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USAF BIOENVIRONMENTAL NOISE DATA HANDBOOK, VOLUME 140, F-16 AIR--ETC(U)
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18. ABSTRACT (Continue on reverse side if necessary and identify by block number) The AF32A-25 noise suppressor is made by the Jetway Equipment Corporation for acoustical suppression of the F-16 aircraft. This report provides measured and extrapolated data defining the bioacoustic environments produced by this aircraft operating in this suppressor for four engine power configurations. Near-field data are reported for three locations in a wide variety of physical and psychoacoustic measures:		

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overall and band sound pressure levels, C-weighted and A-weighted sound levels, preferred speech interference level, perceived noise level, and limiting times for total daily exposure of personnel with and without standard Air Force ear protectors. Far-field data measured at 19 locations are normalized to standard meteorological conditions and extrapolated from 75-8000 meters to derive sets of equal-value contours for these same seven acoustic measures as functions of angle and distance from the source. Refer to Volume 1 of this handbook, "USAF Bioenvironmental Noise Data Handbook, Vol 1: Organization, Content and Application", AMRL-TR-75-50(1) 1975, for discussion of the objective and design of the handbook, the types of data presented, measurement procedures, instrumentation, data processing, definitions of quantities, symbols, equations, applications, limitations, etc.

PREFACE

This report was prepared by the Biodynamic Environment Branch, Aerospace Medical Research Laboratory, under Project/Task 723107, Technology to Define and Assess Environmental Quality of Noise From Air Force Operations.

The author gratefully acknowledges Mr. John Cole and Mr. Robert Powell for their assistance in preparing this report, Mr. Jerry Speakman and Capt Richard Gorman for their assistance in acquiring the raw data, Mr. Keith Kettler, Mr. Henry Mohlman and Mr. Fred Lampley of the University of Dayton for assistance in the mechanics of data processing, and Mrs. Peggy Massie for assistance in typing this report.

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INTRODUCTION

The F-16 is a single seater, multi-purpose fighter powered by one Pratt and Whitney F100-PW-100 engine. The aircraft is manufactured by General Dynamics. The AF32A-25 noise suppressor was built by Jetway Corporation to provide noise level reduction for all F-16 aircraft during ground runup operations.

This volume provides measured and extrapolated data defining bioacoustic environments produced by this aircraft during ground runup operations. Such data are essential to evaluate ear protection requirements, limiting personnel exposure times, voice communication capabilities, and annoyance problems associated with ground runups of the F-16 aircraft operating in the AF32A-25 noise suppressor.

This volume is one of a series published by the Aerospace Medical Research Laboratory (AMRL) under the same report number (AMRL-TR-75-50) as a multi-volume handbook that quantifies the noise environments produced at flight/ground crew locations and in surrounding communities by operations of Air Force aircraft and ground support equipment. The far-field, community-type noise data in the handbook describe the noise produced during *ground operations* of aircraft, ground support equipment, and other ground-based equipment or facilities.

Volume 1 of this handbook discusses the objectives and design of the handbook, the types of data presented, measurement procedures, instrumentation, data processing, definitions of quantities, symbols, equations, applications, limitations, etc. Volume 2 provides a method and data for adjusting the handbook's far-field noise data, which are for standard meteorological conditions (15°C temperature, 70% rel humidity, 0.760 meters Hg barometric pressure), to derive comparable data for other meteorological conditions. *Refer to Volumes 1 and 2* (references 1 and 2) for such information because it is not repeated in other handbook volumes.

A cumulative index lists those aerospace systems contained in the handbook, and identifies the specific volumes containing each type of environmental noise data available (i.e., inflight/flight crew and passenger noise, near-field/ground crew noise, far-field/community noise). Volume numbers are assigned sequentially as individual volumes are published. This index is periodically updated as individual volumes are published and is available upon request from AMRL/BBE, Wright-Patterson AFB, OH 45433. Organizations on the distribution list for the handbook will automatically receive a copy of each updated index.

Direct any questions concerning the technical data in this report and other handbook volumes to: AMRL/BBE, Wright-Patterson AFB, OH 45433; AUTOVON 78-53675 or 78-53664; Commercial (513) 255-3675 or (513) 255-3664.

1. Cole, John N., *USAF Bioenvironmental Noise Data Handbook, Volume 1: Organization, Content and Application*, AMRL-TR-75-50 (1), Aerospace Medical Research Laboratory, Wright-Patterson Air Force Base, Ohio, 1975.
2. Cole, John N., *USAF Bioenvironmental Noise Data Handbook, Volume 2: Procedure to Evaluate Effects of Non-standard Meteorological Conditions on Far-Field Noise*, AMRL-TR-75-50 (2), AMRL, WPAFB, OH, 1975.

NEAR-FIELD NOISE

MEASUREMENTS

AMRL acquired near-field noise data on the AF32A-25 noise suppressor system during ground runup operations of F-16 aircraft. For these tests the aircraft was located in the suppressor at Hill AFB with no significant reflecting surfaces in the vicinity except the ground plane. Table 1 gives the surface meteorological conditions and the four engine power conditions. The ground-crew chief selected power conditions and near-field locations generally used during routine maintenance or engine runup for preflight checks.

At each near-field location a test engineer randomly moved a hand-held microphone in and around each location, probing all areas where a crew member's head would normally be located. He recorded all the noise samples on magnetic tape. During analysis of each sample, he determined the one-third octave band root-mean-square sound pressure using a 4- or 8-second integration time to derive a power averaged level for each location. Figure 1 shows the four near-field locations where ground crew are usually located for maintenance and/or preflight checkout operations. Estimates of noise levels at other locations are difficult in the near-field since the noise source is spatially distributed, i.e., not a point source. The noise levels at near-field locations can vary widely depending upon relative distances from each noise source (intake noise, exhaust noise, panel resonances, internal engine noise through the engine wall, etc.).

Table 1 lists the numeric alphabetic designators used on the data pages in this report to identify the measurement locations and test conditions. For example, the designator 1/A means ground crew location 1 and test condition A.

RESULTS

The measured data presented in Table 2 define the sound pressure levels (SPL) produced by the F-16 aircraft in the AF32A-25 noise suppressor at the three ground crew locations. This table includes the overall, 1/3 octave band, and octave band levels. From these data one can calculate the variety of measures given in Table 3, which are widely used to assess the effects of noise on personnel and their performance.

All near-field data are for the meteorological conditions at the time of test but are valid for all typical airbase meteorology because of the short sound propagation distances involved.

TABLE 1

**MEASUREMENT LOCATIONS AND TEST CONDITIONS
FOR NEAR-FIELD NOISE MEASUREMENTS**

**F-16 Aircraft Suppressor Ground Runup, Hill AFB Survey
Test #79-738-001, 14 March 1979**

Ground Crew Location

- 1.
- 2.
- 3.

Trim Check Position
Leak Check Position
Ground Observer Position

Aircraft Engine Operation

- A.
- B.
- C.
- D.

Idle Power (65% RPM)
80% RPM
Military Power (91% RPM)
Afterburner Power

Meteorology

Temperature	12 C
Bar Pressure	.643 M Hg
Rel Humidity	32 %
Wind — Speed	4 M/Sec (8 Kt)
— Direction	110 Deg

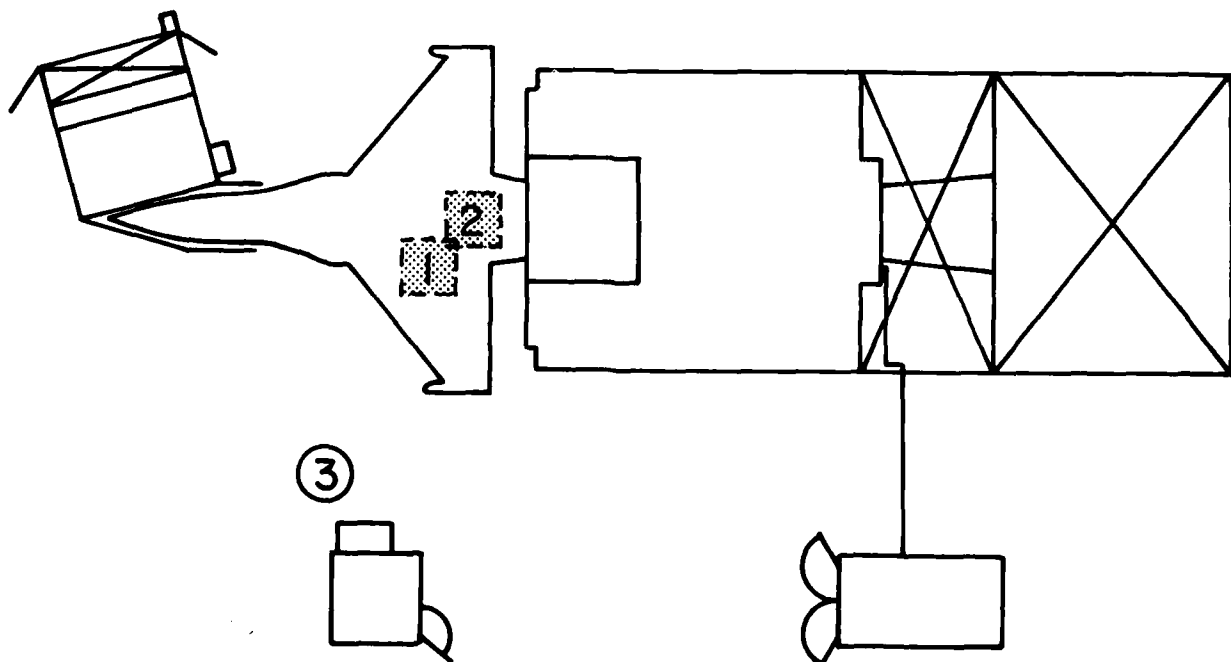


Figure 1. Near-Field Measurement Locations at Hill AFB, Utah

FAR-FIELD NOISE

MEASUREMENTS

AMRL acquired both near and far-field data during a 1- 2-hour test period, thus keeping similar meteorological conditions. Figure 2 shows the ground runup pad, ground cover, aircraft orientation and the 19 microphone measurement sites on a semicircle. The center of the 100 meter radius semicircle used in surveying the AF32A-25 noise suppressor was on the ground directly below the center of the exhaust stack.

Table 4 provides cockpit readouts of engine characteristics (% RPM, fuel flow, etc.) for each power setting used in the far-field tests. Also listed in this table are the surface meteorological conditions during data acquisition.

All microphone measurement sites are in the acoustic far-field of their source where the sound wave-fronts spherically diverge and the noise source may be regarded as a point source.

A portable microphone/tape-recorder system was used to sequentially record the noise at each far-field location. The microphone was attached to a hand held pole, pointed at the source (0° angle of incidence) and vertically scanned from 0.5 to 3 meters for a period of 5-10 seconds during data acquisition at each microphone location. These samples were then time-integrated to derive a root-mean-square sound pressure level. Vertical scanning and time-integrating together reduce anomalies frequently present in data acquired by a fixed height microphone.

RESULTS

Table 5 lists the overall and 1/3 octave band SPL measured at the far-field locations under meteorological conditions at the time of the test. Data in all other figures and tables are based on these levels. These data were normalized to 100 meters distance and standard meteorological conditions (15°C temperature, 70% relative humidity, 0.760 meter Hg barometric pressure) and used to derive the graphic data in Figure 3 which provides a compact summary of the far-field noise characteristics of the F-16 aircraft operating in the AF32A-25 noise suppressor in a standard format.

Estimates of the noise levels for intermediate power settings (e.g., 85% RPM) and/or different number of engines operating (e.g., single engine) can be determined as explained in Volume 1 of this handbook.

Figures 4 through 10 are sets of equal noise contours describing seven different measures of noise as a function of angle and distance from the source for standard day meteorology. They are respectively, overall sound pressure level, C-weighted sound level, A-weighted sound level, perceived noise level, speech interference level, permissible exposure times for personnel and octave band sound pressure levels.

Data excessively influenced by spurious background/electronic noise were eliminated from all figures and tables.

Test personnel performed noise surveys during quiet periods when the background noise was minimal, e.g., early in the morning when no other aircraft or engine test stands were operating. Data eliminated because they were near the background/electronic noise were generally not significant because the levels were so low.

Volume 2 of the handbook describes the influence of meteorology on far-field noise environments, and provides, if required, the factors necessary to adjust the handbook's standard meteorological day data

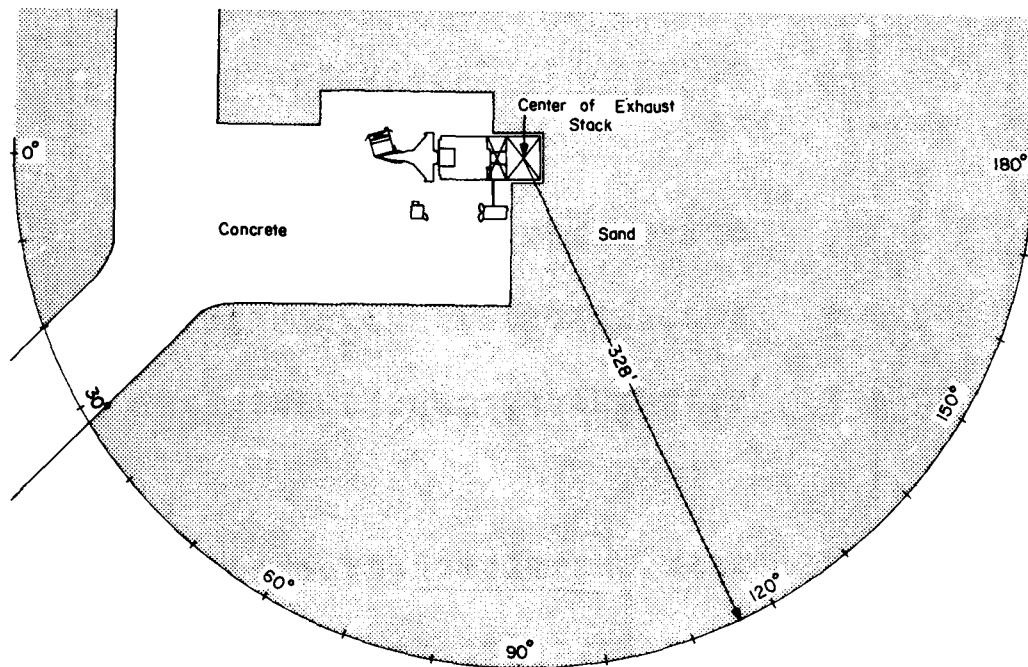


Figure 2. Far-Field Measurement Locations at Hill AFB, Utah

TABLE: MEASURED SOUND PRESSURE LEVEL (DB)													IDENTIFICATIONS		
1/3 OCTAVE BAND															
2													OMEGA 3.2		
													TEST 79-738-001		
NOISE SOURCE/SUBJECT:													RUN 01		
(OPERATION:)															
(A= IDLE PMR (65% RPM))															
(B= 80% RPM)													06 APR 79		
(C= MILITARY PMR (91% RPM))															
(D= AFTERBURNER PMR)													PAGE F1		
NEAR-FIELD NOISE LEVELS															
LOCATION/CONDITION															
1/A 2/A 3/A 1/B 2/B 3/B 1/C 2/C 3/C 1/D 2/D 3/D															
FREQ (HZ)															
25	78	78	66	90	90	80	97	98	88	103	102	91			
31.5	74	76	66	89	89	80	96	96	87	97	98	92			
40	75	78	68	94	100	81	100	106	91	101	107	94			
50	75	79	68	97	103	82	102	109	91	106	111	94			
63	75	79	69	101	104	86	104	110	90	111	115	96			
80	76	79	69	103	106	88	108	110	93	107	111	93			
100	76	78	70	97	102	84	105	110	91	106	111	91			
125	74	77	67	95	99	82	100	103	87	104	106	89			
160	79	83	67	94	98	78	98	102	84	104	106	88			
200	79	80	68	96	100	87	101	105	88	102	105	92			
250	76	77	69	93	97	81	99	104	87	104	108	92			
315	81	78	69	92	94	74	100	103	86	103	107	90			
400	80	79	66	91	96	75	103	107	87	108	114	94			
500	83	82	70	93	95	78	105	107	88	110	113	93			
630	92	91	77	95	96	78	106	107	88	113	112	94			
800	86	84	71	101	101	83	107	108	90	113	114	95			
1000	86	85	73	99	99	82	106	107	88	113	114	95			
1250	90	89	75	99	100	82	107	108	88	114	115	95			
1600	90	89	74	100	101	86	105	107	88	113	115	95			
2000	91	89	74	98	98	83	103	106	86	112	114	94			
2500	103	101	87	97	97	82	102	104	86	110	112	93			
3150	99	97	81	98	98	81	102	104	86	109	112	92			
4000	99	97	81	100	99	84	103	105	86	110	113	92			
5000	97	96	80	107	103	87	102	103	86	108	111	90			
6300	94	92	76	100	98	84	102	101	85	106	108	88			
8000	95	93	77	100	99	84	100	101	87	105	108	88			
10000	94	92	75	99	97	84	99	99	86	103	106	86			
OVERALL	107	106	91	113	114	97	118	120	102	123	126	107			

LEVEL CORRECTED TO REMOVE BACKGROUND/ELECTRONIC NOISE.

LEVEL CORRECTED TO REMOVE BACKGROUND/ELECTRONIC NOISE.

TABLE 2 MEASURED SOUND PRESSURE LEVEL (DB)													IDENTIFICATION:		
OCTAVE BAND															

TABLE: MEASURES OF HUMAN NOISE EXPOSURE										IDENTIFICATION:	
3										OMEGA 3.2	
NOISE SOURCE/SUBJECT:										TEST 79-738-001	
(OPERATION:										RUN 01	
(F-16 AIRCRAFT IN THE (A= IDLE PWR (65% RPM)										06 APR 79	
(AF32A-25 SUPPRESSOR (B= 80% RPM										PAGE H1	
(GROUND CREW (C= MILITARY PWR (91% RPM)											
(NEAR-FIELD NOISE LEVELS (D= AFTERBURNER PWR											
LOCATION/CONDITION											
1/A	2/A	3/A	1/B	2/B	3/B	1/C	2/C	3/C	1/D	2/D	3/D
HAZARD/PROTECTION											
C-WEIGHTED OVERALL SOUND LEVEL (OASLC IN DB) AT EAR											
A-WEIGHTED OVERALL SOUND LEVEL (OASLA IN DB) AT EAR											
MAXIMUM PERMISSIBLE TIME (T IN MINUTES) FOR ONE EXPOSURE PER DAY (AFR 161-35, JULY 73)											
NO PROTECTION											
OASLC	187	185	90	112	113	97	117	120	102	123	125
OASLA	188	186	91	112	111	95	116	117	99	123	124
T	0	11	143	3.8	4.5	71	P	P	36	P	P
MINIMUM QPL EAR MUFFS											
OASLA*	80	78	63	88	89	72	92	95	77	97	100
T	960	960	960	240	202	960	120	71	960	50	30
AMERICAN OPTICAL 1700 EAR MUFFS											
OASLA*	74	72	58	83	85	68	88	91	73	92	95
T	960	960	960	571	404	960	240	143	960	120	71
V-51R EAR PLUGS											
OASLA*	77	76	61	84	84	67	90	91	73	96	98
T	960	960	960	480	480	960	170	143	960	60	42
AMERICAN OPTICAL 1700 EAR MUFFS PLUS V-51R EAR PLUGS											
OASLA*	64	62	47	71	71	55	76	78	60	83	84
T	960	960	960	960	960	960	960	960	960	571	480
H-133 GROUND COMMUNICATION UNIT											
OASLA*	82	80	65	83	84	67	88	90	72	95	97
T	679	960	960	571	480	960	240	170	960	71	58
COMMUNICATION											
PREFERRED SPEECH INTERFERENCE LEVEL (PSIL IN DB)											
PSIL	96	95	81	102	103	86	110	112	92	117	118
ANNOYANCE											
PERCEIVED NOISE LEVEL, TONE CORRECTED (PNLT IN PNDB)											
TONE CORRECTION (C IN DB)											
PNLT	124	123	108	130	127	111	129	131	113	135	138
C	3	3	3	2	1	1	0	0	0	0	1

* BASED ON CALCULATED SPL SPECTRUM UNDER PROTECTIVE DEVICE.
P ADDITIONAL EAR PROTECTION REQUIRED.

TABLE 4
TEST CONDITIONS
FOR FAR-FIELD NOISE MEASUREMENTS

F-16 Aircraft in the AF32A-25 Noise Suppressor, Ground Runup
Hill AFB Utah, 14 March 1979

Aircraft Engine Operation

Idle	Single Engine 65 % RPM 440 F, Turbine Inlet Temperature 850 LBS/HR, Fuel Flow
80% RPM	Single Engine 80 % RPM 650 F, TIT 3600 LBS/HR, FF
Military Power	Single Engine 91 % RPM 920 F, TIT 8150 LBS/HR, FF
Afterburner Power	Single Engine 91 % RPM 920 F, TIT 38,000 LBS/HR, FF

Meteorology

Temperature	12 C
Bar Pressure	.643 M Hg
Rel Humidity	32 %
Wind — Speed	4 M/Sec (8 Kt)
— Direction	110 Deg

TABLE: MEASURED SOUND PRESSURE LEVEL (DB)																		IDENTIFICATIONS	
1/3 OCTAVE BAND																			
DISTANCE = 100 METERS																			
																		OMEGA 1.4	
																		TEST 79-738-881	
																		RUN 01	
																		22 MAR 79	
																		PAGE 2	
NOISE SOURCE/SUBJECT:																			
F-16 AIRCRAFT IN THE																			
AF32A-25 SUPPRESSOR																			
J05-21 ENGINE																			
FAR-FIELD NOISE																			
METEOROLOGY:																			
TEMP = 12 C																			
BAR PRESS = 643 M HG																			
REL HUMID = 32 %																			
ANGLE (DEGREES)																			
FREQ (HZ)																			
0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150 160 170 180																			
25	57	58	58	57	59	60	61	62	58	65	62	64	60	63	61	60	59	56	58
31.5	59	60	57	57	61	61	61	61	60	64	61	61	57	61	61	58	60	58	58
40	58	61	60	61	64	62	62	63	60	66	62	62	59	61	60	60	61	59	59
50	61	59	61	59	60	60	62	59	67	59	60	57	59	59	59	56	59	56	58
63	63	61	67	61	61	58	60	59	60	66	61	60	60	57	56	57	56	56	60
80	62	65	66	66	62	60	60	61	61	67	63	60	61	60	57	59	62	57	70
100	63	61	64	64	66	65	66	60	61	66	64	59	60	66	64	66	67	64	64
125	65	63	61	61	63	60	60	60	59	66	61	59	58	58	58	60	58	56	57
160	62	62	60	61	62	62	61	61	60	64	58	58	56	55	53	54	58	54	53
200	62	60	59	55	58	53	53	54	53	59	55	53	51	50	50	48	49	46	48
250	61	58	59	55	58	53	53	53	52	58	51	51	47	46	43	44	47	46	47
315	57	59	59	54	56	53	52	50	51	53	47	47	46	45	43	44	45	43	45
400	55	57	59	53	55	51	50	47	47	50	45	44	45	44	43	45	46	44	47
500	56	58	60	54	55	54	52	48	48	48	45	43	46	45	44	45	46	43	46
630	63	62	71	66	63	64	57	54	56	56	51	47	50	43	43	45	47	44	44
800	58	59	62	56	57	53	52	48	48	48	44	41	47	44	43	46	47	44	42
1000	55	58	60	54	55	53	52	47	48	45	43	40	46	42	42	45	45	43	41
1250	55	59	63	57	56	54	55	49	52	45	46	40	45	39	41	42	45	41	39
1600	55	59	62	56	56	52	50	50	54	44	44	40	42	37	39	38	42	37	35
2000	56	60	61	56	55	51	48	49	50	44	41	37	37	34	34	33	36	33	32
2500	68	70	71	71	68	65	62	65	59	55	51	52	53	50	45	44	50	41	44
3150	61	65	66	65	62	59	56	61	63	53	47	48	49	44	40	39	46	35	48
4000	58	64	64	60	57	54	53	53	55	46	41	38	39	38	37	35	39	33	33
5000	53	58	59	54	52	48	47	48	50	44	38	34	35	34	32	31	30	29	29
6300	49	56	55	49	47	45	42	43	44	36	32	28	28	27	26	25	25	26	23
8000	44	51	50	44	42	39	37	39	38	31	28	25	26	25	24	23	24	26	21
10000	42	49	48	41	39	36	33	35	32	28	25	23	23	23	22	22	21	26	20
OVERALL	75	76	78	76	75	73	73	72	73	76	71	71	69	71	69	70	71	68	72
LEVEL CORRECTED TO REMOVE BACKGROUND/ELECTRONIC NOISE.																			

TABLE: MEASURED SOUND PRESSURE LEVEL (DB)																			IDENTIFICATION:	
1/3 OCTAVE BAND																				
5																				
DISTANCE = 100 METERS																				
NOISE SOURCE/SUBJECT:																				
F-16 AIRCRAFT IN THE																				
AF32A-25 SUPPRESSOR																				
J85-21 ENGINE																				
FAR-FIELD NOISE																				
OPERATION:																				
80% RPM																				
SINGLE ENGINE																				
GROUND RUNUP (SUPPRESSED)																				
TEMP = 12 C																				
BAR PRESS = .643 M HG																				
REL HUMID = 32 %																				
PAGE 2																				
ANGLE (DEGREES)																				
FREQ (HZ)	0	10	20	30	40	50	60	70	80	90	100	110	120	130	140	150	160	170	180	
25	78	78	76	76	75	74	79	72	73	77	74	75	76	77	77	78	78	78	80	
31.5	80	80	78	76	74	72	74	68	69	71	70	71	75	78	79	77	80	79	80	
40	79	80	77	74	74	71	76	67	70	69	67	71	74	74	74	74	75	77	76	
50	78	79	73	73	70	70	80	68	72	70	69	70	68	71	68	70	71	75	74	
63	81	78	76	73	71	70	78	68	70	71	74	74	76	77	75	75	74	75	75	
80	79	78	79	76	75	70	77	66	66	69	72	72	72	75	76	76	76	75	75	
100	77	79	75	73	69	69	75	68	67	68	70	73	72	72	74	72	73	73	76	
125	77	80	73	72	69	69	72	66	67	68	67	69	71	69	67	74	71	74	76	
160	78	81	73	71	68	67	71	64	64	64	66	68	69	67	64	68	67	65	68	
200	76	80	74	72	68	67	70	64	63	62	64	65	67	63	61	67	64	62	64	
250	74	76	71	70	66	63	69	63	61	60	60	62	61	61	59	64	63	63	63	
315	71	73	68	65	62	61	65	59	59	59	59	57	58	59	59	64	60	62	64	
400	68	69	65	65	62	59	63	59	58	57	57	55	57	55	58	59	57	57	58	
500	66	67	65	64	61	58	63	58	56	55	53	52	54	52	53	58	54	51	52	
630	65	65	66	65	61	57	62	58	56	54	52	49	53	49	50	57	51	47	47	
800	68	71	73	70	65	62	67	60	58	58	57	53	57	52	51	56	52	48	50	
1000	66	69	68	67	61	57	66	61	60	57	57	51	59	60	50	54	51	48	48	
1250	61	65	65	63	58	53	62	60	57	56	55	51	57	52	48	51	49	44	43	
1600	65	70	67	66	62	55	67	63	62	61	61	54	61	57	49	47	46	44	44	
2000	62	66	65	64	59	53	66	62	60	57	55	52	59	53	47	41	42	41	42	
2500	59	64	63	62	56	50	64	61	58	55	52	47	55	51	43	37	38	38	39	
3150	59	63	61	60	54	49	62	59	57	55	52	46	56	52	42	35	37	36	39	
4000	57	62	60	59	53	47	59	55	55	53	49	44	53	49	40	34	36	35	37	
5000	57	62	63	61	55	52	62	58	59	55	50	45	58	53	41	34	35	35	38	
6300	53	59	56	55	50	47	57	53	53	47	43	38	50	45	35	32	32	32	32	
8000	47	52	50	49	44	39	48	46	42	41	37	32	38	34	32	32	32	32	32	
10000	45	50	49	48	43	38	47	43	41	37	34	32	35	32	32	32	32	32	32	
OVERALL	89	90	87	85	82	81	87	79	79	81	81	82	83	84	84	84	85	85	86	
LEVEL CORRECTED TO REMOVE BACKGROUND/ELECTRONIC NOISE.																				

LEVEL CORRECTED TO REMOVE BACKGROUND/ELECTRONIC NOISE.

TABLE: MEASURED SOUND PRESSURE LEVEL (DB)																
1/3 OCTAVE BAND																
DISTANCE = 100 METERS																
NOISE SOURCE/SUBJECT:																
F-16 AIRCRAFT IN THE																
AF32A-25 SUPPRESSOR																
J85-21 ENGINE																
FAR-FIELD NOISE																
FREQ (HZ)	ANGLE (DEGREES)															
	0	10	20	30	40	50	60	70	80	90	100	110	120	130	140	150
25	86	83	84	84	83	83	82	79	81	82	81	83	85	84	85	86
31.5	84	85	84	83	81	80	77	76	77	77	79	79	83	83	83	86
40	86	85	82	81	80	79	77	76	74	76	76	78	79	81	82	84
50	86	85	82	81	80	79	78	74	79	74	77	75	78	78	77	81
63	80	80	78	78	78	78	78	77	76	78	78	82	82	82	81	78
80	87	85	82	80	78	77	75	73	73	75	78	80	81	82	82	81
100	84	84	82	80	78	77	74	73	74	74	79	83	81	80	83	82
125	81	81	80	78	76	75	73	74	73	73	74	78	81	78	80	79
150	77	77	81	78	76	73	74	74	71	73	76	81	82	80	76	79
200	78	77	80	78	76	74	73	72	69	70	73	76	77	72	72	71
250	78	76	81	79	76	74	73	73	72	70	72	72	70	72	70	74
315	76	75	78	76	75	74	71	72	71	71	71	69	67	69	72	75
400	74	74	78	76	74	72	71	70	69	70	69	67	67	68	70	69
500	70	72	76	74	72	70	69	69	66	64	63	62	62	61	63	62
630	69	73	76	73	70	68	66	67	65	64	61	61	59	58	61	60
800	72	75	75	72	70	67	65	66	65	65	62	62	60	58	59	58
1000	69	72	73	70	67	64	63	63	61	62	59	59	58	56	57	56
1250	67	71	71	67	64	61	62	61	58	61	57	54	53	54	55	55
1500	67	71	71	67	64	61	64	62	59	60	58	55	54	53	54	54
2000	67	70	70	67	63	60	63	63	59	61	57	55	52	52	54	53
2500	65	67	68	64	61	58	62	61	56	59	54	51	49	49	51	50
3150	63	66	66	62	58	55	59	57	53	55	52	49	46	48	49	48
4000	62	66	65	61	57	53	56	55	52	52	51	47	45	45	46	45
5000	58	63	62	58	54	50	53	50	47	48	45	43	40	41	42	41
6300	55	59	60	55	51	47	50	46	43	45	41	39	37	38	38	37
8000	49	53	54	50	46	42	44	40	37	39	37	37	37	37	37	37
10000	47	51	52	48	44	40	42	38	36	37	37	37	37	37	37	37
OVERALL	94	93	93	91	90	89	87	86	87	87	88	90	91	91	91	92
																93
																94

LEVEL CORRECTED TO REMOVE BACKGROUND/ELECTRONIC NOISE.

TABLE 1		MEASURED SOUND PRESSURE LEVEL (DB)																	IDENTIFICATION:	
5		1/3 OCTAVE BAND																	OMEGA 1.4	
		DISTANCE = 100 METERS																	TEST 79-738-001	
NOISE SOURCE/SUBJECT:		OPERATION:																	RUN 04	
F-16 AIRCRAFT IN THE		AFTERBURNER POWER																	TEMP = 12 C	
AF32A-25 SUPPRESSOR		SINGLE ENGINE																	BAR PRESS = .643 M HG	
J85-21 ENGINE		GROUND RUNUP (SUPPRESSED)																	REL HUMID = 32 %	
FAR-FIELD NOISE																			PAGE 2	
FREQ		ANGLE (DEGREES)																		
(HZ)		0	18	20	30	40	50	60	70	80	90	100	110	120	130	140	150	160	170	180
25	91	89	89	89	89	88	88	85	84	84	85	85	83	83	85	86	88	87	89	88
31.5	90	89	89	88	88	86	85	82	82	83	83	83	83	82	85	85	88	89	91	89
40	93	91	90	88	88	85	84	84	83	81	83	81	81	84	85	86	87	89	89	91
50	90	89	89	88	88	85	82	82	79	80	80	78	80	79	81	82	85	88	89	90
63	89	86	85	85	83	82	82	80	81	79	79	78	80	77	80	78	81	82	85	87
80	88	88	87	85	83	81	83	83	82	80	82	84	85	83	83	84	82	83	85	88
100	90	91	89	84	82	82	82	80	79	80	82	83	85	85	85	84	83	82	87	89
125	91	88	87	86	82	83	83	83	79	78	80	83	84	84	82	79	77	83	85	89
160	86	83	83	82	80	79	80	80	79	77	77	81	83	83	82	79	76	79	77	80
200	83	81	82	83	81	79	78	77	76	76	79	83	84	82	79	76	73	74	74	75
250	81	79	86	86	82	80	77	77	77	75	77	82	80	77	75	74	73	74	74	75
315	80	80	82	82	81	81	81	78	76	76	78	79	76	74	78	74	72	75	76	77
400	83	82	84	82	80	81	80	76	76	74	75	73	73	74	74	74	73	77	80	83
500	86	83	83	81	79	80	78	78	75	71	75	70	72	73	76	74	73	76	79	80
630	81	79	80	80	76	76	73	73	73	70	71	68	69	68	70	69	69	72	72	75
800	79	81	80	79	74	75	72	72	71	69	70	69	70	68	71	68	68	71	70	73
1000	76	79	79	77	72	71	68	67	66	66	66	65	66	64	66	64	65	66	66	66
1250	75	79	79	77	70	70	66	67	64	63	63	62	62	61	61	61	63	64	64	65
1600	75	80	77	75	68	69	66	66	67	63	64	62	63	61	61	62	62	64	64	64
2000	74	78	76	74	67	68	65	65	66	63	63	62	63	60	62	60	61	62	62	60
2500	73	76	75	73	66	67	63	63	64	61	60	59	59	58	60	58	59	59	59	59
3150	70	74	72	70	62	64	60	60	61	58	58	55	56	55	55	54	57	56	56	56
4000	70	73	72	70	61	63	59	59	60	57	57	53	53	52	52	51	53	54	54	53
5000	65	68	66	66	57	59	54	54	54	52	51	48	49	48	47	47	48	49	49	47
6300	61	64	62	61	52	54	50	50	51	49	49	47	47	47	47	47	47	47	44	42
8000	55	59	57	56	47	49	47	47	47	47	47	47	47	47	47	47	47	47	47	42
10000	50	54	53	51	43	47	47	47	47	47	47	47	47	47	47	47	47	47	47	42
OVERALL	100	99	98	97	95	94	93	93	92	91	92	93	94	93	93	93	95	96	97	99

LEVEL CORRECTED TO REMOVE BACKGROUND/ELECTRONIC NOISE.

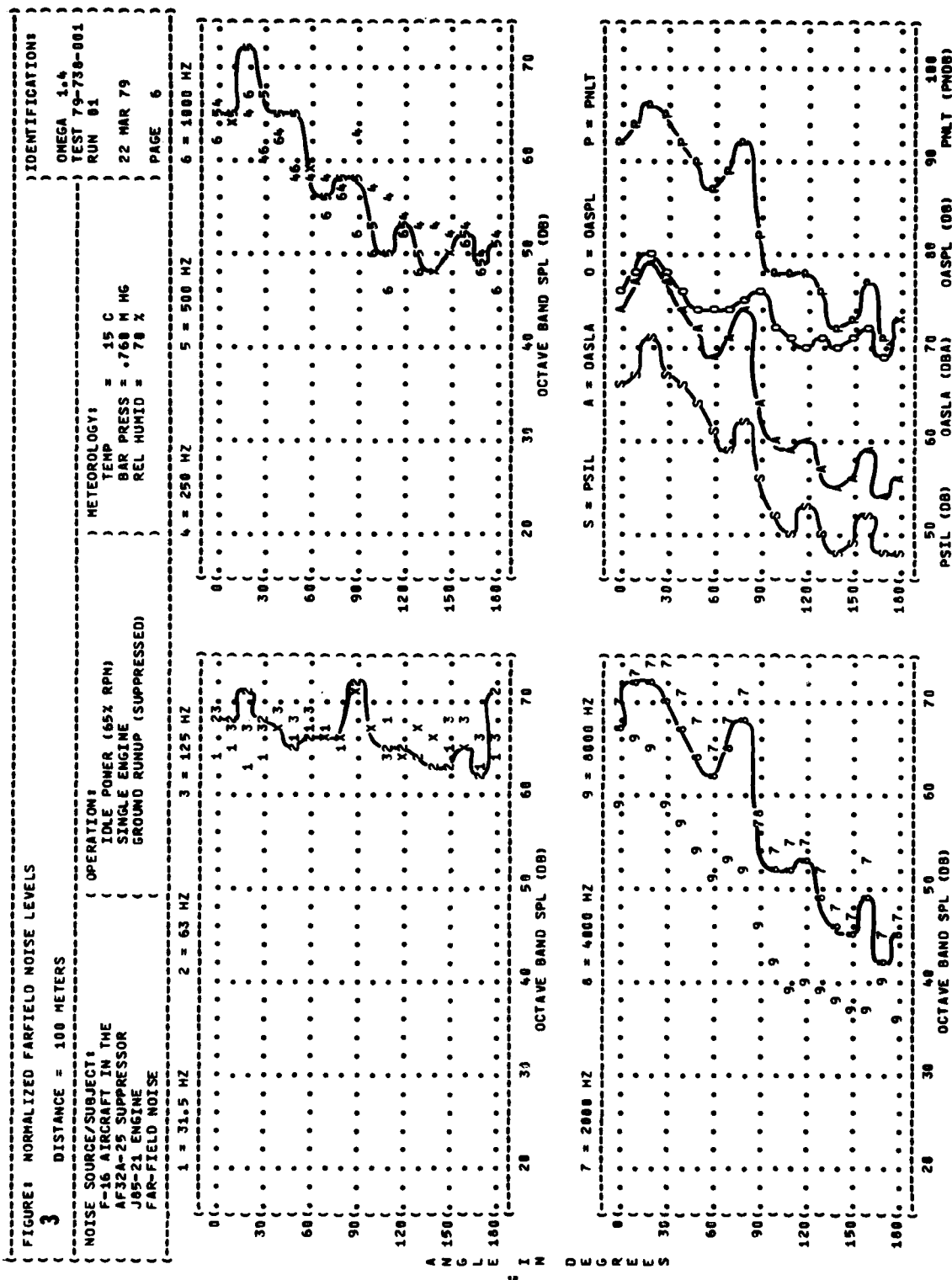


FIGURE 1 NORMALIZED FARFIELD NOISE LEVELS

3 DISTANCE = 100 METERS

NOISE SOURCE/SUBJECT: F-16 AIRCRAFT IN THE AF32A-25 SUPPRESSOR J05-21 ENGINE FAR-FIELD NOISE

OPERATION: 80% RPM SINGLE ENGINE GROUND RUNUP (SUPPRESSED)

METEOROLOGY: TEMP = 15 C BAR PRESS = .760 M HG REL HUMID = 70 %

IDENTIFICATIONS: OMEGA 1.4 TEST 79-730-001 RUN 02 22 MAR 79 PAGE 6

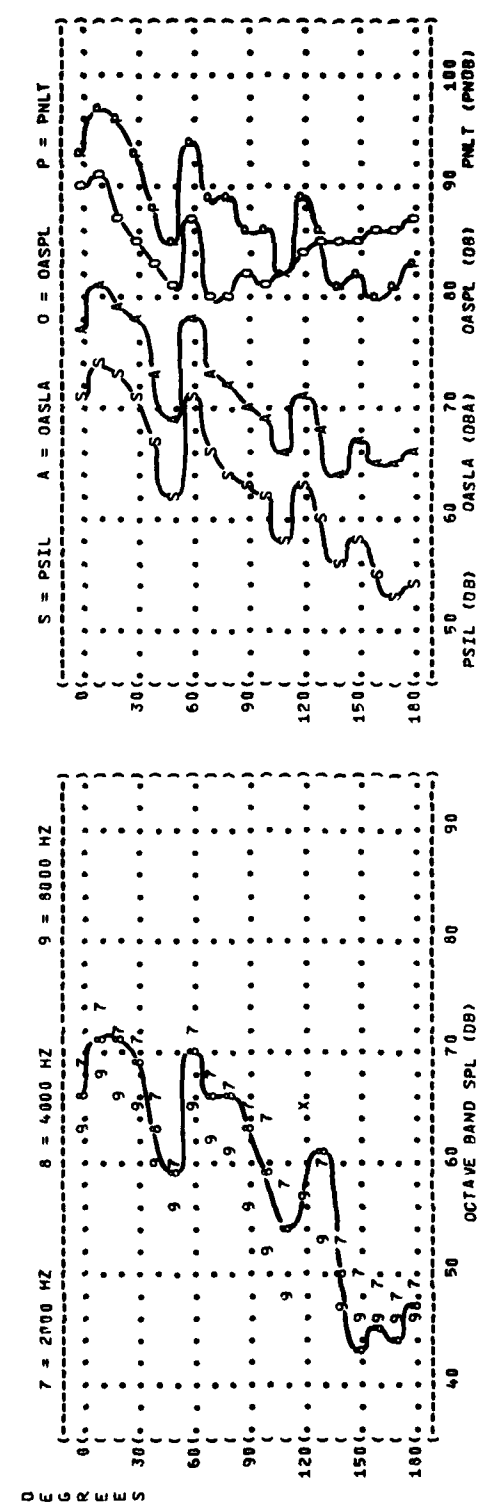
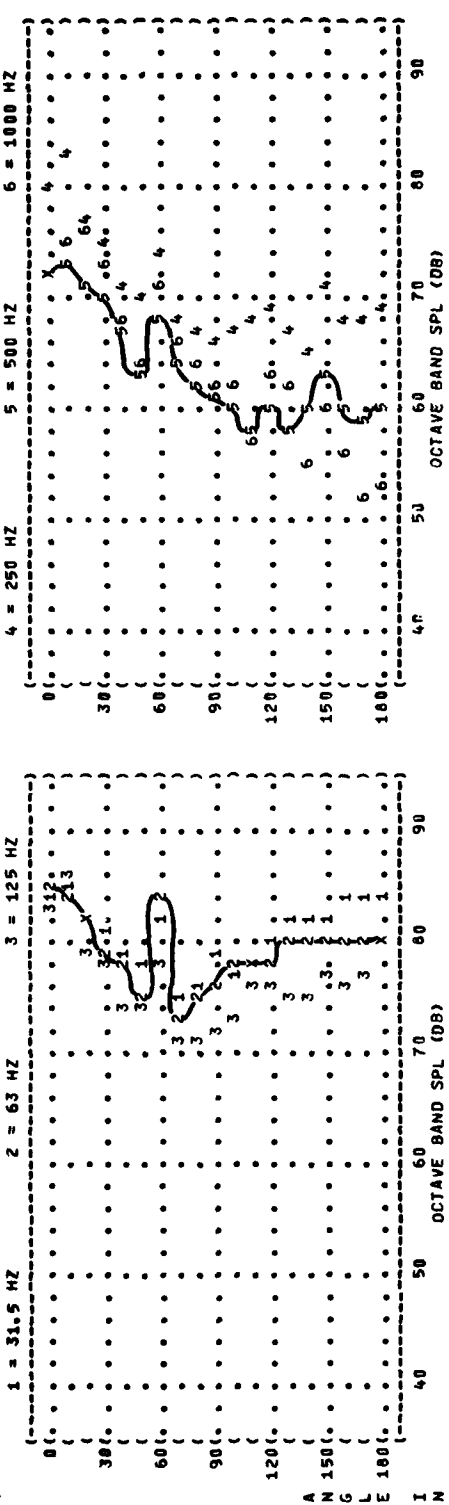


FIGURE: NORMALIZED FARFIELD NOISE LEVELS

3 DISTANCE = 100 METERS

IDENTIFICATION:

OMEGA 1.4

TEST 79-738-001

RUN 03

22 MAR 79

PAGE 6

NOISE SOURCE/SUBJECT:

F-16 AIRCRAFT IN THE

AF124-28 SUPPRESSOR

J48-21 ENGINE

FAR-FIELD NOISE

OPERATION:

MILITARY POWER (91X RPM)

SINGLE ENGINE

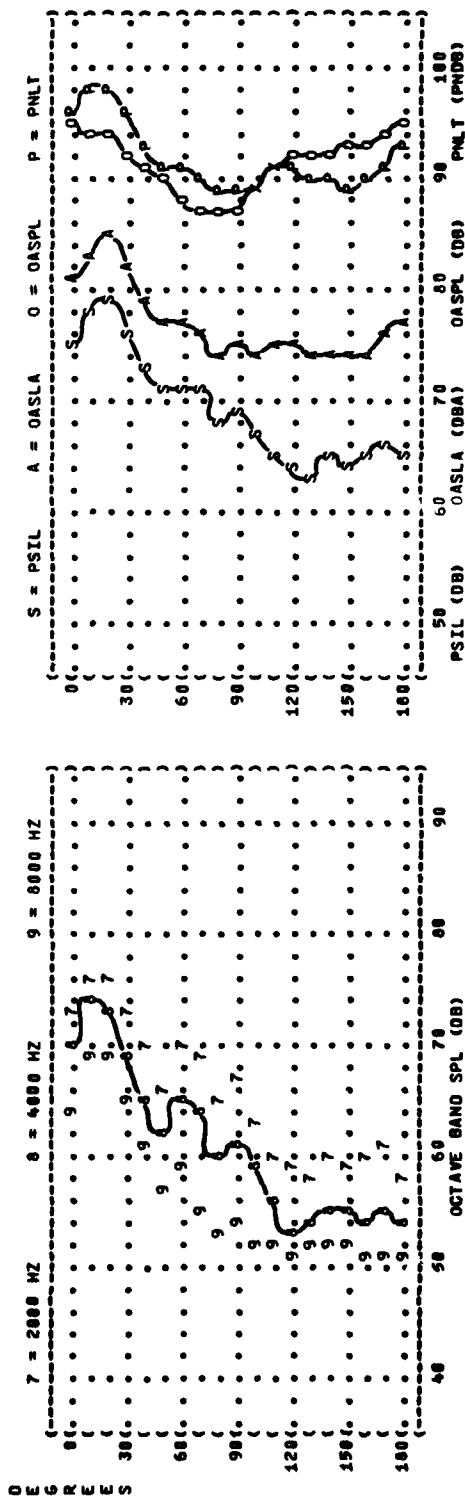
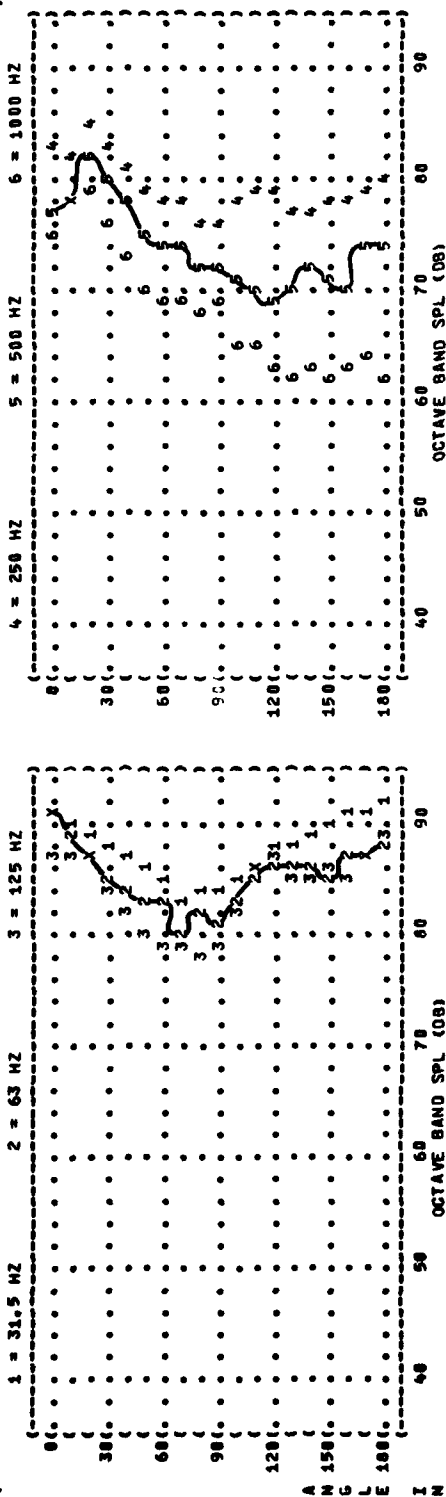
GROUND RUNUP (SUPPRESSED)

METEOROLOGICAL:

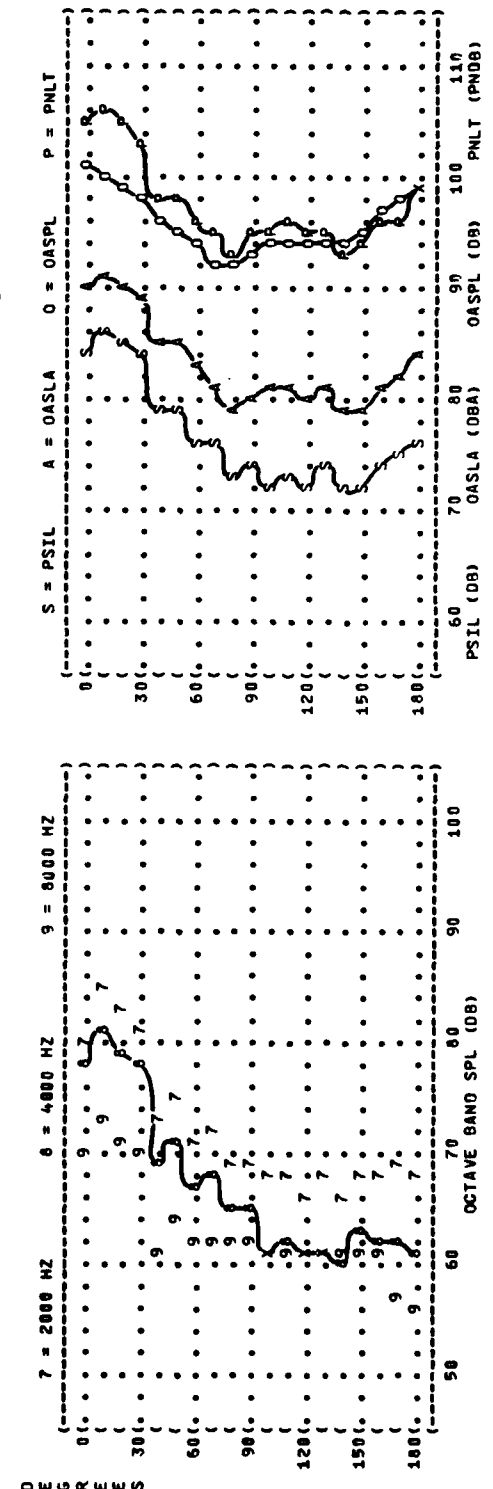
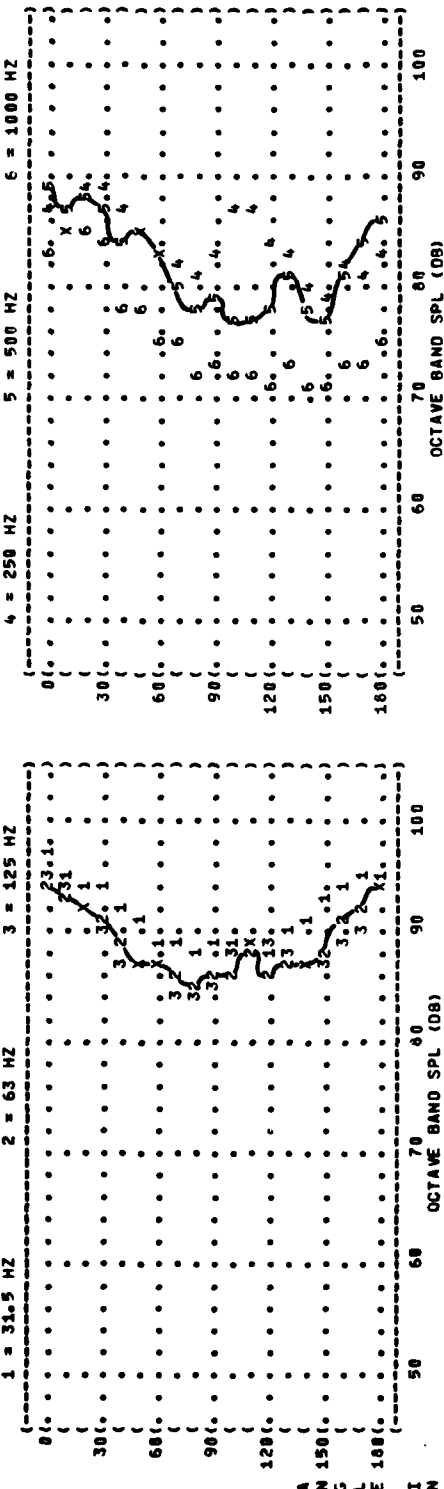
TEMP = 15 C

BAR PRESS = .760 M HG

REL HUMID = 70 %



(FIGURE: NORMALIZED FARFIELD NOISE LEVELS
 (3
 (DISTANCE = 100 METERS
 (NOISE SOURCE/SUBJECT: (OPERATION: (METEOROLOGY: (OMEGA 1.4
 (F-16 AIRCRAFT IN THE (AFTERBURNER POWER () TEST 79-738-001
 (AF32A-25 SUPPRESSOR (SINGLE ENGINE () RUN 04
 (J89-21 ENGINE (GROUND RUNUP (SUPPRESSED) () 22 MAR 79
 (FAR-FIELD NOISE () REL HUMID = 70 %
 () PAGE 6
 ()



S = PSIL A = OASLA O = OASPL P = PNLT
 PSIL (DB) OASLA (DB) OASPL (DB) PNLT (PNDB)

```

))IDENTIFICATION:
))
))
))OMEGA 1.4
))
))TEST 79-730-001
))
))RUN 01
))
))
))22 MAR 79
))
))
))PAGE 13
))

```

METEOROLOGY:
TEMP = 15 C
BAR PRESS = .760 M HG
REL HUMID = 70 %

RUN 01

EMP = 15 C

22 MAR 79

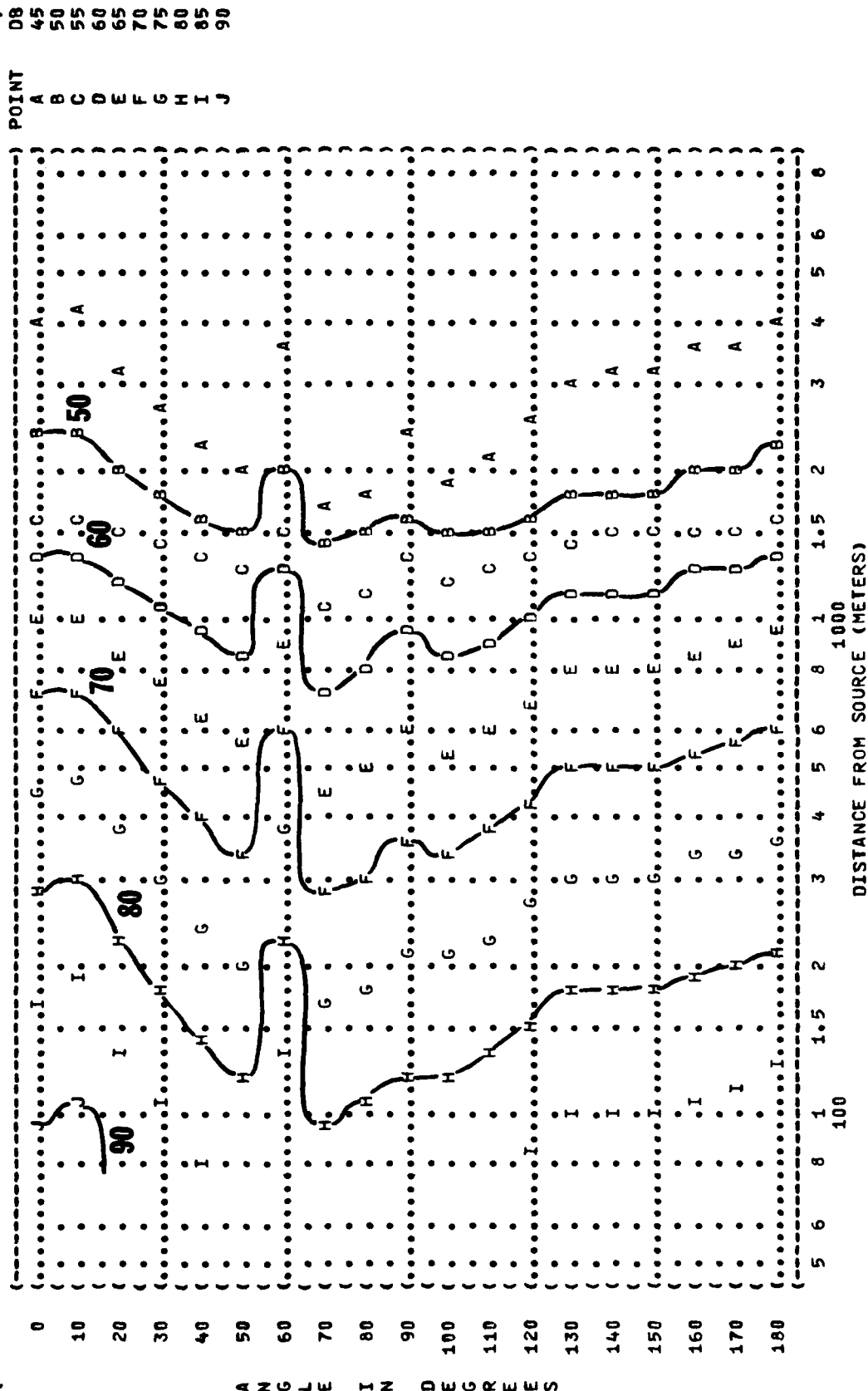
) REL HUMID = 70 %

PAGE 13



20

```
(-----)
( ( FIGURE: OVERALL SOUND PRESSURE LEVEL (OASPL) ) IDENTIFICATION: )
( ( EQUAL LEVEL CONTOURS (DB) ) )
( 4 ) OMEGA 1.4 )
(-----)
( ( NOISE SOURCE/SUBJECT: ) METEOROLOGY: )
( ( F-16 AIRCRAFT IN THE ) TEMP = 15 C )
( ( AF32A-25 SUPPRESSOR ) BAR PRESS = .760 M HG )
( ( J85-21 ENGINE ) GROUND RUNUP (SUPPRESSED) ) REL HUMID = 70 % )
( ( FAR-FIELD NOISE ) ) PAGE 13 )
(-----)
```



ANGLE IN DEGREES

**FIGURE: OVERALL SOUND PRESSURE LEVEL {OASPL}
A
EQUAL LEVEL CONTOURS (DB)**

IDENTIFICATION:

OMEGA 1.4

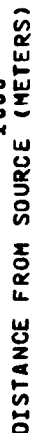
0 METEOROLOGY:

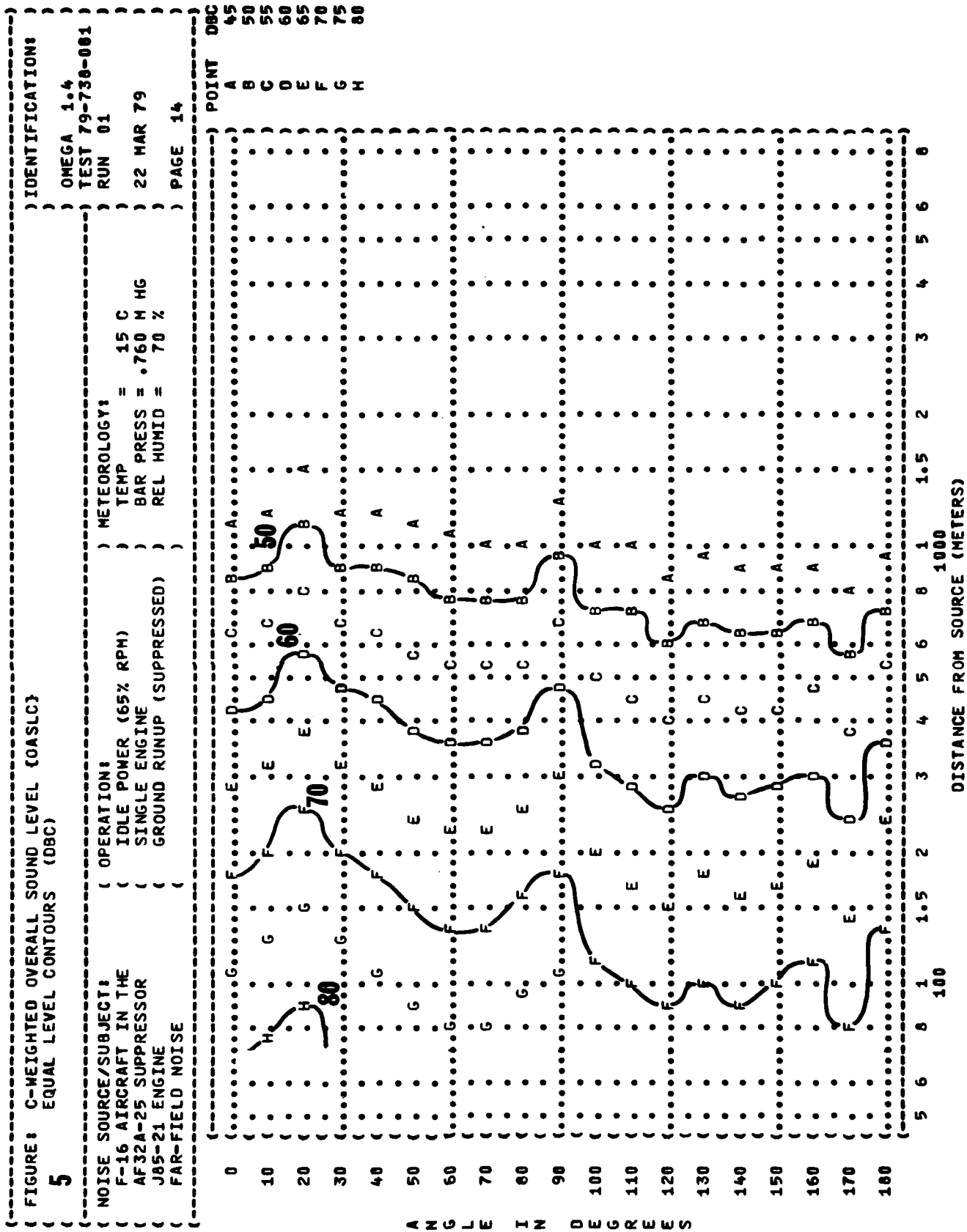
TEMP = 15 C

BAR PRESS = .760 M HG

HUMID = 70 %

PAGE 13





```
IDENTIFICATION:
OMEGA 1.4
TEST 79-738-001
RUN 02
22 MAR 79
PAGE 14
```

METEOROLOGY:
TEMP = 15 C
BAR PRESS = .760 H HG
REL HUMID = 70 %

TEOROLOGY:
TEMP
BAR PRESS
REL HUMID

ERATION:
80% RPM
SINGLE ENGINE
GROUND RUNUP (SUPPRESSED)

ISE SOURCE/SUBJECT:
F-16 AIRCRAFT IN THE
AF32A-25 SUPPRESSOR
J85-21 ENGINE
FAR-FIELD NOISE

POINT A B C D E F G H I J

ANGLE IN DEGREES

1000
DISTANCE FROM SOURCE (METERS)

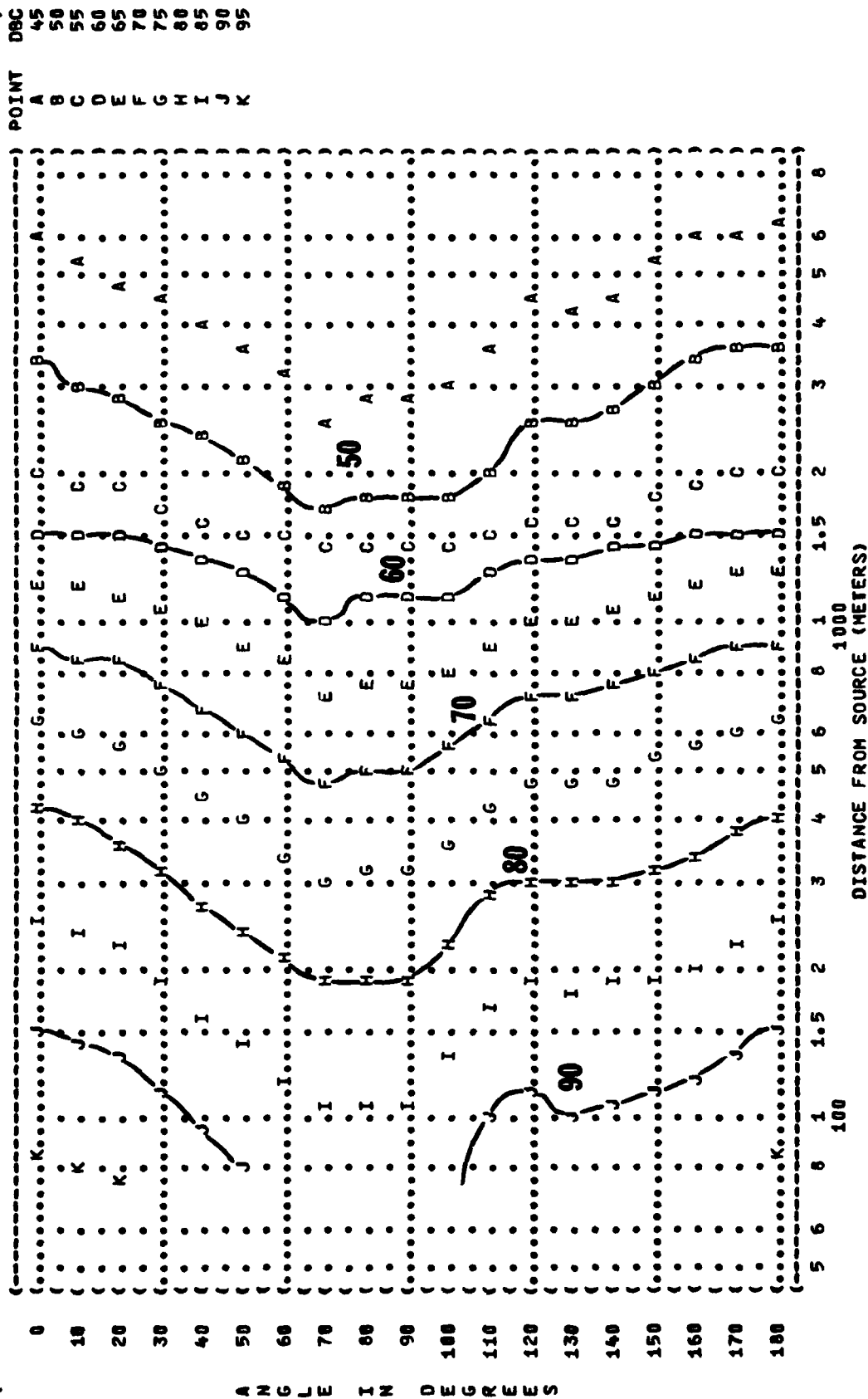
FIGURE: G-WEIGHTED OVERALL SOUND LEVEL (OASLC)
5 EQUAL LEVEL CONTOURS (DBC)

NOISE SOURCE/SUBJECT:
F-16 AIRCRAFT IN THE
AF32A-25 SUPPRESSOR
J45-21 ENGINE
FAR-FIELD NOISE

OPERATION:
MILITARY POWER (91% RPM)
SINGLE ENGINE
GROUND RUNUP (SUPPRESSED)

METEOROLOGY:
TEMP = 15 C
BAR PRESS = .760 H HG
REL HUMID = 70 %

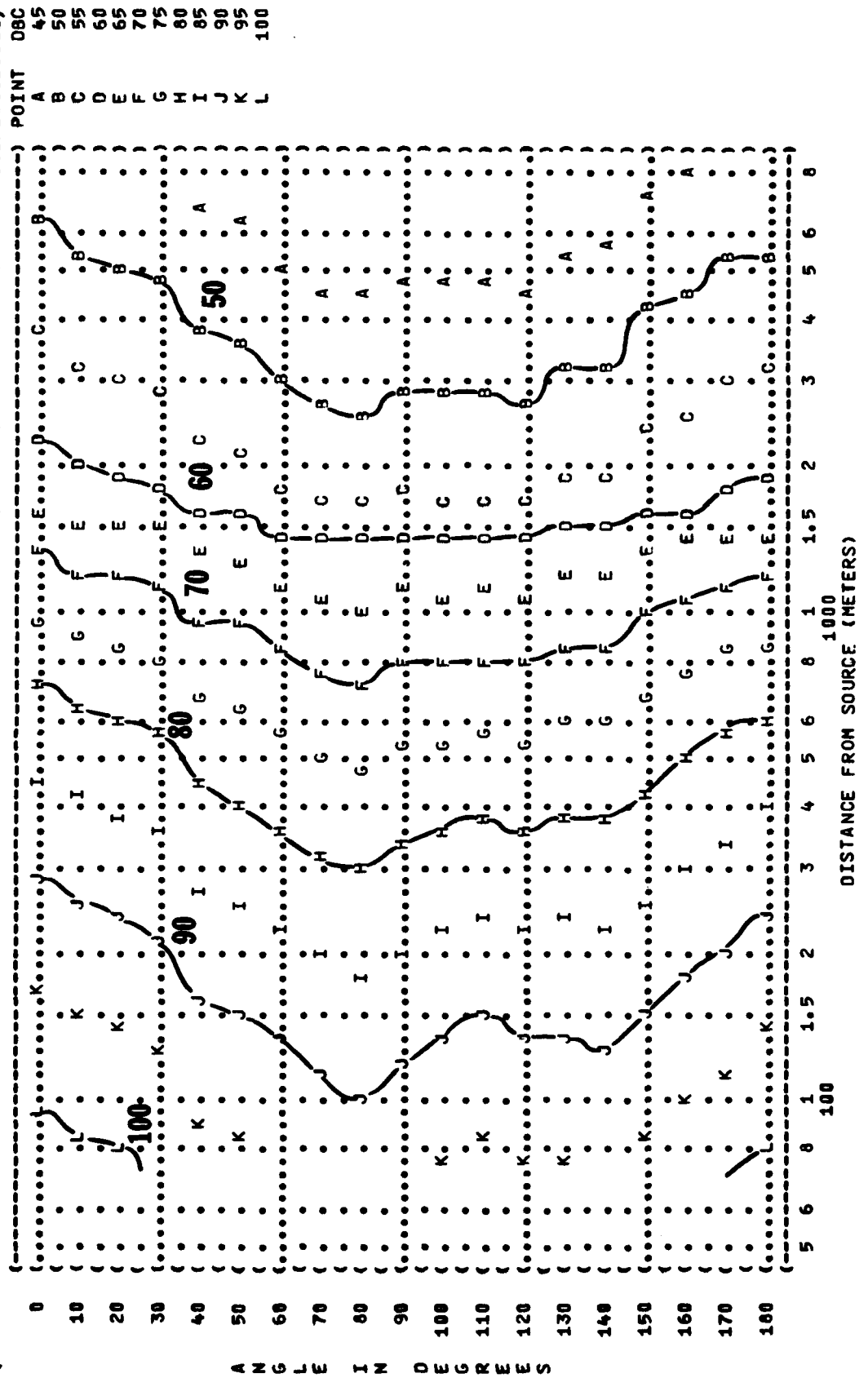
IDENTIFICATION:
OMEGA 1.4
TEST 79-738-001
RUN 03
22 MAR 79
PAGE 14



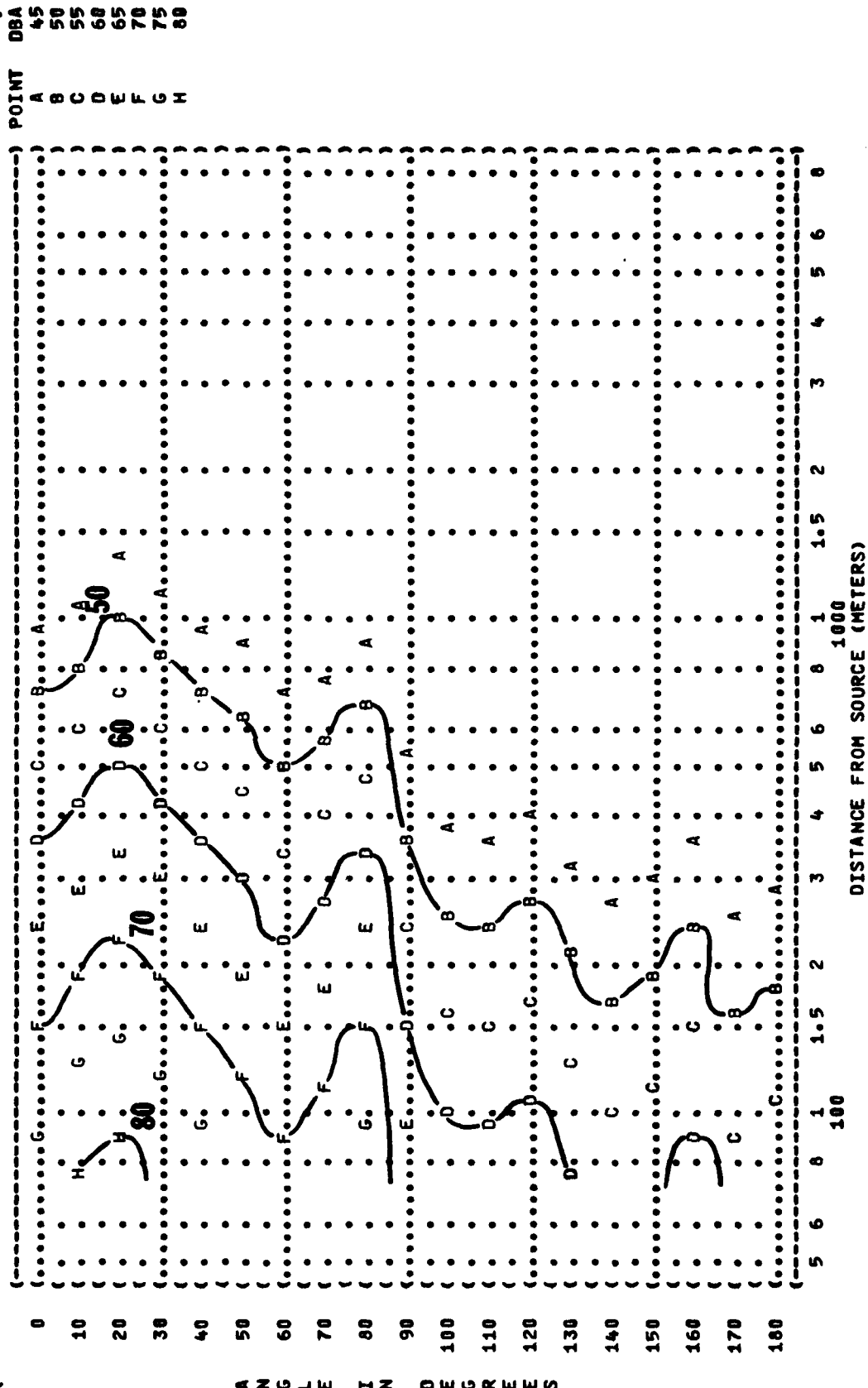
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(-----)
( ( FIGURE: C-WEIGHTED OVERALL SOUND LEVEL (OASLC) ) )
( ( 5 ) )
( ( EQUAL LEVEL CONTOURS (DBC) ) )
(-----)
( ( NOISE SOURCE/SUBJECT: ) )
( ( F-16 AIRCRAFT IN THE ) )
( ( AF32A-25 SUPPRESSOR ) )
( ( J85-21 ENGINE ) )
( ( FAR-FIELD NOISE ) )
(-----)
( ( OPERATION: ) )
( ( AFTERBURNER POWER ) )
( ( SINGLE ENGINE ) )
( ( GROUND RUNUP (SUPPRESSED) ) )
( ( ) )
(-----)
( ( METEOROLOGY: ) )
( ( TEMP = 15 C ) )
( ( BAR PRESS = .760 H MG ) )
( ( REL HUMID = 70 % ) )
( ( ) )
(-----)
( ( IDENTIFICATION: ) )
( ( ) )
( ( OMEGA 1.4 ) )
( ( TEST 79-738-001 ) )
( ( RUN 04 ) )
(-----)
( ( PAGE 14 ) )
(-----)

```



(FIGURE: A-WEIGHTED OVERALL SOUND LEVEL (OASLA)
 (6 EQUAL LEVEL CONTOURS (DBA)
 () IDENTIFICATION:
 () OMEGA 1.4
 () TEST 79-738-001
 () RUN 01
 () METEOROLOGY:
 () TEMP = 15 C
 () BAR PRESS = .760 M HG
 () REL HUMID = 70 %
 () 22 MAR 79
 () PAGE 15
 () NOISE SOURCE/SUBJECT:
 () OPERATION:
 () F-16 AIRCRAFT IN THE
 () IDLE POWER (65% RPM)
 () AF32A-25 SUPPRESSOR
 () SINGLE ENGINE
 () J85-21 ENGINE
 () GROUND RUNUP (SUPPRESSED)
 () FAR-FIELD NOISE
 ()



A N G L E I N D E G R E E S

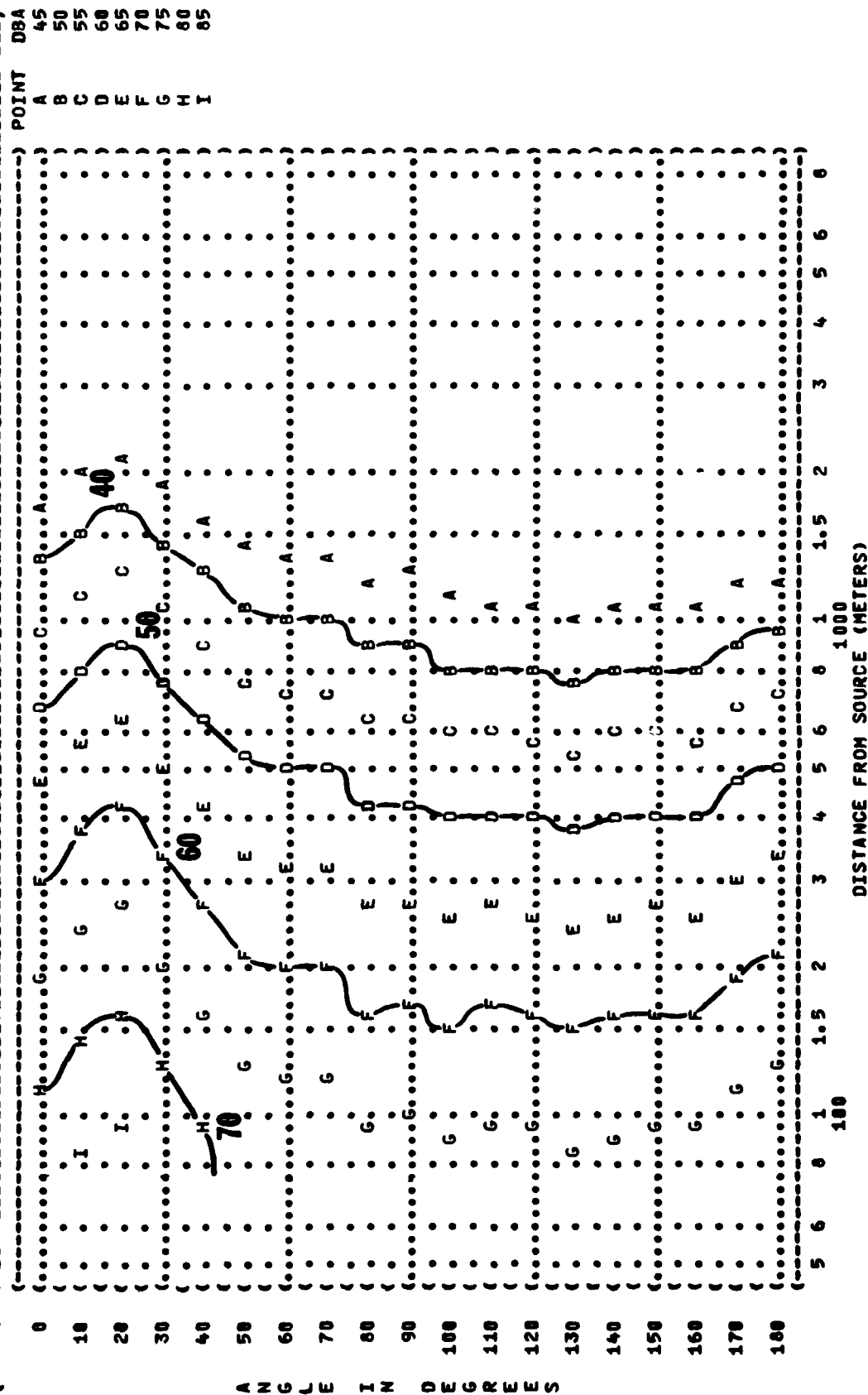
FIGURE 1: A-WEIGHTED OVERALL SOUND LEVEL {OASLA} EQUAL LEVEL CONTOURS (DBA)

TEMP = 15 C
BAR PRESS = .760 M HG
REL HUMID = 70 %

50: A

1000
DISTANCE FROM SOURCE (METERS)

```
(-----)
( FIGURE: A-WEIGHTED OVERALL SOUND LEVEL (OASLA) ) IDENTIFICATION: )
( EQUAL LEVEL CONTOURS (DBA) ) ) )
( 6 ) OMEGA 1.4 )
( ) TEST 79-738-001 )
( NOISE SOURCE/SUBJECT: ) METEOROLOGY: ) RUN 03 )
( F-16 AIRCRAFT IN THE ) TEMP = 15 C ) )
( AF32A-25 SUPPRESSOR ) BAR PRESS = .760 M HG ) )
( J05-21 ENGINE ) REL HUMID = 70 % ) )
( FAR-FIELD NOISE ) PAGE 15 )
(-----)
```



EQUAL LEVEL CONTOURS (DBA)

IDENTIFICATIONS

1

0 OMEGA 1.4

TEST 79-738-001

0 RUN 04

1

0 22 MAR 79

1

PAGE 15

ISE SOURCE/SUBJECT:

F-16 AIRCRAFT IN THE

AF32A-25 SUPPRESSOR

J85-21 ENGINE

FAR-FIELD NOISE

OPERATIONS:

XX AFTERBURNER POWER

SINGLE ENGINE

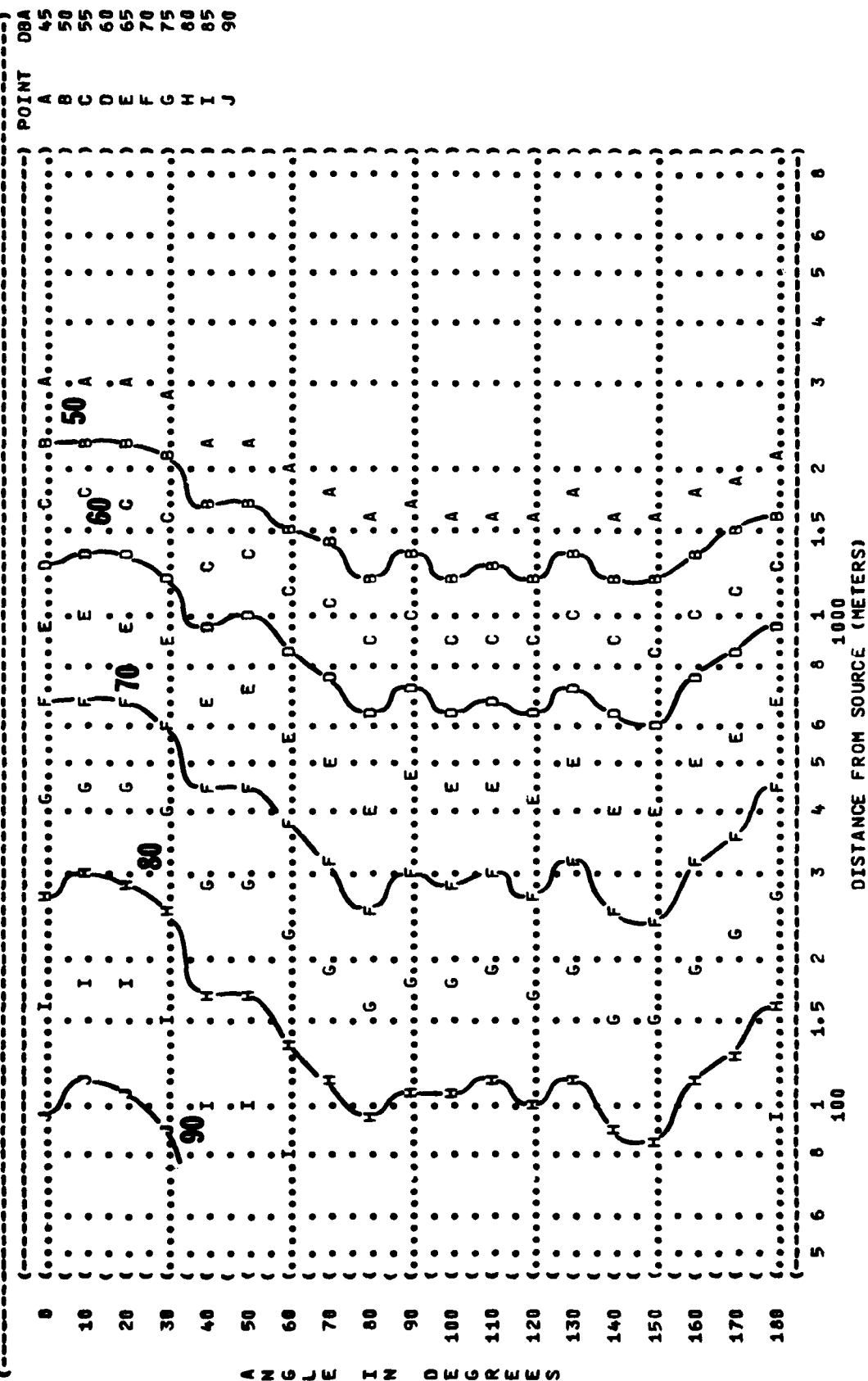
GROUND RUNUP (SUPP)

TEOROLGY:

TEMP = 15 C

BAR PRESS = .760 M

REL HUMID = 70 %



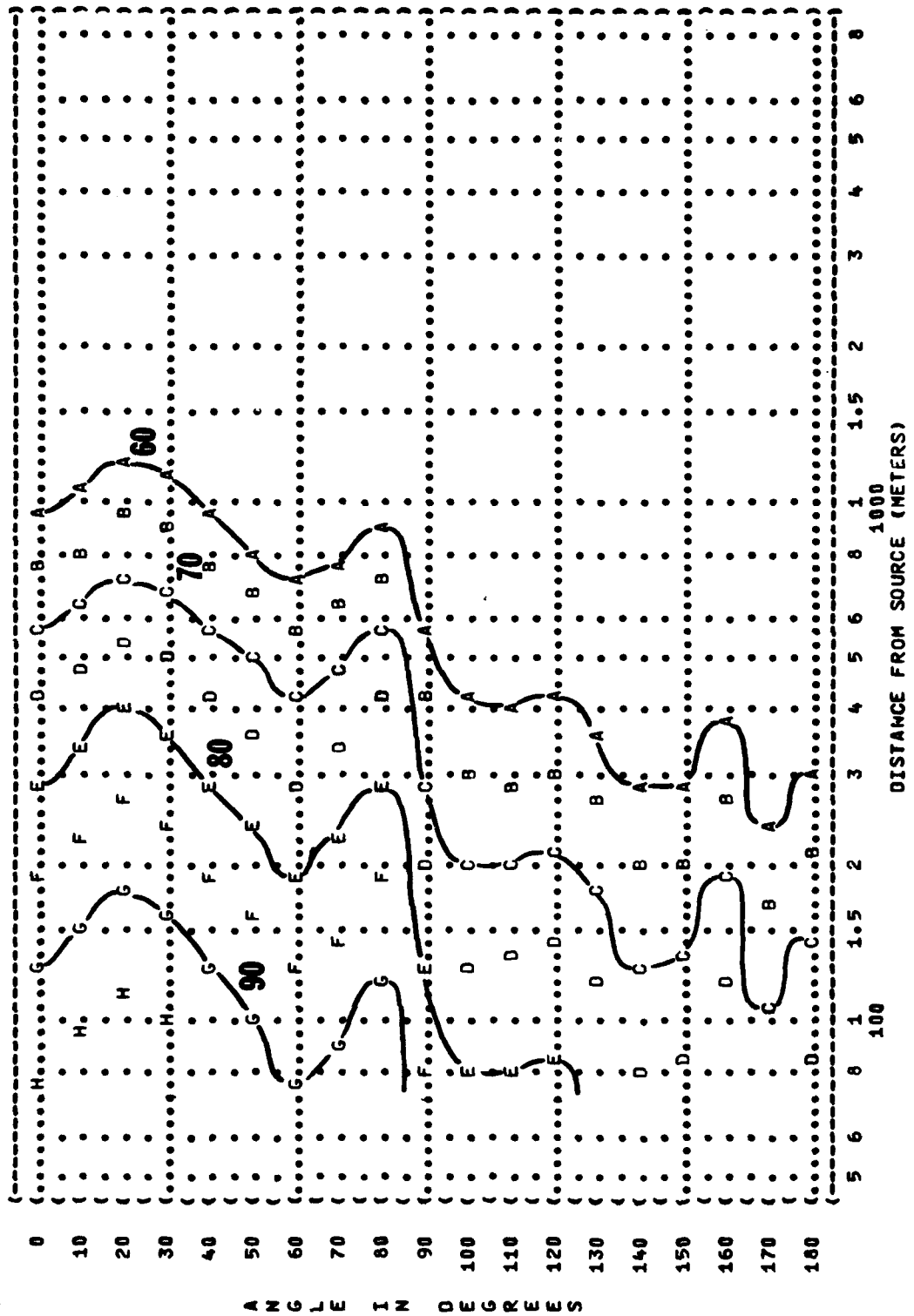
ANGLER IN DECEMBER

2

IDENTIFICATIONS
OMEGA 1.4
TEST 79-738-001

NOISE SOURCE/SUBJECT: (OPERATION:) METEOROLOGY:) RUN 01
F-16 AIRCRAFT IN THE (IDLE POWER (65% RPM)) TEMP = 15 C)
AF32A-25 SUPPRESSOR (SINGLE ENGINE) BAR PRESS = .760 M HG) 22 MAR 79
J85-21 ENGINE (GROUND RUNUP (SUPPRESSED)) REL HUMID = 70 %)
FAR-FIELD NOISE ()) PAGE 16

POINT	A	B	C	D	E	F	G	H
PNOB	60	65	70	75	80	85	90	95



«ZGJE HZ OWMGJWWS»

1

```
IDENTIFICATION:
OMEGA 1.4
TEST 79-736-001
RUN 03
22 MAR 79
PAGE 16
```

TEOROLOGY: = 15 C HG
TEMP = .760 M HG
BAR PRESS = 70 %
REL HUMID

TEOROLGYI

MILITARY POWER (91% RPM)

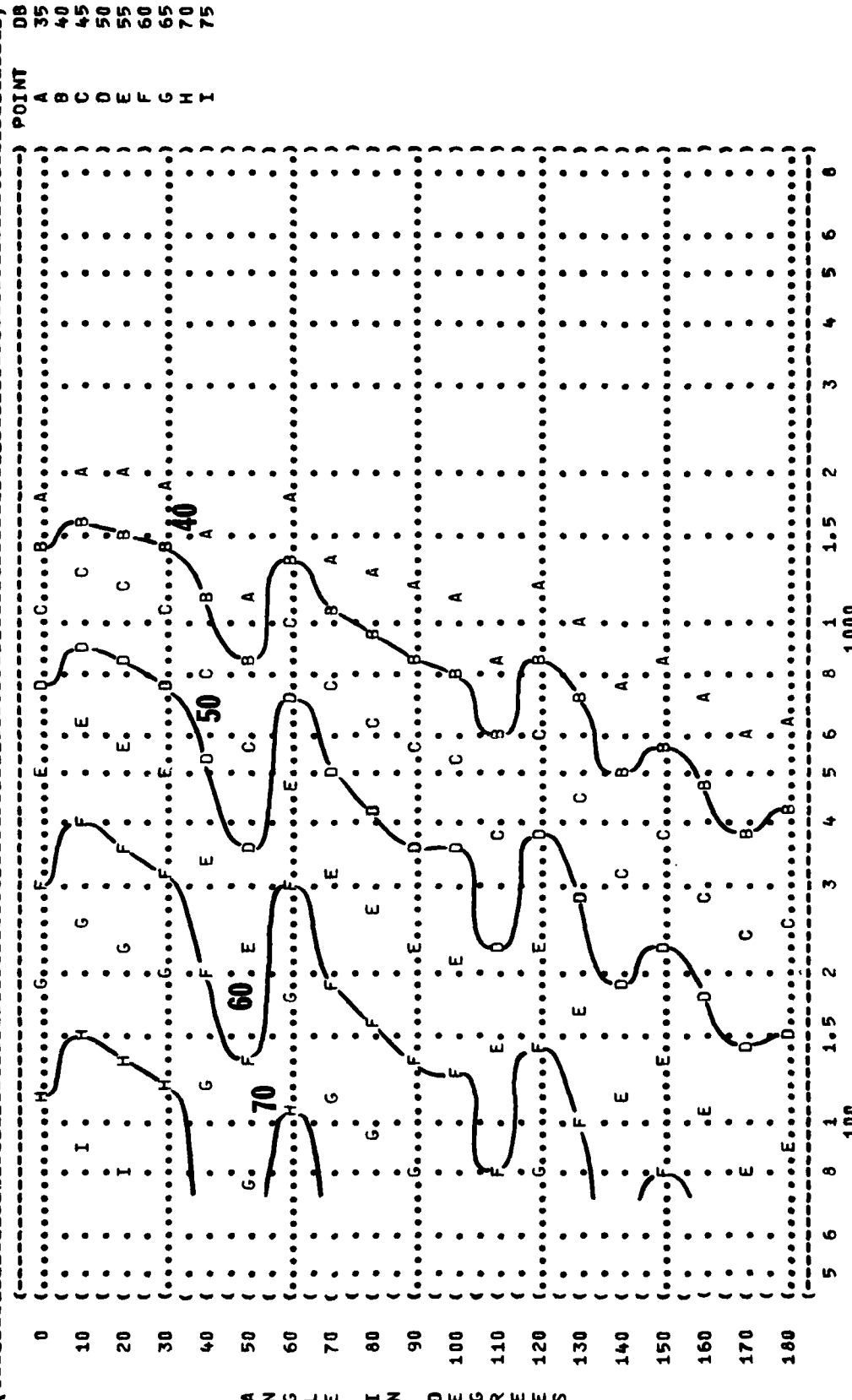
SINGLE ENGINE

GROUND RUNUP (SUPPRESSED)



1

(FIGURE: PREFERRED SPEECH INTERFERENCE LEVEL (PSIL)
 (8 EQUAL LEVEL CONTOURS (DB)
 () IDENTIFICATION:
 () OMEGA 1.4
 () TEST 79-736-001
 () RUN 02
 () METEOROLOGY:
 () TEMP = 15 C
 () BAR PRESS = .760 M HG
 () REL HUMID = 70 %
 () 22 MAR 79
 () PAGE 17
 ()

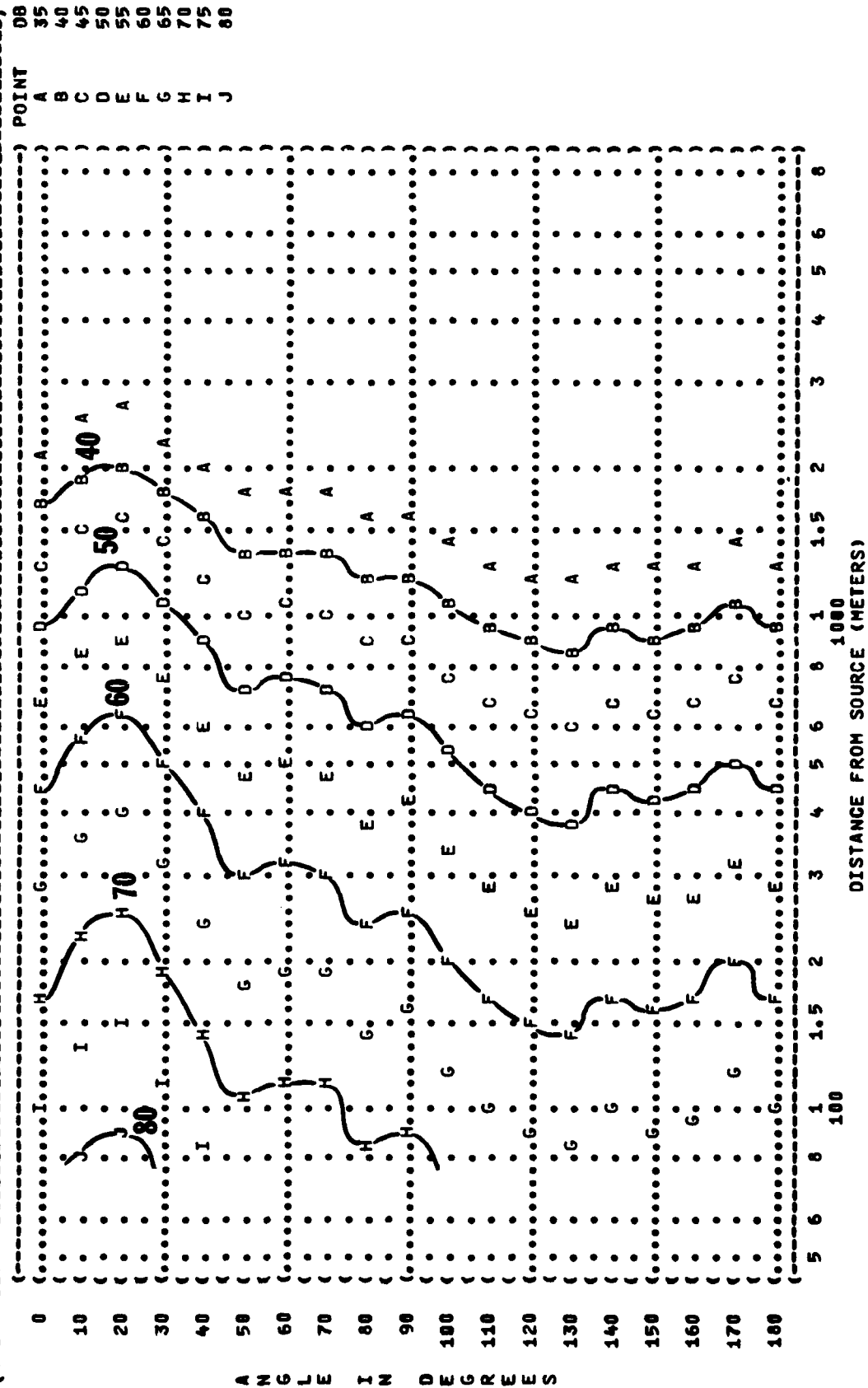


DISTANCE FROM SOURCE (METERS)

```

(-----)
( ( FIGURE: PREFERRED SPEECH INTERFERENCE LEVEL (PSIL) ) IDENTIFICATIONS )
( ( EQUAL LEVEL CONTOURS (DB) ) )
( ( 8 ) )
(-----)
( ( NOISE SOURCE/SUBJECT: ) METEOROLOGY: )
( ( F-16 AIRCRAFT IN THE ) ) TEMP = 15 C )
( ( AF32A-25 SUPPRESSOR ) ) BAR PRESS = .760 M HG )
( ( J85-21 ENGINE ) ) GROUND RUNUP (SUPPRESSED) ) REL HUMID = 70 % )
( ( FAR-FIELD NOISE ) ) )
( ( ) ) PAGE 17 )
(-----)

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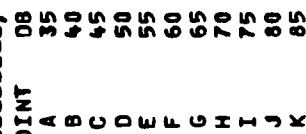
IDENTIFICATION:

OMEGA 1.4

00 METEOROLOGY:
00 TEMP
00 BAR PRESS
00 REL HUMID

TEOROLOGY: = 15 C
TEMP = .760 M HG
BAR PRESS = 70 %
REL HUMID

)
)
)
)
)
)



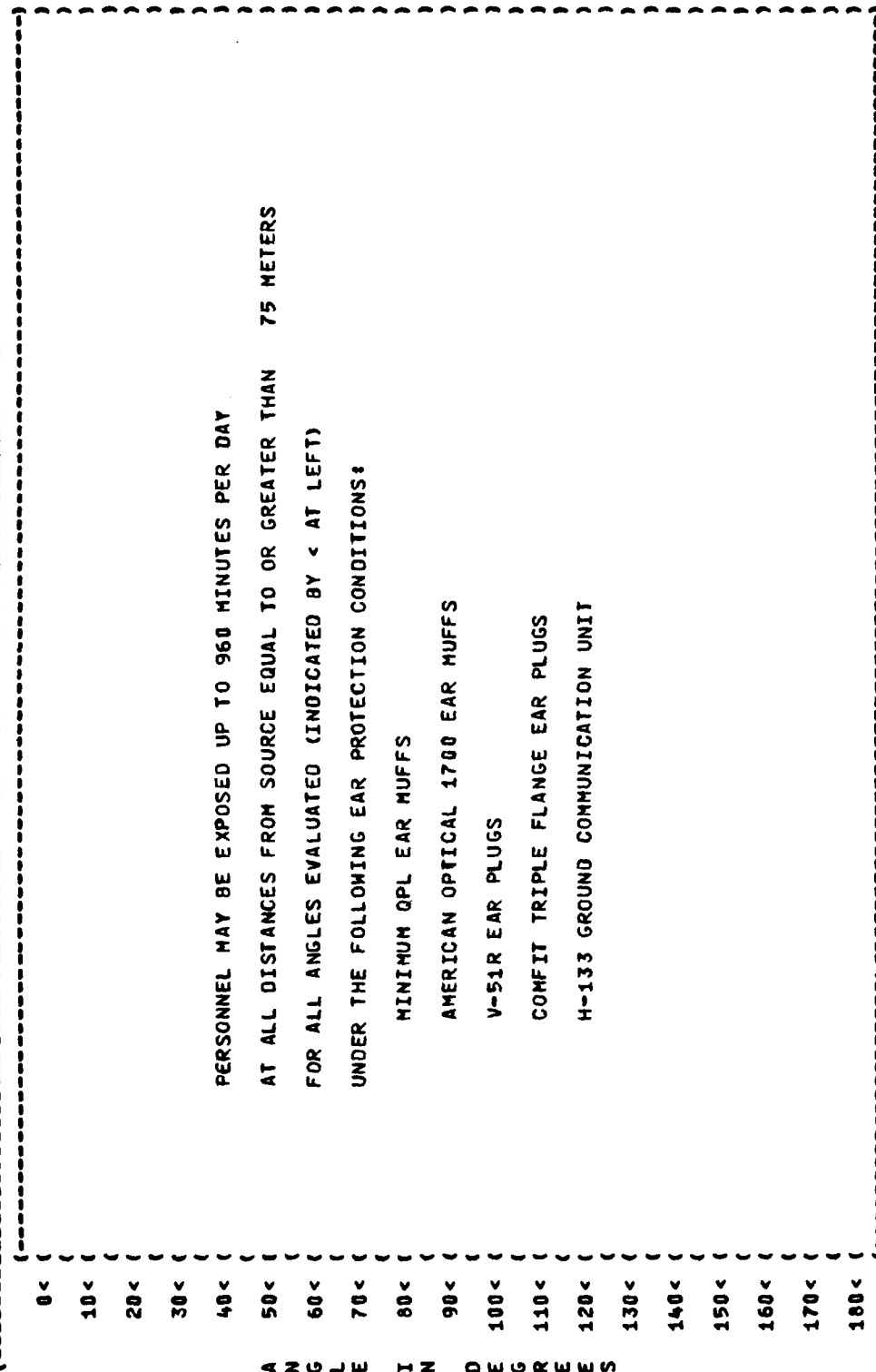
DISTANCE FROM SOURCE (METERS)

«ZU JE HZ DEUDEWEN

FIGURE 1 MAXIMUM PERMISSIBLE TIME (T) FOR ONE EXPOSURE PER DAY (AFR 161-35, JULY 73)

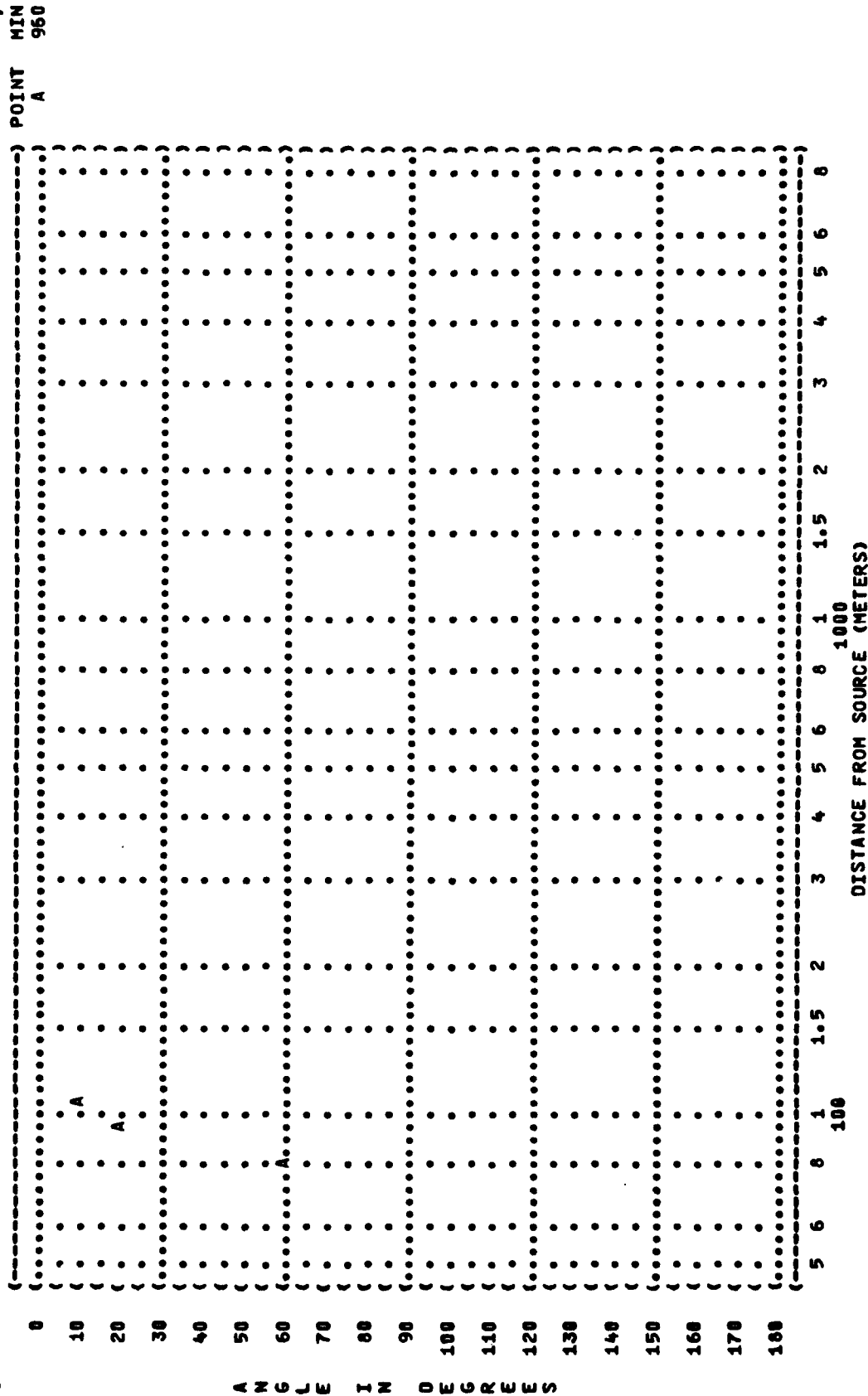
IDENTIFICATION: OMEGA 1.4
TEST 79-730-001
RUN 01

NOISE SOURCE/SUBJECT: METEOROLOGY: TEMP = 15 C
F-16 AIRCRAFT IN THE IDLE POWER (65% RPM)
AF32A-25 SUPPRESSOR SINGLE ENGINE BAR PRESS = .760 M HG
J85-21 ENGINE GROUND RUNUP (SUPPRESSED) REL HUMID = 70 %
FAR-FIELD NOISE



DISTANCE FROM SOURCE (METERS)

(FIGURE: MAXIMUM PERMISSIBLE TIME (T) FOR ONE EXPOSURE PER DAY (AFR 161-35, JULY 73)) IDENTIFICATION:)
 ((9 EQUAL TIME CONTOURS (MINUTES)))
 ((NO PROTECTION))
 ((NOISE SOURCE/SUBJECT: (OPERATION:) METEOROLOGY:))
 ((F-16 AIRCRAFT IN THE (80% RPM) TEMP = 15 C))
 ((AF32A-25 SUPPRESSOR (SINGLE ENGINE) BAR PRESS = .760 M HG))
 ((J85-21 ENGINE (GROUND RUNUP (SUPPRESSED)) REL HUMID = 70 %))
 ((FAR-FIELD NOISE ()) PAGE 7))



A N G L E I N D E G R E E S

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(-----)
( FIGURE: MAXIMUM PERMISSIBLE TIME {T} FOR ONE EXPOSURE PER DAY (AFR 161-35, JULY 73) ) IDENTIFICATION: )
( 9 ) )
( ) ) OMEGA 1.4 )
(-----)
( NOISE SOURCE/SUBJECT: ) OPERATION: ) METEOROLOGY: )
( F-16 AIRCRAFT IN THE ) ( 80% RPM ) TEMP = 15 C )
( AF32A-25 SUPPRESSOR ) ( SINGLE ENGINE ) BAR PRESS = .760 M HG )
( J05-21 ENGINE ) ( GROUND RUNUP (SUPPRESSED) ) REL HUMID = 70 % )
( FAR-FIELD NOISE ) ( ) ) PAGE 8 )
(-----)
```

PERSONNEL MAY BE EXPOSED UP TO 960 MINUTES PER DAY
AT ALL DISTANCES FROM SOURCE EQUAL TO OR GREATER THAN 75 METERS
FOR ALL ANGLES EVALUATED (INDICATED BY < AT LEFT)
UNDER THE FOLLOWING EAR PROTECTION CONDITIONS:

MINIMUM QPL EAR MUFFS
AMERICAN OPTICAL 1700 EAR MUFFS
V-51R EAR PLUGS
COMFIT TRIPLE FLANGE EAR PLUGS
H-133 GROUND COMMUNICATION UNIT

1000
DISTANCE FROM SOURCE (METERS)

	MIN	POINT
0	960	A
1	480	B

	10	20	30	40	50	60	70	80	90	100
A	10	20	30	40	50	60	70	80	90	100
B	10	20	30	40	50	60	70	80	90	100
C	10	20	30	40	50	60	70	80	90	100
D	10	20	30	40	50	60	70	80	90	100
E	10	20	30	40	50	60	70	80	90	100
F	10	20	30	40	50	60	70	80	90	100
G	10	20	30	40	50	60	70	80	90	100
H	10	20	30	40	50	60	70	80	90	100
I	10	20	30	40	50	60	70	80	90	100
J	10	20	30	40	50	60	70	80	90	100
K	10	20	30	40	50	60	70	80	90	100
L	10	20	30	40	50	60	70	80	90	100
M	10	20	30	40	50	60	70	80	90	100
N	10	20	30	40	50	60	70	80	90	100
O	10	20	30	40	50	60	70	80	90	100
P	10	20	30	40	50	60	70	80	90	100
Q	10	20	30	40	50	60	70	80	90	100
R	10	20	30	40	50	60	70	80	90	100
S	10	20	30	40	50	60	70	80	90	100
T	10	20	30	40	50	60	70	80	90	100
U	10	20	30	40	50	60	70	80	90	100
V	10	20	30	40	50	60	70	80	90	100
W	10	20	30	40	50	60	70	80	90	100
X	10	20	30	40	50	60	70	80	90	100
Y	10	20	30	40	50	60	70	80	90	100
Z	10	20	30	40	50	60	70	80	90	100

A.

40

50

[illegible]

3 2 E
 110
 (((

140

170 (.)
(.)
180 (.....)

DISTANCE FROM SOURCE (METERS)

1. The first part of the paper discusses the importance of the study of the history of the English language. It is argued that the study of the history of the English language is essential for a full understanding of the language and its development. The paper then discusses the various factors that have influenced the development of the English language, including the influence of other languages, the influence of social and cultural changes, and the influence of technological advances. The paper concludes by discussing the importance of the study of the history of the English language for the future of the language.

44

FIGURE: MAXIMUM PERMISSIBLE TIME {T} FOR ONE EXPOSURE PER DAY (AFR 161-35, JULY 73)
9
EQUAL TIME CONTOURS (MINUTES)

NOISE SOURCE/SUBJECT: (OPERATION:) METEOROLOGY:
F-16 AIRCRAFT IN THE (MILITARY POWER (91% RPM)) TEMP = 15 C
AF32A-25 SUPPRESSOR (SINGLE ENGINE) BAR PRESS = .760 M HG
J85-21 ENGINE (GROUND RUNUP (SUPPRESSED)) REL HUMID = 70 %
FAIR-FIELD NOISE ()

IDENTIFICATION:) OMEGA 1.4
TEST 79-738-001
RUN 03
22 MAR 79
PAGE 8

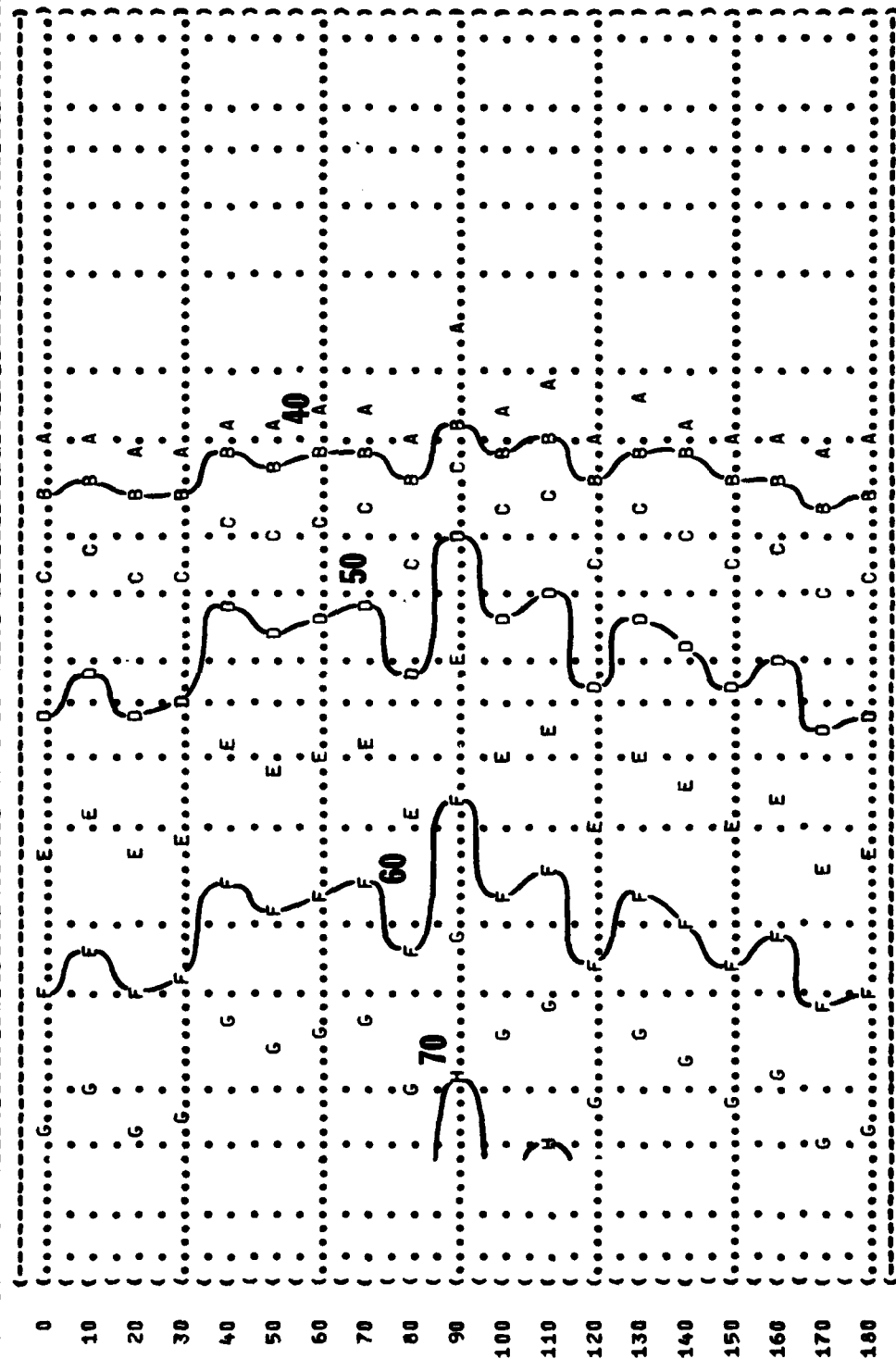
0	10	20	30	40	50	60	70	80	90	100	110	120	130	140	150	160	170	180
PERSONNEL MAY BE EXPOSED UP TO 960 MINUTES PER DAY																		
AT ALL DISTANCES FROM SOURCE EQUAL TO OR GREATER THAN 75 METERS																		
FOR ALL ANGLES EVALUATED (INDICATED BY < AT LEFT)																		
UNDER THE FOLLOWING EAR PROTECTION CONDITIONS:																		
MINIMUM QPL EAR MUFFS																		
AMERICAN OPTICAL 1700 EAR MUFFS																		
V-51R EAR PLUGS																		
COMFIT TRIPLE FLANGE EAR PLUGS																		
H-133 GROUND COMMUNICATION UNIT																		
DISTANCE FROM SOURCE (METERS)																		
5	6	8	1	1.5	2	3	4	5	6	8	1	1.5	2	3	4	5	6	8
100																		

AZGJE IN DEGRWWS

(FIGURE: SOUND PRESSURE LEVEL (SPL)
 (10 EQUAL LEVEL CONTOURS (DB)
 (31.5 HZ OCTAVE BAND
 (NOISE SOURCE/SUBJECT: (OPERATION:
 (F-16 AIRCRAFT IN THE (IDLE POWER (65% RPM)
 (AF32A-25 SUPPRESSOR (SINGLE ENGINE
 (J85-21 ENGINE (GROUND RUNUP (SUPPRESSED)
 (FAR-FIELD NOISE (

) IDENTIFICATION:)
) OMEGA 1.4)
) TEST 79-738-001)
) RUN 01)
) 22 MAR 79)
) PAGE 18)
)
) METEOROLOGY:
) TEMP = 15 C
) BAR PRESS = .760 M HG
) REL HUMID = 70 %
)
) POINT DB
) A 35
) B 40
) C 45
) D 50
) E 55
) F 60
) G 65
) H 70

A N G L E I N D E G R E E S

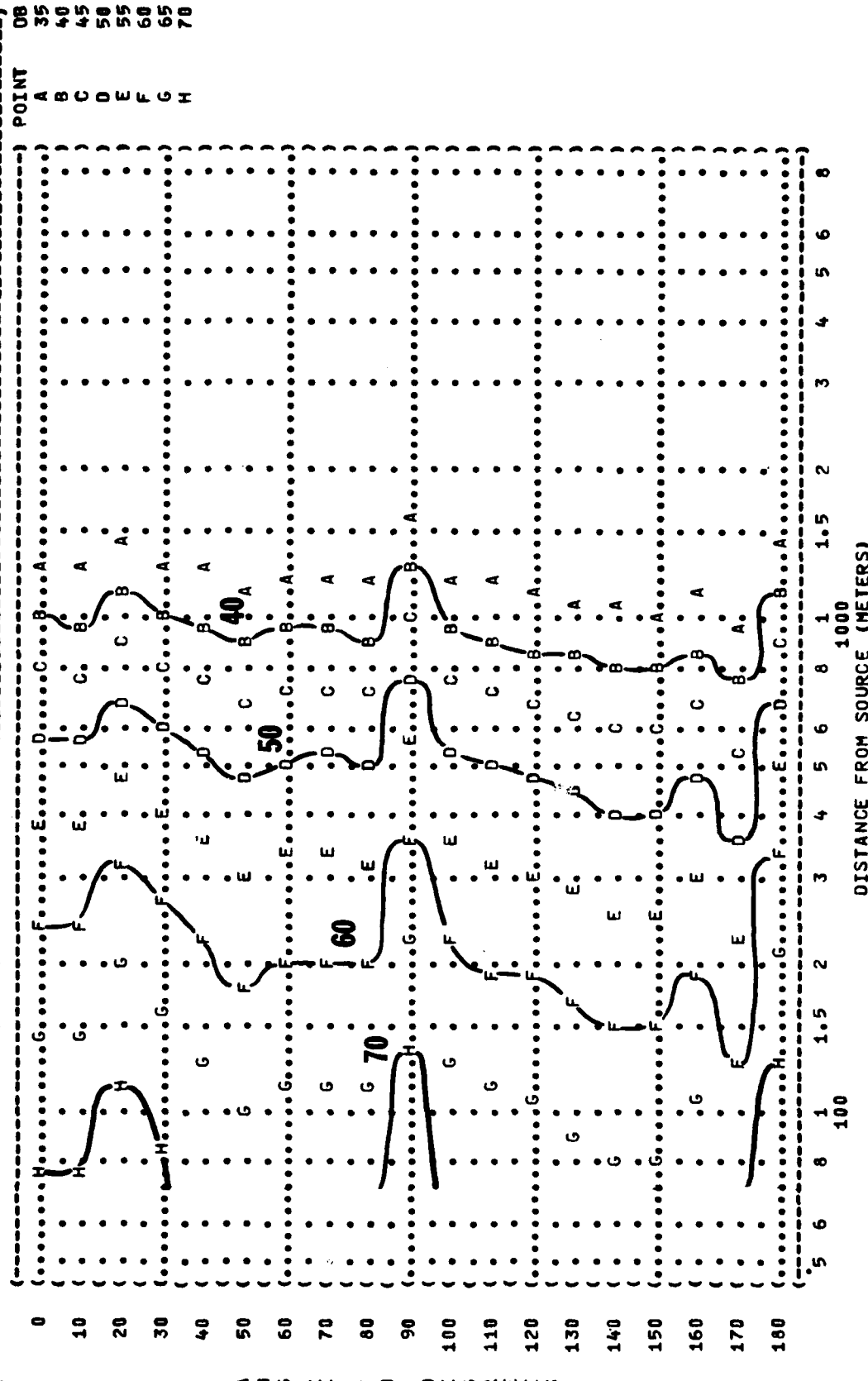


DISTANCE FROM SOURCE (METERS)

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FIGURE: SOUND PRESSURE LEVEL {SPL}
EQUAL LEVEL CONTOURS (DB)
10 63 HZ OCTAVE BAND
-----
NOISE SOURCE/SUBJECT: ( OPERATION: ) METEOROLOGY:
F-16 AIRCRAFT IN THE ( IDLE POWER (65% RPM) ) TEMP = 15 C
AF32A-25 SUPPRESSOR ( SINGLE ENGINE ) BAR PRESS = .760 M HG
J85-21 ENGINE ( GROUND RUNUP (SUPPRESSED) ) REL HUMID = 70 %
FAR-FIELD NOISE ( ) )
-----
) IDENTIFICATION:
)
) OMEGA 1.4
) TEST 79-738-001
) RUN 01
) 22 MAR 79
) PAGE 19
-----

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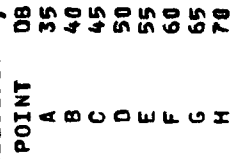
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) IDENTIFICATION:
)
)
) OMEGA 1.4
) TEST 79-738-001
) RUN 01
)
) 22 MAR 79
)
)
) PAGE 20
)

```

TEOROLOGY:
TEMP = 15 C
BAR PRESS = .760 M HG
REL HUMID = 70 %

RUN 01
 22 MAR 79
 PAGE 20



AZGJE IN DEGRWES

100



DISTANCE FROM SOURCE (METERS)

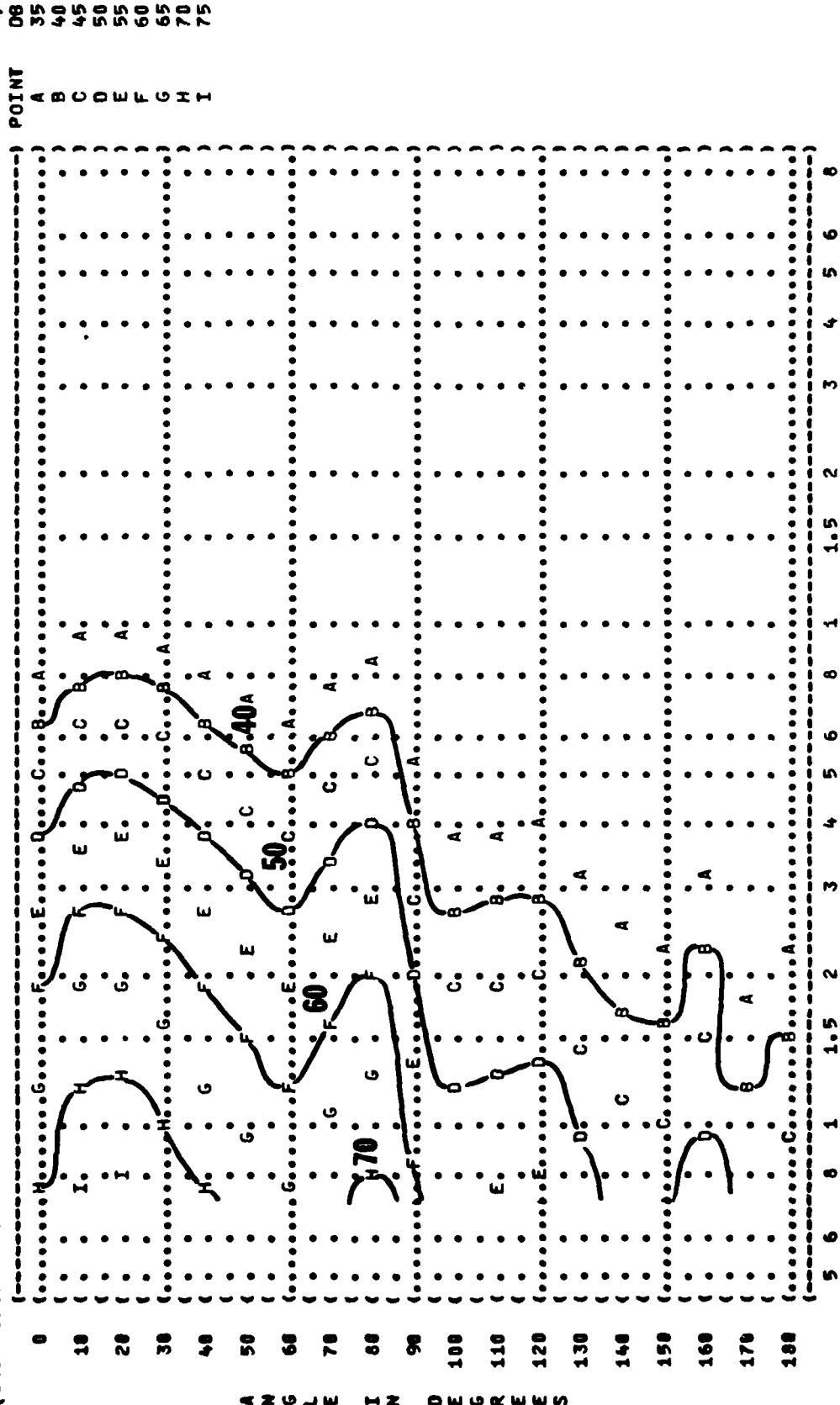
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FAR-FIELD NOISE

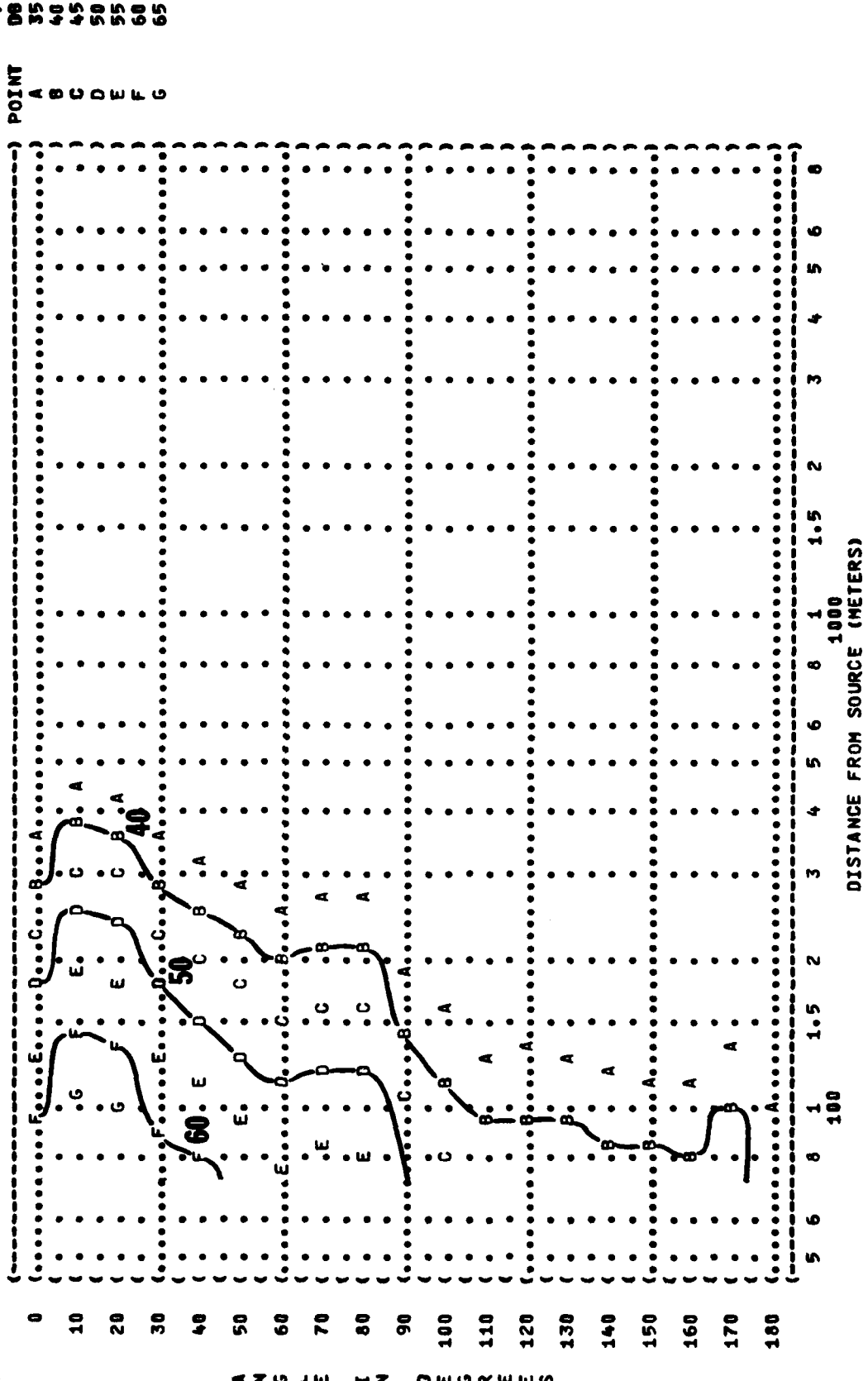


(FIGURE: SOUND PRESSURE LEVEL (SPL)
 (10 EQUAL LEVEL CONTOURS (DB)
 (4000 HZ OCTAVE BAND
 (NOISE SOURCE/SUBJECT: (OPERATION:
 (F-16 AIRCRAFT IN THE (IDLE POWER (65% RPM)
 (AF32A-25 SUPPRESSOR (SINGLE ENGINE
 (J85-21 ENGINE (GROUND RUNUP (SUPPRESSED)
 (FAR-FIELD NOISE ()
 () METEOROLOGY:
 () TEMP = 15 C
 () BAR PRESS = .760 M HG
 () REL HUMID = 70 %
 () PAGE 25
 () IDENTIFICATION:
 () OMEGA 1.4
 () TEST 79-738-001
 () RUN 01
 () 22 MAR 79
 ()



DISTANCE FROM SOURCE (METERS)

(FIGURE 1 SOUND PRESSURE LEVEL (SPL)
 (10 EQUAL LEVEL CONTOURS (DB)
 (8000 HZ OCTAVE BAND
 (NOISE SOURCE/SUBJECT: (OPERATION: (METEOROLOGY: (POINT DB
 (F-16 AIRCRAFT IN THE (IDLE POWER (65% RPM)) TEMP = 15 C 35
 (AF32A-25 SUPPRESSOR (SINGLE ENGINE) BAR PRESS = .760 H HG 40
 (J85-21 ENGINE (GROUND RUNUP (SUPPRESSED)) REL HUMID = 70 % 45
 (FAR-FIELD NOISE ())) 50
 ()))) 55
 ()))) 60
 ()))) 65

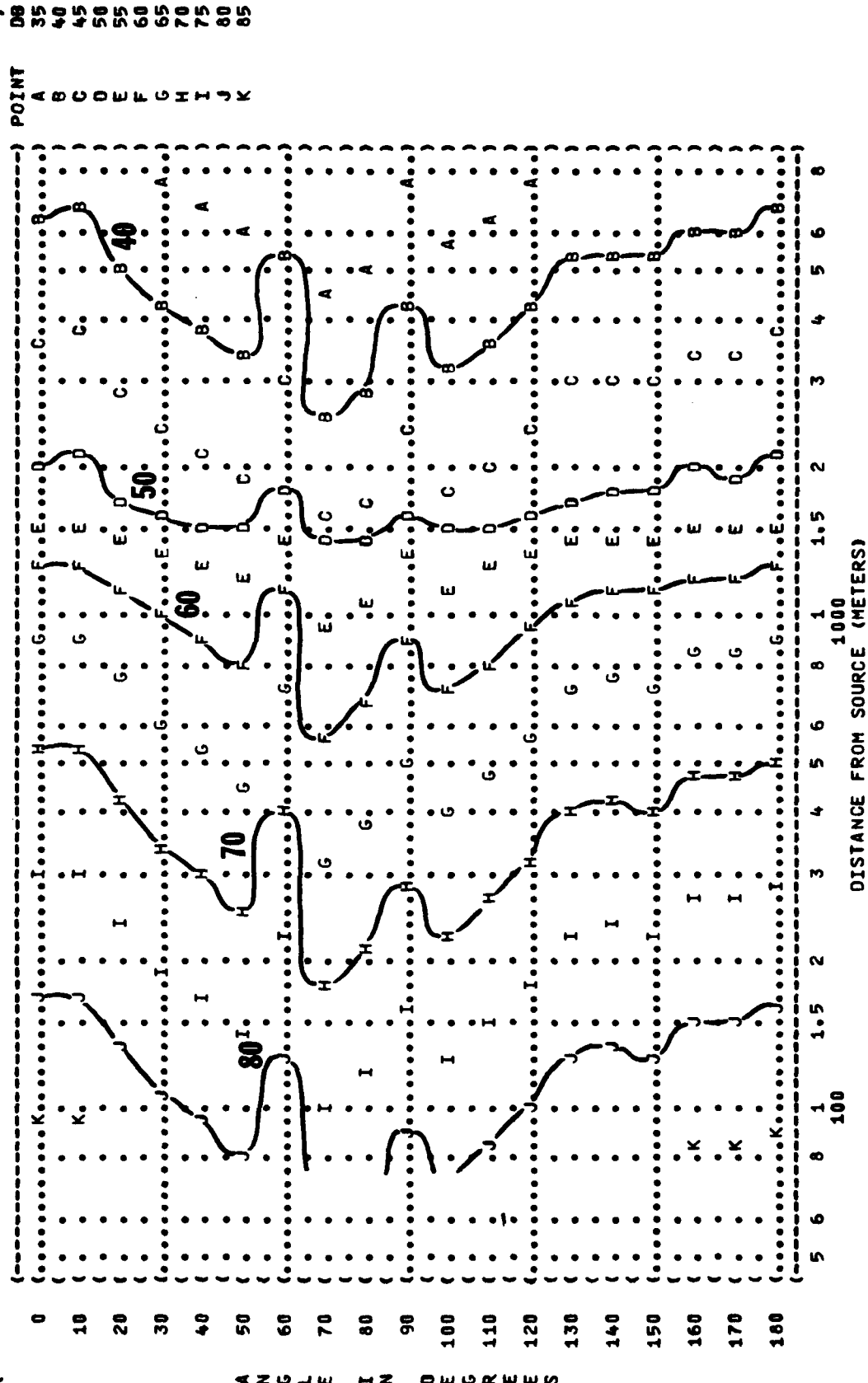


A N G L E I N D E G R E E S

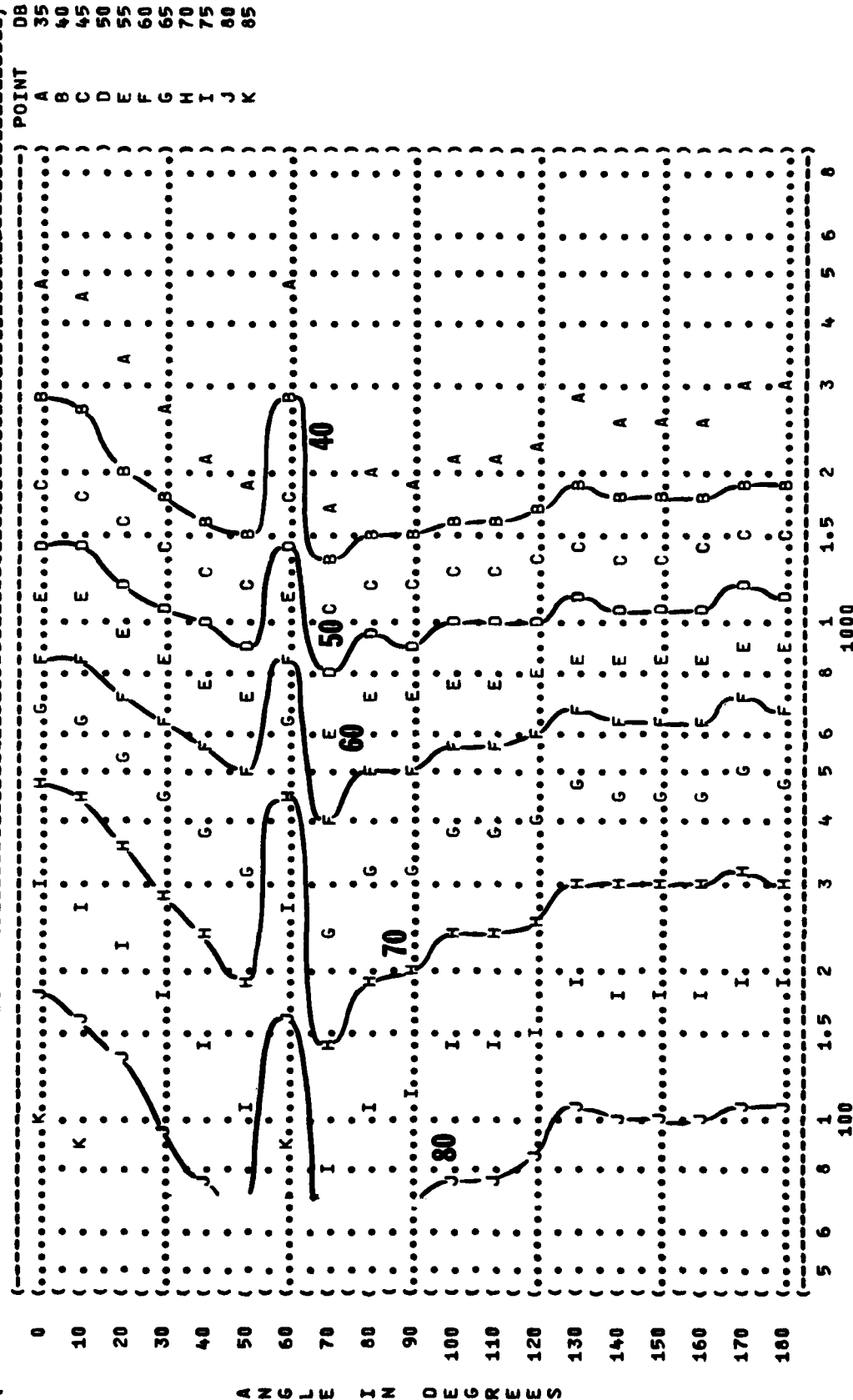
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(-----)
( ( FIGURE: SOUND PRESSURE LEVEL {SPL} ) IDENTIFICATION: )
( ( EQUAL LEVEL CONTOURS (DB) ) )
( ( 10 ) )
( ( 31.5 HZ OCTAVE BAND ) )
(-----)
( ( NOISE SOURCE/SUBJECT: ) METEOROLOGY: )
( ( F-16 AIRCRAFT IN THE ) TEMP = 15 C )
( ( AF32A-25 SUPPRESSOR ) SINGLE ENGINE ) BAR PRESS = .760 M HG )
( ( J85-21 ENGINE ) GROUND RUNUP (SUPPRESSED) ) REL HUMID = 70 % )
( ( FAR-FIELD NOISE ) ) )
(-----)
( ( PAGE 18 ) )
(-----)

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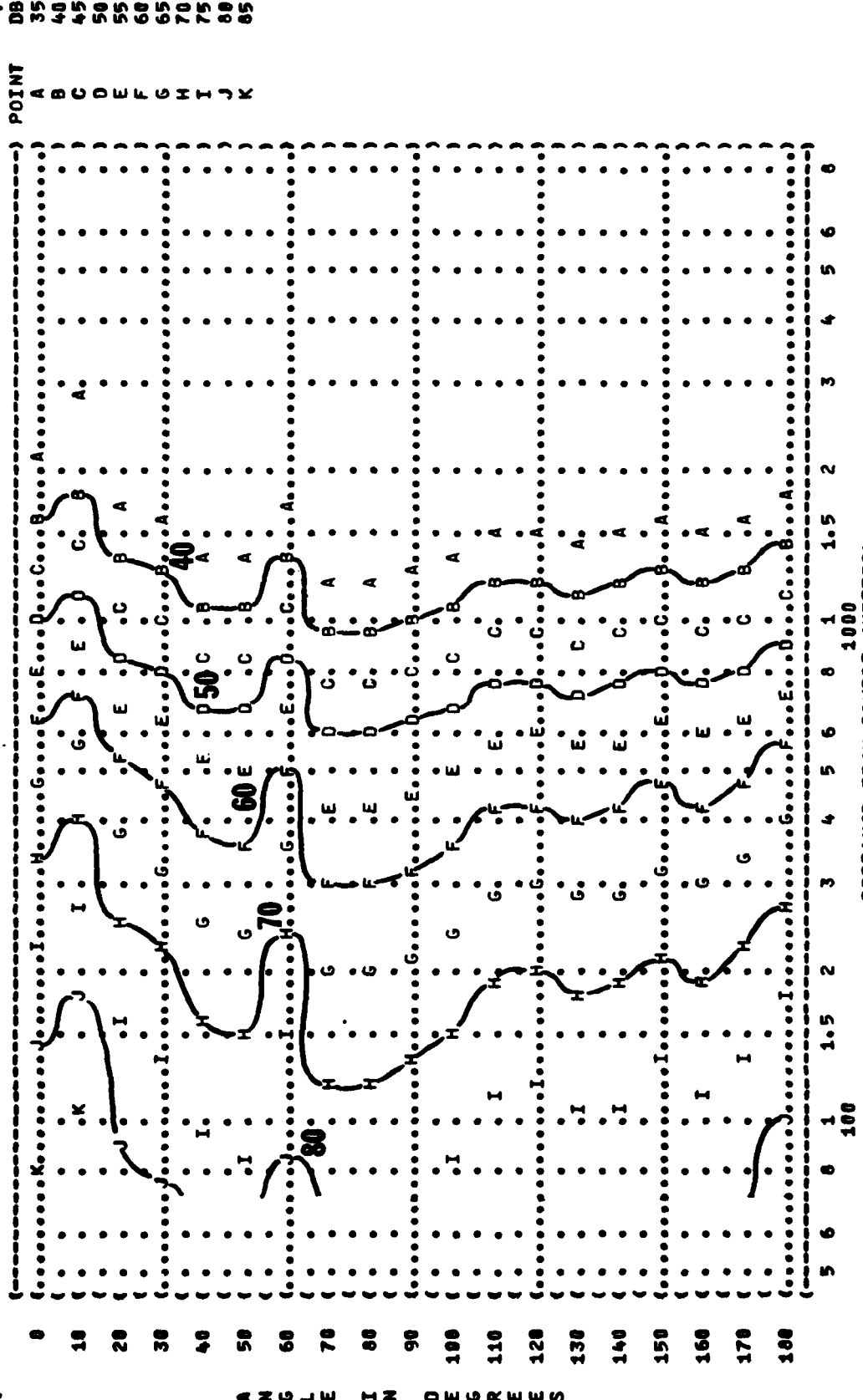


(FIGURE: SOUND PRESSURE LEVEL (SPL)
 (EQUAL LEVEL CONTOURS (DB)
 (10 63 HZ OCTAVE BAND
 () IDENTIFICATION:
 ()
 () OMEGA 1.4
 () TEST 79-738-001
 () RUN 02
 ()
 (NOISE SOURCE/SUBJECT:) METEOROLOGY:
 (F-16 AIRCRAFT IN THE) TEMP = 15 C
 (AF32A-25 SUPPRESSOR) BAR PRESS = .760 M HG
 (J85-21 ENGINE) GROUND RUNUP (SUPPRESSED)) REL HUMID = 70 %
 (FAR-FIELD NOISE)) PAGE 19
 ()

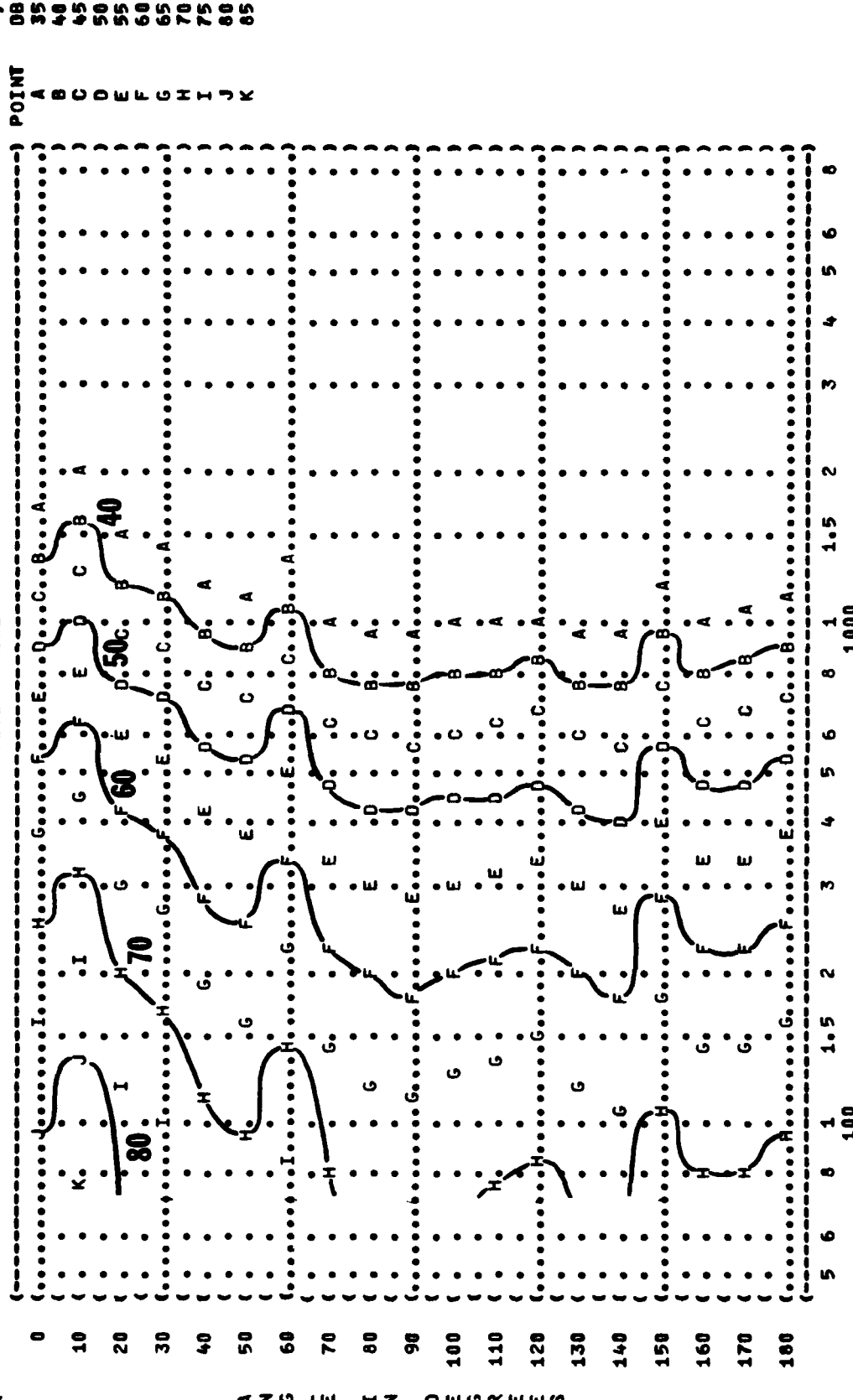


A N G L E I N D E G R E E S

(FIGURE: SOUND PRESSURE LEVEL (SPL)
 (10 EQUAL LEVEL CONTOURS (DB)
 (125 HZ OCTAVE BAND
 (NOISE SOURCE/SUBJECT: (OPERATION:
 (F-16 AIRCRAFT IN THE (88X RPM
 (AF32A-25 SUPPRESSOR (SINGLE ENGINE
 (J65-21 ENGINE (GROUND RUNUP (SUPPRESSED)
 (FAR-FIELD NOISE ()
 () METEOROLOGY:
 () TEMP = 15 C
 () BAR PRESS = .760 M HG
 () REL HUMID = 70 %
 () PAGE 20
 () IDENTIFICATION:
 () OMEGA 1.4
 () TEST 79-738-001
 () RUN 02



) IDENTIFICATIONS)
))
) OMEGA 1.4
) TEST 79-738-001
) RUN 02
)
) NOISE SOURCE/SUBJECT:) METEOROLOGY:
) F-16 AIRCRAFT IN THE) TEMP = 15 C
) AF32A-25 SUPPRESSOR) BAR PRESS = .760 H HG
) J85-21 ENGINE) GROUND RUNUP (SUPPRESSED)) REL HUMID = 70 %
) FAR-FIELD NOISE))
) PAGE 21



DISTANCE FROM SOURCE (METERS)

A N G L E I N D E G R E E S

(FIGURE: SOUND PRESSURE LEVEL (SPL)
 (10 EQUAL LEVEL CONTOURS (DB)
 (500 HZ OCTAVE BAND
 (NOISE SOURCE/SUBJECT: (OPERATION:
 (F-16 AIRCRAFT IN THE (80% RPM
 (AF32A-25 SUPPRESSOR (SINGLE ENGINE
 (J85-21 ENGINE (GROUND RUNUP (SUPPRESSED)
 (FAR-FIELD NOISE ()
 () IDENTIFICATION:
 () OMEGA 1.4
 () TEST 79-738-001
 () RUN 02
 () METEOROLOGY:
 () TEMP = 15 C
 () BAR PRESS = .760 M HG
 () REL HUMID = 70 %
 () 22 MAR 79
 () PAGE 22

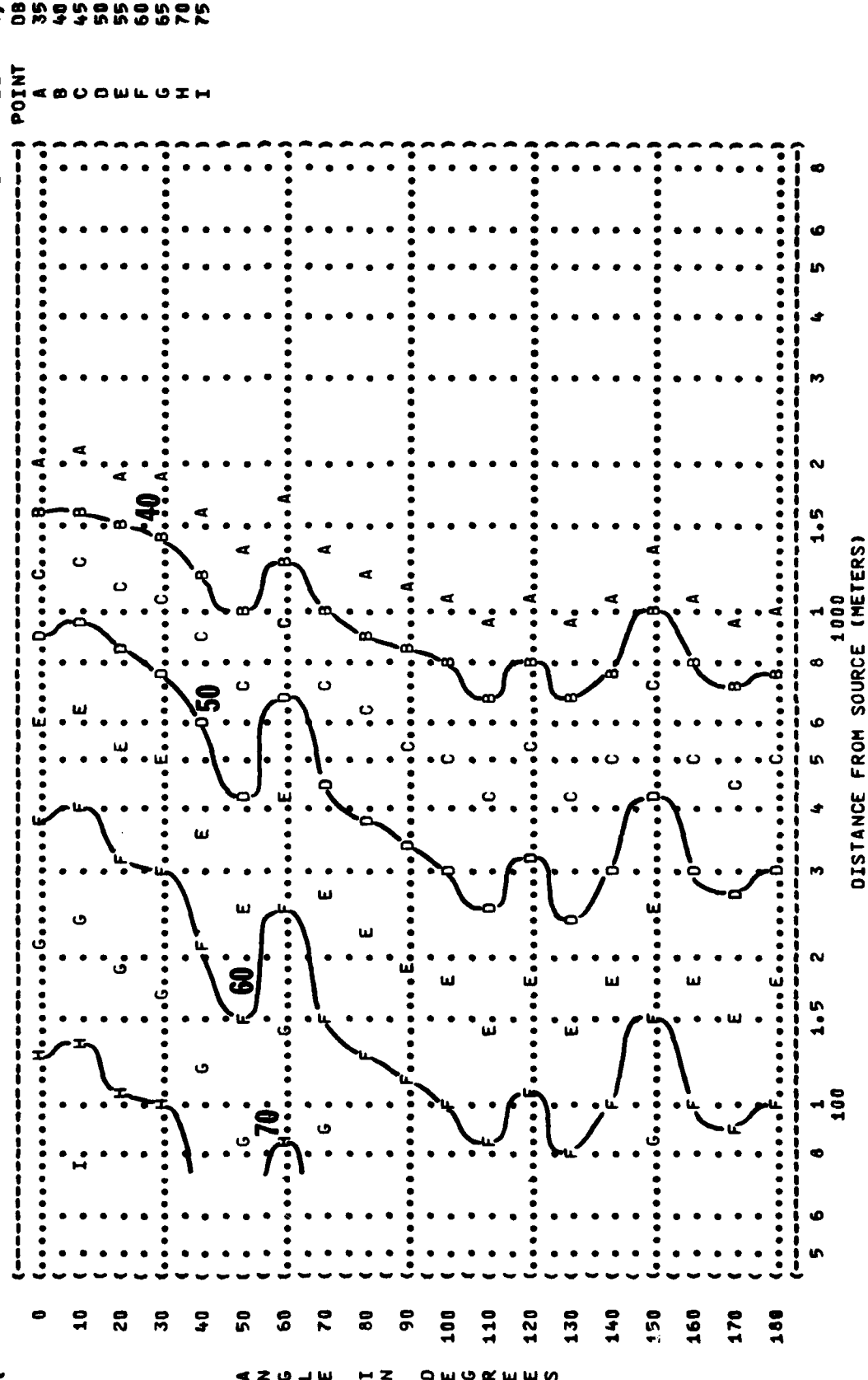


FIGURE 10
SOUND PRESSURE LEVEL (SPL)
EQUAL LEVEL CONTOURS (DB)
1000 HZ OCTAVE BAND

IDENTIFICATION:

OMEGA 1.4

TEST 79-738-001

RUN 02

3H M 092.

PAGE 23

OPERATIONS

(80% RPM

SINGLE ENGINE

GROUND RUNUP (

—

SUBJECT:

THE IN THE

PRESSOR

100

ESI



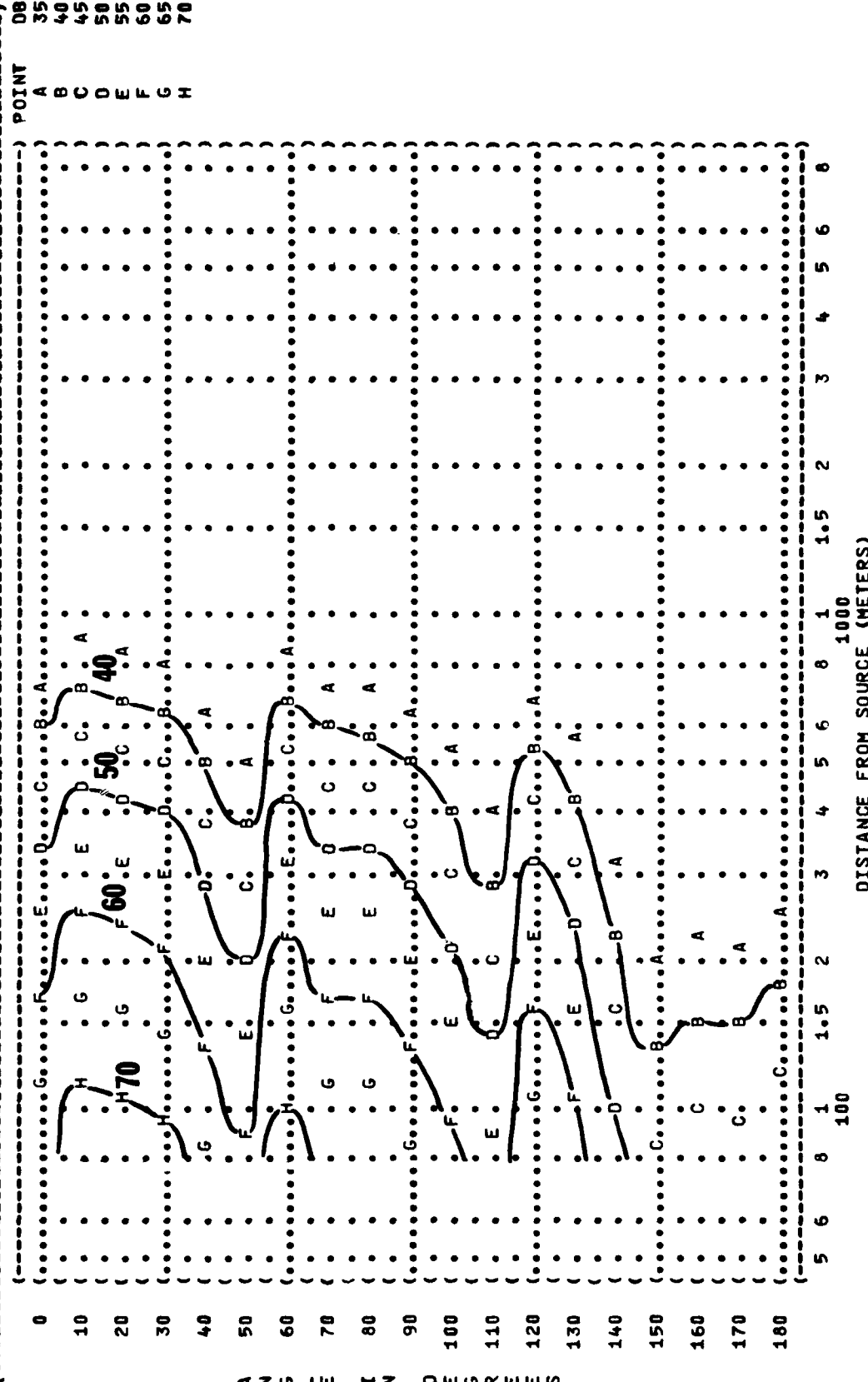
DISTANCE FROM SOURCE (METERS)

OMEGA 1.4
TEST 79-738-001
RUN 02
22 MAR 79
PAGE 24



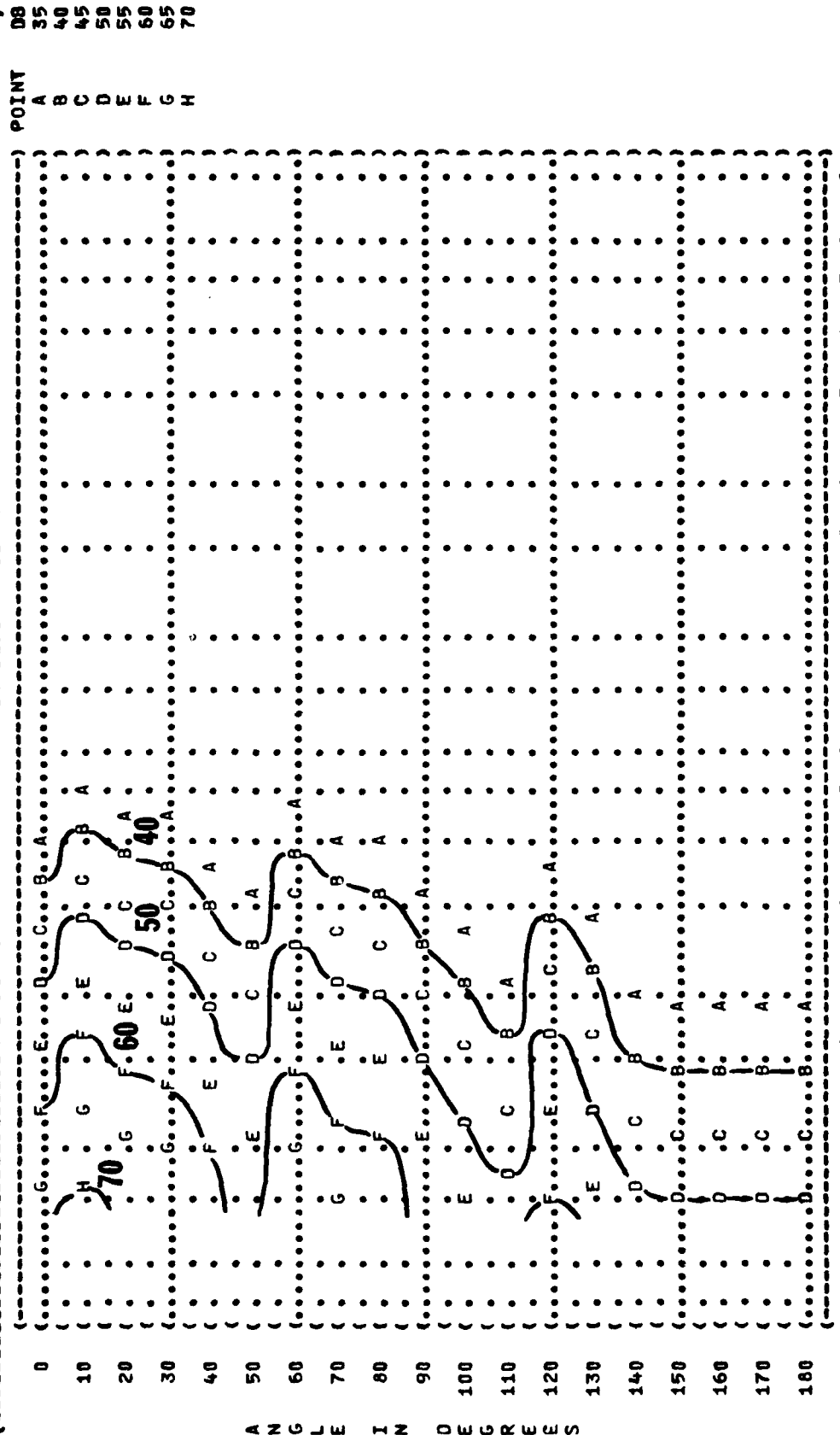
1000

(FIGURE: SOUND PRESSURE LEVEL (SPL)
 (10 EQUAL LEVEL CONTOURS (DB)
 (4000 HZ OCTAVE BAND
 (NOISE SOURCE/SUBJECT: (OPERATION:
 (F-16 AIRCRAFT IN THE (80% RPM
 (AF32A-25 SUPPRESSOR (SINGLE ENGINE
 (J85-21 ENGINE (GROUND RUNUP (SUPPRESSED)
 (FAR-FIELD NOISE ()
 () METEOROLOGY:
 () TEMP = 15 C
 () BAR PRESS = .760 H MG
 () REL HUMID = 70 %
 () PAGE 25
 () IDENTIFICATION:
 () OMEGA 1.4
 () TEST 79-738-001
 () RUN 02
 () 22 MAR 79



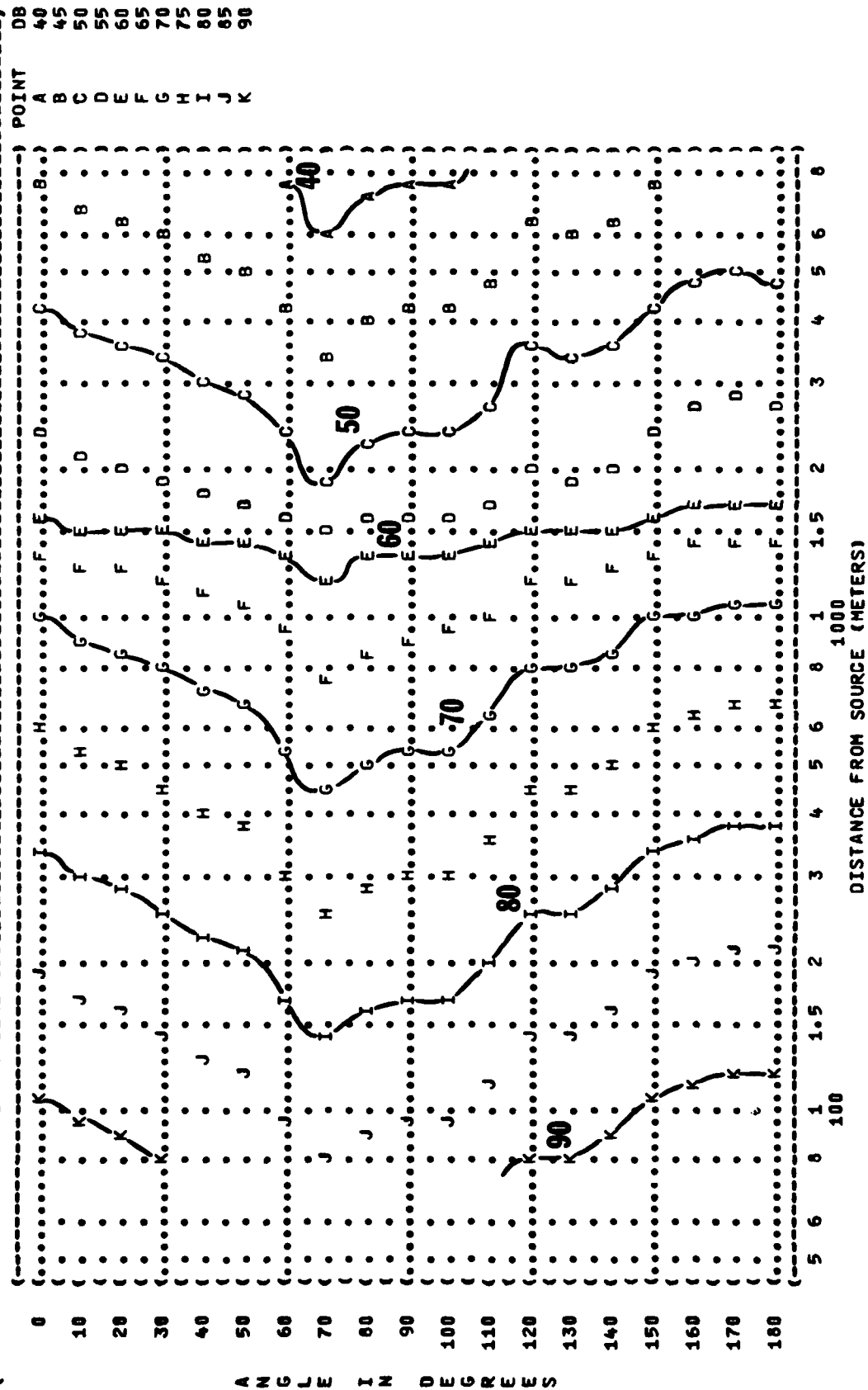
A N G L E I N D E G R E E S

(FIGURE: SOUND PRESSURE LEVEL (SPL))
 (EQUAL LEVEL CONTOURS (DB))
 (10 8000 HZ OCTAVE BAND)
 (NOISE SOURCE/SUBJECT:)
 (F-16 AIRCRAFT IN THE)
 (AF32A-25 SUPPRESSOR)
 (J85-21 ENGINE)
 (FAR-FIELD NOISE)
 (OPERATION:)
 (80% RPM)
 (SINGLE ENGINE)
 (GROUND RUNUP (SUPPRESSED))
 (METEOROLOGY:)
 (TEMP = 15 C)
 (BAR PRESS = .760 M HG)
 (REL HUMID = 70 %)
 (IDENTIFICATION:)
 (OMEGA 1.4)
 (TEST 79-738-001)
 (RUN 02)
 (22 MAR 79)
 (PAGE 26)

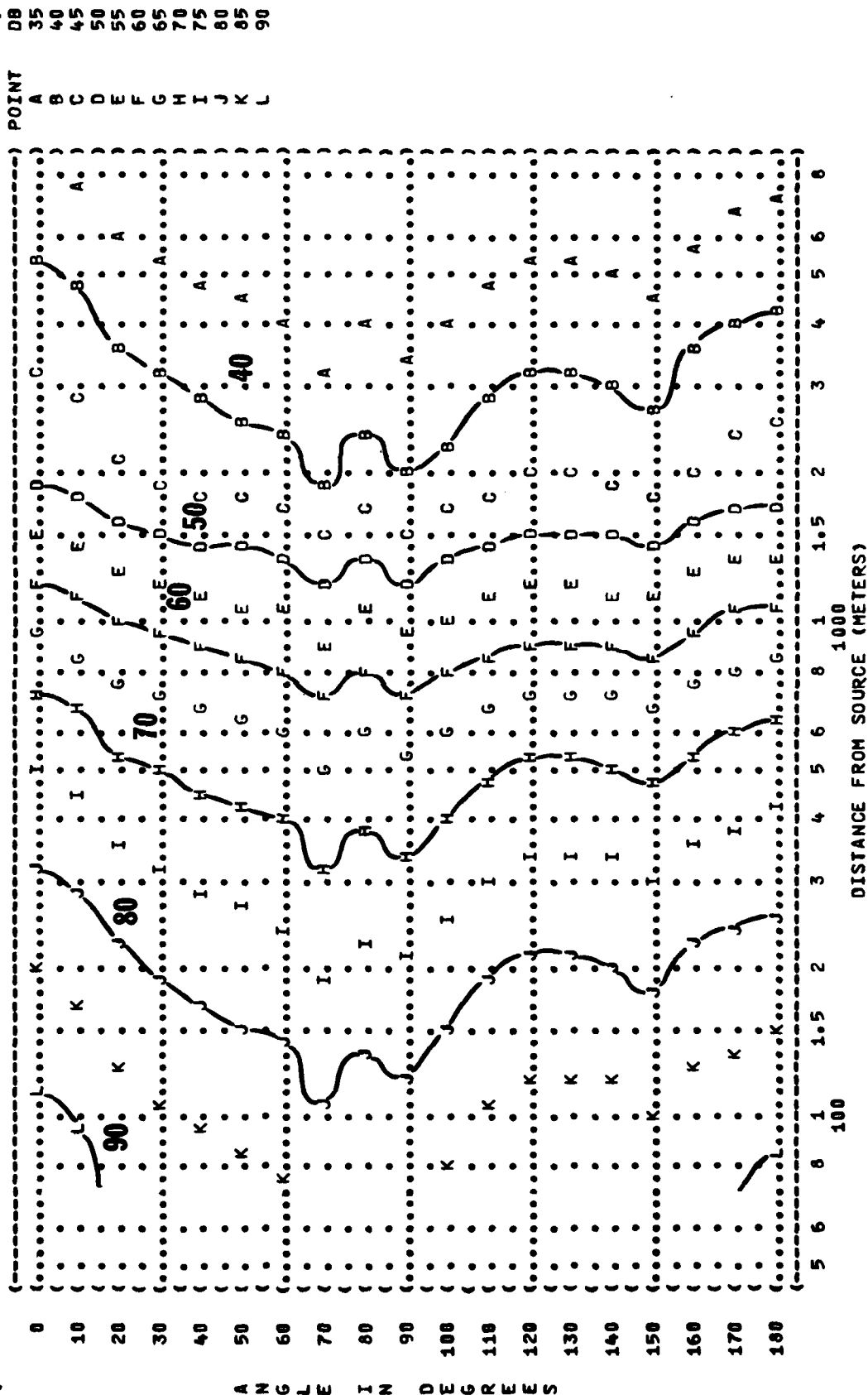


(POINT DB)
 (A 35)
 (B 40)
 (C 45)
 (D 50)
 (E 55)
 (F 60)
 (G 65)
 (H 70)

```
(-----)
( FIGURE: SOUND PRESSURE LEVEL {SPL} ) IDENTIFICATION: )
( EQUAL LEVEL CONTOURS (DB) ) )
( 10 ) OMEGA 1.4 )
( 31.5 HZ OCTAVE BAND ) TEST 79-738-001 )
( NOISE SOURCE/SUBJECT: ) METEOROLOGY: ) RUN 03 )
( F-16 AIRCRAFT IN THE ) TEMP = 15 C )
( AF32A-25 SUPPRESSOR ) BAR PRESS = .760 M HG )
( J85-21 ENGINE ) GROUND RUNUP (SUPPRESSED) ) REL HUMID = 70 % )
( FAR-FIELD NOISE ) PAGE 18 )
(-----)
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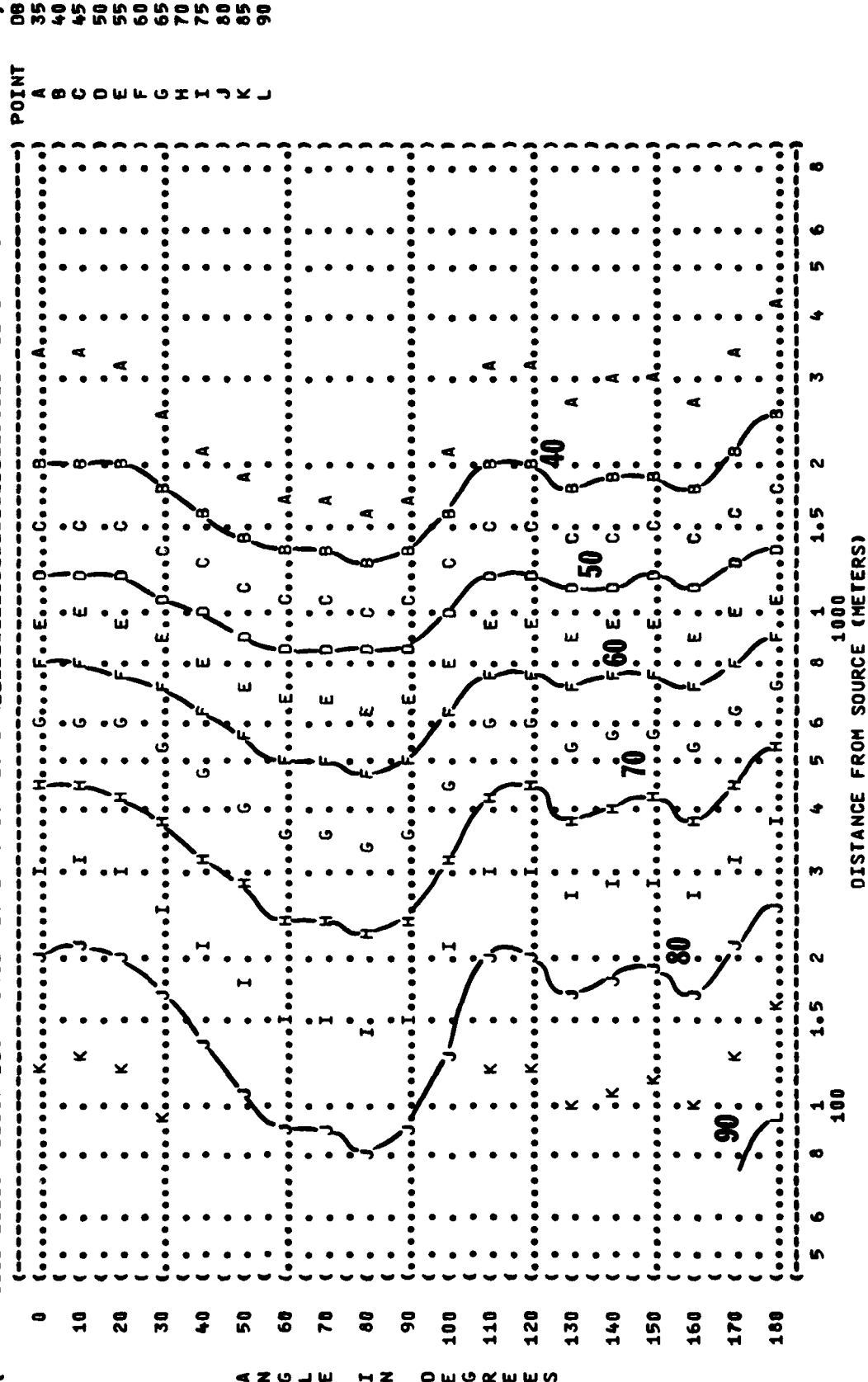
(FIGURE: SOUND PRESSURE LEVEL (SPL)
 (EQUAL LEVEL CONTOURS (DB)
 (10 63 HZ OCTAVE BAND
 (NOISE SOURCE/SUBJECT:
 (F-16 AIRCRAFT IN THE
 (AF32A-25 SUPPRESSOR
 (J05-21 ENGINE
 (FAR-FIELD NOISE
 (OPERATIONS:
 (MILITARY POWER (91% RPM)
 (SINGLE ENGINE
 (GROUND RUNUP (SUPPRESSED)
 (METEOROLOGY:
 (TEMP = 15 C
 (BAR PRESS = .760 M HG
 (REL HUMID = 70 %
 (IDENTIFICATION:
 (OMEGA 1.4
 (TEST 79-730-001
 (RUN 03
 (22 MAR 79
 (PAGE 19



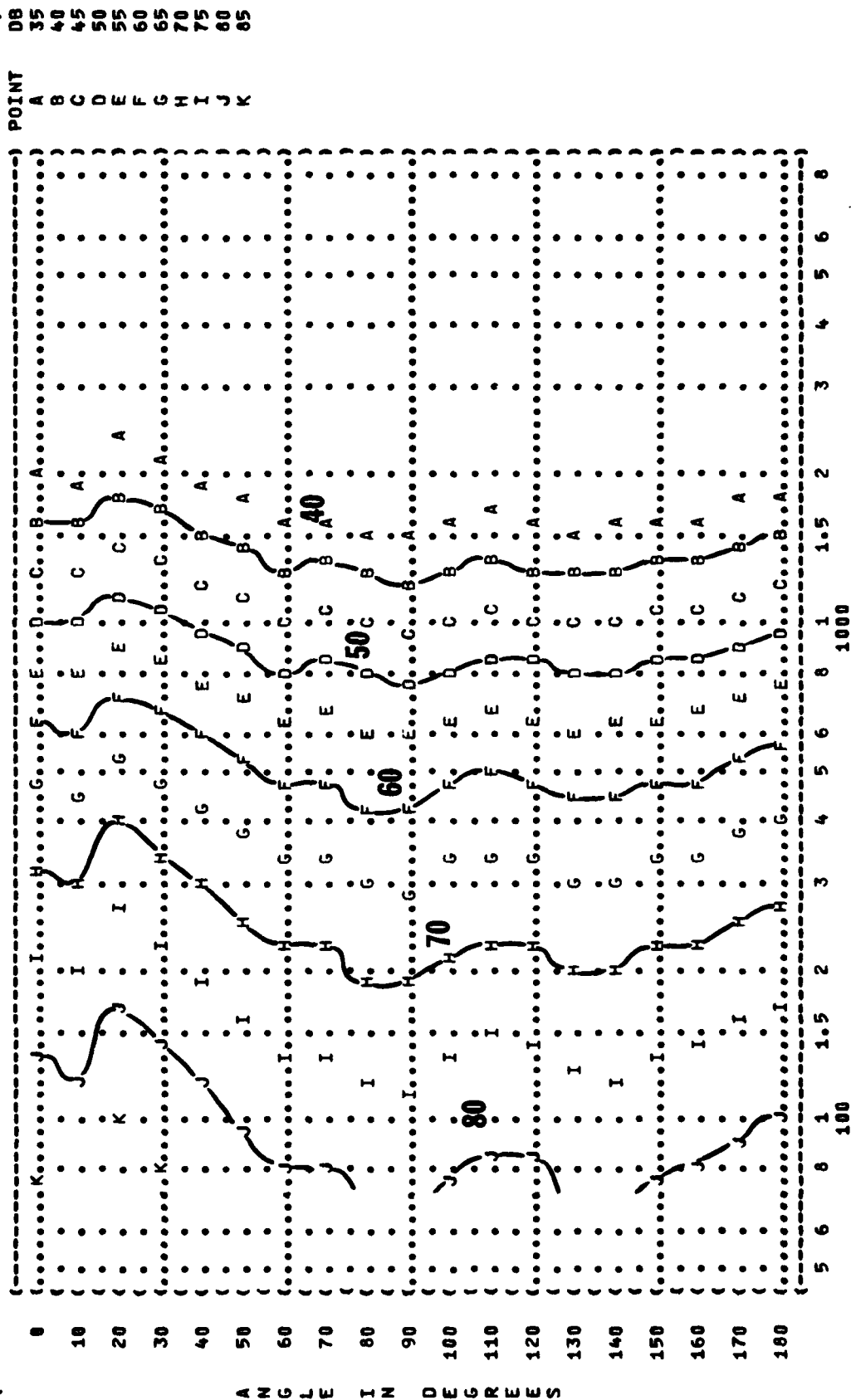
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(-----)
( FIGURE: SOUND PRESSURE LEVEL {SPL} ) IDENTIFICATION: )
( EQUAL LEVEL CONTOURS (DB) ) )
( 10 ) OMEGA 1.4 )
( 125 HZ OCTAVE BAND ) )
(-----)
( NOISE SOURCE/SUBJECT: ) METEOROLOGY: )
( F-16 AIRCRAFT IN THE ) ) TEMP = 15 C )
( AF32A-25 SUPPRESSOR ) ) BAR PRESS = .760 M HG )
( J85-21 ENGINE ) ) GROUND RUNUP (SUPPRESSED) ) REL HUMID = 70 % )
( FAR-FIELD NOISE ) ) ) PAGE 20 )
(-----)

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(FIGURE: SOUND PRESSURE LEVEL (SPL)
 (EQUAL LEVEL CONTOURS (DB)
 (10 250 HZ OCTAVE BAND
 (NOISE SOURCE/SUBJECT: (OPERATION:
 (F-16 AIRCRAFT IN THE (MILITARY POWER (91% RPM)
 (AF32A-25 SUPPRESSOR (SINGLE ENGINE
 (J85-21 ENGINE (GROUND RUNUP (SUPPRESSED)
 (FAR-FIELD NOISE ()
 () IDENTIFICATION:
 () OMEGA 1.4
 () TEST 79-738-001
 () RUN 03
 () TEMP = 15 C
 () BAR PRESS = .760 M HG
 () REL HUMID = 70 %
 () PAGE 21

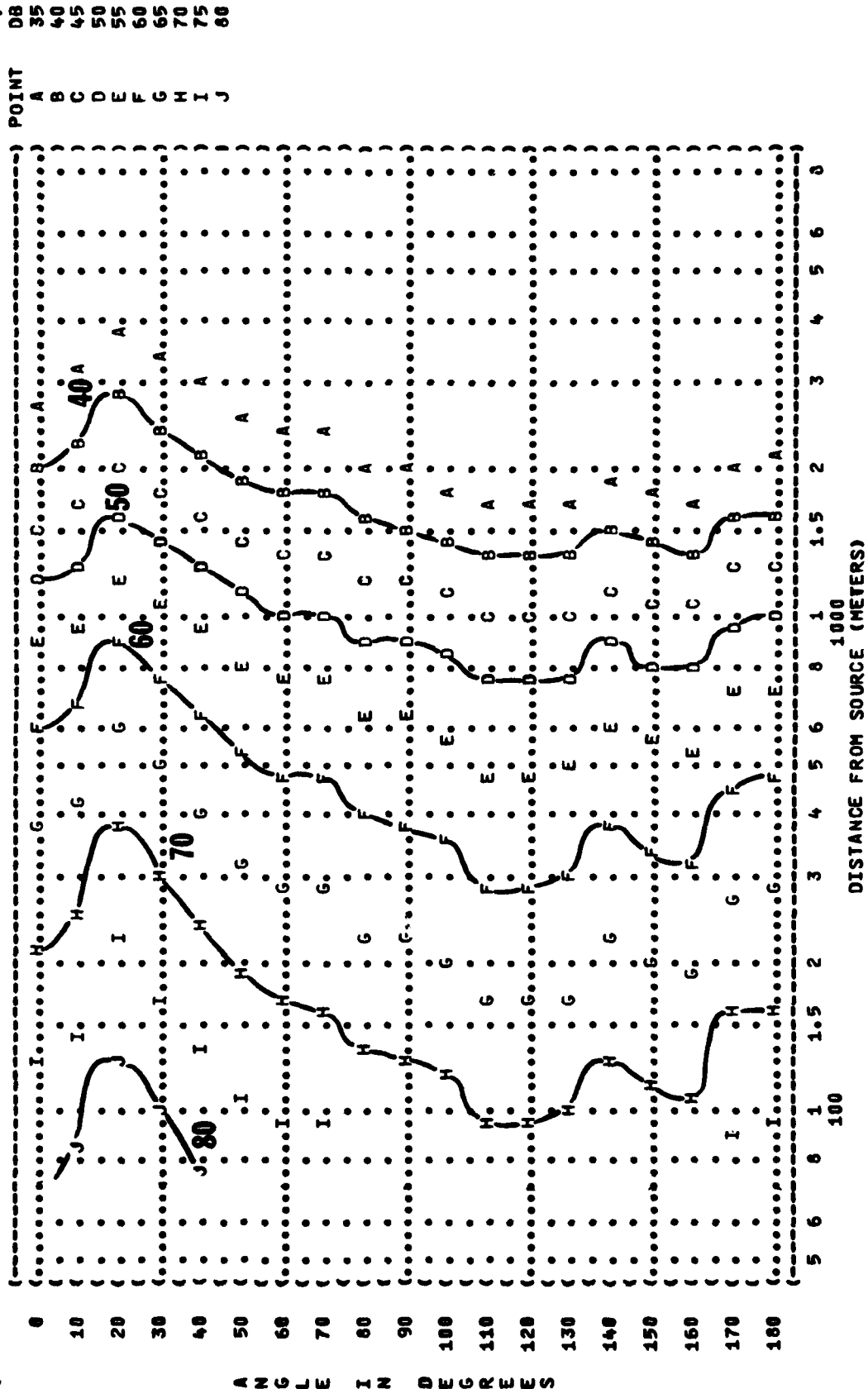


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 E I
 N D
 E E
 R G
 E E
 S

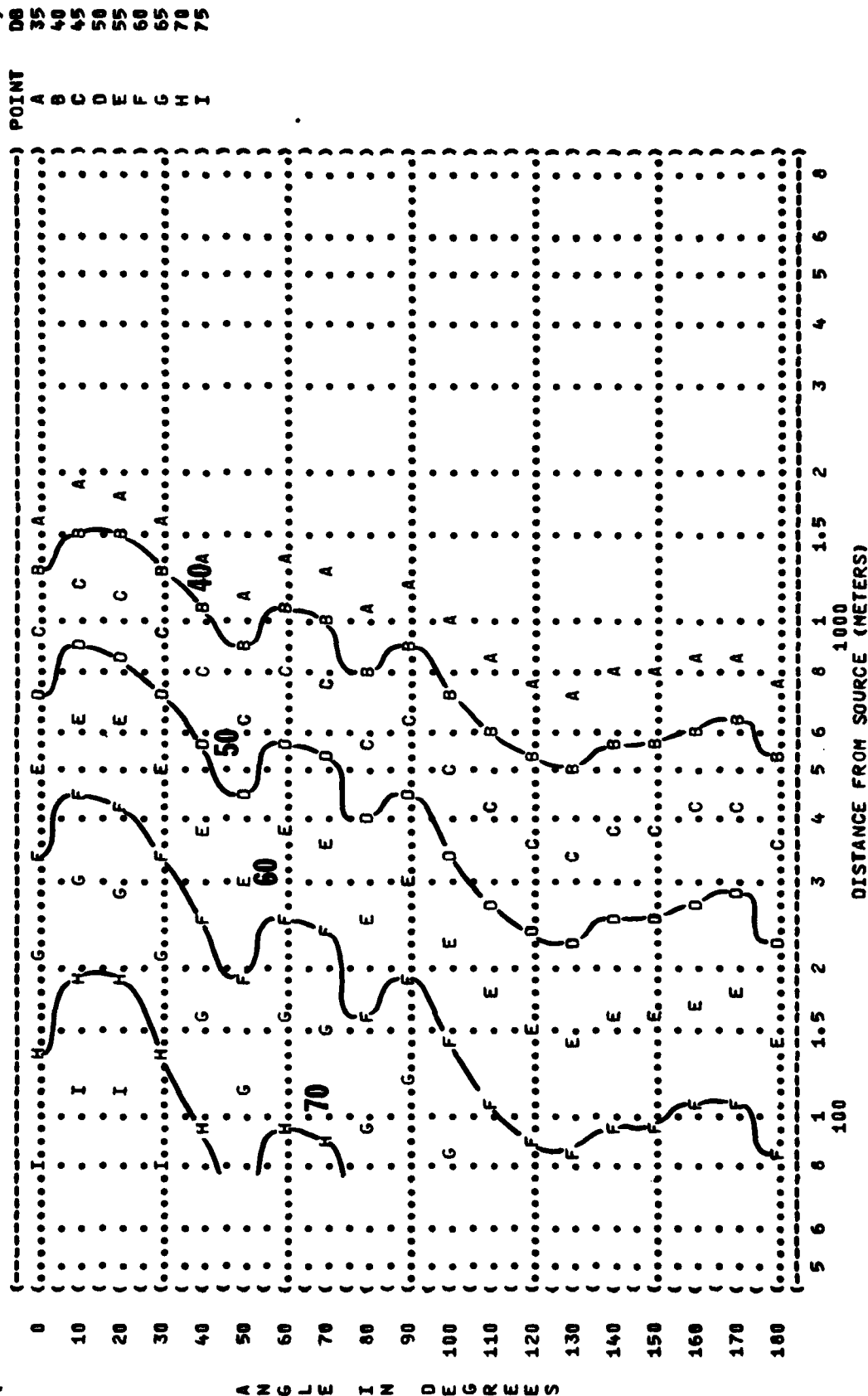
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( FIGURE: SOUND PRESSURE LEVEL (SPL)
( EQUAL LEVEL CONTOURS (DB)
( 10 500 HZ OCTAVE BAND
( NOISE SOURCE/SUBJECT:
( F-16 AIRCRAFT IN THE
( AF32A-25 SUPPRESSOR
( J05-21 ENGINE
( FAR-FIELD NOISE
( OPERATION:
( MILITARY POWER (91% RPM)
( SINGLE ENGINE
( GROUND RUNUP (SUPPRESSED)
( FAR-FIELD NOISE
( METEOROLOGY:
( TEMP = 15 C
( BAR PRESS = .760 H MG
( REL HUMID = 70 %
( PAGE 22
( IDENTIFICATION:
( OMEGA 1.4
( TEST 79-738-001
( RUN 03
( 22 MAR 79
(

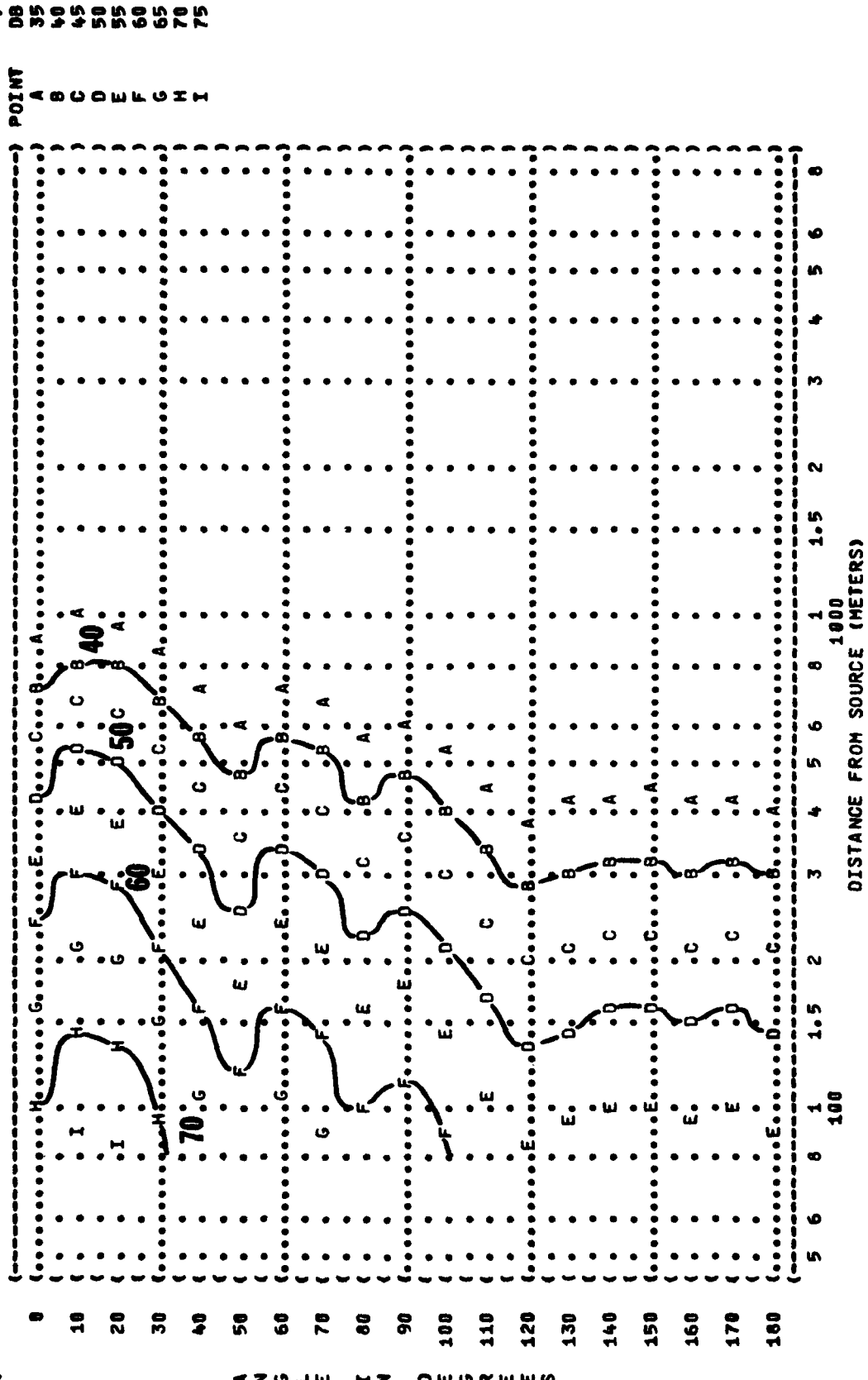
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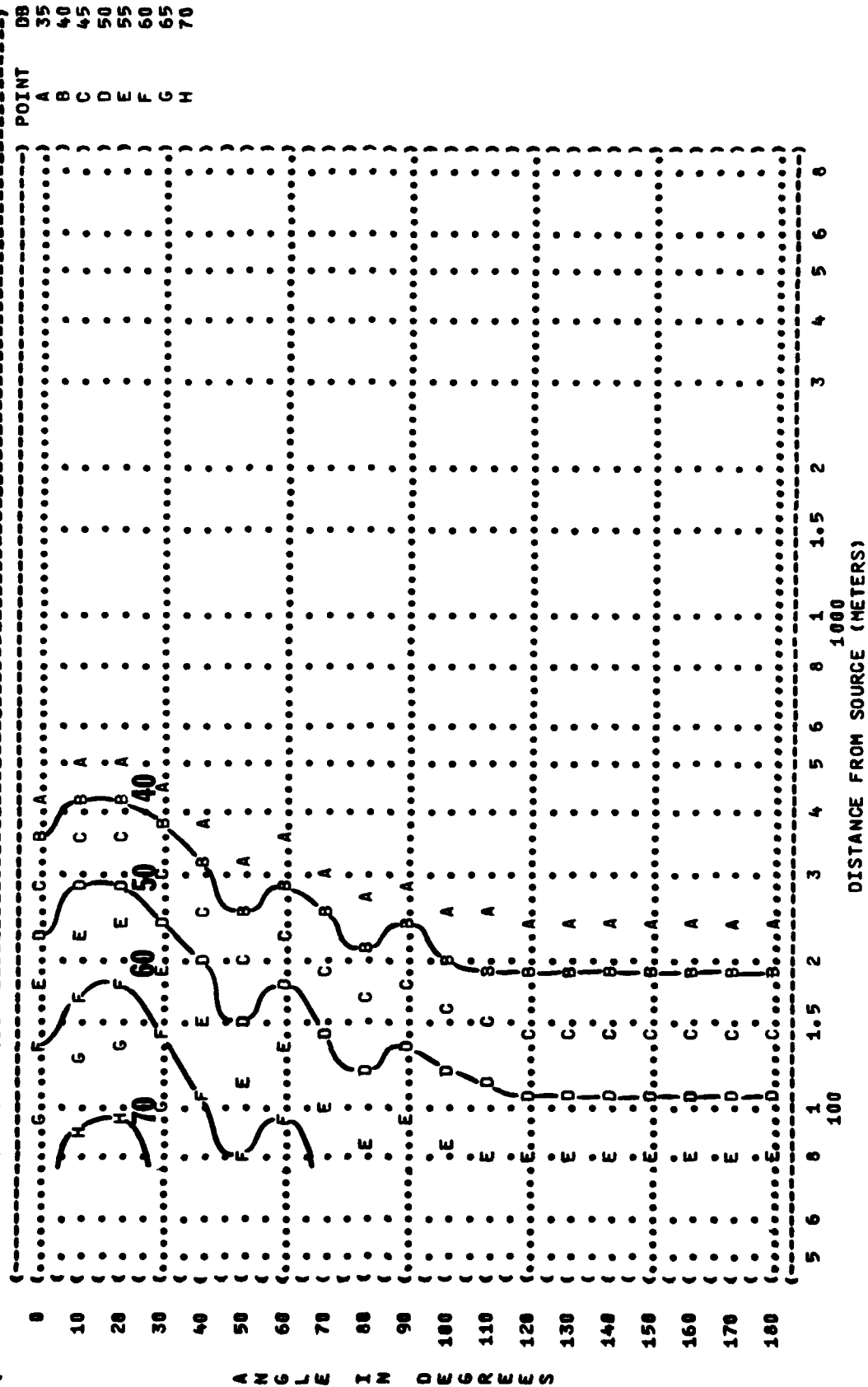
(FIGURE: SOUND PRESSURE LEVEL (SPL)
 (EQUAL LEVEL CONTOURS (DB)
 (10 2000 HZ OCTAVE BAND
 (NOISE SOURCE/SUBJECT: (OPERATION:) METEOROLOGY:
 (F-16 AIRCRAFT IN THE (MILITARY POWER (91% RPM)) TEMP = 15 C
 (AF32A-25 SUPPRESSOR (SINGLE ENGINE) BAR PRESS = .760 M HG
 (J85-21 ENGINE (GROUND RUNUP (SUPPRESSED)) REL HUMID = 70 %
 (FAR-FIELD NOISE ()) PAGE 24)



(FIGURE: SOUND PRESSURE LEVEL (SPL)
 (10 EQUAL LEVEL CONTOURS (DB)
 (4000 HZ OCTAVE BAND
 (NOISE SOURCE/SUBJECT: (OPERATION:) METEOROLOGY:)
 (F-16 AIRCRAFT IN THE (MILITARY POWER (91% RPM)) TEMP = 15 C
 (AF32A-25 SUPPRESSOR (SINGLE ENGINE) BAR PRESS = .760 H HG
 (J85-21 ENGINE (GROUND RUNUP (SUPPRESSED)) REL HUMID = 70 %
 (FAR-FIELD NOISE ()) PAGE 25



(FIGURE: SOUND PRESSURE LEVEL (SPL)
 (EQUAL LEVEL CONTOURS (DB)
 (10 0000 HZ OCTAVE BAND
 (NOISE SOURCE/SUBJECT:
 (F-16 AIRCRAFT IN THE
 (AF32A-25 SUPPRESSOR
 (J85-21 ENGINE
 (FAR-FIELD NOISE
 (OPERATION:
 (MILITARY POWER (91X RPM)
 (SINGLE ENGINE
 (GROUND RUNUP (SUPPRESSED)
 (METEOROLOGY:
 (TEMP = 15 C
 (BAR PRESS = .760 H HG
 (REL HUMID = 70 %
 (IDENTIFICATIONS:
 (OMEGA 1.4
 (TEST 79-730-001
 (RUN 03
 (22 MAR 79
 (PAGE 26



((FIGURE: SOUND PRESSURE LEVEL (SPL)
 ((10 EQUAL LEVEL CONTOURS (DB)
 ((31.5 HZ OCTAVE BAND
 ((NOISE SOURCE/SUBJECT: (OPERATION:
 ((F-16 AIRCRAFT IN THE (AFTERBURNER POWER
 ((AF32A-25 SUPPRESSOR (SINGLE ENGINE
 ((J85-21 ENGINE (GROUND RUNUP (SUPPRESSED)
 ((FAR-FIELD NOISE ()
 (() METEOROLOGY:
 (() TEMP = 15 C
 (() BAR PRESS = .760 M HG
 (() REL HUMID = 70 %
 (() IDENTIFICATION:
 (() OMEGA 1.4
 (() TEST 79-738-001
 (() RUN 04
 (() 22 MAR 79
 (() PAGE 18

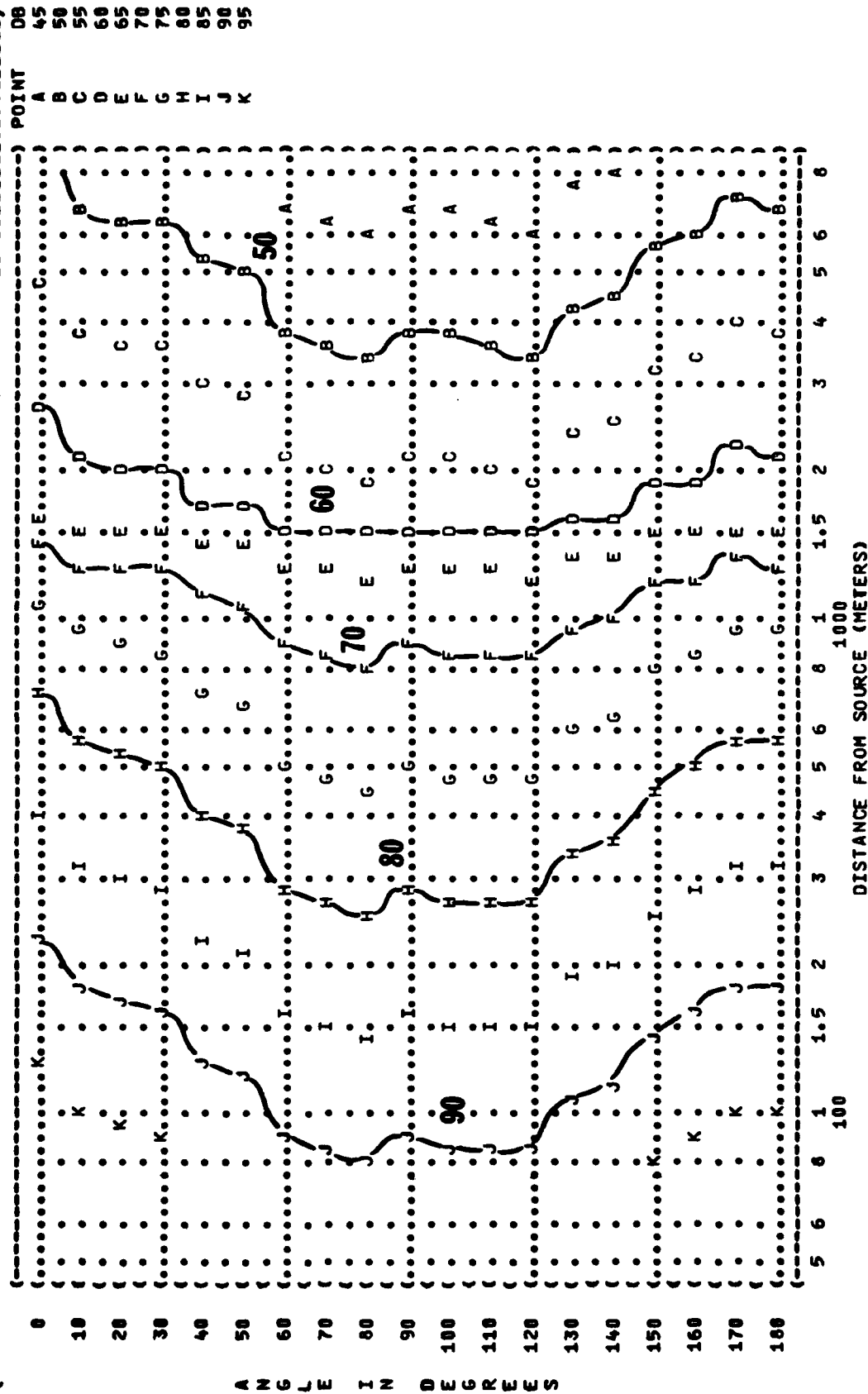


FIGURE: SOUND PRESSURE LEVEL (SPL)
 EQUAL LEVEL CONTOURS (DB)
 63 HZ OCTAVE BAND

IDENTIFICATION:
 OMEGA 1.4
 TEST 79-738-881
 RUN 04

NOISE SOURCE/SUBJECT:
 OPERATION:
 F-16 AIRCRAFT IN THE
 AFTERBURNER POWER
 AF32A-25 SUPPRESSOR
 SINGLE ENGINE
 J85-21 ENGINE
 GROUND RUNUP (SUPPRESSED)
 FAR-FIELD NOISE

METEOLOGY:
 TEMP = 15 C
 BAR PRESS = .760 M HG
 REL HUMID = 70 %

PAGE 19

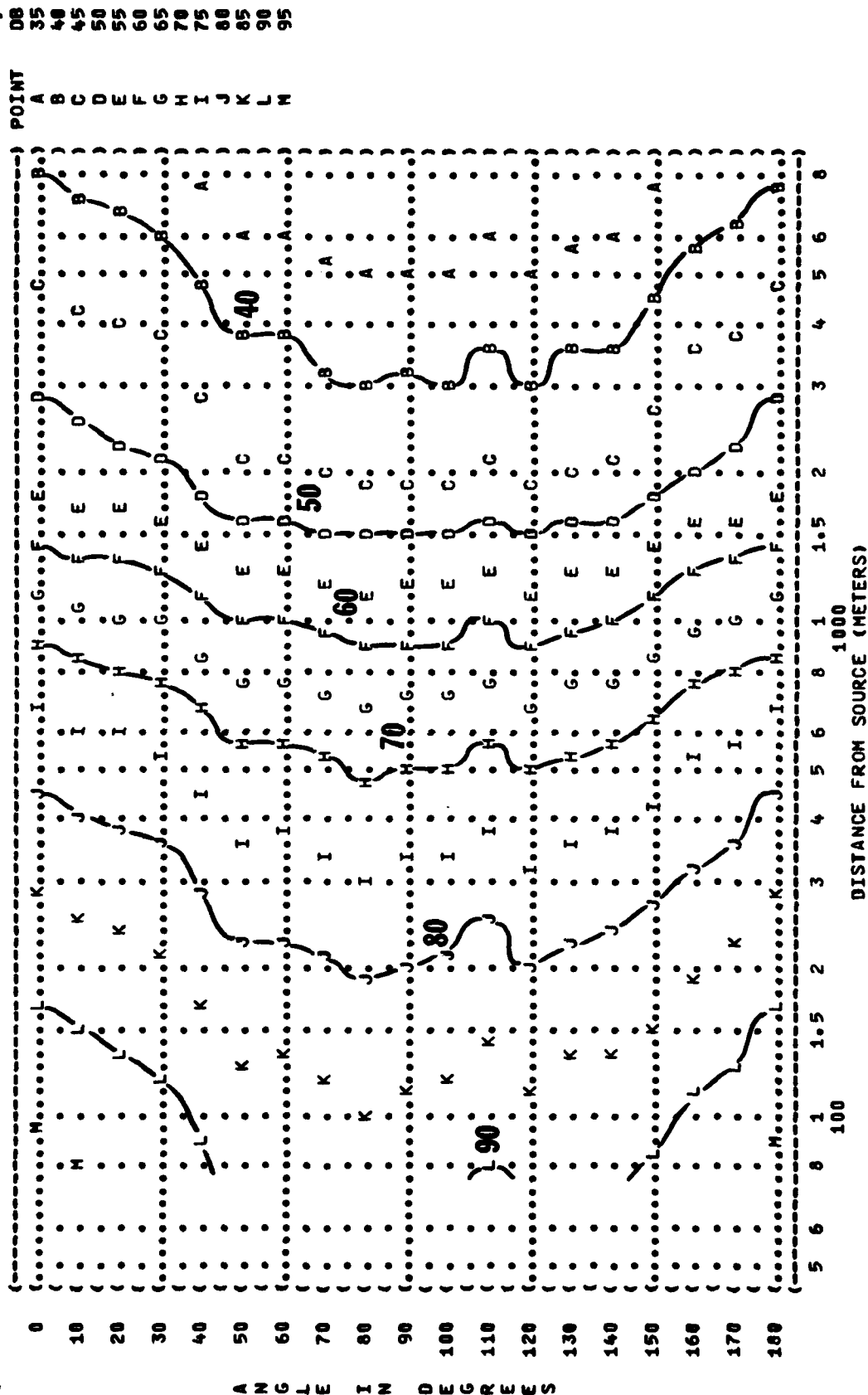


FIGURE 1 SOUND PRESSURE LEVEL (SPL)
EQUAL LEVEL CONTOURS (DB)
250 HZ OCTAVE BAND

10

NOISE SOURCE/SUBJECT: OPERATION:
F-16 AIRCRAFT IN THE AFTERBURNER POWER
AF32A-25 SUPPRESSOR SINGLE ENGINE
J85-21 ENGINE GROUND RUNUP (SUPPRESSED)
FAR-FIELD NOISE

METEOROLOGY:
TEMP = 15 C
BAR PRESS = .760 M HG
REL HUMID = 70 %

IDENTIFICATION:
OMEGA 1.4
TEST 79-738-001
RUN 04
22 MAR 79
PAGE 21

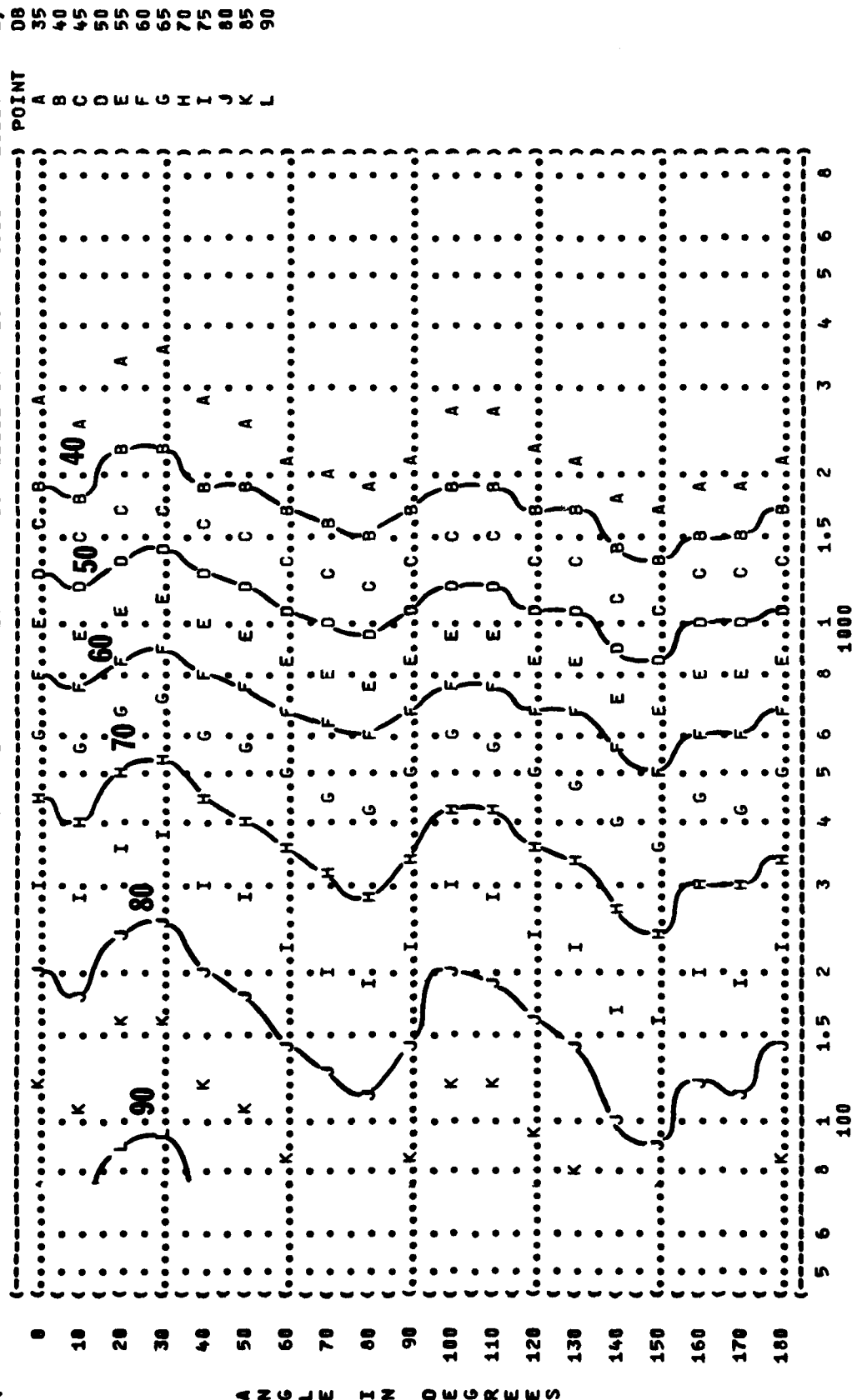


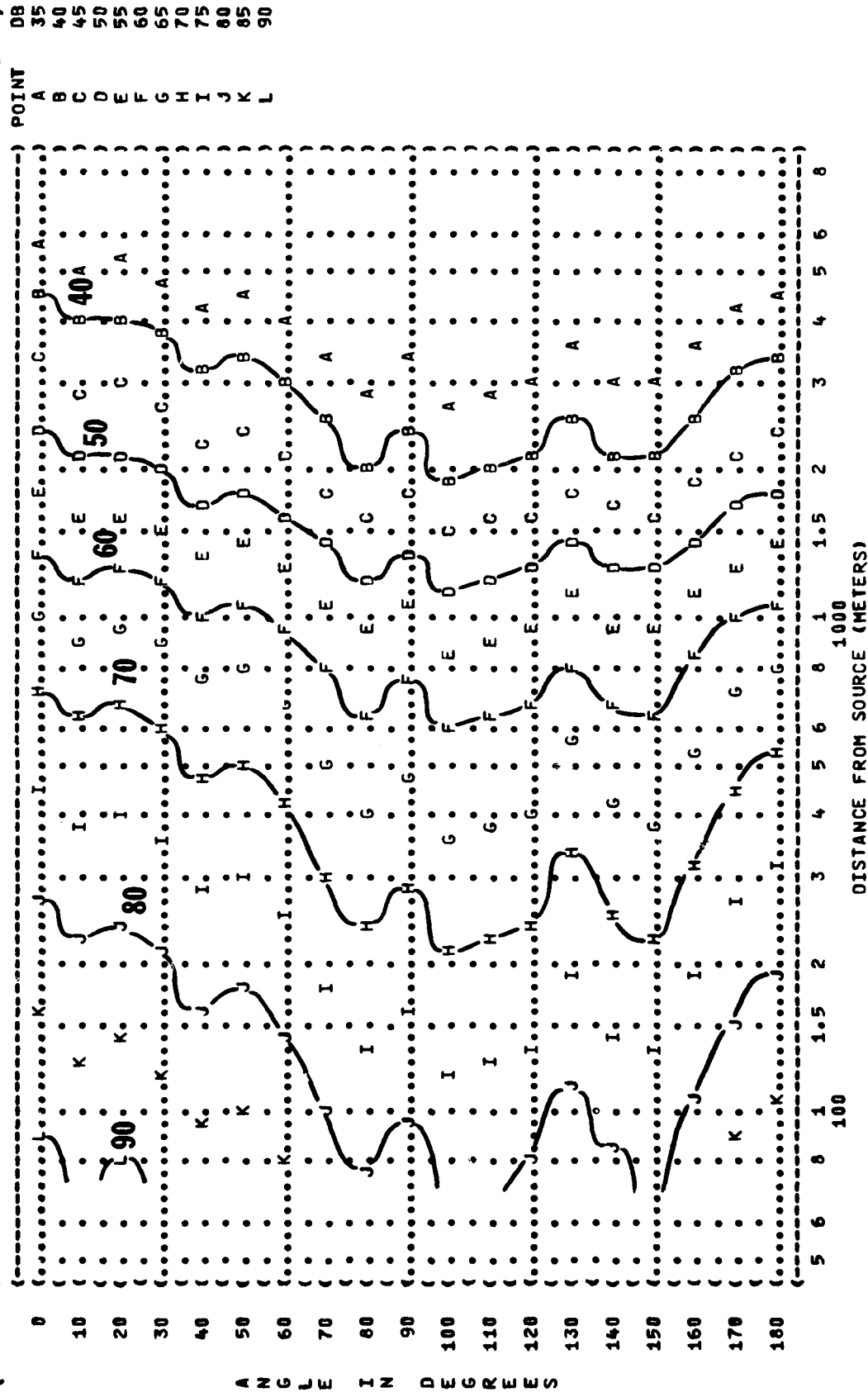
FIGURE 1 SOUND PRESSURE LEVEL (SPL)
EQUAL LEVEL CONTOURS (DB)
500 HZ OCTAVE BAND

IDENTIFICATION: OMEGA 1.4
TEST 79-738-001
RUN 04
22 MAR 79
PAGE 22

METEOROLOGY:
TEMP = 15 C
BAR PRESS = .760 M HG
REL HUMID = 70 %

OPERATION:
AFTERBURNER POWER
SINGLE ENGINE
GROUND RUNUP (SUPPRESSED)

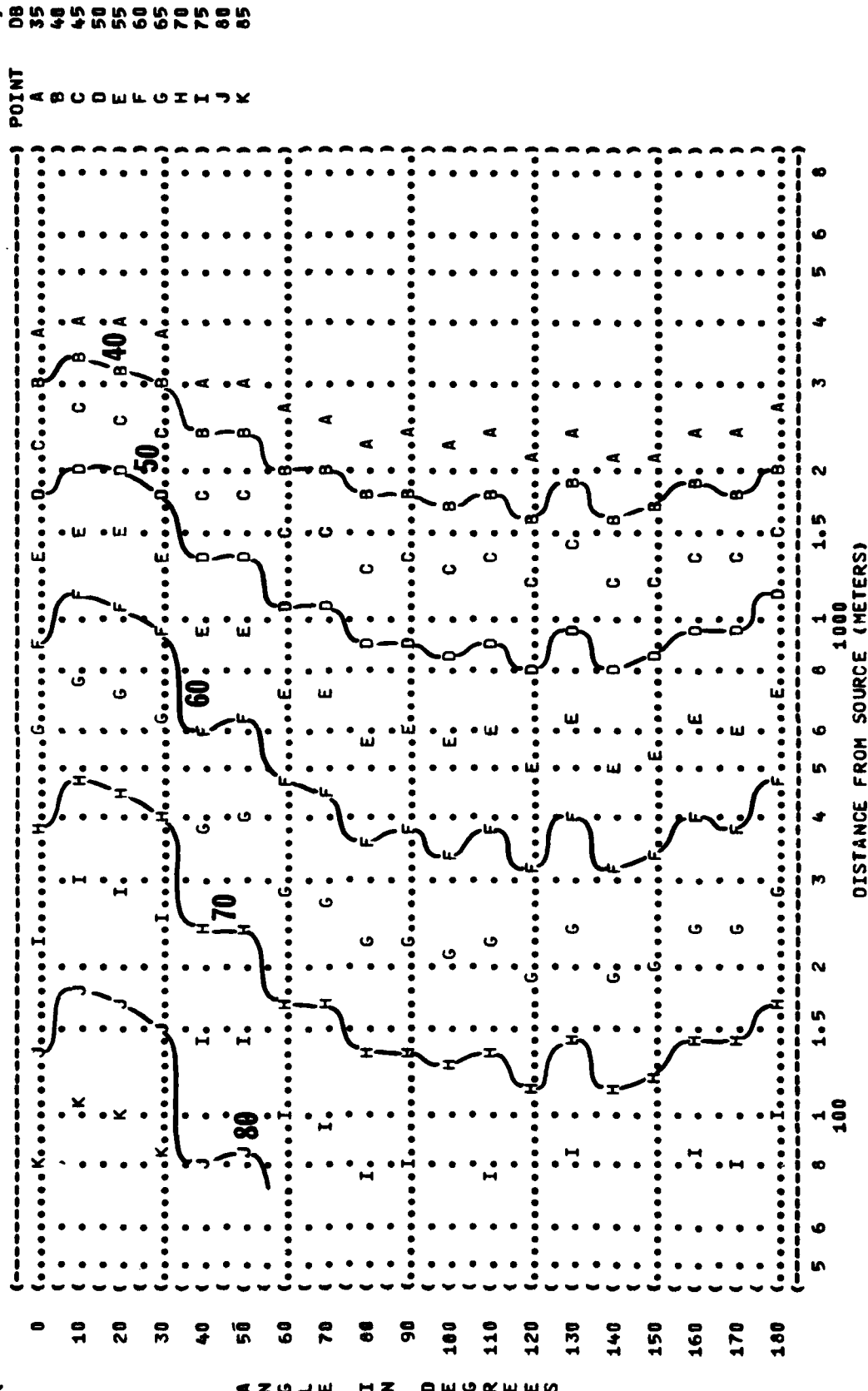
NOISE SOURCE/SUBJECT:
F-16 AIRCRAFT IN THE
AF32A-25 SUPPRESSOR
J65-21 ENGINE
FAR-FIELD NOISE



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(-----)
( ( FIGURE: SOUND PRESSURE LEVEL {SPL} ) IDENTIFICATION: )
( ( EQUAL LEVEL CONTOURS (DB) ) )
( ( 10 ) OMEGA 1.4 )
( ( 1000 HZ OCTAVE BAND ) TEST 79-738-001 )
(-----)
( ( NOISE SOURCE/SUBJECT: ) METEOROLOGY: )
( ( F-16 AIRCRAFT IN THE ) )
( ( AFTERBURNER POWER ) TEMP = 15 C )
( ( SINGLE ENGINE ) BAR PRESS = .760 M HG )
( ( GROUND RUNUP (SUPPRESSED) ) REL HUMID = 70 % )
( ( ) )
( ( FAR-FIELD NOISE ) )
(-----)

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(FIGURE: SOUND PRESSURE LEVEL (SPL)
 (EQUAL LEVEL CONTOURS (DB)
 (10 2000 HZ OCTAVE BAND
 (NOISE SOURCE/SUBJECT: (OPERATION:
 (F-16 AIRCRAFT IN THE (AFTERBURNER POWER
 (AF32A-25 SUPPRESSOR (SINGLE ENGINE
 (J85-21 ENGINE (GROUND RUNUP (SUPPRESSED)
 (FAR-FIELD NOISE ()
 () IDENTIFICATION:
 () OMEGA 1.4
 () TEST 79-738-001
 () RUN 04
 () 22 MAR 79
 () PAGE 24

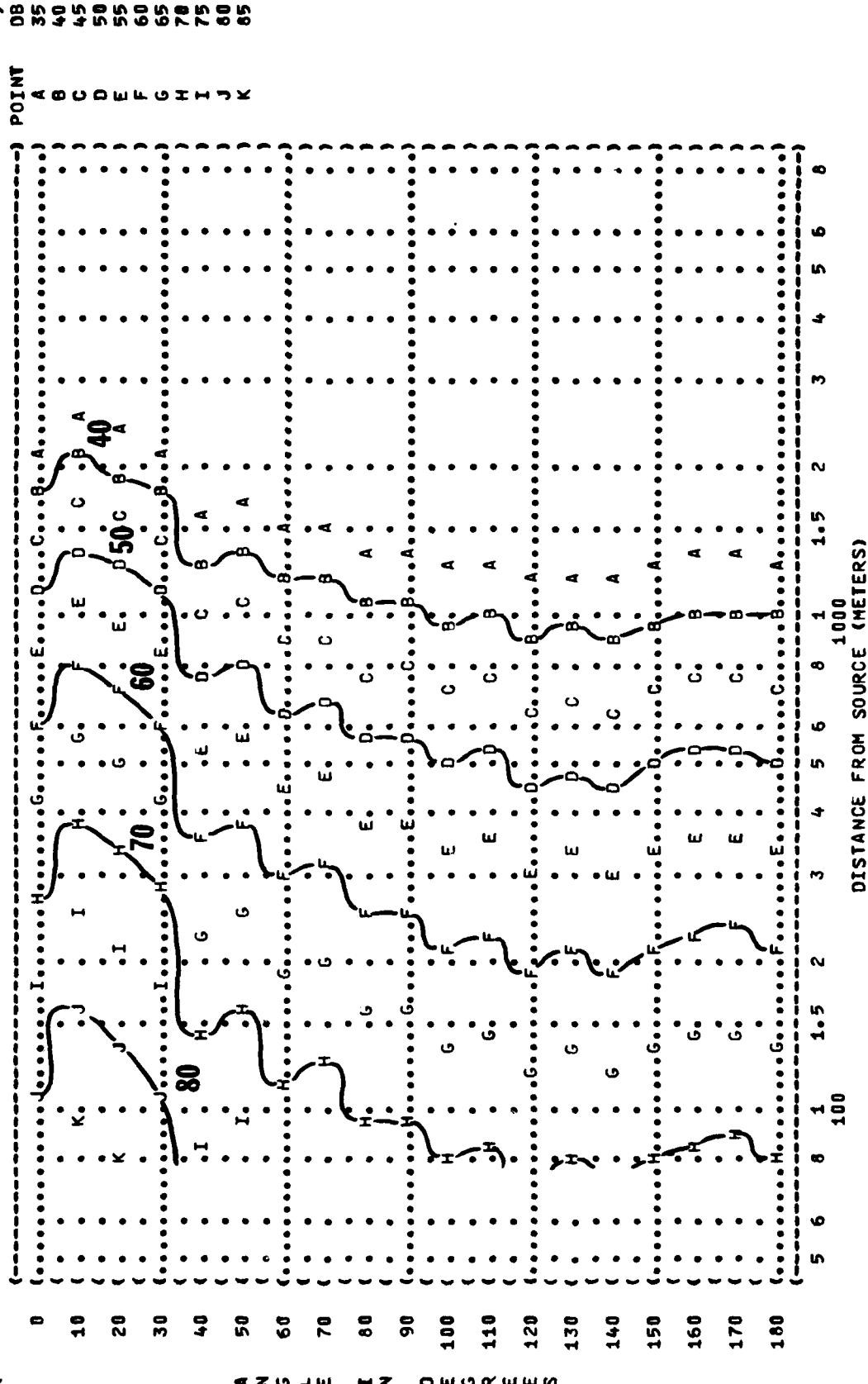


FIGURE 10 SOUND PRESSURE LEVEL (SPL) EQUAL LEVEL CONTOURS 4000 HZ OCTAVE BAND

10

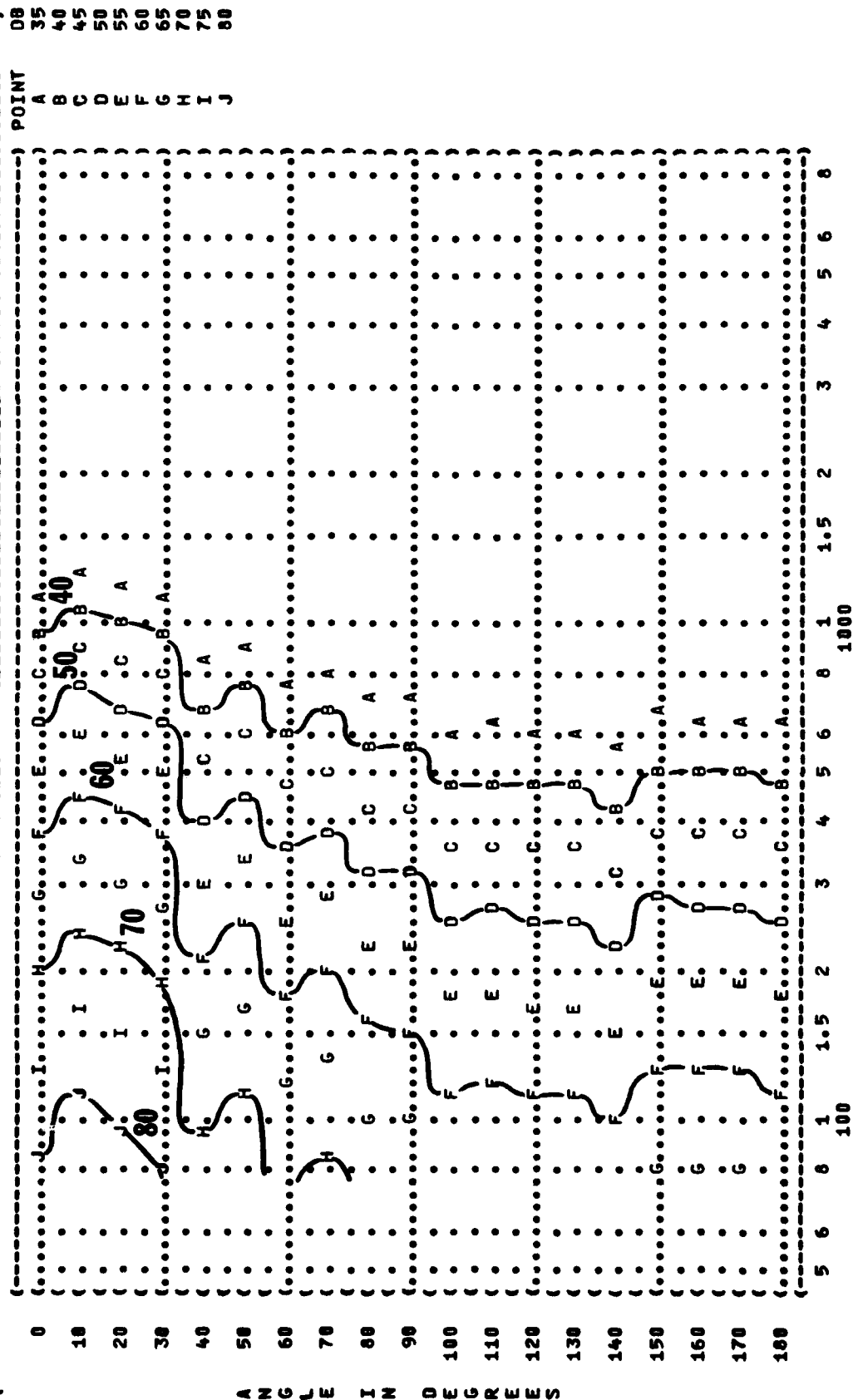
NOISE SOURCE/SUBJECT:
F-16 AIRCRAFT IN THE
AF32A-25 SUPPRESSOR
J05-21 ENGINE
FAR-FIELD NOISE

(OPERATION:
(AFTERBURNER POWER
(SINGLE ENGINE
(GROUND RUNUP (SUPP

METEOROLOGY:
TEMP
BAR PRESS
REL HUMID

IDENTIFICATION:
OMEGA 1.4
TEST 79-738-001

RUN 04
 22 MAR 7
 PAGE 25



(FIGURE: SOUND PRESSURE LEVEL (SPL)
 (10 EQUAL LEVEL CONTOURS (DB)
 (8000 HZ OCTAVE BAND
 (NOISE SOURCE/SUBJECT:
 (F-16 AIRCRAFT IN THE
 (AF32A-25 SUPPRESSOR
 (J05-21 ENGINE
 (FAR-FIELD NOISE
 (OPERATIONS:
 (AFTERBURNER POWER
 (SINGLE ENGINE
 (GROUND RUNUP (SUPPRESSED)
 (METEOROLOGY:
 (TEMP = 15 C
 (BAR PRESS = .760 M HG
 (REL HUMID = 70 %
 (IDENTIFICATIONS:
 (OMEGA 1.4
 (TEST 79-738-001
 (RUN 04
 (22 MAR 79
 (PAGE 26

