

## CURVING TESTS WITH APT-E - COMPARISON BETWEEN MEASURED RESULTS AND LINEAR CURVING THEORY

In 1965, the then Advanced Projects Group of the Research Department began to take a fresh look at different aspects of the behaviour of railway vehicles. One of the main ideas developed was that, within certain limitations, sufficient force could be generated at the wheel treads to guide the vehicles in the train. Using this concept of tread force (or 'creep' force) guidance, a theory of railway vehicle curving was developed, and came to be called the linear curving theory.

When the experimental Advanced Passenger Train (APT-E) was built, it became possible to test this theory against the practical behaviour of the train up to high cant deficiencies. Two short test programmes were devised, and the results are presented in this report. It will be seen that agreement between theory and practice is not good, with even an improved linear theory being a poor predictor of actual events. However, it is possible to explain the sizeable discrepancies and to give a coherent picture of actual behaviour by allowing for the known limitations of the linear theory. A non-linear theory is under development, and this is expected to produce a much better representation of actual practice.

The report concludes that the APT-E does not curve in the way predicted by the linear curving theory. However, this is not unexpected, since the predicted displacements lie a long way outside the known linear regime. In fact, the real behaviour of the APT-E is rather better than the theory suggests, in that the lateral forces at the axles are more similar than predicted. What is more, the results show remarkably consistent trends, which means that the quasi-static behaviour is repeatable, and which suggests that it will be possible to produce a theory to describe quite closely the actual behaviour.