ADJUSTMENTS

FOR

UNISELECTOR - SINGLE MAGNET

(B.P.O) TYPE NO.2.

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AUTOMATIC TELEPHONE AND ELECTRIC COMPANY LIMITED

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FIGURE 1.



ADJUSTMENTS

<u>FOR</u> <u>UNISELECTOR - SINGLE MAGNET</u> (B.P.O.) TYPE NO. 2.

1. FIXING SCREWS AND NUTS.

All fixing screws and nuts shall be tight and shall not be marred or mutilated in any manner.

2. SPRING ASSEMBLIES.

Spring assemblies shall have springs, contacts and bushings well aligned.

Pairs of contacts shall not overlap each other by more than 1/4 of the diameter of a contact as judged by eye.

3. INSULATION.

Insulation tests shall meet the general requirements specified in standard specifications.

4. TOLERANCES.

The tolerances shown in the following paragraphs are intended for testing purposes only. When readjustments are being made the mean values should be aimed at and the tolerances reduced to a minimum.

5. BRUSHES.

Each brush spring should exert a pressure of 20 grammes minimum 60 grammes maximum on the collector ring, measured as near to the spring tip as possible.

If the tension is too heavy it can be reduced by gently closing the brushes together.

If the tension is too weak the mechanism should be removed from the bank. The two springs of a pair should then lie flat against each other and at right angles to the mounting to a point 1/2" (12.70 mm) from the tips, and from this point they should be set outwards so that there is a space between the tips of 3/16" to 1/4" (4.76 to 6.35 mm), when the obstruction of adjacent springs is removed. (See Figure 3).

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FIGURE 3. SETTING OF BRUSH SPRINGS.

This setting is calculated to ensure satisfactory pressure.

6. REPLACING THE MECHANISM TO THE BANK.

No attempt should be made to replace a mechanism to a bank without first fitting the appropriate brush feed assembly comb tool over the brush springs to hold the springs together.

Place the slots of the comb on to the brushes at a point behind the set in the springs as shown in Figure 4, and slide the comb downwards until each pair of springs has been compressed. The reduced rib of the comb should then be inserted behind the bank frame by sliding the comb upwards, so that it is finally located as shown in Figure 5.





The wiper assembly should then be set to the 1st or 2nd position shown on the number disc, and the heels of each pair of wipers passed through their respective slots in the comb and moved upwards to engage the first bank contacts.

The mechanism should then be pushed well home and the mechanism securing screws replaced, and securely tightened.

THE COMB TOOL MUST BE REMOVED BEFORE ROTATING THE WIPER ASSEMBLY.

7. ARMATURE.

The position of the armature shall be set by adjustment of the knife edge adjusting screw so that with the armature operated electrically it strikes the coil core centrally within a tolerance of $\pm 1/4$ the diameter of the core, as judged by eye when viewed from the side.

With the armature in any position there shall be a minimum clearance of 10 mils (0.25 mm) between the armature and the coil box and between the armature assembly and the frame.

The pawl tip shall lie parallel with the ratchet teeth and shall cover the full width of the ratchet wheel, judged by eye.

When correctly adjusted there shall be latitude for further movement of the knife edge adjusting screw to the extent of 1/32" (0.79 mm) in each direction.

8. PAWL SPRING.

The pawl spring shall exert a pressure on the ratchet wheel of 150 grammes minimum 250 grammes maximum measured in the hook of the pawl with the armature fully operated.

The pressure may be reduced if necessary by levering the spring outwards with the armature operated. To increase the pressure the armature should be removed to give full access to the spring.

9. DETENT SPRING.

The detent spring shall be set so that its tip is approximately central and parallel with the ratchet wheel teeth so that it rests in the 2nd tooth from the pawl with the armature normal.

When major adjustments are necessary the following procedure shall be carried out.

With a 3 mil feeler gauge inserted between the armature and the magnet core, 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 this position, adjust the detent to rest squarely against the short face of the ratchet tooth, next to one in which the pawl is resting. When the armature is normal, and with the armature backstop adjusted, the detent spring shall rest in the second notch from the pawl.

To position the detent it will be found convenient if the pointed end of Adjusting Tool L.14576 is inserted in the hole in the detent bracket (See Figure 6) and with the detent fixing screws lightly tightened.



Final adjustment shall be checked as follows:~

- (a) When operated electrically the uniselector shall rotate reliably with a 2 mil (0.05 m.m.) gauge inserted between the armature and core.
- (b) With an 8 mil (0.20 mm) gauge inserted between the armature and the core, and the armature operated electrically the pawl shall not step over the ratchet wheel teeth.

Test (b) to be made in four positions approximately equidistant round the ratchet wheel.

The pressure of the detent spring exerted on the ratchet wheel shall be 50 grammes minimum 110 grammes maximum measured at the spring tip, and under this pressure the detent spring shall lie squarely on the ratchet wheel with a depth of engagement of not less than 2/3 of the thickness of the spring material, as judged by eye.

When measuring the tension care should be taken to ensure that the detent tip is not binding on the short face of the ratchet tooth.

If it is necessary to increase the tension of the detent spring it should be removed and the spring given a set at the root with duckbill pliers.

To decrease the tension the slotted end of Adjusting Tool L.14576 should be placed over the spring, and the spring gently pulled away from the ratchet wheel until the desired tension is obtained.

10. ARMATURE BACK STOP.

Adjust the armature back stop so that when the armature restores, the detent just drops into the root of the ratchet teeth so that no appreciable back lash exists in the wiper assembly.

When in final adjustment the armature back stop shall be flush with or protrude from its lock nut, neglecting any "pip" on the back stop.

11. PAWL BACK STOP.

The pawl back stop shall be set so that with the armature in its normal position, the pawl is lightly wedged between the back stop and the ratchet wheel in



FIGURE 7. ADJUSTMENT OF PAWL BACK STOP.

at least one position of the ratchet wheel. (See Figure 7). This adjustment must not affect the armature back stop or detent adjustments.

Slight forward rotational play in the wiper assembly is permissible, but this must be such that the centre line of non-bridging wipers when lightly forced forward by hand pressure on the number wheel do not move more than 1/3 of the width of a bank contact. This shall be checked in four positions approximately equidistant round the ratchet wheel.

There should be no clearance between the armature and the armature back stop when the armature is in the normal position.

12. INTERRUPTER SPRINGS (Buffered Type) See Figure 8.

With the armature normal the buffered spring shall rest on the back stop and there shall be a clearance between the lever spring and the interrupter striker.

With the lever spring lifted clear the buffered spring shall rest on the front stop with **a** minimum pressure of 30 grammes measured at the contact.

To prevent the contact springs from floating, the two contact springs shall exert a minimum combined pressure of 10 grammes on the back stop, measured at the contact of the buffered spring.

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FIGURE 8. BUFFERED TYPE INTERRUPTER.

With the buffered spring resting on the front stop there shall be a clearance of 10 mils (0.25 mm) minimum 20 mils (0.50 mm) maximum between the buffered spring and the back stop.

The contact pressure with the buffered spring against the front stop shall be 150 grammes minimum 250 grammes maximum, measured at the contact.

The contact opening shall be adjusted by varying the position of the rocker so that the uniselector runs smoothly and reliably. Both spring assembly fixing screws shall be left tight.

13. INTERRUPTER SPRINGS (Non-Buffered Type).

The moving interrupter spring shall be tensioned to give a contact pressure of 150 grammes minimum 250 grammes maximum measured by the contacts.

The contact opening shall be adjusted by varying the position of the rocker so that the uniselector runs smoothly and reliably. Both spring assembly fixing screws shall be left tight.

14. WIPERS AND BANK.

The wiper assembly shall be free on its bearing pin. Wipers shall be set by loosening the wiper clamp screw with Box Spanner L.14659 and rotating the wiper assembly on its spindle so that the centre line of non-bridging wipers rest on the bank contact within limits of 1/3 to 2/3 the width of a contact measured from the entering edge on the 2nd and 24th bank contacts, judged visually. (See Figure 9).

In the case of uniselectors where all wipers are bridging, the wiper contact face shall lie symmetrically about the contact, as judged by eye.



FIGURE 9. POSITION OF WIPER ON CONTACT

The adjustment of the wiper position on bank contacts can be facilitated by retaining the box spanner over the clamp screw and levering it upwards or downwards until the correct position is obtained. (See Figure 10).



FIGURE 10. ADJUSTING WIPER POSITION ON BANK CONTACTS. The wiper clamp shall then be securely tightened. The wiper assembly should be rotated to the 24th bank contact and the position of the mechanism positioning gland adjusted until non-bridging wipers occupy

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FIGURE 10. WIPER POSITION ON CONTACT



FIGURE 11. CLEARANCE OF BRIDGING WIPER

the same relative position on this contact as they occupied on bank contact No. 2. (See Figure 11). The gland locking nut should then be securely tightened.

With the armature at normal the tips of bridging wipers shall clear the leaving edges of the previous bank contacts by not less than 7 mils (0.18 mm) judged by eye. (See Figure 12).

When the wipers are standing on the first row of bank contacts the opposite ends should be adjusted for alignment with the bank levels, so that they will leave these levels without more than slight side movement.

Loosen the two mechanism securing screws at the armature end and adjust the position of the mechanism so that the wipers enter the bank levels without more than slight side movement. Re-tighten the mechanism fixing screws.

The side movement of wipers on entering and leaving the bank contacts shall not exceed the thickness of a bank contact 15 mils (0.38 mm).

When the wipers are standing on the 23rd row of contacts the opposite ends shall clear the brushes by not less than 10 mils (0.25 mm), when the wiper assembly is moved sideways on the spindle.

The side movement of the wiper assembly shall be so limited that no portion of the wiper,other than the normal lines of contact can touch the bank contacts in any position of the wipers (this shall normally be

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checked when the wipers are standing on the 25th row of bank contacts).

When the wipers are clear of the bank contacts, there shall be no gap at the outermost contact points.

Between the innermost contact points there may be a gap not greater than 8 mils (0.20 mm) judged by eye. (See Figure 13).



FIGURE 13. ADJUSTMENT OF WIPER TIPS.

Wipers shall be tensioned to exert a pressure on the bank contacts of 20 grammes minimum 40 grammes maximum measured with the wipers standing on the 25th bank contact and with the gauge inserted at the heel so that the pointer tip engages at the centre point of the width of the wiper and at the inward set of the wiper tip. (See Figure 14).



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15. ARMATURE RESTORING SPRINGS.

On any uniselector the tension in each restoring spring shall be approximately equal, the combined pull of both springs shall be such that when a 20 mil feeler gauge inserted between the armature and its back stop is withdrawn, the armature returns to its back stop and the detent correctly engages the ratchet. This shall be checked at 4 positions round the bank including the position at which the wipers are stepping on to the first row of contacts. A reasonable margin of adjustment in each direction shall be left on the armature restoring spring screws after adjustment.

On uniselectors with 5 levels and under, the combined pull of both springs shall be such that the armature rests on its back stop with a force of not less than 800 grammes measured on the armature adjacent to the side of the armature back stop nearest to the knife edge.

16. POINTER.

The pointer shall be set to indicate position "O", or thick line, when the wipers of homing uniselectors are standing on the first row of bank contacts and position 1 when the wipers of non-homing uniselectors are standing on the first row of bank contacts.

17. OFF NORMAL SPRINGS.

The following adjustments apply to uniselectors having off normal springs and cam:-

The cam shall be set to operate the off normal springs on the step required by the circuit condition. On the step preceding and succeeding the operated step there shall be a clearance between the tip of the moving off normal spring and the cam.

Contact pressure of 20 grammes minimum 30 Isdarounds maximum and a "break" contact pressure of 30 and a maximum 40 grammes maximum measured by the presents.

18. SPEED AND CURRENT ADJUSTMENT.

The wipers of all uniselectors fitted with"break" interrupter springs shall rotate smoothly and reliably and the hunting speed shall be within the following limits when the normal voltage of the uniselectors is applied to the magnet coil in series with the interrupter springs.

Maximum speed for all uniselectors. 100 R.P.M. Minimum speed for uniselectors having 5 levels or under. 60 R.P.M.

Minimum speed for uniselectors having 6 levels or over. 50 R.P.M.

The wipers of all uniselectors fitted with"break" interrupter springs shall rotate smoothly and reliably when tested under the following conditions:-

- (a) 22 volt uniselectors 5 ohms in series with the magnet coil and interrupter springs on 22 volts. (When re-adjusting the resistance shall be 6 ohms on 22 volts).
- (b) 40 volt uniselectors 18 ohms in series with the magnet coil and interrupter springs on 40 volts. (When re-adjusting the resistance shall be 22 ohms on 40 volts).
- (c) 50 volt uniselectors 30 ohms in series with the magnet coil and interrupter springs on 50 volts. (When re-adjusting the resistance shall be 35 ohms on 50 volts).
- (d) 60 volt uniselectors 30 ohms in series with the magnet coil and interrupter springs on 60 volts.
 (When re-adjusting the resistance shall be 35 ohms on 60 volts).
- (e) 80 volt uniselectors 80 ohms in series with the magnet coil and interrupter springs on 80 volts. (When re-adjusting the resistance shall be 90 ohms on 80 volts).

Uniselectors with "make" interrupter springs shall operate reliably step by step in series with the resistances specified above. Homing uniselectors shall "HOME" satisfactorily when tested several times in succession.

19. LUBRICATION.

The following lubricants should be used on all uniselectors:-

- (a) P.O. Oil Bearing No. 16 (A.T. & E. Co. Ltd. Specification S.2497).
- (b) Concentrated **•**ildag.

Lubrication should be carried out regularly during the overhaul of the mechanism.

Lubricants should be applied in moderate quantity and any excess found after subsequent operation of the mechanism should be removed.

NOTE:

When making an initial application of concentrated Oildag to the ratchet teeth, first clean the dust away by means of a brush moistened with P.O. Oil Bearing No.16 (A.T. & E. Co. Ltd. Specification S. 2497). "Concentrated Oildag" should then be applied sparingly by means of a brush. When making a subsequent application of Oildag, it is often found that sufficient graphite from previous applications remains to provide a satisfactory lubricant with the addition of a small quantity of P.O. Oil Bearing No.16 (A.T. & E. Co. Ltd. Specification S.2497). It will be necessary to work this well down into the notches, to bring the Oildag to a suitable consistancy and re-distribute it well over the surfaces.

Where insufficient graphite from a previous application remains, or where the existing lubricant is dirty, it should be cleaned from the notches by means of a brush moistened with P.O. Oil Bearing No.16 (A.T. & E. Co. Ltd. Specification S.2497). The brush must be worked well down into the notches to remove as much as possible of the original lubricant and then cleaned on a piece of clean rag.

When the notches have been cleaned "Concentrated Oildag" should be applied sparingly by means of a brush. The points of application and the lubricants used are specified in the following schedule:

Apply "Concentrated Oildag" sparingly to:-

- (a) All teeth of the ratchet wheel.
- (b) Armature back stop (at point of contact with armature).
- (c) Pawl back stop.
- (d) Armature knife edge, and sides of armature locating lug.
- (e) Point of attachment of restoring spring loops.
 Apply P.O. Oil Bearing No.16 (A.T. & E. Co. Ltd. Specification S.2497) sparingly to:-
- (a) Ratchet wheel hub, inner and outer diameters (during initial assembly).
- (b) Wiper assembly bearing pin (before insertion).
- (c) Armature restoring spring felt inserts.
- (d) Wiper tips and collector rings should be very sparingly lubricated and the lubricant distributed by rotating the wipers electrically.

20. ORDER IN WHICH MECHANISM SHOULD BE DISMANTLED.

- (a) Remove the mechanism securing screws and withdraw the mechanism from the bank.
- (b) Remove the pointer.
- (c) Remove the wiper assembly.
- (d) Remove the detent spring.
- (e) Remove the pawl back stop and mechanism positioning gland.
- (f) Remove the armature restoring springs and armature.
- (g) Remove the armature knife edge and knife edge adjusting screw.
- (h) Remove the interrupter spring assembly.
- (j) Remove the coil box from the frame.
- (k) Remove the coil from the coil box.
- (1) Remove the armature back stop.

21. ORDER IN WHICH MECHANISM SHOULD BE ASSEMBLED.

- (a) Replace the armature back stop.
- (b) Replace the coil in the coil box.
- (c) Replace the coil box in the frame.
- (d) Replace the interrupter spring assembly.
- (e) Replace the armature knife edge and knife edge adjusting screw.
- (f) Replace the armature assembly and armature restoring springs. The felt inserts in the armature restoring springs should be moistened with P.O. Oil Bearing No.16. (A.T. & E. Co. Ltd. Specification S.2497).
- (g) Replace the pawl back stop and mechanism positioning gland.
- (h) Replace the wiper assembly. The wiper assembly shall be free on its spindle which should be lubricated along its length with P.O. Oil Bearing No.16 (A.T. & E. Co. Ltd. Specification S.2497) before insertion.
- (j) Replace the pointer.
- (k) Replace the detent spring.
- (1) Replace the mechanism to the bank. The wiper assembly should be set to a position corresponding to the first or second bank contacts and the brush assembly comb tool fitted to the brushes to hold the spring tips together as outlined in Item 6. The mechanism can then be assembled to the bank and the mechanism securing screws inserted.

THE COMB TOOL MUST BE REMOVED BEFORE ROTATING THE WIPER ASSEMBLY.

R.R.R./R.L.H.