Evaluation of Flight Test Methods for the Calibration of the Pressure Measured through a Static Port

Diplomarbeit in compliance with § 21 of "Ordnung der staatlichen Zwischen- und Diplomprüfung in den Studiengängen Fahrzeugbau und Flugzeugbau an der Fachhochschule Hamburg"

Background

As part of the development and certification process performed jointly by the Airbus partners, it is necessary to calibrate the air data system. One task requires the measurement of the true static pressure not influenced by the aircraft itself. This task is performed today by means of a trailing cone system. The trailing cone with its pressure ports is connected to the fin of the aircraft with a tube, measuring approximately 150 m in length. The tube has to be extended and retracted in flight which requires the operation of an electrical winch. Future aircraft programs like the A3XX or the A400M might even require longer tubes to ensure measurements in the undisturbed atmosphere.

Task

- Compilation of requirements for static pressure measurements.
- Review and research in the area of static pressure measurement techniques.
- Evaluation and comparison of the static pressure measurement techniques (this may include small tests of selected techniques).
- Selection of a measurement technique.
- Integration of the selected technique into a selected aircraft considering:
    - aerodynamic and vibration parameters as well as component weight,
    - 3D integration tests checking for conflicting space requirements of aircraft components.
- Documentation of the selected flight test instrumentation and measurement technique consisting of a system specification, a wiring diagram, a functional description, assembly procedures, calibration procedures, recurring and non-recurring cost calculation.

The results have to be documented in a report. The report has to be written in a form up to internationally excepted scientific standards. The application of the German DIN standards is one excepted method to achieve the required scientific format.