Europa, G-BWYD, 30 December 1997

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Aircraft Type and Registration:	Europa, G-BWYD
No & Type of Engines:	1 Rotax 912-UL piston engine
Year of Manufacture:	1997
Date & Time (UTC):	30 December 1997 at 1350 hrs
Location:	Kemble Airfield, Gloucestershire
Type of Flight:	Private (Training)
Persons on Board:	Crew -2 - Passengers - None
Injuries:	Crew - None - Passengers - N/A
Nature of Damage:	Minor damage to exhaust tail pipe, distortion of landing gear operating lever with elongation of attachment bolt holes, one propeller blade sheared off at hub
Commander's Licence:	Basic Commercial Pilot's Licence with Instructor Rating
Commander's Age:	70 years
Commander's Flying Experience:	12,267 hours (of which 73 were on type)
	Last 90 days - 63 hours
	Last 28 days - 24 hours
Information Source:	Aircraft Accident Report Form submitted by the pilot

The co-owner of the aircraft was receiving some re-familiarisationtraining on the aircraft, which had recently been repaired followinga landing accident at Biggin Hill in August 1997. The sortiewas to include circuits flown from grass Runway 22, the wind being220°, 12 to 15 kt. During the downwind checks on the firstcircuit, the pilot selected the landing gear D0WN and the instructorconfirmed the selection by observing illumination of the greengear down indication light on the instrument panel and checkingengagement of the associated safety latch on the gear selectorlever. The subsequent landing touchdown was normal, althoughthere was an initial 'skip' caused by an undulation in the grasssurface. Towards the end of the landing roll the instructor noticedthe right wing dropping, and suspected a failure of the rightoutrigger. However, before he could react there was a loud bangin the cockpit and the aircraft sank onto its underside. Followinga short groundslide, during which one of the propeller bladesbroke off at the hub, the aircraft came to

a halt and the pilotsselected all switches to OFF. It was then noticed that the landinggear selector lever was in the forward, ie UP position, althoughnot in its gate.

Following the incident, the aircraft was raised by a mobile craneand the landing gear was lowered. The aircraft was then pushedoff the grass onto a taxiway prior to recovery to a hangar. Onceon the tarmac, the cockpit was occupied in order that the brakescould be applied as the aircraft was manoeuvred down a slope towardsthe hangar. However, after a short distance, the landing gearagain collapsed, this time with the selector lever remaining inthe DOWN position.

On this type of aircraft, the landing gear consists of a singleretractable mainwheel, in addition to a tailwheel and two outriggerwheels under the outboard sections of the wings. The retractionlever is attached directly to the gear operating linkage, whichincorporates an over-centre mechanism. The flaps and outriggerwheels are attached to the same linkage. The function of thesafety latch is to prevent inadvertent gear retraction whilston the ground. The latch is attached to the retraction leverand is designed to rotate under its own weight into the guideslot. A positive action is required to move the latch out ofthe slot, which then allows the retraction lever to be moved outof the gate. The gear operating mechanism, together with detailsof the safety latch, are shown in the attached diagram. (Thisaircraft had been modified so that a green light illuminated whenthe gear was selected DOWN, however the switch that operatedthe light was mounted on the mainwheel mechanism, as opposed tothe safety latch, and thus was not capable of providing confirmationthat the gear was 'locked').

Following consulation with the repair organisation, it was consideredthat a possible explanation was that the safety latch may nothave been fully engaged prior to the landing, as the retractionlever was found out of the DOWN gate after the incident. (Howeverthe instructor recalled that the position of the safety latchprior to the landing appeared no different to that on previousoccasions). In the event of the aircraft landing (or taxiing)on undulating surfaces, flexing of the landing gear system inducesa tendency for the linkage to rebound from its over-centre stop. This can in turn move the retraction lever, unless the safetylatch is in position. It was thought that three previous incidentsinvolving landing gear collapse on this aircraft type had beencaused by incomplete engagement of the safety latch. It was consideredunlikely that the gear could collapse with the latch correctlyengaged without causing substantial damage to the retraction levergate structure.

The landing gear retraction lever was later submitted to the AAIBfor examination and it was observed that elongation had occurredin two of the three bolt holes that were used in attaching thelever to the main gear mechanism (see diagram). The elongationwas of the order of 1.5 mm and although some of this had occurredas a result of the incident, the presence of file marks in thebores indicated that the holes had been 'opened out' at some earlierstage. It is possible that this had been done in order to facilitatefitting of the lever. The fact that one hole was round suggestedthat the lever had been assembled to the landing gear linkageby means of a bolt through this hole, with alignment of the othertwo holes being achieved by filing their bores. The result wasa poor joint which had relied on flank friction to lock the partstogether, as evidenced by indentations surrounding the holes wherethe associated washers had dug into the side of the lever. Theindentations took the form of deep smears around the elongatedholes as the joint had slackened in service, and had pivoted aboutthe non-elongated hole. The amount of free play arising fromthe elongated holes, although small, could nevertheless have allowedthe main gear mechanism some additional movement, under the influenceof ground undulations, away from its overcentre stop.

It is possible that some distortion was caused to the landinggear linkage during this latest incident so that when the aircraftwas subsequently raised, and the gear lowered, the mechanism didnot

achieve its over-centre condition. Thus when the aircraftwas placed on the ground again, the gear may have initially beenprevented from collapsing only by the safety latch holdingthe gear selector lever in its DOWN gate. The subsequent gearcollapse may therefore have been due to the additional loads imposedby the weight of the occupant inducing distortion of the gearselector lever whilst it was retained in its DOWN gate by thesafety latch.