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Colin Hinson
In the village of Blunham, Bedfordshire.

INSTRUCTION BOOKLET No. 47K
(3rd Edition)

THE 'N' TYPE KEYB AR

(Nos. 7, 47, 54 and 85 Teleprinters)

MAINTENANCE INSTRUCTIONS

(February 1956)

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T.I.S. No. 62
Page 1/1
(Issued March 1958)

AMENDMENTS TO BOOKLET NO.47K

(The "N' Type Keyboard)

Amendment No. 1

On page 22, Adjustment 22.2, delete "remove the unit from the keyboard".

Amendment No. 2

On page 23, delete Adjustment 23.3 and replace with the following:-

"23.3 Turn the ratchet wheel J, Fig.30, until retention pawl L is resting on top of a tooth, and with this condition set up, check that grub screw P is clear of the tail of retention pawl L by .003 - .005 in. (.08 - .13 mm.) i.e. dimension 'o'."

Amendment No. 3

On page 28, Spring Tensions, PG.7354, delete "21½ - 26½ ozs. (610 - 751 gms.)" and insert "22 - 28 ozs. (630 - 790 gms.)".

Amendment No. 4

Delete Fig.30 and its corresponding dimension 'o', and replace with Fig.30 of this T.I.S.

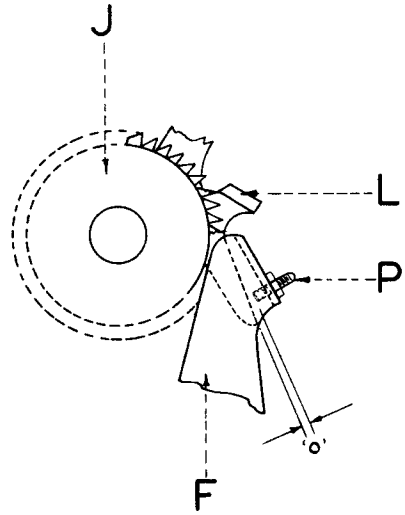

FIG. 30

DIMENSION

'o' = ·003 - ·005 in
·08 - ·13 mm

FIG. 1 THE 'N' TYPE KEYBOARD

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CONTENTS (contd.)

ADJUSTMENT INSTRUCTIONS (contd.)

INTRODUCTION

This edition of Instruction Booklet 47K provides maintenance instructions for the 'N' type (Style 3) Keyboard as used on the Nos. 7, 47, 54 and 85 Teleprinters. It should be used in conjunction with the following booklets:-

1. Instruction Booklet 47R (1st Ed.): applicable to the No. 47 Teleprinter Receiver.
2. Instruction Booklet 54 (1st Ed.): applicable to the No. 54 Teleprinter Receiver.
3. Instruction Booklet 78 (12th Ed.): applicable to the No. 7 Teleprinter Receiver.
4. Instruction Booklet 85 (Issue 3): applicable to the No. 85 Printing Reperforator.

All maintenance instructions for the 'N' type keyboard which have been issued since the previous edition, in the form of Technical Information Supplements, have been incorporated in the present edition. These T.I.S.s are therefore cancelled.

DISMANTLING AND ASSEMBLING INSTRUCTIONS

N.B.: (1) Do not touch the screws which are painted red. Most of these are abutment screws which have been set to gauge, and once they are slackened cannot be correctly re-adjusted without returning the unit to the factory.

(2) When the keyboard has been dismantled in accordance with the following instructions, it may be assembled by following the same instructions in the reverse order. Attention should be given to the notes on assembly procedure which are placed in brackets immediately under the instructions to which they apply.

(3) 'A', 'B' and 'C' instructions are peculiar to 'No.7 Pattern', 'No.47 Pattern', and 'No.54 Pattern' Keyboards respectively. Unlettered instructions apply to all three types of keyboard.

A. TO REMOVE INDIVIDUAL UNITS

1. **To Remove the Keyboard** (Figs. 31, 32 and 34)

1.1A Disconnect the rubber cuttings tube if a reperforating attachment is fitted. Withdraw the two fixing screws, disconnect the plug and socket if an End-of-Line Indicator is fitted, and lift the keyboard from the machine. (**N.B.:** If a reperforating attachment is fitted, take care not to lose any of the plungers of the trip and selector cables when removing the keyboard.)

(When replacing the keyboard on the machine, engage the A/B release shaft with the hook on the A/B Unit and the locating peg W, Fig. 34, with its slot in the keyboard casting. (**N.B.:** If a reperforating attachment is fitted, care should be taken to ensure that the reperforator trip and selector levers are correctly positioned with respect to the cable plungers on the main base). Fit the fibre coupling disc and carry out Adjustment Instruction 28AC. before tightening the keyboard fixing screws fully.)

1.1B Withdraw the three fixing screws, disconnect the plug and socket for the End-of-Line Indicator, and lift the keyboard from the machine.

(When replacing the keyboard on the machine, remove the keyboard dust cover and gear cover, and also the gear cover on the main base. Assemble the keyboard to the teleprinter main base, engaging pin A, Fig. 31, on the idler gear casting, with the slot in the keyboard gear bracket C, and engaging the A/B release shaft with the hook on the A/B Unit. Check that the contact block is correctly engaged with the jack on the main base, and adjust, if necessary, by slackening the locknut of screw M, Fig. 32, moving the block and re-tightening the locknut. Before tightening the keyboard fixing screws, carry out Adjustment Instructions 28B, and refit the gear and dust covers.)

1.1C Raise the main base casting so as to clear the shock absorber mountings on the silencing base, and insert packing to maintain this position. If a

reperforating attachment is fitted, disconnect the rubber cuttings tube. Withdraw the two keyboard fixing screws and lift the keyboard off the machine. (N.B.: If a reperforating attachment is fitted, take care not to lose any of the plungers of the trip and selector cables when removing the keyboard). Remove the packing and lower the machine to its normal position.

(When assembling the keyboard to the main base, raise the main base as before, lower the keyboard on to the two abutment screws, engage the locating peg with its slot in the keyboard casting and the A/B release shaft with the hook on the A/B unit. Slide the keyboard forward and insert the fixing screws. (N.B.: If a reperforating attachment is fitted, care should be taken to ensure that the reperforator trip and selector levers are correctly positioned with respect to the cable plungers on the main base). Lower the machine to its normal position. Carry out Adjustment Instruction 28AC and tighten the keyboard fixing screws.)

1.2C Remove the screws securing the keyboard seal (one at each end of the keyboard), depress the 'Figures' key and withdraw the seal from the keyboard.

2. **To Remove the Transmitter Unit** (Figs. 2 and 3)

2.1AB Slacken the transmitter unit cover fixing screws and remove the cover.

2.2A Remove the right-hand cover bracket K, Fig. 2, slacken the transmitter block terminal screws and withdraw the spade terminals, thus disconnecting the block.

(When assembling, note that the colours of the wires, from left to right, looking from the back of the unit, are Yellow, Green, Blue, Red, Black, White.)

2.2B Remove the right-hand cover bracket K, Fig. 2, slacken the transmitter block terminal screws and withdraw the spade terminals, thus disconnecting the block.

(When assembling, note that the colours of the wires, from left to right, looking from the back of the unit, are White, Blue, Orange, Green, Black, Red.)

2.2C If the starter switch control unit is operated by the depression of the 'Letters' key, disconnect and remove the keybar connecting link. Slacken the transmitter block terminal screws and withdraw the spade terminals, thus disconnecting the block.

(When assembling, note that the colours of the wires, from left to right, looking from the rear of the keyboard, are Yellow, Green, Blue, Red, Black, White.)

2.3 Lift the locking frame X, Fig. 3, and remove the three fixing screws of the transmitter unit. When removing the left-hand screw, care must be taken to insert the screwdriver so that it does not foul the keybar springs behind the front plate.

2.4 If an End-of-Line Indicator is fitted, remove collar H, Fig. 8, and release the indicator resetting link from the Counter Unit.

2.5 Lift the unit off the keyboard, taking care to disengage the transfer and release bars from their linkage with the answer-back unit.

(When replacing the transmitter unit, ensure that the selecting bellcranks are correctly engaged with the transfer bars, lower the unit on to the keyboard and connect the linkage between the transmitter and answer-back units. Before lowering the right-hand end of the transmitter unit, raise the locking frame and check that the operating levers are in engagement with the coupling links of the combination unit, and that the pin of the trip lever on the combination unit is located in the fork of the detent operating lever. Ensure that the unit is resting on its locating edge and abutting against its stop pin before clamping the fixing screws.)

3. **To Remove the Answer-Back Unit**

3.1C Remove the trip link between the keyboard lever and the A/B keybar by slackening the screw securing the collar, and removing the collar and link.

3.2 Remove the fixing screws and washers securing the driving shaft to the unit and remove the shaft assembly. Remove the fixing screws and washers securing the unit to the keyboard.

3.3 Move the unit to the left (looking from the front of the keyboard) and lift the left-hand end of the unit so that the linkage between the A/B unit and the transmitter unit transfer bars is disengaged. Lift the unit clear of the keyboard, taking care not to damage the transfer bar rack.

4. **To Remove the Combination Unit**

4.1 If an End-of-Line Indicator is fitted, remove collar H, Fig. 8, and release the indicator resetting link from the Counter Unit.

4.2 Turn the keyboard over and remove the four fixing screws (two at each end) from the combination unit. Lift the left-hand end of the unit clear of the casting and carefully withdraw the unit.

(When assembling, make sure that the coupling links are engaging correctly with the operating levers on the transmitter unit, and that the pin of the trip lever is located in the fork of the detent operating lever, before tightening the four fixing screws. Also ensure that the unit is correctly located against the abutment plates.)

5. **To Remove the Counter Unit** (if fitted)

5.1 Slacken the transmitter unit cover fixing screws and remove the cover. Remove the collar H, Fig. 8, and release the indicator resetting link.

5.2 Remove the three fixing nuts and washers securing the counter unit to the transmitter back plate and detach the counter.

Note: Do not alter the position of the locating plate D, Fig. 27; otherwise, the counter will not be correctly located when replaced.

6. **To Remove the Transmitter Contact Block** (Fig. 2)

6.1AB Slacken the transmitter unit cover fixing screws and remove the cover. Remove the right-hand cover bracket K.

6.2 Remove the bias springs. Disconnect the cable form by slackening the terminal screws and withdrawing the spade terminals.

(When re-connecting, the colour sequences set out in Instruction 2.2 should be followed.)

6.3 Remove the three fixing screws and washers F, G and H. Lift the contact block L off the main unit.

Note: Do not alter the position of the locating plate secured by screw E; otherwise, the contact block will not be correctly located when replaced.

B. TO DISMANTLE INDIVIDUAL UNITS

7. **To Dismantle the Transmitter Contact Block** (Fig. 5)

7.1 Remove the two bias adjusting lever springs from their anchor pin at the rear of the contact block.

7.2 Remove the screw in the side of the bias adjusting lever L and withdraw pin K, together with the spring.

7.3 Remove the bias adjusting lever L.

7.4 Remove the fixing screw J, and lift out the transmitter tongue together with the pivot block. Remove the fixing screws of contact blocks M and O and remove the blocks, together with the contact screws N and P.

7.5 If a Send/Receive switch is fitted, remove the screw G securing the Send/Receive tongue mounting bracket and remove the bracket together with the tongue. Remove the contact blocks by removing their fixing screws.

8. **To Dismantle the Transmitter Operating Mechanism** (Figs. 2, 3 and 4)

8.1 Remove the striker spring M, Fig. 2, from its anchor pin.

8.2 Withdraw the fixing screw and washers B, C and D, securing the striker lever bracket J, and ease it clear of its locating pins.

8.3 Raise the bracket until the striker lever N clears the front plate O, then disengage the striker from the striker operating unit and remove the latter.

(On assembly, Adjustment Instruction 1 must be carried out before fitting the striker lever bracket.)

8.4 Remove the striker from the pivot in the common operating lever R, Fig. 3.

8.5 Remove the driving shaft A, Fig. 4, after withdrawing the two fixing screws and washers B.

8.6 Remove the countersunk screws at the rear of the unit which secure the transfer bar guides A, Fig. 2, and remove the guides complete with transfer bars, release bar etc.

(On assembly, ensure that the transfer bars are correctly disposed with respect to the selecting bellcranks.)

8.7 Remove the detent spring D, Fig. 4, from the anchor pin at the back of the unit.

8.8 Remove the detent fixing screws and washers, the detent, detent fixing block, and the shims from the front of the detent control shaft C.

8.9 Unscrew the two nuts E securing the clutch spring retaining plate and remove the plate and spring. Withdraw the clutch ratchet. Push out the pin securing the clutch dog, and remove the clutch dog, shims and gear wheel F from the transmitter shaft.

(When assembling, ensure that the clutch dog and ratchet are in correct angular relationship to the camshaft spindle before fitting the pin. This may be achieved by turning the shaft until the retention lever is resting in its cam recess (as in Fig. 10) and turning the clutch dog and ratchet until the camming-out face of the clutch is uppermost.)

8.10 Detach the spring V, Fig. 3, from its anchor pin. Slacken the screw W and withdraw the locking frame X and its set collar from the locking frame pivot.

8.11 Remove the indicator feed lever spring from its anchor pin on the underside of the front plate. Remove the three nuts and washers P, Fig. 2, and lift the front plate off its locating pins. Remove the cam lubricator and its spring from the front plate, and remove spring V, Fig. 3.

(On assembly, spring V must be fitted before replacing the front plate.)

8.12 Remove the spring AC from its anchor pin and withdraw the retaining lever AB from its pivot.

8.13 If a Send/Receive switch is fitted, remove spring AD and withdraw the Send/Receive lever from its pivot.

8.14 Remove the detent control shaft AA and associated parts, i.e. detent operating lever, latch, indicator feed lever etc.

8.15 Push the top of the common operating lever R over to the right as far as it will go. This will lift the six operating levers S clear of the cam. Remove the transmitter shaft Y complete with cams etc.

8.16 Withdraw lubricator and spring U from its pivot after unscrewing the retaining collar screw and removing the collar.

8.17 Release the operating lever springs T from the common anchor pin. These can be slipped over the pin one at a time. (When the springs are replaced they must be staggered.)

8.18 Release the spring Q from its anchor pin and remove the common operating lever R from its pivot.

8.19 Remove the countersunk screw at the rear of the unit which secures the selector rack and remove the rack.

8.20 Remove the clip securing the operating levers S and withdraw the levers and spacing washers from their pivot.

8.21 Remove the clip securing the selector levers Z and withdraw the levers and spacing washers from their pivot.

8.22 Remove the clip securing the selecting bellcranks and after disengaging the bellcrank springs from their anchor pin, withdraw the bellcranks from their pivot.

Note: When the unit has been assembled, check the locking frame clearance as given in Adjustment Instruction 3 before refitting the unit to the keyboard.

9. **To Dismantle the Counter Unit** (Fig. 8)

9.1A Remove the two screws securing the contact pile-up and lift off the pile-up complete with twin lead and plug.

9.1B Release the connection block and the wire supporting clip at the rear of the unit. Remove the contact pile-up F complete with wiring. Remove the connection block supporting bracket.

9.2 Release spring J from its spring anchor pin.

9.3 Remove the spring resetting lever D, together with the collar, from its pivot.

9.4 Remove two collars, one on the pivot of the contact operating lever K, and the other on the pivot of the retention pawl B. Remove the washer and the lever K.

(When assembling, replace the contact operating lever K so that the pivot of the retention pawl protrudes between the forked ends.)

9.5 Release the spring A from its anchor pin and remove the stop plate L with the washer.

(When assembling, before replacing the stop plate L, rotate the ratchet wheel G in an anti-clockwise direction, sufficiently for the stud on the wheel to clear the stop plate L.)

N.B.: Before proceeding any further with the assembly, Adjustment Instruction 22 should be carried out.

9.6 Release the long spring attached to the ratchet wheel. Remove the collar and ratchet wheel G from their pivot.

9.7 Remove the collar and feed link E from their pivot after releasing the feed link spring.

9.8 Release the spring C from its anchor pin and withdraw the retention pawl B, taking care not to lose the distance collar on top of the pawl.

9.9 Release the damping buffer spring from its anchor pin at the rear of the unit. Slacken the clamping nut and withdraw the damping buffer screw. Remove the components of the damping buffer, i.e. spring, clamp plate, friction plate, damping buffer, and second friction plate.

N.B.: When the Counter Unit has been completely assembled, but before it has been replaced on the keyboard, Adjustment Instruction 23 should be carried out.

10. **To Dismantle the Answer-Back Unit** (Figs. 6 and 7)

10.1 Remove the nut CP and the washers CN and CO clamping the answer-back ward drum pivot. Unscrew the pivot from the backplate and draw it through the hole in the front plate. Lift the ward drum vertically off the unit.

10.2 Turn the unit on its back. Remove the trip bar spring AV. Remove the threaded pins DA at the bottom of the unit. Remove the transfer bar guide rack CZ, the five transfer bars DC, the resetting bar, the transmitter release bar CR_1, and the trip bar AT.

(When assembling, note that the third slot from the front in the transfer and trip bar rack is left vacant.)

10.3 Remove the spring AE from the trip lever X. Slacken the screw securing the locating collar AC and withdraw the trip lever and collar from their pivot. Remove the latch support arm AF and collar.

(When assembling, the trip lever collar should be set in such a position that the lower extension of the trip lever X engages centrally with the trip bar AT.)

10.4 Turn the unit on its face and remove the screw securing the transfer bar rack DK, situated below the control cam shaft. The rack can then be lifted from the backplate.

10.5 Remove the springs from the resetting lever DO and the transmitter release bar DP, and remove the springs DH and DJ.

10.6 Remove screws BR, and washers BS, together with the rear bearing plate BP and bush BQ. Remove the three shims and gear BL.

10.7 Holding the control shaft AZ steady by inserting a tommy-pin through the hole in the rear of the shaft, remove the nut BW and washer BV from the front of the shaft. Remove the front plate fixing nuts and washers, and spring EC. Unscrew screw EB and remove the retention lever DX. The front plate B can now be lifted from the supporting pillars.

10.8 Remove the intermediate gear. Press back the operating levers clear of the control shaft, draw the latter forward and remove from the unit.

10.9 Remove detent lever AW, the hold-out lever, transmitter release lever DP, resetting lever DO, washers and collars.

10.10 Remove the operating lever racks CW by removing their fixing screws. Remove collar, washer and keyboard lock lever DS from the right-hand pillar.

10.11 Loosen the screw of the collar located between the release lever CS and the top operating lever. Remove the release lever and the operating levers, with their spacing collars and washers, sliding the springs over their anchor pin.

(When assembling, note that there are two spacing washers and a set collar between the front member of the release lever CS and the top operating lever, one spacing washer in each of the gaps between the operating levers, and one between the bottom operating lever and the lower member of the release lever CS.)

10.12 Loosen the screw of the collar CX holding the transfer bar lock frame DE, and the stop bracket DF, and remove them.

N.B.: When the Answer-Back Unit has been assembled, with the exception of the driving shaft, Adjustment Instructions 12 – 17 should be carried out prior to refitting the unit to the keyboard.)

11. To Dismantle the Combination Unit (Fig. 9)

11.1 Remove the clip securing the connecting lever pivot Q, withdraw the pivot from the rear, and remove the trip lever O, the five connecting levers P and the spacing washers.

11.2 Remove the two fixing screws securing the bar retaining bracket M, and remove the bracket. Lift the five combination bars T out of their racks.

(On assembly, replace the combination bars in the following order:-

No. 1 Comb Bar – occupying rear slot
No. 2 Comb Bar
No. 3 Comb Bar
No. 4 Comb Bar
No. 5 Comb Bar
Shift Locking Bar
Trip Bar – occupying front slot.)

11.3 Remove the trip bar spring N from its anchor pin, lift the trip bar R and the shift locking bar S clear of the left-hand rack, and withdraw them under the bias spring bracket.

Note:- Do not slacken the screws securing the comb bar racks; otherwise, the relationship between the combination unit and the transmitter unit will be disturbed.

ADJUSTMENT INSTRUCTIONS

N.B.: (1) Screws and nuts that are painted red should not be slackened unless a specific instruction to this effect is given. The majority of such screws and nuts are located by special gauge in the factory and if disturbed it will be necessary to return the parts to the factory for readjustment.

(2) It is inadvisable, at a routine maintenance visit, to disturb any adjustment unless it is incorrect. To simplify the checking of adjustments without disturbing them, each of the following adjustments is divided into distinct sections headed '*Check*' and '*Action*', and a guide to the frequency with which these checks should be performed is given by placing asterisks after some of them. Adjustments asterisked in this way should be checked during routine maintenance visits, while the remainder may be left until the machine is overhauled.

(3) If an individual adjustment is carried out, i.e. not as part of the given sequence, all related adjustments should be checked to ensure that they remain unchanged.

A. STRIKER TRANSMITTER UNIT

1. **Retention Lever** (Figs. 10, 11 and 15)

Check *

1.1 Remove spring S, Fig. 15, and the striker operating bracket. Turn the machine by hand until the retention lever B, Fig. 10, drops into the recess of cam C. Turn the clutch ratchet J, Fig. 11, anti-clockwise (viewed from the rear of the keyboard), as far as it will go, i.e. until the pin of the detent G is located against the straight part of the camming-out face of the ratchet.

1.2 With the clutch ratchet held in this position there should be a gap of .070 – .080 in. (1.78 – 2.03 mm.), i.e. dimension 'a', Fig. 10, between the end of the retention lever B and the face of the recess in cam C (see inset diagram). Replace spring S, Fig. 15, and the striker operating bracket unless action is required.

Action

1.3 If this is not so, holding the clutch ratchet firmly against the detent pin, slacken screw A, Fig. 10, and adjust retention lever B by means of the screwdriver slot until dimension 'a' is obtained. Tighten screw A. Replace spring S, Fig. 15, and the striker operating bracket.

2. **Trip Detent** (Fig. 11)

Check *

2.1 Release the clutch and allow the retention lever to locate the cam in the normal rest position, as in Fig. 10. In this position there should be a clearance of .010 – .012 in. (.25 – .30 mm.) between the teeth of the ratchets. On some keyboards it may not be possible to measure this dimension directly with accuracy because the teeth of the gear ratchet are recessed below the gear. If this is the case, the following indirect method of measuring the dimension may be used.

2.2 Pull forward spring H to expose gap 'b'. Measure and note the size of this gap.

2.3 Lift the detent G and rotate the clutch ratchet through half a revolution.

2.4 Pull forward spring H again and insert various thicknesses of feeler gauge into gap 'b' until, with the clutch ratchet pressed back to grip the gauge, the tops of the ratchet teeth are just touching. (This can be tested by rotating the gear wheel K.) Note the value of gap 'b'.

2.5 The difference between the two values for gap 'b' should be .010 – .012in. (.25 – .30 mm.).

Action

2.6 If adjustment is necessary, turn the shaft to the rest position and slacken the detent fixing screws F.

2.7 Set a feeler gauge to the second value for gap 'b', as found in Instruction 2.4, minus .011 in. (.28 mm.), and insert in gap 'b'.

2.8 Pull the ratchet back to grip the gauge, move the detent G outwards until it is arrested by the camming-out face of the ratchet, and tighten screws F.

3. **Locking Frame** (Figs. 10 and 12)

Check *

3.1 With the unit in the rest position, i.e. with the retention lever B, Fig. 10, located in the recess of the cam C, check that the cam lever N, Fig. 12, is centrally aligned with the cam R, looking from the right-hand end of the keyboard.

Action

3.2 If this is not so, slacken screw M and adjust collar L until the correct condition is obtained. Tighten screw M.

Check *

3.3 Check that, with the unit still in the rest position, there is a clearance of .005 – .015 in. (.13 – .38 mm.), i.e. dimension 'c', judged by eye, between the knife edges of the selectors Q and the locking frame P when they are in line.

Action

3.4 If clearance 'c' requires adjustment it will be necessary to remove the unit from the keyboard.

3.5 With the unit off the keyboard, slacken the locking nut of screw O and set the correct gap by positioning cam lever N. Tighten the locking nut of screw O and replace the unit on the keyboard.

4. **Lateral Adjustment of Striker** (Fig. 13)

Check *

4.1 Depress the 'E' key and turn the cam shaft until the third and fourth operating levers AB are touching the common operating lever AA.

4.2 Push the striker X to the left so that its movement is arrested by the striker guide Y. There should now be a clearance of .015 in. (.38 mm.), i.e. dimension 'd', between the operating levers AB and the common operating lever AA.

Action

4.3 If this is not so, slacken screws Z, insert a .015 in. feeler gauge between the common operating lever AA and the operating levers AB, and adjust the striker guide Y until it just touches the right-hand edge of the slot in the striker X. Tighten screws Z.

5. **Transmitter Contacts** (Fig. 13)

Check *

5.1 Check that there is a total movement of the transmitter tongue W of .006 in. (.15 mm.) by inserting a feeler gauge between the tongue and one contact.

5.2 Depress the 'Y' key and, turning the machine by hand, check that the striker is falling equally on each side of the tongue.

Action

5.3 If either of the above conditions is incorrect, the following instructions must be carried out.

5.4 Set up the machine as in Adjustment Instruction 4.1. Slacken locking nuts T and U, and, by screwing in the contact screws S and V, clamp the tongue W between them so that its knife edge is in line with that of the striker X.

5.5 Adjust the right-hand contact screw V to give a clearance of .003 in. (.08 mm.) between its contact and that of the transmitter tongue W. Tighten nut U.

5.6 Adjust the left-hand contact screw S to give a total movement of .006 in. (.15 mm.) to the tongue. Tighten nut T.

5.7 Recheck to see that the striker is falling equally on each side of the tongue.

If this is not so, it will be necessary to trim by readjusting the contact screws very slightly. If trimming is carried out, ensure that the .006 in. travel of the tongue is maintained.

6. **Bias** (Fig. 14)

Check *

6.1 Depress a key and turn the machine by hand until the striker is well clear of the transmitter tongue. Check that the forces to move the tongue in either direction, applied at the bottom of the tongue, are equal.

Action

6.2 If the forces are not equal, slacken locking nut C and adjust screw B until the correct condition is obtained. Tighten nut C.

Check *

6.3 The above forces should be between 60 and 100 grams.

Action

6.4 If this is not the case, change the anchorage of the bias spring F. (Three spring anchor holes are provided in the jockey lever E and the spring should be fitted in the one which gives the highest reading within the range specified above. If the spring does not give a reading in the range in any of the holes, a new spring should be fitted.)

7. **Vertical Adjustment of Striker** (Fig. 15)

Check *

7.1 Depress any key and turn the machine by hand until the knife edges of the transmitter tongue D and the striker Q are vertically in line. Check that there is a clearance of .020 – .030 in. (.51 – .76 mm.), i.e. dimension 'e', between the knife edges.

Action

7.2 If this is not so, slacken screws R and, by placing a screwdriver in slot P, adjust the position of the striker until dimension 'e' is obtained. Tighten screws R.

8. **Send/Receive Contacts (when fitted)** (Figs. 10 and 14)

Check *

8.1 Turn the machine by hand to the rest position, i.e. with the retention lever fully engaged with the recess in the cam. Check that there is a clearance of .005 – .006 in. (.13 – .15 mm.) between the contact of the tongue N, Fig. 14, and the left-hand contact screw J, and that the contacts are horizontally in line.

8.2 Depress any key and turn the machine by hand until the bakelite nosepiece G is well clear of the tongue. Measure the force, applied at the lever operating point, necessary to part the contacts of the tongue and the left-hand contact screw J. This should be 42 – 56 grams.

8.3 To adjust for the above conditions the following sequence should be adopted.

Action

8.4 Slacken screw H and move the bakelite nosepiece G well clear of the tongue N. Slacken the clamping nuts K and L. Unscrew contact screw M well clear of the tongue. Screw in contact screw J until the tongue is centrally disposed between the contact blocks. Slacken screw A, and, by swivelling the tongue mounting bracket about its pivot, line up the contacts. Tighten screw A.

8.5 Measure the force required to part the contacts of the tongue and the left-hand contact J, measured at the lever operating point. If the force is below the minimum value of 42 grams, screw in contact screw J by no more than 1½ turns until the force to break the contact falls within the prescribed range. If the force is greater than the maximum value of 56 grams, unscrew the contact screw by no more than 1½ turns until the force falls within the prescribed range.

8.6 If it is not possible to obtain the given pressures within these limits, it will be necessary to remove the tongue and 'set' it.

8.7 Holding the tail of lever D, Fig. 10, in contact with lever E, move the bakelite nosepiece G, Fig. 14, to the right until a gap of .010 – .015 in. (.25 – .38 mm.) is set up between the contact screw J and the contact on the tongue. Tighten screw H.

8.8 Screw in contact screw M until the above gap is reduced to .005 – .006 in. (.13 – .15 mm.). Tighten nut L.

B. COMBINATION UNIT

9. **Locking Bar Jockey Spring** (Fig. 17)

Check

9.1 With the unit off the keyboard, check that the locking bar A moves snappily from one shift to the other when a force of no more than 7 ozs. (198 grms.) is applied to it. The forces to move the bar in either direction should be equal within ½ oz. (14 grms.).

Action

9.2 If adjustment is necessary, slacken screw B and position the spring C to give the correct conditions. Tighten screw B.

10. Trip Bar Stop and Trip Lever (Fig. 18)

Check *

10.1 With the unit on the keyboard, depress each key in turn and note which one gives the least lift to the trip detent L (see inset).

10.2 With this key depressed there should be a clearance of approximately 1/32 in. (.8 mm.) between the pin of the detent L and the rim of the clutch ratchet K, i.e. dimension 'g'.

10.3 Remove the striker operating bracket from the transmitter unit, and, with the machine in the rest position, check that there is a clearance of 1/32 in. (.8 mm.) between the detent release latch F and the detent operating lever E, i.e. dimension 'f'.

10.4 Replace the striker operating bracket unless action is necessary.

Action

10.5 If either of the above conditions is not obtained, adjust as follows:-

10.6 Slacken the locknut of stop screw J and adjust the screw until dimension 'f' is approximately 1/16 in. (1.6 mm.). Clamp screw J lightly with its locknut.

10.7 Holding down the key which gives the least lift to the trip detent (as found in Instruction 10.1), slacken screw G, and by means of the screwdriver slot H, set up a clearance of 1/32 in. (.8 mm.) between the clutch ratchet K and the pin of the detent L, i.e. dimension 'g'. Tighten screw G.

10.8 Slacken the locknut of stop screw J and adjust the screw until the clearance between the detent release latch F and the detent operating lever E is 1/32 in. (.8 mm.), i.e. dimension 'f'. Clamp screw J with its locknut.

10.9 Replace the striker operating bracket.

C. ANSWER-BACK UNIT

11. Preliminary Check (Figs. 21 and 22)

Check

11.1 Check, by tripping the A/B unit and turning the motor by hand, that the nose of the keyboard lock cam lever B, Fig. 21, is fully (i.e. as far as it will go) in the recess of cam A when the unit is in the rest position, i.e. when the clutch ratchet is arrested by detent pin C.

Action

11.2 If this is not so, hold the control shaft by means of a tommy pin inserted into the hole at the rear of the shaft, and slacken nut M, Fig. 22. Rotate the ward drum until the required condition is obtained. Tighten nut M.

12. **Detent Lever** (Figs. 21, 22, 23 and 26)

Check

12.1 With the unit off the keyboard, and in the rest position, press upwards on screw K, Fig. 23, and simultaneously hold keyboard lock cam lever B, Fig. 21, to the left. Check that the lug on the trip bar F is touching the right-hand lower end of the lock cam lever B.

12.2 Trip the detent and push upwards on screw K, Fig. 23, once more, so that pin C is resting on the raised part of the clutch ratchet. Hold the lock cam lever B, Fig. 21, to the left again. This time, check that there is an estimated 1/16 in. (1.6 mm.) clearance between the lug on trip bar F, and the right-hand lower end of lock cam lever B.

Action

12.3 If either of conditions 12.1 or 12.2 is not satisfied, carry out the following adjustment procedure.

12.4 Slacken nut M, Fig. 22. Trip the clutch and rotate the control shaft until the pin C, Fig. 21, is well past the camming-out surface of the clutch dog.

12.5 Slacken screw H, Fig. 21, and screw N, Fig. 26. Press upwards on screw K, Fig. 21, and simultaneously push the lock cam lever B up into contact with cam A. Now, maintaining these pressures, adjust eccentric G until pin C is in contact with the surface of the clutch dog and the lug on trip bar F *just* makes contact with the right-hand lower end of lock cam lever B. Tighten screws H, Fig. 21, and N, Fig. 26.

12.6 Turn the unit by hand until the detent pin C, Fig. 21, is arrested by the clutch dog. Tighten nut M, Fig. 22.

13. **Ratchet Gap** (Figs. 22 and 23)

Check

13.1 Check that, with the unit in the rest position, there is a gap of .010 – .012 in. (.25 – .30 mm.), i.e. dimension 'I', Fig. 23, between the ratchet teeth. This can be measured through the cutaway portion of the driving gear Q.

Action

13.2 If this is not so, slacken screws K, Fig. 23, and, by means of a screwdriver in the adjusting slot J, move the detent pin C as far as possible towards the gear Q. Tighten screws K.

13.3 Turn the gear Q until the control shaft is arrested by pin C. Maintaining this condition, slacken screw O, Fig. 22, and adjust eccentric N until the nose of retention lever P is at the bottom of the recess of cam L. Tighten screw O. (This ensures that the control shaft is clamped between the detent pin and the retention lever).

13.4 Slacken screws K, Fig. 23, slightly, push gear Q towards the backplate to take up end play, and adjust the position of the detent by means of the

screwdriver adjustment slot J until a gap of .016 – .020 in. (.41 – .51 mm.) is obtained between the ratchet teeth. Tighten screws K.

13.5 Slacken screw O, Fig. 22, press the gear Q, Fig. 23, once more towards the unit backplate to take up end play and readjust eccentric N, Fig. 22, until the gap between the ratchet teeth is reduced to .010 – .012 in. (.25 – .30 mm.), i.e. dimension 'l', Fig. 23.

(**N.B.**: It may be necessary to apply a light pressure to the control shaft in an anti-clockwise direction, viewed from the front of the unit, to ensure that the nose of the retention lever P, Fig. 22, remains at the bottom of its cam recess.)

Tighten screw O.

14. **Ward Drum** (Figs. 21 and 22)

Check *

14.1 Release the clutch and turn the control shaft in the normal direction of rotation. Check that, as the operating levers fall, the wards present themselves in such a manner that they remain in contact with the levers for the maximum time possible, i.e. the wards must travel across the faces of the levers and be lifted clear as they pass the ends of the faces.

14.2 Check also that the ward drum returns to the rest position at the end of one complete revolution.

Action

14.3 If these conditions are not both satisfied, return the unit to the rest position. With the detent pin C, Fig. 21, resting on the surface of the clutch dog, slacken nut M, Fig. 22, and adjust the ward drum so that the right-hand edge of the recess of cam A, Fig. 21, is touching the nose of the lock cam lever B (see inset to Fig. 21). Tighten nut M.

14.4 If conditions 14.1 and 14.2 are still not obtained, slacken nut M again, and refine the adjustment of the ward drum to obtain the required conditions. Tighten nut M.

15. **Holdout Lever Eccentric** (Fig. 24)

Check

15.1 Trip the unit and operate it by hand until the projection on the lever C is opposite one of the nodes of the cam A, and the nose of the holdout lever E is on top of its cam. There should be a clearance of .001 – .005 in. (.03 – .13 mm.) between the node of the cam and the projection on lever C, i.e. dimension 'm'.

Action

15.2 To adjust this clearance, slacken nut D, and move the eccentric until dimension 'm' is satisfied. Clamp the eccentric with the locknut D.

16. **Resetting Lever Eccentric** (Fig. 25)

Check

16.1 Trip the unit and operate it by hand until the resetting lever J is resting on a node of its cam F.

16.2 Move the transfer bars to the left. Check that the condition in Fig. 25 is obtained, i.e. in which one set of lugs on the transfer bars is touching the stop bracket H at the same time as a second set is touching eccentric G.

Action

16.3 If this is not the case, slacken the nut locking eccentric G, and adjust the eccentric until the correct condition is obtained. Tighten the locking nut.

17. **Trip Lever Stop** (Figs. 21 and 26)

Check

17.1 With the unit in the rest position, hold the trip bar F, Fig. 21, to the left so that the nose of the lock cam lever B is as far in the recess of cam A as it will go. In this position the lug on the bottom of the trip lever M, Fig. 26, should be just touching the end projection E, Fig. 21, on the trip bar F.

Action

17.2 If this is not so, slacken screw N, Fig. 26, and, holding the trip bar to the left as in Instruction 17.1, adjust the trip lever M until the correct condition is obtained. Tighten screw N.

18. **Keyboard Lock Lever** (Fig. 21)

Check

18.1 With the unit on the keyboard and in the rest position, check that there is a clearance of .005 in. (.13 mm.), i.e. dimension 'j', between the keyboard lock lever and the lock keybar on the keyboard.

Action

18.2 To adjust this clearance, slacken the tommy-headed screw on lever B clamping eccentric D, and position the lever by means of the eccentric. Clamp the eccentric.

19. **Answer-Back Trip Bar** (Fig. 21)

Check

19.1 With the unit on the keyboard and in the rest position, depress the W.R.U. key and check that there is a clearance of .002 in. (.5 mm.), i.e. dimension 'k', between the extension of the keybar and the left-hand tommy-headed screw on the trip bar.

Action

19.2 To set this clearance, slacken the tommy-headed screws on the left-hand end of the trip bar F, and slide the adjustment bar until dimension 'k' is satisfied. Tighten the tommy-headed screws.

20. **Transmitter Release Bar** (Figs. 18 and 24)

Check *

20.1 With the unit on the keyboard, trip the clutch and rotate the control shaft until the transmitter release bar has moved to the right, thus lifting the trip detent on the transmitter unit. There should be a clearance of 1/32 in. (.8 mm.), i.e. dimension 'g', Fig. 18, between the pin of the detent L and the rim of the clutch ratchet K.

Action

20.2 If this is not so, slacken the nut clamping eccentric B, Fig. 24, adjust the eccentric until the correct dimension is obtained, and tighten the clamping nut.

21. **Answer-Back Transfer Bars** (Fig. 16)

Check

21.1 Check that the force required to move the transfer bars U in either direction is 1 – 2 ozs. (28 – 57 gms.).

Action

21.2 If this is not so, slacken the tommy-headed screws T and adjust the position of the spring until the correct condition is obtained. Tighten screws T.

D. END-OF-LINE INDICATOR

22. **Damping Buffer** (Fig. 29)

Check

22.1 Check that a force of 11–13 ozs. (.31 – .37 kg.) applied against pin O in the direction of the arrow, will just move the damping buffer.

Action

22.2 To adjust the damping, remove the unit from the keyboard, loosen nut M and hold it with a 6BA spanner. Adjust screw N until the correct condition is obtained. Tighten nut M.

23. **Feed Pawl** (Figs. 27, 28 and 30)

Check

23.1 With the retention pawl L, Fig. 28, engaging one of the teeth of the ratchet wheel J, check that there is a clearance of .008 – .012 in. (.20 – .31 mm.), i.e. dimension 'n', between the top edge of the feed pawl F and the edge of the fourth tooth past the one in engagement with the retention pawl.

Action

23.2 To adjust the feed pawl to give this clearance, slacken screw H, Fig. 27, and position the feed pawl by means of the screwdriver adjustment G. Tighten screw H.

Check

23.3 Turn the ratchet wheel until the retention lever L, Fig. 30, is resting on the top of a tooth of the ratchet wheel J. In this position there should be a clearance of .001 – .003 in. (.03 – .08 mm.), i.e. dimension 'o', between the feed lever F and the teeth of the ratchet. (This check is best carried out with the feed lever opposite the plain portion of the ratchet wheel).

Action

23.4 Adjust this clearance if necessary by slackening the locknut of the grub screw P and adjusting the screw until the correct condition is obtained. Tighten the locknut.

24. **Contact Blades**

Check

24.1 Feed the counter until the contacts close and check that there is a gap of .005 in. (.13 mm.) between the ear of the left-hand contact blade and its stop.

Action

24.2 If necessary, 'set' the contact stop to satisfy this condition.

Check

24.3 Trip the counter and check the gap between the contacts. This should be .015 in. (.38 mm.).

Action

24.4 If this is not so, 'set' the right-hand contact blade.

25. **Retention Pawl Extension** (Fig. 27)

Check

25.1 Check that, with the counter in the rest position, the latching face of the retention pawl extension A is flush to .005 in. (.13 mm.) underflush with the

right-hand face of the stop plate extension K, and ensure that the stop plate extension does not drop when the counter is stepped round by hand.

Action

25.2 If adjustment is necessary, slacken screw B and move the retention pawl extension A until the correct condition is set up. Tighten screw B.

26. **Trip Lever** (Fig. 27)

Check

26.1 Feed on the counter unit a few teeth by hand. Slowly depress the Carriage Return key and check that the End-of-Line Indicator unit trips at the same moment as the transmitter clutch ratchet.

Action

26.2 If this is not so, slacken screw E, and by means of the screwdriver adjustment, position the trip lever until the required condition is obtained. Tighten screw E.

E. FINAL ADJUSTMENTS

N.B.: Instructions suffixed 'A' apply to keyboards for No. 7 and No. 85 Teleprinters, 'B' for No. 47 Teleprinters, and 'C' for No. 54 Teleprinters. Unlettered instructions apply to all three patterns of keyboard.

27. **Keybar Travel** (Fig. 20)

Check

27.1 Depress the 'Figures' key. Depress any key in the letters case on the left-hand side of the keyboard and check that the clearance between the upper stop plate R and the depressed keybar S is between .030 – .040 in. (.75 – 1.0 mm.).

27.2 Depress the 'Letters' key and repeat the above check with a key in the figures case on the right-hand side of the keyboard.

Action

27.3 If either of the above conditions is incorrect, slacken screws Q, and position the stop plate R until the correct clearance is obtained at both ends of the keyboard.

(**N.B.:** If adjustment is carried out, ensure that the combination bars move freely without touching the keybars at any point.)

28AC. **Keyboard/Receiver Alignment** (Fig. 34)

Check

28AC. 1 With the keyboard on the machine, check that the driving coupling face on the keyboard is in line with the corresponding face on the receiver.

Action

28AC. 2 If not, slacken the keyboard fixing screws and adjust the height of the keyboard by means of the screws provided on the main base. Tighten the keyboard fixing screws.

Check

28AC. 3 Push the keyboard gear Z towards the receiver coupling face, and check that, in this position, the fibre coupling disc has .005 – .010 in. (.13 – .25 mm.) end play.

Action

28AC. 4 If this is not so, slacken screw Y on the gear bracket (see inset AA) and position the driving gear Z until the correct end play is present. Tighten screw Y.

28B. **Keyboard/Receiver Alignment** (Fig. 31)

Check

28B. 1 With the keyboard on the machine, check that the idler gear casting J is abutting against the keyboard gear bracket C.

Action

28B. 2 If this is not so, slacken screws K and adjust the position of the gear casting until it meets the face of the keyboard gear bracket. Tighten screws K.

Check

28B. 3 Check that the gears mesh with a small amount of backlash. This should not exceed .006 in. (.15 mm.).

Action

28B. 4 To increase or decrease the amount of backlash, slacken screws D and the locknuts of screws H, and adjust the height of the keyboard by means of screws H until the correct backlash is present. Clamp screws H with their locknuts and tighten screws D. Fit screw B and recheck the backlash.

29AC. **Answer-Back Resetting** (Fig. 19)

Check

29AC. 1 With the keyboard on the machine and with the A/B unit in the rest position, the rockshaft O should be held lightly between the rockshaft hook and the side of the latch support arm.

Action

29AC.2 If this is not so, slacken screw P and adjust the rockshaft hook to hold the rockshaft O lightly against the side of the latch support arm. Tighten screw P.

Check

29AC.3 With the A/B unit in the rest position, there should be a clearance of .005 – .015 in. (.13 – .38 mm.), i.e. dimension 'h', between the edge of the cutaway in the trip lever N and the face of the latch M.

Action

29AC.4 Set this clearance, if necessary, by means of the rockshaft adjustment at the combination head.

29B. **Answer-Back Resetting** (Fig. 33)

Check

29B.1 With the keyboard on the machine and the A/B unit in the rest position, the pin S should be held lightly between the hook R and the side of the latch support arm.

Action

29B.2 If adjustment is necessary, slacken screw T and adjust the hook R to hold the pin S lightly against the side of the latch support arm. Tighten screw T.

Check

29B.3 With the A/B unit in the rest position, there should be a clearance of .005 – .015 in. (.13 – .38 mm.), i.e. dimension 'q', between the edge of the cutaway in the trip lever V and the face of the latch U.

Action

29B.4 To adjust dimension 'q', slacken screw Q and adjust by means of the screwdriver slot N. Tighten screw Q.

30B. **Cover Mounting Adjustment** (Figs. 31 and 32)

Check

30B.1 The cover should be located and held firmly by the cones E, Fig. 32, and clear the adjacent casting by 1/8 in. (3.2 mm.), i.e. dimension 'p'.

Action

30B.2 If this is not so, adjust the height of the cover by means of screws F, Fig. 31, until dimension 'p', Fig. 32, is satisfied. Slacken the screws G, Fig. 31, securing the cone locating plates, and adjust the position of the cones until the cover is held firmly in position. Tighten screws G.

SPRING TENSIONS

Spring No.	*Reference*	*Method of Measurement*	*Tension*
	PL. 1047K	**Keyboard Partial Assembly**	
PG.7066	Fig. 4, CY	Force to give an extension of 29/32" (29 mm.)	1¾ – 2¼ ozs. (50 – 64 gms.)
PG.7077	Fig. 4, CW	Force to give an extension of 5/8" (15.9 mm.)	4½ – 5½ ozs. (128 – 156 gms.)
PG.7120	Fig. 4, CX	Force to give an extension of ½" (12.7 mm.)	16½ – 17½ ozs. (468 – 496 gms.)
	PL. 1047K	**Combination Bar Unit**	
PG.7362	Figs. 8) and 9) AC	Force to give an extension of 3/8" (9.5 mm.)	1 oz. (28 gms.)
2091/26	Figs. 8) and 9) AM	Force to move the locking bar in either direction	Max. of 7 ozs. (198 gms.) and equal within ½ oz. (14 gms.)
	PL. 1047K	**Transmitter Unit**	
PG.5085	Fig. 11, AP	Force to give a compression of ¼" (6.4 mm.)	4 – 6 ozs. (113 – 170 gms.)
PG.7003	Fig. 10, CR	Force to give an extension of 7/32" (5.6 mm.)	1lb. 14ozs. – 2lbs. 14ozs. (.85 – 1.02 kg.)
PG.7034	Fig. 13, BR	Force to give an extension of 15/32" (11.9 mm.)	1½ – 2½ ozs. (43 – 71 gms.)
PG.7039	Fig. 13, BX	Force to give an extension of 17/32" (13.5 mm.)	3 – 3½ ozs. (85 – 99 gms.)
PG.7066	Fig. 13, BU	Force to give an extension of 29/32" (23 mm.)	1¾ – 2¼ ozs. (50 – 64 gms.)
PG.7070	Fig. 13, BB	Force to give an extension of 7/16" (11.1 mm.)	3 – 3½ ozs. (85 – 99 gms.)
PG.7212	Fig. 13, AD	Force to give an extension of 17/32" (13.5 mm.)	14½ – 16½ ozs. (411 – 468 gms.)
PG.7216	Fig. 13, CA	Force to give an extension of 3/8" (9.5 mm.)	4½ – 5½ ozs. (128 – 156 gms.)
PG.7217	Fig. 13, CJ	Force to give an extension of 3/16" (4.8 mm.)	1¾ – 2 ozs. (50 – 57 gms.)

Spring No.	*Reference*	*Method of Measurement*	*Tension*
PG.7218	Fig. 13, V	Force to give an extension of 3/16" (4.8 mm.)	8 – 10 ozs. (227 – 284 gms.)
PG.7219	Fig. 13, AX	Force to give an extension of 3/16" (4.8 mm.)	2 – 2½ ozs. (57 – 71 gms.)
1856/177	Fig. 13, DF	Force to move the transfer bars in either direction	1 – 2 ozs. (28 – 57 gms.)
If a Send/Receive Switch is fitted			
PG.7352	Fig. 13, AA	Force to give an extension of 3/16" (4.8 mm.)	8 – 8½ ozs. (227 – 241 gms.)
PG.7352 (Fitted in place of PG.7212)	Fig. 13, AD	Force to give an extension of 3/16" (4.8 mm.)	8 – 8½ ozs. (227 – 241 gms.)
	PL.1047K	**Transmitter Contact Block**	
PG.7046	Fig. 15, AH	Force to give an extension of 13/32" (10.3 mm.)	3 lbs. 13 ozs. – 4 lbs. 3 ozs. (1.73 – 1.9 kg.)
PG.7354	Fig. 15, AJ	Force to give an extension of ½" (12.7 mm.)	21½ – 26½ ozs. (610 – 751 gms.)
	PL.1047K	**Counter Unit (if fitted)**	
PG.7070	Not shown (for Item S Fig. 16)	Force to give an extension of 7/16" (11.1 mm.)	3 – 3½ ozs. (85 – 99 gms.)
PG.7173	Fig. 16, Y	Force to give an extension of 9/16" (14.3 mm.)	3 – 3½ ozs. (85 – 99 gms.)
PG.7176	Fig. 17, J	Force to give an extension of 5/16" (7.9 mm.)	10 – 11½ ozs. (284 – 326 gms.)
PG.7197	Fig. 16, AC	Force to give an extension of 1/32" (.8 mm.)	17 gms.
PG.7198	Fig. 16, AA	Force to give an extension of 1-23/32" (43.7 mm.)	6 – 7 ozs. (170 – 198 gms.)
PG.7208	Fig. 17, R	Force to give an extension of 5/64" (2.0 mm.)	2 – 2½ ozs. (57 – 71 gms.)
PG.7219	Fig. 17, M	Force to give an extension of 3/16" (4.8 mm.)	2 – 2½ ozs. (57 – 71 gms.)

Spring No.	*Reference*	*Method of Measurement*	*Tension*
	T.I.S. No. 28	**Answer-Back Unit**	
PG.5085	Not shown	Force to give a compression of ¼" (6.4 mm.)	4 – 6 ozs. (113 – 170 gms.)
PG.7003	Fig. 20A, DT	Force to give an extension of 7/32" (5.6 mm.)	1 lb. 14 ozs. – 2 lbs. 4 ozs. (.85 – 1.02 kg.)
PG.7050	Fig. 20A, EC	Force to give an extension of 5/8" (15.9 mm.)	1 lb. 14 ozs. – 2 lbs. 2 ozs. (.85 – .96 kg.)
PG.7102	Fig. 19A, DJ	Force to give an extension of 5/8" (15.9 mm.)	13 – 15 ozs. (369 – 425 gms.)
PG.7116	Fig. 20A, DH	Force to give an extension of 7/16" (11.1 mm.)	1 – 1½ ozs. (28 – 43 gms.)
PG.7327	Not shown. (for Item AM Fig. 19A)	Force to give an extension of 3/8" (9.5 mm.)	2¾ – 3¼ ozs. (78 – 92 gms.)
PG.7349	Not shown. (for Item DO Fig. 20A)	Force to give an extension of 9/64" (3.6 mm.)	11 – 14 ozs. (312 – 397 gms.)
PG.7350	Not shown. (for Items CT Fig. 19A)	Force to give an extension of 1/8" (12.7 mm.)	5 – 6½ ozs. (142 – 187 gms.)
PG.7366	Fig. 19A, AE Fig. 20A, AV	Force to give an extension of 9/32" (7.1 mm.)	1¼ – 1¾ ozs. (35 – 50 gms.)
PG.7392	Not shown. (for Item DP Fig. 20A)	Force to give an extension of 15/32" (11.9 mm.)	13 – 16 ozs. (369 – 453 gms.)

LUBRICATION INSTRUCTIONS

AFTER EACH 300 HOURS OF OPERATION

No. 2 Lubricant

Apply a few drops to the following bearings and pivots:-

(a) Common operating Lever (Transmitter Unit).
(b) Feed Lever (oil hole in End-of-Line Indicator).
(c) Feed and retaining pawls (End-of-Line Indicator).
(d) Striker lever (oil hole on Transmitter Unit).
(e) Striker (Transmitter Unit).
(f) Oil hole in clutch ratchet (Transmitter Unit).

WHEN DISMANTLING

No. 1 Lubricant

Lubricate the moving member and engaging faces of the clutch dog (Transmitter Unit).

No. 2 Lubricant

(a) Apply a few drops to all pivots and bearings, including oilite bearings.
(b) Saturate the two lubricator pads on the transmitter unit.
(c) Apply a few drops to the teeth of the driving gear (Answer-Back Unit).
(d) Apply a few drops to the tongue lubricator and bias roller oil bath.

No. 5 Lubricant

Smear a little grease on the following parts:-

(a) The bearings of the driving shaft coupling pin (Answer-Back Unit).
(b) The engaging faces of the detent and the Send/Receive lever (Transmitter Unit).
(c) The cams (Answer-Back Unit).

LUBRICANTS

The following lubricants are recommended and may be obtained from Creed and Co. Ltd.:-

No. 1 Lubricant – Thin oil, such as:

(a) Clavus Oil 17 (Shell Oil J.Y.1.).
(b) Wakefield Magna R.S. Oil.
(c) G.P.O. Oil No. 12.

No. 2 Lubricant – Medium oil, such as:

(a) Talpa Oil 30 (Shell Oil C.Y.2.).
(b) Wakefield Castrol XL.
(c) G.P.O. Oil No. 14.

No. 4 Lubricant – Grease, such as:

(a) Shell Nerita Grease 3 (Shell VW).

No. 5 Lubricant – Grease, such as:

(a) Mobilgrease No. 2.

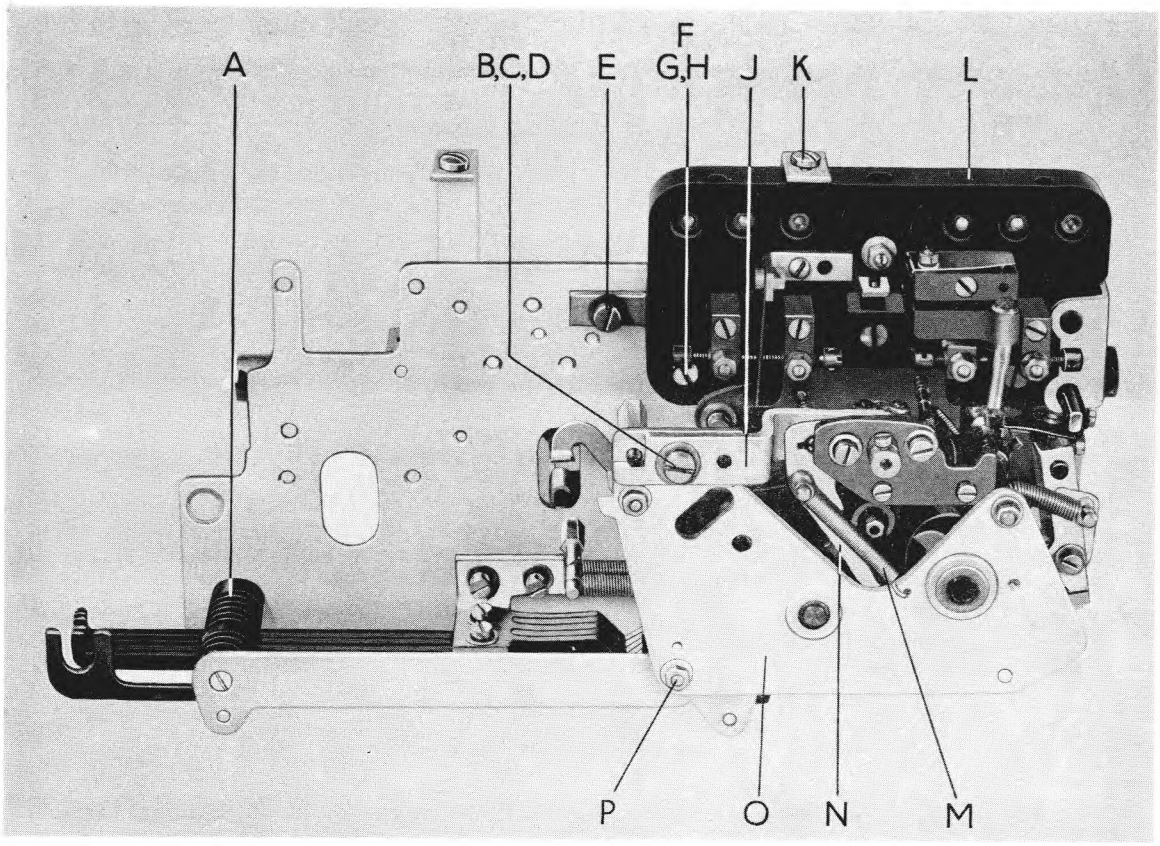


FIG. 2

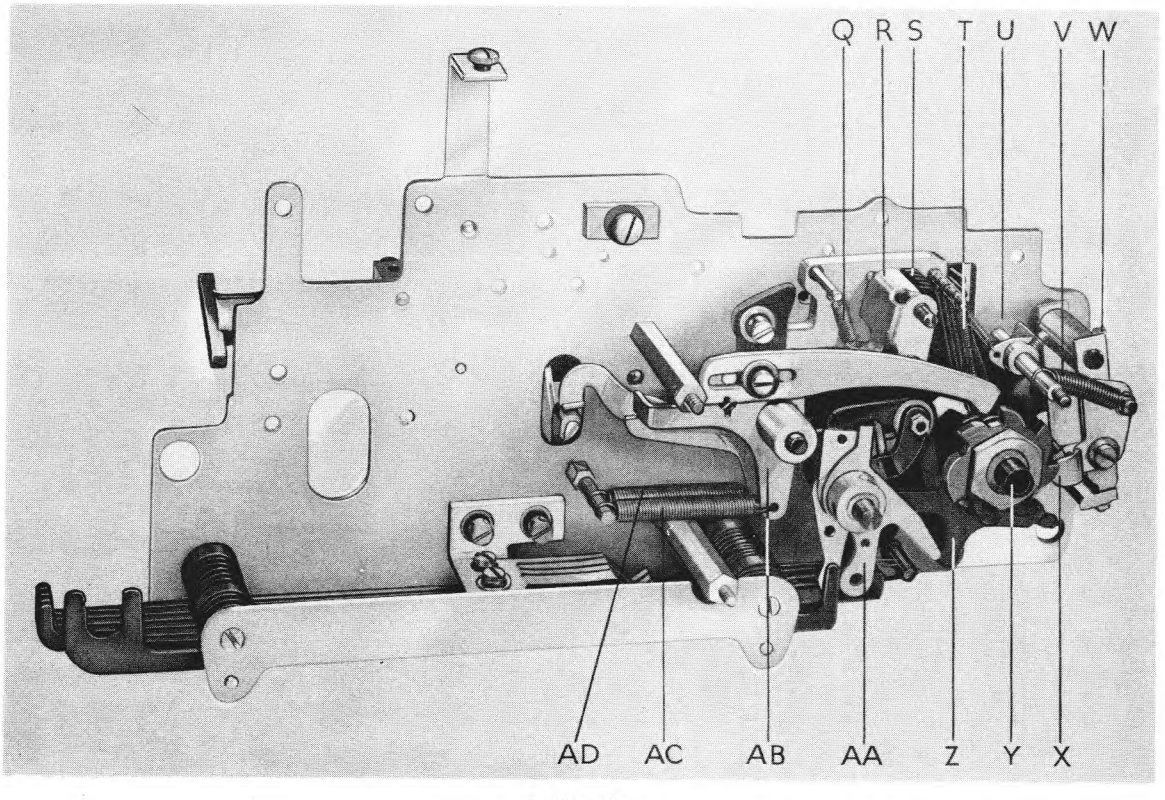


FIG. 3

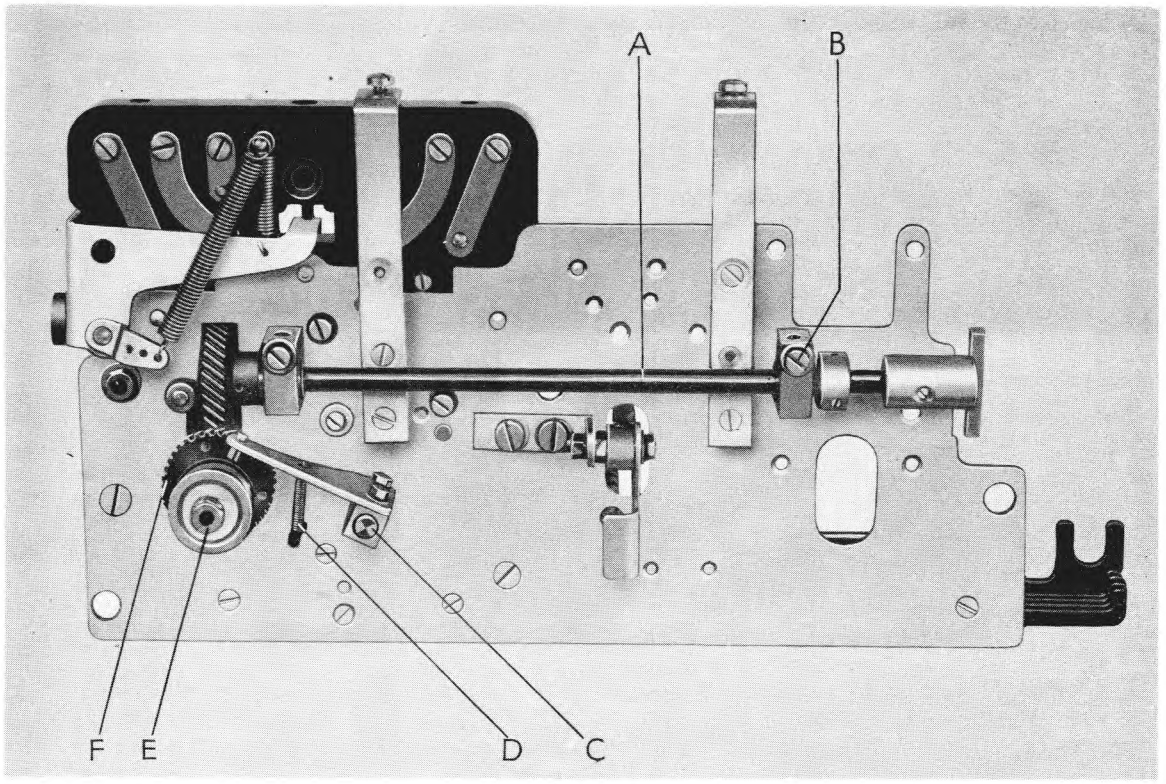


FIG. 4

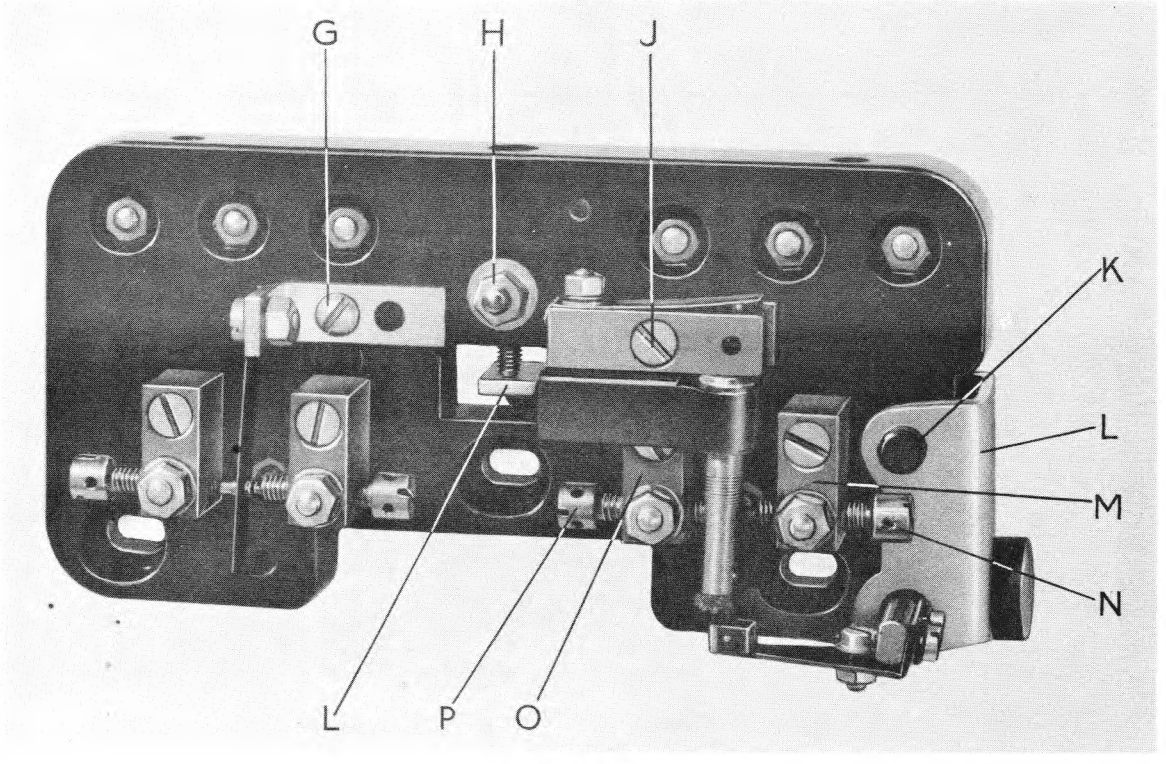
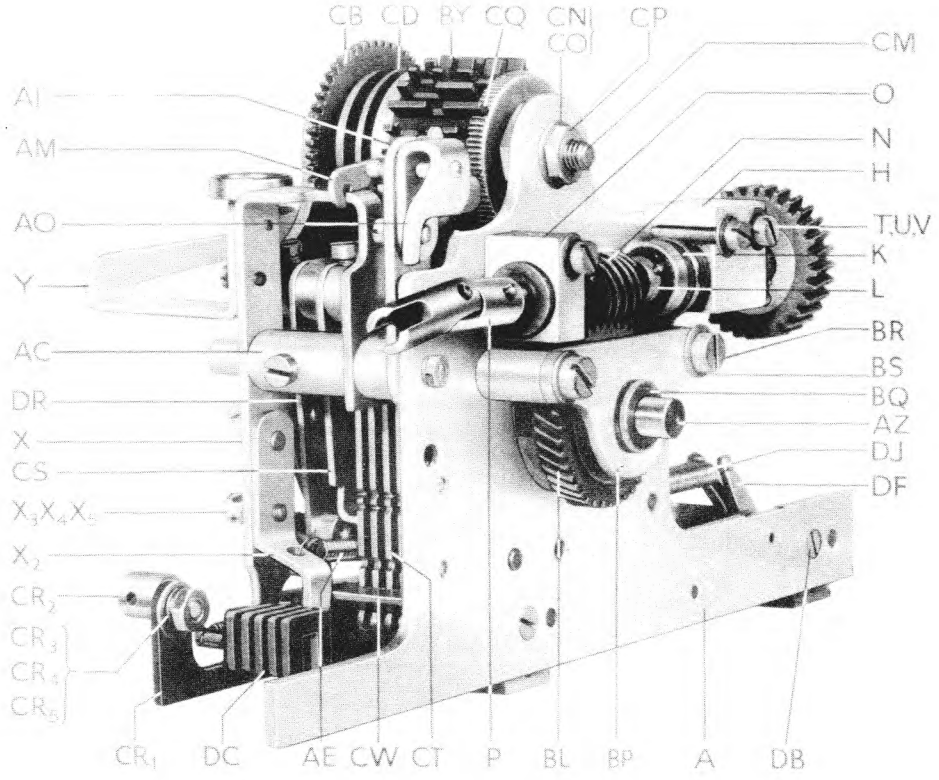


FIG. 5


CB
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CQ
CN
CO
CP
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AO
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Y
L
BR
AC
BS
DR
BQ
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AZ
CS
DJ
$X_3X_4X_5$
DF
X_2
CR_2
CR_3
CR_4
CR_5
CR_1
DC
AE
CW
CT
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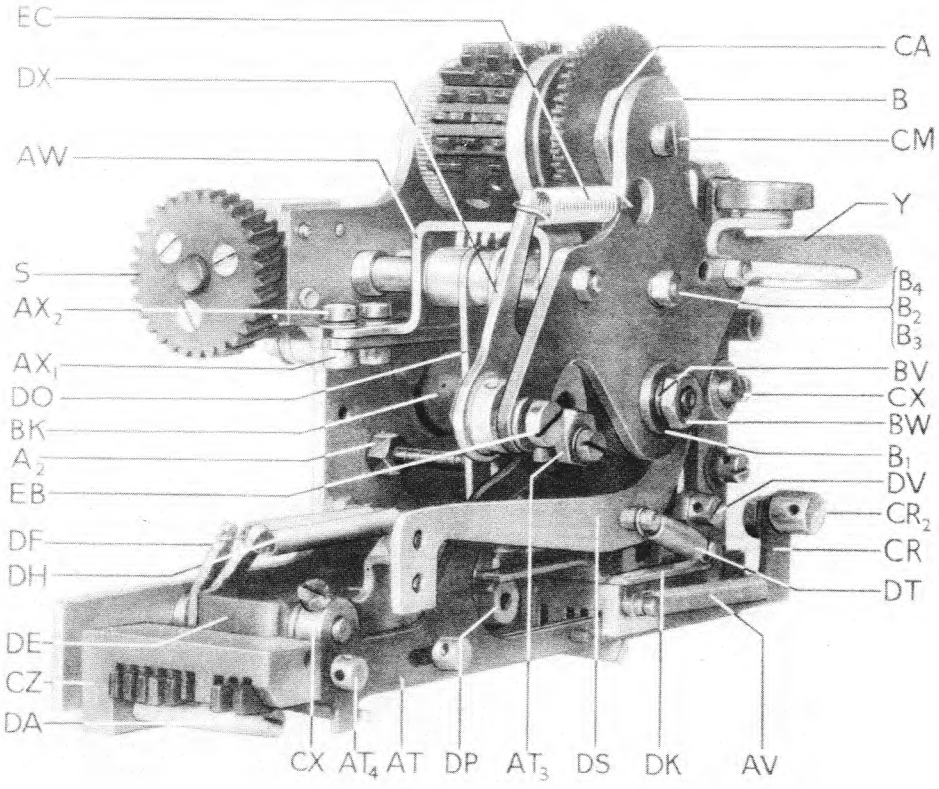
DB

FIG. 6


EC
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AW
Y
S
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AX_2
B_2
B_3
AX_1
BV
DO
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BK
BW
A_2
B_1
EB
DV
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DF
CR
DH
DT
DE
CZ
DA
CX
AT_4
AT
DP
AT_3
DS
DK
AV

FIG. 7

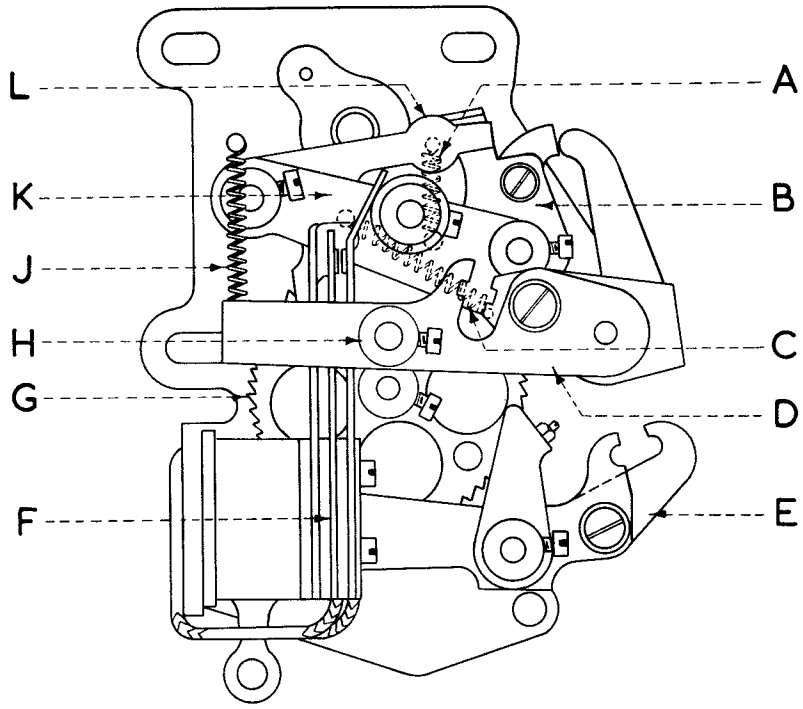

FIG. 8

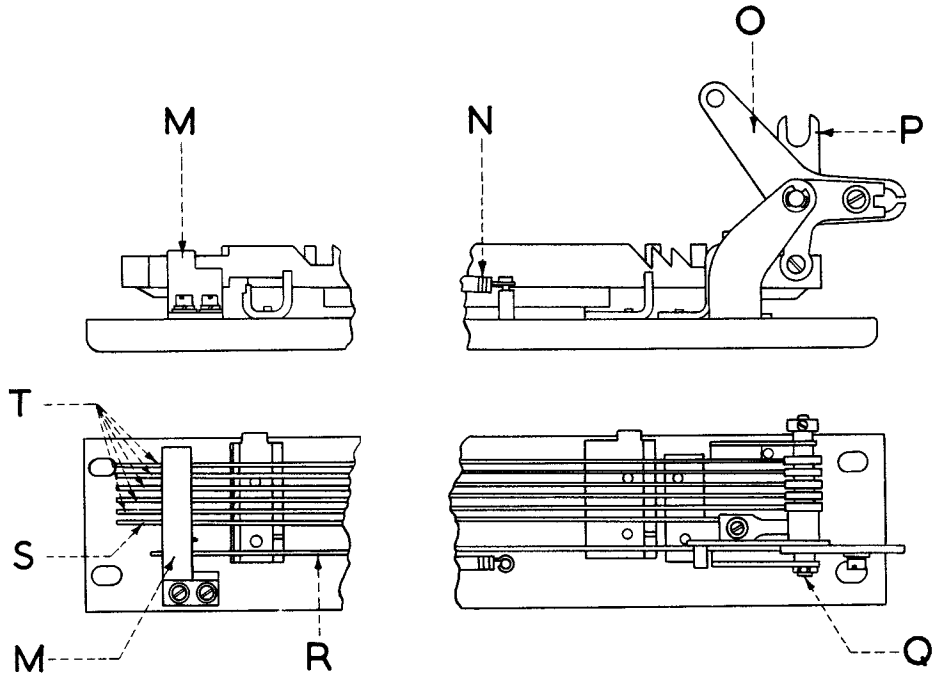

FIG. 9

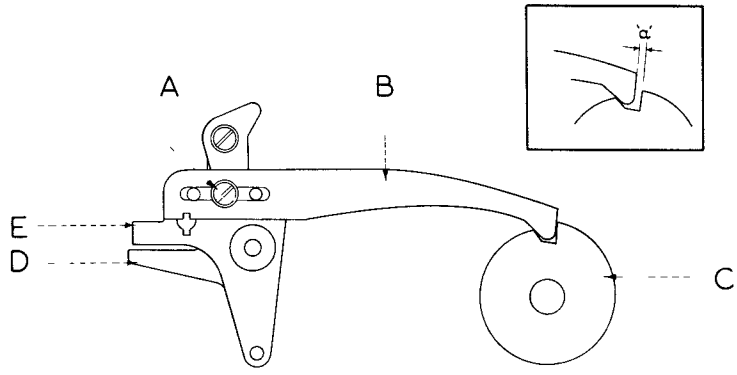

FIG. 10

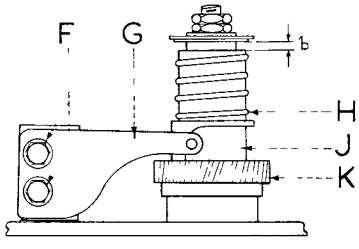

FIG. 11

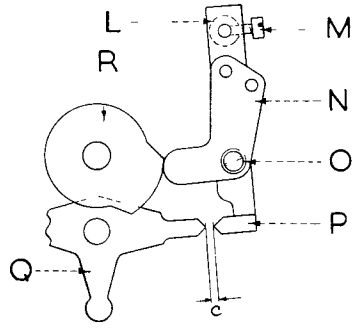

FIG. 12

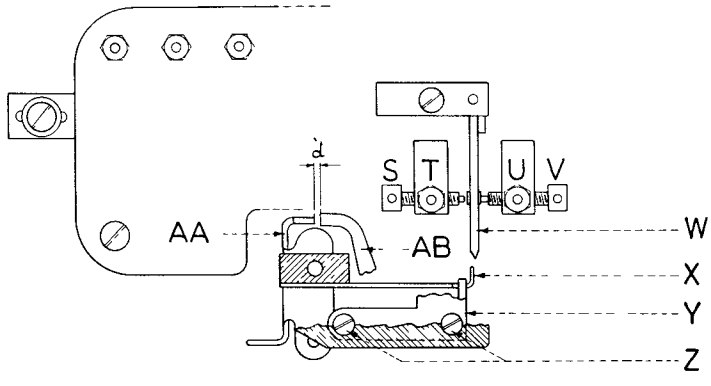

FIG. 13

DIMENSIONS

'a' = { .070 – .080 ins. / 1.78 – 2.03 mm. }

'b' = { See Text }

'c' = { .005 – .015 ins. / .13 – .38 mm. }

'd' = { .015 ins. / .38 mm. }

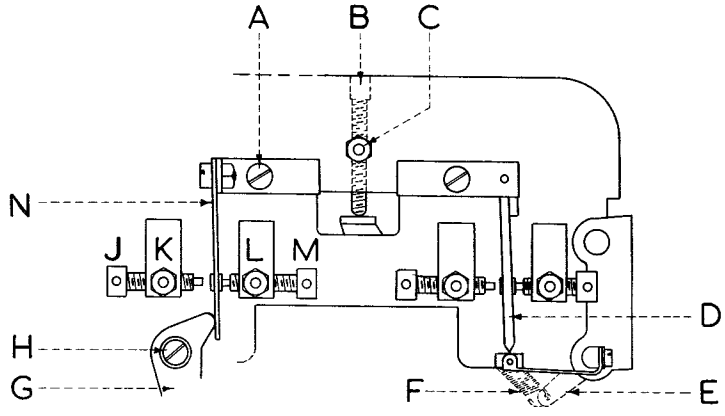

FIG. 14

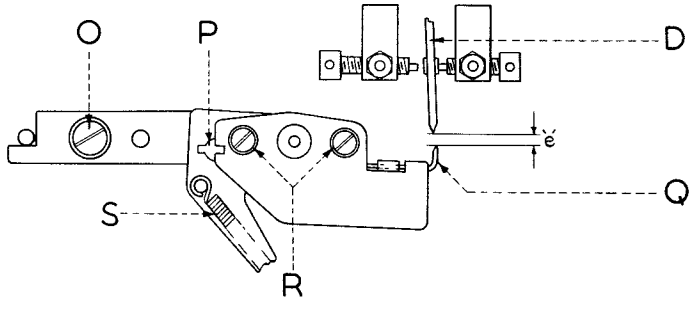

FIG. 15

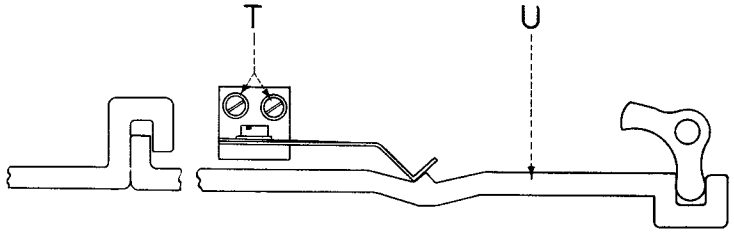

FIG. 16

DIMENSION

'e' = { .020 – .030 ins.
.51 – .76 mm.

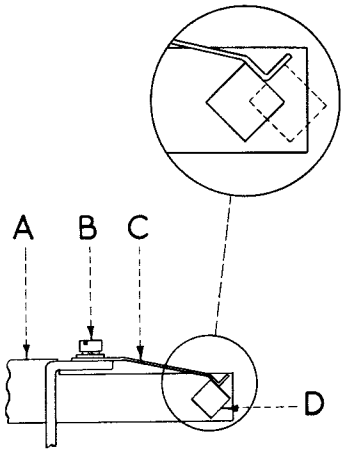

FIG. 17

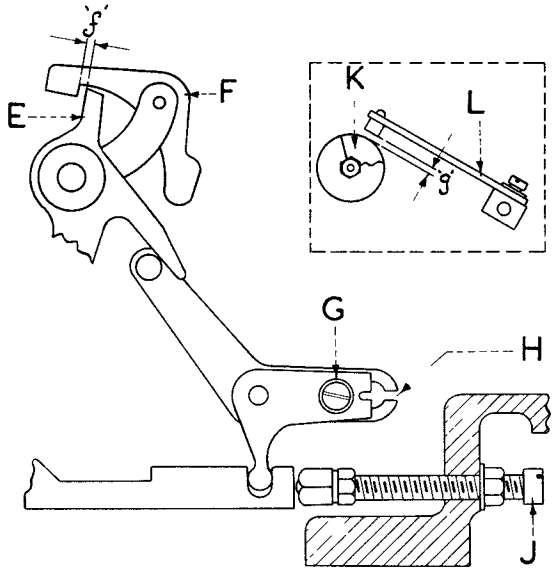

FIG. 18

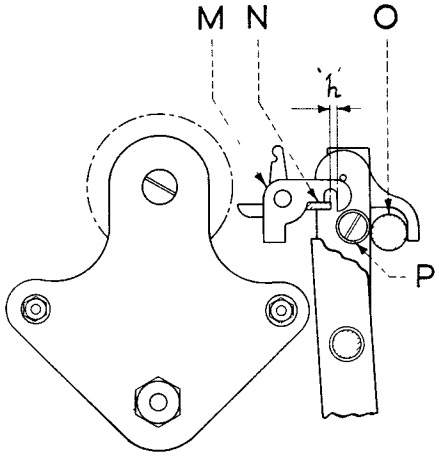

FIG. 19

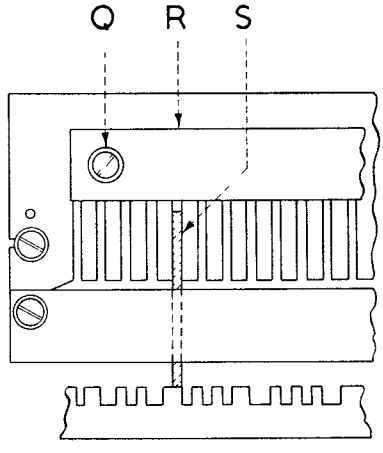

FIG. 20

DIMENSIONS

'f' = { 1/32 in. / .8 mm. } 'g' = { 1/32 in. / .8 mm. } 'h' = { .005 – .015 ins. / .13 – .38 mm. }

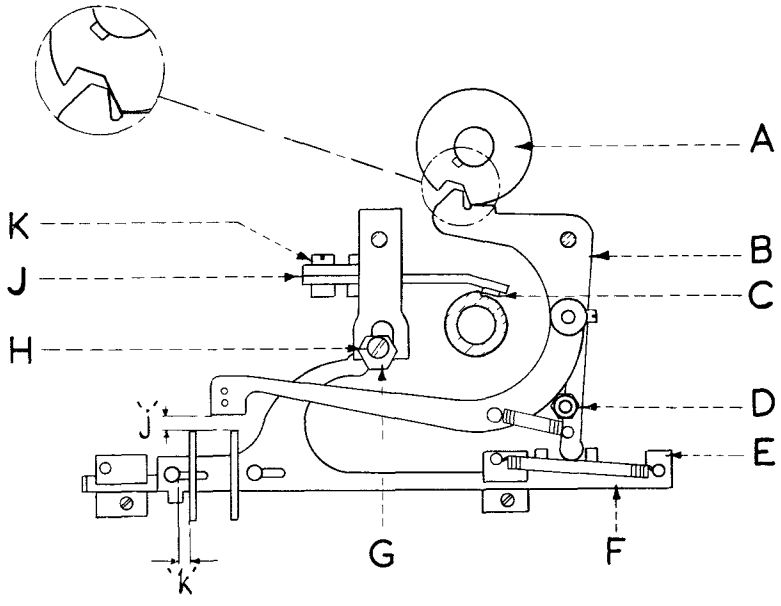

FIG. 21

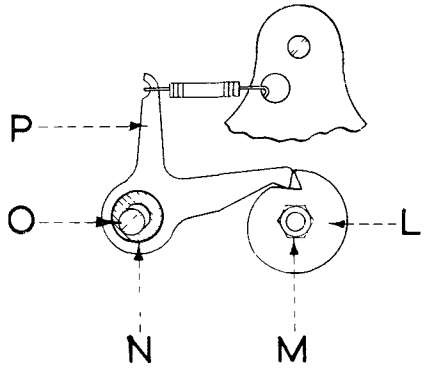

FIG. 22

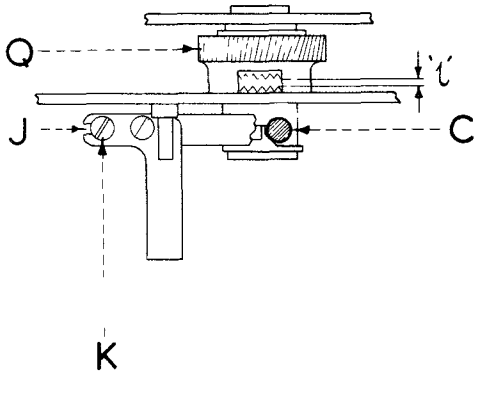

FIG. 23

DIMENSIONS

'j' = { .005 ins. / .03 mm. } 'k' = { .002 ins. / .5 mm. } 'l' = { .010 – .012 ins. / .25 – .30 mm. }

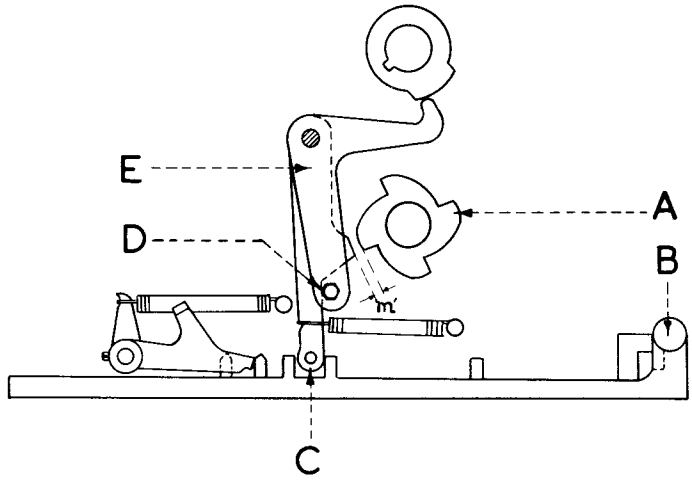

FIG. 24

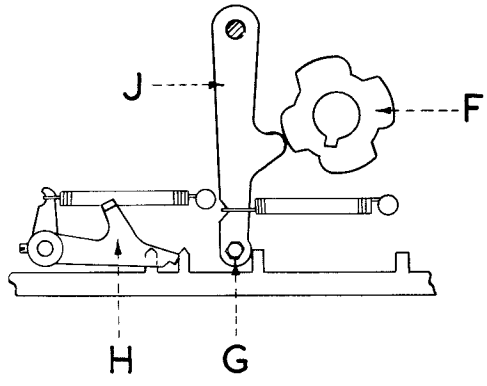

FIG. 25

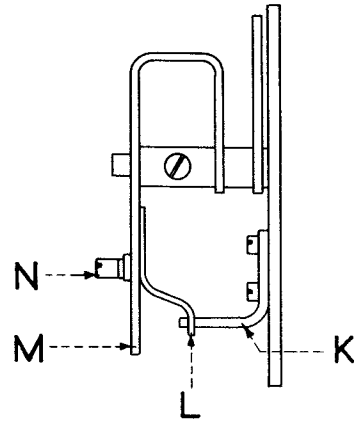

FIG. 26

DIMENSION

'm' = { .001 – .005 ins.
.03 – .13 mm.

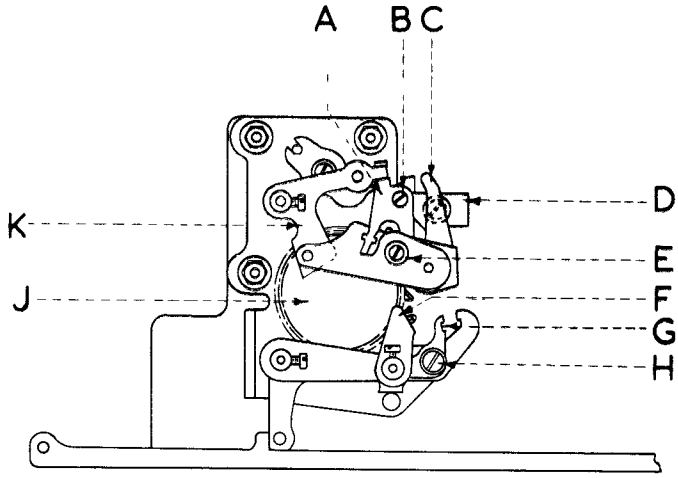

FIG. 27

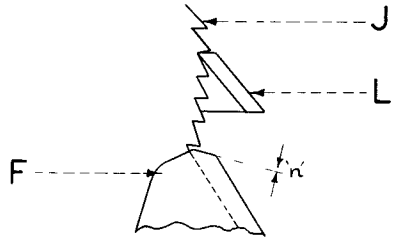

FIG. 28

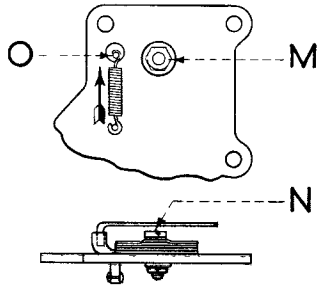

FIG. 29

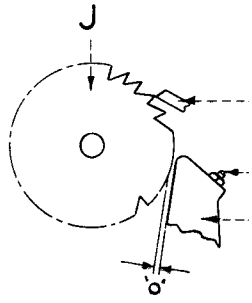

FIG. 30

DIMENSIONS

'n' = { .008 – .012 ins. / .20 – .31 mm.

'o' = { .001 – .003 ins. / .03 – .08 mm.

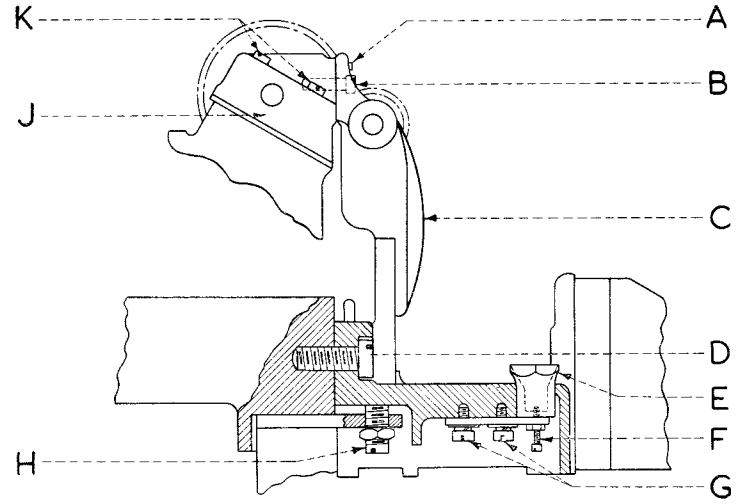

FIG. 31

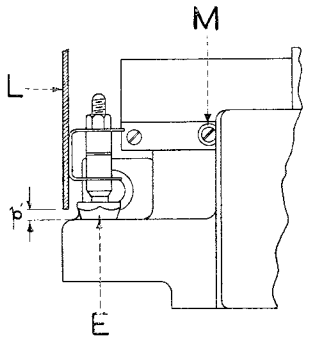

FIG. 32

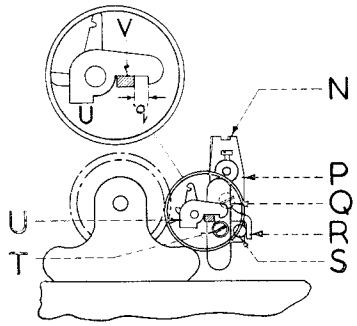

FIG. 33

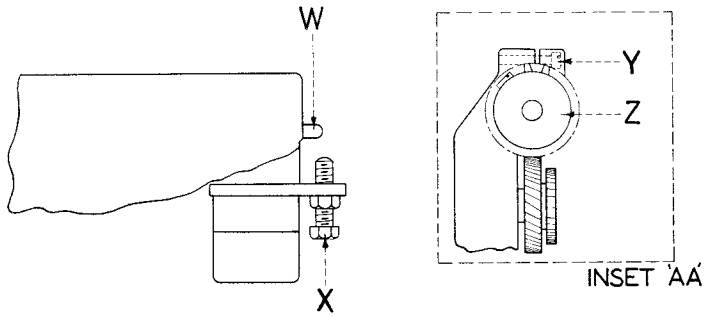

FIG. 34

DIMENSIONS

'p' = { 1/8 in. / 3.2 mm.

'q' = { .005 – .015 ins. / .13 – .38 mm.