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STANDARD ADJUSTMENT INSTRUCTION
FOR
UNISELECTOR. MOTOR DRIVEN P.O. NO. 2.

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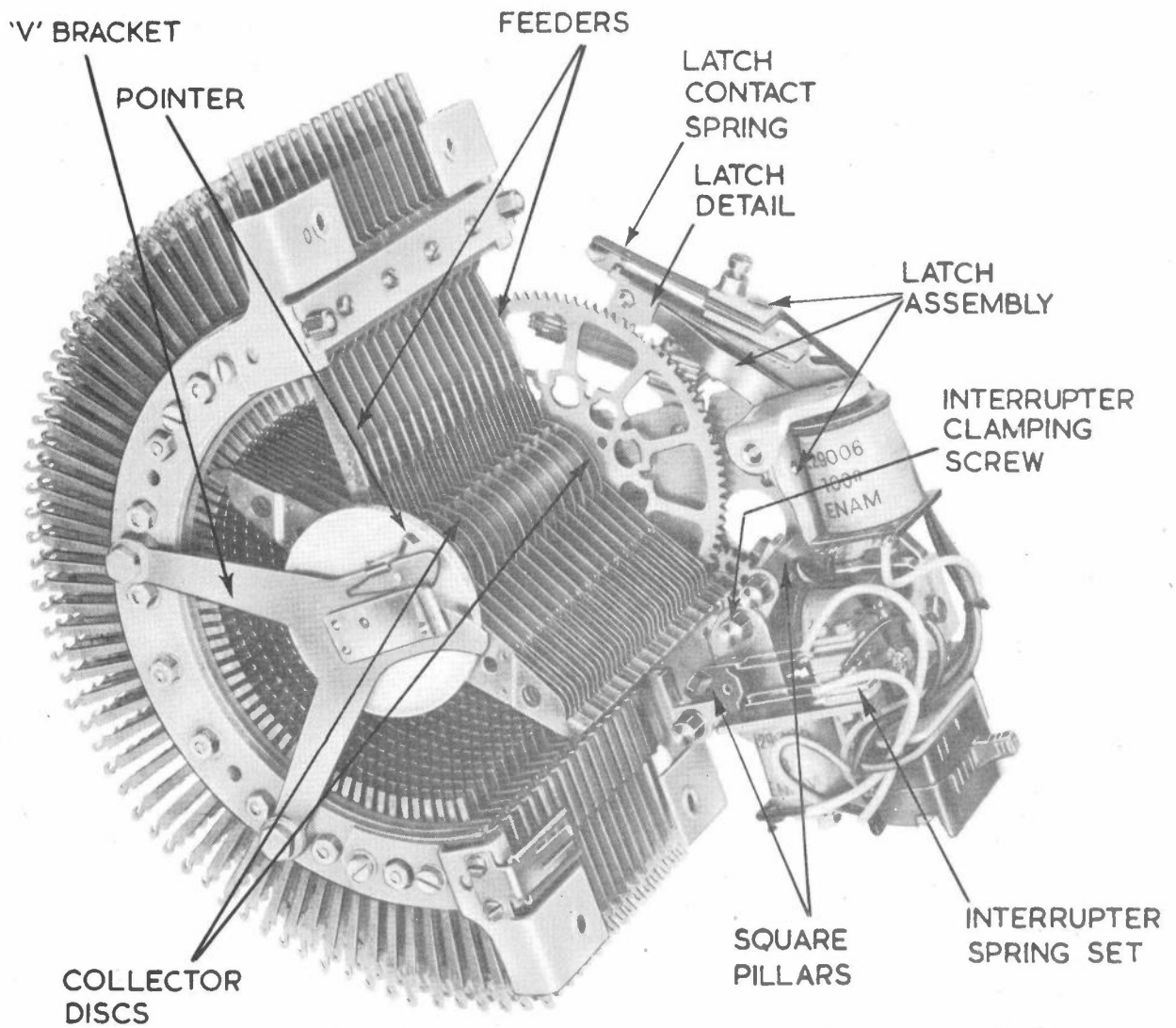


FIGURE I. UNISELECTOR COMPLETE.

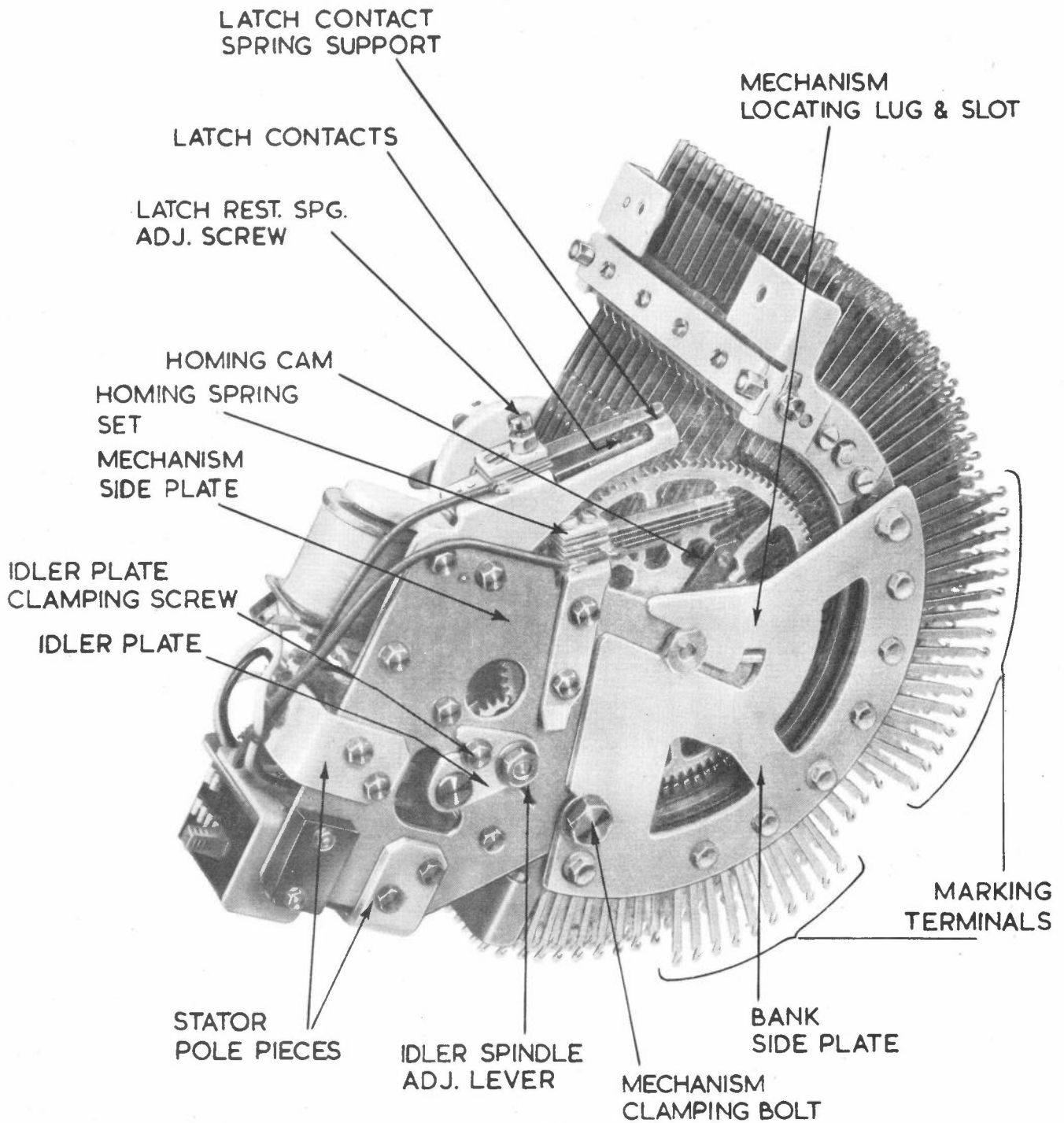


FIGURE 2. UNISELECTOR COMPLETE.

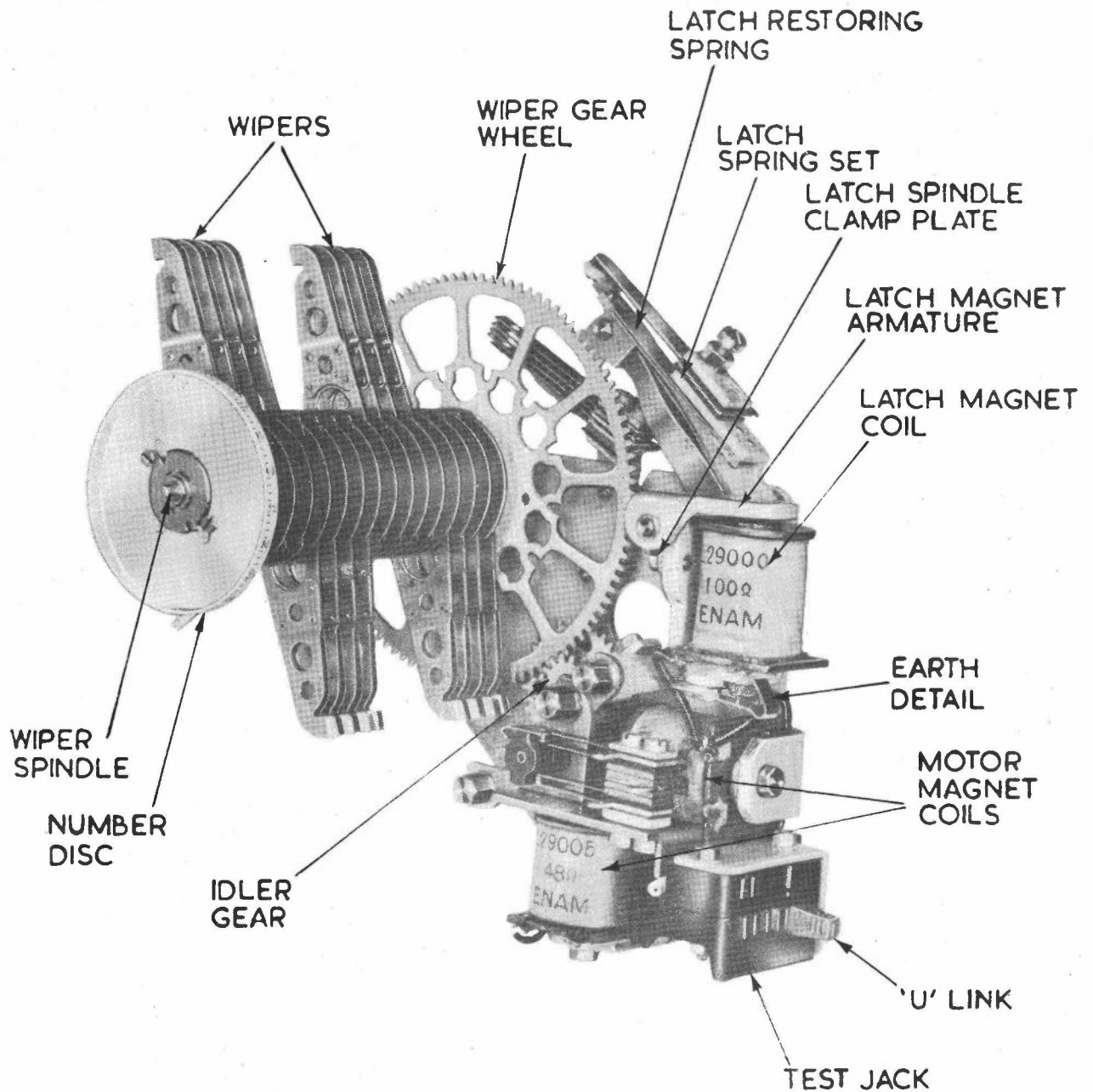


FIGURE 3. UNISELECTOR WIPER ASSEMBLY AND MOTOR.

STANDARD ADJUSTMENT INSTRUCTION

FOR

UNISELECTOR MOTOR DRIVEN P.O. No. 2.

1. GENERAL.

The major proportion of maintenance can be done without removing the mechanism from its bank. If it is found necessary to remove it, however, the external wire form need not necessarily be detached.

2. MECHANISM - REMOVAL FROM BANK.

2a. Remove the green link from T5 & T6 in the test jack and place it in T7 & T8. Loosen the mechanism clamping bolt with L14519. Operate the latch armature manually with the right hand while performing the following operations in the order named:-

2b. Position the wiper tips opposite the rotor.

2c. Gently swing the mechanism upwards so far as it will go.

2d. Press the 'V' bracket outwards until it clears the end of the wiper spindle.

2e. Withdraw the mechanism horizontally and with the left hand slip the outrigger L14521 or 2 into position as follows:-

The slots in the four corners of its base register with the bank fixing lugs.
Position the upper end first; lift upwards; then position the lower end and lower it, then jack the mechanism into the outrigger side plate.

2f. The outrigger can be employed as a bench fixture, if the mechanism is disconnected and removed from the rack.

3. MECHANISM - REPLACEMENT INTO BANK.

3a. Position the wiper tips opposite the latch detail. Hold the mechanism with the right hand, forefinger through the large hole in the side plate and thumb on the latch magnet; insert the side plate lug into the horizontal slot in the bank side plate, keeping the lug hard down against the lower edge of the slot. Gently push the mechanism into the bank aligning the free end of the wiper spindle with the slot in the 'V' bracket, observe that the wipers are central to their feeders and finally see that the 'V' bracket bearing engages the end of the spindle. Swing the mechanism downwards until the front edge of the side plate is nearly vertical.

3. MECHANISM - REPLACEMENT INTO BANK (Cont'd.)

- 3b. If a Homing Spring Set is fitted, operate the latch and turn the wiper assembly until the spring set is operated (i.e. the lowermost pair of contacts are broken) and release the latch. Swing the mechanism downwards until the wipers take up a position one third to two thirds of the contact width on the first row of contacts. Tighten the clamping bolt.
- 3c. If no Homing Spring Set is fitted, swing the mechanism right home; operate the latch, turn the wipers to a position so that when the latch is released the wiper tips are not less than half way on the first row of contacts.

NOTE:- They may be anywhere between half way on the first row and just on the second.

- 3d. If the tips have not left the first row of contacts they should be correctly positioned by gently swinging the mechanism upwards. The trailing edges of all wipers shall rest on the contacts within the limits of $1/3$ to $2/3$ of the width of the contacts, checked on contacts 1, 26 & 51.
- 3e. If the tips have left the first row of contacts, operate the latch and move the mechanism upwards so that the latch can be released into the next tooth. Now position the tips on the second row of contacts as described in paragraph (d).
- 3f. Finally check that when wipers are standing on the first row of contacts, "1" on the number ring is in alignment with the pointer. Set the pointer if necessary.

BANK.

SPECIAL NOTE:-

The 'V' bracket and the bank side plate are jig set in the factory and the screws fixing them to the bank should not be disturbed.

4. FEEDERS - ADJUSTMENT.

- 4a. Set the feeder springs straight and in alignment with their associated collector discs, using a pair of flat nosed pliers.
- 4b. The tip of each brush shall lie flat on the collector disc and shall lift from the disc with a pressure of 50 grammes applied to the vertical portion of the brush tip immediately above the part engaging the collector disc, and not with a pressure of 20 grammes.
- 4c. When the wipers are resting on the 51st row of contacts, the clearance between the brushes and the associated wipers shall not be less than .010" (0,25 mm) and that between the brushes and adjacent wiper shall not be less than .030" (0,76 mm).

5. 'V' BRACKET - SETTING.

- 5a. Check that the 'V' bracket exerts pressure on the shoulder of the wiper spindle when the mechanism is in its bank.
- 5b. If this condition is not met, the mechanism must be removed and the 'V' bracket set inwards. After setting, check that the 'V' bracket does not foul the end of the wiper spindle when offering the mechanism to its bank.

MECHANISM.

SPECIAL NOTE:- The square pillars are jig set in the factory and the screws fixing them to the side plate should not be disturbed.

6. MOTOR MAGNET TO ROTOR - AIR GAPS.

- 6a. Should it be necessary for any reason to adjust the magnet to rotor air gap the following procedure should be adopted.
- 6b. With spanner L.14524 loosen the two long headed hexagon screws holding the interrupter stirrup to the square pillars. Slide the interrupter out of position. Remove the rotor, slightly loosen the four pole piece fixing screws and slide each magnet assembly away from the rotor axis.
- 6c. Insert L.14517 over the rotor spindle. Slide each magnet assembly back again until its pole face bears lightly against the tool. Tighten the pole piece fixing screws and remove the tool which should come away with reasonable ease. When replacing the interrupter stirrup, apply firm pressure at its mid point towards the wiper spindle whilst tightening the fixing screws.

7. GEAR MESH - ADJUSTMENT.

- 7a. Check that the gear train runs freely.
- 7b. There is, however, a maximum amount of backlash permissible in the gear train which is to be measured as under:-
 - 7b.1 With the latch in the main gear wheel, the rotor must not be free to rotate by an amount exceeding one quarter the width of a main pole.
 - 7c. If the backlash exceeds the above amount, proceed to re-adjust as follows and in the order stated.
 - 7c.1 Remove the interrupter stirrup.
 - 7c.2 Slightly loosen the fixing screw in the idler plate slot, swing the idler gears away from the wiper gear wheel and temporarily tighten the screw.

7. GEAR MESH - ADJUSTMENT.(Cont'd.)

7c.3 With the smaller end of L.14519 slightly loosen the idler spindle fixing nut and adjust the rotor/idler gear mesh by rotating the adjusting lever beneath the nut until there is just perceptible play between the two wheels in every meshing position. In no position must the play be zero but it shall be no more than sufficient to allow smooth and easy running of the two wheels. Hold the lever in the set position and tighten the cap nut.

7c.4 Loosen the idler plate clamping screw and adjust the idler/wiper gear mesh by swinging the idler plate towards the wiper gear wheel. Position the idler plate so that a similar degree of backlash, as above, is obtained and so that the rotor can be slipped into a meshing position where one of its mainpoles aligns with one of the magnet poles and secure the idler plate fixing screw. Operate the latch armature manually and test the gears for smooth running.

7c.5 Put the rotor in its correct working position by temporarily unmeshing it and moving it anti-clockwise two gear teeth positions and replace the interrupter stirrup as described under (6c) above.

8. INTERRUPTER SPRING SET ADJUSTMENTS.

8a. The inner spring of each contact unit shall bear lightly on the hub of the cam. The springs shall lift from the cam with a pressure of 20 grammes at the 'V' set in the spring. The tension may be more conveniently checked with mechanisms mounted on the rack by applying the equivalent pressure of 23 grammes at the contact.

8b. The outer spring tension shall result in a contact pressure of 35 plus and minus 10 grammes, measured at the contact.

8c. The contact clearance shall be 8 to 14 mils (0,20 mm to 0,35 mm).

8d. There shall be perceptible end play in the rotor limited by the position of the interrupter spring set. The play shall not be sufficient to permit the rotor pinion to disengage with the idler gear. The lug on the lower spring shall clear the bracket.

8. INTERRUPTER SPRING SET ADJUSTMENTS(Cont'd.)

- 8e. The speed of the motor can be varied by loosening the interrupter clamping screw that clamps the interrupter spring mounting bracket to the stirrup and then swinging the bracket about the centre of the motor. Swing the bracket in an anti-clockwise direction to advance the interrupter and in clockwise direction to retard it.

9. LATCH ARMATURE TO POLEPIECE - SETTING.

- 9a. Check that the gap between the armature and the pole piece does not exceed 3 mils(0,08 mm) when the latch is manually operated, i.e. it shall be impossible to insert a 4 mil(0,1 mm) gauge half an inch(12,7 mm) wide.
- 9b. If this condition is not met, loosen the two screws holding the spindle clamp, hold the armature firmly operated and re-tighten the screws.

NOTE: It may be necessary, in addition, to slacken off the screws clamping the latch magnet yoke to the side plate.

10. LATCH ARMATURE TRAVEL

- 10a. Check that when the latch is fully operated there is only a sufficient clearance between the crest of the latch teeth and the crests of the teeth on the large gear to prevent fouling when the wiper assembly is turned through one revolution. The clearance shall not exceed 12 mils.(0,3 mm)
- 10b. If this condition is not met, loosen the lower and rear fixing screws of the three screws fixing the latch assembly to the side plate using spanner L.14524 and set the latch detail to rest on the crest of a tooth on the wiper gear wheel. With the latch armature fully operated, slightly loosen the remaining fixing screw and move the latch assembly in the direction required to produce the minimum clearance between the latch and the tooth on the wiper gear wheel. This operation will be facilitated if the spanner is kept in position on the head of the remaining fixing screw and used to keep this screw fairly tight.
- 10c. Check that a clearance is maintained when the wiper assembly is turned through one revolution.

11. LATCH SPRING SET ADJUSTMENTS

- 11a. Check that the contacts make when the armature is closed on to a 7 mil(0,18 mm) feeler inserted in the armature air gap.
- 11a.1 The contacts must not make when a 13 mil(0,33 mm) feeler is inserted.
- 11b. The pressure of the contact spring should be 150 grms. min., 250 grms. max., measured behind the stud against the stud.
- 11c. If these conditions are not met, re-adjust the position of the latch contact spring support by bending with L14523, so that the contacts make when the armature is closed on to a 9 mil(0,23 mm) feeler inserted in the armature air gap.
- 11c.1 The contacts must not make when an 11 mil(0,28 mm) feeler is inserted.
- 11d. Tension the contact spring to exert a pressure on the ebonite stud of 180 grms. min., 220 grms. max., measured between the stud and the contact, against the stud.

12. LATCH RESTORING SPRING PRESSURE ADJUSTMENT.

NOTE:- When making the following tests the exchange voltage must be between 48 and 52. The earth detail should not be held in contact with the coil tag any longer than is necessary.

- 12a. Withdraw the green link if it is in the live B.C.O. Jack position and replace it by the "operate" end of Test Plug L.14530. Press the latch earth detail into contact with the coil tag on the latch magnet when the latch should operate to the full extent of its travel. It is not necessary that the motor should drive during this test.
- 12b. Check that the latch restoring spring pressure is not less than 440 grammes measured at the tip.

12. LATCH RESTORING SPRING PRESSURE ADJUSTMENT(Cont'd.)

12c. If the above conditions are not met, loosen the locking nut on the cheese head screw in the latch contact assembly, rotate the screw to increase or decrease pressure as required, re-tighten the nut and re-test.

13. HOMING SPRING SET ADJUSTMENTS

NOTE:- The spring numbers used below follow the order of build up from the bracket.

13a. Measure the spring pressures at the tips of the springs.

13b. When checking the adjustments see that the cam is clear of the spring set.

13c. The pressures specified are for individual springs and any springs bearing on the spring measured must be lifted clear when measuring pressures.

13d. Check that the Homing Spring Set complies with the following:-

13d.1 Spring No.1 should lift off the buffer tip with 16 grms. but not with 8 grms.

13d.2 Spring No.2 should break contact with 16 grms. but not with 8 grms.

13d.3 The insulating stud on Spring No.3 should lift from Spring No.2 with approx. 10 grms. i.e. shall lift with 11 grammes and not with 5 grammes.

13d.4 The metal stud on Spring No.4 should lift from Spring No.1 with 16 grms. but not with 8 grms.

13d.5 The contact opening between Springs Nos. 3 & 4 should be 5 mils minimum, 15 mils maximum (0,13 - 0,38 mm)

13e. If the above conditions are not met, proceed to re-adjust as described below. The adjustments may be effected on or off the mechanism. If the springset is not removed, see that the cam is clear of the spring set.

13e.1 Tension the springs with small flat nose pliers or L14509.

13e.2 Twin contacts must make and break approximately simultaneously as judged by eye.

13e.3 Tension Spring No.1 to lift off its buffer with 14 grms. but not with 10 grms.

13e.4 Tension Spring No.2 to break contact with 14 grms. but not with 10 grms.

13e.5 Tension Spring No.3 so that its insulating stud lifts off Spring No.2 with 10 grms. but not with 6 grms.

13. HOMING SPRING SET ADJUSTMENTS(Cont'd.)

- 13e.6 Adjust the contact opening between Springs No.3 and 4 to 8 mils mins., 14 mils.max(0,2 - 0,35 mm)
- 13e.7 Tension Spring No.4 so that its metal stud lifts off Spring No.1 with 14 grms. but not with 10 grms.

14. HOMING SPRING SET - POSITIONING OF -

- 14a. Check that the following conditions are met:-
 - 14a.1 The Homing Cam must be well down in the slot in the wiper gear and the fixing screw must be tight.
 - 14a.2 By manual operation of the wiper assembly, check that the spring set operates at the instant the wipers leave the 50th bank contact and restores when the wipers leave the 51st contacts.
- 14b. If condition 14a.2 above is not met, proceed to readjust as follows:-
 - 14b.1 Set the wiper gear wheel so that the latch tooth nearest the magnet rests centrally on the crest of a tooth on the gear wheel when the wipers are half a step past the 50th position.
 - 14b.2 This condition is easily obtained by rotating the wipers backwards from the 51st row of contacts so that their tips are pressed against the front edge of the 50th row of bank contacts.
 - 14b.3 Then with the edge of the projection on Spring No.1 in engagement with the back or radial edge of the cam, position the spring set bracket so that there is a clearance between the brass stud and the ebonite stud of 2 mils.min., 5 mils.max.(0,05 - 0,13 mm.)
 - 14b.4 The side of the cam must not touch the springs.
 - 14b.5 The cam must completely disengage the springs when the wipers are advanced from bank contact No.51 one step.

15. WIPERS - ADJUSTMENT

- 15a. When measuring wiper pressures the gauge is to be applied at the heel of the wiper opposite the centre of the contact surface.
- 15b. Check that the wipers meet the following conditions:-

The wiper tips should bear on the contacts with a pressure of 35 grms.max. 15 grms. min. and should lie approximately flat on the contacts.

15. WIPERS - ADJUSTMENT. (Cont'd.)

- 15c. If the above conditions are not met, proceed to re-adjust as follows:-
- 15c.1 Line the wiper tips up with the bank levels by inserting L14520 at the base of the wiper limb, bending as required.
- 15c.2 Tension so that the tips bear on the contacts with a pressure of 30 grms. max., 20 grms.min. with flat nosed pliers.
- 15c.3 The wiper heels must be approximately parallel and square to the spindle. When out of the bank, the gap between the heels of the wipers shall not exceed .1 inch (2,54 mm).
- 15c.4 After adjusting pressures see that the wiper tips lie approximately flat on the bank contacts.
- 15c.5 If this condition is not met, make slight readjustments at the ends of the wipers.
- 15c.6 The wipers shall enter and leave the bank with a minimum of side movement. In no case shall this side movement exceed the thickness of a bank contact i.e. 24 mils(0,61 mm) as judged by eye.
- 15c.7 The tails of single ended wipers should be straight and at right angles to the spindle.

16. B.C.O. JACK.

Check that the green link enters and leaves the jack without jamming and that it is held firmly when in the live position.

17. SPEED ADJUSTMENT

- 17a. Where not more than 8 wipers are in the bank at the same time check that the speed is between 200 and 230 steps per second. In all other cases the speed shall be between 170 and 230 steps per second.
- 17b. The method used to measure the speed of a mechanism is to time a certain number of revolutions with a stop watch.
- 17c. Start the mechanism running by pressing the latch earth detail against the coil tag of the latch magnet and measure the time taken for 10 complete revolutions of the wiper assembly. Then the speed in steps per second is $\frac{1040}{\text{seconds}}$
- 17d. Where re-adjustment is necessary, the speed is adjusted by loosening the hexagon head screw in the interrupter stirrup and moving the interrupter mounting bracket upwards to increase the speed or downwards to decrease the speed.

17. SPEED ADJUSTMENT (Cont'd.)

17e. Position the interrupter to provide a speed approximating to the mean requirement.

18. LUBRICATION

18a. The lubricants which are to be used are:-

18a.1 "Oildag".

18a.2 P.O. Oil Bearing No.16 A.T. & E. Co. Spec. S.2497

18b. The following points are to be lubricated in the manner described.

18c. Rotor - Remove the rotor. Apply a smear of Oildag to the faces of the cam, to the pinion face and teeth & oil the rotor spindle. Re-assemble the rotor so that one of its pole faces is embraced by a magnet pole, then temporarily disengage it and rotate it anti-clockwise through two gear teeth. See that the lubricating wick in the spindle does not protrude.

18d. Idler Spindle. Apply oil to the end of the spindle.

18e. Latch Assembly. - A trace of oil to each armature bearing.

18f. Homing Cam - A smear of "Oildag" to the tip.

18g. Bank and Feeders.

Lubricate by passing a small camel-hair brush soaked in oil, laterally across the upper rows of bank contacts several times. With the remainder of the oil on the brush, lubricate the surface of the collector discs in the track of the feeders. The switch should then be run to distribute the oil. This should be done on site before running the switches.

18h. Wiper Gear Teeth - A trace of "Oildag" in the teeth.

18j. Wiper Spindle - A little oil to the bearing at each end of the assembly. To obtain access to the bearing at the number ring end. The 'V' bracket should be sprung outwards slightly.

18k. Latch Arm - A trace of "Oildag" between the restoring spring and the latch detail, also, a trace under the tip of the tensioning screw.

18. LUBRICATION (contd.)

The frequency of lubrication cannot be specified definitely, since it depends upon the degree of loading and atmospheric conditions.

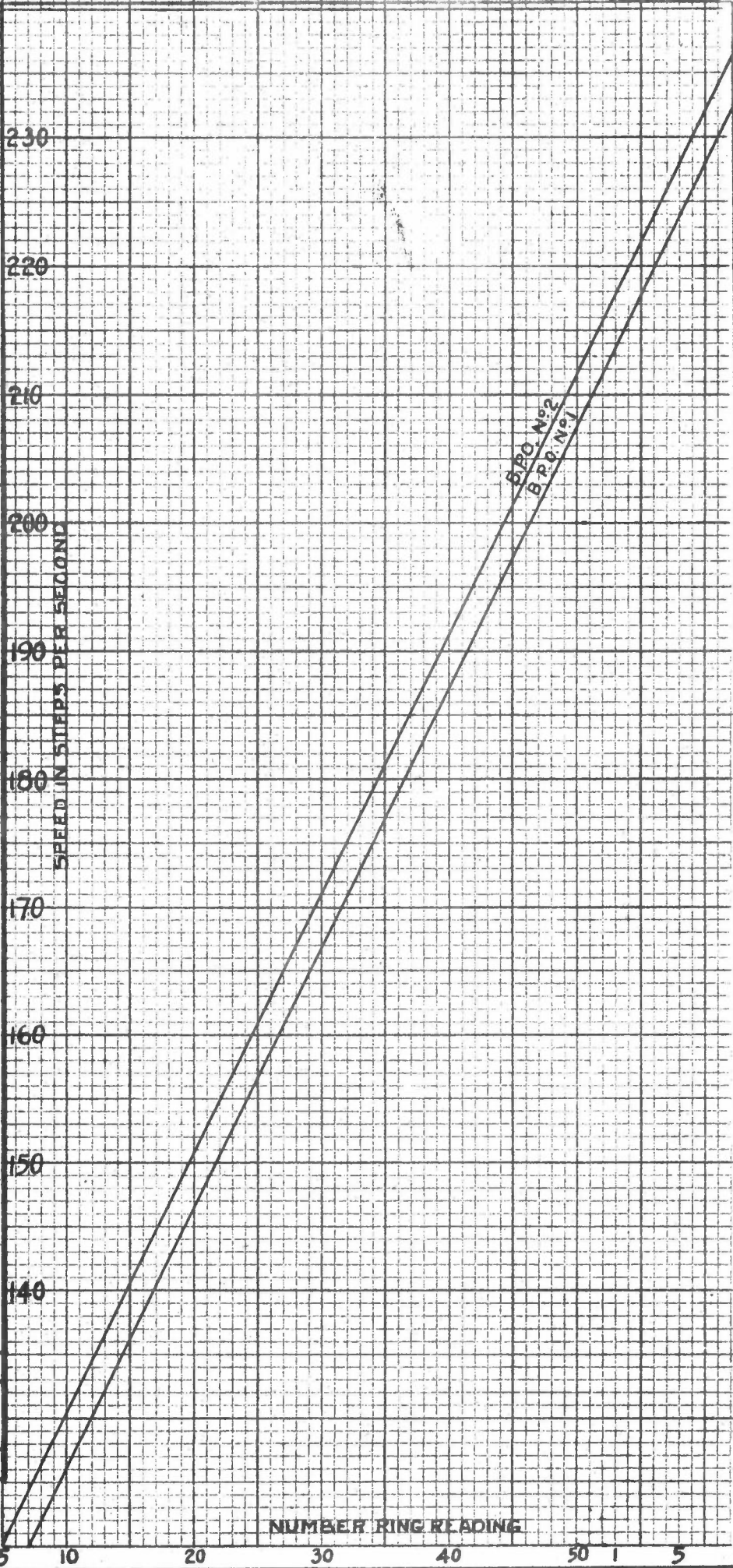
In general, however, the items 18c to 18g should be lubricated every 4 to 6 months and items 18h to 18k every 12 months.

Whilst it is important to avoid excessive lubrication any obvious case of slow or harsh running should be attended to without delay.

LIST OF SPECIAL TOOLS.

L14519	Spanner for Mechanism fixing bolt.
L14744	16 Level)
L14745	8 Level) Outrigger
L14524	4 BA Spanner
L14517	Gauge for Locating Stator Coils
L14509	Spring adjuster for Homing and Interrupter Spring Sets.
L14523	Bonder for Latch contact spring support.
L14518	Spanner for Latch fixing screws.
L14520	Wiper spring adjuster.
L14530	Test plug for latch operate.

ISSUE	APP.
REDRAWN	<i>[Signature]</i>
2	17.4.52



APPROVED

R.R.R.

DRAWN

[Signature] 17.4.52

MOTOR-UNISELECTOR SPEED CHART
 FOR USE WITH MOTOR UNISELECTOR TEST SET TA40211

AS 240

A.T.&E. CO LTD
 LIVERPOOL.