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PART 5

DISMANTLING AND ASSEMBLING INSTRUCTIONS

GENERAL

The dismantling and assembling instructions for the Model Seventy-five Teleprinter are divided into four main sections, as follows:

Section A - To dismantle the machine into units

Section B - To reassemble the units to the machine

Section C - To dismantle individual units

Section D - To reassemble individual units

The instructions in Sections A and B are presented in a convenient sequence for dismantling and reassembling a complete machine for a major overhaul. The detailed instructions for each unit, however, are given in such a way that it it possible to dismantle or reassemble the majority of the individual units on their own, as required. The exceptions to this procedure are the Typehead Carriage, Function Bar, Translator and Platen Units. The Translator Unit, in fact, cannot be dismantled or reassembled without prior removal of most of its adjacent units.

The disturbance of some adjustment points is unavoidable when dismantling, although the procedure given avoids this as far as possible. To obviate any excessive re-adjustment which might otherwise be unnecessary, it is essential that units are mounted firmly against their abutments when reassembled to the machine.

When reassembling a complete machine in the order given in Section B, it is advisable to carry out the reassembly and necessary adjustments in stages. A recommended sequence is given in the introduction to the Adjustment Instructions (Part 4, page 1). This describes the method of co-ordinating the reassembly and adjustment instructions so that the machine can be more readily brought to full working order after it is finally reassembled.

In the following instructions it is assumed that the main teleprinter cover has already been removed, thus allowing full access to the units concerned, Fig. 5.1 shows the location of all the screws securing the units to the machine, except those of the Reperforating Attachment and Electromagnet. In all other instances where figure references are required, the relevant exploded diagram in Part 7 is used in order to provide greater detail, particularly when dismantling and assembling the individual units.

When carrying out the instructions in sections A and C, it is important to note the position of any shims or washers dismantled, and also the length of screws as they are removed.

- Always remove the signal and power plugs from the rear of the machine main base before starting to dismantle any part of the machine.

- Take extreme care when winding or unwinding the carriage return spring drum as the spring is very powerful. It is advisable to hold a piece of rag in the hand when winding or unwinding the drum.

- Avoid moving screws which have been painted red unless a specific instruction to do so is given. Some of these red screws control one-time adjustments set at the initial assembly stage but others have been set to gauges in the factory and cannot be reset easily under field conditions.

A. TO DISMANTLE THE MACHINE INTO UNITS

1. REPERFORATING ATTACHMENT

1.1 Remove the three screws securing the reperforator side cover DP, Fig.7.40, and the screw that secures the lower (curved) side cover DQ. Take off both covers.

1.2 Remove the three screws securing the reperforator support bracket A to the machine main base.

1.3 Slacken the screw securing the punching arm special pivot AN. Insert a tommy pin through the hole in the punching arm pivot and gently ease the pivot approximately ¼ in. (6.4 mm) towards the front of the machine. Remove the tommy pin.

1.4 Withdraw the unit from the machine.

2. OPERATION COUNTER

2.1 Remove the front two screws T, Fig.5.1. Slacken the rear screw T, slide the unit towards the front of the machine and lift it off the main base.

3. TRANSMITTER UNIT

3.1 Remove the three screws P, Fig.5.1, securing the transmitter cover and lift off the cover.

3.2 Disconnect the 18-way signals socket from its plug G, Fig.7.37, and carefully pull off the connexions to the Bell and WRU? contacts.

3.3 Dismantle the transmitter unit from the machine by one of the following methods according to the circumstances, taking care not to damage the code contacts and spring assemblies when lifting off the unit.

(a) If the transmitter unit **only** is required to be dismantled, remove the three screws (two on the left-hand, one on the right-hand side) securing the contact mounting plate A to the contact plate support Y, Fig.7.17, and lift off the unit.

(b) If it is intended later to dismantle the function bar unit from the machine, remove the four screws (two at each end) securing the contact plate support to the translator unit front and rear frames, and lift off the support together with the transmitter unit.

4. ANSWER-BACK UNIT

4.1 Remove the circlip connecting the top of the transfer lever link BH, Fig.7.36, to the release lever AV.

4.2 Remove the three screws Y, Fig.5.1, and lift the unit off the main base.

5. SELECTOR FRAMES UNIT

5.1 Disconnect the answer-back feed pawl spring and swing the feed pawl X, Fig.5.1, clear of the selector frames.

5.2 Remove the two screws W securing the unit front bearing, and slacken the two screws E securing the unit rear bearing. Slacken the trip bar retaining screw U sufficiently enough to allow the trip bar to be withdrawn.

5.3 Slide the unit to the left and lift it off the main base.

6. KEYBOARD

6.1 Support the weight of the keyboard with one hand and remove the two screws S, Fig.5.1, with the other.

6.2 Lower the keyboard and withdraw it from the main base.

7. MOTOR UNIT

7.1 Remove the two screws G, Fig.5.1, securing the paper guide plate AK and lift off the plate.

7.2 Slacken the two screws J and remove the rear tie rod H.

7.3 Disconnect the motor plug from its socket A on the main base.

7.4 Remove the four screws C securing the motor base and lift the unit clear of the machine.

8. END-OF-LINE INDICATOR AND CARRIAGE RETURN SPRING DRUM

8.1 Turn the carriage return spring drum AD, Fig.5.1, clockwise approximately 1/8 of a turn to relieve the tension on the carriage return tape, and disconnect the hook on the tape from its anchor on the spring drum. Allow the spring to unwind gently.

8.2 Remove the end-of-line indicator lamp AC and disconnect the wiring at terminal block AA.

8.3 Remove the three screws AB and lift the unit clear of the main base.

9. RIBBON UNIT

9.1 If not already done, unwind the carriage return spring drum AD, Fig.5.1, as described in paragraph 8.1 above.

9.2 Position the typehead carriage in the centre of its traverse.

9.3 Remove the four screws F (two at each end) securing the ribbon unit and take off the unit complete with its guide rails and brackets. Take care not to lose the cam roller CO, Fig.7.23, or its lubricating washer.

★ Note that the top right-hand screw F, Fig.5.1, also secures the function bar unit.

10. TYPEHEAD CARRIAGE UNIT

10.1 If not already done, dismantle the ribbon unit from the machine as described in paragraph 9 above.

10.2 Set up any printing combination of the pins, lift the translator clutch abutment and turn the machine by hand until the typehead moves forward to print.

10.3 Remove the two screws securing the print rail coupling AH, Fig.5.1.

10.4 Disconnect the carriage feed link AE by operating the carriage return lever AF and sliding the link out of its slot.

10.5 Remove the two screws AG and take off the left-hand typehead bearing block, noting any shims.

10.6 Withdraw the typehead carriage unit carefully to the left and lift it clear of the main base.

11. AGGREGATE MOTION UNIT

11.1 Remove the left-hand screw securing the traverse pivot bracket AV, Fig.7.16, to the translator unit front main frame, and temporarily slacken the bracket right-hand screw. Carefully lift the left-hand end of the pivot bracket clear of the aggregate motion mechanism and then secure it in this position by tightening the bracket right-hand screw.

11.2 Remove the nut (underneath the main base) securing the aggregate motion levers main pivot D, Fig.5.1.

11.3 Disconnect the aggregate motion lever springs and the compensator cam lever spring V.

11.4 Disconnect the circlips at Z and AJ, and lift the pushrod assemblies clear of their pivots.

11.5 Carefully withdraw each pushrod from its associated bellcrank lever.

12. SELECTOR UNIT

12.1 If not already done, disconnect the 18-way signals socket from its plug G, Fig.7.37, and carefully pull off the connexions to the Bell and WRU? contacts.

12.2 Remove the cleats securing the wiring to the translator unit rear frame and the selector unit casting, and move the wiring clear of the selector unit.

12.3 Remove the two screws K, Fig.5.1, and lift off the trip shaft M together with its bracket.

12.4 Ensure that the translator clutch is in the rest position so that the translator clutch bands are free of the selector clutch drum. Remove the three screws L securing the selector unit to the main base.

12.5 Disconnect the pecker frame spring T, Fig.7.15, and the traverse spring BA, Fig.7.16. Remove the screw securing the pecker slide block AZ and lift off the block.

12.6 Slowly and carefully ease the selector unit away from the translator unit and lift it off the main base.

13. FUNCTION BAR UNIT

13.1 If not already done, dismantle the transmitter unit from the machine as described in paragraph 3 above.

13.2 Disconnect the spring DX, Fig.7.17, from its anchor on the lag weight trip lever DW.

13.3 Remove the circlip connecting the top of the answer-back trip link CT, Fig.7.16, to the answer-back trip lever CS.

13.4 Ensure that the translator camshaft is in the rest position and insert a tommy pin through the hole in the function reset bar W, Fig.7.18. This ensures that the function bars remain in place when the unit is removed.

13.5 Lift the translator clutch abutment and turn the camshaft by hand through approximately half a revolution. Depress the extension arm of the function reset shaft on to the push rod W, Fig.7.17, to ensure that there is a clearance between the rear end of the function reset bar and the abutment block S.

13.6 Remove the four screws R, Fig.5.1, securing the unit and lift it off the translator unit.

★ If the ribbon unit has not already been dismantled, it will be necessary to remove the top right-hand screw F in addition, as this screw secures both units.

14. TRANSLATOR UNIT

14.1 If not already done, dismantle the following units from the machine.

Reperforating Attachment (paragraph 1 above refers)
Selector Frames Unit (paragraph 5 above refers)
Ribbon Unit (paragraph 9 above refers)
Typehead Carriage Unit (paragraph 10 above refers)
Aggregate Motion Unit (paragraph 11 above refers)
Selector Unit (paragraph 12 above refers)

★ In addition, if the machine is fitted with a Tape Reader, it will be necessary to dismantle the Keyboard as described in paragraph 6 above.

14.2 Remove the circlip connecting the top of the line feed link Q, Fig.5.1, with the platen unit right-hand side plate.

14.3 Disconnect the print beam AY, Fig.7.9, by removing the screw securing the pin retainer BX, Fig.7.17, to the print shackle BU. Take off the retainer followed by its pin BV.

14.4 Remove the six screws N, Fig.5.1, which secure the unit to the main base.

14.5 Remove the screw securing the bracket L, Fig.7.17, to the platen unit right-hand side plate, and gently lift the unit off the main base.

★ If the machine has a sprocket feed platen, before attempting to lift the unit off the main base it will be necessary to remove the two screws securing the bracket to the translator unit rear frame and take off the bracket. This is because of the length and position of the sprocket feed change lever. If this is done, refit the bracket to the translator unit rear frame and secure it with its two screws after the unit has been removed.

15. ELECTROMAGNET

15.1 If not already done, dismantle the motor unit from the machine as described in paragraph 7 above.

15.2 If the machine has been used on single-current operation, disconnect the biasing springs AX, Fig.7.19, from the electromagnet armature.

15.3 Stand the machine on its back, remove the five screws securing the SRBF cover plate and take off the plate.

15.4 Disconnect the two leads from the electromagnet to its terminal block. Slacken the two screws securing the terminal block to the main base and move the block clear of the magnet base.

15.5 Remove the four screws securing the electromagnet to the main base and withdraw the magnet through the hole in the main base casting.

16. PLATEN UNIT

16.1 If not already done, dismantle the motor unit from the machine as described in paragraph 7 above, and remove the bracket L, Fig.7.17, which secures the platen unit right-hand side plate to the translator unit rear frame, as described in paragraph 14.4 above.

16.2 Disconnect the print spring mechanism by unscrewing the special hexagonal nut AB, Fig.7.4, on the spring adjustment link AC.

16.3 Remove the four screws B, Fig.5.1, securing the platen unit to the main base and lift off the unit.

B. TO REASSEMBLE THE UNITS TO THE MACHINE

1. ELECTROMAGNET

1.1 Refit the unit to the main base and secure it with its four screws.

1.2 Refit the terminal block and secure it with its two screws.

1.3 Connect the leads from the electromagnet to the terminal block as follows.

Red lead to terminal no.1
Black lead to terminal no.4

1.4 Refit the SRBF cover plate and secure it with its five screws.

1.5 If the machine is to be used on single-current operation, re-connect the biasing springs AX, Fig.7.19, to the electromagnet armature.

2. TRANSLATOR UNIT

2.1 Mount the unit in its approximate position on the main base and refit the six screws N, Fig.5.1, friction tight.

2.2 If the platen unit is already assembled, refit the bracket L, Fig.7.17, to the platen unit right-hand side plate and secure it friction tight with its screw. Re-connect the line feed link Q, Fig.5.1, to the side plate and secure it with a new circlip.

2.3 Re-connect the print beam AY, Fig.7.9, to the print shackle BU, Fig.7.17, by refitting pin BV and its retainer BX, and then securing the retainer with its screw.

2.4 When the selector unit has been reassembled to the machine, carry out the line-up procedure recommended in paragraph 4.3 below.

3. FUNCTION BAR UNIT

3.1 Lift the translator clutch abutment and turn the camshaft by hand through approximately half a revolution. Depress the extension arm of the function reset shaft on to the push rod W, Fig.7.17, ensuring that the push rod is fully engaged at both its top and bottom forks. Check that the function abutment plate R is now protruding through its slot in the function reset mechanism sub-plate E.

3.2 Mount the unit in its position on the translator unit and loosely refit its four securing screws R, Fig.5.1. Press the unit firmly against its abutment plates and tighten the right-hand rear screw first, ensuring that the unit does not clip the abutment plate, then tighten the three front screws.

★ If the ribbon unit is already assembled, refit the top right-hand screw F in addition.

3.3 Return the camshaft to the rest position and remove the tommy pin from the hole in the function reset bar W, Fig.7.18.

3.4 Re-connect the top of the answer-back trip link CT, Fig.7.16, to the answer-back trip lever CS and secure it with a new circlip.

3.5 Re-connect the spring DX, Fig.7.17, to its anchor on the lag weight trip lever DW.

4. SELECTOR UNIT

4.1 Ensure that the translator clutch is in the rest position.

4.2 Mount the selector unit against its abutments and secure it with its three screws L, Fig.5.1.

4.3 Ensure that the selector and translator units are correctly lined-up. In the factory this operation is carried out with the help of jigs, but in the field a suitable method of achieving a satisfactory line-up is as follows.

(a) Check that the six translator unit securing screws N, and, if the platen unit is already assembled, the screw securing bracket L, Fig.7.17, are only friction tight.

(b) Turn the selector clutch to the rest position and carry out Adjustment No.32 (Part 4, page 32) to obtain the correct clearance between the selector clutch trigger and its backstop.

(c) Lift the translator clutch abutment and, watching this clearance closely, turn the translator camshaft by hand through one complete revolution. If the two units are lined-up correctly, the clearance will not appear to vary by more than an estimated .003 in. during this operation.

(d) If the clearance variation appears excessive, move the translator unit within the limits imposed by the clearances of its securing screwholes.

(e) Repeat the above procedure until the line-up is satisfactory. Tighten screws N, Fig.5.1, and, if applicable, the screw securing bracket L, Fig.7.17.

4.4 Refit the pecker slide block AZ, Fig.7.16, and secure it with its screw. Re-connect the traverse spring BA and the pecker frame spring T, Fig.7.15.

4.5 Refit the trip shaft M, Fig.5.1, together with its bracket and secure the bracket with its two screws K.

4.6 Refit the wiring cleats to the selector unit casting and the translator unit rear frame, and secure them with their respective screws.

5. AGGREGATE MOTION UNIT

5.1 Remove the left-hand screw securing the traverse pivot bracket AV, Fig.7.16, to the translator unit front main frame, and temporarily slacken the bracket right-hand screw. Lift the left-hand end of the pivot bracket and then secure it in this position by tightening the bracket right-hand screw.

5.2 Ensure that all the pins in the pin-box are withdrawn. Lift the translator clutch abutment and turn the camshaft by hand through approximately half a revolution so that the bottom of the bellcrank levers are moved outwards to their fullest extent.

5.3 Mount the aggregate motion mechanism in its approximate position on the main base. Arrange the pushrods in their correct order for reassembly, i.e. 5-4-3-2-1-6 (shift) reading from the front. Refit each pushrod in turn to its associated bellcrank lever in the order recommended below.

Vertical movement. Pushrods 6-2
Horizontal movement. Pushrods 1-3-4-5

★ Note that the forks at the end of the pushrods are positioned between the felt washers and the bellcrank levers.

5.4 Reposition the aggregate motion mechanism on its pivots Z and AJ, Fig.5.1, and secure it in this position by fitting new circlips. Refit the nut (underneath the main base) securing the aggregate motion levers main pivot D.

5.5 Re-connect the compensator cam lever spring V and the aggregate motion lever springs.

5.6 When the unit has been reassembled, return the traverse pivot bracket AV, Fig.7.16, to its horizontal position and secure it with its two screws.

6. TYPEHEAD CARRIAGE UNIT

6.1 Ensure that the aggregate motion mechanism is in its rest position. Mount the typehead carriage unit in its approximate position on the main base, then slide the unit to the right so that it engages fully with its right-hand bearing block. Ensure also that the stud on the carriage return link arm U, Fig.7.23, is now engaged in the slot in the carriage return operating arm AU, Fig.7.17.

6.2 Refit the left-hand bearing block, together with any shims that may have been previously assembled. Secure the block lightly by tightening its screws AG, Fig.5.1, two or three turns only.

6.3 Turn the typehead so that the letter 'B' is directly facing the front of the machine and press the typehead downwards as far as it will go.

6.4 Holding the typehead in this position, mesh the carriage unit gears with the lift and rotation racks X and Y, Fig.7.8, on the main base. Press the left-hand bearing block lightly inwards to take up any carriage unit end-play and then fully tighten screws AG, Fig.5.1.

6.5 Re-connect the print rail coupling AH and secure it with its two screws.

6.6 Re-connect the carriage feed link AE by sliding the link into its slot.

7. END-OF-LINE INDICATOR AND CARRIAGE RETURN SPRING DRUM

7.1 Mount the unit in its position on the main base and secure it with its three screws AB, Fig.5.1.

7.2 Re-connect the wiring at terminal block AA and refit the end-of-line indicator lamp AC.

7.3 If the ribbon unit is already assembled, wind the carriage return spring drum as follows.

(a) Slide the typehead to its extreme right-hand position.

(b) Anchor the tape to the typehead carriage and pass it around the carriage return tape roller D, Fig.7.25.

(c) Wind the spring drum four complete turns to obtain the approximate operating spring pressure.

(d) Connect the hook on the tape to its anchor on the spring drum.

8. RIBBON UNIT

8.1 Position the typehead carriage in the centre of its traverse.

8.2 Mount the ribbon unit in its position on the main base and secure it with its four screws F, Fig.5.1.

8.3 If not already done, wind the carriage return spring drum as described in paragraph 7.3 above.

9. PLATEN UNIT

9.1 Mount the unit in its position on the main base and secure it with its four screws B, Fig.5.1.

9.2 Re-connect the print spring mechanism by securing the special hexagonal nut AB, Fig.7.4, on the spring adjustment link AC.

9.3 If not already done, refit the bracket L, Fig.7.17, to the platen unit right-hand side plate and secure it with its screw.

10. MOTOR UNIT

10.1 Locate the motor base against its abutments and secure it with its four screws C, Fig.5.1.

10.2 Re-connect the motor plug to its socket A on the main base.

10.3 Refit the rear tie rod H, ensuring that the holes in the rod are facing the rear of the machine, and secure it with its two screws J.

11. KEYBOARD

11.1 Ensure that the keyboard is in the reset condition, i.e. with the combination bars latched back.

11.2 Refit the unit to the main base and secure it with its two screws S, Fig.5.1.

12. SELECTOR FRAMES UNIT

12.1 Mount the unit in its approximate position on the main base and temporarily secure it by tightening the front and rear bearing screws W and E, Fig.5.1, friction tight. Tighten the trip bar retaining screw U.

12.2 Depress the Letters (MMMMM) key and check that there is now a clearance of .015 - .045 in. between the step on each selector bar O, Fig.7.35, and the selector bars traverse plate AQ, Fig.7.16.

12.3 If this clearance is not present for each of the selector bars, reposition the unit until the condition is satisfied. When no further adjustment is required, fully tighten the front and rear bearing screws W and E, Fig.5.1.

13. ANSWER-BACK UNIT

13.1 Mount the unit in its position on the main base and secure it with its three screws Y, Fig.5.1.

13.2 Re-connect the top of the transfer lever link BH, Fig.7.36, to the release lever AV and secure it with a new circlip.

13.3 Reposition the answer-back feed pawl X, Fig.5.1, and re-connect the feed pawl spring.

14. TRANSMITTER UNIT

14.1 Refit the transmitter unit by one of the following methods according to the circumstances, taking care not to damage the code contacts and spring assemblies in the process.

(a) If the transmitter unit only was dismantled, refit the contact mounting plate A, Fig.7.37, together with the transmitter unit to the contact plate support Y, Fig.7.17, and secure the plate with its three screws.

(b) If the function bar unit was also dismantled from the machine, refit the contact plate support, together with the transmitter unit, to the translator unit front and rear frames and secure the support with its four screws (two at each end).

★ Whichever method of reassembly is used, ensure that the unit is fully seated with the abutment and control plate J, Fig.7.37, touching the translator unit front frame at three points.

14.2 Re-connect the 18-way signals socket to its plug G and refit the connexions to the Bell and WRU? contacts.

14.3 Refit the transmitter cover and secure it with its three screws P, Fig.5.1.

15. OPERATION COUNTER

15.1 Mount the unit in its position on the main base and secure it with its three screws T, Fig.5.1.

16. REPERFORATING ATTACHMENT

16.1 Mount the unit in its approximate position and secure the reperforator support bracket A, Fig.7.40, lightly to the main base with the three bracket securing screws.

16.2 Insert a tommy pin through the hole in the punching arm special pivot AN and ease the pivot towards the rear of the machine as far as it will go. Tighten the pivot securing screw and remove the tommy pin.

16.3 Press the unit firmly downwards against its abutments and inwards towards the translator unit, and fully tighten the three support bracket screws.

16.4 Refit the lower (curved) side cover DQ and secure it with its screw. Refit the reperforator side cover DP and secure it with its three screws.

C. TO DISMANTLE INDIVIDUAL UNITS

1. KEYBOARD

1.1 Slacken the four screws (two at each end) securing the keyboard mask E, Fig.5.1, to the unit frame and lift off the mask.

1.2 Slacken the two side screws securing the clamp plates FU, Fig.7.34, to the push rod top rack FS and lift off the push rod assembly.

1.3 Slacken the screws securing the four dowel clips EJ and slide the clips out of engagement with the keyboard front plate E, Fig.7.32.

1.4 Remove the four screws (two at each end) securing the clamp plates Q and take off the plates. The combination bar unit may now be withdrawn from the main frame.

2. MOTOR UNIT

★ To dismantle the motor unit, the following special tools will be required.

(a) Hide hammer or wooden mallet.

(b) Cranked hexagonal wrench, 1/16 in. (1.6 mm) across the flats.

(c) Bearing extractor (Creed Part No.TA1334).

(d) Piece of hard metal tube not less than 1 in. (25.4 mm) long, about 15/16 in. (23.8 mm) diameter and with a bore of approximately 3/4 in. (19 mm).

2.1 Remove the screw securing the governor contacts assembly AQ, Fig.7.26, and take off the assembly. Take care not to lose the contact peg Q, Fig.7.27.

2.2 Slacken the screw clamping the governor unit AP, Fig.7.26, to the motor shaft and take off the unit.

2.3 Remove the four screws securing the motor to its base Y and lay the base aside.

2.4 Remove the screw securing the motor pinion D, Fig.7.22, to the shaft and take off the pinion. Press out the parallel pin that keys the pinion to the shaft.

2.5 Remove the screw securing the brush box cover A, Fig.7.26, and take off the cover.

2.6 Remove the two motor brushes X. Slacken the four screws which secure the brush boxes V to their mounting plate N and slide the boxes off the plate. Disconnect the boxes from their leads.

2.7 Remove the four screws securing the fan end cover U to the motor body. Tap gently with the mallet on the commutator end of the motor shaft until the shaft is driven through the commutator end bearing E. Withdraw the armature L and cover U from the motor body.

2.8 Remove the three screws securing the fan end bearing cap G and take off the cap, gasket and special washer K.

2.9 With the hexagonal wrench, slacken the two special screws J which secure the bearing retaining washer H to the shaft and remove the washer.

2.10 Tap the fan end bearing E out of the cover U and remove the cover. Screw the three threaded studs of the bearing extractor into the bearing clamp plate C, and fit the pointed end of the capstan-headed extractor screw into the recess at the end of the motor shaft. Turn the capstan with a tommy pin and slowly draw the fan end bearing E, gasket and bearing clamp plate C off the motor shaft. Remove the bearing extractor. Take off the fan end thrust collar B.

2.11 Remove the four screws securing the commutator end cover M and take off the cover. Before removing the brush mounting plate from the cover as described in paragraph 2.12 below, make a special note of the position of the scribed line on the plate with respect to the cover, as this relationship must be maintained when the motor is reassembled.

2.12 Remove the two special screws P which secure the brush mounting plate N to the cover and take off the plate. Remove the three screws securing the commutator end bearing cap F and take off the cap and its adjacent gasket. Take off the commutator end thrust collar B, bearing clamp plate C and the remaining gasket.

2.13 As the commutator end bearing E was fitted whilst the cover M was hot, it cannot be pressed out by hand. Place the cover with its outer face upwards on a hard surface and fit the hard metal tube against the outer race of the bearing. Tap the tube gently with the mallet until the bearing is driven out of the cover.

2.14 Discard the four gaskets which have been removed.

3. RIBBON UNIT

3.1 Remove the two nuts securing the left-hand trackrail bracket A, Fig.7.25, and take off the bracket.

3.2 Slide the unit off the trackrails.

3.3 Remove the two ribbon spools, special nuts BD, bushes BC, spool retainers BB, tape retainers AZ and ribbon rollers AY. Unscrew the two roller pivots AW. The ribbon jumper AP may now be removed.

★ If the machine is fitted with two-colour printing mechanism, before removing the jumper it will also be necessary to disconnect the circlip connecting the lift link BG to the jumper. Discard the circlip and the lubricating felt.

3.4 Remove the two special end nuts U, nuts T and compression springs S. Note the position of any shims which may be at either or both ends of the springs.

3.5 Remove the two spool drive plates Q and damping washers P.

3.6 Remove the screws securing the right-hand side plate L and take off the plate.

3.7 Remove the right-hand ratchet coupling V and the circlip behind it. Remove the ratchet W, taking care not to lose the changeover bias spring AN which may attempt to jump out. Remove the remaining circlip and the left-hand ratchet coupling V. Discard both circlips.

3.8 The main unit shaft O may now be removed.

4. TYPEHEAD CARRIAGE UNIT

4.1 Slacken the screw securing the carriage return manual lever T, Fig.7.23, and take off the lever.

4.2 Remove the two screws (one at each end) securing the feed and retention racks M and K, and lift off the racks.

4.3 Remove the two nuts securing the right-hand ends of the two guide rails F, and the screw securing the left-hand end of the print rail R.

4.4 Remove the two circlips securing the right-hand ends of the two splined shafts V. Remove the two lubricating felts and take off the end plate E, together with the carriage return splined shaft S and the print rail. Discard the circlips and lubricating felts.

4.5 Slide the typehead carriage assembly AF off the splined shafts V.

4.6 Disconnect the feed and retention pawl springs CB.

4.7 Remove the two screws securing the pawl support plate BX and take off the plate.

4.8 Remove the two screws securing the carriage return lever retainers CG and take off the retainers and the carriage return lever CJ.

4.9 Remove the screw securing the oiler retainer J to the typehead casting and take off the retainer and the lubricating collar H. Discard the collar.

4.10 Disconnect the lifting link tension spring BV. Remove the two shouldered screws BR and rollers BQ, taking care not to lose special washer BT and any shims that may be fitted. Remove the lifting link BL, together with lifting block BO.

4.11 Remove the small nut securing the typehead. The typehead and its sleeve AG may now be removed, taking care not to lose the bush AK. Remove and discard the lubricating strip AJ.

4.12 Disconnect the corrector lever spring BC, remove the screw securing the eccentric BB and take off the eccentric and the corrector lever AZ, taking care not to lose the collar BA.

4.13 Remove the special screw AY securing the corrector bellcrank AX and take off the bellcrank.

4.14 Remove the remaining screw securing the backing plate BH and take off the plate.

4.15 Remove the screw securing the gear retainer AU and take off the retainer, taking care not to lose the two spacing collars. Bevel gear AS may now be removed.

4.16 Drive out the taper pin securing bevel gear AR to the typehead spindle AH and withdraw the spindle through the side of the casting. Take care not to lose any shims that may be present between the bevel gear and the unit casting.

5. END-OF-LINE INDICATOR AND CARRIAGE RETURN SPRING DRUM

5.1 Remove the nut underneath the spring drum assembly and take off the end-of-line indicator mounting bracket A, Fig.7.24. Lay the end-of-line indicator mechanism aside.

5.2 Remove the three screws securing the cam U and take off the cam. Withdraw the spring drum pivot O.

5.3 Insert the tips of a pair of snipe-nosed pliers into the holes in the inner (lower) half spring drum P. Holding the outer (upper) half spring drum S firmly, turn the inner drum counter-clockwise. This action unlocks the bayonet-type connexion between the two drums.

5.4 The inner drum may now be removed, together with the spring Q.

6. SELECTOR UNIT

6.1 Slacken screw AZ, Fig.7.19, and withdraw the driven gear C, Fig.7.22, from the drive shaft J, Fig.7.19.

6.2 Remove the two screws securing the camshaft gear clamp CO, Fig.7.20, to the selector camshaft BO and take off the clamp. Remove the camshaft gear CN and take off the ball thrust bearing CM which lies behind it, together with the large washer CK which lies between the gear and the bearing.

6.3 Remove the two screws securing the drive shaft bearing block G, Fig.7.19, to the unit casting A and take off the block. Withdraw the drive shaft J from the unit.

6.4 Slacken the screw retaining the bias adjustment clamp DZ, Fig.7.21, and turn the knurled bias adjustment screw EA clockwise as far as it will go. This action will free the rockshaft bearing bracket AC, Fig.7.19, from the spring anchor strip AW.

6.5 Remove the two screws securing the rockshaft bearing bracket AC. Slacken the screw clamping the rockshaft stop arm Q to the rockshaft S. Push the rockshaft out of engagement with its bearing bracket AC and remove the bracket.

6.6 Push the rockshaft S out of engagement with its bearing bracket P and take off the rockshaft, together with its stop arm Q.

6.7 Withdraw the send-receive delay lever EL, Fig.7.21, together with the two break-in levers EQ and ER.

6.8 Remove the screw securing the bias adjustment clamp DZ and take off the clamp. Turn the bias adjustment screw counter-clockwise until it is free. Withdraw the screw and remove the compression spring EC and the two shouldered bushes EB.

6.9 Disconnect the retention locking lever spring CQ, Fig.7.20, from its anchor on the starter mounting bracket C, Fig.7.21.

6.10 Remove the two screws securing the starter main plate D to the unit casting and take off the plate, together with the starter switch mechanism.

★ If the starter switch mechanism is required to be dismantled from the starter main plate, note the correct method of reassembly.

6.11 Remove the two screws securing the guide plate AY, Fig.7.19, and take off the plate. Withdraw the spring anchor strip AW.

6.12 Remove the five screws securing the rockshaft bearing bracket P and the tripshaft bearing bracket AE to the unit casting and take off both brackets, together with the tripshaft AF.

6.13 Remove the special screw CT, Fig.7.20, securing the striker lever CR and the retention locking lever CP on their common pivot and take off both levers, noting the position of any shims that may be present.

6.14 Locate the hole in the unit casting A, Fig.7.19. Turn the camshaft until a grub screw in the collar CH, Fig.7.20, can be seen through the hole. Slacken this screw, turn the shaft through 180^{o} and slacken a second grub screw in the same collar.

6.15 Disconnect the retention lever spring CY from its anchor pin. Tap out the camshaft BO complete with its cam assembly and clutch drum.

★ It is not normally necessary to dismantle the cam assembly and this should be avoided wherever possible.

6.16 Remove the three screws securing the camshaft thrust plate CL to the unit casting and take off the plate.

6.17 Remove the three screws securing the spring washer BN and take off the washer. Slacken the knurled head screw BL and ease the orientation casting BE off the shouldered bush B, Fig.7.19, taking care not to lose the clamp shoe BM, Fig.7.20, from the inner end of screw BL.

6.18 Remove the three screws which secure the shouldered bush B, Fig.7.19, and re-insert them finger-tight in the three holes in the bush which previously held the spring washer. Using a screwdriver, carefully tighten each screw a quarter of a turn at a time. Repeat this for each screw in turn until the bush is withdrawn from the casting. Remove the three screws from the bush.

6.19 Insert a suitable length of wooden dowel rod through the hole from which the bush was removed and set it squarely against collar CH, Fig.7.20. Tap out the ballrace CJ, together with the collar.

6.20 Press the clutch trigger BU against its backstop in the clutch frame BT and withdraw the clutch body BQ and camshaft BO from the cam assembly and clutch bands.

7. FUNCTION BAR UNIT

7.1 Remove the two screws securing the Bell and WRU? lever pivot bracket Y, Fig.7.18, and take off the bracket.

7.2 As it is essential to ensure that the same function bar spring is reassembled to the same function bar, make a special note of the position of each spring and then disconnect it from its function bar.

7.3 Remove the two screws securing each retaining plate T and take off the plates. Noting carefully the order of withdrawal, lift out each function bar in turn.

★ On no account should the dimension between the front and rear racks C and A be disturbed.

8. TRANSLATOR UNIT

8.1 Disconnect the abutment frame return spring DC, Fig.7.17. Slacken screw DF and remove the outer abutment frame CV, taking care not to lose any washers.

8.2 Remove the lag weight spring DU. Disconnect the carriage return lever spring CJ, the letter and line feed lever springs CE, and the two transmitter lever springs EK.

8.3 Remove the circlip connecting the abutment frame trip lever CS and take off the lever and its spring CT.

8.4 Remove the circlip behind the rear frame A which secures the function lever pivot CL and slowly take off the pivot. Remove the following items, noting their order of removal.

Transmitter lever (Start)
Shift bellcrank BL
Function reset lever X
Transmitter lever (Stop)
Print lever BT
Letter feed lever CD
Letter feed bellcrank CF
Carriage return lever CH
Line feed lever CK
Contact operating lever DZ

8.5 Rear frame A may now be removed.

8.6 Remove the two screws securing the pivot bracket AM, Fig.7.16, to the front main frame A.

8.7 Remove the circlip connecting the traverse multiplying lever AN to the pin-box end block AC. Remove the two screws securing the traverse control bracket AS to the front main frame and take off the multiplying lever and shouldered pin AT.

8.8 Remove the two screws securing the traverse lever pivot bracket AD to the base plate and take off the bracket.

8.9 Remove the two screws securing the front slide plate AO and take off this plate and the selector bars traverse plate AQ.

8.10 Ensure that all the pins in the pin-box are reset. Remove the screws securing the front pin-box guide plate AU, raise the selector plate lift frame BQ and take off the complete pin-box, together with its guide plate.

8.11 Disconnect the five springs CH from their respective selector code plates BS.

8.12 Disconnect the circlip connecting the traverse link AG, Fig.7.15, to the traverse bellcrank AW, Fig.7.16.

8.13 Remove the two nuts securing the main plate stay G, and the circlips connecting the front ends of the print control shaft BB and selector lever pivot BL to the front main frame. Remove the nut securing the front main frame support pin C.

8.14 Disconnect the five springs CG connecting the transmitter cam followers CB to the stop bracket CK.

8.15 Remove the two screws securing the stop bracket CK and take off the bracket.

8.16 Remove the two screws securing the bellcrank rack CM and take off the rack, taking care not to lose the two bushes CN.

8.17 Remove the two screws (underneath the base plate) securing the front main frame A. Disconnect spring E from its anchor on lubricator D. The front main frame may now be removed.

8.18 Remove the screw securing the print release pivot arm BJ to the print control shaft BB. Remove the inner circlip and take off the shaft.

8.19 Remove the two screws securing the selector plate rack support H to the middle main frame F. Withdraw the selector lever rack CJ, together with its support H, from the selector code plates BS. The selector code plate assembly may now be removed.

To Dismantle the Selector Assembly

8.20 Withdraw the selector lever pivot BL slowly, together with the print release lever BO. Remove each selector and transmitter lever in turn, noting carefully the order of removal.

★ Each selector lever has a reference number stamped on it for identification purposes, but it is just as important to note the order of the transmitter levers, as these must be reassembled in their correct order otherwise the transmitter timing will be disturbed.

To Dismantle the Vertical Levers and Cam Assemblies

8.21 Remove the two screws securing the vertical lever rack support AA, Fig.7.17, to the rear bearing. Remove the screw securing the support to the shift and

function reset rack T, Fig.7.16. Lift off the vertical lever rack Z, Fig.7.17, together with its support, noting the correct engagement of the rack with its associated levers.

★ If it is necessary to remove the screws securing the vertical lever rack to its support, note the position of the rack carefully as this is set in the factory to obtain optimum clearance and engagement of the vertical lever latches with their associated function bars.

8.22 Remove the two screws (underneath the base plate) securing the rear strike bearing M, Fig.7.15. Note that one of the screws is a long one and also secures the traverse rear bearing X.

8.23 Slacken the two special screws U which secure the pecker frame O to the striker shaft N. Withdraw the shaft from the front strike bearing M and the pecker frame. Remove the shaft and frame.

8.24 Withdraw the print adjustment rod CC, Fig.7.17, from the unit base plate.

8.25 Remove the two screws securing the middle main frame F, Fig.7.16, to the base plate. Disengage the bearing on the frame from traverse shaft Y, Fig.7.15, and lift off the frame.

8.26 Remove the six screws securing the rear bearing block DP, middle bearing block DO and front camshaft bearing block AJ to the base plate. Lift off the complete camshaft assembly.

8.27 Remove the three remaining screws securing the traverse rear bearing X and take off the bearing, together with the traverse shaft Y.

8.28 Remove the two screws securing the carriage return and line feed rack AR, Fig.7.17, and take off the rack, complete with its associated lever assembly.

8.29 The procedure for further dismantling of any items still attached to the unit framework will be obvious and should present no complications.

8.30 Discard all circlips and lubricating felts removed.

To Dismantle the Main Camshaft

★ It is essential that the components which comprise the main camshaft are reassembled in their correct order. Each cam has a reference letter or letters stamped on it for identification purposes (this reference is given in brackets below), but spacers and shims are not marked so a careful note must be made of their number and positions on the shaft as they are removed. It should also be noted that, owing to manufacturing tolerances, the number of shims used and their positions on the shaft may vary from the detailed list given below.

8.31 Remove the special nut AN, Fig.7.15, from the end of the selector traverse shaft AK. Take off the compensator lever AL, noting the position of the special washer AO.

8.32 Remove the nut, spring washer and washer from the front end of the main camshaft, followed by the keyboard reset cam (W)BJ, cam spacer BK, compensator cam (VA)BM, key BO, washer BL and bush BN.

8.33 Remove the front camshaft bearing block AJ, complete with its ballrace BP.

8.34 Remove the components on the main camshaft in the following sequence.

Bush BQ
Answer-back cam (U)BR
Cam spacer BS
Traverse drive gear BT

Key BU
Special washer BV
Bush BW
Retention and pin reset cam (T)BX
Shims BY
Cam spacer BZ
Print and feed control cam (S)CA
Cam spacer CB and shim
Selector plate lift cam (J)CC
Cam spacer BZ
Transmitter cam No.5 (R)CD
Cam spacer BZ and shim
Type rotation cam (Q)CE
Cam spacer BZ
Transmitter cam No.4 (P)CF
Cam spacer BZ and shim
Type rotation cam (K)CG
Cam spacer BZ
Transmitter cam No.3 (O)CH
Cam spacer BZ
Type rotation cam (K)CG
Cam spacer BZ
Transmitter cam No.2 (N)CJ
Cam spacer BZ and shim
Type lift and shift cam (M)CK
Cam spacer BZ
Transmitter cam No.1 (L)CL
Cam spacer BZ
Type rotation cam (K)CG
Shims BY
Cam spacer CM
Selector plate lift cam (J)CC
Key CN

★ Before removing the middle bearing block DO, note that it contains a loose-fitting roller assembly comprising, in sequence.

(a) Special washer CP
(b) Centre race
(c) 21 roller bearings
(d) Special washer CP.

8.35 Remove the middle bearing block and roller bearing assembly, taking care not to lose any of the rollers.

8.36 Continue removing the components on the main camshaft in the following sequence.

Transmitter cam - Start - (I)CQ
Cam spacer CR
Type rotation cam (K)CG
Cam spacer CS
Pecker operating cam (GA)CT
Cam spacer CU and shim
Function reset cam (G)CV
Cam spacer BZ
Transmitter cam - Stop - (F)CW
Cam spacer CX
Print cam (E)CY
Cam spacer CZ and shim
Letter feed cam (D)DA
Cam spacer DB
Carriage return cam (C)DC
Cam spacer DD and shim
Line feed cam (B)DE

Two shims
Key DF
Bush DG
Lag weight cam (A)DH
Key DJ
Cam spacer DK

8.37 Withdraw the rear bearing block DP, complete with its ballrace DL and two retaining plates DQ and DR.

To Dismantle the Traverse Shaft

8.38 Remove the traverse cam thrust washer AQ. Tap out the pin from the traverse cam AR and take off the camshaft assembly.

8.39 Remove the pin at the rear end of the selector traverse shaft. Slacken the screw securing the retaining bush BF and take off the bush and the pin re-setting frame BE.

9. PLATEN UNIT

Friction Feed

9.1 Remove the paper tube CC, Fig.7.30.

9.2 Remove the three screws securing the ratchet feed support plate BC and take off the plate.

9.3 Slacken the screw securing the pressure roller release lever AS and take off the lever.

9.4 Remove the two screws securing the paper guide BN and lift off the guide.

9.5 Disconnect the retention lever spring AW and the paper tension rod spring CJ from their common anchor pin.

9.6 Remove the two screws securing the platen feed ratchet Q. Slacken the two socket-headed screws clamping the platen knob coupling W to the platen spindle P and take off the coupling. The spindle may now be withdrawn to the right and the platen removed.

9.7 Remove one of the pivot screws of paper tension rod CD and take off the rod.

9.8 If any further dismantling is required, this may be achieved by removing the screws securing the side plates A and B.

Sprocket Feed

9.9 Move the top of the sprocket feed change lever S, Fig.7.30, to the right. Slide the distance collar U towards the platen to expose the shouldered screw T which links the lever to the spindle. Remove the screw and take off the lever and distance collar.

9.10 Slacken the screw securing the pressure roller release lever AS and take off the lever.

9.11 Disconnect the retention lever spring AW from its anchor pin.

9.12 Slacken the two socket-headed screws clamping the platen knob coupling W to the platen spindle P and take off the coupling.

9.13 Remove the three screws securing the platen sub-plate V and take off the plate.

9.14 Ensure that all the feed pins H are fully retracted and then carefully slide the complete platen assembly to the left, out of the right-hand side plate.

9.15 With the aid of the platen spindle, expel one of the feed pins just far enough to expose the hole beneath its domed end. Insert an office pin into this hole to maintain the feed pin in position. Repeat this procedure for the remaining 19 pins.

9.16 Remove the three screws securing the ratchet feed support plate BC and take off the plate. Carefully withdraw the platen spindle to the right.

9.17 Remove the three screws securing the platen retention wheel M and take off the wheel.

9.18 Remove the three screws securing the left-hand platen end cap O and take off the cap.

9.19 The feed pins may now be removed, one at a time or as required. Make a careful note of their method of assembly, particularly with regard to the way the feed pin springs J are fitted.

10. ANSWER-BACK UNIT

10.1 Disconnect spring BB, Fig.7.36, from its anchor on the release lever trip arm BA.

10.2 Remove the two circlips securing the 'Here Is' trip bellcrank BD and the release lever trip arm BA, and take off the bellcrank and trip arm.

10.3 Disconnect the release lever spring AX. Remove the rear circlip connecting the release lever spindle AY and withdraw the spindle towards the front of the unit.

10.4 Disconnect the latch trip lever spring AR, ratchet retention pawl spring AL and release lever catch spring AU. Remove the circlip which is located against the inner surface of the release pawl latch AN.

10.5 Withdraw the selector levers spindle X towards the front of the unit, releasing the latch AN and its torsion spring AO, ratchet retention pawl AK, and selector levers AH and their spacing collars AJ.

10.6 Remove the two screws securing the ward drum spindle support C and take off the support.

10.7 Slip the suppressor link AE off its lower retaining pin and remove the ward drum L.

10.8 Remove the circlip securing the lag disc release pawl AM and take off the pawl.

10.9 Remove the circlip securing the ward drum sleeve K and carefully take off the sleeve, lag disc spring J and lag disc F, noting any shims against the disc.

10.10 Discard all circlips removed.

11. REPERFORATING ATTACHMENT

11.1 Slacken the two screws securing the cuttings chute DM, Fig.7.40, and remove the chute.

11.2 Remove the two screws securing the tape guide DH and the retention lever bracket CH, and take off the guide and bracket.

11.3 Disconnect the punching arm spring AQ from its anchor pin on the support bracket A. Remove the two screws securing the punch block assembly to the unit casting. The punch block assembly may now be eased off the main assembly.

11.4 With the exception of the punch block head, any further dismantling of the unit will be obvious and should present no complications.

To Dismantle the Punch Block Head

11.5 Remove the two screws securing the punch cover plate and take off:-

(a) The cover plate.

(b) Two die plates.

(c) Tape guide plate.

(d) Four die plates.

(e) The five code punches and the feed hole punch.

11.6 Turn the punch block over and remove the two screws which secure the four bottom guide plates. Take off the plates.

D. TO REASSEMBLE INDIVIDUAL UNITS

1. KEYBOARD

1.1 Reassemble the combination bar unit to the main frame. Refit the two clamp plates Q, Fig.7.32, (one at each end) and secure them with their screws.

1.2 Slide the four dowel clips EJ, Fig.7.34, so that they engage the keyboard front plate E, Fig.7.32, and tighten the clips with their screws.

1.3 Refit the push rod assembly, ensuring that the slot cut in each push rod FT, Fig.7.34, faces the answer-back unit, and tighten the side screws securing the clamp plates FU to the push rod top rack FS.

1.4 Before reassembling the keyboard mask as described in paragraph 1.5 below, carry out Adjustment Nos.20 – 22 (Part 4, pages 14-16).

1.5 Refit the keyboard mask E, Fig.7.1, to the unit frame and secure the mask with its four screws (two at each end).

2. MOTOR UNIT

★ To reassemble the motor unit, the following special tools will be required.

(a) Hide hammer or wooden mallet.

(b) Cranked hexagonal wrench, 1/16 in. (1.6 mm) across the flats.

(c) Piece of soft metal tube about 3 in. (76.2 mm) long, 3/4 in. (19 mm) maximum diameter and with a bore of 3/8 in. (9.5 mm).

(d) Piece of hard metal tube not less than 1 in. (25.4 mm) long, about 15/16 in. (23.8 mm) diameter and with a bore of approximately 3/4 in. (19 mm).

(e) A 3 in. (76.2 mm) length of 6BA threaded rod.

2.1 Refit the fan end thrust collar B, Fig.7.26, to the motor shaft. Smear a thin film of Creed No.4 lubricant over both sides of a new gasket and over that side of the fan end bearing clamp plate C which will be against its bearing E. Refit the plate and gasket to the shaft.

2.2 Fit the fan end bearing E on to the shaft and slip the soft metal tube over the shaft, holding it in contact with the inner race of the bearing. Tap the end of the tube until the bearing is seated fully against its thrust collar B.

2.3 Assemble the bearing retaining washer H to the shaft. Press the washer against its bearing and tighten the two special screws J with the hexagonal wrench.

2.4 Pass the end of the threaded rod through the assembled gasket and screw it a few turns into one of the threaded holes in clamp plate C.

2.5 Smear a thin film of No.4 lubricant on the inner face of the bearing housing in the fan end cover U. Pass the threaded rod through one of the screw channels in the cover and then press the cover on to the bearing.

2.6 Smear a thin film of No.4 lubricant on both sides of a new gasket and on the inner face of the fan end bearing cap G. Place the special washer K on the bearing. Assemble the new gasket and the bearing cap to the cover U, passing the threaded rod through one of the holes in both the gasket and the cap.

2.7 Holding the armature L fan end upwards, insert one of the bearing cap securing screws through a free hole in the cap and pass it through the cover U. With the threaded rod, draw the bearing clamp plate C up against the cover and pick up one of the plate screw holes with the cap securing screw just inserted. Turn the screw finger tight.

2.8 Insert a second bearing cap securing screw through to the clamp and pick up a second screw hole. Remove the length of threaded rod and insert the third bearing cap screw in its place. Tighten both screws finger tight only.

2.9 Refit the commutator end thrust collar B to the shaft. Smear a thin film of No.4 lubricant over both sides of a new gasket and over that side of the commutator end bearing clamp plate C which will be against its bearing E. Refit the plate and gasket to the shaft.

2.10 Fit the commutator end bearing E on to the shaft and position the soft metal tube against the bearing inner race. Tap the bearing until it is hard up against its thrust collar B.

2.11 Refit the brush mounting plate N to the commutator end cover M. Ensure that the position of the scribed line on the plate is correct with respect to the cover, and then secure the plate with the two special screws P.

2.12 Pass the threaded rod through the assembled gasket and screw it into one of the holes in clamp plate C.

2.13 Refit the commutator end cover M to the motor body and secure it with its four screws.

2.14 To enable the commutator end bearing to be re-housed in cover M, it will be necessary to heat the cover as follows.

(a) Fit the hard metal tube over the bit of a 60W soldering iron.

(b) Insert the tube and iron into the bearing housing in the cover.

(c) Allow the housing to heat up for approximately ten minutes and then remove the tube and iron.

2.15 Immediately pass the armature assembly through the motor body, passing the threaded rod through one of the screw channels in the commutator end cover, and ease the commutator end bearing E into its housing. It may be necessary to tap the fan end of the shaft to drive the bearing fully home.

2.16 Using the length of threaded rod, secure the commutator end bearing clamp place C and bearing cap F by the same method as described in paragraphs 2.7 and 2.8 above.

2.17 Fully tighten the six screws securing bearing caps F and G, and check that the armature now rotates freely. If not, lightly tap each end of the shaft with the mallet and re-check. If the armature is still not free, ease off the six bearing cap screws and secure free rotation by tapping the shaft ends, then tighten the screws again.

2.18 Re-connect the two brush boxes V to their leads and slide the boxes on to their mounting plate N. Position the boxes so that there is a clearance of .010 - .015 in. between the inner surface of each box and the surface of the commutator. When this condition is satisfied, tighten the four brush box securing screws. Refit the brushes X.

2.19 Refit the brush box cover A and secure it with its screw.

2.20 Press the parallel pin that keys the motor pinion D, Fig.7.22, back through the shaft. Refit the motor pinion to the shaft and secure it with its screw.

2.21 Fit the governor unit AP, Fig.7.26, to the motor shaft and clamp it firmly with its screw.

2.22 Refit the motor to its base Y and secure it friction tight with its four screws.

2.23 Fit the contact peg Q, Fig.7.27, into the governor boss, refit the governor contacts assembly AQ, Fig.7.26, and secure it with its screw.

2.24 Check that the motor is correctly positioned with respect to its base Y, as follows.

(a) Refit the motor, together with its base, to the machine main base, ensuring that the abutment screws on the motor base are in contact with the two abutment pins on the machine main base.

(b) Check that the motor pinion and selector unit driven gear mesh and can turn freely. If not, alter the position of the motor on its base until the condition is achieved.

(c) Remove the complete motor unit from the machine main base and fully tighten the four screws securing the motor to its base.

3. RIBBON UNIT

3.1 Assemble the main unit shaft O, Fig.7.25, to the left-hand side plate M. Refit the left-hand ratchet coupling V and fit a new circlip into the left-hand groove in the shaft.

3.2 Assemble the ratchet W, ensuring that it is fitted the correct way round with respect to the feed and retention pawls AA and AF. Ensure also that the pin on the feed change lever AK is engaged with the slot in the ratchet. Fit a new circlip into the right-hand groove in the shaft and then assemble the right-hand ratchet coupling V.

3.3 Refit the right-hand side plate L and secure it with its screws.

3.4 Assemble the two damping washers P and spool drive plates Q to the shaft.

3.5 Assemble the two compression springs S, together with any shims that were previously removed, and secure them to the shaft with nuts T and special end nuts U.

3.6 Assemble the ribbon jumper AP and refit the two roller pivots AW, ribbon rollers AY, tape retainers AZ, spool retainers BB, bushes BC and special nuts BD.

★ If the machine is fitted with two-colour printing mechanism, fit a new lubricating felt to the pin on the ribbon jumper and re-connect the lift link BG to the pin with a new circlip.

3.7 Assemble the two ribbon spools and slide the unit back on to its trackrails.

3.8 Refit the left-hand trackrail bracket A and secure it with its two nuts.

4. TYPEHEAD CARRIAGE UNIT

4.1 Assemble the typehead spindle AH, Fig.7.23, to the bevel gear AR, refitting any shims that may have been present between the gear and the unit casting, and secure the gear and spindle with the taper pin.

4.2 Assemble the bevel gear AS and the gear retainer AU, together with the two spacing collars. Secure the retainer with its screw.

4.3 Refit the backing plate BH and secure it with its special screw BK.

4.4 Refit the corrector bellcrank AX and secure it with its special screw AY.

4.5 Assemble the collar BA, corrector lever AZ and eccentric BB. Ensure that the corrector lever is in the centre of its adjustment range and then secure the eccentric with its screw. Re-connect the corrector lever spring BC.

4.6 Assemble a new lubricating collar H, together with its retainer J, and secure the retainer to the typehead casting with its screw.

4.7 Refit the carriage return lever CJ, together with its retainers CG, and secure the retainers with their two screws.

4.8 Refit the pawl support plate BX and secure it with its two screws.

4.9 Re-connect the feed and retention pawl springs CB.

4.10 Assemble the typehead carriage assembly AF to the splined shafts V, as follows.

(a) Position the splined shafts so that the hole in the collar at the end of each shaft is vertical.

(b) Depress the typehead boss AL as far as it will go and turn it so that the letter 'X' is facing the rear of the unit.

(c) Maintaining these conditions, engage the typehead carriage with the splined shafts.

4.11 Refit the end plate E, together with the carriage return splined shaft S and print rail R, as follows.

(a) Position the carriage return lever CJ so that it is horizontal.

(b) Hold the carriage return link arm U so that its operating pin is approximately mid-way between the rear splined shaft and the bearing on the end plate.

(c) Maintaining these conditions, engage the carriage return shaft with the typehead carriage.

(d) Assemble a new lubricating felt to the right-hand end of each splined shaft V and secure each shaft to the end plate with a new circlip.

4.12 Move the typehead carriage to its extreme right-hand position and secure the two guide rails F with their nuts. Secure the left-hand end of the print rail R with its screw. Check that the carriage will now move freely on its rails.

4.13 Refit the feed and retention racks M and K, and secure them with their two screws (one at each end).

4.14 Assemble bush AK and a new lubricating strip AJ to the typehead sleeve AG. Refit the typehead and its sleeve, as follows.

(a) Ensure that the corrector lever AZ is still in the centre of its adjustment range, and engage it fully with the corrector wheel AO.

(b) Fit the typehead sleeve to the typehead spindle so that, looking at the unit in plan, the face of the type on the typehead boss at the print-out point is parallel to the carriage return splined shaft S.

(c) Secure the typehead with its small nut.

4.15 Refit the lifting link BL, together with lifting block BO. Refit special washer BT and rollers BQ, together with any shims that may have been fitted. Refit the two shouldered screws BR and re-connect the lifting link spring BV.

4.16 Refit the carriage return manual lever T and secure it with its screw.

4.17 After reassembly, check the vertical movement of the typehead to ensure that there are no tight spots in any radial position. Spin the typehead and check that there is no friction in the rotating movement.

5. END-OF-LINE INDICATOR AND CARRIAGE RETURN SPRING DRUM

5.1 Before reassembly, lubricate the spring Q, Fig.7.24, and spring anchor R with Creed No.4 lubricant.

5.2 Ensure that the spring anchor is engaged with the hook on the end of the spring and refit the spring inside the inner drum P.

5.3 Assemble the spring drum pivot O to the outer drum S. Ensure that the inner end of the spring anchor is engaged with the slot in the pivot and refit the inner drum, together with the spring, to the outer drum. Hold the outer drum and turn the inner drum clockwise with a pair of snipe-nosed pliers to engage the bayonet-type connexion between the two drums.

5.4 Refit the cam U and secure it with its three screws.

5.5 Refit the end-of-line indicator bracket A, together with the end-of-line indicator mechanism, to the spring drum assembly and secure both units with the nut underneath the spring drum.

6. SELECTOR UNIT

6.1 Press the clutch trigger BU, Fig.7.20, against its backstop in the clutch frame BT and refit the clutch body BQ and camshaft BO to the cam assembly and clutch bands CD.

6.2 Ensure that the shoulder on the collar CH lies against the central channel of the ballrace CJ, then refit both collar and ballrace to the unit casting A, Fig.7.19, tapping them securely home with the wooden dowel rod. Do not tighten the two grub screws in the collar until the camshaft gear CN, Fig.7.20, has been fitted.

6.3 Align the three holes in the shouldered bush B, Fig.7.19, with those in the casting. Refit the bush to the casting and tap it fully home, then insert and tighten the three bush securing screws.

6.4 Assemble the orientation casting BE, Fig.7.20, to the bush, ensuring that the knurled head screw BL engages the clamp shoe BM. Tighten screw BL. Refit the spring washer BN and secure it with its three screws.

6.5 Refit the camshaft thrust plate CL to the unit casting and secure it with its three screws.

6.6 Assemble the spacing collar CG to the rear end of the camshaft BO. Refit the camshaft, complete with its cam assembly and clutch drum, to the unit casting and tap it fully home in its seating. Re-connect the retention lever spring CY to its anchor pin on the orientation casting.

6.7 Refit the striker lever CR and retention locking lever CP on their common pivot, together with any shims that were present, and secure the levers with special screw CT.

6.8 Refit the rockshaft bearing bracket P, Fig.7.19, and tripshaft bearing bracket AE, together with the tripshaft AF. Secure the brackets with their five screws to the unit casting, ensuring that the tripshaft moves freely both before and after tightening the screws.

6.9 Assemble the spring anchor strip AW and refit the guide plate AY to the unit casting. Ensure that the strip does not bind in the slot in the guide plate when the plate screws are tightened.

6.10 Assemble the starter main plate D, Fig.7.21, together with the starter switch mechanism, to the unit casting and secure it with its two screws. Ensure that the retention arm, Fig.7.20, is correctly positioned with respect to the striker lever CR.

6.11 Re-connect the retention locking lever spring CQ to its anchor on the starter mounting bracket C, Fig.7.21.

6.12 Pull the spring anchor strip AW, Fig.7.19, as far forward as it will go and refit the compression spring EC, Fig.7.21, together with its two shouldered brushes EB. Refit the bias adjustment screw EA and turn it clockwise until it is engaged. Assemble the bias adjustment clamp DZ and secure it with its screw.

6.13 Refit the send-receive delay lever EL, together with the two break-in levers EQ and ER.

6.14 Refit the rockshaft S, Fig.7.19, together with its stop arm Q, to its right-hand bearing bracket P. Refit the rockshaft into its left-hand bearing bracket AC. Ensure that the spring anchor strip AW is correctly engaged in the slot in the bracket, and then secure the bracket with its two screws. Tighten the rockshaft stop arm screw.

6.15 Assemble the drive shaft J. Refit the drive shaft bearing block G to the unit casting and secure it with its two screws.

6.16 Refit the special washer CK, Fig.7.20, ball thrust bearing CM and camshaft gear CN. Assemble the camshaft gear clamp CO and secure it with its two screws. Locate the hole in the unit casting and turn the camshaft until the grub screw in the collar AH can be seen. Hold the collar to the rear against its associated ballrace to take up any end-play in the shaft and tighten the screw. Turn the camshaft through 180° and repeat this operation for the second screw.

6.17 Refit the driven gear C, Fig.7.22, to the drive shaft J, Fig.7.19, and secure it with its screw AZ.

7. FUNCTION BAR UNIT

7.1 Refit each function bar in turn, ensuring that they are reassembled in their correct positions. Refit the two retaining plates T, Fig.7.18, and secure them with their two screws.

7.2 Re-connect each function bar spring to its associated function bar.

7.3 Refit the Bell and WRU? lever pivot bracket Y and secure it with its two screws.

8. TRANSLATOR UNIT

To Reassemble the Traverse Shaft

8.1 Assemble the pin resetting frame BE, Fig.7.15, to the selector traverse shaft AK, ensuring that the frame cam roller AY is aligned with the retention and

pin reset cam BX. Refit the retaining bush BE and secure it with its screw, ensuring that the frame is free to rotate about the traverse shaft with a minimum of end-play. Take care not to position the retaining bush screw so that it fouls the resetting frame. Tap the pin back into its housing in the rear end of the traverse shaft.

8.2 Refit the traverse cam AR and the camshaft assembly, ensuring that the cam is assembled in such a way that its two red spots will face the front of the machine.

To Reassemble the Main Camshaft

★ Before reassembling the rear bearing block DP, remove the screw securing the two retaining plates DQ and DR, and take off the plates. Remove the ballrace DL and clean it thoroughly in white spirit. Allow the race to dry off and then repack with Creed No. 4 lubricant. Reassemble the ballrace and its retaining plates to the bearing block and secure the plates with their screws.

8.3 Refit the rear bearing block DP, together with its ballrace DL and two retaining plates DQ and DR, to the main camshaft.

8.4 Assemble the components to the main camshaft in the following sequence. Note that the cams must be reassembled in such a way that their identification letters will face the front of the machine.

Cam spacer DK
Key DJ
Lag weight cam (A)DH
Bush DG
Key DF
Two shims
Line feed cam (B)DE
Cam spacer DD and shim
Carriage return cam (C)DC
Cam spacer DB
Letter feed cam (D)DA
Cam spacer CZ and shim
Print cam (E)CY
Cam spacer CX
Transmitter cam - Stop - (F)CW
Cam spacer BZ
Function reset cam (G)CV
Cam spacer CU and shim
Pecker operating cam (GA)CT
Cam spacer CS
Type rotation cam (K)CG
Cam spacer CR
Transmitter cam - Start - (I)CQ

★ Before reassembling the middle bearing block BO, clean the roller assembly thoroughly in white spirit.

8.5 Assemble the middle bearing block BO to the main camshaft as follows.

(a) Stand the camshaft on its rear end.

(b) Coat one face of one of the special washers CP with Creed No. 4 lubricant and assemble the washer to the shaft, lubricated face upwards.

(c) Coat the centre race with the same lubricant and assemble it to the shaft.

(d) Coat the inside of the bearing housing in the bearing block with the same lubricant and assemble the block, holding it centrally disposed about the race.

(e) Using a pair of tweezers, insert the rollers vertically so that they are retained by the lubricant.

(f) Coat one face of the remaining special washer with the same lubricant and assemble it to the shaft, lubricated face downwards.

(g) Assemble key CN to retain the roller assembly on the shaft. Note that the bearing block is not retained by the key.

8.6 Continue assembling the components to the main camshaft in the following sequence.

Selector plate lift cam (J)CC
Cam spacer CM
Shims BY
Type rotation cam (K)CG
Cam spacer BZ
Transmitter cam No.1 (L)CL
Cam spacer BZ
Type lift and shift cam (M)CK
Cam spacer BZ and shim
Transmitter cam No.2 (N)CJ
Cam spacer BZ
Type rotation cam (K)CG
Cam spacer BZ
Transmitter cam No.3 (O)CH
Cam spacer BZ
Type rotation cam (K)CG
Cam spacer BZ and shim
Transmitter cam No.4 (P)CF
Cam spacer BZ
Type rotation cam (Q)CE
Cam spacer BZ and shim
Transmitter cam No.5 (R)CD
Cam spacer BZ
Selector plate lift cam (J)CC
Cam spacer CB and shim
Print and feed control cam (S)CA
Cam spacer BZ
Shims BY
Retention and pin reset cam (T)BX
Bush BW
Special washer BV
Key BU
Traverse drive gear BT
Cam spacer BS
Answer-back cam (U)BR
Bush BQ

★ Before reassembling the front camshaft bearing block AJ, tap out the ballrace BP and clean the race thoroughly in white spirit. Allow the race to dry off and then repack with Creed No.4 lubricant. Reassemble the ballrace to its housing in the block and tap it securely home.

8.7 Ensure that the single red spot on the traverse drive gear BT is positioned between the two red spots on the traverse cam AR and then assemble the front camshaft bearing block AJ, complete with its ballrace BP, to the main and traverse camshafts.

8.8 Refit the bush BN, washer BL, key BO, compensator cam (VA)BM, cam spacer BK and the keyboard reset cam (W)BJ to the main camshaft and secure them with their washer, spring washer and nut.

8.9 Assemble the special washer AO and compensator lever AL to the selector traverse shaft AK. Turn the traverse cam thrust washer AQ against the traverse cam AR so that the cam is free to rotate but is without end-play. When this condition has been obtained, hold the thrust washer by its flats with a spanner to retain it in this position and then refit and tighten the special nut AN.

To Reassemble the Vertical Levers and Cam Assemblies

8.10 Refit the carriage return and line feed rack AR, Fig.7.17, together with its associated lever assembly, and secure the rack with its two screws.

8.11 Assemble the traverse rear bearing X, Fig.7.15, together with the traverse shaft Y, and secure the bearing with its three short screws only.

8.12 Mount the camshaft assembly on the base plate and secure the rear bearing block DP, middle bearing block DO and front camshaft bearing block AD with their six screws.

8.13 Refit traverse shaft Y to its bearing on the middle main frame F, Fig.7.16, and secure the frame to the base plate with its two screws.

8.14 Assemble the print adjustment rod CC, Fig.7.17, through the base plate.

8.15 Refit the striker shaft N, Fig.7.15, to the front strike bearing M and secure the shaft to the pecker frame O with its two special screws U.

8.16 Assemble the rear strike bearing M and secure it with its two screws.

8.17 Assemble the vertical lever rack support AA, Fig.7.17, together with the vertical lever rack Z. Refit the support to the rear bearing and secure it with its two screws. Secure the support to the shift and function reset rack T, Fig.7.16, with its screw.

To Reassemble the Selector Assembly

8.18 Refit the selector lever pivot BL, together with the print release lever BO, and each selector and transmitter lever in the order noted when they were dismantled.

8.19 Refit the selector plate rack support H, together with the selector lever rack CJ, and secure the support with its two screws to the middle main frame F.

8.20 Refit the print control shaft BB, ensuring that the print hook BD is hanging downwards, and secure the shaft with a new circlip. Ensure that the slot on the print release pivot arm BJ is engaged with the pin on the print release lever BO and secure the arm with its screw to the print control shaft.

8.21 Refit the front main frame A and a new lubricator D. Ensure that the lubricator is located correctly under its cam, and secure the frame with its two screws. Refit the main plate stay G and secure it with its two nuts. Re-connect spring E to its anchor on lubricator D.

8.22 Refit the two bushes CN and bellcrank rack CM and secure the rack with its two screws.

8.23 Clamp the stop bracket CK in its lowest position and secure it with its two screws. Ensure that the end of spring E is anchored on the underside of the bracket. Re-connect the five springs CG connecting the transmitter cam followers CB to the stop bracket.

8.24 Secure the front ends of the print control shaft BB and selector lever pivot BL to the front main frame with a new circlip. Refit the frame support pin C to the frame and secure it with its nut.

8.25 Re-connect the traverse link AG, Fig.7.15, to the traverse bellcrank AW, Fig.7.16, and secure the link with a new circlip.

8.26 Re-connect the five springs CH to their respective selector code plates BS.

8.27 Locate the pin-box guide plate AU, together with the pin-box, against its abutments and secure the plate with its two screws.

8.28 Assemble the selector bars traverse plate AQ. Refit the front slide plate AO and secure it with its two screws.

8.29 Locate the traverse lever pivot bracket AD against its abutments and secure it with its two screws.

8.30 Refit the shouldered pin AT and traverse control bracket AS, and secure the bracket to the front main frame with its two screws. Re-connect the traverse multiplying lever AN to the pin-box end block AC with a new circlip.

8.31 Refit the pivot bracket AM to the front main frame and secure it with its two screws.

8.32 Refit the rear frame A, Fig.7.17.

8.33 Refit the following items to the function lever pivot CL in the order noted when they were dismantled, and then refit the pivot to the rear frame and secure it with a new circlip.

Contact operating lever DZ
Line feed lever CK
Carriage return lever CH
Letter feed bellcrank CF
Letter feed lever CD
Print lever BT
Transmitter lever (Stop)
Function reset lever X
Shift bellcrank BL
Transmitter lever (Start)

★ Where applicable, ensure that the levers are located in their guides and that the cam followers are on the correct side of their cams.

8.34 Re-connect the abutment frame trip lever CS, together with its spring CT, and secure the lever to the rear frame with a new circlip.

8.35 Re-connect the two transmitter springs EK, the letter and line feed lever springs CE and the carriage return lever spring CJ. Re-connect the lag weight spring CU.

8.36 Refit the outer abutment frame CV, together with any washers that were removed, and tighten screw DF, ensuring that the frame is free on its shaft but with a minimum of end-play. Re-connect the abutment frame return spring DC.

8.37 Ensure that the spacing between the main frame is as follows.

Front to Middle - 1.865 - 1.875 in.
Rear to Middle - 2.219 in.

9. PLATEN UNIT

Friction Feed

9.1 Refit the paper tension rod CD, Fig.7.30, and secure it with its pivot screws.

9.2 Assemble the platen E and the platen spindle P. Refit the platen knob coupling W to the spindle and secure the coupling with its two socket-headed screws. Tighten the two screws securing the platen feed ratchet Q.

9.3 Re-connect the paper tension rod spring CJ and the retention lever spring AW to their common anchor pin.

9.4 Refit the paper guide BN and secure it with its two screws.

9.5 Refit the pressure roller release lever AS and secure it with its screw.

9.6 Refit the ratchet feed support plate BC and secure it with its three screws.

9.7 Assemble the paper tube CC.

Sprocket Feed

9.8 If the feed pins H, Fig.7.30, were removed, refit them to the platen E as follows.

(a) Insert the straight end of one of the springs J through the inner hole of one of the feed pins. Note that the domed end of the pin always faces outwards.

(b) Fit the looped end of the spring round the feed pin and compress the two ends of the spring towards each other with a pair of tweezers.

(c) Insert the spring and feed pin into the platen and fit the pin into its housing. Slowly guide the spring loop over the pin housing and then release the tweezers.

(d) Push the pin far enough through its housing to expose the hole at its domed end. Pass an office pin through this hole to retain the pin in position while the remaining pins are assembled.

(e) Do not remove the office pins until the platen spindle is inserted and retained by the platen end cap O.

9.9 Refit the platen end cap O and secure it with its three screws.

9.10 Refit the platen retention wheel M and secure it with its three screws.

9.11 Assemble the platen spindle. Refit the ratchet feed support plate BC and secure it with its three screws.

9.12 Ensure that all the feed pins are fully retracted and then carefully slide the complete platen assembly through the right-hand side plate into its correct position.

9.13 Refit the platen sub-plate V and secure it with its three screws.

9.14 Refit the platen knob coupling W to the spindle and secure the coupling with its two socket-headed screws.

9.15 Re-connect the retention lever spring AW to its anchor pin.

9.16 Refit the pressure roller release lever AS and secure it with its screw.

9.17 Refit the distance collar U and the feed change lever S, and secure them with the shouldered screw T.

10. ANSWER-BACK UNIT

10.1 Assemble the lag disc F, Fig.7.36, together with any shims that were removed, lag disc spring J and ward drum sleeve K. Secure the sleeve with a new circlip.

10.2 Refit the lag disc release pawl M and secure it with a new circlip.

10.3 Assemble the ward drum L and slip the suppressor link AE on to its lower retaining pin.

10.4 Refit the ward drum spindle support C and secure it with its two screws.

10.5 Refit the selector levers spindle X slowly, assembling to it the release pawl latch AN with its torsion spring AO, ratchet retention pawl AK, and the selector levers AH and their spacing collars AJ. Fit a new circlip against the inner surface of the latch AN.

10.6 Re-connect the release lever catch spring AU, ratchet retention pawl spring AL and the latch trip lever spring AR.

10.7 Refit the release lever spindle AY and secure it with a new circlip. Re-connect the release lever spring AX.

10.8 Refit the release lever trip arm BA and the 'Here Is' trip bellcrank BD, and secure them with new circlips.

10.9 Re-connect spring BB to its anchor on the release lever trip arm.

11. REPERFORATING ATTACHMENT

To Reassemble the Punch Block Head

★ When assembling the guide and die plates, ensure that their cut-away corners are towards the feed wheel knob, Fig.7.40.

11.1 Refit the four bottom guide plates to the punch block casting AS and secure them with their two screws.

11.2 Assemble the following items to the punch block casting.

(a) The five code punches and the feed hole punch.
(b) Four die plates.
(c) Tape guide plate.
(d) Two die plates.
(e) The cover plate.

Secure the cover plate with its two screws.

11.3 Refit the punch block assembly and secure it with its two screws to the unit casting. Re-connect the punching arm spring AQ to its anchor pin on the support bracket A.

11.4 Refit the retention lever bracket CH and tape guide DH, and secure them with their two screws.

11.5 Assemble the cuttings chute DM and tighten its two screws.

★ After assembly, ensure that the chute is free to vibrate.

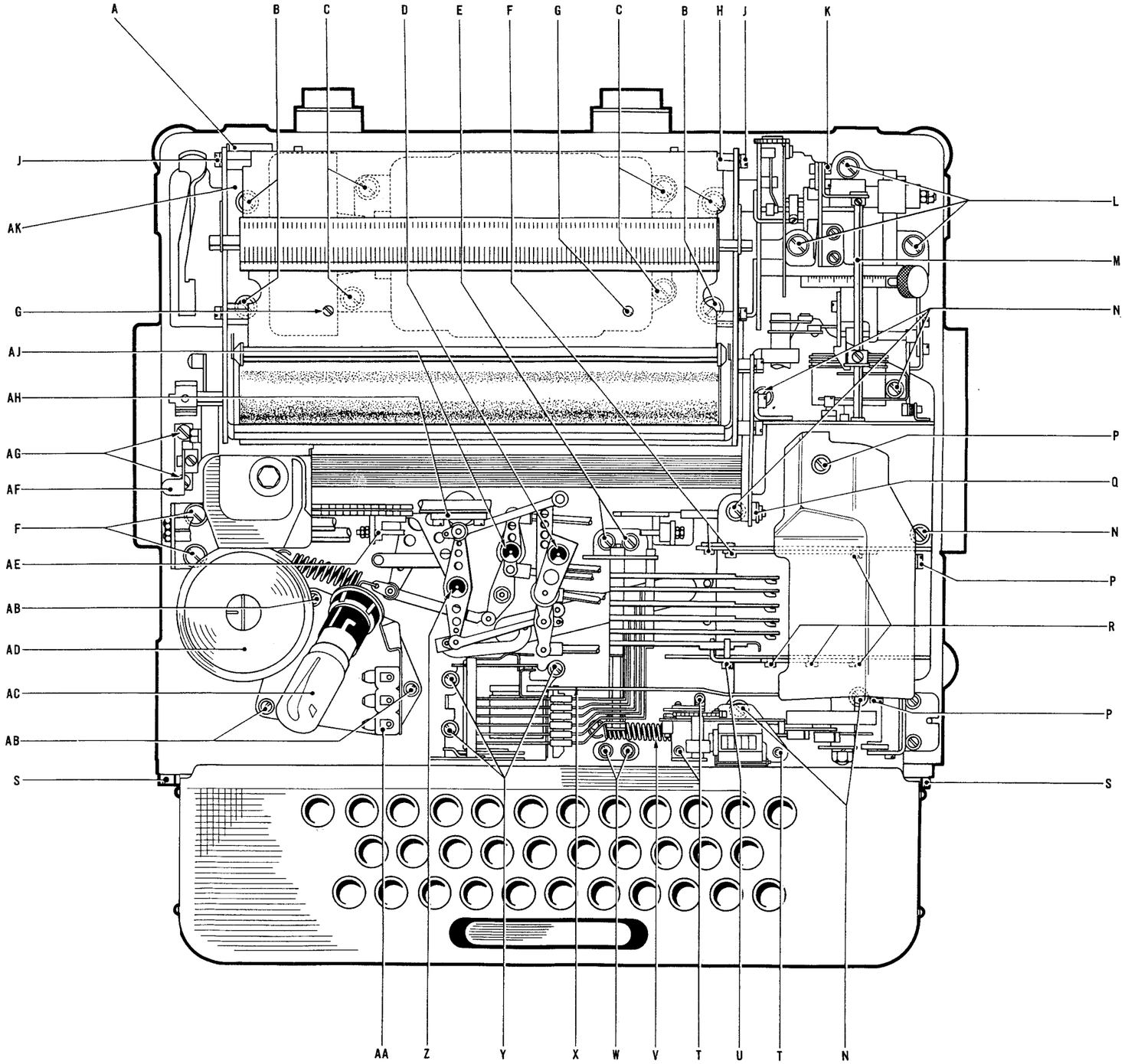

Fig. 5.1 LOCATION OF UNIT SECURING SCREWS