

SONDRESTROM DIVERSION

Original idea from Captain Peter Waddell, Air Canada (1998)

Are you crossing the Atlantic today ? It could be a good idea to read the following article (before)...

We were the second Air Canada flight in seven years to go into *Kangerlussuac*, formerly known as *Sondrestrom*, Greenland.

Because diversions are so rare, I thought it might be of interest to other pilots to hear of our exploits and to dispel some of the myths of *Sondrestrom*. Also I do not think we do enough "hangar flying" enough talking amongst ourselves - of what we do and what happens when we do it.



So in the hope of fostering discussion, I will give as much detail as possible so everyone can second guess our decision making. Our flight, AC 850, left *Edmonton* for *Calgary*, then departed *Calgary* for *London Heathrow*, at 2155 p.m. The flight plan called for a northerly route to take advantage of what wind there was to push our 767-300 toward *London*. Everything was normal as we flew toward 69N/90W, so I sent the relief pilot back for the first rest period. I prefer being up for the oceanic clearance so I arranged to take the last rest, leaving the First Officer with the middle. We planned *Yellowknife* as the first alternate up to 90W, followed by *Sondrestrom* to 20W, and finally, *Glasgow*. Weather was not a problem at any of the alternates, but *Keflavik* was forecast to be down to 400 broken by the time we would overfly Iceland, although visibility was supposed to be good.

Approaching 90W, I noticed that the oil quantity was dropping. Up to this time the First Officer and I had been discussing diversions, where to find the charts, what sort of approaches were to be had, the limits, the runway lengths, the weather to be expected if we were to go at the worst time, our possible weight etc. I like to do this to refresh my memory and also because as more new crews come on the equipment, not all have had the opportunity to dig into the charts during a flight over the North. It adds perspective to problems and makes the quiet of the night pass more quickly.

We checked the logbook for oil checks and saw no oil had been added for some time indicating a good engine until we took it over, so we assumed that the loss was probably real. Next, we attempted to get a phone patch to dispatch. While there is good VHF coverage all through the north, there is no chance in that area of getting more than Satcom Dataplus. A message was sent to dispatch indicating possible trouble and to obtain maintenance perspective on the subject. "Probably an indication problem", was their reply; no, oil does not drop so methodically for indication problems, I thought. The F/O reviewed page 21.20.14 regarding Boeing 767-300 oil quantity.

The QRH 1.14 was quite explicit for oil quantity loss - if the pressure and temperature don't change, press on. But there was something unnerving about watching oil disappear .. 4, then 3, then 2, then 1 liter, and then to sit for the next two and a half hours with zero on the gauge. It had a rather hypnotic effect ! The oil was gone by the time we were north of 70N. Now this is where one can start to second guess, would you have returned at the first indication of trouble, a flight back to *Edmonton* some 2 1/2 hours away; would you have gone to *Yellowknife*, 2 hours away, a 7500 foot strip with good facilities, or would you proceed to *Frobisher*, where the weather was not as good, but the distance would decrease to about 400 miles before increasing again.

I elected to press on and advised dispatch of the decision. I did not inform the Flight Attendants at this time. The First Officer was unable to sleep during his rest, so he came back up. We crossed 70 W and 60 W at 73N, some 300 miles south of Thule, Greenland. Oceanic cleared us as per the flight plan to cross 40 W at 72N. HF was pretty fair with Iceland. We ran up a good bill using Satcom for weather. The three of us discussed our options in the approved CRM manner; however being an optimist I might have been a trifle overbearing in my expectation to make *Glasgow*, at least. We did make one decision - diversion would commence at the first reasonable indication of other faults - be they temperature or pressure. The decision was not scientific, but it was felt that as soon as the engine showed a pressure drop, or differential with the other engine of 20 psi, we were going to divert. Remember, this is a -300, the oil pressure had remained at 189 psi on both sides for the entire flight and the temp was 103 on both. It was just that wretched "O"! We climbed to FL370 prior to 40W, and made a position report passing, 40W.



Fifteen minutes later we got the distinct feeling, that, yes, the pressure on the right side was, in fact, dropping. Was that the result of the climb? Let's wait for the 20 psi. Okay, that's it, make a Pan call and request clearance to *Sondrestrom* 360 miles southwest. The clearance from Iceland came through, via HF, in a few minutes. The In-Charge was advised of the diversion, and with no prompting asked all the right questions regarding the landing and what was to be expected of her crew. I jumped on the radio a couple of times ahead of the First Officer, who was PNF and he, quite rightly, suggested we maintain our roles. Iceland changed our HF to allow a phone patch to dispatch, a very useful feature to supplement our datalink, and we got a good clear link. By this time the In-Charge had briefed her crew and I told the passengers that we were diverting because one of the engines was not operating satisfactorily.

The power was pulled back as far as possible on the right engine to still maintain altitude. The First Officer and the Cruise Relief Pilot reviewed the approach the First Officer had put into the FMS. The diversion was made all the easier by the use of radar control on descent and the clear concise English of the controller. Prior to 40W we had discussed the approach in detail, a LOC/DME ADF to runway 10. The height of land climbs to 2800 feet in the vicinity of the airport and the missed approach is of note while the engine out route for takeoff is a left turn, the missed is a right turn - the specific headings become obvious as the terrain becomes visible.

The approach plate shows a number of fixes with altitude constraints. There are only three listed in the FMS CL 10, FL 10 and ML 10, these represent the fixes at 17, 10 and 3 miles with altitudes of 3300, 3100 and 476. We extended the centerline from the SF NDB and consequently lost the constraints - a thing, to watch for.

"What distance out would you like to intercept?", asked the controller. *"14 miles"* was the answer, and that is what we got. A good localizer signal was received and as we got lower and visual we realized that maintaining the on course was important. The localizer follows the north shore of the fjord which gets narrower as you approach the runway. And, as you get lower, the hills rise steeply above you. The sun had been up long enough so that it was not directly in your eyes and gave us a view of extraordinary stark beauty. I had the help of two other pairs of eyes to verify distances and altitudes. The runway is 9500 feet long and has a pronounced upslope for a quarter of its length. (rather like the round down on a carrier!) The PAPI is on the left side at 3.2 degrees. We kept the engine running all the way in to avoid an in-flight shut down and it behaved well.

On roll out the tower asked us to follow the "Follow Me" for parking on the north side. A sharp 180 degree turn put us over the fueling pits and the engines were shutdown. A voice came over the radio saying, "This is the mechanic, what can I do for you?" As the 60 manual states, the mechanic is qualified on the B767 and PW4000. In the manual will find Sondrestrom listed under its new name of Kangerlussuaq. The stairs were rolled up and the Airport Manager asked, "*What can I do for you*", to which I replied, "*What do you have here?*" "*We are a full service International Airport, what would you like?*" "*Give me ten minutes to talk to the passengers and make a phone call to dispatch.*"

I then went through the cabin and personally explained to the passengers what the situation was. I did this for two reasons. First, the passengers and Flight Attendants need reassurance after the trauma, however minor, of a diversion. Secondly, I think it is very important for all of those in the cabin to be able to put a face to the voice over the P.A. and actually see the person in charge in case they need something. Next I made a call to dispatch. Here I made sure that it was a conference call to maintenance and dispatch to-ether, so I didn't have to repeat myself. Everyone can then hear the same story, can ask their own questions and everyone hears the answers. The mechanic needed faxed authority to open up the cowl, and this was duly sent.

The passengers were escorted to the terminal, a modern building capable, of housing several hundred in a pinch. The other side of the terminal is a hotel and restaurant. There are other rooms available on the far side of the field. The 10,000 USAF personnel are no longer in residence. The mechanic requested and received faxed permission to add oil of a slightly different specification. We interrogated the Mech. EICAS and found the engine had 4 liters of oil after it all drained down. We cranked the engine and found the leak. I asked Air Canada maintenance for the company personnel but this was denied, much to the relief, I might add, of the Greenland mechanic. The line that had failed was the main filter to the engine supply. A line that had an alert on it was to be fixed at the next C check. The third, and hopefully final, fix that Pratt and Whitney had prescribed.

While this was going on we made meal tickets available to passengers. Here again, to keep the visibility of the crew in front of the passengers, one of the Flight Attendants volunteered to hand out the vouchers -a gesture that was much appreciated by everyone. To keep the passengers informed as events unfolded, I was allowed to use the terminal PA. The airport manager had suggested that a passenger list be faxed to him so that if we needed rooms, the assignment could already be done. STOC accommodated him immediately and when it came time to call a halt to the operation, after being on the ground for 5 hours, all was looked after in short order. Air Canada decided to send in a replacement aircraft with mechanics and parts, and it arrived some 8 or 9 hours later at 9 o'clock in the evening. Our mechanics, with assistance from the *Greenlandair* mechanic, had the original aircraft fixed at 5:00 a.m. the next morning, and we ferried to Toronto half an hour later.

As you can see we received excellent help and professional service at all levels. The engine was not shutdown, so we maintained and did not endanger the ETOPS qualification. There was no damage to the engine. I spoke to the Manager, Powerplants, and he pointed out some notes of interest. The static oil quantities of the 4000 are right/left engines -35/29, the initial start up gulp swallows 12/9, the tank quantities 25/22 - though this later will change as mods. are incorporated and differences will become less obvious. The pressure in a situation such as ours should not be allowed to go below 120 psi. The temperature should remain constant with fuel cooling. Some additional points to ponder. We had lots of time to think and react. We did not have to descend and think about minimum enroute altitudes across Greenland. We were not on the NAT tracks, so deviation was not a problem with RVSM (here I wonder what happens when pilots take it upon themselves and offset to avoid nuisance TA/RAs). Then what would happen in an RA if an aircraft is in a descending turn following a power loss only to meet an offset aircraft just below who climbs ? Also, if the pressure had held until over Iceland where would we have diverted to ? Would it have been a good idea to have continued across Glasgow, about 2 hours away ? I do not have to think quite so much about this now as the Company has given me two more engines... on the Airbus 340, so diversions are hopefully even more rare !