

UNISELECTOR PO TYPE 2

Maintenance Adjustment Instruction

[This Instruction has been re-issued in the correct format and to improve the quality of illustrations. Textual changes are minor and therefore no paragraphs have been starred.]

1 INTRODUCTION This Instruction details the maintenance adjustments of the PO Unselector Type 2, which is used on apparatus other than subscribers' line equipment.

The unselector is available in three sizes, which vary, basically, in the width of the frame and wiper assembly. On the largest size mechanism the wiper locating screw and clamp is positioned adjacent to the ratchet wheel and a hole is provided for lubricating the spindle.

On unselectors of later design the brushes are of the self-feed type.

Adjustments which do not involve alignment of the mechanism to the bank and brushes may be performed with the mechanism mounted on an Outtrigger No. 2.

The unselectors can be obtained to provide 25 or 50 outlets. Unselectors of the 25-outlet type have double-ended wipers; in one revolution each end of the wipers sweeps over the same level of 25 bank contacts. Unselectors with 50 outlets have single-ended wipers and by coupling two adjacent and opposite wipers, each wiper will, in turn, sweep over 25 bank contacts, thus providing an availability of 50 bank contacts per revolution.

General views of the unselector, showing the names of the parts, are given in Figs 1 and 2.

2 CONTENTS

MECHANISM ADJUSTMENTS	PAR
ADJUSTMENT TOLERANCES	3
REMOVING MECHANISM FROM BANK	4
ADJUSTMENT OF BRUSHES	5
REPLACING MECHANISM IN BANK	6
BRUSH TENSION	7
ARMATURE KNIFE-EDGE	8
DETENT	9
ARMATURE BACK-STOP	10
PAWL-SPRING TENSION	11
PAWL STOP	12
STEPPING TEST	13
LOCATION OF NON-BRIDGING WIPERS ON BANK CONTACTS	14
POSITION OF BRIDGING WIPERS	15
ADJUSTMENT OF WIPERS	16
ARMATURE-RESTORING SPRINGS	17
INTERRUPTER SPRINGS	18
ROCKER ADJUSTMENT	19
RUNNING TESTS	20
POSITION OF POINTER	21

MISCELLANEOUS

PAR

DISMANTLING	22
ASSEMBLING	23
LUBRICATION	24
PIECE PARTS	25
PRECAUTIONS WHEN RETURNING UNISELECTORS TO STORES	26
TOOLS	27

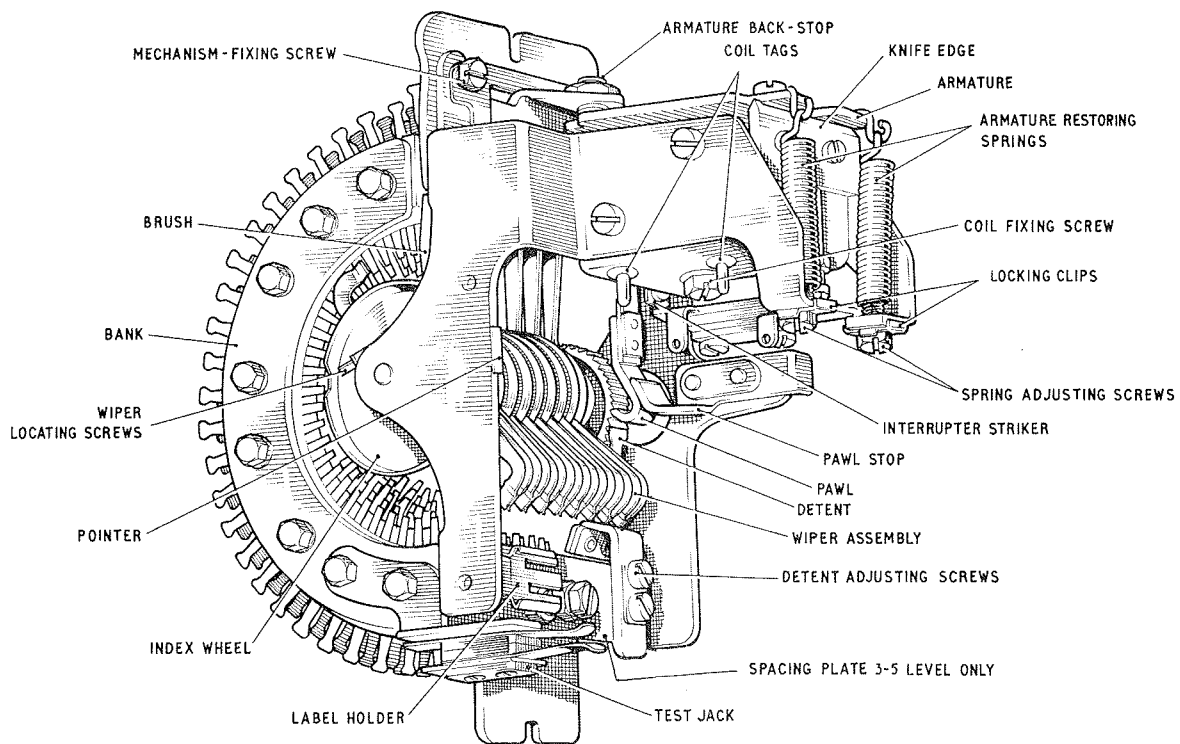


FIG. 1

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Fig 2 Follows

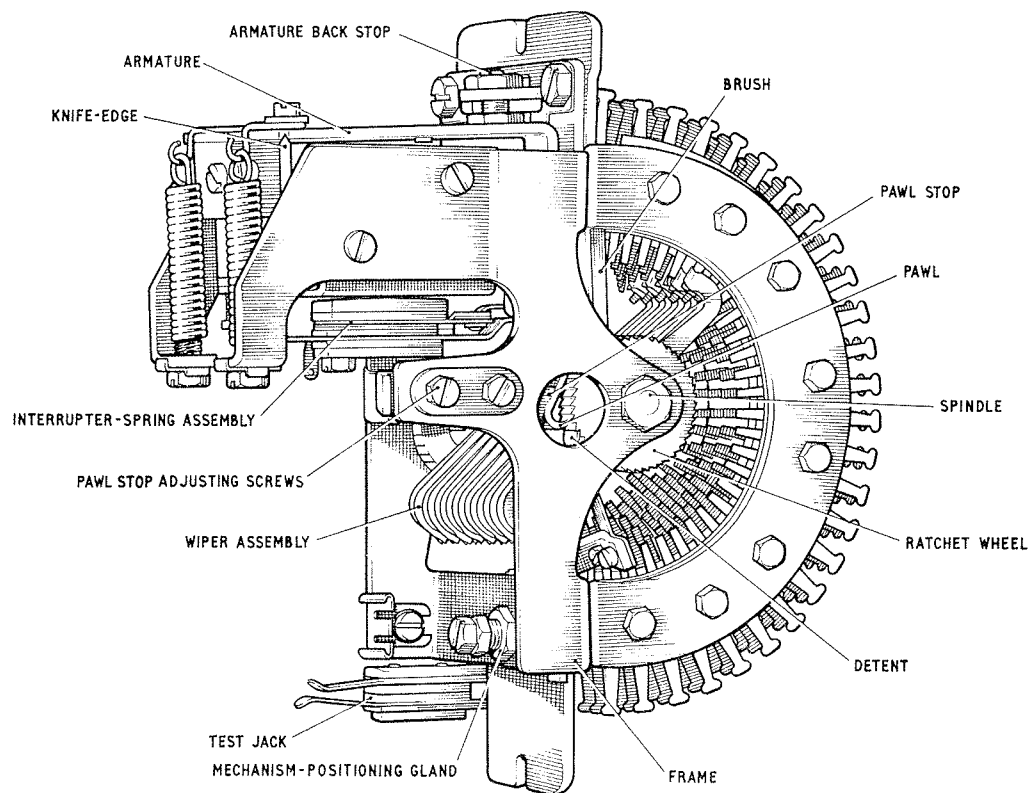


FIG. 2

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MECHANISM ADJUSTMENTS

3 ADJUSTMENT TOLERANCES The terms 'test' and 'readjust' values used in this Instruction are defined in H5100.

4 REMOVING MECHANISM FROM BANK To avoid any possibility of the wipers fouling the bank and brushes, set the wipers on the lower half of the bank between contacts 15 and 25. Then withdraw the two upper mechanism-fixing screws; grip the mechanism with one hand, remove the bottom fixing screw with the other hand, and withdraw the mechanism (see Fig 3).

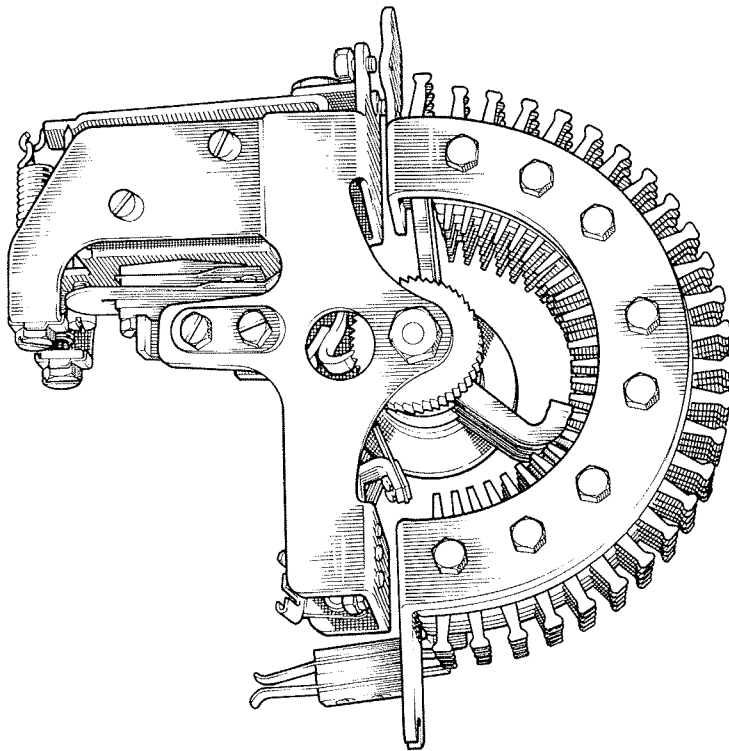


FIG. 3

E6 H5170

5 ADJUSTMENT OF BRUSHES

5.1 Non-self-feed Type The two springs of each brush should lie flat against each other from their base to a point $\frac{1}{2}$ in from the tips. From this point, set the tips of the two springs outwards so that there is a space of $\frac{1}{16}$ in to $\frac{1}{4}$ in between the tips (see Fig 4).

5.2 Self-feed Type The tips of the two springs of each brush should be set outwards so that there is a space of not less than $\frac{1}{8}$ in between their tips and so that the springs of adjacent brushes do not touch (see Fig 5). The splay of the springs should be as even as possible.

Figs 4 and 5 follow

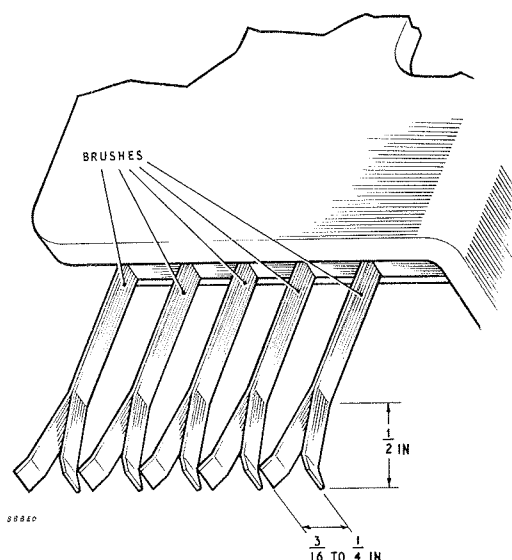


FIG. 4.

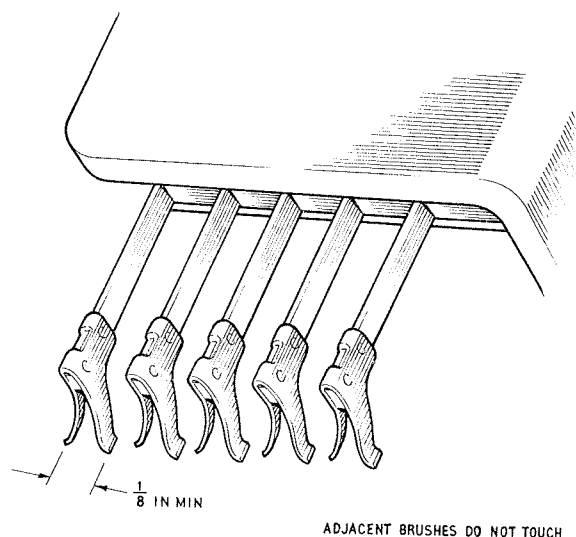


FIG. 5

6 REPLACING MECHANISM IN BANK

6.1 Non-self-feed Brushes Place the locating comb over the brushes at a point above the set in the spring (see Fig 6). Slide the comb downwards until the tips of each pair of springs have been compressed (see Fig 7) and then slide the comb upwards until its reduced rib is inserted behind the bank frame (see Fig 8).

Set the wipers at a position between 3 and 5, as shown by the index wheel. Pass the heels of each pair of wipers through their respective slots in the comb (see Fig 9) and move upwards to engage with the first bank contacts (see Fig 10), then push the mechanism well home on the bank. Engage the mechanism-fixing screws. Then release and remove the comb. Tighten the mechanism-fixing screws securely by means of a box spanner.

Do not attempt to replace the mechanism without fitting a locating comb over the brushes.

6.2 Self-feed Brushes Set the wipers on position 1, as shown by the index wheel. Hold the mechanism at an angle of approximately 30° to the bank, with the upper edge of the frame touching the bank. Align the upper mechanism-fixing screws with the holes in the bank. Using the upper edge of the frame as a pivot, guide the wiper tips between the brushes on to the bank contacts, ensuring that the heels of the brushes enter the collector rings (see Fig 11). Press the mechanism gently but firmly home. A certain amount of resistance will be met during this movement as the brushes are compressed. Engage the mechanism-fixing screws and tighten by means of a box spanner.

Figs 6-11 follow

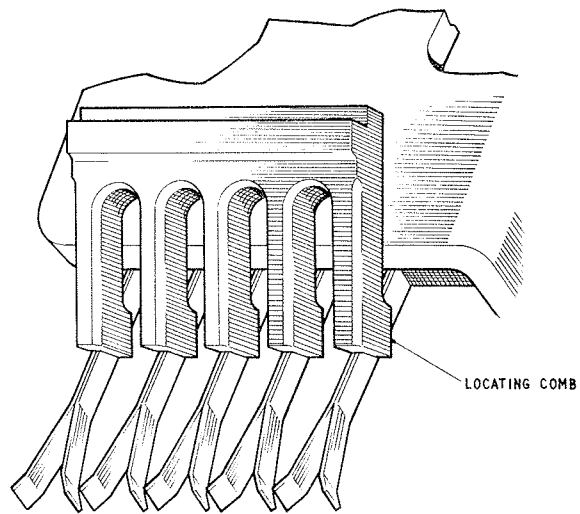


FIG. 6

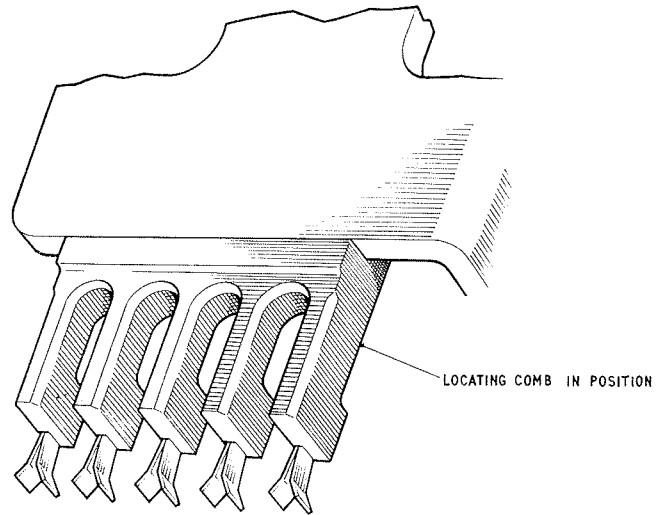


FIG. 8

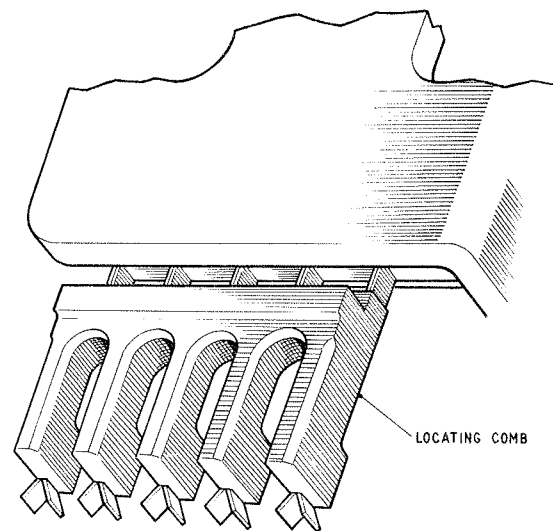


FIG. 7

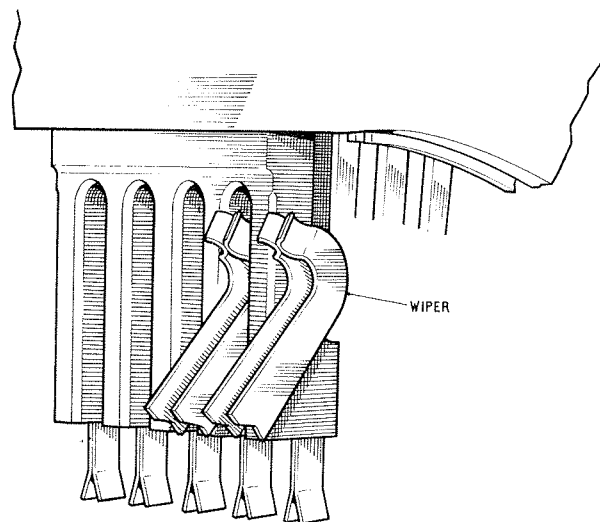


FIG. 9

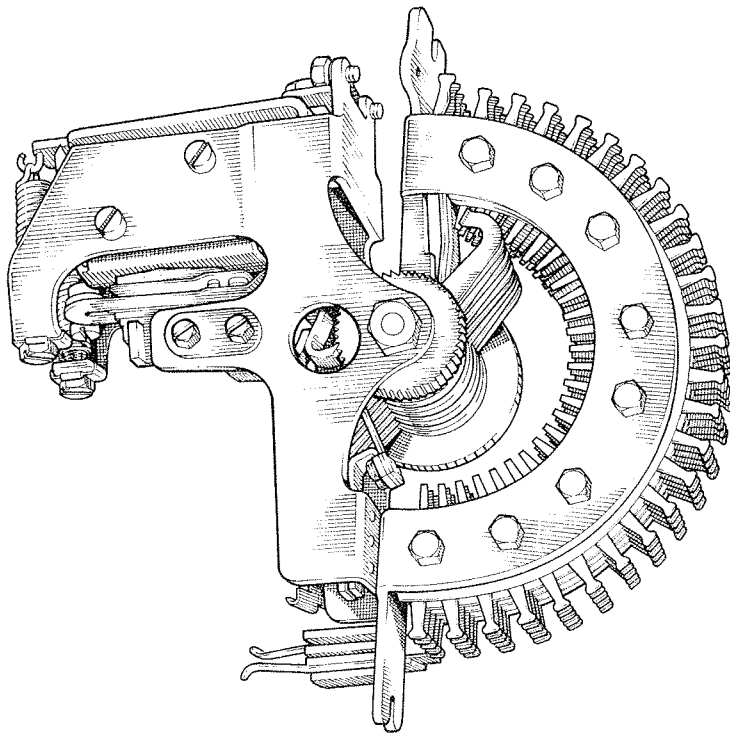


FIG. 10

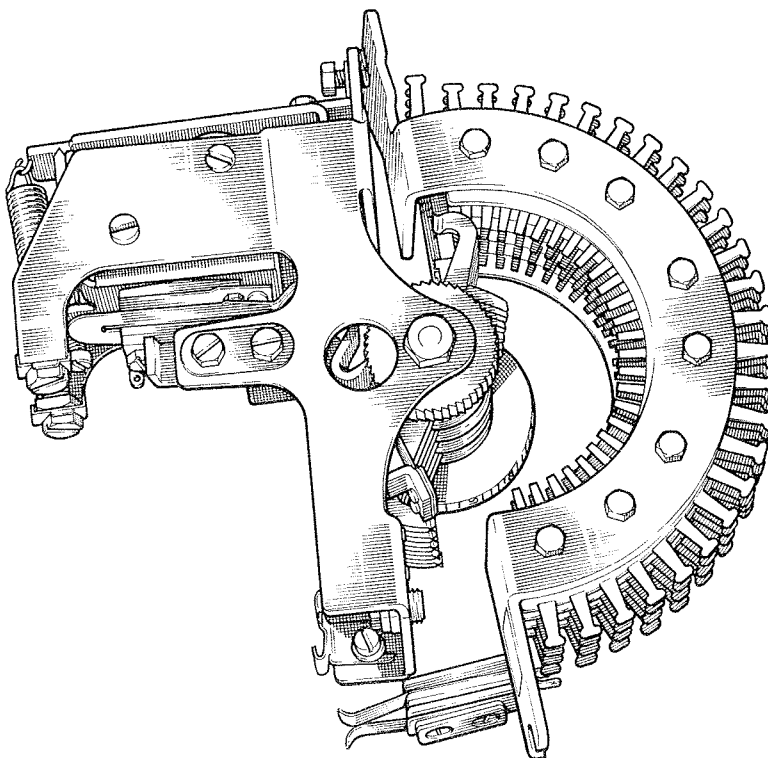


FIG. 11

7 BRUSH SPRING TENSION

7.1 Non-self-feed Type The tension of each spring on its collector ring should be 40 ± 20 gm (test) 40 ± 15 gm (readjust), measured as near to the tip as possible (see Fig 12).

To increase the tension of a brush, remove the mechanism from the bank and reset the springs [see par 5.1].

To decrease the tension use an Adjuster, Spring, No. 9 to lever the particular spring gently away from the collector ring as shown in Fig 13.

7.2 Self-feed Type No adjustment is necessary.

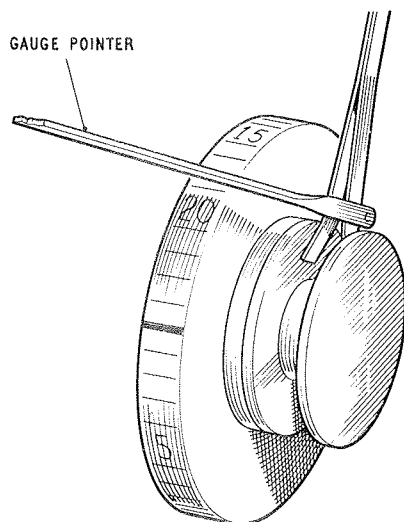


FIG. 12

BAAPB

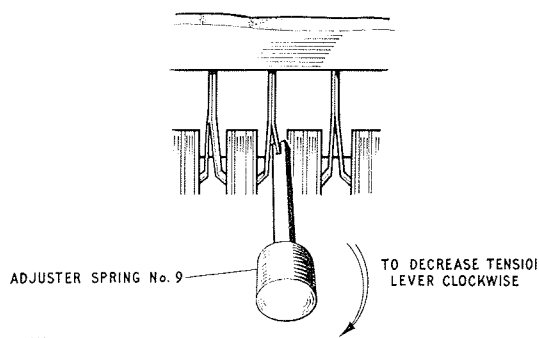


FIG. 13

8 ARMATURE KNIFE-EDGE Position this by means of its adjusting screw (see Fig 14) so that when the armature is manually operated the following conditions obtain:-

The armature is parallel to the side of the coil box (see Fig 15).

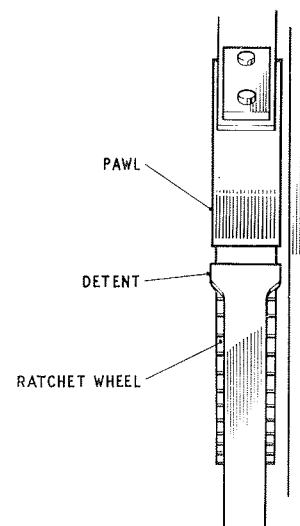
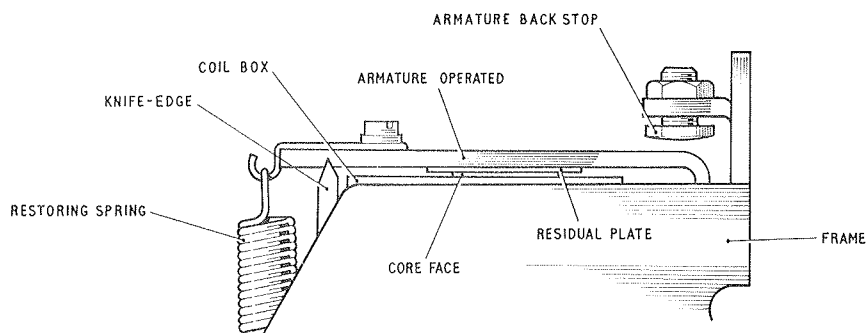
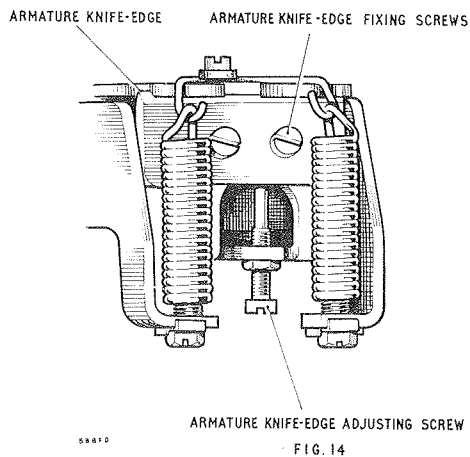
There is a clearance between the sides of the coil box and the armature.

The pawl covers the full width of the ratchet teeth (see Fig 16).

The operating face of the pawl tip is parallel to the short face of the ratchet teeth.

It is permissible to tilt the knife-edge slightly to meet the above conditions.

Figs 14-16 follow



9 DETENT Position the detent so that the tip of the detent covers the full width of the ratchet teeth (see Fig 16). The depth of engagement of the detent in the ratchet teeth should be approximately equal to the thickness of the detent.

9.1 To adjust the detent, insert a 3-mil feeler gauge between the armature and the magnet core and operate the armature electrically. Lightly push the wipers backwards until the operating face of the pawl is resting against the short face of a ratchet tooth. With the wiper assembly held in the position, adjust the detent to rest squarely against the short face of the ratchet tooth, next to the one in which the pawl is resting. When the armature is normal the detent spring should rest in the second tooth from the pawl (see Fig 17).

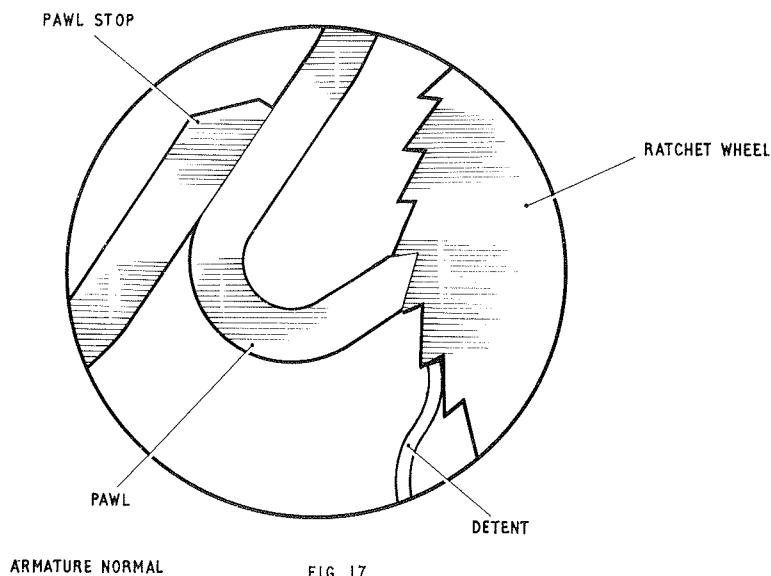
With the detent-fixing screws lightly tightened, fine adjustment may be obtained by inserting the pointed end of an Adjuster, Detent, No. 4 into the hole in the detent and levering the adjuster in the desired direction.

9.2 Tension of the Detent The tension exerted on the ratchet wheel should be 80 ± 30 gm (test) 80 ± 20 gm (readjust), measured as near to the tip as possible. Adjust as follows:-

To reduce the tension ease the detent away from the ratchet wheel using the slotted end of an Adjuster, Detent, No. 4.

To increase the tension remove the detent from the uniselector and, using duck-bill pliers, reset the spring at the root.

When measuring the tension, ensure that the tip of the detent is not binding on the short face of the ratchet tooth.



10 ARMATURE BACK STOP Lubricate the ratchet wheel, pawl stop and armature back stop (see H5137) and then adjust the armature back stop so that, when the armature is released after electrical operation, the detent drops cleanly into the ratchet teeth without allowing any backlash of the wiper assembly. Because of slight manufacturing variations in the ratchet teeth, slight backlash is permissible on some steps but not on all steps.

11 PAWL-SPRING TENSION The tension of the pawl spring should be 200 ± 50 gm (test) 200 ± 30 gm (readjust), measured at the hooked portion of the pawl, with the armature fully operated manually (see Fig 18).

To reduce the tension, apply an Adjuster Spring No. 3 to the root of the spring and, with the armature operated, gently lever the spring outwards.

To increase the tension remove the armature from the unselector and, with the aid of duck-bill pliers, reset the spring from the root.

Fig 18 follows

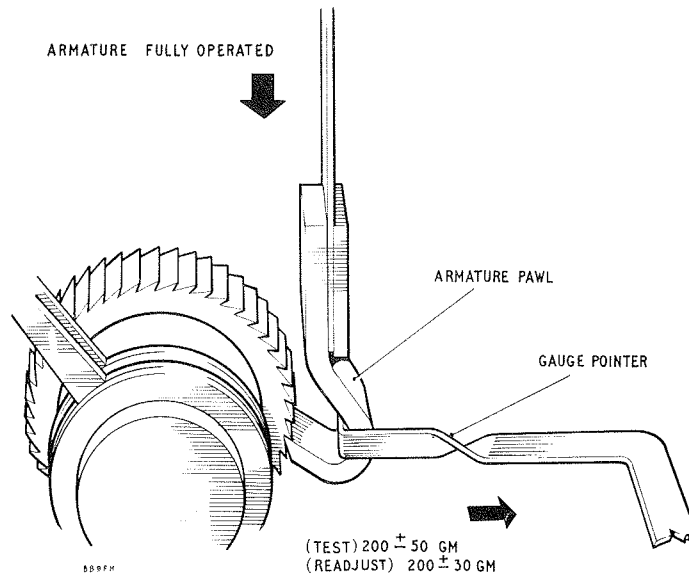


FIG. 18

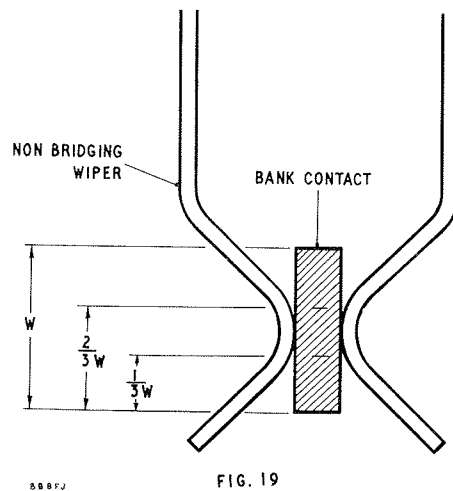
12 PAWL STOP With the armature normal, the pawl should be lightly wedged between the pawl stop and the ratchet wheel. The combined adjustment of the pawl stop and detent should be such that the backward and forward lash in the wiper assembly is only just perceptible on at least one position of the ratchet wheel. The backward and forward lash on any of the remaining positions of the ratchet wheel must not be such that the tips of non-bridging wipers, when lightly moved backwards and forwards, by hand, traverse more than $\frac{1}{3}$ rd the width of a bank contact.

Check by inserting a 5-mil taper feeler gauge between the pawl stop and the pawl and noting that the detent does not drop into the root of the tooth when the armature is manually operated and released. On readjustment the detent should not drop in when a 3-mil feeler gauge is used.

13 STEPPING TEST To check the adjustments described in pars 9-12, insert a 3-mil feeler gauge between the armature and core, operate the armature electrically, and check that the pawl steps over the ratchet teeth. With a 7-mil gauge substituted, the pawl should not step over the ratchet teeth. Check this in at least four positions, approximately equidistant, round the ratchet wheel. These values should be considered as readjust values. The test values for maintenance routing purposes are 2 mils and 8 mils, respectively, and if outside these values the unselector should be readjusted. Recheck that the detent drops cleanly into each tooth of the ratchet wheel when the armature is operated and released by hand.

14 LOCATION OF NON-BRIDGING WIPERS ON BANK CONTACTS The position of the non-bridging wipers on the bank contacts should be such that the radial centre (through the contact portion) rests within the limits of $\frac{1}{3}$ rd and $\frac{2}{3}$ rd of the width of a bank contact (see Fig 19). To adjust the position of the wipers:-

Fig 19 follows



14.1 Move the wipers to the first contact with the wiper locating screw to the front. Using a Spanner, Box, No. 25, loosen the wiper locating screw and move the wiper assembly in the required direction until the wipers rest halfway on the bank contacts. The adjustment can be made by retaining the box spanner over the screw, levering it upwards (or downwards) until the desired position is obtained; then securely tighten the wiper-locating screw.

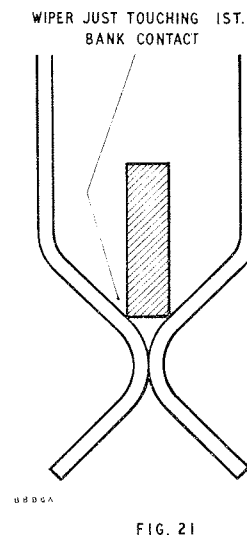
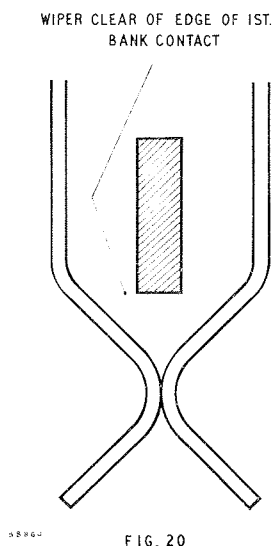
14.2 When uniselectors are mounted close together a Mirror, Inspection, No. 2 should be used to check the position of wipers on the bank contacts. If any difficulty is encountered, the following test will determine whether the wiper-to-bank contact position is correct:-

With the wipers on the last bank contacts, operate the armature and insert a 24-mil gauge (test) 22-mil gauge (readjust) between the armature and armature back stop and allow the armature to restore.

The non-bridging wipers should then be just clear of the leading edge of the first bank contacts (see Fig 20). Check the position of the wipers by deflecting each blade of the wiper outwards, in turn; its partner blade should follow. This condition will be met if follow on one blade only of a pair is obtained.

14.3 With a 14-mil gauge (test) 16-mil gauge (readjust) applied as indicated in 14.2 both partner blades should touch the first bank contact (see Fig 21). Check by deflecting each blade, in turn; the partner blade should *not* follow.

Figs 20 and 21 follow



14.4 Rotate the wiper assembly, by hand, to the 25th bank contact. The non-bridging wipers must now occupy the same relative position on this contact as they occupied on the first bank contact.

This can be checked by operating the armature when the wipers are standing on the 24th bank contact and gauging between the armature and back stop as under 14.2 and 14.3.

If the wipers do not meet the gauging values, adjust the position of the mechanism relative to the bank, by means of the bank-adjusting gland, until the wiper position is correct. Tighten the gland-locking nut and recheck the position of the wipers on the first bank contacts.

15 POSITION OF BRIDGING WIPERS With the wipers standing on the first bank contacts, check that the extreme tips of the opposite ends clear the 25th bank contacts by moving the wiper springs sideways and checking that the flared tips do not touch the bank contacts (see Fig 22).

On a wiper assembly having all bridging wipers, the alignment of the wipers on the bank contacts must ensure that the whole width of the bank contacts is embraced within the wiping surfaces of the wipers (see Fig 22).

Fig 22 follows

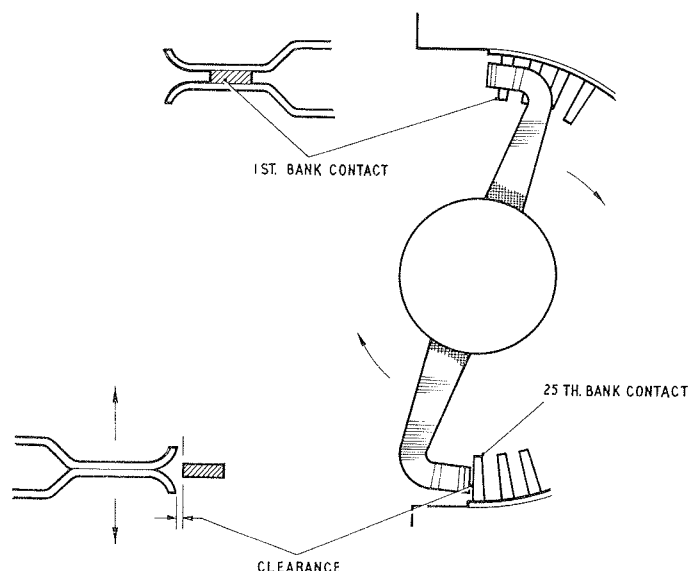


FIG. 22

16 ADJUSTMENT OF WIPERS

16.1 Wiper Entry and Flare When the wipers are standing on the first bank contacts, the opposite ends should be in alignment with the bank levels, so that they will leave the levels without deflecting in either direction more than the thickness of a bank contact.

The adjustment must be made *at both ends* of the wiper assembly. The location of the mechanism must be adjusted by means of the two upper mechanism-fixing screws, so that the wipers enter the bank levels without appreciable side movement.

After adjustment, the mechanism-fixing screws must be securely retightened by means of a box spanner.

16.2 Wiper Tips Adjust the wiper tips so that the two contact points lie as flat as possible upon each other when off the bank contact. There must be no gap perceptible to the eye between the outermost contact points. Between the innermost contact points, however, there may be a gap of 8 mils maximum (test), 4 mils maximum (readjust).

16.3 Wiper Tension When the wipers are standing on the 25th bank contacts, they should exert a pressure of 30 ± 10 gm on the bank contacts. To check this, insert the gauge so that the pointer tip engages a point just in front of angular set of the wiper, and as near as possible at the middle of the wiper blade (see Fig 23). If readjustment is necessary, tension the wipers to exert a pressure of 30 ± 5 gm.

16.4 Clearance Between Wipers and Brushes When the wipers are standing on the 23rd bank contacts and the wiper assembly is moved sideways on the spindle, there should be a minimum clearance of 10 mils between the brushes and the adjacent wipers (see Fig 24).

16.5 Clearance Between Wipers and Adjacent Bank Contacts When the wipers are standing on the 25th bank contacts and the wiper assembly is moved sideways on the spindle, the heels of their opposite ends should not touch the first bank contacts.

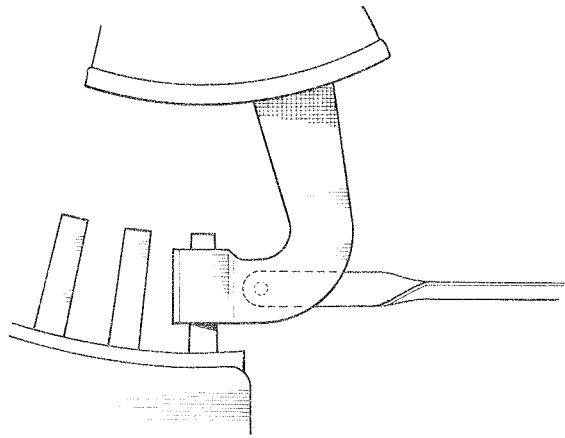


FIG. 23

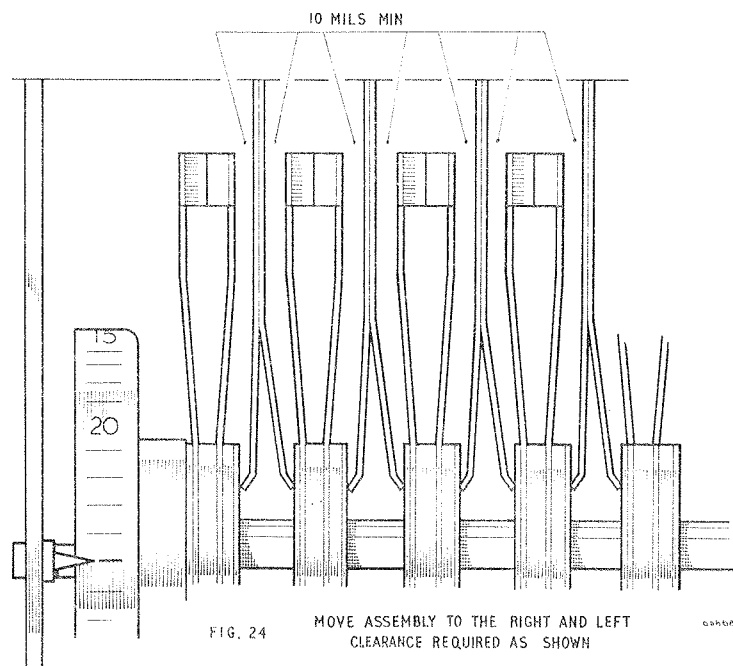


FIG. 24

MOVE ASSEMBLY TO THE RIGHT AND LEFT
CLEARANCE REQUIRED AS SHOWN

17 ARMATURE-RESTORING SPRINGS The tension of the two armature-restoring springs must be evenly distributed, by adjustment of the spring-adjusting screws. The tension must ensure that, when the release of the armature is lightly retarded by hand, the wipers will step positively on to the next bank contacts. Excessive tension must be avoided. Locking clips are provided under the heads of the adjusting screws to prevent loss of tension due to the screws turning in the springs in service. If a screw fails to rise when it is turned, the wings of the clips are probably worn and the clip should be changed.

18 INTERRUPTER-SPRING ASSEMBLY The interrupter-spring assembly is of the rocker type which enables the operate time of the contacts to be varied in relation to the armature travel without changing the contact pressures. The following conditions must be satisfied for correct adjustment:-

With the armature operated, the lever spring must cover the full width of the interrupter striker (see Fig 25).

The contacts must not be out of alignment by more than $\frac{1}{4}$ of the width of a contact (see Fig 26).

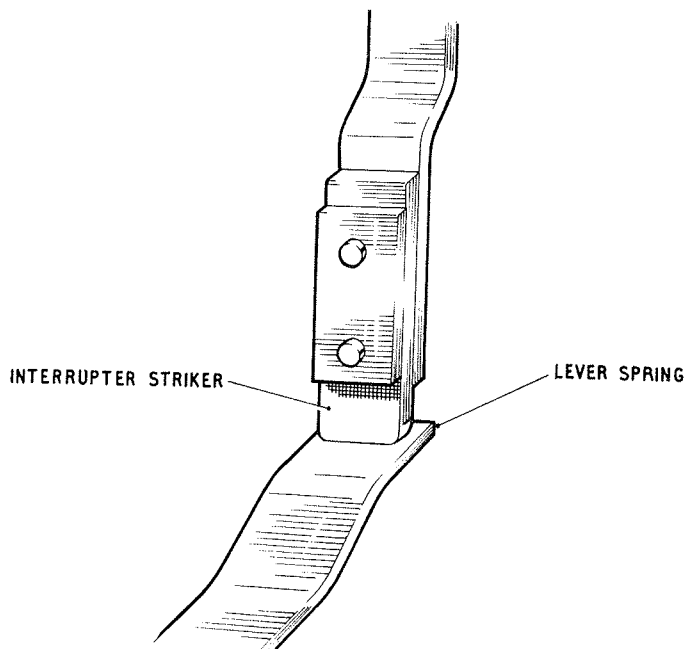


FIG. 25

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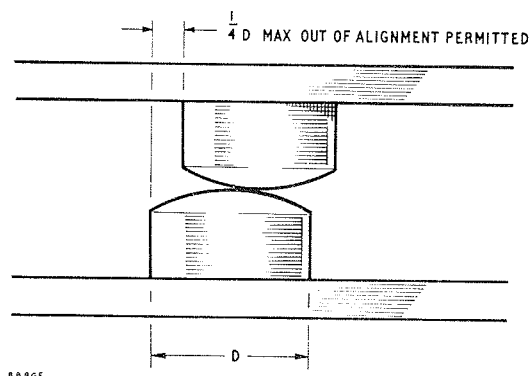


FIG. 26

With the armature normal, the contact spring should be parallel to the clamp plate (see Fig 27). Adjustment can be obtained by varying the position of the inner buffer.

With the armature normal and with the contact spring resting against the inner buffer, the clearance between the contact spring and the outer buffer is 15 ± 5 mils (see Fig 27). The buffers should be adjusted, if necessary, using Pliers, Adjusting, No. 1.

With the armature operated, and the interrupter contacts open, the contact spring should rest against the outer buffer with a pressure of 30 gm min (test) 45 ± 10 gm (readjust). Measure the pressure at a point on the contact spring adjacent to the contact (see Fig 28).

With the armature normal, a pressure of 200 ± 50 gm (test) 220 ± 30 gm (readjust) is required to open the interrupter contacts when the contact spring is against the outer buffer. Apply the pointer of the gauge at a point adjacent to the contacts (see Fig 27).

With the armature normal, check that the tension of the lever spring causes the contact spring to rest against its inner buffer with a minimum pressure of 10 gm. This should be checked with the pointer of the gauge applied adjacent to the contact on the lever spring (see Fig 29).

Figs 27 and 28 follow

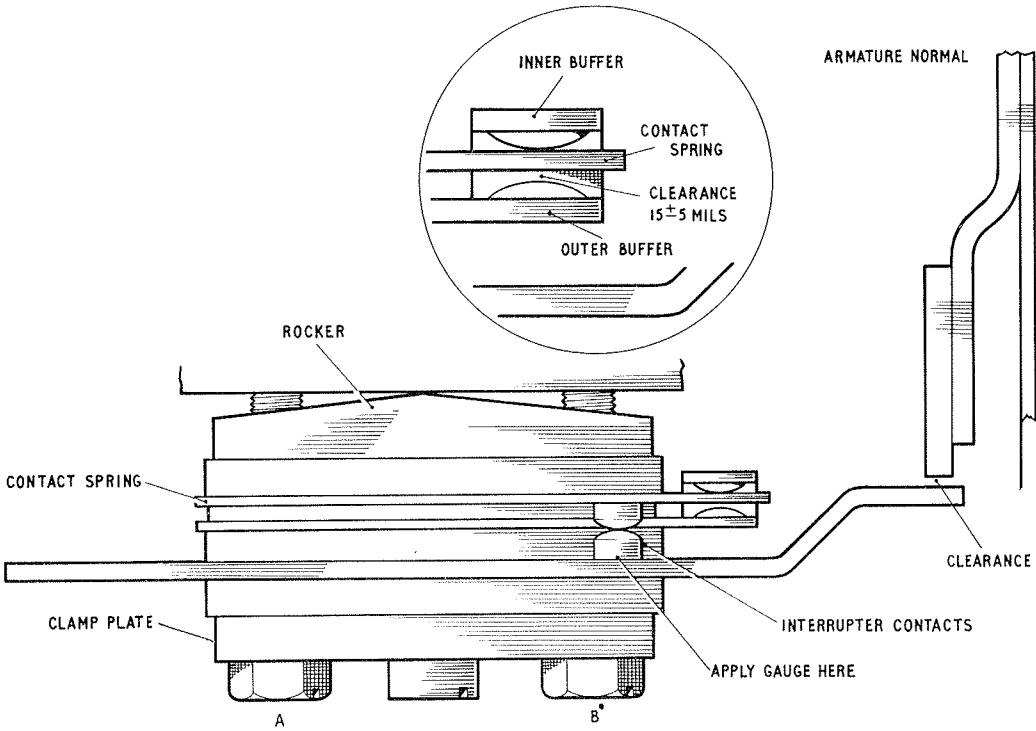


FIG. 27

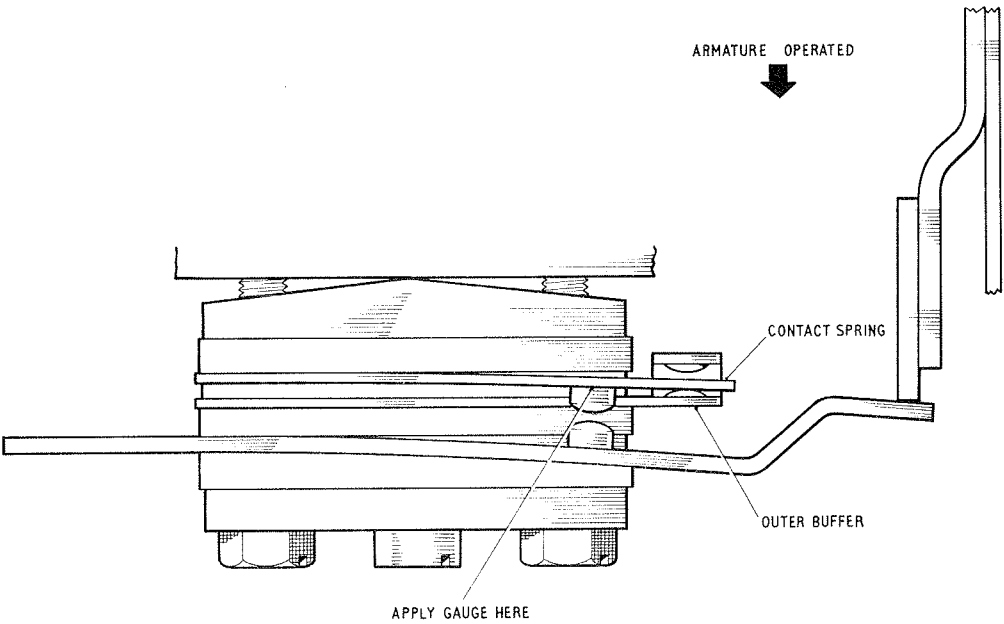


FIG. 28

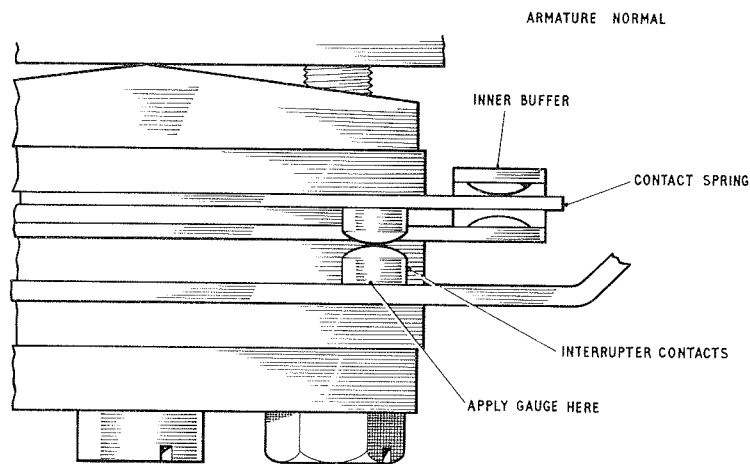


FIG. 29

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19 ROCKER ADJUSTMENT Adjust the position of the rocker by means of the screws marked A and B in Fig 27 so that the instant of contact interruption takes place just before the armature pawl steps over the teeth of the ratchet wheel.

When making this adjustment care should be taken to loosen one screw before tightening the other so as to prevent damage to the screws. To obtain early interruption, slacken screw A and tighten screw B. To obtain late interruption, slacken screw B and tighten screw A.

The instant of interruption should be varied to obtain smooth running consistent with the speed specified in par 20.

Smoothness in running can be checked by observing that the armature movement from the back stop is regular.

With uniselectors having only two or three wipers, it may be necessary to increase the armature-restoring-spring tensions to obtain smooth running.

With the armature normal, there must be a clearance between the tip of the lever spring and the interrupter striker (see Fig 27).

20 RUNNING TESTS Running tests should be performed at the normal exchange voltage. When testing a homing-type unselector, the normal homing earth should be disconnected, by insulating the appropriate relay contact with an Insulator, Contact, No. 1.

The combined tensions of the armature-restoring springs and interrupter springs must ensure that:-

The unselector will start, and the wipers rotate smoothly and reliably, when the operating voltage is applied in series with the magnet coil, interrupter contacts, and a Tester No. 80 ... (see Table 1).

Table 1 follows

TABLE 1

OPERATING VOLTAGE (VOLTS)	TYPE OF UNISELECTOR	OHMS	TESTER	POSITION OF BUTTON
22	All	4	80U	Pressed
40	All	18	80V	Normal
50	Up to 8 wipers in the bank at one time	30	80W	Normal
	Over 8 wipers in the bank at one time	25	80AA	Pressed
60	All	30	80W	Normal
80	All	60	-	-

With the operating voltage applied in series with the magnet coil and interrupter contacts, the wipers must rotate smoothly at the speeds specified in Table 2.

TABLE 2

Maximum speed of all uniselectors	100 rev/min
Minimum speed of uniselectors having up to 5 wipers in the bank at one time	60 rev/min
Minimum speed of uniselectors having from 6-8 wipers in the bank at one time	50 rev/min
Minimum speed of uniselectors having over 8 wipers in the bank at one time	46 rev/min

The wipers of all homing uniselectors must home reliably and stop accurately on the home position, when connected as shown in Fig 30.

When testing or adjusting a unselector for running, always verify that the spark quench is in order.

21 POSITION OF POINTER The pointer must be located to indicate position one, when the wipers are standing on either the first or second row of bank contacts as shown on the relative circuit diagram.

Fig 30 follows

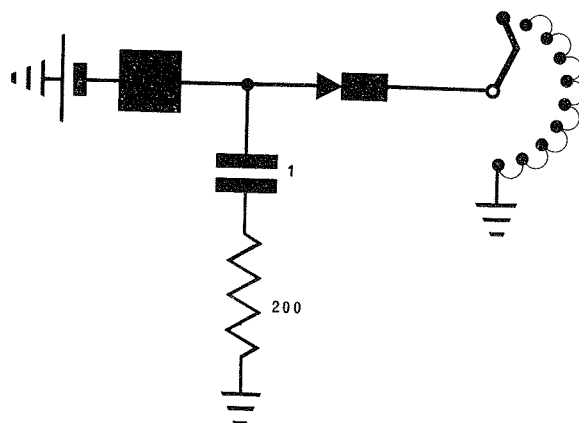


FIG. 30

MISCELLANEOUS

22 **DISMANTLING** The method of removing the mechanism from the bank is described in par 4. The order in which the parts of the mechanism should be dismantled is as follows:-

Remove the pawl stop.

Remove the armature-restoring springs.

Remove the armature

Remove the detent; note the position of the spacing plate (on 3-5 level uniselectors only).

Remove the spindle, wiper assembly and ratchet wheel from the frame.

Remove the armature back stop.

Remove the ratchet wheel from the wiper-assembly hub.

Remove the knife-edge, knife-edge adjusting screw and locknut.

Remove interrupter-spring assembly.

Remove coil box and coil.

Remove the mechanism-positioning gland.

Remove the pointer, label-holder and test jack.

Remove the brush assembly.

23 **ASSEMBLING** The adjustment of the mechanism and replacement in the bank are described in pars 5 to 19. The order in which the parts of the mechanism should be assembled is as follows:-

Replace the knife-edge, knife-edge adjusting screw and locknut on to the coil box.

Replace the coil and coil box on to frame.

Replace the interrupter-spring assembly.

Replace the pointer.

Lubricate the inner and outer diameter of the ratchet-wheel hub with Oil, Bearing, No. 19 and replace in wiper-assembly hub.

Replace the wiper assembly, ratchet wheel and spindle.

Replace the armature back stop.

Replace the pawl stop; set it well back from the ratchet wheel.

Replace the detent (and the spacing plate on 3-5 level uniselectors only).

Replace the armature on the knife-edge, then its restoring springs. To ensure that the springs will not rust, they should be moistened with Oil, Bearing, No. 19.

Replace the mechanism-positioning gland and locking-screw.

Replace the label-holder and test jack.

Replace the brush assembly on the bank.

24 LUBRICATION Details of the method of lubrication of the unselector are outlined in H5137.

25 PIECE PARTS Details of the peice parts applicable to the unselector are given in H5615.

26 PRECAUTIONS WHEN RETURNING UNISELECTORS TO STORES Before returning a unselector to stores, the wipers must be located on bank contacts No. 21, to protect the wipers from damage.

27 TOOLS A list of tools necessary for the adjustment of PO Type 2 uniselectors is given in Table 3. The tools should be used only for the purposes for which they are intended. Any tool that is in such a condition that screws, nuts or springs would be damaged by its use should be changed.

TABLE 3

DESCRIPTION	USE
Adjuster, Spring, No. 3	Tensioning pawl spring
Adjuster, Spring, No. 9	Adjusting wipers and brushes
Adjuster, Detent, No. 4	Locating detent
Cleaner, Contact, No. 8A	Cleaning bank contacts
Cleaner, Contact, No. 9	Cleaning interrupter contacts
Comb, Locating, No. 1	For 5 level and under uni-selectors
Comb, Locating, No. 2	For 6-8 level uniselectors
Comb, Locating, No. 3	For 5 + 5 level uniselectors
Comb, Locating, No. 4	For 3 + 3 level uniselectors
Gauges, Feeler, No. 10	General use
Gauges, Tension, No. 2	Measuring tension of wipers, brushes, interrupter springs, detent, etc.
Gauges, Tension, No. 3	
Mirror, Inspection, No. 2	
Pointer, Gauges, Tension, Cranked, No. 5	Examining position of wipers on bank contacts
Pointer, Gauges, Tension, Cranked, No. 6	
	For use with tension gauges

DESCRIPTION	USE
Insulator, Contact, No. 1 Outrigger, No. 2	Disconnecting homing earth Mounting the mechanism out of bank (3-5 level uniselectors)
Pliers, Adjusting, No. 1 } Pliers, Adjusting, No. 2 } Pliers, Adjusting, No. 5 }	Adjustment of wipers, brushes, detent spring, etc
Screwdriver, Instrument, No. 1 } Screwdriver, Instrument, No. 2 } Screwdriver, Instrument, No. 6 } Screwdriver, Instrument, No. 5 }	General use
Spanner, Flat, No. 3	For use inside box spanners
Spanner, Box, No. 1	For knife-edge adjusting screw locknut
	For mechanism-fixing screws, magnet-fixing screw and mechanism-positioning gland
Spanner, Box, No. 3	For bank-adjusting gland locknut
Spanner, Box, No. 14	For lower mechanism-fixing screw
Spanner, Box, No. 25	For locating wipers on bank contacts
Spanner, Box, No. 33	For locating wipers (10-12 level uniselectors)
Spanner, Cranked, No. 11	For interrupter-spring assembly, pawl back stop and pointer-fixing screw
Spanner, Cranked, No. 3	For armature back stop and wiper spindle nut (Pre-1950 manufacture)
Spanner, Cranked, No. 12	For armature back stop and wiper spindle nut
Tester No. 80U } Tester No. 80V } Tester No. 80W } Tester No. 80AA }	Running tests (see par 20)

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