

EFFECTS OF CREEP FORCE AND WHEEL ROUGHNESS ON THE OPERATION OF LOW VOLTAGE DC TRACK CIRCUITS

Recent designs of diesel multiple units were found to be less effective at operating track circuits than older designs. The mechanism causing this effect was not properly understood and tests were arranged to examine two parameters, which were thought to be relevant. These were:

- The roughness of the tyre on the wear band.
- The creep force between wheel and rail, which is produced during normal running.

A two-axle freight vehicle was converted to have insulated axles and a means by which a controlled brake creep force could be applied to both axles. Separate disc and tread brake frames were made and changed midway through the tests. The electrical impedance between the axles was measured with a small portable instrument and also by later laboratory study of plastic replicas of tyre surfaces. The test train ran over low voltage dc track circuits and their operation was monitored. Rust formation was encouraged, by salting the track each night.

Results showed that with disc brakes, the wheel had smaller peak to trough roughness than with tread brakes, the latter roughness being similar in size to the rust film thickness produced overnight on salted rail. It was found that less creep force was needed to give a low impedance with tread braked wheels than with disc braked wheels. The forces for satisfactory impedance of tread braked wheels were similar to those which would exist during normal running. Satisfactory impedance with disc braked wheels was possible but with forces which were similar to those produced in full braking.

It is concluded that a combination of surface roughness and creep force is required for satisfactory operation of low voltage track circuits. Higher voltage track circuits are more able to break down the rust film since electrical action is available to assist mechanical action. Without the use of Track Circuit Assister, the new Class 165 is expected to be less able to operate the low voltage track circuits than the Class 158, having the smooth wheels of a disc-braked train and a bogie which imposes lower creep forces during running than the Class 158.