Piper PA-38-112 Tomahawk, G-BTJK, 22 June 1996

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Aircraft Type and Registration:	Piper PA-38-112 Tomahawk, G-BTJK
No & Type of Engines:	1 Lycoming O-235-L2C piston engine
Year of Manufacture:	1979
Date & Time (UTC):	22 June 1996 at 1130 hrs
Location:	Runway 25, Thruxton Airfield, Andover
Type of Flight:	Private (Training)
Persons on Board:	Crew - 1 - Passengers - None
Injuries:	Crew - None - Passengers - N/A
Nature of Damage:	Fire damage to engine cowlings and extensive burning of combustible components inside the engine compartment
Commander's Licence:	Private Pilot's Licence
Commander's Age:	61 years
Commander's Flying Experience:	145 hours (of which 10 were on type)
	Last 90 days - 5 hours
	Last 28 days - 2 hours
Information Source:	Aircraft Accident Report Form submitted by the pilot and further investigation by AAIB

The pilot carried out all external pre-flight checks, includinglifting the engine cowlings on each side; everything appearednormal. He then completed his internal pre-start checks and,after receiving clearance, taxied to the holding point for Runway25 where he carried out the power checks. The full power andmagneto checks were normal. However, when the throttle was closedto check the idle RPM, the engine initially idled normally butthen the RPM started to decay slowly and smoke appeared from behindthe spinner. The smoke increased rapidly and the pilot only just had time to make a radio call, advising the tower that hehad a fire, and to shut down the engine before thick smoke forcedhim to evacuate the cockpit. The airfield fire service attendedpromptly and successfully extinguished the fire.

On the previous day, after having been flown satisfactorily fora total of some 3 hours earlier in the day, the aircraft had beengrounded due to fuel leaking from the vicinity of the carburettorair box. The aircraft was towed across the airfield to the operator'smaintenance organisation for rectification. The carburettor wasremoved, the needle valve checked, the float level adjusted andthe

carburettor reassembled and installed. Ground runs were satisfactory,and the aircraft was released back to the operator later in theafternoon, but was not flown again on that day. On the day ofthe accident the Chief Flying Instructor of the flying club whichoperates the aircraft carried out an 'A check' in the morning,and sent a student on a 1 1/2hour solo flight, which passed without incident. The fire occurredduring the power checks at the start of the next detail that day.

The fire caused moderately severe heat damage to the rear partof the lower cowl on the left side, and in the area around thenose leg cut-out. The aft parts of the upper cowl panels displayedevidence of heating from within, with significant paint discolourationand blistering, particularly on the left side. Heavy 'sooting'was evident on the outer surfaces of the cowl behind the spinner,on the fuselage skins and windscreen behind the rear lip of theupper left cowl panel, and on the fuselage panels aft of the lowerleft cowl. The carburettor air intake lip in the cowl was moderatelyheated and heavily sooted, and the periphery of the air filterelement was charred. Inside the cowl, the fire had burnt awaymost of the plastic hoses, wiring insulation and other combustiblematerials in the area beneath the engine on the left side, andbetween the rear of the engine and the firewall. There was nodirect evidence of either the fire or the ignition source, butthe fire damage pattern overall was consistent with initial developmentwithin the lower cowl on the left side, behind the air filter.

The starter motor was found to be engaged after the fire, butthe starter solenoid wiring had been partially burnt away. Electricalcontinuity checks confirmed that, during the course of the fire,heat damage to the wiring insulation had allowed the battery mastersolenoid supply cable to 'short' across to the starter solenoidenergisation cable, and this had almost certainly caused the starterto engage. The starter motor itself was undamaged, and showedno signs of significant heating.

The carburettor was removed and taken for testing under AAIB supervisionat an approved overhaul agency. Carburettor fuel levels are normallytested by the overhaul agency at two fuel supply pressures: 11inches of water, and 11 inches of mercury. It was found thatwhilst the fuel level in the float chamber was normal at the lowerfuel inlet pressure, the float valve leaked when the higher inletpressure was applied, resulting in fuel flooding from the carburettorafter approximately 2 minutes.

The carburettor was dismantled. The float arm was found set slightlylow. A visual inspection of the needle valve stem and seat showeda double *ring* indentation around the Viton tip of the valvestem, and very slight scoring of the seat; however, neither appearedexcessive to the naked eye, or under a X10 magnification glass. There were no obvious signs of interference between the floatbody and the float chamber housing. However, subsequent microscopicexamination of the needle valve seat revealed a very slight hollowin the land of the valve seat at one point, and slight pittingin the land part of the Viton seal was evident on the valve stem.