

# AN INVESTIGATION OF THE LOW CONICITY PERFORMANCE OF A BO-BO LOCOMOTIVE

In a comparative study of vehicle dynamics it is shown that plan view suspension parameters could be chosen for a Bo-Bo locomotive to make it sufficiently stable to be considered suitable for the prototype Advanced Passenger Train. A vehicle of body length 20m and bogie pivot spacing 15.9m was assumed in the original study but since then it has been found possible to reduce these figures. A shorter vehicle introduces fewer structural problems but does, of course, demand a more compact layout of the equipment. In this report the dynamic behaviour of a shorter power car is investigated.

Provided the reduction in body length is not too great, only the low conicity performance will be affected and it is convenient to extend the study to see how other vehicle parameters influence the dynamic stability under these conditions. The following factors are investigated:

- Bogie pivot spacing
- Body yaw inertia
- Body lateral mass
- Wheel/rail creep coefficient
- Secondary suspension parameters
- Primary suspension parameters

The results of this study show that if a vehicle is to be designed for conditions where wheelset guidance is diminished through a condition of low conicity and low creep forces, no amount of adjustment of the parameters of a conventional suspension is able to give the required stability. However, a rather pessimistic picture has been presented because the modelling techniques take no account of non-linearities, not all of which work against the vehicle stability.

Besides the creep coefficients, the only other factor of any importance to the low conicity performance is the bogie pivot spacing. For the body inertia figures of this study, it should be no less than 11m.

The power bogie (H2X), as designed, has come out somewhat heavier than the original estimate. This has not improved its dynamic stability and makes it necessary to request a stiffer primary suspension.