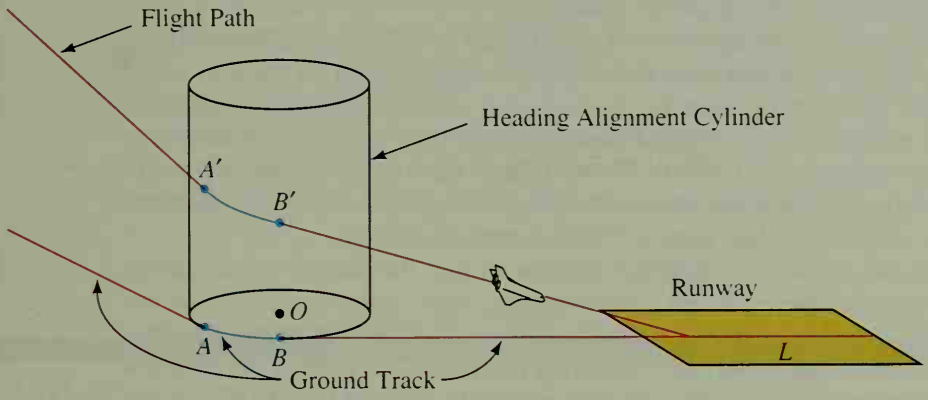
Application

Space Shuttle Landings

The space shuttle is launched vertically as a rocket but lands horizontally as a glider with no power and no second chance at the runway. NASA studied many different guidance systems for the final portion of entry and landing. The system that was selected for the first shuttle flights used a cylinder called the *Heading Alignment Cylinder* (HAC), shown in the diagram below. Notice that the projection of the flight path onto the Earth's surface is called the *ground track*.



The shuttle followed a straight-line flight path to A' and then it followed a curved path along the Heading Alignment Cylinder to point B'. The shuttle continued to lose altitude so that it was closer to the Earth's surface at B' than at A'. From B' to landing at L the shuttle followed a straight path aligned with the center of the runway.