

quality of the match using flight-test data as a reference.

(2) Good engineering judgment should be applied to all tolerances in any test. A test is failed when the results clearly fall outside of the prescribed tolerance(s).

(3) Engineering simulator data are acceptable because the same simulation models used to produce the reference data are also used to test the flight training simulator (i.e., the two sets of results should be “essentially” similar).

(4) The results from the two sources may differ for the following reasons:

- (a) Hardware (avionics units and flight controls);
- (b) Iteration rates;
- (c) Execution order;
- (d) Integration methods;
- (e) Processor architecture;
- (f) Digital drift, including:
 - (i) Interpolation methods;
 - (ii) Data handling differences; and
 - (iii) Auto-test trim tolerances.

(5) The tolerance limit between the reference data and the flight simulator results is generally 40 percent of the corresponding “flight-test” tolerances. However, there may be cases where the simulator models used are of higher fidelity, or the manner in which they are cascaded in the integrated testing loop have the effect of a higher fidelity, than those supplied by the data provider. Under these circumstances, it is possible that an error greater than 40 percent may be generated. An error greater than 40 percent may be acceptable if simulator sponsor can provide an adequate explanation.

(6) Guidelines are needed for the application of tolerances to engineering-simulator-generated validation data because:

- (a) Flight-test data are often not available due to technical reasons;
- (b) Alternative technical solutions are being advanced; and
- (c) High costs.

12. VALIDATION DATA ROADMAP

a. Airplane manufacturers or other data suppliers should supply a validation data roadmap (VDR) document as part of the data package. A VDR document contains guid-

ance material from the airplane validation data supplier recommending the best possible sources of data to be used as validation data in the QTG. A VDR is of special value when requesting interim qualification, qualification of simulators for airplanes certificated prior to 1992, and qualification of alternate engine or avionics fits. A sponsor seeking to have a device qualified in accordance with the standards contained in this QPS appendix should submit a VDR to the NSPM as early as possible in the planning stages. The NSPM is the final authority to approve the data to be used as validation material for the QTG.

b. The VDR should identify (in matrix format) sources of data for all required tests. It should also provide guidance regarding the validity of these data for a specific engine type, thrust rating configuration, and the revision levels of all avionics affecting airplane handling qualities and performance. The VDR should include rationale or explanation in cases where data or parameters are missing, engineering simulation data are to be used, flight test methods require explanation, or there is any deviation from data requirements. Additionally, the document should refer to other appropriate sources of validation data (e.g., sound and vibration data documents).

c. The Sample Validation Data Roadmap (VDR) for airplanes, shown in Table A2C, depicts a generic roadmap matrix identifying sources of validation data for an abbreviated list of tests. This document is merely a sample and does not provide actual data. A complete matrix should address all test conditions and provide actual data and data sources.

d. Two examples of rationale pages are presented in Appendix F of the IATA “Flight Simulator Design and Performance Data Requirements.” These illustrate the type of airplane and avionics configuration information and descriptive engineering rationale used to describe data anomalies or provide an acceptable basis for using alternative data for QTG validation requirements.

END INFORMATION