

THE RELATIONSHIP BETWEEN PASSENGER COMFORT AND VEHICLE BODY ACCELERATIONS

Measurements have been made of passenger response to vehicle ride. The process of vehicle body acceleration measurement with subsequent digitisation has been compared with Macmeter output. Both methods of measurement gave similar results.

Analysis of passenger response data has shown that there is poor correlation between passenger comfort and measured track geometry, when effects due to vehicle suspension are neglected. Consequently, passenger response to vehicle body accelerations is a necessary stage in deriving the comfort to track geometry relationship.

The vehicle body vertical and lateral accelerations need to be weighted to take account of the response of the human body to different frequencies of vibration. Various filter types were investigated, but all resulted in similar correlation coefficients of about 0.82. Combinations of vertical and lateral filtered vehicle body accelerations resulted in correlation coefficients of about 0.85. It is therefore recommended that the vector sum of ISO weighted vertical and lateral accelerations should be used for the comfort-acceleration relationship to give consistency with international procedures. Statistical analysis leads to the conclusion that there is 80% confidence, when using the comfort acceleration relationship, of a predicted value lying within ± 50 of the measured value.

The majority of quarter-mile sections analysed have consistent variation of acceleration whilst only a few sections have sufficiently large discrete levels of acceleration to influence the results. Hence, no improvement in correlation was obtained from the use of RMQ against RMS accelerations.