

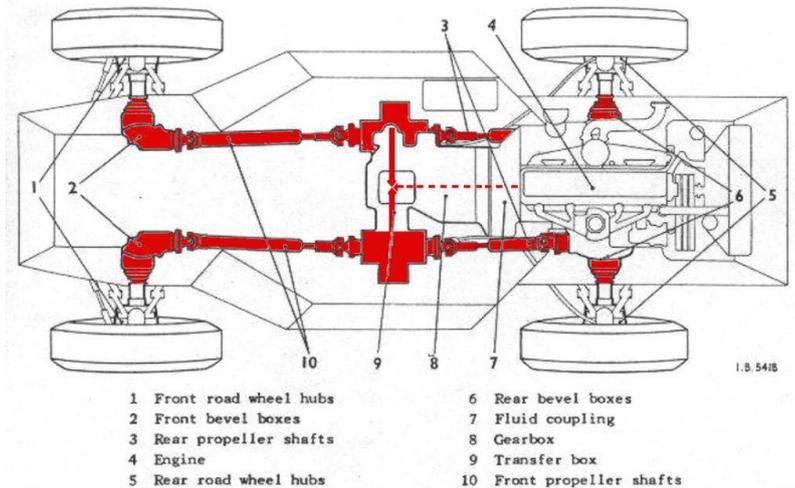
The H-differential

An **H-drive** drivetrain is a system used for heavy off-road vehicles to supply power to each wheel station. A single differential splits the drive into separate left and right drive shafts. At each wheel station a bevel box drives the half-shaft out to the wheel. Effectively, a longitudinal diff lock is permanently engaged in a vehicle with an H-drive. The advantages of the H-differential are:

- Independent suspension at each wheel station
- Traction is maintained if one wheel loses grip
- Greater ground clearance and lower unsprung mass (no centre diff box on the axle).
- A low unsprung mass (i.e. the suspension, wheels/tracks and other components directly connected to the suspension) leads to better ride & handling and less vibration.

Ferrets use a simplified layout of the H-drive with the gearbox and transfer case within a single housing, was used for the Ferret. A single wide casing houses the differential and transfer box, with four articulated driveshafts running to bevel gear boxes inboard of each wheel.

The propeller shafts are fitted with universal constant-velocity joints. The driveshafts are articulated with Tracta constant-velocity joints and epicyclic reduction gears in the hubs at each wheel-station.



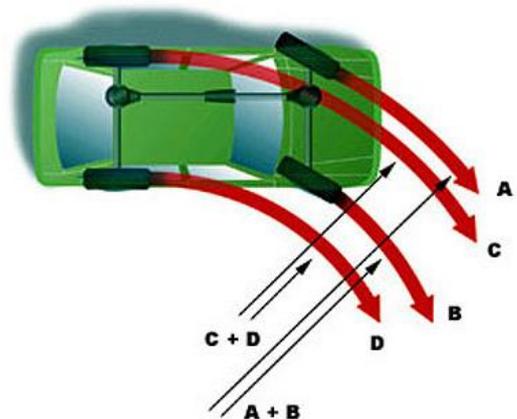
Transmission layout H-differential

Constant-velocity joints (aka homokinetic or CV

joints) allow a drive shaft to transmit power through a variable angle, at constant rotational speed, without an appreciable increase in friction or play. Constant-velocity joints are protected by a rubber boot, a CV gaiter, filled with oil or grease.

Turning corners

When a car corners, all four wheels rotate at different rates since each follows a different imaginary circle. The two wheels on the inside of the turn rotate slower than the pair on the outside, for they follow a smaller radius circle. The front wheels must rotate faster than the rear ones, for they follow a larger radius circle. For best traction *both* front and rear wheels ideally should propel the vehicle. Therefore a differential or transaxle (a combined transmission and differential) is required, to allow differing rotational speeds. Without a differential either the inner wheel rotates too fast or the outer wheel drags, which results in difficult and unpredictable handling, damage to tyres and strain on, or possible failure of, the entire drivetrain.



The sum of the rpm of front wheels (A+B) is higher than the combined rpm of the rear wheels (C+D).

With a permanent 4x4 drive there is no "diff" action between the front wheels and rear wheels on either side. The disadvantages of the H-differential configuration is wind-up.