ACCIDENT

Aircraft Type and Registration:	Europa XS, G-RMMT
No & Type of Engines:	1 Rotax 914 Turbo piston engine
Category:	1.3
Year of Manufacture:	2004
Date & Time (UTC):	21 May 2005 at 1200 hrs
Location:	1/4 nm north east of Tollerton Airport, Nottinghamshire
Type of Flight:	Test flight for Permit issue
Persons on Board:	Crew - 2 Passengers Nil
Injuries:	Crew - None Passengers N/A
Nature of Damage:	None
Commander's Licence:	Private Pilot's Licence
Commander's Age:	70 years
Commander's Flying Experience:	4,831 hours (of which 15 were on type) Last 90 days - 9 hours Last 28 days - 6 hours
Information Source:	Aircraft Accident Report Form submitted by the pilot, examination of the aircraft by AAIB Inspector, further information supplied by UK agents for engine, examination of defective component by AAIB

Aircraft

The aircraft was built using a kit developed in, and supplied from, the UK. It was built by the owner at a dedicated kit aircraft completion centre in the USA, under their supervision, before being shipped back to the UK. The engine is a version of a widely used type, versions being available in both certificated and non-certificated form. The aircraft required a Permit to Fly in order to operate in the UK and although a certificated engine is not required it should be of a type and to a standard approved by the PFA.

The aircraft was being flown by a PFA approved test pilot, on conditions imposed by a 'Permit To Fly for Test Purposes', in order to carry out those tests required for the issue of a PFA Permit to Fly. The observer was the owner/ builder of the aircraft.

Flight Details

The pilot reported that he checked the documents and completed a thorough pre-flight inspection before briefing the observer. He decided to conduct two short circuit details for the purpose of familiarising himself

with the aircraft and its onboard computer displays. Start up followed the procedure displayed on the onboard computer which was also referenced for the vital actions. The first sortie consisted of five uneventful circuits between 1000 hrs and 1035 hrs. The aircraft was then parked and the turbo-charger allowed to cool. The engine was shut down and the aircraft vacated before a walk around visual inspection was carried out.

A second circuit detail was then commenced; the first circuit was entirely normal. Whilst on the downwind leg of the second circuit power was reduced and the aircraft slowed, 10° of flap was selected and the aircraft turned onto the base leg at 70 kt in the approach configuration. The extended centre-line was intercepted at 500 ft and the aircraft was allowed to pass through it to enable an aircraft on the runway to commence its take-off roll. The Europa was then turned back onto finals as the other aircraft began its take-off roll and the throttle was opened to command more power in order to adjust the descent rate. The engine did not respond. The pilot instructed the observer to change the fuel selector onto the reserve position and switch on the secondary fuel pump. A MAYDAY was declared and although the engine continued to run, it did not respond to the throttle. A successful forced landing was carried out into a field.

Subsequent actions

The aircraft was de-rigged and recovered to Tollerton Airfield. It was noted that the temperature/humidity conditions at the time of the incident were highly conducive to carburettor icing although the possibility of such an occurrence, given the heating effect of the turbo-charger on the materials of the induction system, was considered to make such icing an unlikely cause for the problem.

A detailed examination was carried out and extensive ground running undertaken by the UK agent for the engine manufacturer. No fault could be reproduced. The PFA was contacted and the results of the tests fully described and discussed. Additional checks were conducted before further flying took place. In the absence of any defects being detected, a further test flight of one hour duration was completed. The engine functioned satisfactorily throughout this flight.

A series of further flights then took place. On returning to Tollerton from a subsequent flight, with the same two occupants aboard, the pilot was again unable to restore power following a period in the descent. He therefore carried out another successful forced landing into a field. The aircraft was de-rigged and moved to Tollerton.

Further investigation

During a more extensive examination, involving considerable dismantling of the engine, the UK agent for the engine type determined that the unit in question was equipped with an obsolete standard of stator for the dual ignition system. This had been the subject of a Service Bulletin described as Mandatory by the manufacturer and issued a number of years ago. It had been applied to all engines supplied to UK customers by the UK agent and to all other operators of the type known to be operating in the UK. The requirements of the Bulletin are understood to have been applied to all engines built and supplied subsequently.

The Bulletin was issued following the discovery that a particular insulated cable in the stator assembly was deteriorating in service allowing the two conductors within to short and leading to ignition failure at high power. The two conductors in question are routed to the two ignition cut out switches. It appears that the loss of insulation effectiveness occurs on engines after extensive running has allowed parts of the engine to sustain a significantly higher temperature than is normally reached during shorter engine runs. Cables of this type have been found, in service, to have soft, pliable insulation, differing considerably from their firm condition when new; the cable in G-RMMT was found to be in this condition. The reason for this deterioration is not fully understood.

The Bulletin required all stators to be replaced with a modified design supplied free as an exchange component. The later design uses two separate individually insulated cables having a different insulation material.

Turbocharged versions of the Rotax 914 engine used in Europa aircraft kits supplied to the USA must be sourced from suppliers/agents in that country; they do not form part of the kits shipped from the UK. The precise history of the engine in G-RMMT before it was installed in the airframe during build and before being shipped to the UK from the USA has not been established.