

OUTDOOR STUDY OF EFFECTS OF INSULATING RUST FILMS ON TRACK CIRCUITS

Failure of track circuits due to railhead contamination is a known problem. The properties of rust films were studied in the laboratory, and it was concluded that a promising remedy was to break down the insulating films electronically by increasing the track circuit voltage and by allowing more current to flow in the system.

The application of this idea to existing track circuits has been prevented by a lack of information about the properties of containment rust films in ordinary service conditions. Failures reported by the S&T engineers represent only the tip of the iceberg. All near failures and possibly some failures go undetected. A project to study containment films in detail at suitable railway sites was therefore initiated.

This report details work carried out on three track circuits selected for their failure potential – at Matlock, Egginton and Little Eaton. The object of the report is to define the insulating properties of the containment films in typical railway operation and to propose optimum track circuit parameters to overcome the problem.

The main conclusion is that failure of track circuits due to rail contamination is unpredictable, is the result of a large number of different effects, and must be treated in a statistical manner.

It is recommended that raising the effective relay voltage to about 1.0V should almost entirely remove the problem of “unpredictable” failure due to rusty rails. Failures resulting from very long periods of disuse are considered “predictable”, and therefore not covered by this recommendation.

The ends of certain circuits which control half barriers or points are seen to be a principal source of failure. Often, mechanical switches are used at automatic barrier crossings to prevent failure of this sort. It is suggested that in the long term other forms of down-proving may be used at other potential failure sites.