

## **Five endless minutes on an NDB approach at Shoreham**

by George Irvin

Yes, these 'learn about flying from that' pieces do have a dreary sameness about them. "I took up the machine having forgotten to (get the weather/do the walk-around/take flying lessons) and the following awful incident occurred which nearly cost me my (life/ bank account/ marriage) and which I promise never to do again; reader take heed---there but by the Grace of God!"

### **The Plan**

I myself, being a thoroughly sensible pilot, always scrutinise the weather, do my pre-flight checks with meticulous care and observe that ancient adage of the old and unbold that the final no-go decision is taken in the take-off roll. I even read articles about icing in *Pilot* (a particularly good one appears in the November 1996 issue) What prompted me to write this piece is that despite these virtuous practices, I nearly came to grief a few weeks ago.

On this particular occasion, the problem with my aircraft was that the autopilot was u/s, the pitot heat suspect and the ADF not particularly reliable. I wanted the AP fixed before a long flight the following week, and I had had the pitot tube on my squawk list for some weeks. Although it warmed when checked by hand on the pre-flight inspection, it was drawing only 2-3 amps. (The dual element pitot-heater in an Arrow should draw just over 10 amps, and more if the gear retraction sensor mast is heated as on the Arrow III and IV.) The closest trustworthy AP specialist I know is based at Shoreham---two hours away, but well worth the trip because the AP work could be done straight away, and the pitot heating element replaced if necessary.

### **The Flight**

Hence, on a cold clear morning I set out with the destination forecast calling for good visibility and some scattered to broken cloud (no CU) at 3000 feet. The cloud base was slightly lower and thicker at my alternate, EGHI, beloved for its familiar ILS to all who have travelled the IR route at Hurn. The trip at F100 was uneventful and benefited from a good tailwind. The non-turbo Arrow purred along happily showing 125 kts at 55% power, making 155 kts GS and sipping 32 litres (just over 8 US gallons). Fellow Arrow enthusiasts will share my appreciation of the aircraft's felicitous combination of speed, range and economy.

When handed over to London Control I was given the 'standard routeing' KONAN-LYD-SFD. I was then handed over to Gatwick Director whose controllers, though always busy, always seem happy to accommodate an aircraft which takes forever to scroll off the screen (Cheers, Mike!). On top it was pleasant and sunny, but the thin deck below looked slightly thicker to the West. I got the Shoreham weather which was still much as forecast though now BKN 010 and 5 km with a temperature and DP of M2/M3. West of Lydd descent was requested and we were cleared direct SHM, descending to 3000 on the QNH, though 'RAS only' leaving CAS below F060.

By keeping power not below 15", enriching the mixture slowly and targeting a 6-700 fpm rate of descent, the speed builds to about 135 kts and the engine stays comfortably warm. By the time I left CAS, though, I could see that the cloud deck below reached well above 3000 and was solid. Shoreham's NDB-DME plate for R-03 calls for 2000 feet overhead the NDB, outbound on a southerly heading and down to 1360' by D 5.5, then a right-hand turn to intercept inbound QDM of 025 with the descent beginning at D 4.5 to an MDA of 460 with 1600 metres. The Shoreham ATIS was off the air but APP passed the weather as OVC 900 and 3000 metres in light snow. The tops were generally at 3500, I had 10 nm to run and the OAT was zero so (even allowing for any ram rise) there was a slight inversion.

### **The Trouble**

You don't have to be a rocket scientist to guess that there might be ice in such cloud, though being stratoform, ice would not form from large supercooled droplets. Shoreham cleared me to the beacon at 2000' for the procedure.

First decision: should I descend or should I to remain at 4000' until the beacon, using the long outbound and inbound legs to complete the descent through possible ice more rapidly? I elected to descend now.

Yes, there was ice. As I approached the beacon I could see rime crystallising outward from the leading edge. There was no flowback so the droplets must be fine, but this not the fine white powder rime associated with light icing, it was the more dangerous latticed rime of near plasticine consistency which usually defies even wing boots. The ADF needle swung 'round, I pressed the stopwatch, called beacon outbound and was asked to report completing the base turn. I silently recited my BUMPFF checking brakes, fuel and advancing the mixture.

Second problem: the ADF needle tip suddenly swung dead ahead as though the aircraft were still heading towards the beacon! Second decision: continue the procedure or break off?

### **More Trouble**

At this stage I should tell the reader that I carry a Garmin 90 backup into which I had programmed the full Shoreham approach including the outbound and inbound waypoints and the Rwy-03 threshold. Moreover, when outbound over the Shoreham NDB there is coastal effect to contend with, the beacon is as weak as a LOM and there could be ice on the aerial.

The GPS backup confirmed that I was outbound on track, so I continued outbound and the ADF needle slowly swung back to a sensible reading. With a brisk tailwind, I was soon at D 5.5 and started the inbound turn advancing the power to 22" and levelling. There was more ice on the leading edge so I advanced to 23"/2300 and retrimmed.

Where was the inbound course? The ADF needle stayed slightly ahead of the DG so the turn was coming good; yes, I was inbound on 020 looking for 025. With light port drift, I

could nail it easily and the altitude was good. I called "base turn complete" and received an acknowledgement. But in the corner of my eye, the GPS was telling me I was well to the right of my inbound course! The ADF started to flicker again. I turned 10 degrees to starboard. The GPS and DME cross checked sensibly on my distance out and, a mile before the FAF I completed the checklist. I started the watch, lowered the gear and selected one stage of flaps which generally gets me descending from the fix at roughly the right rate. Edging the prop control fully forward and retrimming with 18" of MP will usually suffice to keep the speed at 95 knots.

My scan crossed the VSI. I was descending far too fast! My scan came to a dead stop at the ASI: it read zero! There's an old joke about a BA Mayday call to Dublin Control to which the reply is: "Speedbird 123, repeat after me: "Our father which art in heaven.....' . Later, I had a good laugh about this with the Shoreham controller. For the moment, I invoked the pilot's holy trilogy: Aviate, Navigate, Communicate.

This was not the first time I had seen a dead ASI. It meant static port okay, pitot frozen. When in doubt about speed, fly attitude and numbers. My course was still good. Slowly, I advanced the RPM and brought up the power, first to compensate for the drag produced by the finer pitch, then to compensate for the extra weight and drag. Still going down too fast---I added more power, conscious of an iced aircraft's increased stall speed. At 23" I had stabilised the descent and the aircraft was in trim.

The leading edges now carried, conservatively,  $\frac{1}{2}$  to  $\frac{3}{4}$  of an inch of crusty latticed rime and the tailplane probably far more. Thankfully, the ice had not crawled far up the windscreen. The airspeed was still reading zero, but at 900' the sea was visible below and I was breaking out. Less than a minute later I was at the MDA. Where were the lights? The ADF started to swing erratically as we crossed the coast; the GPS showed less than half a mile to the MAP and on course, roughly fifteen seconds to find the lights. I could see the ground and, hazily, the railway line some white buildings. I have flown this approach dozens of times. I always see the same white buildings and the PAPIs are to the left of them.

Where were they? Concentrate---prepare to miss the approach. A dangerous factor in the single pilot IFR approach is the overwhelming urge to concentrate on finding the lights. Think about the missed approach! Count off the seconds to the MDA! THERE! ... there are the PAPIs and, just coming into focus ahead of them, Shoreham's ludicrously inadequate lead-in lights. A slight drift correction and I was over the threshold. Leave the flaps where they are, bleed off the speed but keep a healthy margin....once on, an iced aircraft will remain earthbound.

#### The Post Mortem

We dragged the Arrow into a cosy, warm hangar and let it thaw and dry out. Within a few minutes, some surprisingly large chunks of ice had dropped off the leading edges and there was more on the tail. It's not what one would call a really serious icing encounter---the aircraft wasn't coated like an iced lolly. But it was an encounter with a cascade of problems: ice accretion and loss of airspeed requiring more power, loss of the ASI and a

weak ADF aggravated by coastal effect and weather conditions. It was the sort of situation in which the dominoes can tumble quickly. Had the aircraft been fully laden or the icing been more severe, I might have needed my maximum power reserve---not much with a single IO-360. Without that reserve, there can be no missed approach, particularly at Shoreham which requires a relatively good climb gradient to avoid the hills to the North. Had I not previously encountered loss of the ASI, I would not have immediately diagnosed pitot heat failure, a conclusion supported by the pre-flight evidence that one of the heating elements was dead. Had I not backed programmed the entire approach into my GPS; had I not been thoroughly familiar with that approach----and so forth.

While the engineers worked on the Arrow, I went up to the Tower for a friendly chat with the duty Controller and watched the VDF cathode display as another aircraft did the approach well to the right of course. "The beam's particularly bent today" he confided. Later that day on departure, having verified the tops were unchanged, I popped out into the blue at 3500' with hardly a trace of rime.

Somebody reading this is certain to argue that I should not have flown the approach in the first place, nor continued it once ice was encountered. Technically speaking, since no ice was in the forecast nor was any reported, the decision to begin the descent justified. Yes, but there was every reason to suppose that there might be ice once in the cloud, and the approach should have been broken off. One could argue here that since the weather was moving from the West, a diversion to Southampton might have run even great risk.

Another point---with which I would now agree---is that I should have elected to remain high outbound, and descended only in the turn and inbound thus minimising my time in IMC. One could argue endlessly about these points. I don't suppose there are many pilots who, with hindsight, wouldn't say "Had only I known, I would have decided otherwise".

I have never thought the 'ice purist' argument----"never fly a non-deiced aircraft near a cloud if the temperature is below freezing"---to be helpful. First, the argument is unrealistic: sooner or later any IFR pilot is going to encounter ice whether in winter or summer. More generally, categorical imperatives of this form are not only unhelpful, they are positively dangerous because they work against developing the knowledge and judgment essential to IFR flying in winter.

Elsewhere I have written at length on heeding certain key rules of winter flying. Every serious IFR pilot has his or her own. The key element all rules share is simply "always leave yourself a way out!", to which I would add "far better the devil you know than the devil you don't." Did I break this key rule? I am still mulling it over.