

## AerE 344 Pre-Lab Assignment

### Lab #05: Determination of the Aerodynamic Performance of a Low-Speed Airfoil based on Pressure Distribution Measurements

#### DUE: At lab time for Lab Experiment

You need to design an experimental procedure to estimate the aerodynamic performance (lift, drag, moment coefficient) of an airfoil based on the surface pressure measurements around the airfoil.

*What you will have available to you for this lab:*

- A thermometer and barometer for observing ambient lab conditions (for calculating atmospheric density).
- A computer with a data acquisition system capable of measuring the voltage from your manometer.
- A GA(W)-1 airfoil that can be mounted at any angle of attack up to 16.0 degrees.
- Three 16-channel Scanivalve DSA electronic pressure scanners.

*What is the final product of your experiment?*

- Plots pressure coefficient ( $C_p$ ) distributions about the airfoil for all of the angles of attack considered.
- Plots of  $C_L$ ,  $C_D$ , and  $C_M$  over the whole range of angle of attack you considered.

*What you need to turn in for this assignment:*

- A step by step procedure that you will follow when you get to the lab next week.
- If you have to modify your procedure somewhat once you get to the lab and start working, that is okay. However, you *must* start with a plan.
- *You only need to turn in one plan per lab group.*

*Questions you must ask yourself when you design the experiment:*

- How will you check the repeatability of your results?
- What kind of uncertainty can you attribute to your final measurement numbers?