

# THEORETICAL STUDIES OF PANTOGRAPHS FOR HIGH SPEED CURRENT COLLECTION

This report describes theoretical work to predict the performance of and optimise parameters for, a pantograph for high speed operation. The work has centred mainly around computer simulation using the finite difference method for solution of the equations of motion of the system, although other theoretical work and the results of track tests have been taken into account as well.

The main problems considered are those of operations at high speed and operation with multiple pantographs. No attention has been given to modification of the overhead, only to the pantograph itself. The qualities that have been of primary concern have been:

- Contact wire uplift at structures
- Contact force variations
- Amplitude of pantograph trajectory

Limitations of the computer program in computing high frequency effects (greater than 10 Hz) are acknowledged, although some improvement has been made to the program in this respect since most of this work was carried out. Allowances have been made for this deficiency in making the comparisons and predictions of the later chapters. The allowances are based on comparisons between test and computed results.