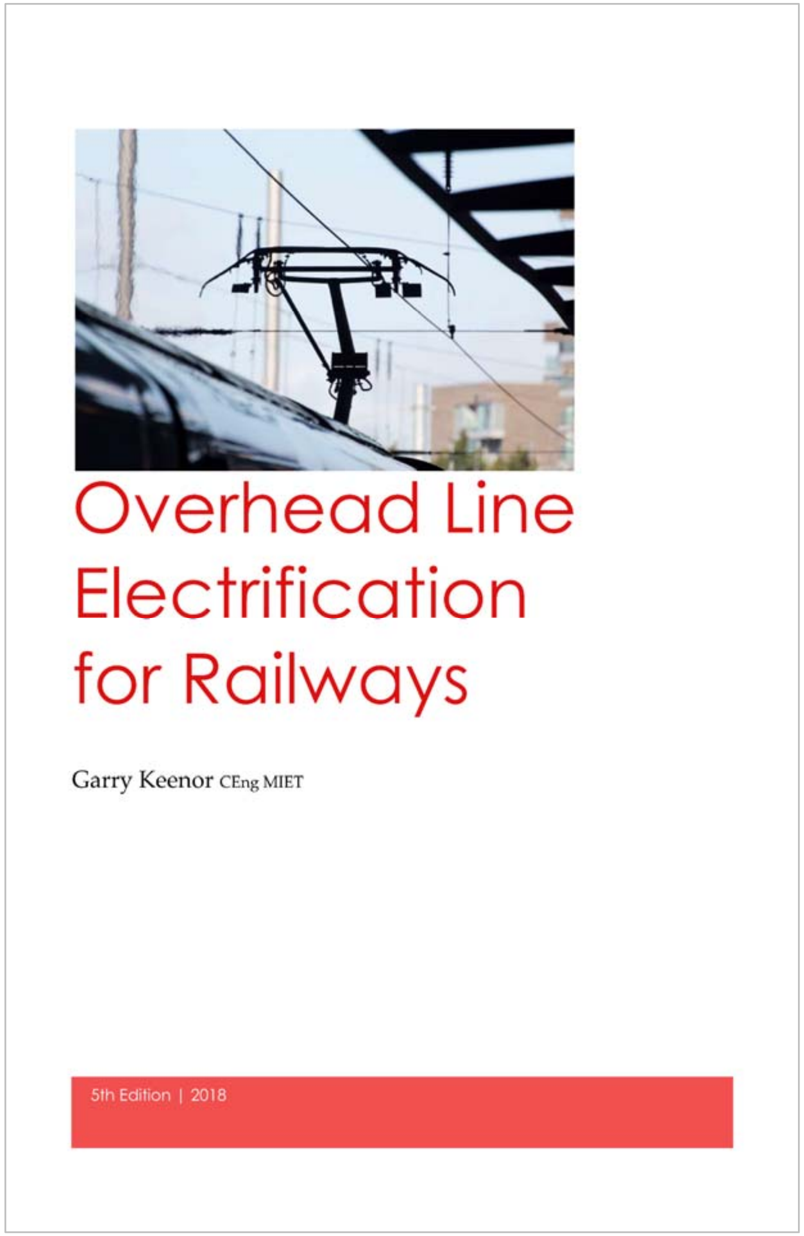

KNOWLEDGE, SKILLS AND LOW COST ELECTRIFICATION

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INTRODUCTION

Traditionally droppers have not had an electrical function, but modern systems increasingly use *current carrying droppers* with suitable electrical connections to improve resilience to potential differences between catenary and contact wire.

For locations with small system heights, a conventional dropper would be subject to excessive flexing due to pantograph passages, and so an *uplift dropper*, without a fixed catenary connection, is used instead.

Figure 205: Dropper types (clockwise from left): non-current carrying; chopsticks uplift; current carrying; loop uplift

Figure 206 (l-r): Arthur Flury Bz II flexible current carrying dropper with CuNiSi clamps; catenary attachment and contact wire attachment

Droppers (other than uplift types) have historically been made from solid copper wire or galvanised steel wire; however these are prone to long-term failure due to the cyclic loading /

unloading created by the passage of trains. Modern droppers use a stranded copper alloy wire, which is more expensive but gives better load cycle performance.

10.17.5 Ancillary Conductors

Conductors which are not contact wire or catenary, but carry traction and/or fault current, are collectively known as *ancillary conductors*.

Return Conductors (section 9.4.1) have historically used 19/3.25 mild steel or 19/3.25 hard drawn copper, but modern systems in the UK use aluminium as a good balance of conductivity and corrosion resistance versus cost. Current standard wires are 19/3.25 Al (given the codename *hornet* in British standards[91]) or 19/4.22 Al (*cockroach*), depending on electrical load. These are used as bare cables in open route, and with a PVC sheath in accessible areas such as stations.

19/3.25 Al is also used for aerial earth wire, although some systems use the *All Aluminium Alloy Conductor* (AAAC) equivalent 19/3.35 to eliminate creep. 19/3.25 Al (with a PVC sheath) is also used for MSCs and RSCs (section 9.4.5), which being ground-mounted and untensioned do not suffer from creep.

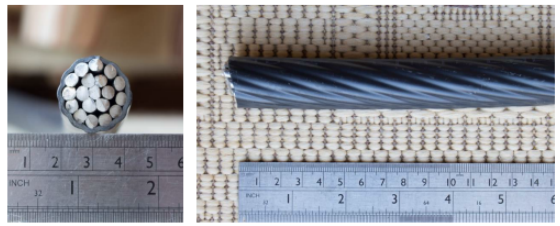
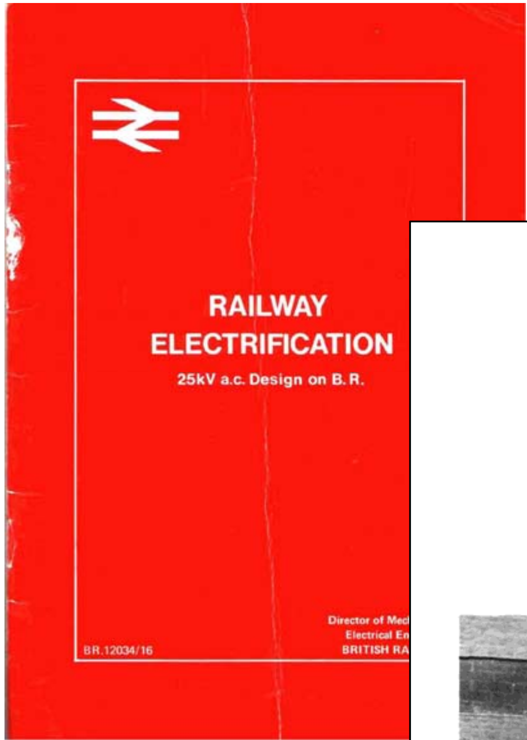


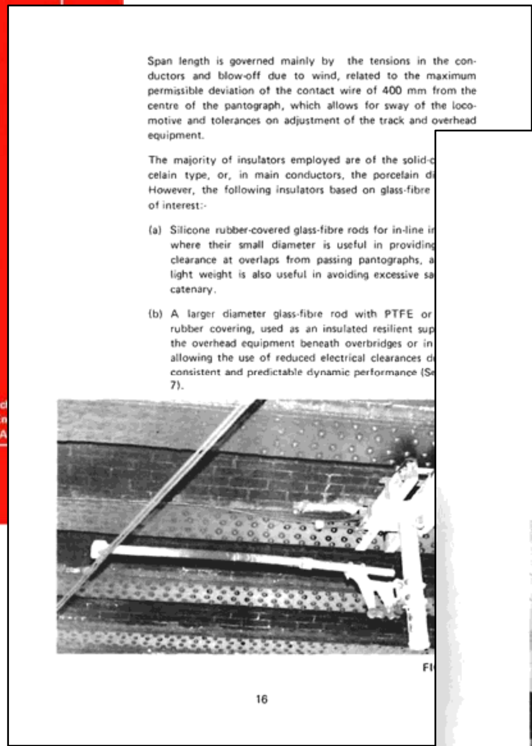
Figure 207: 19/3.25 PVC sheathed Al cable, used in the UK as bonding cable as well as MSC and RSC. Minus the PVC sheath it is also used as earth wire and return conductor

Cross track feeder wires (section 10.8.2) typically use the same aluminium conductors as return conductors, although more recently 37/2.27 hard drawn copper has been used when connecting to

[91] BS215-1:1970 "Aluminium Conductors and Aluminium Conductors, Steel-Reinforced – For Overhead Power Transmission – Part 1: Aluminium Stranded Conductors", March 1970; BSI; Appendix C

LEARNING THE HARD WAY





Span length is governed mainly by the tensions in the conductors and blow-off due to wind, related to the maximum permissible deviation of the contact wire of 400 mm from the centre of the pantograph, which allows for sway of the locomotive and tolerances on adjustment of the track and overhead equipment.

The majority of insulators employed are of the solid-c celain type, or, in main conductors, the porcelain di However, the following insulators based on glass-fibre of interest:-

(a) Silicone rubber-covered glass-fibre rods for in-line ir where their small diameter is useful in providing clearance at overlaps from passing pantographs, a light weight is also useful in avoiding excessive sa catenary.

(b) A larger diameter glass-fibre rod with PTFE or rubber covering, used as an insulated resilient sup the overhead equipment beneath overbridges or in allowing the use of reduced electrical clearances d consistent and predictable dynamic performance (Se 7).

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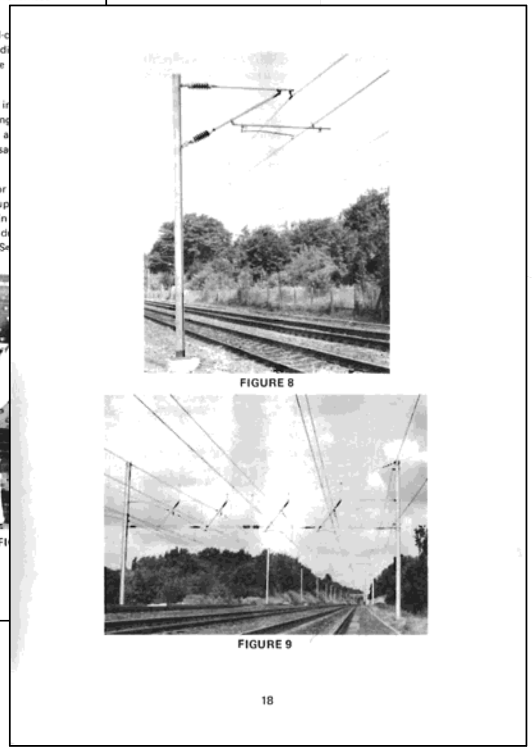

FIGURE 8

FIGURE 9

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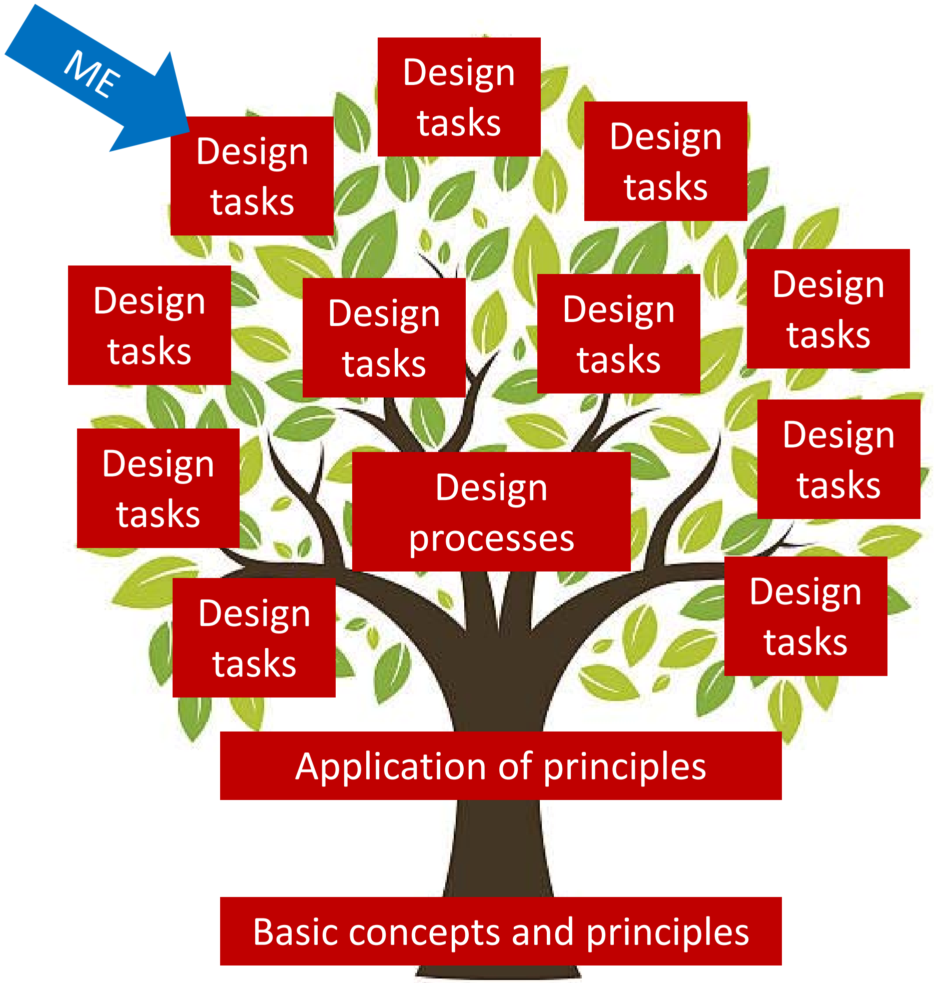
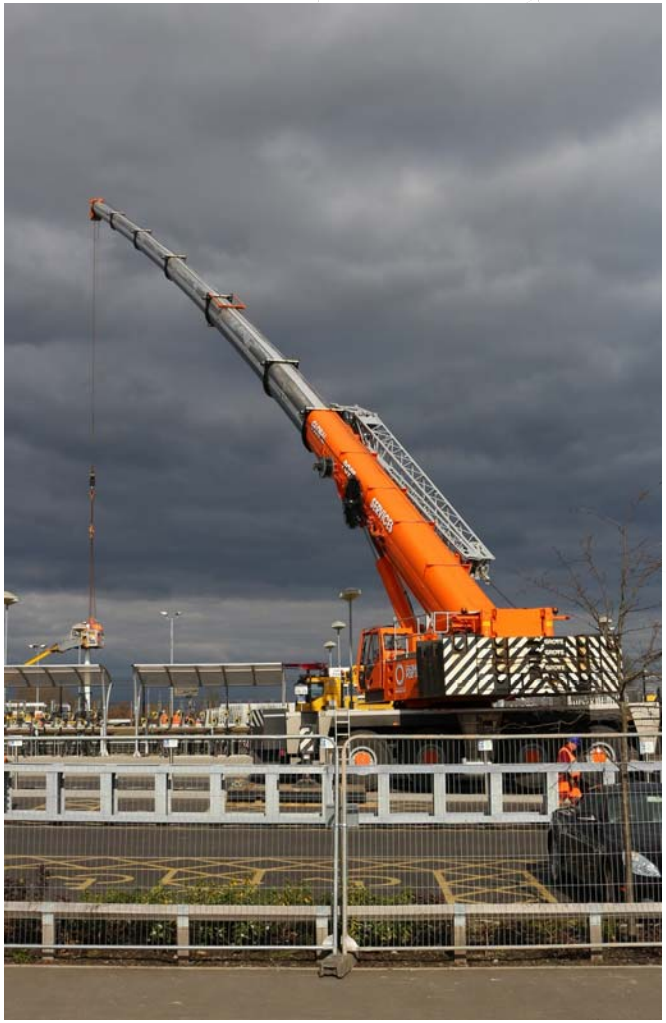
THE TREE OF KNOWLEDGE



GENESIS OF THE BOOK

CP5: WORK EXPLOSION

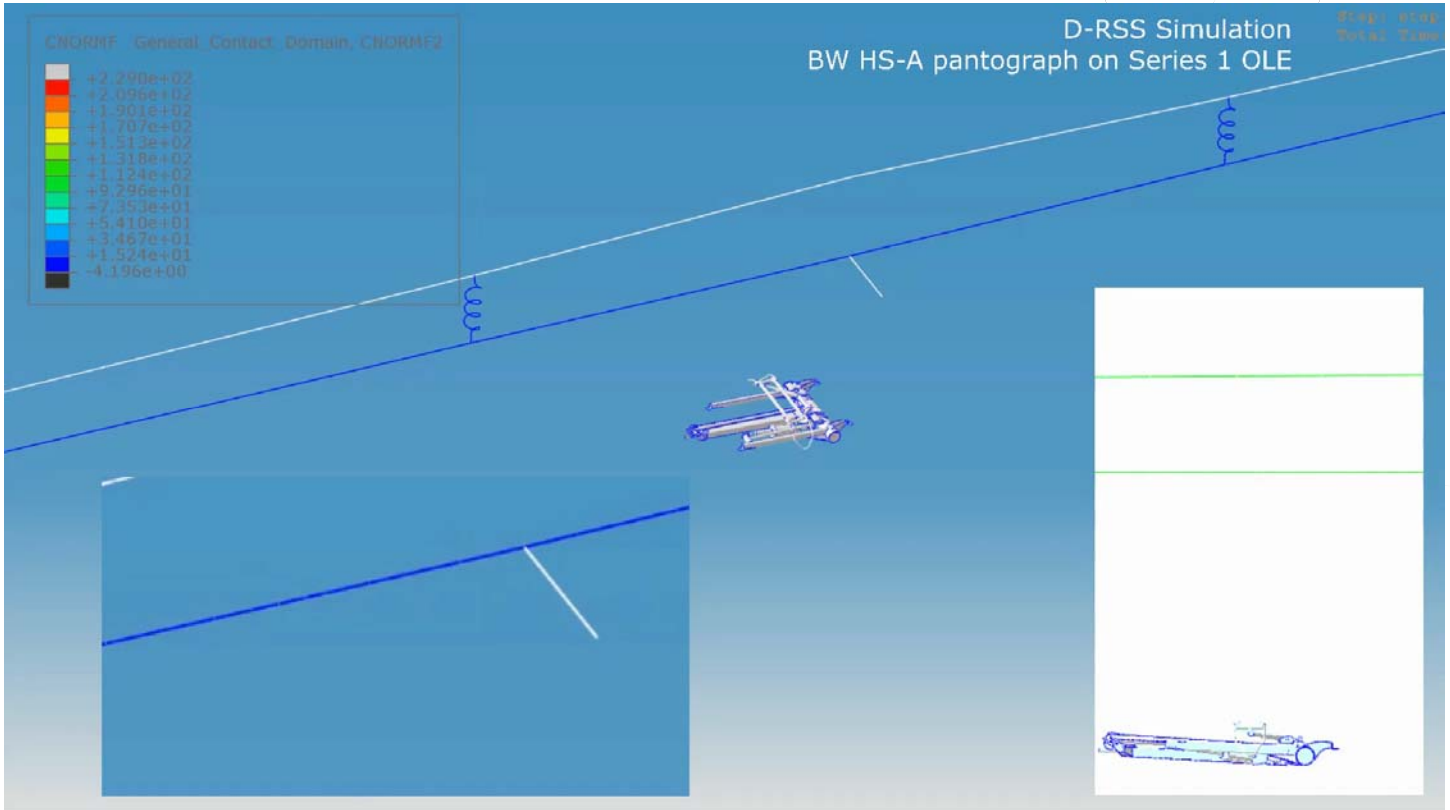


4TH EDITION: THE BOOK GOES PUBLIC

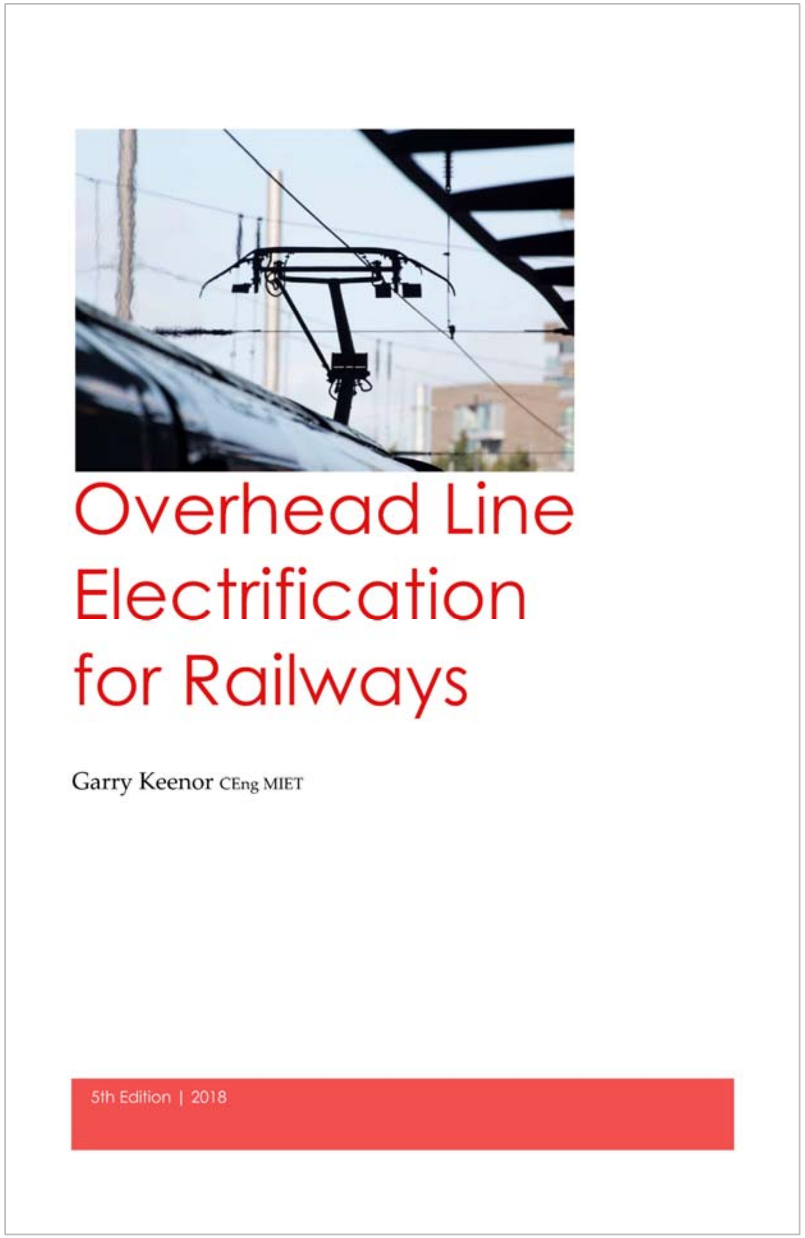
A ROLLING PROGRAMME

5TH EDITION: INTO PRINT

ELECTRIFICATION INNOVATION



LOW COST ELECTRIFICATION



THANK YOU

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