



DEPOT MAINTENANCE MANUAL

CLASS 411, 412, 421 AND 423
ELECTRIC MULTIPLE UNITS

DM 400 SW

Issue: 2

Revision: A

Date: November 97

Section 9

Supply Equipment

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Section 9 - Supply Equipment

Job No Job Description

913	Earth Return Brush and Axle Earth Path - Examine
914	Shoegear - Examine, Gauge
920	Power Fuse Boxes and Fuses - Clean

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EARTH RETURN BRUSH AND AXLE EARTH BRUSH PATH - EXAMINE

MATERIALS			
ITEM	DESCRIPTION	QTY/UNIT	BR CAT NO
1	Electrical Cleaner, 'Electro-Clean'	As req'd	007/007186
2	Brush, CM1S		053/000296

Safety: Unit isolated from traction and auxiliary supplies.

1. Examine both earth brush mountings and earth leads for defects.
2. Disconnect the earth leads from both brush terminals. Remove the four screws securing each brush box, and withdraw the brush boxes. Clean off any grease from the brush.
3. Examine the visible area of the axle slip ring for signs of damage, scoring or burning.
4. Using the specified cleaner (see Materials item 1) clean all the surfaces of the brushes and the insides of the brush holders.
5. Examine both brushes for damage, scoring or burning and replace where necessary (see Materials item 2).
6. Check that brushes move freely in their holders against spring tension. Renew the spring if damaged or if the spring force is thought to be incorrect.
7. Measure the length of the brushes and renew (see Materials item 2) if below the minimum 'put back' length of 40mm.
8. Re-fit both brush boxes to the suspension tube mounting. Re-connect the earth leads to both brush terminals.
9. Carry out items 1 to 8 on all other powered wheelsets.

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SHOEGEAR - EXAMINE, GAUGE

MATERIALS			
ITEM	DESCRIPTION	QTY/UNIT	BR CAT NO
1	Shoe Slipper, 14" Imperial		053/001119
2	Shoe Slipper Set Screw, High Tensile, Marked ' T'		035/032330
3	Shoe Slipper Spring Washer		053/070014
4	PNS7/PNS8 - Shoe Lead Saddle Clamping Set Screw, M10 x 40, EZP		035/100822
5	Single Coil Spring Washer, Rectangular Section, M10		003/195540
6	Cleaning Solution DP17		007/021831
7	Grease, Lithium 3 (50kg)		027/001356

SPECIAL TOOLS		
ITEM	DESCRIPTION	BR CAT NO
1	Shoe Gauge, SR/A0/3950	039/029388

TORQUE FIGURES		
ITEM	DESCRIPTION	TORQUE Nm
1	Shoe Slipper Set Screws	245
2	Shoe Lead Saddle Clamping Screws	56

Safety:- Unit isolated from traction supply.

Gauge (All Types)

1. Measure slipper thickness and change if necessary. Minimum usable slipper thickness is 1" at the ends. New set screws and spring washers must be used when fitting new slippers, and the set screws must be tightened to 245Nm.
2. Gauge slippers to inside bottom edge, using gauge (see Special Tools item 1), and adjust as necessary in accordance with chart. After adjustments secure lock nuts and grease (see Materials item 7) the adjusting bolt threads.

Shoegear	Stock	Gauge height	Notes
Radial	1957	Upper gauge mark	Adjust if 1/4" or more above appropriate gauge mark
PNS7 & 8	1963 and some 1957	Lower gauge mark	

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Examine

Radial Shoe gear (1957 Stock)

3. Check condition of shoe leads, shoe shunts and connections. Check tightness of slipper bolts, shoe shunt bolts and shoe lead clamp bolts. Check security of spindle end covers, and by manually lifting and lowering shoe gear check that the spindle is free and the springs are effective.
4. Clean and rinse off shoe beams, using a stiff bristle brush (not wire) and DP17 cleaning solution (mixed 1 part solution to 50 parts water). Examine 1957 stock types 'A' and 'B' shoe beams from the top and underside for signs of rotting, burning, erosion, or delamination cracks developing from the corner of the shoe gear back plate recess. If the delamination extends to either of the end pockets or cracking of the laminations is apparent across more than a third of the beam thickness, or if the beam is rotting or worn away by more than 1/2", it must be renewed.

Note: (a) When it becomes necessary to change or re-secure 1957 stock shoe beam spigot bolts, refer to Maintenance Procedure MP9-006.

(b) For fitting of replacement shoe beams see Maintenance Procedure MP9-006.

PNS7 & 8 Type Shoe gear (1963 Stock and 1957 Stock with MkVI bogies)

5. Check condition of shoe leads and connections. Check tightness of slipper bolts and height beam bracket fixing bolts.
6. On bolted type shoe arms, examine the shoe cable thimble and saddle connections at the shoe carrier, for looseness and signs of overheating.
7. If it is necessary to renew the M10 x 40 mm shoe lead saddle clamping set screws (see Materials item 4), the tab washer shall be replaced by spring washers (see Materials item 5). Torque tighten the set screws to 56Nm.
8. Clean and rinse off shoe height beams, height beam flash guards and shields, and shoe arms between bogie mounting point and shoe lead connection, using a stiff bristle brush (not wire) and DP17 cleaning solution (mixed 1 part solution to 50 parts water).
9. Examine height beams for splitting, rotting, burning or erosion. If the beam is rotting or worn away by more than 1/4", or showing signs of splitting, it must be renewed.
10. Check the following points:
 - (a) Height beam cranked plate on forks should be inside.

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- (b) The clearances between the shoe arm and stop bracket should be 1/4" min. to 3/8" max. in the stopped position. This dimension is adjustable at the main bracket to bogie transom fixing.
- (c) Height beam link should be at the left hand end of beam, ie in the number 2 and 8 wheel positions.
- (d) Shoe arm cleats should be fitted 4.1/2" from the centre of the shoe lead fixing hole and be fitted with tab washers.

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POWER FUSE BOXES AND FUSES - CLEAN

MATERIALS			
ITEM	DESCRIPTION	QTY/UNIT	BR CAT NO
1	Cleaning Solution DP17	As req'd	007/021831
2	Grey Pigmented Varnish	As req'd	028/038021

Safety:- Unit isolated from traction supply.

1. Wire brush and clean (see Materials item 1) the fuse boxes and dry with clean cloth or paper towel. Examine inside and out for damage or defects.
2. Check that the fuse strips and clamps are in good condition and secure (note additional power fuses on 1957 stock driving motor coaches). Check the cable terminals and clamps are in good condition and secure.
3. Check fixing bolts are in good condition and secure.
4. Clean (see Materials item 1) support brackets, base boards and insulators. Dry with with clean cloth or paper towel and examine for damage or defects.
5. Repaint (see Materials item 2) the fuse boxes if required.
6. On 1963 stock motor coaches only, examine the equipment link, located to the left hand side of the linebreaker case, for security and overheating. Renew if defective.