

**WOSS 680/3**

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**British Railways Board**

Director of Mechanical and Electrical Engineering

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**Wheel Wear  
Compensators**

**WORKSHOP OVERHAUL STANDARD SPECIFICATION**





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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WOSS 680/3

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	
09	
20	X
25	X
26	X
27	X
31	X
33	X
37	X
43	X
45	X
47	X
50	
56	
58	

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

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
127	X
128	X
140	X
141	X
142	
143	
144	
150	
151	
155	
156	

EMU's

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

411	X
412	X
413	X
414	X
415	X
416	X
419	X
421	X
422	X
423	X
432	X
438	
442	
455	
485	
486	
487	
488	
489	
491	

DEMU's

204	
205	
207	
210	

COACHING STOCK

Mk 1	
Mk 2, 2a-c	
Mk 2d-e	
Mk 2f	
Mk 2 DBSO	X
Mk 3a	
Mk 3b	
Mk 3 (HST)	
Mk 3 SLE and SLEP	
Non Passenger	

WORKSHOP OVERHAUL STANDARD SPECIFICATION 680/3

WHEEL WEAR COMPENSATORS

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REFERENCE DOCUMENTS

MT 203 Electronic Equipment Maintenance: Recommended Procedures  
WOSS 560/4 Crimped Joints For Cables  
WOSS 501/1 Hot Water & Detergent Cleaning  
TEE/E/81/M/27 General Instructions for use of Diode Tester  
B2-A1-8301853 Flexible Conduit Assemblies and Adaptor Detail

TOOLS AND MATERIALS

BR Cat. No.

Diode Test Box  
Loctite 222

72/5017  
7/60355

## SECTION 1 REPAIR PROCEDURE

## NOTE:

Where an item is first mentioned in the text it is followed by a number in brackets. The first part of the number, before the full stop, refers to the figure on which the item is identified. The second part of the number, after the full stop, is the number of the item as it appears on the figure. Items lists associated with figures use the full number. If an item is identified on more than one figure then the items list for each figure will give the alternative number.

1 Smith Stone (divided into types A and B for the purposes of this specification: see Section 3).

- 1.1 Remove loose dirt and grease with a scraper. Clean in accordance with WOSS 501/1.
- 1.2 Remove cover (1.3), screws (1.1) and potentiometer mounting board.
- 1.3 Renew the potentiometer if the body is fractured, if the track is fractured or badly worn, or if the wiper does not bear down firmly on the track. See Additional Procedure 1 for type A and Additional Procedure 2 for type B equipment.
  - 1.3.1 Carry out Additional Procedure 2 on type B equipment if the original potentiometer has been replaced by a series of fixed resistors.
- 1.4 Where provision is made for single/dual indicator operation:
  - 1.4.1 Renew the wire or shorting link if it has been removed or is broken (see Figure 2).
  - 1.4.2 Renew resistor R1 (Figure 4) if it is burnt or damaged.
- 1.5 Renew the hose (4.2, 5.1) if damaged. If the original Smith Stone type (2.2) is unobtainable, fit the assembly shown in Figure 3. Apply Loctite 222 to the threads of the connector (4.3) or adaptor (5.2) and the flexible conduit (5.1) before fitting.
- 1.6 Renew the plug interior if the pins are broken or bent, or if the insulator is fractured.
- 1.7 Renew and internal wiring with damaged insulation and remake any defective terminations in accordance with WOSS 560/4.
- 1.8 Test in accordance with Section 2.
- 1.9 Refit the potentiometer and mounting board to the box. If the potentiometer fouls the inside of the box insert plain washers between the mounting board and support lugs.
- 1.10 Renew waterproof sealing ring (1.3) if damaged.
- 1.11 Fit cover.

2 GEC RE 835 A2J4

- 2.1 Clean the assembly in accordance with MT 203.
- 2.2 Examine the PCB for mechanical damage, dry joints or broken circuit tracks. Repair or renew in accordance with MT 203.
- 2.3 Renew any internal wiring with damaged insulation and remake any defective terminations in accordance with WOSS 560/4. Identify all cables in accordance with Figure 4.
- 2.4 For effective operation of the potentiometer spindle clamp the spindle must project beyond the end of the clamp. If the spindle is too short renew the potentiometer by fitting a Colvern type 1106/11S, 1k ohm to BR cat no. 26/145650.
- 2.5 Ensure resistor R2 is fitted. Renew if missing or damaged with item to BR cat 26/152093.
- 2.6 Test in accordance with Section 2.
- 2.7 Varnish both sides of the PCB assembly in accordance with MT 203.

3 AEI (BTH)

- 3.1 Remove loose dirt and grease with a scraper. Clean in accordance with WOSS 501/1.
- 3.2 Remove cover.
- 3.3 Renew the potentiometer if the body is fractured, if the track is fractured or badly worn, or if the wiper does not bear down firmly on the track.
- 3.4 Renew any internal wiring with damaged insulation and remake any defective terminations in accordance with WOSS 560/4.
- 3.5 Test in accordance with Section 2.
- 3.6 Renew seal and fit cover.

4 GEC Type RE2340A2G3 Equipment (classes 415,416).

- 4.1 Remove loose dirt and clean with a dry cloth.
- 4.2 Renew the potentiometer if the body or terminals are fractured.
- 4.3 Renew the knob if the dial markings are illegible.
- 4.4 Renew any internal wiring with damaged insulation and resolder any defective cable connections.
- 4.5 Test in accordance with Section 2.

Items List for Figure 1

Item	Description	S.S Part No.	BR Cat No.
1.1	Screw 2BA ch Lockwasher 2BA Washer 2BA	30-232-158-11	3/83071 3/80485
1.2	Box Box Box	LRB /22/28/5 LRB /47/20 LRB 23/3	51/841 18/9260 14/94295
1.3	Cover O ring	LRB 304 30-781-298-75	14/94475 10/52661
1.4	Connector	LRB 272	61/36365
1.5	Worm drive hose clip size 35		8/112957
1.6	Stud Nut 5/16" BSF Washer 5/16" brass Lockwasher 5/16"	LRB 316 STD687	61/36363 14/94825 3/80840 3/30850
1.7	Nut Washer 5/16" Lockwasher 5/16"	STD687 30-282-018-11	14/94825 3/80840 3/30850
1.8	Stud	LRB 316	61/36363
1.9	Washer	LRB 274	14/95220
1.10	Nut	LRB 279	14/94828
1.11	Cable ferrule	LRB 276	14/94530
1.12	Bush	LRB 275	14/94320
1.13	Seal	LRB 315	
1.14	Gland JTE 493	LRB 327	14/94225
1.15	Plate	LRB 329	
1.16	Stud	LRB 316	61/36363
1.17	Nut Washer 5/16" Lockwasher 5/16"	STD687	14/94825 3/80840 3/30850

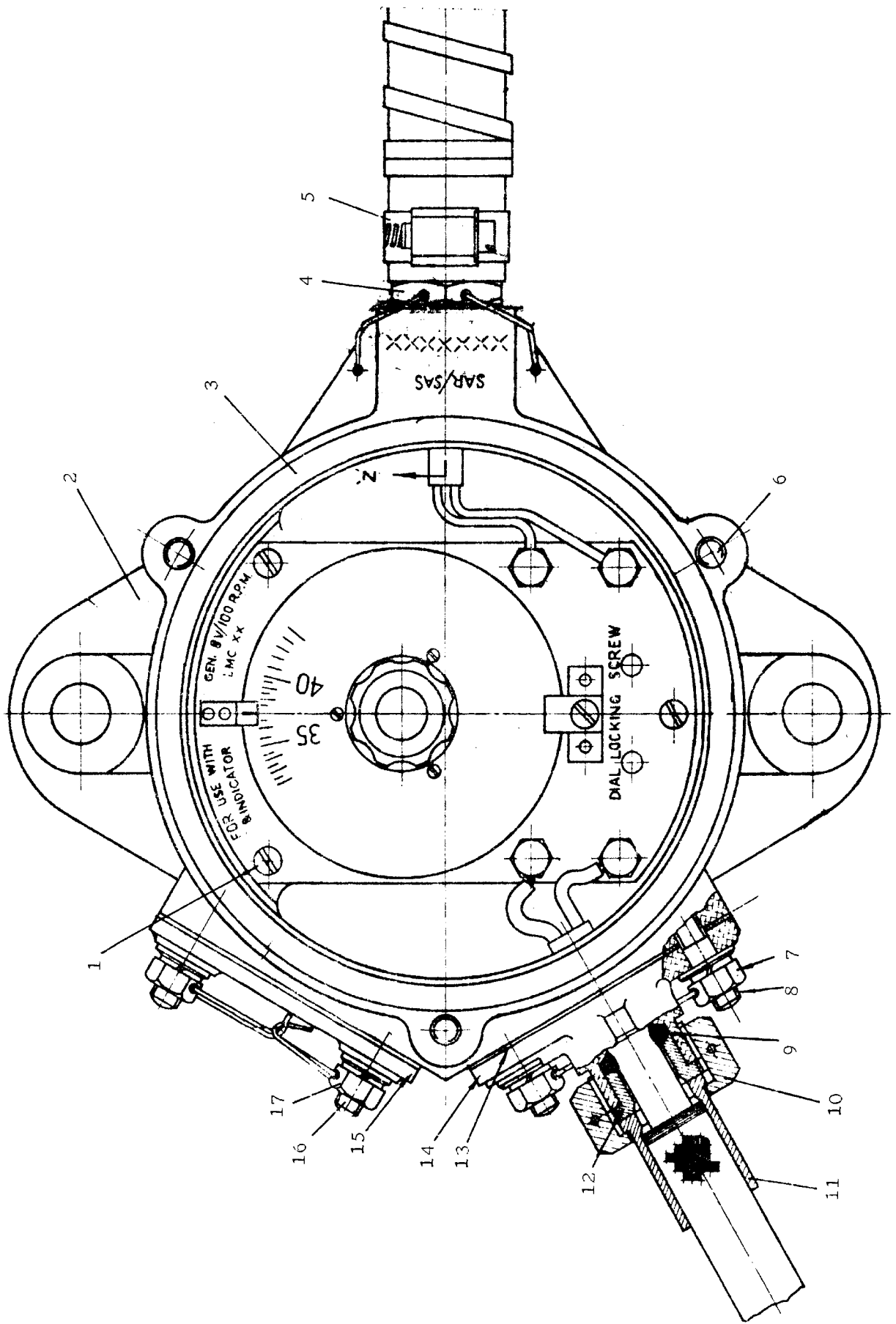
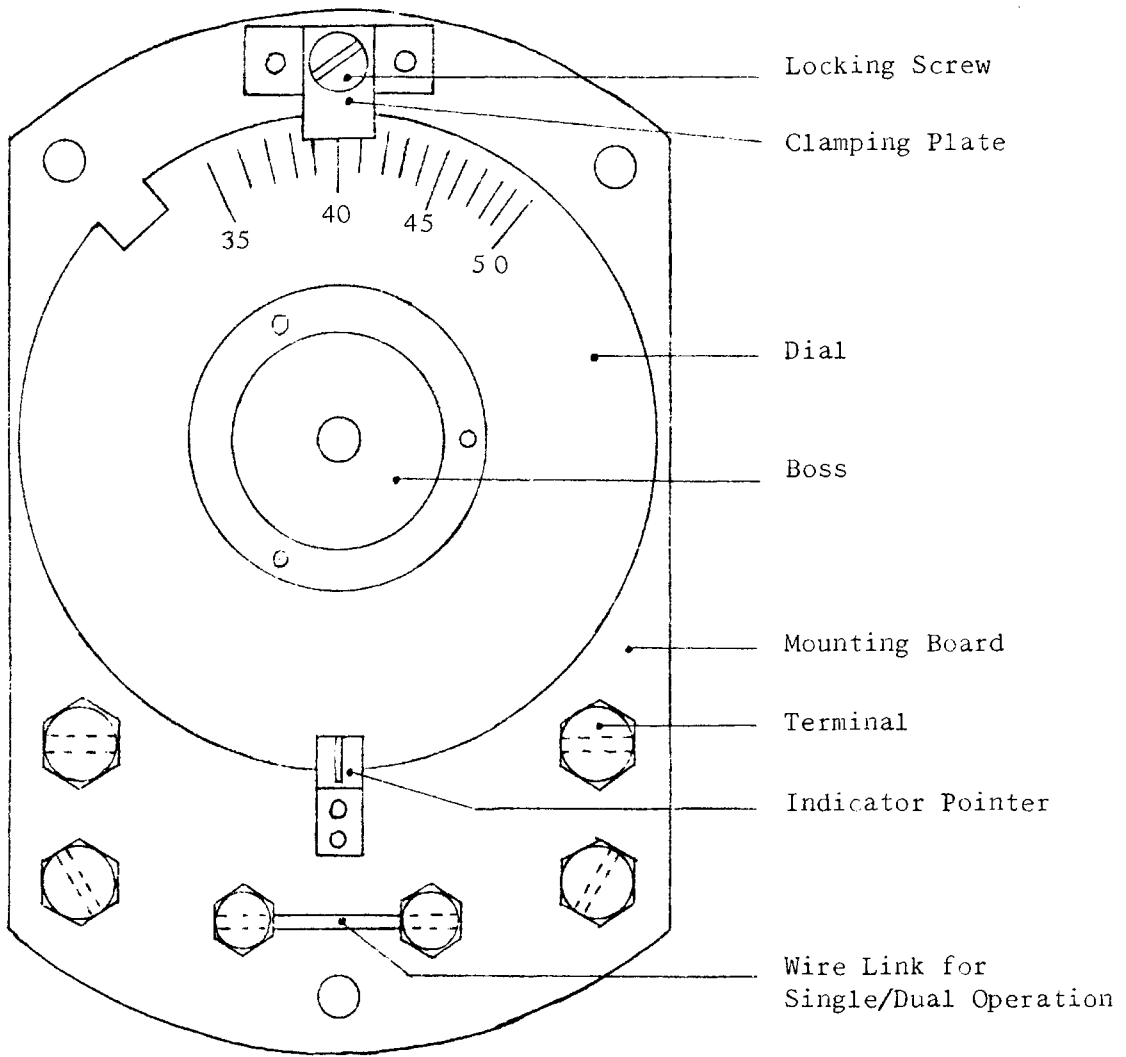


Figure 1 Smith Stone: Original Type

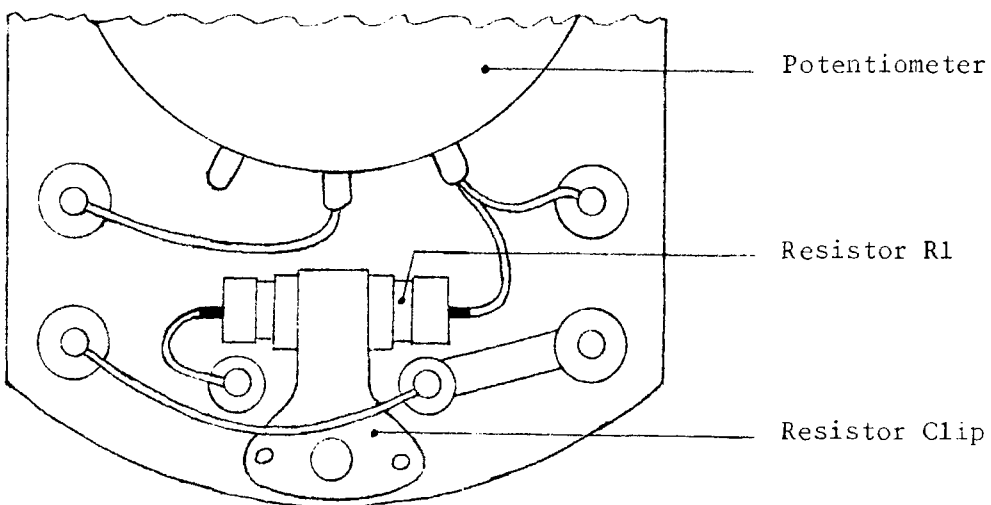


Items List for Figure 2

Item	Description	BR Drg No.	BR Cat No.
2.1	Potentiometer 850R		53/5433
2.2	Screw 2BA		
	Nut 2BA		
	Washer 2BA		
2.3	Transax pin 3/32"φ		



A - View on Topside



B - View on Underside

Figure 2 Smith Stone Replacement Type A

## Items List for Figure 3

Item	Description	BR Drg No.	BR Cat No.
3.1	Mounting board		51/10895
3.2	Potentiometer		51/10894
3.3	Crimp terminal M5		
3.4	Resistor 1k1		26/154048

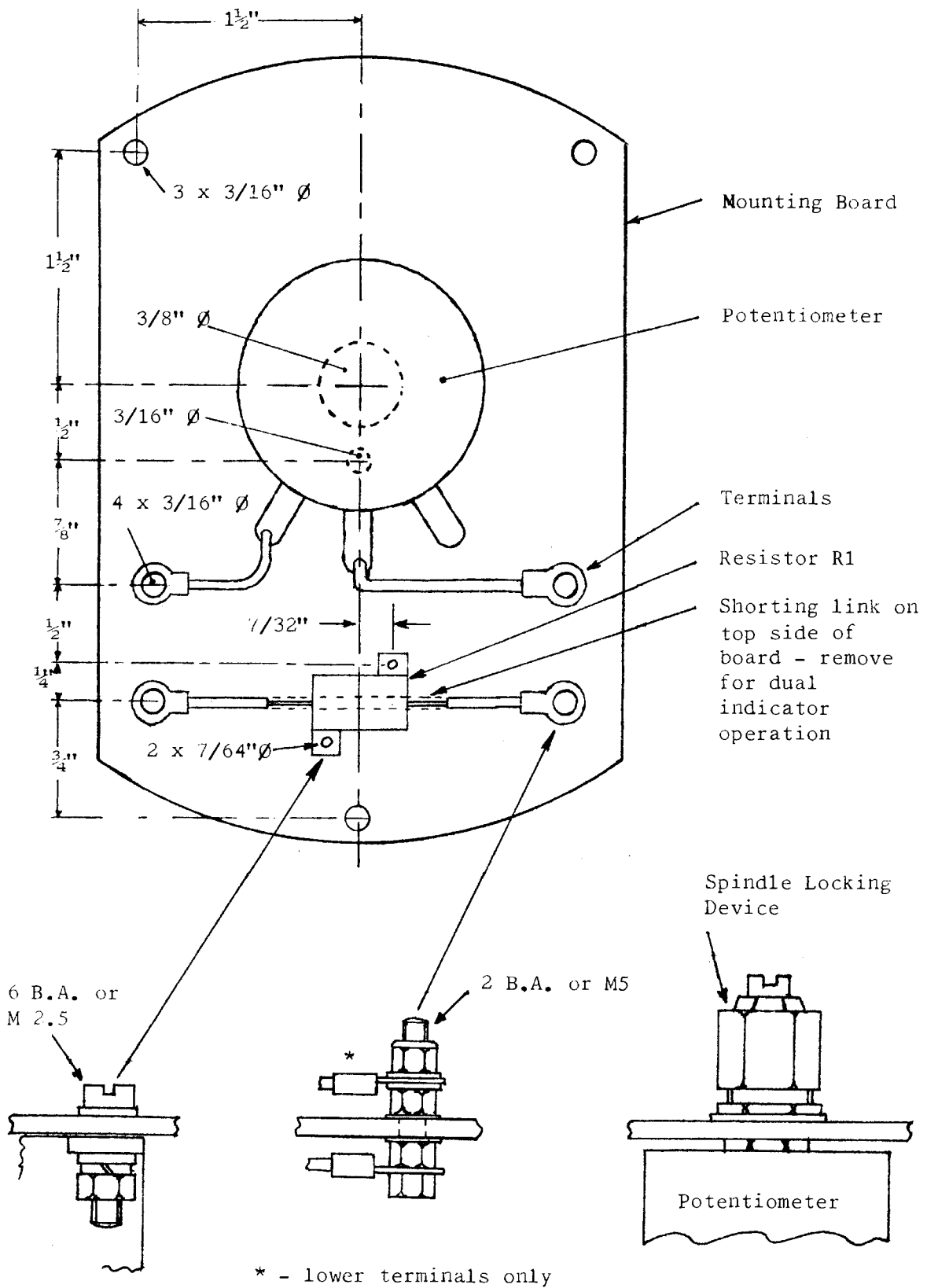


Figure 3 Smith Stone Replacement Type B

## Items List for Figure 4

Item	Description	S.S Part No.	BR Cat No.
4.1	Cable 36"	LRB 107/L36	14/2083
	Cable 42"	LRB 107/L42	14/22250
	Cable 48"	LRB 107/L48	14/94679
	Cable 54"	LRB 107/L54	14/94657
	Cable 2 core 32/0.2 H & R sheath		6/141000
4.2	Hose 36"	LRB 239/L36	14/82914
	Hose 48"	LRB 239/L48	14/82921
4.3	Connector	LRB 272	61/36365
4.4	Jubilee clip	40-276-108	
4.5	Washer	LRB 237	61/14838
4.6	Sealing ring	LRB 236	18/18324
4.7	Plug complete	LRB 270	14/94898
	Housing	LRB 267	61/31838
4.8	Locking ring	LRB 288	
4.9	O ring	30-781-290-75	
4.10	Ring	LRB 269	83/581
4.11	Circlip	30-581-069	
4.12	Plug, terminal	LRB 241	61/38861
4.13	O ring	30-781-206-75	
4.14	O ring	30-781-290-75	
4.15	Terminal block	LRB 244	83/581
4.16	Locknut	30-273-622-01	
4.17	Sleeve	30-783-279-15	
4.18	Pin, socket locating	LRB 243	18/17494



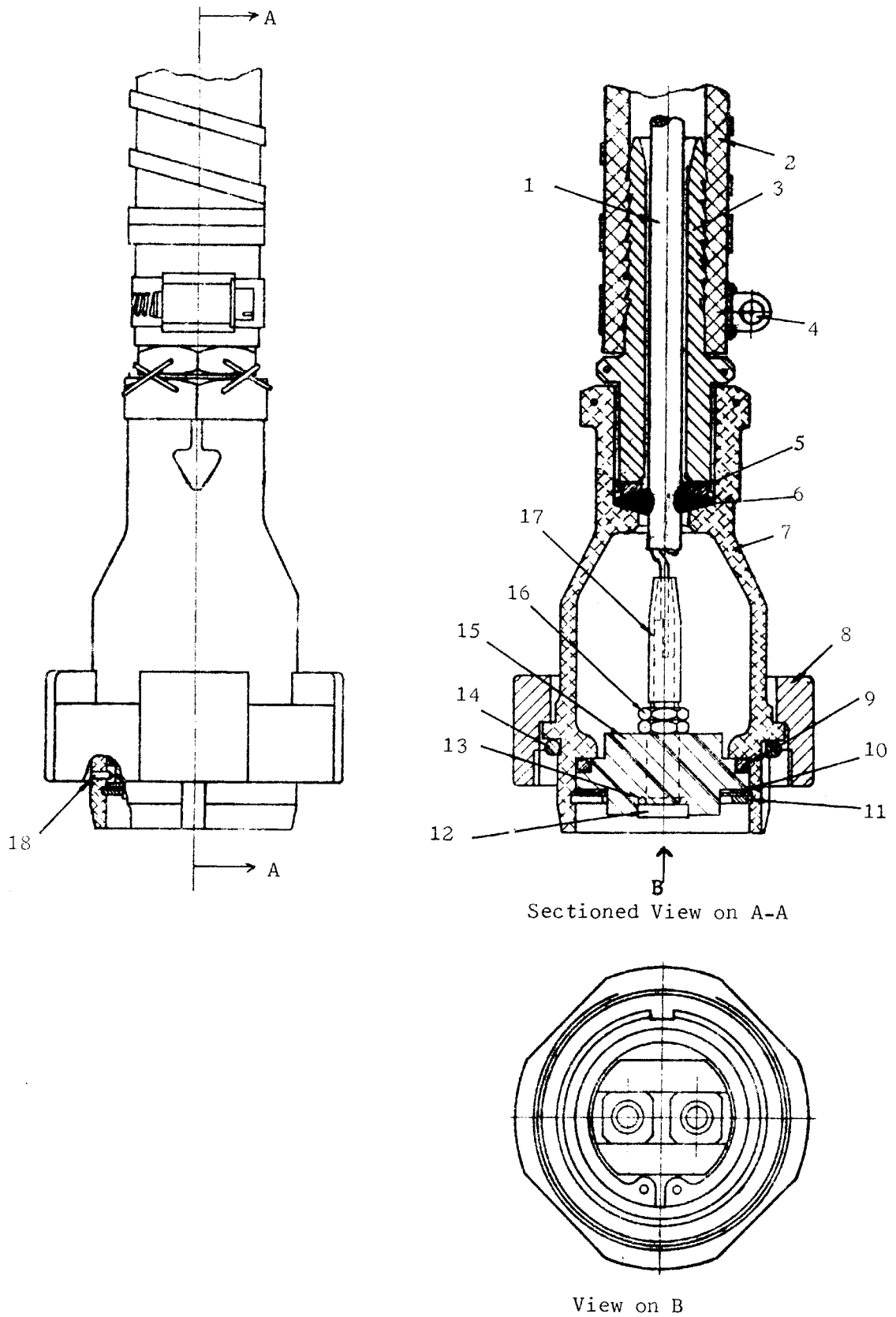


Figure 4 Smith Stone Supplied Plug and Harness

## Items List for Figure 5

Item	Description	BR Drg No.	BR Cat No.
5.1	Flexible conduit 16 mm. L = 635	B2-A1-8301853/03	830/185303
	Flexible conduit 16 mm. L = 686	B2-A1-8301853/08	830/185308
	Flexible conduit 16 mm. L = 914	B2-A1-8301853/04	830/185304
	Flexible conduit 16 mm. L = 990	B2-A1-8301853/09	830/185309
	Flexible conduit 16 mm. L = 1067	B2-A1-8301853/01	830/185301
	Flexible conduit 16 mm. L = 1143	B2-A1-8301853/07	830/185307
	Flexible conduit 16 mm. L = 1220	B2-A1-8301853/02	830/185302
	Flexible conduit 16 mm. L = 1525	B2-A1-8301853/06	830/185306
	Flexible conduit 16 mm. L = 1600	B2-A1-8301853/05	830/185305
5.2	Adaptor	B2-A1-8301853/10	830/185310

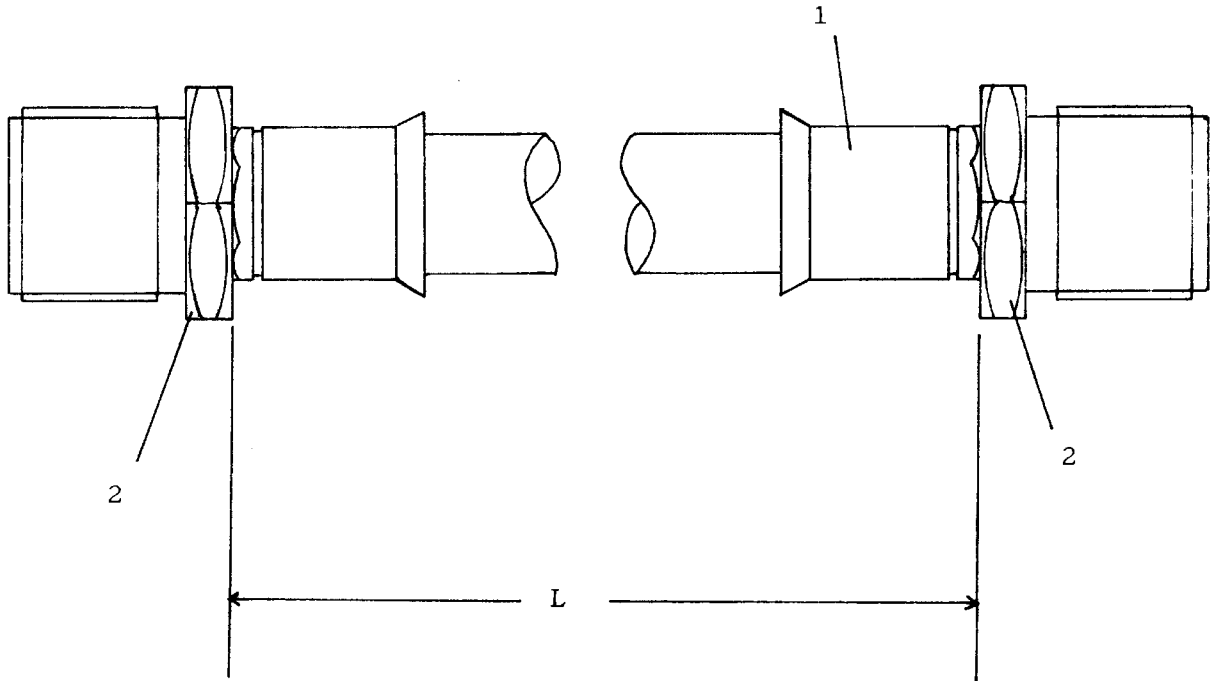


Figure 5 Smith Stone Replacement Harness

## Items List for Figure 6

Item	Description	BR Drg No.	BR Cat No.
D1-4	Diode 1N4007 1A 1kV		26/117298
R1	Resistor 16k $\pm$ 2% 1W		26/152798
R1	Resistor 10K $\pm$ 2% 1W		26/152793
R2*	Resistor 27K $\pm$ 2% 0.5W		26/152093
VR1	Potentiometer 1K 0.5W Colvern CLR 1106/11S		26/145650
	Terminal block 4 way Metway 30704/FN	L-A2-9621/1	72/3332
	Flying leads 37/0.2 x 50		6/110950
	Crimp 22-16 M5 red		54/119378
	PCB assembly (R1 = 16k)	L-A2-9621/1	72/3331
	PCB assembly (R1 = 10k)	L-A2-9621/2	52/3658
	Adaptable box 100 x 100 x 50	L-A2-9621/5	
	Speedometer rectifier & adjustment		
	box complete: (R1 = 16k)	L-A2-9621/7	71/2486
	(R1 = 10k)	L-A2-9621/6	52/3816

\* R2 is fitted to some class 43 equipments in parallel with an R1 of 16k to give a total resistance of 10k $\Omega$ .

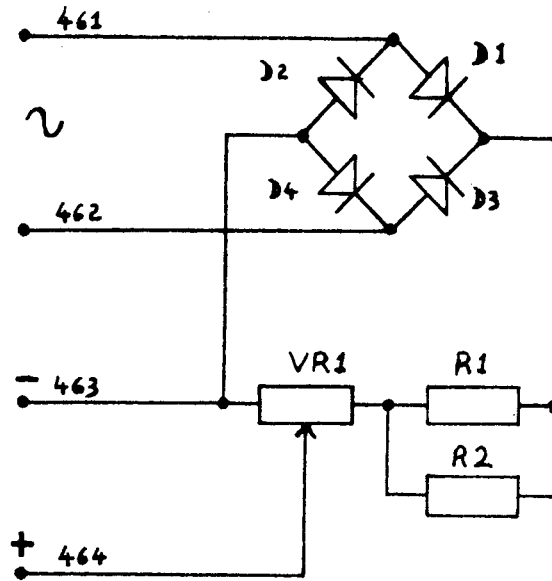


Figure 6 Rectifier and Adjustment Board

Issue 6  
Oct 87



SECTION 2 TEST SPECIFICATION

If any of the following tests do not give the indicated result, investigate and rectify the defect and repeat the test.

1 Functional Test

- 1.1 Connect an analogue multimeter across the potentiometer. Slacken the adjustment locking device, turn the adjustment knob or spindle from zero to maximum and ensure that the meter indicates a smoothly increasing resistance.
- 1.2 Ensure that the maximum resistance value is as specified in Section 3 Table 1.
  - 1.2.1 On GEC type RE3340 A2 G3 ensure that the resistance values correspond with the wheel diameter settings detailed in Section 3 Table 2.
- 1.3 Ensure that the value of resistors R1 and R2 (where fitted) are as specified in Section 3 Table 1.
- 1.4 GEC RE 835 A2J4: test diodes D1-D4 in accordance with TEE/E/81/M/27.

2 Insulation Test

- 2.1 Test the insulation to earth with a 500v megger. Minimum acceptable reading 200M ohm.

SECTION 3 TECHNICAL DATA

Table 1 Vehicle Classes & Equipment Types

Classes	Equipment Type	Resistance ( $\Omega$ )		
		Pot'mtr	R1	R2
20,26,27,37,45 302,303, 305,308,309,311.	Smith Stone type B. Original manufacture. Single Indicator	2020 <u>+200</u>	-	-
121-128	Smith Stone type B Dual Indicator	850 <u>+85</u>	-	-
101-122 307 (original bogies)	Smith Stone type B Refurbished Single/Dual Indr.	1000 <u>+100</u>	1100 <u>+55</u>	-
307 (B4/5 bogies)	Smith Stone type B Single Indicator	2500 <u>+200</u>	1100 <u>+55</u>	-
33,73,201-207, 411 -414,419-430, 489,491	Smith Stone type A Single/Dual Indicator	850 <u>+85</u>	1100 <u>+55</u>	-
25,31,47,81,85, 86/2,86/4	AEI (BTH)	650 <u>+30</u>	-	-
304,504		1000 <u>+50</u>	-	-
310,312		750 <u>+35</u>	-	-
415,416	GEC RE 3340 A2G3	750 <u>+35</u>	-	-
43	L-A2-9621/6	1000 <u>+100</u>	16k <u>+10%</u>	27k <u>+5%</u>
DBSO with GEC tachgenr.	L-A2-9621/6	1000 <u>+100</u>	10k <u>+10%</u>	-
DBSO with Ampy tachgenr.	L-A2-9621/7	1000 <u>+100</u>	16k <u>+10%</u>	-

Table 2 Calibration of GEC type RE3340 A2G3 Equipment

Wheel Dia Setting (")	37	38	39	40
Resistance ( $\Omega$ )	750 $\pm$ 35	645 $\pm$ 30	540 $\pm$ 25	435 $\pm$ 25

Table 3 Smith Stone Details

Class	Part No.	Harness Length	BR Cat. No.
20	LRB22/28/5	1067 (42")	51/841
26, 27	LRB	1220 (48")	
37	LRB30/44/29	635 (25")	51/3033
45	LRB43/98	914 (36")	61/114
101-128	LRB30/44/5	1067 (42")	51/839
201-7 411-14 421-23 438, 492	LRB47/20	1600 (63")	18/9260
303, 311	LRB	1525 (68")	
309	LRB	990 (39")	
33, 419	LRB12/38/5	1143 (45")	61/30215
73, 432	LRB47/2	686 (27")	83/299

SECTION 4 ADDITIONAL PROCEDURES

AP1. Renewal of Potentiometer fitted to Smith Stone Equipment, Type A.

Tools and Materials.

BR Cat. No.

Potentiometer, 850R	53/5433
1 off 2BA screw, nut and washer.	
1 off 3/8 in BSF screw, nut and washer.	
3 off 1/4 in. x 4BA csk. head screws.	
Template as Figure 6.	
Transax pin, 3/32" $\phi$ .	
Ohmmeter	

- 1.1 Remove the mounting board assembly from the housing.
- 1.2 Remove the dial locking screw and clamping plate.
- 1.3 Punch out the Transax pin from the dial boss and remove the dial assembly from the potentiometer spindle.
- 1.4 Remove the dial from the boss.
- 1.5 Disconnect the leads from the potentiometer terminals.
- 1.6 Remove the potentiometer from the mounting board.  
Discard the potentiometer.
- 1.7 If the mounting board has not been modified proceed as follows:-
  - 1.7.1 Remove the resistor retaining clip.
  - 1.7.2 Disconnect the leads and remove the resistor.
  - 1.7.3 Locate the notch in the template over the indicator pointer and secure the template with the 3/8" BSF screw, washer and nut through the centre hole of the board.
  - 1.7.4 Drill the three 5/32"  $\phi$  holes, remove the template and countersink the holes.
  - 1.7.5 Drill a 3/16"  $\phi$  hole in the centre of the resistor retaining clip and secure to the board in the position shown with a 2BA screw, nut and washer.
  - 1N7N6 Using the existing retaining clip holes as guides, drill two 3/32"  $\phi$  holes through the mounting board. Remove the 2BA screw, fit the resistor and rivet the clip to the board.
- 1.8 Locate the potentiometer with its terminals adjacent to the board terminals and secure with three 4BA x 1/4" countersunk screws.

- 1.9 Remove the crimped terminals from the existing leads and solder the terminal and resistor leads as shown. DO NOT UNDO THE SCREWS ON THE POTENTIOMETER TERMINALS.
- 1.10 Connect an ohmmeter across the two terminals connected to the potentiometer and set the resistance value to  $523 \pm 7\Omega$ .
- 1.11 Fit a dial engraved with 35-50" only to the boss and place over the spindle so that the indicator pointer is at the 42" mark. Set the clearance between the dial and mounting board to 0.005-0.010" and tighten the boss onto the spindle by means of a 4BA grub screw.
- 1.12 With the pointer at 42" check that the resistance is still as in 1.10. When correct, drill the spindle and fit a new  $3/32\phi$  Transax pin.
- 1.13 Refit the clamping plate and locking screw.

AP2. Renewal of Potentiometer fitted to Smith Stone Equipment Type B.

Tools and Materials	BR Cat. No.
Potentiometer 1000k	51/10894.
Metalclad Resistor 1K1	26/154048.
Spindle Locking Device, Colvern for 0.25 in spindle, 13.5 mm long x 18.0 mm wide.	
1/8" Tufnol sheet approx 5.7/16 in x 3.5/8 in.	
1" x 2BA Screws, nuts, self-locking nuts, washers and spring washers as required.	

- 2.1 Remove the mounting board assembly from the housing.
- 2.2 Disconnect the cables and remove the potentiometer knob and potentiometer or the resistors.
- 2.3 Renew the mounting board if it is damaged. Manufacture a new board from 1/8" Tufnol sheet using the original board as a pattern, but ignoring the original holes.
- 2.4 Drill the mounting board as detailed in Figure 7.
- 2.5 Fit the potentiometer with its terminals adjacent to the board terminals and the locking nib in the central 3/16 in dia. hole. Fit the locking shaft over the spindle and tighten. Fit the locking collar and hand-tighten firmly.
- 2.6 Assemble the terminals and connect the cables as shown.