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Colin Hinson
In the village of Blunham, Bedfordshire.

AMENDMENTS TO BOOKLET No.78 (12th Edition)

(For use in connection with machines fitted with new Overlap Cam Unit S.3750 described in Technical Information Letter No.87)

Amendment No. 1

Insert the following Appendix immediately after the Lubrication Instructions.

"Appendix I

INSTRUCTIONS FOR OVERLAP CAM UNIT

N.B.: (a) The instructions in the main text of this booklet apply to the Orientation Cam Unit (S.2866B).

This Appendix contains instructions for the Overlap Cam Unit S.3750, used in conjunction with Magnet Unit S.2848A, Group 9.

(b) Screws and nuts are painted red either when a unit or component has been located by special gauge in the factory, or when further adjustment is not normally necessary.

Only when a specific instruction is given should a red-painted screw or nut be slackened.

If this rule is disregarded, it will be necessary to return the unit to the factory for readjustment.

A. CAM UNIT - STATIC ADJUSTMENTS

(This Section replaces Adjustment Instructions A1-14 (pp.23-27), 3.19 (p.28), and D.24 (p.29).

1. Preparatory

1.1 Remove the two nuts and the washer securing the electro-magnet armature link to the armature and lift off the link. To avoid damage to the link, it is advisable to rest it against the cam unit gear cover.

1.2 Remove the two screws securing the electromagnet to the main base and lift off the electromagnet.

1.3 Remove the two screws securing the right-hand ribbon feed bracket to the main base. Disengage the ink ribbon from the ribbon jumper and move the ribbon feed bracket to one side.

2. Receiving Cam Sleeves

2.1 Check that the translator cam sleeve GZ, Fig. 113, and the function cam sleeve GS rotate freely and with negligible end-shake.

2.2 If not, slacken locking screw HD2 in the collar of the selector cam driving gear HC; hold the main camshaft stationary and rotate the selector driving gear in the appropriate direction on the threaded section of the camshaft.

2.3 Tighten the locking screw carefully. If this screw is left loose, and the machine run under power, complete dismantling may be necessary to rectify the error.

3. Rockshaft

3.1 Check that the cone-pointed rear pivot of the rockshaft KH, Fig. 112, is so adjusted that the rockshaft pivots freely, with a minimum of end-shake.

4. Selector Cam Detent – Preliminary (Fig. 100)

4.1 Set the orientation adjusting block to '120' on the scale.

4.2 With the unit at rest, release the selector cam detent A and rotate the selector camshaft until the detent *just* rests on stop arm B.

4.3 Check, with Adjustment Tool TA.1174, that the larger end of the pin (of diameter .078" (1.98 mm.)) just fails to pass between the release lever G and the lug on the retaining plate D, i.e. at point E.

4.4 Repeat the test, using the smaller end of the pin (of diameter .072" (1.83 mm.)). The pin should pass between the release lever and the lug.

4.5 If either of these conditions is not satisfied, slacken nut C clamping the release lever to the tripshaft. Hold the selector detent against its stop arm by pressing, in an anti-clockwise direction, the screw securing the collar on the selector tripshaft just behind its front bearing block F. Adjust the position of the release lever G in accordance with instructions 4.3 and 4.4, and tighten clamping nut C.

4.6 Restore the orientation adjusting block to its original position on the scale.

5. Translator Cam Retention Lever (Figs. 20, 94 and 96)

NOTE: If, during a routine check of adjustments, it is found necessary to alter adjustments 5.2 or 5.4, then adjustment 8.3 must be done again.

5.1 Disengage the translator cam detent I, Fig. 96, from the pawls and rotate the cam slightly so that a spring balance can be applied to each pawl engagement face. A force of 2½–3½ ozs. (71–99 grams) should be required to press the pawls back against their seating on the cam sleeve, as indicated by the arrow in Fig. 20.

5.2 Slacken the clamping nut and adjust the retention lever eccentric L, Fig. 94, so that the pivot is in its lowest position.

5.3 With the unit at rest, check that the retention lever roller M is properly seated in the bottom of its hollow in the cam sleeve.

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AMENDMENTS TO T.I.S No. 30 (Issue No. 2)

(Instructions for Overlap Cam Unit)

Amendment No. 1

On page 7/30, immediately after adjustment 18, insert the following new adjustment:-

"18A. Traversing Link Damping Device (Fig. 116)

18A.1 Check that the pressure required to just lift the friction pad C from contact with the traversing link is 2½ lbs. (1.1 kgs.) when a spring balance is applied as shown in Fig. 116.

18A.2 If the pressure is not correct, slacken locknut A and adjust screw B until the required pressure is obtained.

18A.3 Tighten locknut A."

Amendment No. 2

On page 8/30, immediately after adjustment B.1, insert the following new adjustment:-

"1A. Selector Cam Clutch (Fig. 100)

1A.1 With the motor stopped, disengage the selector cam detent A from the stop arm B by moving the release lever G.

1A.2 Apply the hook of a spring balance under the stop arm B and tension the balance to 500 grams. Firmly retaining the balance in this position, switch on the motor and observe that the torque is 560–620 grams. Switch off the motor before removing the spring balance.

1A.3 If the torque is not correct, then the selector cam unit must be dismantled and the number of clutch shims (Part No. PW.5587) decreased or increased (up to a maximum of three shims) until the required torque is obtained.

NOTE: If the required torque cannot be obtained with three shims, check the tensions of the four clutch springs (Part No. PG.5093B) against the table at the rear of this booklet, and replace any defective spring. If the correct torque is still unobtainable, then it will be necessary to replace the two felt friction discs in the selector cam unit as follows:-

Thoroughly soak the new felt friction discs in Creed Lubricant No. 2, then reassemble the cam unit with the new discs and no clutch shims inserted. Reassemble the machine, and "run in" the new discs for at least four hours, i.e. allow the machine to run in the "spacing" condition. Following the "running-in" period, check the clutch torque and, if necessary, add clutch shims (up to a maximum of three shims) until the correct torque is obtained.

Amendment No. 3

On pages 13/30 and 14/30, amend the following spring tensions:-

T.I.S. No. 30			*DELETE*	*INSERT*
Page	*Spring No.*	*Reference*		
13/30	PG.7372	N, Fig. 94	15–17 ozs. (425–482 gms.)	14–18 ozs. (397–410 gms.)
13/30	PG.7100	I, Fig. 95	4–6 ozs. (113–170 gms.)	2½–4 ozs. (71–113 gms.)
13/30	PG.7227	CZ, Fig. 111	2–3 ozs. (57–85 gms.)	2–2½ ozs. (57–71 gms.)
13/30	PG.5095	DN, Fig. 111	4½–5 ozs. (125–157 gms.)	4¾–6¼ ozs. (135–177 gms.)
14/30	PG.7364A	AG, Fig. 114	3–4¾ ozs. (90–135 gms.)	225–345 gms.
14/30	PG.7209	AI, Fig. 102	12½–13½ ozs. (354–383 gms.)	12–14 ozs. (340–397 gms.)
14/30	PG.5097B	AS, Fig. 107	4¼–5¼ ozs. (120–149 gms.)	4½–6 ozs. (128–170 gms.)
14/30	PG.7100	AJ, Fig. 102	3–3½ ozs. (85–99 gms.)	2¼–4 ozs. (71–113 gms.)
14/30	PG.5093B	BA4, Fig. 115	12½–14½ ozs. (354–411 gms.)	13½–15½ ozs. (383–439 gms.)

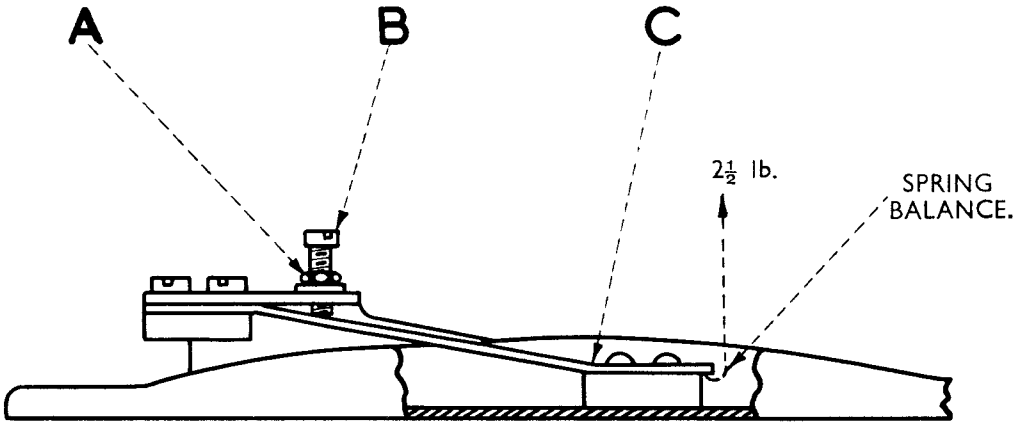

FIG. 116

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AMENDMENTS TO T.I.S. No.30 (ISSUE No.2)

(Instructions for Overlap Cam Unit)

Amendment No.1

On page 7 of T.I.S. No.30, amend the title of paragraph No.18 to read: **"Pilot Cam Detent Link Lever".**

Amendment No.2

On page 7 of T.I.S. No.30, delete sub-paragraph No.18.2.

Amendment No.3

On page 8 of T.I.S. No.30, delete sub-paragraph No.1.3, and substitute the following instructions:-

"1.3 With the motor running, insert a .013 in. (.33 mm.) feeler gauge between the electromagnet armature and its spacing stop. Hold the armature against the feeler, and check that the detent AU, Fig. 105, is out of engagement with the lug on pilot cam AV.

1.4 Substitute a .017 in. (.43 mm.) gauge for the .013 in. (.33 mm.) gauge, and check that detent AU is now engaged with the cam lug.

1.5 If either of the above conditions is not satisfied, slacken nut AZ, and adjust the link lever, radially, on the rockshaft AY, by a small amount as follows:-

a) If check 1.3 is not satisfactory, rotate the link lever *clockwise.*

b) If check 1.4 is not satisfactory, rotate the link lever *anticlockwise.*

1.6 After each adjustment of the link lever, tighten nut AZ, and carry out checks 1.3 and 1.4.

1.7 When adjustment is satisfactory, check that adjustment No.18 has not been disturbed."

Amendment No.4

Delete from Figure 105 dimension "h".

5.4 Adjust the eccentric pivot L until the pawls can be pressed away from the detent by an estimated clearance of 002" – 004" (.05 – .10 mm.), i e dimension 'e', Fig. 20. This can be checked by inserting a thin blade in front of the nose of the detent and depressing the pawls.

5.5 Reclamp the locknut on the eccentric pivot.

6. Translator Cam Detent (Figs. 95 and 96)

6.1 Rotate the selector cam until the trip lever F, Fig 95, rests on the peak of its cam Slacken locknut H and adjust abutment screw G to give a clearance of .018" – .022" (.46 – .56 mm) between the screw and its abutment face on the trip lever, i e dimension 'a' Clamp locknut H.

6.2 With the unit at rest, release detent I, Fig. 96, from the pawls J and hold it against the pawl tails. Slacken detent clamping screw K and place a gauge of .011" – .015" (.28 – .38 mm.) between the abutment face on the trip lever and the abutment screw G, i e dimension 'b' Press the abutment up against the gauge and tighten detent clamping screw K.

7. Function Cam Retention Lever (Figs. 20, 97 and 98)

7.1 Remove the typehammer pivot fixing screw and washer and the collar securing the typehammer link to the typehammer lever Remove the gear-cover and support plate and lift off the typehammer lever, carefully retaining the roller on its pin.

7.2 Disengage the function cam detent N, Fig. 98, from the pawls and rotate the cam slightly so that a spring balance can be applied to each pawl engagement face. A force of 2½–3½ ozs. (71–99 grams) should be required to press the pawls back against their seating on the cam sleeve, as indicated by the arrow in Fig. 20.

7.3 With the unit at rest, check that the retention roller T, Fig. 97 (a), is properly seated in the bottom of its hollow in the cam sleeve.

7.4 Slacken locknut V, Fig. 97 (b), and adjust the eccentric pivot U until the pawls can be pressed away from the detent by an estimated clearance of .002" – .004" (.05 – .10 mm.), i.e. dimension 'e', Fig. 20. This can be checked by inserting a thin blade in front of the nose of the detent and depressing the pawls in the direction of the arrow in Fig. 20.

7.5 Clamp the eccentric pivot by means of locknut V, Fig. 97 (b).

8. Function Cam Detent (Figs. 98 and 99)

8.1 With the machine at rest, release detent N, Fig 98, from the pawls O and hold it against the pawl tails.

8.2 Slacken the two screws securing stop plate P and adjust the plate by means of the screwdriver adjustment to give a clearance of .020" – .023" (.51 – .58 mm.), i e. dimension 'c', between the underside of its top lug and the top of the detent bellcrank Q. Tighten the screws.

8.3 With the unit again at rest, slacken the locknut and adjust rocker lever pivot

R, Fig 99, vertically in its slot to give a clearance of .031" – .035" (.79 – .89 mm.), i e dimension 'd', between the rocker lever and the top of the translator cam retention lever. Tighten the locknut.

8.4 Replace the typehammer lever and the gear cover and support plate.

9. Finger Resetting (Figs. 101, 102 and 107).

9.1 Slacken screws AT securing the finger push rod keep plate AU, Fig 107, and move the plate as far as it will go towards the right.

9.2 With the unit at rest, slacken the locknut and adjust the resetting link pivot AA, Fig. 101, in its slot until, with the resetting link AD pressed forward against stop pin AE, there is a clearance of .010" – .015" (.25 – .38 mm), i e dimension 'e', between the resetting link lever AB and the abutment face of the resetting bellcrank AC. This can be done as follows. turn the machine by hand to the rest position Slacken the resetting link pivot AA and insert a .012" (.30 mm) gauge between the resetting link lever AB and the abutment face on the resetting bellcrank AC Press the resetting link forward against stop pin AE and the link lever against the gauge and tighten the pivot locknut.

9.3 Adjust screw AH, Fig. 102, after slackening its clamping screw, so that, when the fingers are reset, there is a clearance of .012" – .018" (.30 – .46 mm.), i.e dimension 'f', between the fingers AG and the ends of the comb extensions AF Tighten the clamping screw

9.4 Maintain this clearance and adjust the position of the push rod keep plate until it clears the ends of the push rods by .003" – .008" (.08 – .20 mm.). Tighten the two securing screws.

9.5 Replace the typehammer and link.

10. Finger Springs (Figs. 32(b), 109).

NOTE: For adjustment 10.2 the unit must be off the machine It need be carried out only every 3,600 hours of operation and can, therefore, be done before the unit is replaced on the machine during the routine overhaul

10.1 Rotate the camshaft by hand until the fingers are lowered A force of 1–2 ozs (28–57 grams) should be required to set each finger inwards, when applied at the top of the finger, horizontally along its line of travel.

10.2 If this condition is not satisfied, the finger springs should be checked. Place each spring on a flat surface so that its ends are touching the surface (see Fig. 32 (b)). A force of 8–9 ozs. (227–255 grams) should be required to depress the centre flat. Replace the finger springs A and dampers B, as illustrated in Fig. 109.

11. Bellcrank Lift (Figs. 25 and 103).

11.1 Set up the 'N' combination (– – 3 4 –). Turn the machine by hand until the

top bellcrank has fallen. Slacken clamping screw AR, Fig. 103.

11.2 With the cam roller on the straight part of its track, and with backlash taken up by pressing the bellcrank lifting collar in the direction of withdrawal, adjust the bellcrank lifting lever eccentric AS to give a clearance of .006" – .008" (.15 – .20 mm.) between the tail of the fallen bellcrank and the lifting collar B, i.e. dimension 'j', Fig. 25.

11.3 Reclamp screw AR, Fig. 103.

11.4 Turn the machine by hand until the bellcranks are fully lifted. Lift each comb extension to see that the combs are free and return snappily under the action of their springs.

12. Finger Lift (Figs. 25 and 104).

12.1 Turn the machine by hand and set up the 'N' combination (– – 3 4 –). Continue turning until the fingers are fully raised and the selected bellcrank has dropped into the slot in the comb discs.

12.2 Check whether the clearance between the bellcrank and the left-hand side of the slot (viewed from the bellcrank lifting collar end of the combination head) is greater than .012" (.30 mm.) and, between the bellcrank and the right-hand side of the slot, is greater than .006" (.15 mm.).

12.3 If not, turn the cam until the fingers are lowered; slacken the capstan-headed screw AL, Fig. 104, and, by means of the screwdriver adjustment, adjust the relationship between the two halves of the finger lift lever.

12.4 Fully tighten clamping screw AL and repeat the test until the correct adjustment is obtained.

13. Ribbon Feed (Fig. 104)

13.1 Turn the machine by hand and check that the ribbon feed pawl feeds its ratchet regularly.

13.2 If not, turn the machine by hand until the fingers are fully raised. Slacken the feed pawl eccentric clamp screw AQ. Adjust the knurled eccentric until the pawl is in its uppermost position. Tighten the clamp screw.

13.3 Turn the machine by hand and check the ribbon feed. If the feed is unsatisfactory, slacken clamp screw AQ and move the eccentric bush clockwise through approximately 90°. Tighten the screw and re-check the feed.

14. Operating Magnet (Fig. 108)

14.1 Replace the electromagnet on the main base and secure with the two screws. Do not, at this stage, replace the armature link.

14.2 Slacken clamping screw BB, thereby releasing adjusting screw BC.

14.3 Remove bias springs BE. With no current in the operating magnet windings, adjust the field unit by means of screw BC until the force required to move the armature from side to side, measured on the pin in front of the armature stop plate, is the same for both directions.

14.4 Adjust the field force by means of knurled screw BD until this force is:-

(a) 9–11 ozs. (255–312 grams) for double-current operation and

(b) 7–9 ozs. (198–255 grams) for single-current operation.

14.5 Tighten clamping screw BB.

14.6 *FOR DOUBLE-CURRENT OPERATION.* Reconnect the bias springs. Check that the armature is equally biassed. If not, slacken the knurled locking screw BG and adjust the bias spring slide by means of nut BF until the bias is equal. Check that the force required to move the armature from side to side, measured on the pin in front of the armature stop plate, is reduced by 3½–5 ozs. (85–142 grams).

14.7 *FOR SINGLE-CURRENT OPERATION.* See Section C.

15. Electromagnet Armature Link (Figs. 54 and 105)

15.1 Slacken the nut securing the armature link eccentric pivot AW, Fig. 105, and adjust the pivot to the top of its throw. Tighten the nut.

15.2 Connect the armature link to the armature, ensuring that it seats down without strain.

15.3 Check the engagement between the starter control unit trip lever B, Fig. 54, and the armature link. Retain the armature link to the armature by means of the washer, nut and locknut.

16. Rocker Blade – Vertical Adjustment (Figs. 105 and 107)

16.1 With the fingers reset and the armature in the 'Marking' position, slacken nut AX, Fig. 105, clamping the armature link lever to the rockshaft.

16.2 Rotate the rockshaft until the top face of the rocker blade AI, Fig. 107, is level, by eye, with the horizontal clearance faces of the sequential levers AJ. Clamp nut AX, Fig. 105.

17. Rocker Blade – Horizontal Adjustment (Fig. 107)

17.1 With the fingers reset and the armature in the 'Marking' position, slacken screw AK securing the rocker blade to the rockshaft and slide the blade away from the sequential levers as far as it will go.

17.2 Release the selector cam detent and rotate the selector camshaft until the first code lever AL is on the peak of its cam AM, giving maximum movement to the sequential lever AJ.

17.3 Insert a .012" (.30 mm.) gauge between the push rod AN and the finger AO. Now push the rocker blade AI forward until the finger touches the comb stop plate AP or the resetting link AQ, whichever is the nearer. Tighten the rocker blade clamp screw AK.

17.4 Remove the gauge. Turn the camshaft, setting the remaining fingers forward. Check that, in each case, there is a clearance of .003" – .020" (.08 – .51 mm.) between the rear edge of the finger and the comb stop plate or the resetting link, whichever is the nearer.

17.5 If not, slacken screw AK, straighten rocker blade AI, and repeat adjustments 17.1 – 17.4.

17.6 Secure the right-hand ribbon feed bracket to the main base.

18. Pilot Cam Detent (Fig. 105)

18.1 With the armature in the 'Spacing' position, slacken nut AZ clamping the pilot detent link lever to the rockshaft AY. Slide the lever along the rockshaft until it just touches the felt lubricating washer at its front end. The washer should not be compressed against the rockshaft end-plate AT. Check that, at its other end, the link does not foul the machined face of the casting and that it is free on both its pivots.

18.2 With the machine at rest, adjust the detent link lever radially on the rockshaft so that, with the armature on its 'Spacing' stop, there is a clearance of .013" – .017" (.33 – .43 mm.) between the inner face of the detent AU and the outer face of the lug on the pilot cam AV, i.e. dimension 'h'.

19. Carriage Feed Lever (Figs. 34, 38 and 110)

19.1 Turn the machine by hand until the traversing link is in its extreme position of movement away from the carriage. Unlatch the page attachment unit and remove the screw, spring washer and washer covering the eccentric pivot B, Fig. 110, between the feed lever and the traversing link. Slacken clamping screw A.

19.2 Latch the page attachment unit and adjust eccentric B by means of its screwdriver slot until dimension 'p', Fig.38, i.e. .015"– .025" (.38 – .64 mm.) is obtained. Only the 180° away from the feed lever pivot must be used to obtain this adjustment. (N.B.: This dimension is most easily seen from the rear of the machine).

19.3 Unlatch the page attachment unit. Lock the eccentric by means of clamping screw A and replace the screw, washer and spring washer. Latch the page attachment unit.

19.4 If the eccentric B provides insufficient adjustment, change the number of .015" (.38 mm.) buffer spacing plates behind the buffer plate B, Fig. 34 (Part No. 1831/108A).

B. ADJUSTMENTS WITH THE MOTOR RUNNING

(This Section replaces Adjustment Instructions G.48 (p.36) and G.52 (p.37) in the main text).

1. Rocker Blade – Final Adjustment (Figs. 105 and 106)

1.1 Adjust the armature link eccentric pivot AW, Fig. 105, to obtain the following conditions: With the motor running, and with a .013" (.33 mm.) gauge gripped between the armature BI, Fig. 106, and its 'Spacing' stop BH, an 'all-space' combination should be set up when the selector detent is released by hand.

1.2 When a .017" (.43 mm.) gauge is similarly placed, an 'all-mark' combination should be set up.

1.3 With the motor stopped, check that Adjustment 18.2 is unaltered. If not, readjust to obtain dimension 'h', Fig. 105.

2. Typehead Clutch Torque

2.1 Select the letter 'J' on the combination head so that the typehead clutch latches on the 'J' bellcrank with the large gap in the types uppermost.

2.2 Apply a spring balance to the typehead by placing the hook of the balance over the 'J' type and tension the balance to 9 ozs. (255 grams). Hold the balance firmly in this position.

2.3 Depress the space bar, or operate the magnet armature to 'Space'. The spring balance should now give a reading between 10 and 12 ozs. (283–340 grams).

2.4 When a new clutch lining is fitted, the spring balance will give a reading which is too high. Before the machine is restored to service, it should be run continuously until the clutch pressure is reduced to within the limits specified in 2.3.

3. Selector Cam Detent – Final Adjustment (Fig. 100)

3.1 With the motor running, insert the smaller end of Adjustment Tool TA.1174 (of diameter .072" (1.83 mm.)) between the release lever G and the lug on the retaining plate D, i.e. at point E. Check that detent A is *not* withdrawn clear of its stop arm B.

3.2 Repeat the test, using the larger end of the Adjustment Tool (of diameter .078" (1.98 mm.)). Detent A should now be withdrawn clear of stop arm B.

3.3 If either of these conditions is not satisfied, refine adjustment A.4.

C. SINGLE-CURRENT ADJUSTMENTS

(This Section replaces Adjustment Instructions H.55–58 (pp. 38 and 39 in the main text)

NOTES: (a) The adjustments provided in this Section apply to receivers fitted with the 'adjustable field' type electromagnet S.2848A, Group 9.

(b) The adjustment for the magnet field strength, i.e. adjustment 14.4, and the following adjustments are based on the use of 11 lb./in. centralising springs, and provide optimum results only on circuits using a signalling supply of 120 volts and a receive current of 40 mA. For circuits employing lower signalling voltages, application should be made to Creed and Company for alternative spring arrangements and adjustments.

(c) Different adjustment procedures are given in the following instructions for short and long lines. By a 'short' line will be meant one whose capacitance is less than that of 20 km. of 20lb./loop mile copper underground cable. A 'long' line, correspondingly, will be one whose capacitance is greater than this. If there is any doubt as to whether the line is 'short' or 'long' according to the above definition, adjustment procedure 3 should be followed, which is provided to cover this case.

(d) It is assumed that the source of signals for these adjustments is either a T.D.M.T. (or other high-grade source) or a correctly adjusted keyboard transmitter. The measurement of receiver tolerance is assumed to be made with the orientation device. If a T.D.M.T. is used for this purpose, however, the orientation device lever should initially be set at 60.

(e) If no keyboard is fitted to the receiver, or if one is fitted but no local record is required, the 'long line' procedure should be followed, irrespective of the length of the line.

1. Short Lines

1.1 Check that the electrical connections are for single-current working (see p.9).

1.2 Set the orientation lever to 20.

1.3 Slacken clamping nut BG, Fig. 106, and determine the approximate setting for the bias spring adjustment BF by transmitting a succession of Rs from the *local* transmitter and increasing the bias from zero towards 'Space' until correct selection just occurs.

1.4 Refine adjustment 1.3 as follows. Determine the lowest setting of the orientation lever for which the receiver correctly selects both 400 Rs and 400 Ys. Let this setting be x_1.

1.5 Move the orientation lever towards 120. Determine the highest setting of the lever for which the receiver correctly selects 400 Rs and 400 Ys. Let this setting be y_1.

1.6 Increase the bias spring tension in steps of two or three divisions and repeat the tests in 1.4 and 1.5 until $y_1 - x_1$ is a maximum. Lock the adjustment with clamp nut BG.

1.7 Repeat adjustments 1.4 and 1.5 for signals from the *distant* transmitter. Let the upper and lower settings of the orientation lever in this case be y_d and x_d.

1.8 Set the orientation device lever in the centre of the range found in 1.7, i.e. on $\frac{1}{2}(x_d + y_d)$.

2. Long Lines

2.1 Carry out adjustments 1.1 and 1.2.

2.2 Slacken clamping nut BG, Fig. 106, and determine the approximate setting for the bias spring adjustment BF by transmitting a succession of Rs. from the *distant* transmitter and increasing the bias from zero towards 'Space' until correct selection just occurs.

2.3 Refine adjustment 2.2 as follows. Determine the lowest setting of the orientation lever for which the receiver correctly selects both 400 Rs and 400 Ys. Let this setting be x_d.

2.4 Move the orientation lever towards 120. Determine the highest setting of the lever for which the receiver correctly selects both 400 Rs and 400 Ys. Let this setting be y_d.

2.5 Increase the bias spring tension in steps of two or three divisions and repeat the tests in 2.3 and 2.4 until $y_d - x_d$ is a maximum. Lock the adjustment with clamp nut BG.

2.6 Set the orientation lever in the centre of the range found in 2.5, i.e. on $\frac{1}{2}(x_d + y_d)$.

3. Lines of Unknown Characteristics

3.1 Slacking clamping nut BG, Fig. 106, adjust the bias spring tension nut BF to give maximum tolerance to *distant* signals, as in adjustments 2.1 – 2.5.

3.2 Check the margin to *local* signals, as in adjustments 1.2 – 1.5.

3.3 If the local margin is adequate, centralise the orientation lever to the settings for *distant* signals found in 3.1.

3.4 If the local margin is inadequate, increase the bias spring tension two or three divisions of the bias adjustment nut BF.

(a) If the local margin is thereby increased, the receiver should be adjusted as for 'short' lines, i.e. in accordance with adjustment 1.

(b) If the local margin is decreased still further, the line is too long (i.e. the line capacitance is too great) for satisfactory operation.

3.5 Lock the adjustment with clamping nut BG.

4. Short Lines (Alternative Method)

N.B.: The 'short lines' procedure given in adjustment 1 is designed to give optimum results. The following simpler procedure may be used, however, in cases where a slight loss of distant margin (not more than 5 per cent) can be tolerated.

4.1 Place the machine in a purely resistive circuit, e.g. in the base workshop.

4.2 Transmitting signals from a T.D.M.T., or a correctly adjusted keyboard transmitter, slacken clamping nut BG, Fig. 106, and adjust the bias spring tension nut BF until the optimum margin is obtained for successions of 400 Rs and 400 Ys. Clamp the bias adjustment locknut BF.

4.3 Place the machine in the line circuit in which it normally operates.

4.4 Measure the margin to signals from the *distant* end and centralise this by means of the orientation device.

D. DOUBLE-CURRENT ADJUSTMENTS

(This Section replaces Adjustment Instructions 59–60 (p.40) in the main text)

N.B.: The following instruction applies to receivers fitted with the new 'adjustable field' type electromagnet S.2848A, Group 9. It is assumed that receiver tolerance is measured with the orientation device.

1. Margin Measurement and Centralisation (without T.D.M.T.).

1.1 Check that the electrical connections are for double-current operation.

1.2 Check the adjustment of the keyboard transmitter which is to be used as a source of signals.

1.3 Connect the output of the transmitter to the receiver (e.g. by working the transmitter and receiver 'in local').

1.4 Transmit a succession of Rs and move the orientation lever towards zero to determine the lowest position for which the receiver correctly registers 400 transmitted characters.

1.5 Leaving the orientation lever in the position found in the last adjustment, transmit 400 Ys. If the machine fails to select correctly, move the lever towards 120 until the receiver just selects correctly. Note the reading, i.e. the orientation setting for which the receiver just correctly selects 400 Rs and 400 Ys. Let this setting be **x**.

1.6 Move the orientation lever past 60 towards 120 and determine, as in 1.4 – 1.5,

the highest orientation setting for which the receiver correctly selects 400 Rs and 400 Ys. Let this setting be y.

1.7 The difference between x and y provides an approximate measure of the receiver tolerance. If this is less than the required amount the adjustment of the machine should be checked.

1.8 Set the orientation lever in the centre of the range determined in 1.7, i.e. on $\frac{1}{2}(x+y)$.

2. Margin Measurement and Centralisation (with T.D.M.T.)

2.1 Check that the electrical connections are for double-current working.

2.2 Connect the receiver to the T.D.M.T. and set the orientation lever on 60.

2.3 Transmit a succession of Rs and slowly turn the control knob on the T.D.M.T. so as to shorten the start signal. Determine the shortest start signal for which the receiver correctly registers 400 transmitted characters.

2.4 Leaving the margin control knob in this position, transmit 400 Ys. If the machine fails to select correctly, lengthen the start signal until it just selects correctly. Note this reading, i.e. the percentage shortened start signal for which the receiver correctly registers 400 Rs and 400 Ys. Let it be x per cent.

2.5 Slowly turn the margin control knob in the opposite direction and determine, as in 2.3 and 2.4, the longest start signal for which the receiver correctly registers 400 Rs and 400 Ys. Let this be y per cent.

2.6 If x and y are unequal, the setting of the orientation lever should be changed and tests 2.3 to 2.5 repeated until they are equal.

(The correction to be applied to the orientation device setting is as follows:-

(1) If the bias is towards shortened start, move the orientation lever towards zero by $\frac{1}{2}(x-y)$ divisions.

(2) If the bias is towards lengthened start, move the orientation lever towards 120 by $\frac{1}{2}(y-x)$ divisions.

It may be necessary to repeat these corrections.)

2.7 When a balance is obtained, check that the margin of the machine is satisfactory.

E. SPRING TENSIONS

Spring No.	*Reference*	*Method of Measurement*	*Tension*
		Function Retention Lever	
PG.7363	W, Fig. 97(a)	Force to raise the lever out of engagement with the hollow in the cam sleeve, measured under the screw-head above the follower. (N.B.: To satisfy this condition, use either hole in the lever to anchor the spring)	14–18 ozs. (397–510 grams)
		Translator Retention Lever	
PG.7372	N, Fig. 94	Force to give an extension of $\frac{1}{8}$" (3mm.)	15–17 ozs. (425–482 grams)
		Clutch Pawls	
PG.3027B	O, Fig. 94) R, Fig. 98)	Force, applied at the pawl abutment face, to press the pawl back against the cam seating	3–4 ozs. (85–113 grams)
		Translator Trip Lever	
PG.7100	I, Fig. 95	Force applied at the screw abutment face of the trip lever just to part the lever from the screw	4–6 ozs. (113–170 grams)
		Selector Release Lever	
PG.7227	CZ, Fig. 111	Force applied at the spring anchor pin of the release lever to disengage the selector detent from its stop arm	2–3 ozs. (57–85 grams)
		Pilot Cam Clutch	
PG.5095	DN, Fig. 111	Force to arrest the pilot cam, with the motor running	4½–5 ozs. (125–157 grams)

E. SPRING TENSIONS (CONTD.)

Spring No.	*Reference*	*Method of Measurement*	*Tension*
		Code Levers	
PG.7367	AJ, Fig. 114	Force applied to the tail of the lever to depress it from the stop pin ..	1¼–2 ozs. (35–55 grams)
		Chopper Lever	
PG.7364A	AG, Fig. 114	Force applied to the knife-edge of the upper arm to move the lower arm away from the cam	3–4¾ ozs. (90–135 grams)
		Finger Springs	
PG.2120	BG, Fig. 115	Force applied at the centre of the spring to depress it flat ..	8–9 ozs. (227–255 grams)
		Function Detent Bellcrank	
PG.7322	Attached to HT, Fig. 112	Force to give an extension of $\frac{23}{64}$" (9.1 mm.)	12–13 ozs. (340–368 grams)
		Resetting Link Lever	
PG.7209	AI, Fig. 102	Force to give an extension of $\frac{19}{32}$" (15 mm.)	12½–13½ ozs. (354–383 grams)
		Rocker Blade Damping Spring	
PG.5097B	AS, Fig. 107	Force to compress the spring to $\frac{9}{32}$" (7 mm.)	4¼–5¼ ozs. (121–148 grams)
		Resetting Bellcrank	
PG.7100	AJ, Fig. 102	Force to give an extension of $\frac{7}{32}$" (5.5 mm.)	3–3½ ozs. (85–99 grams)
		Selector Clutch	
PG.5093B	BA4, Fig. 115	Force to compress the spring to $\frac{5}{16}$" (8 mm.)	12½–14½ ozs (354–411 grams)
		Ribbon Feed Pawl Latch	
PG.7134	AR, Fig. 104	Force to give an extension of $\frac{11}{32}$" (9 mm.)	2½–3 ozs. (71–85 grams)

F. DISMANTLING AND ASSEMBLY INSTRUCTIONS

(This Section replaces Dismantling and Assembly Instructions C.8 (pp. 53–54) in the main text).

NOTE: To reassemble the Overlap Cam Unit, follow the instructions in this Section in the reverse order.

1. Remove the rockshaft end-plate by undoing the two screws DQ, Fig. 111, with their spring washers.

2. Slacken screw DC securing the pilot cam detent retaining plate DB. Disengage the plate from the detent spindle and remove detent DA, together with detent link DE and the rockshaft KH, Fig. 112.

   (When reassembling, ensure that the rockshaft is correctly replaced on its cone-pointed pivots and that it moves freely, but with a minimum of end-play. There should be an oiling washer at each rockshaft pivot.)

3. Slide the orientation adjusting block CL, Fig. 111, to zero on the scale. Disengage spring JM, Fig. 112, from the translator cam retention lever JK and spring CZ, Fig. 111, from the sickle-shaped release lever CV. Remove screw LJ, Fig. 112, spring washer and washer from the selector tripshaft front bearing block LH. Rotate the block to the vertical position and draw the tripshaft LF forward until the selector cam detent LF2 is clear of the selector camshaft driving gear. Rotate the tripshaft anti-clockwise until the detent is horizontal and withdraw the shaft assembly to the right of the unit.

   (To reassemble, hold the bearing block steady on the shaft and, with the whole assembly held horizontal and the sickle-shaped lever facing left, replace it on the unit so that the selector detent is just in front of the camshaft driving gear. Rotate the assembly clockwise and slide the tripshaft into its rear bearing. Rotate the front bearing block clockwise and replace it on its locating pins, against its abutment stop. The pin at the rear of the orientation link CQ, Fig. 111, must lie between the inner radius of the sickle-shaped lever and the semicircular retaining plate.)

4. Disengage the spring from the function cam detent bellcrank HT, Fig. 112. Remove the two screws JC and spring washers securing the detent rocker lever bracket HV, and those holding the tripshaft rear bearing bracket LD. Lift the assembly and move it to the right, clear of the unit; then slide it to the rear to disengage the translator cam detent link from its pivot on the detent tripshaft LC.

   (When reassembled, the front end of the rocker lever JA, Fig. 112, should lie in the fork of the function cam detent bellcrank HT, and its rear end should rest on the translator cam retention lever JK. The rocker lever bracket HV must be carefully replaced on its locating pins.)

5. Remove the two screws and washers securing the lower, horizontal part of the gear cover DX, Fig. 111, and the two countersunk headed screws CC in the front of the orientation support plate CB. Lift off the orientation scale, together with

the gear cover and support plate.

6. Remove the typehammer lever EW, Fig. 112, carefully retaining the roller on its pin.

7. Turn the machine by hand until the traversing link FB is in its extreme position of movement towards the front of the unit. Slacken the clamping screw and remove pivot pin EZ from the front end of the traversing link. Remove the screw securing the feed lever retaining plate EA2; lift off the plate and remove the feed lever GD, with the traversing link. Remove the traversing lever EX, carefully retaining the roller on its pin.

   (When reassembling, the traversing lever is most easily replaced if the oiling washers are refitted one by one to the spindle.)

8. Remove the bellcrank lifting lever EJ, carefully retaining the roller on its pin.

   (When reassembling, ensure that the lubricating wick EJ2, Fig. 112, is correctly replaced round the bearing pin, flush with the top of the bellcrank lifting lever.)

9. Disengage from its anchor pin the tension spring attached to resetting link lever AW, Fig. 114, and remove the three screws and washers securing the selector unit (Fig. 114) to the cam unit casting. With the fingers lowered slide the selector unit to the right to disengage the finger lift link from its pivot on the finger plunger and lift off the unit.

   (When reassembling, the highest part of the fingers BE should be level with the top of the push rod rack BH. With the finger lift lever roller on the straight part of its cam track, place the selector unit on the cam unit casting, holding it to the front against its two locating pins. Turn the main gear gently by hand, anticlockwise, until the cone-pointed pivot pin on the finger plunger engages with the hole in the finger lift link. Ensure that the selector unit lies against its abutment plate on the cam unit casting, behind the finger block, and secure it with the three screws and washers.)

   To dismantle the selector unit further, see Instructions 16 and 17.

10. Remove screw HR, Fig. 112, spring washer and clamp plate HQ securing the function cam detent mounting spring to the base. Withdraw the detent assembly to the front to disengage the detent link from its pivot on the detent bellcrank HT and slide the detent out to the right, together with its spring backing strip.

    (When reassembled, the lug on the clamp plate HQ should lie to the front.)

11. Remove the screw securing the translator cam detent assembly HN. Hold the link lever and move the mounting spring horizontally and anti-clockwise until the detent assembly can be withdrawn to the right of the unit.

    (When reassembled, the lug on the clamp plate should lie to the rear.)

12. Slacken the screw holding the finger lift lever retaining plate EE, Fig. 113. Withdraw the plate from the finger lift lever pivot, rotating it anticlockwise, clear of the pivot. Turn the barrel camshaft until the lever is fully raised and, ensuring that the ribbon feed pawl is latched up, withdraw the finger lift assembly to the right, keeping the roller on its pin.

(When reassembled, the finger lift lever roller should lie in the cam track nearest the rear of the unit. When the cam unit has been replaced on the machine the ribbon feed pawl must be unlatched. This can be done by inserting a small screwdriver in front of the front bearing bracket of the selector camshaft and pressing the latch clockwise).

13. Remove the two screws securing the translator cam retention lever bracket JE, Fig. 112, and withdraw the assembly.

14. Disengage the spring from the function cam retention lever ER, Fig. 113. Rotate the main driving gear until the hole in it lines up with the cutaway in the orientation support plate, thus giving access to the screw securing the retention lever bracket EM to the casting. Slacken this screw; draw the assembly forward to clear the locating pins and lift it from the unit.

15. Remove the two screws securing each of the two barrel camshaft bearing blocks GK and GL and lift off the camshaft assembly complete.

(When reassembling, care must be taken to ensure that the camshaft bearing blocks are correctly located and seated. The longer screws secure the front block.)

To dismantle the barrel camshaft further, see Instruction 18.

16 TO DISMANTLE THE SELECTOR UNIT (Figs. 114 and 115)

16.1 Remove the two screws securing the selector camshaft front bearing bracket AB, Fig. 114. Pass a screwdriver along the left-hand edges of the five sequential levers AN, parallel to the cam sleeve, and hold the levers away from it. With the blade of the screwdriver against the right-hand edge of the upper arm of the chopper lever AF, hold that lever over towards the cam sleeve. The noses of the code levers AH and of the chopper lever will now be held clear of their respective cams, and the cam sleeve assembly BA can be withdrawn from the unit.

(When reassembling, depress the lower arm of the chopper lever before engaging the screwdriver blade with its upper arm. Adjust the position of the front bearing bracket AB laterally until the chopper lever lines up with its cam and clamp it in that position.)

16.2 Undo the two screws and washers securing the push rod keep plate AQ and remove the plate.

(When reassembling, ensure that the shorter screw AS is replaced in the position shown. At this stage of reassembly check that the push rods slide freely in the upper rack and in the push rod rack.)

16.3 Slide the five finger push rods AO in turn to the right, out of the push rod rack BH mounted on the finger block BB. Lift them out of engagement with their sequential levers and withdraw them from the upper rack AP.

(When reassembling, align the sequential levers with the right-hand edge of the upper rack. Slide the small ends of the push rods into the push rod rack; then insert the push rods in the upper rack, ensuring that their knuckle joints engage with the upper ends of the sequential levers.)

16.4 Remove the two screws and spring washers securing the resetting link keep plate BP, Fig. 115, to the finger block and lift off the plate.

16.5 Move the resetting link AV, Fig. 114, to the rear, out of the slot in the push rod rack. Lift its pivot out of engagement with the resetting link lever AW and remove the resetting link.

16.6 Lift the resetting link lever, with its tension spring, from its pivot in the selector unit casting.

16.7 Undo screw BO securing the finger block to the selector unit casting and remove the finger block.

16.8 Undo the two screws securing the push rod rack to the finger block and remove the rack.

(When reassembled, the slot in the push rod rack should lie towards the rear of the unit.)

16.9 Remove the two screws BM and compression springs BN securing the lubricator frame BL to the finger block. Lift off the frame, followed by the finger block front plate BJ.

(When reassembling, the front plate must be replaced so that the step is towards the top edge of the finger block. Check that the lubricator frame screws do not trap the compression springs and that the frame is free to move.)

16.10 The finger plunger BD, Fig. 115, may now be withdrawn from the bottom of the finger block, with the finger pivot BD2, fingers BE, finger springs BG and dampers BF.

(When reassembling, the dampers must be inserted to the left of the fingers with the finger springs bearing on the dampers, as illustrated in Fig. 109. The smaller locating step on each finger spring should be at the bottom edge of the guideway in the finger block and the finger block front plate should lie between the two steps, flush with the front of the block.)

16.11 Remove the two screws securing the lower rack support block AL2, Fig. 114, to the casting and remove the block, withdrawing the lower rack AL1 carefully from the sequential levers.

(When reassembling, the upper arm of the chopper lever must be held to the left whilst the support block is replaced.)

16.12 Withdraw the sequential levers in turn from the upper rack and disengage their lower ends from the knuckle joints in the code levers AH by sliding them slightly to one side.

(When reassembling, locate each sequential lever carefully in its knuckle joint with a pair of tweezers so that it does not overlap the code lever; then support its upper end in the appropriate guideway in the upper rack.

Check that the recess in each sequential lever faces away from the finger block.)

16.13 Undo the remaining screw and spring washer securing the upper rack and remove the rack.

16.14 Slide the five code levers, spacing washer and chopper lever in turn from their pivot AA5, after disengaging their tension springs from the anchor pins.

(When reassembling, insert the code levers from underneath the casting. Ensure that the tails of the code levers lie under the eccentric stop pin AA4 and that the tension springs are correctly replaced in staggered order.)

17. TO DISMANTLE THE SELECTOR CAM SLEEVE (Figs. 114 and 115)

17.1 Remove nuts AY and washer AZ, Fig. 114, securing the front bearing bracket AB to the selector camshaft and remove the bracket.

17.2 Remove the screw securing the selector cam gear BA2, Fig. 115, to the camshaft and slide off the gear, together with the four clutch springs BA4.

17.3 Remove, in the following order: clutch shim(s) BA5, spring pressure plate BA6 with friction disc BA7, selector cam sleeve BA8, friction disc BA7 with driving disc BA9 and driving pin BA10.

(When reassembling, the flat faces on the driving pin must engage between the two studs on the back of the driving disc. The stop arm on the selector camshaft must lie to the front of the selector unit. The two driving studs on the front of the spring pressure plate must engage in the slot in the back of the gear.)

18. TO DISMANTLE THE BARREL CAMSHAFT (Figs. 111 and 113)

18.1 Remove nut DO, Fig. 111, securing the pilot cam clutch spring to the camshaft and take off the spring DN, front pressure plate and friction disc DJ and the pilot cam DM.

(When reassembled, the smaller lug on the pilot cam must face the front of the unit.)

18.2 Unscrew the pilot cam rear pressure plate with its friction disc and slide off the camshaft front bearing block GK, Fig. 113.

(When reassembled, the semicircular retaining plate fixed to the block must face the front of the unit.)

18.3 Slacken screw HD2 in the collar of the selector driving gear and unscrew the gear from the shaft. Slide off the rear bearing block GL.

(When reassembling, the collar should lie to the rear of the unit. The bearing block must be fitted so that the step at its bottom edge lies to the right. It is essential to tighten the locking screw.)

18.4 Slacken the screw in the spacing collar HA and remove the collar.

(When reassembled, the end of this screw should enter the hole in the cam driving sleeve so that its head is flush with the surface of the collar.)

18.5 Press out pin GY securing the translator cam driving sleeve to the camshaft GM.

18.6 Depress the tails of the translator cam sleeve pawls and slide off the cam sleeve GZ.

(When reassembling, ensure that the free ends of the pawl springs engage in the slots in the pawl tails.)

To dismantle further, see Instruction 18.10.

18.7 Slide off the translator cam driving sleeve GX, shock absorber spring GW, ratchet GV and shim GU.

(When reassembled, the ratchet driving dog must face the rear and must engage with the slot in the shock absorber spring. The driving pin on the cam driving sleeve must also engage with this slot. The shouldered pawl pivot pin must engage with the cutaway in the spacing collar.)

18.8 Follow Instruction 18.6 to remove the function cam sleeve GS, with its thrust plate GT.

(When reassembling, ensure that the function and translator cam sleeves are replaced in the correct order. The function cam sleeve can be identified by the wider flange at the pawl end of the sleeve and by the sharp rise on the typehammer lever cam track. The pawl end of each cam sleeve faces the front of the unit).

18.9 Remove the shim (not shown), ratchet GQ, shock absorber spring GP and thrust washer GR.

(When reassembled, the pin on the main gear boss must engage with the slot in the shock absorber spring. The ratchet driving dog, which must face the front of the unit, also engages with this slot. The shouldered pawl pivot pin must engage with the cutaway in the thrust washer.)

18.10 To dismantle the translator and function cam sleeves further, remove the shouldered pawl pivot pin and lift out the pawls and the pawl distance piece. Extract the pin in the solid end of the pawl spring from the hole in the cam sleeve and remove the spring."

Amendment No. 2

On page 23, after the sub-heading "A. Operating Magnet and Cam Unit", insert the following:-

"N.B.: Adjustment Instructions A.1–14 apply to the Orientation Cam Unit.

Adjustment Instructions for the Overlap Cam Unit are given in Appendix I."

Amendment No. 3

On page 27, after the sub-heading "B. Printing Mechanisms", insert the following:-

"N.B.: When an Overlap Cam Unit is fitted, Instruction B.19 should be replaced by A.13, Appendix I."

Amendment No. 4

On page 36, after the sub-heading "G. Adjustments with the Motor Running", insert the following:-

"N.B.: When an Overlap Cam Unit is fitted, Instructions 48 and 52 do not apply. Appropriate instructions are given in Appendix I, Section B."

Amendment No. 5

On page 38, immediately after the sub-heading "H. Single-Current Adjustments", insert the following:-

"NOTE: When an Overlap Cam Unit and Magnet Unit S.2848A, Group 9, are fitted, Instructions H.55–58 should be replaced by Appendix I, Section C."

Amendment No. 6

On page 40, immediately after the sub-heading "I. Double-Current Adjustments", insert the following:-

"NOTE: When an Overlap Cam Unit and Magnet Unit S.2848A, Group 9, are fitted, Instructions I.59–60 should be replaced by Appendix I, Section D."

Amendment No. 7

On page 56, in column 3, immediately above the sub-heading "Combination Head Unit", insert the following:-

"OVERLAP CAM UNIT – See Appendix I, Section E".

Amendment No. 8

On page 53, after paragraph 8, insert the following:-

"8A. *Overlap Cam Unit*

Dismantling and Assembly Instructions for this unit are given in Appendix I, Section F."

Amendment No. 9

On page 29, after the sub-heading "D. Page Attachment Unit", insert the following:-
"N.B.: When an Overlap Cam Unit is fitted, Instruction D.24 should be replaced by Instruction A.19, Appendix I."

Amendment No. 10

After Fig.69, insert Figs.94–115 attached hereto.

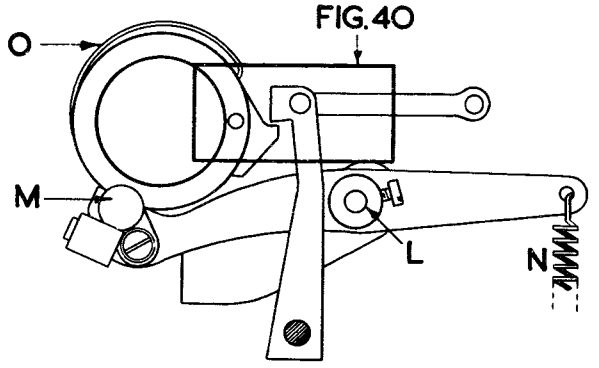

FIG. 94

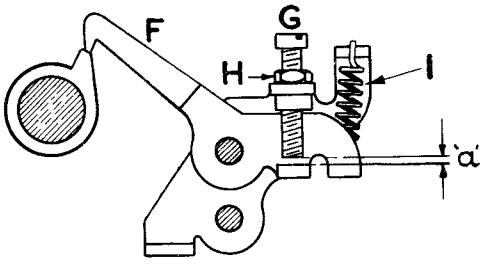

FIG. 95

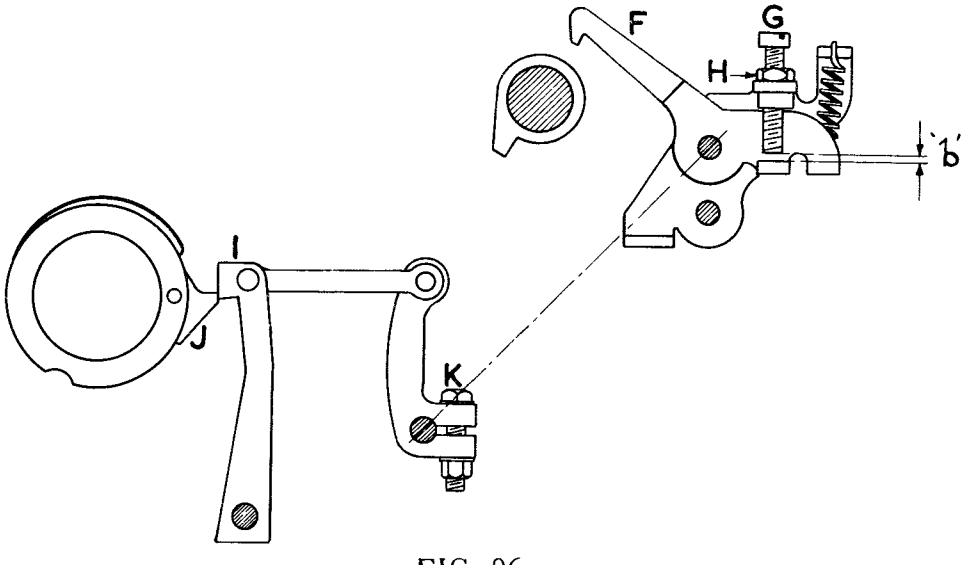

FIG. 96

a' = .018 – .022 in. / .46 – .56 mm.

'b' = .011 – .015 in. / .28 – .38 mm.

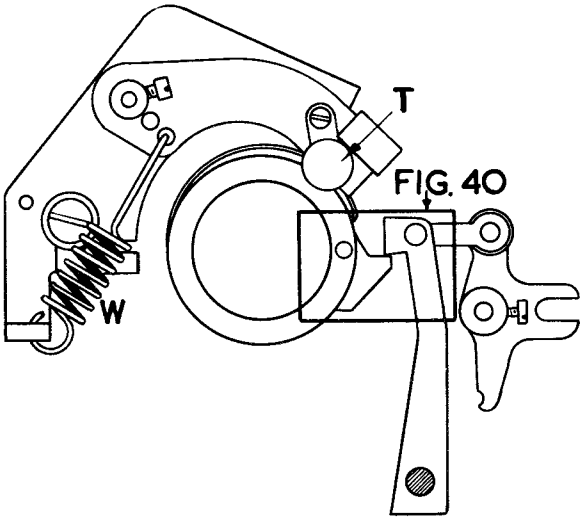

FIG. 97 (a)

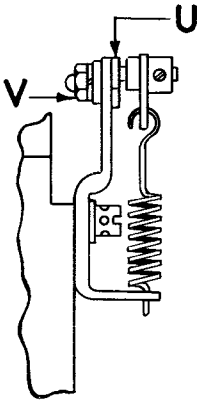

FIG. 97 (b)

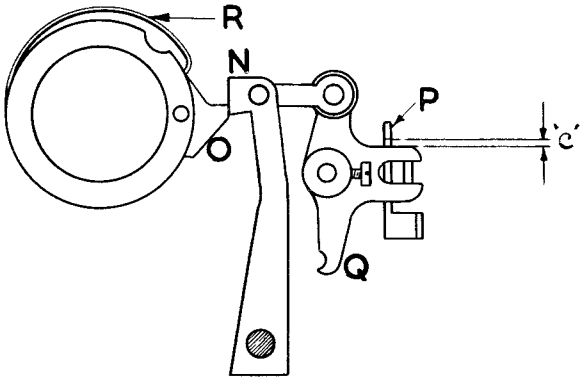

FIG. 98

'c' = { .020 – .023 in.
.51 – .58 mm.

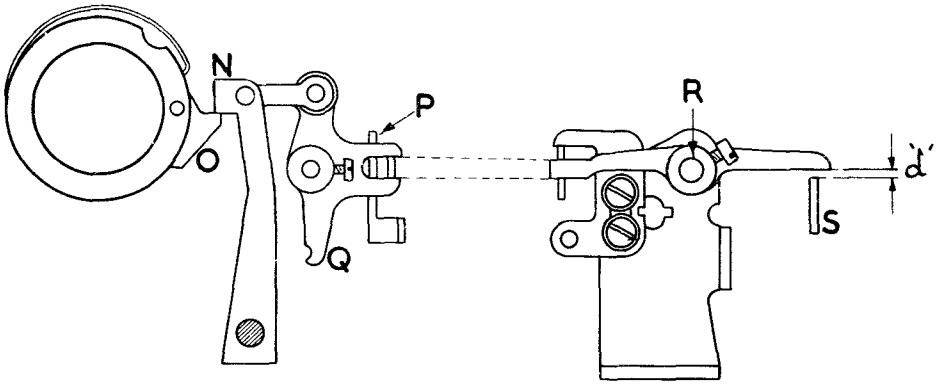

FIG. 99

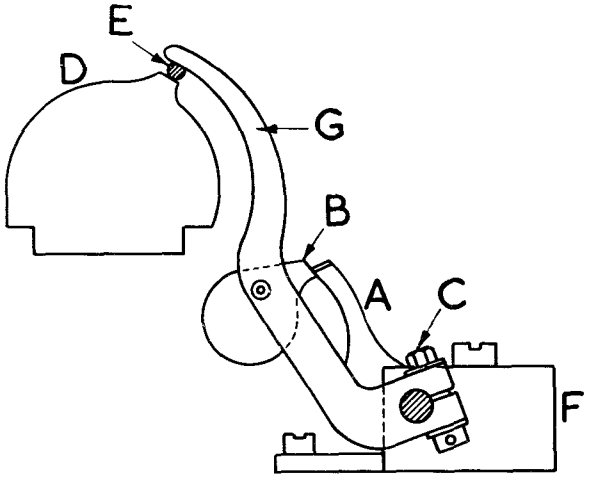

FIG. 100

'd' = $\begin{cases} .031 - .035 \text{ in.} \\ .79 - .89 \text{ mm.} \end{cases}$

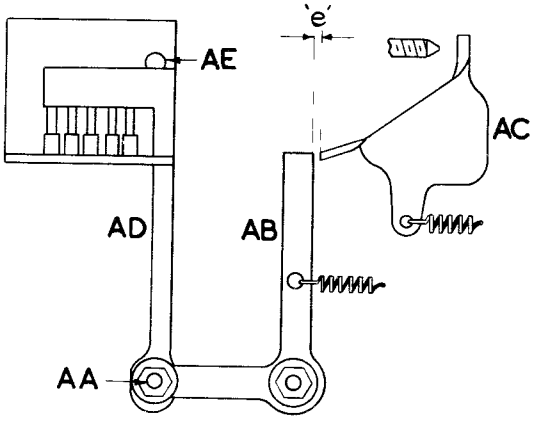

FIG. 101

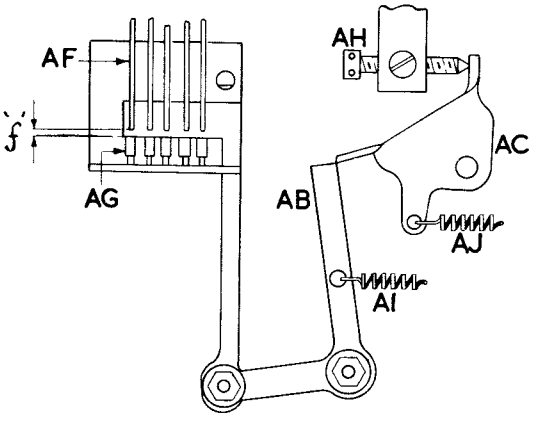

FIG. 102

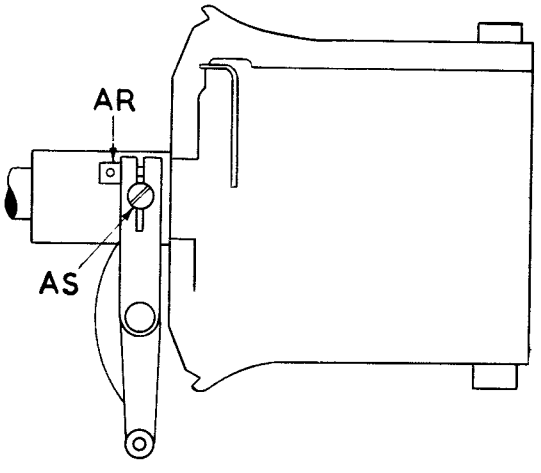

FIG. 103

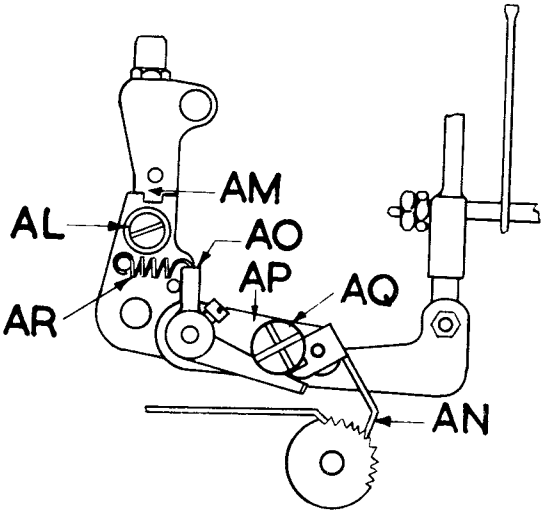

FIG. 104

e' = .010 – .015 in. / .25 – .38 mm.

'f' = .012 – .018 in. / .30 – .46 mm.

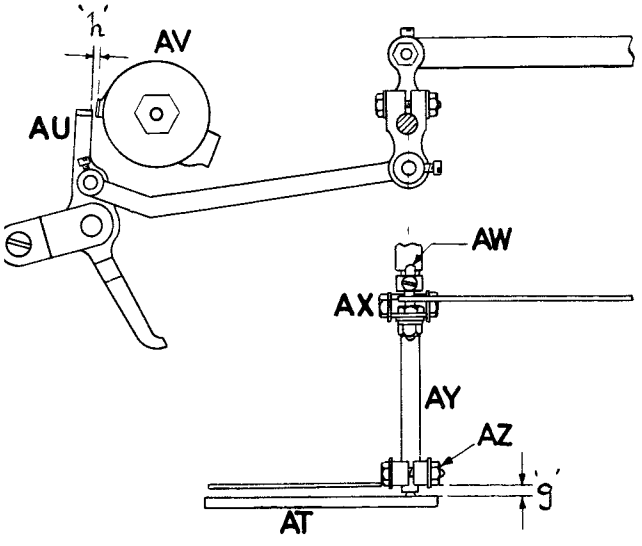

FIG. 105

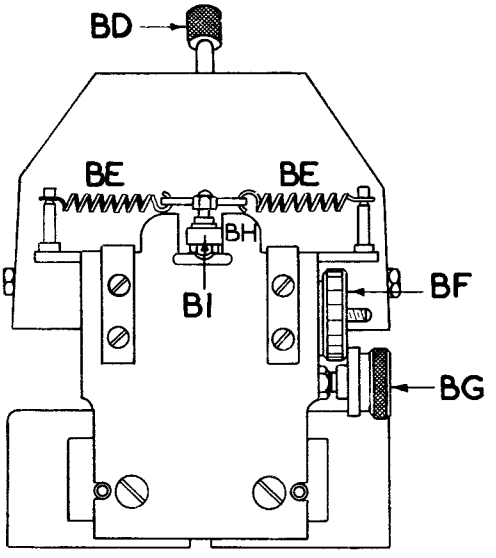

FIG. 106

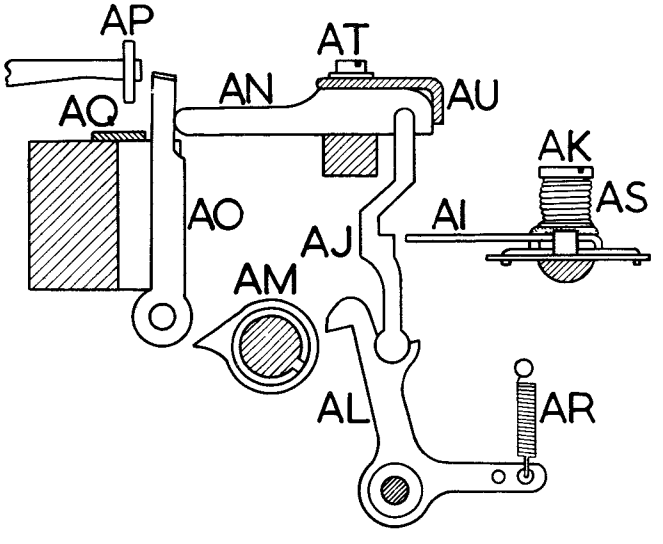

FIG. 107

'g' = {.025 – .031 in. / .64 – .79 mm.

'h' = {.013 – .017 in. / .33 – .43 mm.

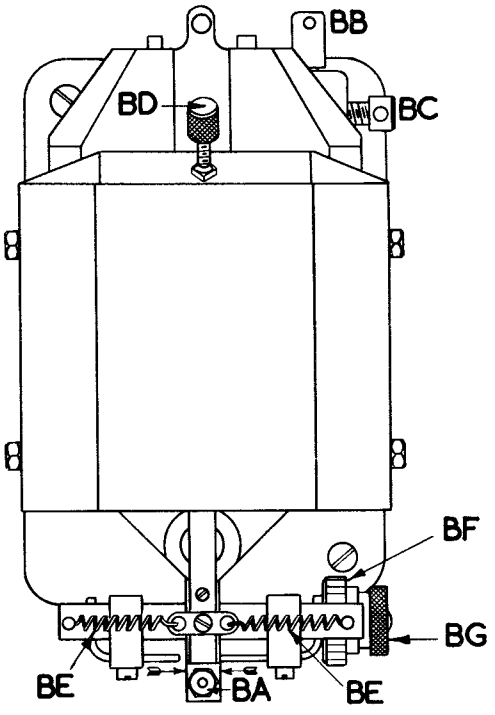

FIG. 108

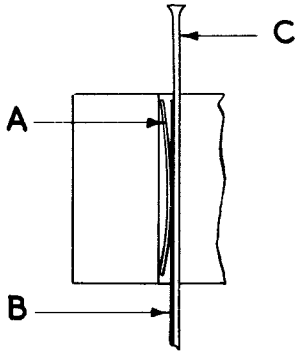

FIG. 109

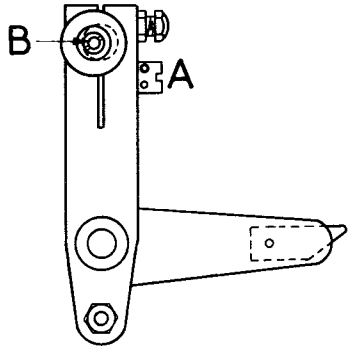

FIG. 110

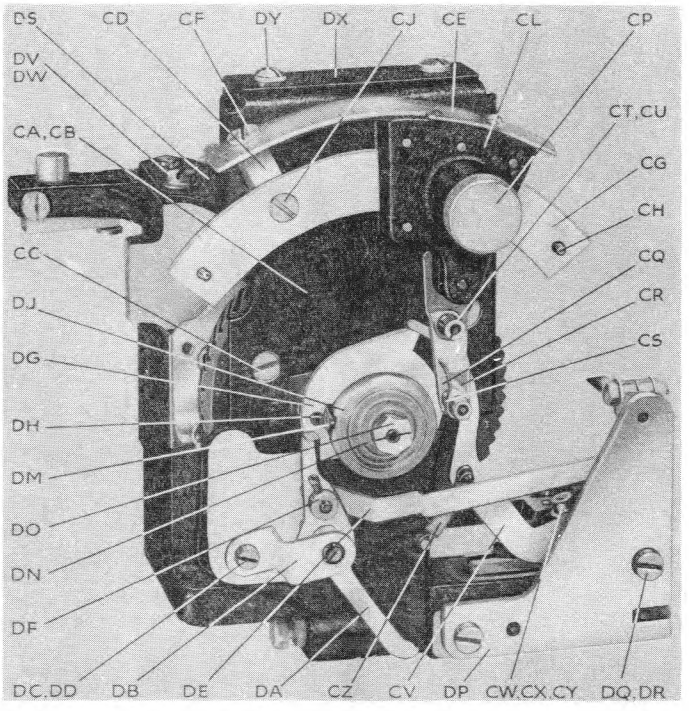

FIG. 111 ORIENTATION DEVICE.

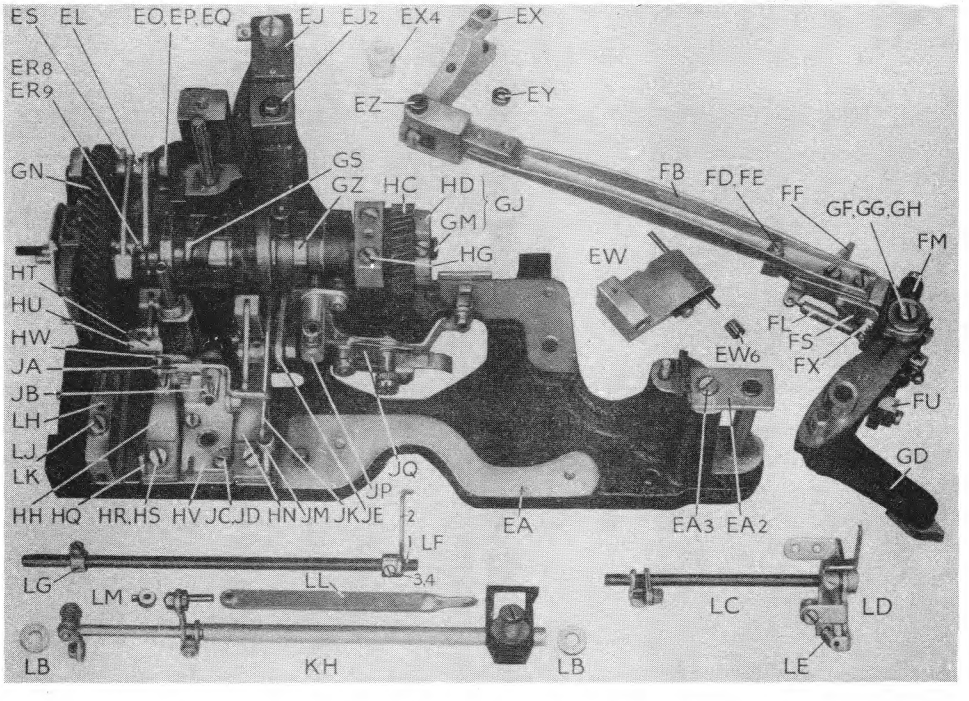

FIG. 112 CAM UNIT PARTIAL ASSEMBLY.

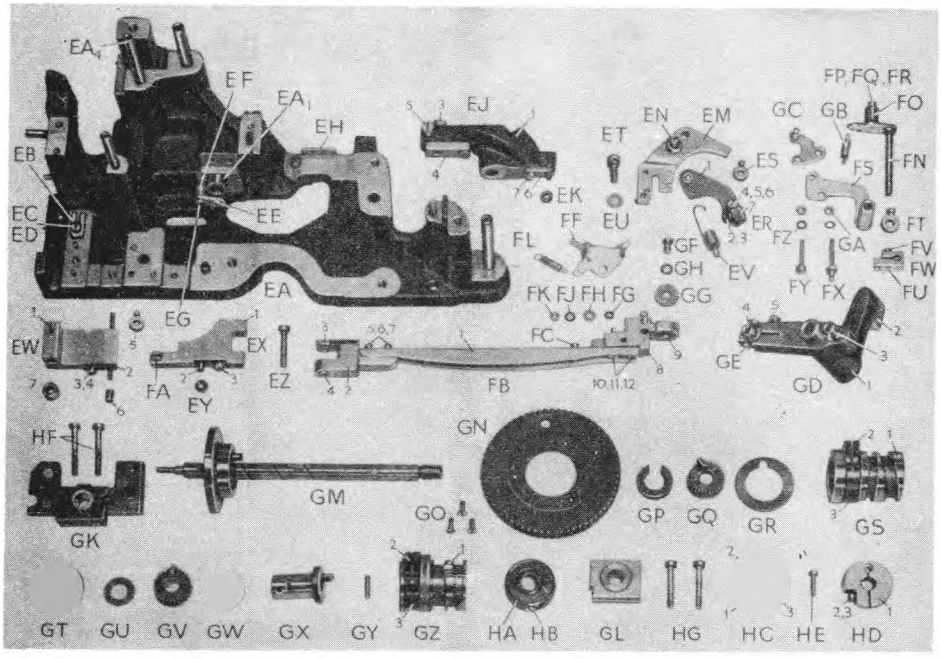

FIG. 113 PARTIAL ASSEMBLY COMPONENTS.

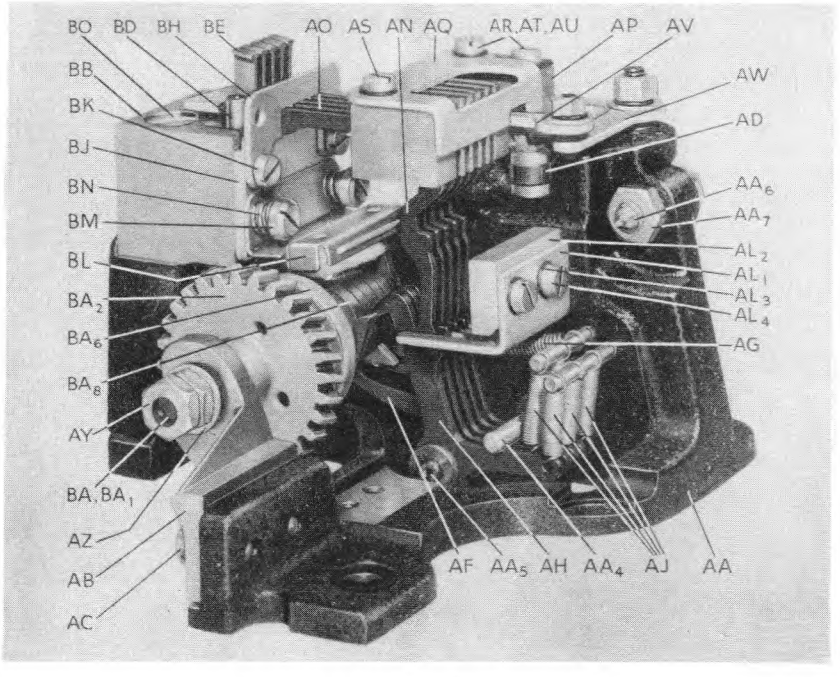

FIG. 114 SELECTOR UNIT.

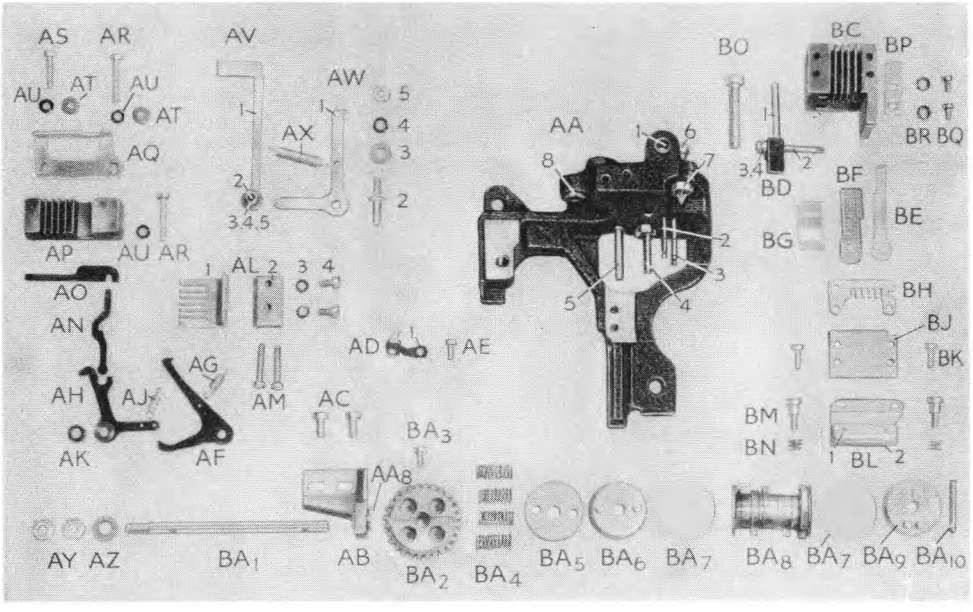

FIG. 115 SELECTOR UNIT COMPONENTS.