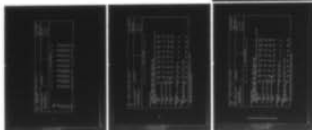
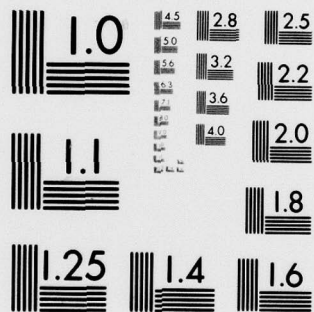


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USAF BIOENVIRONMENTAL NOISE DATA HANDBOOK
Volume 143
F-105D In-Flight Crew Noise *AD 80910*

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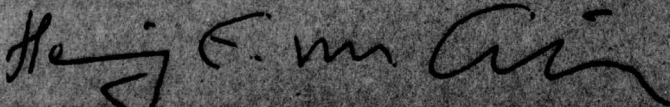
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FOR THE COMMANDER



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

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20. ABSTRACT (Continue on reverse side if necessary and identify by block number) The F-105D is a USAF all-weather fighter-bomber. This report provides measured data defining the bioacoustic environments at the pilot's location inside this aircraft for 19 conditions. Data are reported for one location 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			

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✓ 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, Volume 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 723108, Crew Safety In Operational Noise Environments.

The author acknowledges the efforts of Mr. John N. Cole who established the data analysis requirements, Mr. Henry Mohlman and Mr. Fred Lampley of the University of Dayton who assisted in the mechanics of data processing and Mrs. Peggy Massie who typed this report and prepared it for publication.

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INTRODUCTION

The USAF F-105D is a single seat all-weather fighter-bomber manufactured by the Fairchild Republic Division. Power is provided by one J75-P-19W turbojet engine manufactured by the United Aircraft Corporation, Pratt & Whitney Aircraft Division.

This volume provides measured data defining the bioacoustic environments produced inside the aircraft. Such data are essential to evaluate ear protection requirements, limiting personnel exposure times, voice communication capabilities, and annoyance problems associated with operations of the F-105D 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 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. Refer to *Volume 1* (reference 1) 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., in-flight/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.

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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.

IN-FLIGHT NOISE

MEASUREMENTS

All noise measurements were made on-board a F-105D aircraft during typical speed, altitude, and flight maneuver conditions. These levels describe the standard F-105D environments but may not be representative of those levels encountered if the aircraft has been configured differently (e.g., major equipment or structural changes).

Acoustic measurements were made inside the cockpit at the pilot's location. Table 1 lists the measurement location and test conditions as numeric/alphabetic designators which are used on the data pages. The designator 1/A means measurement location 1 and test condition A, etc.

The microphone was attached to the pilot's helmet by means of a lightweight boom. This arrangement enabled adjustment of the microphone close to the ear level at a distance of 0.1meter with its diaphragm parallel and facing away from the helmet's surface. In the analysis, microphone corrections for random incidence were applied to the overall system response. The recorded samples were analyzed using a four or eight second integration time to obtain a power-averaged level which effectively smooths out short duration fluctuations and best describes the exposure.

RESULTS

The measured data presented in Table 2 define the sound pressure levels (SPL) produced inside the F-105D aircraft at the specified location. This table includes the overall, 1/3 octave band, and octave band levels. From these data, C-weighted and A-weighted sound levels, maximum permissible time for one exposure per day (AFR 161-35) with and without standard Air Force ear protectors, preferred speech interference level, and perceived noise level are calculated and presented in Table 3. These measures are widely used to assess the effects of noise on personnel and their performance.

TABLE 1

MEASUREMENT LOCATIONS AND TEST CONDITIONS

F-105D Carswell AFB, 8 June 1978

<i>Location</i>	<i>Position</i>	<i>Height Above Deck</i>
1	Pilot	Seated Head Level
<i>Condition</i>	<i>Description</i>	
A	Ground Run Up — Engine Idle — Canopy Closed — ECS Off	
B	Ground Run Up — Engine Idle — Canopy Closed — ECS On	
C	Ground Run Up — Engine 100% RPM — Canopy Closed — ECS Off	
D	Ground Run Up — Engine 100% RPM — Canopy Closed — ECS On	
E	Taxi — Engine Idle — Canopy Closed — ECS On	
F	Taxi — Engine Idle — Canopy Open	
G	Takeoff — Engine A/B	
H	Climb To 2500' AGL — Engine A/B Off	
I	Low Altitude High Speed Run — 2000' AGL — 450 KIAS .63 M	
J	Descend 9000' ↘ 3000' PA — Engine Power Mil. — 450 KIAS	
K	Descend 11000' ↘ 3000' PA — Engine Power 88% 450 KIAS	
L	Simulated Dive Bomb Run 9500' — 7500' PA Engine 101% RPM — 450 KIAS	
M	Strafing — Gun Bursts — 8000' ↘ 4500' PA 450 KIAS .58 M	
N	Cruise — 11000' PA — 350 KIAS .63 M Engine 93% RPM	
O	Descend 11000' ↘ 9000' PA — 350 KIAS Engine 91% RPM — ECS Cycled To Remove Ice	
P	Descend 8000' ↘ 3000' PA — 350 KIAS — Engine 90% To Mil.	
Q	GCA Final Approach — 1500' PA — 170 KIAS — Gear And Flaps Down	
R	Touchdown — Landing Roll	
S	Taxi — Engine Idle — Canopy Open	

TABLE: MEASURED SOUND PRESSURE LEVEL (OBS)
 2
 1/3 OCTAVE BAND
 NOISE SOURCE/SUBJECT: (OPERATION:)
 F-105D AIRCRAFT ()
 IN-FLIGHT CREW NOISE ()
 IDENTIFICATION:
 OMEGA 3.2
 TEST AC-079-101
 RUN 01
 31 MAY 79
 PAGE F1

FREQ (HZ)	LOCATION/CONDITION									
	1/A	1/B	1/C	1/D	1/E	1/F	1/G	1/H	1/I	1/J
25	80	75	85	82	75	94	85	76	77	77
31.5	83	80	79	79	74	93	86	75	75	77
40	72	70	79	79	71	93	87	75	75	75
50	77	77	80	81	78	97	88	81	80	80
63	78	77	85	85	83	93	91	84	83	86
80	87	83	94	92	87	93	95	90	90	92
100	87	86	93	94	85	93	96	89	88	93
125	85	85	94	96	85	94	100	92	92	92
160	90	90	99	90	90	93	100	96	93	95
200	95	95	98	99	93	95	98	95	96	95
250	87	87	94	96	87	96	98	95	95	93
315	89	88	94	95	88	97	95	95	96	95
400	93	92	97	97	91	96	96	96	98	96
500	92	93	101	102	94	97	99	99	101	99
630	93	93	102	103	94	97	98	99	102	100
800	92	92	97	98	92	100	97	97	100	96
1000	94	94	97	101	95	104	98	98	102	101
1250	96	96	99	102	97	108	99	98	102	101
1600	98	99	99	99	92	108	98	99	100	99
2000	91	91	91	95	88	106	97	97	96	97
2500	89	89	90	95	87	103	95	96	94	95
3150	89	89	90	97	88	105	97	98	96	98
4000	93	93	91	97	88	110	97	99	96	98
5000	88	88	89	95	85	107	95	97	93	96
6300	89	89	95	97	91	109	98	101	96	100
8000	85	87	88	93	93	105	93	97	93	96
10000	83	84	84	90	86	101	93	96	94	94
OVERALL	105	105	110	111	104	117	111	110	111	111

LEVEL CORRECTED TO REMOVE BACKGROUND/ELECTRONIC NOISE.

TABLE: MEASURED SOUND PRESSURE LEVEL (DB) 1/3 OCTAVE BAND		IDENTIFICATION:									
2		OMEGA 3.2 TEST AC-079-001 RUN 02									
NOISE SOURCE/SUBJECT:		OPERATION:									
F-105D AIRCRAFT		31 MAY 79									
IN-FLIGHT CREW NOISE		PAGE F2									
		LOCATION/CONDITION									
FREQ (HZ)	1/K	1/L	1/M	1/N	1/O	1/P	1/Q	1/R	1/S		
25	77	77	79	75	76	76	82	84	81	81	81
31.5	75	76	78	73	73	81	81	83	81	83	77
40	76	76	73	74	74	84	82	83	84	83	71
50	80	80	85	78	78	79	91	89	79	91	76
63	84	85	88	81	84	82	92	90	82	90	81
80	90	89	94	87	89	86	94	91	86	94	90
100	94	95	94	93	94	88	92	90	88	92	89
125	91	91	93	91	92	91	94	93	91	94	86
160	94	94	94	91	92	91	96	93	91	96	91
200	95	95	96	94	95	96	97	96	96	97	96
250	92	92	94	90	92	94	95	92	94	95	88
315	95	94	94	92	94	94	96	92	94	96	89
400	95	96	96	94	95	97	97	95	97	97	93
500	97	98	98	96	97	99	99	99	99	99	97
630	98	99	98	95	97	99	100	99	99	99	98
800	96	96	97	95	96	98	95	95	98	95	95
1000	100	100	100	98	98	99	96	95	99	96	96
1250	99	101	99	97	98	98	98	96	98	98	98
1600	100	99	99	99	99	98	98	98	98	98	98
2000	98	96	96	98	97	93	93	92	90	92	90
2500	96	95	94	98	96	92	92	91	89	92	89
3150	99	98	96	100	98	94	95	92	89	92	89
4000	100	98	98	101	99	94	94	91	89	94	89
5000	98	96	95	98	98	92	92	88	85	92	85
6300	101	99	99	101	101	97	94	90	86	94	86
8000	98	95	95	98	98	94	92	89	85	94	85
10000	96	94	94	96	96	94	89	86	82	94	82
OVERALL	111	110	110	110	110	109	109	108	106	109	106

LEVEL CORRECTED TO REMOVE BACKGROUND/ELECTRONIC NOISE.

TABLE: MEASURED SOUND PRESSURE LEVEL (DB)		IDENTIFICATION:										
2 OCTAVE BAND		OMEGA 3.2										
		TEST AC-079-001										
		RUN 01										
		31 MAY 79										
		PAGE J1										
NOISE SOURCE/SUBJECT:		OPERATION:										
F-105D AIRCRAFT												
IN-FLIGHT CREW NOISE												
		LOCATION/CONDITION										
FREQ (HZ)	1/A	1/B	1/C	1/D	1/E	1/F	1/G	1/H	1/I	1/J		
31.5	84	81	87	85	78	98	91	80	81	81		
63	88	85	95	93	89	99	97	91	91	91		
125	92	92	101	101	92	98	104	98	96	98		
250	96	96	100	102	95	101	102	99	100	99		
500	97	97	105	106	98	101	103	103	105	103		
1000	99	99	102	105	99	110	103	102	106	105		
2000	99	100	100	101	94	111	101	102	102	102		
4000	95	95	95	101	92	112	101	103	110	102		
8000	91	92	96	99	95	111	100	103	99	102		
OVERALL	105	105	110	111	104	117	111	110	111	111		

TABLE: MEASURED SOUND PRESSURE LEVEL (DB)		IDENTIFICATION:											
OCTAVE BAND													
NOISE SOURCE/SUBJECT:		OMEGA 3.2											
		TEST AC-079-001											
		RUN 02											
F-1050 AIRCRAFT		31 MAY 79											
IN-FLIGHT CREW NOISE		PAGE J2											
		LOCATION/CONDITION											
		1/K	1/L	1/M	1/N	1/O	1/P	1/Q	1/R	1/S			
FREQ (HZ)													
31.5		81	81	83	79	79	86	86	88	83			
63		91	90	95	88	90	88	97	95	90			
125		98	98	98	96	98	95	99	97	94			
250		99	99	99	97	98	100	101	99	97			
500		102	102	102	100	101	103	103	102	101			
1000		103	104	104	102	102	103	101	100	101			
2000		103	102	101	103	102	100	100	100	99			
4000		104	102	101	104	103	98	98	95	93			
8000		104	101	101	104	103	100	97	93	89			
OVERALL		111	110	110	110	110	109	109	108	106			

