AAIB Bulletin No: 12/95 **Ref: EW/G95/06/11** **Category: 1.3**

Aircraft Type and Registration:	Rand KR-2, G-BRJY
No & Type of Engines:	1 Revmaster 2100D piston engine
Year of Manufacture:	1990
Date & Time (UTC):	15 June 1995 at 1246 hrs
Location:	Inverness Airport
Type of Flight:	Private
Persons on Board:	Crew - 2 Passengers - None
Injuries:	Crew - None Passengers - N/A
Nature of Damage:	Fractured left landing gear leg, scraped underside of wing, destroyed left flap
Commander's Licence:	Private Pilot's Licence with Night Rating
Commander's Age:	59 years
Commander's Flying Experience:	182 hours (of which 2 were on type) Last 90 days - 2 hours Last 28 days - 0 hours
Information Source:	Aircraft Accident Report Form submitted by the pilot, examination of failed leg by the AAIB and consultations with the Popular Flying Association

The KR-2 is a home built aircraft of American design. It is of tailwheel layout with a mainly wood and foam structure. G-BRJY was equipped with retractable cast aluminium alloy mainwheel legs. Many of the type have, however, been built with fixed gear or have been converted to that configuration.

The pilot reported that the aircraft ballooned on landing and the left gear leg departed in a forward direction before the aircraft swung round and came to rest at the turning to Runway 30.

The failed gear leg was initially examined by the AAIB and then subjected to specialist laboratory examination. This confirmed that the leg had indeed failed in a forward direction and also confirmed that the leg casting was of good quality.

An examination of diagrammatic sketches published by the design organisation of the aircraft type showed that the failed leg was very different in design from the type presumed to be in general use on KR-2s. In particular, the diagrams show the presence of flanges on the forward face of the leg in positions such that they would provide greatly increased bending strength appropriate to carrying loading in the direction which lead to the failure of the leg from G-BRJY.

Study of the layout of the aircraft suggests that, should it land firmly in a three-point attitude, the horizontal spring strip to which the gear legs are attached will suffer some torsional deflection in addition to the expected bending. This may be capable of positioning the loading axis in the leg such that forward bending will take place. Under such circumstances, the leg appears to be particularly weak since the relative position of the lateral web and vertical flanges, whilst appropriate to carrying normal vertical compression and horizontal spin-up drag loads (ie rearward bending) appears to be quite unsuitable for carrying the forward loading. Such loading would result most probably in very high tensile stress in the edge flanges, even when the applied bending force is low.

Further enquiries carried out by the Popular Flying Association indicate that the legs for G-BRJY were cast using a pattern supplied by the former UK distributor of the KR-2. The failed casting appears to be generally similar to other castings supplied by this former distributor, but differs in that the central vertical flange tapers as it extends downwards from the top of the leg and runs out completely at a point above the plane of failure. The castings on other KR-2 aircraft, in contrast, each incorporate a central flange which continues at full depth through the failure plane. This renders the leg design significantly stronger in forward bending than the failed leg, although both it and the failed leg are both considerably different from the units shown in the sketches supplied by the design organisation in the USA.

The latter organisation have discontinued the retractable undercarriage on the KR-2, no longer supply parts for it and cannot supply a design drawing. Since the casting of the failed leg took place some years ago and the UK distributor has since died, it has not been possible to pursue the origin of the failed leg design further.

The Popular Flying Association is writing to all UK based owners of KR-2s with retractable landing gear to establish whether any other machines use castings similar to the failed unit on G-BRJY.