The AF32A-18 noise suppressor is made by the General Acoustics Corporation for acoustical suppression of the F-5 aircraft. This report provides measured and extrapolated data defining the bioacoustic environments produced by this aircraft operating in this suppressor for three engine power configurations. Near-field data are reported for two locations in a wide variety of physical and psychoacoustic measures: overall and band sound pressure levels, C-weighted and A-weighted sound levels, preferred speech inter-
ference level, perceived noise level, and limiting times for total daily exposure of personnel with and without standard Air Force ear protectors. Far-field data measured at 19 locations are normalized to standard meteorological conditions and extrapolated from 75-8000 meters to derive sets of equal-value contours for these same seven acoustic measures as functions of angle and distance from the source. Refer to Volume 1 of this handbook, "USAF Bioenvironmental Noise Data Handbook, Vol 1: Organization, Content and Application", AMRL-TR-75-50(1) 1975, for discussion of the objective and design of the handbook, the types of data presented, measurement procedures, instrumentation, data processing, definitions of quantities, symbols, equations, applications, limitations, etc.
PREFACE

This report was prepared by the Biodynamic Environment Branch, Aerospace Medical Research Laboratory, under Project/Task 723107, Technology to Define and Assess Environmental Quality of Noise From Air Force Operations.

The author gratefully acknowledges Mr. John Cole and Mr. Robert Powell for their assistance in preparing this report, Mr. Jerry Speakman and Capt. Richard Gorman for their assistance in acquiring the raw data, Mr. Keith Kettler, Mr. Henry Mohlman and Mr. Fred Lampley of the University of Dayton for assistance in the mechanics of data processing, and Mrs. Peggy Massie for assistance in typing this report.
# Table of Contents

INTRODUCTION .......................................................... 3
NEAR-FIELD NOISE .......................................................... 4
FAR-FIELD NOISE .......................................................... 6

## List of Tables

**NEAR-FIELD NOISE**
1. Measurement Locations and Test Conditions .................................................. 5
2. Measured Sound Pressure Level
   1/3 Octave Band ........................................................................ 8
   Octave Band ............................................................................... 9
3. Measures of Human Noise Exposure .......................................................... 10

**FAR-FIELD NOISE**
4. Test Conditions .............................................................................. 11
5. Measured Sound Pressure Level ....................................................... 12-14

## List of Figures

**NEAR-FIELD NOISE**
1. Measurement Locations ........................................................................ 5

**FAR-FIELD NOISE**
2. Measurement Locations ........................................................................ 7
3. Normalized Far-Field Noise Levels .................................................. 15-17
4. Overall Sound Pressure Level — Contours ........................................ 18-20
5. C-Weighted Sound Level — Contours .............................................. 21-23
6. A-Weighted Sound Level — Contours ............................................... 24-26
7. Perceived Noise Level — Contours ...................................................... 27-29
8. Speech Interference Level — Contours .................................................. 30-32
9. Permissible Exposure Time — Contours .................................................. 33-38
10. Octave Band Sound Pressure Level — Contours ..................................... 39-65
INTRODUCTION

The F-5E is a twin engine, single-place, supersonic fighter powered by General Electric J85-GE-21 engines. The aircraft is manufactured by Northrop and code named the International Fighter. The AF32A-18 noise suppressor was built by General Acoustics Corporation to provide noise level reduction for all F-5 aircraft during ground runup operations. This volume provides measured and extrapolated data defining bioacoustic environments produced by this aircraft in this suppressor system during ground runup operations. Such data are essential to evaluate ear protection requirements, limiting personnel exposure times, voice communication capabilities, and annoyance problems associated with ground runups of the F-5 aircraft operating in the AF32A-18 noise suppressor.

This volume is one of a series published by the Aerospace Medical Research Laboratory (AMRL) under the same report number (AMRL-TR-75-50) as a multi-volume handbook that quantifies the noise environments produced at flight/ground crew locations and in surrounding communities by operations of Air Force aircraft and ground support equipment. The far-field, community-type noise data in the handbook describe the noise produced during ground operations of aircraft, ground support equipment, and other ground-based equipment or facilities.

Volume 1 of this handbook discusses the objectives and design of the handbook, the types of data presented, measurement procedures, instrumentation, data processing, definitions of quantities, symbols, equations, applications, limitations, etc. Volume 2 provides a method and data for adjusting the handbook's far-field noise data, which are for standard meteorological conditions (15°C temperature, 70% rel humidity, 0.760 meters Hg barometric pressure), to derive comparable data for other meteorological conditions. Refer to Volumes 1 and 2 (references 1 and 2) for such information because it is not repeated in other handbook volumes.

A cumulative index lists those aerospace systems contained in the handbook, and identifies the specific volumes containing each type of environmental noise data available (i.e., inflight/flight crew and passenger noise, near-field/ground crew noise, far-field/community noise). Volume numbers are assigned sequentially as individual volumes are published. This index is periodically updated as individual volumes are published and is available upon request from AMRL/L/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.


NEAR-FIELD NOISE

MEASUREMENTS
AMRL acquired near-field noise data on the AF32A-18 noise suppressor system during ground runup operations of the F-5E aircraft. For these tests the aircraft was located in the AF32A-18 noise suppressor at Nellis AFB with no significant reflecting surfaces in the vicinity except the ground plane. Table 1 gives the surface meteorological conditions and the four engine power conditions. The ground-crew chief selected power conditions and near-field locations generally used during routine maintenance or engine runup for preflight checks.

At each near-field location a test engineer randomly moved a hand-held microphone in and around each location, probing all areas where a crew member's head would normally be located. He recorded all the noise samples on magnetic tape. During analysis of each sample, he determined the one-third octave band root-mean-square sound pressure using a 4- or 8-second integration time to derive a power-averaged level for each location. Figure 1 shows the two near-field locations where ground crew are usually located for maintenance and/or preflight checkout operations. Estimates of noise levels at other locations are difficult in the near-field since the noise source is spatially distributed, i.e., not a point source. The noise levels at near-field locations can vary widely depending upon relative distances from each noise source (intake noise, exhaust noise, panel resonances, internal engine noise through the engine wall, etc.).

Table 1 lists the numerical/alphabetic designators used on the data pages in this report to identify the measurement locations and test conditions. For example, the designator 1/A means ground crew location 1 and test condition A.

RESULTS
The measured data presented in Table 2 define the sound pressure levels (SPL) produced by the F-5E aircraft in the AF32A-18 noise suppressor at the two 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 the meteorological conditions at the time of test but are valid for all typical airbase meteorology because of the short sound propagation distances involved.
TABLE 1

MEASUREMENT LOCATIONS AND TEST CONDITIONS
FOR NEAR-FIELD NOISE MEASUREMENTS

F-5 Aircraft Suppressor Ground Runup, Nellis AFB Survey
Test #77-746-001, 7 September 1977

Ground Crew Location
1. Trim Check Position
2. Leak Check Position

Aircraft Engine Operation
A. Idle Power (50% RPM)
B. 80% RPM
C. Military Power (101% RPM)
D. Afterburner Power

Meteorology
Temperature 34 C
Bar Pressure .712 M Hg
Rel Humidity 21 %
Wind — Speed Calm
— Direction Calm

Figure 1. Near-Field Measurement Locations
FAR-FIELD NOISE

MEASUREMENTS
AMRL acquired the near and far-field data during a 1-2 hour test period, thus keeping similar meteorological conditions. Figure 2 shows the aircraft in the suppressor and its orientation relative to 19 microphone measurement sites on a semicircle. The center of the 100 meter radius semicircle used in surveying the AF32A-18 suppressor was on the ground directly below the center of the exhaust stack.

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

All 19 microphone measurement sites are in the acoustic far-field of the source where the sound wave-fronts spherically diverge and the noise source may be regarded as a point source.

A portable microphone/tape-recorder system was used to sequentially record the noise at each far-field location. The microphone was attached to a hand held pole, pointed at the source (0° angle of incidence) and vertically scanned from 0.5 to 3 meters for a period of 5-10 seconds during data acquisition at each microphone location. These samples were then time-integrated to derive a root-mean-square sound pressure level. Vertical scanning and time-integrating together reduce anomalies frequently present in data acquired by a fixed height microphone.

RESULTS
Table 5 lists the overall and 1/3 octave band SPL measured at the far-field locations under meteorological conditions at the time of the test. Data in all other figures and tables are based on these levels. These data were normalized to 100 meters distance and standard meteorological conditions (15 C temperature, 70% relative humidity, 0.760 meter Hg barometric pressure) and used to derive the graphic data in Figure 3 which provides a compact summary of the far-field noise characteristics of the F-5E aircraft operating in the AF32A-18 noise suppressor in a standard format.
Estimates of the noise levels for intermediate power settings (e.g., 90% RPM) and/or different number of engines operating (e.g., single engine) can be determined as explained in Volume 1 of this handbook.

Figures 4 through 10 are sets of equal noise contours describing seven different measures of noise as a function of angle and distance from the source for standard day meteorology. They are respectively, overall sound pressure level, C-weighted sound level, A-weighted sound level, perceived noise level, speech interference level, permissible exposure times for personnel and octave band sound pressure levels.

Data excessively influenced by spurious background/electronic noise were eliminated from all figures and tables.

Test personnel performed noise surveys during quiet periods when the background noise was minimal, e.g., early in the morning when no other aircraft or engine test stands were operating. Data eliminated because they were near the background/electronic noise were generally not significant because the levels were so low.

Volume 2 of the handbook describes the influence of meteorology on far-field noise environments, and provides, if required, the factors necessary to adjust the handbook's standard meteorological day data.

---

Figure 2. Far-Field Measurement Locations at Nellis AFB, NV
### TABLE 1: MEASURED SOUND PRESSURE LEVEL (dB)

<table>
<thead>
<tr>
<th>FREQUENCY (Hz)</th>
<th>LOCATION/CONDITION</th>
<th>2/A</th>
<th>2/B</th>
<th>2/C</th>
<th>2/D</th>
</tr>
</thead>
<tbody>
<tr>
<td>25</td>
<td>80</td>
<td>89</td>
<td>90</td>
<td>97</td>
<td>99</td>
</tr>
<tr>
<td>31.5</td>
<td>78</td>
<td>87</td>
<td>92</td>
<td>98</td>
<td>100</td>
</tr>
<tr>
<td>40</td>
<td>87</td>
<td>90</td>
<td>93</td>
<td>102</td>
<td>107</td>
</tr>
<tr>
<td>50</td>
<td>90</td>
<td>91</td>
<td>94</td>
<td>104</td>
<td>107</td>
</tr>
<tr>
<td>63</td>
<td>88</td>
<td>92</td>
<td>95</td>
<td>100</td>
<td>107</td>
</tr>
<tr>
<td>86</td>
<td>81</td>
<td>96</td>
<td>101</td>
<td>102</td>
<td>109</td>
</tr>
<tr>
<td>100</td>
<td>83</td>
<td>93</td>
<td>101</td>
<td>101</td>
<td>106</td>
</tr>
<tr>
<td>125</td>
<td>89</td>
<td>94</td>
<td>97</td>
<td>103</td>
<td>102</td>
</tr>
<tr>
<td>160</td>
<td>85</td>
<td>93</td>
<td>95</td>
<td>101</td>
<td>106</td>
</tr>
<tr>
<td>200</td>
<td>90</td>
<td>93</td>
<td>99</td>
<td>105</td>
<td>107</td>
</tr>
<tr>
<td>250</td>
<td>88</td>
<td>94</td>
<td>98</td>
<td>104</td>
<td>103</td>
</tr>
<tr>
<td>315</td>
<td>90</td>
<td>96</td>
<td>99</td>
<td>105</td>
<td>106</td>
</tr>
<tr>
<td>400</td>
<td>94</td>
<td>97</td>
<td>97</td>
<td>106</td>
<td>105</td>
</tr>
<tr>
<td>500</td>
<td>90</td>
<td>94</td>
<td>94</td>
<td>106</td>
<td>107</td>
</tr>
<tr>
<td>630</td>
<td>90</td>
<td>93</td>
<td>93</td>
<td>104</td>
<td>107</td>
</tr>
<tr>
<td>860</td>
<td>93</td>
<td>94</td>
<td>98</td>
<td>105</td>
<td>107</td>
</tr>
<tr>
<td>1000</td>
<td>92</td>
<td>92</td>
<td>96</td>
<td>107</td>
<td>108</td>
</tr>
<tr>
<td>1250</td>
<td>93</td>
<td>93</td>
<td>94</td>
<td>107</td>
<td>110</td>
</tr>
<tr>
<td>1600</td>
<td>96</td>
<td>94</td>
<td>96</td>
<td>106</td>
<td>110</td>
</tr>
<tr>
<td>2000</td>
<td>94</td>
<td>93</td>
<td>94</td>
<td>111</td>
<td>115</td>
</tr>
<tr>
<td>2500</td>
<td>94</td>
<td>97</td>
<td>97</td>
<td>109</td>
<td>107</td>
</tr>
<tr>
<td>3150</td>
<td>96</td>
<td>91</td>
<td>101</td>
<td>99</td>
<td>109</td>
</tr>
<tr>
<td>4000</td>
<td>100</td>
<td>100</td>
<td>100</td>
<td>104</td>
<td>104</td>
</tr>
<tr>
<td>5000</td>
<td>95</td>
<td>92</td>
<td>102</td>
<td>99</td>
<td>103</td>
</tr>
<tr>
<td>6300</td>
<td>93</td>
<td>94</td>
<td>95</td>
<td>109</td>
<td>103</td>
</tr>
<tr>
<td>8000</td>
<td>92</td>
<td>91</td>
<td>94</td>
<td>103</td>
<td>103</td>
</tr>
<tr>
<td>10000</td>
<td>89</td>
<td>76</td>
<td>92</td>
<td>101</td>
<td>100</td>
</tr>
</tbody>
</table>

**OVERALL**  

|           | 106 | 106 | 111 | 111 | 126 | 121 | 122 | 122 |

*Level corrected to remove background/electronic noise.*
<table>
<thead>
<tr>
<th>FREQ (HZ)</th>
<th>LOCALLATION/CONDITION</th>
</tr>
</thead>
<tbody>
<tr>
<td>31.5</td>
<td>88</td>
</tr>
<tr>
<td>63</td>
<td>91</td>
</tr>
<tr>
<td>125</td>
<td>91</td>
</tr>
<tr>
<td>250</td>
<td>93</td>
</tr>
<tr>
<td>500</td>
<td>96</td>
</tr>
<tr>
<td>1000</td>
<td>97</td>
</tr>
<tr>
<td>2000</td>
<td>99</td>
</tr>
<tr>
<td>4000</td>
<td>102</td>
</tr>
<tr>
<td>8000</td>
<td>96</td>
</tr>
<tr>
<td>OVERALL</td>
<td>105</td>
</tr>
</tbody>
</table>
### Measures of Human Noise Exposure

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Near-field Noise Levels</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>M=133 GROUND COMMUNICATION UNIT</td>
<td>76</td>
<td>77</td>
<td>83</td>
<td>81</td>
<td>92</td>
<td>93</td>
<td>94</td>
<td>93</td>
</tr>
<tr>
<td>T</td>
<td>960</td>
<td>960</td>
<td>571</td>
<td>607</td>
<td>120</td>
<td>101</td>
<td>85</td>
<td>101</td>
</tr>
</tbody>
</table>

### 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

<table>
<thead>
<tr>
<th>Source</th>
<th>OASLC</th>
<th>OASLA</th>
<th>T</th>
</tr>
</thead>
<tbody>
<tr>
<td>NO PROTECTION</td>
<td>106</td>
<td>105</td>
<td>11</td>
</tr>
<tr>
<td></td>
<td>106</td>
<td>105</td>
<td>111</td>
</tr>
<tr>
<td></td>
<td>119</td>
<td>121</td>
<td>121</td>
</tr>
<tr>
<td></td>
<td>119</td>
<td>120</td>
<td>121</td>
</tr>
</tbody>
</table>

### Minimum Quiets Ear Muffs

<table>
<thead>
<tr>
<th>Source</th>
<th>OASLC</th>
<th>OASLA</th>
<th>T</th>
</tr>
</thead>
<tbody>
<tr>
<td>MINIMUM QUIETS EAR MUFFS</td>
<td>80</td>
<td>81</td>
<td>86</td>
</tr>
<tr>
<td></td>
<td>960</td>
<td>960</td>
<td>339</td>
</tr>
<tr>
<td></td>
<td>94</td>
<td>95</td>
<td>96</td>
</tr>
<tr>
<td></td>
<td>85</td>
<td>71</td>
<td>60</td>
</tr>
</tbody>
</table>

### American Optical 1700 Ear Muffs

<table>
<thead>
<tr>
<th>Source</th>
<th>OASLC</th>
<th>OASLA</th>
<th>T</th>
</tr>
</thead>
<tbody>
<tr>
<td>AMERICAN OPTICAL 1700 EAR MUFFS</td>
<td>76</td>
<td>76</td>
<td>80</td>
</tr>
<tr>
<td></td>
<td>960</td>
<td>960</td>
<td>89</td>
</tr>
<tr>
<td></td>
<td>202</td>
<td>143</td>
<td>91</td>
</tr>
<tr>
<td></td>
<td>143</td>
<td>101</td>
<td>93</td>
</tr>
</tbody>
</table>

### V-51r Ear Plugs

<table>
<thead>
<tr>
<th>Source</th>
<th>OASLC</th>
<th>OASLA</th>
<th>T</th>
</tr>
</thead>
<tbody>
<tr>
<td>V-51R EAR PLUGS</td>
<td>76</td>
<td>79</td>
<td>82</td>
</tr>
<tr>
<td></td>
<td>960</td>
<td>960</td>
<td>91</td>
</tr>
<tr>
<td></td>
<td>143</td>
<td>120</td>
<td>93</td>
</tr>
<tr>
<td></td>
<td>101</td>
<td>101</td>
<td>93</td>
</tr>
</tbody>
</table>

### American Optical 1700 Ear Muffs Plus V-51r Ear Plugs

<table>
<thead>
<tr>
<th>Source</th>
<th>OASLC</th>
<th>OASLA</th>
<th>T</th>
</tr>
</thead>
<tbody>
<tr>
<td>AMERICAN OPTICAL 1700 EAR MUFFS PLUS V-51R EAR PLUGS</td>
<td>64</td>
<td>64</td>
<td>69</td>
</tr>
<tr>
<td></td>
<td>960</td>
<td>960</td>
<td>78</td>
</tr>
<tr>
<td></td>
<td>960</td>
<td>960</td>
<td>80</td>
</tr>
<tr>
<td></td>
<td>960</td>
<td>960</td>
<td>960</td>
</tr>
</tbody>
</table>

### Communication

<table>
<thead>
<tr>
<th>Source</th>
<th>OASLC</th>
<th>OASLA</th>
<th>T</th>
</tr>
</thead>
<tbody>
<tr>
<td>COMMUNICATION PREFERRED SPEECH INTERFERENCE LEVEL (PSIL IN DB)</td>
<td>97</td>
<td>99</td>
<td>101</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>112</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>113</td>
</tr>
</tbody>
</table>

### Annoyance

- **Perceived Noise Level, Tone Corrected (PNLT in PNB)**
- **Tone Correction (C in DB)**

<table>
<thead>
<tr>
<th>Source</th>
<th>PNLT</th>
<th>C</th>
</tr>
</thead>
<tbody>
<tr>
<td>ANNOYANCE</td>
<td>123</td>
<td>120</td>
</tr>
<tr>
<td></td>
<td>126</td>
<td>125</td>
</tr>
<tr>
<td></td>
<td>133</td>
<td>136</td>
</tr>
<tr>
<td></td>
<td>137</td>
<td>133</td>
</tr>
</tbody>
</table>

* Based on calculated SPL spectrum under protective device.

P Additional ear protection required.
## TABLE 4

TEST CONDITIONS
FOR FAR-FIELD NOISE MEASUREMENTS

F-5E Aircraft In The AF32A-18 Noise Suppressor, Ground Runup
Nellis AFB NV

### Aircraft Engine Operation

<table>
<thead>
<tr>
<th>Condition</th>
<th>Engine Type</th>
<th>Specifications</th>
</tr>
</thead>
<tbody>
<tr>
<td>80% RPM</td>
<td>One Engine</td>
<td>80 % RPM</td>
</tr>
<tr>
<td></td>
<td></td>
<td>400 °C, EGT</td>
</tr>
<tr>
<td></td>
<td></td>
<td>800 LBS/HR, FF</td>
</tr>
<tr>
<td>Military Power</td>
<td>One Engine</td>
<td>101 % RPM</td>
</tr>
<tr>
<td></td>
<td></td>
<td>670 °C, EGT</td>
</tr>
<tr>
<td></td>
<td></td>
<td>3500 LBS/HR, FF</td>
</tr>
<tr>
<td>Afterburner Power</td>
<td>One Engine</td>
<td>101 % RPM</td>
</tr>
<tr>
<td></td>
<td></td>
<td>670 °C, EGT</td>
</tr>
<tr>
<td></td>
<td></td>
<td>8000 LBS/HR, FF</td>
</tr>
</tbody>
</table>

### Meteorology

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Temperature</td>
<td>34 °C</td>
</tr>
<tr>
<td>Bar Pressure</td>
<td>0.712 M Hg</td>
</tr>
<tr>
<td>Rel Humidity</td>
<td>21 %</td>
</tr>
<tr>
<td>Wind Speed</td>
<td>Calm</td>
</tr>
<tr>
<td>Wind Direction</td>
<td>Calm</td>
</tr>
<tr>
<td>FREQUENCY (Hz)</td>
<td>10</td>
</tr>
<tr>
<td>---------------</td>
<td>----</td>
</tr>
<tr>
<td>25</td>
<td>60</td>
</tr>
<tr>
<td>31.5</td>
<td>69</td>
</tr>
<tr>
<td>40</td>
<td>71</td>
</tr>
<tr>
<td>50</td>
<td>73</td>
</tr>
<tr>
<td>80</td>
<td>71</td>
</tr>
<tr>
<td>100</td>
<td>73</td>
</tr>
<tr>
<td>125</td>
<td>60</td>
</tr>
<tr>
<td>160</td>
<td>63</td>
</tr>
<tr>
<td>200</td>
<td>61</td>
</tr>
<tr>
<td>315</td>
<td>68</td>
</tr>
<tr>
<td>400</td>
<td>60</td>
</tr>
<tr>
<td>500</td>
<td>54</td>
</tr>
<tr>
<td>630</td>
<td>52</td>
</tr>
<tr>
<td>800</td>
<td>53</td>
</tr>
<tr>
<td>1000</td>
<td>52</td>
</tr>
<tr>
<td>1250</td>
<td>51</td>
</tr>
<tr>
<td>1600</td>
<td>50</td>
</tr>
<tr>
<td>2000</td>
<td>50</td>
</tr>
<tr>
<td>2500</td>
<td>50</td>
</tr>
<tr>
<td>3150</td>
<td>50</td>
</tr>
<tr>
<td>4000</td>
<td>50</td>
</tr>
<tr>
<td>5000</td>
<td>50</td>
</tr>
<tr>
<td>6300</td>
<td>50</td>
</tr>
<tr>
<td>8000</td>
<td>50</td>
</tr>
<tr>
<td>10000</td>
<td>50</td>
</tr>
</tbody>
</table>

< LEVEL CORRECTED TO REMOVE BACKGROUND/ELECTRONIC NOISE.>
<table>
<thead>
<tr>
<th>FREQUENCY (HZ)</th>
<th>0</th>
<th>10</th>
<th>20</th>
<th>30</th>
<th>40</th>
<th>50</th>
<th>60</th>
<th>70</th>
<th>80</th>
<th>90</th>
<th>100</th>
<th>110</th>
<th>120</th>
<th>130</th>
<th>140</th>
<th>150</th>
<th>160</th>
<th>170</th>
<th>180</th>
</tr>
</thead>
<tbody>
<tr>
<td>25</td>
<td>76</td>
<td>79</td>
<td>77&lt;</td>
<td>75&lt;</td>
<td>74&lt;</td>
<td>76&lt;</td>
<td>80</td>
<td>82</td>
<td>84</td>
<td>83</td>
<td>83</td>
<td>83</td>
<td>83</td>
<td>83</td>
<td>82</td>
<td>82</td>
<td>82</td>
<td>83</td>
<td>83</td>
</tr>
<tr>
<td>31.5</td>
<td>79</td>
<td>78</td>
<td>82</td>
<td>79</td>
<td>79</td>
<td>81</td>
<td>88</td>
<td>83</td>
<td>83</td>
<td>83</td>
<td>83</td>
<td>83</td>
<td>83</td>
<td>84</td>
<td>84</td>
<td>84</td>
<td>83</td>
<td>83</td>
<td>83</td>
</tr>
<tr>
<td>40</td>
<td>85</td>
<td>83</td>
<td>85</td>
<td>85</td>
<td>84</td>
<td>86</td>
<td>86</td>
<td>88</td>
<td>87</td>
<td>88</td>
<td>88</td>
<td>89</td>
<td>89</td>
<td>89</td>
<td>90</td>
<td>90</td>
<td>90</td>
<td>90</td>
<td>91</td>
</tr>
<tr>
<td>50</td>
<td>85</td>
<td>83</td>
<td>86</td>
<td>85</td>
<td>87</td>
<td>85</td>
<td>90</td>
<td>90</td>
<td>90</td>
<td>90</td>
<td>89</td>
<td>90</td>
<td>90</td>
<td>90</td>
<td>90</td>
<td>90</td>
<td>90</td>
<td>90</td>
<td>90</td>
</tr>
<tr>
<td>63</td>
<td>82</td>
<td>84</td>
<td>86</td>
<td>85</td>
<td>86</td>
<td>85</td>
<td>88</td>
<td>88</td>
<td>89</td>
<td>89</td>
<td>89</td>
<td>90</td>
<td>91</td>
<td>91</td>
<td>91</td>
<td>91</td>
<td>91</td>
<td>91</td>
<td>91</td>
</tr>
<tr>
<td>80</td>
<td>85</td>
<td>85</td>
<td>86</td>
<td>85</td>
<td>85</td>
<td>83</td>
<td>87</td>
<td>89</td>
<td>88</td>
<td>88</td>
<td>89</td>
<td>90</td>
<td>90</td>
<td>90</td>
<td>90</td>
<td>90</td>
<td>90</td>
<td>90</td>
<td>90</td>
</tr>
<tr>
<td>100</td>
<td>79</td>
<td>79</td>
<td>78</td>
<td>77</td>
<td>76</td>
<td>79</td>
<td>82</td>
<td>84</td>
<td>81</td>
<td>82</td>
<td>82</td>
<td>81</td>
<td>84</td>
<td>84</td>
<td>84</td>
<td>84</td>
<td>84</td>
<td>84</td>
<td>84</td>
</tr>
<tr>
<td>125</td>
<td>79</td>
<td>79</td>
<td>79</td>
<td>79</td>
<td>82</td>
<td>80</td>
<td>78</td>
<td>79</td>
<td>79</td>
<td>82</td>
<td>82</td>
<td>85</td>
<td>86</td>
<td>84</td>
<td>84</td>
<td>86</td>
<td>86</td>
<td>87</td>
<td>86</td>
</tr>
<tr>
<td>160</td>
<td>77</td>
<td>77</td>
<td>77</td>
<td>77</td>
<td>77</td>
<td>74</td>
<td>78</td>
<td>77</td>
<td>77</td>
<td>77</td>
<td>85</td>
<td>81</td>
<td>80</td>
<td>80</td>
<td>81</td>
<td>81</td>
<td>81</td>
<td>81</td>
<td>81</td>
</tr>
<tr>
<td>200</td>
<td>74</td>
<td>74</td>
<td>73</td>
<td>73</td>
<td>71</td>
<td>72</td>
<td>72</td>
<td>75</td>
<td>74</td>
<td>76</td>
<td>76</td>
<td>74</td>
<td>75</td>
<td>76</td>
<td>76</td>
<td>76</td>
<td>76</td>
<td>76</td>
<td>77</td>
</tr>
<tr>
<td>250</td>
<td>72</td>
<td>73</td>
<td>71</td>
<td>70</td>
<td>69</td>
<td>71</td>
<td>70</td>
<td>71</td>
<td>71</td>
<td>71</td>
<td>69</td>
<td>68</td>
<td>67</td>
<td>68</td>
<td>68</td>
<td>68</td>
<td>68</td>
<td>68</td>
<td>68</td>
</tr>
<tr>
<td>315</td>
<td>72</td>
<td>72</td>
<td>69</td>
<td>70</td>
<td>69</td>
<td>69</td>
<td>71</td>
<td>70</td>
<td>72</td>
<td>71</td>
<td>71</td>
<td>69</td>
<td>68</td>
<td>67</td>
<td>68</td>
<td>68</td>
<td>68</td>
<td>68</td>
<td>68</td>
</tr>
<tr>
<td>400</td>
<td>72</td>
<td>74</td>
<td>70</td>
<td>72</td>
<td>70</td>
<td>68</td>
<td>67</td>
<td>70</td>
<td>69</td>
<td>70</td>
<td>71</td>
<td>69</td>
<td>68</td>
<td>68</td>
<td>69</td>
<td>69</td>
<td>67</td>
<td>67</td>
<td>67</td>
</tr>
<tr>
<td>500</td>
<td>66</td>
<td>67</td>
<td>65</td>
<td>68</td>
<td>68</td>
<td>65</td>
<td>68</td>
<td>67</td>
<td>68</td>
<td>68</td>
<td>68</td>
<td>67</td>
<td>66</td>
<td>66</td>
<td>66</td>
<td>66</td>
<td>66</td>
<td>66</td>
<td>66</td>
</tr>
<tr>
<td>630</td>
<td>63</td>
<td>66</td>
<td>61</td>
<td>65</td>
<td>67</td>
<td>63</td>
<td>63</td>
<td>66</td>
<td>66</td>
<td>66</td>
<td>65</td>
<td>63</td>
<td>64</td>
<td>64</td>
<td>64</td>
<td>64</td>
<td>64</td>
<td>64</td>
<td>65</td>
</tr>
<tr>
<td>800</td>
<td>66</td>
<td>67</td>
<td>64</td>
<td>68</td>
<td>68</td>
<td>66</td>
<td>67</td>
<td>66</td>
<td>67</td>
<td>66</td>
<td>65</td>
<td>64</td>
<td>65</td>
<td>66</td>
<td>66</td>
<td>66</td>
<td>66</td>
<td>66</td>
<td>65</td>
</tr>
<tr>
<td>1000</td>
<td>67</td>
<td>68</td>
<td>64</td>
<td>67</td>
<td>66</td>
<td>66</td>
<td>66</td>
<td>66</td>
<td>67</td>
<td>67</td>
<td>67</td>
<td>65</td>
<td>65</td>
<td>65</td>
<td>65</td>
<td>65</td>
<td>65</td>
<td>65</td>
<td>65</td>
</tr>
<tr>
<td>1250</td>
<td>66</td>
<td>68</td>
<td>64</td>
<td>68</td>
<td>67</td>
<td>66</td>
<td>66</td>
<td>66</td>
<td>68</td>
<td>68</td>
<td>67</td>
<td>66</td>
<td>66</td>
<td>66</td>
<td>66</td>
<td>66</td>
<td>66</td>
<td>66</td>
<td>66</td>
</tr>
<tr>
<td>1600</td>
<td>65</td>
<td>67</td>
<td>63</td>
<td>66</td>
<td>66</td>
<td>65</td>
<td>65</td>
<td>67</td>
<td>67</td>
<td>67</td>
<td>66</td>
<td>64</td>
<td>63</td>
<td>64</td>
<td>65</td>
<td>64</td>
<td>65</td>
<td>64</td>
<td>64</td>
</tr>
<tr>
<td>2000</td>
<td>67</td>
<td>69</td>
<td>63</td>
<td>68</td>
<td>70</td>
<td>64</td>
<td>64</td>
<td>64</td>
<td>64</td>
<td>63</td>
<td>62</td>
<td>62</td>
<td>64</td>
<td>64</td>
<td>63</td>
<td>63</td>
<td>63</td>
<td>63</td>
<td>62</td>
</tr>
<tr>
<td>2500</td>
<td>62</td>
<td>65</td>
<td>60</td>
<td>65</td>
<td>65</td>
<td>60</td>
<td>60</td>
<td>61</td>
<td>60</td>
<td>60</td>
<td>60</td>
<td>60</td>
<td>60</td>
<td>60</td>
<td>60</td>
<td>60</td>
<td>60</td>
<td>60</td>
<td>59</td>
</tr>
<tr>
<td>3150</td>
<td>61</td>
<td>63</td>
<td>62</td>
<td>62</td>
<td>63</td>
<td>59</td>
<td>60</td>
<td>60</td>
<td>59</td>
<td>59</td>
<td>59</td>
<td>58</td>
<td>58</td>
<td>57</td>
<td>58</td>
<td>58</td>
<td>58</td>
<td>58</td>
<td>58</td>
</tr>
<tr>
<td>4000</td>
<td>59</td>
<td>60</td>
<td>56</td>
<td>57</td>
<td>60</td>
<td>57</td>
<td>57</td>
<td>57</td>
<td>57</td>
<td>57</td>
<td>57</td>
<td>57</td>
<td>56</td>
<td>58</td>
<td>58</td>
<td>58</td>
<td>58</td>
<td>58</td>
<td>58</td>
</tr>
<tr>
<td>5000</td>
<td>59</td>
<td>54</td>
<td>51</td>
<td>52</td>
<td>54</td>
<td>51</td>
<td>52</td>
<td>52</td>
<td>52</td>
<td>51</td>
<td>50</td>
<td>50</td>
<td>49</td>
<td>50</td>
<td>51</td>
<td>51</td>
<td>51</td>
<td>51</td>
<td>51</td>
</tr>
<tr>
<td>6300</td>
<td>53</td>
<td>50</td>
<td>48</td>
<td>48</td>
<td>50</td>
<td>48</td>
<td>50</td>
<td>47</td>
<td>50</td>
<td>46</td>
<td>46</td>
<td>46</td>
<td>45</td>
<td>46</td>
<td>46</td>
<td>46</td>
<td>46</td>
<td>46</td>
<td>47</td>
</tr>
<tr>
<td>8000</td>
<td>51</td>
<td>48</td>
<td>43</td>
<td>43</td>
<td>45</td>
<td>44</td>
<td>43</td>
<td>42</td>
<td>43</td>
<td>42</td>
<td>42</td>
<td>42</td>
<td>42</td>
<td>42</td>
<td>42</td>
<td>42</td>
<td>42</td>
<td>42</td>
<td>42</td>
</tr>
<tr>
<td>10000</td>
<td>40</td>
<td>40</td>
<td>40</td>
<td>40</td>
<td>40</td>
<td>40</td>
<td>37</td>
<td>37</td>
<td>37</td>
<td>37</td>
<td>37</td>
<td>37</td>
<td>37</td>
<td>37</td>
<td>37</td>
<td>37</td>
<td>37</td>
<td>37</td>
<td>37</td>
</tr>
</tbody>
</table>

<LEVEL CORRECTED TO REMOVE BACKGROUND/ELECTRONIC NOISE.

* TABLE: MEASURED SOUND PRESSURE LEVEL (DB)
* 1/3 OCTAVE BAND
* DISTANCE = 100 METERS
* IDENTIFICATION: OMEGA 14
* NOISE SOURCE/SUBJECT: F-5E AIRCRAFT IN THE MILITARY POWER 101% RPM
* ENGINE J85-GE-21 (GROUND RUNUP (SUPPRESSED))
* FAR FIELD NOISE
* OPERATION: SINGLE ENGINE
* WEATHER: REL HUMID = 21% PAGE 2
* METEOROLOGY: TEMP = 34°C
* RUN: 02
* BAR PRESS = 712 M HG
* TEST 77-746-001

OVERALL 92 92 93 92 92 92 92 95 95 95 95 96 97 97 97 96 97 98
FIGURE 1: NORMALIZED FARFIELD NOISE LEVELS

DISTANCE = 100 METERS

NOISE SOURCE/SUBJECT:
F-15 AIRCRAFT IN TANK
F-16 A-18 SUPPRESSOR
ENGINE J85-GE-21
FAR FIELD NOISE

NOISE METADATA:
1 = 31.5 Hz  2 = 63 Hz  3 = 125 Hz
4 = 250 Hz  5 = 500 Hz  6 = 1000 Hz

OPERATION:
ENGINE RU-41 V 00 RPM
SINGLE ENGINE
GROUND RU-41 V (SUPPRESSED)

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

IDENTIFICATION:
OMEGA 1
TEST 77-766-001
RUN 01

OCTAVE BAND SPL (dB)

ANGLE

150°
120°
90°
60°
30°
0°

7 = 2000 Hz  8 = 4000 Hz
9 = 6000 Hz

S = PSIL  A = OASLA  O = OASPL  P = PNLT

OCTAVE BAND SPL (dB)

PSIL (dB) OASLA (DBA) OASPL (DB) PNLT (PNDB)
FOUR FIGURE: OVERALL SOUND PRESSURE LEVEL (OASPL)

EQUAL LEVEL CONTOURS (DB)

NOISE SOURCE/SUBJECT: F-15E AIRCRAFT IN THE AF-32A-18 SUPPRESSOR ENGINE J85-GE-21 FAR FIELD NOISE

OPERATION: MILITARY POWER 161% RPM SINGLE ENGINE GROUND RUNUP (SUPPRESSED)

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

RUN: 02 TEST 77-766-001

IDENTIFICATION:

OMEGA 1-4

PAGE 13

DISTANCE FROM SOURCE (METERS)

1000 100 10 1 1.5 2 3 4 5 6 8 10 100

0 POINT DB

A 45 B 50

C 55 D 60

E 65 F 70

G 75 H 80

I 85 J 90

K 95 L 100

10 20 30 40 50 60 ANGLE DEGREES

70 80 90 100 110 120

I NE

130 140 150 160 170 180
Figure 5: C-Weighted Overall Sound Level (OASLC)

Equal Level Contours (DBC)

Noise Source/Subject:
- F-9E Aircraft in the
- AF32A-18 Suppressor
- Engine J85-GE-21
- Far Field Noise

Operation:
- Engine Runup 80% RPM
- Single Engine
- Ground Runup (Suppressed)

Meteorology:
- Temp = 15°C
- Barometric Press = 760 M HG
- Rel Humid = 70%

Test 77-746-001

Omega 1.4

Run 01

Page 14

Point DBC

A

B

C

D

E

F

G

H

I

X

100

500

1000

Distance from Source (Meters)
FIGURE: C-WEIGHTED OVERALL SOUND LEVEL (OASLC)
5
EQUAL LEVEL CONTOURS (DBC)
NOISE SOURCE/SUBJECT: F-5E AIRCRAFT IN THE MILITARY POWER 101% RPM
AF32A-18 SUPPRESSOR SINGLE ENGINE
ENGINE J85-GE-21 GROUND RUNUP (SUPPRESSED)
FAR FIELD NOISE

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

METEOROLOGY: RUN 02

IDENTIFICATION: TEST 77-746-001

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

EQUAI TIME CONTOURS (MINUTES)

<table>
<thead>
<tr>
<th>NOISE SOURCE/SUBJECT</th>
<th>OPERATION</th>
<th>METEOROLOGY</th>
<th>IDENTIFICATION</th>
<th>PAGE</th>
</tr>
</thead>
<tbody>
<tr>
<td>F-105 AIRCRAFT IN THE</td>
<td>ENGINE RUNUP 80% RPM</td>
<td>TEMP = 15°C</td>
<td>OMEGA 1.4</td>
<td>7</td>
</tr>
<tr>
<td>AF32A-18 SUPPRESSOR</td>
<td>Single engine</td>
<td>BAR PRESS = .760 M HG</td>
<td>TEST 77-746-001</td>
<td></td>
</tr>
<tr>
<td>ENGINE J85-GE-21</td>
<td>Ground runup (8uppressed)</td>
<td>REL HUMID = 70%</td>
<td>RUN 01</td>
<td></td>
</tr>
<tr>
<td>FAR FIELD NOISE</td>
<td></td>
<td></td>
<td></td>
<td>7</td>
</tr>
</tbody>
</table>

0° <
10° <
20° <
30° <
40° <
50° <
60° <
70° <
80° <
90° <
100° <
110° <
120° <
130° <
140° <
150° <
160° <
170° <
180° <

PERSONNEL MAY BE EXPOSED UP TO 960 MINUTES PER DAY
AT ALL DISTANCES FROM SOURCE EQUAL TO OR GREATER THAN 75 METERS
FOR ALL ANGLES EVALUATED (INDICATED BY < AT LEFT)
UNDER THE FOLLOWING EAR PROTECTION CONDITIONS:

IN 80°
MINIMUM QPL EAR MUFFS

90°
AMERICAN OPTICAL 1700 EAR MUFFS

100°
V-51R EAR PLUGS

110°
COMFIT TRIPLE FLANGE EAR PLUGS

120°
H-133 GROUND COMMUNICATION UNIT

DISTANCE FROM SOURCE (METERS)
### Figure: Maximum Permissible Time (T) for One Exposure Per Day (AFR 161-35, July 73)

#### Equal Time Contours (Minutes)

<table>
<thead>
<tr>
<th>Noise Source/Subject</th>
<th>Operation</th>
<th>Meteorology</th>
</tr>
</thead>
<tbody>
<tr>
<td>F-5C Aircraft in the</td>
<td>Military Power 101% RPM</td>
<td>Temp = 15°C</td>
</tr>
<tr>
<td>AP32A-18 Suppressor</td>
<td>Single Engine</td>
<td>Bar Press = 760 M Hg</td>
</tr>
<tr>
<td>Engine J05-GE-21</td>
<td>Ground Runup (Suppressed)</td>
<td>Rel Humid = 70%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Angle in Degrees</th>
<th>0</th>
<th>10</th>
<th>20</th>
<th>30</th>
<th>40</th>
<th>50</th>
<th>60</th>
<th>70</th>
<th>80</th>
<th>90</th>
<th>100</th>
<th>110</th>
<th>120</th>
<th>130</th>
<th>140</th>
<th>150</th>
<th>160</th>
<th>170</th>
<th>180</th>
</tr>
</thead>
<tbody>
<tr>
<td>Point Min</td>
<td>A</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>A</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>A</td>
<td></td>
</tr>
</tbody>
</table>

#### Distance from Source (Meters)

5 6 8 1 1.5 2 3 4 5 6 8 1 1.5 2 3 4 5 6 8 100 1000
**Figure 1: Maximum Permissible Time (T) for One Exposure Per Day (AFR 161-35, July 73)**

**Noise Source/Subject:**
- F-5E Aircraft in the Test 77-746-001

**Operation:**
- Military Power 101% RPM

**Meteorology:**
- Temp = 15°C
- Bar Press = 760 m Hg
- Rel Humid = 70%

**FAR Field Noise:**

<table>
<thead>
<tr>
<th>T (minutes)</th>
<th>Distance (meters)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>5</td>
</tr>
<tr>
<td>10</td>
<td>5</td>
</tr>
<tr>
<td>20</td>
<td>15</td>
</tr>
<tr>
<td>30</td>
<td>25</td>
</tr>
<tr>
<td>40</td>
<td>35</td>
</tr>
<tr>
<td>50</td>
<td>45</td>
</tr>
<tr>
<td>60</td>
<td>55</td>
</tr>
<tr>
<td>70</td>
<td>65</td>
</tr>
<tr>
<td>80</td>
<td>75</td>
</tr>
<tr>
<td>90</td>
<td>85</td>
</tr>
<tr>
<td>100</td>
<td>95</td>
</tr>
<tr>
<td>110</td>
<td>105</td>
</tr>
<tr>
<td>120</td>
<td></td>
</tr>
<tr>
<td>130</td>
<td></td>
</tr>
<tr>
<td>140</td>
<td></td>
</tr>
<tr>
<td>150</td>
<td></td>
</tr>
<tr>
<td>160</td>
<td></td>
</tr>
<tr>
<td>170</td>
<td></td>
</tr>
<tr>
<td>180</td>
<td></td>
</tr>
</tbody>
</table>

Personnel may be exposed up to 960 minutes per day at all distances from source equal to or greater than 75 meters for all angles evaluated (indicated by < at left) under the following ear protection conditions:

- Minimum QPL ear muffs
- American Optical 1700 ear muffs
- V-51R ear plugs
- Comfit triple flange ear plugs
- H-133 ground communication unit
FIGURE 1: MAXIMUM PERMISSIBLE TIME (T) FOR ONE EXPOSURE PER DAY (AFR 161-35, JULY 73)

EQUAL TIME CONTOURS (MINUTES)

NO PROTECTION

F-SE AIRCRAFT IN THE
AF32A-18 SUPPRESSOR
ENGINE J85-GE-21
FAR FIELD NOISE

OPERATION:
AFTERBURNER POWER
SINGLE ENGINE
GROUND RUNUP (SUPPRESSED)

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

IDENTIFICATION:
OMEGA 1.4
TEST 77-746-001

WEB 03
14 SEP 78

PAGE 7

POINT MIN
A 960
B 480

ANGLE (°)

DEGREES

DISTANCE FROM SOURCE (METERS)
**Figure:** Maximum permissible time (T) for one exposure per day (AFR 161-35, July 73)

**Equal Time Contours (Minutes)**

**Minimum QPL ear muff**

**Noise source/subject:**
- F-5E aircraft in the
- AF32A-18 suppressor
- Engine J85-GE-21
- Far field noise

**Operation:**
- Afterburner power
- Single engine
- Ground runup (suppressed)

**Meteorology:**
- Temp = 15 C
- Bar Press = 760 M HG
- Rel Humid = 70%

**Run:** 03

**Identification:** OMEGA 1.4

**Test:** 77-746-001

**Page:** 9

**Point Min**

**Angle**
- 0
- 10
- 20
- 30
- 40
- 50
- 60
- 70
- 80
- 90
- 100
- 110
- 120
- 130
- 140
- 150
- 160
- 170
- 180

**Distance from source (meters):**

5 6 8 10 1.5 2 3 4 5 6 7 8

A 960
<table>
<thead>
<tr>
<th>Noise Source/Subject</th>
<th>Operation</th>
<th>Meteorology</th>
</tr>
</thead>
<tbody>
<tr>
<td>F-15 E Aircraft in the</td>
<td>Afterburner Power</td>
<td>Temp = 15 C</td>
</tr>
<tr>
<td>AF32A-18 Suppressor</td>
<td>Single Engine</td>
<td>Bar Press = 760 m Hg</td>
</tr>
<tr>
<td>Engine J85-GE-21</td>
<td>Ground Runup (Suppressed)</td>
<td>Rel Humid = 70 %</td>
</tr>
<tr>
<td>Far Field Noise</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Personnel may be exposed up to 960 minutes per day at all distances from source equal to or greater than 75 meters for all angles evaluated (indicated by < at left) under the following ear protection conditions:

- American Optical 1700 Ear Muffs
- V-51R Ear Plugs
- Comfit Triple Flange Ear Plugs
- H-133 Ground Communication Unit

Distance from Source (Meters):

<p>| 5 6 8 1 | 1.5 2 | 3 4 | 5 | 6 | 8 | 1 | 1.5 | 2 | 3 | 4 | 5 | 6 | 8 |
|----------|-------|----|---|---|---|---|-----|---|---|---|---|---|---|---|
| 100      | 1000  | 1000 | 1000 | 1000 | 1000 | 1000 | 1000 | 1000 | 1000 | 1000 | 1000 | 1000 | 1000 |</p>
<table>
<thead>
<tr>
<th>Angle (Degrees)</th>
<th>Distance (Meters)</th>
<th>Point</th>
<th>DB</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>0</td>
<td>A</td>
<td>35</td>
</tr>
<tr>
<td>10</td>
<td>0</td>
<td>B</td>
<td>40</td>
</tr>
<tr>
<td>20</td>
<td>0</td>
<td>C</td>
<td>45</td>
</tr>
<tr>
<td>30</td>
<td>0</td>
<td>D</td>
<td>50</td>
</tr>
<tr>
<td>40</td>
<td>0</td>
<td>E</td>
<td>55</td>
</tr>
<tr>
<td>60</td>
<td>0</td>
<td>F</td>
<td>60</td>
</tr>
<tr>
<td>90</td>
<td>0</td>
<td>G</td>
<td>65</td>
</tr>
<tr>
<td>120</td>
<td>0</td>
<td>H</td>
<td>70</td>
</tr>
</tbody>
</table>

**Figure 1: Sound Pressure Level (SPL)**

- **Noise Source/Subject:** F-5E Aircraft in the AF-32A-18 Suppressor
- **Operation:** Engine Runup 80% RPM
- **Meteorology:**
  - Temp: 15°C
  - Bar Press: 760 M Hg
  - Rel Humid: 70%

**Identification:**
- Engine J85-GE-21
- Ground Runup (Suppressed)
- Far Field Noise
- Omega 1.4
- Test 77-746-001
- Page 21

**Graph Details:**
- Equal Level Contours (dB)
- 250 Hz Octave Band
**Sound Pressure Level (SPL)**

**Equal Level Contours (dB)**

**2000 Hz Octave Band**

**Noise Source/Subject:**
- F-5E Aircraft in the AF32A-18 Suppressor
- Engine J85-GE-21 (Ground Runup Suppressed)

**Operation:**
- Engine Runup 80% RPM
- Single Engine
- Ground Runup (Suppressed)

**Meteorology:**
- Temp: 15°C
- Bar Press: 760 m Hg
- Rel Humidity: 70%

**Identification:**
- QMGA 1.6
- Test 77-746-001

**Angle**

**Degrees**

**Point**

- A: 35
- B: 40
- C: 45
- D: 50
- E: 55
- F: 60
- G: 65

**Distance from Source (Meters)**

- 5
- 10
- 15
- 20
- 25
- 30
- 35
- 40
- 45
- 50
- 55
- 60
- 65
- 70
- 75
- 80
- 85
- 90
- 95
- 100

- 1
- 2
- 3
- 4
- 5
- 6
- 7
- 8
- 9
- 10

**Pages:**
- Page 24
### Noise Source/Subject: F-5E Aircraft in the Far Field Noise

### Operation: Engine Runup 600 RPM

### Meteorology:
- Temp: 15°C
- Bar Press: 760 M HG
- Rel Humid: 70%

### Test Information:
- Test: 77-746-001
- Run: 01

### Sound Pressure Level (SPL) Equal Level Contours (DB)

<table>
<thead>
<tr>
<th>Distance from Source (Meters)</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
<th>F</th>
<th>G</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>20</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>30</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>40</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>50</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>60</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>70</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>80</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>90</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>100</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>110</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>120</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>130</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>140</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>150</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>160</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>170</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>180</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

---

**Figure:** Sound Pressure Level (SPL)

**1000 Hz Octave Band**

**Identification:**
- Omega 1.4
Figure: Sound Pressure Level (SPL)
Equal Level Contours (dB)
63 Hz Octave Band

Noise Source/Subject:
F-5E Aircraft In The
AF32A-18 Suppressor
Engine J65-GE-21
Far Field Noise

Operation:
Military Power 101% RPM
Single Engine
Ground Runup (Suppressed)

Meteorology:
Temp = 15°C
Bar Press = 760 mm Hg
Rel Humid = 70%

Identification:
Omega 14
Test 77-746-001
Run 02

Angle:
Point 00
0
10
20
30
40
50
60
70
80
90
100
110
120
130
140
150
160
170
180

Distance from Source (Meters)

1000
**FIGURE 1: SOUND PRESSURE LEVEL (SPL)**

**EQUAL LEVEL CONTOURS (DB)**

**10**

**125 Hz OCTAVE BAND**

**NOISE SOURCE/SUBJECT:**
- F-5E AIRCRAFT IN THE
- AP324-18 SUPPRESSOR
- ENGINE J85-GE-21
- FAR FIELD NOISE

**OPERATION:**
- MILITARY POWER 101% RPM
- SINGLE ENGINE
- GROUND RUNUP (SUPPRESSED)

**METEOROLOGY:**
- TEMP = 15°C
- BAR PRESS = 760 M HG
- REL HUMID = 70%

**RUN 02**

**TEST 77-746-001**

**POINT DB**

<table>
<thead>
<tr>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
<th>F</th>
<th>G</th>
<th>H</th>
<th>I</th>
<th>J</th>
<th>K</th>
<th>L</th>
</tr>
</thead>
<tbody>
<tr>
<td>35</td>
<td>40</td>
<td>45</td>
<td>50</td>
<td>55</td>
<td>60</td>
<td>65</td>
<td>70</td>
<td>75</td>
<td>80</td>
<td>85</td>
<td>90</td>
</tr>
</tbody>
</table>

**DISTANCE FROM SOURCE (METERS)**

**ANGLE IN DEGREES**

<table>
<thead>
<tr>
<th>5</th>
<th>6</th>
<th>8</th>
<th>1</th>
<th>1.5</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
</tr>
</thead>
<tbody>
<tr>
<td>100</td>
<td>100</td>
<td>100</td>
<td>100</td>
<td>100</td>
<td>100</td>
<td>100</td>
<td>100</td>
<td>100</td>
<td>100</td>
<td>100</td>
<td>100</td>
</tr>
</tbody>
</table>

**NOTE:**
- The diagram shows the sound pressure levels at various points around the aircraft and engine sources.
- The levels are measured in decibels (DB) for different distances from the source.
- The legend provided indicates the relationship between the letters and the corresponding point levels.

**KEY:**
- A: 35 DB
- B: 40 DB
- C: 45 DB
- D: 50 DB
- E: 55 DB
- F: 60 DB
- G: 65 DB
- H: 70 DB
- I: 75 DB
- J: 80 DB
- K: 85 DB
- L: 90 DB
(FIGURE 1) SOUND PRESSURE LEVEL (SPL)

**IDENTIFICATION**
- OMEGA 14
- TEST 77-745-001

**NOISE SOURCE/SUBJECT:**
- F-5E AIRCRAFT IN THE 1000 Hz OCTAVE BAND
- AF32A-18 SUPPRESSOR
- ENGINE J85-GE-21
- FAR FIELD NOISE

**OPERATION:**
- MILITARY POWER 101% RPM
- SINGLE ENGINE
- GROUND RUNUP (SUPPRESSED)

**METEOROLOGY:**
- TEMP = 15°C
- BAR PRESS = 29.600 M HG
- REL HUMID = 70%

**ANGLE ( Deg.)**
- 0
- 10
- 20
- 30
- 40
- 50
- 60
- 70
- 80
- 90
- 100
- 110
- 120
- 130
- 140
- 150
- 160
- 170
- 180

**DISTANCE FROM SOURCE (METERS)**
- 5 6 7 8 10 1.5 2 3 4 5 6 8

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

 exhausted.
<table>
<thead>
<tr>
<th>ANGLE (DEGREES)</th>
<th>OPERATION</th>
<th>METEOREOLOGY</th>
<th>POINT</th>
</tr>
</thead>
<tbody>
<tr>
<td>50</td>
<td>AFTERBURNER POWER</td>
<td>TEMP = 15 C</td>
<td>A 45</td>
</tr>
<tr>
<td>60</td>
<td>SINGLE ENGINE</td>
<td>BAR PRESS = 760 Hg</td>
<td>B 50</td>
</tr>
<tr>
<td>70</td>
<td>GROUND RUNUP (SUPPRESSED)</td>
<td>REL HUMID = 70 %</td>
<td>C 60</td>
</tr>
<tr>
<td>80</td>
<td></td>
<td></td>
<td>D 70</td>
</tr>
<tr>
<td>90</td>
<td></td>
<td></td>
<td>E 80</td>
</tr>
<tr>
<td>100</td>
<td></td>
<td></td>
<td>F 90</td>
</tr>
<tr>
<td>110</td>
<td></td>
<td></td>
<td>G 95</td>
</tr>
<tr>
<td>120</td>
<td></td>
<td></td>
<td>H 95</td>
</tr>
<tr>
<td>130</td>
<td></td>
<td></td>
<td>I 95</td>
</tr>
<tr>
<td>140</td>
<td></td>
<td></td>
<td>J 95</td>
</tr>
<tr>
<td>150</td>
<td></td>
<td></td>
<td>K 95</td>
</tr>
<tr>
<td>160</td>
<td></td>
<td></td>
<td>L 85</td>
</tr>
<tr>
<td>170</td>
<td></td>
<td></td>
<td>M 75</td>
</tr>
<tr>
<td>180</td>
<td></td>
<td></td>
<td>N 65</td>
</tr>
</tbody>
</table>

DISTANCE FROM SOURCE (METERS)
<table>
<thead>
<tr>
<th>NOISE SOURCE/SUBJECT</th>
<th>OPERATION</th>
<th>METEOROLOGY</th>
<th>RUN</th>
<th>POINT</th>
</tr>
</thead>
<tbody>
<tr>
<td>F-5E AIRCRAFT IN THE</td>
<td>AFTERBURNER POWER</td>
<td>TEMP = 15° C</td>
<td>03</td>
<td>A</td>
</tr>
<tr>
<td>AF32A-10 SUPPRESSOR</td>
<td>SINGLE ENGINE</td>
<td>BAR PRESS = 760 M HG</td>
<td></td>
<td>B</td>
</tr>
<tr>
<td>ENGINE J85-GE-21</td>
<td>GROUND RUNUP (SUPPRESSED)</td>
<td>REL HUMID = 70%</td>
<td></td>
<td>C</td>
</tr>
<tr>
<td>FAR FIELD NOISE</td>
<td></td>
<td></td>
<td></td>
<td>D</td>
</tr>
</tbody>
</table>

### Diagram

**Figure**: Sound pressure level (SPL)  
10 equal level contours (dB)  
1000 HZ OCTAVE BAND  

**Identification**:  
OMEGA 1  
TEST 77-746-001  

**Noise Source/Subject**:  
- F-5E AIRCRAFT IN THE AIR
- AF32A-10 SUPPRESSOR
- ENGINE J85-GE-21

**Operation**:
- Afterburner Power
- Single Engine
- Ground Runup (Suppressed)

**Meteorology**:
- Temperature: 15°C
- Barometric Pressure: 760 M HG
- Relative Humidity: 70%

**Run**: 03

**Point**: A

**Distance from Source (Meters)**

<table>
<thead>
<tr>
<th>Distance</th>
<th>0</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>20</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>30</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>40</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>50</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>60</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>70</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>80</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>90</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>100</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>110</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>120</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>130</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>140</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>150</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>160</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>170</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>180</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
FIGURE 1  SOUND PRESSURE LEVEL (SPL)
EQUAL LEVEL CONTOURS (DB)
2000 HZ OCTAVE BAND

NOISE SOURCE/SUBJECT: F-5E AIRCRAFT IN THE AF32A-18 SUPPRESSOR
ENGINE J85-GE-21

OPERATION: AFTERBURNER POWER SINGLE ENGINE GROUND RUNUP (SUPPRESSED)

METHODOLOGY:

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

TEST 77-746-001  RUN 03  14 SEP 78  PAGE 24

DISTANCE FROM SOURCE (METERS)

POINT 08
A 35  B 40  C 45  D 50  E 55  F 60  G 65  H 70  I 75