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USAF BIOENVIRONMENTAL NOISE DATA HANDBOOK. VOLUME 109. MK-3A TE--ETC(U)
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Volume 109

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USAF BIOENVIRONMENTAL NOISE DATA HANDBOOK.

Volume 109.

MK-3A Test Stand, Aircraft System, Electric Motor-Driven.

9 Technical rept.

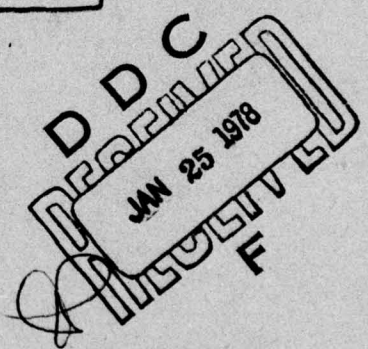
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AEROSPACE MEDICAL RESEARCH LABORATORY
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FOR THE COMMANDER


HENNING E. VON GIERKE

Director
Biodynamics and Bionics Division
Aerospace Medical Research Laboratory

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20. ABSTRACT (Continue on reverse side if necessary and identify by block number) → The MK-3A Hydraulic Test Stand is an electric motor-driven unit designed to pressurize and test aircraft hydraulic systems. This report provides measured data defining the bioacoustic environments produced by this unit operating inside a large aircraft hangar at normal rated conditions. Near-field data are reported for 37 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 → over		

SECURITY CLASSIFICATION OF THIS PAGE(When Data Entered)

→ noise level, and limiting times for total daily exposure of personnel with and without standard Air Force ear protectors. 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. ↑

SECURITY CLASSIFICATION OF THIS PAGE(When Data Entered)

PREFACE

This report was prepared by the Biodynamic Environment Branch, Aerospace Medical Research Laboratory, under Project/Task 723104, Measurement and Prediction of Noise Environments of Air Force Operations.

The author acknowledges the efforts of Mr. Robert T. England and Mr. Robert G. Powell who conducted the field measurements, and Mr. John N. Cole who established the data analysis requirements and assisted in the preparation of this report. Mr. Henry Mohlman and Mr. David Eilerman of the University of Dayton assisted in the mechanics of data processing, and Mrs. Norma Peachey typed and prepared the graphics.

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NEAR-FIELD NOISE

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INTRODUCTION

The MK-34 Hydraulic Test Stand is an electric motor-driven unit designed to pressurize and test aircraft hydraulic systems. This unit is manufactured by the Sprague Engineering and Sales Corporation.

This volume provides measured data defining the bioacoustic environments produced by this unit. Such data are essential to evaluate ear protection requirements, limiting personnel exposure times, voice communication capabilities, and annoyance problems associated with operations of the MK-3A test stand.

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 (15C 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 the updated index as it is generated.

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

A standard MK-3A Test Stand was operated inside, and approximately in the center of a large aircraft hanger (190.5 m long \times 95.1 m wide \times 18.3 m high) on a concrete floor at a normal rated condition of the system pressurized at 3000 PSI, no flow. The hanger walls and ceiling were not acoustically treated. No aircraft were in the vicinity of the unit while being measured. No far-field acoustic data were acquired because of the relatively close proximity of the hanger walls.

Figure 1 identifies 36 noise measurement locations at a height of 1.5 meters above the concrete apron (nominal ear level of ground crew). The 0 degree reference direction passes through the tow bar. These locations are in the acoustic near-field of the source where the sound wave fronts generally do not spherically diverge and the source appears to be spatially distributed (i.e., not a point source). Consequently, these near-field data cannot be extrapolated to longer distances but do properly define the levels at locations close to the unit.

Near-field measurements were also made at ear level at the operator control panel. Table 1 lists the numeric/alphabetic designators used on the data pages in this report to identify the operator measurement location and test conditions. The designator 1/A means operator location 1 and test condition A. Such a descriptor is essential in many handbook volumes that involve multiple combinations of locations/conditions. It is used in this report to maintain format consistency.

RESULTS

The measured data presented in Table 2 define the sound pressure levels (SPL) produced by the MK-3A unit at the 37 specified, near-field locations. This table includes the overall, 1/3 octave band, and octave band levels. From these data one can calculate the variety of measures in Table 3 which are widely used to assess the effects of noise on personnel and their performance.

For data at other intermediate near-field locations (i.e., for radial distances less than 4 meters) you can interpolate between the 36 measured data points.

TABLE 1

MEASUREMENT LOCATION AND TEST CONDITION FOR OPERATOR NOISE MEASUREMENTS

MK-3A Test Stand, Aircraft Hydraulic System, Electric Motor-Driven
Edwards AFB, 22 Sep 1972

Measurement Location

1

Operator Control Panel

Operation

A

System Pressurized at
3000 PSI, No Flow

PREFACE

This report was prepared by the Biodynamic Environment Branch, Aerospace
Laboratory, under Project Task 723104, Measurement and Prediction of Noise Environment
Force.

- MEASUREMENT
LOCATION, MIC.
HEIGHT, 1.5 METERS

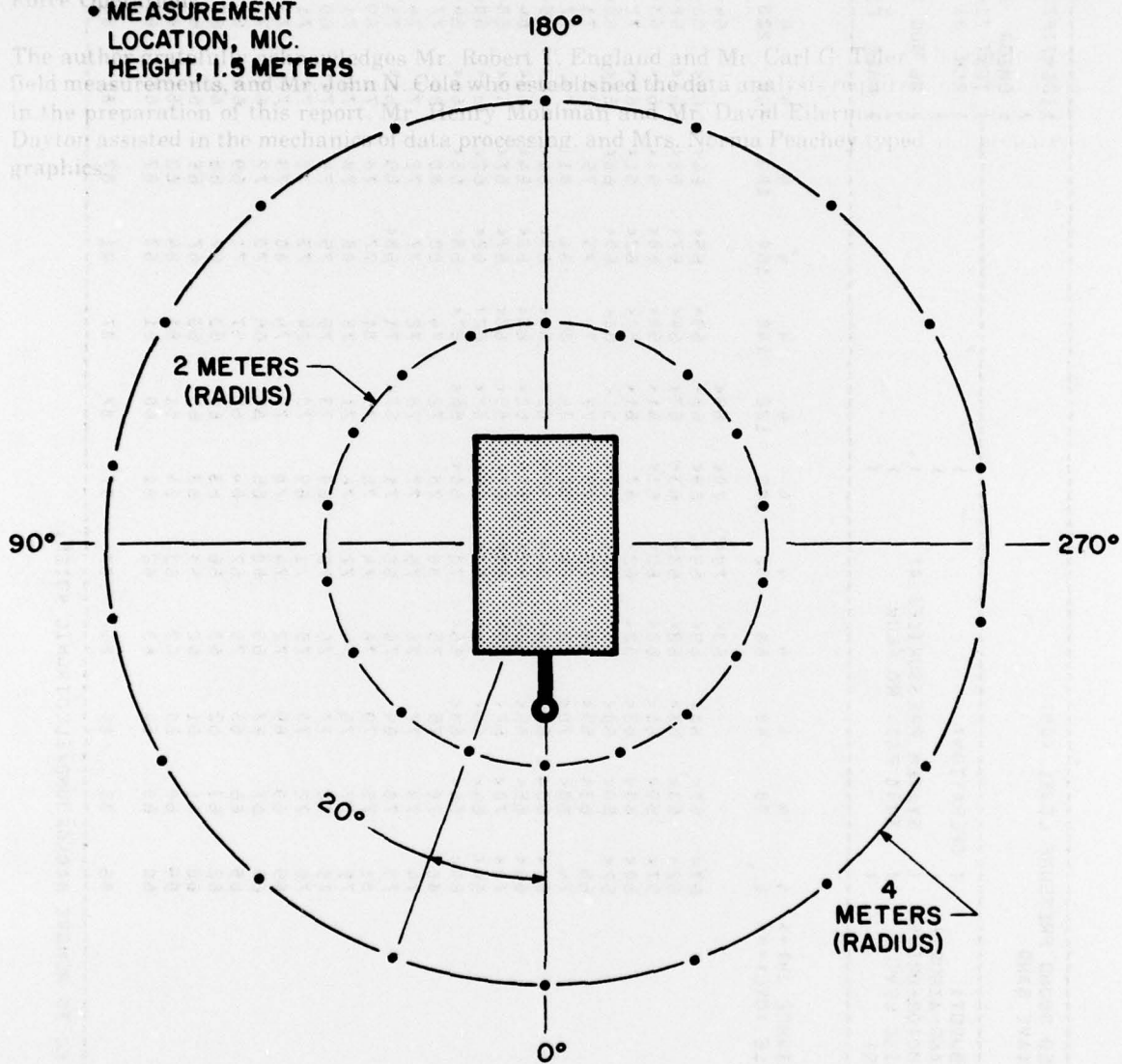


Figure 1. Measurement Locations

TABLE: MEASURED SOUND PRESSURE LEVEL (DB)		IDENTIFICATION:												
1/3 OCTAVE BAND		OMEGA 3.2												
		TEST 71-020-340												
		RUN 01												
		26 AUG 74												
		PAGE F1												
FREQ (HZ)	DISTANCE (M)-->	4	20	40	60	80	100	120	140	160	180	200	220	240
25	ANGLE (DEG)-->	0	4	4	4	4	4	4	4	4	4	4	4	4
31.5		67<	67<	68<	63<	70<	70<	69<	69<	65<	64<	65<	64<	66<
40		62<	63<	63<	62<	63<	63<	63<	64<	57<	58<	62<	58<	68
50		57<	59<	61<	60<	60<	61<	61<	58<	60<	61<	64<	63<	63<
63		60<	60<	62<	62<	62<	67	61<	59<	62<	61<	65<	72	65<
80		57<	59<	60<	60<	63<	64<	64<	60<	60<	60<	62<	63<	62<
100		68	63<	65<	68	75	75	77	76	75	75	73	71	68
125		74	68<	70<	72	81	82	84	82	81	81	79	77	73
160		63<	63<	63<	64<	68<	65<	65<	64<	63<	64<	64<	65<	66<
200		66<	65<	64<	62<	68<	62<	62<	63<	62<	64<	63<	64<	63<
250		70<	70<	67<	65<	68<	67<	65<	68<	67<	67<	68<	68<	66<
315		64<	64<	63<	61<	63<	64<	62<	62<	62<	62<	61<	60<	61<
400		69<	66<	68<	66<	70<	68<	68<	67<	68<	66<	66<	64<	65<
500		80	78	75	75	80	78	72	74	80	80	83	77	85
630		74	79	77	76	75	77	78	72	77	72	77	74	80
800		70	70	69	70	68<	71	67<	71	68<	69	68<	71	69
1000		81	75	79	76	74	76	73	81	77	78	72	69	81
1250		75	77	76	74	77	76	71	75	88	78	78	71	81
1600		75	72	77	76	75	69	73	75	75	76	73	69	77
2000		70	72	70	75	71	69	70	74	73	71	73	71	75
2500		69	69	69	72	74	70	70	74	80	73	72	73	71
3150		65	67	68	68	68	66	66	66	70	72	69	71	67
4000		65	66	66	70	67	64	65	67	71	69	68	68	66
5000		62	63	62	63	66	63	61	63	67	66	66	67	65
6300		60	61	61	62	63	63	63	63	63	65	64	66	64
8000		59	60	60	62	63	64	61	61	64	62	63	63	61
10000		60	60	64	63	62	61	60	61	63	62	62	61	60
OVERALL		86	85	85	85	87	87	87	87	91	87	87	84	89

< LEVEL CORRECTED TO REMOVE BACKGROUND/ELECTRONIC NOISE.

TABLE 2		MEASURED SOUND PRESSURE LEVEL (DB)										IDENTIFICATIONS													
1/3 OCTAVE BAND												OMEGA 3.2													
												TEST 71-020-340													
												RUN 02													
												26 AUG 74													
												PAGE F2													
NOISE SOURCE/SUBJECT:		OPERATION:																							
HK-3A TEST STAND-AIRCRAFT		SYS., ELECT. MOTOR-DRIVEN																							
NEAR FIELD NOISE LEVELS		3000 PSI, NO FLOW																							
(INSIDE HANGER)																									
FREQ (HZ)	DISTANCE (M) ->	4	4	4	4	4	4	4	4	4	4	2	2	2	2	2	2	2	2	2	2	2	2	2	
ANGLE (DEG) ->	260	280	300	320	340	0	20	40	60	80	100	120	140												
25		66<	64<	63<	63<	62<	63<	62<	62<	62<	62<	62<	62<	62<	62<	62<	62<	62<	62<	62<	62<	62<	62<	62<	62<
31.5		66<	64<	63<	63<	64<	70<	71<	70<	70<	70<	70<	70<	70<	70<	70<	70<	70<	70<	70<	70<	70<	70<	70<	70<
40		66<	64<	63<	63<	64<	60<	65<	58<	57<	60<	59<	58<	58<	58<	58<	58<	58<	58<	58<	58<	58<	58<	58<	58<
50		65<	60<	59<	58<	56<	61<	62<	61<	61<	69<	71<	62<	65<	59<	59<	59<	59<	59<	59<	59<	59<	59<	59<	59<
63		61<	63<	63<	61<	61<	69<	65<	66<	65<	65<	72<	68<	67<	66<	66<	66<	66<	66<	66<	66<	66<	66<	66<	66<
80		61<	64<	66<	66<	68<	73<	71<	70<	73<	73<	71<	70<	70<	73<	76<	76<	76<	76<	76<	76<	76<	76<	76<	76<
100		68	70<	72	72	74	80	77	77	76	82	82	82	82	84	84	84	84	84	84	84	84	84	84	84
125		65<	64<	63<	64<	64<	68<	68<	67<	68<	68<	68<	68<	68<	67<	67<	67<	67<	67<	67<	67<	67<	67<	67<	67<
160		65<	63<	64<	64<	66<	71<	70<	66<	66<	71<	70<	70<	66<	64<	64<	64<	64<	64<	64<	64<	64<	64<	64<	64<
200		67<	69<	69<	69<	70<	75	72<	70<	70<	75	72<	70<	71<	71<	71<	71<	71<	71<	71<	71<	71<	71<	71<	71<
250		63<	66<	63<	65<	64<	71	71	70	71	71	71	71	71	69	69	69	69	69	69	69	69	69	69	69
315		65<	66<	66<	67<	67<	73<	73<	73<	74	73<	73<	73<	73<	72<	72<	72<	72<	72<	72<	72<	72<	72<	72<	72<
400		70<	71<	81	80	71<	75	78	79	76	75	78	78	78	79	79	79	79	79	79	79	79	79	79	79
500		71	75	73	72	71	81	82	81	81	81	82	82	82	82	82	82	82	82	82	82	82	82	82	82
630		68<	69	70	70	71	76	72	72	71	76	72	72	72	72	72	72	72	72	72	72	72	72	72	72
800		83	69	76	76	74	78	76	79	79	78	76	76	76	78	78	78	78	78	78	78	78	78	78	78
1000		81	73	73	71	70	76	73	75	76	76	73	73	73	73	73	73	73	73	73	73	73	73	73	73
1250		77	72	80	71	73	76	75	77	77	76	73	73	73	73	73	73	73	73	73	73	73	73	73	73
1600		72	74	72	72	72	72	72	72	72	72	72	72	72	72	72	72	72	72	72	72	72	72	72	72
2000		77	70	69	70	70	70	74	69	74	70	74	74	74	74	74	74	74	74	74	74	74	74	74	74
2500		68	66	66	68	67	72	68	71	68	68	68	68	68	68	68	68	68	68	68	68	68	68	68	68
3150		64	63	63	65	65	69	67	65	68	65	65	65	65	65	65	65	65	65	65	65	65	65	65	65
4000		64	63	63	61	64	65	65	67	65	65	65	65	65	65	65	65	65	65	65	65	65	65	65	65
5000		63	62	62	63	63	63	63	63	63	63	63	63	63	63	63	63	63	63	63	63	63	63	63	63
6300		63	60	60	60	61	64	64	66	66	66	66	66	66	66	66	66	66	66	66	66	66	66	66	66
8000		60	59	59	59	59	61	61	61	61	61	61	61	61	61	61	61	61	61	61	61	61	61	61	61
10000		60	59	59	59	59	62	62	62	62	62	62	62	62	62	62	62	62	62	62	62	62	62	62	62
OVERALL		87	83	86	84	83	87	87	88	88	88	88	88	88	88	88	88	88	88	88	88	88	88	88	88

< LEVEL CORRECTED TO REMOVE BACKGROUND/ELECTRONIC NOISE.

TABLE: MEASURED SOUND PRESSURE LEVEL (DB)		IDENTIFICATION:																
OCTAVE BAND																		
2		OMEGA 3.2																
		TEST 71-020-340																
		RUN 02																
		26 AUG 74																
		PAGE J2																
NOISE SOURCE/SUBJECT: (OPERATION:)																		
HK-3A TEST STAND-AIRCRAFT ()																		
SYS., ELECT. MOTOR-DRIVEN (SYSTEM PRESSURIZED AT)																		
NEAR FIELD NOISE LEVELS (3000 PSI, NO FLOW)																		
(INSIDE, HANGER) ()																		
FREQ (HZ)	DISTANCE (M)-->	4	4	4	4	4	4	2	2	2	2	2	2	2	2	2	2	2
ANGLE (DEG)-->	260	280	300	320	340	0	20	40	60	80	100	120	140	160	180	200	220	240
31.5	69	70	68	64	67	71	71	72	71	71	71	71	70	70	71	69	69	70
63	73	72	73	68	68	71	75	71	70	69	69	69	69	69	69	69	69	68
125	75	72	73	73	75	81	78	77	79	83	85	85	86	86	86	86	86	86
250	70	71	71	72	72	78	76	74	74	73	74	74	73	74	73	74	73	74
500	74	77	82	81	75	80	84	83	81	81	81	84	81	81	81	81	81	81
1000	85	75	78	78	76	81	79	81	83	80	80	78	79	79	79	79	79	81
2000	81	77	81	75	76	78	78	78	83	79	79	79	77	77	77	77	77	80
4000	70	70	69	70	70	74	71	72	75	72	73	73	73	73	73	73	73	73
8000	67	65	65	66	66	68	67	67	69	70	69	69	68	68	68	68	68	68
OVERALL	87	83	86	84	83	87	87	87	88	88	89	89	88	88	88	88	88	89

TABLE: MEASURED SOUND PRESSURE LEVEL (DB)		IDENTIFICATIONS:										
2		OMEGA 3.2 TEST 71-020-340 RUN 03 26 AUG 74 PAGE J3										
NOISE SOURCE/SUBJECT:		OPERATION:										
MK-JA TEST STAND-AIRCRAFT		SYSTEM PRESSURIZED AT										
SYS., ELECT. MOTOR-DRIVEN		3000 PSI, NO FLOW										
NEAR FIELD NOISE LEVELS		(INSIDE HANGER)										
DISTANCE (M) -->		OPERATOR LOCATION										
ANGLE (DEG) -->		TEST CONDITION										
FREQ (HZ)	160	200	220	240	260	280	300	320	340	360	1/A	2/A
31.5	71	70	72	67	69	67	67	70	71	71	73	
63	68	70	70	74	70	68	67	67	68	68	69	62
125	85	86	85	85	81	81	81	81	80	80	85	70
250	74	73	74	74	71	72	73	75	76	76	76	72
500	85	86	83	85	78	85	80	83	84	84	94	82
1000	82	79	84	78	79	80	79	80	81	81	88	81
2000	84	87	82	80	77	83	79	78	78	78	89	77
4000	76	80	79	73	76	76	74	75	75	75	82	78
8000	73	76	72	73	72	71	71	69	69	69	78	74
OVERALL	90	92	90	91	86	89	87	87	88	88	97	86

MEASURES OF HUMAN NOISE EXPOSURE											IDENTIFICATION:			
3											OMEGA 3.2			
NOISE SOURCE/SUBJECT: (OPERATION:)											TEST 71-020-340			
HK-JA TEST STAND-AIRCRAFT ()											RUN 01			
SYS., ELECT. MOTOR-DRIVEN (SYSTEM PRESSURIZED AT)											26 AUG 74			
NEAR FIELD NOISE LEVELS (3000 PSI, NO FLOW)											PAGE H1			
(INSIDE HANGER)														
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														
MINIMUM OPL EAR MUFFS														
OASLC	86	85	85	84	87	86	87	87	91	87	87	87	84	89
OASLA	85	84	84	84	84	83	82	85	90	85	85	85	82	88
T	404	480	480	480	480	571	679	404	170	404	404	404	679	240
AMERICAN OPTICAL 1700 EAR MUFFS														
OASLA*	61	59	59	59	63	63	65	63	65	63	63	63	60	64
T	960	960	960	960	960	960	960	960	960	960	960	960	960	960
AMERICAN OPTICAL 1700 EAR MUFFS PLUS V-51R EAR PLUGS														
OASLA*	55	54	53	53	58	58	60	58	59	58	58	58	55	58
T	960	960	960	960	960	960	960	960	960	960	960	960	960	960
V-51R EAR PLUGS														
OASLA*	61	59	59	58	59	59	57	59	64	60	60	60	56	63
T	960	960	960	960	960	960	960	960	960	960	960	960	960	960
AMERICAN OPTICAL 1700 EAR MUFFS PLUS V-51R EAR PLUGS														
OASLA*	47	45	46	44	45	45	45	47	52	46	46	46	42	49
T	960	960	960	960	960	960	960	960	960	960	960	960	960	960
H-133 GROUND COMMUNICATION UNIT														
OASLA*	58	55	57	56	57	56	56	58	63	58	57	57	55	59
T	960	960	960	960	960	960	960	960	960	960	960	960	960	960
COMMUNICATION														
PREFERRED SPEECH INTERFERENCE LEVEL (PSIL IN DB)														
PSIL	80	79	79	79	80	78	77	79	84	80	80	80	76	83
ANNOYANCE														
PERCEIVED NOISE LEVEL, TONE CORRECTED (PNLT IN PNDB)														
TONE CORRECTION (C IN DB)														
PNLT	98	96	97	97	99	96	97	99	104	100	100	100	98	101
C	3	2	2	1	2	2	3	3	4	3	3	3	2	3

* BASED ON CALCULATED SPL SPECTRUM UNDER PROTECTIVE DEVICE.

TABLE: MEASURES OF HUMAN NOISE EXPOSURE										IDENTIFICATION:			
3										OMEGA 3.2			
NOISE SOURCE/SUBJECT: (OPERATION:)										TEST 71-020-340			
MK-JA TEST STAND-AIRCRAFT ()										RUN 02			
SYS. ELECT. MOTOR-DRIVEN (SYSTEM PRESSURIZED AT)										26 AUG 74			
NEAR FIELD NOISE LEVELS (3000 PSI, NO FLOW)										PAGE M2			
(INSIDE HANGER)													
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	87	83	86	84	83	87	87	87	88	87	89	88	89
OASLA	87	82	85	83	81	85	85	85	87	85	85	84	86
T	285	679	404	571	807	404	404	404	285	404	404	480	339
MINIMUM QPL EAR MUFFS													
OASLA*	60	57	61	60	58	63	63	62	63	64	66	65	66
T	960	960	960	960	960	960	960	960	960	960	960	960	960
AMERICAN OPTICAL 1700 EAR MUFFS													
OASLA*	54	52	55	54	53	58	57	56	57	59	61	60	61
T	960	960	960	960	960	960	960	960	960	960	960	960	960
V-51R EAR PLUGS													
OASLA*	61	55	59	58	55	60	61	61	61	60	60	59	60
T	960	960	960	960	960	960	960	960	960	960	960	960	960
AMERICAN OPTICAL 1700 EAR MUFFS PLUS V-51R EAR PLUGS													
OASLA*	49	42	45	44	42	47	46	47	48	46	46	46	47
T	960	960	960	960	960	960	960	960	960	960	960	960	960
H-133 GROUND COMMUNICATION UNIT													
OASLA*	61	54	56	54	54	58	57	58	60	57	58	57	59
T	960	960	960	960	960	960	960	960	960	960	960	960	960
COMMUNICATION													
PREFERRED SPEECH INTERFERENCE LEVEL (PSIL IN DB)													
PSIL	80	76	80	78	76	80	80	81	82	80	80	79	81
ANNOYANCE													
PERCEIVED NOISE LEVEL, TONE CORRECTED (PNLT IN PNDB)													
TONE CORRECTION (C IN DB)													
PNLT	100	96	100	97	95	99	99	99	101	99	100	98	101
C	3	2	3	3	1	2	2	2	2	2	2	2	2

* BASED ON CALCULATED SPL SPECTRUM UNDER PROTECTIVE DEVICE.

MEASURES OF HUMAN NOISE EXPOSURE													IDENTIFICATION#
3													
NOISE SOURCE/SUBJECT: (OPERATION:)													
MK-3A TEST STAND-AIRCRAFT ()													OMEGA 3.2
SYS., ELECT. MOTOR-DRIVEN (SYSTEM PRESSURIZED AT)													TEST 71-020-340
NEAR FIELD NOISE LEVELS (3000 PSI, NO FLOW)													RUN 03
(INSIDE HANGER) ()													26 AUG 74
													PAGE H3
DISTANCE (M)--> 2 2 2 2 2 2 2 2 2 2 2 2 2													OPERATOR LOCATION
ANGLE (DEG)--> 160 180 200 220 240 260 280 300 320 340													TEST CONDITION
													1/A 2/A
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													
OASLA													
T													
MINIMUM OPL EAR MUFFS													
OASLA*													
T													
AMERICAN OPTICAL 1700 EAR MUFFS													
OASLA*													
T													
V-51R EAR PLUGS													
OASLA*													
T													
AMERICAN OPTICAL 1700 EAR MUFFS PLUS V-51R EAR PLUGS													
OASLA*													
T													
H-133 GROUND COMMUNICATION UNIT													
OASLA*													
T													
COMMUNICATION													
PREFERRED SPEECH INTERFERENCE LEVEL (PSIL IN DB)													
PSIL													
ANNoyANCE													
PERCEIVED NOISE LEVEL, TONE CORRECTED (PMLT IN PNOB)													
TONE CORRECTION (C IN DB)													
PMLT													
C													

* BASED ON CALCULATED SPL SPECTRUM UNDER PROTECTIVE DEVICE.