

**WOSS 560/3**

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# **British Railways Board**

Director of Mechanical & Electrical Engineering

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## **Cable Repairs**

WORKSHOP OVERHAUL STANDARD SPECIFICATION

WOSS 560/3

REVISION RECORD

This Specification will be updated when necessary by the issue of amended pages accompanied by revision letters. The amended or additional part of re-issued pages will be marked with a vertical black line.

If you consider that an amendment is necessary, complete BR Form 14298 and pass it to the local BRB Resident Engineer or Area Quality Engineer. Submission of a form does not authorise the proposed amendments.

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I authorise the work content of the publication shown above and its distribution to user departments.

Signed:

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This Specification applies to equipment fitted to the vehicles indicated 'X' below, but it is only to be implemented when authorised by the appropriate maintenance/overhaul document.

LOCOMOTIVES

03	X
08	X
09	X
20	X
26	X
31	X
33	X
37	X
43	X
47	X
50	X
56	X
58	X
60	X

73	X
81	X
85	X
86	X
87	X
88	X
89	X
90	X
91	X
92	X

DMU's

101	X
104	X
107	X
108	X
110	X
111	X
114	X
115	X
116	X
117	X
118	X
119	X
120	X
121	X
122	X
128	X

140	X
141	X
142	X
143	X
144	X
150	X
151	X
154	X
155	X
156	X
158	X

EMU's

302	X
303	X
304	X
305	X
307	X
308	X
309	X
310	X
311	X
312	X
313	X
314	X
315	X
317	X
318	X
319	X
320	X
321	X
322	X
504	X
507	X
508	X

411	X
412	X
413	X
414	X
415	X
416	X
419	X
421	X
422	X
423	X
432	X
438	X
442	X
455	X
456	X
485	X
486	X
487	X
488	X
489	X

COACHING STOCK

Mk 1	X
Mk 1 Catering	X
Mk2z, 2a-c	X
Mk 2d-e	X
Mk 2f	X
Mk 2 DBSO	X
Mk 3a	X
Mk 3b	X
Mk 3 Catering	X
Mk 3(HST)	X
Mk 3(HST) Catering	X
Mk 3 SLE and SLEP	X
Mk 4	X
DVT IC225	X
DVT IC125	X
Non Passenger	X

DEMU's

204	X
205	X
207	X

WAGONS


COMPONENTS




# WORKSHOP OVERHAUL STANDARD SPECIFICATION 560/3

## CABLE REPAIRS

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### INTRODUCTION

In BREL and other contractors workshops, authority to carry out any cable repair must be obtained from the BRB Resident Engineer/Area Quality Manager before work commences. His approval will also be required on completion of the repair.

Approval will not be given for any repair which will subsequently be pulled into a grommet, conduit or conduit fitting.

This specification does not apply to electronic control equipment cables, shoe leads or AVC (braided cambric) cables.

Cables are identified in this specification as follows.

Multicore : a number of insulated and taped cores with an overall outer sheath of black heavy duty polychloroprene (PCP).

Traction Motor Tails, Power, ETH and 3 Phase Jumper Assemblies : a single multi-stranded conductor, over which a tape separator may have been applied, followed by a composite covering consisting of a layer of butyl or ethylene propylene rubber (EPR) and a layer of chlorosulphonated polyethylene (CSP).

Underframe and Externally Mounted : single core cables with conductor stranding of 190/0.4 and above which are fixed externally to the underframe with no mechanical protection.

Internal : single core cables inside the vehicle and inside any equipment case or cubicle.

## REFERENCE DOCUMENTS

WOSS 560/4 Crimped joints for cables

### SECTION 1. REPAIR PROCEDURE

#### 1. Examination

1.1 Identify the damaged cable (see Introduction) and proceed as follows.

#### 1.2 Multicore (Figure 1)

1.2.1 Disregard any damage to the outer covering less than 1 mm deep.

1.2.2 Renew the cable if any of the taped cores are damaged. New cables are to be in accordance with Section 3 Table 3.

1.2.3 If the outer covering is split or worn to a depth greater than 1.0 mm, but the taped cores are not damaged it is to be repaired in accordance with clause 2.

#### 1.3 Traction Motor Tails, Power, ETH and 3 Phase Jumper Assemblies (Figure 2).

1.3.1 Disregard damage to the outer covering less than 0.5 mm deep.

1.3.2 Renew the cable if the conductor is damaged or corroded, it is to be repaired in accordance with clause 2.

1.3.3 If the outer covering is split or worn to a depth greater than 0.5 mm but the conductor is not damaged or corroded, it is to be repaired in accordance with clause 2.

#### 1.4 Underframe and Externally Mounted (Figure 3)

1.4.1 Disregard damage to the outer covering less than 1.0 mm deep.

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- 1.4.2 Renew the cable if damage is deeper than 1.0 mm and it is easy and economical to do so. New cable to be in accordance with Section 3 Table 1 and 2. If the cable is not easily accessible or is of a length which makes renewal uneconomical, proceed as follows.
  - 1.4.2.1 If the conductor is damaged or corroded, or if the cable has been stretched, repair in accordance with clauses 3 or 4.
  - 1.4.2.2 If the conductor is not damaged or corroded, repair in accordance with clause 2.
- 1.5 Internal (Figure 4)
  - 1.5.1 Disregard any damage to the outer covering less than 0.5 mm deep on cables with a conductor csa of 10 mm squared and above.
  - 1.5.2 Renew any damaged cables (other than in 1.5.1) if it is easy and economical to do so. New cable to be in accordance with Section 3 Table 1 and 2. If the cable is not easily accessible or is of a length which makes renewal uneconomical, proceed as follows.
    - 1.5.2.1 Cables less than 5.0 mm squared csa : if the circuit is less than 300 Vrms (350 V dc) and conditions are not wet, dirty or oily, repair in accordance with clause 5. For higher voltage circuits and/or contaminated conditions, repair in accordance with clause 3.
    - 1.5.2.2 Cables 5-10 mm squared csa : repair in accordance with clause 3.
    - 1.5.2.3 Cables above 10 mm squared csa : if the conductor is damaged or corroded repair in accordance with clause 3. If the conductor is not affected repair in accordance with clause 2.

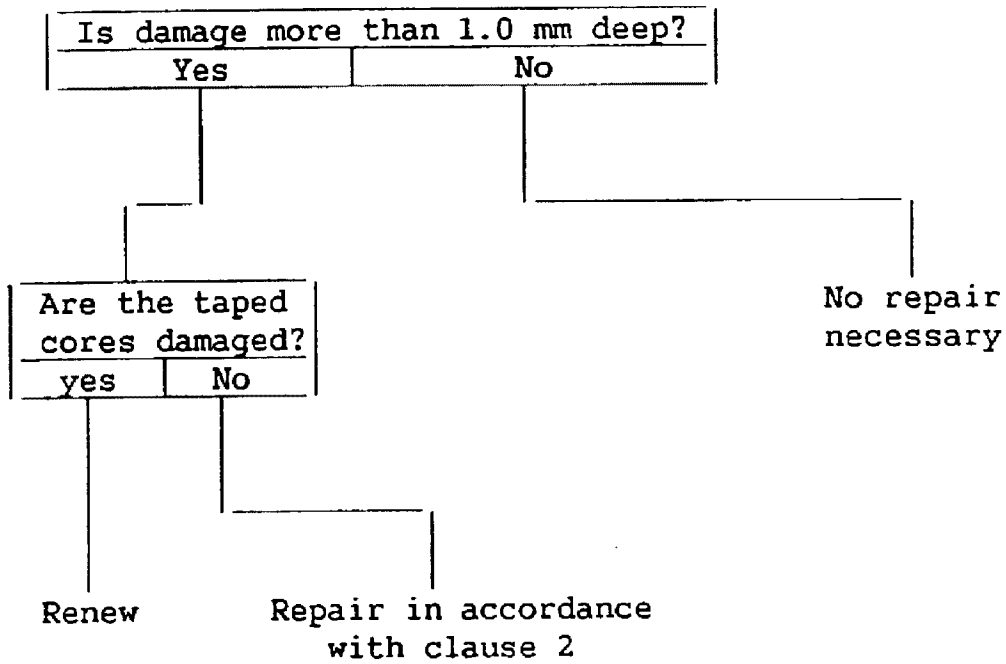


Figure 1 Multicore Cable Examination

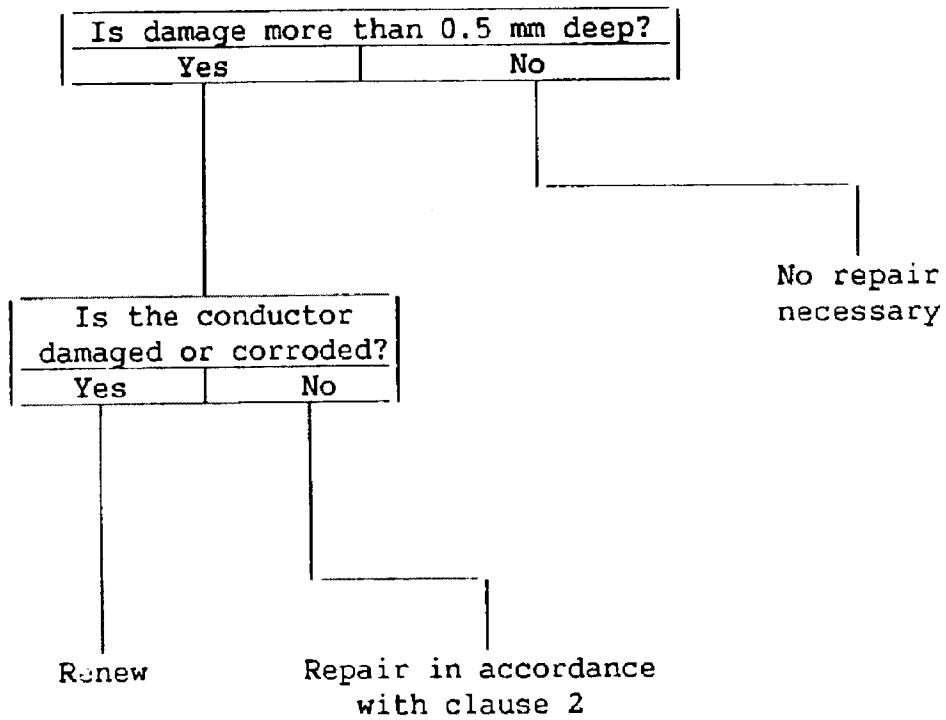


Figure 2 Traction Motor Tails, Power, ETH and 3 Φ Jumper Assembly Cable Examination

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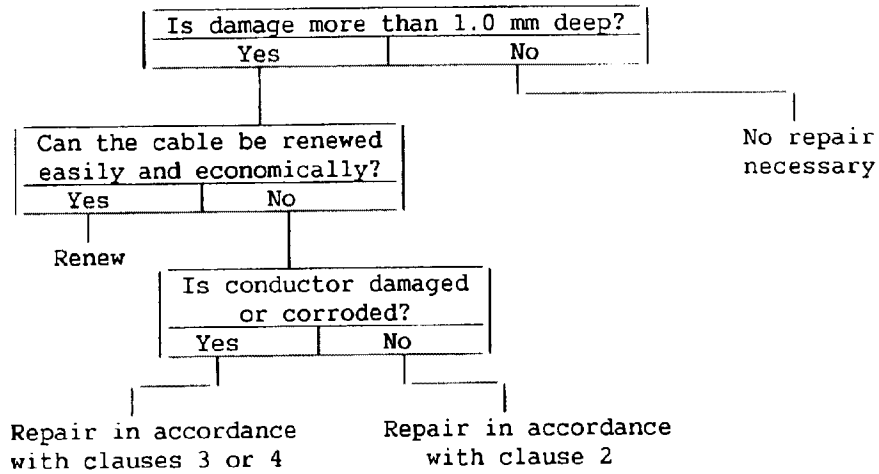


Figure 3 Underframe and Externally Mounted Cable Examination

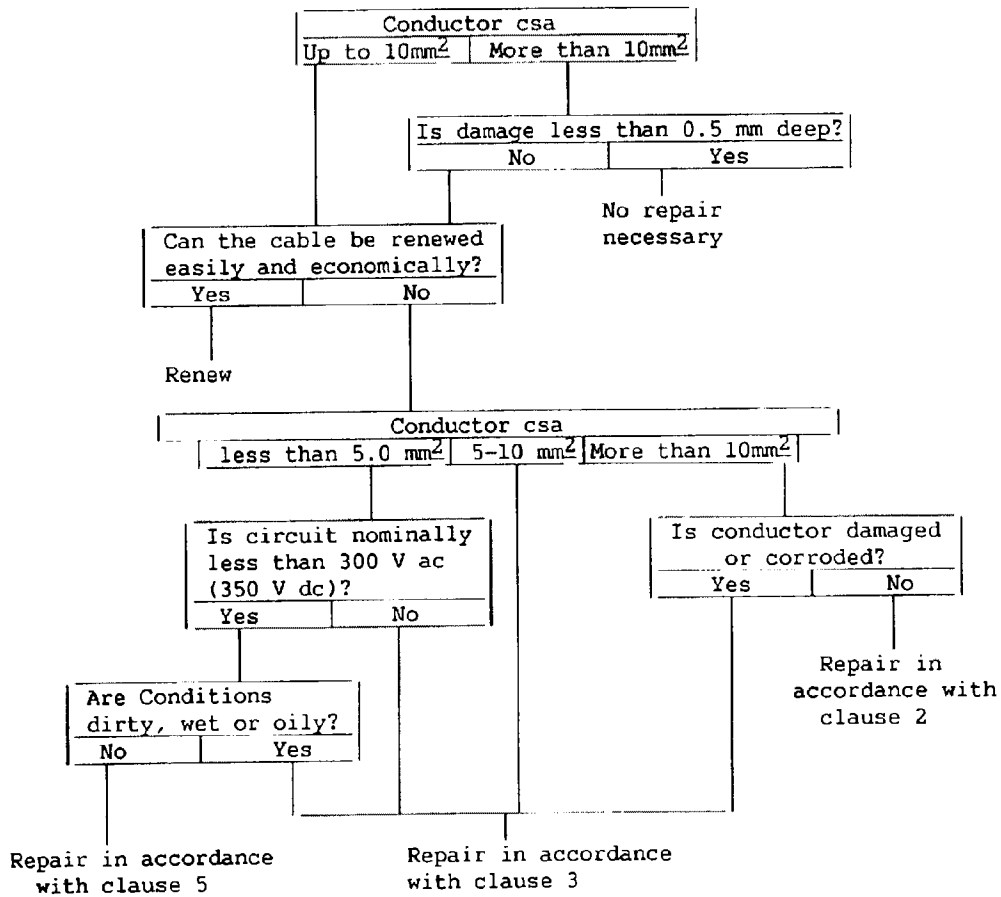


Figure 4 Internal Cable Examination



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2. Use of Belzona M.P. High Build Elastomer (Figure 5)

Tools and Materials

BR Cat No.

Belzona Molecular NF Cleaner/Degreaser  
(2 x 0.5 Litre)  
Carding Brush 39/001013  
Kit, Belzona No. 885 7/057451  
comprising:-  
2 x 138ml D and A Surface conditioner (1)  
1 x 523g M.P. Elastomer base  
1 x 227g M.P. Elastomer solidifier  
5 x Data/Application leaflets  
1 Mixing Board  
5 Spatulas  
5 Applicators

Polythene Tape: 1" strip cut from 500 gauge polythene sheet 59/040035 (2)

Notes

(1) Available separately as 7/057986

(2) Roll 2 m wide x 100 m long

- 2.1 Release the defective cable from cleats/clips, where applicable, to facilitate access.
- 2.2 Scrape off any dirt from the cable and wipe clean with a cloth moistened with NF Cleaner/Degreaser.
- 2.3 Cut away the damaged area of cable covering.

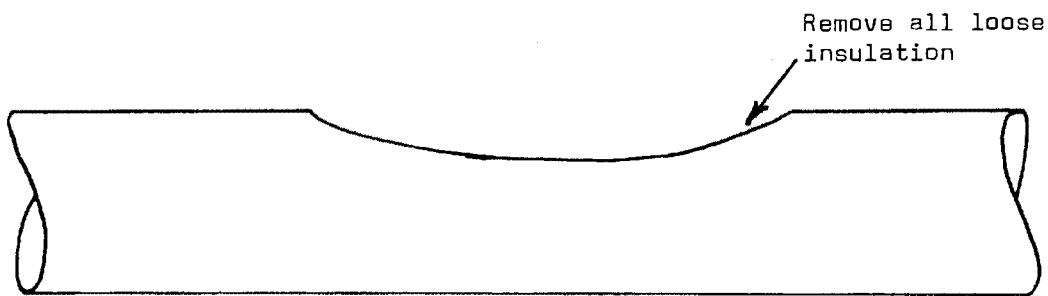
NOTE: for traction motor tails the following procedure must be implemented after the motor carcase has completed all oven stoving procedures.

- 2.4 Roughen the cable covering surface around and within the damaged area using a carding brush. Do not damage the conductor if it is exposed.
- 2.5 Brush off loose dust. Clean the area to be repaired with NF Cleaner/Degreaser applied either with a cloth or a brush as appropriate.

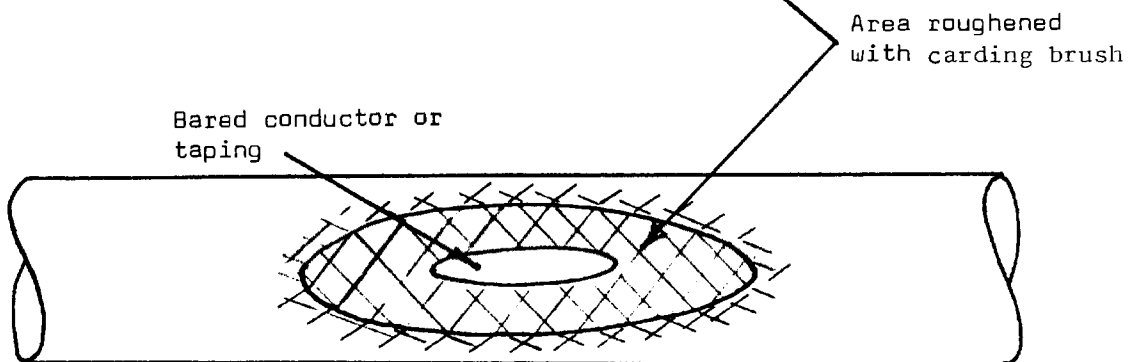
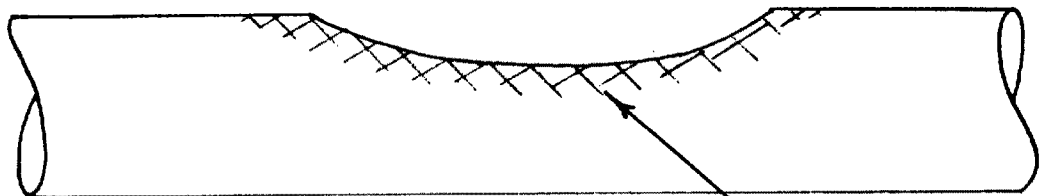
NOTE: The application of the Conditioner and the M.P. Elastomer in the following instructions must be done in dry conditions and at a temperature exceeding 5 degrees C.

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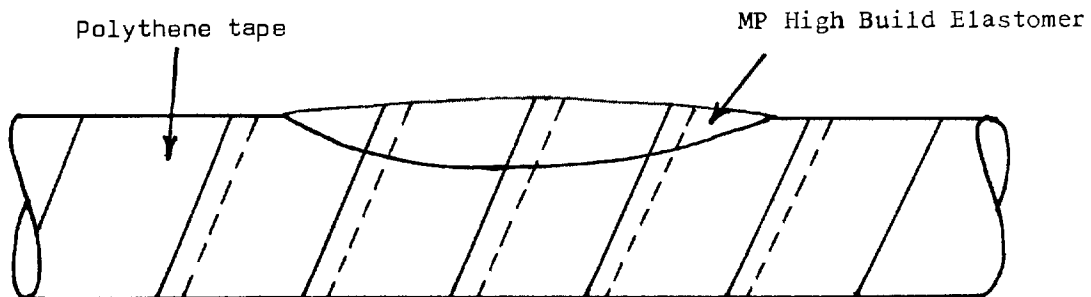
- 2.6 Apply a thin film of D and A Surface Conditioner onto the prepared surface. Use a stippling action to ensure the thinnest possible film. Cover a larger area than the area to be repaired to ensure that the Elastomer repair finishes within the conditioned area.
- 2.7 Leave the conditioned area until the D and A Conditioner is touch dry (at least 1 hour).
- 2.8 Using the spatulas, measure by volume, three parts of the M.P. Elastomer Base and one part of the M.P. Elastomer Solidifier on the mixing board. Use a separate spatula for each compound to avoid contamination of the compounds left in the containers as contamination will subsequently render the compounds unusable.
- 2.9 Complete mixing is essential so the two compounds must be mixed on the mixing board for at least three minutes and until an even colour and consistency is obtained. Use a spreading and scraping action with the spatula.
- 2.10 Within 15 minutes of mixing apply the M.P. Elastomer directly on to the prepared surface with the spatula, pressing down firmly to remove air and to ensure maximum contact with the cable. Build up to the thickness required. Do not spread the mixture past the conditioned area.
- 2.11 Contour the M.P. Elastomer to the cable profile with the applicator and then apply polythene tape loosely round the cable and cover the completed repair to produce a smooth finish.
- 2.12 The completed repair must not be moved for at least four hours to allow the M.P. Elastomer to cure. If necessary the repaired cable should be fixed to a straight bar or piece of wood during the curing period to prevent movement.
- 2.13 Clean the spatulas, mixing board and applicator with N.F. cleaner/degreaser immediately after use.
- 2.14 When the four hours curing period is completed remove the polythene tape and check that the mixture has set. The cable may now be bent or flexed.
- 2.15 Refit the repaired cable into the cable clips/cleats where applicable.



Removal of Damage



Roughening of Repair Area



MP High Build Elastomer applied and repair taped

Figure 5 Repair Using MP High Build Elastomer

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### 3. Use of Uninsulated Butt Splices

#### Tools and Materials

BR Cat No.

NF Cleaner/Degreaser (2 x 0.5 litre)

7/019330

#### Uninsulated Butt Splices

Shrink Sleeving (Hellerman medium wall adhesive lined Polyolefin)

)See Section 3  
)Table 1

#### Crimping Tools

Hellerman Polyolefin Insultape HST19

55/121004

Heat Gun (capable of 135 degree C and above) and  
Accessories AMP cat. no. 344306-1

240V

40/021021

AMP cat. no. 576825

110V

40/021014

- 3.1 For detailed information on crimping procedures refer to WOSS 560/4.
- 3.2 Release the defective piece of cable from cleats/clips, where applicable, to facilitate access with tools.
- 3.3 Cut out the defective piece of cable.
- 3.4 Scrape off any dirt from the end/s of the retained cable for a distance of between 300mm and 400mm and wipe clean with a cloth moistened with NF Cleaner/Degreaser.
- 3.5 Strip the insulation from the end/s of the retained cable to the dimension specified in Section 3 Table 1. Ensure that any melanex tape separator (it may be colourless or red) has been removed.
- 3.6 If a new piece of cable is being inserted cut a length of the appropriate size using cable in accordance with Section 3 Tables 1 & 2.
- 3.7 Strip the insulation from the ends of new cable to the dimension specified Section 3 Table 1. Ensure that any melanex tape separator (it may be colourless or red) has been removed.
- 3.8 Check the stranding of the cable to be joined and from the information given in Section 3 Table 1 obtain the appropriate uninsulated butt splice, crimping tool and length of shrink sleeving.
- 3.9 Slide the shrink sleeving onto the cable before crimping.
- 3.10 Crimp the prepared cable ends into the butt splice and check the completed operation in accordance with WOSS 560/4 Remove any flashing from the edges of the butt splice body.

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- 3.11 Using Polyolefin Insultape HST19 build up over the butt splice to the O/D of the cable and extend the tape for approx 15mm along the cables.
- 3.12 Apply heat, using a hot air gun, and reflector appropriate to the cable size, to the taped joint to shrink the tape and melt the inner liner of the tape.
- 3.13 From the centre of the butt splice mark the position of the ends of the shrink sleeve on the cable.
- 3.14 Slide the shrink sleeve over the taped butt splice to the marks on the cable and shrink the sleeve down onto the cable using a hot air gun and the appropriate reflector.
- 3.15 If the insertion of the new cable has been includes two butt splices repeat 3.8 to 3.14 inclusive for the second butt splice.
- 3.16 If a new piece of cable has been inserted and one end is to be connected to a terminal bar or equipment terminal the appropriate crimp terminal, crimping tool and crimping procedure is to be selected from WOSS 560/4.
- 3.17 Refit the repaired cable back into the cleats/clips. If the cable is not in cleats/clips it should be supported at each side of this repair by securing to other cables or cable loom.
- 3.18 If approval has been given for the repair of more than one cable in a group or loom the completed repairs must be staggered and not bunched together.

4. Use of Connection Box

Tools and Materials

Terminal Ends and  
Crimping Tools

See Section 3 Table 5.

Connection Box (coaching stock)	64/002426
Connection Box (Cl 86, 87)	54/075380
NF Cleaner/Degreaser (2 x 0.5 litre)	7/019330

Reference documents

Drawings for fitting the Connection Box to vehicles as follows.

Mark 1 Vehicles

Drg No. C-A0-19801 Arrg't of ETH Connection Box typical MK 1 vehicles  
Drg No. C-A0-19802 Item 1 Connection Box Bracket  
Drg No. C-A0-19802 Item 2 Connection Box Bracket  
Drg No. C-A0-19802 Item 8 Cable Cleat Bracket  
Drg No. C-A0-19802 Item 9 Cable Cleat Bracket Cat No. 63/7649  
Drg No. C-A0-19802 Item 3 Connection Box Stud Plate Cat No. 63/7650  
Drg No. C-A0-19802 Item 10 Cable Cleat Bracket Cat No. 63/7651  
Drg No. C-A0-19802 Item 11 Cable Cleat Bracket Cat No. 63/7652  
Drg No. C-A0-19802 Item 12 Cable Cleat Bracket Cat No. 63/7653  
Drg No. C-A3-19803 Item 1 Cable Cleat  
Drg No. C-A3-19803 Item 2 Cleat Packing

Mark 2 a, b and c

Drg No. C-A0-17952 Arrg't of ETH Connection Box Mark 2 a, b and c  
Drg No. C-A0-19802 Item 4 Connection Box Bracket  
Drg No. C-A3-19803 Item 1 Cable Cleat  
Drg No. C-A3-19803 Item 2 Cleat Packing

Mark 3 LH and Mark 3 Sleepers Toilet End

Drg No. C-A0-17588 Arrg't of ETH Connection Box Loco Hauled MK 3 Coach FO and SO  
Drg No. C-A0-19802 Item 5 Connection Box Bracket Cat No. 63/7654  
Drg No. C-A0-19802 Item 6 Connection Box Bracket Cat No. 63/7655  
Drg No. C-A1-5877 Item 4 Cable Cleat  
Drg No. C-A1-5877 Item 5C Cleat Packing Cat No. 63/7057

Mark 3 Sleepers Non Toilet End

This procedure not applicable: use procedure 3.

Class 86 and 87

Drg No. L-A0-11137 ETH Connection Boxes

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### Procedure

- 4.1 For detailed information on crimping procedures refer to WOSS 560/4.
- 4.2 Refer to "Reference Documents" for drawings applicable to Mk 1, 2, 3 Coaches, Mk 3 Sleepers, Class 86 and 87 locomotives.
- 4.3 Release defective cable from cleats/clips to facilitate access with tools etc.
- 4.4 Cut out the damaged cable to a position suitable for mounting the connection box in accordance with the appropriate drawing.
- 4.5 Scrape off any dirt from the end of the retained cable and wipe clean with a cloth moistened with NF Cleaner/Degreaser.
- 4.6 Assemble the box gland assembly onto the retained cable.
- 4.7 Crimp the terminal in accordance in accordance with WOSS 560/4.
- 4.8 Temporarily connect the crimped cable to the stud in the box and hold the box up to the underframe. Mark off the positions of any cable fixing brackets and box mounting brackets in accordance with the appropriate drawing.
- 4.9 Move the box and fix the cable fixing brackets and box mounting brackets in accordance with the appropriate drawing.
- 4.10 Fix the box in position in accordance with the appropriate drawing.
- 4.11 Slide the gland assembly items down the cable and fix with the bolts to the connecting box.
- 4.12 Cut a length of the appropriate new cable, in accordance with Section 3 Table 2 and strip the insulation to the dimension specified in Section 3 Table 1. Ensure any melanex tape separator (it may be colourless or red) has been removed.
- 4.13 Assemble the box gland assembly onto the new cable.
- 4.14 Select the appropriate crimp terminal end and crimping tool from Section 3 Table 5.
- 4.15 Crimp the terminal end to the prepared cable and check the completed operation is correct in accordance with WOSS 560/4.
- 4.16 Connect the terminal to the stud in the box and secure with the 16mm flat washer, spring washer and nut.
- 4.17 Slide the gland assembly items down the cable and fix with the bolts to the connecting box.

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- 4.18 Fit lid and tighten screws.
- 4.19 Check that all cable cleats/clips have been refitted or fitted in accordance with the appropriate drawing.

### 5. Use of Insulated Butt Splices

#### Tools and Materials

Insulated Butt Splices  
and Crimping Tools

Section 3 Table 4

NF Cleaner/Degreaser (2 x 0.5 litre)

7/019330

NOTE: If the size of the defective cable is not listed in Section 3 Table 4 repair in accordance with Clause 3.

#### Procedure

- 5.1 For detailed information on crimping procedures refer to WOSS 560/4.
- 5.2 Cut out the defective piece of cable.
- 5.3 Scrape off any dirt from the end/s of the retained cable and wipe clean with a cloth moistened with NF Cleaner/Degreaser.
- 5.4 Strip the insulation from the end/s of the retained cable to the dimension specified in Section 3 Table 4.
- 5.5 If a new piece of cable is being inserted cut a length of the appropriate size using cable in accordance with Section 3 Table 2 and Table 4 and strip the insulation to the dimension specified in Section 3 Table 4.
- 5.6 Select the appropriate insulated butt splice and crimping tool from Section 3 Table 4 and crimp the cable in accordance with WOSS 560/4.
- 5.7 If a new piece of cable has been inserted and one end is to be connected to a terminal bar or equipment terminal the appropriate crimp terminal, crimping tool and crimping procedure is to be selected from WOSS 560/4.
- 5.8 The completed joint/s must be supported at each side by securing the cable to either other cables or cable loom to prevent failure through vibration.
- 5.9 If approval has been given for the repair of more than one cable in a group or loom the insulated butt splices must be staggered and not bunched together.



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SECTION 3. TECHNICAL DATA

Table 1 Cable Sizes and Uninsulated Butt Splices

When renewing or joining cables, those marked \* are those currently available and are detailed in Table 2. The first column is divided into blocks, each of which contains a \* replacement cable for the others.

Cable			Uninsulated Butt Splice	Crimping Tool			Heat Shrink Sleeving
Strands (No./dia of wires)	Insulation Stripping Length			BR Cat No. 54/	AMP Part No	BR Cat No. 39/	Jaw
	Min mm	Max mm					
32/0.2mm 1/0.044" 33/0.0076" 7/0.018" 16/0.012" 40/0.0076" 3/0.029" 37/0.2mm *	6	7	119212	49935 or 525693	8133	16-14	121930
30/0.25mm 37/0.25mm *							
3/0.036" 28/0.012" 70/0.0076" 50/0.25mm 37/0.3mm *							
7/0.029" 19/0.018" 44/0.012" 110/0.0076" 56/0.3mm 7/0.036" 65/0.012" 162/0.0076" 73/0.012" 84/0.3mm 37/0.4mm	6	7	119215	49935 or 525693	8133	12-10	121930

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Table 1 Continued

Cable			Uninsulated Butt Splice	Crimping Tool			Heat Shrink Sleeving
Strands (No./dia of wires)	Insulation Stripping Length			BR Cat No. 54/	AMP Part No	BR Cat No. 39/	Jaw
	Min mm	Max mm					
7/0.044" 97/0.012" 140/0.010" 61/0.4mm *	10	11	119223	69062	8206	8	121931
120/0.012" 7/0.052" 60/0.018" 195/0.010" 80/0.4mm *							
182/0.012" 91/0.018" 296/0.010" 7/0.064" 126/0.4mm *	12	13	119223	69062	8206	6	121931
19/0.044" 117/0.018" 294/0.012" 19/0.052" 196/0.4mm *	13	14	119225	69062	8206	4	121931
163/0.018" 203/0.018" 557/0.012" 248/0.018" 276/0.4mm *	15	16	119229	69062	8206	2	121931

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Table 1 Continued

Cable			Uninsulated Butt Splice	Crimping Tool		Heat Shrink Sleeving
Strands (No./dia of wires)	Insulation Stripping Length		BR Cat No. 54/	Corner Part No	BR Cat No. 39/	BR Cat No. 55/
	Min mm	Max mm				
121/0.029" 313/0.018" 705/0.012" 323/0.018" 19/0.083" 396/0.4mm *	23	24	103496	J	8177	121932
416/0.018" 160/0.029" 19/0.083" 37/0.064"(1) 360/0.5mm *	23	24	103501	K	8178	121932
37/0.083" 513/0.018" 475/0.5mm *	27	28	103506	L	8179	121932
610/0.018"(2) 235/0.029"(2) 660/0.018" 608/0.5mm *	27	28	103515	M	8180	121932
810/0.018"(3) 312/0.029"(3) 37/0.103" 756/0.5mm *	27	28	103520	N	8181	121932
392/0.029"(1) 1017/0.018"(1) 37/0.093" 925/0.5mm *	31	32	103510	O	8182	121933

Notes

- (1) Wrap core with 0.6mm copper sheet, BR Cat. No. 22/164351.
- (2) Insert 2 x 1.8mm dia copper wires (see WOSS 560/4).
- (3) Insert 3 x 1.8mm dia copper wires (see WOSS 560/4).

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Table 1 Continued

Cable		Uninsulated Butt Splice	Crimping Tool		Heat Shrink Sleeving	
Strands (No./dia of wires)	Insulation Stripping Length		BR Cat No. 54/	Corner Part No	BR Cat No. 39/	BR Cat No. 55/
	Min mm	Max mm				
481/0.029"(3) 1248/0.018"(3) 61/0.093" 1221/0.5mm *	31	32	103525	P	8183	121933
646/0.029"(1) 1677/0.018"(3) 61/0.093"(3) 792/0.029" 2057/0.018" 61/0.103"(1)	37	38	103530	Q	8184	121933
940/0.029" 940/0.029" 2013/0.5mm *	37	38	103535	R	8186	121933

Notes

- (1) Wrap core with 0.6mm copper sheet, BR Cat. No. 22/164351.
- (3) Insert 3 x 1.8mm dia copper wires (see WOSS 560/4).

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Table 2 Single Core Cables

No/Dia of Wires (mm)	BR Cat No.
37/0.2	6/110950
37/0.25	6/110960
37/0.3	6/110970
37/0.4	6/110980
61/0.4	6/110990
80/0.4	6/111000
126/0.4	6/111010
196/0.4	6/111020
276/0.4	6/111030
396/0.4	6/111040
360/0.5	6/111050
475/0.5	6/111060
608/0.5	6/111070
756/0.5	6/111080
925/0.5	6/111090
1221/0.5	6/111100
1525/0.5	6/111110
2013/0.5	6/111120

The above cables are in accordance with Specification TDE/76/P/16.

Table 3 Multicore Cables

No of Cores	No/Dia of Wires (mm)	BR Cat No.
10	50/0.25	6/153300
12	32/0.2	6/153501
19	50/0.25	6/154220
20	56/0.3	6/154300
27	50/0.25	6/155020
36	30/0.25	6/155925
42	30/0.25	6/156250

The above cables are in accordance with RIA Recommendation 10.

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Table 4 Cable Sizes and Insulated Butt Splices

When renewing or joining cables, those marked \* are those currently available and are detailed in Table 2. The first column is divided into blocks, each of which contains a \* replacement cable for the others.

Cable		Insulated Butt Splice	Crimping Tool			
Strands (No./dia of wires)	Insulation Stripping Length		BR Cat No. 54/	Amp Part No	BR Cat No. 39/	Size
	Min mm	Max mm				
32/0.2mm 1/0.044" 7/0.018" 16/0.012" 40/0.0076" 3/0.029"(1) 37/0.2mm *	6	7	119478	47387 or 525691	8123	16-14
37/0.25" *						
56/0.3mm 7/0.029" 19/0.018" 110/0.0076" 56/0.3mm(1) 7/0.036" 65/0.012" 162/0.0076" 75/0.012" 37/0.4 *	8	9	119442	59239-4	8127	12-10

Note: (1) 250/440V grade only. Use Table 1 for higher grades.

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Table 5 Terminal Ends

Strands (No./dia of wires)	Insulation Stripping Length		BR Cat No. (54/)	Corner Cat. No.	Code	BR Cat No. (39/)
	Min	Max				
475/0.5mm	27	28	120550	DL16	L	8179
37/0.072" 608/0.5mm	27	28	120650	DM16	M	8180
756/0.5mm	27	28	120740	DN16	N	8181
925/0.5mm	31	32	120840	DO16	O	8182