AAIB Bulletin No: 9/94 **Ref: EW/G94/08/02** **Category: 1.3**

Aircraft Type and Registration:	Yak 18T, RA-44481
No & Type of Engines:	1 Ivchenko M14-P nine cylinder radial piston engine
Year of Manufacture:	1994
Date & Time (UTC):	7 August 1994 at 1425 hrs
Location:	White Waltham Airfield, Berkshire
Type of Flight:	Private
Persons on Board:	Crew - 1 Passengers - None
Injuries:	Crew - Minor Passengers - N/A
Nature of Damage:	Damage to propeller, landing gear, right wing, lower fuselage and tail surfaces
Commander's Licence:	Airline Transport Pilot's Licence
Commander's Age:	29 years
Commander's Flying Experience:	6,361 (of which 14 were on type) Last 90 days - 185 hours Last 28 days - 66 hours
Information Source:	Aircraft Accident Report Form submitted by the pilot

The Yak 18T is a low wing four seat monoplane which, when flown at a reduced weight, has a full aerobatic capability. The 360 hp Ivchenko radial piston engine drives a constant speed two bladed propeller of wooden construction. The aircraft was constructed in 1994 and had accumulated a total time flying of some 49 hours at the time of the accident.

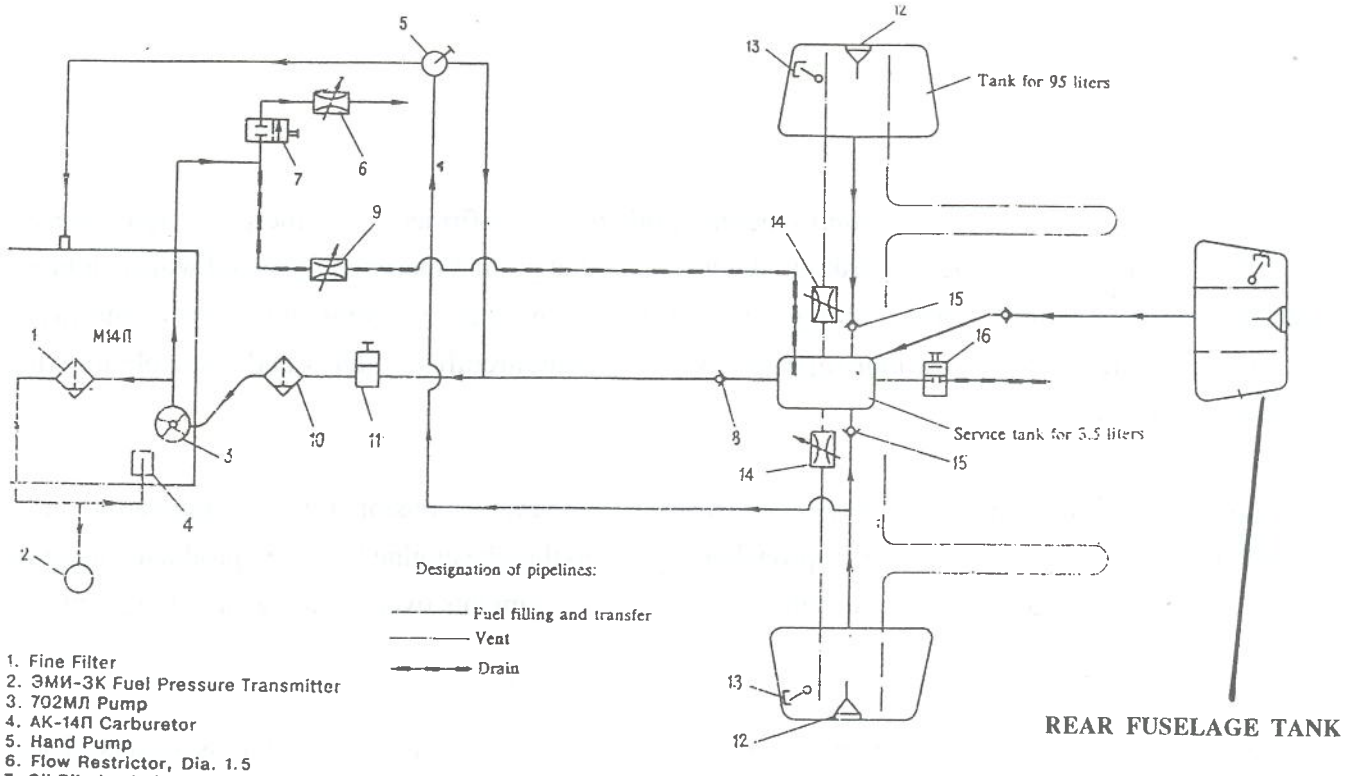
The aircraft was taking part in an authorised flying display at White Waltham Airfield and was being flown by an experienced aerobatic/display pilot. Whilst performing an inverted pass along Runway 21 at a height of approximately 70 feet agl, during which the landing gear had been extended, the engine lost power. The pilot quickly rolled the aircraft erect and assessed that his only course of action was to make a forced landing in open fields to the right of the runway, since a turn to the left was precluded by spectators and landing straight ahead by trees and buildings. Whilst in the turn to the right as the aircraft was gently climbed the pilot attempted to restore power by operation of the fuel hand/primer pump positioned on the instrument panel directly forward of the control wheel. Video recordings of the accident, however, showed this to be only momentarily successful. As the turn continued, the aircraft stalled and it struck the ground initially with its right wing. Just before impact, the pilot had

noted that the engine speed had begun to increase, this being confirmed by an increase engine noise which was audible on the video recording. After striking the ground the aircraft slewed whilst sliding erect for a short distance, before coming to rest. Little, if any, fuel was spilt and there was no fire. The pilot, who received only minor injuries, shut down the aircraft's systems and was able to exit unaided through the left door.

The aircraft was later examined by personnel from the company responsible for its maintenance, and the AAIB. Examination of the wooden propeller suggested that the engine had been producing a high level of power at impact since it had shattered and spread fragments over a wide area at the point of impact with the ground.

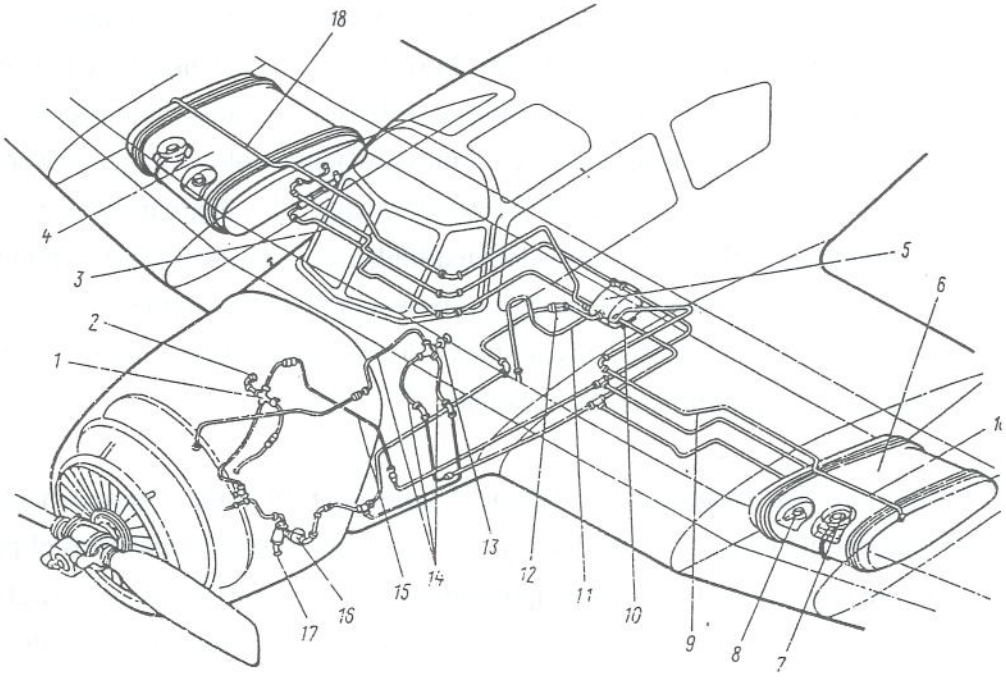
The aircraft's fuel system was examined and found to be clean and free from any obvious defects. The basic Yak 18T fuel system, shown diagramatically and pictorially in Figure 1, is arranged such that two main tanks (each of 95 litres capacity, with one in each wing) gravity feed fuel through non-return valves into a service tank in the centre fuselage. Fuel from this tank, which is of only 3.5 litres capacity and is designed as the lowest point in the system with the aircraft erect, is drawn by an engine driven pump and delivered to the carburettor. To ensure that a supply of fuel is available to the engine under negative g conditions, the internal fuel outlet pipe from this tank is flexible and weighted at its open end so that it will always fall to the lowest point in the tank and remain submersed in fuel until the tank contents become depleted. With a full service tank the engine will run at full power for approximately 30 seconds, but longer times are achievable at lower power settings. RA-44481 was fitted with an additional fuel tank of 130 litres capacity in the rear fuselage, which was also connected into the service tank. This tank is located higher than the wing tanks and produces, under positive g conditions, a greater head of fuel with a consequent increase in the rate of fuel transfer into the service tank than that provided by the wing tanks. It was reported that approximately 15 to 20 litres of fuel was present in this tank after the accident.

The pilot reported that in his experience of this aircraft all the inverted manoeuvres that he had flown during practice and previous displays were possible without loss of fuel pressure. On the accident flight the engine lost power after approximately 50 seconds of inverted flight. The pilot believed that this had resulted from his use of a higher than intended power setting for the manoeuvre and, possibly, not starting the inverted run with a full service tank as a result of insufficient time having elapsed for it to have refilled following his previous negative g manoeuvres during the flying display. Fuel quantity in the service tank is not separately indicated to the pilot in the Yak 18T.



1. Fine Filter
2. ЭМИ-3К Fuel Pressure Transmitter
3. 702МЛ Pump
4. АК-14П Carburetor
5. Hand Pump
6. Flow Restrictor, Dia. 1.5
7. Oil Dilution Valve
8. Check Valve
9. Flow Restrictor, Dia. 0.8
10. Coarse Filter
11. Fire Shutoff Valve
12. Filler
13. СБЭС Fuel Quantity Gauge
14. Flow Restrictor, Dia. 1
15. Check Valve
16. 600500A Fuel Sediment Drain Valve

YAK-18T FUEL SYSTEM



1. Oil Dilution Valve
2. П-15 Fuel Pressure Transmitter
3. Pipeline
4. Main Fuel Tank
5. Service Tank
6. Main Fuel Tank
7. Filler
8. Fuel Quantity Gauge Transmitter
9. Vent Pipeline
10. Drain Valve
11. Vent Pipe
12. Check Valve
13. Hand Primer Pump 740400
14. Priming Hoses
15. Bypass Pipeline
16. Fire Shutoff Valve
17. Fuel Filter
18. Service Tank Vent Pipeline

Figure 1