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NR/L2/ELP/21088

Module 02 – Mark 1 Maintenance Parameters

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1 Scope

This module of NR/L2/ELP/21088 covers:

- a) Equipment Design;
- b) Equipment Design Variations;
- c) Equipment Design Designations;
- d) Environmental Conditions;
- e) Maximum Pantograph Operational Speeds;
- f) Continuous Current Carrying Capacity;
- g) Design Staggers and Deviation;
- h) Minimum Staggers;
- i) Design Heights;
- j) Heel Settings;
- k) Track Tolerances;
- l) Maximum Dropper Spacing;
- m) Conductor Particulars;
- n) Conductor Tensions;
- o) Factor of Safety.

2 Definitions

See Glossary (NR/L2/ELP/21088/01)

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3 Equipment Design

The Mk1 design is defined as a Compound auto-tensioned catenary system for main lines, and a Simple catenary auto-tensioned system or fixed catenary system for slow lines and sidings.

The Mk1 system was first developed in 1955 for use on the branch line from Colchester to Clacton and Walton-on-the-Naze, of the Eastern Region, and the Styal line, on the Manchester-Crewe line, of the London Midland Region. The work was completed in 1959 and 1960 respectively.

Mk1 equipment subsequently went on to be used on Anglia and Glasgow suburban schemes between 1960 and 1962, and also on the main lines between Euston, Liverpool and Manchester via Birmingham and Stoke-on-Trent between 1963 and 1966.

The original designs were based on weight tensioned equipment; simple equipment up to 60mph (96km/h), stitched equipment up to 80mph (128km/h) and compound equipment up to 100mph (160km/h). The stitch was later abandoned, and the simple equipment's speed was raised to 80mph (128km/h). The compound equipment was subsequently raised to 110mph (176km/h). For lines operating at less than 60mph (96km/h), for example station areas, termini and sidings, fixed terminations were used.

In the original design the relationship between the spacing of both the main catenary and the auxiliary droppers were the uniform dimensions, i.e if the main dropper spacing was 'A', the main dropper end panels and the auxiliary panels were A/2 and the auxiliary end panels were A/4. The maximum span length was 73m.

In order to improve current collection, a revised design using modified dropper spacings was introduced for construction work after 1964 and was known as 'biased' or 'stiffness graded' compound A.T. equipment. The spans in this design were biased in the direction of travel. Dropper spacing is increasingly shortened towards the trailing end, and the main dropper connection to the auxiliary catenary being offset from the centre of the span.

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4 Equipment Design Variations

- There are a total of 7 different variations of the Mk1 equipment design as detailed in table 1.

Variation	Description
Mark 1-00	Original compound, simple and tramway equipment
Mark 1-01	Sagged simple equipment and original biased compound
Mark 1-02	Simple and biased compound supertensioned equipment
Mark 1-03	Sagged biased supertensioned compound and simple equipment
Mark 1-04	Sagged compound equipment
Mark 1-05	Sagged supertensioned compound equipment
Mark 1-06	Sagged biased compound equipment

Table 1 – Equipment design variations

5 Equipment Design Designations

- The equipment design designations are detailed in table 2:

Variation	Designation
Mark 1-00	Mk1-00-AT-C
	Mk1-00-AT-S
	Mk1-00-FT-S
	Mk1-00-FT-T
	Mk1-00-FCO-S
Mark 1-01	Mk1-01-AT-B-C
	Mk1-01-AT-S
Mark 1-02	Mk1-02-AT-B-C-ST
	Mk1-02-AT-S-ST
Mark 1-03	Mk1-03-AT-B-C-ST
	Mk1-03-AT-S-ST
Mark 1-04	Mk1-04-AT-C
Mark 1-05	Mk1-05-AT-C-ST
Mark 1-06	Mk1-06-AT-B-C

Table 2 – Equipment designations