

## Rand KR-2, G-JCMW

<b>AAIB Bulletin No: 9/2003</b>	<b>Ref: EW/C2002/09/21</b>	<b>Category: 1.3</b>
<b>Aircraft Type and Registration:</b>	Rand KR-2, G-JCMW	
<b>No &amp; Type of Engines:</b>	1 Great Planes VW derivative piston engine	
<b>Year of Manufacture:</b>	1999	
<b>Date &amp; Time (UTC):</b>	24 September 2002 at 1530 hrs	
<b>Location:</b>	Sturgate Airfield, Lincolnshire	
<b>Type of Flight:</b>	Development test flight	
<b>Persons on Board:</b>	Crew - 1	Passengers - None
<b>Injuries:</b>	Crew - None	Passengers - N/A
<b>Nature of Damage:</b>	Damage to nose landing gear and propeller	
<b>Commander's Licence:</b>	Airline Transport Pilot's Licence	
<b>Commander's Age:</b>	64 years	
<b>Commander's Flying Experience:</b>	20,764 hours (of which 2 were on type)	
	Last 90 days - 7 hours	
	Last 28 days - 1 hour	
<b>Information Source:</b>	AAIB Field Investigation	

The aircraft was undergoing a series of test flights, as specified by the Popular Flying Association, to qualify for a Permit to Fly. Another pilot had completed the first 10 hours of flying, and a further 15 hours were required to achieve an acceptable climb performance, a satisfactory cylinder head temperature and to prove the reliability of the engine's electronic ignition system.

The second pilot was aware of the improvements required and that, to achieve this, the propeller had been changed prior to his first flight. The original propeller had been of 56 inches diameter with three blades, the pitch of which could be adjusted on the ground. This was replaced with a 52.5 inch diameter and 52 inch pitch three bladed propeller. At the start of that flight the pilot experienced extreme difficulty in rotating the aircraft during takeoff. The subsequent rate of climb was low, at less than 200 ft/min, and the engine was temperature limited. At 2,000 feet agl full throttle was required to maintain level flight and the pilot noted that, in all phases of flight, constant back pressure on the control column was necessary to maintain any pitch attitude, even with full aft trim. The aircraft was landed at 60 kt IAS with power applied.

Following this flight, a two bladed 54 inch diameter and 35 inch pitch propeller was fitted, to improve the climb performance, and the elevator trim tab modified, by increasing its chord and camber, to try and achieve balanced flight.

On the next flight the pilot experienced even more difficulty rotating the aircraft during takeoff. At about 70 kt IAS the aircraft "pitched up violently to a very steep angle". This was contained using

aggressive elevator movements, which resulted in pitch oscillations. The subsequent rate of climb was satisfactory at 500 to 600 ft/min and the engine temperatures remained well within limits. The pilot also found that he was able to trim the elevators successfully both in the climb and in level flight. Low speed handling was assessed, and a minimum speed of 55 kt IAS was noted with the flaps up and 53 kt IAS with full flap selected. The aircraft did not stall.

An approach of approximately 5° slope was flown to Runway 09 at 65 kt IAS. The surface wind was from 050° at 5 kt and there was 25 km visibility under a 4,500 foot cloudbase. The pilot started the round out over the runway, but on retarding the throttle he found that he was unable to flare the aircraft. He stated that it sank on to its main wheels, pitched rapidly forward onto the nose wheel, bounced into the air and landed again on the nose and main wheels almost simultaneously. The nose wheel detached from the nose leg and the pilot steered the aircraft to the right side of the runway, bringing it to a halt at the edge. He shut the aircraft down and exited normally. Damage was limited to the propeller, which had shattered, and the nose landing gear.

The pilot concluded that, although the CG was well within limits, there was insufficient elevator authority to flare the aircraft at an appropriate speed. He recommended that the elevator rigging was checked and the CG recalculated. He estimated that the stalling speed on his last flight should have been about 40 kt.

Subsequent discussion with the first pilot to fly this aircraft indicated that he had experienced no handling problems and had recorded a stalling speed of 40 kt IAS. Since the accident, a PFA engineer has inspected the aircraft and found the flying controls to be rigged correctly. He also confirmed that the CG was within limits for the accident flight and that it was not adversely affected by the propeller changes. Further inspection by AAIB confirmed that the elevators, as rigged, had a range of movement from about 28.5° up to 13.5° down and it was not possible to alter the rigging of the elevator to give greater elevator travel downwards than up. The rigging angle of the tailplane was not adjustable.

It is possible that, on both flights, there had been a temporary obstruction which limited the rearward movement of the control column and reduced the pilot's ability to apply full nose up elevator but no evidence of this was found during the inspections. It is planned to continue with the aircraft's flying programme in the near future.