HIGH SPEED APT-P TESTS DECEMBER 1979 - PANTOGRAPH AND OVERHEAD EQUIPMENT PERFORMANCE

A series of tests was carried out in December 1979 on the Scottish Region to evaluate the performance of the prototype Advanced Passenger Train at speeds between 210km/h and 260km/h. Part of the test programme included a performance assessment of the pantograph and overhead equipment, for which measurements were made both on the train and at the trackside. This report describes the tests carried out and the assesses the results obtained.

The objective of running the APT at its design maximum of 255km/h was achieved, but it is clear that the standard overhead line equipment and pantograph are unsatisfactory for these high speeds in their present form.

The major problem with the pantograph is the large aerodynamic force generated by the main frame at high speeds, which compresses the secondary suspension and applies large forces to the overhead line, thus giving high uplift with consequent risk of damage. Whilst these problems were due to high train speed and moderate head winds, it is likely that a train in service running at say 210km/h with a 50km/h head wind would be generating similar levels of force. It therefore seems essential to modify the pantograph before regular service begins.

The modification of the standard MkIII overhead equipment, by introducing stitches, was very successful and achieved a substantial reduction of both arcing and force variation. Assuming the pantograph mean force was reduced, this would probably be suitable for high speed operation. Two incidents where the pantograph struck the fixed equipment while running on the stitched overhead line would not have occurred had the pantograph force been lower, and it is felt they cannot be attributed to the stitched equipment. They did however demonstrate how robust the pantograph is.

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