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Colin Hinson
In the village of Blunham, Bedfordshire.

INSTRUCTION BOOK No. 71
(2nd Edition)

creed

models 71, 72 and 74 Mk. IV THREE-GANG MULTIPLE TRANSMITTERS

maintenance instructions

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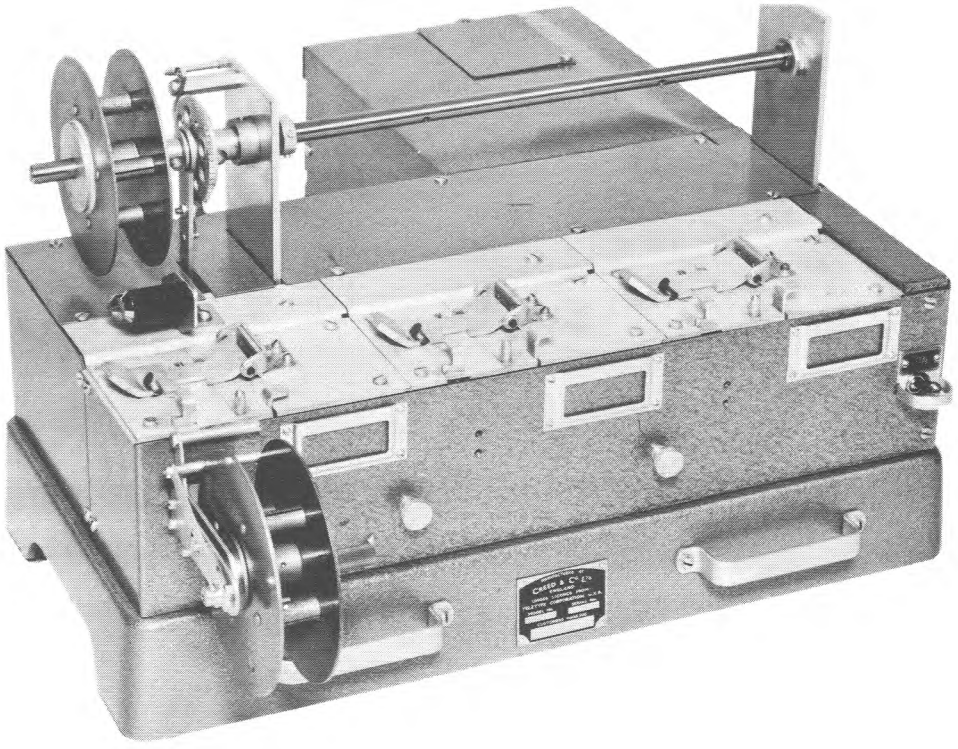
CREED MODEL 71 THREE-GANG MESSAGE TRANSMITTER



CREED MODEL 74 THREE-GANG MESSAGE AND NUMBER TRANSMITTER

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FOREWORD

The Instruction Book provides maintenance instructions for the CREED 3-Gang Multiple Automatic Tape Transmitters, Mark IV, with a transmission speed of 50 bauds, 7½ unit.

The instructions are applicable to all standard models of types 71B multiple message transmitters, 72B multiple numbering transmitters, and 74B two message transmitters and one numbering transmitter.

The information provided covers adjustments, maintenance work, including lubrication, and dismantling instructions. A description of the principle of operation of a typical machine, and its associated relay control circuits, will be found in Bulletin No.25.

Figures 31, 32 and 33 give details of the motor circuit, the signals circuit of a combined two message plus one numbering transmitter, and a diagram of the components lay-out underneath the machine main base respectively.

Non-standard models of the 3-Gang Transmitter can be supplied to operate at other speeds, and a 5-wire model is also available.

ADJUSTMENT INSTRUCTIONS

The adjustment instructions provided in the following pages are arranged in sequential order to ensure that account is taken in each adjustment of the possible effect on it of subsequent adjustments. When the machine is to be completely adjusted, as at major overhaul periods, this order of procedure should be carefully followed. If an isolated adjustment is carried out, it is advisable to check any related adjustment(s) which may be affected.

When removing shims, careful note should be made of their number and exact position, in order that they may be correctly replaced. After adjustments are completed, ensure that all nuts and screws are securely tightened, unless a specific instruction to the contrary is given.

It is important not to slacken the motor abutment screw(s), E, Fig. 26, which are painted red, because it is, usually, impossible to re-set an abutment outside the factory.

The High-Speed version of this Transmitter is designed to transmit one cycle during half a revolution of the camshaft, instead of during one full revolution, as with the standard model. Adjustments which require the camshaft to be placed in a specified position should, in the case of the High-Speed model, be checked for both half-revolutions of the shaft. Note, also, that adjustments concerned with the camshaft clutch should be checked for both camming-out faces.

A. TRANSMITTING UNITS

Note: All adjustment numbers with suffix 'A' apply only to message transmitters. Those with suffix 'B' apply only to numbering transmitters. Numbers without a suffix apply equally to both types of unit. Adjustments marked with an asterisk should, normally, need attention only at periods of major overhaul, or if the machine has been partly dismantled to clear a fault.

* 1. Camshaft Endplay (Figs.1 and 2)

Check

1.1 Slacken the screw which secures drive ratchet D, Fig.2, to the shaft, and check that the endplay of the camshaft is not greater than .002 in. (.05 mm.) as measured at 'a', Fig.1.

Action

1.2 If this is not so, add or remove shims (3672/189) at B until the check is satisfactory.

Note: For access to these shims, refer to Section I (Dismantling).

Action

1.3 Adjust the position of the drive ratchet D, Fig.2, so that the camshaft rotates freely, and tighten its fixing screw.

* 2. Camshaft Clutch (Fig.2)

Check

2.1 With ratchet E, Fig.2, held fully disengaged from ratchet D by detent F, check that clearance 'b' is .010 - .015 in. (.25 - .38 mm.).

Action

2.2 If this is not so, carry out the following operations:-

(a) Remove nuts and washers G, and detent F.

(b) Unscrew detent pivot I from bearing block J, and add or remove shims (3672/88) at H until dimension 'b' is correct.

(c) Replace the pivot and detent, securing it with nut and washer G.

(d) Re-check dimension 'b'.

3. Magnet Mounting Block (Fig.3)

Check

3.1 Trip the clutch and turn the camshaft until the raised part of the clutch section E, Fig.3, is adjacent to the top of detent F. Hold the magnet armature K against the cores of magnet P, and check that clearance 'c' is .004 - .012 in. (.10 - .30 mm.).

Action

3.2 If this is not so, slacken two nuts N, and adjust bracket O until clearance 'c' is correct. Ensure that the magnet cores P are square with the armature face, and tighten nuts N.

4. Transmitting Contacts (Fig.4)

Note: Normally, this adjustment will need attention only at major overhaul periods, but it is advisable to apply the checks on short term maintenance visits, and, if not satisfactory, the adjustment procedure given below should be carried out in full. The instructions apply to all contacts, including those for 'start/stop' and 'tape-out' ('letters sensing' in the case of a numbering transmitter unit).

Check

4.1 With any contact operating lever L, Fig.4, on the high part of its camtrack, apply a spring gauge to the long contact blade just above its contact, and check that a force of 7 ozs. (200 gms.), applied in direction F_1, is sufficient to just start the blade moving away from lever L.

Check

4.2 Turn the camshaft until lever L is resting fully down in its cam fall. Apply the gauge as in *Check* 4.1, and check that a force of 4½ - 5½ ozs. (128 - 156 gms.), applied in direction F_1, is just sufficient to open the contacts.

Check

4.3 With lever L on the high part of its cam track, check that dimension 'd' is .020 - .025 in. (.51 - .64 mm.), as measured with special feeler gauge TA.1142.

Check

4.4 Repeat the above *Checks* for each set of contacts.

Action

4.5 If the above *Checks* are not satisfactory, carry out the following operations:-

(a) Remove the transmitter head from the machine main base.

(b) Unsolder the wire connections from the transmitter contacts, taking care to note the correct method of re-connection.

(c) Remove the four screws which secure the contact banks to their common mounting bracket, and remove the complete assembly. Note correct method of reassembly.

(d) Examine the contacts. If they are dull, burnish them with a clean feeler gauge. If pitted, obtain a new set of blades as replacement.

Action

4.6 To adjust the contact blades, carry out the following operations:-

(e) *Contact Backstops.* Flatten all backstops J and ensure that they are lined up. 'Set' the blades, if necessary, to satisfy this requirement.

(f) *Fixed Contact Blades.* Ensure that no blade I is bent, and line up all blades, 'setting' as necessary to obtain these conditions. With the contacts facing down, hold the blade assembly base down on a flat surface, and check that there is a clearance of .025 in. (.05 mm.) between the flat surface and the surface of each contact. 'Set' the blades, as required, to obtain this clearance.

(g) *Moving Contact Blades.* Straighten and line up all blades H. With the contacts facing up, hold the blade assembly base down on a flat surface, and check that there is a clearance between the surface and the free end of each blade of 3/32 in. (2.4 mms.). 'Set' the blades, as required, to obtain this clearance.

(h) Reassemble the contacts, replace the unit on the transmitter head, and re-connect the wiring.

(i) Adjust the backstop screws K to give a clearance of .020 in. (.51 mm.) between each pair of contacts, when fully opened, as measured with the special gauge, TA.1142.

(j) Replace the transmitter head on the machine main base, and check for signal distortion with a T.D.M.S., if available. If the display is not central, correct the error by adjusting the backstop screw K of the 'start/stop' contacts.

5. Pecker Lever Spindle Height (Fig.5)

Check

5.1 Check that spindle B, Fig.5, is resting fully down in the slot of rack M, but is without evidence of strain.

Action

5.2 If this is not so, slacken screws O (one at each end of the spindle), adjust retaining plate N to give the required conditions, and tighten screws O.

6. Contact Operating Lever Latch (Figs.6 and 13)

Check

6.1 With release lever K, Fig.13, fully raised, turn the camshaft until operating lever latch R, Fig.6, is resting in the fall of cam S. Hold lever R in the cam fall, and lever Q against the pin on lever R, and check that there is a clearance at 'e' of .010 - .020 in. (.25 - .51 mm.).

Action

6.2 If this is not so, slacken nut Y and adjust the bolt in its elongated slot until dimension 'e' is correct. Tighten nut Y.

7A. Tape-Out Sensing Lever (Figs.10, 11, 12, 13, 15 and 20)

Note: This is an optional modification for message transmitters which may be used to transmit from badly worn or creased tapes. It has the effect of increasing the margin of operation of the tape-out mechanism. To make the modification, the use of two special bending tools, TA.1136, is recommended.

Action

7.1 Turn the camshaft until all pecker pins are fully raised. Remove screws and washers W, Fig.20, and tape retaining plate spring Y.

Action

7.2 Remove the two screws which secure the retaining plate M, Fig.13, of the tape width adjustment lever W to the left-hand mounting pillar of top plate H, and remove plate M. Remove the bolt from the diagonal slot in the lower end of lever W, and remove W.

Action

7.3 Unhook the return vertical spring of lever K from its anchor underneath the top plate H, and unhook feed pawl spring J, Fig.15, from the pawl. Swing the pawl away from ratchet B.

Action

7.4 Remove four screws A, Fig.13, and remove the shims from under the corners of the top plate H, taking note of the number used at each mounting point. Move lever K out of the way, and ease off plate H, taking care not to bend the pecker pins.

Check

7.5 Check that a force of ½ - 1½ ozs. K14 - 43 gms.), applied horizontally at the bend of the 'tape-out' sensing lever just below the selector lever bail, is sufficient to just start the lever moving.

Action

7.6 Place bending tools B and C, Fig.10, on the 'tape-out' lever D as shown in the diagram, leaving some clearance at 'h', and with tool C as high as it will go.

Action

7.7 Bend the horizontal leg of lever D so that the top of pin A is flush to within .005 in. (.13 mm.) with the top of the adjacent pecker pin. Avoid damaging pin A with tool B by ensuring that there is sufficient clearance at 'h'.

Action

7.8 With the camshaft in the rest position, place tools B and C, Fig.11, on lever D as shown, with tool B as close as possible to pecker lever F, and tool C as close as possible to spring E.

Action

7.9 Bend the vertical section of lever D until a clearance of .015 - .030 in. (.38 - .76 mm.) is obtained at 'i', Fig.12.

Action

7.10 Replace all parts removed on the instructions given in *Actions* 7.1 to 7.4 by following those instructions in reverse order, taking care to replace all shims correctly and to re-engage the feed pawl with its ratchet.

Note: If these modifications have been made in isolation, Adjustments 9, 11 and 15 should now be checked, as they may have been disturbed.

* 8. Pecker Lever Rack (Figs.8 and 9)

Check

8.1 With the camshaft in the rest position, check that the clearance at 'f', Fig.8, between the ends of pecker levers M and the ends of the contact operating levers is .002 - .012 in. (.05 - .30 mm.). This may be measured by passing a feeler gauge through the hole in the left-hand bearing block G, and holding down levers K, in turn, to expose the one being checked.

Action

8.2 If clearance 'f' is not satisfactory, remove two screws H, Fig.9, and lift rack I. Remove or add shims (3672/169) between the rack and its right-hand and left-hand bearing blocks G at each screw position. When dimension 'f' is satisfactory, replace and tighten screws H.

* 9. Tape Guide Plate (Figs.4, 8, 9, 13, 14 and 21)

Check

9.1 Turn the camshaft until the pecker pin tops are just flush with the upper surface of tape guide slot D, Fig.14. Check that the ends of pecker levers M, Fig.8, overlap their corresponding contact operating levers L by at least half the width of the pecker lever ends, as shown at 'g'.

Action

9.2 If this is not so, slcaken screw O, Fig.9, and adjust bail C, Fig.4, relative to its vertical extension E until dimension 'g', Fig.8, is satisfactory.

Note: It is important to ensure that the adjustment is not left at its limit of possible movement. If this has happened, add, or remove, shims under the top plate at the four screw positions A, Fig.13, and repeat *Action* 9.2.

Check

9.3 Turn the camshaft until the peckers are fully down, and check that their tops are underflush to the top surface of guide slot D, Fig.14, by not more than an estimated .010 in. (.25 mm.).

Action

9.4 If the check is not satisfactory, refine *Action* 9.2.

Note: In the case of a numbering transmitter, move the 'letters' operating lever B, Fig.21, away from the ends of the pecker levers A by slackening nut G and moving pivot E towards the front of the slot in mounting bracket H before carrying out the actions described above. At the conclusion of the adjustment procedure, re-set the 'letters' operating lever to its original position.

*10. Tape Feed Wheel (Fig.14)

Check

10.1 Check that the feed wheel pins C, Fig.14, on the tape feed wheel U protrude above the top surface of the tape guide slot D, by .035 - .045 in. (189 - 1.14 mms.), at 'j'.

Action

10.2 If this is not so, slacken the two sets of screws Q, and add or remove shims (3672/150) 0 between the tape feed wheel brackets S and V and the underside of plate H. Tighten screws Q.

Check

10.3 Check that screws Q have the maximum number of available threads engaged in plate H, but are not proud of the upper surface of the plate.

Action

10.4 If this is not so, slacken screws Q again and add or remove shims (3672/150) between brackets S and V and the heads of screws Q. Re-check dimension 'j', and when satisfactory fully tighten screws Q.

Check

10.5 Obtain a length of fully perforated tape with the 'letters' (1, 2, 3, 4, 5) combination, and having correctly spaced feed holes. Check that the code holes 1 and 5 are equidistant from the edges of the tape. Insert the tape centrally over the peckers, engaging it with the feed wheel pins, and check that there is an equal clearance between each pecker pin and the sides of its code hole when the peckers are raised so that their tops are level with the top surface of the tape.

Action

10.6 If this is not so, slacken nuts R and adjust pivot screws T until the required condition is obtained. Tighten nuts R.

Check

10.7 Hold the feed pawl and retention levers out of engagement with the feed ratchet, and check that feed wheel U rotates freely, with end play of not more than an estimated .002 in. (.05 mm.).

Action

10.8 If *Check* 10.7 is not satisfactory, refine *Action* 10.6.

11. Tape Feed Detent Lever (Figs.13 and 15)

Check

11.1 Insert a length of tape, fully perforated with the 'letters' combination and having correctly spaces feed holes. Turn the camshaft until the tops of the pecker pins are flush with the top surface of guide slot D, Fig.13, and check that the pecker nearest to the trailing edge of a code hole does not touch that edge.

Action

11.2 If the pin concerned does not clear the edge, hold feed pawl H, Fig.15, clear of ratchet wheel B and slacken nut K. Adjust the eccentric pivot, which was secured by nut K, to obtain the required clearance, keeping its high part towards the rear of the unit, and tighten nut K.

Note: For CHADLESS TAPE the pecker pin should be approximately midway between the hinged edge of the chad and the trailing edge of the code hole.

12. Pecker Lever Guide (Figs.13 and 17)

Check

12.1 With the perforated tape still in position, continue to turn the camshaft until the tops of the pecker pins are level with the upper surface of the tape. Raise retaining plate B, Fig.13, and check that the pecker pins are approximately central in the code holes.

Action

12.2 If this is not so, slacken two screws O, Fig.17, and slide pecker lever guide Q into such a position that *Check* 12.1 is satisfactory. Hold the guide in place and tighten screws O.

13A. Feed Pawl Operation (Figs.15 and 16)

Check

13.1 With the camshaft in the rest position, check that the feed pawl H, Fig.16, engages the second tooth below the horizontal centre line of feed ratchet B.

Check

13.2 Check that there is a clearance at 'k' of not more than .010 in. (25 mm.) between the pawl and the feeding face of the last tooth fed on ratchet B. Repeat these two checks for each tooth on the ratchet.

Action

13.3 If the above checks are not satisfactory, slacken screw C, Fig.15, hold feed follower roller D down in its cam fall and adjust pawl operating lever G to give the required conditions. Tighten screw C.

14B. Feed Pawl Operating Lever (Figs.15, 16 and 20)

Check

14.1 Remove bolt X, Fig.20, and slacken bolt V. Swing the 'letters' sensing lever extension O downwards to expose ratchet wheel B, Fig.15. With the camshaft in the rest position, pawl H should engage the face of the second tooth below the horizontal centre line of feed ratchet B. There should be a clearance of some .010 in. (.25 mm.) at 'k', Fig.16. Repeat this check for each tooth on the ratchet.

Action

14.2 If *Check* 14.1 is unsatisfactory, slacken screw C, Fig.15, hold feed follower roller D down in its cam fall, and adjust lever G to give the required conditions. Tighten screw C.

Action

14.3 Replace bolt X, Fig.20, position lever O approximately across the ends of pecker levers N when the camshaft is in the rest position, and so that lever O passes under levers N when they are fully raised. Tighten bolts X and V.

Note: If this adjustment is carried out in isolation, adjustment 19B should now be checked.

15. Release Lever Assembly (Figs.18 and 19)

Check

15.1 Depress and latch down lever A, Fig.18, and check that there is now a contact gap of .020 - .025 in. (.51 - .64 mm.) at 'n'.

Action

15.2 If this is not so, bend thick blade D until clearance 'n' is satisfactory.

Check

15.3 Pull lever A, Fig.19, slightly forward and let it rise up fully, under the tension of its return spring. Hook a spring tension gauge to blade C just above its contacts and apply force in direction F_2. A force of 2½ - 3½ ozs. (71 - 99 gms.) should just open contacts L.

Action

15.4 If this is not so, 'set' blade C to obtain the correct tension.

Check

15.5 With lever A fully raised, check that there is a gap of .010 - .015 in. '.25 - .38 mm.) at 'o'.

Action

15.6 If this is not so, 'set' backing spring J to obtain the required gap at 'o'.

Check

15.7 With lever A fully raised, hook a spring gauge to blade I close to its contacts, and check that a force of 2½-3½ ozs. (71 - 99 gms.), applied in direction F_3, Fig.19, will just start blade I moving away from backing spring J.

Action

15.8 If this is not so, 'set' blade I to give the required tension. Note that blade I should lie reasonably flat against backing spring J.

Check

15.9 Fully depress lever A and hold it down. Check that there is some clearance between latch G, Fig.18, and the latching edge of lever A, but not more than about .010 in. (.25 mm.).

Action

15.10 If this is not so, bend latch G to obtain the required clearance.

Check

15.11 With lever A latched down, check that there is an estimated clearance of .010 in. (.25 mm.), minimum, between the release lever slot and the back of the slot in tape guide plate H.

Action

15.12 If this is not so, slacken two screws B and position latch G to give the required clearance. Tighten screws B.

16. Tape Retaining Plate (Fig.13)

Checks

16.1 Check that the tape retaining plate B, Fig.13, is located centrally between the arms of bracket L and that it pivots freely, but with the minimum amount of endplay.

Action

16.2 If this is not so, slacken locknuts E and adjust the pivots as required, ensuring that the retaining plate remains centralised in slot D. Tighten nuts E.

*17. Tape Retaining Plate (Fig.13)

Check

17.1 Check that the tape retaining plate B, Fig.13, lies flat on each side of guide slot D.

Action

17.2 If this is not so, slacken screws F and ascertain whether the required condition can be obtained by pressing down on either side of the plate. If this can be done, hold the plate in position and tighten screws F.

Action

17.3 If *Action* 17.2 is unsuccessful, slacken also screws G and add or remove shims (3672/190) between bracket I and guide plate H until *Check* 17.1 is satisfied. Hold the plate in position and tighten screws G and F.

Check

17.4 Repeat *Check* 17.1.

18. Tape Retaining Plate Spring (Fig.20)

Check

18.1 Check that, when latched down by spring Y, Fig.20, tape retaining plate M has no vertical play.

Action

18.2 If vertical play is present, slacken nuts W and adjust spring Y to satisfy *Check* 18.1. Tighten nuts W.

Check

18.3 Check that a force of ¾ to 1 lb. (.34 - .45 Kgm.), applied in direction F_4, is just sufficient to start spring Y moving.

Action

18.4 If this is not so, 'set' spring Y at approximately midway between upper nut W and plate H to obtain the required tension.

19B. 'Letters' Operating Lever Extension (Figs.17 and 21)

Check

19.1 With the camshaft in the rest position, check that there is a clearance at 'p', Fig.21, of .010 - .025 in. (.25 - .64 mm.) between the ends of the pecker levers A and the sensing face of the 'letters' operating lever extension B when the operating lever L is held against its cam track.

Action

19.2 If this is not so, slacken nut G and adjust the position of pivot E to give the required clearance. Tighten nut G.

Check

19.3 Turn the camshaft until all peckers are fully raised and lever extension B is fully forward under pecker levers A. Check that there is now some clearance at 'm', Fig.17, between pecker lever guide Q and 'letters' sensing lever extension P.

Action

19.4 If this is not so, slacken screws C and D, Fig.21, and adjust lever B to give a small clearance at 'm', Fig.17. Tighten screws C and D, Fig.21.

20B. 'Letters' Release Lever (Figs.6 and 21)

Check

20.1 Slacken nut Y, Fig.6, and move its bolt up to the top of the slot. Make nut Y finger tight. Turn the camshaft until all peckers are fully raised, and the 'Letters' operating lever extension B, Fig.21, has moved fully forward under pecker levers A. Check that there is a clearance at 'e', Fig.6, of .010 - .020 in. (.25 - .51 mm.).

Action

20.2 If this is not so, slacken screw K, Fig.21, and adjust lever J with respect to lever L until the clearance is correct. Tighten screw K.

Action

20.3 Move the bolt of nut Y, Fig.6, down far enough to render latch W ineffective and to give a clearance between the end face of the tail of contact operating lever Q and latch W of not less than .010 in. (.25 mm.). Tighten nut Y.

B. MAIN BASE UNIT

Note: The covers of the three transmitter units should be removed before the following operations are carried out.

21. Driving Shaft (Figs.25 and 29)

Check

21.1 Remove screw H, Fig.25, from the boss of gear G and slide the gear out of engagement with motor pinion P. Check that shaft F will now spin freely in its bearings.

Note: In the case of a numbering transmitter, fitted with a tape winder assembly, disengage springs H and A, Fig.29, from anchors K and G before testing the shaft for freedom of spin.

Action

21.2 If the shaft is not free, slacken the two sets of fixing screws C, Fig.25, leaving them finger tight, and align bearing blocks A by gently tapping them until free spin is obtained. Tighten screws C.

Action

21.3 If *Action* 21.2 is not successful, remove screws C from each bearing block in turn, and add or remove shims (3672/13) at M. Align the blocks and when the shaft is free tighten screws C.

Check

21.4 Check that drive shaft F has endplay of not more than .004 in. (.10 mm.), as measured at 's'.

Action

21.5 If this is not so, slacken two screws Q, hold the boss of gear O against block A, and adjust retaining collar R to give the correct endplay. Check that the shaft is still free, then tighten screws Q.

Action

21.6 If Action 21.5 results in loss of free spin for shaft F, refine *Action* 21.2 and, if necessary, *Action* 21.3 also. When all is satisfactory, re-engage gear G with the motor pinion P and replace and tighten screw H.

Note: If the machine is a numbering transmitter, re-engage springs A and H, Fig.29, with anchors K and G.

22. Motor Pinion (Figs.25 and 26)

Check

22.1 Check that motor pinion P, Fig.25, is in true mesh with gear G and that the following conditions are complied with:-

(a) pinion P should be in correct alignment with gear G;

(b) pinion P should be at such a height that when the motor is turned by hand backlash is barely perceptible between pinion and gear, but there is no evidence of binding.

Action

22.2 If *Check* 22.1 is not satisfactory, slacken four screws D, Fig.26, which secure the motor cradle to the machine main base. According to whether it is necessary to raise or lower the motor unit, add or remove shims (3673/73) at points B. Each screw should be dealt with in turn.

Note: Do not alter the setting of abutment screw E, whether or not it is painted red.

Action

22.3 Position the motor unit to satisfy *Check* 22.1 and tighten screws D.

23. Gear Guard (Fig.27)

Check

23.1 Check that gear guard A, Fig.27, clears gear wheel B by not more than 1/32 in. (.8 mm.) at the point of their nearest approach.

Action

23.2 If this is not so, slacken screws E, and position the guard to obtain the required clearance. Tighten screws E.

24. Transmitter Unit Setting (Figs. 25 and 27)

Note: In the case of a numbering transmitter, remove the top cover above the camshaft to afford access to the rear fixing screw.

Check

24.1 With the transmitter units in position on the main base and the three fixing screws of each unit turned in finger tight, check that each drive gear O, Fig. 25, is in true mesh with its associated driven gear on each transmitter unit.

Check

24.2 Check that there is a minimum of backlash between the gears, but no evidence of binding, when the motor is turned by hand.

Action

24.3 If necessary, adjust the position of the units to satisfy the above two checks, then tighten their fixing screws.

Check

24.4 When the right-hand unit has been secured, check that there is a clearance of not less than $\frac{1}{8}$in. (3.1 mms.) between gear guard A, Fig. 27, and the adjacent connection tag on the contacts assembly.

Action

24.5 If necessary, bend the tag to give this clearance.

25. Governor Contacts - Fixed Backstop (Fig. 24)

Check

25.1 Remove the governor unit from the motor shaft and remove its cover. Place the special clamp, TA.1110, Fig. 24, with its fork over spring anchor loop D and its screw against backstop B, as shown at A. Tighten the clamp screw until saddle C is drawn against backstop B, and check that there is a clearance between contacts F and G of .020 - .025 in. (.51 - .64 mm.).

Action

25.2 If the clearance is incorrect, slacken screw E and adjust contact F to correct the error. Tighten screw E, relax and remove the clamp, and replace the governor cover.

Note: Before returning the governor unit to the motor shaft, check that a force of 3-4½ ozs. (85-130 gms), applied to the face of the governor brush S, Fig. 23, in direction F_2, is sufficient to move the brush from stop T. Check, also, that a force of 5 ozs. (14 gms.) is sufficient to give dimension 'r' If the checks are not satisfactory, replace spring(s) U. When satisfactory, return the governor unit to the motor shaft.

26. Governor Contacts - Resilient Backstop (Fig. 22)

Check

26.1 Proceed as instructed in *Check* 25.1 but extend the spring only until saddle Q, Fig. 22, just touches backstop P. Check that there is now a gap at 'q' of .015 - .020 in. (.38 - .51 mm.).

Action

26.2 If this is not so, slacken screw 9 and adjust contact M to give the correct clearance at 'q'. Tighten screw O, and remove the clamp. Replace the governor cover.

Note: Before returning the governor unit to the motor shaft, check that a force of 3-4½ ozs. (85-130 gms.), applied to the face of the governor brush S, Fig.23, is direction F_2, is sufficient to move the brush from stop T. Check, also, that a force of 5 ozs. (14 gms.) is sufficient to give dimension 'r'. If the checks are not satisfactory, replace spring(s) U. When satisfactory, return the governor unit to the motor shaft.

27. Replacement of Covers

Action

27.1 In the case of a message transmitter, replace all outer covers, including the cover of the motor unit.

Action

27.2 In the case of a numbering transmitter with tape winder assembly, replace all but the top cover.

C. TAPE WINDER ASSEMBLY

Note: This section applies only to numbering transmitters fitted with a tape winder assembly. The adjustments should be carried out with the top cover removed.

28B. Tape Reel Bearings (Figs.25 and 29)

Check

28.1 Unhook springs A and H, Fig.29, from anchors G and K, and check that tape reel shaft C will now spin freely.

Action

28.2 If this is not so, slacken two screws E, Fig.25, and set the left-hand bearing plate squarely at the approximate centre of its vertical adjustment. Tighten the screws sufficiently to hold the plate steady, then slacken screws L and set the right-hand bearing plate so that shaft C, Fig.29, is free. Tighten screws L and screws E, Fig.25, and re-attach springs A and H, Fig.29, to anchors K and G.

29B. Tape Reel Shaft End Play (Fig.28)

Check

29.1 Check that shaft K, Fig.28, has endplay at 't' of not more than .005 in. (.13 mm.).

Action

29.2 If this is not so, slacken two screws U, hold collar J against bearing W, and move shaft K until dimension 't' is correct. Tighten screws U.

30B. Tape Guide Arm (Fig.28)

Check

30.1 Check that the endplay of guide arm S, Fig.28, is not greater than .005 in. (13 mm.) at 'u'.

Action

30.2 If this is not so, slacken two screws T, and position arm S on shaft K to give dimension 'u'. Maintain this dimension and tighten screws T.

31B. Tape Guide Pins

Check

31.1 Check that the tape guide pins are in good condition.

Action

31.2 If signs of wear are evident, a new bracket should be fitted.

D. ADJUSTMENTS WITH MOTOR RUNNING

32B. Clutch Torque (Figs.28 and 30)

Check

32.1 With the motor running and the tape winder assembly operating, apply a spring gauge to the hole U, Fig.30, in tape reel plate T, and exert force in direction F_3, at right angles to the radius of the reel and against the direction of revolution. A force of 7 - 9 ozs. (198 - 225 gms.) should be sufficient to stop the reel.

Action

32.3 If this is not so, slacken locknut Q, Fig.28, and turn the friction adjustment washer N:

(a) in a clockwise direction (as viewed from the motor end of the shaft) to increase clutch torque, or

(b) anti-clockwise to decrease torque.

Hold the washer steady with Tool TA.1135 and tighten nut Q.

Note: Repeat the above operations with the remaining two tape reels.

33B. Retention Pawl (Figs.28 and 29)

Check

33.1 With the motor running, hold tape reel M, Fig.28, at rest and check that the other two reels rotate with a minimum of backward movement.

Action

33.2 If back movement seems excessive, slacken nut I and adjust eccentric pivot B, Fig.29, by turning pawl mounting G, Fig.28, so that when feed pawl E, Fig.29, has reached the limit of its feeding movement, there is the least amount of clearance between the stopping face of retention lever J and the face of the ratchet tooth just fed, i.e. so that the least amount of set-back occurs as the pawl moves back to pick up the next tooth to be fed.

Check

33.3 Check for set-back throughout one complete revolution of ratchet D and, turning the machine by hand, check that the feed pawl drops into each tooth to be fed.

34. Motor Speed (Fig.22)

Check

34.1 Swing aside the small cover plate over the motor governor. Switch on the motor and view the stripes on the governor cover through the fork stroboscope, T.A.1117. The stripes should appear stationary.

Action

34.2 If the stripes appear to move, note whether they:

(a) move in the direction of rotation, indicating that the motor is running too fast, or

(b) against the direction of rotation, indicating that the motor is running too slow.

Action

34.3 If movement is apparent, carry out the following operations:-

(a) Check the supply voltage. If in order, short out the governor brushes and note that the motor speed should increase rapidly.

Note: Remove the short on the brushes as soon as possible. It may then be necessary to turn off the supply to decrease motor speed.

(b) If test (a) gives little or no difference in motor speed, switch off the supply and check over the governor circuit for possible faults, dealing with each component in turn.

(c) If all is in order, insert a screwdriver through the hole in the governor cover, and turn screw N, Fig.22, by a small amount:-

(i) anti-clockwise to decrease speed, or

(ii) clockwise to increase speed.

Action

34.4 Switch on the supply and repeat *Check* 34.1. If the speed is still incorrect, refine *Action* 34.3 (c).

E. THE RELAY UNITS

35. The Carpenter (Polarized) Relays

Ref. TMC.4Y.12 - Code: S.58348. Creed No. BO.4029/2.

Note: To ensure satisfactory operation of this relay, it is essential that the magnetic gaps shall be free from dust, especially dust of a magnetic nature. To this end, it is advisable not to remove the plastic cover from the unit unless it becomes necessary to adjust the contacts.

If the contacts are thought to be in need of adjustment, carry out the following operations. A low voltage lamp or buzzer circuit will be found useful.

Check

35.1 Remove the plastic cover from the relay contacts, and examine them for wear or pitting. If their surfaces are dull, burnish them with a clean feeler gauge, of about .002 in. (.05 mm.) thickness. If the surfaces are pitted, the relay should be sent to Maintenance Centre, so that new contacts may be fitted.

Check

35.2 If the condition of the contacts is satisfactory, check that the armature may be freely moved from side to side and that it will remain against each fixed contact in turn, when placed there.

Check

35.3 With the armature resting against one fixed contact, check that there is a gap between the open contacts of about .004 in. (.1 mm.). Move the armature over to the other fixed contact and repeat the check.

Action

35.4 If the results of the Checks are not satisfactory, slacken both locking screws and turn the fixed contacts out through one or two of the divisions engraved on their heads.

Action

35.5 With the armature resting against one fixed contact, turn that contact in until the armature *just* trips over. Turn the contact out for 1½ divisions and tighten the locking screw. Repeat for the remaining fixed contact.

Action

35.6 Repeat Check 35.3. If still unsatisfactory, refine Action 35.5.

Note: It is essential that the fixed contacts shall be accurately adjusted, and *Action* 35.5 should be carried out with precision.

Check

35.7 Check that a force of about 4-5 gms. is just sufficient to move the armature from one side to the other.

Action

35.8 Remove all dust from the relay mechanism, replace the plastic cover and check operation. If this is still unsatisfactory, and if no fault can be found with other components of the circuit, the relay should be sent to Maintenance Centre for overhaul and testing.

Note: No attempt should be made to dismantle the relay, or to carry out any operations on it other than those described above.

36. The 3000-type Relays

The instructions given in this section apply to standard 3000 type relays, as fitted to the Relay Unit associated with the 3-gang communications transmitter. They are not suitable for checking non-standard relays, such as may be fitted to machines designed for special purposes. The following relays are dealt with:-

(a) S.T. & C. Code 4603/DED ..... Creed No. 3773/16
(b) S.T. & C. Code 4603/CGZ ..... Creed No. 3773/17
(c) S.T. & C. Code 4603/CGY ..... Creed No. 3773/18

36.1 *Type DED.* The relay should operate on a current of 14 mA. When deoperated, there should be a gap of .031 in. (.79 mm.) between the residual stud on the armature and the magnet face. When the relay is operated, this gap should be reduced to .004 in. (.10 mm.). The residual stud is not adjustable on this relay, and if the gaps are unsatisfactory it will be necessary to 'set' the armature to obtain correct clearances.

36.2 *Type CGZ.* The relay should operate when a current of 8 - 9 mA. is passed through winding 'de'. The 'ab' winding should hold on a current of 55 mA. When deoperated, there should be a gap of .031 in. (.79 mm.) between the residual stud and magnet face. When operated, this gap should be reduced to .015 in. (.38 mm.). If necessary, the screw stud may be adjusted to give these clearances.

36.3 *Type CGY.* The relay should operate on a current of 12 mA. When deoperated, there should be a gap of .031 in. (.79 mm.) between the residual stud and the magnet face. When operated, this gap should be reduced to .004 in. (.10 mm.). If necessary, 'set' the armature to give these clearances.

37. Tests and Adjustments

37.1 When deoperated, each buffer blade should bear on its buffer block with a pressure of 16 - 24 gms., as measured at the free end of the blade. When operated, the blade should be clear of its buffer block by about .002 in. (.05 mm.). If necessary, 'set' the blades to obtain these conditions.

37.2 When deoperated, each lever spring blade should bear on its operating pin with a pressure of 7 - 14 gms., as measured at the free end of the blade.

37.3 The contact faces should be clean and bright. If they are not, burnish with a clean feeler gauge. New blades should be fitted to replace those with worn or pitted contacts.

37.4 Check that all contacts break and make in correct sequence as required by the operating characteristics of the circuit. If they do not, 'set' the blades to correct the fault.

37.5 Note that, except for contacts designed for 'make-before-break' working, all 'break' contacts should open before 'make' contacts close. If necessary, 'set' the blades to satisfy this requirement.

37.6 Except in special cases, there should be no gap between a lifting pin and the armature, when deoperated, or between the pin and its associated blade(s).

37.7 Ensure that the relay mechanism is clean and free from dust, and that the connection tags are clear of adjacent components.

37.8 Check over the wiring of the relay unit, and ensure that all components are in good condition.

F. MOTOR MAINTENANCE INSTRUCTIONS

Note: Maintenance instructions are the same for both the KBE and KBF Type motor units. Dismantling and reassembling instructions for each motor are given later in this section.

38. Short Term Maintenance - After each 500 hours

38.1 Remove the governor unit from the motor, and remove the motor from the mainbase. Remove the plastic drip cover, and remove the brushes and springs.

38.2 Examine the condition of the brushes, and if they are less than .25 in. (6.35 mms.) in length, obtain and fit new brushes and springs.

Note: Old springs should not be used with new brushes.

38.3 Clean the commutator with a dry rag and brush out all dust from the slots. Do not attempt to remove the black glaze from its surface.

38.4 Check that the brush boxes are so placed that they clear the commutator surface by .005 - .010 in. (.23 - .25 mm.). If this is not so, slacken the screws which secure the boxes to their mounting ring, and adjust correctly. Tighten the screws.

38.5 Replace the plastic drip cover, return the motor to the mainbase, fit the governor. Run the motor for about five minutes, and check its speed (Adjustment No.34).

39. Long Maintenance - After 3000 hours

Note: The following instructions should be carried out at periods of major overhaul.

39.1 Remove the governor unit from the motor, and remove the motor from the mainbase. Dismantle it, according to the instructions given later in this section.

39.2 Soak the ballraces in white spirit to remove all old grease, dry them, and re-pack with Creed No.4 Lubricant. If wear is apparent, obtain and fit new ballraces.

39.3 Clean all bearing caps and clamp plates, and remove all grease and dust from the motor parts and body.

39.4 Discard all four fibre gaskets which seal the ballrace housings. Obtain new gaskets, and smear each with a little No.4 Lubricant, on both sides.

39.5 If the commutator surface is pitted, or badly worn, carry out the following operations:-

(a) Mount the armature in lathe, and skim up the surface with a sharp, pointed tool. Note: The *finished* diameter of the commutator must not be less than one inch (25 mms.).

(b) Using a length of SWG.46 - 43 wire, laid in each slot, check that the depth of the slot is .025-.035 in. (.64 - .89 mm.).

(c) If this is not so, i.e. if the wire is proud of the surface, remove some insulation from the floor of the slot with a sharp, chisel-ended tool. Ensure that the slot is of equal width from top to bottom, and that all insulation is removed from its sides.

(d) Bring the surface to a high polish with fine glass paper. Note: Emery paper should not be used for this operation. Brush away all dust from the slots.

(e) Reassemble the motor, as instructed later in this section, fitting new brushes and springs if the old brushes are less than .25 in. (6.35 mms.) in length. Note: Old springs should not be used with new brushes.

(f) Assemble the motor to the mainbase, run for about five minutes, and carry out Adjustment No.34.

THE TYPE KBF MOTOR

Note: The KBF motor unit is obtainable for a voltage range of 200-250V, in models suitable for a.c. or for d.c. working. The motor body is fitted with an air-exhaust spout.

KBF- S.4177, Grp.I - Ref.412A - 200-250V A.C. - one field coil on each side of armature.
KBF- S.4177, Grp.II - Ref.411A - 200-250V D.C. - one field coil on each side of armature.

40. Dismantling instructions (Fig.34)

The following special tools will be required:-

(a) Ballrace extractor TA.1188
(b) Pin spanner ..... TA.1189.

40.1 Remove the motor from the mainbase, remove the plastic drip cover, and the drive pinion.

40.2 Remove four screws D, Fig.34, and remove fan guard E.

40.3 Slide off the brush box covers Y, and remove the brushes and springs. (Note: If any brush is less than .25 in. (6.35 mms.) long, discard it and obtain a new brush/spring assembly (Part No. AA.11/1).

40.4 Slacken four screws U, and slide the brush boxes off their mounting ring V. (Note: Do not slacken the fixing screws of V, and when reassembling, check that the mark on ring V alignes with the mark on the endplate T).

40.5 Remove four screws B. Remove three screws N, and remove cover plate R and gasket S. Discard the gasket (3905/16).

40.6 With a hide or wood mallet, tap the shaft at P until bearing O is free of its housing in endplate T. Remove the armature shaft, with endplate AD from the motor body.

40.7 Remove screws AJ, remove cover plate AH and gasket AG. Discard AG (Part No.3905/16). Remove spring ring AL.

40.8 With the mallet, tap shaft at AK, to free bearing AF from its housing in endplate AD. Remove AD.

40.9 Using the pin spanner, remove locking rings A, Q from the shaft.

40.10 With the bearing extractor, remove both ballraces. Remove gaskets (Part No.3905/16). Remove thrust plates K, AB.

41. Reassembling Instructions (Fig.34)

Note: The following special tools will be required;-

(a) Pin spanner ..... TA.1189.
(b) A 3in. (7.5 cms.) length of 6BA screwed rod.
(c) A 3in. (7.5 cms.) length of soft metal tube, of bore to slide over the shaft and rest on the inner race of each ballrace.

41.1 Assemble the thrust plates K and AB, Fig.34, and cover plates C and L with new gaskets M and AC.

41.2 Assemble bearing AF to the shaft, place the soft metal tube over the shaft and against the centre race of the bearing and tap the free end of the tube until the bearing is fully home against the shoulder on the shaft. Repeat this method of assembly for bearing O.

41.3 Replace locking collars A and Q, and tighten them with the pin spanner.

41.4 Pass the 6BA rod through a hole in gasket AC and screw it a few turns into plate C. Smear the ballrace housing in end plate AD with a little No.4 grease, and also the housing in end plate T.

41.5 Replace plate AD on the shaft, passing the screwed rod through one screw channel, and tap the plate on to bearing AF.

41.6 Assemble the spring AL to bearing AF. Assemble a new gasket AG and cover plate AH, passing the rod through a screw hole in each part.

41.7 By means of the rod, pull plate C against end plate AD, and secure it with one screw AJ turned in finger tight. Insert a second screw AJ, remove the rod and insert the third screw AJ.

41.8 Pass the screwed rod through one hole in new gasket M and screw it a few turns into plate L. Assembly the armature into the motor body, passing the rod through a screw channel in end plate T. Tap the shaft at AK until bearing O is fully home in end plate T.

41.9 Assemble new gasket S and plate R and secure all by screws N by the method used for plates AH and C (41.7).

41.10 Secure end plate AD to the motor body with screws B, ensuring that pin AE is located vertically below the shaft.

41.11 Lightly tap each end of the shaft and check that it rotates freely. If it does not, slacken screws N and AJ, tap the shaft again, then tighten all screws.

41.12 Remount the brush boxes on ring V, setting each one to satisfy dimension 'a'. Insert the brushes and springs (AA.11/1), and secure them in place with the box covers. Check that the transverse mark on the edge of ring V is aligned with the mark on end plate T. If it is not, slacken the bolts which secure the ring to the end plate casting, align the marks and tighten the bolts.

41.13 Reassemble fan guard E, replace the plastic drip cover, and the drive pinion, and assembly the motor to the machine mainbase.

41.14 Run the motor for about five minutes, then check its speed, as directed in Adjustment 34.

THE TYPE KBE MOTOR

Note: The Type KBE motor unit is normally fitted to machines intended to operate on a mains supply of 100-130V range. Unlike the Type KBF motor, it does not have an air-exit spout. Maintenance operations are the same as for Type KBF motors, given above, but the following Dismantling and Assembling Instructions should be used.

KBE - S.4178, Grp.88 - Ref.202A - 100-130V A.C. - one field coil on each side of armature.
KBE - S.4178, Grp.III - Ref.210A - 100-130V A.C/D.C. - both field coils same side of armature.

The following special tools will be required:-

(a) Ballrace extractor ..... TA.1188.
(b) A 3 in. (7.5 cm.) length of 6BA screwed rod.
(c) A 3 in. (7.5 cm.) length of soft metal tub, of bore to slide easily over the shaft and rest on the centre race of each ballrace.

Dismantling Instructions (Fig.35)

(s) Remove the motor from the mainbase, remove the plastic drip cover, and the drive pinion.

(b) Remove the brush box covers, followed by the brush/spring assemblies. Slacken the fixing screws of the brush boxes, and remove them from their mounting ring, leaving them suspended by their wire connections.

Note: Do not slacken the fixing screws of the mounting ring, and when re-assembling, check that the setting mark on the ring is aligned with the mark on the endplate.

(c) Remove the two screws which secure endplate U, Fig.35, to the motor body.

(d) Remove the three screws which secure the trefoil-shaped cover plate M to the inner ring P. Remove M and gasket N. Discard the gasket.

(e) Using a hide or wooden mallet, gently tap out the armature shaft from the commutator end, and remove the complete armature/endplate assembly from the motor body.

(f) Remove the three screws securing trefoil-shaped cover plate Y, and remove the plate, followed by gasket AA, special washer W, and end-plate U. Discard the gasket.

(g) Release the screw of locking collar V, and remove the collar. Using bearing extractors (TA.1188), withdraw the ballraces (BO.2874) from the shaft, followed by clamp plates P and S, and gaskets AE, AB. Discard the gaskets.

Reassembling Instructions (Fig.35)

(a) Assemble lightly greased gaskets (Creed No.4 lubricant) as follows:-

Gasket AE (Part No.) Gasket AB (Part No.)	BO.2929/88
Gasket N (Part No.) Gasket AA (Part No.)	BO.2929/85

aligning the screw holes in each case.

(b) Replace plates P and S, with their gaskets, on the shaft. Replace the ballraces, tapping them home against the shoulders of the shaft with the aid of the soft metal tune, replace and secure the locking collar V ensuring that it is hard up against the centre race of the bearing.

(c) Turn the 6BA rod into a screw hole of clamp plate S.

(d) Smear a little Creed lubricant No.4 on the inner surface of the housings of the ballraces. Hold the armature shaft upright, commutator end down.

(e) Lower the endplate U on to the shaft, passing the screwed rod through one of the clamp screw channels in the plate.

(f) Replace special spring washer W on the ballrace, fit the trefoil-shaped ring, with new gasket AA, in position on plate U, passing the rod through one screw channel in the gasket/plate assembly.

(g) Using the screwed rod, pull inner plate S up against endplate U, and secure it with two fixing screws X, finger tight. Remove the rod, and insert the third screw X. Tighten the three screws, a little each in turn.

(h) Engage the rod for a few turns into one of the screw holes in plate P. Replace the endplate/armature assembly into the motor body, passing the rod through one of the clamping screw channels in the commutator endplate C.

(i) Rotate the tongue on endplate U into register with the slot in the motor body, and tap the shaft home. Press endplate U into firm contact with the motor body, and secure with its fixing screws.

(j) Replace the trefoil-shaped cover plate M, and new gasket N, passing one screw hole over the 6BA rod. Secure M to ring P by the method given in (g), above. Check that the armature will rotate freely, if not, tap each end of the armature shaft.

(k) Reassemble the brush boxes to the rocker arm, adjusting their position to satisfy dimension 'a' of .005-.010 in. (.13-.25 mm.). Tighten the box fixing screws E and K before removing the feeler.

(l) Replace the motor brushes, or fit new ones, with new springs, in the brush boxes. (Brush/spring assembly: Part No. AA.1/2). Check that all screws are properly tightened.

(m) Replace the plastic drip cover, remount the motor on the main base, and run for about five minutes, then check the speed as directed in Adjustment No.34.

G. THE NUMBERING TAPE

Note: When preparing a numbering tape, a length of about two feet should be perforated with the 'space' combination before the punching of the first number combination. On machines with an adjustable tape width guide W, Fig.13, this should be set for the width of tape to be used.

To do this, the guide W should be depressed, then moved (a) to the left for wide tape, or (b) to the right for narrow tape. Then let the guide rise up against the top plate.

42. To Insert the Numbering Tape (Fig.36)

42.1 Wind the prepared tape on the (front) storage reel, starting with the finishing end of the tape, and winding backwards, so that the start end will pass over the front of the reel to its pin guides, and that the start of the number sequence is on the outside of the reel.

42.2 Raise the tape retaining plate, pass the tape under the brake pin, over the guide pin and over the feed wheel pins. Close the tape gate, after feeding through enough tape to reach the take-up reel on the top of the machine.

42.3 Pass the tape under the metal snubbing pin on top of the transmitter, and under and over the front of the rubber sleeve snubber.

42.4 Engage the starting end of the tape with one of the slots in a pin of the take-up reel, then turn the reel to take up all slack.

42.5 Switch on the motor and run the machine until the first sequence number combination is about to enter the tape guide slot on the transmitter top plate. Switch off the motor, and the machine is ready for use.

43. To Rewind the Tape (Fig.36)

43.1 When all the numbering tape has passed to the take-up reel, it may be rewound for further use as follows:-

43.2 Anchor the rear end of the tape to one of the slots in the storage (front of machine reel pins, so that it passes directly to the reel, without passing through the transmitter gate or the snubbing pins.

43.3 Turn the storage reel backwards until all the tape is rewound, then reload the tape as directed in Section 42.

H. LUBRICATION INSTRUCTIONS

44. Short Term Lubrication - After each 500 hours of operation

44.1 No.1 Lubricant:

Lubricate the pivots of the following parts:-

(a) Pecker levers on pecker lever spindle - (P, Fig.6).

(b) Feed Follower roller - (D, Fig.15).

(c) Feed Pawl - (H, Fig.16).

(d) Tape Feed retention lever - (L, Fig.15).

(e) Camshaft detent roller.

(f) Contact Spring operating levers - (L, Fig.4).

Lubricate the following friction facts:-

(g) Sleeve of 'letters' operating lever - (on pivot E, Fig.21).

(h) Teeth of camshaft clutch and driving dog:- (D, E, Fig.2).

(i) Engaging surfaces of clutch and cam driving sleeve - (R-H end of E, Fig.2).

44.2 No.2 Lubricant

Lubricate the pivots of the following parts:-

(a) Clutch detent - (F, Fig.2).

(b) Feed and retention pawls - (J, E, Fig.29).

Lubricate the following parts:-

(c) Fill the oil cups of the camshaft bearings.

(d) Felt oiling washers of the camshaft.

(e) Bearing points of the tape feed wheel - (T, Fig.14).

(f) Oil holes in each bearing block of the main drive shaft.

(g) Oil holes in each bearing block of the tape reel shaft.

(h) Bearing surface between the tape feed ratchet boss and the tape reel operating lever, (at C, Fig.29).

(i) Tape brake arm bearing (see Fig.36).

44.3 No.4 Lubricant (grease)

Apply a little grease to the following parts:-

(a) Teeth of the tape feed ratchet wheel, (P, Fig.14).

(b) Teeth of the camshaft driven gear.

(c) Teeth of all gear wheels on the main drive shaft, and of the motor pinion.

(d) Teeth of the ratchet wheel on the tape reel shaft, (D, Fig.29).

(e) Engaging faces of the tape feed detent lever, release lever, and tape feed pawl.

(f) Guide slot of the 'tape-out' contact operating lever.

(g) Engaging faces between the contact operating lever latch and the 'tape-out' contact operating lever. (On W, Fig.6).

(h) Bearing slot in the release lever, and the engaging surfaces round the latching point, (H, G, Fig.18).

(i) The tape reel operating pin, and the outer face of the retaining collar, and the slot of the tape feed operating lever, (foot of lever H. Fig.28).

45. Long Term Lubrication - After each 3000 hours of operation

Lubrication instructions given below are to apply when the machine is dismantled for major overhaul. They are additional to those already given for Short Term Lubrication.

(a) Wash out the ballraces of the motor unit in white spirit, ensure that all old grease is removed, then repack with No.4 Lubricant.

(b) Soak the oilite bearings of the tape guide arms in No.2 Lubricant.

46. CREED Lubricants

The following Lubricants are recommended:-

No.1 Lubricant

(a) Shell CLAVUS oil 17 - (formerly Shell Oil J.Y.1).

(b) Wakefield MAGNA R.S. oil.

No.2 Lubricant

(a) Shell TALPA Oil 30 - (formerly Shell Oil CY2).

(b) Wakefield CASTROL XL.

No.4 Lubricant

(a) Shell ALVANIA 3 Grease - (formerly Shell Nerita Crease 1).

I. TRANSMITTER HEAD

DISMANTLING INSTRUCTIONS

Note: The following instructions apply to a Message transmitter. In the case of a Numbering transmitter, the operations are the same, apart from removal of part of the 'letters' sensing mechanism, which should be dealt with first.

Care should be taken to note the number and positions of all shims, and spacing washers, in order that they may be correctly replaced.

The unit may be reassembled by following the dismantling instructions in reverse order, and substituting the words 'replace' and 'tighten' for 'remove' and 'slacken' where necessary.

After reassembly the Adjustment Instructions should be carried out in full.

1. In the case of a numbering transmitter unit, remove the tape snubbing pins and bracket from the top of the unit. Detach spring I, Fig.21, from its base anchor. Remove screws C, D, and remove vertical lever B.

2. Remove the top cover from the camshaft.

3. Remove screws W, Fig.20, and remove the tape gate retaining spring Y.

4. Remove the tape width-setting lever W, Fig.13, and its spring. Remove two springs from their anchorages on release lever K, and swing the lever forward out of its slot in top plate H.

6. Turn the camshaft to the rest position, then remove six pecker lever spring X, Fig.6, from their common anchor plate. Remove the spring from the foot of the pecker lever bail extension. Remove the spring from the foot of the vertical extension of feed follower G, Fig.15.

7. Remove the fixing screws from each end of the pecker levers mounting bracket I, Fig.9, and ease the bracket assembly off the shaft. Note any shims N at the bracket mounting points. If it is thought desirable to dismantle the assembly, the method will be obvious, When reassembling, return each part to its original position.

8. Remove spring L, Fig.3, from anchor pin M. Unsolder the connections to the transmitter contact blades, taking note of the correct method of reassembly. Remove the four screws which secure the contacts assembly to the unit frame, and dismantle the assembly, taking note of the correct method of reassembly.

9. Remove the screw which secures the horizontal spring anchor strip to the clutch-end bearing plate of the camshaft.

10. Remove the two screws (under plate) which secure the clutch-end camshaft bearing plate to the baseplate.

11. Ease the camshaft out of its other bearing, taking note of the shims at B, Fig.1, and remove it, complete with the clutch detent F, Fig.2, and bearing plate J.

    Note: The clutch spring will tend to draw the cam sleeve out of engagement with clutch section E. It is important that the sleeve and the clutch shall be correctly engaged, on reassembly, so that when the shaft is in the rest position, the fall in the cam which operates the 'start-stop' contacts is underneath the sleeve, i.e. that the contacts are closed.

12. Dismantle the contacts operating levers from their common pivot by unscrewing the pivot. At this point, the rest of the 'letters' sensing mechanism of a Numbering transmitter may be removed, if this is thought necessary. When reassembling, note that each lever and part should be returned to its original position.

    Note: Normally, it is not necessary to further dismantle the unit, but if this is thought desirable, the method is obvious.

    On some machines produced prior to the introduction of the current Mark IV machine, the cams were separate entities, bolted together on the camshaft. If this is the case, no attempt should be made to remove the cams from the shaft.

    Clean all parts. If wear is apparent, obtain new parts as replacements. Reassemble.

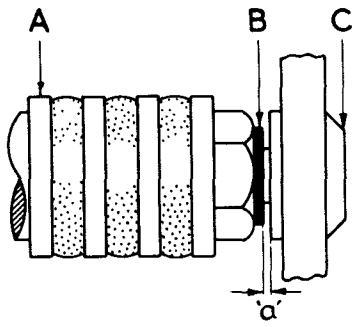


FIG. 1

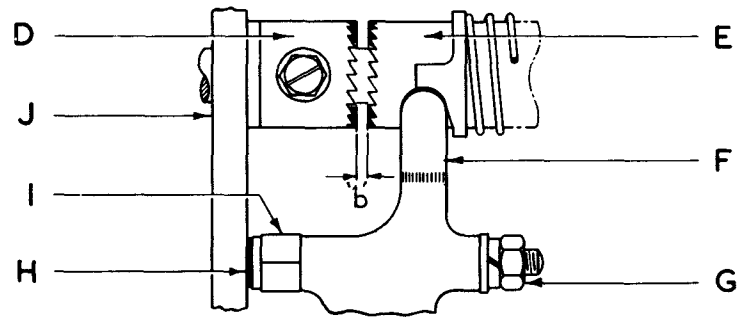


FIG. 2

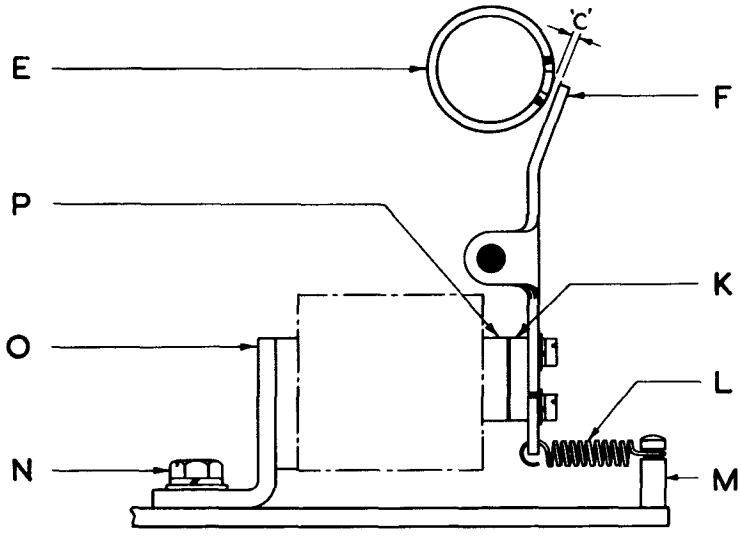


FIG. 3

DIMENSIONS

'a' = {·002 in. max. / ·05 mm.} 'b' = {·010—·015 in. / ·25 —·38 mm.} 'c' = {·004—·012 in. / ·10 —·30 mm.}

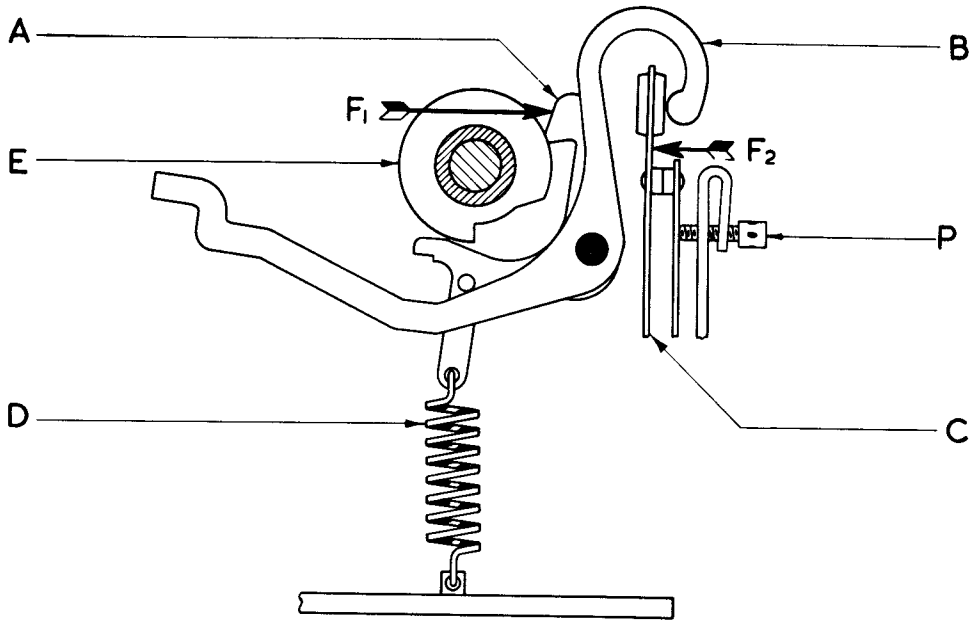


FIG. 7

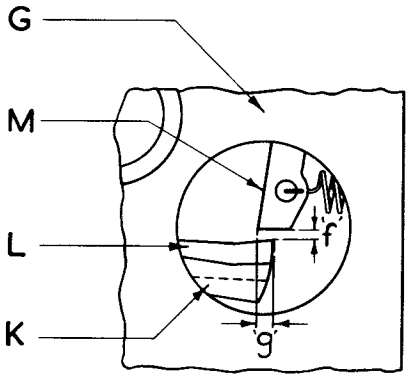


FIG. 8

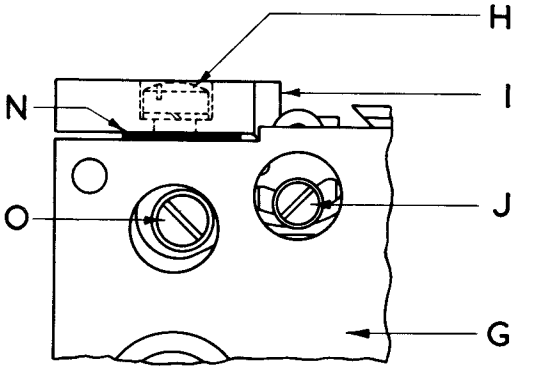


FIG. 9

DIMENSIONS

'f' = {·002—·012 in. / ·05 —·30 mm.} 'g' = {·050—·090 in. / 1·27—2·29 mm.}

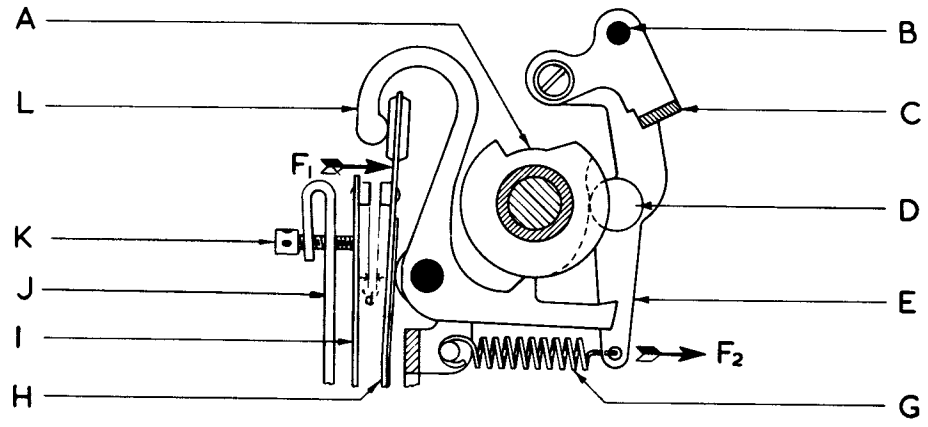


FIG. 4

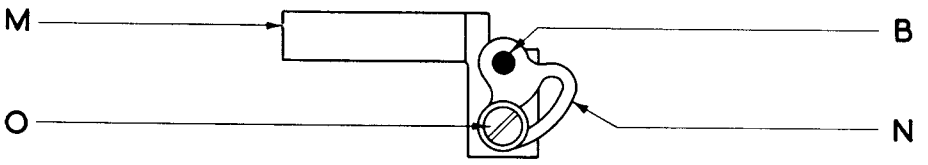


FIG. 5

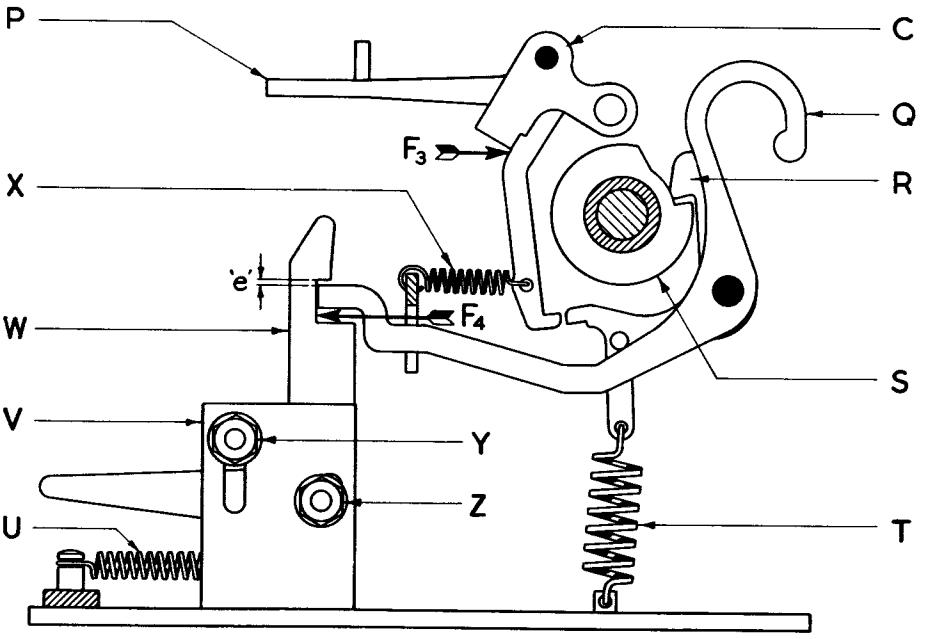


FIG. 6

DIMENSIONS

'd' = {·020—·025 in. / ·51 —·64 mm.}

'e' = {·010—·020 in. / ·25 —·51 mm.}

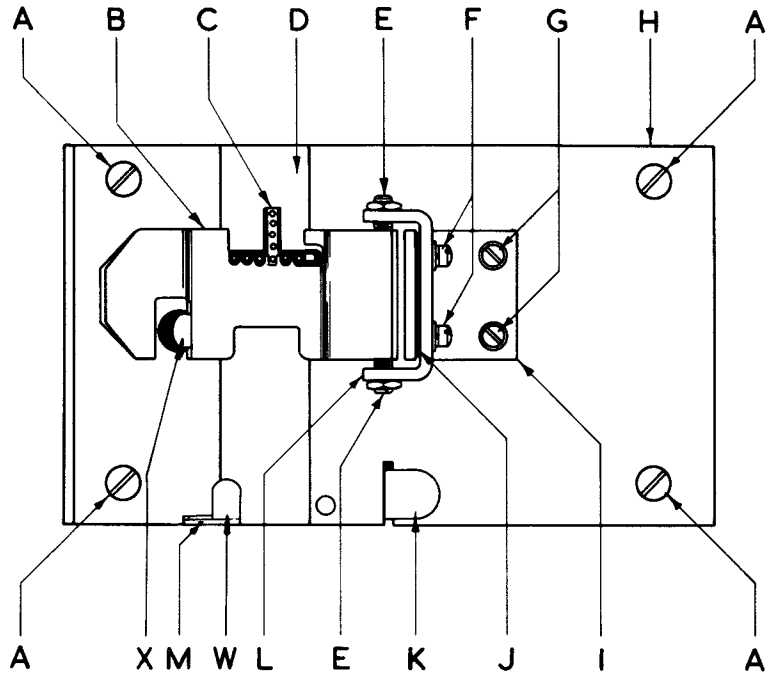


FIG. 13

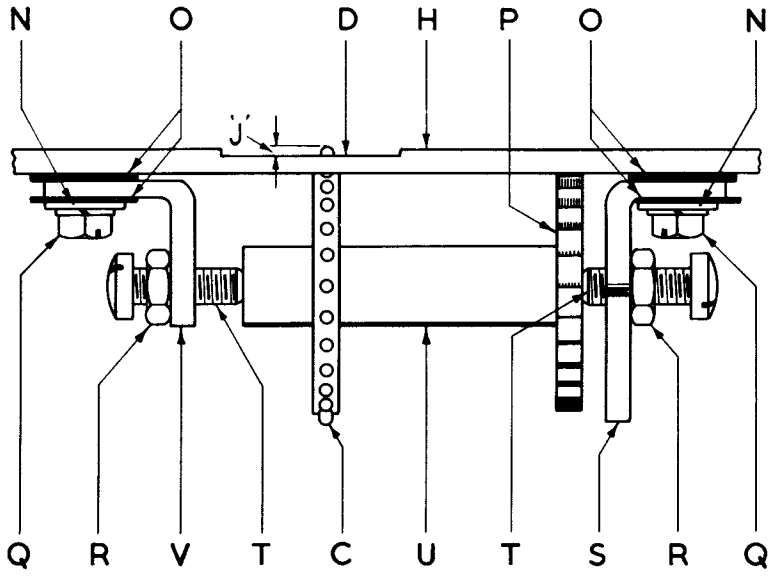


FIG. 14

DIMENSIONS

'j' = {·035—·045 in. / ·89 —1·14 mm.

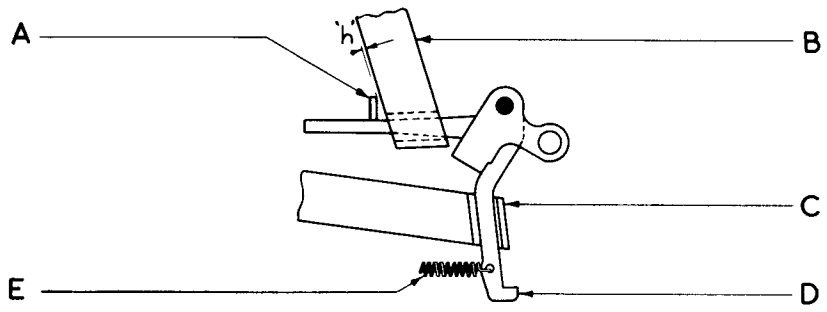


FIG. 10

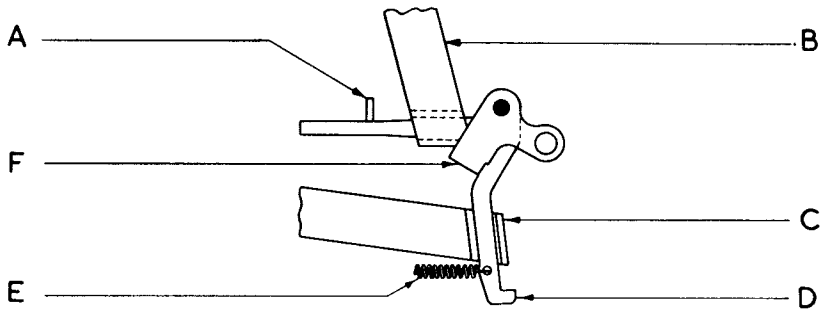


FIG. 11

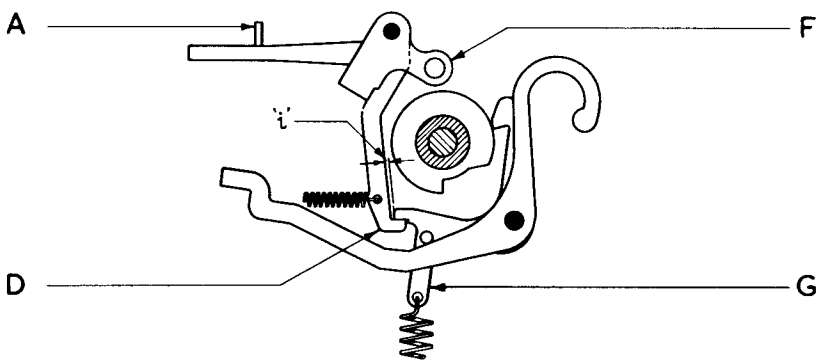


FIG. 12

DIMENSIONS

'h' = Some Clearance

'i' = ·015—·030 in.
·38 —·76 mm.

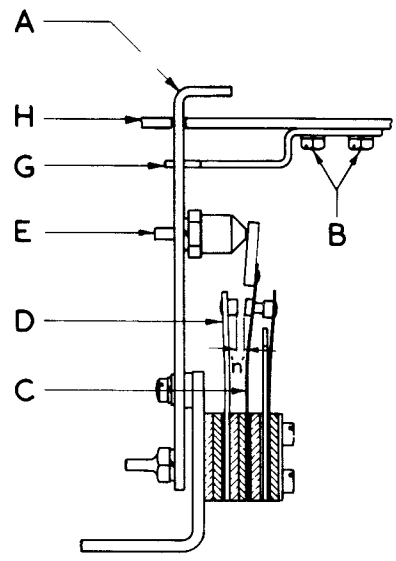


FIG. 18

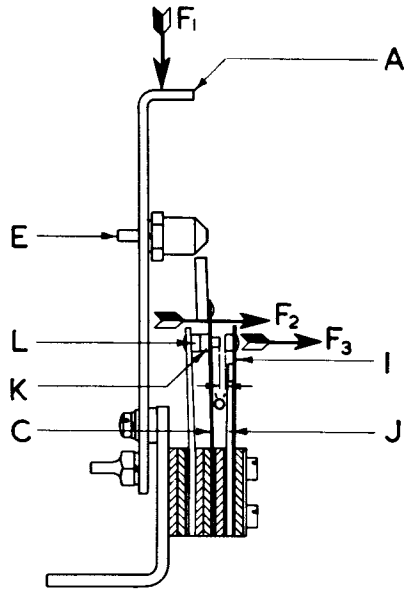


FIG. 19

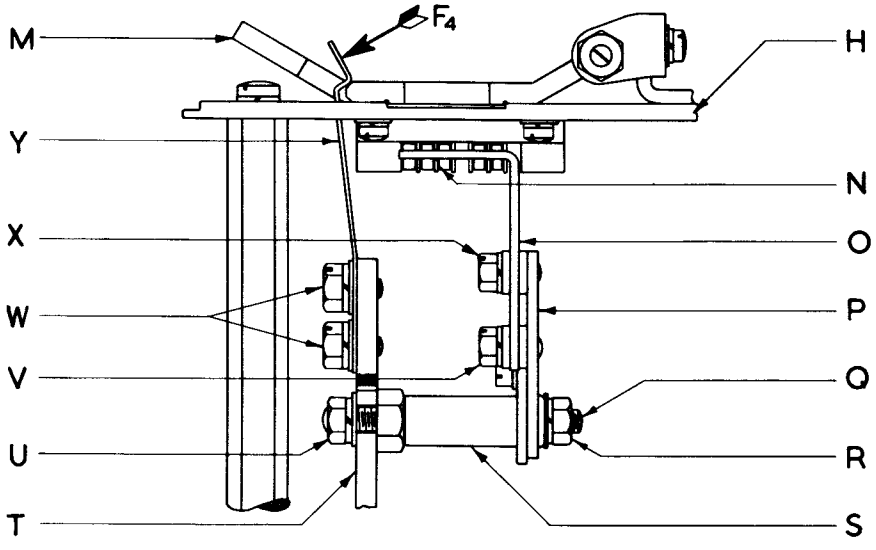


FIG. 20

DIMENSIONS

'n' = {·020—·025 in. / ·051—·64 mm.} 'o' = {·010—·015 in. / ·25 —·38 mm.}

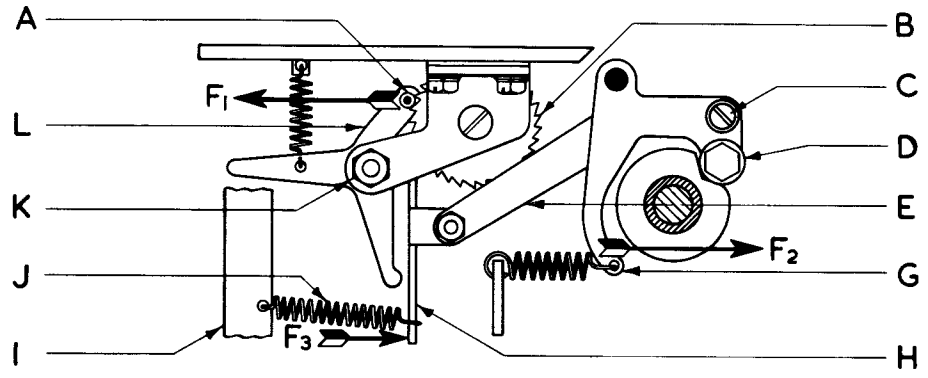


FIG. 15

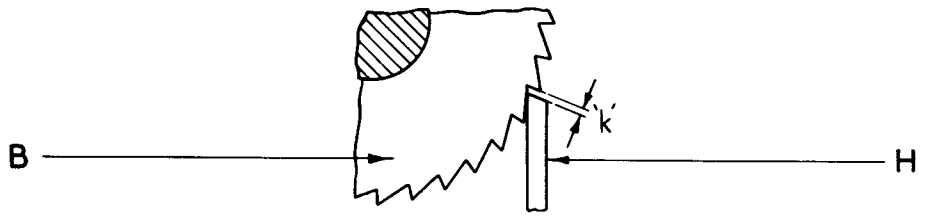


FIG. 16

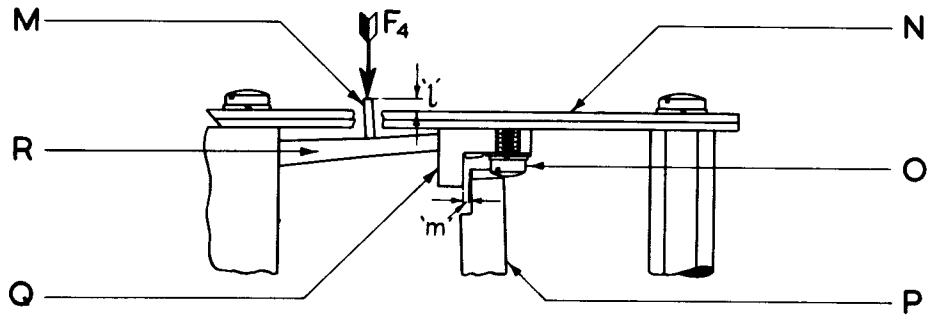
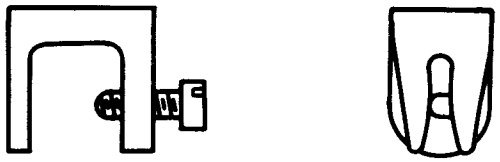


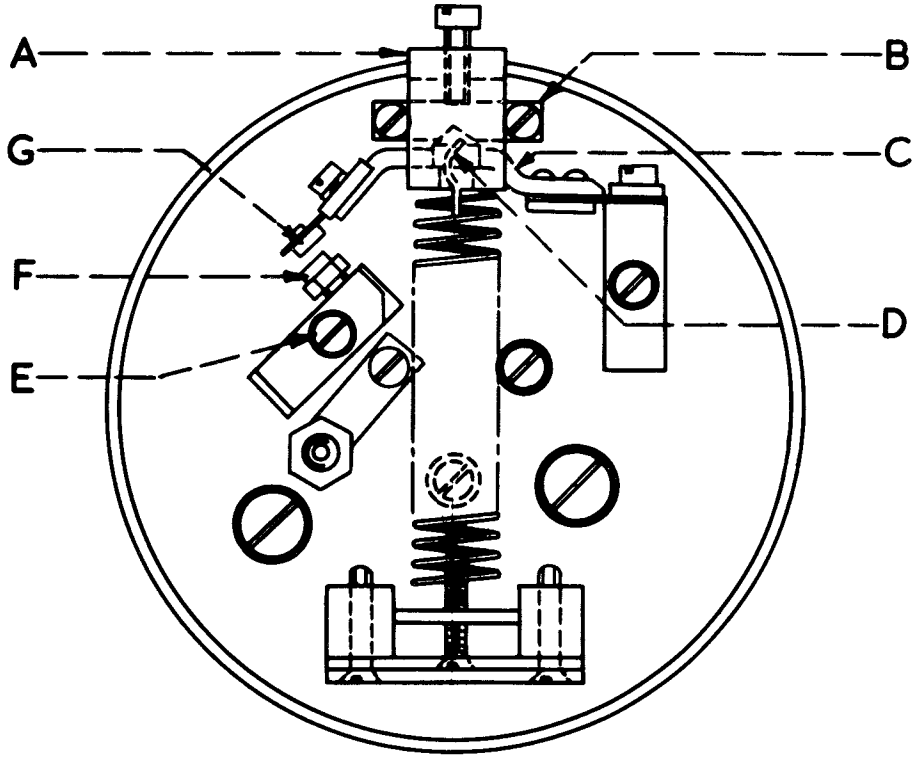
FIG. 17

DIMENSIONS

k' = {·010 in max. / ·25 mm.} 'l' = {·037—·066 in. / ·94 —1·68 mm.} 'm' = Some Clearance



TA.1110
GOVERNOR ADJUSTING CLAMP



GOVERNOR AND CLAMP

FIG. 24

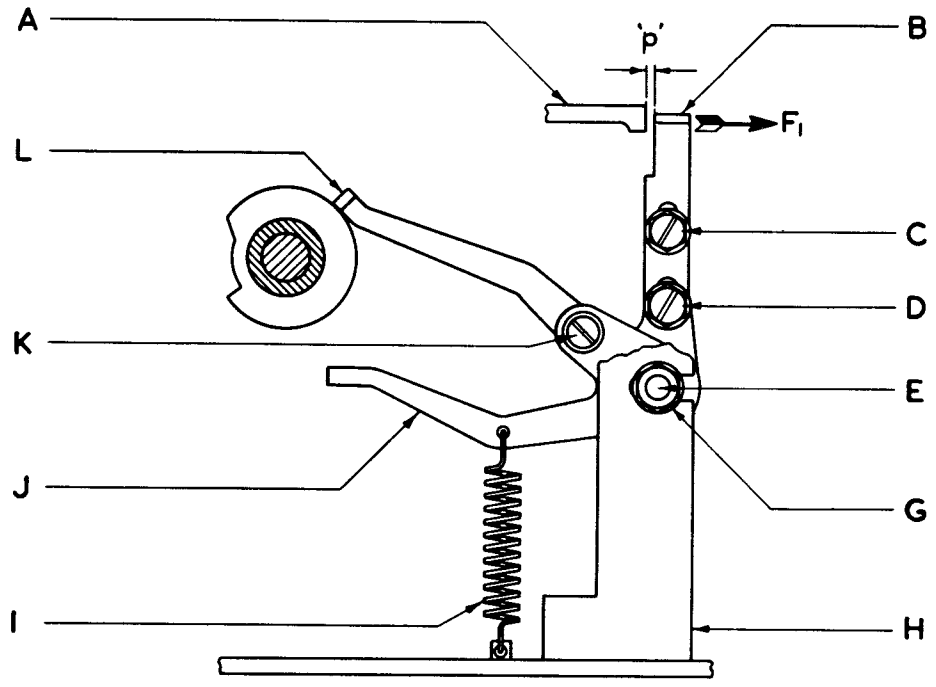


FIG. 21

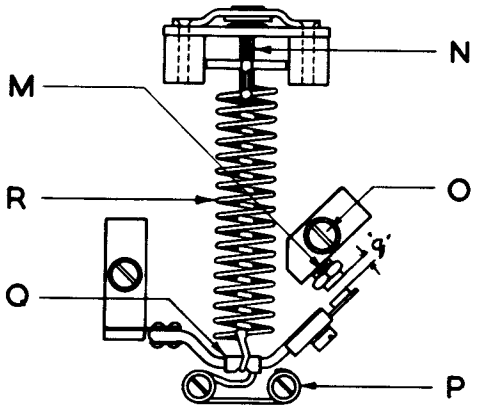


FIG. 22

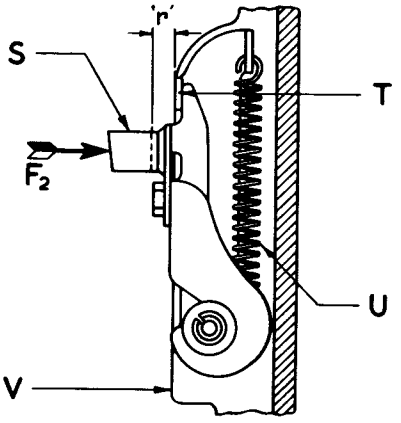


FIG. 23

DIMENSIONS

p' = {·010—·025 in. / ·25 —·64 mm.} 'q' = {·015—·020 in. / ·38 —·51 mm.} 'r' = {1/16 in. / 1·6 mm.}

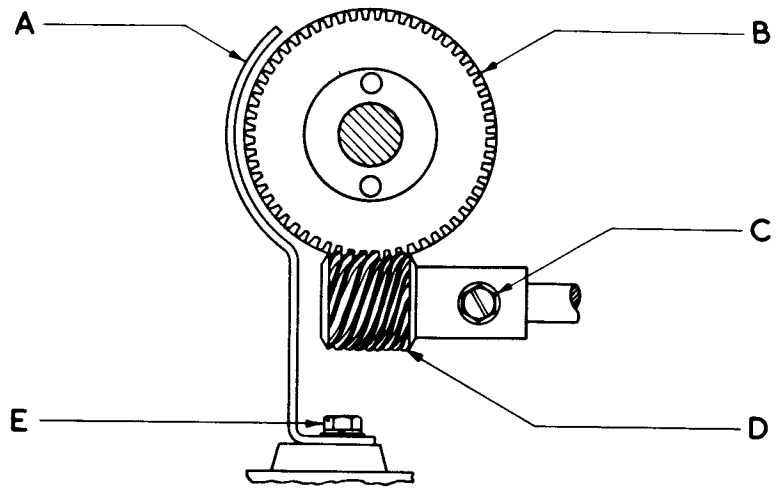


FIG. 27

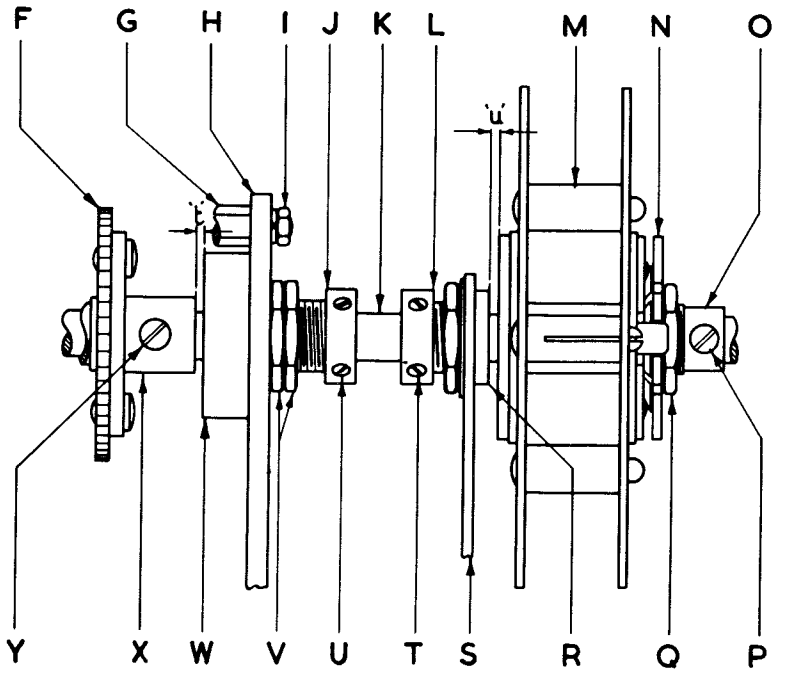


FIG. 28

DIMENSIONS

't' = {·005 in. max. / ·13 mm.}

'u' = {·005 in. max. / ·13 mm.}

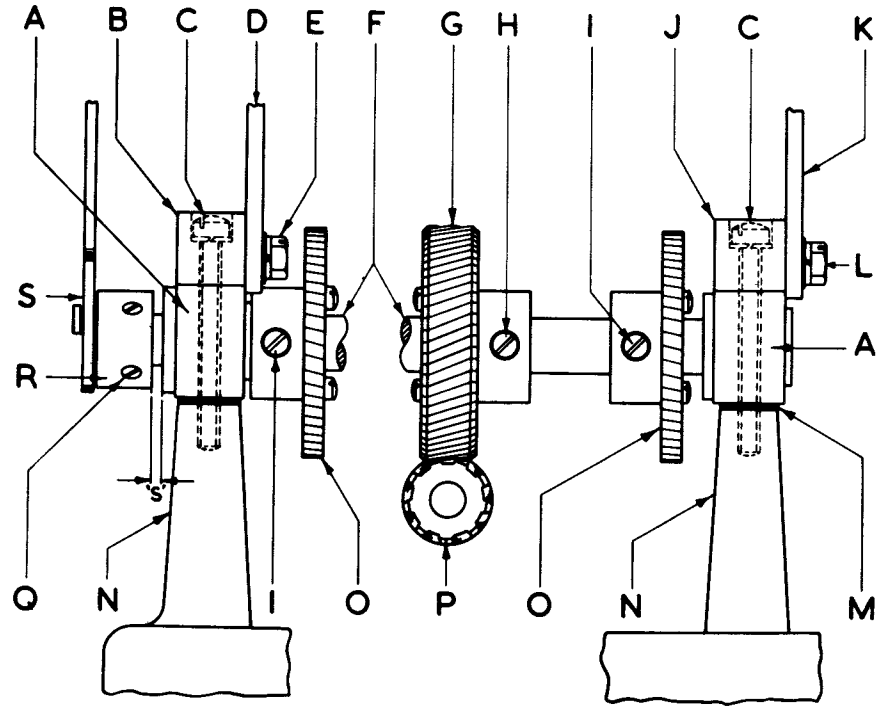


FIG. 25

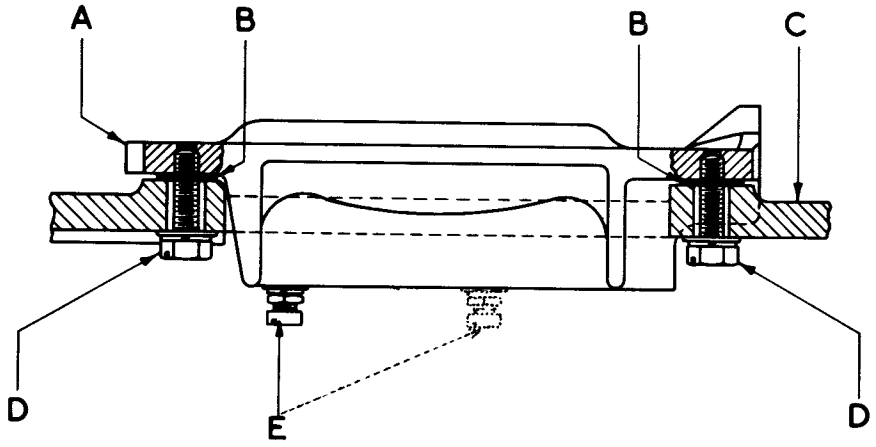


FIG. 26

DIMENSIONS

's' = {·004 in. max. / ·10 mm.}

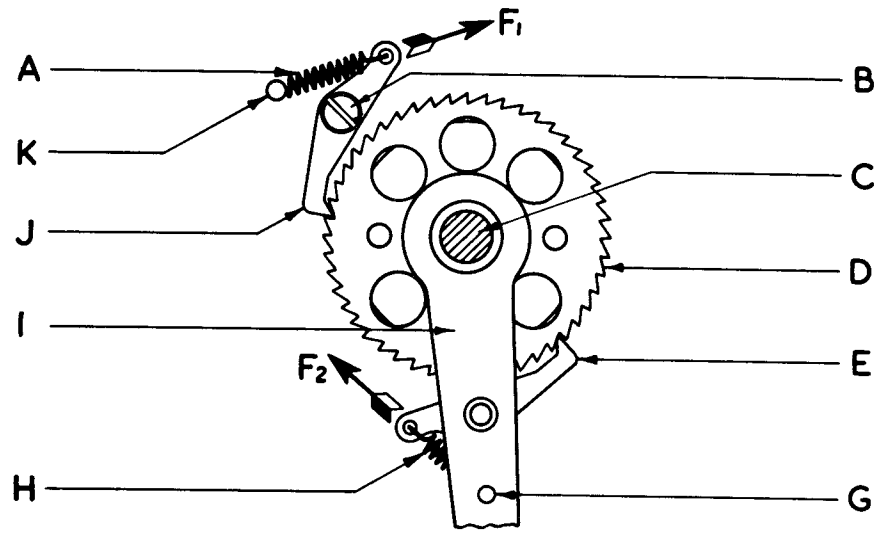


FIG. 29

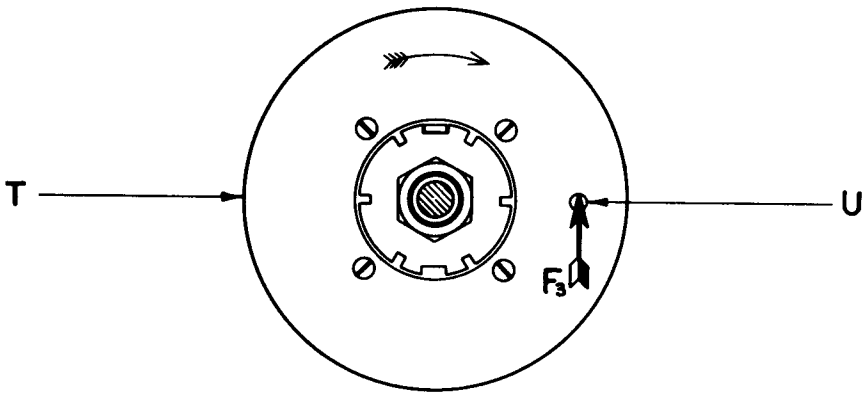
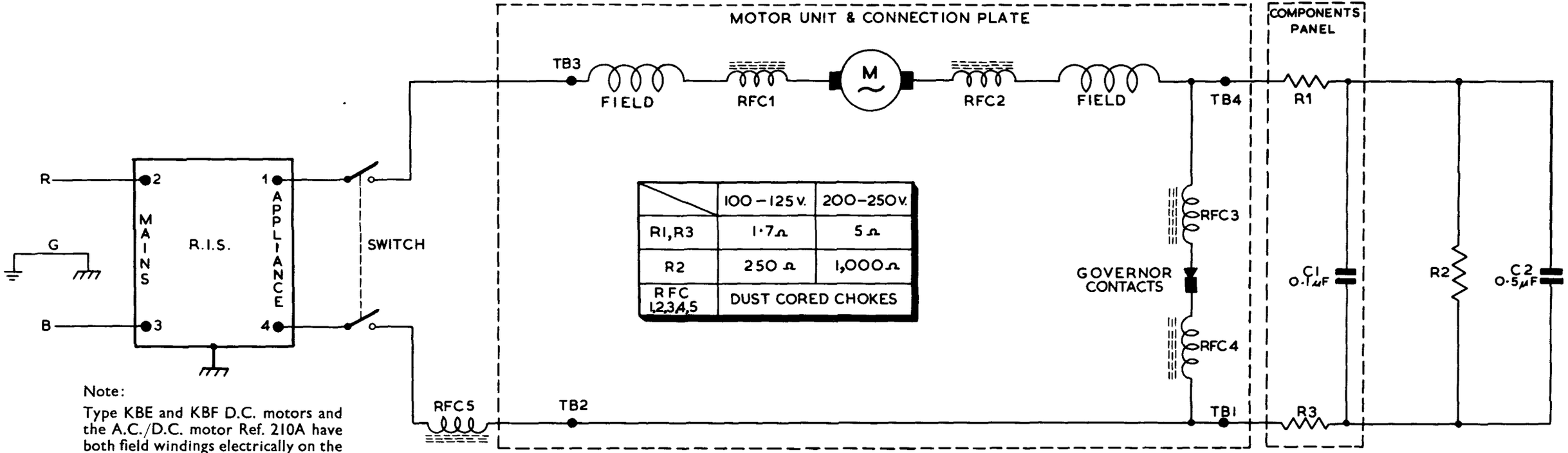


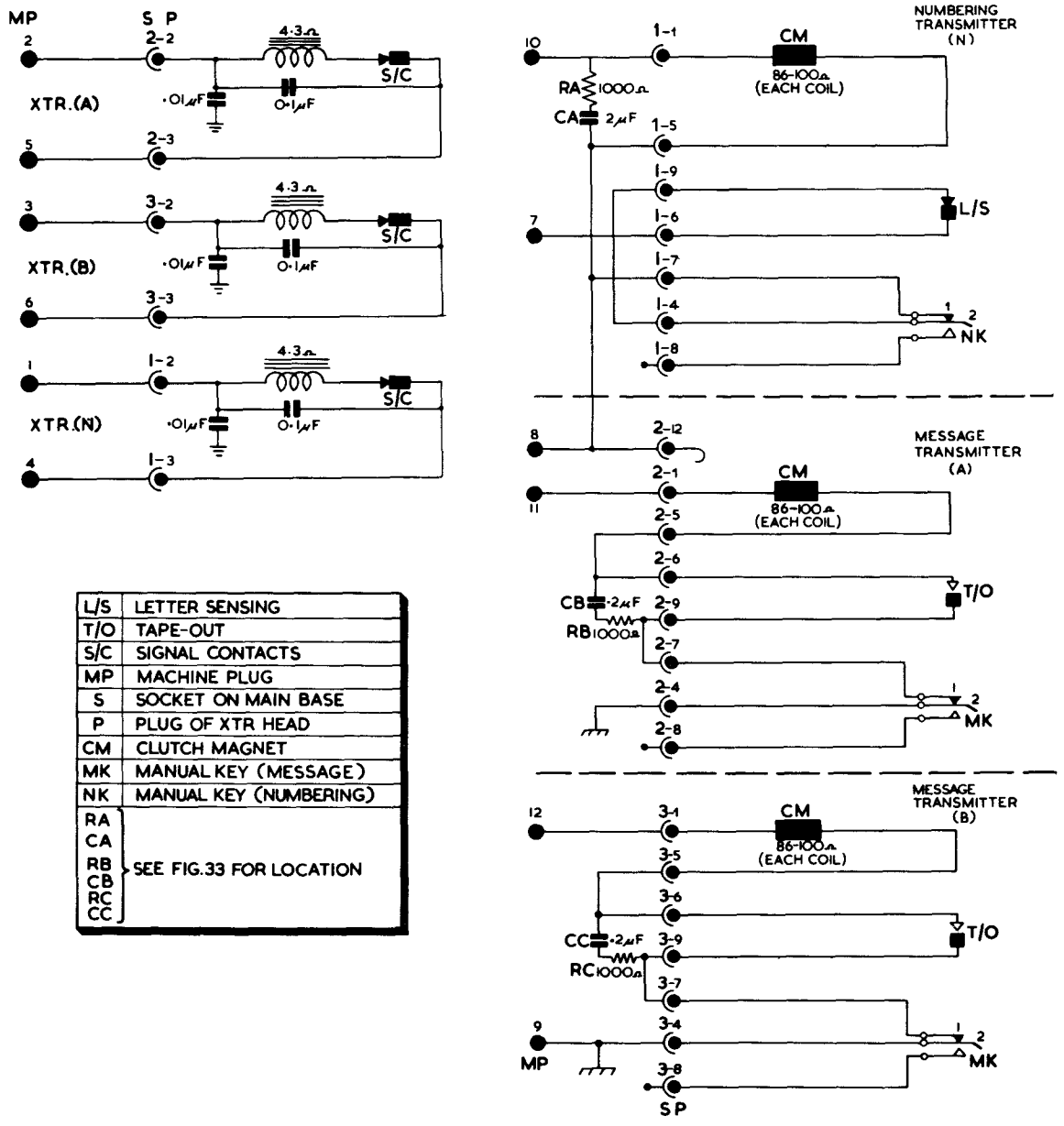
FIG. 30



	100–125 V.	200–250 V.
R1, R3	1·7Ω	5Ω
R2	250Ω	1,000Ω
RFC 1,2,3,4,5	DUST CORED CHOKES	

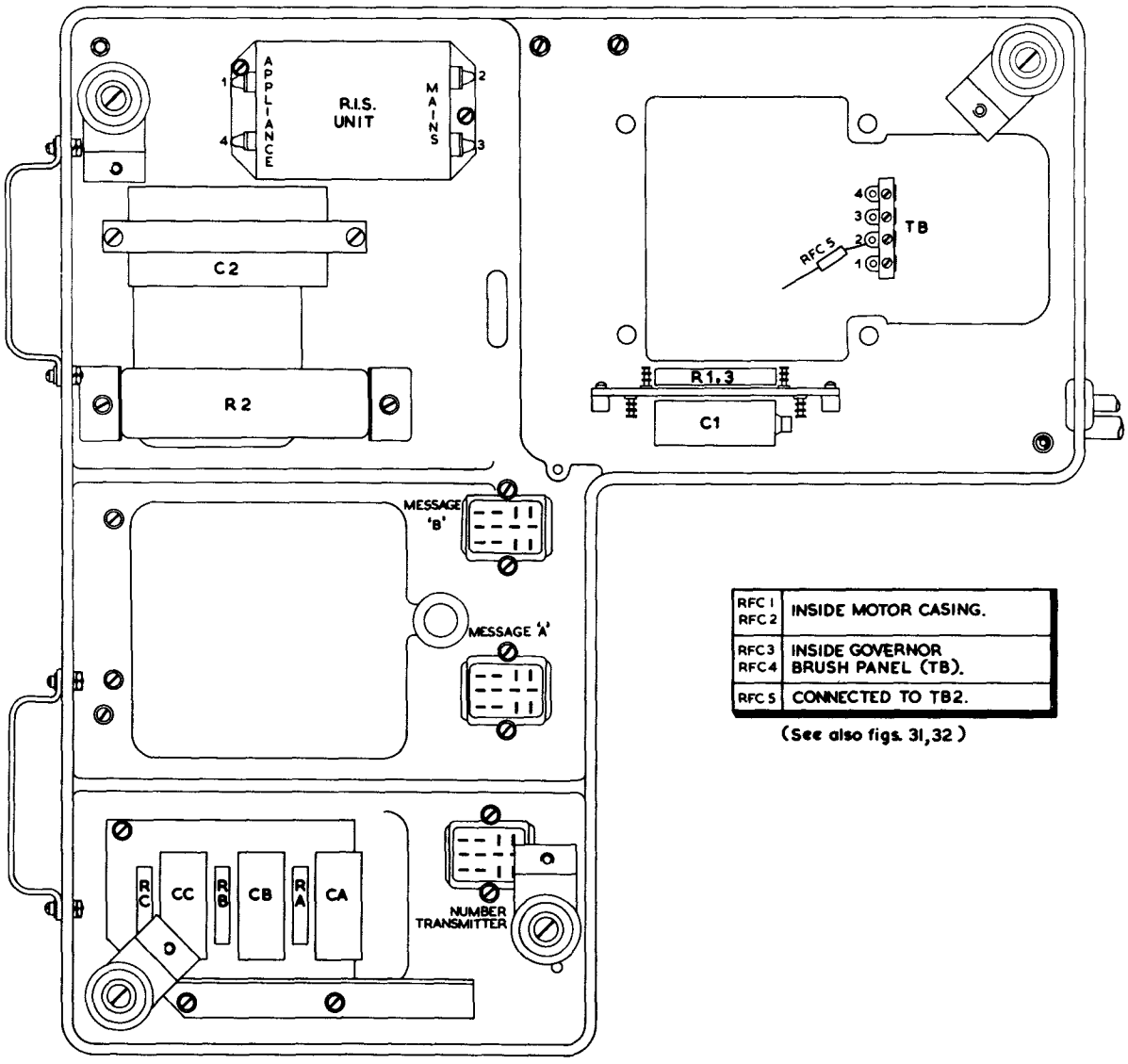
Note:
Type KBE and KBF D.C. motors and the A.C./D.C. motor Ref. 210A have both field windings electrically on the same side of the armature.

FIG. 31 MOTOR CIRCUIT
(Types KBE and KBF—A.C. Models)



L/S	LETTER SENSING
T/O	TAPE-OUT
S/C	SIGNAL CONTACTS
MP	MACHINE PLUG
S	SOCKET ON MAIN BASE
P	PLUG OF XTR HEAD
CM	CLUTCH MAGNET
MK	MANUAL KEY (MESSAGE)
NK	MANUAL KEY (NUMBERING)
RA, CA, RB, CB, RC, CC	SEE FIG.33 FOR LOCATION

FIG. 32 SCHEMATIC CIRCUIT DIAGRAM



RFC 1 RFC 2	INSIDE MOTOR CASING.
RFC 3 RFC 4	INSIDE GOVERNOR BRUSH PANEL (TB).
RFC 5	CONNECTED TO TB2.

(See also figs. 31, 32)

FIG. 33 COMPONENT LOCATION

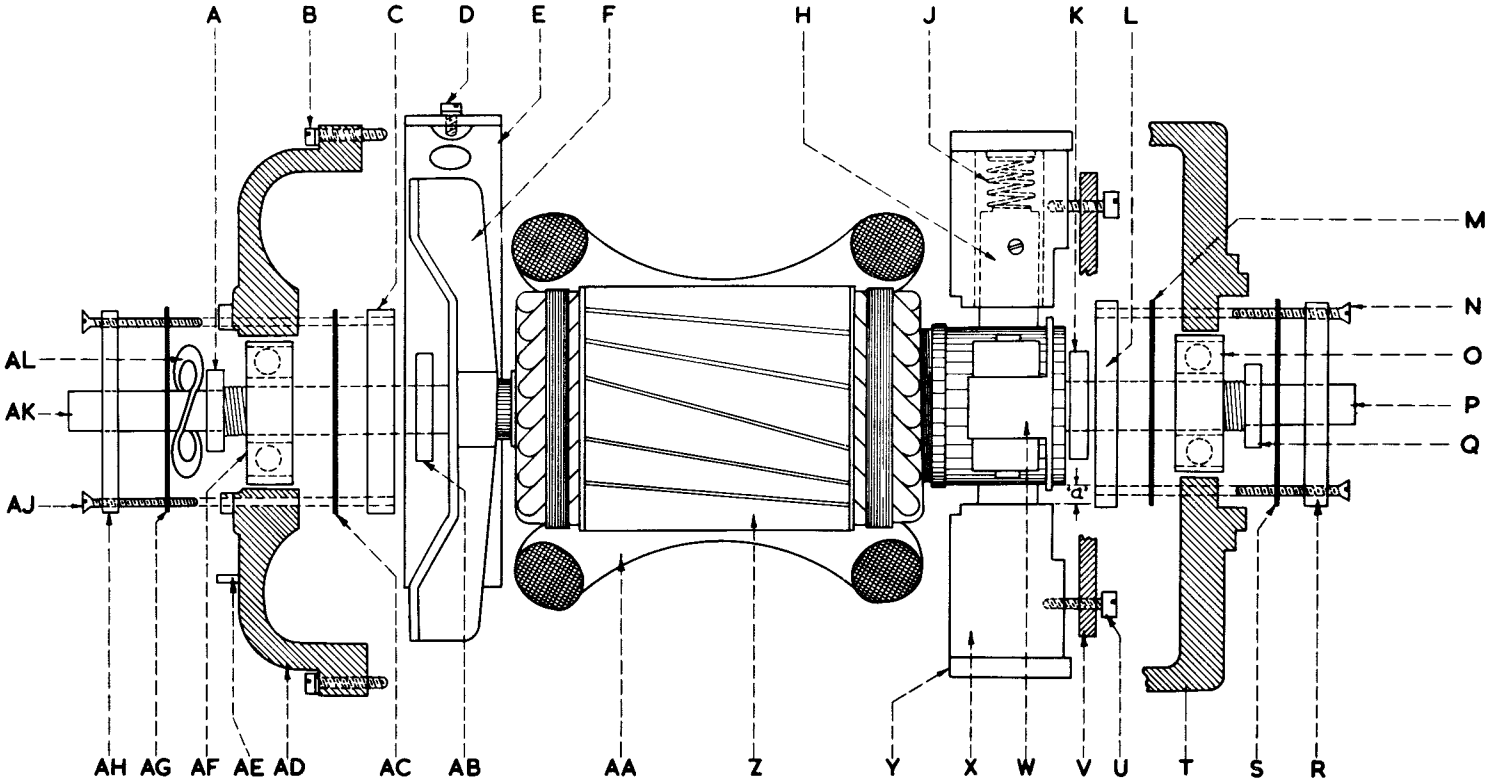
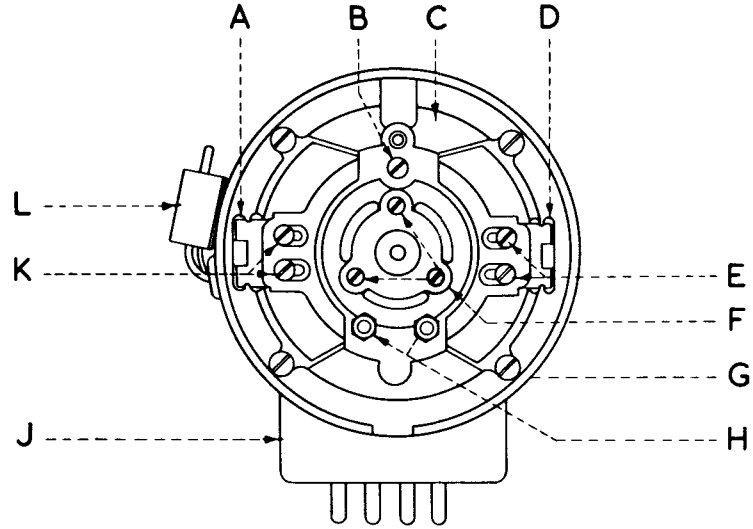


FIG. 34 DIAGRAM OF KBF MOTOR DIMENSION

'α' = {·005—·010 in. / ·13 —·25 mm.



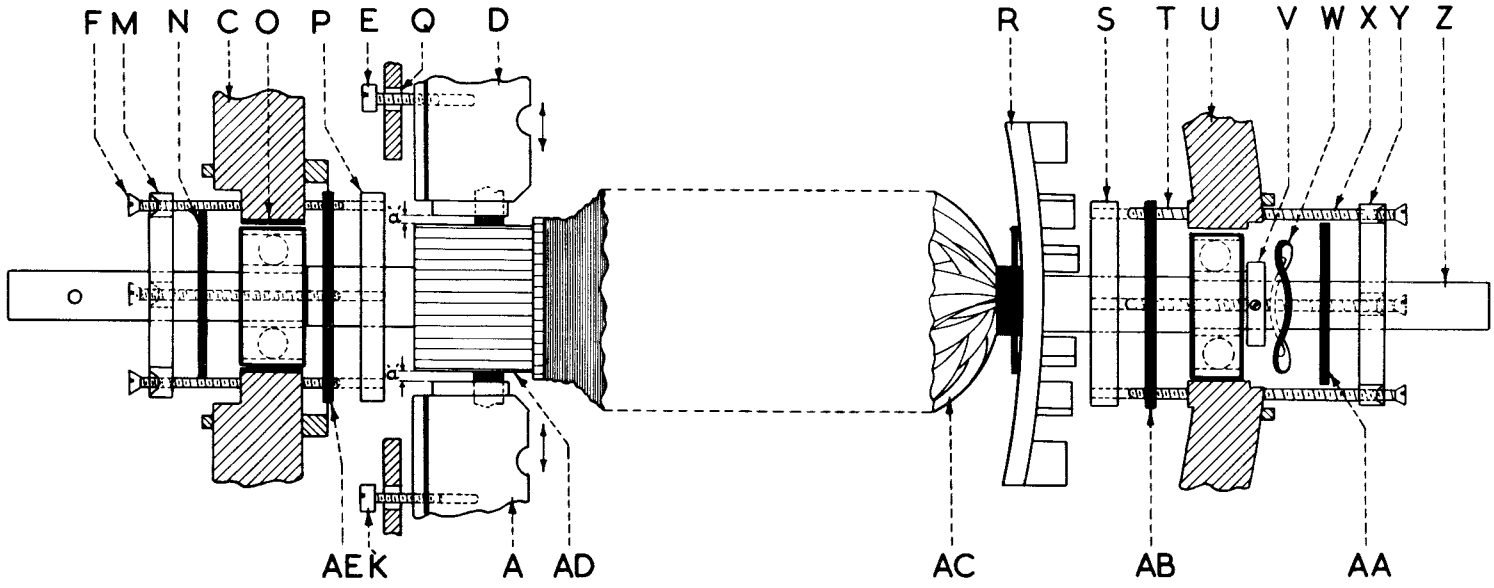


FIG. 35 DIAGRAM OF KBE MOTOR DIMENSION

'α' = {·005—·010 in. / ·13 —·25 mm.

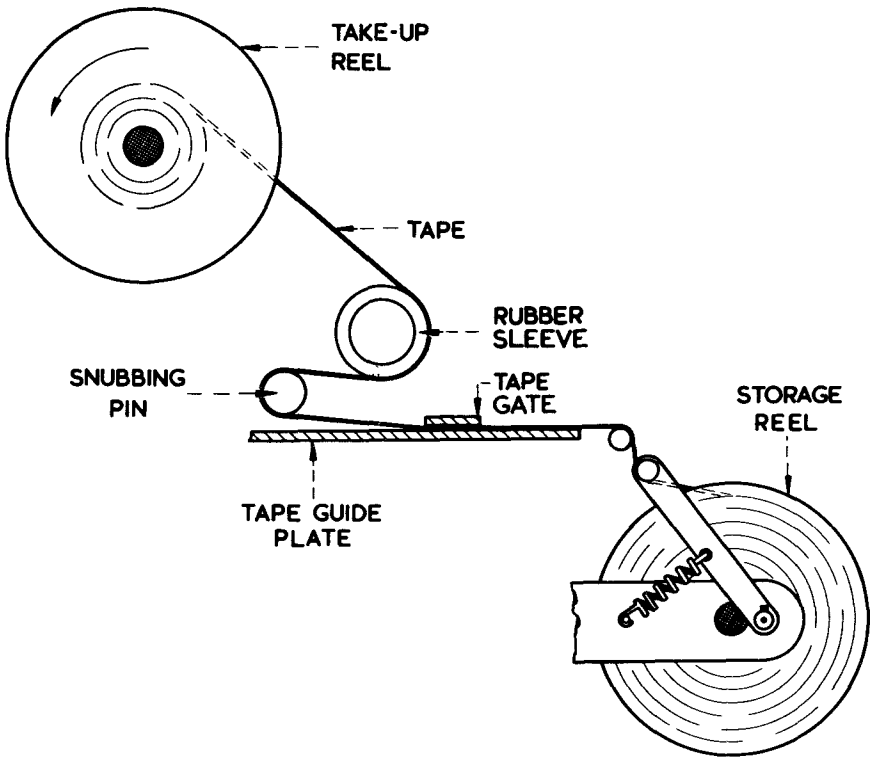


FIG. 36 PATH OF NUMBERING TAPE