This covers a nominally level flightpath over rapidly rising ground. The mode is split into two sub-modes: 2a covers the "flaps not in the landing configuration" case, and 2b the "flaps set for landing" condition. The two envelopes differ slightly to rule out warnings during normal approaches.

• 3 This mode caters for losses of height after take-off caused, for example, by engine failure. Under the CAA rules the warning will sound if the aircraft sinks by only 40ft when below 375ft a.g.l.

• 4 Mode 4 is again split into two: 4a covers the "undercarriage up" case, 4b "flaps not set for landing." The mode copes with unsafe ground clearance. If the aircraft is below 50/00 ft a.g.l. and the rate of ascent is less than 1,500ft/min the warning will be triggered. Mode 4 is designed to warn of approaches with the flaps or undercarriage incorrectly set. It will however be triggered by an attempted flapless or part-flap approach. A special box providing a different Mode 4 envelope is available for aircraft (such as the Viscount and Electra) which are required to keep flaps up during much of the approach at very busy airports in order to maintain speeds similar to those of the large jets.

• 5 Mode 5 is the most controversial, both in terms of operational (flying) procedures and electronic programming. It warns of flight below the ILS glideslope and rules out a fairly commonplace manoeuvre. Most ILS glideslopes intercept the runway some distance (usually 800-1,000ft) from the threshold. In certain circumstances it is normal to "dive" under the glideslope to land near the threshold. To improve the GPWS integrity the FAA has allowed a six-month delay in the introduction of Mode 5 until mid-1976. The CAA Mode 5 envelope involves a less demanding programming task than the FAA law.

As the system cannot look ahead (the radio altimeter only looks vertically down) GPWS is unable to warn of an approaching vertical obstruction. On the other hand, it will be triggered by a flapless or part-flap approach, and an ILS backbeam approach may cause a warning. Moreover, provided that flap and undercarriage position, and rate of descent, are normal, it cannot warn of an attempted landing at a place where there is no runway.

The possibility of a GPWS warning as a result of non-standard operations is avoided by the installation of two circuit-breakers in the cockpit. One—generally accessible only with difficulty, so as to deter over-frequent use—cuts power from the whole system; the second, incorporated in the flashing-light assembly, disables Mode 5 only.

Little publicity has been given to the accident-prevention performance of GPWS so far, but Flight understands that several potentially disastrous incidents have already been avoided, saving several hundred lives. In strictly financial terms, just one major accident saved in each airline over the next 20 years will repay GPWS purchase and installation costs manyfold. Problems remain, but these will almost certainly be solved this year. The statisticians can now look confidently for a steady decline in the number of fatal air-transport accidents.

The system airborne

At 4,000ft Sqn Ldr Tim Sindall eased the two Darts back towards the flight-fine pitch stops and the Royal Aircraft Establishment's HS.748 started to descend—fast. The needle of the vertical-speed indicator swung past the end of the scale at 2,000ft/min and we dropped into thick haze through which the Bedfordshire landscape could just be discerned. Every instinct said "Pull up," words which became a reality when, at 800ft on the radio altimeter, the ground-proximity warning sounded. I was sitting on the flight deck immediately behind the crew to see the behaviour of Britain's Plessey entrant in the ground-proximity warning market. The HS.748 installation is the first UK unit to be cleared for flight and the aircraft is participating in a joint Plessey/RAE flight-development programme.

Plessey began work on GPWS as a private venture,