

to the flight crew. These aural cues can either assist the crew (as an indication of an abnormal situation), or hinder the crew (as a distraction or nuisance). For effective training, the flight simulator should provide flight deck sounds that are perceptible to the pilot during normal and abnormal operations, and that are comparable to those of the helicopter. The flight simulator operator should carefully evaluate background noises in the location where the device will be installed. To demonstrate compliance with the sound requirements, the objective or validation tests in this attachment were selected to provide a representative sample of normal static conditions typically experienced by a pilot.

b. Alternate propulsion. For FFS with multiple propulsion configurations, any condition listed in Table C2A in this attachment should be presented for evaluation as part of the QTG if identified by the helicopter manufacturer or other data supplier as significantly different due to a change in propulsion system (engine or propeller).

c. Data and Data Collection System.

(1) Information provided to the flight simulator manufacturer should comply be presented in the format suggested by the "International Air Transport Association (IATA) Flight Simulator Design and Performance Data Requirements," as amended. This information should contain calibration and frequency response data.

(2) The system used to perform the tests listed in Table C2A should comply with the following standards:

(a) The specifications for octave, half octave, and third octave band filter sets may be found in American National Standards Institute (ANSI) S1.11–1986.

(b) Measurement microphones should be type WS2 or better, as described in International Electrotechnical Commission (IEC) 1094-4-1995.

(3) Headsets. If headsets are used during normal operation of the helicopter they should also be used during the flight simulator evaluation.

(4) Playback equipment. Playback equipment and recordings of the QTG conditions should be provided during initial evaluations.

(5) Background noise.

(a) Background noise is the noise in the flight simulator that is not associated with the helicopter, but is caused by the flight simulator's cooling and hydraulic systems and extraneous noise from other locations in the building. Background noise can seriously impact the correct simulation of helicopter sounds, and should be kept below the helicopter sounds. In some cases, the sound level of the simulation can be increased to compensate for the background noise. However, this approach is limited by the specified tolerances and by the subjective acceptability

of the sound environment to the evaluation pilot.

(b) The acceptability of the background noise levels is dependent upon the normal sound levels in the helicopter being represented. Background noise levels that fall below the lines defined by the following points, may be acceptable:

- (i) 70 dB @ 50 Hz;
- (ii) 55 dB @ 1000 Hz;
- (iii) 30 dB @ 16 kHz.

(NOTE: These limits are for unweighted 1/3 octave band sound levels. Meeting these limits for background noise does not ensure an acceptable flight simulator. Helicopter sounds that fall below this limit require careful review and may require lower limits on background noise.)

(6) Validation testing. Deficiencies in helicopter recordings should be considered when applying the specified tolerances to ensure that the simulation is representative of the helicopter. Examples of typical deficiencies are:

- (a) Variation of data between tail numbers.
- (b) Frequency response of microphones.
- (c) Repeatability of the measurements.

TABLE C2C—EXAMPLE OF CONTINUING QUALIFICATION FREQUENCY RESPONSE TEST TOLERANCE

| Band center frequency | Initial results (dB SPL) | Continuing qualification results (dB SPL) | Absolute difference |
|-----------------------|--------------------------|---|---------------------|
| 50 .....              | 75.0                     | 73.8                                      | 1.2                 |
| 63 .....              | 75.9                     | 75.6                                      | 0.3                 |
| 80 .....              | 77.1                     | 76.5                                      | 0.6                 |
| 100 .....             | 78.0                     | 78.3                                      | 0.3                 |
| 125 .....             | 81.9                     | 81.3                                      | 0.6                 |
| 160 .....             | 79.8                     | 80.1                                      | 0.3                 |
| 200 .....             | 83.1                     | 84.9                                      | 1.8                 |
| 250 .....             | 78.6                     | 78.9                                      | 0.3                 |
| 315 .....             | 79.5                     | 78.3                                      | 1.2                 |
| 400 .....             | 80.1                     | 79.5                                      | 0.9                 |
| 500 .....             | 80.7                     | 79.8                                      | 0.9                 |
| 630 .....             | 81.9                     | 80.4                                      | 1.5                 |
| 800 .....             | 73.2                     | 74.1                                      | 0.9                 |
| 1000 .....            | 79.2                     | 80.1                                      | 0.9                 |
| 1250 .....            | 80.7                     | 82.8                                      | 2.1                 |
| 1600 .....            | 81.6                     | 78.6                                      | 3.0                 |
| 2000 .....            | 76.2                     | 74.4                                      | 1.8                 |
| 2500 .....            | 79.5                     | 80.7                                      | 1.2                 |
| 3150 .....            | 80.1                     | 77.1                                      | 3.0                 |
| 4000 .....            | 78.9                     | 78.6                                      | 0.3                 |
| 5000 .....            | 80.1                     | 77.1                                      | 3.0                 |
| 6300 .....            | 80.7                     | 80.4                                      | 0.3                 |
| 8000 .....            | 84.3                     | 85.5                                      | 1.2                 |
| 10000 .....           | 81.3                     | 79.8                                      | 1.5                 |
| 12500 .....           | 80.7                     | 80.1                                      | 0.6                 |
| 16000 .....           | 71.1                     | 71.1                                      | 0.0                 |
| Average               |                          |   | 1.1                 |