

 SOUTH WEST TRAINS	<b>DEPOT MAINTENANCE MANUAL</b> <b>CLASS 411, 412, 421 AND 423</b> <b>ELECTRIC MULTIPLE UNITS</b>	<b>DM 400 SW</b> <b>Issue: 2</b> <b>Revision: A</b> <b>Date: November 97</b>
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## BULK LIGHTING INVERTER

**Safety:-** Unit isolated from traction and auxiliary supply.

1. If, with the MG running and the lights set, none of the main lights in any of the open saloon vehicles illuminate then carry out the checks detailed in the attached block diagram, figure 1.
2. On class 411 and 412 units access to the lighting bulk inverter is obtained by releasing the hinged ceiling panel. This is done by supporting the end of the panel remote from the hinges with one hand, undoing the locks with a carriage key and gently lowering the panel. Ensure that the spring loaded slam lock is the last to be undone, this being held in the unlocked position until the panel has been lowered away from the ceiling.
3. If it is necessary to change the inverter module, the replacement module obtained from the stores will be in a protective frame, BR Cat No. 052/003593. The defective module must be placed in this frame before returning it for repair.
4. To refit the hinged ceiling panel, push the panel firmly upwards so the spring loaded slam lock retains the panel in the closed position. Secure the panel in position by locking the remaining budget locks using the carriage key.

**Note:-** Ensure the panel is not warped or askew, so preventing the locks locating correctly.

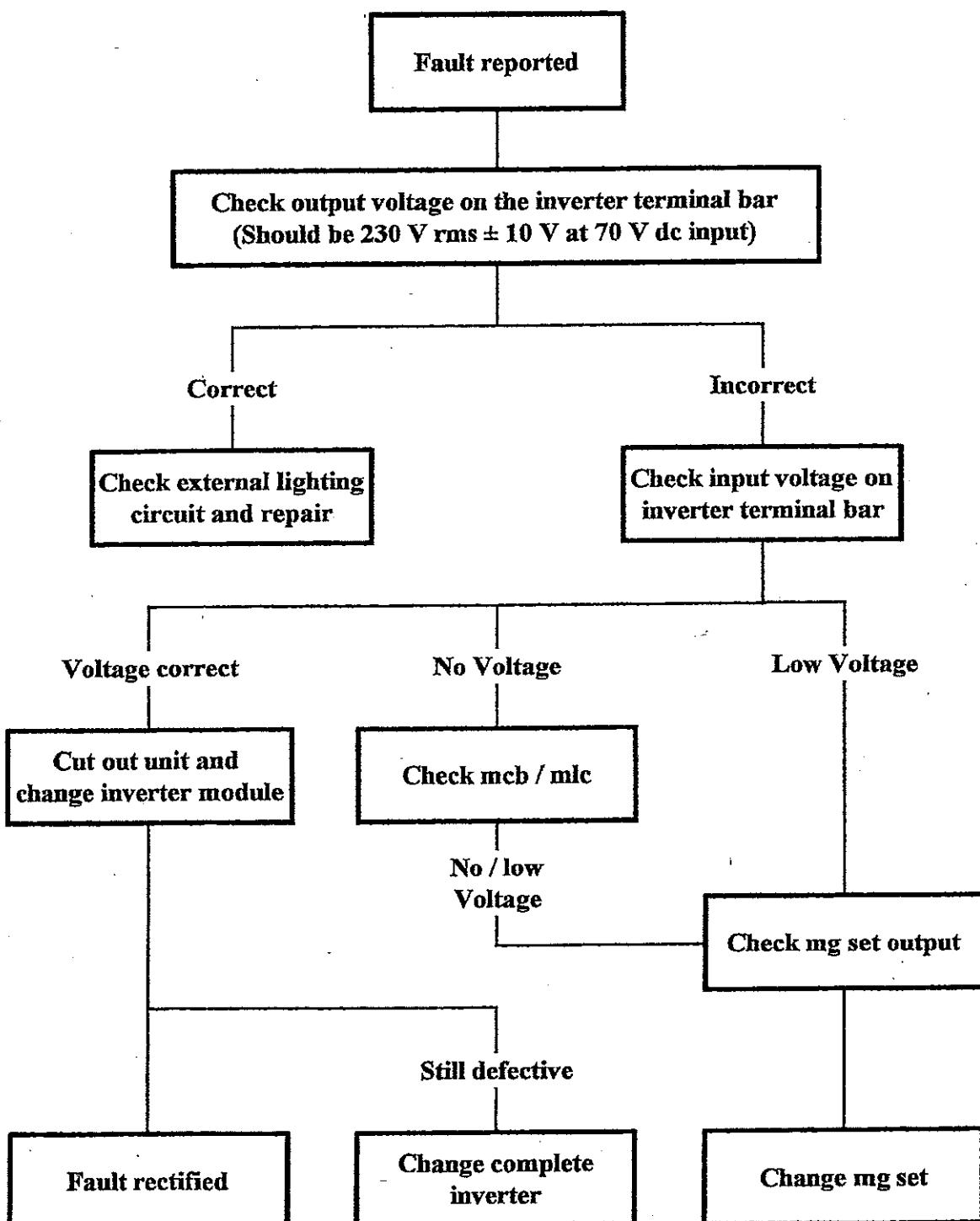


Figure 1 - Block Diagram

 <b>SWT</b> SOUTH WEST TRAINS	<b>DEPOT MAINTENANCE MANUAL</b>  <b>CLASS 411,412, 421 AND 423</b> <b>ELECTRIC MULTIPLE UNITS</b>	<b>DM 400 SW</b>  Issue: 2 Revision: A Date: November 97

## **COACH HEAT ISOLATION AND REINSTATEMENT**

**Safety:-** Unit isolated from traction and auxiliary supply.

The order for these instructions to be implemented will be given at the appropriate morning call-over.

### **Isolation**

In the interest of energy conservation during the summer period the coach heating must be isolated as detailed below.

Observe all safety precautions before carrying out this work.

#### **1. 1957 Class 411/412 Stock**

On motor coaches, disconnect and tape back both 41 wires from the bottom of B19, master heating control MCB.

#### **2. 1963 Stock nmodified**

In the motor coach, disconnect and tape back up HCP wire from the TS4 thermostat connection block. In each driving trailer, disconnect and tape back TL wire from the bottom of B26 MCB.

#### **3. 1963 Stock Modified to RS560**

Turn the keyswitch located on the metal panel below the earth test socket in the auxiliary cupboard to the 'Off' position (projecting). Keys are kept at every Depot with allocated modified units.

### **Reinstatement**

#### **4. 1957 Class 411/412 Stock**

On motor coaches, remove the tape and reconnect both 41 wires to the bottom of B19, master heating control MCB.

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**5. 1963 Stock Unmodified**

In the motor coach, remove the adhesive tape from HCP wire and reconnect to the TS4 thermostat connection block. In each driving trailer, remove the tape from TL wire and reconnect to the bottom of B26 MCB.

**6. 1963 Stock Modified to RS560**

Turn the keyswitch located on the metal panel below the earth test socket in the auxiliary cupboard to the 'On' position (depressed). Keys are kept at every Depot with allocated modified units.

**7. On all stock, test heaters and thermostats in accordance with Job Nos. 806 and 816.**

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**FLUORESCENT TUBE RENEWAL**

MATERIALS			
ITEM	DESCRIPTION	QTY/UNIT	BR CAT NO
1	Tube 4ft, 240V 40W Warm White		054/031568
2	Tube 2ft, 240V 20W Warm White		054/031516

**Safety:-** Unit isolated from traction and auxiliary supply.

1. Trip out AIS switch.
2. Slide the tube end-covers 2-3 inches along the line of the tube to release the cover retaining clips. Remove the covers from the ceiling. Remove the lamp connectors from either end of the tube and pull the tube from the spring support clips.
3. Renew the tube, re-assembling in the reverse order.

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## **SHOEGEAR INCIDENT INVESTIGATION**

**Safety:-** Unit isolated from traction supply.

The investigation of a lost or damaged shoegear incident is the responsibility of the Fleet Manager of the area concerned. To enable him to initiate the procedure for investigation, South West trains Control will be responsible for passing on details of any incident when received.

1. On receipt of a report of a shoegear incident the Fleet Manager should ascertain from Railtrack Zone Control details of any reported trippings or other relevant information in the area concerned.
2. Fleet Manager's staff or person nominated below is to carry out the following action:-

### **2.1 Action by Fleet Manager's staff.**

Site examination to ascertain from the evidence on the track whether the incident was a result of conductor rail or protection board obstruction, or other causes, eg failure of shoegear, obstruction or mismanagement by Permanent Way staff or others.

### **2.2 Action by Fleet Manager's staff or South West Trains Control.**

Locate and arrange recovery of detached shoegear or components to depot. South West Trains Control should attempt to encourage the driver to salvage detached items at the incident for return to depot on the vehicle concerned. If a fitter attends at the incident he must ensure that all recovered or removed material is returned to depot. Report on location where items are found, with locations clearly defined, ie up or down road, in cess, four foot or other relevant details, eg nearest mile post. The local Permanent Way Supervisor may be requested for assistance to have the line searched and any shoegear items found to be placed for collection and a report of the location at which items were found.

### **2.3 Action by Fleet Manager's staff.**

Contact South West Trains Control to assist by obtaining driver's report of the incident with particular reference to any running or track irregularities.



## MAINTENANCE PROCEDURE MP9-002 (Cont'd)

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## 2.4 Action by Fleet Manager's staff.

Report on condition of stock involved in the incident on return to depot. All damaged items of equipment are to be retained for examination.

- (a) Establish position of damaged shoegear and, where possible, relationship to the direction of travel at the time of the incident.
- (b) Check for any item of vehicle equipment missing, which could have resulted in shoegear damage.
- (c) Check for damaged underframe equipment showing indication of being struck by an obstruction or flying material, or actual damage.
- (d) Gauge and examine all remaining shoegear for defects or damage. Record all actual slipper heights obtained throughout the train if possible. Examine all slipper bolts for security and check for even slipper wear. Record results. Check for excessive lateral displacement. Nominal distance from inside of running rail to inside face of the slipper is 1 ft 2 in.

**Note:-** Slippers are to be raised to the horizontal position when checking.

Tolerances:-

1957 stock	+1 in - 1/4 in
Shoe arm type	+3/4 in - 1/4 in
1957 stock with backplate recess	+3/4 in - 1/2 in
eliminated on shoebeam	

To prevent errors due to bogie position, measure from the inside of the running rail to the inside edge of the slipper on both sides of the bogie. Total dimension of both sides added together and divided by two should produce a figure of the nominal dimension +/- the tolerances quoted above.

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(e) At the damaged shoegear position examine and report in writing the following:-

### PNS7 & 8 Type Shoegear

Examine slipper bolts for security and check for even slipper wear.

Examine for impact marks due to obstruction.

Examine shoe lead terminals for security.

Examine slipper carrier for fractures or damage.

Examine arm bonding and dowels for security or possible failure or impact damage.

Examine vibro stop and mounting for damage.

Examine height limit beam for security to bogie. Check for broken end muffs, and split, de-laminated, broken or damaged beams. Examine limit stop assembly for damage or defects.

If shoegear is missing, examine the remaining material on the bogie and the recovered shoegear when available.

### Radial Type Shoegear

Examine for seized spindle, broken springs, burnt or damaged shunts, broken or damaged stops, security of spindle end caps, shoe leads and shunt connections.

Examine slipper bolts for security.

Examine beam bolts and height adjusting bolts for security or damage, and check for even slipper wear.

Examine shoe beam for security of end fixings, and split, de-laminated, broken or damaged beam.

**Note:-** (a) Loose or damaged shoegear should be removed from the bogie and placed in the vehicle. If the circumstances permit, damaged shoegear may be secured in position clear of the conductor rail and electrically isolated by removal of the associated fuse/fuses. In the event of shoe lead defect or tracking of height limit beam requiring shoe isolation on 1963 stock, shoe arms may be lifted by raising the height limit stop to maximum height and removing the shoe slipper. All broken or trailing leads must be taped up and safely secured.

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(b) The two axles on the bogie on which shoe gear damage has occurred must be examined over a pit and if evidence of electrical burning or mechanical damage is seen on wheels or axles, it must be noted and the unit sent for axle change. The damaged wheel set is to be subjected to metallurgical examination before being returned to service.

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## AUXILIARY SUPPLY, CONNECTION AND DISCONNECTION

**Safety:-** Unit isolated from traction supply.

### Units fitted with Knife Switches in Auxiliary Cupboards

#### Connection

1. Trip the auxiliary isolating switch (AIS).
2. Trip the overhead or shed supply and check that the white indicator light comes on. If this condition is not obtained, inform the Supervisor and proceed no further.
3. Place the auxiliary supply change over switch to the 'Mid' position.
4. Examine plug, socket and pole to ensure fit for service . If defective do not use and report to supervisor.
5. Insert the plug of the shed pole or shed supply into the auxiliary supply socket.
6. Double check item 2.
7. Hook the shed pole on to the overhead trolley wire (if applicable).
8. Place the auxiliary supply change over switch to the 'Shed' position.
9. Set the overhead or shed supply and check that the white indicator light extinguishes and the red indicator light comes on. If this condition is not obtained, inform the Supervisor and proceed no further.
10. Cut in the AIS.

#### Disconnection

11. Trip the auxiliary isolating switch (AIS).
12. Trip the overhead or shed supply and check that the red indicator light extinguishes and the white indicator light comes on. If this condition is not obtained, inform the Supervisor and proceed no further.
13. Switch to 'Normal' position

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## MAINTENANCE PROCEDURE MP9-003 (Cont'd)

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### Units fitted with Rotary Switches mounted on Underframe

#### Connection

14. Remove the shed pole from the overhead trolley wire (if applicable).
15. Remove the plug of the shed pole or shed supply from the auxiliary supply socket.
16. Place the auxiliary supply change over switch to the 'Normal' position.
17. Trip the auxiliary isolating switch (AIS).
18. Trip the overhead or shed supply and check that the white indicator light comes on. If this condition is not obtained, inform the Supervisor and proceed no further.
19. Turn the auxiliary supply switch away from the 'Normal' to the 'Mid' supply position.
20. Examine plug, socket and pole to ensure fit for service . If defective do not use and report to supervisor.
21. Place the auxiliary supply change over switch to the 'Shed' position.
20. Insert the plug of the auxiliary supply trolley jumper into one of the auxiliary supply receptacles, situated on the underframe both sides of each motor coach.
21. Set the overhead or shed supply and check that the white indicator light extinguishes and the red indicator light comes on. If this condition is not obtained, inform the Supervisor and proceed no further.
22. Cut in the AIS.

#### Disconnection

23. Trip the auxiliary isolating switch (AIS).
24. Trip the overhead or shed supply and check that the red indicator light extinguishes and the white indicator light comes on. If this condition is not obtained, inform the Supervisor and proceed no further.
25. Turn the auxiliary supply switch from the 'Shed' to the 'Normal' position.

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## MAINTENANCE PROCEDURE MP9-006

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### FITTING OF SHOE BEAMS

**Safety:-** Unit isolated from traction supply.

#### 1957 Type Shoe Beams, Spigot Bolts

When it becomes necessary to change or re-secure the above bolts, then the following points should be noted:-

1. The 3/4 in BSW securing nut should be tightened so that the top plate bears hard down on to the shoulder of the spigot bolts.
2. The correct size split pin for locking the securing nut is 5/32 in.

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# Section 11

## Data

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## **REVISION STATUS**

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## **DATA SECTION - BATTERIES**

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### Alkaline

Class	Type	Capacity	Cells	Top Up To (Over Plates)
411, 412, 421, 423	VF5 D13	40 AH	46	4.3/8"

### Buffet Cars

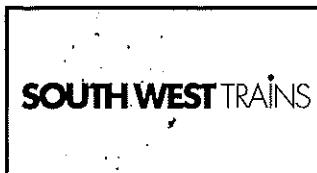
Class 412	Cyclon	25 AH (12 volt)
Class 412 Burglar Alarm	Ever Ready 961	

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**DATA SECTION - MACHINES**

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	<b>1957 Stock</b>	<b>1963 Stock</b>
Compressor	DH25	DH25
MG set	EE704-4G	EE704-5H EE704-7K
MG set, buffet	EE753-2B	
Traction motor		EE507



## DATA SECTION - MINIATURE CIRCUIT BREAKERS

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Manufacturer	Type	Rating	BR Cat No.
Dorman Smith	MBTC 1	5 A	53/3693
Dorman Smith	MBTC 2	15 A	53/3695
Dorman Smith	MBTC 3	30 A	53/3696
Heinemann	CF1 B3B	5 A	53/3693
	CF1 B3B	15 A	53/3695
	CF1 B3B	30 A	53/3696

**DATA SECTION - PUBLIC ADDRESS EQUIPMENT****Page 1 of 1****BR Cat No.**

Public address amplifier, receiver	52/3404
Public address amplifier, transmitter	52/3403
Speak switch, Highland Type 03-122 (24 V lamps)	61/24235
Telephone cradle and handset	52/3512
Loudspeaker	52/1014

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## **DATA SECTION - PASSENGER COMMUNICATION APPARATUS**

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### **Correct Materials and Test Equipment**

#### **Chain**



Figure 1 - Twisted Link Chain

#### **'S' Hook**

Small 13 SWG x 1 $\frac{1}{8}$  in to drawing SC/ES 180, fitted to most stock.

Large 10 SWG x 1 $\frac{1}{2}$  in to drawing SC/ES 181, fitted as alternative.

#### **Adjusting Eye Bolt**

2 in x 1/4 in to drawing SE/ES 179.

#### **Spring Balance**

Salter type model 15 to 44 lbs with cursor ring, and hook attachment to drawing SK-D2-8309.

#### **Combined Spring Balance and Hook Attachment**

SK-D2-8309

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## **DATA SECTION - RELAY DETAILS**

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### **RELAY DETAILS**

#### **NL8 - CB1**

Contact gap (A1) 1/16 in  
(CB1) 3/32 in  
BR Cat Nos. A1 - 53/988  
CB1 - 53/989

#### **NL9 - F3**

Armature contact gap 3/32 in  
Series coil resistance Copper strip 1 turn 3/4 in x 3/8  
in  
Shunt coil resistance 11.8 ohm  
BR Cat No. 53/2192

#### **NR20 - A2**

Contact gap 3/32 in - 1/8 in  
Armature gap 5/32 in - 3/16 in  
BR Cat Nos. A1 - 53/994, A2 - 53/995

#### **NR27 - E10**

Contact gap 5/32 in  
Contact pressure 2.4 - 3.5 ozf  
Operating coil resistance 260 ohm  
BR Cat No. 53/2220

#### **NR28 - A3, A10 and J10**

Contact gap 0.10 in (min.)  
Pressure on each cont. (A3, A10) 3 - 5 ozf  
(J10) 2.5 - 3 ozf  
Operating coil resistance (A3) 230 ohm  
(A10, J10) 329 ohm  
BR Cat Nos. A3 - 53/997, A10 - 83/2763  
J10 - 83/2766

#### **NR30 - B1**

Contact gap 0.062 in  
Armature back stop gap 0.062 in  
Pole piece gaps 0.125 in  
BR Cat No. 53/998

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## **DATA SECTION - RELAYS**

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### **1957 Stock Motor Vehicle**

No volt relay	NL8 - CB1
Current limit relay	NL9 - F1
Reverse current relay (419 only)	NR20 - A2
Camshaft position relay (Phase I)	NR28 - A3
Lighting trip and set relay	NR28 - A3
Lock out relay	NR28 - A3
Polarised current relay	NR30 - B1
Overload relay	NT9 - A1
Internotch relay (Phase II)	NR28 - A3

### **Class 421/1 Driving Trailer**

Electric parking brake relay	NR28 - J10
Handbrake generator relay	NR28 - A10
Handbrake generator contactor	NR27 - E10

### **1963 Stock Motor Vehicle**

Current balance relay	NR31 - D1
Lighting trip and set relays (421/1)	NR28 - A3
Lighting trip and set relays	NR28 - A10
Lockout relay (421/1)	NR28 - A3
Lockout relay	NR28 - A10
Polarised current relay	NR30 - B1
Overload relay (421/1)	NT9 - A1
Overload relay	NT9 - A5
No volt relay	NL8 - CB1
Current limit relay	NL9 - F3

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**DATA SECTION - TRIPLE VALVE GASKETS**

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Type	Position of Gasket	Westinghouse Part No.	BR Cat No.
QS (J3)	Bulb to body	2545	70/1458
QS (J3)	Valve to bracket	A85043	70/1226
L1	Bulb to body	A74538	70/1241
L1	Valve to bracket	B77709/1	70/1242
L1	Magnet valve to triple valve	B77717/1	70/1253
LD3	Valve to bracket	B77709/1	70/1242
LD3	Magnet valve to triple valve	B77717/1	70/1253

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## **DATA SECTION - VOLTAGE REGULATORS**

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<b>Use</b>	<b>Voltage</b>	<b>Type</b>	<b>BR Cat No.</b>
Control	70	4/44496P	53/2358
Control	70	SVR2	53/3783
Buffet	200	4/60133P	53/987

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## **DATA SECTION - WHEEL DATA**

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**Table 1 - Wheelset Back-to-Back Dimension**

<b>New/Rewheeled Wheelsets</b>	
1360 - 1362 mm	

**Table 2 - Limiting Wheel Diameter/Tread Thickness, Maximum Flange Height and Profiles.**

<b>Bogie Type</b>	<b>Wheel Profile</b>	<b>Wheel Diameter (mm)</b>			<b>Actual Tyre Thickness (mm)</b>		
		<b>New</b>	<b>Last Turning</b>	<b>Scrap</b>	<b>New</b>	<b>Last Turning</b>	<b>Scrap</b>
Mk VI Mtr	P1	1016	970	962	63.5	41	37
B5	P1	914	855	847	63.5	34	30
Mk IV Mtr	P1	1016	964	956	63.5	37.5	33.5
C/wealth	P1	1067	1008	1000	63.5	34	30

**Table 3 - Wheel Profile Drawings, Flange Height & Thickness Dimensions**

<b>Wheel Profile</b>	<b>Drawing Number</b>	<b>Flange Thickness (mm)</b>		<b>Flange Height (mm)</b>	
		<b>New Profile</b>	<b>Minimum worn</b>	<b>New Profile</b>	<b>Maximum worn</b>
P1	S8-C2- 806234	28	24	30	34

**Table 4 - Diameter Differential Between Wheelsets.**

	<b>Maximum variation of diameter (in mm) between wheelsets on one Bogie</b>		<b>Vehicle</b>
	<b>New Profile</b>	<b>Minimum worn</b>	
Mk IV Motor Bogies	30		67*
Commonwealth Trailer Bogies	67		67
Mk VI Motor Bogies (1963 Stock)	30		30
Mk VI Motor Bogies (1957 Stock)	30		67*
B5 Trailer Bogies	67		67

**Note:** For dimensions marked \* there is an intentional design difference in wheel diameters on the motors and trailers fitted to Class 411 and 412 motor coaches, i.e. MK IV and Commonwealth or Mk VI and B5. The maximum permitted variation quoted applies after this difference has been taken into account.

**Note:** Refer to MT/288 for identification of the gauges to be used and the techniques for their use.

## DATA SECTION - BRAKE RIGGING (B5 BOGIE) ADJUSTMENT

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Chart showing the 2 hole adjustment positions.

Position of Pin Tyre dia. at tread	Vehicle type	Units	Section of gauge to use
3ft to 2ft 10.5in	2ft 10.5in to 2ft 9.5in		NSE-A2- 460/02 Stroke
PR	PS	DT	NSE-A2- 460/01 Truss Bar
QR	QS	TS	P 421 423 Q
			P Q

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**DATA SECTION - BRUSHES (CARBON)**

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Machine	Grade	BR Cat No.	Lengths		Spring pressure (lbf)
			New (in)	Put back (in)	
<b>Traction Motors</b>					
507	EG 14D	53/300	2.25	1.5	7-8
<b>Motor Generators</b>					
704 A&G	PM 50P	53/295	2	1.5	1.5 - 2
704 H	EG 14D	53/1857	2	1.25	1.5 - 2
704	EG319P	98/5456	72 mm	25 mm	576 - 704g
<b>H&amp;K(CF)</b>					
707 N	1M 8101	53/1721	1.35	-	14 - 18oz
753 B(M)	PM 50P	53/294	2.25	1	1.5 - 2
753 B(G)	EG 14D	53/1858	2	1	1.5 - 2
753 D(M)	EG 14D	53/1857	2	1	1.5 - 2
753 D(G)	EG 14D	53/1858	2	1	1.5 - 2
<b>Compressors</b>					
DH 25	C2	70/7733	1.5	0.75	4 - 5
<b>Boiler Pump</b>					
	1M 6	52/6010	0.75	0.4	-
<b>Airmax Fan</b>					
	1M C	52/1273	-	-	-
<b>Refrigerators</b>					
EE 1/4 HP	EG 8101	52/6006	0.75	0.3	-
EE 1/3 HP	BO	52/6005	0.75	0.5	-
CP 1/3 HP	1M 3 SR	52/6004	0.94	0.5	-
<b>Earth Brush</b>					
	CM1S	53/296	2.5	1.6	-

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## **DATA SECTION - CONTACTOR DETAILS**

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### **CONTACTORS**

#### **1957 Stock Motor Vehicle**

Auxiliary contactor	NM22 - A4/D9
Compressor contactor	NM22 - A4/D9
Emergency lights contactor	NM22 - A4/D9
Contactor (EP brake)	NM22 - A4/D9
Heater contactor	NM22 - A4/D9
Isolating contactor	NA18 - A2
Line breaker	NA18 - A2
Main lights contactor	NM22 - A4/D9

#### **1957 Stock Driving Trailer**

Water heater contactor	NM22 - A5/D10
Contactor (EP brake)	NM22 - A4/D9

#### **1957 Stock Buffet Car**

Auxiliary supply contactor	NM16 - A29
Boiler main contactor	NM22 - A4/D9
Coach heater contactor	NM22 - A5/D10
Bottle cooler contactor	NM22 - A5/D10
MG HT contactor	NM22 - A4/D9
Refrigerator contactor	NM22 - A5/D10

#### **1963 Stock Motor Vehicle**

Compressor contactor	NM22 - N1
Emergency lights contactor	NM22 - N1
Heater contactor	NM16 - A22
Isolating contactor	NA18 - J6
Line breaker	NA18 - J6
Main lights contactor	NM16 - A22

#### **1963 Stock Driving Trailer**

Contactor (EP brake)	NM22 - N1
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DETAILS**

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**NA18 - A2 and J6**

Initial main contact pressure	11 - 14 lbf
Final main contact pressure	32 - 39 lbf
Main contact gap	9/16 - 5/8 in
BR Cat Nos.	A2 - 53/526 J6 - 53/2289
Main contact spring washer (if available)	53/3224
Main contact spring washer (when above is obsolete)	3/195535
Arc horn spring washer (if available)	53/3455
Arc horn spring washer (when above is obsolete)	3/195530

**NM9 - A3 and A25**

Contact pressure	3 - 3 3/4 lbf
Contact gap	15/32 - 17/32 in
Operating coil resistance	127 ohm
Blow out coil resistance (A3)	0.054 ohm
Blow out coil resistance (A25)	0.0049 ohm
BR Cat No.	A3 - 53/528 A25 - 53/530

**NM16 - A22**

Main contact pressure	4 3/4 - 5 lbf
Main contact gap	9/16 - 11/16 in
Operating coil resistance	209 ohm
Blow out coil	Copper strip 14 turns of 5/8 x 1/16 in
Minimum operating voltage	42 V
BR Cat No.	53/2184

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**NM22 - A4, A5, D9, D10 and N1**

Main contact pressure	2 <sup>3</sup> / <sub>4</sub> - 3 <sup>3</sup> / <sub>4</sub> lbf
Main contact gap	1/2 - 17/32 in
Operating coil resistance	
A4, A5, D9, D10	203 ohm
N1	260 ohm
Blow out coil resistance	Copper strip 18 turns
A5, D10, N1	3/8 x 0.48 in
A4, D9	Wire wound 0.023 ohm
Operating Voltage	
A4, A5, D9, D10	70 V
N1	70/110 V
BR Cat Nos.	A4 - 53/535 A5 - 53/536 D9 - 83/683 D10 - 53/3288 N1 - 83/783

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**DATA SECTION - DIODES**

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**(All stock)**

Reverse current and D1 to D4 Westinghouse Type S4AN125/70D blocking diodes.

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**DATA SECTION - EQUIPMENT CASE SEALS**

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Equipment case seals for 1957 and 1963 type stock - BR Cat No. 053/002730.

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## **DATA SECTION - FUSES**

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### **FUSES**

#### **1957 Stock Motor Vehicle**

160 A	MG LT (No. 1 end only)
150/100 A	Main auxiliary
60 A	Battery (No. 1 end only), MG supply (No. 1 end only)
30 A	Compressor, motor vehicle heater, cab, trailer vehicle, van and compartment heater
15 A	Vehicle heater (trailer vehicle corridor & toilet), no volt relay, line indicator light
Single Ribbon	Shoe, train line, main equipment (BR Cat No. 053/002549)

#### **1957 Stock Driving Trailer**

Single Ribbon	Shoe, train line (BR Cat No. 053/002549)
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#### **1957 Stock Buffet Car**

160 A	MG LT positive and negative
100 A	Main isolating
60 A	MG supply
30 A	Stills boiler
5 A	Staff heater

#### **1963 Stock Motor Vehicle**

160 A	MG LT positive and negative
100 A	Main auxiliary, buffet car supply
60 A	Battery positive and negative, MG supply, heater contactor
30 A	Compressor supply
15 A	NVR, coach heat, HT indicator

#### **1963 Stock Driving Trailer**

Double Ribbon	Shoe (BR Cat No. 053/002549 - 2off)
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## **DATA SECTION - HEATING EQUIPMENT**

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### **Solid State Switches and Thermostats**

**Table 1 - Cabs, Compartments and Toilets**

<b>Solid State Switch Type</b>	<b>Thermostat Type</b>	<b>Fitted Position</b>	<b>Stock Types</b>	<b>Notes</b>
Unipolar 1kW 52/3589	SR2C 52/3580	Cab	411, 412	1
	BRT(M) 52/4132	Cab/Comp	423	
		Cab/Comp	421	
	BRT(R) 53/3336	Cab/Comp	423	
	SRT 837/031801	Comp	421, 423	
Unipolar 1.5kW 53/3631	Satchwell 53/1528	Toilet	411, 412, 423 421 423	1
Unipolar 2kW 53/3592	SR2C 52/3580	Comp	411, 412	1
Vacuum Switch 52/622	BRT(M) 52/4132	Cab/Comp	421	1
	SRT 837/031801	Comp	421, 423	

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## DATA SECTION - HEATING EQUIPMENT

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### Solid State Switches and Thermostats (Cont'd)

**Table 2 - Saloons**

Thermostat Type	Fitted to Stock Types	Notes
TS4/SR4 (52/1109)	412 421 423	2 3

### **Notes**

1. Class 421/1 units have no thermostat control in cabs, vacuum switches in compartments and AEI thermostats in toilets. These are to be changed for Unipolar switches as in table on refurbishment.

Class 421/2 units have vacuum switches in cabs and compartments. These are being changed in cabs and will be changed in future in compartments for Unipolar switches as in table.

2. Class 412 have one SR4 per saloon and two per buffet car.
3. Class 421 and 423 have one SR4 per unit supplying all saloons.

### Other Useful Data

Water heater isolating switches	Arrow Type 106 MS
Guard's heater switch	Arrow Type 106 MS
Dummy heater	Type 2E44 3000 ohm
Series resistor (Trailer Std)	Cressal Type HTWEJ36 7150 ohm
Series resistor (motor vehicle)	Cressal Type 2E47 7150 ohm
SR4 thermostat ambient probe	BR Cat No. 52/1110
SR4 dummy heater probe	BR Cat No. 52/1111
SR4 roof probe (also SR2C thermostat probe)	BR Cat No. 52/1112

## DATA SECTION - LIGHTING EQUIPMENT

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Miscellaneous Items

		BR Cat No.
Bulk inverter, complete	Type SB1	52/3560
Inverter, control module		52/3572
Emergency lights inverter	Thorn Type R2897	52/2412
Lighting trip and set switches	Arrow Type 106 MPS MC	
Van lights switch	Arrow Type 106 MS	
Ballast units	Transtar Type K40	55/54264

Lamps and Fluorescent TubesLamps

Voltage	Wattage	Type	BR Cat No.
70 V	25 W	2 pin	54/39224
70 V	60 W	2 pin	54/39228
65 V	40 W	3 pin	54/39289
24 V	6 W	SBC	33/80046

Tubes

Voltage	Wattage	Type	BR Cat No.
Saloon 4 ft	40W, 240V	Warm White	54/31568
Toilet 2 ft	20W, 240V	Warm White	54/31516