Notes of conversation with Wilf Smith, 3 July 1997

Wilf Smith was about 80 years old and lived with his wife at South Lodge, Kingstanding, Needwood. He had resided and worked in the Needwood area all his life. Although his memory of events was very good, he confessed his recollection of dates could not be relied upon (except for the explosion at Fauld in November 1944).

Wilf was born around 1917 and lived during the pre-war years in Brick Kiln Cottages[1]. For 4 years[2] prior to the outbreak of war he was engaged as a carpenter's labourer on the construction of RAF Fauld, working primarily in the mine helping to make wood shutters. The arduous work affected his health and he was later released to return to work on the land.

Before the war Crossplain Farm was owned by Ernest Tipper who moved to live at Gratwich, near Uttoxeter, when the Air Ministry compulsory purchased the farm . Mr Tipper's farmland covered only the east 'half' of the aerodrome, the west belonging to the Duchy of Lancaster[3]. At this time Kingstanding Hall was owned by a Mrs Fort, who also left the area when her property was requisitioned.

After leaving Fauld mine Wilf worked for Mr Joab Harrison at Middle Linbrook Farm. Mr Harrison farmed about 100 acres in the vicinity of his farm buildings. Wilf also got contract work[4] with Tarmac who laid the runways at RAF Tatenhill and later with Douglas Concrete who built the perimeter roads. During the rest of the war Wilf worked for J W Page (of Kent) employed in cultivation work on the aerodrome site, later taking over the contract from them. During this time he moved to live in Home Farm, Kingstanding.

He and his wife well remember the planes flying from the aerodrome and the constant activity during the middle years of the war. They also remember POWs being kept on the Kingstanding site for a while before the Fauld explosion. The "War Ag" officer was based at School House, Hoar Cross. Of the people Wilf knew he especially recalled Squadron Leader Cox and Wing Commander Goodbody who both became good friends to the family.

Although the aerodrome closed in 1947 the RAF remained there for some time, finally auctioning off the lands circa 1954. The Duchy of Lancaster bought all the land south of the B5234 on condition that the airfield be made available to Ind Coope Ltd[5].

Today, the cottages at Crossplains are all that remain of Mr Tipper's farm. Numbers 1 and 2 are privately owned with 3 and 4 belonging to David Hall.

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1 At SK142272? (check).

2 Circa 1935-39?

3 The division may have been along the former parish boundary directly south from SK156246.

4 About spring 1941?

5 It seems that the Bass family owned land on the eastern side of the aerodrome before the war, part of the Byrkley Park estate. The post-war deal with the Duchy regarding use of the airfield may be consequent to the death of Sir William Bass in 1952.

SOME THOUGHTS ABOUT RAF TATENHILL

One's memory 59 years after events occurred is not entirely reliable, but here are some recollections about flying at RAF Tatenhill in 1944. A royal Canadian Air Force officer, I received pilot training in Canada on North American Harvards, flew Miles Masters at 17 AFU at RAF Watton, and converted to Mustangs at 41 OTU at RAF Hawarden (and nearby Poulton). After tactical/fighter operations on Mustangs with 170 Squadron RAF, I was posted to the Flying Instructor Course on Airspeed Oxfords at RAF Montrose. My first posting as a qualified instructor was to 21 (P) AFU (Pilot Advanced Flying Unit) at RAF Tatenhill, near Burton-on-Trent, in early May 1944.

Having been stationed at a number of airfields in England, it's difficult to remember the particulars of any one of them. Tatenhill, called Cross Plains by the locals, was in a lovely rural setting. The officer's quarters, which were in a one-storey building, were reasonably comfortable with two officers to a room. The rooms contained small coal stoves. The toilets and bath houses were in adjacent buildings. Close by was the Officers' Mess. It had a main lounge with fireplace and a billiard table, a bar, a separate dining room, and a cloak room near the entrance. Its main shell was still standing when I last visited the site, although one had to step around cow dung to view it. We ate all our meals in the Mess when on base. Occasionally we had parties and dances there, but more often we went into town for entertainment. Not far from the officer's mess was the Sergeants Mess.

I can't remember much about the hangar line, which was probably quite standard. I recall there being a bicycle shop in one of the lean-to's, which was a busy place because almost everyone had a bicycle.

(The pubs in the area were well patronized. The closest was the New Inn on the nearby intersection where several roads (five I think) met. We also tippled at the Acorn at Rough Hayes, the nearby Burnt Gate and the Bell in Anslow. Sometimes we attended dances in Anslow's village hall.)

The AFU students had already graduated as pilots. Some had earned their wings on single-engine Harvard or Master aircraft; others had trained on twins, such as Cessna Cranes, Avro Ansons, and Oxfords. We instructed them on the twin-engine Oxford to prepare them for further operational training on bomber aircraft.

For pilots trained under the British Commonwealth Air Training Plan (BCATP) in Canada and who had not yet experienced flying in the UK, AFU provided a useful orientation to flying over England's terrain. Until one got used to it, navigating over this congested, confusing patchwork was a challenge. Nothing in the tangle of roads and railways ran in a straight line, and visibility was often reduced by industrial haze - so different from flying over Canada's open spaces, where the roads, railways and farm fences ran straight and the skies were more often clear.

To digress for a moment, the BCATP under whose auspices most of us learned to fly was the greatest undertaking of its kind before or since. Altogether the plan produced 131,553 aircrew, of which 72,835 were RCAF. Other trainees were from the Royal Air Force (including Allied nationals, such as those from South Africa and Trinidad), Royal Australian Air Force and Royal New Zealand Air Force. Of the RCAF trainees, 25,747 were pilots, 12,855 navigators, 6,659 air bombers,

12,744 wireless air gunners, 12,917 air gunners and 1,913 flight engineers.

Fondly called the "Ox-box", the Oxford had a reputation for being rather tricky to fly and it was said that having mastered it students would be well equipped to handle more powerful aircraft at Operational Training Units, which was the next step in their bomber training. The Oxford was powered by two 355h.p. Armstrong-Siddeley Cheetah radial engines. For most Canadian trained pilots, the Oxford's instrumentation and controls took some getting used to. It had British turn and bank needles, instead of the American "needle and ball" display. Engine boost was calibrated in pounds rather than inches of mercury. Instead of hydraulic brakes operated by toe pressure on the rudder pedals, the Oxford had air brakes operated by a device on the control column.

A stout rope was fastened along the port side of the Oxford's cabin, from the cockpit to the exit door. The Oxford's spin was very flat and I heard that there had been incidents where people trying to abandon the aircraft had been thrown to the rear of the cabin by centrifugal force and trapped there, unable to reach the door. The rope gave one something to hang on to in these circumstances.

My first flight at Tatenhill was on May 4th 1944. AFU instruction followed standard RAF sequences, essentially as follows:

1. Familiarization with cockpit layout.
2. Preparation for flight.
3. Air experience.
4. Effect of controls
5. Taxiing.
6. Straight and level flight.
7. Climbing.
8. Descending.
9. Stalling.
10. Medium Turns.
11. Gliding and Gliding turns.
12. Taking off into wind.
13. The approach and landing:
    (1) Glide approach and landing.
    (2) Engine assisted approach and landing.
    (3) Going round again.
    (4) Wheel landing.
14. Spinning (stalls only with Oxfords!).
15. First solo.
16. Side slipping.
17. Steep turns.
18. Instrument Flying:
    (1) The instruments.
    (2) Straight and Level Flight.
    (3) Climbing.
    (4) Descending.
    (5) Turns.
    (6) Climbing and descending turns.
    (7) Turns onto courses.
    (8) Taking off.
    (9) Going round again.
    (10) Recovery from spins (stalls).
    (11) Recovery from unusual spins (not with Oxfords!)

19. Low flying.
20. Taking off and landing out of wind.
21. Precautionary landings.
22. Forced landings.
23. Action in the event of fire.
24. Re-starting the engine in flight.
25. Aerobatics (not Oxfords).
26. Night flying.
27. Pilot navigation.
28. Formation flying.
(29-32 Not applicable.)
33. Single engine flying (M.E.types)

The hours available for night flying were greatly increased by means of what was called day/night training using sodium flares. This clever innovation made it possible to practise night flying circuits during daylight hours. High intensity sodium lamps along each side of the runway simulated a night flare path. Student pilots wore goggles fitted with dark lenses of different intensities, which could create the illusion of various night conditions from bright moonlight to complete darkness. The instructor, who didn't wear the goggles, had a normal daylight view. It was a safe and effective way of doubling the night training capacity of the airfield.

The night flying curriculum included cross-country trips, my most vivid memory of which is the gorgeous colours of the sky and clouds. We'd take off just after dark. At cruising altitude the sun would just be setting, sometimes followed by the moon rising. Usually there was a blanket of stratus cloud to penetrate. Breaking out above it, we were often bathed in a spectacular panorama of colour, muted shades of red, orange, blue and mauve, an exquisite kaleidoscope of ever-changing pastels too beautiful to describe. On some of these night cross-country exercises we carried a wireless operator who maintained contact with base and provided bearings and homings to assist with navigation.

To help friendly forces navigate at night in the UK, the landscape was dotted with beacon lights that flashed Morse code identifiers that changed nightly. The beacons were of two types: Pundits and Occults. Pundits flashed red lights and identified geographical positions; Occults were white and were located near aerodromes.

Another useful aid was the DREM system (I can't remember what the letters stood for), which helped night flying aircraft to land in bad weather. If you needed assistance you flew a certain pattern around the aerodrome's Occult beacon and flashed an assigned code. Soon a large circle of yellow lights, about four miles in diameter, appeared on the ground, the lights about 200 yards apart. You flew around the circle until you saw a funnel of lights leading toward its centre. At the narrow end of the funnel was the runway. To minimize the chance of enemy aircraft seeing the DREM display, the lights behind you were extinguished as soon as you passed over them. Once in the funnel, you could see the lighted runway. A Glide Path Indicator was positioned on the left side of the runway button. It consisted of a vertical display of shielded coloured lights: amber if you were too high, green if you were on the correct glide path, and red if you were too low.

One day I was surprised at being assigned a student named Wing Commander James who'd already earned an Air Force Cross. It wasn't just his senior rank that surprised me. I recognized him as the Squadron Leader who'd commanded my Flight when I was an ab-initio student pilot at SFTS in Canada. Now it was my turn to put *him* through the ropes!

Circling to land at Tatenhill on the afternoon of June 5th 1944, I witnessed a tragedy - an aircraft diving toward the ground in a tail spin. It was a Miles Martinet from Lichfield. It crashed and burned two miles northeast of Tatenhill, killing the two pilots, both Australians.

Personally, I'd lived a charmed life so far, having survived ops, as well as a head-on collision of two Mustangs at RAF Odiham. My luck still held when an incident occurred at Tatenhill that could have left me a cripple. During a training flight, a piece of metal broke off from the tip of a propeller blade. With a loud bang it shot through the nose section of the Oxford, passing about an inch above my ankle!

Hanbury Dump Explosion. At 1100 hrs on Nov 27th 1944 I was sitting on a toilet in the hangar area at Tatenhill when suddenly the ground shook and there was a horrendous roar. My first thought was that one of the new German V2 rockets must have landed nearby. It was far worse than that. In one brief moment near the village of Hanbury, five miles from our airfield, 1,500 two-ton "block-busters", those huge town-smashing bombs that were dropped on Germany by our Lancaster bombers, that were stored in disused mine-workings, had detonated, together with hundreds of smaller bombs. It was the biggest single explosion of the war in the West. In this one fantastic bang, there had gone up nearly ten times the tonnage dropped on Coventry during its famous hours-long blitz. The explosion blasted a giant crater in the pastoral landscape a third of a mile long and a quarter of a mile wide. I flew over it next day to have a look. It wiped out of existence two complete farms and killed over 60 people and scores of farm animals. Buildings in Burton-on-Trent, five miles away were damaged. (Parts of this description are quoted from a newspaper source, which I've unfortunately mislaid.)

An important part of the AFU course was Beam Approach training. At the end of November I began instructing at 1515 BAT (Beam Approach Training) Flight at Poulton, near Chester, which was a unit of 21(P)AFU.

Ind Coope Ltd Operations at Tatenhill Airfield[1]

Following the post-war release of Tatenhill aerodrome by the RAF to the Duchy of Lancaster's tenants in c1953, it was disused for a few years. The Burton-Newborough road (B5234), which traverses the site, had been closed 'for the duration' and was reopened in May 1954[2].

In 1959 the Burton upon Trent based Ind Coope brewery[3], who had a fleet of executive aircraft based at Burnaston airfield, acquired the lease to Tatenhill and transferred its operations there. On the north-east side of the perimeter track the company erected a remodelled, re-used Bellman hanger with a new control tower and office suite attached. At first only the eastern two-thirds of runway 08/26 was used. The other runways deteriorated rapidly and were used only occasionally. Runway 16/34 became disused very quickly while 014/22 was soon suitable for light aircraft only. Runway 08/26 was later extended to its present length of 1200m (1312 yds)[4]. A radar facility was erected at the convergence of 08/26 and 16/34 to deal with the dense winter fogs encountered over the Needwood Forest.

At commencement of operations Ind Coope transferred Captain David Lancaster (ex-RAF Fighter pilot) from Manchester to Tatenhill to become Chief Pilot. Captain Wally Evans DFC was appointed as his no. 2, with Chief Engineer Terry McCarthy completing the team. In 1961 Dave Moon replaced Terry McCarthy and he remained as Chief Engineer throughout, taking retirement in 1985. The team were joined by Captain Laurie Walford (ex-RAF) in 1968, who went on to became Chief Pilot upon David Lancaster's retirement. At its height the company had five pilots on site. At various times the brewery owned several executive aircraft based at Tatenhill including:

G-APCZ	de Havilland 104 Dove
G-ARDE	de Havilland 104 Dove 6
G-ASNO	Beech B55 Baron
	Beech B 58 Baron
S-ASIU	Beech B65-A80 Queen Air
G-ASXV	Beech B65-A80 Queen Air
G-BCUZ	Beech King Air 200

By the end of its operation the company had a Beechcraft King Air 90 and a Beechcraft King Air 200.

A highlight for all the staff at Tatenhill was a visit by HM the Queen in 1982 who, after visiting the Duchy of Lancaster estates in the Needwood Forest, flew out from the airfield in a Royal Flight aircraft. Laurie Walford, Dave Moon and other members of the team were presented to her before she departed.

The wartime watch tower[5] became derelict during this period and was considered structurally unsafe. Concern was expressed that children using it as a playground might be injured and it was demolished in 1982/3.

The years 1984-5 saw large cutbacks at Allied Breweries which resulted in the closure of operations at Tatenhill in July 1985. The workforce, including Laurie Walford and Dave Moon, were made redundant and the aircraft sold. Thus ended a period of over 25 years private flying from the airfield.

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1 Notes based mainly on information from Laurie Walford, Dave Moon and Fay Insley employed at that time by Ind Coope.

2 Alf Moss "A Burtonians Diary" page 11: entry for 14/7/54.

3 Later Allied Breweries.

4 Pooley Guides 1967 and 1979.

5 AMWD plan nos. 13726/41 and 15683/41.

An Account of a Flying Accident at R.A.F. Tatenhill in November 1944 [1]

Near the end of the war the trainees were kept [at R.A.F. Tatenhill] for an extended period because operational losses were, luckily, over estimated by the Air Ministry. ...

November 1944: At night briefing, I informed the aircrews that it would be a clear cloudless night and fog was expected around midnight. The Flight Commander had already informed them that there would only be one lot of cross county exercises but circuits and bumps would continue until the weather looked as if it was closing in. Nearing midnight, as predicted, the visibility reduced to just less then 2,000 yards and it had been decided to cease flying after the six airborne trainees landed. At that moment the control room lights went out. Looking out to the airfield and all the lights were out. Told the W/Ops to radio the pilots to circle until we could restore power - no radios - they worked off the power supply. Grabbed the Tannoy mike - dead. Telephone - dead. By this time the W.A.A.F.s had connected the emergency batteries to the radios - guess what? - they had not been used for so many years, they were flat. At that moment a telephone rang in the corner of the room that I had never used. It was a field telephone connected to the beacon a few miles from the airfield and the electrician informed me the aircraft were circling his beacon. Thank goodness I had at least a few minutes breathing space. The normal emergency procedure would have been to divert to another airfield, but we were the highest field for miles around so all these would have been closed in, and how could I communicate with them or the aircraft anyway? There was no way the trainee pilots could have been able to navigate for hundreds of miles without a pre-arranged route. There was only the ground crew to do with the assistance of the fire crew. It did not take them long and when they were clear of the runway, I had the pleasure of firing a white rocket for the first time in my life and the Airfield Controller signalled them in one by one using his Aldis Lamp. I had told him on his field telephone the recognition letters.

All this time I watched the fog creeping up on us, but it was still reasonably safe, particularly as the paraffin flares gave a very good light. All went well until the Airfield Controller informed me on the field telephone that the last aircraft was coming in to land before the penultimate aircraft had left the runway against his Red Aldis. I went out to the balcony but, because of the fog and the smoke from the goose necks, I could not observe what was happening on the runway. The penultimate aircraft might not have left the runway as he could have been confused because there were no perimeter lights. I had no alternative but to fire a red Very.

The trainee went round again, but crashed a few hundred yards from the end of the runway[2]. Did he get caught in the notorious down draft at the end of Runway 22, but would there have been a down draft when there was no wind? Can you "go through the gate" on an Oxford the same as on a Blenheim in an emergency?

There was no enquiry so it has prayed on my mind ever since. Was I responsible for this poor youngster's death or would it have been possible that two aircraft would have crashed wasting two lives? All this happened in far less time that it has taken to feed it into the W.P. I always remember this incident with remorse when we experience a November fog, Remembrance Day or whenever an aircraft crash is reported (you can tell how clear it is in my mind 53 years later).

There was a sequel to this. I had met the girl who was to be my wife in May 1944. On this November night it took me all night and most of the morning writing reports and reporting verbally so had no sleep, but just had time for a bath before leaving camp to meet my fiancée in Derby where 'Gone with the Wind' was premiered. I not only went to sleep in the bath, I slept through most of the film too. Have seen this wretched film at least three times since and never have seen the middle of it.

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1 From a letter by Wal Denney - 8/1/98

2 Probably the accident of the 4 November involving the Oxford V3950 from 21 PAFU Wheaton Aston.

UK Air Accidents Investigation Branch

AAIB Bulletin No: 4/97 Ref: EW/C96/6/4 Category: 1.3

Aircraft Type and Registration:	Pierre Robin R1180TD, G-CRAN
No & Type of Engines:	1Lycoming O-360-A3A piston engine
Year of Manufacture:	1980
Date & Time (UTC):	15 June 1996 at 0955 hrs
Location:	Staden Industrial Estate, Buxton, Derbyshire
Type of Flight:	Private
Persons on Board:	Crew - 1 - Passengers - 3
Injuries:	Crew - 1 (Fatal) - Passengers - 3 (Fatal)
Nature of Damage:	Aircraft destroyed
Commander's Licence:	Private Pilot's Licence
Commander's Age:	45 years
Commander's Flying Experience:	865 hours (of which 4 hours were on type)
Last 90 days -	34 hours
Last 28 days -	4 hours
Information Source:	AAIB Field Investigation

The day of the accident was the eleventh birthday of one of the pilot's daughters and as a birthday treat he organised to take her, together with her twelve-year-old sister and an eleven year-old girl friend on a flight around the local area. The Robin aircraft was booked for 0900 hrs, but when the party arrived at Tatenhill Airfield they found that it was airborne for a short familiarisation flight for another pilot, this lasted approximately 15 minutes.

By observation of photographs taken by the girls during the flight and some correlation with radar track evidence, it has been possible to reconstruct the route flown by the aircraft. The pilot and his passengers took-off from Tatenhill at approximately 0930 hrs and flew first to Alton Towers Adventure Playground, 12 nm to the north. The aircraft flew past Alton Towers on the western side at a height above the ground of approximately 500 to 1,000 feet and turned northeast. It then flew 16 nm on that track towards Riber Castle where it turned and flew past Matlock on the southern side on a westerly track, keeping to the same approximate height throughout. From Matlock it flew 8 nm to the ancient stone circle at Arbor Low, around which it made a right-hand orbit before setting off northwesterly to the village of King Sterndale in Derbyshire, six miles away.

After completing an orbit to the right around King Sterndale, the aircraft then made another orbit around the village of Cowdale which is 1 nm further to the northwest. The aircraft was observed completing this second orbit at a somewhat lower height and then continuing northwest towards Buxton where the pilot and his family lived. It then flew over Slade Hill Farm at a very low height, of the order of two hundred feet or less. Slade Hill Farm was well known to the pilot and his daughters and a young friend of the girls waved

to them as the aircraft flew past, dipping a wing towards him as it did so.

Slade Hill Farm is situated on the 350 metre contour line of a ridge running north to south, one mile to the southeast of Buxton. Beyond the farm to the north-west, the ground falls away in a valley which at its lowest point is at a height of approximately 290 metres above sea level before the ground begins to rise again towards Buxton. A line of trees marks the road which leads to the farm and the aircraft was seen to pass low over these before descending into the valley. Two eyewitnesses in particular, one in the garden of his house further along the lane from Slade Hill Farm, and another whose garden looks out across the valley from the west, were able to provide a clear picture of the flight of the aircraft from the time that it left Cowdale until its conclusion.

At about the time the aircraft entered the valley, its engine was heard to misfire and lose power and the aircraft was seen to turn to the left through 180º onto a heading of approximately 150ºM to line up with a service road on an industrial estate. As the aircraft descended towards this service road, and having reached a height of considerably less than 100 feet, the engine was heard to pick up and fire normally once again.

With power restored, the aircraft was then seen to climb steeply away. However, before it had reached sufficient height to clear the ridge the engine was heard to cut out once again and the aircraft entered a tight descending spiral to the left before crashing onto an area of waste ground in the industrial estate. The pilot and his passengers were killed instantly when the aircraft hit the ground. There was no fire and the rescue services arrived at the scene shortly afterwards.

Examination of the Wreckage

The aircraft examination commenced in the afternoon following the accident. It lay in Staden Industrial Estate which comprised a number of widely spaced industrial units situated on otherwise fairly rough, unprepared ground. The aircraft had not struck any buildings, being about 20 metres from one of the installations. It was quite evident that it had struck the ground in a steep (approximately 60°) nose-down attitude with a moderately high rate of descent but with little forward speed, consistent with a stalled condition. It was also apparent that it was rotating to the left at impact. There were no signs of fire but the impact was non-survivable. Detailed examination did not reveal any signs of pre-impact structural failure nor any anomalies with the flying controls. The condition of the propeller suggested that the engine was delivering low to moderate power at impact and this was reinforced by the tachometer, which was found with the needle jammed at 1,600 RPM. Although the disruption to the airframe precluded rapid estimation of the flap position, subsequent inspection of the actuator after the aircraft had been recovered to the AAIB hangar at Farnborough, showed conclusively that the flaps had been close to the fully extended stop.

On the Aiglon and many other low-winged light aircraft, the fuel tanks are in the wings and therefore lower than the carburettor such that, in the absence of any other pump, the mechanical diaphragm fuel pump has to suck fuel under negative pressure from the tanks. The Aiglon also, as is commonplace, has an electric boost pump which, when switched on, supplies fuel under positive pressure to the mechanical pump. The Flight Manual only requires operation of the electric pump during take off and landing, as the mechanical pump is quite capable of supplying the required amount of fuel on its own and the former becomes a 'back-up' at critical phases of flight. It was not possible to tell if the electric pump on G-CRAN had been selected on prior to impact, although it did function during testing after the accident despite being damaged.

A strip of the engine was undertaken in the AAIB hangar with a representative of Textron Lycoming present. The engine itself was an overhauled unit fitted to G-CRAN in March 1995 when the aircraft had been acquired by its present owner. The overhaul had been carried out by Lycoming themselves in the USA and the engine had run some 120 hours since then. The strip inspection revealed no abnormalities and the engine condition was consistent with such a recently overhauled unit, although an anomaly was noted in the fuel supply system.

The anomaly concerned the flexible hoses connecting the electric boost pump to the mechanical pump and the mechanical pump to the carburettor. During strip of the mechanical pump (with which no defects were found) it was noticed that the pump-carburettor hose union (outlet) was lacking the 'O' ring and washer

which are intended to be part of such a union (see photograph). In their place the joint had been made with sticky green sealant which is not specified in any technical reference. The mechanical pump to electrical boost pump (inlet) union possessed both a washer and 'O' ring. Moreover, both fittings were of a type which were not advocated by Lycoming for use in connections to the mechanical pump.

Lycoming do not supply these fittings either on new or overhauled engines as it is the responsibility of the airframe manufacturer to specify and supply them. However, a Lycoming Service Bulletin (SB) No 374 entitled 'Fuel Pump Inlet Inspection' dated 15 March 1974 was cited as relevant. This SB commences with the following justification for issue:-

"Loss of fuel pressure may be due to leakage at the inlet port of the diaphragm fuel pump. Leakage at this location may be caused by ageing of the 'O' ring seal or improper installation of the adapter fitting that connects the fuel line to the pump".

The SB essentially continues with an inspection procedure followed by installation of a new 'O' ring seal "anytime fuel pressure fluctuates or deteriorates with increase in altitude".

A further note appears on the SB diagram which shows a typical 37° angle 9/16 in x 18 UNF fitting which has one plain end and one tapered end. The note refers to the tapered end and states:-

Note. This end of fitting is designed to attach flared tube fitting. Do not install this end in fuel pump

Both ends of both fittings from G-CRAN were tapered. As already noted, the outlet fitting lacked both the 'O' ring and washer but, even though present on the inlet, the 'O' ring appeared badly deformed and scored, an appearance not consistent with it having been renewed when the engine was installed about 15 months before (see Photograph). It was decided to test the integrity of sealing of the inlet connection using the original parts but the outlet fitting had been broken during impact and had to be substituted for a similar component, omitting the washer, the 'O' ring and the sealant.

To do this it was necessary to re-assemble the fittings in the knowledge that it would be impossible to re-create with confidence the exact state of the seals as it existed prior to the accident. A vacuum rig was used to apply negative pressure roughly equivalent to that expected across the inlet fitting assuming no boost pump was running. It was found that the assembly failed to hold the vacuum, but only indicated a small leak. In order to see where this leak originated, both unions were sprayed with red penetrating dye whilst still under vacuum and then disassembled. The dye had penetrated into the pump only through the inlet fitting, showing that this was the source of the leak.

Additional Information

The aircraft technical records were examined and the only entries considered potentially relevant to the power loss were the engine replacement already mentioned and the replacement of the fuel pressure transmitter the day before the accident, following a forced landing the week before.

The aircraft had its newly overhauled engine fitted in March, 1995, at which time the company that fitted the engine also took over responsibility for maintenance of the aircraft. When questioned, their Chief Engineer said that, to the best of his recall, the new engine was fitted using new fuel hoses but using the unions from the original installation. He said that, although he had personally not performed much of the work, as the Licensed Engineer responsible he had done a complete check of the installation including a particularly thorough leak check of the fuel system before signing for it. He acknowledged (correctly) that it would be difficult to spot the missing 'O' ring and washer from the outlet of the pump but was at a loss to explain the green sealant applied in its place. He said he had no knowledge of any such material being used in his workplace. He was not aware of the Lycoming SB 374, although the company had a copy in their technical library.

In addition, he gave details of the events which led to the replacement of the fuel pressure transmitter which took place the day before the accident as recorded in the aircraft log book. It transpired that, following an

engine off landing about a week before, it was found that the fuel pressure gauge was registering a reading even though no pumps were running. Diagnosed as a faulty pressure transmitter, this had no connection with the engine failure, which was due to fuel mishandling and the faulty part had merely been found as a result of the diagnostic process. It had taken about a week to obtain a kit of parts which not only included a new transmitter but also a new gauge and wiring. The transmitter is located on what is effectively a TEE fitting between the outlet side of the mechanical pump and the hose to the carburettor but there was no requirement to breakdown the fuel union into the pump because the transmitter is designed to be fitted into the TEE without the need to disturb the direct fuel flow path. Again, the Licensed Engineer said that he had checked thoroughly for leaks and the aircraft was test flown for about 1 hour 15 minutes because some radio replacement work had been done concurrently which required this. The engine and fuel system were apparently performing faultlessly throughout.

Contact was made with Avions Pierre Robin concerning their drawing specifications for the subject unions. They confirmed that they appeared to be correct to their drawing and were also not aware of Lycoming SB 374, which they were, like the maintenance organisation, able to subsequently locate in their technical library. They refuted that use of tapered fittings was inappropriate and said that such fittings had been used by them for decades without any known problems such as those inferred in the SB.

Conclusions

It has not been possible to positively identify positively the cause of the loss of engine power which was heard by the eye-witnesses. Although the leak at the inlet to the mechanical fuel pump demonstrated in testing appeared not to be of such a magnitude as to have caused a problem in the fuel supply, the pre-accident condition of the inlet fitting could not be accurately reproduced with confidence. Lycoming said that they knew of several cases from their experience where air induction into fuel lines had caused engine problems and stated that this was the reason for issuing SB 374. However, they were unable to provide any documented cases from their service records. Analysis also suggested that, were this a cause of an engine loss of power, it could become a function of aircraft attitude since a nose-high attitude would increase the depression on the inlet side of the pump (and hence increase the tendency to draw air) whilst a nose-low attitude would decrease such tendency. In either case, switching-on the boost pump should rapidly clear any such problems.

It would appear that the pilot decided to carry out an emergency landing when the power loss occurred and had selected the service road on the industrial estate for this purpose, making best use of the local terrain.

Unfortunately, a restoration of engine power shortly before his planned touchdown probably persuaded him that whatever fault there had been with the engine had cleared itself. It would seem that a further loss of power occurred while he was carrying out a missed approach from the forced landing when the aircraft had reached a height of the order of 100 feet and was still climbing at a steep angle to clear the approaching high ground. The aircraft would have had very little margin of speed above the stall at this stage and this combined with the aircraft configuration of landing flap down would cause the aircraft to stall unless immediate corrective action were taken. However, due to the nature of the terrain there were now few or no options remaining to the pilot.

Owing to the low height at which the latter stage of the flight was conducted, little safety margin existed to enable the pilot to select a suitable emergency landing area in the event of an engine failure.

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AERODROME CHART - ICAO

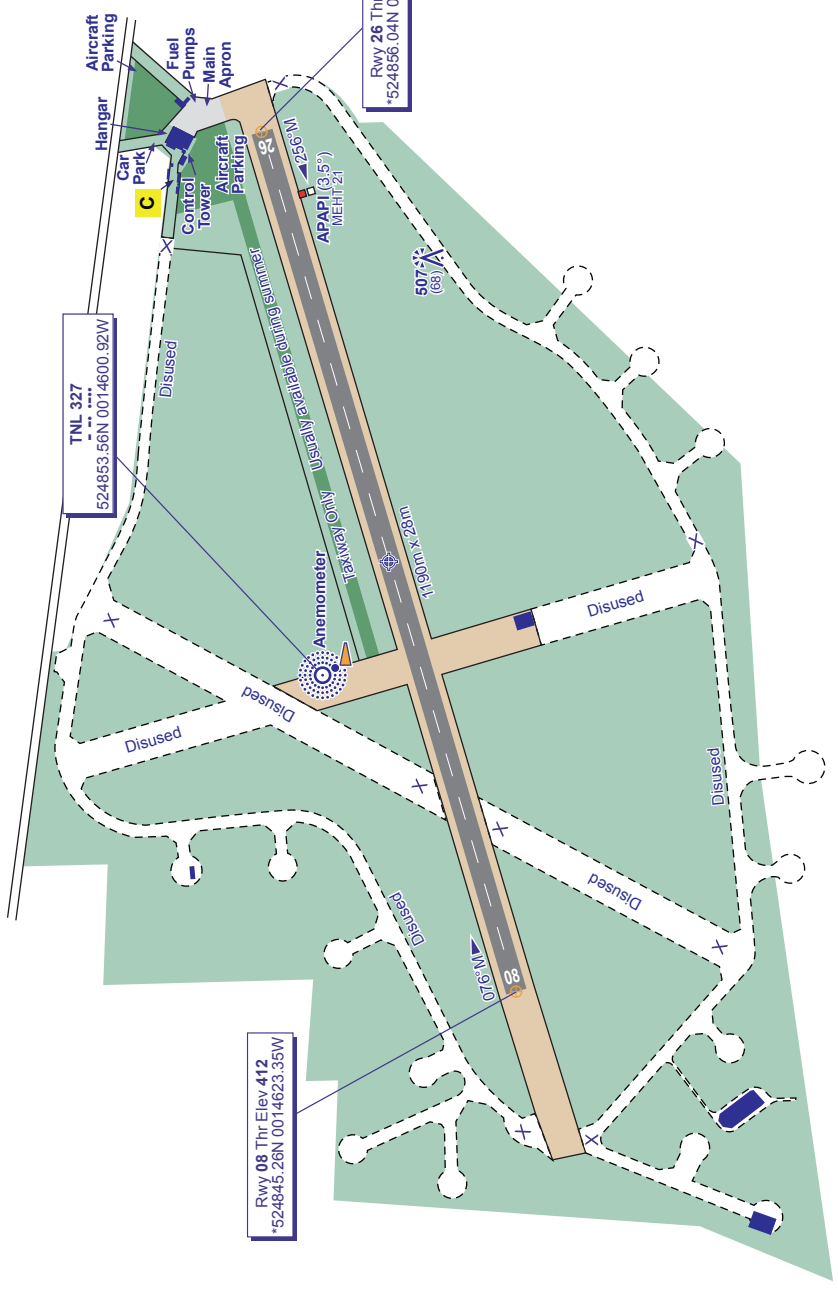
TATENHILL EGBM

AD ELEV 439FT

ARP 524851N 0014553W

RUNWAY/TAXIWAY/APRON PHYSICAL CHARACTERISTICS			
APRON / RWY / TWY	SURFACE	BEARING STRENGTH	ELEVATION
RWY 08/26	Asphalt	-	-
Main Apron	Asphalt	-	-
Main Taxiway	Asphalt	-	-

VAR 2.0°W - 2013
Annual Rate of Change 0.15°E



COM		
A/G	124.075	TATENHILL RADIO

LIGHTING
Runway lighting available by special arrangement only

BEARINGS ARE MAGNETIC ELEVATIONS AND HEIGHTS ARE IN FEET	
ELEVATIONS IN FEET AMSL HEIGHTS IN FEET ABOVE AD	507 (68)

100 0 100 200 300m
500 0 500 1000ft

CHANGE (8/13): MAG VAR. GRASS TAXIWAY NOTE ADDED.

AERO INFO DATE 16 MAY 13