N42RF CALIBRATION RESULTS FROM July 31 1999 FLIGHT

N42RF flew a five-hour mission on July 31, 1999 over the northeast Gulf of Mexico. Several maneuvers were executed that would determine the coefficients for the attack and slip angles. A yaw maneuver was done at 1500 feet and 15000 feet to provide input for deriving the slope for slip angle. Several speed runs, into and out of the wind, were flown at five altitudes and the data collected from those maneuvers were used to determine the slope and intercept for attack angle.

The slow data was stored on the HP system and the Sun System (Everest) via UCI's AOCPROC program. Through AOCPROC the flight level data was stored as a netCDF file. This allows the NCAR-provided plotting program, NCPLOT, not only to view the flight level parameters, but also store user-selected portions of the data as ASCII files. These ASCII files are used as input to the attack/slip angle derivation program ABD_TPCAL.o located in /home/users/barryd/cprog on Everest.

For the attack angle coefficients four separate ASCII files (one for each speed run) were created for each altitude. Each file was edited to remove data points that did not fit the specs for that particular run. Approximately one hundred (100) points are required for each speed run to make it statistically significant. After each file was edited, the four files were merged into one ASCII file. ABD_TPCAL.o uses that merged file as input to determine the attack angle coefficients for that altitude. The following table shows the attack angle coefficients for each of the five altitudes:

	Slope	Intercept
1500 feet	6.14436	2.1713
5000 feet	5.99108	2.1760
10000 feet	6.29351	2.0974
15000 feet	6.10801	2.0001
20000 feet	5.89623	2.0335

The above table is for reference purposes only. To obtain the "final" slope and intercept for attack angle all five ASCII files (one for each of the five altitudes) are merged into a single ASCII file, and that file would be used as input by ABD_TPCAL.o. For this calibration flight the slope and intercept for attack angle are as follows:

For all levels Slope: 6.11806 Intercept: 2.0979

The program also computes a correlation coefficient and it is .99755 for this data.

The input data to determine the slope for slip angle comes from the two yaw maneuvers. Each maneuver has its own ASCII file. Each file is edited to remove unwanted data. Approximately one hundred (100) points are required per maneuver.

ABD_TPCAL.o computes a slope for slip angle for each maneuver. For this flight the slip angle slopes are as follows:

1500 feet	Slope: 7.32021
15000 feet	Slope: 7.62215

As was for the attack angle derivation, the two files are merged into one ASCII file. The "final" slip angle slope is 7.57355.

To determine the slip intercept, a subjective technique is employed using plots of wind direction, wind speed and vertical wind from the circle maneuvers made at 5000 feet. Several plots of the aforementioned parameters are made varying the intercept value for slip angle. Through some simple statistics and a "meteorological eyeballing" of the plots, a determination for the slip angle intercept is made. For this flight the slip angle intercept is +0.35. As stated previously this method is very subjective, but it does provide a hands-on view of what is happening to the wind values when modifying the value for the slip angle intercept.

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