

WOSS 680/2

British Railways Board

Director of Mechanical and Electrical Engineering

AXLE DRIVEN

SPEEDOMETER GENERATORS

WORKSHOP OVERHAUL STANDARD SPECIFICATION

REVISION RECORD

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

If amendments are considered to be necessary, the following actions shall be undertaken:-

- 1) Depots using this document as part of a vehicle repair shall complete BR Form 14298 and pass it to the relevant Business Engineer.
- 2) Contractors shall inform the BRB Director of Procurement in accordance with the contract requirements.

Amendments submitted for consideration shall not be implemented until approved.

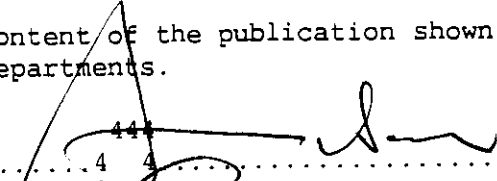
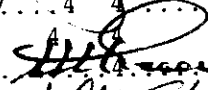
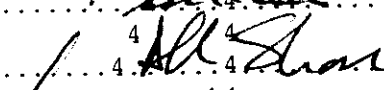
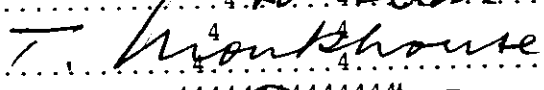
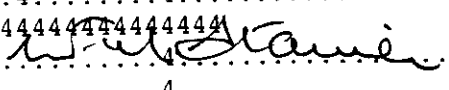
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I authorise the work content of the publication shown above and its distribution to user departments.

Signed:

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Should any query arise regarding the contents of this document telephone 0332 42442 Ext. 3573, BR Code is 056 3573, or write to the above address.

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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 an appropriate maintenance/overhaul document.

LOCOMOTIVES

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

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

101	X
104	X
107	X
108	X
114	X
115	X
116	X
117	X
118	X
119	X
121	X
122	X

DMU's

140	
141	
142	
143	
144	
150	
151	
154	
155	
156	
158	
165	

EMU's

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

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

COACHING STOCK

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

DEMU's

205	X
207	X

WAGONS

COMPONENTS

WOSS 680/2

WORKSHOP OVERHAUL STANDARD SPECIFICATION 680/2

AXLE DRIVEN SPEEDOMETER GENERATORS

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TOOLS & MATERIALS BR Cat No

Mild Steel keeper for generator rotor

Ohmmeter, Range 0 - 20M Ω

Megger 500V

Fluffless cloth

Gasket compound, medium strength

007/060342

Grease

027/001350

Ensis SDC fluid

027/018401

Non-setting jointing compound

007/060190

Loctite nutlock

007/060353

Varnish B8 Grey

028/030821

SECTION 1. REPAIR PROCEDURE.

1. Protect all equipment from mechanical damage during storage and transit. Fit protection covers to exposed threads whenever plugs are removed.
2. Remove all loose dirt and grease with a scraper. Clean all external surfaces with a hot water and detergent spray. Rinse and dry.
3. Examine the generator for mechanical damage. If the casting is damaged the machine is to be scrapped or dismantled for spares.
4. Overhaul operations must be carried out on a clean bench in an area where ferrous swarf cannot be picked up by the generator permanent magnet rotor or drawn into the bearings. Do not allow ferrous tools to touch the rotor.
5. Dismantle the generator. Slide the rotor through the stator into a tubular keeper. Identify the rotor to the stator and, so far as possible, keep these as a matched set.

Place the rotor and keeper in a polythene bag.

6. Wash all components. Remove all jointing compound from covers and stator end faces.
7. Renew the bearings.
8. Check the stator and end shield mating faces for burrs or mechanical damage. Dress any damaged areas with a fine file.
9. DO NOT remove the stator winding from the casting unless it is necessary to renew the windings. Check the windings for open circuit with an ohmmeter. Renew if defective.
10. Examine the cable socket and remove any burrs on the locking thread with a knife file. Renew the socket if the insulator or pins are broken, or if the pins have opened out. Reseal the joints of the socket assembly with medium strength gasket compound.
11. Examine the internal wiring and resolder any dry joints.
12. Test the insulation to earth with a 500 V megger. Minimum acceptable reading 20 M ohm.
13. Examine the rotor for loose rivets and check that the core is firmly fixed to the shaft. Renew the rotor if these are loose. Remove any metal particles adhering to the rotor.

14. GEC Generators.

14.1 Fit a magnetic shunt ring which has 4 grub screws. Magnetic shunts with 1 grub screw can be used if the additional holes are drilled, counterbored and tapped as shown in Figure 1.

14.2 Renew any grub screws which do not have pointed ends. Check that they screw freely through the tapped holes in the magnetic shunt. Re-tap any threads which are damaged and renew grub screws with damaged threads.

15. AEI Generators.

15.1 Check that the thrust bearing casing has two 0.125" holes drilled to facilitate removal of the bearing with a pin punch. If not they are to be drilled as shown in Figure 2.

16. Grease the bearings. Do not fill the housing more than 2/3rds full of grease.

17. Reassemble the generator using new gaskets. Coat mating surfaces with non-setting jointing compound.

18. Check that the rotor moves freely, allowing for the effect of the permanent magnets. If there is any indication of binding, the generator must be stripped and examined for burrs, ingress of swarf, etc.

19. Coat all external machined surfaces with S.D.C. fluid.

20. Test and calibrate the generator in accordance with Section 2.

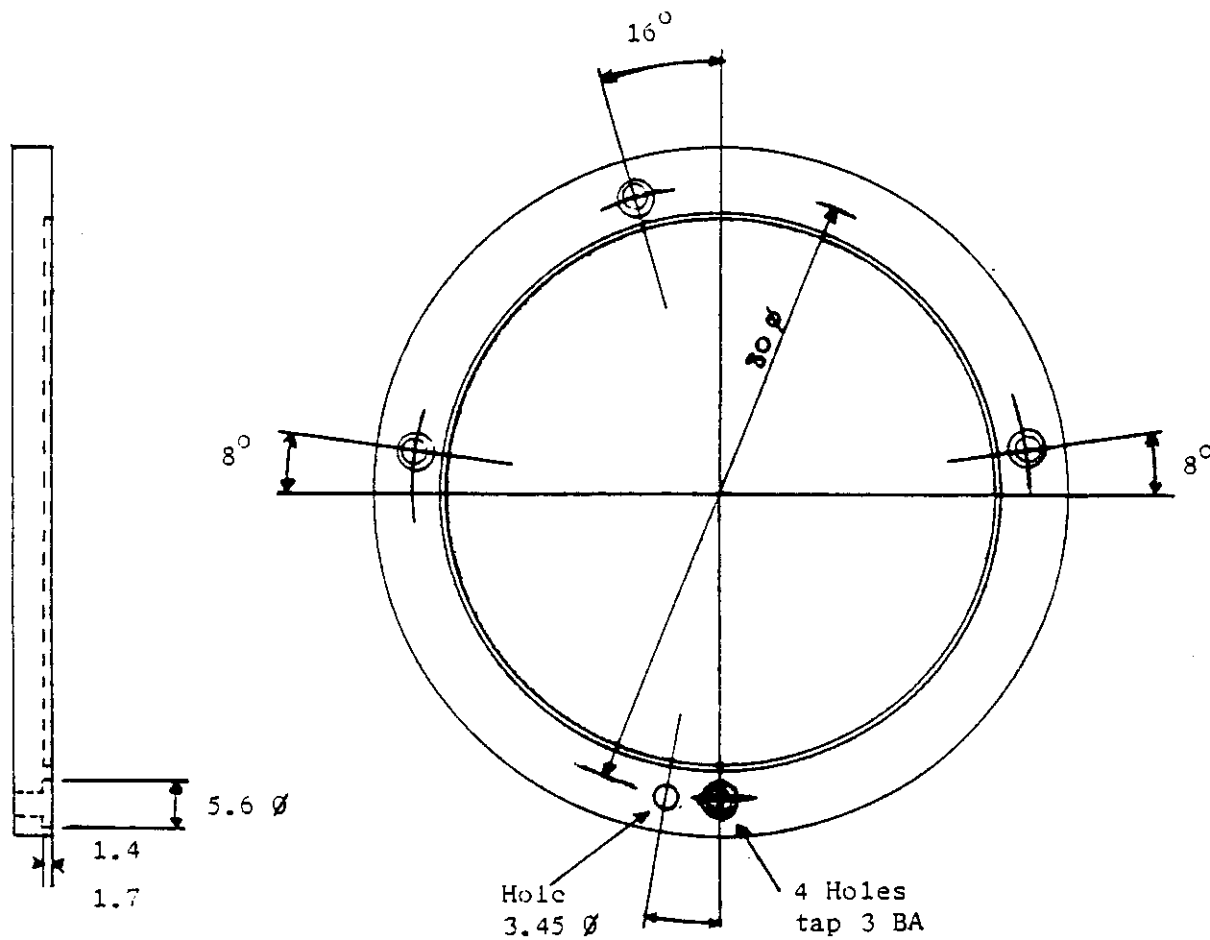


Figure 1. RE3340 Generators: Magnetic Shunt
with Four Grub Screw Positions

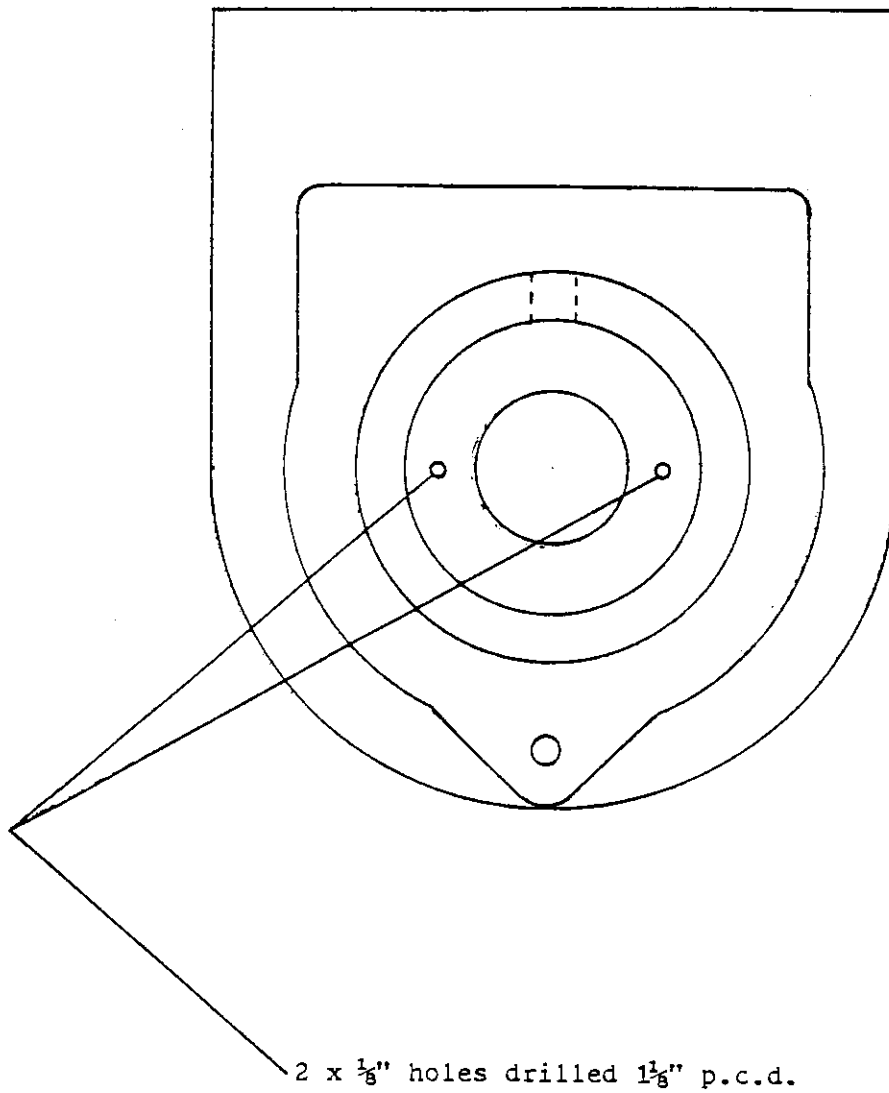


Figure 2. AEI Type JB Generators: Holes for
Drive End Bearing Removal

SECTION 2. TEST SPECIFICATION.

Equipment

Test rig (Figure 3) with 0-3500 rpm variable speed output.
Magnetiser, 60,000 ampere turns minimum.
De-magnetising coil.
Variable a.c. transformer.

1. Testing.

- 1.1 Set up the generator on the test rig as shown in Figure 3.
- 1.2 Run the generator at the speed specified in Section 3 Table 2 or 3.
- 1.3 Adjust the variable load resistor to give the current reading specified in Section 3 Table 2.
- 1.4 Check that the generator output voltage is in accordance with that specified in Section 3 Table 2. If not calibrate as detailed below.
- 1.5 Megger test at 500 V 20 M ohm or above is acceptable.

2. Calibration

2.1 Smith-Stone Generators

- 2.1.1 Small inaccuracies in output (3%) may be corrected by removing the generator cover unlocking the adjustment plate and resetting the plate to give the specified voltage output.
- 2.1.2 If the output is too low to be corrected by the adjustment plate, dismantle the generator and re-magnetise the rotor. The rotor will usually require 3 pulses.
- 2.1.3 If the output is too high, rotate the adjustment plate until the generator output voltage is midway between the two extreme values and note the voltmeter reading. Remove the rotor and stator with its adjustment plate and insert in the de-magnetising coil connected through a Variac to a 200-250 V 50 Hz supply. Raise the voltage from zero to the required value (found by experience) then return the voltage slowly to zero.
- 2.1.4 Reassemble the generator, check the output voltage and correct errors as before.
- 2.1.5 When output is satisfactory, lock the adjustment plate screw with grey varnish.

2.2 AEI(BTH) Generators.

- 2.2.1 Small inaccuracies in output (3%) may be corrected by means of the shunt screw. This is exposed when the screw plug is removed from the generator end plate. To increase the generator output voltage turn the screw clockwise and vice versa.
- 2.2.2 If the output is too high or too low to be corrected in this way, de-magnetise or re-magnetise the rotor as detailed in 2.1.2 to 2.1.4.
- 2.2.3 When output is satisfactory, lock the shunt screw with grey varnish.
- 2.2.4 Replace and lock the screw plug with nutlock.

2.3 GEC Generators.

- 2.3.1 Small inaccuracies (3%) may be corrected by rotating the magnetic shunt as follows:
 - 2.3.1.1 Remove the screw plug from the generator end plate.
 - 2.3.1.2 Rotate the rotor until a magnetic shunt locking screw is visible through the plug hole.
 - 2.3.1.3 Slacken the screw, then repeat for the other 3 screws.
 - 2.3.1.4 Rotate the rotor until the plain hole is aligned with the plug hole.
 - 2.3.1.5 Pin the magnetic shunt in this position and rotate the rotor clockwise to increase the generator output voltage or vice versa. Retighten the 4 screws.
- 2.3.2 If the output is too high or too low to be corrected in this way, de-magnetise or re-magnetise the rotor as detailed in 2.1.2 - 4.
- 2.3.3 When output is satisfactory seal the heads of the magnetic shunt locking screws with grey varnish.
- 2.3.4 Replace the screw plug and lock with nutlock.

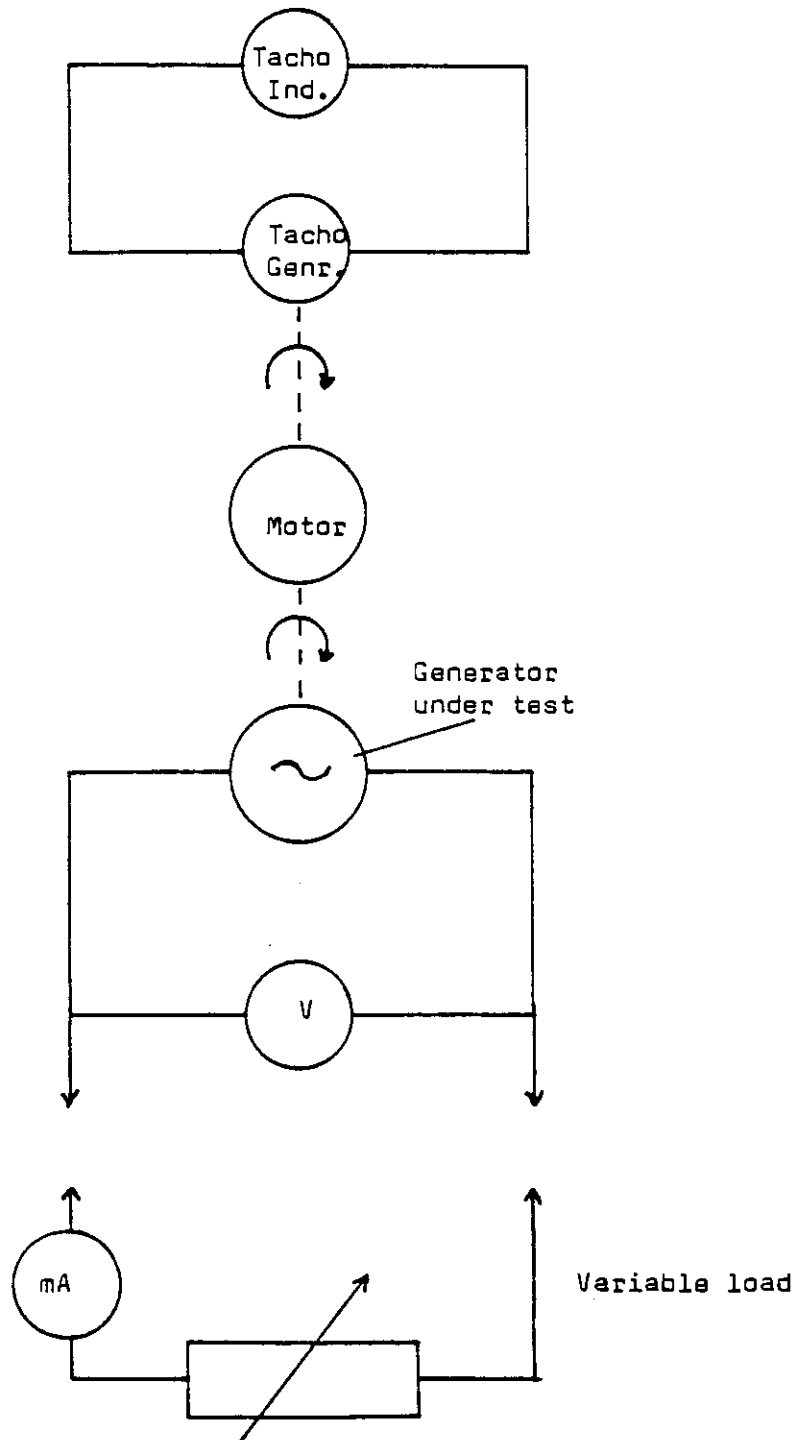


Figure 3. Generator Test Rig

SECTION 3. TECHNICAL DATA

Table 1 Vehicle Classes, Generator Types, and BR Cat. Numbers

Class	Generator		
	Make	Type	BR Cat. No.
08 09	Smith Stone	LSG 128/54 Mod 1	017/008444
20	Smith Stone	LSG 58 Mod 4 LSG 58 CD Mod 4	061/000626
26	Smith Stone	LSG 58 Mod 4	061/000626
31	AEI JB	E10F52	051/044508
33	Smith Stone	LSG 58 Mod 4	061/000626
37	Smith Stone	LSG 54 Mod 4 *LSG 58 Mod 4	051/005190 061/000626
47	AEI JB	E10B 56 E 7F E10F E10F 56	061/065670
73/0 73/1	Smith Stone	LSG 114 Mod 4 LSG 158	090/042010 083/001450
81 85	AEI RE	701A1B2 701A2B2	090/042012
86/2 86/4 86/6	AEI RE	748A2B2 748A2B4	090/042020

* - Fitted in accordance with Engineering Instruction LD/981

Table 1 (Cont'd)

Class	Generator		
	Make	Type	BR Cat. No.
101 - 128	Smith Stone	LSG 58 Mod 4 LSG 118 LSG 158	061/000626 014/094604 083/001450
205 & 207 MBS	Smith Stone	LSG 158	083/001450
205 & 207 DTS and DTC	Smith Stone	LSG 108	052/000126
302	Smith Stone	LSG 58/V Mod 4 LSG 108/V	061/000626 052/000126
303	Smith Stone	LSG 118	014/094604
304	AEI JB	E7J E10J46	093/005100
305	Smith Stone	LSG 58/V Mod 4 LSG 108/V	061/000626 052/000126
307	Smith Stone	LSG 108/V	052/000126
308	Smith Stone	LSG 58/V Mod 4 LSG 108/V	061/000626 052/000126
309	Smith Stone	LSG 58/V Mod 4	061/000626
310	AEI JB	E10K 38	093/005130
312	AEI JB	E10M 38	093/048911
411-14 419-38 487	Smith Stone	LSG 158	083/001450
415-16	AEI RE	3340A2G2	053/3669

Table 2 Speed, Output and Load Details.

Generator Type	Test Speed (rpm)	Output (V)	Load Current (mA)
Smith Stone 4V* Smith Stone 8V*	1000 500	40.3 ± 0.1	21.8
AEI(BTH)	See Table 3	78.0 ± 0.5	12.0

* Identified by final digit of type number e.g.

LSG 108 = 8V
LSG 54 = 4V

Stator Resistances - LSG 54 = 17 - 19Ω
- LSG 58 = 67 - 75Ω

Table 3 Test Speeds for AEI(BTH) Generators.

Class	Test Speed (r/min)
47	747
31	851
81, 85	700
86/2, 4, 6	747
304	800
310, 312	934
415, 416	3340