

**Aviation Safety Investigation Report
199500060**

**Amateur Built Aircraft
EXEC 90**

11 January 1995

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NOTE: All air safety occurrences reported to the ATSB are categorised and recorded. For a detailed explanation on Category definitions please refer to the ATSB website at www.atsb.gov.au.

The Bureau did not conduct an on scene investigation of this occurrence. The information presented below was obtained from information supplied to the Bureau.

Occurrence Number: 199500060 **Occurrence Type:** Incident
Location: 4 km NW Pakenham
State: VIC **Inv Category:** 4
Date: Wednesday 11 January 1995
Time: 1230 hours **Time Zone** ESuT
Highest Injury Level: None

Aircraft Manufacturer: Amateur Built Aircraft
Aircraft Model: EXEC 90
Aircraft Registration: VH-TKO **Serial Number:**
Type of Operation: Miscellaneous Ferry
Damage to Aircraft: Nil
Departure Point: Koo Wee Rup VIC
Departure Time: 1225 ESuT
Destination: Mangalore VIC

Crew Details:

Role	Class of Licence	Hours on Type	Hours Total
Pilot-In-Command	Commercial	70.0	4500

Approved for Release: Wednesday, March 29, 1995

The grade one flying instructor was ferrying the kit helicopter to Mangalore where he planned to teach the owner/builder how to fly it.

About five minutes after departure, at 2000 feet, the pilot noticed an abnormal forward position for the cyclic in the cruise. Fearing that there may be a problem with the cyclic control rigging, he elected to turn back to the nearest airfield which was Pakenham. The cyclic control suddenly became very heavy and difficult to push to the left. However, for a short time it remained free to move in other directions. Then, without pilot input, the helicopter rolled to the right. The pilot was unable to prevent a right turn. When the helicopter had turned onto south, the cyclic suddenly became loose and then stiff intermittently.

Fearing that something in the control system was about to fail completely, the pilot entered autorotation in an attempt to descend and land as quickly as possible. During the descent, the helicopter pitched nose high then low severely, to the extent that the pilot thought the main rotor might cut off the tailboom. He discovered that by maintaining rotor RPM and raising the collective lever when the nose pitched down, and lowering the collective when the nose pitched up, he was able to use the secondary effects of collective control to counteract some of the uncommanded pitching and rolling.

Nearing the ground the pilot was able to execute a flare to eliminate all forward speed. At about ten feet AGL, the helicopter pitched nose up and rolled to the right. The pilot closed the throttle and allowed the helicopter to sink, expecting it to roll over on the ground. However, he managed to land firmly without damage. While shutting down, the pilot noticed that the cyclic was stirring in circles by itself.

Subsequently, the helicopter was inspected by engineers. No restriction of the cyclic control system was detected.

The helicopter owner subsequently advised the investigating CAA Airworthiness Surveyor that there was mention in the manufacturer's data that cyclic control problems may occur in hot conditions. On the day of this incident the outside temperature was 34 degrees celsius.

The investigation by the CAA has revealed that the friction adjustment of the slider ball (uniball) was temperature sensitive and caused binding of the cyclic control system. The CAA considered that the instructions provided by the kit helicopter manufacturer to address the cyclic binding problem were unacceptable.

The CAA was not made aware of the potentially hazardous problem during the application for the amateur built aircraft approval process. Until improved, the Rotorway EXEC 90 does not comply with the Australian flight characteristics requirements for amateur built helicopters.

Significant Factors

The following factors were considered relevant to the development of the incident:

1. The friction adjustment of the slider ball (uniball) was temperature sensitive.
2. Cyclic control binding resulted in significant loss of primary control in flight.
3. According to the CAA, manufacturer's instructions to rectify the potential cyclic control problem were inadequate.
4. Neither the helicopter manufacturer nor the Australian agent made the CAA aware of potential loss of cyclic control during the application for the amateur built aircraft approval.
5. The helicopter does not meet Australian design standards.
6. The pilot was unaware of a potential cyclic control problem until he encountered it in flight.

SAFETY ACTION



The CAA has withdrawn permits to fly the Rotorway EXEC 90 and will not issue a Certificate of Airworthiness to the helicopter type until convinced that the cyclic control system will operate in a satisfactory manner, with no mechanical degradation, and with a useful life, over a full range of temperatures including hot and cold soak likely to be encountered in normal Australian operations from minus 15 degrees celsius to plus 45 degrees.

