Squawk List for flights 1852 and 1853 which took place on Saturday/Sunday, 20-21 January 2001 (UTC days/dates). (1635-2028; 2128–0050 UTC, start end times of first and second flights, resp.)

((Comments on flt 1853 are tentative since data will not be ready for examination until tomorrow—it didn't get copied over to the removable disk on Saturday. Will update this only if post-flight data inspection makes it necessary. Just about all of our key parameters are easily trackable on our new display system. This makes surprises in post-analysis less likely.))

Project IMPROVE test flights 6&7

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

The first flight over the coastal waters of Washington State southwest of Westport in an advancing but weakening rather diffuse cold/occluded with large wind direction shift. Coastal flow offshore southeasterly ahead of front and northerly behind front (did not reach this windshift, however). Also, the weak nature of this system led to rather chaotic cloud conditions with regions of soft-cumulonimbus clouds (tops 10-15 kft) visible along the frontal line and other saddle and weakly developed regions. It appeared that the heavier convection had moved away from the flight track by the time we got to 10.5 kft (the last leg in which little cloud was intercepted.) Instead, multi-layered, but often non-contiguous cloud layers at varying heights comprised the flight track. Also, at cloud top, it was observed that precipitation fell in scattered regions into the lower clouds being overflown from an overlying, overcast layer of altostratus clouds.

The second flight, in an encroaching warm-frontal type band, conditions were far more steady state with the exception of the first two legs which happened to encounter, or were designed to sample, embedded convection within the over all precipitating layer. This convection was marked by a larger region of cumuliform appearing cloud bases and a weak rain shaft into which the plane flew at the lowest level (north-south legs were flown) at about the mid-point of the leg, and then on the return leg near the freezing level, heavy snow, and moderate LWC of about 0.5 g m-3.

Thereafter, the cell(s) penetrated on the 2nd leg moved away from the N-S line the aircraft flew and only very steady state, glaciated conditions were observed from flight level 7.5 kft to 21 kft. These

conditions were unrimed crystals and aggregates. Tops were considerably above the highest level flown; the sun's position could not be discerned at 21 kft (the 35-GHz radar was in the downward mode at the highest flight altitudes.)

OVERALL ASSESSMENT OF MEAUREMENTS

- Most important probes and the radar worked well. Radar data began being recorded on the first flight, toward the end, and intermittently on the second flight.
- Continuing, but greatly reduced in frequency electrical noise. Impacted several instruments.
- Lots of ice multiplication observed in the first flight, but cloud tops not well documented—moved away by the time the aircraft got to cloud top; in the second flight nearly steady-state conditions were encountered which should simplify post-analysis.
- Low voltage from an inverter caused a 7 min computer/data shutdown in an important leg on flight 1852. Leg had to be repeated.

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 temperature measurement.

Rosemount TAS: No change. LOTS of noise due to dropouts. Appears accurate otherwise; in essence, the trace looks like a bar diagram whose peaks are at correct true airspeeds.

BAT: Not working yet.

2. STATE PARAMETERS

Rosemount temperature sensor: No change. The Rosemount-derived static temperature continues 5-12˚ C higher than both the reverse flow temperature (tstatr) and the Shadin Air Computer static temperature. However, the Shadin temperature does have a long

reset time and so often lags the real temperature by a deg or more. Hence, we really only have a single reliable temperature measurement in real time. More effort should be put into fixing our venerable Rosemount temperature probe. It seems that it may require outside help since this is a problem that has been noted since the pre-SAFARI test flights but in which no progress has been able to be made due to higher priorities. Cause for some concern springs from the fact that on the last fly-by comparison, the Reverse Flow Temperature was a deg low compared with the tower measurement. The Rosemount temperature probe, til post KWAJEX, was always our most dependable and most accurate temperature measurement.

3. CLOUD PHYSICS

PVM-100: Noise spikes are now rare for some reason, only several were observed in flight 1852. Probably should be checked with the HG calibration disk since we are approaching the mid-project calibration stage. The results should be written down.

DMT hot wire: No change. Still impacted by much noise. LWCs are pretty close to that of other probes when the noise is absent.

J-W: Worked better than on the last flight. Did not experience drop outs. Occasional perfect agreement with FSSP derived LWC. Noise spikes are still occasionally present

2-D cloud probe: Need concentration calculations in real time. Should also be calibrated.

1-D cloud probe: Should be calibrated and calibration documented. Otherwise working well.

HVPS: Occasional noise problems/data dropouts. These seemed to be associated with temperature and pressure changes during ascents and descents that may have resulted in condensation, and/or LW on the lens from flying in the rain (as happened in KWAJEX).

Radar: Worked well, and data is starting to be recorded.

CPI: Suffered some computer shutdowns in otherwise good performance. Not clear what caused the shutdowns. Seem to happen only after the inverter problem mentioned above. May have to re-install the CPI processing software on the plane in case it was corrupted by the power outage.