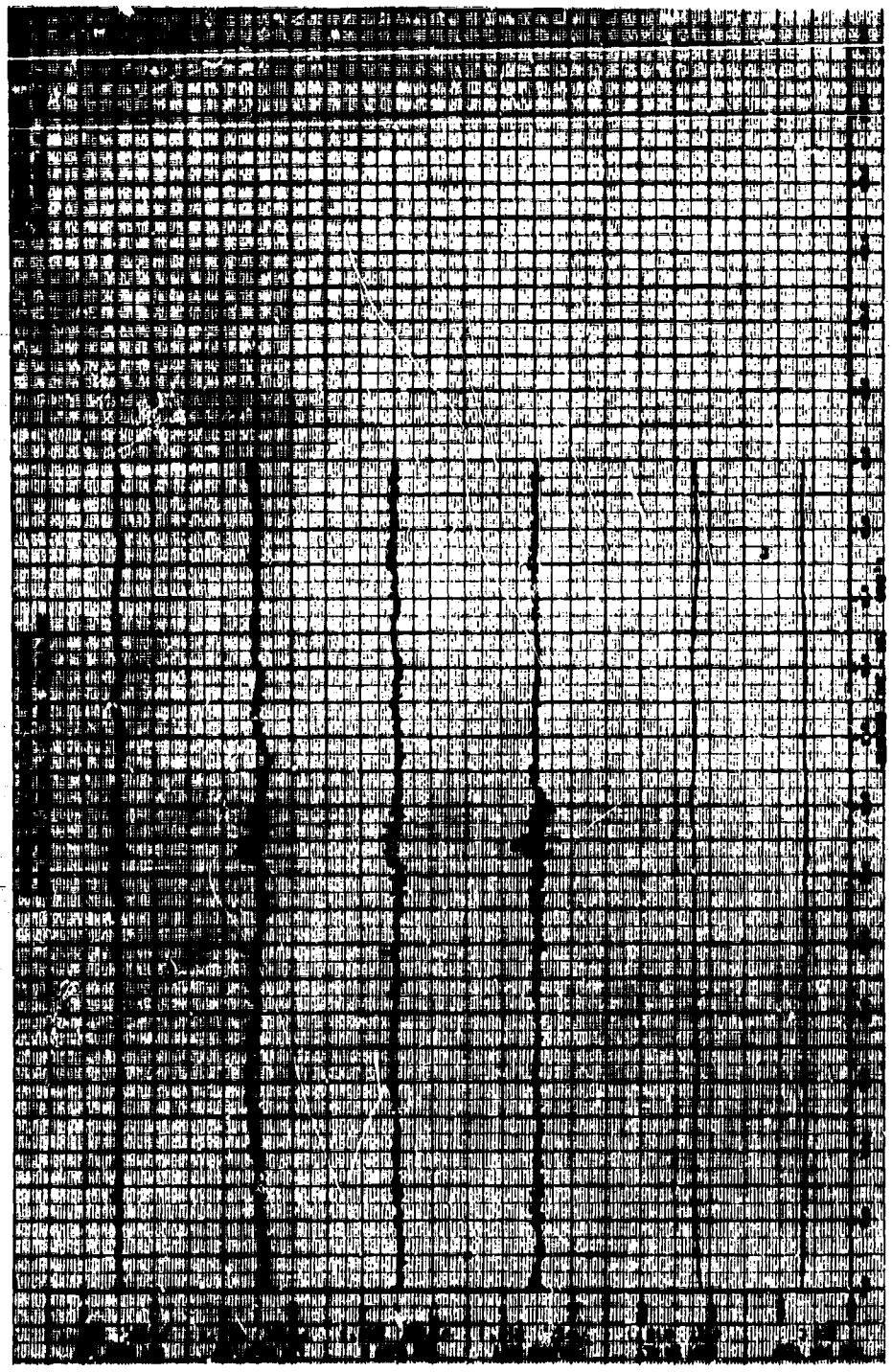


Figure 29A. Gust Velocity Time Histories of Test 107, Run 6 - (Laverton, Australia, 6 Aug 66) (Sheet 3 of 3)

Figure 45b. Flight Parameter Time Histories of Test 107, Run 6 (Sheet 3 of 3)

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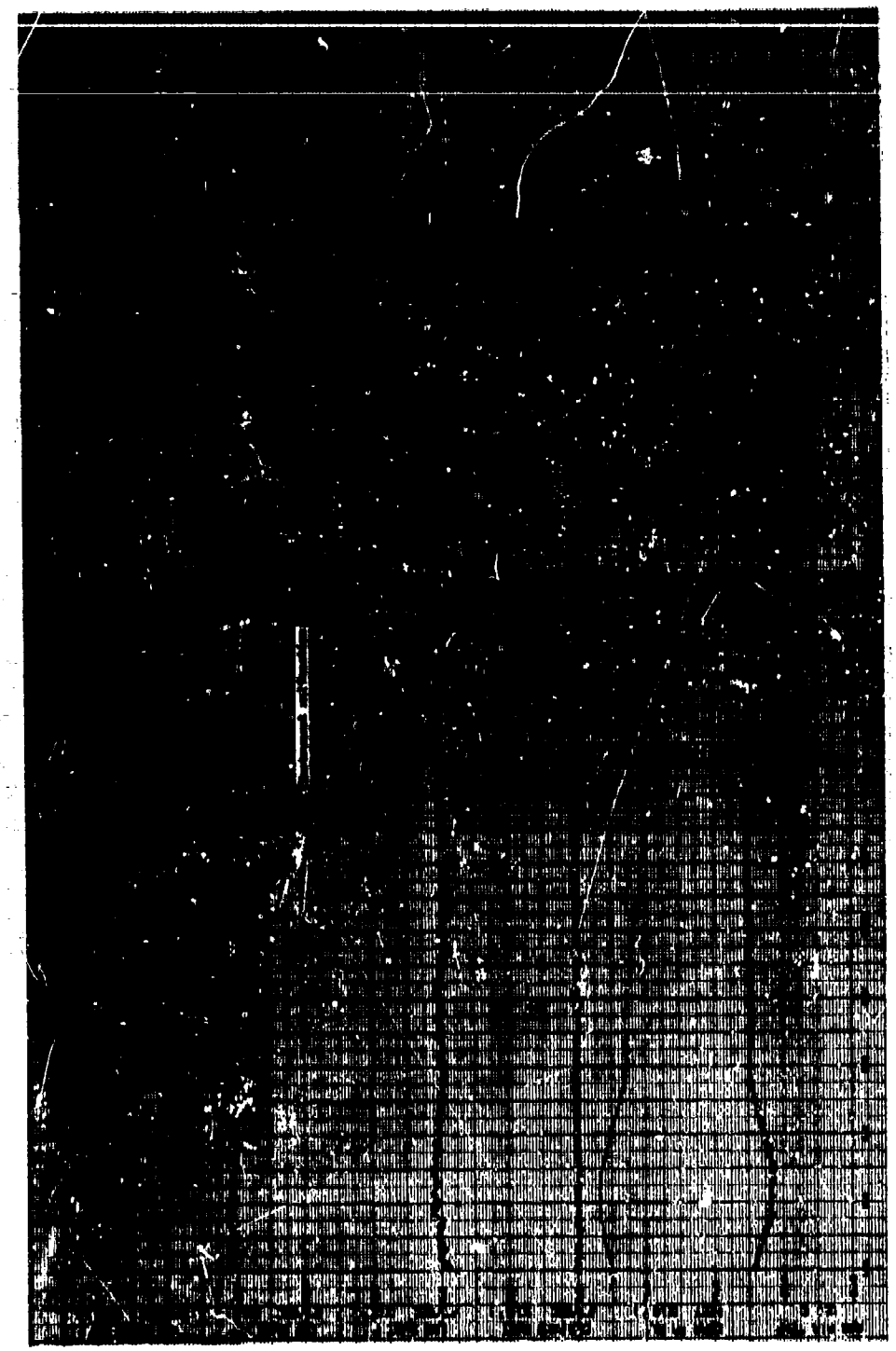


Figure 50A. Gust Velocity Time Histories of Test 107, Run 7 - (Laverton, Australia, 8 Aug 66) (Sheet 1 of 2)

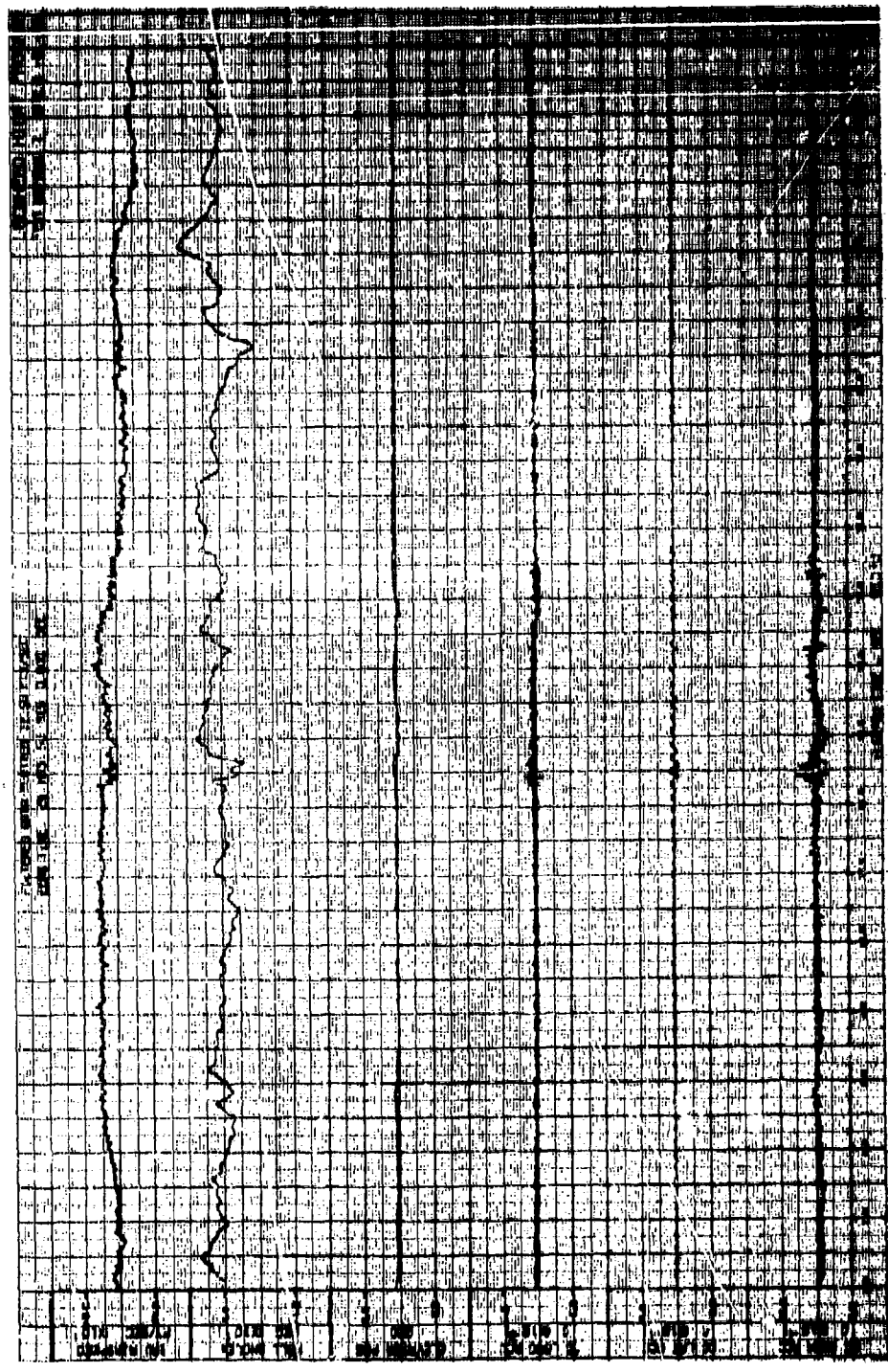


Figure 36B. Flight Parameter and Histories of Test 107, Rec 7 (Sheet 1 of 2)

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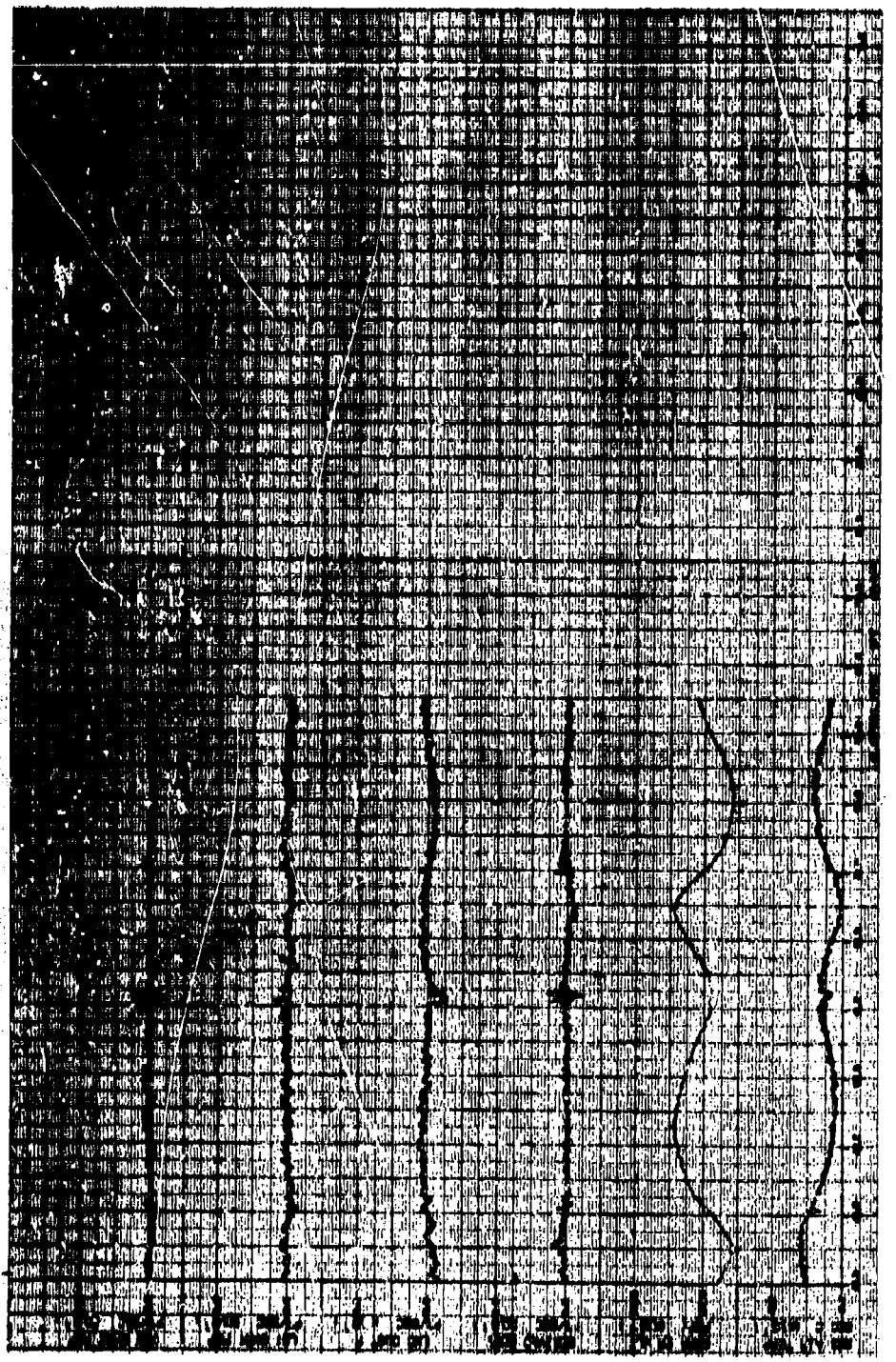


Figure 50A. Gust Velocity Time Histories of Test 107, Run 7 - (Laverton, Australia, 8 Aug 55) (Sheet 2 of 2)

Figure 50B. Flight Parameter Time Histories of Test 107, Run 7 (Sheet 2 of 2)

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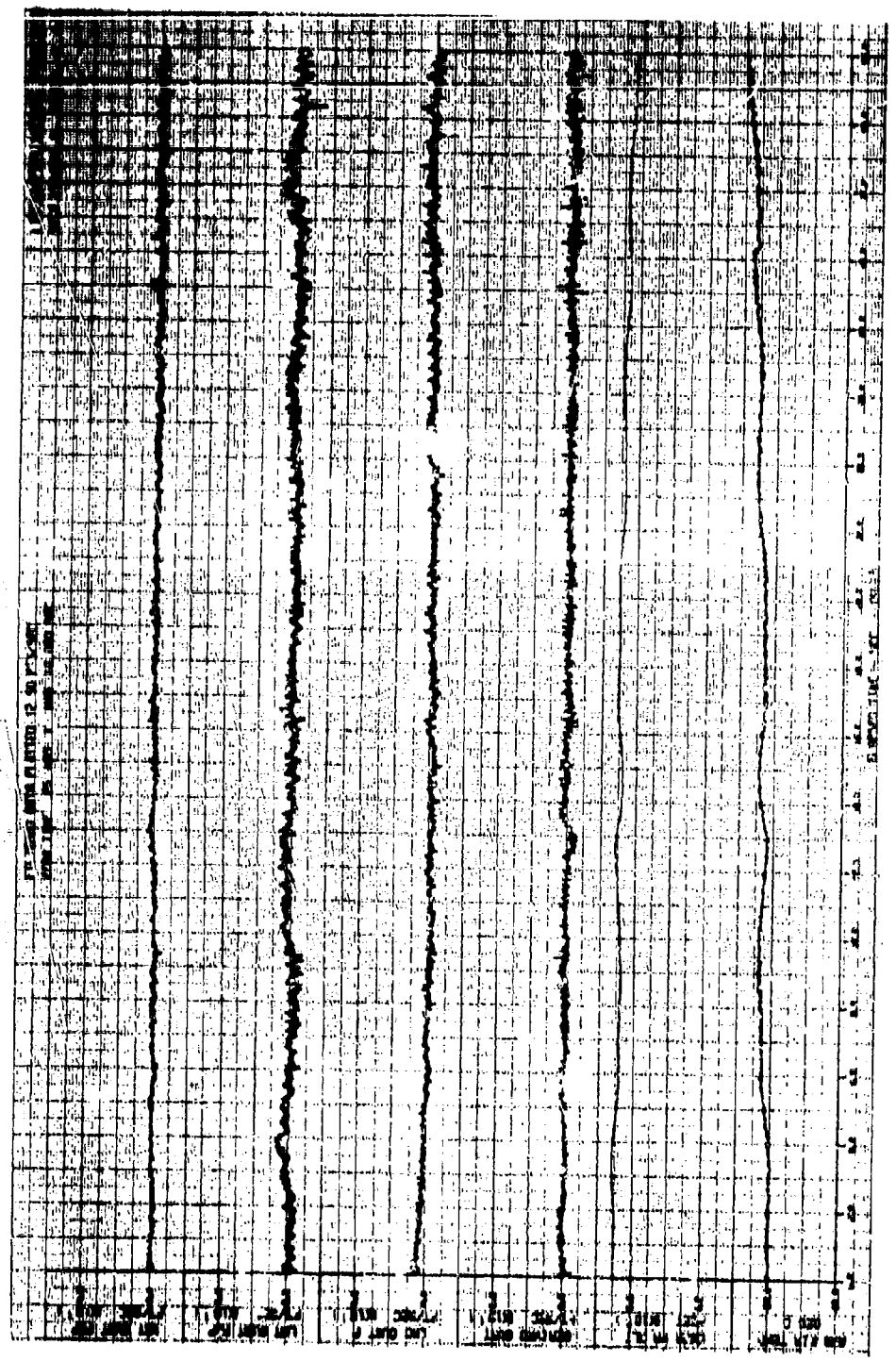


Figure A4. Gust Velocity Record at Run 137, Rec 6 -
(Laverton, Australia, 3 Aug 80)

Figure 51B. Flight Parameter Time History of Test 107, Run 8 (Sheet 1 of 3)

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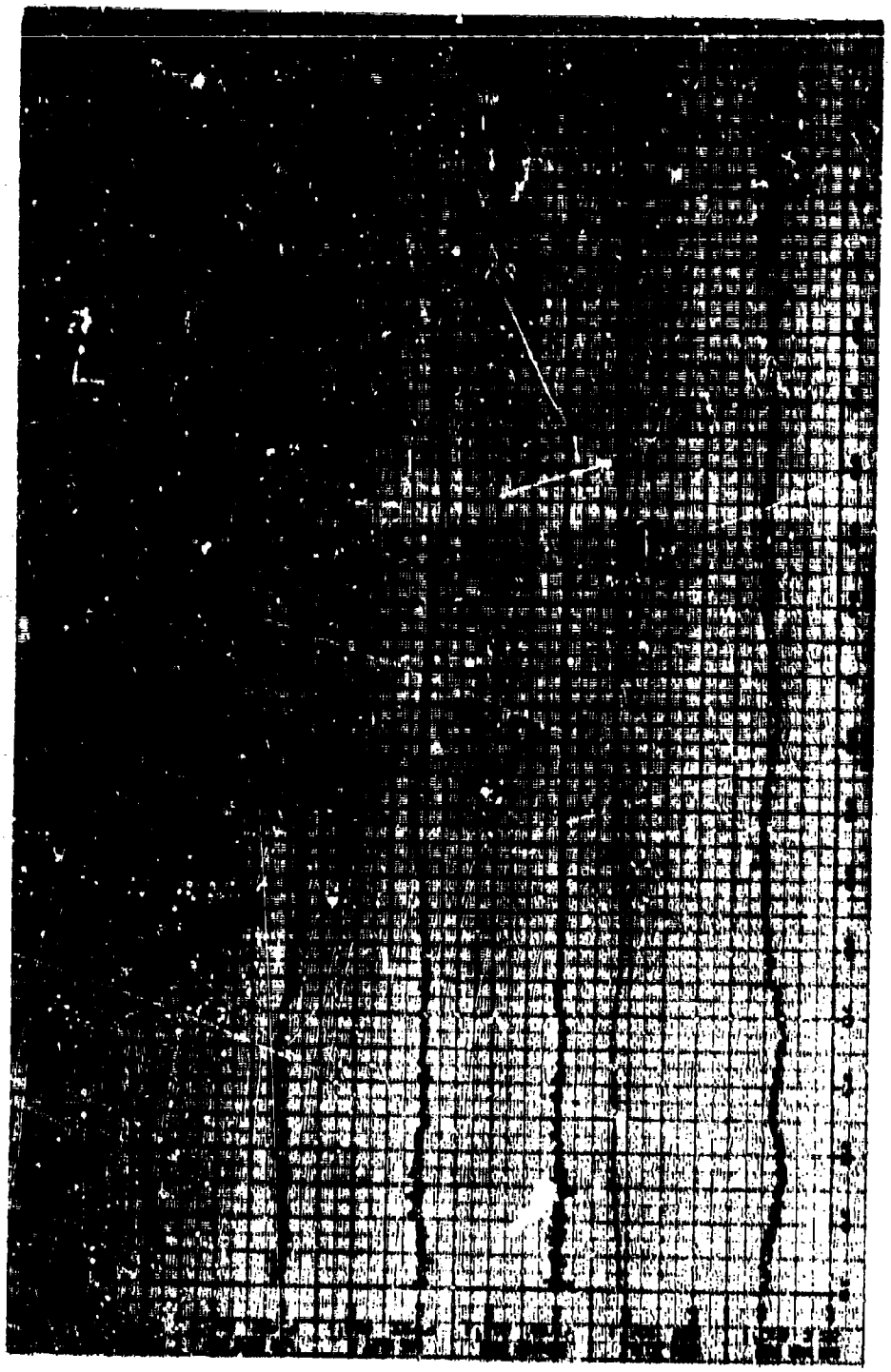


Figure A-1. Dust Velocity Time Histories of Test 107, Run 2 -
(Laverton, Australia, 8 Aug 66) (Sheet 2 of 3)

Figure 51B. Flight Parameter Time Histories of Test 107, Run 6
(Sheet 2 of 3)

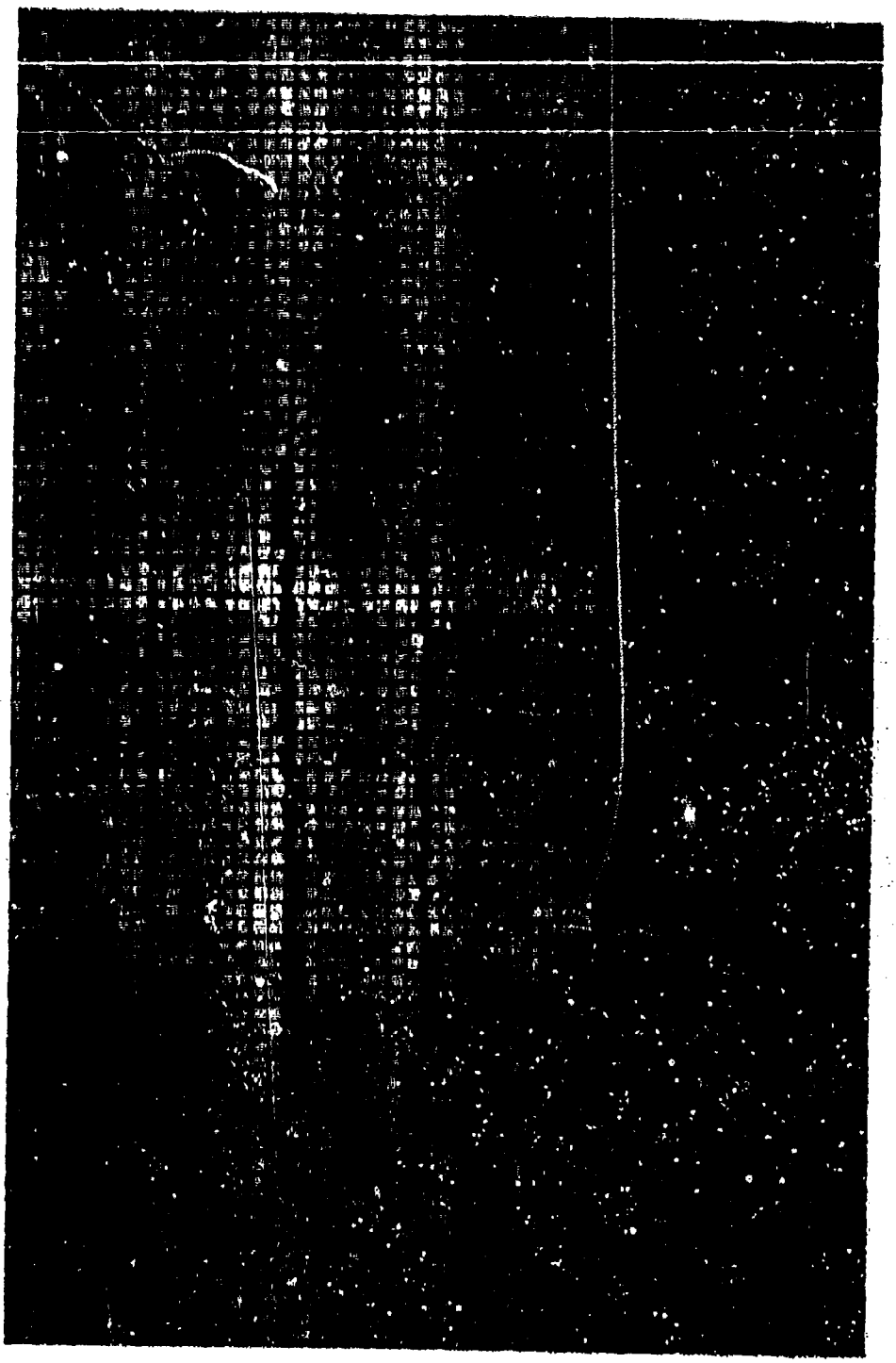


Figure 7A. Gust Velocity Time Histories of Test 107, Run 8 - (Laverton, Australia, 8 Aug 66). (Sheet 3 of 3)

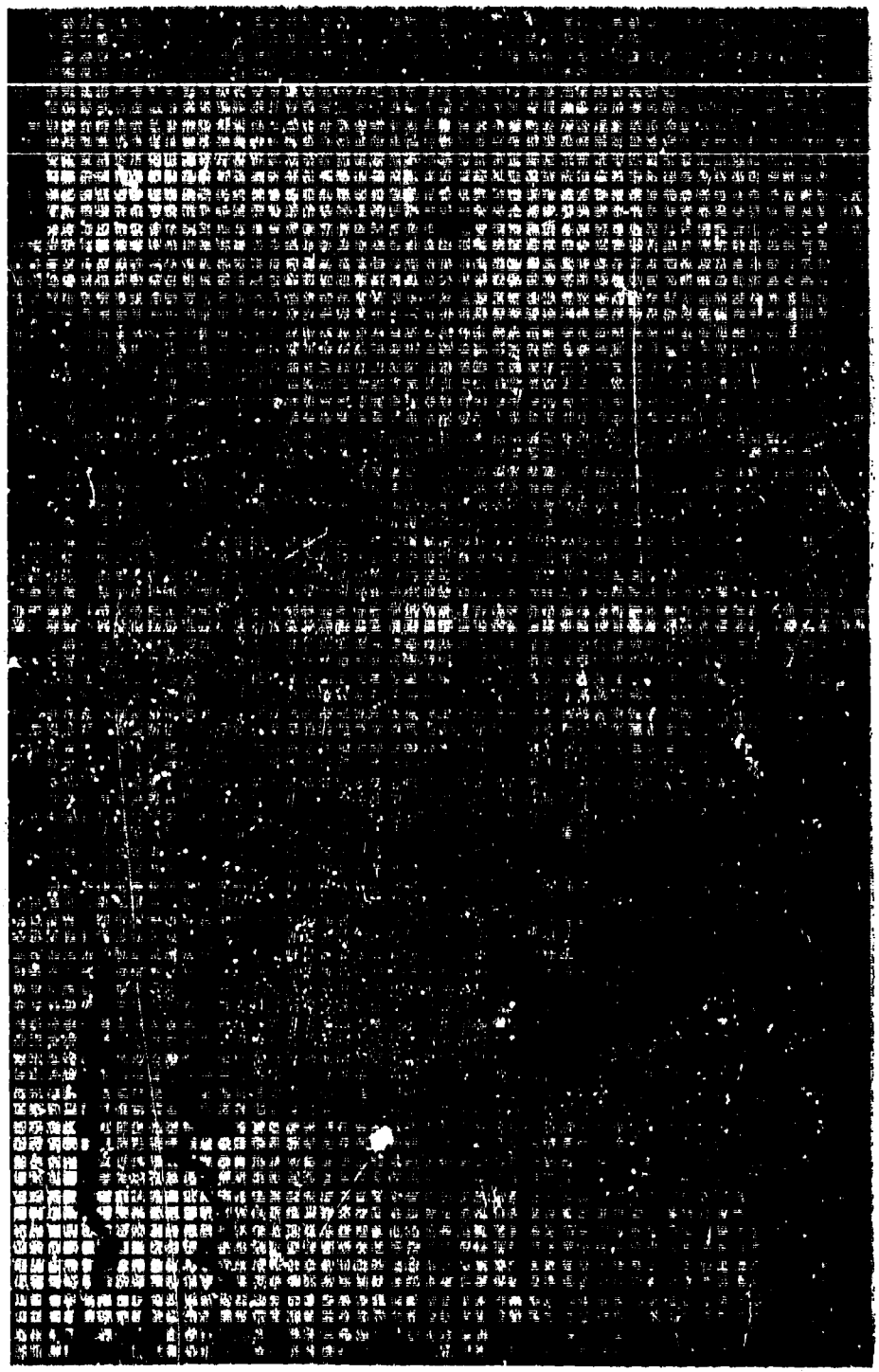


Figure 51B. Flight Parameter Time Histories of Test LG7, Run 8
(Sheet 3 of 3)

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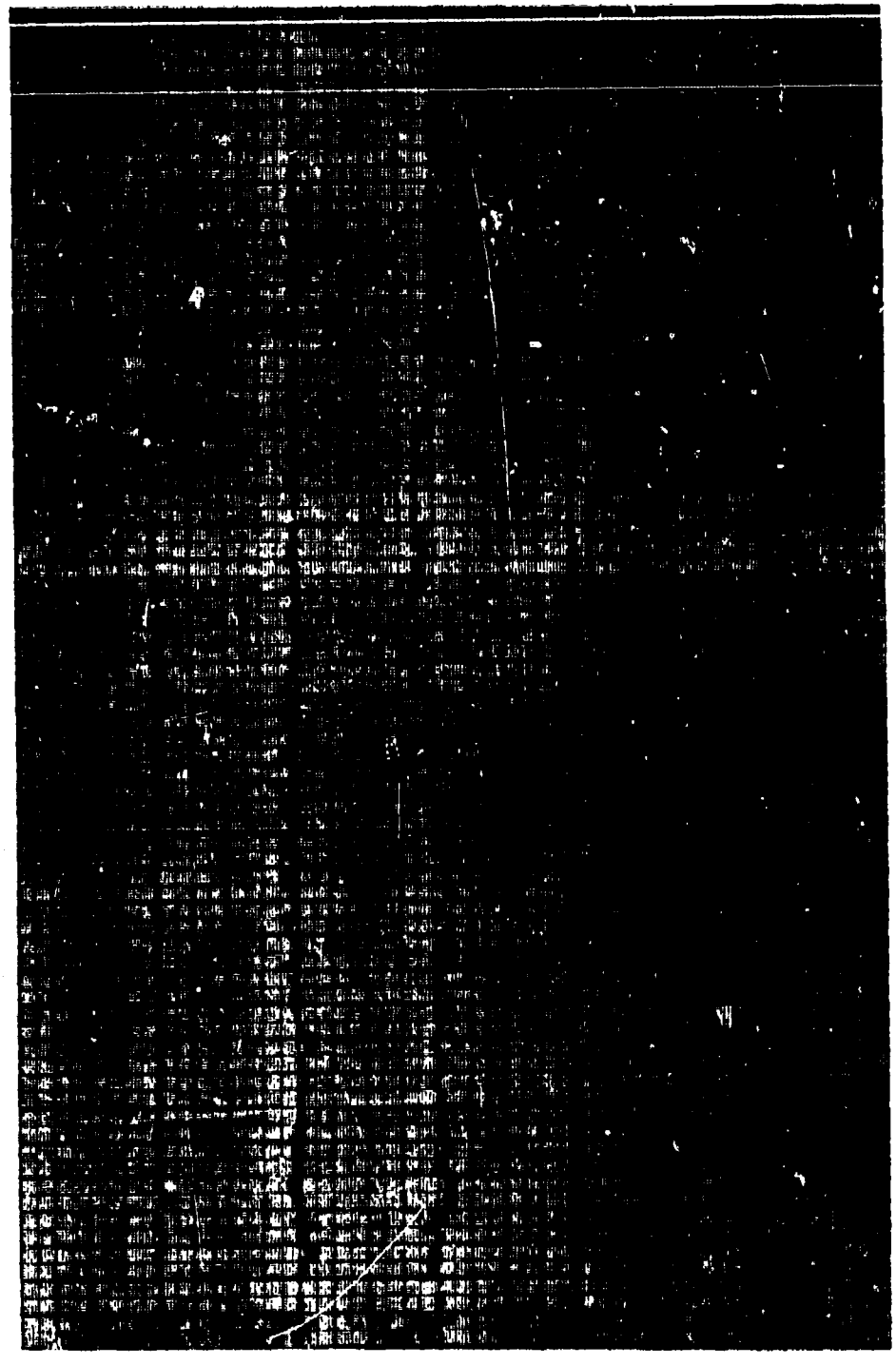


Figure 52A. Gust Velocity Time Histories of Test 107, Run 9 - (Laverton, Australia, 9 Aug 66). (Sheet 1 of 2)



Figure 52B. Flight Parameter Time Histories of Test 107, Run 9
(Sheet 1 of 2)

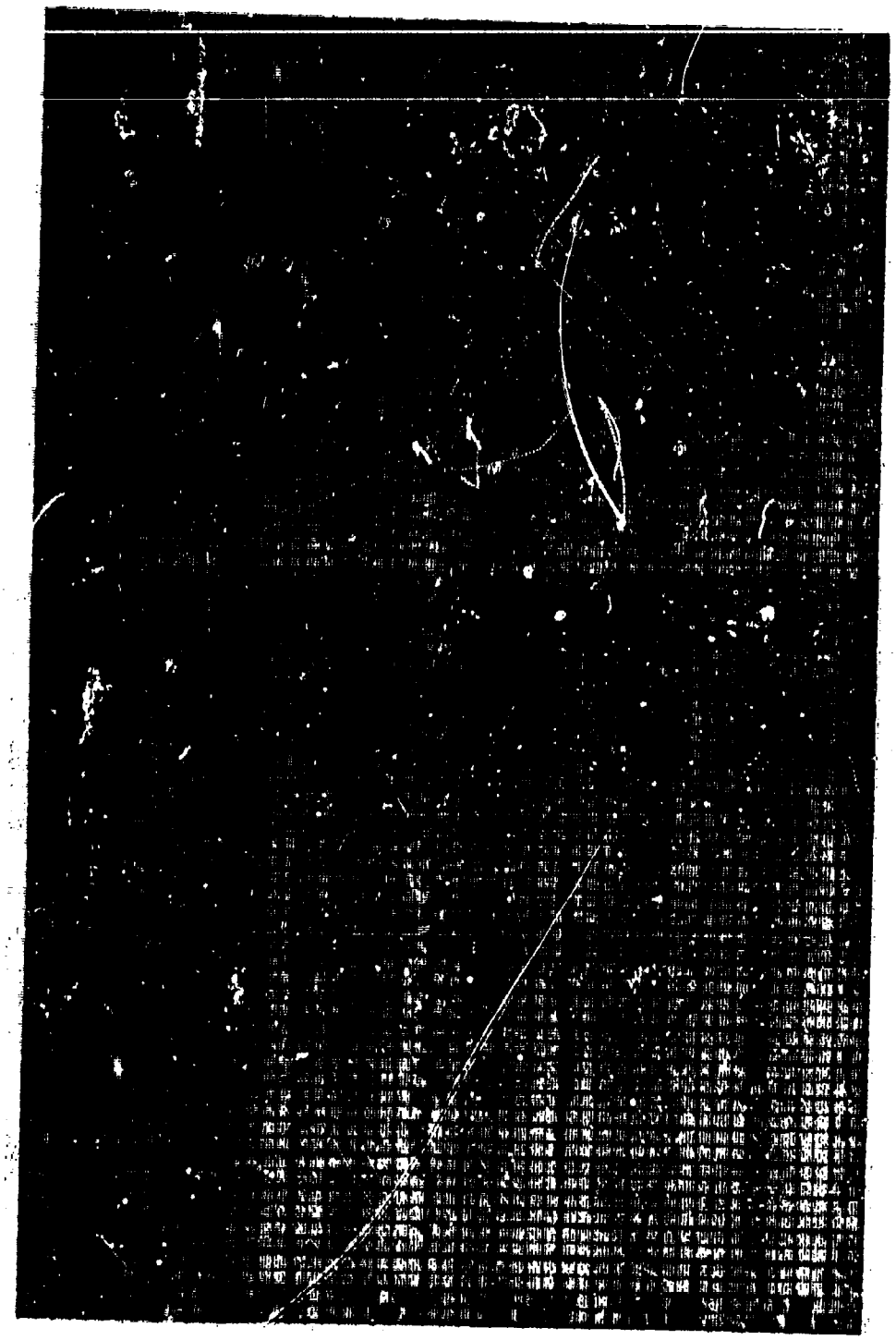


Figure 52A. Gust Velocity Time Histories of Test 107, Run 9 - (Laverton, Australia, 8 Aug 66). (Sheet 2 of 2)

Figure 52B. - Flight Parameter Time Histories of Test 107, Run 9
(Sheet 2 of 2)

Figure 53A. Gust Velocity Time Histories of Test 107, Run 10 - (Laverton, Australia, 8 Aug 60). (Sheet 1 of 2)

Figure 53B. Flight Parameter Time Histories of Test 107, Run 10
(Sheet 1 of 2)



Figure 53A. Gust Velocity Time Histories of Test 107, Run 10 - (Laverton, Australia, 8 Aug 66). (Sheet 2 of 2)

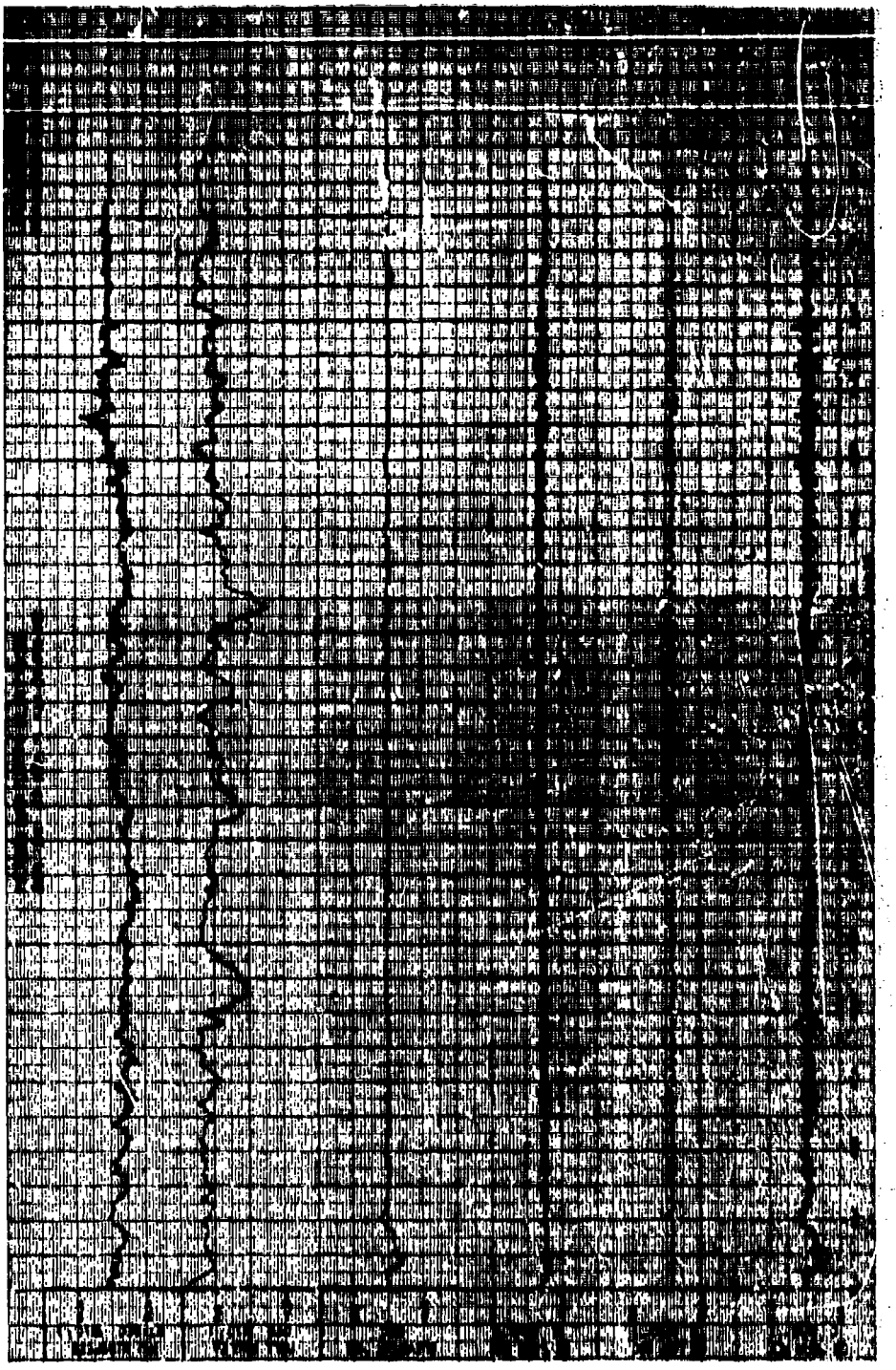


Figure 53. Flight Parameter Time Histories of Test 107, Run 10
(Sheet 2 of 2)

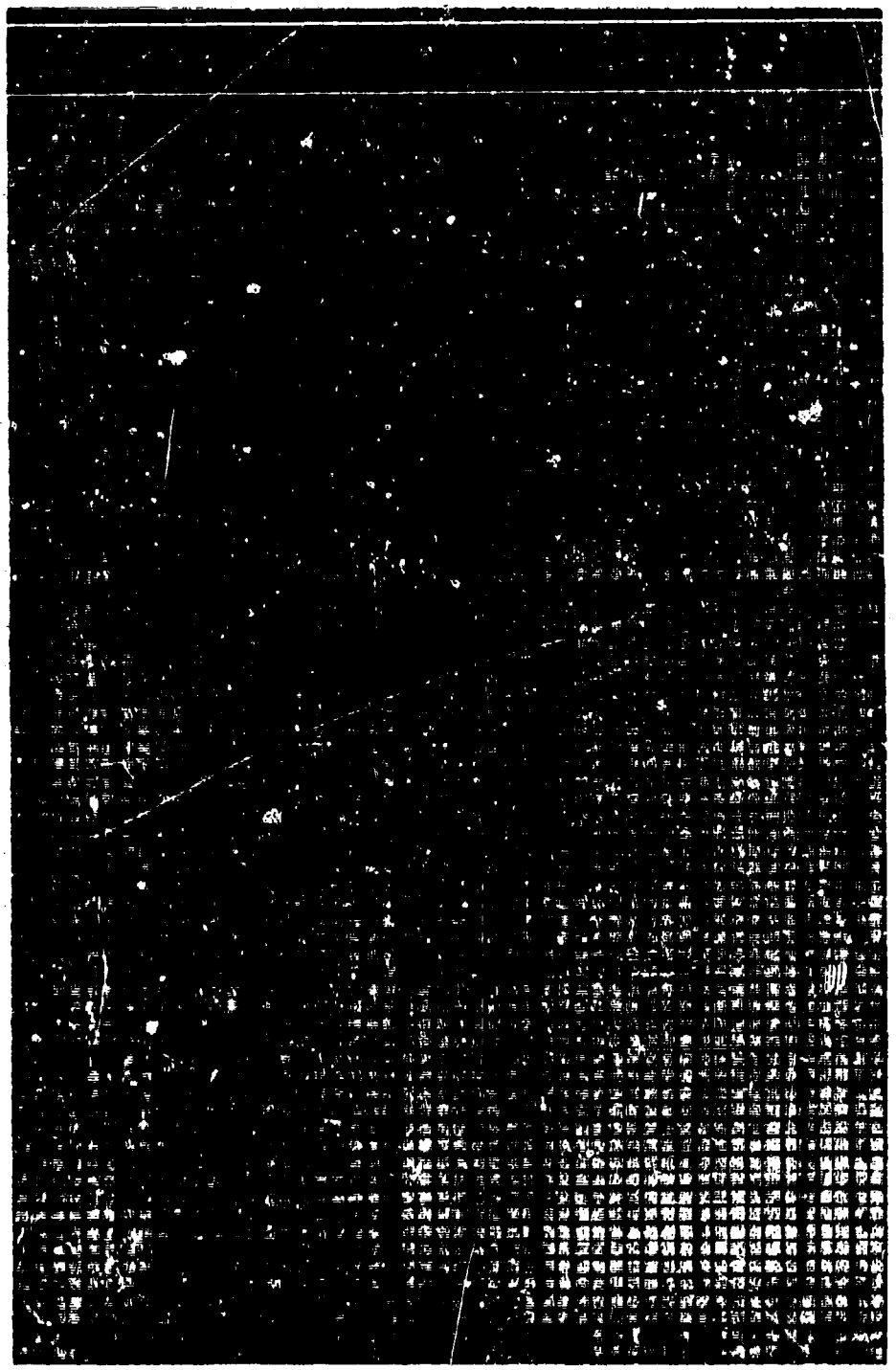


Figure 54A. Gust Velocity Time Histories of Test 107, Run 11 - (Laverton, Australia, 8 Aug 66). (Sheet 1 of 3)

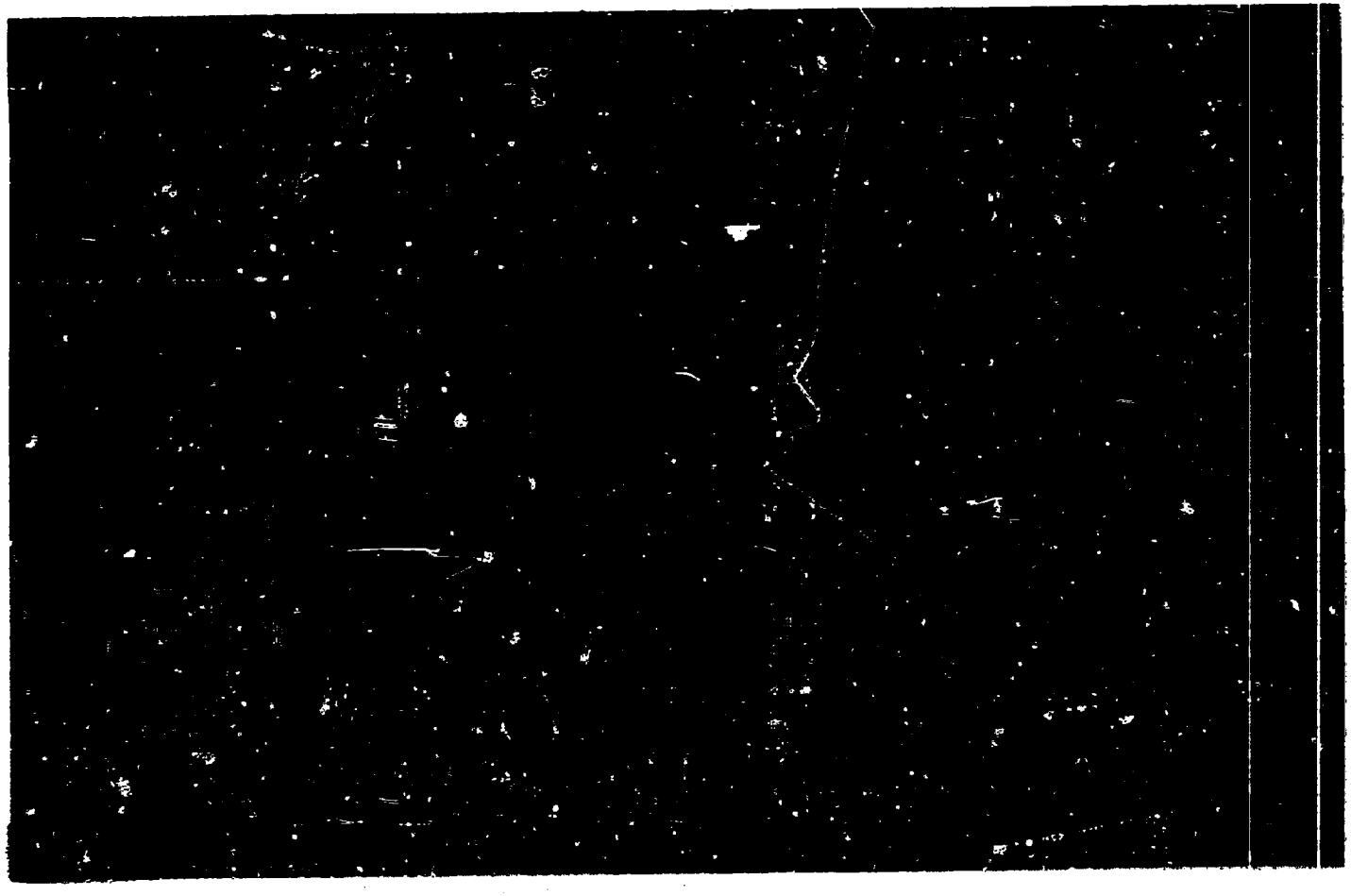


Figure 54B. Flight Parameter Time Histories of Test 107, Run 11
(Sheet 1 of 3)

Figure 54A. Gust Velocity Time Histories of Test 107, Run 11 - (Laverton, Australia, 8 Aug 66). (Sheet 2 of 3)

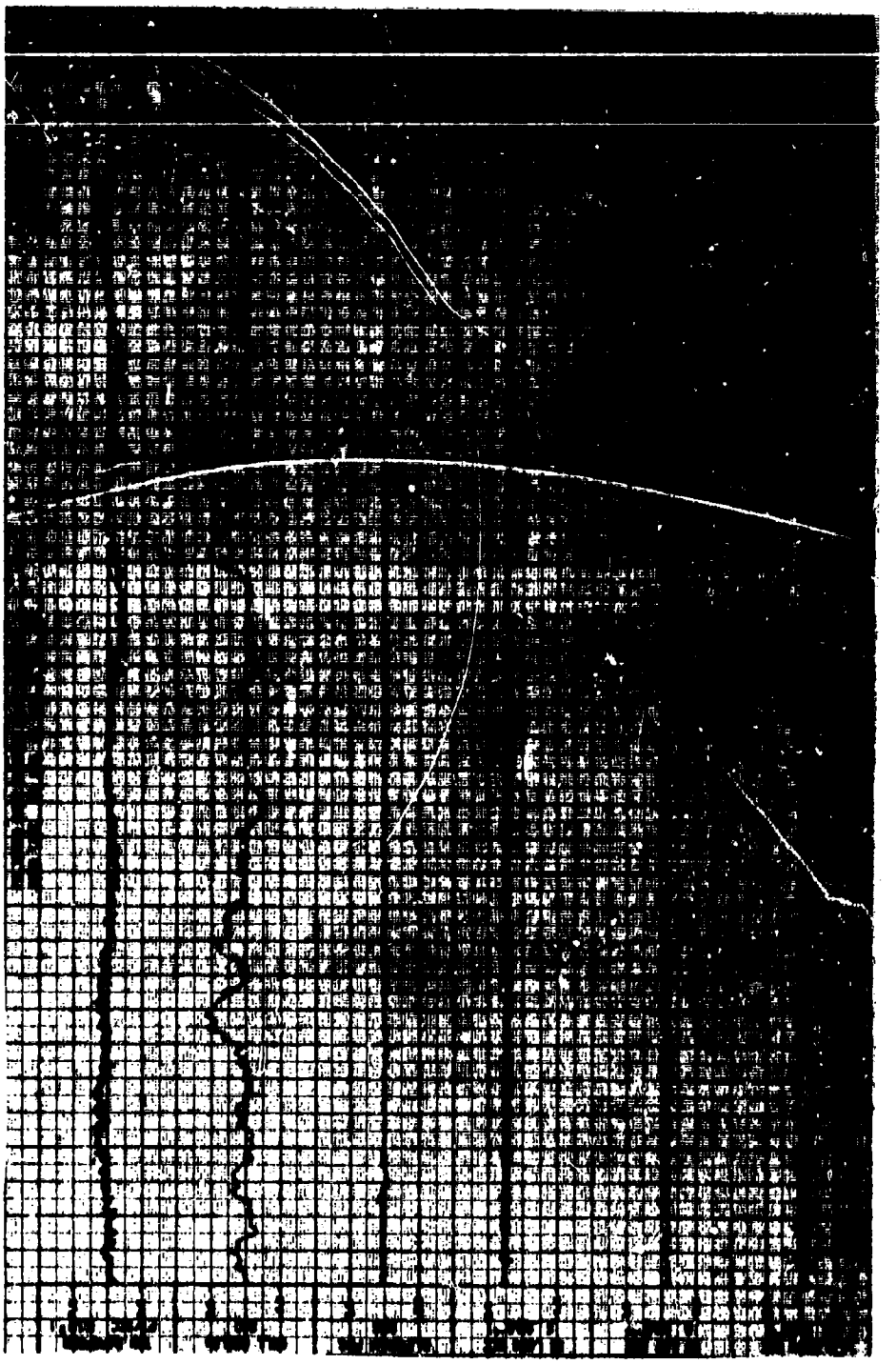


Figure 34B. Flight Parameter Time Histories of Test 107, Run 11
(Sheet 2 of 3)

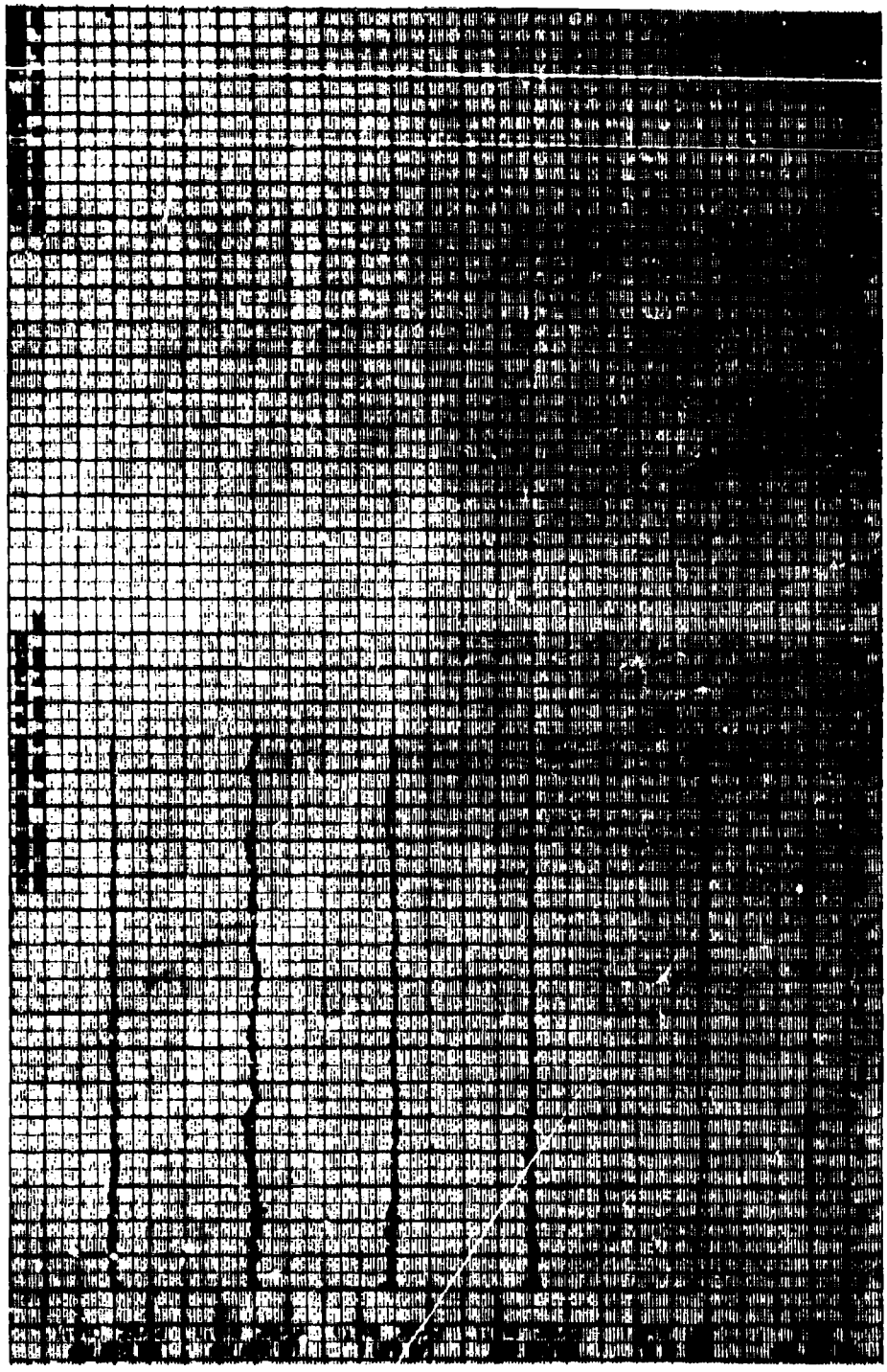


Figure 54A. Gust Velocity Time Histories of Test 107, Run 11 - (Laverton, Australia, 8 Aug 66). (Sheet 3 of 3)

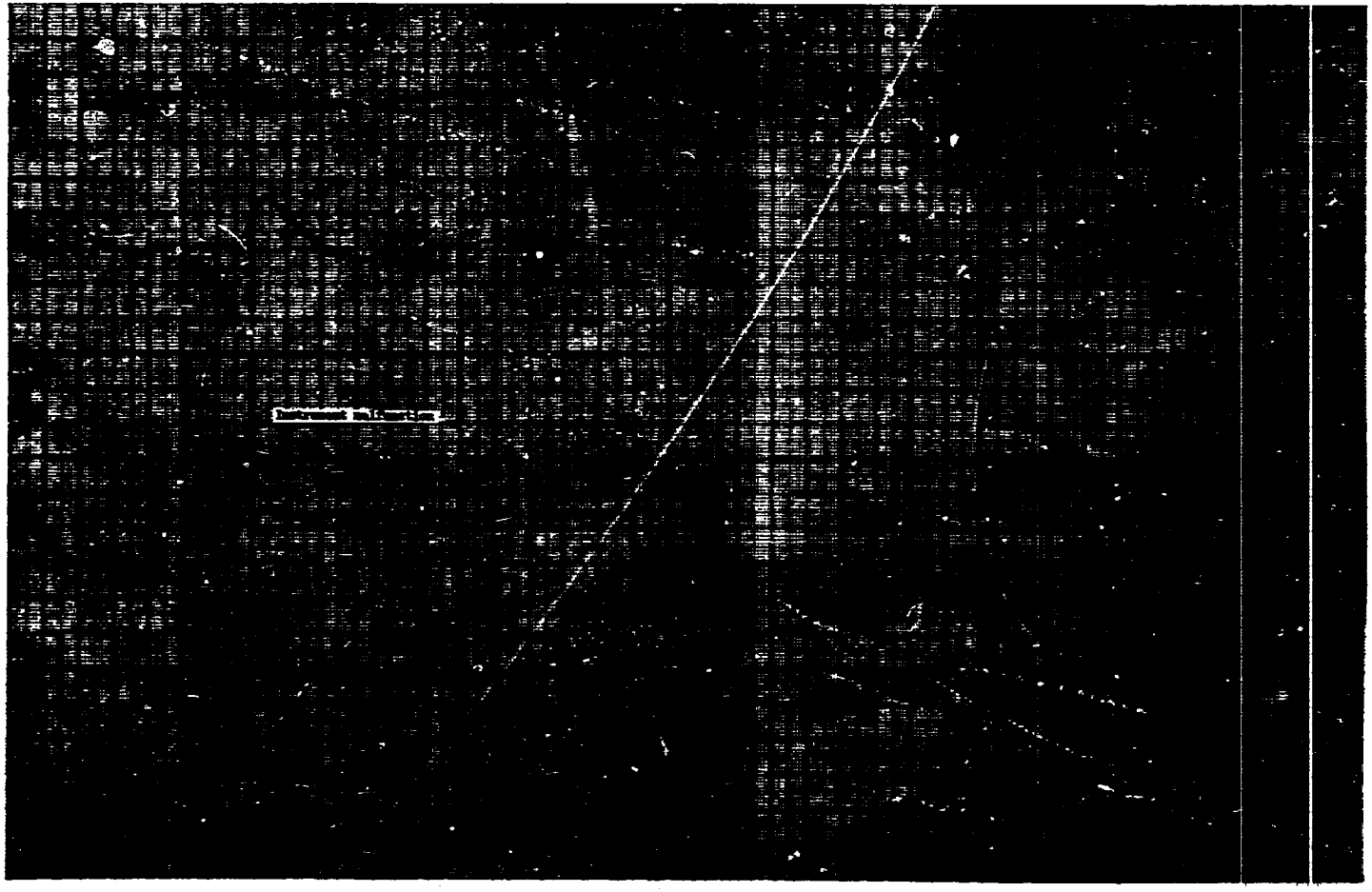


Figure 54B. Flight Parameter Time Histories of Test 107, Run 11
(Sheet 3 of 3)

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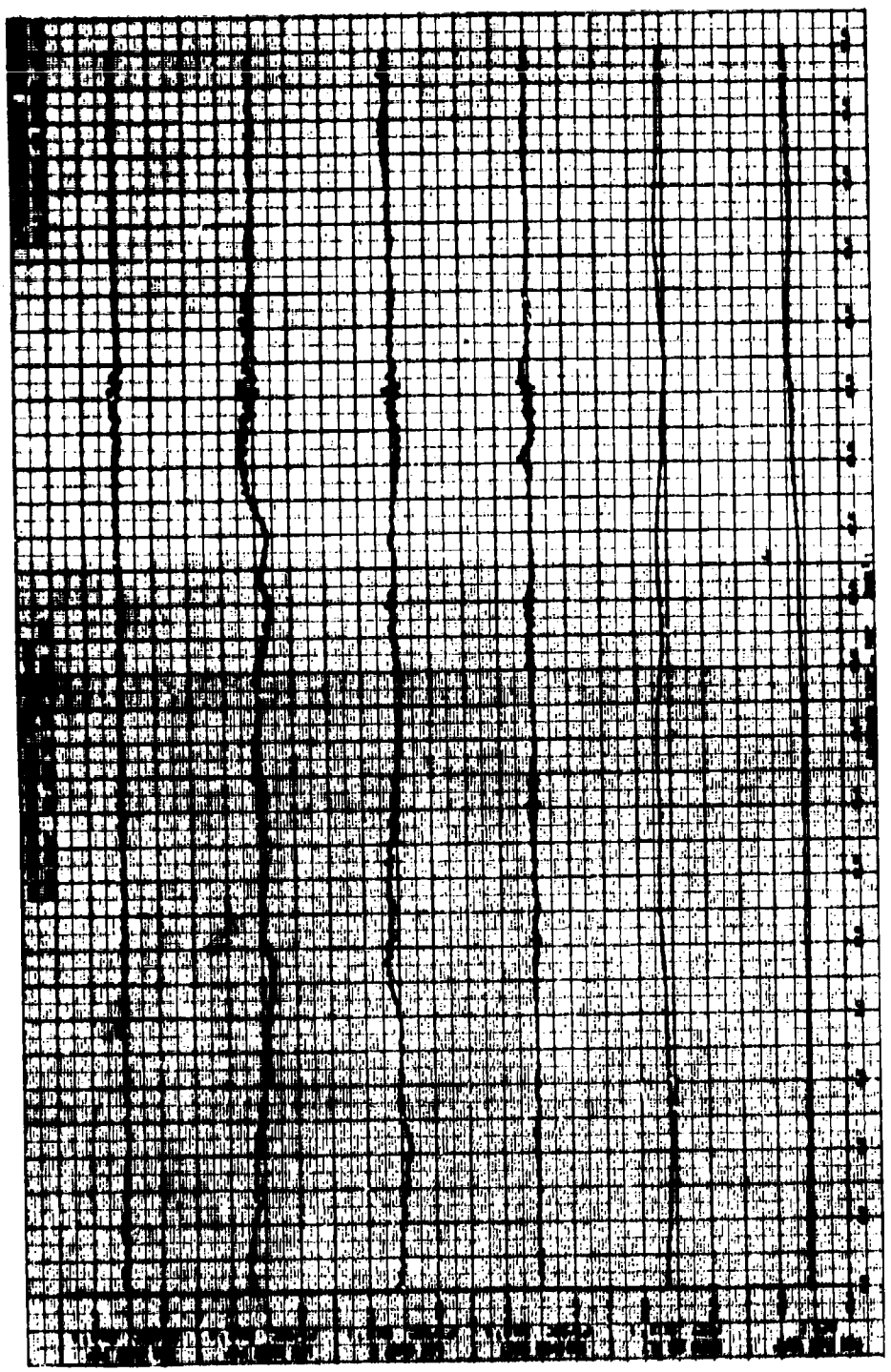


Figure 55A. Gust Velocity Time Histories of Test 107, Run 13 - (Laverton, Australia, 8 Aug 66). (Sheet 1 of 2)

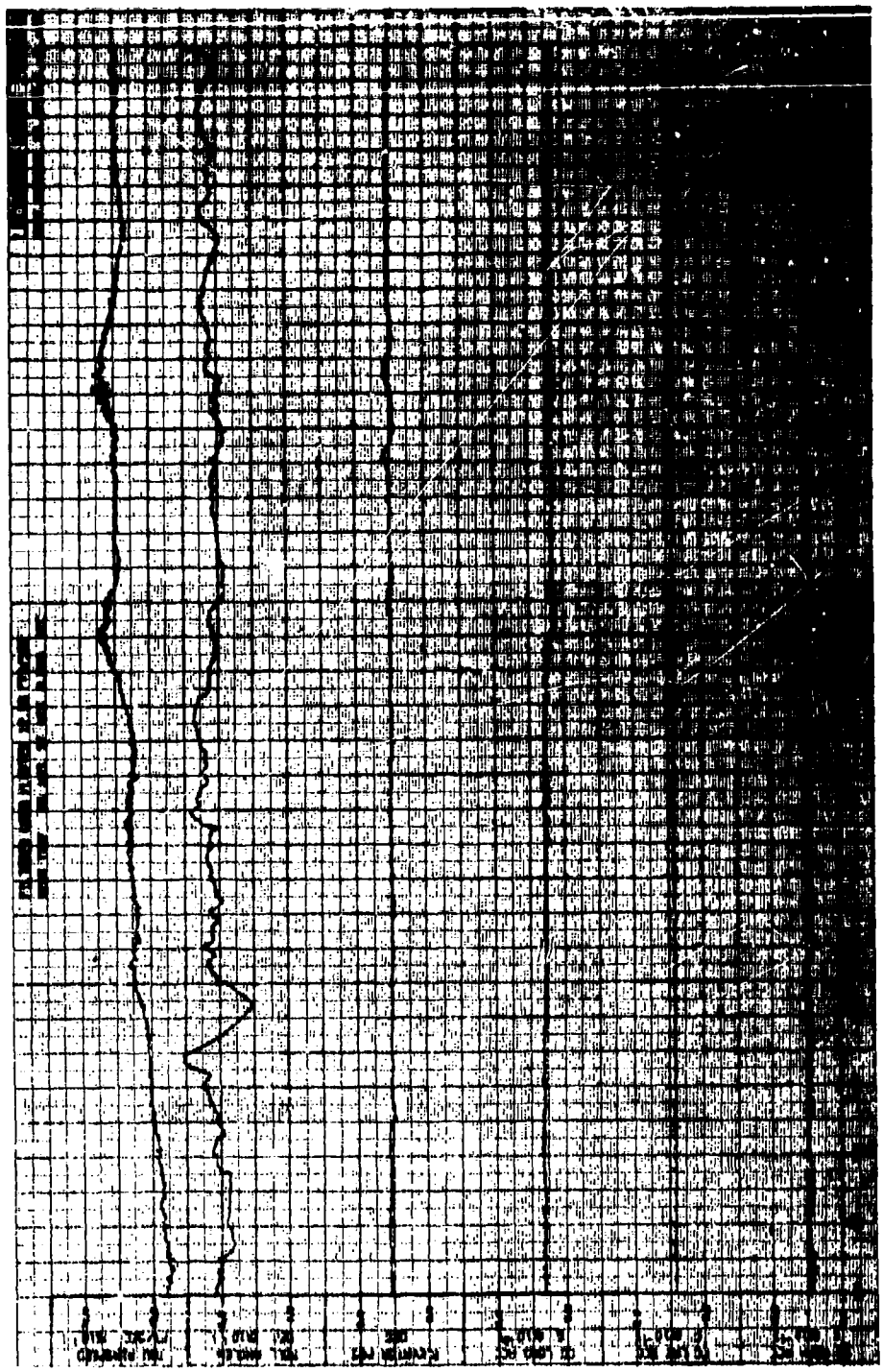


Figure 55B. Flight Parameter Time Histories of Test 107, Run 13
(Sheet 1 of 2)

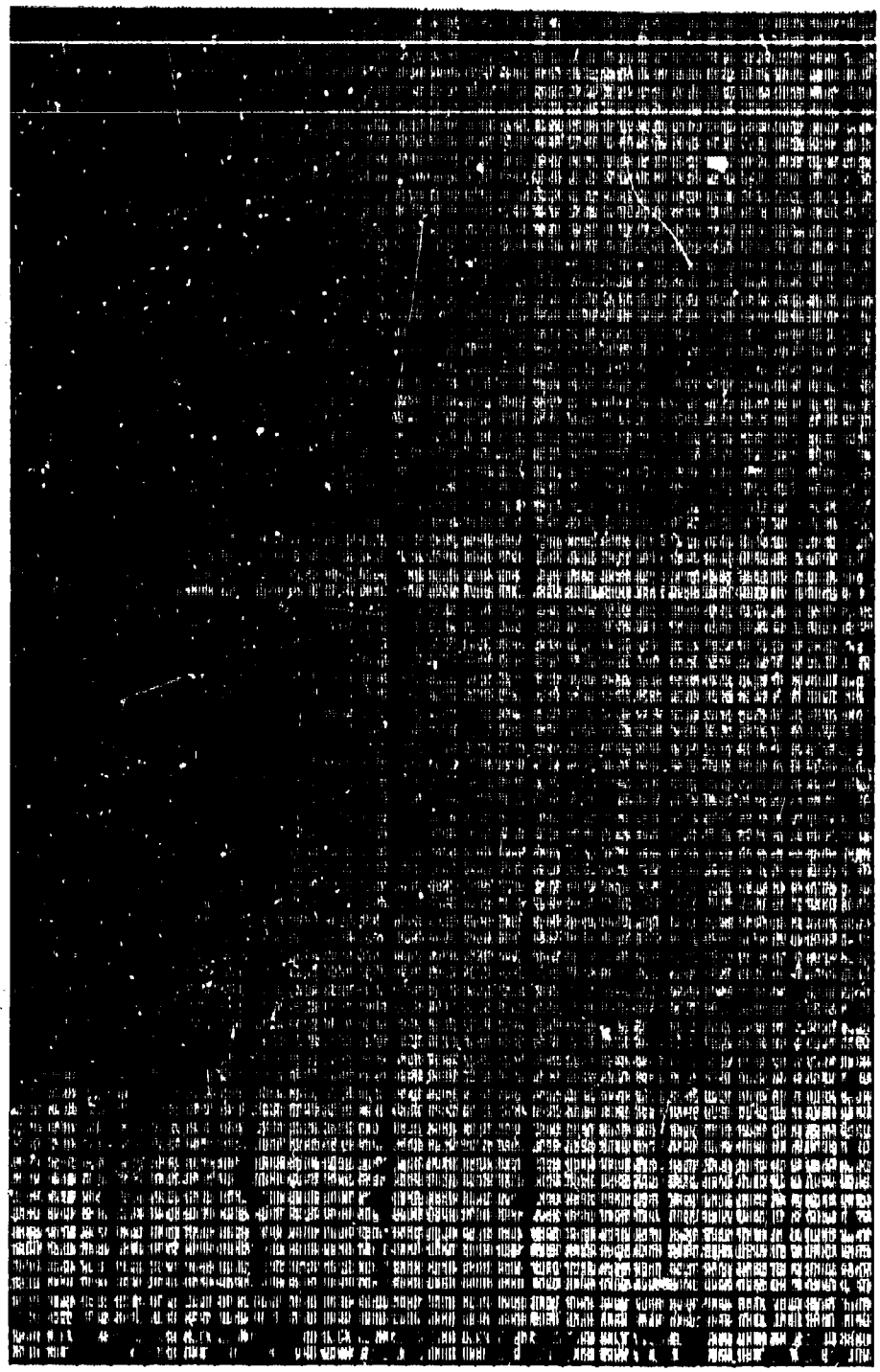


Figure 55A. Gust Velocity Time Histories of Test 107, Run 13 - (Laverton, Australia, 8 Aug 66). (Sheet 2 of 2)

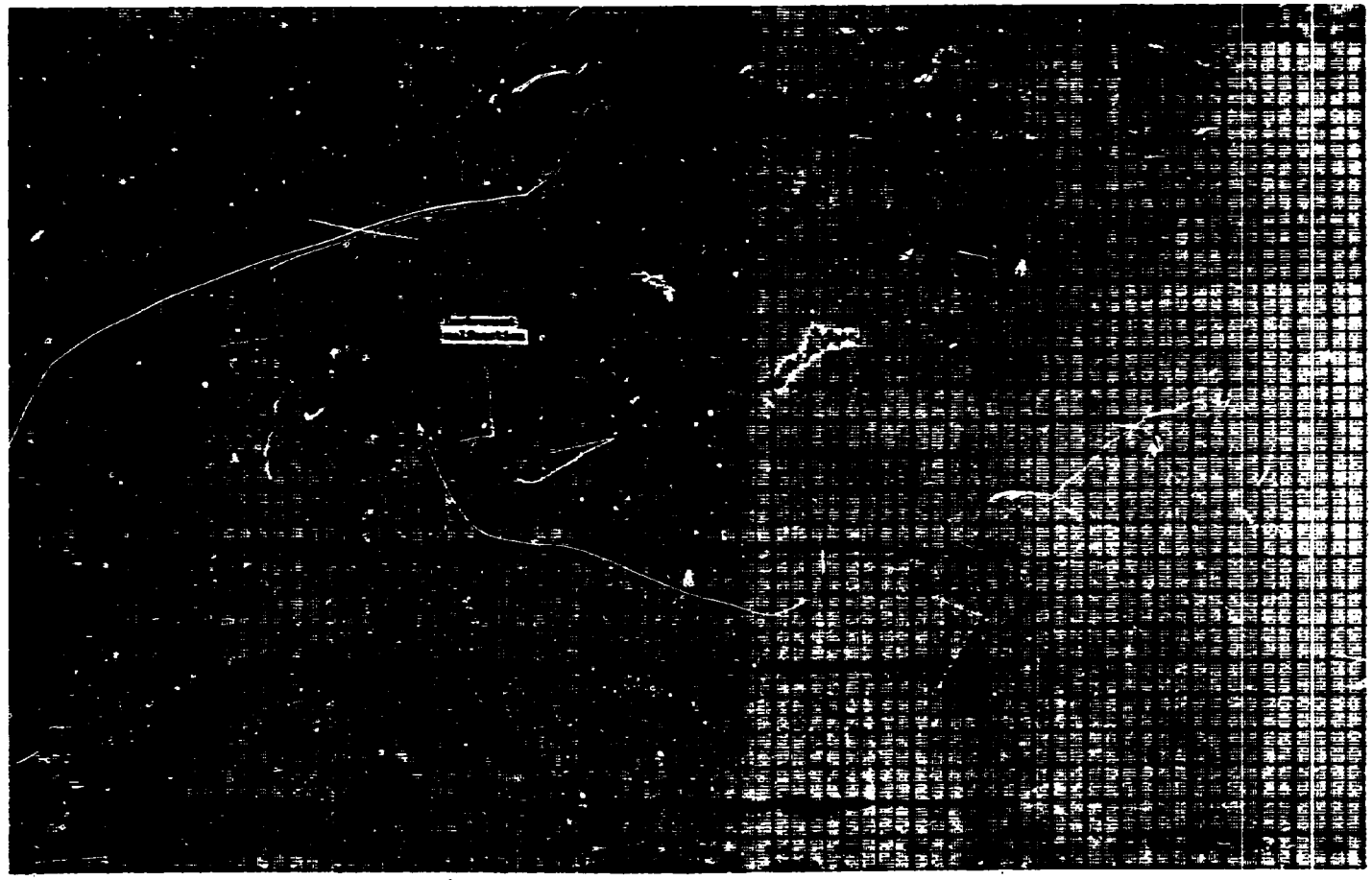


Figure 55B. Flight Parameter Time Histories of Test 107, Run 13
(Sheet 2 of 2)

Appendix VI

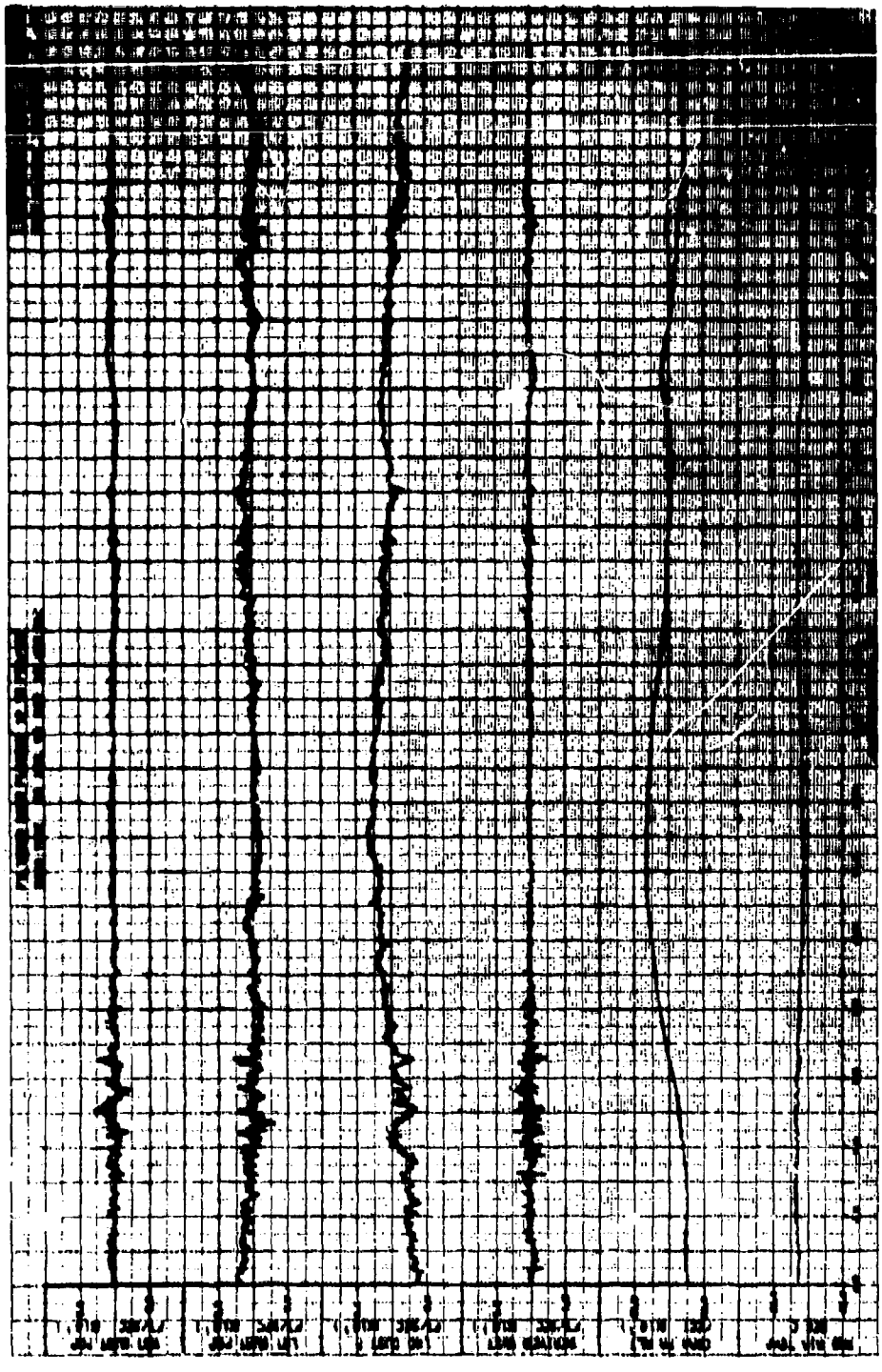


Figure 56A. Gust Velocity Time Histories of Test 107, Run 14 - (Laverton, Australia, 8 Aug 66). (Sheet 1 of 2)



Figure 56B. Flight Parameter Time Histories of Test 107, Run 14
(Sheet 1 of 2)

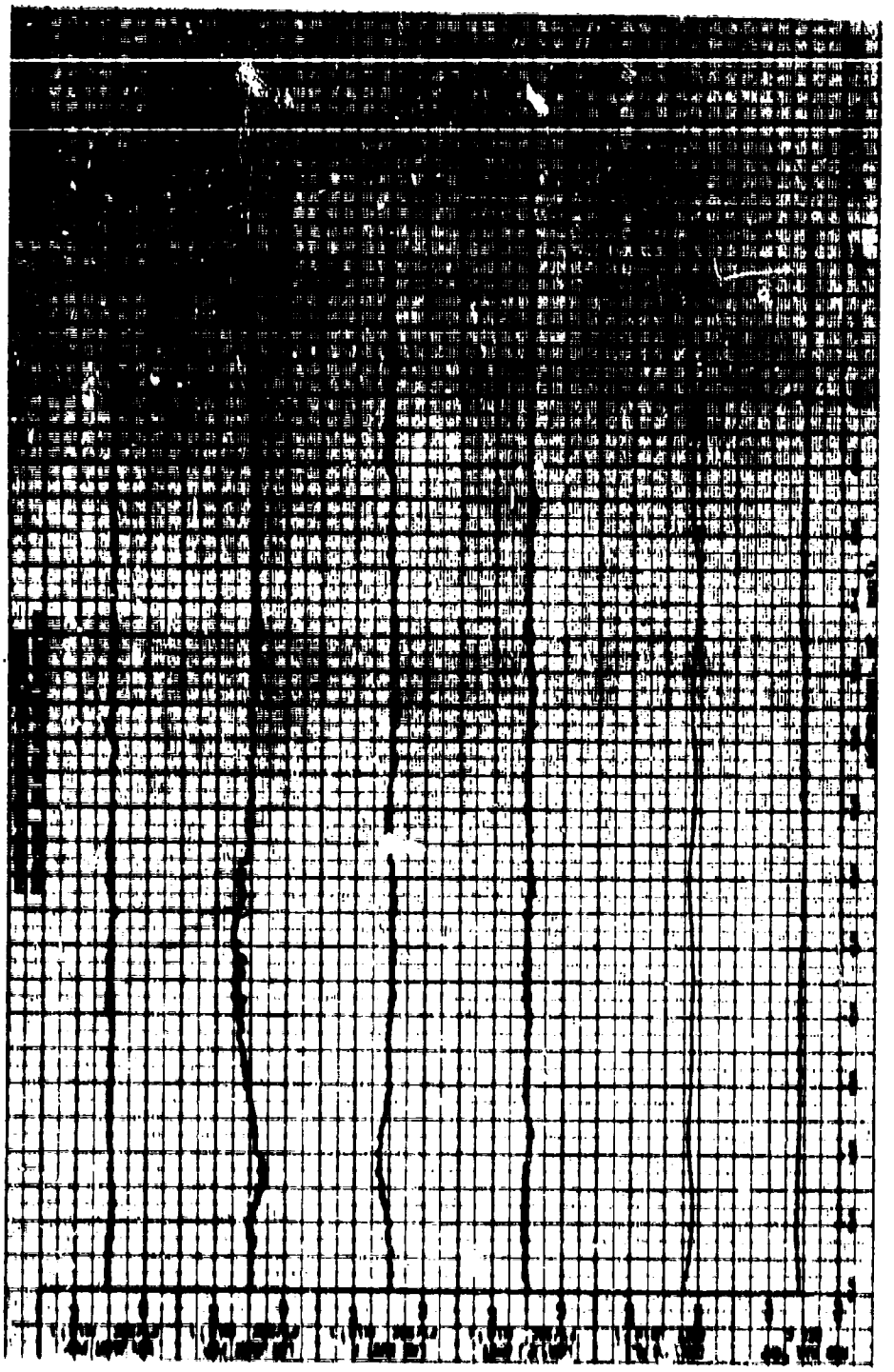


Figure 56A. Gust Velocity Time Histories of Test 107, Run 14 - (Lerartor, Australia, 8 Aug 66). (Sheet 2 of 2)

Figure 56B. Flight Parameter Time Histories of Test 107, Run 14
(Sheet 2 of 2).

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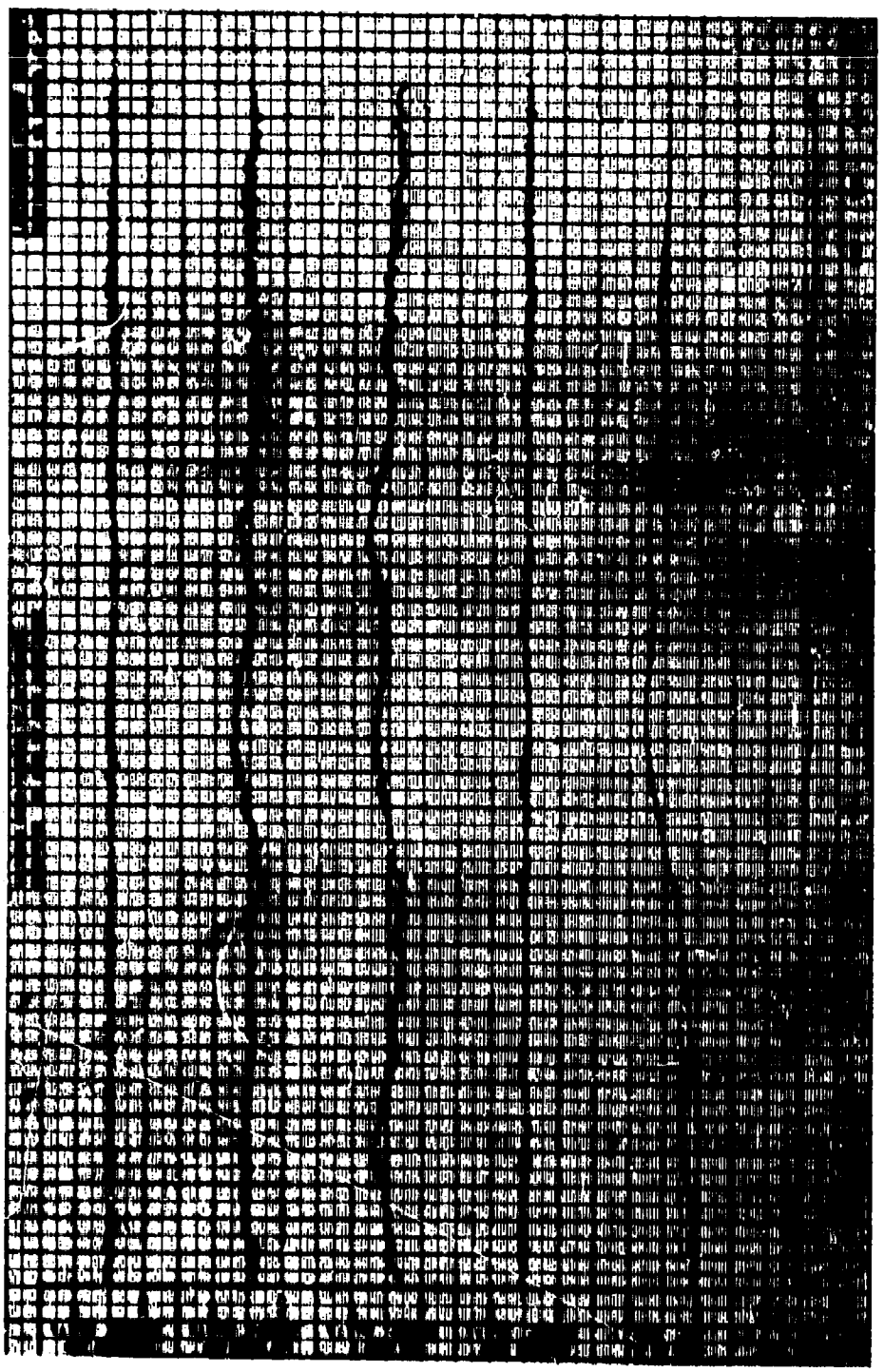


Figure 57A. Gust Velocity Time Histories of Test 107, Run 15 - (Laverton, Australia, 8 Aug 66).

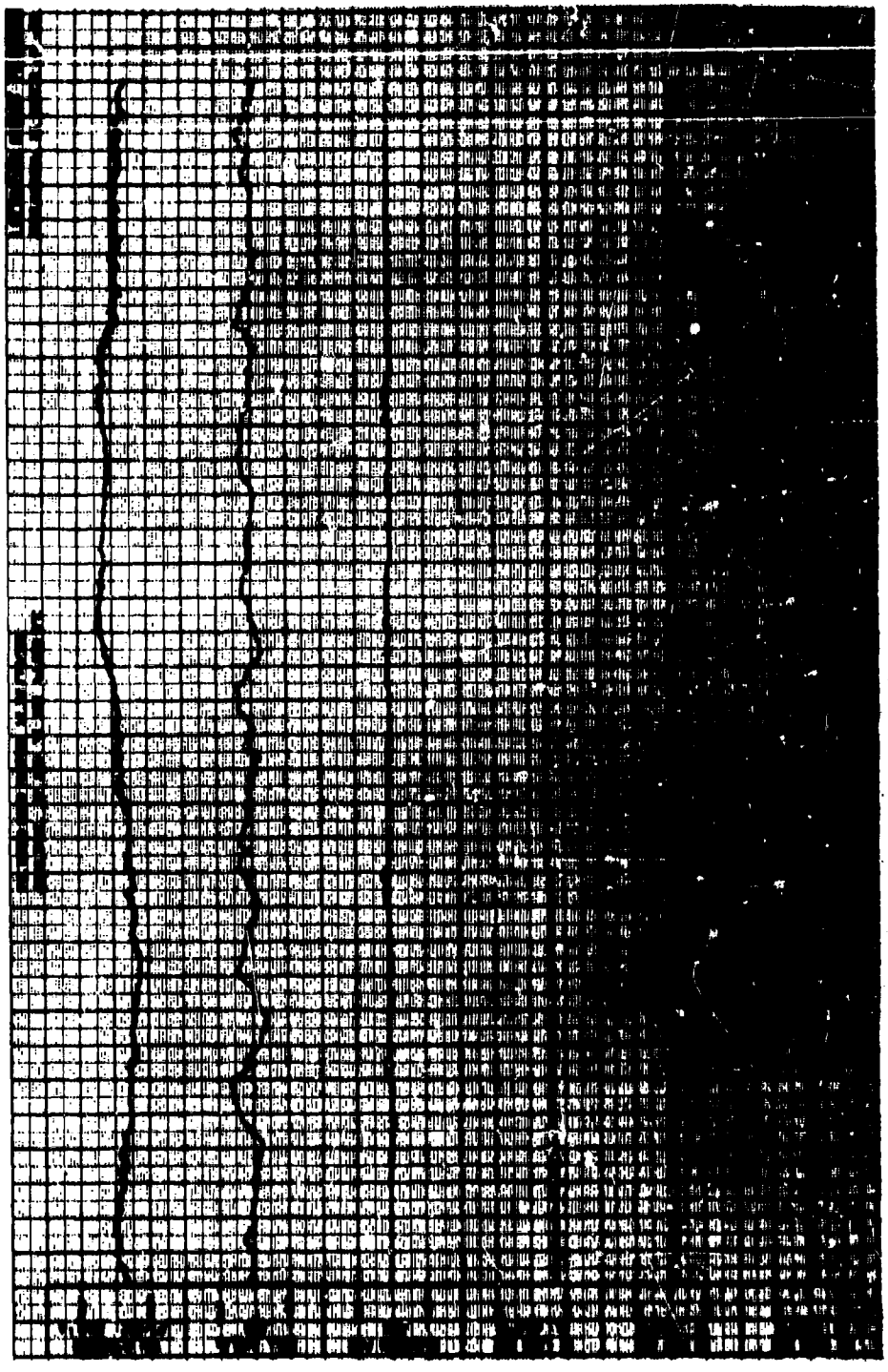


Figure 57B. Flight Parameter Time Histories of Test 107, Run 15.

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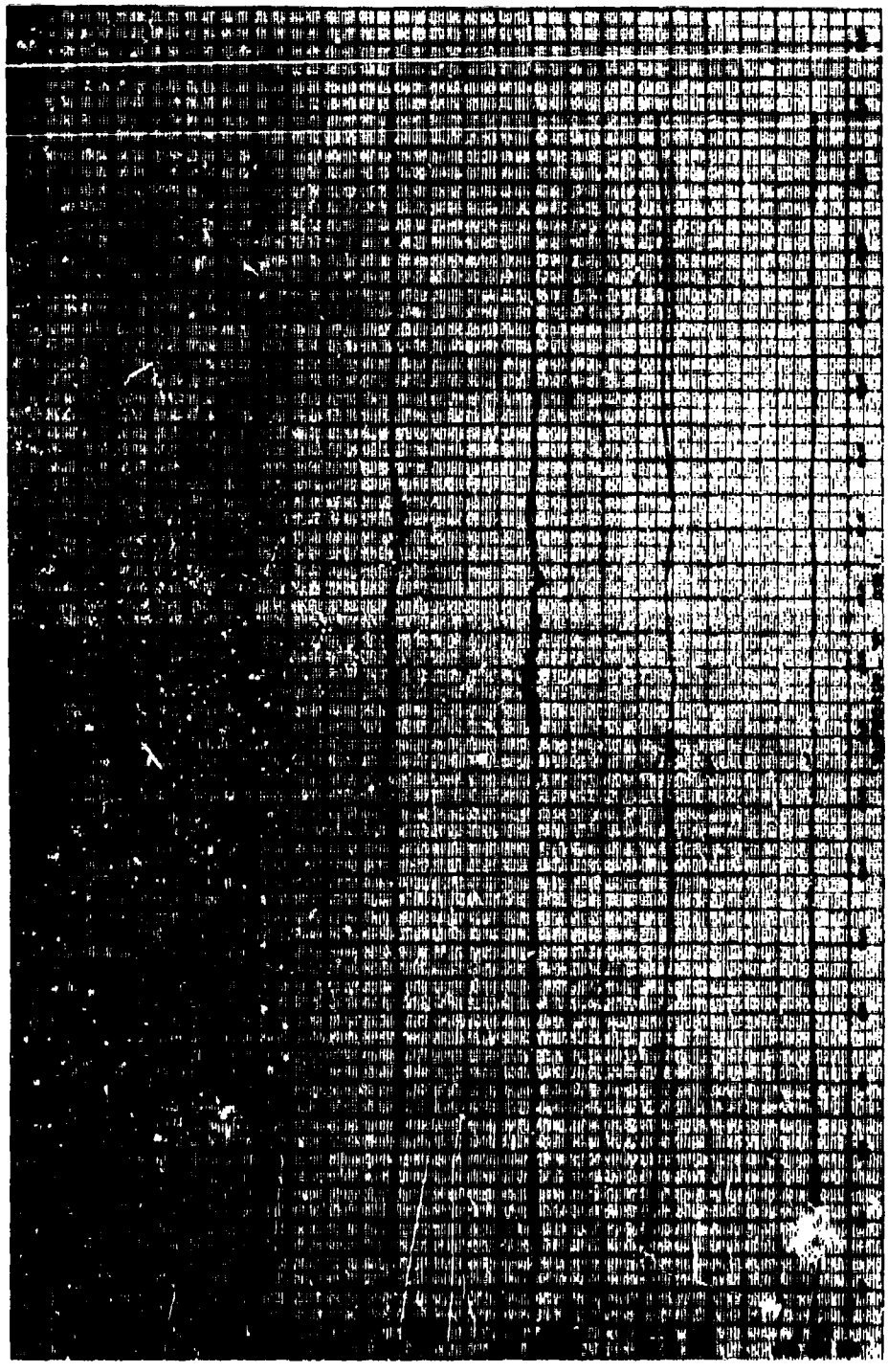


Figure 58A. Gust Velocity Time Histories of Test 107, Run 16 - (Laverton, Australia, 8 Aug 66).

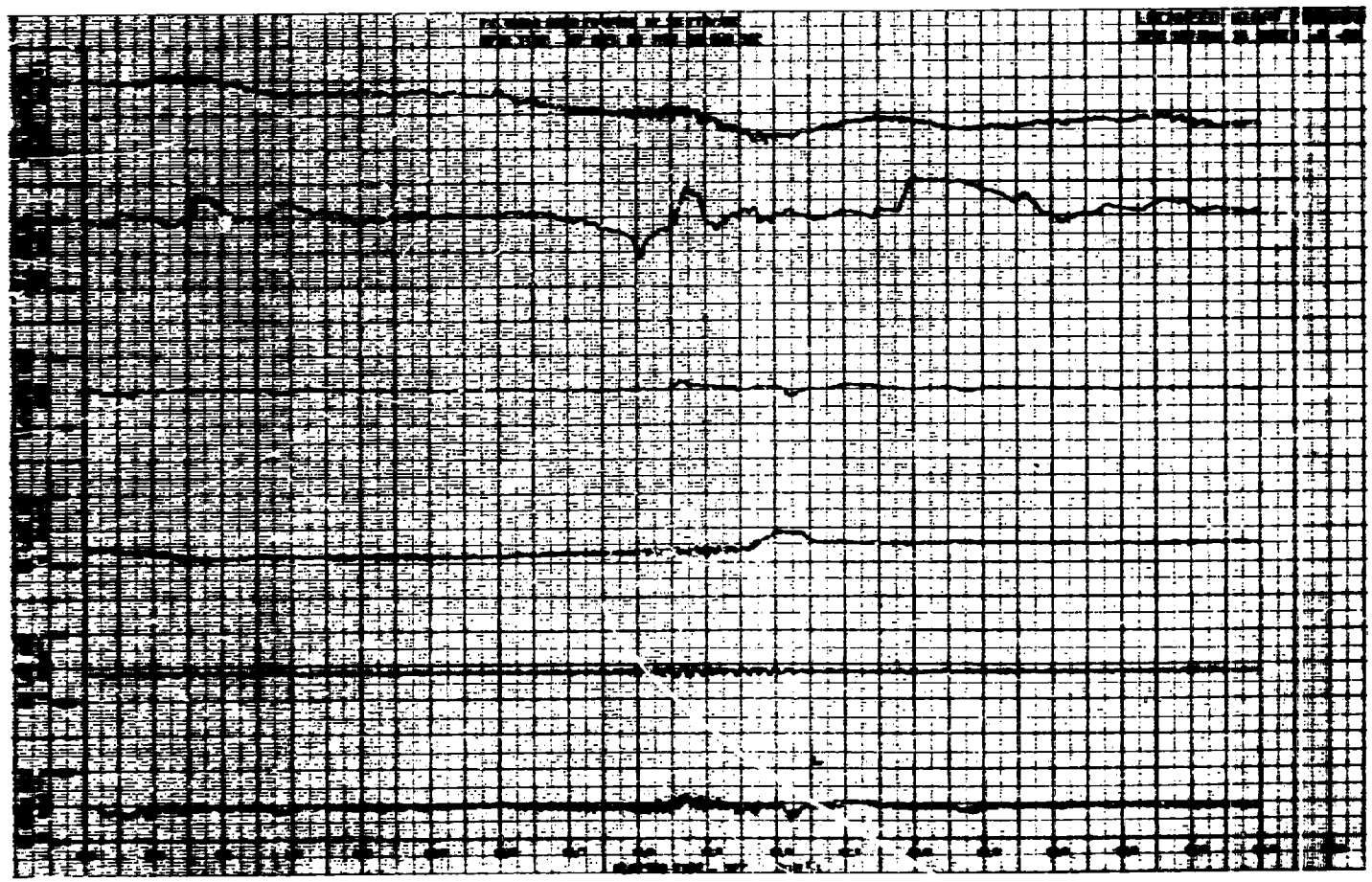


Figure 58B. Flight Parameter Time Histories of Test 107, Run 16.

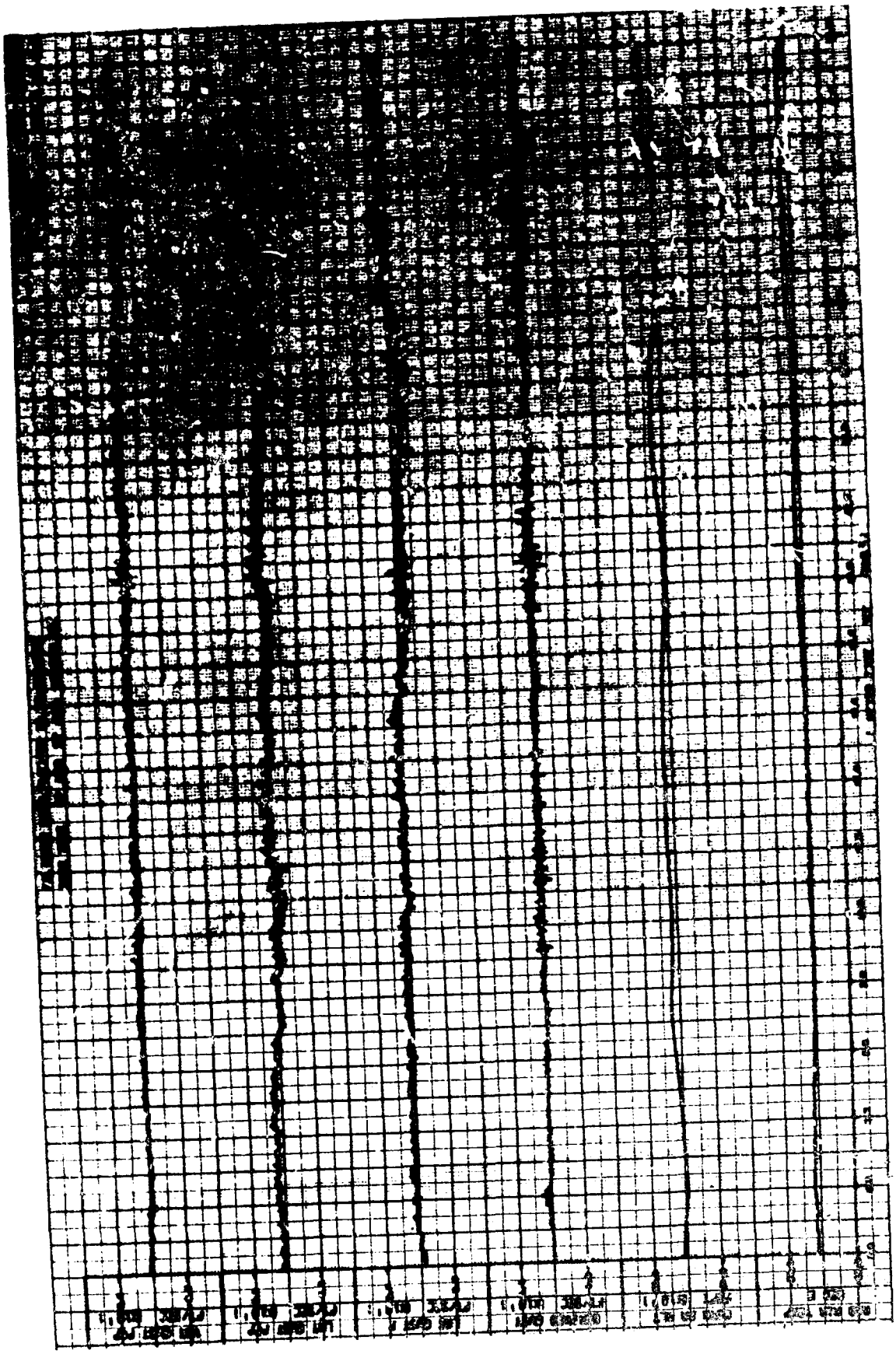


Figure 59A. Gust Velocity Time Histories of Test 107, Run '7 - (Laverton, Australia, 8 Aug 66). (Sheet 1 of 2)

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Figure 59B. Flight Parameter Time Histories of Test 107, Run 17 (Sheet 1 of 2).

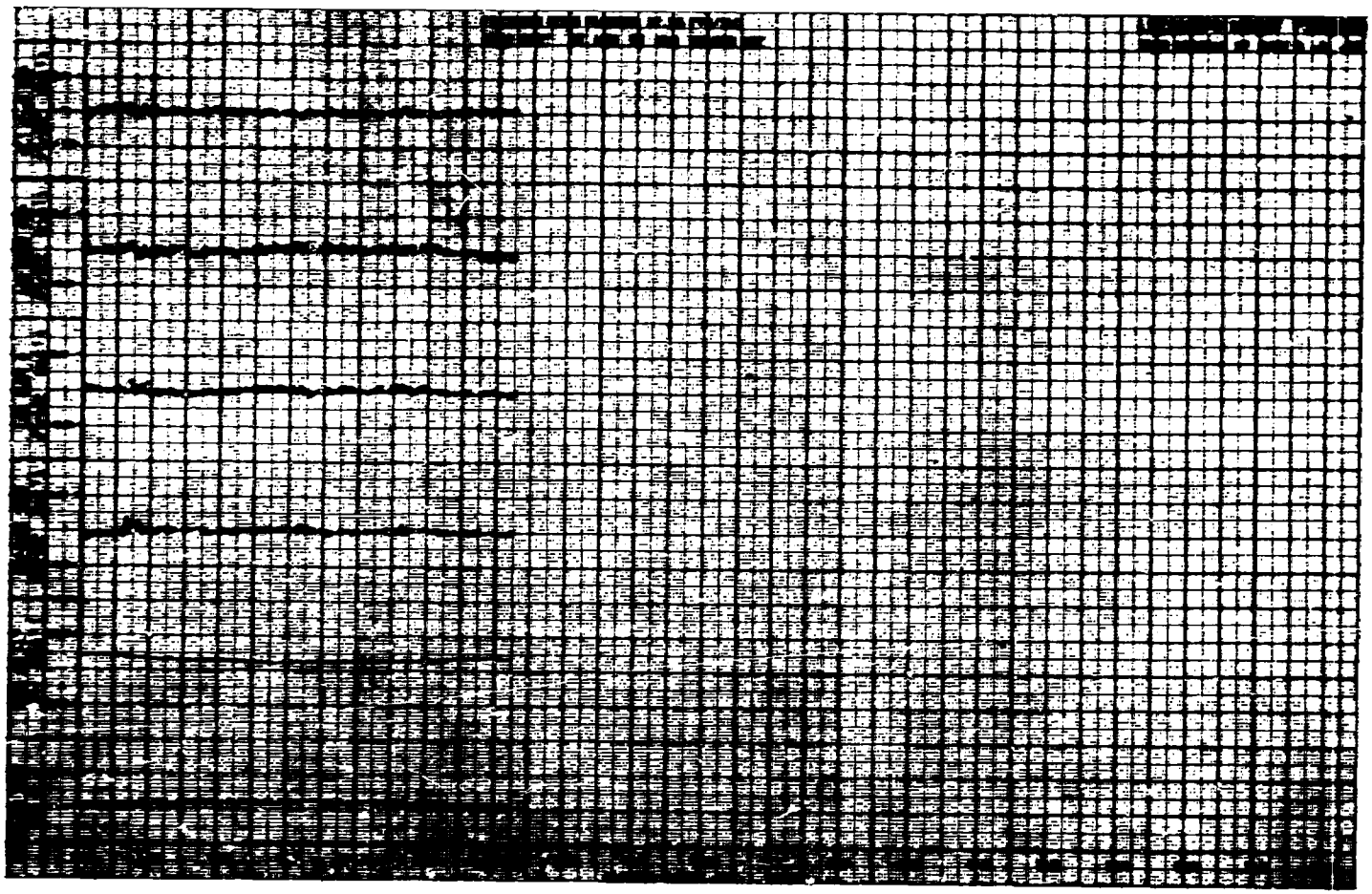


Figure 59A. Gust Velocity Time Histories of Test 107, Run 17 - (Laverton, Australia, 8 Aug 66). (Sheet 2 of 2)

Figure 93B. Flight Parameter Time Histories of Test 107, Run 17 (Sheet 2 of 2).

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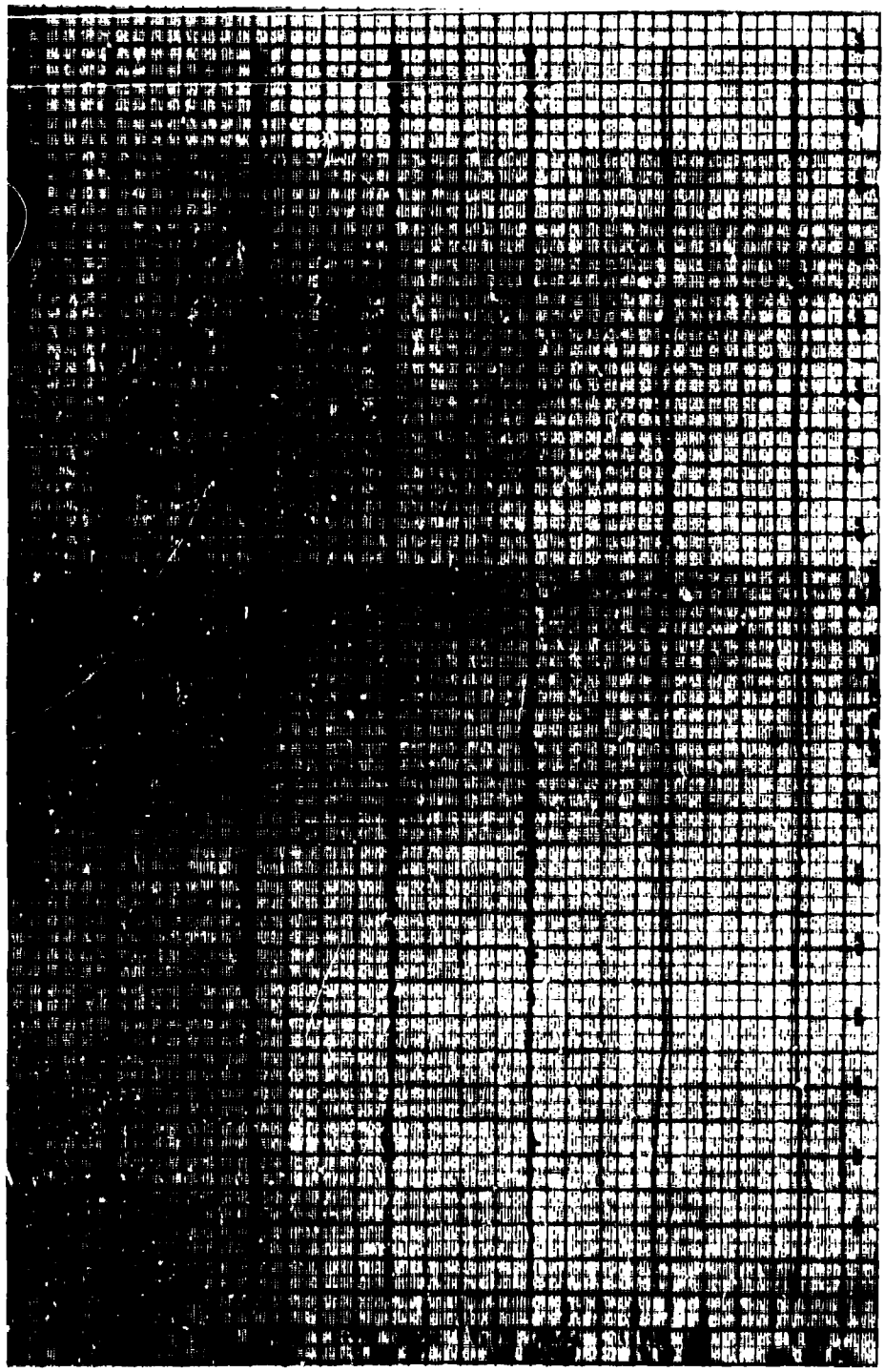


Figure 60A. Gust Velocity Time Histories of Test 107, Run 18 - (Laverton, Australia, 8 Aug 66). (Sheet 1 of 3)

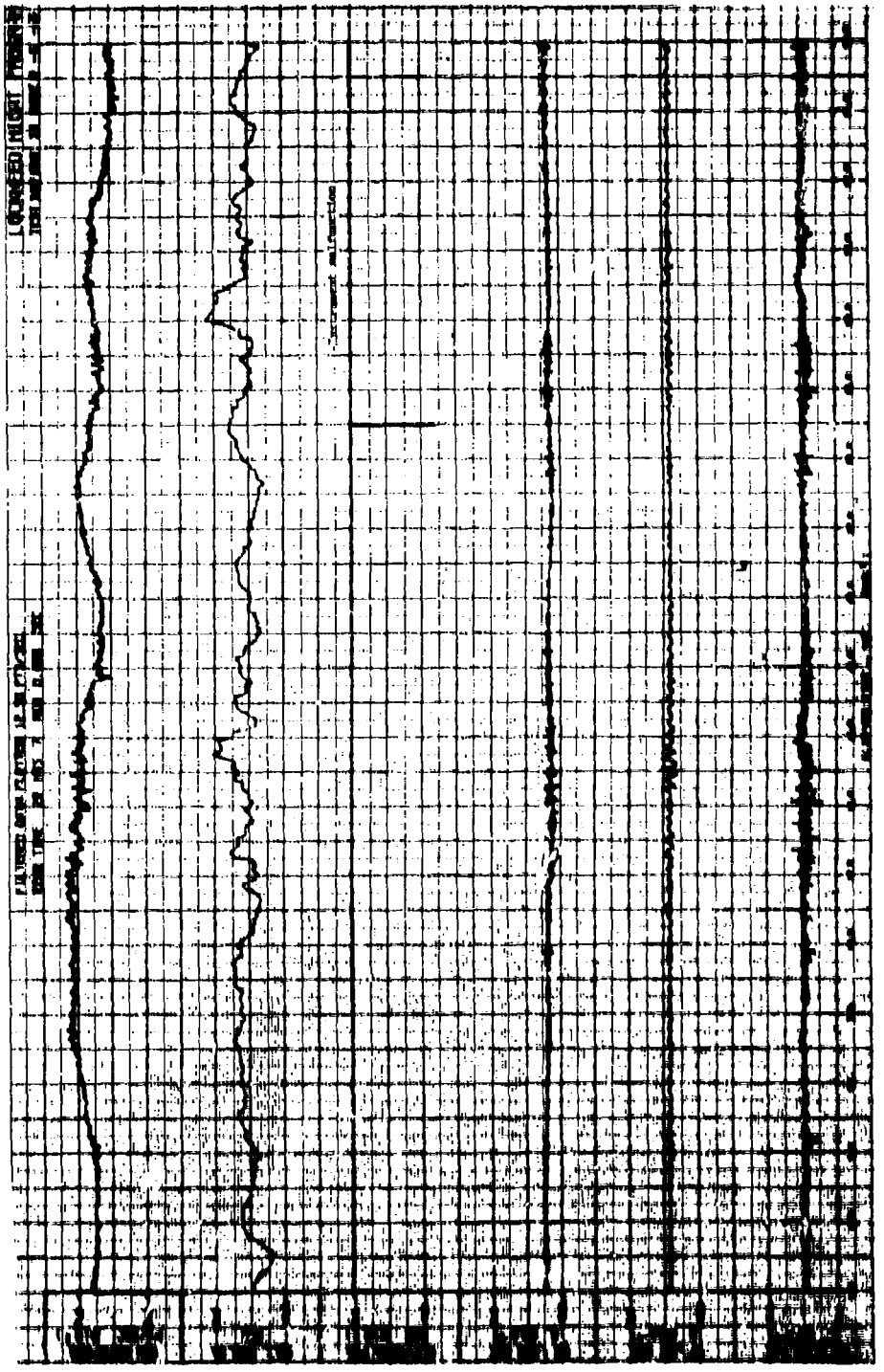


Figure 33b. Flight Parameter Time Histories of Test 107, Run 18 (Sheet 1 of 3).

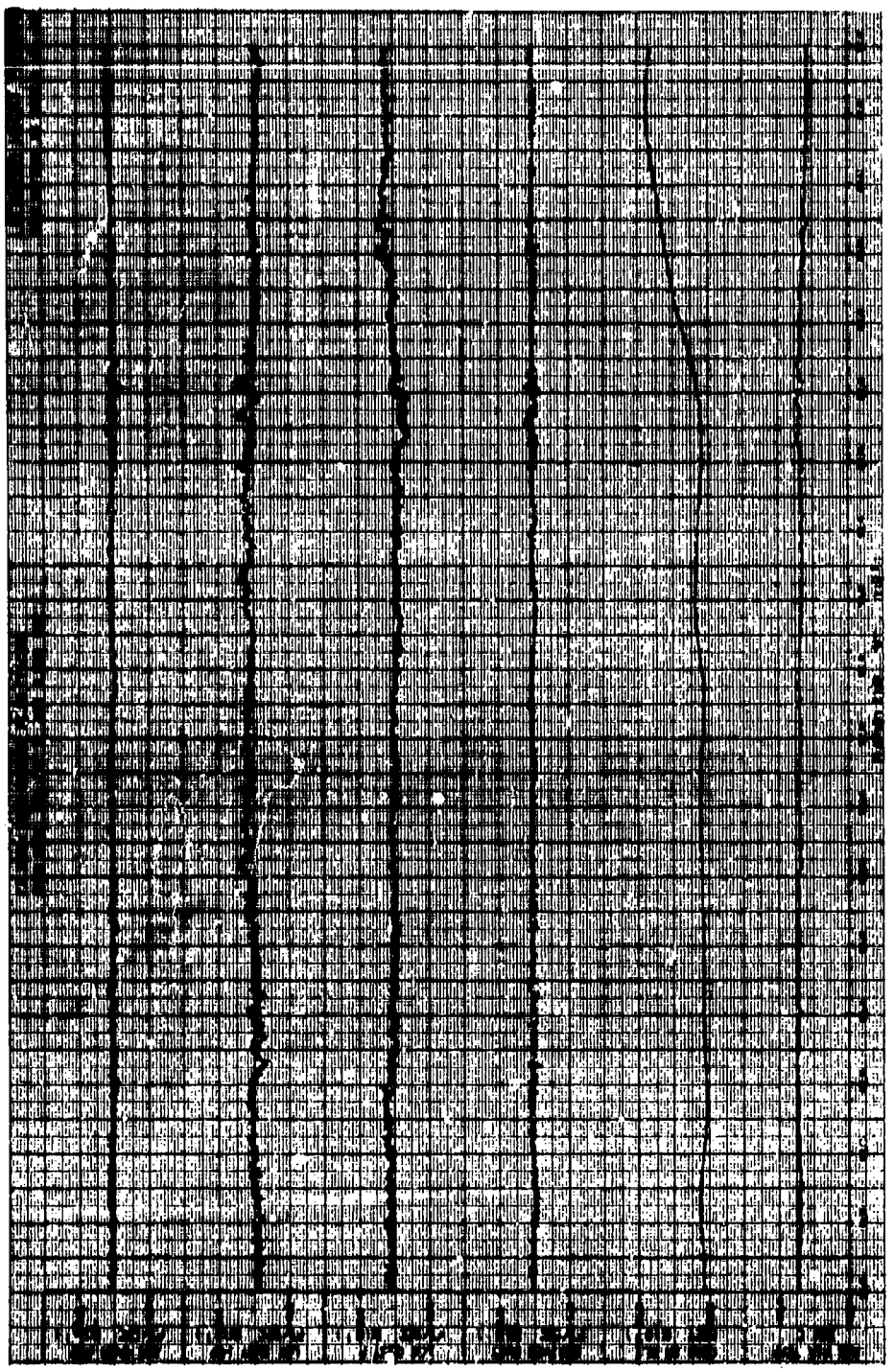


Figure 60A. Gust Velocity Time Histories on Test 107, Run 18 - (Laverton, Australia, 8 Aug 66). (Sheet 2 of 3)

Figure 60B. Flight Parameter Time Histories of Test 107, Run 18 (Sheet 2 of 3).

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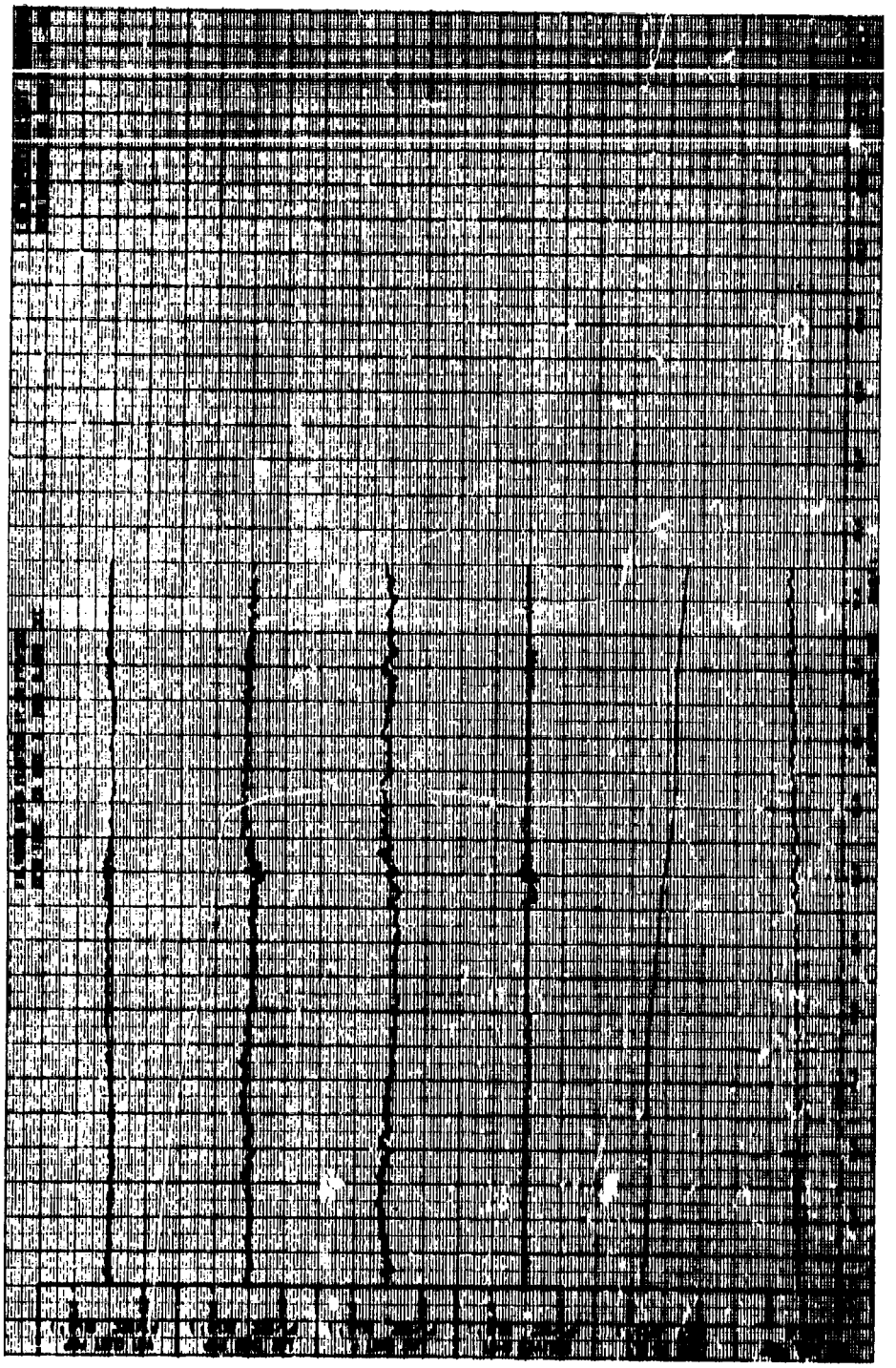


Figure 60A. Gust Velocity Time Histories of Test 127, Run 16 - (Laverton, Australia, 6 Aug 66). (Sheet 3 of 3).

Figure 60B. Flight Parameter Time Histories of Test 107, Run 18 - (Sheet 3 of 3).

Figure 51A. Gust Velocity Time Histories of Test 11L, Run 10 - (Edwards AFB, California, 29 Aug (66) (Sheet 1 of 3).

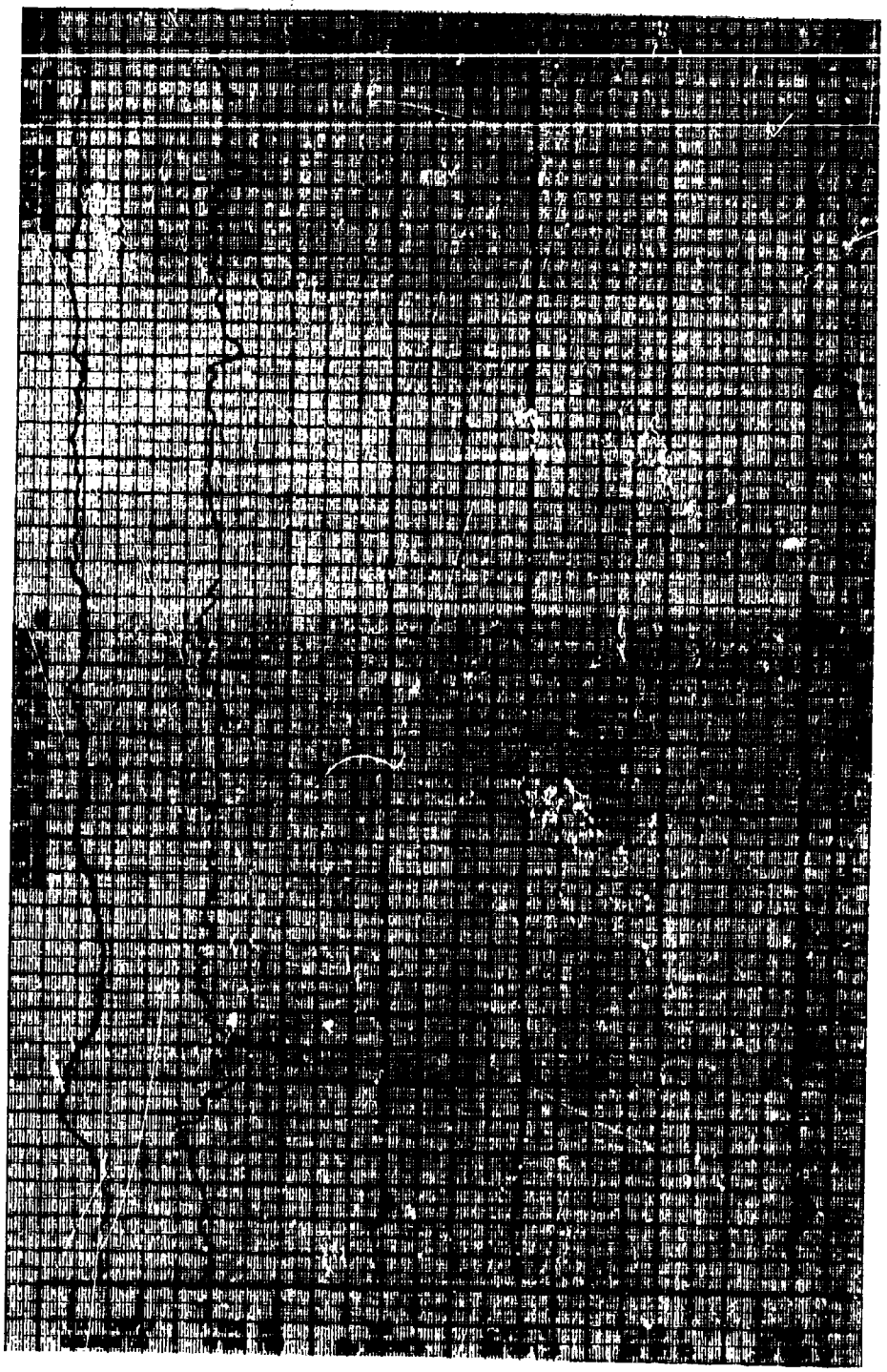


Figure 61B. Flight Parameter Time Histories of Test 114, Run 10 - (Sheet 1 of 3).

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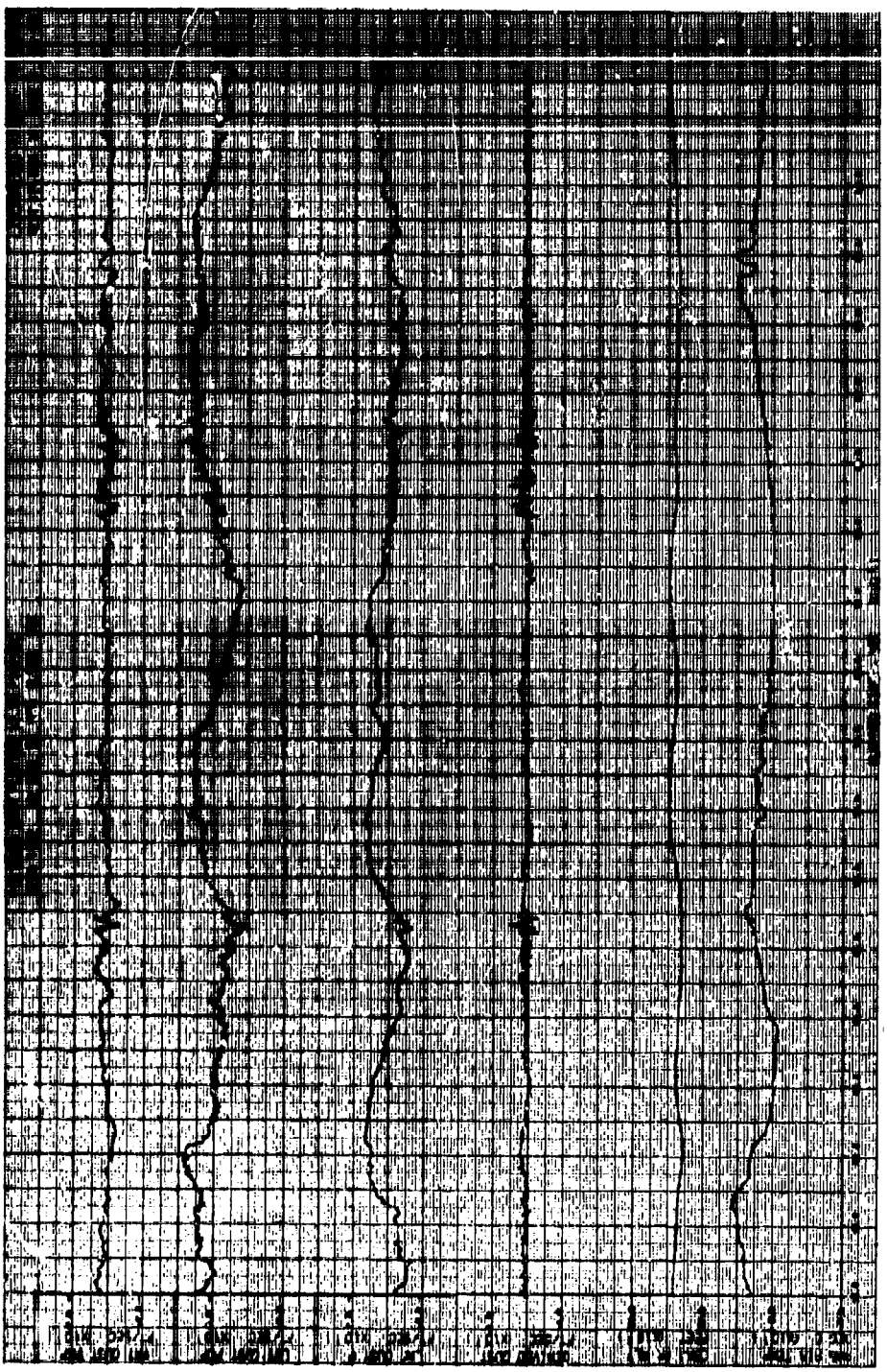


Figure 61a. Gust Velocity Time Histories of Test 114, Run 10 - (Edwards AFB, California, 29 Aug 66) (Sheet 2 of 3).

Figure 61B. Flight Parameter Time Histories of Test 11, Run 10 - (Sheet 2 of 3).

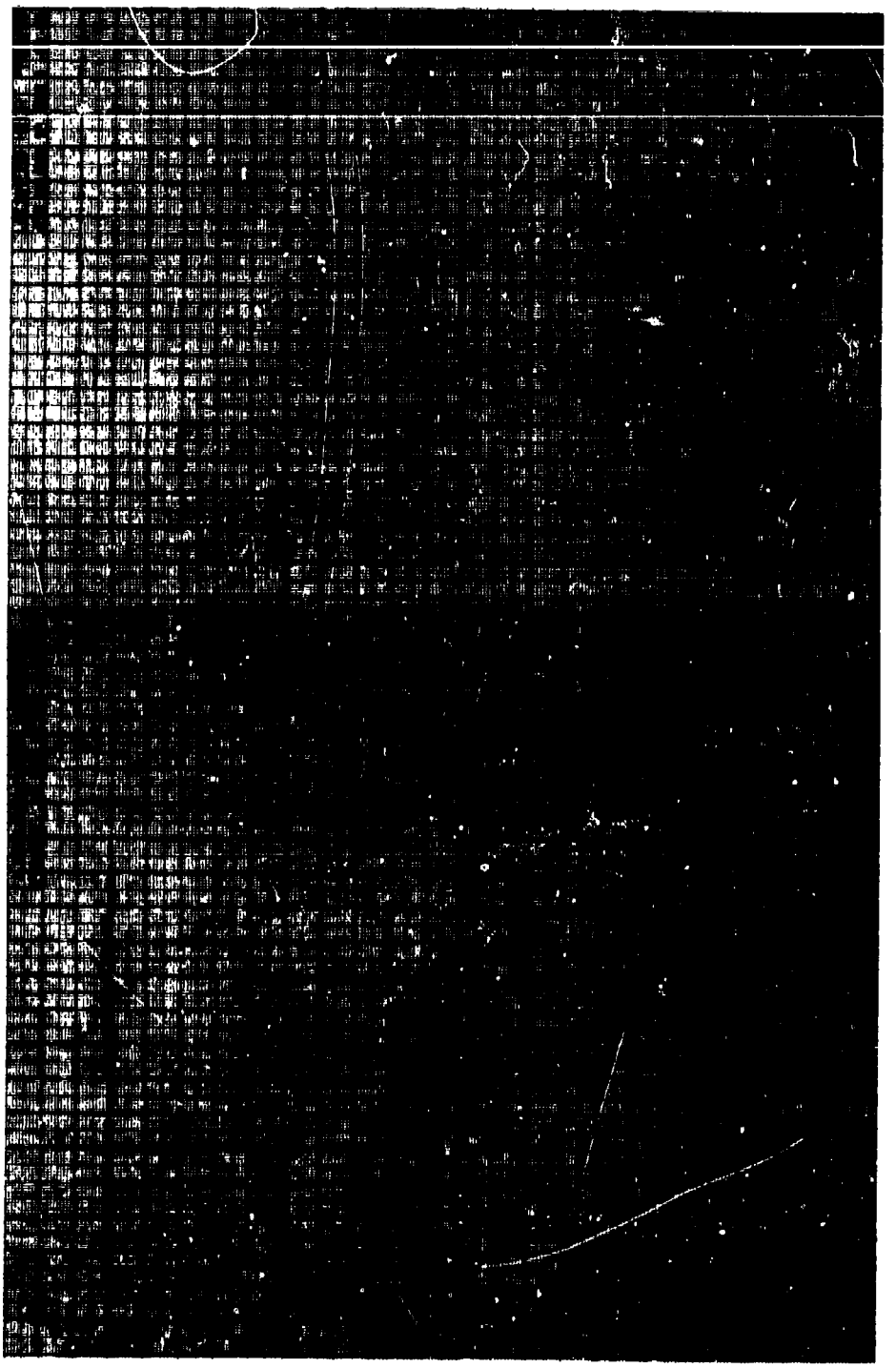


Figure 61A. Gust Velocity Time Histories of Test 114, Run 10 - (Edwards AFB, California, 29 Aug 66) (Sheet 3 of 3).

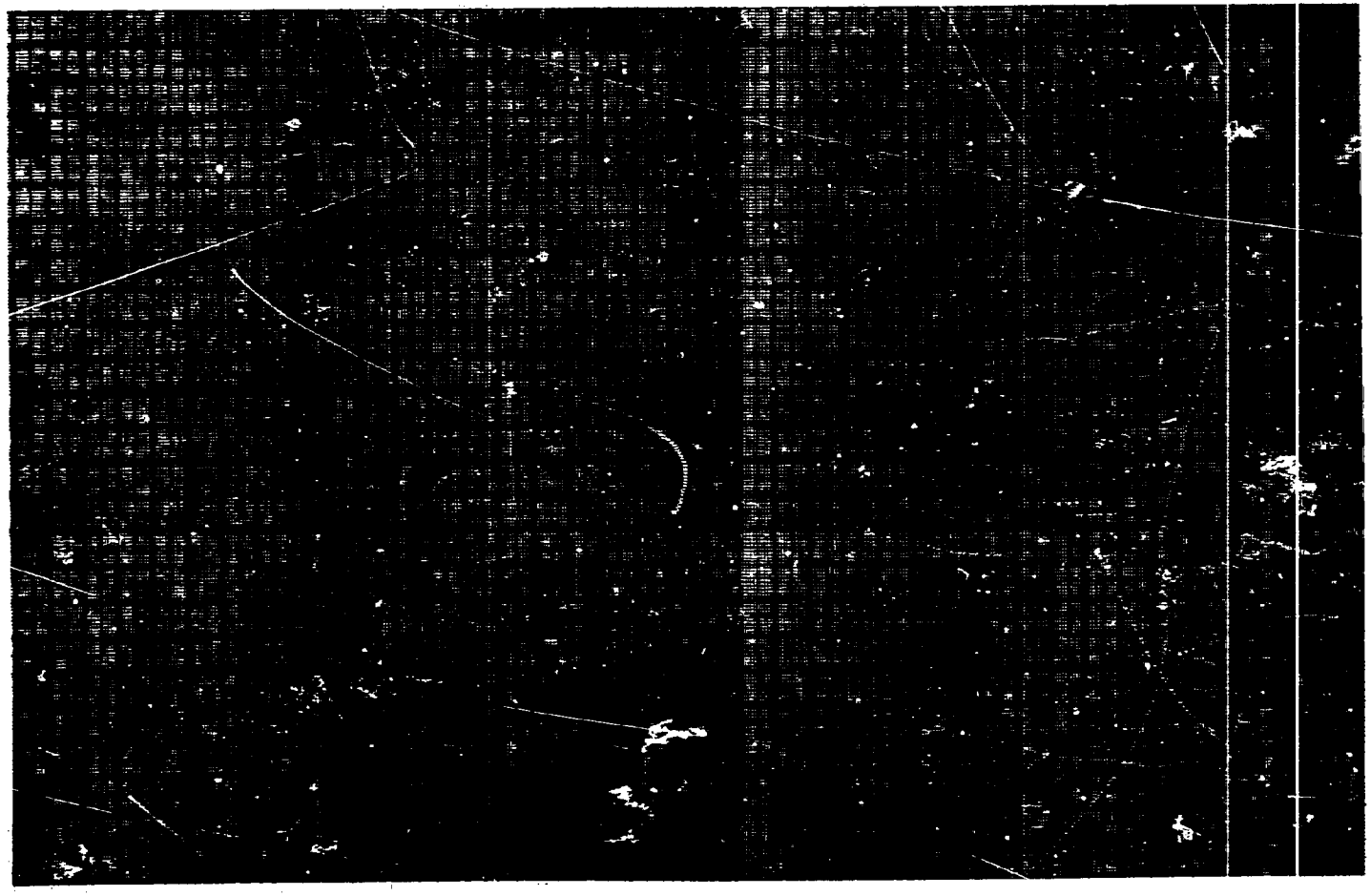


Figure 61B. Flight Parameter Time Histories of Test 114, Run 10 - (Sheet 3 of 3).

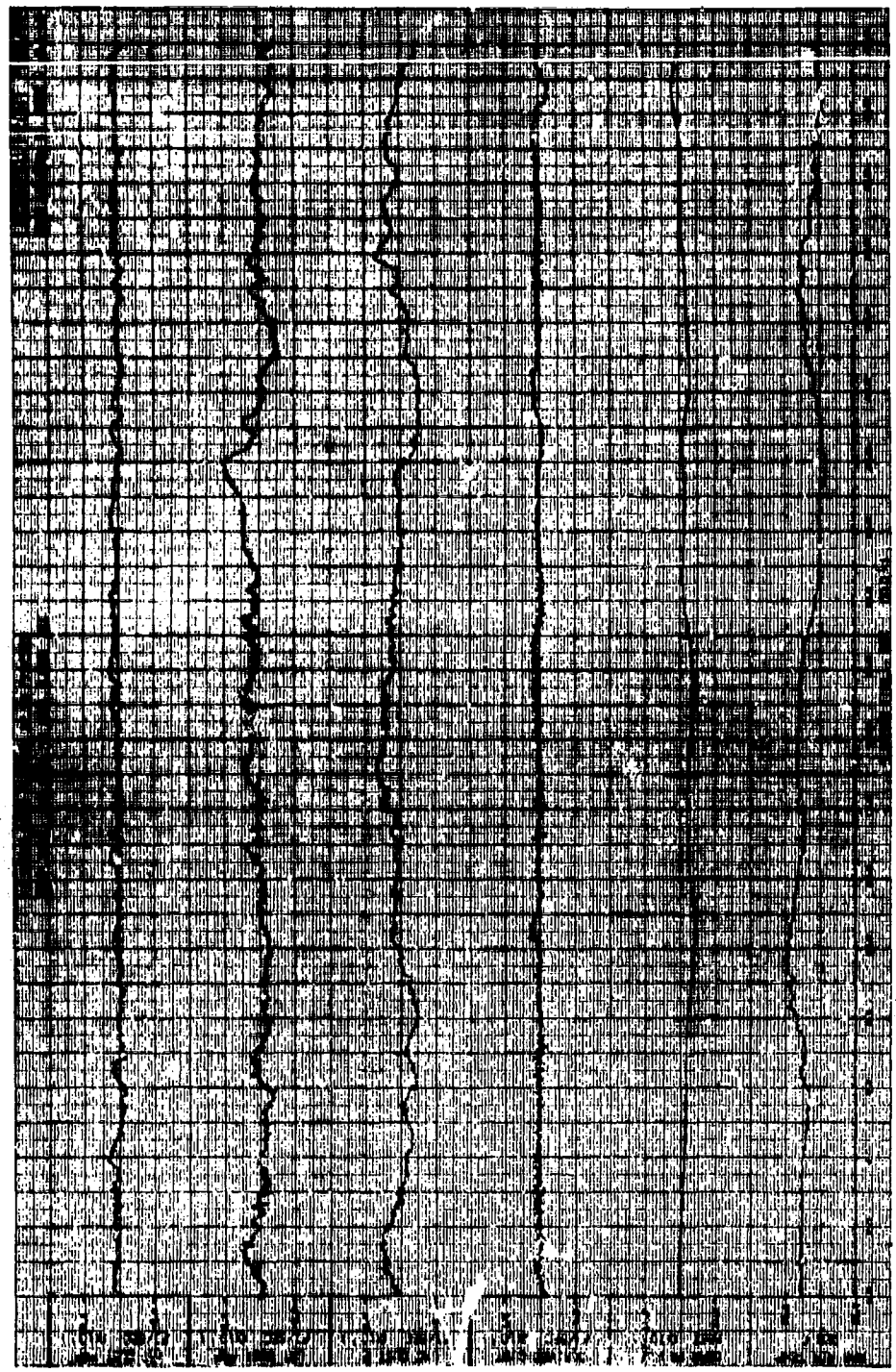


Figure 62A. Gust Velocity Time Histories of Test 114, Run 11 - (Edwards AFB, California, 29 Aug 66) (Sheet 1 of 2).

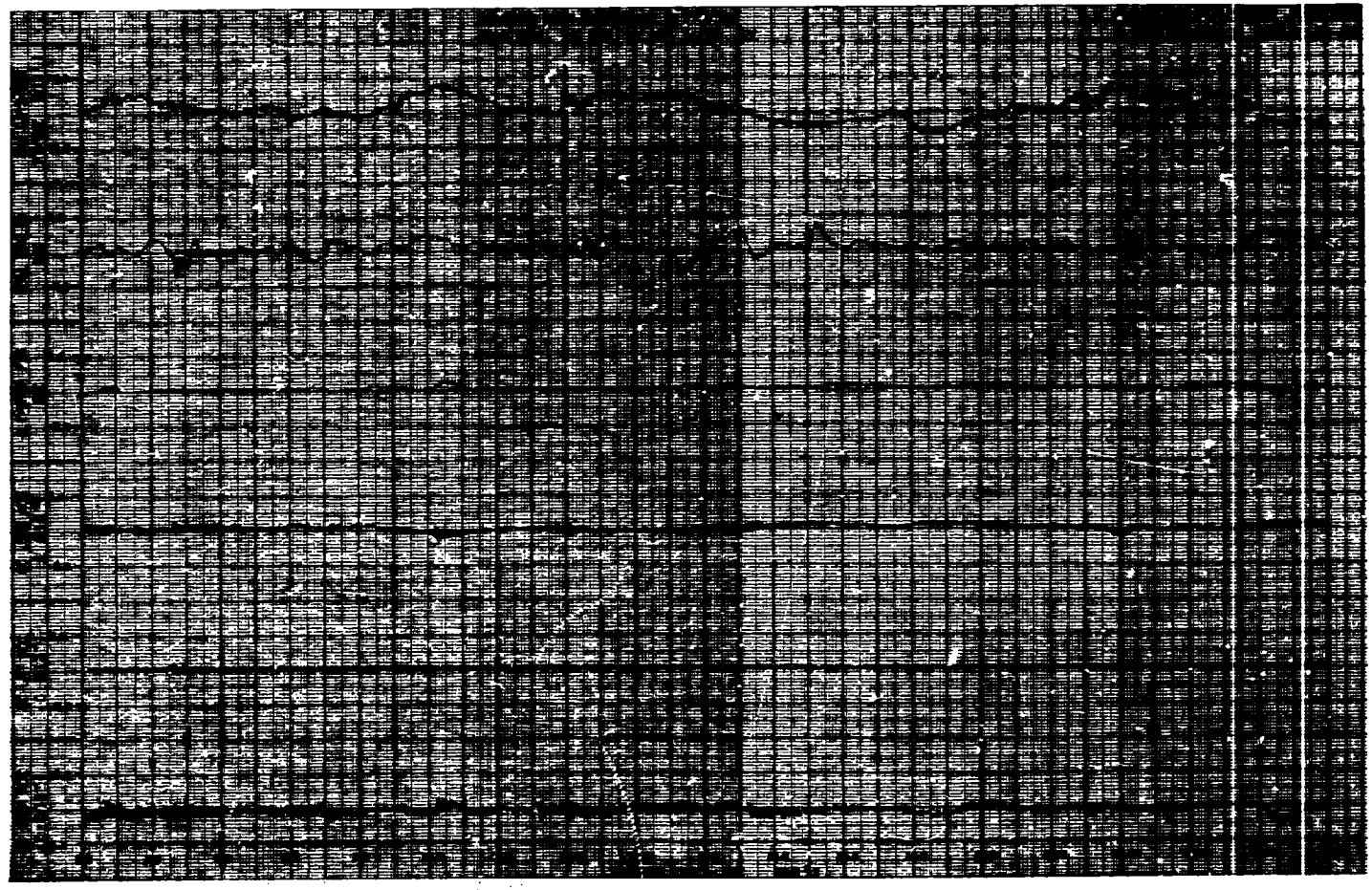


Figure 62B. Flight Parameter Time Histories of Test 114, Run 11 - (Sheet 1 of 2).

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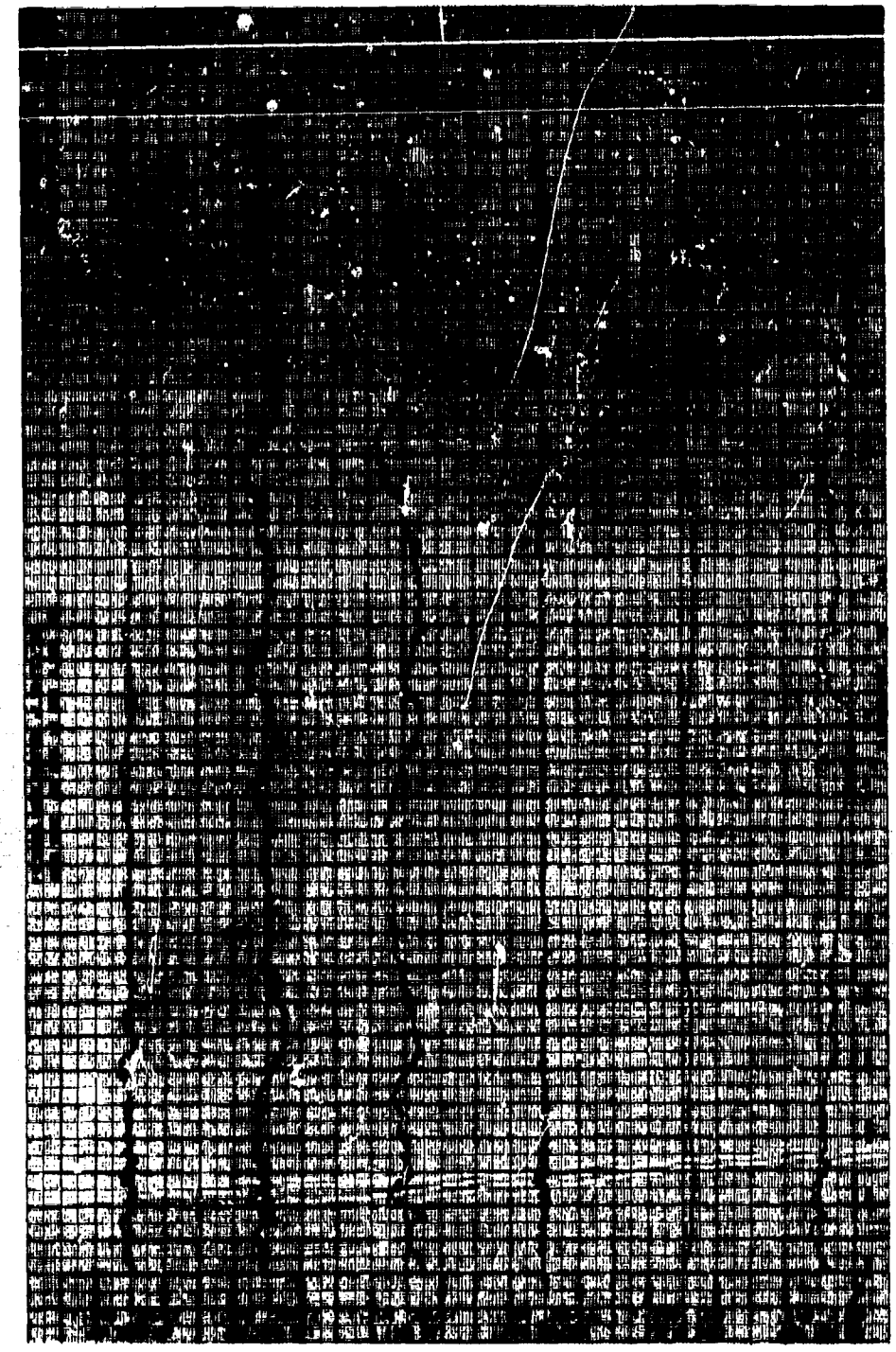


Figure 62A. Gust Velocity Time Histories of Test 114, Run 11 - (Edwards AFB, California, 29 Aug 66) (Sheet 2 of 2).

Figure 62B. Flight Parameter Time Histories of Test 114, Rm 11 - (Sheet 2 of 2).

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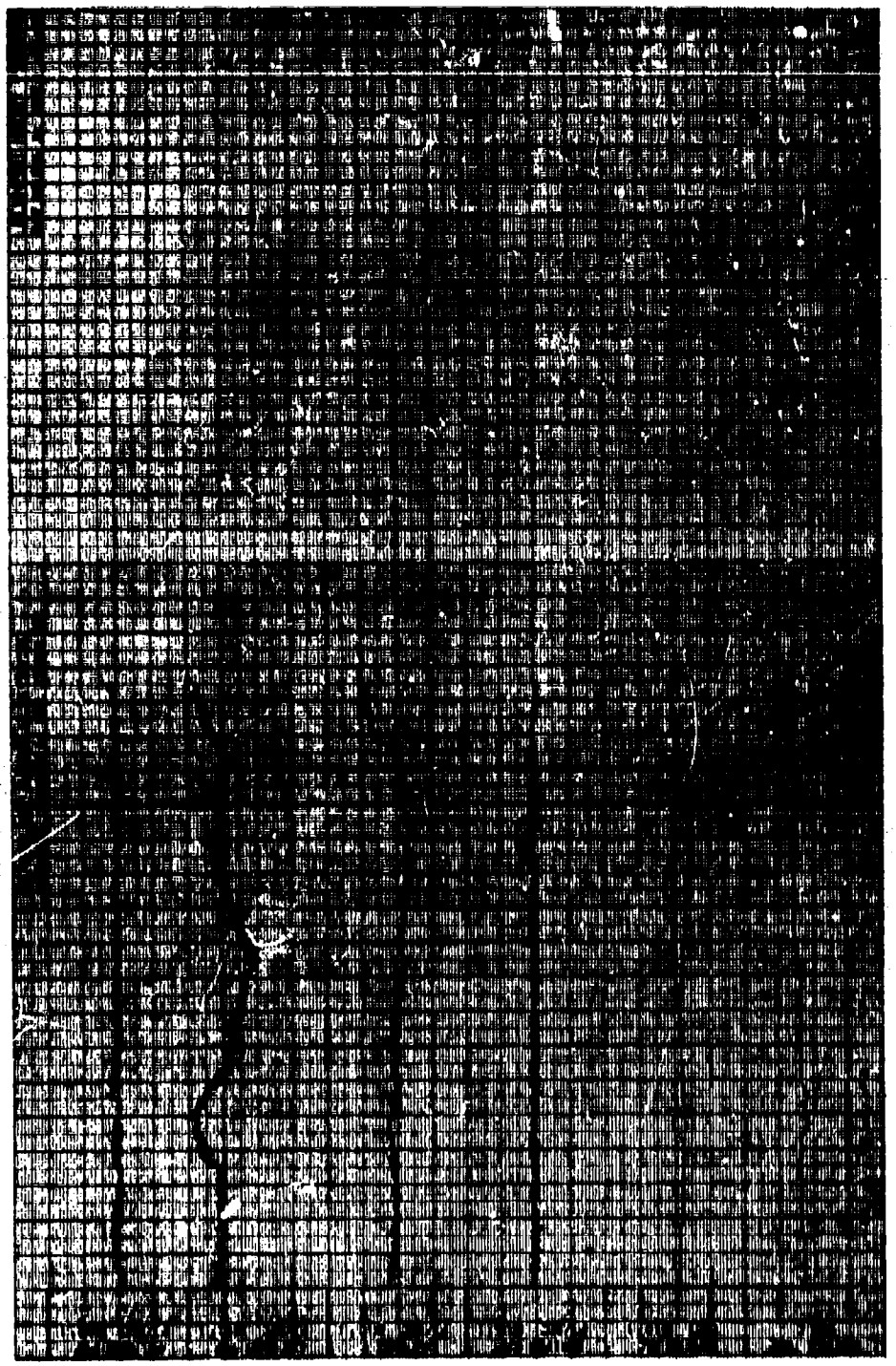


Figure 63A. Gust Velocity Time Histories of Test 114, Run 12 - (Edwards AFB, California, 29 Aug 66).

Figure 63. Flight Parameter Time Histories of Test 114, Run 12.

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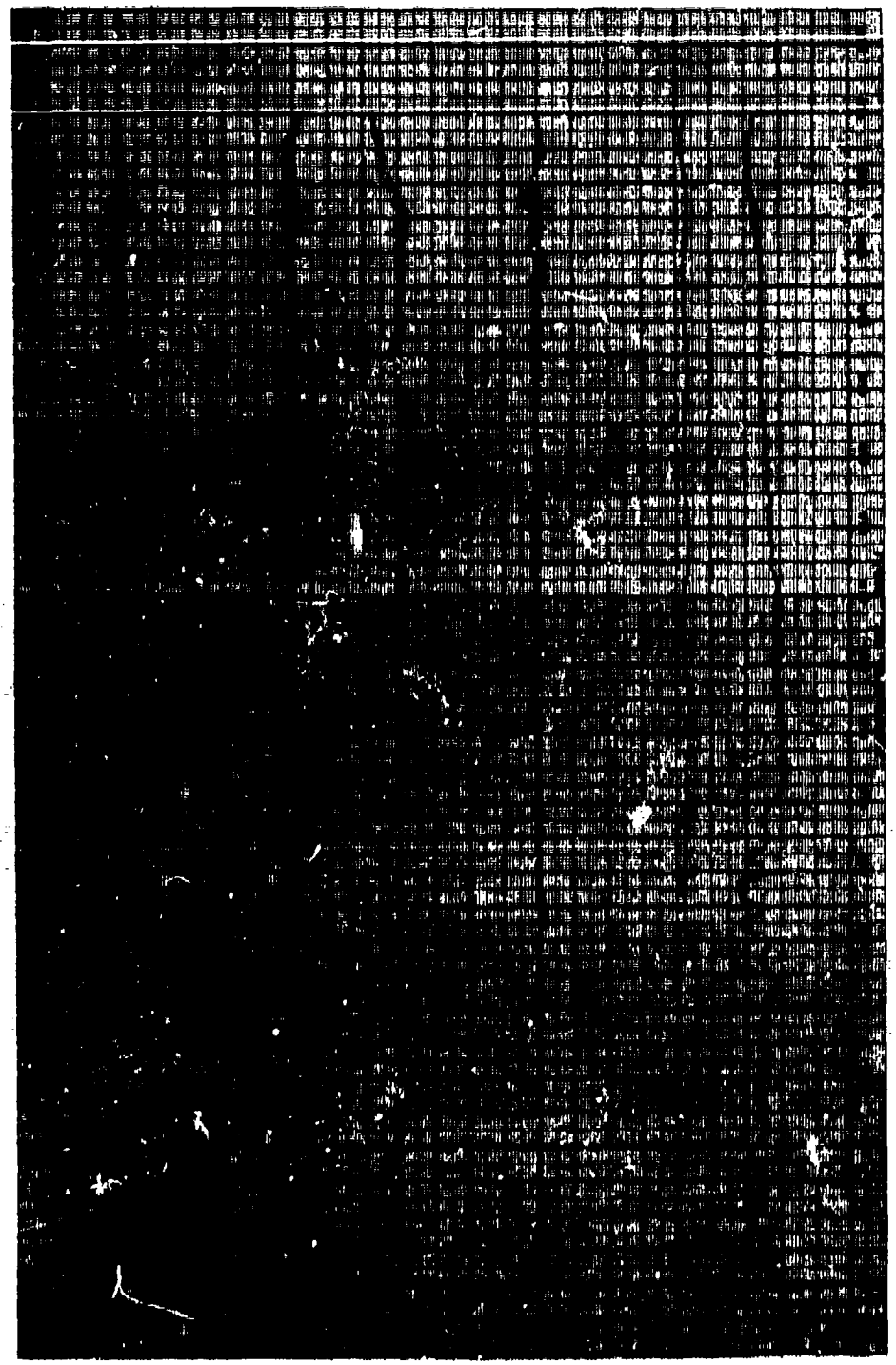


Figure 64. Gust Velocity Time Histories of Test 114, Run 13 - (Edwards AFB, California, 29 Aug 66).



Figure 64B. Flight Parameter Time Histories of Test 114, Run 13.

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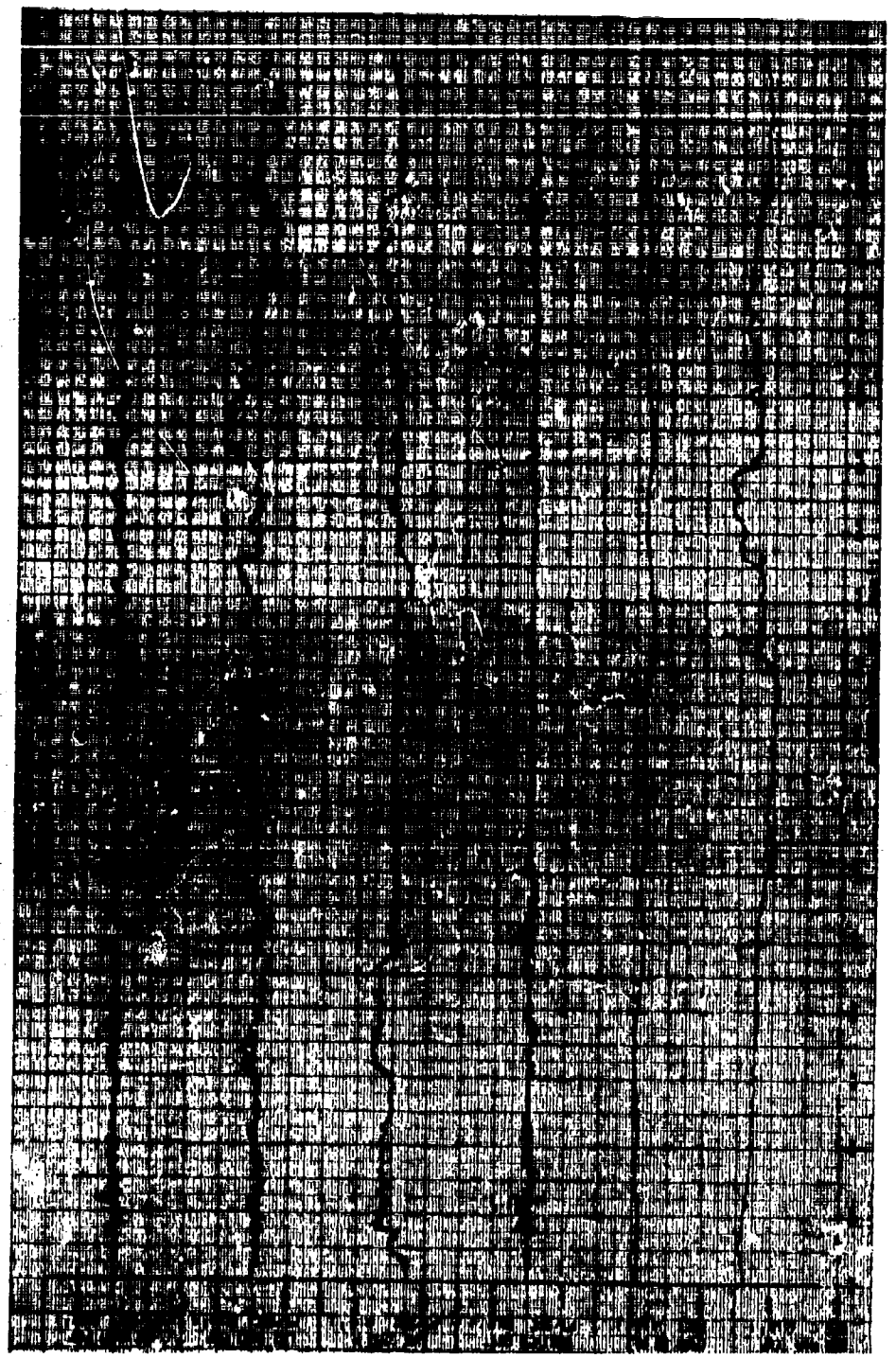


Figure 65A. Gust Velocity Time Histories of Test 114, Run 14 - (Edwards AFB, California, 29 Aug 66) (Sheet 1 of 2).

Figure 65B. Flight Parameter Time Histories of Test 114, Run 14 - (Sheet 1 of 2).

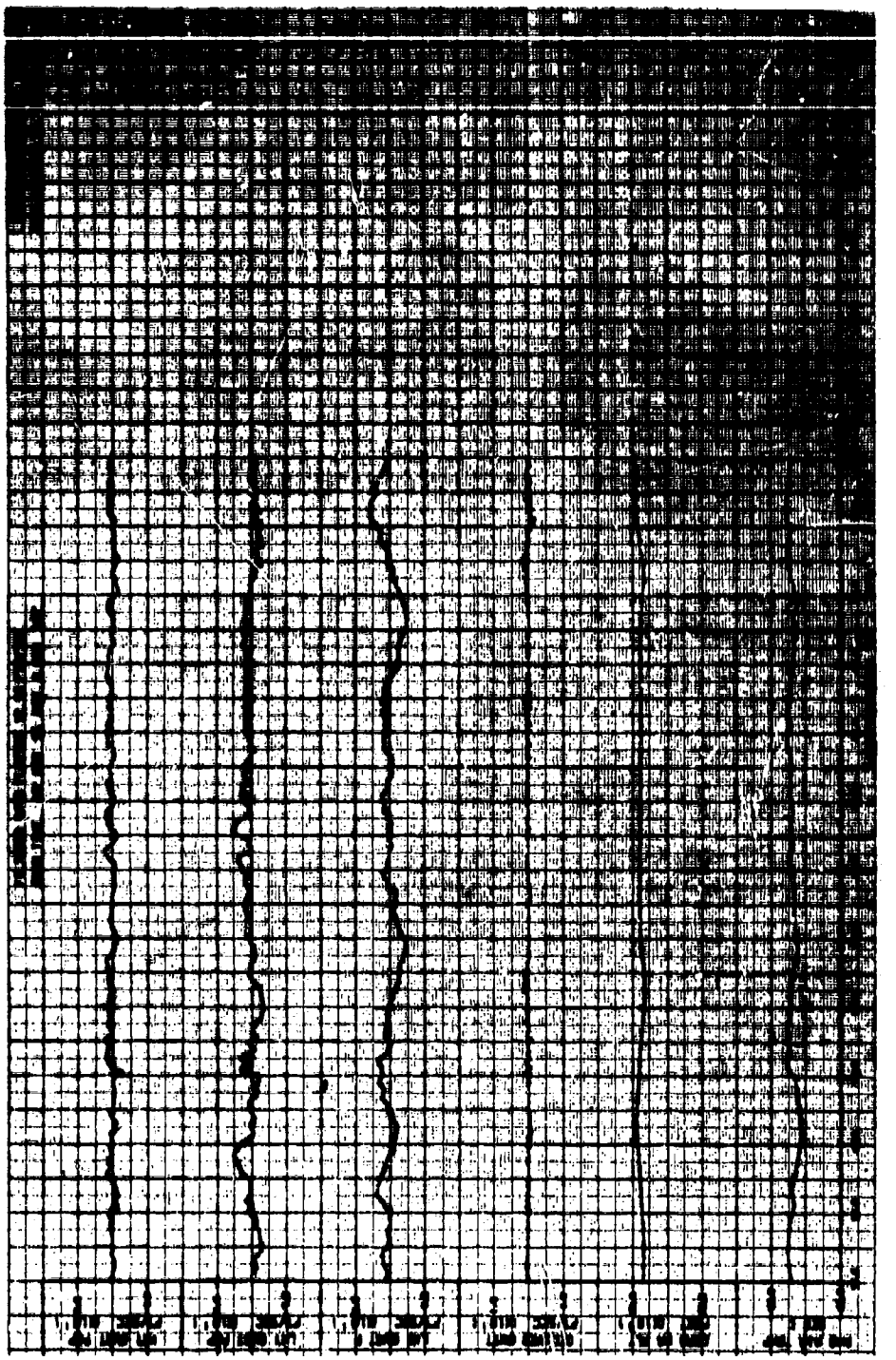


Figure 65A. Jet Velocity Time Histories of Test 114, Run 14 - (Edwards AFB, California, 29 Aug 66) (Sheet 2 of 2)

Figure 65B. Flight Parameter Time Histories of Test 114, Run 14 - (Sheet 2 of 2).

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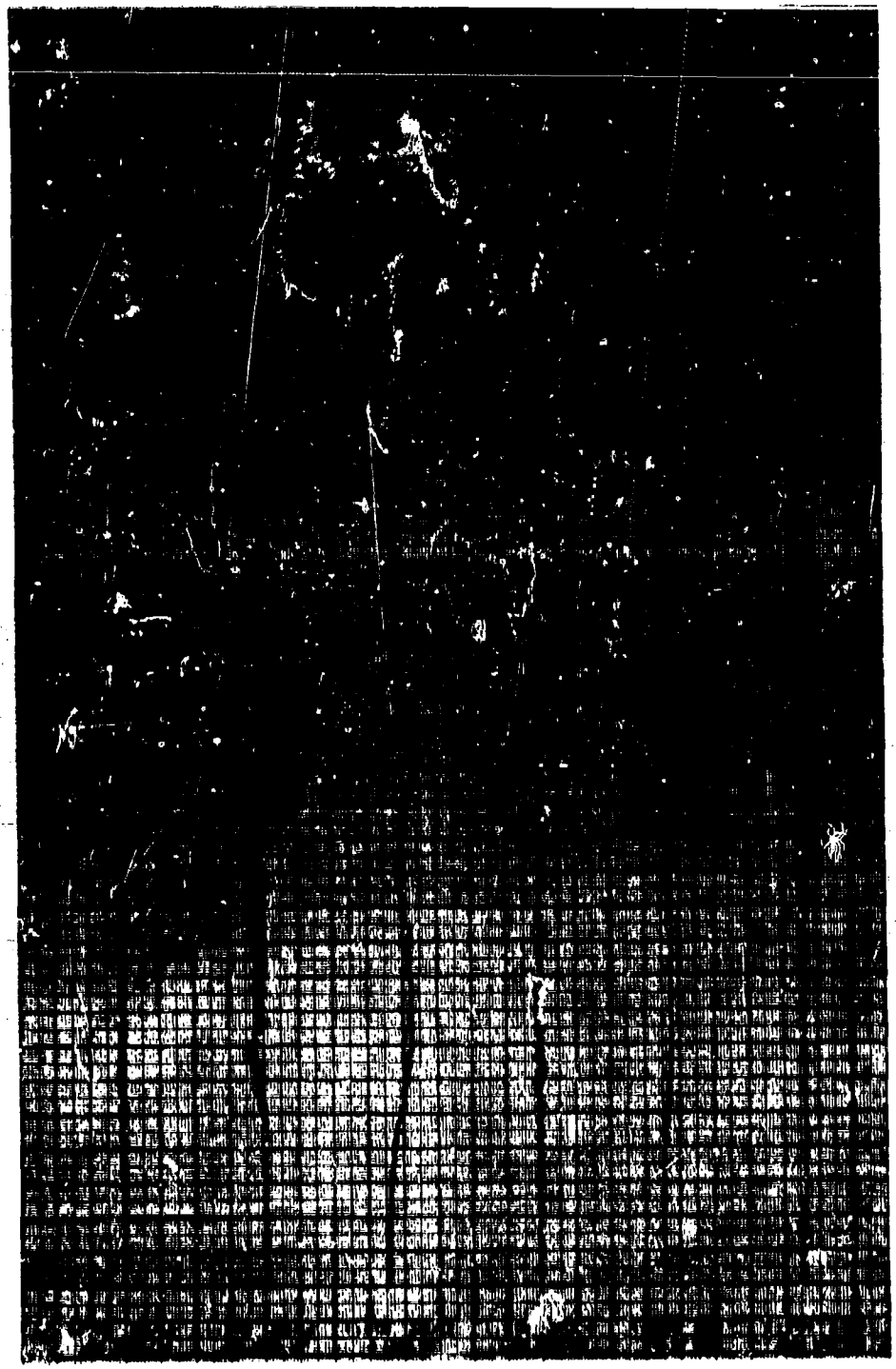


Figure 66A. Gust Velocity Time Histories of Test 142, Run 3 - (Parey AFB, Puerto Rico, 8 Nov 66).

Figure 66B. Flight Parameter Time Histories of Test 142, Run 3.

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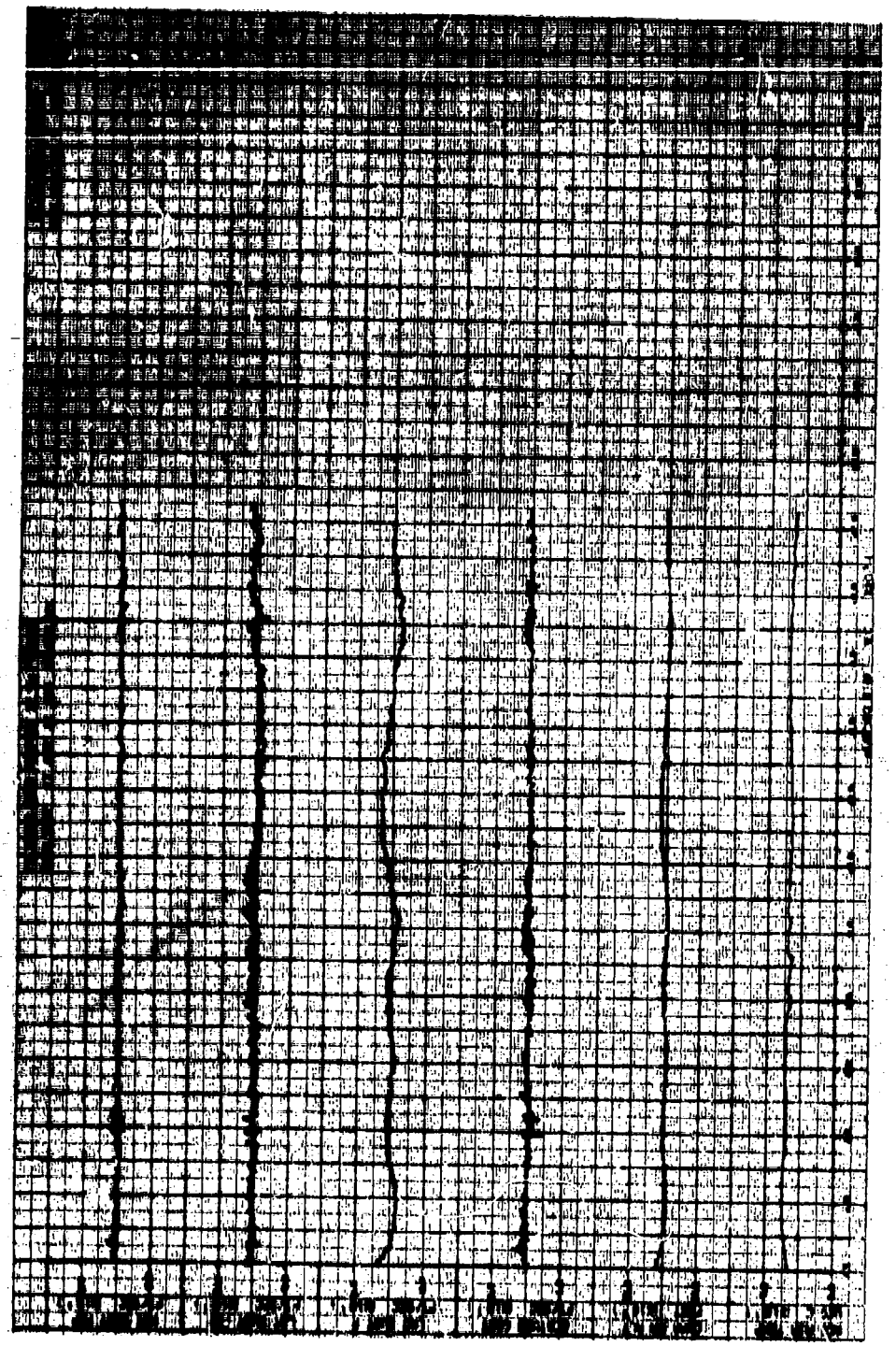


Figure 67A. Gust Velocity Time Histories of Test 142, Run 4 - (Ramey AFB, Puerto Rico, 8 Jan 62).

Figure 6.B. Flight Parameter Time Histories of Test 142, Run 4.

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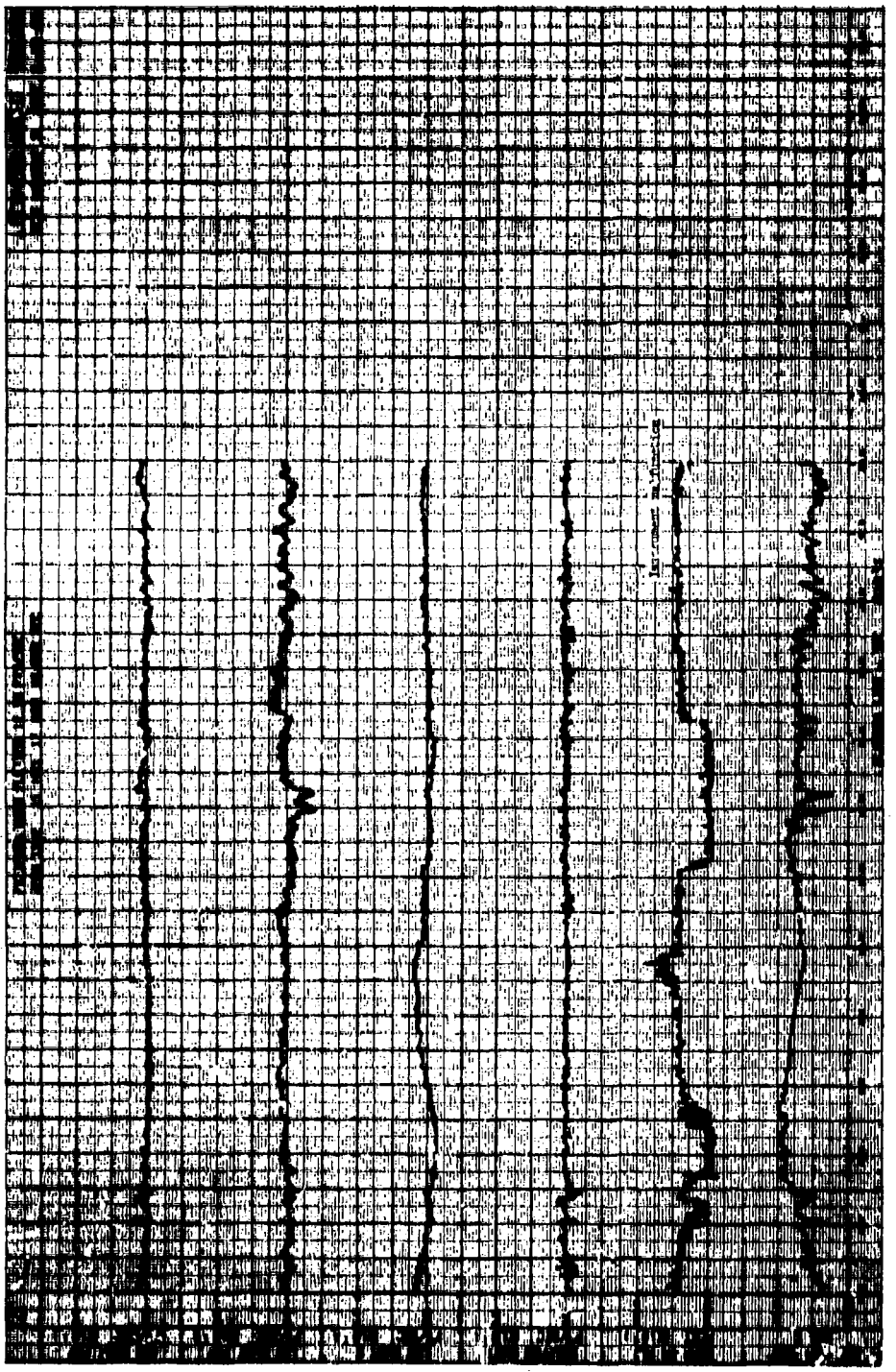


Figure 68A. Gust Velocity Time Histories of Test 14, Run 3 - (Camp Ares, Puerto Rico, 10 May 66).

Figure 68a. Flight Parameter Time Histories of Test 144, Run 3.

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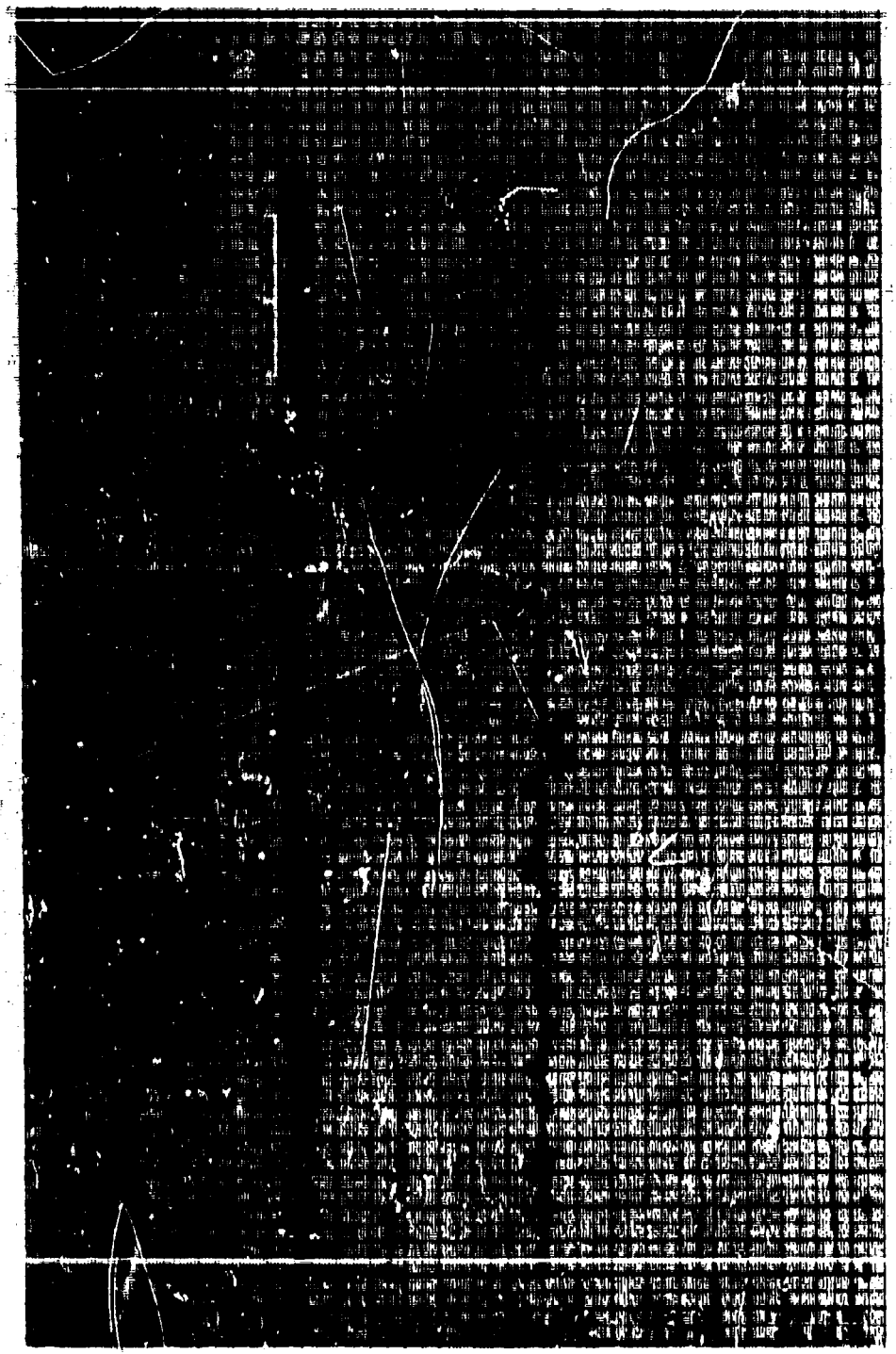


Figure 69a. Gust Velocity Time Histories of Test 147, Run 3 - (Ramey AFB, Puerto Rico, 16 Nov 66).

Figure 69B. Flight Parameter Time Histories of Test 147, Run 3.

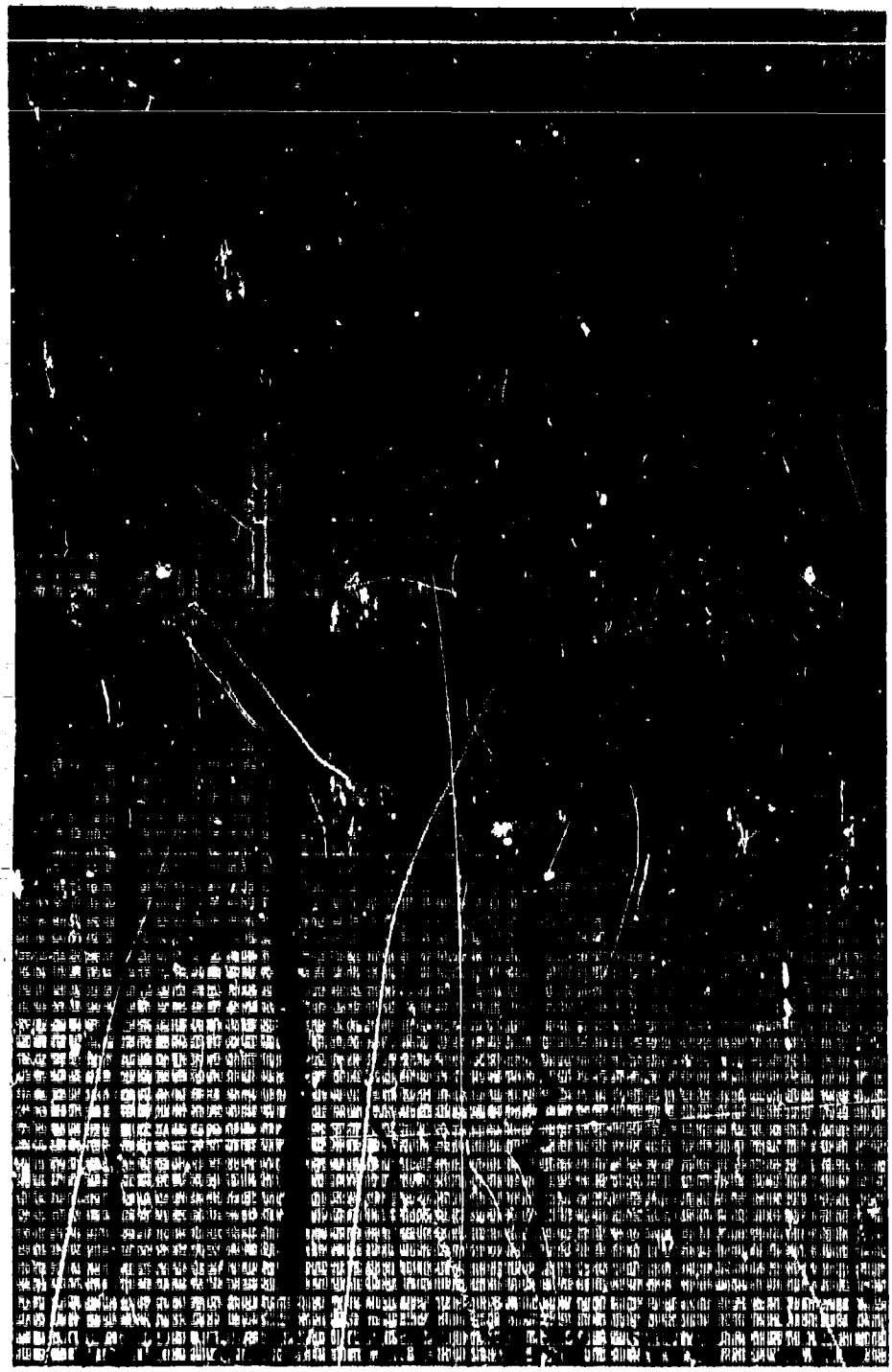


Figure 70A. Gust Velocity Time Histories of Test 147, Rnn 4 - (Ramey AFB, Puerto Rico, 16 Nov 66).

Figure 70B. Flight Parameter Time Histories of Test 147, Run 4.

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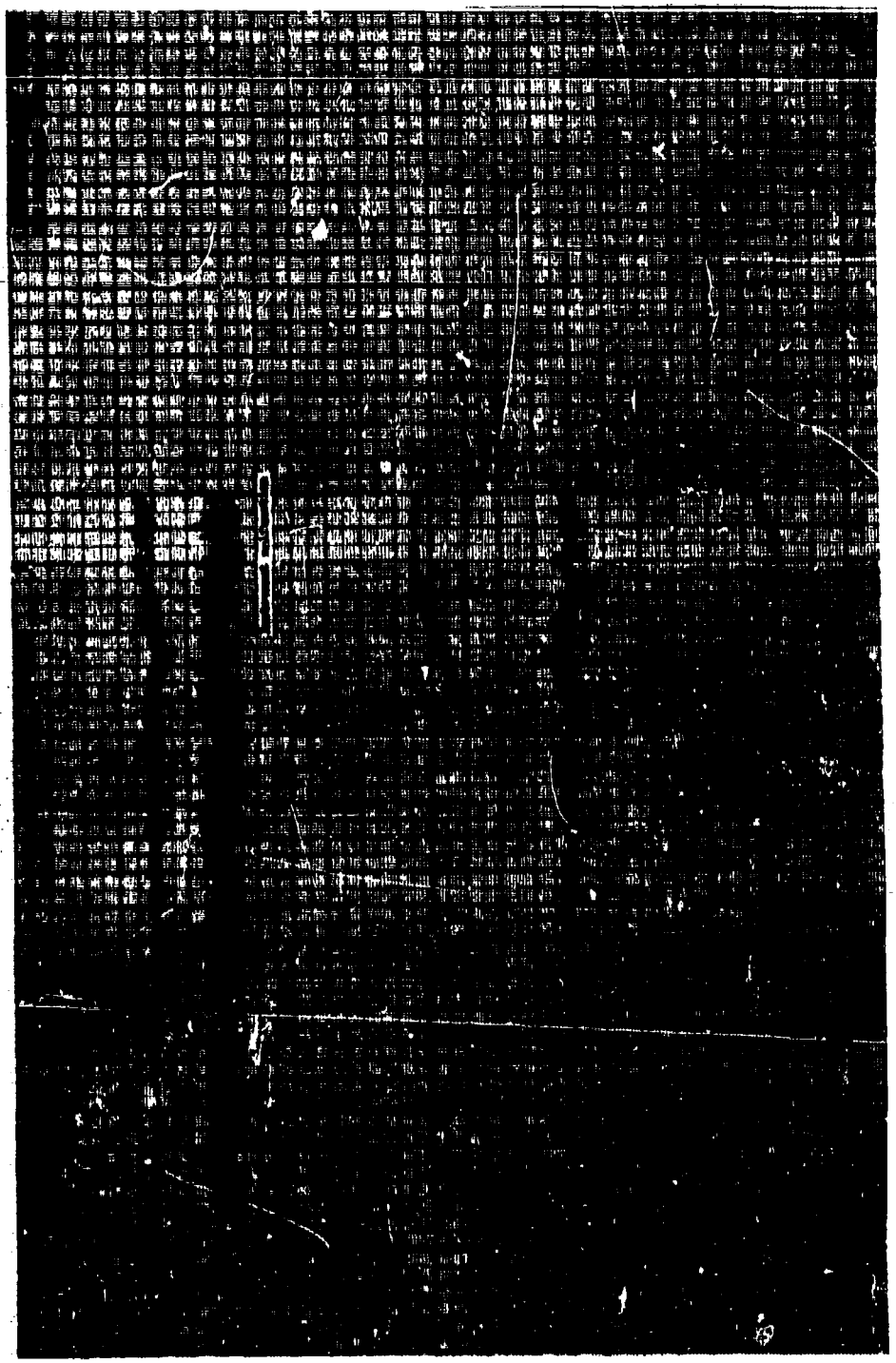


Figure 71A. Gust Velocity Time Histories of Test 147, Run 5 - (Ramey AFB, Puerto Rico, 16 Nov 66).

Figure 71B. Flight Parameter Time Histories of Test 147, Run 5.

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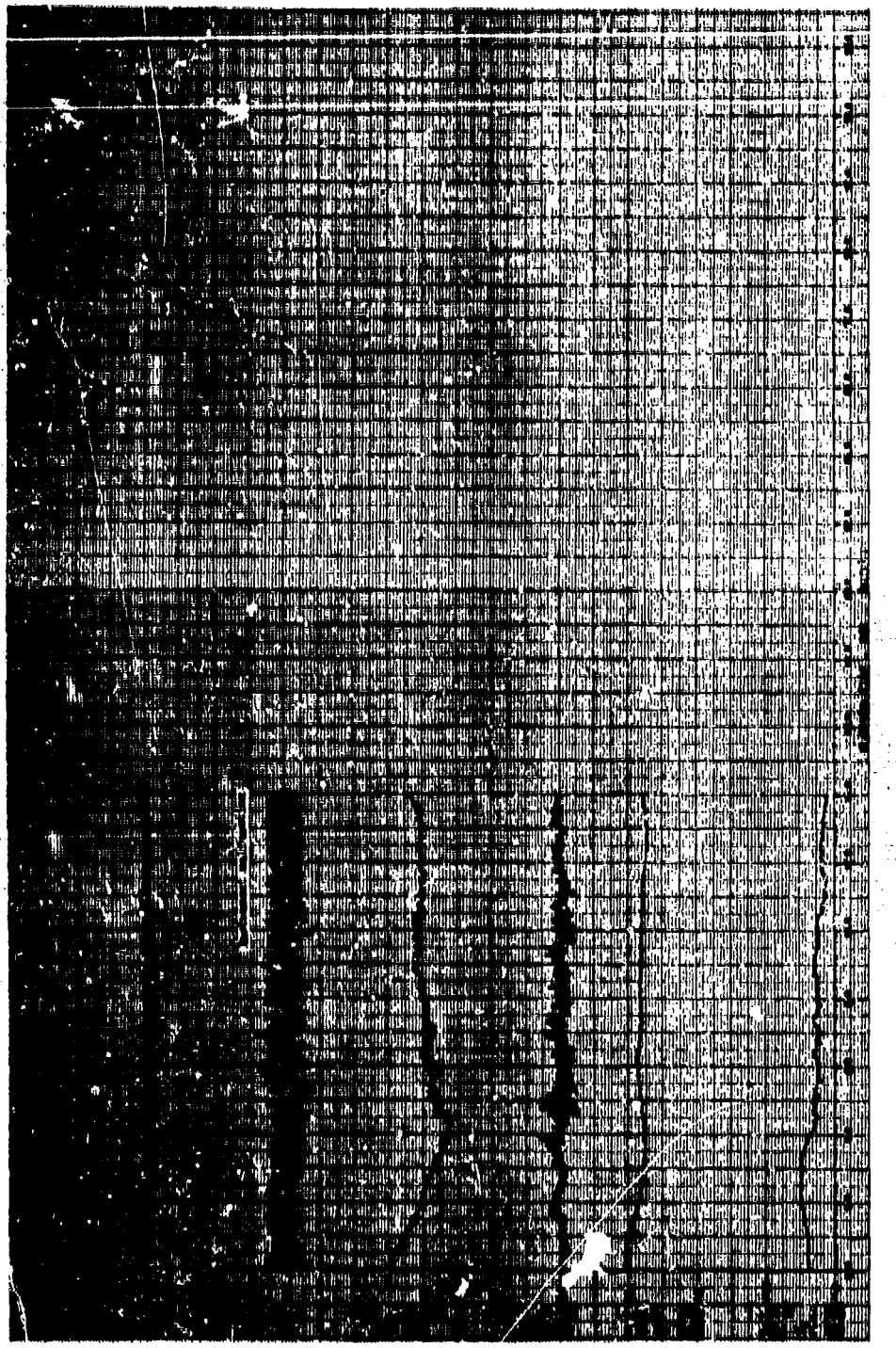


Figure 72A. Giant Velocity Mine Electrical Test Lot, Item 7 - (Camp Ritz, Puerto Rico, 16 Jan 66)

Figure 72B. Flight Parameter Time Histories of Test 147, Run 7.

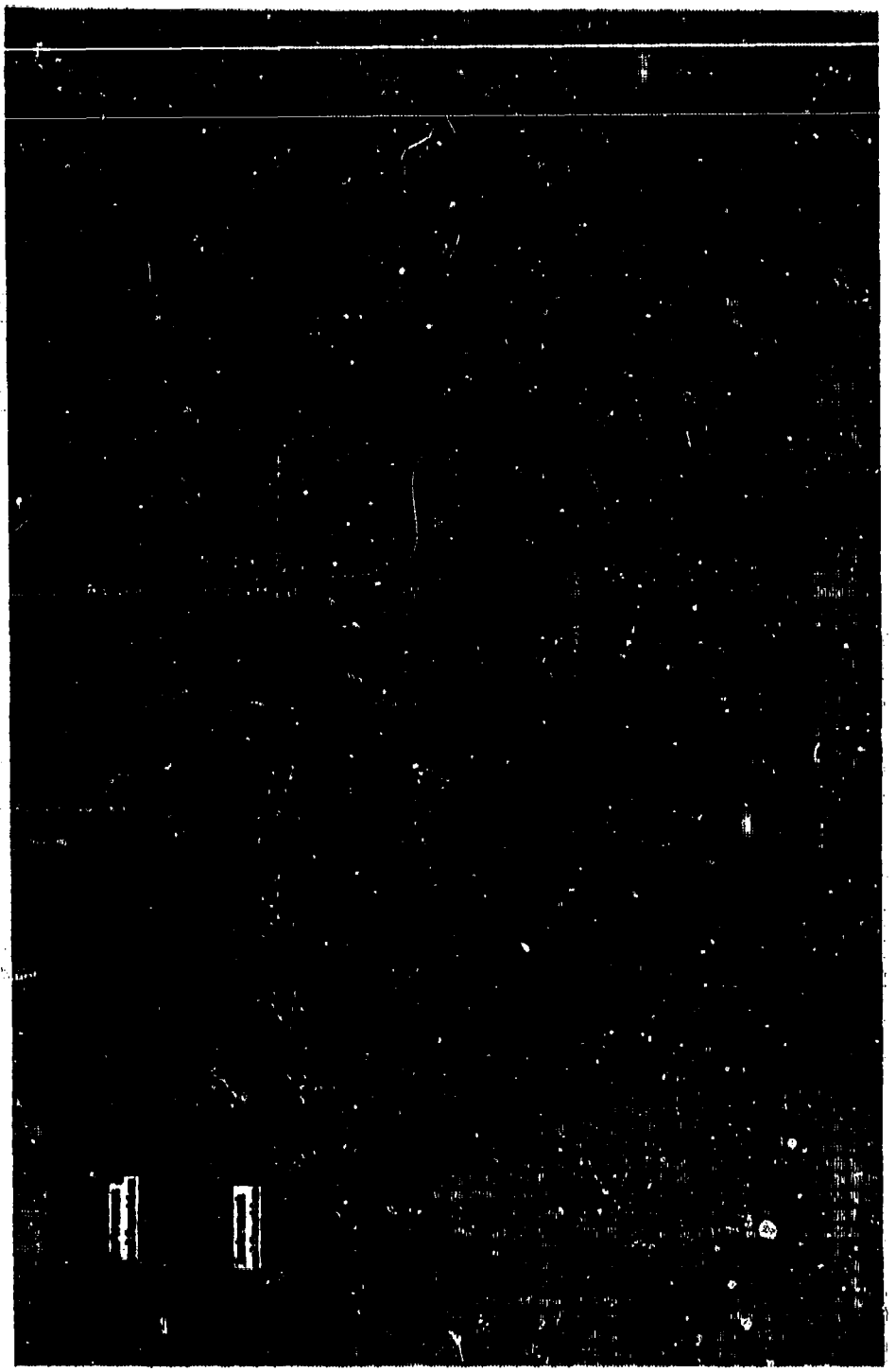


Figure 73A. Gust Velocity Time Histories of Test 147, Run 8 - (Ramey AFB, Puerto Rico, 16 Nov 66).

Figure 73B. Flight Parameter Time Histories of Test 147, Run 8.

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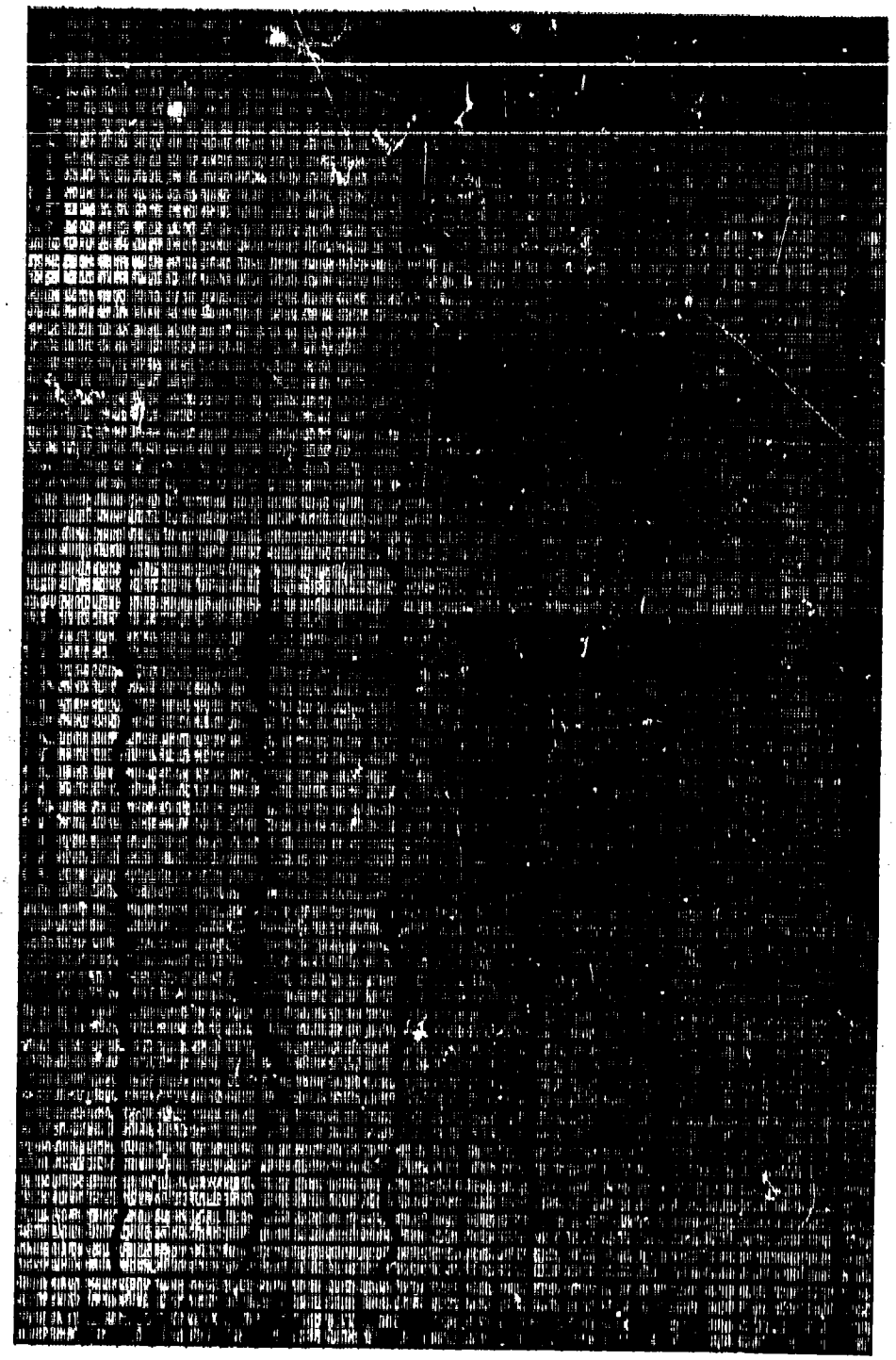


Figure 74A. Gust Velocity Time Histories of Test 164, Run 4 - (Elmendorf AFB, Alaska, 16 Jan 67).

Figure 74B. Flight Parameter Time Histories of Test 164, Run 4.

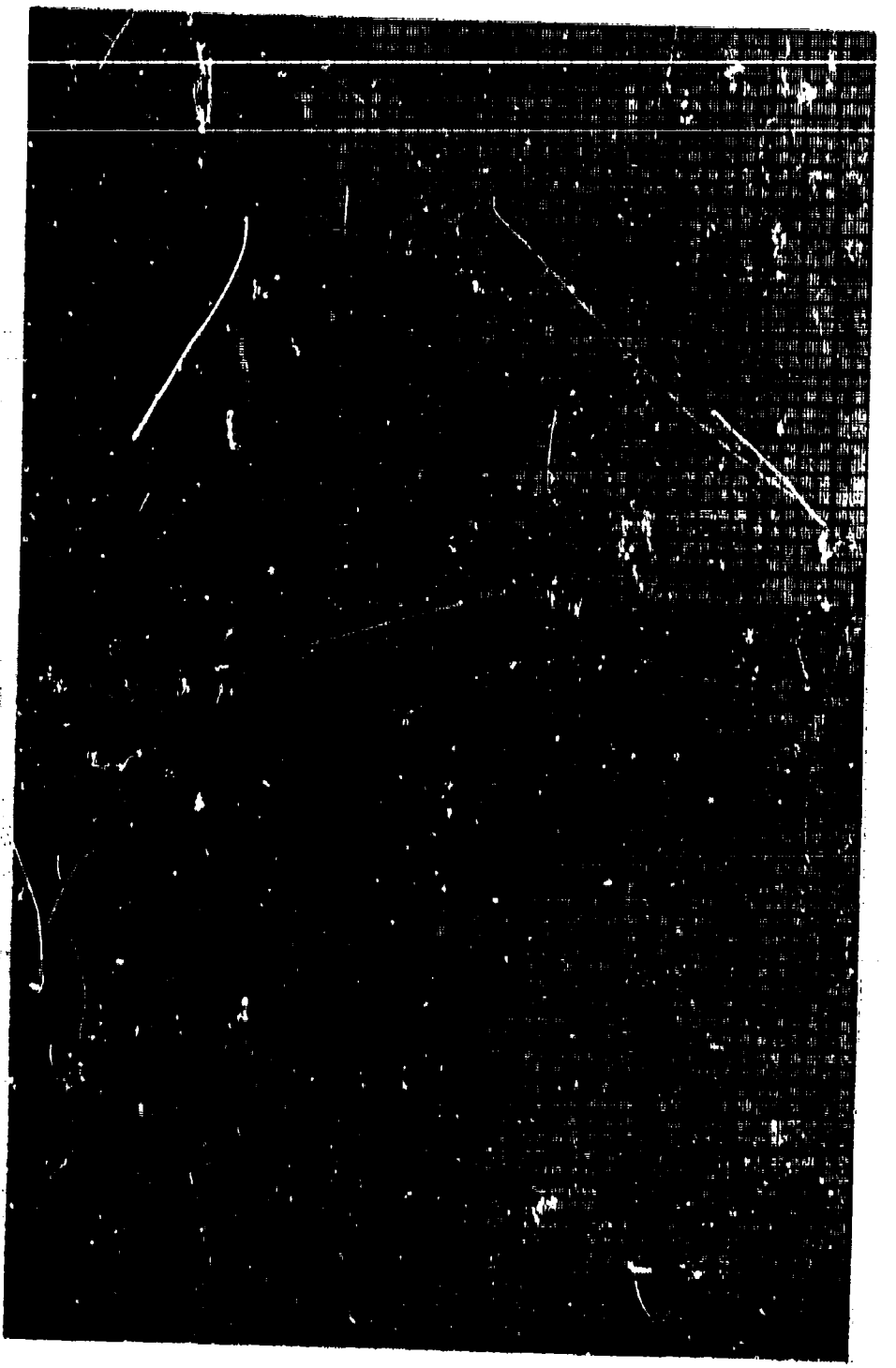


Figure 72A. Gust Velocity Time Histories of Test 164, Run 5 - (Elmendorf AFB, Alaska, 16 Jan 67).

Figure 75B. Flight Parameter Time Histories of Test 164, Run 5.

Appendix VI

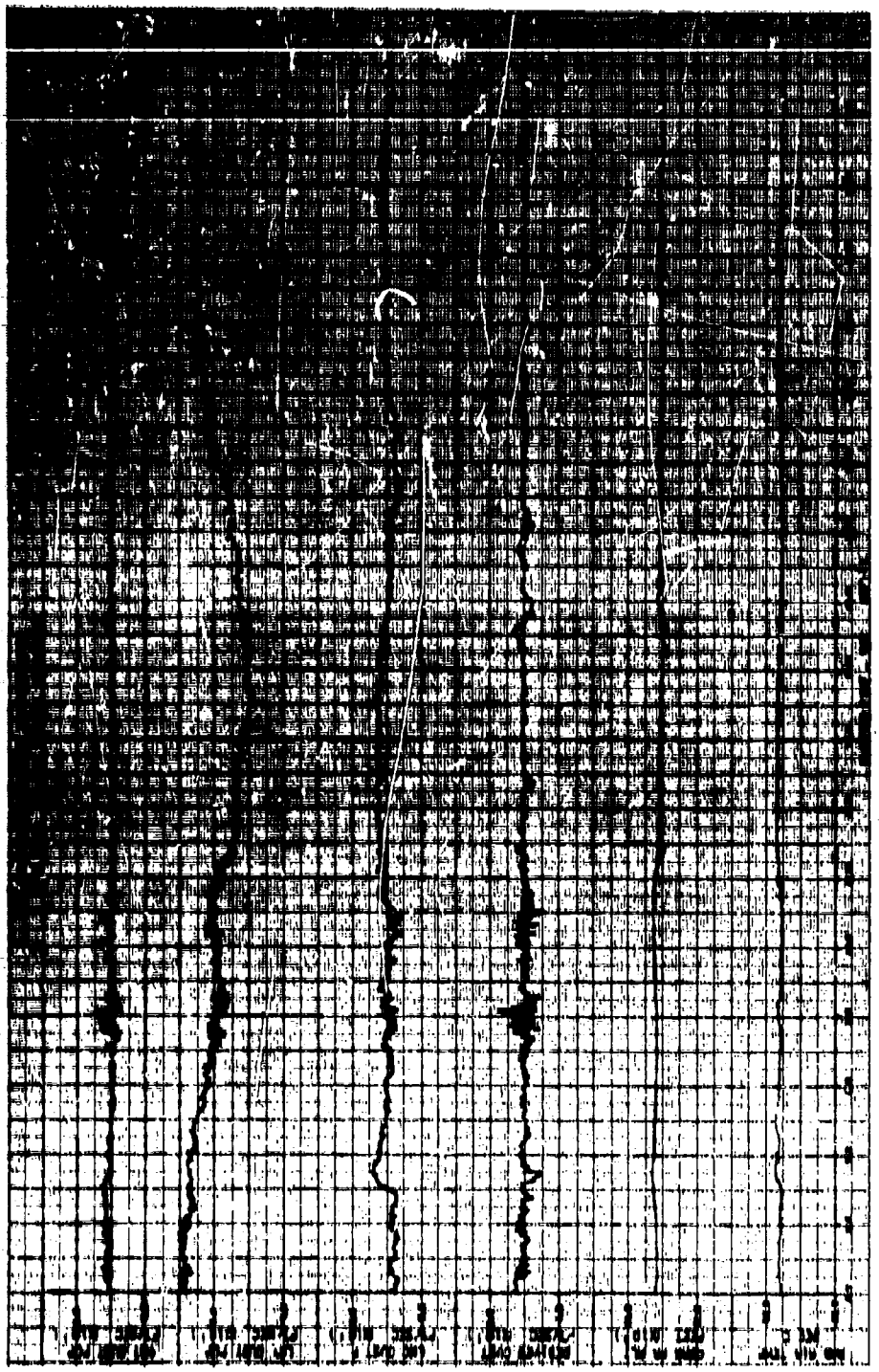


Figure 76A. Gust Velocity Time Histories of Test 164, Run 6 (Firendorf AFB, Alaska, 16 Jan 67) (Sheet 1 of 2).

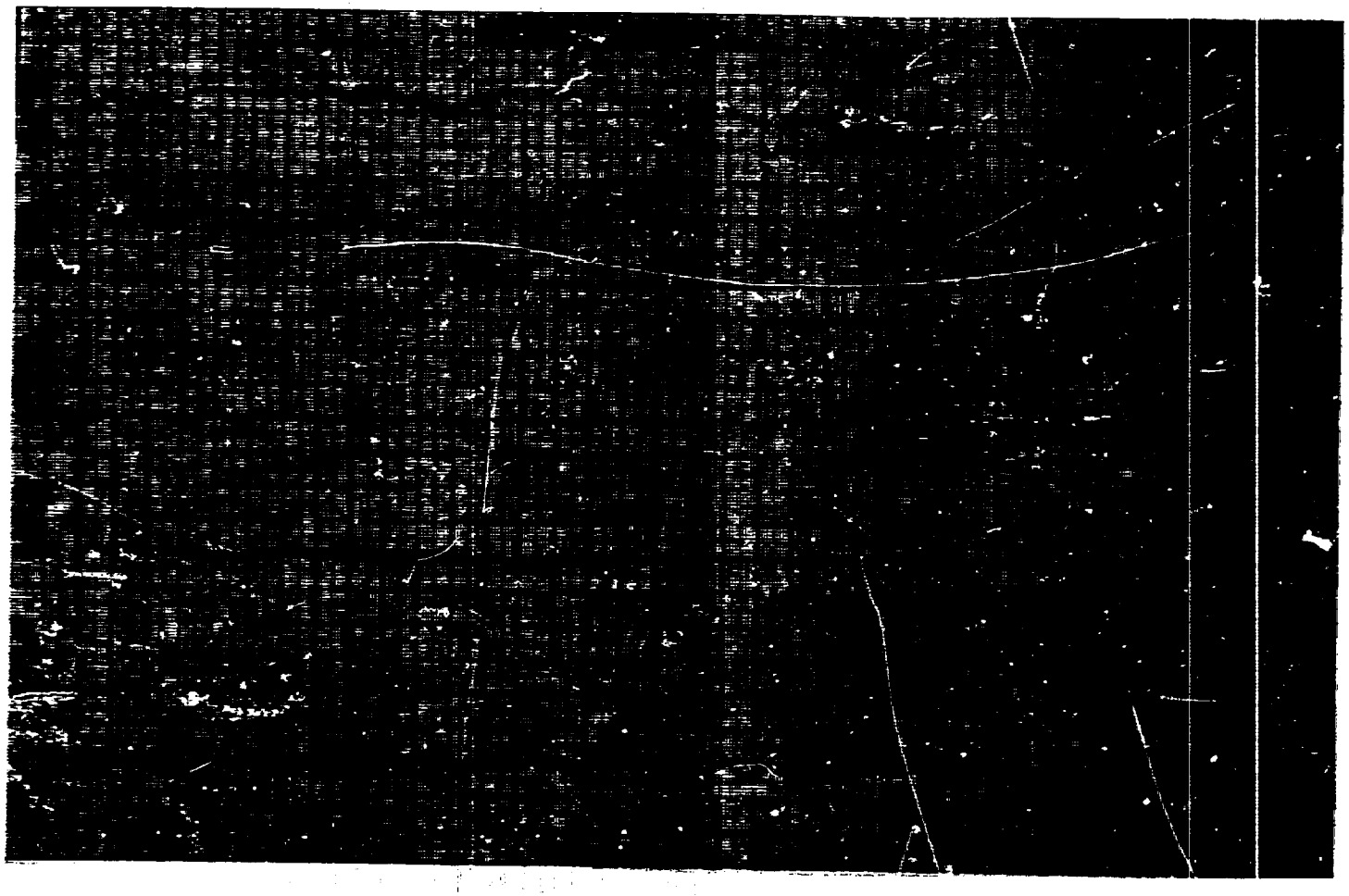


Figure 76B. Flight Parameter Time Histories of Test 164, Run 6 - (Sheet 1 of 2).

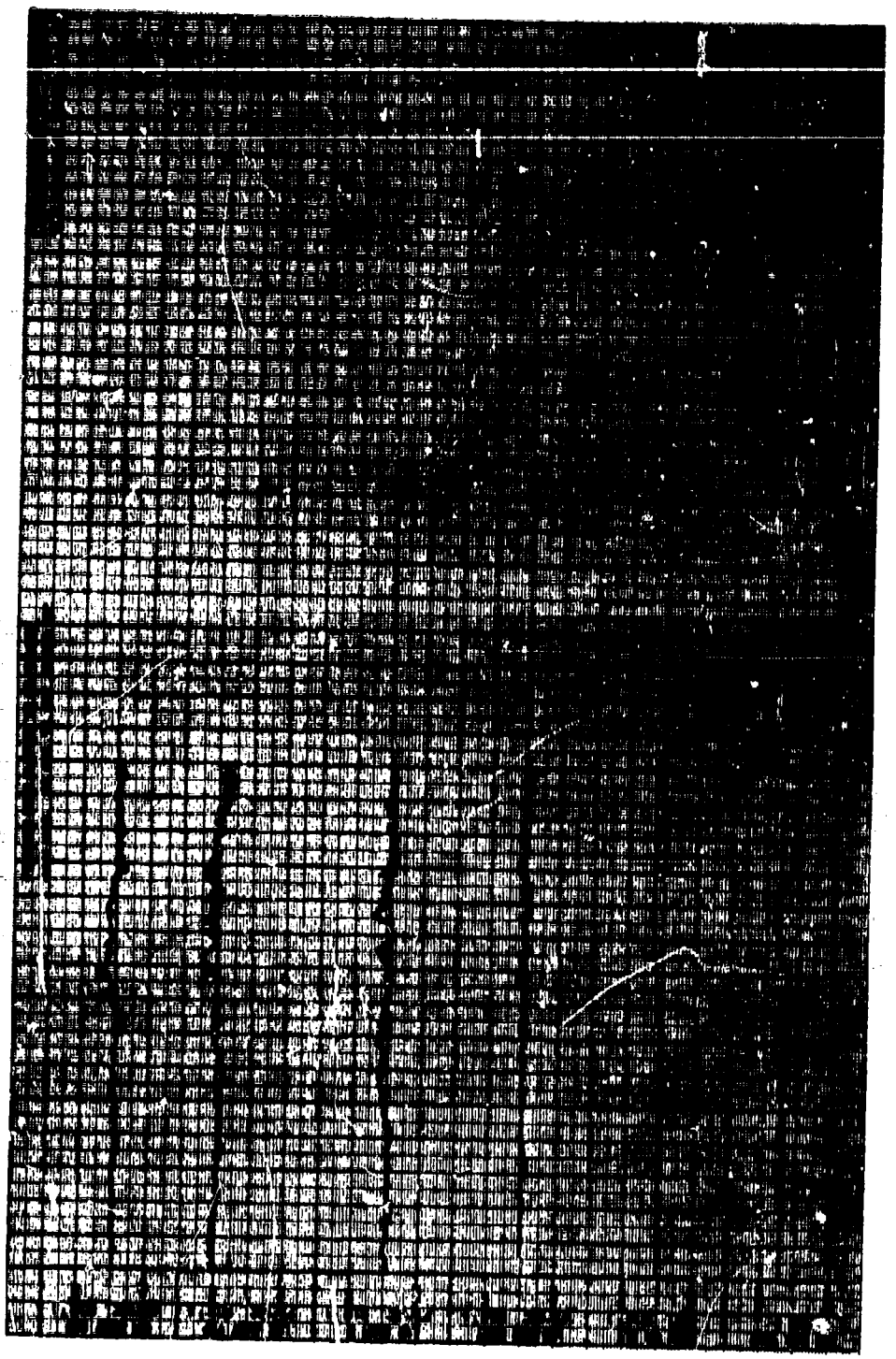


Figure 76a. Gust Velocity Time Histories of Test 164, Run 6 - (Elmendorf AFB, Alaska, 16 Jan 67) (Sheet 2 of 2).

Figure 768. Flight Parameter Time Histories of Test 154, Run 6 - (Sheet 2 of 2).

Appendix VI

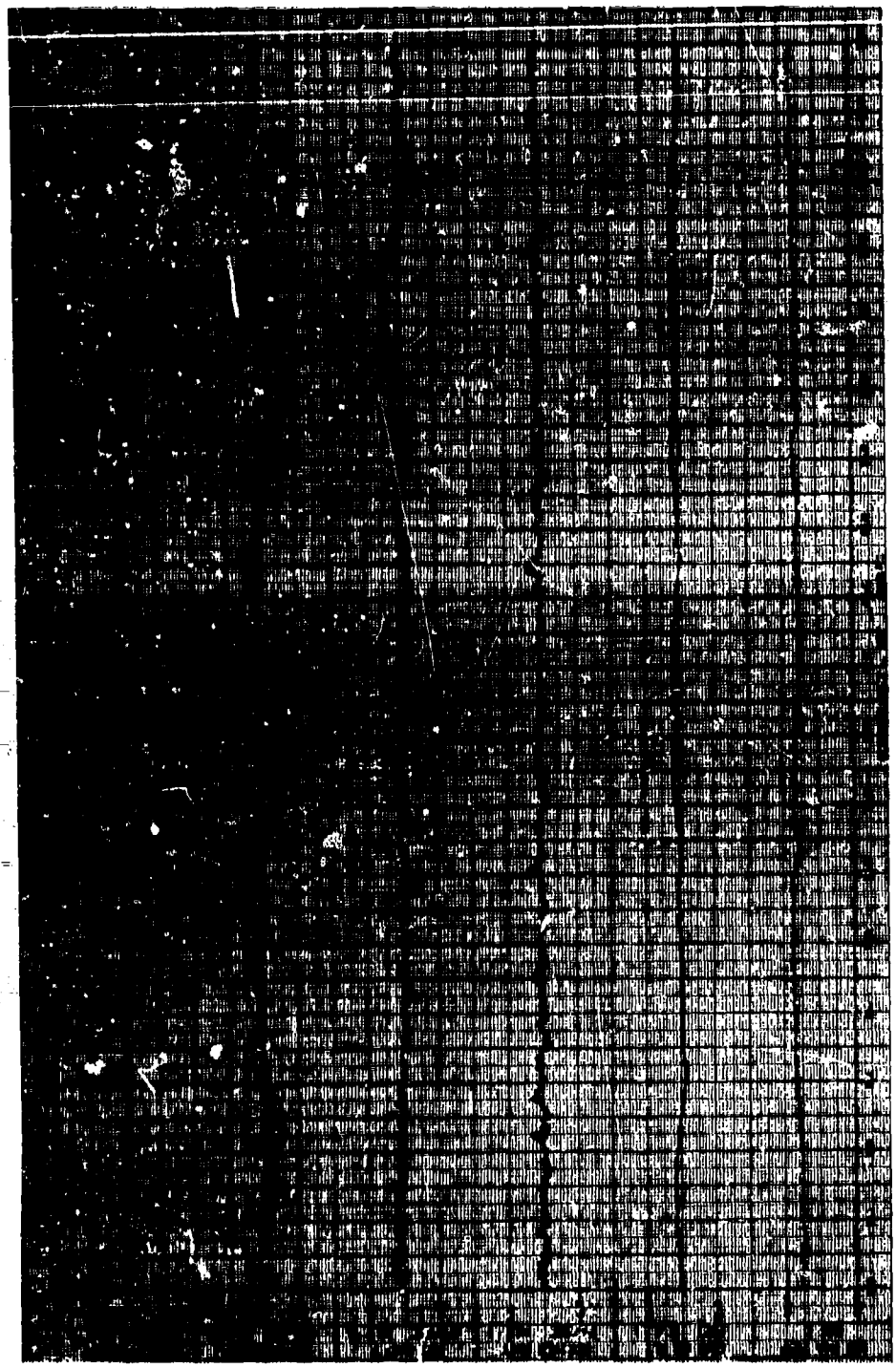


Figure 77A. Gust Velocity Time Histories of Test 164, Run 7 - (Elmendorf AFB, Alaska, 16 Jan 67) (Sheet 1 of 2).

Figure 77. Flight Parameter Time Histories of Test 164, Run 7 - (Sheet 2 of 2).

Appendix VI

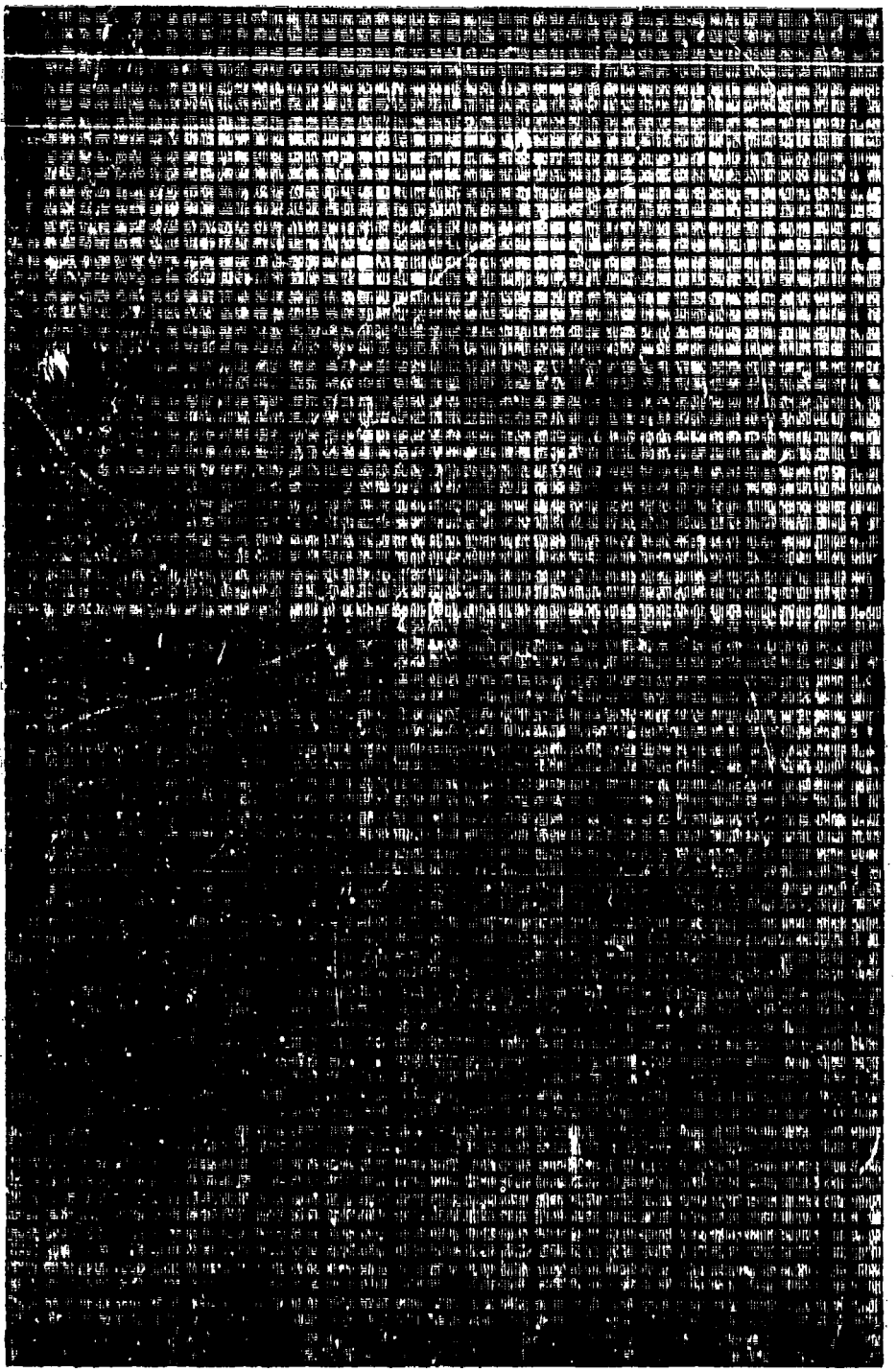


Figure 77A. Gust Velocity Time Histories of Test 164, Run 7 - (Elmendorf AFB, Alaska, 16 Jan 67) (Sheet 2 of 2).

Figure 175. Flight Parameter Time Histories of Test 164, Run 7 - (Sheet 1 of 2).

APPENDIX VII

GUST VELOCITY POWER SPECTRA

Gust velocity power spectra for qualifying CAT runs are presented in order by test number in Figures 78 through 154. These are prewhitened - post darkened spectra computed from gust velocity time histories with linear trends removed as described in Section IV, Data Processing.

The spectra labels are somewhat abbreviated and require explanation. The first three digits after "Test" are the test number. The fourth and, when required, the fifth digit comprise the run number. The next two letters represent the test base of operations as follows:

EC	Edwards AFB, California
PR	Ramey AFB, Puerto Rico
HH	Hickam AFB, Hawaii
NZ	Christchurch International Airport, Christchurch, New Zealand
RA	Royal Australian Air Force Base, Laverton, Australia
HM	Hanscom Fld, Bedford, Massachusetts
EA	Elmendorf AFB, Anchorage, Alaska

The next two digits are the altitude in thousands of feet followed by three numbers designating the true airspeed in feet per second. The "Start Time" is the moment the run began in hours, minutes, and seconds, Greenwich time. "Duration" of run length is in minutes and seconds. The "No. Lags" is the number of separate estimates comprising the spectrum. The "Time Incr." is the time between data samples in seconds. "No. Points" is the number of data samples in the run. "Deg Freedom" is the number of degrees of freedom contained in the data run and is used to evaluate the statistical reliability of the spectrum. For statistical reliability, the "Deg Freedom" should be large, preferably 100 or more. For 100 degrees of freedom one may say that four out of five times the measured spectrum is within ±18 percent of the "true" long term average spectrum.

The confidence band at the 80 percent confidence level corresponding to a specific number of degrees of freedom is shown in Figure 155.

The root mean square (rms) gust velocity value (in ft/sec) of the entire spectrum is tabulated next, followed by other rms values corresponding to the various wavelength cutoffs contained within the spectrum; these cutoffs are designated in thousands of feet by the numbers following the abbreviation rms, i.e., 10 refers to a 10,000-foot cutoff, 2 refers to a 2000-foot cutoff, etc.

Best Available Copy

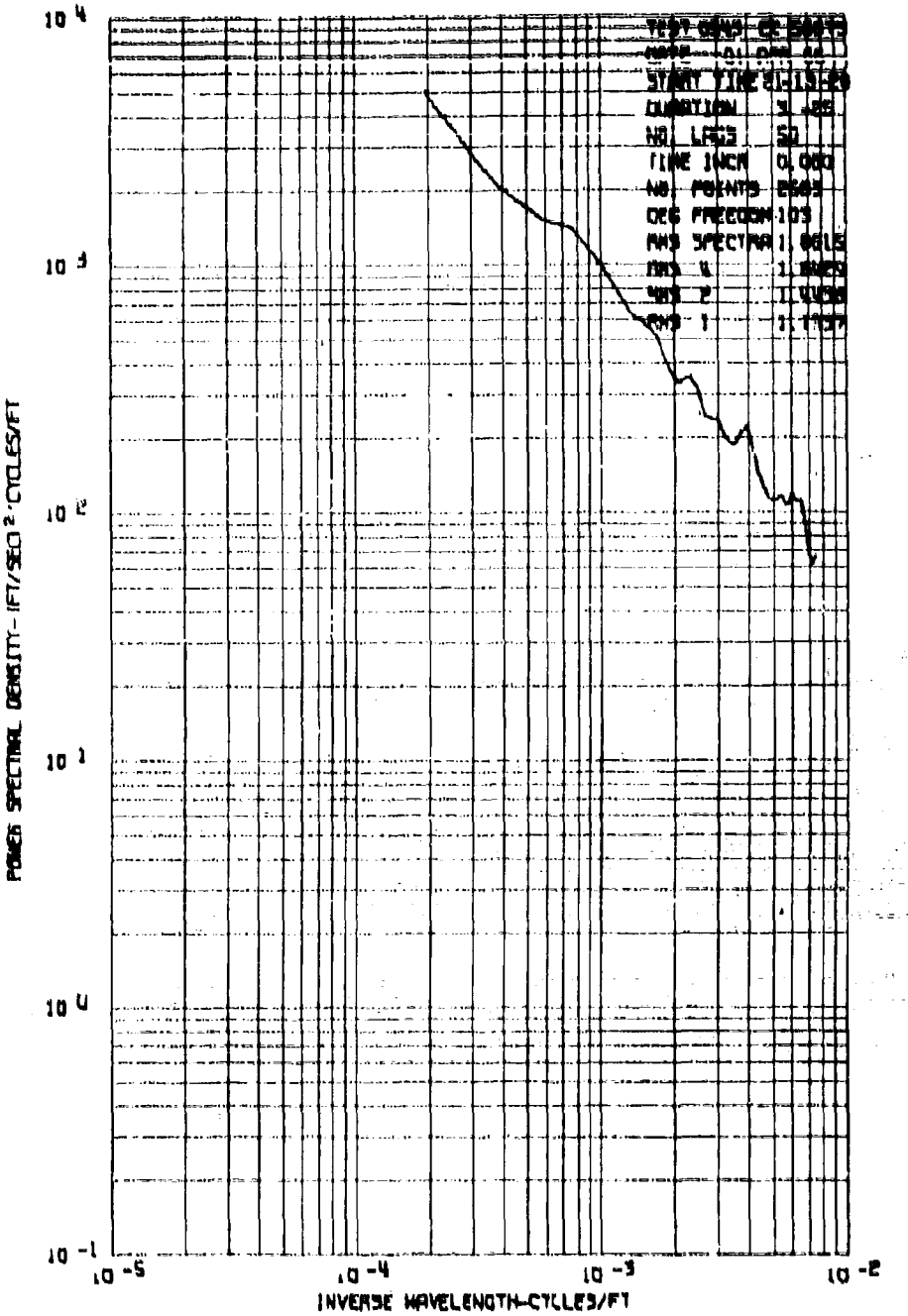


Figure 78A. Power Spectrum of Vertical Gust Velocity, Test 54, Run 3.

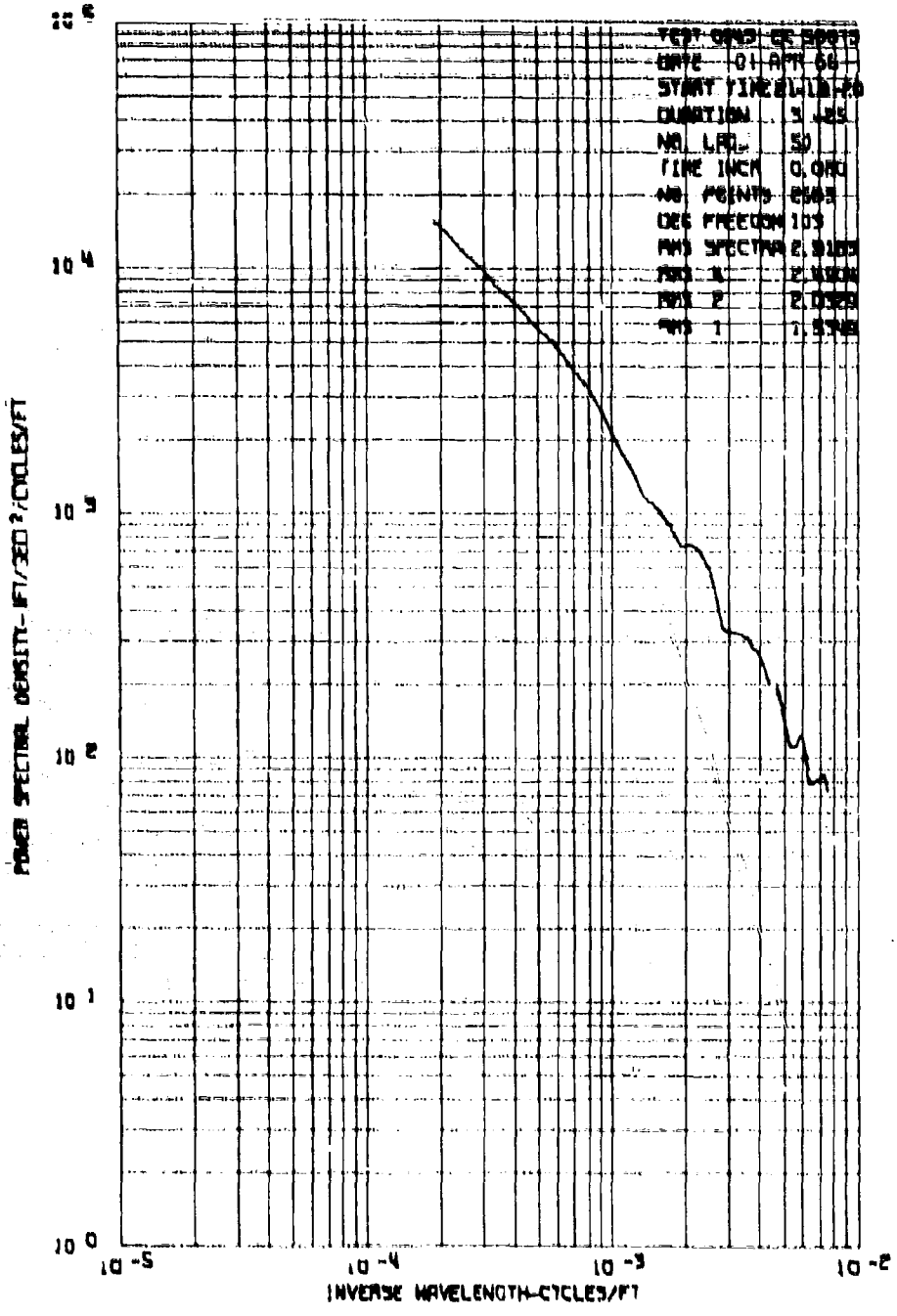


Figure 78B. Power Spectrum of Lateral Gust Velocity, Test 54, Run 3.

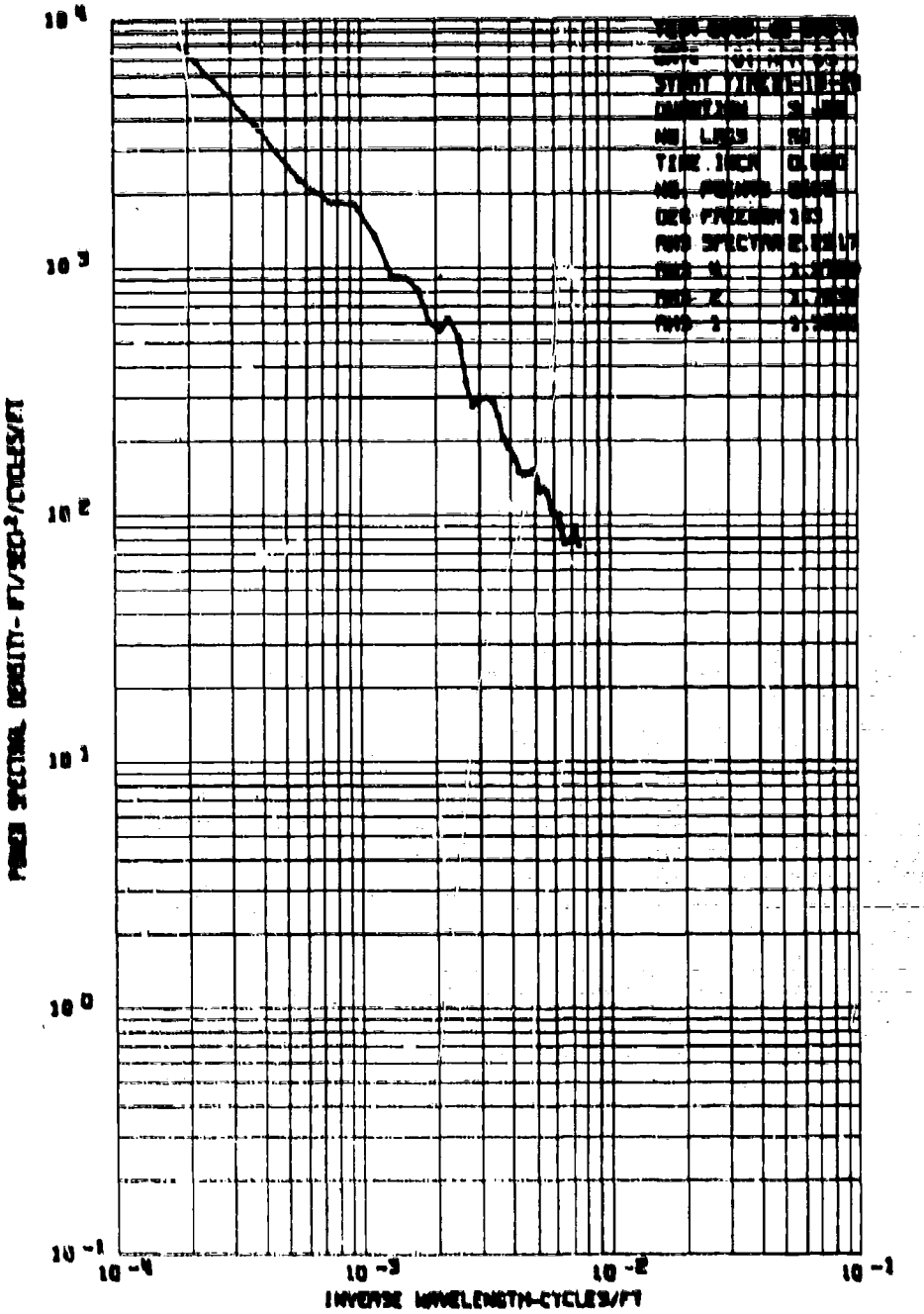


Figure 78C. Power Spectrum of Longitudinal Velocity, Test 54, Run 3.

Appendix VII

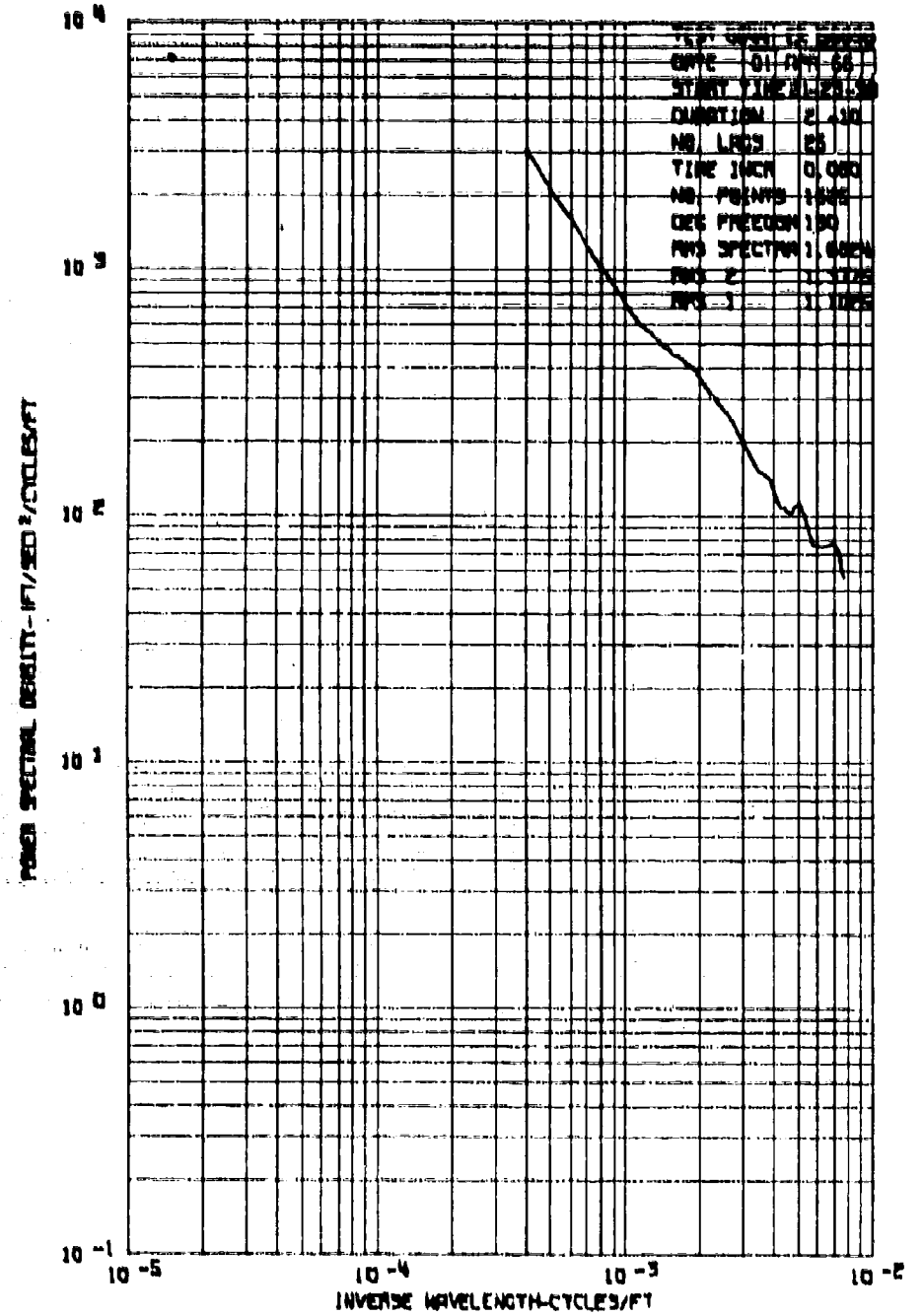


Figure 79A. Power Spectrum of Vertical Gust Velocity
Test 5h, Run 4.

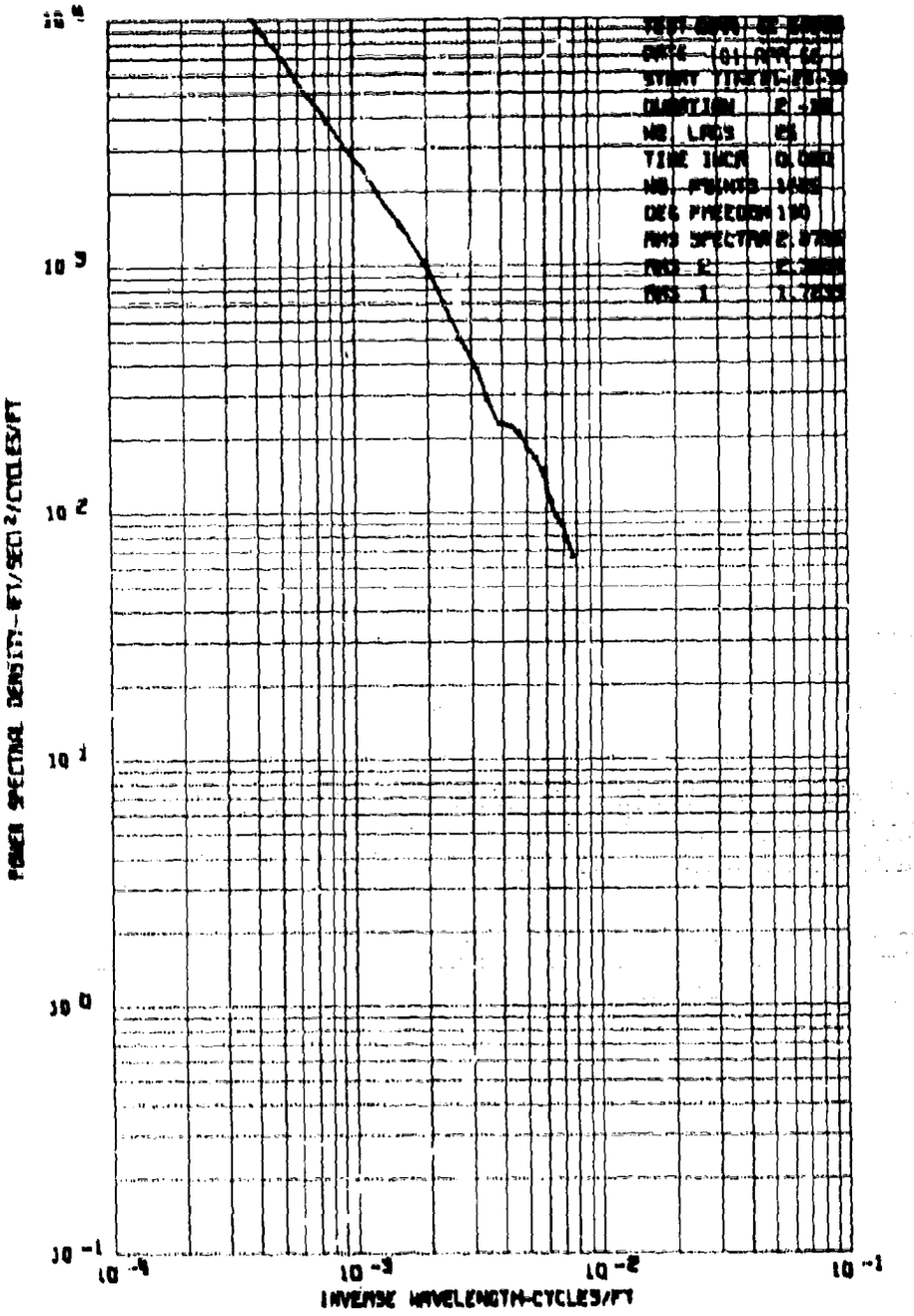


Figure 79B. Power Spectrum of Lateral Gust Velocity, Test 54, Run 4.

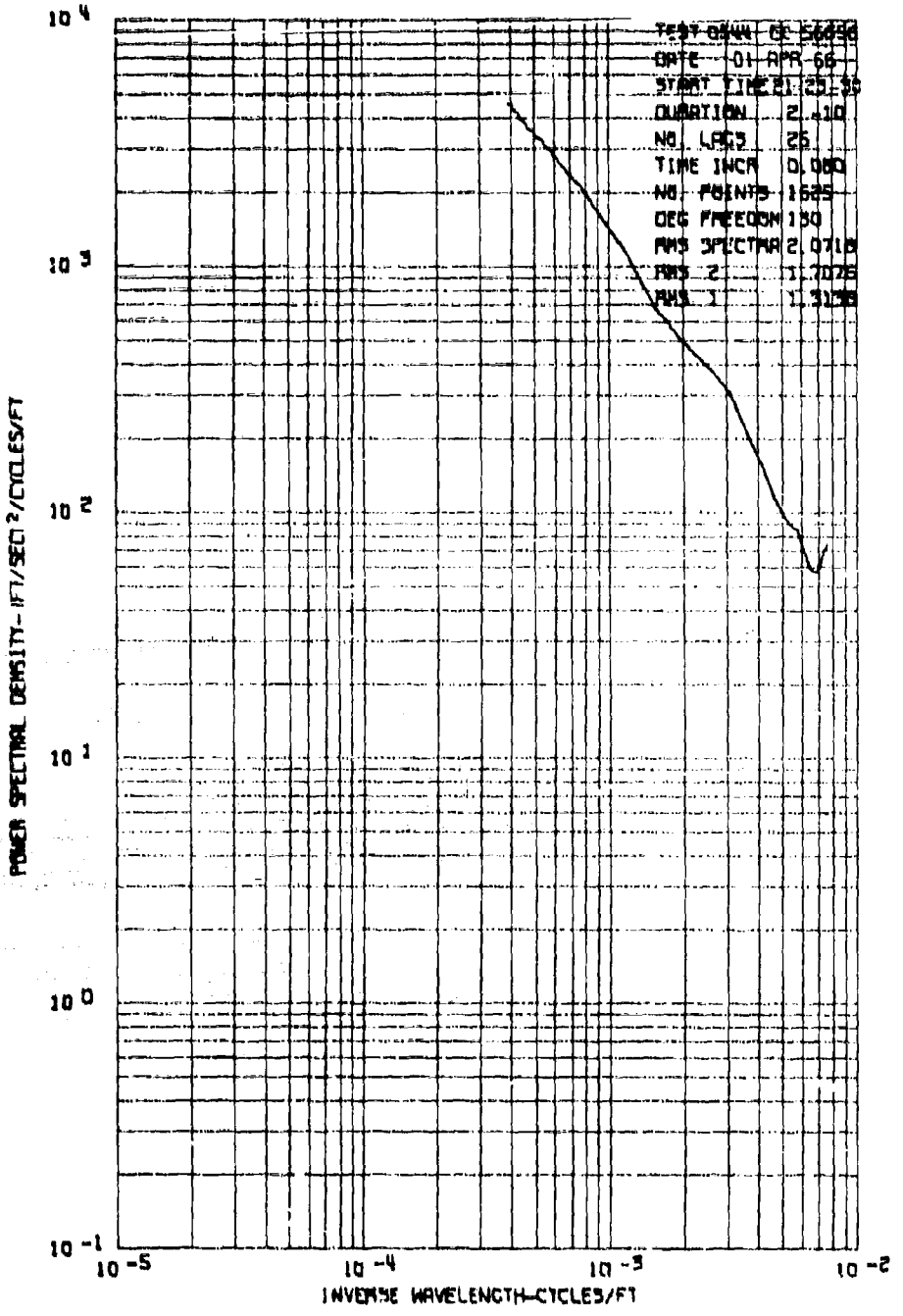


Figure 79C. Power Spectrum of Longitudinal Gust Velocity, Test 58, Run 4.

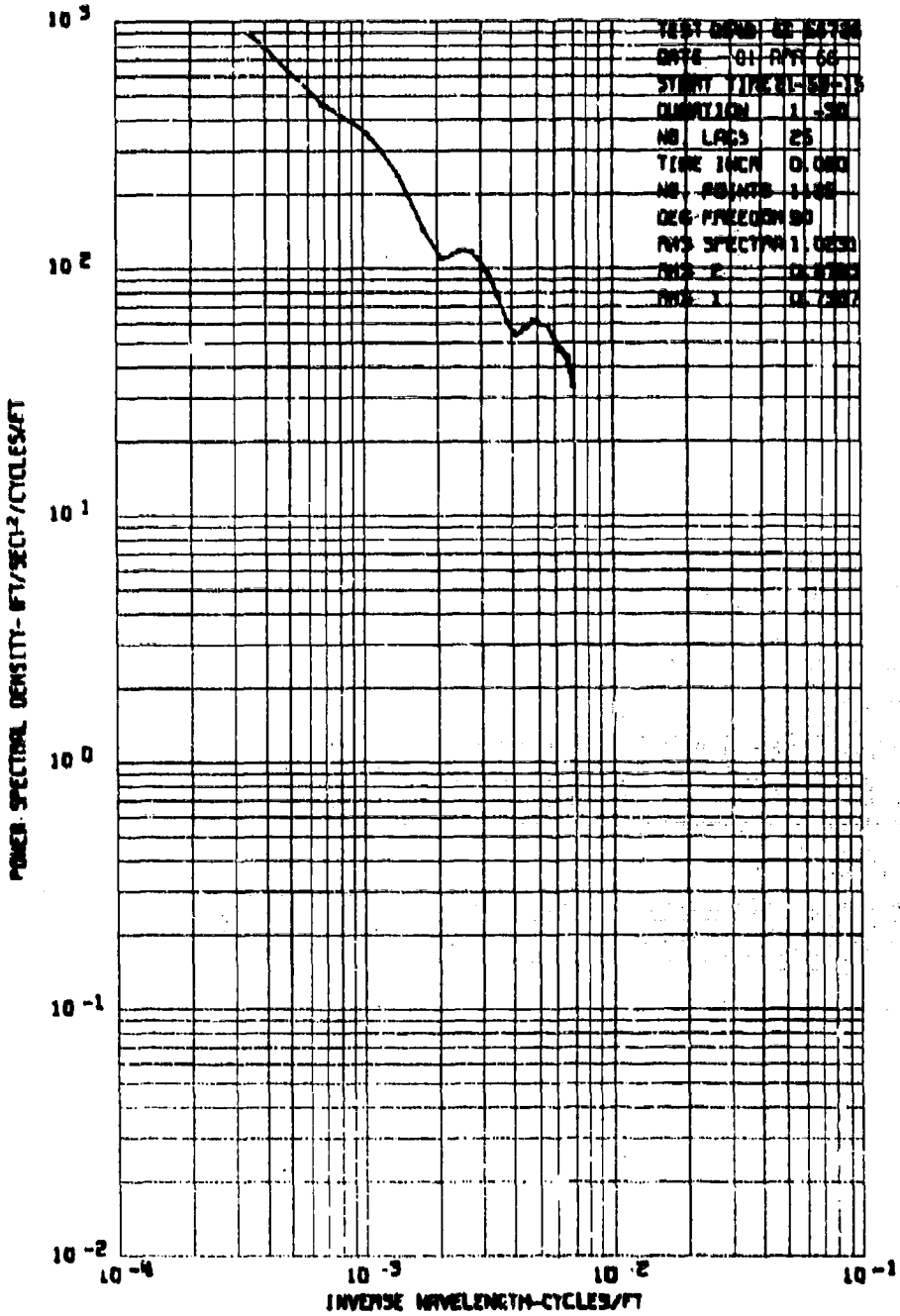


Figure 80A. Power Spectrum of Vertical Gust Velocity, Test 54, Run 9.

Appendix VII

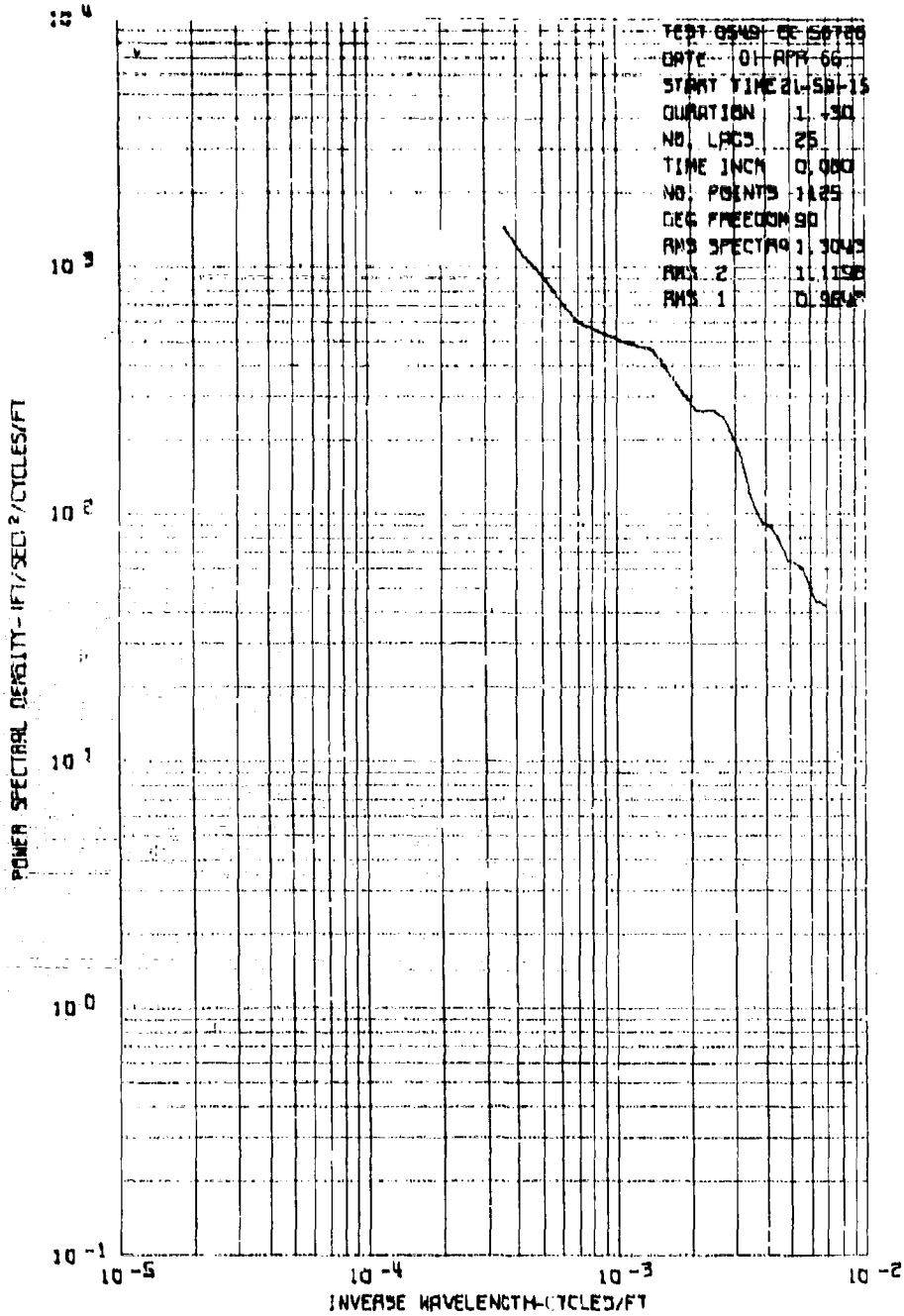


Figure 80B. Power Spectrum of Lateral Gust Velocity, Test 54, Run 9.

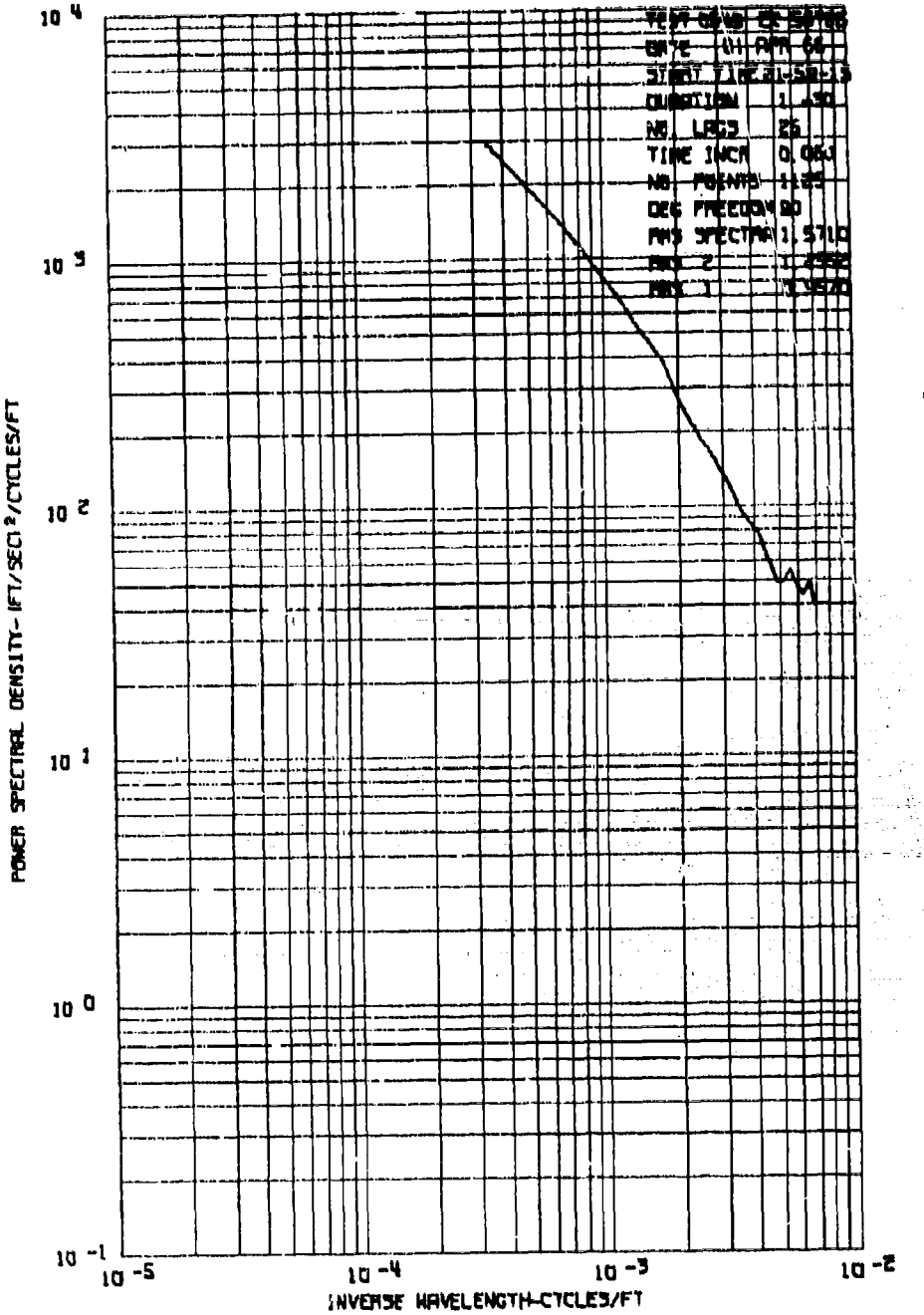


Figure 80C. Power Spectrum of Longitudinal Gust Velocity, Test 54, Run 9.

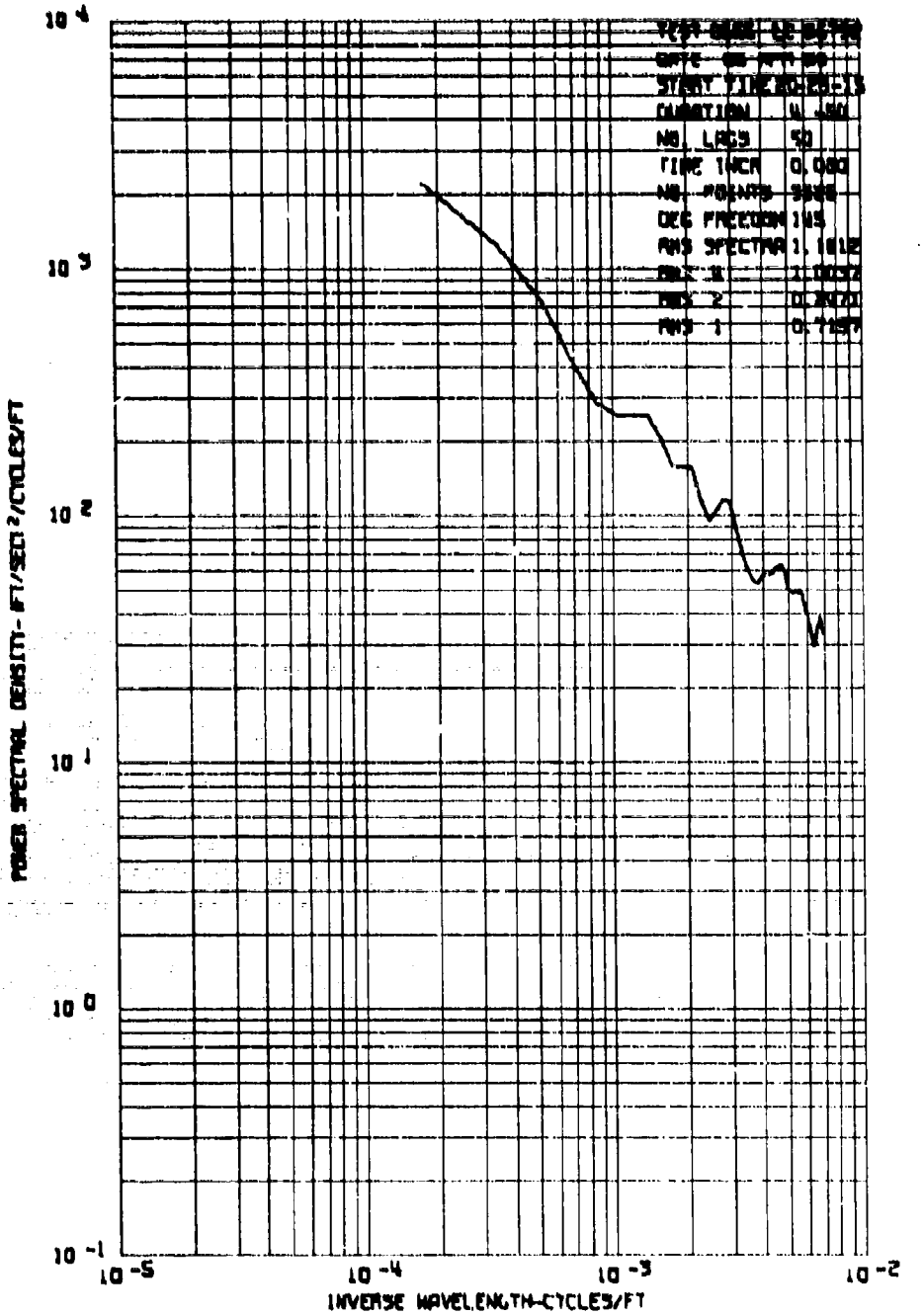


Figure 81A. Power Spectrum of Vertical Gust Velocity, Test 55, Run 5.

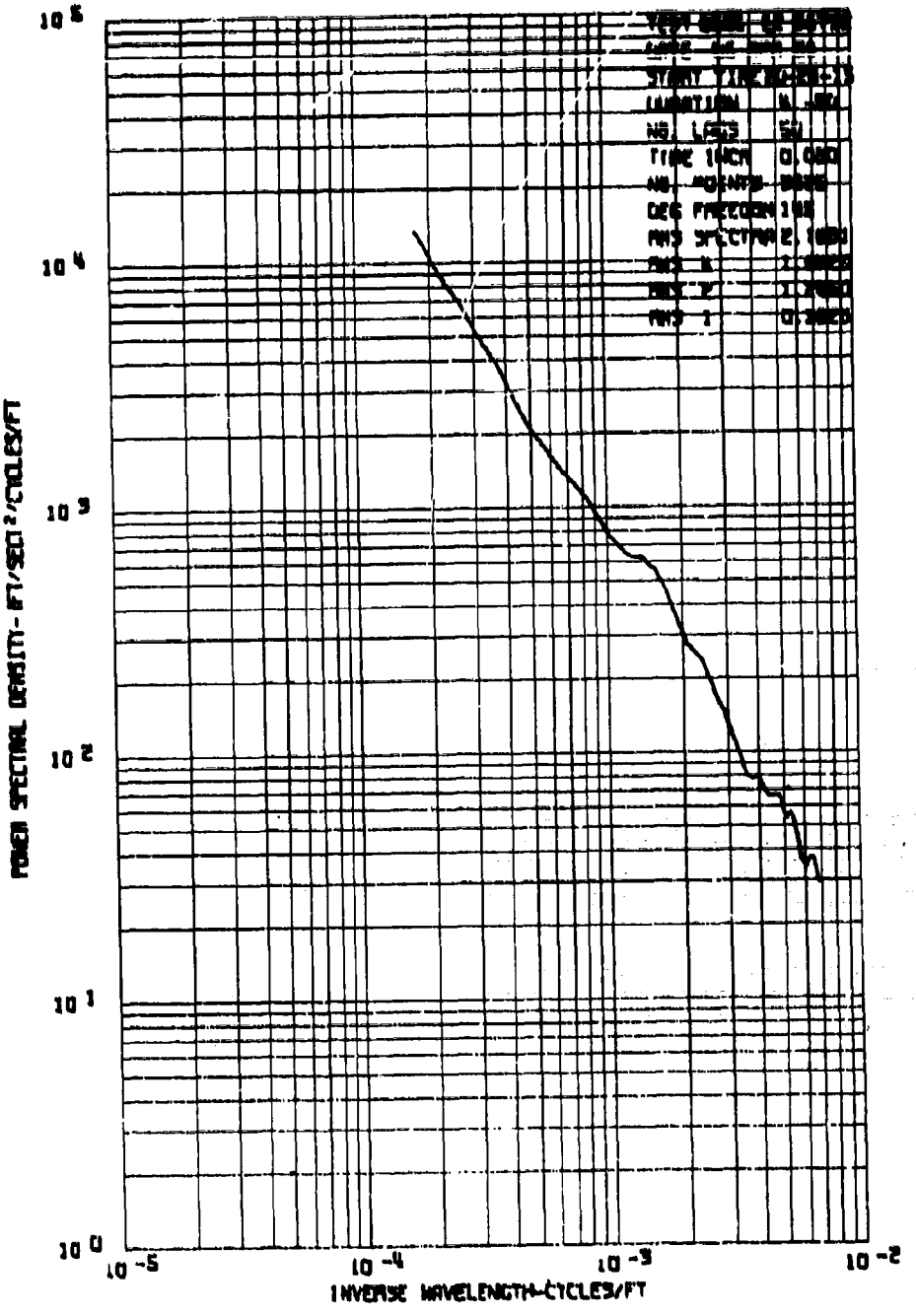


Figure 81B. Power Spectrum of Lateral Gust Velocity, Test 55, Run 5.

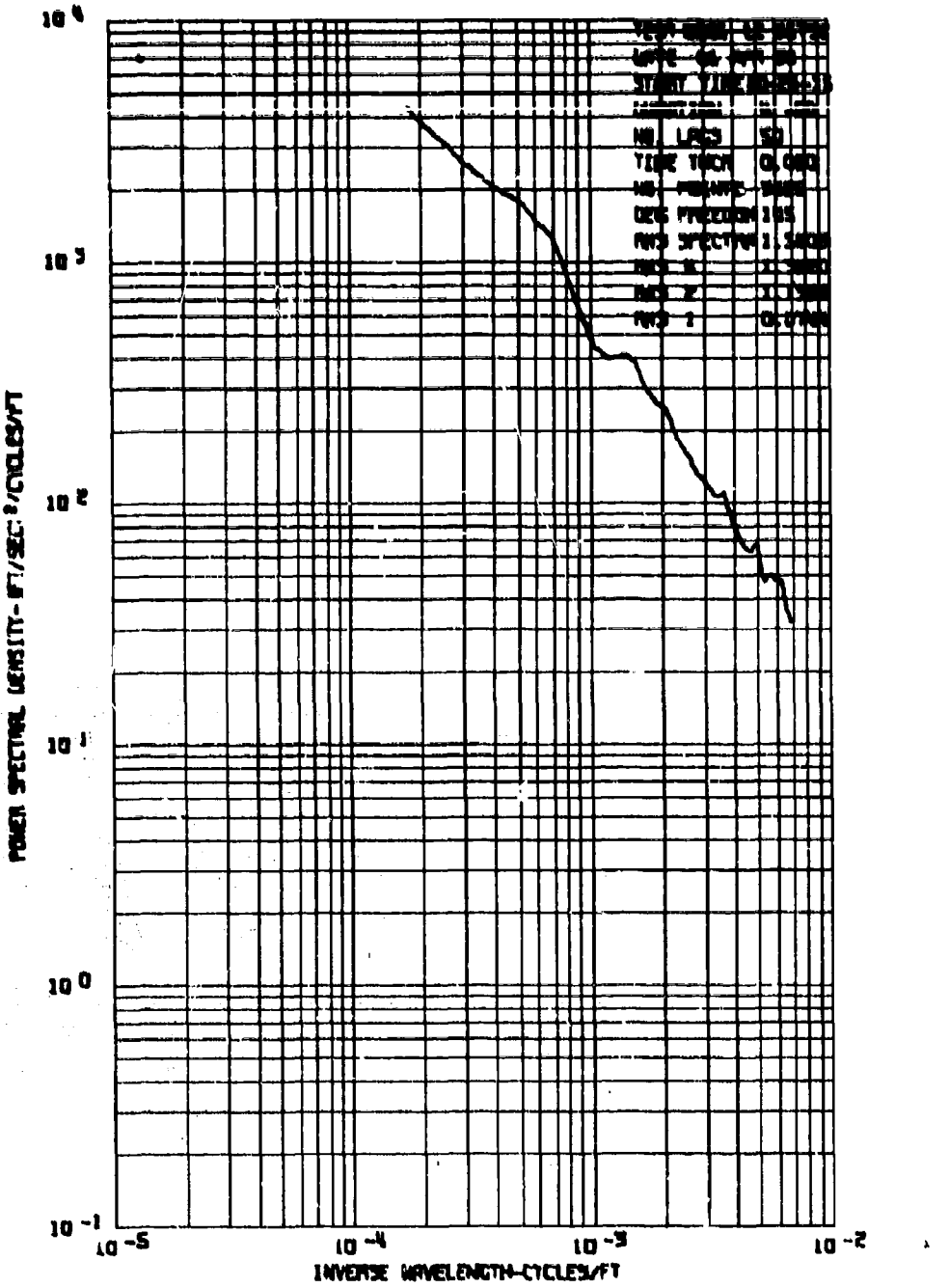


Figure 81C. Power Spectrum of Longitudinal Gust Velocity, Test 55, Run 5.

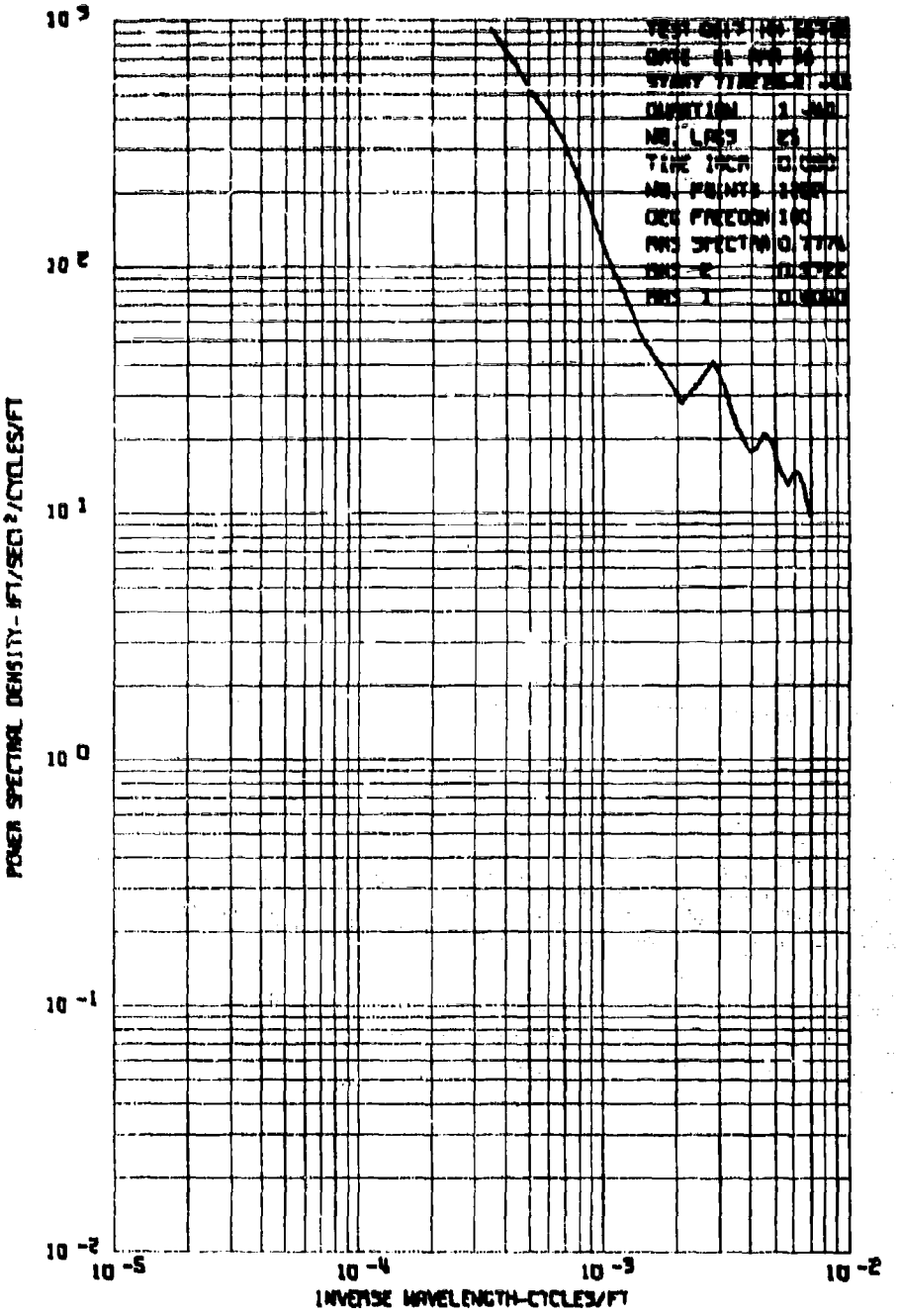


Figure 82A. Power Spectrum of Vertical Gust Velocity, Test 61, Run 7.

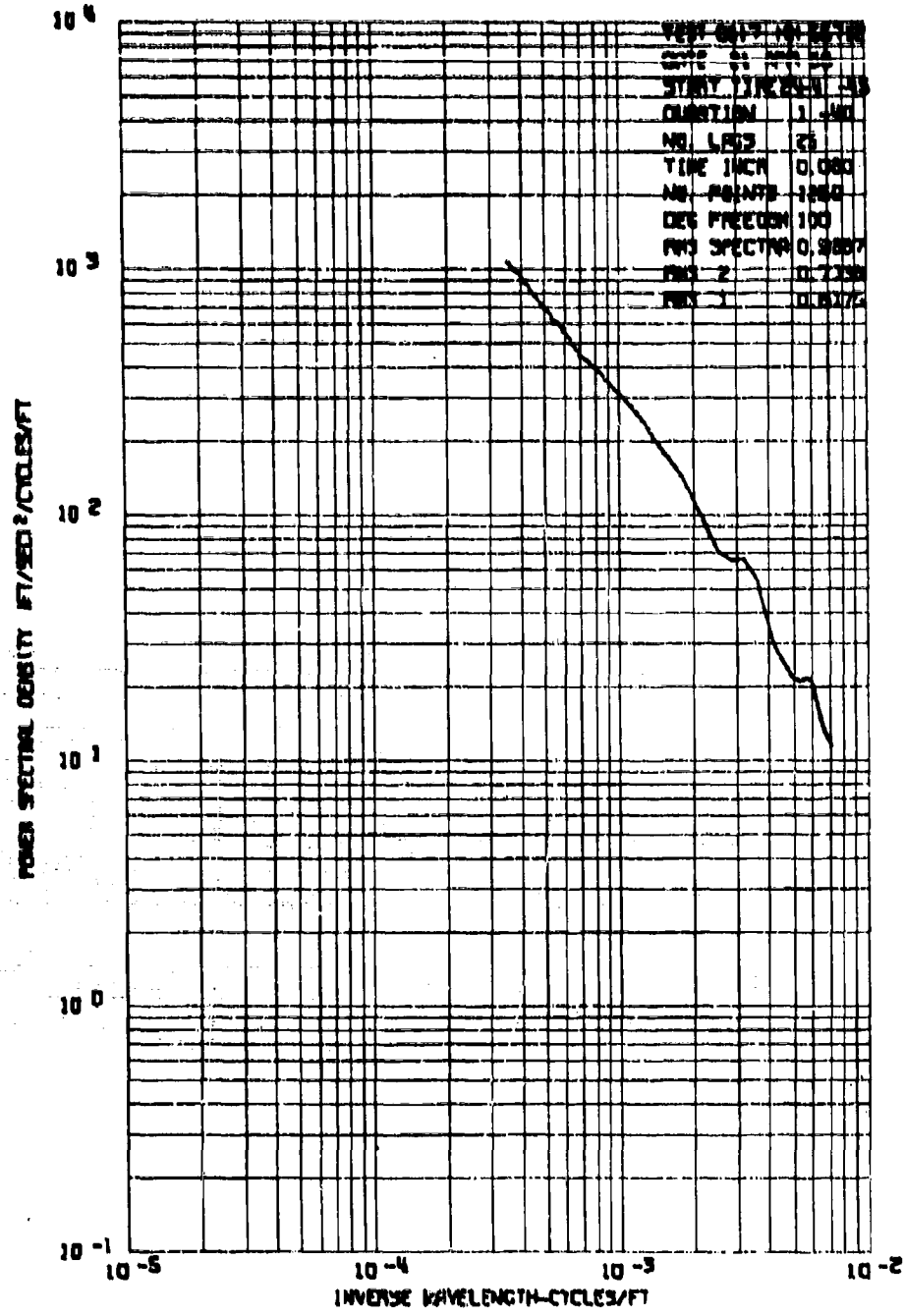


Figure 82B. Power Spectrum of Lateral Gust Velocity, Test 61, Run 7.

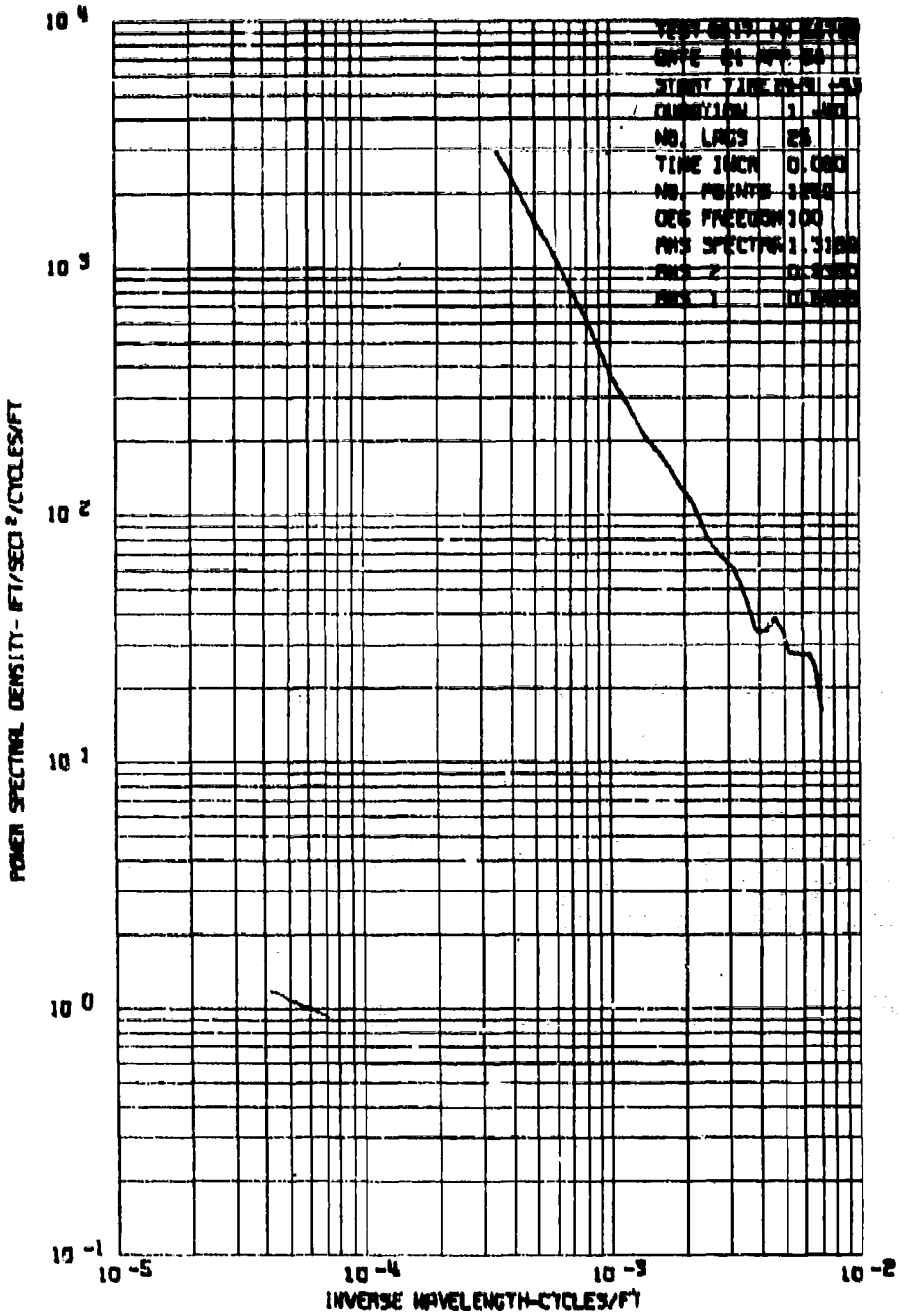


Figure 82C. Power Spectrum of Longitudinal Gust Velocity, Test 61, Run 7.

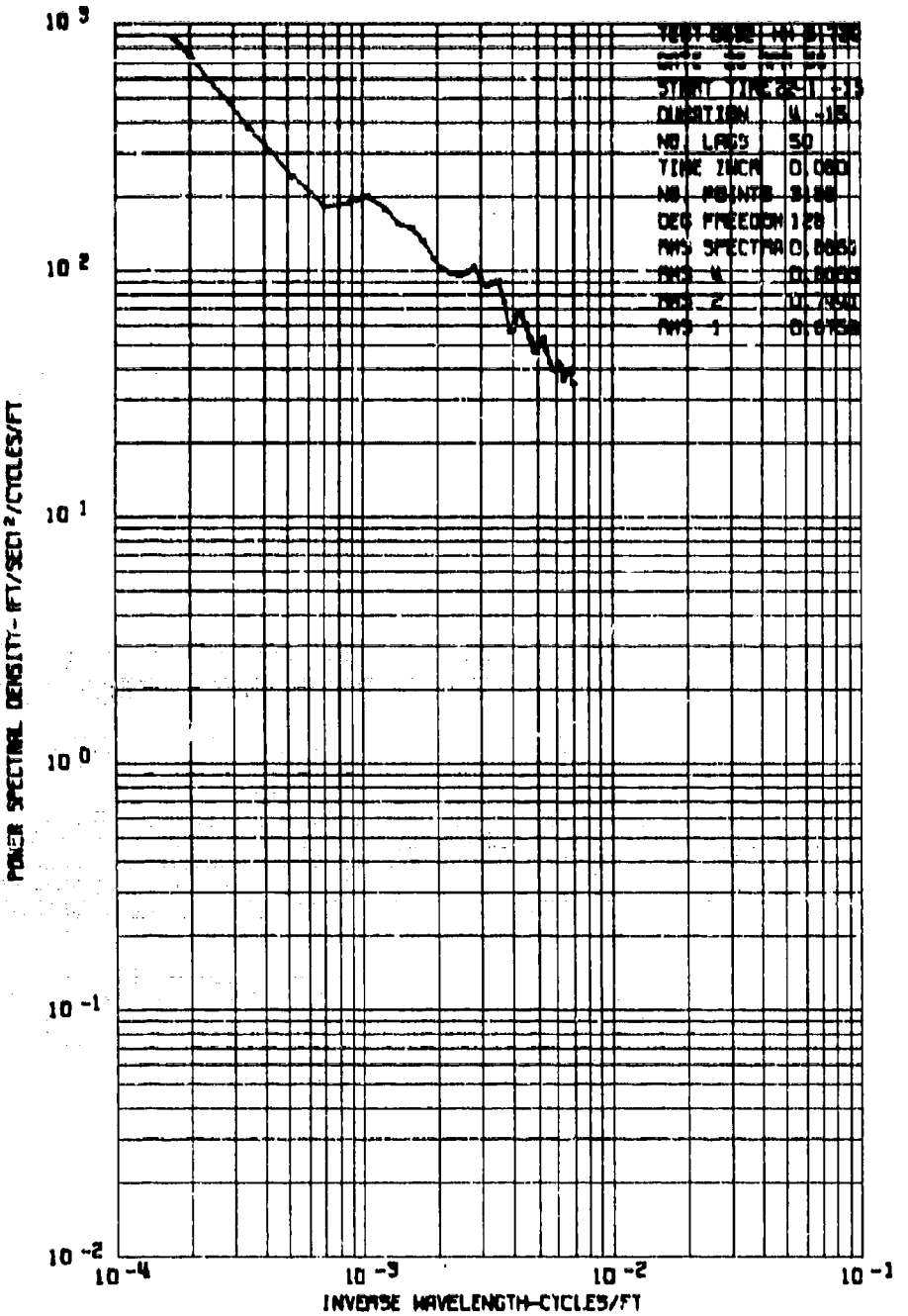


Figure 83A. Power Spectrum of Vertical Gust Velocity, Test 63, Run 2.

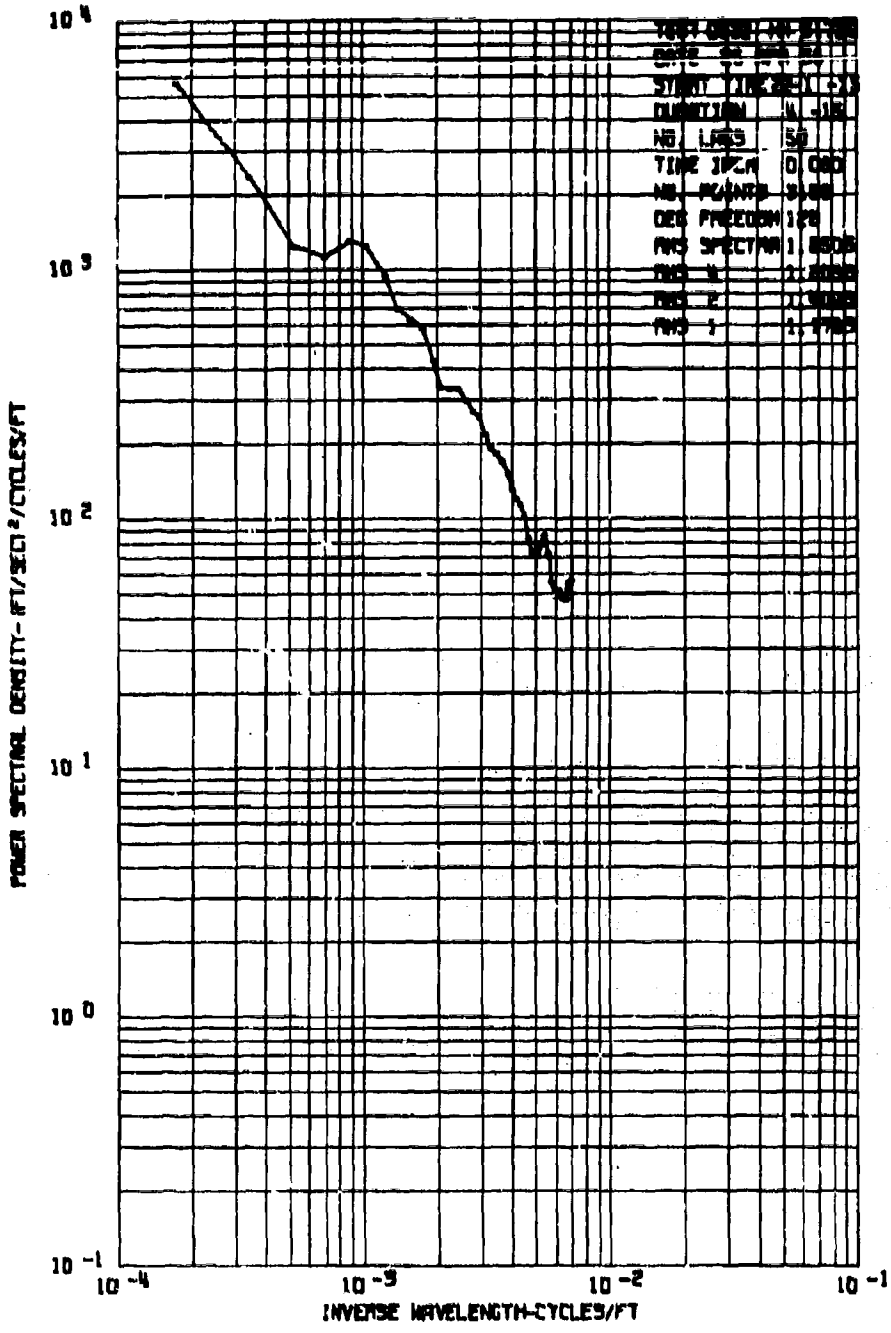


Figure 83B. Power Spectrum of Lateral Gust Velocity, Test 63, Run 2.

Appendix VII

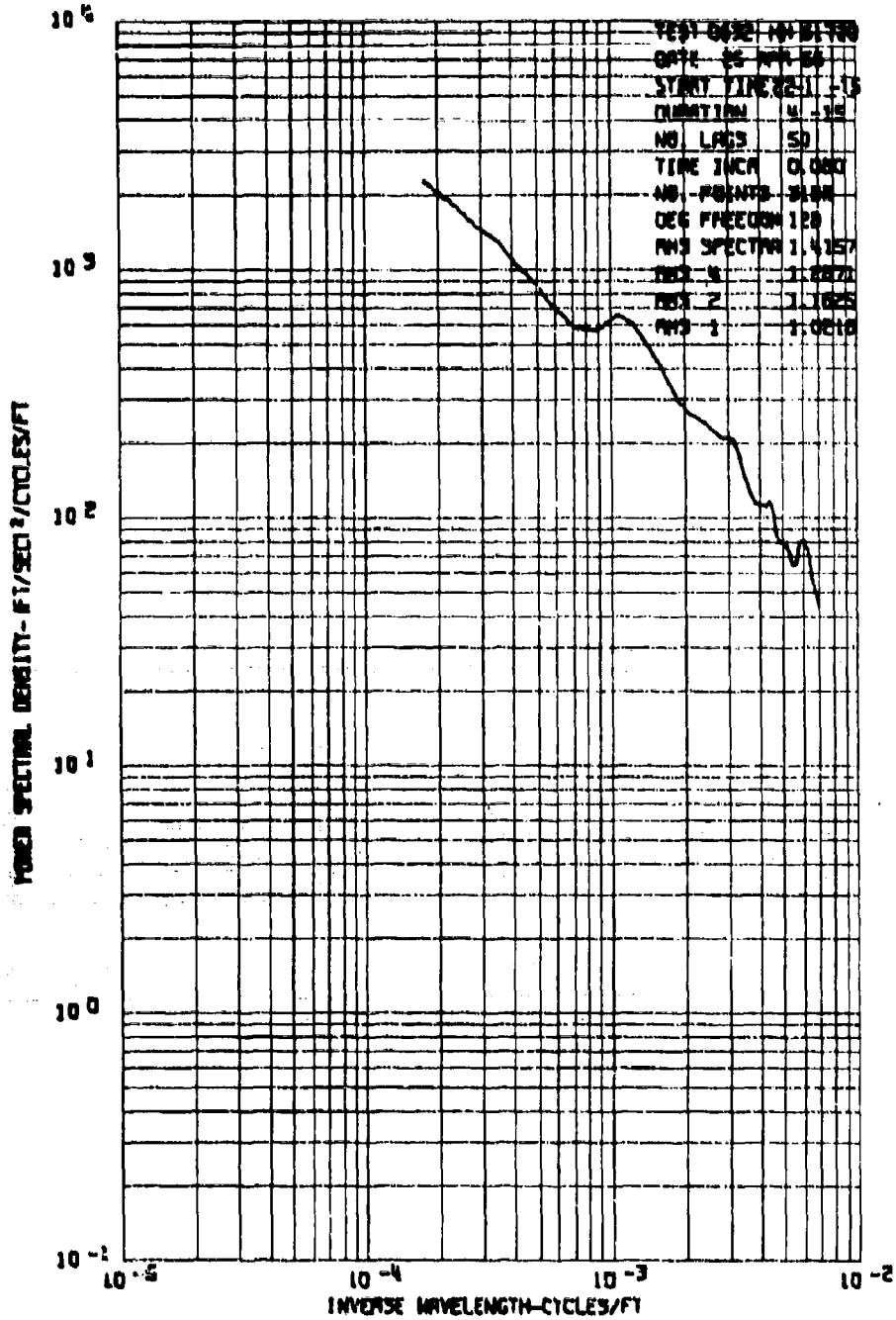


Figure 83C. Power Spectrum of Longitudinal Gust Velocity, Test 63, Run 2.

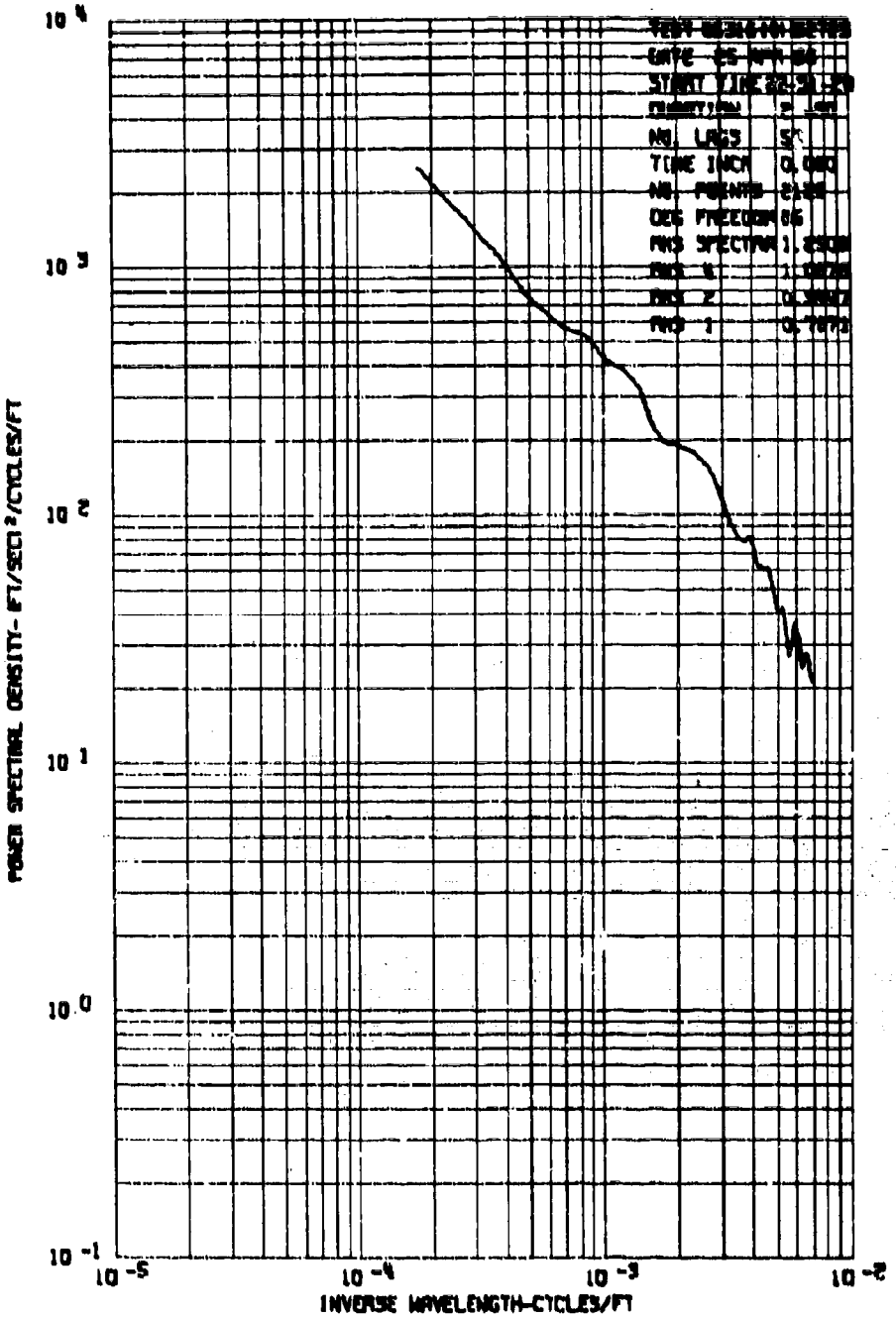


Figure 84A. Power Spectrum of Lateral Gust Velocity, Test 63, Run 16.

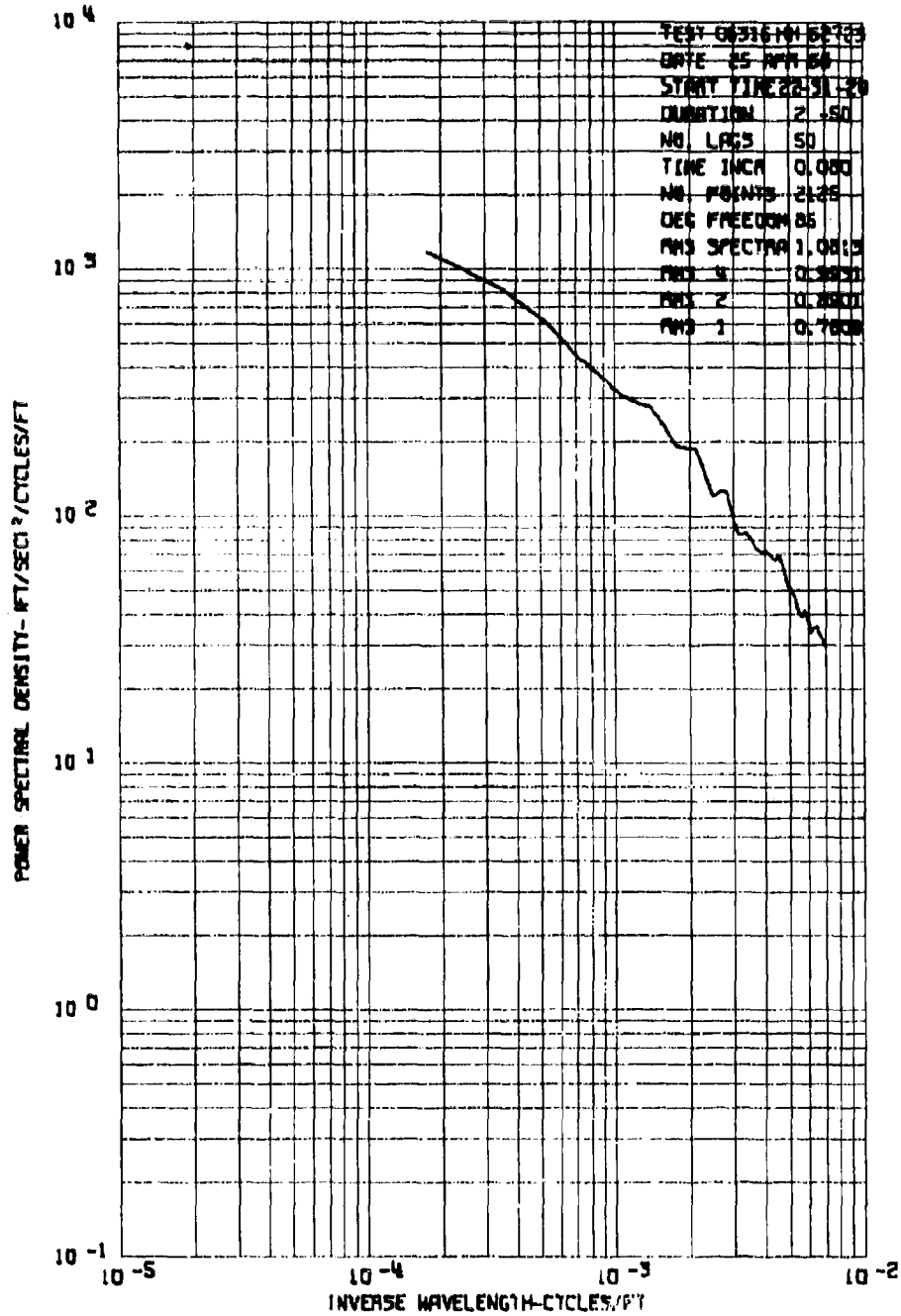


Figure 81B. Power Spectrum of Longitudinal Gust Velocity, Test 63, Run 16.

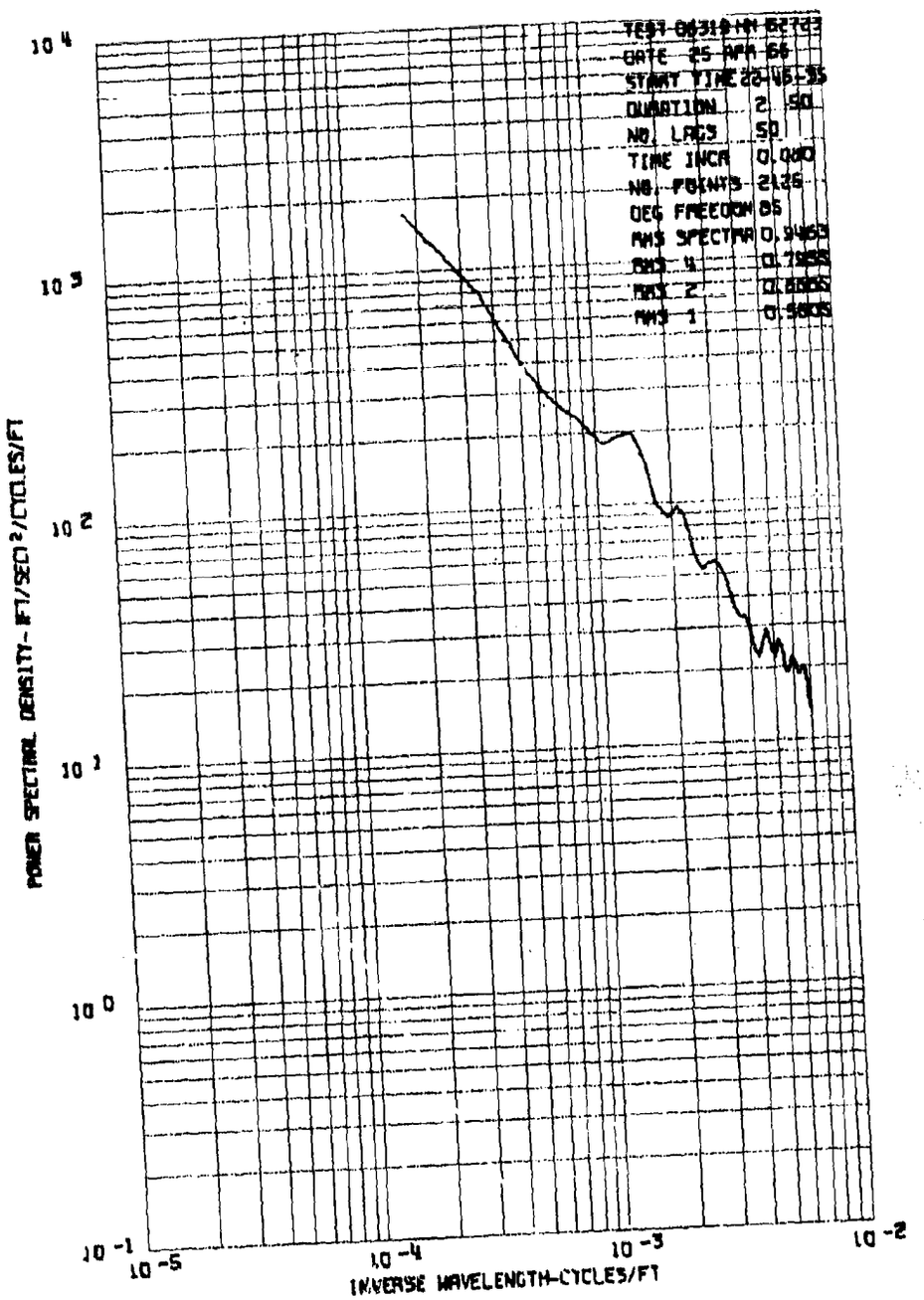


Figure 85A. Power Spectrum of Lateral Gust Velocity, Test 63, Run 19.

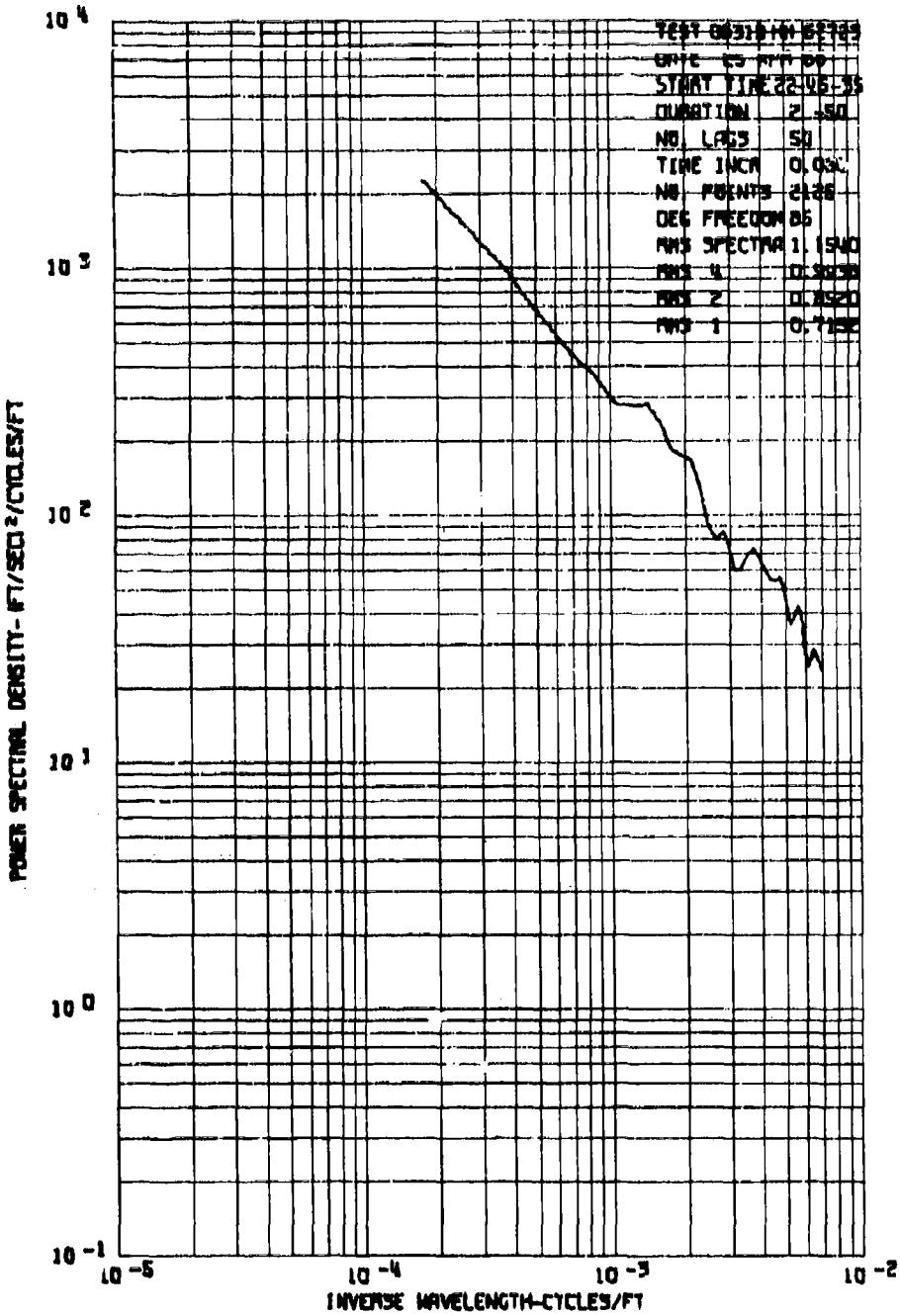


Figure 85B. Power Spectrum of Longitudinal Gust Velocity, Test 63, Run 19.

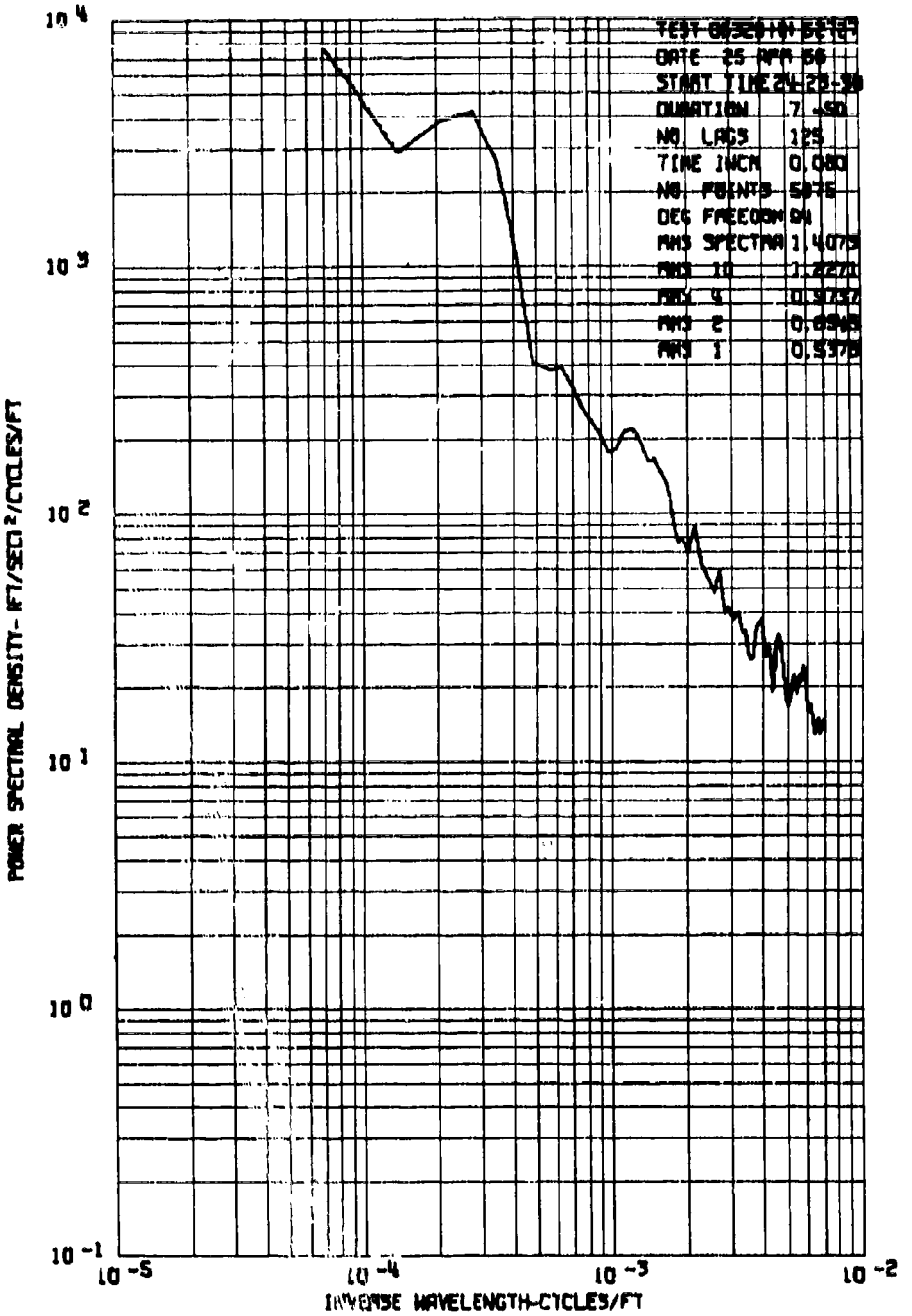


Figure 86A. Power Spectrum of Lateral Gust Velocity, Test 63, Run 29.

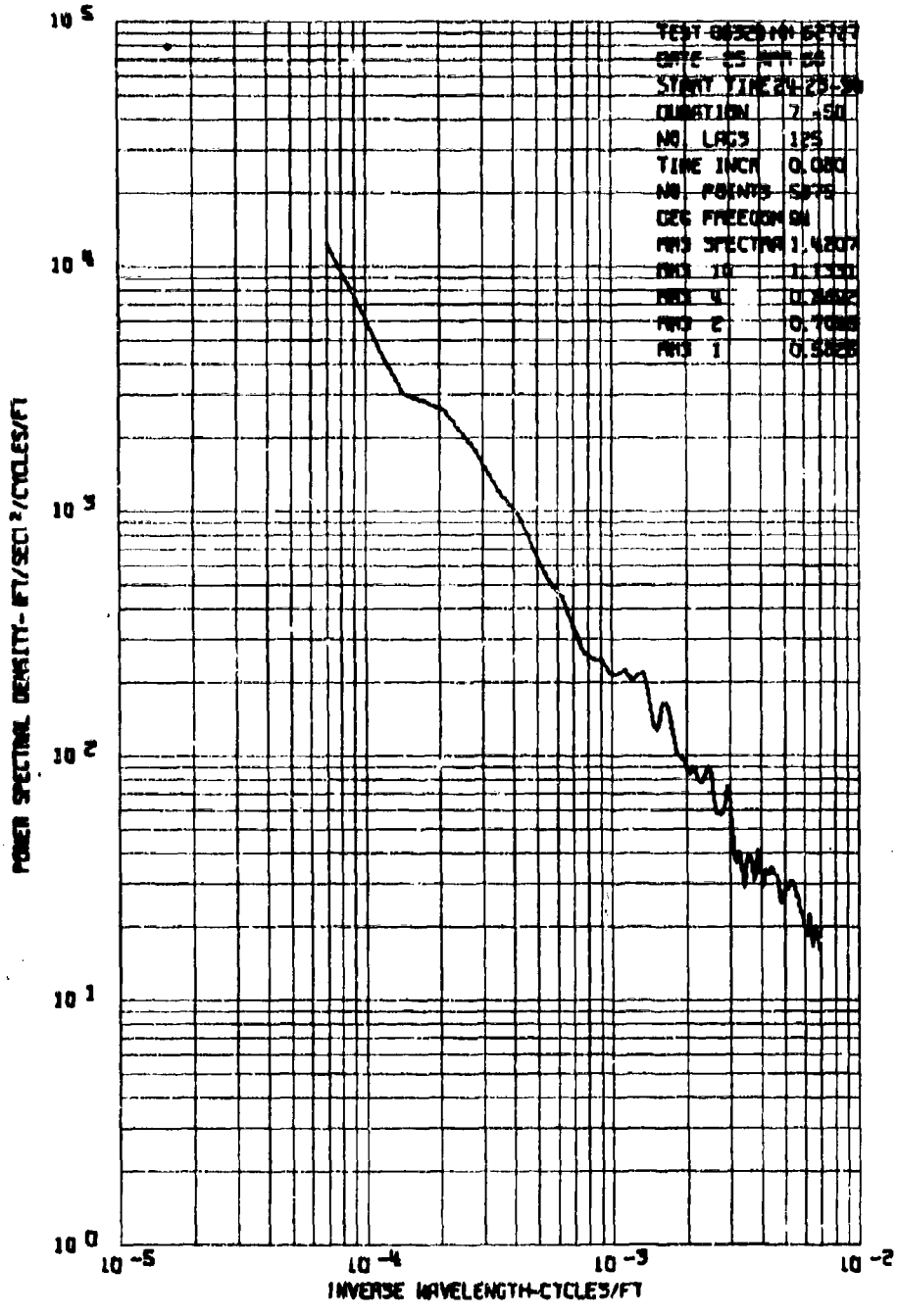


Figure 86B. Power Spectrum of Longitudinal Gust Velocity, Test 63, Run 29.

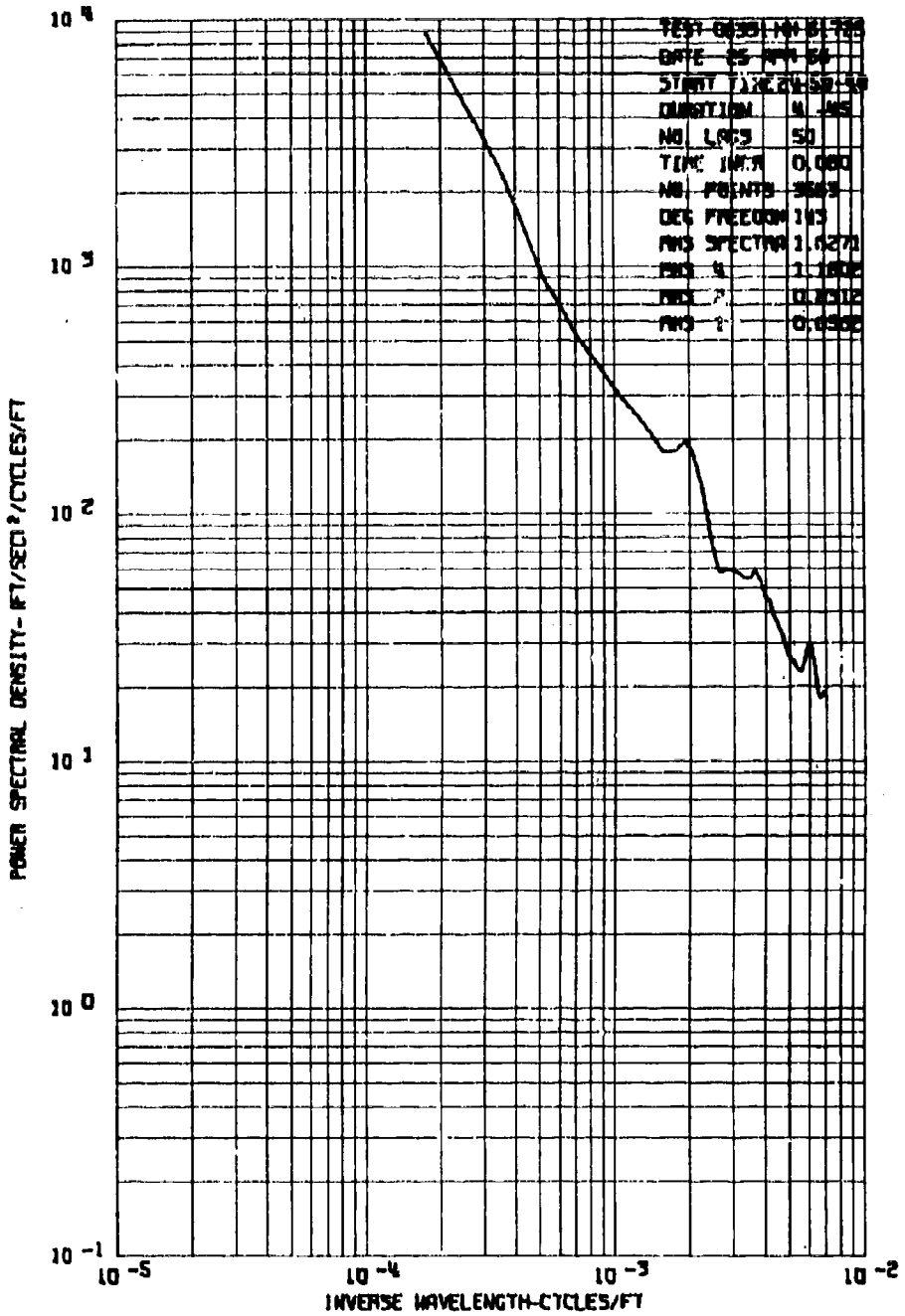


Figure 87A. Power Spectrum of Lateral Gust Velocity, Test 63, Run 31.

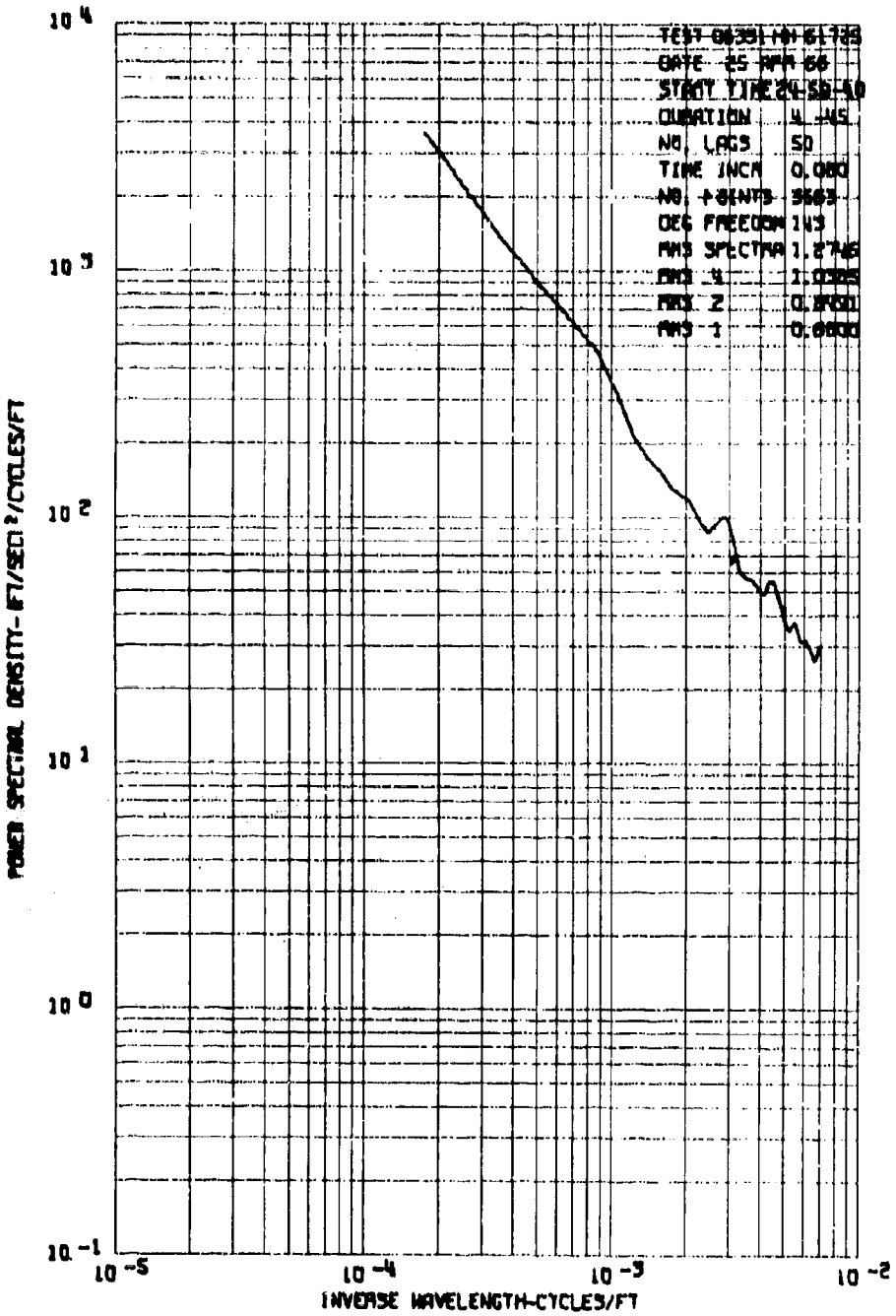


Figure 87B. Power Spectrum of Longitudinal Gust Velocity, Test 63, Run 31.

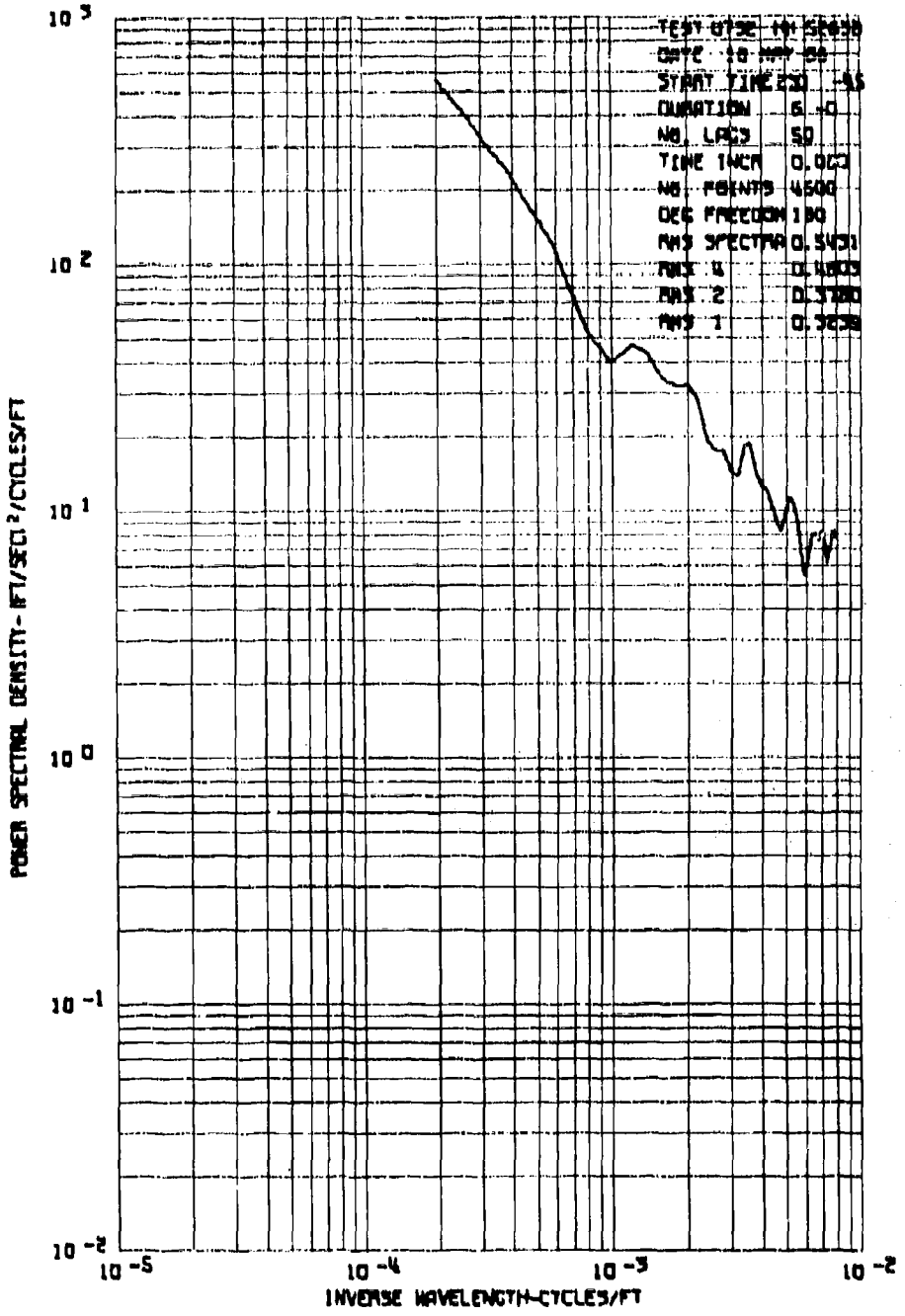


Figure 88A. Power Spectrum of Vertical Gust Velocity, Test 73, Run 8.

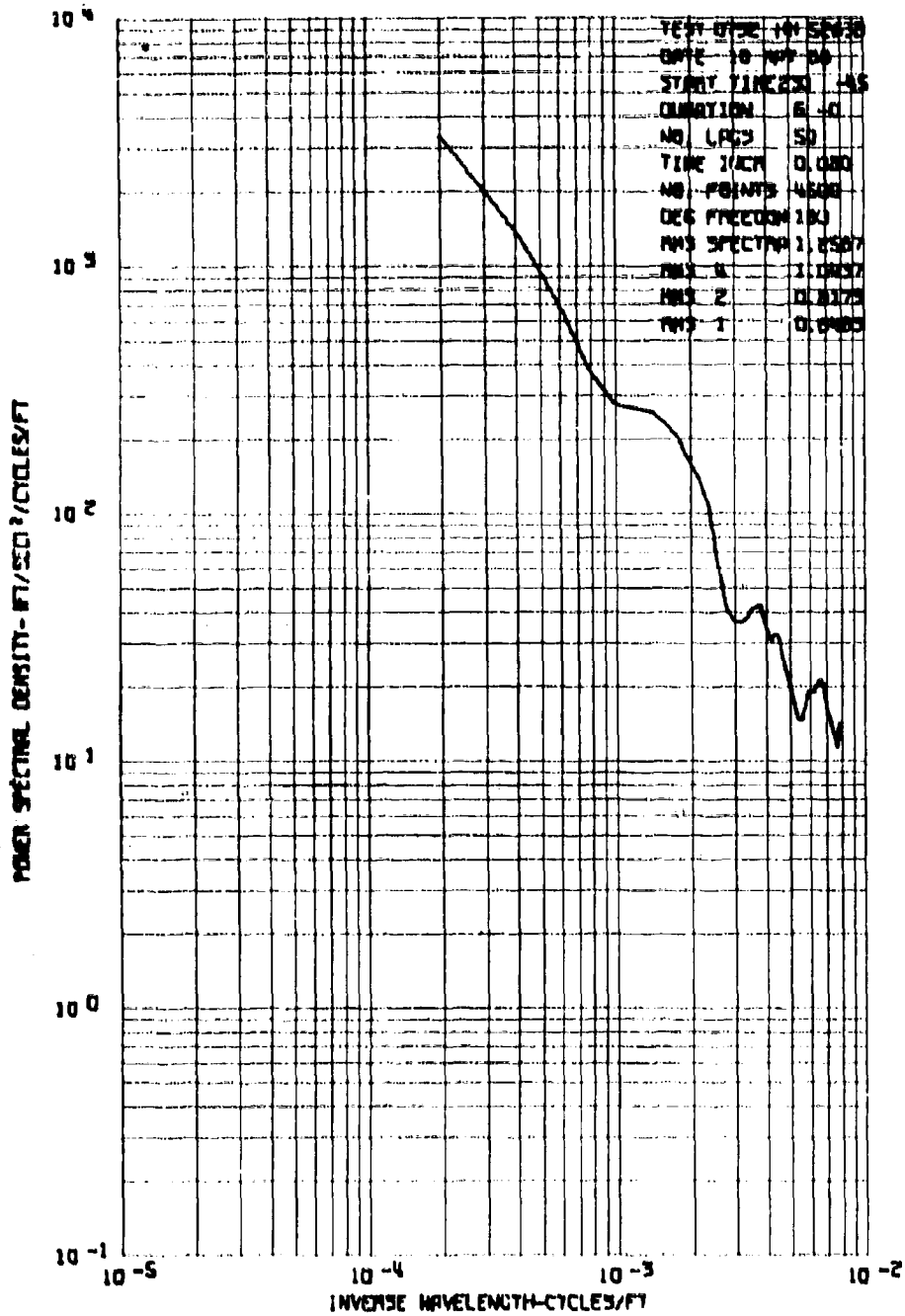


Figure 88B. Power Spectrum of Lateral Gust Velocity, Test 73, Run 2.

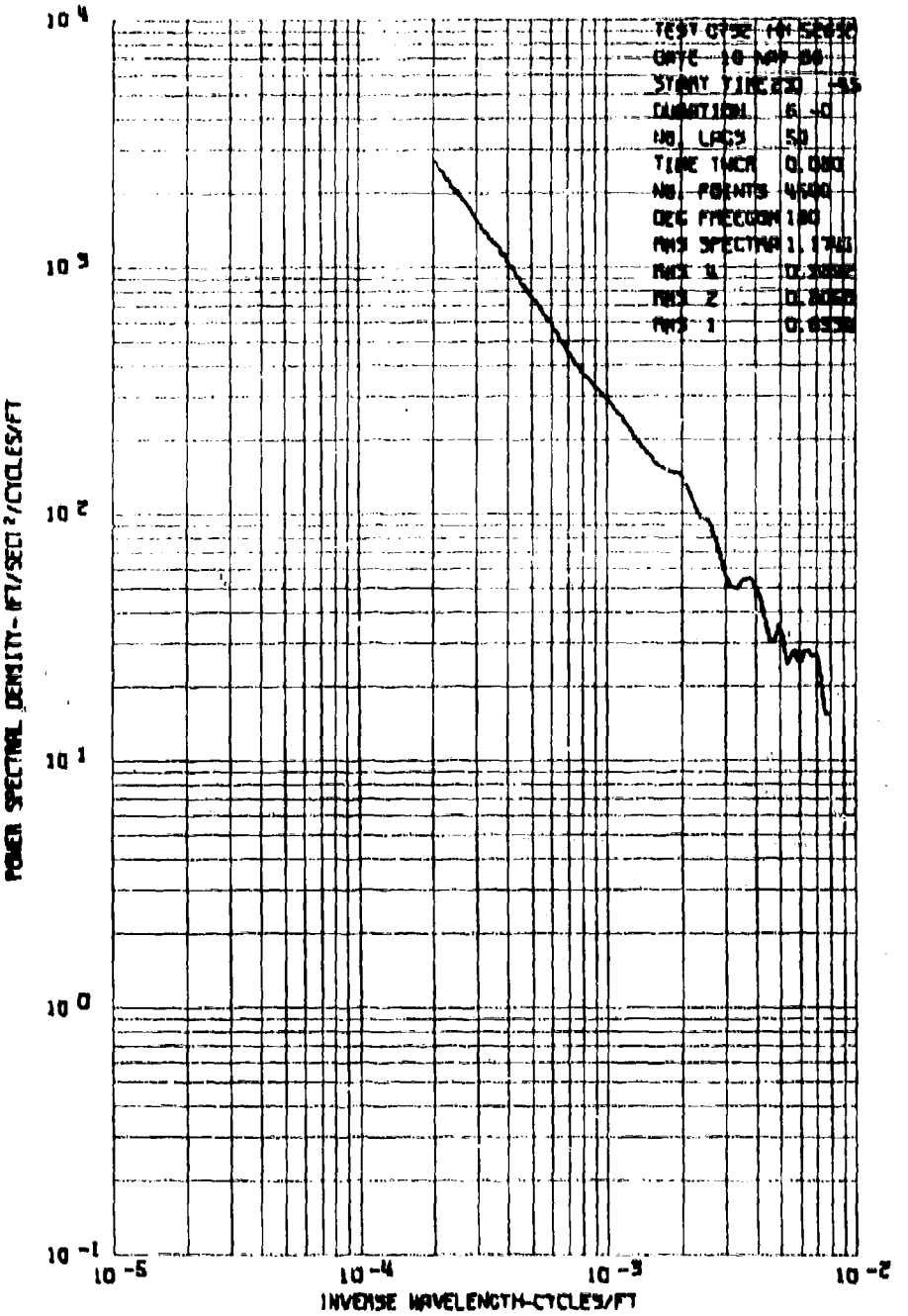


Figure 88C. Power Spectrum of Longitudinal Gust Velocity, Test 73, Run 2.

Appendix VII

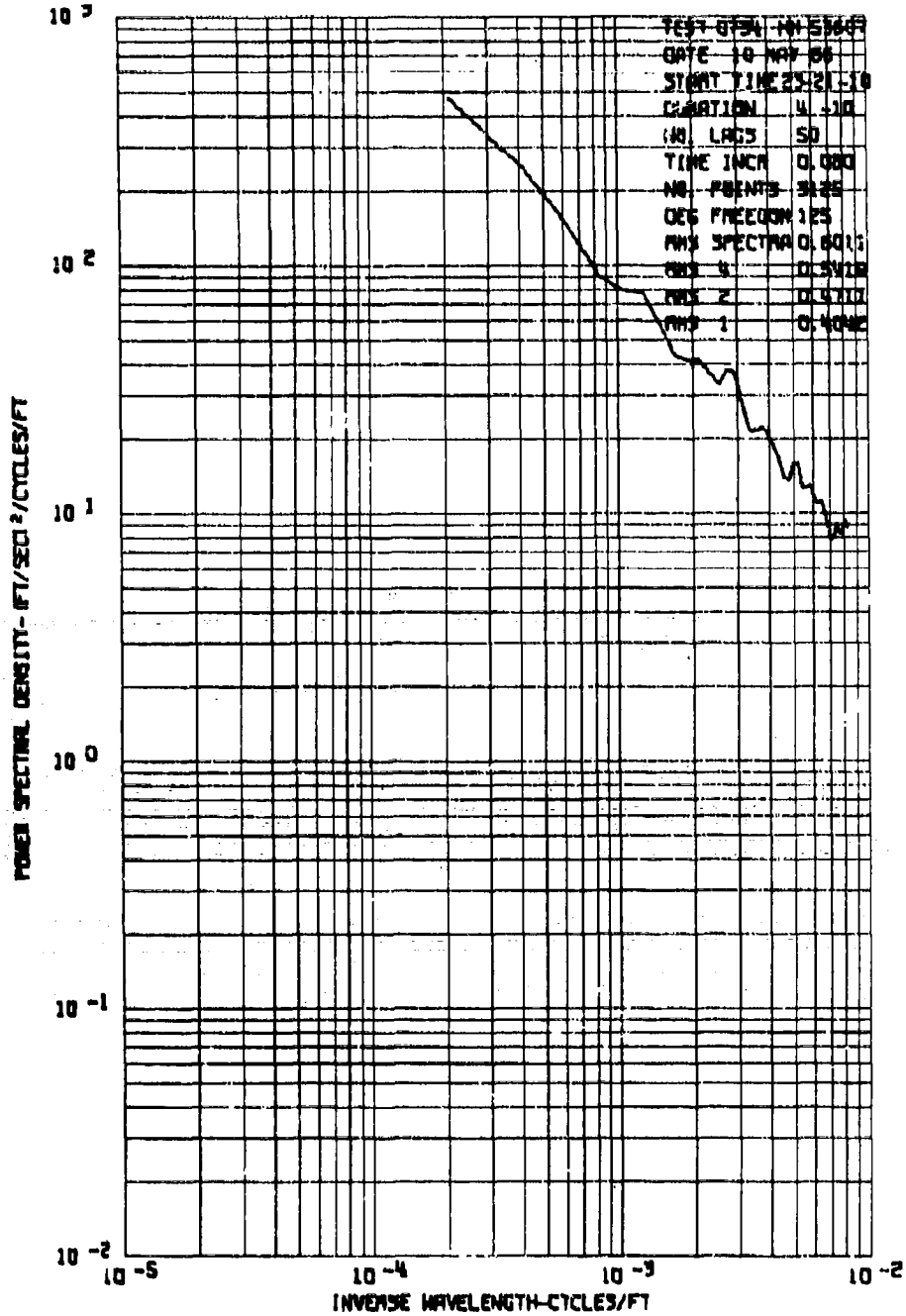


Figure 89A. Power Spectrum of Vertical Gust Velocity, Test 73, Run 4.

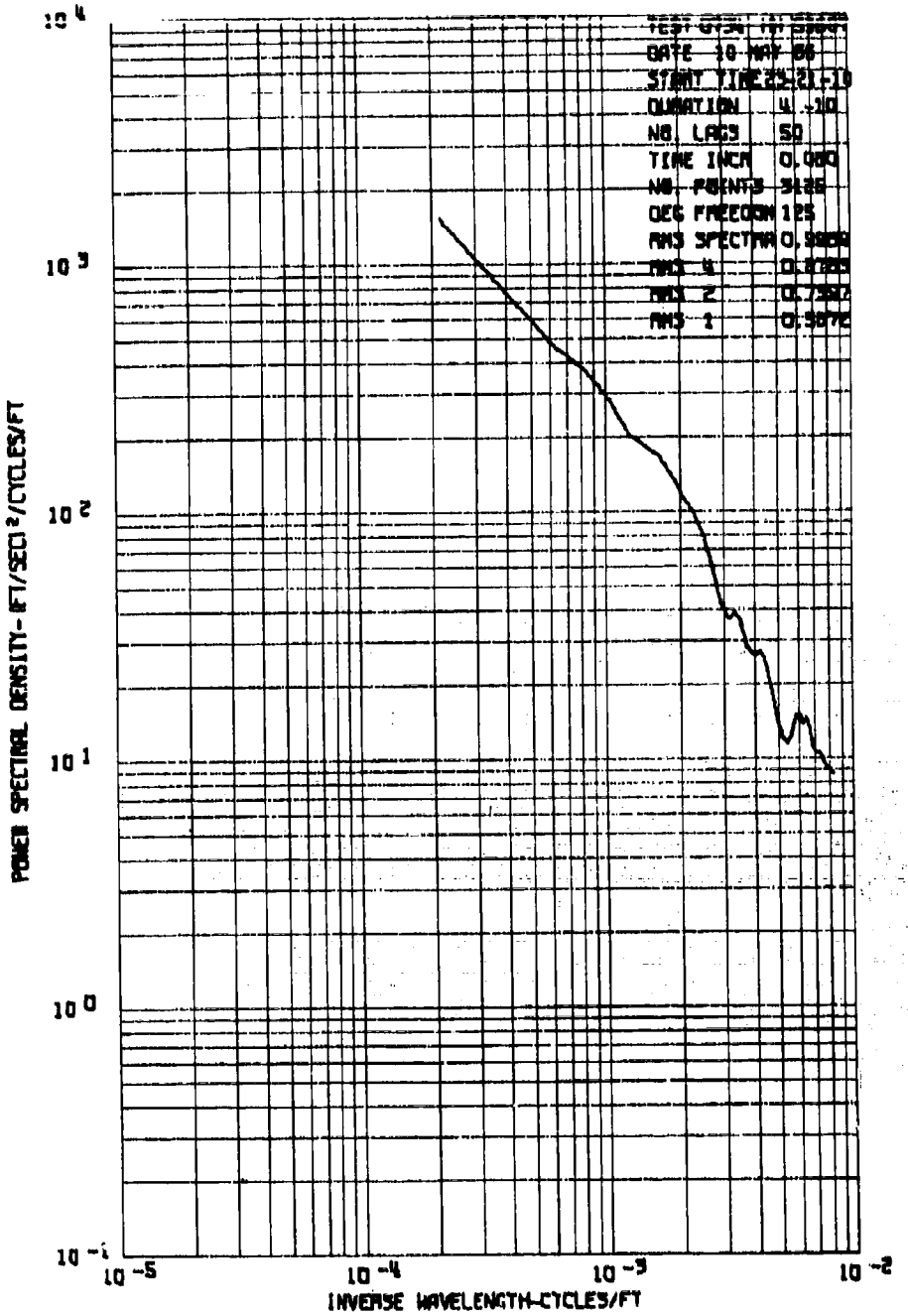


Figure 89B. Power Spectrum of Lateral Gust Velocity, Test 73, Run 4.

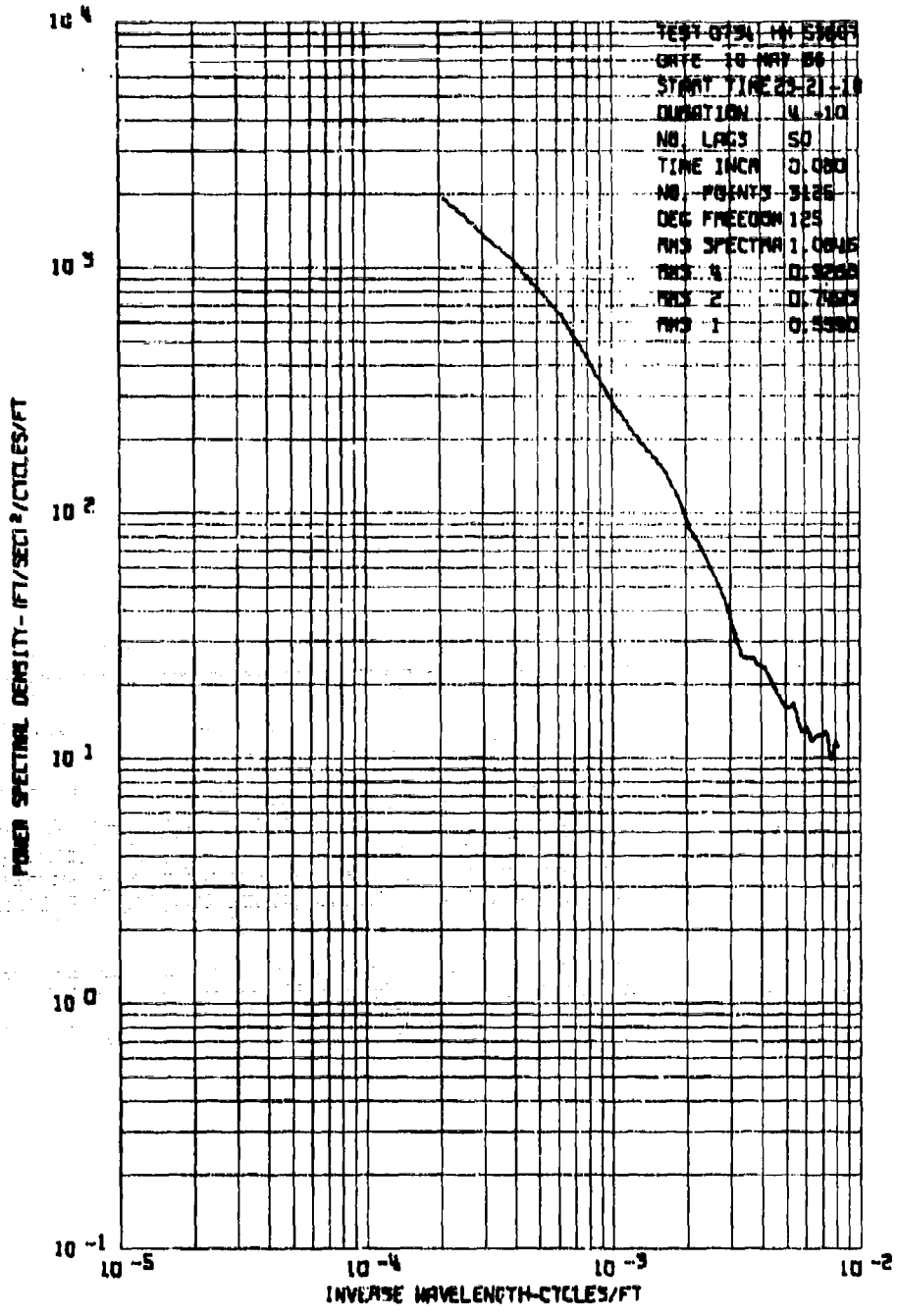


Figure 89C. Power Spectrum of Longitudinal Gust Velocity, Test 73, Run 4.

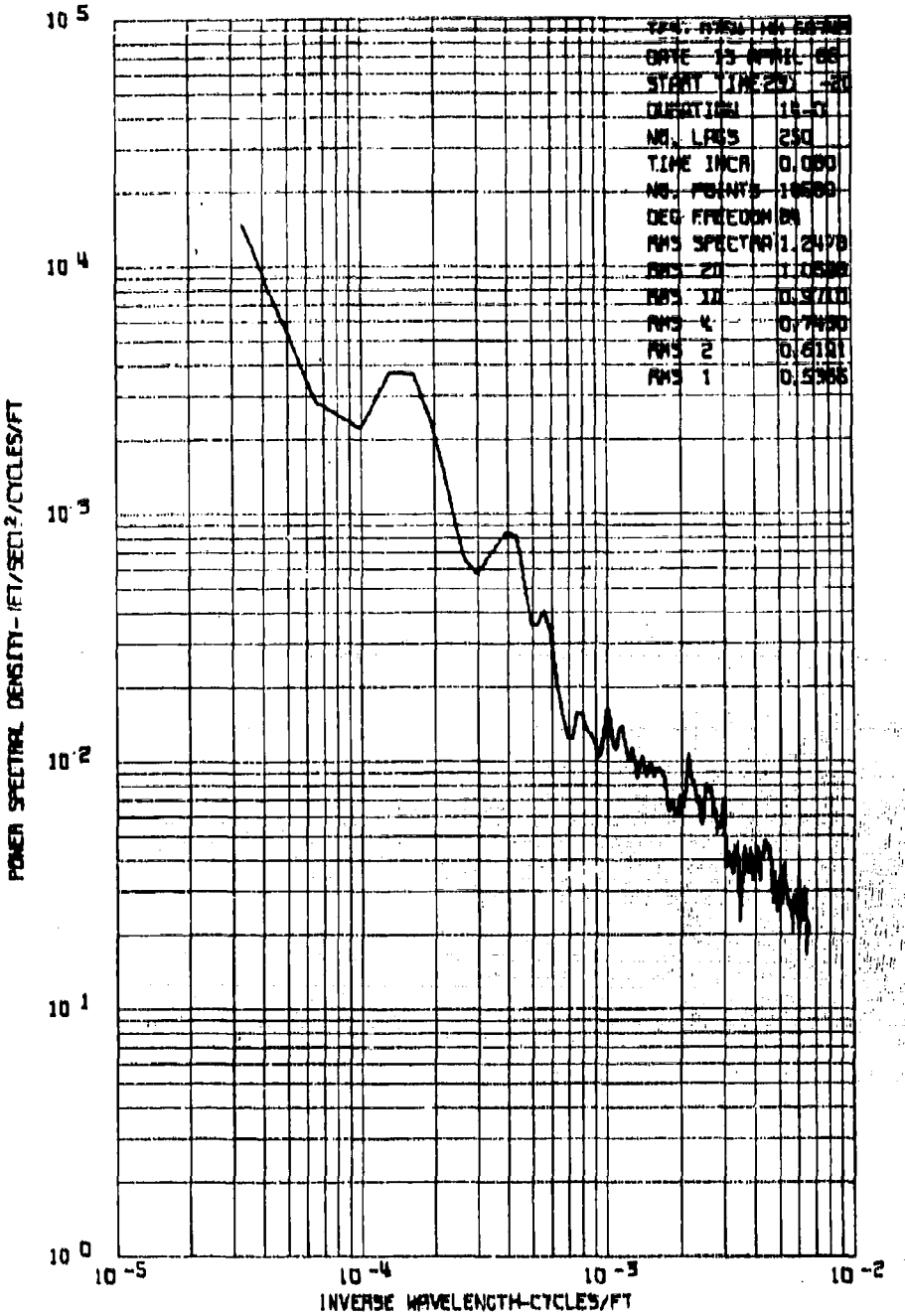


Figure 90A. Power Spectrum of Vertical Gust Velocity, Test 75, Run 4.

Appendix VII

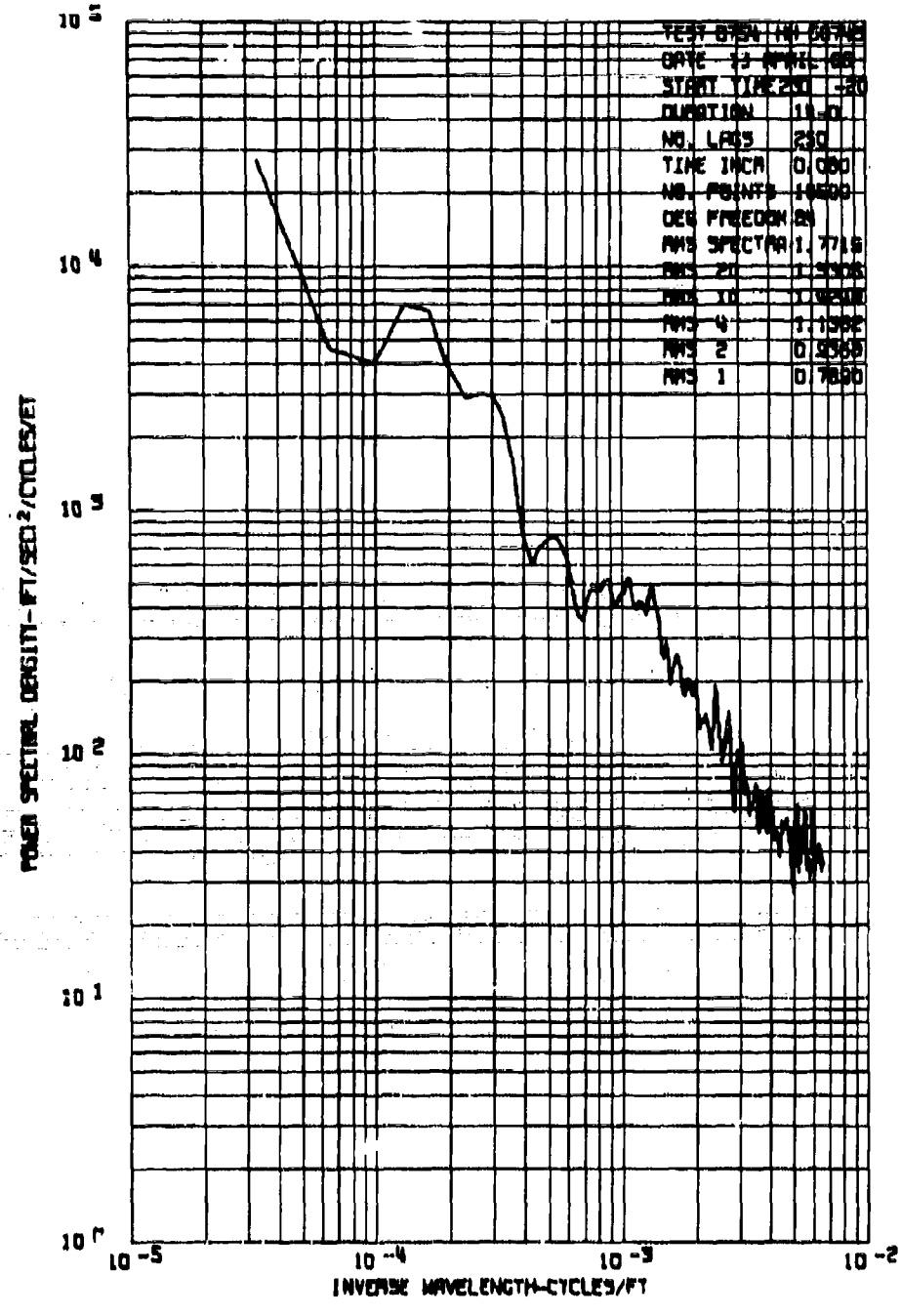


Figure 90B. Power Spectrum in Lateral Gust Velocity, Test 75, Run 4.

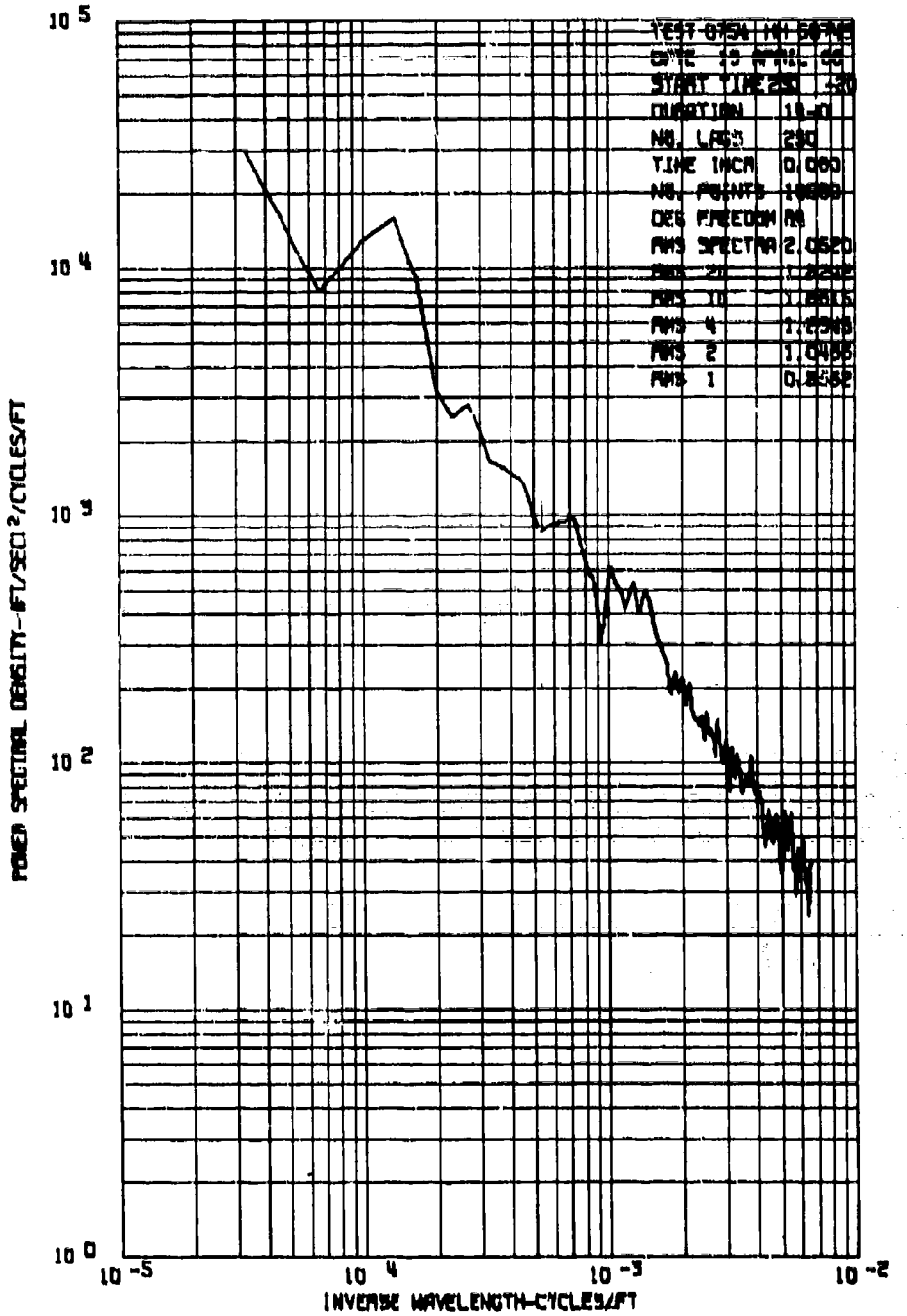


Figure 900. Power Spectrum of Longitudinal Gust Velocity, Test 75, Run 4.

Appendix VII

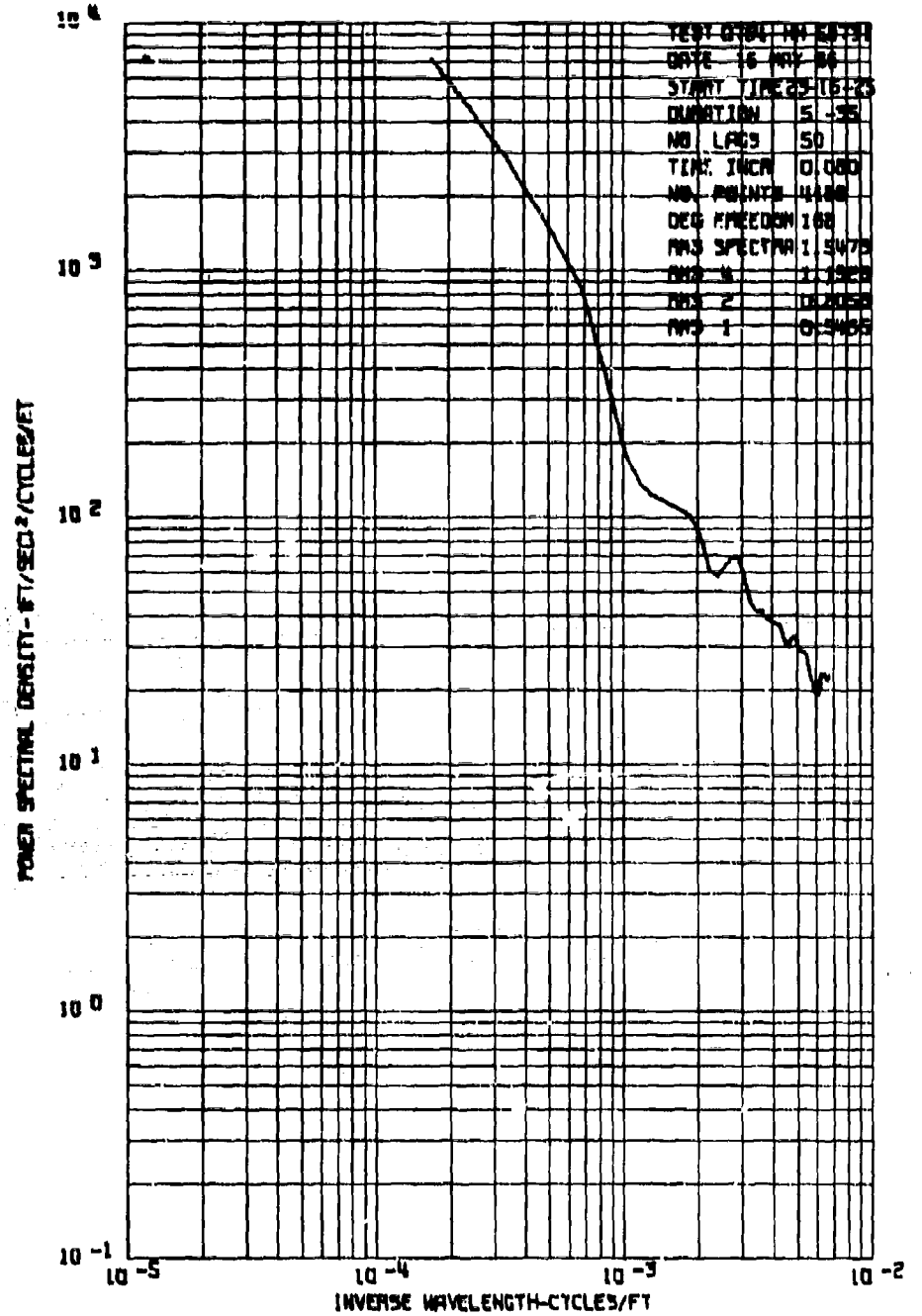


Figure 91A. Power Spectrum of Vertical Gust Velocity, Test 76, Run 4.

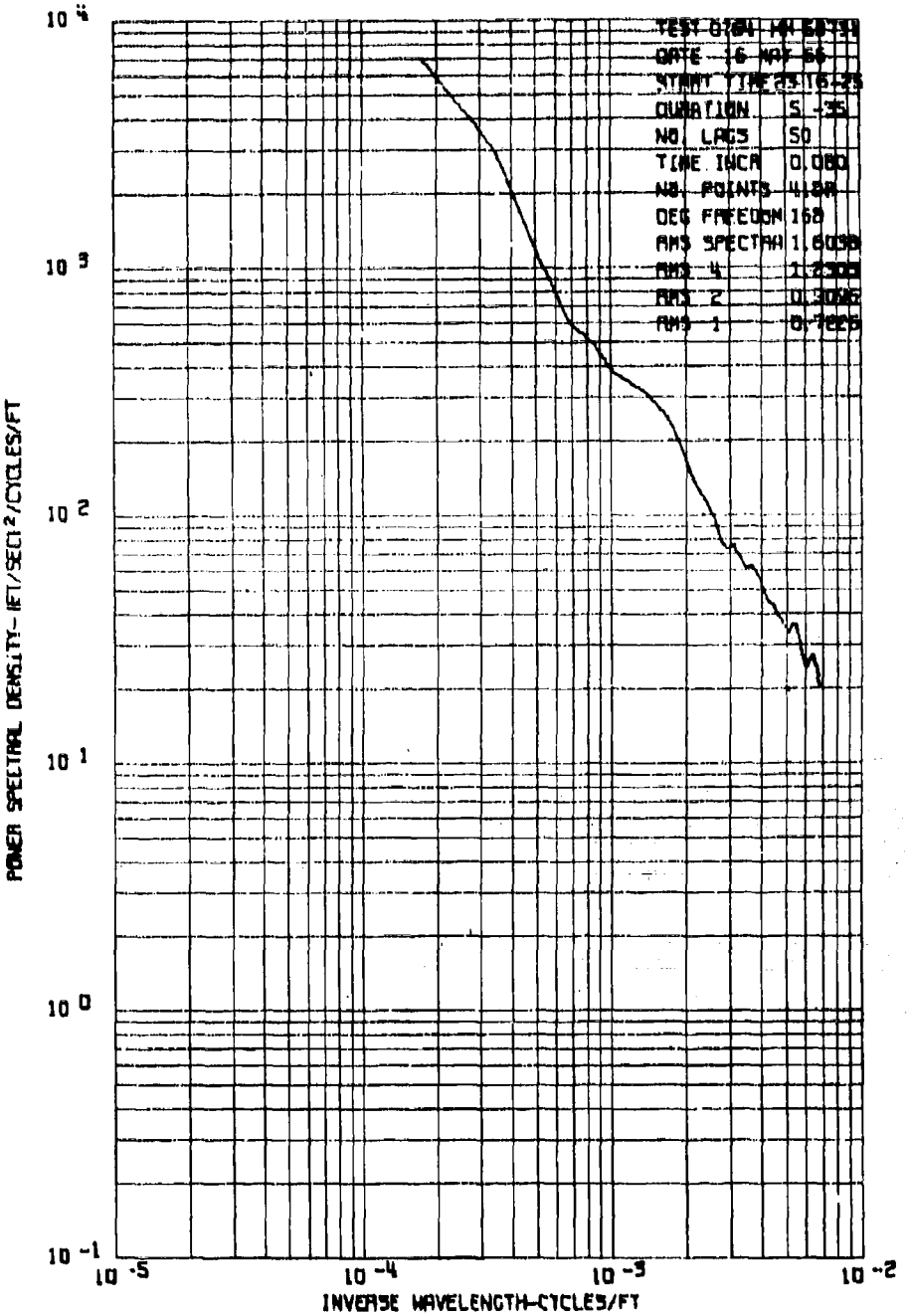


Figure 91B. Power Spectrum of Lateral Gust Velocity, Test 76, Run 4.

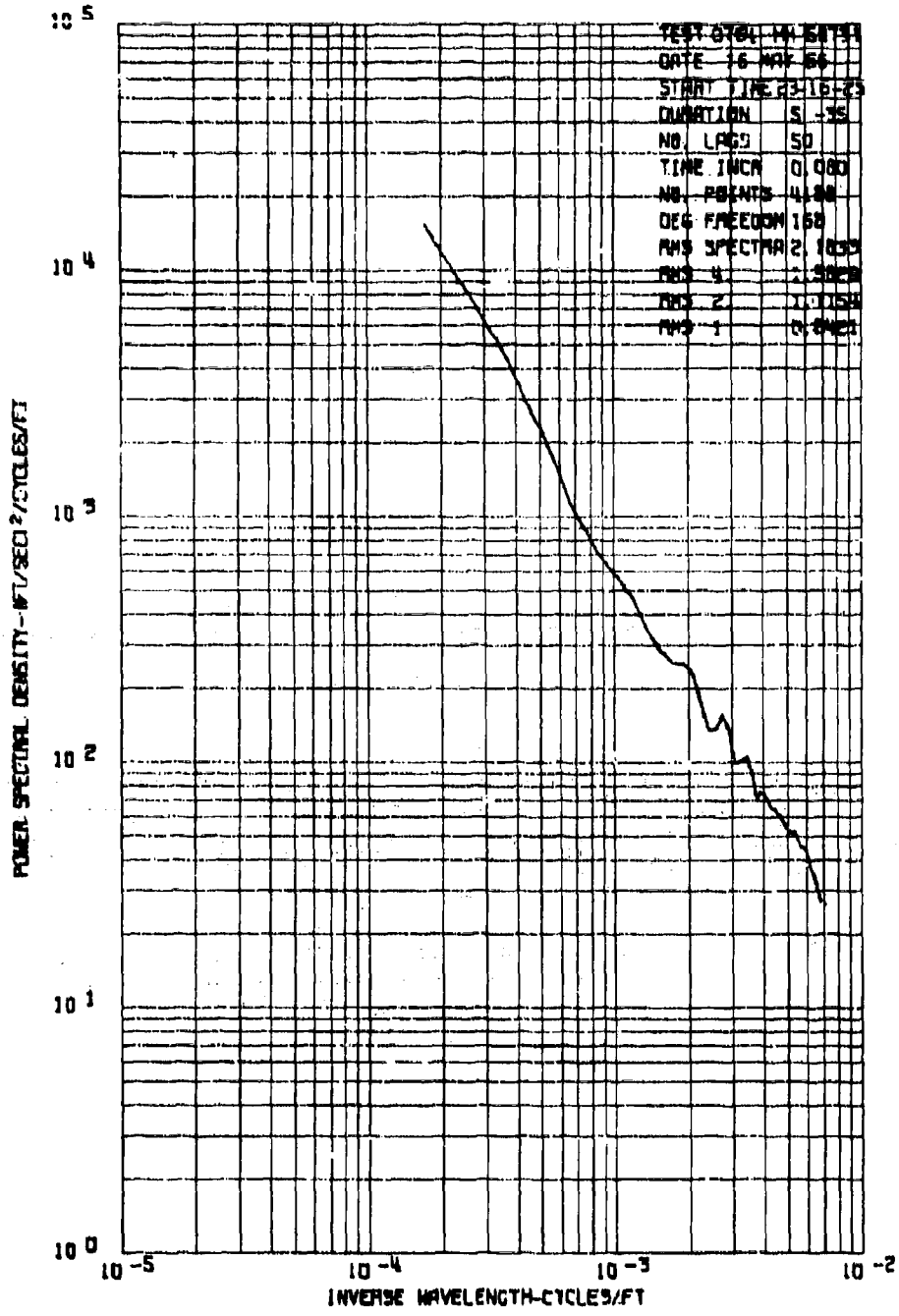


Figure 91C. Power Spectrum of Longitudinal Gust Velocity, Test 76, Run 4.

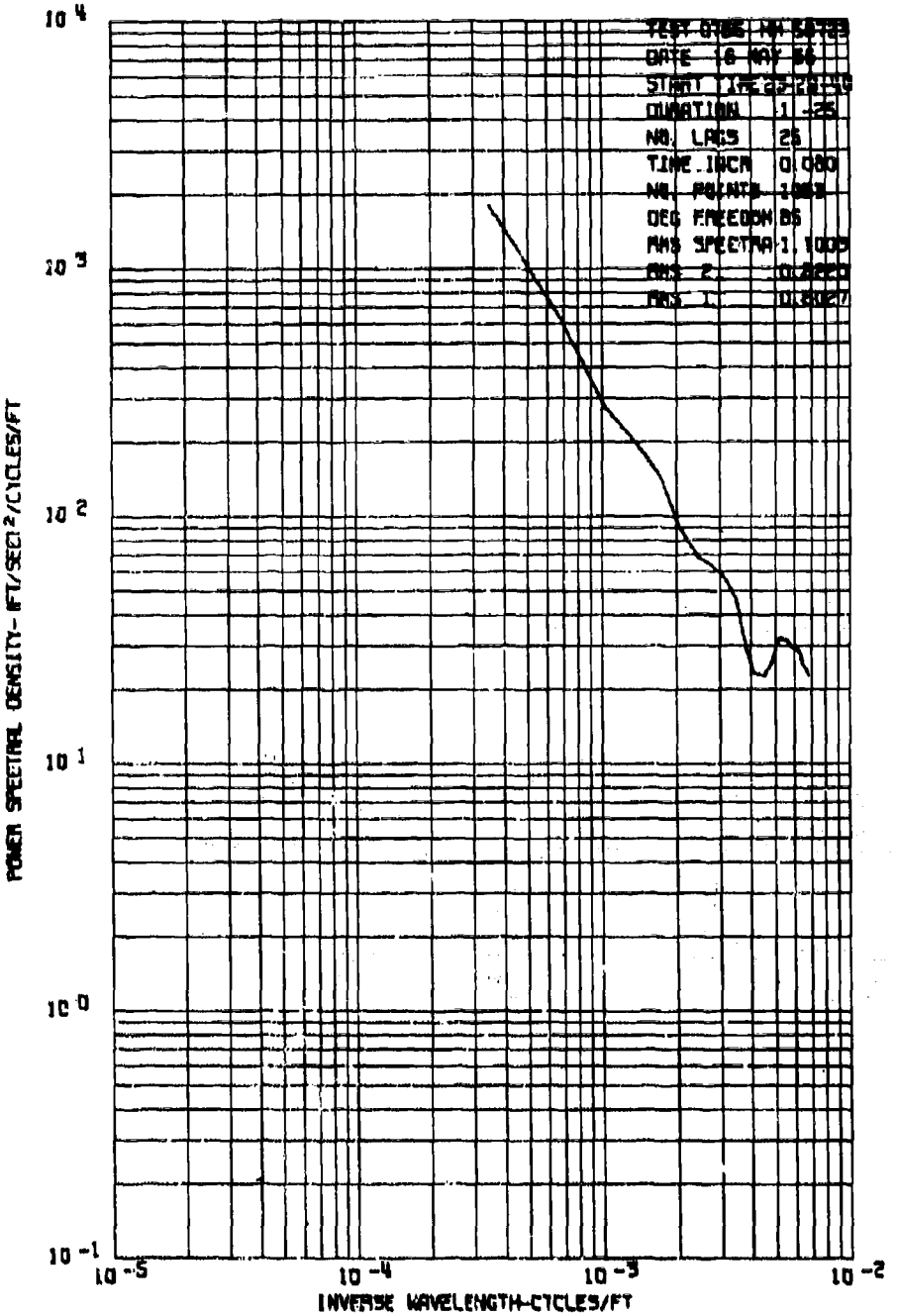


Figure 92A. Power Spectrum of Vertical Gust Velocity, Test 76, Run 5.

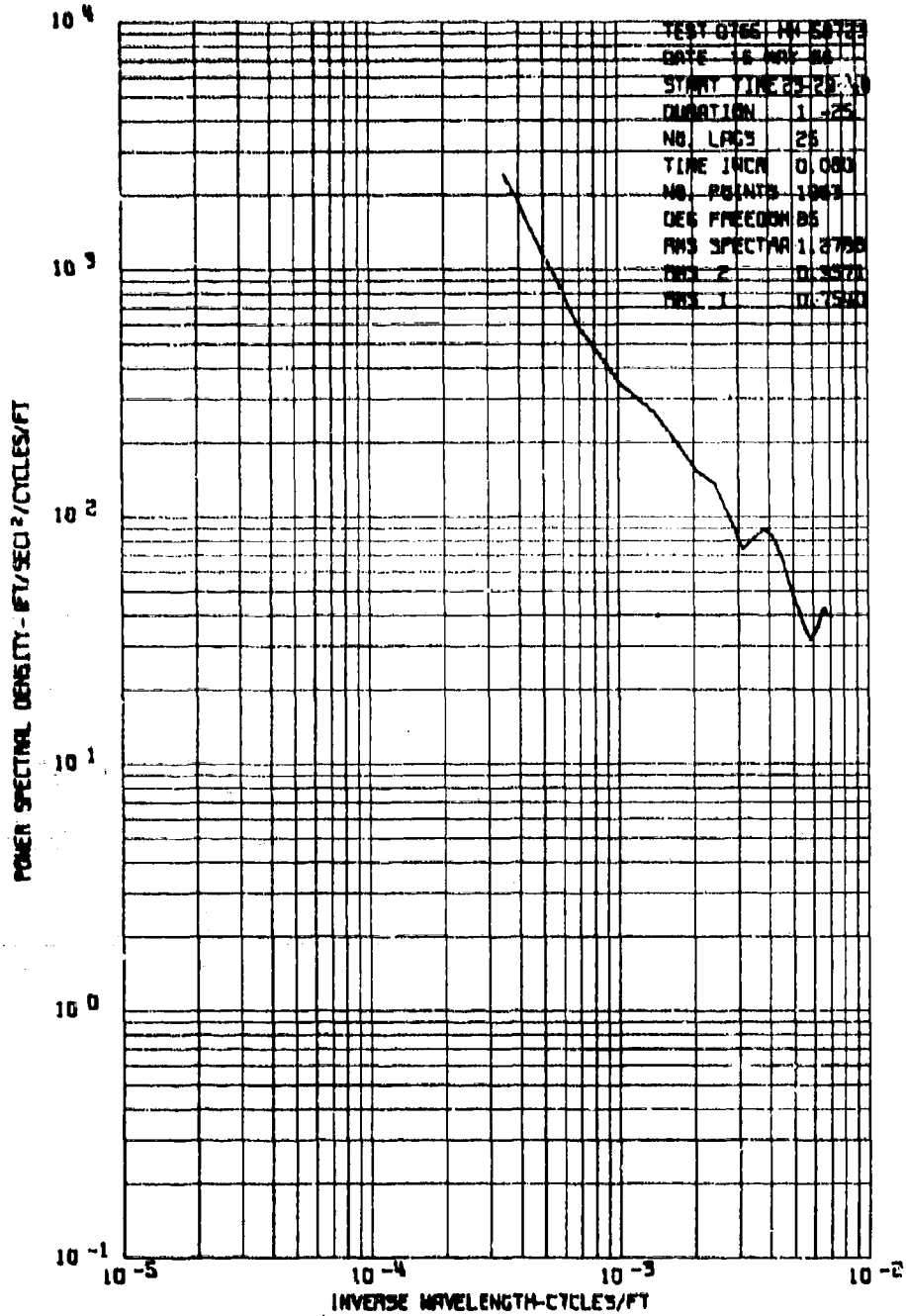


Figure 92B. Power Spectrum of Lateral Gust Velocity, Test 76, Run 5.

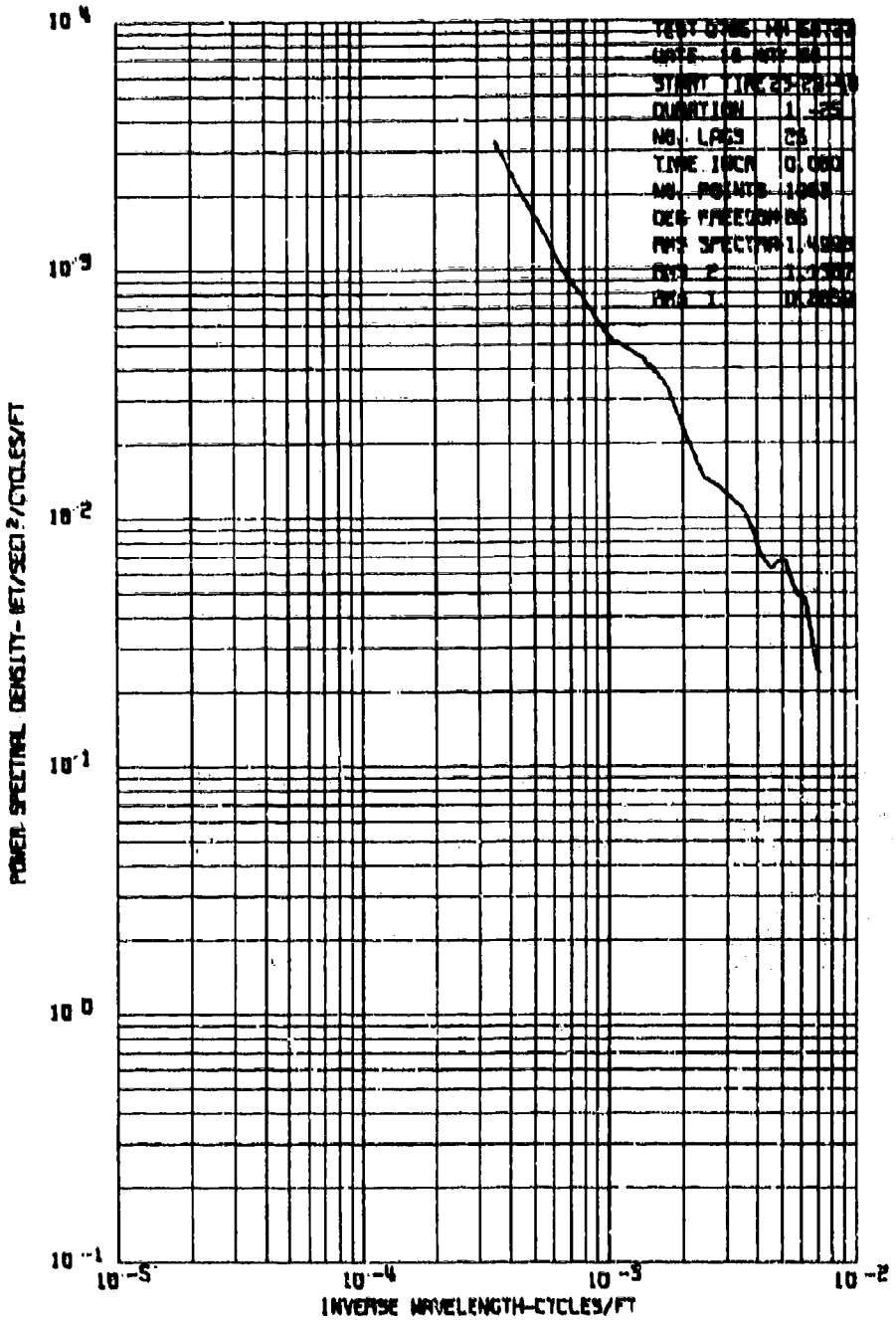


Figure 92C. Power Spectrum of Longitudinal Gust Velocity, Test 76, Run 5.

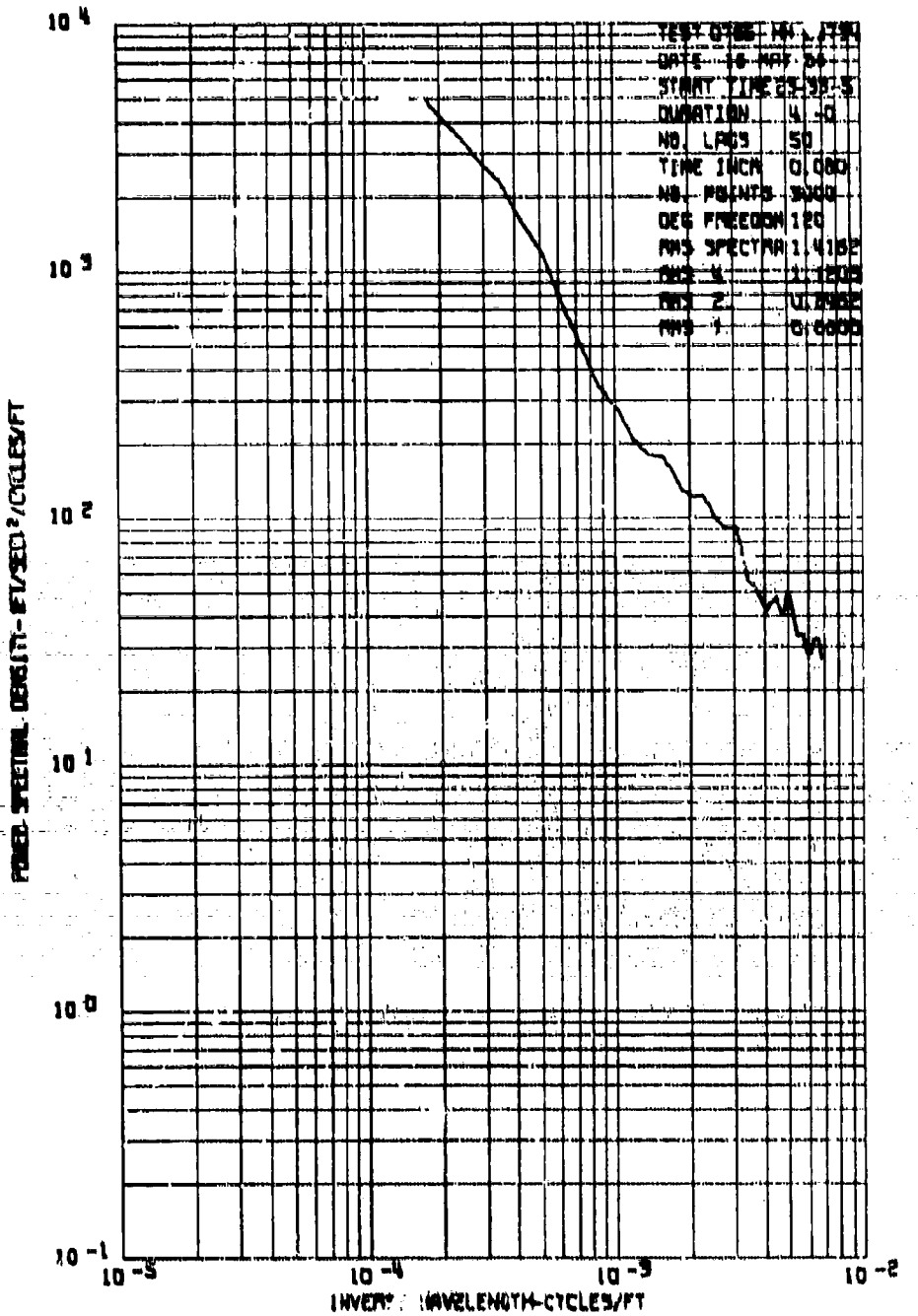


Figure 93A. Power Spectrum of Vertical Gust Velocity, Test 76, Run 6.

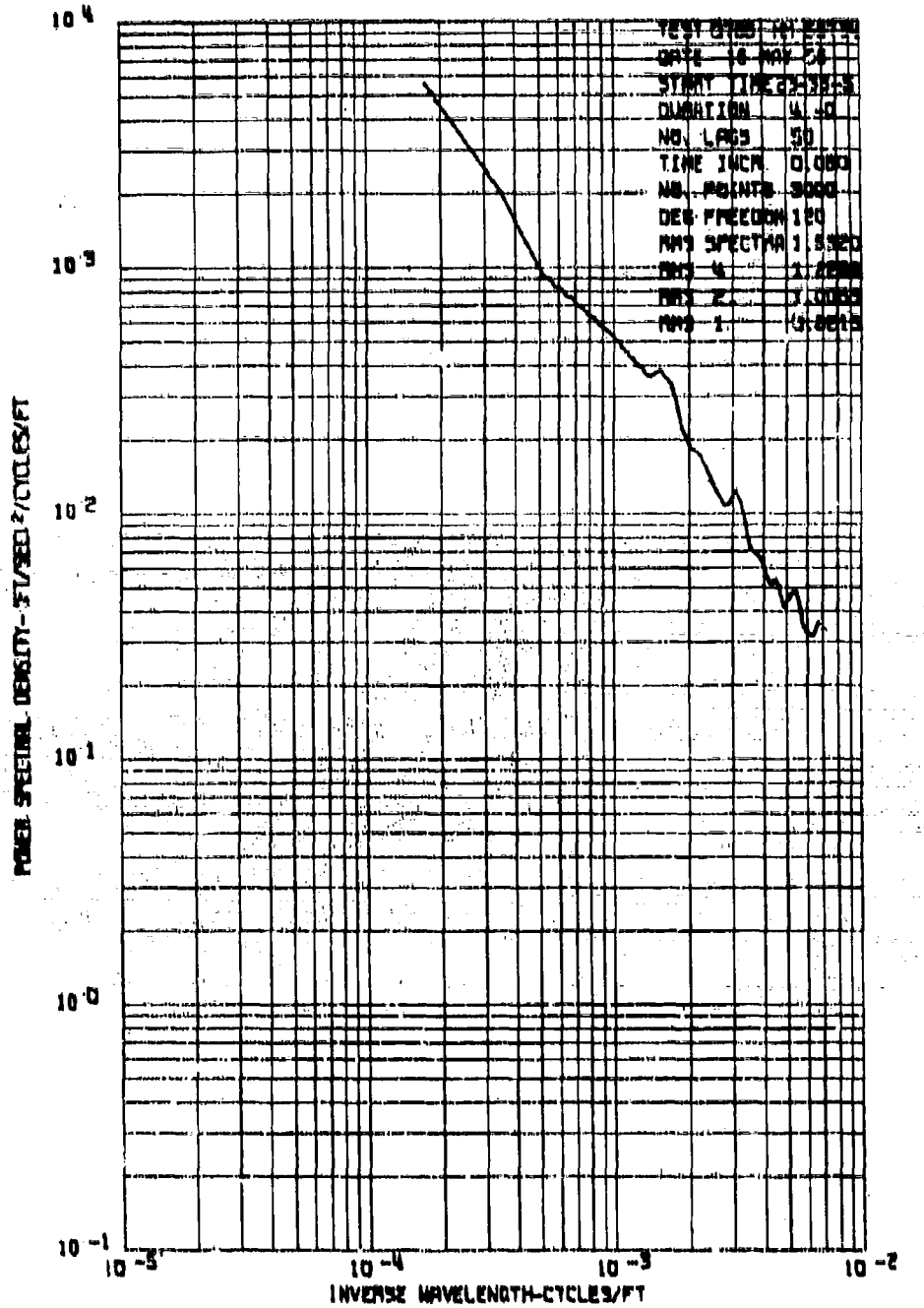


Figure 93B. Power Spectrum of Lateral Gust Velocity, Test 76, Run 6.

Appendix VII

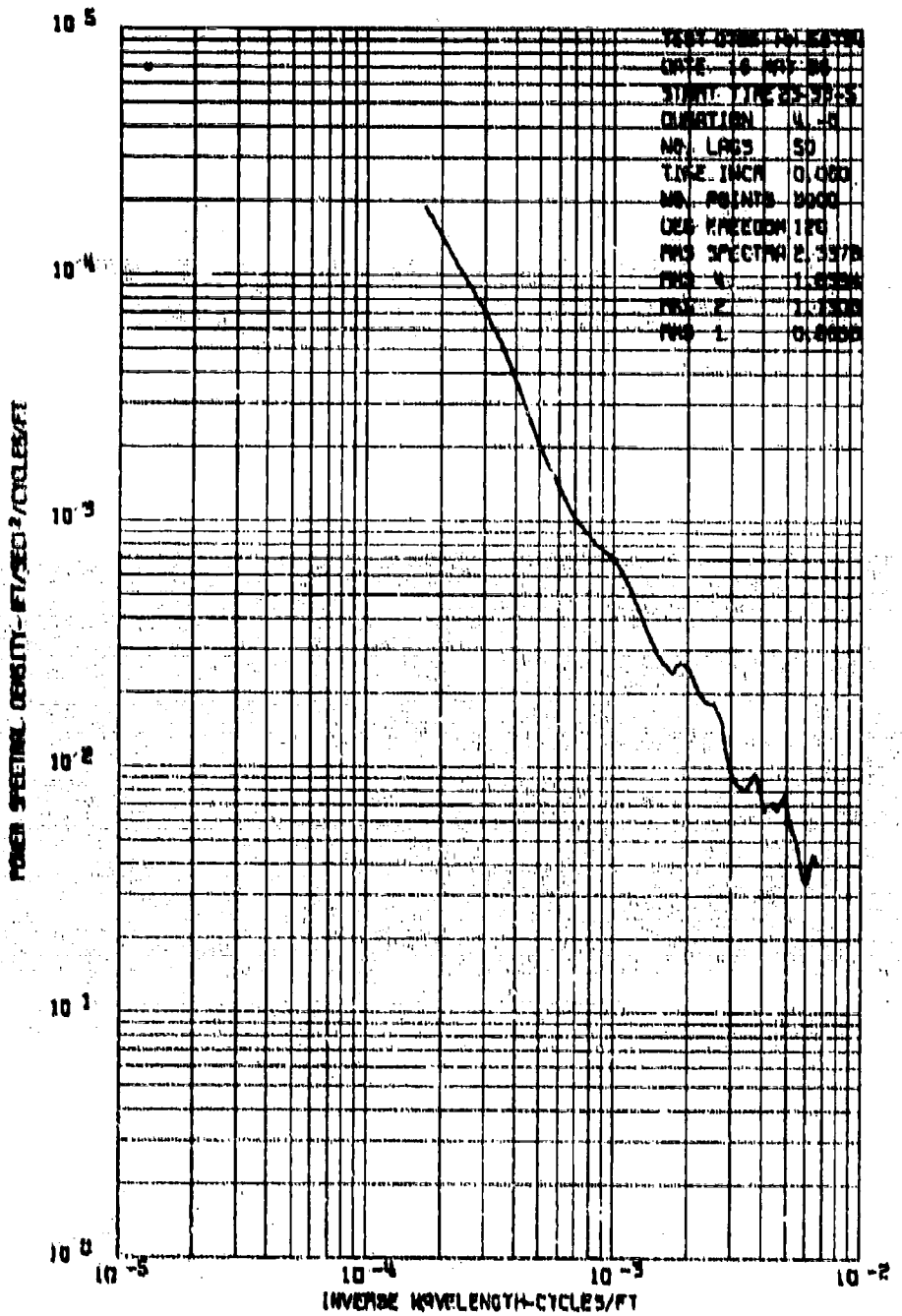


Figure 930. Power Spectrum of Longitudinal Gust Velocity, Test 76, Run 6.

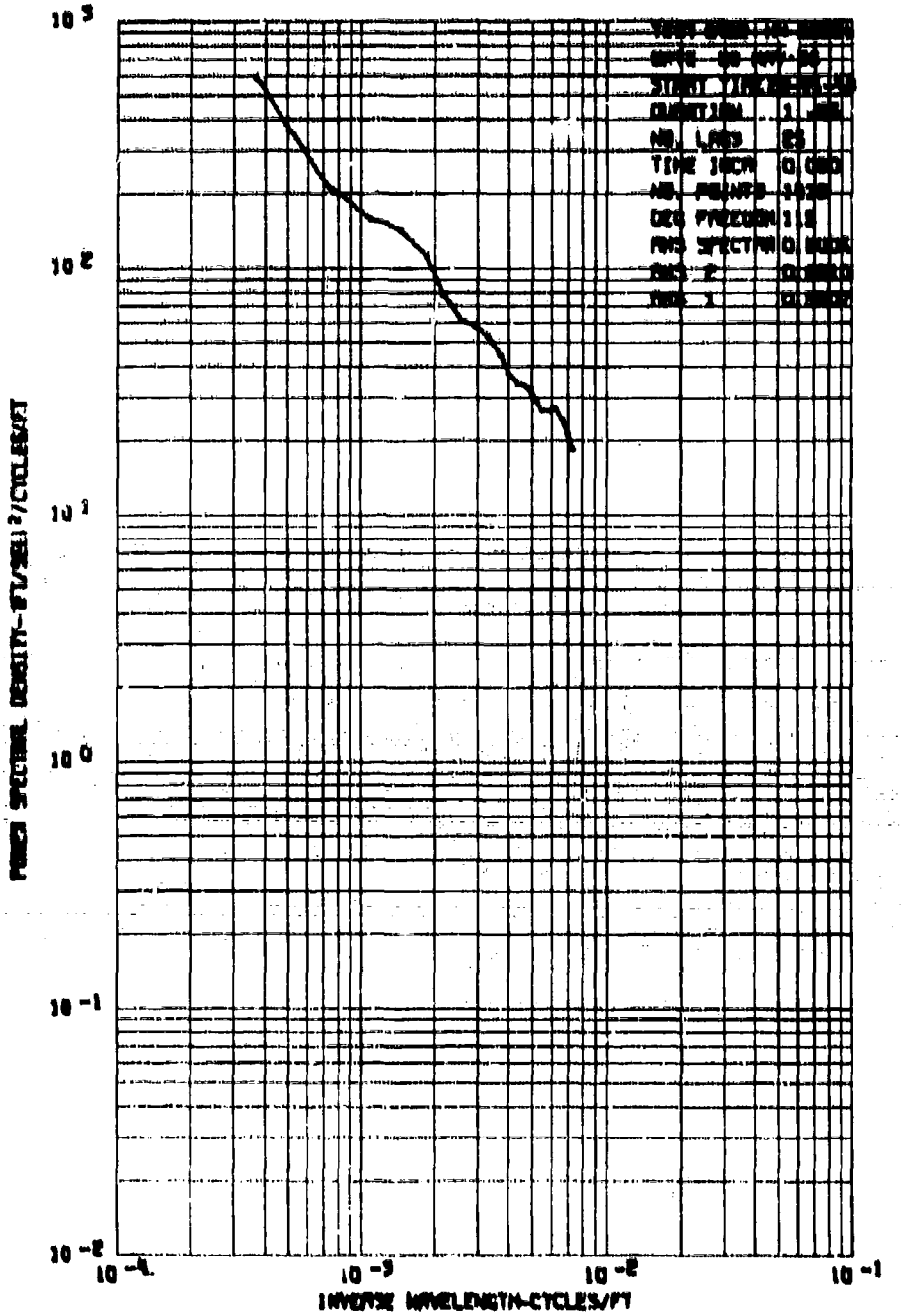


Figure 91A. Power Spectrum of Vertical Gust Velocity, Test 79, Run 2.

Appendix VII

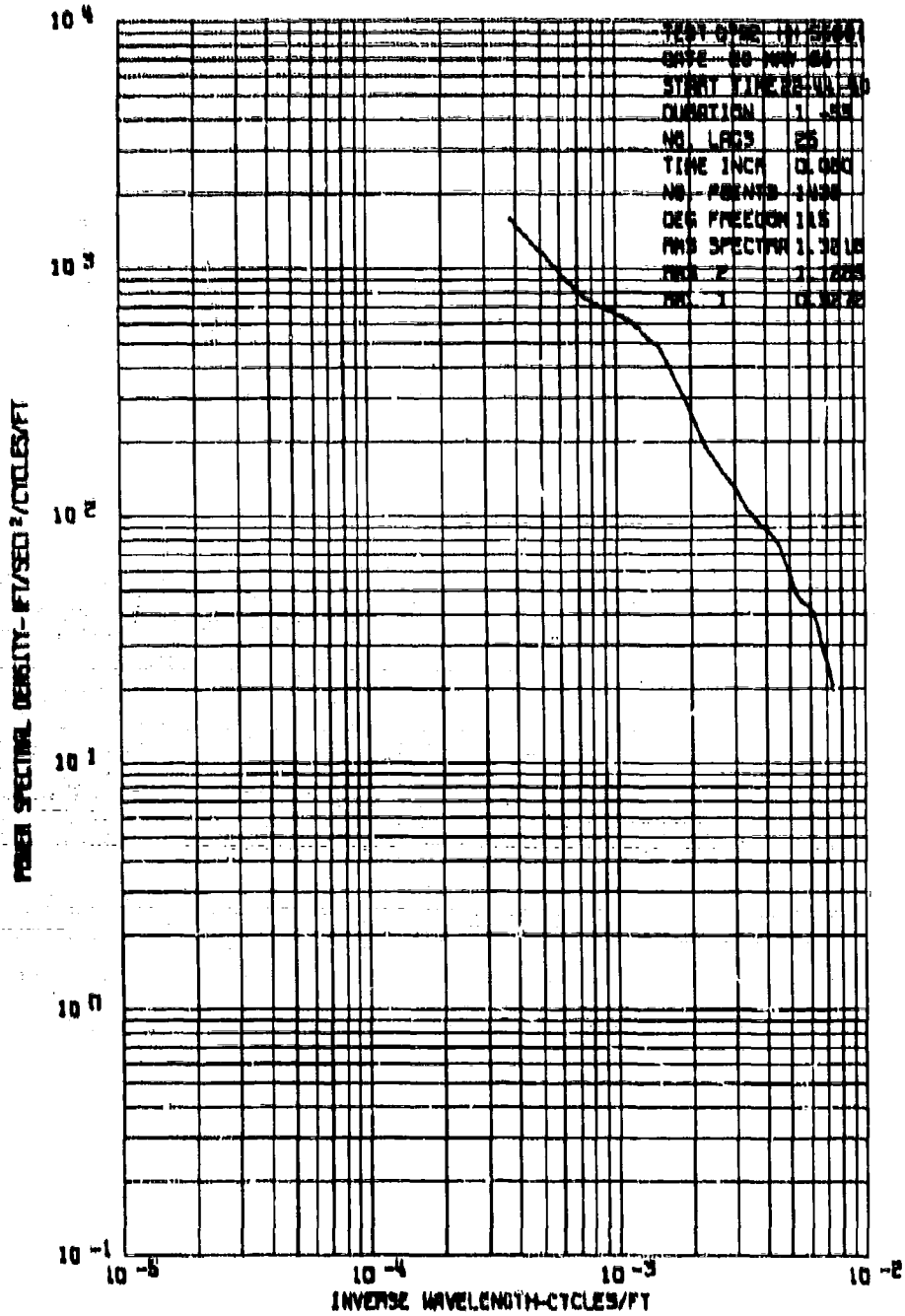


Figure 91B. Power Spectrum of Lateral Gust Velocity, Test 79, Run 2.

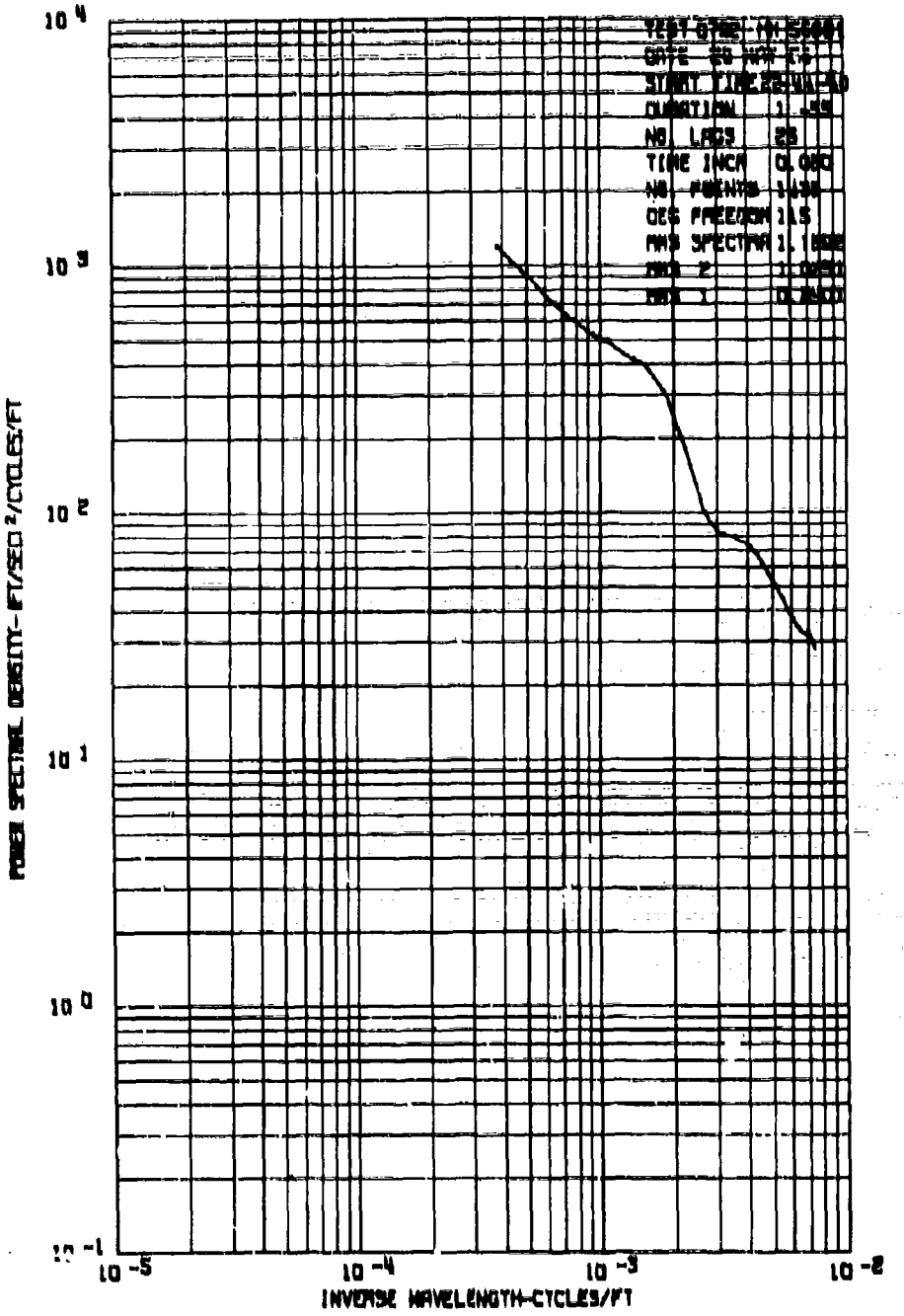


Figure 94d. Power Spectrum of Longitudinal Gust Velocity, Test 79, Run 2.

Appendix VII

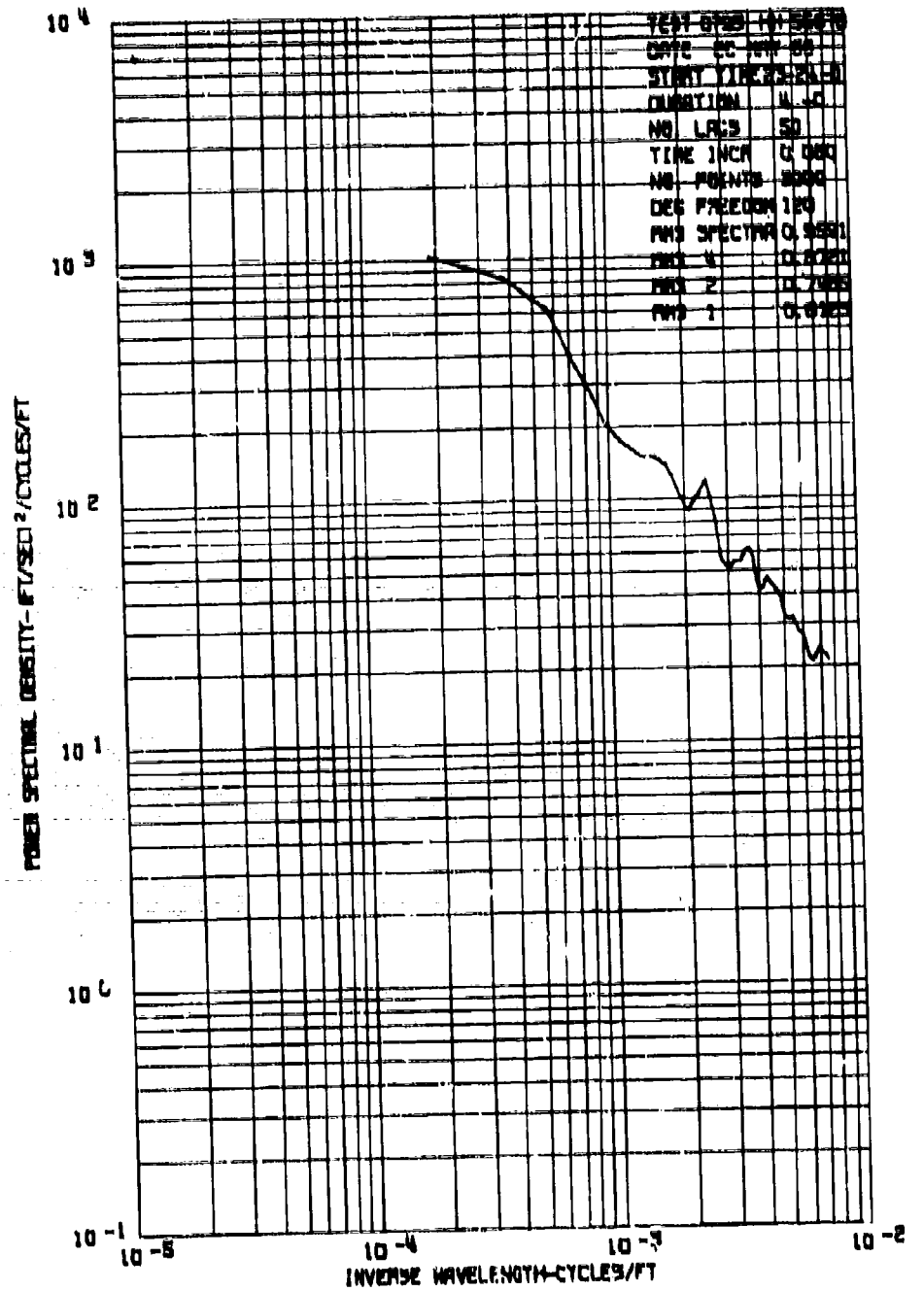


Figure 95A. Power Spectrum of Vertical Gust Velocity, Test 79, Run 3.

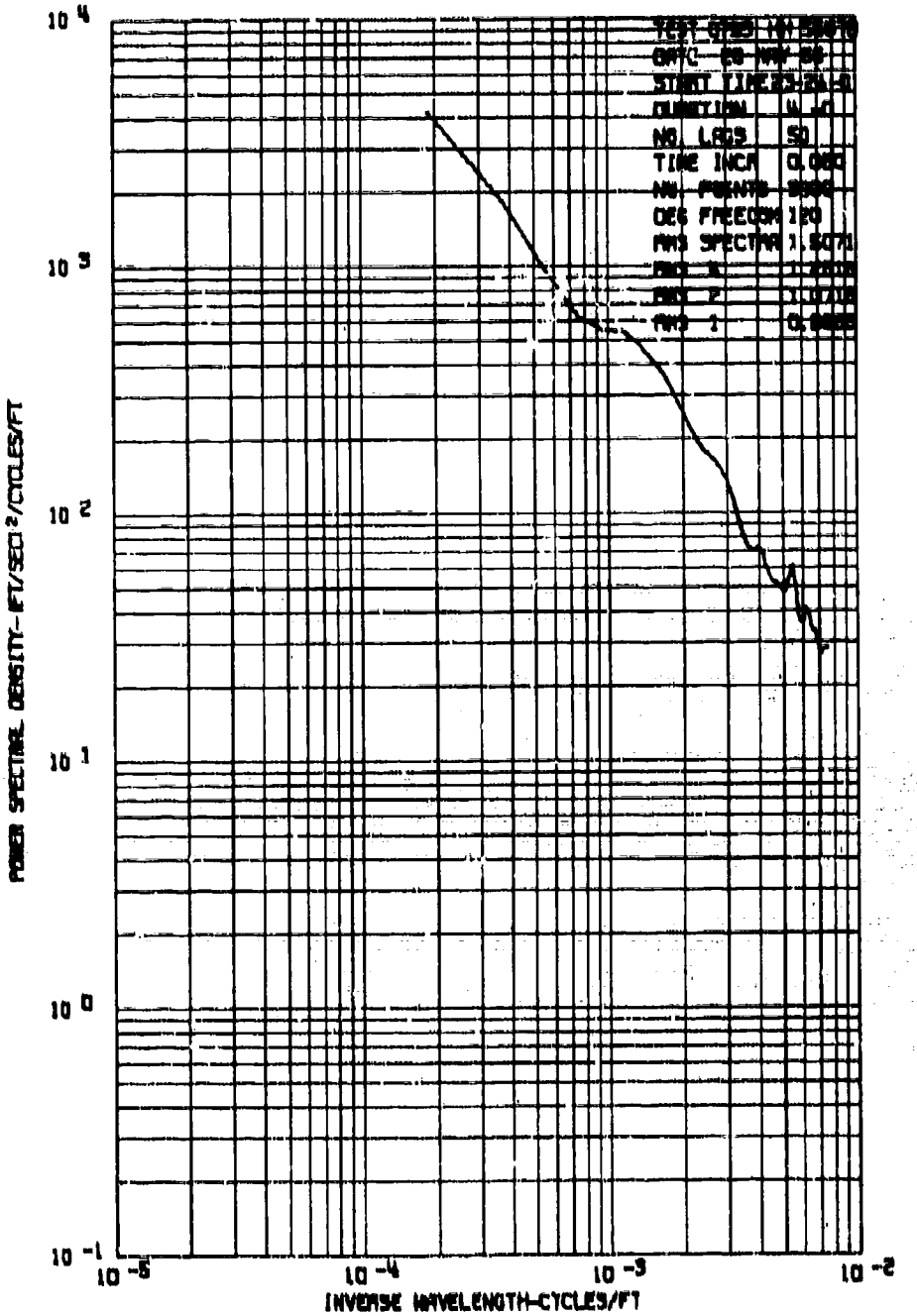


Figure 95B. Power Spectrum of Lateral Gust Velocity, Test 79, Run 3.

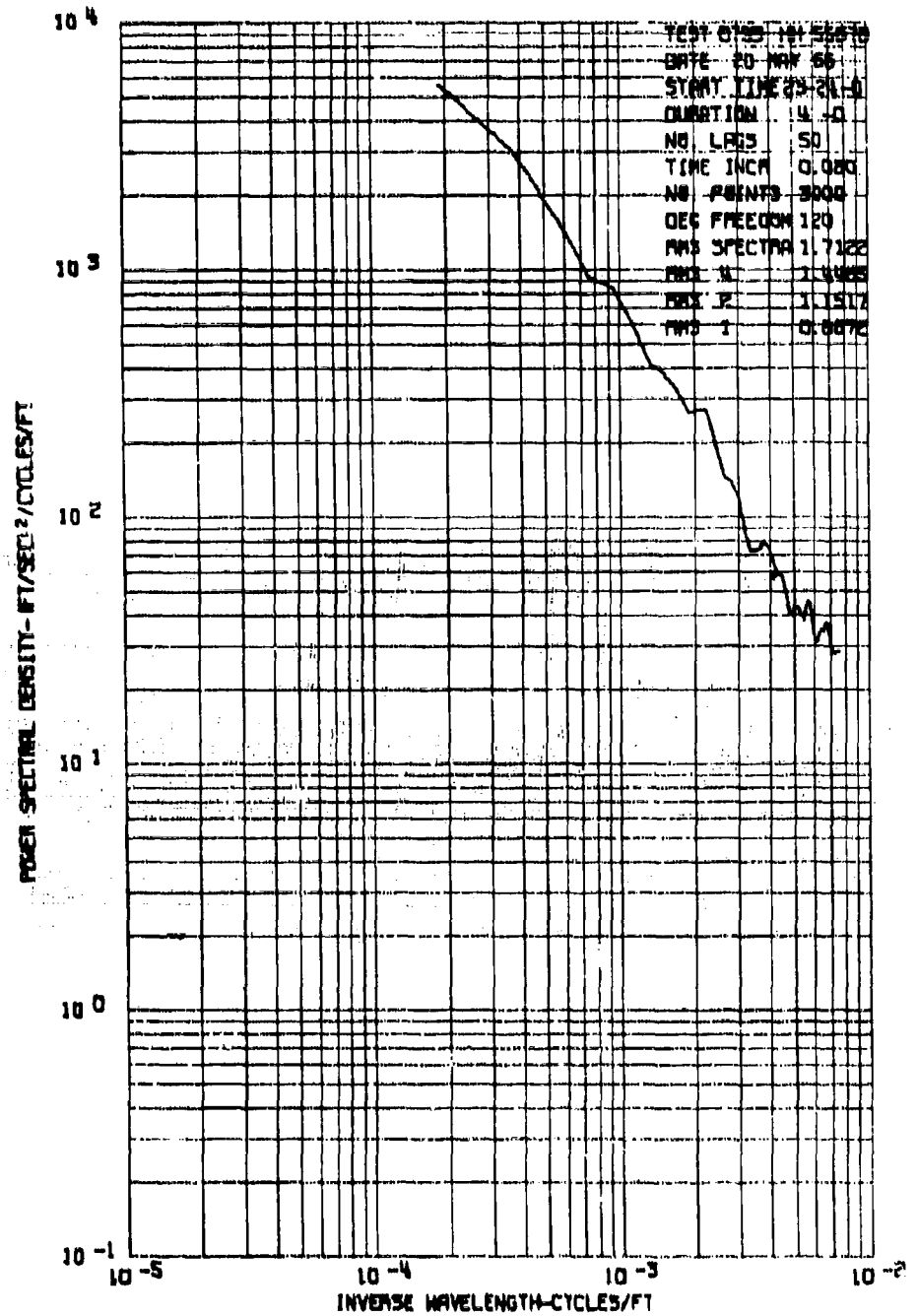


Figure 95C. Power Spectrum of Longitudinal Gust Velocity, Test 79, Run 3.

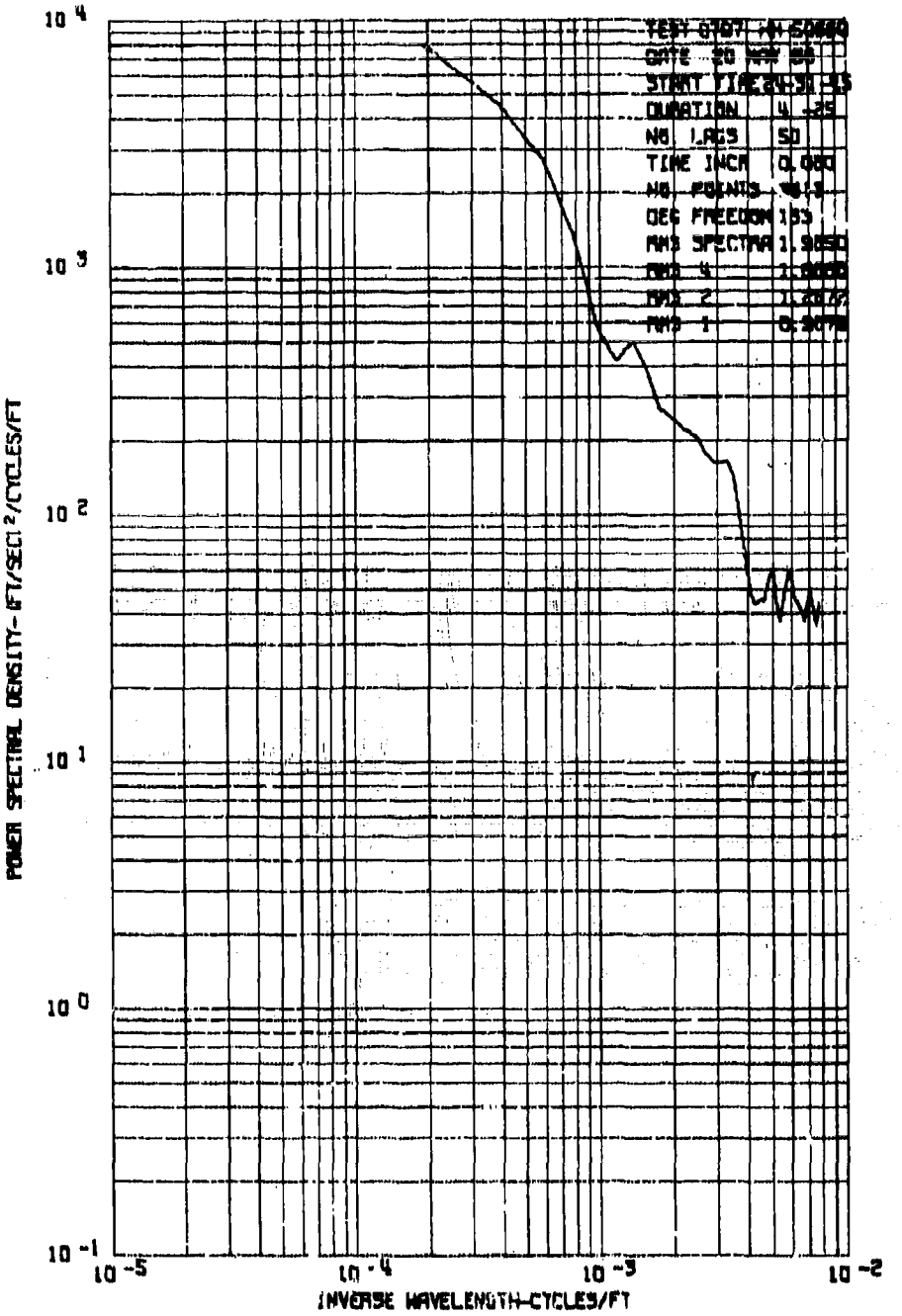


Figure 96A. Power Spectrum of Vertical Gust Velocity, Test 79, Run 7.

Appendix VII

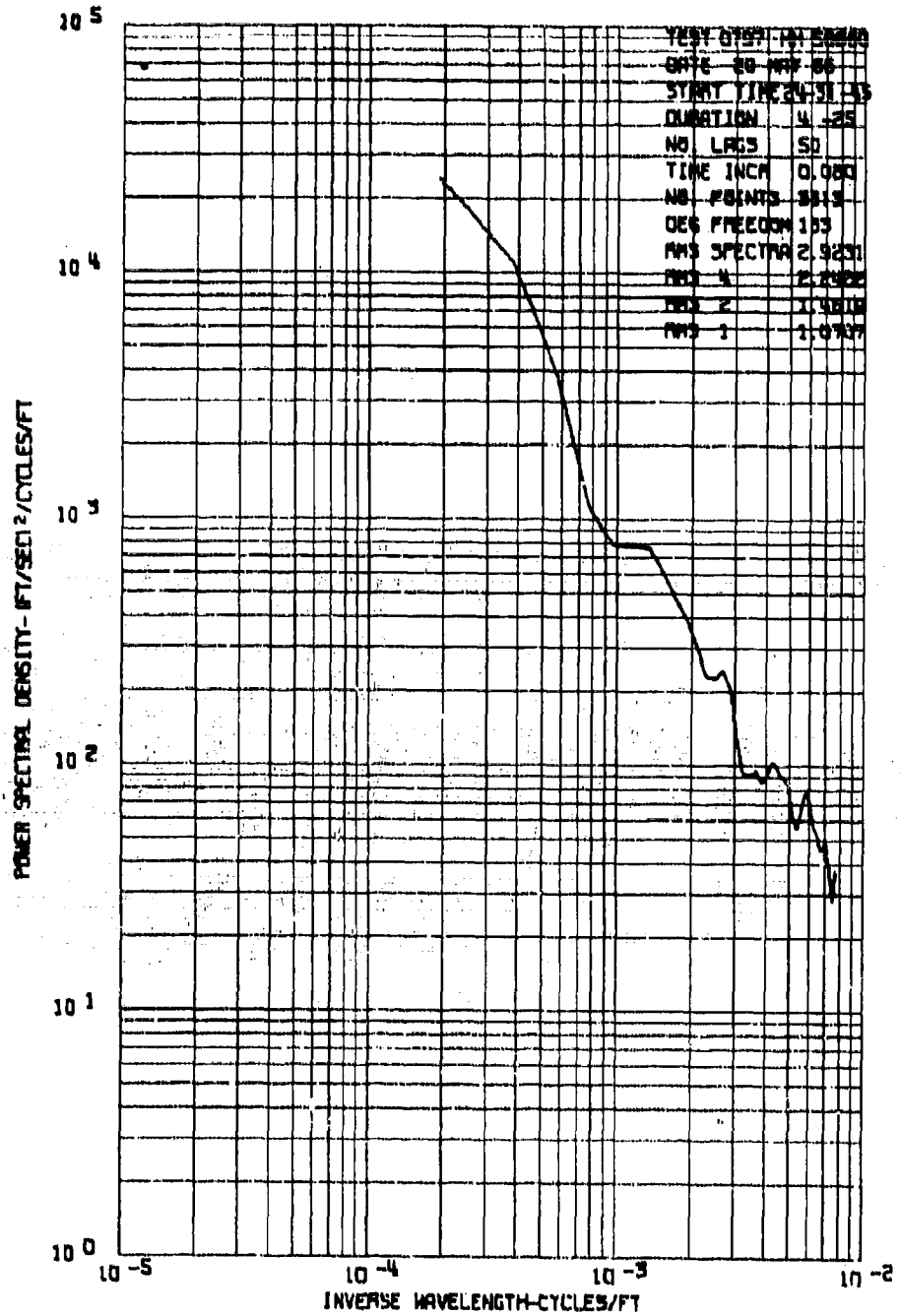


Figure 96B. Power Spectrum of Lateral Gust Velocity, Test 79, Run 7.

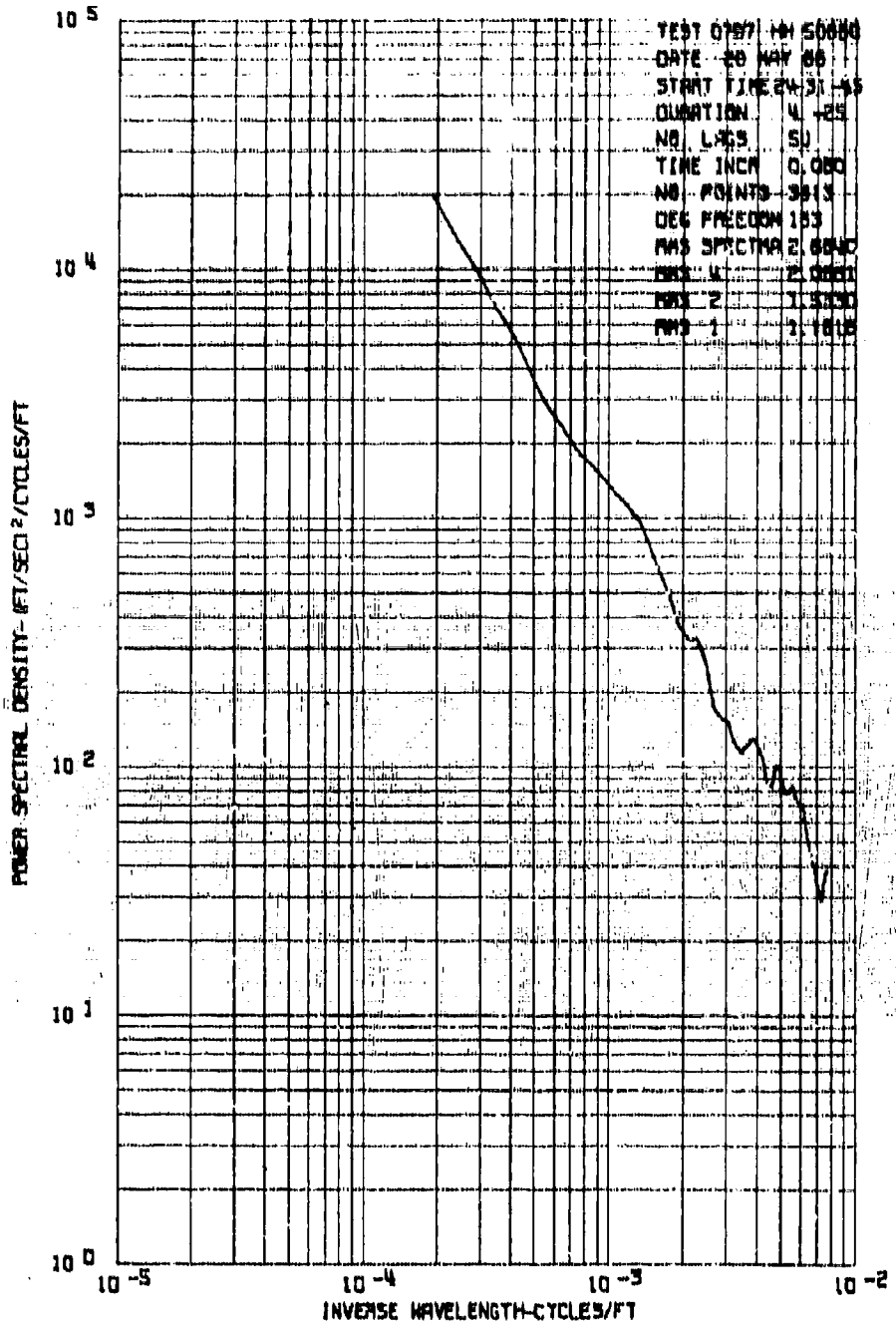


Figure 96C. Power Spectrum of Longitudinal Gust Velocity, Test 79, Run 7.

Appendix VII

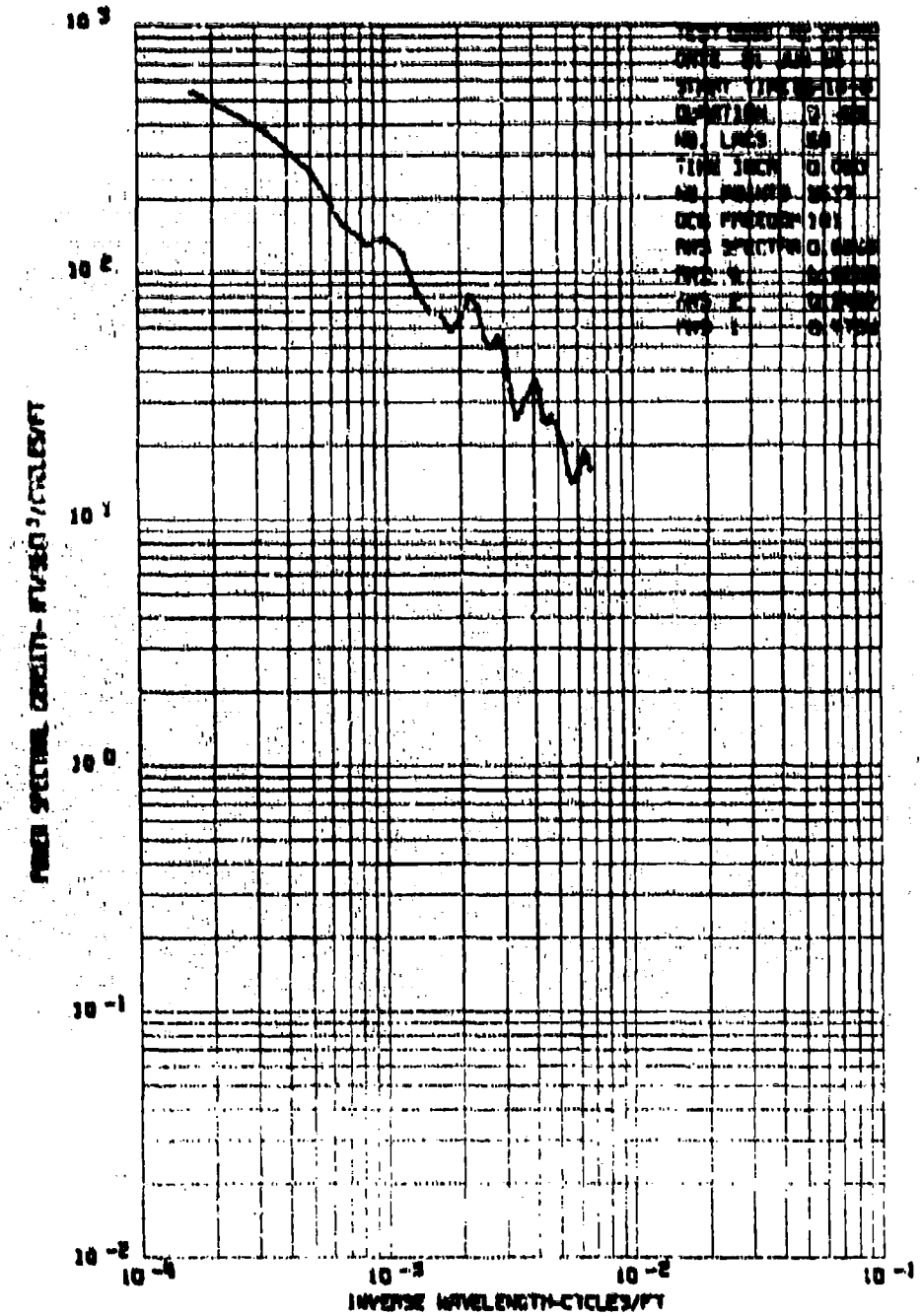


Figure 9/A. Power Spectrum of Vertical Gust Velocity, Test 88, Run 6.

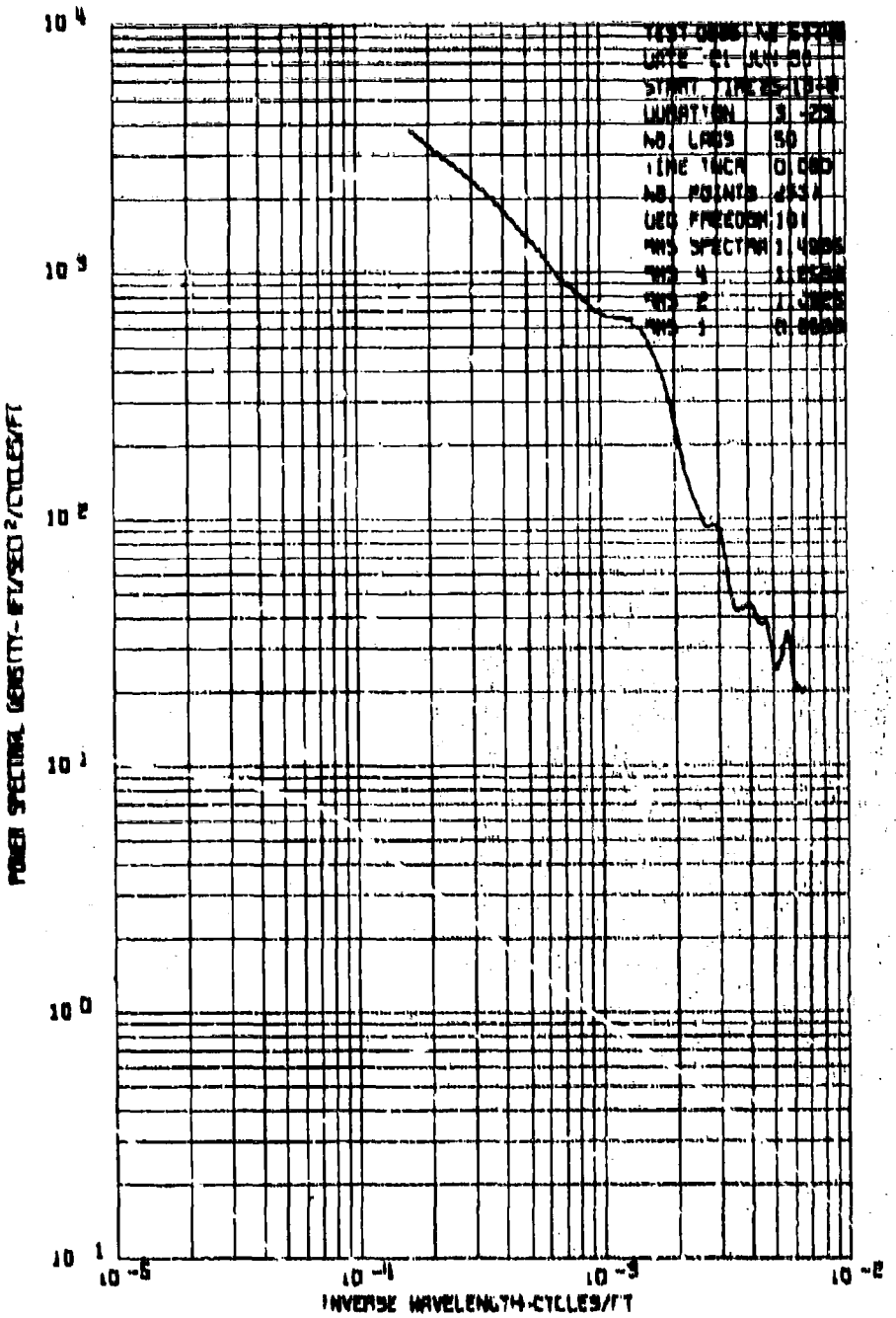


Figure 97B. Power Spectrum of Lateral Gust Velocity, Test 88, Run 6.

Appendix VII

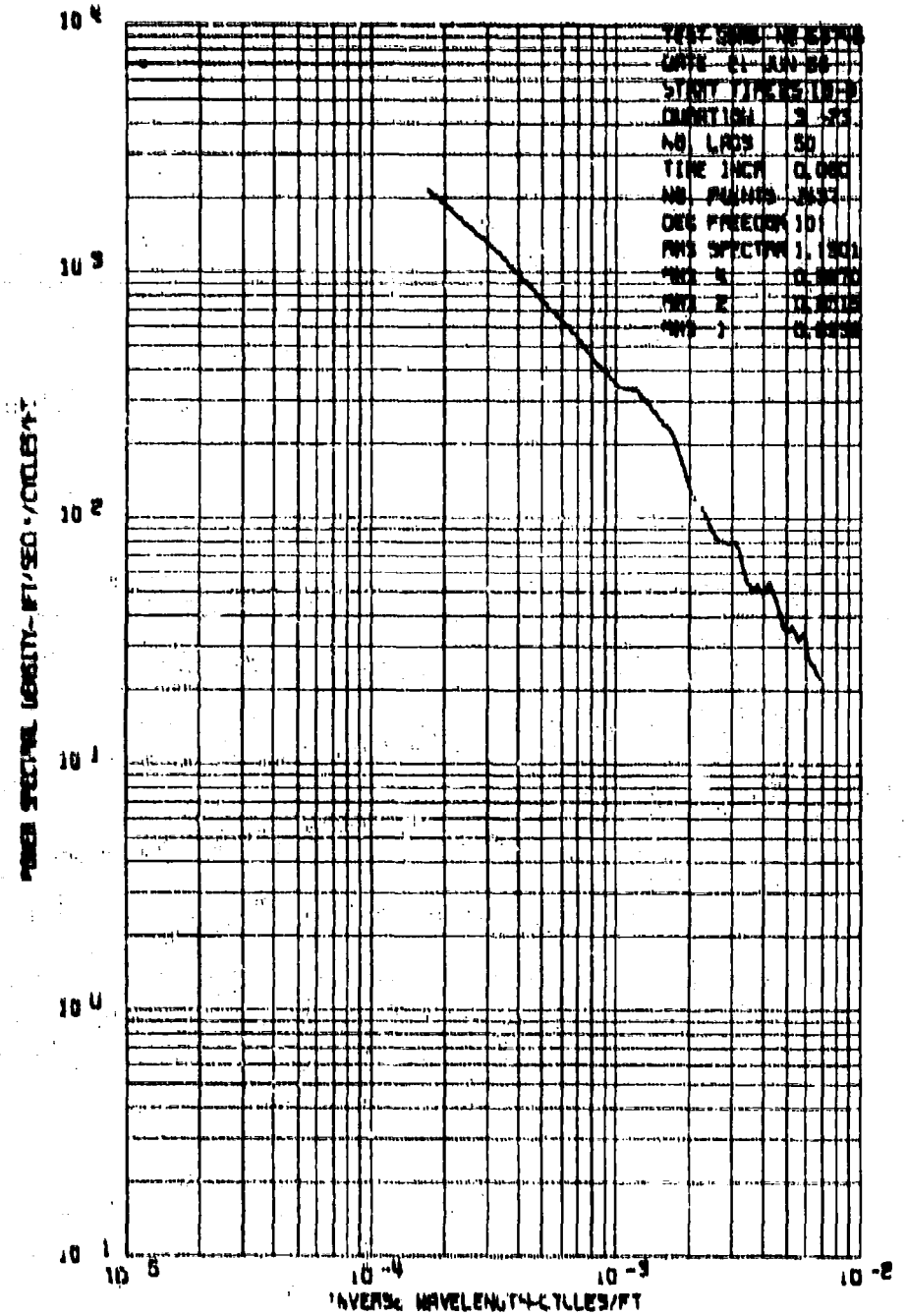


Figure 97C. Power Spectrum of Longitudinal Gust Velocity, Test 88, Run 6.

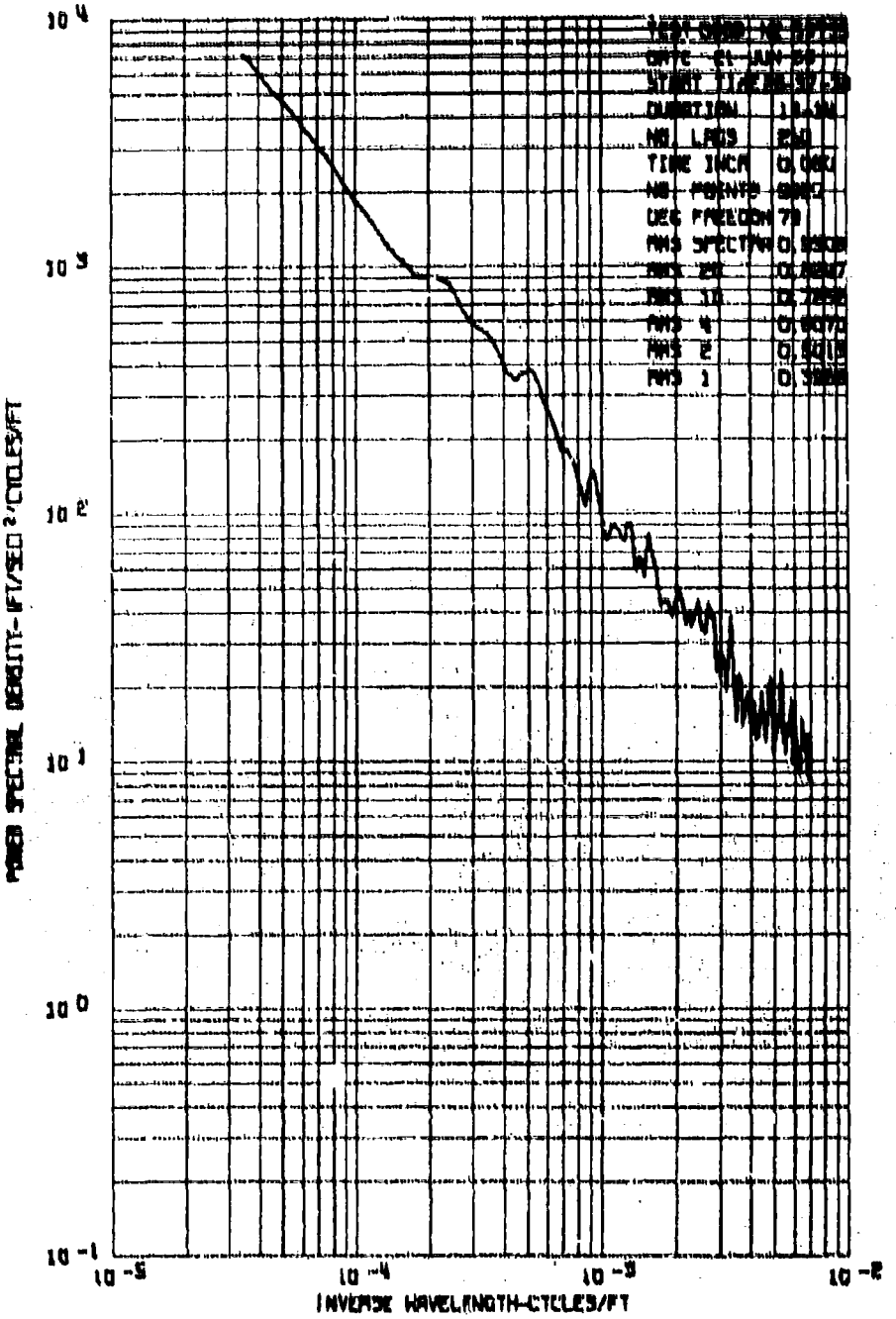


Figure 98A. Power Spectrum of Vertical Gust Velocity, Test 88, Run 8 - 250 Lags.

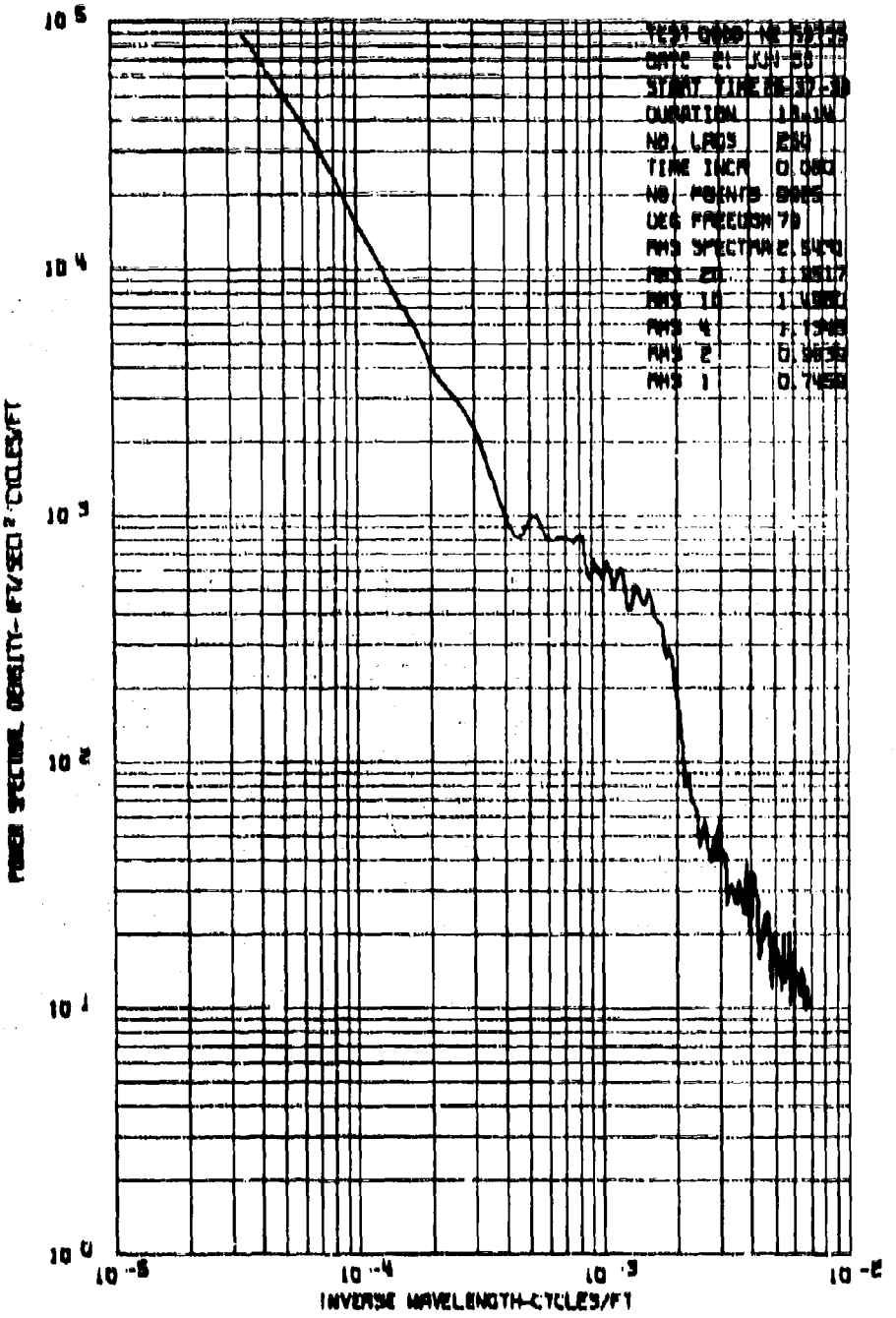


Figure 98B. Power Spectrum of Lateral Gust Velocity, Test 88, Run 8 - 250 Lags.

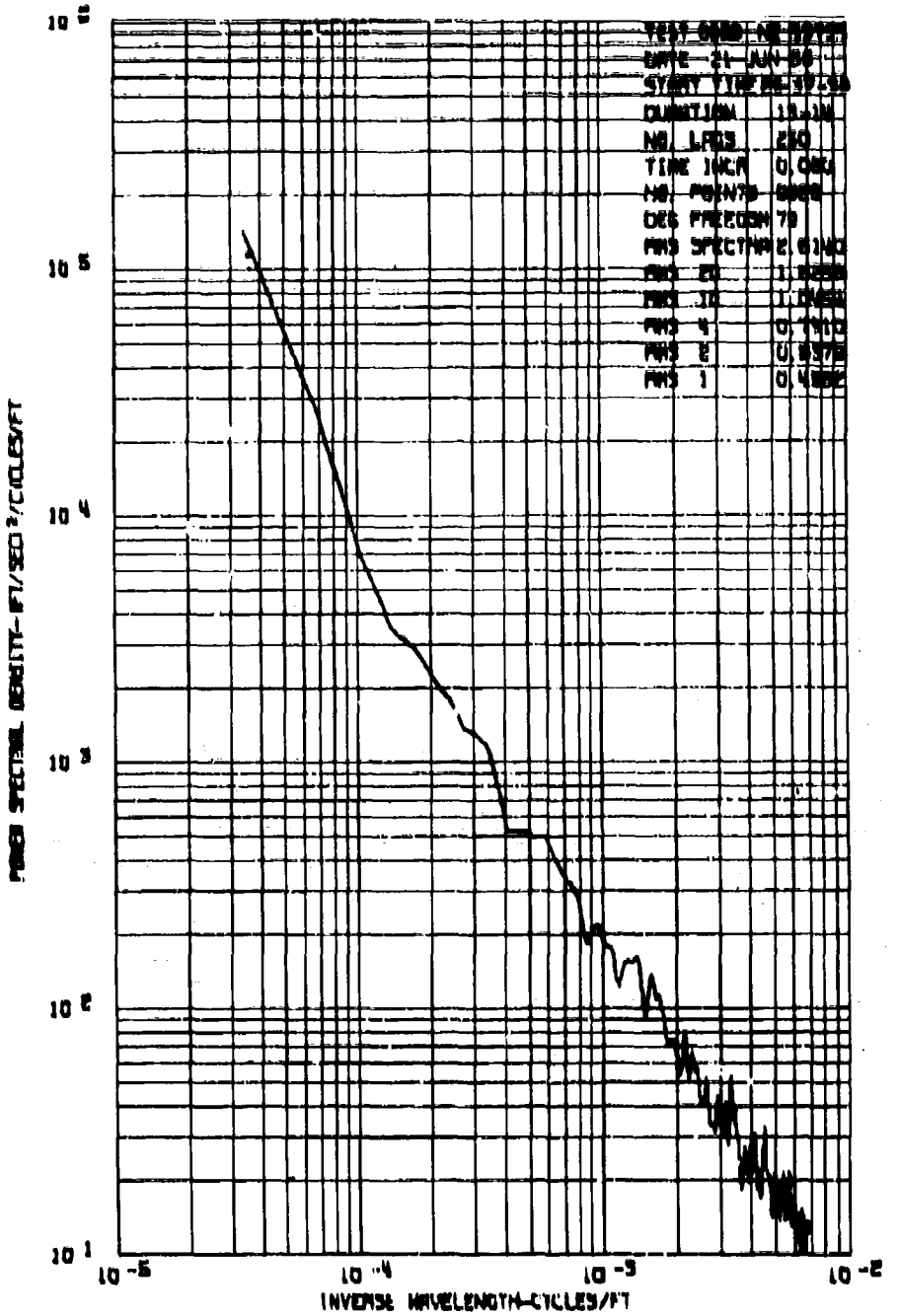


Figure 980. Power Spectrum of Longitudinal Gust Velocity, Test 88, Run 8 - 250 Lags.

Appendix VII

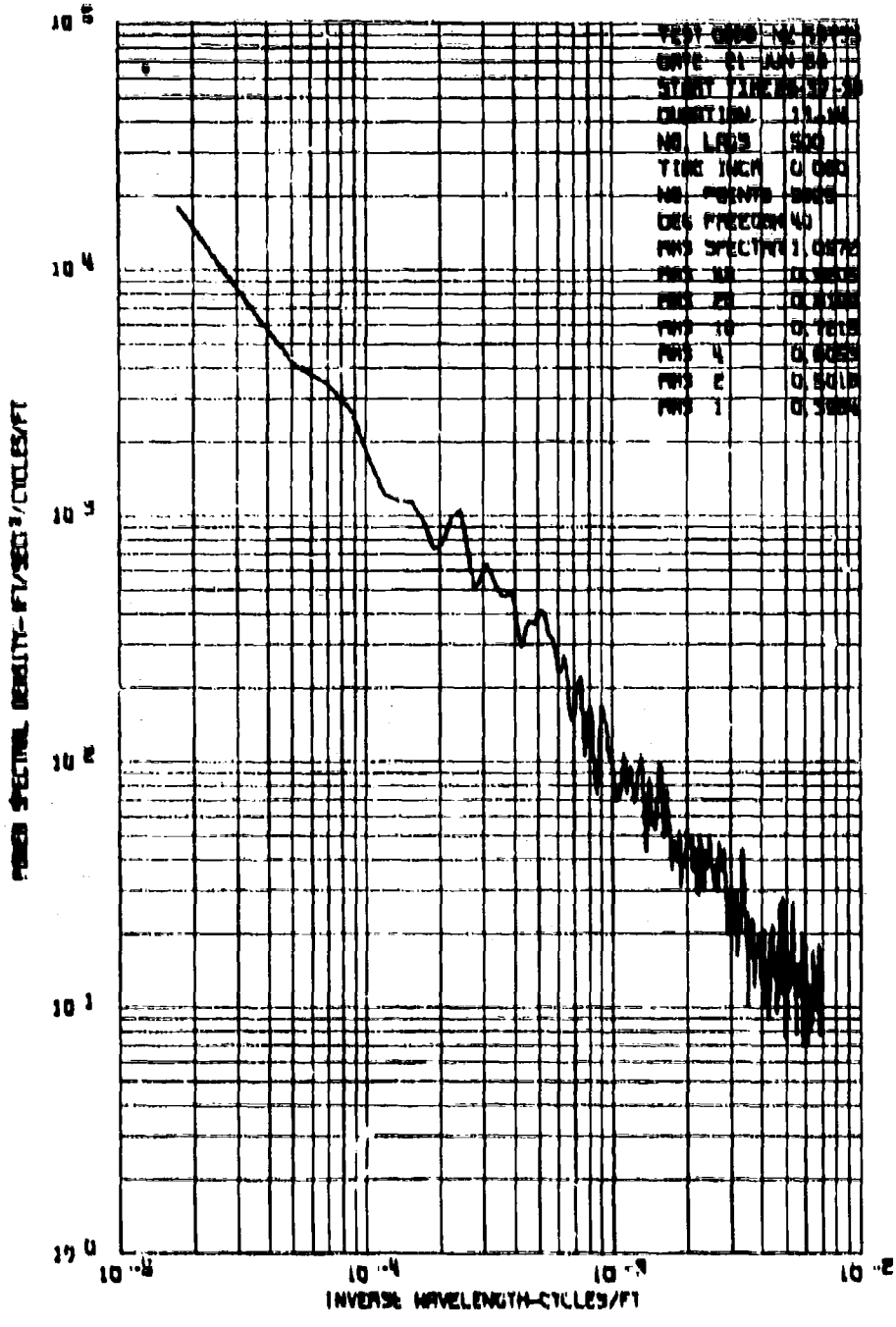


Figure 98D. Power Spectrum of Vertical Gust Velocity, Test 88, Run 8 - 900 Lags.

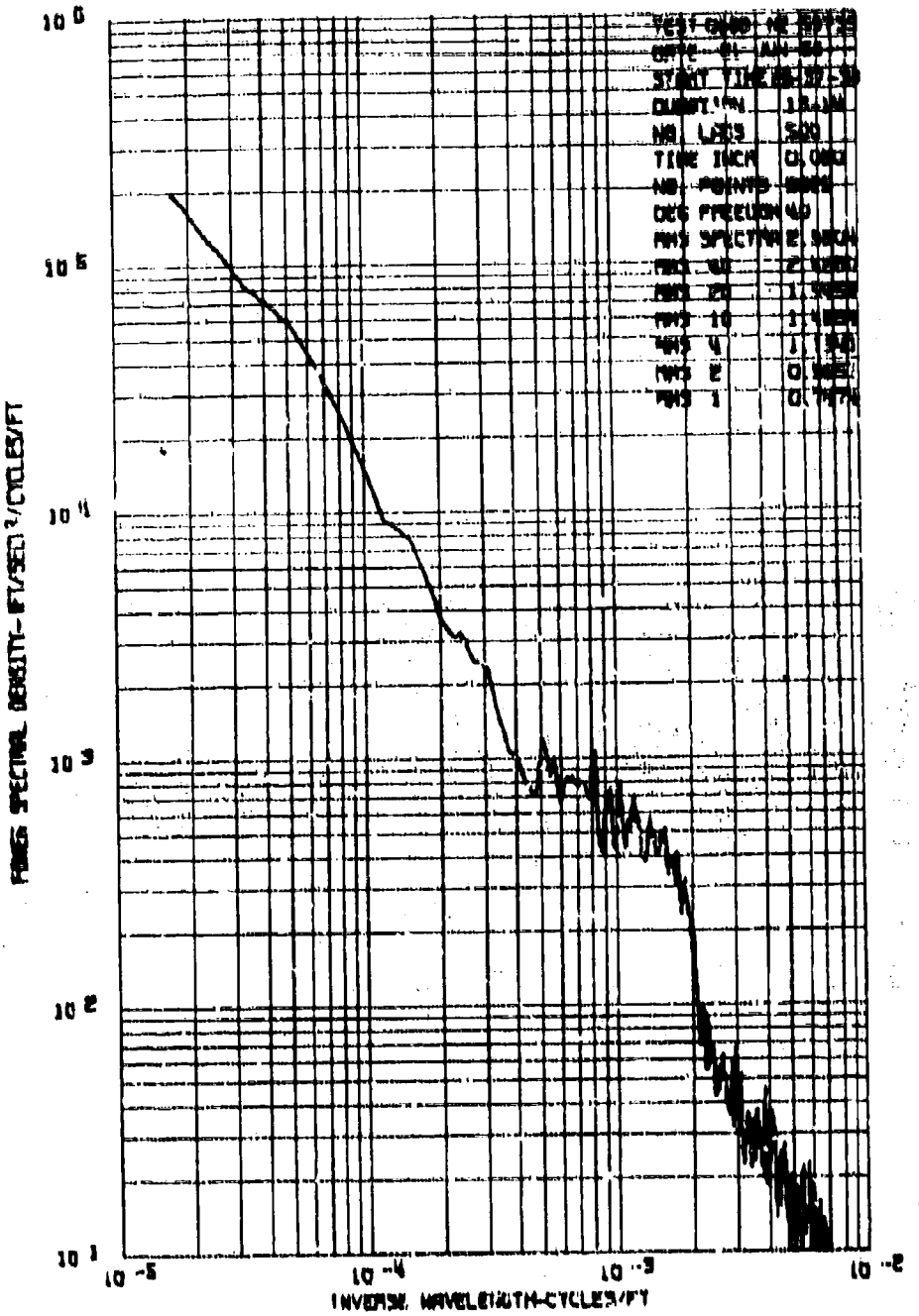


Figure 98E. Power Spectrum of Lateral Gust Velocity, Test 80, Run 8 - 500 Lags.

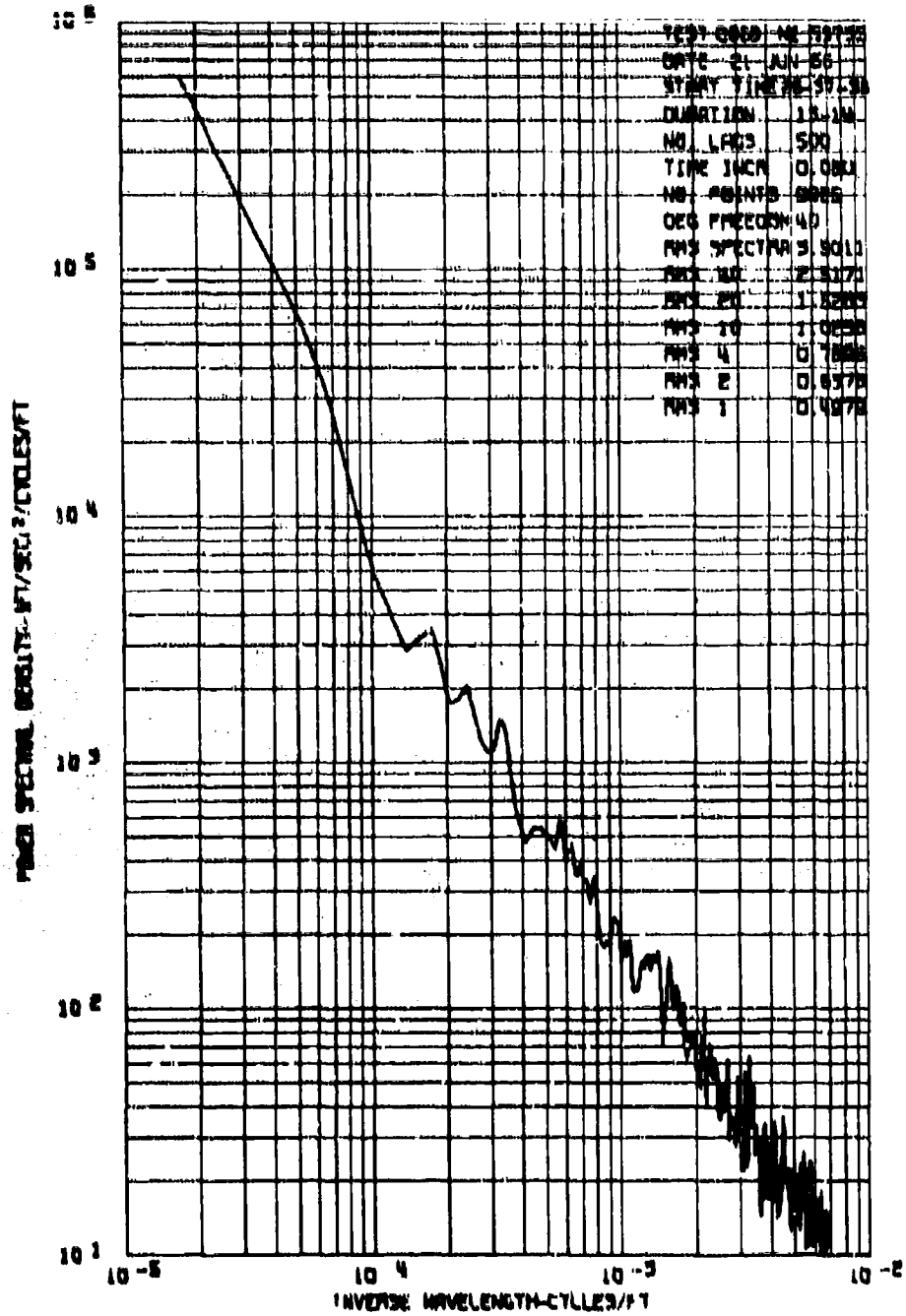


Figure 98F. Power Spectrum of Longitudinal Gust Velocity, Test 88, Run 8 - 500 Lags.

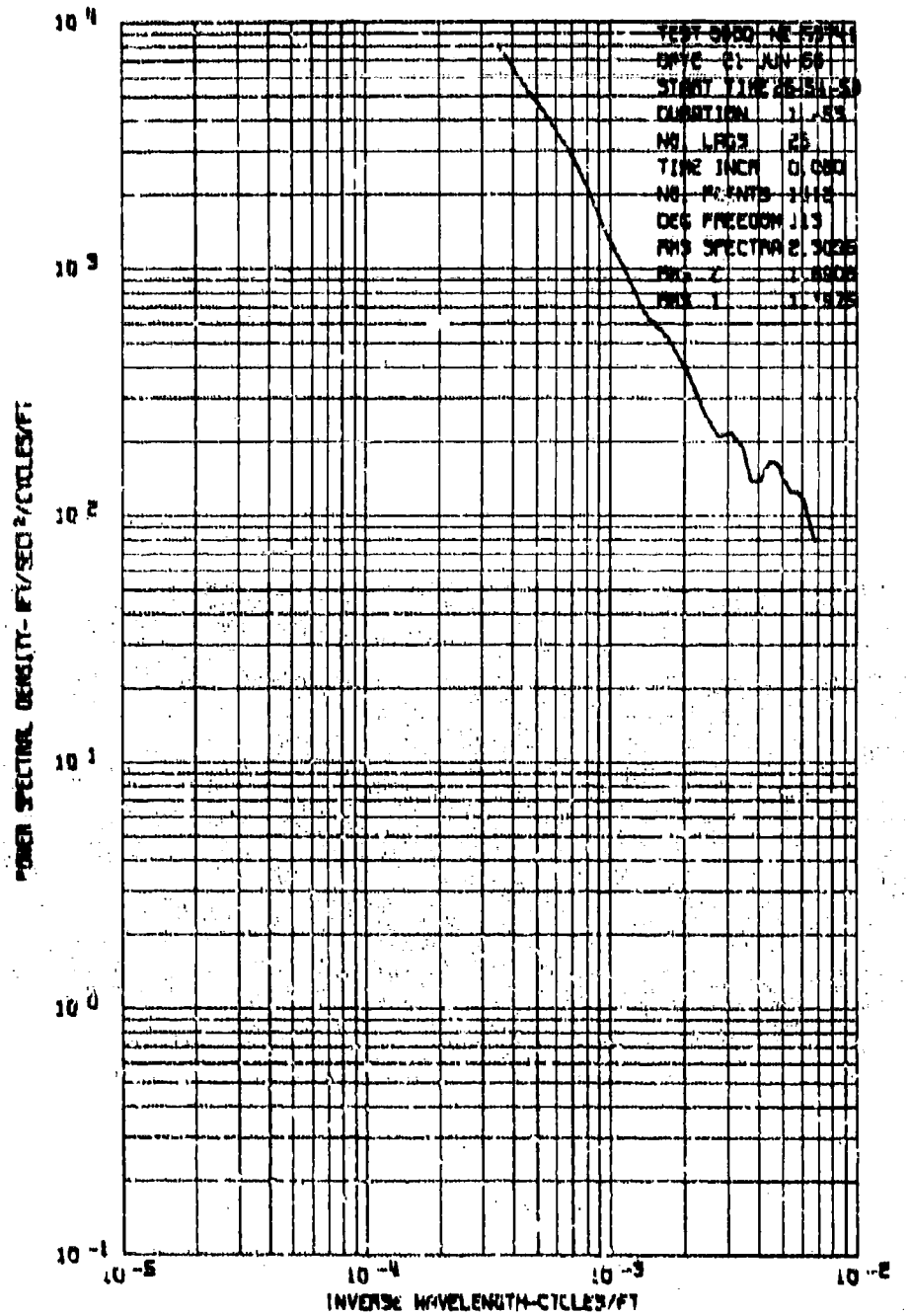


Figure 99A. Power Spectrum of Vertical Gust Velocity, Test 88, Run 9.

Appendix VII

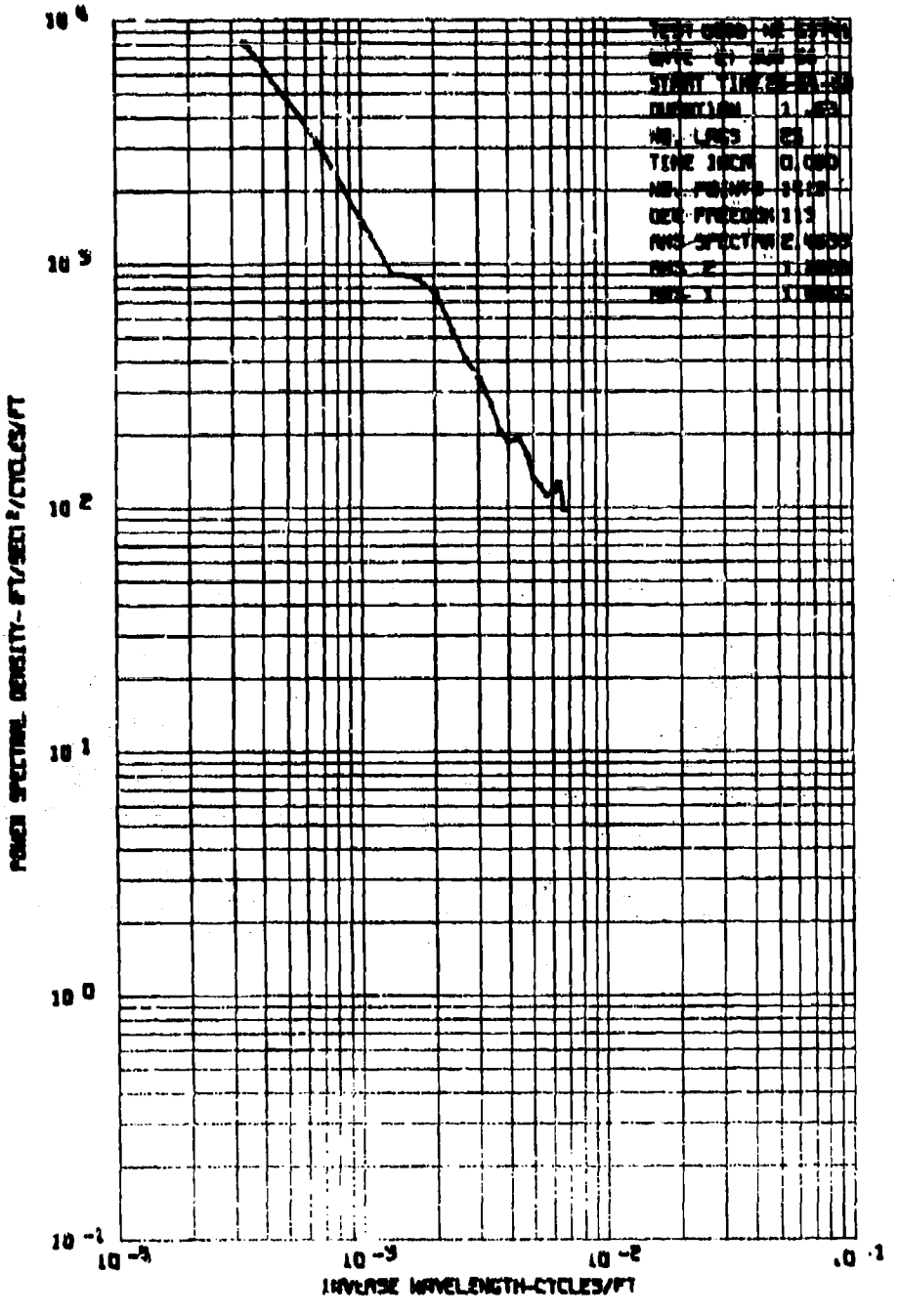


Figure 99B. Power Spectrum of Lateral Gust Velocity, Test 88, Run 9.

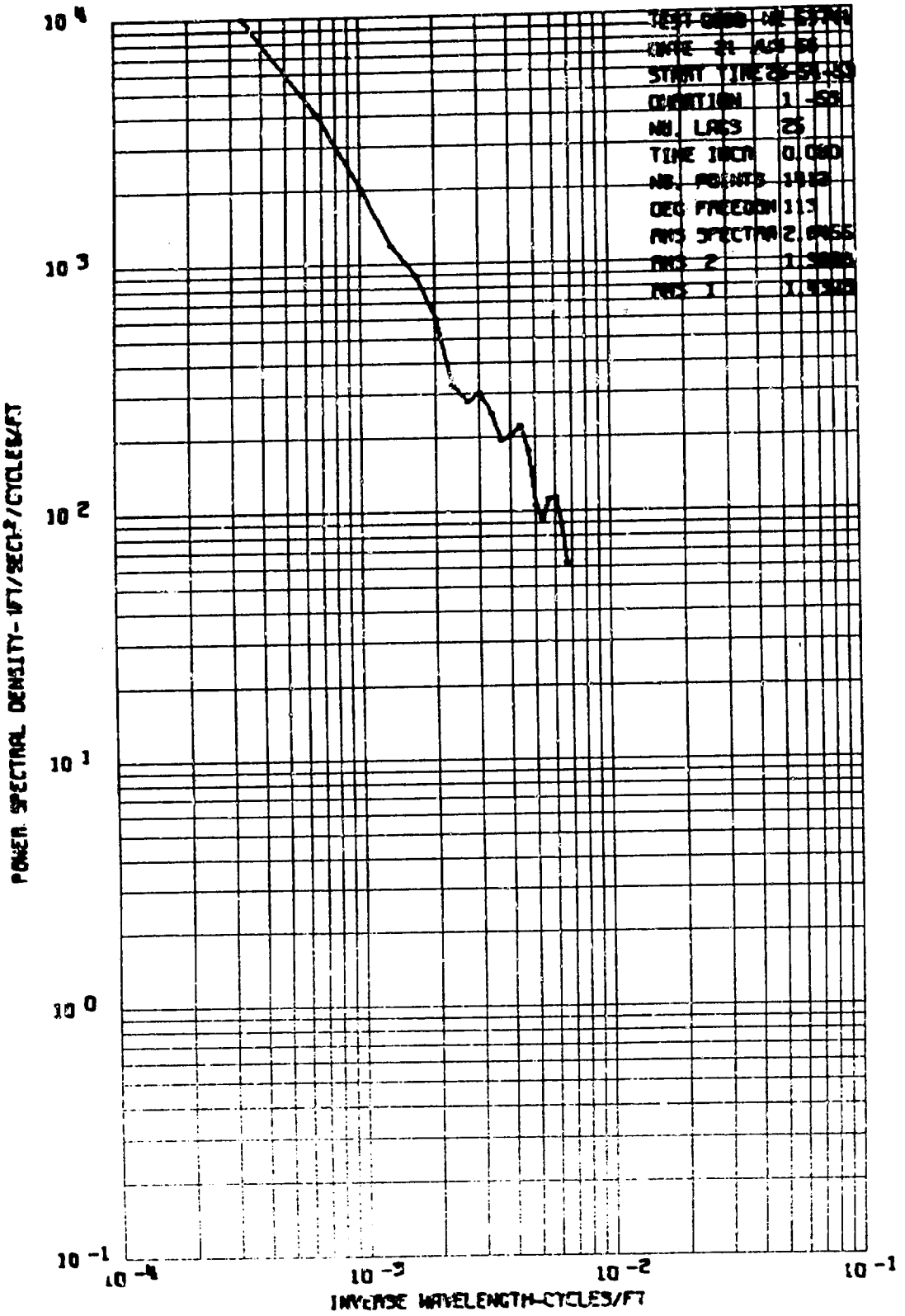


Figure 99C. Power Spectrum of Longitudinal Gust Velocity, Test 88, Run 9.

Appendix VII

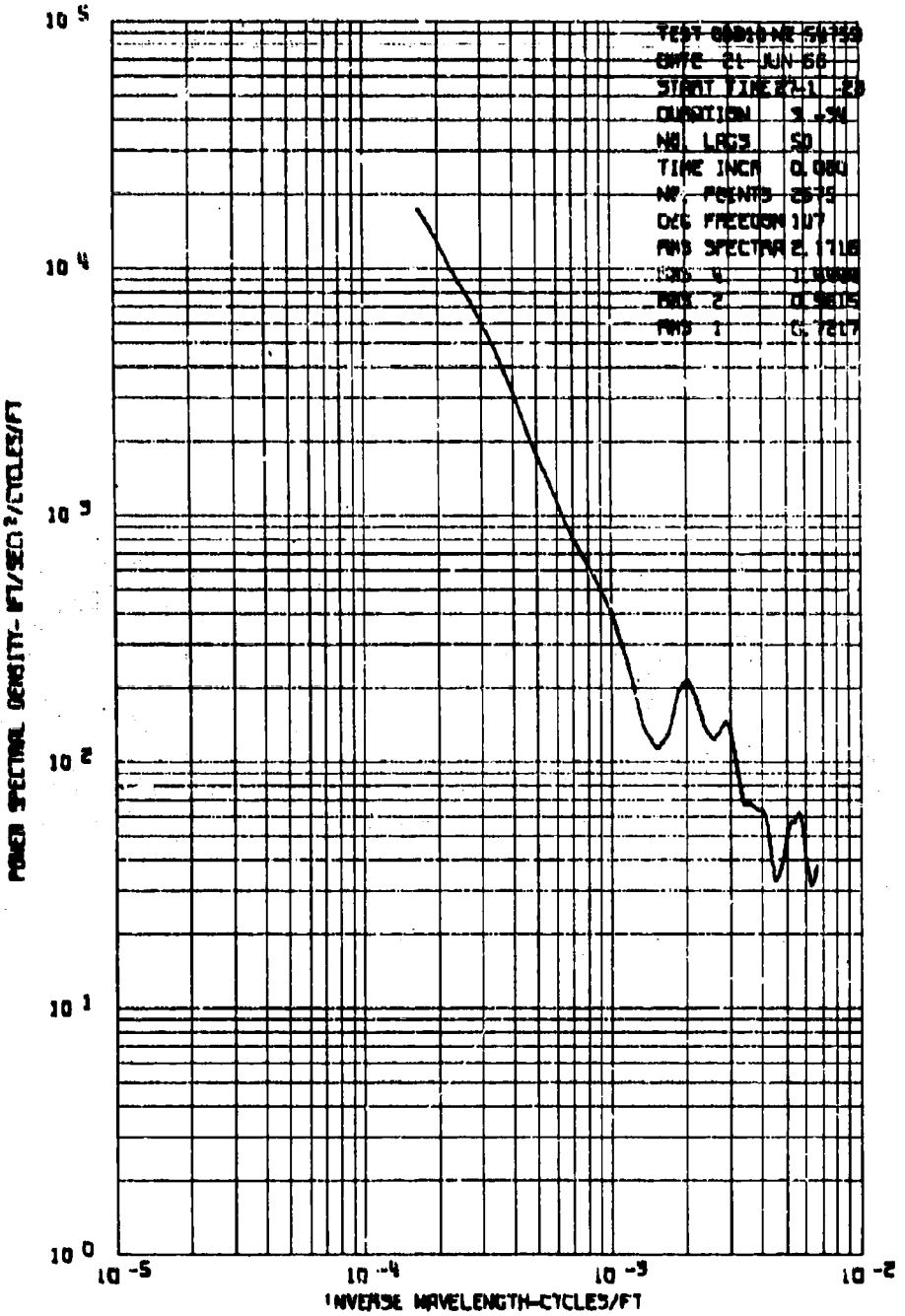


Figure 100A. Power Spectrum of Vertical Gust Velocity, Test 88, Run 10.

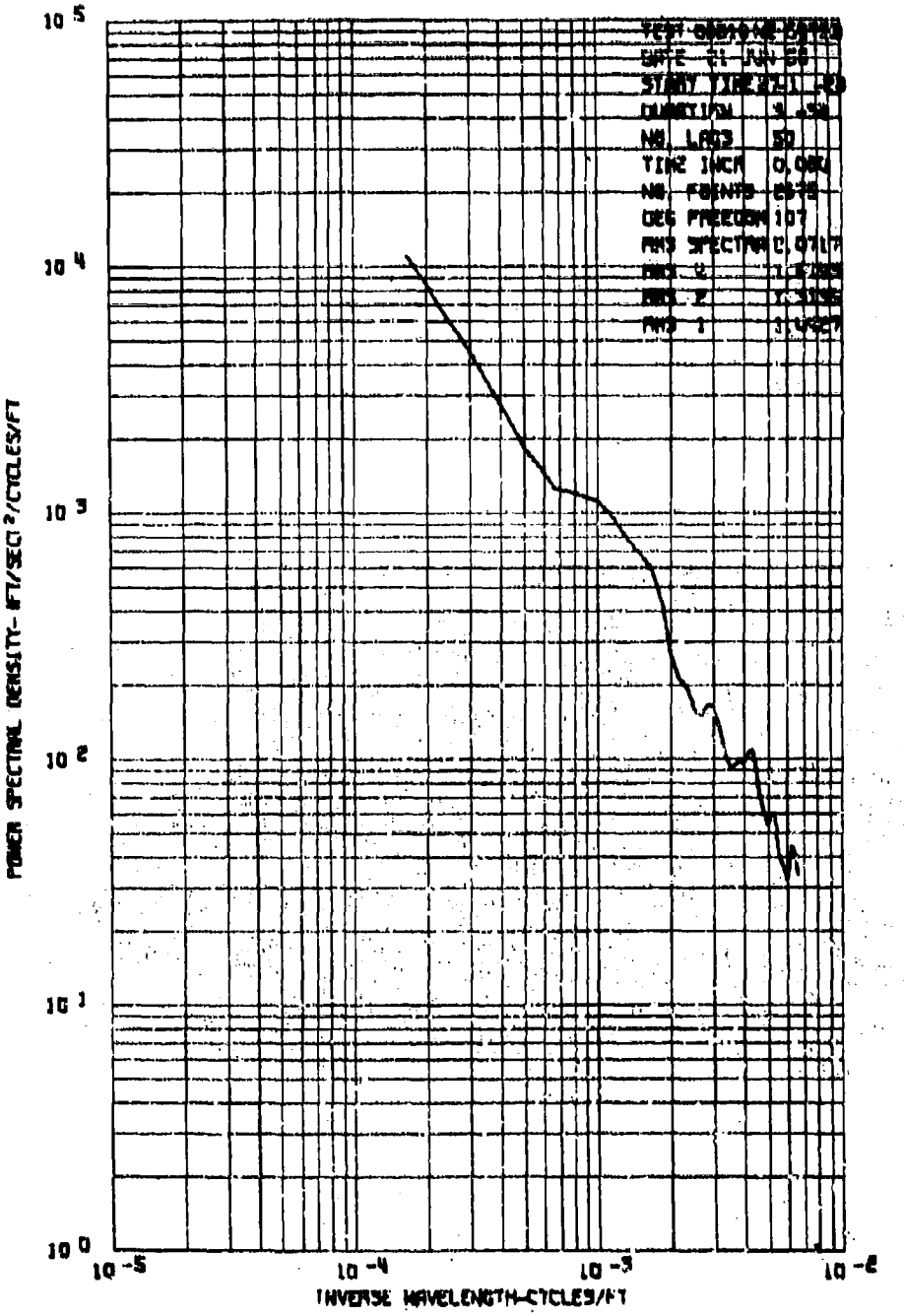


Figure 100B. Power Spectrum of Lateral Gust Velocity, Test 88, Run 10.

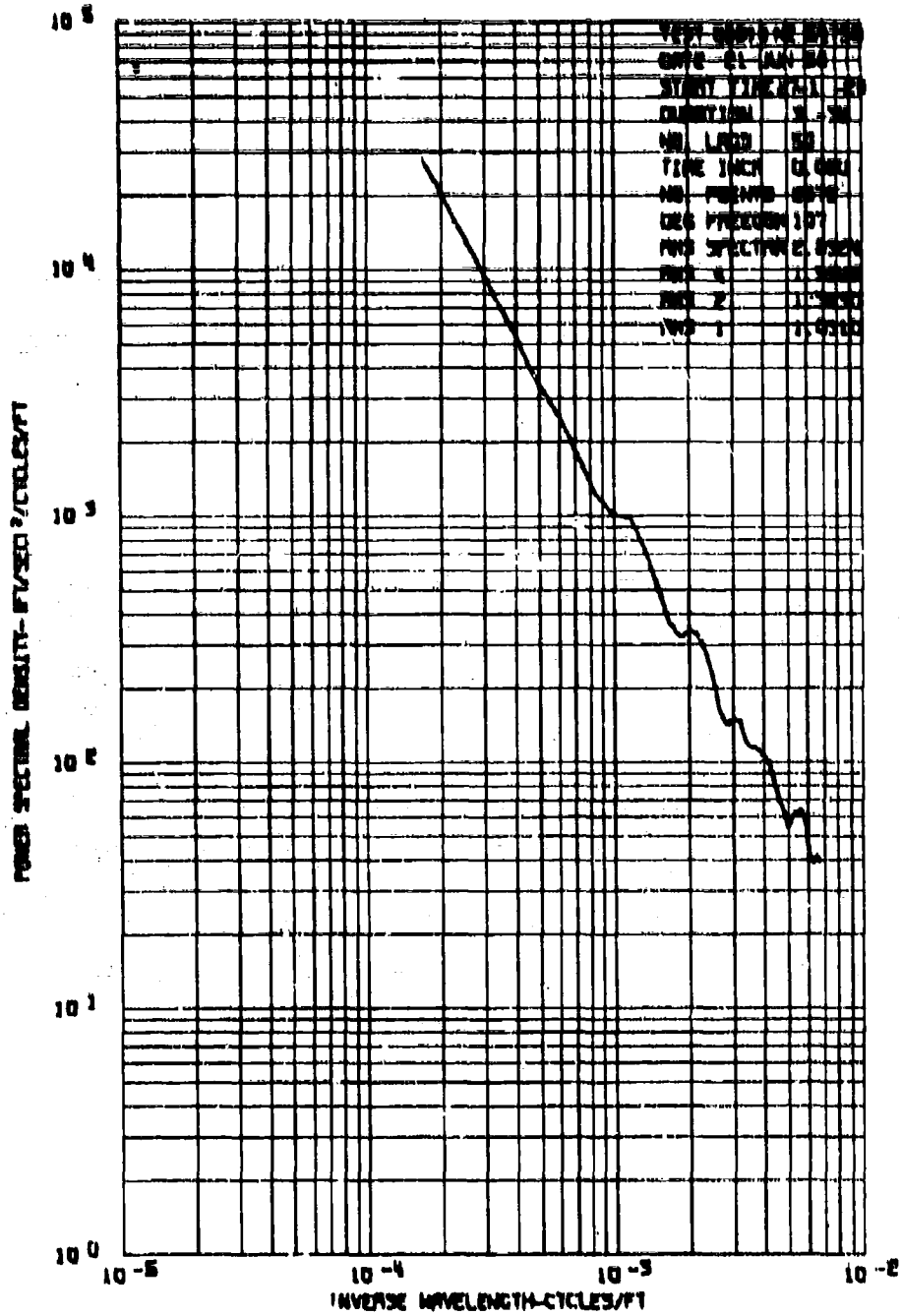


Figure 100C. Power Spectrum of Longitudinal Gust Velocity, Test 88, Run 10.

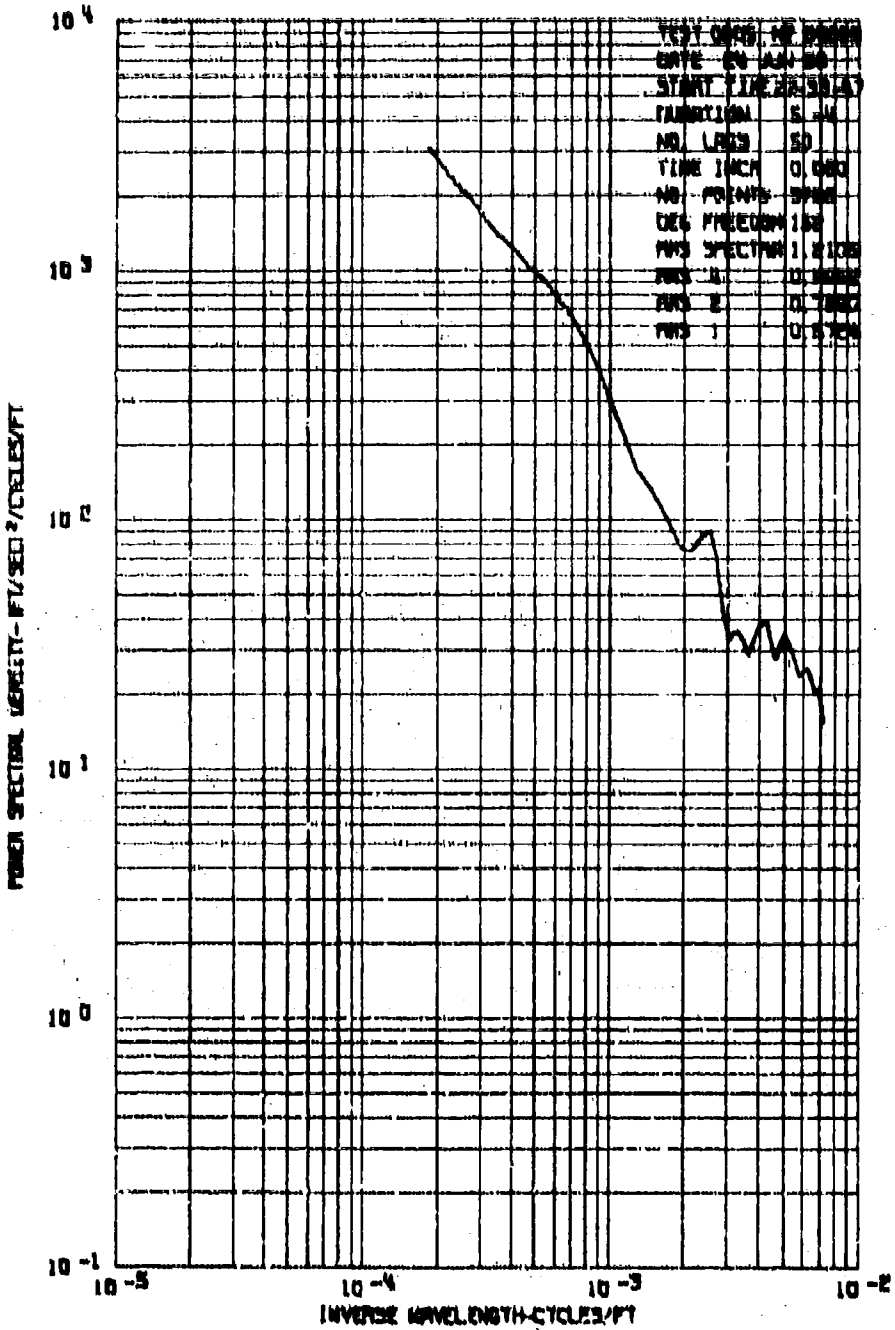


Figure 101A. Power Spectrum of Vertical Gust Velocity, Test 90, Run 5.

Appendix VII

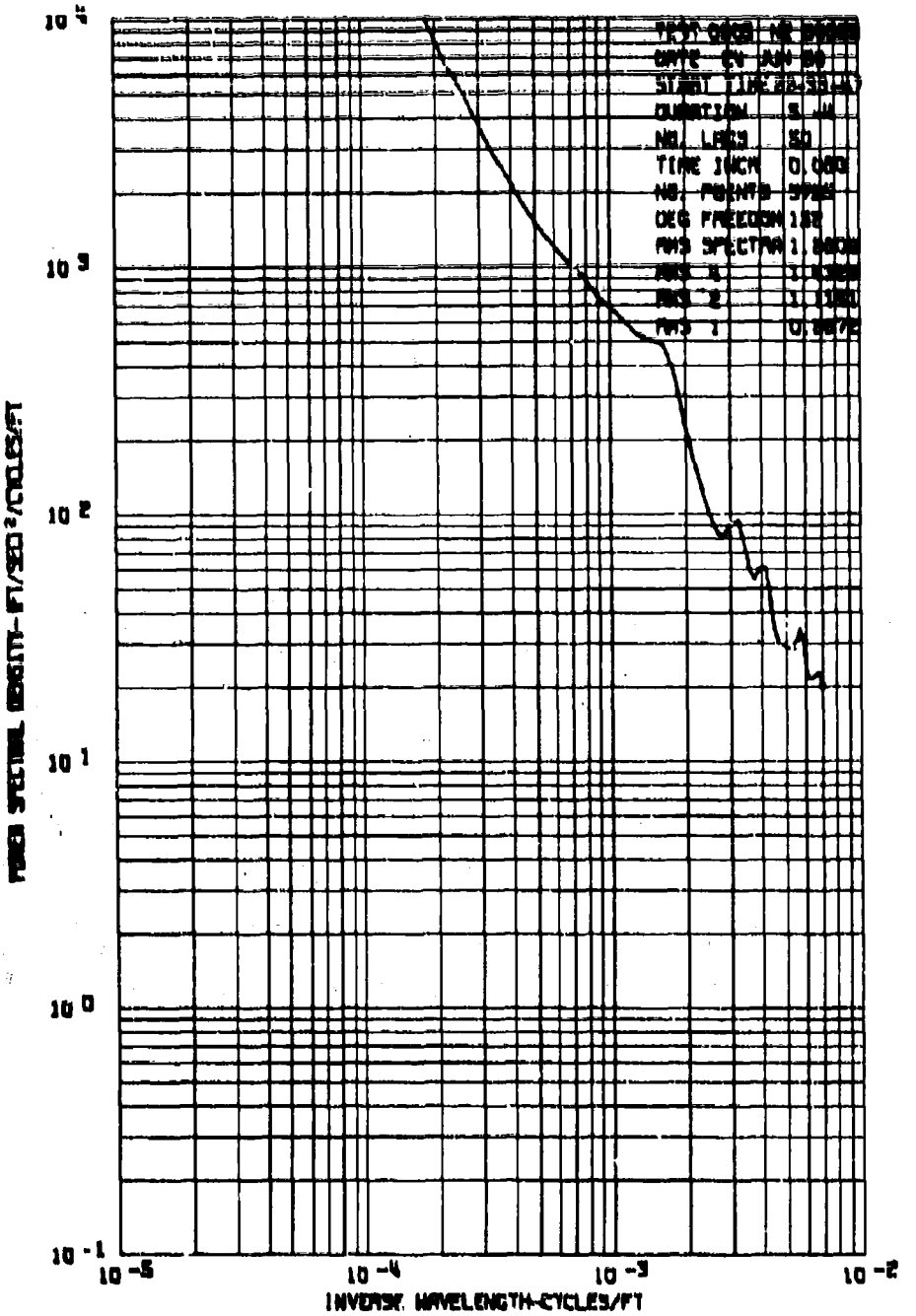


Figure 101B. Power Spectrum of Lateral Gust Velocity, Test 90, Run 5.

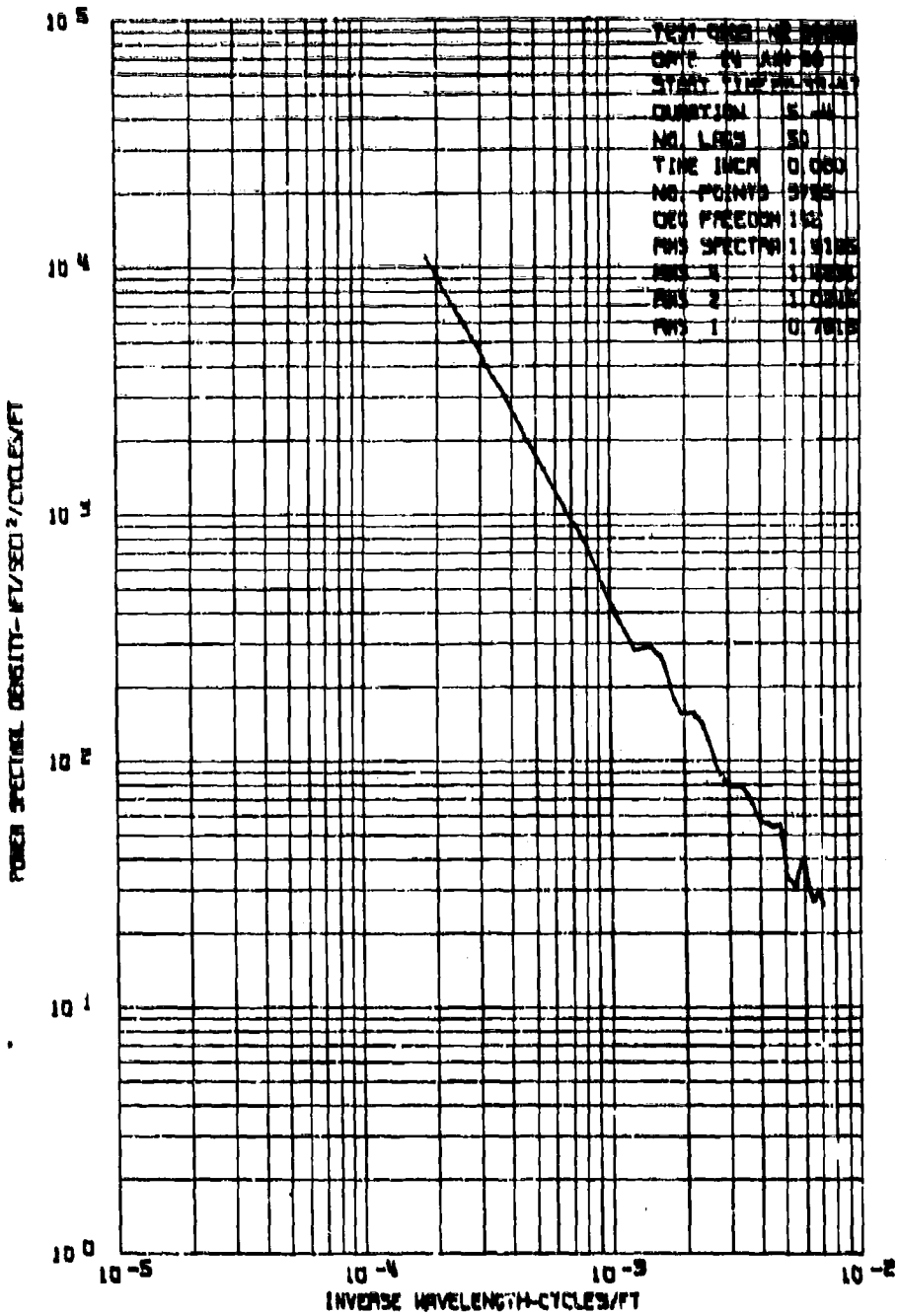


Figure 101C. Power Spectrum of Longitudinal Gust Velocity, Test 90, Run 5.

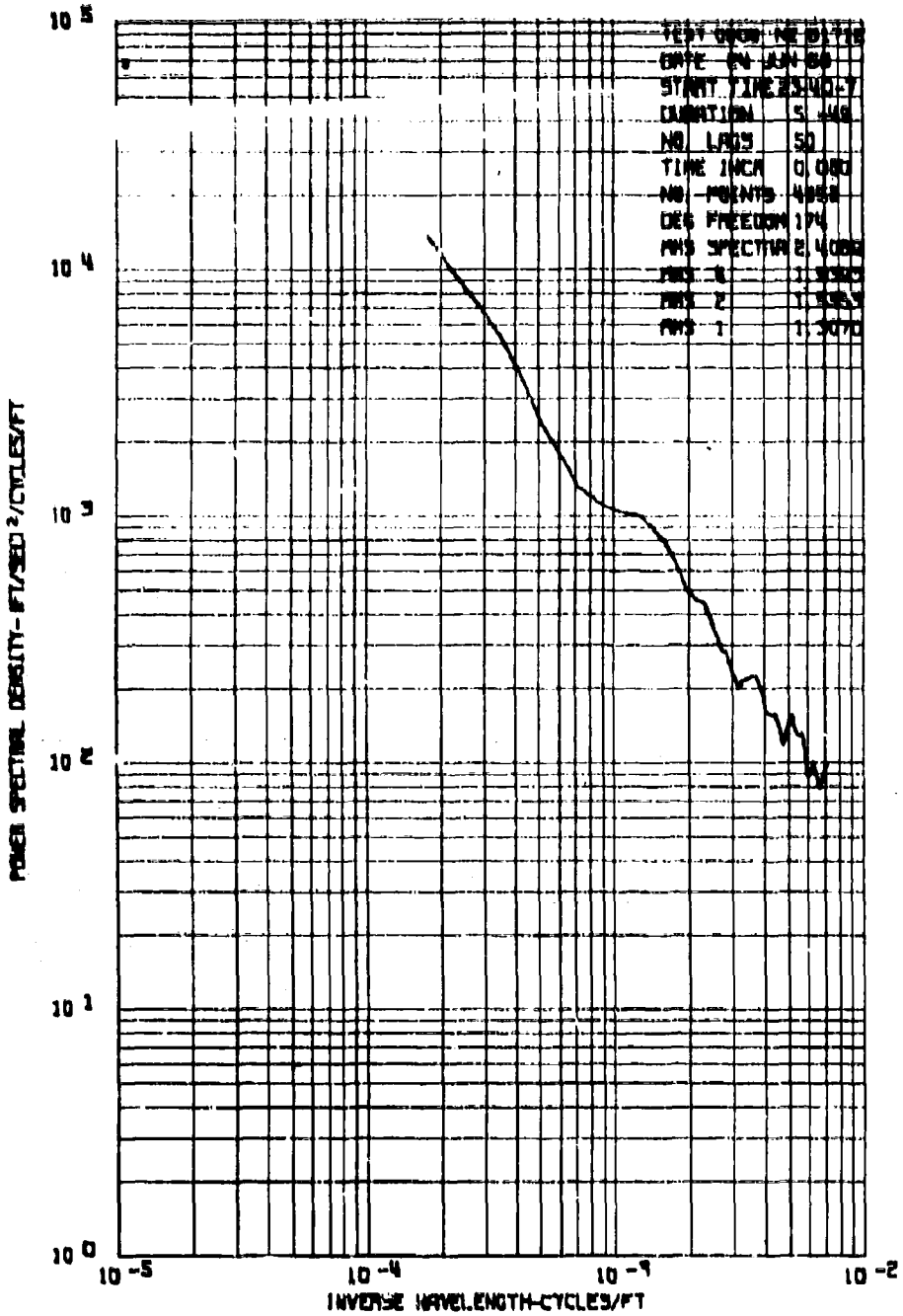


Figure 102A. Power Spectrum of Vertical Gust Velocity, Test 90, Run 9.

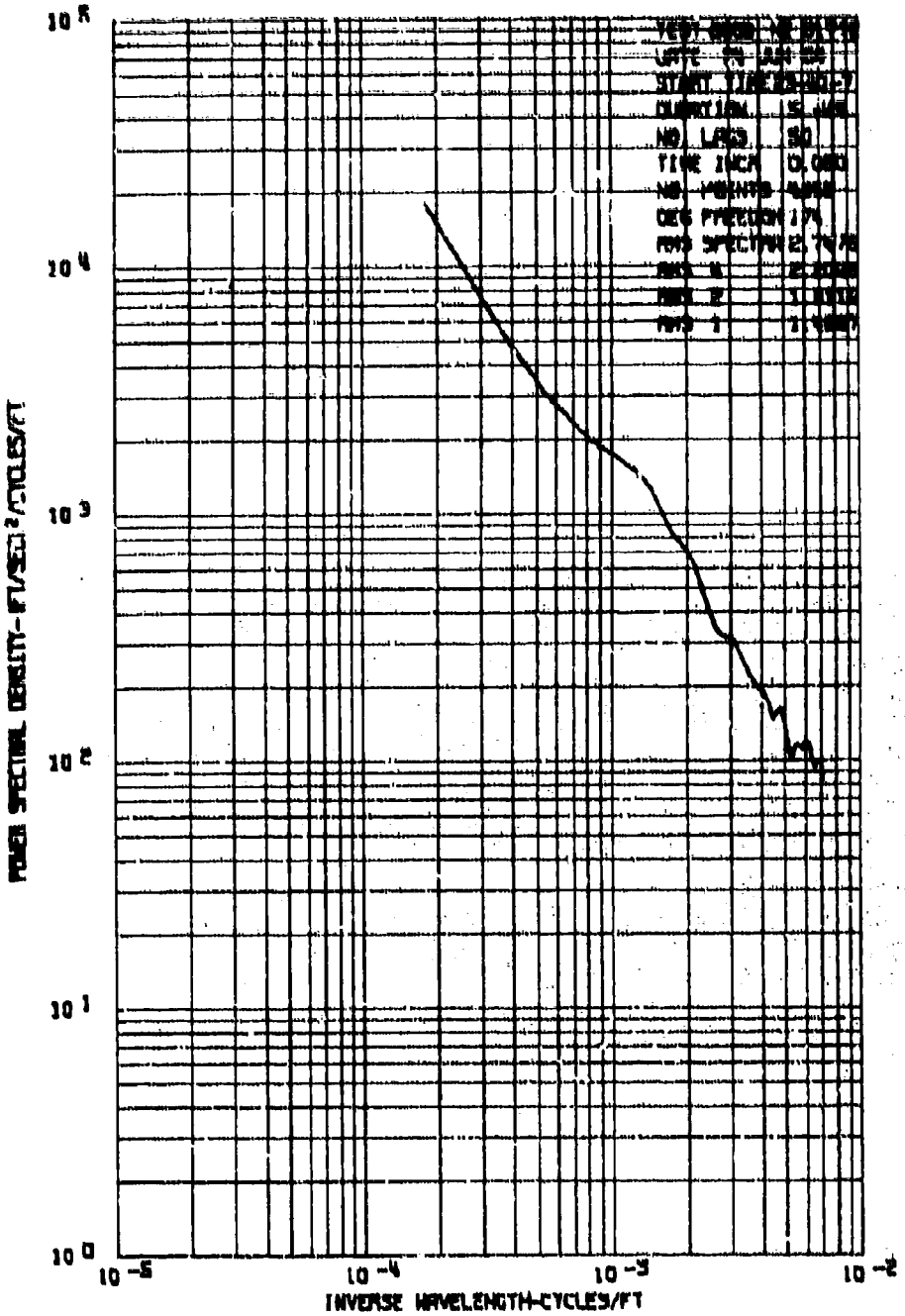


Figure 102B. Power Spectrum or Lateral Gust Velocity, Test 90, Run 9.

Appendix VII

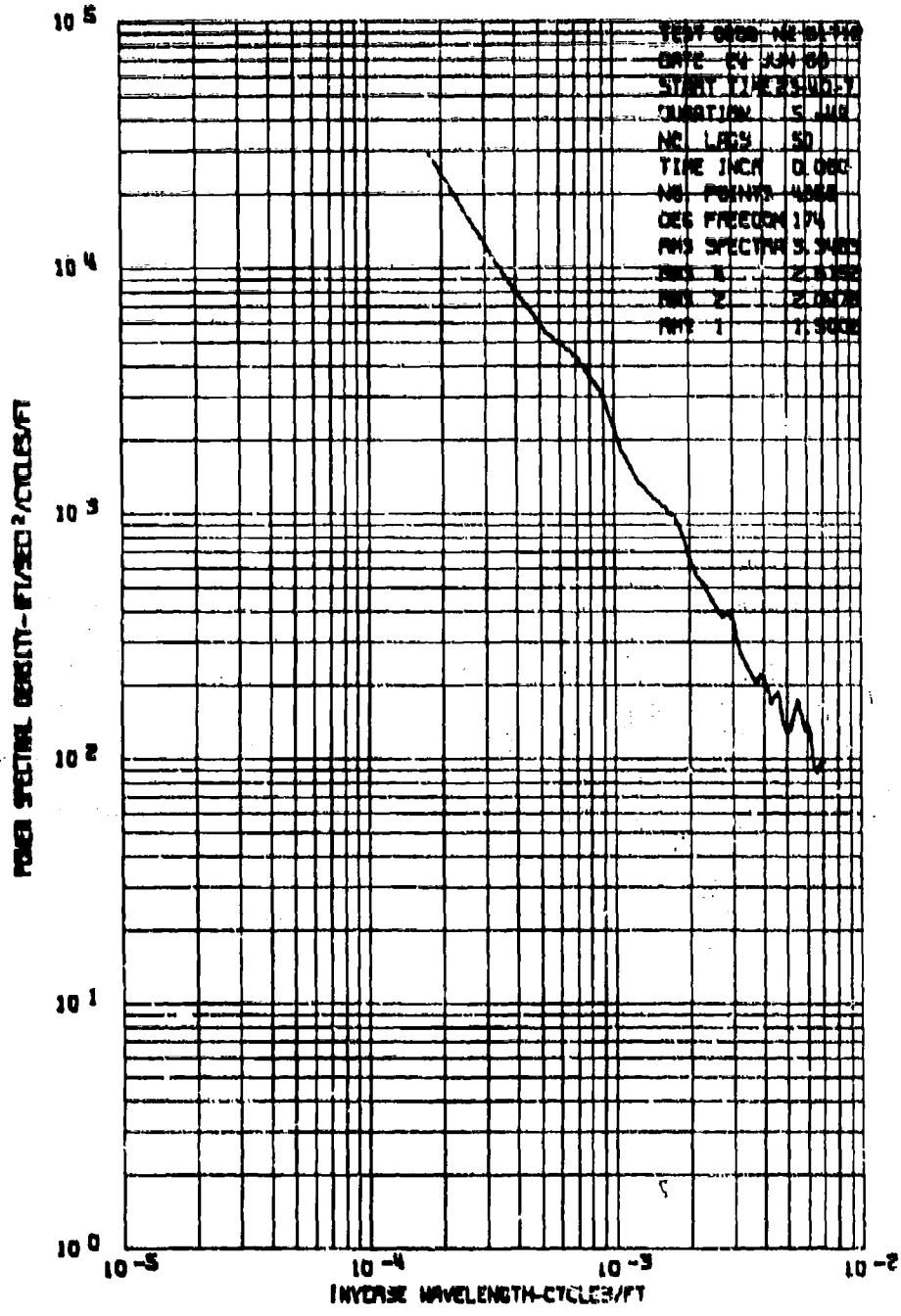


Figure 102C. Power Spectrum of Longitudinal Gust Velocity, Test 90, Run 9.

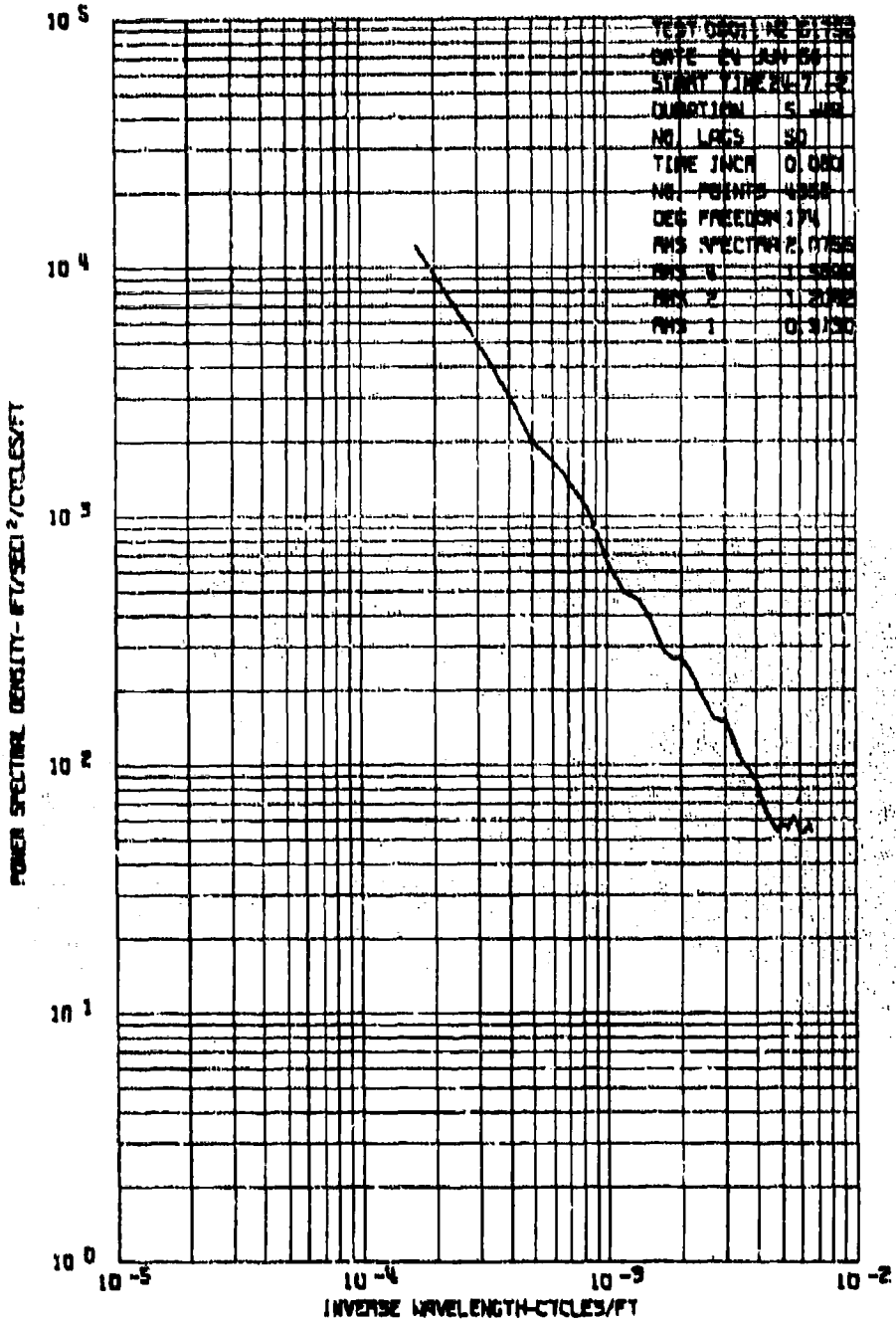


Figure 103A. Power Spectrum of Vertical Gust Velocity, Test 90, Run 11.

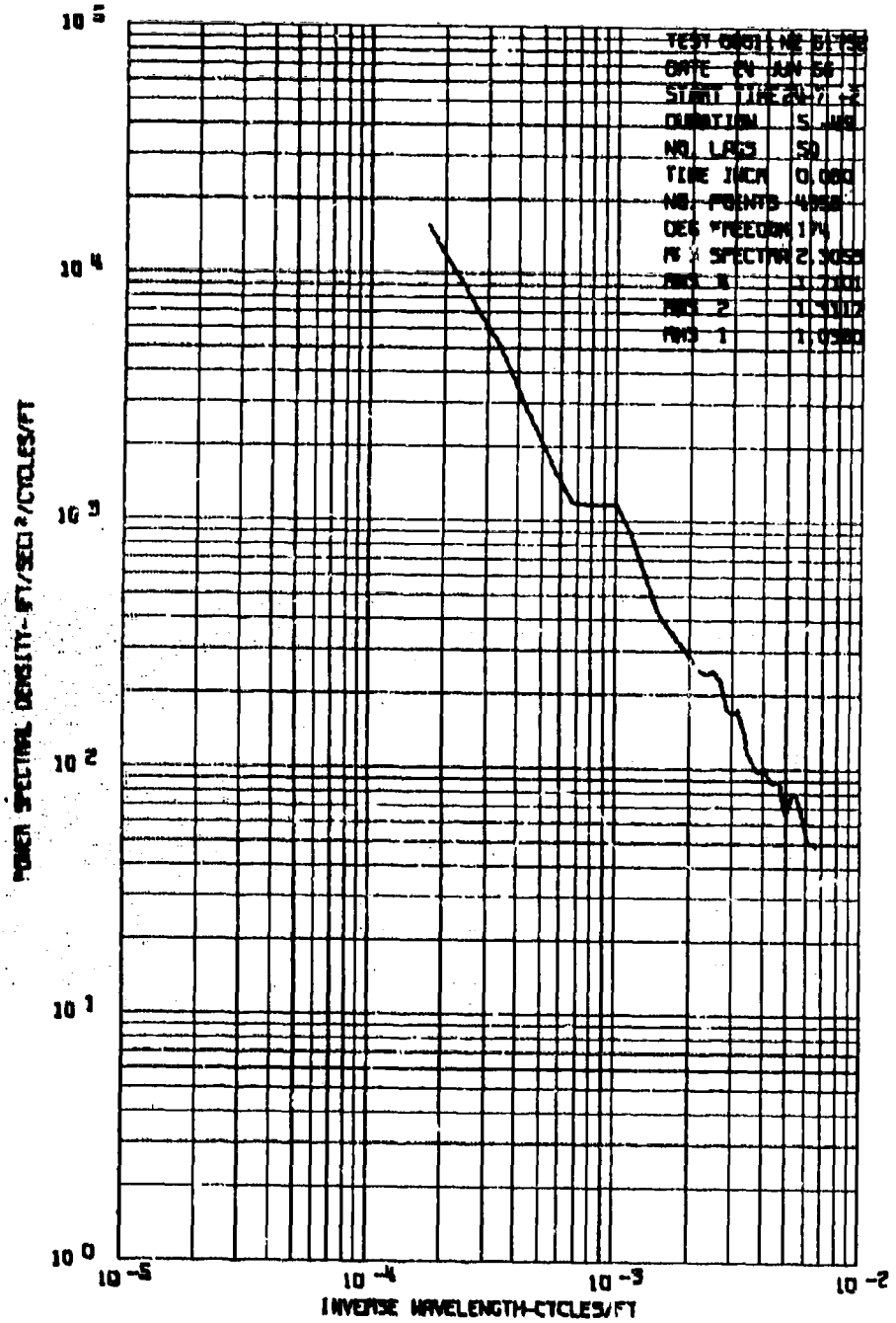


Figure 103B. Power Spectrum of Lateral Gust Velocity, Test 90, Run 11.

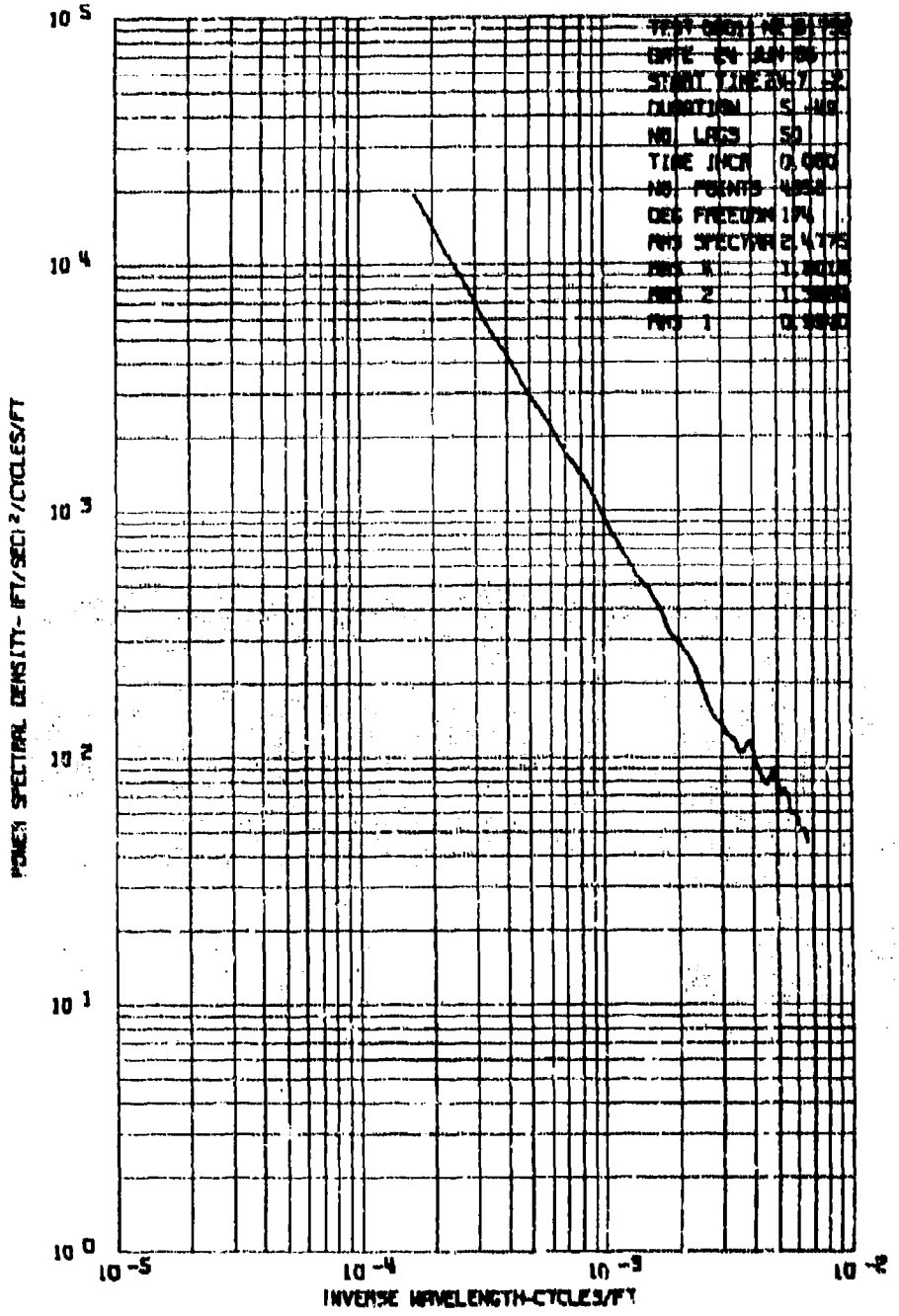


Figure 103C. Power Spectrum of Longitudinal Gust Velocity, Test 90, Run 11.

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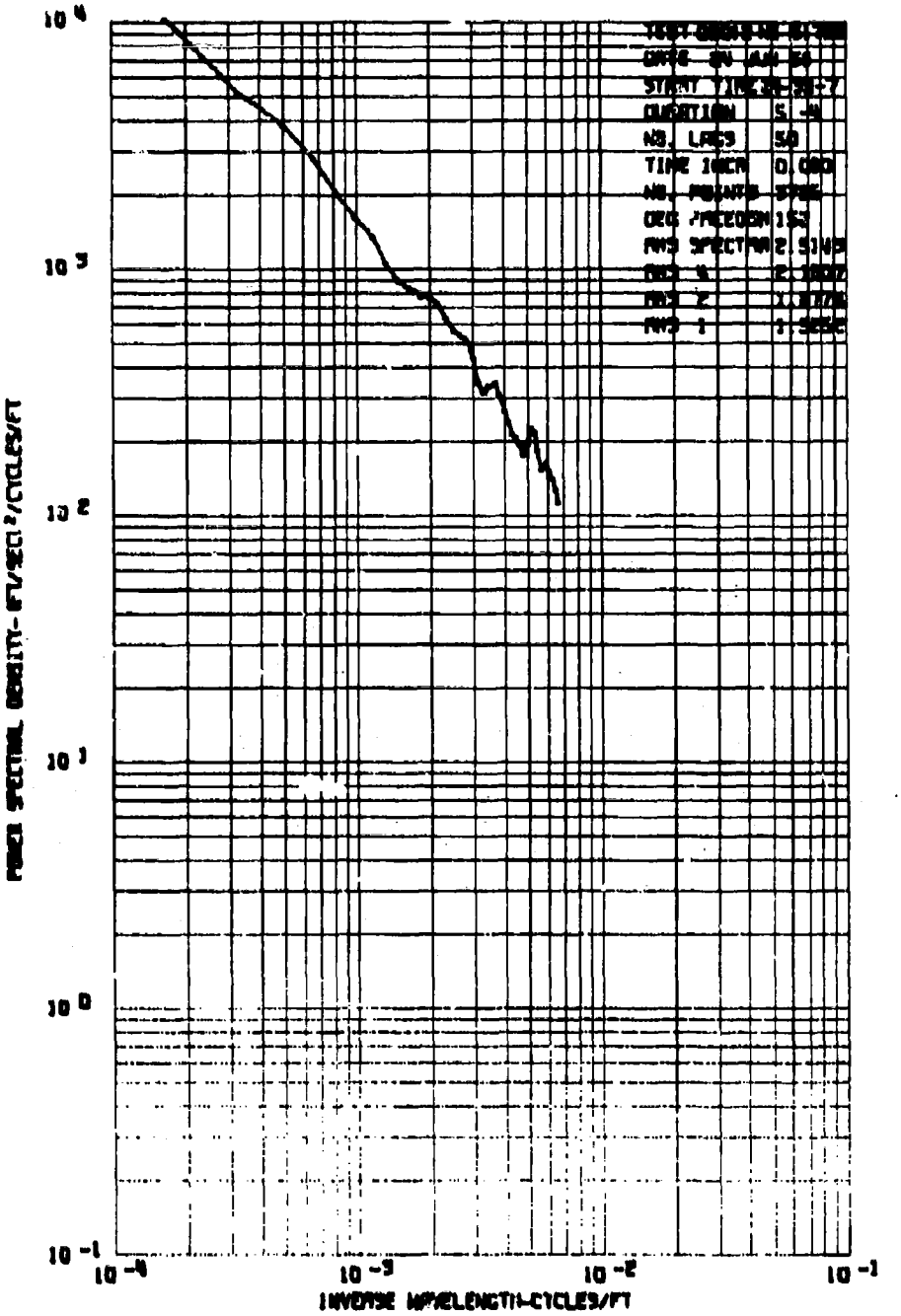


Figure 104A. Power Spectrum of Vertical Gust Velocity, Test 9C, Run 12.

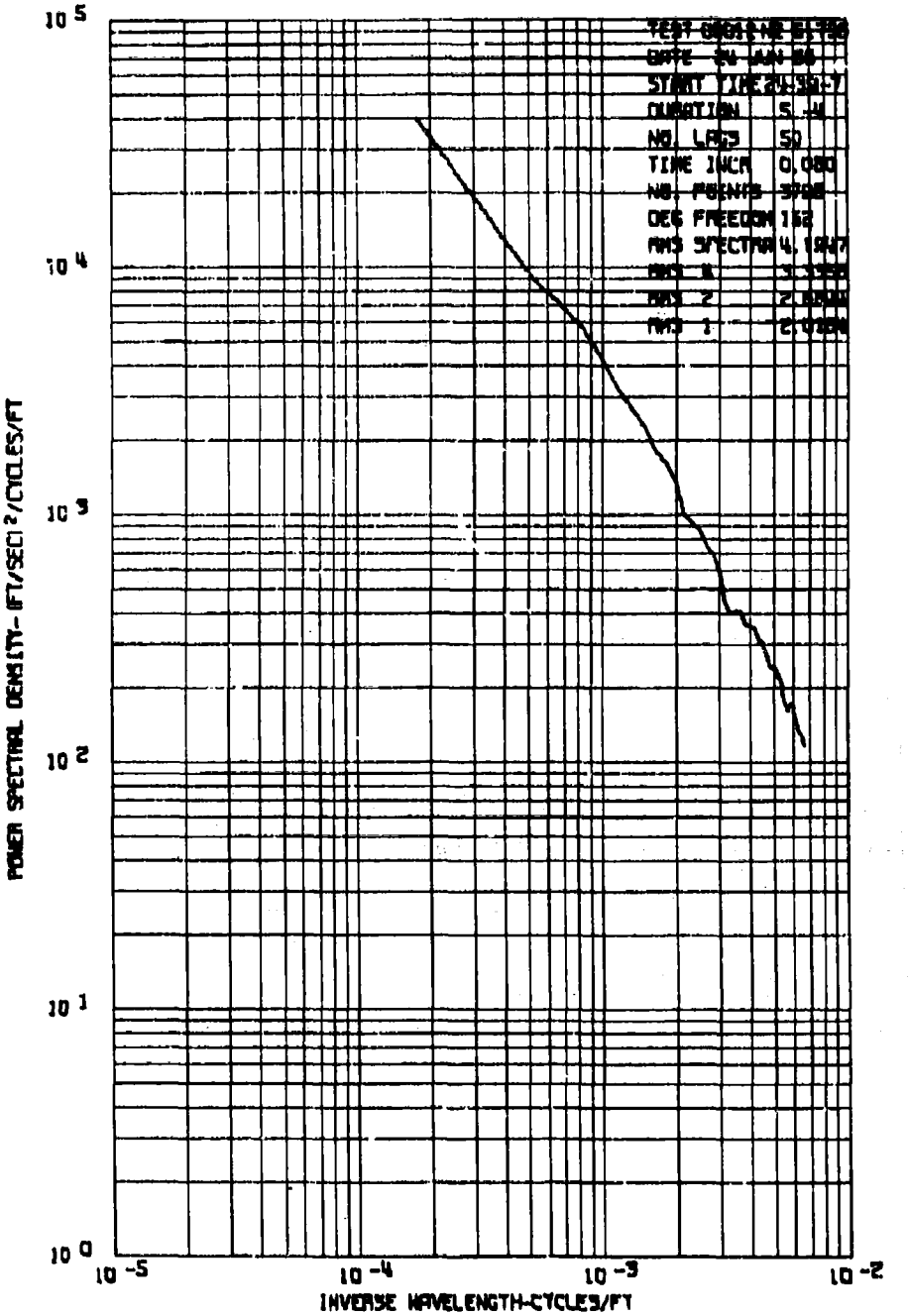


Figure 104B. Power Spectrum of Lateral Gust Velocity, Test 90, Run 12.

Appendix VII

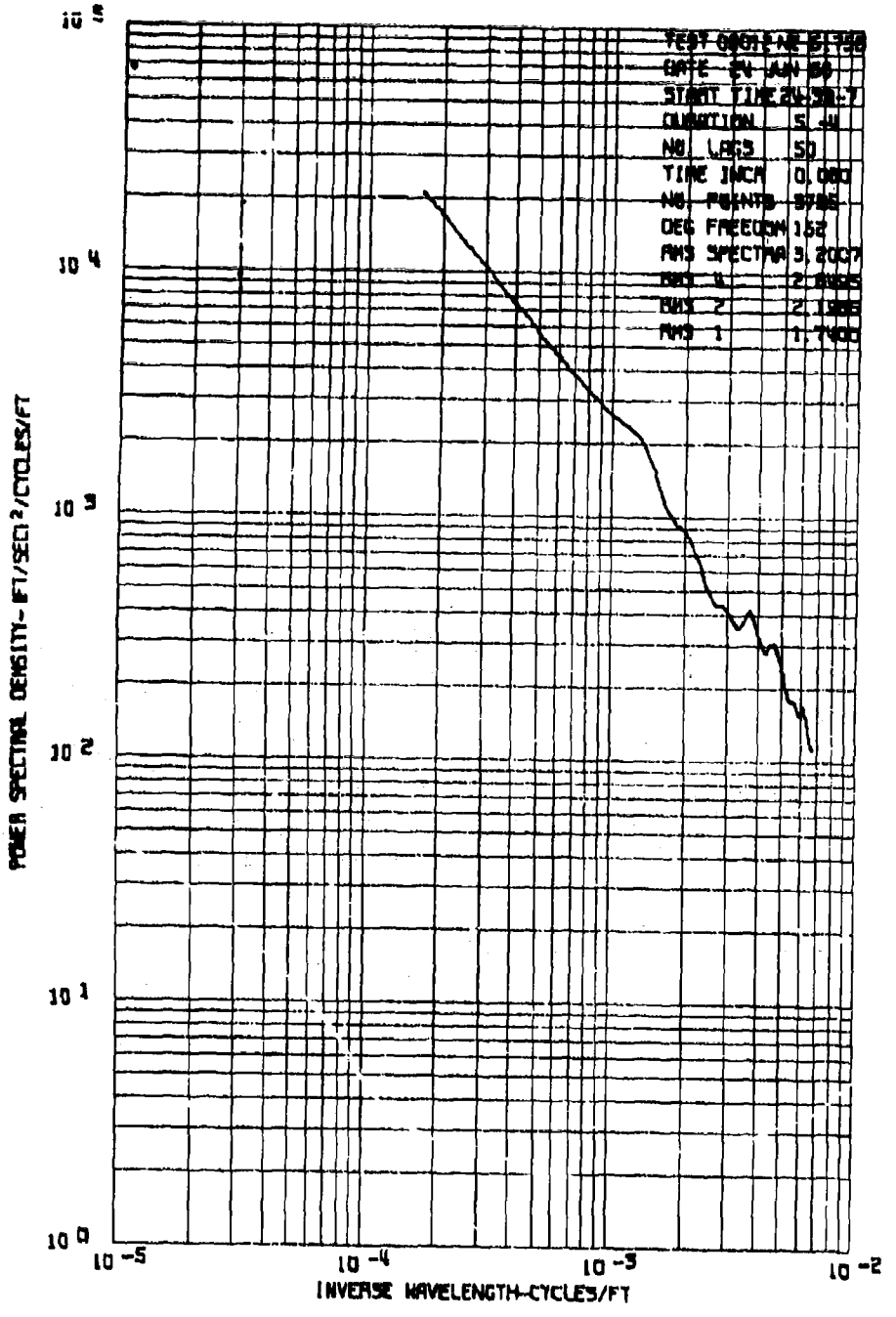


Figure 104C. Power Spectrum of Longitudinal Gust Velocity, Test 90, Run 12.

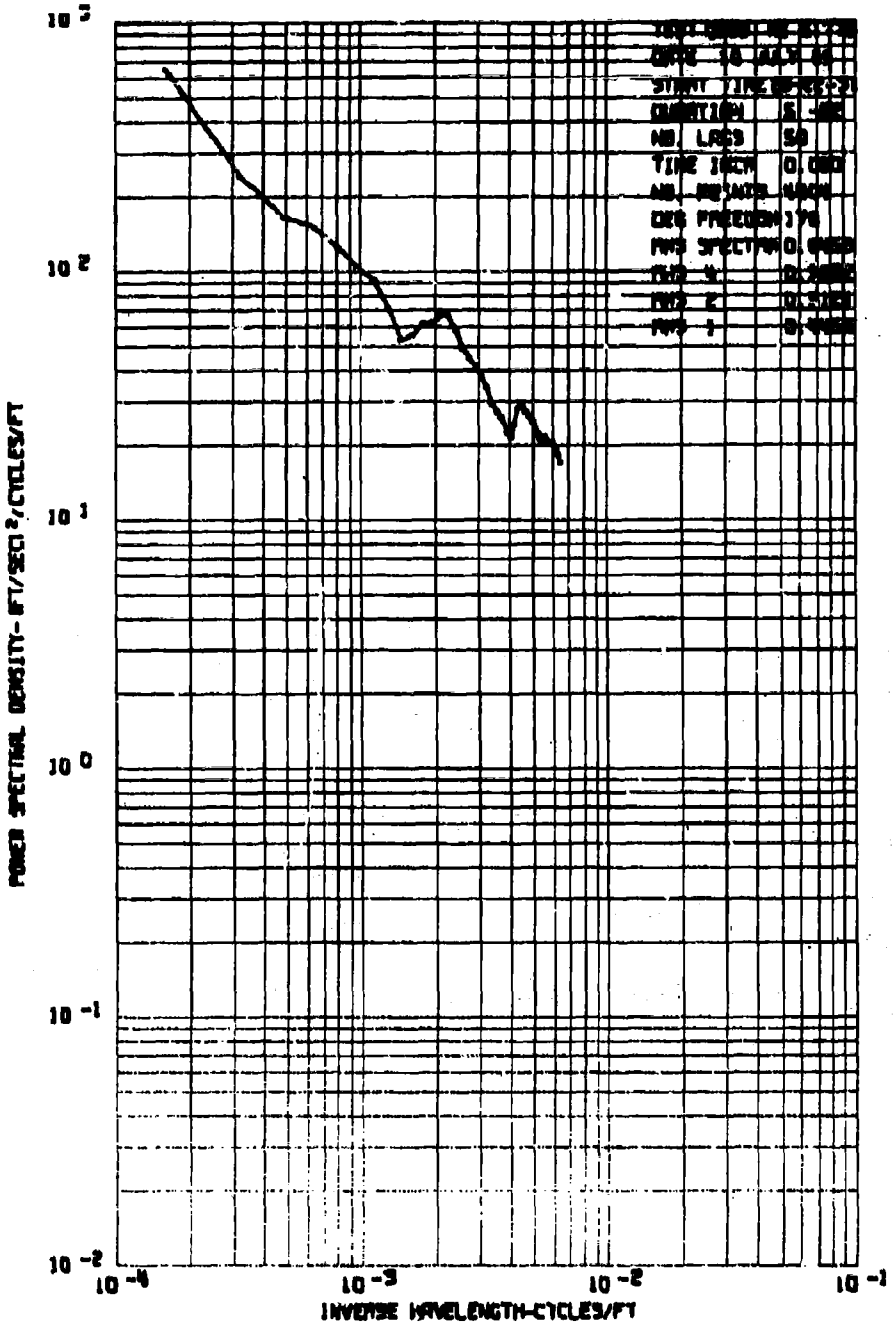


Figure 105A. Power Spectrum of Vertical Gust Velocity, Test 96, Run 8.

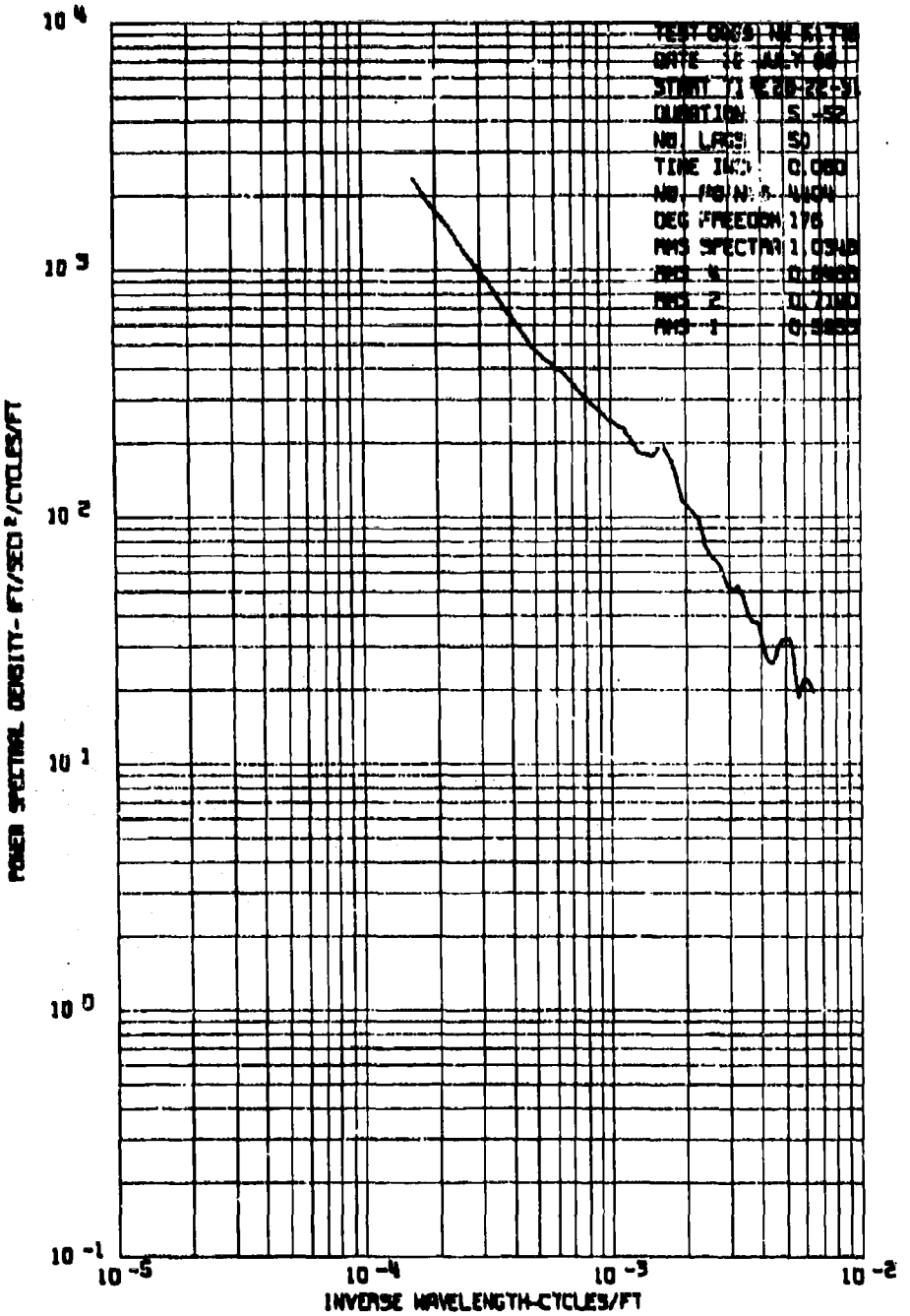


Figure 105B. Power Spectrum of Lateral Gust Velocity, Test 96, Run 8.

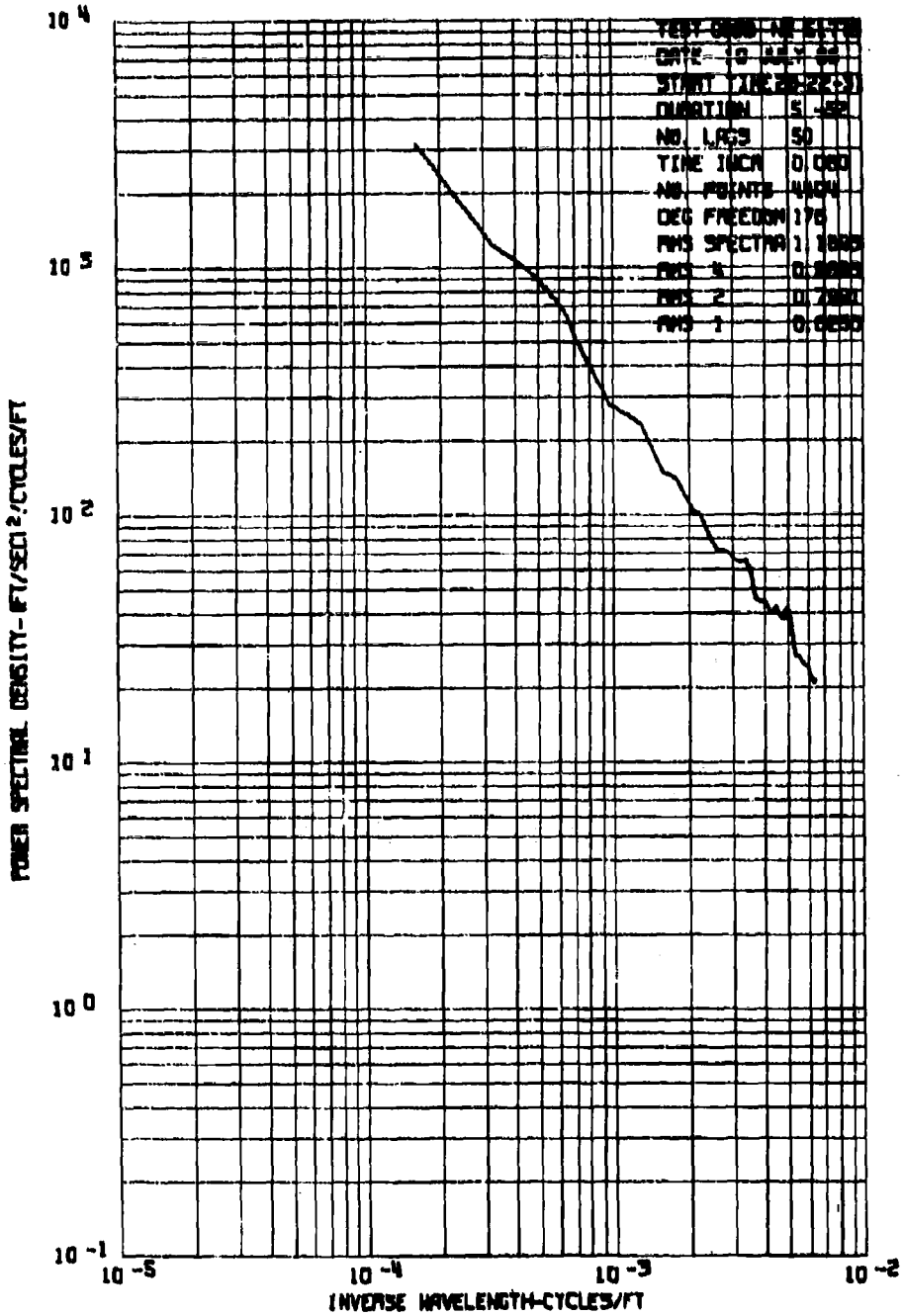


Figure 105C. Power Spectrum of Longitudinal Gust Velocity, Test 96, Run 8.

Appendix VII

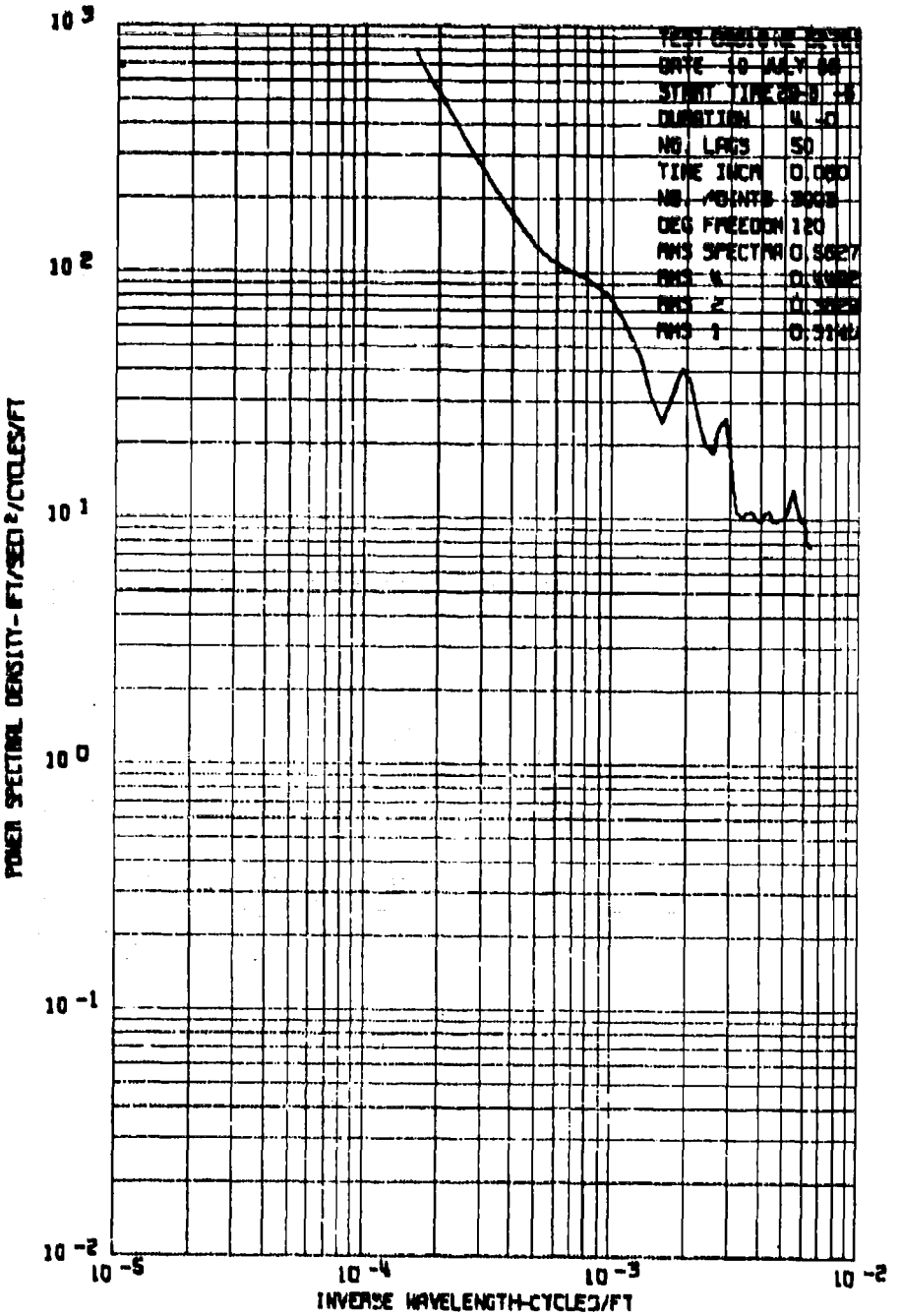


Figure 106A. Power Spectrum of Vertical Gust Velocity, Test 96, Run 10.

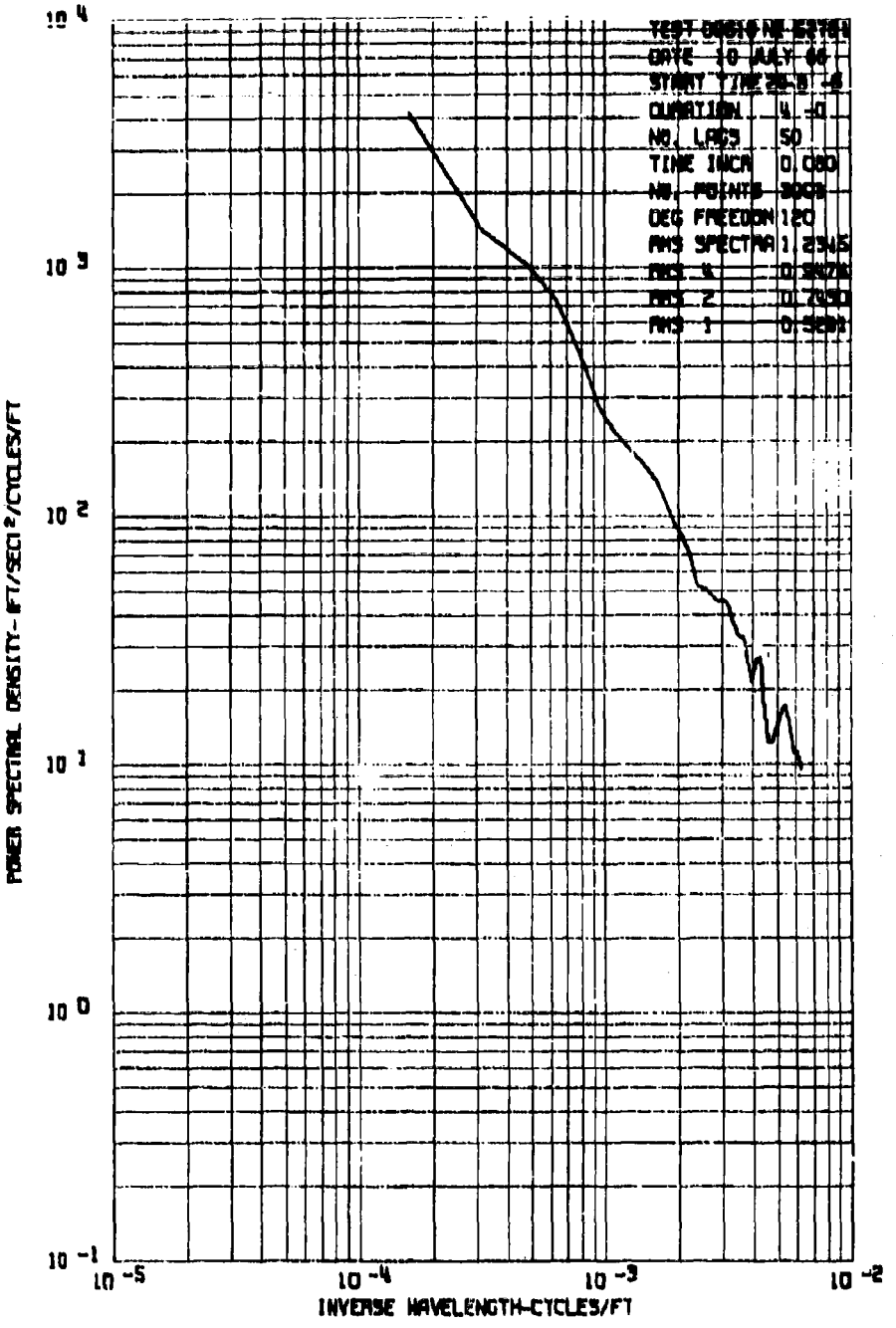


Figure 106B. Power Spectrum of Lateral Gust Velocity, Test 96, Run 10.

Appendix VII

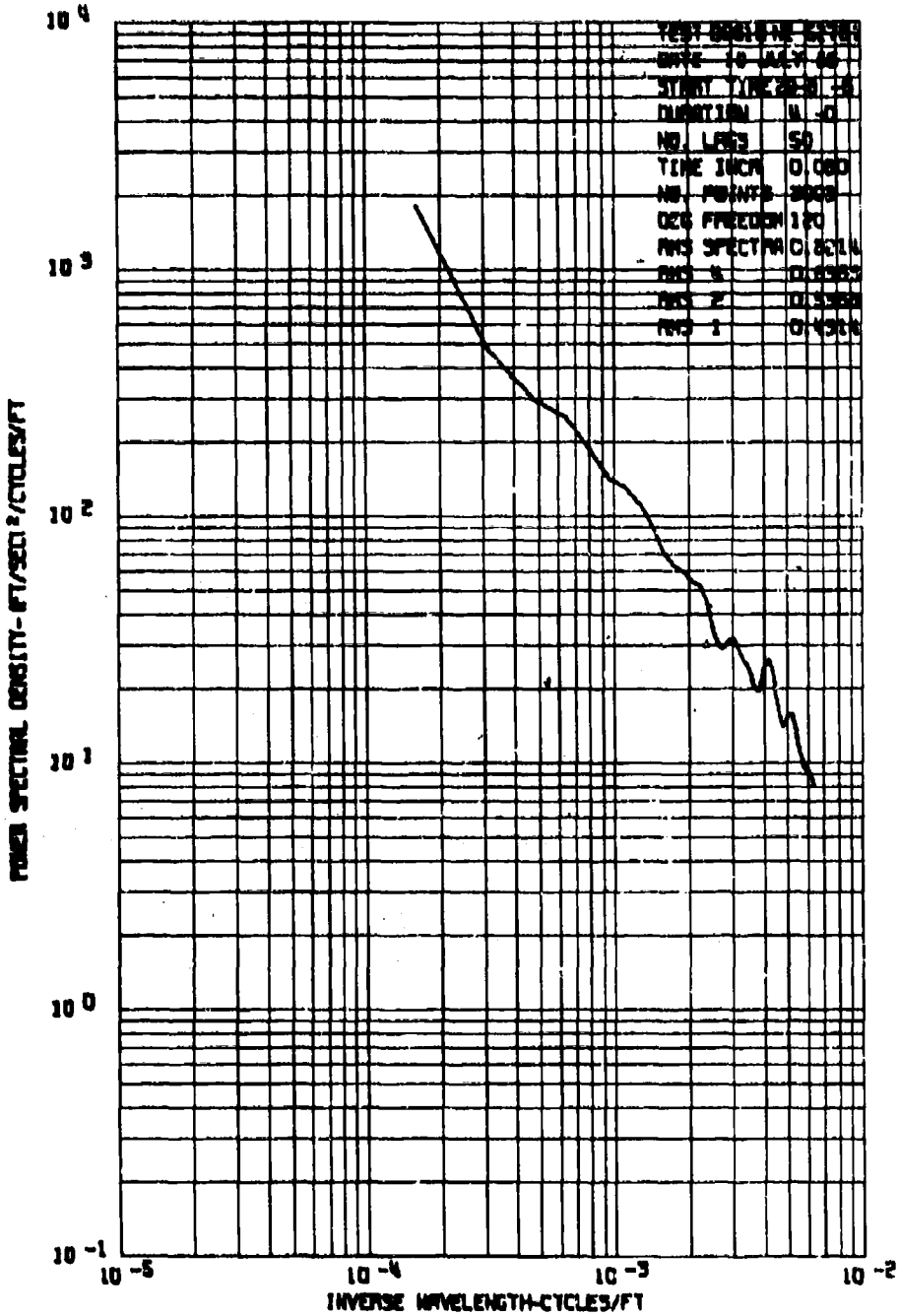


Figure 106C. Power Spectrum of Longitudinal Gust Velocity, Test 96, Run 10.

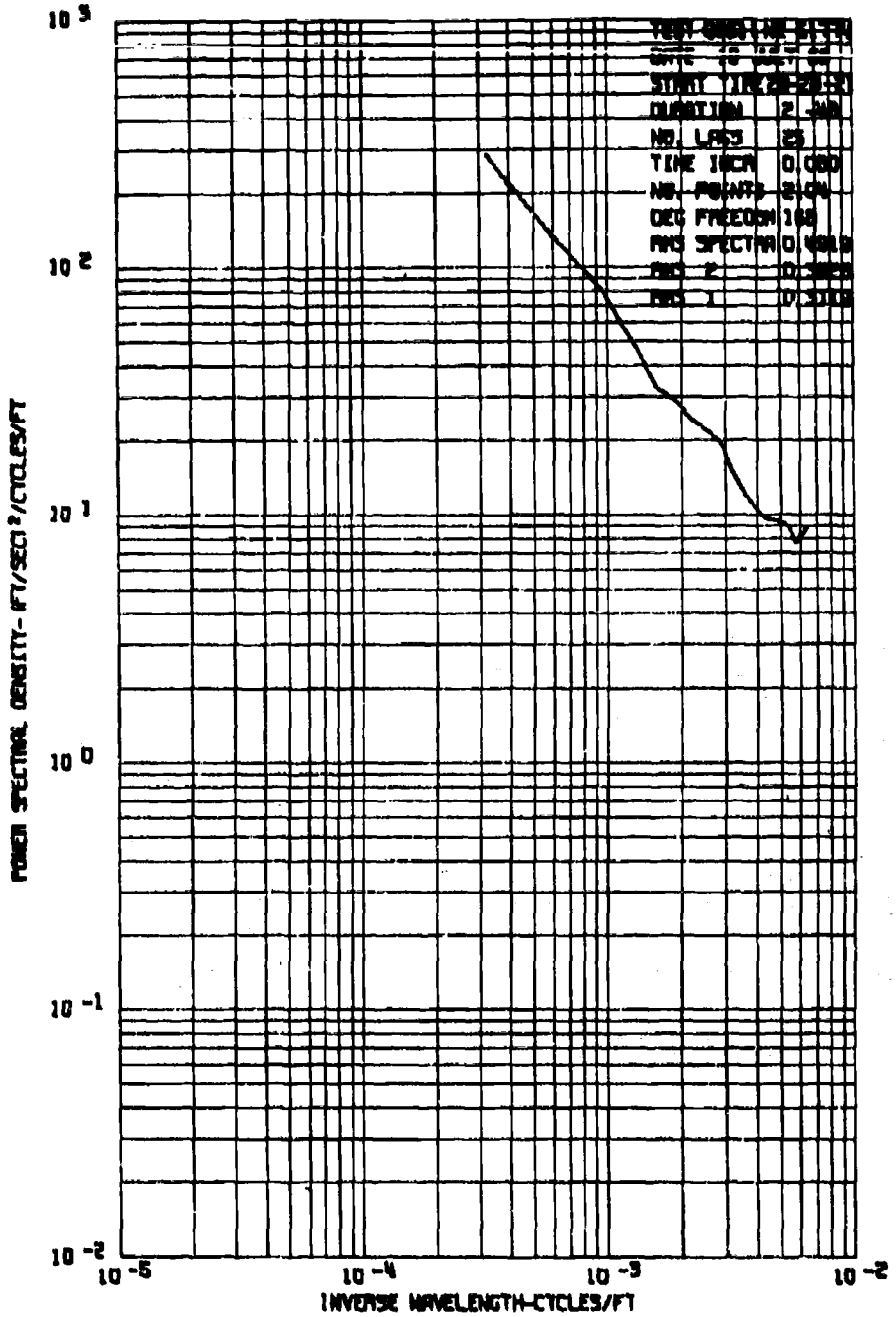


Figure 107A. Power Spectrum of Vertical Gust Velocity, Test 96, Run 11.

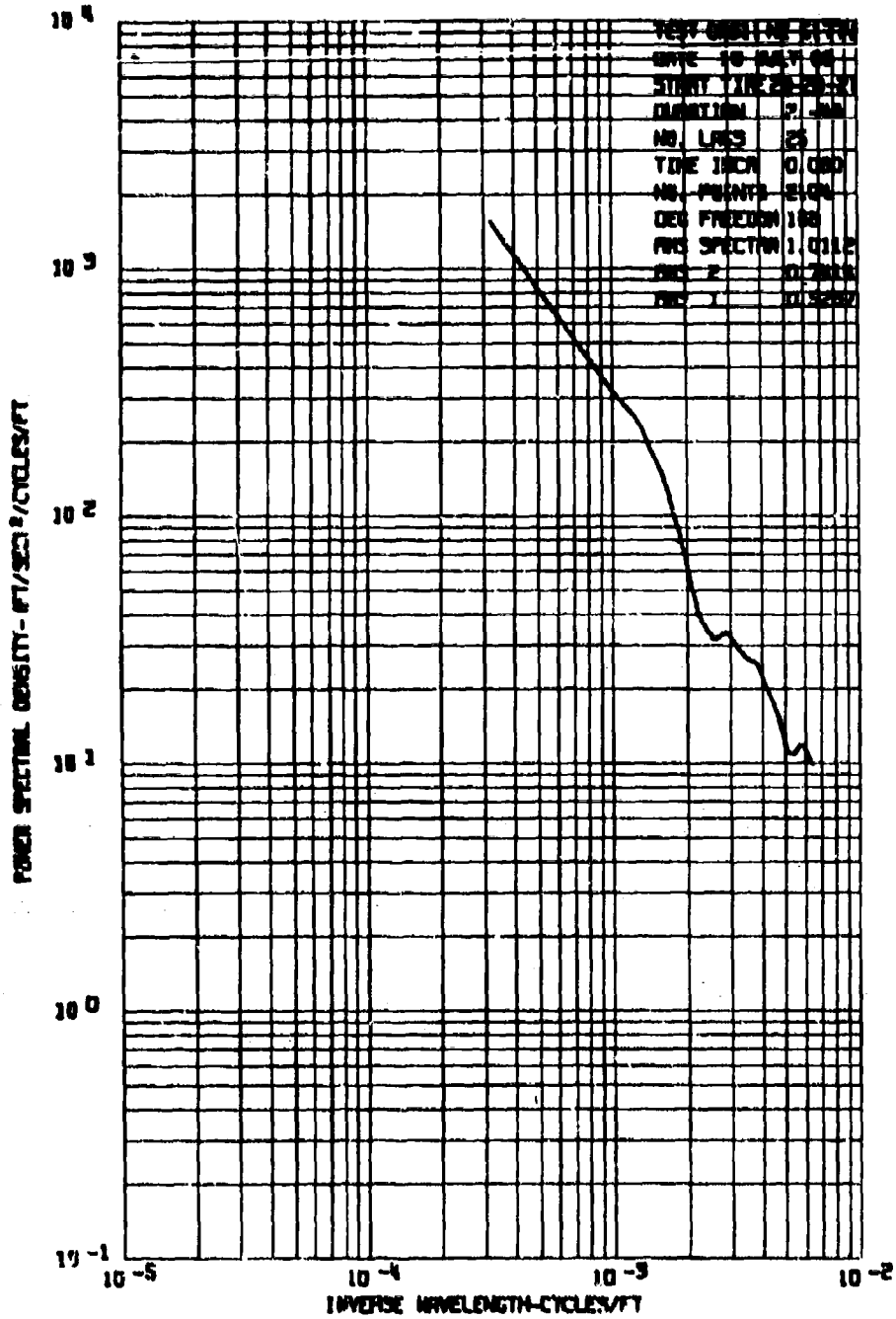


Figure 107B. Power Spectrum of Lateral Gust Velocity, Test 96, Run 11.

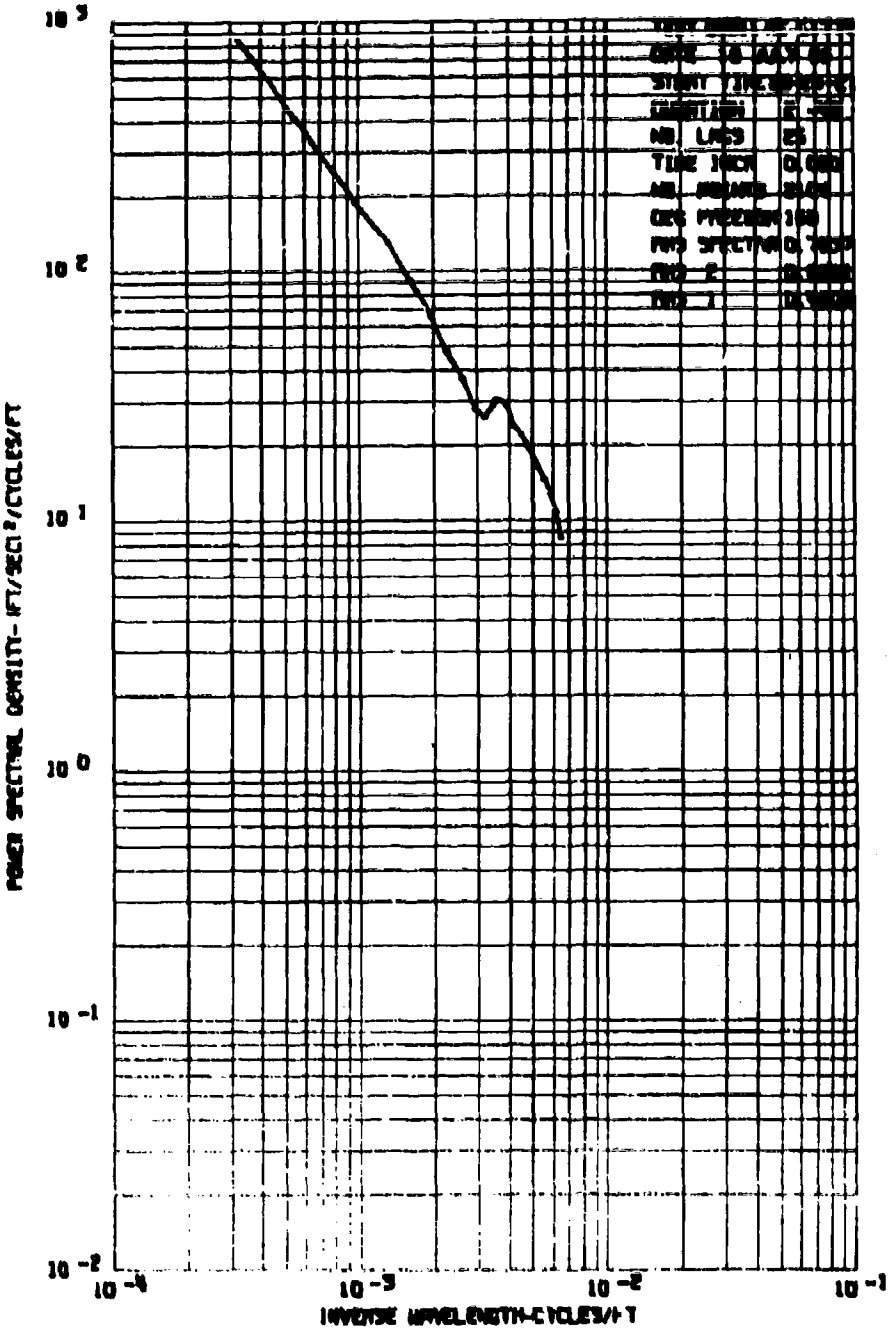


Figure 107C. Power Spectrum of Longitudinal Gust Velocity, Test 96, Run 11.

Appendix VII

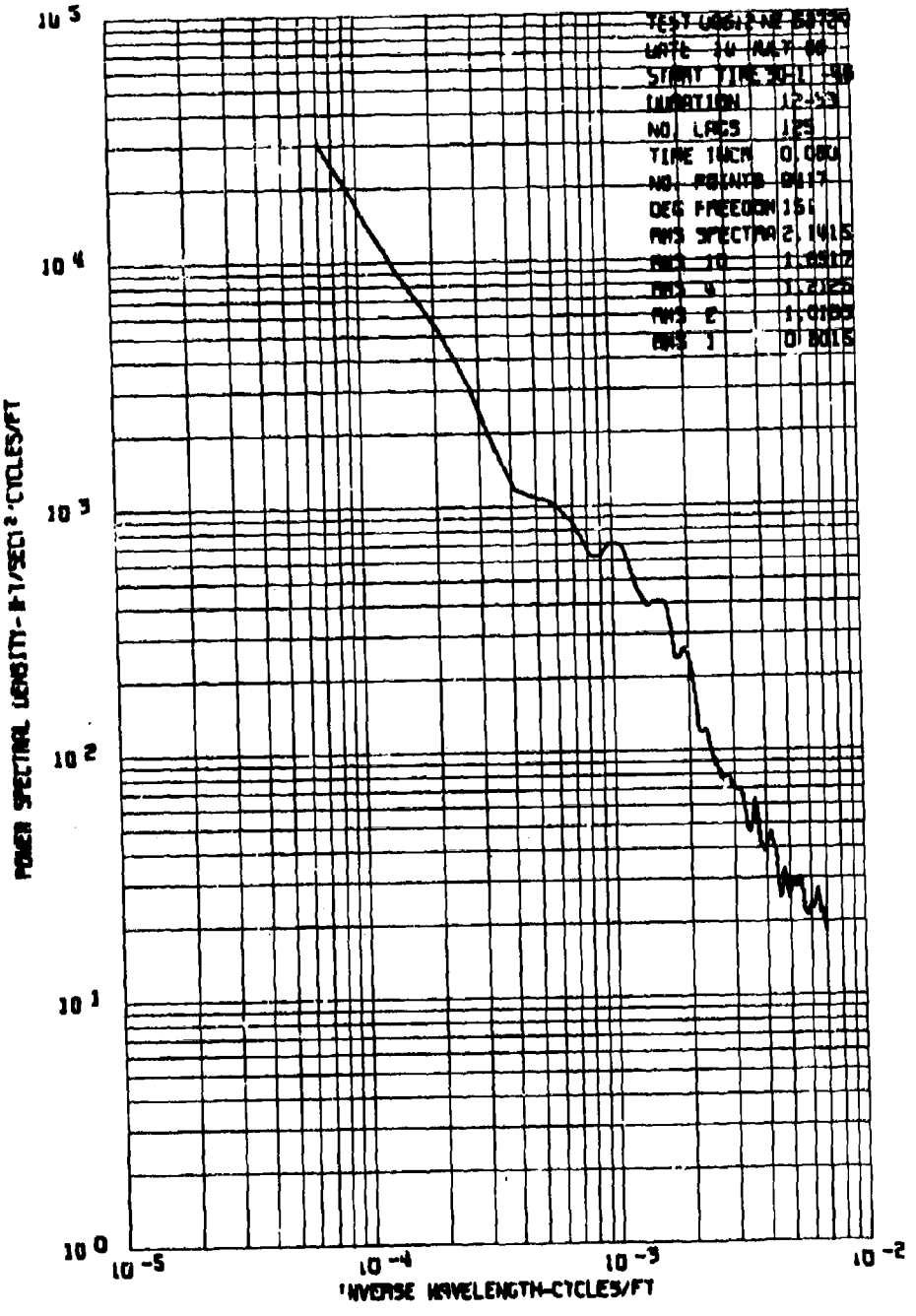


Figure 108A. Power Spectrum of Lateral Gust Velocity, Test 96, Run 12.

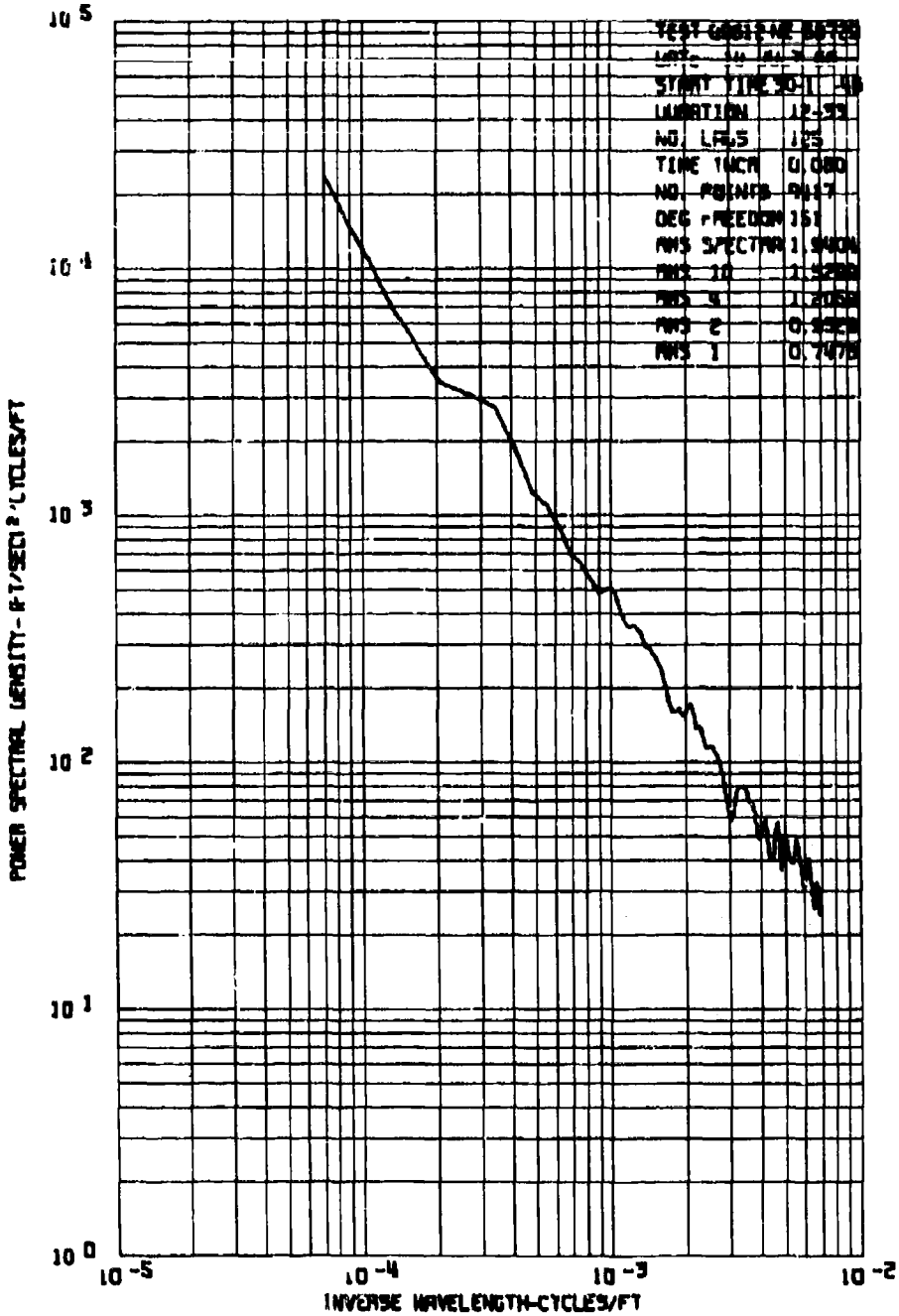


Figure 108B. Power Spectrum of Longitudinal Gust Velocity, Test 96, Run 12.

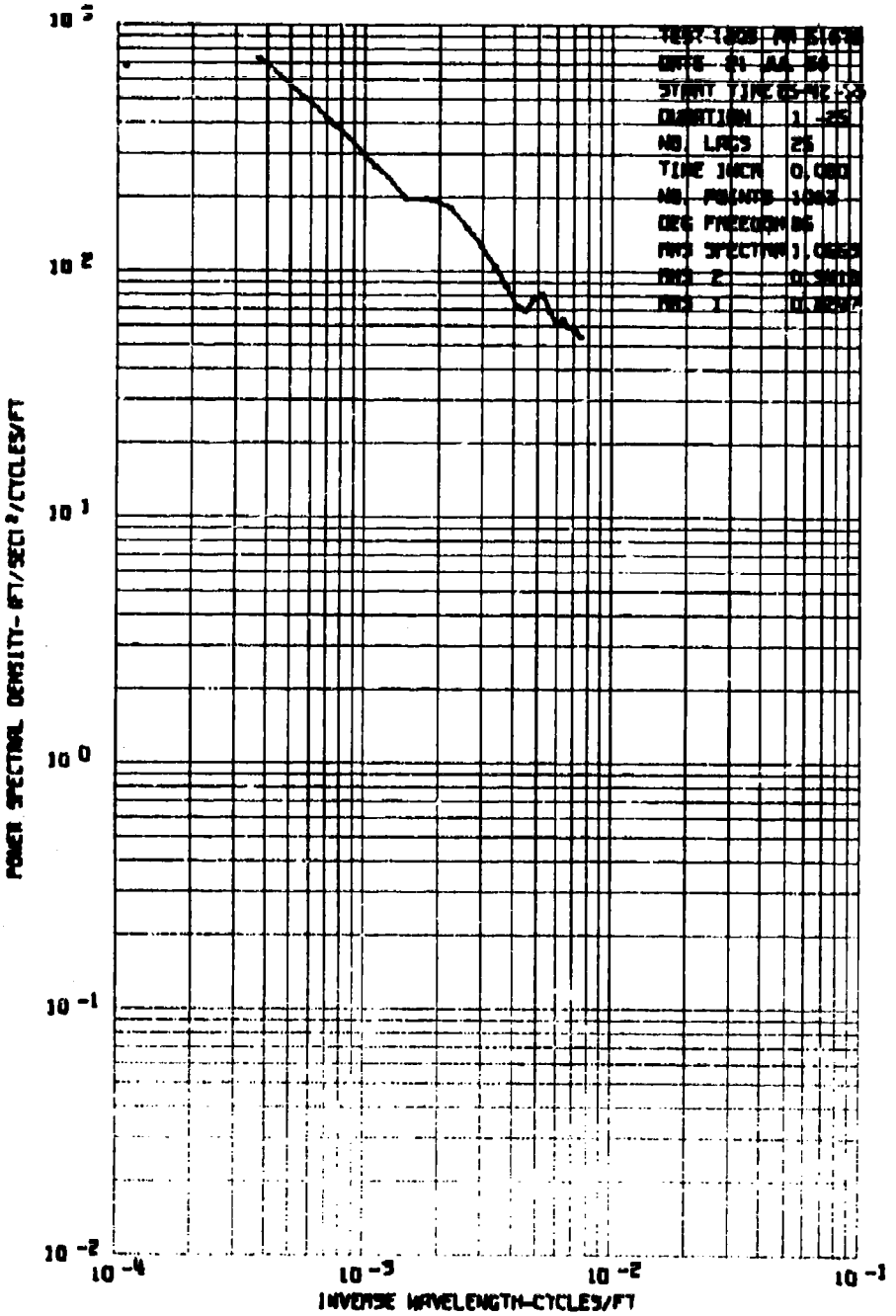


Figure 109A. Power Spectrum of Vertical Gust Velocity, Test 100, Run 3.

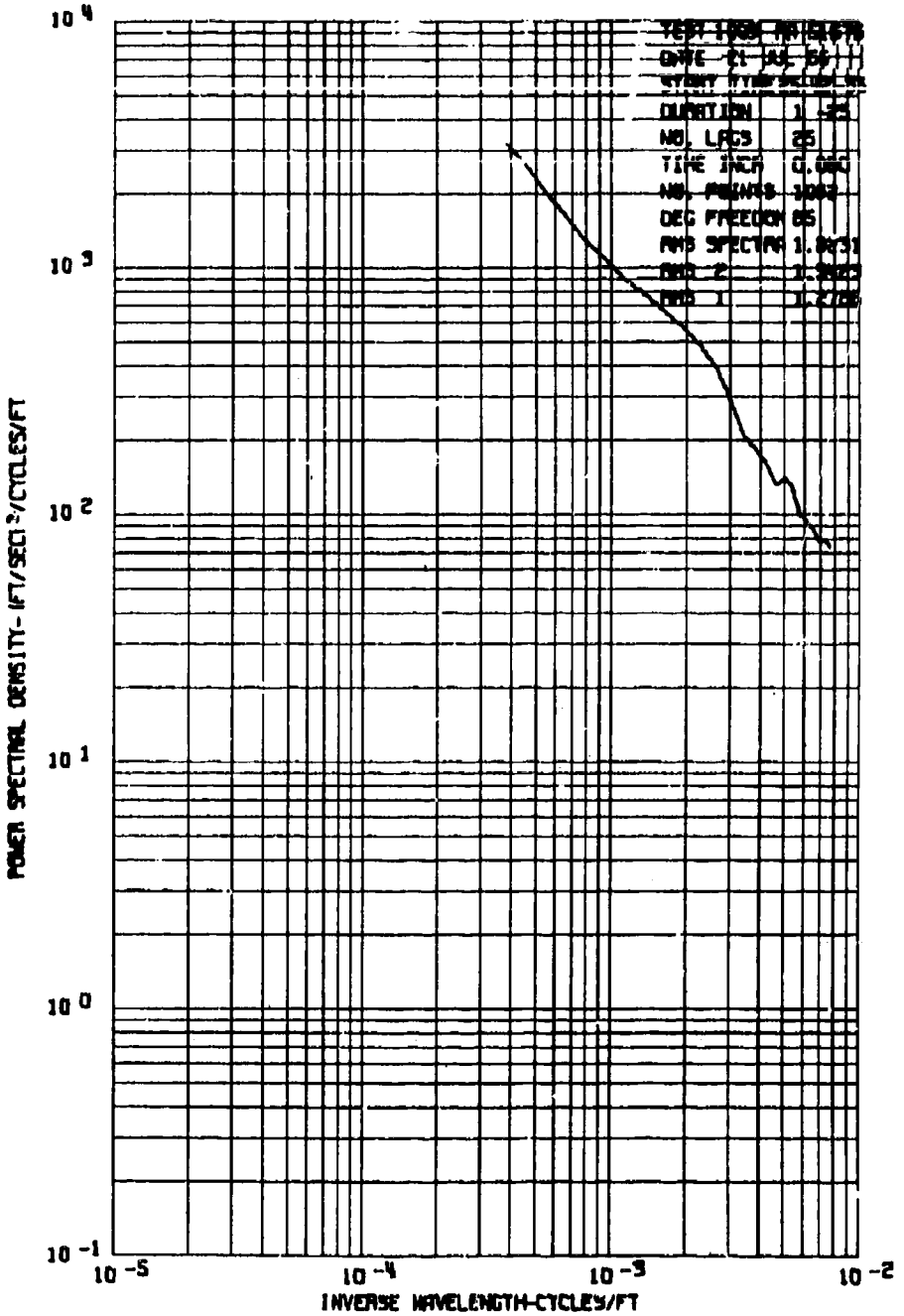


Figure 109B. Power Spectrum of Lateral Gust Velocity, Test 100, Run 3.

Appendix VII

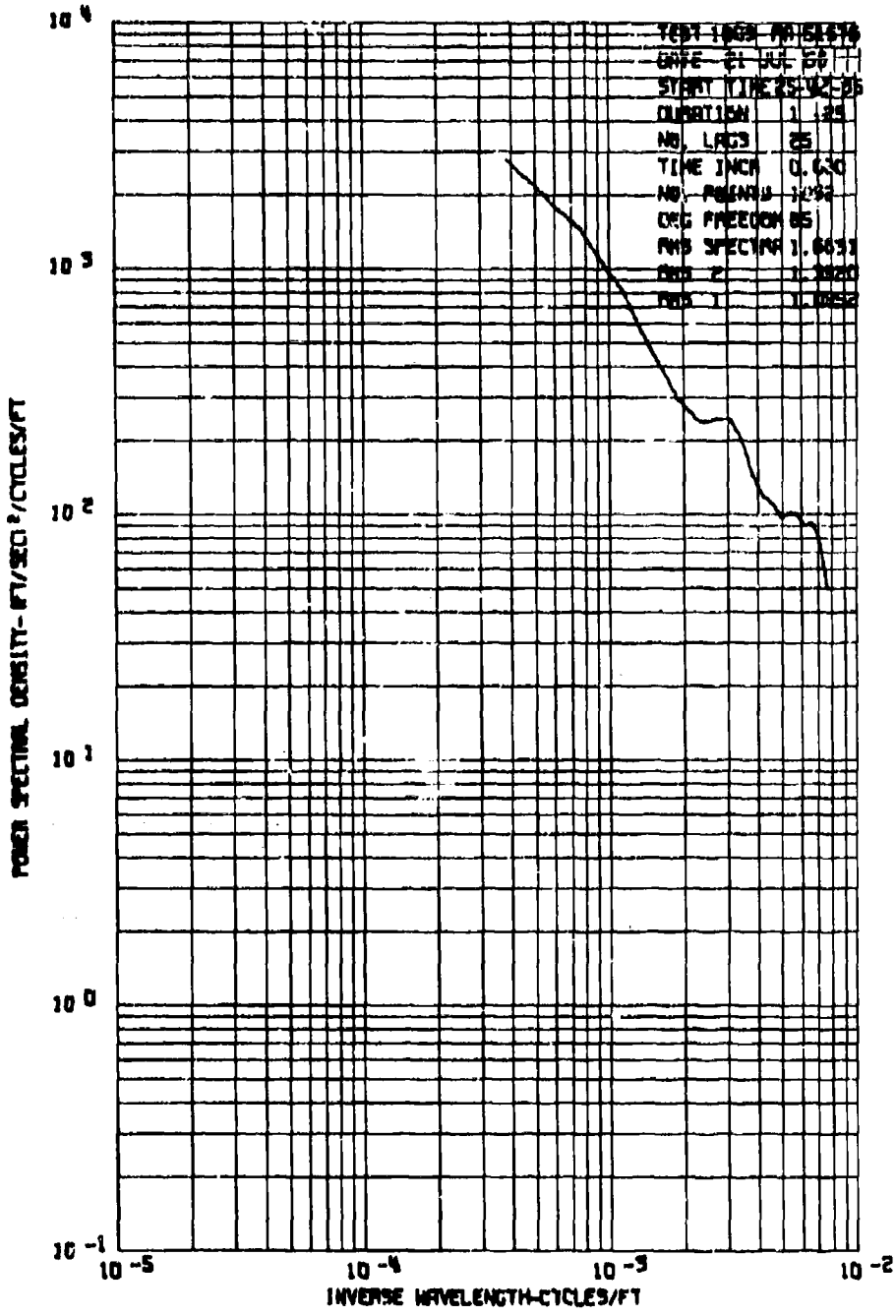


Figure 109C. Power Spectrum of Longitudinal Gust Velocity, Test 100, Run 3.

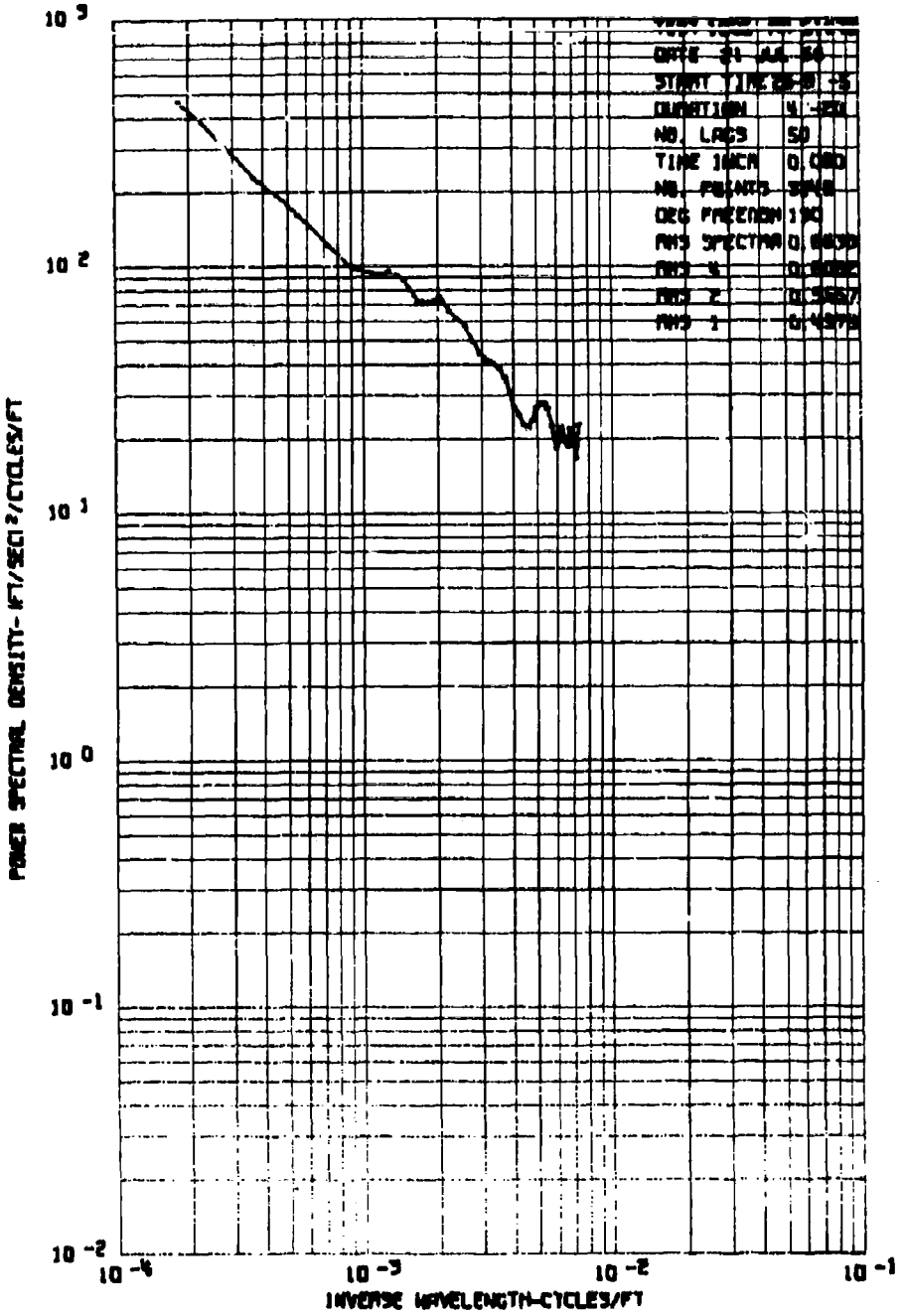


Figure 110A. Power Spectrum of Vertical Gust Velocity, Test 100, Run 5.

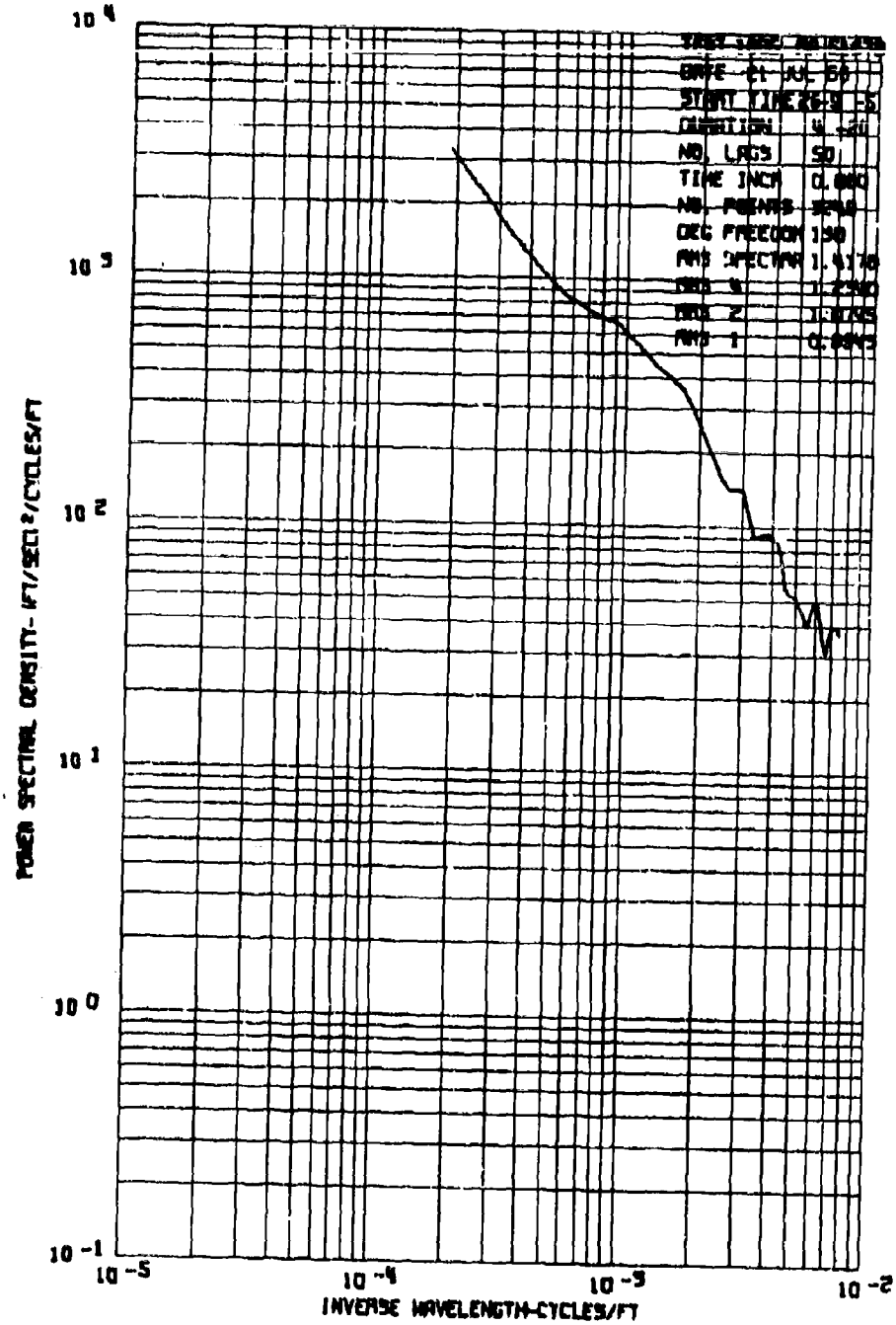


Figure 110B. Power Spectrum of Lateral Gust Velocity, Test 100, Run 5.

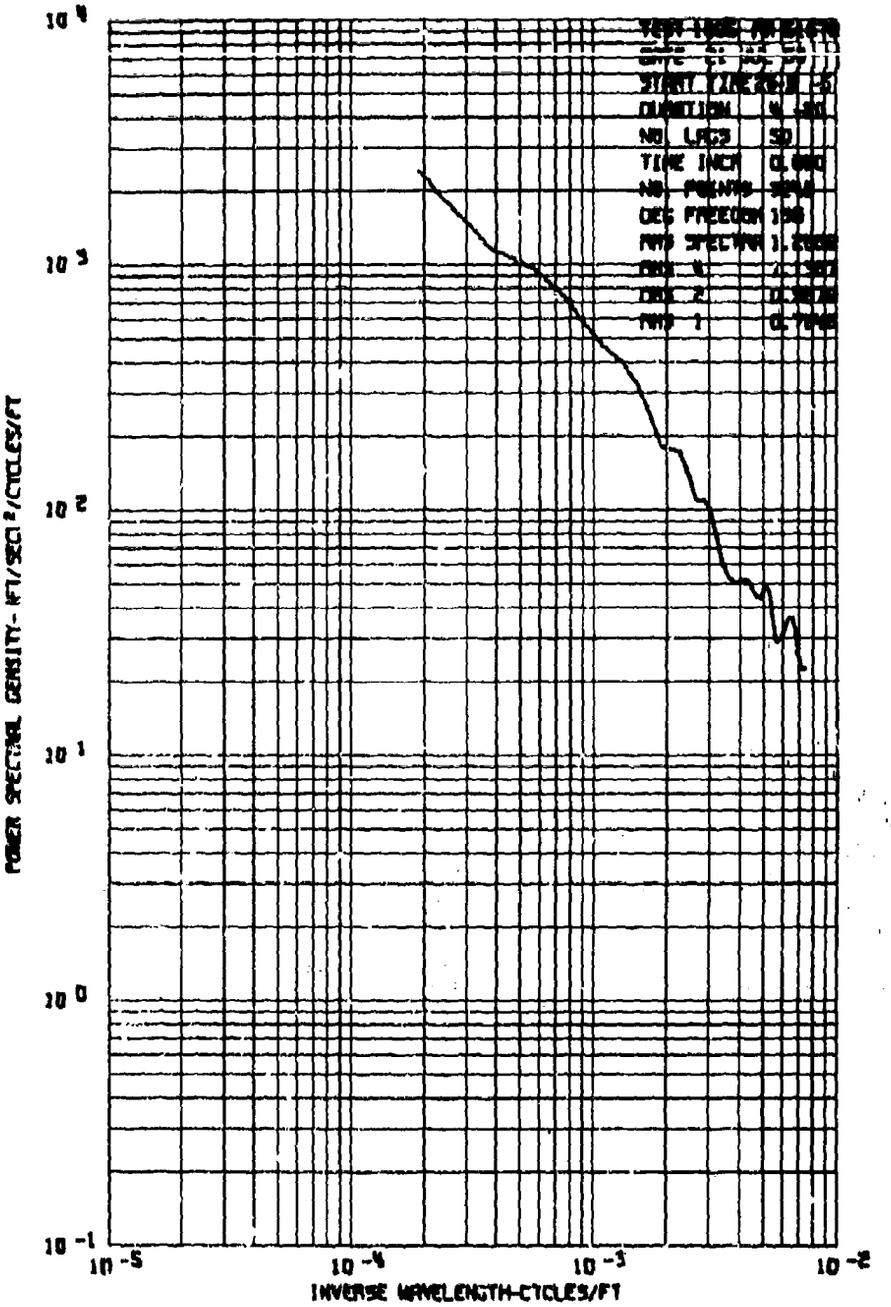


Figure 110C. Power Spectrum of Longitudinal Gust Velocity, Test 100, Run 5.

Appendix VII

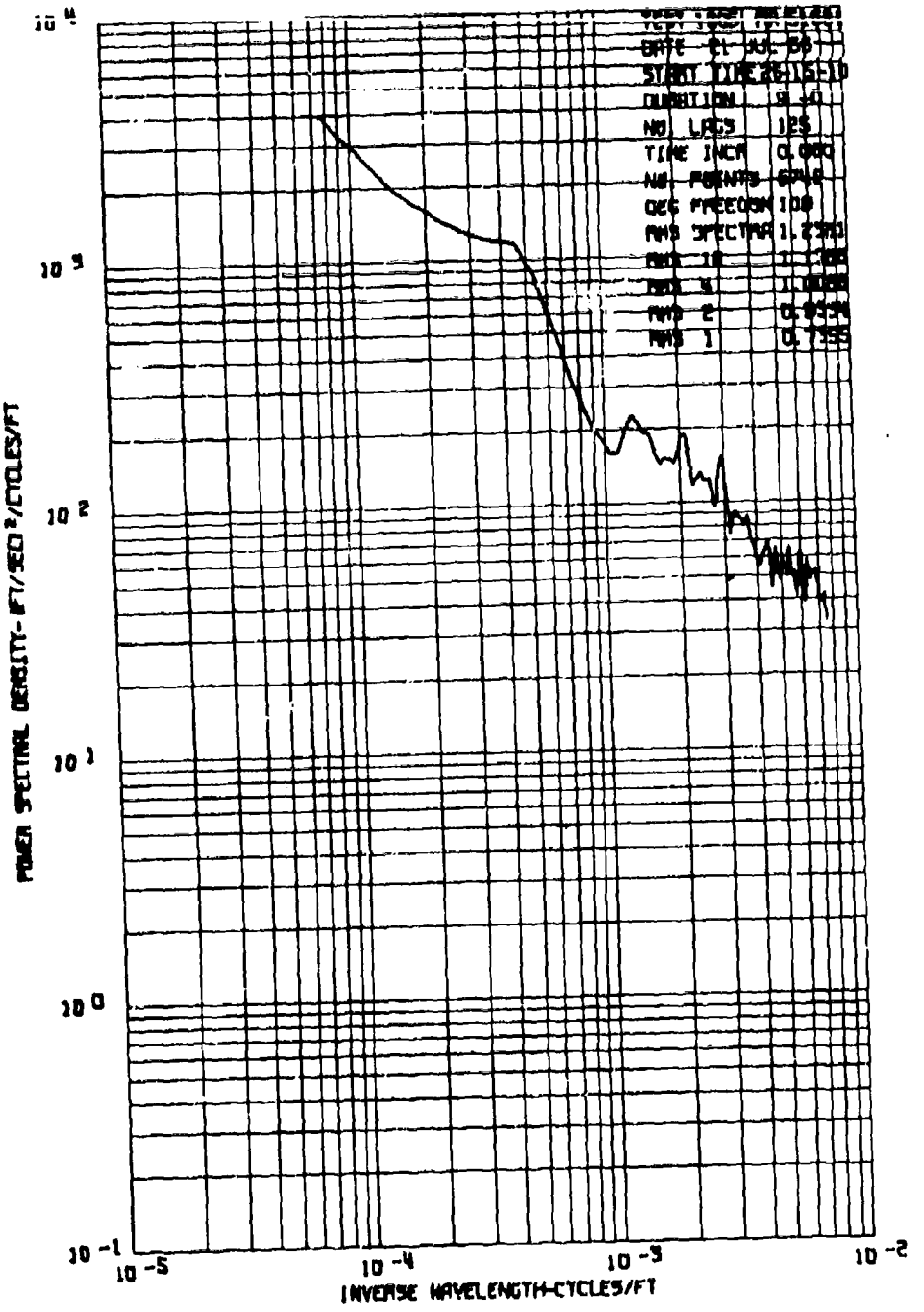


Figure 111A. Power Spectrum of Vertical Gust Velocity, Test 100, Run 6.

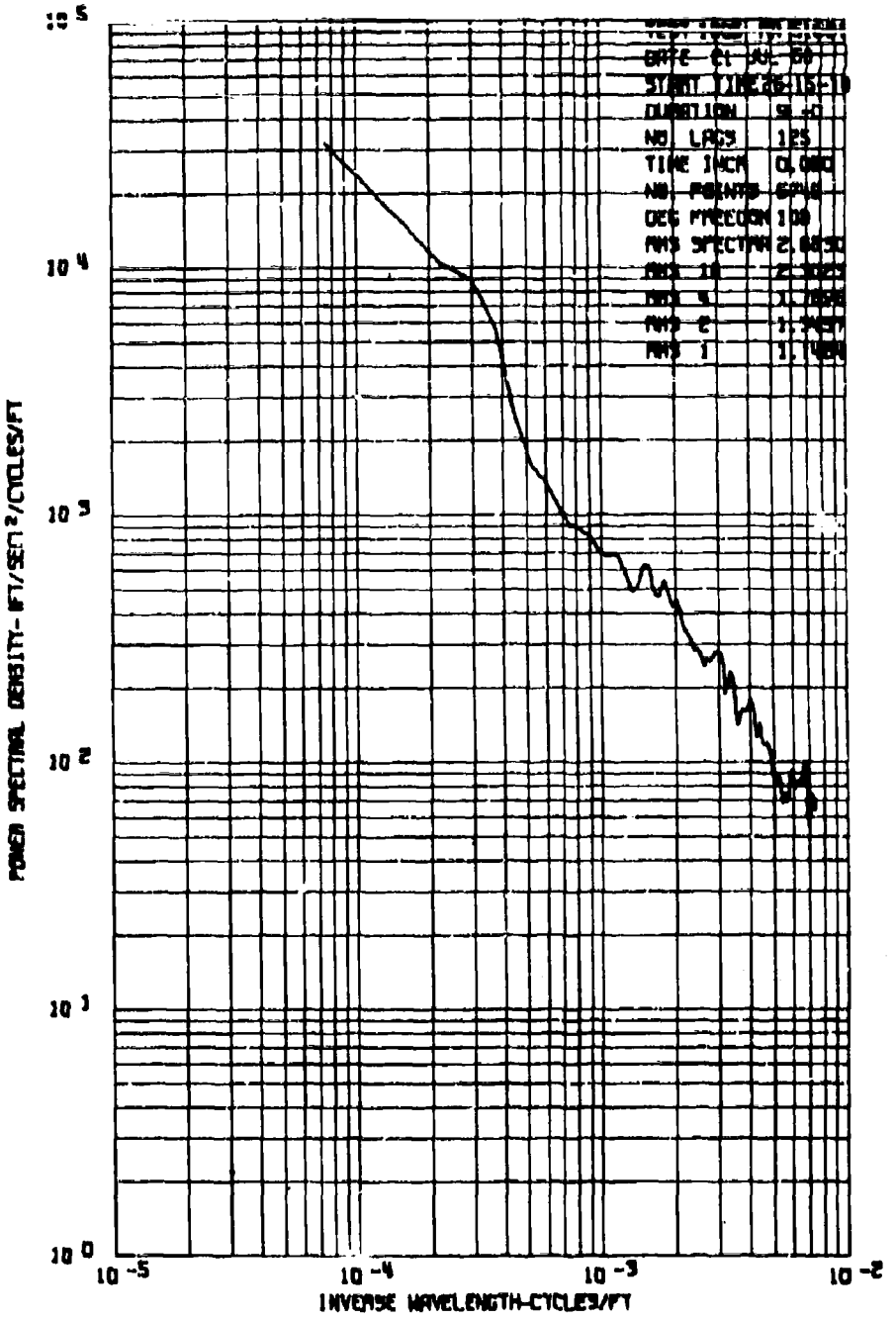


Figure 111B. Power Spectrum of Lateral Gust Velocity, Test 100, Run 6.

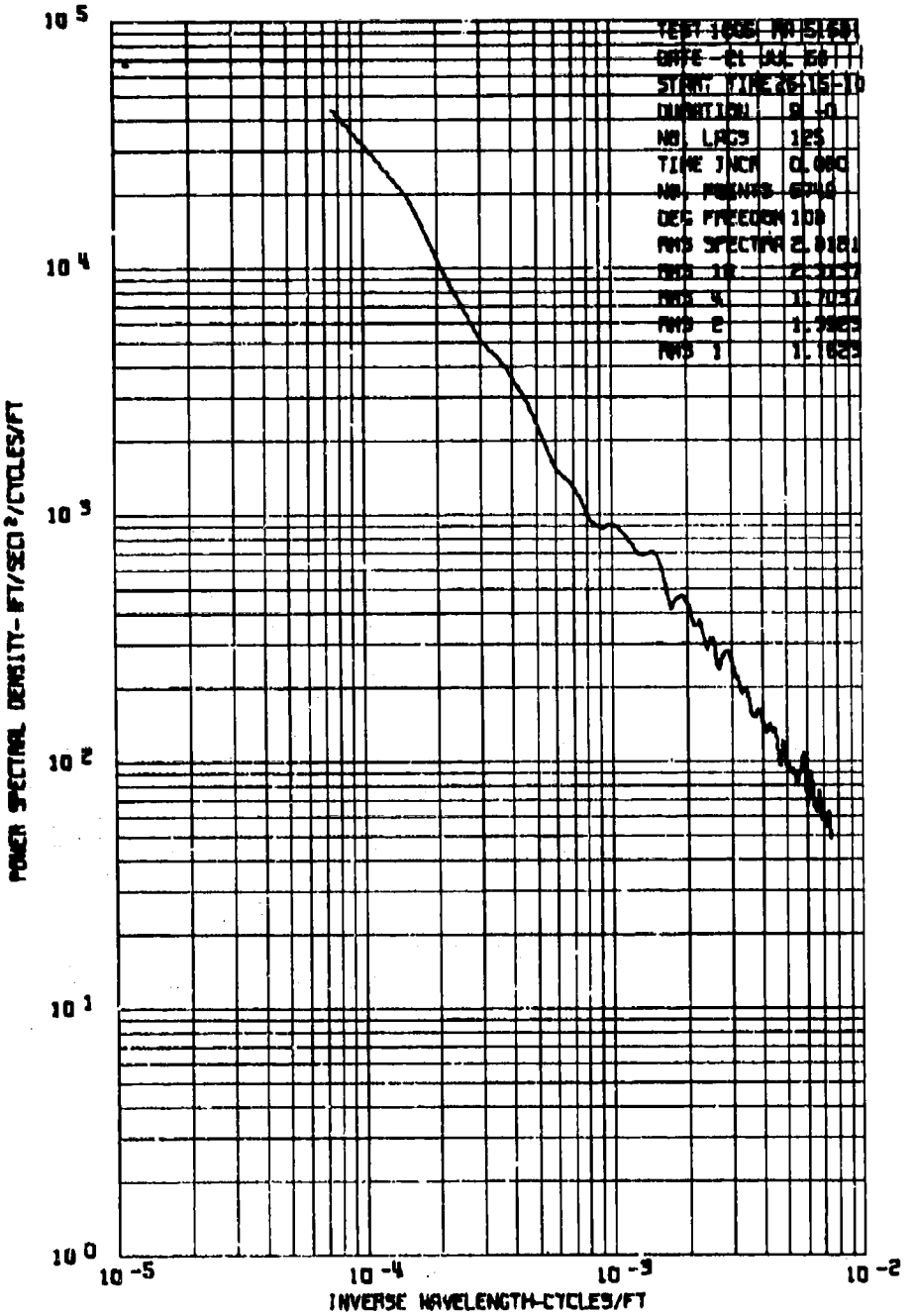


Figure 111C. Power Spectrum of Longitudinal Gust Velocity, Test 100, Run 6.

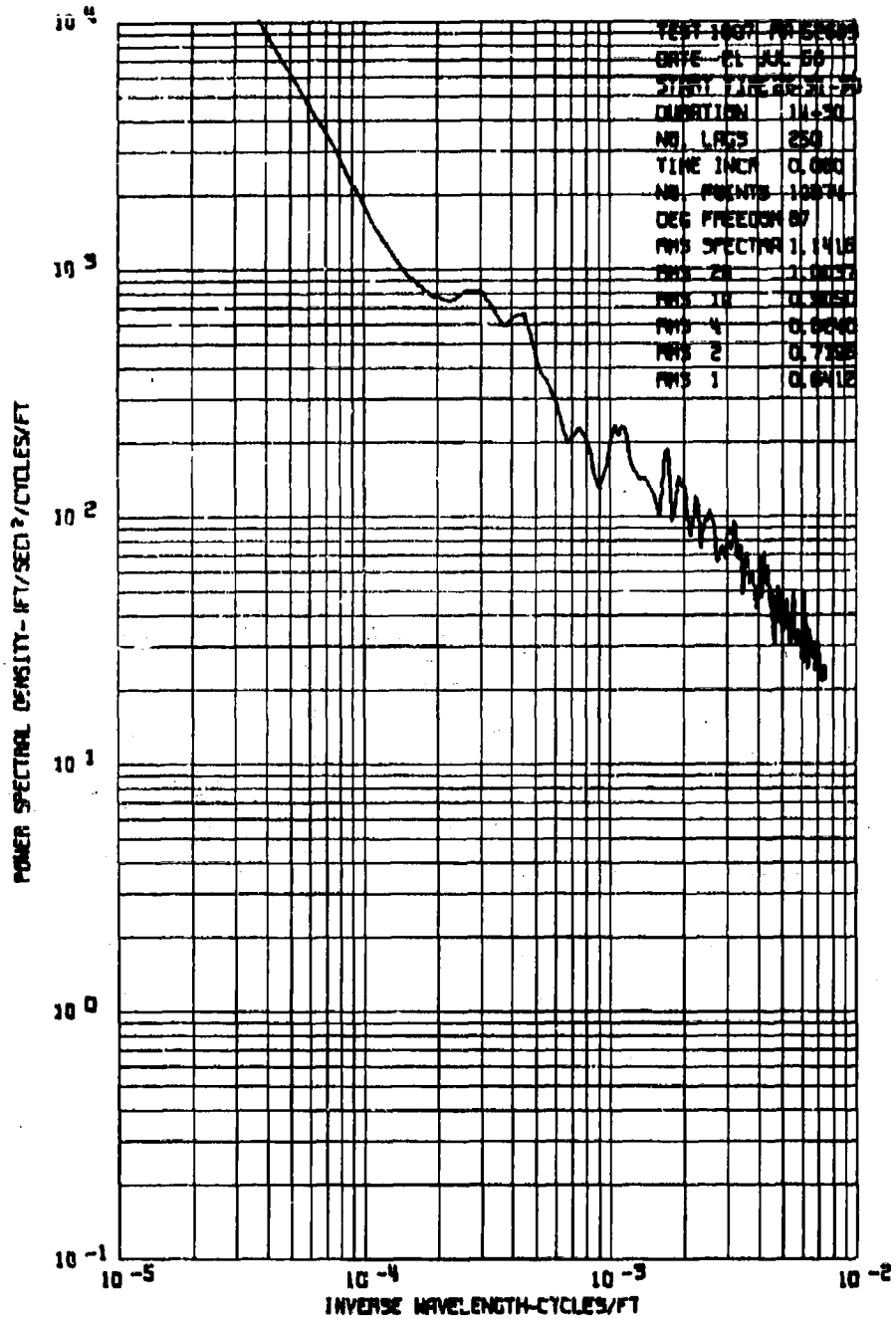


Figure 112A. Power Spectrum of Vertical Gust Velocity, Test 100, Run 7 - 250 Lags.

Appendix VII

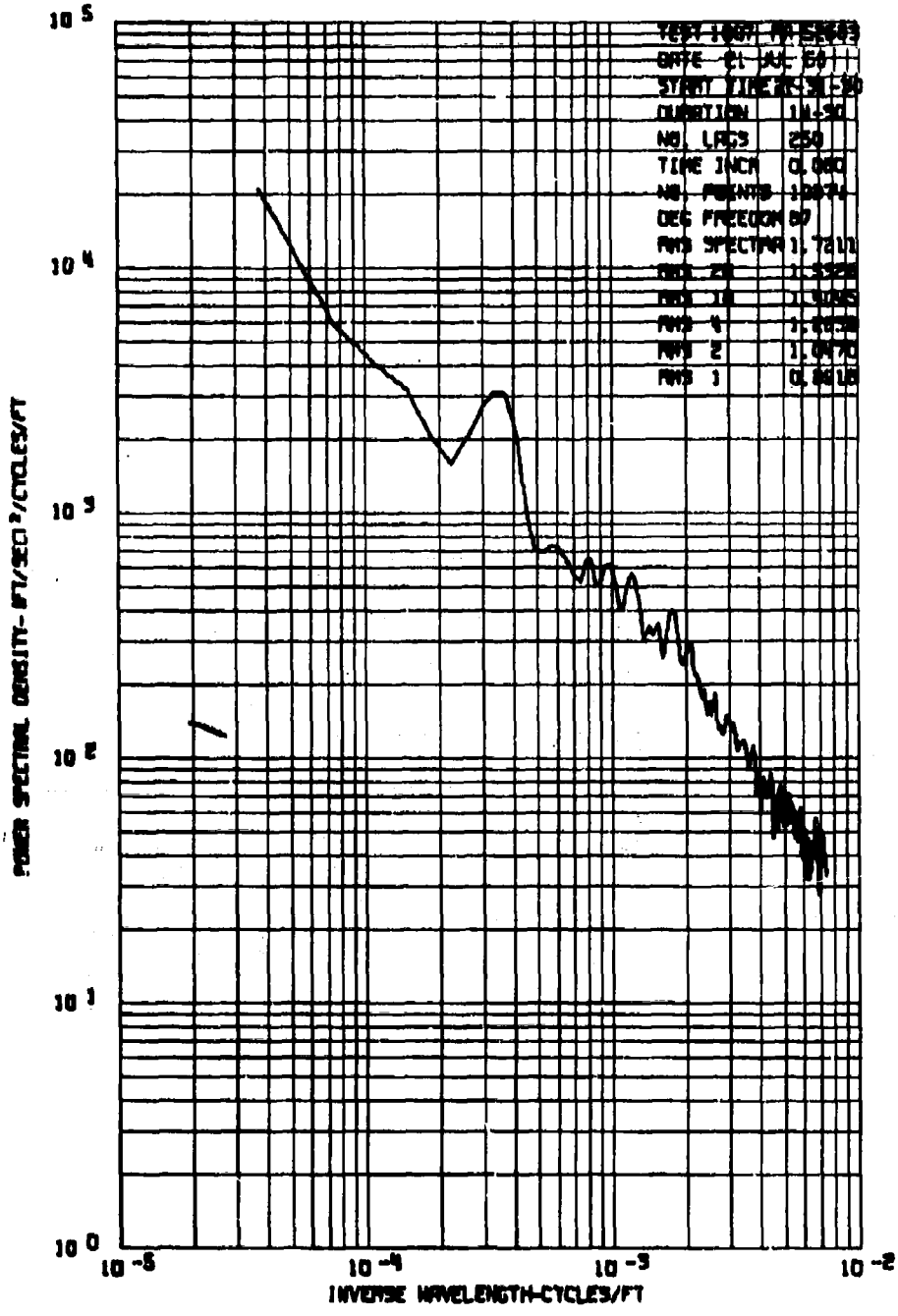


Figure 112B. Power Spectrum of Lateral Gust Velocity, Test 100, Run 7 - 250 Lags.

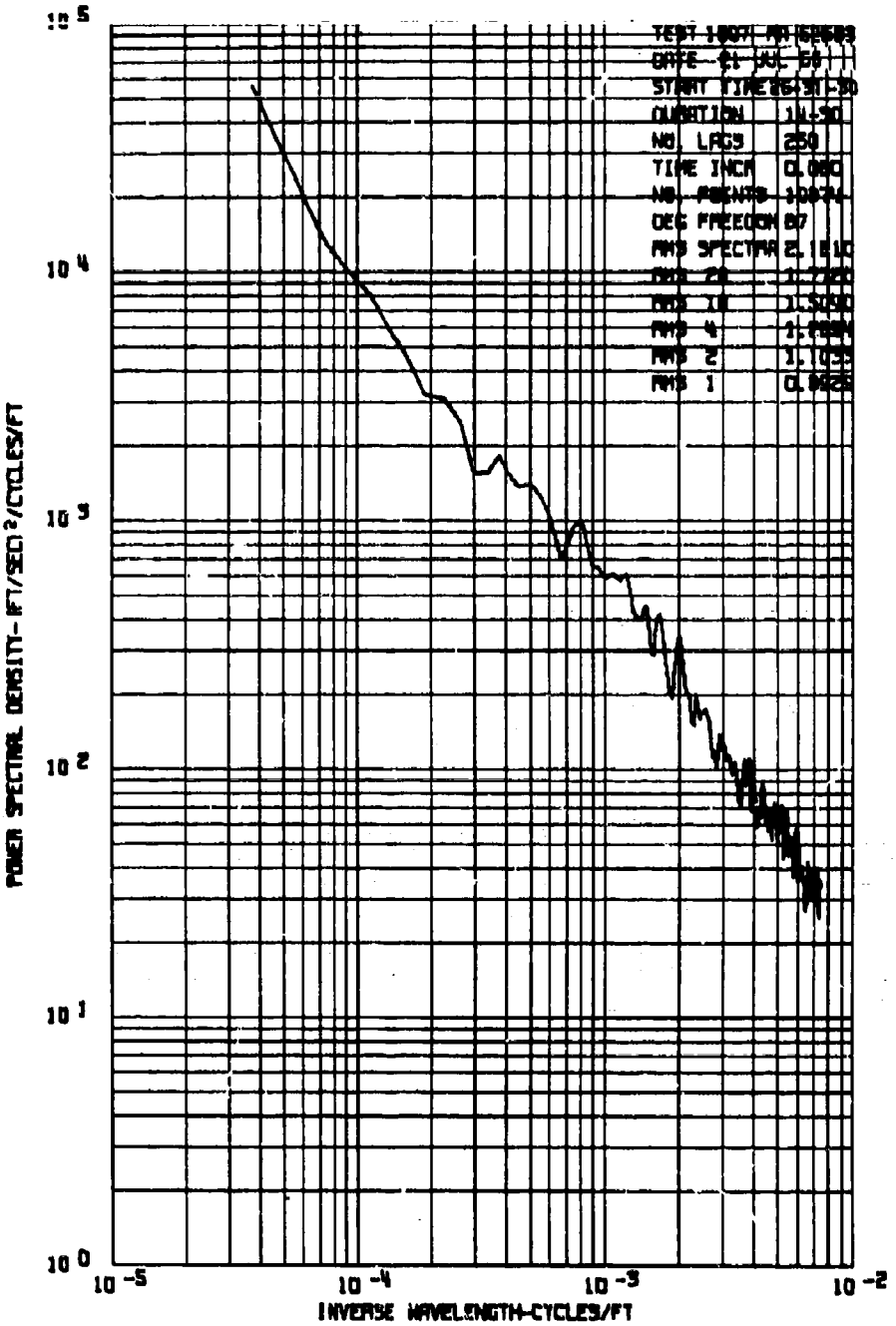


Figure 112C. Power Spectrum of Longitudinal Gust Velocity, Test 100, Run 7 - 250 Lags.

Appendix VII

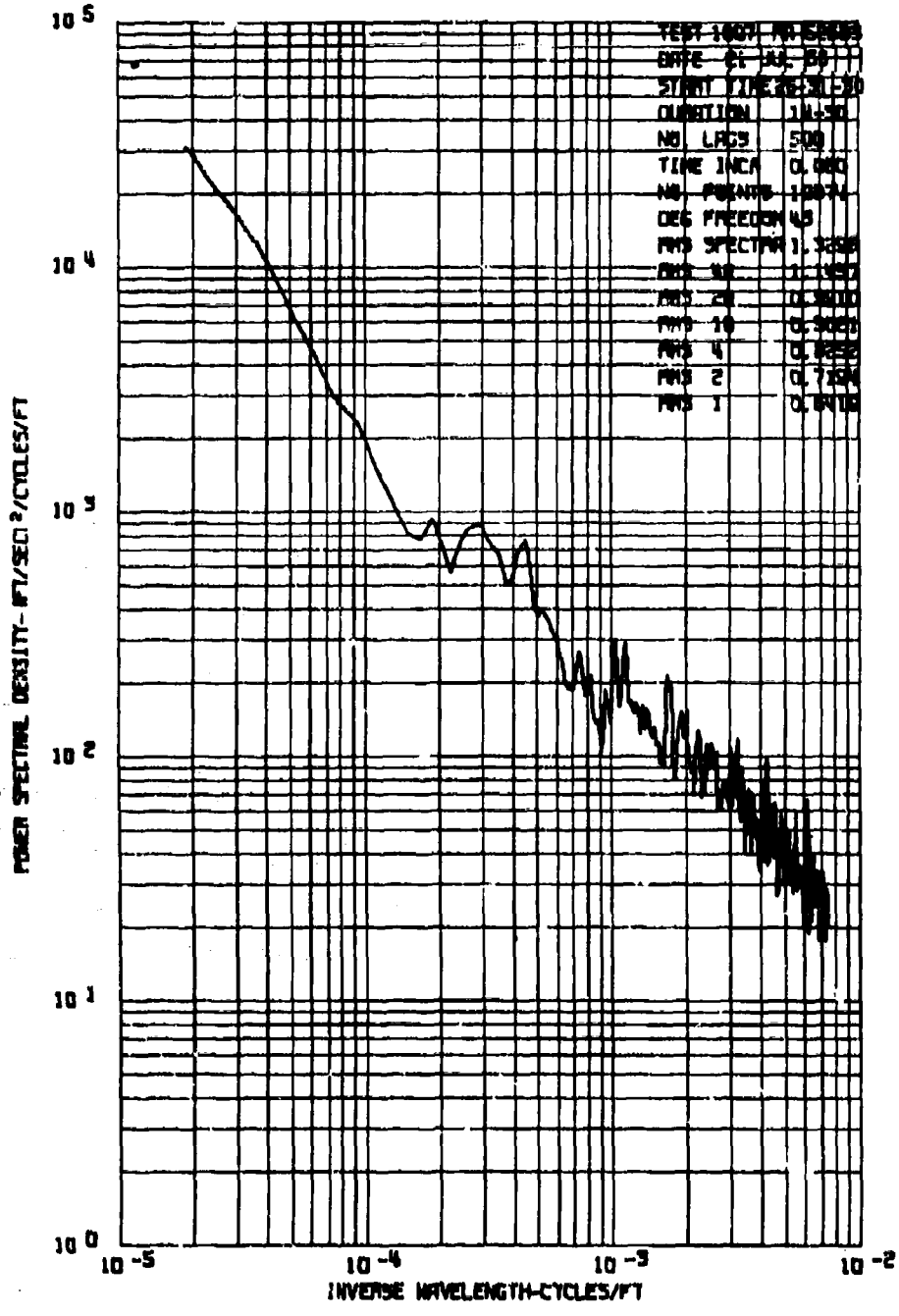


Figure 112D. Power Spectrum of Vertical Gust Velocity, Test 100, Run 7 - 500 Lags.

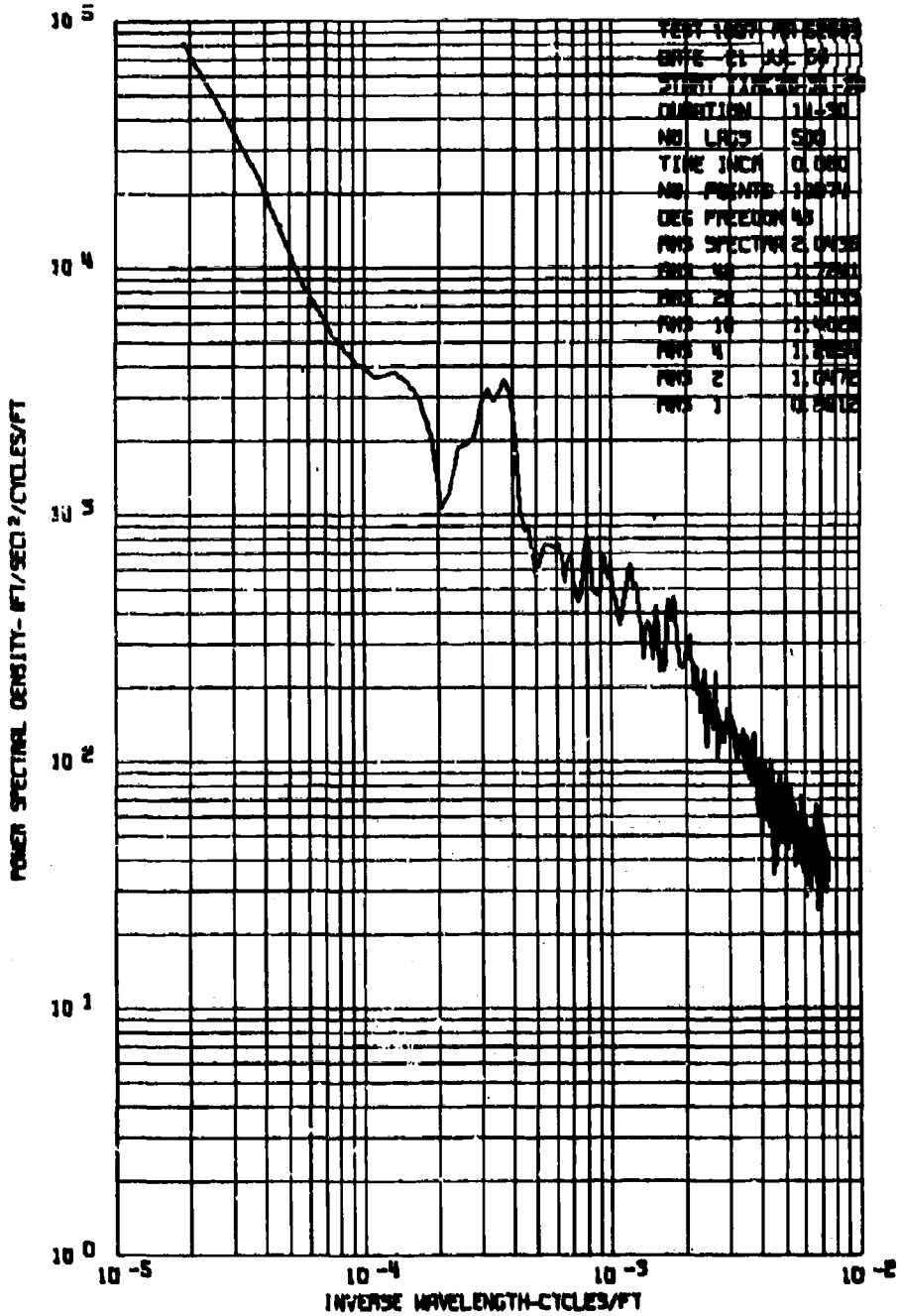


Figure 112E. Power Spectrum of Lateral Gust Velocity, Test 100, Run 7 - 500 Lags.

Appendix VII

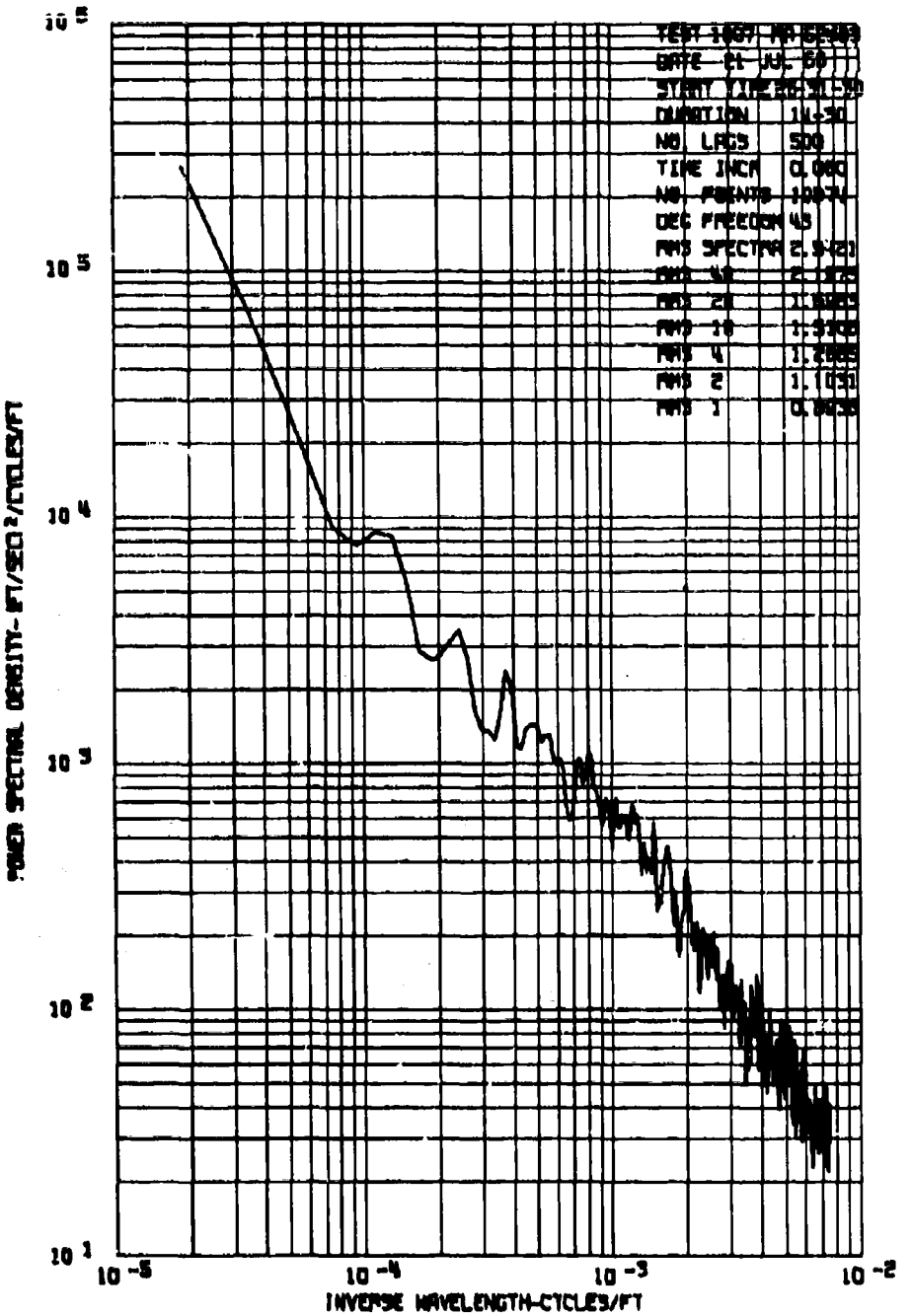


Figure 112F. Power Spectrum of Longitudinal Gust Velocity, Test 1.00, Run 7 - 500 Lags.

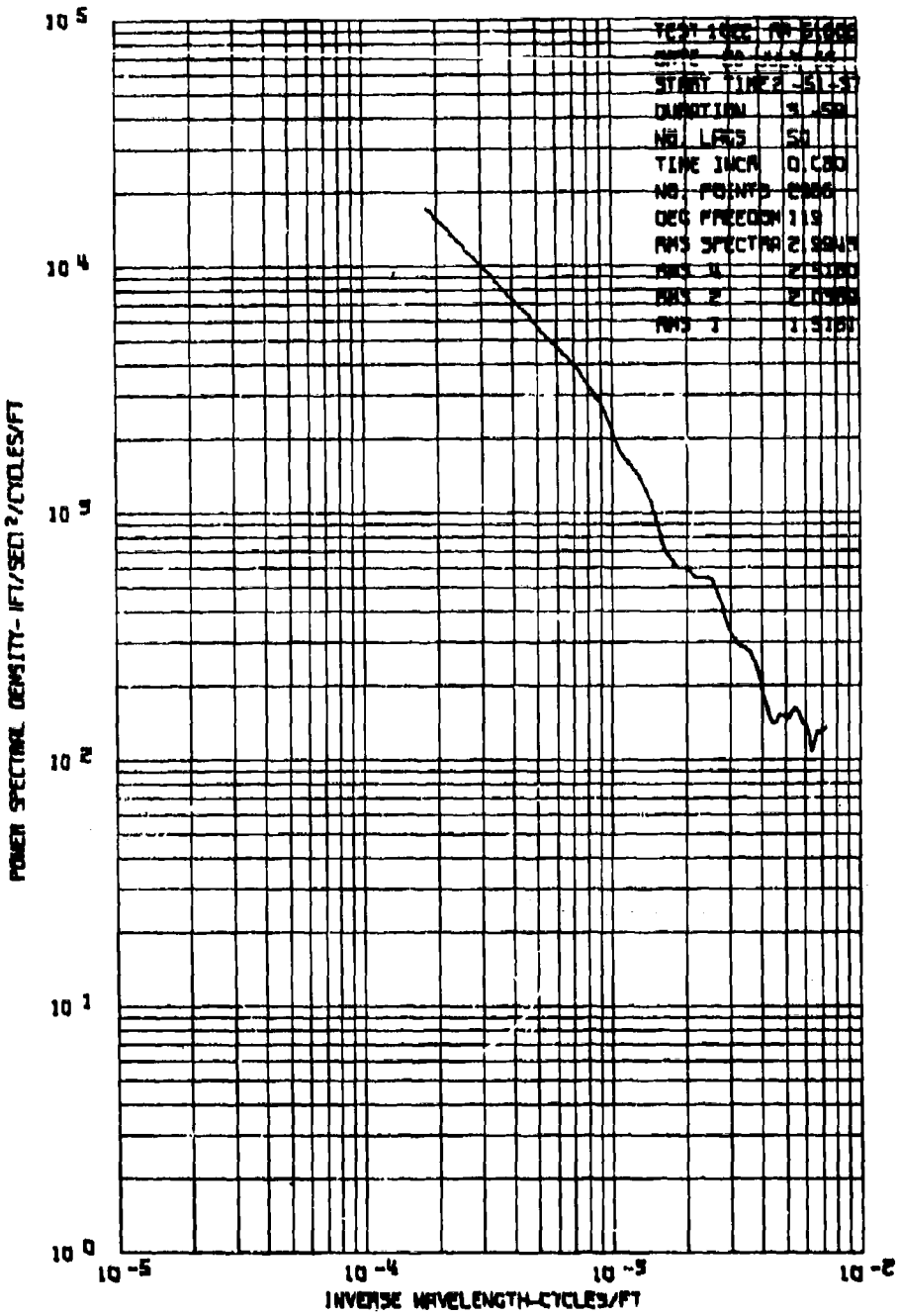


Figure 113A. Power Spectrum of Vertical Gust Velocity, Test 102, Run 2.

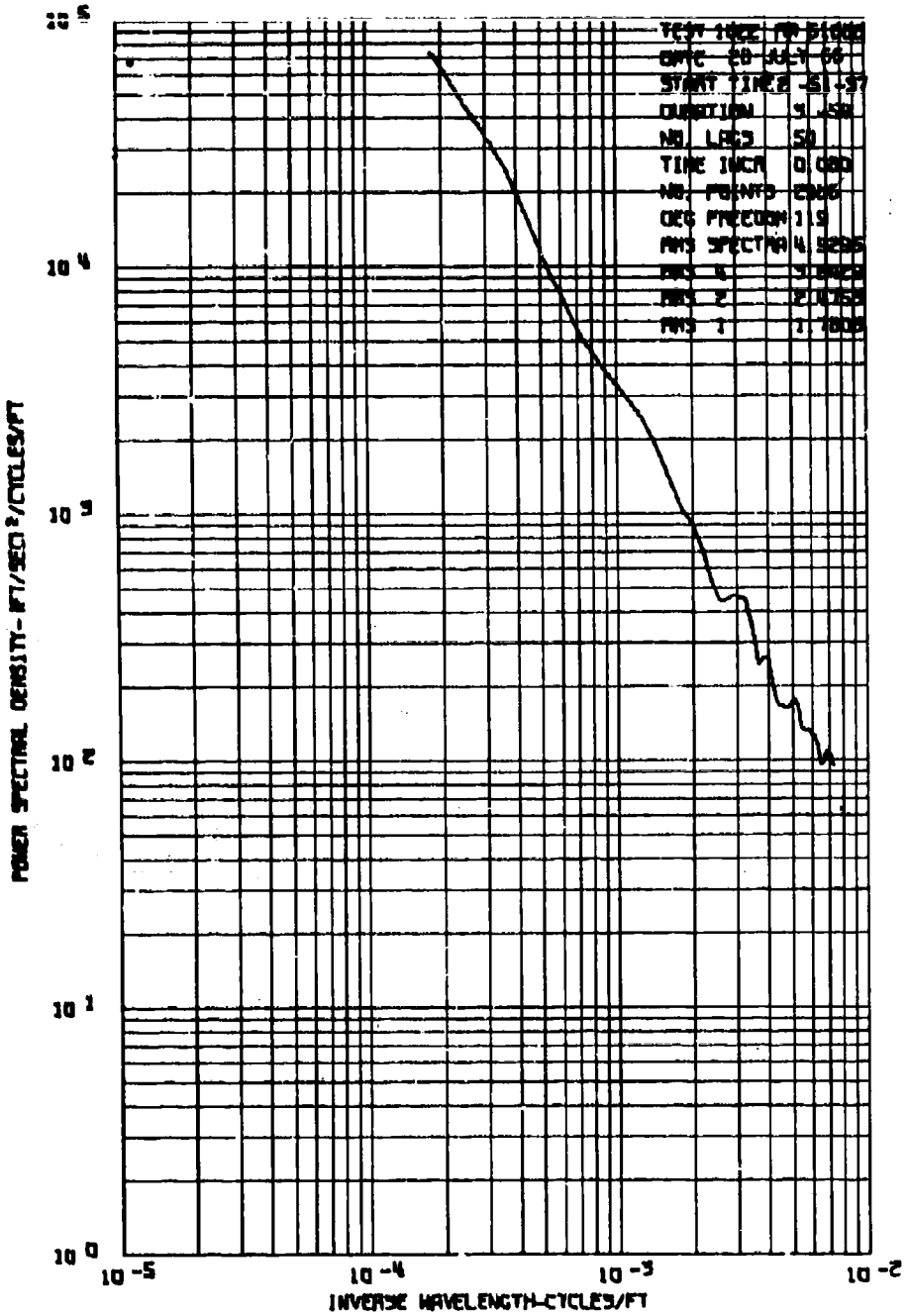


Figure 113B. Power Spectrum of Lateral Gust Velocity, Test 102, Run 2.

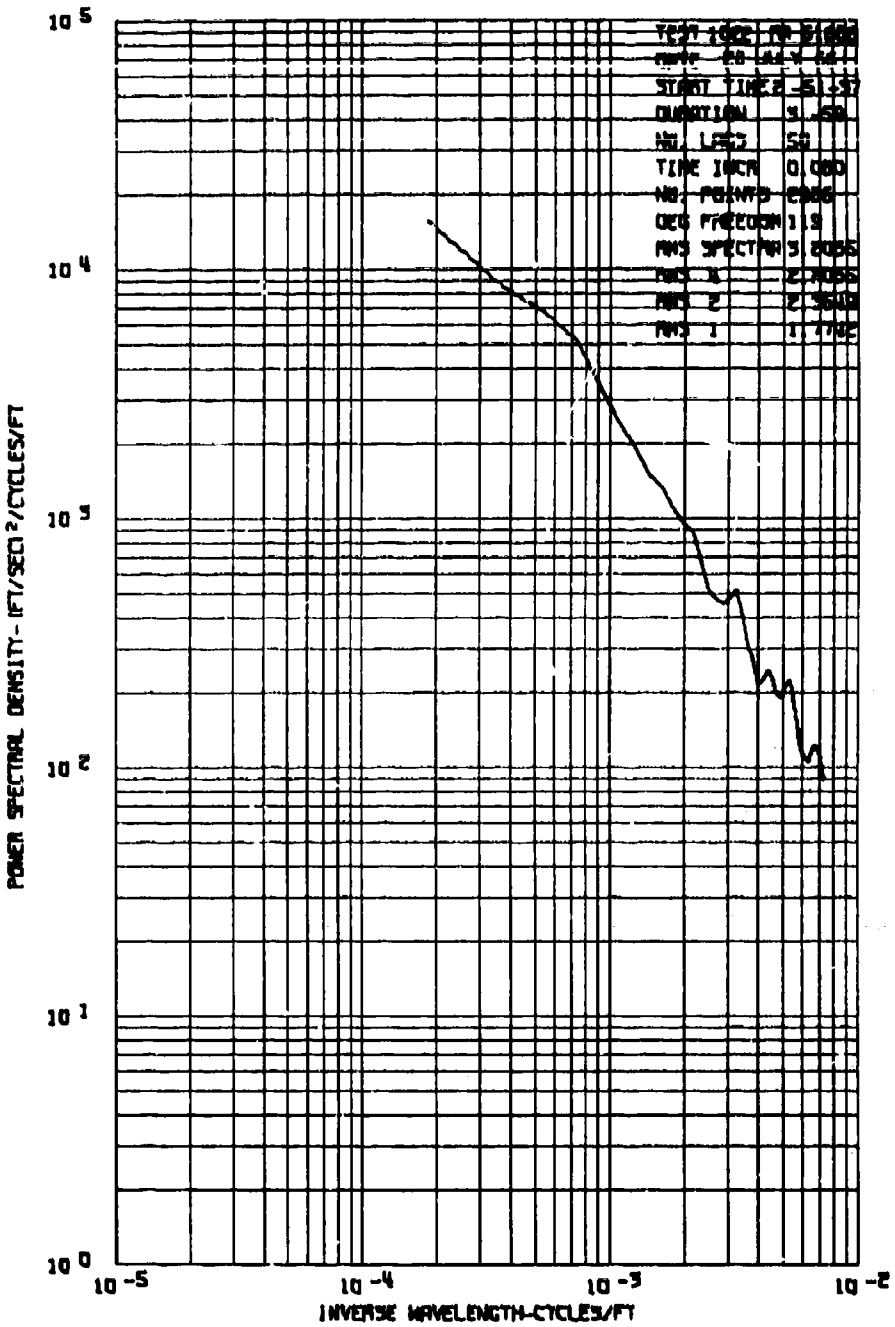


Figure 113C. Power Spectrum of Longitudinal Gust Velocity, Test 102, Run 2.

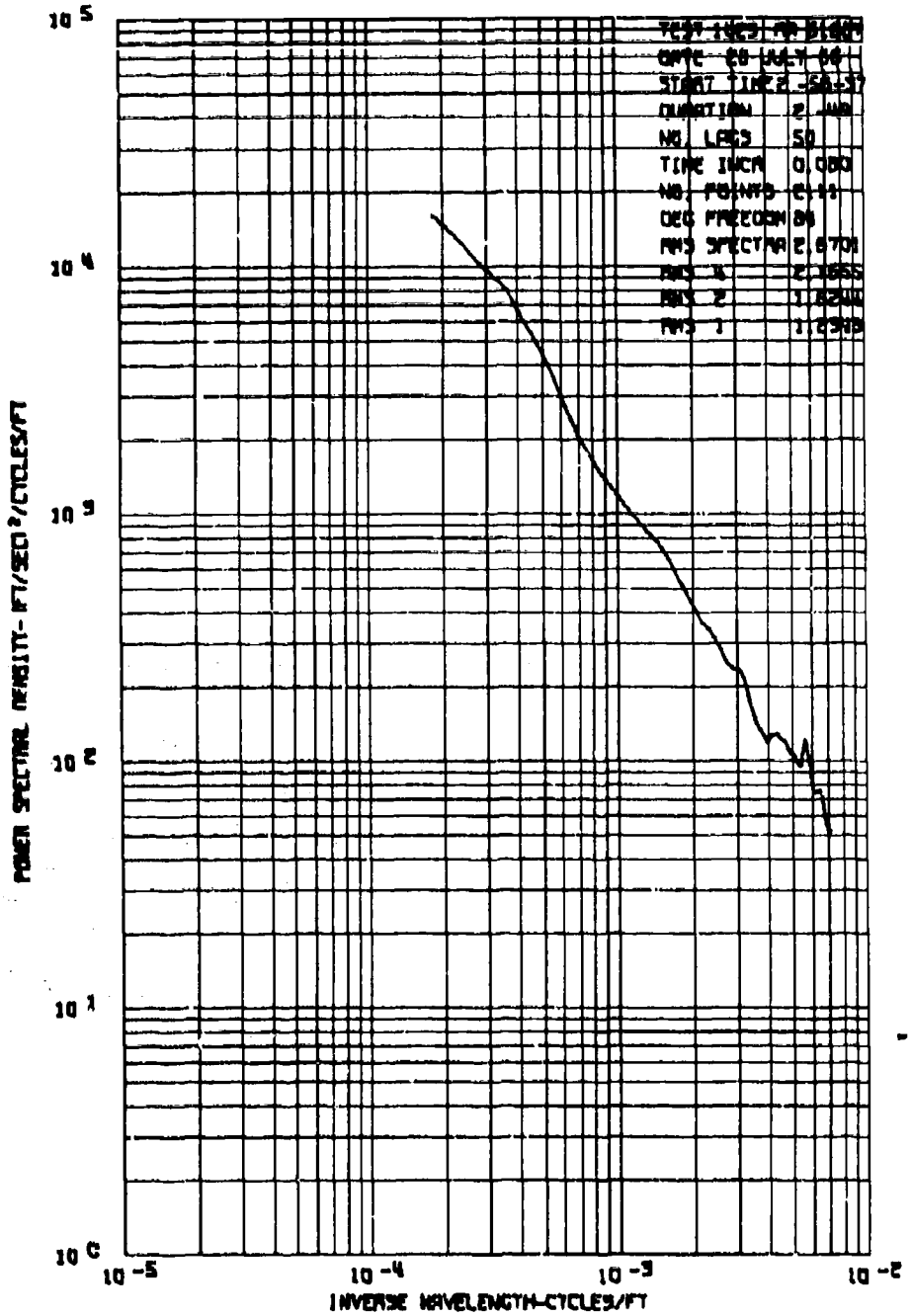


Figure 114A. Power Spectrum of Vertical Gust Velocity, Test 102, Run 3.

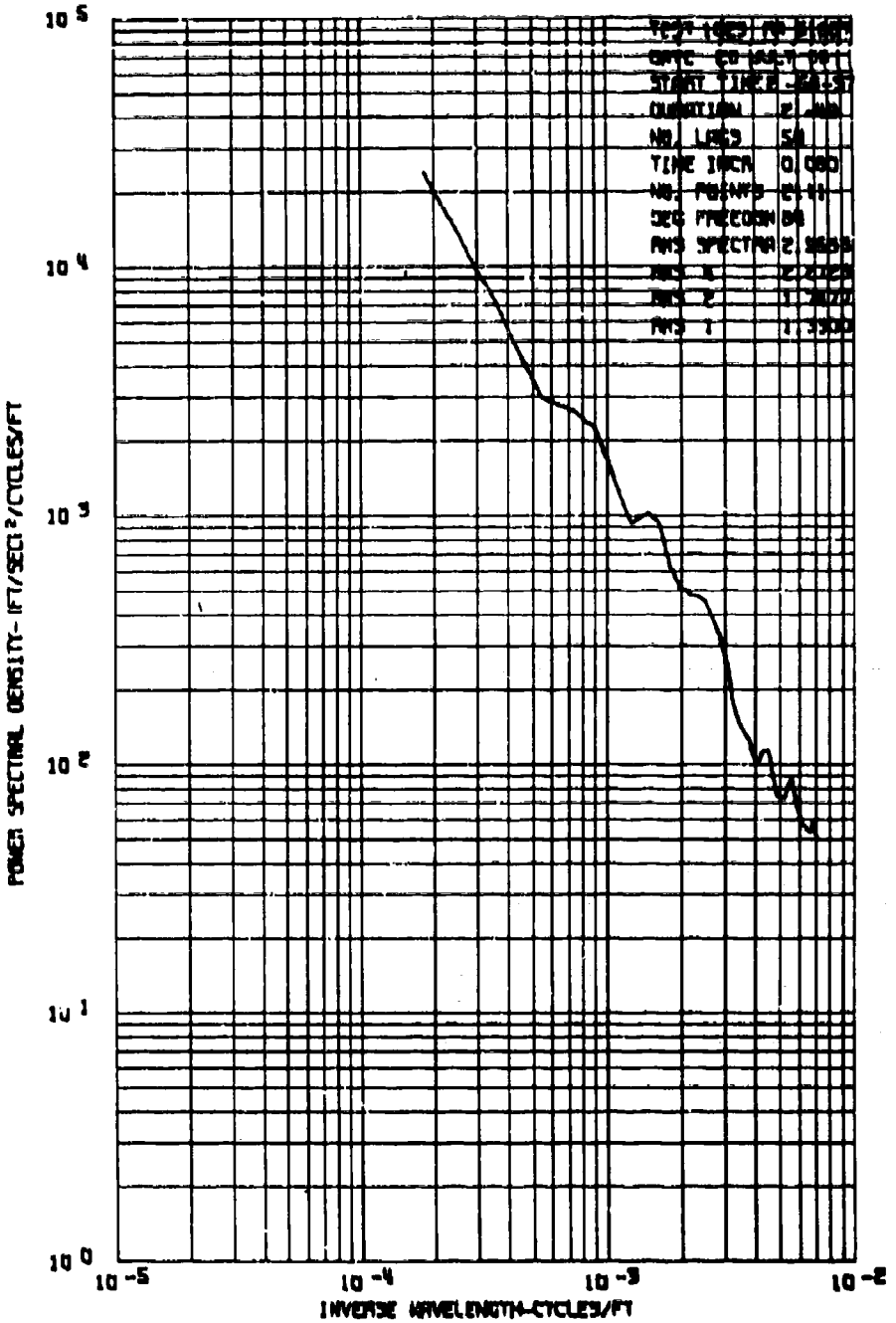


Figure 114B. Power Spectrum of Lateral Gust Velocity, Test 102, Run 3.

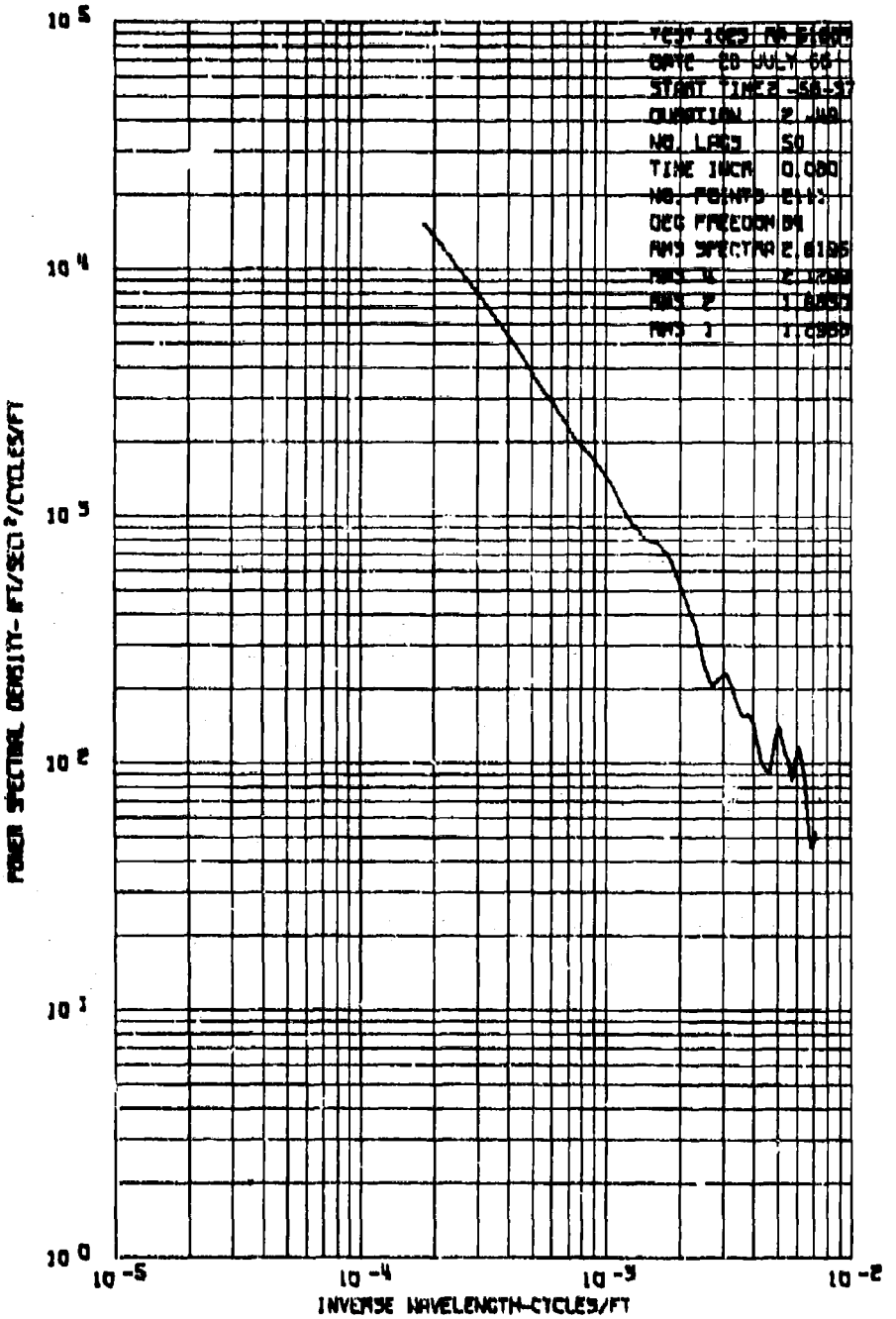


Figure 114C. Power Spectrum of Longitudinal Gust Velocity, Test 102, Run 3.

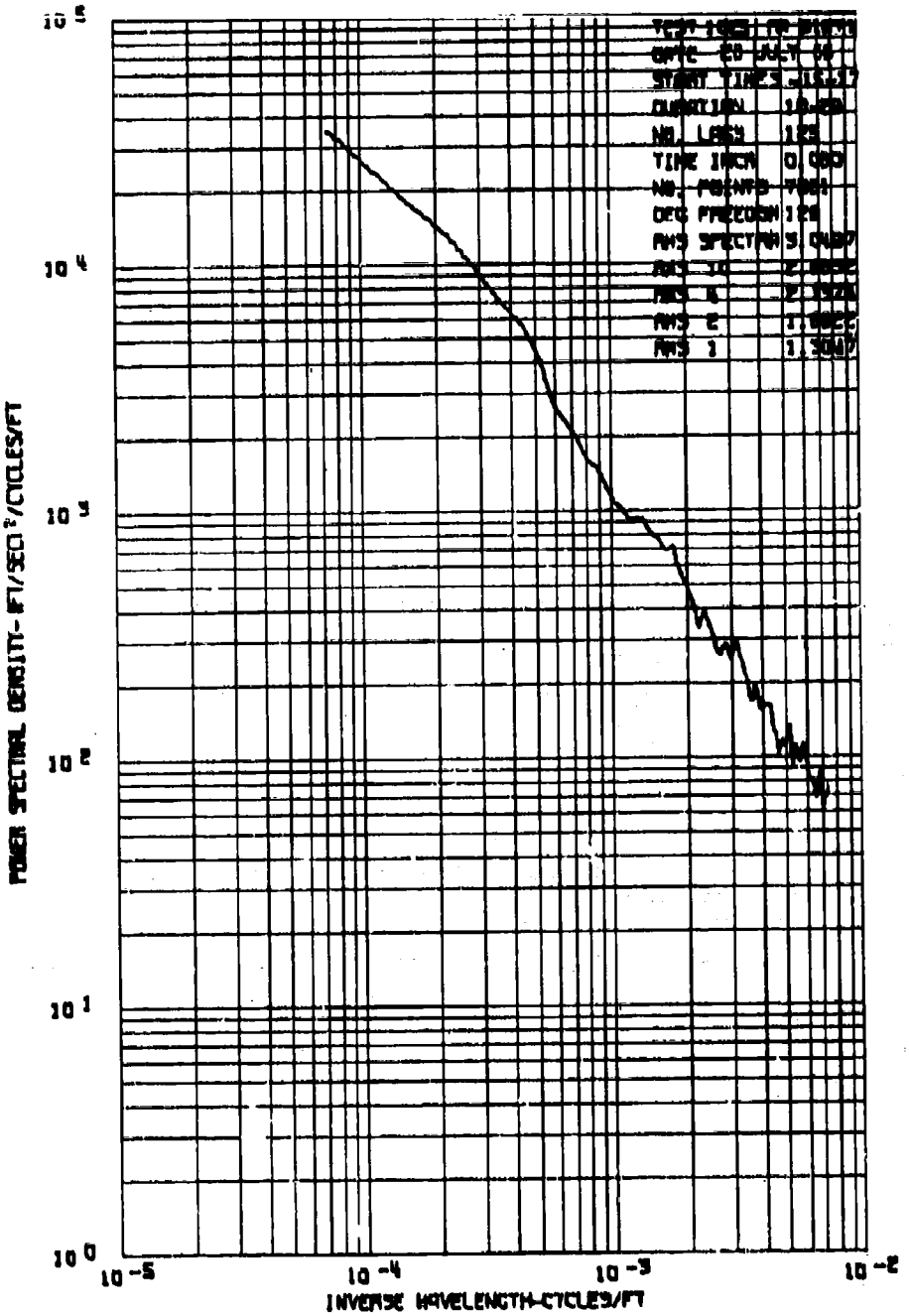


Figure 115A. Power Spectrum of Vertical Gust Velocity, Test 102, Run 5.

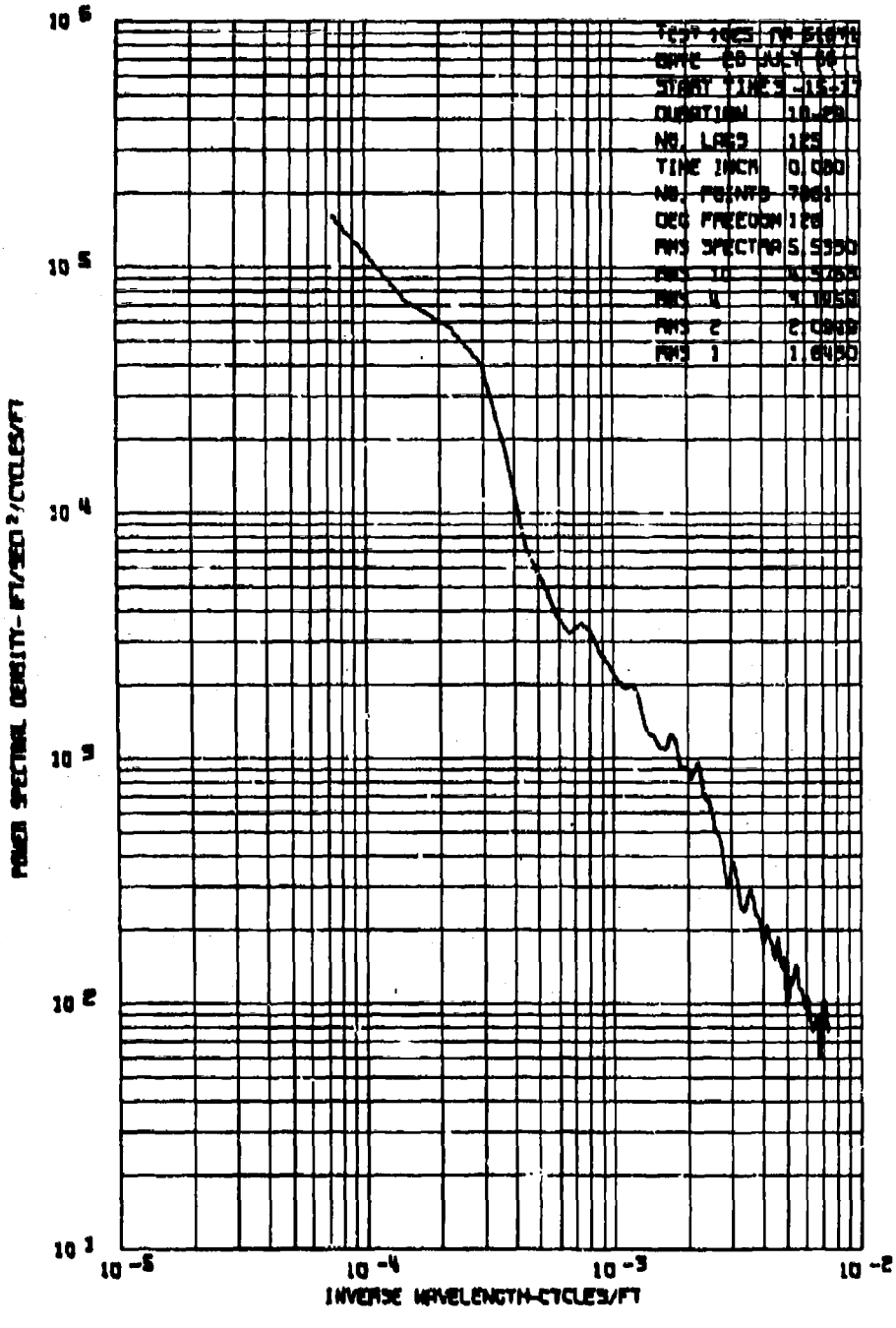


Figure 115B. Power Spectrum of Lateral Gust Velocity, Test 102, Run 5.

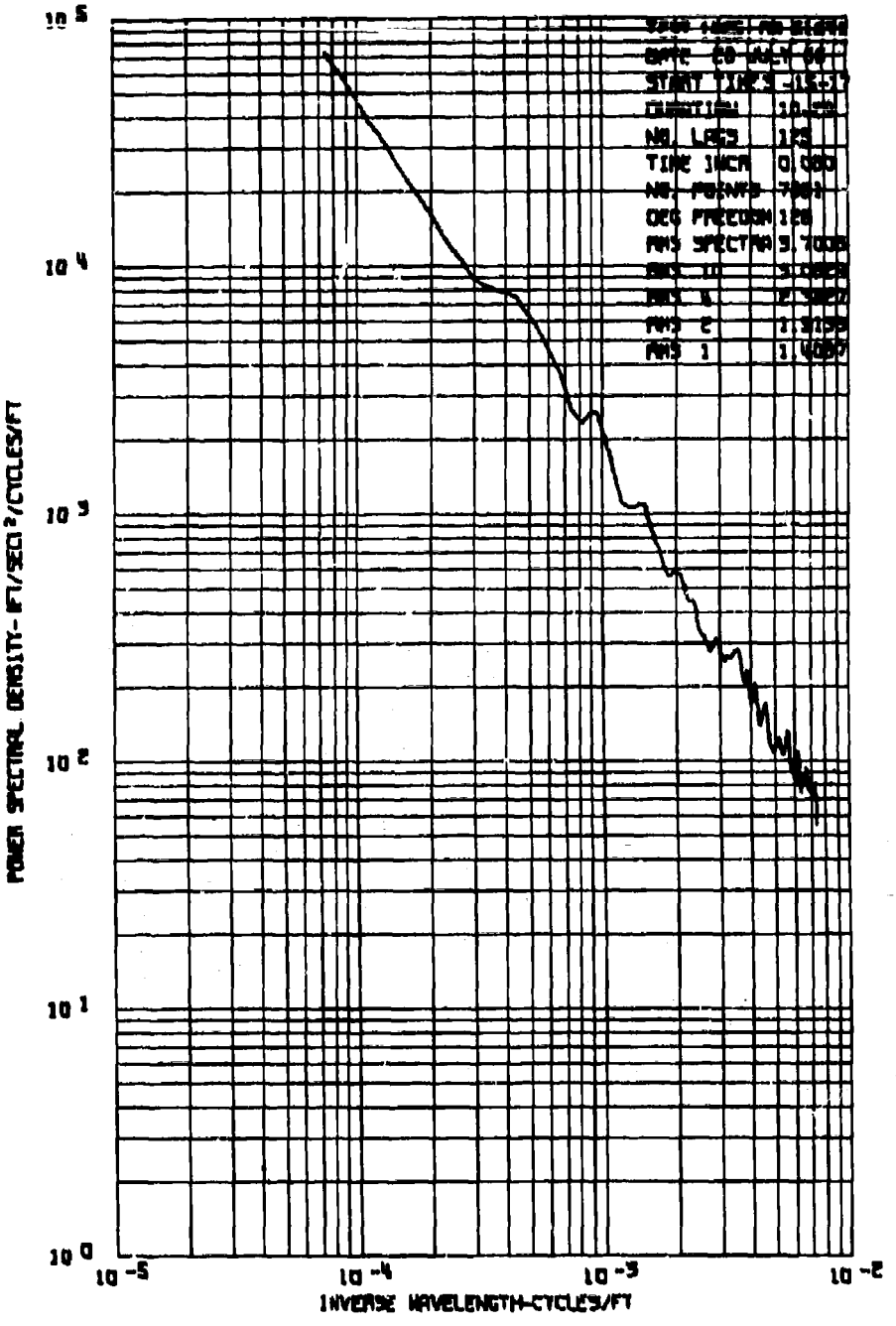


Figure 115C. Power Spectrum of Longitudinal Gust Velocity, Test 102, Run 5.

Appendix VII

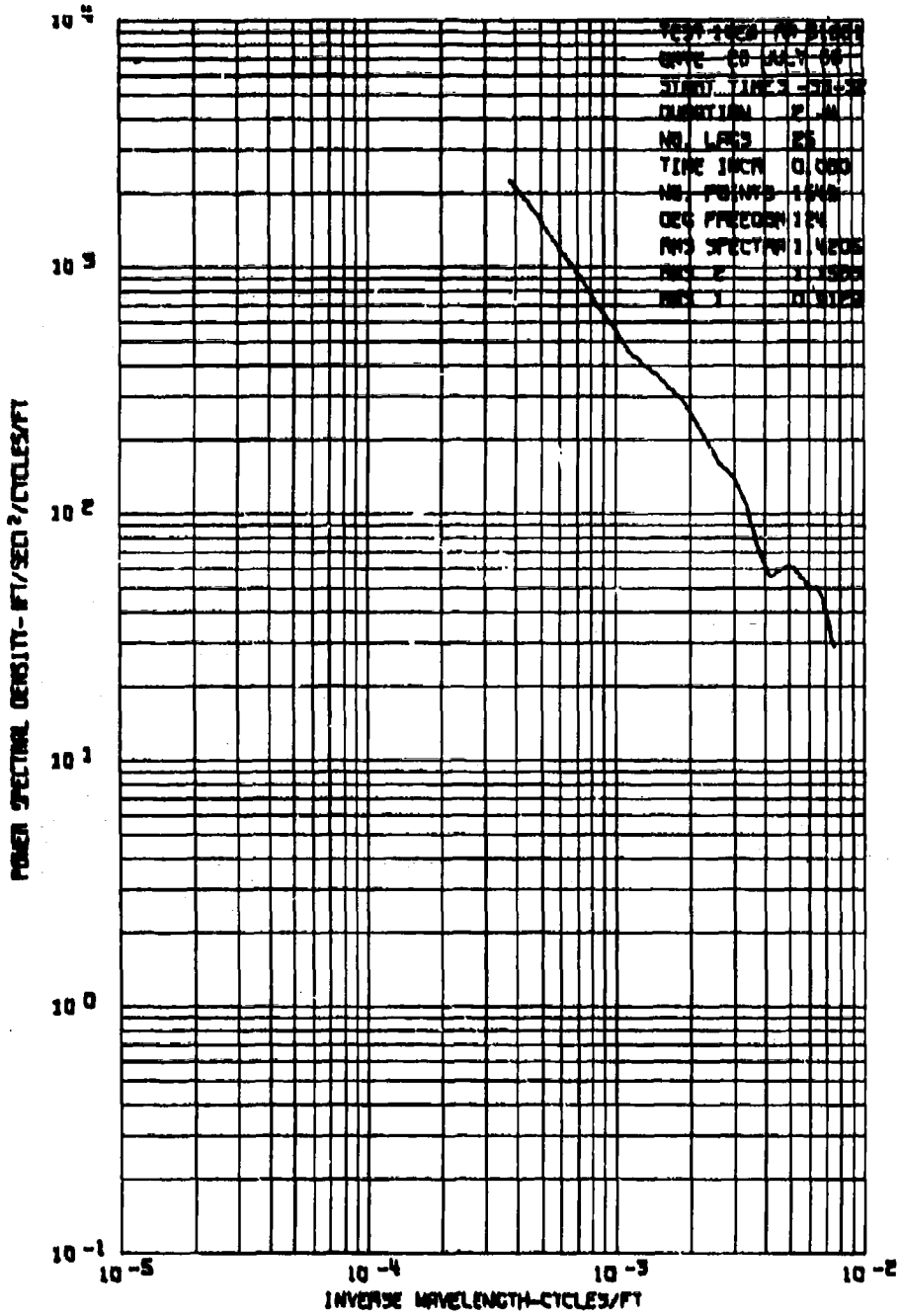


Figure 116A. Power Spectrum of Vertical Gust Velocity, Test 102, Run 6.

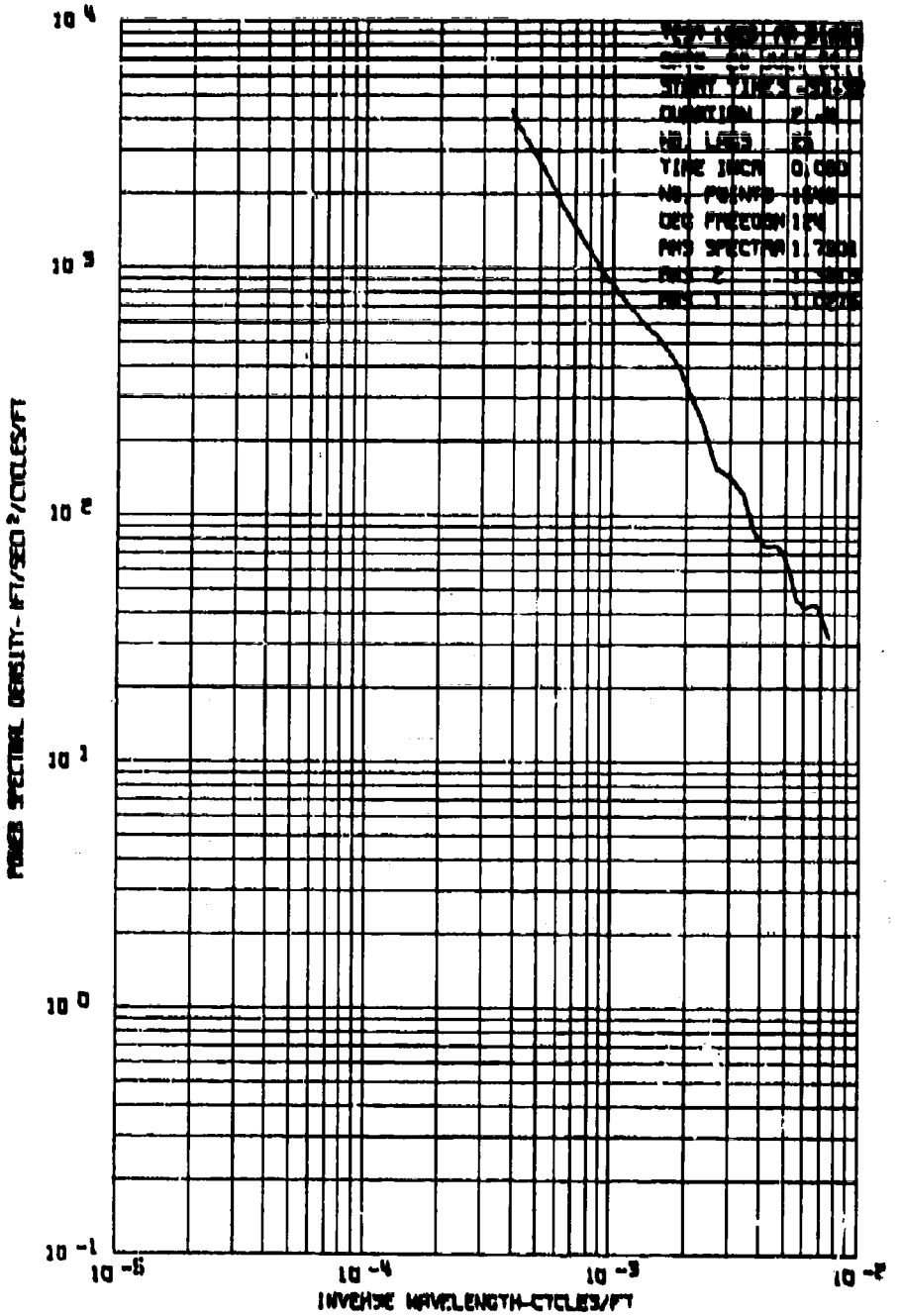


Figure 116B. Power Spectrum of Lateral Gust Velocity, Test 102, Run 6.

Appendix VII

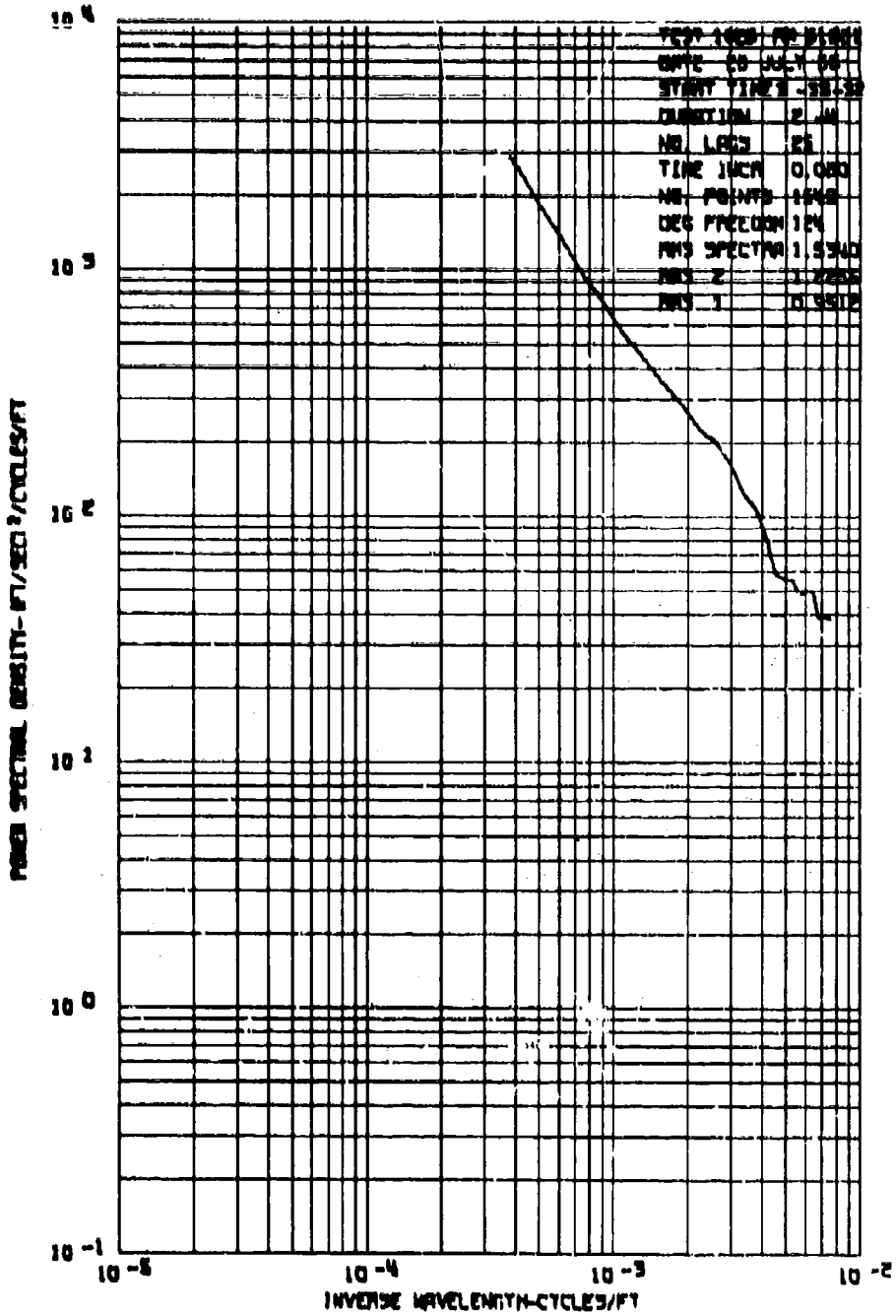


Figure 116C. Power Spectrum of Longitudinal Gust Velocity, Test 102, Run 6.

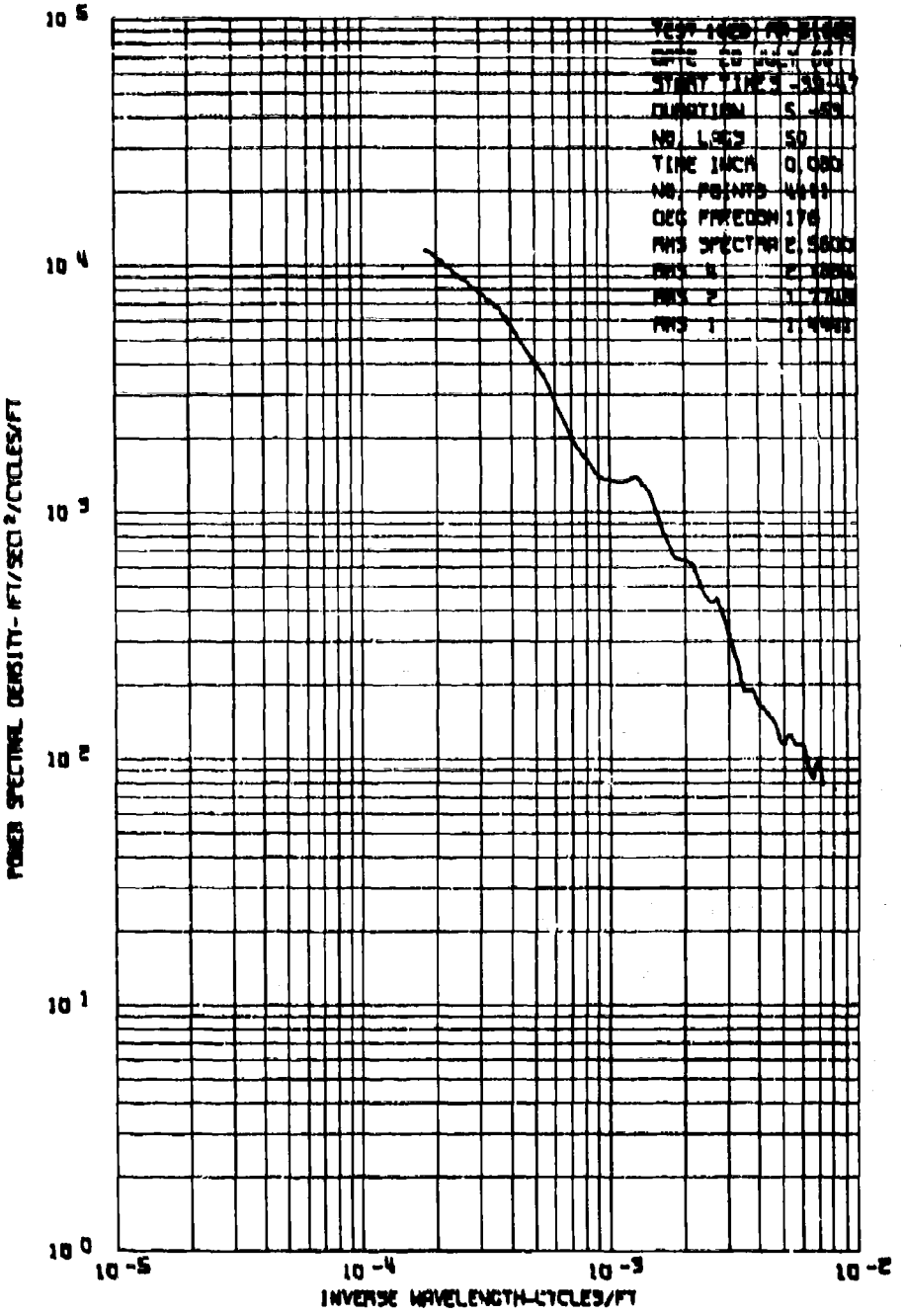


Figure 117A. Power Spectrum of Vertical Gust Velocity, Test 102, Run 8.

Appendix VII

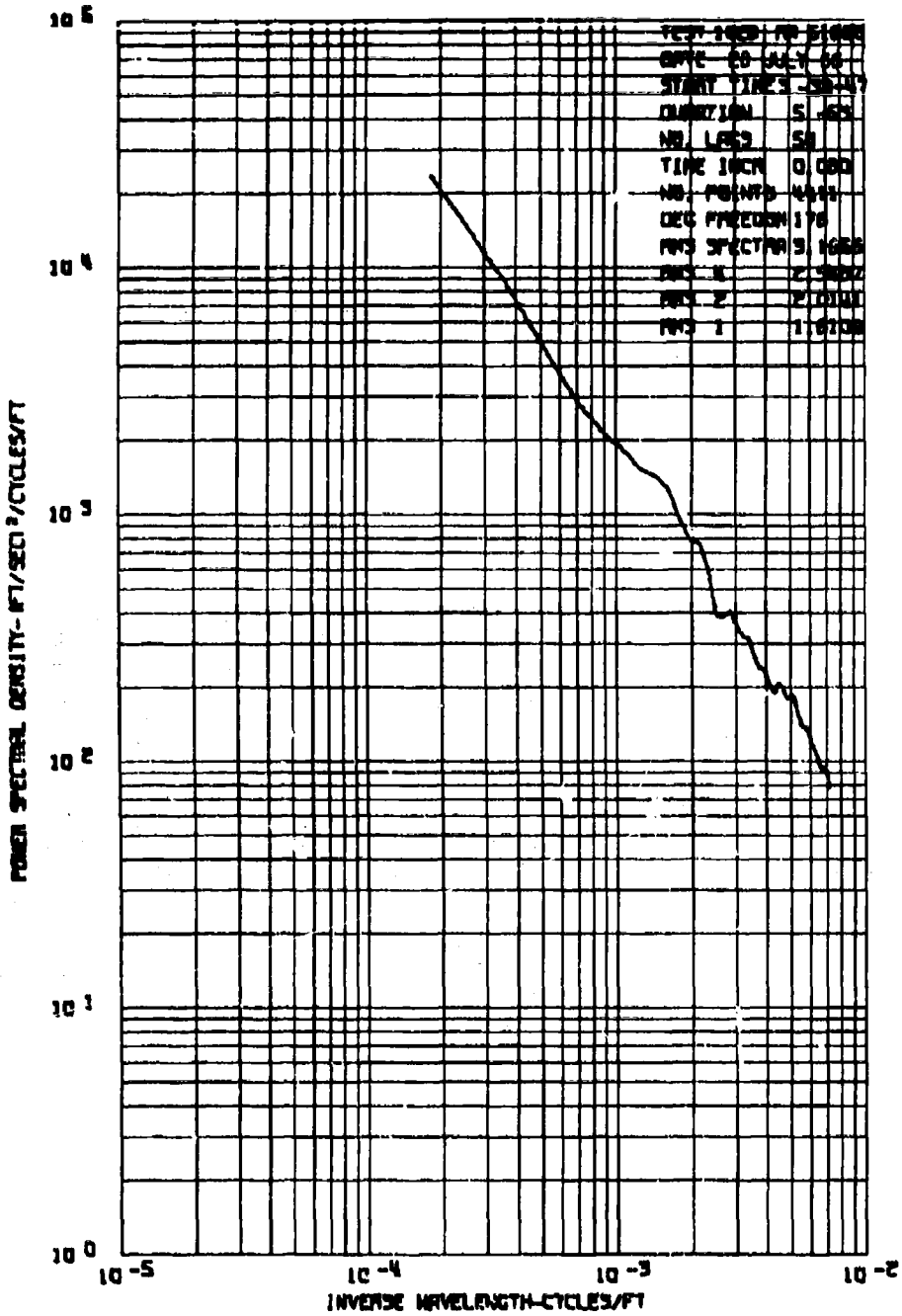


Figure 117B. Power Spectrum of Lateral Gust Velocity, Test 102, Run 8.

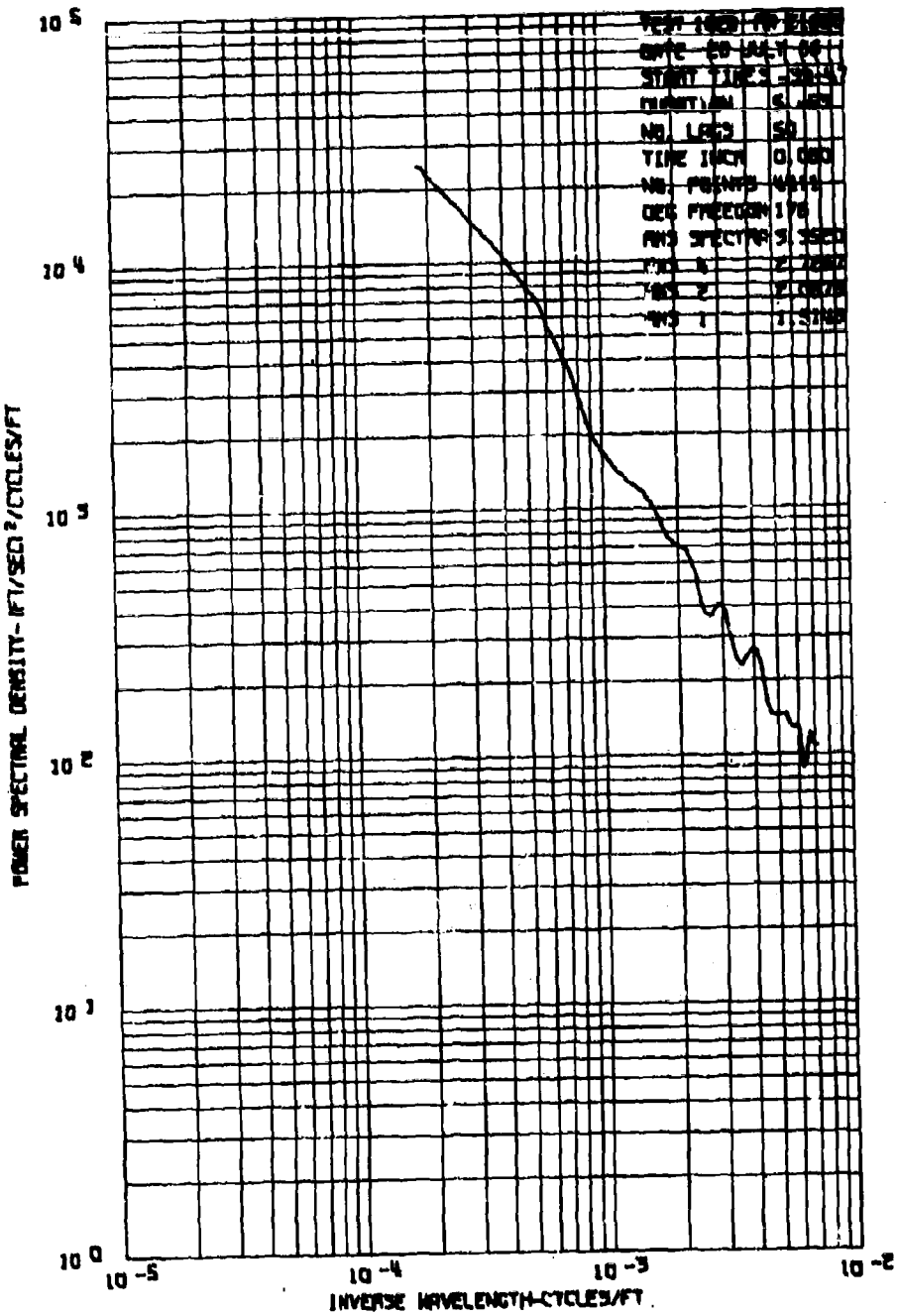


Figure 117C. Power Spectrum of Longitudinal Gust Velocity, Test 102, Run 8.

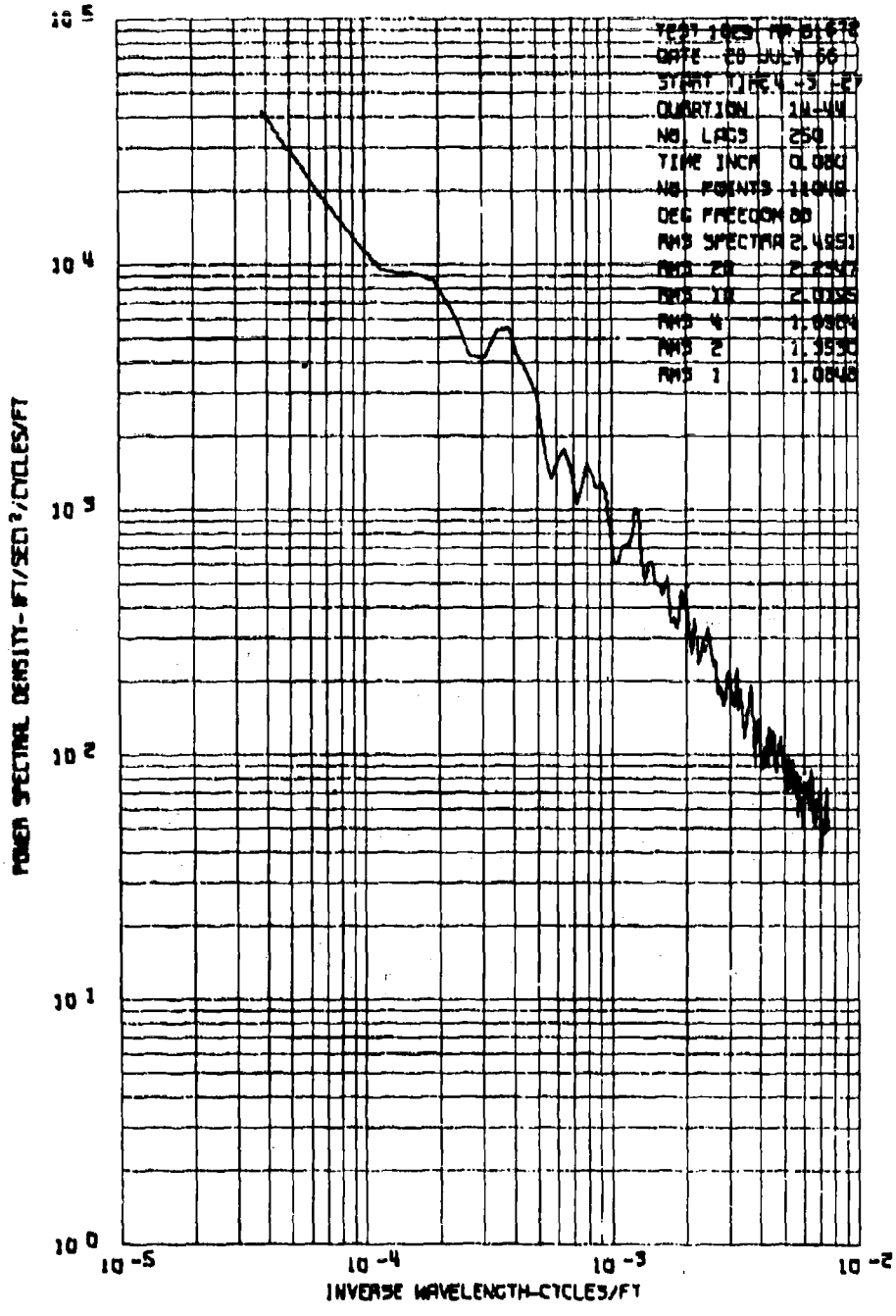


Figure 118A. Power Spectrum of Vertical Gust Velocity, Test 102, Run 9 - 250 Lags.

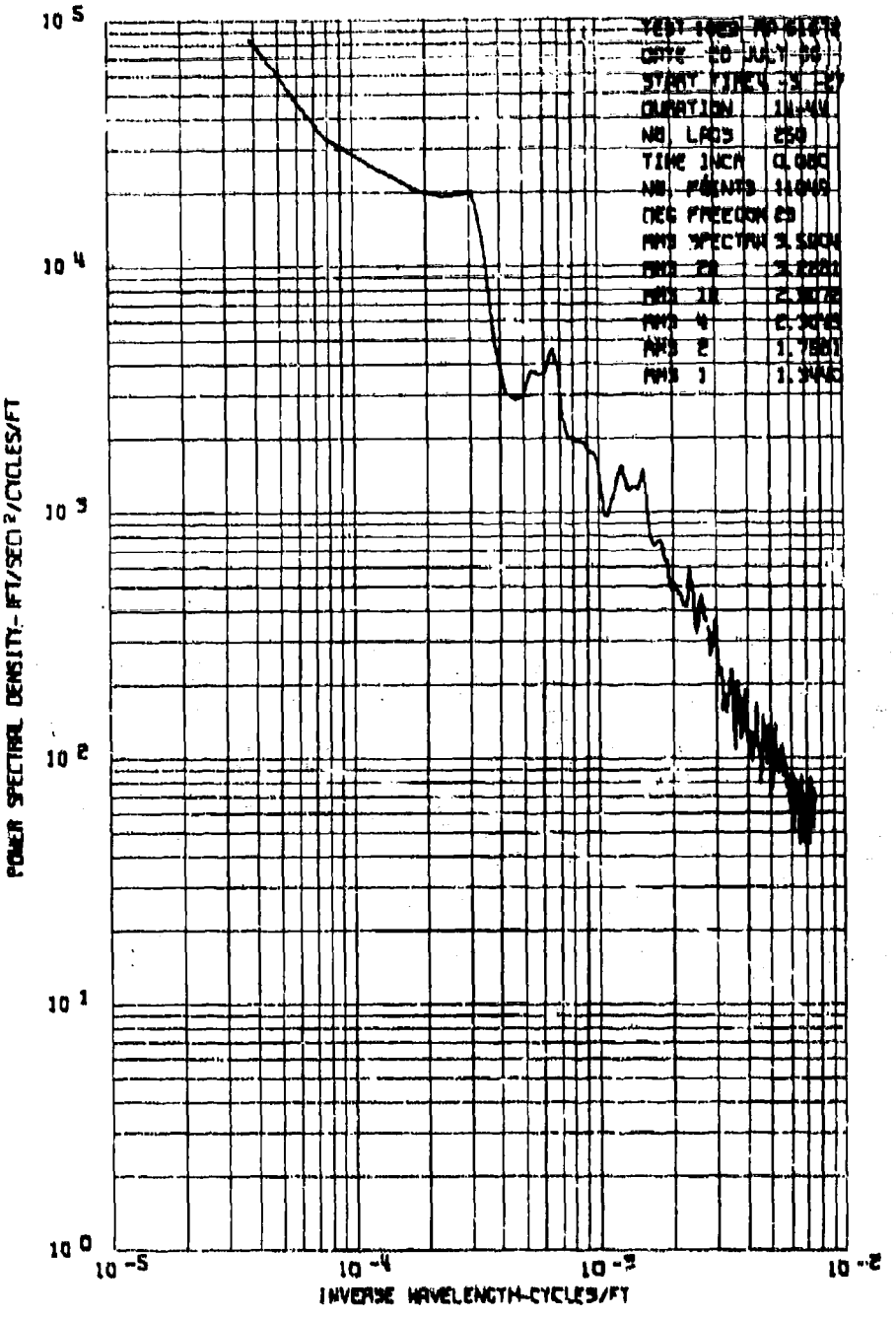


Figure 118B. Power Spectrum of Lateral Gust Velocity, Test 102, Run 9 - 250 Lags.

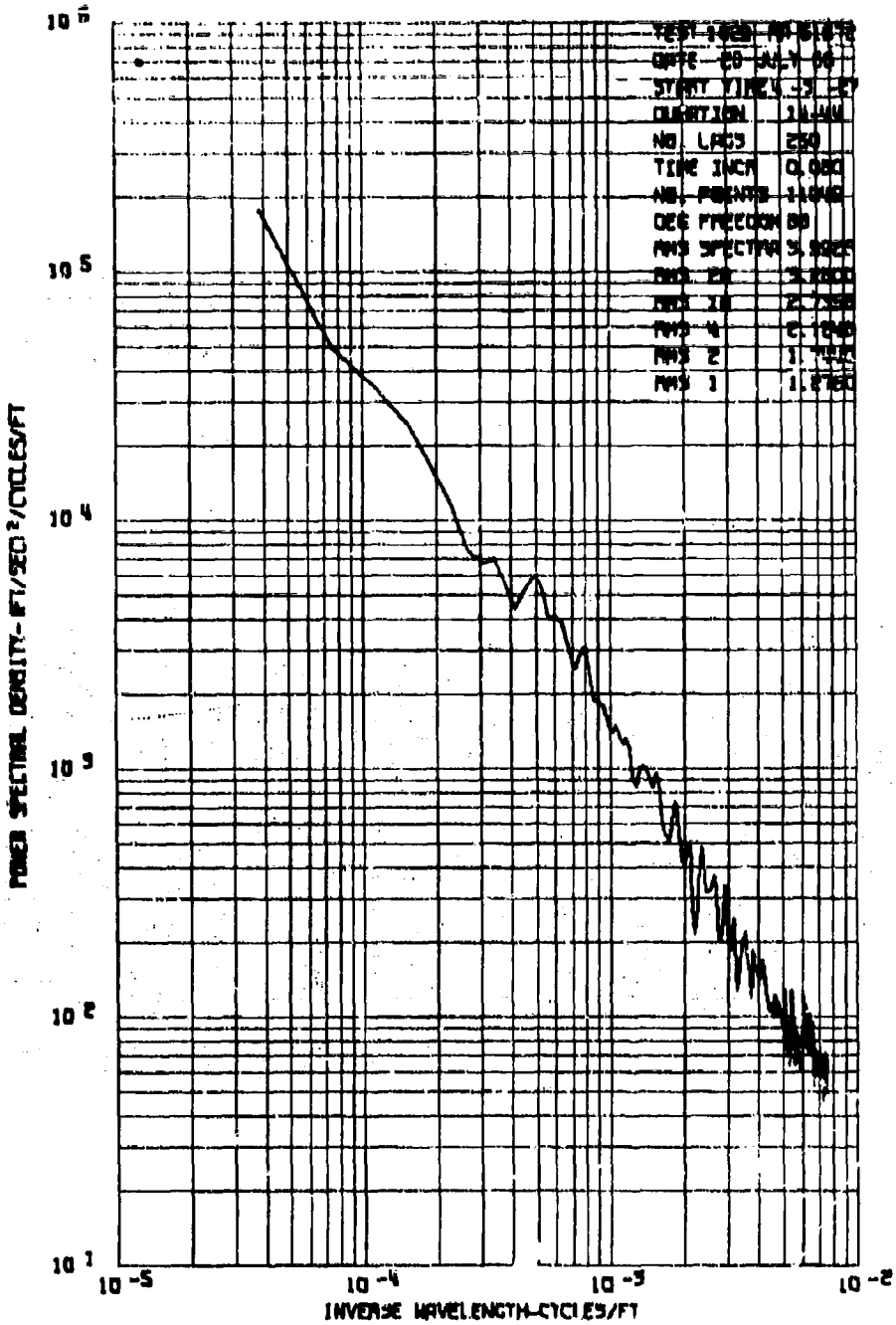


Figure 118C. Power Spectrum of Longitudinal Gust Velocity, Test 102, Run 9 - 250 Lags.

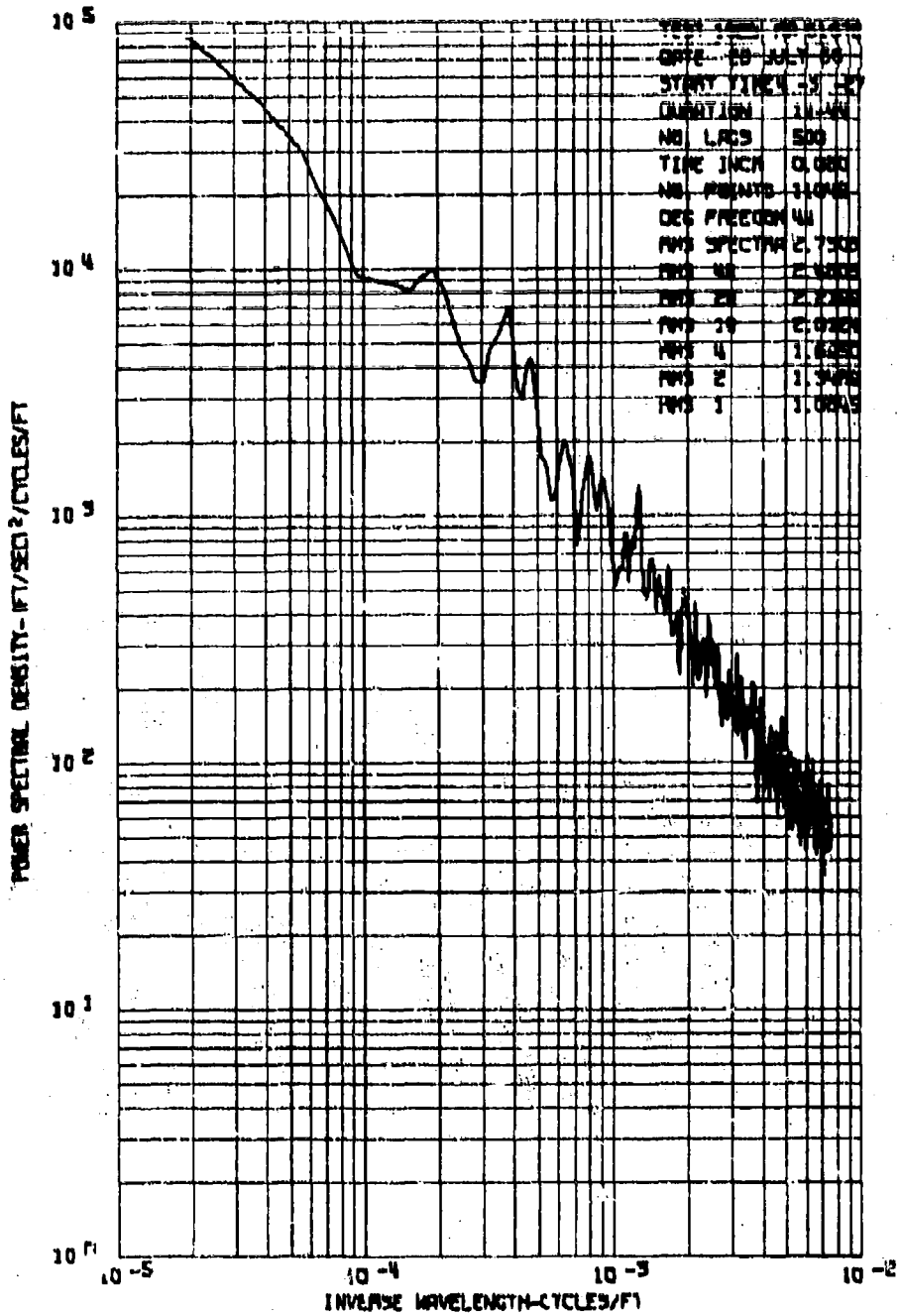


Figure 118D. Power Spectrum of Vertical Gust Velocity, Test 102, Run 9 - 500 Lags.

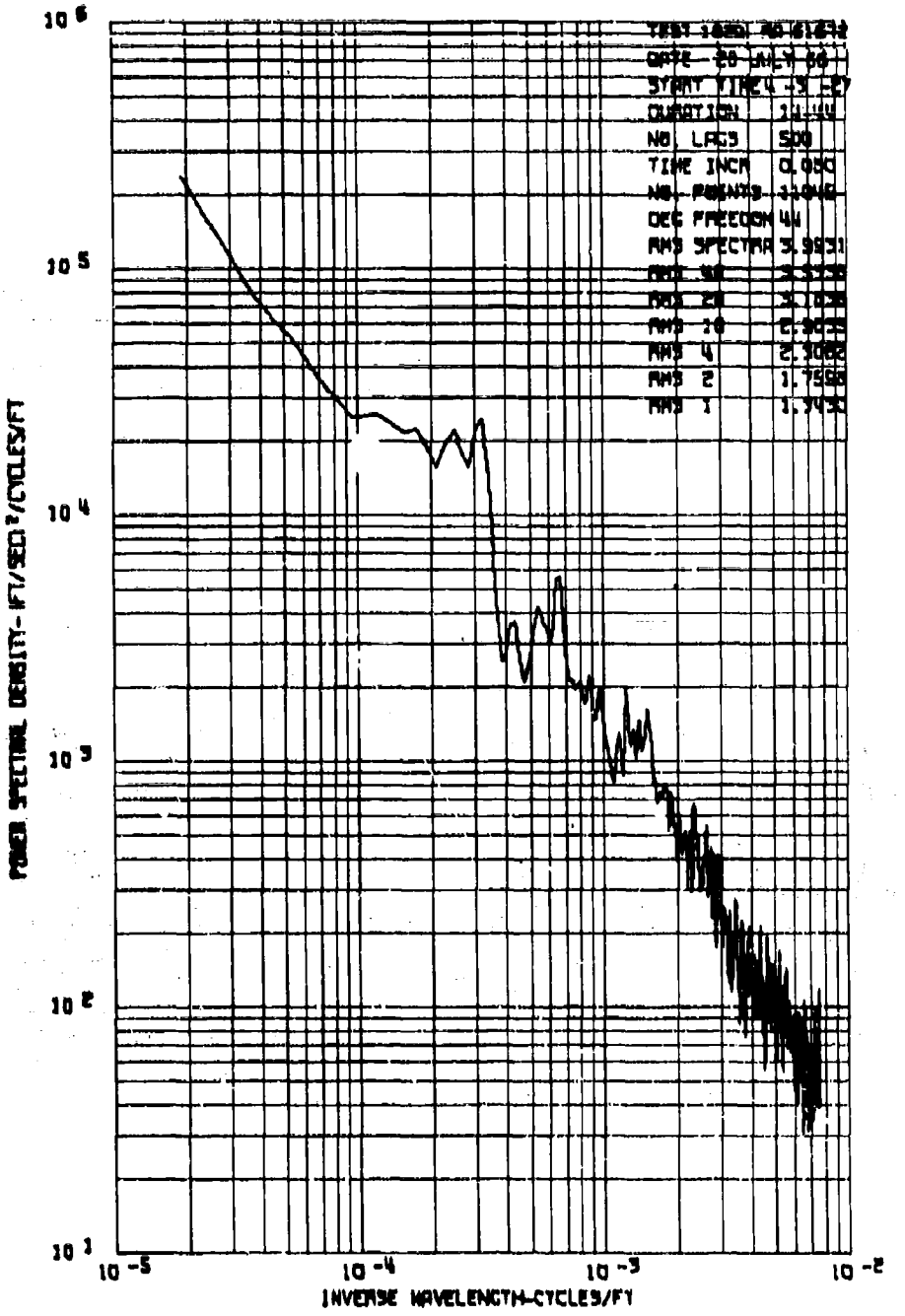


Figure 118E. Power Spectrum of Lateral Gust Velocity, Test 107, Run 9 - 500 Lags.

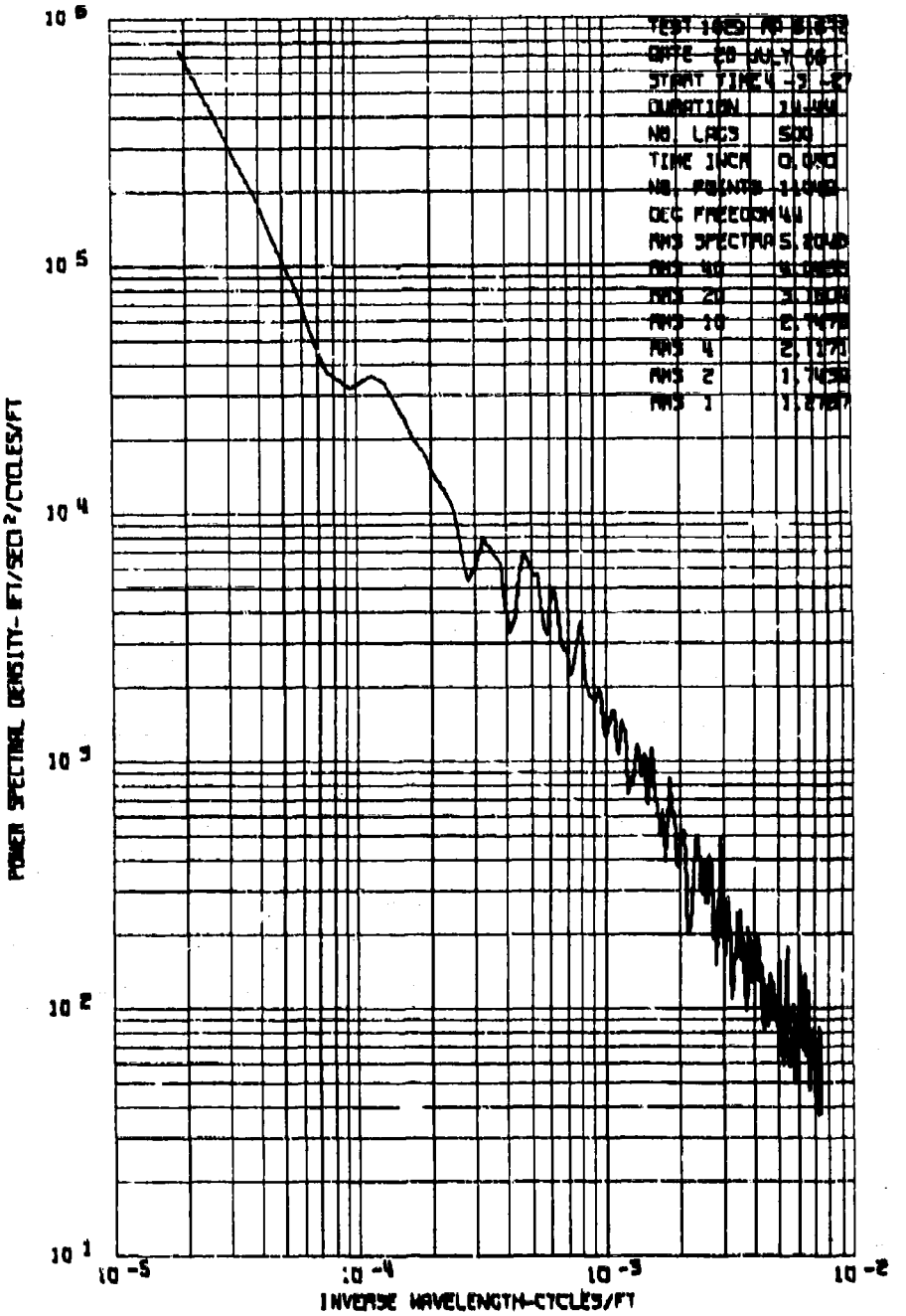


Figure 118F. Power Spectrum of Longitudinal Gust Velocity, Test 102, Run 9 - 500 Lags.

Appendix VII

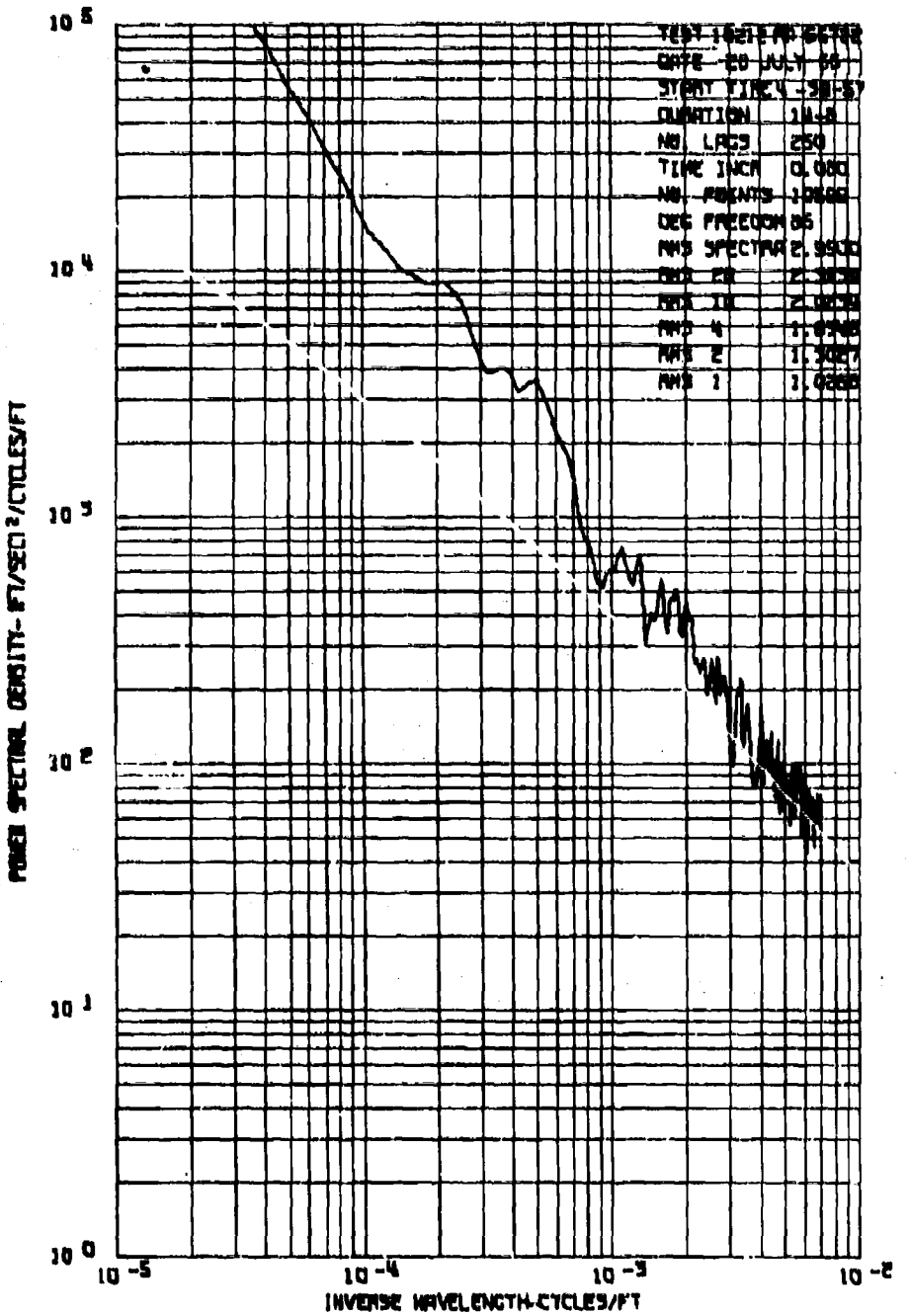


Figure 119A. Power Spectrum of Vertical Gust Velocity, Test 102, Run 12 - 250 Lngs.

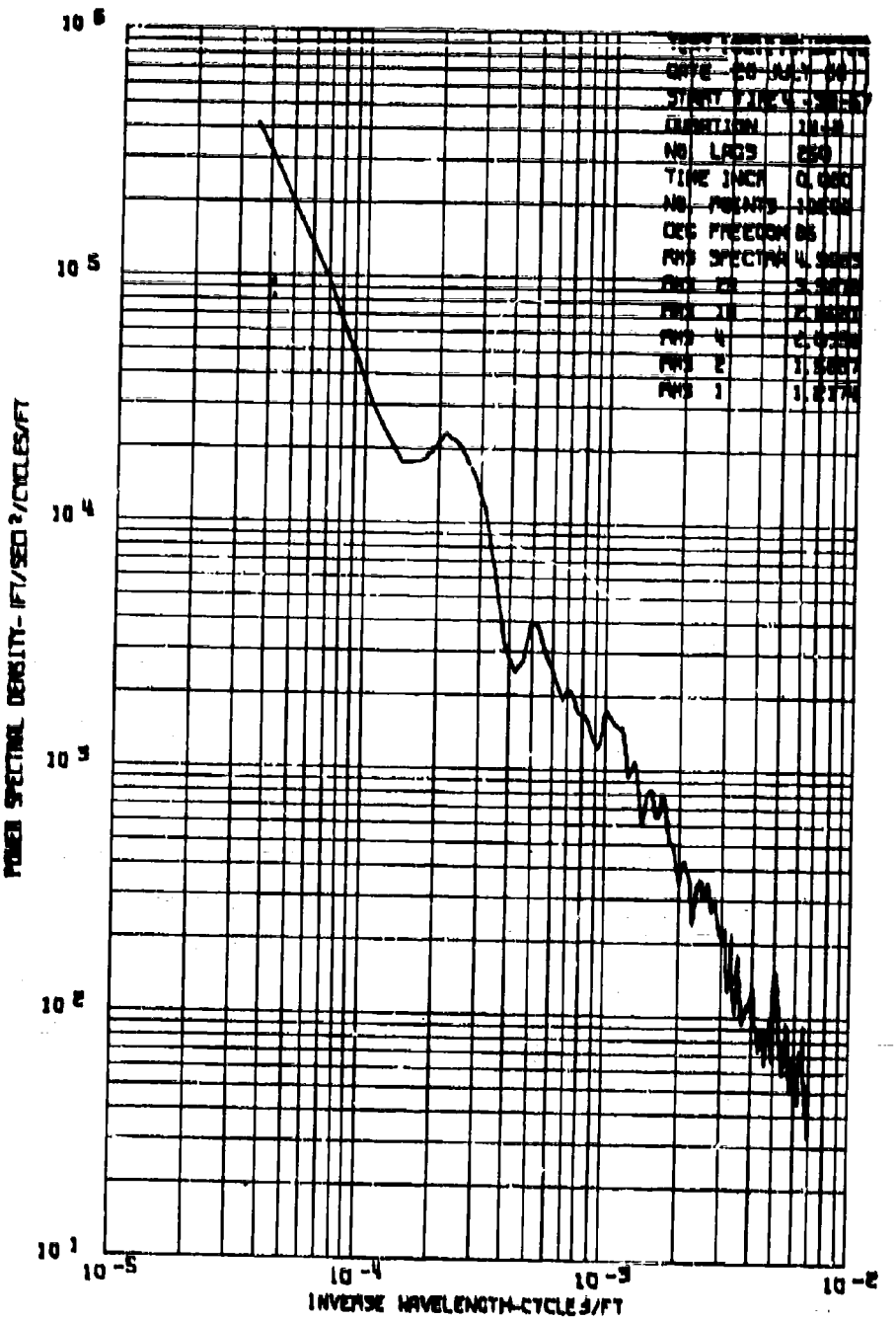


Figure 119B. Power Spectrum of Lateral Gust Velocity, Test 102, Run 12 - 250 Lags.

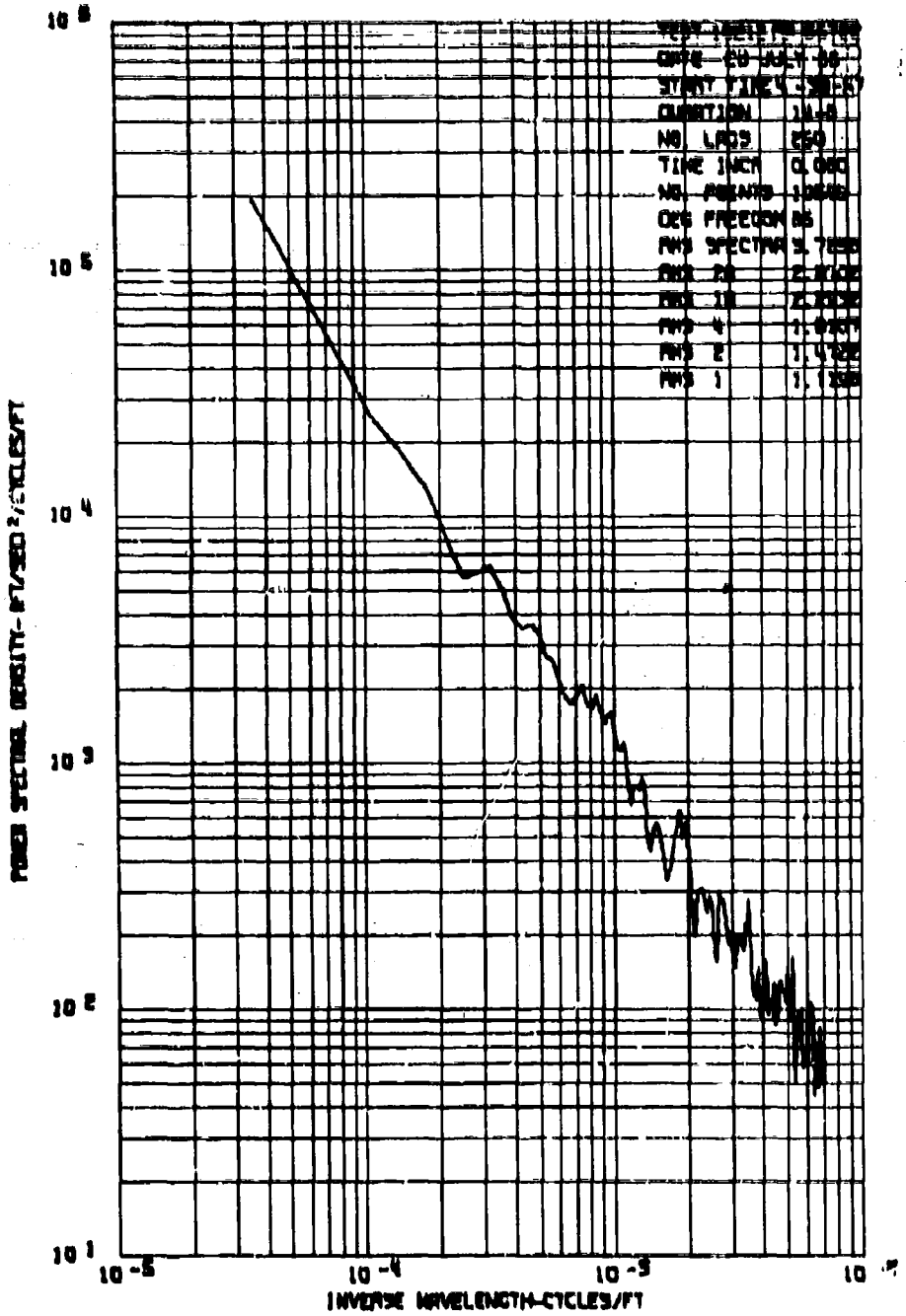


Figure 1190. Power Spectrum of Longitudinal Gust Velocity, Test 102, Run 12 - 250 Lags.

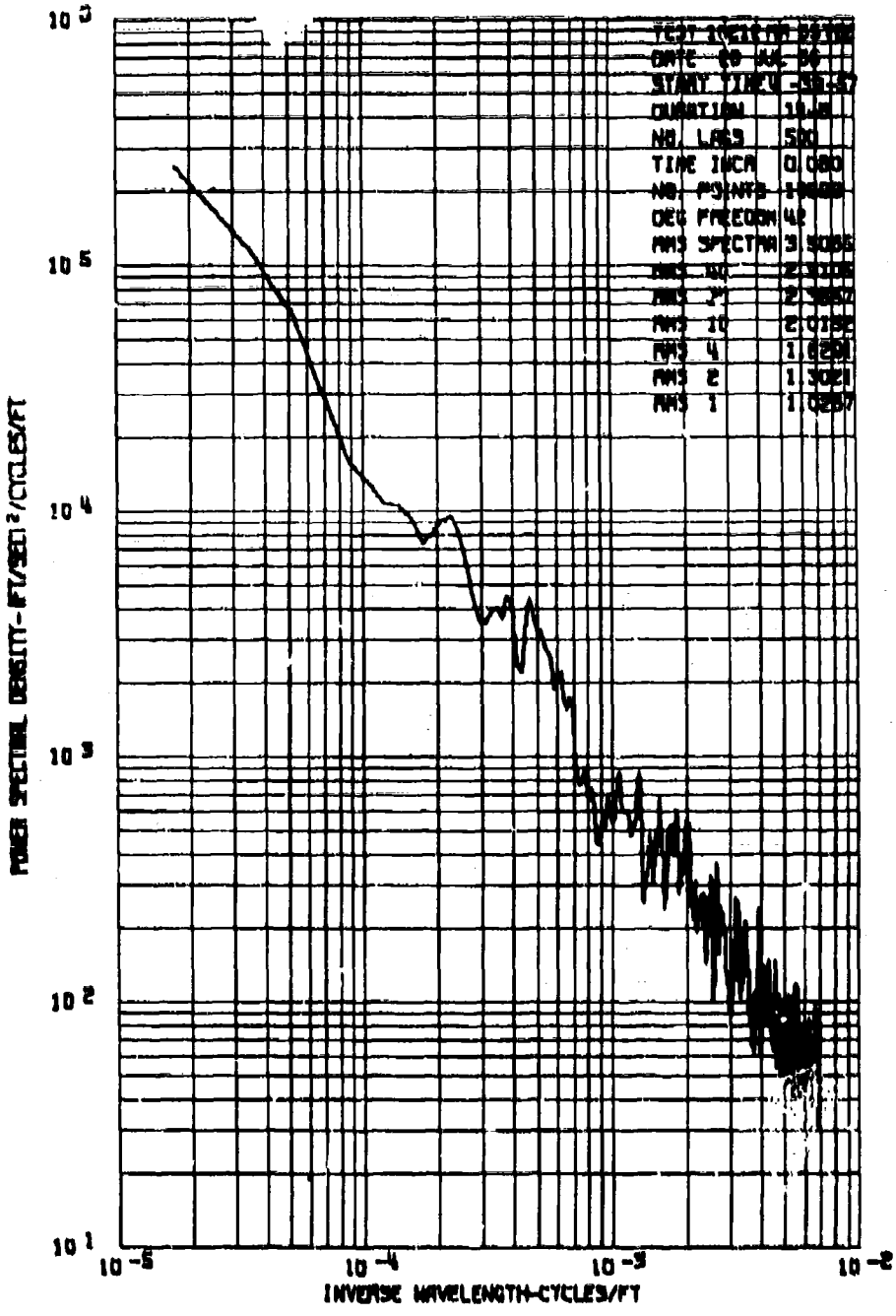


Figure 119D. Power Spectrum of Vertical Gust Velocity, Test 102, Run 12 - 500 Lags.

Appendix VII

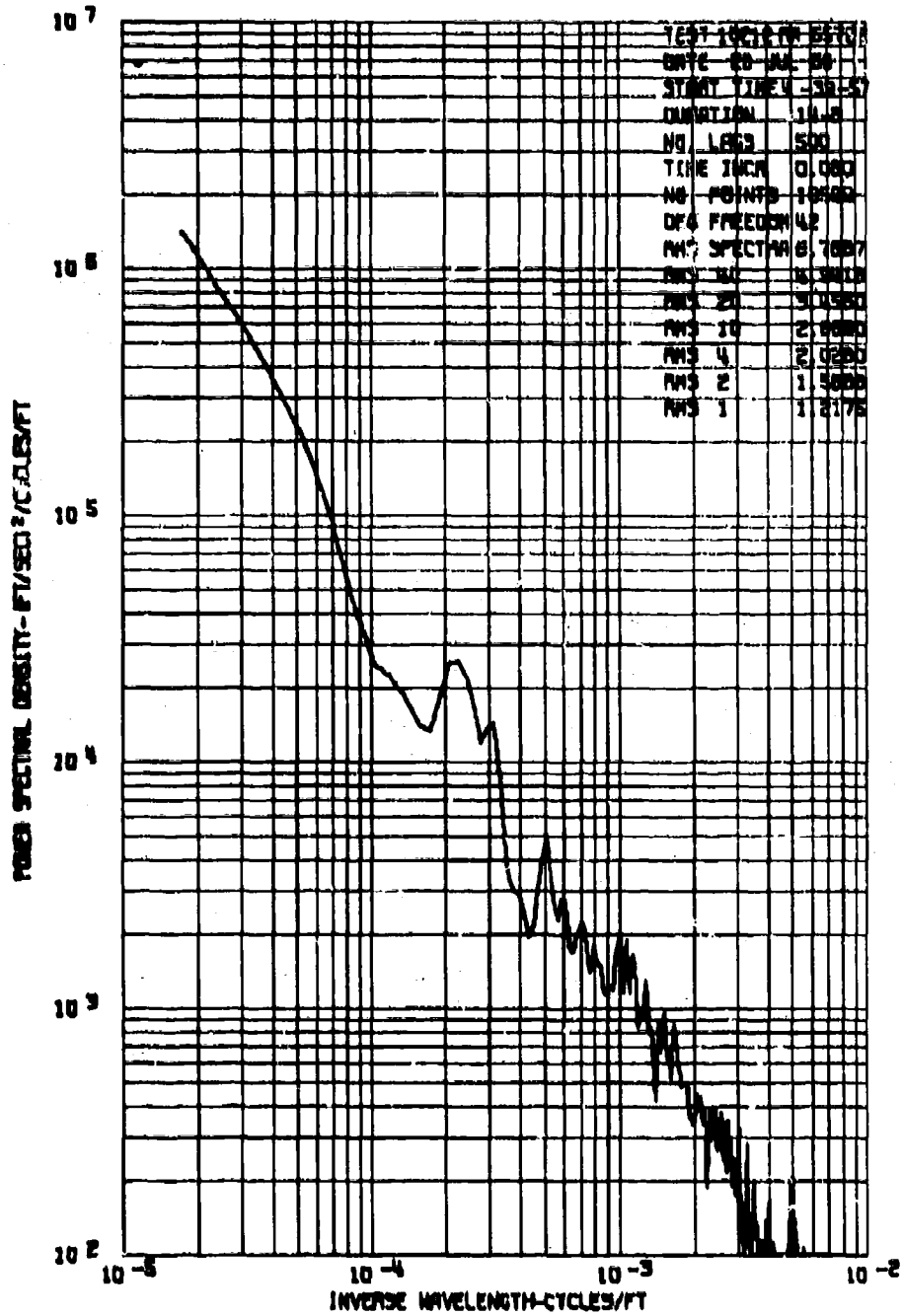


Figure 119E. Power Spectrum of Lateral Gust Velocity, Test 102, Run 12 - 500 Lags.

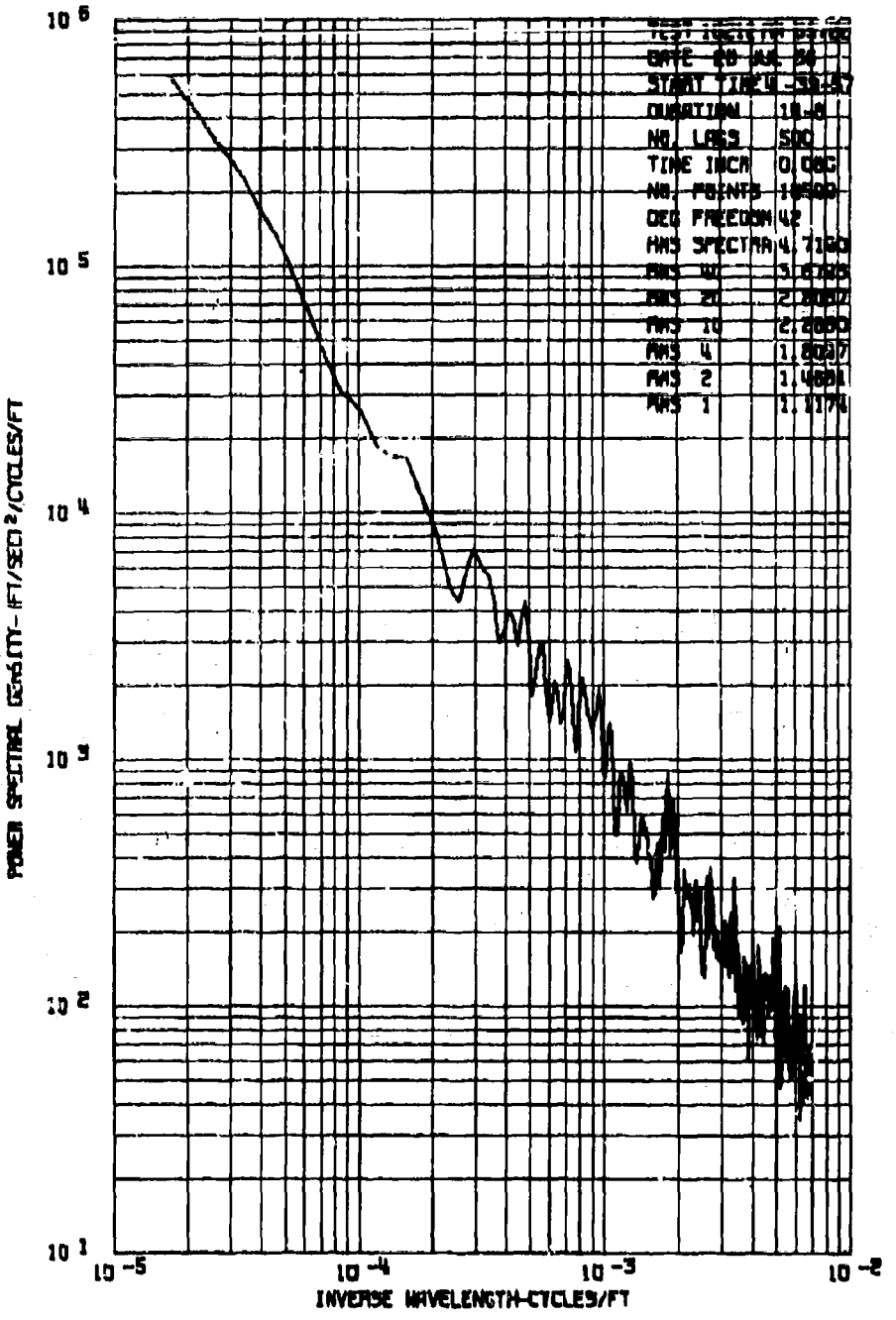


Figure 119F. Power Spectrum of Longitudinal Gust Velocity, Test 102, Run 12 - 500 Lags.

Appendix VII

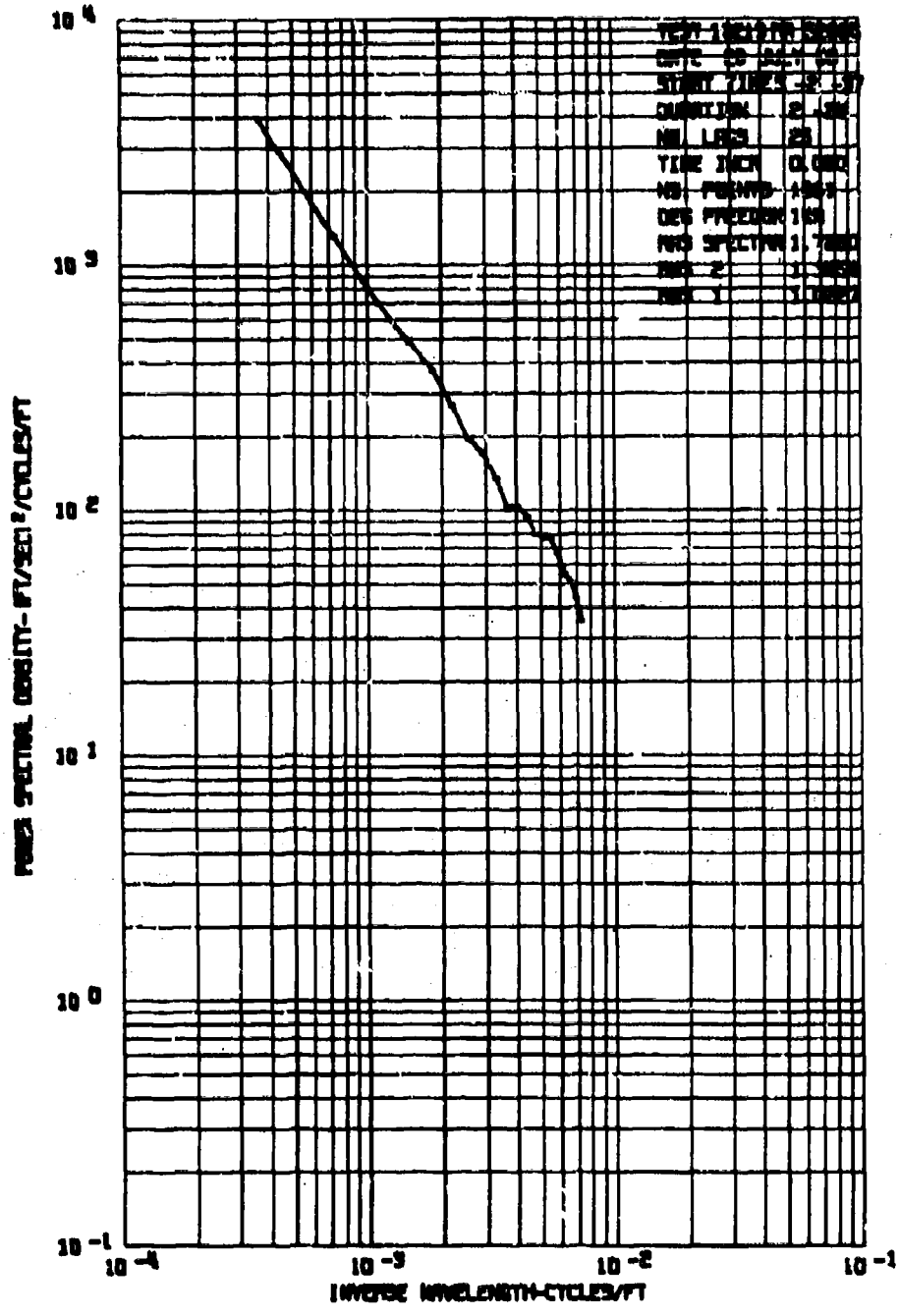


Figure 120A. Power Spectrum of Vertical Gust Velocity, Test 102, Run 13.

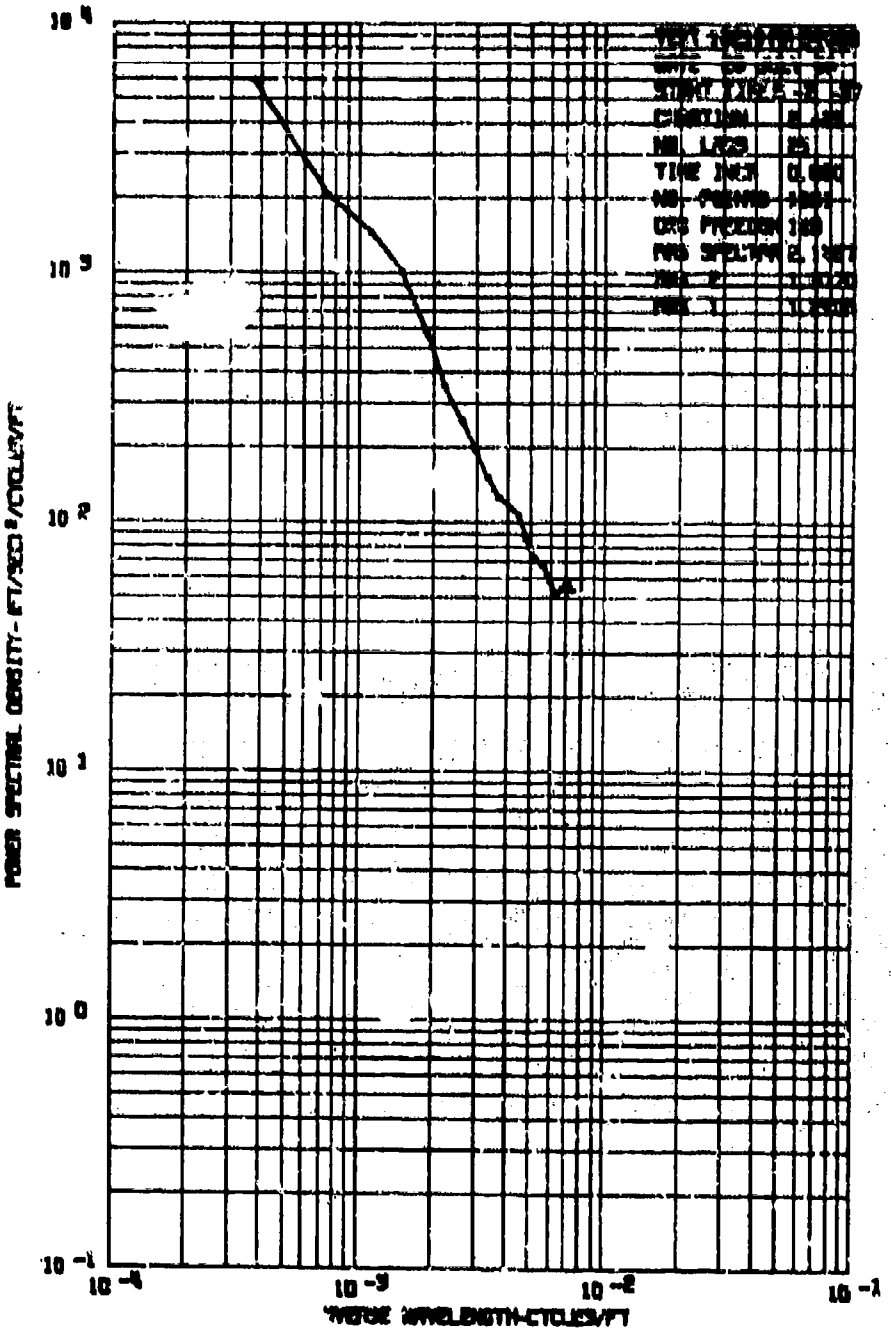


Figure 120B. Power Spectrum of Lateral Gust Velocity, Test 102, Run 13.

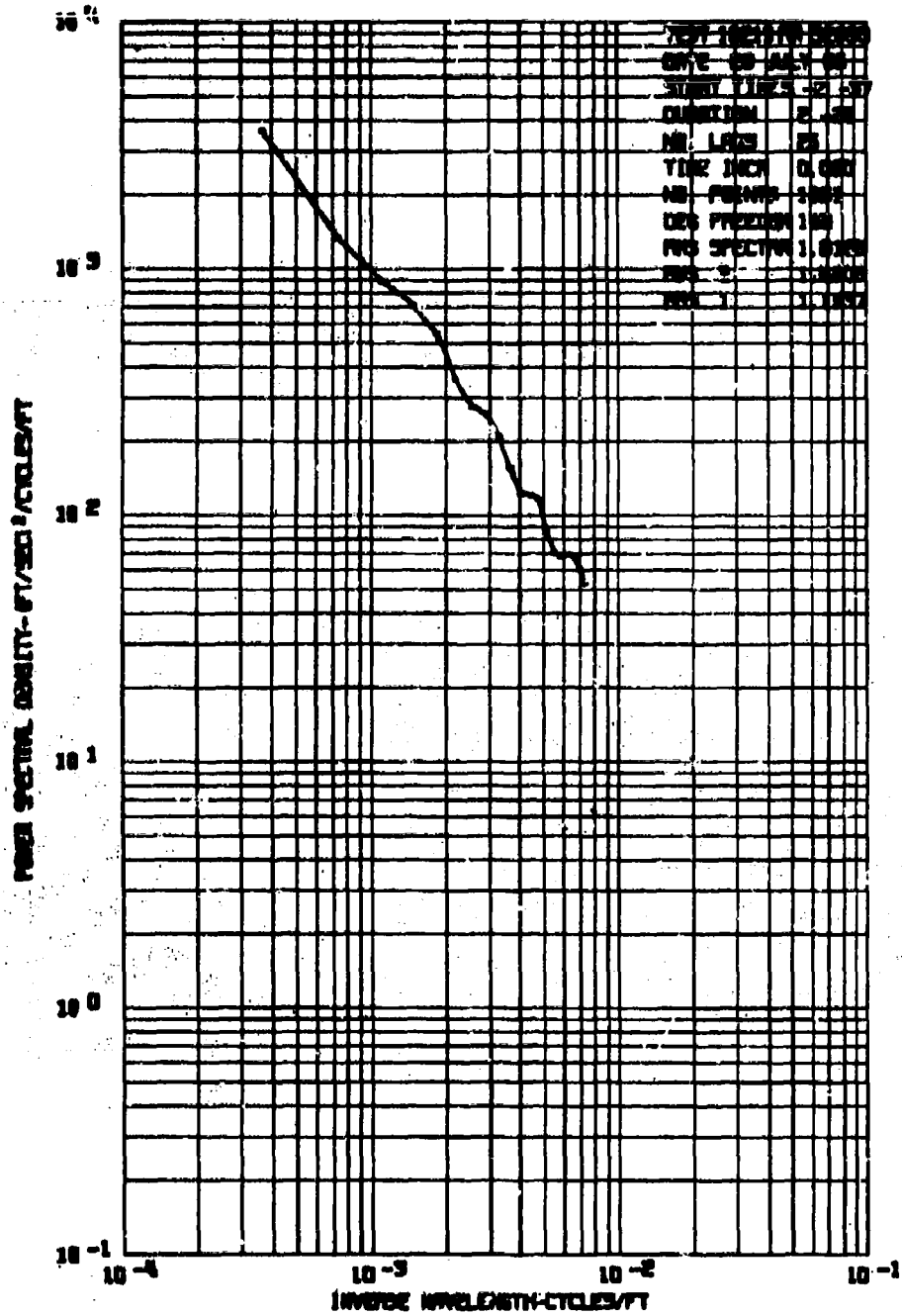


Figure 120C. Power Spectrum of Longitudinal Gust Velocity, Test 102, Run 13.

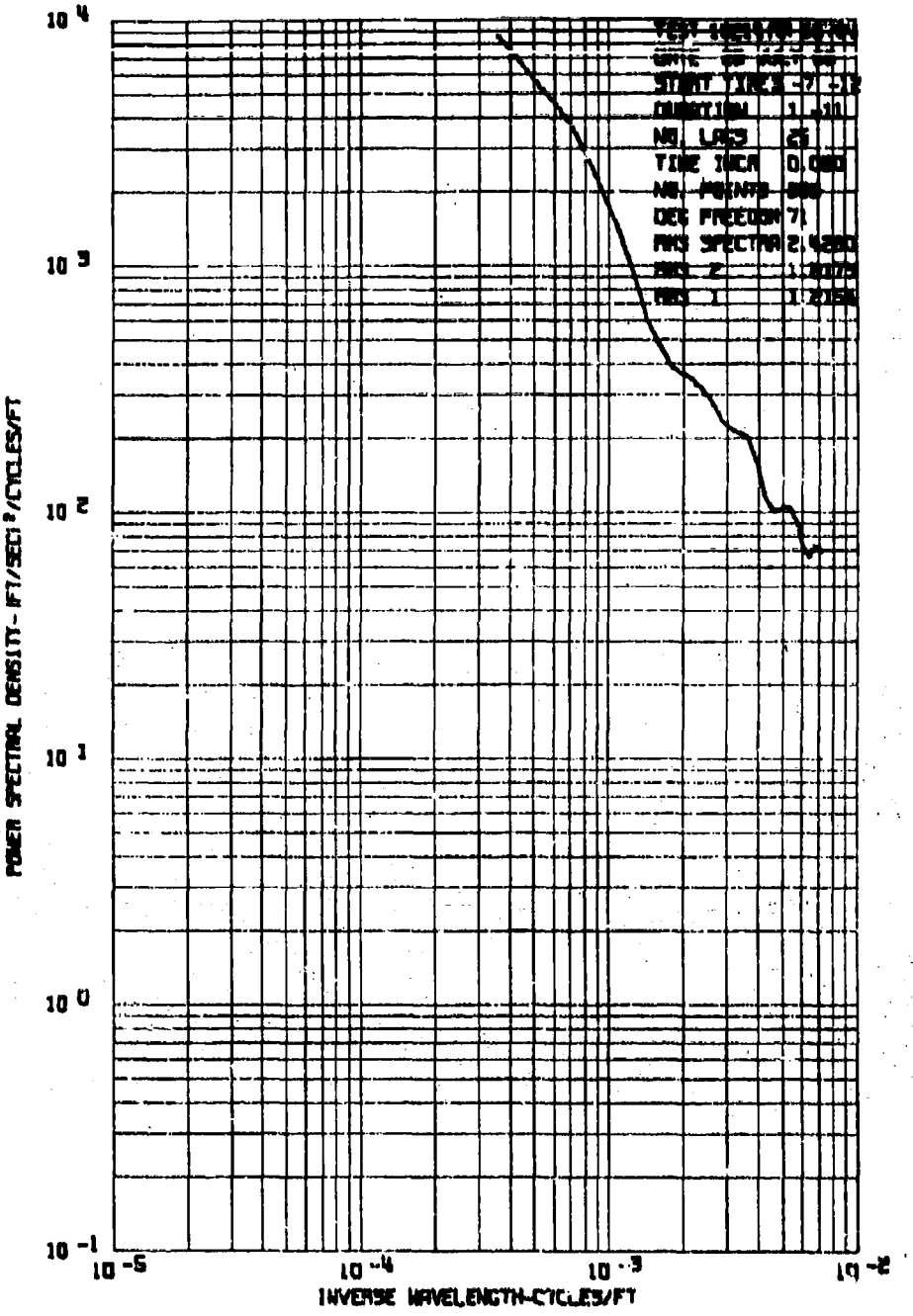


Figure 121A. Power Spectrum of Vertical Gust Velocity, Test 102, Run 14.

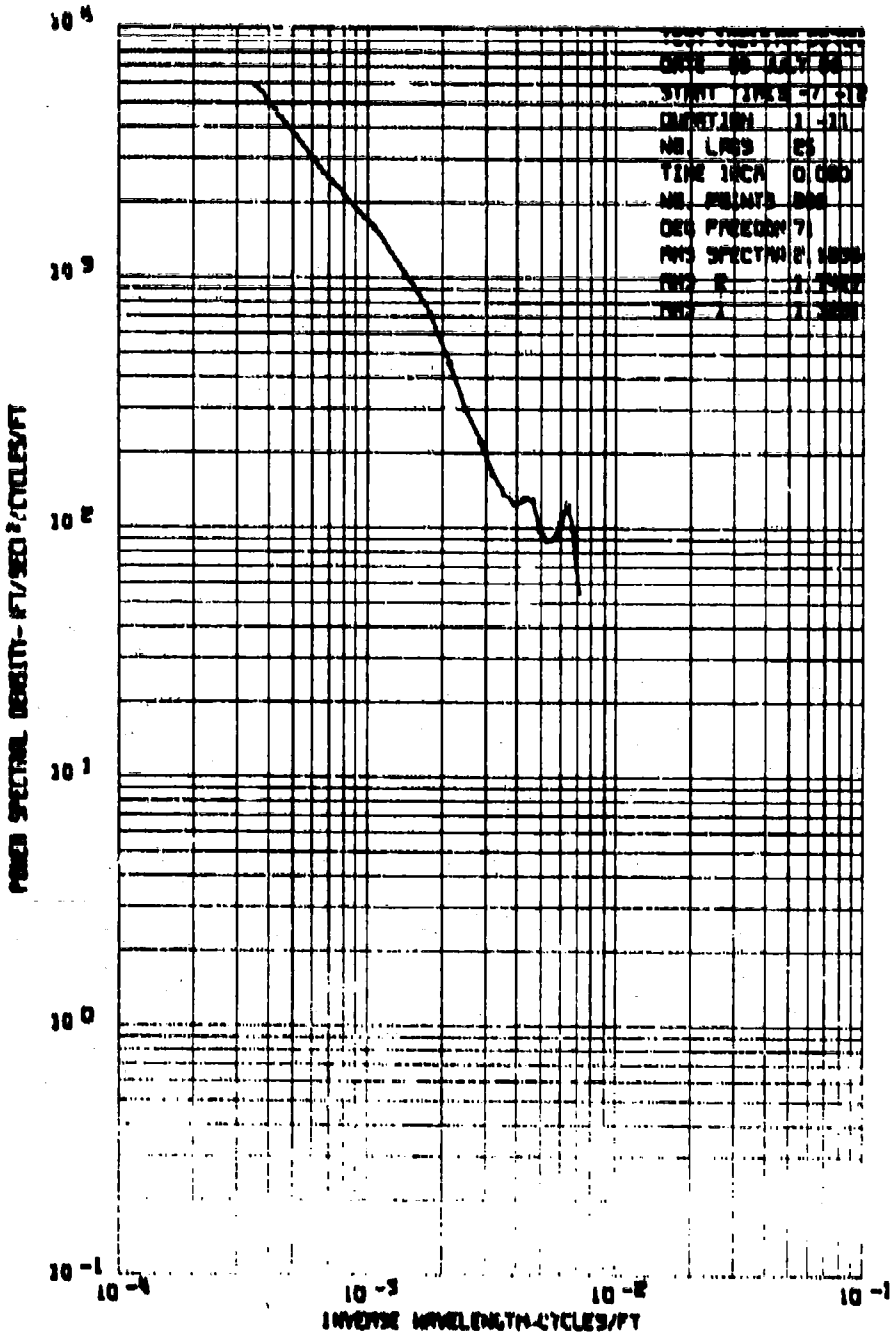


Figure 121B. Power Spectrum of Lateral Gust Velocity, Test 102, Run 14.

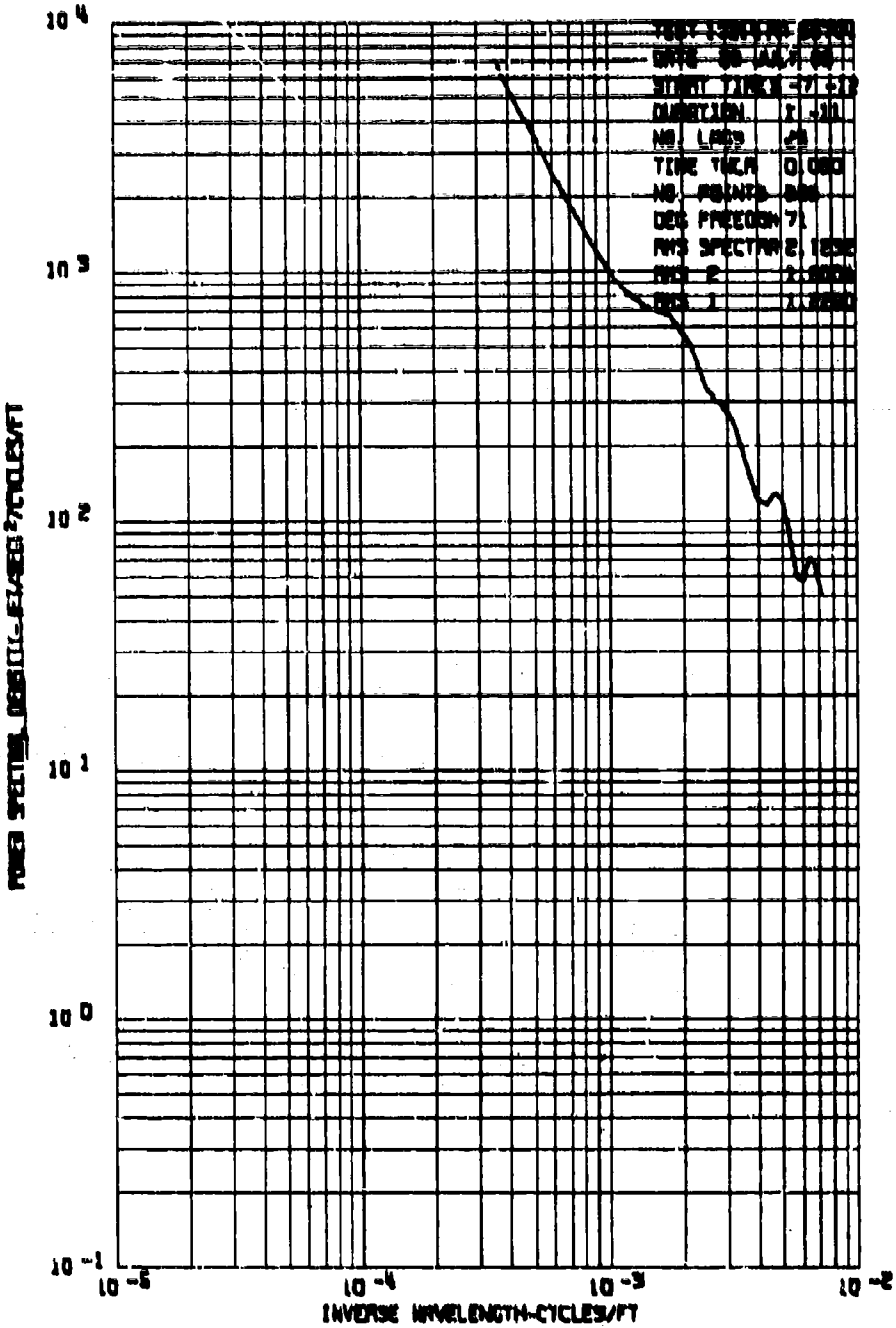


Figure 1210. Power Spectrum of Longitudinal Gust Velocity, Test 102, Run 14.

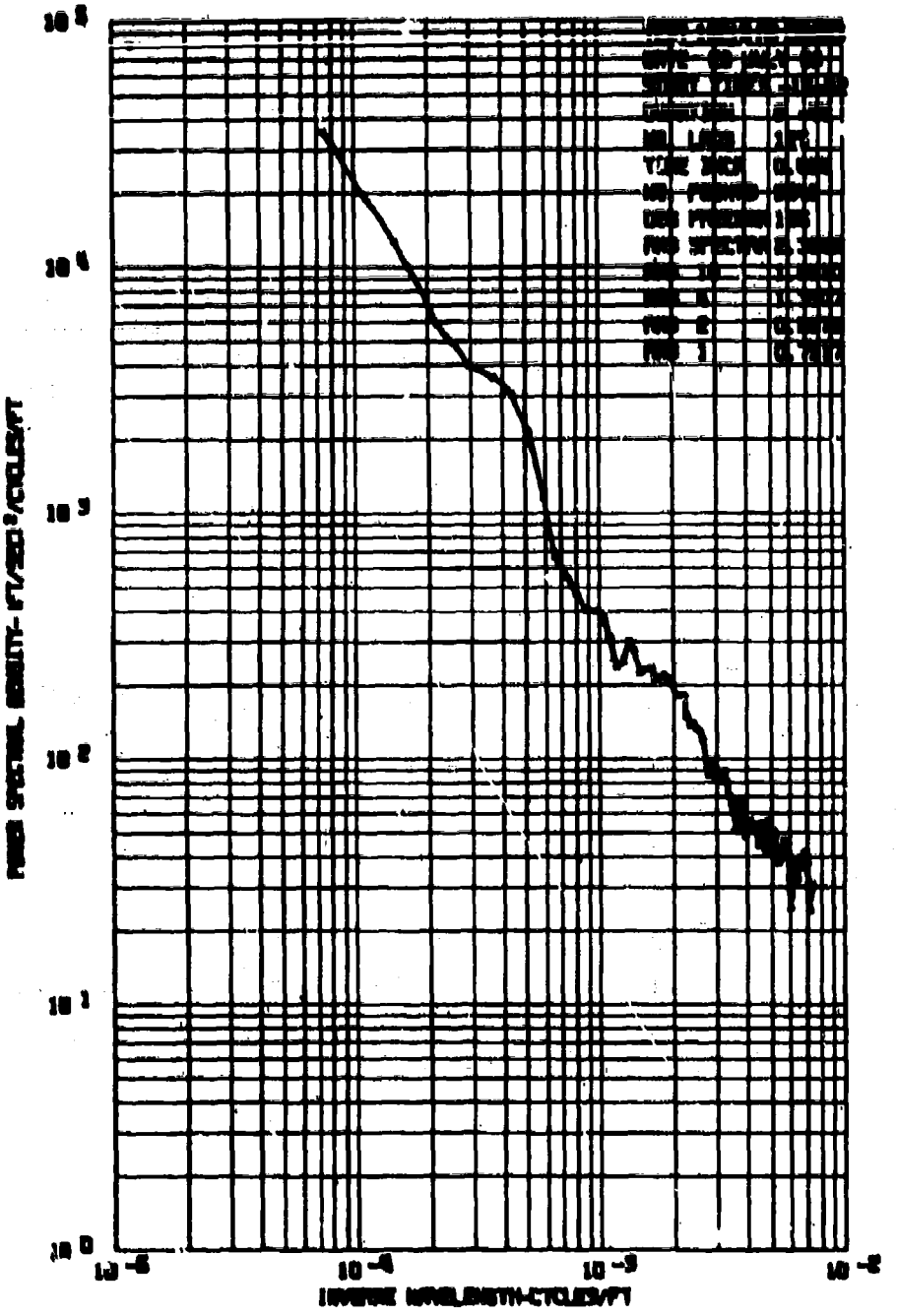


Figure 122A. Power Spectrum of Vertical Gust Velocity, Test 102, Run 15.

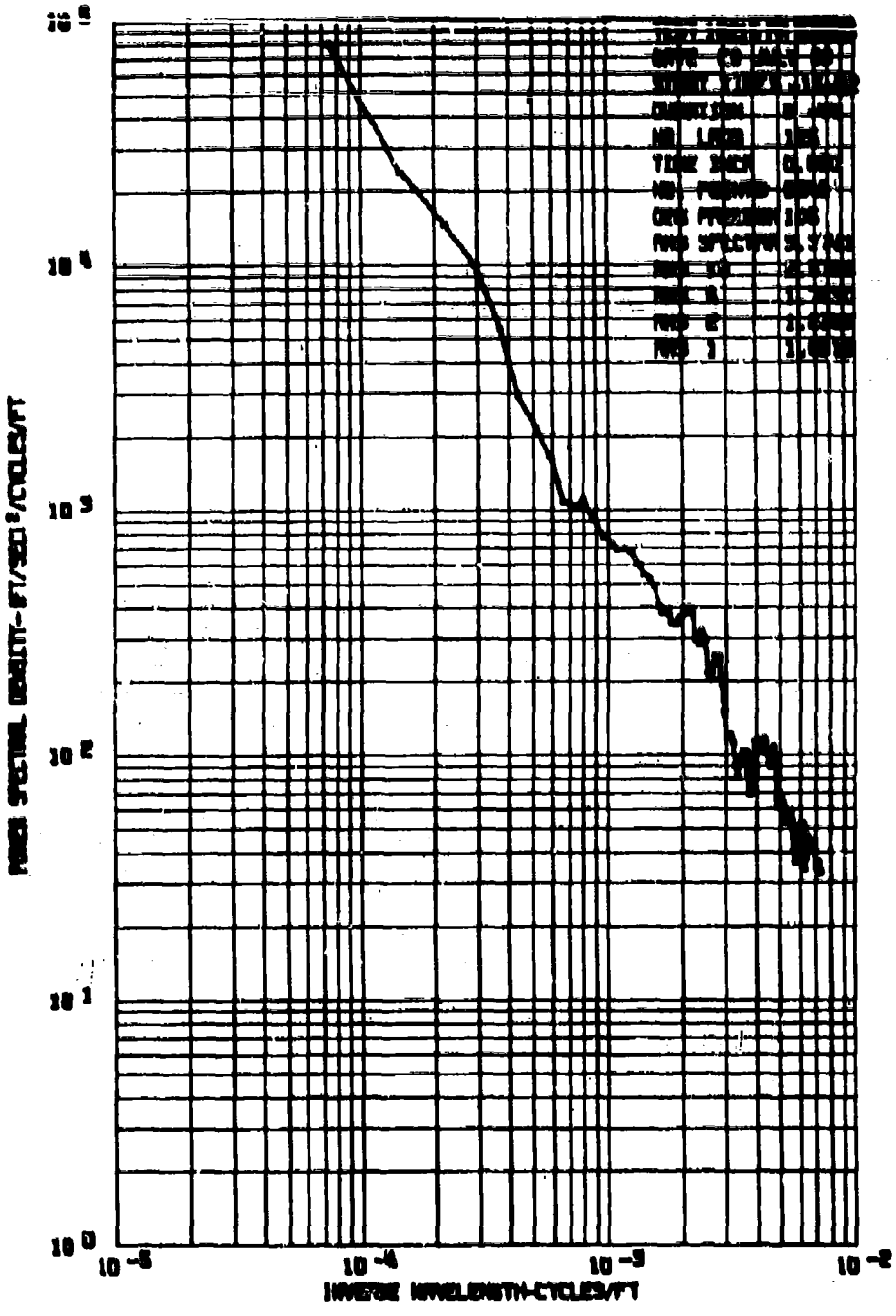


Figure 122B. Power Spectrum of Lateral Gust Velocity, Test 102, Run 15.

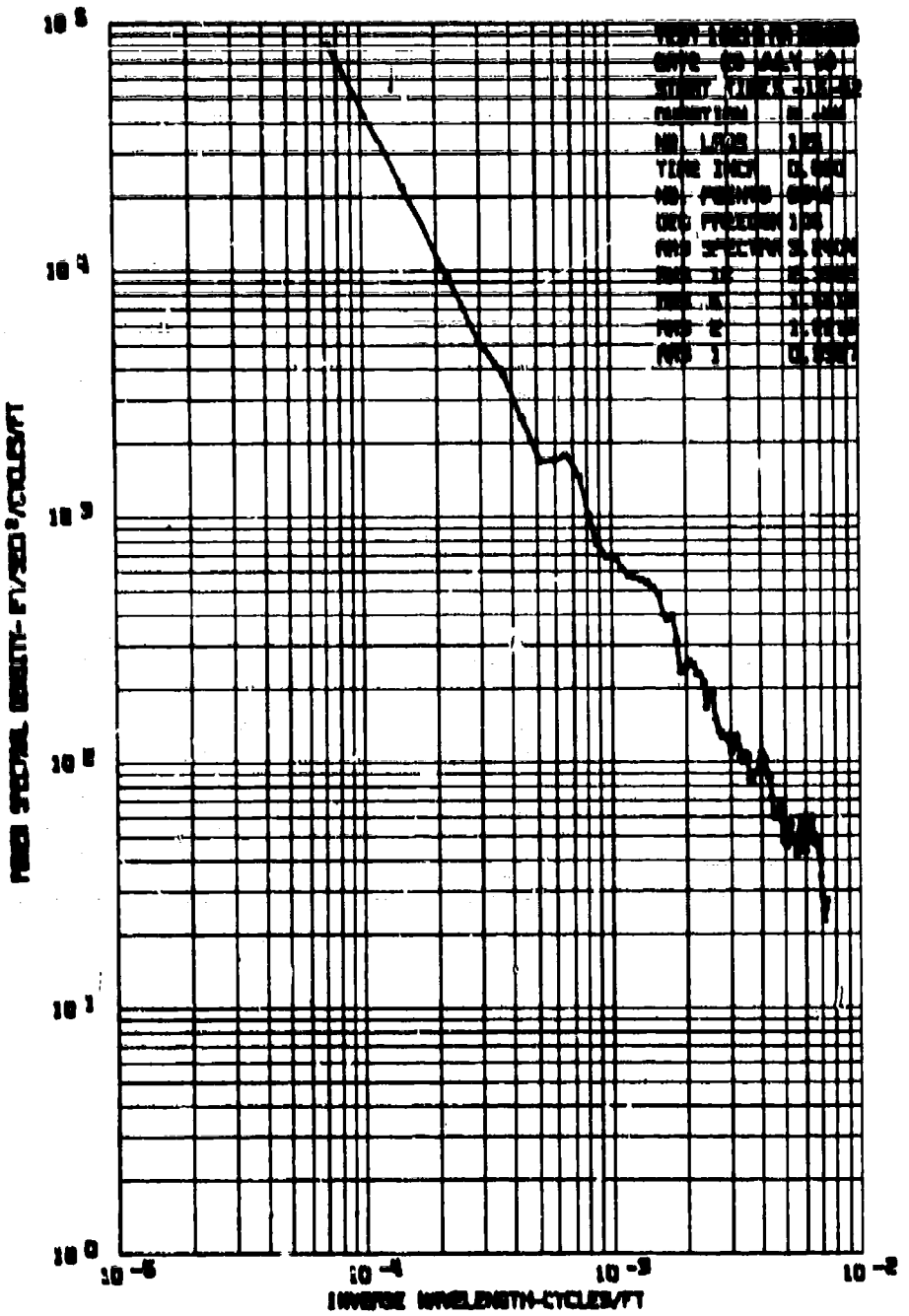


Figure 122C. Power Spectrum of Longitudinal Gust Velocity, Test 102, Run 15.

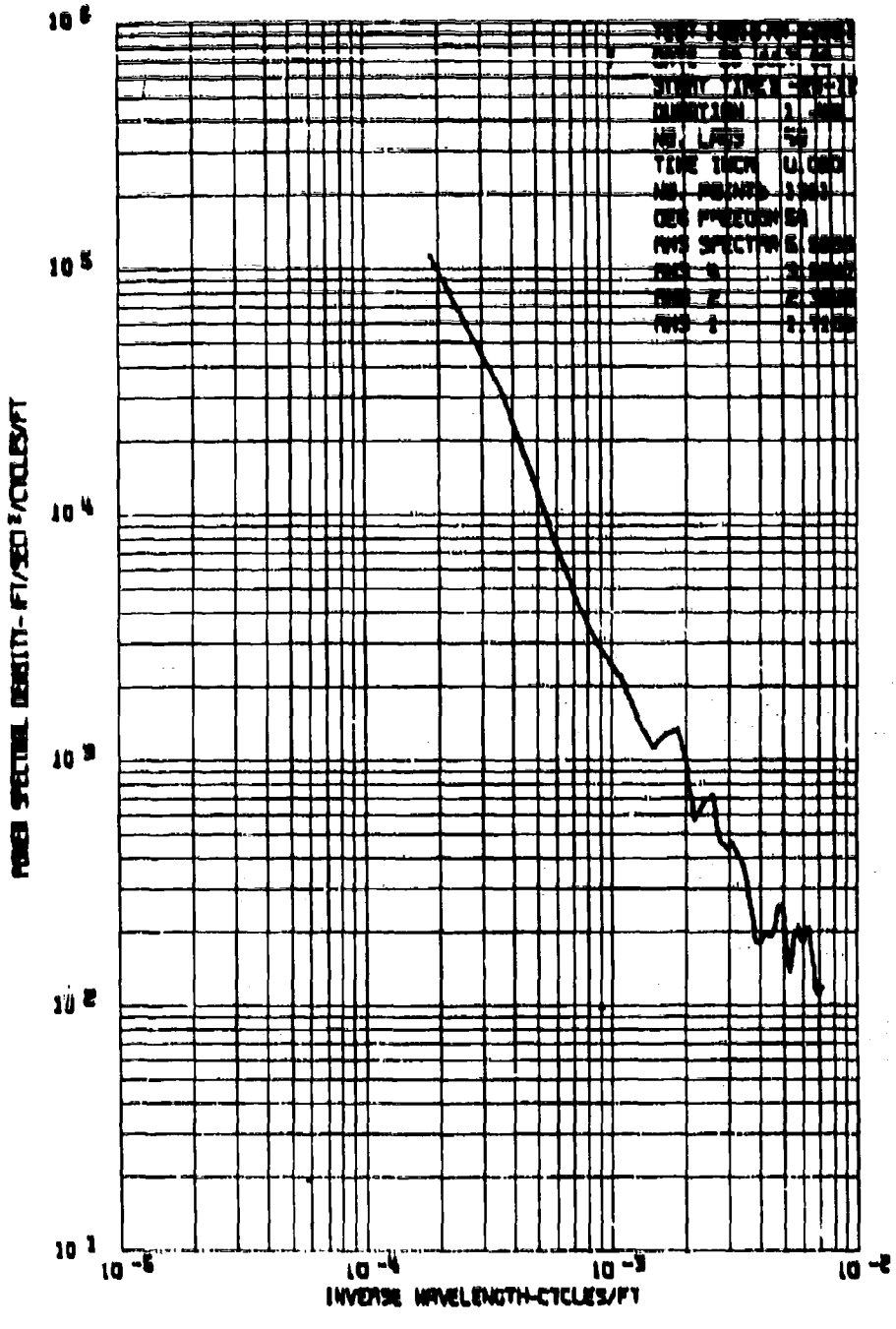


Figure 123A. Power Spectrum of Vertical Gust Velocity, Test 102, Run 16

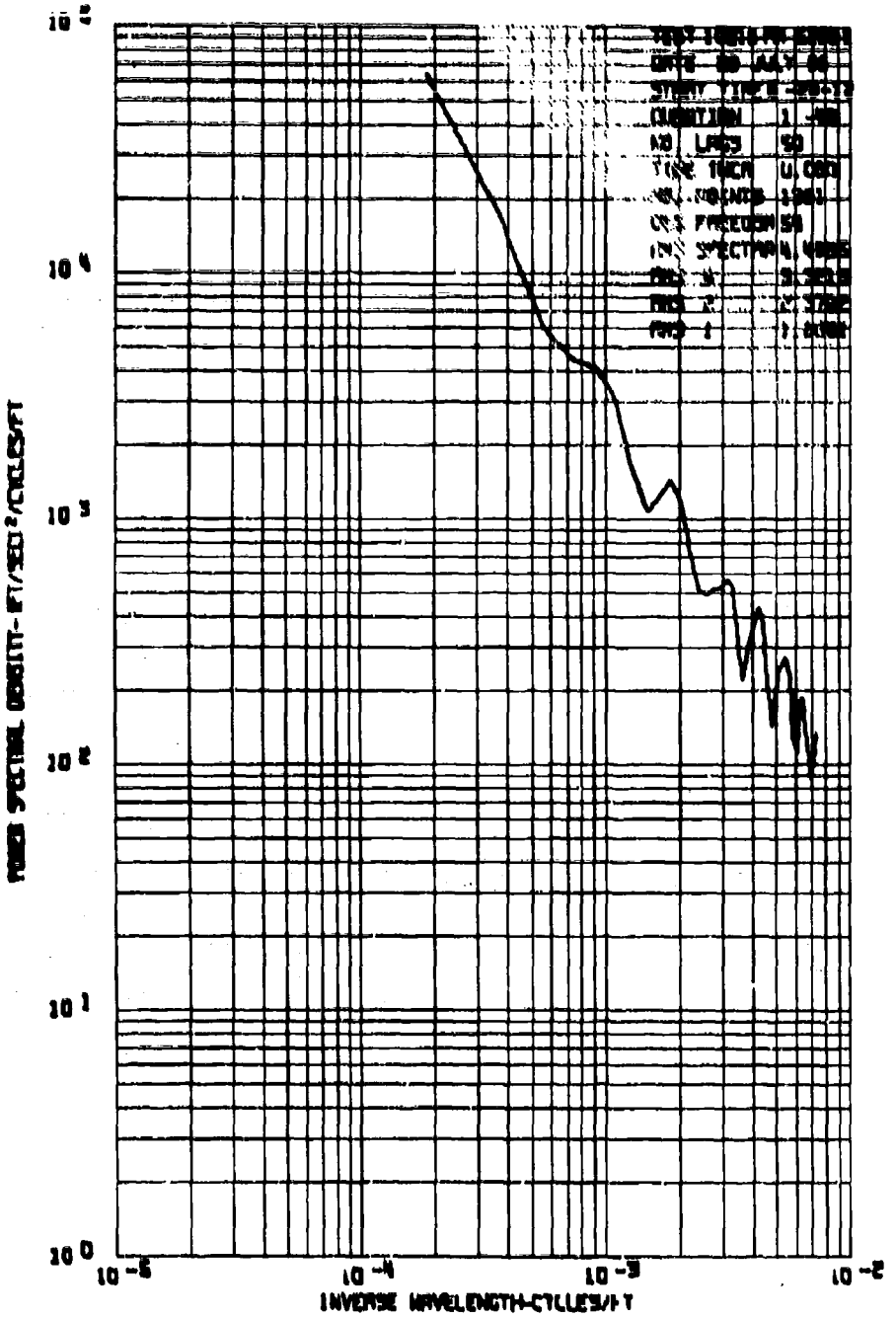


Figure 123B. Power Spectrum of Lateral Gust Velocity, Test 102, Run 16.

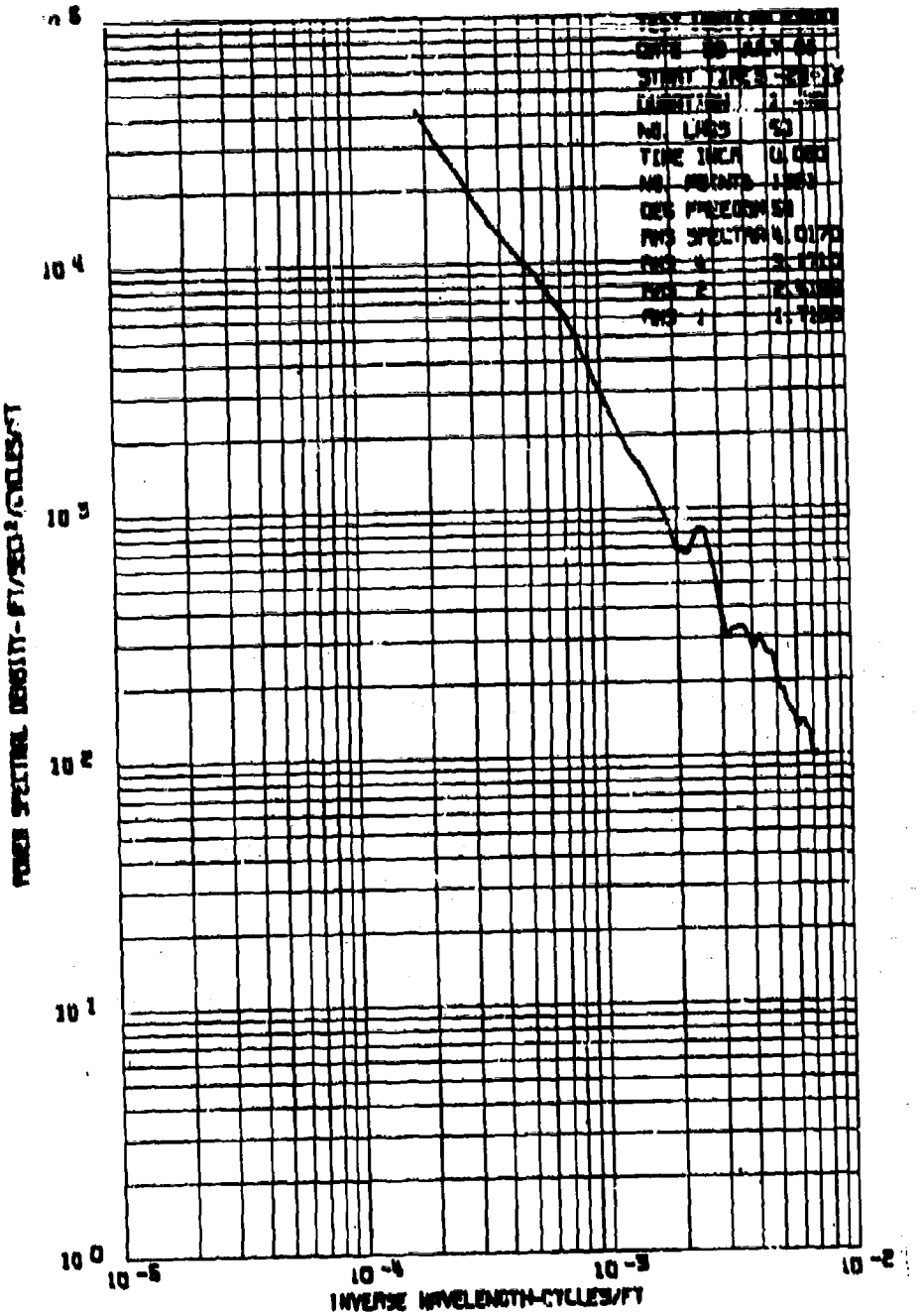


Figure 123C. Power Spectrum of Longitudinal Gust Velocity, Test 102, Run 16.

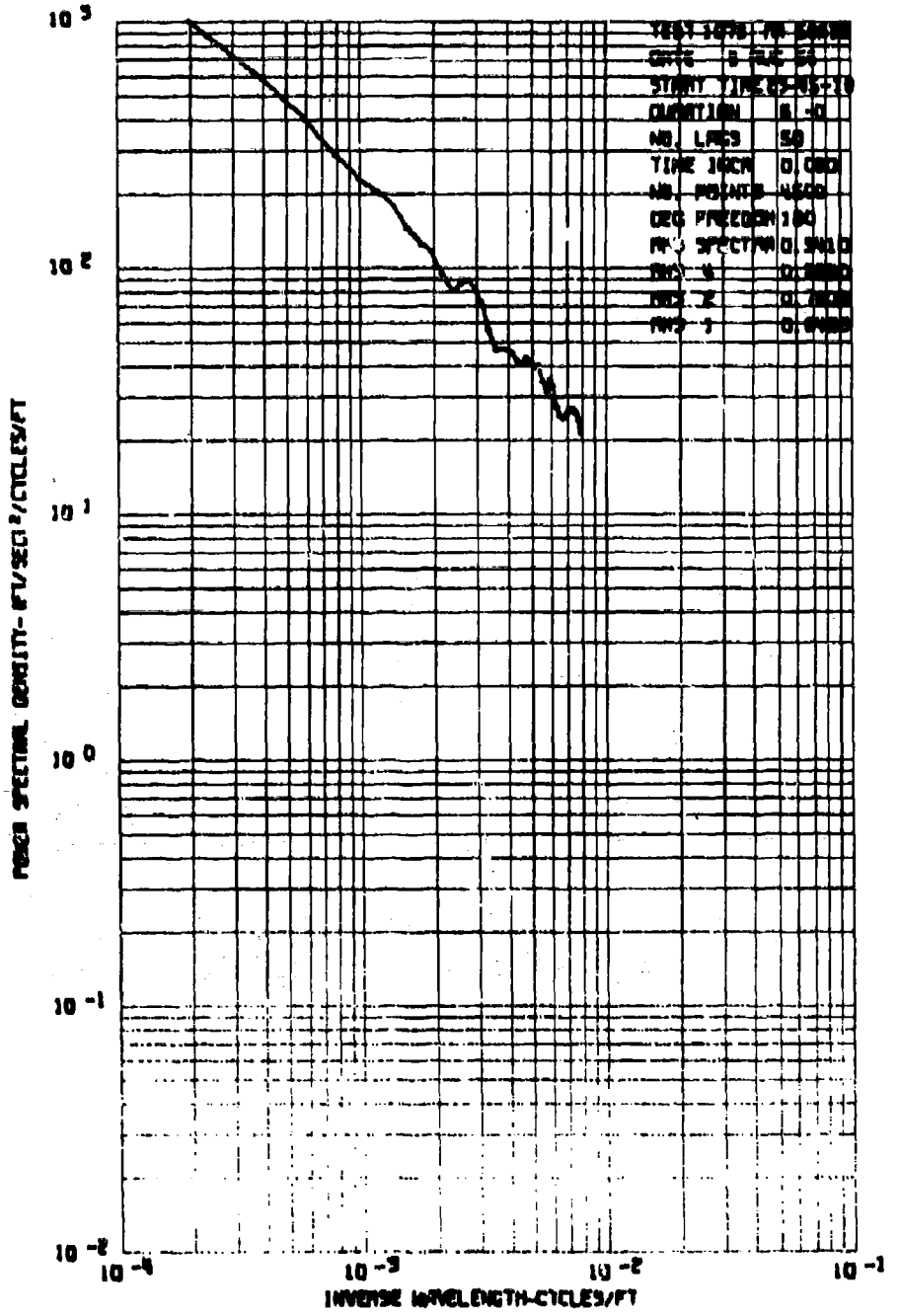


Figure 124A. Power Spectrum of Vertical Gust Velocity, Test 107, Run 3.

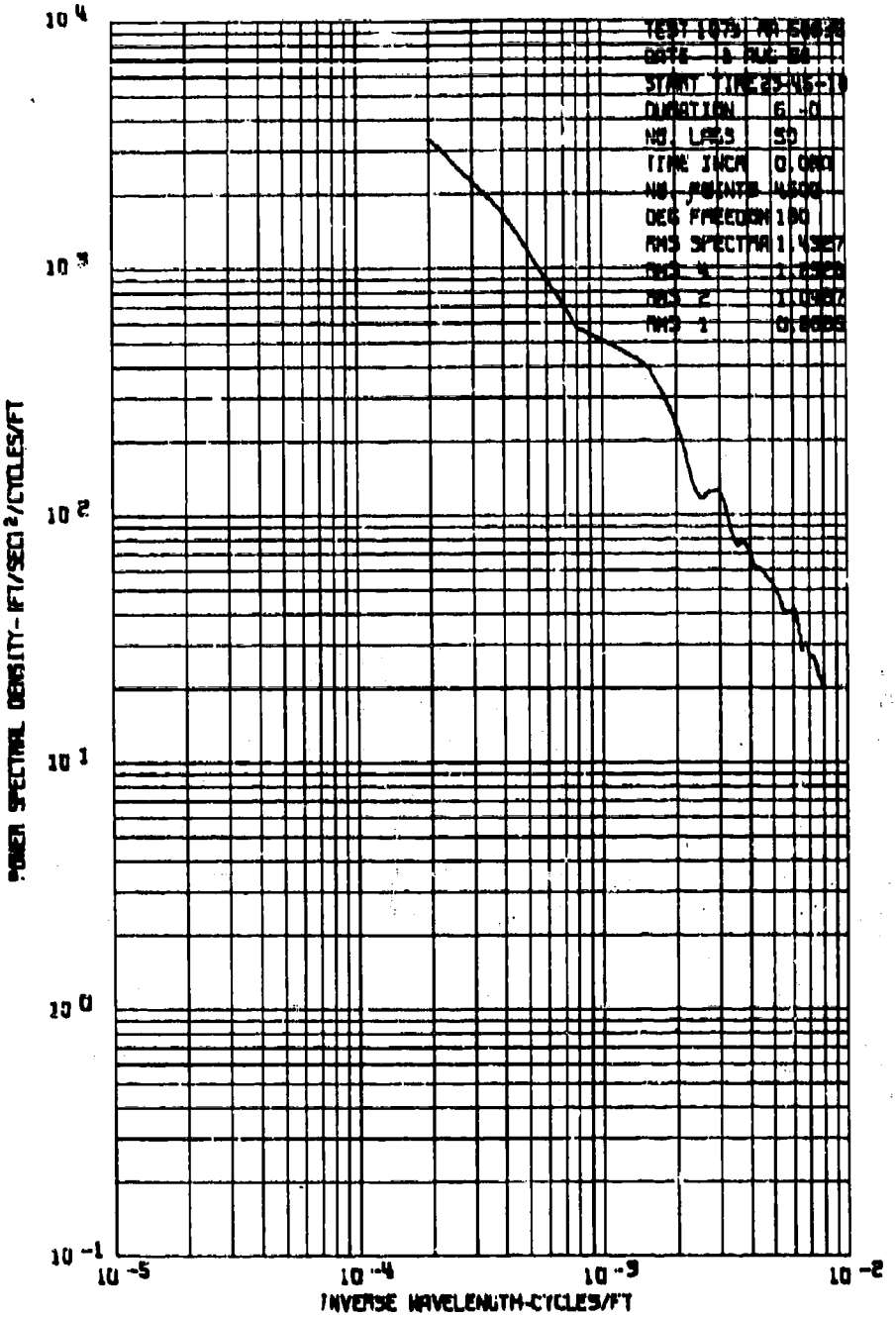


Figure 124B. Power Spectrum of Lateral Gust Velocity, Test 107, Run 3.

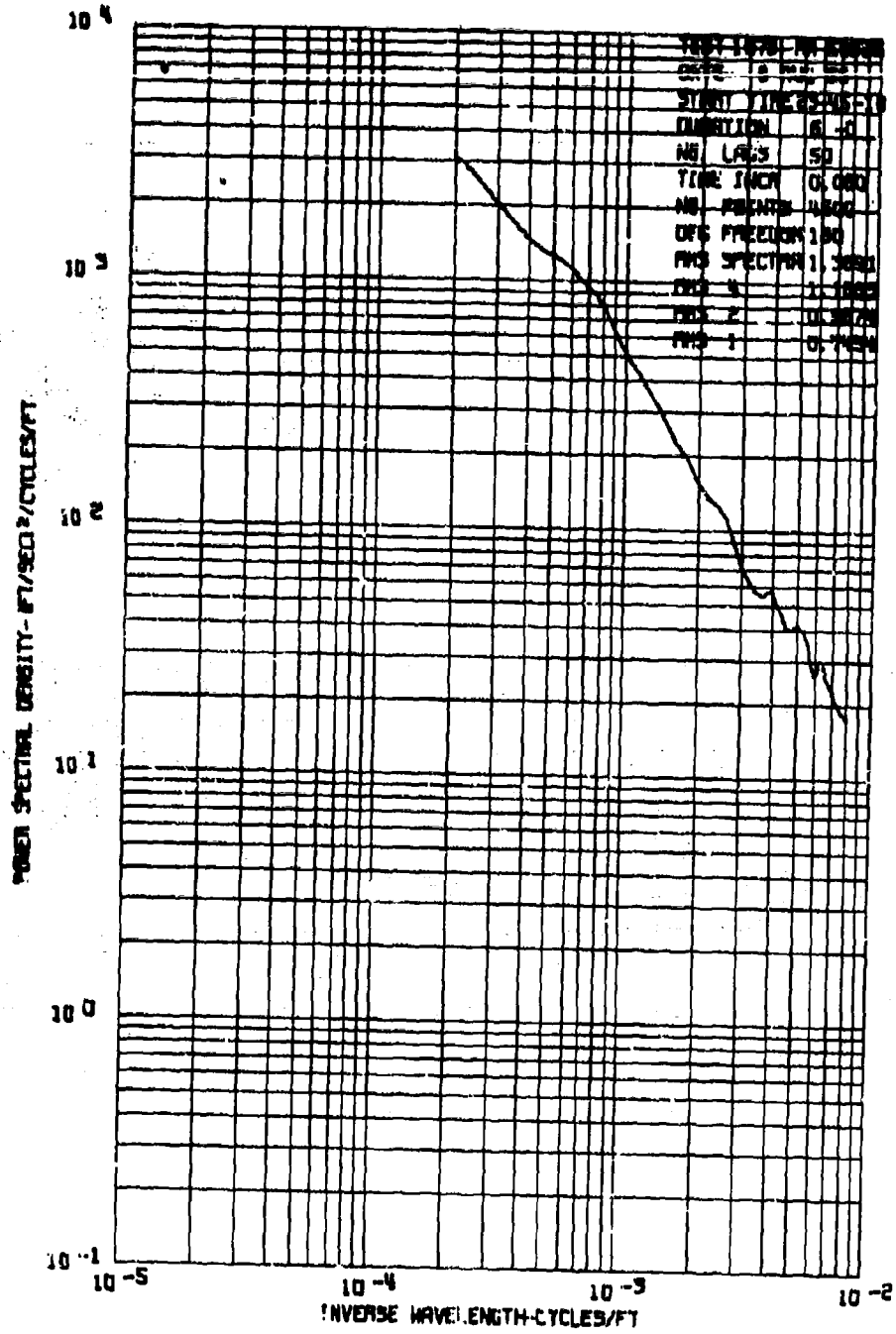


Figure 124C. Power Spectrum of Longitudinal Gust Velocity, Test 107, Run 3.

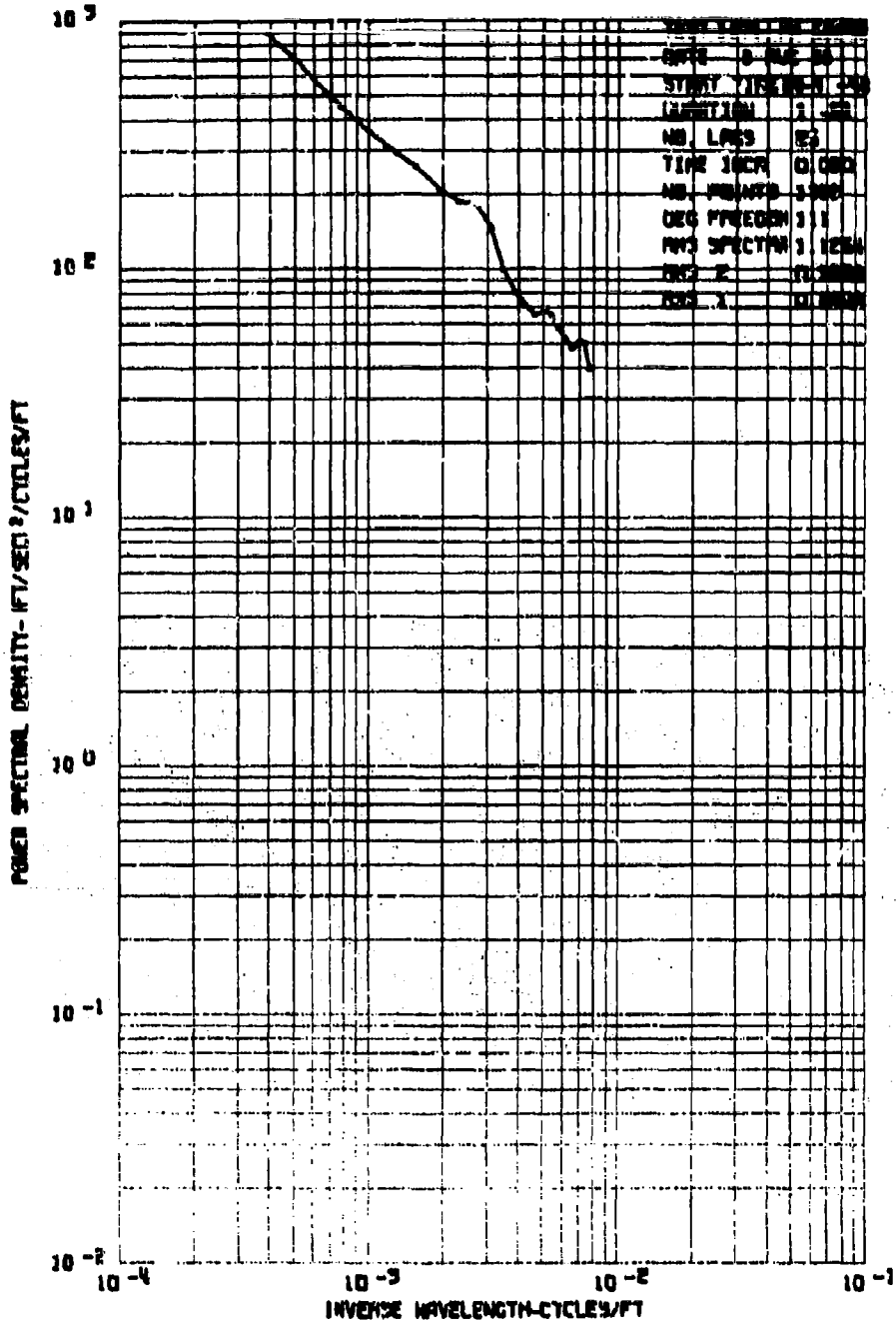


Figure 125A. Power Spectrum of Vertical Gust Velocity, Test 107, Run 4.

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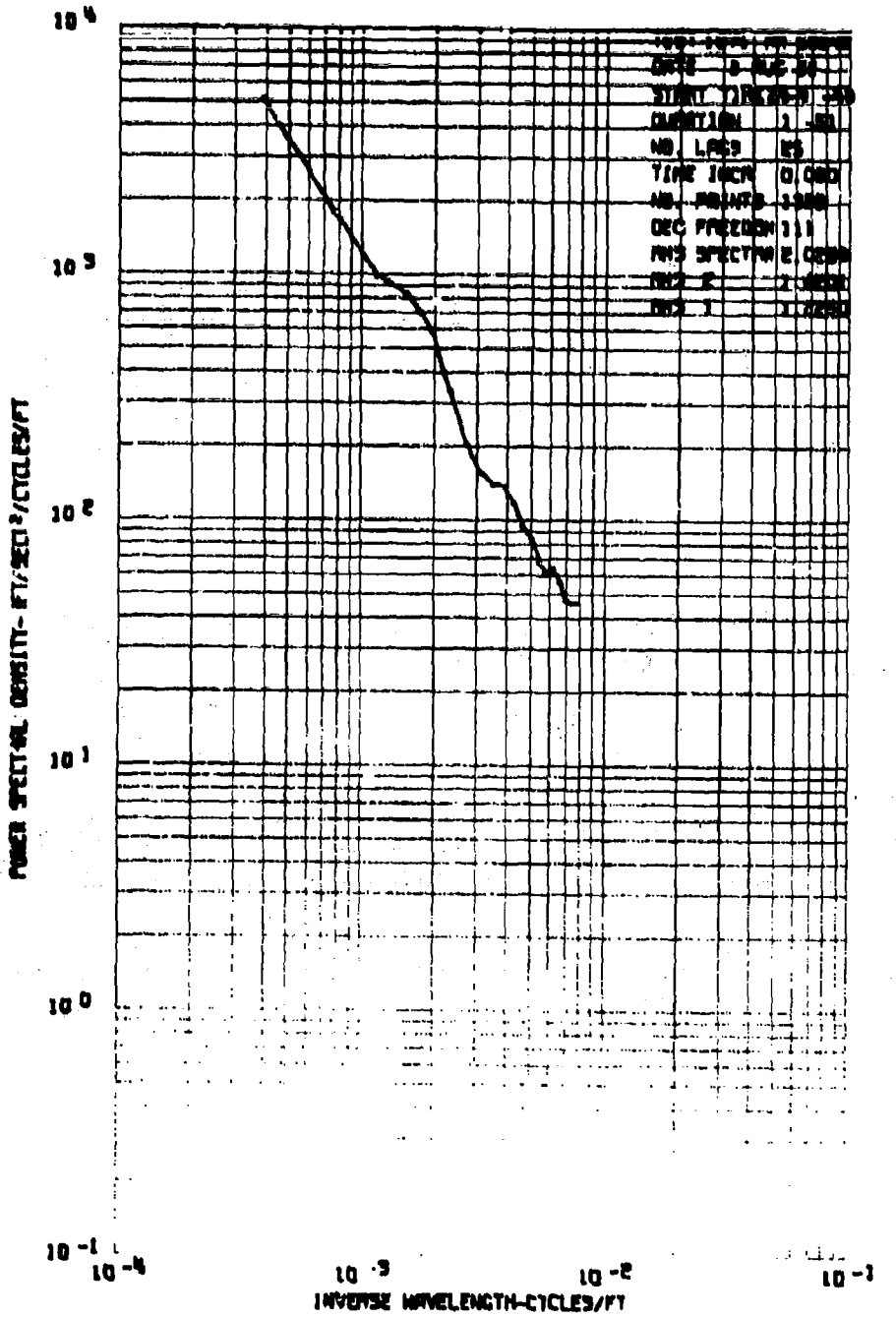


Figure 125B. Power Spectrum of Lateral Gust Velocity, Test 107, Run 4.

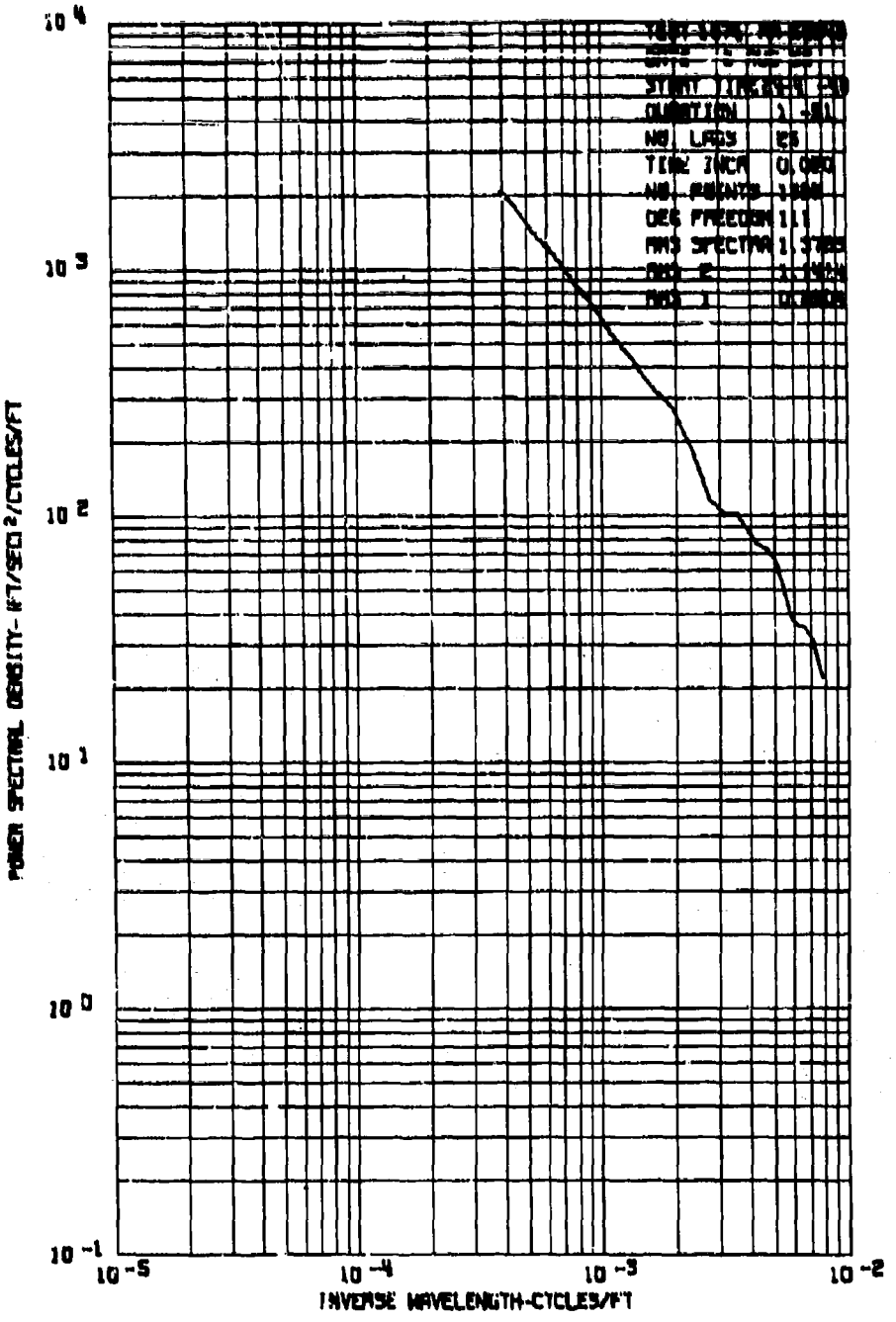


Figure 125C. Power Spectrum of Longitudinal Gust Velocity, Test 107, Run 4.

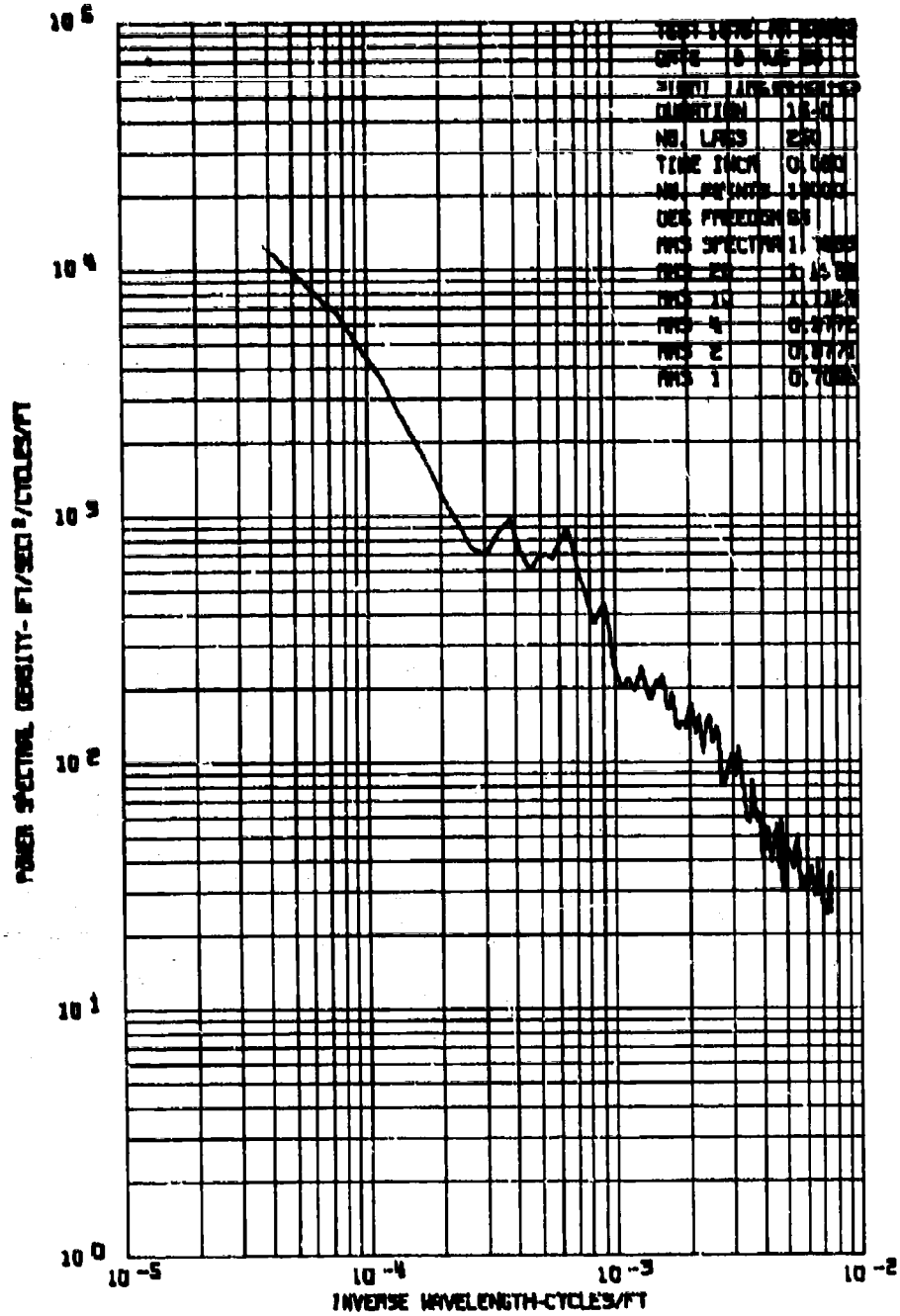


Figure 126A. Power Spectrum of Vertical Gust Velocity, Test 107, Run 6 - 250 Lags.

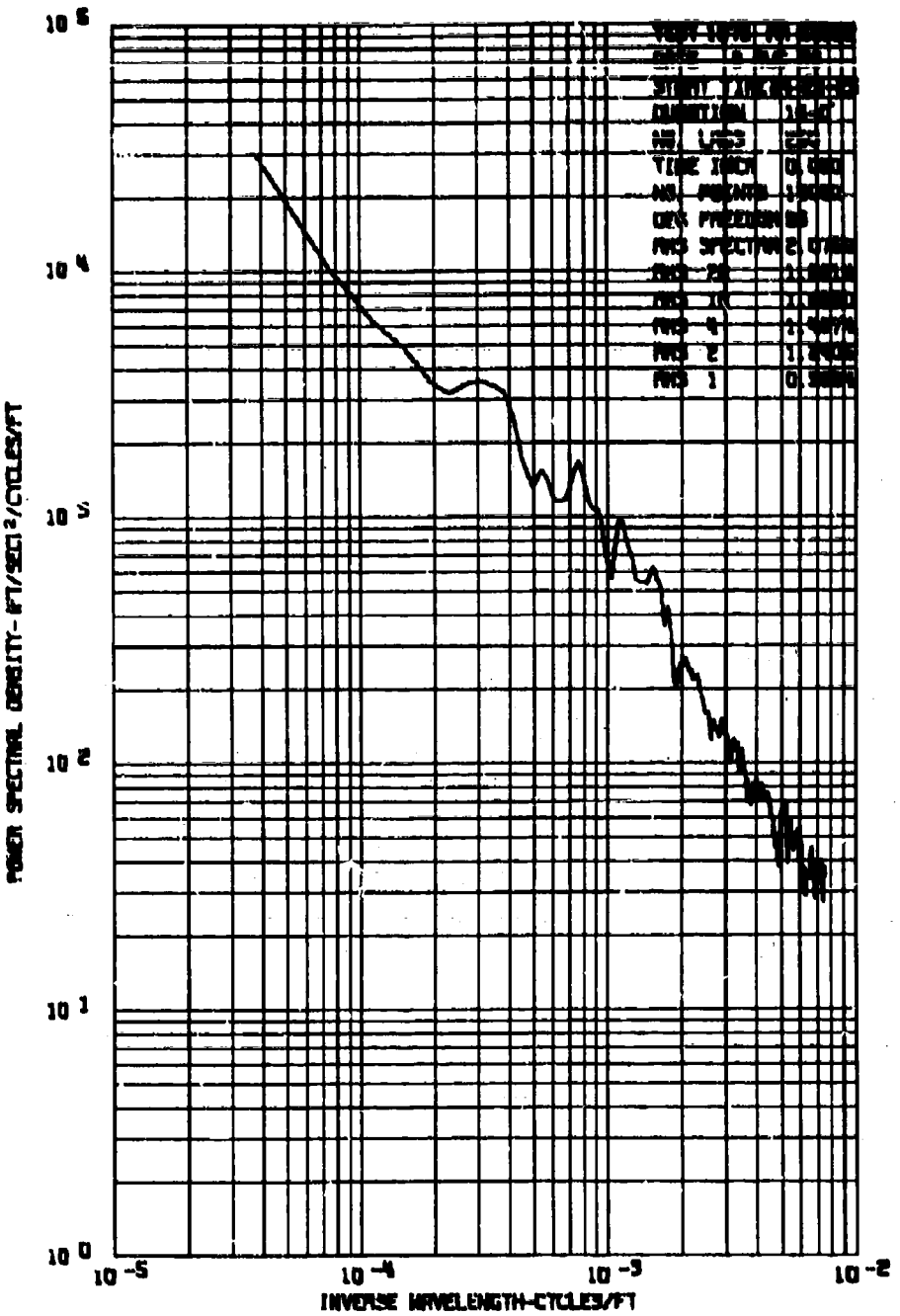


Figure 126B. Power Spectrum of Lateral Gust Velocity, Test 107, Run 6 - 250 Lags.

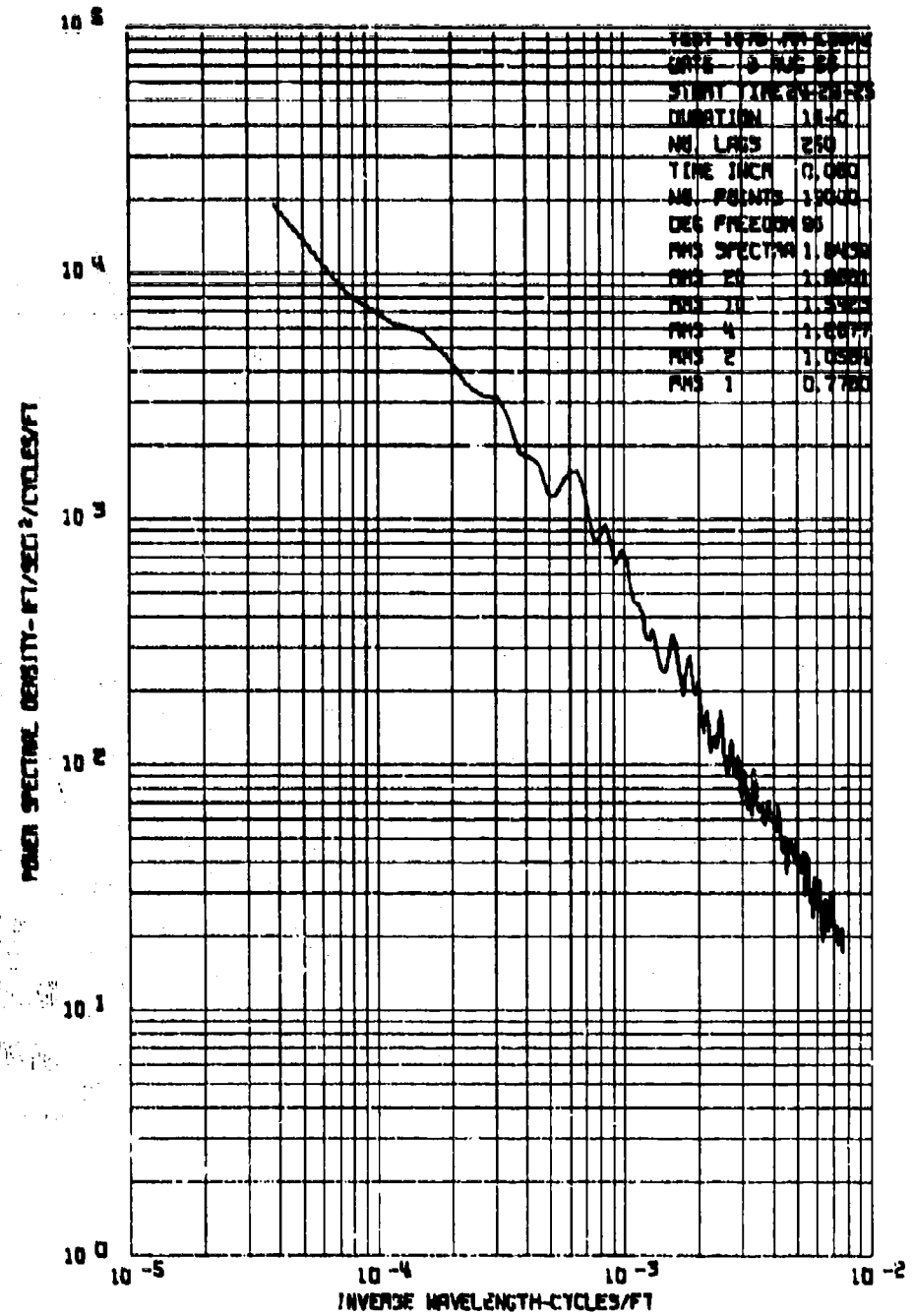


Figure 126C. Power Spectrum of Longitudinal Gust Velocity, Test 107, Run 6 - 250 lags.

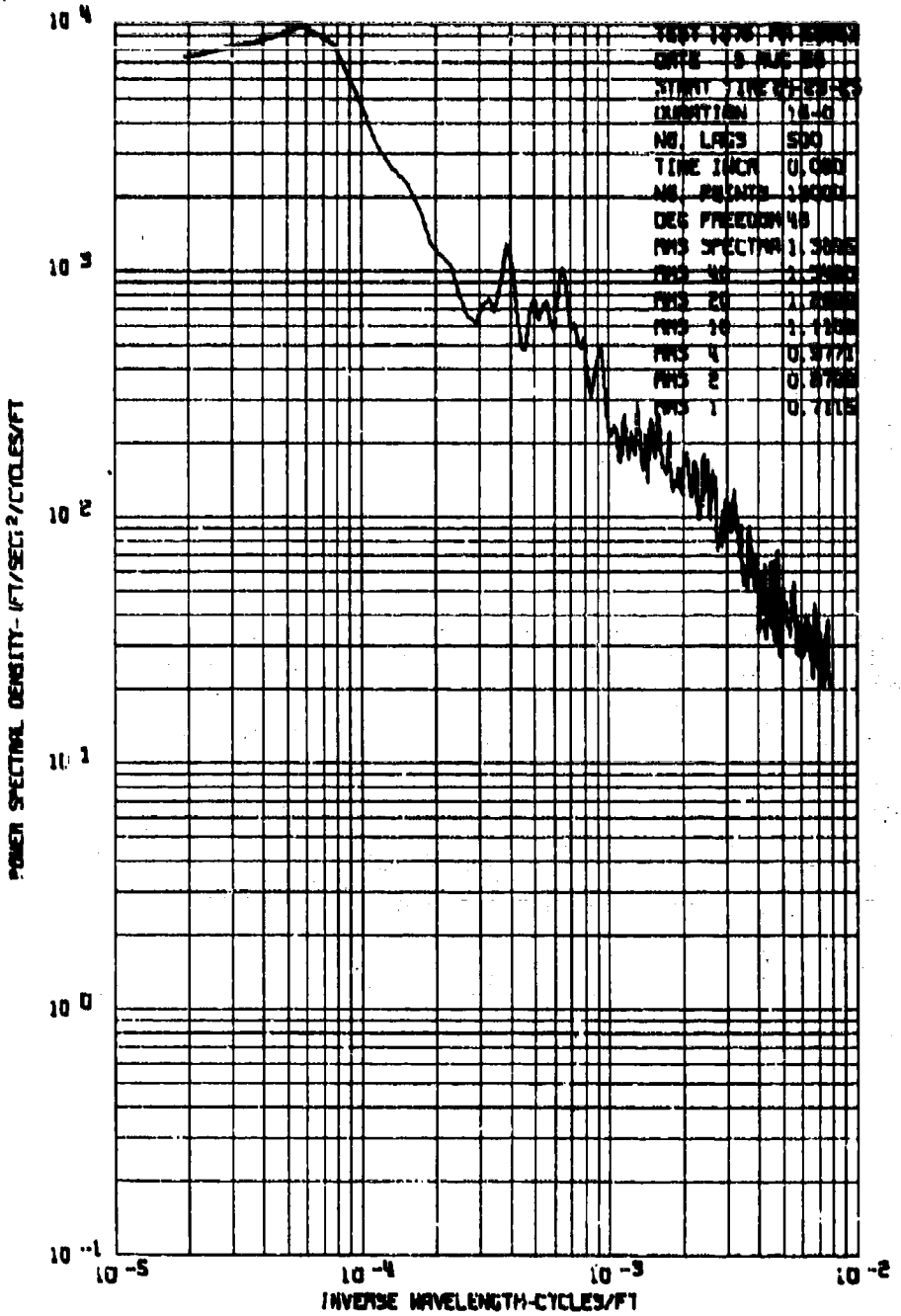


Figure 126D. Power Spectrum of Vertical Gust Velocity, Test 107, Run 6 - 500 Lags.

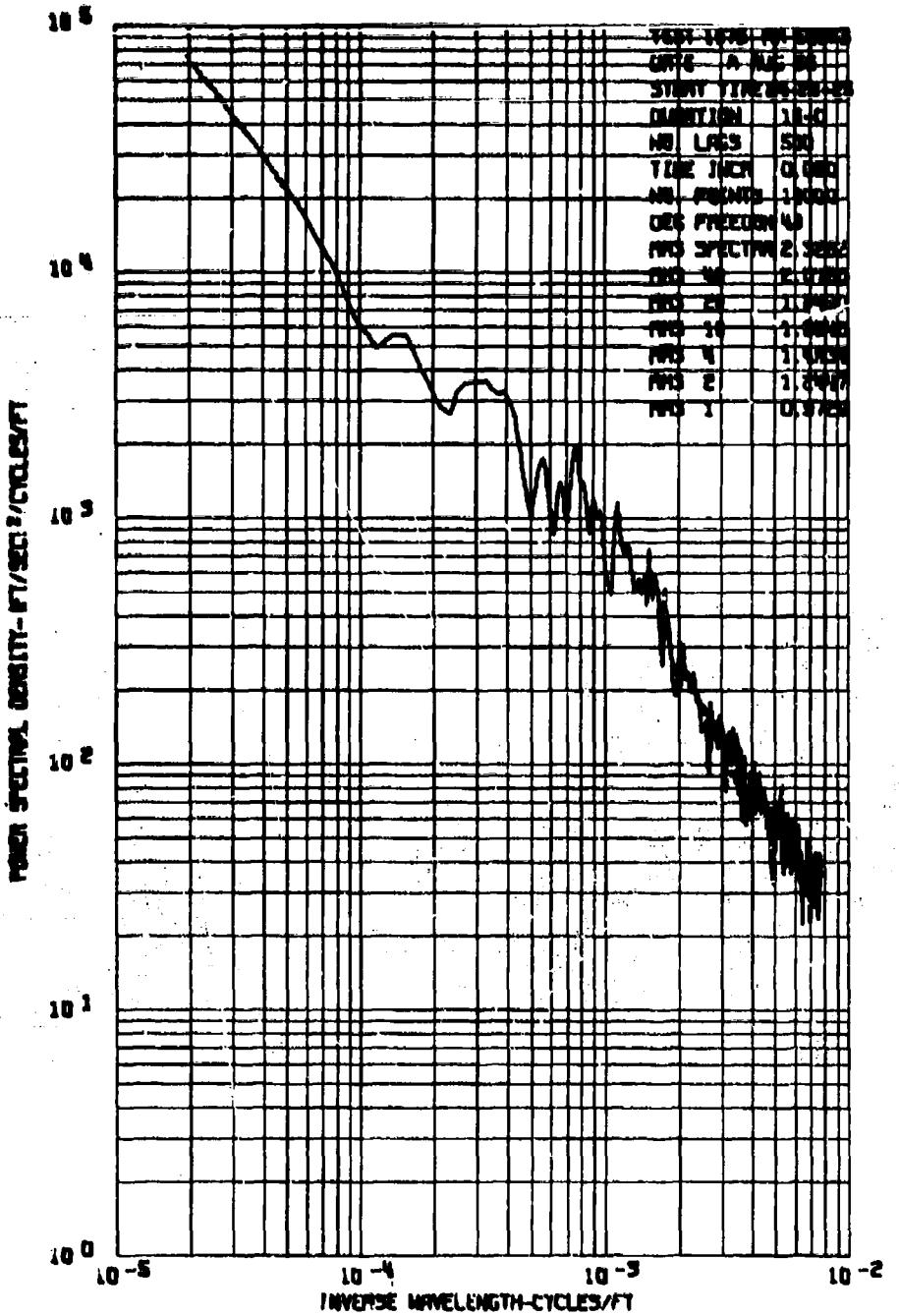


Figure 126E. Power Spectrum of Lateral Gust Velocity, Test 107, Run 6 - 500 Lags.

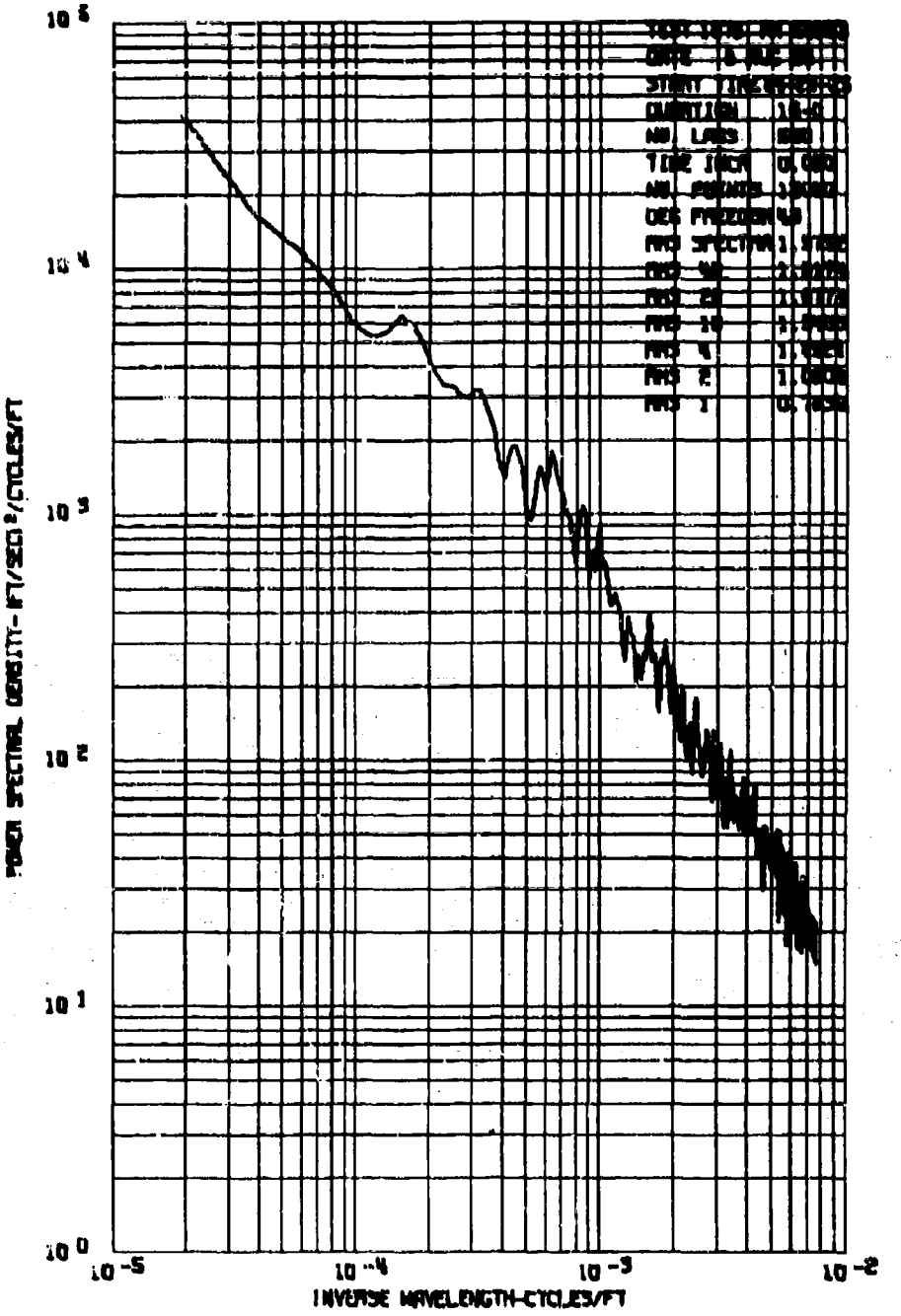


Figure 126F. Power Spectrum of Longitudinal Gust Velocity, Test 107, Run 6 - 500 Lags.

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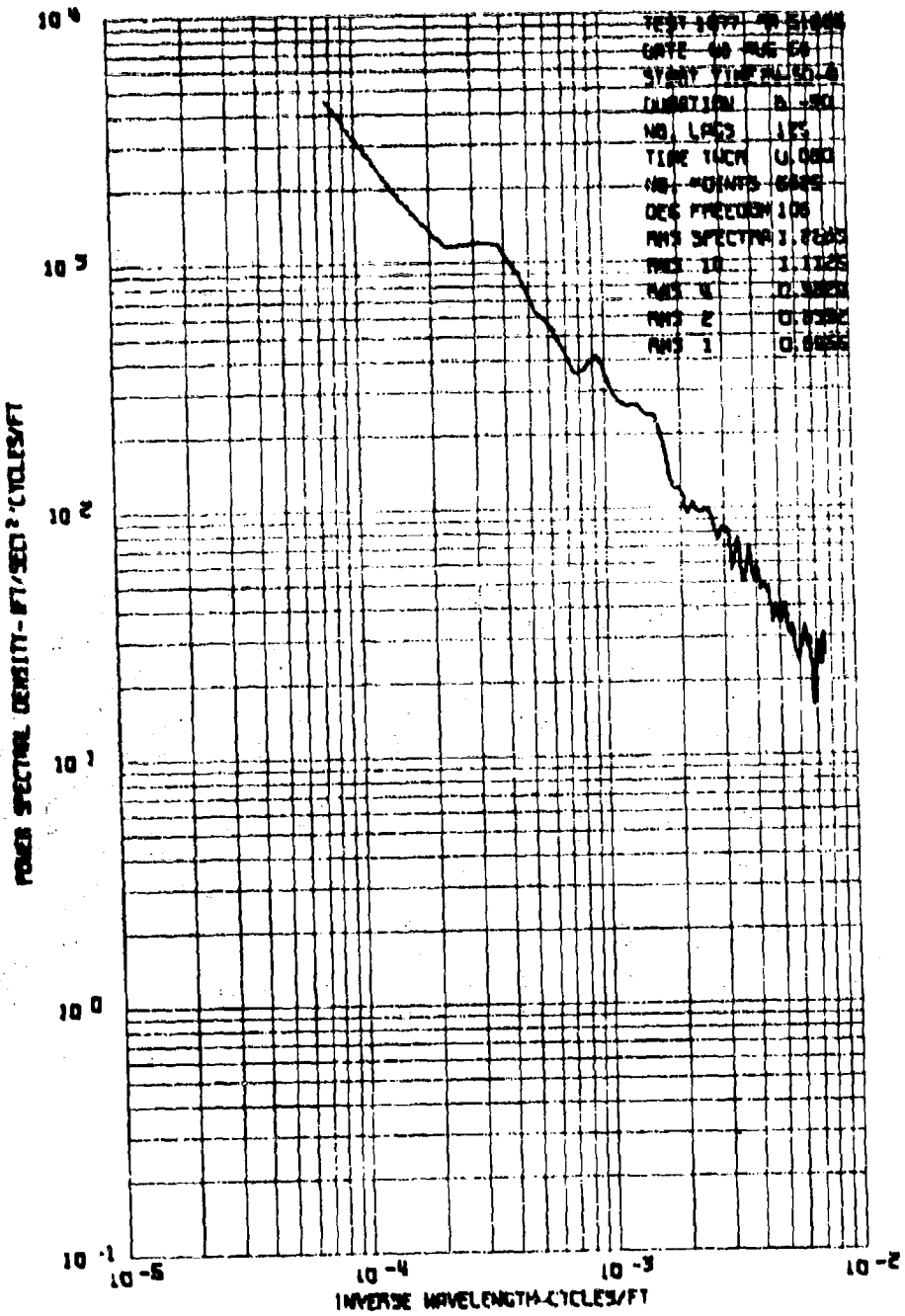


Figure 127A. Power Spectrum of Vertical Gust Velocity, Test 107, Run 7.

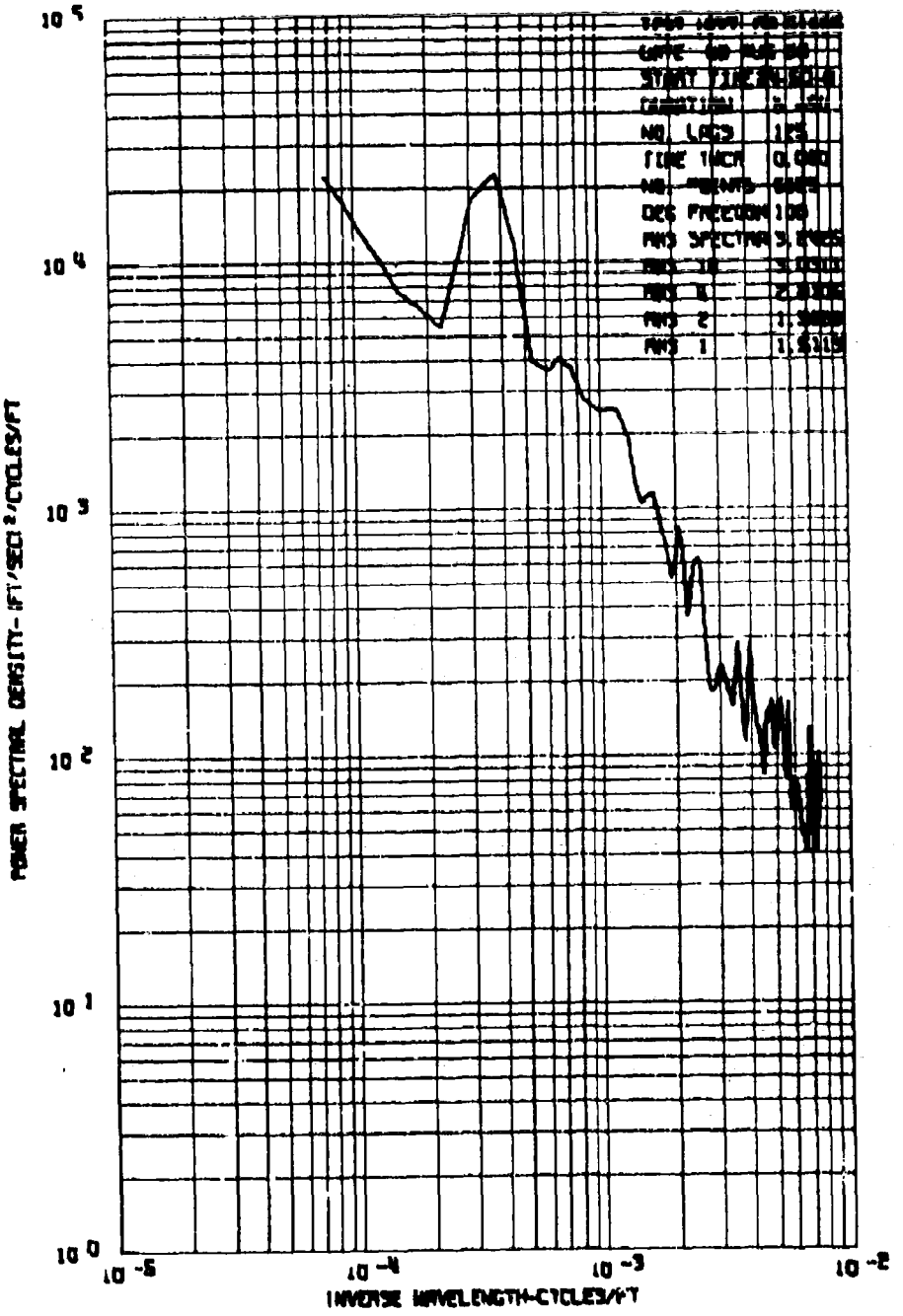


Figure 127B. Power Spectrum of Lateral Gust Velocity, Test 107, Run 7.

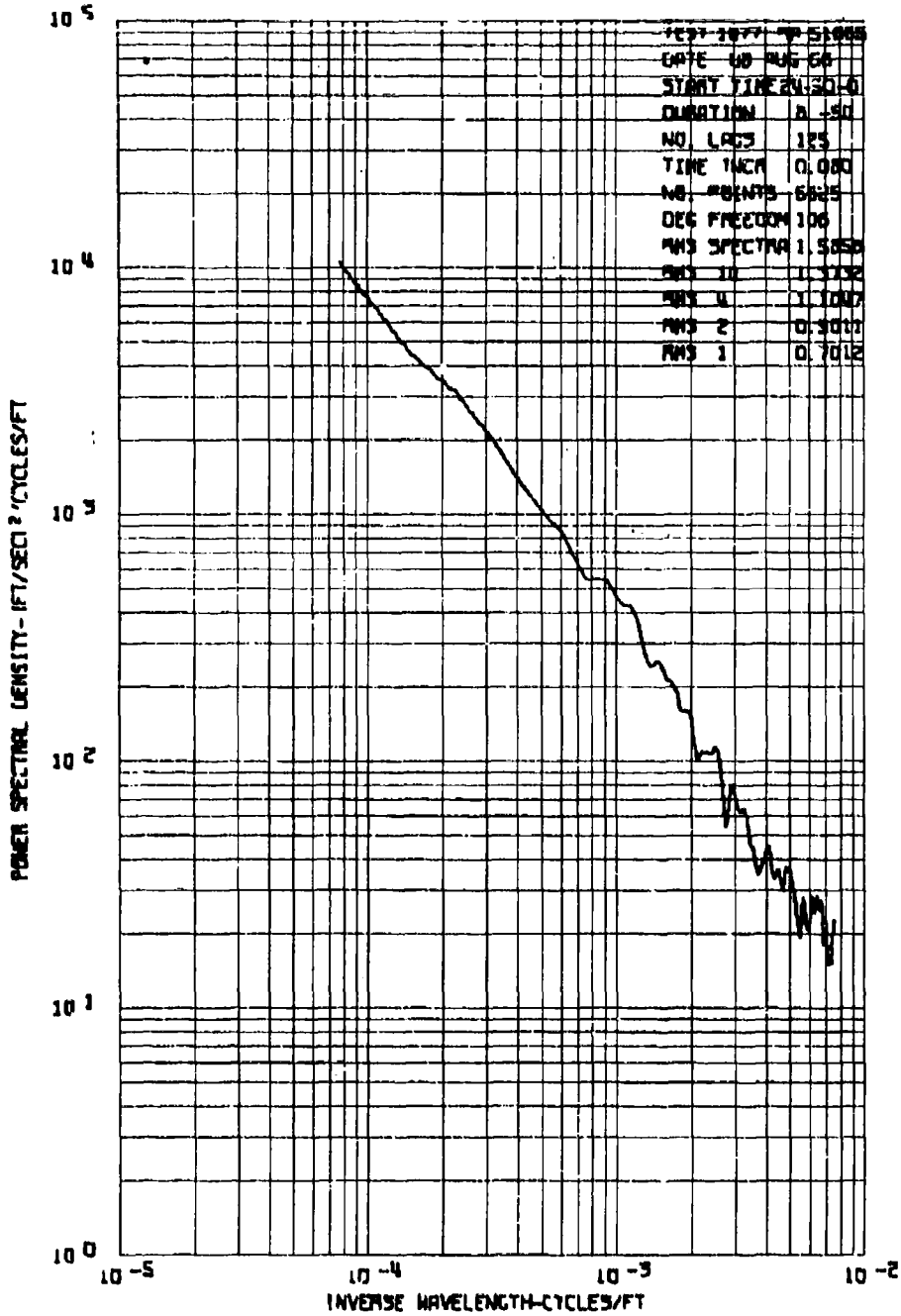


Figure 127C. Power-Spectrum of Longitudinal Gust Velocity
Test 107, Run 7.

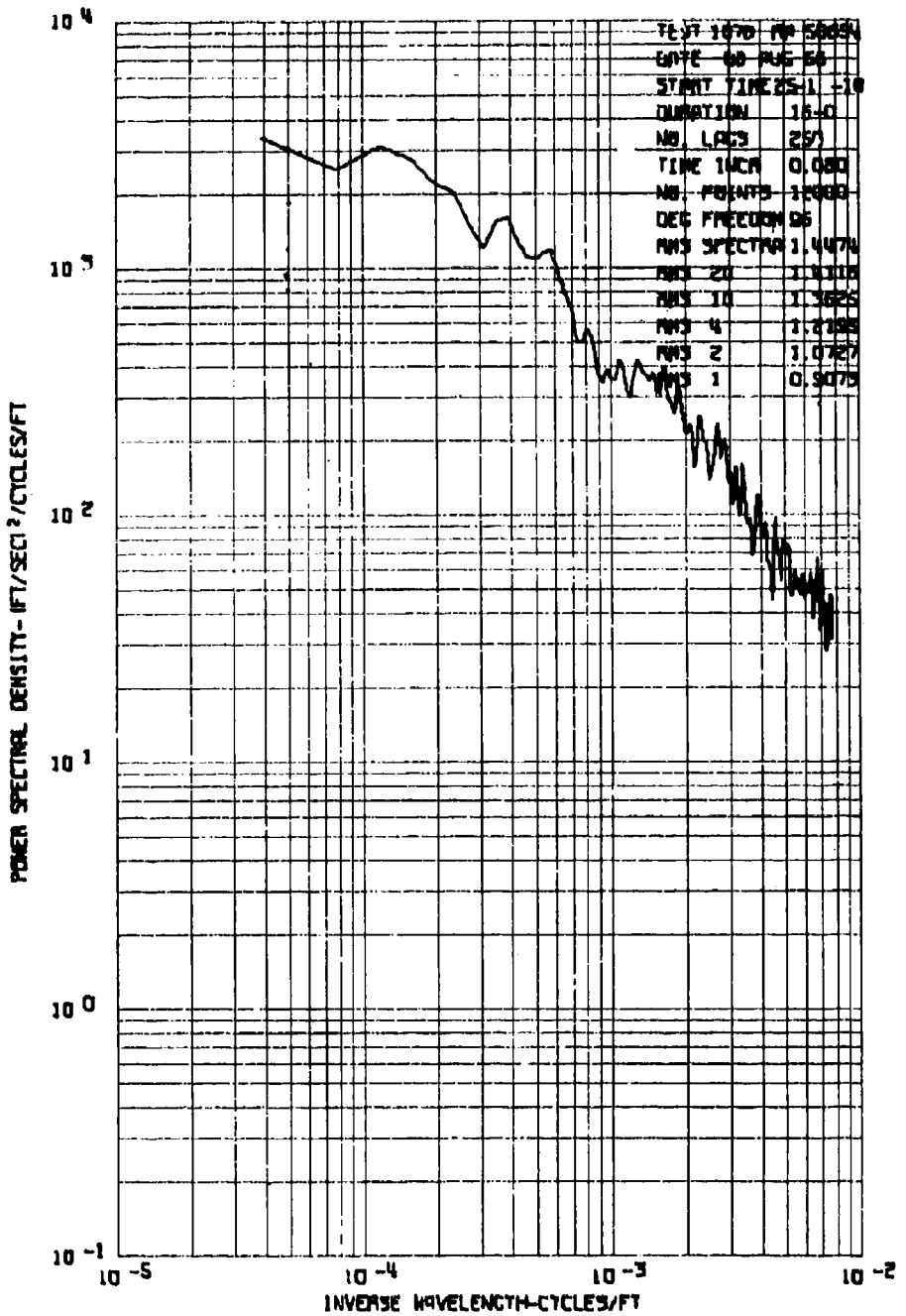


Figure 128A. Power Spectrum of Vertical Gust Velocity, Test 107, Run 8 - 250 Lags.

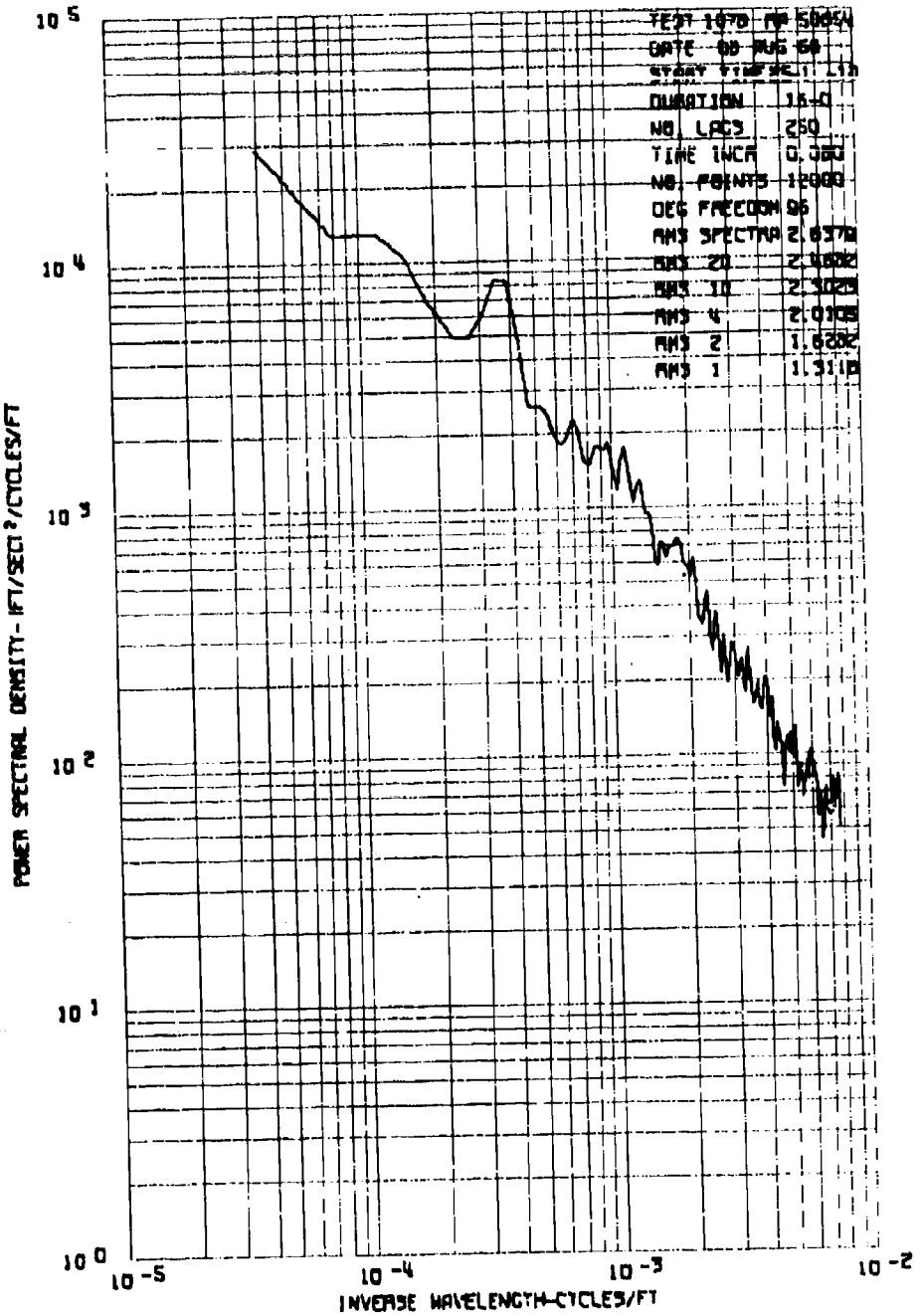


Figure 128B. Power Spectrum of Lateral Gust Velocity, Test 107, Run 3 - 250 Lags.

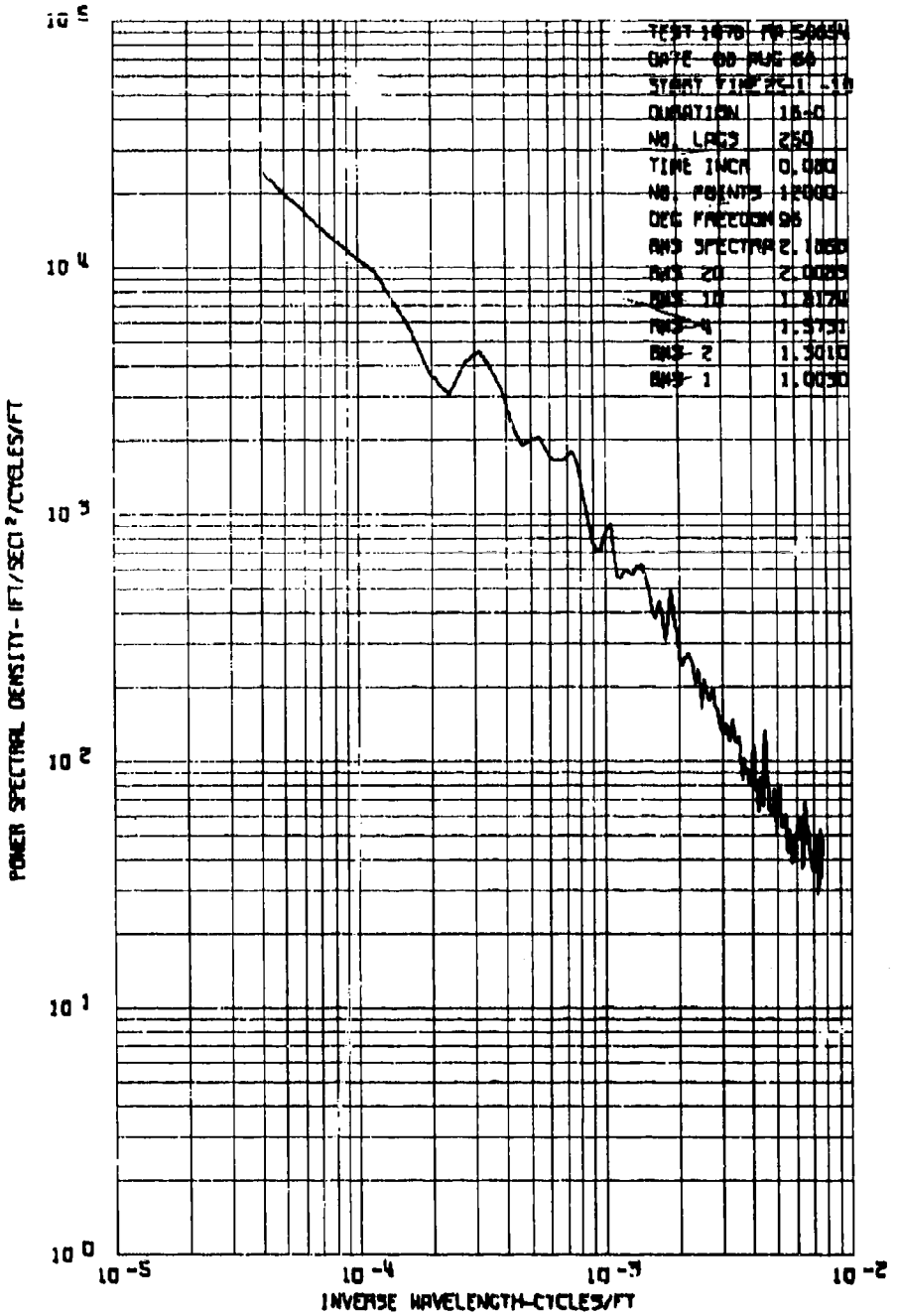


Figure 128C. Power Spectrum of Longitudinal Gust Velocity, Test 107, Run 8 - 250 Lags.

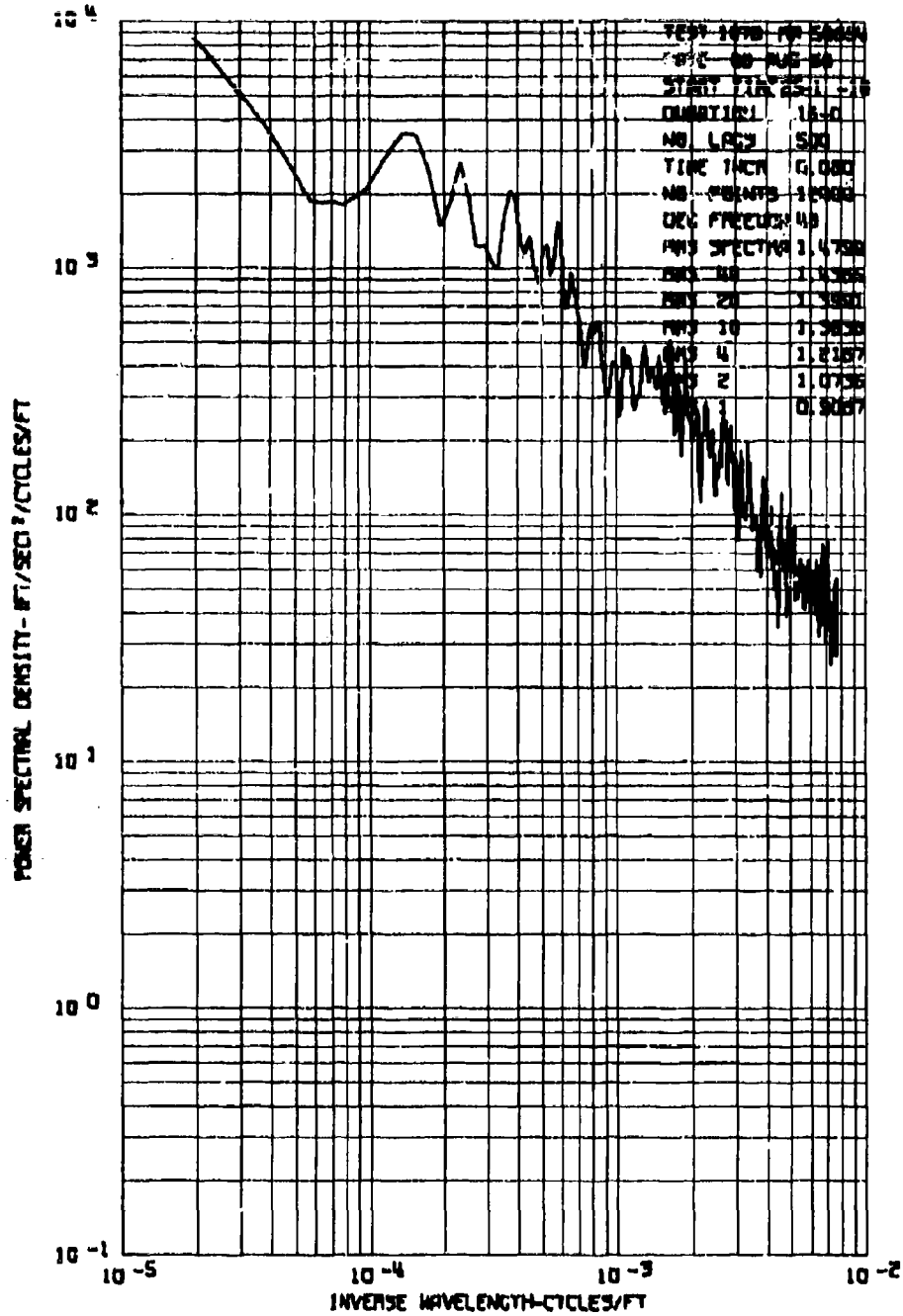


Figure 128D. Power Spectrum of Vertical Gust Velocity, Test 107, Run 8 - 500 Lags.

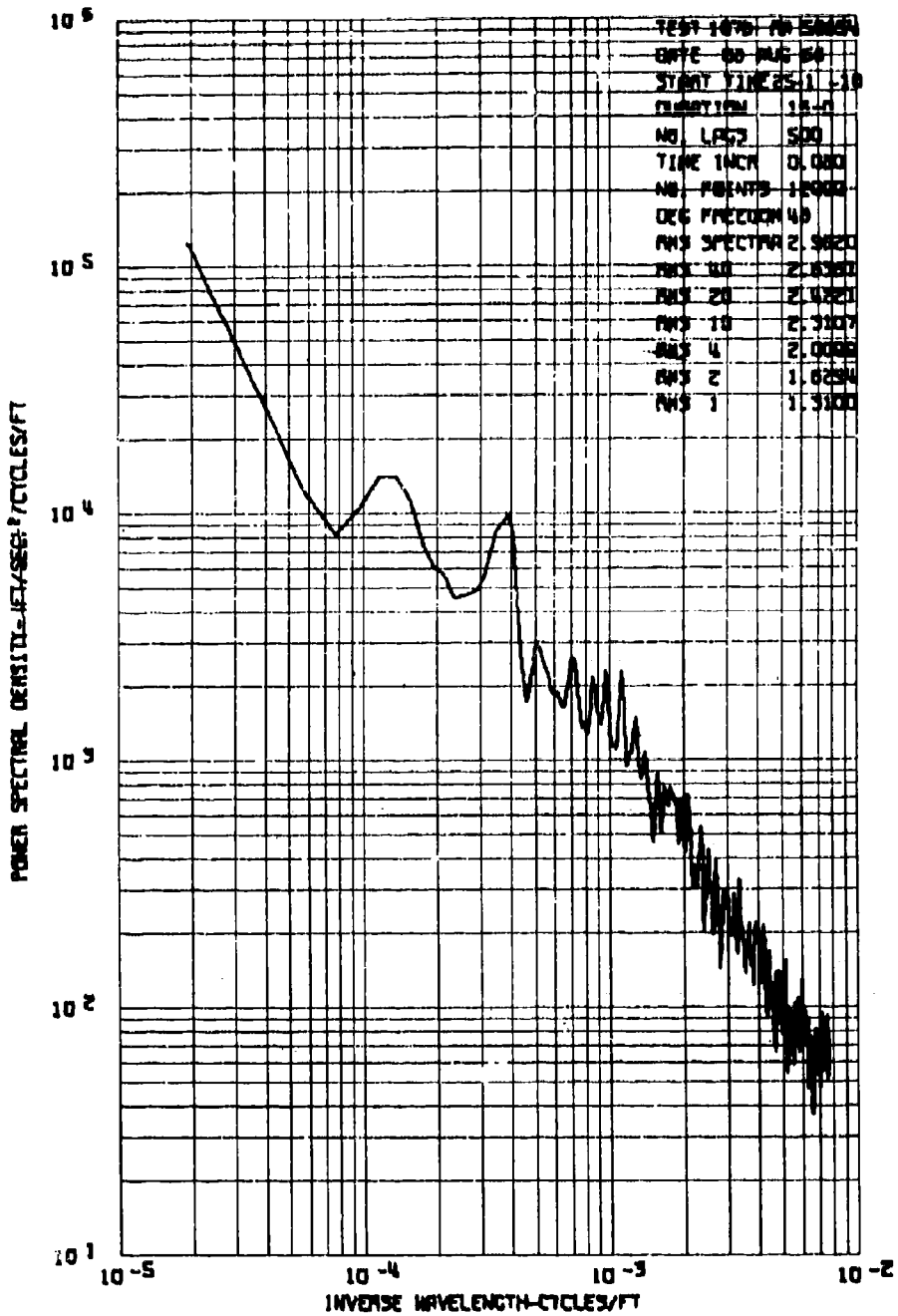


Figure 128E. Power Spectrum of Lateral Gust Velocity, Test 107, Run 8 - 500 Lags.

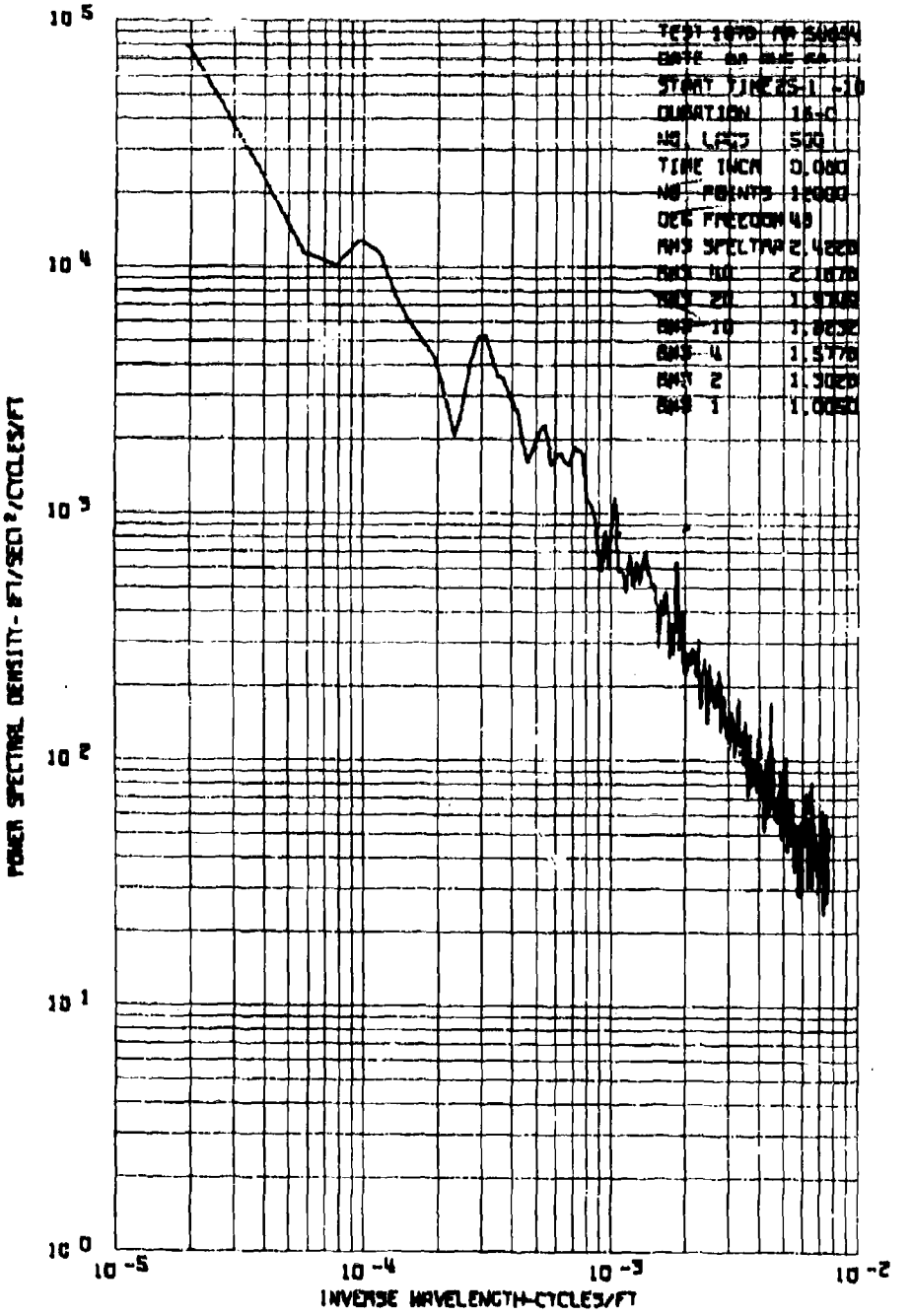


Figure 128F. Power Spectrum of Longitudinal Gust Velocity, Test 107, Run 8 - 500 Lags.

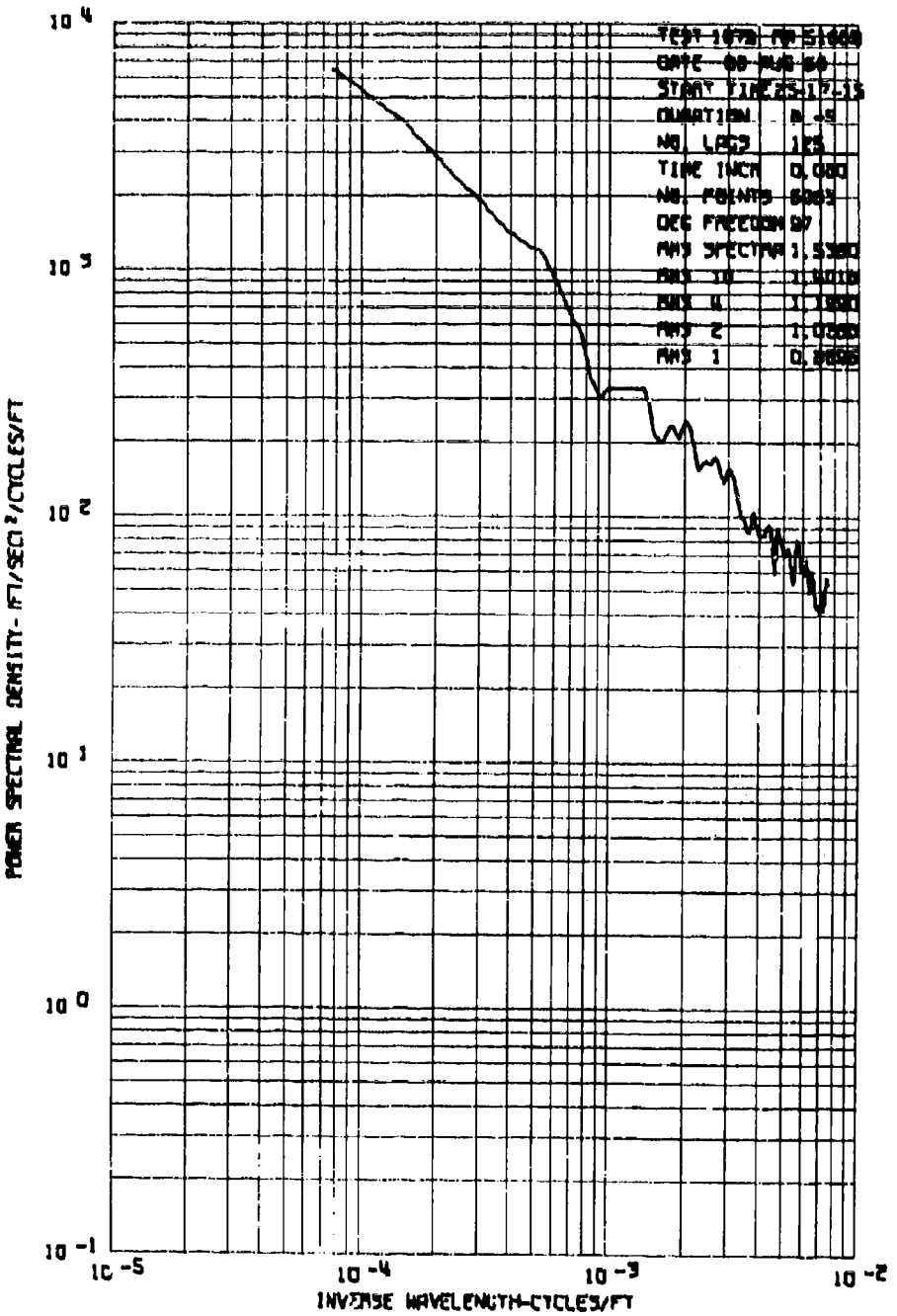


Figure 129A. Power Spectrum of Vertical Gust Velocity, Test 107, Run 9.

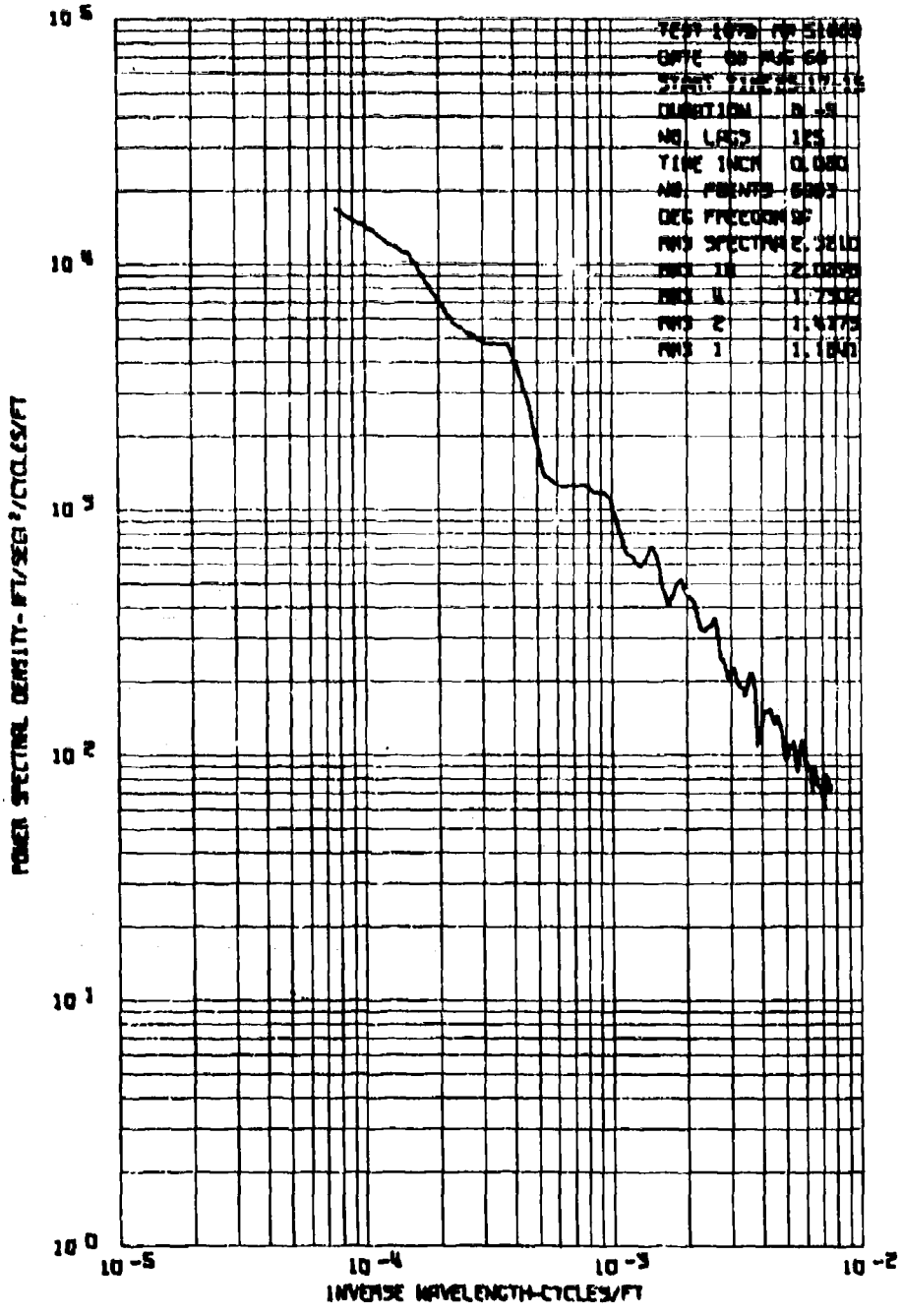


Figure 129B. Power Spectrum of Lateral Gust Velocity, Test 107, Run 9.

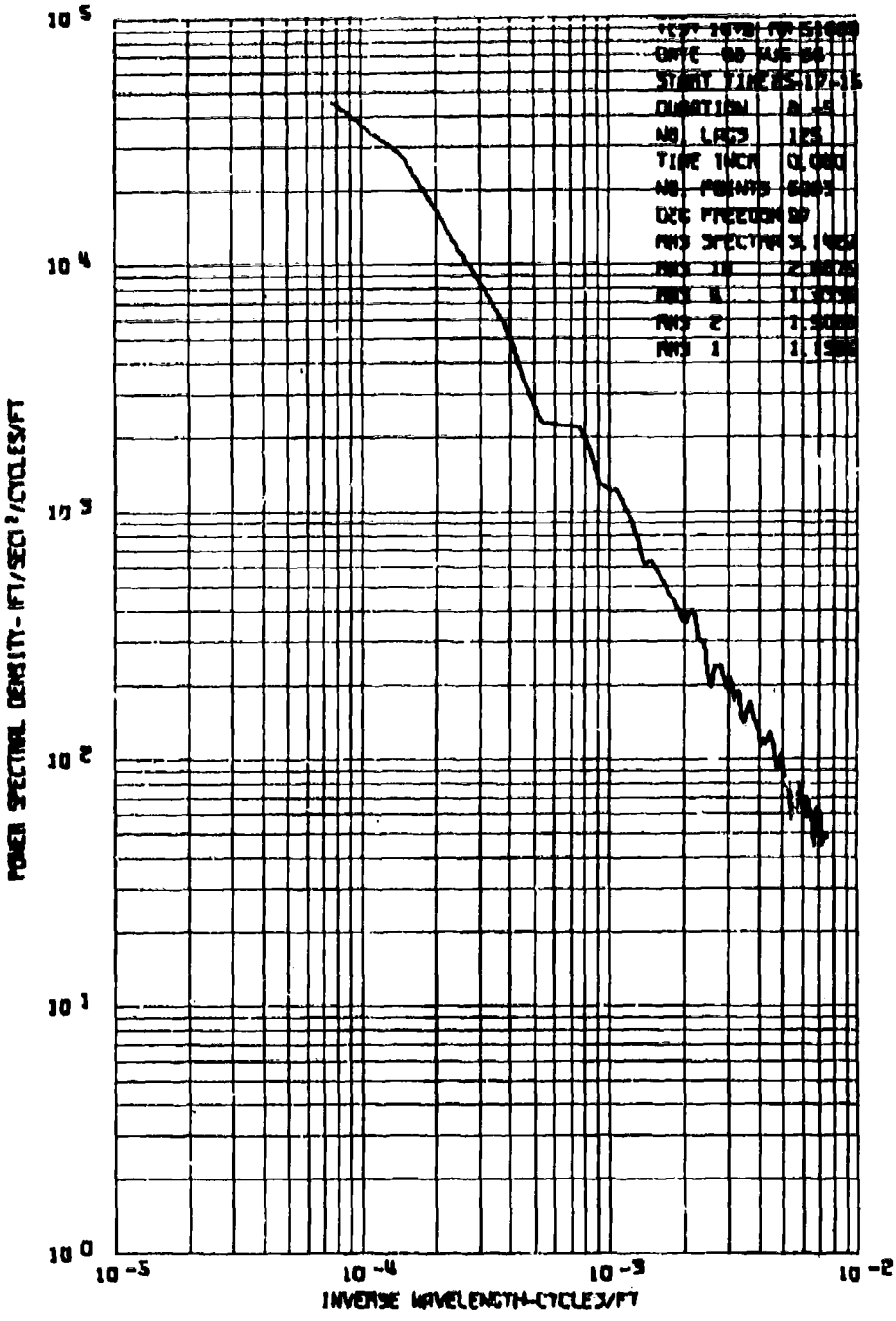


Figure 129C. Power Spectrum of Longitudinal Gust Velocity, Test 107, Run 9.

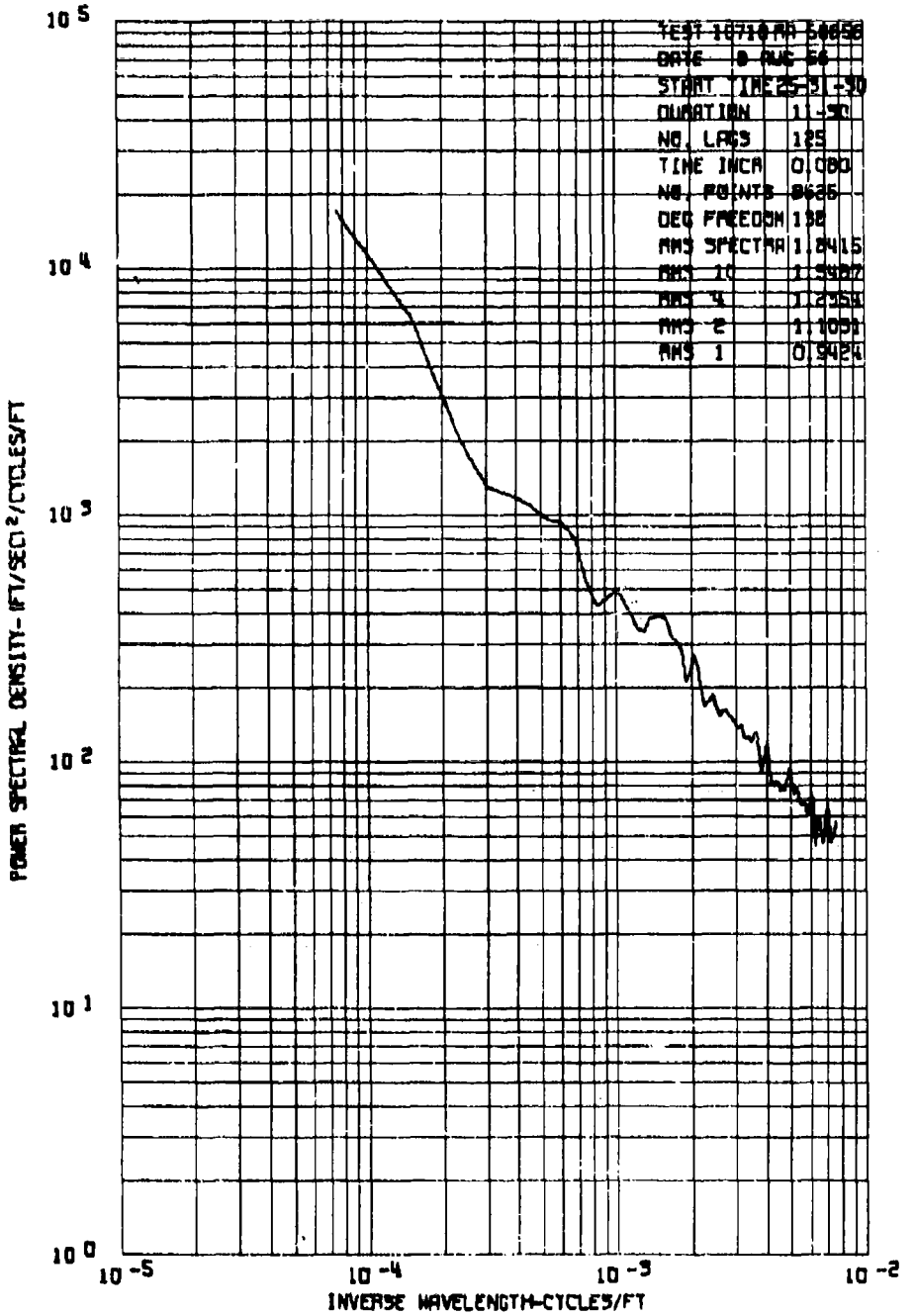


Figure 130A. Power Spectrum of Vertical Gust Velocity, Test 107, Run 10.

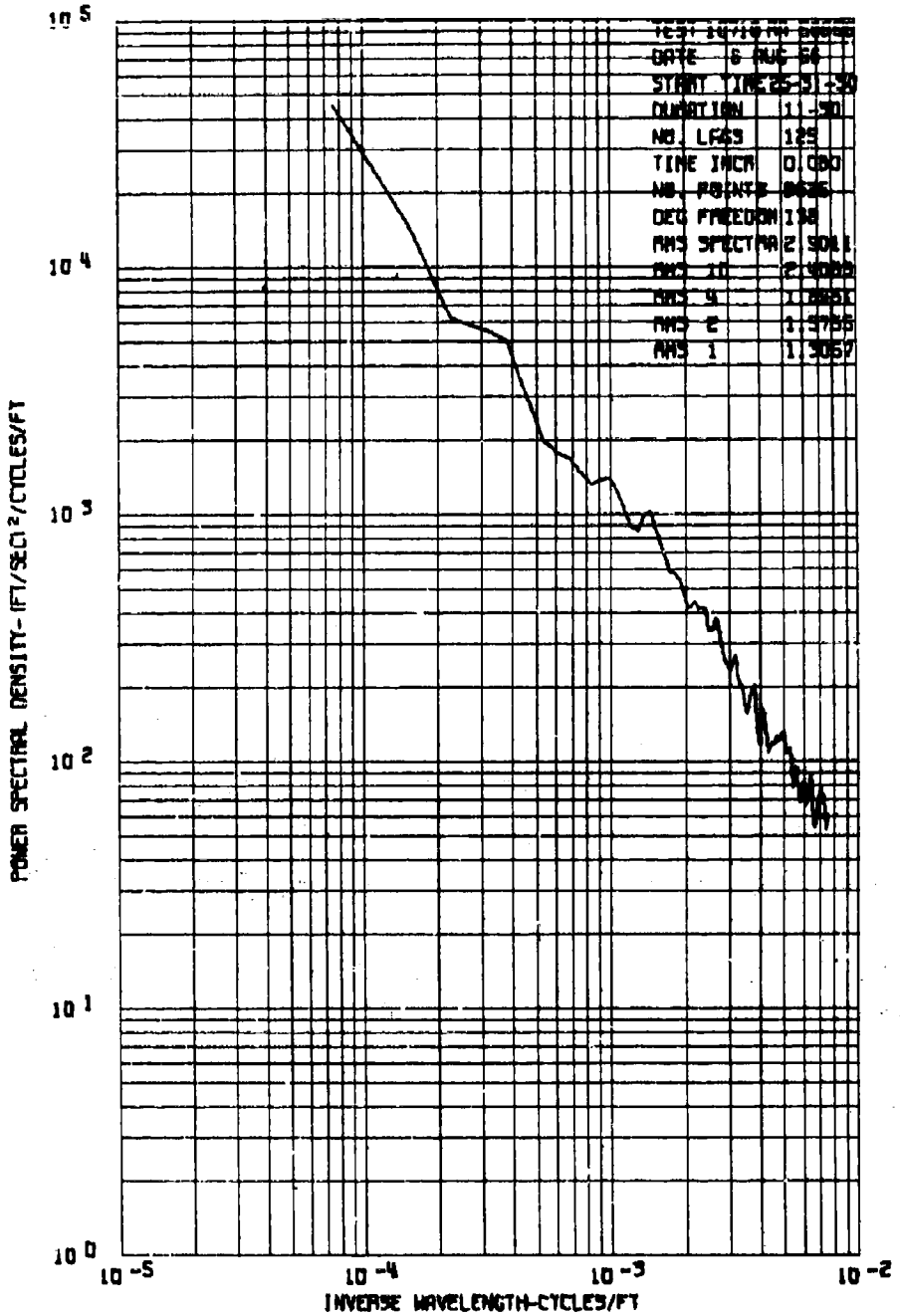


Figure 130B. Power Spectrum of Lateral Gust Velocity, Test 107, Run 10.

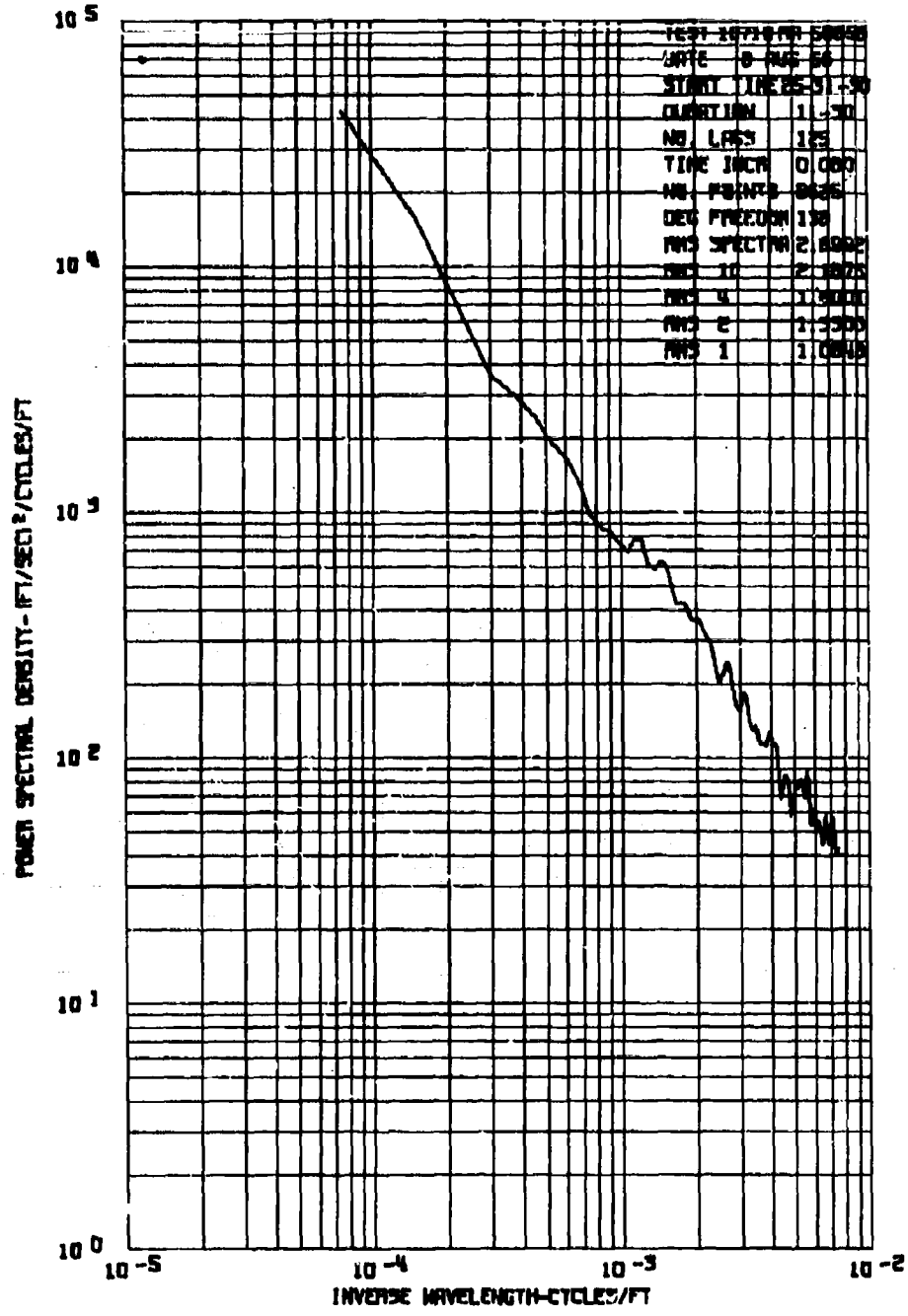


Figure 130C. Power Spectrum of Longitudinal Gust Velocity, Test 107, Run 10.

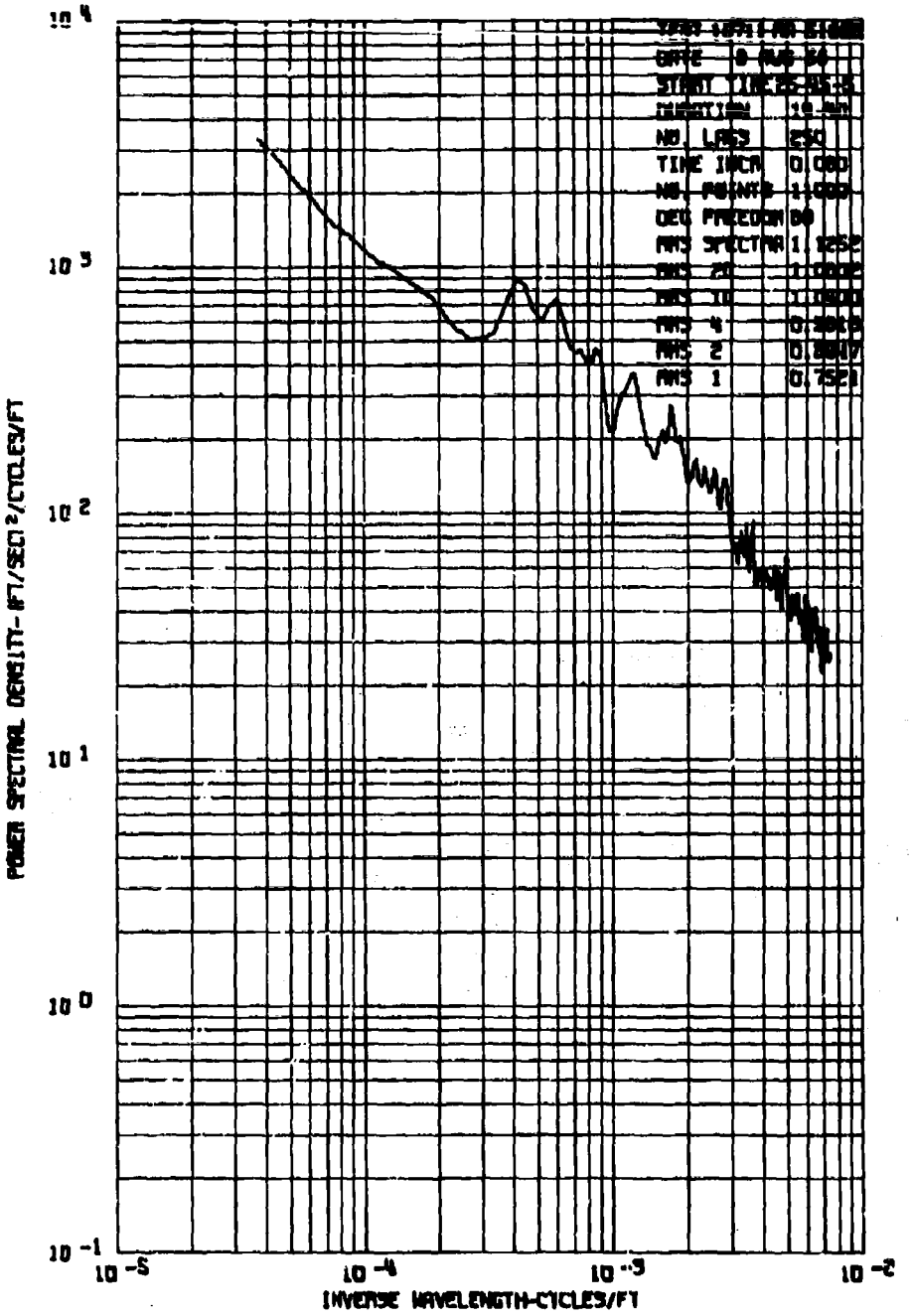


Figure 131A. Power Spectrum of Vertical Gust Velocity, Test 107, Run 11.

Appendix VII

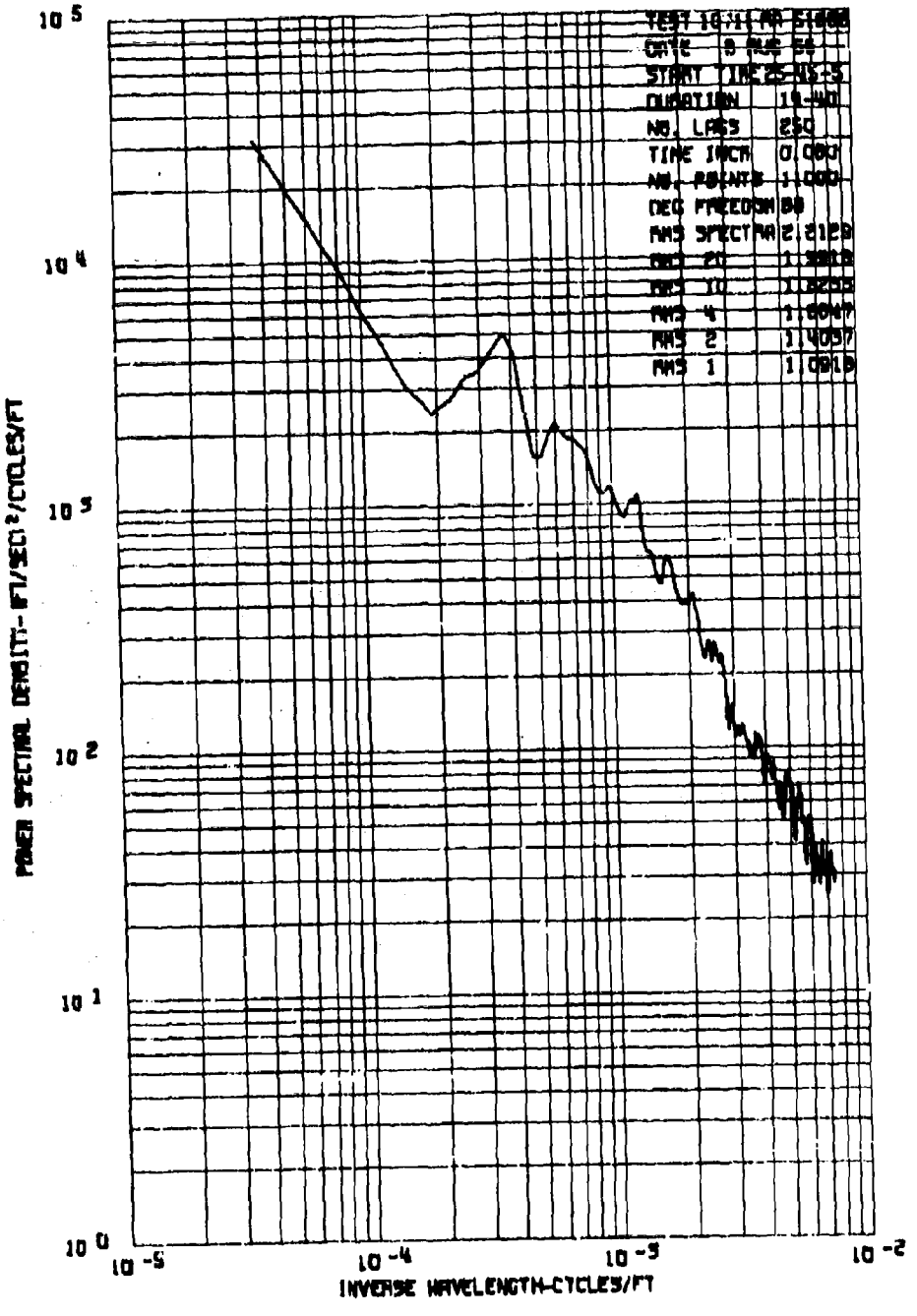


Figure 131B. Power Spectrum of Lateral Gust Velocity, Test 107, Run 11.

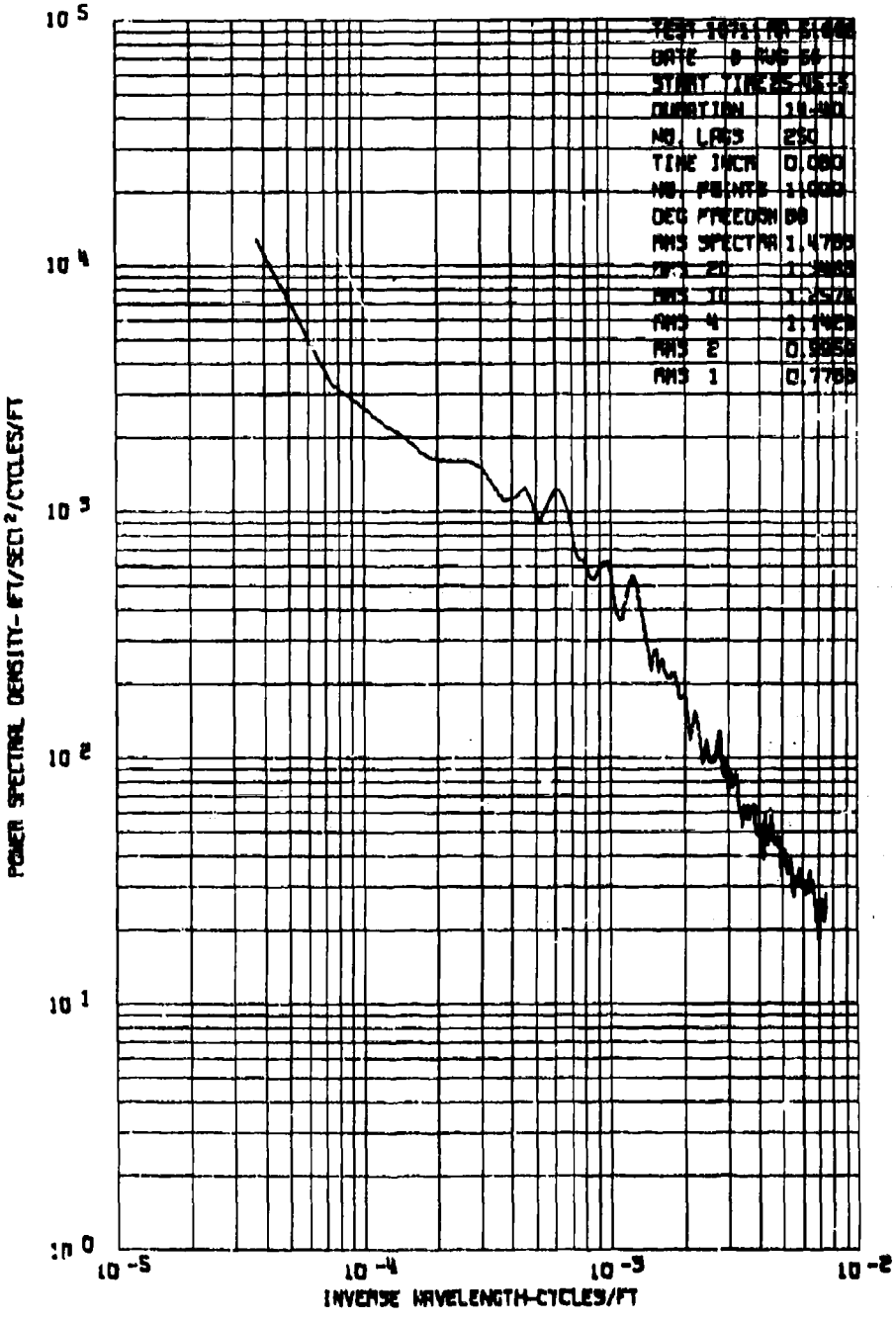


Figure 131C. Power Spectrum of Longitudinal Gust Velocity, Test 107, Run 11.

Appendix VII

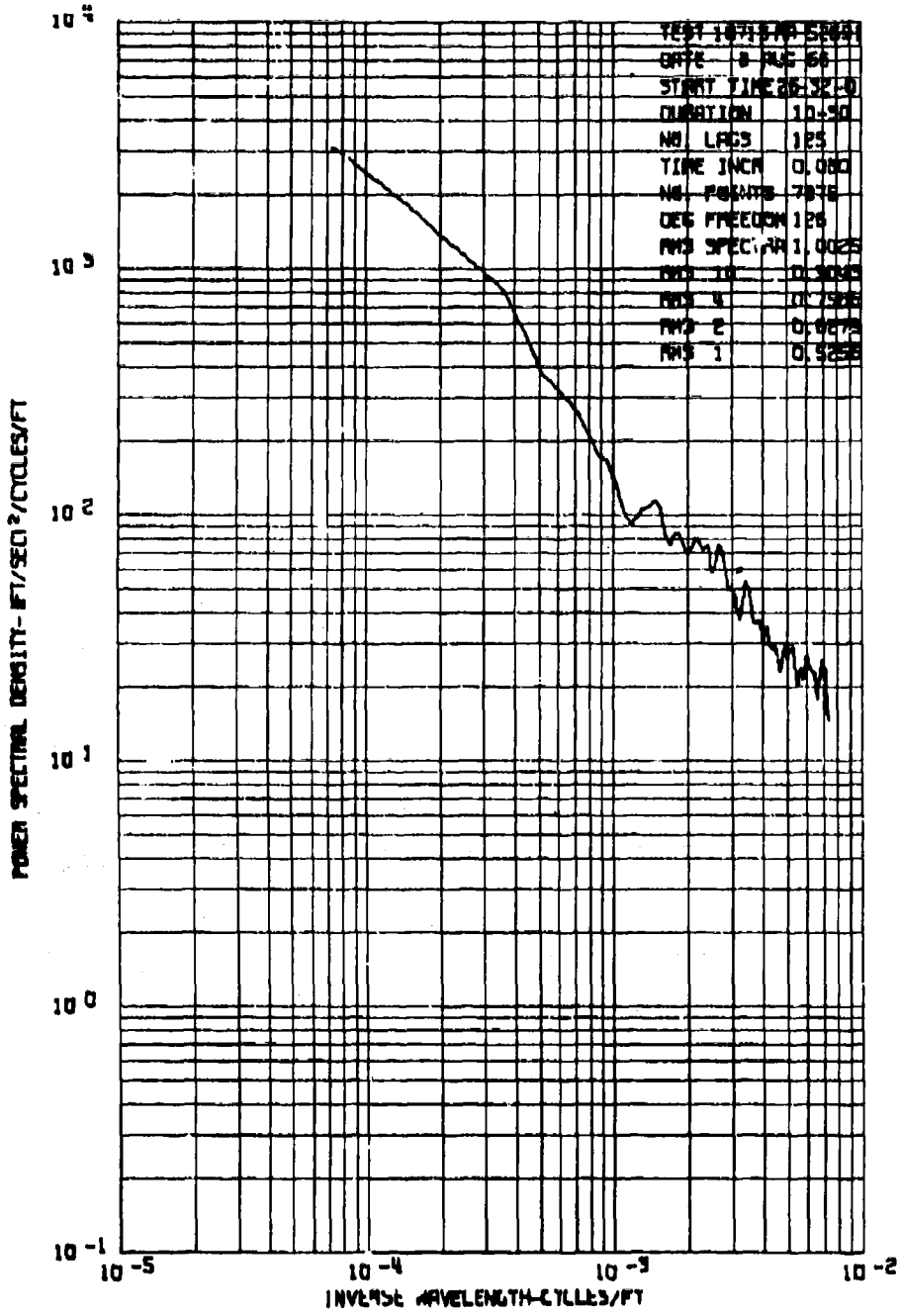


Figure 132A. Power Spectrum of Vertical Gust Velocity, Test 107, Run 13.

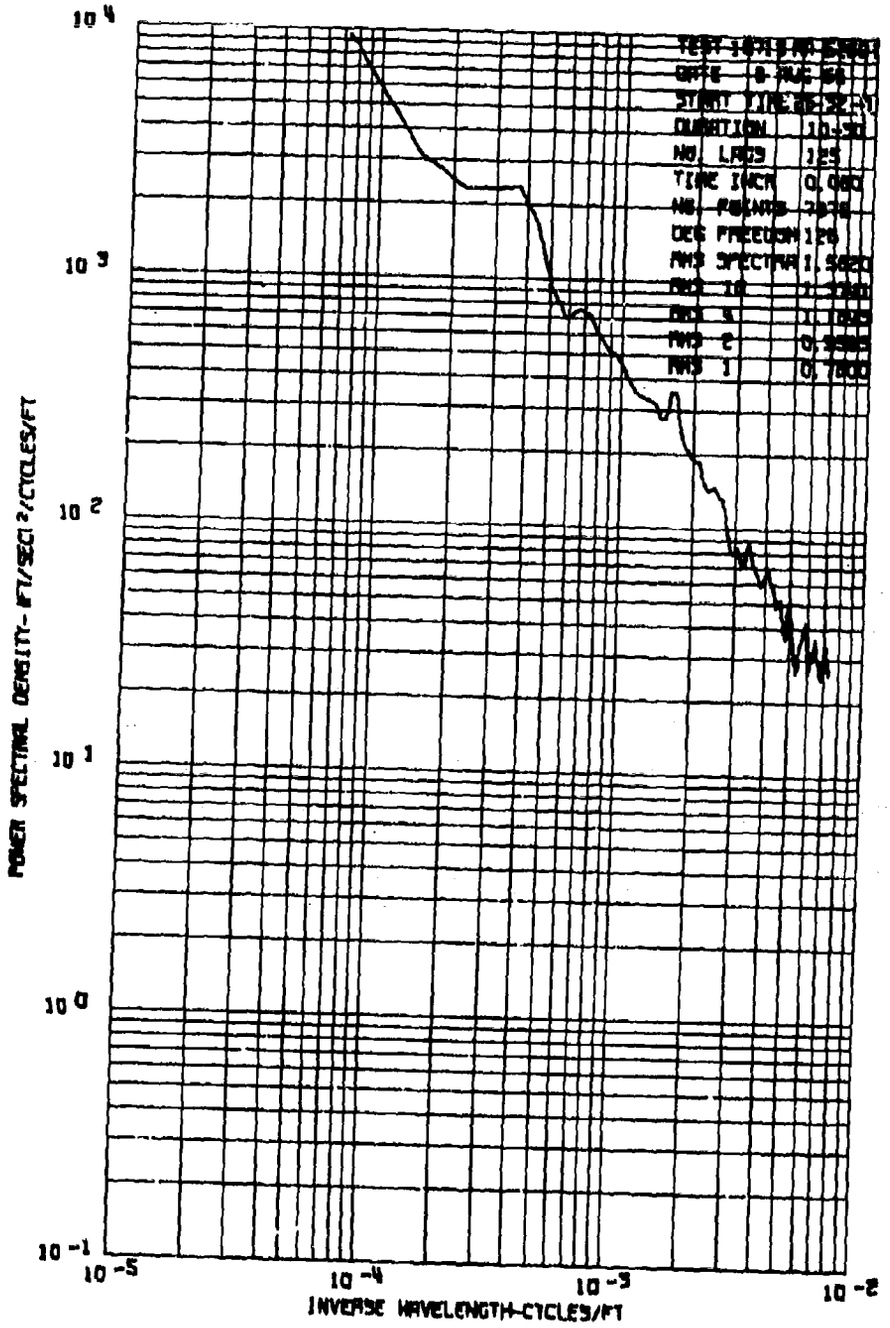


Figure 132B. Power Spectrum of Lateral Gust Velocity, Test 107, Run 13.

Appendix VII

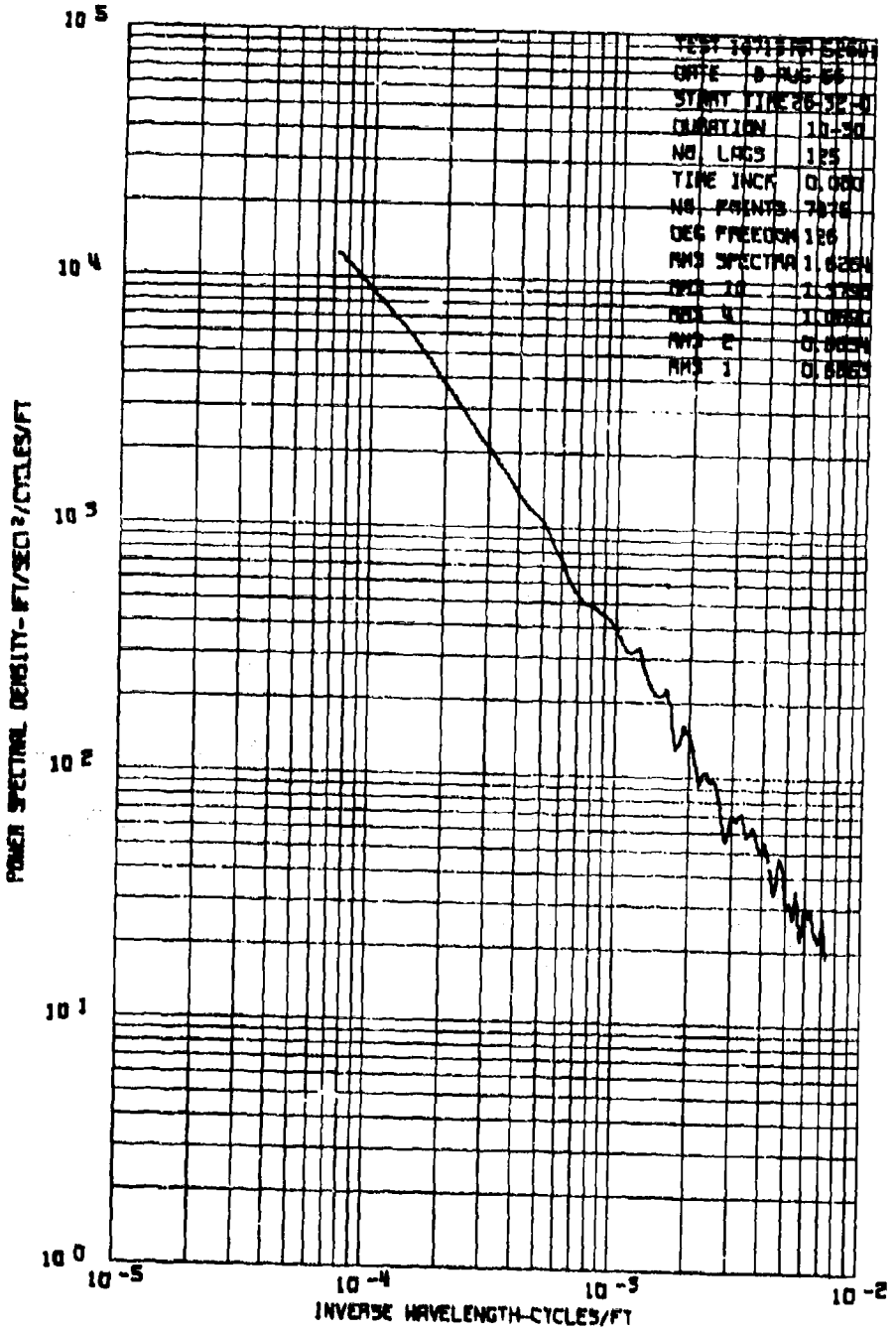


Figure 132C. Power Spectrum of Longitudinal Gust Velocity, Test 107, Run 13.

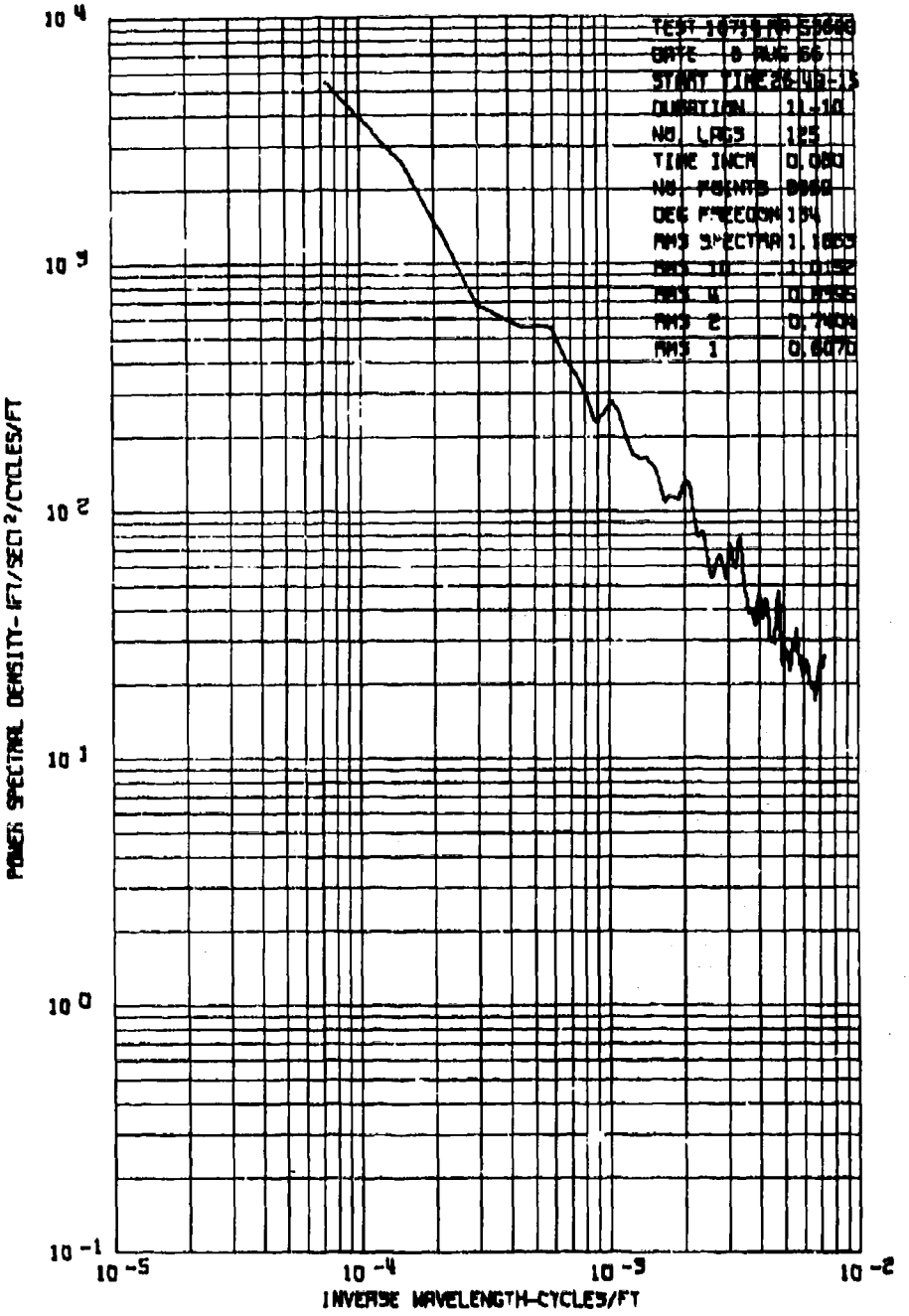


Figure 133A. Power Spectrum of Vertical Gust Velocity, Test 107, Run 14.

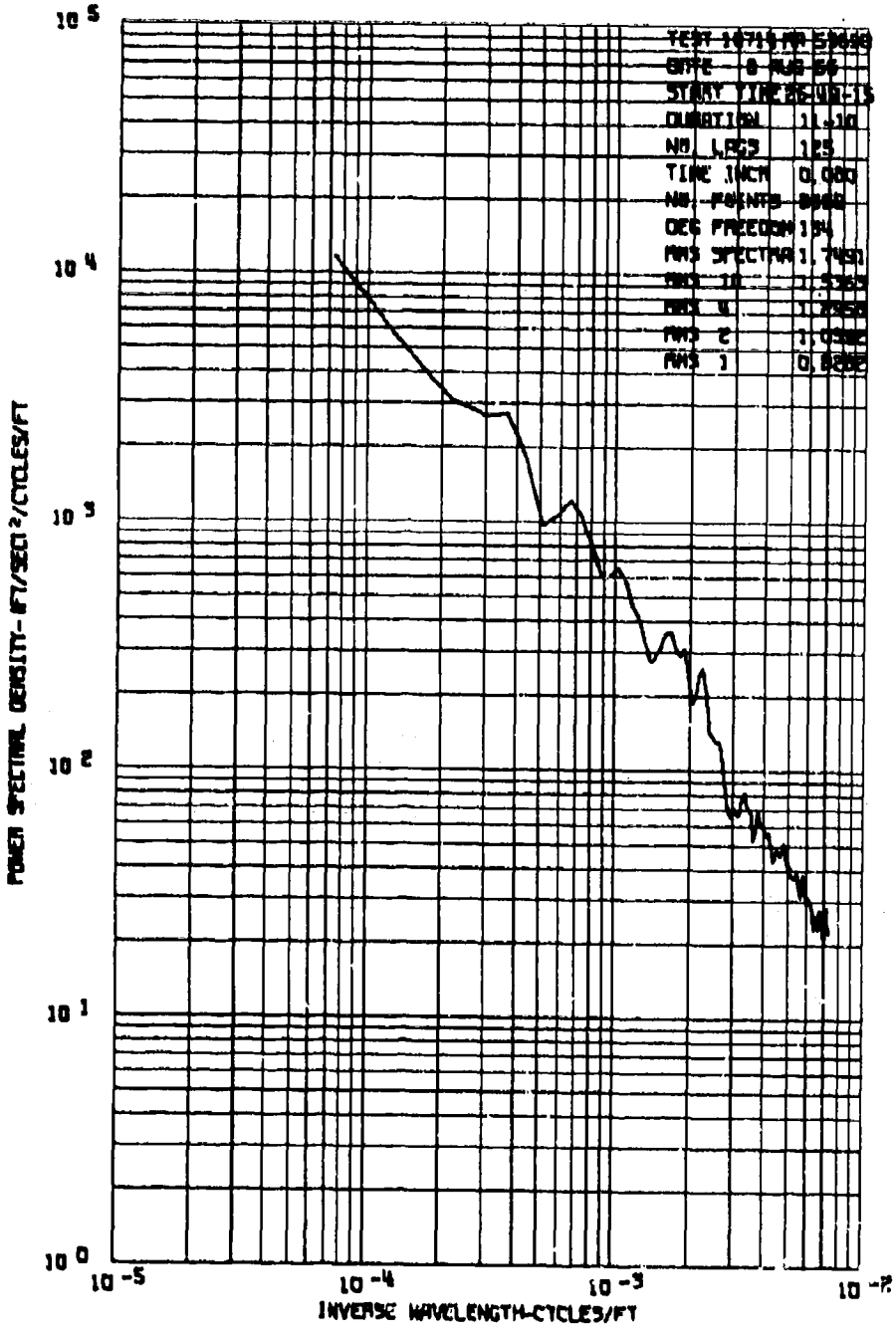


Figure 133B. Power Spectrum of Lateral Gust Velocity, Test 107, Run 14.

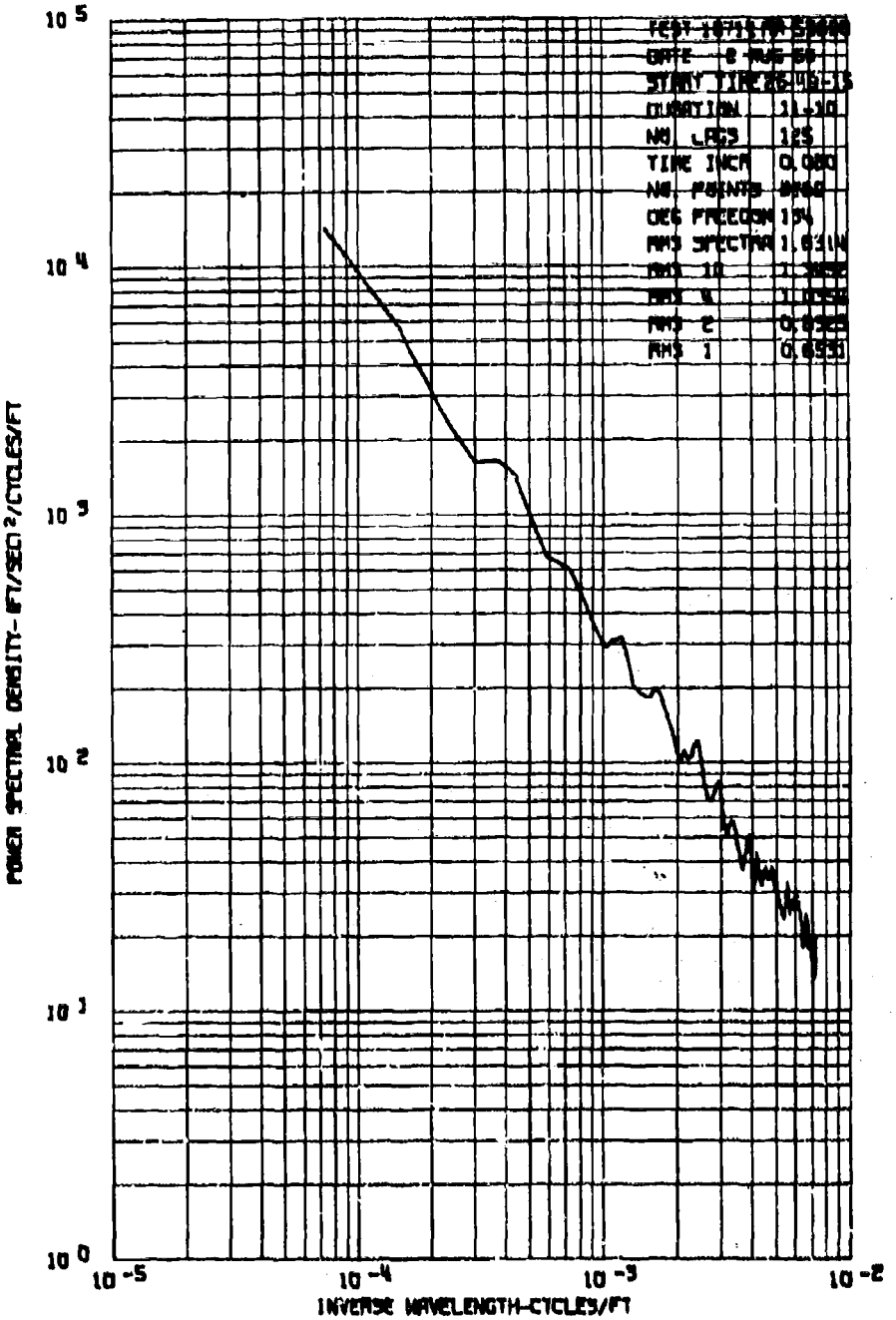


Figure 133C. Power Spectrum of Longitudinal Gust Velocity, Test 107, Run 14.

Appendix VII

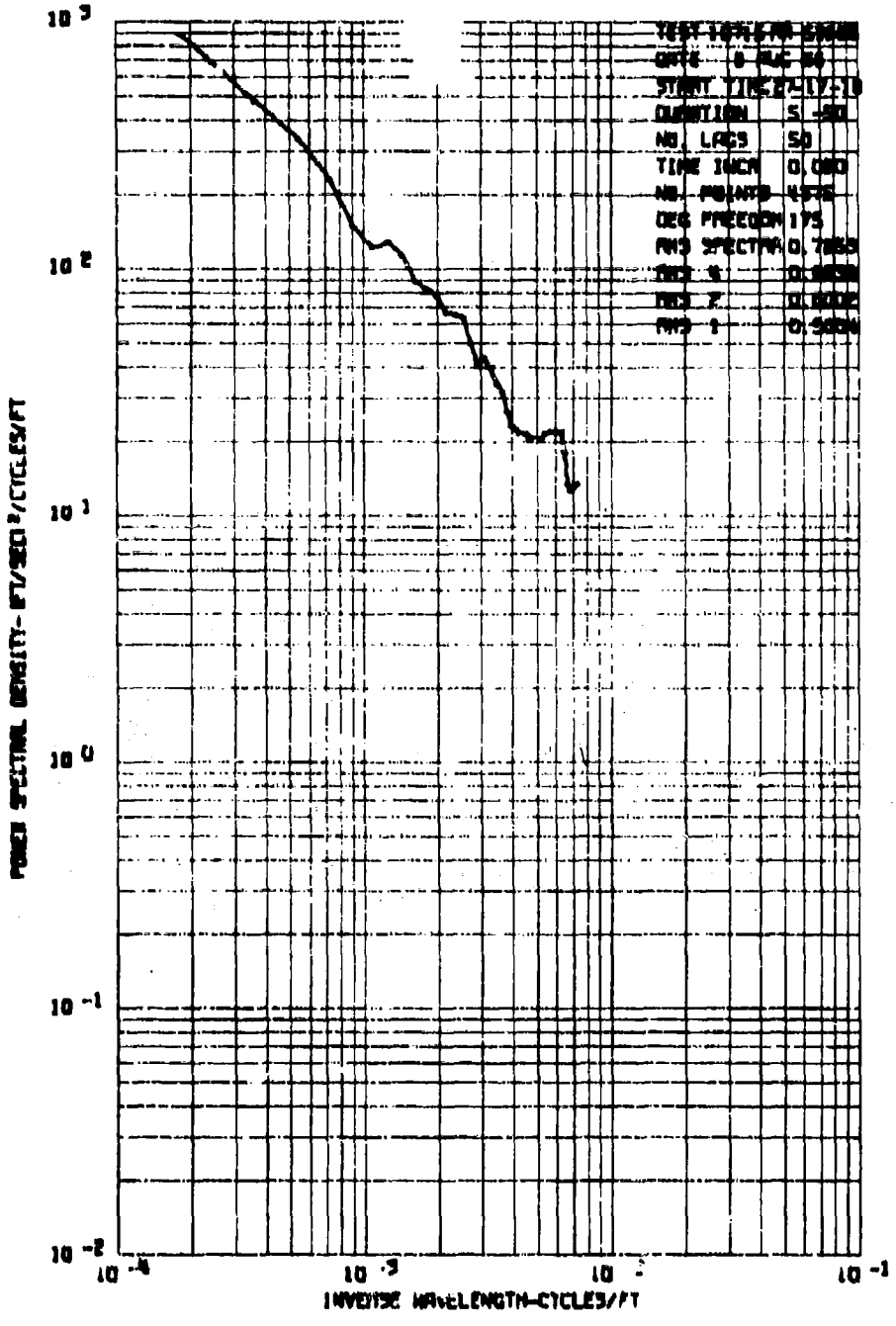


Figure 130A. Power Spectrum of Vertical Gust Velocity, Test 107, Run 15.

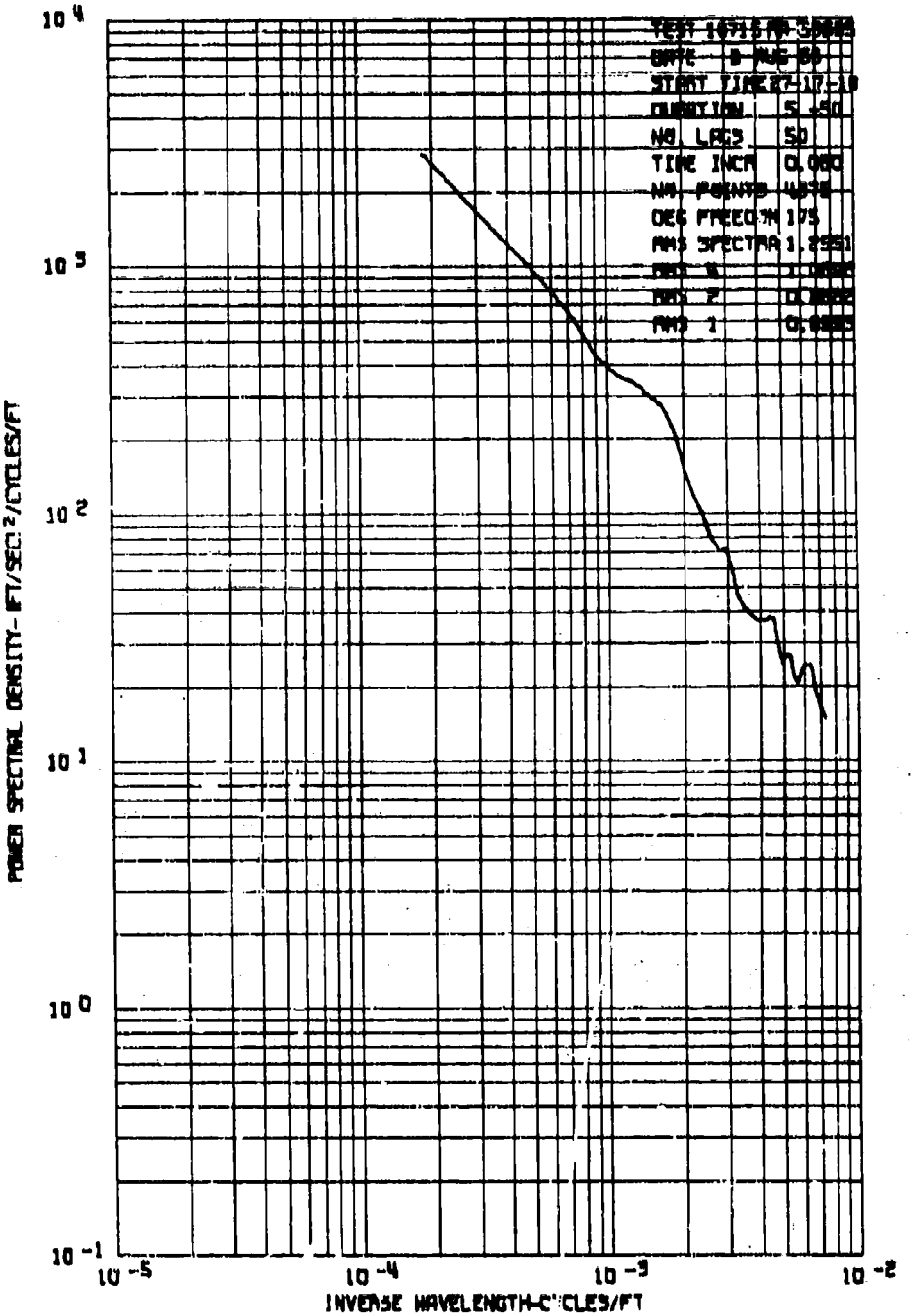


Figure 134B. Power Spectrum of Lateral Gust Velocity, Test 107, Run 15.

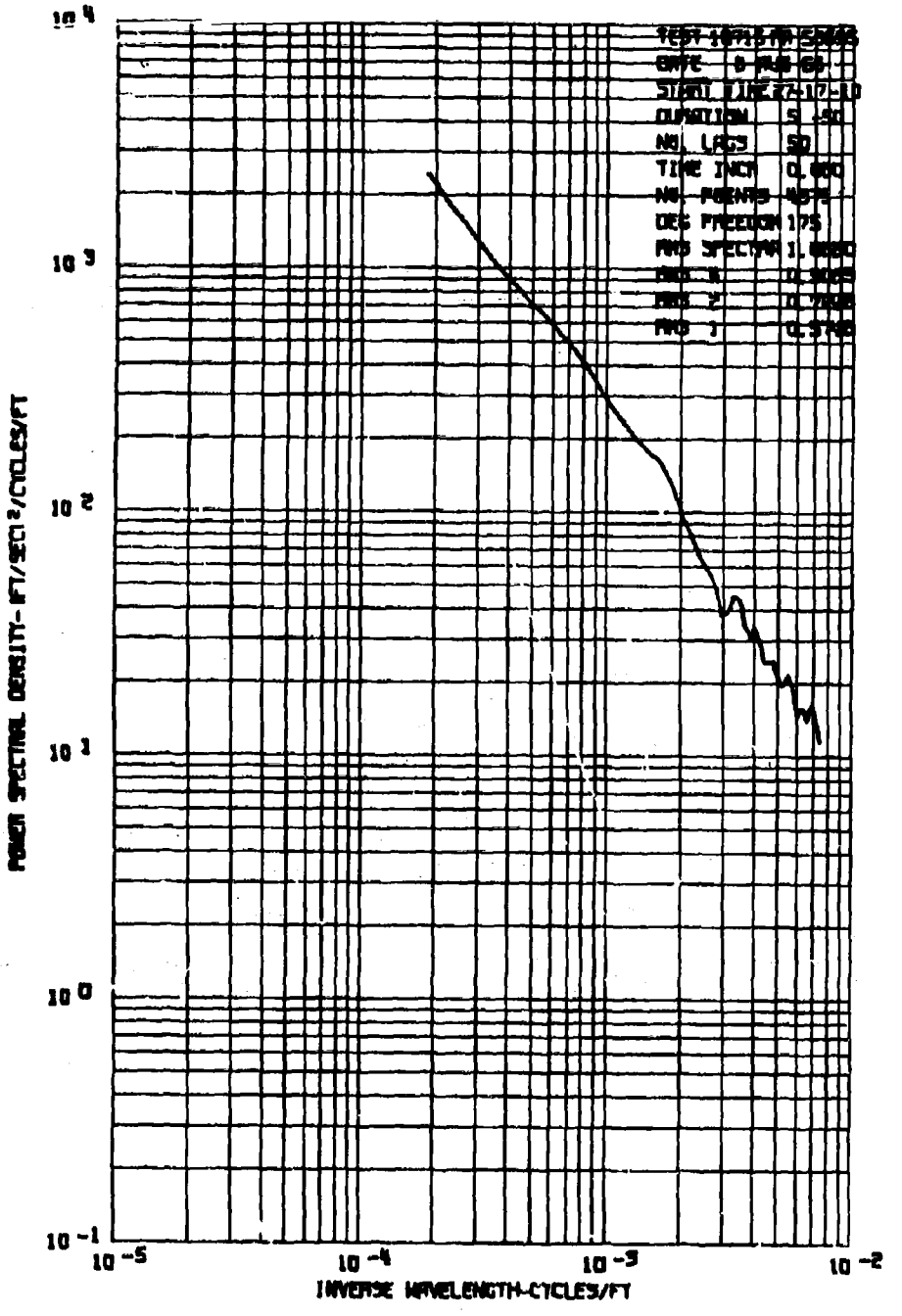


Figure 134C. Power Spectrum of Longitudinal Gust Velocity, Test 107, Run 15.

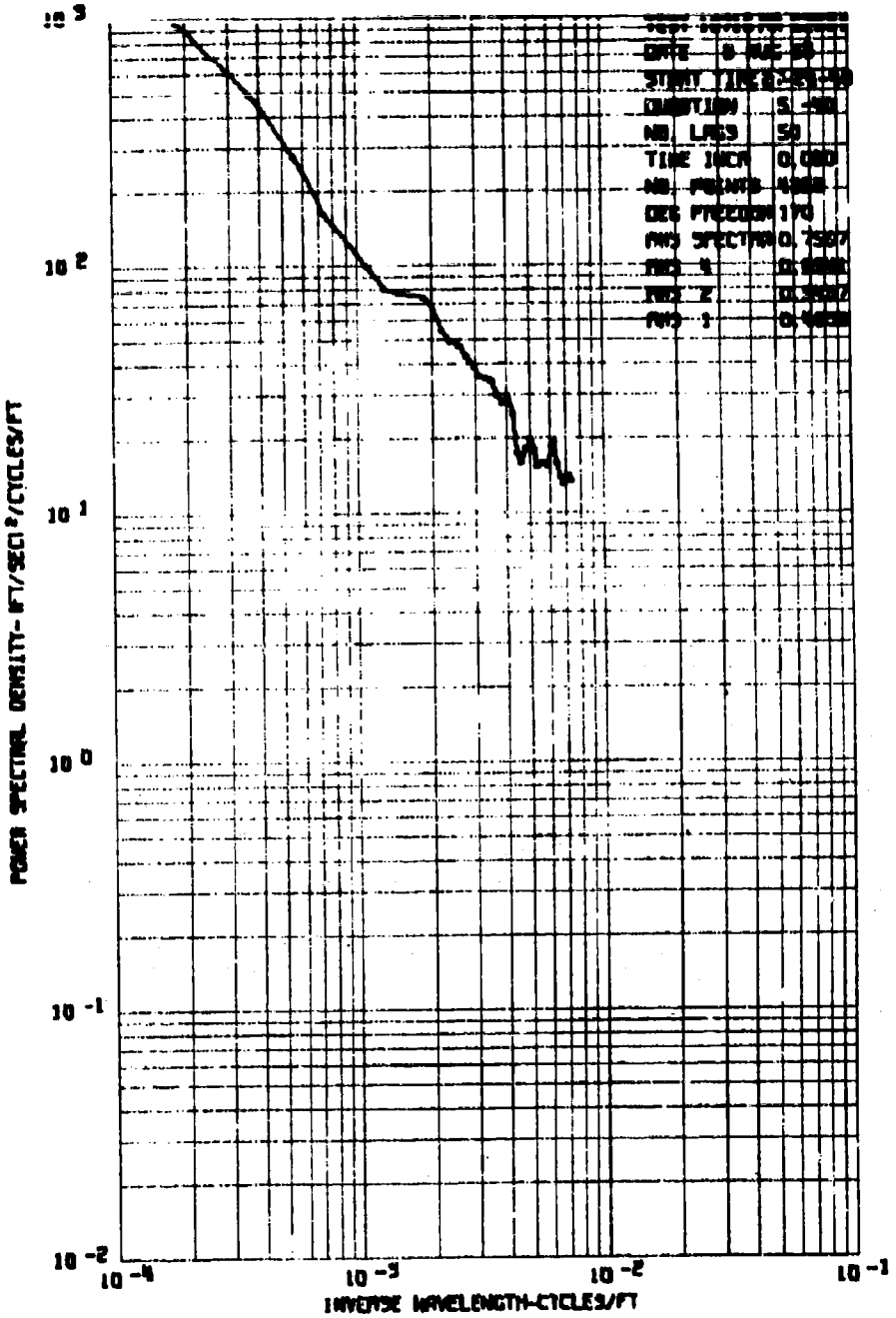


Figure 135A. Power Spectrum of Vertical Gust Velocity, Test 107, Run 16.

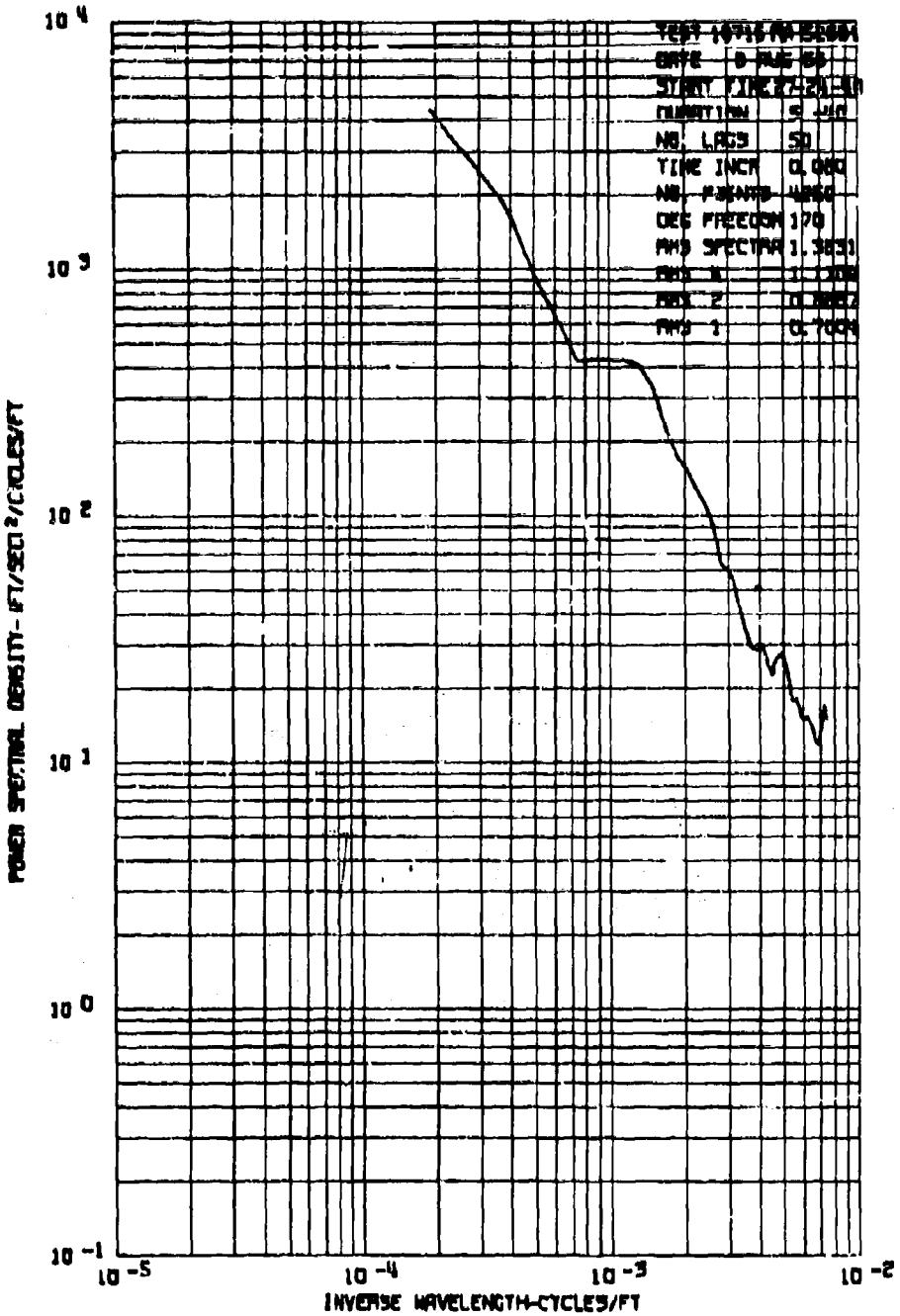


Figure 135B. Power Spectrum of Lateral Gust Velocity, Test 107, Run 16.

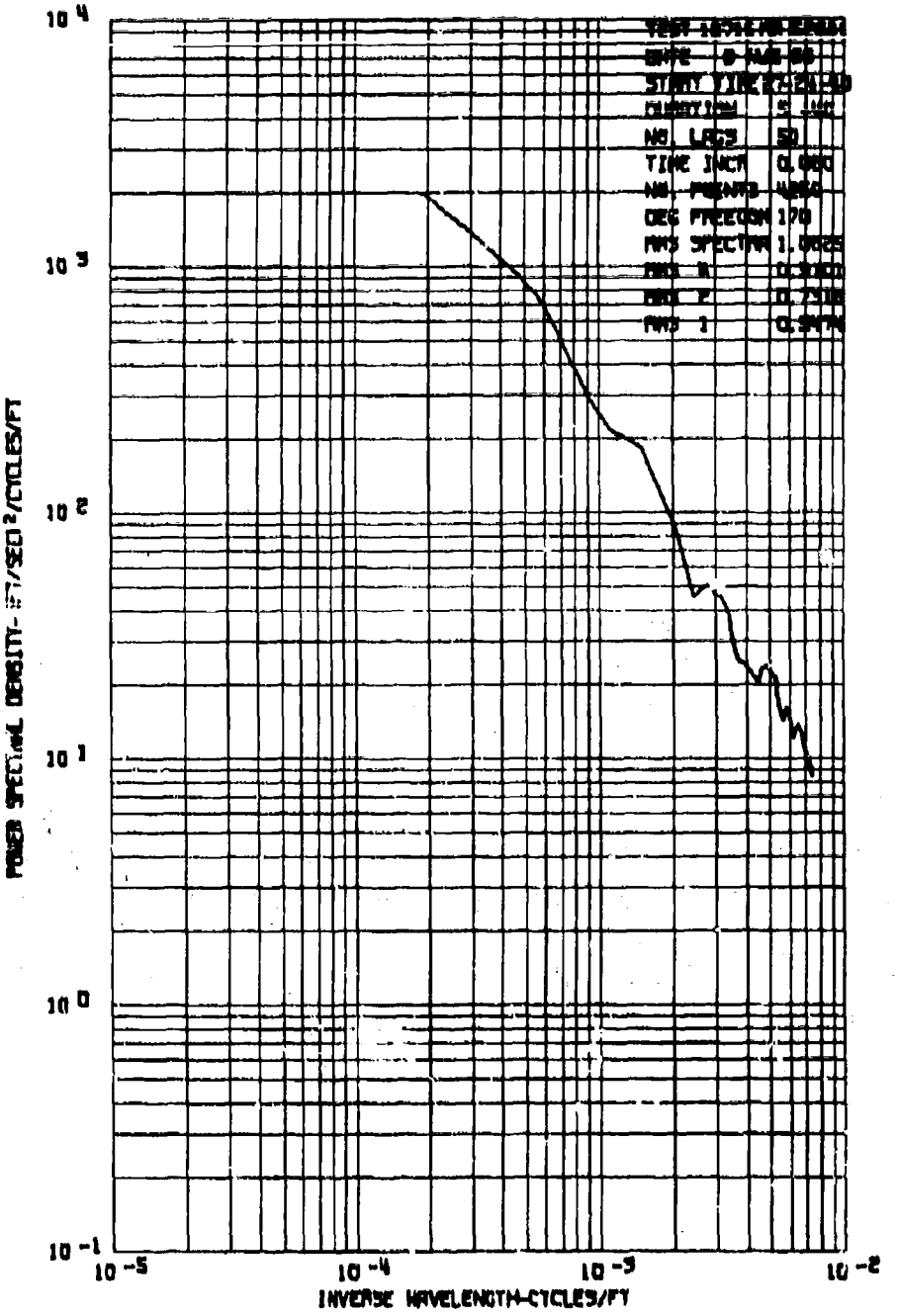


Figure 135C. Power Spectrum of Longitudinal Gust Velocity, Test 107, Run 16.

Appendix VII

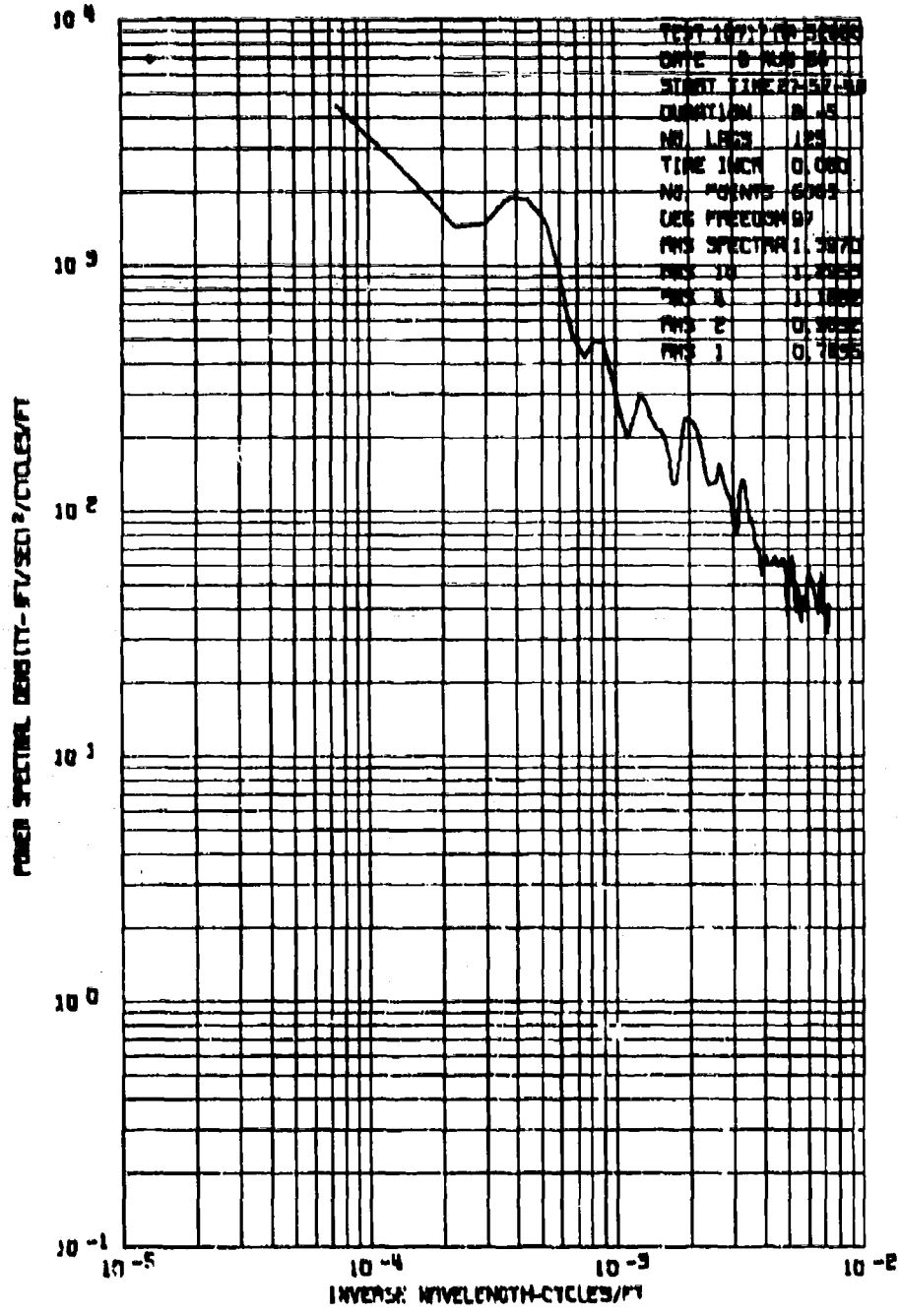


Figure 136A. Power Spectrum of Vertical Gust Velocity, Test 107, Run 17.

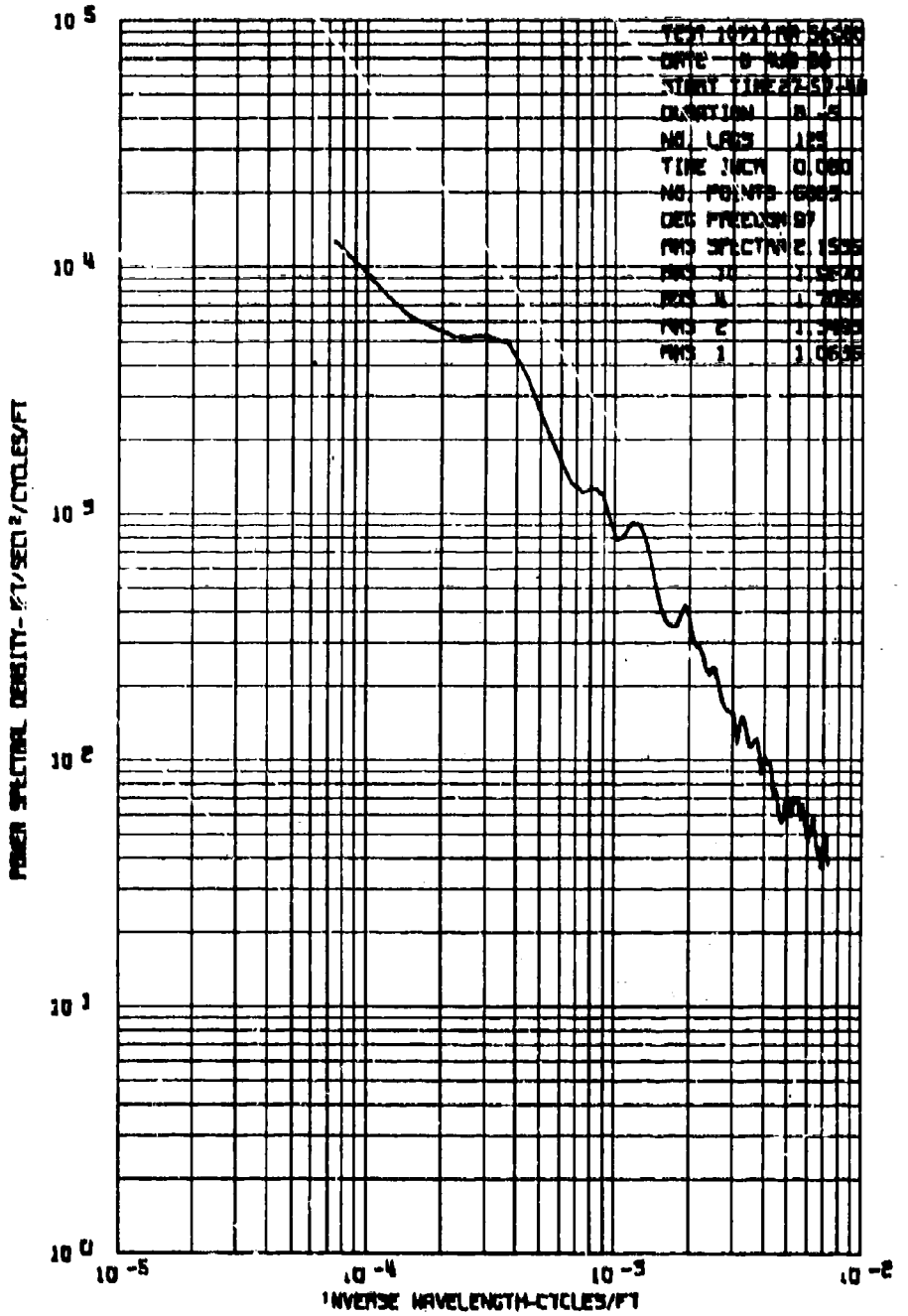


Figure 136B. Power Spectrum of Lateral Gust Velocity, Test 107, Run 17.

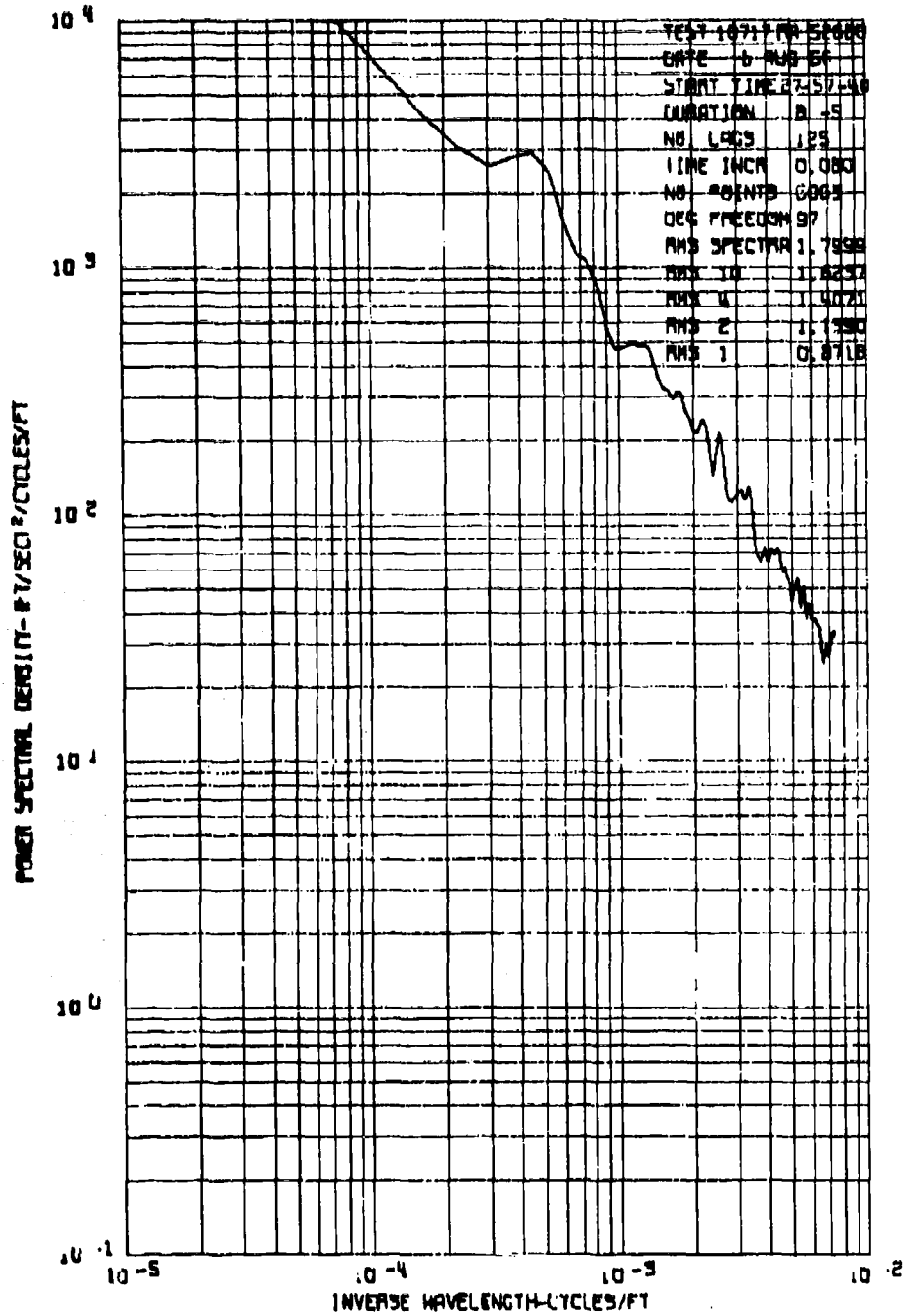


Figure 136C. Power Spectrum of Longitudinal Gust Velocity, Test 107, Run 17.

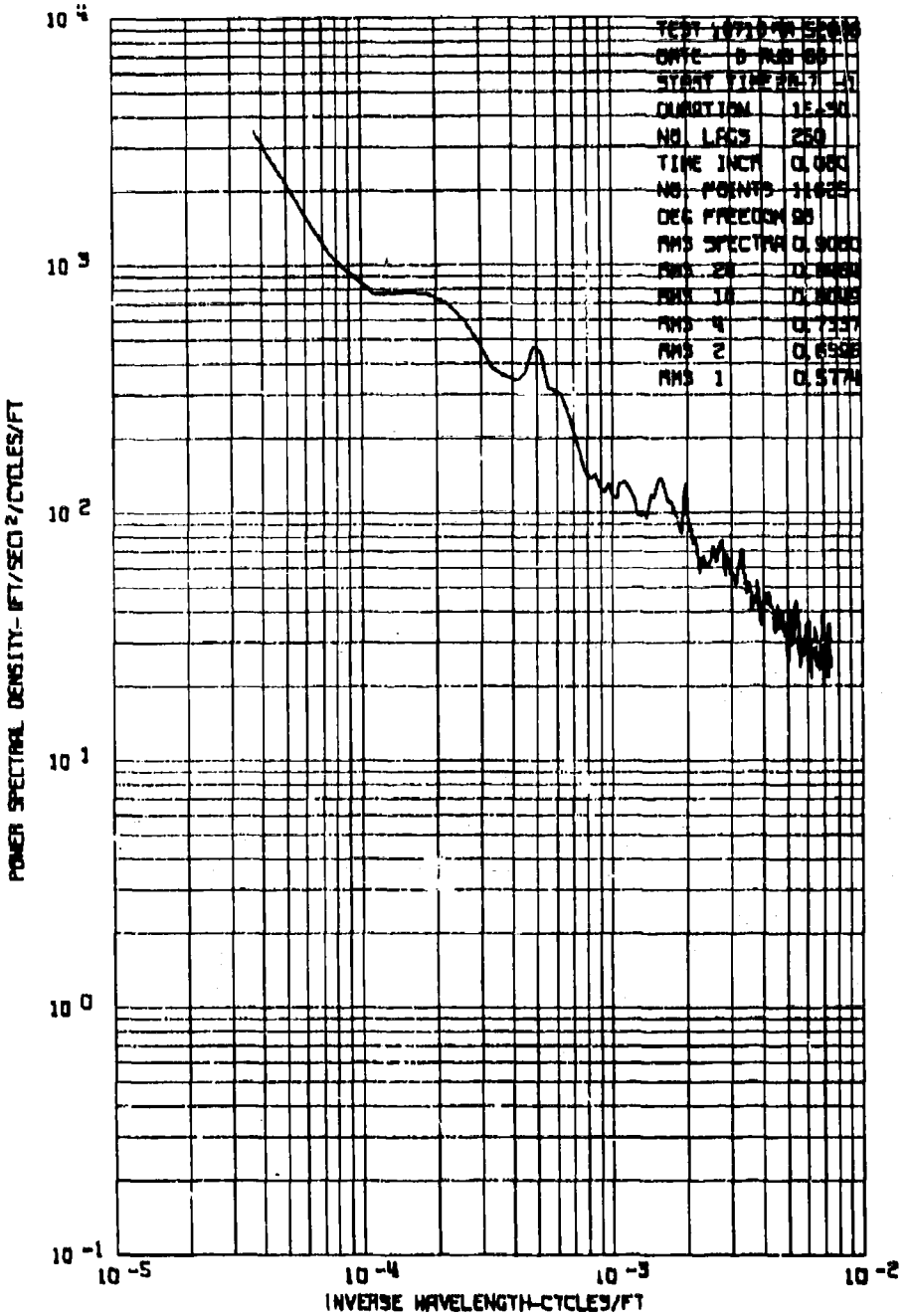


Figure 137A. Power Spectrum of Vertical Gust Velocity, Test 107, Run 18 - 250 Lags.

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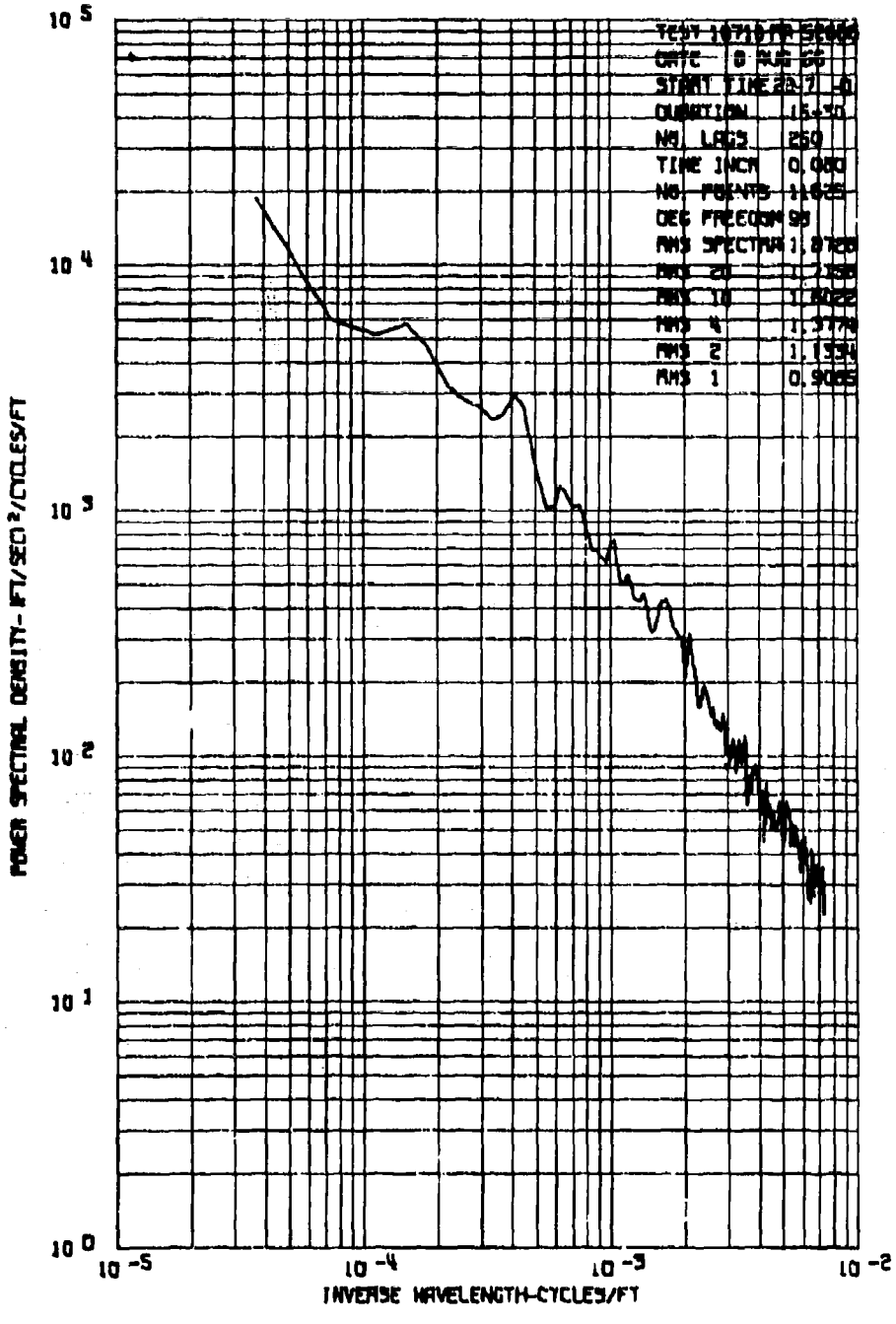


Figure 137B. Power Spectrum of Lateral Gust Velocity, Test 107, Run 18 - 250 Lags.

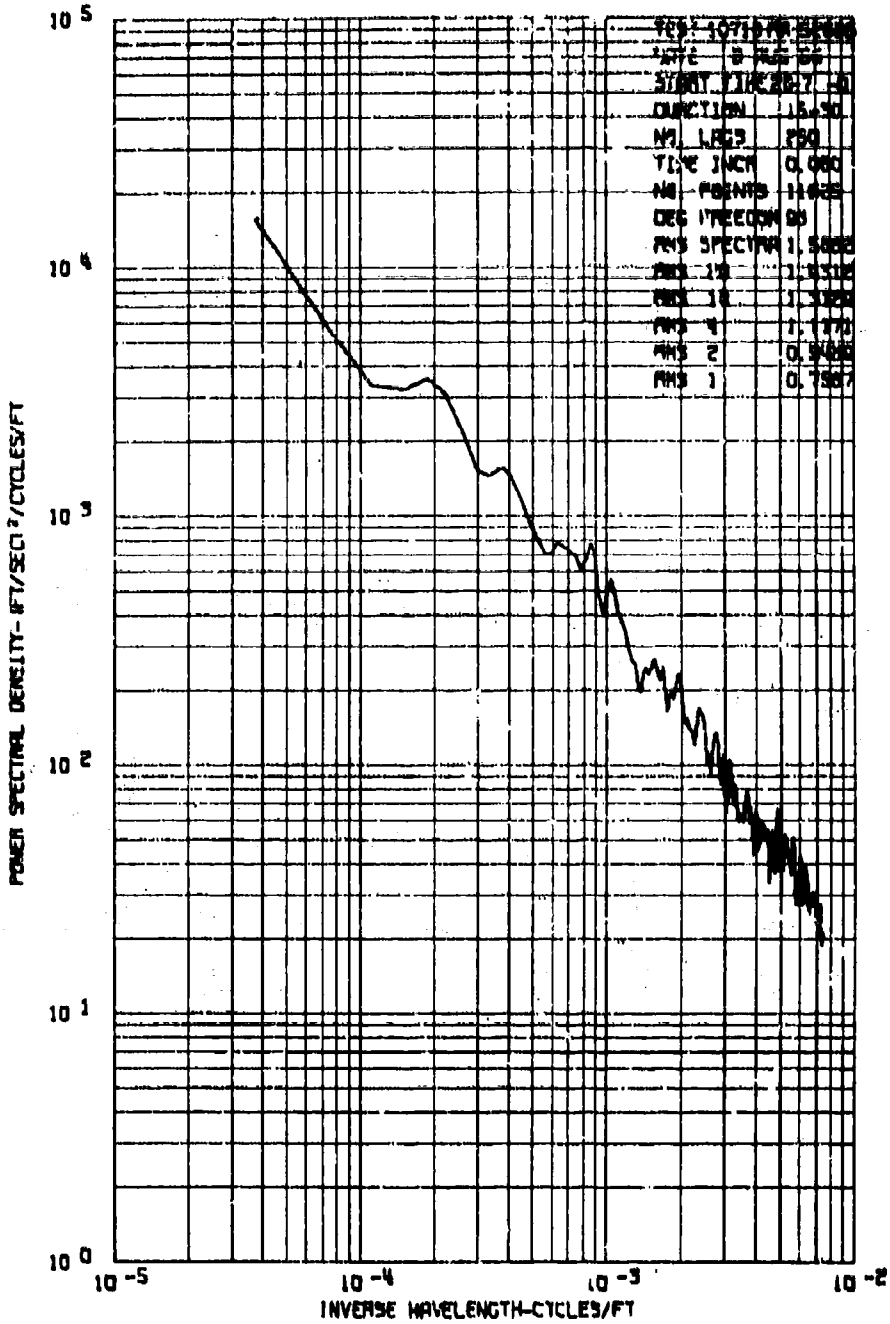


Figure 137C. Power Spectrum of Longitudinal Gust Velocity, Test 107, Run 18 - 250 Lags.

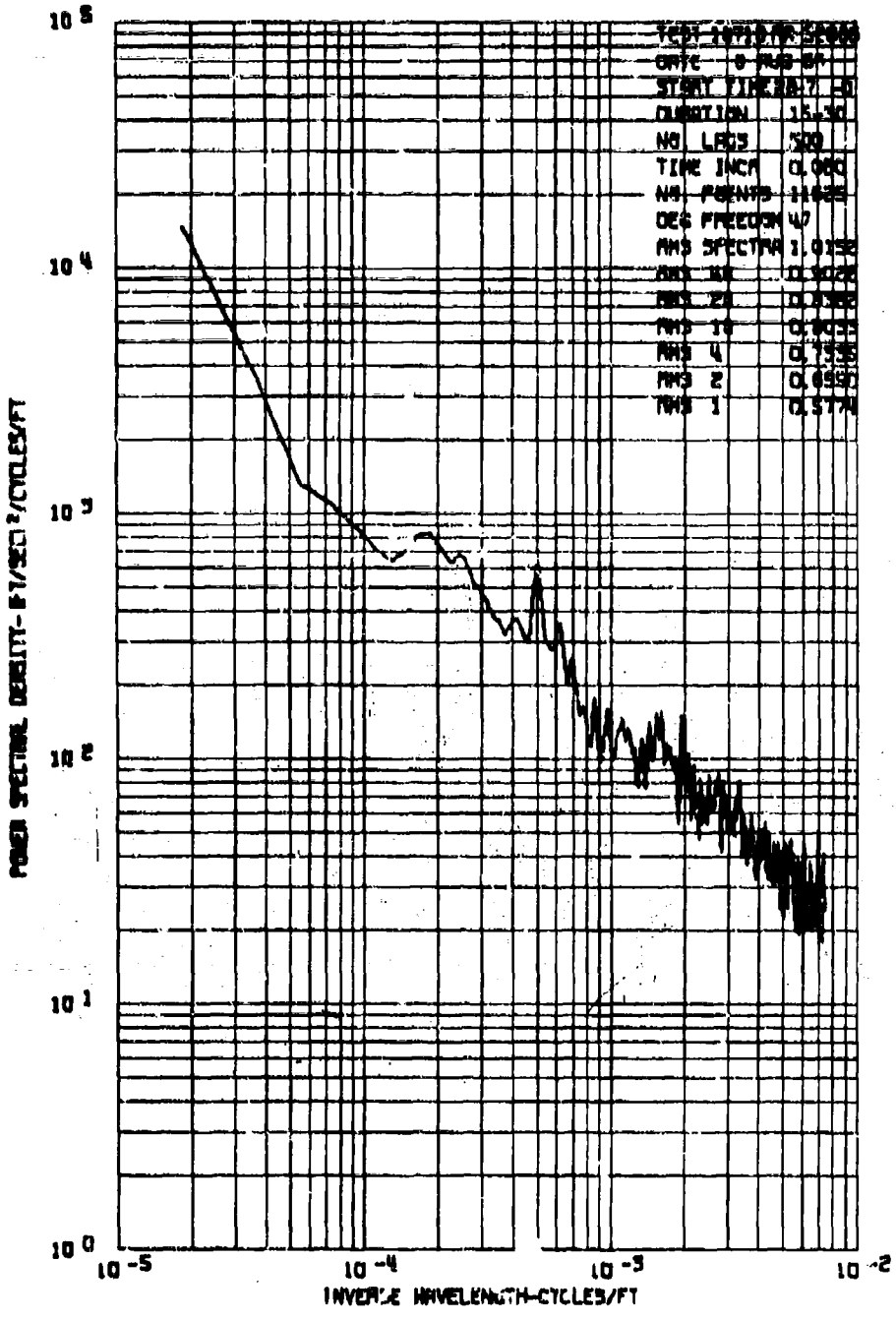


Figure 137D. Power Spectrum of Vertical Gust Velocity, Test 107, Run 18 - 500 Lags.

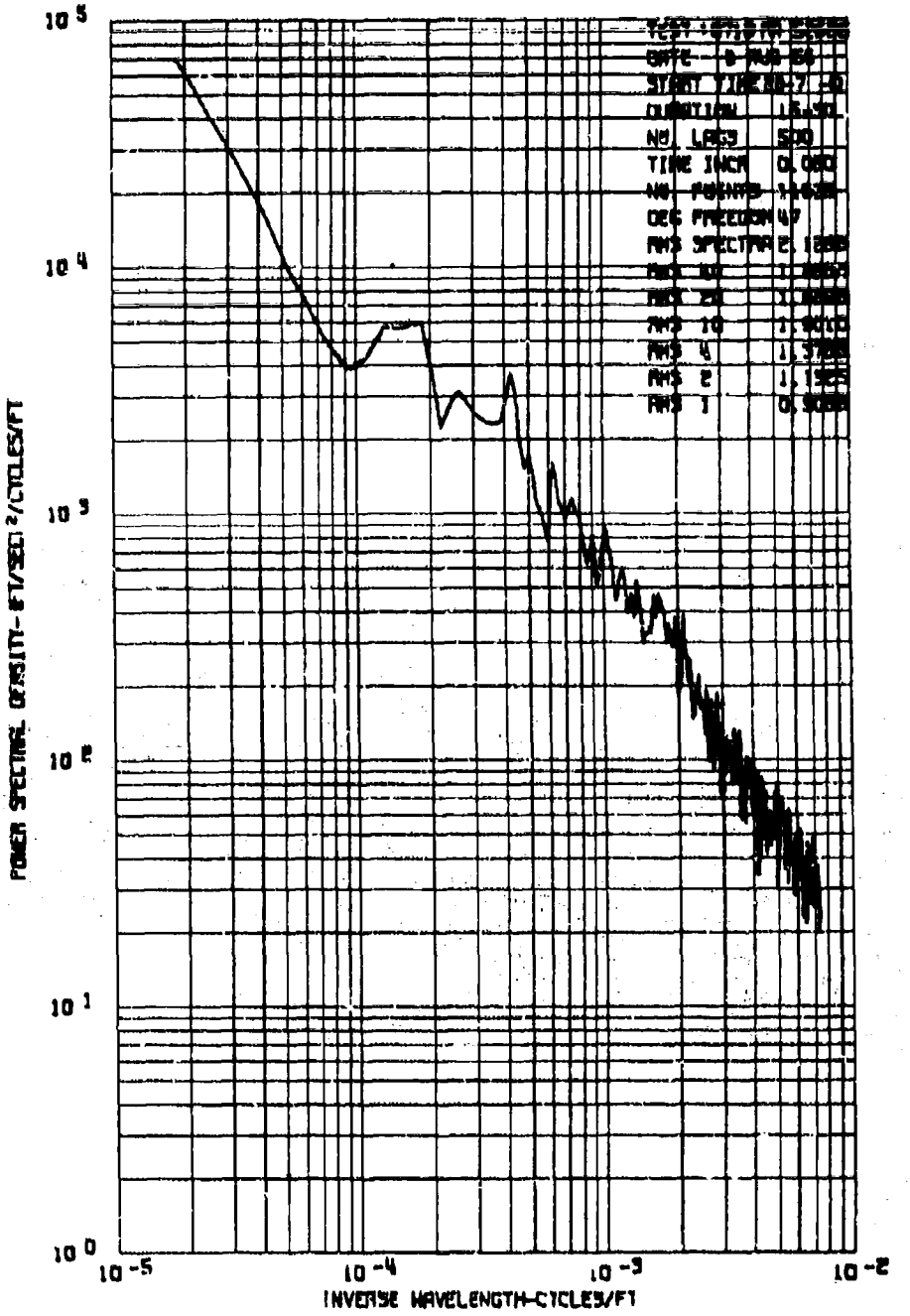


Figure 137E. Power Spectrum of Lateral Gust Velocity, Test 107, Run 18 - 500 Lags.

Appendix VII

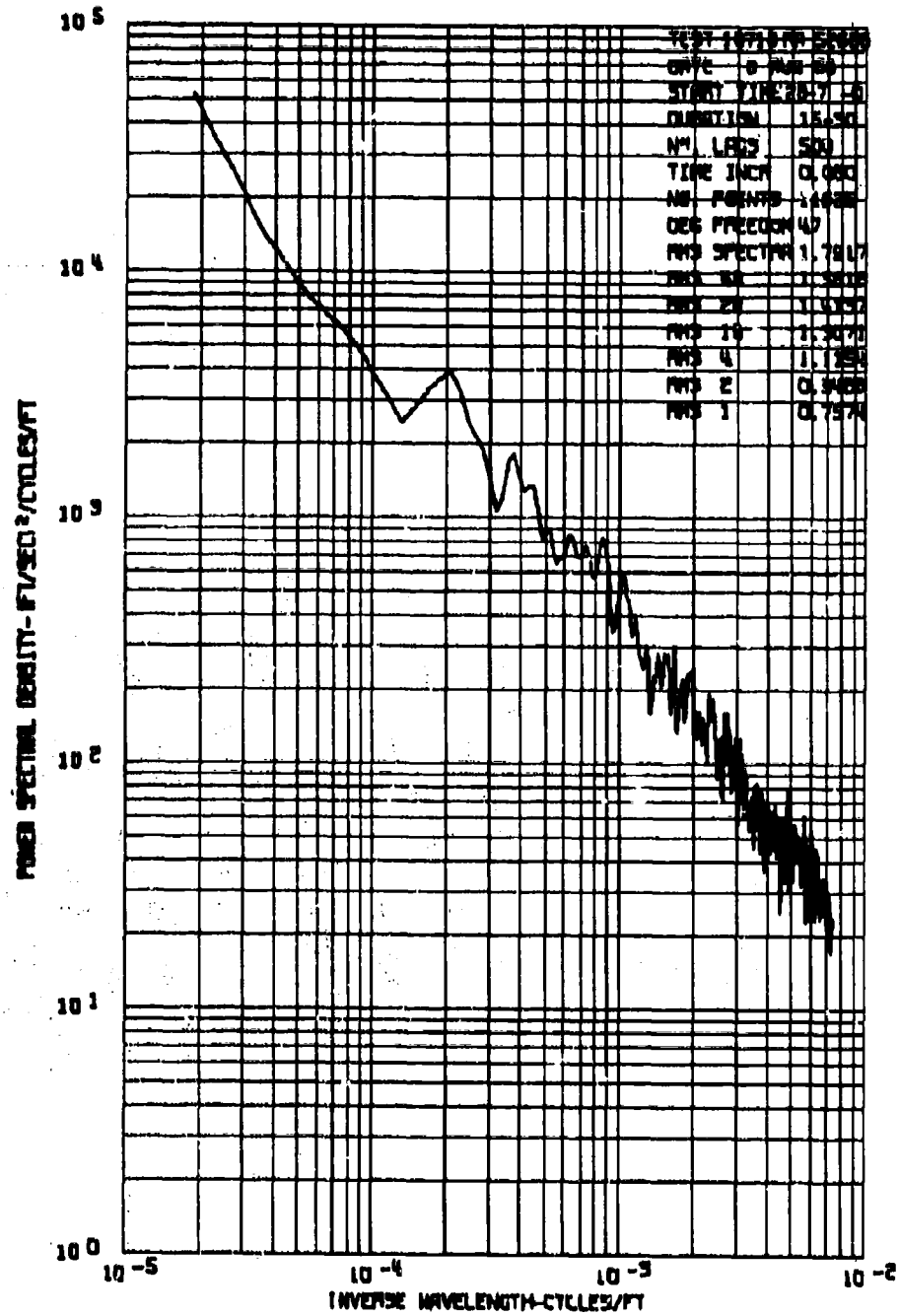


Figure 137F. Power Spectrum of Longitudinal Gust Velocity, Test 107, Run 18 - 500 Lags.

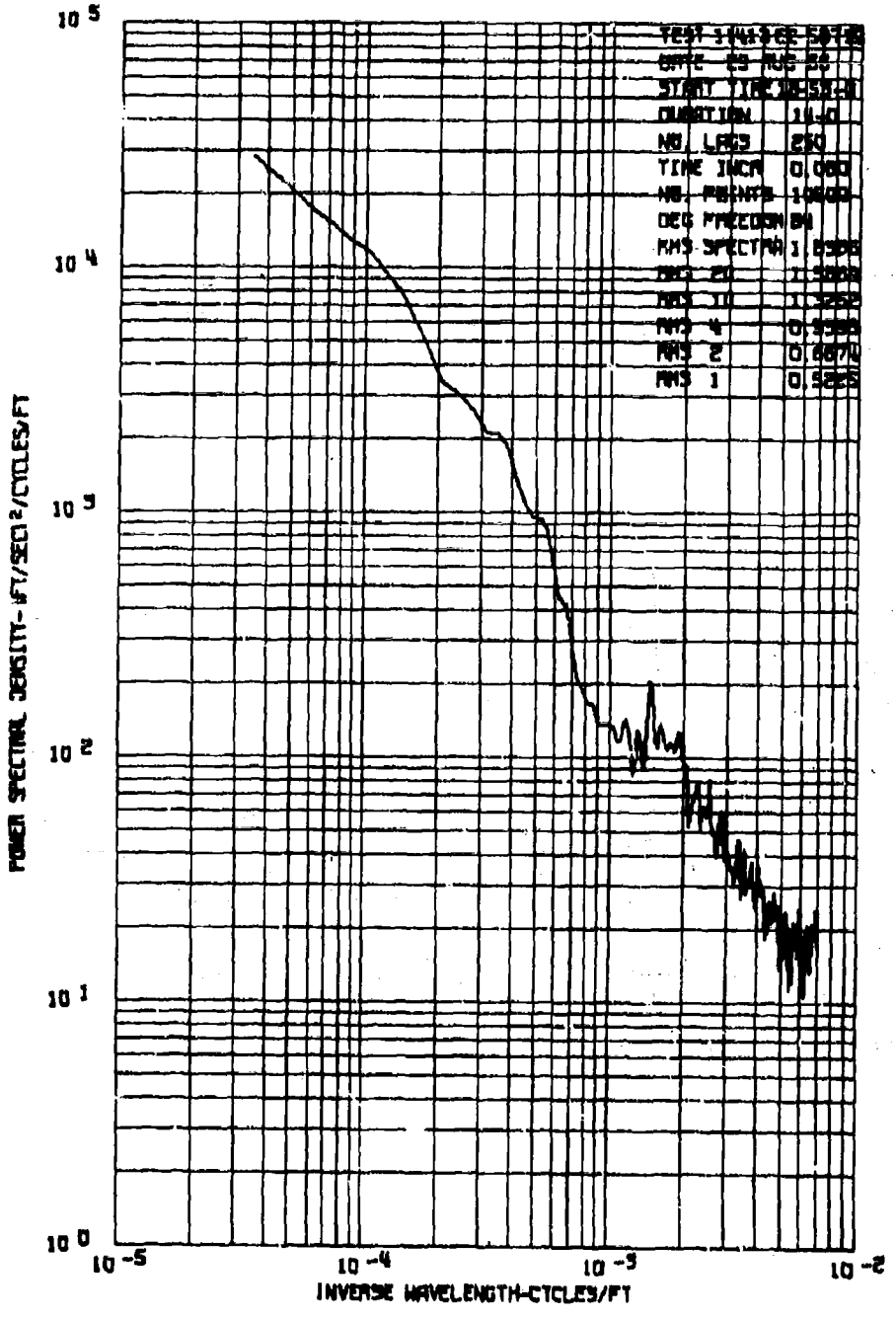


Figure 138A. Power Spectrum of Vertical Gust Velocity, Test 114, Run 10 - 250 Lags.

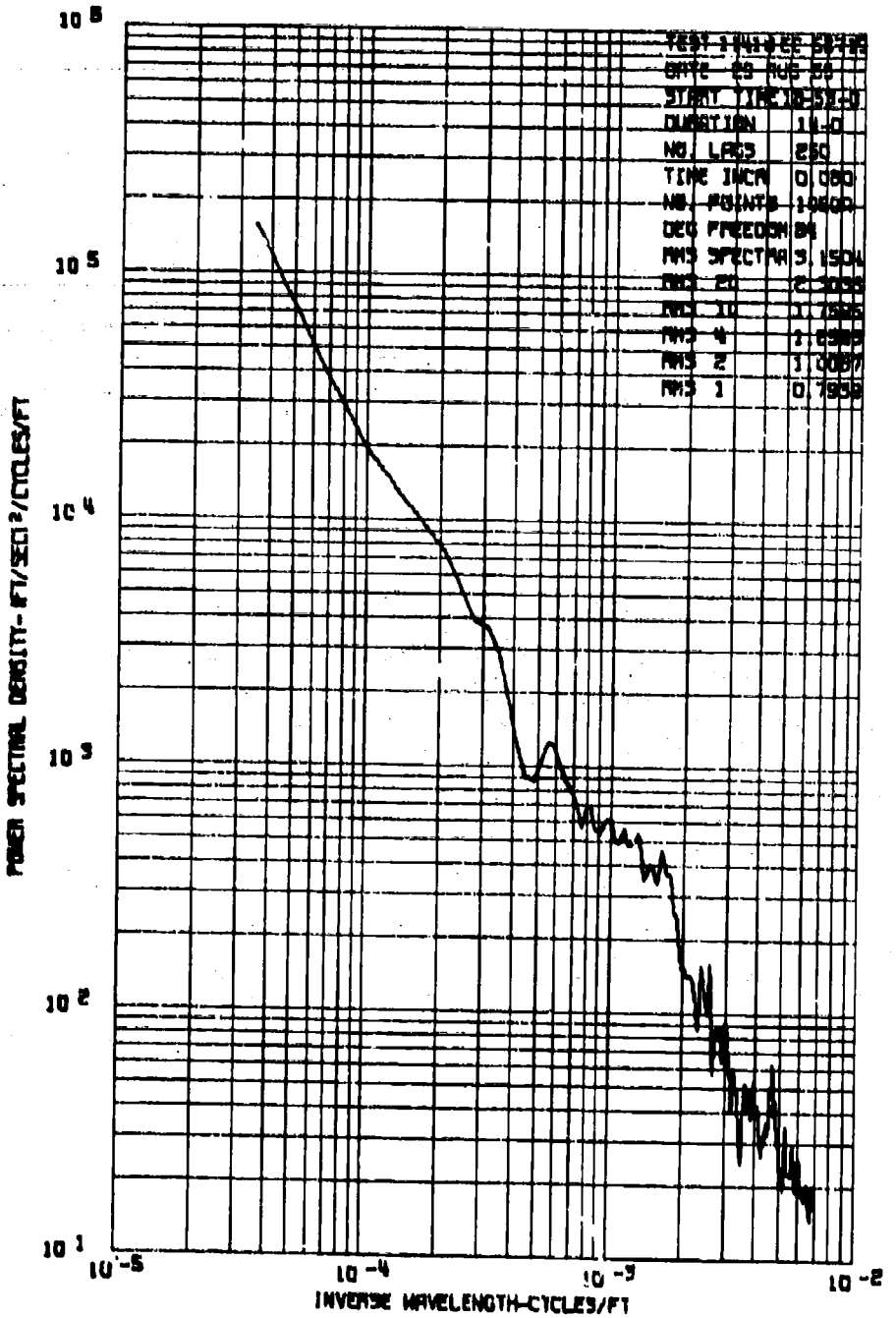


Figure 138B. Power Spectrum of Lateral Gust Velocity, Test 114, Run 10 - 250 Lags.

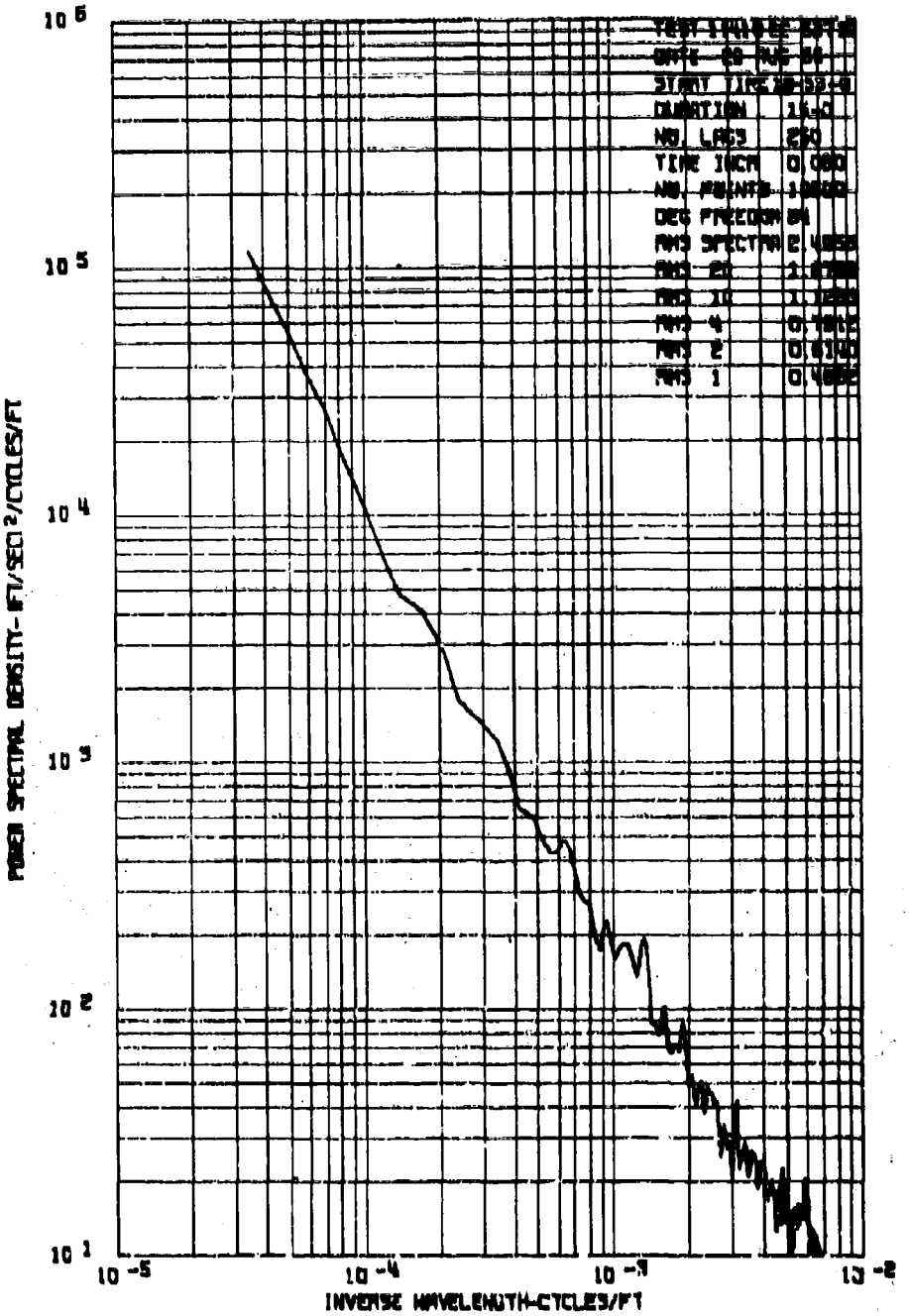


Figure 1380. Power Spectrum of Longitudinal Gust Velocity, Test 114, Run 10 - 250 Lags.

Appendix VII

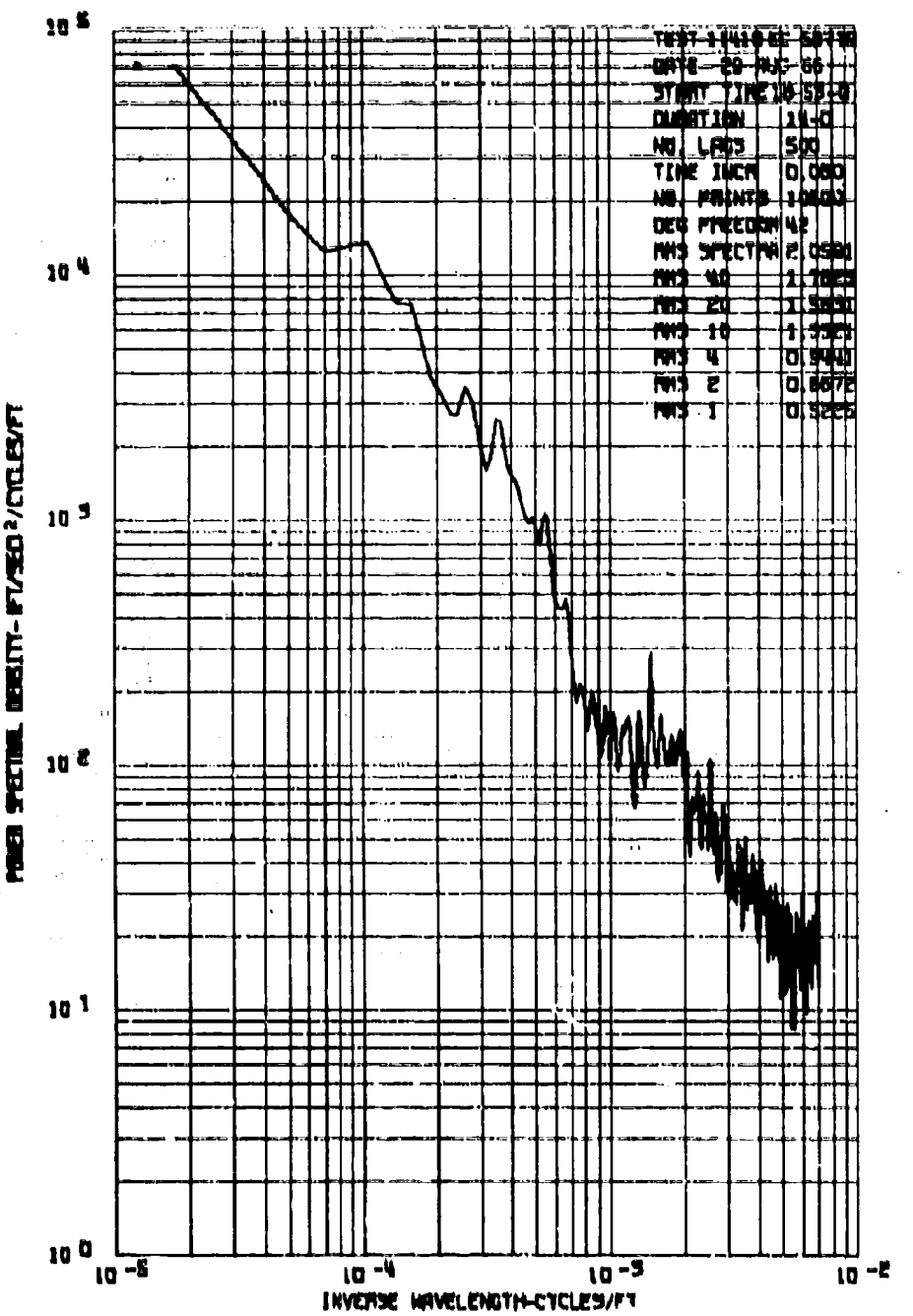


Figure 138D. Power Spectrum of Vertical Gust Velocity, Test 114, Run 10 - 500 Lags.

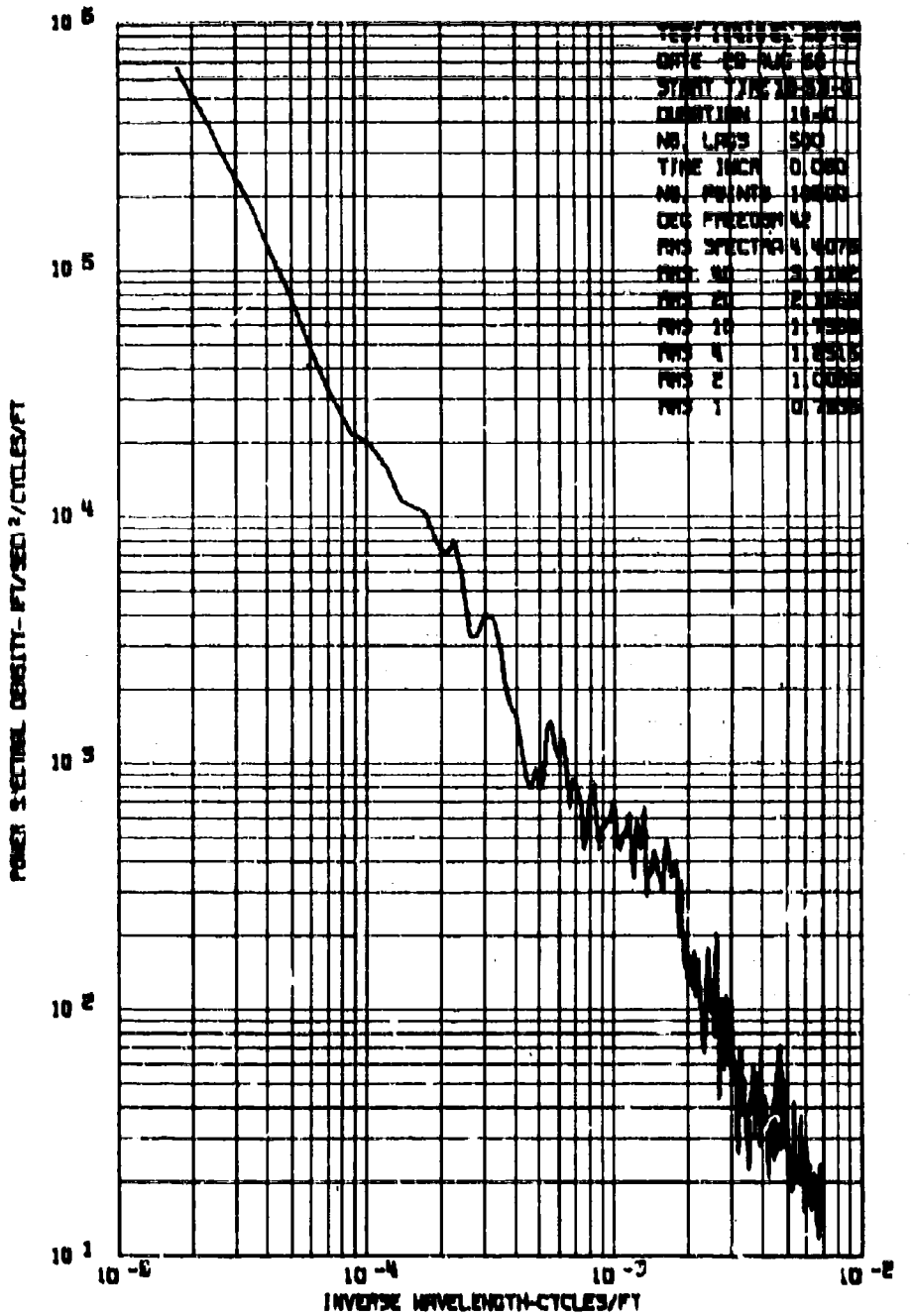


Figure 138E. Power Spectrum of Lateral Gust Velocity, Test 114, Run 10 - 500 Lags.

Appendix VII

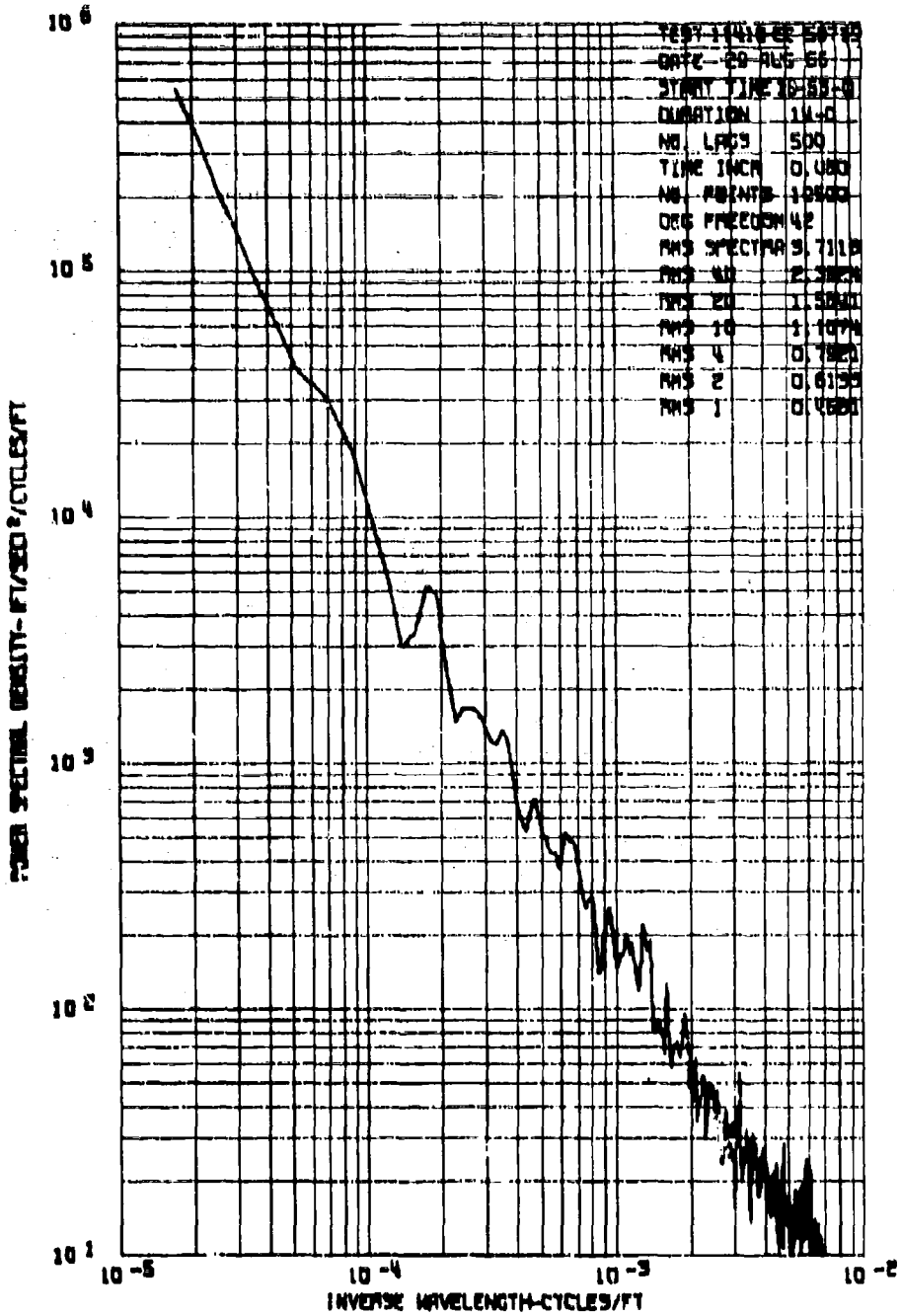


Figure 138F. Power Spectrum of Longitudinal Gust Velocity, Test 114, Run 10 - 500 Lags.

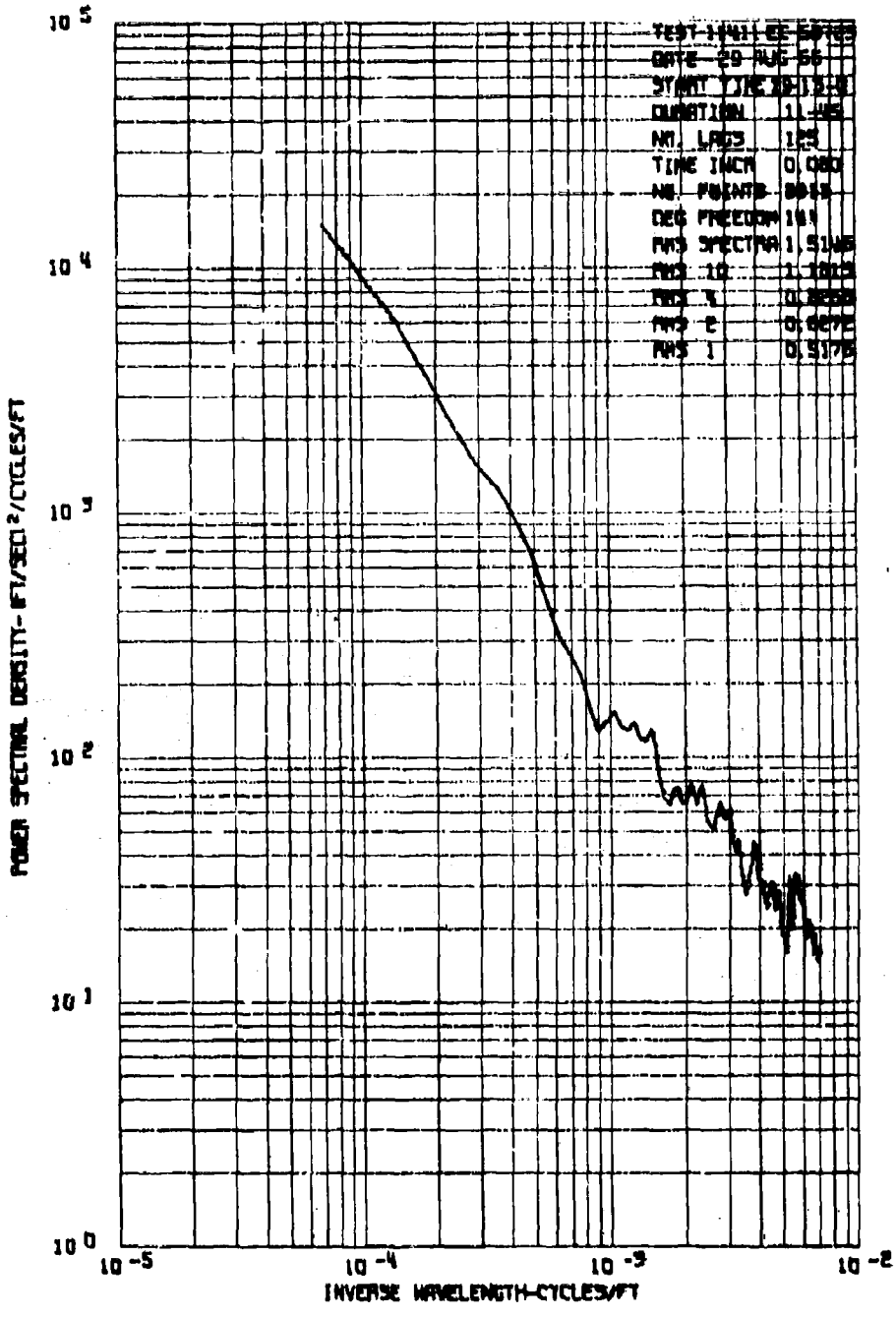


Figure 139A. Power Spectrum of Vertical Gust Velocity, Test 114, Run 11.

Appendix VII

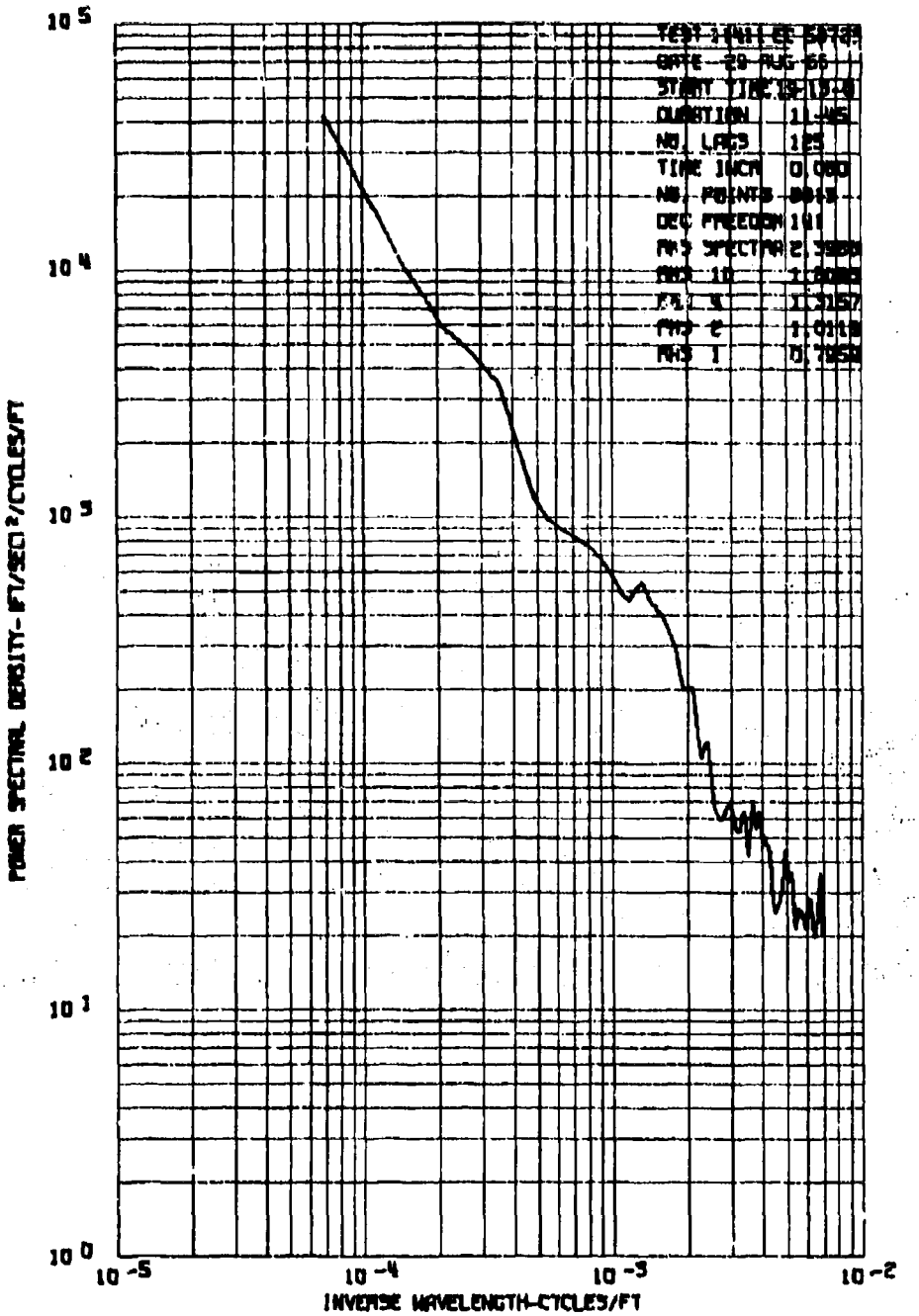


Figure 139B. Power Spectrum of Lateral Gust Velocity, Test 114, Run 11.

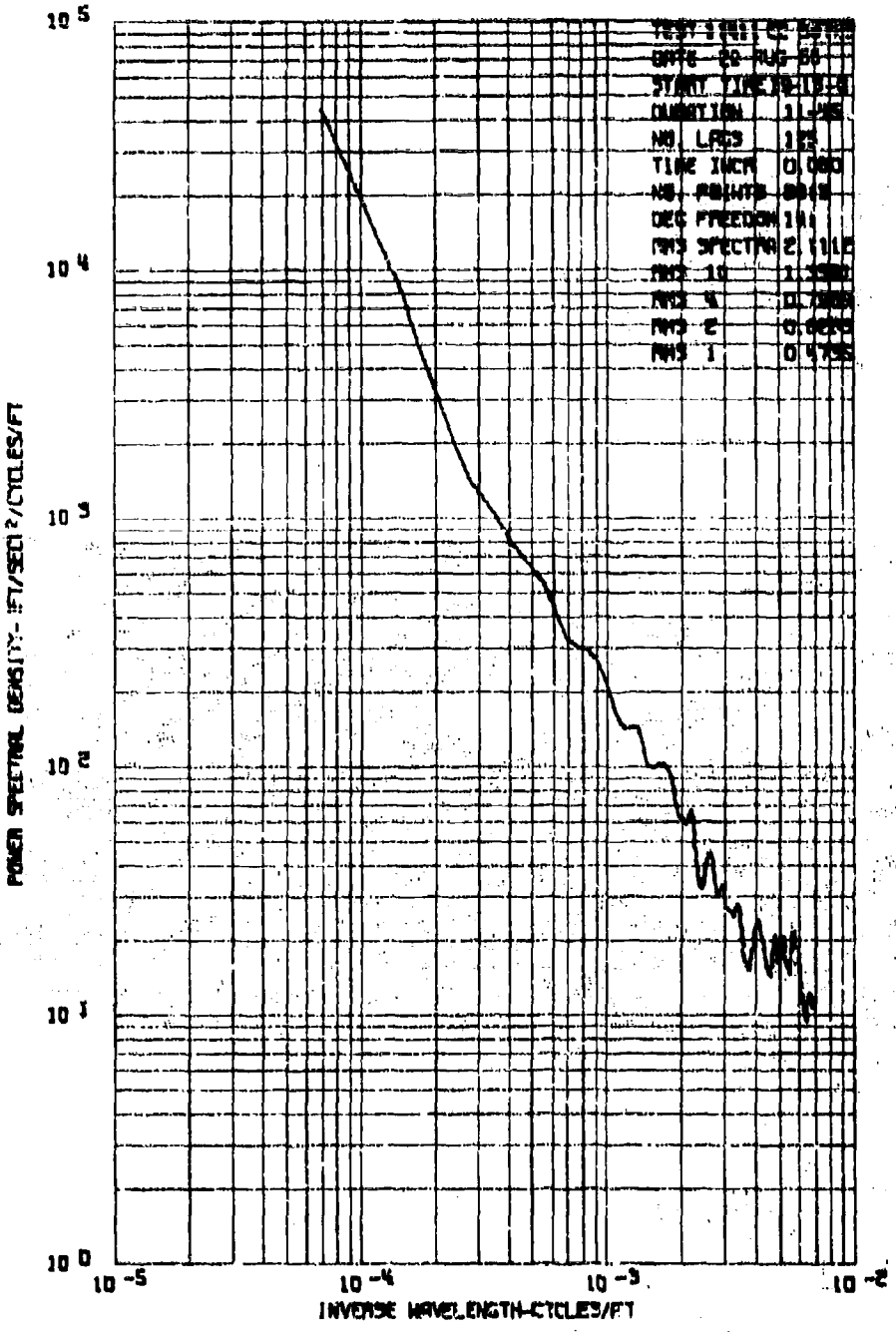


Figure 139C. Power Spectrum of Longitudinal Gust Velocity, Test 114, Run 11.

Appendix VII

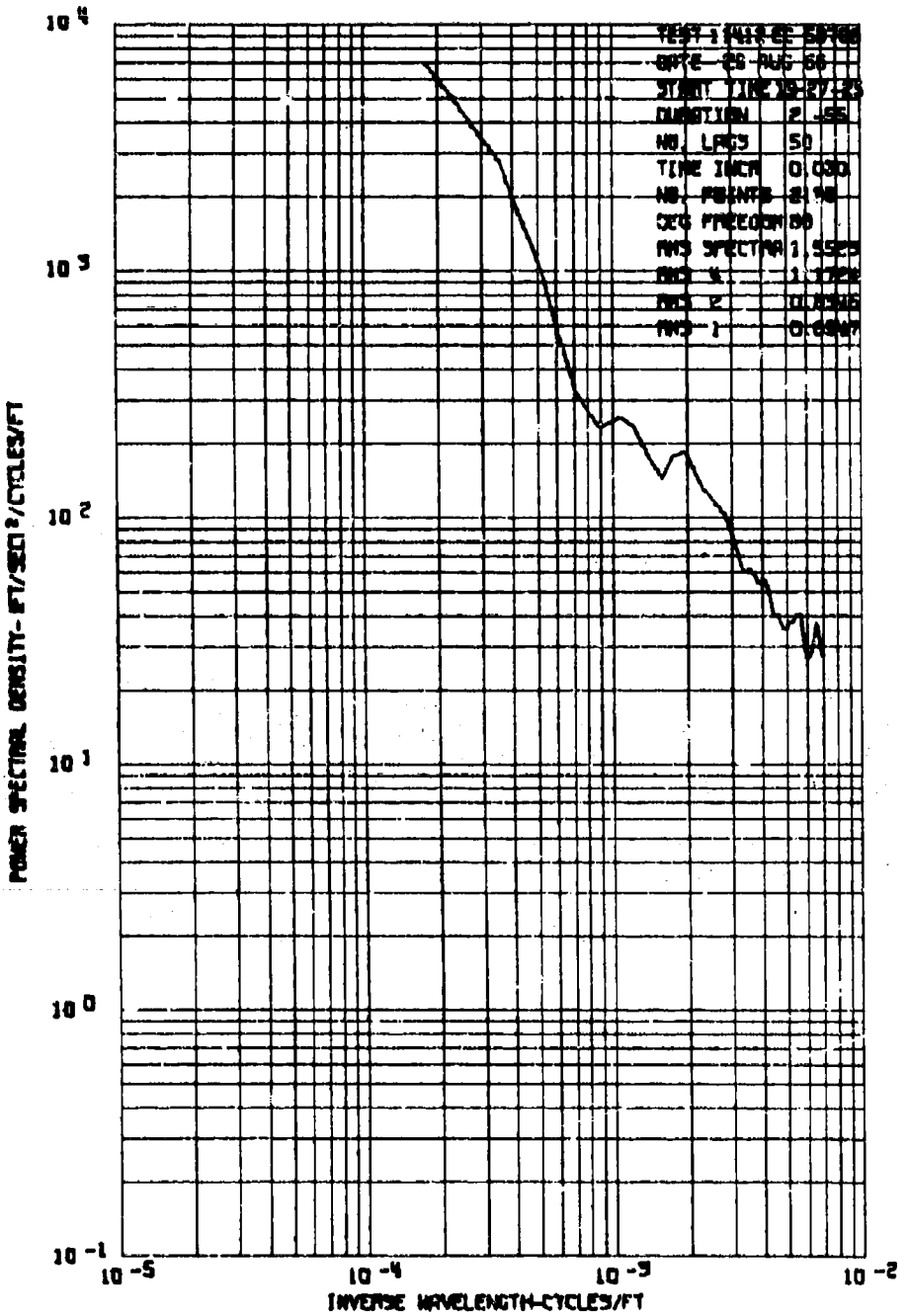


Figure 140A. Power Spectrum of Vertical Gust Velocity, Test 114, Run 12.

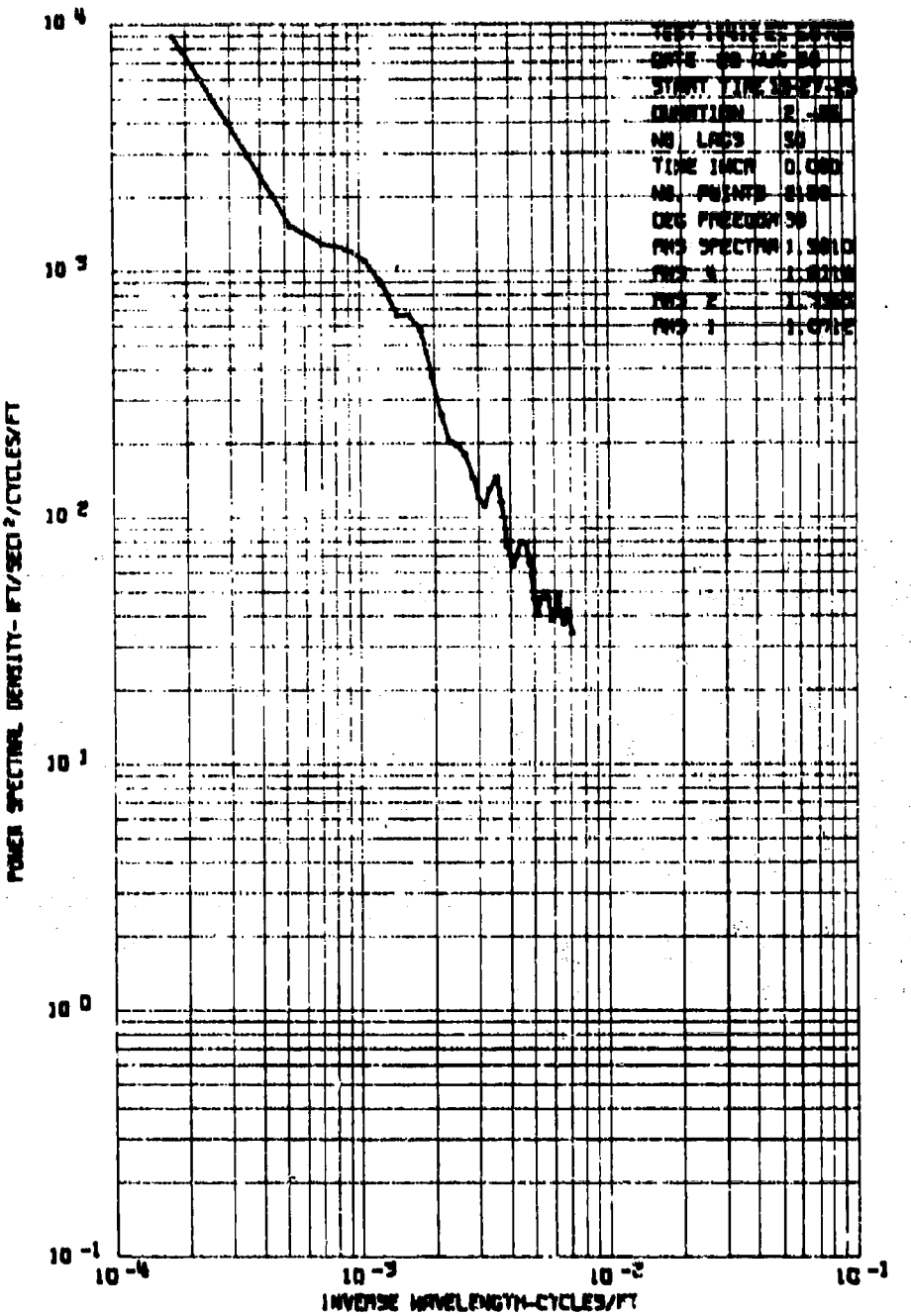


Figure 140B. Power Spectrum of Lateral Gust Velocity, Test 114, Run 12.

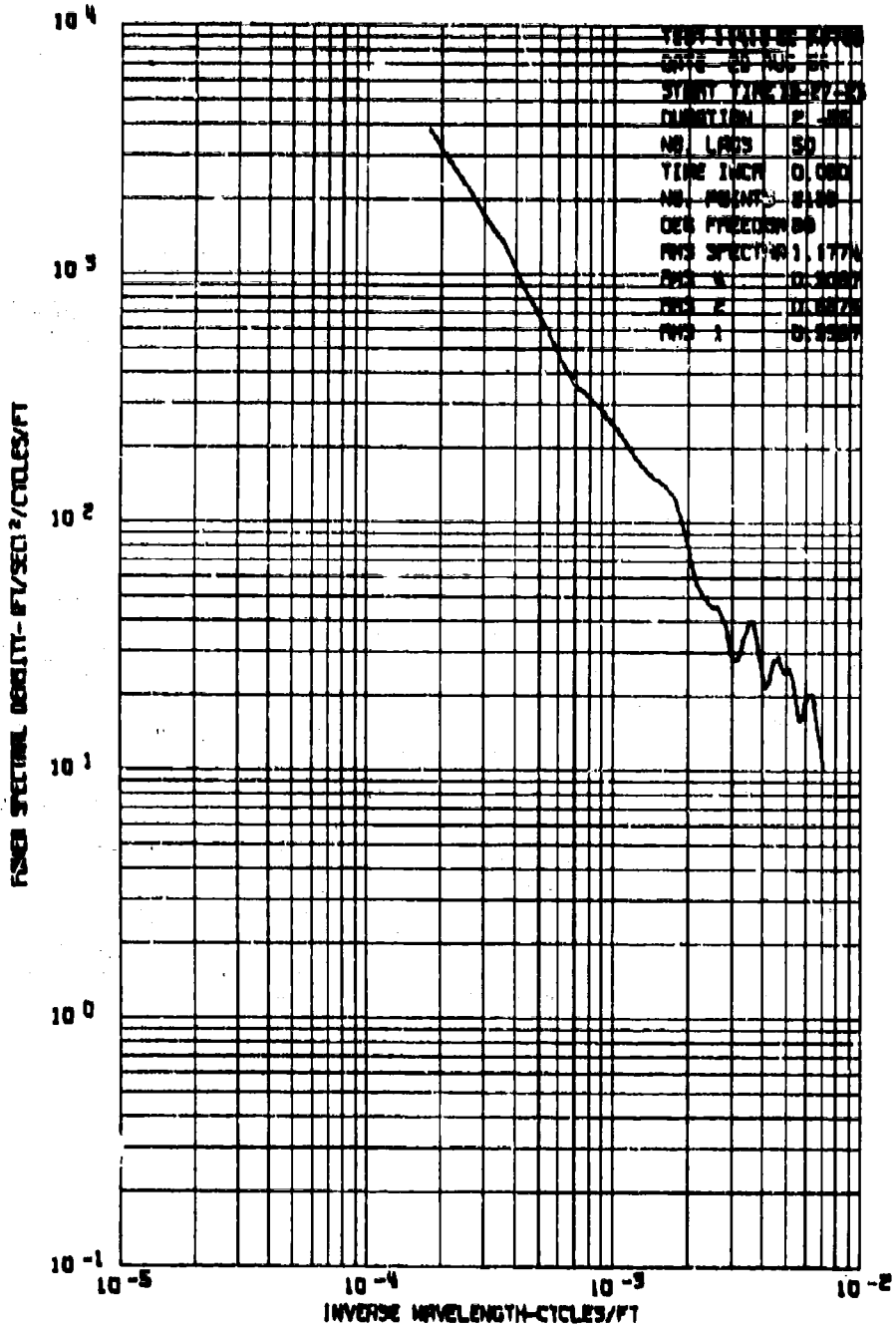


Figure 140C. Power Spectrum of Longitudinal Gust Velocity, Test 114, Run 12.

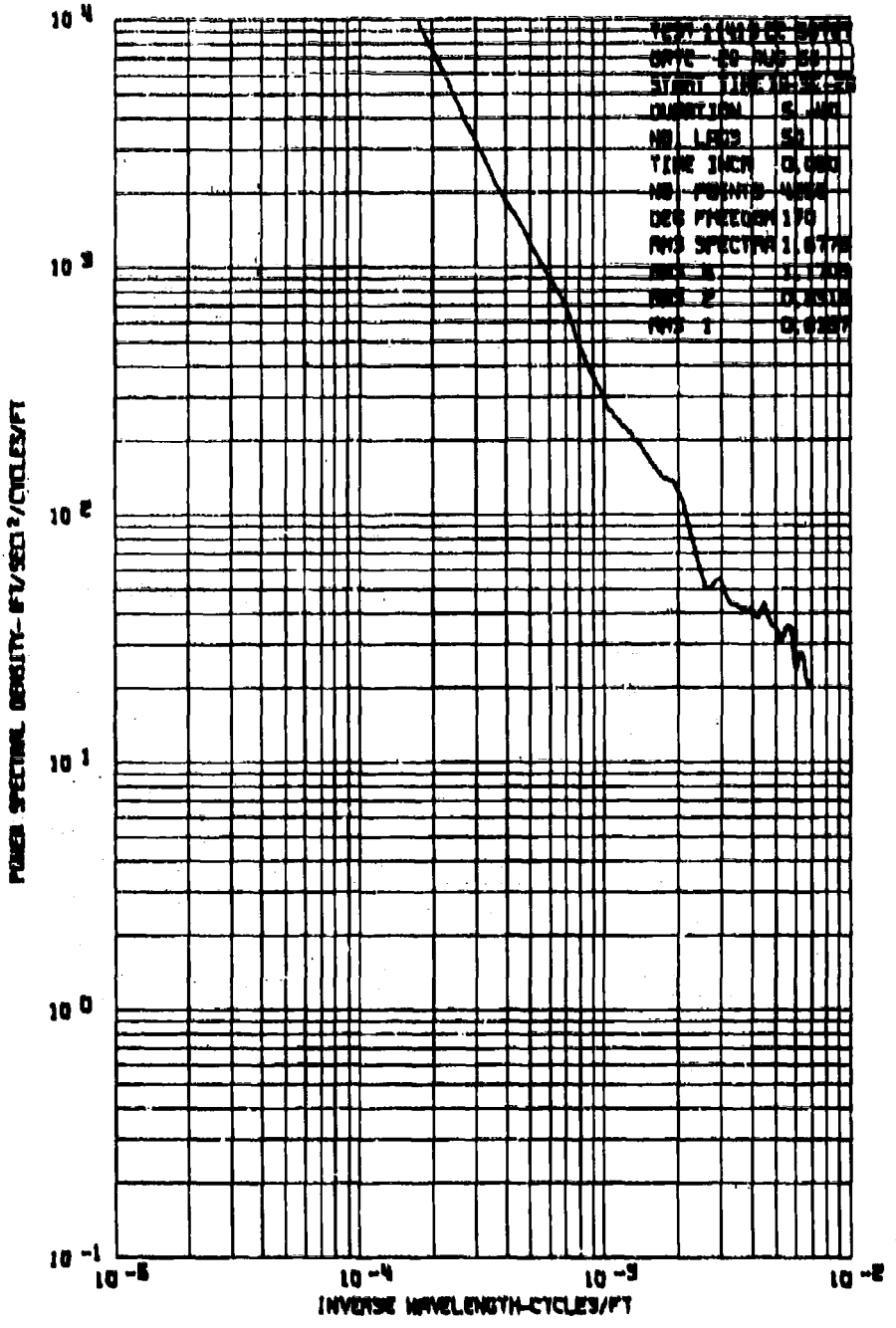


Figure 141A. Power Spectrum of Vertical Gust Velocity, Test 114, Run 13.

Appendix VII

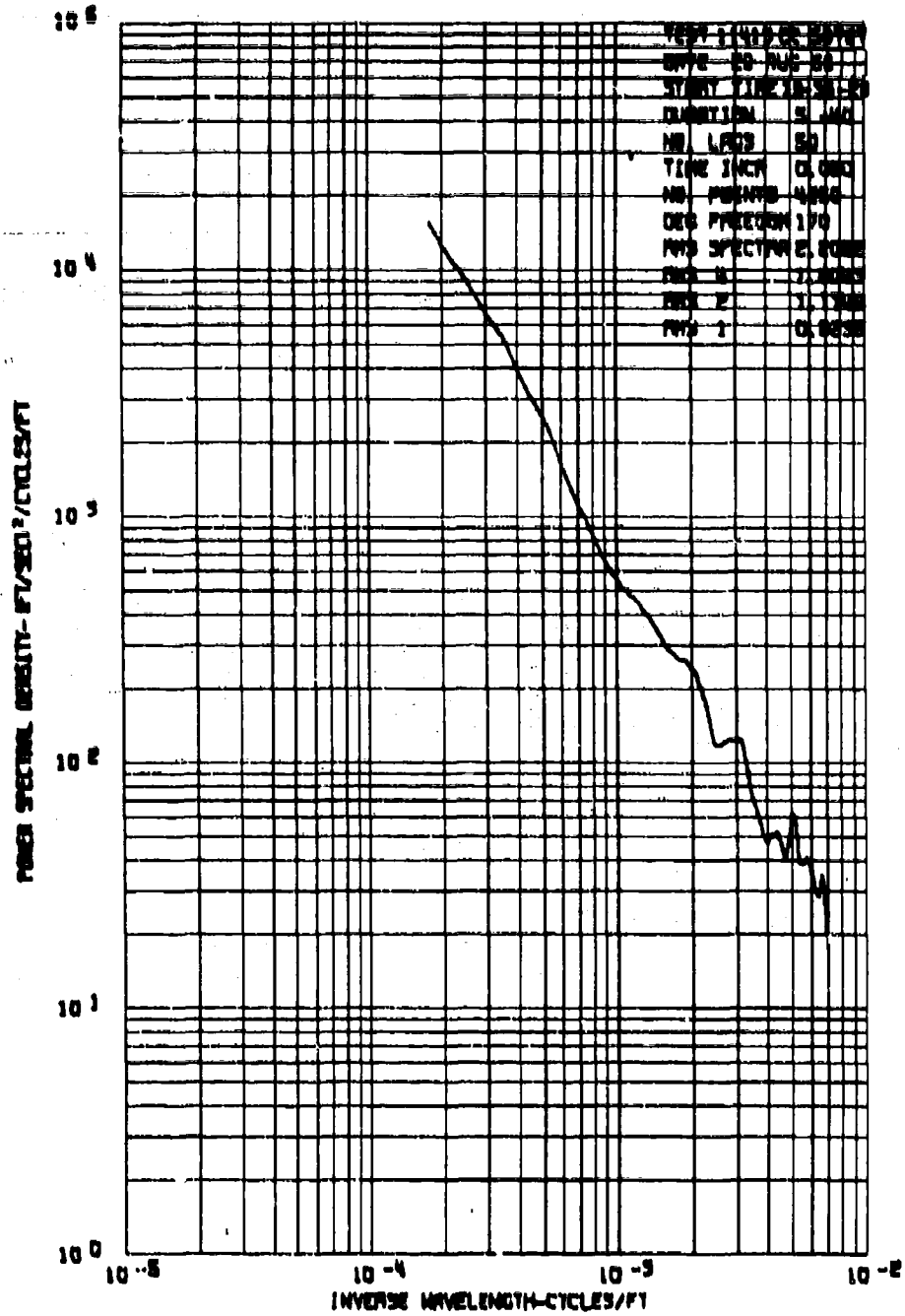


Figure 141B. Power Spectrum of Lateral Gust Velocity, Test 114, Run 13.

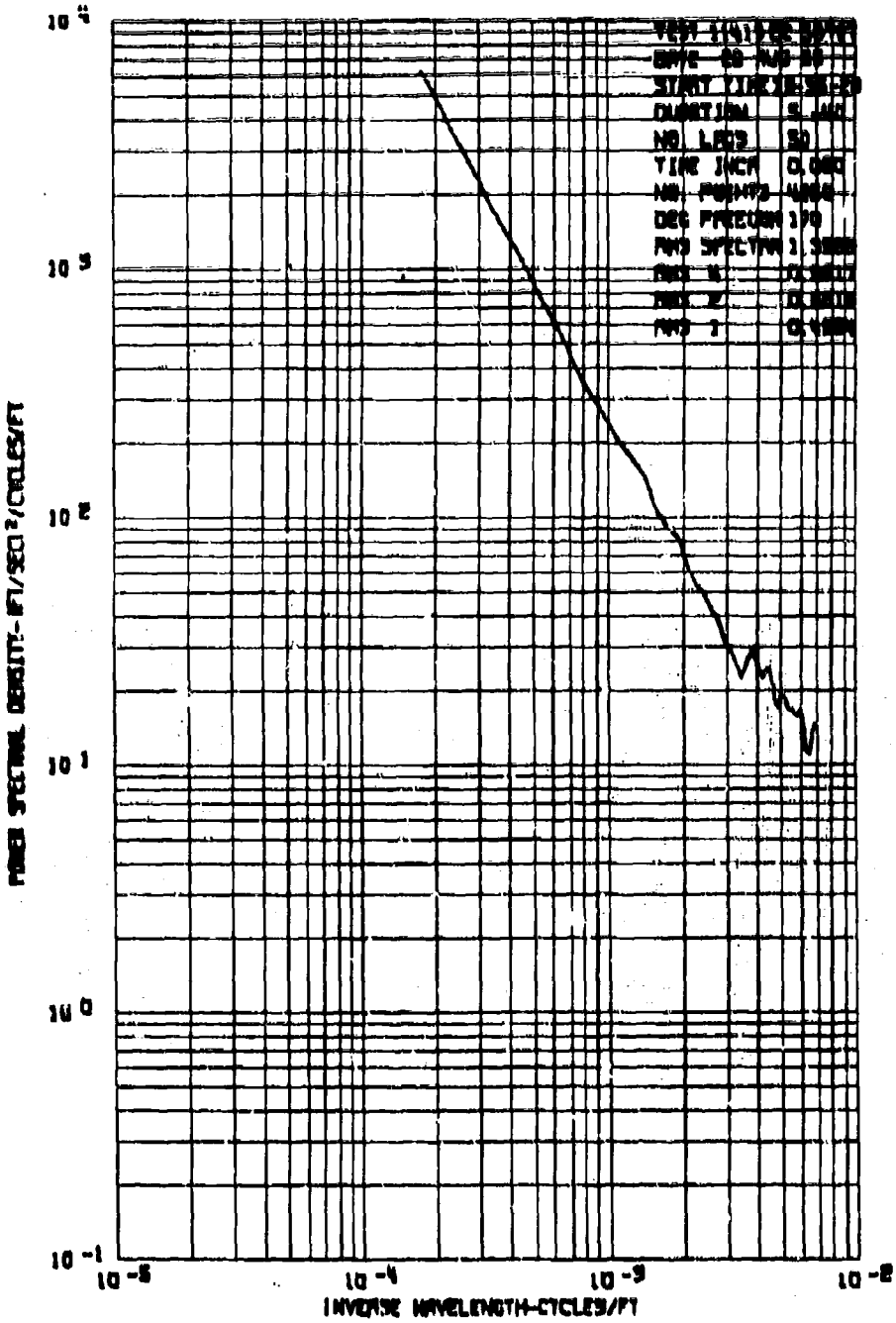


Figure 141C. Power Spectrum of Longitudinal Gust Velocity, Test 114, Run 13.

Appendix VII

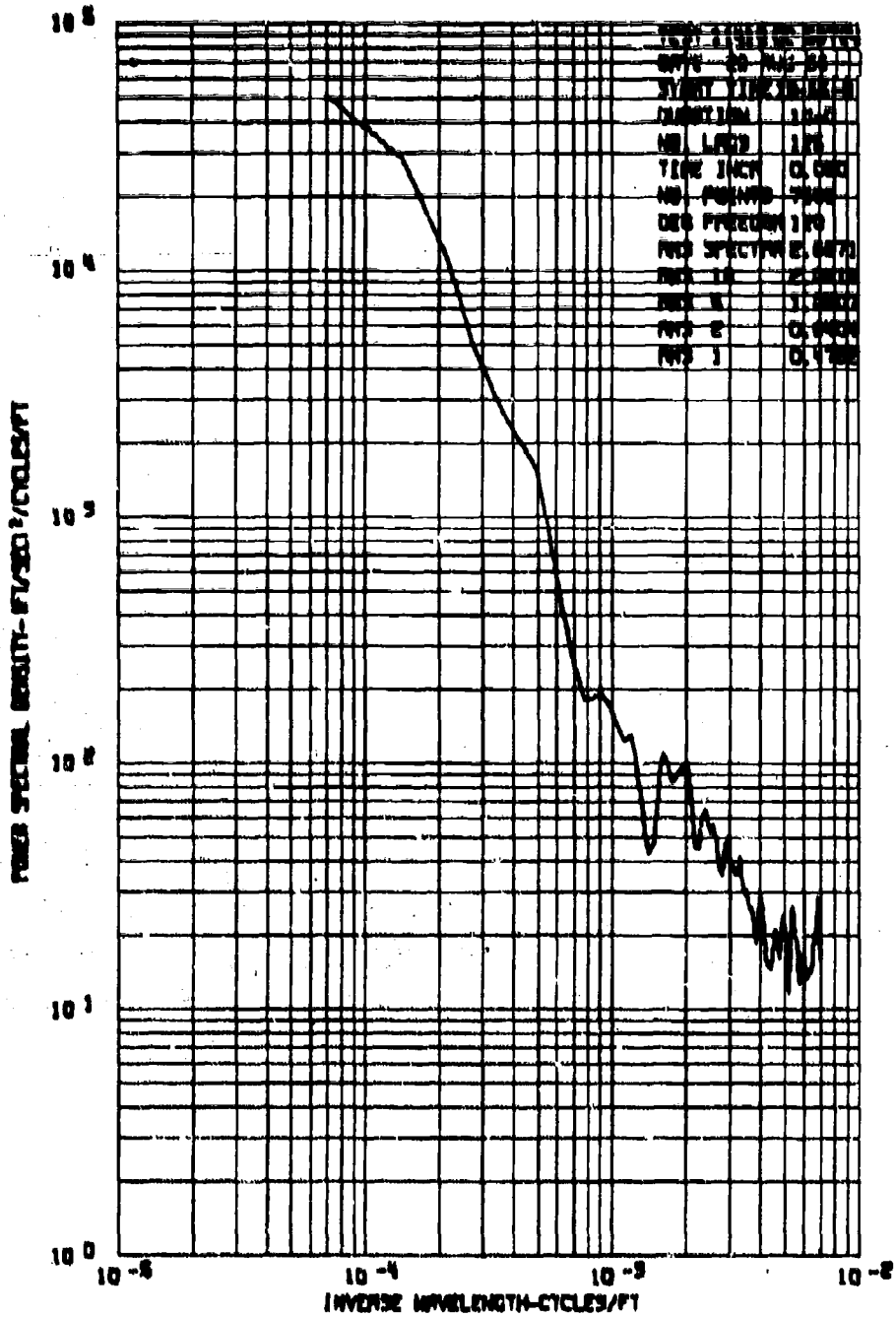


Figure 142A. Power Spectrum of Vertical Gust Velocity, Test 114, Run 14.

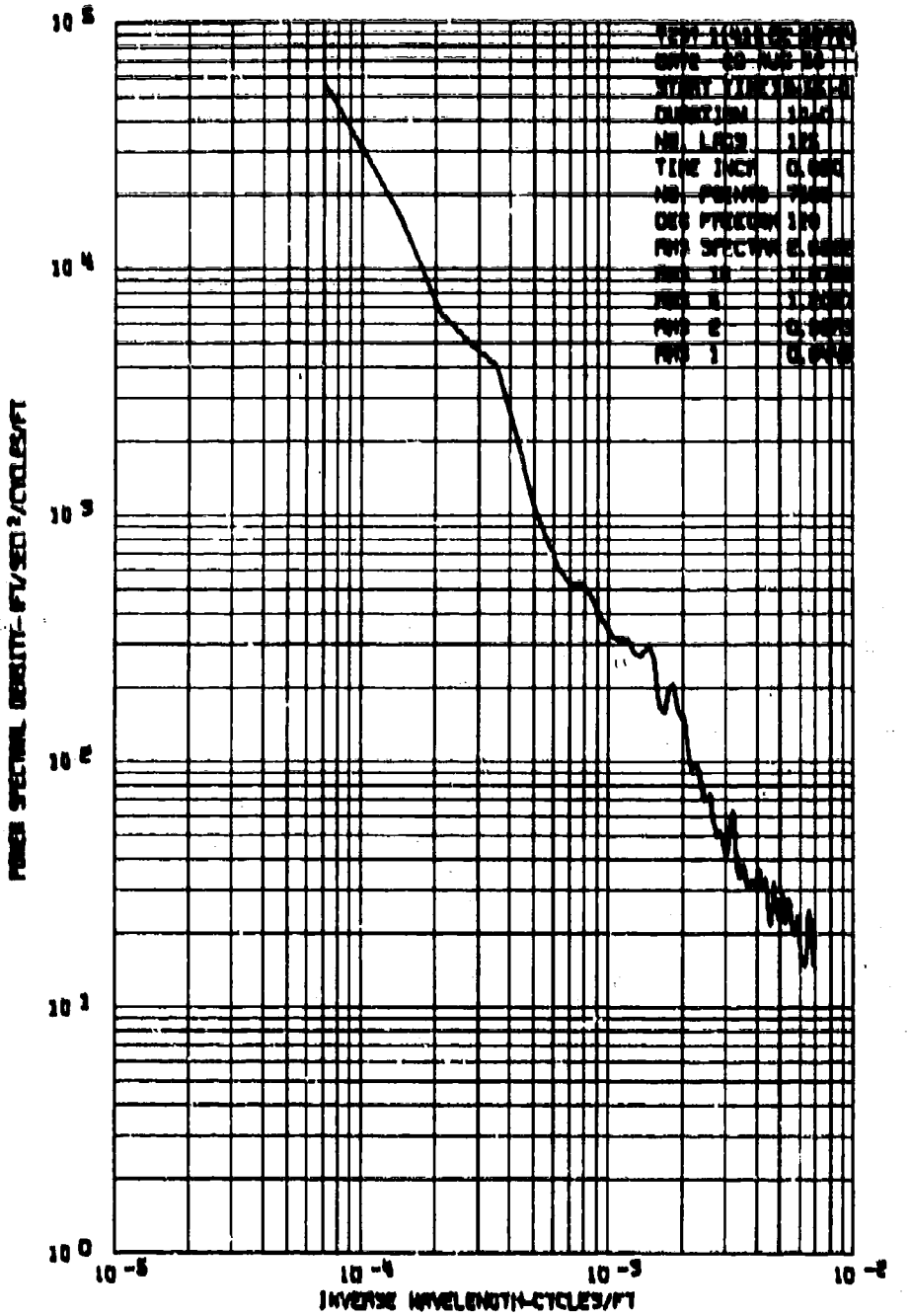


Figure 142B. Power Spectrum of Lateral Gust Velocity, Test 114, Run 14.

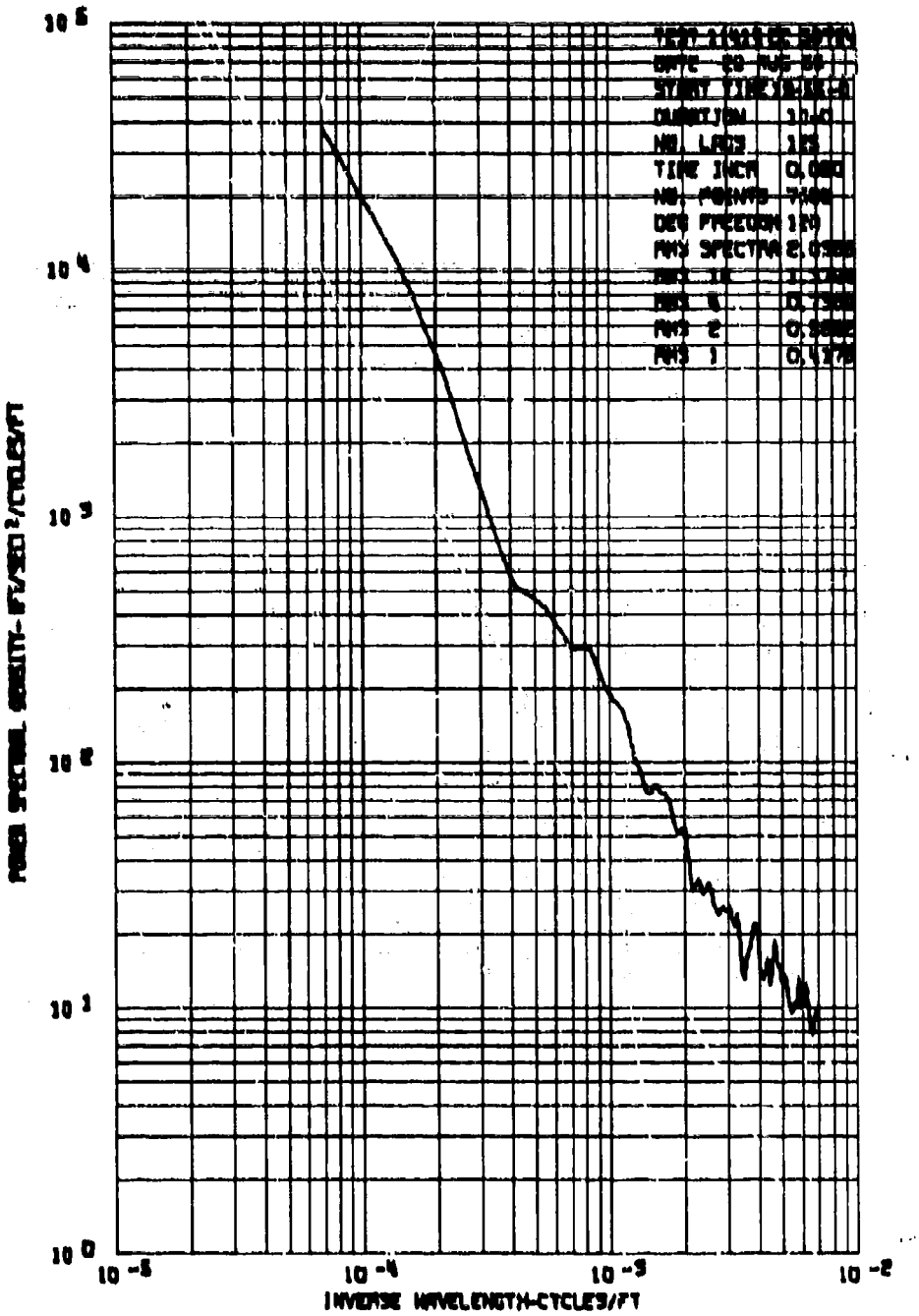


Figure 142C. Power Spectrum of Longitudinal Gust Velocity, Test 114, Run 14.

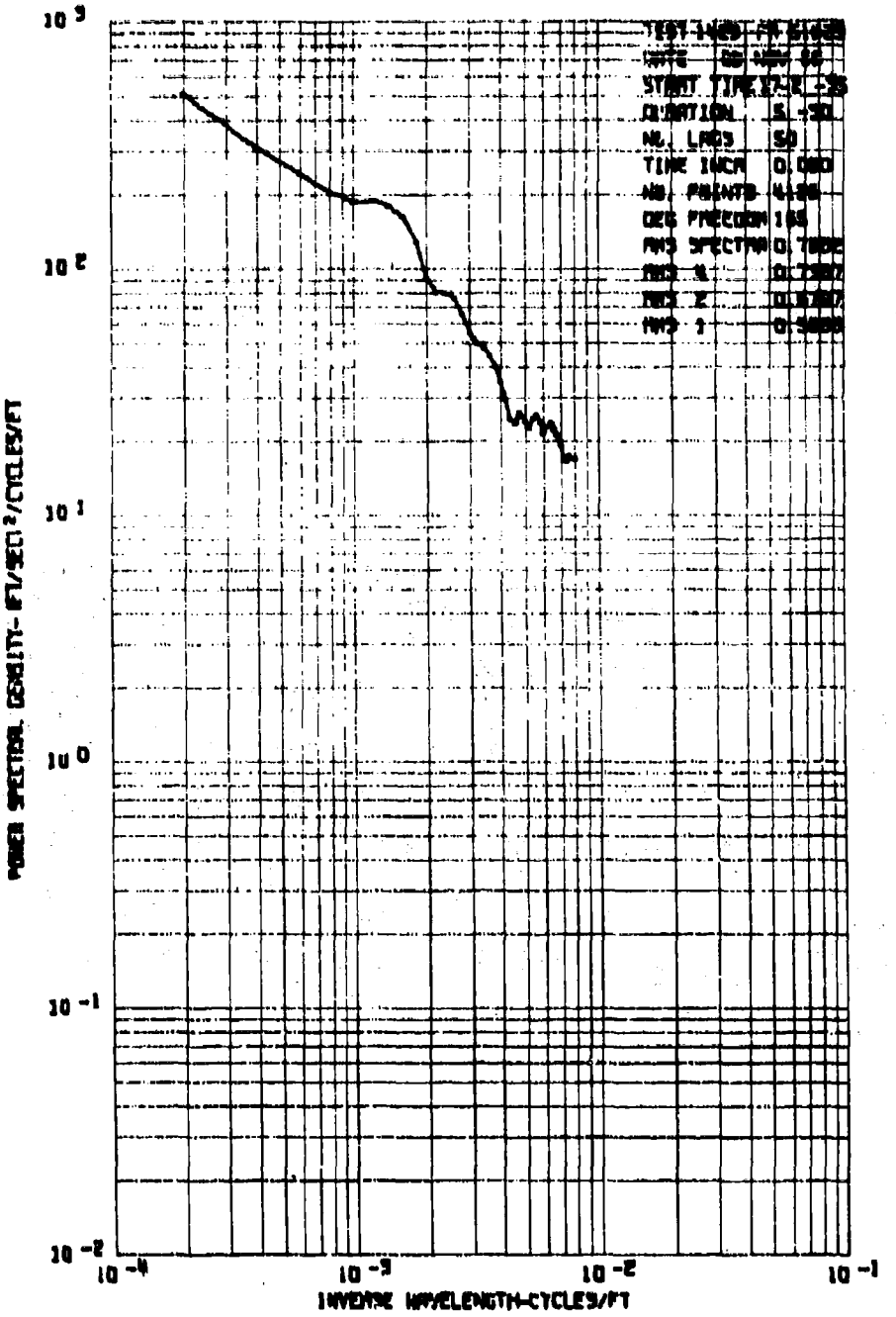


Figure 143A. Power Spectrum of Vertical Gust Velocity, Test 142, Run 3.

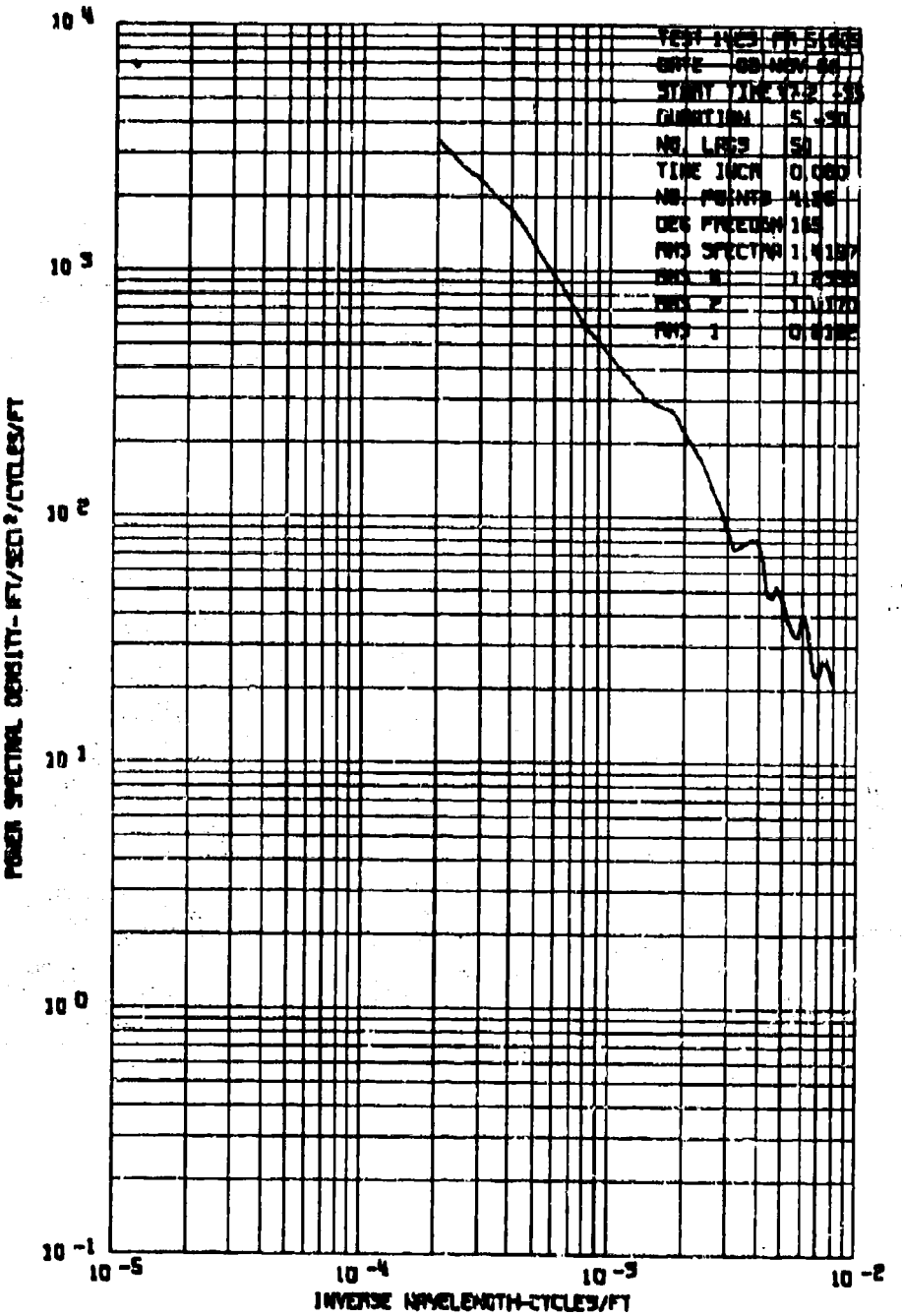


Figure 143B. Power Spectrum of Lateral Gust Velocity, Test 142, Run 3.

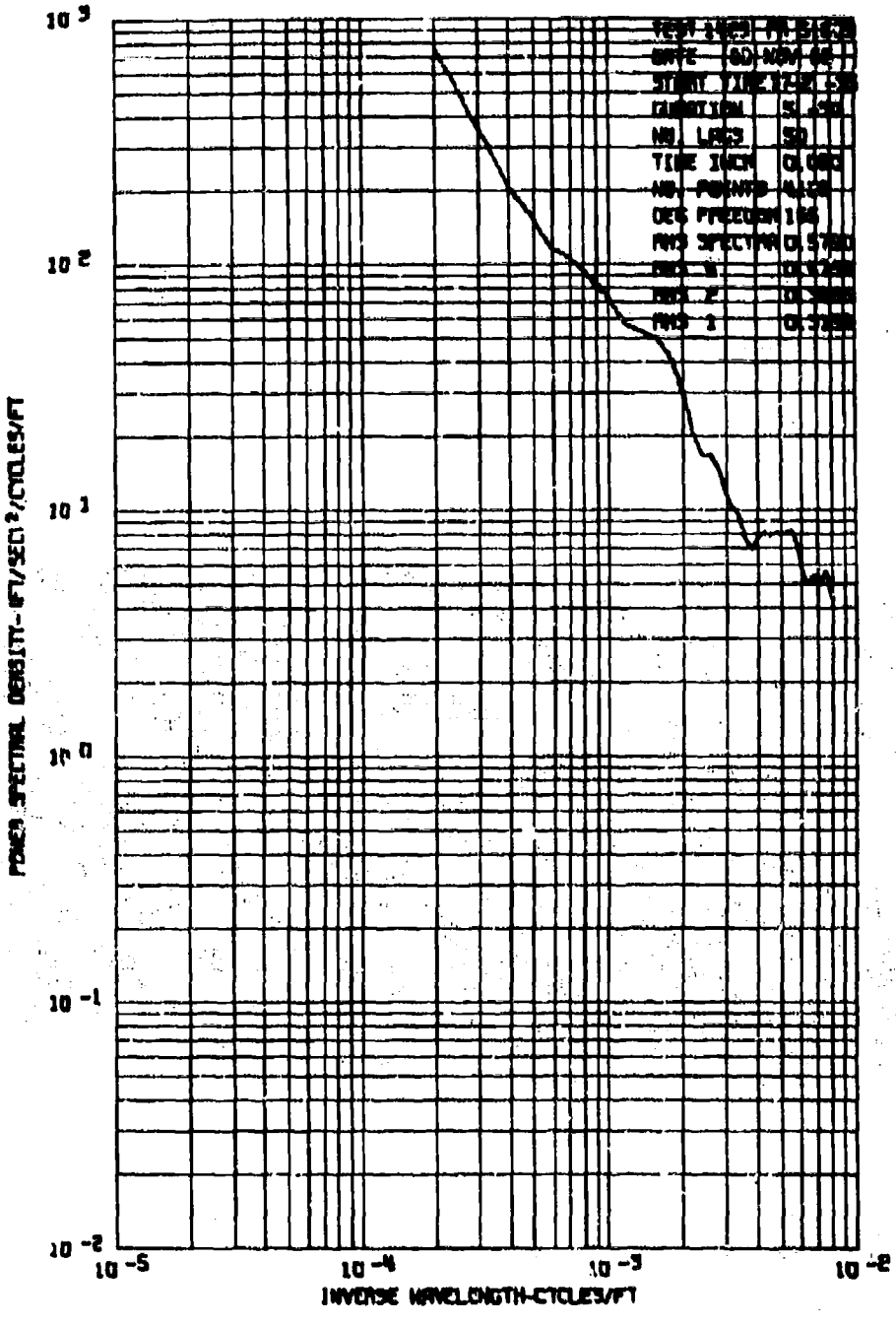


Figure 143C. Power Spectrum of Longitudinal Gust Velocity, Test 142, Run 3.

Appendix VII

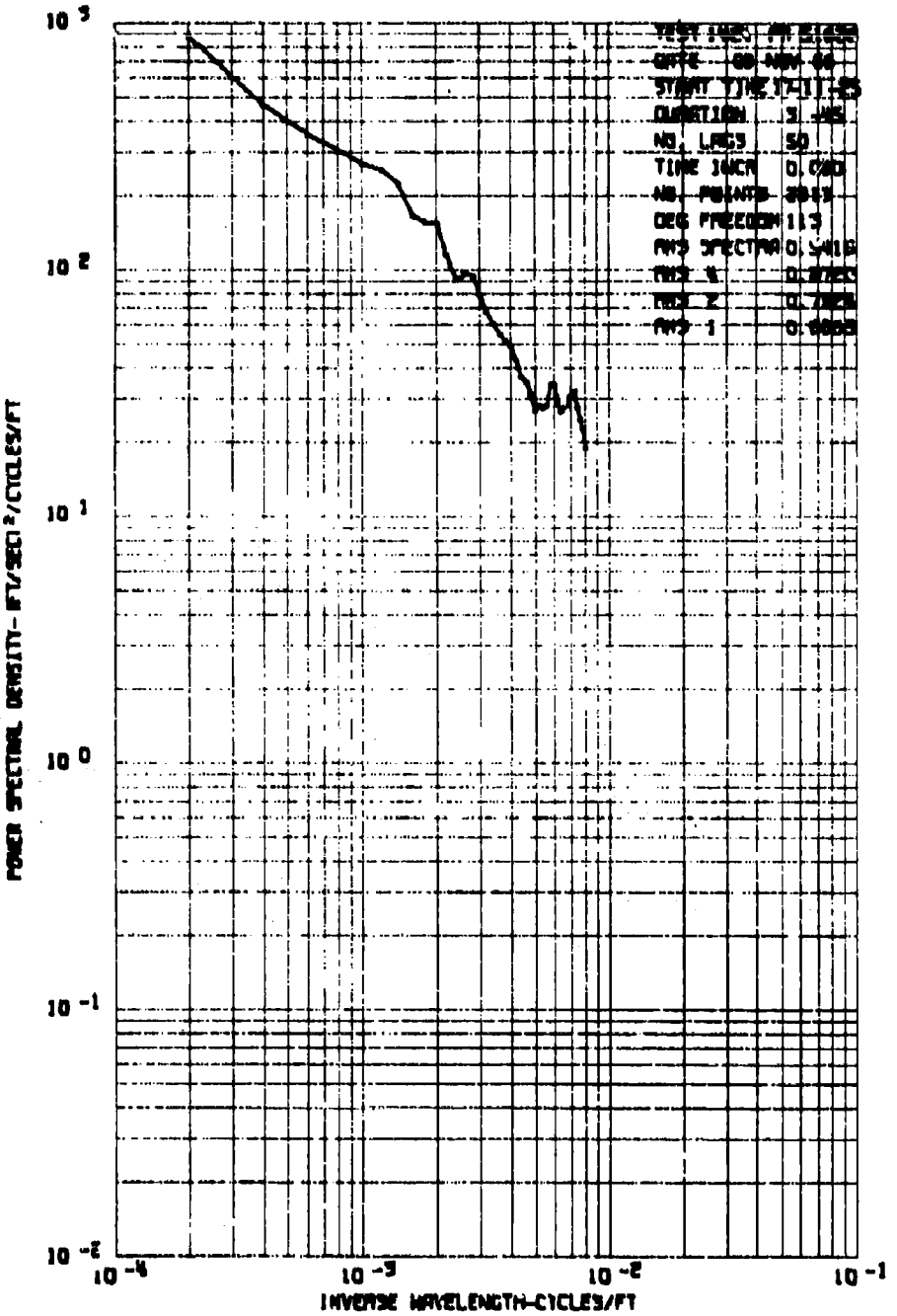


Figure 144A. Power Spectrum of Vertical Gust Velocity, Test 142, Run 4.

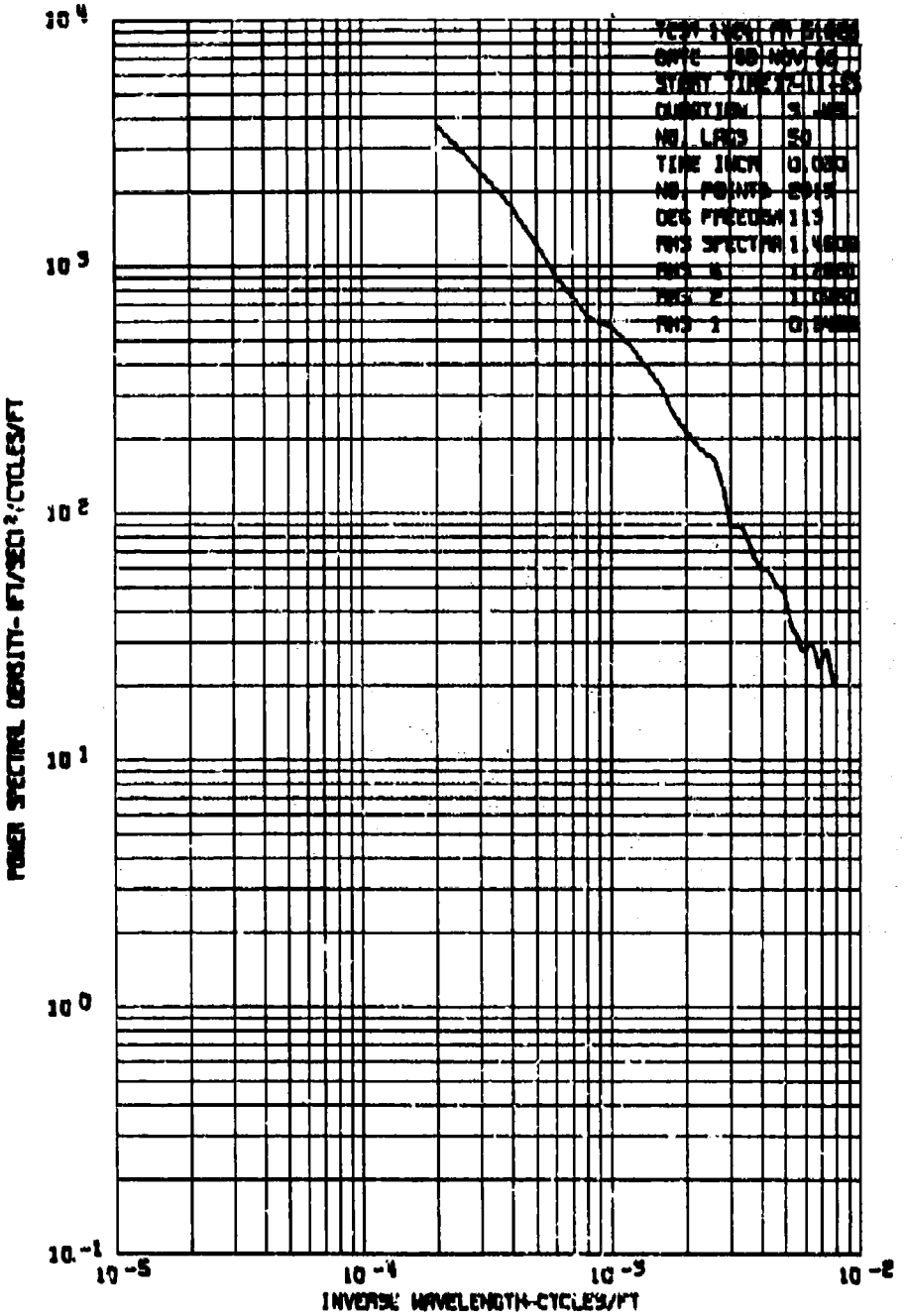


Figure 144B. Power Spectrum of Lateral Gust Velocity, Test 142, Run 4.

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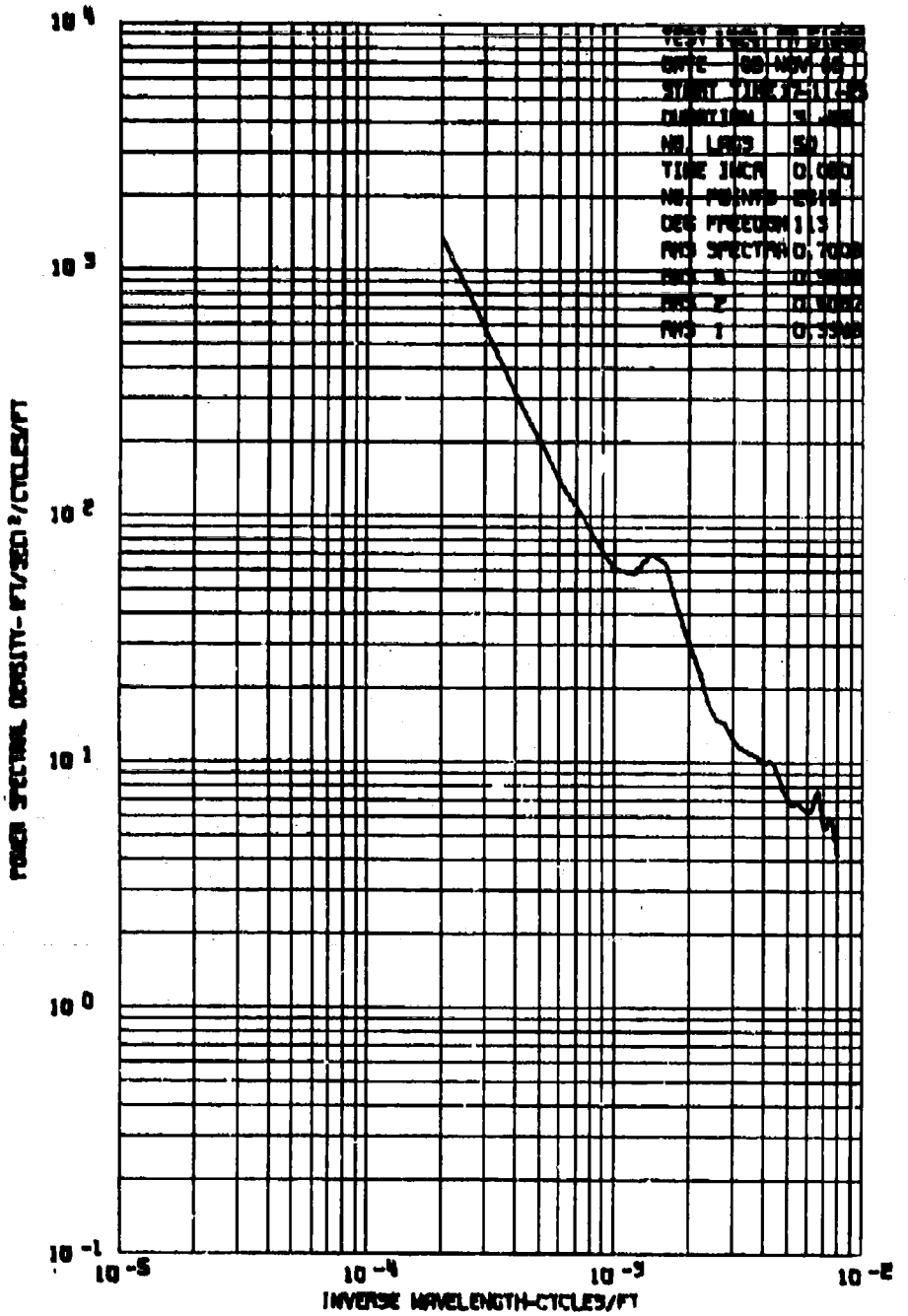


Figure 144C. Power Spectrum of Longitudinal Gust Velocity, Test 142, Run 4.

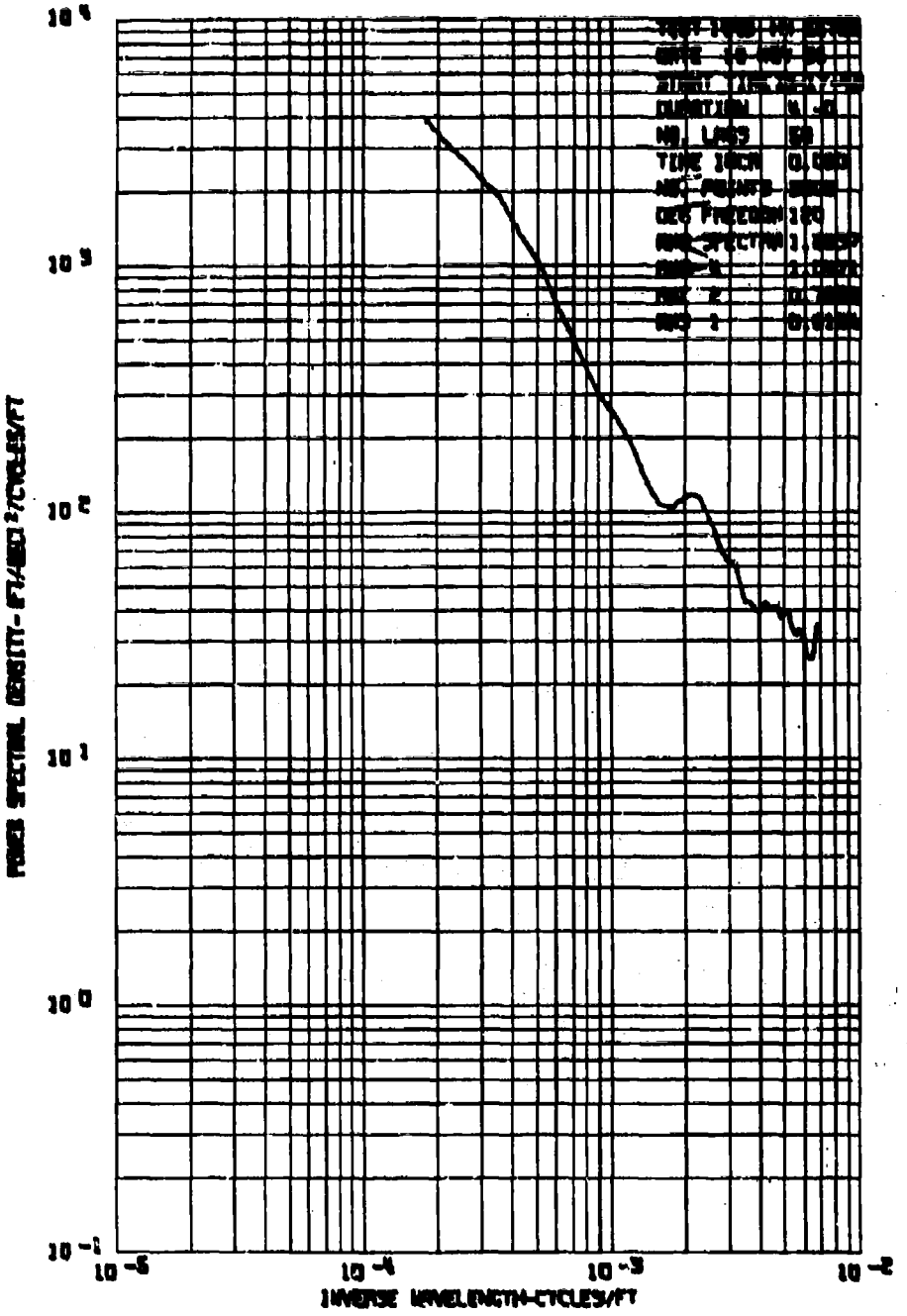


Figure 145A. Power Spectrum of Vertical Gust Velocity, Test 144, Run 3.

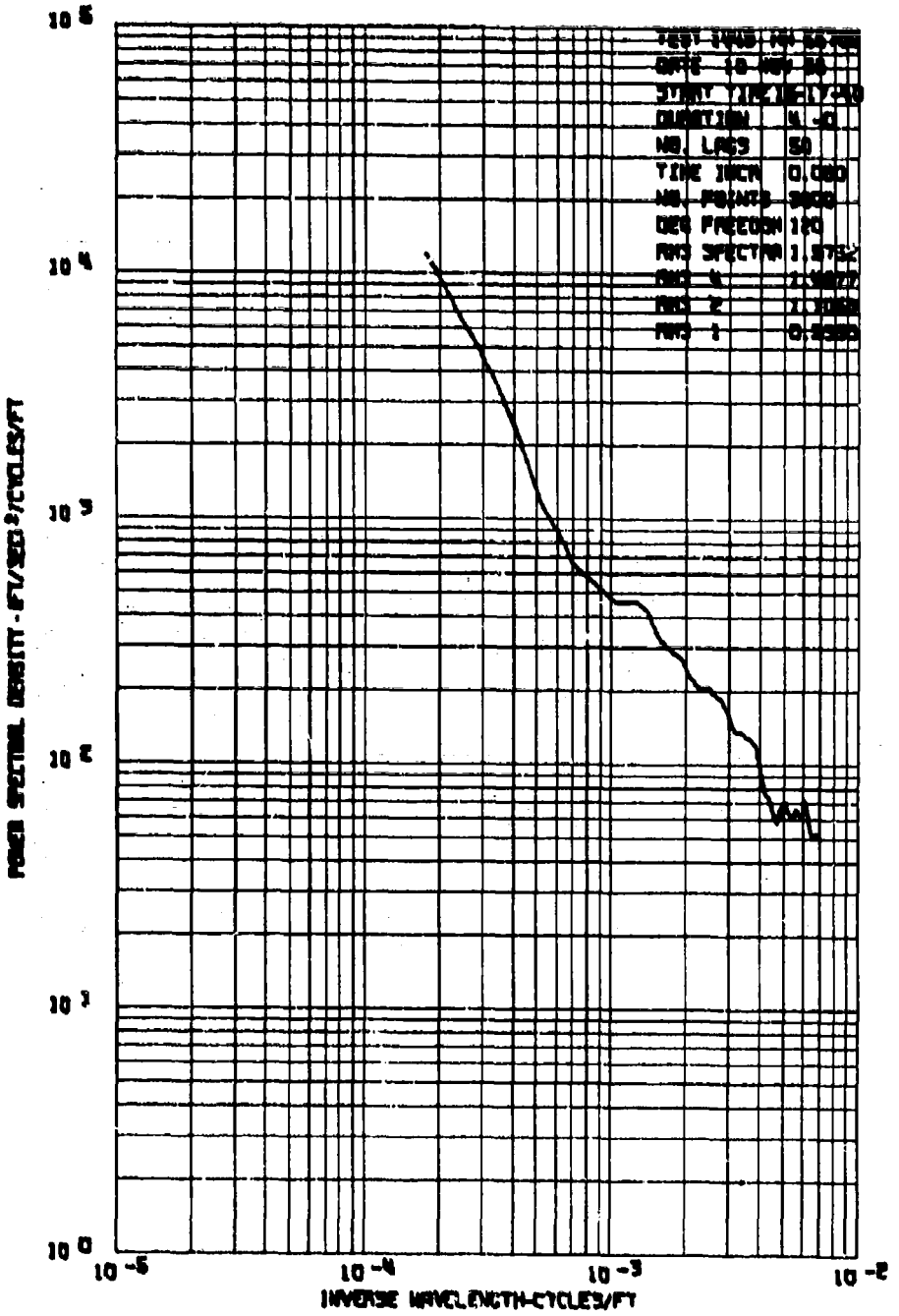


Figure 145B. Power Spectrum of Lateral Gust Velocity, Test 144, Run 3.

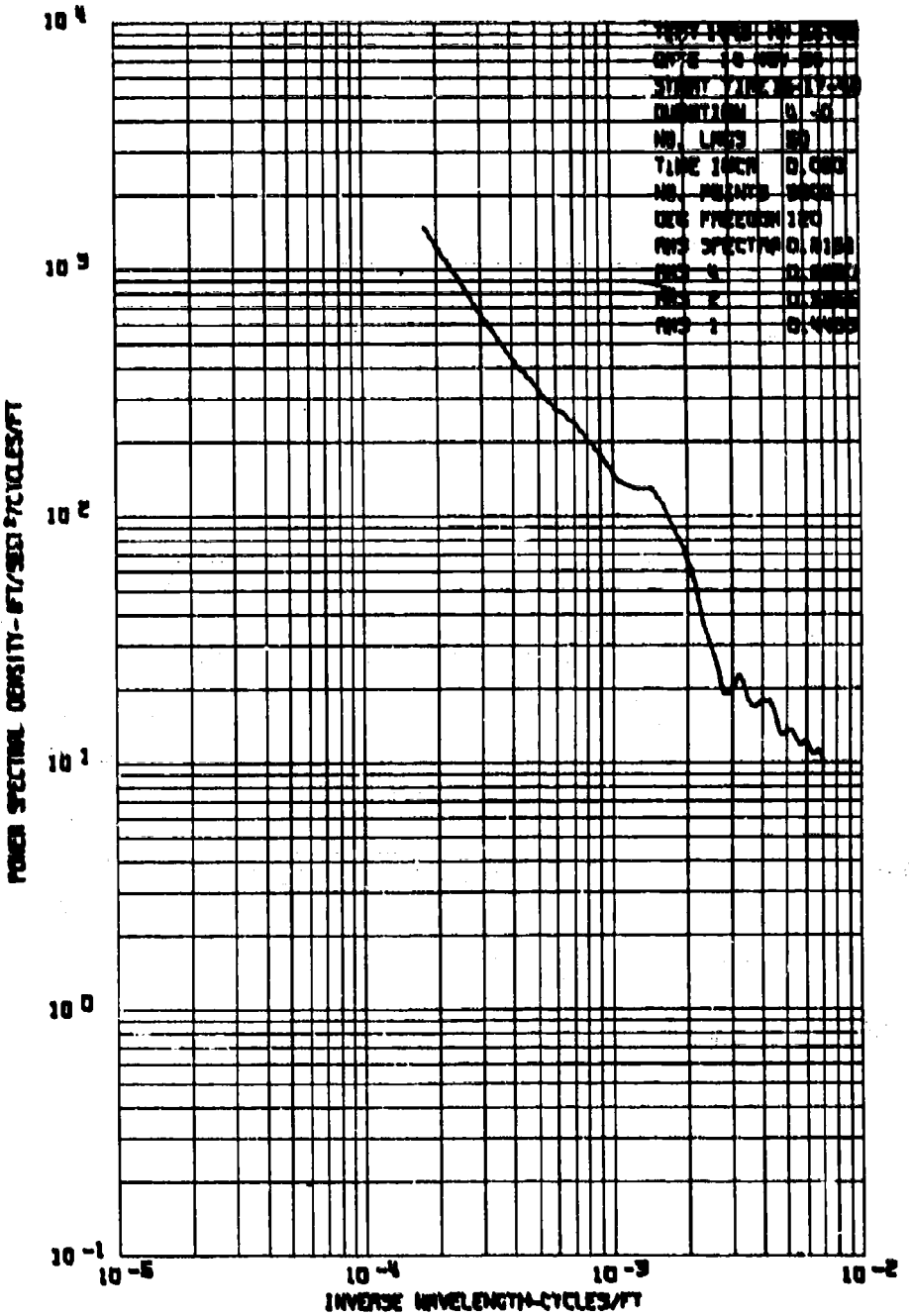


Figure 145C. Power Spectrum of Longitudinal Gust Velocity, Test 144, Run 3.

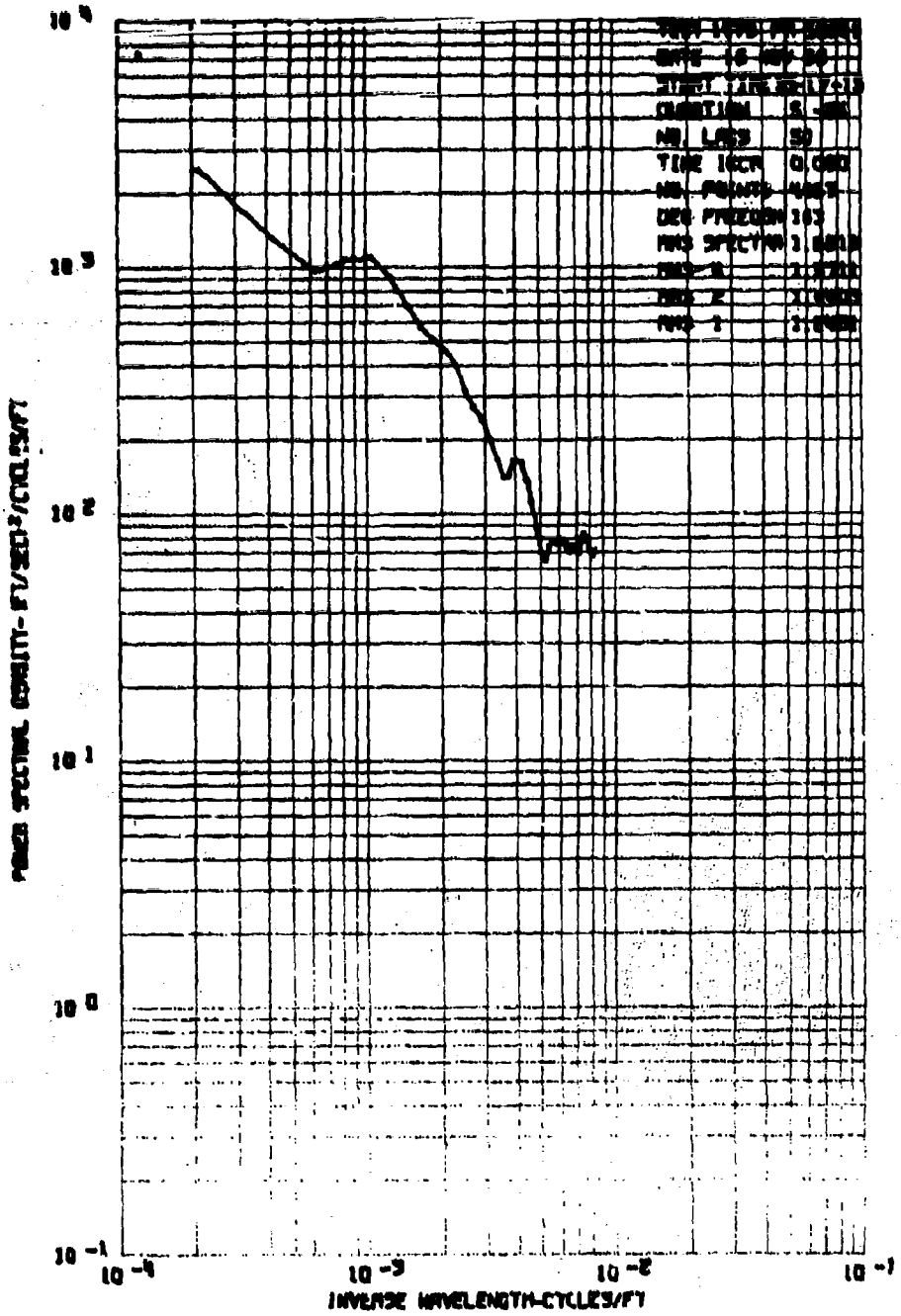


Figure 146A. Power Spectrum of Vertical Gust Velocity, Test 147, Run 3.

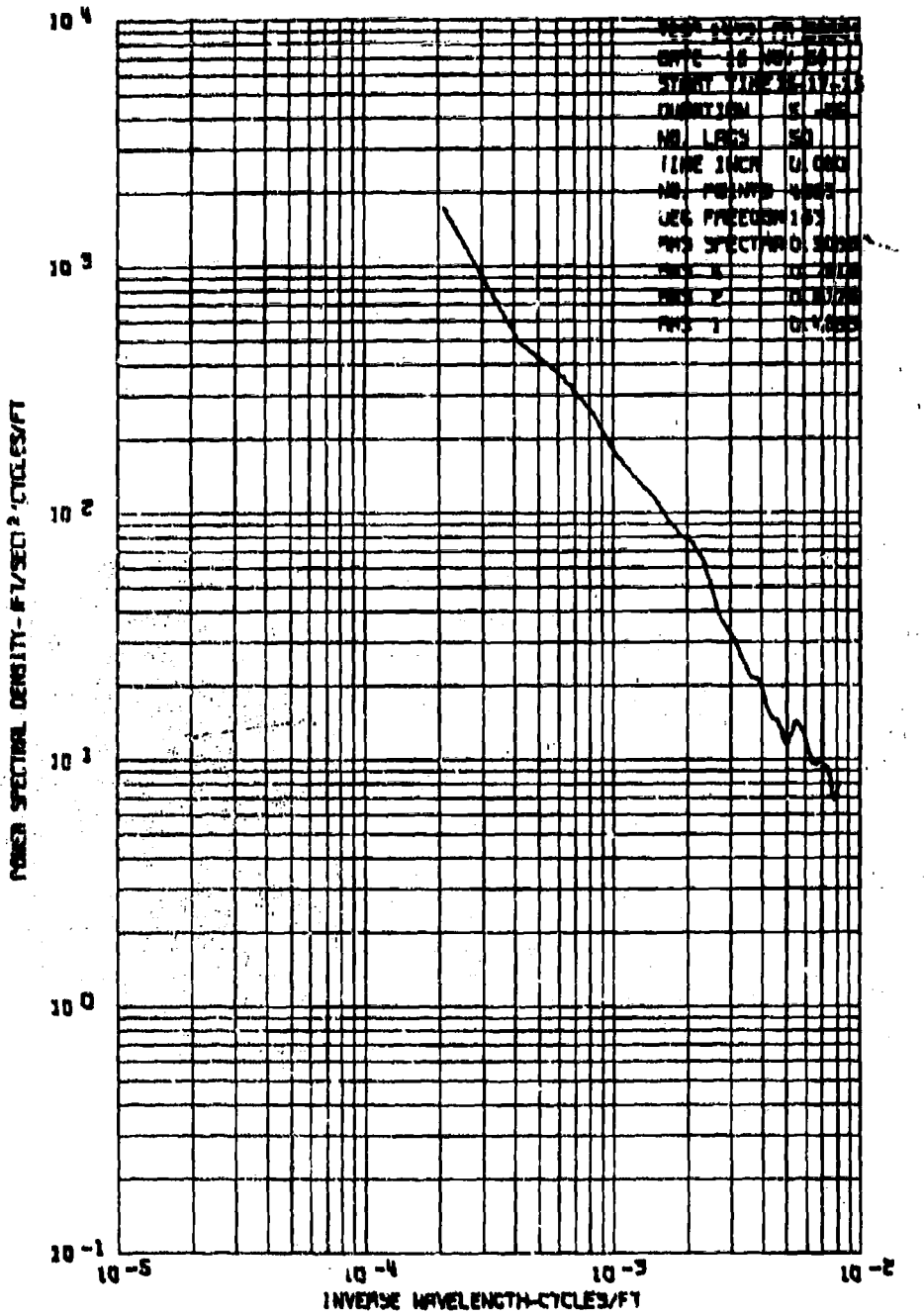


Figure 146B. Power Spectrum of Longitudinal Gust Velocity, Test 147, Run 3.

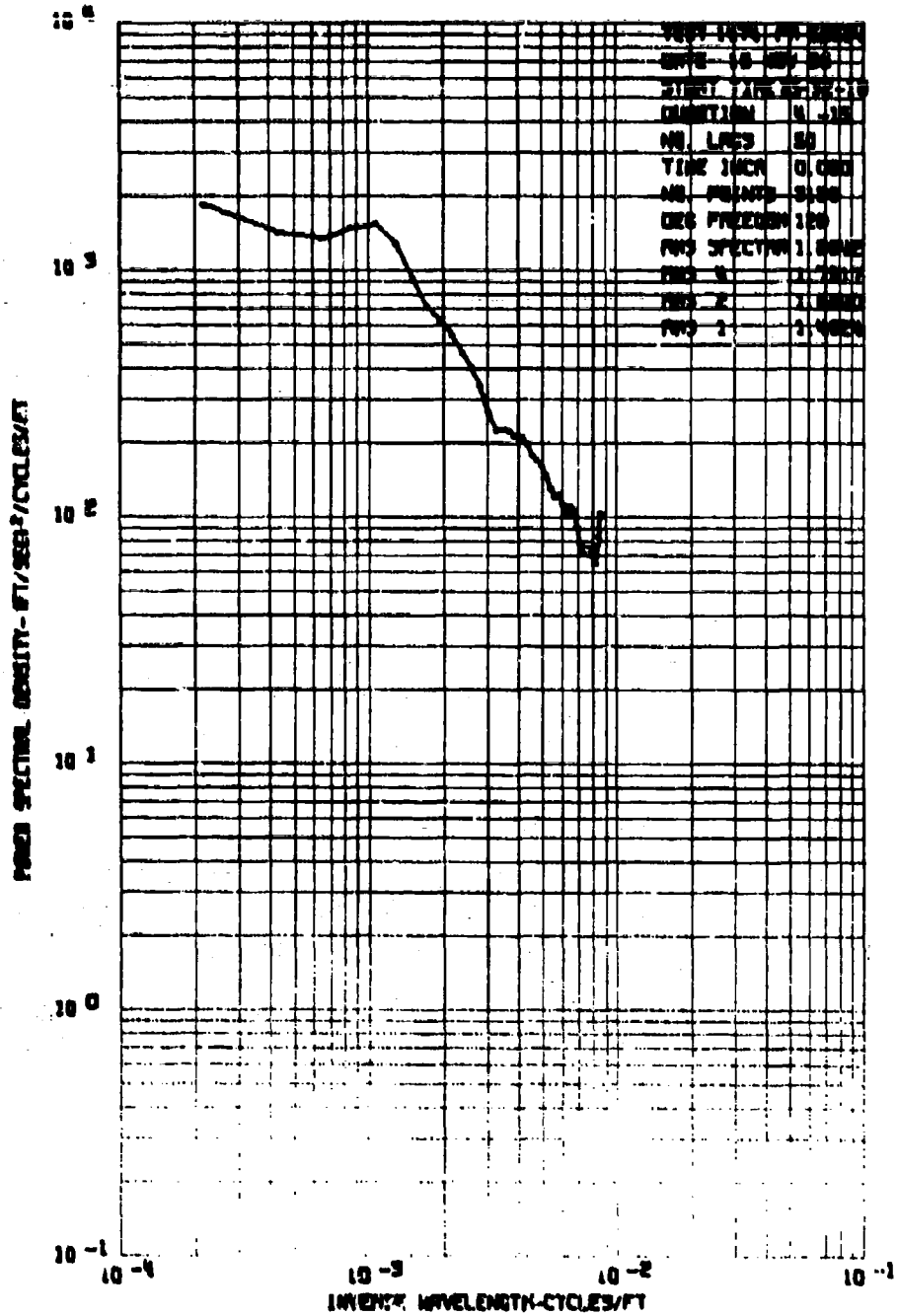


Figure 147A. Power Spectrum of Vertical Gust Velocity, Test 147, Run 4.

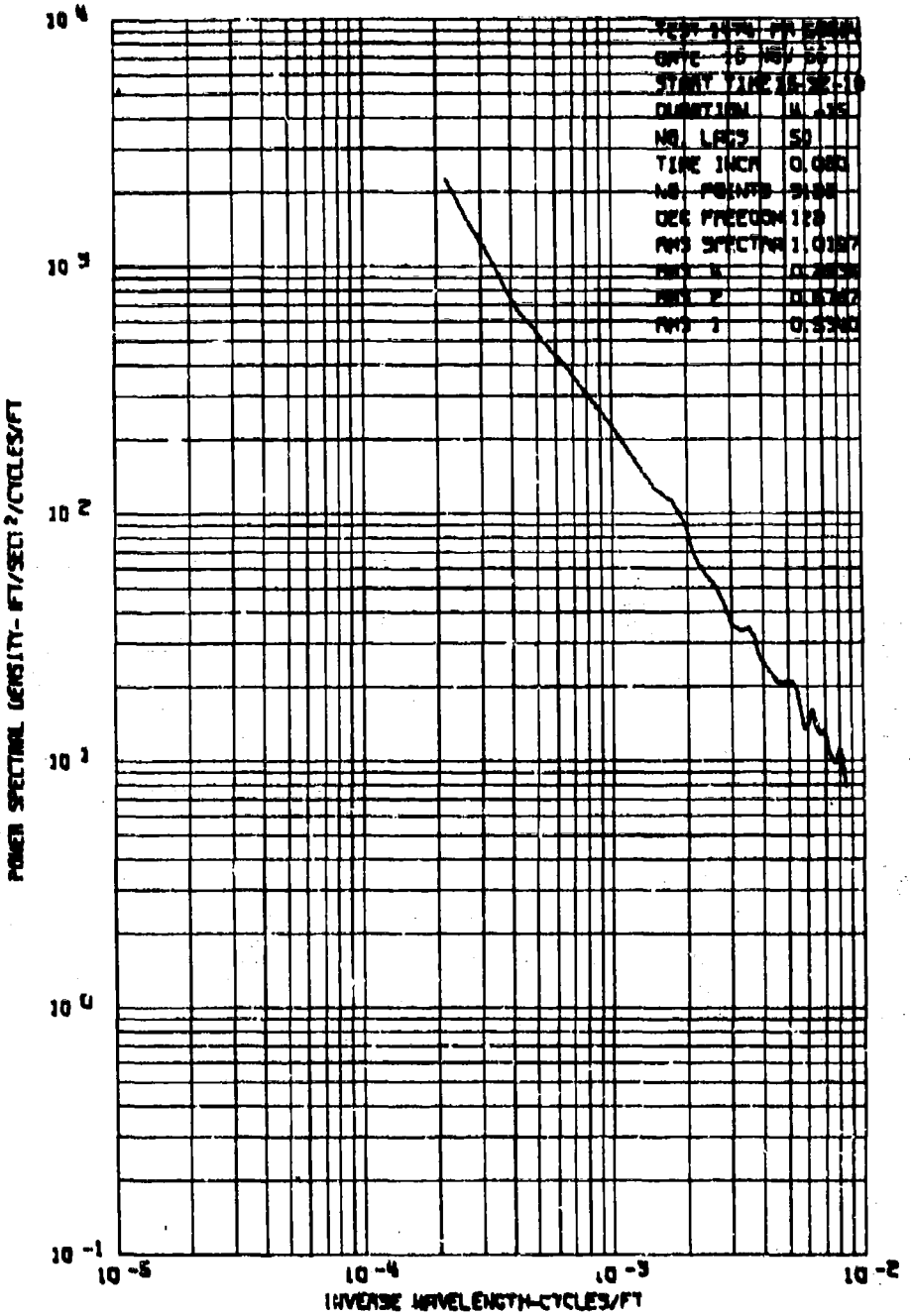


Figure 147B. Power Spectrum of Longitudinal Gust Velocity, Test 147, Run 4.

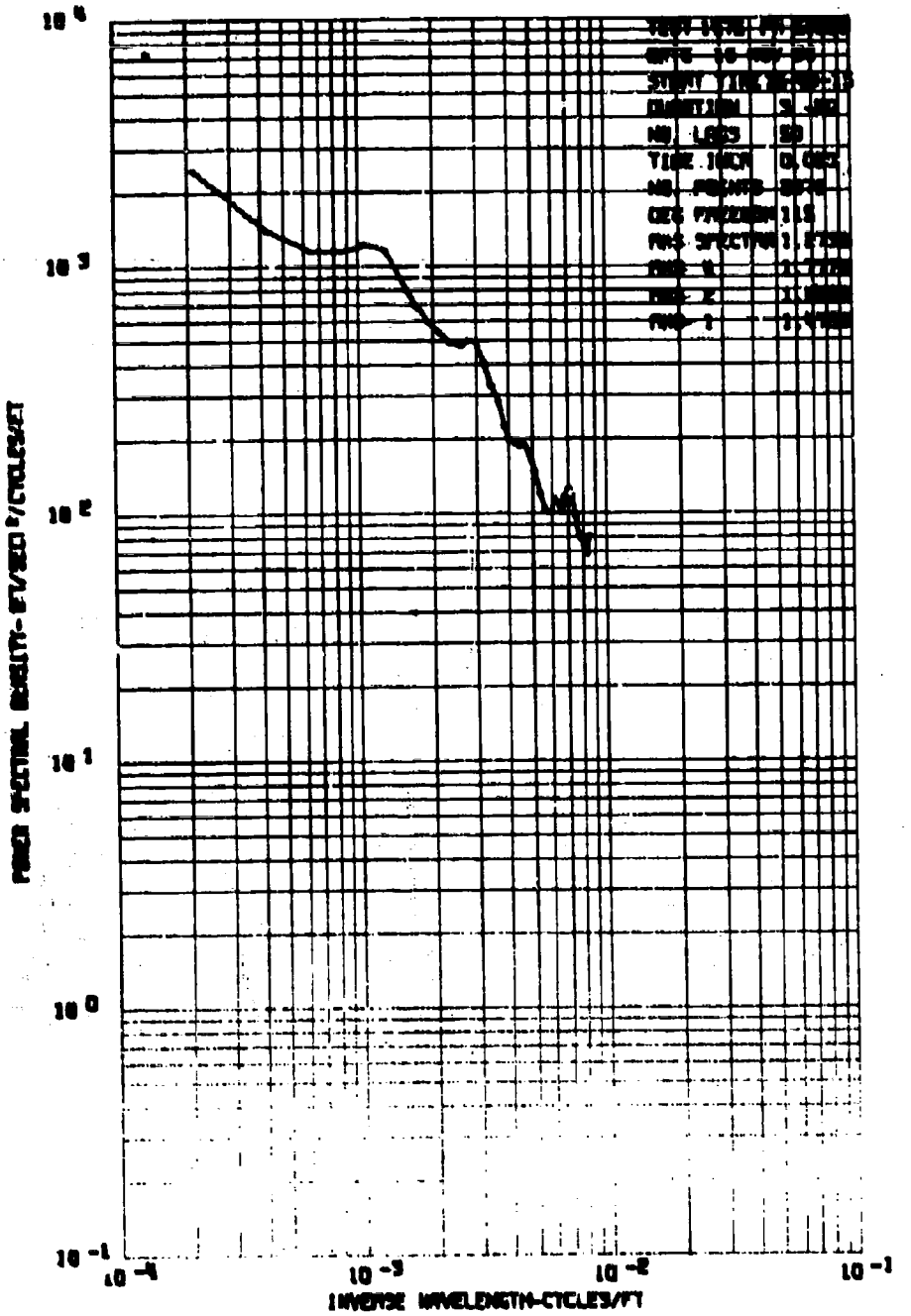


Figure 148A. Power Spectrum of Vertical Gust Velocity, Test 147, Run 5.

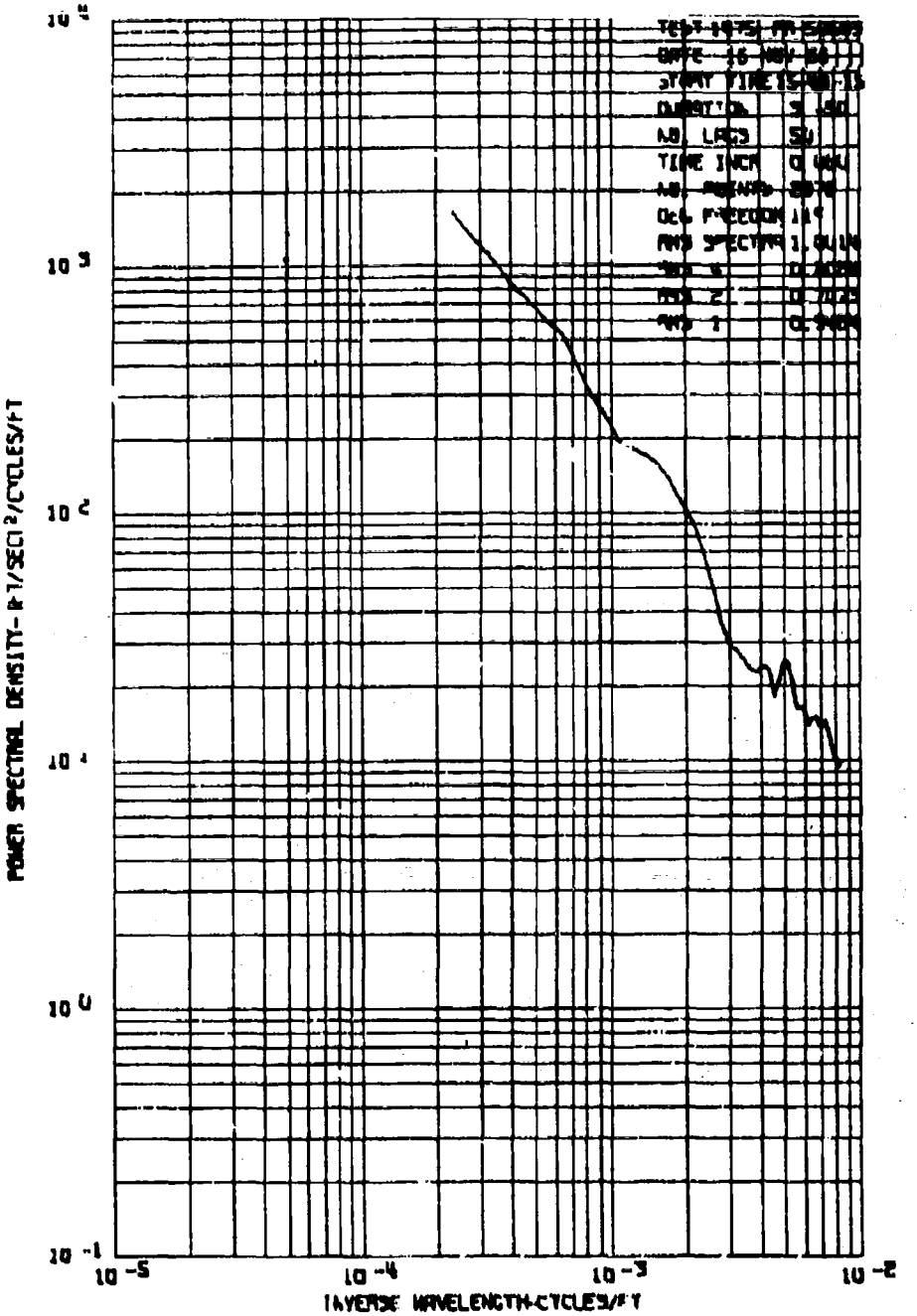


Figure 148B. Power Spectrum of Longitudinal Gust Velocity, Test 147, Run 5.

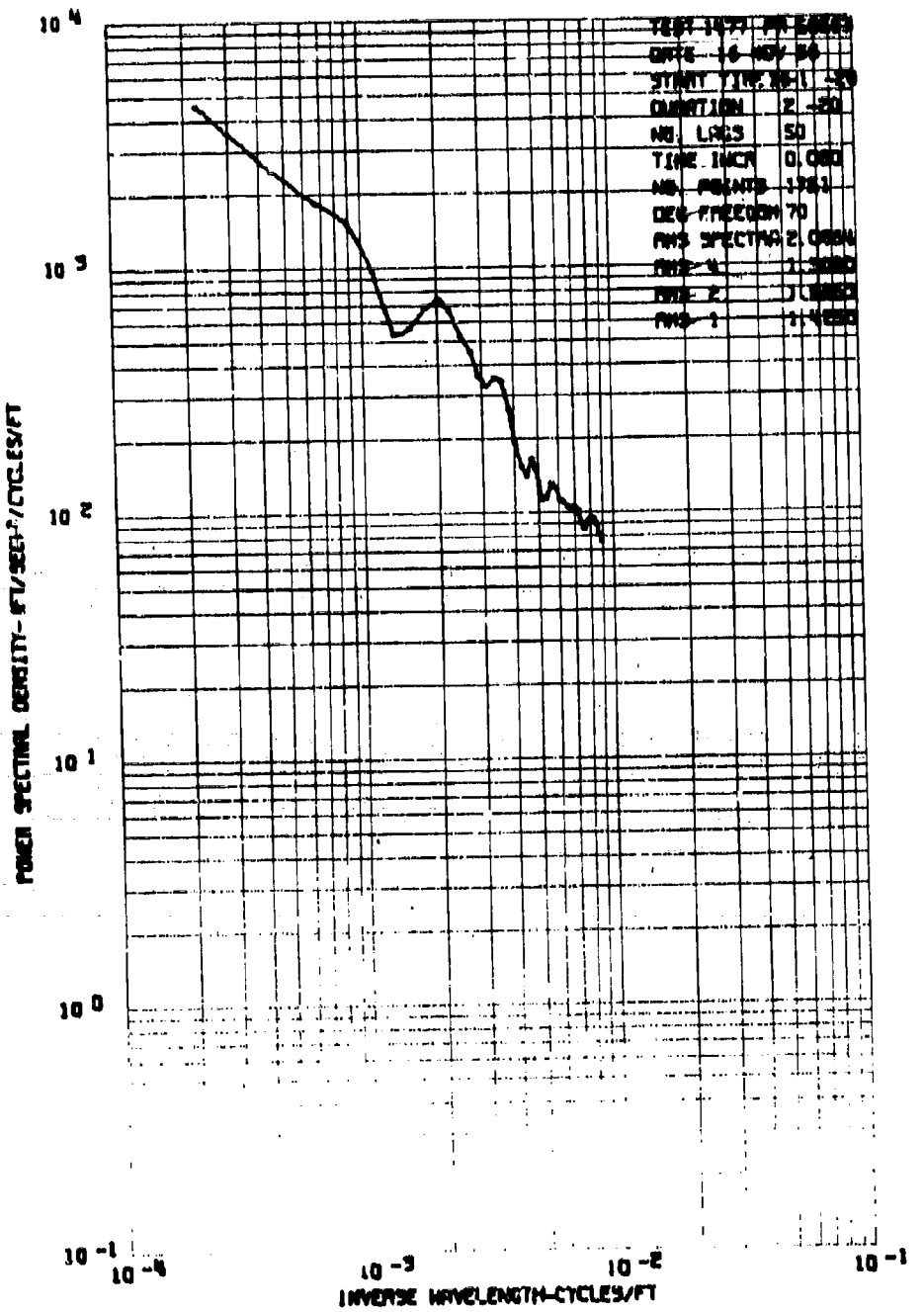


Figure 149A. Power Spectrum of Vertical Gust Velocity, Test 147, Run 7.

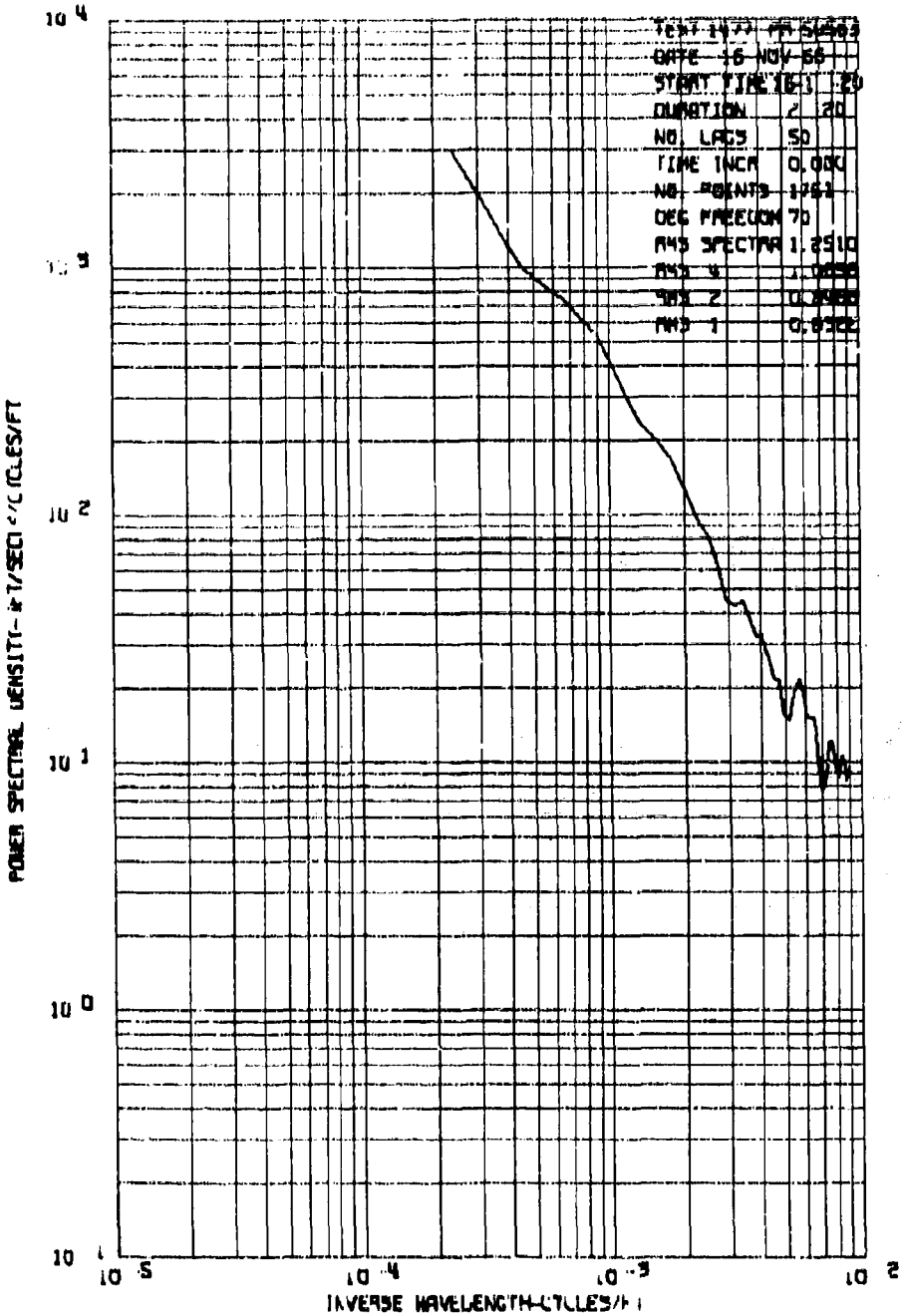


Figure 149B. Power Spectrum of Longitudinal Gust Velocity, Test 147, Run 7.

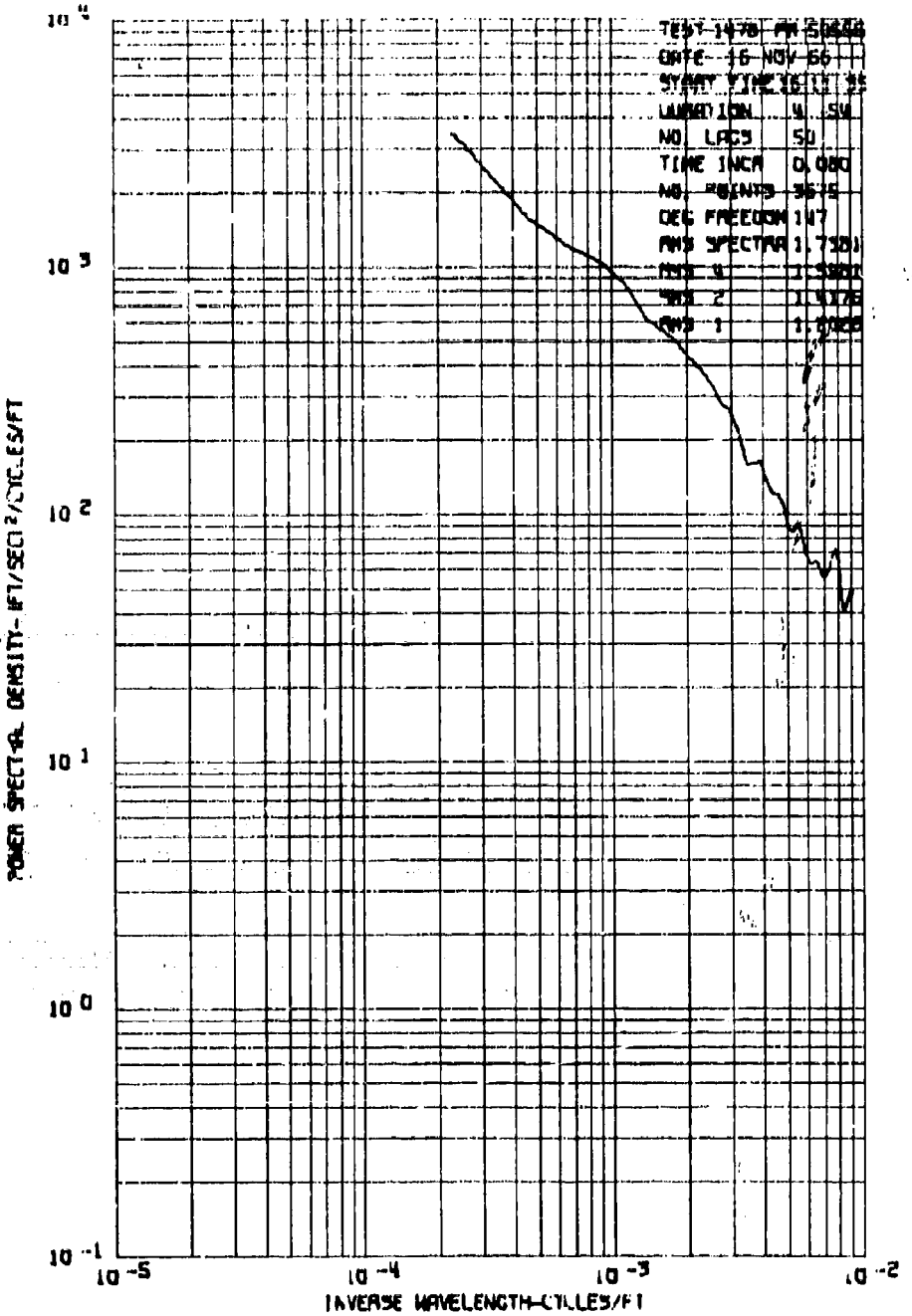


Figure 150A. Power Spectrum of Vertical Gust Velocity, Test 147, Run 8.

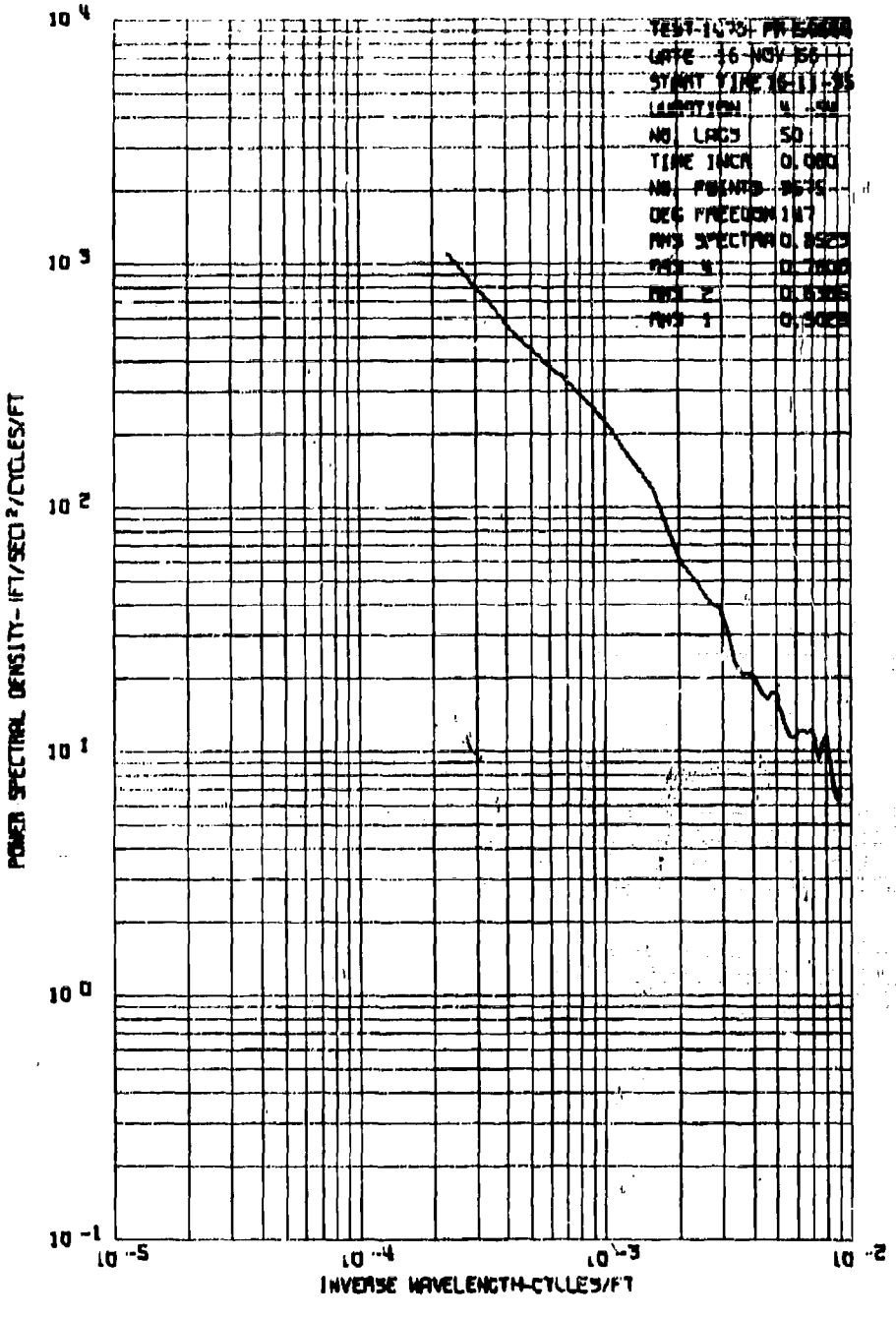


Figure 150B. Power Spectrum of Longitudinal Gust Velocity, Test 147, Run 8.

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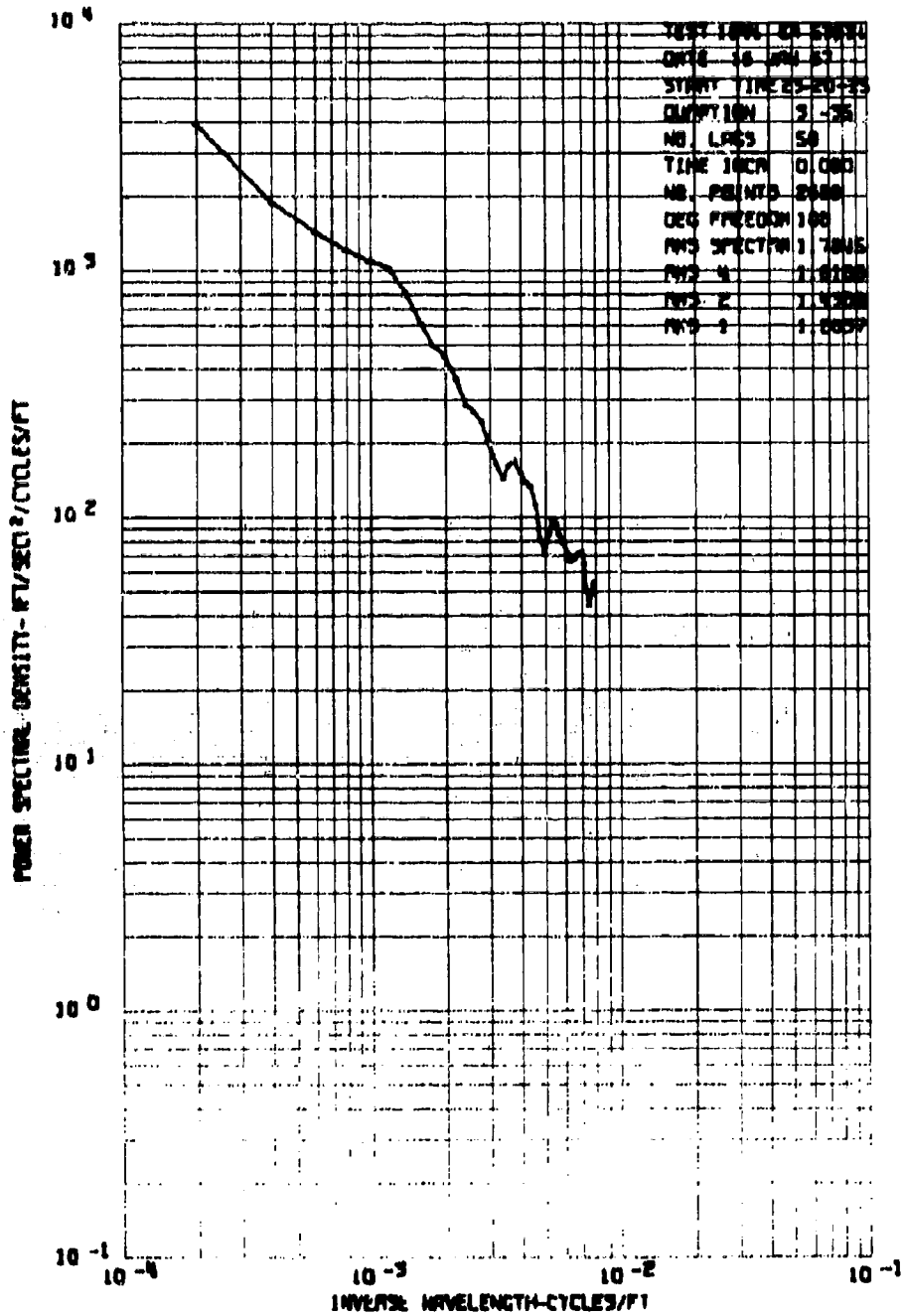


Figure 151A. Power Spectrum of Vertical Gust Velocity, Test 164, Run 4.

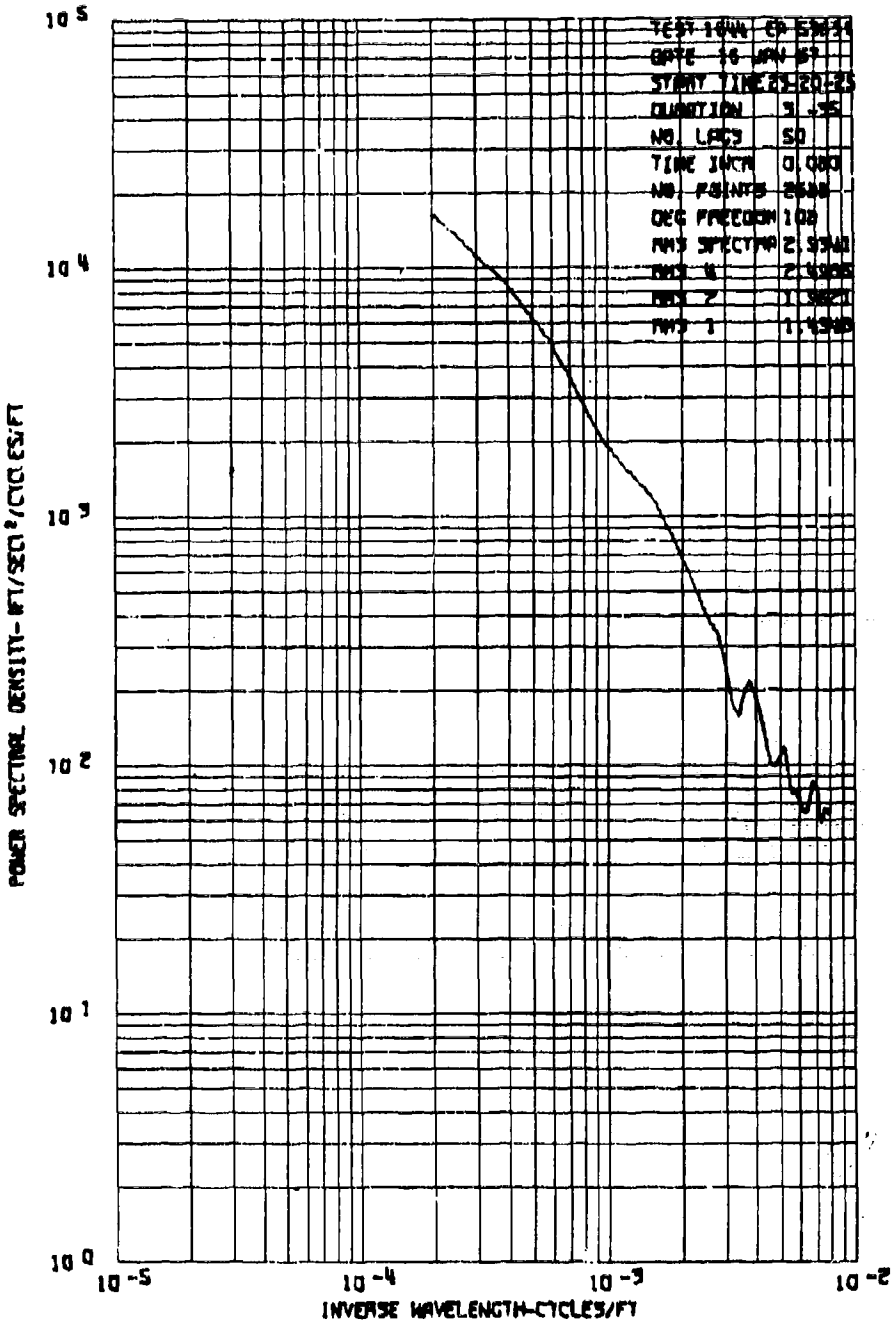


Figure 151B. Power Spectrum of Lateral Gust Velocity, Test 164, Run 4.

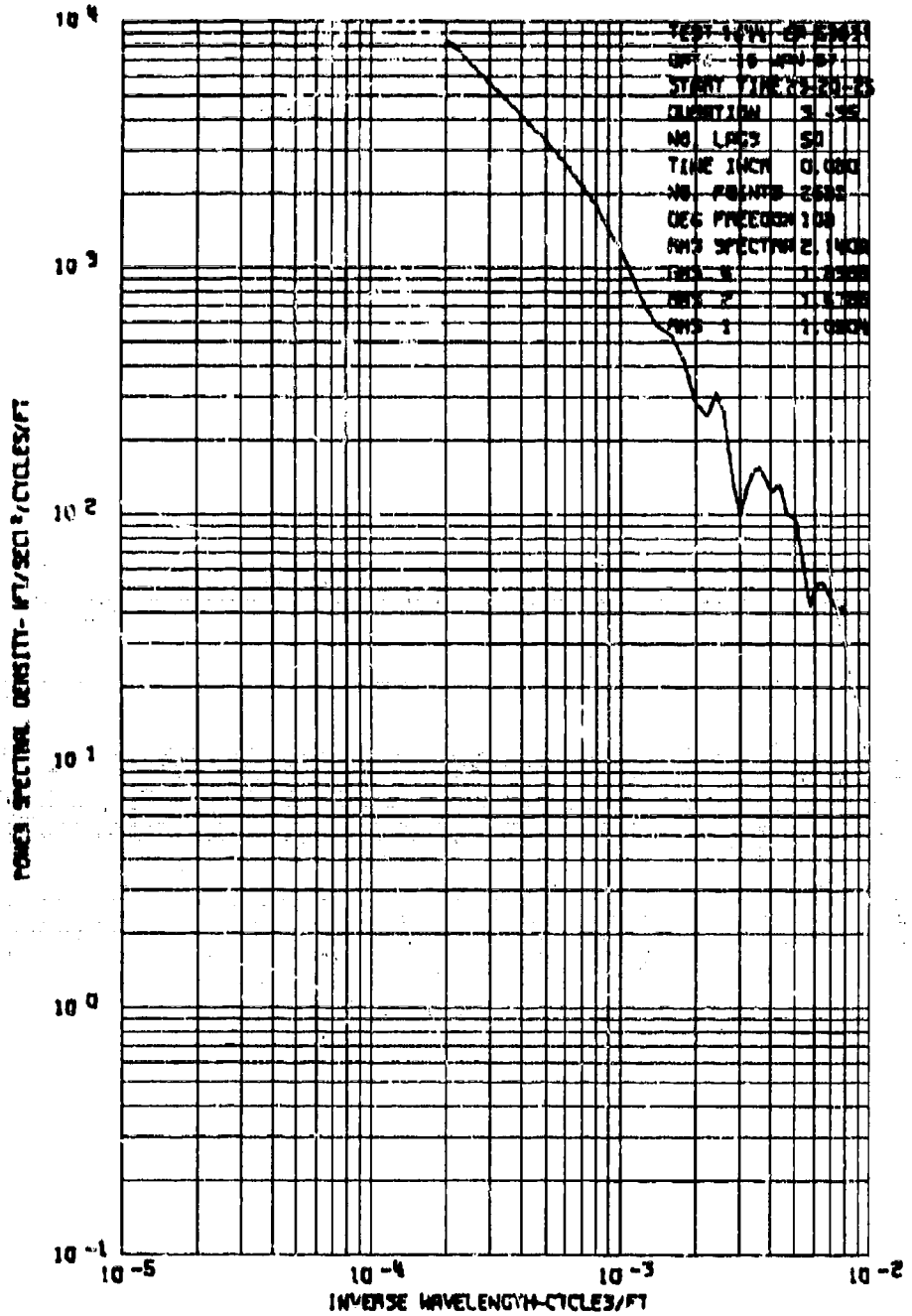


Figure 151C. Power Spectrum of Longitudinal Gust Velocity, Test 164, Run 4.

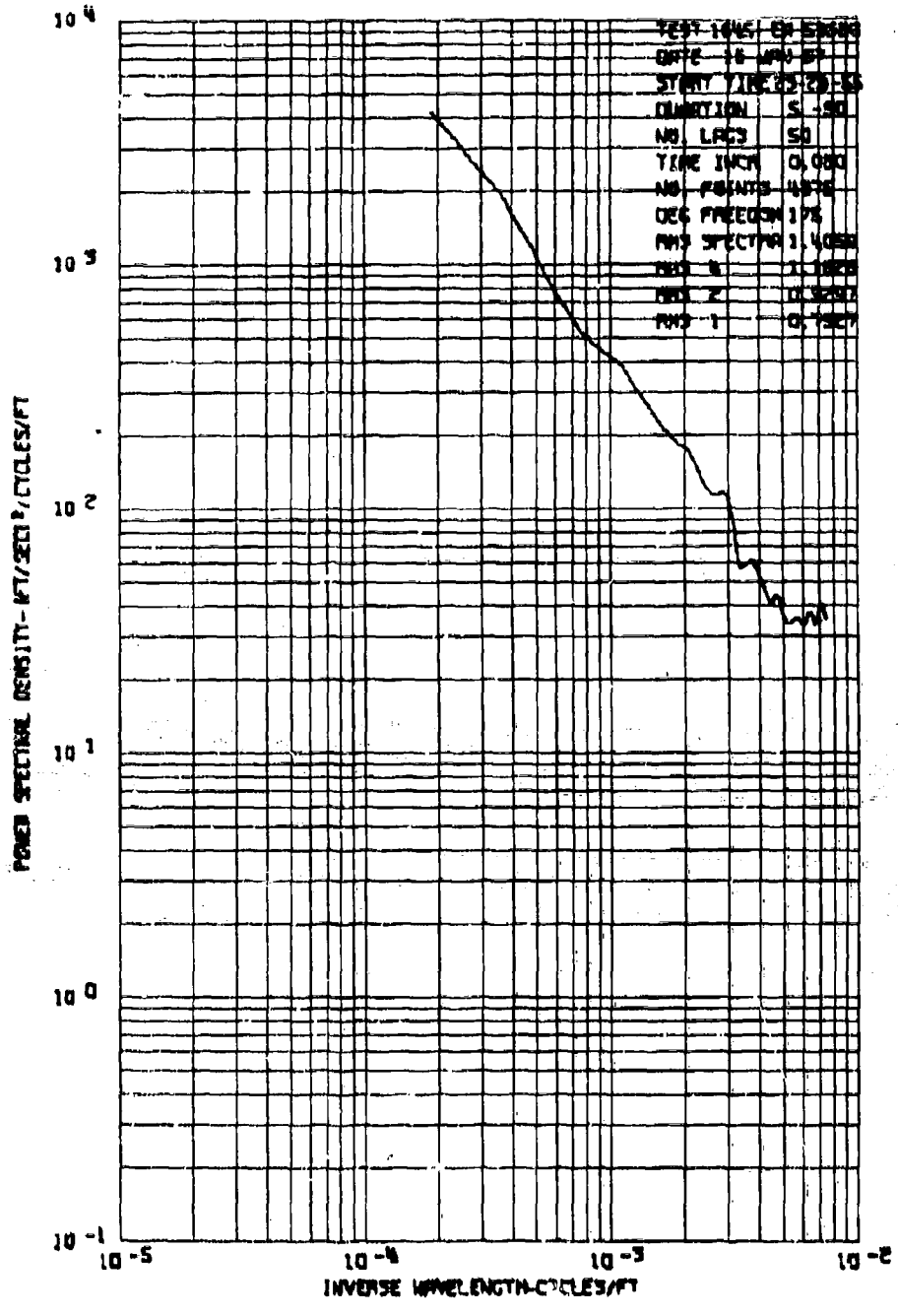


Figure 152A. Power Spectrum of Vertical Gust Velocity, Test 164, Run 5.

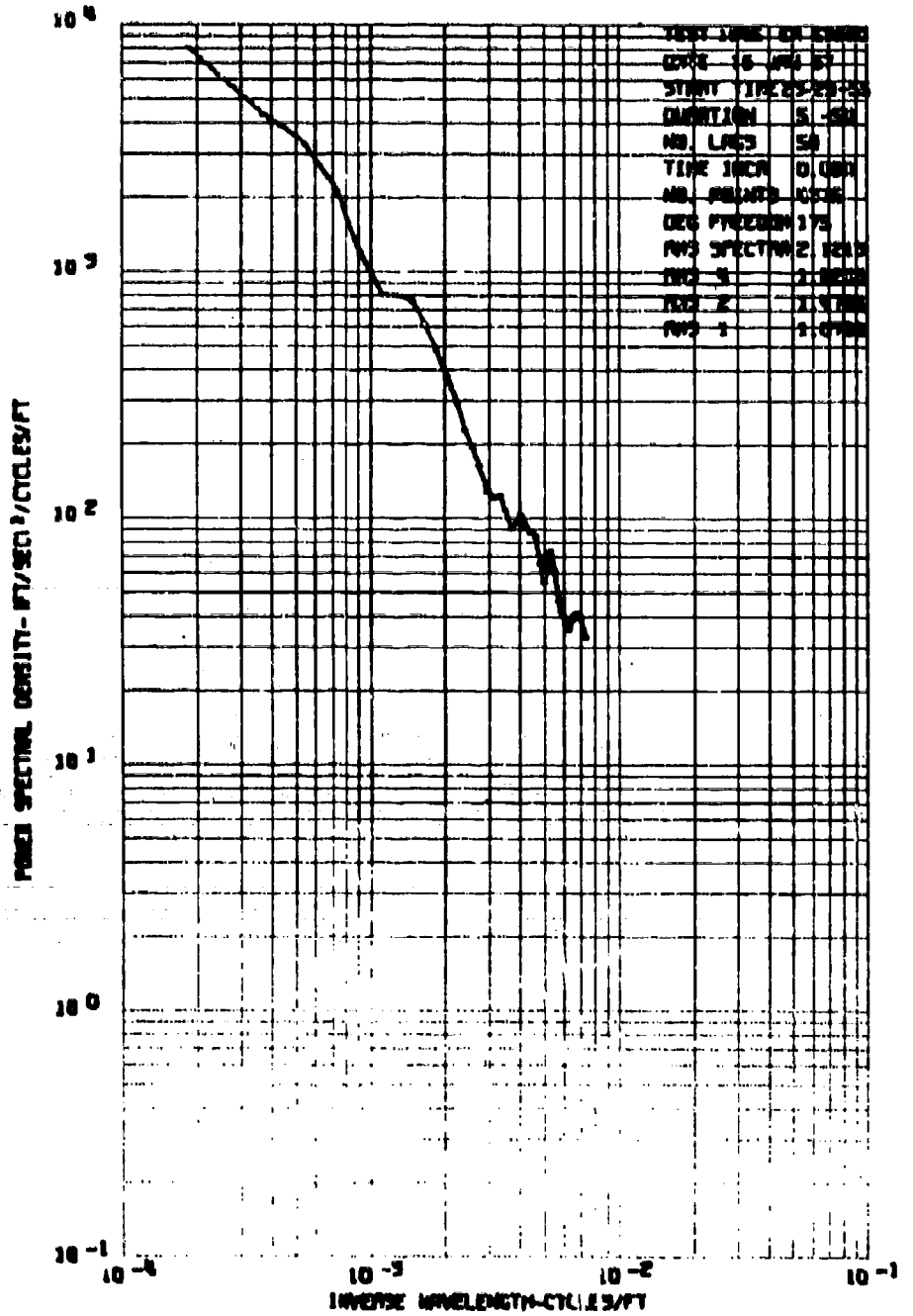


Figure 152B. Power Spectrum of Lateral Gust Velocity, Test 164, Run 5.

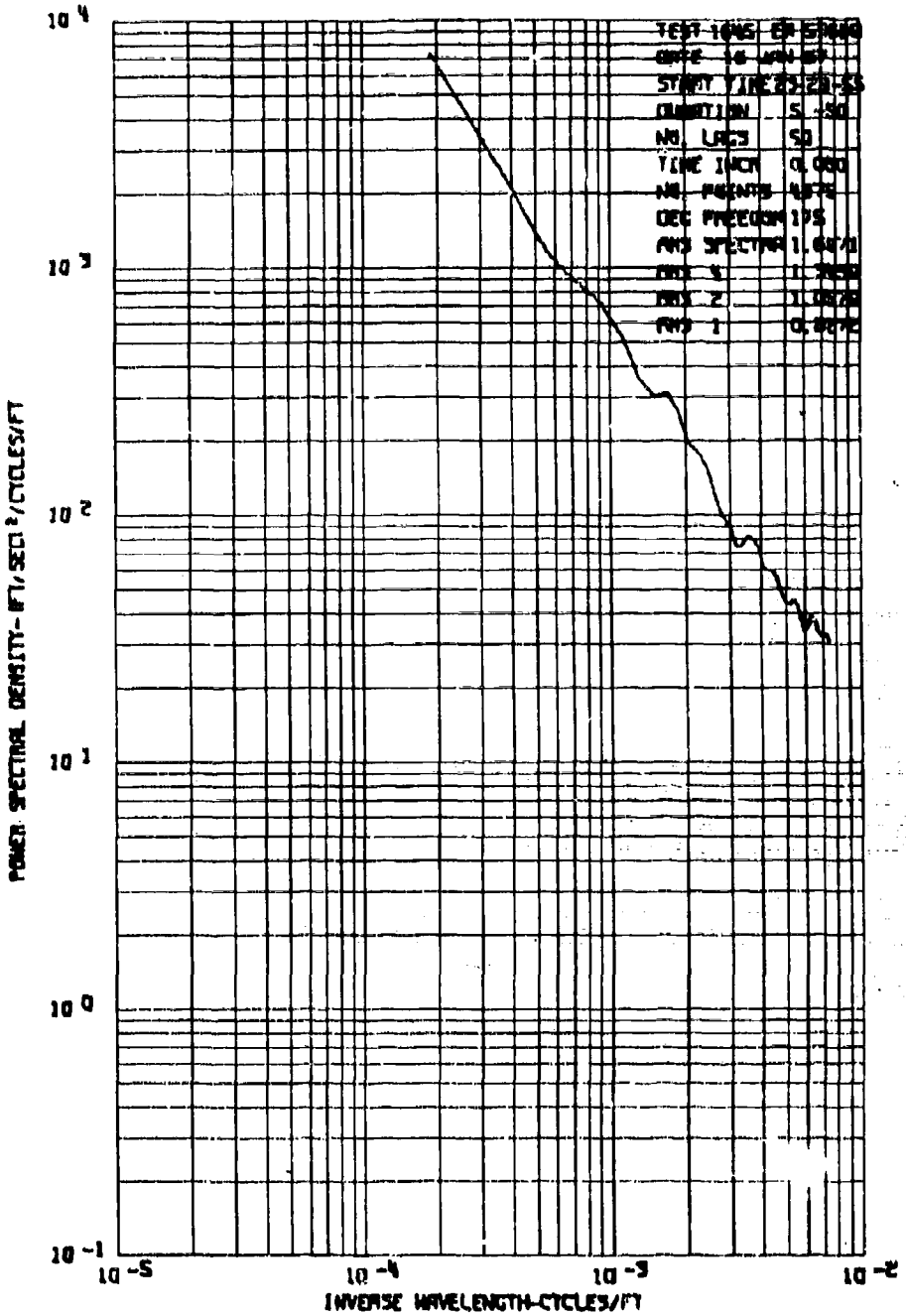


Figure 152C. Power Spectrum of Longitudinal Gust Velocity, Test 164, Run 5.

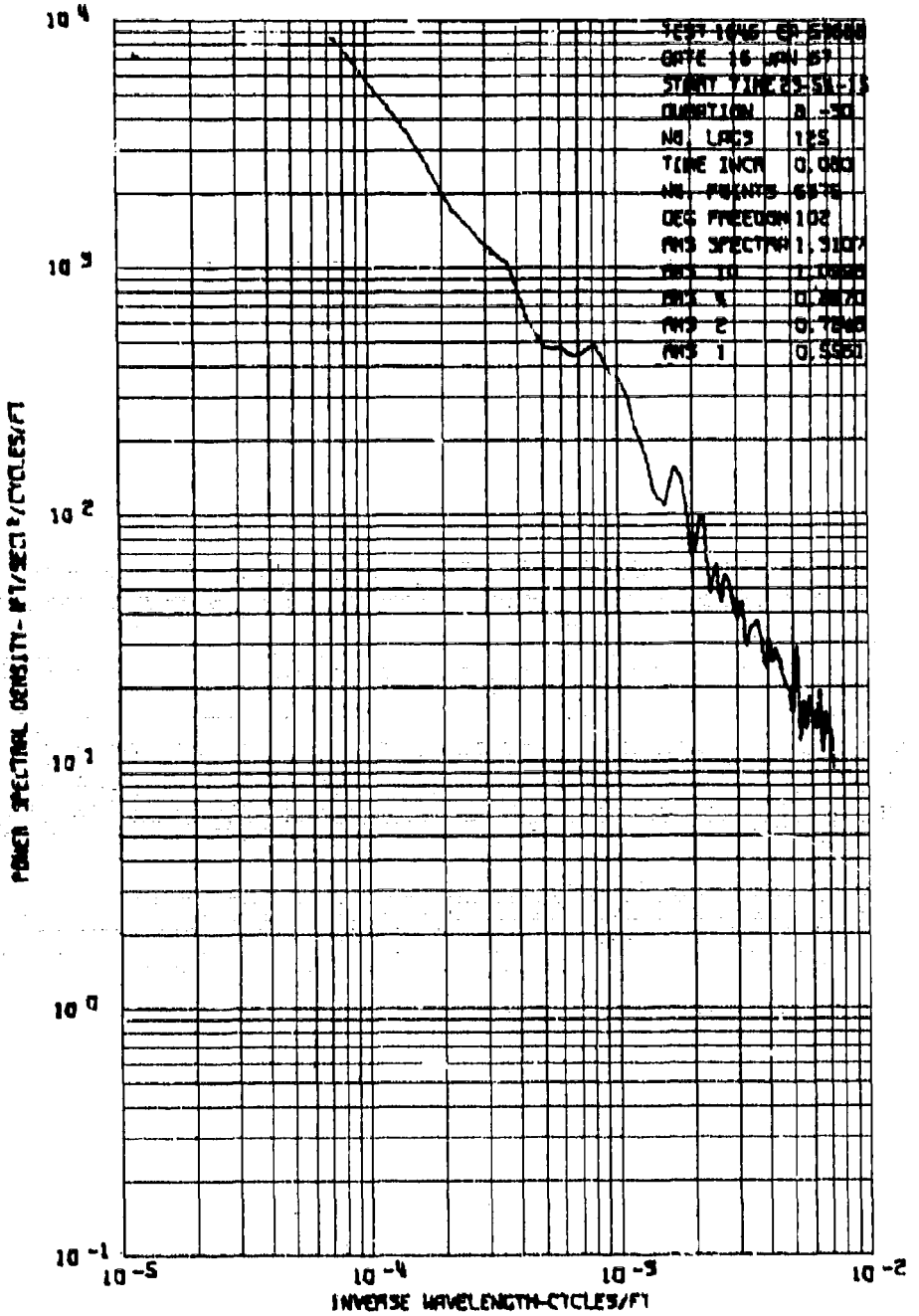


Figure 153A. Power Spectrum of Vertical Gust Velocity, Test 164, Run 6.

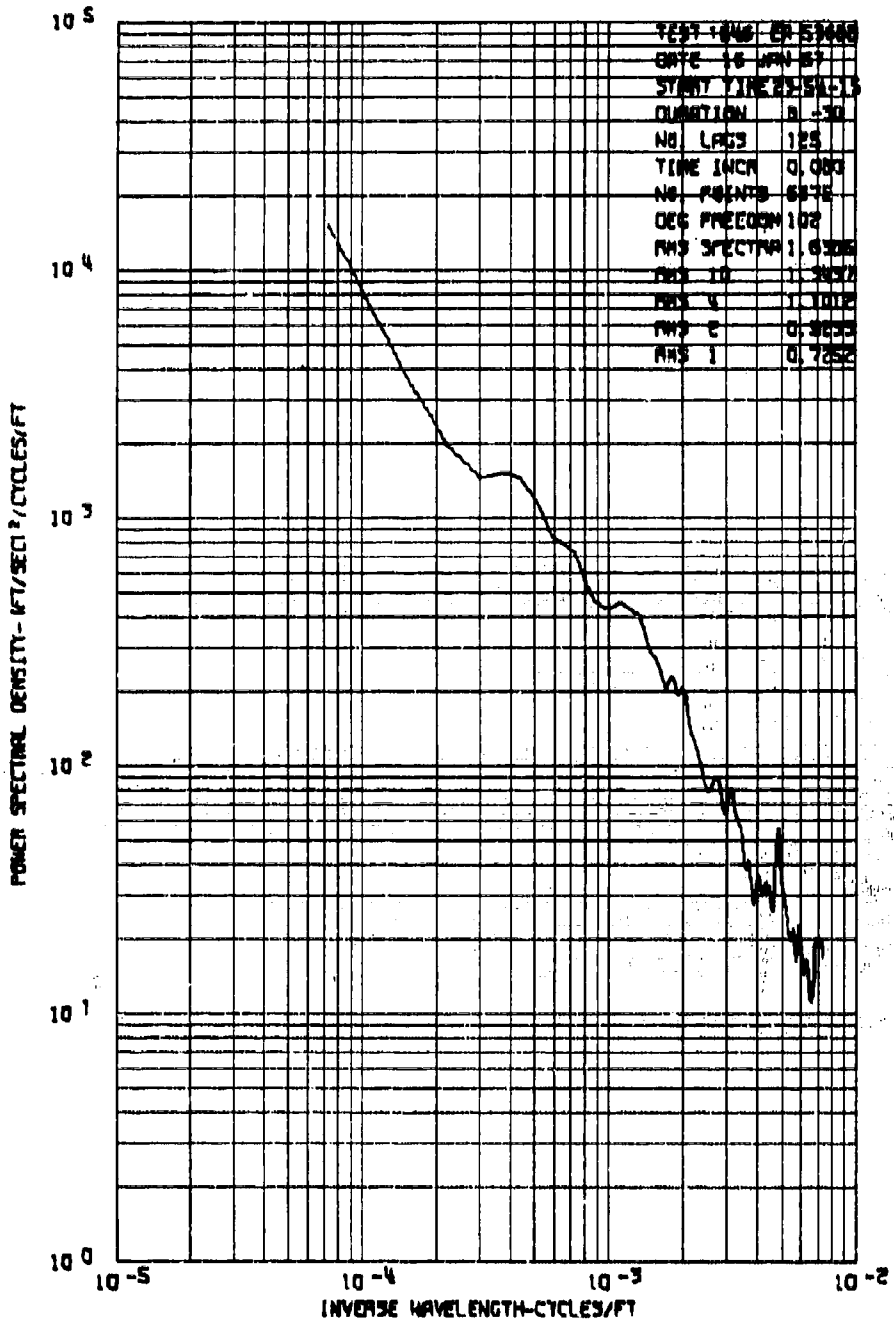


Figure 153B. Power Spectrum of Lateral Gust Velocity, Test 164, Run 6.

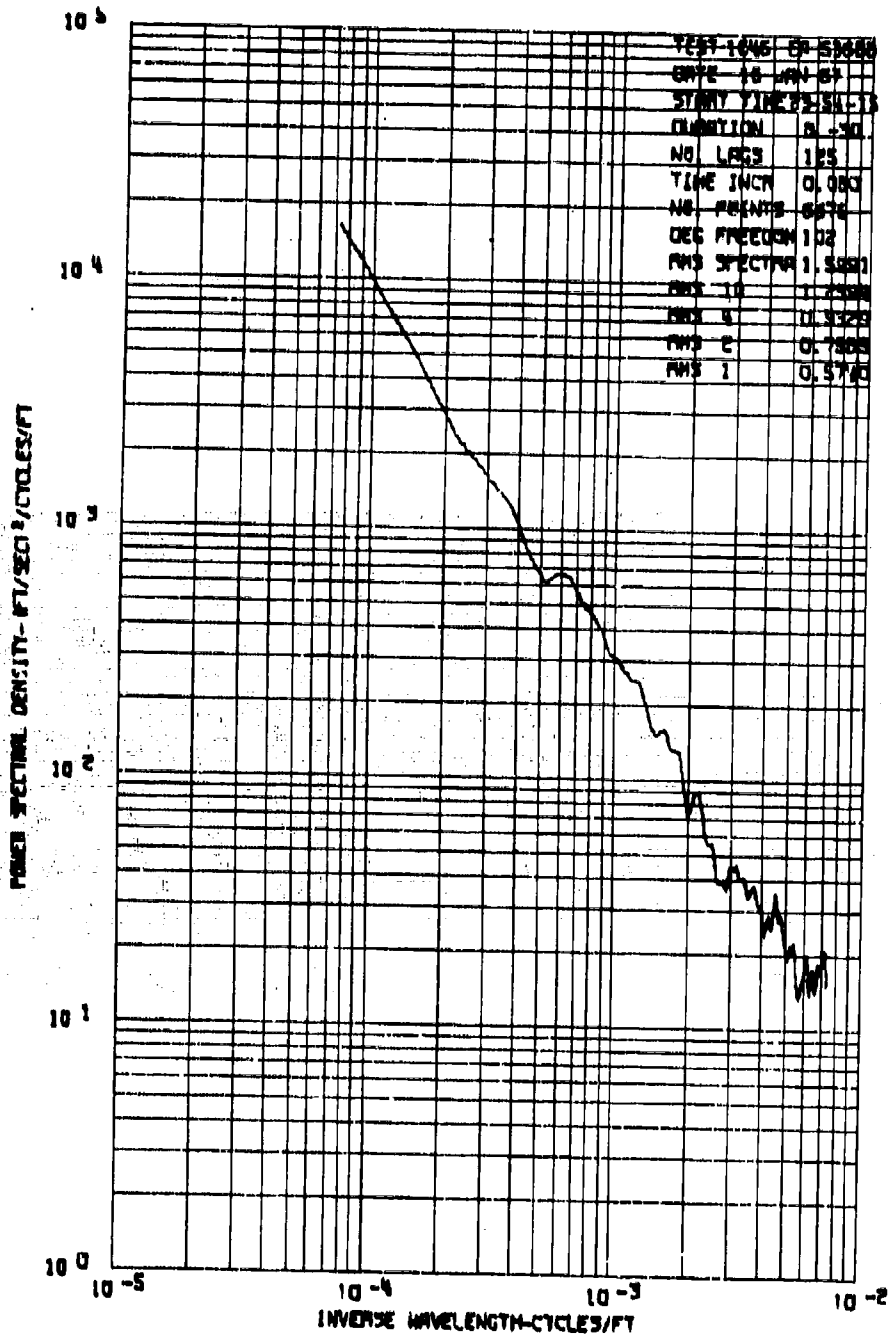


Figure 153C. Power Spectrum of Longitudinal Gust Velocity, Test 164, Run 6.

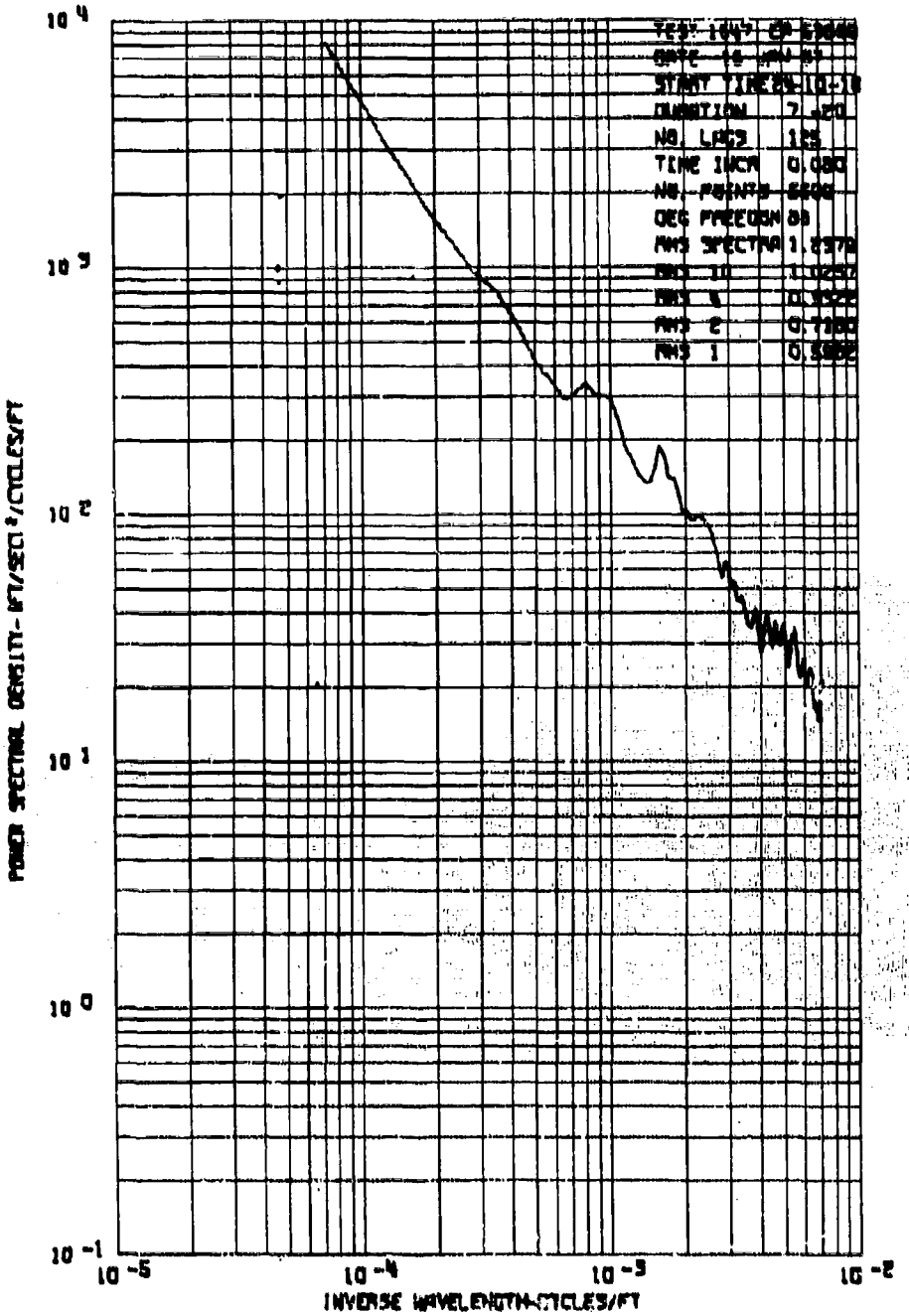


Figure 154A. Power Spectrum of Vertical Gust Velocity, Test 164, Run 7.

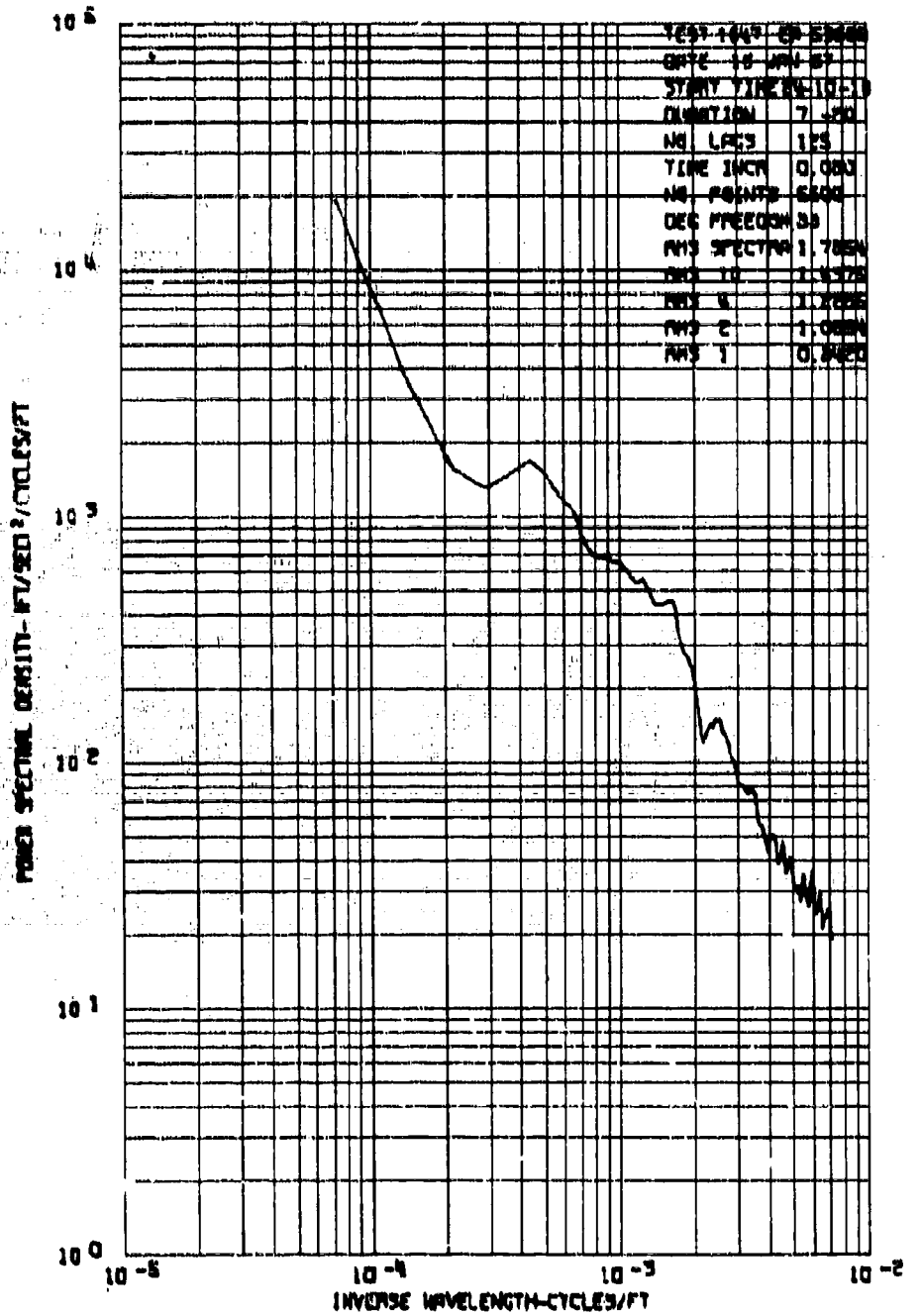


Figure 154B. Power Spectrum of Lateral Gust Velocity, Test 164, Run 7.

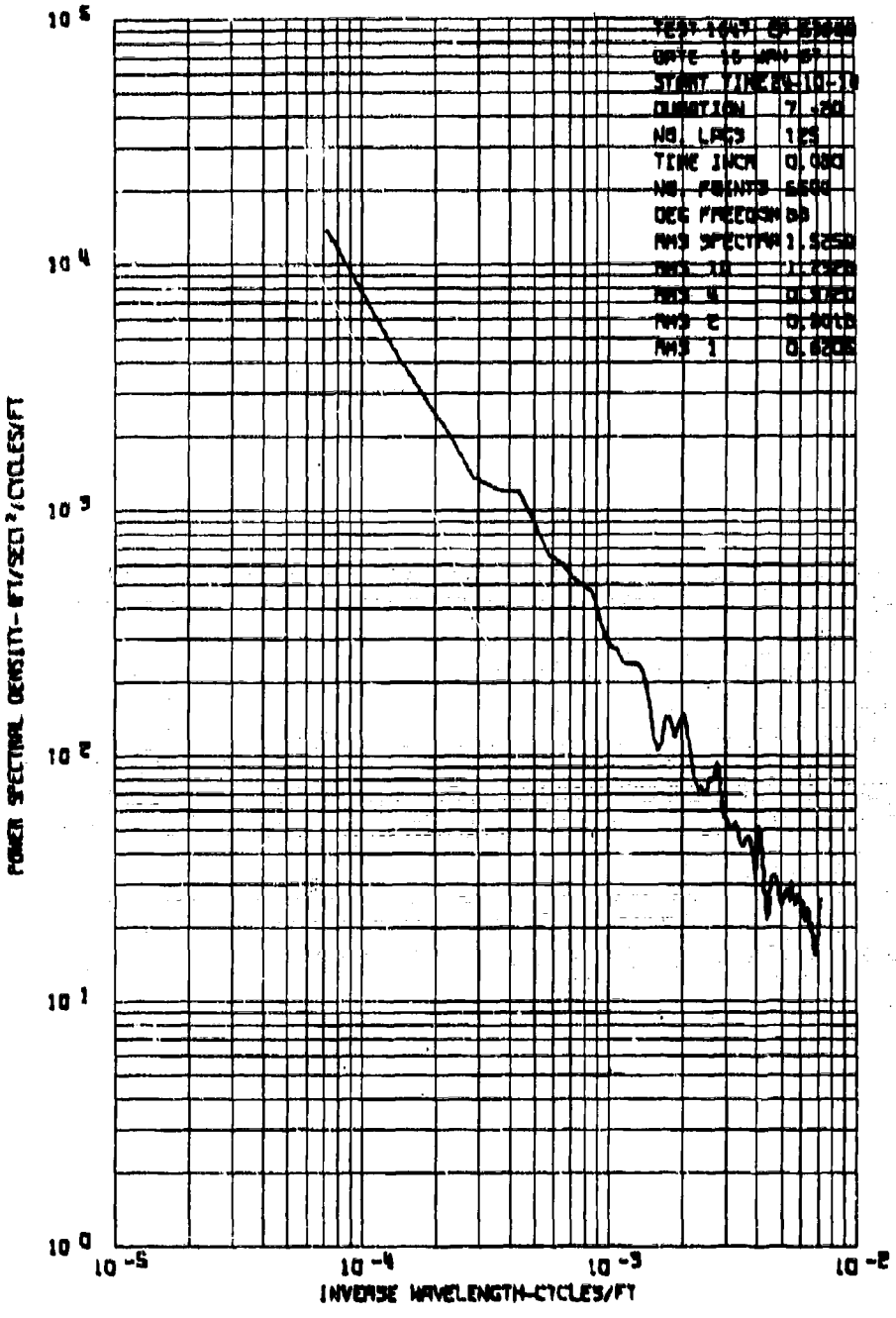


Figure 154C. Power Spectrum of Longitudinal Gust Velocity, Test 164, Run 7.

Appendix VII

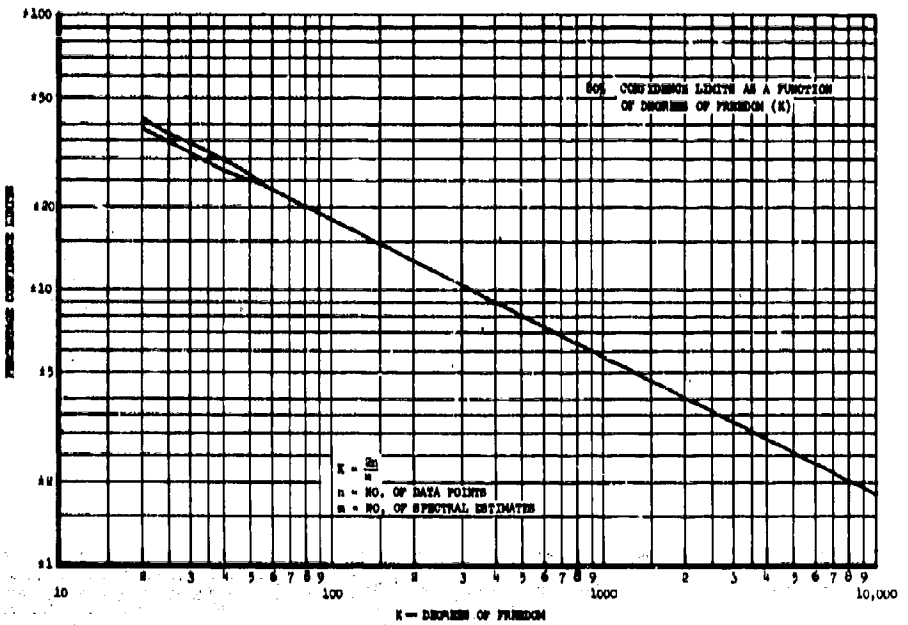


Figure 155. Eighty Percent Confidence Limits as a Function of Degrees of Freedom.

APPENDIX VIII

MATHEMATICALLY DEFINED GUST VELOCITY POWER SPECTRAL DENSITY CURVES

Mathematically defined gust velocity power spectral density curves are presented in Figures 1 through 21 for comparison with the measured gust velocity spectra of Appendix VII. Three families of power spectral density curves are provided designated as follows:

- Taylor-Bullen . . . Figures 156 to 160
- Sharp Knee . . . . Figures 161 to 167
- Mild Knee . . . . . Figures 168 to 176

Each family contains curves shown in separate figures for high frequency exponents, m, of -1, -7/6, -4/3, -3/2, -5/3, -11/6, and -2. In each figure curves are shown for scales of turbulence, L, of 500, 1000, 2000, 4000, and 8000 ft, and ∞.

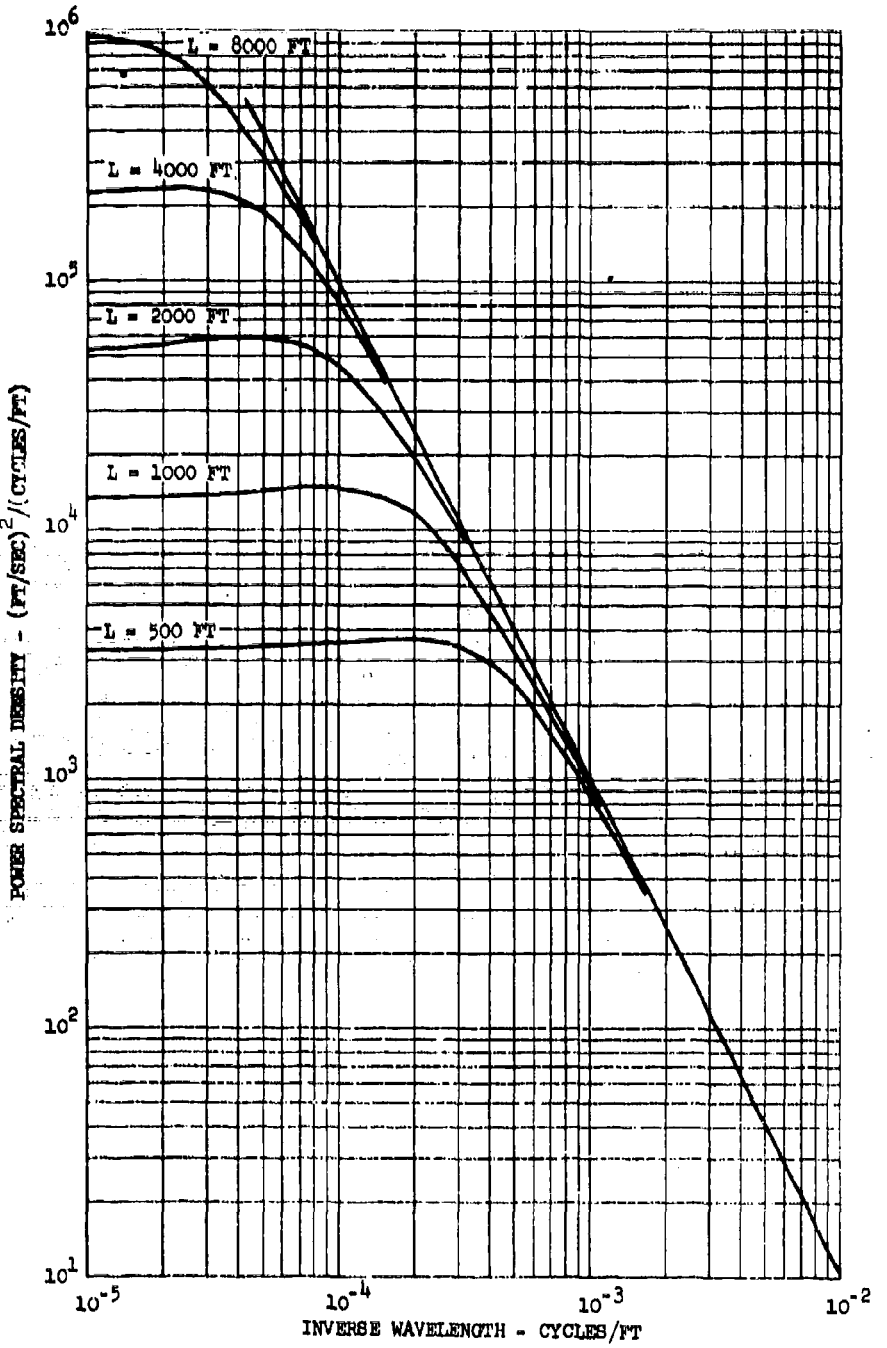


Figure 156. Mathematically Defined Gust Power Spectral Density Curves, Taylor/Bullen Family, m = -12/6 = -2 (Dryden)

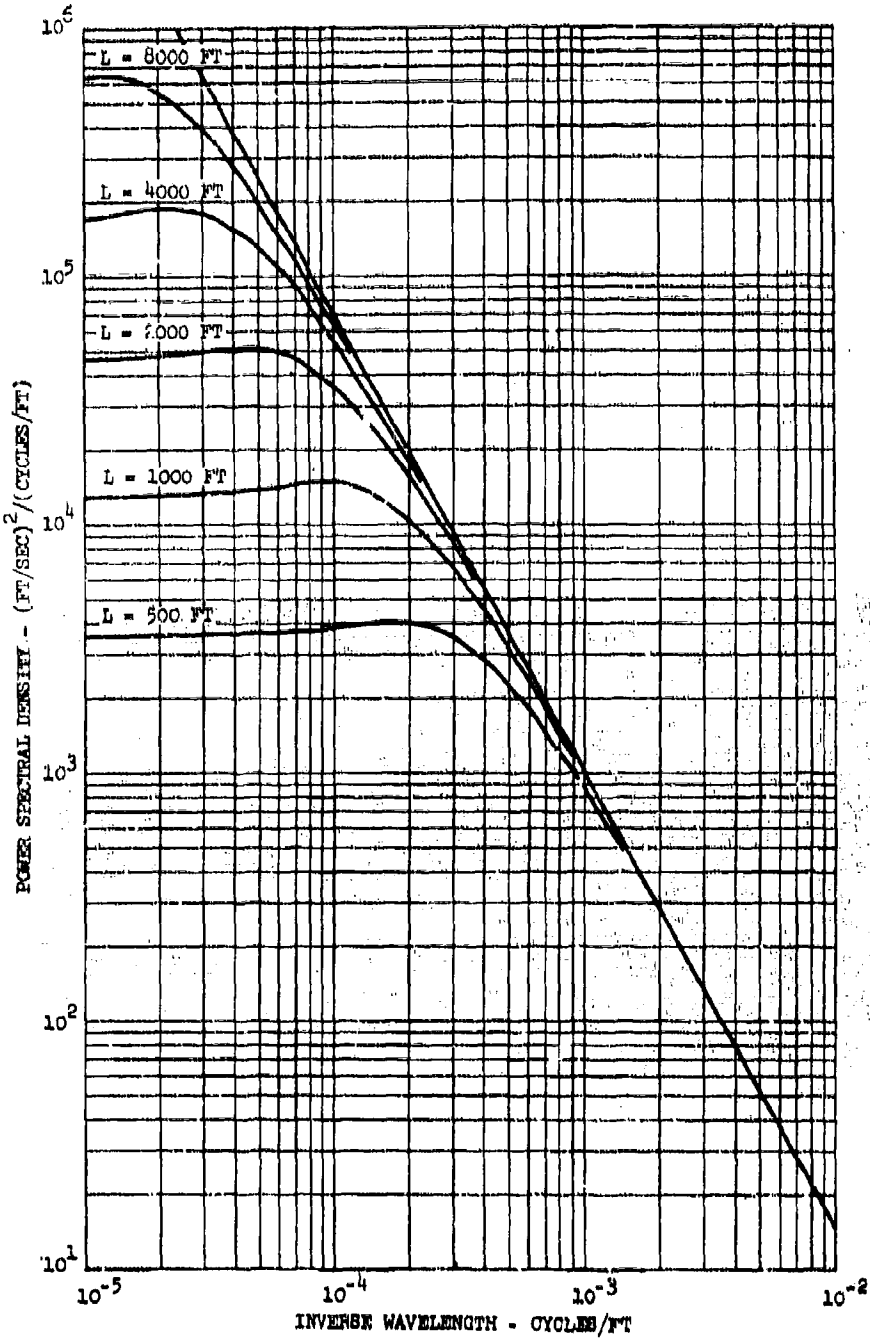


Figure 157. Mathematically Defined Gust Power Spectral Density Curves, Taylor/Bullen Family, m = -11/6 = -1.833

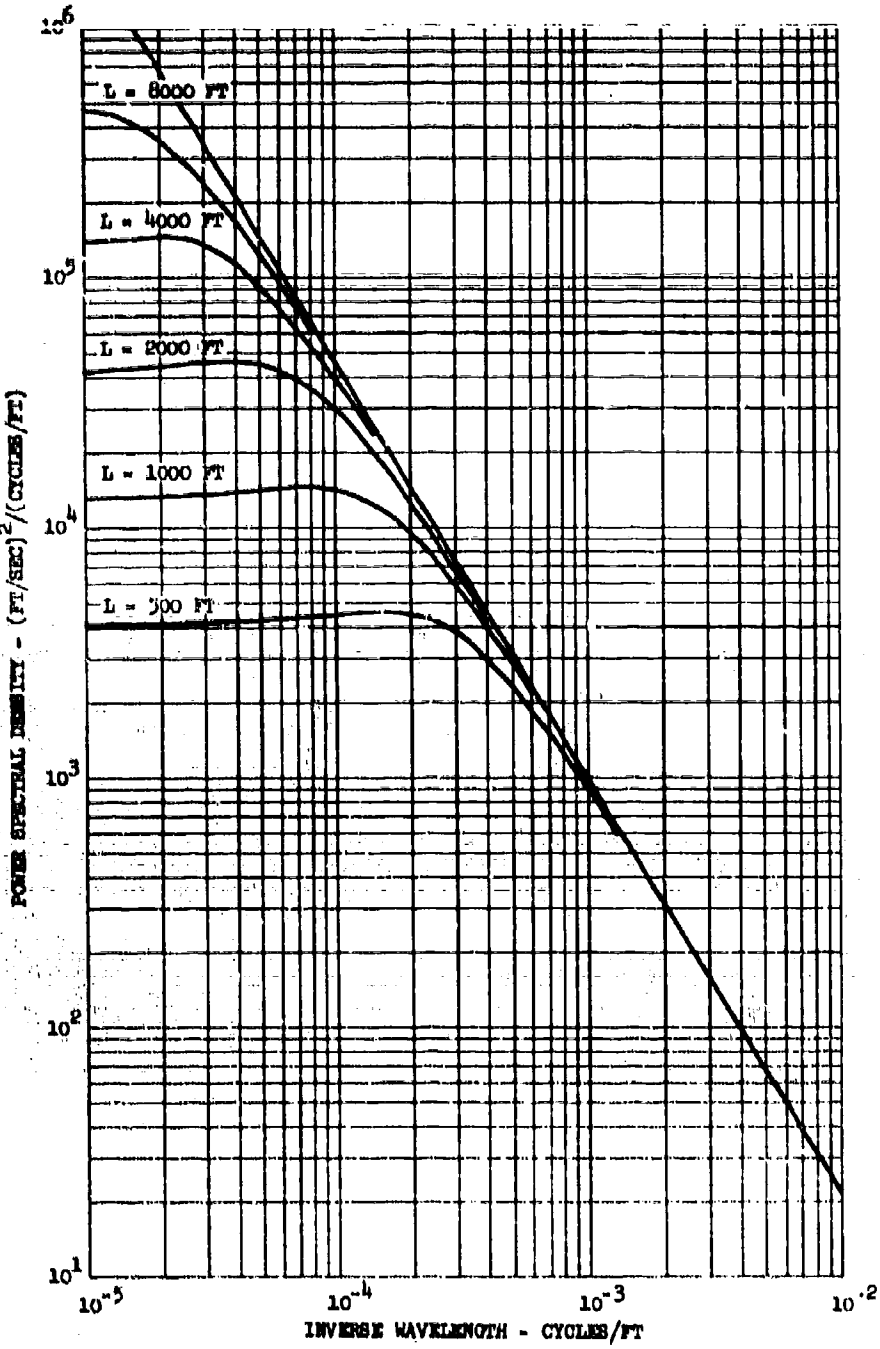


Figure 158. Mathematically Defined Gust Power Spectral Density Curves, Taylor/Bullen Family, m = -10/6 = -1.667 (Von Karman)

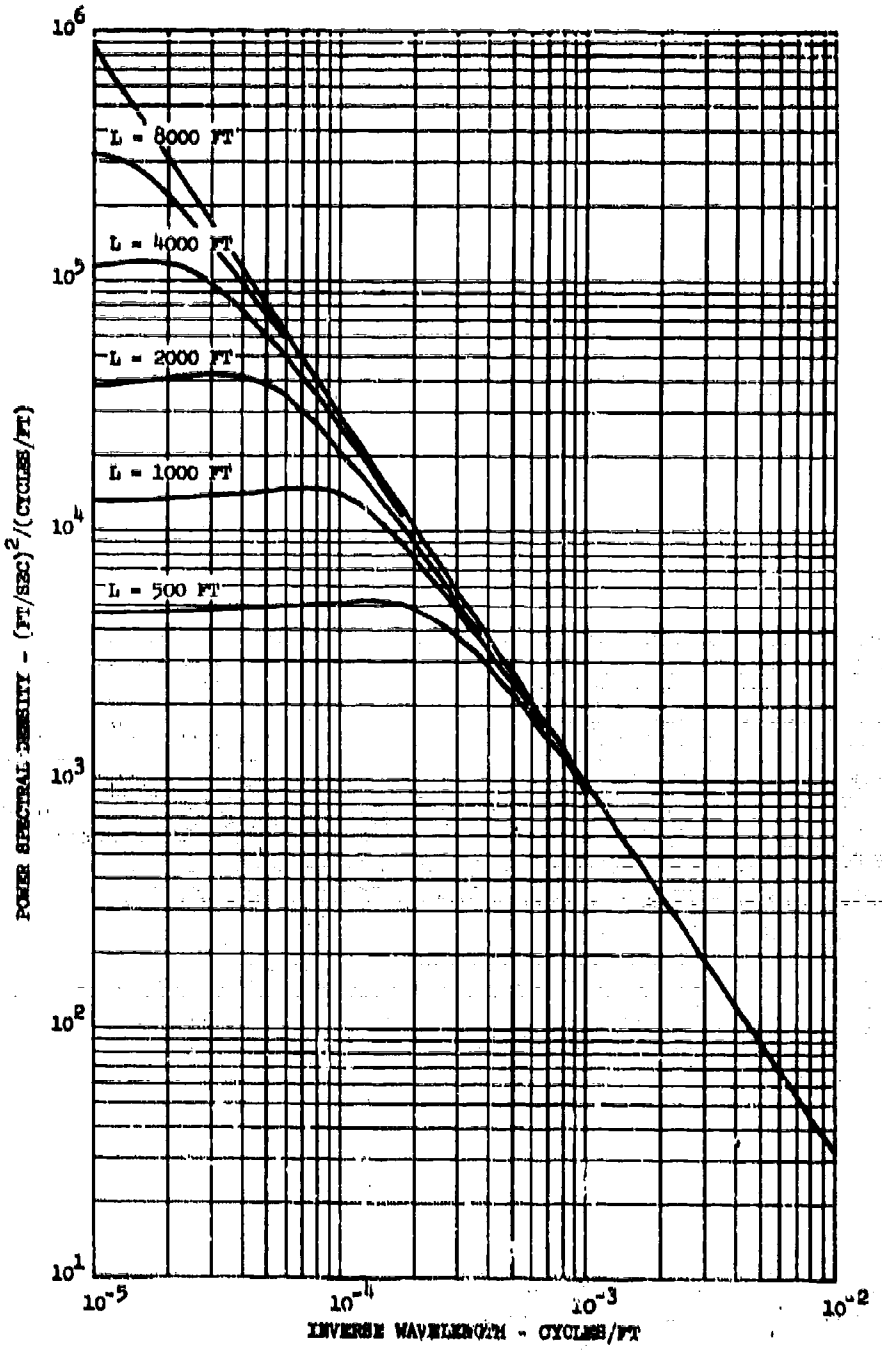


Figure 159. Mathematically Defined Gust Power Spectral Density Curves, Taylor/Bullen Family, m = -9/6 = -1.50

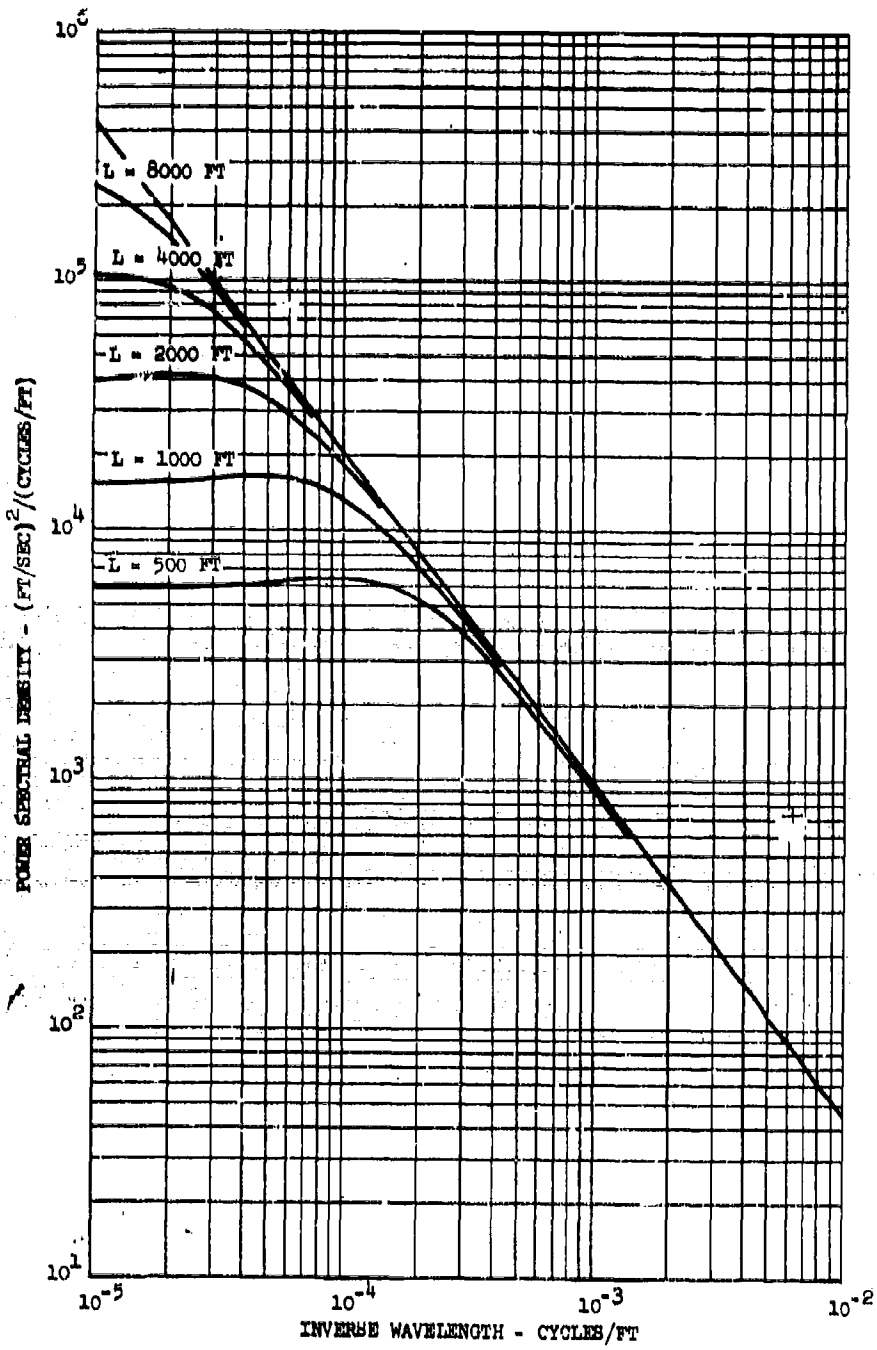


Figure 160. Mathematically Defined Gust Power Spectral Density Curves, Taylor/Bullen Family, m = -8/6 = -1.333

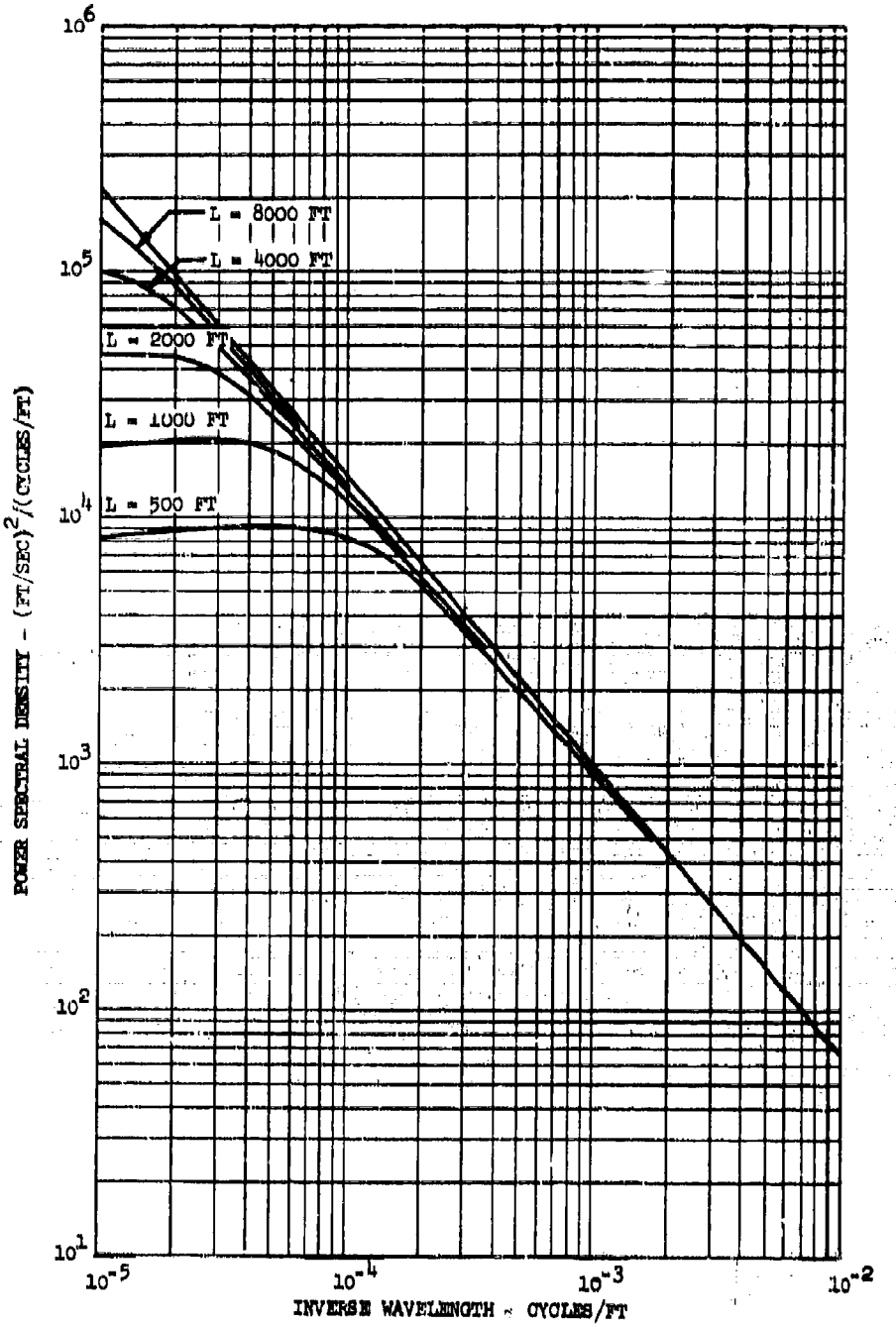


Figure 161. Mathematically Defined Gust Power Spectral Density Curves, Taylor/Bullen Family, m =-7/6 = -1.167

Appendix VIII

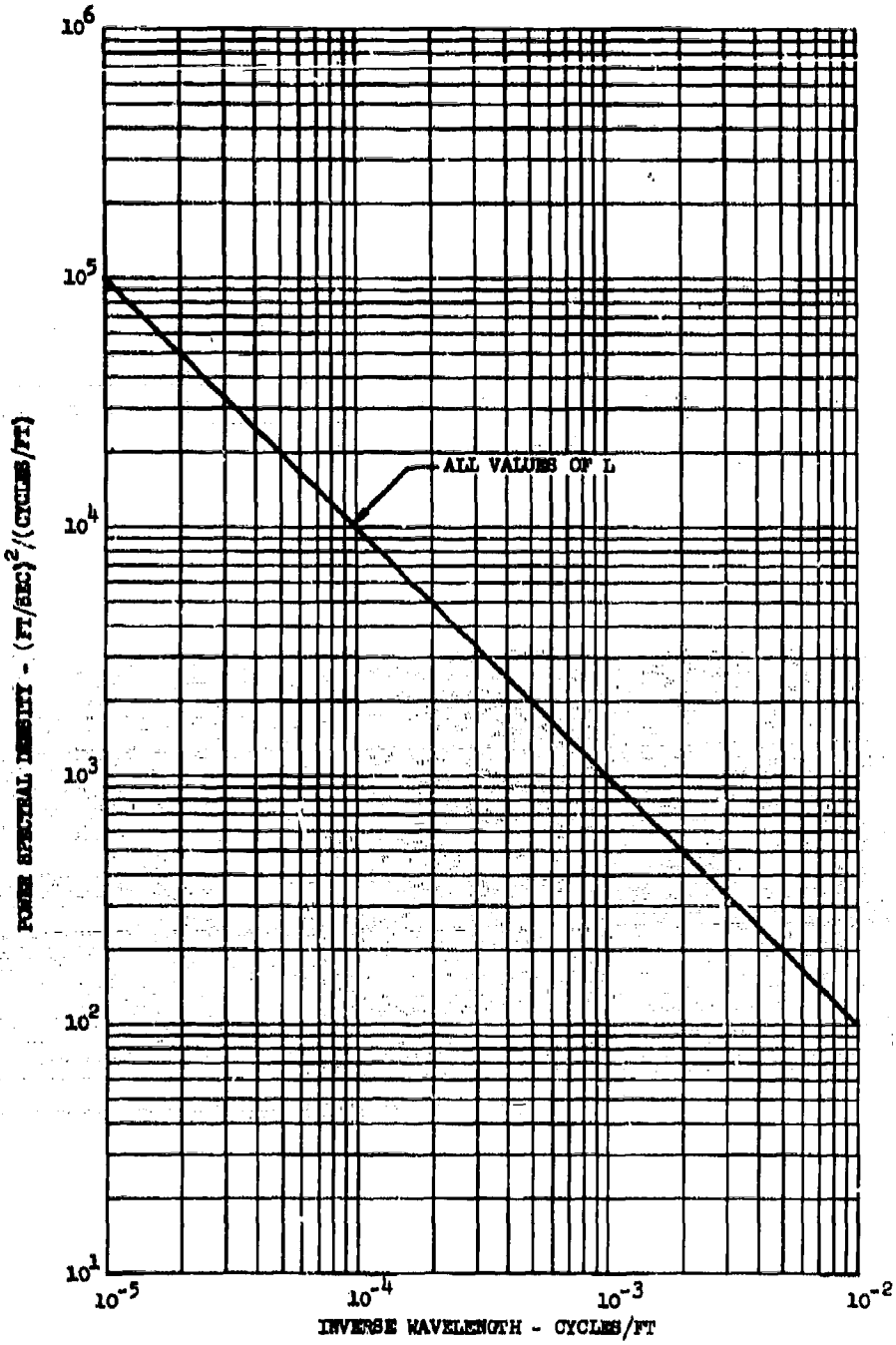


Figure 162. Mathematically Defined Gust Power Spectral Density Curves, Taylor/Bullen Family, $m = -5/6 = -1.0$

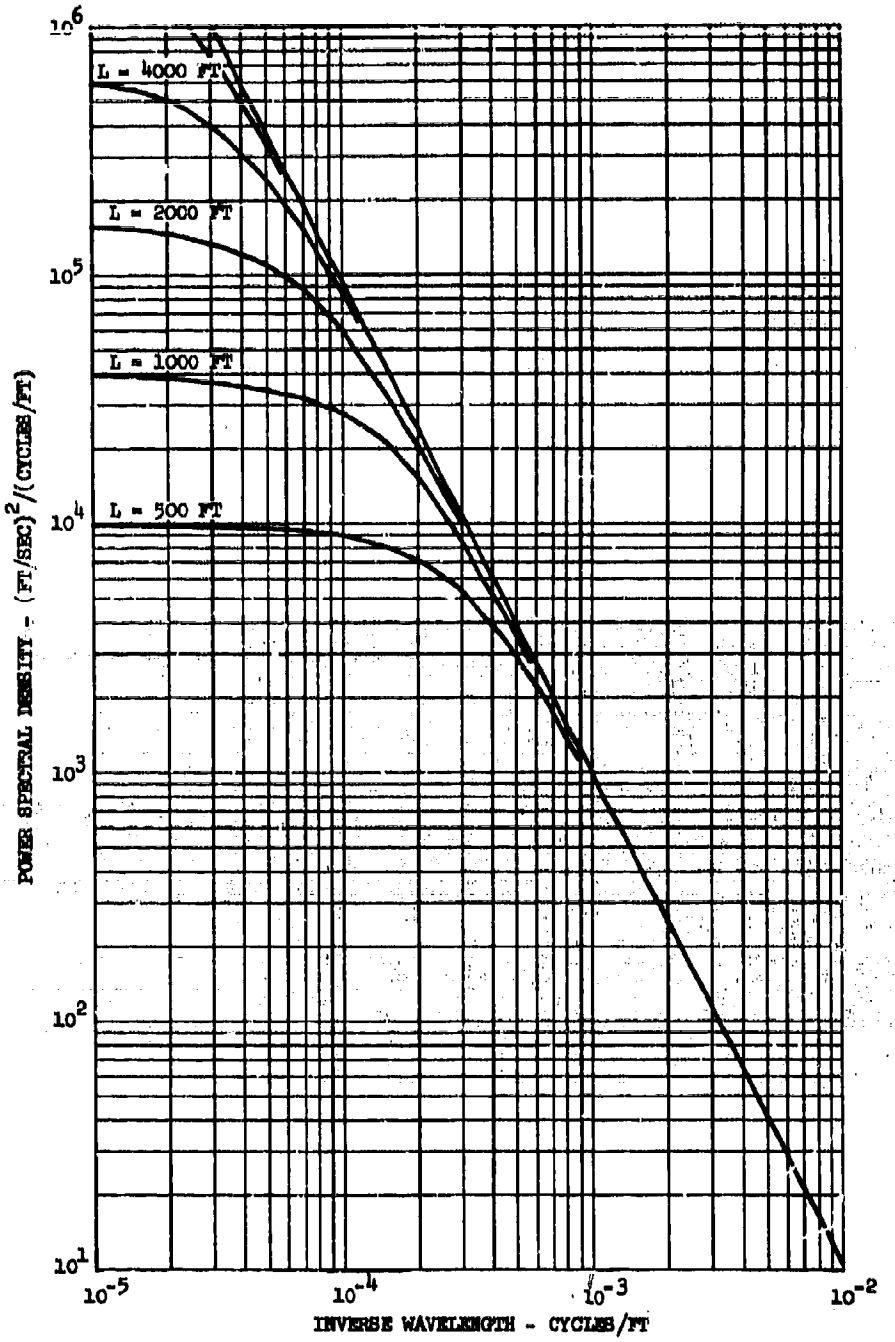


Figure 163. Mathematically Defined Gust Power Spectral Density Curves, Sharp Knee Family, m = -12/6 = -2.0

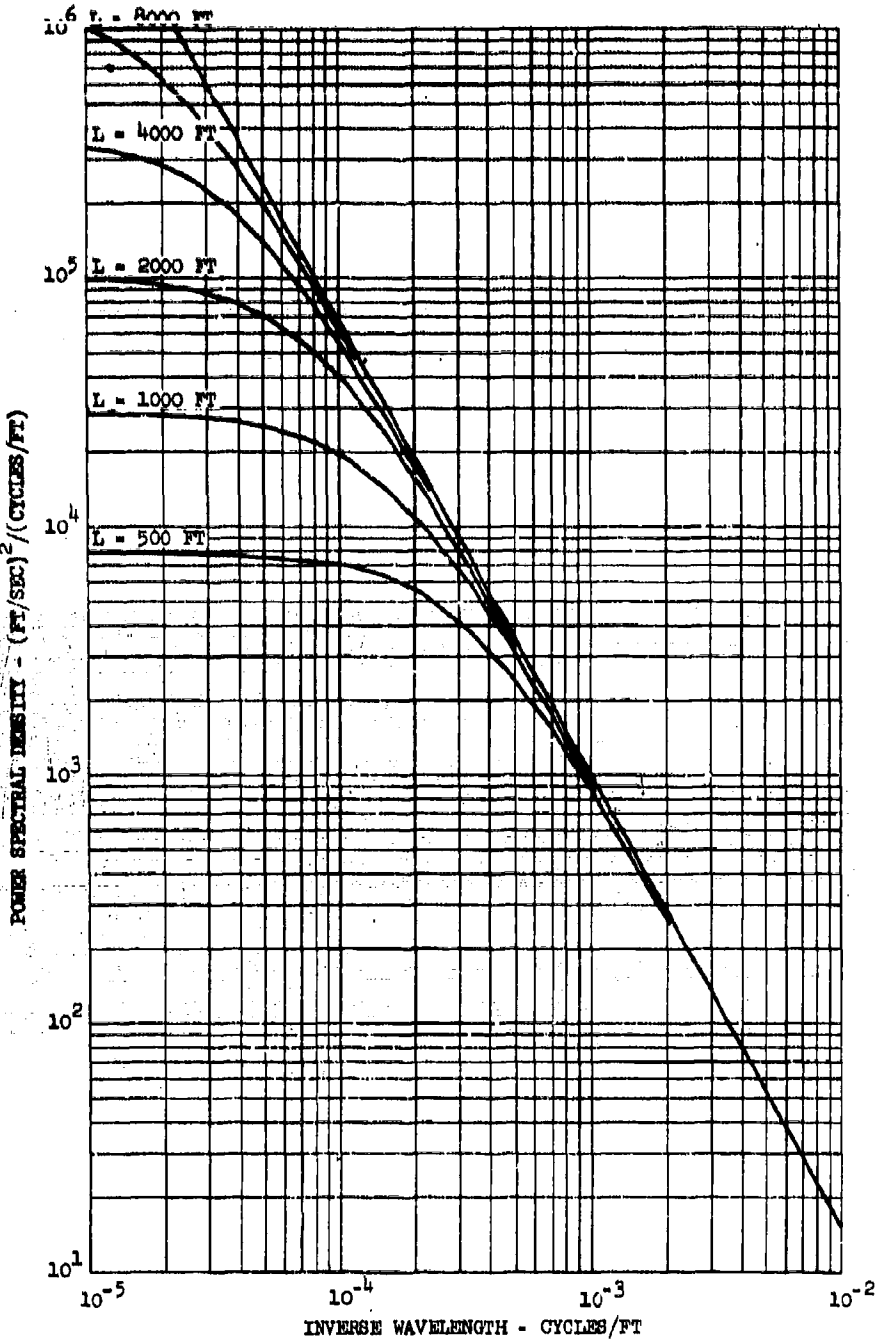


Figure 164. Mathematically Defined Gust Power Spectral Density Curves, Sharp Knee Family, m = -11/6 = -1.833

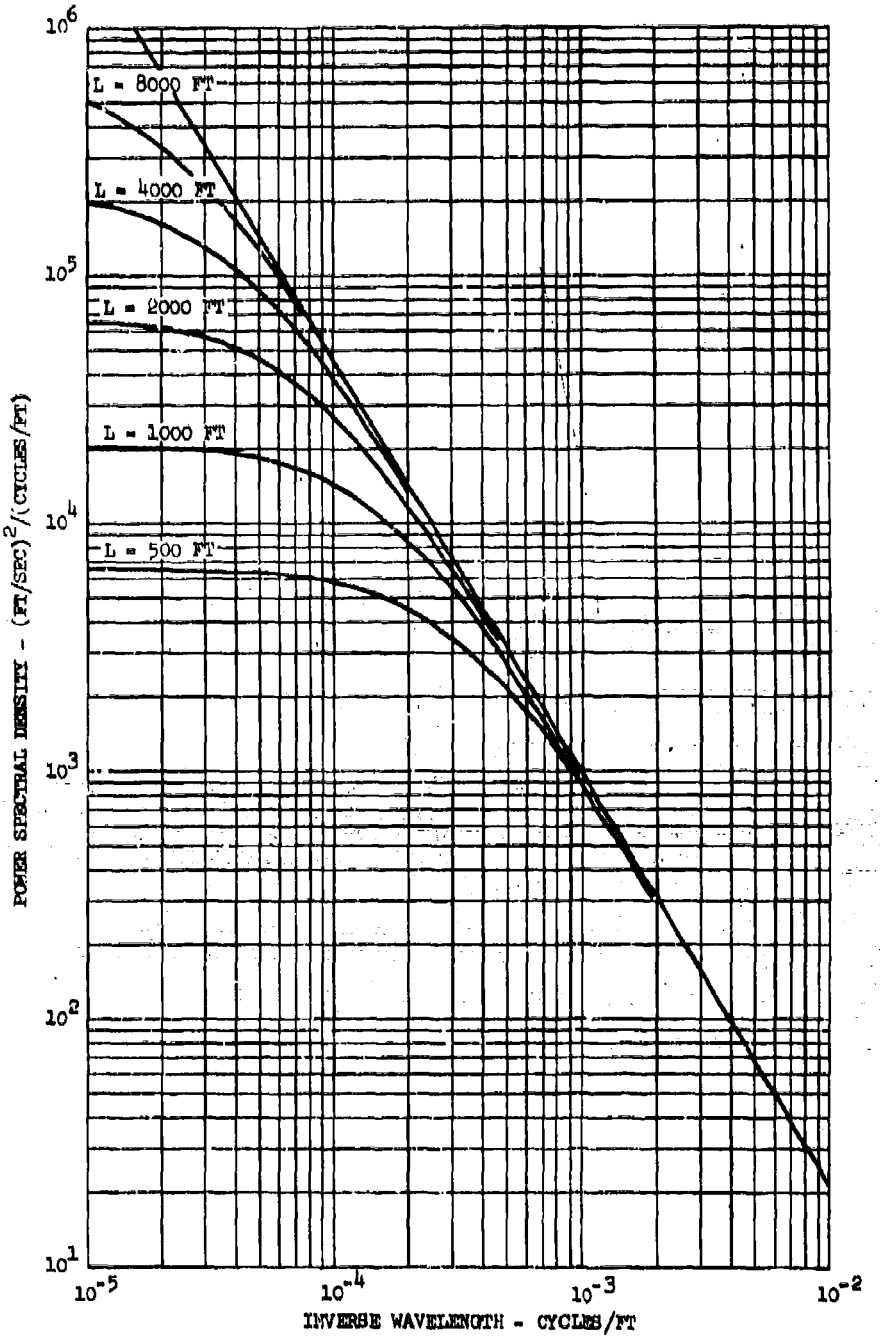


Figure 165. Mathematically Defined Gust Power Spectral Density Curves, Sharp Knee Family, m = -10/6 = -1.667

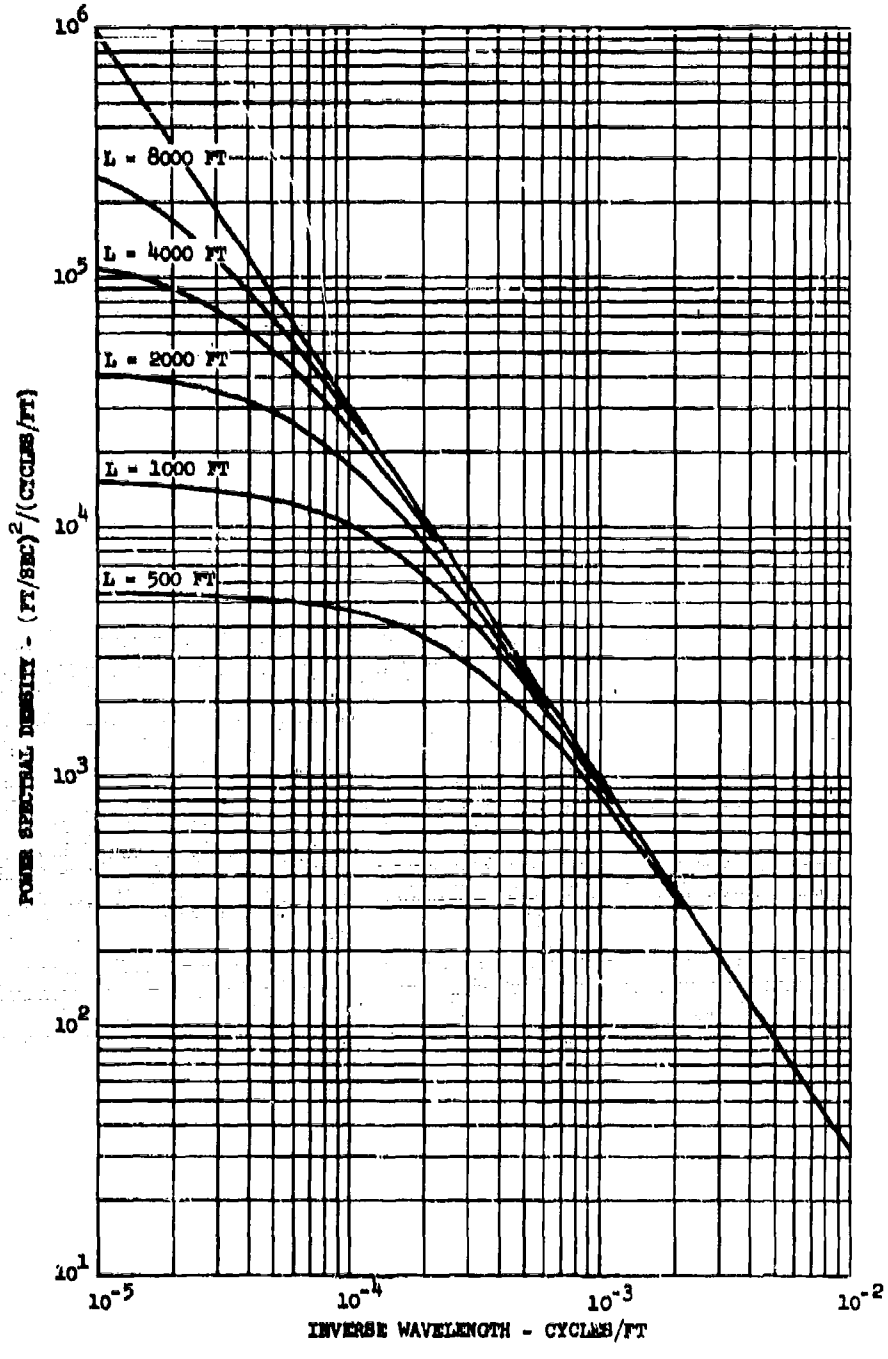


Figure 166. Mathematically Defined Gust Power Spectral Density Curves, Sharp Knee Family, m = -9/6 = -1.50

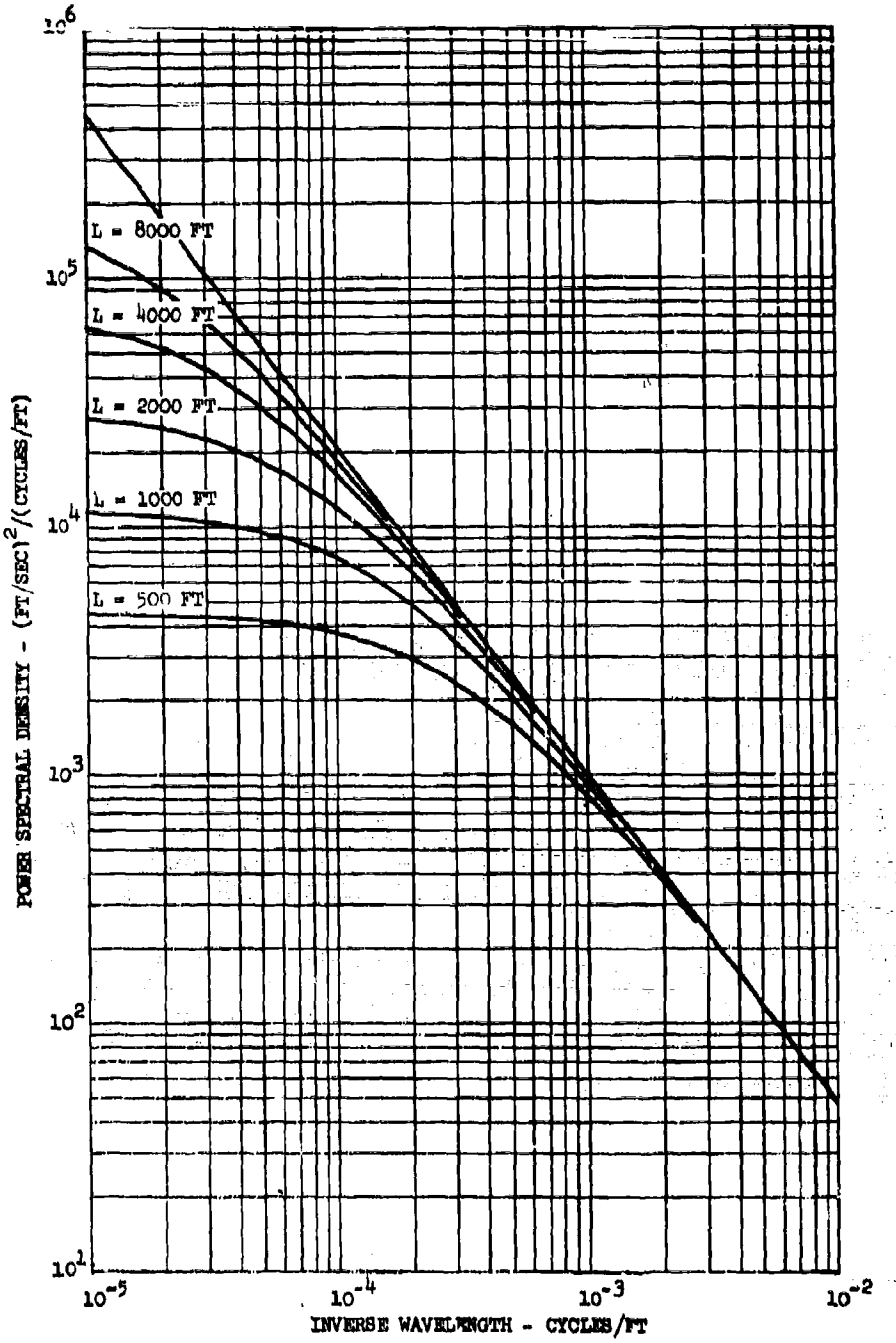


Figure 167. Mathematically Defined Gust Power Spectral Density Curves, Sharp Knee Family, m = -8/6 = -1.333

Appendix VIII

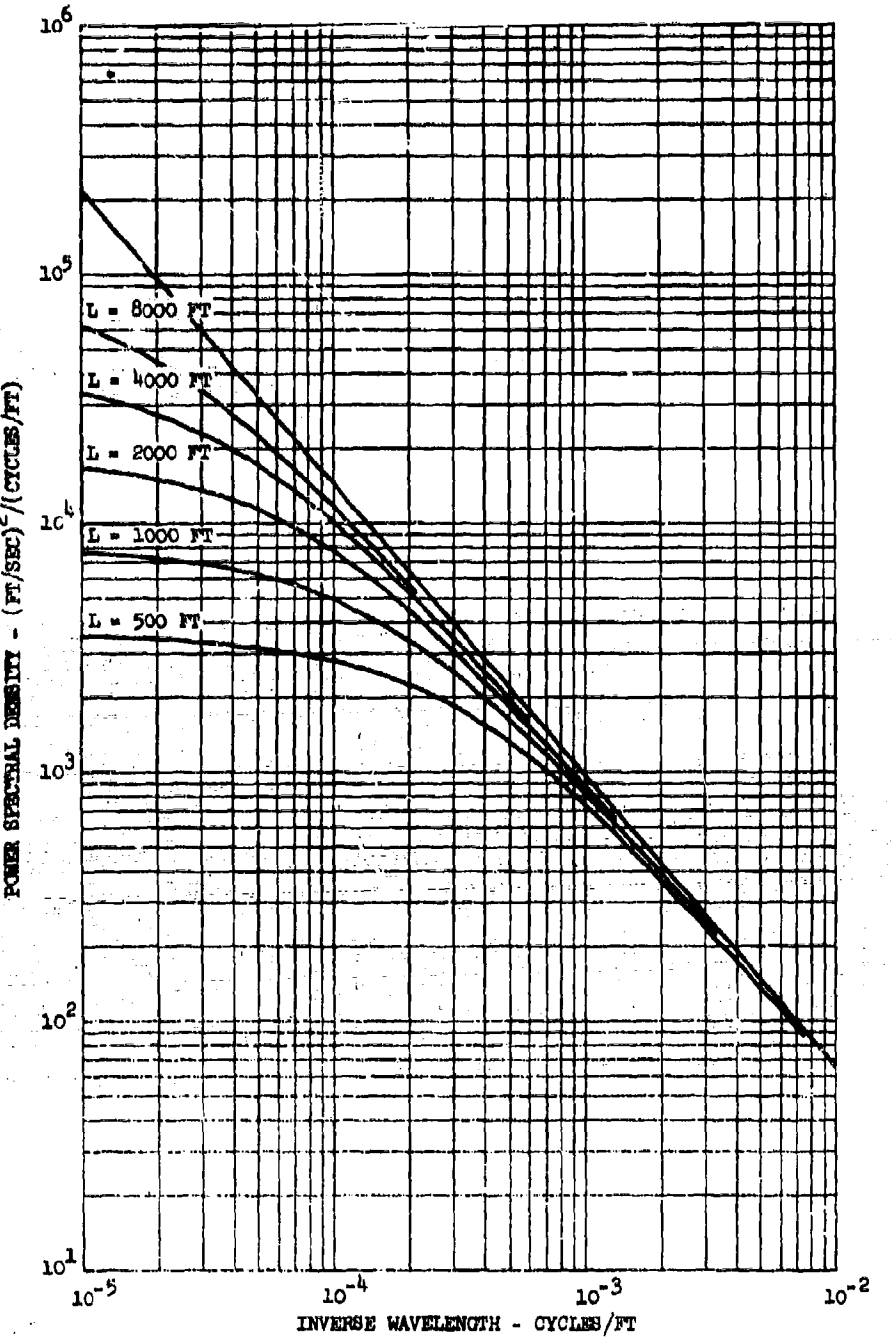


Figure 168. Mathematically Defined Gust Power Spectral Density Curves, Sharp Knee Family, m = -7/6 = -1.167

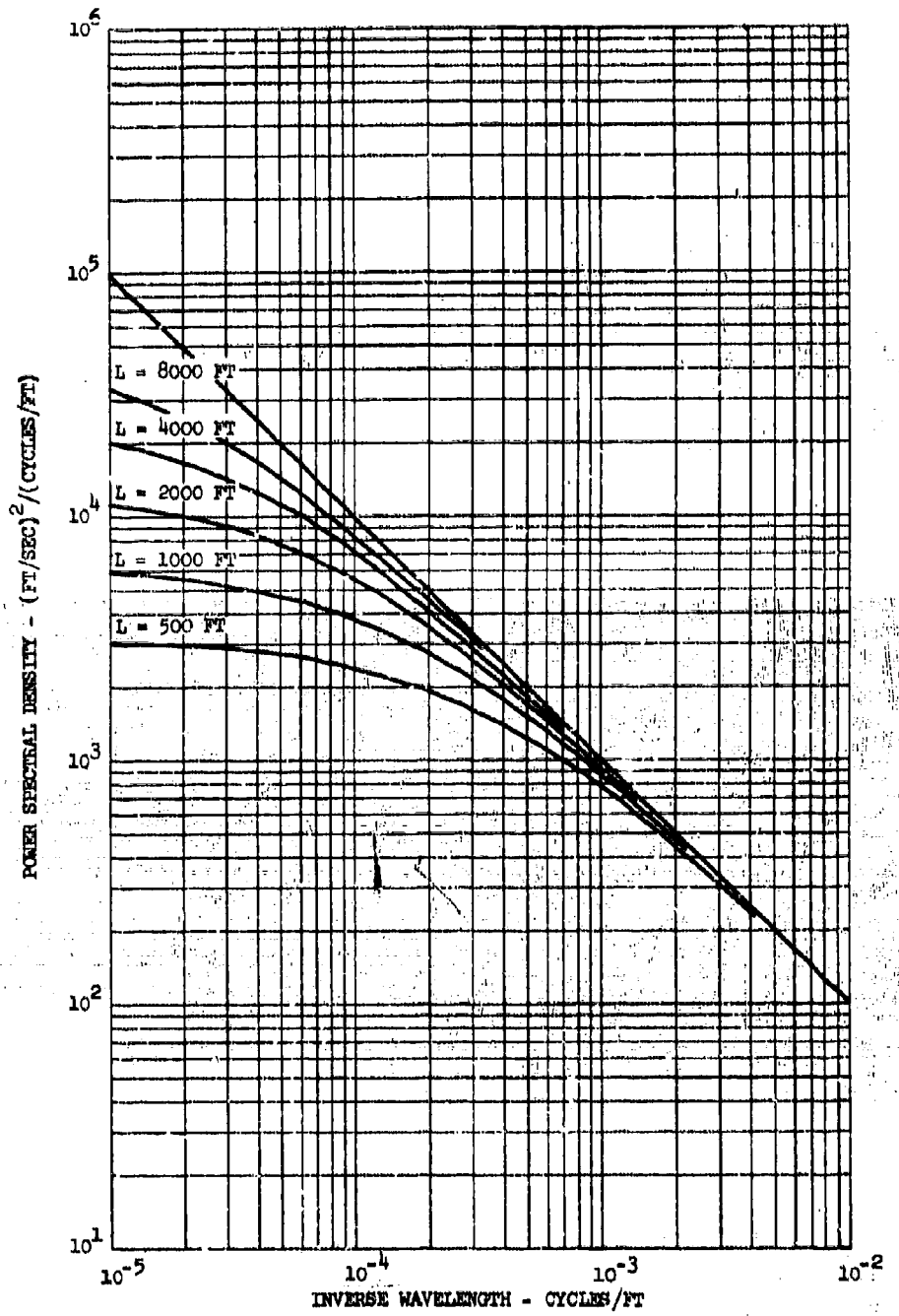


Figure 169. Mathematically Defined Gust Power Spectral Density Curves, Sharp Knee Family, m = -6/6 = -1.0

Appendix VIII

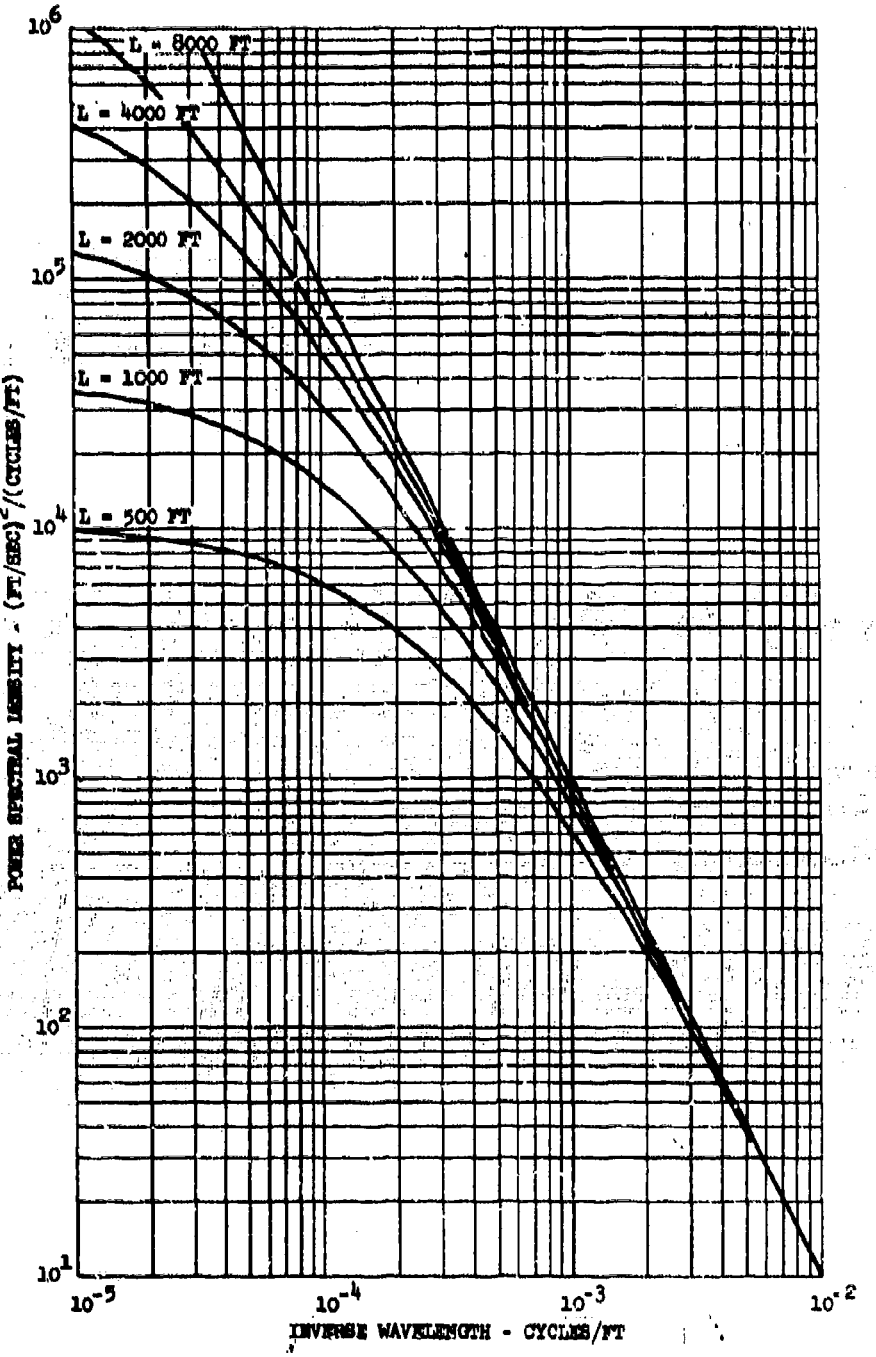


Figure 170. Mathematically Defined Gust Power Spectral Density Curves, Mild Knee Family, m =-12/6 = -2.0 (Lappe)

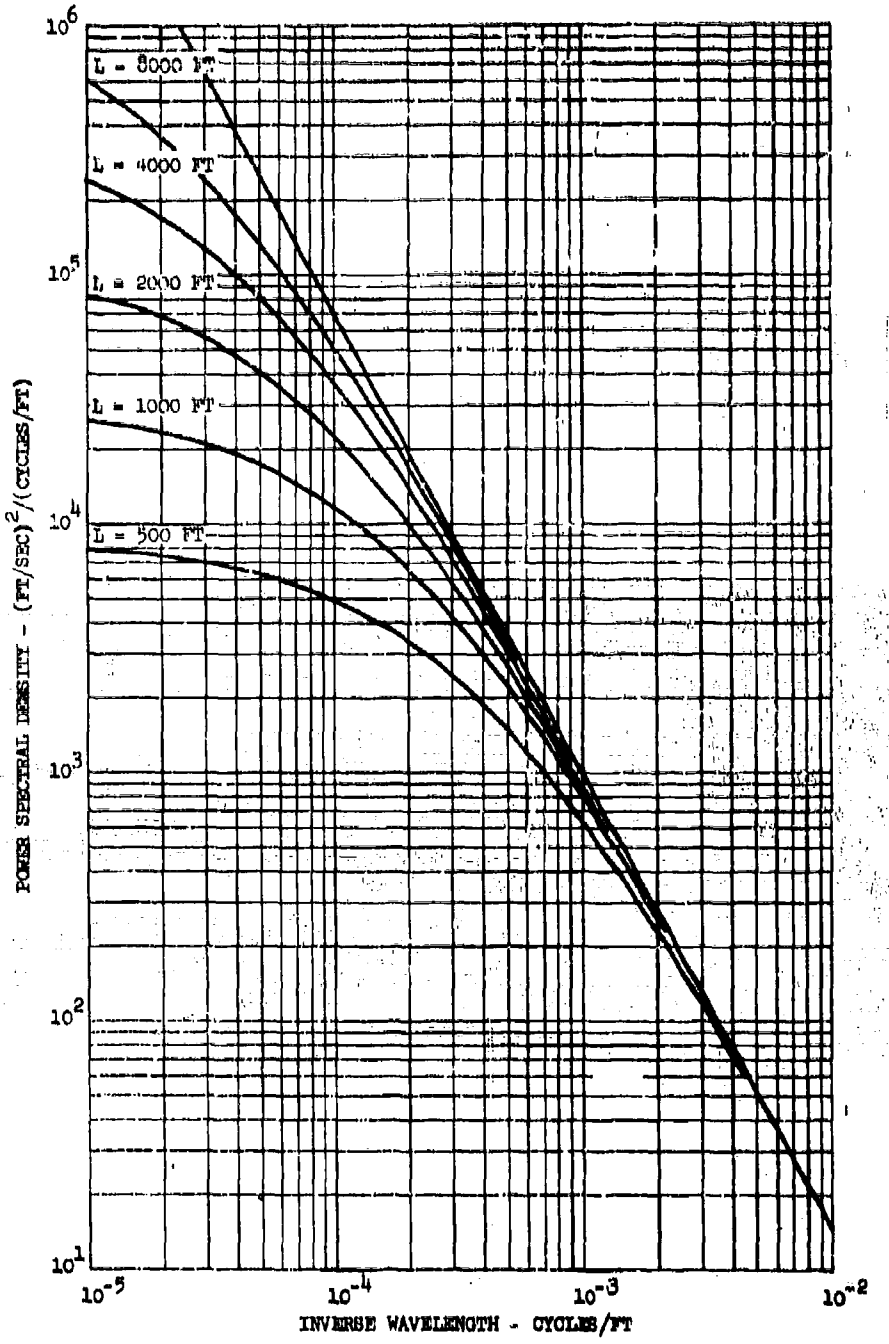


Figure 171. Mathematically Defined Gust Power Spectral Density Curves, Mild Knee Family, m = -11/6 = -1.8331

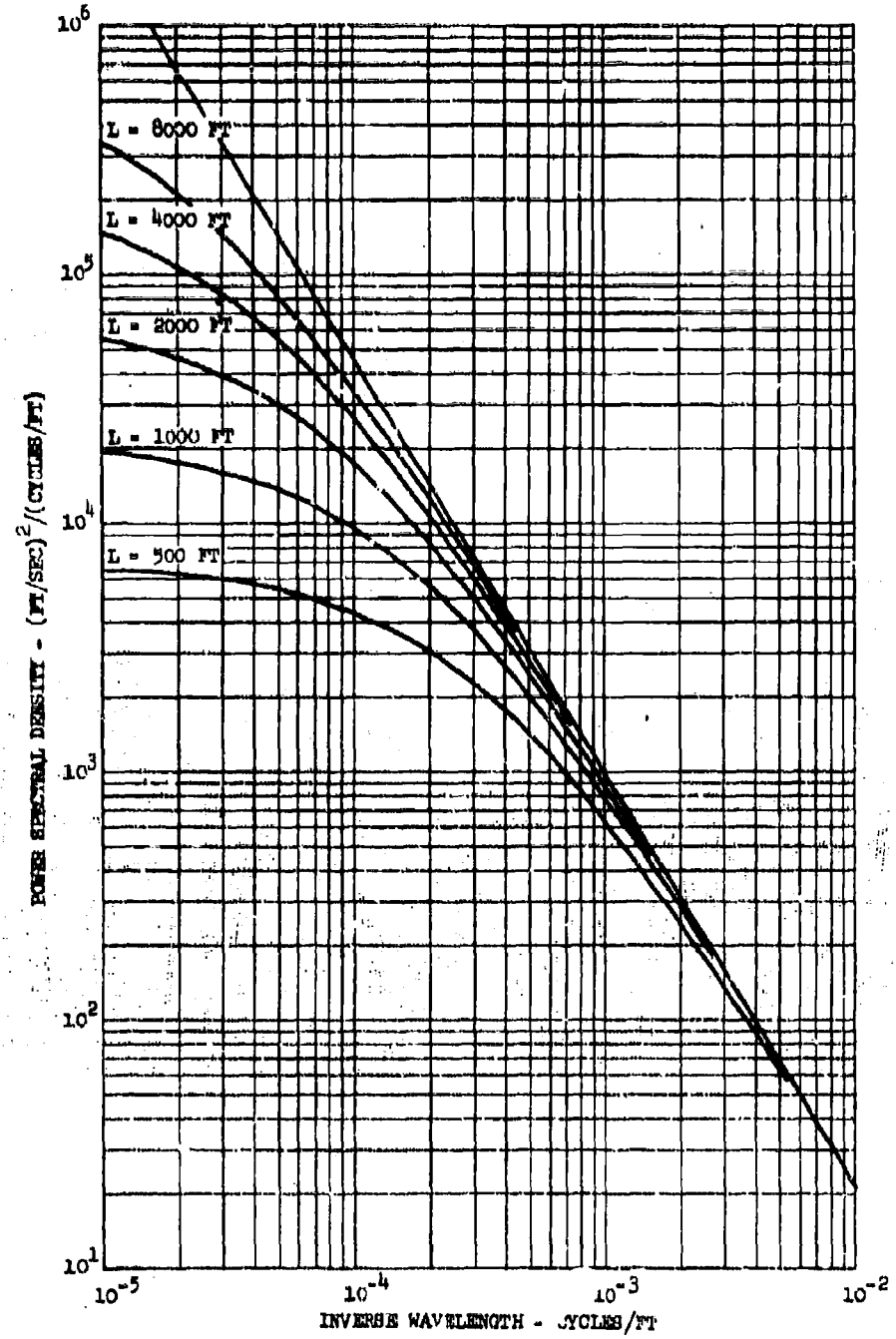


Figure 172. Mathematically Defined Gust Power Spectral Density Curves, Mild Knee Family, m = -10/6 = -1.667

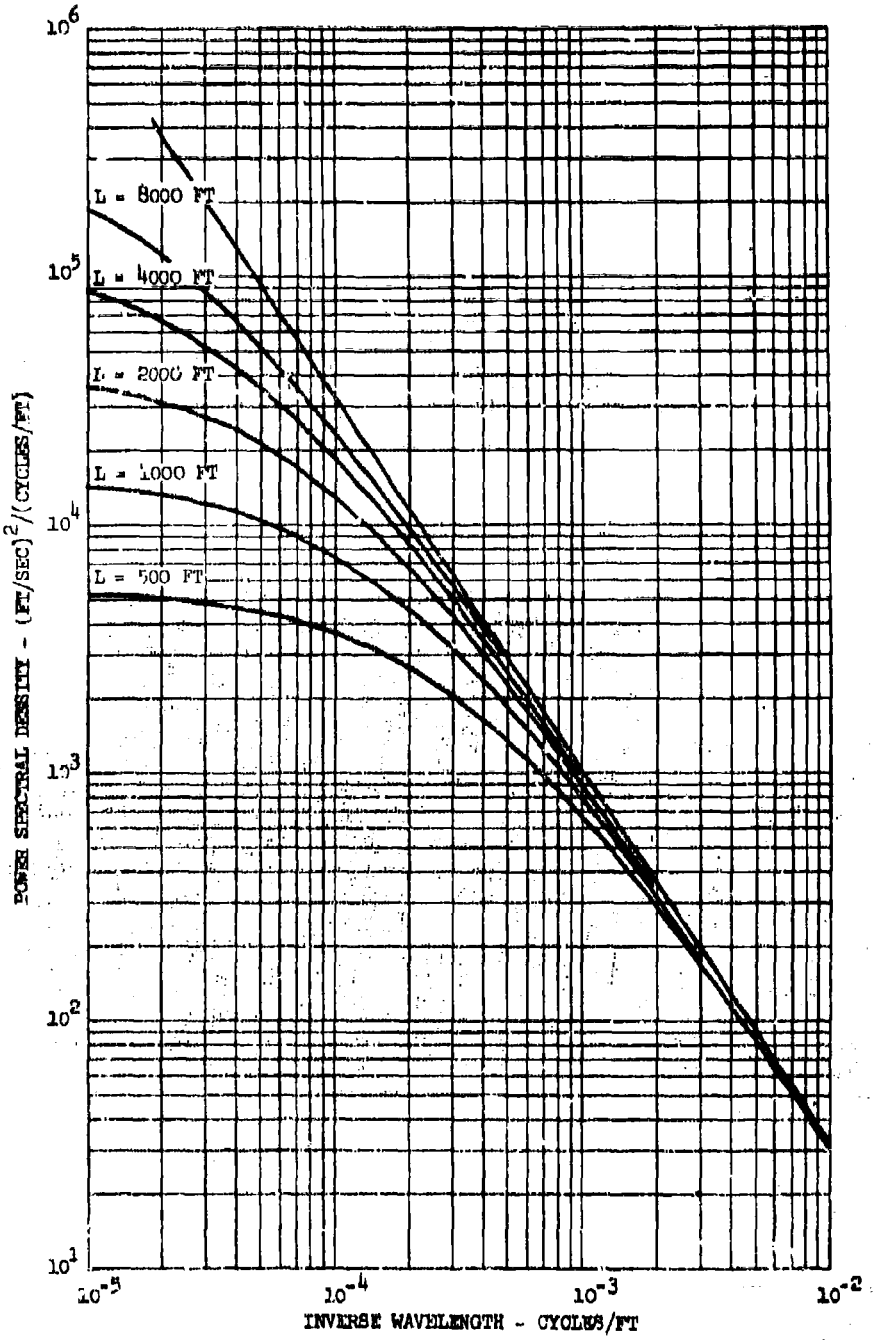


Figure 173. Mathematically Defined Gust Power Spectral Density Curves, Mild Knee Family, m = -9/6 = -1.50

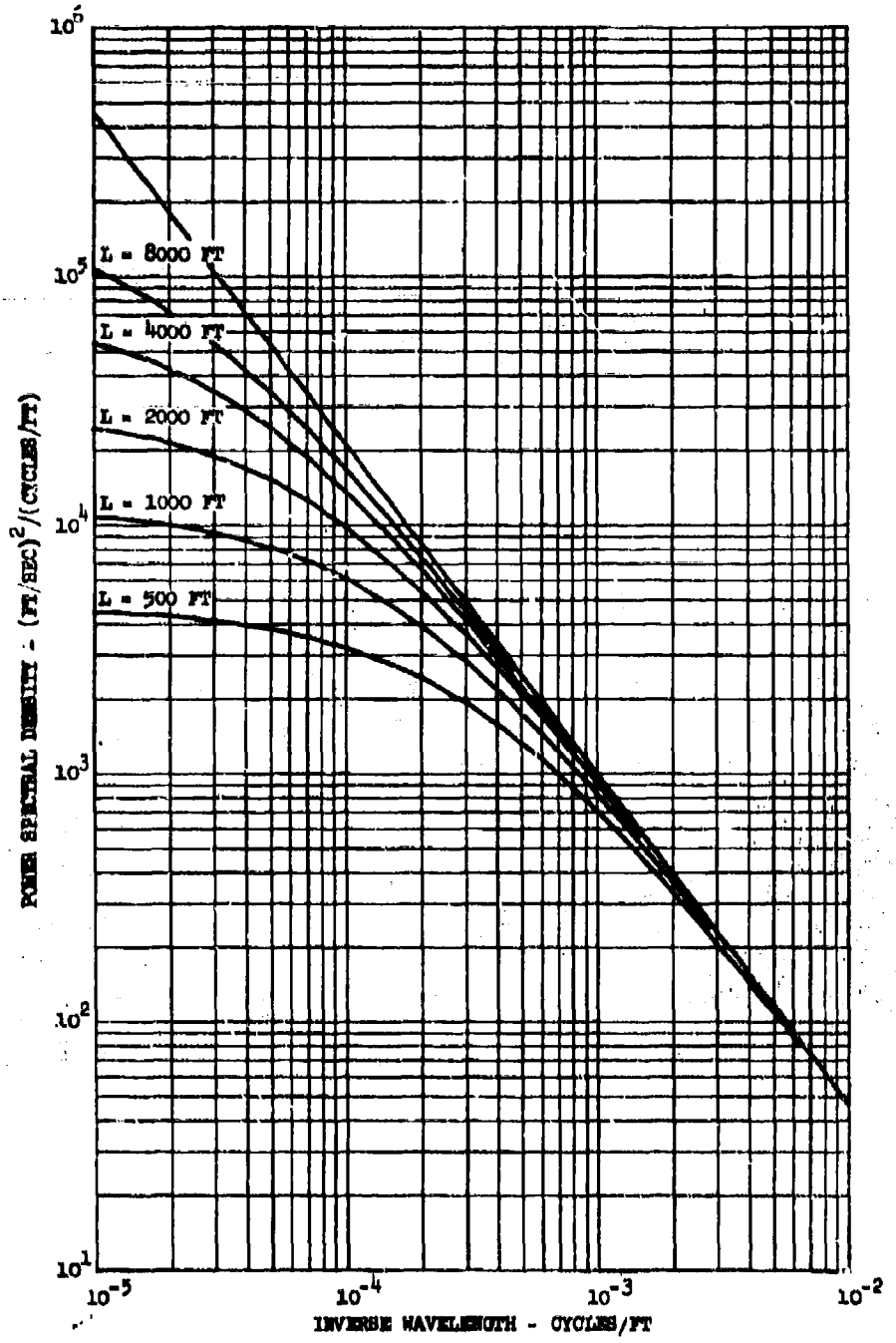


Figure 174. Mathematically Defined Gust Power Spectral Density Curves, Mild Knee Family, m = -8/6 = -1.333

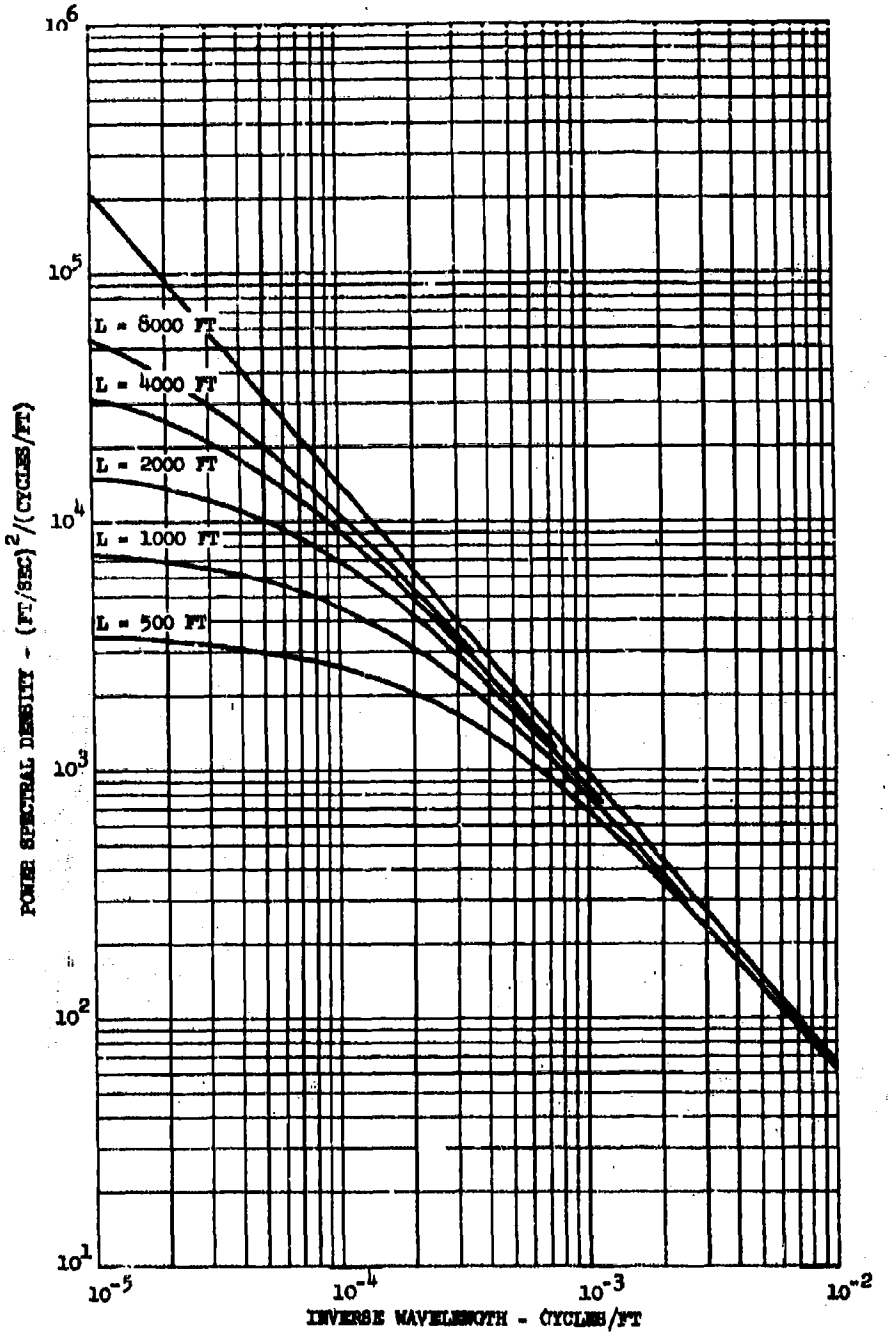


Figure 175. Mathematically Defined Gust Power Spectral Density Curves, Mild Knee Family, m = -7/6 = -1.167

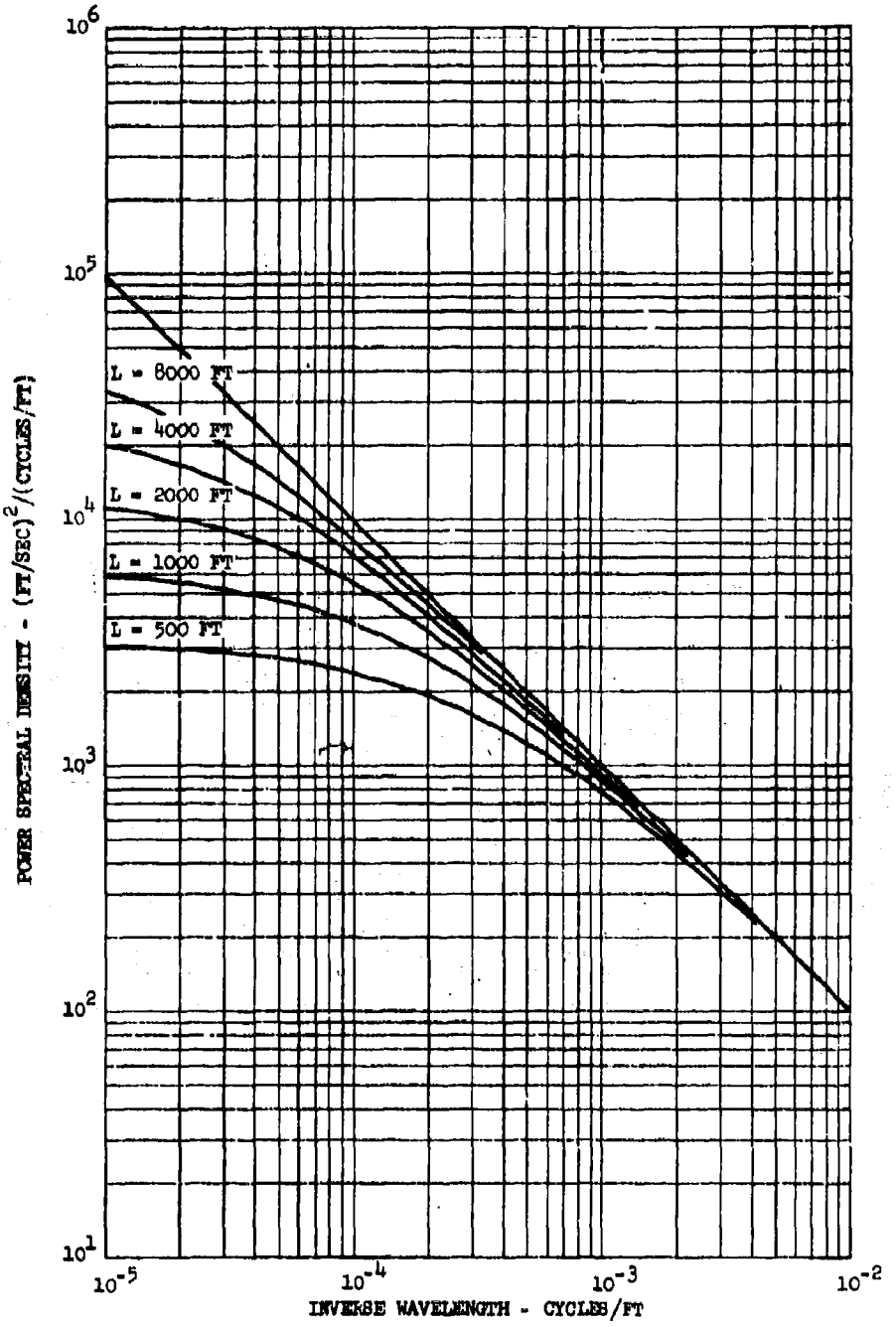


Figure 176. Mathematically Defined Gust Power Spectral Density Curves, Mild Knee Family, m = -6/6 = -1.0

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13. ABSTRACT

This report describes the high altitude clear air turbulence (HICAT) flight investigation with primary emphasis upon the results achieved since 15 February 1965. On this date the program was redirected to utilize a new digital instrumentation system for the measurement of CAT in the wavelength range from about 100 feet to 60,000 feet. The program effort required the measurement of CAT velocity components at altitudes of 45,000 to 70,000 feet in seven geographic areas. Instrumentation carried aboard the HICAT aircraft, an Air Force U-2, consisted of a PCM System, an Inertial Navigation System, aerodynamic and aircraft response sensors including a fixed vane gust probe, oscillograph recorder, and a digital magnetic tape recorder.

The program objective is to determine the statistical characteristics of high altitude CAT so as to improve structural design criteria. Overall, 29.2 hours of high altitude CAT were located and recorded in flights covering over 256,000 miles from bases in California, Massachusetts, Alaska, Hawaii, Puerto Rico, New Zealand, and Australia. Actual vertical, lateral, and longitudinal gust velocity time histories have been calculated from the measurements and used to obtain gust velocity power spectra. Derived equivalent gust velocities were also calculated and peak counted. Meteorological factors were considered in categorizing and correlating data. Time histories and power spectra are found in Volume II of this report, while meteorological data and flight track maps are included in Volume III.

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14. KEY WORDS	LINK A		LINK B		LINK C	
	ROLE	WT	ROLE	WT	ROLE	WT
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Clear Air Turbulence						
Critical Atmospheric Turbulence						
Atmospheric Turbulence						
HICAT (High Altitude Clear Air Turbulence)						

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