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Volume 106.

MA-1A Air Conditioner.

(9) Technical rept.,

(10) Nick A. Farinacci

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AEROSPACE MEDICAL RESEARCH LABORATORY
AEROSPACE MEDICAL DIVISION
AIR FORCE SYSTEMS COMMAND
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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

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The MA-1A Air Conditioner is an engine-driven air conditioner designed to provide conditioned air to the aircraft's interior during ground servicing. This report provides measured data defining the bioacoustic environments produced by this unit operating outdoors on a concrete apron at normal rated/loaded conditions. Near-field data are reported for 36 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

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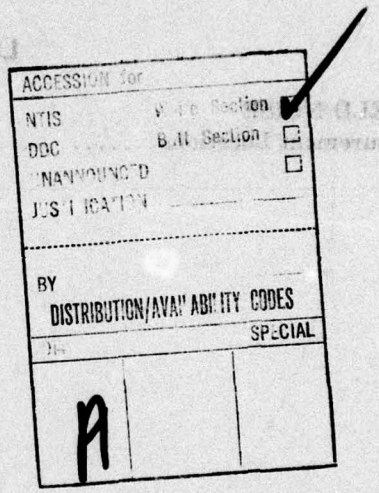
interference level, perceived noise level, and limiting times for total daily exposure of personnel with and without standard Air Force ear protectors. Refer to Volume 1 of this handbook, USAF Bioenvironmental Noise Data Handbook, Vol 1: Organization, Content and Application, AMRL-TR-75-50(1) 1975, for 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.

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 gratefully acknowledges Mr. Robert T. England and Mr. Carl G. Toler 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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INTRODUCTION

The MA-1A Air Conditioner is an engine-driven air conditioner designed to provide conditioned air to the aircraft's interior during ground servicing. This unit is manufactured by Keco Industries, Incorporated.

This volume provides measured data defining 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 MA-1A air conditioner.

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, 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-Paterson 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.

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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 MA-1A air conditioner was operated outdoors on a concrete apron at normal rated conditions with no significant sound-reflective surfaces present except the ground plane. Table 1 notes the surface meteorological conditions at the time of measurement.

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.

RESULTS

The measured data presented in Table 2 define the sound pressure levels (SPL) produced by the MA-1A unit at the 36 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 meaured data points. 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 distances over which the sound is propagated.

TABLE 1

METEOROLOGICAL CONDITIONS
FOR NOISE MEAUREMENTS

MA-1A Air Conditioner
Wright-Patterson AFB, 5 November 1971

Meteorology

Temperature	17 C
Bar Pressure	0.745 M Hg
Rel Humidity	26 %
Wind — Speed	6.8 M/Sec (13 Kt)

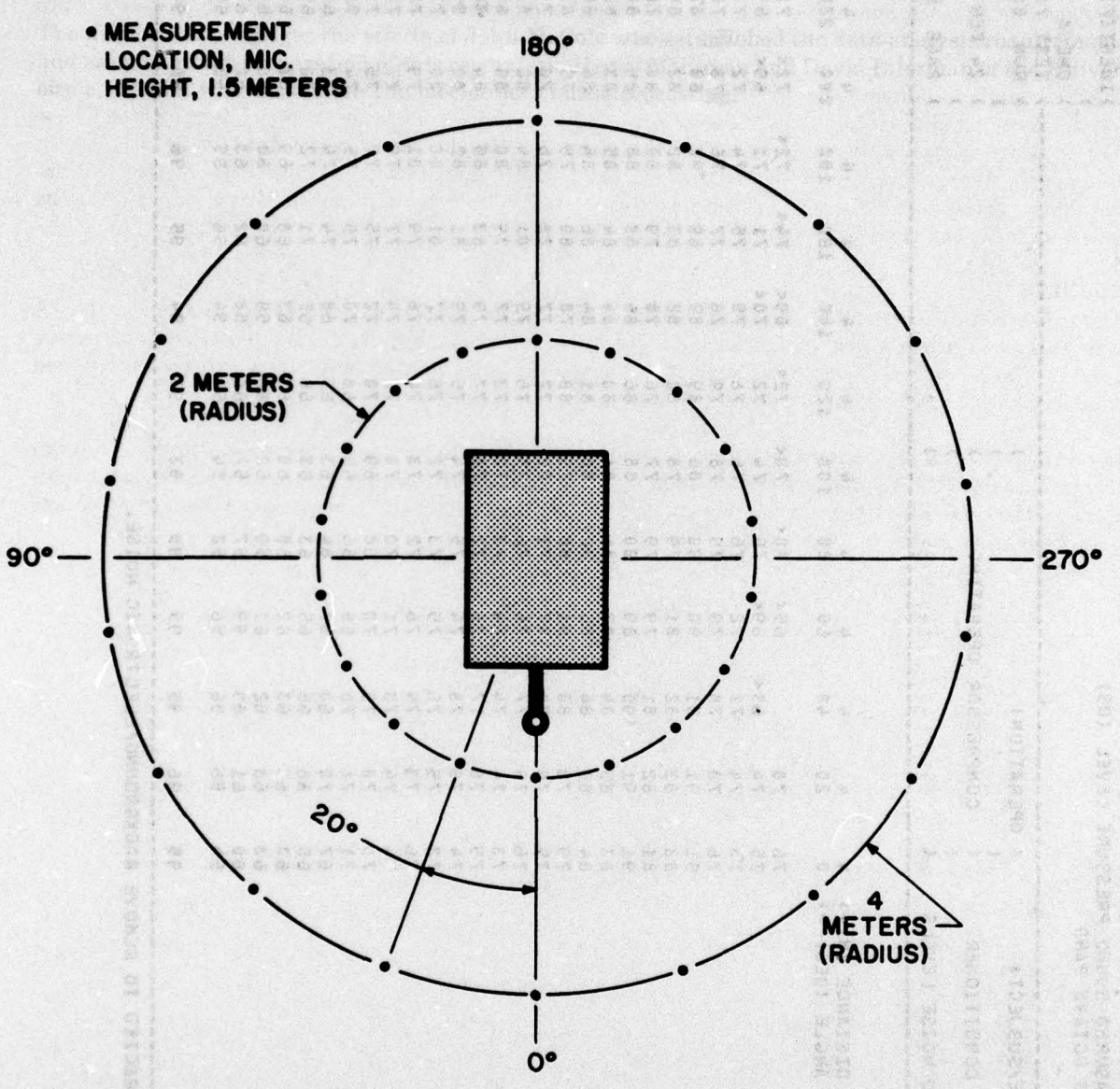

Figure 12. Measurement Locations

TABLE: 2 — MEASURED SOUND PRESSURE LEVEL (DB), 1/3 OCTAVE BAND

IDENTIFICATION: OMEGA 3.2 / TEST 71-020-080 / RUN 01 / 24 FEB 75 / PAGE F1

NOISE SOURCE/SUBJECT: MA-1A AIR CONDITIONER — NEAR FIELD NOISE LEVELS

OPERATION: COMPRESSOR OPERATING

FREQ (HZ)	DISTANCE (M) →	4	4	4	4	4	4	4	4	4	4	4	4	4
	ANGLE (DEG) →	0	20	40	60	80	100	120	140	160	180	200	220	240
25		76	78		65<	70<	70<	72<	69<	74<	72<	72<	71<	79
31.5		75	74	68<	69<	75	74	72	70<	71	71	69<	69<	76
40		73	74	72	72	76	76	78	75	75	74	72	73	79
50		76	78	78	79	79	78	79	78	77	76	76	76	76
63		91	91	91	90	90	88	89	89	89	90	89	87	86
80		83	83	82	81	79	78	80	82	83	82	82	84	83
100		81	82	81	79	79	77	76	78	79	80	80	78	79
125		91	91	90	89	90	88	86	86	88	88	89	88	87
160		83	85	84	83	84	81	80	84	84	85	83	82	83
200		84	83	84	85	82	80	81	84	86	86	86	85	80
250		79	79	80	81	80	79	80	78	80	79	79	80	79
315		75	75	78	77	78	77	77	77	78	76	76	74	73
400		76	75	77	76	76	75	76	79	81	84	86	82	75
500		73	74	74	74	73	72	73	77	79	80	80	80	74
630		75	76	77	75	77	78	77	79	83	85	84	80	78
800		74	76	78	74	75	74	75	79	81	82	80	80	75
1000		72	75	76	75	73	72	76	77	81	82	80	77	73
1250		76	73	74	76	72	73	74	76	79	81	79	75	73
1600		74	74	73	71	70	70	72	74	77	79	77	73	71
2000		70	70	70	70	68	69	70	72	75	77	75	71	69
2500		71	71	70	68	66	65	68	70	75	75	74	70	67
3150		67	70	68	67	64	63	65	68	74	74	73	68	65
4000		65	66	66	65	63	63	66	65	71	72	70	65	63
5000		63	65	63	62	60	60	63	63	68	69	67	63	61
6300		63	63	62	61	59	60	60	59	60	60	60	60	60
8000		60	61	60	59	57	57	60	58	62	63	62	60	60
10000		54	56	56	56	52	54	54	54	56	55	55	55	55
OVERALL		95	96	95	95	95	93	93	94	95	96	96	94	93

< LEVEL CORRECTED TO REMOVE BACKGROUND/ELECTRONIC NOISE.

TABLE: 2 MEASURED SOUND PRESSURE LEVEL (DB)
1/3 OCTAVE BAND

IDENTIFICATION:
OMEGA 3.2
TEST 71-020-080
RUN 02
24 FEB 75
PAGE F2

NOISE SOURCE/SUBJECT:
MA-1A AIR CONDITIONER
NEAR FIELD NOISE LEVELS

OPERATION:
COMPRESSOR OPERATING

FREQ (HZ)	DISTANCE (M) ->	4	4	4	4	4	2	2	2	2	2	2	2	2
	ANGLE (DEG) -->	260	280	300	320	340	0	20	40	60	80	100	120	140
25		79	79	73<	76	79	78	78	78	78	78	78	77	77
31.5		79	75	73	72	75	74	78	77	76	79	77	76	74
40		78	77	78	77	76	76	77	76	78	80	80	81	77
50		77	77	78	77	75	84	86	81	83	83	82	81	79
63		89	87	88	89	89	101	103	101	99	97	93	91	88
80		80	81	79	81	83	89	90	89	87	86	83	82	83
100		79	81	79	81	80	90	89	87	87	85	83	83	82
125		86	88	89	91	92	100	99	101	97	97	95	94	92
160		82	82	81	81	82	89	90	89	87	87	86	85	85
200		81	84	83	82	83	87	89	89	87	87	88	85	86
250		78	82	79	79	79	82	84	86	88	89	90	88	86
315		72	75	77	78	76	81	82	80	81	84	84	83	82
400		76	77	78	78	76	82	83	82	81	82	80	81	80
500		75	77	76	75	74	80	81	81	79	80	79	78	77
630		75	77	77	78	76	81	80	84	82	84	83	82	81
800		73	74	75	75	74	80	80	81	78	82	81	79	78
1000		71	73	74	76	74	78	79	80	80	82	82	81	80
1250		71	72	73	73	73	77	77	78	78	78	77	78	78
1600		70	72	73	74	74	78	79	77	75	76	75	76	73
2000		68	70	71	71	71	75	75	75	73	72	73	72	71
2500		67	69	71	72	71	75	76	74	71	71	72	71	70
3150		65	67	69	69	69	73	73	72	69	70	71	69	67
4000		64	66	68	68	67	71	71	70	67	68	70	67	65
5000		63	65	66	65	64	68	70	68	66	66	67	66	64
6300		62	64	65	65	64	69	69	68	66	65	66	65	63
8000		62	64	66	65	62	68	70	69	65	65	65	64	63
10000		58	61	62	60	58	64	64	63	60	60	60	59	58
OVERALL		93	94	94	95	96	104	105	105	102	101	99	98	97

< LEVEL CORRECTED TO REMOVE BACKGROUND/ELECTRONIC NOISE.

TABLE: 2 — MEASURED SOUND PRESSURE LEVEL (DB) — 1/3 OCTAVE BAND

IDENTIFICATION: OMEGA 3.2 / TEST 71-020-080 / RUN 03 / 24 FEB 75 / PAGE F3

NOISE SOURCE/SUBJECT: MA-1A AIR CONDITIONER — NEAR FIELD NOISE LEVELS

OPERATION: COMPRESSOR OPERATING

FREQ (HZ)	DISTANCE (M) ->	2	2	2	2	2	2	2	2	2	2
	ANGLE (DEG) -->	160	180	200	220	240	260	280	300	320	340
25		80	82	75<	72<	77	73<	78	81	77	74<
31.5		75	79	73	73	78	75	78	78	76	76
40		77	79	76	77	79	82	82	85	83	79
50		78	78	77	77	79	80	79	81	81	82
63		85	85	84	84	88	87	90	91	95	99
80		84	85	83	85	83	84	86	81	85	86
100		84	84	84	82	82	83	85	86	86	88
125		91	92	94	92	92	94	95	95	97	99
160		89	88	87	87	87	90	92	92	92	91
200		91	92	94	89	85	88	89	89	88	86
250		85	85	85	84	81	85	87	87	85	83
315		82	85	84	79	78	80	82	83	83	81
400		85	88	87	82	80	81	83	83	83	83
500		83	88	84	81	76	78	80	81	81	81
630		88	89	88	82	78	79	80	81	83	82
800		87	88	86	79	75	77	79	78	82	81
1000		83	87	85	77	75	77	79	77	79	79
1250		84	86	82	75	76	76	77	76	78	77
1600		82	84	82	74	73	75	77	76	77	78
2000		81	82	80	73	70	72	76	75	76	75
2500		77	78	79	71	70	71	75	75	75	75
3150		76	76	77	69	69	70	73	74	73	72
4000		73	75	74	67	67	68	71	72	71	71
5000		71	73	72	65	66	67	72	71	70	69
6300		66	67	66	64	65	65	71	71	69	69
8000		64	65	64	63	65	65	70	71	70	69
10000		59	60	58	58	60	61	66	67	66	65
OVERALL		99	100	100	97	96	98	100	100	101	103

< LEVEL CORRECTED TO REMOVE BACKGROUND/ELECTRONIC NOISE.

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

IDENTIFICATION:
OMEGA 3.2
TEST 71-020-080
RUN 01
24 FEB 75
PAGE J1

NOISE SOURCE/SUBJECT:
MA-1A AIR CONDITIONER
NEAR FIELD NOISE LEVELS

OPERATION:
COMPRESSOR OPERATING

FREQ (HZ)	DISTANCE (M) ->	4	4	4	4	4	4	4	4	4	4	4	4	4
	ANGLE (DEG) -->	0	20	40	60	80	100	120	140	160	180	200	220	240
31.5		79	80	73	74	79	78	79	77	78	77	76	76	83
63		91	92	91	91	90	88	90	90	90	90	90	89	88
125		92	92	91	90	91	89	87	88	89	90	90	89	89
250		85	85	86	86	85	84	84	85	87	87	87	86	83
500		80	80	81	80	80	80	80	83	86	88	88	85	81
1000		79	79	81	80	78	78	80	82	85	86	84	82	78
2000		76	77	76	75	73	73	75	77	81	82	80	76	74
4000		70	72	71	70	67	67	70	70	76	77	75	71	68
8000		65	65	65	64	61	62	63	62	65	65	65	63	64
OVERALL		95	96	95	95	95	93	93	94	95	96	96	94	93

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

IDENTIFICATION:
OMEGA 3.2
TEST 71-020-080
RUN 02
24 FEB 75
PAGE J2

NOISE SOURCE/SUBJECT:
MA-1A AIR CONDITIONER
NEAR FIELD NOISE LEVELS

OPERATION:
COMPRESSOR OPERATING

FREQ (HZ)	DISTANCE (M) -> / ANGLE (DEG) -->	4 / 260	4 / 280	4 / 300	4 / 320	4 / 340	2 / 0	2 / 20	2 / 40	2 / 60	2 / 80	2 / 100	2 / 120	2 / 140
31.5		83	82	80	80	82	81	82	82	82	84	83	83	81
63		90	88	89	90	90	101	103	102	99	97	94	92	89
125		88	89	90	92	93	100	100	101	98	97	96	95	93
250		83	86	85	84	85	89	91	91	91	92	93	91	90
500		80	82	82	82	80	86	86	87	86	87	85	85	84
1000		76	78	79	80	78	83	83	84	84	85	85	84	83
2000		73	75	76	77	77	81	81	80	78	79	78	78	76
4000		69	71	72	72	72	76	76	75	72	73	74	72	70
8000		66	68	69	68	66	72	73	72	69	69	69	68	67
OVERALL		93	94	94	95	96	104	105	105	102	101	99	98	97

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

IDENTIFICATION:
OMEGA 3.2
TEST 71-020-080
RUN 03
24 FEB 75
PAGE J3

NOISE SOURCE/SUBJECT:
MA-1A AIR CONDITIONER
NEAR FIELD NOISE LEVELS

OPERATION:
COMPRESSOR OPERATING

FREQ (HZ)	DISTANCE (M) ->	2	2	2	2	2	2	2	2	2	2
	ANGLE (DEG) -->	160	180	200	220	240	260	280	300	320	340
31.5		83	85	80	79	83	83	85	87	84	81
63		88	89	87	88	89	89	91	92	95	99
125		93	94	95	93	94	96	97	97	98	100
250		92	93	95	90	87	90	91	92	91	88
500		90	93	91	86	83	84	86	86	87	87
1000		90	91	89	82	80	81	83	82	85	84
2000		85	86	85	77	76	77	81	80	81	81
4000		79	80	79	72	72	73	77	77	76	75
8000		68	70	69	67	68	69	74	75	73	73
OVERALL		99	100	100	97	96	98	100	100	101	103

TABLE: 3 MEASURES OF HUMAN NOISE EXPOSURE

IDENTIFICATION:
OMEGA 3.2
TEST 71-020-080
RUN 01
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PAGE H1

NOISE SOURCE/SUBJECT:
MA-1A AIR CONDITIONER
NEAR FIELD NOISE LEVELS

OPERATION:
COMPRESSOR OPERATING

DISTANCE (M)->	4	4	4	4	4	4	4	4	4	4	4	4	4
ANGLE (DEG)-->	0	20	40	60	80	100	120	140	160	180	200	220	240
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	95	95	95	94	94	92	93	94	95	96	95	94	92
OASLA	84	85	85	84	84	83	84	86	89	90	89	87	83
T	480	404	404	480	480	571	480	339	202	170	202	285	571
MINIMUM QPL EAR MUFFS													
OASLA*	72	73	72	72	72	70	69	70	72	72	72	71	70
T	960	960	960	960	960	960	960	960	960	960	960	960	960
AMERICAN OPTICAL 1700 EAR MUFFS													
OASLA*	69	69	68	68	68	66	66	67	68	68	68	67	66
T	960	960	960	960	960	960	960	960	960	960	960	960	960
V-51R EAR PLUGS													
OASLA*	61	62	62	62	61	60	61	63	65	67	66	64	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*	50	51	51	50	50	48	49	50	52	53	52	51	48
T	960	960	960	960	960	960	960	960	960	960	960	960	960
H-133 GROUND COMMUNICATION UNIT													
OASLA*	62	63	62	62	61	59	60	61	63	64	63	61	60
T	960	960	960	960	960	960	960	960	960	960	960	960	960
COMMUNICATION													
PREFERRED SPEECH INTERFERENCE LEVEL (PSIL IN DB)													
PSIL	78	79	79	78	77	77	78	81	84	85	84	81	77
ANNOYANCE													
PERCEIVED NOISE LEVEL, TONE CORRECTED (PNLT IN PNDB)													
TONE CORRECTION (C IN DB)													
PNLT	101	101	101	100	100	99	99	99	103	104	103	101	98
C	1	1	1	1	1	2	1	1	1	1	1	1	1

* BASED ON CALCULATED SPL SPECTRUM UNDER PROTECTIVE DEVICE.

TABLE: 3 MEASURES OF HUMAN NOISE EXPOSURE

IDENTIFICATION:
OMEGA 3.2
TEST 71-020-080
RUN 02
24 FEB 75
PAGE H2

NOISE SOURCE/SUBJECT: MA-1A AIR CONDITIONER
NEAR FIELD NOISE LEVELS

OPERATION: COMPRESSOR OPERATING

DISTANCE (M)->	4	4	4	4	4	2	2	2	2	2	2	2	2
ANGLE (DEG)-->	260	280	300	320	340	0	20	40	60	80	100	120	140
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	93	93	94	94	95	103	104	104	102	101	99	98	96
OASLA	82	84	85	85	85	90	90	91	89	90	90	89	88
T	679	480	404	404	404	170	170	143	202	170	170	202	240
MINIMUM QPL EAR MUFFS													
OASLA*	69	70	71	72	73	81	81	81	79	78	77	75	74
T	960	960	960	960	960	807	807	807	960	960	960	960	960
AMERICAN OPTICAL 1700 EAR MUFFS													
OASLA*	66	66	67	68	69	77	78	78	75	74	72	71	69
T	960	960	960	960	960	960	960	960	960	960	960	960	960
V-51R EAR PLUGS													
OASLA*	60	61	61	62	61	68	69	69	67	68	67	66	65
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*	48	49	49	50	51	59	60	59	57	56	55	54	53
T	960	960	960	960	960	960	960	960	960	960	960	960	960
H-133 GROUND COMMUNICATION UNIT													
OASLA*	60	60	61	62	62	70	71	71	69	68	66	65	64
T	960	960	960	960	960	960	960	960	960	960	960	960	960
COMMUNICATION													
PREFERRED SPEECH INTERFERENCE LEVEL (PSIL IN DB)													
PSIL	77	78	79	79	78	83	84	84	82	84	83	82	81
ANNOYANCE													
PERCEIVED NOISE LEVEL, TONE CORRECTED (PNLT IN PNDB)													
TONE CORRECTION (C IN DB)													
PNLT	98	99	101	102	102	108	108	109	106	107	106	105	103
C	1	1	2	2	2	2	2	2	2	2	2	2	1

* BASED ON CALCULATED SPL SPECTRUM UNDER PROTECTIVE DEVICE.

TABLE: 3 MEASURES OF HUMAN NOISE EXPOSURE	IDENTIFICATION:
	OMEGA 3.2
NOISE SOURCE/SUBJECT: MA-1A AIR CONDITIONER NEAR FIELD NOISE LEVELS	OPERATION: COMPRESSOR OPERATING	TEST 71-020-080 RUN 03 24 FEB 75 PAGE H3

DISTANCE (M)-->	2	2	2	2	2	2	2	2	2	2
ANGLE (DEG)-->	160	180	200	220	240	260	280	300	320	340
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	98	100	99	96	96	98	99	99	100	102
OASLA	93	95	94	88	86	88	90	90	90	90
T	101	71	85	240	339	240	170	170	170	170
MINIMUM QPL EAR MUFFS										
OASLA*	75	76	77	74	74	76	77	77	78	80
T	960	960	960	960	960	960	960	960	960	960
AMERICAN OPTICAL 1700 EAR MUFFS										
OASLA*	71	72	72	70	69	71	73	73	74	76
T	960	960	960	960	960	960	960	960	960	960
V-51R EAR PLUGS										
OASLA*	70	72	70	65	63	65	67	67	68	68
T	960	960	960	960	960	960	960	960	960	960
AMERICAN OPTICAL 1700 EAR MUFFS PLUS V-51R EAR PLUGS										
OASLA*	56	58	57	52	51	53	55	55	56	58
T	960	960	960	960	960	960	960	960	960	960
H-133 GROUND COMMUNICATION UNIT										
OASLA*	67	68	68	63	63	65	67	66	68	69
T	960	960	960	960	960	960	960	960	960	960
COMMUNICATION										
PREFERRED SPEECH INTERFERENCE LEVEL (PSIL IN DB)										
PSIL	88	90	88	82	80	81	83	83	84	84
ANNOYANCE										
PERCEIVED NOISE LEVEL, TONE CORRECTED (PNLT IN PNDB)										
TONE CORRECTION (C IN DB)										
PNLT	106	108	108	103	102	104	106	105	107	108
C	1	1	1	1	1	1	1	1	1	2

* BASED ON CALCULATED SPL SPECTRUM UNDER PROTECTIVE DEVICE.

*U.S.Government Printing Office: 1977 — 757-080/254