

No: 4/91

Ref: EW/C1188

Category: 2c

Aircraft Type and Registration: Air Command 532 Elite Gyrocopter, G-YROB

No & Type of Engines: 1 Rotax 532 piston engine

Year of Manufacture: 1989

Date and Time (UTC): 24 December 1990 at 1600 hrs

Location: Beaumont-cum-Mose, Near Clacton, Essex

Type of flight: Private

Persons on Board: Crew - 1 Passengers - None

Injuries: Crew - Serious Passengers - N/A

Nature of Damage: Aircraft destroyed

Commander's Licence: Private Pilot's Licence (Aeroplanes) and
Private Pilot's Licence (Rotorcraft-Helicopters) issued by the FAA

Commander's Age: 36 years

Commander's Total Flying Experience: 136 hours (of which 26 were on type)

Information Source: AAIB Field Investigation

On the afternoon of the accident, the pilot took his gyrocopter, G-YROB, to a field from where he had permission to fly. The weather was fine with a light westerly wind and the light conditions were good. The pilot was seen to assemble the aircraft and refuel it with both petrol and oil. He states that he added 20 litres of 4 star Mogas and 400 cc of an approved oil to give the correct 50:1 petrol/oil mixture.

G-YROB took-off in a westerly direction and climbed to about 100 feet before turning onto an easterly heading and overflying the take-off point. It then climbed steeply for about ten seconds before the engine power was heard to reduce and the aircraft descended to a low height before continuing its flight in an easterly direction. The pilot pulled up to fly over a barn and then turned left onto a westerly heading while descending to a height variously estimated by witnesses as between 2 and 30 feet. One witness states that ,whilst on this heading, G-YROB passed within 15 feet of him as the pilot waved with his left hand. At the end of the field, the pilot pulled up to avoid some trees and the engine power was heard to increase. G-YROB was next seen to enter a steep climb with its nose pitched-up close to the vertical. One witness states that at this time the engine cut for a period of about two seconds before increasing speed to a higher value than that before the cut. When at an estimated height of 100-150 feet G-YROB was seen to roll to the left at which point the engine was heard at high rpm for a short time before stopping completely. G-YROB continued to roll onto its back and fall vertically, rolling upright again before impacting the ground. The pilot, who sustained serious injury, has no recollection of the accident.

The pilot first flew in 1972 when he was awarded a Special Flying Award by the Royal Air Force during which he completed 35 hours of fixed wing flying to an approved syllabus. He next flew in 1981 when he gained an FAA Private Pilot's Licence (Rotorcraft-Helicopters). During this course he flew a total of 39 hours but there is no record of him ever having exercised the privileges of this licence. In 1984 and 1989 he completed two periods of glider flying during which he accumulated some ten hours of which one hour was solo. In May 1988 he began a Private Pilot's Licence (Aeroplanes) course which resulted in the award of a licence in September 1990.

In September 1988, the pilot purchased the accident aircraft in kit form and began construction. The aircraft was completed in March 1989 and, following a satisfactory inspection and flight test by the Popular Flying Association, it was granted a Permit to Fly by the CAA on 5 April 1990. On 26 April 1990 the pilot undertook one hour and ten minutes of dual instruction in a two seat gyrocopter. There is no record of any further dual instruction but the pilot states that he had flown a further 25 hours solo at the time of the accident. The aircraft had been seen flying in the accident area during the recent past.

The aircraft type is a single seat gyrocopter, consisting of a tubular aluminium trike fitted with tricycle undercarriage and carrying the seat, an engine and a rudder, and supported by a two-bladed rotor. It is powered by a 65 hp Rotax two-stroke twin-cylinder engine which is mounted behind the seat and driving a 60 inch diameter three-blade wooden pusher propeller. Maximum propeller speed is 2350 rpm. The rotor is 23 foot in diameter and normally rotates at about 300-400 rpm. It is mounted on a teetering pivot on the head, which rotates on an axle carried on a static beam. The beam is attached to the top of a mast, which forms part of the trike, via a universal joint and can be moved in the pitch and/or roll senses by the pilot's control stick, thereby also tilting the rotor disc relative to the aircraft. An instrument pod carries a rotor rpm indicator, in addition to basic flight and engine instruments.

G-YROB crashed at 30 ft amsl into a level field of winter wheat with a surface of damp soil of medium weight and come to rest with no travel of the wreckage over the ground after impact. All parts of the aircraft were found together, with the exception of the propeller blades, much of which were fragmented and scattered over an area to the right of and behind the aircraft impact point relative to the impact heading of the aircraft. The forward part of the trike had been broken off, support tubes for the right main landing gear had been fractured and the rotor mast had fractured near its centre. The engine had remained in place, and the rudder had remained attached and unmarked.

Examination of the accident site and the wreckage indicated that the aircraft had impacted the ground steeply nose down and rolled to the right while in a very steep, or even vertical, descent. There was no fire.

The rotor had remained intact and attached, with signs that it had not been rotating at the moment of ground impact. There was clear evidence of multiple in-flight strikes between the propeller blades and the trailing edge of both rotor blades at spanwise positions between 20-30 inches from the rotor rotational axis. In addition, the rotor head axle had bent and the head beam had twisted, resulting in contact of rotating and static components in a number of areas. All of the rotor, rotor head and propeller damage was consistent with the rotor disc having forcibly overtravelled in flight relative to the aircraft in a nose up pitch and left roll sense while the rotor was rotating at relatively low speed. With this exception, no evidence was found of any pre-impact defect or malfunction of the aircraft.