



AEROSPACE INFORMATION REPORT

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Procedures for the Calculation of Airplane Fuel Consumption

RATIONALE

This SAE Aerospace Information Report (AIR) provides aviation environmental modelers with standard procedures for calculating the fuel consumption of airplanes in all phases of flight. The methods contained in this AIR make use of airplane performance models, such as found in AIR1845 or Eurocontrol's BADA 3. The fuel consumption predicted by these methods can be used as inputs to emission calculations, such as found in AIR5715.

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1. SCOPE

This SAE Aerospace Information Report (AIR) describes procedures for calculating fuel consumption for civil jet airplanes through all modes of operation for all segments of a flight. Turboprop and piston airplanes, as well as helicopters or unconventional aircraft, are not included in this AIR. The principle purpose of these procedures is to assist model developers in calculating airplane fuel consumption in a consistent and accurate manner that can be used to address various environmental assessments including those related to policy decisions and regulatory requirements. This AIR is intended to directly support the emission calculations documented in AIR5715. The models described in this AIR are intended to be used from the start of the takeoff roll to the end of the ground roll; taxi fuel consumption models are not included. If modelers have access to higher fidelity methods, they should use those methods in lieu of the ones in this AIR.

2. REFERENCES

2.1 Applicable Documents

The following publications form a part of this document to the extent specified herein. The latest issue of SAE publications shall apply. The applicable issue of other publications shall be the issue in effect on the date of the purchase order. In the event of conflict between the text of this document and references cited herein, the text of this document takes precedence. Nothing in this document, however, supersedes applicable laws and regulations unless a specific exemption has been obtained.

2.1.1 SAE Publications

Available from SAE International, 400 Commonwealth Drive, Warrendale, PA 15096-0001, Tel: 877-606-7323 (inside USA and Canada) or +1 724-776-4970 (outside USA), www.sae.org.

AIR1845 Procedure for the Calculation of Airplane Noise in the Vicinity of Airports

AIR5715 Procedure for the Calculation of Aircraft Emissions

DuBois, D. and Paynter, G., "Fuel Flow Method 2' for Estimating Aircraft Emissions," SAE Technical Paper 2006-01-1987, 2006, <https://doi.org/10.4271/2006-01-1987>.

2.1.2 AIAA Publications

Available from American Institute of Aeronautics and Astronautics, 1801 Alexander Bell Drive, Suite 500, Reston, VA 20191-4344, Tel: 703-264-7500, www.aiaa.org.

Patterson, J., Noel, G.J., Senzig, D.A., et al. "Analysis of Departure and Arrival Profiles Using Real-Time Aircraft Data," J. of Aircraft, Vol. 46, No. 4, 2009.

Senzig, D.A., Fleming, G.G., and Kevinelli, R.J., "Modeling of Terminal-Area Airplane Fuel Consumption," J. of Aircraft, Vol. 46, No. 4, 2009.

2.1.3 ICAO Publications

Available from International Civil Aviation Organization, 999 University Street, Montreal, Quebec H3C 5H7, Canada, Tel: +1 514 954 2219, <http://www.icao.int/>.

ICAO, "International Standards and Recommended Practices," Environmental Protection, Annex 16, Vol. 2 - Aircraft Engine Emissions, 3rd ed., Montreal, July 2008.

ICAO, "Recommended Method for Computing Noise Contours around Airports," Doc. 9911, 2008.

[ICAO Aircraft Engine Emissions Databank | EASA \(europa.eu\)](https://www.easa.europa.eu/domains/environment/icao-aircraft-engine-emissions-databank) (<https://www.easa.europa.eu/domains/environment/icao-aircraft-engine-emissions-databank>), retrieved May 2022.