

Flight 1895
December 4, 2001
Voice Transcriptions*
IMPROVE-2

10:59 PM

PH: This is Flight 1895 on 4 December. Onboard are Hobbs, Rangno, Wilson, Salazar, McMillen, Sutherland and Calvin Ingram. We're heading out toward Santiam Pass where we'll be doing vertical profiles with the P-3. The P-3 went off about 50 min ahead of us.

11:00 PM

AR: Looking back we've climbed up on top of shelves, stratocumulus, and cumulus clouds. Nicely formed compact turrets lined up down there off the left wing and back behind the tail toward the Cascades. We have a ice fall coming from a higher cloud that we'll be seeing in the forward video and that is falling into the stratocumulus back toward the Cascades and also up toward the north end of Puget Sound. Very light precipitation. Low clouds clear off and I can see the Port Townsend paper mill here with a plume going almost straight up and then off toward it looks like the northeast. A very pretty sight, the sunlit, backlit stratocumulus clouds below with breaks in the undercast.

PH: It looks like t-stat reverse is working now after it had been worked on by Charlie Black.

11:02 PM

AR: We'll continue to climb up toward some isolated patches of altocumulus and the forward video shows lenticular off the left side about 11 o'clock. It looks like ice cloud at our level off the right wing. Large breaks in the cloud cover aloft. Just now I was able to bring up my text.

11:03 PM

PH: The wind direction is not right.

AR: Yes. We see true airspeed here is indicated to be 80 meters per second is not right either. This static pressure isn't correct either.

11:04 PM

* AR = Art Rangno, CI = Calvin Ingram, KM = Ken McMillen, LS = Larry Sutherland, PH = Peter Hobbs, TW = Tom Wilson, VS = Vidal Salazar

AR: Tom, do you know what the problem is?

PH: P-alt is not correct.

AR: Right. It's because static pressure is only 9.8 mb for some reason.

TW: I do not know.

PH: More gremlins.

11:05 PM

PH: At the least the t-stat temperatures, t-stat and t-stat r, are almost identical.

AR: Right, and they look pretty accurate. I checked the MM5 prediction for this time of day and at 700 mb they were really, really close to predicted temperatures. So I'm quite sure they are both pretty reliable today. I don't see that 3 degree offset that we had on Flight 1983. It's probably feeding in that 80 meters per second phony true airspeed to correct those temperatures for the dynamic ram effect and that's probably not quite enough.

11:06 PM

PH: A good time to zero the liquid water measurements.

TW: I just did.

PH: Very good.

11:07 PM

PH: The 1-DC is showing erroneous counts in clear air.

11:08 PM

PH: Counts going up to 1,000. All the liquid water meters are steady on zero in clear air.

11:10 PM

VS: The CCN is working okay now.

PH: Very good. Hello, Ken?

KM: Go.

PH: What's our true airspeed?

KM: Standby. I'll work it out.

11:13 PM

KM: It's 248 knots.

PH: Thank you.

11:14 PM

TW: Well it looks like once again the CN counters are not working.

PH: Both of them?

TW: It looks that way. I don't know if that's due to pressurization of what, but I was in here like 20 min ago or right before we took off. When I was loading them up and I was getting like 10 to the 4th particle count and stuff.

PH: It could be pretty clean up here, but I would expect to see 100 or so.

VS: The CCN is also acting kind of weird. I don't know why, but the effect to the voltage is reading like too low. I don't understand why. It was running okay on the ground.

11:16 PM

PH: Toward the end of the flight when we get lower down we'll depressurize and see if that helps the CCN measurements.

VS: That will be great.

PH: In clear air the DMT is still showing the occasional spike to 0.9 gm per cubic meter. That's its old symptom. It's done that ever since we've had it virtually.

11:17 PM

PH: What do you think is wrong with the TANS, Tom?

TW: What do you mean the TANS?

PH: The wind direction and wind speed and all that stuff, true airspeed.

TW: It's probably all based on the true airspeed having a problem. So I don't know. That's not the TANS.

PH: Where does that come from?

TW: I think it's the Rosemount? I mean it comes from co-pilot's pitot maybe. I'm not sure. I think Art would know more. A lot of things depend on true airspeed in computations.

11:19 PM

PH: Hello, Ken?

KM: Go.

PH: Is everything work okay up front there?

KM: Everything good is here.

PH: We seem to be getting a bad true airspeed measurement back here, which probably comes from your pitot tube.

KM: Our indicators are right on.

PH: Okay. It's something back here then.

11:20 PM

TW: Art told me that it does come from either the copilot or the pilot, so maybe a wire got disconnected when they did the repair.

PH: Yes, that's what I'm wondering. The nose was off and who knows what happened. Ken is getting good readings.

11:21 PM

PH: Art's having trouble with the CPI. We're in cloud here getting spikes, top hat sort of responses on the J-W, which probably hasn't been fixed yet. That's something Charlie is still working on and lower more realistic responses from the FSSP. It should probably ice crystals.

11:22 PM

AR: Lots of ice crystals ahead. I don't see any liquid cloud at least as we go into this shield.

PH: I want to see something on the 2-D.

AR: Roger.

PH: That first strip was when we took off.

AR: Yes, we're definitely flying in some ice now, not a lot, but it's out there.

PH: There's nothing on the 2-D. Maybe that's his high airspeed problem again.

TW: I don't think it should, but let me check.

AR: I think Tom made it so that wouldn't be problem. We get squashed particles, but they would still be imageable.

PH: Getting something on the HVPS, but it's some lines, sort of interference there as well.

TW: I'm going to reset it right now since the CPI is not working anyway.

AR: Now the HVPS looks like it's, I think there are real particles out there along with the bits of noise.

PH: Let's keep our fingers crossed on the 2-D sometimes it comes up after being flying for a half an hour or so.

AR: Tom, are we turning these probes on fairly soon after takeoff or are we still waiting for the pilots to give us the power back here, right?

TW: We're turning them on, yes, we're waiting for the power.

AR: Because they might be getting a little cold. That's the only thing I can think of either cold soaking and that's delaying the onset of working until the heaters can bring the temperature up.

11:25 PM

PH: HVPS activity in cloud here, but still no 2-D.

11:26 PM

PH: What's this board not initialized on the 2-D?

TW: Yes, I'm seeing we're getting that error. I don't know why. That just started coming up, right?

PH: I'm not sure when it came up. Some have okay.

11:27 PM

TW: I'm beginning to think there is something going on with the pilot's true airspeed because the Shadin true airspeed is also not giving a good value, which comes from the aircraft computer.

PH: Well I checked with Ken. He said everything looked good up there.

TW: I'll check a couple of other Shadin values.

PH: I'm more concerned about the 2-D actually.

TW: Okay.

PH: We've got all okays on there now. I'd just like to see some images come up.

11:29 PM

VS: I just detected a little leak on the sampling tubes. I don't know if that might be the problem for the CCN or for the CN.

PH: Okay. Can you fix it with duct tape?

VS: I think the tape is broken, so I'll have to change the tube.

PH: You say the tube is broken or the tape?

VS: The tube itself is broken.

PH: The tube.

VS: Right.

11:30 PM

PH: Maybe you can see if we've got some tape onboard and tape it up around where it's broken?

VS: Okay.

11:34 PM

PH: Ken?

KM: Go.

PH: We want to be at 16,000 ft now and I've got a new start point for you.

KM: Okay, roger. Start point go ahead.

PH: 44°21.5'/123°32.0'.

KM: 44°21.5'/123.32.

PH: No, 123°32.0'.

KM: Roger.

11:36 PM

PH: Ken?

KM: Go.

PH: Instead of coming down in 1,000 ft intervals, we'll be descending in 1,500 ft intervals starting at 16,000 K.

KM: Roger, 1,500 ft intervals. You know, starting at 16,000. Let us know when you want to go down.

PH: Well, the first leg of the constant altitude at 16,000 and we'll be heading from our start point going east.

11:37 PM

PH: We still have no 2-DC or CPI.

11:42 PM

TW: I have a feeling the 2-D is getting confused because we have such a low true airspeed that we're sending to it, so I might artificially set it a little higher.

PH: Yes, I'd do that, but our research speed is usually 80 meters per second and that's what we're going to be flying when we get down there.

TW: I'll just try and experiment right now with a faster speed or more close to what we're doing.

PH: Might as well. We're not getting anything at the moment.

11:44 PM

PH: I notice on the 2-D it says automode is on. Is that usual?

TW: That's usual. Otherwise it won't scroll for you.

11:46 PM

PH: Ken?

KM: Go.

PH: Just repeat the start point for me.

KM: 44°21.5'/123°32'.

PH: That's it, 16,000.

KM: We're at 16,000 ft now and we'll hit that point and precede east, right?

PH: That's correct at that altitude.

11:47 PM

PH: At the moment things are not looking very good here. We don't have our 2-D images and we don't have our CPI. We do have our HVPS and we have our FSSP.

11:49 PM

PH: Ken?

KM: Go.

PH: I have our first easterly point for you.

KM: Go.

PH: 44°24.8'/121°59.0'.

KM: 44°24.8'/121°59'.

PH: That's correct. That differs from what we have on the table that was transmitted to us. So we'll head from our westerly point to our easterly point at 16,000 ft.

11:52 PM

PH: Tom?

TW: Yes.

PH: Have you ever looked at that wiring in the nose to know what the true airspeed connection is up there?

TW: I would have no idea. I've never looked at it.

PH: Okay. We'll just have to tell Charlie that we lost that on this flight and they'll have to take a look and see if he can see if he disconnected something.

11:54 PM

TW: Yes. At least for me it's really hard to test on the ground because we're never moving.

PH: Have you tried everything you can think of, Tom, on the 2-D?

TW: I can just cycle power some more. I can just keep on doing that, but that will interrupt the HVPS and the CPI though.

PH: I think you should do it. We're coming on station shortly and we've got no images.

11:57 PM

PH: Okay, that did it. We got something flashed up for a moment there. It went off again now though. It flashed up for second.

KM: Peter, we'll be at that latest point you gave me in about 4 min.

PH: At our first start point?

KM: That's right.

PH: Okay, then we'll be heading due east from there.

KM: Yes. We'll be turning just about south to get there and then we'll be turning due east.

PH: Okay.

11:58 PM

PH: Tom, try that cycle again.

11:59 PM

PH: We're getting images now. It did it.

TW: I counted to 13 that time instead of 12. I don't know if that made a difference.

PH: Let's just hope it keeps going. On the CPI these are the only images we have.

TW: I'm still at that faster speed. I'll have to slow it down.

PH: Yes. They'll be slowing themselves down to 80 meters per second pretty soon, actual true airspeed. I'll remind them of that. Ken?

KM: Roger.

PH: I've lost the images again.

12:00 MIDNIGHT

PH: Ken? We've got the images again for a few minutes here. Every time you switch it on they come back up.

KM: Go ahead, Peter.

PH: Let's decrease to our 160 knot speed.

KM: We're doing that now.

12:01 AM

PH: Ken is decreasing his true airspeed to 160 knots now.

TW: It looks like the 2-D is back to its old ways.

PH: Yes.

TW: I wonder if it coincides when Art turns on his CPI there.

PH: I think all you can do is keep triggering it and hope that it turns on.

TW: I don't think it's good for the CPI to keep turning it off.

PH: Just turn the CPI off.

12:02 AM

PH: See if it comes up this time. If not, then switch it off.

12:03 AM

VS: The CN counter started working. It's showing around 400 particles at the moment.

TW: Is that the little one or the bottom one?

VS: The one on the top.

PH: Which one is that, CNC-2? We're just starting now the beginning of our first leg at 16,000 ft, so we need to try to get one of these images up. Art's shutting down and see if that helps the 2-D.

KM: Peter, we're on our line going eastbound.

PH: Thanks, Ken. So we're at our first starting point at 16,000 ft eastbound. We've got images again on 2-DC. Tom just switched it on again. See if we can keep them.

12:04 AM

AR: This is just for the record. I've been away from the bubble now for about half an hour at least trying to get the CPI to work, which I was unable to work. The computer came up with a display in a different mode than we had been using just prior to landing, which was 1024x768, filled the full screen. That was true color display setting for the monitor. When we started it up it was set on 65,000 colors and had vertical lines much like a bad television set turned on its side I suppose. Lots of washed out vertical lines that interfere with the display of particles. At first the probe cameras seemed to fire. I was able to look at some live video for a little bit, but the particles never really looked, I wasn't sure if they were real or condensate or frozen drops or something in there. Then after trying to get this thing to start up, why several times by restarting the software and turning the probe on and off, each time starting the software prior to turning the probe on as instructed by Don, what we got in trying to get a background was that the set point, with the laser at 45 and 90 set points, would go immediately to zero upon hitting the "take background" button. At the same time the PDS thresholds would jump from whatever the default values were around 400 to 4,095 and we could not recover live video indicating possibly the 45 and 90 degree lasers were not firing or perhaps the camera is not firing. I have no clue. The worse part of this was the system was working the best that it had worked on the last flight right down to just before landing. I looked at it and it was working fine and now sitting in the hangar once again, as we see all the time, it is now broke. Along with that a

number of other ideas, the 1-D cloud probe is not working. Again counting in good air.

PH: Ken.

KM: Go.

PH: So when we reach our easterly point, we'll be returning to the following westerly point. Ken?

AR: True airspeed is not working.

PH: 44°21.9'/123°22.4'.

KM: Okay. From our easterly point we'll do a reversal to 44°21.9'/123°22.4'.

PH: Right, and along that track we'll be steadily descending to 14,500 ft.

AR: As I was saying, we do not have a true airspeed from either the Rosemount or the Shadin indicating on my text readout here the default value 80 meters per second. Of course, that impacts the winds. Correction, the winds at this point look pretty good. I take that back. My azimuth heading is looking pretty good here, 085, so we are getting lat/long at a true heading, which allows us to calculate the winds. Correction, I think Tom has hardwired. That's it. I think he's hardwired a true airspeed. Let me double check on that. Maybe that's why we're getting winds. They look a little too strong as a matter of fact, 268 at 72. I think that's a bit higher than the models were expecting.

12:10 AM

PH: We're now and have been on most of this first leg getting good 2-D images. The CPI we've sort of given up on for the time being.

AR: The true airspeed is producing these winds, which are actually quite bogus, 270 at 43 meters per second. Apparently the heading combined with the bogus true airspeed is giving us the excessive winds.

12:11 AM

AR: As soon as we turn we'll see that wind direction go askew again. It just happens, coincidentally, it's about right at 270° true.

PH: HVPS seems to be working all right.

12:12 AM

PH: Irregular crystals at this level, occasional columns with plates on either end. Ken?

KM: Go.

PH: Well, at this level we're not picking up any icing.

KM: No, it looks pretty good.

12:13 AM

PH: Crystals and column rather than plate-like, although they look sort of irregular.

12:14 AM

PH: I'm going to try the CPI again to see if it knocks out the 2-D. The radar sees this system over here filling in more and more echoes as the afternoon has progressed. The P-3 is in place. For the tape, the NOAA P-3 aircraft is below.

12:16 AM

PH: We've still got the 2-D images. Art is still playing with the CPI and it hasn't knocked out the 2-D yet, so maybe that was not a correct hypothesis.

12:18 AM

TW: It's interesting when we disconnected the CN-1 and CN-2 inlet valves, so they are sort of getting cabin air, they started giving a whole bunch of counts. So it has something to do with the pressurization of the flow I think.

PH: Yes, it just maybe that we're not plumbed correctly to take in outside air when we're pressurized. We were in SAFARI. Of course, we were depressurized most of the time in SAFARI.

TW: Right. Not this high either probably.

PH: But when we get down to below 10,000 ft, we'll depressurize and see what we get. The CN measurements and CCN are most interested and importance low down, so that's when we'll depressurize.

12:19 AM

KM: Peter, we're at our easterly point. We're starting our reversal and when we're out of our reversal we'll start to descend to 14,500 ft. How soon do you want to go down?

12:21 AM

KM: Peter?

PH: Yes.

KM: We're on our easterly point. We're doing our reversal. When we come out of this turn, we'll start down to 14,500. At what rate of descent would you like?

PH: Let's make it 500 ft per minute.

12:22 AM

AR: Tried to start the CPI with no success. Software returns the error message.

PH: Ken.

KM: Go.

PH: Let me change that. Why don't you descend at such a steady rate so you end up at 14,500 ft when we reach our westerly point.

KM: We'll try to work it out, roughly.

AR: For example, when trying to stop the probe on the software it returns the error message "failed to stop acquisition" even though the "stop probe" button has been depressed.

12:23 AM

AR: No evidence that tops are anywhere near this flight level, 15,300 ft, according to TANS-alt. True airspeed of 50 meters per second and another one defaulting to 80 meters per second. Both temperatures have been holding pretty much around -23°C; although they're probably not corrected as much as they should be, which means they're probably a little bit colder than the values of -23. Maybe another half degree or a full degree lower given that the true airspeed is probably closer to 110 meters per second. Pressure altitude has gradually recovered getting closer and closer to our actual height, but it's still only about half that. It was stuck on 2,000 ft when we were up at 10,000 ft. So it appears as though, since we've been flying steady at about 15,000 ft or about 550 mb, that it has been slowly trying to work its way somehow up to 550 mb because now it says 770 mb, 767. I must have something in the line. I'm not clear. Maybe it's just not hooked up.

12:25 AM

PH: Ken?

KM: Go.

PH: I had a report from the P-3 flying at 8,000 ft. They're not encountering nearly as much icing today as we've had on previous flights.

KM: That's good.

PH: Yes. I think it's because we've got a higher cloud top, so we're getting many more crystals falling through the cloud and getting rid of the droplets.

12:27 AM

PH: So we just started our return leg to the west. We'll be descending steadily to end up at 14,500 ft at our westerly point. Ken, I have a new easterly point for you.

KM: Easterly or westerly?

PH: You have your westerly, don't you?

KM: Yes.

PH: So I'll give you your new easterly when we do our return trip back to the east you'll be heading to the following point. Are you ready?

KM: Go ahead.

PH: 44°25.3'/121°42.9'.

KM: Roger, 44°25'/121°43'.

PH: 25.3', and we'll be heading back there to the east at a steady altitude of 14,500 ft.

KM: Okay. We'll stay at 14,500 ft when we get there for the point east.

PH: Correct.

12:28 AM

TW: I don't think the true airspeed is right, but we're getting a true airspeed other than 80.

PH: At least it's moved from 80. We should be flying close to 80 meters per second now.

AR: I don't think so at this height, Peter. You might check with Ken though.

PH: Okay. Let me check. Ken, what is our true airspeed now?

KM: Standby.

12:29 AM

PH: Our windspeed is not correct and we still have the wrong p-alt.

AR: Roger, and I think that comes from the bad true airspeed.

KM: About 200 knots.

PH: Okay. 200 knots true airspeed.

AR: Roger. So we should be somewhere around 100 meters per second, 95 to 100.

PH: Yes, so it's reading about half.

AR: Yes, I'm reading 80. Maybe you're getting a different feed than I am. I've got 80 and 54 meters per second.

PH: Well, it's reading 55 now, meters per second, on the output.

AR: Right. That should be the Rosemount and we should be say around 95. As we get lower we'll probably get a little bit closer to that 80, 85. I don't think you like to get too slow with the possibility of icing. I think that's another factor where we might be a little bit over the research speed we would really like to have.

PH: Had a report from the P-3 at 8,000 ft. They're not encountering much icing. So I think the higher cloud tops today are helping us in that respect.

AR: Right, that and at least the predicted wind at 700 mb was only going to be 20 knots according to the MM5 for 00Z in this area, and so that's about a half to a third of what we saw. It's not coming up the slope there fast to lose condensate, so that helps too.

PH: Right.

12:32 AM

PH: FSSP is showing about 0.05 grams per cubic meter at this time.

AR: Yes, and those might be ice crystals. There is no icing on the Pilewskie rod here.

PH: No icing on the windows at all. There probably are a few ice crystals.

AR: Right. I would think though even with that 20 knots we'll pick up some liquid water down around, I don't know how low we can get today, 10,000 ft. If we get to 10,000 ft I would think we would see somewhere along this track.

PH: The wind direction is not too bad.

AR: I don't think it's 315° though.

PH: I don't think it's correct. I'm reading 310° from true.

AR: The models are going to have quite a bust if that's a correct wind direction. It should have been about 270°, maybe 260°. But then again as we slow down, and apparently that 80 is a default value, as we slow down those winds will get more accurate.

12:33 AM

PH: It looks as if Art has given up on the CPI, but the other instruments are working okay.

AR: I'll probably come back and try again. I'll just keep trying off and on the whole flight.

12:34 AM

TW: I think this monitor will only support 1024×768, which is what it is now, and only 256 colors. So I think it might be the wrong monitor for the job.

PH: That's if we change the monitor?

TW: Well, this computer changed. I don't know if maybe it requires a better monitor now or not. Maybe we should call SPEC and maybe if they have a flat panel monitor recommendation.

PH: Why don't you talk to them about that? It's probably better for you to talk to them than Art on that issue.

12:35 AM

PH: So as we've descended to 14,500 ft, the appearance is that we're getting larger crystals on the 2-D than we had at 16,000 ft.

12:38 AM

PH: The HVPS stopped 3 min ago.

12:39 AM

PH: Tom, can you do anything to try to restart the HVPS?

TW: I restarted it a couple times. I can recycle power, but then you always have the problem of ruining the 2-DC.

PH: Yes, I don't want to do that.

12:41 AM

TW: I've requested Don to have separate ways of cycling power, but, of course, that's more wire.

12:42 AM

PH: Is your experience that cycling the power does bring the HVPS up?

TW: Not really, no. Sometimes it does go into kind of a sleep mode when it gets overloaded and it's trying to regain a background of what lasers of its array are active, but that should only take not more than a minute, I don't think.

PH: Up at this level the 2-D data is more important than the HVPS, but lower down the HVPS will become more important.

12:43 AM

TW: I am getting diagnostic data from it, but nothing that really says if anything is wrong. I'm getting like all the temperatures and they look about right.

PH: Okay.

TW: So the probe is still alive out there, it's just not sending us any data.

12:44 AM

PH: Ken?

KM: Go.

PH: No sign of any icing here.

KM: Can you look forward and see the right-hand pitot tube?

PH: I just did, but I can't see any icing. There's no icing on my window. Tom, I think we should risk a recycle and see if we can bring the HVPS up.

TW: Okay.

KM: If you look out now, you'll see that we're going through a fair bit of precip.

PH: Yes, but it's all ice crystals, which is not going to ice you up.

12:45 AM

AR: That's right, Ken. If there's any icing, it's going to be in some stratocumulus clouds that are still below us.

TW: Art, is it okay if I turn off the CPI?

KM: We're concerned with our right-hand pitot tube is in and out.

AR: Say again, Tom.

TW: Is it okay if I turn off the CPI up here?

AR: Let me just come up one more time and I'll just check it for one more second.

12:46 AM

PH: I wonder if work they did to bring the pilot's airspeed indicator up could have interfered with our connection to the true airspeed rather than what Charlie did?

TW: I don't know the logistics of where everything is at. It looks like it's reporting wrong to the Shadin also because the Shadin is not getting a true airspeed either.

PH: So we need to talk to Calvin about that.

TW: I'm cycling power.

PH: We're going to try recycling the power to see if we can bring the HVPS up even at the risk of losing 2-DC. Okay, both are up again, the 2-DC and HVPS.

AR: That's how we fix things, turn them on and turn them off.

PH: Could it be a problem with our power supply rather than the instruments?

TW: I have no idea. Actually, I've perused the information.

KM: Peter, is your true airspeed indicator working now?

PH: No, I'm afraid it's not, Ken. I think during the work that was done on your airspeed indicator, they must have disconnected a wire that gives us our true airspeed.

KM: Our airspeed indicator is working now. It wasn't working when you had asked before what we were getting. When we had to abort the other time because of the airspeed indicator, was your true airspeed indicator working?

PH: We had true airspeed on the last flight. We haven't had any true airspeed of any worth on this flight. So I think something happened, a wire was disconnected when you were repairing your airspeed indicator.

KM: Our system should be completely separate from yours.

AR: I understand that we tapped off the co-pilot's true airspeed, but I'm not sure.

KM: We didn't touch any wires.

AR: I think it's a _____ top, but I'm not sure about that. Maybe a ___ with a transducer on it of some kind.

PH: The main thing is you've got yours, Ken.

12:49 AM

TW: We've been getting a reliable CNC-2 for the last half an hour or so. It was connected to the wrong A to D channel up here. I followed it, so we might have it for previous flights too.

PH: Okay. But not CNC-1?

TW: No, it's just reading zero down there, so it may be something in the hose or something.

PH: As long as we've got one of them.

12:50 AM

VS: I think the problem is with the tubing because when I unplug the inlet it starts working okay. I guess we just need to check this tubing.

PH: You mean the CNC-2 starts working okay?

VS: Yes, when I unplug the inlet it starts working okay.

12:51 AM

VS: Another problem is that it might be running out of butanol because when I unplug it I can smell it.

KM: We're at the end point, Peter, and in our reversal.

PH: Thank you, Ken.

KM: And holding 14,500 ft.

PH: Right. Thank you.

VS: The CCN was working for like 2 min, but now it doesn't want to work any more.

TW: I've removed the connector for the true airspeed on ours just to see what effect that would have and it's having an effect but not a good one.

12:52 AM

PH: Ken?

KM: Go.

PH: I have a new westerly point for you.

KM: Go ahead.

PH: 44°22.3'/123°12.8'.

KM: Roger, 44°22.3'N/123°12.8'W.

PH: That's correct. As we proceed from our easterly to our new westerly point, we'll be descending steadily to 13,000 ft at the westerly point.

KM: When we do our reversal, do you want to slowly go down to 13,000 ft. You were cut out there.

PH: That's correct. Slowly go down to 13,000 ft.

12:55 AM

PH: We're still getting basically irregular crystals here at 14,000 ft, but they're more plate-like now. They were more prism-like at 16,000 ft, more plate-like at 14,000 ft, actually 14,500 ft.

12:56 AM

PH: When you make those changes, Tom, record it on the tape so we know what's going on.

12:59 AM

PH: FSSP is the only liquid water instrument that's responding up here, probably responding mainly to ice crystals. Don't have any output at the moment from PVM. We know the J-W is not working.

1:00 AM

AR: I'm back in the bubble here for a minute as it gets dark and looking for some icing. I see no sign of icing.

TW: The default now is 100.

AR: Roger, copy.

PH: That's 100 meters per second true airspeed that's been put into the calculations for particle concentrations and other TANS measurements?

TW: Yes.

1:02 AM

AR: I see no sign of ice back up at the top of the vertical stabilizer by the strobe light back there.

PH: Ken?

KM: Go.

PH: My feet are getting awfully cold back here. Can you give us anymore heat?

KM: Give you all we've got.

1:03 AM

VS: Did you recycle any power or something?

1:05 AM

AR: Tom, on the 2-D display here on the particle concentration versus time, am I able to change the time range for minutes ago, which is 6 min now, could I change that to 60 min by alt-left button?

1:08 AM

VS: The CCN is working okay now. I don't know what happened but the detected voltage is within a good number no. It's working fine.

PH: That's good.

1:10 AM

PH: Tom, if that CNC-1 seems more reliable than CNC-2 maybe you should switch my readout or vice versa, whatever it is. In other words, put the more reliable CNC on my readout.

TW: On your strip chart or the text display?

PH: On the strip chart.

1:11 AM

PH: We're approaching our easterly point.

AR: No moon visible yet and I suppose it comes up later where we have had a near full moon lately. I'm back here in the bubble and I don't really see anything. There is no cloud feature evident. It looks like a trace of ice on the Pilewskie rod here. It looks like we picked up a trace of icing here on the Pilewskie rod and up on the tail strobe light, lighthouse.

PH: The FSSP is reading about 0.05 grams per cubic meter.

1:12 AM

TW: I changed your strip chart.

PH: Thanks.

1:13 AM

PH: Going a little further east on this leg.

AR: Notice how the wind is going eastbound again. I just looked that is from northwest instead of the west we had going westbound.

1:14 AM

KM: Peter, we're completing our turn at the easterly point and we're just about to roll out on our westerly heading. We're being held up here for a little while because of the P-3.

PH: Okay. So then as you head back to the west you'll be descending steadily to 13,000 ft.

KM: Right. As soon as they let us out of 14,500 ft here.

AR: The temperature indicates -20°C at 14,000 ft roughly. That would agree with the model predictions of about -12°C at 10,000 ft for 000 Z; $4,000 \times 2^{\circ}$ per 1,000 ft pseudoadiabatic lapse rate. We're looking at -20°C . Lots of quasi-spherical crystals and maybe some short columns in there. Generally the sizes are less than the full width of the 2-D ray maybe running 300 to 500 or so most of them, the larger ones. Haven't seen any aggregates to speak of and, of course, you have to keep in mind that the true airspeed is not quite correct so they're not going to be dimensionally correct here on the 2-D display. We're assuming 100 meters per second. We may be a little bit below that now in actuality. Every once in a while I'll see something that looks like a bullet rosette, but most of them do not look like bullet rosettes. I suspect that we're not reaching up or at least those crystals that might be up at -30°C and cirrus levels aren't getting down here at the moment. This is an evaluation over the last couple of minutes at 011700 UTC.

1:17 AM

PH: Ken.

KM: Go ahead, Peter.

PH: Have we got permission now to descend to 13,000 ft?

KM: Yes. We're slowly going down.

PH: Very good. Thank you.

1:21 AM

AR: Disregard those comments I made about ice crystals. Only now have I realized that the small window I had for the 2-D display did not cover the larger particles which many, many, many of those are indicated to be bullet rosettes and having come down from the low temperatures indicated on the satellite imagery for this system, which now makes complete sense. What I was looking at before was the small size range, which I keep wondering why are these looking so small and they're not growing in size as we descend in height, which is of course crazy. Then by expanding the window all the way across the screen I'm just able to see the largest particles that are accepted. What a gaffe! Good grief, so please

disregard all those previous comments I made about ice crystal types. They are, in fact, lots of bullet rosettes, lots of amorphous aggregates of some kind. They're probably small aggregates.

KM: Peter.

1:25 AM

KM: Peter.

PH: Hello Ken.

KM: We're going to have to break this off. We've lost both of our airspeed indicators.

PH: Oh dear.

KM: So we're getting vectors for lower altitude.

PH: Okay. So the pilots have now lost both of their airspeed indicators so they're breaking off.

AR: Roger. I notice the HVPS has quit here again.

PH: Yes. Let's start it up again.

AR: It looks like it's been dead for about 10 min now.

PH: Just when we get anything going here by way of a comprehensive data set we have to break away.

1:26 AM

AR: Here comes the HVPS again. Great.

1:27 AM

PH: As we've descended here on this westerly leg, we've progressively encountered bigger crystals. We restarted again and got the HVPS up.

AR: I'm starting to pick up some liquid water.

PH: So it can't be icing that's causing this problem with their airspeed indicators.

AR: No.

PH: Why are both gone now?

AR: Yes, that's really a mystery.

TW: I've noticed on the Shadin that things like pressure altitude is reading like 6,000 ft, which doesn't seem right.

PH: It's been doing that all the flight. It's been off, you now, wrong.

TW: Indicated airspeed is even slower on the Shadin. It's only 38 meters per second.

AR: I'm getting a default of 80, but you're able to read the actual value?

TW: There's the true airspeed and an indicated airspeed. We default the true airspeed because we use it a lot, but the indicated airspeed we hardly ever use.

PH: Ken.

1:29 AM

PH: Ken.

KM: Go.

PH: Are both your indicators still out?

KM: The pilot's just came back in and maybe the co-pilot's is coming in.

PH: Good. So you're not breaking off?

KM: Yes, we're breaking off, Peter.

PH: You are? Do you want to go into Salem and see if you can fix it?

KM: I don't think there's anyway we can fix it. This is a repeat squawk on the right side and then having lost the left side. Well, we did an awful lot of digging before and came up with a burned out element, but that was it.

1:30 AM

PH: Ken.

KM: Go.

PH: There's one thought that maybe one of the P-3 aeromechanics might be able to help us out on the ground because they've had a lot of experience of flying in

hurricanes with lots of ice in them. Maybe they've had the same problem assuming it is flying in cloud, although I doubt it.

1:31 AM

PH: We're stuck again.

TW: I need to shut down this then. Art?

PH: Close this down. We're still getting good data here. They've broken away from the research pattern. Down to 6,500 ft and still getting data from the 2-D, but the HVPS stopped and Tom has just started them up again. They're both going again now.

1:34 AM

PH: Just went through Sweet Home.

(End of Tape, Side One)

1:35 AM

PH: Just going through the freezing level here and picking up our highest liquid water so far. Still picking up crystals, columns. Went to about 0.5 on the FSSP, only to about 0.3 or so on the PVM. Still keeping on our westerly track.

1:36 AM

PH: Picked up 0.85 on the FSSP there. Still getting crystals.

1:37 AM

PH: Ken?

KM: Go ahead.

PH: Are you going to land?

KM: Yes, we're going into Eugene. Our airspeed indicators, both of them, are dead two thirds of the time.

PH: Okay. Landing in Eugene.

1:38 AM

KM: Husky One.

1:39 AM

VS: The CN counter was working okay, but now it's showing this fueling command.

TW: It probably means it's run out of butanol.

VS: If you filled it before the flight, then it's kind of hard to believe.

1:40 AM

PH: Ken?

KM: Go.

PH: I've asked Mark to contact all the homes of the various people on board to let them know that we might possibly have to spend the night in Eugene.

KM: Thank you.

1:41 AM

TW: I'm shutting down, Peter. The server didn't close.

PH: Okay.

1:41 AM

PH: I didn't get a chance to shut down completely.

TW: I shut it down for you.

1:42 AM

Summary of UW Flight 1895*

This flight took place in a deep frontal cloud shield with light westerly flow and rather low temperatures (-20° C at 600 hPa). Malfunctions of the pilot's airspeed indicators caused an early termination of the flight and landing at Eugene, Oregon, for a repair of the instrument overnight in Eugene.

Cloud and ice crystal observations were not made en route to the research site flight by the Flight Meteorologist (FM) due to the considerable amount of time spent in attempts to get the CPI started. Despite numerous attempts, the CPI could not be made to

* No verbal summary of this flight was recorded onboard the aircraft. This summary was written post-flight by A. Rangno and P. Hobbs.

work. Also, the 2-DC probe did not function during the ferry leg but began to work just after the beginning of the first W-E research leg heading toward Santiam Pass at 16,000 feet MSL. The PMS 1-DC probe had high (>1000 per liter) counts in clear air, making its data questionable.

The true airspeed (TAS) measurements were also subject to malfunctions or errors, which prevents the calculation of reliable winds at flight level and accurate sample volumes for the probes (estimates of TAS will have to be used for particle sample volumes). Finally, pstat (and thus, pressure altitude) did not work properly, with pstat indicating erroneously high pressure (e.g., 928 hPa when the plane was at 16,000 feet MSL).

Virtually no icing occurred on this flight in a featureless ice cloud (as indicated by only traces of icing on the airframe at the time of the termination of the research portion of the flight at about 0125 UTC). During the rapid descent to Eugene, the aircraft passed through the only appreciable liquid water cloud (maximum liquid water contents of a few tenths per gram per cubic meter) beginning at about 7000 feet and terminating near the surface at Eugene.