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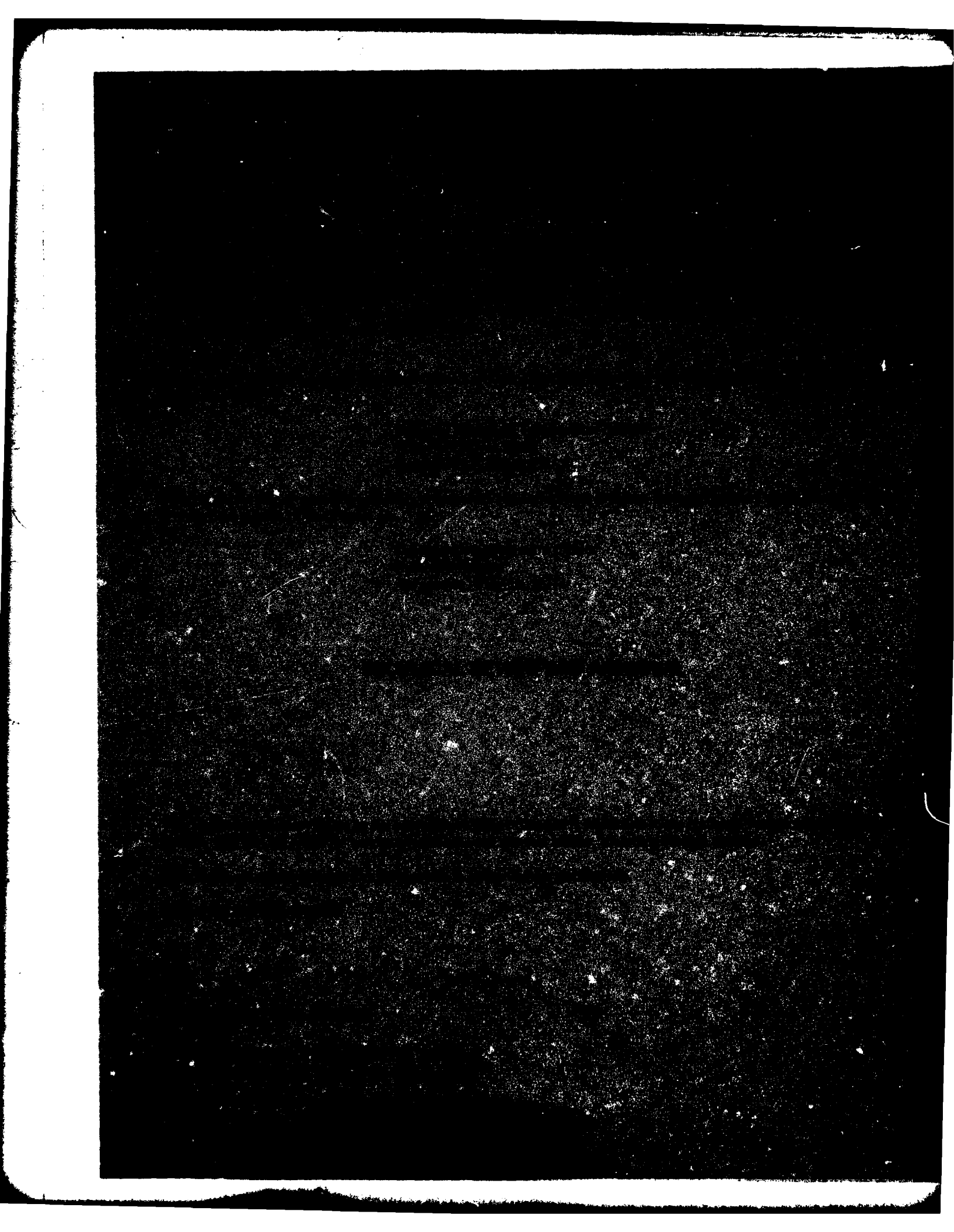
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The AF32A-14 noise suppressor is made by Koppers Environmental Elements Corporation for acoustical suppression of the F-4 aircraft. This report provides measured and extrapolated data defining the bioacoustic environments produced by this aircraft operating in this suppressor for three engine power configurations. Near-field data are reported for two locations in a wide variety of physical and psychoacoustic measures: overall and band sound			

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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.

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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-4 aircraft equipped with two General Electric J79-GE-17 engines functions as a long range, high altitude interceptor, long range attack, and close air support aircraft. This aircraft is manufactured by McDonnell-Douglas and is code named the Phantom II. The AF32A-14 noise suppressor is made by Koppers Environmental Elements Corporation to provide noise level reduction for all F-4 aircraft during ground runup operations.

This volume provides measured and extrapolated data defining bioacoustic environments produced by this aircraft in this suppressor system 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-4 aircraft operating in the AF32A-14 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-14 noise suppressor system during ground runup operations of the F-4 aircraft. For these tests the aircraft was located in the AF32A-14 noise suppressor at Nellis 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-4 aircraft in the AF32A-14 noise suppressor at the two ground crew locations. This table includes 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 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-4 Aircraft Suppressor Ground Runup
Test #77-731-001

Ground Crew Location

1

Leak Check Position

2

Lookout Position

Aircraft Engine Operation

A

Idle Power

B

85% RPM

C

Military Power (98.5% RPM)

D

Afterburner Power

Meteorology

Temperature

34 C

Bar Pressure

.709 M Hg

Rel Humidity

22 %

Wind — Speed

Calm

— Direction

Calm

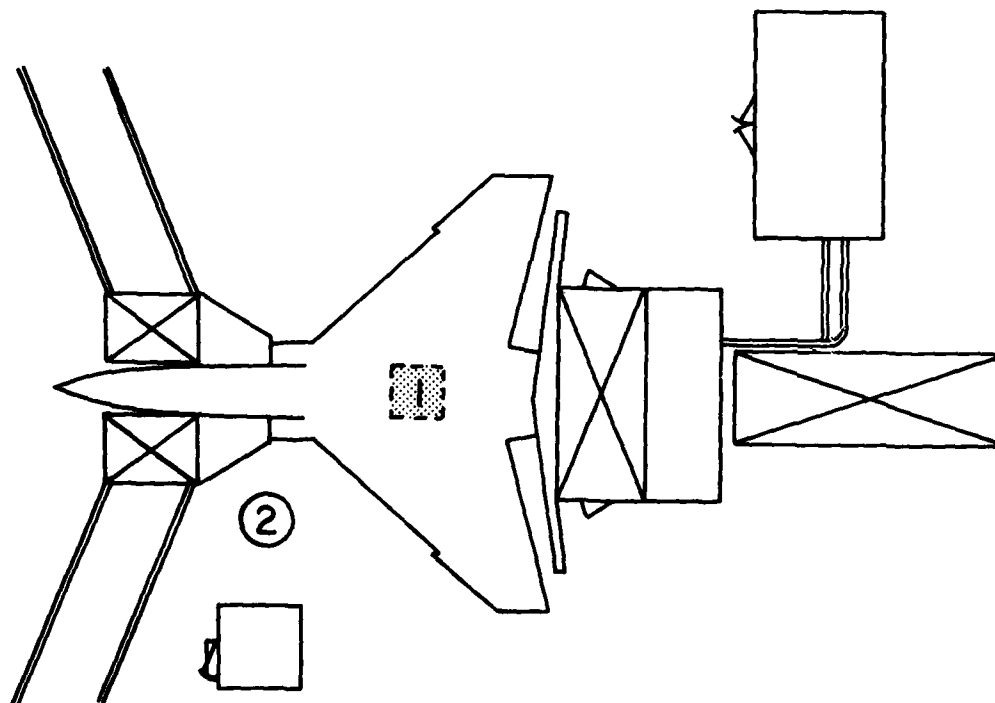


Figure 1. Near-Field Measurement Locations

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-14 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-4 aircraft operating in the AF32A-14 noise suppressor in a standard format.

Estimates of the noise levels for intermediate power settings (e.g., 90% 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.

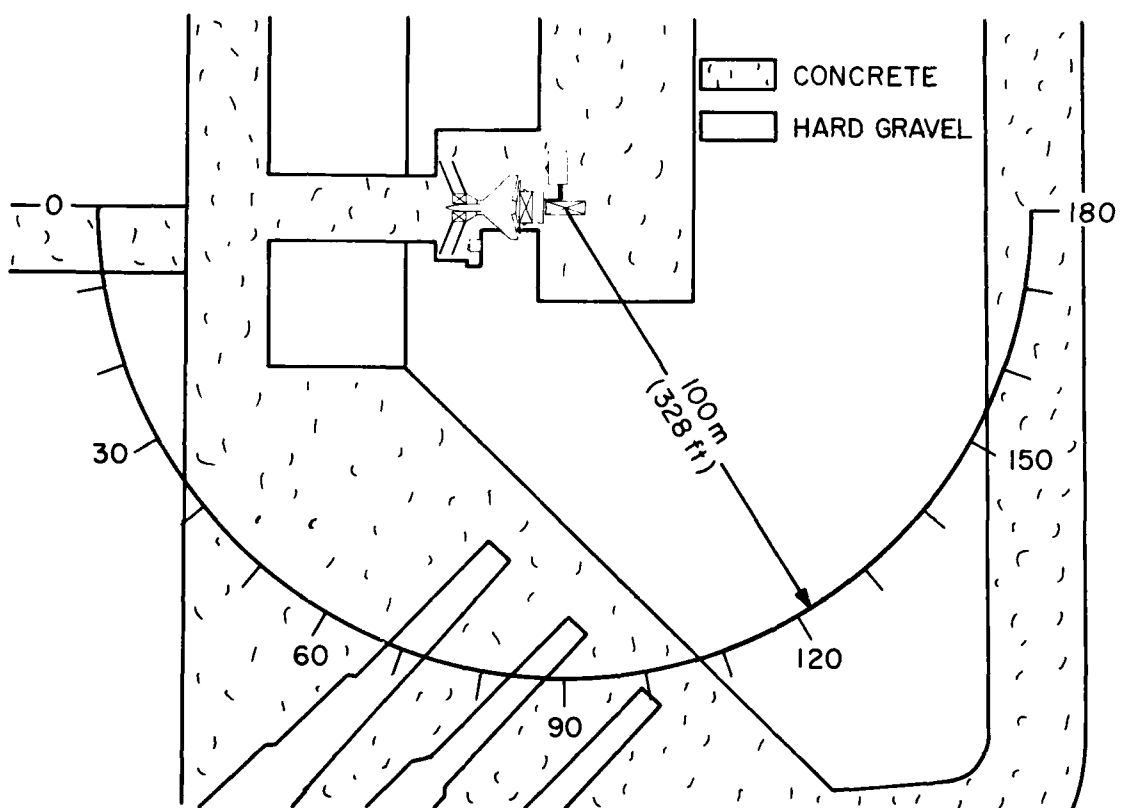


Figure 2. Far-Field Measurement Locations at Nellis AFB, NV

TABLE 1 MEASURED SOUND PRESSURE LEVEL (DB)									
2 1/3 OCTAVE BAND									
IDENTIFICATION:									
OMEGA 3.2									
TEST 77-731-001									
RUN 01									
14 SEP 78									
PAGE F1									
NOISE SOURCE/SUBJECT:									
F-4 AIRCRAFT IN THE									
AF/32A-14 SUPPRESSOR									
GROUND CREW									
NEAR-FIELD NOISE LEVELS									
LOCATION/CONDITION									
1/A 2/A 1/B 2/B 1/C 2/C 1/D 2/D									
FREQ (HZ)									
25	90	77	97	86	102	93	112	101	
31.5	96	79	90	82	94	92	102	95	
40	101	78	94	79	96	85	102	91	
50	96	75	93	78	93	81	104	92	
63	88	70	93	75	93	81	98	87	
80	94	79	92	78	95	82	99	87	
100	88	72	101	81	97	82	101	89	
125	91	72	102	82	101	86	106	93	
160	94	72	105	84	103	85	113	92	
200	85	69	99	84	98	86	104	90	
250	90	70	102	86	104	90	108	94	
315	87	71	110	84	106	85	110	89	
400	93	75	104	82	104	89	109	92	
500	88	79	103	85	106	91	110	95	
630	88	78	100	88	107	91	112	95	
800	90	77	101	91	109	93	113	95	
1000	89	77	102	91	107	93	113	95	
1250	91	77	102	90	107	94	113	95	
1600	95	82	103	93	108	95	114	97	
2000	98	81	105	93	108	94	113	94	
2500	93	81	105	93	108	94	112	94	
3150	92	81	103	92	107	95	111	95	
4000	92	81	103	93	107	96	111	97	
5000	91	80	101	92	105	94	107	95	
6300	87	76	100	92	104	93	106	94	
8000	86	75	100	91	102	92	103	93	
10000	86	73	98	90	100	90	102	91	
OVERALL	107	92	117	103	119	106	124	108	

LEVEL CORRECTED TO REMOVE BACKGROUND/ELECTRONIC NOISE.

TABLE 2 MEASURED SOUND PRESSURE LEVEL (DB)									
OCTAVE BAND									
NOISE SOURCE/SUBJECT#									
F-4 AIRCRAFT IN THE									
AF/32A-14 SUPPRESSOR									
GROUND CREW									
NEAR-FIELD NOISE LEVELS									
LOCATION/CONDITION									
1/A 2/A 1/B 2/B 1/C 2/C 1/D 2/D									
FREQ (HZ)									
31.5									
63									
125									
250									
500									
1000									
2000									
4000									
8000									
OVERALL									
IDENTIFICATION:									
OMEGA 3.2									
TEST 77-731-001									
RUN 01									
14 SEP 78									
PAGE J1									
102 83 99 88 104 96 113 102									
98 81 98 82 98 86 106 94									
96 77 108 87 106 89 114 96									
93 75 111 89 108 92 113 96									
95 82 107 90 111 95 115 99									
1000 95 82 106 95 112 98 117 99									
2000 86 109 98 113 99 117 100									
96 85 107 97 111 100 115 100									
91 80 104 96 107 96 108 98									
107 92 117 103 119 106 124 108									

TABLE 3 MEASURES OF HUMAN NOISE EXPOSURE										IDENTIFICATION:	

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

TABLE 4
TEST CONDITIONS
FOR FAR-FIELD NOISE MEASUREMENTS

F-4 Aircraft In The AF32A-14 Noise Suppressor, Ground Runup
Nellis AFB, NV, Test #77-731-001

Aircraft Engine Operation

85% RPM	One Engine 85 % RPM 400 °C EGT 2850 LBS/HR, FF
Military Power	One Engine 98.5 % RPM 660 °C EGT 7800 LBS/HR, FF
Afterburner Power	One Engine 98.5 % RPM 660 °C EGT 44,500 LBS/HR, FF

Meteorology

Temperature	34 C
Bar Pressure	.709 M Hg
Rel Humidity	22 %
Wind — Speed	Calm
— Direction	Calm

TABLE: MEASURED SOUND PRESSURE LEVEL (DB)																		IDENTIFICATION:	
5	1/3 OCTAVE BAND																		
	DISTANCE = 100 METERS																		
																		OMEGA 1.4	
NOISE SOURCE/SUBJECT:																		TEST 77-731-001	
(F-4 AIRCRAFT IN THE)																		RUN 02	
(AF32A-14 SUPPRESSOR)																			
(ENGINE J79-GE-17)																		14 SEP 78	
(FAR FIELD NOISE)																		PAGE 2	
METEOROLOGY:																			
TEMP = 34 C																			
BAR PRESS = .709 M HG																			
REL HUMID = 22 %																			
ANGLE (DEGREES)																			
FREQ	0	10	20	30	40	50	60	70	80	90	100	110	120	130	140	150	160	170	180
(HZ)																			
25	83	83	82	84	83	84	86	86	85	85	84	81	79	82	84	86	85	85	82
31.5	81	80	80	80	80	79	79	81	81	79	79	80	81	83	83	82	81	82	80
40	78	78	77	78	77	77	79	82	80	77	78	78	79	81	82	80	82	81	82
50	73	73	72	73	73	74	76	76	77	75	76	75	76	79	78	79	79	79	80
63	75	74	70	72	77	76	77	78	78	78	78	77	75	78	79	79	78	79	80
80	76	73	70	75	78	77	79	77	79	77	78	76	78	79	79	80	77	79	78
100	73	73	73	76	77	77	78	78	80	76	77	77	78	81	80	80	80	79	77
125	73	73	74	77	79	82	78	78	80	76	77	77	76	81	79	81	80	76	76
160	75	75	72	73	77	76	75	76	79	77	79	77	77	80	80	80	78	78	76
200	74	74	71	73	77	78	78	75	78	79	79	76	78	80	80	80	80	78	75
250	80	78	73	74	76	76	79	80	77	80	79	80	78	78	80	80	81	81	78
315	78	76	74	75	77	80	81	77	77	78	79	78	77	78	78	79	79	79	75
400	78	76	74	74	76	78	79	77	76	78	77	77	78	77	78	78	79	79	75
500	75	76	74	73	74	76	75	75	74	76	74	73	73	75	75	75	76	75	72
630	73	73	72	72	73	74	73	74	75	74	73	71	72	72	72	71	73	72	69
800	74	76	74	74	76	76	76	75	75	72	72	70	70	71	71	72	71	70	69
1000	74	75	73	74	75	74	74	73	73	71	70	69	69	67	67	68	67	66	65
1250	72	74	72	72	74	74	73	72	73	69	68	68	68	69	68	70	68	67	67
1600	70	74	71	71	72	72	72	71	71	67	68	67	68	68	69	69	70	69	67
2000	71	75	71	71	71	72	71	69	69	66	66	66	67	69	69	70	70	70	69
2500	71	73	69	69	68	68	68	67	66	64	65	67	66	69	70	70	69	70	70
3150	71	73	70	71	69	70	70	68	66	64	66	67	68	69	71	70	70	72	71
4000	69	72	68	67	67	69	68	68	67	68	66	68	68	70	71	70	71	72	70
5000	67	70	64	63	64	66	64	64	63	63	62	63	64	64	65	64	64	66	64
6300	62	65	60	59	60	62	60	59	59	58	57	58	58	60	61	60	60	62	60
8000	59	60	55	54	55	57	54	54	53	52	51	51	52	53	53	54	54	57	57
10000	50	52	47	46	46	48	45	44	44	42	42	42	43	43	42	44	46	52	54
OVERALL	90	90	88	89	90	91	91	91	91	90	90	89	89	92	92	92	92	92	90
< LEVEL CORRECTED TO REMOVE BACKGROUND/ELECTRONIC NOISE																			

< LEVEL CORRECTED TO REMOVE BACKGROUND/ELECTRONIC NOISE.

TABLE: MEASURED SOUND PRESSURE LEVEL (DB)																				IDENTIFICATION:	
1/3 OCTAVE BAND																				)	
DISTANCE = 100 METERS																				) OMEGA 1.4	
																				) TEST 77-731-001	
NOISE SOURCE/SUBJECT:																				) METEOROLOGY:	
(F-4 AIRCRAFT IN THE																				) TEMP = 34 C	
(AF32A-14 SUPPRESSOR																				) BAR PRESS = .709 M HG	
(ENGINE J79-GE-17																				) REL HUMID = 22 %	
(FAR FIELD NOISE																				) PAGE 2	
																				)	
FREQ	0	10	20	30	40	50	60	70	80	90	100	110	120	130	140	150	160	170	180		
(HZ)																					
25	96	95	93	92	92	92	94	95	94	91	90	86	90	94	95	96	96	97	95		
31.5	86	85	84	85	85	85	86	85	85	84	83	84	86	87	89	87	86	87	86		
40	84	83	82	83	82	83	85	84	84	83	83	81	81	85	85	84	85	85	87		
50	86	85	85	86	86	87	85	84	83	82	83	85	84	86	85	83	84	82	83		
63	80	79	78	80	82	82	84	84	83	81	81	81	82	86	83	82	83	80	82		
80	80	78	76	79	82	83	84	86	83	82	82	84	84	86	85	81	81	80	80		
100	78	78	76	78	81	83	84	86	85	82	86	86	87	88	85	84	84	81	81		
125	78	77	79	81	83	82	81	86	83	80	83	86	87	86	83	81	80	81	81		
160	79	76	76	79	84	84	86	86	82	81	81	84	85	84	82	83	83	81	80		
200	78	77	77	77	80	81	81	85	83	81	82	82	86	84	85	84	84	81	80		
250	83	79	76	79	81	82	86	85	83	82	81	81	83	83	83	82	83	79	80		
315	79	75	76	77	79	83	85	84	82	82	81	83	83	82	81	82	81	82	80		
400	78	74	75	76	77	81	83	81	80	77	79	79	81	82	82	82	81	82	78		
500	79	73	74	75	77	78	80	82	79	76	77	76	77	78	79	78	80	79	76		
630	78	73	75	76	78	78	81	80	79	78	77	76	77	78	77	77	78	77	77		
800	77	74	76	77	80	79	81	82	79	78	77	76	77	76	77	75	75	75	76		
1000	78	74	76	79	80	79	80	79	78	77	75	74	74	74	75	74	74	72	72		
1250	74	70	74	76	76	77	77	77	76	74	74	73	73	73	74	74	73	72	71		
1600	72	71	74	76	76	76	76	77	75	72	71	70	71	74	74	74	74	74	73		
2000	72	71	73	74	75	74	73	74	73	70	69	69	71	72	72	72	72	73	71		
2500	70	71	72	73	73	71	70	72	70	68	69	70	70	73	73	72	74	73	71		
3150	71	71	73	75	73	73	72	71	70	69	70	71	73	73	73	72	74	72	71		
4000	67	67	69	71	71	71	68	70	69	70	69	70	71	72	72	71	73	72	69		
5000	65	65	66	68	68	68	66	66	66	65	64	66	67	67	68	67	68	66	65		
6300	61	61	62	64	64	64	61	63	62	62	61	62	63	62	63	63	63	61	60		
8000	56	55	57	58	58	60	55	56	55	54	54	54	55	56	58	56	57	55	54		
10000	49	48	50	51	50	51	47	46	46	45	44	44	45	46	50	47	50	49	49		
OVERALL	98	97	95	95	96	97	98	99	97	95	95	95	97	98	98	98	98	98	97		
LEVEL CORRECTED TO REMOVE BACKGROUND/ELECTRONIC NOISE.																					

LEVEL CORRECTED TO REMOVE BACKGROUND/ELECTRONIC NOISE.

FIGURE 1 NORMALIZED FARFIELD NOISE LEVELS

3 DISTANCE = 100 METERS

NOISE SOURCE/SUBJECT 1

7-4 AIRCRAFT IN THE

AF32A-14 SUPPRESSOR

ENGINE J79-GE-17

FAR FIELD NOISE

OPERATION 1

ENGINE RUNUP 85% RPM

SINGLE ENGINE

GROUND RUNUP (SUPPRESSED)

METEOROLOGY 1

TEMP = 15 C

CAR PRESS = .760 M HG

REL HUMID = 70 %

PAGE 6

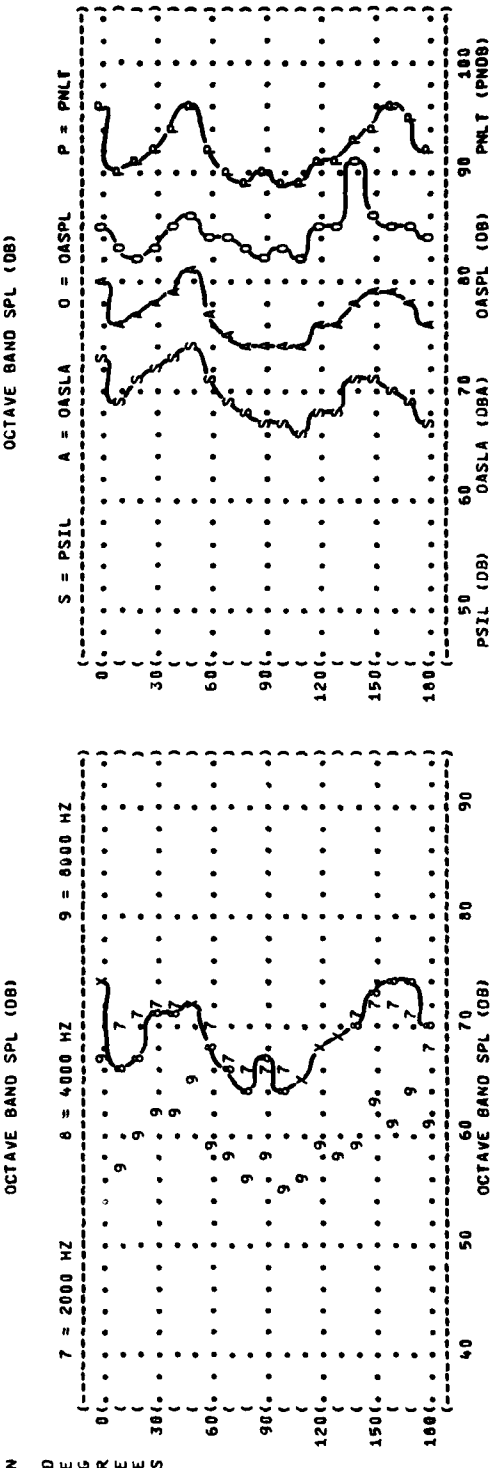
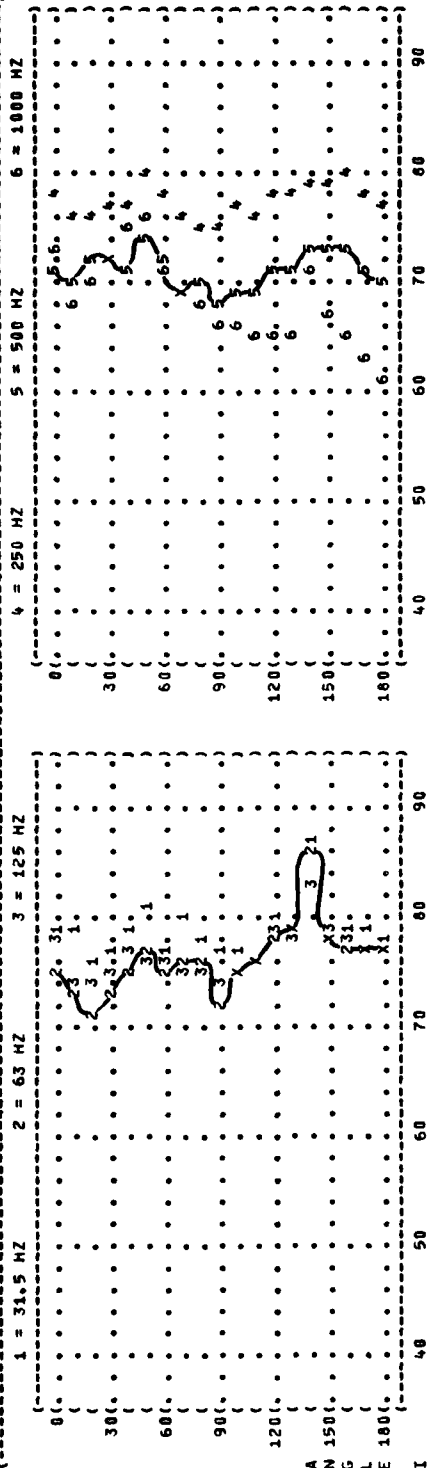
IDENTIFICATION:

OMEGA 1.4

TEST 77-731-001

RUN 01

14 SEP 78



((FIGURE: NORMALIZED FARFIELD NOISE LEVELS
 ((3 DISTANCE = 100 METERS
 ((NOISE SOURCE/SUBJECT: (OPERATION: (METEOROLOGY: (TEMPERATURE = 15 C
 ((F-4 AIRCRAFT IN THE (MILITARY POWER 98.5% RPM (BAR PRESS = 760 M HG
 ((AF32A-14 SUPPRESSOR (SINGLE ENGINE (REL HUMID = 70 %
 ((ENGINE J79-GE-17 (GROUND RUNUP (SUPPRESSED)
 ((FAR FIELD NOISE ((PAGE 6
 ((IDENTIFICATION: ((OMEGA 1.4
 ((TEST 77-731-001
 ((RUN 02
 ((14 SEP 78
 ((6

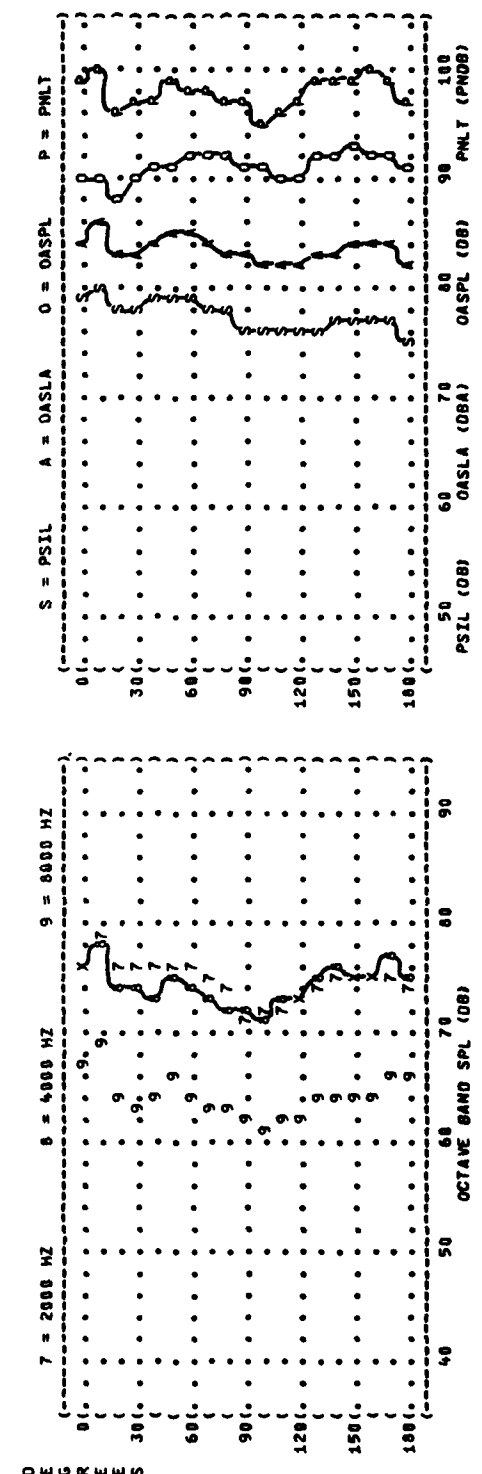
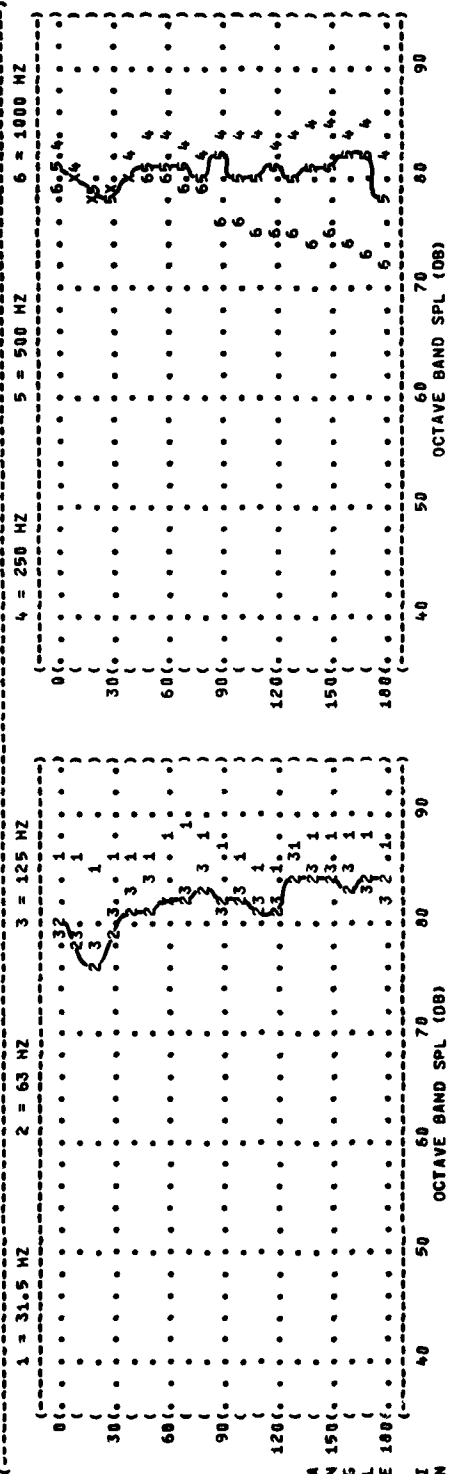


FIGURE 1 NORMALIZED FARFIELD NOISE LEVELS

3 DISTANCE = 100 METERS

NOISE SOURCE/SUBJECT:

7-4 AIRCRAFT IN THE

AF32A-14 SUPPRESSOR

ENGINE J79-GE-17

FAR FIELD NOISE

OPERATION:

AFTERBURNER POWER

SINGLE ENGINE

GROUND RUNUP (SUPPRESSED)

METEOROLOGY:

TEMP = 15 C

BAR PRESS = .760 M HG

REL HUMID = 78 %

IDENTIFICATION:

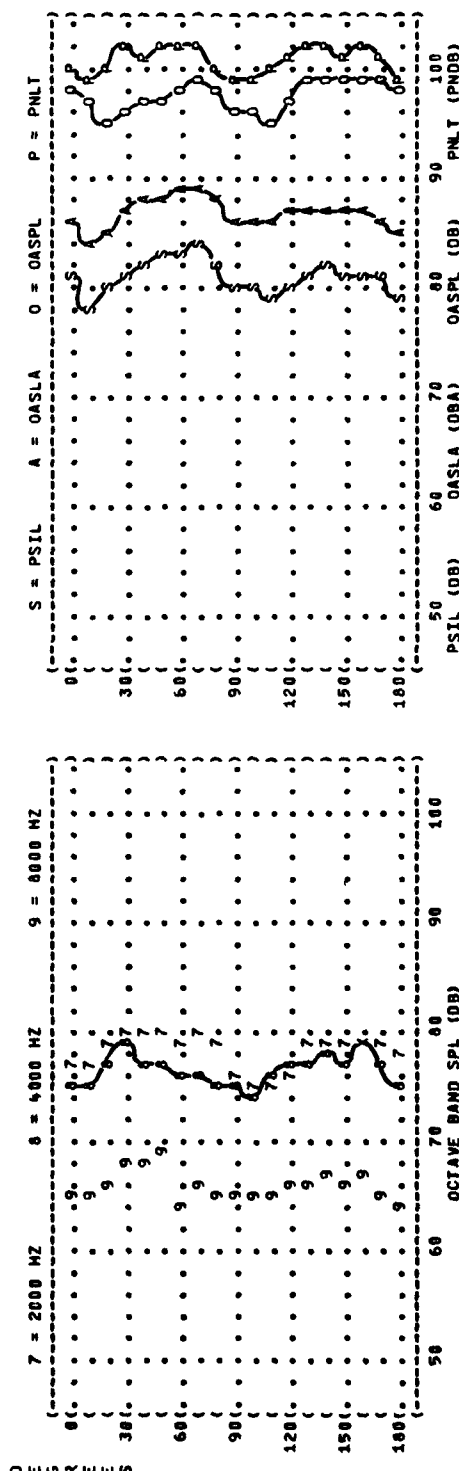
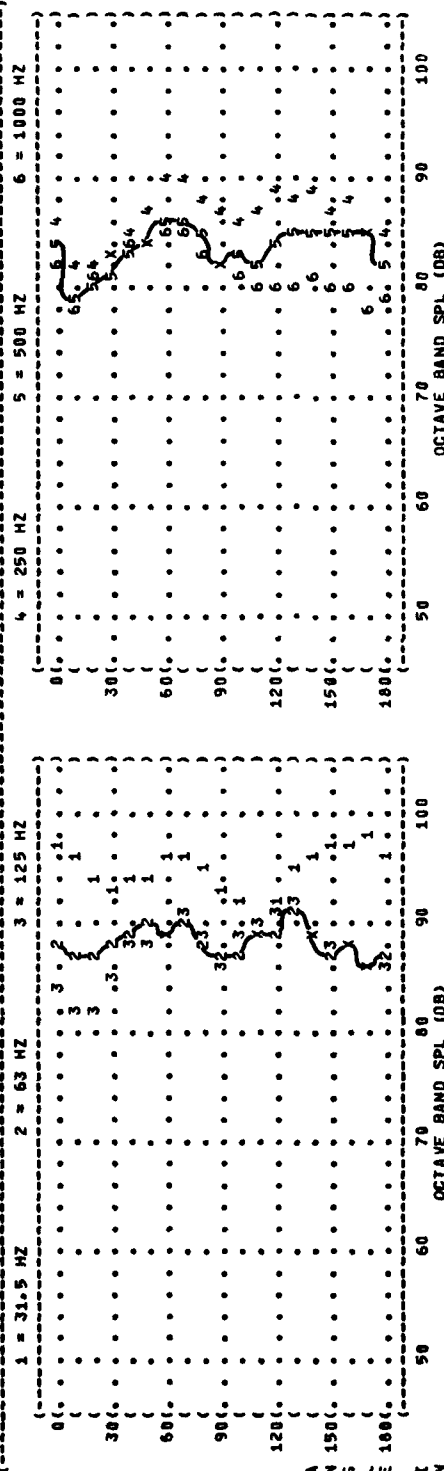
OMEGA 1.4

TEST 77-731-001

RUN 03

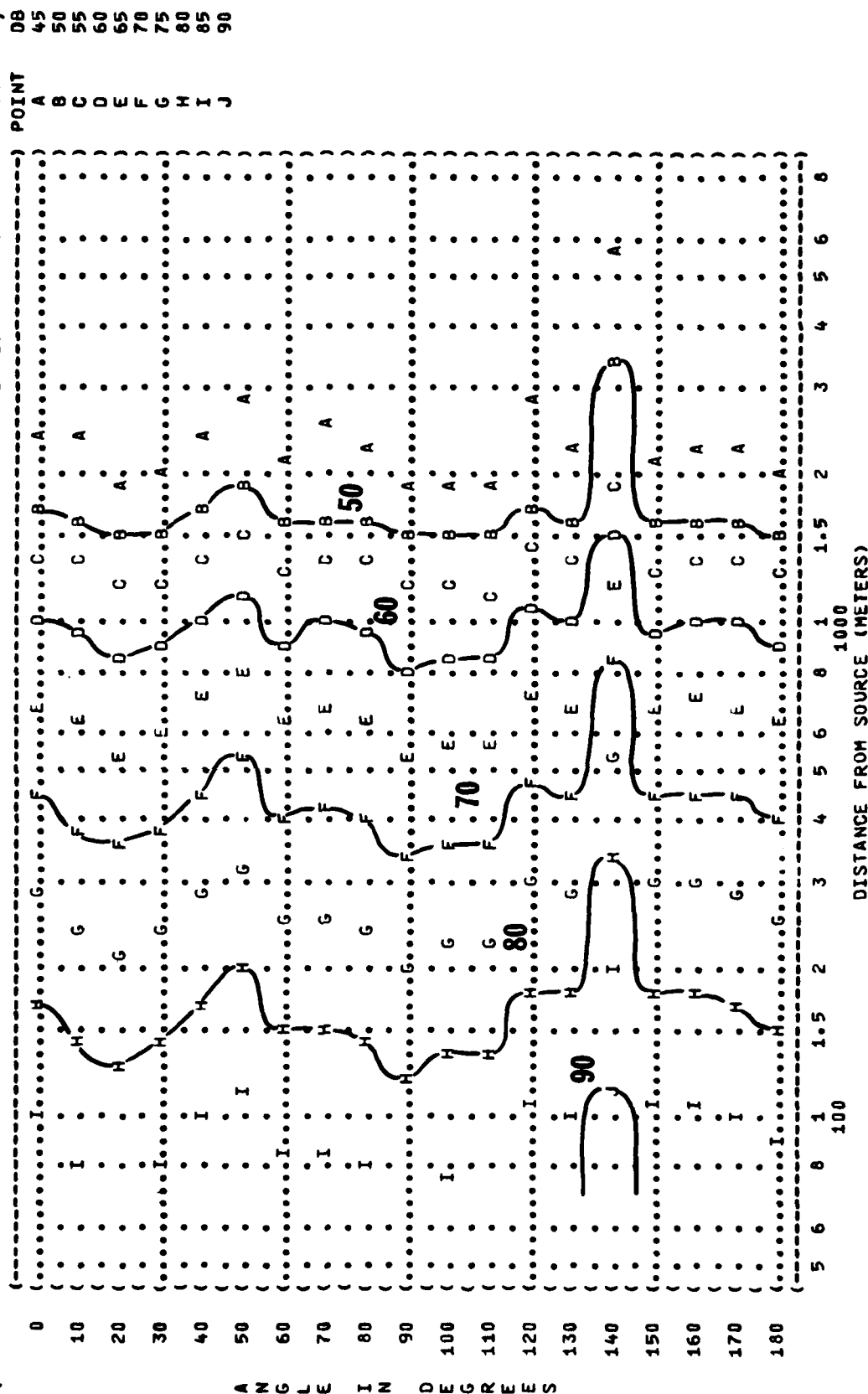
14 SEP 78

PAGE 6



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```
FIGURE 1 ) OVERALL SOUND PRESSURE LEVEL {OASPL}
           EQUAL LEVEL CONTOURS (DB)
          4 -----
NOISE SOURCE/SUBJECT:      ) OPERATION:      ) METEOROLOGY:
F-4 AIRCRAFT IN THE       ) ENGINE RUNUP 85% RPM    =   15 C
AF32A-14 SUPPRESSOR       ) SINGLE ENGINE        BAR PRESS = .760 M HG
ENGINE J79-GE-17         ) GROUND RUNUP (SUPPRESSED) REL HUMID = 70 %
FAIR FIELD NOISE         )                      )
                           )                      )
IDENTIFICATION:            ) OMEGA 1.4             )
                          ) TEST 77-731-001        )
                          ) RUN 01                 )
                          ) 14 SEP 76              )
                          ) PAGE 13                )
```



IDENTIFICATION:
OMEGA 1.4
TEST 77-731-00

OMEGA 1.4
TEST 77-731-001

METEOROLOGY:
TEMP
BAR PRESS
REL HUMID

(OPERATION:
(MILITARY
(SINGLE E
(GROUND R

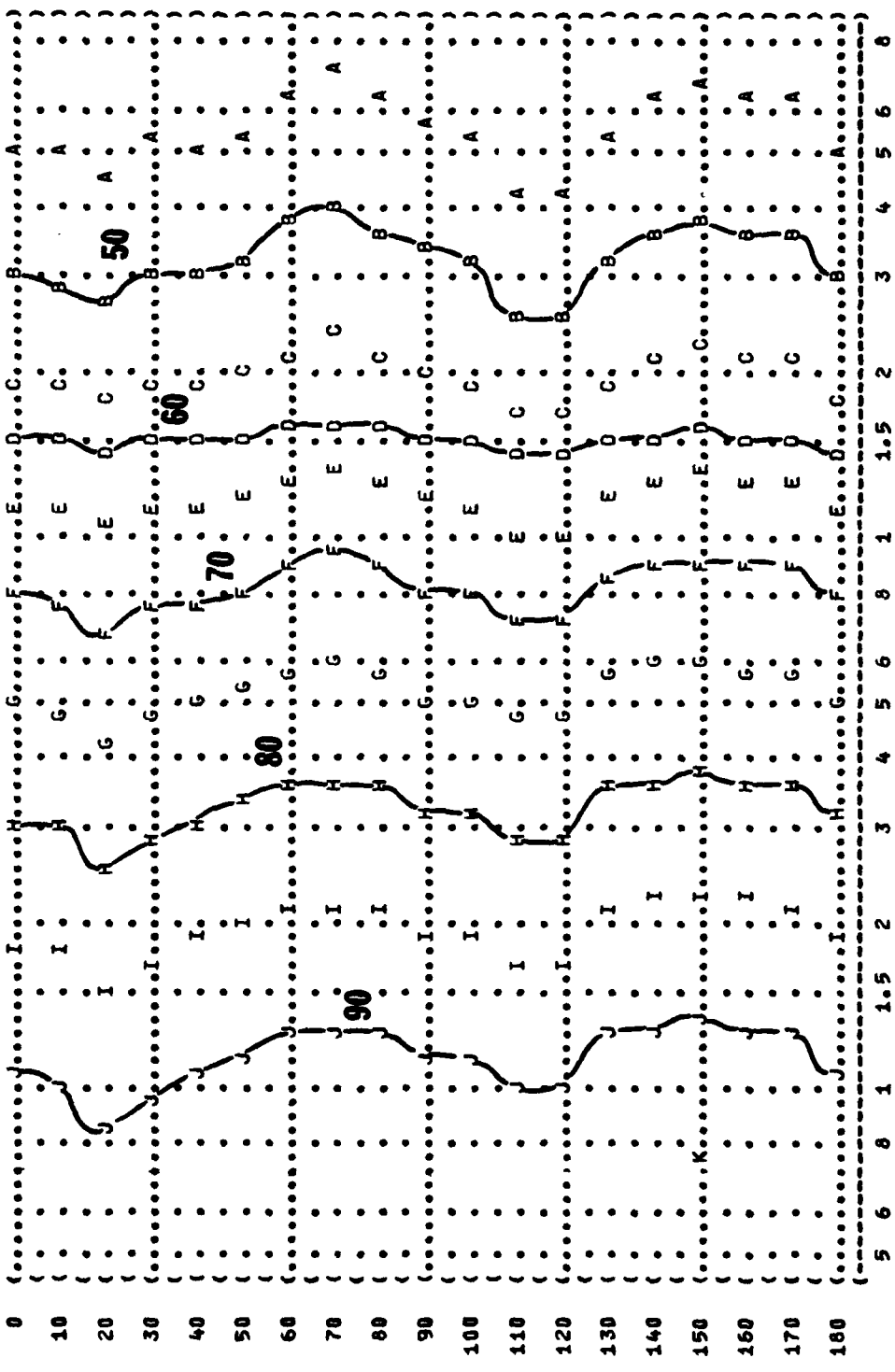
IR 98.5% RPM
(SUPPRESSED)

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

PAGE 13

POINT

420-13 112 030325000

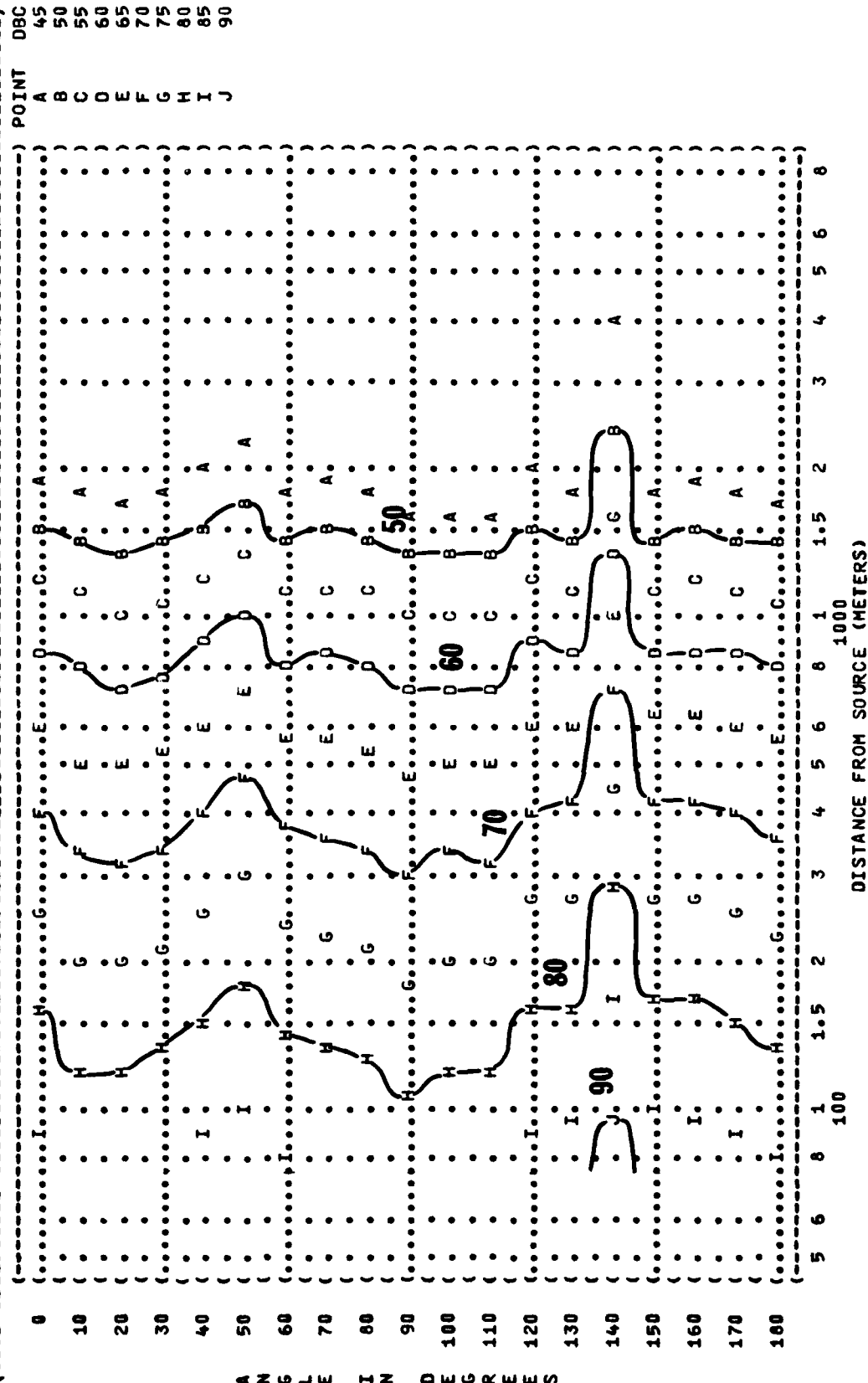


DISTANCE FROM SOURCE (METERS)


```

(-----)
( ( FIGURE 5 C-WEIGHTED OVERALL SOUND LEVEL (OASLC) ) )
( ( EQUAL LEVEL CONTOURS (DBC) ) )
( ( 5 ) )
(-----)
( ( NOISE SOURCE/SUBJECT: ) )
( ( F-4 AIRCRAFT IN THE ) )
( ( AF32A-14 SUPPRESSOR ) )
( ( ENGINE J79-GE-17 ) )
( ( FAR FIELD NOISE ) )
(-----)
( ( OPERATION: ) )
( ( ENGINE RUNUP 85% RPM ) )
( ( SINGLE ENGINE ) )
( ( GROUND RUNUP (SUPPRESSED) ) )
( ( ) )
(-----)
( ( METEOROLOGY: ) )
( ( TEMP = 15 C ) )
( ( BAR PRESS = .760 M HG ) )
( ( REL HUMID = 70 % ) )
(-----)
( ( IDENTIFICATION: ) )
( ( ) )
( ( OMEGA 1.4 ) )
( ( TEST 77-731-001 ) )
( ( RUN 01 ) )
( ( 14 SEP 78 ) )
( ( ) )
( ( PAGE 14 ) )
(-----)

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[illegible][illegible]

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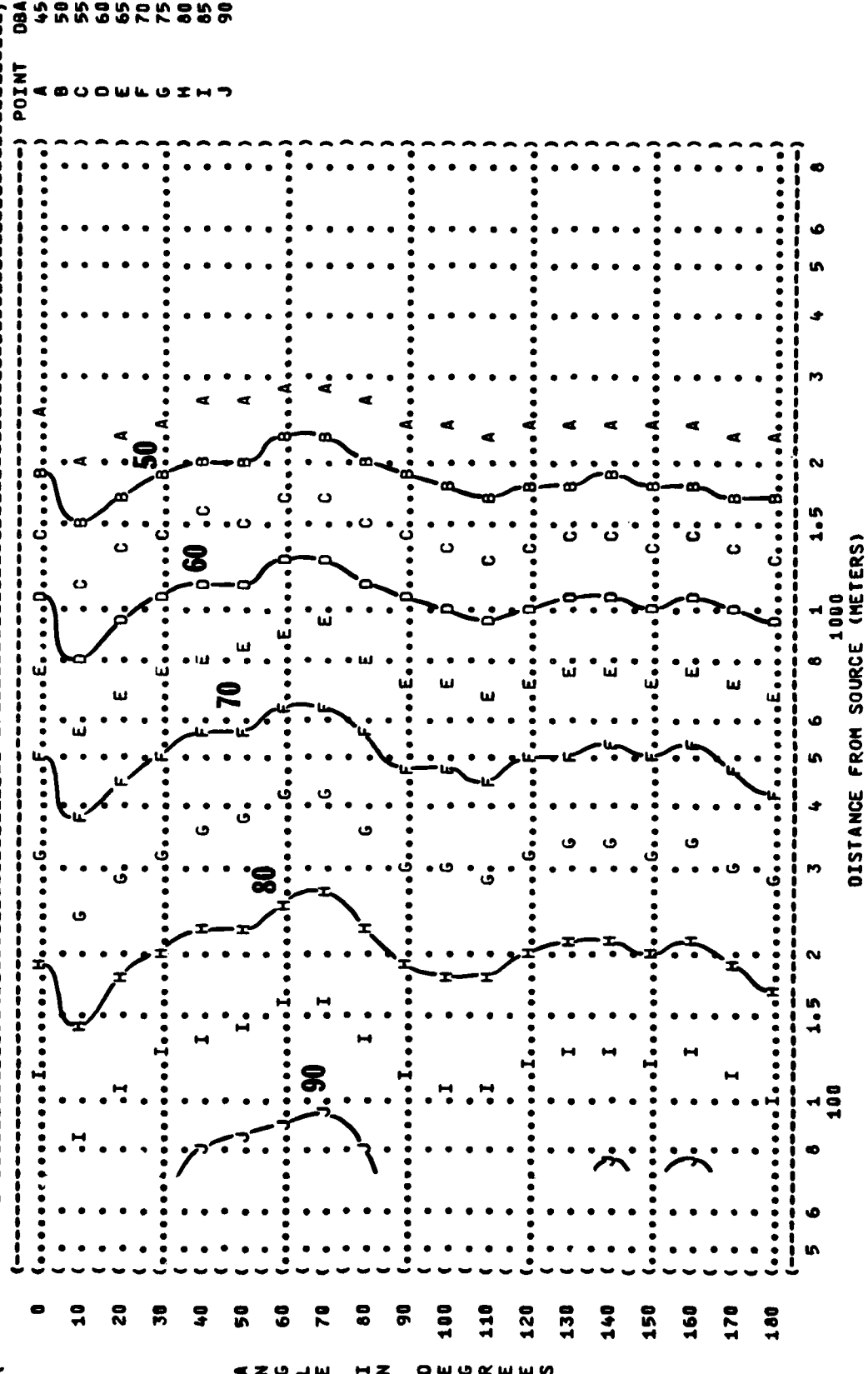
23

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190

(FIGURE: A-WEIGHTED OVERALL SOUND LEVEL (OASLA)
 (6 EQUAL LEVEL CONTOURS (DBA)
 () IDENTIFICATION:
 ()
 () OMEGA 1.4
 () TEST 77-731-001
 () RUN 03
 ()
 (NOISE SOURCE/SUBJECT:) METEOROLOGY:
 (F-4 AIRCRAFT IN THE) TEMP = 15 C
 (AF32A-14 SUPPRESSOR) BAR PRESS = .760 M HG
 (ENGINE J79-GE-17) REL HUMID = 70 %
 (FAR FIELD NOISE)
 () PAGE 15



1

```
( { FIGURE: PERCEIVED NOISE LEVEL, TONE CORRECTED (PNLT) ) IDENTIFICATION: )
( { EQUAL LEVEL CONTOURS (PNDB) ) ) )
( { 7 ) ) OMEGA 1.4 )
( { ) ) TEST 77-731-001 )
( { ) ) RUN 02 )
( { NOISE SOURCE/SUBJECT: ) METEOROLOGY: )
( { F-4 AIRCRAFT IN THE ) TEMP = 15 C )
( { AF32A-14 SUPPRESSOR ) SINGLE ENGINE ) BAR PRESS = .760 H HG )
( { ENGINE J79-GE-17 ) GROUND RUNUP (SUPPRESSED) ) REL HUMID = 70 % )
( { FAR FIELD NOISE ) ) PAGE 16 )
```

(OPERATIONS:
(MILITARY POWER 98.5% RPM
(SINGLE ENGINE
(GROUND RUNUP (SUPPRESSED)

) METEOROLOGY :
) TEMP
) BAR PRESS
) REL HUMID

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

RUN 02
14 SEP 7
PAGE 10



FIGURE: PERCEIVED NOISE LEVEL, TONE CORRECTED (PNLT)
 7
 EQUAL LEVEL CONTOURS (PNDB)

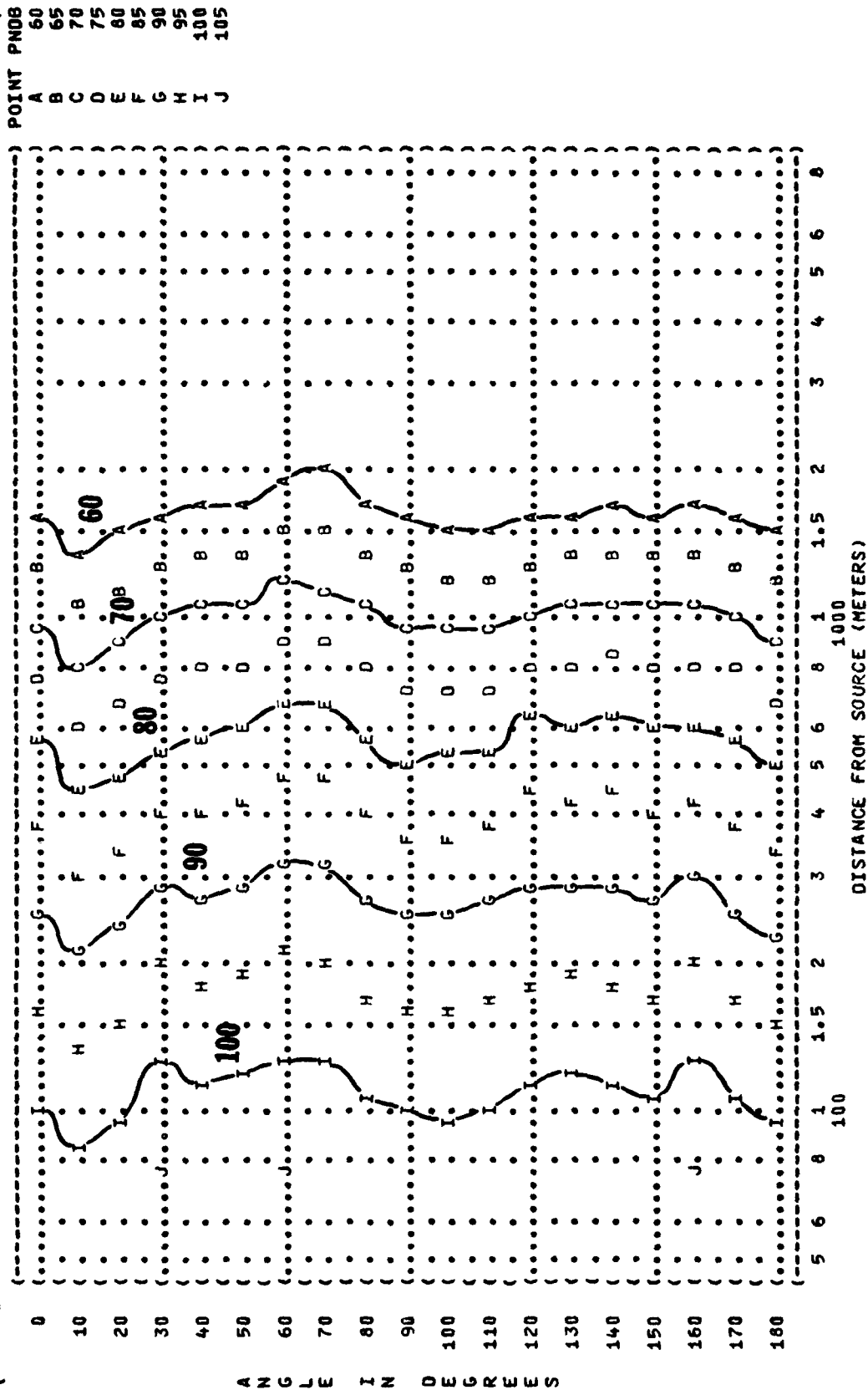
IDENTIFICATION:
 OMEGA 1.4
 TEST 77-731-001
 RUN 03

NOISE SOURCE/SUBJECT:
 F-4 AIRCRAFT IN THE
 AF32A-14 SUPPRESSOR
 ENGINE J79-GE-17
 FAR FIELD NOISE

OPERATION:
 AFTERBURNER POWER
 SINGLE ENGINE
 GROUND RUNUP (SUPPRESSED)

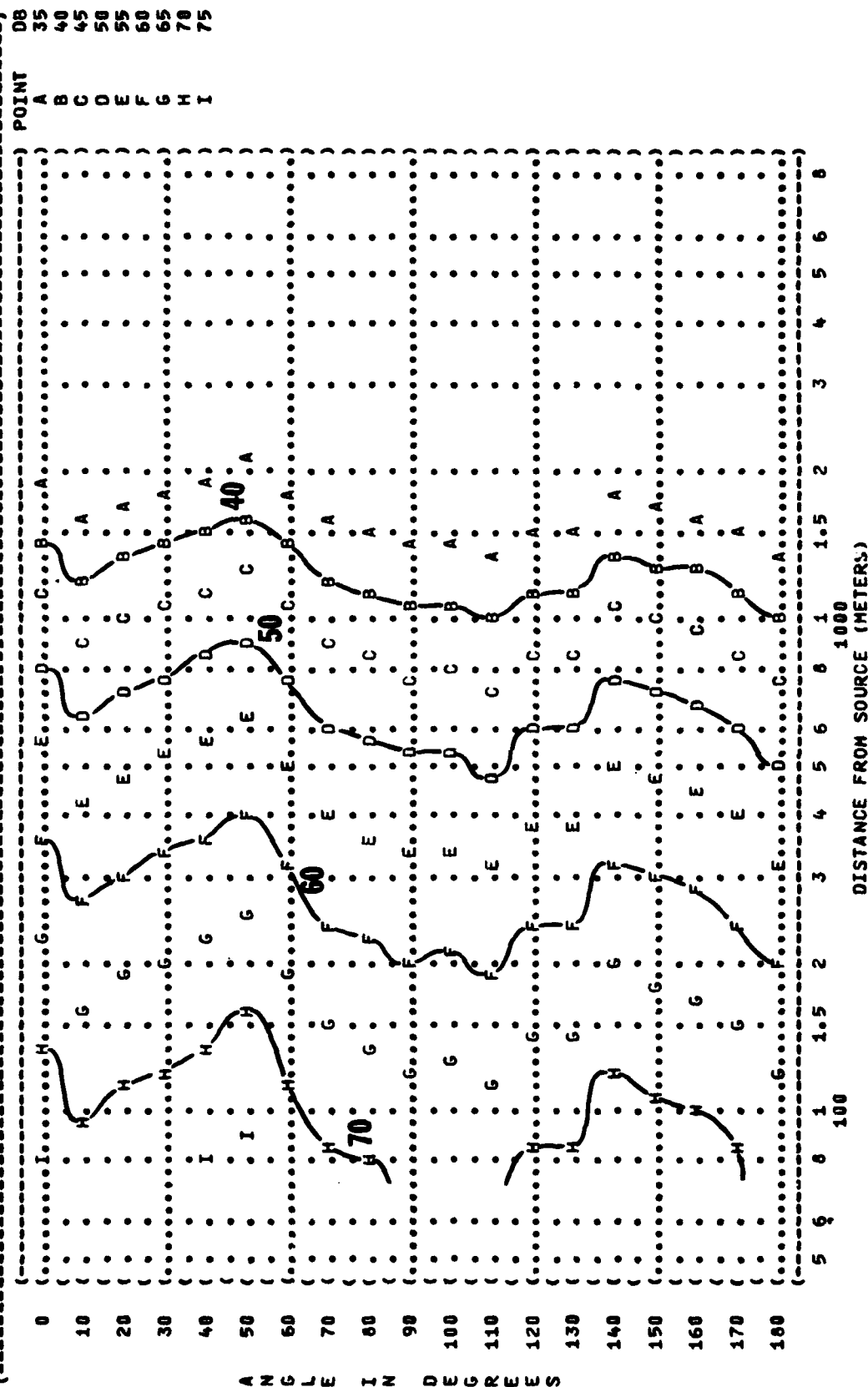
METEOROLOGY:
 TEMP = 15 C
 BAR PRESS = .760 M HG
 REL HUMID = 70 %

PAGE 16



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

FIGURE 1. PREFERRED SPEECH INTERFERENCE LEVEL (PSIL) EQUAL LEVEL CONTOURS (DB)

[illegible]


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(-----)
( FIGURE: PREFERRED SPEECH INTERFERENCE LEVEL {PSIL} ) IDENTIFICATION:
(      8      EQUAL LEVEL CONTOURS (DB) ) )
( ) ) OMEGA 1.4
( ) ) TEST 77-731-001
( ) ) RUN 03
( NOISE SOURCE/SUBJECT: ) METEOROLOGY:
( F-4 AIRCRAFT IN THE ) TEMP = 15 C
( AF32A-14 SUPPRESSOR ) BAR PRESS = .760 M HG
( ENGINE J79-GE-17 ) GROUND RUNUP (SUPPRESSED) REL HUMID = 70 %
( FAR FIELD NOISE ) PAGE 17
(-----)
```

FIGURE 10 MAXIMUM PERMISSIBLE TIME (T) FOR ONE EXPOSURE PER DAY (AFR 161-35, JULY 73)									
EQUAL TIME CONTOURS (MINUTES)									
NO PROTECTION									
NOISE SOURCE/SUBJECT:									
F-4 AIRCRAFT IN THE									
AF32A-14 SUPPRESSOR									
ENGINE J79-GE-17									
FAR FIELD NOISE									
OPERATION:									
ENGINE RUNUP 85% RPM									
TEMP = 15 C									
BAR PRESS = .760 M HG									
REL HUMID = 70 %									
METEOROLOGY:									
TEST 77-731-001									
RUN 01									
PAGE 7									
IDENTIFICATION:									
OMEGA 1.4									
POINT MIN									
A 960									
0	A	.	.	.	.	.	.	.	.
10	.	.	.	.	.	.	.	.	.
20	.	.	.	.	.	.	.	.	.
30	A	.	.	.	.	.	.	.	.
40	.	A	.	.	.	.	.	.	.
50	.	.	A	.	.	.	.	.	.
60	.	.	.	.	.	.	.	.	.
70	.	.	.	.	.	.	.	.	.
80	.	.	.	.	.	.	.	.	.
90	.	.	.	.	.	.	.	.	.
100	.	.	.	.	.	.	.	.	.
110	.	.	.	.	.	.	.	.	.
120	.	.	.	.	.	.	.	.	.
130	.	.	.	.	.	.	.	.	.
140	.	A	.	.	.	.	.	.	.
150	.	.	A	.	.	.	.	.	.
160	.	.	.	A	.	.	.	.	.
170	.	.	.	.	A	.	.	.	.
180	.	.	.	.	.	.	.	.	.
DISTANCE FROM SOURCE (METERS)									
5	6	8	1	1.5	2	3	4	5	6
1000									

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

[illegible]

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
M-133 GROUND COMMUNICATION UNIT

5 6 8 1 1.5 2 3 4 5 6 8
100 1000
DISTANCE FROM SOURCE (METERS)

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

9 EQUAL TIME CONTOURS (MINUTES)

NO PROTECTION

NOISE SOURCE/SUBJECT: (OPERATION:) METEOROLOGY: TEMP = 15 C

F-4 AIRCRAFT IN THE (AFTERBURNER POWER)

AF32A-14 SUPPRESSOR (SINGLE ENGINE) BAR PRESS = .760 M HG

ENGINE J79-GE-17 (GROUND RUNUP (SUPPRESSED)) REL HUMID = 70 %

FAR FIELD NOISE () PAGE 7

IDENTIFICATION:)

OMEGA 1.4)

TEST 77-731-001)

RUN 03)

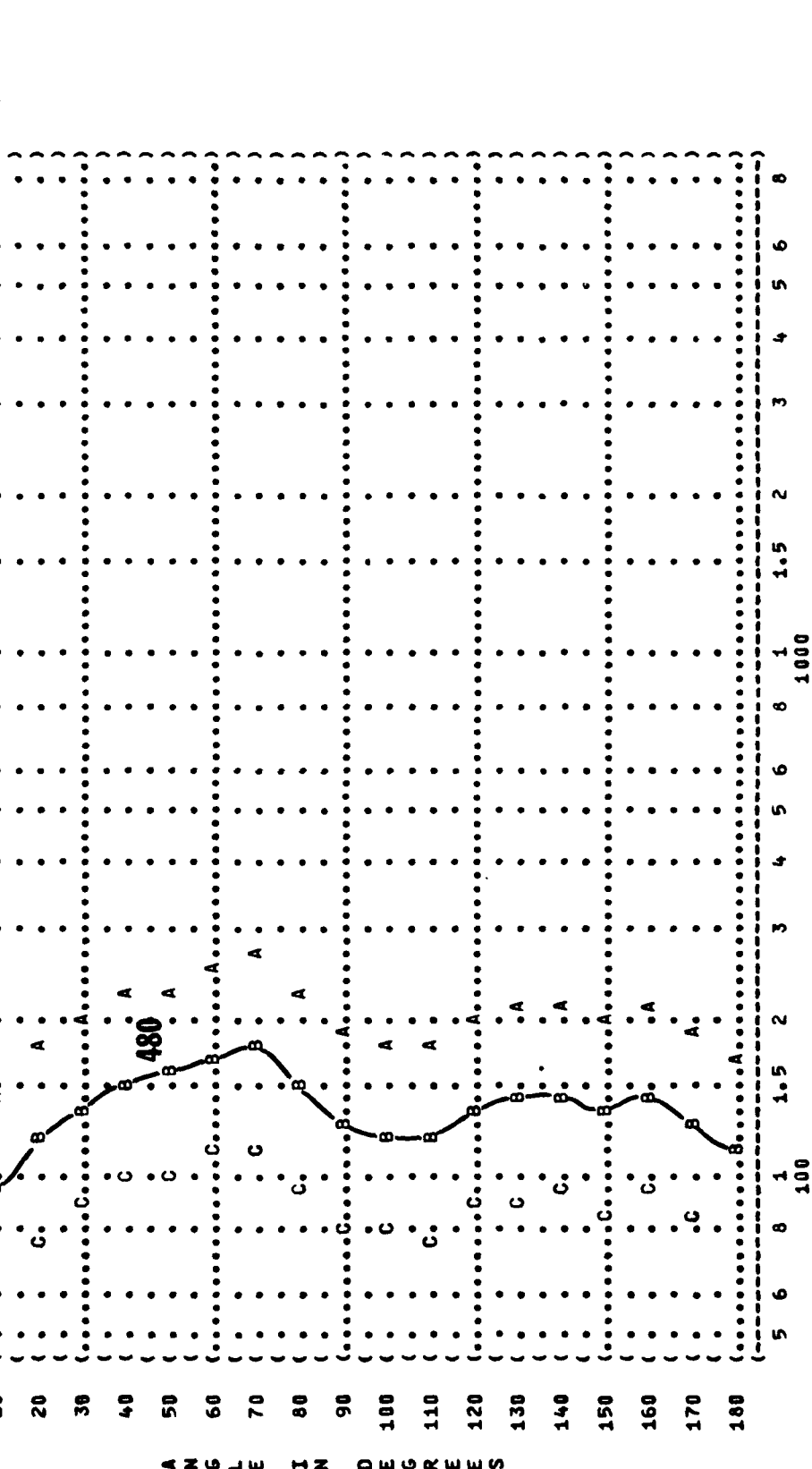
14 SEP 78)

POINT MIN

A 960

B 480

C 240



```

(-----)
( ( FIGURE: MAXIMUM PERMISSIBLE TIME {T} FOR ONE EXPOSURE PER DAY (AFR 161-35, JULY 73) ) IDENTIFICATION: )
( ( 9 ) ) )
( ( ) ) )
( ( ) ) )
( ( ) ) )
( ( NOISE SOURCE/SUBJECT: ) OPERATION: ) METEOROLOGY: ) TEST 77-731-001 )
( ( ) ) ) ) )
( ( F-4 AIRCRAFT IN THE ) AFTERBURNER POWER ) TEMP = 15 C ) )
( ( AF32A-14 SUPPRESSOR ) SINGLE ENGINE ) BAR PRESS = .760 M HG ) )
( ( ENGINE J79-GE-17 ) GROUND RUNUP (SUPPRESSED) ) REL HUMID = 70 % ) )
( ( FAR FIELD NOISE ) ) ) ) )
(-----)

```

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

FIGURE 10 SOUND PRESSURE LEVEL {SPL} EQUAL LEVEL CONTOURS (DB) 31.5 HZ OCTAVE BAND

```

1 NOISE SOURCE/SUBJECT: ) METEOROLOGY: ) RUN 01
2 F-4 AIRCRAFT IN THE ) TEMP = 15 C )
3 AF32A-14 SUPPRESSOR ) BAR PRESS = .760 M HG )
4 ENGINE J79-GE-17 ) REL HUMID = 70 % )
5 FAR FIELD NOISE ) ) PAGE 10

```

UNUP 85% RPM	) METEOROLOGY :
ENGINE	) TEMP :
UNUP (SUPPRESSED)	) BAR PRESS :
	) REL HUMID :

```

) RUN 01
)
)
) 14 SEP 78
)
)

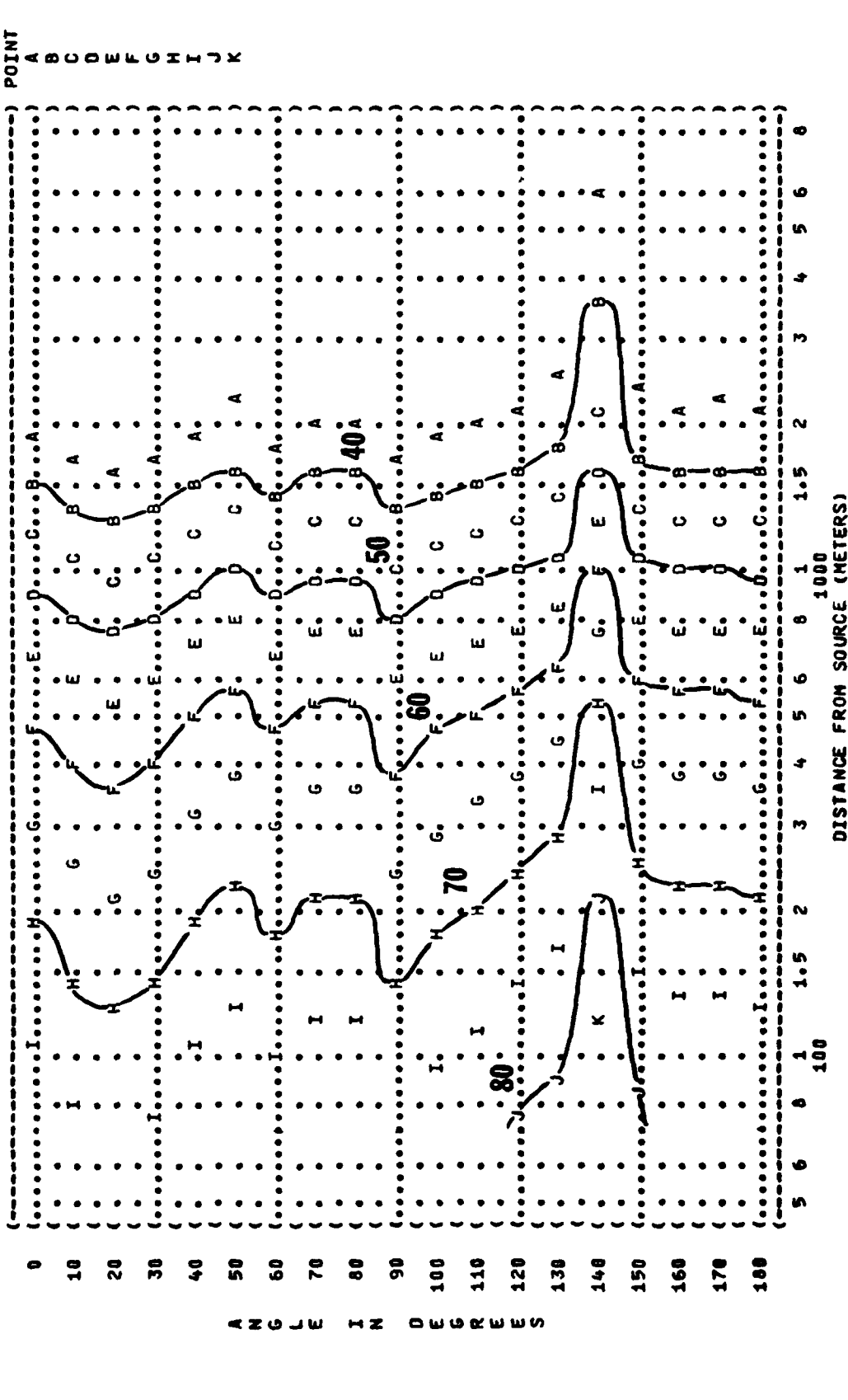
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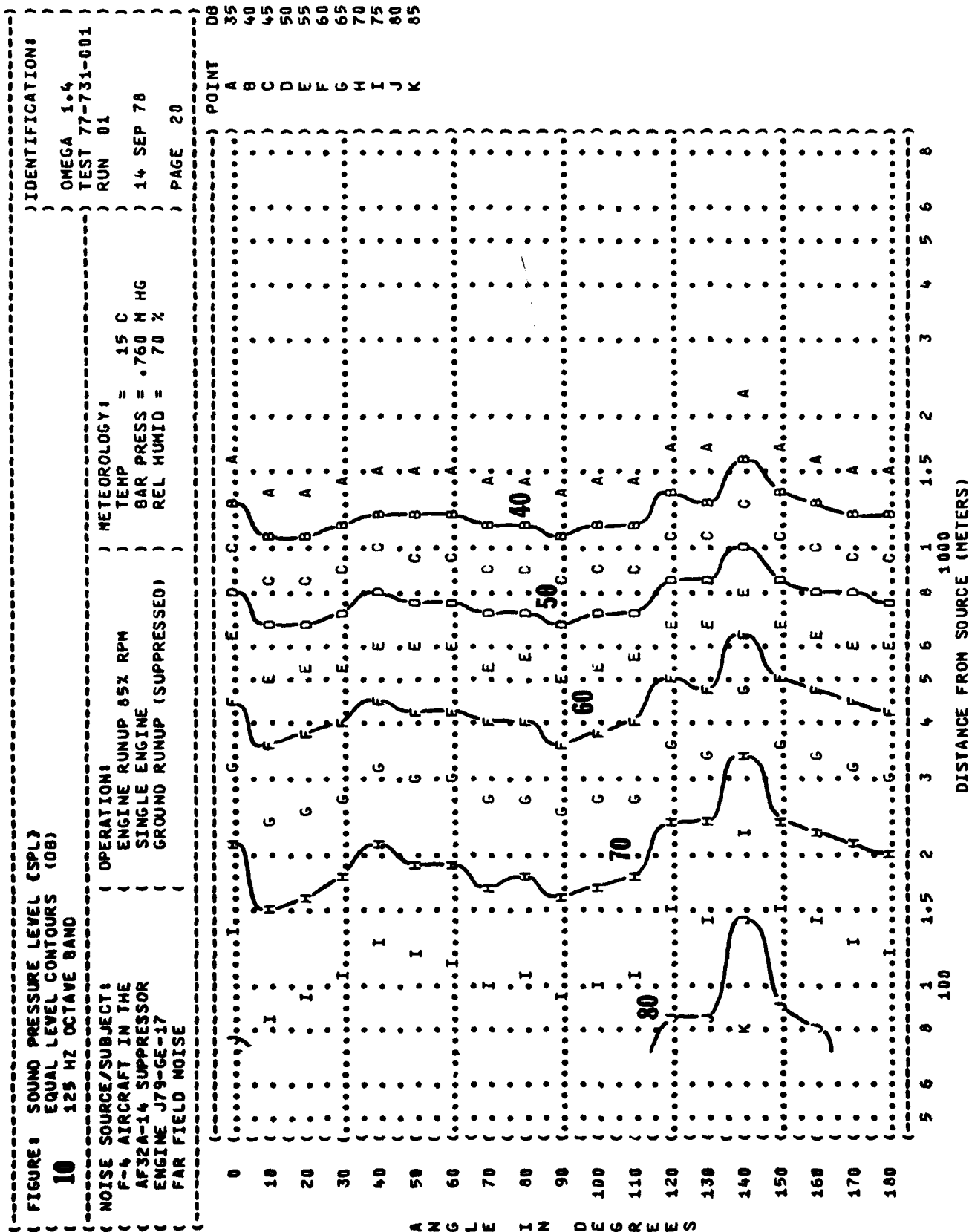
((FIGURE: SOUND PRESSURE LEVEL {SPL}
((EQUAL LEVEL CONTOURS (DB)
((**10**
((63 HZ OCTAVE BAND
-----)
) IDENTIFICATION:)
)
)
) OMEGA 1.4)
-----) TEST 77-731-001)

) RUN 01
)
) 14 SEP 78
)
) PAGE 19

ERATION:
ENGINE RUNUP 85% RPM
SINGLE ENGINE
GROUND RUNUP (SUPPRESSED)
)
)
)
)
)
)



Only



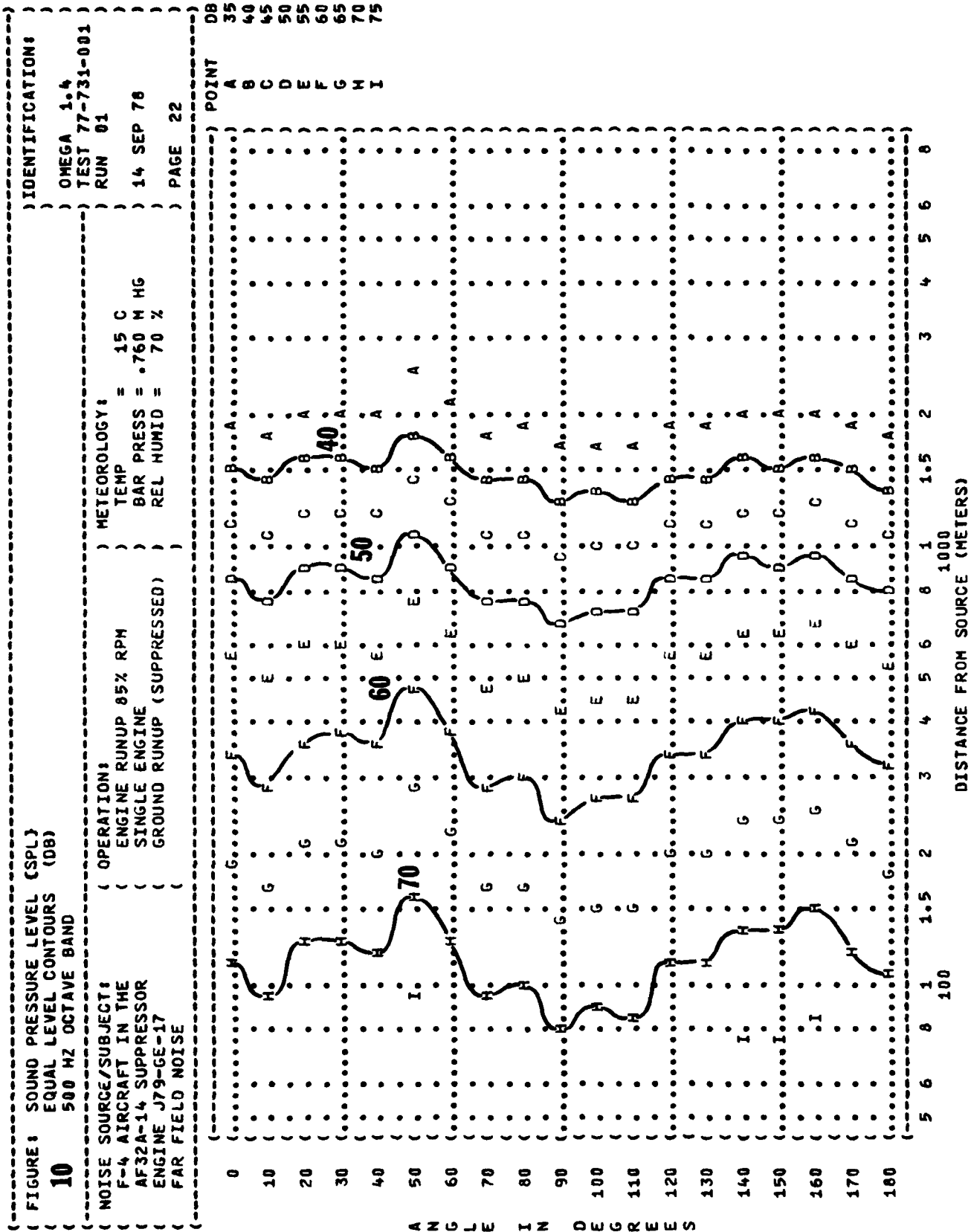
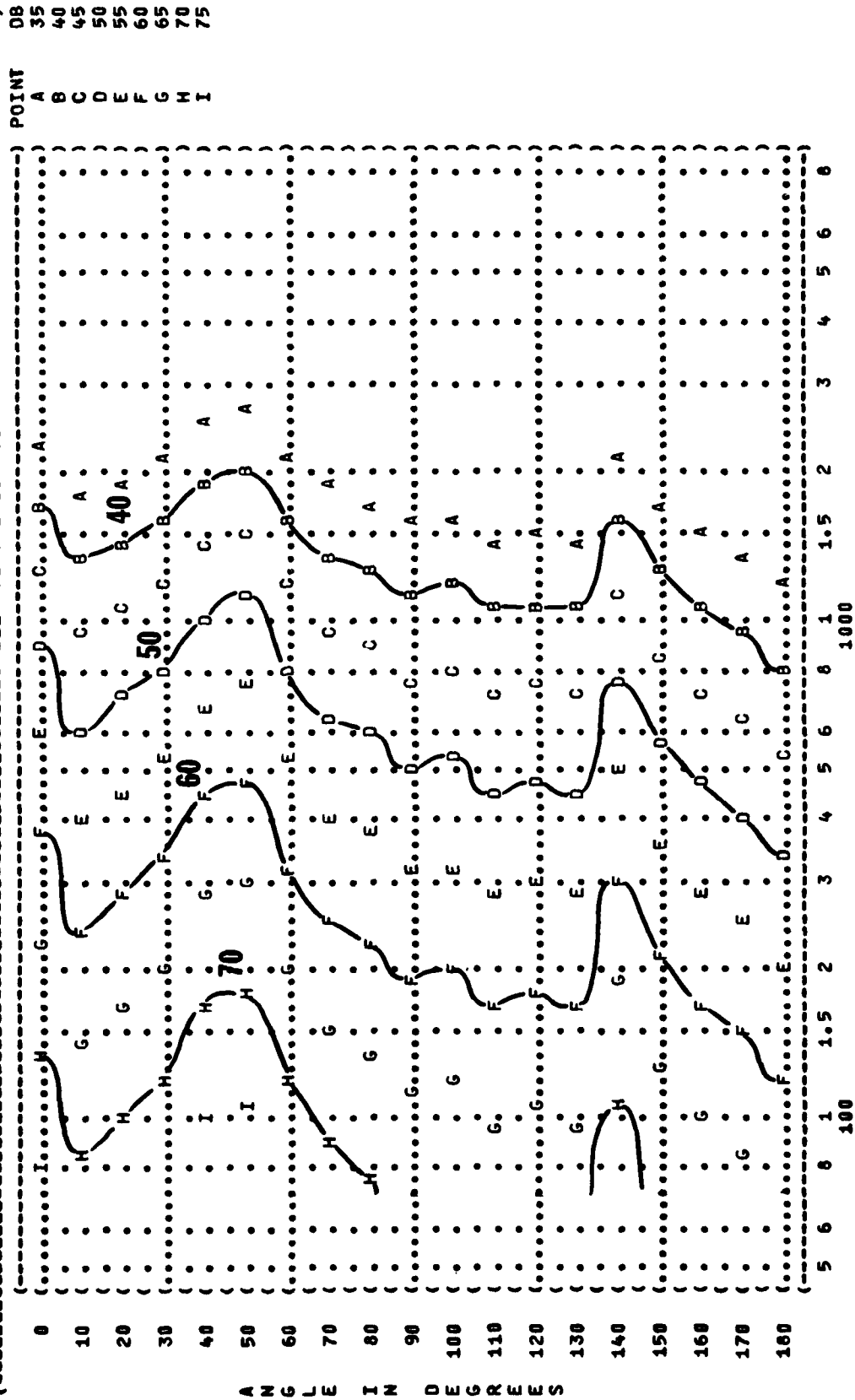


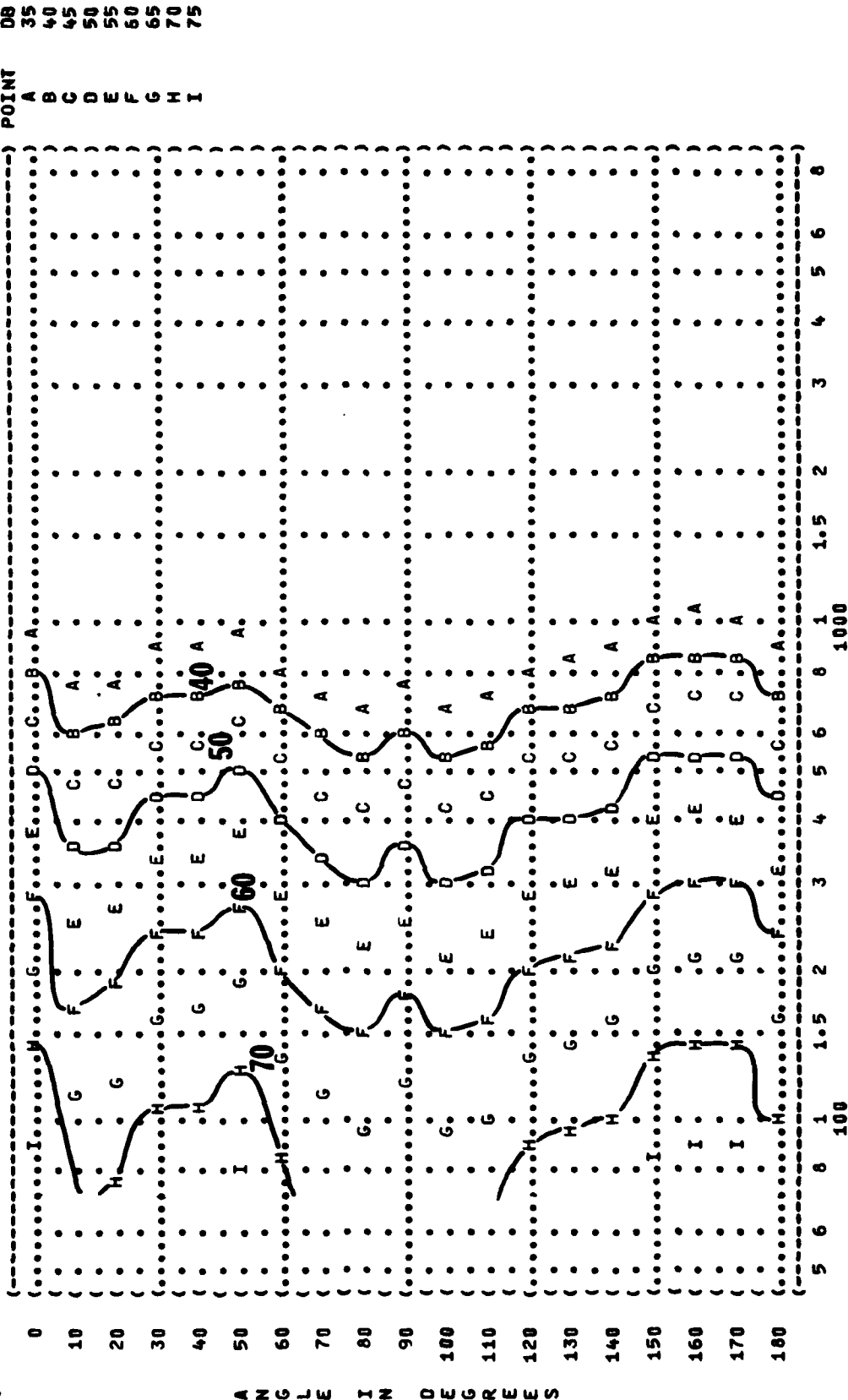
FIGURE 10 SOUND PRESSURE LEVEL {SPL} EQUAL LEVEL CONTOURS 1000 HZ OCTAVE BAND

IDENTIFICATION:
OMEGA 1.4
TEST 77-731-001

NOISE SOURCE/SUBJECT:	(OPERATION:	METEOROLOGY:
F-4 AIRCRAFT IN THE	(ENGINE RUNUP 85% RPM	TEMP = 15 C
AF32A-14 SUPPRESSOR	(SINGLE ENGINE	BAR PRESS = .760 M HG
ENGINE J79-GE-17	(GROUND RUNUP (SUPPRESSED)	REL HUMID = 70 %

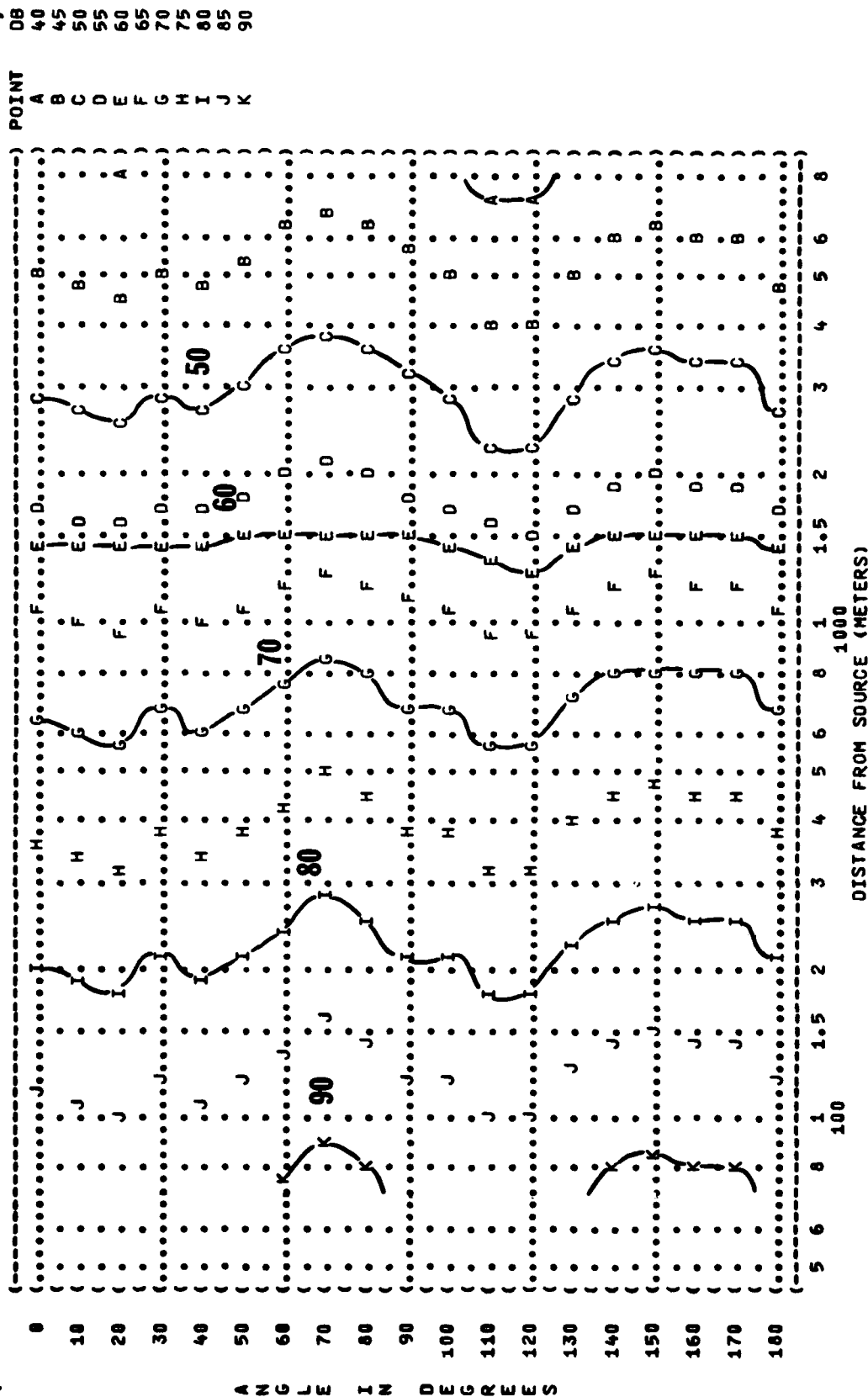


(FIGURE: SOUND PRESSURE LEVEL (SPL)
 (EQUAL LEVEL CONTOURS (DB)
 (10 4000 HZ OCTAVE BAND
 () IDENTIFICATION:
 () OMEGA 1.4
 () TEST 77-731-001
 () RUN 01
 (NOISE SOURCE/SUBJECT:
 () OPERATION:
 () ENGINE RUNUP 85% RPM
 () TEMP = 15 C
 () SINGLE ENGINE
 () BAR PRESS = .760 H HG
 () GROUND RUNUP (SUPPRESSED)
 () REL HUMID = 70 %
 () FAR FIELD NOISE
 () PAGE 25

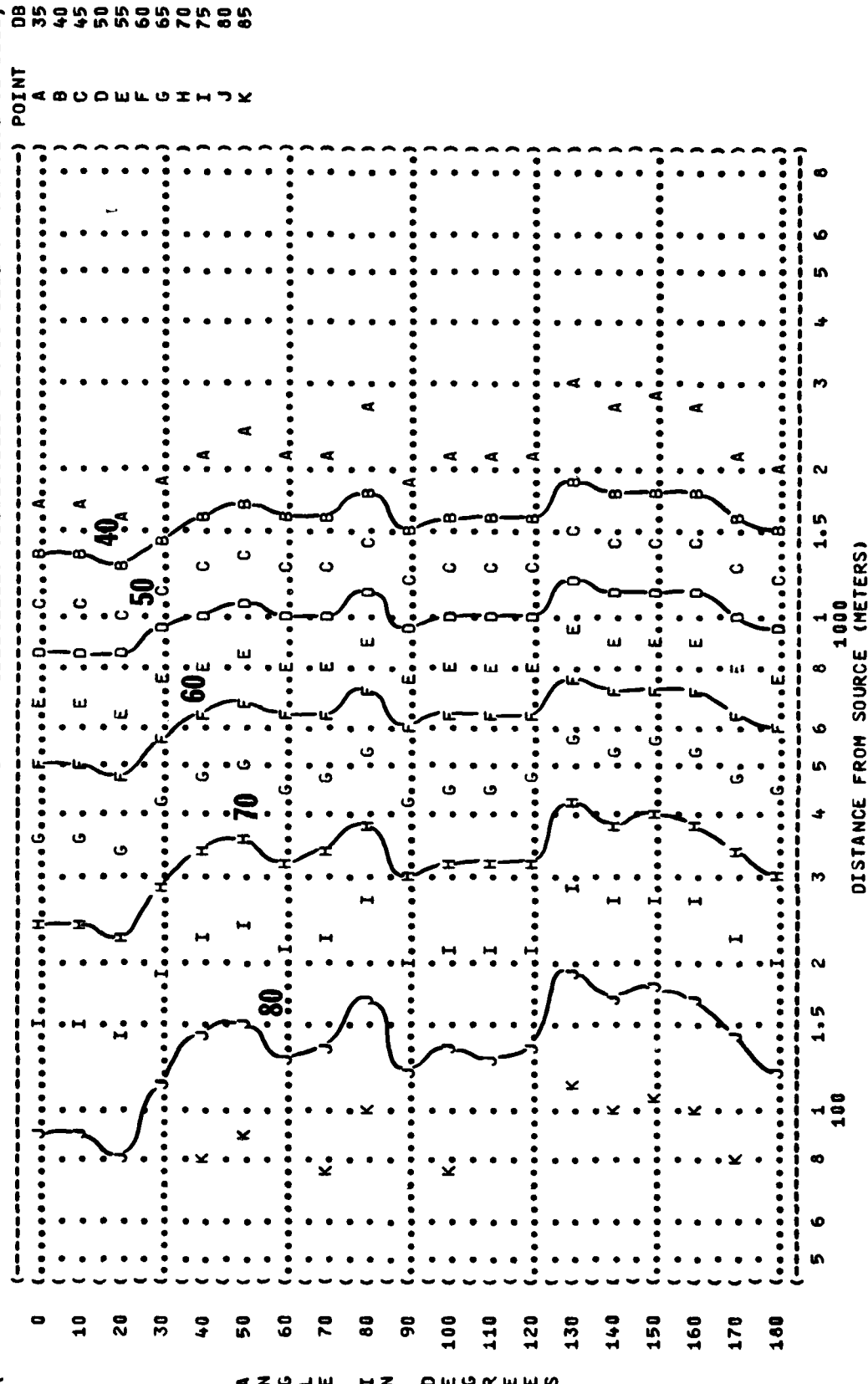


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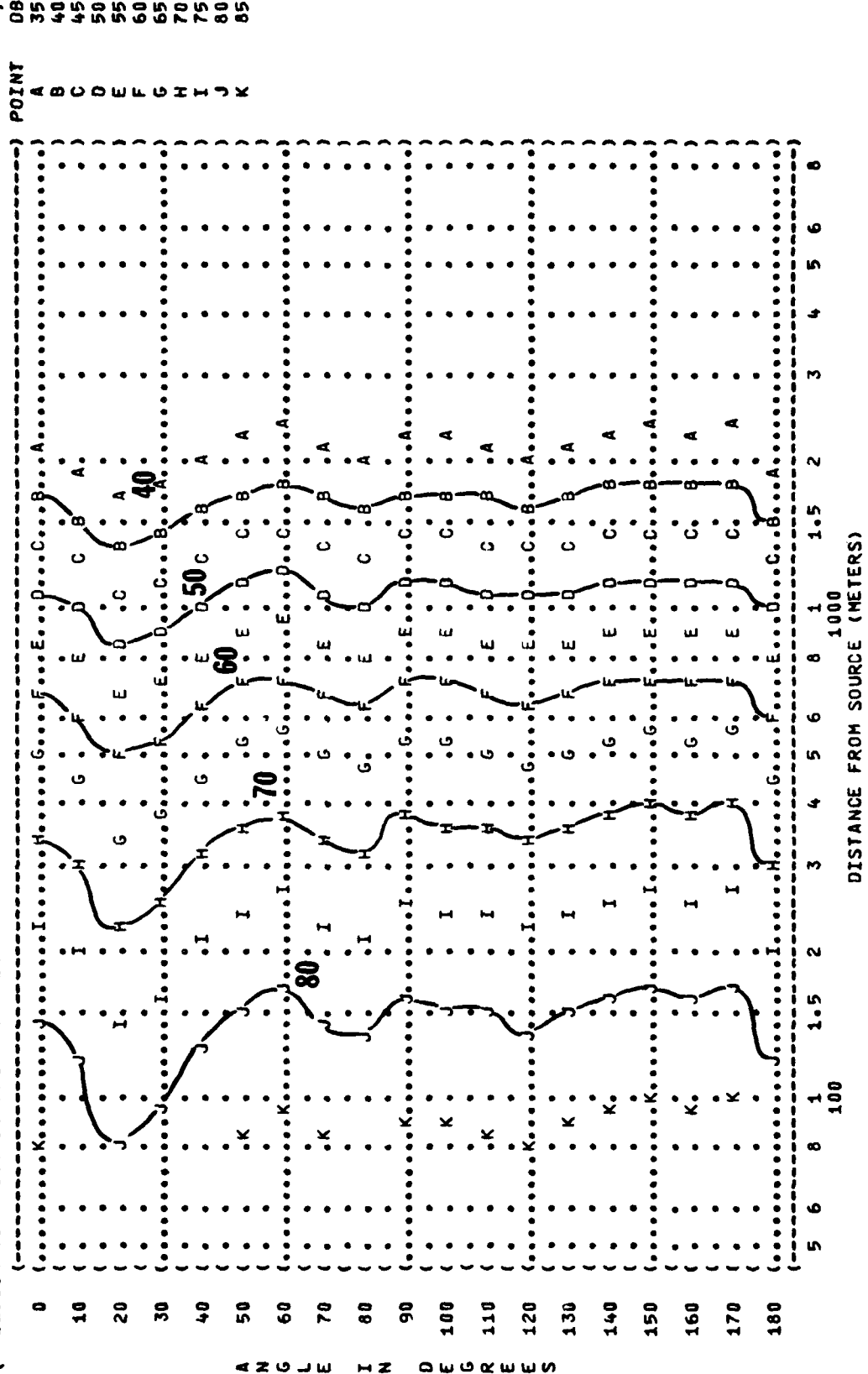

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(-----)
( FIGURE: SOUND PRESSURE LEVEL {SPL} ) IDENTIFICATION: )
( 10 EQUAL LEVEL CONTOURS (DB) ) )
( 31.5 HZ OCTAVE BAND ) OMEGA 1.4 )
( ) TEST 77-731-001 )
( NOISE SOURCE/SUBJECT: ) METEOROLOGY: ) RUN 02 )
( F-4 AIRCRAFT IN THE ) OPERATION: ) TEMP = 15 C )
( AF32A-14 SUPPRESSOR ) MILITARY POWER 98.5% RPM ) BAR PRESS = .760 M HG )
( ENGINE J79-G5-17 ) SINGLE ENGINE ) REL HUMID = 70 % )
( FAR FIELD NOISE ) GROUND RUNUP (SUPPRESSED) ) PAGE 18 )
(-----)
```



(FIGURE: SOUND PRESSURE LEVEL {SPL})
 (10 EQUAL LEVEL CONTOURS (DB))
 (125 HZ OCTAVE BAND)
 (NOISE SOURCE/SUBJECT:)
 (F-4 AIRCRAFT IN THE)
 (AF32A-14 SUPPRESSOR)
 (ENGINE J79-GE-17)
 (FAR FIELD NOISE)
 (OPERATION:)
 (MILITARY POWER 98.5% RPM)
 (SINGLE ENGINE)
 (GROUND RUNUP (SUPPRESSED))
 (METEOROLOGY:)
 (TEMP = 15 C)
 (BAR PRESS = .760 M HG)
 (REL HUMID = 70 %)
 (IDENTIFICATION:)
 (OMEGA 1.4)
 (TEST 77-731-001)
 (RUN 02)
 (14 SEP 78)
 (PAGE 20)



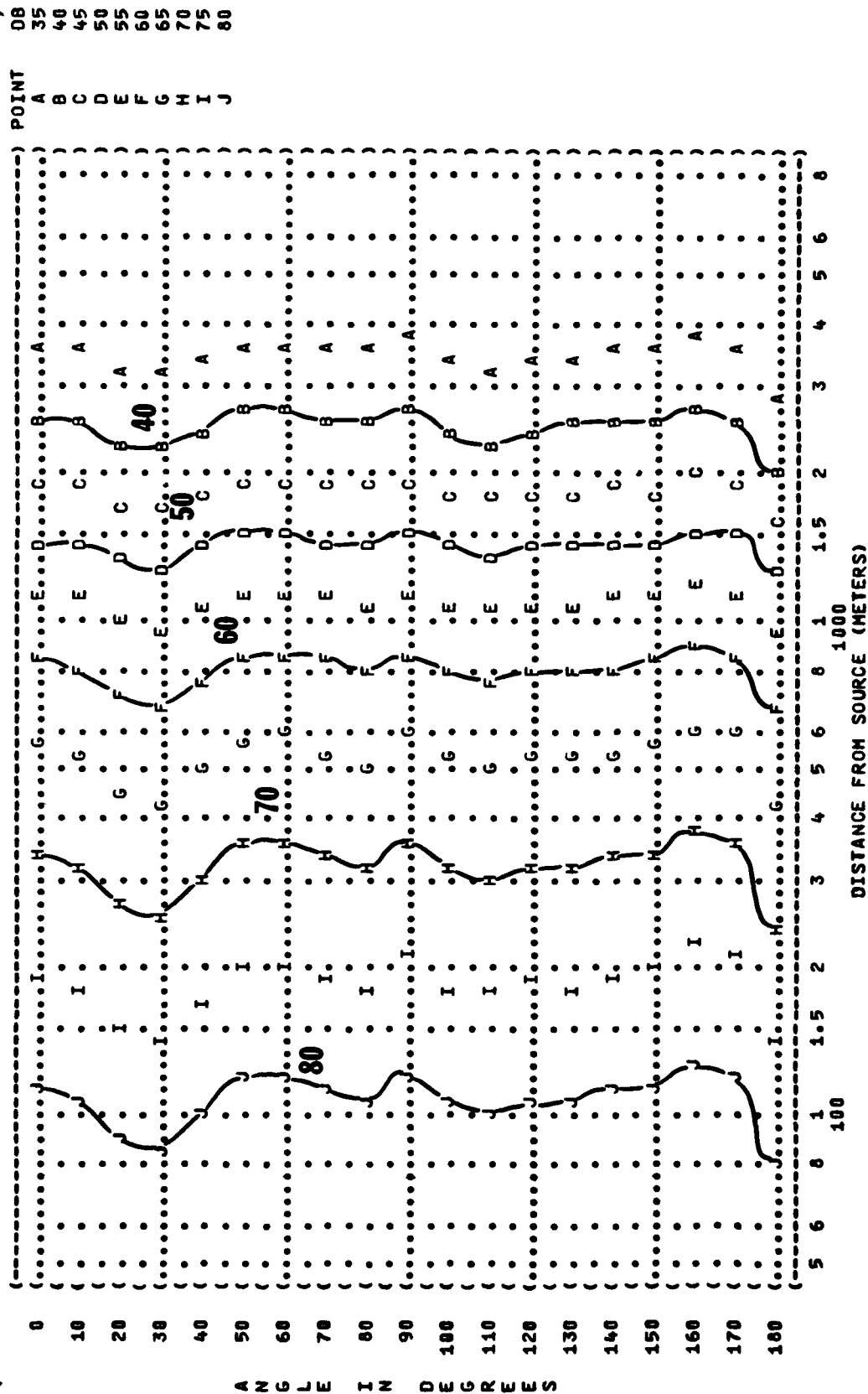
(FIGURE: SOUND PRESSURE LEVEL (SPL)
 (EQUAL LEVEL CONTOURS (DB)
 (10 250 HZ OCTAVE BAND
 () IDENTIFICATION:
 () OMEGA 1.4
 () TEST 77-731-001
 () RUN 02
 (NOISE SOURCE/SUBJECT:) METEOROLOGY:
 (F-4 AIRCRAFT IN THE) TEMP = 15 C
 (AF32A-14 SUPPRESSOR) SINGLE ENGINE) BAR PRESS = .760 M HG
 (ENGINE J79-GE-17) GROUND RUNUP (SUPPRESSED)) REL HUMID = 70 %
 (FAR FIELD NOISE)) PAGE 21



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(-----)
( ( FIGURE: SOUND PRESSURE LEVEL (SPL) ) )
( ( EQUAL LEVEL CONTOURS (DB) ) )
( ( 10 ) )
( ( 500 HZ OCTAVE BAND ) )
(-----)
( ( NOISE SOURCE/SUBJECT: ) )
( ( F-4 AIRCRAFT IN THE ) )
( ( AF32A-14 SUPPRESSOR ) )
( ( ENGINE J79-GE-17 ) )
( ( FAR FIELD NOISE ) )
(-----)
( ( OPERATION: ) )
( ( MILITARY POWER 98.5% RPM ) )
( ( SINGLE ENGINE ) )
( ( GROUND RUNUP (SUPPRESSED) ) )
(-----)
( ( METEOROLOGY: ) )
( ( TEMP = 15 C ) )
( ( BAR PRESS = .760 M HG ) )
( ( REL HUMID = 70 % ) )
(-----)
( ( IDENTIFICATION: ) )
( ( ) )
( ( OMEGA 1.4 ) )
( ( TEST 77-731-001 ) )
( ( RUN 02 ) )
( ( 14 SEP 78 ) )
( ( ) )
( ( PAGE 22 ) )
(-----)

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IDENTIFICATION:

OMEGA 1.4
TEST 77-731-001

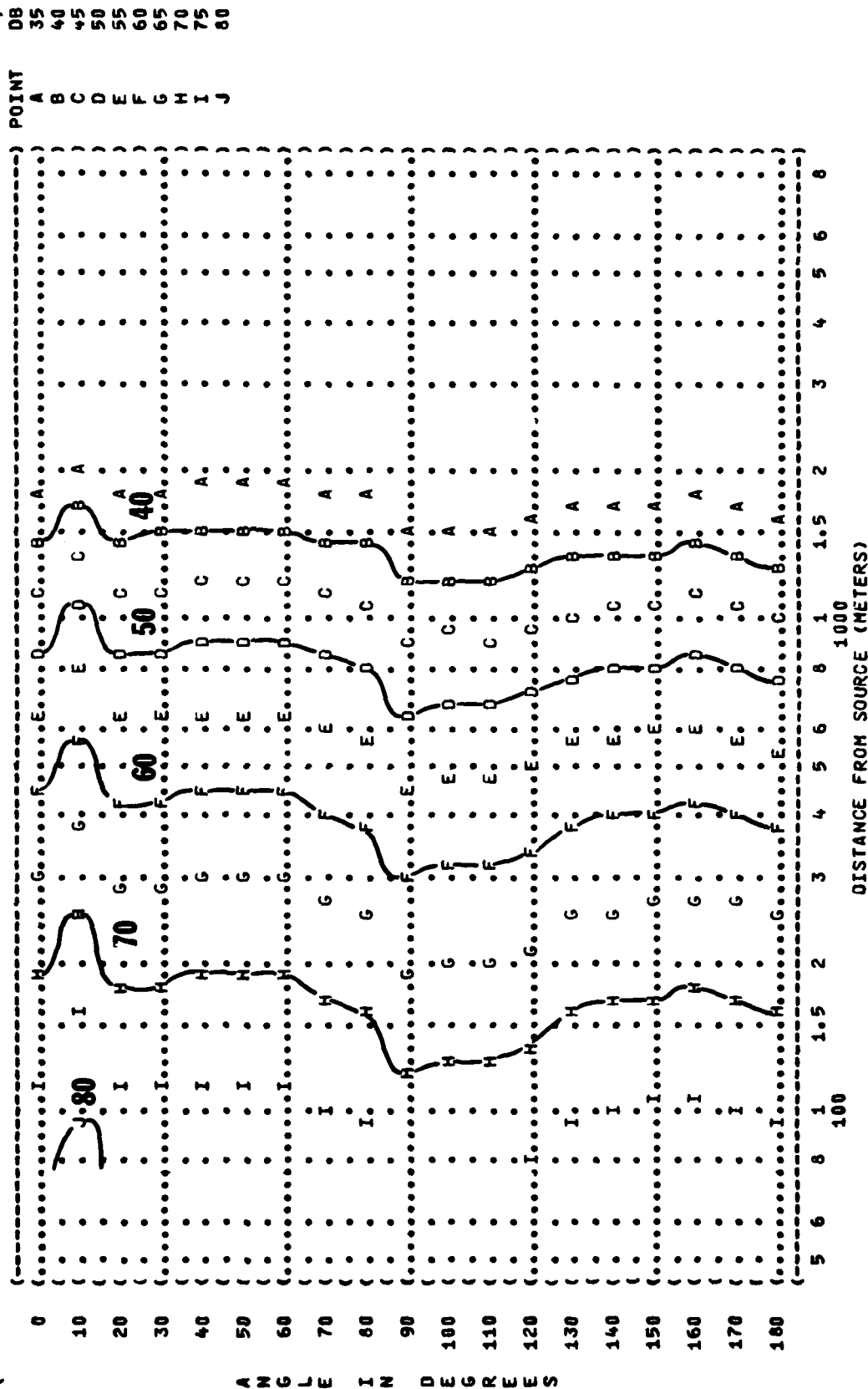
METEOROLOGY:

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

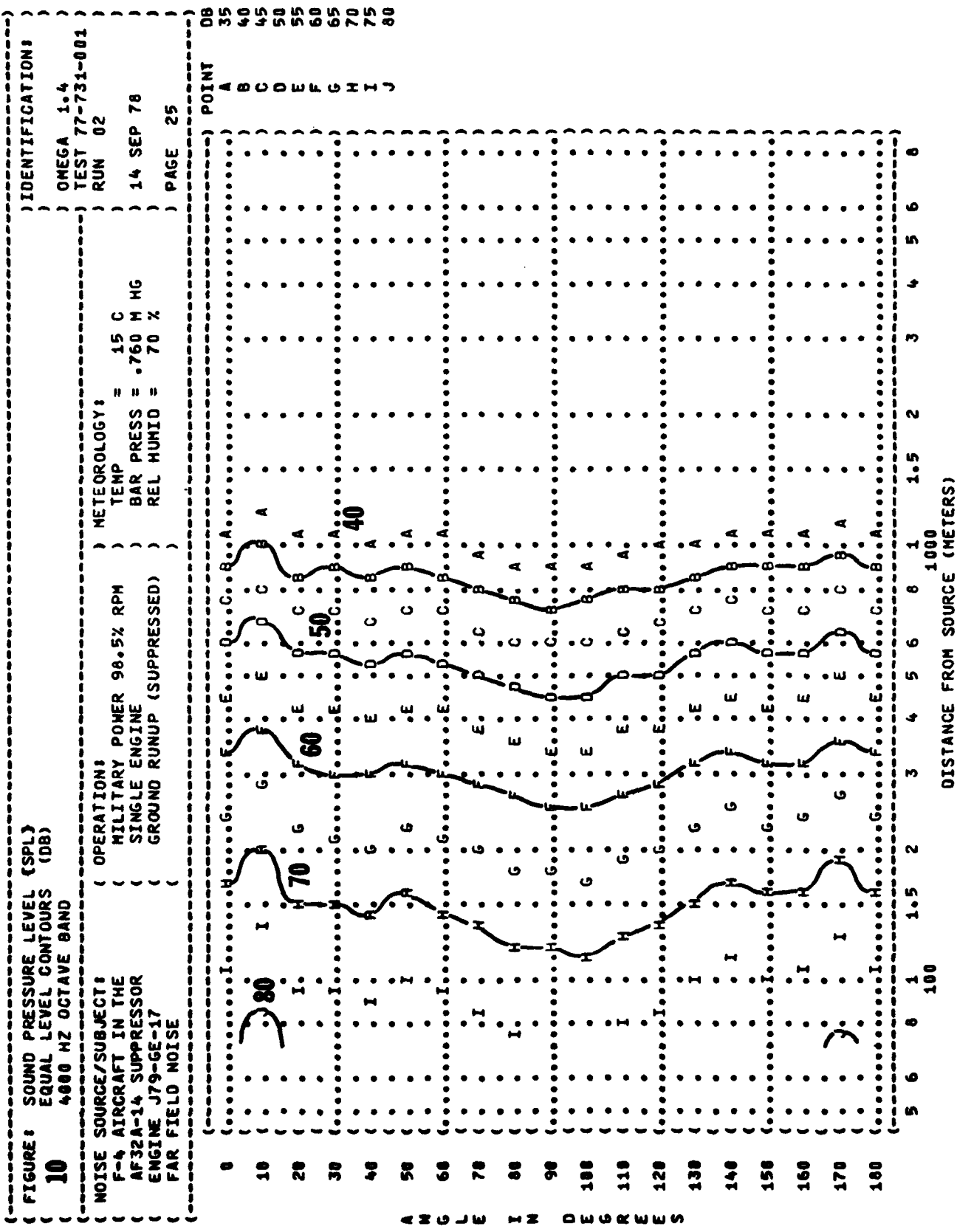
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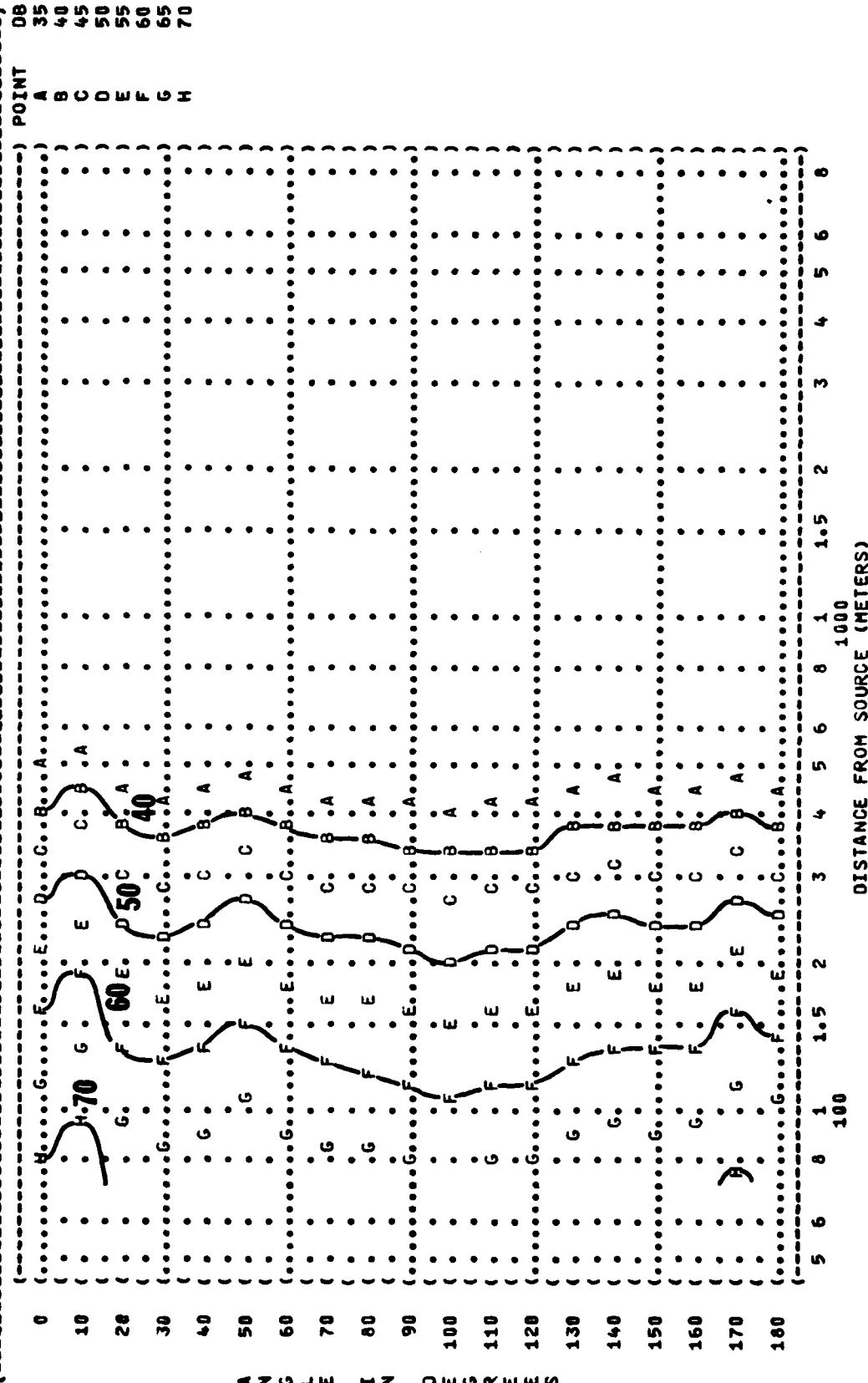
(FIGURE: SOUND PRESSURE LEVEL (SPL)) IDENTIFICATION:)
 ((EQUAL LEVEL CONTOURS (DB)))
 (10 2000 HZ OCTAVE BAND) OMEGA 1.4)
 () TEST 77-731-001)
 () RUN 02)
 (NOISE SOURCE/SUBJECT:) METEOROLOGY:)
 (F-4 AIRCRAFT IN THE) TEMP = 15 C)
 (AF32A-14 SUPPRESSOR) BAR PRESS = .760 M HG)
 (ENGINE J79-GE-17) REL HUMID = 70 %)
 (FAR FIELD NOISE))
 () PAGE 24)



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



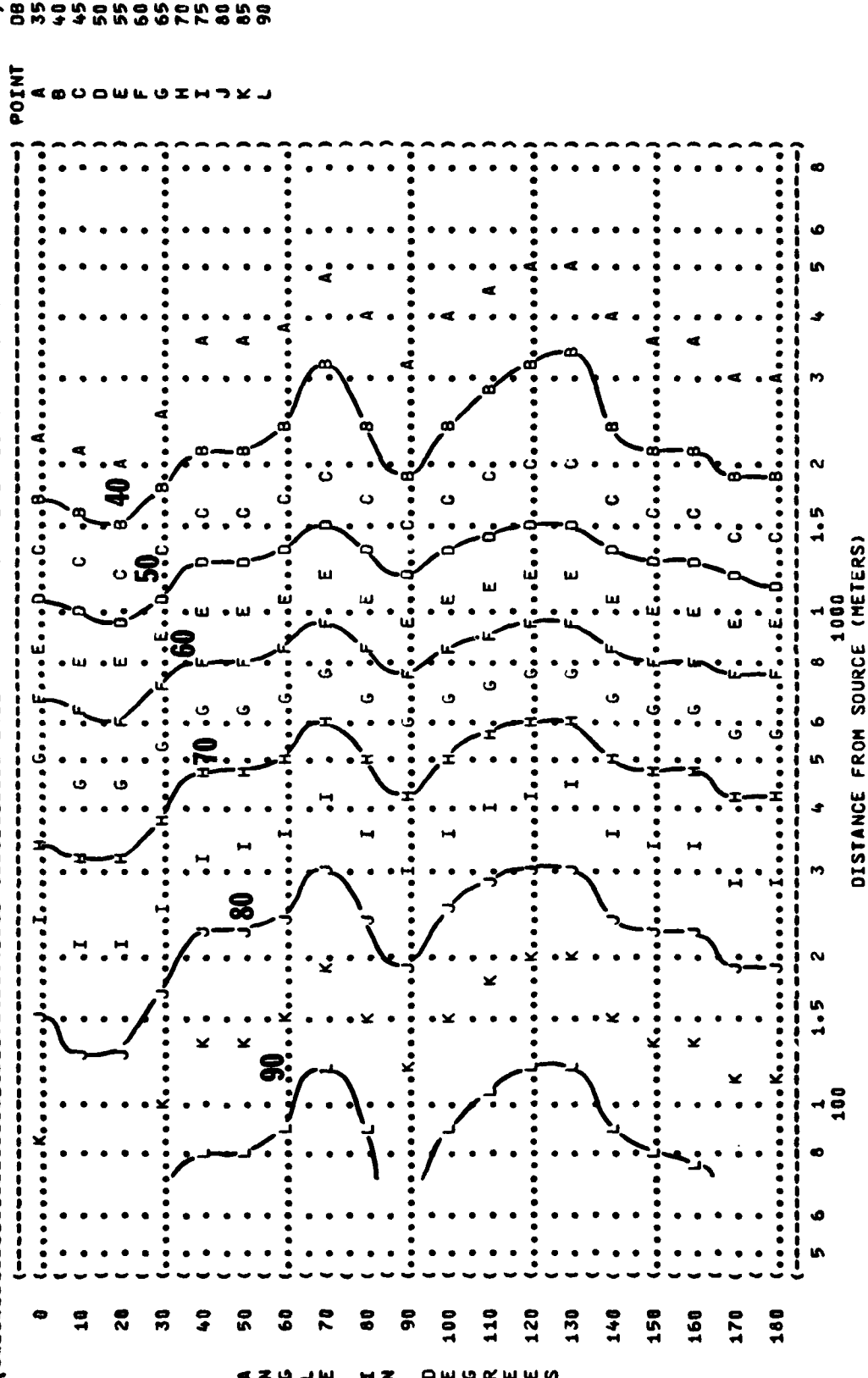
(FIGURE: SOUND PRESSURE LEVEL (SPL)
 (10 EQUAL LEVEL CONTOURS (DB)
 (8000 HZ OCTAVE BAND
 (NOISE SOURCE/SUBJECT:
 (F-4 AIRCRAFT IN THE
 (AF32A-14 SUPPRESSOR
 (ENGINE J79-GE-17
 (FAR FIELD NOISE
 (OPERATION:
 (MILITARY POWER 98.5% RPM
 (SINGLE ENGINE
 (GROUND RUNUP (SUPPRESSED)
 (METEOROLOGY:
 (TEMP = 15 C
 (BAR PRESS = .760 M HG
 (REL HUMID = 70 %
 (IDENTIFICATION:
 (OMEGA 1.4
 (TEST 77-731-001
 (RUN 02
 (14 SEP 78
 (PAGE 26



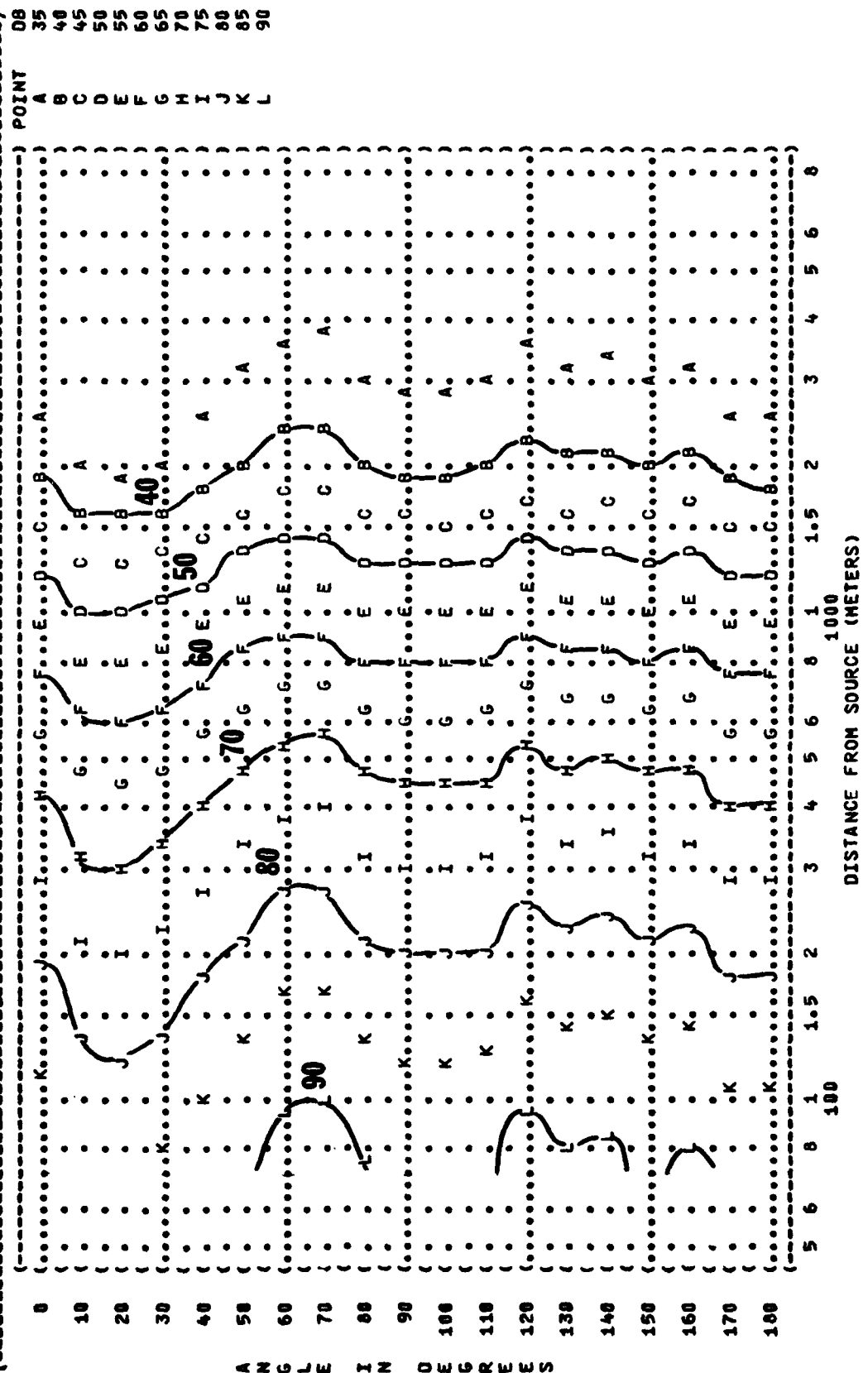
	DB	45	50	55	60	65	70	75	80	85	90	95	100
INT	A	B	C	D	E	F	G	H	I	J	K	L	

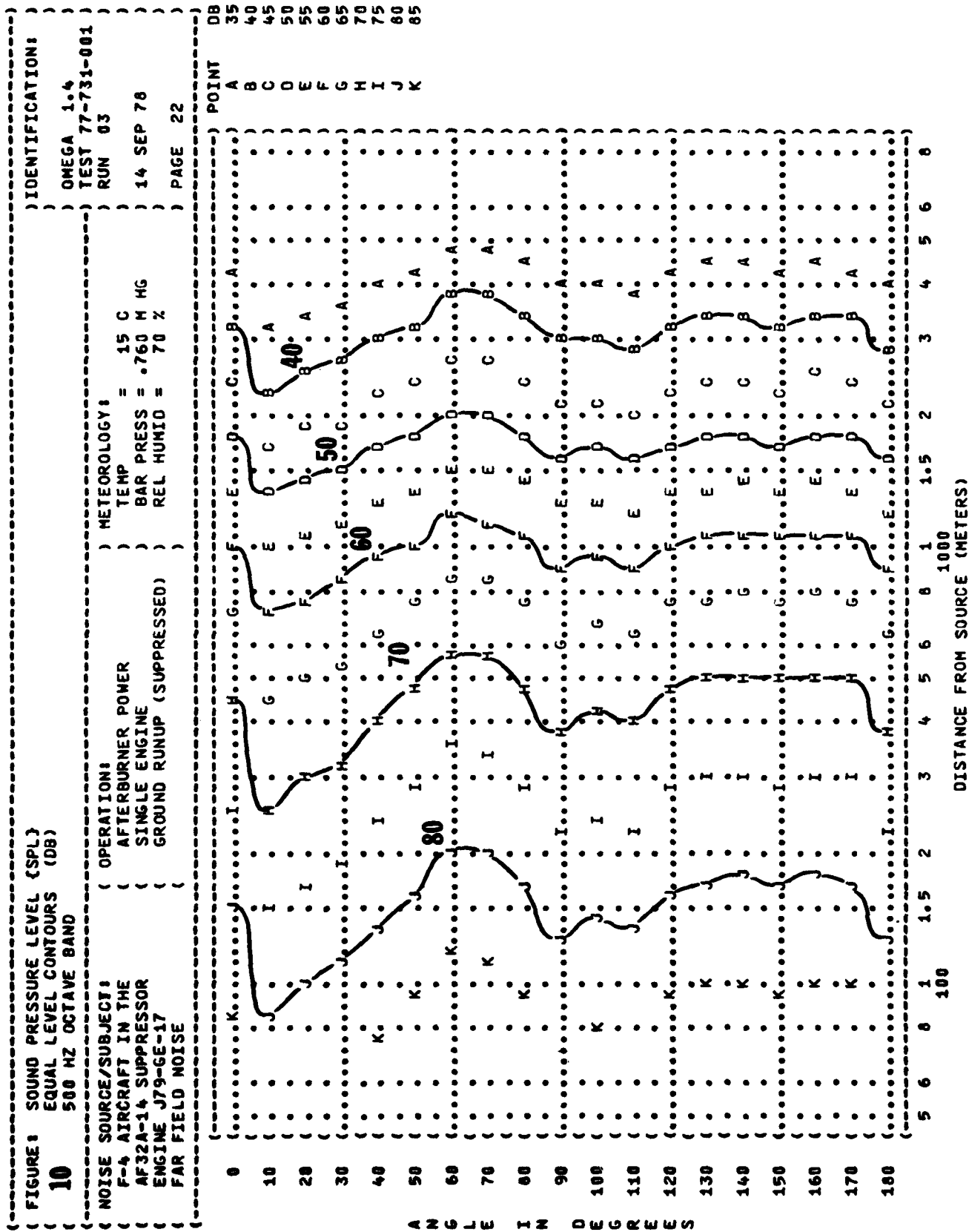


(FIGURE 1 SOUND PRESSURE LEVEL (SPL)
 (EQUAL LEVEL CONTOURS (DB)
 (10 125 HZ OCTAVE BAND
 (NOISE SOURCE/SUBJECT:
 (F-4 AIRCRAFT IN THE
 (AF32A-14 SUPPRESSOR
 (ENGINE J79-GE-17
 (FAR FIELD NOISE
 (OPERATION:
 (AFTERBURNER POWER
 (SINGLE ENGINE
 (GROUND RUNUP (SUPPRESSED)
 (METEOROLOGY:
 (TEMP = 15 C
 (BAR PRESS = .760 M HG
 (REL HUMID = 70 %
 (IDENTIFICATION:
 (OMEGA 1.4
 (TEST 77-731-001
 (RUN 03
 (14 SEP 78
 (PAGE 20

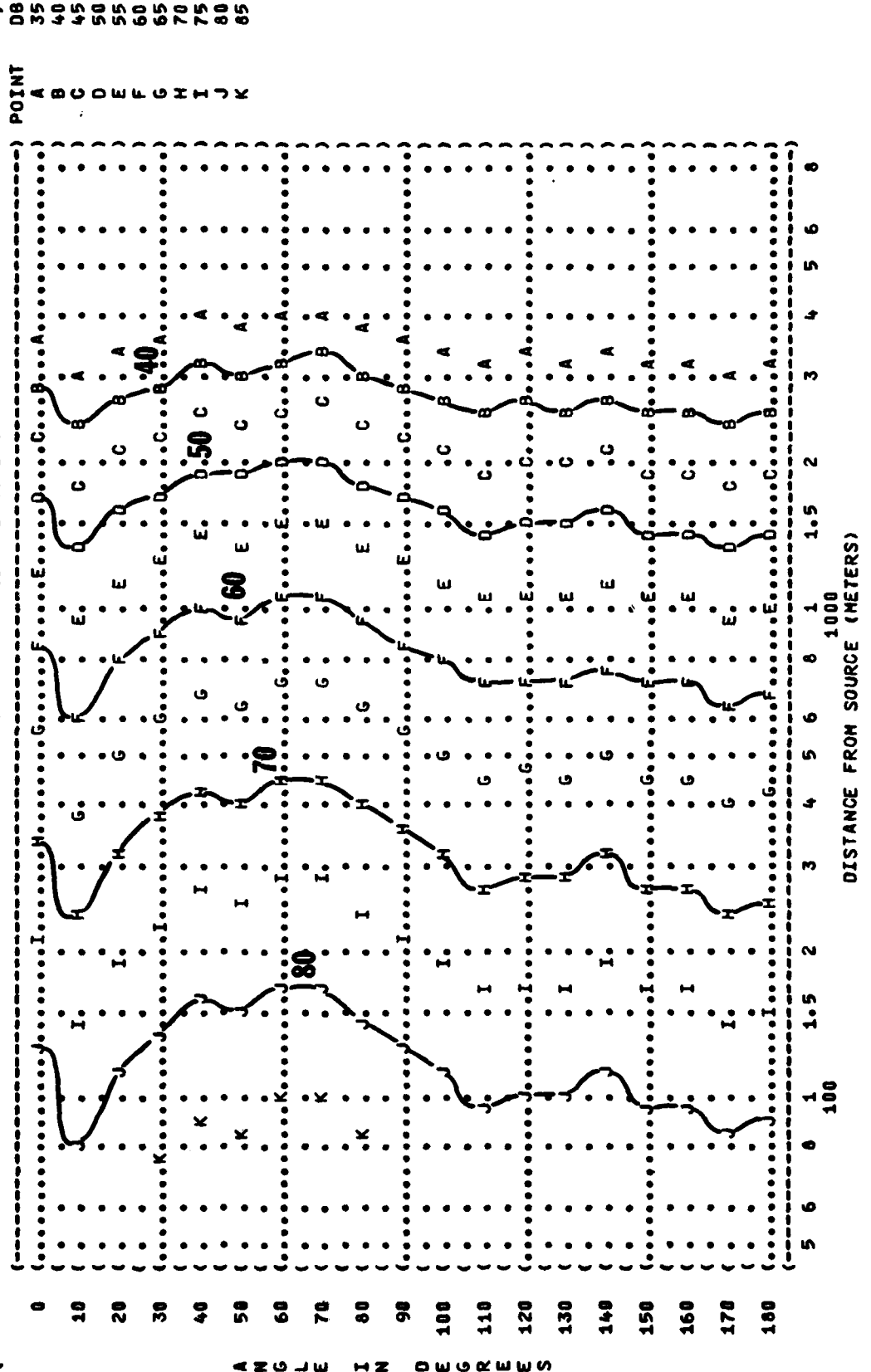


(FIGURE: SOUND PRESSURE LEVEL (SPL)
 (EQUAL LEVEL CONTOURS (DB)
 (10 250 HZ OCTAVE BAND
 (NOISE SOURCE/SUBJECT: (OPERATION:
 (F-4 AIRCRAFT IN THE (AFTERBURNER POWER
 (AF32A-14 SUPPRESSOR (SINGLE ENGINE
 (ENGINE J79-GE-17 (GROUND RUNUP (SUPPRESSED)
 (FAR FIELD NOISE ()
 () IDENTIFICATION:
 () OMEGA 1.4
 () TEST 77-731-001
 () RUN 03
 () TEMP = 15 C
 () BAR PRESS = .760 M HG
 () REL HUMID = 70 %
 () PAGE 21

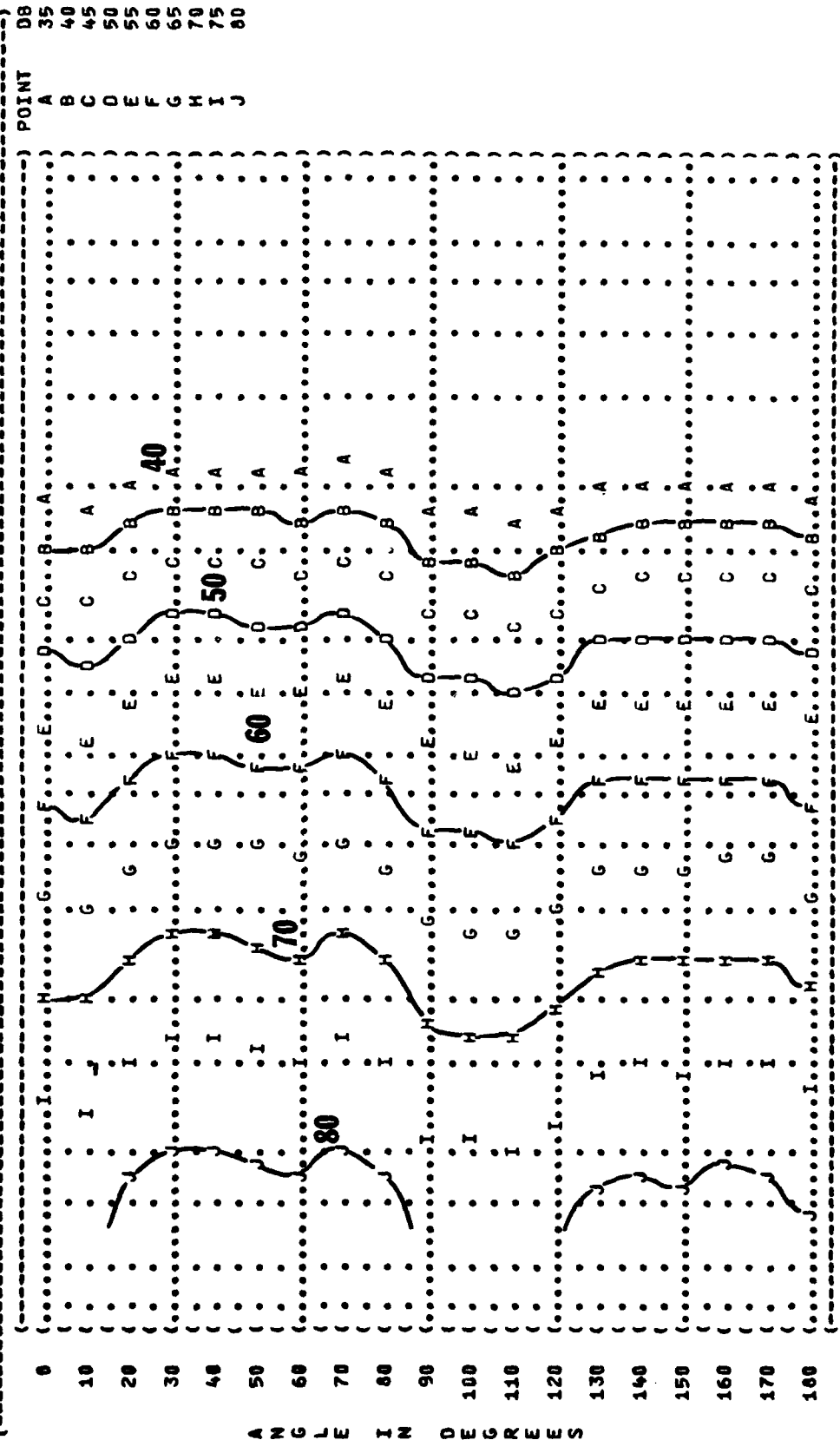




(FIGURE: SOUND PRESSURE LEVEL (SPL)
 (10 EQUAL LEVEL CONTOURS (DB)
 (1000 HZ OCTAVE BAND
 (NOISE SOURCE/SUBJECT: (OPERATIONS:) METEOROLOGY:) IDENTIFICATION:)
 (F-4 AIRCRAFT IN THE (AFTERBURNER POWER) TEMP = 15 C) OMEGA 1.4
 (AF32A-14 SUPPRESSOR (SINGLE ENGINE) BAR PRESS = .760 M HG) TEST 77-731-001
 (ENGINE J79-GE-17 (GROUND RUNUP (SUPPRESSED)) REL HUMID = 70 %) RUN 03
 (FAR FIELD NOISE ()) PAGE 23)



(FIGURE: SOUND PRESSURE LEVEL (SPL)
 (EQUAL LEVEL CONTOURS (DB)
 (10 2000 HZ OCTAVE BAND
 (NOISE SOURCE/SUBJECT:
 (F-4 AIRCRAFT IN THE
 (AF32A-14 SUPPRESSOR
 (ENGINE J79-GE-17
 (FAR FIELD NOISE
 (OPERATION:
 (AFTERBURNER POWER
 (SINGLE ENGINE
 (GROUND RUNUP (SUPPRESSED)
 (METEOROLOGY:
 (TEMP = 15 C
 (BAR PRESS = .760 M HG
 (REL HUMID = 70 %
 (IDENTIFICATION:
 (OMEGA 1.4
 (TEST 77-731-001
 (RUN 03
 (14 SEP 78
 (PAGE 24



0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150 160 170 180
 A M G L E I N D E G R E E S
 5 6 8 1 1.5 2 3 4 5 6 8
 100 1000
 DISTANCE FROM SOURCE (METERS)

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(-----)
( ( FIGURE: SOUND PRESSURE LEVEL {SPL} ) IDENTIFICATION: )
( ( EQUAL LEVEL CONTOURS (DB) ) )
( ( 10 ) )
( ( 4000 HZ OCTAVE BAND ) )
( ( NOISE SOURCE/SUBJECT: ) METEOROLOGY: )
( ( F-4 AIRCRAFT IN THE ) AFTERBURNER POWER = 15 C )
( ( AF32A-14 SUPPRESSOR ) SINGLE ENGINE ) BAR PRESS = .760 M HG )
( ( ENGINE J79-GE-17 ) GROUND RUNUP (SUPPRESSED) ) REL HUMID = 70 % )
( ( FAR FIELD NOISE ) ) PAGE 25 )
(-----)
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