Aviation Safety Investigation Report 199800123

Kawasaki Heavy Industries Kawasaki KH4

14 January 1998

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199800123	Occurrence Type:	Accident
Jandakot, Aerodrome		
WA	Inv Category:	4
Wednesday 14 January 1998	8	
1210 hours	Time Zone	WST
None		
r: Kawasaki Heavy Industrie 47G3B-KH4 VH-ATU Miscellaneous Test Substantial Jandakot WA 1210 WST Jandakot WA	es Serial Number: 2	2178
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Crew Details:

	Hours on		
Role	Class of Licence	Туре Но	ours Total
Pilot-In-Command	Commercial	1700.0	2600

Approved for Release: Friday, September 18, 1998

The Kawasaki 47G3B helicopter had undergone major servicing, part of which required the removal and re-installation of the tail rotor cables, gearbox and extension tube. The pilot had assumed the ground-running of the helicopter from another company pilot, who had conducted the daily inspection. Following the rectification of some problems with the engine, the ground runs were completed and the tail rotor successfully balanced. The rotor track and balance equipment was then transferred from the tail to the main rotor to conduct main rotor blade tracking and balancing ground runs. The licensed aircraft maintenance engineer (LAME) who had conducted the maintenance work accompanied the pilot during the ground runs.

After the flat pitch track had been checked and found to be within limits on the ground, the LAME requested the pilot to fly the helicopter into a hover to check the main rotor blade tracking. The pilot complied with the LAME's request. However, the maintenance documentation had not been completed in that the independent inspection required on the flying controls had not been certified.

As the helicopter lifted to a 3-ft hover, it began to yaw to the right. The pilot attempted to correct the movement through the application of left tail rotor pedal, but the yaw accelerated to the right. Because the yaw was accelerating despite the pedal input, the pilot concluded that the helicopter had sustained a tail rotor failure. As the helicopter completed the second or third turn, the pilot lowered the collective to place the helicopter back on the ground. The helicopter landed heavily, damaging the landing gear, main transmission system and components of the tail rotor system. Neither of the helicopter's occupants received any injuries. No bystanders were injured.

The tail rotor control cables were subsequently found to have been incorrectly routed onto the tail rotor pitch change drum, causing the tail rotor control to work in the opposite sense to the tail rotor pedals.

The LAME had previously completed similar tasks on the helicopter type. He could not explain why he had incorrectly installed the cables on this occasion, other than to comment that he may have become too familiar with the procedure.

Before disconnecting the cables to conduct the required servicing, the LAME pinned the tail rotor cable pulley assembly to avoid a later requirement to re-rig the tail rotor controls. After the tail rotor gearbox and extension tube had been fitted, the LAME reinstalled the two tail rotor control cables to the tail rotor control drum. The cables ran in parallel along the helicopter's tail boom to the rotary drum that adjusts the tail rotor pitch control. When installed, the cable lengths were similar and both of the cable ends were alike. Instructions detailing the installation of the cables to the drum were in the maintenance and overhaul instruction manual. Although these instructions referred the reader to a diagram that displayed the routing of the cables, the diagram did not highlight the need for the cables to cross over before being connected to the drum. The cables should have been installed such that the inboard cable was connected to the outboard section of the drum and the outboard cable to the inboard section of the drum. However, the cables were not installed such that they crossed over and were, therefore, attached to their respective sections of the drum. Despite the incorrect installation of the cables, the tail rotor pitch change drum still worked, albeit in the reverse sense. Because the LAME had pinned the tail rotor pulley assembly, he decided that the check rigging of the tail rotor detailed in the maintenance manual was not required. As a result, a procedural step that may have detected the incorrect routing of the control cables was missed.

After the LAME had completed the work, he certified the appropriate sections of the maintenance work package even though the secondary inspection of the flying controls had not been conducted or certified. The independent secondary inspection should have detected the incorrect routing of the tail rotor pitch cables. Civil Aviation Regulation 42G detailed the qualifications required to conduct secondary inspections. The regulation permitted a pilot who held a licence that was valid for the aircraft to conduct a secondary inspection. However, the pilot was not required to undertake any relevant specific training on the conduct of such inspections. There was no regulatory requirement for the pilot to check the maintenance documentation other than the maintenance release before flying the helicopter, so he was not aware that the secondary inspection of the flying controls had not been completed.

The LAME's circumvention of the procedures, probably because of his familiarity with the task, was a factor in the accident. Although the maintenance manual specified procedures that should have ensured the correct operation of the tail rotor system, the design of the cables did not preclude their incorrect routing and attachment to the drum. Therefore, the design of the cables was also a factor in the accident. The investigation also found that the maintenance manual description of how to route the tail rotor cables was deficient in that it did not adequately highlight the cable crossover to the drum.

SAFETY ACTION

As a result of this occurrence, the Bureau of Air Safety Investigation is currently analysing two possible safety deficiencies. The deficiencies identified involve tail rotor cable marking and routing instructions in the Kawasaki Bell 47G and the qualifications of people permitted to carry out secondary inspections.

Any recommendation issued as a result of this analysis will be published in the Bureau's Quarterly Safety Deficiency Report.