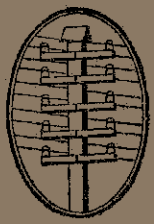
THE MORSE KEYBOARD PERFORATOR

MODEL No. 9.



CREED & CO., LTD.,
TELEGRAPH HOUSE
CROYDON

THE MORSE KEYBOARD PERFORATOR

MODEL No. 9

INSTRUCTION BOOKLET

No. 16

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CROYDON

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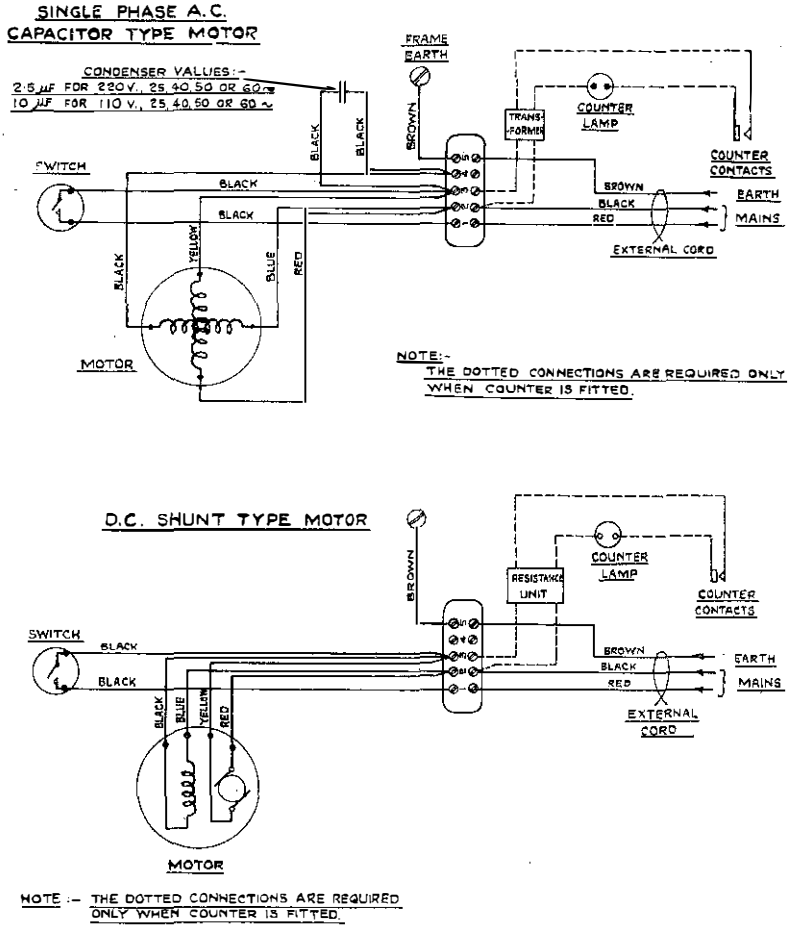

Internal wiring diagram for The Morse Keyboard Perforator, Model No. 9.

THE CREED MORSE KEYBOARD PERFORATOR

The Perforator prepares tape for controlling an Automatic Wheatstone or Cable Code Tape Transmitter. The visual letter counter, described on pages 14, 15 and 16, together with a special signal key and a warning lamp are only provided when it is required to perforate tape that is to be used for automatic transmission to stations employing Morse page printers.

TO FEED THE TAPE

Place the tape on the wheel so as to unwind in an anti-clockwise direction. Feed it under the roller on the brake arm, through the arm, and over the back roller. Turn the guide roller away from the punch block. Crease about three inches of the tape, slightly, to strengthen it. Pull back the tape bellcrank crossbar against its spring with the middle finger of the left hand, at the same time pushing forward the tape retention pawl with the first finger. The tape can now be passed through the punch block with the right hand. Return the guide roller into position and feed the tape round it, otherwise the paper will break immediately the paper becomes taut.

If a horizontal tape wheel is fitted, feed the tape through the guide pillar, round the right-hand roller of the retention lever, through the latter and around the left-hand roller. The tape may now be inserted through the punch block as explained in the last paragraph.

OPERATION

The Perforator is driven by a fractional H.P. motor via a belt drive to a pulley on the cam shaft (J. Fig. 2).

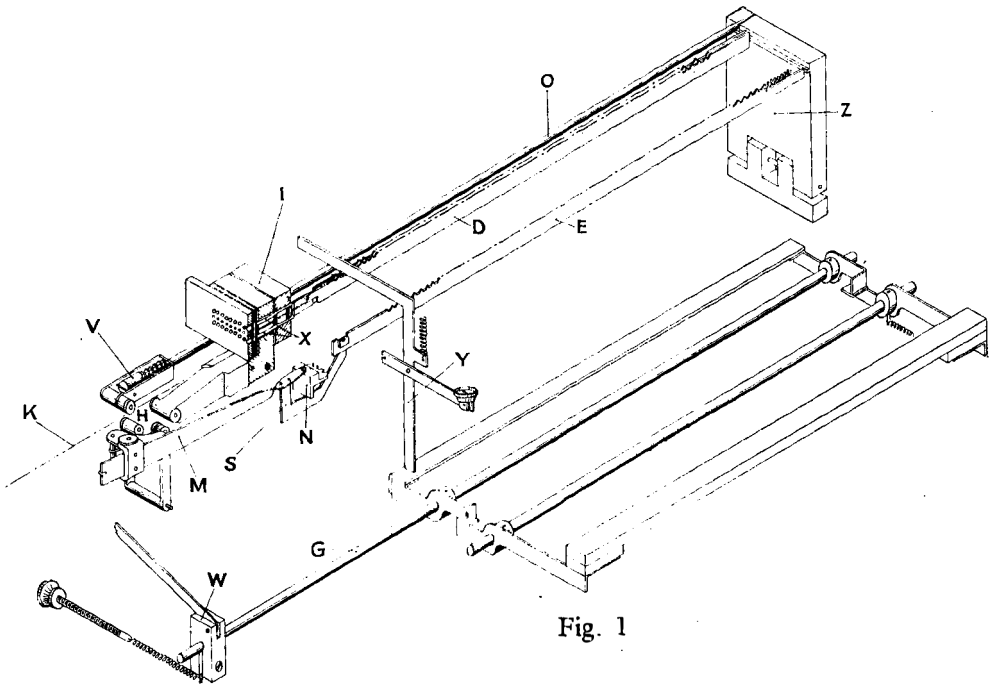

Fig. 1

The cam shaft, which is supported by two bearings and revolves continuously, is fitted with a ratchet.

Enveloping the cam shaft, in the form of a sleeve, is the cam which is cut with three grooves shaped and timed to give the necessary movement to the punching, feeding, and comb bar re-setting mechanism.

The cam also carries at its left-hand end, two pivoted pawls (P), the teeth of which, under the action of a spring, are pressed in towards the shaft, where they engage with the teeth of the rotating ratchet. They are normally held out of engagement by the pawl abutment (R) so that the cam remains stationary on the rotating shaft.

The trip lever (W) is held in engagement with the abutment (R) by a small spring as shown in Fig. 2.

Every time a keybar is depressed, the resulting movement of the trip rod (G, Fig. 1) causes the trip lever (W) to rotate the abutment on its pivot and release the pawls (P, Fig. 2).

On their release the pawls are pressed into engagement with the ratchet teeth (J) by the small curled spring seen in Fig. 2.

Immediately the pawls engage with the ratchet the cam is revolved with the shaft (J) and the mechanism is brought into operation.

The end of the trip lever passes underneath an eccentric portion of the cam. When the cam revolves as a result of the abutment (R) being tripped by the depression of a key, the trip lever is carried out of engagement with the abutment by the eccentric on the cam. This allows the abutment to drop into its original position in the path of the pawls (P) before the cam shafts and cams have completed one revolution. It is thus possible for the Perforator to perform one cycle of operations only each time a key is depressed.

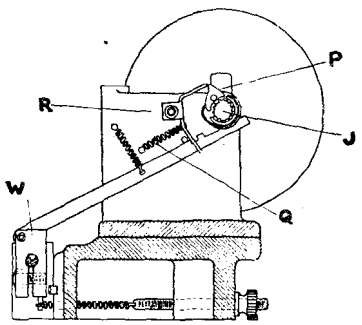

Fig. 2

Holding a key down has no effect; repetition of letters can only be obtained by repeatedly striking the keys.

The punch block (I, Fig. 1), which obtains its movement from the right-hand groove on the cam, is mounted on a pivoted link, so that it can oscillate left to right. It carries the punches and dies arranged so that the paper tape can be fed transversely between them, i.e., from the back of the machine to the front The end of the punches extend to the right, where they line up with the ends of twenty comb bars (D) (of which two only are shown in Fig. 1).

These bars are cut with notches corresponding to the Morse code, and the key bars (Y) are mounted at right angles above the comb bars (D) in such a manner that each key bar is associated with its own arrangement of notches cut according to the character selected.

When a key bar is depressed the portion traversing the comb bars (D) engages a slot left between the notches, and so prevents a certain combination of the bars (D) from being pushed backwards by the punches. The trip rod (G) is also operated, and this in turn releases the pawls (P) and operates the cam which pushes the punch block (I) against the bars (D). The selected bars will be arrested, and cause the punches which meet them to be forced through the paper.

The other bars having no notches associated with the particular key depressed will be pushed to the right by the punches without perforating the tape. Immediately this has taken place the punch block (I) is returned to its normal position by the cam.

The differential paper feed, necessitated by the varying length of letters in the Morse Code, is carried out by a permissive spacing mechanism.

In addition to the comb bars already described, there are ten other bars (E) extending the length of the keyboard under the selector bars. These ten space-stop bars tend to move to the right under the tension of springs, but are normally held to the left by the lever (Z), which is operated by the centre cam track. They are separated from each other by one-tenth of an inch, which is the distance between two centre holes of the perforated tape.

Teeth are cut in the upper edges of these bars in such a manner that on the depression of a key (Y) only one bar can move to the right under the impulse of its spring, the remainder being held by the selector bar.

To the left-hand ends of the space-stop bars are connected ten space stops (S) carried in the space stop rack (L, Fig. 3). In addition to the ten slots carrying the space stops, this rack also has a transverse slot cut in it, in such a position that when the selected space bar moves to the right the associated space stop is set across it.

The feeding of the paper is carried out by a rake, which is moved backwards and forwards in the transverse groove of the space stop rack. It obtains its movement from the left-hand cam track by way of the spacing lever and spacing lever blade (M). This movement is applied permissively in the backward direction, the amount being determined by the selected space stops.

The complete cycle of operations is as follows :—A key bar (Y) is depressed. This enters the slots in the comb bars (D) and space bars (E), and, as it nears the end of its stroke, operates the trip rod (G), which in turn operates the abutment (R) and allows the pawls (P) to engage with the teeth of the revolving shaft (J). The cam then commences to revolve, and first operates the rod (O), which pushes back the lever (Z) so as to leave space for the comb bars to operate.

As this lever goes back, space bar (E) corresponding to the selected letter will follow it and carry a space stop (S) into the path of the feed rake.

The punch block (I) carrying the punches and the tape is then moved to the right. The punches in this block meet certain bars (D) according to the signal selected, and are forced through the paper tape.

The remaining punches will push the unwanted bars (D) away. The return movement of the punch block (I) disengages the feed rake (N) from the paper, and when this has taken place the cam operates the spacing blade (M) and carries the feed rake towards the punch block.

The spacing rake travels down its path until it meets the space stop (S) which determines the length of the letter. As the cam continues to revolve, the punch block is returned to its normal position, and this causes the paper tape to engage once again with the feed rake (N), which in turn is moved by the cam to its normal position, thus feeding the paper tape.

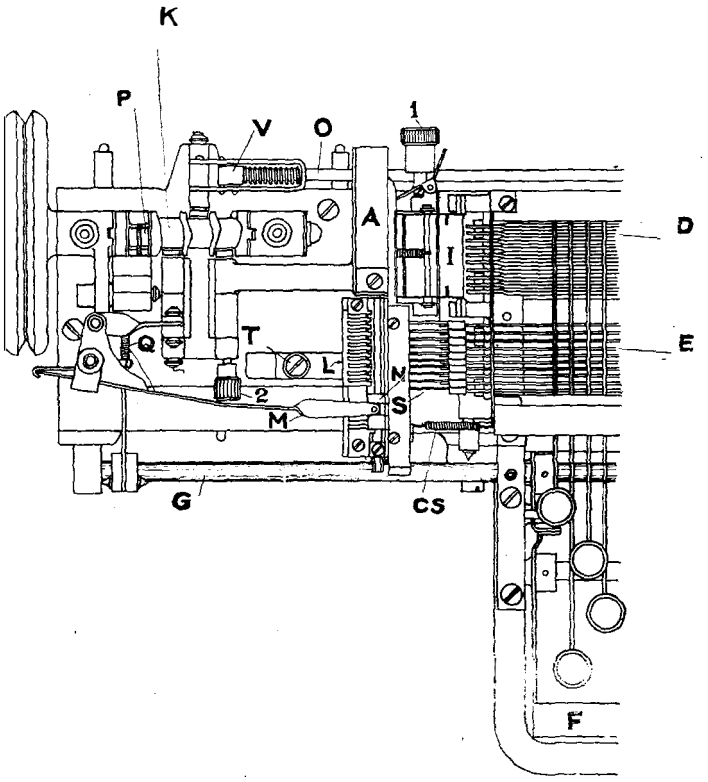

Fig. 3

Immediately after, the cam operates the lever (Z) and returns the bars (D) and (E) to their normal positions. At this point the pawls (P) strike the abutment (R) and are thrown out of engagement with the revolving shaft, thus completing the cycle of operations.

DISMANTLING

PUNCH BLOCK

Remove the cutting guide (A, Fig. 3), extract the locking pin at the end of the space rack (L) and pull out the small guide pin which runs through the rake. Lift the spacing lever blade (M) clear of the trunnion in the feed rake (N), and swing it outwards. If the lever which supports the space rack (L) is depressed at the point (T) the feed rake will either lift out, or it can be removed with the punch block. Remove the two punch block bearing pins 1 and 2 ; these have milled heads and can be pulled out with the fingers. The punch block will then lift out.

OPERATING HEAD

Take out the pin which connects the returning bar (O) to the returning bracket, i.e., the bracket which returns the combination bars (D) and space bars (E). Remove the small springs (CS) from the reduce lever stop in the front of the head. Remove the spring from the trip lever and take out the base holding-down screws. Lift the head off, taking care to disengage the space stops (S), and swing it backwards to clear the trip lever.

SPACE STOP BRACKET

Remove the bearing pin which has a milled head and can be pulled out with the fingers. Remove the stop screw (T), which is a slotted screw, having a spiral spring under its head. The bracket will then lift out. Beware of losing the spring washer which is between the bracket and its back bearing.

SPACING BLADE

Remove the securing ring, pull out the spacing lever pivot pin and the blade can be lifted out.

CAM

Remove the returning bar (O). Remove the securing ring from the end of the shaft opposite the pulley. Pull out the shaft, which can be done by gently pulling the pulley.

PAWLS

First remove the cam. The pawl pivot pin can then be tapped out from the end which can be seen in the left-hand cam groove.

PUNCHES AND DIES

After the punch block has been removed, slide the punch returning bar out sideways. Remove the feed punches individually by means of tweezers. Take out the four clamping screws and slide out the feed punch retaining plate, removing the punch retaining plate by turning it sideways and lifting it. The punches can then be easily pulled out. The die plate can be taken off its steady pin, exposing the die.

It will be noticed that the punches are supported and guided by two plates similar to the die, the holes in the other parts being clearance holes.

One guide plate is situated at the back of the block and the other one behind the distance plate which has the paper slot in it.

To ensure accuracy, the die and guide plates are supplied in sets of 3. The die is of thicker material (.015") than the guide plates. When renewing the die it is advisable to renew the guide plates as well.

ASSEMBLING

PUNCHES AND DIES

Assemble the guide plates and large punches first, the eleventh feed hole, which has no punch holes either side of it, being placed to the rear. Next slide in the punch retaining plate, and the feed retaining plate with the countersunk holes upward. Replace the feed punches and punch returning bar. Replace the die back plate, seeing that the paper guide levers are in the correct position. Slide the punch support blocks into position so that the punch retaining plate lies in the slots, and secure all with the screws.

OPERATING HEAD

Replace the cam between the bearings with a distance washer at each end on the inside of the bearing, push the shaft into place, lifting the pawls at the same time so as to clear the ratchet teeth. A washer is placed at the end of the shaft outside the bearings under the securing ring.

When replacing the operating head on the main frame, note that the trip lever should slide under the cam. Replace the space stops (S) with a pair of tweezers.

PUNCH BLOCK

Place the punch block in position, turning the cam round by hand if difficulty is experienced in getting the punch returning bar into its slot. Replace the bearing pins. Replace the feed rake (N) in its slot, and place the end of the spacing blade (M) in engagement with the rake trunnion.

ADJUSTMENTS

RETURNING LEVER

This is effected by removing the end of rod (O) from the returning bracket and screwing it in or out of the nut (V), mounted on the operating head.

Its adjustment should be such that when it is moved away from the comb bars (D) there should not be more than $\frac{1}{64}$ inch play between it and the bars, and when the cam is in its position of rest there should be a slight compression of the spring under the nut (V) so as to retain the cam in position. Ascertain that the key bars clear the projections on the space bars (E), also ascertain that, when the returning lever is fully back, the space stops (S) move right across the path of the rake (N) and enter the slot on the other side.

FEED

The feed is set when the machine leaves the Factory and should not need alteration. If, however, any alteration does become necessary, immediately under the space stop guide, in front of the operating head, will be found a hexagon-headed screw, and this should be screwed in or out until the pitch of feed holes is correct, viz., 120 in 12 inches of tape.

TRIP LEVER

Loosen the screw in lever (W) on the trip rod (G), depress a key and set the lever until the pawl abutment clears the top of the pawls by the thickness of a piece of tape. Tighten the screw in this position.

POSSIBLE FAULTS AND RECTIFICATION

JUMPING OR DOUBLE PUNCHING

This may be caused by the pawl abutment or the pawls being worn, allowing the pawls to slip off the abutment, and causing the cam to make two revolutions instead of one per depression of a key. This is first apparent when the space bar gives extra spaces, the reason being that when spacing, the speed is increased owing to less load on the motor. If the trip lever is not central in the abutment, "jumping" may occur.

ELONGATED CENTRE HOLES

This may be caused by any of the following :—

(*a*) Feed rake sluggish due to cuttings, or fluff, in the track in the space stop rack ; oil too thick on the trunnion block guide pin.

(*b*) Tape may be pulling, bringing up with a jerk after a free run of the tape wheel.

(*c*) Punches may not be sharp and the shutters thrown up bend over in the track between the die and the punch block distance piece, giving the spacing lever blade extra work to do.

(*d*) Feed rake may not be central in the slot of the paper guide or in the slot of the die back plate, or there may be fluff in the tape guide.

(*e*) Spring washer at the rear of the space stop bracket may have lost its tension and allowed the bracket to move.

(*f*) The spacing lever spring may have become too weak.

EXTRA HOLES PERFORATED

There may be friction between the combination bars. If two keys are depressed at the same time extra holes will be perforated.

HIGH PITCHED BUZZ OR HUM

This may be caused by a broken pawl or by an incipient seizure due to lack of oil, causing extra strain on the cam, which pulls up the motor and prevents the pawls from being thrown out of engagement.

INSUFFICIENT HOLES BEING PERFORATED

The adjustment of the trip lever may be incorrect, causing the lever link to trip before the key bar is in engagement with the projections on the comb bars. Projections on the comb bars may be worn or the punches too short.

KEY BARS SLUGGISH

This may be due to wear having taken place at the end of the space-stop bars and the key bars not clearing the projections on them. This can be temporarily overcome, if it is not convenient to change key bars, by adjusting the returning lever. After adjustment ascertain that the space stops still move right across the path of the rake and enter the slot on the other side.

MAINTENANCE

LUBRICATION

Use a good quality thin oil for the operating head. Do not oil the comb or space bars. Oil the motor about once a month. A few drops of oil are sufficient, if too much is used it will only run over the windings and may cause a breakdown. Too thick an oil on the trunnion block guide pin will cause the tape to drag.

A lubrication chart (No. 516) is supplied with each machine.

THE LETTER COUNTER

This device is fitted to Keyboard Perforators used in connection with Page printing machines and shows the operator at any instant the number of letters he has perforated since he last depressed the carriage return signal, i.e., the position he has reached on the line. A warning is given by means of a lamp, which lights up about 10 letters before he reaches the end of the line.

The operation is as follows :—The pawl lever (L, Fig. 4) is operated from the keyboard whenever a key is depressed and is moved a short distance to the right, carrying with it the pawl (P). The pawl is then returned against the stop pin (S) by a spring (B), at the same time carrying the toothed wheel (W) forward one tooth. A retaining pawl (C) prevents this wheel moving backwards when the pawl moves to the right and engages another tooth.

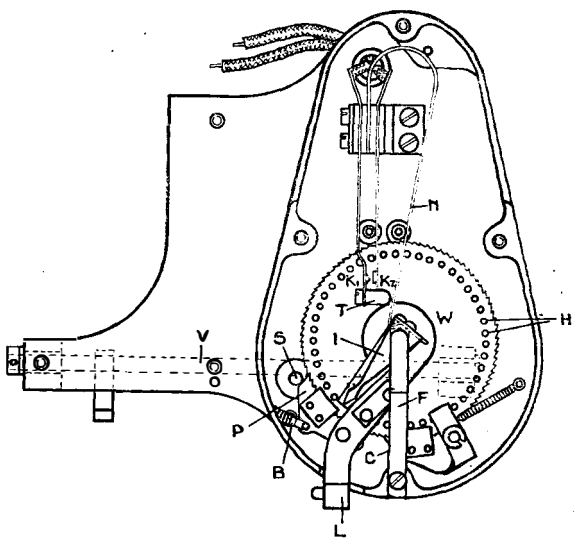

Fig. 4

The wheel (W) has teeth cut on its periphery corresponding to the maximum number of letters which can be printed in a line of the Printer with which it is intended to work. Further, it is drilled with a number of holes (H) which are slightly countersunk on the front face.

Through the centre of the wheel (W) is a spindle (D, Fig. 5), carrying on one end an indicator (I) and on the other end a boss or roller (R). This spindle is free to revolve independently of the wheel and is also able to move in an endwise direction. The underside of the indicator has a projection (E) which engages with the holes in the wheel (W). It is normally held in engagement with the wheel by means of a flat spring (F). The boss on the end of the spindle (D) has a spiral spring (G) attached to it. As the wheel (W) is revolved by means of the lever and pawl (P) it will carry with it the indicator (I) and also wind the spiral spring (G) around the boss (R), thus moving the indicator point one division every time a key bar is depressed.

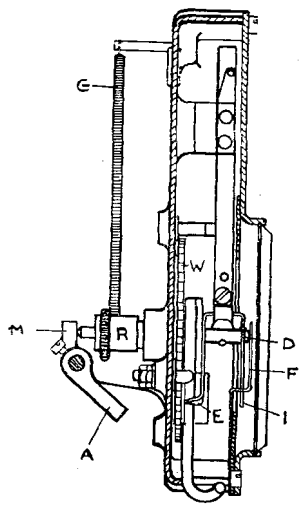

Fig. 5

Behind the indicator is a trip shaft (V) which is operated whenever the carriage return key is depressed. A lever (M) on this shaft bears against the end of the spindle (D) and when the carriage return key is depressed, pushes the spindle and indicator out of engagement with the wheel (W). The spiral spring (G), which has been coiled round the boss (R), immediately returns the indicator to zero. When the spindle (D) is released, the projection (E) will re-engage with a hole in the wheel (W).

Provision is made for preventing the wheel (W) carrying the indicator round further than the end of line position, i.e., preventing the spiral spring (G) being over-wound by neglecting to operate the carriage return key. This is effected by the lower portion of the indicator (I) which, as the end of line position is reached, comes into contact with a projection on the retaining pawl (C), forcing it out of action and so preventing the pawl (P) from feeding the wheel forward.

The contacts for closing the warning lamp circuit are at K.1 and K.2. K.2 is fixed, but K.1 is on a spring blade which would normally rest against K.2. It is, however, held away by a spring (N) bearing against the insulated block (T). As the indicator is revolved and nears the end of its scale, a projection on it engages the spring (N) and carries the latter with it, so allowing the contact K.1 to bear against K.2. Immediately the indicator is released and returned to zero, spring (N) will cause the contacts to open again.

ADJUSTMENT OF COUNTER

The link operating the pawl lever (PL) should be so adjusted that at its full stroke the pawl (P) will feed one and a half teeth, or as near to this as possible. The indicator (I) should be released at approximately the same instant that the pawls are released, when the carriage return key is depressed. Adjustment for this is provided by the lever (A) at the back of the counter, by slackening the clamp screw and moving the lever to the correct position.

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