

## Squawk List Flight 1842, 5 Dec 2000

### Project IMPROVE test flight

(Instruments not mentioned as having a problem are believed to have worked satisfactorily)

Flight over the coastal waters of Washington State between Point Brown Quillayute on a day with massive high pressure aloft, offshore flow, and extremely good visibility. The only clouds about were thin broken cirriform clouds above the flight ceiling of the aircraft. Hence, no clouds were sampled.

### OVERALL ASSESSMENT

No update available on cloud-related probes possible with the exception of the fact that noise spikes appeared to be eliminated in the PVM-100 and J-W records. Cleaning of the chilled mirror and Ophir devices brought them into outstanding agreement, a significant improvement over the previous flight.

#### 1. GPS /WINDS/TURBULENCE/AIRSPEED

GPS system. Data OK.

No turbulence data: Unrealistic values; meter not hooked up or not working properly.

Winds: Occasional “credible” winds from the Shadin Air Computer. More extensive study needed to determine why those winds went bad during the flight (e.g., was it a time delay thing? Or?)

Our own GPS-derived winds using heading and ground tracking not reliable in either direction or speed.

BAT: Not working yet.

Rosemount true air speed. Discrepancy between the Shadin and the Rosemount true airspeed continues. We now use the Shadin TAS to calculate static temperature for our Rosemount probe, and well as for concentration calculations. Grant has suggested that the low Rosemount TAS may not be corrected for pressure.

## 2. STATE PARAMETERS

Rosemount temperature sensor: The Rosemount temperature continues 5-10° C higher than the reverse flow temperature and the Shadin Air Computer static temperature due to a problem with the wiring and/or the Rosemount sensing head. Implementing a calibration is confounded by a Rosemount temperature dependency on TAS and time—the magnitude of the temperature discrepancy diminishes from the beginning to the end of the flight. This, too, is symptomatic of the SAFARI problem. More studies are needed to solve this problem before a calibration can be applied.

I suggested this a. m. that we find the fast reponse Rosemount temperature sensor that we have previously used to see if that would help or provide a clue for us in solving this troubling problem, but Don S. insists that such a move would not make a difference in correcting the problem and so I won't formally suggest it. I am getting pretty convinced that we do not have the expertise to repair this problem, which is not necessarily the fault of present personnel.

I suggest we bring in someone from outside to look at this problem—Don suggested that Charlie Black could fix this problem. But maybe someone from another aircraft group or from Rosemount could look at it (I'm THAT desparate!!)

As it is, we are relying on what was previously a second line measurement of temperature, tstatr, one that was never as accurate as the robust Rosemount sensor. If tstatr goes bad, we're cooked. The Shadin Air Computer temperature, while not terribly bad, only outputs temperature to whole degrees and was not meant for science use. Also, it too, drifted by at least two degrees at times from the tstatr.

Reverse flow temperature sensor: We still continue to see large spikes (electrical noise) in the data. These are not easily excised from the data. I don't believe we're going to be able to rectify this problem either. I strongly recommend that we use true radio expert from outside to solve the pilot radio transmission interference problem. Presently, correcting our only accurate temperature data due to these spikes represents a preventable HUGE waste of time. (I'm getting emotional here because we've lived with these problems for soooooo long!)

Ophir hygrometer: Cleaned prior to the flight. The same types of noise spikes seen in tstatr also affect this instrument, with the same time wasted excising them from data going to archives! In-cloud humidities topped out around 80-85% on the previous flight, but since no clouds

were sampled, don't know if this is still the case. The chilled mirror and the Ophir were both cleaned prior to this flight and were in outstanding agreement.

Chilled mirror: Cleaned prior to the flight.

### 3. CLOUD PHYSICS

No update; no clouds sampled with the exception that noise spikes in two key probes, the PVM-100 and the J-W, were eliminated.

FSSP-100: No update available.

Johnson-Williams hot wire: Noise spikes eliminated.

PVM-100: Noise spikes eliminated.

DMT hot wire: No change, still broke, produces noisy trace in clear air.

2-D probes: Software to display data available, but no particles sampled.

1-D probe: No update available.