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It is my hope that you find the file of use to you personally – I know that I would have liked to have found some of these files years ago – they would have saved me a lot of time !

Colin Hinson

In the village of Blunham, Bedfordshire.

**AMENDMENTS TO BOOKLET NO. 85 (ISSUE NO. 3)**

(For Models 85 and 86 Printing Reperforators)

**Notes:** This T.I.S. has three functions :-

- 1) To provide adjustment instructions for the Model 86 ( $\frac{7}{8}$ " wide fully punched and printed tape) version of the Printing Reperforator which are not already given in Booklet No. 85.
- 2) To provide amendments to Booklet No. 85 to cover all changes that have been made to the No. 85 Printing Reperforator since the issue of the booklet. The amendments given in T.I.S. No. 36 have been incorporated, where still applicable, in this T.I.S. T.I.S. No. 36 is, therefore, cancelled.
- 3) To relate T.I.S. No. 30 to Booklet No. 85 so that this T.I.S. may be used for Nos. 85 and 86 Reperforators fitted with 'Overlap' Pattern Cam Units. The T.I.S. at present consists of amendments to Booklet No. 78 (12th Edition).

To distinguish between the different types of amendments resulting from the above three functions of this T.I.S., a code reference is added to each amendment, consisting of a combination of the following abbreviations :-

'85' ..... for the No. 85 Printing Reperforator  
'86' ..... for the No. 86 Printing Reperforator  
'Or.' ..... for the 'Orientation' Cam Unit  
'Ov.' ..... for the 'Overlap' Cam Unit

**Amendment No. 1 (85, 86, Or.)**

On page 1, delete the note at the head of adjustment No. 3 and substitute the following:-

**"N.B.:** This instruction provides a preliminary adjustment for the finger setting blade height. The final adjustment is provided on page 16 (Adjustment No. 42)."

**Amendment No. 2 (85, 86, Or.)**

On page 16, insert the following adjustment:-

**"42. Finger Setting Blade (Final Check)**

**N.B.:** If it is necessary to alter this adjustment then adjustments 4 and 5 will also require attention.

- 42.1 With the motor running and the magnet armature on the 'Marking' stop, insert a .013" (.33 mm.) feeler gauge between the armature and the 'Spacing' stop. Move the armature towards the 'Spacing' stop, holding the feeler gauge against the stop by means of the

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armature. If the receiving cam detent has not already been released, release it and check that all-marking combinations only are set up on the fingers.

- 42.2 Repeat the above procedure with a .009" (.23 mm.) feeler gauge. This time, all-spacing combinations only should be set up on the fingers.
- 42.3 If either of these conditions is not satisfied, readjust the height of the finger setting blade and then check adjustments 4 and 5 again."

### **Amendment No. 3 (85, 86, Or.)**

On page 16, after adjustment No. 42 (inserted in the previous amendment) insert the following adjustments :-

#### **"H. SINGLE-CURRENT ADJUSTMENTS**

- N.B.: (a) The adjustments provided in this section apply to reperforators fitted with the 'adjustable field' type electromagnet S.2848A with a single bias spring, and an Orientation Cam Unit. For reperforators fitted with Overlap Cam Units, this section should be replaced by T.I.S. No. 30, Section C.
- (b) The adjustment for the magnet field strength, viz. adjustment 1.3B, produces optimum results only on circuits employing a signalling supply of 60–120 volts and 40 mA. receive current. If an adjustment for voltages and currents outside this range is required, it will be necessary either to experiment or to apply to Creed and Company for an investigation to be made.
  - (c) Different adjustment procedures are given in the following instructions for short and long lines. By a 'short' line will be meant one whose capacitance is less than that of 20 km. of 20-lb./loop mile copper underground cable. A 'long' line, correspondingly, will be one whose capacitance is greater than this. If there is any doubt as to whether the line is 'short' or 'long' according to the above definition, adjustment procedure 45 should be followed, which is provided to cover this case.
  - (d) It is assumed that the source of signals for these adjustments is either a T.D.M.T. (or other high-grade source) or a correctly adjusted keyboard transmitter. The measurement of receiver tolerance is assumed to be made with an orientation device. If a T.D.M.T. is used for this purpose, however, the orientation device lever should be initially set at 50.
  - (e) If no keyboard is fitted to the reperforator, or if one is fitted but no local record is required, the 'long line' procedure should be followed, irrespective of the length of the line.

### **43. Short Lines**

- 43.1 Check that the electrical connections (see Booklet No. 78) are for single-current working.

- 43.2 Set the orientation lever to 15.
- 43.3 Determine the approximate setting for the bias spring adjustment by transmitting a succession of Rs from the *local* transmitter and increasing the tension of the bias spring from zero until correct selection just occurs.
- 43.4 Refine adjustment 43.3 as follows. Determine the lowest setting of the orientation lever for which the reperforator correctly selects both 400 Rs and 400 Ys. Let this setting be  $x_1$ .
- 43.5 Move the orientation lever towards 100. Determine the highest setting of the lever for which the reperforator correctly selects 400 Rs and 400 Ys. Let this setting be  $y_1$ .
- 43.6 Increase the bias spring tension in steps of two or three divisions and repeat the tests in 43.4 and 43.5 until  $y_1 - x_1$  is a maximum. Lock the adjustment with the clamp nut.
- 43.7 Repeat adjustments 43.4 and 43.5 for signals from the *distant* transmitter. Let the upper and lower settings of the orientation lever in this case be  $y_d$  and  $x_d$ .
- 43.8 Set the orientation device lever in the centre of the range found in 43.7, i.e. on  $\frac{1}{2}(x_d + y_d)$ .

#### 44. Long Lines

- 44.1 Carry out adjustments 43.1 and 43.2.
- 44.2 Determine the approximate setting for the bias spring adjustment by transmitting a succession of Rs from the *distant* transmitter and increasing the tension of the bias spring from zero until correct selection just occurs.
- 44.3 Refine adjustment 44.2 as follows. Determine the lowest setting of the orientation lever for which the reperforator correctly selects both 400 Rs and 400 Ys. Let this setting be  $x_d$ .
- 44.4 Move the orientation lever towards 100. Determine the highest setting of the lever for which the reperforator correctly selects 400 Rs and 400 Ys. Let this setting be  $y_d$ .
- 44.5 Increase the bias spring tension in steps of two or three divisions and repeat the tests in 44.3 and 44.4 until  $y_d - x_d$  is a maximum. Lock the adjustment with the clamp nut.
- 44.6 Set the orientation lever in the centre of the range found in 44.5, i.e. on  $\frac{1}{2}(x_d + y_d)$ .

#### 45. Lines of Unknown Characteristics

- 45.1 Adjust the bias spring tension to give maximum tolerance to *distant* signals as in adjustments 44.1 - 44.5.
- 45.2 Check the margin to *local* signals as in adjustments 43.2 - 43.5.

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- 45.3 If the local margin is adequate, centralise the orientation lever to the settings for *distant* signals found in 45.1.
- 45.4 If the local margin is inadequate, increase the bias spring tension two or three divisions of the bias adjustment nut.
- (a) If the local margin is thereby increased, the reperforator should be adjusted for 'short' lines, i.e. in accordance with adjustment 43.
- (b) If the local margin is decreased still further, the line is too long (i.e. the line capacitance is too great) for satisfactory operation.
46. **Short Lines (Alternative Method)**
- N.B.: The 'short lines' procedure given in adjustment 43 is designed to give optimum results. The following simpler procedure may be used, however, in cases where a slight loss of distant margin (not more than 5 per cent) can be tolerated.
- 46.1 Place the machine in a purely resistive circuit, e.g. in the base workshop.
- 46.2 Transmitting signals from a T.D.M.T. or a correctly adjusted keyboard transmitter, adjust the bias spring tension until the optimum margin is obtained for successions of 400 Rs and 400 Ys. Clamp the bias adjustment locknut.
- 46.3 Place the machine in the line circuit in which it normally operates.
- 46.4 Measure the margin to signals from the *distant* end and centralise this by means of the orientation device."

### I. DOUBLE-CURRENT ADJUSTMENTS

- N.B.: The adjustments provided in this Section apply to reperforators fitted with Magnet S.2848A and an orientation cam unit. Similar adjustments for reperforators fitted with an overlap cam unit are provided in T.I.S. No. 30, Section D.
47. **Adjustment with T.D.M.T.**
- 47.1 Check that the electrical connections are for double-current working (see Booklet No. 78).
- 47.2 Connect the reperforator to the T.D.M.T. and set the orientation device lever on 50.
- 47.3 Transmit a succession of Rs and slowly turn the control knob on the T.D.M.T. so as to shorten the start signal. Determine the shortest start signal for which the reperforator correctly registers 400 transmitted characters.
- 47.4 Leaving the margin control knob in this position, transmit 400 Ys. If the machine fails to select correctly, lengthen the start signal until it

just selects correctly. Note this reading, i.e. the percentage shortened start signal for which the reperforator correctly registers 400 Rs and 400 Ys. Let this be  $x$  per cent.

- 47.5 Slowly turn the control knob in the opposite direction and determine, as in 47.3 and 47.4, the longest start signal for which the reperforator correctly registers 400 Rs and 400 Ys. Let this be  $y$  per cent.
- 47.6 If  $x$  and  $y$  are unequal, the setting of the orientation lever should be changed and tests 47.3 and 47.4 repeated until they are equal.

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

- (a) If the bias is towards shortened start, move the orientation lever towards zero by  $\frac{1}{2}(x - y)$  divisions.
- (b) If the bias is towards lengthened start, move the orientation lever towards 100 by  $\frac{1}{2}(y - x)$  divisions.

It may be necessary to repeat these corrections.)

**48. Adjustment without T.D.M.T.**

- 48.1 Carry out adjustment 47.1.
- 48.2 Check the adjustment of the striker pattern keyboard that is to be used as a source of signals.
- 48.3 Connect the output of the transmitter to the reperforator (e.g. by working the transmitter and reperforator 'in local').
- 48.4 Transmit a succession of Rs and move the orientation lever towards zero to determine the lowest position for which the reperforator correctly registers 400 transmitted characters.
- 48.5 Leaving the orientation lever in the position found in the last adjustment, transmit 400 Ys. If the machine fails to select correctly, move the lever towards 100 until the machine just selects correctly. Note the reading, i.e. the orientation setting for which the reperforator just correctly selects 400 Rs and 400 Ys. Let this setting be  $x$ .
- 48.6 Move the orientation lever past 50 towards 100 and determine as in 48.4 - 48.5, the highest orientation setting for which the reperforator correctly selects both 400 Rs and 400 Ys. Let this setting be  $y$ .
- 48.7 The difference between  $x$  and  $y$  provides an approximate measure of the overall adjustment of the reperforator. If the orientation range obtained in this way is less than the required amount, the adjustment of the machine should be checked.
- 48.8 Set the orientation device lever in the centre of the range determined in 47.6, i.e. on  $\frac{1}{2}(x + y)$ . Check that this position is between 40 and 60. If this is not the case, check the machine adjustments."

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### **Amendment No. 4 (85, Or., Ov.)**

On page 10 of Booklet No. 85, delete adjustment 27 and substitute the following:-

#### **"27A. Punching Depth (Figs. 22, 28 and 31)**

- 27A.1 Slacken screws I, Fig. 28, turn the machine by hand and select the letter shift combination. This will set the punching levers in the 'marking' or back position.
- 27A.2 With the machine in the stop position, loosen screws D and E, Fig. 31, and screw F, Fig. 22. Slacken screw Z, Fig. 22, and move the punching cam assembly to the left as far as it will go.
- 27A.3 Put the end of a blank piece of tape into the punching head. Turn the punching camshaft by hand until the top punching bar moves fully to the right. Without turning the camshaft, draw the complete cam assembly to the right by slowly turning the adjusting screw Z, Fig. 22, clockwise. Using the tape as a feeler, stop turning when the top punch touches but does not pierce the tape.
- 27A.4 Turn screw Z, Fig. 22, clockwise by a further half to three-quarters of a turn. Since the pitch of this adjusting screw is approximately .020 in. (.51 mm.), this will give a punching depth of .010 - .015 in. (.25 - .38 mm.). Tighten screws D and E, Fig. 31, and screw F, Fig. 22.
- 27A.5 Turn the punching camshaft by hand, causing the punches to penetrate a length of tape inserted in the punching head. Feed out the tape and observe whether the holes are fully and cleanly perforated.
- 27A.6 If not, alter the adjustment in 27A.4 by the least amount necessary to obtain the condition in 27A.5".

### **Amendment No. 5 (85, Or. Ov.)**

Delete Figs. 22 and 31 and substitute the attached Figs. 22 and 31.

### **Amendment No. 6 (86, Or. Ov.)**

Between adjustments 30.1 and 30.2 on page 11, insert the following adjustment:-

- "30.1a Slacken the pivot clamping screw of the sprocket feed jockey lever and turn the pivot until the jockey lever is midway between its limits of travel. Tighten the clamping screw again."

### **Amendment No. 7 (86, Or. Ov.)**

Delete adjustment 32 given on page 12.

**Amendment No. 8 (85, 86, Or. Ov.)**

On page 12, insert the following note after adjustment 30.5:-

"For machines fitted with the 'Who Are You?' suppression mechanism, the adjustment for the tape pawl guide is given in the appendix on page 25."

**Amendment No. 9 (86, Or. Ov.)**

Add the following adjustments on page 16 after adjustment 42 (inserted in Amendment No. 2):-

**"42A Tape Guide**

N.B.: The tape guide is the small curved and slotted plate which guides the tape round the sprocket wheel and keeps the feed holes engaged with the spokes.

42A.1 Slacken the locknut of the tape guide stop and adjust the guide so that when it is in the normal 'on' position, it clears the body of the sprocket wheel by .006 - .007 in. (.15 - .18 mm.). Tighten the guide stop locknut.

**42B Sprocket Feed**

42B.1 Run the machine and check the pitch of the feed holes. The distance measured from the leading edge of one hole to the leading edge of the 101st succeeding hole should not differ from 10 ins. by more than half a feed hole pitch.

42B.2 If the pitch is unsatisfactory, slacken the two sprocket wheel grub screws and turn the sprocket wheel round so that the grub screws are well away from their previous indentations in the sprocket shaft. Tighten the upper grub screw sufficiently to prevent the sprocket teeth from slipping when the machine is run under power. Run another length of tape and check the pitch of the feed holes again.

42B.3 If the pitch is too great, slacken the upper grub screw and turn the sprocket wheel slightly anti-clockwise. Tighten the grub screw, and check the pitch again.

42B.4 When the pitch is nearly correct, tighten the lower grub screw and make the final adjustment by slackening the jockey lever pivot clamping screw and turning the pivot slightly towards the rear of the machine if the pitch is too small, and towards the front of the machine if the pitch is too great. Tighten the clamping screw.

42B.5 If it has been necessary to do adjustment 42B.4, check adjustments 30.1 - 30.2 (excluding 30.1a).

**Amendment No. 10 (85, 86, Or. Ov.)**

On page 19, delete the note under Section B, and substitute the following:-

"N.B.: Dismantling instructions for those units of the machine which are common to the No. 7 Teleprinter are given in Booklet No. 78 (12th Edition),



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pages 48 to 55. Dismantling instructions for the 'Overlap' pattern cam unit are given in T.I.S. No. 30."

### Amendment No. 11 (85, 86, Or. Ov.)

In the Spring Tensions table on p. 22, for –

Item 1, Col. 3, read: 'Force to give an extension of  $7/32$ " (5.6 mm.)'.

Item 1, Col. 4, read: ' $7\frac{1}{2}$  –  $9\frac{1}{2}$  ozs. (213 – 269 gms.)'

Item 6, Col. 1, read: 'PG.7436'

Item 6, Col. 3, read: 'Force to give an extension of  $1/8$  in. (3.25 mm.)'.

Item 6, Col. 4, read: '12 – 18 ozs. (340 – 510 gms.)'.

### Amendment No. 12 (85, 86, Ov.)

In T.I.S. No. 30 (Issue No. 2, May 1955), make the following alterations :-

<i>Page</i>	<i>Line</i>	<i>Action</i>	<i>Alteration</i>
1	Title	Substitute	'Amendments to Booklet No. 85 (Issue 3)'
1	5	"	'Appendix II'
1	19–20	"	'This section replaces Adjustment Instructions A1 – A13 (pp. 1–5) and B.18 (p. 16)'
7	23–29	Delete	Adjustment No. 19.
8	2–3	Substitute	'This section replaces Adjustment Instructions G.40 (p. 15), Booklet No. 85'
9	2–3	"	'This section replaces Adjustment Instructions H. 43–46 given in T.I.S. No. 49, Amendment No. 3'
11	15–16	"	'This section replaces Adjustment Instructions I, 47–48, given in T.I.S. No. 49, Amendment No. 3'
13	1–2	Insert	'N.B.: Add these spring tensions to p. 22, Booklet No. 85. Fig. references are to T.I.S. No. 30'
20–21	–	Delete	Amendments 2 – 10.

### Amendment No. 13 (85, 86, Or. Ov.)

On page 1 of Booklet No. 85, after the sub-heading 'A. Operating Magnet and Cam Unit', insert the following:-

'N.B.: Adjustment Instructions A.1–13 apply to the Orientation Cam Unit. Adjustment Instructions for the Overlap Cam Unit are given in Appendix II'.

**Amendment No. 14 (85, 86, Ov.)**

On page 5, Booklet No. 85, after the sub-heading 'B. Printing Mechanisms', insert the following:-

'N.B.: When an Overlap Cam Unit is fitted, Instruction B. 18 should be replaced by A. 13, Appendix II'.

**Amendment No. 15 (85, 86, Ov.)**

On page 15, after the sub-heading 'G. Adjustments with the Motor Running', insert the following:-

'N.B.: When an Overlap Cam Unit is fitted, Instruction No. 40 does not apply. Appropriate instructions are given in Appendix II, Section B.'

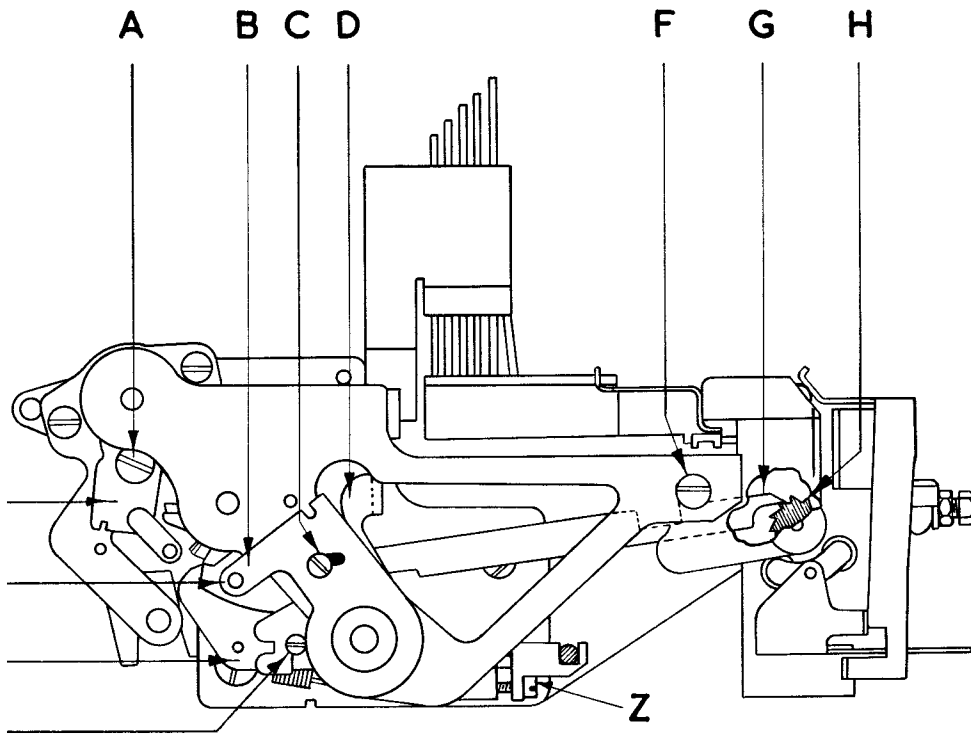


FIG. 22

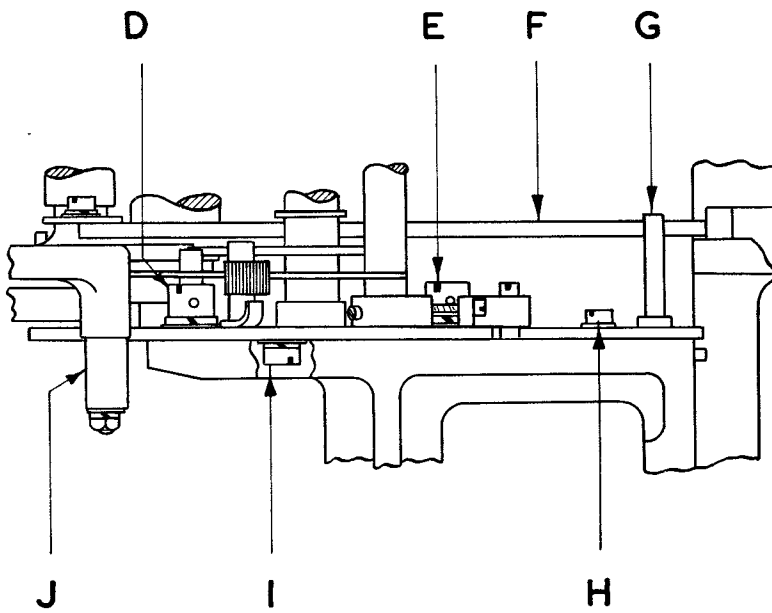


FIG. 31

**ADDENDUM TO:-**

Booklet No. 47R (Model 47 Tape Teleprinter)  
Booklet No. 54 (Model 54 Teleprinter)  
Booklet No. 71 (Models 71, 72 and 74 3-Gang Transmitters)  
Booklet No. 78 (Models 7 and 8 Teleprinters)  
Booklet No. 85 (Models 85 and 86 Printing Reperforators)

**KBF MOTOR**

**MAINTENANCE, DISMANTLING AND ASSEMBLING INSTRUCTIONS**

**AND PART LIST**

**A. MAINTENANCE INSTRUCTIONS (Fig. 1)**

**1. After every 300 hours working**

- 1.1 Remove the brush box covers (23) and the brushes (7) together with their springs (8).
- 1.2 Examine the brushes. If they have a life of less than 400 hours remaining, i.e. if they are less than  $\frac{1}{4}$ " (6.35 mm.) long, change them as follows:-
- 1.3 Insert a new brush and spring CP, part number AA11/1, in each brush box and replace the box covers.

**Note:** In order to get maximum life from the motor brushes, the spring should always be replaced at the same time as the brush.

- 1.4 Clean the commutator with a clean, dry rag and, with a small semi-stiff brush, remove all dust, paying particular attention to that adhering to the end face of the commutator, between the commutator segments, and on the end seals of the capacitor (21).

**Note:** No attempt should be made to remove the black, glazed surface of the commutator.

**2. After 3600 hours working**

- 2.1 Dismantle the motor in accordance with the dismantling instructions in this T.I.S.
- 2.2 Soak the ball bearings (13) and (30) in white spirit and remove the old grease. Thoroughly dry the bearings and inspect them for wear.
- 2.3 If there are unmistakable signs of wear, replace the bearings with new ones (part number BO.3879).

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- 2.4 Clean the bearing caps (16) and (32) and the clamp plates (3) and (10).
- 2.5 Pack the bearings with Creed No.4 lubricant (**N.B.:** Oil should not be used in these bearings).
- 2.6 Inspect the sealing gaskets (11), (17), (27) and (31), replace any which are faulty and lightly smear their surfaces with No.4 lubricant.
- 2.7 Check the condition of the commutator. If it is pitted or badly worn, do the following:-
  - (a) Skim up the commutator in a lathe by means of a sharp, pointed tool.
  - (b) Using a piece of wire of appropriate gauge laid in the slots between the commutator segments, check that the level of the mica insulation is .025" to .035" (.64 to .89 mm.) below the surface of the commutator.
  - (c) If it is less than this, the mica should be undercut while still in the lathe. With the lathe at rest, run a thin, square-edged tool along the gaps between the segments to cut the mica back to the required depth, ensuring that none is left on the sides of the copper segments.
  - (d) Take a light finishing cut and then highly polish the commutator with fine glass paper (emery paper or cloth should not be used for this purpose). Obtain as high a degree of polish as possible as this minimises brush wear.

**N.B.:** The minimum diameter to which the commutator may be reduced is 1.070 ins. (27.18 mms.).  
Commutator grinding stones are not recommended.
  - (e) Remove any burrs that may have arisen at the edges of the commutator segments. Remove all dust with a brush.
- 2.8 Reassemble the motor in accordance with the assembling instructions given in this T.I.S.
- 2.9 Carry out instructions 1.1 to 1.4 above.

### B. DISMANTLING INSTRUCTIONS (Fig. 1)

**Note:** To carry out these instructions the following special tools are needed:-

Ball bearing extractor (TA.1188)  
Pin spanner (TA.1189)

1. Remove the motor from the machine.
2. Remove the screw securing the moulded commutator cover (not shown) and remove the cover.

3. Remove the four screws and washers (36) securing the fan guard (4) and remove the guard.
4. Slide off the brush box covers (23) and remove the brush assemblies (7) and (8) noting the position of each brush in its box.
5. Slacken the screws (19) securing the brush boxes (22) to the mounting plate (20) and slide them out of their slots in the plate, leaving the brush boxes suspended on their connecting wires.
6. Remove the four screws and washers (2) holding the fan-end cover (28) to the motor body.
7. At the commutator end, remove the three screws (12) which hold the bearing cap (16) to the bearing clamp plate (10). Remove the cap (16) and the gasket (17).
8. Using a hide or wooden mallet on end (14) of the shaft, tap out the armature shaft and ball bearing (13) from the commutator-end plate (18) and withdraw the armature together with fan-end parts of the motor.
9. At the fan end of the armature, remove the three screws (33) which hold the bearing cap (32) to the bearing clamp plate (3). Remove the cap (32), the gasket (31) and the special washer (35).
10. Using the mallet on end (34) of the shaft, tap out the armature and ball bearing (30) from its housing in the fan-end cover (28).
11. Using the pin spanner (TA.1189) remove the locking collars (1) and (15) from the shaft.
12. Using the bearing extractor (TA.1188), remove the ball bearings (13) and (30) from the armature shaft.
13. Remove the gaskets (11) and (27), the bearing clamp plates (3) and (10), and the inner race thrust plates (9) and (26).

### **C. ASSEMBLING INSTRUCTIONS (Fig. 1)**

**Note:** To carry out these instructions the following appliances are required:-

Pin spanner (TA.1189)

Piece of 6BA screwed rod 3 ins. (7.5 cms.) long.

1. Replace thrust plate (26), bearing clamp plate (3) and gasket (27) on the fan end of the armature shaft. Replace ball bearing (30) on the shaft finger tight.
2. Obtain a piece of soft metal tube with a bore that will fit easily over the shaft and a thickness which will allow the end of the tube to abut against the inner ball race of the bearing without touching the ball cage or the outer race.

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3. Insert end (34) of the shaft into the tube and, with the tube downwards, stand it and the armature upright on the bench (**N.B.:** if the bench has a metal surface, put a wooden pad between it and the tube).
4. Using the mallet, tap end (14) of the shaft until bearing (30) is driven home against the thrust plate (26), taking care not to trap plate (3) or gasket (27) while doing so.
5. Replace locking collar (1) and screw it up tight against the bearing with the pin spanner (TA.1189).
6. At the commutator end of the shaft, replace items (9), (10), (11), (12) and (15) by methods similar to those described in 1 to 5 above.
7. At the fan end of the armature shaft, line up the screw holes in the bearing clamp plate (3) and the gasket (27) and engage the screwed rod for a few turns in one of the screw holes in plate (3).
8. Smear lightly the inside surface of the bearing housing in the fan-end plate (28) with Creed No.4 lubricant.
9. Replace the fan-end cover on the shaft, threading the screwed rod through one of the screw holes and entering the ball bearing (30) lightly and evenly in its housing.
10. With the armature upright, hold the fan-end cover in one hand and tap end (14) of the shaft with the mallet until bearing (30) is fully entered in its housing.
11. Replace washer (35), gasket (31) and bearing cap (32), i.e. *the thinner of the two bearing caps*, threading a screw hole of each of items (31) and (32) over the screwed rod.
12. Insert two of the screws (33) in the vacant holes in cap (32) and fan-end plate (28) and enter them for a turn or two into the corresponding holes in clamp plate (3). To do this it may be necessary to pull on the screwed rod while pushing on bearing cap (32), thus lessening the distance between plate (3) and cap (32).
13. Remove the screwed rod and insert the third screw (33). Tighten the three screws in turn, a little at a time.
14. At the commutator end of the shaft, repeat instruction 7 above in respect of bearing clamp plate (10) and gasket (11).
15. Repeat instruction 8 above in respect of commutator-end plate (18).
16. Replace the armature in the motor frame, threading the screwed rod through a screw hole in the commutator-end plate (18) and lightly and evenly entering ball bearing (13) into its housing.
17. Holding the motor in one hand, fan end upwards, tap end (34) of the shaft with the hide mallet so that bearing (13) fully enters its housing in the commutator-end cover.

**N.B.** During operation 17, which should be done very carefully, see that the fan-end cover beds evenly over the flange of the motor frame with the respective screw holes in both parts registering accurately. See also that the fan-end cover is so located that the projecting pin (29) will, when the motor is refitted on its machine, be directly below the axis of the armature shaft.

18. Replace the four screws and washers (2). Tighten the screws in turn, a little at a time.
19. Repeat instructions 11, 12 and 13 at the commutator end of the machine in respect of gasket (17), bearing cap (16), i.e. *the thicker of the two bearing caps*, screws (12), commutator-end plate (18) and clamp plate (10).
20. Restore the brush boxes (22) to their mounting plate (20) with the fixing screws in their respective slots, taking care that the washers are between the screw heads and the plate. Slide the boxes inwards until, as measured with a feeler gauge, they are .010" to .015" (.25 to .38 mm.) from the commutator, i.e. dimension 'a'. Tighten the screws (19) and remove the gauge.
21. Carry out, in reverse, dismantling instructions 1 to 4.
22. After reassembling the motor rotate the shaft by hand and make quite sure that none of the leads to the brush boxes is touching the armature or the commutator.

D. PART LIST (Fig. 1)

<i>Fig. Ref. No.</i>	<i>Part No.</i>	<i>Part Name</i>	<i>Quantity per motor</i>
1, 15	*3905/18	Special Nut	2
1		Sleeve nut (for 3-gang transmitter motors only)	1
2	(PS.1777-1 (PW.2025	Screw 4BA x 7/8" long, Ch.Hd. M.S. Spring Washer Std. 4BA S.C.	8 8
3, 10	*3905/14	Bearing clamp plate	2
4	(quote ) (motor ) (ref.no.)	Fan guard	1
5	*3905/58A	Motor fan	1
6	3905/17	Field winding clip	2
7) 8)	AA.11/1	(Motor brush (Brush spring and clip) Motor brush C.P.	2



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## D. PART LIST (Fig. 1) (continued)

<i>Fig. Ref. No.</i>	<i>Part No.</i>	<i>Part Name</i>	<i>Quantity per motor</i>
9, 26	*3905/19	Inner race thrust	2
11, 17) 27, 31)	*3905/16	Gasket	4
12, 33	PS.2157-1	Screw 6BA x $\frac{5}{8}$ " long C'sk.Hd. M.S.	6
13, 30	*BO.3879	Ball bearing	2
16	3905/15	Bearing cap (commutator end)	1
18	3905/1	Commutator end cover	1
19	(PS.2109-1	Screw 6BA x $\frac{7}{16}$ " long Ch.Hd. M.S.	4
	(PW.1013-1	Washer Std. 6BA M.S.	4
	(PW.2037	Washer spring S.C. Std. 6BA.	4
20	3905/6	Brush mounting plate	1
21	3905/67	R.I.S. Capacitor C.P. (.01 + .01 uF)	1
22	3905/21	Brush box	2
23	3905/7A	Brush box cover	2
24	**3905/86	KBF armature C.P. (includes items marked *)	1
25	**3905/34	Field coil	1 pair
28	3905/64	Fan end cover C.P.	1
32	3905/13	Bearing cap (fan end)	1
35	3905/12	Special washer	1
36	(PS.2045	Screw 6BA x $\frac{3}{16}$ " long M.S. Ch.Hd.	4
	(PW.2037	Washer spring S.C. 6BA light	4
Not ) shown)	3905/20A	Commutator drip-proof cover	1

(\*) These items are included in item 24.

(\*\*) When ordering these items also specify the information given on the motor nameplate.

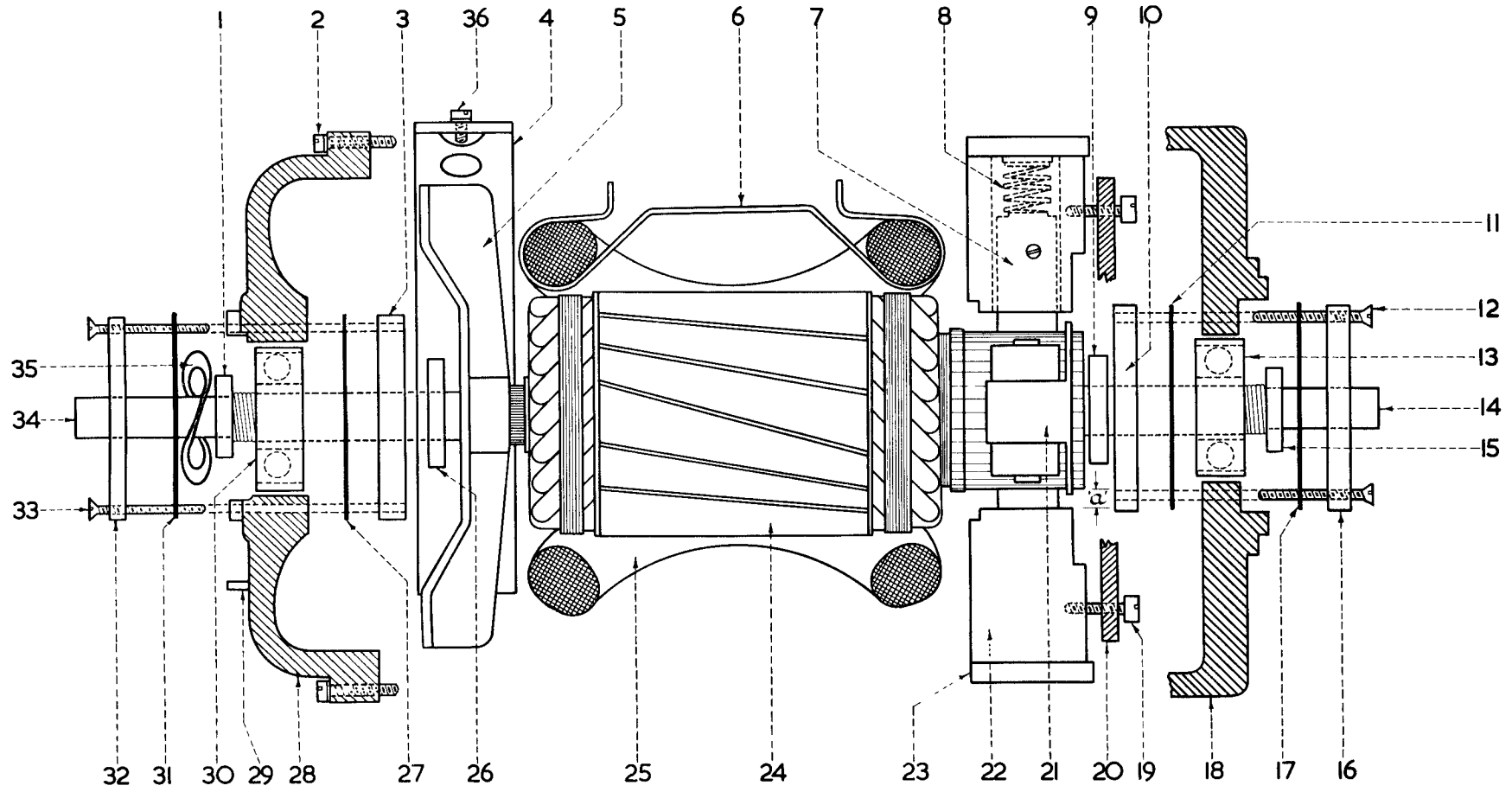


Fig. 1. DIAGRAM OF KBF MOTOR.  
 DIMENSION 'a' .010 - .015" (.25 - .38 mm.)

AMENDMENTS TO BOOKLET NO. 85 (ISSUE NO. 3)

(for Model 85 and Model 86 Printing Reperforators)

Amendment No. 1

On the cover and title page of Instruction Booklet No. 85, delete "No. 85 Teleprinter Printing Reperforator" and insert "The Teleprinter Printing Reperforator, Models 85 and 86".

Amendment No. 2

On page 8, delete the note immediately below the heading LOCATION OF UNIT and insert the following:-

"Note: This adjustment should be performed only if a different perforator unit is fitted to the machine, at major overhauls, or if any of the parts affecting the adjustment are changed. It should not require attention at routine maintenance visits".

Amendment No. 3

On page 8, delete Adjustment 22.6 and insert the following new adjustment:-

"22.6 Turn the machine by hand until the comb extensions are in their lowest position. The setting lever spring should then take control and disengage the punch bars from the punching levers, i.e. the punch bars should move to the non-punch position. Remove the unit from the machine and replace the setting arm rack and guard plate K, ensuring that the setting arms are free to move and do not foul the guard plate when the setting levers 0 are depressed. Remove the transfer rocker assembly. Replace the typehead, typehead support bracket, typehammer overthrow stop, typehammer, transfer rocker assembly and right-hand ribbon bracket. Tighten screw R and replace the perforator unit".

Amendment No. 4

On page 9, delete the note immediately below the heading RETENTION LEVER and insert the following:-

"Note: This adjustment should be checked only if the machine is overhauled, or if any of the parts affecting the adjustment are changed. It should not require attention at routine maintenance visits".

**Adjustment No. 5**

On page 9, delete Adjustment 24.3 and insert the following new adjustment:-

"24.3 Press the punch return frame D, Fig. 27, against the punching bars and, at the same time, push in the lever S until it touches cam T; then turn the perforator camshaft anti-clockwise by hand until the highest point of the cam is on the highest point of the resetting lever S. Tighten screws I, Fig. 28, and screw R, Fig. 27. (This adjustment ensures that the punching bars are fully withdrawn by the punch return frame, and that the resetting lever S does not bear too hard on the reset cam). Check this adjustment on the remaining five cam teeth in case the original setting was carried out on a worn tooth. Refine the original setting if necessary.

**Adjustment No. 6**

On page 10, Adjustment 27A.1, delete "Slacken screws I, Fig. 28".

**Adjustment No. 7**

On page 10, delete Adjustment 28.1 and insert the following new adjustment:-

"28.1 Slacken screw I, Fig. 31, and move pin M, Fig. 28, away from the cam as far as it will go. Rotate the governor by hand until the traversing link is fully towards the punch block".

**Adjustment No. 8**

On page 11, delete Adjustment 29.1 and insert the following new adjustment -

"29.1 Slacken screws I and withdraw the feed pawl N, Fig. 28, from the pin M until a .004 in. (.1 mm.) feeler gauge, can be inserted at the point indicated by dimension 'e'. Tighten screws I".

ment No.9

On pages 11 and 12, delete Adjustments 30.1 to 30.5 inclusive and insert the following new adjustments: -

- 30.1 Turn the machine by hand until the traversing link is fully towards the keyboard.
- 30.2 In the case of a Model 86 Reperforator only, slacken the clamping screw of the sprocket-feed jockey lever pivot and turn the pivot until the jockey lever is midway between its limits of travel. Tighten the clamping screw again.
- 30.3 Slacken screw A, Fig. 22, and, while pressing the feed pawl towards the punch block as far as it will go, move the plate Y to the right until the cut-away portion of the feed pawl touches the ratchet wheel H.
- 30.4 Release the pressure on the feed pawl and retract the plate Y slowly until the feed pawl drops behind the next tooth on the ratchet wheel, making sure that the jockey roller is in full engagement with a tooth on the retention wheel.
- 30.5 Press the feed lever Q, Fig. 28, to the left to take up all backlash, and again move the plate Y, Fig. 22, slowly to the right so that it is in full engagement with the ratchet tooth without moving the ratchet H. Tighten screw A''.