

Chapter 2

BRUSH BEDDING ON COMMUTATORS AND SLIPRINGS

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Introduction

1. The bedding of carbon brushes on to commutators and sliprings to obtain the necessary surface finish over a maximum arc of contact is essential to the efficient operation of rotary electrical machines. This chapter describes a revised brush bedding procedure which reduces considerably the overall time required to achieve satisfactory results.

DESCRIPTION

General

2. The revised procedure utilizes improved

preliminary bedding techniques and employs a high armature speed during the final bedding run. Cooling by the use of air blowers is applied only to types of machines which are likely to reach a temperature of 100°C during the bedding run. The process can be completed on many types of machine without air cooling but on other types forced air cooling is essential to maintain the temperature within the prescribed limits. Details of cooling and other requirements peculiar to individual types of machine will be found in the relevant A.P.4343 series, Vol. 1 chapters.

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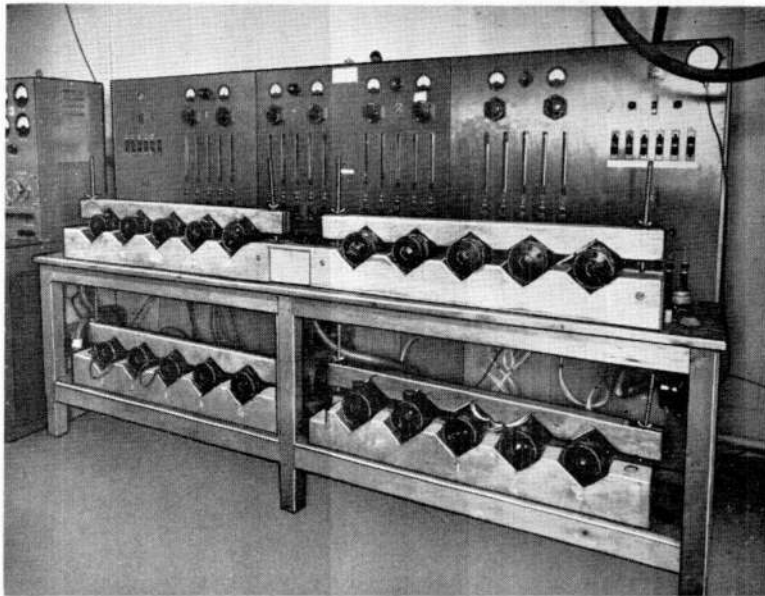


Fig. 1. Brush bedding rig at a Maintenance Unit

Preliminary bedding

3. The preliminary bedding processes are designed to shape the contact surfaces of the brushes to a close approximation of the commutator profile by the use of a thin abrasive strip affixed to the commutator without any overlap by tissue tape coated on both sides with adhesive.

4. Variations in the time taken by individual brushes to acquire the correct contour, because of the tilting effect on the brushes due to the friction of the abrasive and the clearance between each brush and its box, are eliminated to a great extent by the fitting of tape shims to one face of each brush to reduce the clearance to a minimum consistent with freedom of brush movement.

5. The contact surfaces of the brushes are coated with yellow lacquer, which provides an effective means of indicating the progress of the pre-bedding operation. The brushes are then fitted in their boxes and after the brush spring

pressure is checked to ensure that it is within permissible limits, the armature is turned by hand, or in some instances by a motorised friction drive, in the normal direction of rotation until all traces of the yellow lacquer are removed from the brush faces.

6. Because of the thin abrasive strip and adhesive, and the absence of any overlapping of the abrasive, the brush contact surfaces are shaped to a radius which is only slightly larger than that of the commutator on which they are to be used. Thus after the shims are removed from the brushes \blacktriangleleft , a relatively short running time is required to wear the brush surfaces to obtain the required percentage of bedding.

7. The preliminary bedding processes are effected in two stages and the following tools and materials are required, in addition to the electrical fitters tool kit and special tools or equipment required for the machines concerned.

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Stores Ref. No.	Nomenclature	
32B/702	Tape, self adhesive, $\frac{1}{2}$ in.	
32B/997	Tape, adhesive, transparent	
33B/9429181	Lacquer, opaque, yellow	
1H/97	Balances, spring, 0-4 lb.	
5UA/	Brushes, commutator	
	Methylated spirit	
	Knife	
	Scissors	
	Template, mild steel 22 s.w.g. to enable abrasive and adhesive tapes to be cut to correct size	Manufactured locally to commutator dimensions
	Plywood backed felt brush, for the application of lacquer	Local manufacture
	Tools, brush lifting, to suit various types of machine	Local manufacture
◀5F/2846▶	Tape, Garnet, brush bedding, 3 in.	
◀5F/2847▶	Tape, Tissue, double sided, brush bedding, 3 in. N400	

Sequence of operations

8. Stage 1:—

- (1) Examine the brushes for signs of unserviceability and where applicable check the security of cores by light tapping.

Note . . .

Brushes should be allowed to remain in

their packages until required for immediate use. Subsequently, when they are not in their holders, they should be kept in compartments of a wooden box, marked to indicate their relevant positions in the boxes of the brush holders. Great care should be taken to avoid their being contaminated by lubricants or moisture.

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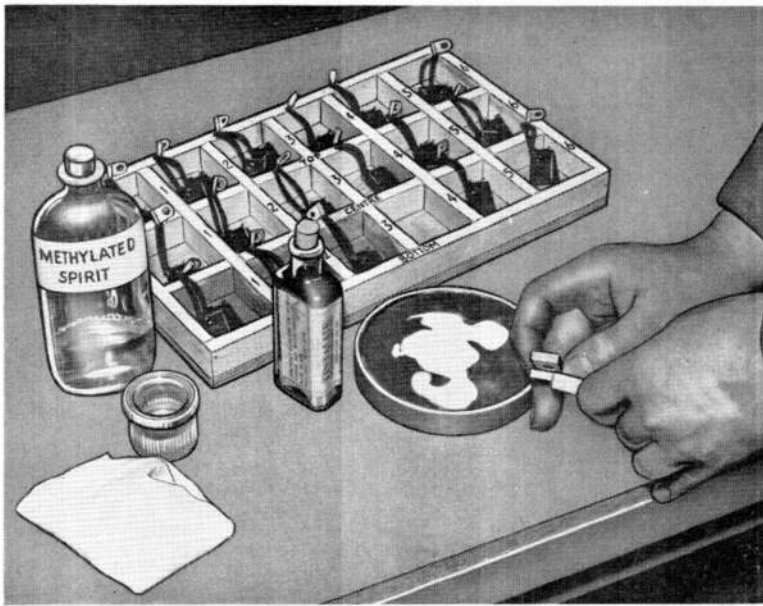


Fig. 2. Applying lacquer to contact surfaces of brushes

(2) Apply an even coating of yellow lacquer to the contact surface of each brush using the locally manufactured felt brush. Ensure that corners and edges of

the surface are covered and remove any lacquer inadvertently applied to the faces and sides of the brushes, using clean rag and methylated spirit.

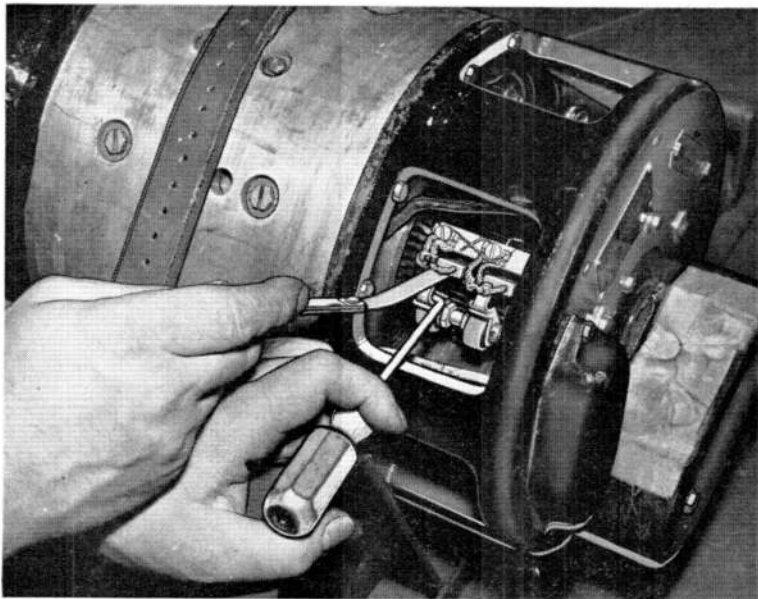


Fig. 3. Measuring clearance between brush face and box

(3) Check the clearance between the brushes and the boxes in which they are

to be used by means of feeler gauges. Make a note of required shim sizes.

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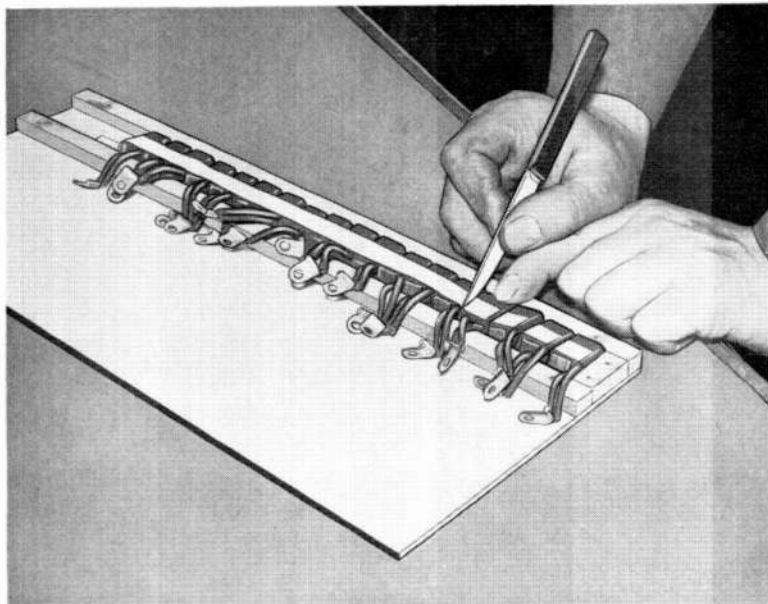


Fig. 4. Fixing tape shims to brushes

(4) Affix strips of the $\frac{1}{2}$ in. self adhesive and the transparent adhesive tape to the faces of the brushes sufficient to take up excessive clearance during preliminary bedding.

Note . . .

The tape shims are usually affixed to the leading faces of the brushes but exceptionally in some types of machine

it may be necessary to fit them on the other face. Where doubt exists on the correct method of fitting the shims, reference should be made to the relevant A.P.4343, Vol. 1.

(5) Place the brushes in the appropriate compartments of a locally manufactured wooden box marked to identify the positions of the brushes in the brush boxes. A typical box is illustrated in fig. 2.

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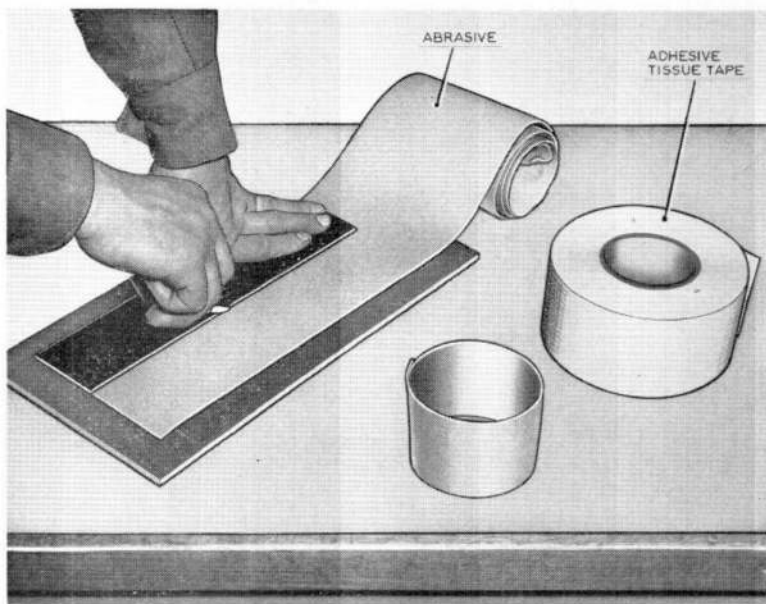


Fig. 5. Cutting abrasive paper to a template

(6) Using a rectangular template, of identical size to the width and circumference of a new commutator, cut a strip

of the abrasive paper and a similar strip of the double coated adhesive tissue with a sharp knife.

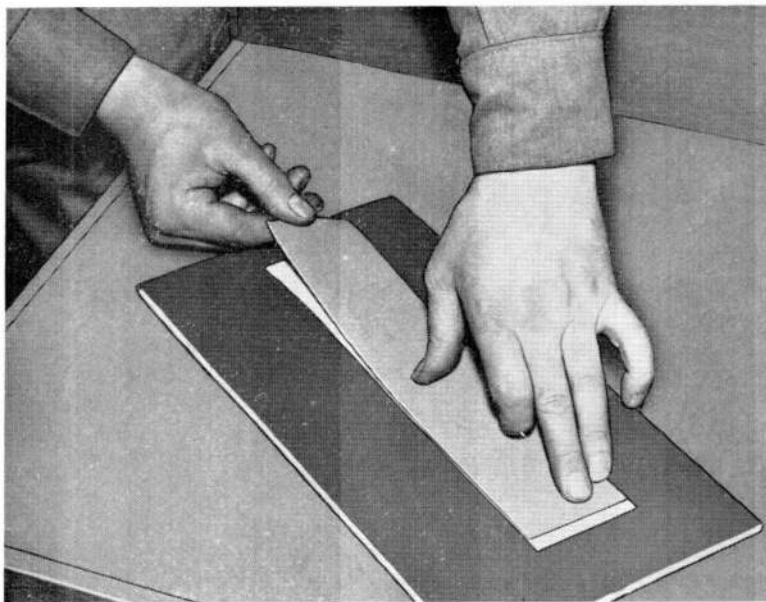


Fig. 6. Affixing abrasive strip to adhesive tissue tape

(7) Back the abrasive paper with the double coated adhesive so that the ends

overlap each other by about $\frac{1}{4}$ in.

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(8) Remove and discard worn brushes (where applicable).

wipe the commutator clean with a dry rag.

(9) Dismantle the machine to the extent defined in the relevant A.P.4343 series Vol. 1 chapter to gain access to the commutator. Remove any foreign matter and

Note . . .

Partial dismantling is not always necessary, the Type 551 generator is a typical example.

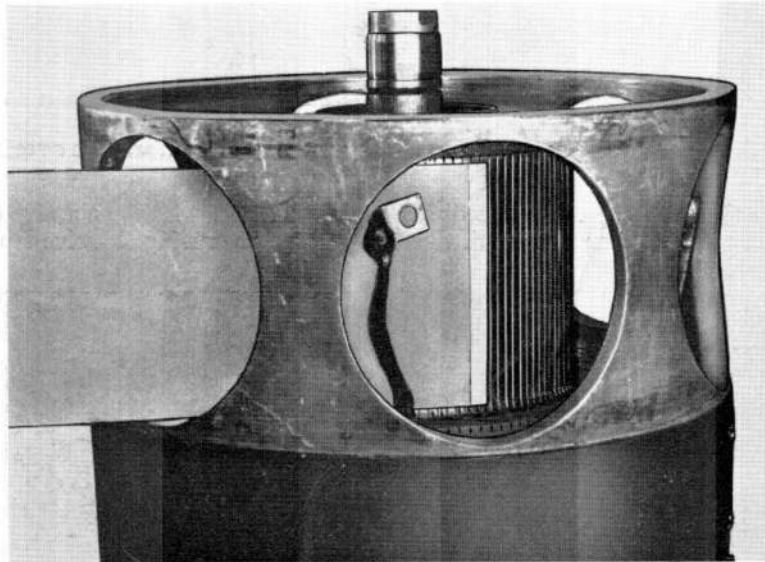


Fig. 7. Alignment of strip with commutator segment

(10) Place the end of the abrasive-adhesive strip on the commutator so that the adhesive overlap is aligned with one of the segments.

Note . . .

Correct alignment and clean hands are essential when fitting the abrasive strip to the machine.

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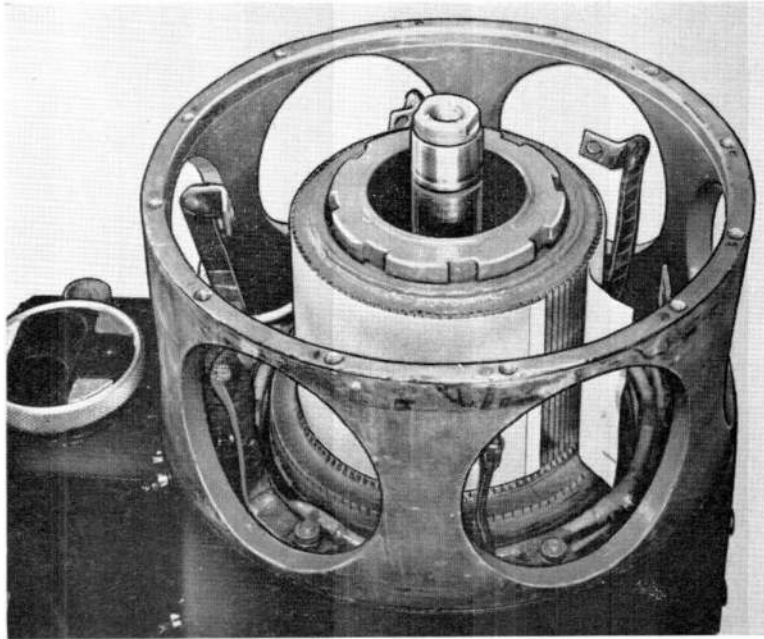


Fig. 8. Strip on commutator showing tissue tape and abrasive overlaps

(11) Turn the armature slowly, feeding the strip on to the commutator until the

free end, with the abrasive overlap, meets the protruding adhesive tape.

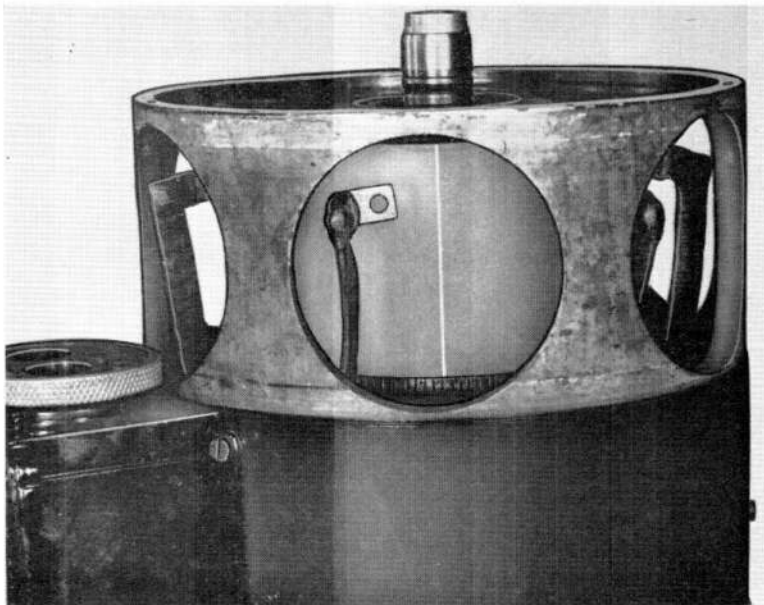


Fig. 9. Butt joint between ends of abrasive strip

(12) Mark the free end of the abrasive paper to show where it meets the fixed end and trim with scissors as necessary to

obtain a butt joint with a minimum gap between the ends.

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Note . . .

Care must be taken to prevent foreign matter adhering to either side of the tissue tape and preventing the abrasive strip from lying flat on the commutator. When the strip is fitted correctly, the commutator cannot be seen through the brush boxes in any position of the armature.

(13) Fit the brushes in their correct positions in the relevant brush holder boxes, checking that they move freely and that clearance is not excessive.

(14) Check that the brush spring pressure is within the limits prescribed in the relevant A.P.4343 series, Vol. 1 chapter.

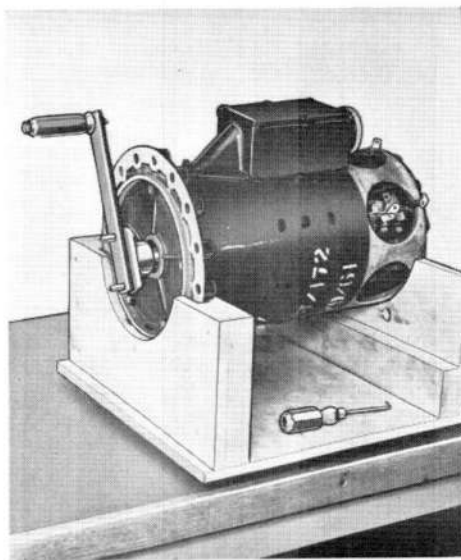


Fig. 10. Hand crank and half coupling used to rotate generator armature

(15) Turn the armature in the normal direction of rotation until all traces of the marking lacquer are removed from the contact surfaces of the brushes. Lift completed sets of brushes clear of the abrasive strip progressively until the whole of the brushes are pre-bedded.

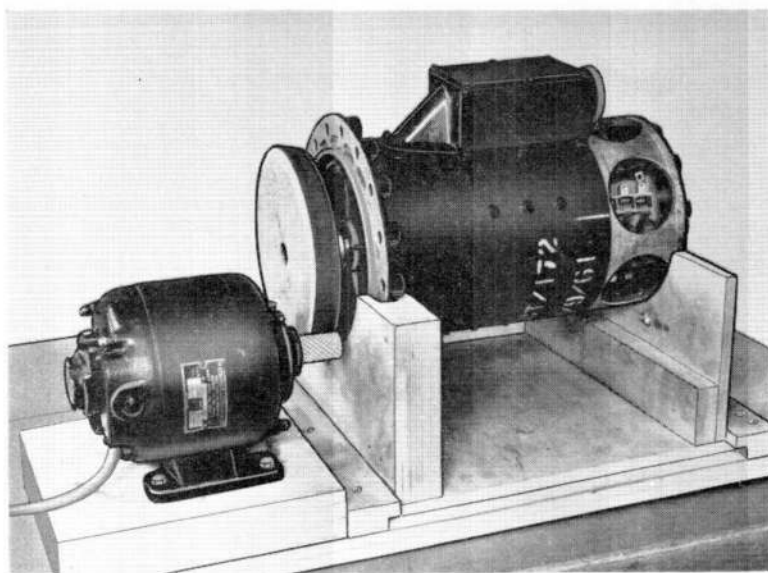


Fig. 11. Motorised friction drive through rubber tyred wooden pulley and half coupling

9. Stage 2.—The second stage of the preliminary bedding process shapes the contact surfaces of the brushes to a radius closer to that of the commutator by the elimination of the double coated adhesive tape except for a small strip under the butt joint of the abrasive paper. Yellow marking lacquer is used as before and each set of brushes is processed separately as follows:—

(1) Remove the brushes and apply yellow lacquer to their contact surfaces as in the operations detailed at para. 8 (2).

(3) Cut a strip of the abrasive to the size of the template and a $\frac{3}{4}$ in. strip of the double coated adhesive tape to secure the abutting ends of the abrasive paper to the commutator.

(4) Affix one end of the abrasive paper to half the width of the $\frac{3}{4}$ in. strip of adhesive tape and place it squarely on the commutator, aligning the leading edge with a commutator segment.

(5) Turn the armature and feed the remainder of the abrasive strip around the commutator and, after any necessary trimming, press down the free end to make a butt joint between the two ends of the strip.

(6) Replace the brushes in their correct positions in the relevant brush holder boxes, allowing one set only to make contact with the abrasive paper.

(7) Turn the armature by hand in the normal direction of rotation, lifting the brushes at each revolution to allow the joint, which is thickened by the adhesive tissue tape, to pass underneath. When all traces of the marking lacquer are removed from the contact surfaces, lift the brushes clear, lower the next set and continue the cycle of operations until all the brushes have been processed.

(8) Remove the tape shims from the brushes and after blowing carbon dust out of the machine, wipe the commutator carefully with a dry rag.

(9) Replace the brushes in their boxes and prepare the machine for the bedding run in accordance with the instructions contained in the relevant A.P.4343 series Vol. 1.

Final bedding run

10. On completion of the preliminary bedding, the machine is run as a motor or driven on the test bench as appropriate, to continue the process of making intimate contact between the brushes and the slip rings or commutator

until the sliding surfaces are polished uniformly.

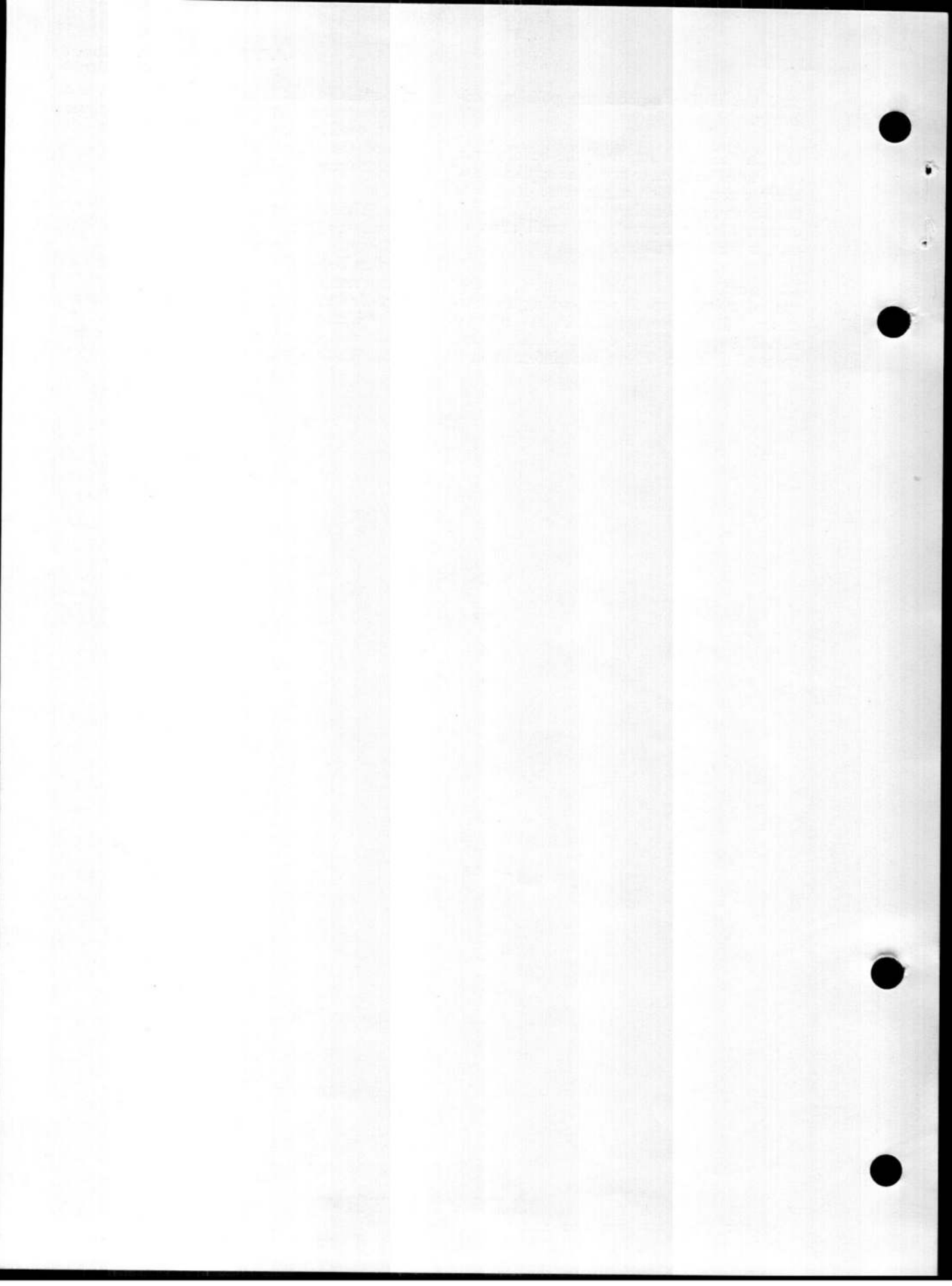
11. In the initial stages of the bedding run care should be taken to avoid the application of heavy currents which might cause damage to the armature or brushes because of the high current density through the small areas of contact surface available.

12. Details of field and armature current, applied voltage, speed and cooling requirements will be promulgated in the relevant A.P.4343 series, Vol. 1 chapter for individual types of machine. Where such information is

not available, the machine should be run at a speed approaching the normal maximum and blast cooling should not be applied except where the temperature of the machine is likely to reach 100°C.

13. The load applied to generators being driven on a test bench should be light initially and should be increased progressively as the brushes become bedded until the machine will accept normal loading without excessive sparking. Prolonged running on light load should be avoided since this practice causes glazing of brush and commutator surfaces to the detriment of subsequent operation.

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