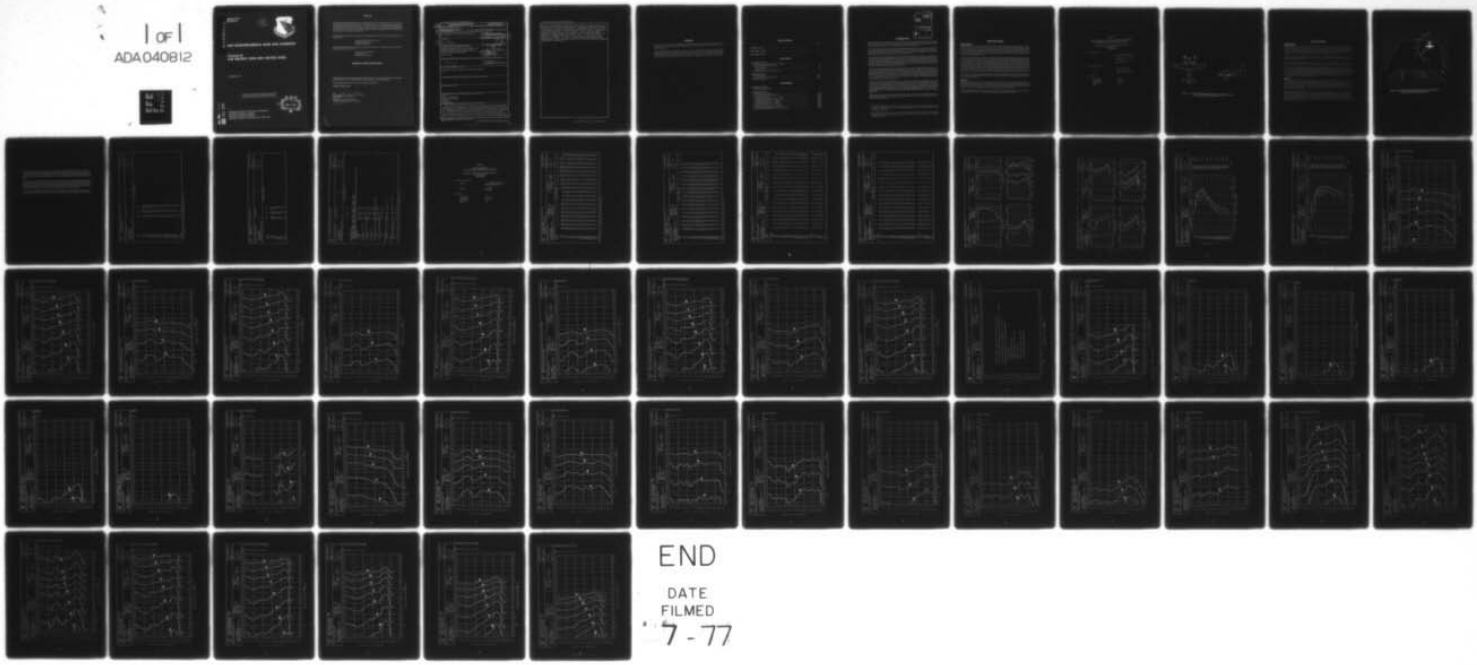
AD-A040 812 AEROSPACE MEDICAL RESEARCH LAB WRIGHT-PATTERSON AFB OHIO F/G 20/1
USAF BIOENVIRONMENTAL NOISE DATA HANDBOOK. VOLUME 66. U-4B AIRC--ETC(U)
NOV 75 R G POWELL

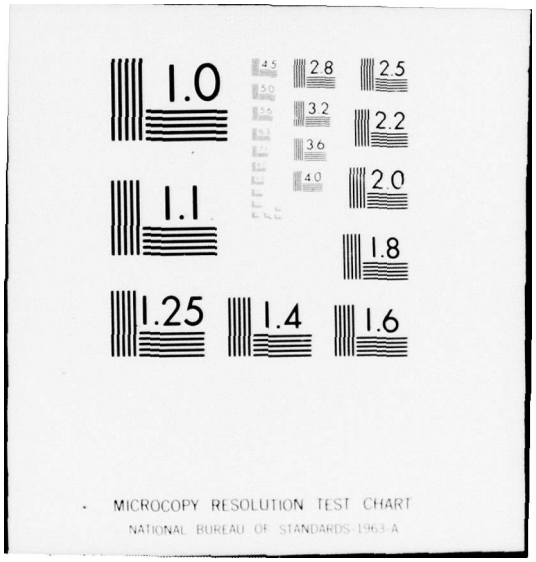
UNCLASSIFIED AMRL-TR-75-50-VOL-66 NL

1 OF 1
ADA040812



END

DATE
FILMED
7-77


1.0
1.1
1.25
1.4
1.6
1.8
2.0
2.2
2.5
2.8
3.2
3.6
4.0
4.5
5.0
5.6
MICROCOPY RESOLUTION TEST CHART
NATIONAL BUREAU OF STANDARDS-1963-A

AD A040812

AMRL-TR-75-50
Volume 66

12 NW



USAF BIOENVIRONMENTAL NOISE DATA HANDBOOK

Volume 66
U-4B AIRCRAFT, NEAR AND FAR-FIELD NOISE

NOVEMBER 1975

Approved for public release; distribution unlimited

DDC
JUN 22 1977
B

AEROSPACE MEDICAL RESEARCH LABORATORY
AEROSPACE MEDICAL DIVISION
AIR FORCE SYSTEMS COMMAND
WRIGHT-PATTERSON AIR FORCE BASE, OHIO 45433

AU NO.
DDC FILE COPY

NOTICES

When US Government drawings, specifications, or other data are used for any purpose other than a definitely related Government procurement operation, the Government thereby incurs no responsibility nor any obligation whatsoever, and the fact that the Government may have formulated, furnished, or in any way supplied the said drawings, specifications, or other data, is not to be regarded by implication or otherwise, as in any manner licensing the holder or any other person or corporation, or conveying any rights or permission to manufacture, use, or sell any patented invention that may in any way be related thereto.

Please do not request copies of this report from Aerospace Medical Research Laboratory. Additional copies may be purchased from:

National Technical Information Service
5285 Port Royal Road
Springfield, Virginia 22161

Federal Government agencies and their contractors registered with Defense Documentation Center should direct requests for copies of this report to:

Defense Documentation Center
Cameron Station
Alexandria, Virginia 22314

TECHNICAL REVIEW AND APPROVAL

This report has been reviewed by the Information Office (OI) and is releasable to the National Technical Information Service (NTIS). At NTIS, it will be available to the general public, including foreign nations.

This technical report has been reviewed and is approved for publication.

FOR THE COMMANDER

HENNING E. VON GIERKE
Director
Biodynamics and Bionics Division
Aerospace Medical Research Laboratory

AIR FORCE - 19 MAY 77 - 300

SECURITY CLASSIFICATION OF THIS PAGE *(When Data Entered)*

REPORT DOCUMENTATION PAGE

READ INSTRUCTIONS BEFORE COMPLETING FORM

1. REPORT NUMBER: AMRL-TR-75-50 Vol 66
2. GOVT ACCESSION NO.
3. RECIPIENT'S CATALOG NUMBER
4. ~~TITLE (and Subtitle)~~: USAF BIOENVIRONMENTAL NOISE DATA HANDBOOK. Volume 66. U-4B Aircraft, Near and Far-Field Noise.
5. TYPE OF REPORT & PERIOD COVERED: Volume 66 of a series
6. PERFORMING ORG. REPORT NUMBER: Technical Rept.
7. AUTHOR(s): Robert G. Powell
8. CONTRACT OR GRANT NUMBER(s)
9. PERFORMING ORGANIZATION NAME AND ADDRESS: Aerospace Medical Research Laboratory, Aerospace Medical Division, Air Force Systems Command, Wright-Patterson AFB, OH 45433
10. PROGRAM ELEMENT, PROJECT, TASK AREA & WORK UNIT NUMBERS: 62202F 7231-04-18
11. CONTROLLING OFFICE NAME AND ADDRESS: Same as above
12. REPORT DATE: November 1975
13. NUMBER OF PAGES: 60
14. MONITORING AGENCY NAME & ADDRESS *(if different from Controlling Office)*: 58 p.
15. SECURITY CLASS. *(of this report)*: Unclassified
15a. DECLASSIFICATION/DOWNGRADING SCHEDULE

16. DISTRIBUTION STATEMENT *(of this Report)*

Approved for public release; distribution unlimited

17. DISTRIBUTION STATEMENT *(of the abstract entered in Block 20, if different from Report)*

18. SUPPLEMENTARY NOTES

19. KEY WORDS *(Continue on reverse side if necessary and identify by block number)*

Noise
Noise Environments
Bioenvironment Noise
Aircraft
U-4B Aircraft

20. ABSTRACT *(Continue on reverse side if necessary and identify by block number)*

The USAF U-4B aircraft is a utility aircraft powered by one each GSO-480-A1A6,B1B6 reciprocating engines. This report provides measured and extrapolated data defining the bioacoustic environments produced by this aircraft operating on a concrete runup pad for two power conditions. Near-field data are reported for 3 locations in a wide variety of physical and psychoacoustic measures: overall and band sound pressure levels, C-weighted and A-weighted sound levels, preferred speech interference level, perceived noise level, and limiting times →

DD FORM 1 JAN 73 1473 EDITION OF 1 NOV 65 IS OBSOLETE

SECURITY CLASSIFICATION OF THIS PAGE *(When Data Entered)*

009850

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 50-8000 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 723104, Measurement of Noise and Vibration Environments of Air Force Operations.

The author gratefully acknowledges Mr. John Cole for his assistance in preparing this report, Mr. Robert England for his assistance in acquiring the raw data, Mr. Henry Mohlman and Mr. David Eilerman of the University of Dayton for assistance in the mechanics of data processing and Mrs. Norma Peachey and Mr. Mike Patterson for assistance in typing and preparation of the graphics.

Table of Contents

	Page
INTRODUCTION	3
NEAR-FIELD NOISE	4
FAR-FIELD NOISE	7

List of Tables

NEAR-FIELD NOISE	
1. Measurement Locations and Test Conditions	5
2. Measured Sound Pressure Level	
1/3 Octave Band	10
Octave Band	11
3. Measures of Human Noise Exposure	12
FAR-FIELD NOISE	
4. Test Conditions	13
5. Measured Sound Pressure Level	14-15
6. Directivity Index	16-17

List of Figures

NEAR-FIELD NOISE	
1. Measurement Locations	6
FAR-FIELD NOISE	
2. Measurement Locations	8
3. Normalized Far-Field Noise levels	18-19
4. Acoustic Power Level	20-21
5. Overall Sound Pressure Level — Contours	22-23
6. C-Weighted Sound level — Contours	24-25
7. A-Weighted Sound Level — Contours	26-27
8. Perceived Noise Level — Contours	28-29
9. Speech Interference Level — Contours	30-31
10. Permissible Exposure Time — Contours	32-38
11. Octave Band Sound Pressure Level — Contours	39-56

ACCESSION for
NTIS White Section
DDC Buff Section
UNANNOUNCED
JUSTIFICATION
BY
DISTRIBUTION/AVAILABILITY CODES
Dist. AVAIL. and/or SPECIAL
A

INTRODUCTION

The USAF U-4B Aero Commander is a utility-type aircraft powered by one each GS0-480-A1A6, B1B6 reciprocating engines. The aircraft was manufactured by North American Rockwell/General Aviation Division and the engines by Avco Corporation, Avco Lycomming Division.

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 U-4B aircraft.

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 aerospace ground equipment. The far-field, community-type noise data in the handbook describe the noise produced during *ground operations* of aircraft, aerospace ground 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 U-4 aircraft during ground runup operations of its engines. For these tests the aircraft was located on a concrete runup pad at Peterson Field, Colorado Springs, Colorado with no significant reflecting surfaces in the vicinity except the ground plane. Table 1 gives the surface meteorological conditions and the two 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 of the noise samples on magnetic tape. During analysis of each sample, he determined the 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 three near-field locations where ground crews are usually located for maintenance and/or preflight checkout operations. Estimates of noise levels at other locations in the near-field are difficult 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 (propeller 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 U-4B aircraft 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

U-4B Aircraft, Ground Runup, Peterson Field, CO
28 September 1972
Tail #054648

Ground Crew Location

1	Engine #2 Start Fire Guard
2	Engine #1 Start Fire Guard
3	Wheel Chock Pull

Aircraft Engine Operation

A	Engine #2 Idle Power
B	Both Engines Idle Power

Meteorology

Temperature	12.2 C
Bar Pressure	.766 M Hg
Rel Humidity	50 %
Wind	Calm

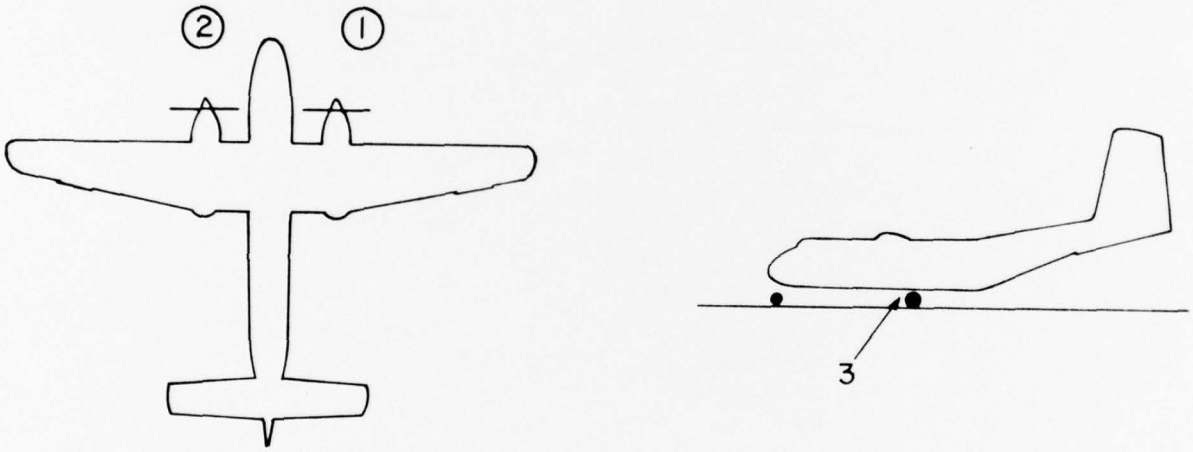


Figure 1. Near-Field Measurement Locations at North Runup Area, Peterson Field, Colorado Springs, CO

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 30 meter radius semicircle used in surveying the GS0-480 engines was on the ground directly below the intersection of the aircraft's centerline and the plane passing through both engines' propeller planes.

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

All 19 microphone measurement sites are in the acoustic far-field of their respective 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 U-4B aircraft in a standard format.

Figure 4 and Table 6 present two basic acoustic measures, the acoustic power level and the directivity index, respectively. The acoustic power level describes the power radiated by the source as a function of frequency. The directivity index is a standard acoustical engineering measure that describes the geometric way in which the source radiates this power as a function of both frequency and angle from source. These basic source measures are primarily of interest for acoustical engineers and noise generation/control specialists.

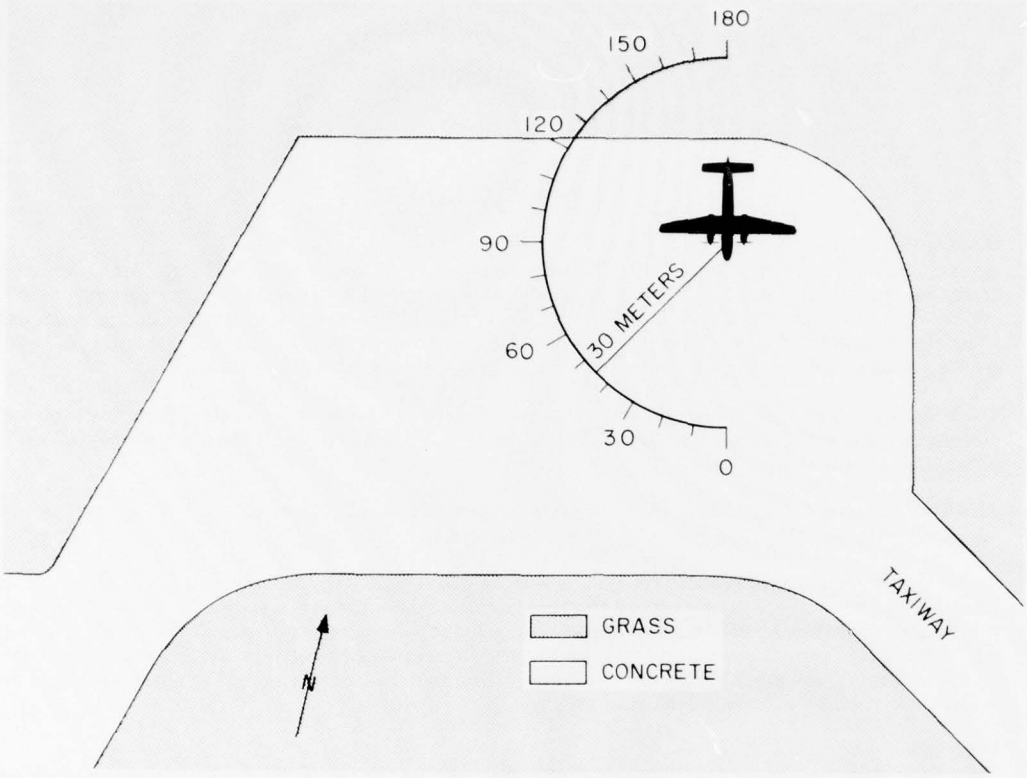


Figure 2. Far-Field Measurement Locations at North Runup Area, Peterson Field, Colorado Springs, CO

Figures 5 through 11 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 (e.g., Table 5 and Figure 11 at idle/taxi power).

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.

TABLE: 2 MEASURED SOUND PRESSURE LEVEL (DB) 1/3 OCTAVE BAND		IDENTIFICATION: OMEGA 3.2 TEST 72-049-002 RUN 01 27 NOV 74 PAGE F1
NOISE SOURCE/SUBJECT: U-48 AIRCRAFT GROUND CREW NEAR FIELD NOISE LEVELS	OPERATION:	

	LOCATION/CONDITION		
FREQ (HZ)	1/A	2/B	3/B
25	78	71<	95
31.5	84	78	101
40	92	94	100
50	97	104	116
63	95	104	100
80	90	91	93
100	87	92	101
125	99	99	109
160	93	93	104
200	83	84	93
250	91	91	96
315	89	90	92
400	85	88	92
500	82	85	90
630	83	85	89
800	82	82	86
1000	81	81	84
1250	80	81	85
1600	79	80	84
2000	77	78	83
2500	74	77	82
3150	73	75	81
4000	73	75	82
5000	71	74	81
6300	70	74	81
8000	69	73	81
10000	68	72	79
OVERALL	104	108	117

< LEVEL CORRECTED TO REMOVE BACKGROUND/ELECTRONIC NOISE.

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

IDENTIFICATION:
OMEGA 3.2
TEST 72-049-002
RUN 01
27 NOV 74
PAGE J1

NOISE SOURCE/SUBJECT:
U-4B AIRCRAFT
GROUND CREW
NEAR FIELD NOISE LEVELS

OPERATION:

FREQ (HZ)	LOCATION/CONDITION 1/A	2/B	3/B
31.5	93	94	104
63	100	107	116
125	100	101	110
250	93	94	99
500	88	91	95
1000	85	86	89
2000	82	83	88
4000	77	80	86
8000	74	78	85
OVERALL	104	108	117

TABLE: MEASURES OF HUMAN NOISE EXPOSURE				IDENTIFICATION:
3				
NOISE SOURCE/SUBJECT:	OPERATION:			OMEGA 3.2
				TEST 72-049-002
U-4B AIRCRAFT				RUN 01
GROUND CREW				27 NOV 74
NEAR FIELD NOISE LEVELS				PAGE H1

	LOCATION/CONDITION		
	1/A	2/B	3/B
HAZARD/PROTECTION			
C-WEIGHTED OVERALL SOUND LEVEL (OASLC IN DBC) AT EAR			
A-WEIGHTED OVERALL SOUND LEVEL (OASLA IN DBA) AT EAR			
MAXIMUM PERMISSIBLE TIME (T IN MINUTES) FOR ONE EXPOSURE PER DAY (AFR 161-35, JULY 73)			
NO PROTECTION			
OASLC	103	108	116
OASLA	92	93	99
T	120	101	36
MINIMUM QPL EAR MUFFS			
OASLA*	81	83	91
T	807	571	143
AMERICAN OPTICAL 1700 EAR MUFFS			
OASLA*	77	80	88
T	960	960	240
V-51R EAR PLUGS			
OASLA*	70	72	79
T	960	960	960
AMERICAN OPTICAL 1700 EAR MUFFS PLUS V-51R EAR PLUGS			
OASLA*	59	62	71
T	960	960	960
H-133 GROUND COMMUNICATION UNIT			
OASLA*	70	74	83
T	960	960	571
COMMUNICATION			
PREFERRED SPEECH INTERFERENCE LEVEL (PSIL IN DB)			
PSIL	35	87	91
ANNOYANCE			
PERCEIVED NOISE LEVEL, TONE CORRECTED (PNLT IN PNDB)			
TONE CORRECTION (C IN DB)			
PNLT	109	110	118
C	2	1	1

* BASED ON CALCULATED SPL SPECTRUM UNDER PROTECTIVE DEVICE.

TABLE 4

TEST CONDITIONS
FOR FAR-FIELD NOISE MEASUREMENTS

U-4B Aircraft, Ground Runups, Peterson Field, CO
28 September 1972
Tail #054648

Aircraft Engine Operation

Idle/Taxi	14 In Hg (Manifold Pressure) 1000 RPM Engine Speed)
Military	48 In Hg 3400 RPM

Meteorology

Temperature	12.2 C
Bar Pressure	0.766 M Hg
Rel Humidity	50 %
Wind	Calm

TABLE 5: MEASURED SOUND PRESSURE LEVEL (DB)
1/3 OCTAVE BAND
DISTANCE = 30 METERS

IDENTIFICATION:
OMEGA 1.4
TEST 75-002-050
RUN 01
30 MAY 75
PAGE 2

NOISE SOURCE/SUBJECT:
U-4B AIRCRAFT
GSO-480-A1A6/B1A6 ENGINE
FAR FIELD NOISE

OPERATION:
IDLE/TAXI POWER
1000 RPM
BOTH ENGINES
FREE FLOW

METEOROLOGY:
TEMP = 12 C
BAR PRESS = .766 M HG
REL HUMID = 50 %

FREQ (HZ)	ANGLE (DEGREES) 0	10	20	30	40	50	60	70	80	90	100	110	120	130	140	150	160	170	180
25													67<	63<	62<	66<	71<	70<	
31.5	66<	68<	65<	64<	65<	65<	65<				64<	64<	69<	68<	67<	68<	70<	72<	
40	68<	68<	67<	68<	66<	67<	68<	66<	67<	67<	70<	68<	74<	70<	68<	68<	68<	72<	68<
50	90	90	89	89	89	89	87	87	86	86	85	84	83	82	82	77<	73<	72<	73<
63	78<	78<	76<	78<	81	81	84	82	84	81	82	81	82	80<	77<	75<			
80	74<	75<	74<	74<	74<	74<	74<	73<	74<	76<	79	79	80	79	76<	75<	73<	72<	73<
100	81<	82	82	79<	81<	83	82	83	80<	79<	79<	81<	83	83	81<	79<	77<	76<	75<
125	85	83	87	90	91	91	87	86	88	90	90	90	90	90	90	89	88	85	84
160	80	79	78	81	84	85	84	79	84	87	87	84	84	83	84	83	81	80	80
200	71<	73<	73<	73<	75	75	76	77	77	75	78	78	77	76	76	76	75	71<	69<
250	75	76	77	79	81	81	80	80	78	79	79	78	80	81	80	78	78	76	74
315	76	75	77	77	80	79	77	78	77	78	79	77	76	77	80	81	78	77	75
400	74	74	71	73	75	70	74	71	74	74	76	74	74	74	74	74	75	70	69
500	71	70	69	69	70	71	71	68	68	68	69	69	71	71	73	70	72	66	64<
630	71	69	68	66<	69	70	69	66<	68	69	70	70	71	71	70	70	69	65<	62<
800	68	67	66	64<	67	65	66	62<	64<	64<	67	67	69	69	69	68	69	68	61<
1000	67	66	64	63	64	62<	62<	59<	62<	62<	66	67	70	69	68	70	68	69	62
1250	67	66	64	64	63	63	63	60	62	62	64	66	69	66	67	69	67	70	60
1600	63	63	62	62	61	62	61	60	60	62	62	62	64	65	66	70	67	69	58
2000	60	60	60	60	60	59	59	58	59	58	60	61	65	65	65	69	66	68	57
2500	58	58	59	58	58	57	57	56	56	57	57	60	65	66	65	67	65	64	55
3150	56	58	57	57	57	57	56	56	56	57	59	61	65	68	64	67	62	62	52
4000	56	56	57	56	56	56	55	55	56	56	59	61	64	66	64	68	63	59	50
5000	54	55	55	54	55	55	54	54	55	57	59	62	64	67	66	67	62	58	50
6300	52	54	54	53	53	53	52	52	53	54	58	61	64	67	65	64	60	56	48
8000	50	51	52	50	51	51	51	51	52	54	57	61	64	66	64	63	59	56	49
10000	45<	46<	48	46<	47<	47<	47<	46<	47<	48	53	57	59	60	59	59	56	52	44<
OVERALL	92	92	92	93	95	95	93	92	93	94	94	93	93	93	93	92	90	88	87

< LEVEL CORRECTED TO REMOVE BACKGROUND/ELECTRONIC NOISE.

TABLE 5: MEASURED SOUND PRESSURE LEVEL (DB)
1/3 OCTAVE BAND
DISTANCE = 30 METERS

IDENTIFICATION:
OMEGA 1.4
TEST 75-002-050
RUN 02
30 MAY 75
PAGE 2

NOISE SOURCE/SUBJECT:
U-4B AIRCRAFT
GSO-480-A1A6/B1A6 ENGINE
FAR FIELD NOISE

OPERATION:
MILITARY POWER
3400 RPM
BOTH ENGINES
FREE FLOW

METEOROLOGY:
TEMP = 12 C
BAR PRESS = .766 M HG
REL HUMID = 50 %

FREQ (HZ)	ANGLE (DEGREES) 0	10	20	30	40	50	60	70	80	90	100	110	120	130	140	150	160	170	180
25	72	70<	72	70<	71<	72	73	75	75	77	75	76	78	77	78	77	78		
31.5	72<	73<	76	75	74	75	75	75	73<	74	75	77	77	78	77	78	78		
40	76<	78	78	77	77	77	79	77	76<	77	79	81	81	81	80	80	79		
50	81	80	80	80	81	81	83	83	83	84	83	83	82	83	81	82	82		
63	80<	80<	80<	82	83	83	84	84	85	85	84	86	87	87	86	83	82		
80	87	87	86	93	99	102	104	104	104	105	106	106	107	107	105	100	94		
100	101	103	101	100	99	101	103	104	105	108	111	112	113	113	107	99	99		
125	91	94	94	93	94	94	94	93	96	100	101	102	105	105	100	92	93		
160	99	99	95	98	104	105	107	105	103	105	107	109	111	111	111	109	110		
200	99	99	100	101	101	103	101	100	101	103	104	103	105	103	102	98	99		
250	98	104	107	107	101	109	112	107	104	108	108	112	116	117	110	103	101		
315	110	109	104	105	103	106	103	104	104	106	107	105	107	106	107	102	103		
400	106	104	105	105	100	106	107	104	108	108	108	109	113	115	110	101	102		
500	107	106	103	102	104	104	105	106	107	108	109	107	109	111	110	99	102		
630	106	105	104	104	104	104	106	107	106	108	109	109	111	112	112	101	103		
800	105	104	102	101	102	104	104	105	104	107	106	107	110	111	113	102	103		
1000	100	100	98	99	100	100	99	99	101	104	106	106	109	111	113	101	102		
1250	100	99	97	98	98	97	98	98	98	99	101	104	107	110	109	100	101		
1600	99	98	96	96	96	96	97	99	100	100	100	99	104	109	109	99	99		
2000	98	97	98	96	95	96	97	98	100	99	102	102	105	109	109	99	100		
2500	97	96	96	95	95	95	97	98	100	101	102	104	106	108	107	98	99		
3150	95	94	94	93	94	94	96	97	99	100	102	104	105	108	107	97	98		
4000	93	93	93	92	92	93	94	96	97	98	101	103	105	106	105	94	97		
5000	92	91	90	91	91	92	93	95	97	97	99	100	104	106	103	94	96		
6300	90	89	89	89	90	90	92	94	95	96	98	99	102	104	101	92	95		
8000	87	86	87	87	87	88	90	92	93	94	96	97	100	102	100	90	92		
10000	83	83	83	83	84	85	86	88	89	90	92	93	97	99	97	86	89		
OVERALL	115	115	113	113	113	115	117	115	116	118	119	120	122	123	122	114	115		

< LEVEL CORRECTED TO REMOVE BACKGROUND/ELECTRONIC NOISE.

TABLE: DIRECTIVITY INDEX (DB)

6

IDENTIFICATION:

OMEGA 1.4
TEST 75-002-050
RUN 01
30 MAY 75
PAGE 4

NOISE SOURCE/SUBJECT:
U-4B AIRCRAFT
GSO-480-A1A6/B1A6 ENGINE
FAR FIELD NOISE

OPERATION:
IDLE/TAXI POWER
1000 RPM
BOTH ENGINES
FREE FLOW

METEOROLOGY:
TEMP = 12 C
BAR PRESS = .766 M HG
REL HUMID = 50 %

FREQ (HZ)	ANGLE (DEGREES) 0	10	20	30	40	50	60	70	80	90	100	110	120	130	140	150	160	170	180
1/3 OCTAVE																			
25													6	2	1	5	10	9	
31.5	0	2	-0	-1	-0	-1	-0				-1	-1	3	2	2	2	5	7	
40	-1	-1	-2	-1	-2	-2	-1	-3	-2	-2	1	-1	5	1	-0	-1	-0	3	-1
50	4	4	3	3	3	3	1	1	0	-0	-1	-2	-3	-4	-4	-9	-13	-14	-13
63	-3	-3	-5	-3	-1	-0	3	1	2	0	0	-0	1	-1	-4	-6			
80	-2	-1	-2	-3	-2	-2	-2	-3	-2	-0	2	3	3	2	-1	-2	-3	-5	-4
100	-0	1	0	-2	-0	1	1	2	-1	-3	-2	-0	2	1	-0	-3	-4	-6	-6
125	-5	-6	-2	0	2	2	-2	-3	-1	1	1	1	1	0	1	-0	-2	-5	-5
160	-4	-5	-6	-3	0	1	0	-5	0	3	3	0	0	-1	-0	-1	-3	-4	-4
200	-5	-3	-3	-3	-1	-1	-1	1	1	-1	2	2	0	-1	-1	-0	-1	-5	-7
250	-4	-4	-3	-1	2	1	1	1	-2	-1	-0	-1	0	1	1	-1	-1	-3	-5
315	-2	-3	-1	-1	2	1	-1	0	-1	-0	1	-1	-2	-1	2	3	-0	-1	-3
400	1	-0	-3	-1	1	-4	0	-3	1	0	2	1	0	-0	0	0	2	-4	-5
500	1	0	-1	-1	-0	1	1	-2	-2	-2	-1	-1	1	1	3	-0	2	-4	-5
630	2	0	-1	-3	-1	1	0	-4	-1	-1	1	1	2	1	1	1	-0	-4	-7
800	1	0	-1	-2	-0	-2	-1	-5	-3	-3	0	1	2	2	2	1	2	1	-6
1000	1	-0	-2	-3	-2	-4	-4	-7	-4	-4	-0	1	4	3	2	4	2	3	-4
1250	2	1	-1	-1	-2	-2	-2	-5	-3	-3	-1	1	4	1	2	4	2	5	-5
1600	-1	-1	-2	-2	-3	-2	-3	-4	-4	-1	-1	-1	1	2	2	7	4	5	-6
2000	-2	-3	-2	-3	-3	-3	-4	-4	-4	-5	-3	-1	3	3	2	7	4	5	-6
2500	-4	-3	-3	-3	-3	-4	-4	-5	-6	-5	-4	-2	3	4	3	6	3	3	-7
3150	-5	-4	-4	-4	-5	-5	-6	-6	-6	-5	-3	-1	4	6	2	5	1	0	-10
4000	-5	-5	-4	-5	-5	-5	-6	-6	-5	-5	-2	-0	3	5	3	7	2	-2	-11
5000	-7	-6	-7	-7	-6	-7	-7	-7	-6	-4	-2	1	3	6	5	5	0	-4	-11
6300	-8	-7	-6	-7	-7	-7	-8	-8	-7	-6	-2	0	4	6	4	4	-0	-5	-12
8000	-10	-9	-8	-10	-9	-8	-9	-9	-7	-5	-3	1	4	7	4	3	-1	-4	-11
10000	-9	-8	-7	-8	-8	-8	-8	-9	-8	-7	-2	2	4	5	4	4	1	-3	-11
OCTAVE																			
31.5	-1	-0	-2	-1	-2	-2	-1				0	-2	5	2	0	1	4	5	
63	2	2	2	2	2	2	1	1	1	-0	-1	-1	-1	-2	-4	-7	-12	-13	-12
125	-4	-4	-3	-0	1	1	-1	-2	-1	1	1	1	1	0	1	-1	-2	-5	-5
250	-3	-3	-2	-1	1	1	0	1	-1	-1	1	-0	-0	0	1	1	-1	-3	-5
500	1	-0	-2	-1	0	-1	0	-3	-0	-0	1	0	1	0	1	0	1	-4	-5
1000	1	0	-1	-2	-1	-3	-2	-5	-3	-3	-0	1	3	2	2	3	2	3	-5
2000	-2	-2	-2	-3	-3	-3	-4	-4	-4	-3	-2	-2	2	3	2	6	4	4	-6
4000	-6	-5	-5	-5	-5	-5	-6	-7	-6	-5	-3	-0	3	6	3	6	1	-1	-11
8000	-9	-8	-7	-8	-8	-8	-8	-8	-7	-6	-2	1	4	6	4	4	-0	-4	-11
OVERALL	-1	-1	-1	0	1	2	-0	-1	-0	0	1	0	0	-0	-0	-1	-3	-5	-6

TABLE: DIRECTIVITY INDEX (DB)

6

NOISE SOURCE/SUBJECT:
U-4B AIRCRAFT
GSO-480-A1A6/B1A6 ENGINE
FAR FIELD NOISE

OPERATION:
MILITARY POWER
3400 RPM
BOTH ENGINES
FREE FLOW

METEOROLOGY:
TEMP = 12 C
BAR PRESS = .766 M HG
REL HUMID = 50 %

IDENTIFICATION:
OMEGA 1.4
TEST 75-002-050
RUN 02
30 MAY 75
PAGE 4

FREQ (HZ)	ANGLE (DEGREES) 0	10	20	30	40	50	60	70	80	90	100	110	120	130	140	150	160	170	180
1/3 OCTAVE																			
25	-4	-5	-3	-6	-5	-4	-3	-1	-0	1	-0	1	3	2	2	1	2		
31.5	-4	-3	-0	-1	-1	-1	-1	-1	-3	-1	-0	2	2	2	1	2	2		
40	-3	-1	-1	-2	-2	-2	0	-2	-2	-2	0	2	2	2	1	1	0		
50	-1	-2	-2	-2	-1	-1	0	1	1	2	0	1	-0	1	-1	-1	-0		
63	-4	-4	-4	-3	-2	-2	-0	-0	1	1	-0	1	2	2	1	-1	-3		
80	-18	-17	-16	-11	-6	-2	-0	-0	-0	1	2	2	3	3	0	-5	-10		
100	-7	-5	-7	-9	-9	-7	-5	-5	-4	-0	2	3	5	5	-1	-9	-9		
125	-9	-6	-6	-7	-6	-6	-6	-7	-4	0	1	2	5	5	-0	-8	-7		
160	-9	-3	-12	-10	-4	-3	-1	-3	-5	-3	-0	1	4	3	3	1	3		
200	-3	-3	-2	-1	-1	1	-1	-2	-1	1	2	1	3	1	0	-4	-3		
250	-13	-7	-4	-4	-10	-2	1	-4	-7	-3	-3	1	5	6	-1	-8	-10		
315	4	3	-1	-0	-2	1	-3	-1	-1	1	1	-0	2	1	2	-4	-2		
400	-3	-5	-4	-4	-8	-3	-2	-5	-1	-1	-1	0	4	6	2	-8	-7		
500	-0	-2	-4	-6	-4	-3	-3	-2	-0	1	2	-0	2	4	2	-9	-5		
630	-2	-3	-4	-4	-4	-4	-2	-1	-2	0	1	1	3	4	4	-7	-5		
800	-2	-3	-5	-6	-5	-3	-3	-2	-3	-0	-1	0	3	4	6	-5	-4		
1000	-6	-6	-8	-7	-6	-6	-7	-7	-5	-2	0	0	3	5	7	-5	-4		
1250	-3	-4	-6	-5	-5	-6	-5	-5	-5	-4	-2	0	3	6	6	-4	-2		
1600	-4	-4	-6	-7	-6	-6	-5	-4	-2	-2	-2	-3	2	6	7	-4	-3		
2000	-4	-5	-5	-6	-7	-7	-5	-4	-2	-3	-1	-0	2	6	6	-3	-2		
2500	-6	-7	-6	-7	-8	-8	-6	-4	-2	-2	-0	1	3	6	5	-5	-4		
3150	-7	-8	-8	-9	-9	-8	-7	-5	-3	-2	0	1	3	6	5	-6	-4		
4000	-7	-7	-8	-8	-9	-8	-7	-5	-3	-2	0	2	4	6	4	-6	-4		
5000	-8	-8	-9	-8	-8	-7	-6	-5	-2	-2	-0	1	4	7	3	-6	-3		
6300	-8	-9	-9	-9	-8	-8	-6	-4	-3	-2	0	1	4	6	3	-6	-3		
8000	-9	-10	-9	-9	-9	-8	-6	-4	-3	-2	-0	1	4	6	4	-6	-4		
10000	-9	-10	-10	-9	-8	-8	-7	-5	-4	-2	-1	1	4	6	4	-6	-4		
OCTAVE																			
31.5	-3	-2	-1	-2	-2	-2	-1	-1	-2	-1	-0	2	2	2	1	1	1		
63	-16	-16	-15	-11	-6	-2	-0	-0	-0	1	2	2	3	3	0	-5	-10		
125	-8	-6	-9	-9	-6	-4	-3	-4	-4	-1	1	2	4	4	1	-2	-1		
250	-2	-2	-3	-3	-6	-1	0	-3	-4	-1	-1	1	4	5	0	-6	-6		
500	-2	-3	-4	-5	-5	-3	-2	-3	-1	0	1	1	3	5	3	-8	-6		
1000	-3	-4	-6	-6	-5	-4	-4	-4	-4	-1	-1	0	3	5	6	-5	-3		
2000	-5	-5	-6	-7	-7	-7	-5	-4	-2	-2	-1	-0	3	6	6	-4	-3		
4000	-7	-8	-8	-9	-9	-8	-7	-5	-3	-2	0	1	4	6	4	-6	-4		
8000	-8	-9	-9	-9	-8	-8	-6	-4	-3	-2	-0	1	4	6	4	-6	-4		
OVERALL	-3	-4	-5	-5	-6	-3	-2	-3	-3	-1	0	1	4	5	3	-5	-4		

FIGURE 3 NORMALIZED FARFIELD NOISE LEVELS

DISTANCE = 100 METERS

NOISE SOURCE/SUBJECT:
U-48 AIRCRAFT
GSO-480-A1A6/B1A6 ENGINE
FAR FIELD NOISE

OPERATION:
IDLE/TAXI POWER
1000 RPM
BOTH ENGINES
FREE FLOW

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

IDENTIFICATION:
OMEGA 1.4
TEST 75-002-050
RUN 01
30 MAY 75
PAGE 6

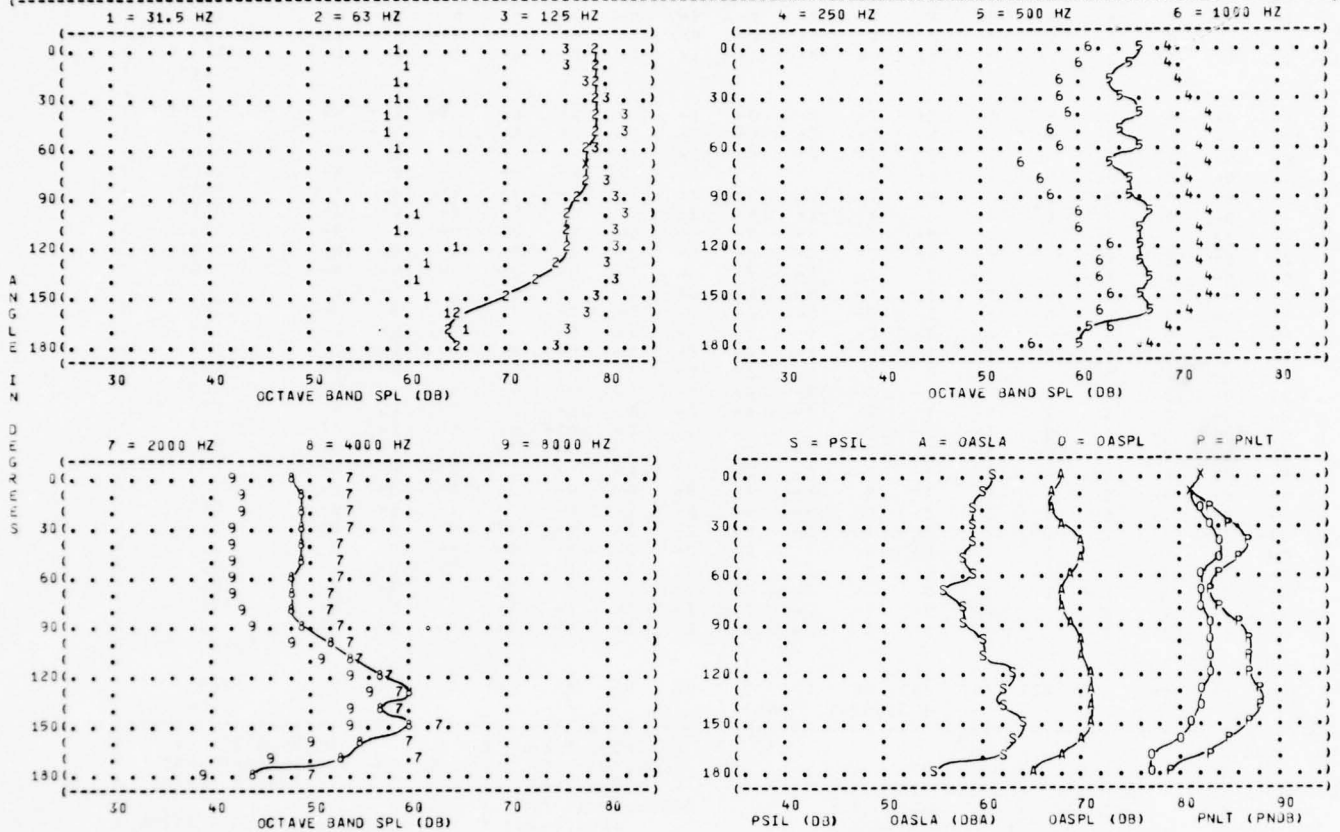


FIGURE 3 NORMALIZED FARFIELD NOISE LEVELS

DISTANCE = 100 METERS

NOISE SOURCE/SUBJECT:
U-43 AIRCRAFT
GSO-480-A1A6/B1A6 ENGINE
FAR FIELD NOISE

OPERATION:
MILITARY POWER
3400 RPM
BOTH ENGINES
FREE FLOW

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

IDENTIFICATION:
OMEGA 1.4
TEST 75-002-050
RUN 02
30 MAY 75
PAGE 6

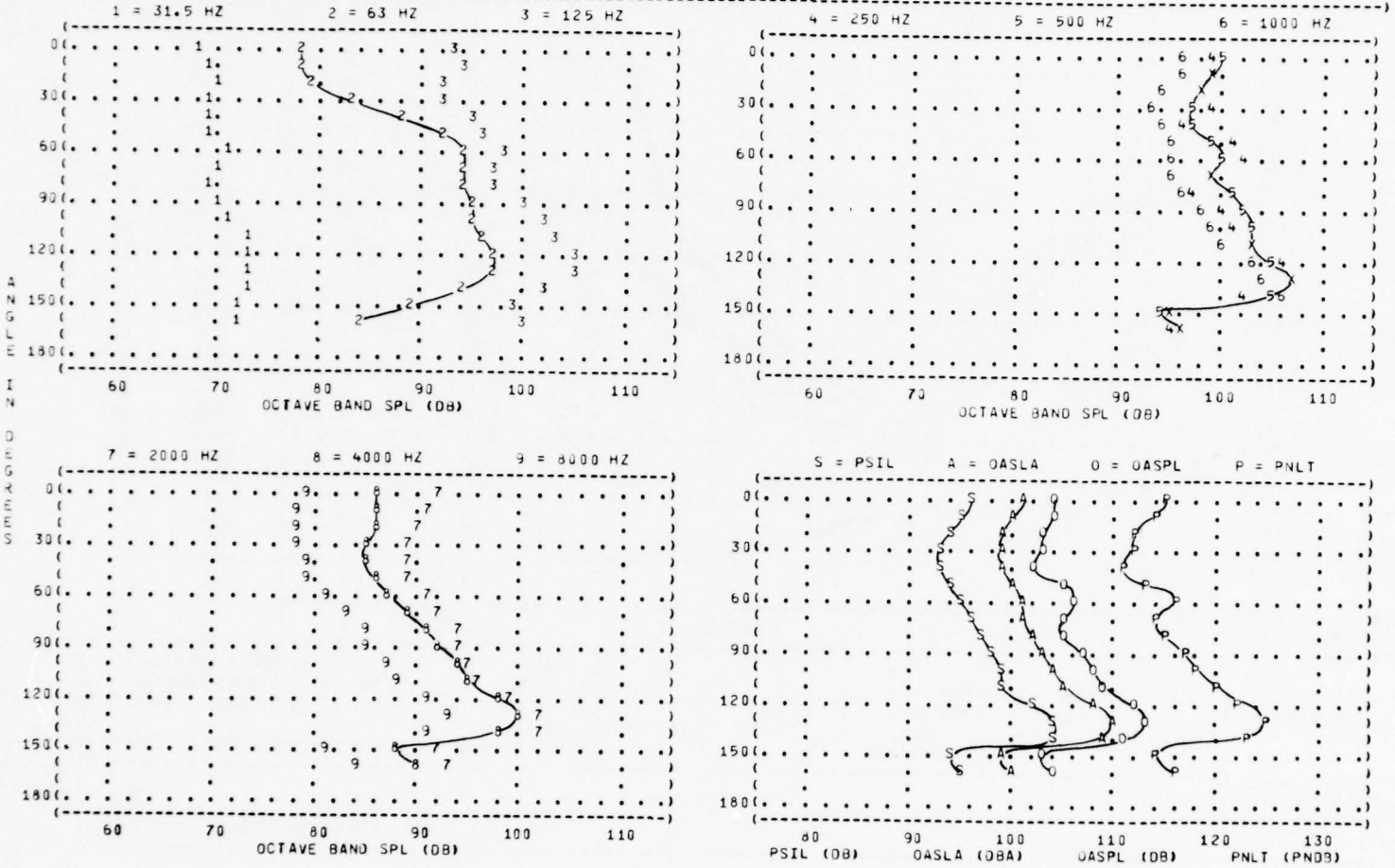


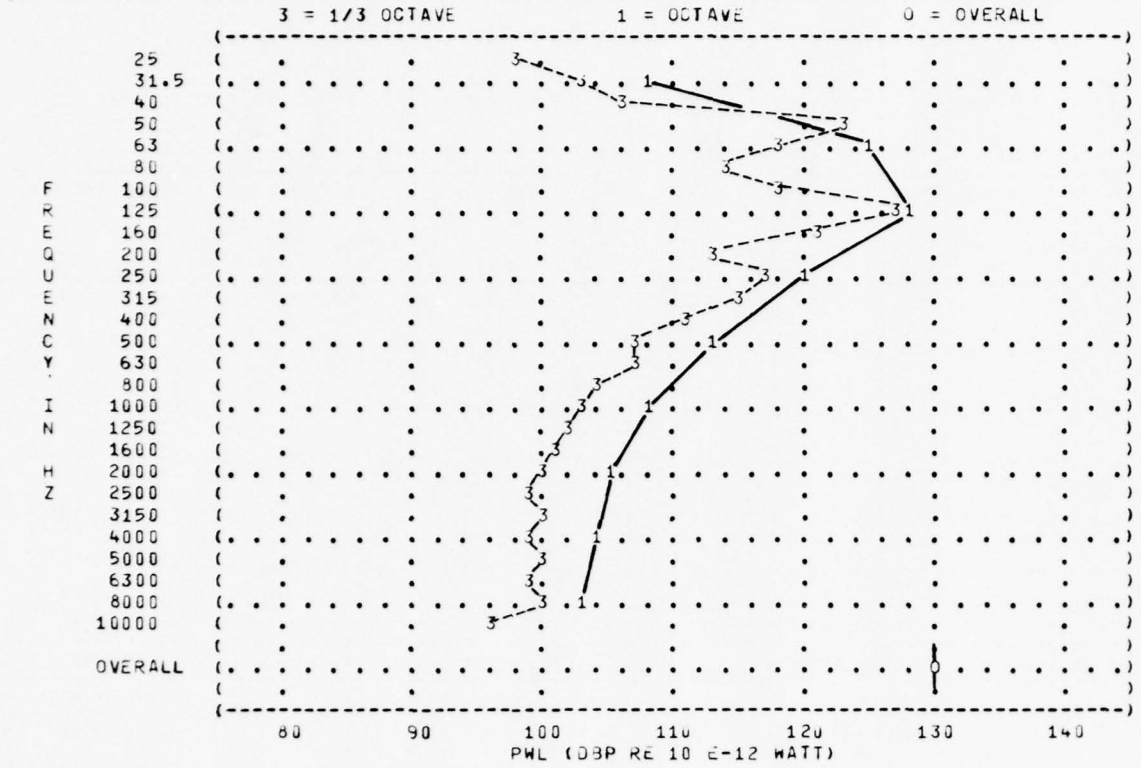
FIGURE: 4 ACOUSTIC POWER LEVEL (PWL)

IDENTIFICATION:
OMEGA 1.4
TEST 75-002-050
RUN 01
30 MAY 75
PAGE 3

NOISE SOURCE/SUBJECT:
U-4B AIRCRAFT
GSO-480-A1A6/B1A6 ENGINE
FAR FIELD NOISE

OPERATION:
IDLE/TAXI POWER
1000 RPM
BOTH ENGINES
FREE FLOW

METEOROLOGY:
TEMP = 12 C
BAR PRESS = .766 M HG
REL HUMID = 50 %



	PWL	
	1/3 OCTAVE	OCTAVE
25	98.3	
31.5	102.7	108.2
40	106.2	
50	123.2	
63	118.3	124.8
80	113.7	
100	118.4	
125	126.5	128.2
160	121.3	
200	113.4	
250	116.6	120.0
315	115.1	
400	111.0	
500	107.2	113.5
630	106.6	
800	103.9	
1000	103.4	108.1
1250	102.5	
1600	101.2	
2000	100.2	105.1
2500	99.2	
3150	99.8	
4000	99.4	104.5
5000	100.0	
6300	99.4	
8000	99.7	103.5
10000	96.1	
OVERALL		130.4

FIGURE: ACOUSTIC POWER LEVEL (PWL)

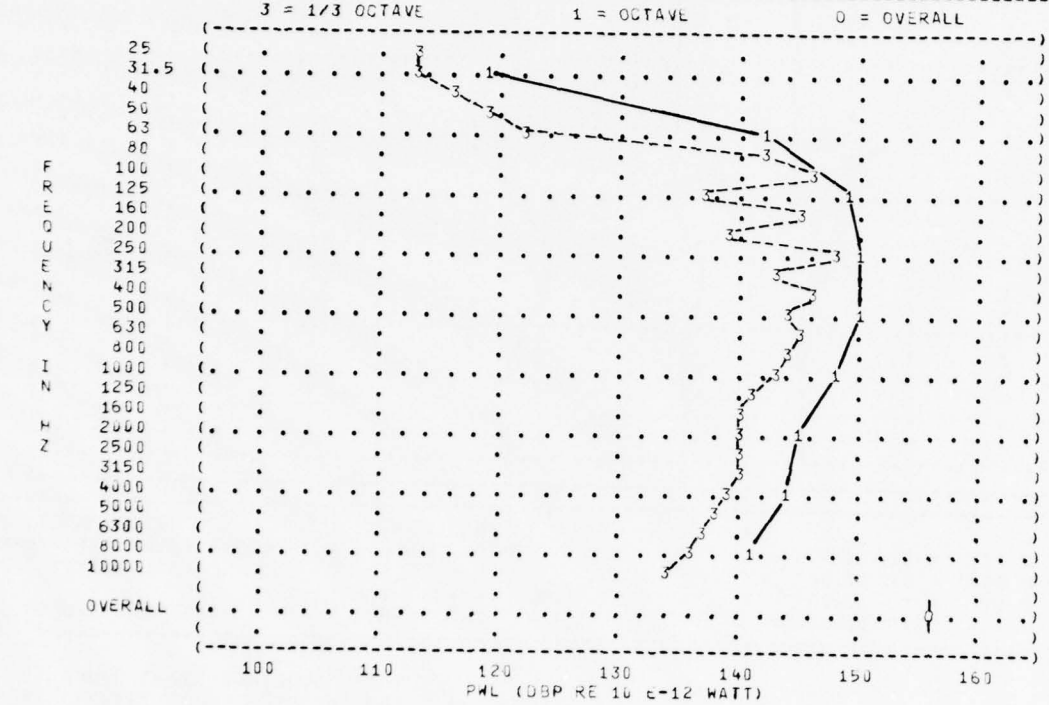
4

NOISE SOURCE/SUBJECT:
U-4B AIRCRAFT
GSO-480-A1A6/B1A6 ENGINE
FAR FIELD NOISE

OPERATION:
MILITARY POWER
3400 RPM
BOTH ENGINES
FREE FLOW

METEOROLOGY:
TEMP = 12 C
BAR PRESS = .766 M HG
REL HUMID = 50 %

IDENTIFICATION:
OMEGA 1.4
TEST 75-002-050
RUN 02
30 MAY 75
PAGE 3



PWL 1/3 OCTAVE	PWL OCTAVE
112.6	
112.9	119.0
116.2	
119.5	
121.9	141.6
141.5	
145.6	
137.1	148.6
144.8	
139.2	
148.1	149.6
142.6	
146.0	
144.4	150.1
145.3	
144.2	
143.2	147.7
140.7	
140.0	
140.1	144.9
140.2	
140.2	
138.9	143.9
137.9	
137.1	
135.9	140.6
133.8	
	156.1

FIGURE: 5 OVERALL SOUND PRESSURE LEVEL (OASPL) EQUAL LEVEL CONTOURS (DB)

NOISE SOURCE/SUBJECT:
U-4B AIRCRAFT
GSO-480-A1A6/B1A6 ENGINE
FAR FIELD NOISE

OPERATION:
IDLE/TAXI POWER
1000 RPM
BOTH ENGINES
FREE FLOW

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

IDENTIFICATION:
OMEGA 1.4
TEST 75-002-050
RUN 01
30 MAY 75
PAGE 13

POINT	DB
A	45
B	50
C	55
D	60
E	65
F	70
G	75
H	80
I	85
J	90

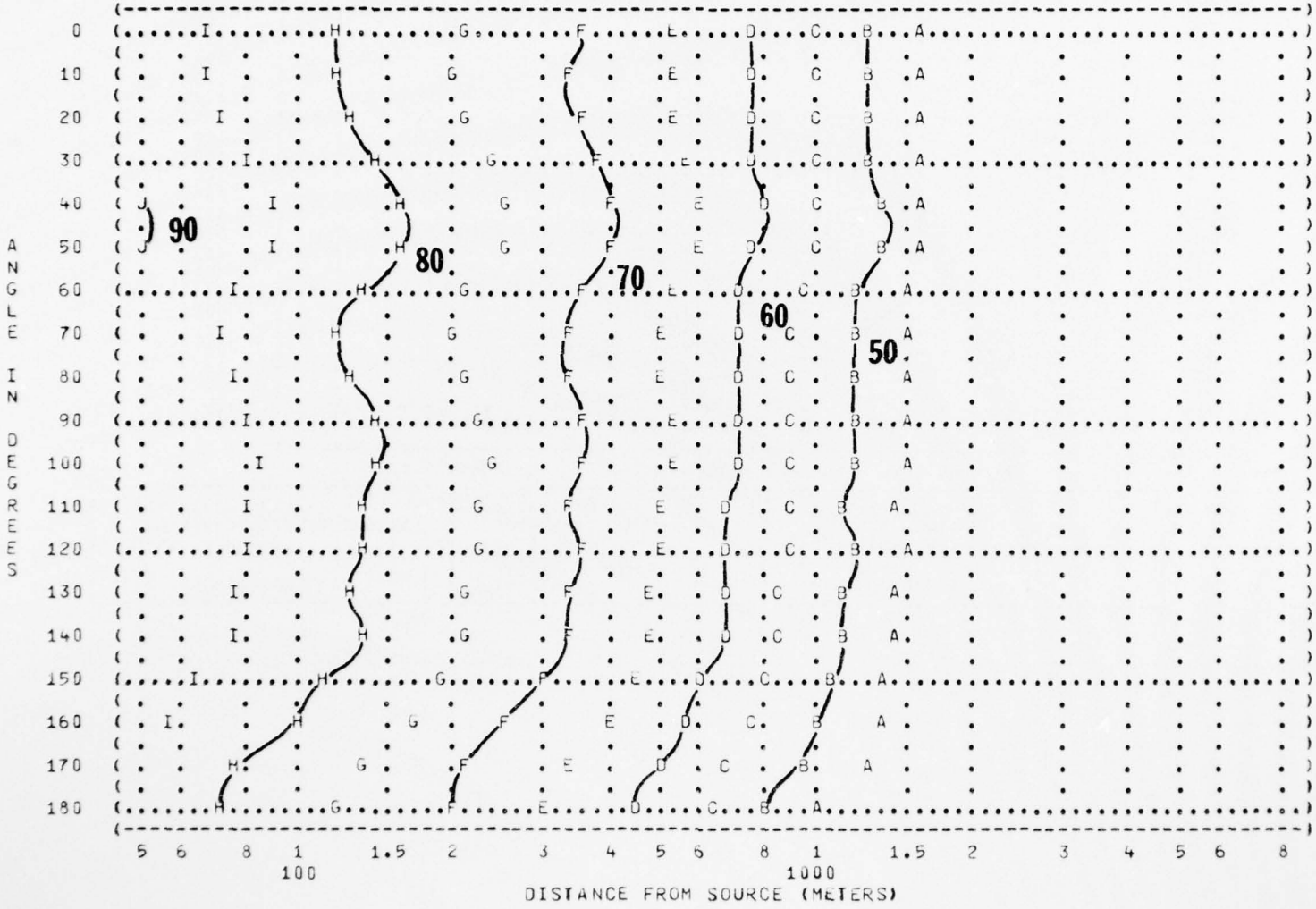


FIGURE 5 OVERALL SOUND PRESSURE LEVEL (OASPL) EQUAL LEVEL CONTOURS (DB)

IDENTIFICATION:
OMEGA 1.4
TEST 75-002-050
RUN 02
30 MAY 75
PAGE 13

NOISE SOURCE/SUBJECT:
U-4B AIRCRAFT
GSO-480-A1A6/B1A6 ENGINE
FAR FIELD NOISE

OPERATION:
MILITARY POWER
3400 RPM
BOTH ENGINES
FREE FLOW

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

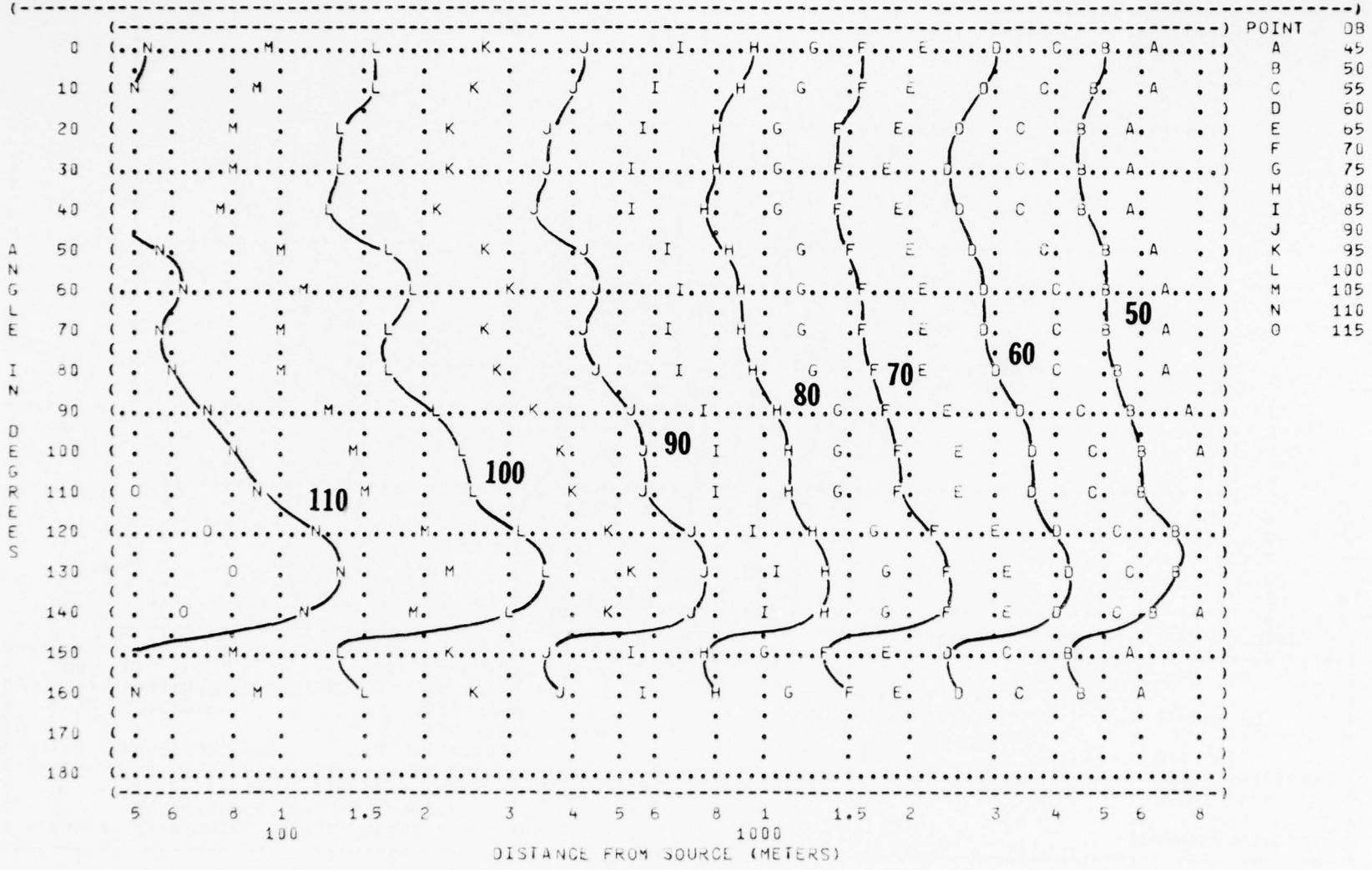


FIGURE: 6 C-WEIGHTED OVERALL SOUND LEVEL (OASLC) EQUAL LEVEL CONTOURS (DBC)

NOISE SOURCE/SUBJECT:
U-4B AIRCRAFT
GSO-480-A1A6/B1A6 ENGINE
FAR FIELD NOISE

OPERATION:
IDLE/TAXI POWER
1000 RPM
BOTH ENGINES
FREE FLOW

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

IDENTIFICATION:
OMEGA 1.4
TEST 75-002-050
RUN 01
30 MAY 75
PAGE 14

POINT	DBC
A	45
B	50
C	55
D	60
E	65
F	70
G	75
H	80
I	85

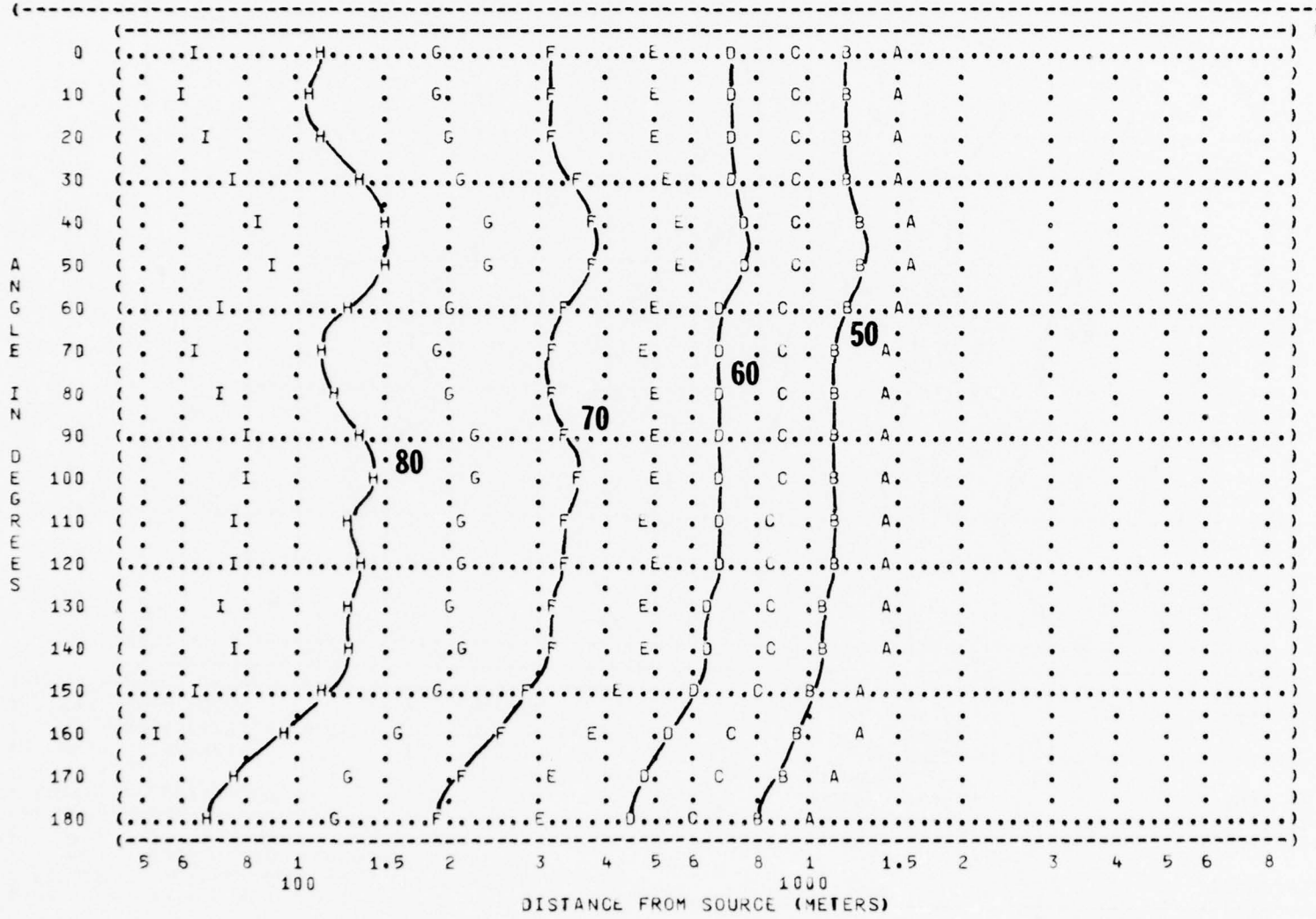


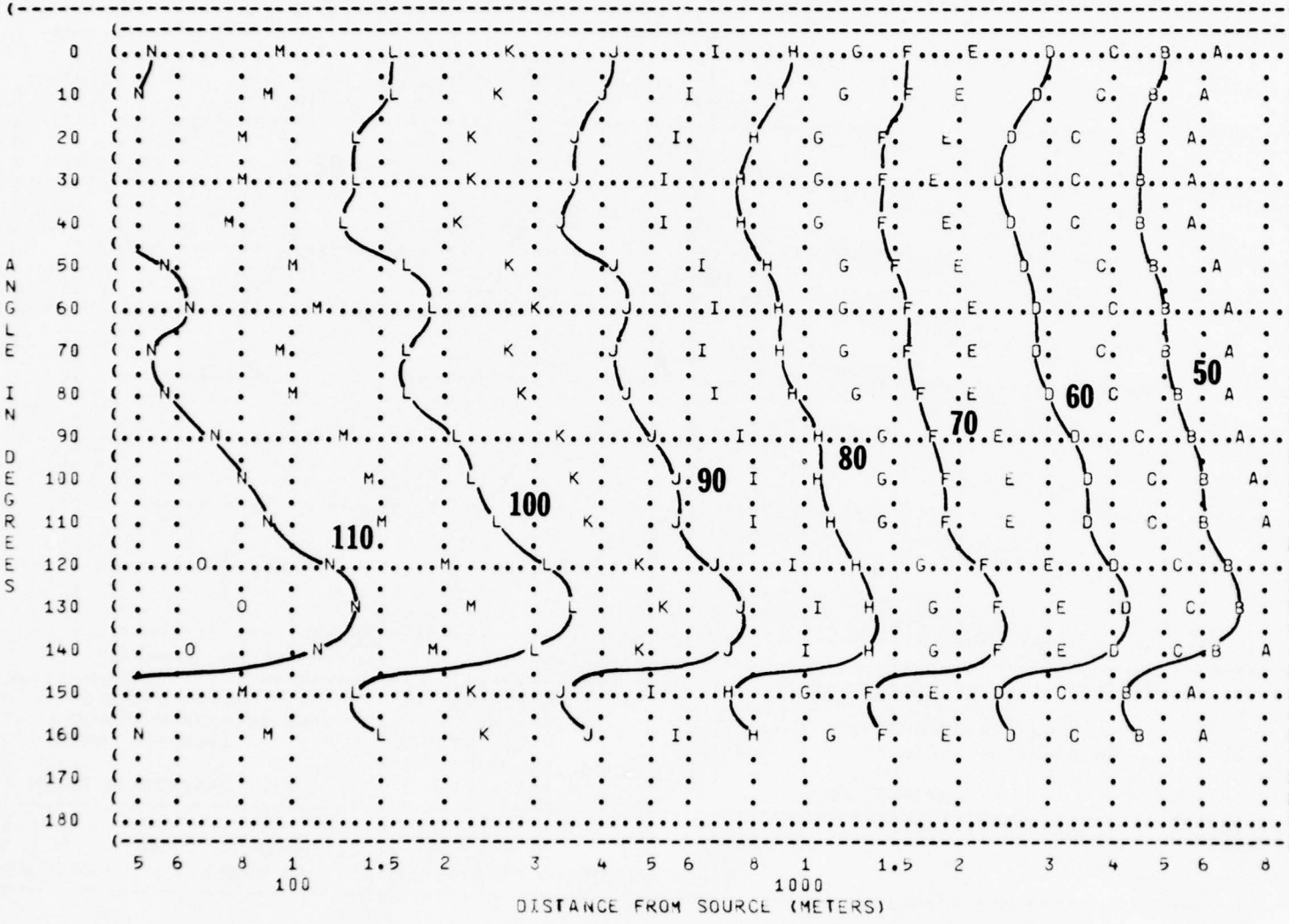
FIGURE 6: C-WEIGHTED OVERALL SOUND LEVEL (OASLC) EQUAL LEVEL CONTOURS (DBC)

IDENTIFICATION:
OMEGA 1.4
TEST 75-002-050
RUN 02
30 MAY 75
PAGE 14

NOISE SOURCE/SUBJECT:
U-4B AIRCRAFT
GSO-480-A1A6/B1A6 ENGINE
FAR FIELD NOISE

OPERATION:
MILITARY POWER
3400 RPM
BOTH ENGINES
FREE FLOW

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



POINT	DBC
A	45
B	50
C	55
D	60
E	65
F	70
G	75
H	80
I	85
J	90
K	95
L	100
M	105
N	110
O	115

FIGURE 7: A-WEIGHTED OVERALL SOUND LEVEL (OASLA) EQUAL LEVEL CONTOURS (DBA)

IDENTIFICATION:
OMEGA 1.4
TEST 75-002-050
RUN 01
30 MAY 75
PAGE 15

NOISE SOURCE/SUBJECT:
U-4B AIRCRAFT
GSO-480-A1A6/B1A6 ENGINE
FAR FIELD NOISE

OPERATION:
IDLE/TAXI POWER
1000 RPM
BOTH ENGINES
FREE FLOW

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

POINT	DBA
A	45
B	50
C	55
D	60
E	65
F	70
G	75

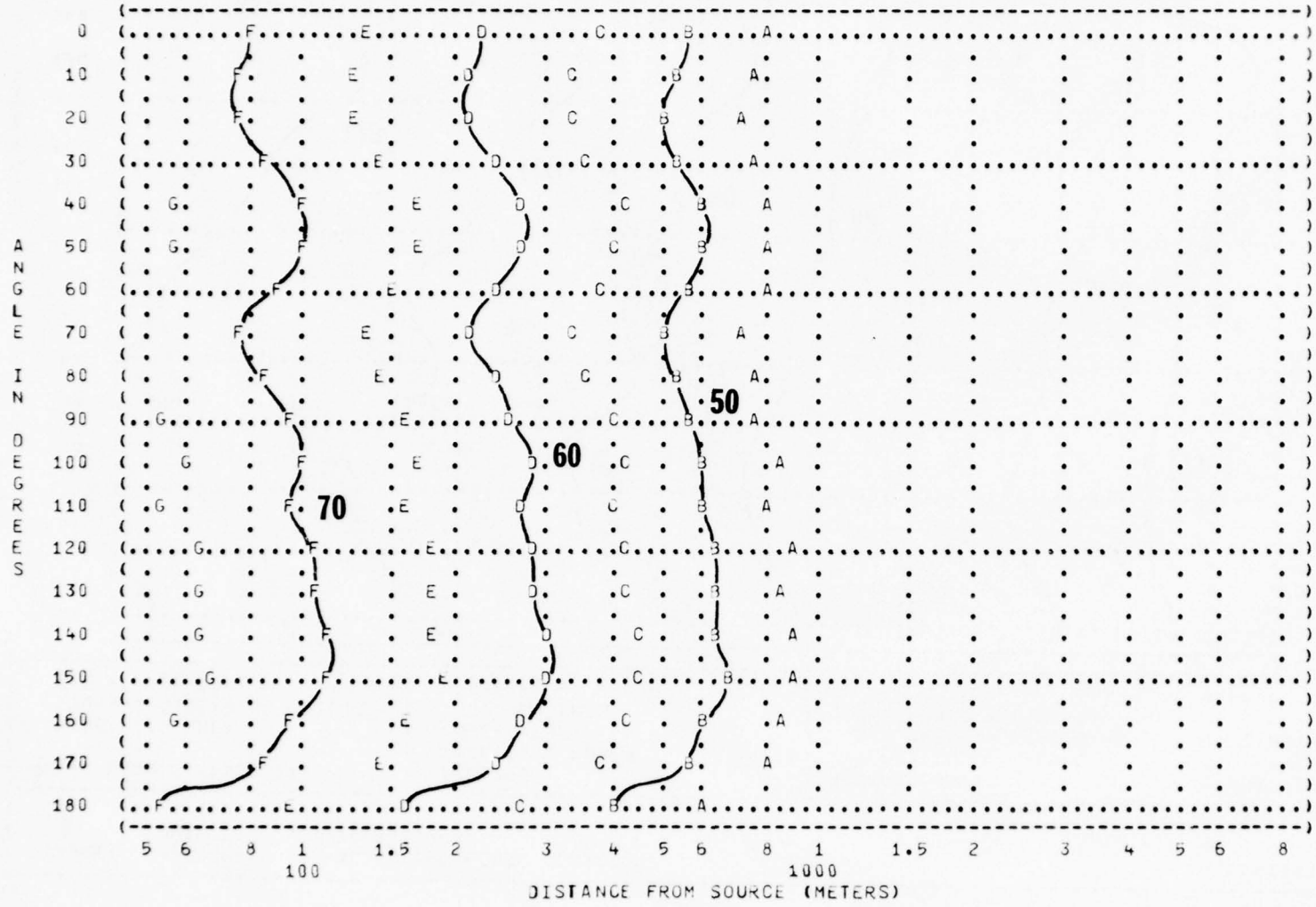


FIGURE: 7 A-WEIGHTED OVERALL SOUND LEVEL (OASLA) EQUAL LEVEL CONTOURS (DBA)

IDENTIFICATION:
OMEGA 1.4
TEST 75-002-050
RUN 02
30 MAY 75
PAGE 15

NOISE SOURCE/SUBJECT:
U-48 AIRCRAFT
GSO-480-A1A6/B1A6 ENGINE
FAR FIELD NOISE

OPERATION:
MILITARY POWER
3400 RPM
BOTH ENGINES
FREE FLOW

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

POINT	DBA
A	45
B	50
C	55
D	60
E	65
F	70
G	75
H	80
I	85
J	90
K	95
L	100
M	105
N	110
O	115

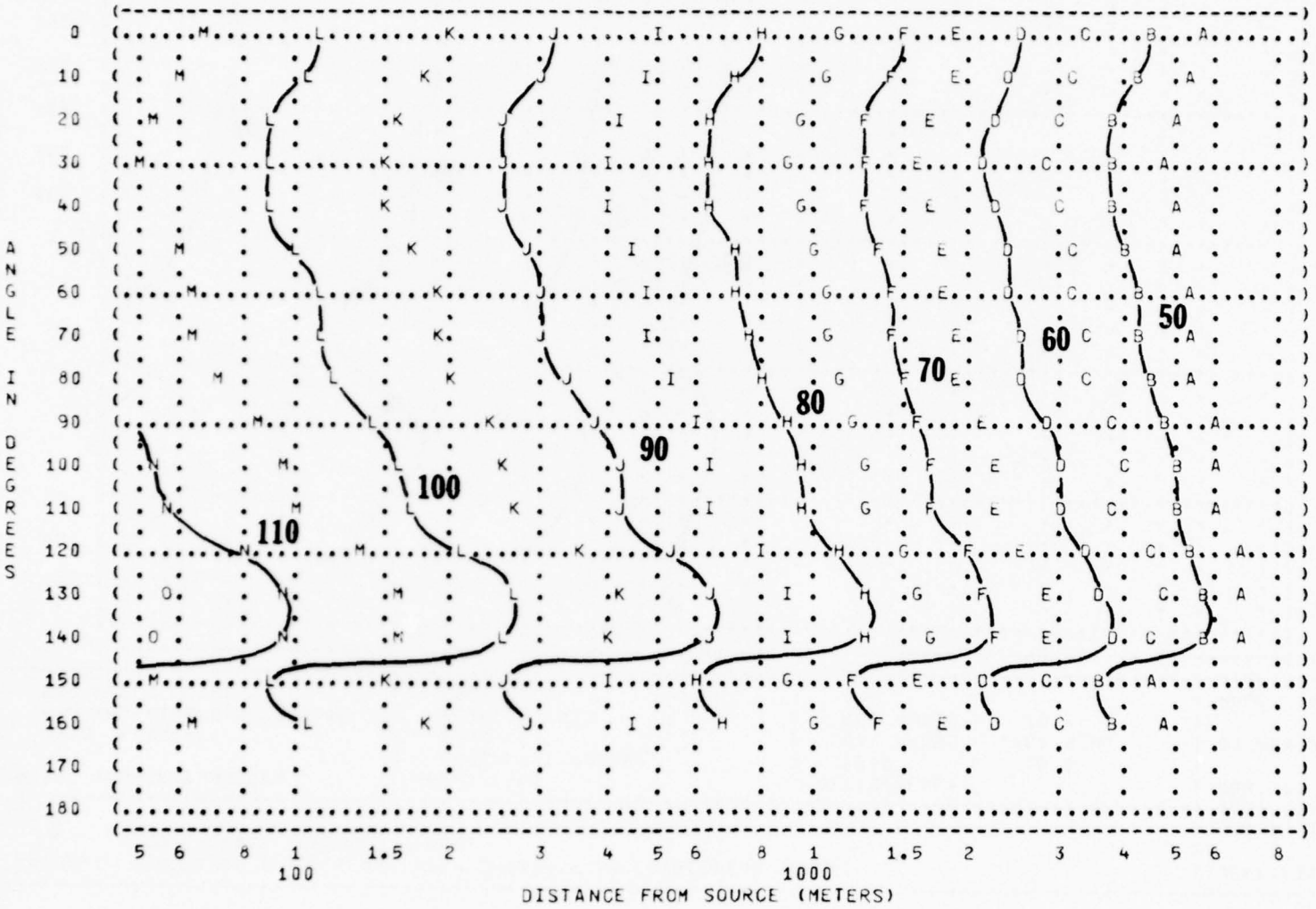


FIGURE: 8 PERCEIVED NOISE LEVEL WITH SMOOTH TONE CORRECTION (PNLT) EQUAL LEVEL CONTOURS (PNDB)

NOISE SOURCE/SUBJECT:
U-4B AIRCRAFT
GSO-480-A1A6/B1A6 ENGINE
FAR FIELD NOISE

OPERATION:
IDLE/TAXI POWER
1000 RPM
BOTH ENGINES
FREE FLOW

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

IDENTIFICATION:
OMEGA 1.4
TEST 75-002-050
RUN 01
30 MAY 75
PAGE 16

POINT	PNDB
A	60
B	65
C	70
D	75
E	80
F	85
G	90

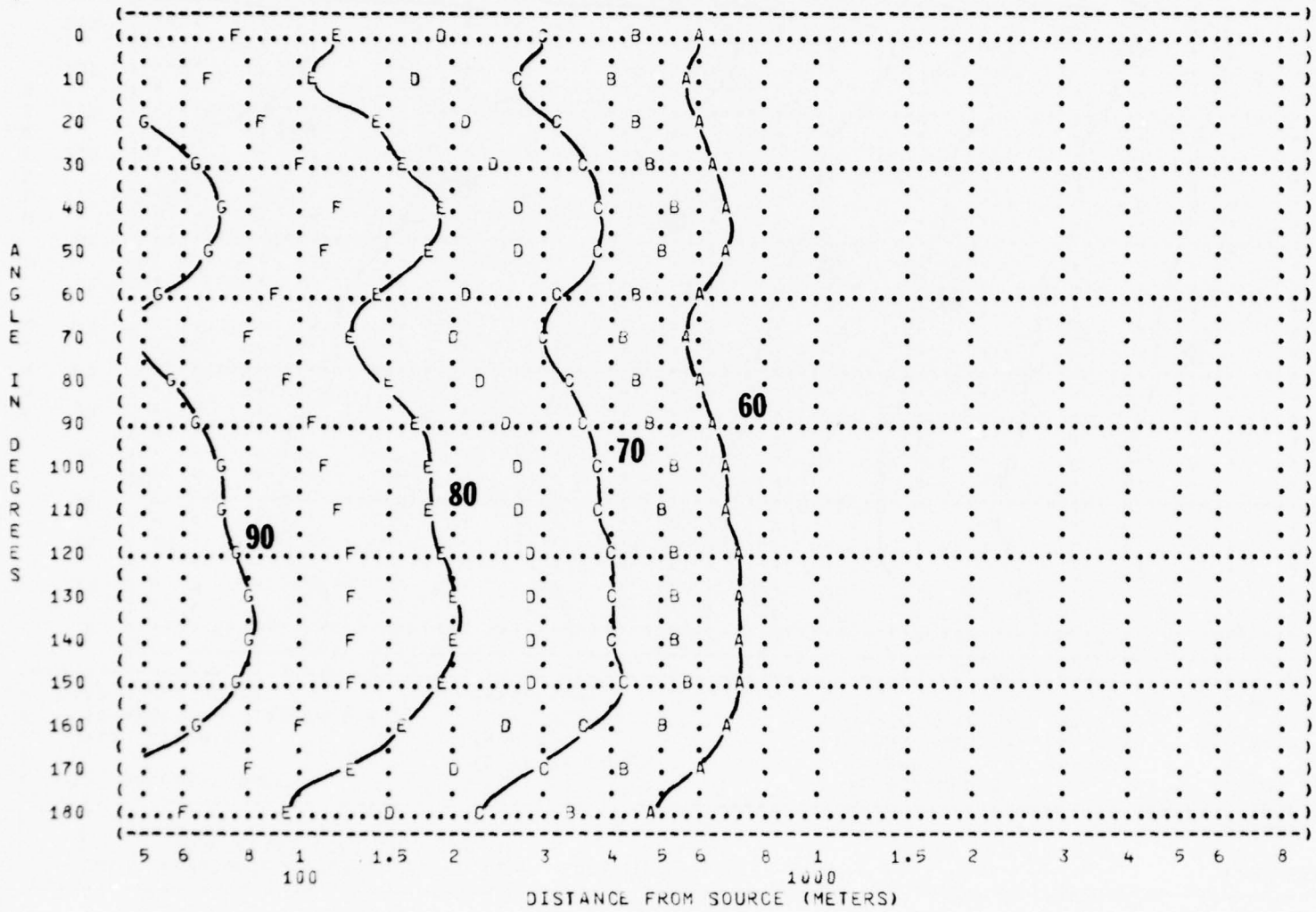


FIGURE: 8 PERCEIVED NOISE LEVEL WITH SMOOTH TONE CORRECTION (PNLT) EQUAL LEVEL CONTOURS (PNDB)

NOISE SOURCE/SUBJECT:
U-48 AIRCRAFT
GSO-480-A1A6/B1A6 ENGINE
FAR FIELD NOISE

OPERATION:
MILITARY POWER
3400 RPM
BOTH ENGINES
FREE FLOW

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

IDENTIFICATION:
OMEGA 1.4
TEST 75-002-050
RUN 02
30 MAY 75
PAGE 16

POINT	PNDB
A	60
B	65
C	70
D	75
E	80
F	85
G	90
H	95
I	100
J	105
K	110
L	115
M	120
N	125
O	130

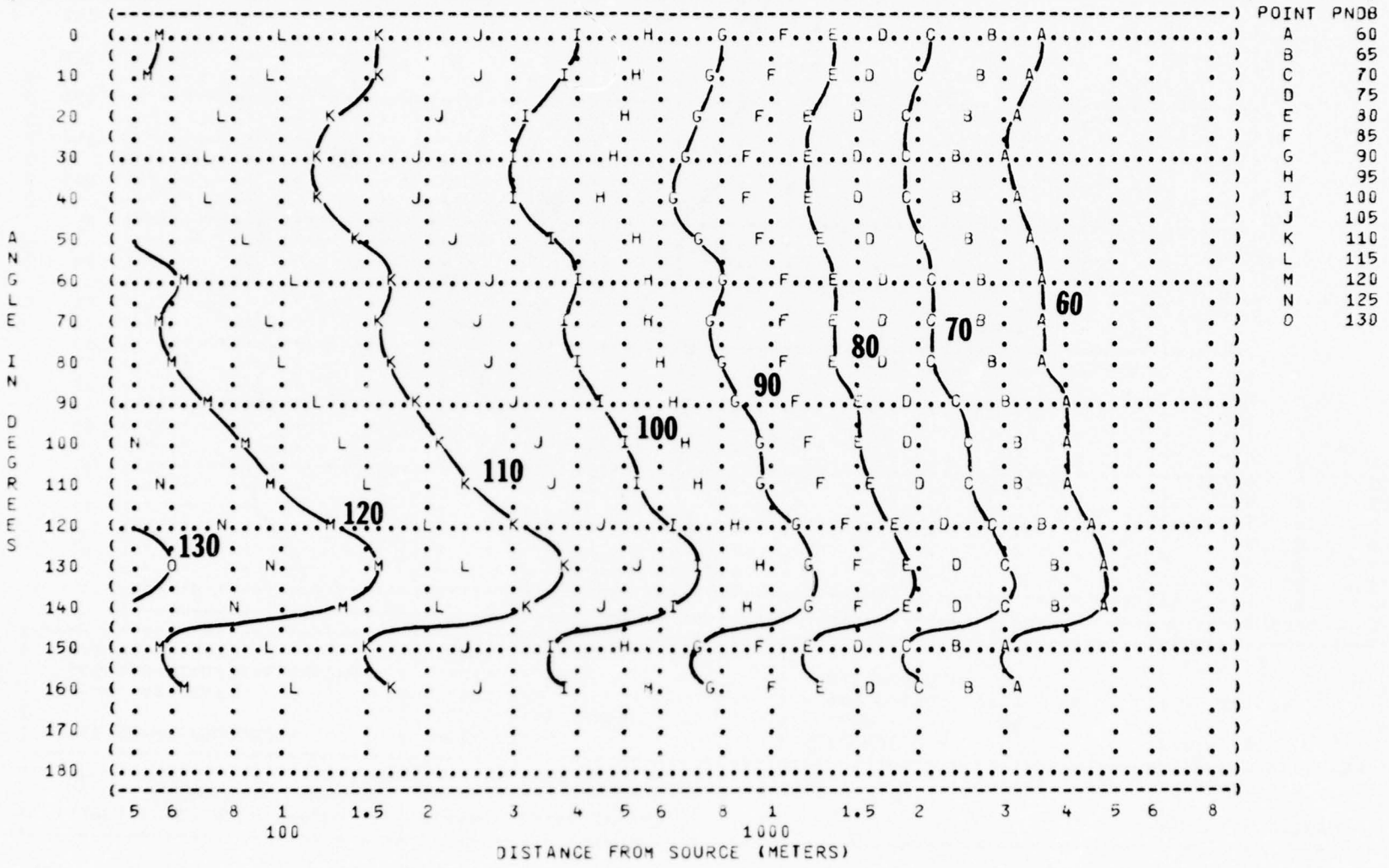


FIGURE 9: PREFERRED SPEECH INTERFERENCE LEVEL (PSIL) EQUAL LEVEL CONTOURS (DB)

IDENTIFICATION:
OMEGA 1.4
TEST 75-002-050
RUN 01
30 MAY 75
PAGE 17

NOISE SOURCE/SUBJECT:
U-4B AIRCRAFT
GSO-480-A1A6/B1A6 ENGINE
FAR FIELD NOISE

OPERATION:
IDLE/TAXI POWER
1000 RPM
BOTH ENGINES
FREE FLOW

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

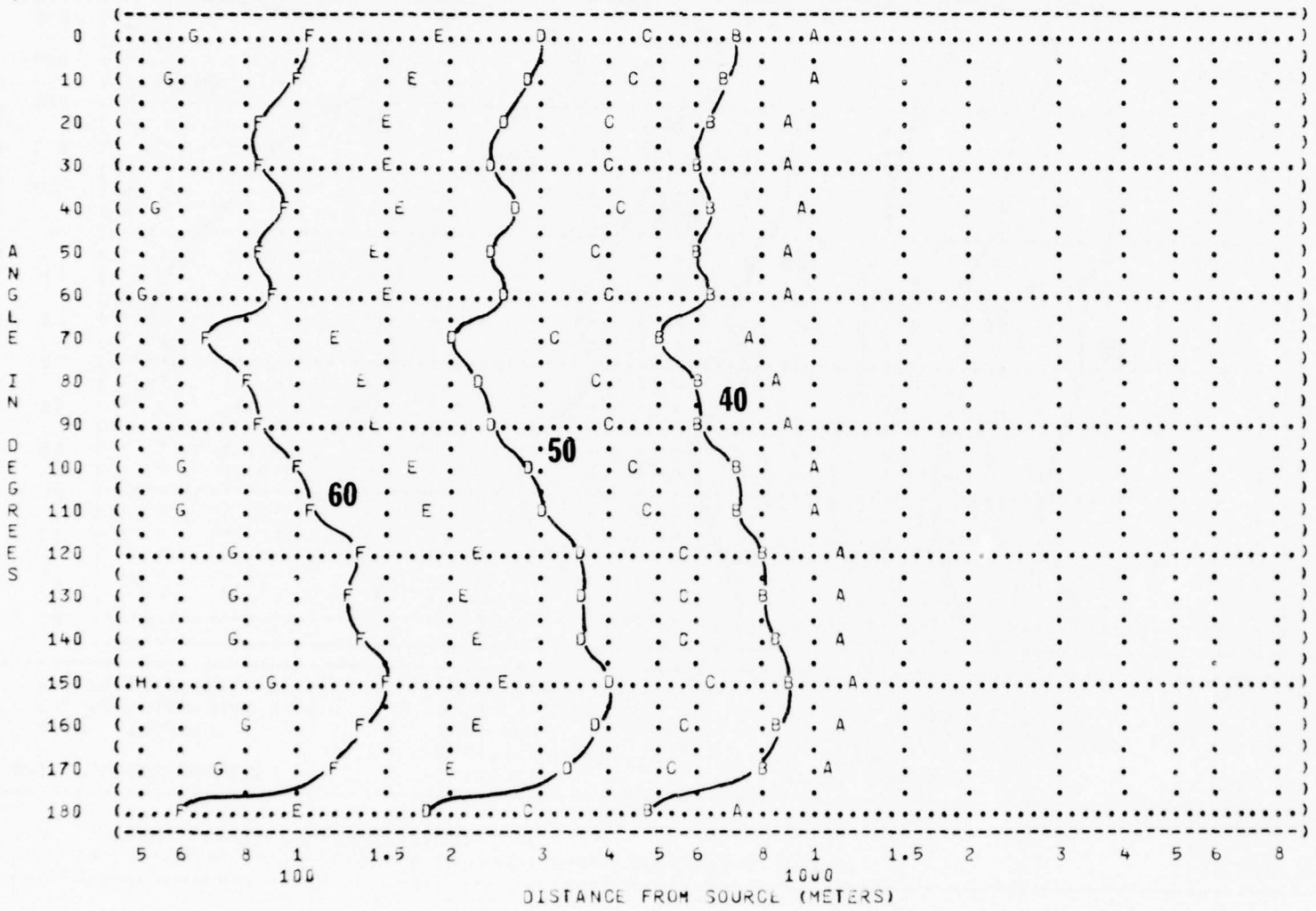


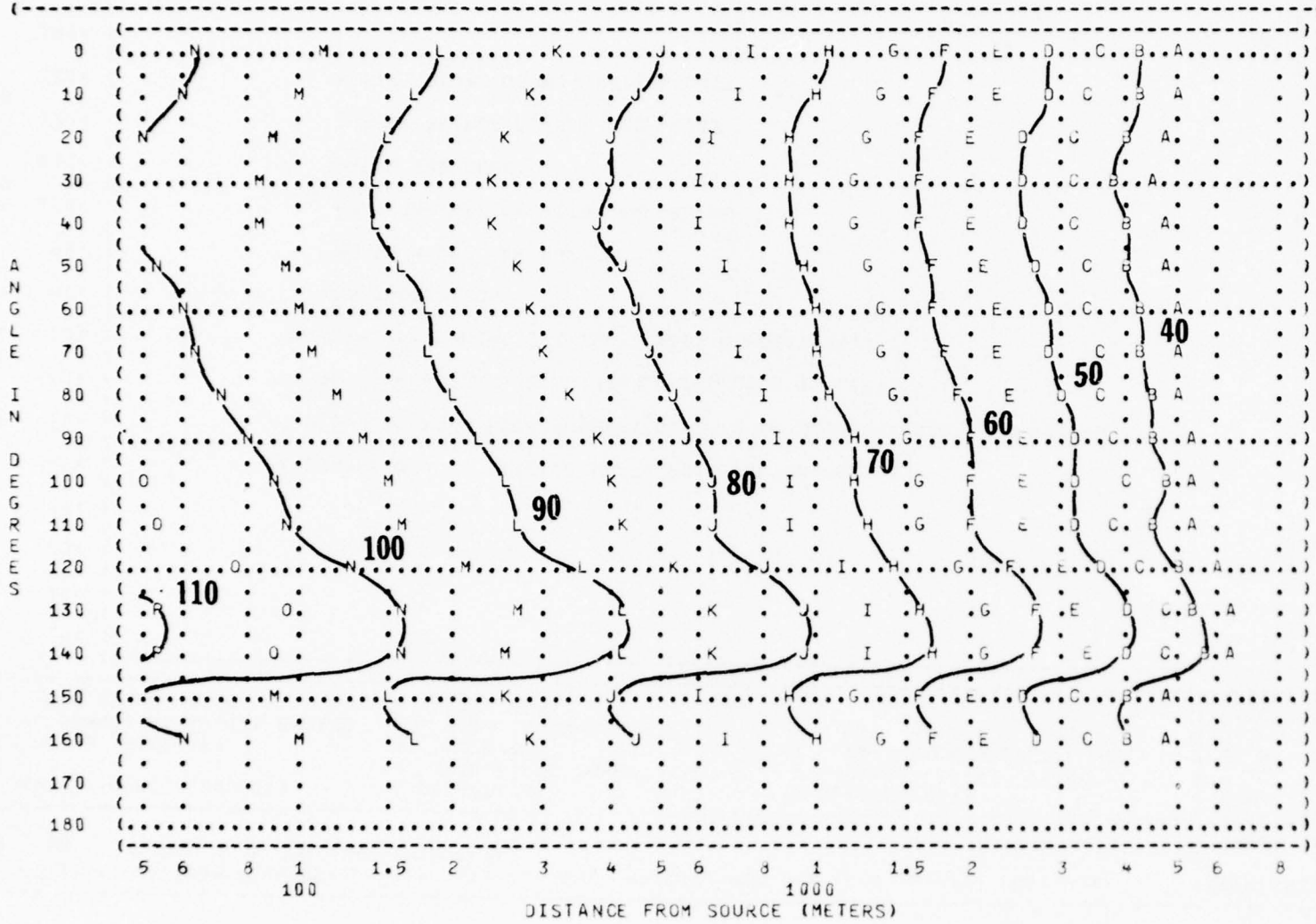
FIGURE 9 PREFERRED SPEECH INTERFERENCE LEVEL (PSIL)
EQUAL LEVEL CONTOURS (DB)

IDENTIFICATION:
OMEGA 1.4
TEST 75-002-050
RUN 02
30 MAY 75
PAGE 17

NOISE SOURCE/SUBJECT:
U-4B AIRCRAFT
GSO-480-A1A6/B1A6 ENGINE
FAR FIELD NOISE

OPERATION:
MILITARY POWER
3400 RPM
BOTH ENGINES
FREE FLOW

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
I	75
J	80
K	85
L	90
M	95
N	100
O	105
P	110

FIGURE: 10 MAXIMUM PERMISSIBLE TIME (T) FOR ONE EXPOSURE PER DAY (AFR 161-35, JULY 73)
EQUAL TIME CONTOURS (MINUTES)

IDENTIFICATION:
OMEGA 1.4
TEST 75-002-050
RUN 01
30 MAY 75
PAGE 7

NOISE SOURCE/SUBJECT:
U-4B AIRCRAFT
GSO-480-A1A6/B1A6 ENGINE
FAR FIELD NOISE

OPERATION:
IDLE/TAXI POWER
1000 RPM
BOTH ENGINES
FREE FLOW

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

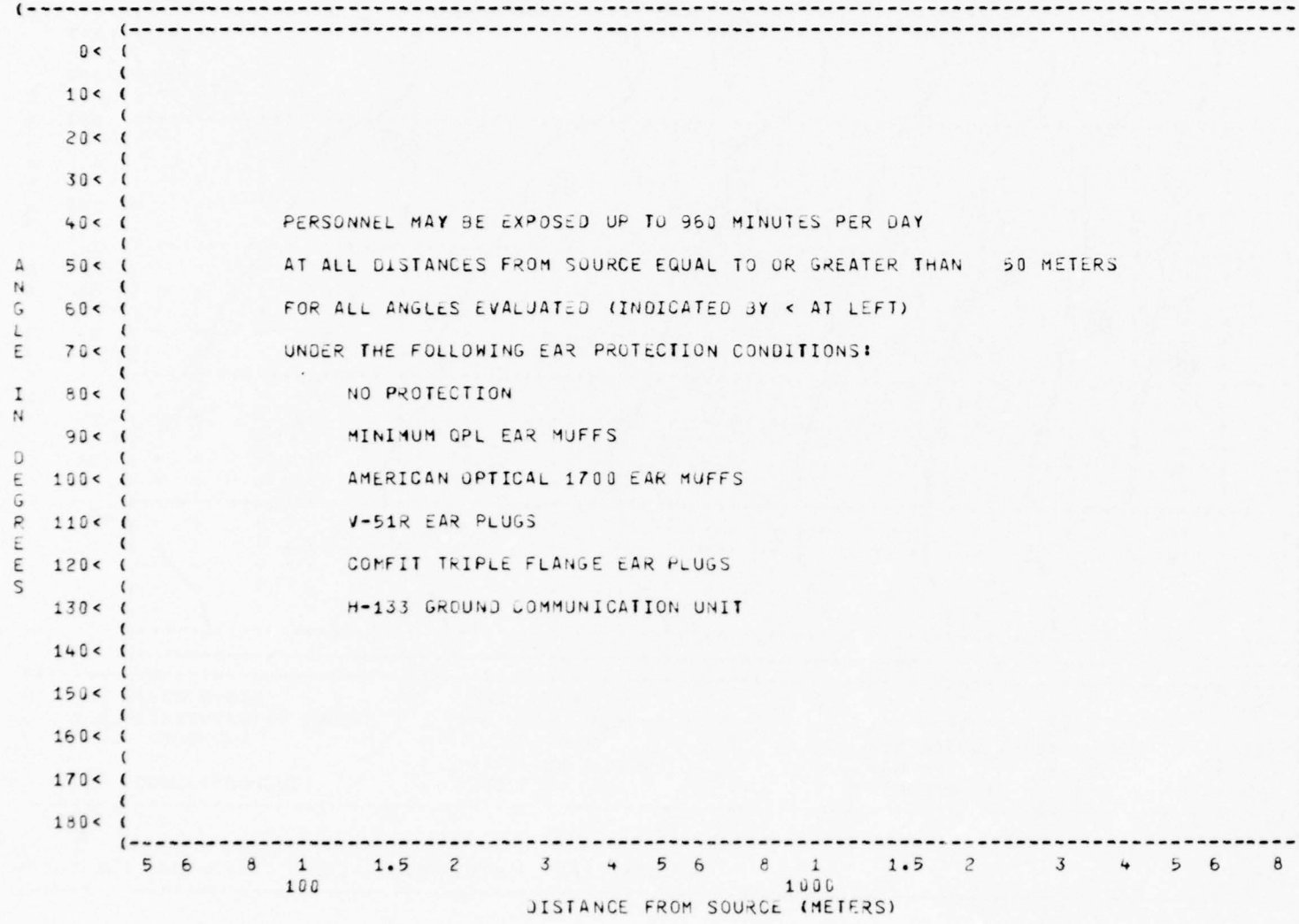


FIGURE 10: MAXIMUM PERMISSIBLE TIME (T) FOR ONE EXPOSURE PER DAY (AFR 161-35, JULY 73)
EQUAL TIME CONTOURS (MINUTES)
NO PROTECTION

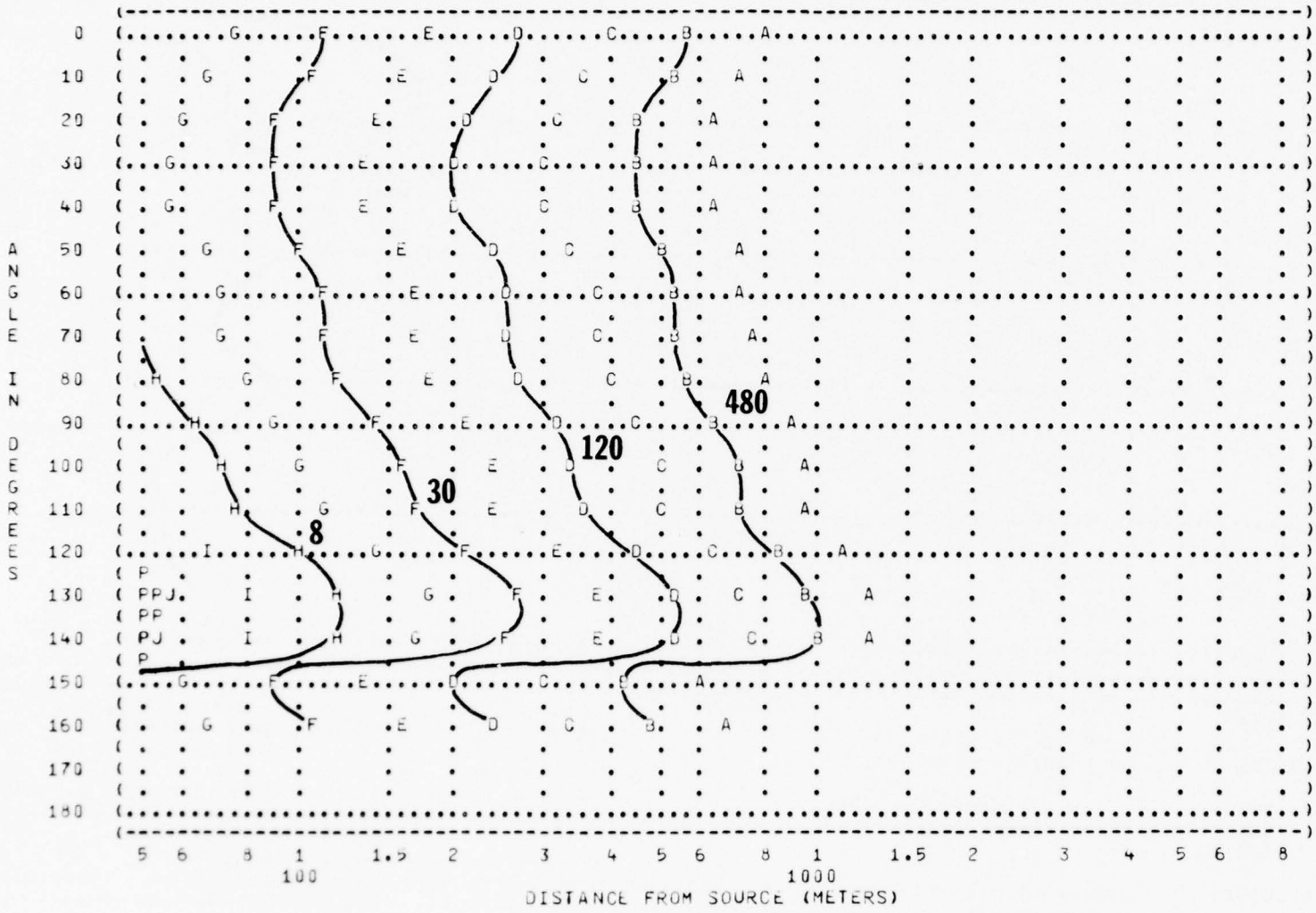
IDENTIFICATION:
OMEGA 1.4
TEST 75-002-050
RUN 02
30 MAY 75
PAGE 7

NOISE SOURCE/SUBJECT:
U-4B AIRCRAFT
GSO-480-A1A6/B1A6 ENGINE
FAR FIELD NOISE

OPERATION:
MILITARY POWER
3400 RPM
BOTH ENGINES
FREE FLOW

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

POINT	MIN
A	960
B	480
C	240
D	120
E	60
F	30
G	15
H	8
I	4
J	2.2



P ADDITIONAL EAR PROTECTION REQUIRED.

FIGURE: 10

MAXIMUM PERMISSIBLE TIME (T) FOR ONE EXPOSURE PER DAY (AFR 161-35, JULY 73)
EQUAL TIME CONTOURS (MINUTES)
MINIMUM QPL EAR MUFFS

IDENTIFICATION:
OMEGA 1.4
TEST 75-002-050
RUN 02
30 MAY 75
PAGE 8

NOISE SOURCE/SUBJECT:
U-4B AIRCRAFT
GSO-480-A1A6/B1A6 ENGINE
FAR FIELD NOISE

OPERATION:
MILITARY POWER
3400 RPM
BOTH ENGINES
FREE FLOW

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

POINT	MIN
A	960
B	480
C	240
D	120

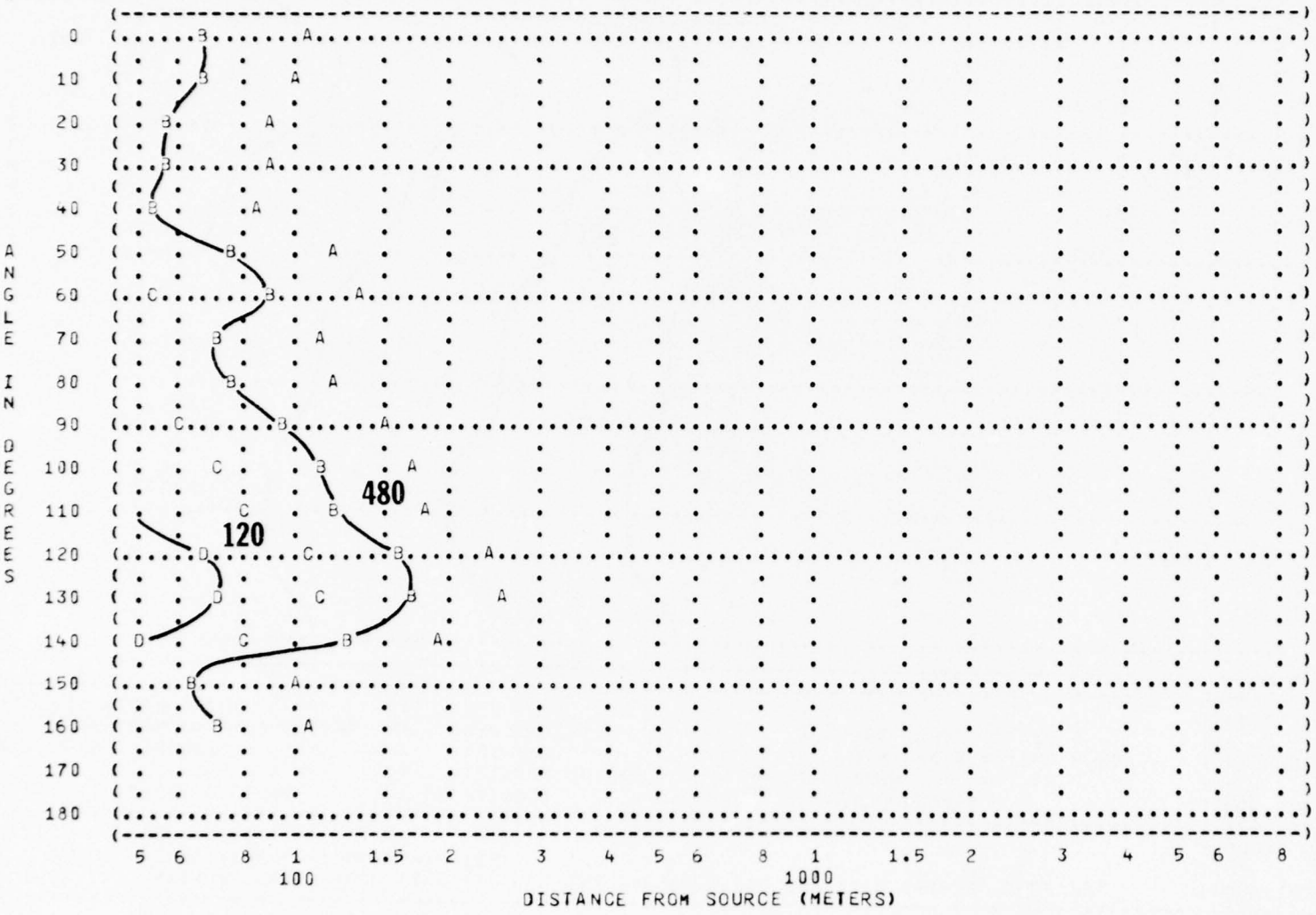


FIGURE: 10 MAXIMUM PERMISSIBLE TIME (T) FOR ONE EXPOSURE PER DAY (AFR 161-35, JULY 73)
EQUAL TIME CONTOURS (MINUTES)
AMERICAN OPTICAL 1700 EAR MUFFS

NOISE SOURCE/SUBJECT:
U-4B AIRCRAFT
GSO-480-A1A6/B1A6 ENGINE
FAR FIELD NOISE

OPERATION:
MILITARY POWER
3400 RPM
BOTH ENGINES
FREE FLOW

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

IDENTIFICATION:
OMEGA 1.4
TEST 75-002-050
RUN 02

30 MAY 75

PAGE 9

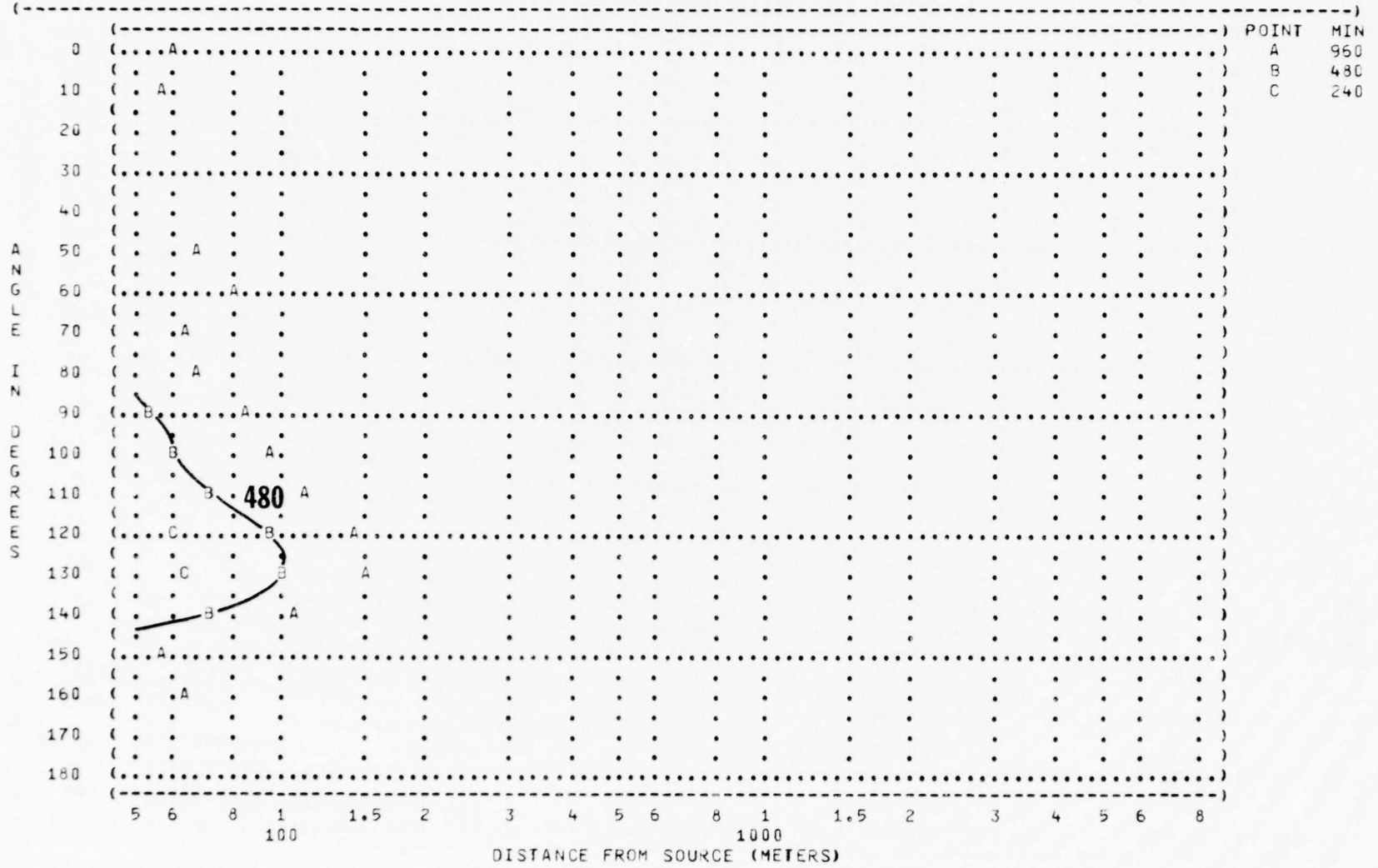


FIGURE: 10

MAXIMUM PERMISSIBLE TIME (T) FOR ONE EXPOSURE PER DAY (AFR 161-35, JULY 73)
EQUAL TIME CONTOURS (MINUTES)
V-51R EAR PLUGS

NOISE SOURCE/SUBJECT:
U-48 AIRCRAFT
GSO-480-A1A6/B1A6 ENGINE
FAR FIELD NOISE

OPERATION:
MILITARY POWER
3400 RPM
BOTH ENGINES
FREE FLOW

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

IDENTIFICATION:
OMEGA 1.4
TEST 75-002-050
RUN 02
30 MAY 75
PAGE 10

POINT	MIN
A	960
B	480
C	240

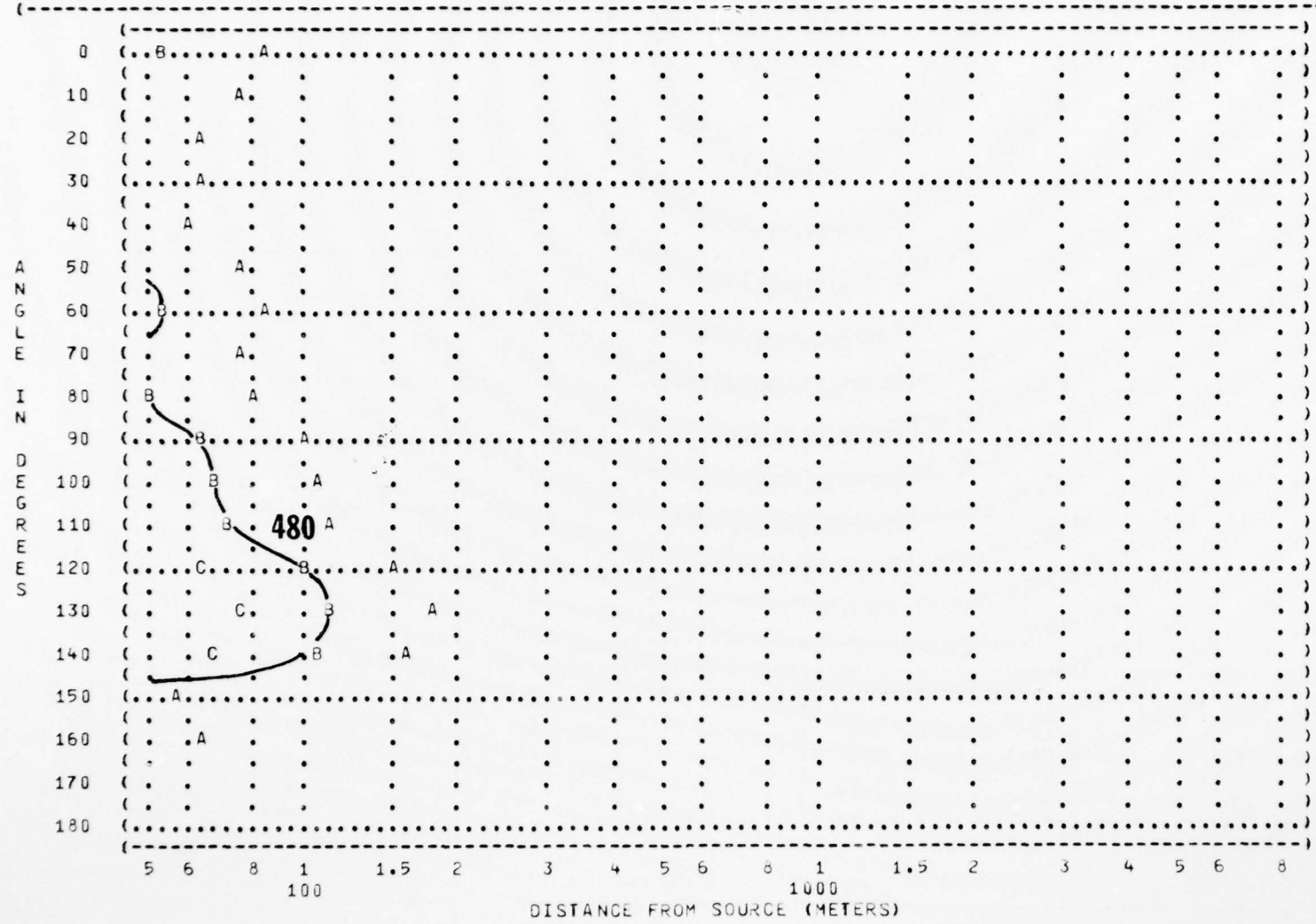


FIGURE 10: MAXIMUM PERMISSIBLE TIME (T) FOR ONE EXPOSURE PER DAY (AFR 161-35, JULY 73)
EQUAL TIME CONTOURS (MINUTES)
COMFIT TRIPLE FLANGE EAR PLUGS

IDENTIFICATION:
OMEGA 1.4
TEST 75-002-050
RUN 02
30 MAY 75
PAGE 11

NOISE SOURCE/SUBJECT:
U-4B AIRCRAFT
GSO-480-A1A6/B1A6 ENGINE
FAR FIELD NOISE

OPERATION:
MILITARY POWER
3400 RPM
BOTH ENGINES
FREE FLOW

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

POINT	MIN
A	960
B	480
C	240
D	120

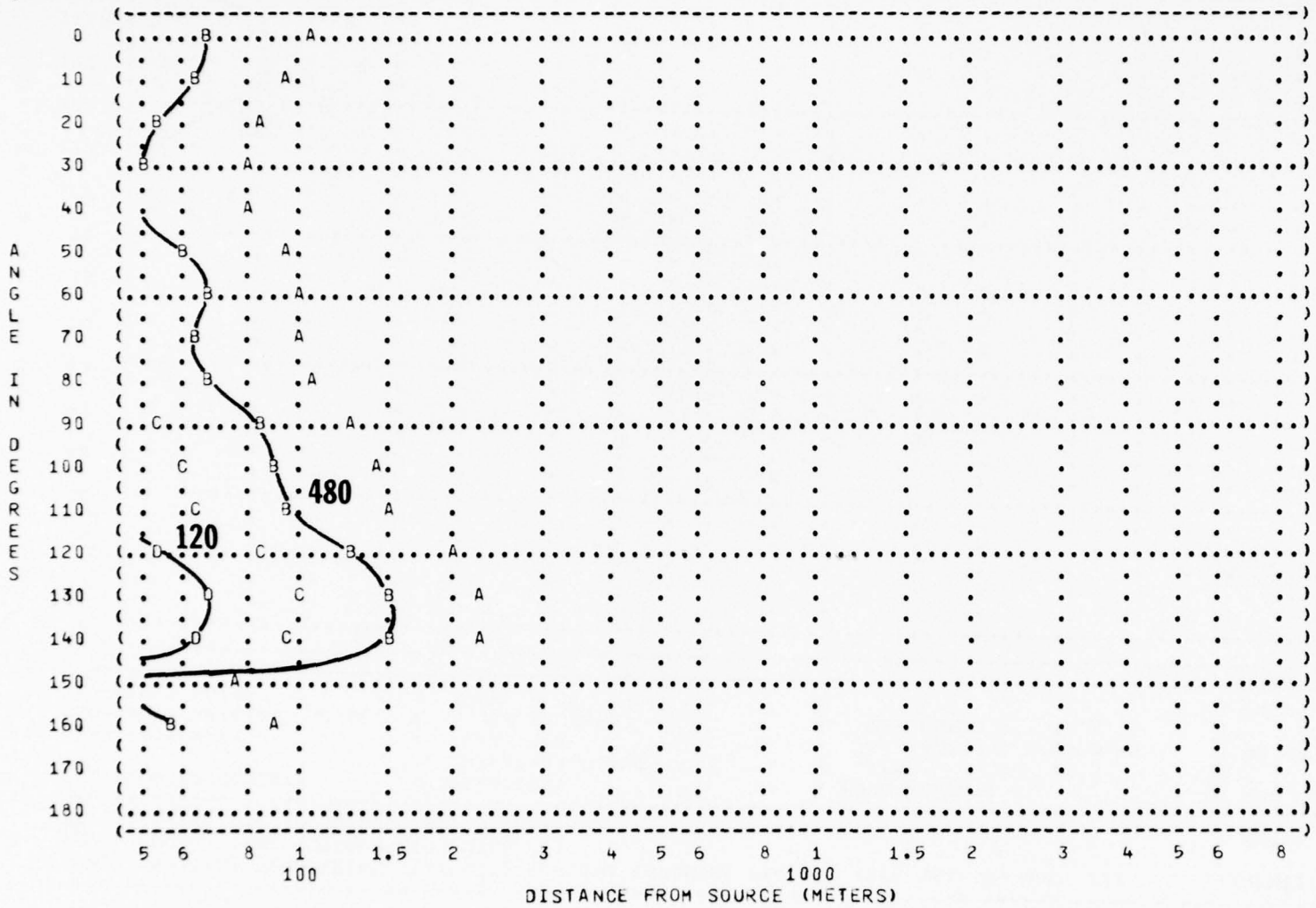


FIGURE: 10

MAXIMUM PERMISSIBLE TIME (T) FOR ONE EXPOSURE PER DAY (AFR 161-35, JULY 73)
EQUAL TIME CONTOURS (MINUTES)
H-133 GROUND COMMUNICATION UNIT

NOISE SOURCE/SUBJECT:
U-4B AIRCRAFT
GSO-480-A1A6/B1A6 ENGINE
FAR FIELD NOISE

OPERATION:
MILITARY POWER
3400 RPM
BOTH ENGINES
FREE FLOW

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

IDENTIFICATION:
OMEGA 1.4
TEST 75-002-050
RUN 02
30 MAY 75
PAGE 12

POINT	MIN
A	960
B	480
C	240

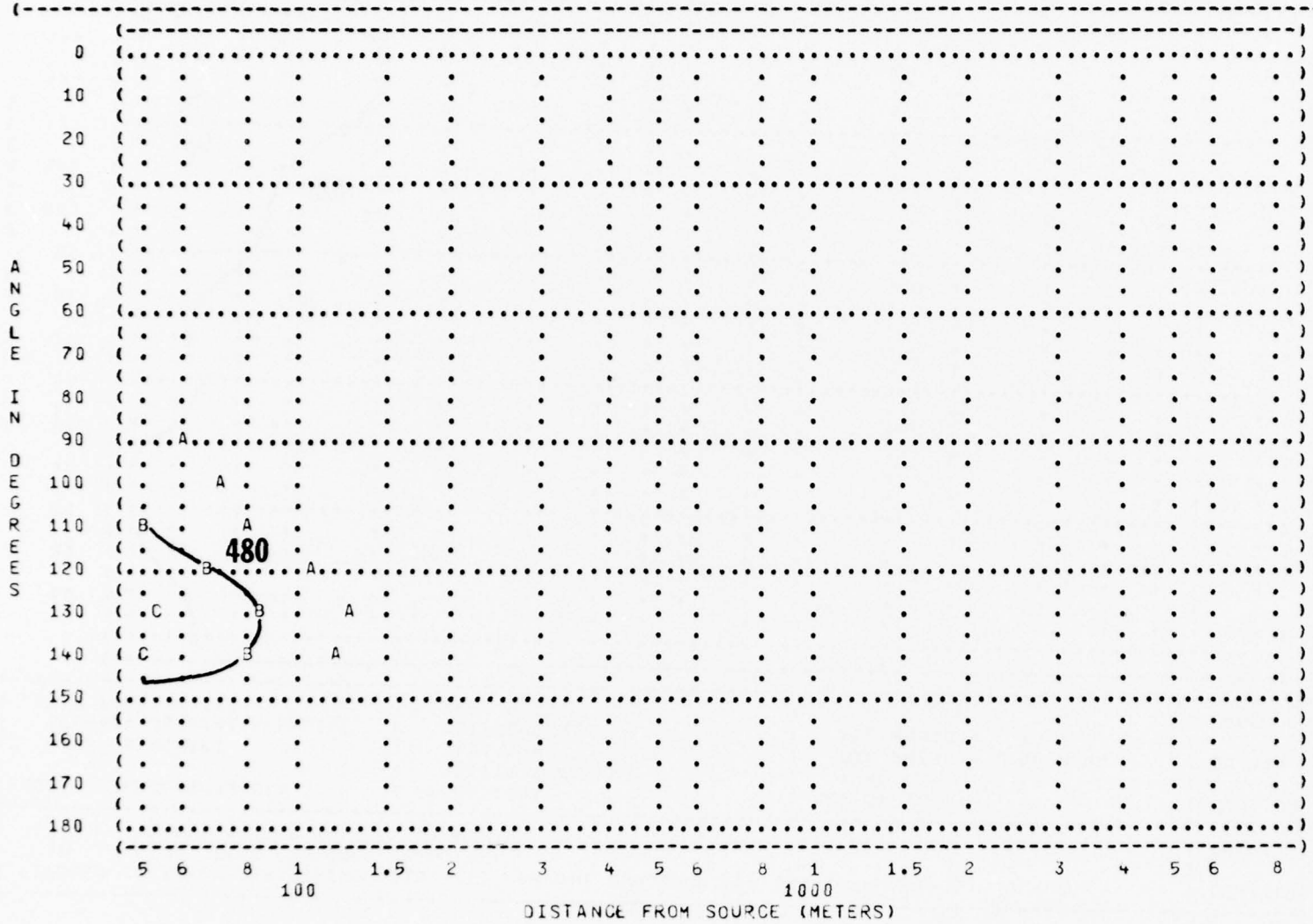


FIGURE 11: SOUND PRESSURE LEVEL (SPL) EQUAL LEVEL CONTOURS (DB) 31.5 HZ OCTAVE BAND

IDENTIFICATION: OMEGA 1.4 / TEST 75-002-050 / RUN 01 / 30 MAY 75 / PAGE 18

NOISE SOURCE/SUBJECT: U-4B AIRCRAFT; GSO-480-A1A6/B1A6 ENGINE; FAR FIELD NOISE

OPERATION: IDLE/TAXI POWER; 1000 RPM; BOTH ENGINES; FREE FLOW

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

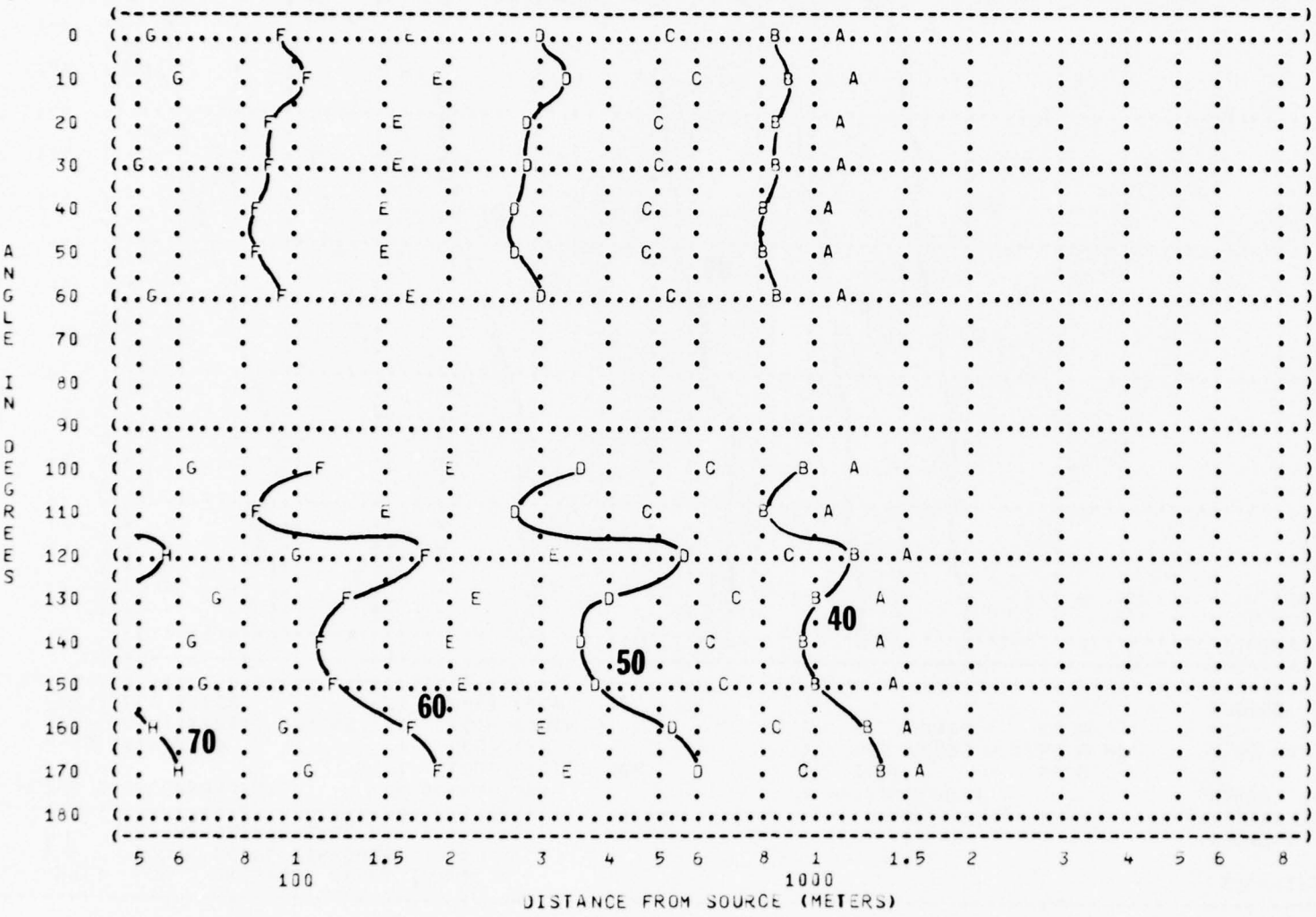


FIGURE 11: SOUND PRESSURE LEVEL (SPL) EQUAL LEVEL CONTOURS (DB) 63 HZ OCTAVE BAND

NOISE SOURCE/SUBJECT:
U-4B AIRCRAFT
GSO-480-A1A6/B1A6 ENGINE
FAR FIELD NOISE

OPERATION:
IDLE/TAXI POWER
1000 RPM
BOTH ENGINES
FREE FLOW

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

IDENTIFICATION:
OMEGA 1.4
TEST 75-002-050
RUN 01
30 MAY 75
PAGE 19

POINT	DB
A	35
B	40
C	45
D	50
E	55
F	60
G	65
H	70
I	75
J	80
K	85

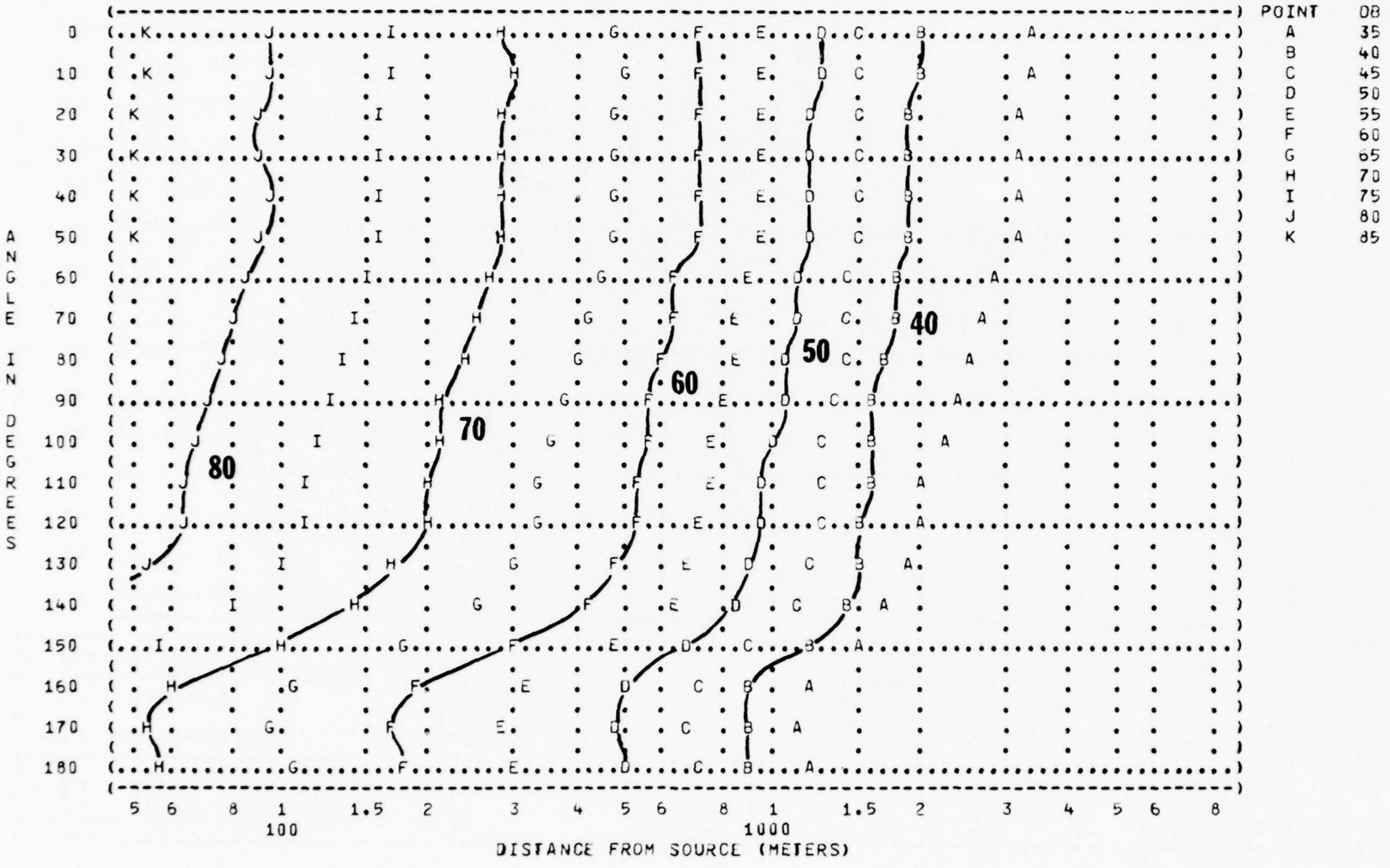


FIGURE: 11 SOUND PRESSURE LEVEL (SPL) EQUAL LEVEL CONTOURS (DB) 125 HZ OCTAVE BAND

IDENTIFICATION:
OMEGA 1.4
TEST 75-002-050
RUN 01
30 MAY 75
PAGE 20

NOISE SOURCE/SUBJECT:
U-4B AIRCRAFT
GSO-480-A1A6/B1A6 ENGINE
FAR FIELD NOISE

OPERATION:
IDLE/TAXI POWER
1000 RPM
BOTH ENGINES
FREE FLOW

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
I	75
J	80
K	85

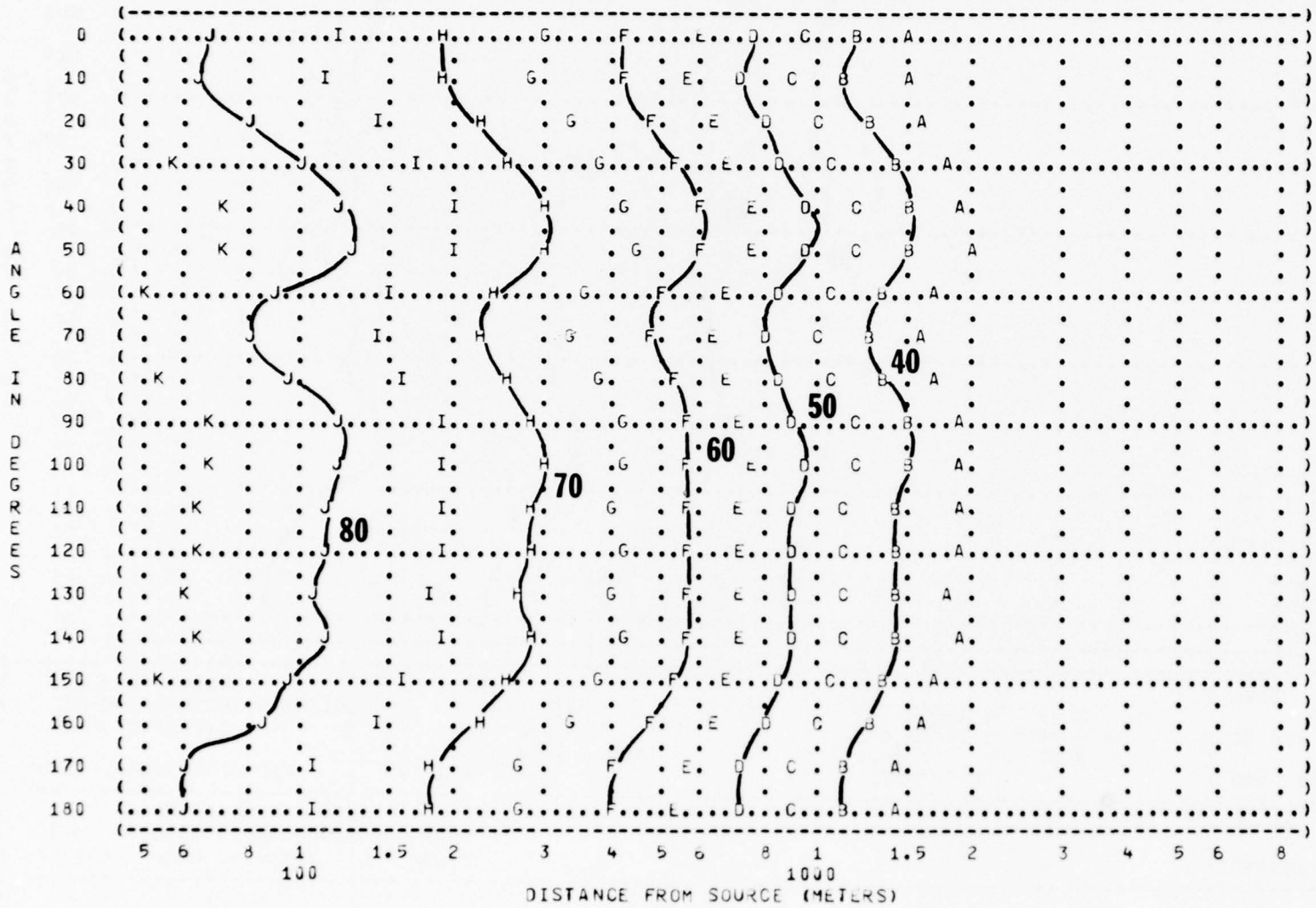


FIGURE: 11 SOUND PRESSURE LEVEL (SPL) EQUAL LEVEL CONTOURS (DB) 250 HZ OCTAVE BAND

IDENTIFICATION:
OMEGA 1.4
TEST 75-002-050
RUN 01
30 MAY 75
PAGE 21

NOISE SOURCE/SUBJECT:
U-4B AIRCRAFT
GSO-480-A1A6/B1A6 ENGINE
FAR FIELD NOISE

OPERATION:
IDLE/TAXI POWER
1000 RPM
BOTH ENGINES
FREE FLOW

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
I	75

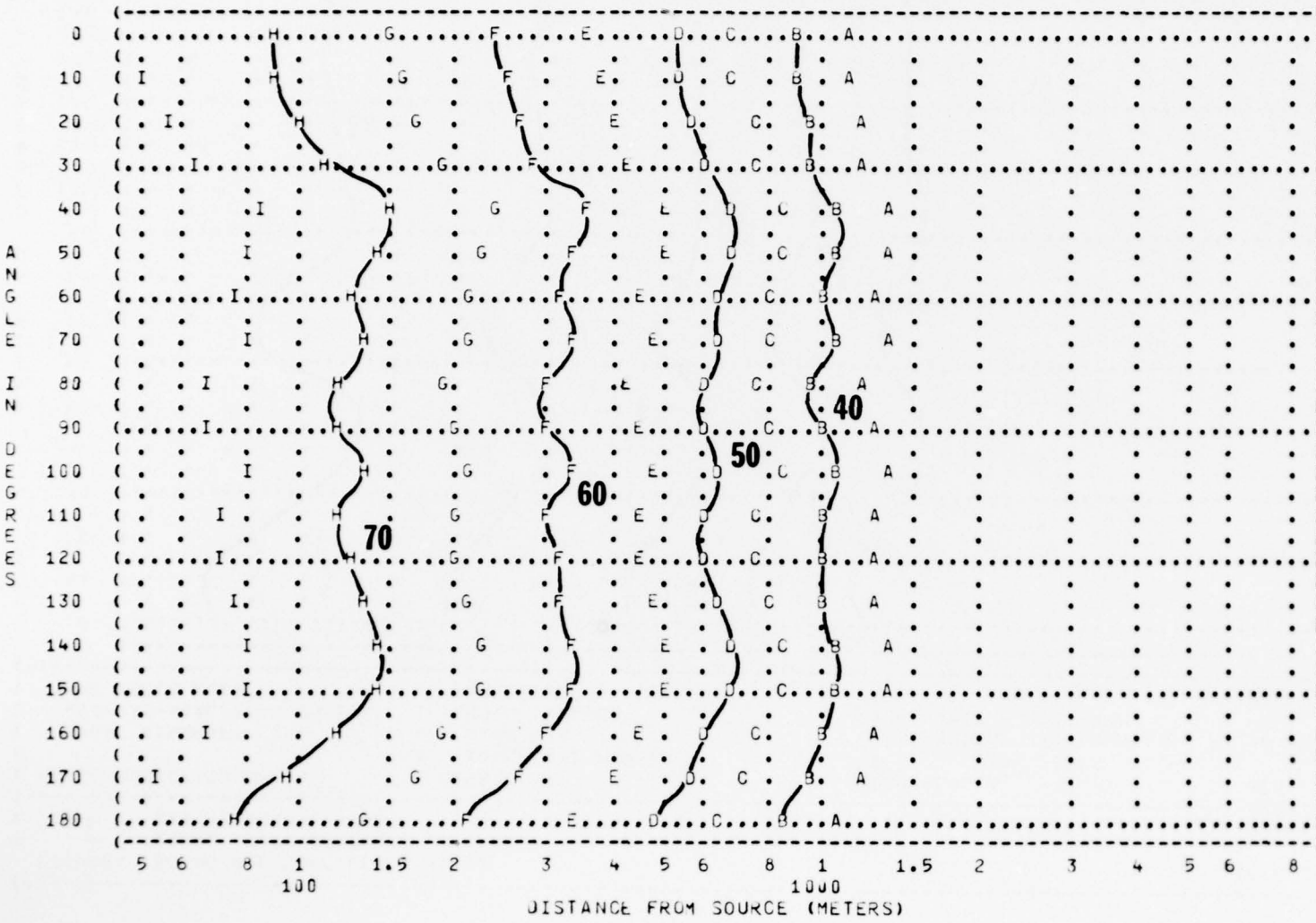


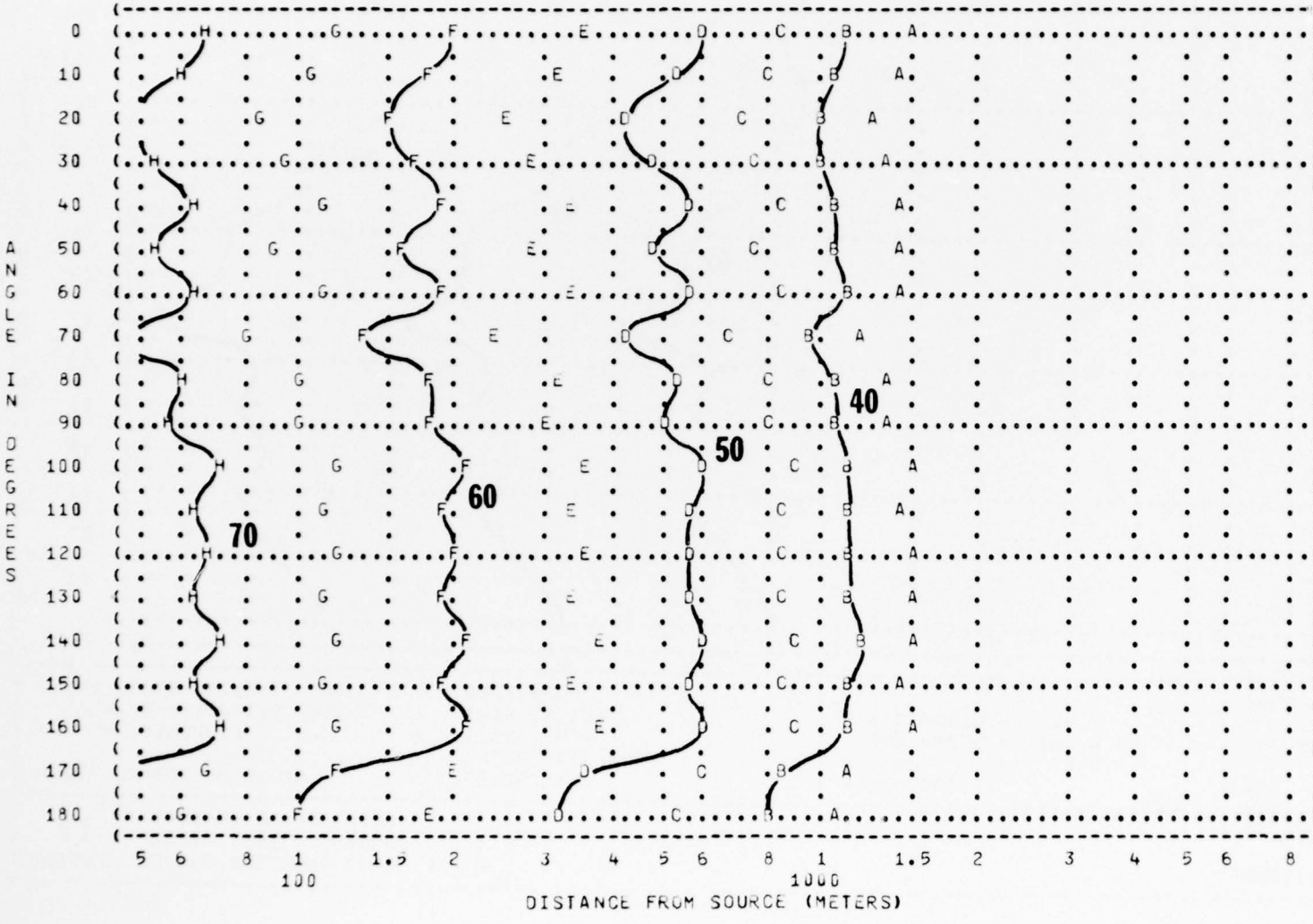
FIGURE 11: SOUND PRESSURE LEVEL (SPL) EQUAL LEVEL CONTOURS (DB) 500 HZ OCTAVE BAND

NOISE SOURCE/SUBJECT:
U-4B AIRCRAFT
GSO-480-A1A6/B1A6 ENGINE
FAR FIELD NOISE

OPERATION:
IDLE/TAXI POWER
1000 RPM
BOTH ENGINES
FREE FLOW

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

IDENTIFICATION:
OMEGA 1.4
TEST 75-002-050
RUN 01
30 MAY 75
PAGE 22



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

FIGURE: 11

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

NOISE SOURCE/SUBJECT:
U-4B AIRCRAFT
GSO-480-A1A6/B1A6 ENGINE
FAR FIELD NOISE

OPERATION:
IDLE/TAXI POWER
1000 RPM
BOTH ENGINES
FREE FLOW

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

IDENTIFICATION:
OMEGA 1.4
TEST 75-002-050
RUN 01
30 MAY 75
PAGE 23

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

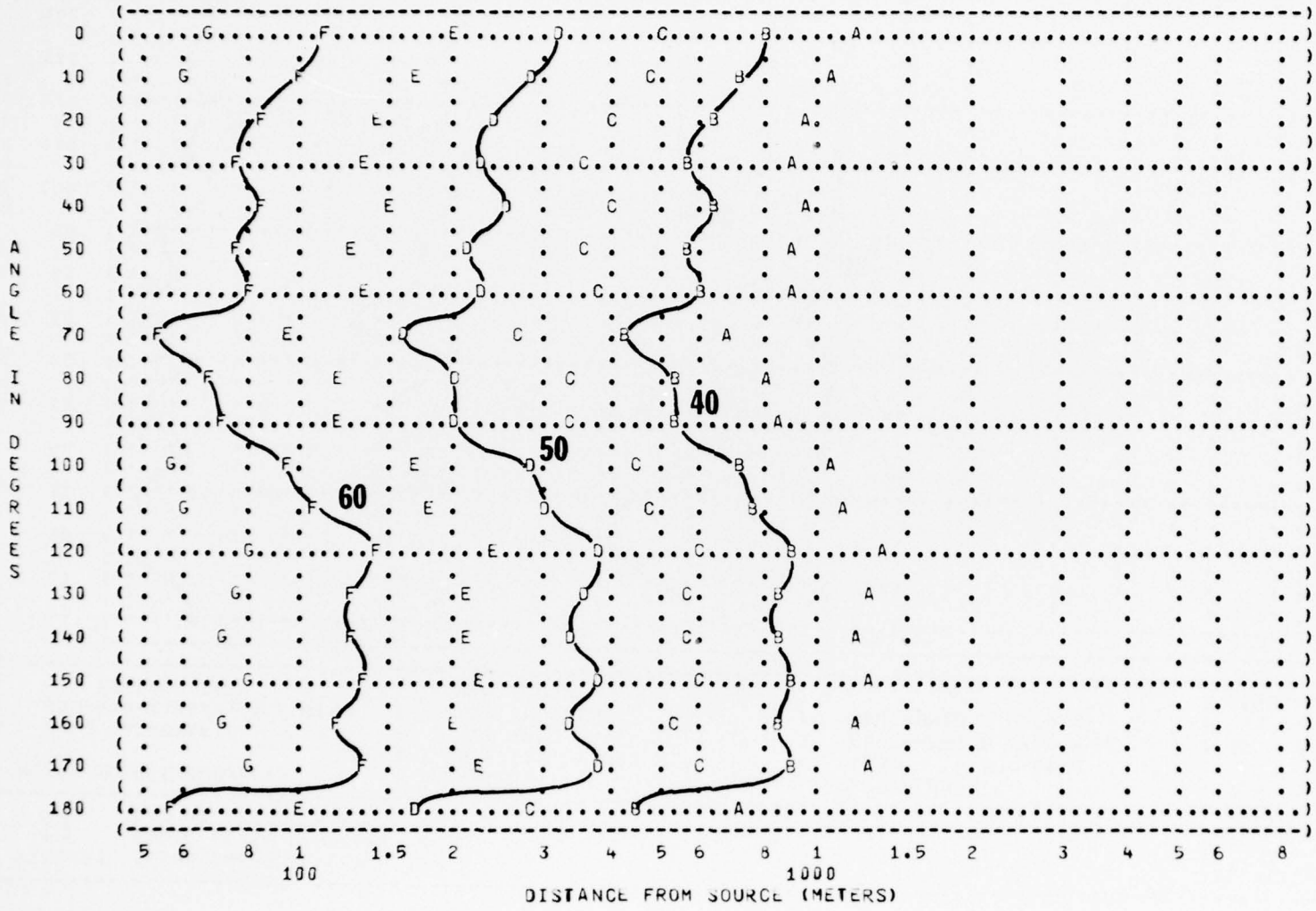


FIGURE 11 SOUND PRESSURE LEVEL (SPL) EQUAL LEVEL CONTOURS (DB) 2000 HZ OCTAVE BAND

NOISE SOURCE/SUBJECT:
U-43 AIRCRAFT
GSO-480-A1A6/B1A6 ENGINE
FAR FIELD NOISE

OPERATION:
IDLE/TAXI POWER
1000 RPM
BOTH ENGINES
FREE FLOW

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

IDENTIFICATION:
OMEGA 1.4
TEST 75-002-050
RUN 01
30 MAY 75
PAGE 24

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

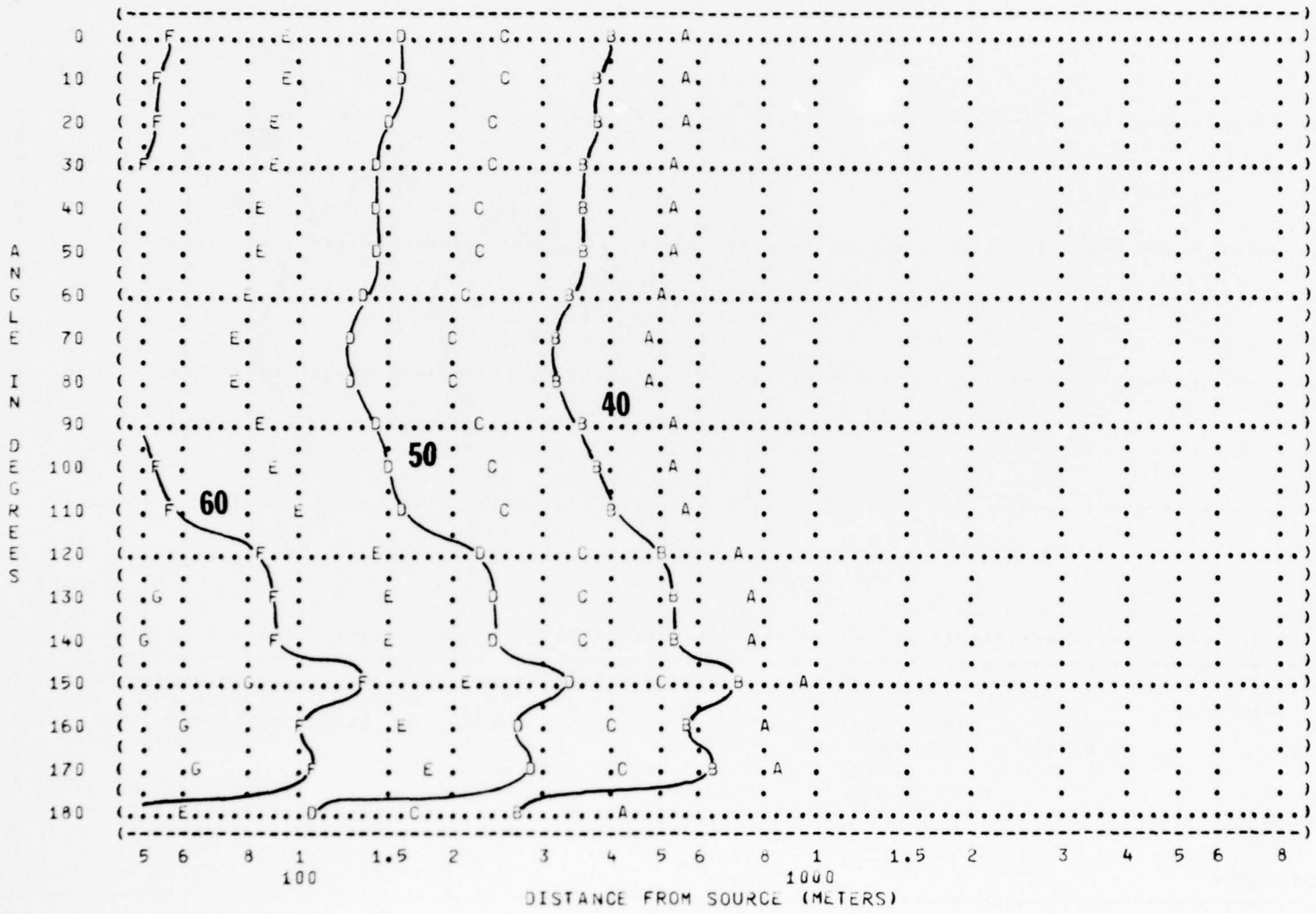


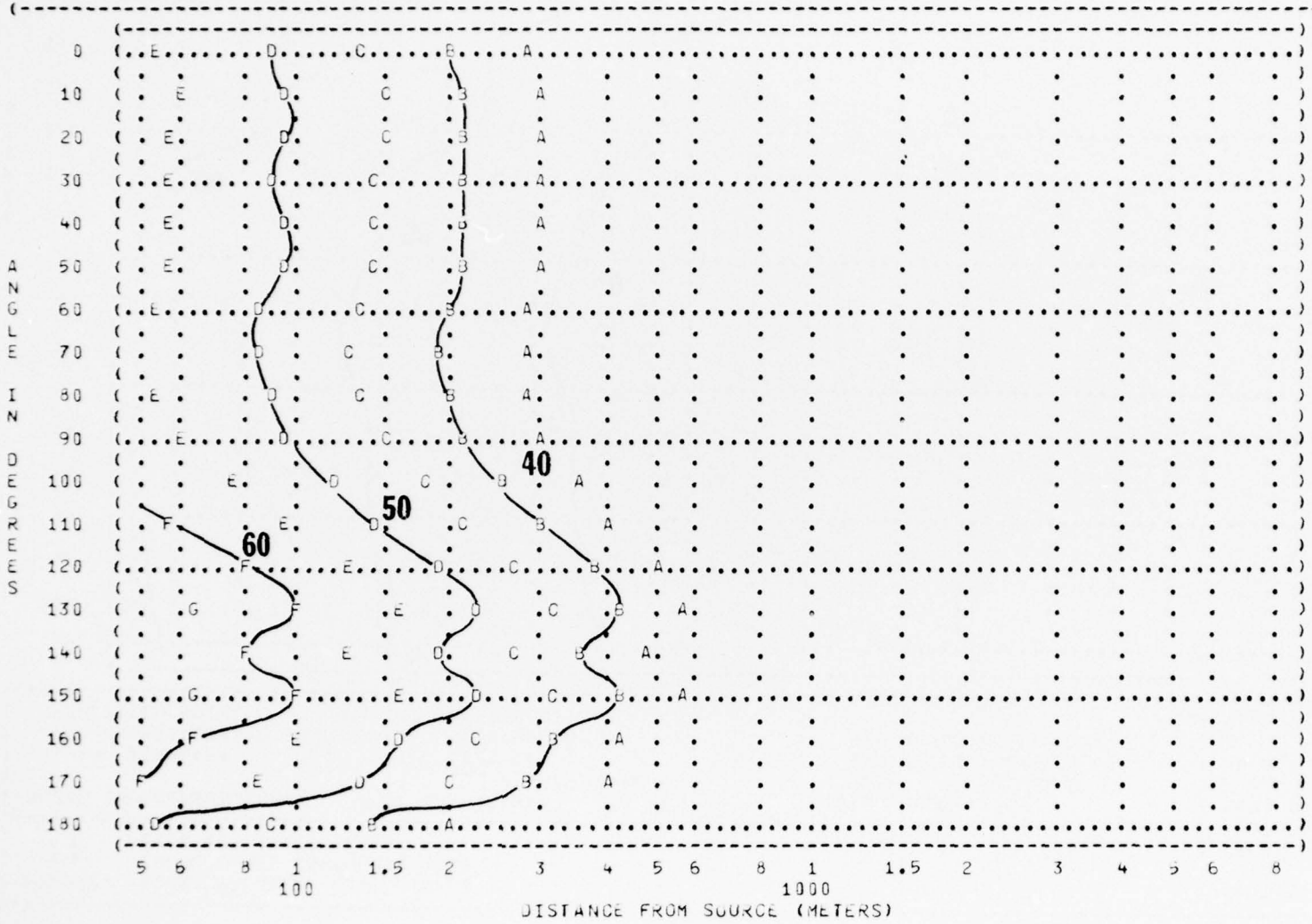
FIGURE 11: SOUND PRESSURE LEVEL (SPL) EQUAL LEVEL CONTOURS (DB) 4000 HZ OCTAVE BAND

NOISE SOURCE/SUBJECT:
U-4B AIRCRAFT
GSO-480-A1A6/B1A6 ENGINE
FAR FIELD NOISE

OPERATION:
IDLE/TAXI POWER
1000 RPM
BOTH ENGINES
FREE FLOW

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

IDENTIFICATION:
OMEGA 1.4
TEST 75-002-050
RUN 01
30 MAY 75
PAGE 25



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

FIGURE 11 SOUND PRESSURE LEVEL (SPL) EQUAL LEVEL CONTOURS (DB) 8000 HZ OCTAVE BAND

NOISE SOURCE/SUBJECT:
U-4B AIRCRAFT
GSO-480-A1A6/B1A6 ENGINE
FAR FIELD NOISE

OPERATION:
IDLE/TAXI POWER
1000 RPM
BOTH ENGINES
FREE FLOW

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

IDENTIFICATION:
OMEGA 1.4
TEST 75-002-050
RUN 01
30 MAY 75
PAGE 26

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

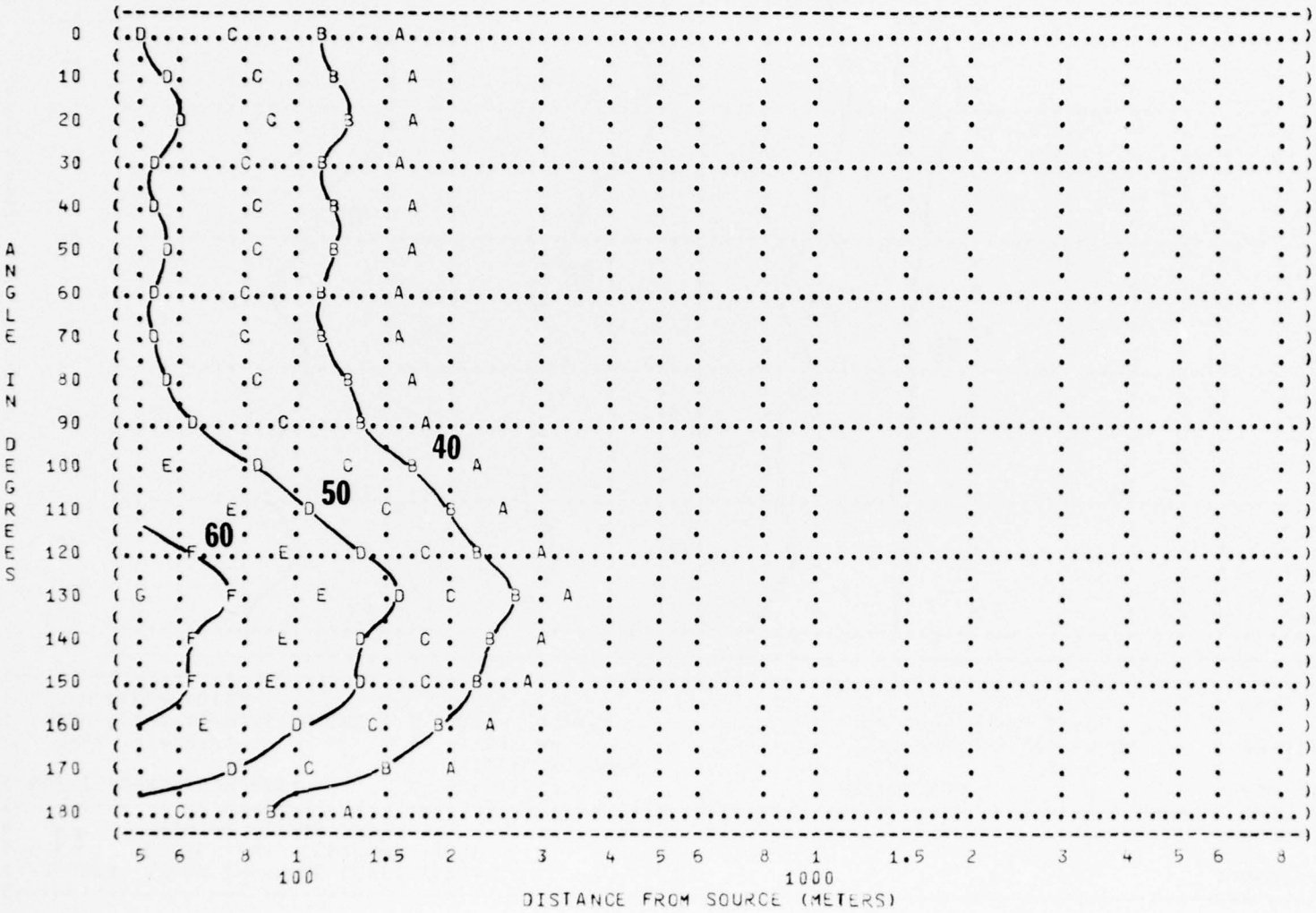


FIGURE 11: SOUND PRESSURE LEVEL (SPL) EQUAL LEVEL CONTOURS (DB) 31.5 HZ OCTAVE BAND

NOISE SOURCE/SUBJECT:
U-48 AIRCRAFT
GSO-480-A1A6/B1A6 ENGINE
FAR FIELD NOISE

OPERATION:
MILITARY POWER
3400 RPM
BOTH ENGINES
FREE FLOW

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

IDENTIFICATION:
OMEGA 1.4
TEST 75-002-050
RUN 02
30 MAY 75
PAGE 18

POINT	DB
A	35
B	40
C	45
D	50
E	55
F	60
G	65
H	70
I	75

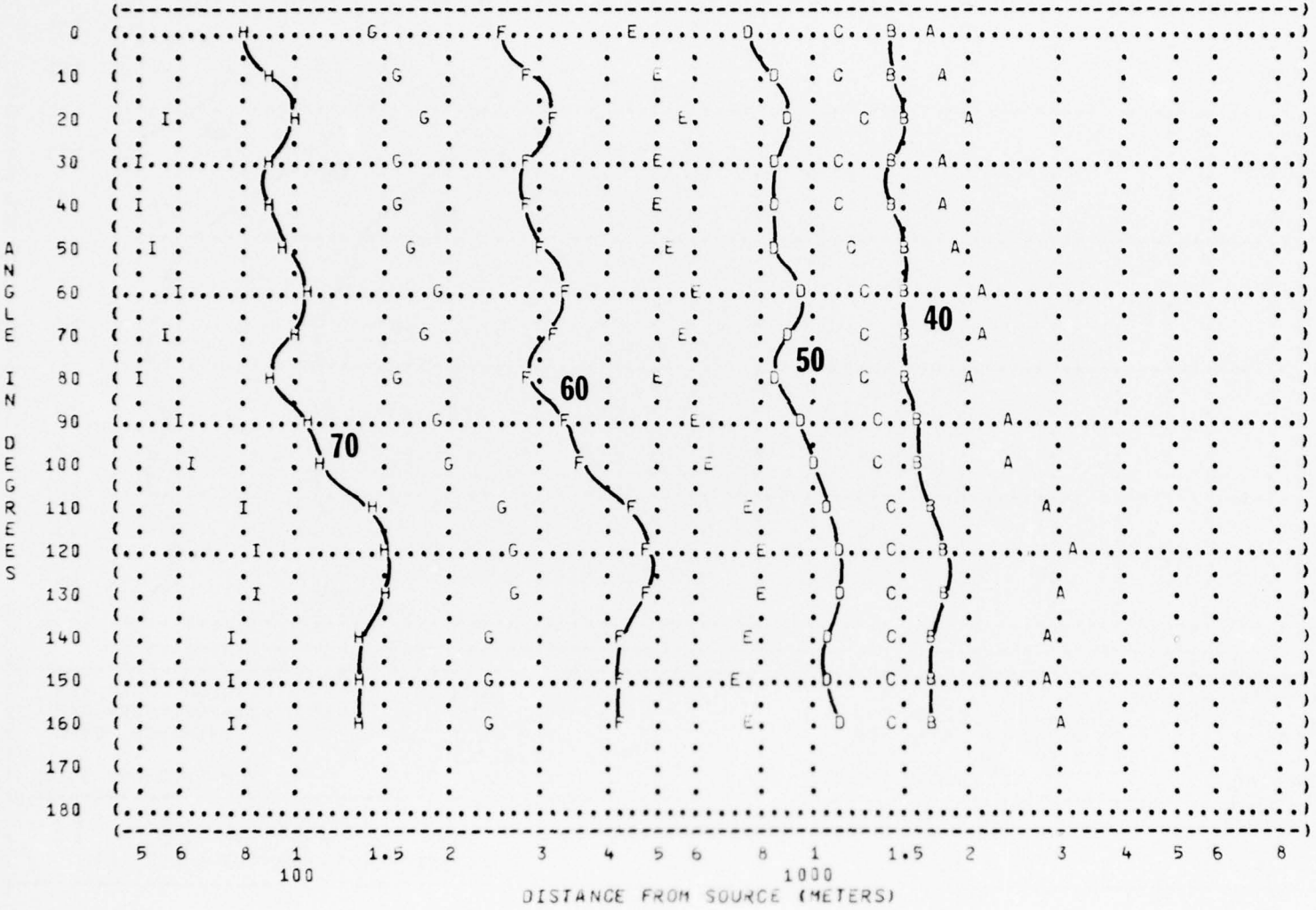


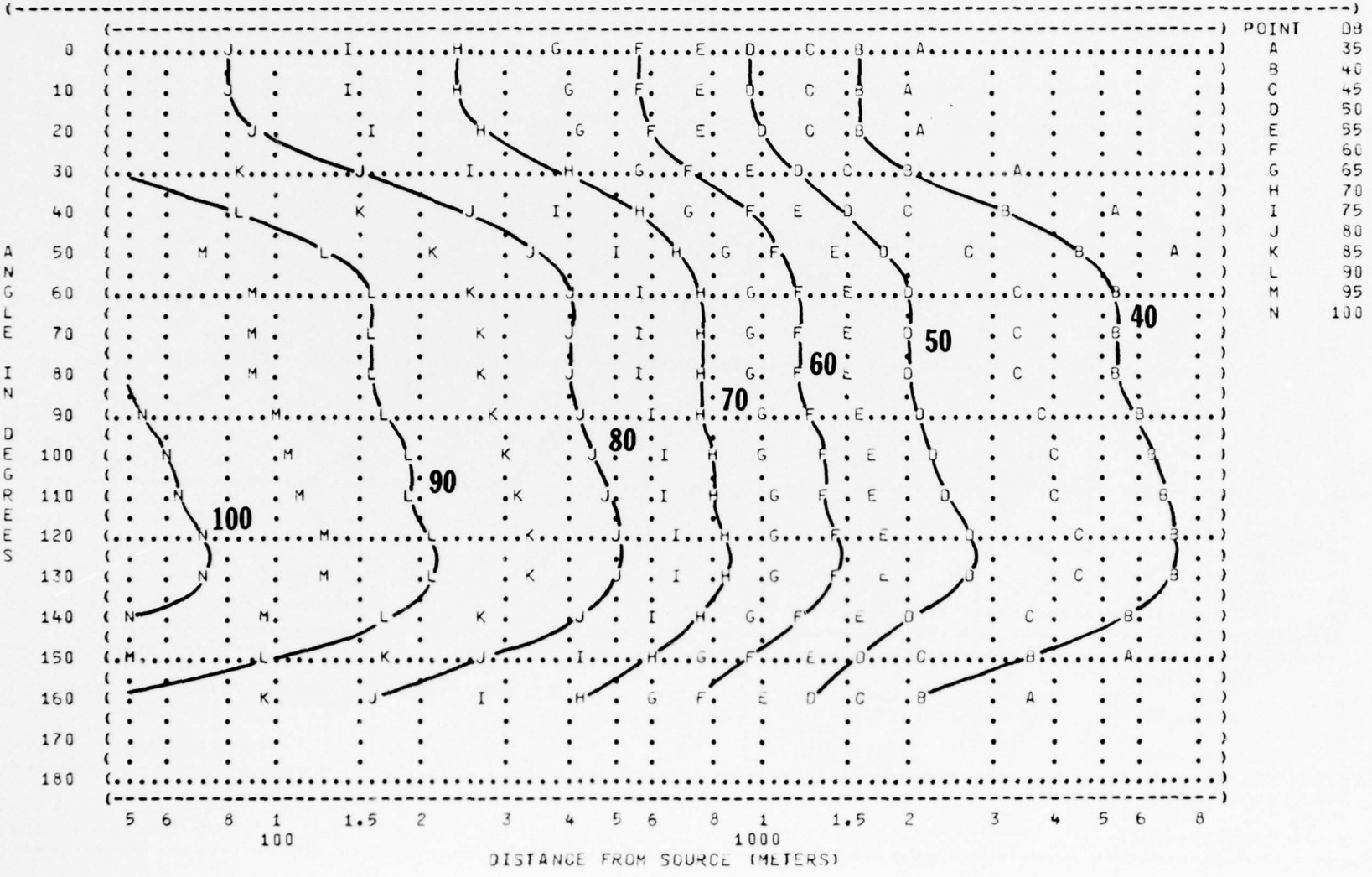
FIGURE 11: SOUND PRESSURE LEVEL (SPL) EQUAL LEVEL CONTOURS (DB) 63 HZ OCTAVE BAND

IDENTIFICATION: OMEGA 1.4 TEST 75-002-050 RUN 02 30 MAY 75 PAGE 19

NOISE SOURCE/SUBJECT: U-4B AIRCRAFT; GSO-460-A1A6/B1A6 ENGINE; FAR FIELD NOISE

OPERATION: MILITARY POWER; 3400 RPM; BOTH ENGINES; FREE FLOW

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
I	75
J	80
K	85
L	90
M	95
N	100

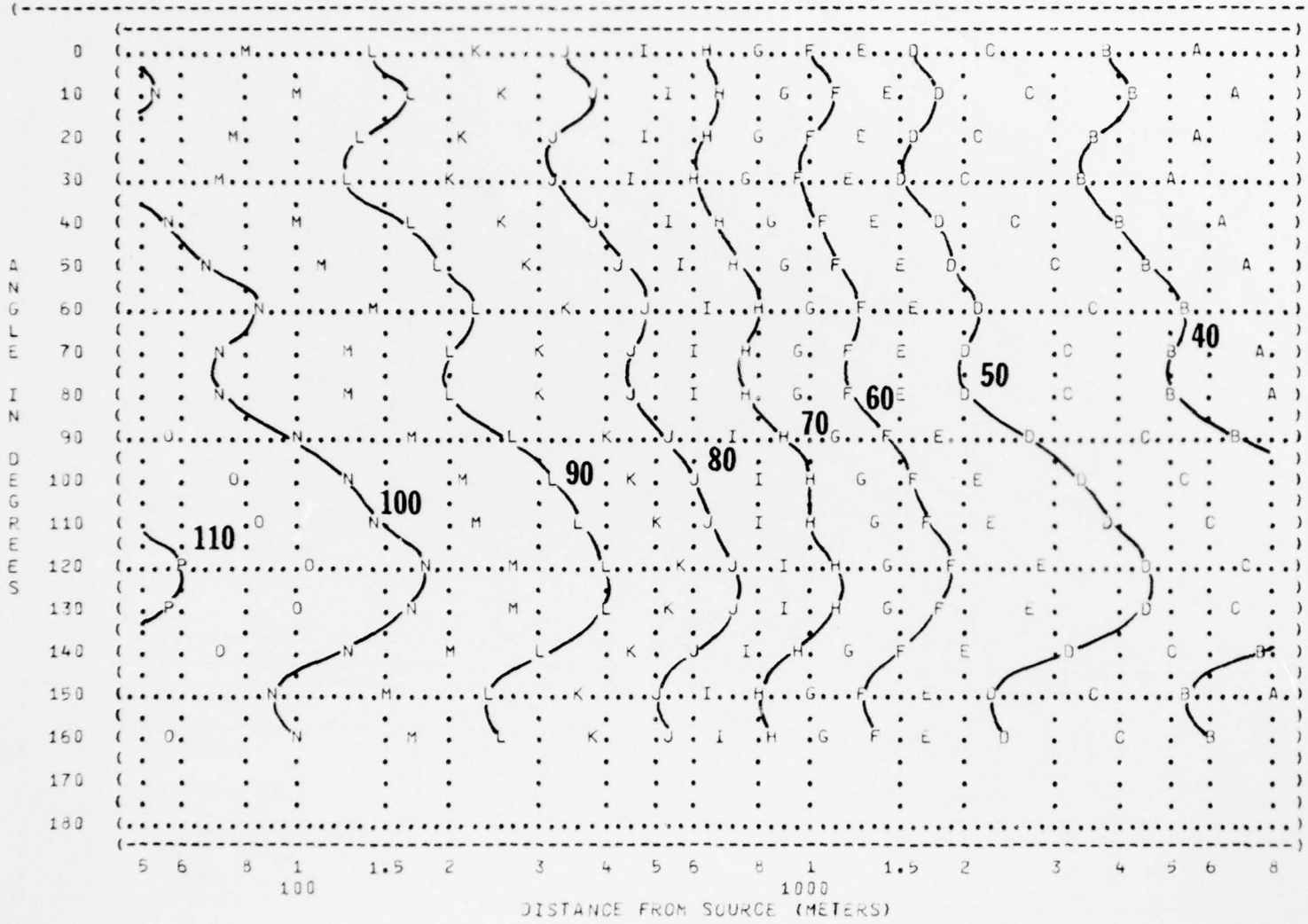
FIGURE 11 SOUND PRESSURE LEVEL (SPL) EQUAL LEVEL CONTOURS (DB) 125 HZ OCTAVE BAND

NOISE SOURCE/SUBJECT:
U-4B AIRCRAFT
GSO-480-A1A6/B1A6 ENGINE
FAR FIELD NOISE

OPERATION:
MILITARY POWER
3400 RPM
BOTH ENGINES
FREE FLOW

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

IDENTIFICATION:
OMEGA 1.4
TEST 75-002-050
RUN 02
30 MAY 75
PAGE 20



POINT	DB
A	35
B	40
C	45
D	50
E	55
F	60
G	65
H	70
I	75
J	80
K	85
L	90
M	95
N	100
O	105
P	110

FIGURE 11: SOUND PRESSURE LEVEL (SPL) EQUAL LEVEL CONTOURS (DB) 250 HZ OCTAVE BAND

NOISE SOURCE/SUBJECT:
U-48 AIRCRAFT
GSO-480-A1A6/B1A6 ENGINE
FAR FIELD NOISE

OPERATION:
MILITARY POWER
3400 RPM
BOTH ENGINES
FREE FLOW

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

IDENTIFICATION:
OMEGA 1.4
TEST 75-002-050
RUN 02
30 MAY 75
PAGE 21

POINT	DB
A	35
B	40
C	45
D	50
E	55
F	60
G	65
H	70
I	75
J	80
K	85
L	90
M	95
N	100
O	105
P	110

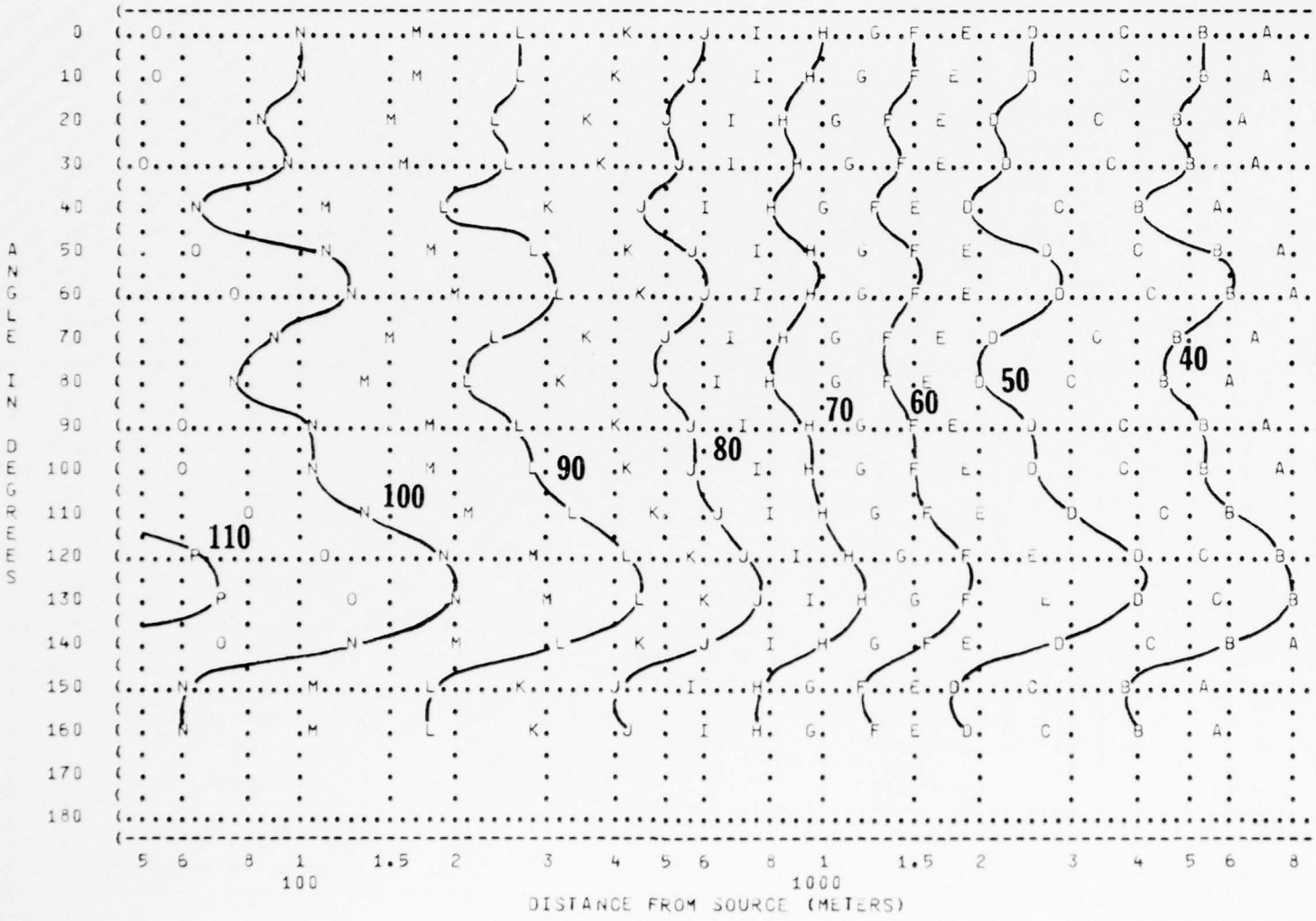


FIGURE 11: SOUND PRESSURE LEVEL (SPL) EQUAL LEVEL CONTOURS (DB) 500 HZ OCTAVE BAND

NOISE SOURCE/SUBJECT:
U-4B AIRCRAFT
GSO-480-A1A6/B1A6 ENGINE
FAR FIELD NOISE

OPERATION:
MILITARY POWER
3400 RPM
BOTH ENGINES
FREE FLOW

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

IDENTIFICATION:
OMEGA 1.4
TEST 75-002-050
RUN 02
30 MAY 75
PAGE 22

POINT	DB
A	35
B	40
C	45
D	50
E	55
F	60
G	65
H	70
I	75
J	80
K	85
L	90
M	95
N	100
O	105
P	110

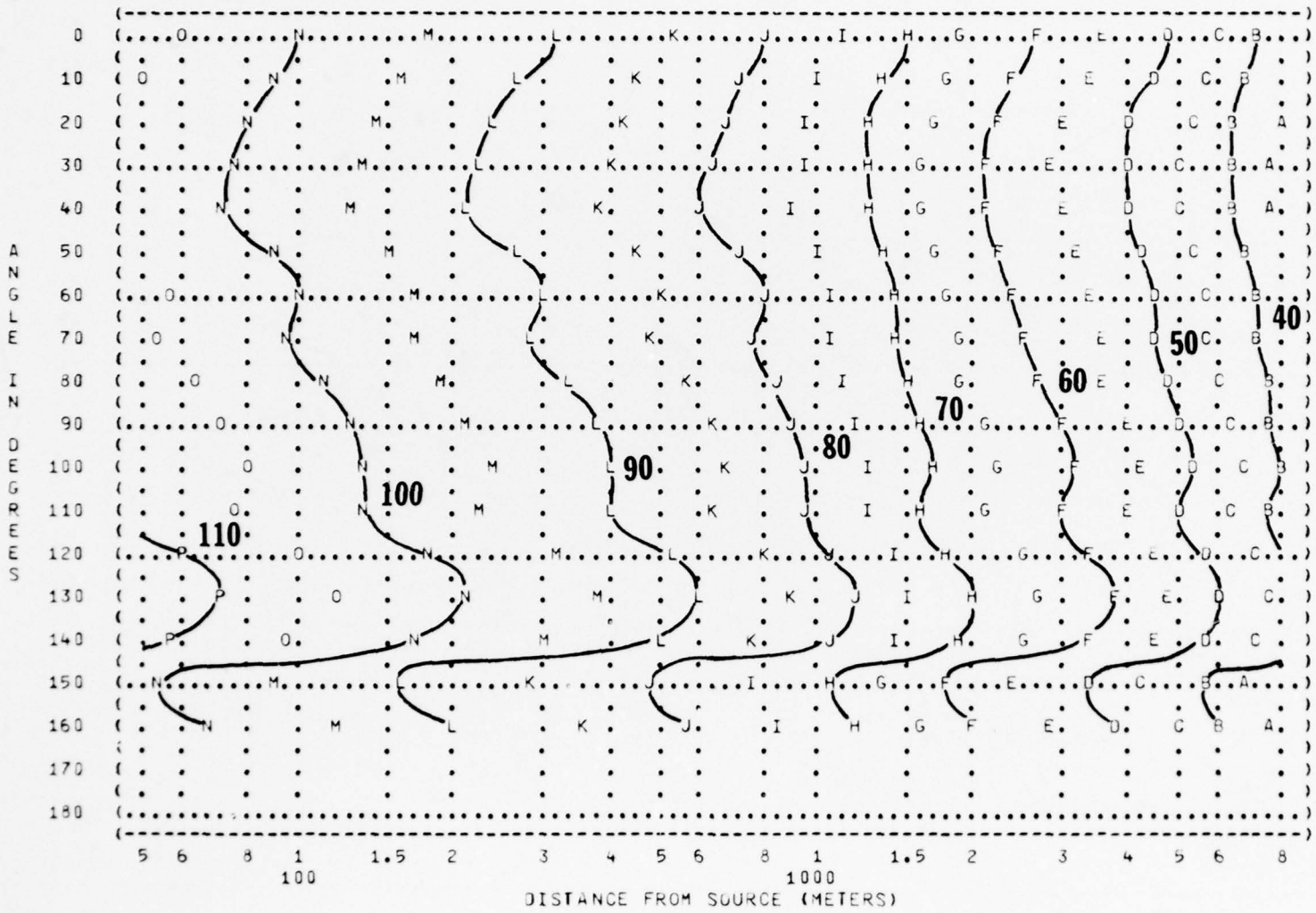


FIGURE: 11

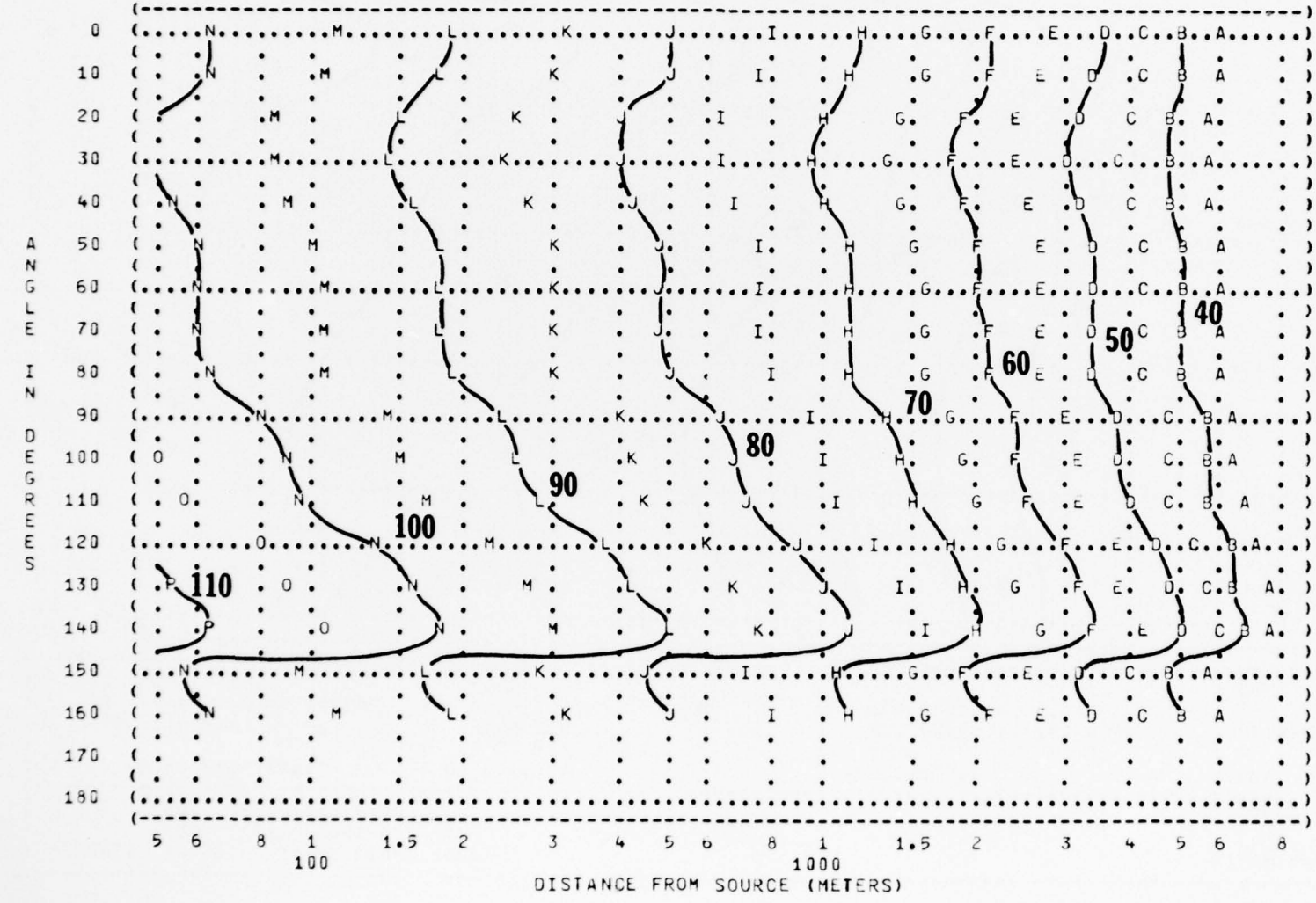
SOUND PRESSURE LEVEL (SPL)
EQUAL LEVEL CONTOURS (DB)
1000 HZ OCTAVE BAND

NOISE SOURCE/SUBJECT:
U-4B AIRCRAFT
GSO-480-A1A6/B1A6 ENGINE
FAR FIELD NOISE

OPERATION:
MILITARY POWER
3400 RPM
BOTH ENGINES
FREE FLOW

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

IDENTIFICATION:
OMEGA 1.4
TEST 75-002-050
RUN 02
30 MAY 75
PAGE 23



POINT	DB
A	35
B	40
C	45
D	50
E	55
F	60
G	65
H	70
I	75
J	80
K	85
L	90
M	95
N	100
O	105
P	110

FIGURE: 11

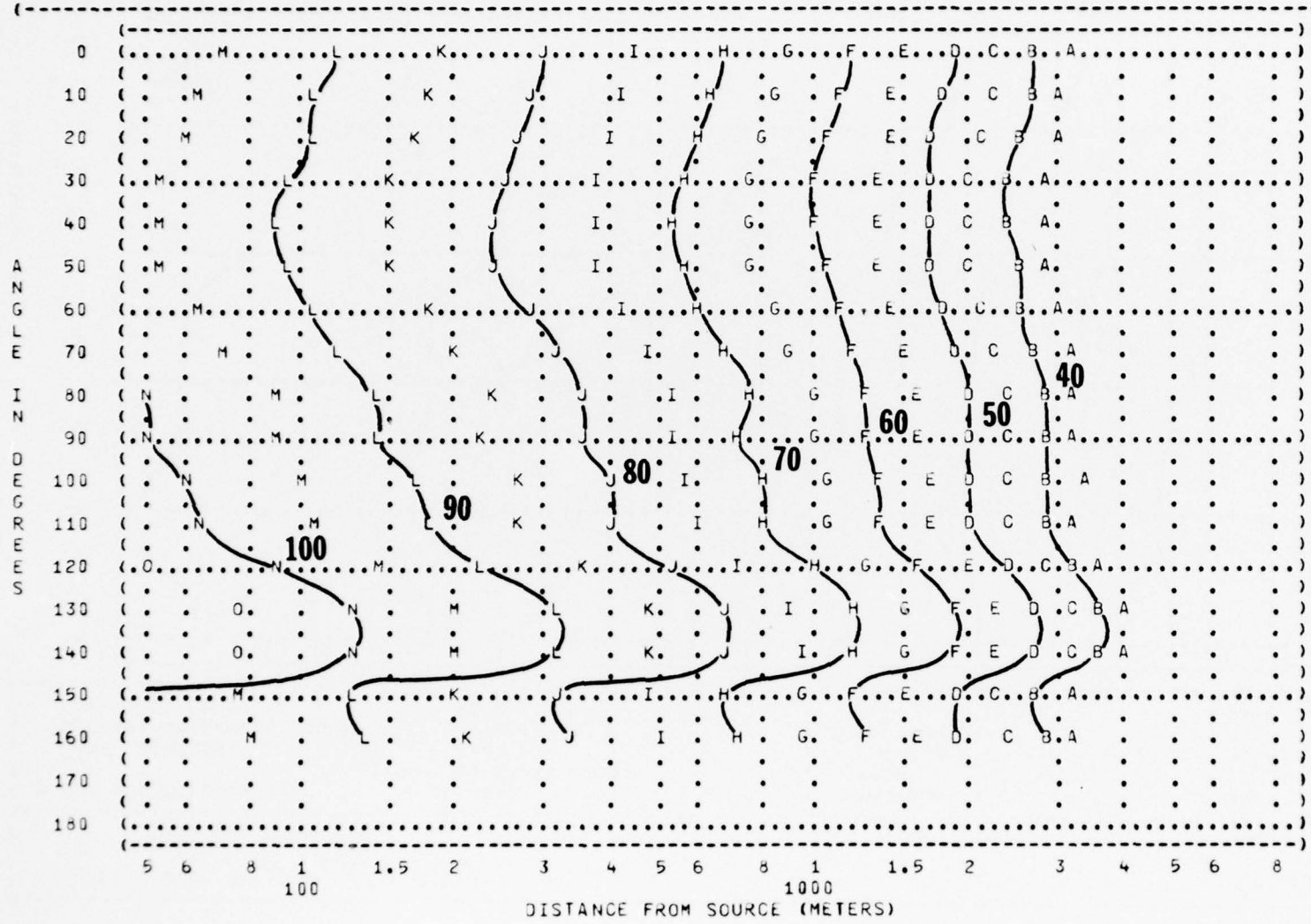
SOUND PRESSURE LEVEL (SPL)
EQUAL LEVEL CONTOURS (DB)
2000 HZ OCTAVE BAND

NOISE SOURCE/SUBJECT:
U-4B AIRCRAFT
GSO-480-A1A6/B1A6 ENGINE
FAR FIELD NOISE

OPERATION:
MILITARY POWER
3400 RPM
BOTH ENGINES
FREE FLOW

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

IDENTIFICATION:
OMEGA 1.4
TEST 75-002-050
RUN 02
30 MAY 75
PAGE 24



POINT	DB
A	35
B	40
C	45
D	50
E	55
F	60
G	65
H	70
I	75
J	80
K	85
L	90
M	95
N	100
O	105

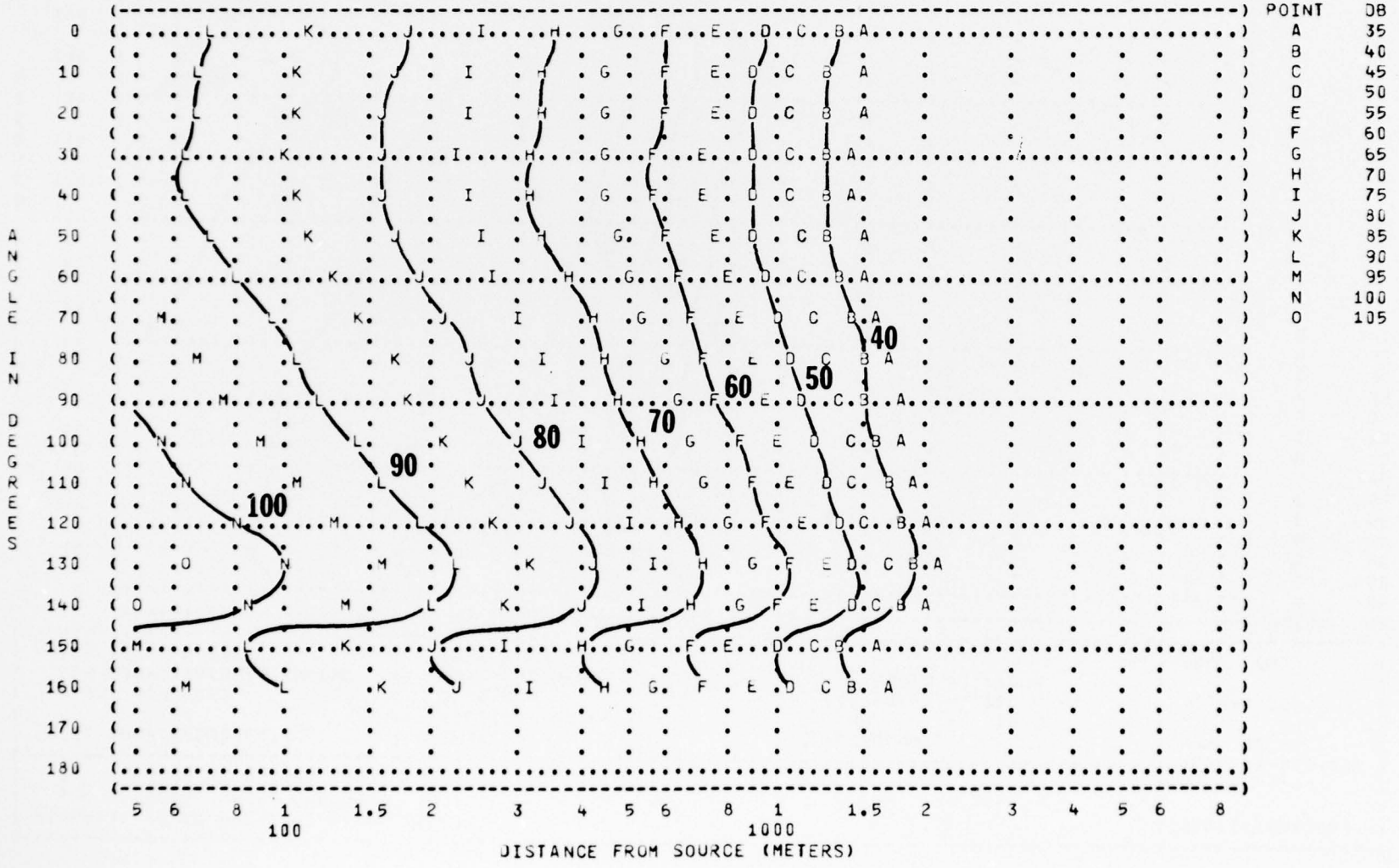
FIGURE 11: SOUND PRESSURE LEVEL (SPL) EQUAL LEVEL CONTOURS (DB) 4000 HZ OCTAVE BAND

IDENTIFICATION: OMEGA 1.4 TEST 75-002-050 RUN 02 30 MAY 75 PAGE 25

NOISE SOURCE/SUBJECT: U-43 AIRCRAFT; GSO-480-A1A6/B1A6 ENGINE; FAR FIELD NOISE

OPERATION: MILITARY POWER; 3400 RPM; BOTH ENGINES; FREE FLOW

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
I	75
J	80
K	85
L	90
M	95
N	100
O	105

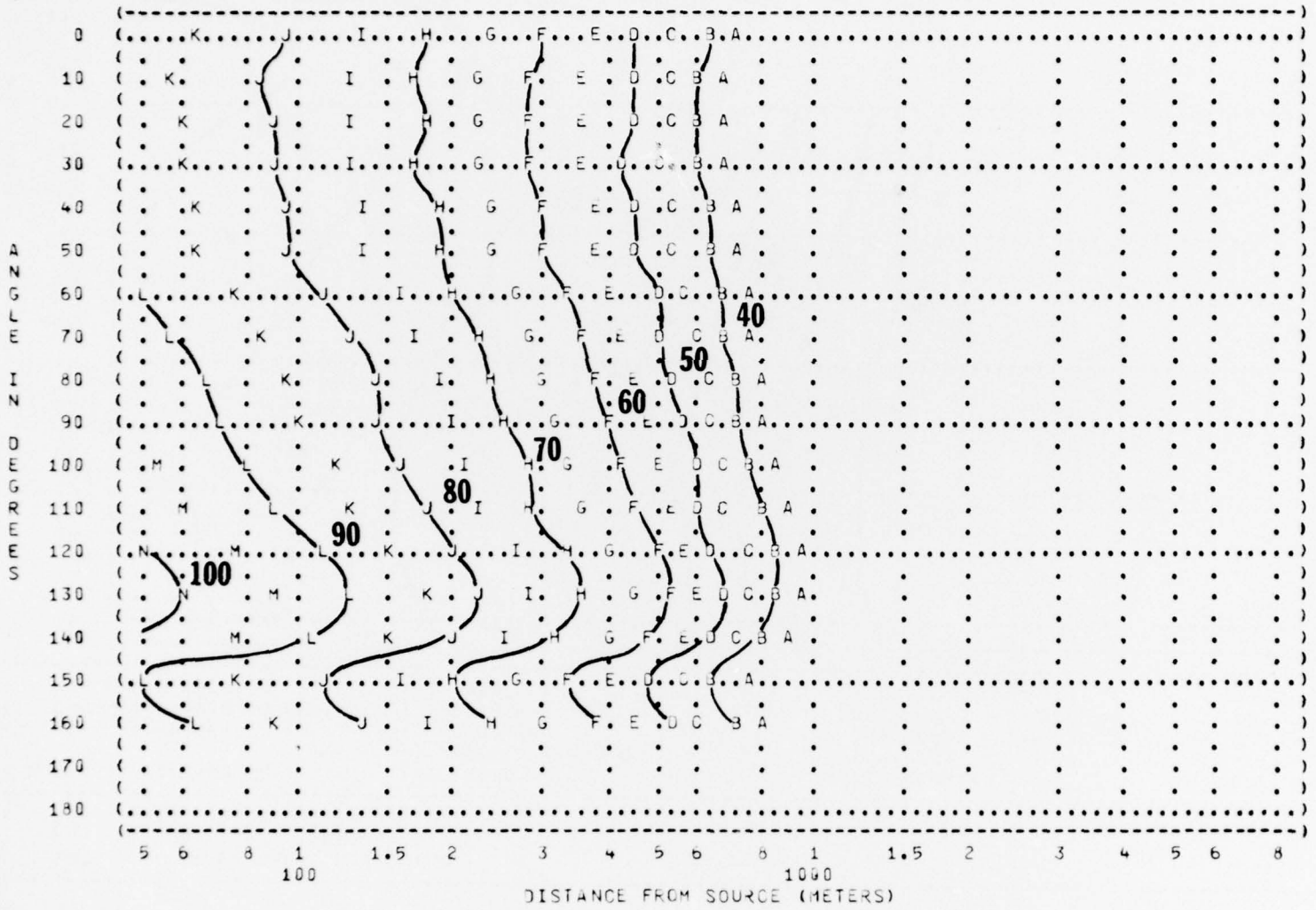
FIGURE 11 SOUND PRESSURE LEVEL (SPL) EQUAL LEVEL CONTOURS (DB) 8000 HZ OCTAVE BAND

NOISE SOURCE/SUBJECT:
U-4B AIRCRAFT
GSO-480-A1A6/B1A6 ENGINE
FAR FIELD NOISE

OPERATION:
MILITARY POWER
3400 RPM
BOTH ENGINES
FREE FLOW

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

IDENTIFICATION:
OMEGA 1.4
TEST 75-002-050
RUN 02
30 MAY 75
PAGE 26



POINT	DB
A	35
B	40
C	45
D	50
E	55
F	60
G	65
H	70
I	75
J	80
K	85
L	90
M	95
N	100

☆ U.S. GOVERNMENT PRINTING OFFICE: 1977 — 757-001/166