Squawk List for flight 1859
Flight flown Saturday 10 February 2001 (UTC day and date)

Project IMPROVE flight 13

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

OVERALL ASSESSMENT OF MEAUREMENTS

- Very good measurement day. Robustness of Convair 580 instrument configuration and grounding mechanisms shown when only the Johnson-Williams probe failed after a strong lightning strike at 090310 UTC. Some performance degradation also occurred with the CPI and the PVM (briefly), but much good data was also obtained. Otherwise, there no evidence of the strike in any other data!
- The 35 GHz radar continues to work very well and data are being recorded. One problem that has recurred is the inability to switch it from upward or downward-pointed positions at low temperatures.
- Electrical noise continues to impact some key instruments.

1. GPS /WINDS/TURBULENCE/AIRSPEED

**GPS tans-vector:** No change; data OK; apparently a characteristic of this system is to only find a new lat-long every 3-15 seconds. Thus for intervals of the same time period, winds cannot be updated, nor do we show a location change. Winds and ground speed are thus necessarily constant, and are derived from the last last lat-long position, which may have been as much as 10 or more seconds earlier. This also appears true for the Shadin static temperature measurement.

**Rosemount TAS:** No change. Continues to have excessive noise at about a frequency of 1 Hz. Appears accurate otherwise; in essence, the TAS trace for a flight looks like a long bar diagram whose peaks are at the correct true airspeed.

**BAT**: Not working yet.

2. STATE PARAMETERS

**Rosemount temperature sensor**: Sporadic large noise spikes otherwise no change. The Rosemount-derived static temperature continues 5-15˚ C higher than both the reverse flow temperature (tstatr) and the Shadin Air Computer static temperature. There seems to be no coherence to the delta temperatures between tstat and tstatr.

The difference often decreases/increases in straight, level flight at constant TAS.

**Reverse flow temperature:** Occasional large noise spikes.

**Cambridge Chilled Mirror:** Occasional noise spikes, otherwise no change.

**Ophir infrared hygrometer:** Occasional noise spikes, otherwise no change-still too high.

3. CLOUD PHYSICS

**PVM-100**: The PVM LWC was considerably lower than the FSSP-100 LWC (<0.1 lwfsp) beginning at the time of the lightning strike and continuing until 0927 UTC. Otherwise, there was good agreement between these two probes. There are still noise spikes when the LWC is zero or very low. The PVM effective radius (ER) was generally low relative to the combined FSSP and 1-DC effective radii. Some of this is due to the contribution of the 1-DC on the ER calculation. The PVM surface area (SA) channel showed generally good agreement with the FSSP-100 derived surface area. However, both the PVM ER and PVM SA channel had hundreds of noise spikes during cloud free times.

**DMT hot wire**: No change. Still impacted by too much rambly drift-type noise rather than spikes of the kind that impact the PVM and J-W probes. DMT LWCs are pretty close to that of other probes when the noise is absent and the LWC appreciable.

**J-W**: Generally worked well up until the lightning strike at 090310 UTC. There was no more data from this instrument after that time.

**HVPS:** Occasional noise problems/data dropouts, but in general worked well. Some dropouts are associated with steep descents and likely condensation because the probe remains colder than the warming moist air that the plane is descending into. However, it has also been noticed that the probe seems to drop out in some climbs as well.

**CPI:** Was working extremely well prior to the lightning strike. Thereafter needed much attention to keep running and many images were blank (suggesting the camera was not firing at times.) Also, the images did not appear as sharp as they had been prior to the strike. Nevertheless, considerable very good data was gotten before and after the strike.

**35 GHz radar:** Unable to be switched to a different vertically-pointed modes at low temperatures.