Aerostar SA Yak-52, G-YAKY

AAIB Bulletin No: 3/2002	**Ref: EW/G2001/08/07**	**Category: 1.3**
Aircraft Type and Registration:	Aerostar SA Yak-52, G-YAKY	
No & Type of Engines:	1 Ivchenko Vedeneyev M-14P piston engine	
Year of Manufacture:	1984	
Date & Time (UTC):	4 August 2001 at 1440 hrs	
Location:	5 miles south of Carlisle	
Type of Flight:	Private	
Persons on Board:	Crew - 1	Passengers - 1
Injuries:	Crew - 1 minor	Passengers 1 minor
Nature of Damage:	Landing gear and both wings badly damaged	
Commander's Licence:	Private Pilots Licence	
Commander's Age:	52 years	
Commander's Flying Experience:	726 hours (of which 171 were on type)	
	Last 90 days - 3 hours	
	Last 28 days - 2 hours	
Information Source:	Aircraft Accident Report Form submitted by the pilot	

The aircraft was refuelled at Bagby, North Yorkshire, before departing on a planned flight to Carlisle Airport, Cumbria. The plan was to fly there in formation with another Yak aircraft, routing via the Lake District. The aircraft both took off from Bagby at about 1405 hrs, but after take-off the passenger in G-YAKY noticed fuel escaping from their left wing. He advised the pilot on the intercom about the fuel. The pilot decided to land immediately, so he turned back towards the airfield and landed downwind, on the opposite end of the runway from which he had departed. After landing he parked, shutdown and inspected the aircraft. He found that the fuel cap had been incorrectly fitted, so he re-secured it. The aircraft then took off again, contacted the first aircraft and planned a rendezvous point at Penrith.

The aircraft joined up at Penrith and continued towards Carlisle in formation. Five miles south of Carlisle G-YAKY experienced a loss of engine power. The pilot contacted the aircraft ahead to

advise that he had an engine problem and was dropping back. The pilot of the other aircraft relayed a PAN call to Carlisle, then later upgraded this to a MAYDAY call.

The engine of G-YAKY continued to run, but at idle power. The pilot tried a number of methods to restore normal cruise power. To enable him to concentrate on this, he handed control of the aircraft to the rear seat passenger who was an experienced pilot, but who had never previously flown in a Yak aircraft. The restart actions that the pilot tried were application of carburettor heat, manual pressurisation of the fuel primer, operation of the propeller pitch through the range and pumping of the throttle. Pumping the throttle caused a momentary pick up of power but this was not sustained. During this time, the passenger flew the aircraft, selected a field for a forced landing and positioned the aircraft for an approach.

The pilot resumed control, but found that the approach angle felt steep and the rate of descent was high. He decided, at a late stage, to deploy the landing gear in an attempt to absorb energy on touchdown. The aircraft hit the ground hard in a right wing low attitude with the landing gear only partially deployed. The landing gear folded backwards on impact, the aircraft slewed through 90° and came to rest within about 30 metres. Both the pilot and the passenger were wearing full five point safety harnesses. The passenger suffered a cut to his head but managed to get quickly out of the aircraft and clear. On turning round he noticed the pilot was still in the aircraft. The pilot was not injured and completed the shutdown checks before he vacated the aircraft. The weather conditions en-route were clear with westerly winds and good visibility under a cloud base which the pilot estimated to be 3,000 feet. The outside air temperature at Carlisle Airport was 18°C and the dewpoint was 7°C. A chart showing the probability of induction icing indicated that there could have been a moderate risk of icing at cruise power in these conditions.

The engine had been imported as an overhauled engine and was recently fitted to the aircraft. At the time of the accident the aircraft had flown for 4 hours since the engine was installed.

The Pilot's Operating Handbook for the Yak 52 aircraft states that in the event of a forced landing the wheels should remain up. The landing gear is semi-retractable and will thus prevent major damage to the airframe. Both the pilot and the passenger later commented that the rate of descent of the aircraft in the gliding configuration was very high and a steep nose down attitude was required to maintain speed. The Engine Failure Checklist Card notes that the target approach speed is 160 km/h with full flap or with flap up and that 'at low speeds, the rate of descent is very high.'

Engineering assessment

Damage to the engine precluded a test run, but there were no obvious external signs of mechanical malfunction. A loss-adjuster from the owner's insurance company inspected the fuel system shortly after recovery of the aircraft, noting that both tanks held significant quantities of fuel and that fuel was present in the system through to the carburettor.

The Yak fuel system comprises two wing tanks feeding to a collector tank. Neither tank can be individually selected. Attention was drawn to a rumoured phenomenon with Yak aircraft of this type, in which fuel can be preferentially drawn from one of the tanks, causing it to drain more rapidly than the other. Anecdotal evidence also held that, after a period of standing and despite the presence of non-return valves in the system, the level in the tanks could equalise, so disguising the possible reason for a loss of power. In this case, there was no evidence to substantiate or deny this hypothesis.

Previous occurrence

On 24 May 2001, a Yak 18A aircraft, registration RA01370, fitted with the same type of engine, suffered a similar significant loss of engine power while in cruising flight. That event was reported in AAIB Bulletin 9/2001.