

A PRACTICAL METHOD OF MEASURING TOTAL TRAIN RESISTANCE

The measurement of train resistance is a desirable exercise following the introduction of new stock to establish that design targets have been met, to provide a feedback for future designs and to make proven values available for train performance estimation. It also allows the effects of modifications to existing vehicles to be assessed.

Scale model tests in wind tunnels provide some data but these relate only to aerodynamic forces. Although these predominate at high speeds, the translation of the data to full scale is uncertain because of the insufficiency of the length of available tunnel for a model of reasonable scale, and the problem of ground effect simulation.

This report describes a relatively simple technique for the measurement of total train resistance. The times of the train passing over successive fixed event markers spaced out along a selected test site are measured. The measurement system consists of a number of reflective boards mounted at known distance apart (typically 100m) between the rails. A combined light source and detector is mounted beneath the train and the output of the detector passing over successive boards is used to gate counters driven from a high frequency clock source. A knowledge of both the marker spacing and the track gradient then permits calculation of the equivalent level track deceleration of the train.

Provided that care is taken in determining the magnitudes of the different parameters, so that the resultant error levels are minimised but fully appreciated, then this technique offers an attractive means of assessing total train resistance, which avoids many of the difficulties inherent in work in this field.

As the choice of site and installation of the fixed equipment consumes significant effort, the recommendation is made that British Rail consider the provision of a permanent site.