SERIES J

TEN KEY

ADDING MACHINE

Above serial number J1001F

Burroughs

INSTRUCTION BOOK

Printed in U.S. America May 1965

Form 3705

✓CHANGES OR ADDITIONS

On "Revised" pages, the check mark (✓) shown to the left of items or subject titles indicates changes or additions since last issue.

Burroughs

Series J

TEN KEY ADDING MACHINE

INSTRUCTION BOOK

Section I

●

INTRODUCTION

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FOR FORM 3705

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INTRODUCTION

SERIES J TEN KEY ADDING AND SUBTRACTING MACHINE

Fig. I-1 Series J400

The above Fig. I-1 is the Burroughs Series J400 which is the basic machine explained in this instruction book. It is a light weight, portable, ten key, adding and subtracting machine of sturdy construction. Compact construction makes it readily adaptable to desk use and its attractive appearance makes it especially desirable for personal use on all types of computing problems.

The Series J Range of machines include a variety of styles and models with different features which are as follows:

J400 Series - Standard model in a die cast case.

J500 Series - Standard model without red ribbon and 5/6" spacing in a high quality plastic case.

J600 Series - Standard model with addition keyboard features in a high quality plastic case.

J514 - Basic J500 with dial set multiplier in a high quality plastic case.

J700 - Keyset multiplier with the additional J600 features fitted, also in a high quality plastic case.

A more detailed description of the various styles and features is given in later sections of this instruction book.

All Series J Machines are electrically operated and use the principle of full camshaft control of all machine functions. This principle assured positive control and timing of all mechanisms in the machine, thus permitting a quiet, high speed operation with a high degree of dependability.

The keyboard and functional controls provide ease of machine operation for the occasional operator and the attainment of high speed performance by the experienced operator.

The various styles and models available provide a wide range of high performance machines to cover most adding and calculating problems.

More detailed information pertaining to machine operating instructions may be found in the Advertising and Reference File in the District/Branch Office. It is suggested you review this for additional assistance.

KEYBOARD CONTROLS THE BASIC FUNCTIONS

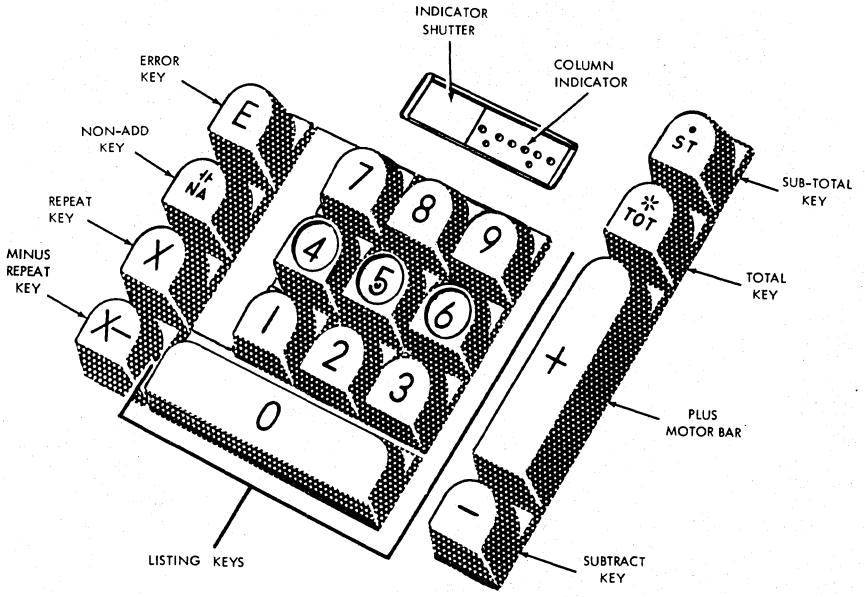


Fig. I-2 Keyboard Section

Listing Keys

The listing keys, Fig. I-2, are located in the central area of the keyboard and are so arranged that it is possible to operate the keys with just one finger or by the touch method. To assist in the use of the touch method of operation, the top surfaces of keys 4, 5 and 6 have been formed more concave than the others, with an added embossment in the center of the concave surface of the 5 keytop to afford the operator a home position for the fingers without visual observation. Amounts are set up on the listing keys in the same order as the figures would be written by hand. The machine automatically places each figure in its proper column.

Column Indicator

Just above the listing keys is the visual column indicator, which is covered by an indicator shutter when no amounts are indexed in the intermediate keyboard. The indicator shutter moves to the left one column as each listing key is depressed, and amounts set up in the intermediate keyboard will print in the columns exposed on the column indicator.

Total Key

The net total of accumulated amounts that have been added or subtracted is printed and the machine is cleared when the total key is depressed.

If the total is a plus amount, an asterisk (✱) is printed to the right of the totaled amount.

Machines containing the Minus Balance Feature print a true minus total from depression of the total key when a larger amount is subtracted than the amount that is added. Minus totals are indicated by the printing of the minus total symbol (−✱), and the amount is printed in red.

Machines that do not contain the Minus Balance Feature print the complement of minus totals which are identified with the total symbol (✱).

If no amounts have been accumulated and the total key is depressed a clear machine is indicated by one or two ciphers according to punctuation and a total symbol.

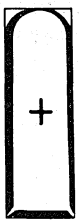
Sub-Total Key.

In machines having the Minus Balance Feature, depression of the sub-total key automatically prints a total of plus or minus accumulations and retains the accumulation in the machine. The sub-totaled minus amounts are printed in red. Separate sub-total symbols are also printed for sub-totaled plus amounts (●) and sub-totaled minus amounts (−●).

Machines that do not contain the Minus Balance Feature print the complements of minus totals which are identified with the sub-total symbol (●).

If no amounts have been accumulated and the subtotal key is depressed, a clear machine is indicated by one or two ciphers according to punctuation and sub-total symbol.

Plus Motor Bar



After listing keys have been depressed to index amounts into the intermediate keyboard depression of the plus motor bar causes the machine to operate and accumulate as a plus amount the numerals that were set up in the intermediate keyboard. By depressing the motor bar to operate the machine without indexing amounts into the intermediate keyboard; blank space in multiples of 1/6" may be placed between printed amounts. This may be desirable, for example, when listing a series of separate groups of figures, or when space is needed for writing in pertinent information to the printed amount.

Subtract Key

Depression of the subtract key causes amounts indexed in the intermediate keyboard to subtract in the same manner as the plus motor bar causes addition. All amounts subtracted are identified with the subtract symbol (−) printed to the right of the amount and by being printed in red.

Repeat Key

Amounts indexed in the intermediate keyboard are printed, added and retained on the intermediate keyboard for as many machine operations as the multiplying key is held depressed. The intermediate keyboard will not be cleared during the last operation from the plus Multiplying Key. After the plus multiplying operation, the keyboard may be cleared by using the Error (E) key, or on machines fitted with Totals After Repeat, the Total or Sub-Total keys.

Minus Repeat Key

Amounts indexed into the intermediate keyboard are printed, subtracted and retained on the intermediate keyboard for as many operations as the Subtract Multi-

plying key is held depressed. The intermediate keyboard will not be cleared during the last operation from the Subtract Multiplying Key. After the minus multiplying operation, the keyboard may be cleared by using the Error (E) key, or on machines fitted with Totals after Repeat, the Total or Sub-Total keys.

Non Add Key

NA Amounts indexed into the intermediate keyboard from depression of any of the ten listing keys may be printed but not added or subtracted by depressing the non-add key. This key, when depressed, indexes the non-add symbol (#) to print with the indexed amount, disengages the accumulator meshing mechanism and operates the machine.

Error Key

E When the error key is depressed, the machine operates - clearing the intermediate keyboard and returning the column indicator shutter to normal position. Depression of the error key prevents printing, accumulation and paper spacing during the machine operation. As previously stated, it may be used to clear the intermediate keyboard of the multiplicand following multiplying operations.

Paper Feeding

Amounts indexed into the intermediate keyboard are subsequently printed on the paper tape, which feeds from a paper roll in the back of the machine during the ensuing machine operation. The paper progresses around the platen 1/6" during each machine operation, except from the correction key as explained in the preceeding subject and from the total key explained in the next subject.

Feeding of the paper on each machine operation places enough space between amounts to afford easy reading of amounts and economical use of paper tape.

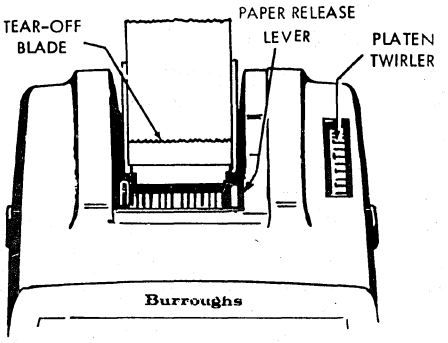


Fig. I-3 Paper Feed

The paper tape may be easily spaced either forward or reverse by manually turning the platen twirler. The tape may also be straightened or moved independently of the platen by actuating the paper release lever or button which is shown in Fig. I-1. Actuation of the lever or button releases pressure rolls under the platen that, normally, hold the paper firmly against the platen for efficient paper feeding.

The printed list may be removed from the machine by pulling the exposed end of the tape forward and tearing it off against the upper serrated edge of the tear off blade.

Extra Spaces from Totals

During total operations, the paper tape is spaced five spaces-5/6"-to place the printed total above the serrated edge of the tear-off blade, thus eliminating the

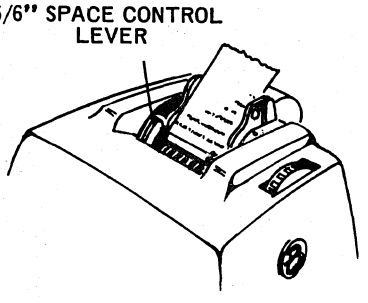


Fig. I-4. 5/6" Space Lever

need for manual advancing of the tape before tearing the paper to remove the printed list and total from the machine. When there is no need to remove the tape after the total operation - such as when several lists and totals are to be left on one strip of the tape - the control lever may be moved forward to provide standard 1/6" spacing from total operations.

Paper Roll

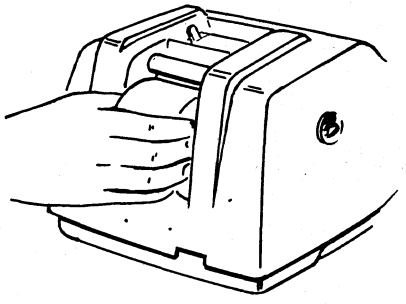


Fig. I-5. Roll Paper Position

An opening is provided in the back of the machine case in order that the paper roll, used for printing of all amounts, may be installed into the paper roll holder. The roll is supported by a shaft which in turn is retained in position by latches in each side of the roll holder. The roll is easily installed by placing the support shaft through the core of the roll and, with the tape directed forward and upward between the roll and the carriage, inserting the roll into the holder so that the retaining latches firmly hold the roll support shaft.

Paper Insertion into the Carriage

There are two simple, easily performed methods of inserting the paper tape into the carriage, both of which are equally acceptable.

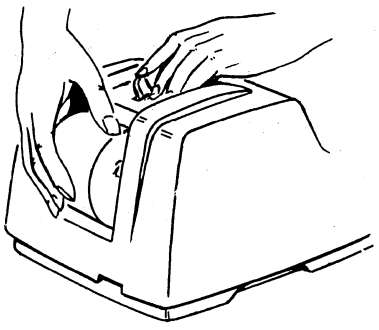


Fig. I-6. Paper Release Lever

The small amount of paper left on the nearly depleted roll may be removed by holding down the paper release lever or button to release the pressure rolls from the tape and pulling the tape from the carriage.

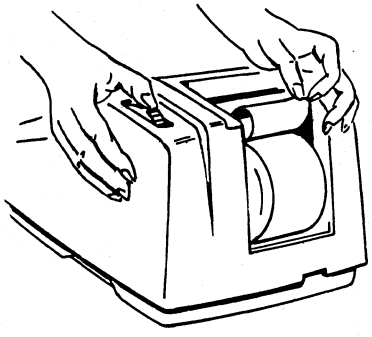


Fig. I-7. Paper Insertion

Place the end of the tape from the new paper roll over the small diameter plastic roller and firmly under the rearward side of the platen. Manually turn the platen with the platen twirler to advance the tape into printing position, with the paper directed under the tear-off blade as it comes from the platen.

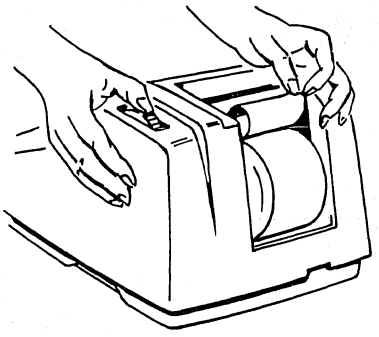


Fig. I-8. Paper Insertion

The other method is similar to the first, except that instead of removing the end of the tape-of the nearly depleted roll - from the carriage, tear it in two between the core and the platen. Then insert the end of the tape from the new roll over the old tape, which acts as a guide for the new tape and turn the twirler to advance both tapes around the platen. The portion of old tape may be discarded as soon as the platen has been turned enough to release it from the pressure rolls.

The Inked Ribbon

The printed figures on the paper tape are obtained by automatically feeding an ink-impregnated cloth ribbon between the paper and the type. When the type bars have been indexed to the printing position, the carriage is raised to apply pressure, by the platen, to the type. As the ribbon is between the tape and the type, pressure by the platen imprints an exact outline of the type face on the tape.

The method of removing the case and replacing the ribbon is covered in 'Servicing Procedures', Section X of this book.

BASIC FUNCTIONS, CROSS-SECTION VIEW SERIES J400

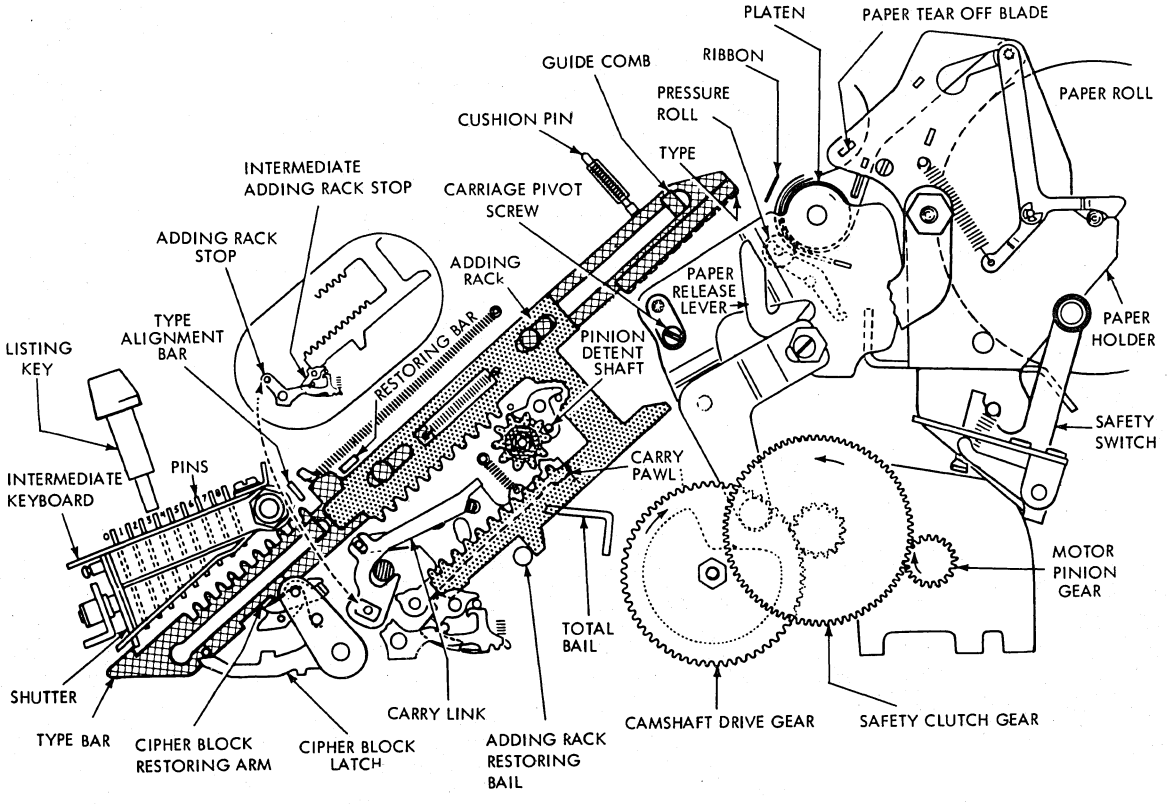


Fig. I-9 Terminology and Parts Relation, Series J400

After learning some uses of the Series J machine and how it is operated, the next step would be to look at a cross-section view of the machine showing the relationship of the various sections to be studied. The cross-section view of the Series J400 Fig. I-9 outlines the location of the mechanism in the machine, the relationship of the sections and parts to other sections and parts, also the names of the sections and parts to be referred to in this instruction book. You should familiarize yourself with Fig. I-9 at this time.

The primary sections of the Series J are Keyboard, Carriage, Printing, Power & Accumulation. Your sequence of study will cover the functions, construction, tests and adjustments, and servicing procedures of the sections as listed above. This sequence is followed because it is the logical order of dismantling the machine for the purpose of study, Preventive Maintenance, and Extra Attentions.

Observe the advantages of compactness, pleasing outward design, easy portability and adaptability to work location accomplished through careful engineering.

Case Removal Opens Safety Switch

The case is removed by first pushing the clamps which extend through the base on both sides of the machine rearward. Then raisethe front end of the case until it clears the keyboard applying a slight rearward movement followed by an upward movement as you remove the case.

Removal of the case actuates a safety device.

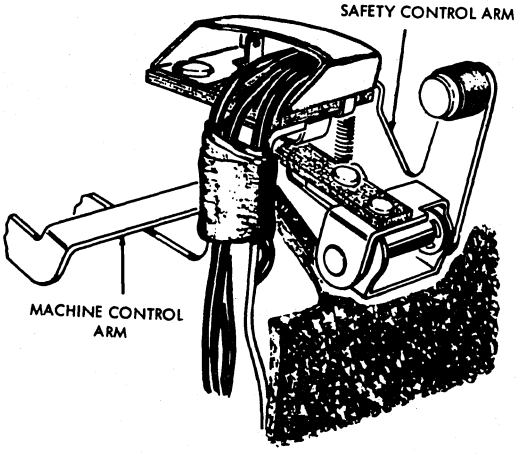


Fig. I-10. Safety Switch (Early Style)

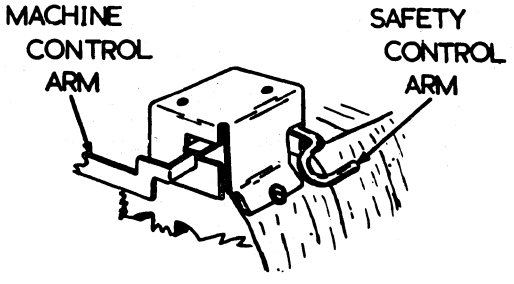


Fig.I-11. Safety Switch (Late Style)

Located on the right side of the paper holder on early machines (Fig. I-10), and on top of the motor on late style machines (Fig. I-11). This safety device, through spring tension, holds the microswitch open, even though the drive is tripped by a control key depression. However, the switch control device is only a safety factor, and to follow good practice, the motor cord should be disconnected from the machine or from the wall outlet any time the case is removed from the machine.

Intermediate Keyboard Limits Type Bars

In order that figures may be printed and accumulated in each column of an adding machine, several limits must be provided in each column to position type bars and adding racks in relationship to the keys depressed. In some full keyboard machines, the type bars and adding racks are limited directly by the keystems. In other machines, the listing keys index auxiliary mechanisms to limit the type bars and adding racks. In Series J Machines, an intermediate keyboard is used for this function.

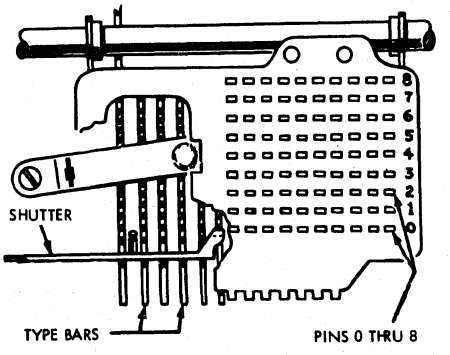


Fig.I-12 Intermediate Keyboard

The intermediate keyboard is located under the listing keyboard and contains 7,8 or 10 columns of stop pins. In each column are nine pins (cipher through eight) which, when lowered, limit the travel of the type bars. To print and accumulate nines, the type bars limit on the type bar restoring bail.

The left column of stop pins in the intermediate keyboard is positioned under the listing keys when the intermediate keyboard is in home position - to the right. When a listing key is depressed, the intermediate keyboard is moved one column to the left by a spring, and the column in which a stop pin has been lowered is positioned over the first type bar. Subsequent key depressions result in progressive movement of the intermediate keyboard toward the left.

A type bar blocking shutter, in front of the intermediate keyboard, clears the type bars in columns where figures are indexed as the intermediate keyboard moves to the left. The shutter retains the type bars, to the left of indexed amounts, in non-printing (minus cipher) position during the machine listing operation.

Indexing Amounts in the Intermediate Keyboard

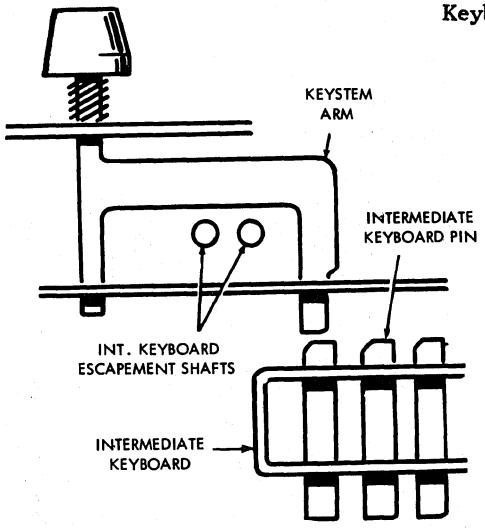


Fig.I-13 Indexing Amounts

When listing an amount $409.00, for example, the following actuations occur: depression of the number four key lowers the number four intermediate keyboard pin in the left column of the intermediate keyboard and causes the intermediate keyboard to move one column to the left by lowering intermediate keyboard escapement shafts (Fig.I-13) The intermediate keyboard shutter, (Fig.I-12) clears the first (units of cents) type bar as the lowered number four stop pin is positioned over the first (units of cents) type bar.

Depression of the cipher key lowers the cipher stop pin in the second column from the left of the intermediate keyboard, Again the intermediate keyboard moves to the left - the shutter clears the second type bar and the lowered four stop pin is positioned over the second type bar as the cipher stop pin is positioned over the first type bar

When the nine key is depressed, no stop pin is lowered but the intermediate keyboard moves to the left - the shutter clears the third type bar and the lowered four and cipher stop pins are positioned over the third and second type bars while no stop pin is lowered over the first type bar.

Depression of the cipher key twice after indexing $4.09 moves the intermediate keyboard to the left two more columns. Thus, type bars one through five are indexed, and $409.00 is printed and accumulated during the ensuing machine operation.

Paper Holder Dispenses Paper Tape for Printed Amounts.

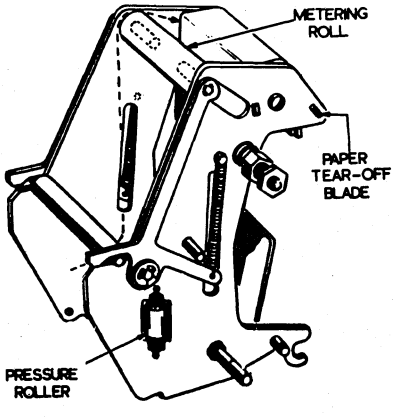


Fig. 1-14 Paper Holder

Plain paper tape is dispensed from a roll in the paper roll holder through the carriage for printing listed and totalled amounts. The Paper as it is fed from the roll must be controlled so that spacing between amounts is not hampered, and unwinding of the paper ahead of actual need is prevented. Control is provided in the paper holder through the combination of the pressure roller contacting the side of the roll to control unwinding and a metering roll which provides only sufficient slack in the paper to avoid inertia against full spacing.

The Construction and functioning of the following parts and sections may bemore easily observed with the paper holder removed. Remove the holder by following instructions contained in Servicing Procedures, Section X under subject 'Paper Holder.'

Carriage Provides Printing Surface.

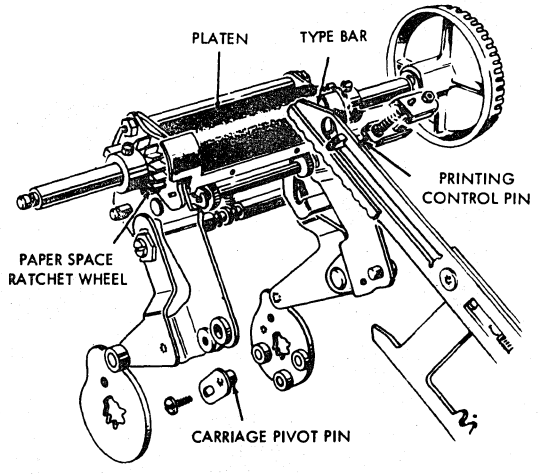


Fig. I-15 Printing

Indexed amounts and totals are printed as the carriage is raised to press the platen against the type. The type bars are backed up by individual pins, under compression spring tension, over each type bar to give an even impression of all figures.

The Platen, which may be adjusted vertically and horizontally, is positioned between the carriage side frames. The side frames pivot, when actuated by machine operation, on pivot pins connecting the carriage to the accumulator section.

After the printing takes place, the carriage is lowered. In the process of the carriage being lowered, the platen is advanced 1/6" in preparation for the next printed item and also to make the last printed item visible as the machine restores to normal position.

Ribbon Feeds Automatically

A cloth, ink-impregnated ribbon is moved into position between the paper and the type by a cam in the camshaft assembly actuating the ribbon guides on each machine operation.
The Ribbon used is two color - bichrome- i.e. the upper half is black and the

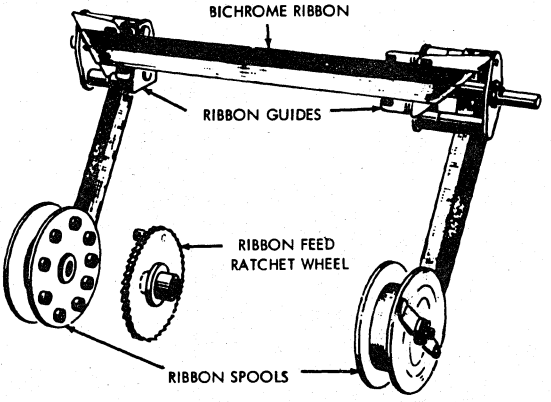


Fig. I-16 Ribbon Feed

lower half red. When the amount printed has a plus valuation the ribbon is shifted only far enough to align the black portion with the type and platen. When the amount to be printed has a minus valuation, the ribbon is shifted further to align the red portion with the type and platen. Automatic shifting of the ribbon to print in red is controlled through the symbol type bar, which, when in position to print the correct designating symbol, also controls the ribbon shifting mechanism.

The ends of the ribbon are attached to two spools, one on each side of the machine. One spool is always advanced a few tooth spaces on each machine operation, pulling the ribbon a like amount from the other spool. As the ribbon becomes wound fully on the spool being advanced, the feeding mechanism it automatically reversed so that feeding is then to the opposite spool.

Power is Provided by the Motor

Power to operate the machine is provided by an electric motor which rotates a mainshaft containing a series of individually designed cams for actuating functional mechanisms.

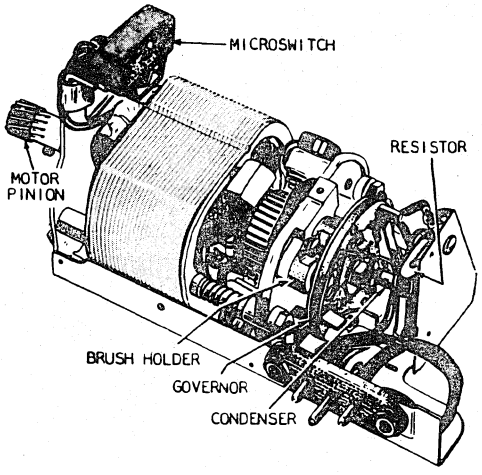


Fig. I-17 Series J Motor

The Motor, being of the 'Universal' type, will operate on either direct or alternating current as long as the voltage remains within specifications of the motor rating plate attached to the motor. An adjustable centrifugal governor controls the motor speed, thus a machine operating speed is maintained within a range of 172 to 178 operations per minute with the Repeat Key or Motor Bar held depressed.

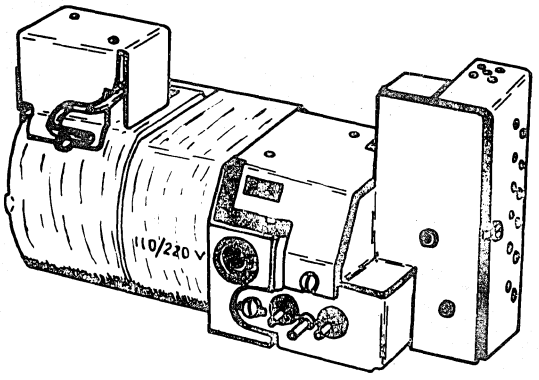


Fig. I-18 The Improved J(F) Motor

The new improved J(F) motor fitted from first machine serial No. J166176F is also a 'Universal' type motor. It is totally enclosed for extra safety and has the same basic specifications as the earlier Series J Motor. A new type adjustable centrifugal governor is fitted and switch points are used instead of a micro-switch.

Safety Clutch Protects Mechanisms.

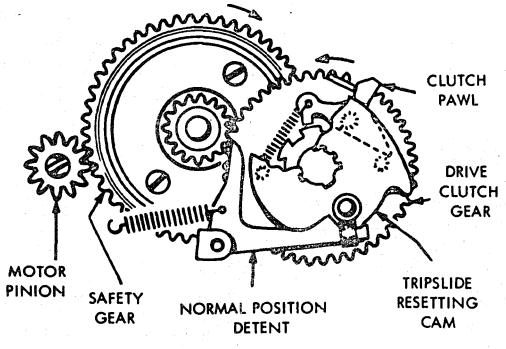


Fig. I-19. Safety Clutch

. Power is transmitted to the camshaft through a gear train, one gear containing a safety clutch. The safety clutch is designed to release under a predetermined pressure so that in event of accidental locking of any part of the machine, no damage to individual parts will result, nor will the motor be stalled. A stalled motor could result in damage to the commutator surface of the motor armature or to the motor field windings.

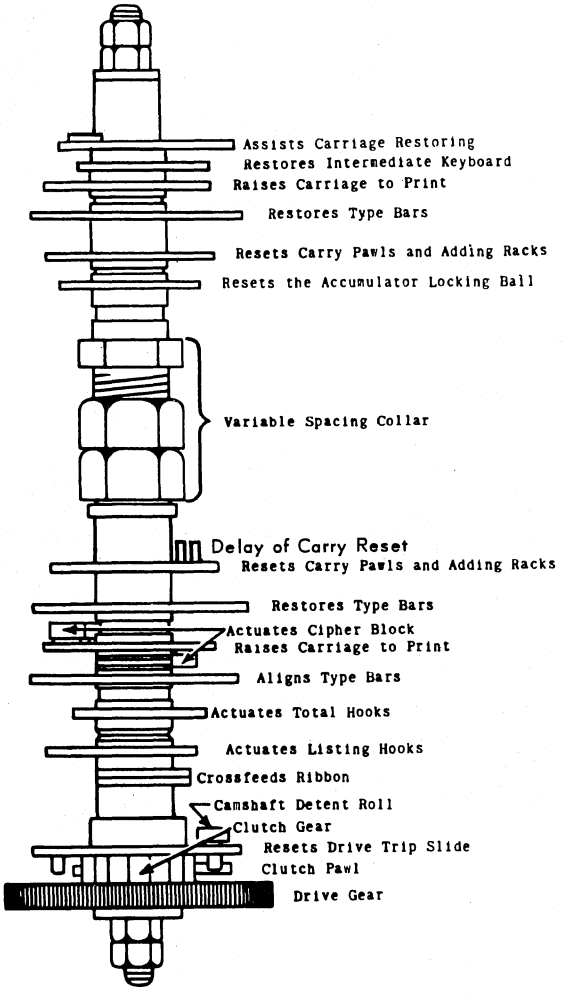


Fig. I-20 Camshaft

Camshaft Transmits Power.

When a functional control key is depressed in the keyboard, a clutch pawl in the camshaft assembly locks into a tooth of the drive gear, meshing the power from the motor to the camshaft assembly. As the camshaft is rotated, the cams controlling the machine functions are rotated, resulting in the kind of machine operation that was indexed by the depressed key.

Each cam is locked permanently in position by being shaped to fit the splines of the shaft, and are spaced to align with their matching functional levers by space washers and collars.

Accumulator Pinions Turn Clockwise To Add, Counterclockwise to Subtract.

Each type bar contains an adding rack with two sets of teeth for meshing with a corresponding ten toothed adding pinion. The upper set of teeth is used to turn the adding pinions for minus amounts and the lower set of teeth is used for plus amounts.

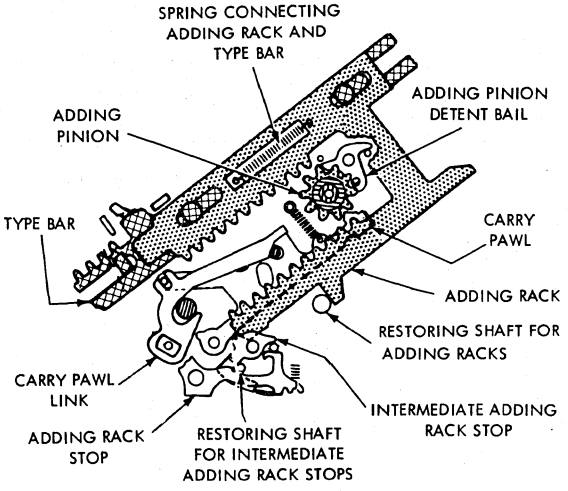


Fig. I-21 Accumulation

Adding and subtracting is accomplished by meshing the adding pinions with the adding racks at the mid-point of a machine cycle so that the pinions will be turned - clockwise to add and counterclockwise to subtract - during the last half of the machine cycle.

When a pinion is turned to add or subtract more than nine, a wide tooth of the pinion trips the carry mechanism to produce movement of one tooth space in the adding rack and pinion in the next leftward column. This causes a carry of one in the same manner as when making a mental calculation.

Totalling is accomplished by meshing the pinions with either the lower adding rack teeth, when the amount is plus, or the upper rack teeth, when the amount is minus, at the start of the machine cycle. The Type bars are released, to permit indexing, at the start of the totalling cycle and will travel until stopped by the wide tooth of each adding pinion limiting against the cam surface of the matching carry pawl in the carry mechanism. This positions the type bars to print the amount that has been accumulated in the pinions.

At the midpoint of a total cycle, the pinions disengage from the adding racks, leaving the pinions at cipher position while the type bars are returned to normal during the last part of the machine cycle.

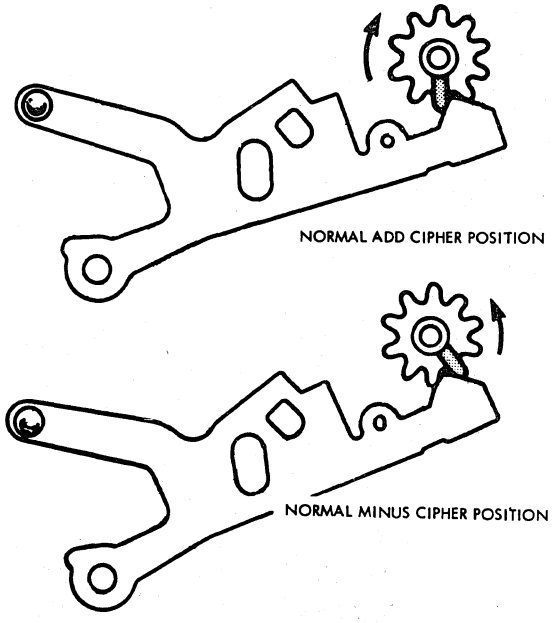


Fig. I-22 Pinion and Carry Pawl Relation

When totalling the selection of the upper or lower adding rack teeth for meshing with the adding pinions is automatic, determined by the accumulated amounts. If the added amounts exceed the subtracted amounts in total value, the meshing will be with the lower teeth of the racks, and if the subtracted amounts have more value than the added amounts, the meshing will be with the upper teeth.

Sub-totalling combines the controls of adding and totalling. The first half-cycle is the same as for totalling except the pinions remain meshed for the last half-cycle the same as when accumulating. Thus, the amount accumulated is printed, identified with the sub-total symbol and retained in the adding pinions.

Replace the paper holder, case and motor cord. Then test the machine for correct operation by performing the 'Operating Tests' in Section X of this book.

Burroughs

Series J

TEN KEY ADDING MACHINE

INSTRUCTION BOOK

Section II

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MECHANISMS AND ADJUSTMENTS

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FOR FORM 3705

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MECHANISMS AND ADJUSTMENTS

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MECHANISMS AND ADJUSTMENTS

Completion of Section I provides a general description of the Series J machine including an explanation of the operation and some applications. Also given was the terminology for specific sections and parts, and their relation to other sections and parts.

Section II covers in detail the construction, parts movement, tests and adjustments that provides the information needed for correct servicing to ensure satisfactory performance of the Series J line of products.

As study progresses through this section to a point where the removal of a part or section from the machine is desirable, directions are given for the removal. This procedure provides detailed review of the subject just covered and also preparation for the next subject.

If sections other than those specified are desired to be removed, either to expose 'hard to see' areas or to become familiar with machine detail, procedures for section removal may be found in Section X.

As you progress through this course of study you may from time to time find it desirable to reinstall parts or sections previously removed in order to clarify the details of movement and relationship of parts and sections. This must be left to the particular need and judgement of each individual.

You should at this time remove the case.

KEYBOARD

Machines Functions are controlled from the Keyboard.

As previously discussed in Section I, the keyboard contains ten listing keys for indexing amounts into the machine plus seven operation control keys and a motor bar to control the machine function.

Listing Keys

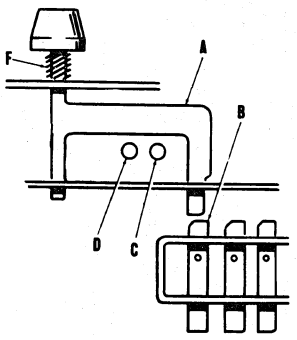


Fig. II-1 View of Keystem & Stop Pins

Each listing key A (Fig. II-1), cipher through eight, has an arm extending over the respective stop pin B in the intermediate keyboard.

The arms extend over the two shafts C and D which actuate the intermediate keyboard escapement mechanism. Depression of the nine key does not lower a stop pin in the intermediate keyboard but does actuate the intermediate keyboard escapement shafts C and D. Each keysten is held in non depressed 'home' position against felt pads attached to the underside of the upper keyboard plate by coil spring E assembled around the keystem. The listing keys, when depressed, limit on the lower keyboard plate.

Intermediate Keyboard Escapement
Early J400 & J200

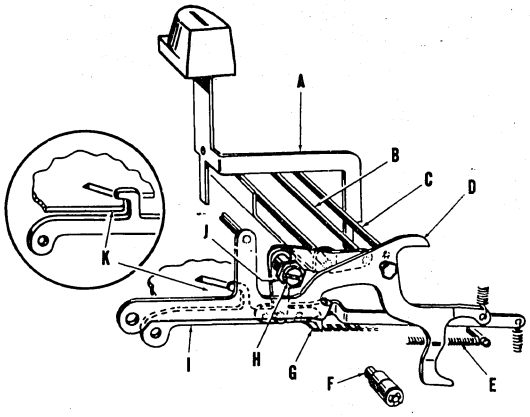


Fig. II-2 Keyboard Escapement

Escapement of the intermediate keyboard- movement of the intermediate keyboard one column to the left from depression of listing key - occurs partially on listing key depression and partially during the restoring of the key to home position. Key depression through A (Fig. II-2) contacts shaft B and through link raises escapement pawl I, part A also contacts shaft C which lowers arm D. Before pawl I is raised sufficient to clear escapement tooth G in the intermediate keyboard; the formed ear of arm D will have entered one of the spaces between escapement teeth. As pawl I is raised above the escapement tooth the intermediate keyboard moves to the left, through tension of spring E, until escapement tooth G is limited by ear of arm D.

On later style machines, spring F is not attached to the intermediate keyboard but to the restoring arm as shown in Fig. II-20.

As the listing key restores to normal pawl I enters the next tooth space to the right of the one previously occupied and as arm D is raised out of the escapement teeth, the intermediate keyboard is permitted to complete one full escapement by limiting on pawl I. A full escapement of the intermediate keyboard places the next column of stop pins, in the intermediate keyboard, under the indexing arms of the listing keys.

During the machine operation as the intermediate keyboard is moved to the right, restoring the stop pins, shaft C is momentarily positioned under the lower extension of arm A through the roller on post F on the intermediate keyboard contacting the lower leg of arm D. This prevents depression of a listing key until the stop pins in the intermediate keyboard are aligned with the indexing arms of the listing keys.

Tests and Adjustments

1. To ensure full indexing of the stop pins, in the intermediate keyboard before the intermediate keyboard escapement takes place:

Depress each listing key individually to determine which key provides the least amount of lift to escapement pawl I (Fig. II-2). With this key held depressed there should not be more than .010" clearance between the bottom of pawl I and top of escapement teeth G.

To adjust - Turn eccentric J (Fig. II-2) as required keeping the high side of the eccentric to the right.

2. To prevent accidental escapement of the intermediate keyboard assembly:

With all listing keys at normal, escapement arm I should have full hold to .010" more than full hold on escapement teeth G.

To adjust - Raise or lower portion of lower keyboard plate K (Fig. II-2) that is partly separated by an angle cut. This provides the limit of escapement pawl I at the home position.

Intermediate Keyboard Escapement
Late style J400, J500, J600, J700

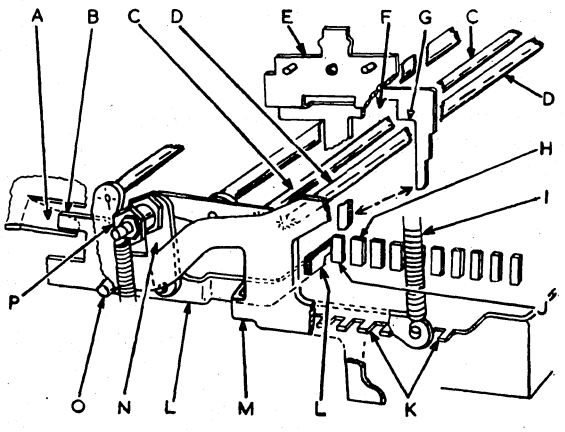


Fig. II-3 Keyboard Escapement (Late Style)

With the introduction of 1-2-3 cipher construction, the escapement mechanism was modified to enable common parts to be fitted to all styles of machines. Escapement arm I (Fig. II-2) was replaced by an escapement arm L (Fig. II-3) which limits on the cipher pins in the intermediate keyboard.

Depression of a listing key 1 through 9 raises escapement arm L above the cipher pins through the extended arms contacting shaft C and link N. Shaft D, also lowered by the indexed key, positions the formed ear of bail M into the teeth K. When arm L clears the top of cipher pin J, the intermediate keyboard moves to the left until limited by the formed ear on M.

As the listing key restores to normal, arm L is lowered into space between cipher pins J and H and the formed ear of bail M is raised out of the teeth K. The intermediate keyboard is then allowed to complete the full one column escapement until arm L limits on cipher pin H.

Depression of the cipher key E through the cut out at F does not raise arm L but projector G lowers bail M in the normal way into the teeth K. The extension of keystem E lowers the cipher pin J and initial escapement takes place until limited by the ear of bail M. As the cipher key E restores to normal, bail M is raised out of the teeth K and the intermediate keyboard tabulates until arm L limits on the next cipher pin H.

At the end of the machine operation, shaft D is raised through bail M being contacted by the roller on the intermediate keyboard to prevent depression of a listing key until the first cipher pin is limited by arm L in the home position.

Tests and Adjustments

1. To ensure escapement of the intermediate keyboard when a listing key 1 through 9 is depressed.

Depress each listing key 1 through 9 to determine which key provides the least amount of lift to escapement arm L. When this key is depressed the stop pin should be indexed slightly before the initial escapement takes place.

To Adjust - Position eccentric P as required keeping the high side towards the right.

2. With the machine at normal in the home position there should be minimum clearance between the bottom of arm L and the intermediate keyboard top plate K.

To Adjust - Bend the projection A on the lower keyboard plate where extension B of escapement arm L limits at normal.

3. To ensure a safe hold of the rack bars on the indexed stop pins and to avoid a false limit of the half space pawl on machines with Totals after Repeat features.

With the intermediate keyboard fully escaped to the last but one column to the left, manually operate the machine until the rack bars limit on the stop pins. In this position the rack bars should align centrally with the indexed stop pins.

To adjust - Bend the formed ear of escapement arm L where it contacts the cipher pin.

1-2-3 Ciphers

Machines of the J600 and J700 range which are fitted with the 1-2-3 ciphers construction have the regular cipher key removed. In its place at the front of the keyboard are three different cipher keys which allow for the automatic indexing of 1, 2 or 3 ciphers to the right of an indexed amount.

The cipher keys are located on the keyboard in the following manner:

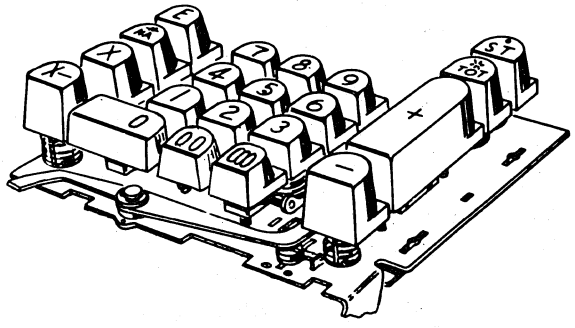


Fig. II-4 Cipher Keys

One cipher key to the left
Two cipher key in the center
Three cipher key to the right

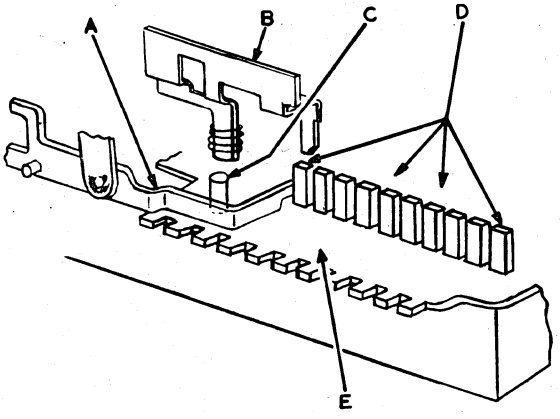


Fig. II-5 Escapement Arm

The escapement arm A limits on the zero cipher pins D themselves instead of a tooth in the rack of the intermediate keyboard top plate E.

To enable three cipher pins to be indexed at the same time the intermediate keyboard restoring plate has been cut away at the cipher position (See Fig. II-6). The standard restoring linkage has been modified to give more reset of the intermediate keyboard to allow the second cipher pin to be restored during the machine operation. To avoid increasing the restoration of the intermediate keyboard to reset the first cipher pin, advantage was taken of the fact that a cipher is never indexed in front of an amount so the first zero cipher pin D is fixed. When the intermediate keyboard is in the home position, stud C located on the intermediate keyboard top plate E is positioned beneath auxiliary cipher keystem B, and prevents the keystem from being depressed.

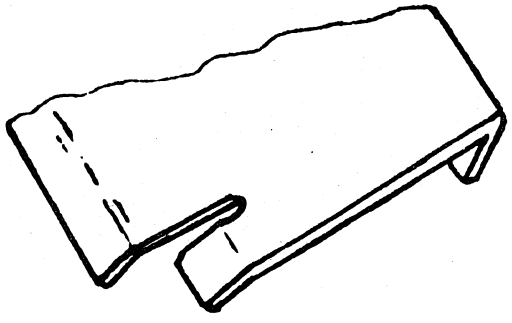


Fig. II-6 Restoring Plate

Cipher Keys Operation

The three cipher keys together with two auxiliary cipher keystems enable the indexing of 1, 2 or 3 ciphers from their respective keys.

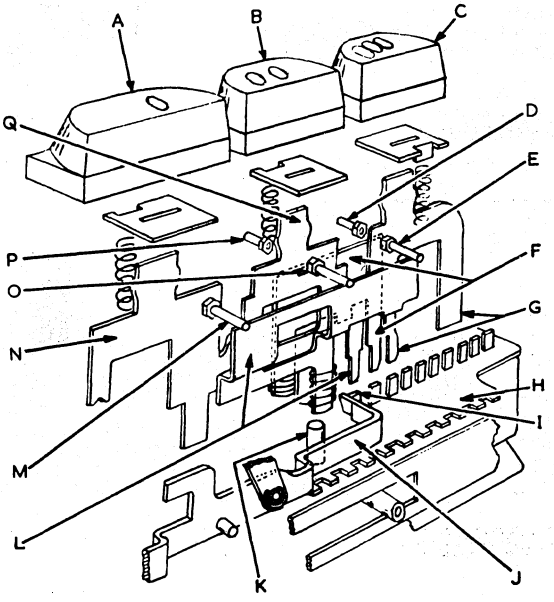


Fig. II-7 View of 1-2-3 Cipher Keystems

Since the first cipher pin I is permanantly fixed it is necessary to tabulate the intermediate keyboard one space prior to depressing any of the cipher keys. When tabulated from the home position post K is moved from beneath keystem L and indexing of any cipher key may take place.

One cipher Key

Depression of the one cipher key A lowers keystem N, and its stud M contacts the front auxiliary keystem L, lowering it and through its lower projection contacts and indexes a regular cipher pin.

Two Cipher Key

Depression of the two cipher key B lowers keystem Q, and its forward stud O contacts and lowers auxiliary keystem L. Simultaneously the rear stud P contacts the rear auxiliary keystem F, lowering it and indexing a second cipher pin to the right of the one being indexed by keystem L. Two cipher pins are therefore, indexed from the depression of the two cipher key B.

Three Cipher Key

Depression of the three cipher key C lowers keystem G. Its forward stud E and rear stud D contact the front and rear auxiliary keystems L and F respectively to index two cipher pins. The lower and rear projection of keystem G contacts and indexes a third cipher pin. Three cipher pins are therefore indexed at the same time from depression of the three cipher bar C.

Escapement of the Intermediate Keyboard

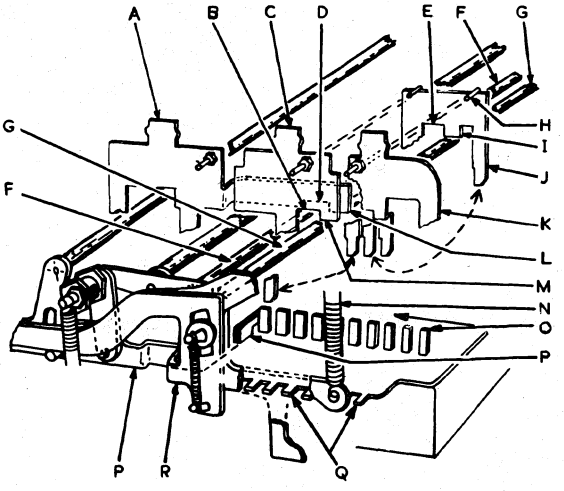


Fig. II-8 Keyboard Escapement 1-2-3 Ciphers

On machines with 1-2-3 Ciphers construction the escapement arm limits on the cipher pins themselves and any attempt to raise the escapement arm while the cipher pin or pins were being indexed would result in uncontrolled escapement. Escapement of the keyboard therefore takes place in two ways.

Depression of a listing key 1 through 9

through its extended arm, contacts shafts F and G. Shaft F raises escapement arm P and shaft G lowers auxiliary pawl R into the teeth of the intermediate keyboard top plate Q. This being standard construction escapement takes place in the normal way.

Depression of the cipher keys has been modified so that shaft F is not contacted by the keystems. This is achieved by cut outs at D and B on the 1 and 2 cipher keystems A and C respectively. The three cipher keystem K through stud H lowers rear auxiliary keystem J which has a cut out at E. Auxiliary pawl R is lowered into the teeth of the intermediate keyboard top plate Q by a projection on the indexed keystem or auxiliary keystem. Keystem A for I cipher key has a projection at L, keystem C for 2 cipher key a projection at M, and rear auxiliary keystem J which is lowered by keystem K for 3 cipher key a projection at I.

When fully depressed the active cipher keystem A, C or J will index I, 2 or 3 cipher pins O. Upon releasing the indexed cipher key the keystem will restore allowing spring N to raise auxiliary pawl R out of the teeth of the intermediate keyboard top plate Q. Tabulation of the intermediate keyboard takes place until escapement arm P is limited by the next cipher pin which has not been indexed.

OPERATION CONTROL KEYS

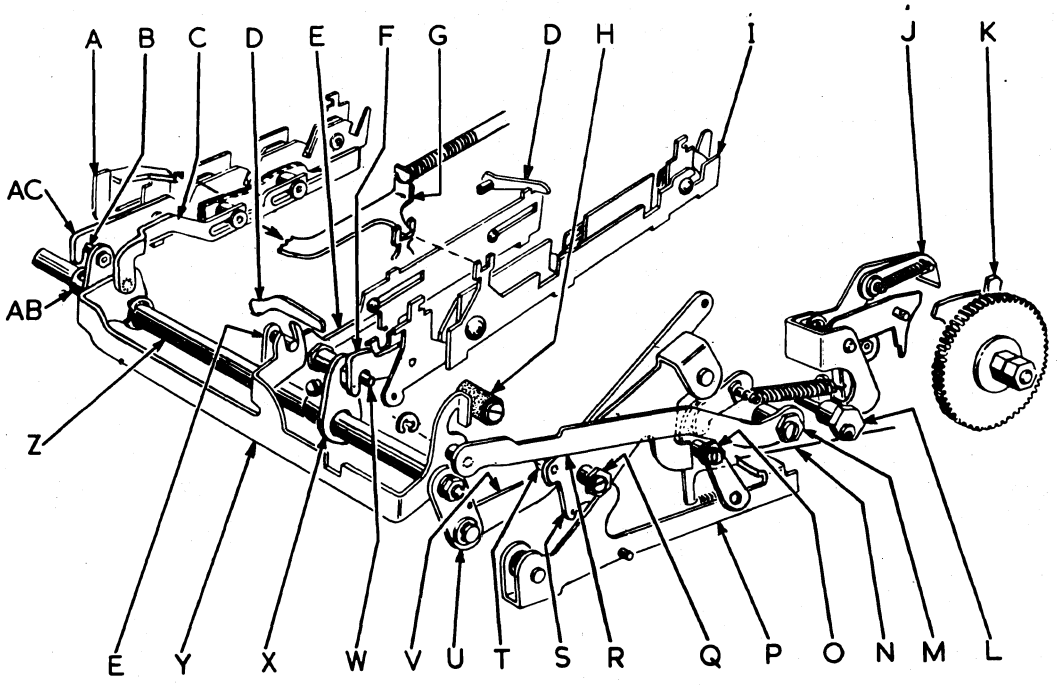


Fig. II-9 Control Key Slides and Drive Trip with Power Driven Interlocks

Operation Controls Keys with Power Driven Interlocks - J600 and J700

Keys operating the machine are arranged to right and left of numeral keys. Depression of a specific operating key on the right moves slide F (Fig. II-9) rearward to block depression of all other keys in the right hand column. The front end of F is forked over eccentric stud W located in the vertical arm X on the right portion of shaft Z. Shaft Z being rotated in a clockwise direction, through arm AB on left side of shaft Z, will move slide AC through eccentric screw B rearward to block depression of keys on left of keyboard. As the left hand control keys are depressed, the vertical finger of slide A contacts front edge of link G which pivots on a stud in front portion of upper keyboard plate, thus moving the left arm of G rearward. The right arm of G has a projection keyed through an extension of slide I - which extends upward through the top keyboard plate - pulling slide I forward to block depression of control keys in right hand column. As shaft Z rotates in a clockwise direction slide V pivoting on a link U keyed to the right hand end of Z is pulled forward. Slide V moving forward releases driver S which is pulled downward by spring tension. Square stud T in driver S engages in the step of slide V to retain the active operation control key depressed. Driver S, moving downwards, through eccentric Q contacts and releases latch P to allow slide N to move rearwards and start the machine operation. This will be covered more fully in the Power Section.

Bail Y pivoting on shaft Z is rocked clockwise by link R which is fastened to right hand side of Y and to the slide N

by eccentric M and screw. Bail Y is forked over stud in forward end of slides C and H thus driving these rearward to block depression of listing keys. Rearward movement of slide C positions it under listing keys 1, 4 and 7 to prevent their depression. The rear of slide H moves under projection of bail D thus preventing depression of keys 0, 2, 5, 8, 3, 6 and 9.

During repeat of machine operations bail Y is rocked rearward, moving interlock slides C and H rearward to block depression of listing keys. The formed lip on the right side of bail Y limiting the rearward travel, through contact with rubber sleeve H preventing slides C and H from limiting on the studs in assemblies A thereby reducing machine noise.

Tests and Adjustments

Note: Before making the following adjustments, position the high side of eccentric posts B and W at twelve o'clock.

1. To ensure uniform key depression and drive trip timing from all operation control keys:

With the 'Power Off' and the control key which gives the least amount of throw on the right side held depressed there should be from .005" to .015" clearance between the step in link V and the square stud T.

To adjust - Position eccentric post W in hub X, keeping the high side of the eccentric upwards.

2. Perform the same procedure as Test 1, but for the operational control keys on the left side.

To adjust - Position eccentric post B in hub AB keeping the high side of the eccentric upwards.

3. To ensure resetting the drive trip mechanisms:

With the motor trip slide N at maximum overthrow position on restoration there should be between .003" to .015" clearance between the bottom of square stud T and the top of link V.

To adjust - Position eccentric O on trip slide N.

4. To ensure trip of the drive:

With an operational control key depressed there should be between .030" to .050" clearance between the lower edge of trip slide N and the top of the formed lip on latch P.

To adjust - Position eccentric Q in driver S.

5.
(a) To prevent hard listing key depression.
(b) To prevent simultaneous depression of a listing key and an operation control key:

With any listing key held depressed, the front finger of escapement bail assembly D should just contact the front side of the cut-out in slide E.

To adjust - Position eccentric M in trip slide N.

6.
(a) To prevent disengagement of the clutch pawl K when the repeat key is held depressed:

(b) To prevent a machine operation when the drive trip is held up through depression of a listing key holding bail Y forward when any operation control key is depressed:

With the drive tripped there should be between .030" to .040" clearance between the underside of clutch dog stop J and the top of clutch pawl K.

To adjust - Rotate eccentric L in trip slide N.

Operation Control Keys- Early Style

Keys operating the machine, including the plus motor bar, are arranged in two columns and actuate slides A and D (Fig. II-10) through camming slots in the slides. Slides A and D fit over eccentric screws H in shaft assembly J which, when rotated by slide movement indexes tripping of the drive mechanism. Consequently with any operation key either partially or fully depressed, slides A and D block depression of any other operation key. This prevents interference between various machine mechanisms while indexing a machine operation and during a machine operation. However, the repeat key and the minus (subtract) key may be depressed at the same time for repeating minus items.

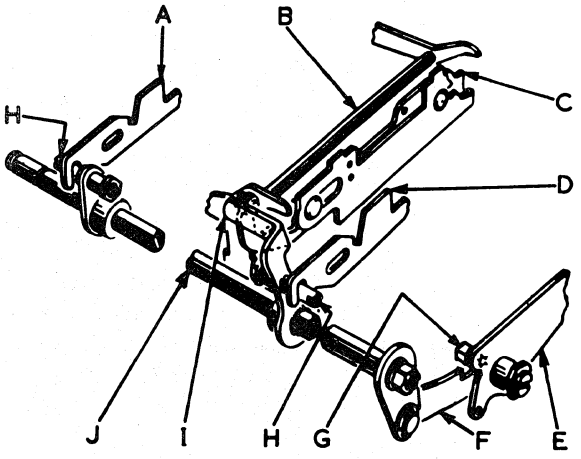


Fig. II-10 Operation Control Key Slides and drive trip. (Early Style).

All operation keys - including the plus bar - are retained, when active, in a depressed position during a machine operation. Depression of an operation control key through slides A or D and shaft J moves link F forward to release driver E. As driver E moves downward to release the drive mechanism, the square stud G in the driver engages a step in link F, holding depressed operation keys from restoring to normal until the end of the machine operation. This ensures indexing and retention of the various mechanisms during a machine operation - as in symbol selecting and subtract indexing.

Slides A and D, through shaft J and arm I position the high surface of slide C under the front and rear extensions of escapement arm assembly B to prevent weaving of the assembly and depression of a listing key during a machine operation. During depression of an operation key, the cam surface of slide C moving rearward ensures complete restoring to normal of the intermediate keyboard escapement mechanism and the listing keys before the machine operation begins. Therefore, the indexed intermediate keyboard stop pins are aligned with the type bars before the machine operation begins.

Tests and Adjustments:

1. To have uniform key depression and drive trip timing when depressing any operation key:

With the power off, fully depress and hold down each operation key on the right side of the keyboard to locate the key which gives the least amount of throw to the right arm I on shaft J. With this key held down, there should be from .005" to .015" clearance between the step on link F and square stud G.

To adjust - Turn eccentric screw H on the right side.

2. Perform Test 1 for the left column of keys.

To adjust - Turn eccentric screw H on the left side.

3. To prevent depression of a listing key during a machine operation:

With the power off and the operation key with the least amount of throw held depressed, slide C should have flush hold under the extensions of escapement assembly B.

To adjust - Weave the wing of arm I.

Totals After Repeat (T.A.R.)

The totals after repeat mechanisms has been incorporated in all Series J machines from serial No. J119992F.

Total after Repeat enables the total and sub-total keys to be depressed immediately following a repeat operation without first clearing the intermediate keyboard. This is achieved by mechanism designed to tabulate the intermediate keyboard half a space at the beginning of the total operation so as to allow the type bars to move between the pin stops. The intermediate keyboard is restored to normal at the end of the total operation.

In order to accomplish this operation a redesign of the keyboard interlocks was necessary, and is explained in detail on pages 14 & 15, Fig. II-13

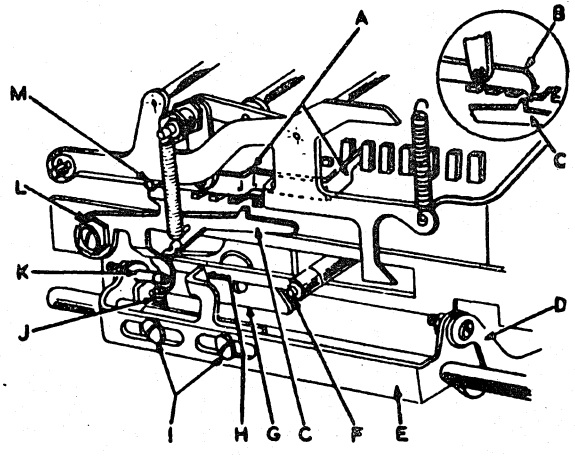


Fig. II-11 Total After Repeat

At the beginning of the total operation link assembly D is driven forward through assembly J, Fig. II-70, Accumulation, Section, Page 63 to operate the shutter lift control bail E. Bail E is rocked raising half escapement pawl C through spring J into the path of the escapement rack of intermediate keyboard. As pawl C is raised it contacts stud M of escapement arm A raising it above the Zero cipher pins which allows the intermediate keyboard to tabulate half a space to limit on pawl C.

The intermediate keyboard shutter G is also raised by bail E releasing the rack bars which allows them to pass between the intermediate keyboard stop pins until they are limited by the wide teeth of the pinions against the carry pawls.

When the intermediate keyboard is fully escaped to the left, it is limited by stud F against lip of limit plate H. The limit arm on the left side frame for the intermediate keyboard being omitted from machine with the T.A.R. feature. On a total operation bail E rocks, allowing lip of limit plate H to clear stud F and allow the intermediate keyboard to escape one half space.

Note: Escapement arm A is fitted to all Series J Machines from serial No. J122074F. On machine from J119992F to J122073F escapement pawl B was fitted. The operationof the T.A.R. being the same except that pawl B is raised out of the escapement rack of the intermediate keyboard.

Tests and Adjustments:

1. To ensure the correct location of the intermediate keyboard when fully escaped to the left.

Index 1 and then 0's to full capacity and manually operate the machine and check that the type bars are centrally aligned with the cipher pin stops.

To adjust - Loosen screws I and move limit plate H as required.

2. To ensure that the rack bars move freely through the intermediate keyboard stop pins during totalling:

Add all 9's, index 1 and then 0's to full capacity and with the line cord removed depress the total key and manually operate the machine and check for equal clearance of the rack bars between the stop pins of the intermediate keyboard.

To adjust - Starting with the high side of eccentric L upward turn as required and tighten securing screw.

3. To ensure correct escapement of the intermediate keyboard on a total operation:

With the machine at normal check for minimum clearance between stud M in escapement arm A and the upper formed ear of half escapement pawl C.

To adjust - Position eccentric post K and tighten securing nut.

Keyboard Interlocks - J500 - J600 - J700

Sliding interlocks located in the operation key columns prevent depression of more than one key in each column at the same time.

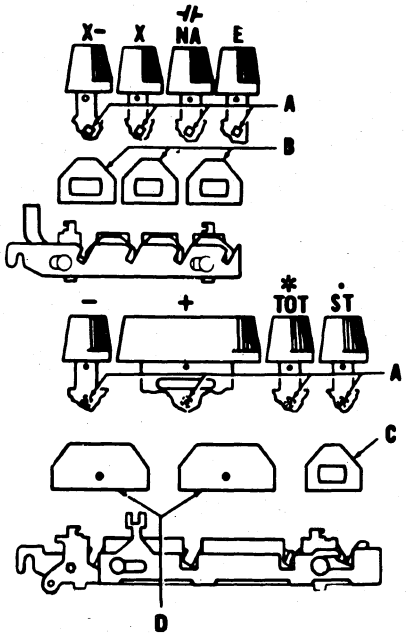


Fig. II-12 Keyboard Interlocks(Late Style)

Interlocks B (Fig. II-12) in the left control column, when contacted by one of the milled studs A in an operation control key, permits the contacting stud to pass downward. However, as there is passage space for only one stud, the other three are blocked from depression.

Interlocks C and D, in the right control column, perform in the same way for the right column operation control keys when contacted by a milled stud A as slides B perform in the left column.

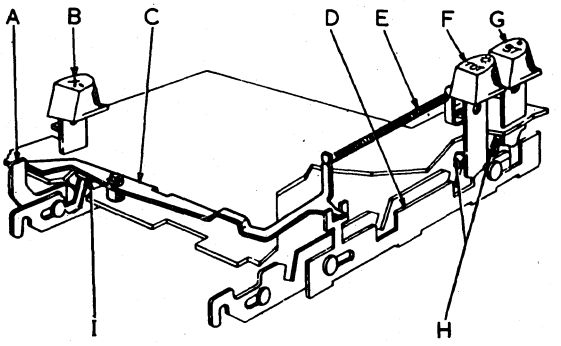


Fig. II-13 Keyboard Interlocks. Totals after Repeat, and Minus Repeat.

Incorporation of the Total after Repeat and Minus Repeat features necessitated a redesign of the keyboard interlocks to safeguard the operation and prevent misoperation.

Interlocks:

1. Enables the total and sub-total keys to be open for depression with an amount entered in the intermediate keyboard.

2. Depression of non-add, repeat or minus repeat key prevents depression of the total key, sub-total key, the plus and minus motor bars.

3. Depression of the total key, sub-total key, the plus or minus motor bars prevent depression of the non-add, repeat or minus repeat keys.

To enable the total and sub-total keys to be depressed with an amount in the intermediate keyboard, the original interlock described in Fig. II-15 has been removed. This enables a total operation immediately following a repeat operation without first restoring the intermediate keyboard.

When the Minus Repeat key B is depressed its square stud I cams locking slide A rearward which in turn pivots link C. Link C which is coupled to locking slide D through its forked projection, moves locking slide D forward to position projections on the slide under the square studs H in the total and sub-total keystems F and G preventing depression of the keys. Plus and Minus bars (not illustrated) are locked in the same manner.

When the total, sub-total keys, plus or minus motor bars are depressed the square studs in the keystems move down into pockets of the locking slide and thus effectively blocking lock slide A. Blocking of Slide A prevents depression of minus repeat key B as its square stud I cannot move down the cam surface. Non-add and Repeat keys (not illustrated) are also blocked in the same manner.

Tests and Adjustments:

Slides should be assembled as shown and have free movement.

Keyboard Interlocks - J200 and J400

Interlocks B (Fig. II-14) - in the left control column - when contacted by one of the milled studs A in an operation control key, permits the contacting stud to pass downward. However, as there is passage space from only one stud, the other two are blocked from depression.

Interlocks C and D - in the right control column - perform in the same way for the right column operation control keys when contacted by a milled stud A as slides B perform in the left column.

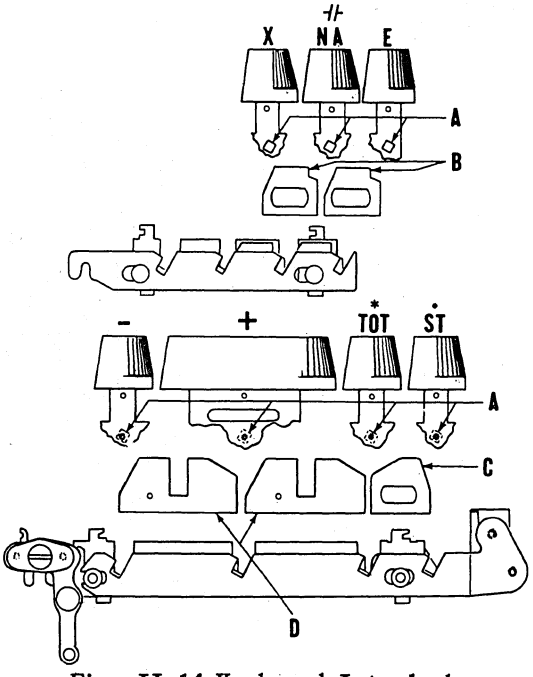


Fig. II-14 Keyboard Interlocks (Early Style)

Tests and Adjustments:

The slides should be assembled as shown and have free action.

Result Keys are Blocked by Partial Depression of a Listing Key - J400 Early Style.

When an amount has been indexed into the intermediate keyboard, depression of the result keys must be prevented. Otherwise, the ensuing result will print an

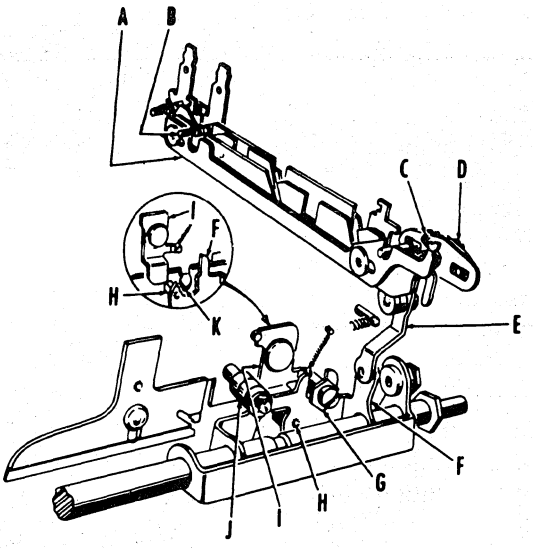


Fig. II-15 Result Keys Blocking Mechanism

amount taken from the indexed stop pins or from the accumulator pinions, whichever has the smaller value. When the smaller value is a stop pin, in a particular column, the difference between the pin and the pinion will remain in the accumulator and the printed result will be short a like amount.

Locking slide A (Fig. II-15) prevents depression of result keys as soon as the intermediate keyboard has made the initial partial escapement from a fully restored position. As the initial escapement of the intermediate keyboard takes place, Pawl I releases stud H-in bail F-and connecting arm E, so that spring C is permitted to move slide A rearward, thereby effectively blocking depression of result keys for as long as the intermediate keyboard is tabulated out of a fully restored position.

As the intermediate keyboard is restored at the end of a machine cycle, roll J moves over the cam surface of bail F, restoring slide A and permitting pawl I to position over square stud H, again holding slide A forward in open position.

When a listing key is depressed and lock slide A is prevented from rearward movement - such as by a partly depressed result key slide A then holds square stud H aligned with lip K. Full escapement of the intermediate keyboard, which would place the indexed stop pin over the first column type bar, is thereby prevented until the locking slide is permitted full rearward movement.

Tests and Adjustments

To ensure blocking of result keys with an amount indexed into the intermediate keyboard.

1. With the machine at home position, there should be approximately .010" passing clearance between studs B, in the result keys, and locking slide A. The clearance may be observed through the opening in the top keyboard plate, along side of the total keystem.

To adjust - Turn eccentric D.

2. With the machine at home position, pawl I should have approximately .020" hold on stud H, and approximately .002" passing clearance with the stud after initial escapement. Excessive hold delays effective blocking of the result keys from listing key depression. Insufficient hold may result in accidental blocking of result keys when no listing key has been depressed.

To adjust - Turn eccentric G.

Remove the keyboard. Remove and replace a keystem. Refer to Section X for removal procedure.

Intermediate Keyboard Limits Type Bars

With the keyboard removed from the machine, the intermediate keyboard is exposed for convenient observation and study. The intermediate keyboard is similar to

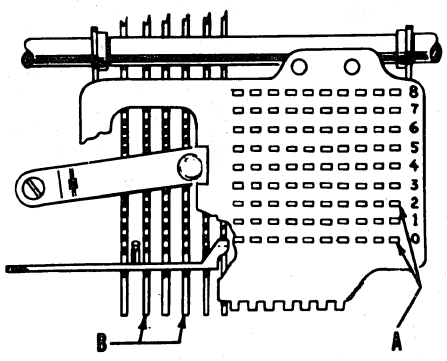


Fig. II-16 Intermediate Keyboard

a full listing keyboard in that it contains either seven, eight or ten columns of pins. In each of these columns are nine stop pins A (Fig. II-16) which, when lowered by depression of a listing key, index figures 0 through 8. The stop pins limit movement of type bars B, each of which includes an adding rack. Since the type bars are usually in non-print position, stop pins are used to index ciphers. When nine is indexed on the listing keyboard, no stop pin is lowered and the type bar moves all the way out to limit on the type bar restoring bail.

Stop Pins

Each row of stop pins across all columns has pins of a different length than those in other rows. The lengths are graduated from the cipher pin which is longest to the eight pin which is the shortest.

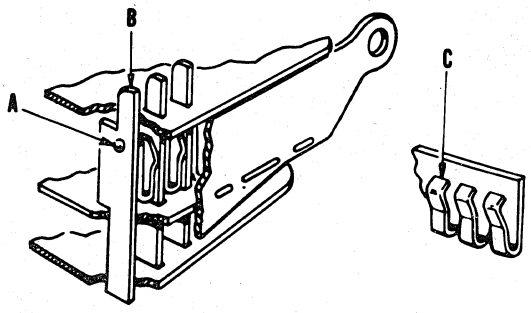


Fig. II-17 Leaf Spring and Stop Pins

Embossing A (Fig. II-17) on each stop pin B contacts an arm of leaf spring C to retain the stop pins in raised position when restored during the machine operation, or when lowered by listing key depression. There are nine leaf springs used in the intermediate keyboard-one for each row of stop pins.

Shutter Holds Type Bars in Non Print Position.

The home position for the intermediate keyboard is toward the right side of the machine over stop pin restoring plate E (Fig. II-18). In this position, type bar blocking shutter G is behind projection F on each of the type bars to hold the type bars in non-print (minus cipher) position except in column one. The offset in the right side of shutter G permits a cipher to print to the left of a figure in the units column - for example. ,01 through .09. If the offset, in shutter G is positioned over any type bar other than that in column two, the respective type bar will be restored to non-print position.

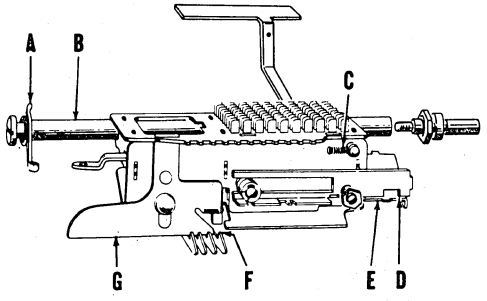


Fig. II-18 Blocking of Type Bars by Shutter

As figures are indexed on the listing keyboard, the intermediate keyboard escapes (tabulates) to the left on shaft B and guide rail D, through the tension of spring C (shown). On later style machines spring C is fitted to the restoring link (Fig. II-20). The escapement of the intermediate keyboard positions the lowered stop pins over the type bars in the columns where amounts are to be printed and accumulated. Shutter G, being a part of the intermediate keyboard, moves progressively to the left out of the path of

the indexed type bars as the indexed stop pins move into position.

When the intermediate keyboard is fully escaped to the left, it limits on adjustable stop A (shown) on early style machines. On later style machines the limit is providedby lip of plate H, (Fig. II-11, Total After Repeat). Stop A prevents movement of the intermediate keyboard beyond the aligned position of the stop pins over the last listing type bar.

During a total operation, shutter G, which contains a vertical slot, is moved upward to release the type bars.

Tests and Adjustments

1. To ensure alignment of the stop pins with the type bars when the intermediate keyboard is escaped to full listing capacity of the machine:

Allow the intermediate keyboard to escape fully to the left and depress an additional listing key. There should be not more than .005" lateral clearance between escapement pawl I (Fig II-2) and the escapement tooth in the upper intermediate keyboard plate.

To adjust - Weave limit arm A.

Restoring the Intermediate Keyboard and Repeat Key Operation (Early Styles)

Towards the end of the machine cycle- after the type bars are fully restored to home position - a cam in the main cam shaft assembly returns the intermediate keyboard to the home position.

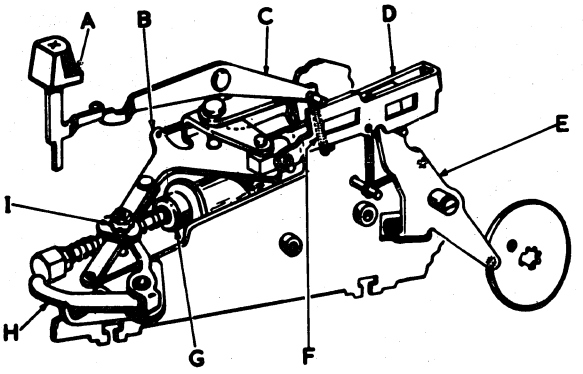


Fig. II-19 Repeat Key and Intermediate Keyboard Restoring.

Link D (Fig. II-19) is pulled rearwards as lever E is actuated by the camshaft assembly. Link D in turn rocks arm assembly B to restore the intermediate keyboard to the right. This movement to the right causes all lowered stop pins to be cammed upward as the intermediate keyboard is moved over restoring plate E (Fig. II-18).

Air cushion G prevents overthrow of the intermediate keyboard when it is returned to normal position. Otherwise, momentum could cause the intermediate keyboard to strike the right side frame, resulting in damage to the intermediate keyboard. The air cushion plunger, in air cushion G is forced into the cylinder through bell crank H as arm assembly B is actuated.

As long as repeat key A (Fig. II-19) is held depressed, the machine will continue to operate. When the repeat key is depressed, the intermediate keyboard restoring mechanism is disabled and remains so as long as the key is held down, and the amount indexed into the intermediate keyboard is accumulated on each machine cycle.

Depression of repeat key A rocks lever

C and through tension of spring F raises link D, above lever E so that actuation of lever E by the cam shaft assembly does not drive link D rearwards to restore the keyboard.

Tests and Adjustments

1. To ensure retaining the indexed amounts in the intermediate keyboard for as many machine operations as are caused by depression of the repeat key:

With repeat key A held depressed, link D should be raised high enough to clear the top of lever E. Insufficient raising of the link may permit full or partial reset of the intermediate keyboard.

To adjust - Bend lever C

2. To ensure restoring of all indexed stop pins to normal home position, without causing the intermediate keyboard to strike the machine right side frame:

Manually operate the machine with the intermediate keyboard escaped to full listing capacity. Near the end of the machine cycle, the intermediate keyboard should be moved only far enough to have the leading corner of the left - most row of stop pins reach maximum restoring movement from contact with the restoring plate.

To adjust Turn eccentric I.

Restoring the Intermediate Keyboard and Repeat Keys Operation (Late Style)

Towards the end of the machine cycle - after the type bars are fully restored to normal position - a cam in the main camshaft assembly returns the intermediate keyboard to normal position.

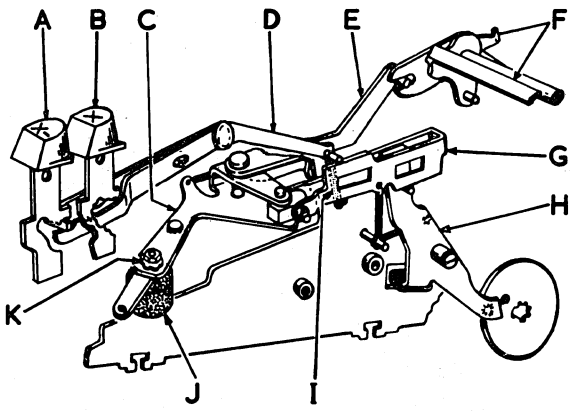


Fig. II-20 Repeat & Minus Repeat Keys and Intermediate Keyboard Restoring.

Link G (Fig. II-20) is pulled rearwards as lever H is actuated by the camshaft assembly. Link G in turn rocks arm assembly C to restore the intermediate keyboard to the right. This movement to the right causes all lowered stop pins to be cammed upward as the intermediate keyboard is moved over stop pin restoring plate E (Fig. II-18).

Rubber bumper J prevents overthrow of the intermediate keyboard when it is returned to normal position. Otherwise, momentum could cause the intermediate keyboard to strike the right side frame, resulting in damage to the intermediate keyboard. The rubber bumper J limits against the adding section side frame and cushions the intermediate keyboard assembly.

As long as the repeat key B (Fig. II-20) or the Minus Repeat Key A is held depressed the machine will continue to operate. When the indexed repeat key is depressed, the intermediate keyboard restoring mechanism is disabled and remains so as long as the key is held down, and the amount indexed into the intermediate keyboard is added or subtracted on each machine cycle.

Depression of repeat keys A or B rocks lever D and through spring tension of spring I raises link G above lever H so

that actuation of lever H by the camshaft assembly does not drive link G rearward to restore the keyboard.

Lever E also rocked by depression of repeat keys A and B rocks bail F to index the adding, subtracting and printing controls. These are described in detail in the Printing and Accumulation Sections.

Tests and Adjustments:

1. To ensure retaining the indexed amounts in the intermediate keyboard for as many machine operations as are caused by depression of the repeat key:

With repeat keys A or B held depressed, link G should be raised high enough to clear the top of lever H. Insufficient raising of the link may permit full or partial reset of the intermediate keyboard.

To adjust - Bend lever D.

2. To prevent overthrow of the minus repeat mechanism on a snap depression of the key.

With Minus Repeat Key A held depressed check for .003"-.008" clearance between rear lip of bail F and the top edge of machine left side frame.

To adjust - Bend lip up or down as required.

3. To ensure restoring of all indexed stop pins to normal home position, without causing the intermediate keyboard to strike the machine right side frame:

Manually operate the machine with the intermediate keyboard escaped to full listing capacity. Near the end of the machine cycle, the intermediate keyboard should be moved only far enough to have the leading corner of the left most row of stop pins reach maximum restoring movement from contact with the restoring plate.

To adjust - Turn eccentric K.

Note:

On machines with 1-2-3 cipher construction, test 3 is as follows:

Remove rubber bumper. List 1 and all ciphers. Manually operate the machine until maximum restoration has been reached and check for the leading edge of the left most pin (the last pin to be restored) to be located just above the forming of the restoring plate (as shown in Fig. II-21) and for the pin to be fully restored.

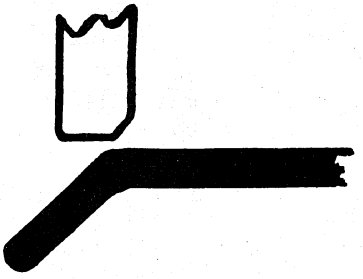


Fig. II-21 Intermediate Keyboard Restoring 1-2-3 Ciphers.

To adjust - Turn eccentric K.
Replace rubber bumper.

Remove the machine base and the intermediate keyboard. Refer to Section X for removal procedures.

Error Key Restores the Intermediate Keyboard.

Depression of the error key blocks the type bars, disables the paper spacing pawl and trips the drive. As during any listing machine operation, except during a repeat operation, the intermediate keyboard is restored to home and any indexed stop pins are reset. The use of a machine cycle to restore the intermediate keyboard provides a nearly effortless means for the operator to correct errors made when listing amounts into the intermediate keyboard.

Depression of the error key lowers bail B (Fig. II-22) behind projection C of the type bars to retain the type bars in minus cipher (non-print) position and thus prevents printing and accumulation of erroneously listed amounts.

Rocking of bail B also holds paper feed pawl A clear of the platen feed ratchet gear so that no blank space will be left between printed amounts on the paper tape.

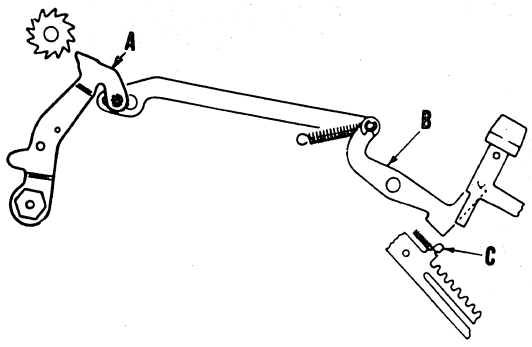


Fig. II-22 Error Key Non-Spacing

Tests and Adjustments

To ensure blocking of type bars and non spacing of the platen during an error key operation-

1. Bail B should have flush to .015" more than flush hold on all type bars with error key latched down.

To Adjust - Square the bail by bending to provide uniform and ample hold.

2. Feed pawl A should be held forward with approximately .010" clearance of the space ratchet gear during a correction operation.

To adjust- Shorten the link between pawl A and bail B. Note: The stud in space pawl A must be free in the slot of the link to bail B. Align the link by weaving.

Cipher Block Mechanism - J400 - J500
J600 - J700

The method used for printing is such that any type aligned with the platen, at the time it is raised, will cause printing to take place. Therefore, it is necessary to lower those type bars from which no print is desired, such as ciphers to the left of an indexed amount. This function is performed by the cipher block mechanism in the following manner:

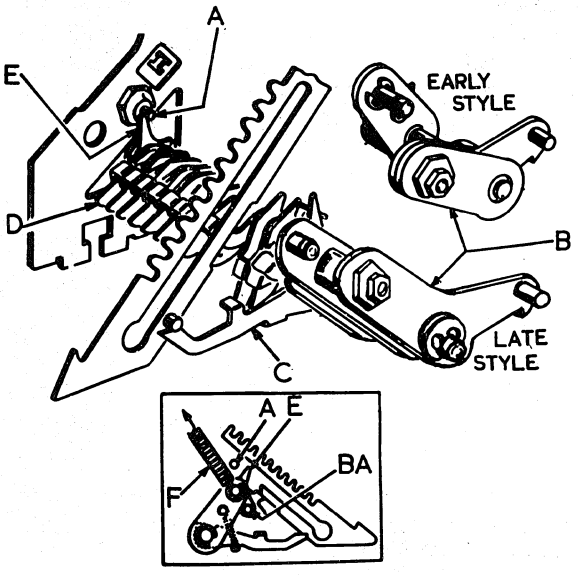


Fig. II-23 Cipher Block Relation to Type Bar

With the machine at home position, the top end of arm E (Fig. II-15) limits against stud A in the side frame while its lower extension forks over stud BA in the leftmost restoring arm D. A rearward formed lip in each arm D in turn overlaps the arm D to its right, so that the tension of spring F, holding the cipher block assembly rearward against stud A, tends to hold all arms D downward against the tension of the torsion spring inside the 'U' form of each arm D. The restoring arms are thus held away from the type bars during the early part of the machine cycle to ensure free travel of the type bars to indexed limits.

During a blank listing cycle, all type bars except the first one are blocked in non-print position by the shutter on the intermediate keyboard. The first bar, because of the offset in the shutter, travels to cipher position. After the type bar limiting portion of the cycle has been completed cipher block assembly B is driven counterclockwise so that arm

E leaves stud A permitting the front extension of arms D to raise under the tension of their respective springs. The 'U' form of arms D enter the cutouts in the underside of the type bars, and as the cipher block assembly continues its movement, the first type bar is driven back to non-print position by arm D in the first column.

When a stop pin is indexed into the intermediate keyboard in column one, the offset cipher extension of the shutter is moved to column two, and during the machine cycle, the type bar in column one moves until limited by the indexed stop pin. Arm D in column two having a longer front extension than the other arms is engaged by latch C in column two.

During the counterclockwise movement of the cipher block assembly, the two bars are permitted to remain in printing position, column two at cipher and column one at the indexed stop pin, as latch C holds arms D depressed and clear of the type bars in those two columns.

When mixed amounts and ciphers (90703) are indexed across the intermediate keyboard, the type bars with ciphers indexed will remain at cipher position to print because arms D in those columns will be held away from the type bars by the overlapping tails of the restoring arms D immediately to the left.

During a total or sub-total cycle, the type bar blocking shutter is raised clear of the type bars which are then limited by the wide teeth of the adding pinions against the carry pawls. In the same manner as when listing, arms D to the left of an amount are permitted to engage the step in type bars limited at cipher and to return them to non-print position, while the latches in the amount columns, including columns with ciphers to the right of a digit, will be held downward to permit printing.

On a clear total or sub-total operation columns one and two are permitted to remain at the cipher position and print a two cipher clear signal. Arm D in column two having a longer front extension than the other arms is engaged by latch C holding arm D in column two clear of the type bar. As previously explained, column one will also remain at non-print by the overlapping tail of restoring arm immediately to the left in column two.

Tests and Adjustments

1. To ensure restoring of type bars to non-print position when no print is required and to ensure free indexing of type bars to printing position when printing is required.

Overall end play of restoring arms D in the pivot shaft frame should be within a range of .005" to .008" and each arm should align centrally with its respective type bar.

To adjust - Open or close the 'U' form of the arms.

2. Restoring arm D column two should contact centrally on the lip of latch C.

To adjust - Weave latch C, close to its pivot, as required.

3. With left type bar restored by cipher block mechanism, remaining type bars at 9 position and aligning blade fully engaged there should be .003" to .006" clearance between the front of the spring anchor projection of the left-most type bar and the aligning blade.

To adjust - Rotate eccentric in part B.

Cipher Block Mechanism - J200

The method used for printing is such that any type aligned with the platen at the time it is raised will cause printing to take place. Therefore, it is necessary

to lower those type bars from which no print is desired, such as ciphers to the left of an indexed amount. This function is performed by the cipher block mechanism in the following manner:

With the machine in normal position, the top end of arm E (Fig. II-24) limits against stud A in the side frame while its lower extension forks over stud BA in

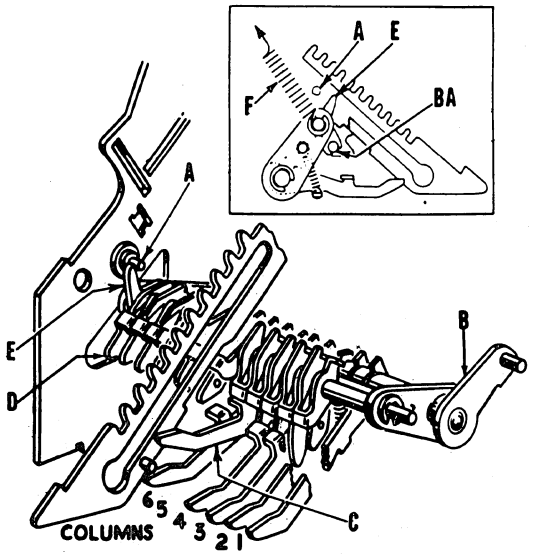


Fig. II-24 Cipher Block Relation to Type Bar.

the leftmost restoring arm D. A rearward formed lip in each arm D in turn overlaps the arm D to its right so that the tension of spring F holding the cipher block assembly rearward against stud A tends to hold all arms D downward against the tension of the torsion spring inside the 'U' form of each arm D. The restoring arms are thus held away from the type bars during the early part of the machine cycle to ensure free indexing travel of the type bars.

Early in each machine cycle, the cipher block assembly makes a slight clockwise movement - observed from the right side of the machine - to increase the passing clearance of the formed lips in latches C in front of the forward extensions of arms D. During the machine cycle when a type bar moves rearward beyond the minus-cipher limit of the type bar blocking shutter G (Fig. II-18) the respective latch C follows, under its spring tension, and is limited by the stud in the type bar, or until the type bar has travelled far enough to let the lip of latch C contact the 'U' form of arm D in its respective column.

During a blank listing cycle, all type bars except the first one are blocked in minus-cipher position by the shutter. The first bar, because of the offset in the shutter, travels to cipher position. As the type bar advances, latch C in the first column follows upward but not far enough to engage arm D in the first column. After the type bar limiting portion of the cycle has been completed, cipher block assembly B is driven counterclockwise so that arm E leaves stud A permitting the front extension of arms D to raise under the tension of their respective springs. The 'U' form of arms D enter the cutouts in the underside of the type bars, and as the cipher block assembly continues its movement, the first type bar is driven back to minus cipher (Non-print) position by arm D in the first column.

When a stop pin is indexed into the intermediate keyboard in column one, the offset cipher extension of the shutter is moved to column two, and during the machine cycle, the type bar-in column one-moves until limited by the indexed stop pin. When the type bar in column one moves beyond cipher position, latch C moves up to block the forward extension of arm D. Arm D in column two having a longer front extension than the other arms is also engaged by latch C in column two even though the type bar travelled only to cipher position. During the counter-clockwise movement of the cipher block assembly, the two bars are permitted to remain in printing position, column two at cipher and column one at the indexed

stop pin, as latches C hold arms D depressed and clear of the type bars in those two columns.

As ciphers and amounts are indexed in other columns across the intermediate keyboard, the effect is the same as the preceding action with the addition that when a type bar is indexed in any column, with other type bars to the right limited at cipher position, latch C in the indexed column, by holding arm D clear of the type bar, will also hold all arms D to the right of that column clear of their respective type bars, thereby permitting ciphers to print to the right of the indexed column. This is because of the overlapping lips of restoring arms D.

Note: The Basic purpose of latches C in columns to the left of columns one and two is to hold arms D clear of indexed type bars during the counterclockwise movement of the cipher block assembly, thus avoiding accidental movement of an indexed type bar by the respective restoring arm D. During a total or subtotal cycle, the type bar blocking shutter is raised clear of the type bars which are then limited by the wide teeth of the adding pinions against the carry pawls. In the same manner as when listing, arms D to the left of an amount are permitted to engage the step in type bars limited at cipher and to return them to non-print (minus cipher) position, while the latches to the right of the amount, including columns with ciphers, will be held downward to permit printing, totalling and sub-totalling.

Tests and Adjustments

To ensure restoring of type bars to minus cipher (non-print) position when no print is required and to ensure free indexingof type bars to printing position when printing is required-

1. Overall end play of restoring arms D in the pivot shaft frame should be within a range of .005" to .008" and each arm should align centrally with its respecttive type bar.

To adjust- Open or close the 'U' form of the arms.

2. Restoring arms D should contact centrally on the lip of their respective latches C.

To adjust- Weave latch C, close to its pivot.

Styles J209 Through J214

Machines constructed prior to serial No. J77596F (France) contain the following keyboard control mechanism, due to different construction of earlier machines.

Motor Bar and Subtract Key Interlock

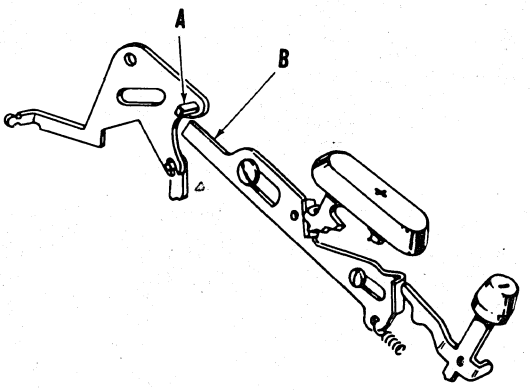


Fig. II-25 View of Interlock for Motor Bar and Subtract Key.

Slide B and stud A (Fig.II-25) prevent indexing of more than one accumulator function at the same time. Simultaneous depression of either the minus key or plus bar and a result key is prevented. The slide, which is located under the

keyboard on the right side frame, slides rearward under the stud when actuated by the plus bar or minus key. The slide is blocked when the result keys are depressed as stud A is lowered into the path of slide B.

Result Keys Actuate Intermediate Keyboard Shutter

During a total operation, all type bars must be permitted to move rearward until limited by the wide teeth of the accumulator pinions contacting the blocked carry pawls. Therefore, shutter E (Fig. II -26) which normally is in position to block the type bars, must be raised at the beginning of a total operation.

Depression of either result key lowers stud A which causes bail C to be rocked through lever B. Bail C in turn actuates bail D to raise the shutter until the shutter is limited in the front plate of the intermediate keyboard.

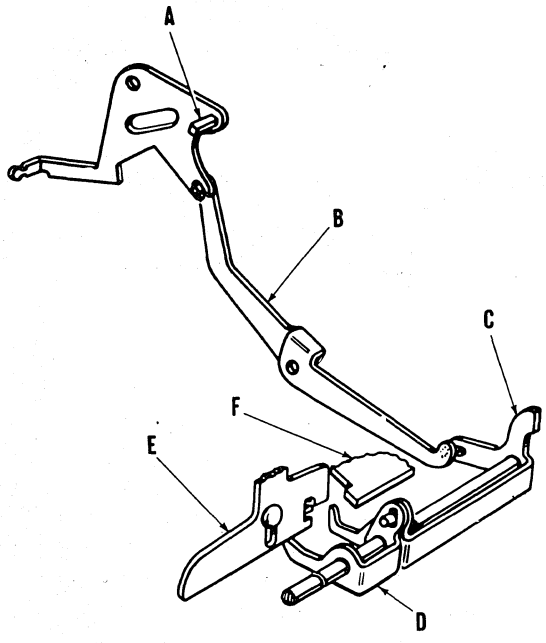


Fig. II-26 Keyboard Shutter Actuated From Result Keys.

To prevent incorrect limiting of the type bars, the result keys are blocked against depression when figures are indexed on the intermediate keyboard. If the intermediate keyboard has escaped to the left one column or more, depression of either result key is blocked as the left end of bail C limits under base plate F of the intermediate keyboard.

Review

1. From what source are machine operations indexed?

2. During the indexing of an amount from a listing key, when does escapement of the intermediate keyboard take place?

3. How is each indexed stop pin placed in proper sequence to provide the desired printed amount?

4. If the intermediate keyboard is too far to the right so the stop pins are not in line with the listing keys, how is depression of a listing key blocked?

5. During a machine operation, depression of a listing key is blocked by what mechanism?

6. In what way does depressing an operation key after a listing operation cause full escapement of the intermediate keyboard before the machine operation begins?

7. What means is used to prevent depression of the total or sub-total keys when the intermediate keyboard is escaped from normal position?

8. Name two basic functions of operation keys.

9. How is simultaneous depression of more than one control key in each control column prevented?

10. In addition to the stop pins, what other part of the intermediate keyboard limits the type bars?

11. What restores indexed stop pins to normal?

12. How is depression of the error key kept as light as other control keys?

13. How is restoring of stop pins to normal prevented by depression of the repeat key?

14. How are ciphers prevented from printing to the left of an amount?

15. At the beginning of each machine operation, the cipher block restoring arms are lowered. Why?

16. If $300.00 is added into the machine, which cipher block or blocks must be latched?

17. During a machine operation in which $94.81 is printed, when and how are the cipher block restoring arms released by the latches?

For convenience when operating the machine during study of the next subjects (Carriage, Printing and Power) it may be desirable to replace the intermediate and listing keyboards.

NON-CLEAR FEATURE

SERIES J1600 and J1700 ONLY

The purpose of the Non-Clear feature is to prevent the restoration of the indexed amount during a Total or Sub-Total operation. This is accomplished by depressing the Non-Clear (NC) key simultaneously with a Total or Sub-Total key. The Non-Clear (NC) key must be manually held depressed, since it is not a latch-down key.

Non-restoration of the Intermediate Keyboard

When the NC key C (Fig. II-26-1) is depressed, keystem E is moved down, rocking bail L thru stud D. The pivoting action of bail L causes its left arm to rock lever B by raising stud A, which is attached to the rear of lever B. Lever B is similar to the normal control lever used in all Series J machines for repeat of the intermediate keyboard. Its length has been extended and stud A added, so as to permit its actuation by the NC bail. Lever B (Fig. II-26-1) raises intermediate keyboard restoration rocker link G (Fig. II-20) upwards thru the action of spring I (Fig. II-20). Therefore, the intermediate keyboard will not be restored during a cycle when the NC key is held in a depressed position.

Latching of the NC Key

The Non-Clear (NC) key is a non-machine operating, indexing key. It is latched down only during a machine operation when depressed simultaneously, and manually held depressed with a Total or Sub-Total key.

If only the NC key is depressed and then released, nothing will be changed in the next normal machine operation.

When the NC key is depressed simultaneously with a Total or Sub-Total key and manually held depressed, the normal interlocking slide J (Fig. II-26-1) moves rearward, and through spring G, latching slide F follows. Spring G is attached between slide F and slide H. Slide H is riveted to interlocking slide J. The rearward movement of latching slide H causes its rear portion to rest over stud K in the NC keystem E, latching the key until interlocking slide J is normally released at the end of the machine cycle. Spring

G acts as a yielding connection, in case the NC key is depressed after the machine cycle has started. The yielding action of spring G prevents parts from being damaged by the end of latching slide F interfering with stud K in the Non-Clear keystem E.

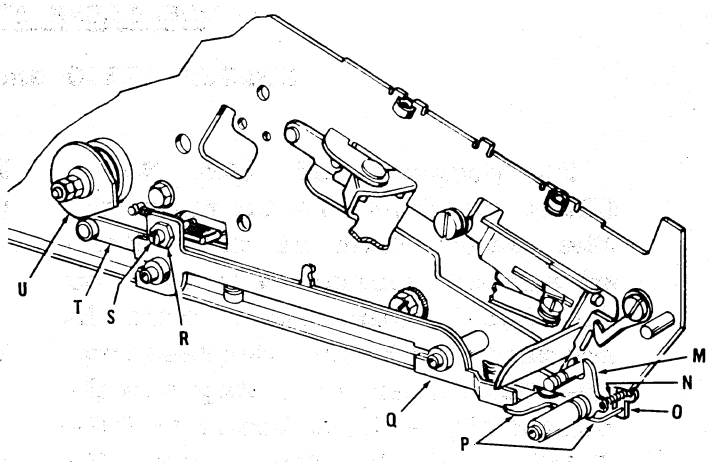


FIG. II-26-2
NON-RESTORATION OF INTERMEDIATE KEYBOARD

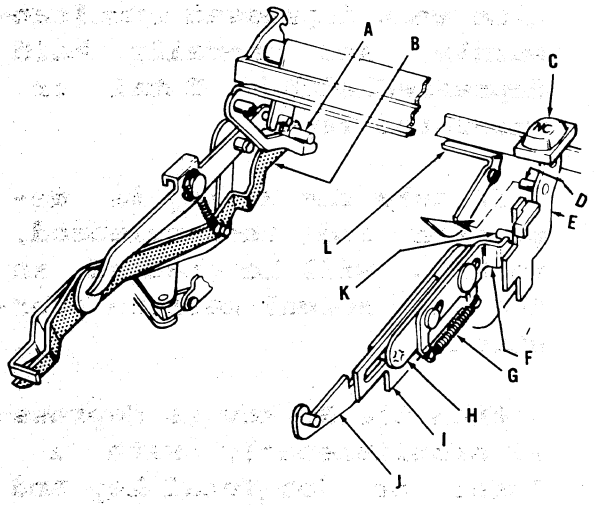


FIG. II-26-1
KEYBOARD CONSTRUCTION and OPERATION

Back Spacing of Intermediate Keyboard

With the simultaneous depression of the NC key and a Total or Sub-Total key, the intermediate keyboard is moved a half step to the left at the beginning of the machine cycle, thru the action of the "Total After Repeat Mechanism".

The Non-Clear mechanism prevents restoration of the intermediate keyboard during the same machine cycle. The normal function of the intermediate keyboard would be to escape a half step more to the left at the end of the cycle, thru the action of its driving spring, but is prevented by the action of Cam U (Fig. II-26-2), Slide T, and Bellcrank P.

It is necessary to move the intermediate keyboard a half step back to the right (after the type bars have been restored on the Sub-Total or Total operation), to have the intermediate keyboard correctly located in relation to the type bars.

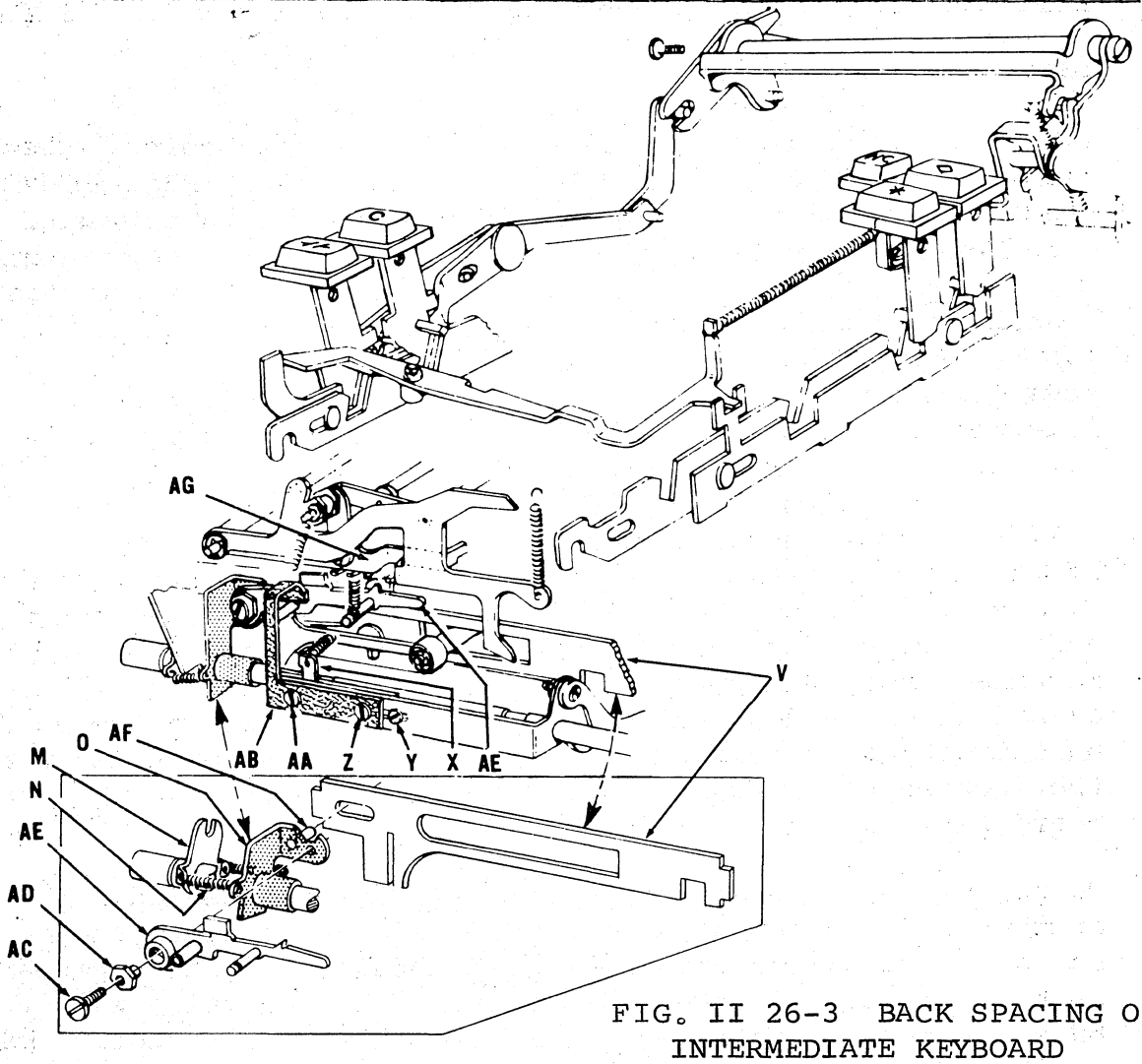


FIG. II 26-3 BACK SPACING OF INTERMEDIATE KEYBOARD

Backspacing of Intermediate Keyboard

After the restoration of the typebars has taken place, cam U (Fig. II-26-2) moves NC cam-slide T forward. Slide T is connected to NC actuating-slide Q thru eccentric R, which moves slide Q forward. When actuating-slide Q is moved forward, it contacts bellcrank P which in turn moves slide O (Fig. II-26-2 and II-26-3) to the right. Slide O supports intermediate keyboard half escapement limit AE (Fig. II-26-3), which is also moved to the right.

Intermediate keyboard half escapement limit AE, being engaged into the front teeth of the intermediate keyboard, moves the latter to the right far enough for the normal escapement pawl AG of the intermediate keyboard to fall in place 1/2 step back, placing the intermediate keyboard in exactly the same place it was before the Total-Sub-Total machine operation.

Tests and Adjustments

1. To insure a correct function of the "Total After Repeat" mechanism, on machines with Non-Clear mechanism.

Add all 9's in the accumulator and index the listing keys for full capacity of the intermediate keyboard. Bring sliding brace O (Fig. II-26-3) at normal, with its limit roller AF contacting the edge of the elongated slot in rail V. Depress the Sub-Total key and manually operate the machine until all type bars are fully raised. All type bars must move freely between the indexed intermediate keyboard pins.

To adjust - Turn eccentric AD on the half escapement arm AE, so as to equalize clearance on both sides of the type bars, keeping the highpoint of the eccentric upward.

2. To insure a correct function of the Non-Clear mechanism.

List an amount in the intermediate keyboard. Simultaneously depress the NC and Sub-Total keys. While holding the NC key depressed, manually operate the machine by hand. Slightly before Non-Clear cam U (Fig. II-26-2) is at its high point, escapement pawl AG (Fig. II-26-3) should drop down between the intermediate keyboard pins, from Total After Repeat position, to normal position.

To adjust - Adjust eccentric R (Fig. II-26-2), on non-clear slides.

3. To have a correct limit of the intermediate keyboard with full capacity, and to insure a correct function of the "Total After Repeat" mechanism on machines with Non-Clear mechanism.

a. Index intermediate keyboard completely to the left. The heels of the type bars must face centrally with the feet of the intermediate keyboard pins.

b. With the machine at normal, there should be minimum clearance of the upper cam-surface of arm O (Fig. II-26-3) under the stud in the normal escapement pawl AG.

To adjust - Loosen screws Y, Z, and AA (Fig. II-26-3).

a. Move adjustable limit X, and tighten screw Y.

b. Move adjustable limit AB and tighten screws AA and Z.

CARRIAGE

Paper Holder - J600-J700 with J(F) Motor

The paper holder is supported by two forked extensions over a tie shaft between the machine side frames and by posts F (Fig. II-27). The holder is adjustable laterally to align in correct relationship to the carriage, and is held aligned with retaining nuts E and lock nuts D.

The holder will accomodate a roll of paper 2 1/4" wide and approximately 3 1/2" in diameter, with shaft J supporting the roll to permit reeling the paper through the carriage. Shaft J is retained in the holder by retaining arms under spring tension that yield to pressure for installing or removing the paper roll.

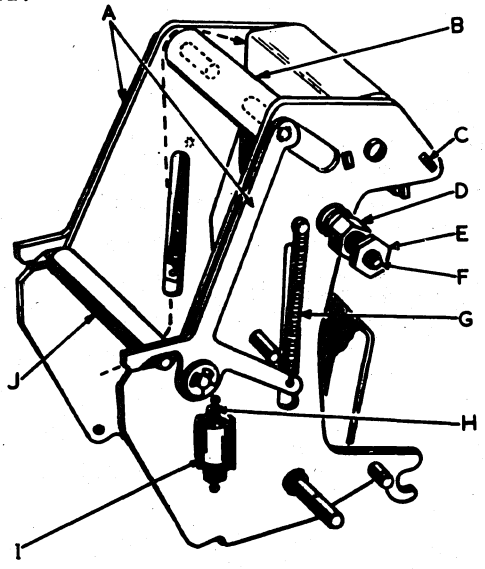


Fig. II-27 Paper Holder J600-J700

As the paper leaves the bottom of the roll, it travels forward and upward, following the dotted line on the inner surface of the holder, then over roller B, downward and around the platen and again upward behind plastic tear-off blade C.

Straight paper feeding is provided by pressure roller I through spring H, applying pressure against the side of the roll paper to ensure controlled unrolling and uniform alignment of the paper. As a result of the tension from pressure roller I, there may be times when the paper is left taut which tends to increase the power needed to overcome the inertia to start paper feed during the next machine operation. This tendency is more pronounced during multiple spacing (5/6") from total operation.

In order to provide a slight amount of slack at the start of the paper around the platen, the paper is threaded over metering roller B before being fed between the platen and pressure rolls. Further feeding of the paper after it is taut causes springs G, in arms A, to expand momentarily. As the spacing is completed or as the inertia of the paper roll is overcome, springs G recover with enough force to cause sufficient additional unrolling of the paper to leave needed slack for the next operation.

Tests and Adjustments.

To provide straight and uniform feeding of the paper:

1. The inner surface of the right side of the paper holder should be flush with the inside surface of the right carriage end plate.

To adjust - Position the paper holder laterally, then lock in position with nuts D and E.
Next, remove the paper holder.

Paper Holder - J200-J400, J600-J700 Early style

The paper holder has the same basic specifications as the J600-J700 holder. The holder is supported over a tie shaft between the machine side frames and by posts F (Fig. II-28). Lateral adjustment

is made by retaining nuts E and lock nuts D.

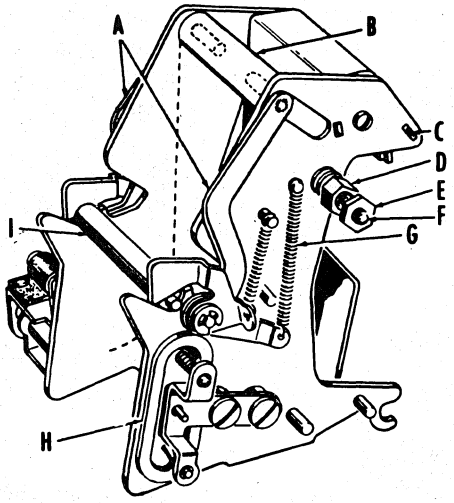


Fig. II-28 Paper Holder (Early Style)

The roll paper is supported by shaft I. Paper leaves the bottom of the roll, following the dotted line on the inner surface of the holder, over metering roller B, under and around the platen and up behind the plastic tear-off blade C.

Straight paper feeding is provided by pressure plate H against the side of the roll paper. Metering roller B and springs G ensure that sufficient slack paper feed is available at all times.

Tests and Adjustments

To provide straight and uniform feeding of the paper:

1. The inner surface of the right side of the paper holder should be flush with the inside surface of the right carriage end plate.

To adjust- Position the paper holder laterally, then lock in position with nuts D and E.

Paper Holder J500-J514

The paper holder like the other styles is supported by shafts F (Fig. II-29) and over a tie shaft. Lateral adjustment is made by retaining nuts E and lock nuts D.

The roll paper is supported by shaft G. Paper leaves the bottom of the roll, following the dotted line on the inner surface of the holder, under and around the platen and up behind the plastic tear-off blade.

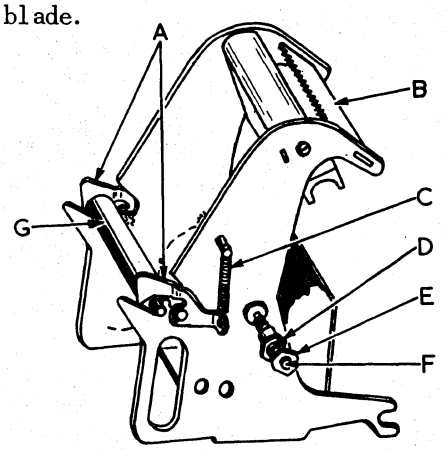


Fig. II-29 Paper Holder J500

J500 machines being without 5/6" spacing no metering roll is fitted.

Tests and Adjustments

To provide straight and uniform feeding of the paper:

1. The inner surface of the right side of the paper holder should be flush with the inside surface of the right carriage end plate.

To adjust- Position the paper holder laterally, then lock in position with nuts D and E.

Next, remove the paper holder.

Platen Spaces as Carriage Restores.

The carriage, which contains platen A (Fig. II-30) serves the dual purpose of providing a printing surface for the type and spacing the paper 1/6" during each machine operation - except during total and error correction operations. Total operations space the paper five spaces instead of one. Error correction operations prevent paper spacing.

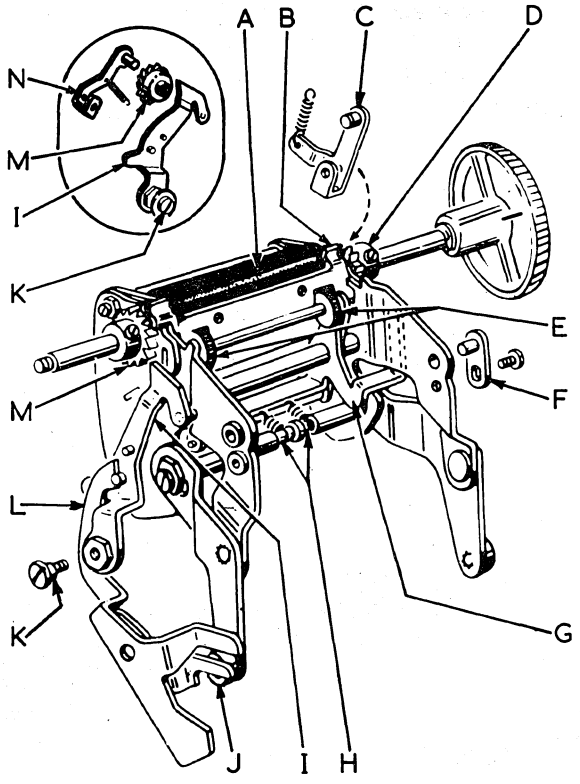


Fig. II-30 Platen Spacing

The paper, as it passes around the platen, feeds between the platen and knurled steel pressure rolls E and shield B. The pressure rolls ensure the paper being advanced the distance that is established by platen rotation. The pressure rolls are under tension of springs H which are mounted between the pressure rolls to equalize tension to the rolls, thereby applying uniform tension to both edges of the paper. The pressure rolls may be released manually through depression of a release button in the machine case, or release lever which lowers lever G.

Toward the end of the first half of a machine cycle, a cam in the camshaft assembly raises the carriage, which pivots on studs F, to apply platen pressure against the type faces that were positioned earlier in the cycle through machine functional control. With the paper tape around the platen - and the inked ribbon between the paper and the type - the pressure applied by the platen against the type causes an impression of the indexed amount to be left on the tape.

During the last half of the machine cycle, the carriage actuating cams, in the camshaft assembly permit the carriage to recede under spring tension to its normal position. As the carriage is lowered, a tooth of space wheel M contacts the top of space pawl I causing the platen to advance one space. The platen is retained from unintentional rotation between spacing operations by the roll in detent C seating in one of the tooth spaces of detent wheel D.

After spacing has taken place and as the carriage nears its restored position, arm L - also controlled by a cam in the camshaft assembly - moves over left carriage actuating roll J to ensure that the carriage is fully restored to normal position. Arm L also moves space pawl I from space wheel M so that the platen may be turned manually in either direction with machine normal.

Platen Detent J500 (Late Style)

Late style J500 machines have detent arm C and wheel D omitted. Detent arm N (Fig. II-30) is fitted to the left carriage side frame and through its roll seating in the teeth of space wheel M controls the platen from unintentional rotation.

Tests and Adjustments

Note: The following Tests and Adjustments should be performed after Tests and Adjustments, Printing, Section II, Page 36 have been made first.

Instruction

- Position eccentric K at mid-point
- Rotate the platen in order to have the cup screw in detent wheel D at the top.
- Slacken cup screw in detent wheel D.

Machines with detent C:

1. (I) To ensure positive platen spacing.
(II)To ensure positive platen detenting.

With full capacity indexed, manually operate the machine until arm L allows space pawl I to enter and contact the teeth of space wheel M. Check for .005"-.010" entering clearance between the top of space pawl I and the bottom of the tooth on space wheel M above it.

To Adjust - (I) Turn eccentric K.
(II) Tighten cup screw in detent wheel D.

Continue manual operation until the machine reaches printing position and check again for .005"-.010" entering clearance between the top of space pawl I and the tooth of gear M.

Machines with detent N.

1. To ensure positive platen spacing:

With full capacity indexed, manually operate the machine until arm L allows space pawl I to enter and contact the teeth of space wheel M. Check for .005"-.010" entering clearance between the top of space pawl I and the bottom of the tooth on space wheel M above it.

To adjust - Turn eccentric K.

Continue manual operation of the machine until printing position is reached and recheck for .005"-.010" entering clearance of single space pawl I and the tooth of space wheel M.

2. To provide free turning of the platen when the machine is normal:

With the machine at normal, space pawl I should clear the teeth of space wheel M by .010".

To adjust - Bend the rearward extension of arm L.

5/6" Spacing Total Key Controlled (Late Style).

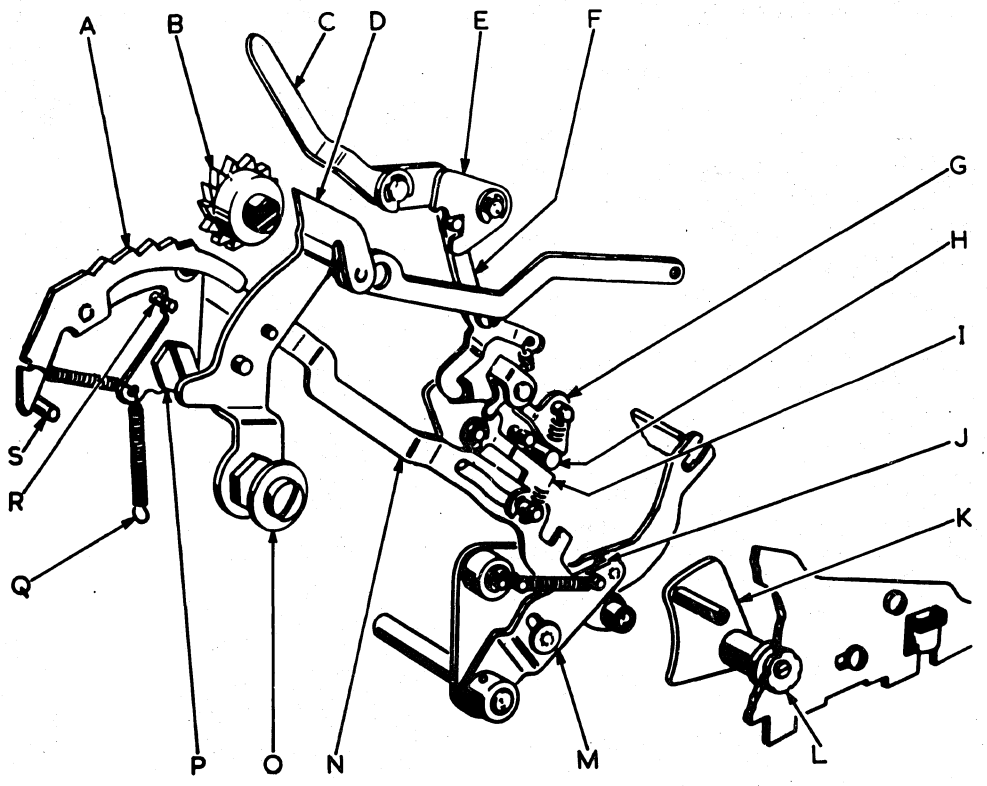


Fig. II-31 Spacing From Total Key

Total Key Controlled 5/6" Form Spacing (Late Style) on machines after serial No. J202620F.

Normal form spacing from each machine operation except total operations is one space of 1/6". Total operations provide five spaces (5/6"). These additional spaces automatically advance the printed total to a position above the serrated edge of the tear-off blade, making unnecessary manual advancing of the paper before tearing off the completed tape listing. The mechanism contains a normalizing lever for inactivating the multiple spacing when only a single (1/6") space is required from a total operation.

The 5/6" spacing mechanism is controlled from the accumulator through screw stud H (Fig. II-31) in the left end of the accumulator pinion shaft. Selector arm G above and selector arm I below stud H are interlocked so that raising arm G lowers arm I and vice versa. When the accumulator is in neutral position, both arms G and I contact stud H.

Link assembly N, which is pivoted at its rearward end on shoulder screw P, is supported at the forward end by a stud in the lower portion of arm I through a slot in the link. Therefore, when the accumulator is in neutral position, the front end of link N is raised, and when the accumulator is meshed with either set of adding racks, the link is lowered. The only time the step in the forward end of link N is synchronized to latch stud J, to provide power for the 5/6" spacing mechanism, is during the total operations.

During non-add operations, the accumulator remains in neutral position at the start of the machine cycle, With arms G and I against stud H holding link N elevated, stud J limits against the front side of the projection of link N, inactivating driver arm M throughout the cycle.

Link N is engaged by stud J at the midpoint of a total operation and, as the cycle is completed, the link is carried forward moving spacing pawl A (part of link N) into mesh with the teeth of ratchet wheel B. The first space of the five spaces is performed simultaneously with space pawl D and space pawl A, and the additional four spaces are performed by pawl A only, giving five spaces in all.

When the machine cycle is nearly completed, a roll in the front end of link N contacts the cam surface of disengaging plate K, lowering and disengaging link N from stud J. Link N is then free to restore under tension of spring Q to its normal rearward position against stud R (on the carriage side frame). The rear end of spacing pawl A limits at normal on stud S (on the paper holder side frame) preventing interference between the teeth of spacing pawl A and the teeth of ratchet B.

5/6" spacing is inactivated by moving normalizing lever C forward which lowers detent E to place the stud in lever F in the rear pocket of the detent E. When the stud of lever F is in the rearward pocket of detent E, the lower rearward extension of lever F contacts the bent over lip of arm I and separates arms G and I, lowering the front end of link N.

Tests and Adjustments

To ensure full 5/6" platen spacing from a total operation:

Note: Before beginning tests and adjustments to ensure full 5/6" spacing, check the following:

a. The platen should be aligned so that a uniform impression will be provided from both the top and the bottom of the type.

To Adjust - Turn eccentric shaft A (Fig. II-34 Printing Section).

b. Pressure of the platen against the type should be sufficient to provide a satisfactory print (be sure ribbon still has a

good supply of ink) and should be uniform at both ends of the platen.

To Adjust - Turn right and left eccentrics I (Fig. II-34, Printing Section) as required.

✓ Instruction

- Position eccentric O at mid-point.
- Rotate platen to have the cup screw in detent wheel D (Fig. II-30) to the top.

c 1) To ensure positive platen detenting.
2) To ensure positive platen spacing.

With full capacity indexed, manually operate the machine to printing position. Check for .005" to .010" entering clearance between the top of space pawl D and the bottom of the tooth of gear B. When the machine restores the platen should rotate one space and detent C (Fig. II-30) should rest between 2 teeth of detent wheel D.

1) Manually operate the machine until single spacing pawl D (Fig. II-31) contacts spacing wheel B. Loosen cup screw in detent wheel D (Fig. II-30) and turn platen back until the tooth of spacing wheel B (Fig. II-31) rests on the top of spacing pawl D. Tighten cup screw.

2) Continue to operate the machine to printing position. Check clearance between the top of spacing pawl D and bottom of tooth in space wheel B. Rotate eccentric O to obtain .005" to .010" clearance.

Test 1 : To ensure correct 5/6" spacing on total operations with lever C rearward and to provide overthrow limit.

Depress total key and manually cycle the machine. The space wheel B should rotate five teeth. To prevent overthrow, segment A should release when the sixth tooth of the space wheel comes within .005" to .010" of the upper surface of segment A. After segment A disengages, detent C (Fig. II-30) should locate the platen in normal position and rest in the middle of the fifth tooth on detent wheel D.

To Adjust - Rotate eccentric L (Fig. II-31).

5/6" Spacing Total Key Controlled (Early Style)

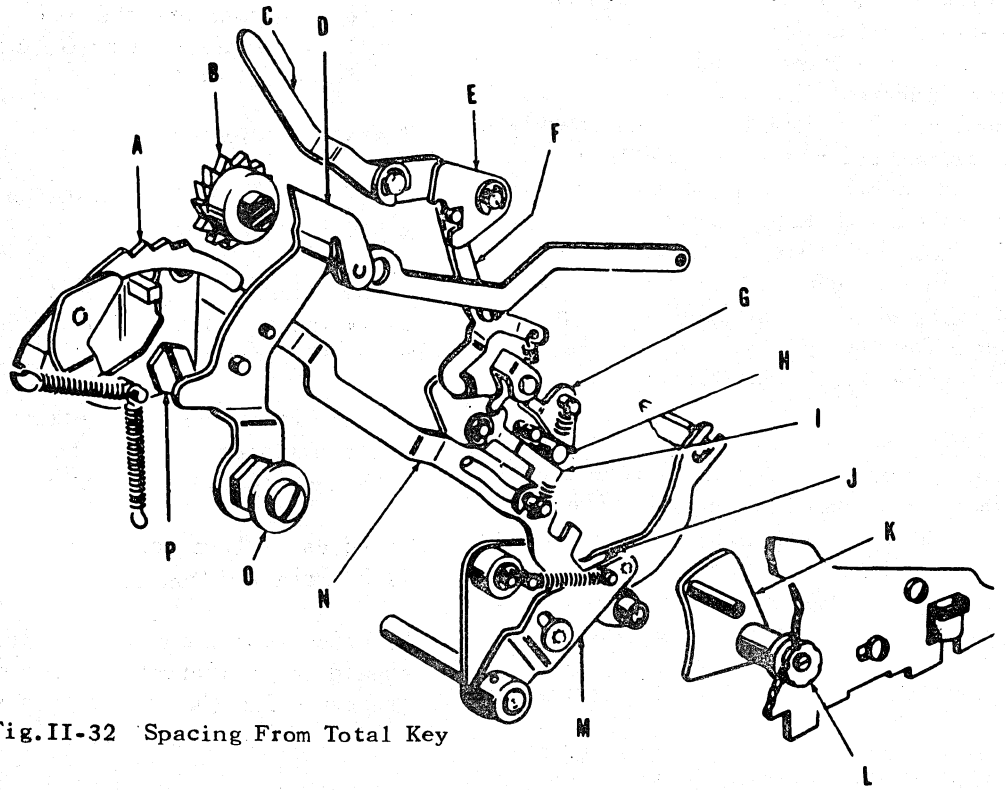


Fig. II-32 Spacing From Total Key

Total Key Controlled 5/6" Form Spacing (Early Style) on machines before serial No. J202620F.

Normal form spacing from each machine operation except total operations is one space of 1/6". Total operations provide five spaces (5/6"). These additional spaces automatically advance the printed total to a position above the serrated edge of the tear-off blade, making unnecessary manual advancing of the paper before tearing off the completed tape listing. The mechanism contains a normalizing lever for inactivating the multiple spacing when only a single (1/6") space is required from a total operation.

The 5/6" spacing mechanism is controlled from the accumulator through screw stud H (Fig. II-32) in the left end of the accumulator pinion shaft. Selector arm G above and selector arm I below stud H are interlocked so that raising arm G lowers arm I and vice versa. When the accumulator is in neutral position, both arms G and I contact stud H.

Link assembly N, which is pivoted at its rearward end on shoulder screw P, is supported at the forward end by a stud in the lower portion of arm I through a slot in the link N. Therefore, when the accumulator is in neutral position, the front end of link N is raised, and when the accumulator is meshed with either set of adding racks, the link is lowered. The only time the step in the forward end of link N is synchronized to latch stud J, to provide power for the 5/6" spacing mechanism, is during total operations.

During non-add operations, the accumulator remains in neutral position at the start of the machine cycle. With arms G and I against stud H holding link N elevated, stud J limits against the front side of the projection of link N, inactivating driver arm M through the cycle.

Link N is engaged by stud J at the midpoint of a total operation and, as the cycle is completed, the link is carried forward, moving pawl A into mesh with the teeth of spacing ratchet wheel B. The first space of the five spaces is performed with space pawl D in the same manner as 1/6" spacing when listing. As the space from pawl D is completed, each tooth, of the four teeth on spacing pawl A, performs an additional space of the platen - five in all.

When the machine cycle is nearly completed, a roll in the front end of link N contacts the cam surface of disengaging plate K, lowering and disengaging link N from stud J. Link N is then free to restore under spring tension to its normal rearward position.

5/6" spacing is inactivated by moving normalizing lever C forward which lowers detent E to place the stud in lever F in the rearward pocket of the detent. When the stud of lever F is in the rearward pocket of detent E, the lower rearward extension of lever F contacts the bent over lip of arm I and separates arms G and I, lowering the front end of link N.

Tests and Adjustments:

To ensure full 5/6" platen spacing from a total operation:

Note: Before beginning tests and adjustments to ensure full 5/6" spacing, check the following:

a. The platen should be aligned so that a uniform impression will be provided from both the top and the bottom of the type.

To adjust - Turn eccentric shaft A (Fig. II-34, Printing Section).

b. Pressure of the platen against the type

should be sufficient to provide a satisfactory print (be sure ribbon still has a good supply of ink) and should be uniform at both ends of the platen.

To adjust - Turn right and left eccentrics I (Fig. II-34) Printing Section) as required.

Instruction

- Position eccentric O at mid-point
- Rotate the platen in order to have the cup screw in detent wheel D (Fig. II-30) to the top
- Slacken cup screw in detent wheel D

c (I) To ensure positive platen spacing.
(II) To ensure positive platen detenting.

With full capacity indexed, manually operate the machine until space pawl D is allowed to enter and contact the teeth of space wheel B. Check for .005"-.010" entering clearance between the top of space pawl D and the bottom of the tooth on space wheel B above it.

To adjust - (I) Turn eccentric O
(II) Tighten cup screw in detent wheel D (Fig. II-30)

Test 1. To ensure a correct 5/6" spacing on total operations with normalizing lever C rearwards:

Depress total key and manually cycle the machine. The space wheel B should rotate through five teeth. Simultaneously, spacing sector A should release from the space wheel B as the roller falls into the middle of the fifth tooth on the detent wheel D (Fig. II-30).

To adjust - Rotate eccentric L.

Detent Guards Five Spaces from Total Operations.
on machines before serial No. J202620F.

Overthrow caused by the driving action of pawl J (Fig. II-33) which could result in a partial, or an additional, space during total operations, is prevented by locking space wheel E after five spaces with detent stud D.

✓ Machines after serial No. J202620F with 5/6" spacing mechanism, shown in Fig. II-31, have the detent guard mechanisms omitted. On these machines overthrow limit is provided by the upper surface of the spacing pawl blocking the space wheel after five spaces have been made.

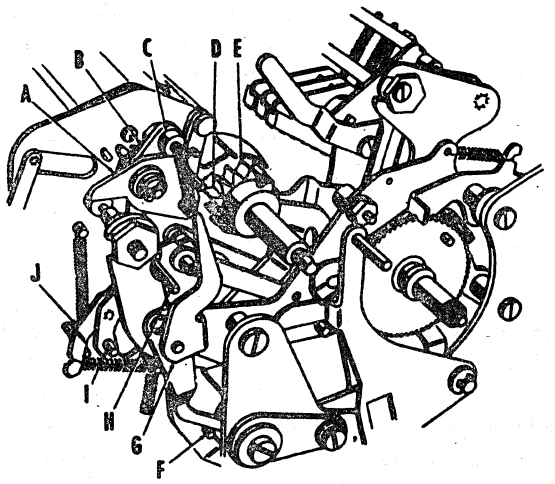


Fig. II-33 5/6" Spacing

Forward movement of the 5/6" driving link raises stud I in the assembly to contact the foot of arm B which contains stud H. Movement of arm B raises cam A and drives stud D into a tooth space in space wheel E, effectively preventing further turning of the wheel.

After printing takes place and as the carriage is lowered to normal, stud F is moved forward, rocking lever G, which in turn through contact with stud H restores arm B to normal and permits stud D to also restore under spring tension.

Tests and Adjustments:

To ensure against spacing more than five spaces during total operations:

All form spacing adjustments must be on test before testing for detent action.

1. Manually cycle the machine through a total operation. StudD should have slight rubbing contact with the last tooth of wheel E before entering the fifth tooth space, and cam A should be driven upward so studis just over the cornerof the cam.

To adjust - Turn eccentric C.

Note : Over-adjustment of eccentric C may cause a lock-up of the machine as the carriage is restored.

Review:

1. How is an impression of type transmitted to the paper tape?
2. What prevents excessive unrolling of paper from the paper roll?
3. How is the inertia of the paper roll prevented from retarding paper feeding?
4. Why is 5/6" form spacing not obtainable on sub-total operations?
5. Why is it desirable to avoid heavy printing impressions?

Printing

Printing is Obtained by Upward Movement of the Carriage

Printing is accomplished by raising the carriage assembly against indexed type during each machine operation. An impression of the indexed amount is made on the paper as the platen presses the paper and the inked ribbon against the type bars.

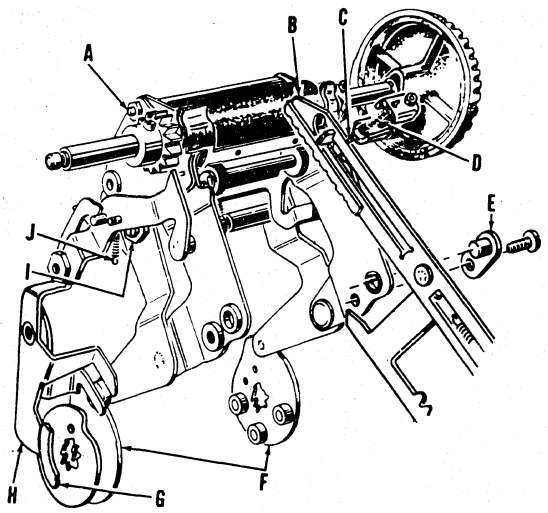


Fig. II-34 Carriage Assembly Actuations

Power to actuate the carriage is transmitted by cams F (Fig. II-34) rotating under rollers in the lower arms of the carriage side frames. The carriage, suspended on right and left studs E between the accumulator side frames, swings in an arc as it moves up to printing position from the driving action of the cams. Right and left springs J, attached between the carriage side frames and the paper holder, restore the carriage to normal as the rollers in the carriage side frames descend from the high points of the actuating cams.

Arm H ensures full restoring of the carriage after printing has taken place. After the indexed figures are printed and the high points of cams F move away from the rolls in the carriage side frames auxiliary cam G rocks arm H. The upper forward projection of arm H moving downward contacts the roll in the left carriage side frame to enforce full carriage restoring.

Each type bar B is located under its cushion pin C. The pins are held downward toward the type bars by compression springs D. Placement of a pin and spring over each type bar provides individual and uniform pressure to each bar during printing, resulting in uniform density of print in each column.

Tests and Adjustments

To ensure uniform and readable printing of indexed amounts:

Note: When installing a carriage in which eccentrics I have not been adjusted to the machine, the high side of the eccentric should be at the top i.e. the punch mark at twelve o'clock. If the high part of the eccentric is at the bottom and the machine is operated, a bind may be caused between the platen and the type and could cause damage to the machine parts.

1. The platen should be aligned so that a uniform impression will be provided from both the top and the bottom of the type.

To adjust - Turn eccentric shaft A.

2. Uniform pressure should be exerted to all type bars as the platen is pressed against the type which are indexed into printing position.

To adjust- Equalize minority columns with majority columns by installing longer or shorter pins C.

3. Pressure of the platen against the type should be sufficient to provide a satisfactory print (from a ribbon in which the ink supply has not been exhausted) and should be uniform at both ends of the platen.

Note: Excessive pressure will place undue strain on the type bars, and will exhaust the ink from the ribbon at an excessive rate, producing a blurred print.

To adjust- Turn right and left eccentrics I.

Note: Changing the adjustment of either eccentric I may disturb the adjustment of the platen space pawl and 5/6" spacing sector. Re-check the first test under Carriage, Fig. II-30, Platen Spaces as Carriage Restores.

Aligning Blade Assures Printing Alignment

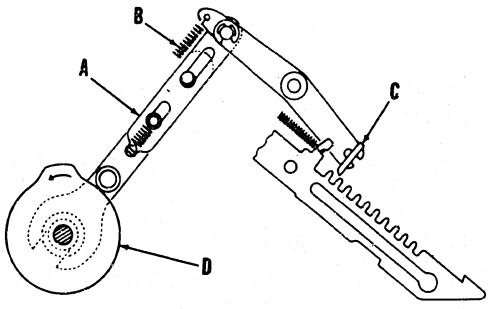


Fig. II-35 Aligning Blade Actuation

Just prior to taking an impression of the indexed type, the type bars are cammed forward slightly by type bar aligning blade C (Fig. II-35).

This prevents placing any strain on the stop pins in the intermediate keyboard during the printing operation and aligns all type for straight horizontal alignment of printed amounts.

Aligning blade C is driven into mesh with the teeth in the upper forward surface of the type bars by cam D. Drive arm A contains a yielding connection that avoids damage to parts if a type bar should accidentally block the aligning blade. As the high point of cam D moves from under the roll in drive arm A, spring B lowers the arm to disengage the aligning blade from the type bars. Aligning blade C is placed in the machine with the chamfered edge rearward to provide easier camming action of the blade against the type bar teeth, and to afford later engagement of the blade with the teeth after the type bars are indexed and earlier release of the blade from the teeth before the restoring action of the type bars begins.

Tests and Adjustments

To obtain a satisfactory print from the symbol type bar:

1. With the minus key depressed, manually cycle the machine until aligning blade C is fully seated. There should be very slight or no pull back of the symbol bar.

To adjust - Weave bail E, Fig. II-36

Symbol Printing - Controlled from
Result and Operating Keys - Late Style
For Machines with Totals After Repeat and Minus Repeat Mechanism

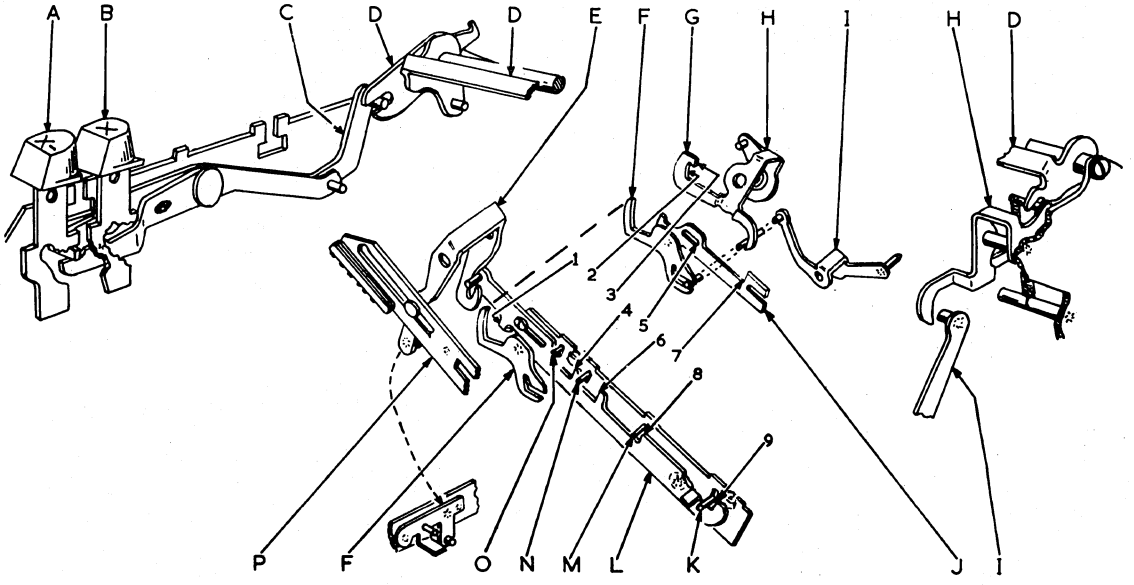


Fig. II-36 Symbol Printing (Late Style).

Symbol printing is controlled by limiting the rearward travel of slide L (Fig. II-36). Slide L is connected to symbol type bar P through bail E and positions the type for correct symbol printing during any machine operation that permits slide Lto index from its normal position. Indexing of the slide and symbol bar during each kind of machine operation is performed in the following manner:

Plus Motor Bar depression lowers stud M to block indexing movement of slide L by contact with limit projection 8. In as much as the slide remains in restored position, no symbol is printed.

Subtract Key depression lowers stud K to limit movement of slide L by contact with limit projection 9.

Plus-Total Key depression lowers stud N to limit movement of slide L by contact with limit projection 6.

Minus Total Key depression requires auxiliary slide J in conjunction with slide L. The automatic one bail, when actuated by a change in the nature of the amount in the accumulator pinions, indexes the subtract mechanisms and through lever I raises the rearward hook portion of lever F (part of slide J) into the pathof index limit 1 in slide L. Stud N in the total key, being in a lowered position, limits the travel of auxiliary slide J and slide L by contact with limit projection 7.

Plus Sub-Total Key depression lowers stud O to limit rearward movement of slide L by contact with limit projection 4.

Minus Sub-Total Key depression requires auxiliary slide J in conjunction with slide L. The automatic one bail, when actuated by a change in the nature of the amount in the accumulator pinions, indexes the subtract mechanism and through lever I raises the rearward hook portion of

lever F (part of slide J) into the path of index limit 1 in slide L. There being no limit projection in auxiliary slide J for the sub-total key limit 1 of slide L drives auxiliary slide J until the latter is limited by slot limit 5 in auxiliary slide J.

Non-Add Key depression does not limit slide L. Therefore, slide L will move rearward during the machine cycle until limited by the blank on the symbol bar against the rearward type bar guide.

Repeat Key depression requires auxiliary bellcrank H in conjunction with slide L. Repeat key B, through lever C and bail D, rocks bellcrank Hto raise its rear formed ear Gto block movement of slide L by contact of limit 3 with limit 1. In as much as the slide L remains in a restored position, no symbol is printed.

Minus Repeat Key depression requires auxiliary bellcrank H in conjunction with slide L. Minus repeatkey A, through lever C and bail D, rocks bellcrank H to raise its rear formedear G still further. Slide L moves rearward until limit 1 contacts limit 2 which corresponds to the subtract key limit.

Tests and Adjustments

1. To ensure printing the correct symbol when the minus repeat key is depressed:

With the minus repeat key depressed, limit 1 should limit at position 2 on formed ear G.

To adjust - Bend bail D as required.

Symbol Printing - Controlled From Result and Operating Keys - Early Style J200 - J400

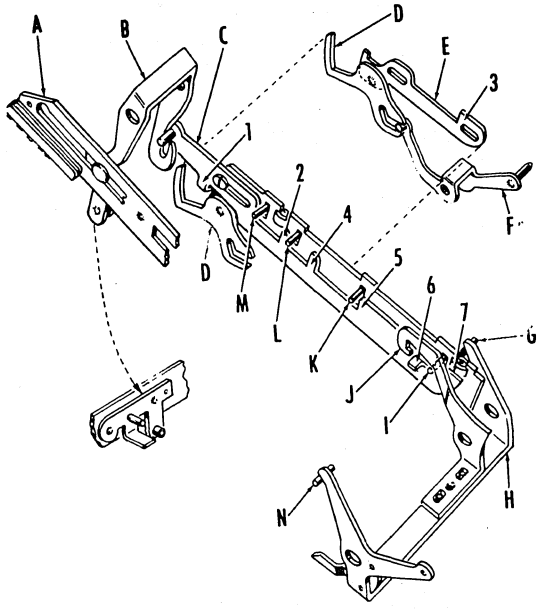


Fig. II-37 Symbol Printing (Early Style)

Symbol printing control is simplified and improved by limiting of control slide C (Fig. II-37) against a result or control key when the key is indexed to cause a machine operation. A meansis also provided to effectively control symbol printing when result and control keys are used in combination.

Slide C is connected to symbol type bar A through bail B and positions the type bar for correct symbol printing during any machine operation that permits slide C to index from its normal position. Indexing of the slide and symbol bar during each kind of machine operation is performed in the following manner:

Plus Motor Bar depression lowers stud K to block indexing movement of slide C by contact with limit projection 5. In as much as the slide remains in restored position, no symbol is printed.

Subtract Key depression lowers stud I to limit movement of slide C by contact with limit projection 7.

Plus Total Key depression lowers stud L to limit movement of slide C by contact with limit projection 4.

Minus Total Key depression requires auxiliary slide E in conjunction with slide C. The automatic one bail, when actuated by a change in the nature of the amount in the accumulator pinions, indexes the subtract mechanism and through lever F raises the rearward hook portion of lever D - part of slide E - into the path of index limit 1 in slide C. Stud L, in the total key, being in a lowered position, limits the travel of auxiliary slide E and slide C by contact with limit projection 3.

Plus Sub-Total Key depression lowers stud M to limit rearward movement of slide C by contact with limit projection 2.

Minus Sub-Total Key depression requires auxiliary slide E in conjunction with slide C. The automatic one bail, when actuated by a change in the nature of the amount in the accumulator pinions, indexes the subtract mechanism and through lever F raises the rearward hook portion of lever D - part of slide E - into the path of index limit 1 in slide C. There being no limit projection in auxiliary slide E for the sub-total key, lip 1 of slide C drives auxiliary slide E until the latter is limited by the slots in auxiliary slide E.

Non-Add Key depression does not limit slide C. Therefore, slide C will move rearward during the machine cycle until limited by the blank on the symbol bar against the rearward type bar guide.

Multiplying Key depression lowers stud N and permits bail H to lower until limited by stud G in the subtract key. With bail H limited in this position, step J blocks movement of slide C by contact with limit projection 6 and no symbol is printed.

Subtract and Multiplying Keys, when depressed simultaneously, lowers both studs I and N far enough to align the pocket above limit step J with limit projection 6 so that slide C will index to print the minus symbol.

Tests and Adjustments

To ensure positive indexing of the correct symbol with the item being printed:

Limit step J should align centrally with the limit projection 6.

To adjust - Loosen the retaining screw which holds step J to bail H. Position the step and retighten the screw.

Symbol Printing Interlock - Result Key Controlled - Early Style

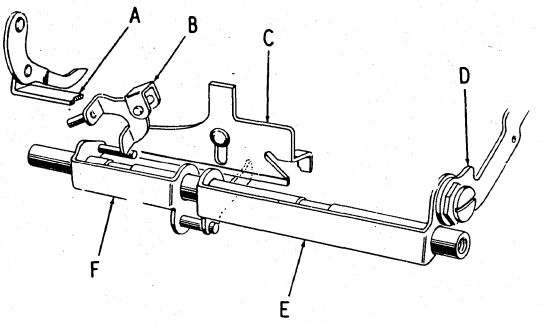


Fig. II-38 Result Key Symbol Printing Interlock

Safeguarding of correct symbol printing from result keys is accomplished with bail E (Fig. II-38) and interlock B if, inadvertently, the multiplying key is depressed simultaneously with a result key.

Depression of a result key indexes link D so that during the machine cycle, shutter C is raised to permit indexing of type bars. As bail E is rocked to raise the shutter, bail F raises interlock B far enough to contact the rearward foot of bail A. Interlock B, when raised, prevents bail A from lowering enough to block limit 6 of slide C (Fig. II-37) with arm J, thereby permitting the correct symbol to print.

Symbol Printing - Controlled from Repeat Key - Series J600 and J700 For Machines After Serial No. J230362F

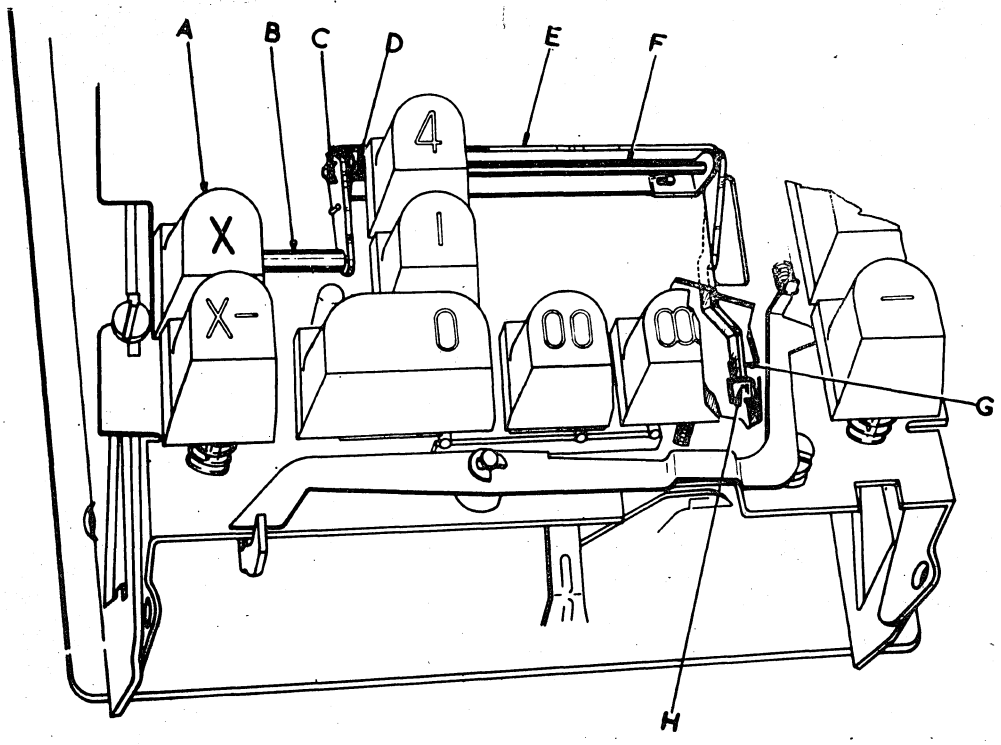


Fig. II-38-1 Repeat Key Symbol Printing

An improved symbol indexing slide limit, which operates from the Repeat Key, improves the functioning of the machine. Depression of Repeat key gives a more direct limit to the symbol slide to hold it in non-print position.

The new limit improves machine function and prevents -

1. Indexing of subtract mechanism due to the overthrow of subtract bail D (Fig. II-36) following snappy repeat key depression.

2. On Series J700 machines it allows freer operation of multiplying slide for multiplying keys 6 thru 9 as the new mechanism enables spring tension on the subtract indexing lever to be reduced.

Operation

When repeat key A is depressed, the bottom of keytop lowers stud B in bail E. Bail E pivots on shaft F to position projection G in path of lip H of symbol indexing slide to hold slide in non-print position. After repeat operation bail E restores to normal through spring D.

Test and Adjustment

To ensure symbol slide H is held in non-print position when repeat key is depressed.

With repeat key depressed projection G should have full hold of lip H.

To Adjust : Weave bail E.

Tests and Adjustments

To ensure correct symbol printing during result key machine operations:

Manually operate the machine with a result key depressed. The stud in interlock B should contact but not raise the extension of bail A.

To adjust - Weave bail F.

Ribbon Feed Mechanism

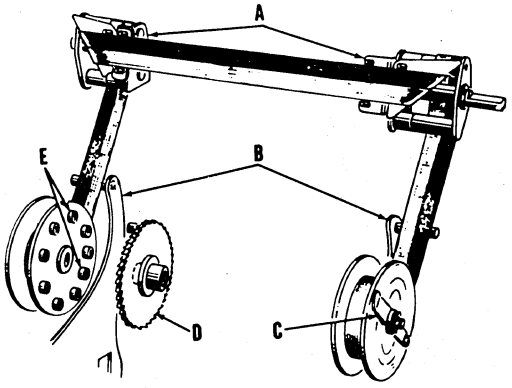


Fig. II-39 Ribbon Feeding

Uniform density of the printed figures is obtained by crossfeeding a ribbon between two spools and by automatically reversing the ribbon movement when the ribbon has been completely unwound from either spool.

The ribbon is threaded around floating ribbon guides A (Fig. II-39) that are assembled and pivot on the platen shaft. The ribbon is shifted to printing position by cam controlled movement of guides A. The ribbon shifting movement is simultaneous with the carriage movement as the latter is raised to printing position. As the carriage is restored, the ribbon restores to its normal position so that the last printed amount is visible when the machine operation is completed.

Ratchet wheels D, which are assembled vertically and parallel to the length of the machine, pivot on posts in the ribbon mechanism side frames that are attached to the right and left machine side frames. Each ratchet wheel contains a stud which fits into any one of the flanged holes E in the ribbon spool. Therefore, rotation of the ratchet wheel causes the ribbon spool to rotate and the ribbon to feed. Retainer arm C on each ribbon spool securely holds the spool on a roller assembled on the same post on which the ratchet wheel pivots to provide free turning of the ratchet wheel. Arms B, which are under spring tension, hold the ribbon taut after printing and ribbon reversing.

Tests and Adjustments

1. To ensure that the ribbon remains aligned with the ribbon guides during reverse operations:

Arms B should take up any slackness of the ribbon without deflecting the ribbon feed during normal ribbon travel.

To adjust - Increase or decrease spring tension on arms B after ensuring free turning rolls on the ribbon guides.

Ribbon Feed is automatically reversed.

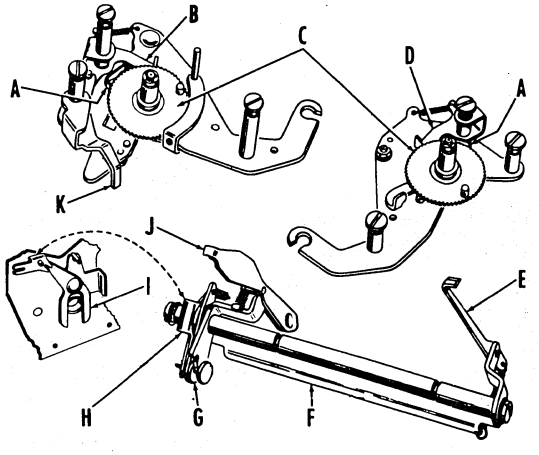


Fig. II-40 Ribbon Reverse Mechanism

When the ribbon is being wound on either spool, tight winding of the ribbon is provided by brake shoe A (Fig. II-40) which places friction against the drum surface of the opposite ratchet wheel. When ribbon travel is reversed, tautness of the ribbon is maintained in as much as each ratchet wheel contains a brake shoe. Safeguarding against back lashing of the ratchet wheels is provided by engagement of the ratchet wheels by check pawls B and D as feed pawl J restores after feeding the right ratchet wheel or as feed pawl E is advanced into feeding position for the left ratchet wheel.

Ratchet wheels C are turned by power transmitted from a cam in the camshaft assembly. Rotation of the cam causes arm I to oscillate. The oscillating movement of arm I is transmitted through lever H to ribbon feed bail assembly F which contains feed pawls E and J. Lever H is coupled to feed bail F by the stud in detent G, and the other end is seated in one of two pockets in bail F. The pocket in which the stud seats determines the direction of ribbon feeding. When the ribbon is fully wound on one spool, the build-up of tension by feed pawl E or J causes the stud in detent G to expand the detent spring permitting the stud to enter the other pocket of bail F, thereby reversing the direction of ribbon feeding by activating the other feed pawl.

Tests and Adjustments

1. To ensure a taut ribbon:

Tension of brake shoes A against the brake surfaces of ratchet wheels C should be equal, one wheel with the other, and only sufficiently strong to provide tight winding of the ribbon on the spools.

To adjust - Spread or close the ends of brake shoes A.

2. To provide full length feeding of the ribbon and prompt reverse when either spool is fully wound:

With the ribbon feeding onto the right spool, check pawl B should remain in full contact with the right ratchet wheel during the complete machine cycle.

To adjust - Bend the formed ear of lever K.

3. With the ribbon feeding onto the right spool, check pawl D should not engage the left ratchet wheel during the machine cycle.

To adjust - With the machine normal, bend the formed ear at the rearward end of pawl D for minimum clearance of the ratchet wheel.

4. With the ribbon feeding onto the left spool, check pawl D should engage the teeth of the left ratchet wheel immediately at the start of the machine cycle and remain in full contact until the end of the machine cycle.

To adjust - Bend the formed lip at the rearward end of pawl D.

Note: It may be necessary to equalize this adjustment with adjustment '3'.

5. With the ribbon feeding onto the left spool, check pawl B should not engage the right ratchet wheel during the complete machine cycle.

To adjust - Bend the formed ear of lever K.

Note: It may be necessary to equalize this adjustment with adjustment '2'.

6. When the ribbon is fully unwound from either spool, reverse slide G should move promptly to the opposite pocket of feed bail F but should not change pockets before either end of the ribbon is reached.

To adjust - Ensure that slide G and bail F have free action, then increase or decrease the tension of the spring on slide G.

Red Ribbon - Controlled From the Symbol Bar

The ribbon shift mechanism is actuated directly from the camshaft assembly and contains controls to provide red printing of all subtractions, minus totals and minus sub-totals. All other items print in black.

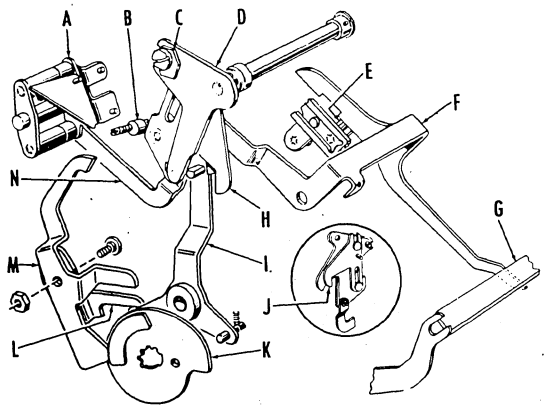


Fig. II-41 Red Ribbon Mechanism

Rotation of the camshaft assembly rocks arm I (Fig. II-41) causing the arm to drive limit plate H, of assembly D, forward. As assembly D moves forward, right and left ribbon guides A are raised, through links N, far enough to align the black portion of the ribbon into printing position. After printing takes place, the ribbon is lowered to make the printed items fully visible.

Reversing the direction of ribbon feeding is safeguarded by the auxiliary cam on cam assembly K and lever M which contains arm L. The auxiliary cam through arm L, holds the ribbon shifting mechanism normal against the tightening effect placed on the ribbon by continued feeding onto the right ribbon spool when the left end of the ribbon is reached. As soon as right ribbon feeding is completed, the auxiliary cam releases arm L to permit cam controlled ribbon shifting.

If the ribbon were permitted to shift prematurely to printing position, the length of ribbon required for cam controlled shifting would be taken up on the right spool causing excessive tautness of the ribbon instead of reversing the direction of ribbon feeding. Restoring the ribbon from printing position would cause further stretching and possible tearing of the ribbon.

The symbol printing type bar controls the printing of minus value items in red. Indexing of the symbol type bar during minus operations places stud E (in the type bar) under and within the span of the cutout in the rearward extension of bail F. As typebar restoring bail G moves rearward during the machine cycle, bail F lowers until it limits on stud E, lowering auxiliary limit plate J into the path of the stud in arm I. Auxiliary plate J affords an earlier contact for arm I, therefore, the ribbon guides are raised higher to elevate the red portion of the ribbon into printing alignment.

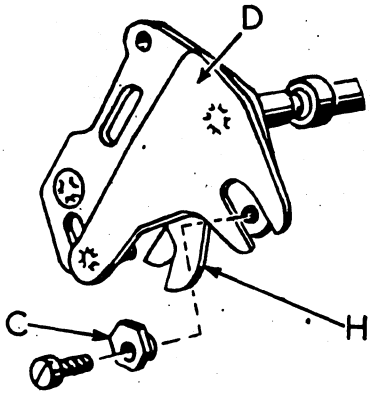


Fig. II-42 Ribbon Shift Assembly Late Style

Late style machines with plastic case from serial No. J167339F have a modified ribbon shift assembly D as shown in Fig. II-42. The operation is the same as the earlier style.

Tests and Adjustments

To ensure positioning of the ribbon so that a full black print will be provided

for positive amounts and a full red print will be provided for minus amounts:

1. With the high dwell of cam N (Fig. II-50 Power) aligned with the roll in slide P (Fig. II-50 Power) there should be approximately .005" play between assembly D and eccentric B.

To adjust- Apply slight downward pressure to ribbon shift arm assembly C and turn eccentric B.

2. With the subtract key depressed, manually operate the machine until the ribbon has been raised to printing position. The minus symbol (—) should print through the centre of the red portion of the ribbon.

To adjust - Turn eccentric C.

Styles J209 Through J214

Symbols are Printed to Identify The Machine Operations.

The mechanism covered under this subject pertains to those machines built prior to Serial No. J77596F (France); J56297D (US) and J5948C (Canada).

The various machine operations, except an add listing operation or error key operation, are indentified by symbols printed to the right of the printed amount.

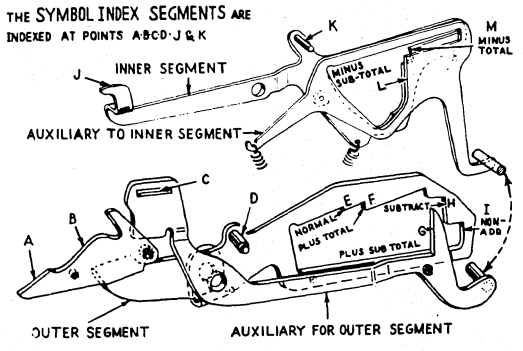


Fig. II-43 Symbol Index Segments

The symbol type bar does not contain an adding rack nor is it limited by the intermediate keyboard. An extension, riveted to the symbol type bar, limits the type bar on steps of the symbol index segments. The segments are indexed from various sources as illustrated.

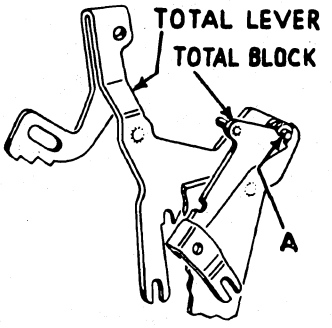


Fig. II-44 Plus Total Symbol

Plus Total - The outer indexing segment is moved through contact at point A (Fig. II-43) but movement of the segment is only partial as the total lever limits on the total block, Fig. II-44.

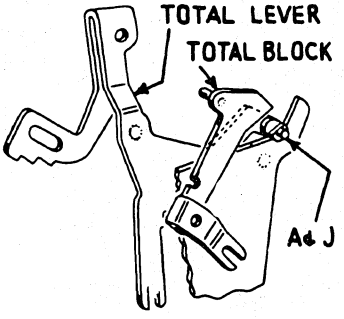


Fig. II-45 Minus Total Symbol

Minus Total Operation - The outer and inner index segments are moved through contact at points A and J (Fig. II-45) as the total lever is not limited by the total block. The inner and outer auxiliary segments are retained in normal position by the sub-total key through contact at point C (Fig. II-43).

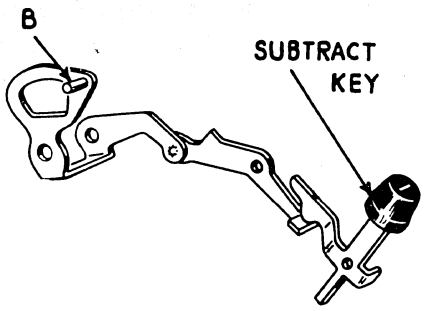


Fig. II-46 Subtract Symbol

Subtract Operation - A subtract symbol is indexed by moving only the outer segment (Fig. II-43) as the subtract key is depressed and contact is made at point B (Fig. II-46).

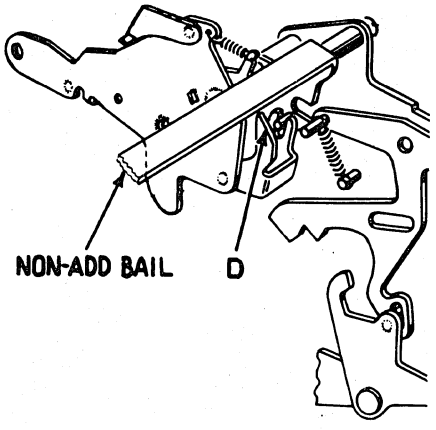


Fig. II-47 Non-Add Symbol

Non-Add Operation - Depression of the non-add key actuates only the outer segment (Fig. II-43). The rear limit of the segment is positioned through contact at point D (Fig. II-47).

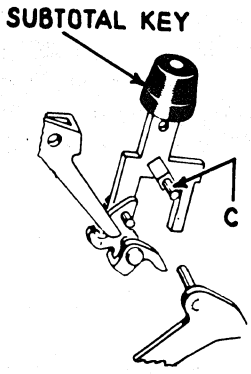


Fig. II-48 Plus Sub-Total

Plus Sub-Total Operation- The outer index segment and its auxiliary (Fig. II-43) are actuated through contact at point C (Fig. II-48) as the sub-total key is depressed.

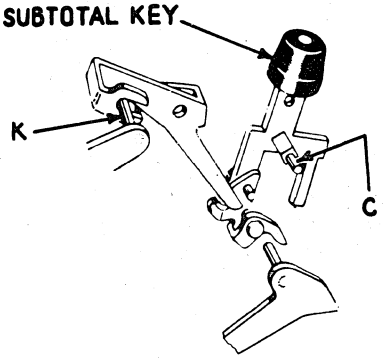


Fig. II-49 Minus Sub-Total

Minus Sub-Total Operation - The outer index segment and its auxiliary (Fig. II-43 are moved through contact at point C (Fig. II-49). The inner index segment is moved through contact at point K. Movement of the auxiliary outer segment permits spring tension to move the auxiliary inner segment. As the sub-total key is depressed its lever limits on the stud in the total block to actuate the inner index segment.

Tests and Adjustments

1. To print a minus sub-total symbol when a minus sub-total operation is indexed:

With the power off and the total block (Fig. II-44) in a rearward (minus total) position, depress the sub-total key. Manually operate the machine. The inner symbol segment and the auxiliary inner segment should be rocked upward to limit the movement of the symbol type bar.

To adjust - Bend the forward arm of the lever that is rocked by the pawl on the bottom of the sub-total key.

Review

1. How is a uniform printing impression provided from all columns?

2. Why does the type bar alignment blade cam the type bars forward?

3. What mechanism changes the symbol selection to provide the correct symbol for the result printed even though the same result keys are used for both plus and minus amounts?

4. What would happen if interlock B (Fig. II-38, Printing) were removed?

5. What would be the operator's complaint if the ribbon failed to reverse promptly?

6. If minus amounts were printed in black, what would be the most probable cause?

7. Why is it necessary to keep the ribbon taut at all times?

8. During what part of the machine cycle does the ribbon feed to the right? - to the left?

POWER

KEYBOARD INDEXES DRIVE TRIP

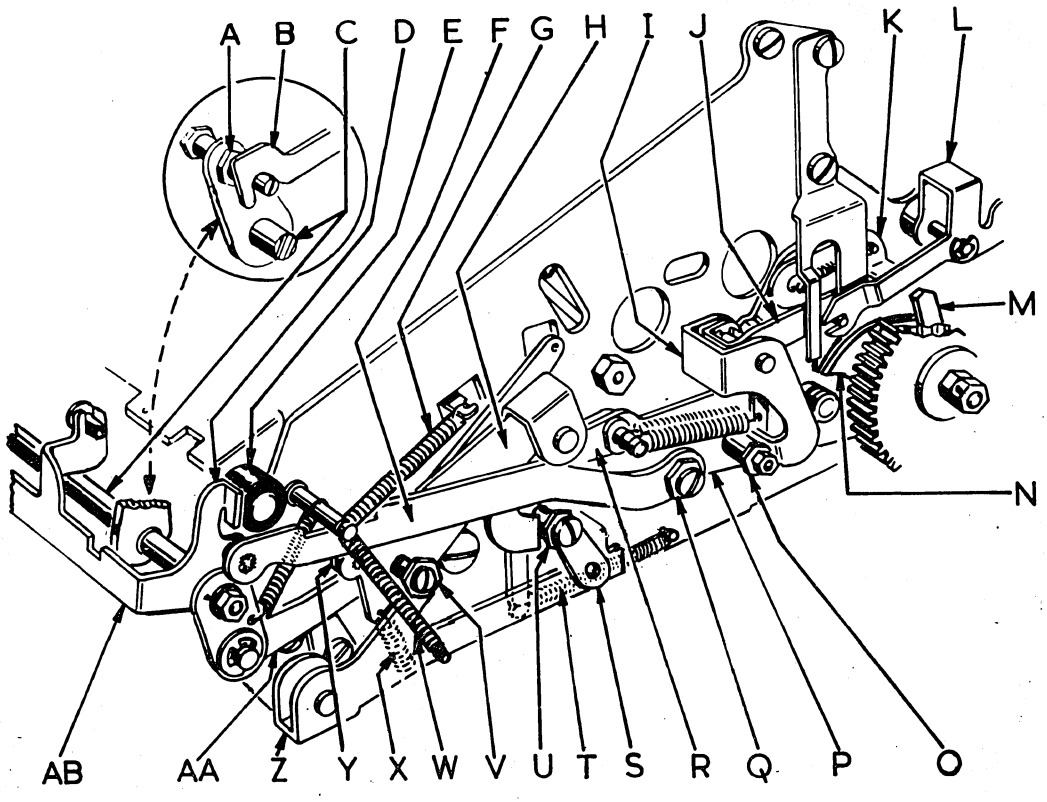


Fig. II-50 Drive Trip Indexing from Keyboard With Power Driven Interlocks.

Machine operations are indexed from the error, non-add, repeat, minus repeat, subtract key, plus motor bar, total and subtotal keys. The drive trip mechanism from the control keys is designed to provide accessible adjustments, mainly from eccentrics, and light control key depressions that are balanced with the listing keys to provide a smooth key response for the operator.

Depression of a control key in either operational control key column rotates shaft C (Fig. II-50) clockwise, moving link AA forward. Forward movement of link AA allows square stud Y in driver H to be pulled into notch of link AA by spring X. Eccentric V in driver H contacts latch Z lowering it from the step in slide P. When released from latch Z, slide P is driven rearward by spring T to release clutch pawl M by raising latch K.

Rearward movement of slide P, through eccentric stud O, also raises the rearward extension of arm J to rock lever L which actuates the motor control switch.

During subtract operations, the milled stud in plate R (part of slide P) which extends through the machine side frame, also drives the subtract indexing mechanism.

Stud Y in driver H remains positioned in the step of link AA to retain the indexed result or control key depression until the end of the machine operation, when the trip slide is restored by contact of cam N (in camshaft section) on roll in slide P.

During the end of the machine cycle, clutch pawl M contacts the underside of arm J holding arm L in position to retain the motor switch closed. This assures continued power from the motor to complete the machine cycle.

The purpose of the broken joint in the limit step of latch K is to provide easy release of clutch pawl M and to insure clearance between the clutch pawl and the clutch teeth when the machine is normal.

Tests and Adjustments

1. To provide uniform key depression and drive trip timing from all operation and result control keys:

With the power off hold slide P (Fig. II-50) forward and depress each operation control key on the right side of the keyboard to locate the key which gives the least amount of throw of link AA. With this key held down there should be .005" to .015" clearance between the step in link AA and the square stud Y.

To adjust - Position eccentric post A keeping the high side of the eccentric upwards.

2. Perform same procedure as Test 1 but for the operation control keys on the left side.

To adjust- Position eccentric post in the hub on the left side of shaft C keeping the high side of the eccentric upwards.

3. To ensure resetting the drive trip mechanism:

With motor trip slide P at maximum overthrow position on restoration there should be between .003"- .015" clearance between the bottom of square stud Y and the top of link AA.

To adjust - Position eccentric U on trip slide P.

4. To ensure trip of the drive:

With any operational key depressed, there should be between .030" - .050" clearance between the lower edge of trip slide P and the top of the formed lip of latch Z.

To adjust - Position eccentric V.

5.

(a) To prevent disengagement of clutch pawl M when the repeat key is held depressed:

(b) To prevent a machine operation when the drive trip is held up through depression of a listing key holding bail AB forward when any operation control key is held depressed:

With the drive tripped there should be between .030" - .040" clearance between the underside of clutch dog stop K and the top of clutch pawl M.

To adjust - Position eccentric O.

6.

(a) To prevent latch T from being tripped off by motor trip slide P as it restores from overthrow position to limit on lip of latch T:

(b) To prevent latch T from being trapped under guide S and causing repeat machine operations:

With the trip slide P released, the lip on latch T should have .010" - .015" clearance with the machine right side frame:

To adjust - (a) Bend guide S as required.
(b) Position guide S at 4 o' clock to align with lip on latch T.

KEYBOARD INDEXES DRIVE TRIP

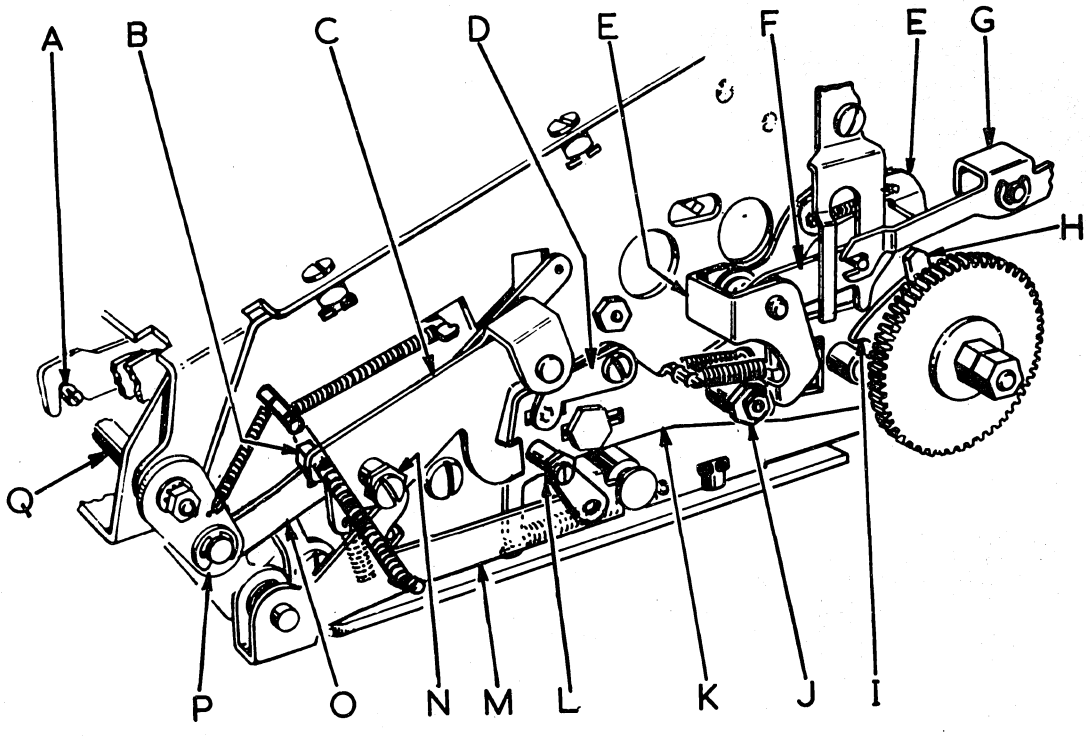


Fig. II-51 Drive Trip Mechanism
Early Style

Machine operations are indexed from the error, non-add, repeat, subtract key, plus motor bar and the total and sub-total keys. The drive trip mechanism controlled from the operation keys is designed to provide accessible adjustments - in the main controlled from eccentrics - and light key depressions that are balanced with the listing keys to provide a smooth response to manipulation by the operator.

Depression of a control key in either operation control column actuates shaft assembly Q (Fig. II-51) moving link O forward. Forward movement of link O allows square stud B in driver C to be pulled into the notch of link O. Eccentric N in driver C contacts latch M lowering it from the step in slide K. When released from latch M, slide K is driven rearward under spring tension to release clutch pawl H by raising latch E.

Rearward movement of slide K through eccentric stud J also raises the rearward extension of arm F to rock lever G which actuates the motor control switch.

During subtract operations, the milled stud in plate D (part of slide K) which extends through the machine side frame also drives the subtract indexing mechanism.

Stud Bin driver C remains positioned in the step of link O to retain the indexed result or control key depressed until the end of the machine operation, when the trip slide is restored by contact of cam I (in camshaft assembly) on roll in slide K.

During the end of the machine cycle, clutch pawl H contacts the underside of arm F holding arm G in position to retain

the motor switch closed. This assures continued power from the motor to complete the machine cycle.

The purpose of the broken joint in the limit step of latch assembly E is to provide easy release of clutch pawl H and to ensure clearance between the clutch pawl and the clutch teeth when the machine is normal.

Tests and Adjustments

1. To have uniform key depression and drive trip timing from all operation and result control keys:

With the power off, depress each operation control key on the right side of the keyboard to locate which key gives the least amount of throw to shaft assembly Q. With this key held down there should be from .005"-.015" passing clearance between the square stud B on hammer C and the step in link O.

To adjust - Turn eccentric A in the hub assembly on the right side of shaft Q.

2. Perform same procedure as Test 1 but for the operational control keys on the left side.

To adjust - Position the eccentric post in the hub on the left side of shaft Q.

3. To ensure resetting the drive trip mechanism:

With the motor trip slide K at maximum overthrow position on restoration there should be between .003"-.015" clearance between the bottom of square stud B and the top of the formed lip on link O.

To adjust - Position eccentric L in trip slide K.

4. To ensure trip of the drive:

With an operational control key depressed there should be between .040"-.050" passing clearance between the lower edge of trip slide K and the top of the formed lip on latch M.

To adjust- Position eccentric N on hammer C.

5. To ensure latching and unlatching of the trip slide during each operation:

Machine at normal, there should be between .040"-.060" clearance between the top of the drive trip cam I and the underside of the lip on clutch stop dog E.

To adjust - Position eccentric J.

6. To ensure a complete machine cycle during each operation:

Manually cycle the machine until clutch pawl H limits downward movement of control arm F. With the power on, the motor should operate. With the machine in normal position and the power on, the machine should not operate.

To adjust- Bend the rearward extension of switch arm G upwards or downwards as required.

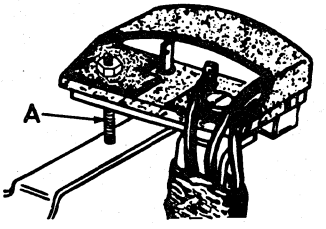


Fig. II-52 Switch Arm Limit

7. To prevent damage to microswitch and provide for limit switch arm G:

With the machine normal and switch arm G adjusted as for Test 6 there should be from .005"-.010" clearance between the switch U form and the fibre base of the microswitch.

To adjust - Position screw A (Fig. II-52) as required and lock with nut.

TYPE J3 INDUCTION MOTOR

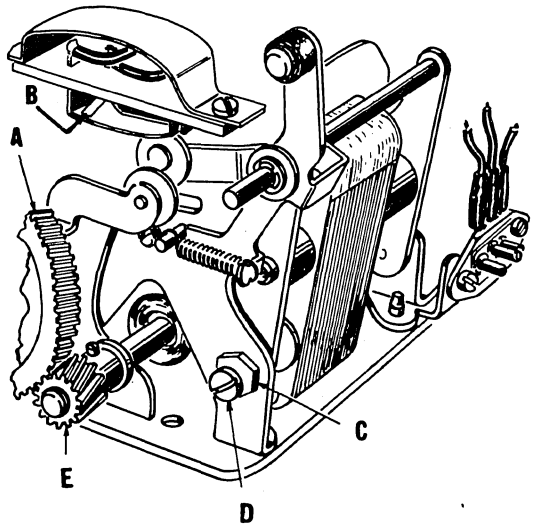


Fig. II-52-1 Type J3 Motor

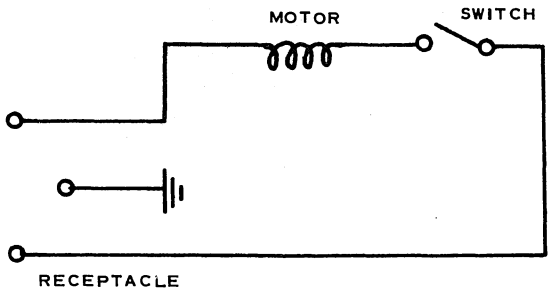


Fig. II-52-2. Schematic Type J3 Motor

The type J3 motor, Induction Winding, furnishes power to operate the machine when microswitch A (Fig. II-52-1) is closed, is of the AC type only. The motor is mounted on the auxiliary machine base and is retained by four screws. Correct mesh of the motor pinion and safety clutch gear will be with minimum play to produce the least gear noise.

Ball bearings located on each end of armature are of the sealed type that requires no lubrication. The bearings fit into the auxiliary side frames.

A safety feature "Thermal Cut-Out" is incorporated in the type J3 motor to prevent overheating. When the motor temperature reaches a predetermined degree the switch points open and the motor will not operate until the motor temperature has dropped.

Motor Is Power Source

The Type J Motor, which furnishes power to operate the machine when microswitch A (Fig. II-53) is closed, is of the AC-DC type. It operates, within a specified range of voltages, on either direct or alternating current. The motor is mounted on the auxiliary machine base and is retained by four screws. By loosening the screws, the motor may be moved forward or rearward to obtain correct mesh of motor pinion I with the safety clutch gear. The gears are meshed with minimum play to produce the least gear noise.

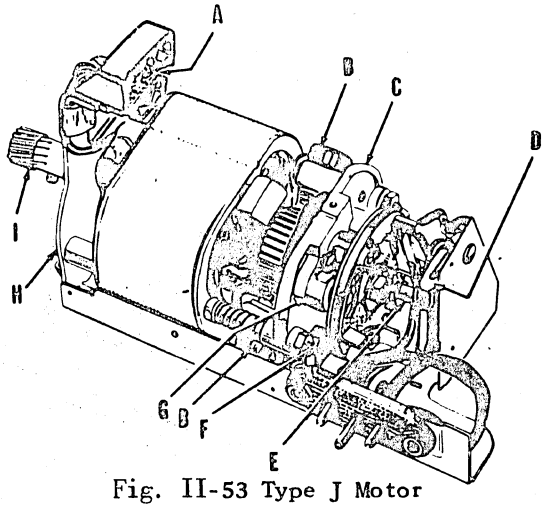


Fig. II-53 Type J Motor

Ball bearings located at each end of the armature shaft are of the sealed type that requires no lubrication. The bearings fit into end frame H and casting C. Casting C also contains commutator brush holders B which are held in position by set screws.

Speed of the motor is controlled by governor F secured to the end of the armature shaft. The governor is adjusted to operate the machine between 172 and 178 operations per minute. Centrifugal force separates the governor points and breaks the circuit when rotation of the governor exceeds the speed for which the governor has been adjusted. The governor also has brush contacts through insulated rings in the governor assembly. Governor brush holders G are in casting C.

Electric current enters from one conductor of the line cord to lower brush holder G, and travels through the commutator, out upper brush holder B to the governor. From the governor, the circuit is completed through microswitch A to the motor field coils and back through the other conductor of the line cord.

The purpose of condenser E is to prolong the life of the switch and governor contact points by absorbing the current which tends to arc between the points as the points are separated.

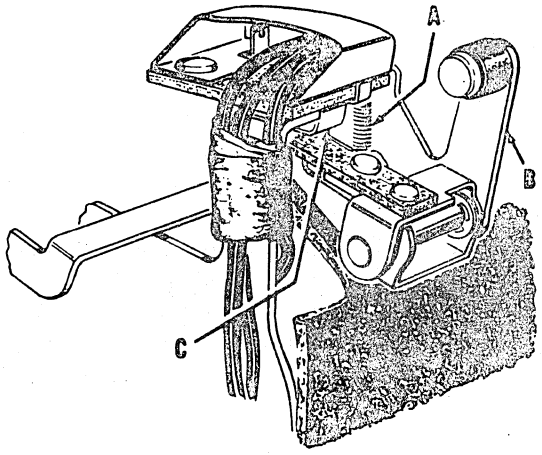


Fig. II-54 Safety Switch

The purpose of resistor D, which is connected across the governor, is to permit a portion of the current supply (predetermined by the ohm rating of the resistor) to by-pass the governor as long as the microswitch is closed. When the governor points are opened by centrifugal force, the flow of current through the resistor feeds enough current to the motor to provide even motor performance. Conversely, absence of the resistor would result in irregular motor performance because of the abrupt intermittent current flow as the governor points are closed and opened.

When the machine case is removed, spring A (Fig. II-54) drives arm B rearward and its lower extension holds microswitch C open, preventing an inadvertant powered machine operation. Replacing the case moves arm B away from microswitch control

so that normal machine operation may again take place.

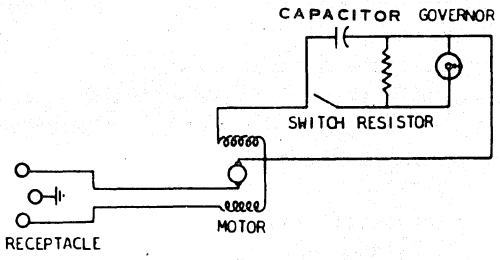


Fig. II-55 Schematic Diagram Type J Motor

The above diagram shows the complete circuit through the Series J Motor.

Tests and Adjustments

1. To ensure constant and controlled motor speed:

The correct operating speed of the machine is within a range of 172 to 178 operations per minute. Test the speed by indexing 'one' in the intermediate keyboard and operate the machine electrically using the repeat key, for exactly one minute. The accumulated total is the machine speed.

To adjust - Turn the adjusting screw in the governor assembly.

Improved J(F) Motor

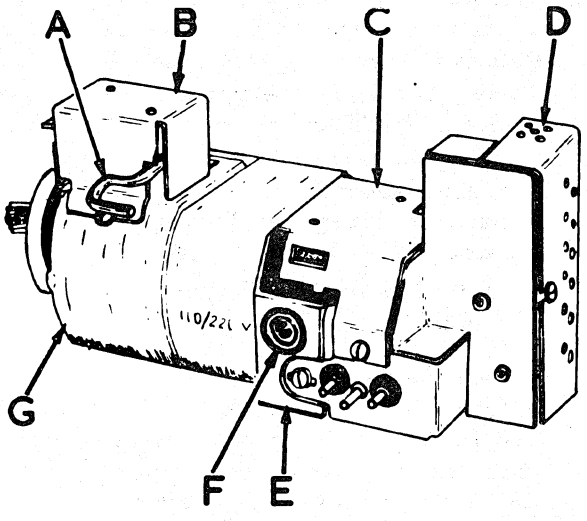
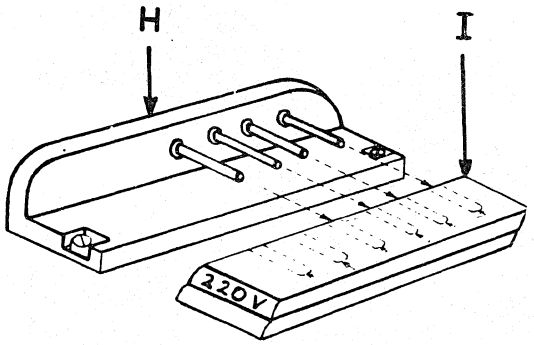


Fig. II-56 Type J(F) Motor

The new improved J(F) motor fitted from first machine serial number J166176(F) is also a universal type motor. It is totally enclosed for extra safety and has the same basic specifications as the earlier Series J motor. A new type adjustable centrifugal governor is fitted and switch points are used instead of a microswitch.

✓ The multivoltage motor type J(F) is also available for operating on 110/220V. The voltage setting can be read through the cut out in cover plate C, Fig. II-56. To change the voltage remove cover plate C, slide adaptor plug I off connector H, Fig. II-56-1, turn upside down and replace. The changed voltage reading will now be visible through cut out in the cover plate.



✓ Fig. II-56-1 Voltage Adaptor Plug

Type J(F) motor furnishes the power to operate the machine when the switch points located under cover B, are closed. It operates within specified range of voltages, on either direct or alternating current. The motor is mounted on the auxiliary machine sub-base and is retained by three screws. By loosening the screws the motor may be moved forward or rearward to obtain correct mesh of the motor pinion with the safety clutch gear.

The armature shaft is supported by ball bearings fitted into the end frame G and casting E. The ball bearings are of the sealed type that require no lubrication. Armature brush holders F are also located in the casting E.

The speed of the motor is controlled by

the governor located under cover plate C secured to the end of the armature shaft. The governor is adjusted to operate the machine between 172 to 178 operations per minute. Centrifugal force separates the governor points and breaks the circuit when rotation by the governor exceeds the speed for which the governor has been adjusted. The governor also has brush contacts through insulated rings in the governor assembly.

Electric current enters from one conductor of the line cord and travels to the switch points located under the cover B. Closing the switch points allows the current to travel on through the commutator via the brush holders F, in the casting E and through the governor located under cover plate C back to the other conducter of the line cord.

The condenser, located under cover plate D, prolongs the life of the governor switch points. The resistor also under cover plate D, is connected across the governor to permit a portion of the current supply (predetermined by the ohm rating of the resistor) to by-pass the governor as long as the microswitch is closed. When the governor points are opened by centrifugal force, the flow of current through the resistor feeds enough current to the motor to provide even motor performance. Conversely, absence of the resistor would result in irregular motor performance because of the abrupt intermittent current flow as the governor points are closed and opened.

When the machine case is removed a spring under cover B drives arm A upwards to hold the switch points open, preventing an inadvertent powered machine operation. Replacing the case moves arm A downwards to allow the switch points to be closed and a normal machine operation may again take place.

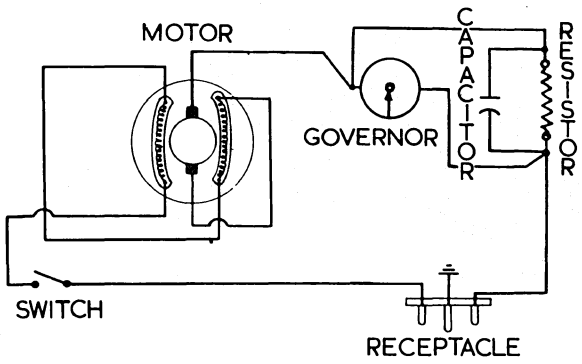


Fig. II-57 Schematic Diagram Type J(F) Motor

The above diagram shows the complete circuit through the Series J(F) Motor.

Tests and Adjustments

1. To ensure constant and controlled motor speed:

The correct operating speed of the machine is within a range of 172-178 operations per minute. Test the speed by indexing 'one' in the intermediate keyboard and operate the machine electrically, using the repeat key, for exactly one minute. The accumulated total is the machine speed.

To adjust - Turn the adjusting screw in the governor assembly.

Brake Stops Motor After Machine Cycle

Gear noise resulting from the coasting action of the motor and camshaft assembly after a machine cycle is completed is avoided by application of brake shoe E (Fig. II-58) under tension of spring B -

to brake drum F, which is a part of the motor pinion.

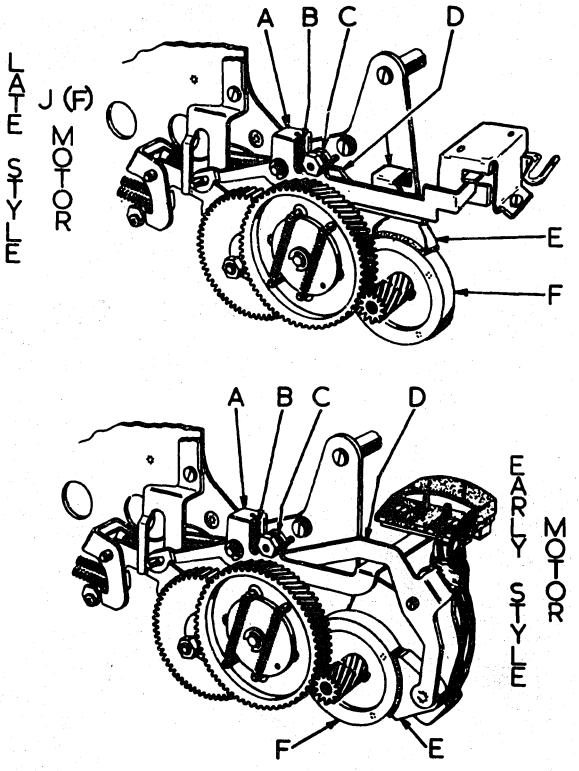


Fig. II-58 Motor Brake

When the drive is tripped, actuation of motor switch arm A, through eccentric C, drives the forward end of arm D downward releasing the brake and affording the motor freedom to operate without restriction through the entire machine cycle.

Tests and Adjustments

1. To ensure free turning of the motor during machine cycle and to stop the motor quickly after the cycle is completed:

There should be .015" clearance between eccentric C and arm D when the machine is normal, and with the drive tripped there shouldbe clearance between the brake shoe and the brake drum.

To adjust - Turn eccentric C.

Motor To Camshaft Gear Train

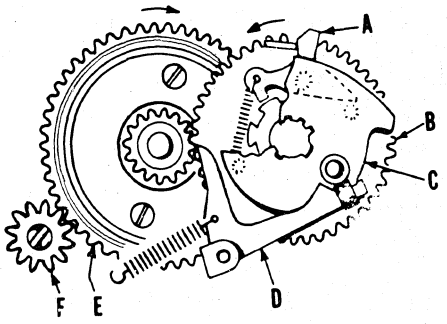


Fig. II-59 Drive Gears

Gear E (Fig. II-59) meshed with pinion F on the motor armature shaft and functioning as an intermediate between the pinion and clutch gear Bon the camshaft assembly is a gear reduction assembly that provides the desired relationship or revolutions per minute between the armature and the camshaft. Gear E is also a safety device that prevents motor stalling and damage to components of the machine should a lock-up of the machine occur.

Detent arm D provides a means of establishing a fixed position for the camshaft assembly with the machine normal. A neoprene sleeveon the detent arm cushions the arm to minimize noise as the roll on cam C passes over the high point of the arm.

Gear B is free running on the camshaft assembly. Control key depression releases drive pawl A to engage a tooth of the driving hub in gear B, locking the gear and camshaft together. The drive pawl remains locked to gear B until released at the end of a complete machine cycle.

Tests and Adjustments

For Machines with Type J Motor:

1. To keep gear noise to a minimum:

With the power off, the back lash between motor pinion F and safety clutch gear E should be .002" to .003".

To adjust - Loosen the four screws that hold the motor to the auxiliary machine base and move the motor forward or rearward, then tighten the screws.

2. Motor pinion gear F should align with safety clutch gear E. This can be assured by providing a parallel condition between the rearward edges of the motor base plate and the auxiliary machine base.

To adjust - Loosen the four screws that hold the motor to the auxiliary machine base and parallel the motor base with the auxiliary machine base. Be sure to maintain the correct mesh- Test '1' - between pinion F and gear E.

Note: The motor aligning slide C (Fig. II-60) enables removal and replacement of the motor without losing adjustment

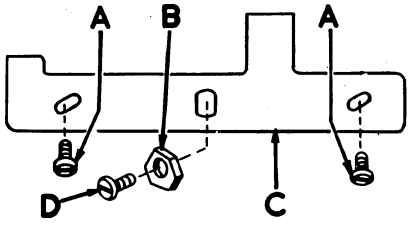


Fig. II-60 Motor Aligning Slide Type J Motor

To adjust - aligning slide C.

With the motor correctly adjusted, slacken screws A and D (Fig. II-60), move motor aligning slide C against motor securing screws and tighten screws A. Turn eccentric B to lock against slide C and tighten screw D.

For Machines with Type J (F) Motor

1. To keep gear noise to a minimum:

With the power off, and screws A and C (Fig. II-61) loose, align the stud (part of the motor casting E (Fig. II-56) against the edge of the sub-base B and check for .002'-.003' back lash between the motor pinion and the clutch gear.

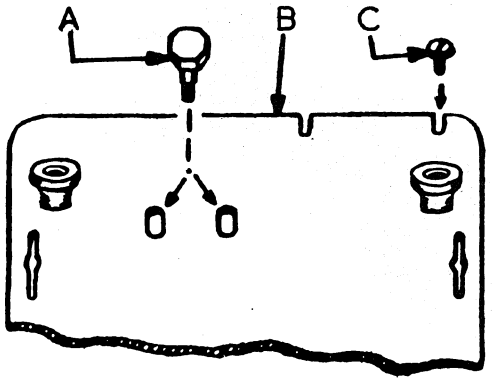


Fig. II-61 Type J (F) Motor Alignment

To adjust- Move the stud against the sub-base B, pivot the motor to obtain the required back lash and tighten screws A to secure the motor and screw C to secure the resistor and condenser bracket.

Remove the motor to better observe the following text.

Rotary Transmission of Power

Power provided by the motor to the camshaft is transmitted from the camshaft to the various mechanisms of the machine by cams that are spline locked to the shaft.

In addition to transmitting power to operate the various mechanisms, the camshaft assembly also controls the timing and speed of action of each mechanism - the speed of action being controlled by the cam design. The element of timing (sequence) is designed into each cam, which, being permanently locked to the splined shaft, provides a fixed and exact relationship between the functions of the mechanisms.

Each cam is individually designed to provide the exact need of the function controlled by the cam and to work in definite co-ordination with all other cams. The various cams and the respective functions controlled and other parts of the camshaft assembly are as follows:

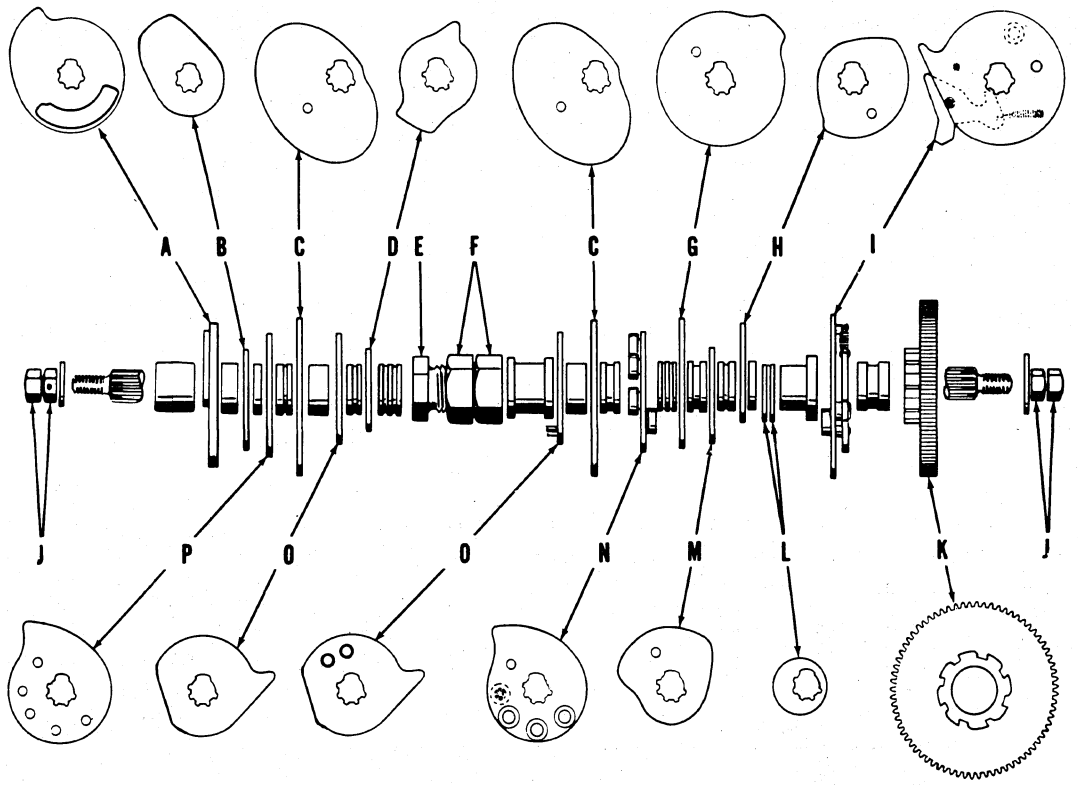


Fig. II-62 Camshaft Cam Outline and Function.

A. Cam surface - restores intermediate keyboard.
Auxiliary cam - assists carriage restoring and protects ribbon reversing.

B. Shifts ribbon to printing position.

C. Restores type bars (2 used).

D. Resets the accumulator locking bail.

E. Screw to tighten cams and collars on the camshaft.

F. Thrust and lock nuts for screw E.

G. Aligns type bars.

H. Actuates accumulator meshing for listing operations.

I. Cam surface - resets drive trip slide.
Roll- for camshaft detent.
Pawl- couples drive gear K to camshaft.

J. Retaining and lock nuts.

K. Drive gear.

L. Crossfeeds ribbon.

M. Actuates accumulator meshing for totaling operations.

N. Cam surface - raises carriage to print.
Rolls- actuates cipher block mechanism.

O. Resets carry pawls and adding racks.
Studs - unlatch carry reset bail.

P. Raises carriage to print.

Tests and Adjustments

1. To ensure alignment of each control cam with the respective operating mechanism:

With all cams, spacers, washers and locking device (screw E and nuts F)(Fig. II-62) assembledon the splined shaft, the cams should be locked firmly in position.

To adjust - Tighten inner nuts J and lock with outer nuts J. Expand screw E and outer nut F against the cams and spacers, then lock with inner nut F.

Timing of Mechanism

Timing Chart - 10 Key Machine

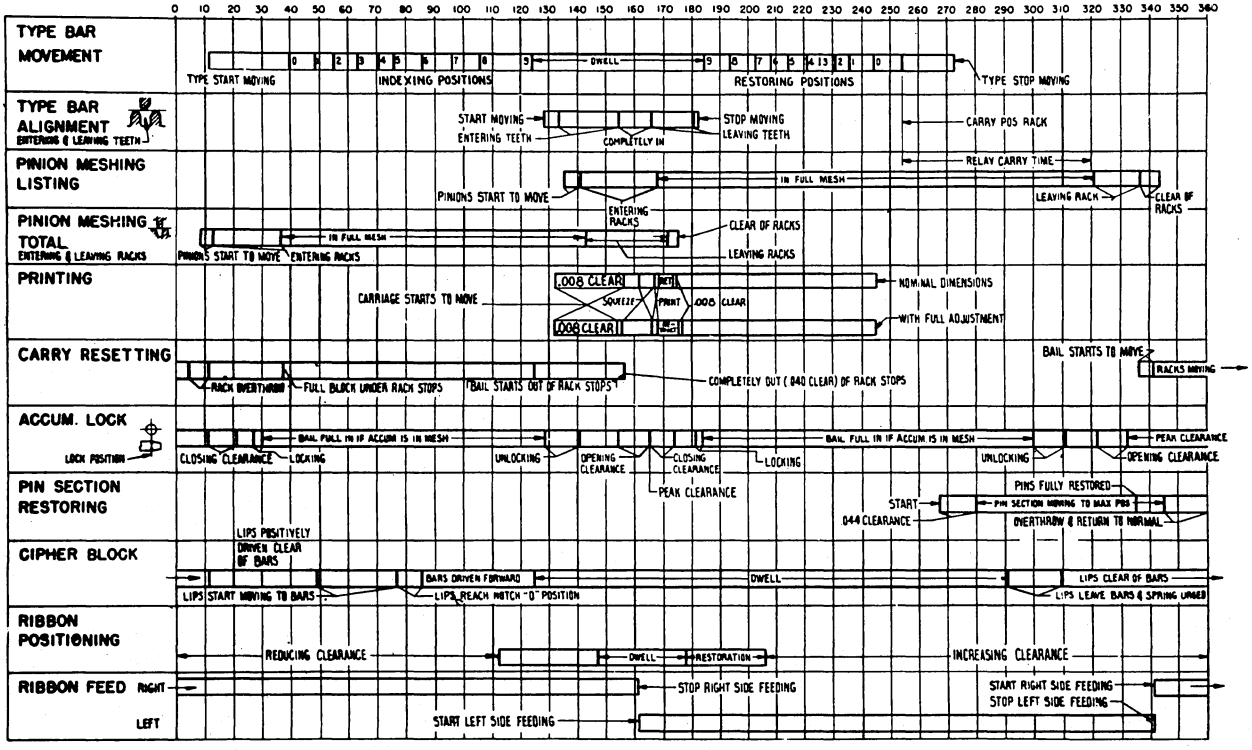


Fig. II-63 Timing Chart

The timing chart provides a graphic picture of the co-ordination between operating mechanisms. It will be noted that in two instances mechanisms (carry resetting and right spool ribbon feeding) are given initial movement at the end of a machine cycle, with the principle part of the movement taking place on the following machine cycle.

A high rate of machine operating speed is obtained because all sections and their individual parts are precisely timed and are under positive control.

Review

1. By what means does release of the drive trip mechanism permit light depression of control keys?

2. How are the points held closed as the drive trip slide is restored during any machine operation?

3. How are the commutator brush holders secured in the motor casting ?

4. What is the allowable machine speed in operations per minute?

5. What is the purpose of detent (on the right side frame) that exerts pressure on the camshaft assembly?

6. What principle of construction makes the high speed of the machine possible.

If the keyboard and intermediate keyboard were replaced as outlined in Keyboard Section II, the assemblies should again be removed so accumulator controls may be observed. Also remove the ribbon mechanism side frame assemblies and the carriage.

ACCUMULATION

Addition and Subtraction with One Set of Pinions

Introduction Section 1 outlined how the adding pinions are suspended, when normal between two sets of adding racks, and how the pinions are raised to subtract and lowered to add, at the mid-point of the machine listing operation. Also outlined was how the meshing is done at the start of the machine cycle with a reversed direction of rotation for the pinions when totaling.

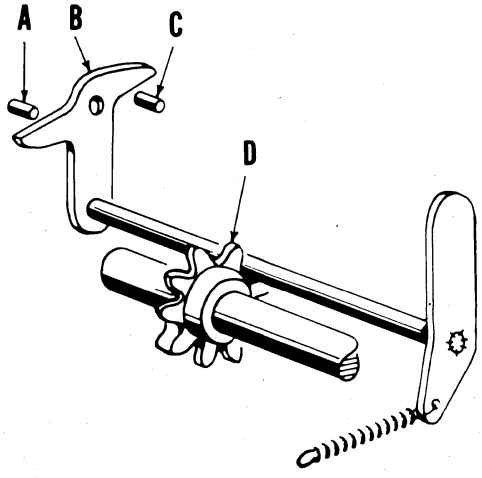


Fig. II-64 Pinion and Detent Bail

When pinions D (Fig. II-64) are in normal position (not meshed with the adding racks) detent bail B is meshed with the pinion teeth to prevent rotation of the pinions. Rotation of a pinion at this point would alter the value of the amounts listed. Raising the accumulator assembly causes the projection on detent bail B to contact stud A in the adding section side frame, thereby swinging the detent shaft out of the pinion teeth. When the accumulator assembly is lowered (from normal), detent bail B limits on stud C in the adding section side frame to swing the detent shaft out of the pinion teeth. Thus, the pinions are locked from rotation when not meshed with the adding racks, and permitted to turn freely when meshed and controlled by the adding racks.

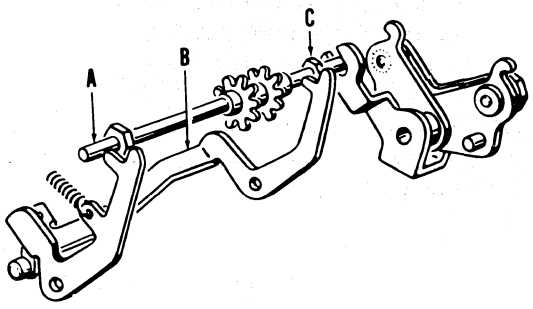


Fig. II-65 Pinions Safeguard Bail

To guard against accidental disengaging of the pinions from the adding racks during the time accumulating or totaling is being performed, detent bail B (Fig. II-65) positions over screw studs A and C when the pinion assembly is lowered, and under the studs when the pinion assembly is raised. Bail B is spring driven. It is released to become active before the type bars start to index and restored to clear the pinion assembly after the type bars are restored to normal.

Accumulator - Controlled from one Hook Assembly

Meshing of the pinion assembly with the adding racks for both accumulating and totaling is controlled by a single hook assembly. The hook assembly is actuated by either or both of two cams in the camshaft assembly determined by the function indexed from the keyboard.

With actuating power for the hook assembly provided from the camshaft assembly, the operating keys need only to index the selected function. This arrangement results in light control key depression, which is nearly uniform with listing key depression.

Meshing Hook Assembly

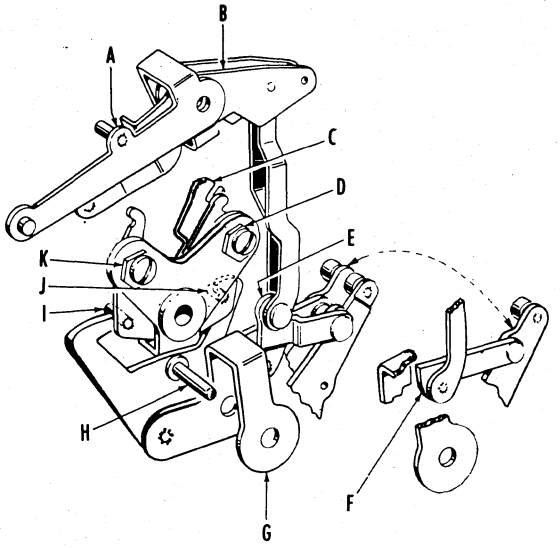


Fig. II-66 Meshing Hook Assembly

Control hook assembly G (Fig. II-66) consists of a plus hook, a minus hook and a driving bail. The plus hook is active during all plus listing and plus totaling operations, and the minus hook is active for all minus listing and minus totaling operations. Because plus operations are basic and most commonly used, the hook assembly is normal when positioned with the plus (rearward) hook active over post J in rocker (cradle) assembly C. When an amount having a minus value is accumulated or totaled, the minus (forward) hook is moved into active (subtract) position over stud I in the rocker assembly C.

Hook assembly G is actuated by cams in the camshaft assembly through intermediate driver arms E and F. Driver E and its respective cam actuate the hook assembly beginning at the mid-point of the machine cycle. Thus, when driver E is aligned with the bail of hook assembly G - its normal position - and the machine is operated, it will, through stud J and rocker C, lower the accumulator pinions to add or, through stud I and rocker C, raise the accumulator pinions to subtract any amounts that have been indexed into the intermediate keyboard.

Driver F, when normal is positioned below the bail of assembly G so that unless the driver is indexed into active position it will idle under the bail without contact during the machine cycle. Depression of the total or sub-total key raises driver F into active alignment with the bail. The matching cam for driver F causes the driver to move forward during the first part of the machine cycle and to recede at the mid-point, controlling hook assembly G in the same manner during the first half of the machine cycle as driver E functions during the last half of a machine cycle.

Total key depression rocks both levers A and B. Lever A through its respective linkage raises driver E above the bail of assembly G into inactive position. Therefore, driver F will cause the accumulator pinions to engage the adding racks at the start of the machine operation and, because driver E is inactive, the pinions will restore to neutral position at the mid-point of the machine cycle, resulting in printing the amount and leaving the accumulator pinions at cipher.

Sub-total key depression rocks lever A only so that driver F is indexed into active position, and, because lever B is not actuated, driver E remains active. With both drivers active, the accumulator pinions are meshed at the start of the machine cycle and remain meshed until the end of the cycle, resulting in the amounts in the pinions being printed and retained.

Tests and Adjustments

1. To ensure meshing of the accumulator pinions with the adding racks during all machine operations:

Note : When installing rocker assembly C (not previously adjusted) the wide portion of eccentrics D and K should be positioned upward (punch marks at twelve o'clock) to prevent damage to parts when the machine is operated for the purpose of making adjustments.

a. Plus Amounts

Depress the sub-total key and manually rotate the camshaft assembly 1/4 turn clockwise (right side of machine). The extension screw posts in the ends of the accumulator pinion shaft should be touching the shelves in the adding section side frames, and accumulator locking bail B (Fig. II-65) should pass freely over the pinion shaft posts.

To adjust - Turn eccentric D.

b. Minus Amounts.

Depress the sub-total key with a minus amount in the accumulator and perform Test 'a' with the forward hook of assembly G active over stud I.

To adjust - Turn eccentric K.

Subtract - Keys and Accumulator Controlled

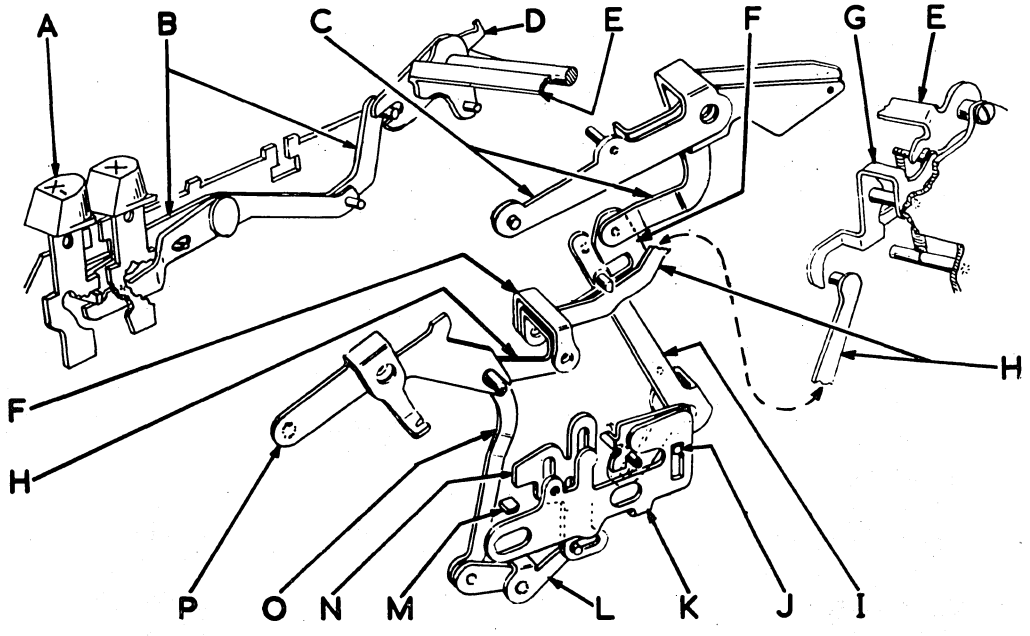


Fig. II-67 Shifting Accumulator to Subtract

Indexing of the mechanism to shift control hook assembly G (Fig. II-66) to minus position is through subtract key, minus repeat key (on machines equipped with this feature) or a combination of changed values in the accumulator and depression of a result key. Power to shift the subtract mechanism is provided by rearward movement of drive trip slide P (Fig. II-50) and milled stud M (part of plate R, Fig. II-50).

Subtract Key

Subtract key depression through lever P (Fig. II-67), link O and linkage L lowers slide N (contained in slide K) into the path of milled stud M. Stud M, in adjustable plate R (Fig. II-50), moves rearward with the motor trip slide when released by full subtract key depression. Stud J, (H in Fig. II-66) part of the meshing hook assembly G (Fig. II-66) extends into the

vertical slot in slide K so that rearward movement of stud M and slide K positions subtract hook of assembly G (Fig. II-66) over stud I (Fig. II-66) in rocker assembly C (Fig. II-66).

Minus Repeat Key

Depression of the minus repeat key A through lever B and bail E rocks bellcrank G which contacts lever H raising link O and through linkage L lowers slide N. Trip of the drive completes the subtract indexing as in a normal subtract key operation when milled stud M is driven rearwards.

Accumulator Control

When the amount in the accumulator pinions changes to a minus value the automatic one bail moves to place the stud in the top of arm I into the notch of coupler F. A combination of arm I indexed rearward and depression of a result key rocks linkage L through levers C and H and link O to place the slide N into the path of milled stud M in the same manner as when the subtract key is depressed.

Tests and Adjustments

1. To prevent overthrow of the minus repeat indexing mechanism:

With the minus repeat key A held depressed, there should be between .003"-.008" clearance between the lip D on bail E and the edge of the machine left side frame.

To adjust - Bend lip D up or down as required.

2. To ensure full positioning of the subtract hook over stud I (Fig. II-66) during minus operations:

With the power off and the subtract key depressed, the subtract hook of assembly G (Fig. II-66) should be fully over stud I (Fig. II-66).

To adjust - Position plate R (Fig. II-50 Power Section) which contains milled stud M in the motor trip slide.

Non-Adding of Listed Amounts - Late Style

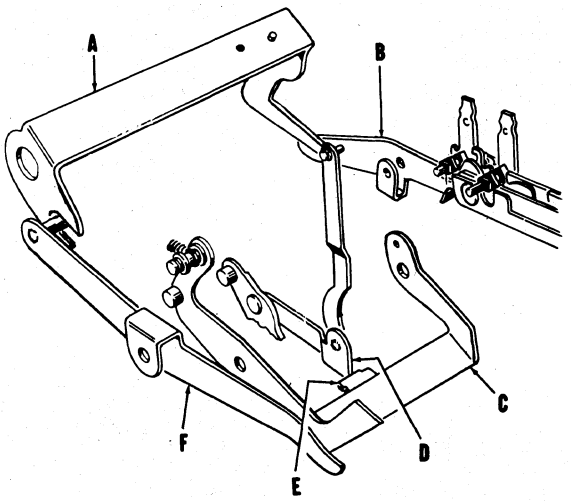


Fig. II-68 Non-Add Mechanism

Non-Add Mechanism

Depression of non-add key through lever F (Fig. II-68) actuates bail A. The cam extension in the right end of the bail through lever B raises driver D above the bail of hook assembly E. As the camshaft assembly moves driver D, no action is transmitted to the bail, and the accumulator remains in neutral (non-add) position during the complete machine cycle.

Tests and Adjustments

1. To ensure non-adding of indexed amounts when the non-add key is depressed:

Depression of the non-add key should raise driver D above the bail of hook assembly E with .010" passing clearance.

To adjust - Weave bail A as required.

Non-Adding of Listed Amounts - Early Style

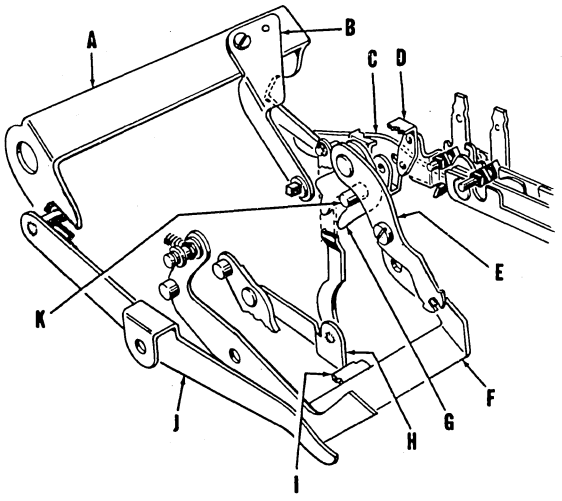


Fig. II-69 Non-Add Mechanism

Non-add key depression through lever J (Fig. II-69) actuates bail A. The cam extension in the right end of the bail through lever C raises driver H above the bail of hook assembly I. As the camshaft assembly moves driver H, no action is transmitted to the bail, and the accumulator remains in neutral position during the complete machine cycle.

Tests and Adjustments

1. To ensure non-adding of indexed amounts when the non-add key is depressed:

Depression of the non-add key should raise driver H above the bail of hook assembly I with .010" passing clearance.

To adjust - Weave bail A.

Non-Add and Result Key Safeguard

Symbol identification of accumulated amounts is safeguarded by blocking type bars during machine operations when the non-add key and a result key are depressed simultaneously.

Depression of the non-add key through lever J (Fig. II-69) and bail A raises arm B. Depression of a result key moves slide D rearward so that stud K in the slide cams pawl G, in arm E, upward. Depression of the non-add key and a result key together indexes pawl G into the path of the stud in arm B which rocks bail F into the path of the type bars in the same manner as when the error key is depressed.

Tests and Adjustments

1. To ensure non-interference of the error bail with type bar indexing during normal listing and totaling operations, and an error operation when the non-add and a result key are depressed simultaneously.

Depression of the non-add key should raise the stud in arm B with only passing clearance of pawl G. Depression of a result key should raise pawl G into the path of the stud in arm B without lost motion.

To adjust - Weave the bail portion of slide assembly D.

Caution : Slide D must be without binding action.

Type Bar Blocking Shutter - Result Key Controlled

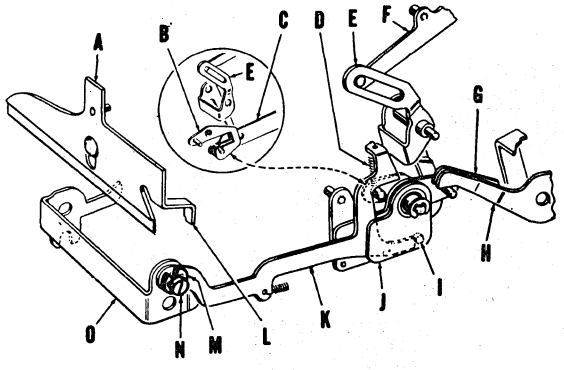


Fig. II-70 Type Bar Blocking Shutter

Depression of a result key raises type bar blocking shutter A (Fig. II-70) so that the type bars, which contain the adding racks, are free to index until limited by the wide tooth of the accumulator pinions against their respective carry pawl, thereby, positioning the type for printing of the accumulated amounts. The lower end of lever E and the lower end of bellcrank B are coupled together by both being hooked to the stud in the forward end of slide C, When a result key is depressed, lever F is lowered moving lever E to pivot bellcrank B and lower the stud in the front end of the bellcrank. Spring D from the stud in bellcrank B to the spring extension of link K causes the link to follow the stud when the bellcrank is pivoted, thus placing the rearward end of the link in the path of stud I in rocker J.

During the machine operation, the front ends of driver assemblies G and H actuate rocker assembly J to lift shutter A clear of the type bars through link K and bail O.

Tests and Adjustments

1. To ensure passing clearance between the shutter and the type bars during result operations:

With amounts in the accumulator pinions and a result key depressed, manually operate the machine. The shutter should be raised as early as possible for passing clearance of the type bars as the bars pass under the shutter - particularly the offset portion at L.

To adjust - With the machine normal and a result key depressed, turn eccentric screw N - starting with the high portion of the eccentric upward - until link K contacts stud I. Then reverse the direction of the eccentric 1/8 to 1/4 turn and tighten the retaining nut.

Restoring of Accumulator Pinions To Neutral

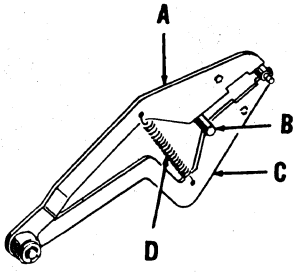


Fig. II-71 Accumulator Pinion Restoring

Meshing the accumulator pinions downward to add or upward to subtract moves screw stud B (Fig. II-71) in the accumulator pinion shaft, upward or downward. Movement of stud B moves arm A upward or arm C downward, expanding spring D.

When the pinion shaft is released by accumulator locking bail B (Fig. II-65) spring D contracts, restoring the accumulator pinion assembly to neutral position.

Total Bail Assembly Limits Accumulator Pinions

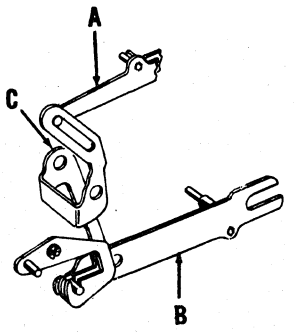


Fig. II-72 Total Bail Actuation

Result key depression rocks lever A (Fig II-72) and through lever C, actuates slide B rearward to move the fingers of total blocking comb G (Fig. II-73) thereby preventing carry pawl indexing during total and sub-total operations.

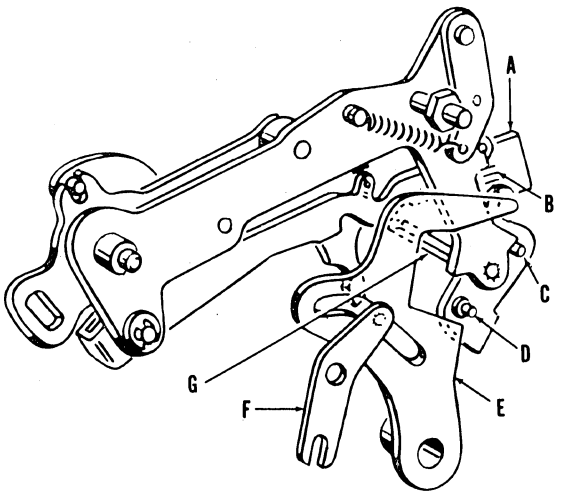


Fig. II-73 Total Bail Limits Carry Pawl

Actuation of slide B (Fig. II-72) through lever F (Fig. II-73) cams total arm E rearward under stud D and over stud C. Studs D and C are in the end of the total bail assembly. When the accumulator pinions are lowered during a plus total or sub-total operation, stud D limits on total arm E. This causes the total bail assembly to pivot, and locates total comb G under carry pawls A, which at this time are in normal reset position. Since the carry pawls cannot be lowered with total comb G indexed, rotation of the accumulator pinions is halted as the wide tooth of each pinion contacts the spear point of the respective carry pawl. Spring B restores the total stop bail assembly as the accumulator pinions return to normal position.

During a minus total or sub-total operation when the accumulator pinions are raised, stud C limits on the upper projection of total arm E to position total comb G under the carry pawls in the same manner as from plus result operations.

Tests and Adjustments

1. To maintain the carry pawls in position to block the accumulator pinions

During the totaling operation, total comb G must be free to rotate under the carry pawls. If the clearance is too great a carry may be tripped off. Clearance should be held to .005" or less.

To adjust- Install the required thickness of shims under the total comb.

Carry Mechanism

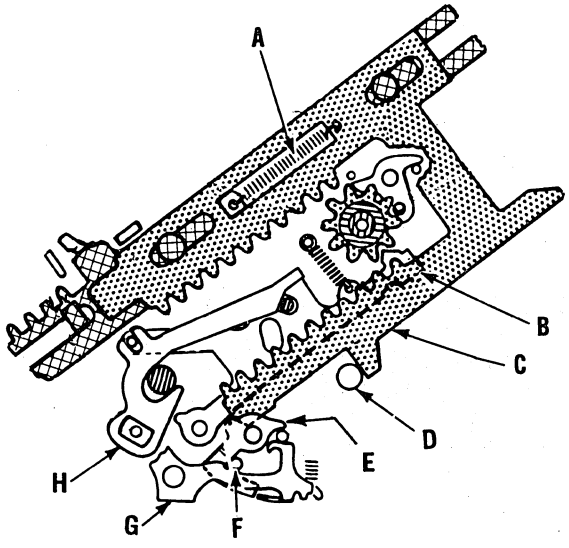


Fig. II-74 Carry Mechanism Simplified

Carry Mechanism Adds One or Subtracts One in Column To Left

When an amount is added or subtracted on any accumulator pinion causing the wide tooth of a pinion to pass over the spear point of the respective carry pawl B (Fig. II-74) the carry pawl is forced downward. The downward movement of carry pawl moves carry pawl link H rearward, contacting stud in adding rack stop G in the next column to the left, moving it clockwise allowing intermediate stop E (through spring tension) to move counter-clockwise over lip of adding rack stop G. If the type bar in that column is in non-print position, one is immediately accumulated as spring A pulls the adding rack forward. If the type bar is not in non-print position one will be accumulated as the type bar is restored to non-print position.

The adding racks and the carry pawl latches are returned to their home position near the end of the machine operation and are given latching lead at the beginning of the next machine operation by restoring bail D. Shaft F of the restoring bail assembly partially restores intermediate stops E at the end of the machine cycle and completely restores the stops at the beginning of the next machine cycle. Immediately after restoring the intermediate stops, shaft F is moved rearward into the hooked projections of adding rack stops G to prevent possible indexing of a carry while meshing and while limiting the accumulator pinions during a total operation. Shaft F then moves forward slightly to permit carry indexing during a listing operation.

The carry mechanism moves with the accumulator pinions as they are engaged with either the lower or upper teeth of the adding racks. Therefore, the carry pawls are in position to receive a carry when adding or subtracting.

Tests and Adjustments

1. To permit a carry to take place when a carry is indexed and to prevent a carry when it is not indexed:

1. Intermediate rack stops E should be reset with .010" to .050" clearance over rack stops G. Cycle the machine until resetting shaft F is at its farthest point of travel. In this position, hold individually, each intermediate stop E against the resetting shaft F to observe the clearance.

To adjust - Install larger rolls in the carry resetting frame to increase the clearance and smaller rolls to decrease the clearance.

2. Latching of rack stops G should be flush with intermediate rack stops E. Less hold may permit accidental tripping of carries and more hold may prevent tripping of wanted carries. Cycle the machine until all carries have been reset and the resetting shaft has permitted intermediate rack stops E to again limit on rack stops G and observe the hold.

To adjust - Bend the formed lip of rack stop G.

Note: Use care when adjusting to maintain a square contact of the stop surfaces and to avoid interference of the stop with adjacent stops.

Carry Mechanism Adds One or Subtracts One in Column to Left - Early

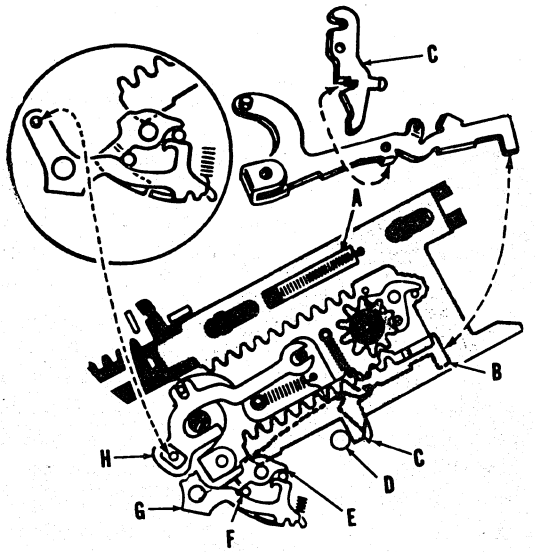


Fig. II-75 View of Carry Mechanism

When an amount is added or subtracted on any of the accumulator pinions and the cam or wide tooth of a pinion passes over the spear point of the respective carry pawl B (Fig. II-75), the carry pawl is forced downward where it is held by the respective carry pawl latch C. Lowering of the carry pawl causes 'one' to be added or subtracted in the next column to the left.

The carry mechanism moves with the accumulator pinions as they are engaged with either the lower or upper teeth of the adding racks. Therefore, the carry pawls

are in position to receive a carry when adding or subtracting.

As carry pawl B is lowered, it slides carry link H rearward which in turn rocks adding rack stop G in the next column to the left. Adding rack stop G is lowered out of the path of intermediate stop E which is then free to pivot out of the path of the adding rack. If the type bar in that column is in non-print position, 'one' is immediately accumulated as spring A pulls the adding rack forward. If the type bar is not in non-print position, 'one' will be accumulated as the type bar is restored to non-print position.

The adding racks and the carry pawl latches are returned to normal near the end of the machine operation and are given latching lead at the beginning of the next machine operation by restoring bail D. Shaft F, of the restoring bail assembly, partially restores intermediate stops E at the end of the machine cycle and completely restores the stops at the beginning of the next machine cycle. Immediately after restoring the intermediate stops, shaft F is moved rearward into the hooked projections of adding rack stops G to prevent possible indexing of a carry while meshing and while limiting the accumulator pinions during a total operation. Shaft F then moves forward slightly to permit indexing of carries during a listing operation.

Tests and Adjustments

1. To permit a carry to take place when a carry is indexed and to prevent a carry when it is not indexed:

1. Intermediate rack stops E should be reset with .010"-.050" clearance over rack stops G when shaft F is at its furthest point of travel.

To adjust - Install larger or smaller rolls as required on the carry resetting frame.

2. Latching of rack stops G should be flush with intermediate rack stops E. Less hold may permit accidental tripping of carries and more hold may prevent tripping of wanted carries. Cycle the machine until all carries have been reset and the resetting shaft has permitted intermediate rack stops E to again limit on rack stops G and observe the hold.

To adjust - Bend the formed lip of rack stop G.

Note: Use care when adjusting to maintain a square contact of the stop surfaces and to avoid interference of the stop with adjacent stops.

Accumulator Pinions are Repositioned as Nature of Amount Changes

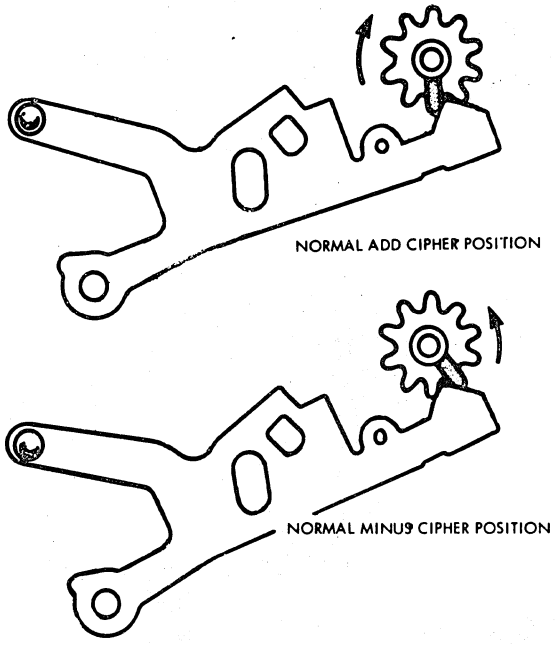


Fig. II-76 Accumulator Pinions in Cipher Position

The accumulator pinions are in add cipher position when the wide teeth of the pinion wheels are in front of the carry pawl spear point as illustrated. When the wide teeth of the pinion wheels are to the rear of the carry pawl spear point, as illustrated, the pinions are in minus cipher

position. Therefore, the accumulator pinions must be repositioned when added or subtracted amounts change the nature of the accumulated balance from plus to minus or vice versa. An automatic one is subtracted to rotate the pinions from add cipher position to subtract cipher position and is added to rotate the pinions back to add cipher position.

Automatic Carry From the Last to The First Column

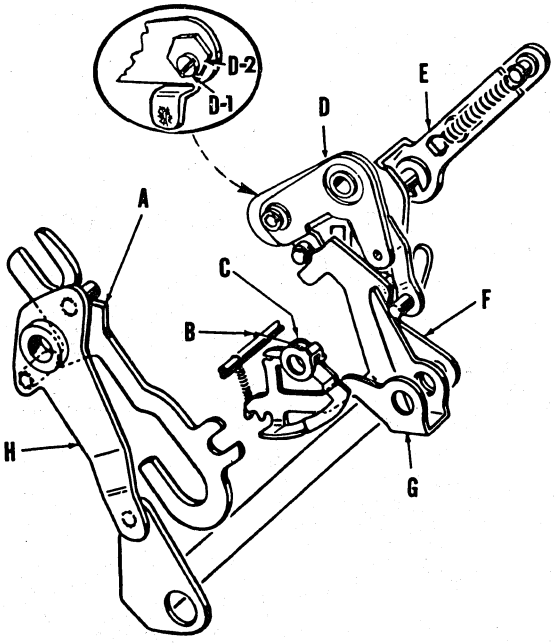


Fig. II-77 Automatic One

When the accumulator pinions are in add cipher position and 'one' is subtracted, an ordinary carry operation takes place. The wide tooth of the first pinion wheel, traveling counter clockwise, lowers the carry pawl and the carry pawl through the carry link sliding rearward lowers the adding rack stop in the second column to subtract 'one' in that column.

In turn, the pinion of each column is rotated counter clockwise (a relay carry). In the left column of the accumulator, carry link A contains a lower and an upper projection. These projections cause 'one' to add or subtract in the first column. Since the pinions are in subtract position, the upper projection of carry link A raises the arm of carry lever H which in turn raises the right end of carry bail F and actuates carry detent D. Carry detent D is actuated as its roll rides over the high point between the pockets in carry bail F. The forward stud on detent D lowers the column one adding rack stop G. Spring B moves intermediate adding rack stop C rearward over the formed ear of adding rack stop G to hold the adding rack stop indexed and permit the adding rack to move forward to carry position. Thus, as the adding rack moves forward to a carry position, the first column pinion is turned counter clockwise, subtracting 'one'.

Raising of carry bail F also moves arm E into indexed position in the pocket of lever F (Fig. II-67) so that total key depression will cause the amount to be taken from the adding pinions while meshed with the upper adding racks- a minus or credit total.

When amounts are again accumulated so that plus amounts exceed the minus amounts the above action is reversed and arm E is retracted from the pocket of lever F (Fig. II-67). Thus, total key depression will mesh the adding pinions with the lower adding racks - a plus total.

Tests and Adjustments

1. To ensure a positive automatic 'one' when the nature of an accumulated amount changes:

There should be slight play of detent D when the roll in the detent is in either pocket of bail F. There should be approximately .005" lift of rack stop G over intermediate stop C as the roll in detent D passes over the high point between the pockets of bail F.

To adjust- Turn eccentric screw in detent bail D (Fig. II-77) as required.

Safeguard to Prevent Unwanted Carries During Sub-Total Operation

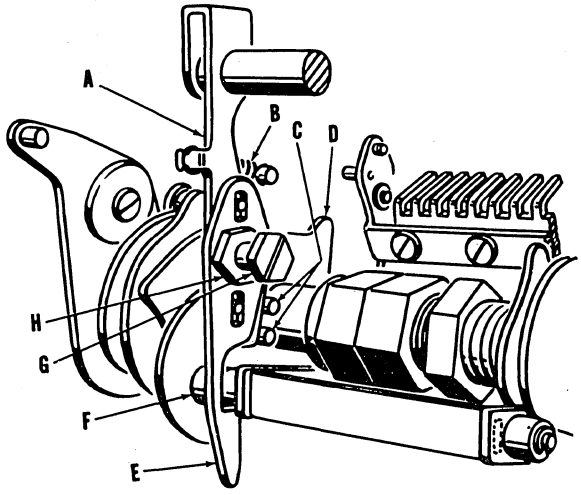


Fig. II-78 Carry Reset Bail Latch

Latch A (Fig. II-78), pulled forward by spring B, latches under roller F early in the machine cycle. As camshaft rotates, studs C move latch A rearward from under roll F just prior to contact of cam D with roll F permitting resetting of carries.

Tests and Adjustments

1. To assure latching to prevent unwanted carries during sub-total operations:

a) As camshaft rotates latch A should align with studs C with flush hold.

b) When roll F is raised latch E should move under roll F with .005" clearance.

To adjust - Loosen screw G and turn eccentric H as required.

Styles J209 Through J214

Accumulator - Controlled from Two Hook Construction

Machines constructed prior to serial No. J77596F were constructed with two accumulator control hook assemblies. One hook assembly controls listing operations and the other controls totaling and sub-totaling operations.

Accumulator Indexing and Meshing

The pinions are meshed with the adding racks at about mid-point of the machine cycle and are disengaged before the cycle is completed. Normally, add hook J is in active position - located over the rear post of cradle E. Therefore, when the add bar is depressed and the listing hooks are lowered by the camshaft assembly, the add hook will cause the cradle to pivot and lower the accumulator pinions.

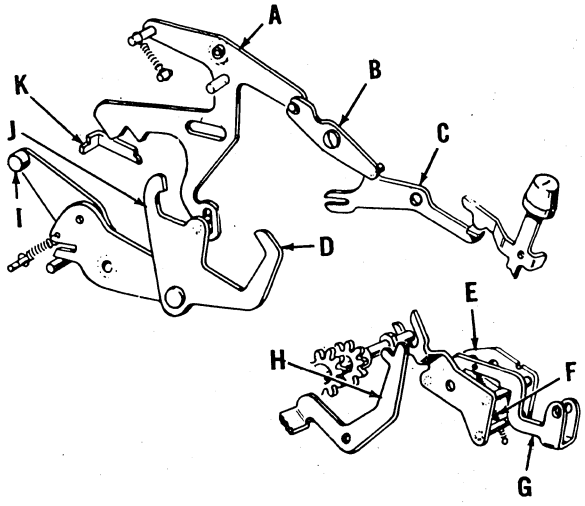


Fig. II-79 Accumulator Indexing and Meshing

To subtract an amount, the accumulator pinions are raised and meshed with the upper teeth of the adding racks by pivoting cradle E in the opposite direction. This is accomplished by moving the listing hooks rearward. Depression of the subtract key moves the hooks rearward through actuation of levers C, B, and A. Rotation of the camshaft assembly raises roll I to lower the listing hooks. The subtract hook being positioned over the upper front post of cradle E causes the cradle to pivot and raise the accumulator pinions

into mesh with the upper teeth of the adding racks. Lever A is latched rearward by latch K to ensure full engagement of the subtract hook with the cradle post during the complete machine operation. Resetting of the drive trip mechanism by the camshaft assembly actuates latch K to release lever A and permit the listing hooks to restore to normal position when the drive trip slide releases the keyboard.

Spring F is connected to centralizer arm G and is expanded when the accumulator pinions are in mesh with the adding racks. Tension of the spring restores the accumulator pinions to normal position when released by locking bail H and a meshing hook. The centralizer arm then retains the accumulator pinions in normal position until they are meshed again. Locking bail H locates under the accumulator pinion shaft when subtracting and over the pinion shaft when adding. The bail locks the accumulator pinions in mesh with the adding racks to prevent the pinion assembly from backing out when a carry pawl is actuated while listing or when the pinions limit on the carry pawls while totaling.

Non-Add Key Disables Accumulator Meshing

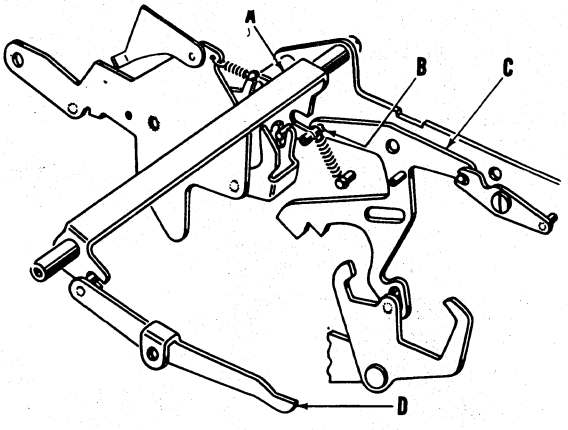


Fig. II-80 Non-Add Functions

The accumulator pinions remain at normal (home position) during a non-add operation (not in mesh with the adding racks). Since the listing hooks are normally in add position, it is necessary to disengage the listing hooks to prevent meshing of the pinions.

Depression of the non-add key rocks lever D and bail A. Bail A in turn cams stud B upward to rock lever C and move the listing hooks rearward. Stud B enters the pocket of bail A to properly locate and hold the listing hooks during the machine operation. The listing hooks are held partially rearward so that neither the plus hook nor the minus hook will engage the accumulator meshing cradle when the listing hooks are lowered.

Plus Totals and Minus Totals From One Set of Pinions

To total accumulated amounts, the accumulator pinions are raised for minus totals and lowered for plus totals. The accumulator pinions are meshed with the adding racks during the early portion of the machine cycle and are disengaged as the machine cycle is half completed. Since the time of meshing the pinions when

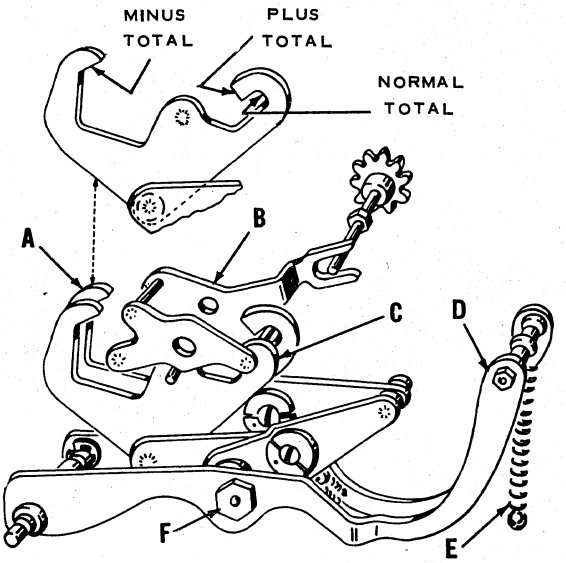


Fig. II-81 Meshing Hooks

totaling is different than when listing, a second control hook assembly is required to control the accumulator pinions. During every machine operation, total hook assembly A is lowered by a cam on the camshaft assembly. However, because the pocket of the plus total hook is over the rear post of the cradle when normal, and therefore is inactive, the hook must be shifted through result key depression to become active.

If the listing hook assembly C and totaling hook assembly A should accidentally both become active over the posts in the cradle in opposition to one another, or if the accumulator pinions are prevented from meshing with the adding racks, as from a point to point lock, frame D pivots by expanding spring E thus preventing damage to the accumulator meshing mechanism. Shoulder nut F which extends through a slot in the right side frame tends to prevent weaving of frame D when the pivoting action takes place.

Control From Result Keys

Depression of the total keys causes the listing hook assembly to be inactive. Total key E cams stud F downward locating the listing hooks in non-add position.

Depression of the sub-total key A indexes the total hook in the same manner as the total key but without actuating stud F. Therefore, the listing hook being in normal add position retains the accumulator pinions in mesh with the adding racks during the last half of the machine cycle to sub-total the pinions.

Depression of a result key (total or sub-total) with the pinions in plus position actuates lever L and through the formed ear of lever L moves total linkage I rearward. The upper pocket in total linkage I fits over stud J in the total hook assembly, and as the total linkage I is moved rearward, the total hook assembly is shifted far enough to place the plus total hook over the rearward post of the cradle. With the pinions in plus position, total block D limits total linkage I to move only far enough for latch M to engage the first step of linkage I. Latch M holds linkage I rearward until the drive trip slide is released at the end of the machine cycle to ensure complete total function.

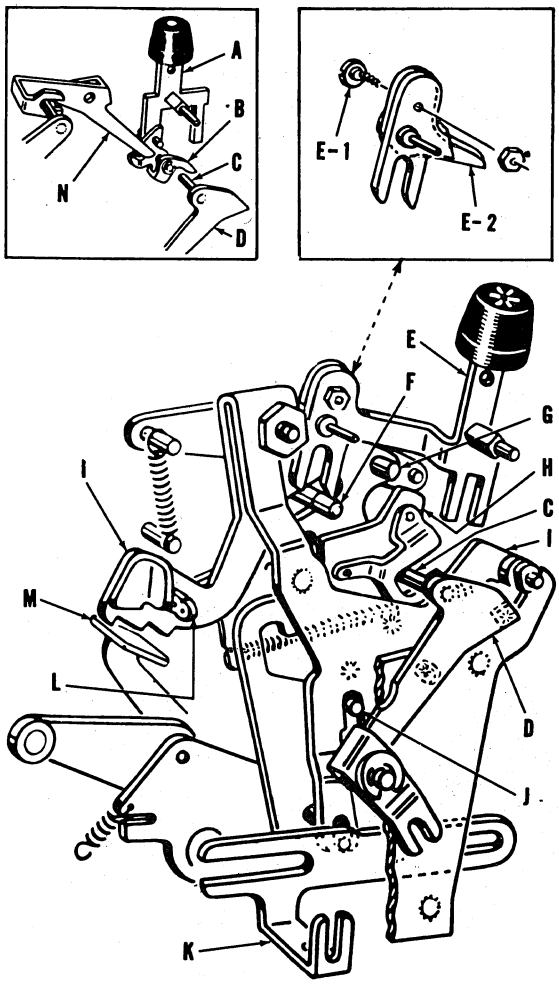


Fig. II-82 Result Key Mechanism

Swing of total linkage I causes the accumulator carry pawls to be blocked during a total operation so that the wide teeth of the accumulator pinions are limitedat cipher position without causing a carry to be indexed. Total linkage I through its lower pocket moves slide K rearward to rock lever F (Fig.II-73).

When subtracted amounts exceed added amounts, the automatic one carry bail moves total block D rearward from under the milled stud in total linkage I. Stud C in total block D moves arm H (part of total linkage I) under stud G in lever L so that when the total key is depressed, total linkage I is moved farther than during plus totals to position the minus total hook over the forward post in the cradle, and to latch the second step of total linkage I on latch M. Thus, the machine cycle causes the accumulator pinions to mesh with the upper teeth of the adding racks to produce a minus total.

During a minus sub-total operation, the listing hook assembly is moved rearward to activate the subtract hook as the sub-total key is depressed. With a minus amount in the pinions, total block D is in a rearward position, and as the sub-total key is depressed, lever B limits on stud C, causing lever B to pivot on the sub-total keystem. Pivoting of lever B cams stud F rearward shifting the listing hook assembly so that the subtract hook is over the forward post in the cradle to hold the accumulator pinions meshed with the adding racks during the last half of the minus sub-total operation.

Tests and Adjustments

1.To ensure free positioning of the minus balance total control mechanism:

With the machine normal, there should be not more than .012" clearance between stud G (Fig.II-82) and arm H when arm H is moved rearward under stud G. With slide B (Fig.II-25 Keyboard Section) moved under stud A and a result key held downward arm H (Fig.II-82) should move freely under the stud.

To adjust - Bend arm H at its offset.

2. To permit the listing hooks and total hooks to move freely:

With meshing cradle D (Fig.II-83) in normal position the listing and total hooks should have .015' to .020' clearance when passing over the front and rear posts of the meshing cradle.

If the hooks do not have enough clearance over the posts of meshing cradle D (Fig.II-83), the hooks will not move freely.

To adjust - Open or close the slot in lever H at point F of the listing and total hooks.

3. To ensure meshing of the accumulator pinions with the adding racks during all machine operations:

Note : (a) This adjustment may best be made with the carriage removed from the machine so that the locking bail may be actuated manually.

(b) When installing meshing hooks, the punch marks on eccentric collars G (Fig. II-83) should be positioned downward to prevent damage to the parts when the machine is operated to make the adjustment.

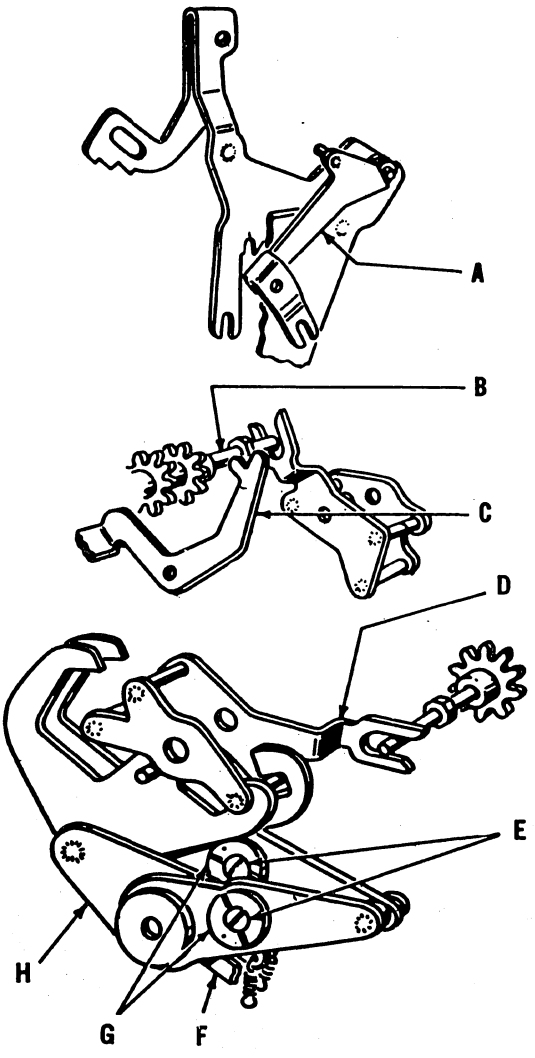


Fig. II-83 Accumulator Controls

With the power off and total block A (Fig. II-83) forward in plus total position, depress the sub-total key and adjust the plus listing and plus total hooks during one operation of the machine.

a. Plus Total Hook.

Rotate the camshaft assembly 1/4 turn clockwise (right side of machine). The extension screw posts, such as post B, screwed in each end of the accumulator pinion shaft should now be touching the shelves in the adding section side frames and the accumulator locking bail C should freely pass over the pinion shaft posts.

To adjust - Loosen screw E in the total hook assembly and rotate eccentric collar G to obtain the above conditions. (Punch mark designates the lower part of the eccentric). Then tighten the screw.

b. Plus Listing Hook

Continue rotating the camshaft assembly until it has been moved 3/4 of a turn. The extension posts in each end of the accumulator pinion shaft should now be touching the shelves in the adding section side frames, and accumulator locking bail C should freely pass over the pinion shaft posts.

To adjust - Loosen screw E in the listing hook assembly and rotate eccentric collar G to obtain the above conditions. (Punch mark designates the low part of the eccentric). Then tighten the screw.

c. Subtract Hook and Minus Total Hook.

Move the total block rearward (minus total position). Repeat the above tests, a and b, observing that the accumulator locking bail passes freely under the extension posts in the accumulator pinion shaft.

4. To hold the listing hooks completely engaged with the accumulator meshing cradle through the entire machine cycle:

With the power off, depress the subtract key. The first step of listing control lever A (Fig. II-79) should have .005" latching lead behind latch K. Listing control lever A should be held in indexed position by latch K until the latch is released by the drive trip slide as it is restored at the end of the machine cycle. Perform a minus sub-total operation and check for the same conditions.

To adjust - Bend the formed ear on latch K to obtain the latching lead.

5. To permit full depression of the subtract key:

With the power off, depress and hold down the subtract key. Lever C (Fig. II-79) should have .010" clearance under the subtract keystem.

To adjust - Bend the formed ear of lever C to obtain the clearance.

6. To hold the total hooks completely engaged with the accumulator meshing cradle through the entire machine cycle:

With the power off and the total block in a rearward (minus total) position, depress the total key. The second step of total control lever I (Fig. II-82) should have .005" latching lead behind latch M. Total control lever I should be held in indexed position by latch M until the latch is released by the drive trip slide as it is restored at the end of the machine cycle.

To adjust - Bend the ear on latch M to obtain the above conditions.

Remove the accumulator assembly so that detailed review of the carry section and construction detail of the accumulator controls on the right machine side frame may be observed.

While the accumulator assembly is removed, additional disassembling may be done as outlined in Section X, Servicing Procedures. After the section is reassembled, the following method of testing for relay carries should be carefully studied and performed until the test is made proficiently.

How To Test for Relay Carries

Purpose

To test relay carries prior to installing the accumulator assembly in the machine.

Preparation- (Minus Balance Construction)

Add Carries

1. Restore all adding racks (type bars) to normal position and retain with the error correction bail.

2. Move the automatic one bail to subtract position (detent roll in lower pocket). Mesh the adding pinions with the lower (add) racks and reset all carries with the reset bail assembly.

3. Mesh the pinions with the subtract (upper) racks.

4. Position and hold the total stop comb to block the carry pawls, and release the adding racks by raising the error correction bail.

Note : Possible interferences to rack indexing are the cipher block mechanism, the aligning bail and the red ribbon control bail.

5. Permit the neutralizing arms to restore the pinion assembly to neutral position.

6. Restore all except the next to the last adding rack and retain those restored with the error correction bail.

7. Mesh the pinion assembly with the adding (lower) racks.

To Test : Hold the carry reset bail far enough depressed (about 1/4 way) to clear the restoring shaft from under the rearward hooks of the latches, but not so far

as to cause interference with the carry action. Tap lightly the adding rack (type bar) which was not restored. This should cause a carry to take place in the last column, which moves the automatic one bail to add position and causes a relay carry across to the starting column.

Note : The test may be repeated by resetting the carries, moving the automatic one bail to subtract position and tapping the adding rack as done previously.

Subtract Carries

1. Release the error correction bail to permit all type bars to move to 9 position. Restore the accumulator to normal by releasing the adding pinion assembly detent bail.

2. Restore all adding racks (type bars) to normal position and retain with the error correction bail.

3. Move the automatic one bail to add position (detent roll in upper pocket). Mesh the adding pinions with the lower (add) racks and reset all carries with the reset bail assembly.

4. Mesh the pinions with the adding (lower) racks.

5. Position and hold the total stop comb to block the carry pawls and release the adding racks by raising the error correction bail.

Note : Possible interferences to rack indexing are the cipher block mechanism, the aligning bail and the red ribbon control bail.

6. Permit the neutralizing arms to restore the pinion assembly to neutral position.

7. Restore all except the next to the last adding rack and retain those restored with the error correction bail.

8. Mesh the pinion assembly with the subtract (upper) racks.

To Test : Hold the carry reset bail far enough depressed (about 1/4 way) to clear the restoring shaft from under the rearward hooks of the latches, but not so far as to cause interference with the carry action. Tap lightly the adding rack (type bar) which was not restored. This should cause a carry to take place in the last column, which moves the automatic one bail to subtract position and causes a relay carry across to the starting column.

Preparation- (Non-Minus Balance Construction)

Add and Subtract Carries

Follow the same procedure given for Minus Balance machines with the following exceptions:

1. Restore all except the adding rack (type bar) in column one in order to test a relay carry from column one through the machine capacity.

Review

1. When observed from the right side of the machine, in which direction are the adding pinions turned when adding? When subtracting?

2. With which set of adding racks are the adding pinions meshed to accumulate plus amounts? Which set for minus amounts?

3. What kind of machine operation leaves the adding pinions in neutral position?

4. How many cams on the camshaft assembly control meshing of the adding pinions and the adding racks?

5. From how many sources is the accumulator hook assembly controlled?

6. How is meshing of the accumulator timing control changes from adding to totaling?

7. What would be the result if part B (Fig. II-69) were removed and the non-add and total keys were depressed simultaneously?

8. What would be the result during totals and sub-totals if there were no passing clearance between link K (Fig. II-70) and stud I?

9. When the accumulator hook assembly releases control of the pinion shaft assembly, what restores the pinions to the neutral position between the upper and lower adding racks?

10. During total or sub-total operations the carry pawls block rotation of the adding pinions by limiting the wide teeth of the pinions. Why isn't the carry pawl driven into a carry action the same as during accumulating operations?

11. A carry is set up when more than 9 is accumulated either adding or subtracting. What determines whether a carry is added or subtracted?

12. When and how is the automatic one carry bail actuated?

13. Name two specific reasons why the automatic one is required.

14. If $9.00 is in the accumulator and $9.00 is added, when is the carry accumulated?

15. If $9.00 is in the accumulator and $29.00 is added, when is the carry accumulated?

16. The adding racks and carry pawls are reset simultaneously. When during the machine operation is latching lead of the carry pawl latches obtained?

17. Where are the wide teeth of the accumulator pinions positioned in relation to the carry pawl when in normal plus position? In normal minus position?

Reassemble the machine and make a complete test run of all operations as outlined in Section X under 'Some Machine Operating Tests' to assure that all adjustments are on test.

Burroughs

Series J

TEN KEY ADDING MACHINE

INSTRUCTION BOOK

Section III

●

SERIES J 314

PRINTED IN U.S.AMERICA MAY 1965

FOR FORM 3705

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SERIES J314

Multiplying Feature Dial Set Series J314

Introduction

The multiplying feature enables the semi-automatic multiplication of an amount entered on the intermediate keyboard by another amount, the digits of which are set up on a multiplying dial one at a time starting with the first unit digit. The machine is operated during each multiplying operation by depression of the repeat key. After each operation the intermediate keyboard is tabulated one space to enable ten times the amount on the intermediate keyboard to be added with succeeding digits indexed on the multiplying dial.

The multiplying dial is located at the top left hand side of the keyboard, It is divided into 11 segments which are numerically graduated from 0 to 9 with a blank space between 0 and 9. The dial can be rotated backwards or forwards to select the required number for multiplying. During a multiplying operation a protecting shield covers the multiplying dial to prevent manipulation of the dial during the whole of the multiplying operation.

When the '0' is set up on the multiplying dial, and the repeat key is depressed, the machine non-adds and non-spaces to prevent accumulation of the indexed amounts. The intermediate keyboard is, however, tabulated one space in preparation for the next multiplication, This is achieved by the use of an auxiliary cipher key which operates while the normal keyboard is locked against depression.

Method used for Multiplying

The method used for multiplying is a short cut method. Multiplying by numbers 1 to 5 the machine repeats 1 to 5 times respectively, adding during each operation the amount indexed on the intermediate keyboard. At the end of the last repeat operation the intermediate keyboard is tabulated one space to the left.

Example :	Multiply	12 x 3
	1st operation	12
	2nd operation	12
	3rd operation	12
	Total	36

Multiplying by 6 to 9 the machine repeats 5 to 2 times respectively, subtracting the amount listed on the keyboard on each operation except the last. At the end of the next to last operation the intermediate keyboard is tabulated one space to the left to allow ten times the indexed amount to be added on the last operation.

Example :	Multiply	12 x 8
	1st operation	12 -
	2nd operation	12 -
	3rd operation	120
	Total	96

Operation

Coupled to and rotating with the multiplying dial are three cams, a repeat cam, a step-over cam and a subtract cam as well as a detent wheel and spacing ratchet.

The repeat cam controls the necessary automatic repeat operations required during multiplication and also indexes the non-add, non-space mechanism.

The step over cam indexes the intermediate keyboard escapement mechanism when the multiplying dial is in the 0, 1 or 9 position.

The subtract cam operates the subtract mechanism and indexes the minus symbol when the multiplying dial is set in position 6 thru 9.

Interlocks

To prevent misoperation of the multiplying feature a number of interlocks have been incorporated into the design.

1. To prevent tripping of the clutch when the multiplying dial is between two positions.
2. To prevent simultaneous depression of repeat and minus keys.
3. To prevent depression of any power keys except the repeat (X) when the Rotary Multiplying dial is in other than '0' position.
4. To prevent manipulation of the multiplying dial during a multiplying operation.

Repeat Cam

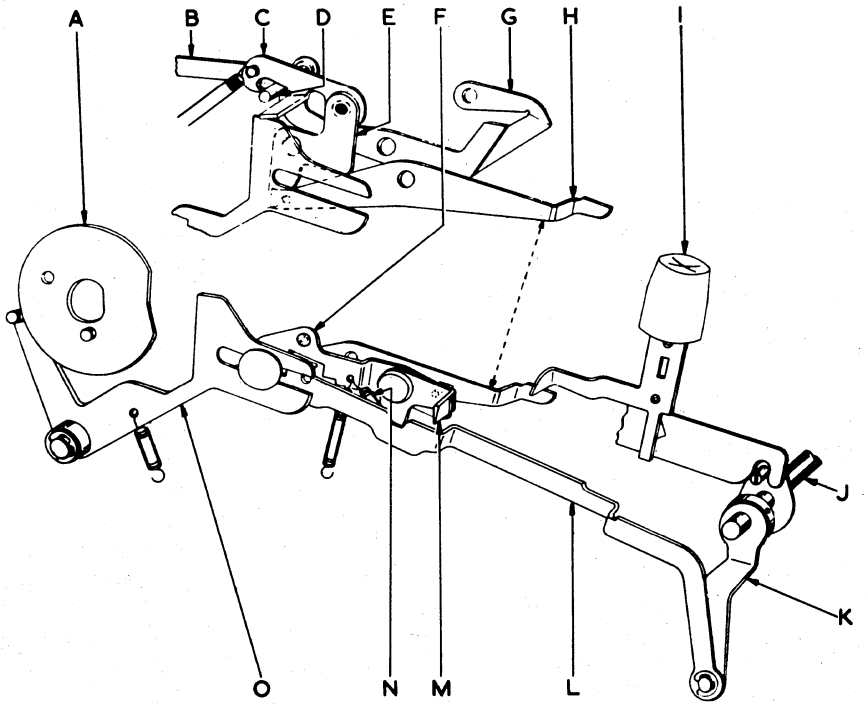

Fig. III-1 Repeat Cam Mechanism

When the repeat cam A (Fig. III-1) is set at any position from 1 to 9, repeat link L is held in upward position by bellcrank O. Depression of repeat key I, through repeat lever H, rocks interlock lever F to lower repeat locking pawl M and expand spring N. As repeat link L is moved forward by arm K on clutch trip shaft J, pawl M enters the cut-out in link L to hold the clutch tripped throughout the multiplying operation. When cam A returns to '0' position the roll on bellcrank O moves into the pocket of cam A causing the bellcrank to lower link L clear of pawl M.

Depression of an operating key other than the repeat key is prevented when the multiplying dial is set in any position other than '0'. Interlock lever F blocks the formed ear on repeat link L which prevents forward movement of the link and rotation of clutch trip shaft J.

Non-Add, Non-Print, Non-Space Operation

When the multiplying dial is set in '0' position, hook C (Fig. III-1) is positioned over stud D in type bar blocking bail G. Depression of the repeat key, through repeat lever H, bellcrank E and hook C rocks bail G to retain the type bars in non-print position. Link B moves the feed pawl to inactive position to prevent the paper spacing. With the multiplying dial set in any position other than '0', bellcrank O holds hook C clear of stud D.

Tests and Adjustments

1. To ensure automatic repeat of machine operations when multiplying:

With the clutch trip correctly adjusted set the multiplying dial to any position 1 thru 9 and depress the repeat key to latch repeat link L on repeat locking pawl M. There should be minimum clearance between the foot of limit AP, Plate 17, Series J Parts Catalog, Form 2905, and the upper surface of the formed ear on arm I, Fig. III-2.

To adjust- Bend the formed ear on pawl M.

3. To ensure a non-add, non-print, non-space operation when multiplying by '0':

With the multiplying dial set in any position 1 thru 9, there should be minimum clearance of hook C over stud D when the repeat key is depressed.

To adjust- Bend the formed ear of hook C.

Step-Over Selecting Cam

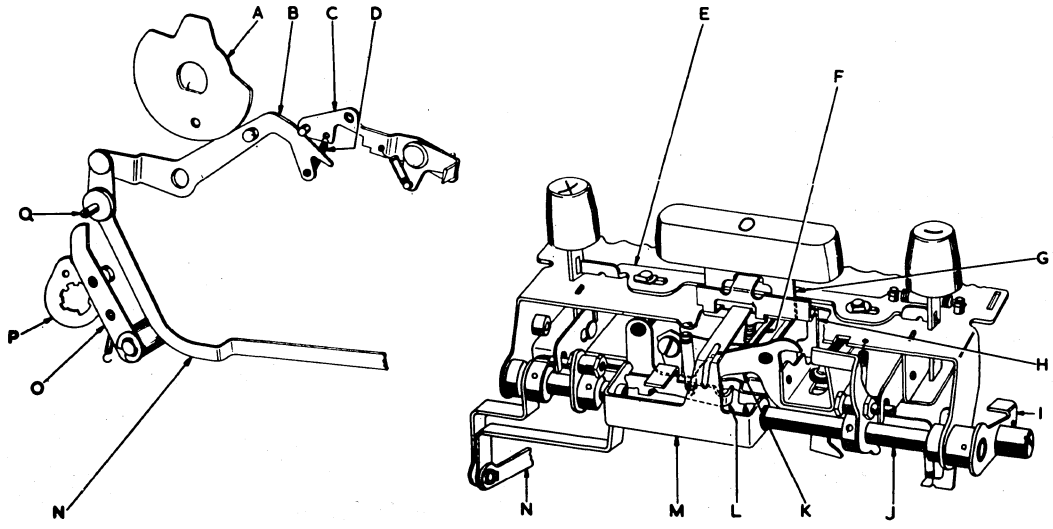

Fig. III-2 Keyboard and Step-Over Selective Cam Functions

Depression of the repeat key through lever H (Fig. III-1) rocks interlock arm C (Fig. III-2) which through spring D raises arm B until it's roller contacts step-over selecting cam A. As the cam reaches position 1 or 9, arm B, which follows the outline of the cam under the tension of spring D, lowers stud Q into the path of arm O. Near the end of the machine cycle, actuating cam P on the main camshaft drives link N forward through arm O to rock step-over bail M.

The same function occurs when the repeat key is depressed with the multiplying dial set at '0' position.

Intermediate Keyboard Escapement

A projection on the left bearingof bail M lowers auxiliary escapement pawl L to place it's formed ear into the teeth of the intermediate keyboard escapement rack. At the same time the finger on bail M depresses auxiliary cipher keystem Hto rock shaft assembly F which raises the regular escapement pawl and allows the initial escapement to take place. The escapement is completed as link N and bail M restore to normal.

Depression of a listing key actuates auxiliary escapement pawlL through escapement shaft assembly K which operates in a 'U' form on the auxiliary escapement pawl.

Interlock to Prevent Simultaneous Depression of Repeat and Minus Keys

Depression of the subtract key cams interlock slide E to the left into the slotof the repeat keystem thus preventing depressionof the repeat key. When the repeat key is depressed, the solid portion of the keystem blocks slide E which prevents depression of the subtract key.

Tests and Adjustments

1.(a) To ensure immediate movement of auxiliary keystem H when the cipher key is depressed:
(b) To maintain the cipher keyin normal position:
(c) To prevent a false upward limit of auxiliary keystem H:

With the machine normal and cipher keystem G manually held in upward position, there should be minimum clearance between the formed ear on auxiliary keystem H and cipher keystem G.

To adjust - Bend the formed ear on auxiliary keystem H.

2. To ensure full depression of auxiliary keystem H:

With the multiplying dial set at '0' position, depress the repeat key and operate the machine manually until the roller on arm O is on the high point of cam P. Auxiliary keystem H shouldbe fully depressed without cramp.

To adjust - Turn eccentric stud Q.

3. To ensure correct escapement of the intermediate keyboard when multiplying by '0' and to prevent overthrow of auxiliary pawl L when listing keys are depressed:

With the multiplying dial set at '0' position, depress the repeat key and operate the machine manually until the roller on arm O is on the high point of cam P.

(a) The formed ear of auxiliary pawl L should be fully engaged with the escapement rack on the intermediate keyboard.

(b) There should be minimum clearance between the upper formed ear of auxiliary pawl L and shaft J.

To adjust -
(a) Bend the projection on the left end of bail M up or down,
(b) Bend the upper formed ear of auxiliary pawl L up or down.

Subtract Cam

When the multiplying dial is turned to any position 6 thru 9, the high portion of cam F (Fig. III-3) rocks bail A to move listing hooks D to subtract position through listing control lever C. The rocking of bail A also positions symbol indexing butterfly B to the minus (—) position

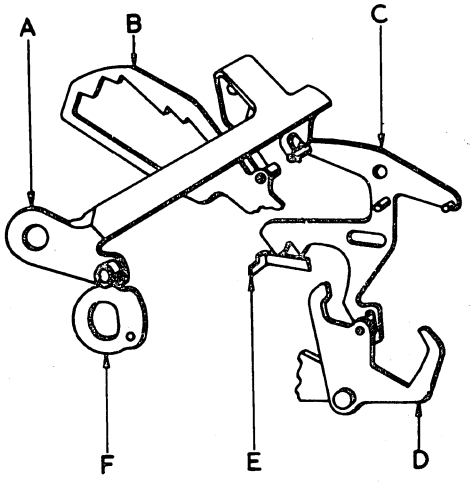

Fig. III-3 Subtract Cam Mechanism

Tests and Adjustments

1. To ensure a correct subtract function when multiplying by 6 thru 9:

With the multiplying dial set in any position 6 thru 9, the step of listing control lever C should have .005" lead over latch E.

To adjust - Weave bail A.

2. To ensure printing the minus symbol when multiplying by 6 thru 9:

With the multiplying dial set in any position 6 thru 9, symbol butterfly B should be in minus (—) position.

To adjust - Bend the finger of bail A.

Multiplying Dial Re-Set Mechanism

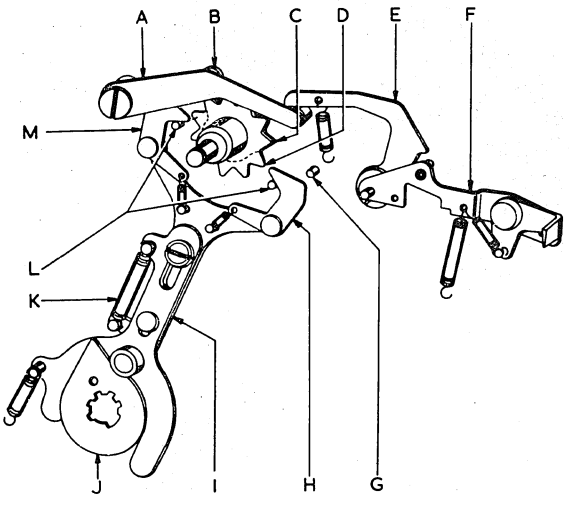

Fig. III-4 Multiplying Dial Reset Mechanisms

Slide assembly I (Fig. III-4) is driven upwards near the end of each machine cycle by cam J on the main camshaft. If the multiplying dial is set to a position other than '0', pawl H or M will contact one of the five teeth of ratchet wheel C to turn the dial one space, this is repeated on each machine operation until the dial reaches '0' position. From positions 1 to 5 ratchet C is driven in a clockwise direction by pawl M, from positions 6 to 9 the ratchet is driven counter-clockwise by pawl H. Studs L hold pawls H and M clear of ratchet C when slide assembly I is in it's lowered position.

Studs G hold the active pawl fully engaged with ratchet wheel C when slide I reaches the limit of its upward travel to prevent overthrow of the multiplying dial. Spring K forms a yielding joint between the two halves of slide assembly I to prevent a machine lock if the multiplying dial is not free to rotate.

Drive Trip Interlock

Interlock E (Fig. III-4) prevents a machine operation if the multiplying dial is set between two positions. If roller B is not correctly located in a tooth space of star wheel D the front roller on detent A positions interlock E over a stud in interlock arm F thus preventing upward movement of arm F and depression of the repeat key.

Rotary Protecting Shield

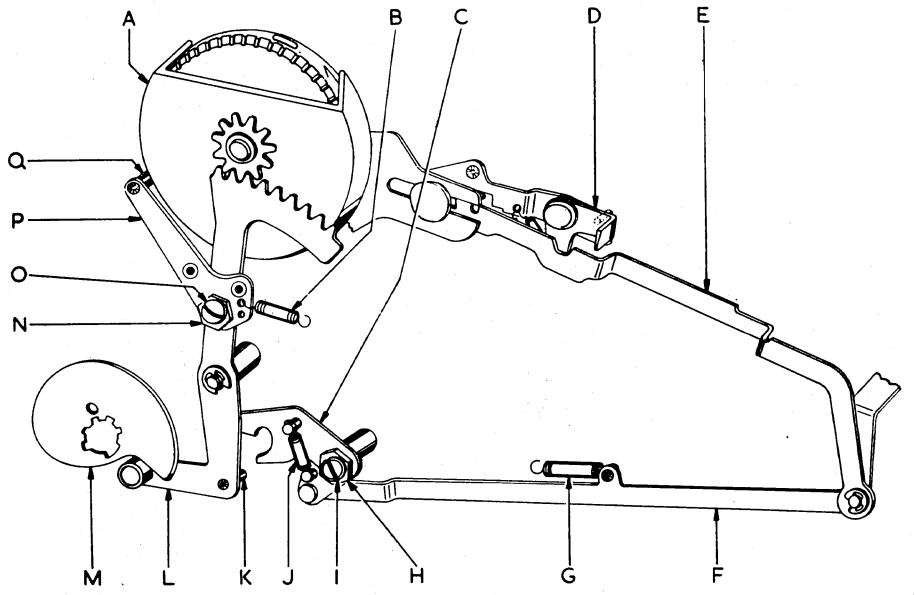

Fig. III-5 Rotary Protecting Shield Mechanisms

When the drive is tripped, link F (Fig. III-5) is moved forward which, through spring J, lowers latch C to limit on stud K in sector L. At the beginning of the machine operation cam M on the main camshaft rocks sector L to rotate shield A. As stud K moves forward it is engaged by the pocket in latch C which locks sector L in position throughout the multiplying operation. At the end of the multiplying operation repeat link E is disengaged from repeat locking pawl D which allows link F to restore under tension of spring G. Restoration of link F raises latch C to clear stud K and allow spring B to restore sector L to normal.

Rubber cushion Q on arm P exerts a braking effect on shield A as the latter restores to normal and also provides the normal limit for sector L.

Tests and Adjustments

1. To ensure correct positioning of the rotary protecting shield:

With the machine normal the inclined edge of the shield should align with the opening in the machine case.

To adjust - Turn eccentric N.

2. To prevent vibration of the shield during multiplying operations:

Manually operate the machine until sector L is held by latch C, there should be minimum clearance between the roller on the sector and cam M.

To adjust - Turn eccentric H.

Burroughs

Series J

TEN KEY ADDING MACHINE

INSTRUCTION BOOK

Section IV

●

SERIES J 514

PRINTED IN U.S.AMERICA MAY 1965

FOR FORM 3705

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SERIES J514

MULTIPLYING FEATURE DIAL SET

SERIES J514

Introduction

The multiplying feature enables the semi-automatic multiplication of an amount entered on the intermediate keyboard by another amount, the digits of which are set up on a multiplying dial one at a time starting with the first unit digit. The machine is operated during each multiplying operation by depression of the repeat key. After each operation the intermediate keyboard is tabulated one space to enable ten times the amount on the intermediate keyboard to be added with succeeding digits indexed on the multiplying dial.

The multiplying dial is located at the top left hand side of the keyboard. It is divided into 11 segments which are numerically graduated from 0 to 9 with a blank space between 0 and 9. The dial can be rotated backward or forward to select the required number for multiplying. During a multiplying operation a protecting shield covers the multiplying dial preventing manipulation of the dial during the whole of the multiplying operation.

When the '0' is set up on the multiplying dial and the repeat key is depressed, the machine non-adds and non-spaces to prevent accumulation of the indexed amounts. The intermediate keyboard is, however, tabulated one space in preparation for the next multiplication. This is achieved by the use of an auxiliary cipher key which operates while the normal keyboard is locked against depression.

Method Used For Multiplying

The method used for multiplying is a short cut method. Multiplying by numbers 1 to 5 the machine repeats 1 to 5 times respectively, adding during each operation the amount indexed on the intermediate keyboard. At the end of the last repeat operation the intermediate keyboard is tabulated one space to the left.

Example :	Multiply	12 x 3
	1st operation	12
	2nd operation	12
	3rd operation	12
	Total	**36**

Multiplying by 6 to 9 the machine repeats 5 to 2 times respectively, subtracting the amount listed on the keyboard on each operation except the last. At the end of the next to last operation the intermediate keyboard is tabulated one space to the left to allow ten times the indexed amount to be added on the last operation.

Example :	Multiply	12 x 8
	1st operation	12 –
	2nd operation	12 –
	3rd operation	120
	Total	**96**

Operation

Coupled to and rotating with the multiplying dial are three cams, a repeat cam, a step-over cam and a subtract cam as well as a detent wheel and spacing ratchet.

The repeat cam controls the necessary automatic repeat operations required during multiplication.

The step-over cam indexes the intermediate keyboard escapement mechanism when the multiplying dial is in the 0, 1 or 9 position.

The subtract cam operates the subtract mechanism, indexes the minus symbol when the multiplying dial is set in position 6 through 9, and also indexes the non-add non-space mechanism.

Interlocks

To prevent misoperation of the multiplying feature a number of interlocks have been incorporated into the design.

1. To prevent tripping of the clutch when the multiplying dial is between two positions.

2. To prevent simultaneous depression of the repeat (x) and minus (−) keys.

3. To prevent depression of any live key except repeat key (x) when the rotary dial is set at any position other than '0'.

4. To prevent interfering with the rotary dial during a multiplying operation.

5. To prevent depressing any listing keys during a multiplying, step-over or machine operation.

Machine Functions and Cam Operations Controlled by Multiplier Dial and Repeat Key

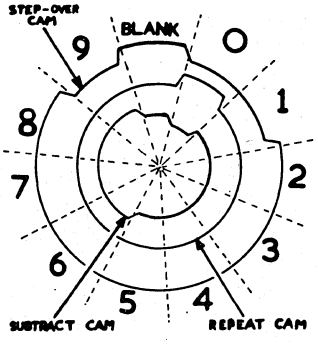


Fig. IV-1 Cam Functions

Dial Setting	Repeat Cam	Step Over Cam	Subtract Cam
0	Stop Repeat	Step Over	Non Add
1	Repeat	Step Over	Add
2	Repeat		Add
3	Repeat		Add
4	Repeat		Add
5	Repeat		Add
6	Repeat		Subtract
7	Repeat		Subtract
8	Repeat		Subtract
9	Repeat	Step Over	Subtract
Blank	Repeat		Add

Repeat Cam

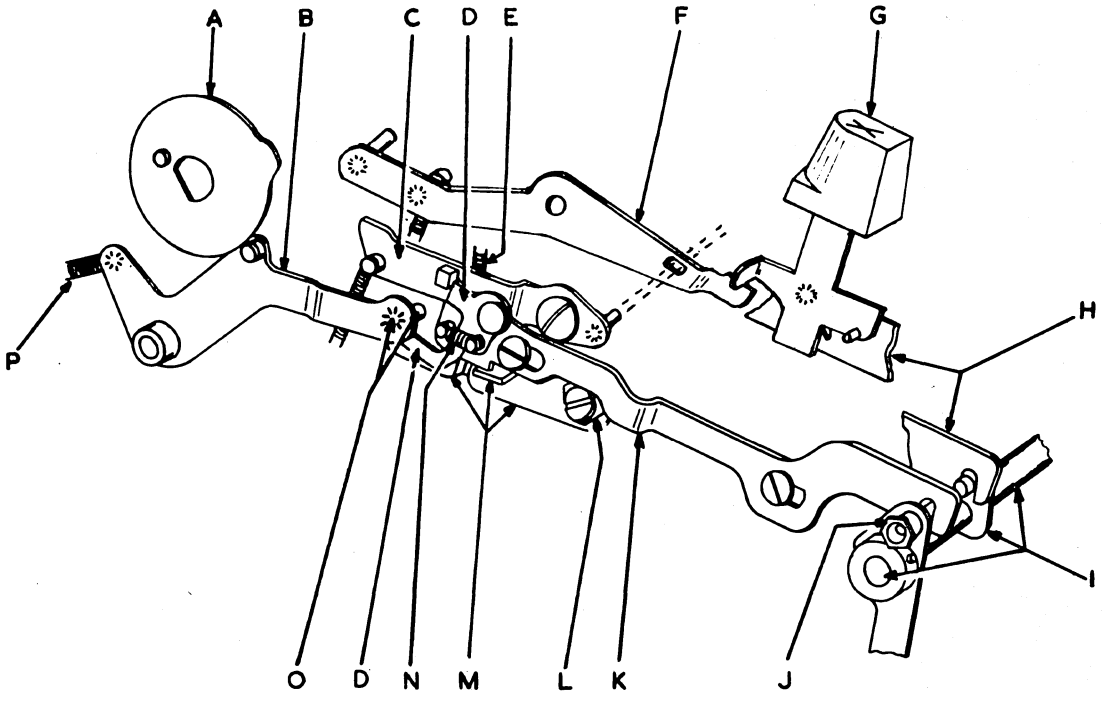


Fig. IV-2 Repeat Cam Mechanism

When using the repeat key (x) and the multiplier dial, automatic repeat machine operations are indexed to speed the operation and reduce operator work.

When the repeat cam A (Fig. IV-2) controlled by the multiplying dial, is set at any position 1 to 9 and Blank the stud O at the forward end of repeat indexing lever B is held upward by spring P which allows latch M under spring E tension to become active. Depression of the repeat key G moves keyboard slide H rearward to rock clutch trip shaft I. As shaft I rocks, eccentric post J drives locking slide K rearward to be latched by M and maintain the clutch tripped throughout the multiplying operations.

When the repeat cam A returns to '0' position the projection on the cam drives lever B downward, through its stud O lowers latch M to release slide K and allow clutch trip shaft I, slide H and repeat key G to restore to normal.

Since the multiplier dial controls machine functions an interlock is incorporated to prevent depression of an operating key other than the repeat key (x) when the multiplying dial is set in any position other than '0'.

When the multiplying dial is set in any position other than '0', arm D (part of locking slide K) controlled by lever B in the same way as latch M is raised by spring N in front of square stud on part C to prevent rearward movement of slide K and tripping the clutch.

Depression of the repeat key G raises part C through lever F and post at front end of C, which allows slide K to move rearward and be latched by M.

When the multiplying dial is set at '0' position arm B being in the lowered position all operating keys are free to operate in the normal way. Depression of the repeat key G trips the clutch but since

latch M is inactive the machine operates only once and steps the intermediate keyboard one column to the left (See Step-over cam).

Tests and Adjustments

1. To prevent depression of any operating key except the repeat key (x) when the multiplying dial is set at any position other than '0'.

Machine normal, dial set at any position 1 to 9 there should be .008" clearance between square stud on part C and arm D on slide K.

To adjust - Position eccentric post J keeping the high point upward.

2. To ensure automatic repeat machine operations when multiplying.

Machine normal, dial set at any position 1 to 9, depress repeat key slowly and hold down. There should be minimum clearance between rear edge of latch M and step on slide K.

To adjust - Position eccentric L keeping the high point upward.

Step Over Cam

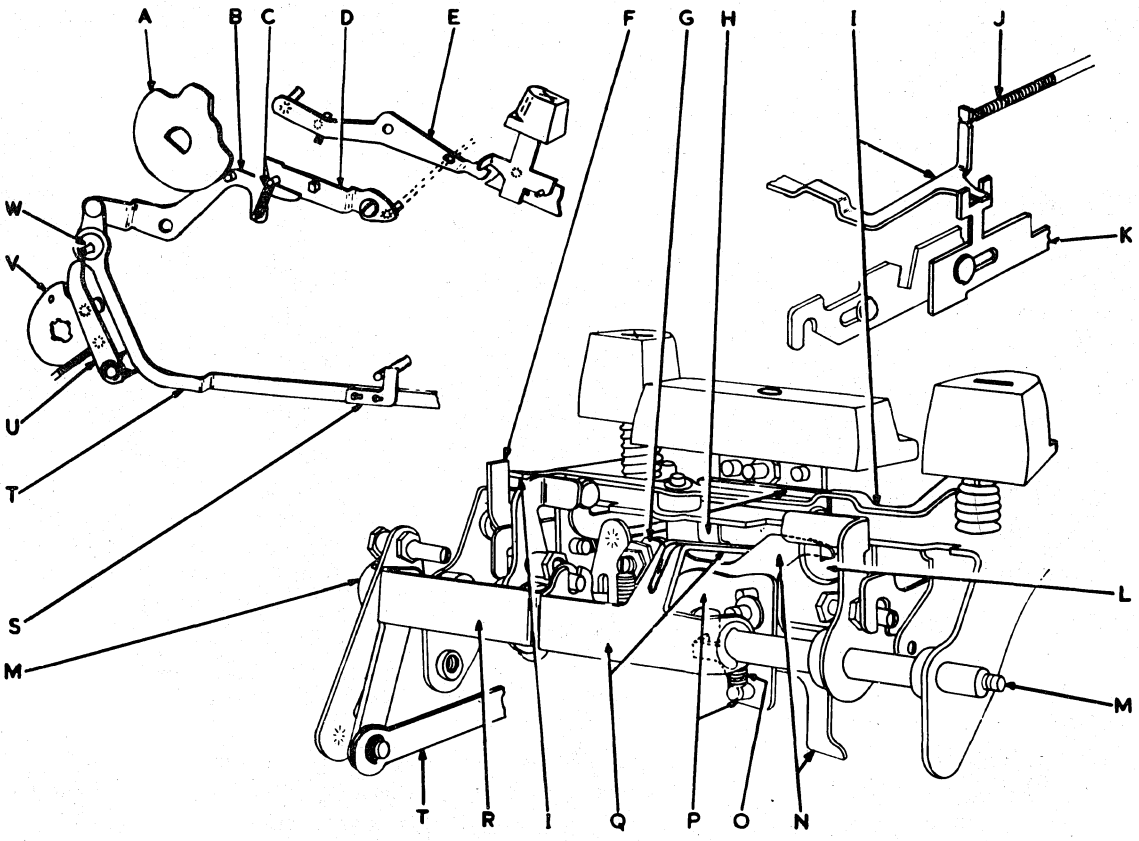


Fig. IV-3 Step-Over Cam Mechanism

In using the 'short cut' principle for multiplying it is necessary to step over the intermediate keyboard one column to left when multiplying by figures from 6 to 9. The intermediate keyboard is, however, moved over one column whatever figure is set on the multiplying dial in preparation for further multiplication which may be required.

The step over cam A (Fig. IV-3) has two pockets, one which aligns with the '0' and '1' position and the other with the '9' position on the multiplying dial. Part D which is held upwards by the repeat lever E is connected to arm B by spring C connection and holds it against the cam contour. When the multiplying dial is in the '0', '1' or '9' position, arm B is raised into the active pocket by spring C, which lowers stud W into line with actuating arm U. Cam V which is located on the main camshaft drives arm U forward on each machine operation, and when stud W is active will drive it and link T forward. Forward movement of link T rocks bails R and Q to index the intermediate keyboard escapement.

Intermediate Keyboard Escapement

A projection on the right of bail R rocks auxiliary escapement arm P into the intermediate keyboard tooth rack, while the stud on R rocks bail Q. The finger on bail Q rocking downward depresses auxiliary cipher keystem H, which lowers a cipher pin in the intermediate keyboard to allow the initial escapement to take place. The escapement is completed when link T and bails R and Q restore to normal near the end of the machine cycle.

Note: On early style machines which are fitted with escapement pawl B (Fig. II-11) Keyboard Section), auxiliary cipher keystem H rocks escapement assembly C to raise the escapement pawl and allow the initial escapement to take place.

Spring O forms a yielding joint between auxiliary escapement arm P and shaft assembly N this being necessary to prevent depression of the listing keys whilst the clutch is tripped.

Interlock to Prevent Depression of Listing Keys During Machine Operation

During machine operation clutch trip shaft M being rocked, holds slide L rearward, which presents a blocking surface to the ear of shaft assembly N. The shaft assembly N blocked from lowering prevents indexing of the intermediate keyboard.

The auxiliary cipher keystem H being narrower is not blocked by shaft assembly N and by means of the yielding spring O connection, the intermediate keyboard may be indexed by the 'step-over' mechanism while the keyboard remains blocked. When the machine is at normal, slide L being forward the keyboard is free to operate in the normal way, auxiliary escapement arm P being lowered by the upper anchor stud for spring O.

Interlock to Prevent Simultaneous Depression of Repeat and Minus Keys

Since the minus key (—) function will conflict with a repeat key (x) multiplying operation, depression of both keys simultaneously is prevented by an interlock.

Arm I pivots on the keyboard top plate between interlock slides F and K on the left and right sides of the keyboard. Depression of repeat key (x) rocks slide F rearward which swings slide K forward through pivoting arm I on the keyboard top plate. Slide K being in the forward position presents a blocking surface under the operating keys and prevents their depression. When the repeat key (x) restores to normal spring J restores arm I and slides K and F to normal.

Depression of the minus key (—) positions a stud in front of slide K and prevents its movement should an attempt be made to depress the repeat key.

Tests and Adjustments

The following tests and adjustments should be made in the correct sequence.

1. To ensure full indexing of the auxiliary cipher keystem.

Dial set at '0' position, repeat key (x) latched down operate the machine manually until arm U is fully forward. Auxiliary keystem H should be completely depressed without binding.

To adjust - Position eccentric stud W.

2. To ensure correct escapement of the intermediate keyboard:

With the auxiliary keystem H fully indexed, auxiliary escapement arm P should enter and have full hold of the next tooth on the intermediate keyboard rack.

To adjust - Bend the right rear end projection of bail R where it makes contact with arm P.

3. To ensure indexing the step over mechanism:

With the machine normal, dial set at '0' position, depress and latch repeat key (x). Stud W should pass freely in front of arm U with minimum clearance.

To adjust - Position limit plate S on slide T against post in side frame.

Multiplying Dial Re-set Mechanism

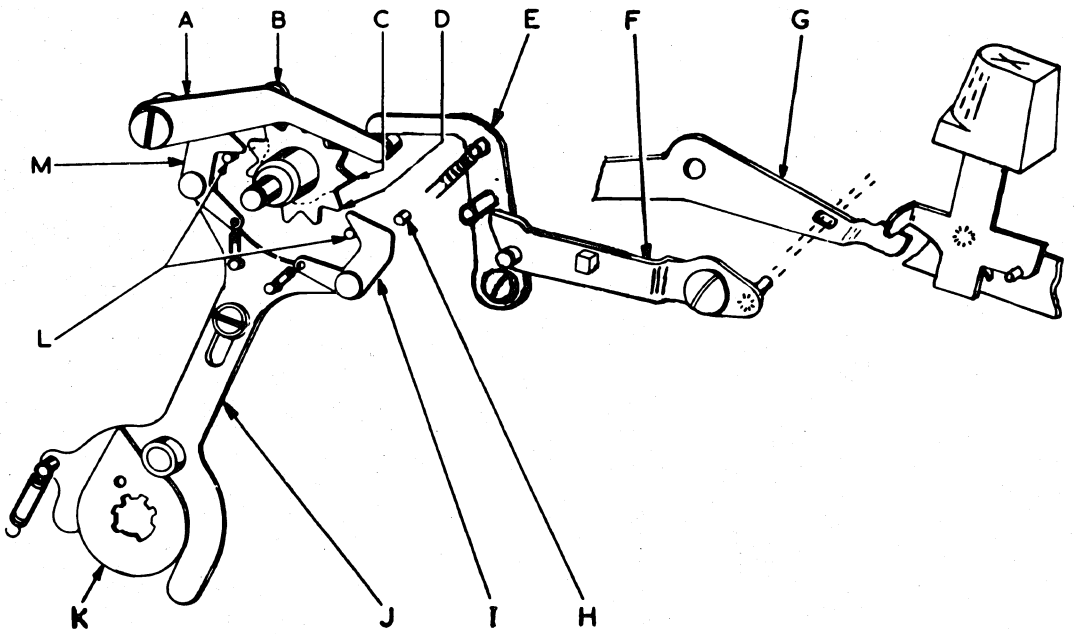


Fig. IV-4 Multiplying Dial Reset Mechanism

During the automatic repeat machine operations the multiplying dial is returned to the '0' position. This enables the different machine functions required to be indexed at the appropriate time.

Restoring slide J (Fig. IV-4) is driven upward near the end of each machine cycle by cam K which is located on the main camshaft. If the multiplying dial is set to a position other than '0' pawl I or M

will contact one of the five teeth of ratchet wheel C to turn the dial one space. This being repeated on each machine operation until the dial reaches the '0' position where no teeth are active and movement of the dial ceases. From dial positions 1 to 5 ratchet C is driven in a clockwise direction by pawl M and from positions 6 to 9 and the blank position the ratchet C is driven counter-clockwise by pawl I. Studs L hold pawls I and M clear of ratchet C when slide J is in its lowered position at normal. Studs H hold the active pawl fully engaged with ratchet wheel C when slide J reaches the limit of its upward movement to prevent overthrow of the multiplying dial.

Drive Trip Interlocks

Interlock E (Fig. IV-4) prevents depression of the repeat key (x) and machine operation if the multiplying dial is set between two positions.

If roller B is not correctly located in a tooth space of star wheel D, the front roller on detent A holds interlock arm E forward. The stud in E now positioned over part F prevents it being raised by depression of the repeat key (x) and repeat lever G.

Subtract Cam

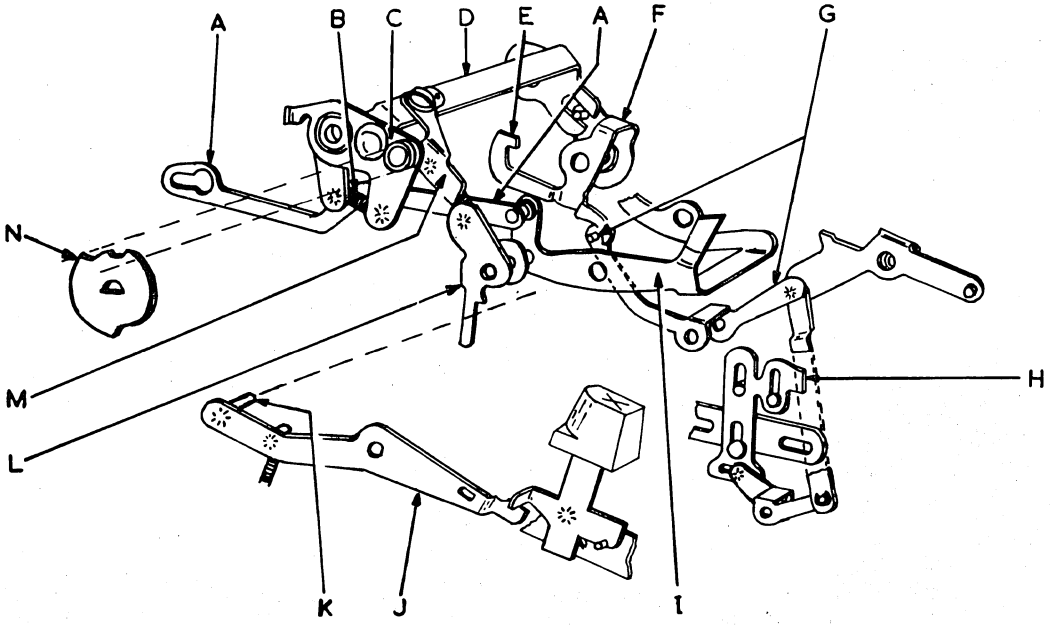


Fig. IV-5 Subtract Cam Mechanism

The subtract cam controls the listing and printing functions during multiplying operations by means of a dwell and a pocket on the cam outline. With the dial set in a position 1 to 5 and the blank position, the amount indexed on the intermediate keyboard will be added and printed. With the dial set in a position 6 to 9 the indexed amount will be subtracted and printed.

When the dial is set at the '0' position and the repeat key (x) is used a non-add, non-print, non-space operation through a partial indexing of the standard Error Mechanism, while a step over operation takes place.

When the multiplying dial is set in a 6 to 9 position the dwell on the subtract cam N (Fig. IV-5) rocks part C which,

through spring B, raises bail D to lower minus index link H into an active position by rocking bail F which in turn rocks minus index bail G to position H.

When the multiplying dial is set in a 1 to 5 and blank position, cam N positions part C to lower bail D which allows minus indexing bail G and link H to restore to normal and an add operation takes place.

When the multiplying dial is set at the '0' position the pocket on the subtract cam N is active. Finger M which is attached to bail D is lowered and pawl L swings into active position. When repeat key (x) is depressed stud K at rear of repeat lever J raises pawl L and rocks type bar blocking bail I into active position, and link A being moved forward disables spacing. The amount indexed in the intermediate keyboard is retained since repeat lever J being in the raised position the restoring link is held inactive during the machine cycle.

Symbol Printing When Multiplying

When using the repeat key (x) the printing control slide is controlled by a formed ear E (Fig. IV-5) on bail F and the subtract cam.

With the dial set in the '0' position, bail D is in a lowered position and ear E inactive, leaving the symbol slide free to move rearward in the normal way until reaching the limit set by the active operation key. Using the repeat key (x) indexes the type bar blocking bail I and no limit for the symbol slide is required.

With the dial set in the 1 to 5 and blank positions, subtract cam N raises the formed ear E on bail F through part C and bail D into a blocking position, which prevents rearward movement of the symbol slide.

With the dial set in the 6 to 9 positions, bail D positioned by subtract cam N raises the formed ear E out of a blocking position and the symbol slide may move rearward until limited in the pocket of ear E which coincides with the minus printing position.

Spring B forms a yielding joint between part C and bail D to prevent a machine lock should bail D not be free to index.

Tests and Adjustments

1. To prevent overthrow of the subtract indexing mechanism.

With the machine normal, dial set at a 6 to 9 position there should be minimum pivoting movement of bail D without cramping roller on part C.

To adjust - Bend the rear extension of part C where contact with the left side frame is made.

2. To ensure correct operation of the type bar blocking bail:

With the machine normal, dial set at a 1 to 5 position, depress repeat key (x). There should be minimum passing clearance between rear of stud K and pawl L.

To adjust - Bend non-add indexing finger M on bail D to position pawl L as required.

Rotary Protecting Shield

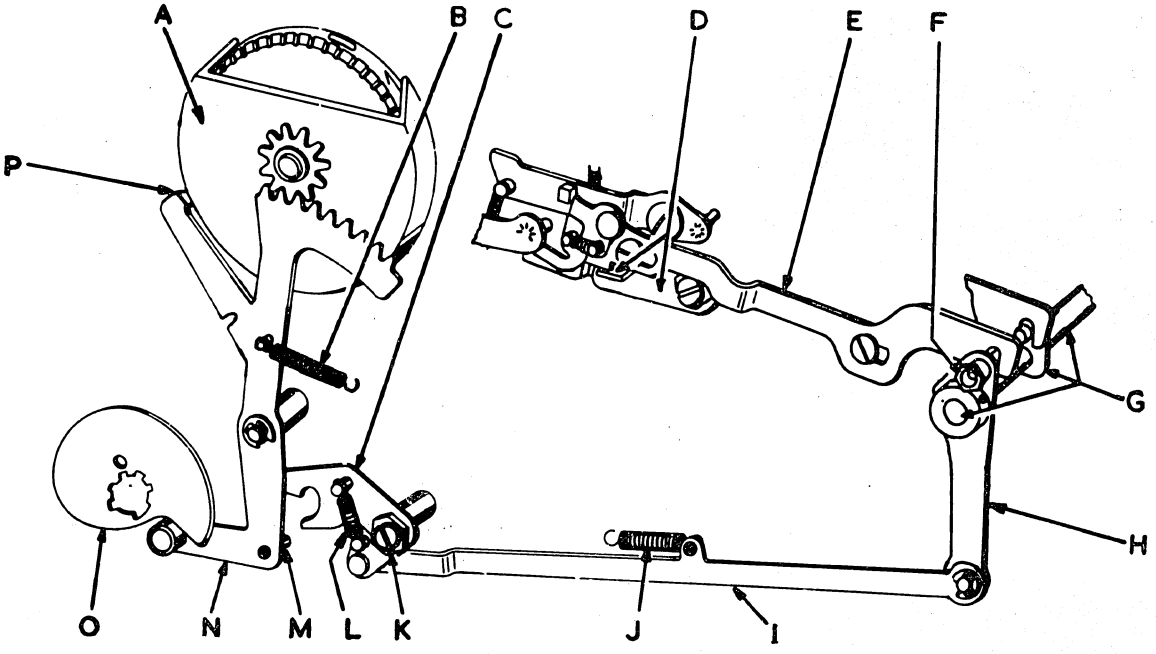


Fig. IV-6 Rotary Protecting Shield Mechanism

When the clutch is tripped manipulation of the multiplying dial must be prevented or incorrect machine functions would occur.

When the drive is tripped link I (Fig. IV-6) is moved forward which through spring L lowers latch C to limit on stud M in sector N. At the beginning of the machine operation cam O on the main camshaft rocks sector N to rotate shield A. As stud M moves forward it is engaged by the pocket in latch C which locks sector N and shield A in position throughout the multiplying operation. At the end of the multiplying operation repeat link E disengaged from latch D restores to normal and allows link I to move rearward under spring J tension. Restoration of link I raises latch C to clear stud M and allow spring B to restore sector N and shield A to normal. Lip P on arm of sector N exerts a braking effect on shield A as the latter restores to normal and also provides the normal limit for sector N and shield A.

Link I connected to repeat link E through stud F and arm H is moved on all machine operations since arm H is pinned to the clutch trip shaft G. This prevents manipulating the multiplying dial while listing and other non-multiplying operations are being carried out.

Tests and Adjustments

1. To ensure correct positioning of the rotary protecting shield.

With the machine normal the inclined edge of the shield should align with the opening in the machine case.

To adjust - Bend the arm of sector N which carries lip P.

2. To prevent vibration of the shield during multiplying operations.

Manually operate the machine until sector N is held by latch C, there should be minimum clearance between the roller on sector N and cam O.

To adjust - Position eccentric K.

Burroughs

Series J

TEN KEY ADDING MACHINE

INSTRUCTION BOOK

Section V

●

SERIES J700

PRINTED IN U.S.AMERICA MAY 1965

FOR FORM 3705

TABLE OF CONTENTS

SERIES J700

Multiplying Feature, Keyset Multiplier

Series J700

Introduction

The multiplying feature enables the semi-automatic multiplication of an amount entered on the intermediate keyboard by another amount, the digits of which are set upon the multiplying keyboard, starting with the first unit digit. The drive is tripped for the multiplying operation by depressing one of the multiplier keys. After each multiplying operation, the intermediate keyboard is tabulated one space to enable ten times the amount on the intermediate keyboard to be added with succeeding digits if they are indexed on the multiplying keyboard keys.

The multiplying keyboard is located at the left hand side of the regular keyboard. It contains 10 keys numbered 0 to 9 in line starting at the front. As the keytops are smaller than the regular ones, they are offset for easier depression. The odd numbers being on the left and the even numbers on the right. During the multiplying operations interlocks are activated in order to prevent other keys from being depressed thereby preventing misoperation.

Depression of the '0' multiplying key tabulates the intermediate keyboard one space in preparation for the next multiplication. Machines prior to Serial Number J171502F do not trip the drive but machines after Serial Number J171501F trip the drive and perform a non-print, non-space operation.

The J700 contains the 1-2-3 cipher construction keyboard and therefore, with the intermediate keyboard in the home position, the '0' multiplying key cannot be depressed. This is described on Page 7 Keyboard Section, Section II, Series J Instruction Book.

Method used for Multiplying

The method used for multiplying is a short cut method. Multiplying by numbers 1 through 5 the machines repeats 1 to 5 times respectively, adding during each operation the amount indexed on the intermediate keyboard. At the end of the last repeat operation the intermediate keyboard is tabulated one space to the left.

Example :	Multiply	12 x 3
	1st operation	12
	2nd operation	12
	3rd operation	12
	Total	**36**

Multiplying by 6 through 9 the machine repeats 5 to 2 times respectively, subtracting the amount listed on the keyboard on each operation except the last. At the end of the next to last operation the intermediate keyboard is tabulated one space to the left to allow ten times the indexed amount to be added on the last operation.

Example :	Multiply	12 x 8
	1st operation	12 -
	2nd operation	12 - (tabulates)
	3rd operation	120
	Total	**96**

Operation

Depression of any multiplying key 1 through 9 indexes mechanism to activate one of two multiplying slides. One slide activated by keys 1 through 5, trips the drive and controls the machine repeat, adding, printing and tabulation operations which take place during the multiplying cycle. The other slide activated by keys 6 through 9 likewise trips the drive and

controls the machine repeat, adding printing and tabulation operations, with the additional function of controlling the subtract operations which take place during the multiplying.

Fitted to the main camshaft are two additional cams. One restores the active multiplying slide to normal and the other activates the tabulation mechanism when it is indexed by the multiplying slide.

The Multiplier Keyboard and Interlocks

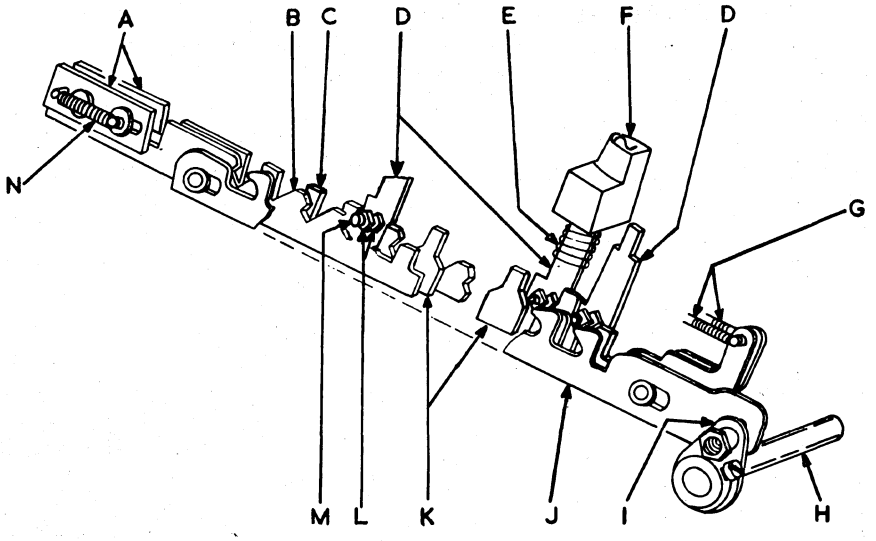


Fig. V-1 Multiplier Keyboard

The multiplier keyboard located to the left of the regular keyboard is secured to the machine by three screws, and can be easily removed as an assembly.

The keyboard contains a slide assembly which is rivetted to its right partition plate. The assembly consists of two index slides B and C (Fig. V-1) and one locking slide J.

Depression of any multiplying key 1 through 5 moves index slide C forward, whereas depression of any multiplying key 6 through 9 moves index slide B forward. Both slides are designed with the necessary cam surface at the point where contacted by their respective keys.

Keystems D have square studs L which have a rounded end M on the left. Depression of a keybutton F lowers keystem D, and stud L cams its active slide forward and also moves into the open space in the inactive index slide. This construction prevents simultaneous depression of any one of keys 1 through 5 with one of 6 through 9.

To prevent depression of two keys in one group 1 through 5 and 6 through 9, interlocks K are located between the two index slides B and C. They are retained in their respective positions by long projections between the square studs on the keystems.

Rocking of the drive trip shaft H to start the machine operation drives locking slide J rearward through eccentric post assembly I, placing its projection under the round ends M of the square studs L, preventing depression of the multiplying keys until the end of the machine cycle. When the drive is tripped through depression of a multiplying key the projection on the locking slide J moves over the round end M to hold the multiplying

key depressed during the multiplying operation and prevent depression of any other multiplying key.

Keystems D restore under the tension of coiled springs E around the keystem and between the keytop F and the keyboard top plate. Slide B and C restore to normal under tension of springs G at the end of the multiplying cycle.

The purpose of latch plates A and springs N is described under Restoring the Multiplier Slides, Page 12

On machines prior to Serial No. J171502F depression of the '0' multiplying key directly indexes tabulation of the intermediate keyboard and is described under Escapement of the Intermediate Keyboard Page 10 Locking slide J therefore, only has a blocking surface in this position since the '0' multiplying key does not trip the drive and is not required to be latched down.

Index slide C is also modified in this position and does not move. The square studs L move into an open space in both index slides B and C thus preventing their movement.

Machines after Serial No. J171501F contain a Power Operated Zero Multiplying Key and depression of the '0' multiplying key trips the drive and performs a non-print non-space operation in addition to tabulating the intermediate keyboard. This is described under Power Operated Zero Multiplying Key, Page 14

Tests and Adjustments

a. To ensure positive latching and unlatching of the index multiplying keys:

b. To ensure positive locking of the multiplying keyboard during machine operations:

c. To enable flexible depression of the result keys following multiplying operation:

Machine at normal, partially depress any multiplying key so as to align the round end M with the nose on the locking slide J and holding the multiplying key forward to take up any play, the round end M should be located centrally between the nose of the locking slide and next rearward projection on the slide. Check this condition on all keys 1 to 9.

To adjust - Rotate eccentric post in the hub assembly I.

The Multiplying Operation

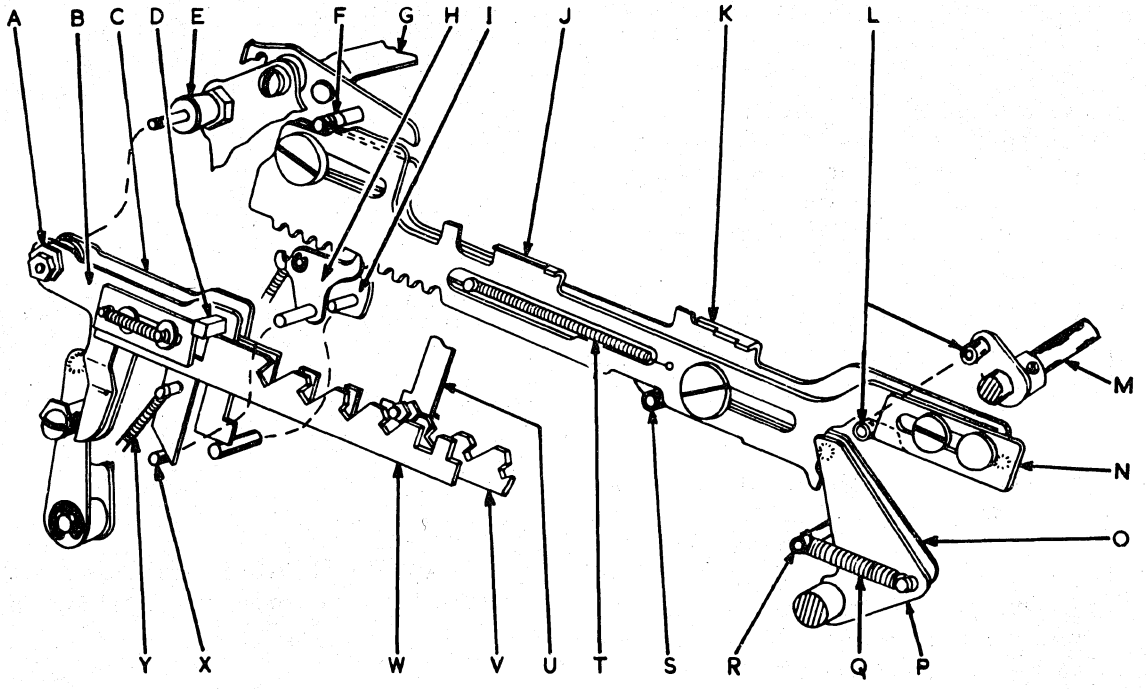


Fig. V-2 Multiplier Slides

Depression of any multiplying key 1 through 9 indexes automatic repeat machine operations which are controlled by the active multiplying key.

Depression of a multiplying key 6 through 9 moves index slide W (Fig. V-2) forward through keystem U. Index slide W moving forward allows hammer B and its square stud D under tension of spring Y to drop into the cut-out at the rear of the index slide. As hammer B drops into the cut-out its forward leg contacts stud X to rock detent pawl H out of the toothed rack at the rear of multiplying slide J. Multiplying slide J then moves rearward under tension of spring T and assisted by driver P, until limited by a projection on the indexed multiplying keystem or in the slot of multiplying slide J in the case of the No. 6 key.

Depression of a multiplying key 1 through 5, through index slide V, releases hammer C and detent pawl I to allow multiplying slide K to move rearward until limited by the active keystem or in the slot of multiplying slide K in the case of the No. 5 key.

At the rear of the multiplying slides is a cam surface which raises roller F and subtract bail G. The latter controls the listing and printing during the subsequent machine operations. This is described under Listing and Symbol Printing Controlled by Multiplying Slides, Page 8

At the front of each multiplier slide J and K is a cam surface which when the slides move rearward rocks roller L and trips the drive through shaft M to start the machine cycle.

Multiplying slide J is designed to give a later trip of the drive so as to allow the subtract bail G to be fully indexed before the machine operation starts. As the multiplier slide J moves rearward, plate N fitted at the front, contacts

roller L. Plate N then expands its spring (not shown) as the multiplier slide J continues to move rearward until the subtract bail G is fully indexed whereupon roller L and shaft M are rocked. When roller L is rocked, plate N moves rearward under its spring tension to maintain the drive shaft in its active position until the end of the multiplying cycle and prevent premature resetting of the drive shaft.

Drivers O and P ensure a fast and positive movement of their respective multiplying slide. Spring Q (one for each driver) imparts the initial thrust to the multiplying slide. The active driver moves rearward until limited by shaft R which is the anchor for its spring.

Amounts listed in the intermediate keyboard are retained during the multiplying cycle. Multiplying slide J or K moving rearward rocks down roll S which is connected to the regular repeat index lever and is described under Listing and Symbol Printing Controlled by Multiplier Slides, Page 8

Tests and Adjustments

1. To ensure correct trip of the drive from the multiplying slides:

Loosen cup screws in hub assembly L. With the power off, hold depressed the operation control key which gives the least amount of throw of link AA (Fig. II-50, Power, Sec. II, Series J Instruction Book). Manually release multiplying slide J by lowering detent pawl H and allow the slide J to fully index rearward. Manually restore the slide one position.

To adjust - Position hub assembly L so that its roller just contacts the bottom edge of the released multiplying slide J and tighten the cup screws.

2. To ensure correct drive trip of the machine during multiplying operation:

Note: Before making the following adjustment eccentric A should be positioned the high point forward.

Depress any multiplying key 1 through 9 to select the key which gives the least amount of throw of index slides V and W. With this key fully depressed there should be from .008"-.012" clearance between the front edge of square stud D (or similar stud on hammer C) and the rear edge of the slot in the active index slide.

To adjust - Position eccentric A rearward as required and lock with nut.

Listing and Symbol Printing Controlled by Multiplier Slides

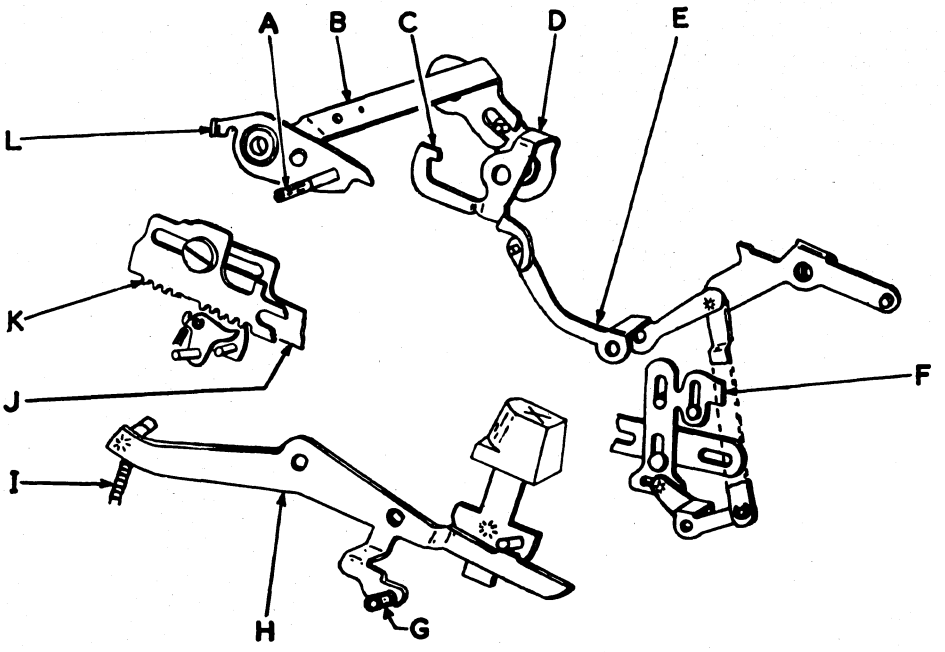


Fig.V-3 Subtract Indexing and Symbol Printing Mechanism

The adding, subtracting and symbol printing during multiplying operation are controlled by cam surfaces on the rear of the multiplier slides.

With the machine normal roller A (Fig.V-3) on subtract bail B is in a lowered position resting on the rear of multiplier slides J and K, this holds the front of bellcrank D in a raised position which allows minus indexing bail E to position minus index link F in its upper and inactive position so that the meshing controls are in add.

Depression of a multiplying key 1 through 5 releases multiplying slide J which moving rearward raises subtract bail B and rocks bellcrank D. This movement, however, is not sufficient to alter the position of minus indexing bail E and link F so add operations take place during the multiplying cycle.

Depression of a multiplying key 6 through 9 releases slide K which has two cam surfaces. The forward and higher surface raises roller A, bail B and rocks bellcrank D further to index bail E and lower minus index link F to the subtract position. Amounts on the intermediate keyboard will therefore be subtracted during the multiplying cycle until slide K is restored to a point where the lower cam surface allows bail B and bellcrank D to position bail E and raise minus index link F for the add operation of ten times the amount on the intermediate keyboard. This operation being a necessary part of the short cut principle as outlined in the Introduction.

At the forward end of multiplier slides J and K is a cam surface (not shown) which rocks roll G downward when the slides move rearward. Roll G rocking downward raises the rear end of repeat lever H which through spring I raises the restoring link and disables restoration of the intermediate keyboard. Amounts listed are

added and subtracted as directed by the active multiplier slide.

Symbol Printing When Multiplying

At normal bail B being in a lowered position swings bellcrank D to lower its ear C below the lip on the symbol slide allowing normal printing control from the active operation control keys.

When multiplier slide J is active bail B being in a slightly raised position aligns the formed ear C with the lip on the symbol slide and prevents it from moving rearward. This being an add operation no symbol is required. The rear and lower cam surface on slide K also aligns ear C to prevent symbol printing on the add operation.

When the forward and higher cam surface of slide K raises bail B still further bellcrank D is swung to position the pocket below ear C in line with the lip on the symbol slide. When the machine operates the symbol slide moves rearward until limited in the pocket and a minus sign prints so as to give identification of the subtract operation taking place.

Tests and Adjustments

1. To prevent overthrow of the subtract mechanism:

With the machine normal depress any multiplying key 6 through 9. There should be minimum pivoting movement of bail B without cramping roll A.

To adjust- Bend ear L on bail A for .003" to .005" clearance with left side frame.

2. To prevent printing a symbol during 'plus' repeat operations:

With the machine normal depress any multiplying key 1 through 5. Check that the lip of the symbol indexing slide limits correctly on the formed ear C of rocker D.

Perform the same test with repeat key held depressed and again but with the repeat key latched down. Under all these tests the symbol indexing slide should be correctly limited by the formed ear C of rocker D.

To adjust - Weave bail B as required.

Escapement of the Intermediate Keyboard

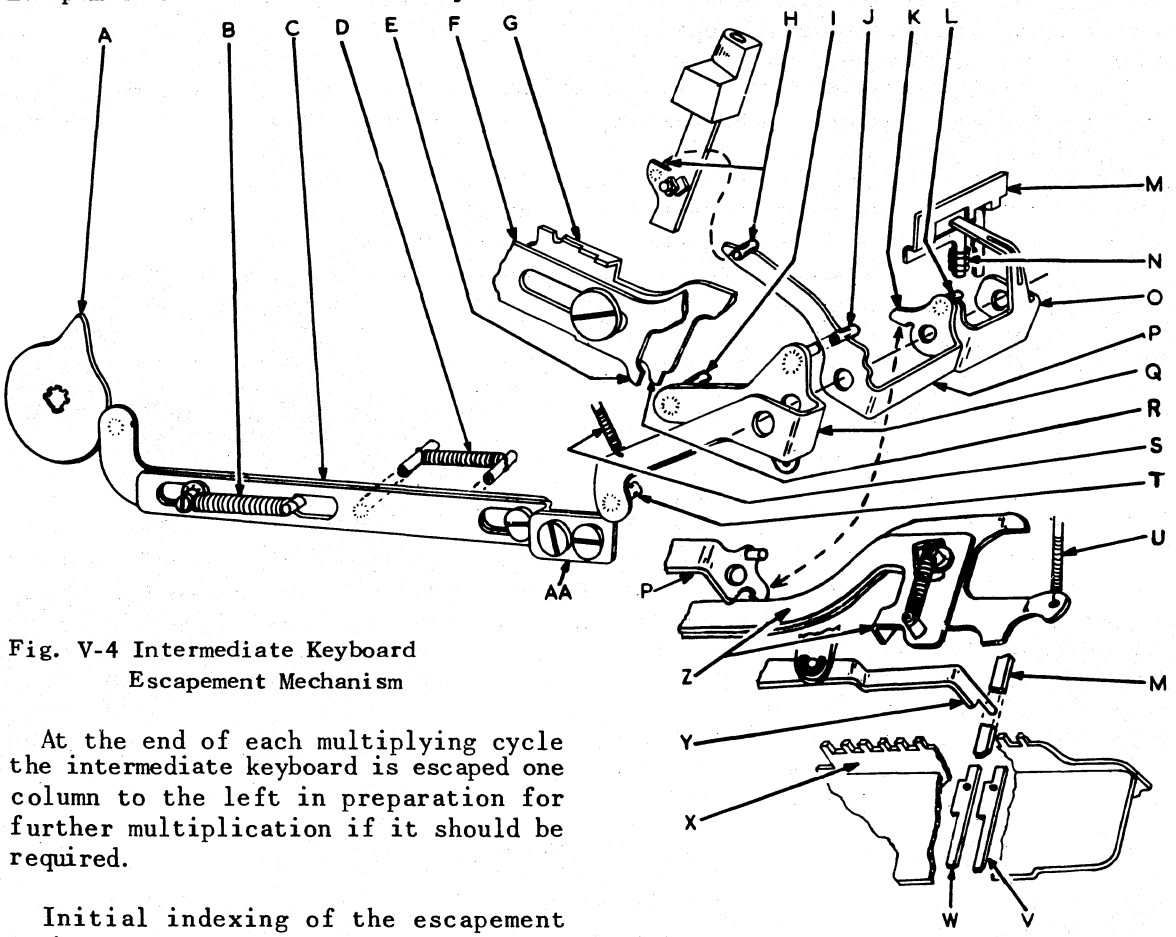


Fig. V-4 Intermediate Keyboard Escapement Mechanism

At the end of each multiplying cycle the intermediate keyboard is escaped one column to the left in preparation for further multiplication if it should be required.

Initial indexing of the escapement mechanism is achieved by a projection on the active multiplying slide, and a bridge piece. A cam added to the main camshaft activates a driving slide on each operation and when the bridge piece is active will rock it and index the escapement mechanism.

Multiplying slides F (Fig.V-4) and G have projections E and R respectively. During the multiplying cycle either projection E or R will contact roller I on bridge piece Q, depending on which multiplying slide is active, and rock it downward. Toward the end of each machine operation cam A which is connected to the main camshaft drives driving slide C forward. When stud T of bridge piece Q is in a lowered position it will be contacted by the driving slide C and rock the bridge piece still further. This added movement will cause stud J to rock bail P which through its stud L in turn rocks bail O. The finger on bail O depresses one cipher keystem M, which depresses cipher pin W. At the same time the projection K at the rear of bail P lowers escapement pawl Z into the teeth on the intermediate keyboard top plate X. Escapement takes place when driving slide C restores to normal under tension of spring B allowing bridge piece Q and bails P and O to restore also. Spring N restores the one cipher keystem and bails P and O. Bridge piece Q is restored to an inactive position by spring S. When spring U has raised auxiliary escapement pawl Z out of the teeth of intermediate keyboard plate X, the intermediate keyboard moves to the left until the next cipher pin V limits on escapement arm Y and the escapement is complete.

On machines prior to Serial No. J171502F when the '0' multiplying key is depressed the drive is not tripped and no multiplying slide is indexed. Stud H on the keystem when lowered rocks the arm on the left of bail P and depresses the one cipher keystem M through stud L and bail O.

Machines after J171501F contain a Power Operated Zero Multiplying Key which is described on Page 15

Note: As the Series J700 machine contains the 1, 2, 3, cipher key construction as outlined in 1-2-3 Ciphers, Sec. II, Page 7, Keyboard, Series J Instruction Book it is not possible to depress the '0' multiplying keystem with the machine clear since the first cipher pin is a fixed one. Should a multiplying key 1 through 9 be depressed when the machine is clear spring D will yield when slide C is driven forward and no damage to the mechanism will take place.

Tests and Adjustments

1. To ensure correct indexing of the auxiliary cipher keystem:

With the No. 1 multiplying key depressed manually cycle the machine until the driver slide C has reached maximum forward movement. In this position the one cipher keystem M should be fully depressed without binding.

To adjust - Position adjustable limit plate AA as required and lock with screws.

2. To ensure correct escapement of the intermediate keyboard.

With the driver slide C and keystem M fully indexed as before, the ear of auxiliary escapement pawl Z should be fully engaged between the teeth space of the intermediate keyboard top plate X.

To adjust - Bend projection K on bail P as required.

Restoring the Multiplier Slides

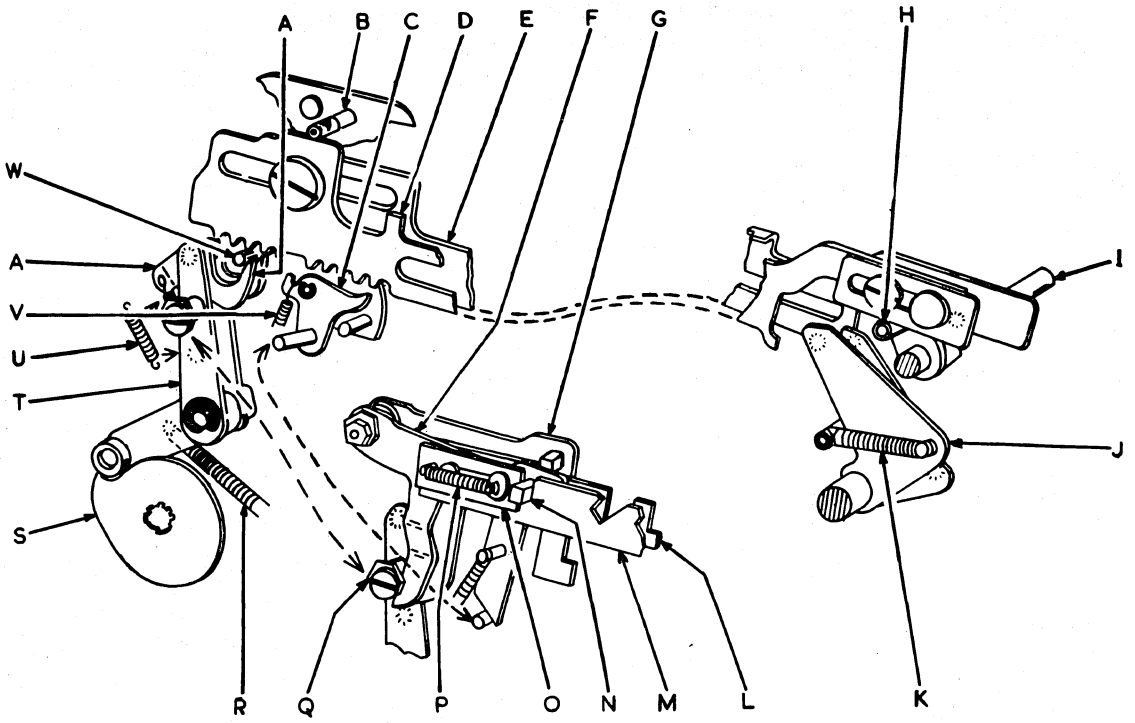


Fig. V-5 Restoring the Multiplier Slides

The multiplying cycle is brought to an end by restoring the active multiplier slide which allows the drive trip shaft to restore to normal. The number of machine operations and the listing controls having been determined by which multiplier key was indexed.

Assuming a multiplier key 6 through 9 has been depressed. On the first machine operation of the multiplying cycle the active hammer F (Fig. V-5) is raised through eccentric Q on bellcrank assembly T by cam S. Cam S is added to the main camshaft and actuates bellcrank assembly T on each machine operation. When hammer F is raised latch plate O is pulled forward under spring P tension, which prevents the square stud N from re-entering the cut-out in index slide M during the rest of the multiplying cycle. Hammer F now in a raised position allows detent pawl C under tension of spring V to re-engage the tooth rack of multiplying slide D. At the same time reset pawl A positioned by spring U and attached to bellcrank T engages the tooth rack on the multiplier slide D. Reset pawl A, through bellcrank T and cam S then drives the multiplier slide D one tooth space forward where it is maintained by detent pawl C. At the end of the machine operation bellcrank assembly T restores under spring R tension. The 'step by step' forward movement of multiplier slide D will continue until roller H of drive trip shaft I is allowed to rise, and the drive will reset bringing the multiplying cycle to a halt.

As multiplier slide D restores to normal roll B and the subtract bail are lowered to an inactive position. At the same time the forward end of slide D puts driver J under the tension of spring K in preparation for an ensuing function.

When bellcrank T is at normal spring U holds reset pawl A against shaft W. In

this position pawl A is clear of the toothed rack on slide D, which allows the slide to move freely rearward when indexed.

Multiplier slide E, which is controlled by multiplying keys 1 through 5, index slide L and hammer G are reset in a similar manner by means of its respective detent and reset pawls.

Tests and Adjustments

1. To ensure the 'step by step' restoration of the active multiplier slide during the multiplying cycle.

With the No. 9 multiplier key depressed, manually operate the machine until hammer F is raised to its highest point. In this condition there should be a clearance of .008" to .012" between the upper edge of latch plate O and the bottom edge of square stud N on hammer F.

Perform the same test with the multiplying key No. 1 depressed and check for the same condition of the hammer G and latch plate on index slide L.

To adjust - Position eccentric shoulder nut Q as required.

Power Operated Zero Multiplying Key

Machines after Serial No. J171501F have a power operated Zero Multiplying Key.

Depression of the '0' multiplying key results in the following machine functions:

1. Trip of the drive for the power operation.

2. Non-print of the amount on the intermediate keyboard and non-space of the platen.

3. Indexing of cipher pin and escapement of the intermediate keyboard 1 column to the left.

Note : If the cipher multiplying key is held depressed, the intermediate keyboard will be tabulated on each machine operation to full capacity and machine operations will continue until such times as the key is released.

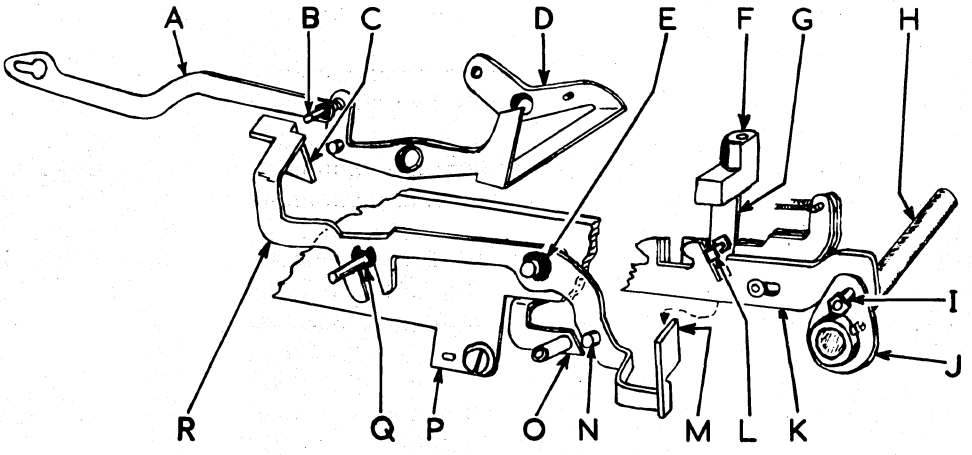


Fig. V-6 Drive Trip and Non-Print,Non-Space Mechanism

Drive Trip:

Depression of the cipher multiplying key F (Fig.V-6) through square stud L in keystem G moves slide K rearwards to rock drive trip shaft assembly H through eccentric post I in hub J. Rocking of trip shaft H releases drive trip mechanism as outlined in Sec.II, Power, Series J Instruction Book.

Non-Print, Non-Space

Non-print, non-space functions are controlled by lever R (Fig.V-6) which is rocked by depression of the cipher multiplying key F.

Depression of cipher multiplying key F lowers keystem G to contact projection M and rock lever R which through its rear camming surface C contacts stud B to rock type bar blocking bail D into an active position thereby preventing printing the amounts in the intermediate keyboard. Rocking of bail D through its stud B moves spacing pawl control link A forward into an inactive position to prevent spacing the platen.

When lever R is rocked, stud N, at its forward end, contacts lever O so as to disable the restoration of the intermediate keyboard and retain the amount for further multiplication as described on Page 8 , Listing and Symbol Printing Controlled by Multiplier Slides, Sec. V Series J Instruction Book.

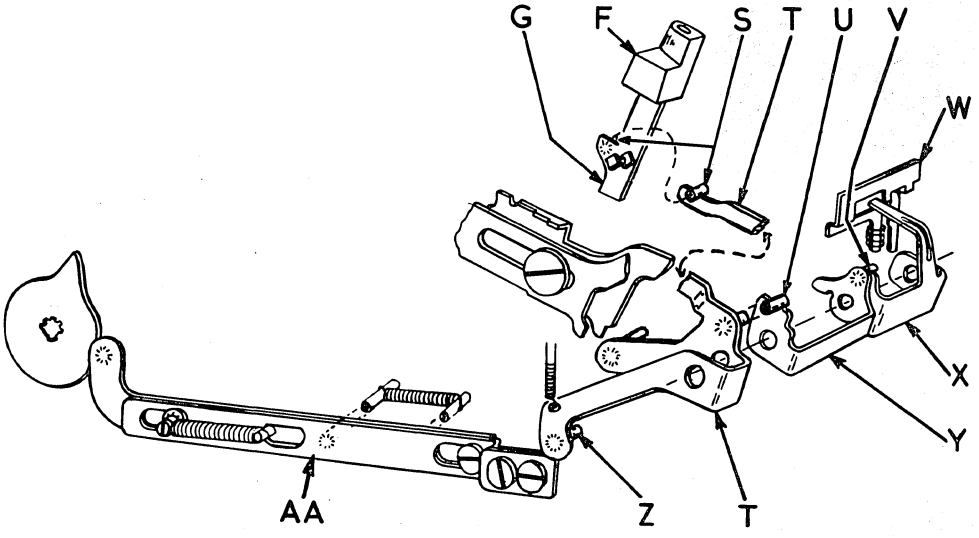


Fig. V - 7 Intermediate Keyboard Escapement Mechanism

Cipher Pin Indexing and Escapement of Intermediate Keyboard

The intermediate keyboard is tabulated one column to the left on the depression of the cipher multiplying key, in preparation for further multiplication.

Initial indexing of the escapement mechanism is achieved by depression of the cipher multiplying key F (Fig.V-7). Depression of the cipher multiplying key F lowers keystem G, which through its stud S, rocks bellcrank T to position its stud Z into an active position, Complete indexing is accomplished towards the end of the machine operation when slide assembly AA is driven forward to rock bellcrank T still further which through its upper stud U and stud V rocks step-over bail Y and bail X. The finger on bail X lowers the one cipher keystem W. Escapement takes place as outlined on page 10, Escapement of the Intermediate Keyboard, Section V, Series J Instruction Book.

Burroughs

Series J

TEN KEY ADDING MACHINE

INSTRUCTION BOOK

Section VI

●

SERIES J

STERLING CONSTRUCTION

PRINTED IN U.S.AMERICA MAY 1965

FOR FORM 3705

TABLE OF CONTENTS

SERIES J STERLING CONSTRUCTION

Sterling Construction Series J Machines

Introduction

The series J range of machines has been extended to include Sterling construction styles of the regular 7, 8 and 10 column listing, adding and subtracting machines. Multiplier versions are not available in Sterling construction. The styles are identified by 1/2 following the regular style number e.g. J221.1/2, J422.1/2, J523.1/2, J624.1/2. These machines, which are of the same basic construction as the corresponding decimal styles, omit the 1-2-3 Ciphers, Totals after Repeat and Minus Repeat features, but contain the following additional features:-

Pound Key

The Pound Key is located at the bottom of the keyboard to the right of the cipher bar and is used to facilitate the setting up of amounts consisting of pounds only. For example, when listing £123 without using the Pound Key, it is necessary to depress the cipher bar three times following the amount. Depression of the Pound Key after the amount is set up indexes a mechanism which, when the drive is tripped, allows the intermediate keyboard to tabulate three columns and sets up three cipher pins.

An interlock prevents depression of the Pound Key until a listing key has been depressed and following the depression of the Pound Key, further depression of the listing keys is prevented. Depression of the Pound Key is prevented when the number of columns indexed exceeds 5 on machines of 7 column listing capacity, 6 on machines of 8 column listing capacity, 8 on machines of 10 column listing capacity.

Whole Number Key

The Whole Number Key is a latch down key located at the top left hand side of the keyboard which enables the listing and accumulation of whole numbers. When the Whole Number Key is latched down a mechanism is indexed which, when the drive is tripped, provides three column escapement of the intermediate keyboard together with non-add, non-print of columns 1, 2 and 3. With the key latched down all operation control keys perform their normal functions and print their respective symbols. Depression of the Total and Sub-Total keys disables the Whole Number mechanism to ensure printing a true result of any items which may have been listed in columns 1, 2 and 3.

Listing Keys

Twelve listing keys are provided (1 through 11 and '0') These are located in the central area of the keyboard and are arranged in three columns. The two extra keys (10 and 11) are located to the rear of keys 7 and 8 respectively.

To provide stop pins for the two extra keys, the intermediate keyboard is constructed with eleven stop pins (cipher through 10) in each column.

The construction and operation of these features, together with the modifications to other mechanisms necessitated by their incorporation, is covered in the following pages.

Keyboard

As previously discussed on Page 3, the keyboard contains twelve listing keys for indexing amounts into the machine plus the £ key, Whole Number Key, six operation control keys and a motor bar to control the machine function.

Listing Keys

Each listing key A (Fig.VI-1), cipher through eleven, has an arm extending over the respective stop pin B in the intermediate keyboard.

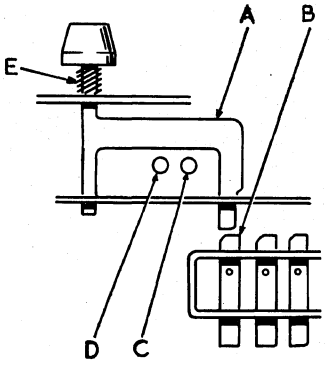


Fig. VI-1 View of Keystem & Stop Pins

The arms extends over the two shafts C and D which actuate the intermediate keyboard escapement mechanism. Depression of the eleven key does not lower a stop pin in the intermediate keyboard but does actuate the intermediate keyboard escapement shafts C and D. Each keystem is held in non-depressed 'home' position against felt pads attached to the underside of the upper keyboard plate by coil spring E assembled around the keystem. The listing keys, when depressed, limit on the lower keyboard plate.

Intermediate Keyboard Escapement

Escapement of the intermediate keyboard occurs partly on depression of a listing key and partly as the key restores to normal.

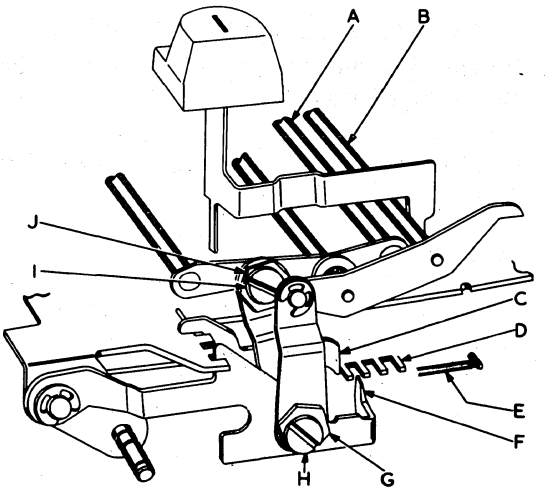


Fig.VI-2 Intermediate Keyboard Escapement

Key depression lowers shafts A and B (Fig.VI-2) to raise escapement pawls C and F. Before pawl C is raised high enough to clear the teeth of escapement rack D, pawl F enters the next tooth space to the right. As pawl C is raised above the escapement rack, the intermediate keyboard moves to the left under tension of spring E or spring attached to arm B (Fig.II-19, Section II), until limited by pawl F.

As the listing key restores to normal, pawl C enters the next tooth space to the right of the one previously occupied and as pawl F is lowered out of the escapement rack, the intermediate keyboard is permitted to complete the escapement and limit on pawl C.

Tests and Adjustments

1. To ensure full indexing of the stop pins before the intermediate keyboard escapement takes place:

On a slow depression of the cipher bar the stop pin should fully index at the same time as, or slightly before, pawl C clears the teeth of rack D. Repeat this test for all columns.

To adjust - Loosen screw I and turn eccentric J.

2. To ensure limiting the intermediate keyboard on initial escapement:

With the cipher bar held depressed, escapement pawl F should have full hold on tooth of rack D.

To adjust - Loosen screw H and turn eccentric G.

Pound Key

Depression of the Pound Key after an amount is set up indexes mechanism which, when the drive is tripped, allows the intermediate keyboard to tabulate three columns. Upon completion of the three column tabulation, a hammer is released to depress the three cipher keystem.

Pound Key Blocked

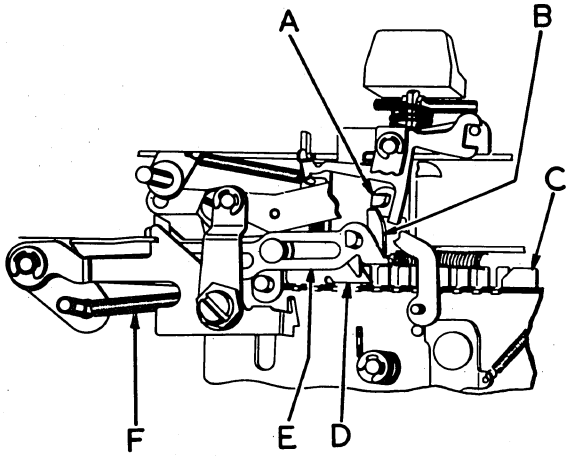


Fig.VI-3 Pound Key Blocking Mechanism

Depression of the Pound Key is prevented until a listing key is depressed. With the intermediate keyboard in the home position auxiliary escapement pawl E (Fig.VI-3) is held upward by cam D (attached to the intermediate keyboard top plate), to prevent depression of the Pound Key through studs B and A. Depression of a listing key or keys causes the intermediate keyboard to tabulate which allows auxiliary escapement pawl E to be lowered into the escapement teeth by spring F.

Depression of the Pound Key is also prevented as the intermediate keyboard tabulates into column five on machines of 7 columns capacity, column six on machines of 8 columns capacity or column eight on machines of 10 columns capacity. This is necessary as a three column escapement of the intermediate keyboard is required to trip off the hammer assembly and depress the 3 column cipher keystem. Failure to depress this keystem would permit the type bars in columns one, two and three to travel to their full limit. As the intermediate keyboard tabulates into the column to be blocked, cam C passes under auxiliary pawl E which raises the pawl and positions stud B under stud A in the pound keystem.

Pound Key Indexing

All J200.1/2 styles and J400.1/2 styles before Serial No. J121433F contained a separate indexing and escapement mechanism for the Pound Key and the Whole Number Key. Machines from Serial No. J121433F incorporate a common sensing mechanism for the Pound Key and Whole Number Key escapement mechanism.

Pound Key (Late Style) Common Sensing Mechanism

Depression of the Pound Key through its keystem Q (Fig.VI-4) and stud D rocks lever M to raise the forward end of lever F, and arm of bellcrank H, through stud L in bail J and lift arm G. The milled stud on the keystem Q cams interlock slide K rearward under the arms of escapement assembly B to prevent further depression of the listing keys. The Pound Key is held depressed by latch C which is moved over stud E in the keystem by spring A.

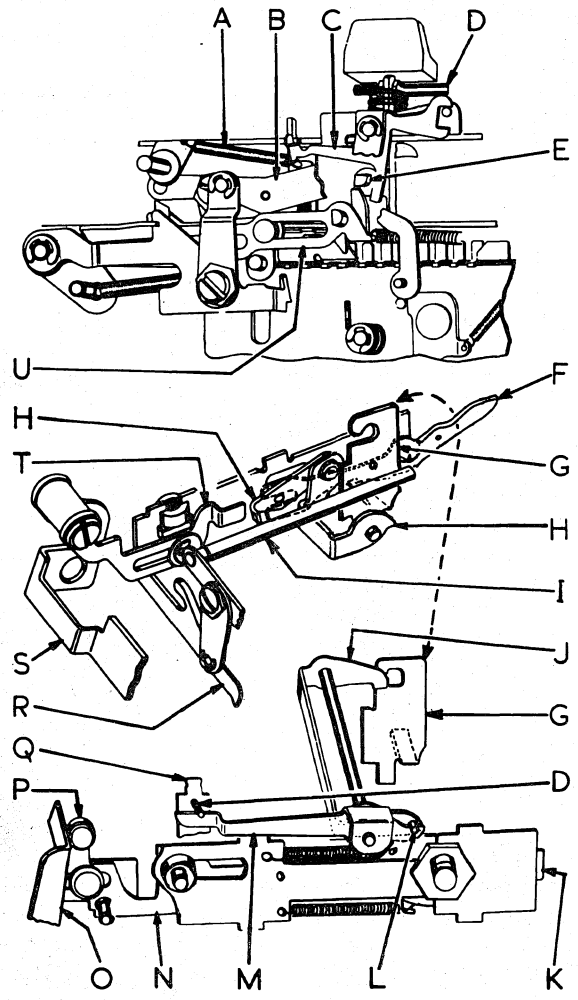


Fig. VI-4 Pound Key Mechanism (Common Sensing) Late Style.

When the drive is tripped bail S is rocked and drives slide T rearward to contact the raised arm of bellcrank assembly H, rocking it and raising shaft assembly I, which raises upper escapement pawl C (Fig.VI-2) clear of the escapement teeth. This allows the intermediate keyboard to tabulate three spaces, this distance being the length of the slot in auxiliary pawl U.

A formed ear O on the right hub of the drive trip shaft contacts roller P on slide N to drive it rearward and block the listing keys through an extension at its rearend. Slide N also maintains slide K rearward after the Pound Key is released upon depression of the 3 cipher keystem.

Tests and Adjustments

1. To ensure indexing the 3 column escapement from the Pound Key:

With the Pound Key held depressed, lift arm G should be fully raised without cramping on the keyboard top plate.

To adjust - Weave bail J as required.

2. To ensure 3 column escapement and prevent a false limit of the Whole Number Shutter:

Note : Before making the following Test, loosen screw B (Fig.VI-8) on lever E (Fig. VI-8) in order to avoid a false limit from the shutter.

Remove link E (Fig.VI-10, Page 10) from bail S. Depress '1' listing key, Pound Key and motor bar. With bail S and slide N held fully rearward, there should be .005" to .020" clearance between ear O and the roller P on slide N.

To adjust - Bend the formed ear O as required.

Pound Key (Early Style)

Depression of the Pound Key, through stud D (Fig.VI-5) and lever K lowers arm J on slide L to position it's rearward formed ear into the path of the lower projection on bail F. A milled stud on the keystem cams slide I rearward under the arms of escapement shaft assembly B to prevent depression of the listing keys. The Pound Key is held depressed by latch C which is moved over stud E in the keystem by spring A.

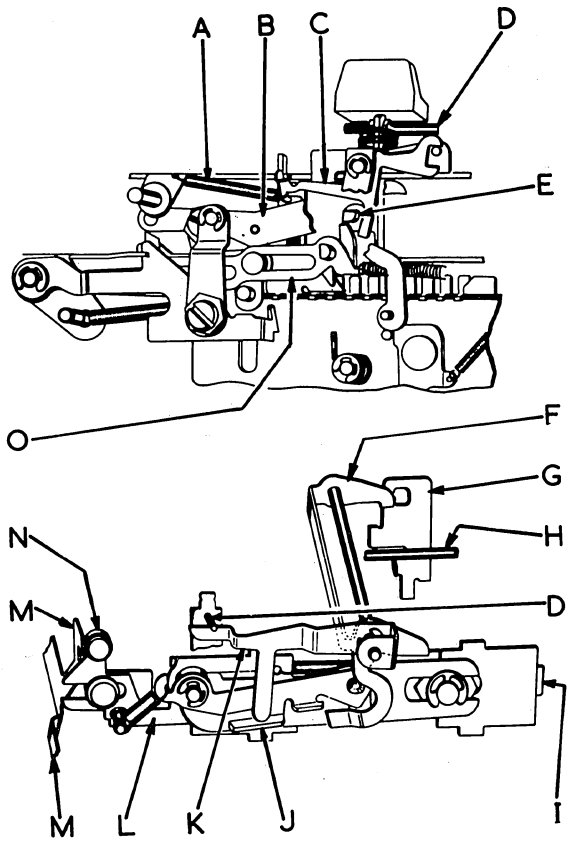


Fig. VI-5 Pound Key Mechanism
(Early Style)

When the drive is tripped, bail M drives slide assembly L rearward which rocks bail F to raise slide G. Slide G through shaft assembly H raises upper escapement pawl C (Fig. VI-2) clear of the escapement teeth which allows the intermediate keyboard to tabulate three spaces, this distance being the length of the slot in auxiliary pawl O.

Bail M holds slide L rearward throughout the machine operation to prevent depression of the listing keys through an extension at its rear and hold slide I rearward after the Pound Key is released upon depression of the 3 cipher keystem.

Tests and Adjustments

1. To ensure that the 3 column escapement takes place as early as possible:

With the machine normal, block escapement shaft assembly H against upward movement through the opening in the upper left hand corner of the keyboard. There should be from .003" to .010" clearance between the limit projection on the right of bail F and the upper keyboard plate when the bail is held upward.

To adjust - Weave bail F as required.

2. To ensure full indexing of the 3 column escapement:

Note : Before making the following Test, loosen screw B (Fig. VI-9) on bail E (Fig. VI-9) in order to avoid a false limit of the Whole Number Shutter.

Remove link E (Fig. VI-11, Page 12) from bail M. Depress '1' key, pound key and the motor bar. With bail M and slide L manually held fully rearward there should be .005" to .020" clearance between the bail M and the roller N on slide L.

To adjust - Bend the formed ear on bail M as required.

Indexing the Three Cipher Keystem

Following the trip of the drive and the three column escapement taking place the three cipher keystem is released.

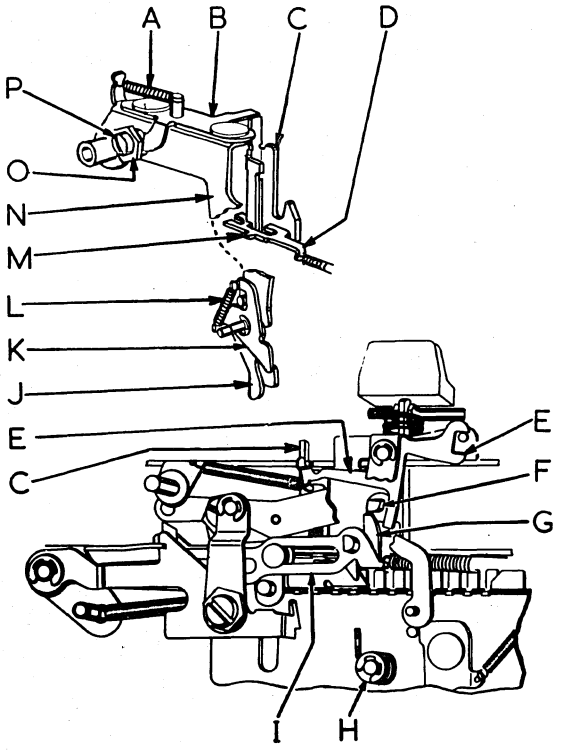


Fig. VI-6 Three Cipher Hammer and Keystem Mechanism

As auxiliary pawl I (Fig.VI-6) is moved to the left by the intermediate keyboard, stud G contacts projection M on slide D (on the lower keyboard plate) moving it to the left to release three column cipher keystem C. The keystem C is driven downward by hammer assembly N to index cipher pins in the three columns to the right of the unit pound column. When hammer assembly N nears the lowest point of it's travel, slide B clears keystem C allowing it to restore to normal. If keystem C were not allowed to restore, a machine lock would occur on restoration of the intermediate keyboard.

As hammer assembly N moves downward it contacts the arm of latch E which moves the latch clear of stud F in the pound keystem to enable the Pound Key to restore after the first cycle of a repeat operation.

Restoration of the intermediate keyboard through roll H raises hammer assembly N to latch it on 3 column cipher keystem C. Pawl K contacts the stud in the lower part of latch E to move the latch clear of stud F and prevent relatching the Pound Key if this is manually held depressed throughout the machine cycle. Spring L forms a yielding joint between parts J and K when the intermediate keyboard is overthrown beyond the home position.

Tests and Adjustments

1. To ensure full depression and release of 3 column cipher keystem C:

With hammer assembly N in tripped position, there should be minimum clearance between the left edge of slide B and keystem C.

To adjust - Loosen screw P and turn eccentric O.

Whole Number Key

When the Whole Number Key is latched down by depressing it and pushing it rearwards, a mechanism is indexed which, when the drive is tripped, provides three column escapement of the intermediate keyboard together with non-add, non-print of columns 1, 2 and 3.

Whole Number 3 Column Escapement

Depression of the Whole Number Key through lever C (Fig.VI-7) raises arm B on assembly E into the path of slide A. When the drive is tripped, slide A is driven rearward by bail I to rock assembly E which raises shaft assembly F and the forward end of lever D.

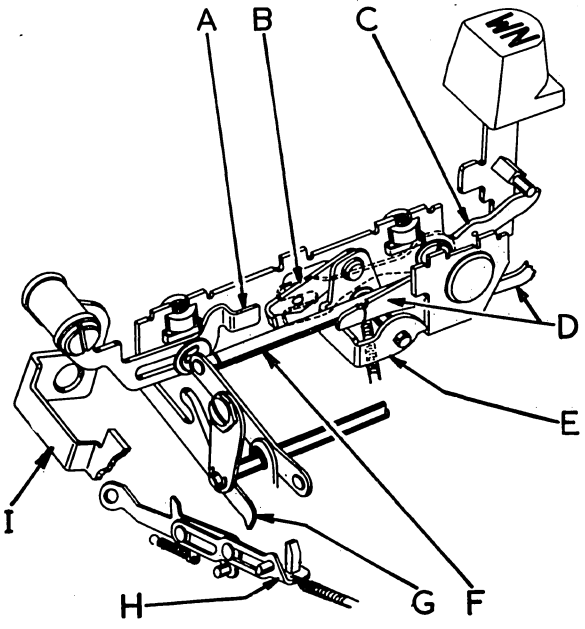


Fig.VI-7 Whole Number Three Column Escapement

Shaft assembly F raises upper escapement pawl G to allow the intermediate keyboard to tabulate three spaces, this distance being the length of the slot in auxiliary pawl H.

The three column escapement releases the 3 cipher hammer and keystem to index the three ciphers in columns 1, 2 and 3. Lever D, however, being rocked indexes the shutter mechanism and non-add, non-print of columns 1, 2 and 3 takes place.

Tests and Adjustments

1. To ensure 3 column escapement from the Whole Number Key and prevent a false limit of the shutter:

Perform test 2 (Fig.VI-4, Page 6). For machines with Common Sensing Mechanism or test 2 (Fig.VI-5, Page 7) for machines with early style mechanism.

Whole Number Shutter (Late Style) Common Sensing Mechanism

Machines from Serial No. J121433F which are equipped with the Common Sensing Mechanism for the three column escapement index the shutter for columns 1, 2 and 3 in the following manner.

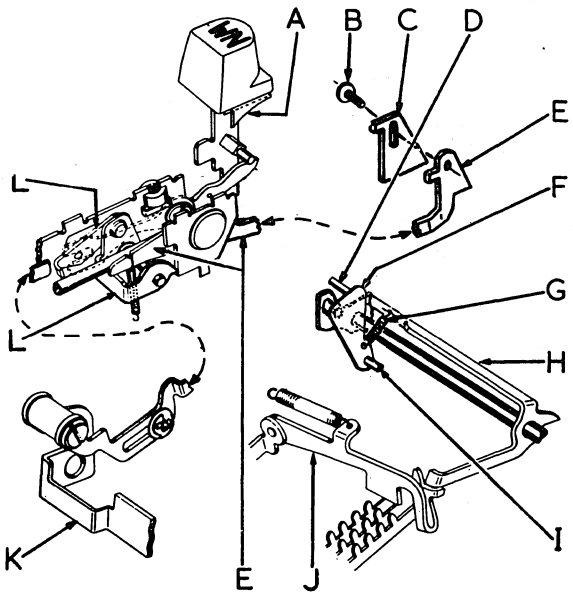


Fig. VI-8 Whole Number Shutter (Common Sensing) Late Style

Depression of the Whole Number key lowers cam plate A (Fig.VI-8) (fitted under the keytop) to contact stud D on pawl F and swing it into an active position.

When the drive is tripped lever E rocked by bellcrank assembly L lowers the shutter into the teeth of the first three type bars, through plate C (attached to lever E) by contacting stud I on pawl F which rocks bail H and lowers shutter J. With the shutter in a lowered position the type bars in columns 1, 2 and 3 are retained at minus cipher position and ciphers are not printed.

With the Whole Number Key normal, spring G swings pawl F and its stud I clear of plate C, which enables lever E to be rocked on a Pound Key operation by bellcrank assembly L for the three column escapement and still allow ciphers to print in columns 1 and 2.

Tests and Adjustments

1. To ensure blocking the type bars in columns 1, 2 and 3 during a Whole Number operation.

With the drive tripped and bail K correctly adjusted (see Fig.VI-4, Test 2, Page 6), hold bail K rearward. Shutter J should be fully downward without cramping in the teeth of the adding racks.

To adjust - Position plate C as required and tighten screw B.

Whole Number Shutter (Early Style)

All J200.1/2 styles and J400.1/2 styles before Serial No. J121433F index the shutter in the following manner.

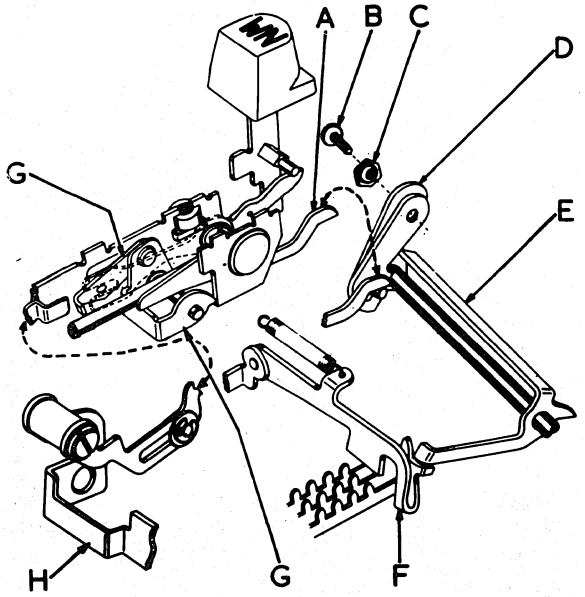


Fig.VI-9 Whole Number Shutter (Early Style)

When the drive is tripped, lever A (Fig. VI-9) rocked by bellcrank assembly G, rocks bail E to lower the shutter F into the teeth of the first three type bars to retain them in non-print position.

Tests and Adjustments

1. To ensure blocking the type bars in columns 1, 2 and 3 during a Whole Number operation:

On a Whole Number operation with the drive tripped and bail H correctly adjusted (see Fig.VI-5, Test 2, Page 7), hold bail H rearward, shutter F should be positioned fully downward without cramping in the teeth of the adding racks.

To adjust - Position eccentric C as required and tighten screw B.

Listing Key Interlocks and Drive for Pound Key and Whole Number Mechanisms

Depression of a motor bar provides the power for completing the Pound Key or Whole Number operation indexed on the keyboard. Interlocks are provided to prevent depression of listing keys during a machine operation and to prevent a machine operation if a listing key is held depressed..

Listing Key Interlock (Late Style) Common Sensing Mechanism

Depression of a motor bar or operation control key is prevented when a listing key is held depressed. Depression of a listing key lowers escapement shaft assembly D (Fig.VI-10) which through its front and rear arms, prevents rearward movement of slide C. Slide C being in a forward position prevents rocking hub L and drive trip shaft K.

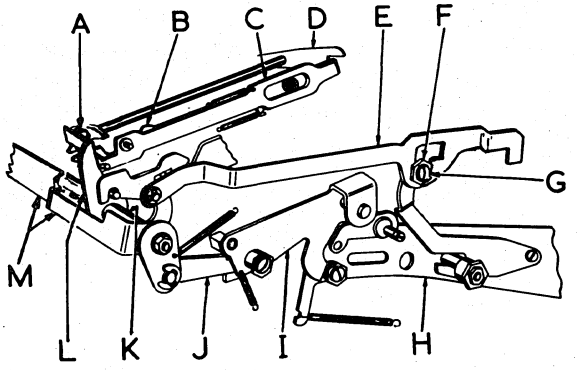


Fig. VI-10 Interlock (Late Style) Common Sensing Mechanism

Following the depression of a motor bar or operation control key, the listing keys are blocked throughout the machine operation. Trip of the drive rocks shaft assembly K (Fig. VI-10) and through the formed ear on hub L contacts roller A on slide C driving it rearwards to position the high surface of the slide under the arms of shaft assembly D to prevent depression of the listing keys. Slide B also part of the interlock assembly is driven rearwards by slide C to either hold the Pound Key depressed or prevent its depression during the machine operation. Near the end of the machine operation, driver I is raised by trip slide H clear of the step in link J to allow the trip shaft K and slides B and C to restore to normal. At this time the intermediate keyboard is being restored beyond the home position and hammer assembly N (Fig. VI-6, Page 8) is held upwards to engage the step in the front end of slide C which retains the slides in the rearward position and blocks the keyboard until the intermediate keyboard drops back to normal.

Depression of the Total or Sub-total keys through a stud in the result linkage lowers link E to disable bail M and the Whole Number Mechanism. This ensures that a true result is printed.

Tests and Adjustments

1(a) To ensure blocking the listing keys and Pound Key during a machine operation:

(b) To prevent a false limit of hub L on slide C.

Note : Before making the following Test, loosen screw B (Fig. VI-8) on lever E (Fig. VI-8) in order to avoid a false limit from the shutter.

Remove link E from bail M. Whole number Key latched, depress '1' listing key and motor bar. With bail M and slide C held fully rearward there should be .005" to .020" clearance between the ear on hub L and the roller A on slide C.

To adjust - Bend the formed ear on hub L.

2. To ensure blocking the listing keys and Pound Key during overthrow of the intermediate keyboard:

With restoration of the intermediate keyboard correctly adjusted (leading edge of left-most stop pin to just reach the flat of restoring plate), manually cycle the machine to maximum restoration of the intermediate keyboard. Hammer assembly N (Fig. VI-6) should be raised to block slide C but not bind on the step.

To adjust - Replace roll H (Fig. VI-6) on the intermediate keyboard, which is available in three different sizes.

3. To ensure 3 column escapement from the motor bars on a Pound Key or Whole Number operation:

Whole Number Key latched, depress '1' listing key and motor bar. With bail M held manually rearward link E should slide onto the stud in bail M without interference.

To adjust - Position eccentric F and secure with screw G.

Listing Key Interlock (Early Style)

Depression of a motor bar or operation control key is prevented when a listing key is held depressed. Depression of a listing key lowers escapement shaft assembly D (Fig. VI-11) which, through its front and rear arms, prevents rearward movement of slide B. The forward end of slide B, limits stud L in assembly M thus preventing rotation of drive trip shaft K.

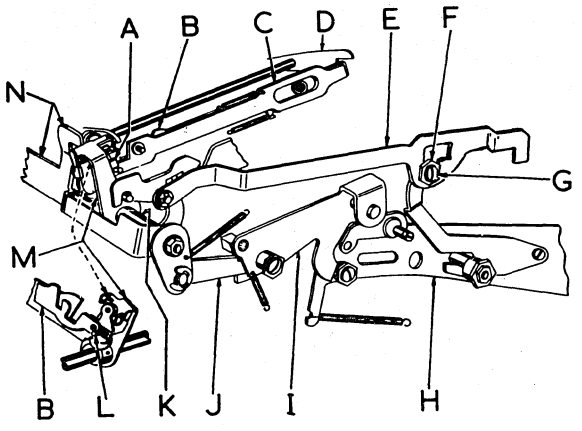


Fig.VI-11 Interlock (Early Style)

Following the depression of the plus motor bar, minus motor bar or repeat key, the listing keys are blocked throughout the machine operation. Rearward movement of drive trip slideH, (Fig.VI-11) through link E, rocks bail N to drive slide C, rearward and position the high surface of the slide under the arms of shaft assembly D to prevent depression of the listing keys. As slide C is driven rearward, pawl A positions in front of a stud in the slide to retain it in the rearward position when drive trip slide H startsto restore. Slide B, also part of the interlock assembly, is driven rearwards by slide C to either hold the Pound Key depressed or prevent its depression during the machine operation. Near the end of the machine cycle driver I is raised to clear the step in slide J allowing drive trip shaft assembly K to restore and swing pawl A clear of the stud in slide C. At this time the intermediate keyboard is being restored beyond the home position and hammer assembly N (Fig.VI-6) is held upward to engage the step in the front of slide C which retains the slide in the rearward position and prevents depression of the listing keys until the intermediate keyboard drops back to the home position.

Depression of the Total or Sub-total keys through a stud in the result linkage disables link E and bail N to prevent the Whole Number Shutter from operating. This ensures that a true result is printed on total and sub-total operations.

Actuation of the result linkage through a stud lowers link E to align the top of its 'L' shaped slot with eccentric F. When the trip slide H moves rearwards Link E and bail N remain at rest. Rocking of assembly M from the trip shaft K contacts a long roller on slide C to drive the slides rearward and blocks the keyboard during the machine operation.

Bail N connected to link E also provides the drive for the Whole Number mechanism which is connected to a tapped hub on the left end of the bail.

Tests and Adjustments

1. To ensure blocking the listing keys during machine operation:

a) There should be clearance to light rubbing contact of the stud in slide C under pawl A with the machine normal.

b) With the motor bar depressed, pawl A should have full hold on the stud in slide C.

To adjust - Bend the spring anchor ear on pawl A.

2. To ensure blocking the listing keys and Pound keys during overthrow of the intermediate keyboard:

With restoration of the intermediate keyboard correctly adjusted (leading edge of left-most stop pin to just reach the flat of restoring plate), manually cycle the machine to maximum restoration of the intermediate keyboard. Hammer assembly N (Fig.VI-6) should be raised to block slide C but not bind on the step.

To adjust - Replace roll H (Fig.VI-6) on the intermediate keyboard which is available in three different sizes.

3. To prevent a false limit of bail N on slide C.

Note : Before making the following Test, loosen screw B (Fig.VI-9) on bail E (Fig. VI-9) in order to avoid false limit from the shutter.

Remove link E from bail N. Whole number Key latched, depress '1' listing key and motor bar. With bail N and slide C held fully rearward there should .005" to.020" clearance between the ear on bail N and the roller at the front of slide C.

To adjust- Bend the formed ear on bail N.

4. To ensure 3 column escapement from the motor bars on Whole Number operation:

Whole Number Key latched, depress '1' listing key and motor bar. With bail N manually held rearward, link E should slide onto the stud in bail N without interference.

To adjust - Position the eccentric F and secure with screw G.

Keyboard Indexes Drive Trip

Machine operations are indexed from the error, non-add, repeat, subtract, plus motor bar and the total and sub-total keys as outlined on Pages 49 and 50, Power, Section II, Series J Instruction Book (Drive Trip Mechanism, Early Style). There are, however, alterations in some of the tests and adjustments, and for convenience sake all drive trip tests and adjustments as they apply to Sterling machines are provided together.

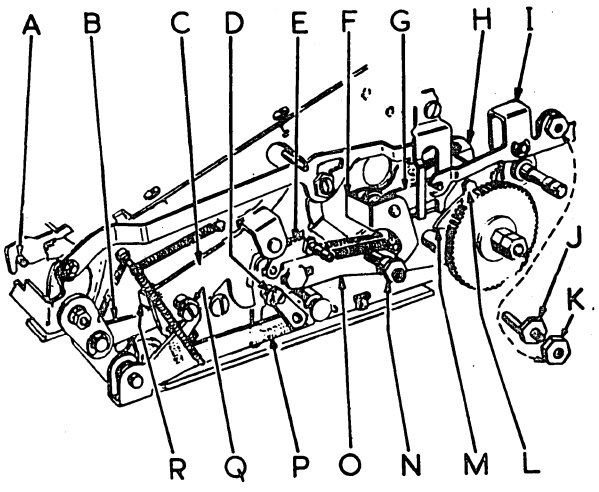


Fig. VI-12 Sterling Drive Trip Mechanism

Sterling Drive Trip Tests and Adjustments

1. To have uniform key depression and drive trip timing from all operation and result control keys:

With the power off, depress each operation control key in the right side of the keyboard to locate which key gives the least amount of throw of the drive trip shaft assembly. With this key held down, there should be from .005" to .015" passing clearance between the square stud R on hammer C and the step in link B.

To adjust - Turn eccentric A in the hub assembly on the right side of the drive trip shaft.

2. Perform the same procedure as Test 1, but for the operational control keys on the left side.

To adjust - Position eccentric post in the hub on the left side of the drive trip shaft.

3. To ensure resetting the drive trip mechanism:

With the motor trip slide O at maximum overthrow position on restoration, there should be between .003"to .015" clearance between the bottom of square stud R and the top of the formed lip of link B.

To adjust - Position eccentric D on trip slide O.

4. To ensure trip of the drive:

With an operational control key depressed, there should be between .015" to .020" passing clearance between the lower edge of trip slide O and the top of the formed lip on latch P.

To adjust- Position eccentric Q on hammer C.

5. To ensure latching and unlatching of the trip slide during each machine operation:

Machine at normal, there should be between .040" to .060" clearance between the top of the drive trip cam M and the underside of the lip H on clutch stop dog F.

To adjust - Position eccentric N.

6. To ensure a complete machine cycle during each machine operation:

Manually cycle the machine until clutch pawl L limits downward movement of control arm G. With the power on, motor should operate. With the machine in normal position and the power on, the machine should not operate.

To adjust - Bend the rearward extension of switch arm I up or down as required.

7. To allow time for the three column escapement to take place before the type bars are released:

With the intermediate keyboard escaped one column, index the Pound Key. 'Power off', hold trip slide O and depress the motor bar. Slowly release the drive trip slide O. The switch points should close just as the slide O reaches the end of it's travel.

To adjust - Refine adjustment 6.

8. To ensure free turning of the motor during machine cycle and to stop the motor quickly after the cycle is completed:

There should be .005" to .010" clearance between eccentric J and the brake arm when the machine is normal, and with the drive tripped there should be clearance between the brake shoe and brake drum.

To adjust - Position eccentric J and tighten nut K.

9. (Machines with early style motors only)
To prevent damage to microswitch and provide a limit for switch arm I:

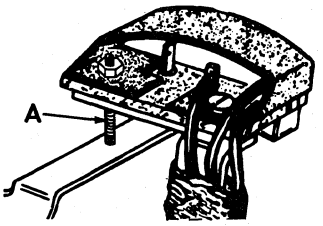


Fig. VI-13 Switch Arm Limit

With the machine normal and switch arm I adjusted as for Tests 6 and 7, there should be from .005" to .010" clearance between the switch 'U' form and the fibre base of the microswitch.

To adjust - Position screw A (Fig. VI-13) as required and lock with nut.

Intermediate Keyboard Home Position Latch

To prevent uncontrolled escapement of the intermediate keyboard if the motor bar is depressed with the Whole Number Key latched or the Pound Key held from a previous operation, a rebound latch has been added to the drive trip mechanism:

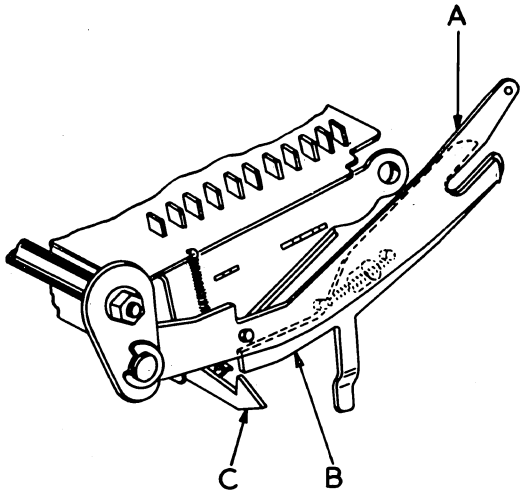


Fig.VI-14 Intermediate Keyboard Home Position Latch

Latch C (Fig.VI-14) prevents escapement of the intermediate keyboard on a blank machine operation with the Whole Number key depressed or with the Pound Key held depressed from the previous operation. Under these conditions the auxiliary escapement pawl is held clear of the escapement teeth by cam D (Fig.VI-3) therefore, a Whole Number or Pound Key operation would result in uncontrolled escapement of the intermediate keyboard.

When the drive is tripped with the intermediate keyboard in the home position slide B on link A moves forward to engage latch C and prevent escapement. The spring connection between slide B and link A is necessary to allow link A to move forward and trip the drive when the intermediate keyboard is located in column one.

Repeat Disabling

When the machine is operated with the Whole Number Key depressed and no listing keys indexed, the intermediate keyboard is limited by slide C (Fig.VI-14) which holds it in a partially escaped position until near the end of the machine cycle when it is restored to normal. If the intermediate keyboard was not restored, escapement into column one would occur when slide B releases latch C (Fig.VI-15). It is necessary therefore, to prevent disabling the intermediate keyboard restoring mechanism from the repeat key when no listing keys have been indexed.

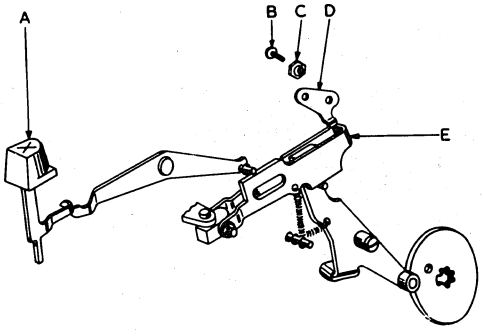


Fig.VI-15 Repeat Disabling

With the intermediate keyboard in the home position, limit D (Fig.VI-15) on the left side frame prevents upward movement of restoring link E when repeat key A is depressed. When a listing key is indexed, escapement of the intermediate keyboard moves restoring link E forward to clear limit D.

Tests and Adjustments

1. To prevent escapement of the intermediate keyboard on a blank repeat operation with the Whole Number Key depressed:

With the intermediate keyboard in home position restoring link E should have full hold on limit D.

To adjust - Loosen screw B and turn eccentric C.

2. To ensure a normal repeat operation when an amount key has been indexed.

With the intermediate keyboard escaped one column, restoring link E should clear limit D by .010" to .015".

To adjust - Refine adjustment 1.

Intermediate Keyboard Rebound Pawl

To prevent rebound of the intermediate keyboard on a 3 column escapement and the possibility of the rack bars moving between the stop pins, a rebound pawl has been fitted to control the intermediate keyboard escapement.

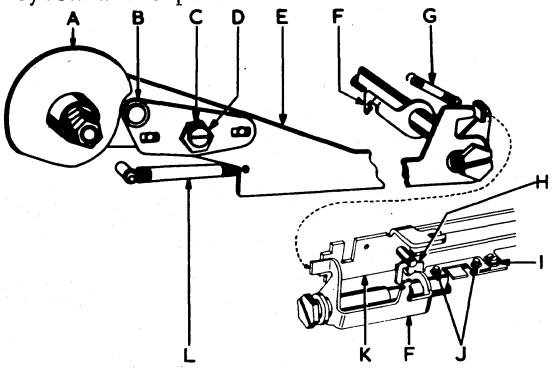


Fig.VI-16 Intermediate Keyboard Rebound Pawl

Pawl F (Fig.VI-16) prevents rebound of the intermediate keyboard on a three column escapement from the Pound Key or Whole Number Key. As the escapement takes place the lower teeth on the intermediate keyboard cam under the pawl which is maintained in active position by spring G. During the second half of the machine cycle cam A drives slide E forward to raise pawl F and allow the restoration of the intermediate keyboard to take place. Near the end of the machine cycle slide E is restored by spring L which allows pawl F to move into active position for the next machine operation.

Tests and Adjustments

1. To prevent excessive rebound of the intermediate keyboard on a three column escapement which would permit the type bars to travel between the stop pins:

With the intermediate keyboard limited by auxiliary escapement pawl E (Fig.VI-3) there should be from .005 to .015" clearance between the right hand side of the second tooth on the intermediate keyboard and the latching face of pawl F.

To adjust - Loosen screws J and position guide H.

2. To prevent pawl F interfering with the restoration of the intermediate keyboard:

With roller B on the high portion of cam A pawl F should clear the teeth on the intermediate keyboard by .010" to .030" but should not cramp on guide rail K.

To adjust - Loosen screw D and turn eccentric C.

Cipher Block Mechanism

The method used for printing is such that any type aligned with the platen at the time it is raised will cause printing to take place. Therefore, it is necessary to withdraw those type bars from which no print is desired, such as ciphers to the left of an amount. This function is performed by the cipher block mechanism, in the following manner -

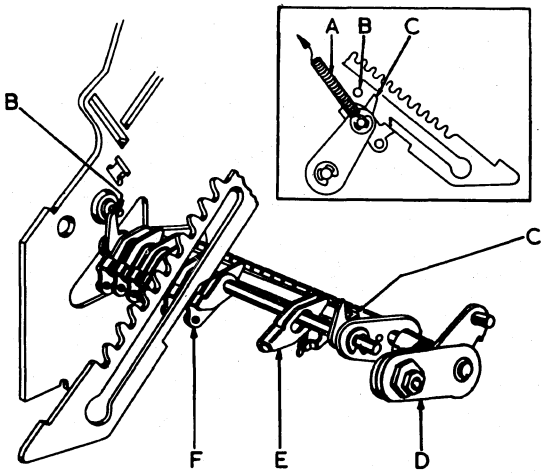


Fig. VI-17 Cipher Block Mechanism

With the machine in normal position the right and left arms of bail C (Fig. VI-17) limit against studs B in the adding section side frames. The rear of each restoring arm F limits on bail C so that the tension of spring A holding the cipher block assembly rearward against studs B holds the front end of all the restoring arms downward against the torque of the torsion spring inside the 'U' form of each arm.

In the early part of the machine cycle cipher block assembly D is rocked forward moving the arms of bail C away from studs B. This allows restoring arms F to move upward and if the type bars are limited at cipher, as on a clear total operation the restoring arms enter the cut-outs in the type bars. As the cipher block assembly continues to move forward, arms F drive the type bars to non-print (minus cipher) position.

If an amount is indexed which allows a type bar to move beyond cipher position, the restoring arm in that column will not enter the cut-out but will limit on the underside of the type bar. Because each restoring arm overlaps a stud in the arm to its right, limiting the upward movement of the arm in the indexed column will hold all arms to the right clear of their respective type bars, thereby permitting ciphers to print to the right of the indexed amount.

To permit the two cipher clear signal to print in columns 1 and 2, restoring arms E in these two columns are longer than the regular restoring arms and do not contain coupling studs. The extra length of these arms prevents them engaging the cut-outs in their respective type bars when these are limited at cipher position, thereby allowing ciphers to print in columns 1 and 2 on a clear total or sub-total operation.

As a cipher is never required to print in column 3 (10/-), the restoring arm in this column does not contain a coupling stud. Therefore, whenever the type bar in this column is limited at cipher it will be withdrawn to non-print position.

Tests and Adjustments

1. To ensure restoring of type bars to non-print position when no print is required and to ensure free indexing of type bars to printing position when printing is required:

Overall end play of restoring arms F in the pivot shaft frame should be within a range of .005" to .008" and each arm should align centrally with its respective type bar.

To adjust - Open or close the 'U' form of the arms.

3. With left type bar restored by cipher block mechanism, remaining type bars at 9 position and aligning blade fully engaged there should be .003" to .006" clearance between the front of the spring anchor projection of the left-most type bar and the aligning blade.

To adjust - Rotate eccentric in part D.

Pence Column Adding Rack

Sterling construction requires that the adding rack in column one (Pence Column) should be increased in length from 10 teeth to 12 teeth to accommodate the 12 pitch pinion.

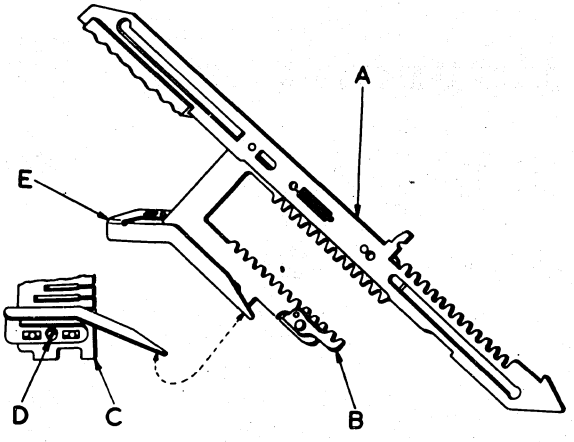


Fig. VI-18 Pence Column Adding Rack

The extra teeth required on the twelve pitch adding rack in the pence column are contained on auxiliary rack B (Fig. VI-18) which pivots on the main adding rack. This construction is necessary to allow the extra length of the rack to clear the intermediate rack stop in column 1. As type bar A is restored to normal position auxiliary rack B is allowed to move upward and cam over the intermediate rack stop. When the type bar moves out to position 9, 10 or 11, the formed ear on auxiliary rack B rides over guide bracket E which is secured to the underside of adding rack guide comb C, this maintains the auxiliary rack in lowered position.

Tests and Adjustments

1. To prevent auxiliary rack B flicking up into the adding pinion and turning it when type bar A is restoring on a total operation:

Guide bracket E should be positioned as far forward as possible without interfering with the free movement of type bar A.

To adjust - Loosen screw D and position bracket E.

Burroughs
Series J
TEN KEY ADDING MACHINE

INSTRUCTION BOOK
Section X
●
SERVICING PROCEDURES

PRINTED IN U.S. AMERICA MAY 1965

FOR FORM 3705

TABLE OF CONTENTS

Servicing Procedures

PREVENTIVE MAINTENANCE GUIDE

SERIES J TEN KEY MACHINES

This Preventive Maintenance Guide outlines the sequence of operations to be followed by Service Representatives when a P.M. attention is rendered.

Particular attention should be given to "Approved Test and Adjustments" as specified in current instruction books and Service Technical Notices. Any variation in adjustments should be thoroughly analyzed and before attempting to restore the adjustments to "test", consideration should be given to all related mechanisms that may be affected by this adjustment.

Parts showing signs of wear or deterioration must be replaced to keep "Approved Test and Adjustments" within safety margins at all times.

If adjustments other than "Approved Test and Adjustments" are necessary to place the machine in operating condition, a complete report describing the need of such adjustments must be made to service management.

Service Technical Notice parts should be installed where such action is required to reduce equipment "down" time.

Thorough cleaning and lubrication, using the following approved types of oil, grease and cleaning agents is a must for proper equipment performance.

1. Machine oil 16249245 - to be used on all shafts bearing, pivot points, rollers, oil holes, and metal to metal contact of moving parts.

2. Machine grease 16249427 - to be used on all cams, forked arms, and slots where contact is made with studs and metal gears.

3. Platen restorer S3 - to be used to clean platen, pressure rolls.

4. Case cleaner and polish 16249146 - to be used for cleaning all cases.

Procedure:

1. Inquire of the user regarding machine performance. Make an operational test run of the machine observing printing, spacing, accumulation and machine speed.

2. Note any deficiencies for later attention at the appropriate part of the P.M. Confirm need for new ribbon.

3. Remove the case and the base. Remove the paper roll, the motor and the ribbon.

4. Inspect, clean and lubricate the machine.

5. List all 9's, manually cycle the machine to full travel of the type bars checking for free movement. Clean type and type bars at this time.

6A. On machines with early style motor test for good condition of the micro-switch A, brushes G and B and governor assembly F. (Fig.X-1).

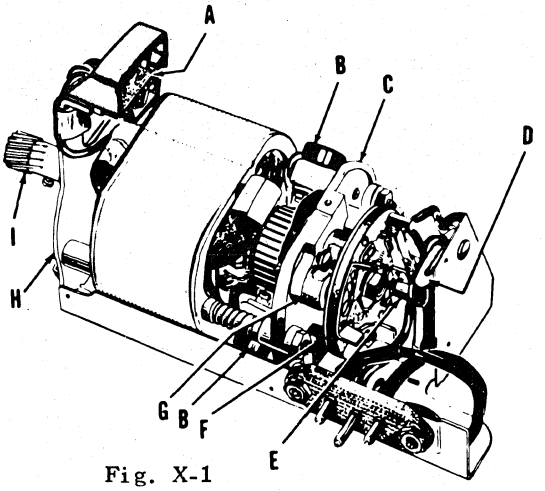


Fig. X-1

6B. On machines with late style J(F) motor test for good condition of the switch points located under cover B, condition of the brushes F and governor assembly and its brushes located under cover plate C. (Fig.X-2).

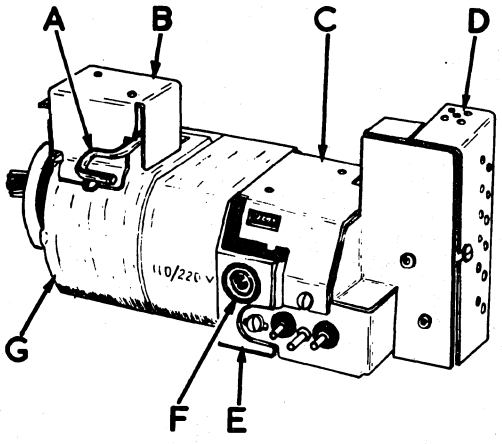


Fig. X-2

7. Sec. II, Power, Page 54 - Install the motor and check for slight play (.002" to .003" clearance) between pinion F and safety clutch gear E. (Fig.X-3).

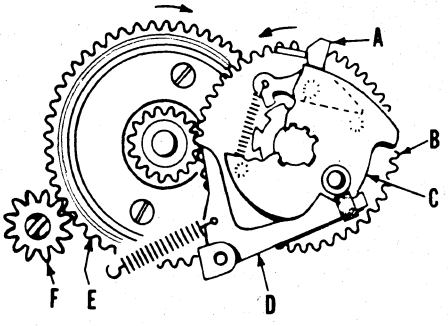


Fig. X-3

8. Sec. II, Carriage, Pages 27-28 Install the paper holder. The inner surface of the right side should be flush with the inside surface of the right carriage end plate.

9. Sec. II, Printing, Pages 41-42. Install the ribbon. Check the ribbon feed during machine operation. The ribbon should be taut while feeding, and when manually holding the spool reverse slide G should move promptly to the opposite pocket of feed bail F. (Fig. X-4).

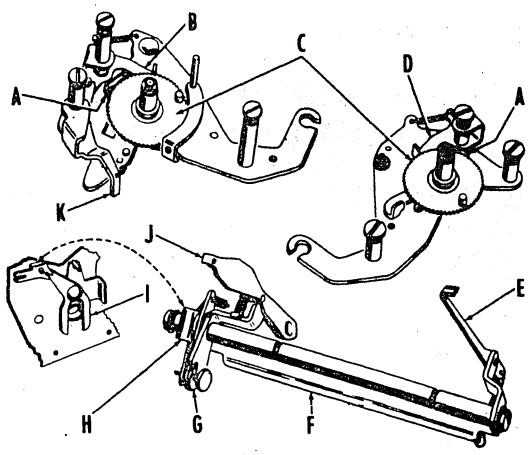


Fig. X-4

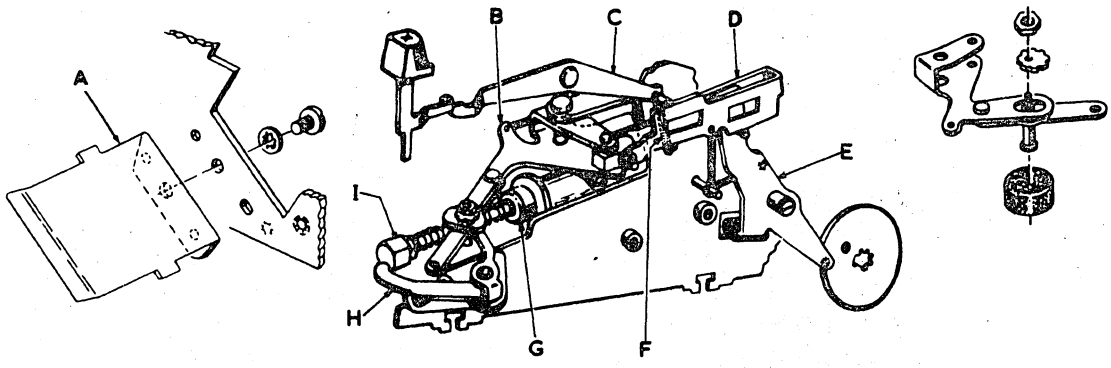


Fig. X-5

10. Check for free movement and full restoring of all the keystems.

11. Index all 1's in the keyboard, manually operate the machine and test for complete restoring of the pins in the intermediate keyboard.

12. Test for straightness of the restoring plate A (Fig. X-5).

13A. Test free movement of the plunger I in the airpot G on early style machines.

13B. Check the rubber bumper for good condition on late style machines. (Fig. X-5)

14. Check the speed of the machine. Install the base and the case. Perform operational test.

OPERATING TESTS

a) On machines with 5/6" spacing device, position disabling lever to the rear.

b) On machines with red ribbon, check that all minus amounts and minus totals are printed in red.

The following tests to be performed on all machine styles according to capacity.

1. Perform a fast indexing and check for accurate movement of the column indicator needle.

```
                .00•
                .00*

  11,111,111.11
  22,222,222.22
  33,333,333.33
  44,444,444.44
  55,555,555.55
  66,666,666.66
  77,777,777.77
  88,888,888.88
  99,999,999.99
 499,999,999.95•
 499,999,999.95•
 499,999,999.95•
                .05*
                .05
 500,000,000.00•
 500,000,000.00•
 500,000,000.00•
                .01-
 499,999,999.99•
 499,999,999.99•
 499,999,999.99•
                .01
 500,000,000.00•
 500,000,000.00•
 500,000,000.00•
 500,000,000.00*
```

2. Index all 9's and depress plus bar. Then perform the subsequent operations by using R and R- (or X and X-) keys followed by a subtotal operation. On Series J500 depress repeat and minus keys simultaneously for the subtract operations.

```
99,999,999.99
12,345,678.90
12,345,678.90-
99,999,999.99•
23,456,789.01
23,456,789.01-
99,999,999.99•
34,567,890.12
34,567,890.12-
99,999,999.99•
45,678,901.23
45,678,901.23-
99,999,999.99•
56,789,012.34
56,789,012.34-
99,999,999.99•
67,890,123.45
67,890,123.45-
99,999,999.99•
78,901,234.56
78,901,234.56-
99,999,999.99•
89,012,345.67
89,012,345.67-
99,999,999.99•
90,123,456.78
90,123,456.78-
99,999,999.99•
99,999,999.99•
99,999,999.99*
```

3. Test to be performed on credit balance styles. Use plus bar (+) and minus bar (-). Move quickly from the plus or minus bar to the subtotal key.

```
.01-
.02
.01•
.02-
.01-•
.02
.01•
.01*
```

4. Test to be performed on non-credit balance machines.

```
                .00•
                .00*
                .01-
999,999,999.99•
999,999,999.99*
                .00•
                .00*
```

5. Test to be performed on machines with 1, 2 or 3 cipher keys. Move quickly (without simultaneous depression) from cipher keys to plus (+) bar.

```
   .10
  1.00
 10.00
   .10
  1.00
 10.00
   .10
  1.00
 10.00
 33.30•
 33.30*
```

6. Check machine speed by listing 1 and hold repeat key depressed for one minute. The result should be 175 ± 3.

```
.01
.01
.01
.01

etc...

.01
.01
.01
.01
1.75*
```

7. For all style J machines :
Simultaneously depress the No. 1 listing key. Release first the minus key and then the No. 1 listing key.

Check for correct printing of the listed figure and correct tripping of the machine when listing key is released. Perform test as follows:

* For machines with "Totals after Repeat"

Operation		Print
No. 1 key and	- key	.01-
No. 2 key and	+ key	.02
No. 3 key and	- key	.03-
No. 4 key and	+ key	.04
No. 5 key and	E key	
No. 6 key and	NA key	.06*
* No. 7 key and	ST key	.02•
No. 8 key and	+ key	.08
* No. 9 key and	TOT key	.10*
TOT key		.00*

8. Test to be performed on credit balance machines only, up to full capacity.
On credit balance machines, add 9, subtract 10, subtotal and total. Then add 99, subtract 100, subtotal and total. Continue test to full capacity.

```
  .09
 .10-
.01-•
.01-*

  .99
1.00-
 .01-•
 .01-*

          etc...

   999,999.99
1,000,000.00-
        .01-•
        .01-*

  9,999,999.99
10,000,000.00-
        .01-•
        .01-*
```

9. Test to be performed on all machine styles up to full capacity.
On all machines subtract 9, add 10, subtotal and total. Then subtract 99, add 100, subtotal and total. Continue test to full capacity.

```
.09-
.10
.01•
.01*

.99-
1.00
.01•
.01*

etc...

999,999.99-
1,000,000.00
.01•
.01*

9,999,999.99-
10,000,000.00
.01•
.01*
```

10. For J700 and J704:

Check for correct multiplication and flexibility between multiplying keyboard and result keys as follows:

(a) Perform once each operation

Listing Key.	Mult. Key.	Print
123,456.79	x 9	1,111,111.11*
123,456.79	x 18	2,222,222.22*
123,456.79	x 27	3,333,333.33*
123,456.79	x 36	4,444,444.44*
123,456.79	x 45	5,555,555.55*
123,456.79	x 54	6,666,666.66*
123,456.79	x 63	7,777,777.77*
123,456.79	x 72	8,888,888.88*
123,456.79	x 81	9,999,999.99*

(b) Check for flexibility of multiplying keyboard as follows: depress listing key No. 1 and then depress consecutively the multiplying keys 9, 8, 7, 6, 5, 4, 3, 2, 1 and 0. Result should be

```
1,234,567.89•
1,234,567.89*
.00*
```

With the multiplying keys depressed in reverse order (0 thru 9) the result should be:

```
8,765,432.10•
8,765,432.10•
.00•
```

7. Check platen for spacing.

   a. Make sure the platen may be turned backwards.

   b. Check the paper roll release button for releasing the roll paper.

8 Check the machine for accumulation - including operation of the automatic one if the machine contains the minus balance feature.

   a. Perform the following test run three times:
   Minus balance machines
   .00 * Subtract .01- and total .01-*

   Eight column machines without the minus balance feature
   Subtract .01-
   and total 9,999,999,99*

   Ten column machines without the minus balance feature
   Subtract .01-
   and total 999,999,999.99*

   b. Perform the following test to check the automatic one.

.00●	.00●
.00✲	.00✲
.01-	.01
.02	.02-
.02-	.02
.02	.02-
.02-	.02
.02	.02-
.02-	.02
.02	.02-
.02-	.02
.02	.02-
.02-	.02
.01-●	.01●
.01-✲	.01✲
.00-✲	.00✲

   c. Perform the following test to receive a carry and actuate the automatic one from each column.

.00●	.00●
.00✲	.00✲
.09	.09-
.10-	.10
.01-●	.01●
.01-✲	.01✲
.00-✲	.00✲
.99	.99-
1.00-	1.00
.01-●	.01●
.01-✲	.01✲
.00-✲	.00✲
9.99	9.99-
10.00-	10.00
.01-●	.01●
.01-✲	.01✲
.00-✲	.00✲

(Continue the above procedure across the keyboard).

d./....

d. Perform each of the following test three times to receive a carry and to actuate the automatic one.

```
              .00●
              .00*


66,666,666.66
66,666,666.66●
66,666,666.66*
              .00●
              .00*


10,000,000.00-
10,000,000.00
              .00-●
              .00-*
              .01
              .01*
              .00*


11,111,111.11
 2,020,202.02-
 9,090,909.09*
              .00*


              .00*


11,111,111.11
20,202,020.20-
 9,090,909.09-*
              .00-*


88,888,888.88
 9,090,909.09-
79,797,979.79*
              .00*


88,888,888.88
90,909,090.90-
 2,020,202.02-*
              .00-*
```

REMOVAL AND REPLACEMENT PROCEDURES

How to Change the Ribbon

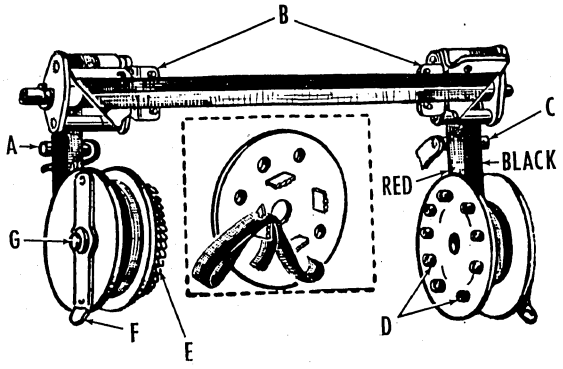


Fig. X-6

A. Remove the case

1. Push case latching arms rearward, which extend through the base on both sides near the centre of the machine to unlatch the case.

2. Raise the front of case to approximately a 45° angle; then with a rearward and upward movement, remove the case.

B. Change the Ribbon

1. To remove each ribbon spool, swing ribbon spool retainer F (Fig. X-6) away from the ribbon spool post and slide the spool off the post. Remove the ribbon from one spool and discard old ribbon and the other spool.

2. Attach the free end of the new ribbon to the retained spool, in the same manner that the old ribbon was attached, with the black edge against the outside flange of the spool, as shown.

3. Install the ribbon spools on spool posts G so that the ribbon feeds toward the bottom of each ribbon spool. Assure that the driving stud in each ratchet wheel E is in one of the embossed holes D in the respective ribbon spool. Lock the spools on the posts with spool retainer arms F.

4. Thread the ribbon over studs A and C in the take up arms, and through ribbon guide assemblies B, as shown. Remove any slack in the ribbon by turning the spools manually.

5. Operate the machine electrically to observe that the ribbon is feeding and reversing correctly.

C. Replace the Case

1. Lower the rear portion of case under the roll paper, with case at approximately 45° angle, then lower front of case into position.

2. Pull case latching arms forward, which extend through the base on both sides near the centre of the machine to latch case.

Case -

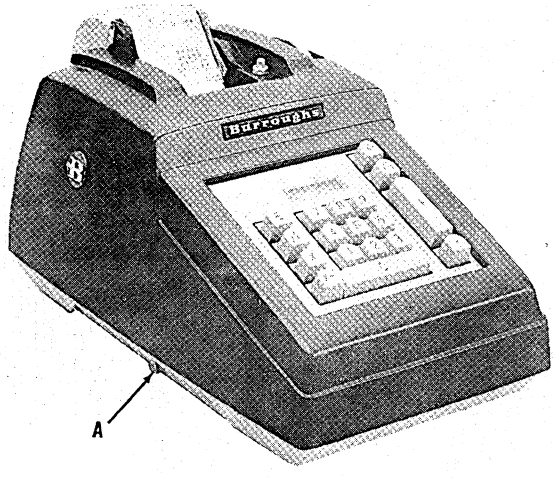


Fig. X-7

A. Removal

1. Push case latching arms A (Fig. X-7) rearward, which extend through the base on both sides near the centre of the machine, to unlatch the case.

2. Raise the front of case to approximately a 45° angle, then with a rearward and upward movement, remove the case.

B. Replacement

1. Lower the rear portion of case under the roll paper, with case at approximately 45° angle, then lower front of case into position.

2. Pull case latching arms A (Fig.X-7) forward, which extend through the base on both sides near the centre of the machine, to latch case.

Base (Early Style Machines)

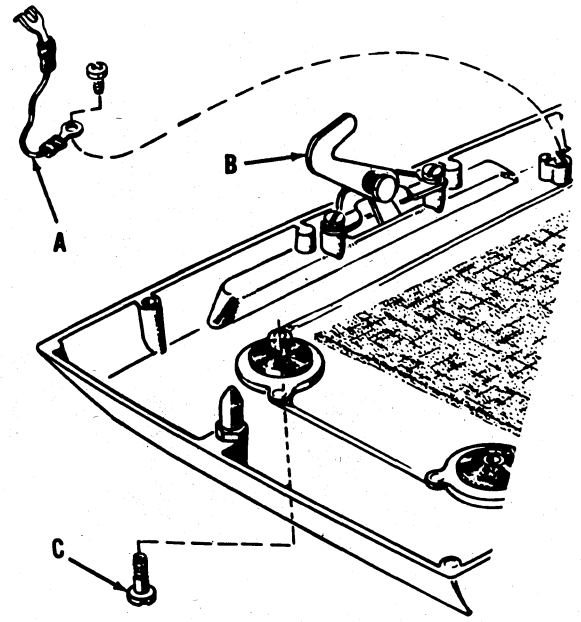


Fig. X-8

A. Removal

1. Disconnect the upper end of the ground wire A (Fig.X-8) connected to the rear portion of the left side frame by loosening screw and slipping wire from screw.

2. Invert the machine and remove four screws C (Fig.X-8) from the centre of the four shock mount feet. Lift the base from machine.

B. Replacement

1. Set machine on its keyboard, line up one of the holes in the centre of the shock mount feet and insert the screw C (Fig.X-8). Insert the balance of screws and tighten.

2. Invert the machine and slip ground wire A (Fig.X-8) under screw at the rear of left side frame, tighten screw.

Base (Late Style Machines)
Plastic Bases Without Securing Screws.

1) Using Pilot Screws (16227670)

A. Removal

1. Remove case.

2. Turn the machine over on its keyboard, insert four pilot screws A (Fig.X-9) through the rubber feet in base B and screw into the flanged studs of the machine sub-base C. Turn the machine to upright position resting on the pilot screws. Apply downward pressure on base B until the four projections on sub-base C are loose from the base.

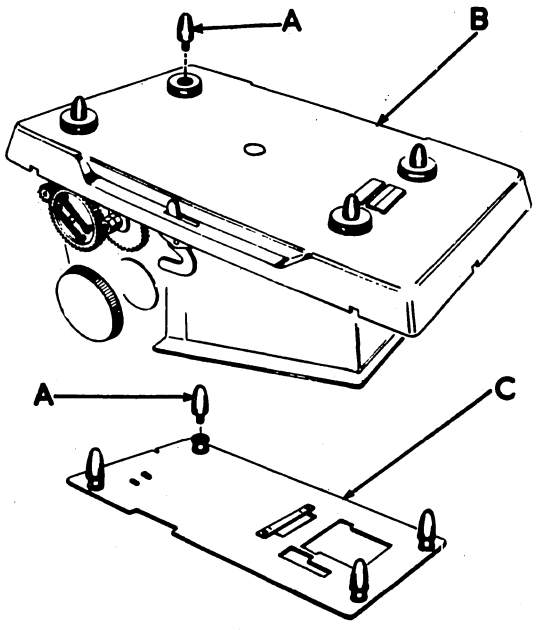


Fig. X-9

Caution: The points of the pilot screws may mar soft desk tops, therefore any working surface subject to damage should be protected.

B. Replacement

1. Turn the machine over to rest on its keyboard, install four lightly lubricated pilot screws A (Fig.X-9) into the flanged studs of machine sub-base C. Align holes in four rubber feet of base B with pilot screws A. Press base down until base is in place.

2. Remove four pilot screws A.

3. Replace case.

ii) Without using pilot screw.

A. Removal

1. Remove case.

2. Hold machine base D (Fig.X-10) at one corner and pull machine at the same corner. The machine sub-base A which carries foot B will then separate from rubber foot C. The procedure is then repeated at the other three corners of the machine.

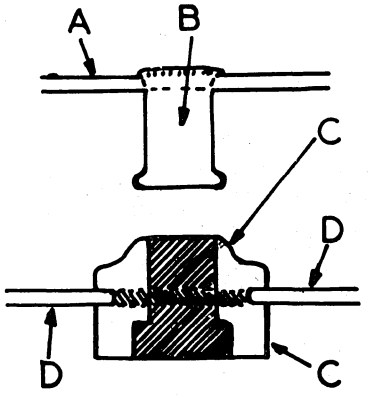


Fig. X-10

B. Replacement

1. The feet B (Fig.X-10) on machine sub-base A are aligned over rubber feet C and the machine is then pressed home one corner at a time.

Keyboard

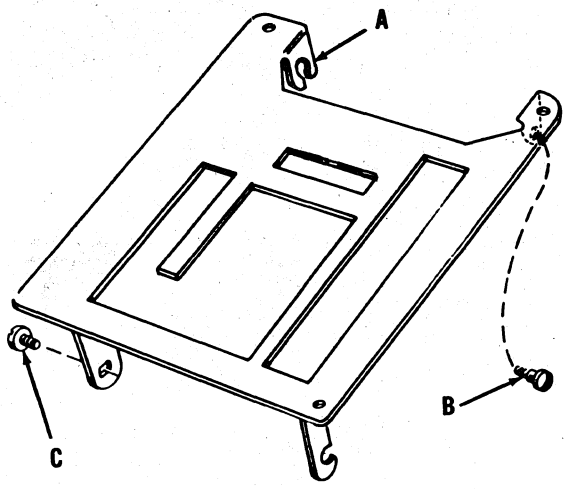


Fig. X-11

A. Removal

1. Remove keyboard plate by removing screw B (Fig.X-11) on the right rear side and screw C (Fig.X-11) on front left side of keyboard plate.

   Note: On some styles it will be necessary to remove screw at front right also.

2. Move the rear portion of keyboard plate to the right, until the forked leg A (Fig.X-11) at the left rear can be raised in slot in shaft, raise the keyboard plate clear of keyboard.

3. Remove non-add bail A (Fig.X-12) by removing screw on the left side, raising tie shaft and bail A straight up out of slots in side frames.

4. Remove four screws on the keyboard top plate which extend into the left and right outer machine side frames.

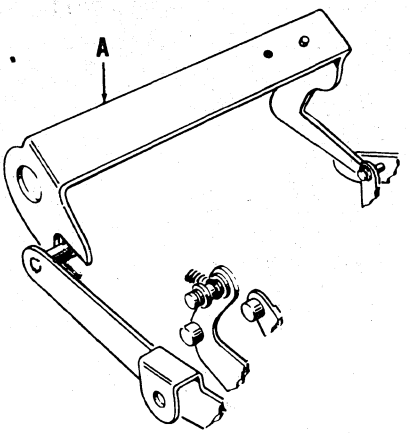


Fig. X-12

5. Remove clip D (Fig.X-13) at front of the right side frame.

6. Unhook spring A (Fig.X-13) from post B (Fig.X-13) on the right side frame.

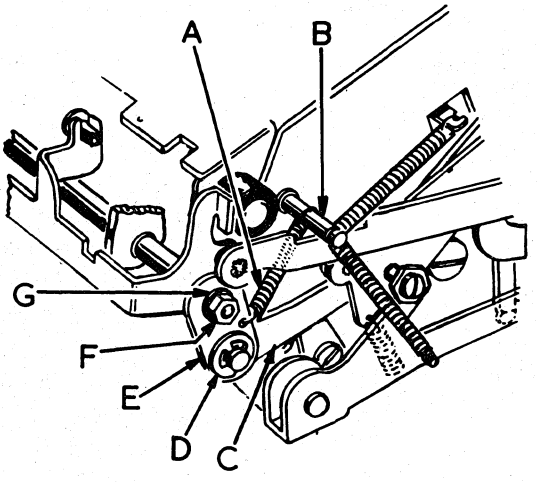


Fig. X-13

7. Remove nut F (Fig.X-13) and lock washer G (Fig.X-13) from shaft. Then remove trip slide C (Fig.X-13) and arm E (Fig.X-13) from the machine.

8. Remove two screws which extend through side frames at the front of keyboard.

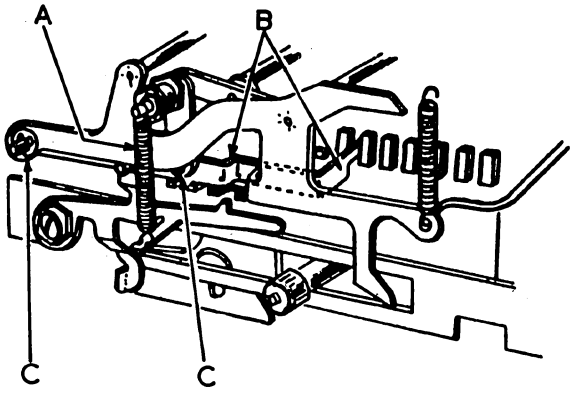


Fig. X-14

9. On late style machines, remove spring A (Fig.X-14).

10. Raise the keyboard to remove, being sure not to bend column indicator arm as keyboard is removed.

B. Replacement

1. Be sure to hold column indicator arm to the right to prevent bending.

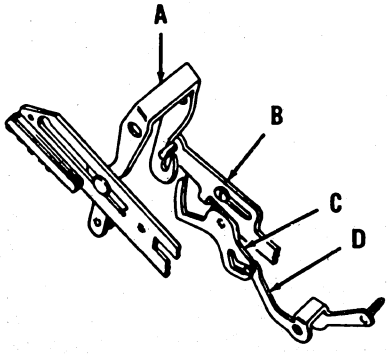


Fig.X-15

2. As the keyboard is lowered into the machine, be sure stud in keyboard slide B (Fig.X-15) fits into hook portion of bail A and the stud in lever D is engaged in the cam slot of lever C.

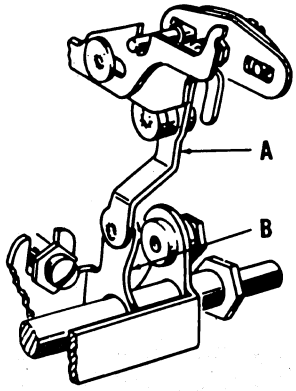


Fig. X-16

3. Reverse steps 9 through 1 of keyboard removal to install keyboard.

4. On early style machines, re-engage the stud in arm A (Fig.X-16) with the upper forked extension of bail B.

Keystem

A. Removal

1. Remove case and keyboard.

2. Remove the keytop and restoring spring from the keystem to be removed.

   Note: When removing any keytop compress the restoring spring downward and insert a spring hook in the scoring hole in the keystem. Using the spring hook as a fulcrum, insert the bit of the screw driver between the spring hook and the keytop, prying the keytop off the keystem.

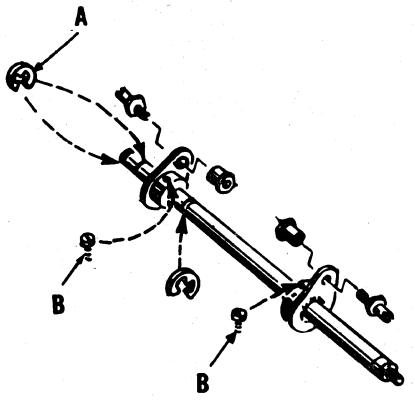


Fig. X-17

3. Remove clips A (Fig.X-17) and set screws B (Fig.X-17) from lower front keyboard shaft assembly, then remove the shaft and parts which pivot on the shaft.

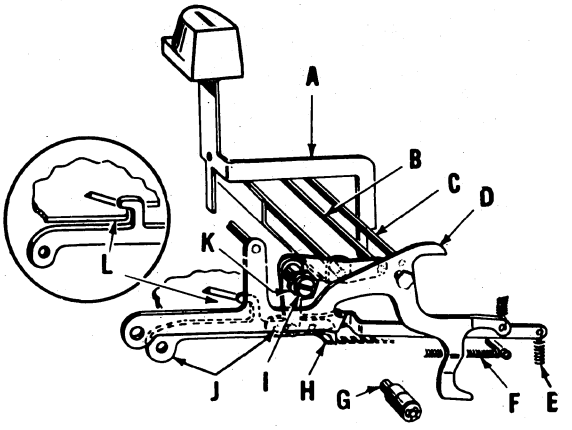


Fig. X-18

4A. On early style machines remove escapement pawl J (Fig.X-18) by removing two clips and spring E.

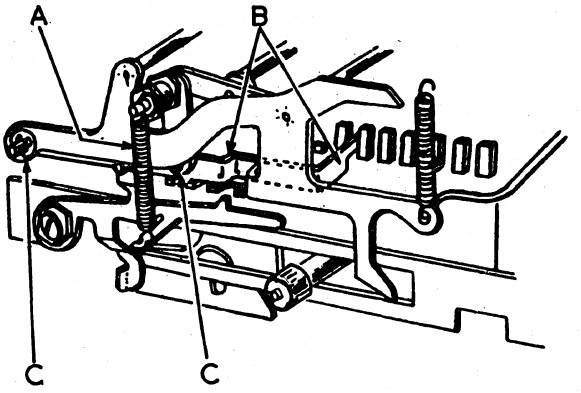


Fig.X-19

4B. On late style machines remove escapement arm B (Fig.X-19) by removing two clips C.

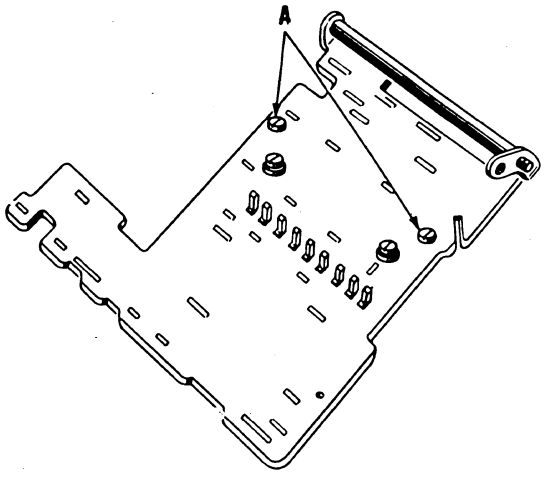


Fig. X-20

5. Remove two screws A (Fig.X-20) from keyboard bottom plate.

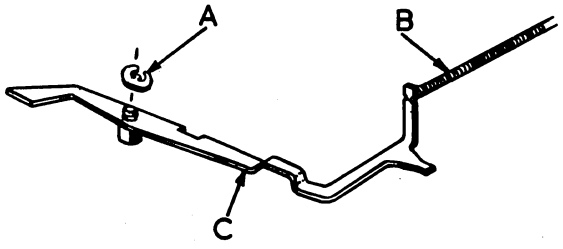


Fig. X-21

6. Remove the minus repeat interlock arm C (Fig.X-21) by removing the retaining clip A and spring B.

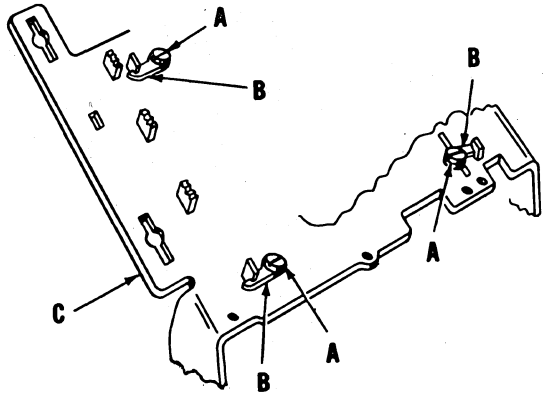


Fig. X-22

7. Remove four screws A (Fig.X-22) from top plate which hold keyboard lock plates B (Fig.X-22). Then remove four lock plates B which retain top plate C.

8. Raise the top keyboard plate C (Fig. X-22) being sure to remove escapement bail from pivot points (front and rear), and keystems from the bottom plate.

9. Remove the keystem to be replaced.

B. Replacement

1. Replace keystem removed.

2. Start top keyboard plate into position being sure to insert 0 first, then 1, 2, 3 followed by 4, 5, 6 and then 7, 8 and 9. Follow this by working control keys into correct position.

3. Reverse the procedure for removal steps 7 through 3.

4. Install the restoring spring and keytop, being sure to hold spring compressed by inserting spring hook in hole of keystem. Insert a screw driver bit between spring and keyboard top plate, then press keytop into position.

5. Check to be sure all keystems, and keyboard parts are free and non-binding.

6. Replace keyboard and check for correct operation.

7. Replace case.

Intermediate Keyboard

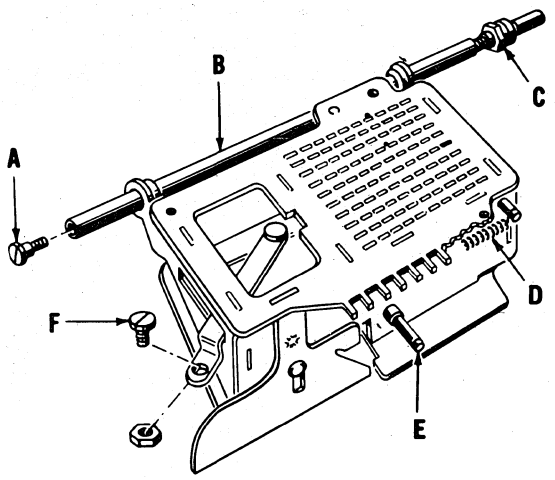


Fig. X-23

A. Removal

1. Remove case and keyboard.
2. Remove spring D (Fig. X-23) if fitted (on early style machines).
3. Remove screws A, C and F.
4. Remove clip and roller from post E.
5. Remove screw in column indicator arm and remove arm to prevent bending.
6. Remove shaft B and the intermediate keyboard.

B. Replacement

1. Replace shaft B and the intermediate keyboard being sure post E is placed in the slot of front bearing plate.
2. Replace screws A, C and F.
3. Replace roller and clip on post E.
4. Replace column indicator arm and retaining screw.
5. Replace spring D (on early style machines).
6. Replace keyboard then check adjustment listed below before replacing case.

C. Adjustment

1. With the intermediate keyboard fully restored, the last column of stop pins should be moved only far enough to have the leading corner reach maximum restoring movement from contact with the restoring plate. Turn eccentric A (Fig. X-24).

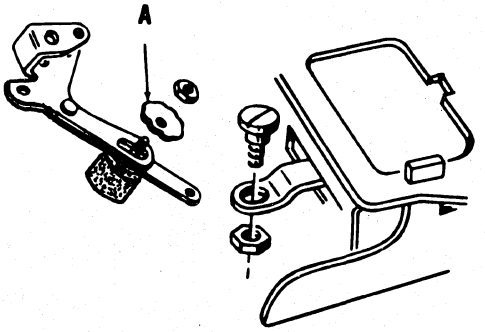


Fig. X-24

Note: The above adjustment should be completed by operating the machine by hand. Be sure intermediate keyboard does not contact right side frame during a power machine operation.

Paper Holder - J600 - J700

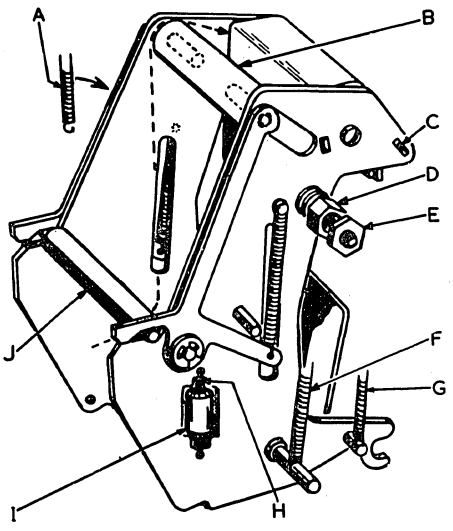


Fig. X-25

A. Removal

1. Remove springs A, F and G (Fig. X-25) from the studs in the paper holder.

2. Loosen shoulder nuts E and with the carriage in a raised position remove the paper holder rearwards.

B. Replacement

1. With carriage in a raised position insert paper holder over tie shaft and posts in their respective slots.

2. Refit springs A, F and G to paper holder.

C. Adjustment

1. Turn the inside nuts D (recessed) to provide flush alignment of the right paper holder side frame with the right side frame of the carriage. Then tighten the shoulder nuts E to secure paper holder.

Ribbon Mechanism Right Side Frame

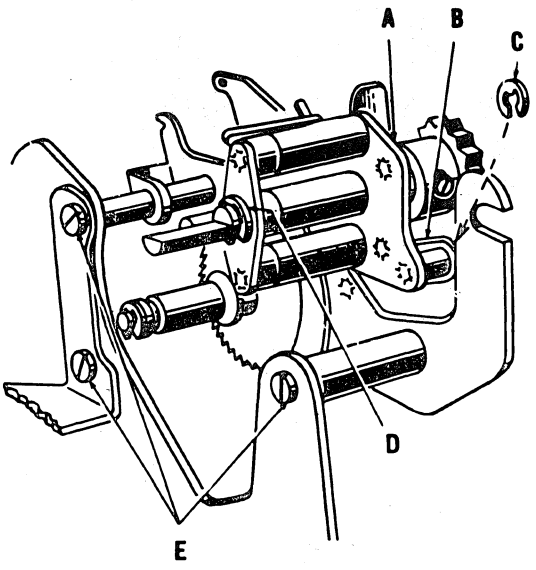


Fig. X-26

A. Removal

1. Remove case, ribbon, paper holder and platen twirler.

2. Detach link B (Fig. X-26) from ribbon guide by removing clip C (Fig. X-26).

3. Remove right ribbon guide A (Fig. X-26), retained by clip D (Fig. X-26) from the platen shaft.

4. Unhook the red ribbon restoring spring from the inside of the ribbon mechanism side frame.

5. Unhook ribbon reverse detent spring from detent.

6. Remove three screws E (Fig. X-26) and lift the frame assembly from the machine.

B. Replacement

1. Replace the ribbon mechanism right side frame assembly being sure ribbon feed pawl is correctly positioned.
2. Install three screws E being sure to install guide for drive clutch release.
3. Hook ribbon reverse detent spring to stud in detent.
4. Hook red ribbon restoring spring to stud in side frame assembly.
5. Replace ribbon guide A and retaining clip D.
6. Replace link B in ribbon guide A and replace retaining clip C.
7. Replace ribbon, paper holder, and platen twirler.
8. Check to be sure ribbon feeds and reverses properly.

Ribbon Mechanism Left Side Frame

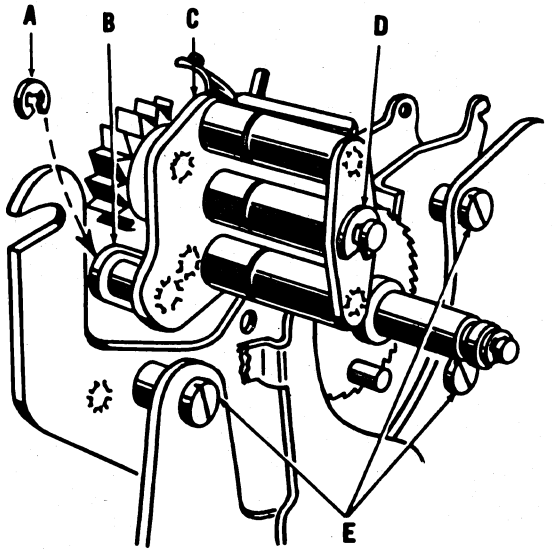


Fig. X-27

A. Removal

1. Remove ribbon and paper holder.
2. Detach link B (Fig.X-27) from the ribbon guide by removing clip A (Fig.X-27).
3. Remove left ribbon guide C (Fig.X-27), retained by clip D from the platen shaft.
4. Unhook the space pawl spring from the inside of the ribbon mechanism side frame.
5. Unhook 5/6" space pawl spring from the inside of the ribbon mechanism side frame.
6. Unhook spring and two clips retaining ribbon tension bar and remove.
7. Remove clip from 5/6" space detent driver assembly and remove (on early style machines).
8. Remove three screws E (Fig.X-27) and lift the side frame assembly upward and rearward from machine.

B. Replacement

1. Replace left ribbon side frame assembly being sure to position ribbon feed pawl properly to the rear and that restoring arm B (Fig.X-27) is in front of stud in carriage restoring arm.
2. Replace three screws E (Fig.X-27) being sure to have spring anchor on rear screw.
3. Replace 5/6" space detent driver assembly and retaining clip (on early style machines).
4. Hook 5/6" space pawl and single space pawl springs to the inside studs of the ribbon mechanism side frame.

5. Replace ribbon tension bar, two retaining clips and hook spring to stud in left side frame.

6. Replace left ribbon guide C (Fig.X-27) and retaining clip D.

7. Attach link B to ribbon guide by installing clip A.

8. Replace ribbon and paper holder.

5/6" Space Detent (Early Style Machines)

A. Removal

1. Manually cycle the machine until the carriage and ribbon shift mechanism are fully indexed.

2. Remove clips A and D (Fig.X-27) and remove left ribbon guide C.

3. Remove spring from 5/6" space detent A (Fig.X-28).

4. Remove clip from 5/6" space detent A (Fig.X-28) and remove.

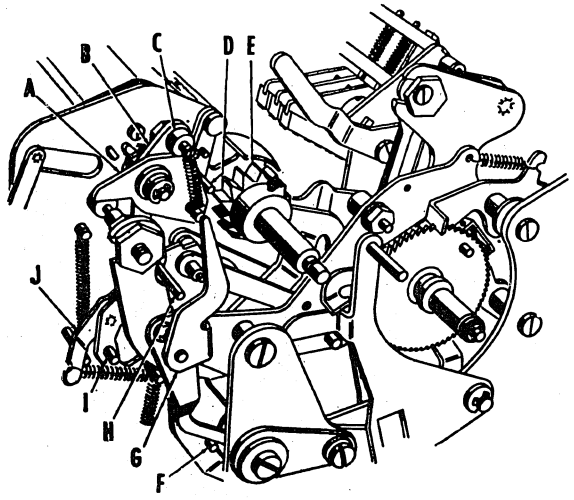


Fig. X-28

B. Replacement

1. Replace 5/6" space detent A (Fig.X-28) and clip.

2. Replace spring on detent A.

3. Replace left ribbon guide C (Fig.X-27) and clips A and D (Fig.X-27).

4. Manually cycle machine to home position.

Note: Refer to Series J Instruction Book, Fig. II-33 for adjustments.

5/6" Space Pawl Link (All Styles)

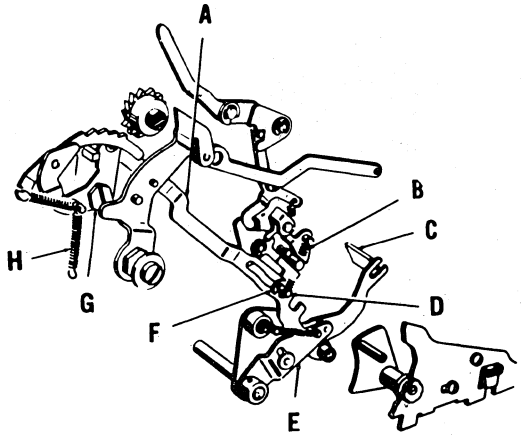


Fig. X-29

A. Removal

1. Remove paper holder, motor and left ribbon mechanism side frame.

2. Remove hexagon screw G, unhook springs B and H, remove clip and washer F.

3. Index 9's - to keep type bar restoring bail C from restoring toward normal - and advance the machine to about the two or three key limit position. With the rearward end of space link A lowered as far as possible, tilt its upper edge outward and uncouple it from stud D.

4. Advance the machine to half cycle position and with actuating arm E held all the way down, uncouple link A from arm and remove to the rear.

B. Replacement

1. Reverse the procedure for space link removal.

Red Ribbon Shaft Assembly

A. Removal

1. Remove clips which retain links D (Fig. X-30) to ribbon guides and detach the links.

2. Unhook restoring spring B from the right ribbon mechanism side frame.

3. Remove the clip which retains collar C in position.

4. Cycle machine on a symbol printing operation to provide passing clearance of the red ribbon shaft assembly.

5. Move the red ribbon shaft assembly to the right until the milled grooves in the shaft are aligned with the accumulator side frames, then lift the shaft assembly upward to remove.

Note: It may be necessary to raise stud in shaft assembly plate to clear screw in accumulator right side frame, to obtain sufficient movement to the right for removal of shaft assembly.

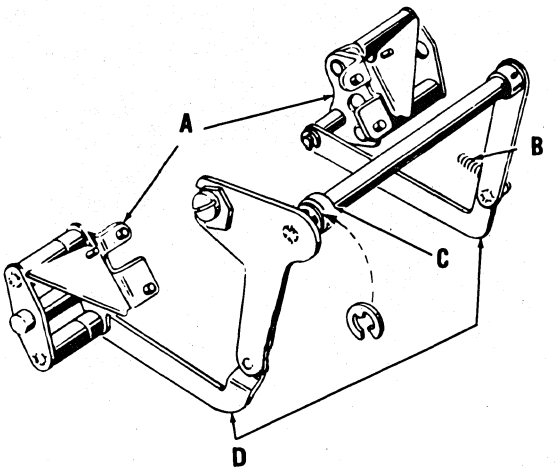


Fig. X-30

B. Replacement

1. Replace the red ribbon shaft assembly being careful to keep links D for ribbon guides A to the rear and upward. Also be sure ribbon power arm I (Fig. II-41) is in the slot in shaft assembly and stud is in the slot of selector bail.

2. Insert links in ribbon guides A and install clips.

3. Move shaft assembly to the left, position collar C and install clip.

4. Hook restoring spring B to stud in shaft assembly.

5. Complete machine cycle to home position.

Carriage

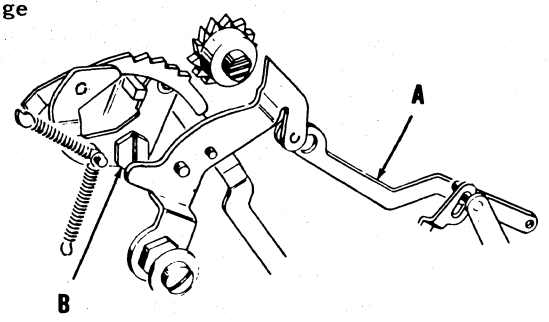


Fig. X-31

A. Removal

1. Remove paper holder (Fig.X-25) and ribbon mechanism side frames (Fig. X-26) and Fig. X-27).

2. Remove link A (Fig.X-31) from the platen space pawl and remove the space pawl.

3. Remove hexagon shoulder screw B from the 5/6' space control link.

4. Unhook carriage restoring spring inside left carriage side frame, being careful of spring anchor.

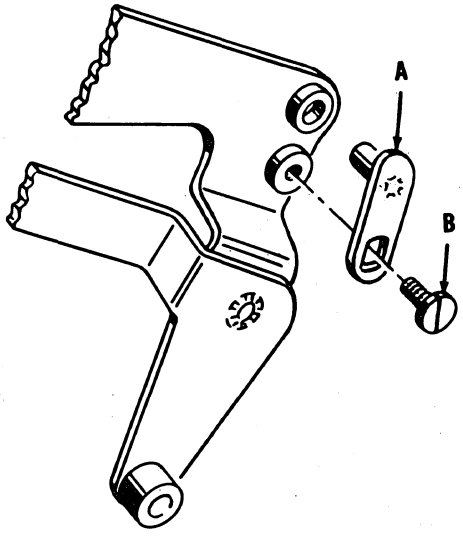


Fig.X-32

5. Remove screws B (Fig.X-32) and pivot assemblies A from right and left sides of the carriage.

6. Remove the carriage upward and rearward from the machine.

B. Replacement

1. Reverse the procedure for removal of the carriage.

Left Side Frame

A. Removal

1. Remove case, base, keyboard, ribbon, paper holder and left ribbon mechanism side frame.

Note: If the carriage and accumulator are to be removed, the right ribbon mechanism side frame will also require removal.

2. Remove the regular (1/6") space pawl and the carriage restoring arm.

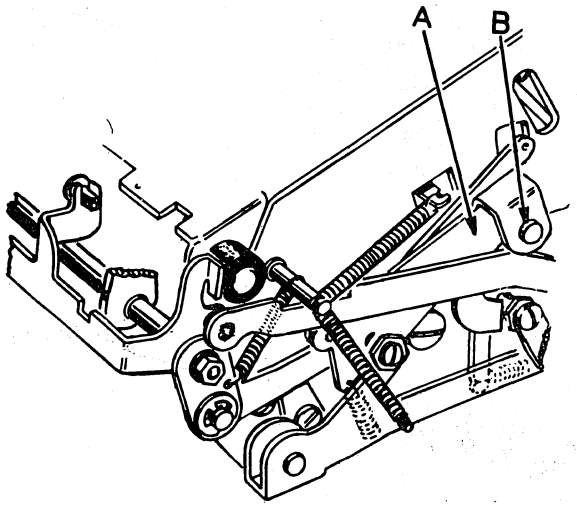


Fig.X-33

3. Remove driver A (Fig.X-33) from the machine right side frame.

4. Remove screw B from the machine right side frame.

Note: The intermediate keyboard may be removed with the left machine side frame as a unit.

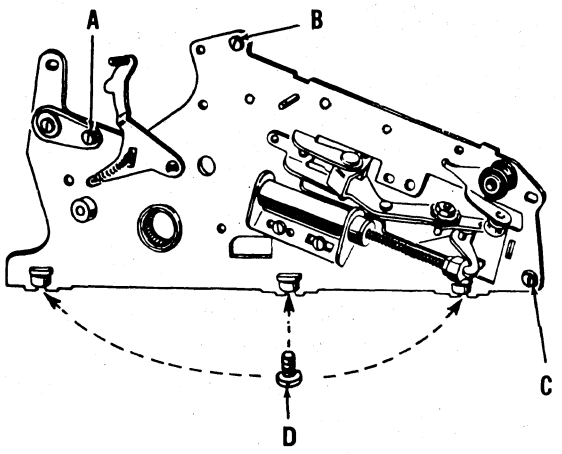


Fig. X-34

5. Remove screws A, B, and C (Fig. X-34) from the tie shafts.

6. Remove column indicator arm to prevent bending.

7. Remove screws D which retain the left machine side frame to the sub-base.

8. Raise the side frame far enough to clear the projections in the bottom edge of the side frame from the slots in the sub-base.

9. Hold the intermediate keyboard restoring lever and the red ribbon shifting lever clear of the cams in the camshaft assembly, and remove the left side frame.

Note: Rotate camshaft to obtain passing clearance between the levers and the cams.

B. Replacement

1. Raise the camshaft to align with bearing in left side frame and start side into position.

2. Move keyboard restoring lever and the red ribbon shifting lever to clear cams.

Note: Rotate camshaft to obtain passing clearance between the levers and the cams.

3. Be sure ribbon feed pawl is to the rear of red ribbon shifting lever.

4. Position intermediate keyboard guide rail, being sure eccentric collar is in correct slot.

5. Position left side frame in slots of sub-base and install the three screws D.

6. Install screws A,B and C in the tie shafts.

7. Replace driver screw and driver to the right side frame and hook springs to studs.

8. Replace the regular (1/6") space pawl and the carriage restoring arm.

9. Replace left ribbon mechanism side frame, ribbon, paper holder, keyboard, base and case.

C. Adjustment

1. Check test and adjustments, Section II Pages 18-20, and 29-30.

Accumulator Section

A. Removal

1. Remove the case, base, keyboard, paper holder, motor, ribbon mechanism side frames, carriage and left side frame.

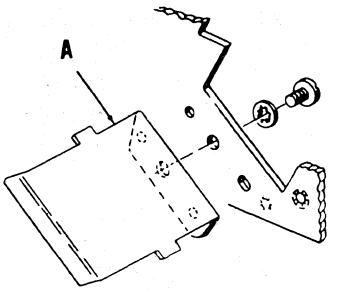


Fig. X-35

2. Remove restoring plate A (Fig.X-35).

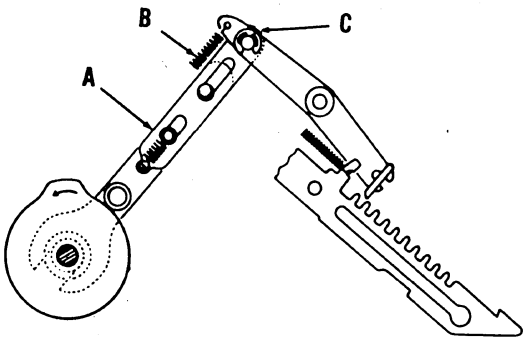


Fig. X-36

3. Remove aligner assembly restoring spring B (Fig.X-36).

4. Remove clip C from aligner arm and remove.

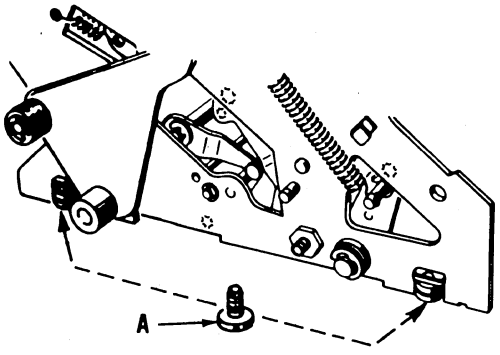


Fig. X-37

5. Remove four screws A (Fig.X-37) holding the accumulator section to the sub-base.

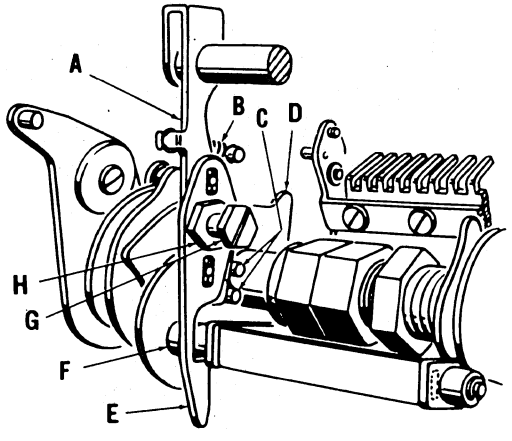


Fig. X-38

6. Unhook spring B (Fig.X-38) from carry reset latch.

7. Remove the complete accumulator section from the machine by tilting the front of the section upward and moving the section forward to clear the camshaft section.

Note: Rotate the camshaft assembly to provide free removal of the carry reset assembly past the cams of the camshaft assembly.

B. Replacement

1. Rotate the camshaft assembly until the high points of the carry reset cams are pointed forward.

2. With the accumulator pinion assembly in add (lower) position and the front of the accumulator section tilted upward, insert the carry reset bail under the camshaft assembly and work the accumulator section into position.

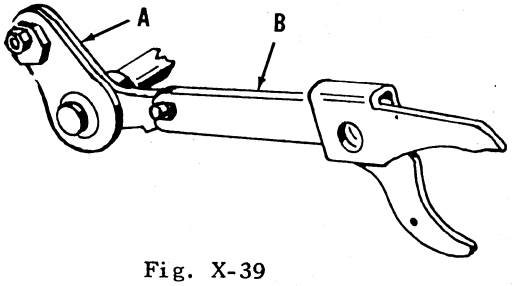


Fig. X-39

3. Insert stud in cipher block control arm A (Fig.X-39) in slot in cipher block lever B.

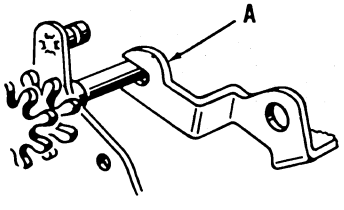


Fig. X-40

4. Insert accumulator pinion shaft into slot in accumulator control arm A (Fig.X-40).

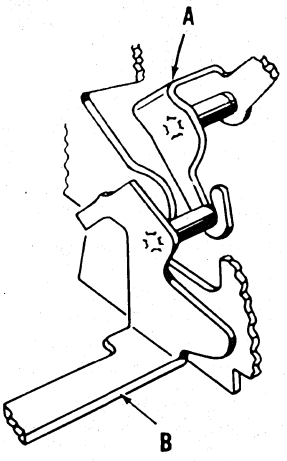


Fig. X-41

5. Insert stud in carry bail B (Fig. X-41) into the slot of automatic "one" control flag A.

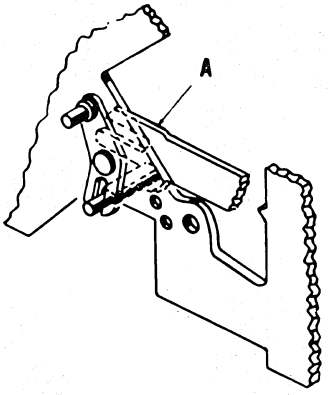


Fig. X-42

6. Insert stud in total stop comb slide A (Fig.X-42) into slot of connecting lever to actuate comb.

7. Replace four screws A (Fig.X-37) holding accumulator section to sub-base.

8. Replace aligner armA (Fig.X-36) and clip C.

9. Replace aligner assembly restoring spring B (Fig.X-36).

10. Replace restoring plate A (Fig.X-35)

11. Replace left side frame, carriage, ribbon mechanism side frames, motor, paper holder, keyboard, base and case.

Cipher Block Restoring Pawl Torsion Spring

A. Removal

1. Remove case.

2. Advance all type bars to 9 position.

3. Invert machine and remove the base and sub-base.

Note: Type bars should always be at 9 position anytime the sub-base is removed from the assembled machine to reduce torquing of the machine by the type bar restoring spring.

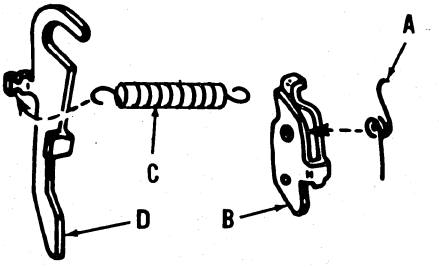


Fig. X-43

4. Unhook spring C (Fig.X-43) and remove latch D to provide accessibility to restoring pawls B and springs A. On late style machines with the new cipher block mechanism latch D does not need removing.

5. Unhook actuating springs, right and left, from the cipher block mechanism.

6. Remove the retaining clip from the right end of the shaft through restoring pawls B.

7. Remove restoring pawls B and torsion springs A by moving the supporting shaft to the left.

Note: A follow-up shaft made by bending approximately 3/4" of the blunt end of spring hook KIT 145A at right angle will permit removal of an individual spring as far over as four columns. Replacement of a spring in a column to the left of column four will require removal of the intervening restoring pawls and springs.

B. Replacement

1. Replace restoring pawls B and torsion springs A by moving the supporting shaft to the right.

2. Replace the retaining clip on the right end of the shaft through restoring pawls B.

3. Hook actuating springs, right and left, to the cipherblock mechanism.

4. Replace latch D and hook spring C.

5. Replace sub-base and base.

6. Restore all type bars to home position.

7. Replace case.

Type Bars

Removal procedure of the type bars will be dependant on the construction of the restoring frame assembly fitted to the machine. In machines fitted with the restoring bar B (Fig.X-49) removal of the type bars may be achieved without removal of the accumulator.

In machines with the restoring bar B (Fig.X-51) removal of the accumulator is required.

The procedures are as follows:

A. Removal (without removing accumulator)

1. Remove case, base, keyboard and intermediate keyboard.

2. Remove non-add bail A (Fig.X-12).

3. Remove stop pin restoring plate A (Fig.X-35)

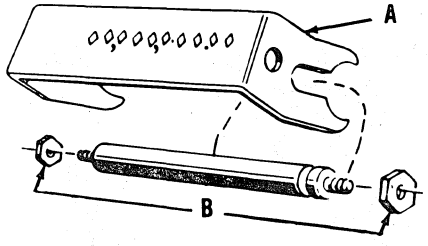


Fig. X-44

4. Loosen nuts B (Fig.X-44) and remove column indicator plate A.

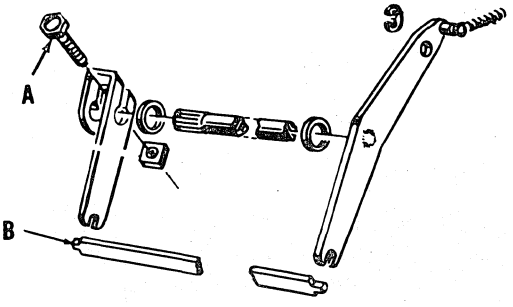


Fig. X-45

5. Loosen the aligning blade assembly screw A (Fig.X-45) and remove aligning blade B.

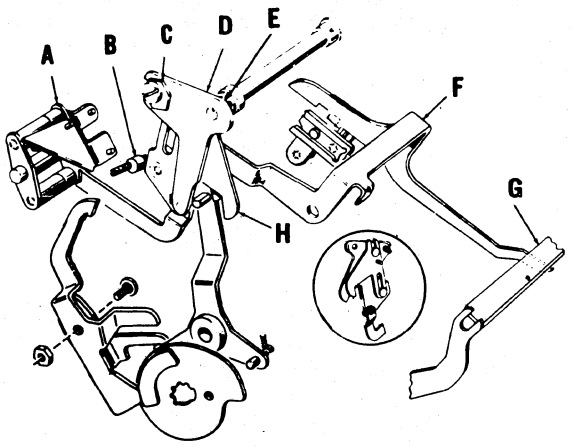


Fig. X-46

6. Remove red ribbon bail F (Fig.X-46)

7. Index a subtract operation and cycle the machine until the pinions are meshed.

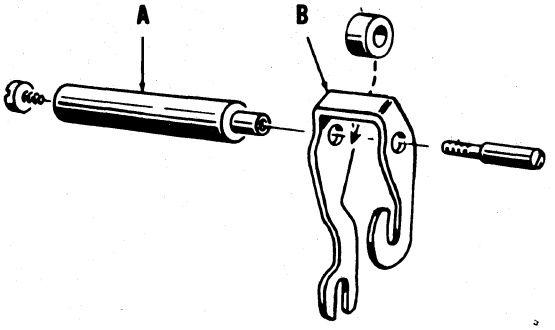


Fig. X-47

8. Remove symbol bail B (Fig.X-47) and shaft A.

9. Remove clip E (Fig.X-46) and raise ribbon shift bail assembly D out of the slots in the accumulator side frames.

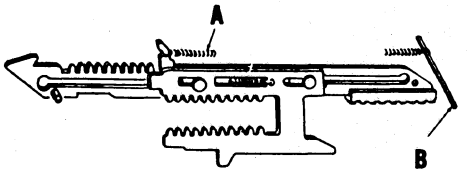


Fig. X-48

10. Unhook type bar springs A (Fig.X-48) and springs A (Fig.X-49) from type restoring bar B (Fig.X-49). Remove the springs A and shaft B (Fig.X-48) as a unit.

11. Remove cushion pin assembly.

12. Remove the two front screws that retain the accumulator to sub-base and loosen the two rear screws.

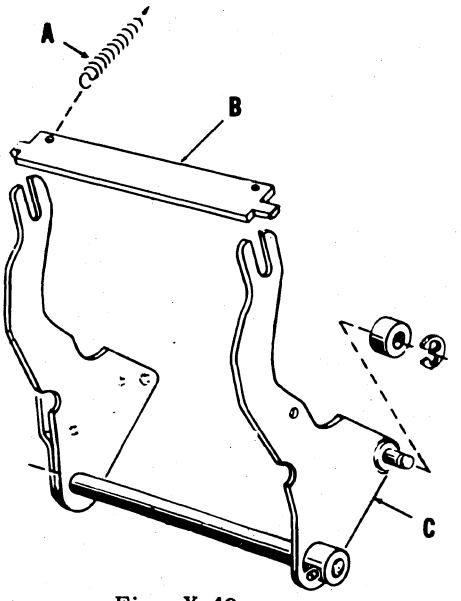


Fig. X-49

13. Spread the restoring frame assembly C (Fig.X-49) and remove type bar restoring blade B.

14. Spread the accumulator section side frames and remove upper type bar guide comb.

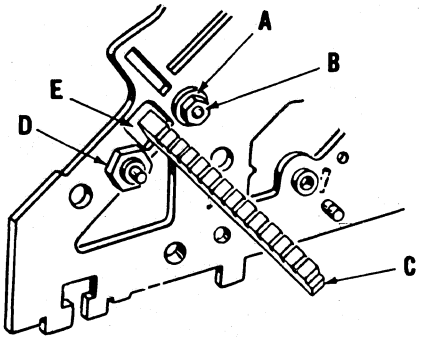


Fig. X-50

15. Loosen screw B (Fig.X-50) and remove screw post D and comb brace E then remove the lower type bar guide comb C through the left side frame.

16. Remove the type bars carefully, one at a time, working from right to left.

Note: Removal of type bars from early style machines will require some variation in removal of individual parts preparatory to removal of the bars. However, the same basic procedure is used. In the earlier construction it will be found easier to remove the type bars in columns one and two prior to removal of the symbol bar.

B. Replacement

1. Replace type bars from the right to the left, being careful that each bar is in its proper position.

2. Insert lower type bar guide comb C (Fig.X-50) into type bars and align in slots. Then insert comb into accumulator side frames. Install guide comb brace E (Fig.X-50) and screws B and D.

3. Insert type bar guide comb in upper type bars slots, Spread the accumulator side frames and install guide comb.

4. Install type bar restoring blade B (Fig.X-49) by spreading restoring frame assembly.

5. Install the two front screws that retain the accumulator to the sub-base and tighten the two rear screws.

6. Replace cushion pin assembly.

7. Install type bar springs A (Fig.X-48) and shaft B. Then hook up type bar springs and restoring shaft spring A (Fig. X-49).

8. Lower ribbon shift bail assembly D (Fig.X-46) into slots of the accumulator side frames and install clip E.

9. Install symbol bail B (Fig.X-47) and shaft A.

10. Install red ribbon bail F (Fig.X-46).

11. Install aligning blade B (Fig.X-45) and tighten aligning blade assembly.

12. Replace column indicator plate A (Fig.X-44) and tighten nuts B.

13. Replace stop pin restoring plate A (Fig.X-35).

14. Replace non-add bail A (Fig.X-12).

15. Replace intermediate keyboard, keyboard base and case.

A. Removal (For machines with restoring bar B (Fig.X-51).

1. Remove the case, base, keyboard, paper holder, motor, ribbon mechanism side frames, carriage, left side frame and accumulator section from the machine.

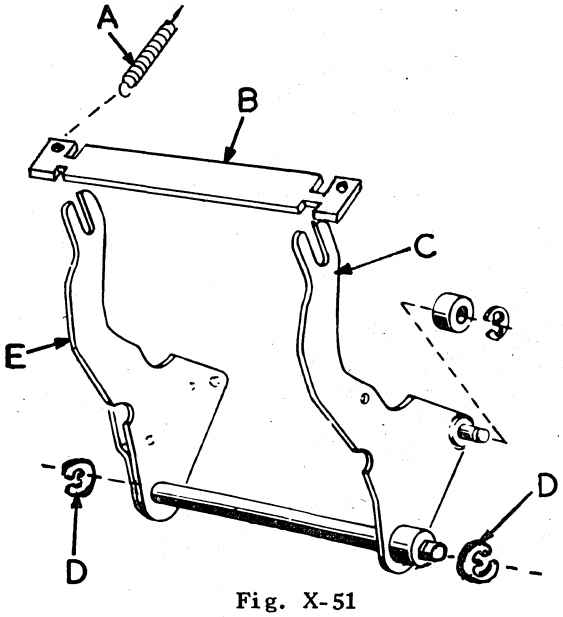


Fig. X-51

2. Remove clips D, arms C and E and remove blade B (Fig.X-51).

   At this stage the type bars can be removed following procedures 10 - 16 omitting 13 as already outlined, or the accumulator side frame can be removed as follows:

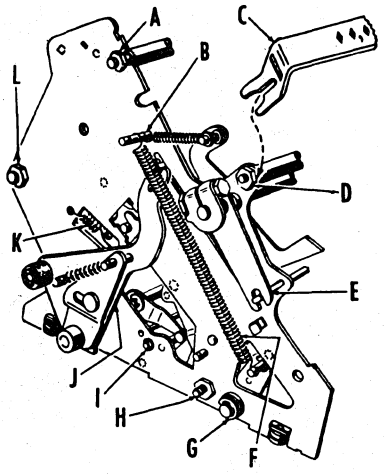


Fig. X-52

3. Unhook the carry rack stop springs and remove the spring anchor shaft with the springs.

4. Remove carry rack stop limit shaft I, (Fig.X-52).

5. Remove nuts A, D, L and H, (Fig. X-52).

6. Unhook spring K from the accumulator section side frame and the springs from post B (Fig.X-52). Remove spring F (Fig.X-52).

7. Unhook the type bar restoring springs and the spring from the type bar restoring bar. Remove the springs and their anchor shaft together.

8. Remove indicator plate C (Fig.X-52) aligning blade arm E and clip G (Fig.X-52).

9. Remove the left accumulator side frame.

10. Release three type bar guide bars from the right accumulator side frame and remove type bars as a unit from the right side frame.

B. Replacement

   Reverse the procedure for removal of the type bars.

Motor

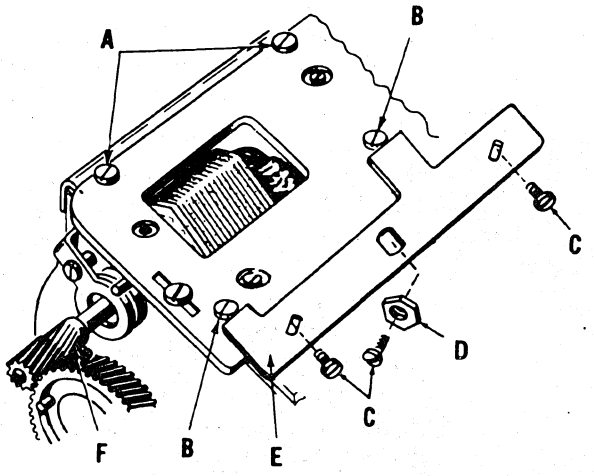


Fig. X-53

A. Removal (Early Style)

1. Remove case, base and paper holder.

2 Unhook spring on the brake arm.

3. Remove the front two screws B (Fig. X-53) from the motor, then loosen the rear two screws A (Fig.X-53) and slide motor rearward from the machine.

B. Replacement

1. Reverse the procedure for motor removal.

C. Adjustment

1. Position the motor on the sub-base so that the play between the pinion F and the teeth of safety clutch should be .002" to .003" and the motor plate parallel with the machine sub-base. Tighten motor screws A and B, Fig.X-53.

2. Motor aligning brace E (Fig.X-53), if it has not been disturbed, will provide the correct position for the adjustment. If not adjust as outlined in the Power Section of the Instruction Book.

A. Removal (Late Style J(F) Motor)

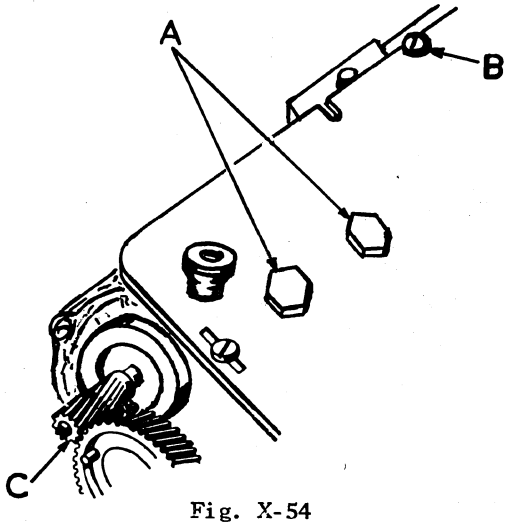


Fig. X-54

1. Remove case, base and paper holder (on late style machines the paper holder does not need removing).

2. Unhook spring on the brake arm.

3. Remove two large screws A and screw B (Fig.X-54). Then remove the motor from the machine.

B. Replacement

1. Reverse the procedure for motor removal.

C. Adjustment

1. Position the motor on the sub-base so that the play between the pinion C (Fig.X-54) and the teeth of the safety clutch should be .002" to .003" by moving the stud on the motor casting against the sub-base and pivotting the motor to require the correct adjustment. Tighten screws A to secure motor and screw B to secure the resistor and condenser bracket.

Camshaft Assembly

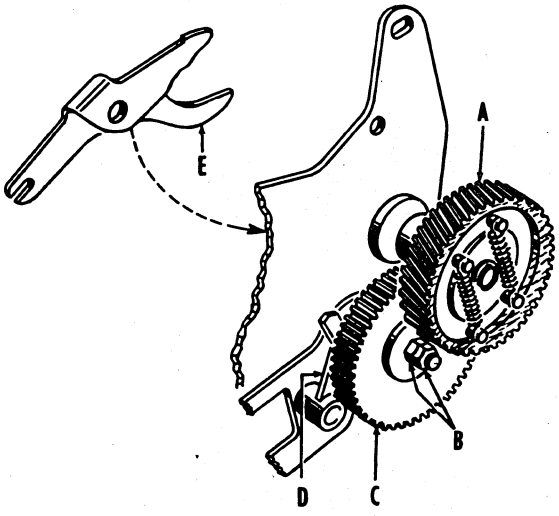


Fig. X-55

A. Removal

1. Remove the accumulator section.
2. Remove safety clutch gear A.
3. Remove nuts B.
4. Remove drive gear C and drive pawl cam D.
5. Remove the camshaft assembly leftward from the side frame.
   (a) Remove cipher block drive arm E simultaneously with the camshaft.

B. Replacement

1. Reverse the procedure for removal of the camshaft assembly.

Burroughs

Series J

TEN KEY ADDING MACHINE

INSTRUCTION BOOK

Section XI

●

RELIABILITY IMPROVMENT NOTICES

(E & S MARKETING DIVISION PUBLICATION)

OR

SERVICE TECHNICAL NOTICES

(INTERNATIONAL DIVISION PUBLICATION)

Printed in U. S. America May 1965

For Form 3705

RELIABILITY IMPROVEMENT NOTICE

I

CONDITION: Complementary totals.

CAUSE: 1. Automatic one bail N (Plate 21, Parts Catalog) not shifting from subtract position to add position when adding a larger debit amount to a smaller credit amount, or when listing positive amounts after a credit total operation. The total will print as a complementary amount, under one cent, with a credit total symbol.

2. Minus balance lever P (Plate 13) binding on pivot shaft and spreading where connected with automatic one bail.

3. Automatic one bail N (Plate 21) binding or twisted and not furnishing sufficient throw of minus balance lever P (Plate 13).

4. Another possible cause of a complementary total when subtracting a smaller credit amount from a debit amount is failure of the subtract linkage H (Plate 13) to restore to normal after a subtract operation.

CORRECTION: 1. Install improved automatic one bail detent C (Plate 21) with differently designed hub that eliminates interference with shaft J (Plate 23).

2. Replace defective minus balance lever P (Plate 13).

3. Replace defective automatic one bail N (Plate 21).

4. Adjustment of plate D (Plate 12) should be backed off slightly to assure that the subtract hook does not limit on meshing stud in AB (Plate 13). Failure in this area may be recognized by a minus total or a minus subtotal symbol being printed with a complementary amount. However, if a plus total or subtotal symbol is printed with a complementary amount, this indicates the minus hook did not restore to home position. Check cradle hook AG (Plate 13) for free and springs K and M for good condition. Also check eccentrics D and K, Sec. II, Series J Instruction Book, Page 48, for being adjusted correctly.

INSTALLATION TIME: Approximately 4 hours.

INCORPORATION DATE: May 23, 1962, with Serial No. J189316D (Deluxe). June 12, 1962, with Serial No. J192704D (Thriftline) for Correction No. 1.

Tests and Adjustments

1. There should be a minimum of play but no bind in detent C (Plate 21) when the roller of detent is in either pocket of carry bail N, and rack stop latch W limiting on guide comb AE (Plate 18).

To adjust, rotate eccentric B (Plate 21).

CAUTION: Intermediate rack stop X (Plate 21) must be reset and first rack bar stop latch W (Plate 21) held in position when making the above adjustment.

2. To insure an automatic one when the nature of the accumulated amount changes there should be .002 to .010 lift of rack bar stop latch W over intermediate rack stop X with roller of detent C positioned on high point of cam surface on carry bail N.

To adjust, bend lip of rack bar stop latch W as required.

PARTS REQUIRED:

PACKAGE NO.	Includes all parts shown below for one machine. Available until 11-1-65.	Pkg. Price
16250565		$6.75

Part No.	Description	Price Each
2JT26-3	Auto One Bail Detent	$1.75
2JD52-4	Minus Balance Lever	2.20
1JT25-2	Carry Bail	3.50

THIS INFORMATION CANCELS R.I.N. 001 DATED 9-13-63.

II

CONDITION: Intermediate keyboard not restoring Series J200 or J400.

CAUSE: Longer universal JD78-1, which is copper plated, was introduced with the incorporation of restoring arm 1JD43-4 since it was found that the restoring movement was excessive due to heavier construction. It has since been found that a build-up of tolerances in the restoring linkage affects the linkage sufficiently that eccentric E (Plate 14) cannot always overcome this condition by itself.

CORRECTION: Shorter universal JD78 (cadmium plated) is again available when the build-up of tolerances is such that sufficient restoring movement for intermediate keyboard cannot be secured from eccentric alone. Machines beginning with Serial Number J207505 (J200) and J210258 (J400) may contain either universal JD78 or JD78-1 depending on tolerance.

PARTS REQUIRED:

Part No.	Description	Price Each
JD78	Short Universal	$ .78
JD78-1	Long Universal	.78

RELIABILITY IMPROVEMENT NOTICE

I

CONDITION:

1. Repeat cycle.
2. Hesitation during repeat operation.
3. Locking in partial cycle.

CAUSE:

1. Excessive side play of latch AL (Plate 12) Series J Parts Catalog, causing it to lose its hold on slide A resulting in a repeat cycle.
2. Slow action of clutch dog stop Q would allow it to contact clutch dog on repeat operation resulting in a hesitation action.
3. When a listing key is depressed prior to completion of machine cycle, eccentric B could contact clutch dog stop Q to index the power and release the clutch dog momentarily causing partial machine cycle.

CORRECTION:

1. Install guide 20 #102 between eccentric AX and head of screw AY in slide A to remove excessive side play of latch AL and assure positive latching of slide A. Position guide so that its upper edge aligns with step of motor trip slide A. Hexagon portion of eccentric AX should be reversed to lay against slide A.

Replace BB with new trip driver arm 10290773 which has a spring stud added to permit a quicker and more positive latching movement of latch AL.

2. Install spring 3688 between spring stud in driver trip arm BB and spring stud in latch AL.

This provides more driving power for driver BB to drive latch AL below step of slide A to provide early rearward travel.

Remove spring 72806, part J (Plate 12), from clutch dog stop Q and install in place of spring BD on trip slide A to assure earlier movement of clutch dog stop Q, preventing Q contacting clutch dog on repeat operation.

3. Replace clutch dog stop Q with new clutch dog stop 10290799 with permanent limit projection to limit on hub in side frame and provide clearance between eccentric B and lip of clutch dog stop Q when interlock slide 1 (Plate 8-3) Series J Parts Catalog is blocked by a depressed listing key.

Spring 72828 BD (Plate 12) removed from motor trip slide A should be installed on clutch dog stop Q in place of spring 72806 J (Plate 12).

Installation of this improved construction will alleviate complementary amounts resulting from a quick depression of the total key following a subtract operation with a positive amount on wheels.

Tests and Adjustments

1. With trip slide A in maximum overthrow position, there should be .012 to .020 clearance between bottom of square stud in driver BB and the top edge of arm AP to assure indexed functions restoring before key for next operation is indexed.
   To adjust, rotate eccentric AX in front end of slide A.

2. There should be no side play in latch AL so it will not be released by impact of trip slide A when slide restores from overthrow position.
   To adjust, bend guide 20 #102.

3. J400 only. With drive tripped, there should be .030 to .050 clearance between lip of clutch dog stop Q and clutch dog (shown on part AH) to prevent clutch disengagement on repeat operations and to assure machine stopping when escapement bail Z (Plate 8-3) is indexed.
   To adjust, turn eccentric B.

4. J200 only. With machine normal there should be a minimum clearance between eccentric B and stop Q to insure disengagement of clutch dog at the end of machine cycle and to prevent clutch disengagement on repeat operations.
   To adjust, turn eccentric B.

INSTALLATION TIME: Approximately 1 hour.

INCORPORATION DATE: March 5, 1964, with machine number J221587D (J400) and machine number J225879D (Thriftline).

J400 before J221587D use Consistency of Parts #1.
J200 between J116246D and J225879D use Consistency of Parts #1.
J200 between J99944D and J116246D use Consistency of Parts #1 and 2.
J200 between J96669D and J99944D use Consistency of Parts #1, 2, and 3.
J200 between J73287D and J96669D use Consistency of Parts #1, 2, 3, and 4.
J200 between J56297D and J73287D use Consistency of Parts #1,2,3,4, and 5.

PARTS REQUIRED:

PACKAGE NO.	Parts for Consistency #1 may be ordered until January 1, 1966.	Pkg. Price
16250912		$4.50

Consistency #1

Part No.	Description	Price
10290773	Drive Trip Driver Arm	$1.40

Part No.	Description	Price
20 #102	Guide	$ .08
X57-7	Eccentric for slide A (Plate 12) replacing JD139AX (Plate 12)	.42
3688	Spring between BB and AL	.24
3486 1/2	Spring between BB and stud in sideframe	.27
10290799	Clutch Dog Stop	2.30
72828	Spring for clutch dog stop Q (Spring Joint) replacing 79824 R (Plate 12)	.23
	Consistency #2	
JK15-2	Arm AO with hole for spring	.08
780 (2 carbon)	Spring for JK15-2	.29
	Consistency #3	
1JD17-3	Trip slide AL (Plate 12) with stud	1.50
JX82	Spring anchor under screw AK for spring 3486½	.28
	Consistency #4	
1JD16-3	Trip slide A	4.00
	Consistency #5	
JD165	Spring post for indexing plate D at E	.50
1JD118-2	Subtract indexing plate D	.61
JD139	Eccentric for slide A at B	.60
46	Nut for eccentric JD139	.05
988	Spring for switch timer P	.25

II

CONDITION: Paper bulging during single spacing, Series J400.

CAUSE: Paper butting into the paper guide plate G (Plate 2-1, Symbol List) and causing it to bulge when spacing after paper tearoff operation.

CORRECTION: A buttonhead rivet has been added to the paper guide plate to guide the paper upward. New guide plates have been incorporated in J400 machines beginning with Serial No. J208172D.

PARTS REQUIRED:

Part Number	Description	Price
10299618	Paper guide plate	$2.45

THIS INFORMATION CANCELS R.I.N. 002 DATED 10-15-63.

RELIABILITY IMPROVEMENT NOTICE

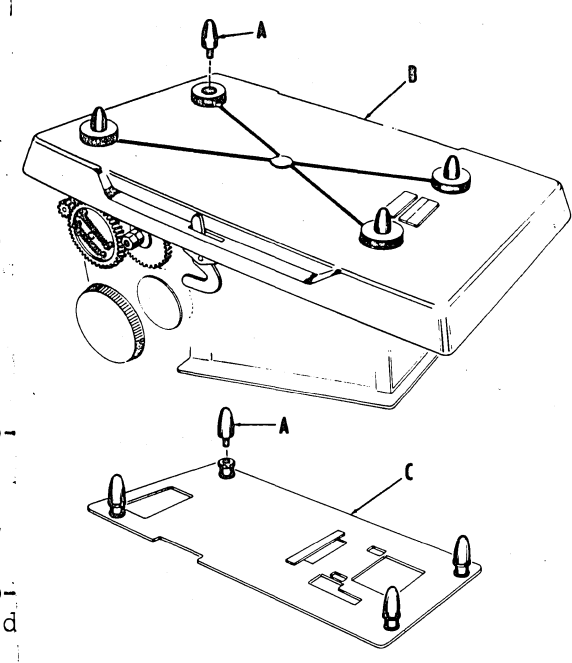
CONDITION: Availability of a pilot screw to facilitate the removal and replacement of the plastic base on Series J machines above serial number J1001F.

PROCEDURE:

1. Removal

   a. Remove case.
   b. Turn the machine over on its keyboard, insert four pilot screws A through the rubber feet in base B and screw into the flanged studs of the machine sub-base C. Turn the machine to upright position resting on the pilot screws. Apply downward pressure on base B until the four projections on sub-base C are loose from the base.

      CAUTION: The points of the pilot screws may mar soft desk tops, therefore any working surface subject to damage should be protected



2. Replacement:

   a. Turn the machine over to set on its keyboard, install four lightly lubricated pilot screws A into the flanged studs of machine sub-base C. Align holes in four rubber feet of base B with pilot screws A. Press base down until base is in place.
   b. Remove four pilot screws A.
   c. Replace case.

PARTS REQUIRED:

Part No.	Description	Price Each
16227670	Pilot Screw (4 req'd)	$ .10

Burroughs FIELD ENGINEERING TECHNICAL OPERATIONS	RELIABILITY IMPROVEMENT NOTICE	SYSTEM SERIES Series J	No. 0004
		STYLE/MODEL J700	PAGE 1 OF 1
		TOP UNIT NO.	

INCORPORATION DATE	UNITS AFFECTED	UNIT DESCRIPTION	
May, 1965	Before J201270F	Multiplying Keyboard	
STD. INSTALL. TIME 1 hour	INSTALLATION PACKAGE NO. AND PKG. PRICE		DATE 6-17-65
TITLE Improved Multiplying Keystems			

CONDITION: Unable to depress multiplying keys on Series J700 machines.

CAUSE: Keystems coming out of the slots in the multiplying keyboard bottom plate due to wear or incorrect positioning of felt limit pad 1230 1016.

CORRECTION: 1. The multiplying keystems have been lengthened .040". No change in part numbers.

NOTE: It is not considered necessary to replace keystems in field machines.

2. Replace felt limit pad which is self adhesive. The No. 7 keystem with a shorter indexing limit has the least hold on the felt pad, therefore a small additional piece of the limit pad should be cut out and fitted onto the keyboard top plate to give larger contact.

INCORPORATION: The longer keystems have been incorporated in machines above Serial No. J201270F.

PARTS REQUIRED:

Part Number	Description	Price
1230 1016	Felt Limit Pad	$ .10

Burroughs FIELD ENGINEERING TECHNICAL OPERATIONS	RELIABILITY IMPROVEMENT NOTICE	SYSTEM SERIES Series J	No. 0005
		STYLE/MODEL J500, J600, J700	PAGE 1 OF 1
		TOP UNIT NO.	

INCORPORATION DATE	UNITS AFFECTED	UNIT DESCRIPTION	
October 1, 1964	Before J177080F	Right Side Frame	
STD. INSTALL. TIME 1/2 Hour	INSTALLATION PACKAGE NO. AND PKG. PRICE		DATE 6-18-65
TITLE Improved Drive Trip Mechanism			

CONDITION: Drive fails to trip on operation control key depression, Series J500, J600, and J700 machines.

CAUSE: Spring AV, Plate 16, Series J Parts Catalog, Form 2905, not strong enough to permit driver AW to unlatch drive trip latch AK from motor trip slide B.

CORRECTION: Replace spring 81803 (AV, Plate 16), with spring 705811.

INCORPORATION: The new spring has been incorporated in machines above serial no. J177080F.

PARTS REQUIRED:

Part Number	Description	Price
705811	Spring	$ .31

Burroughs FIELD ENGINEERING TECHNICAL OPERATIONS	RELIABILITY IMPROVEMENT NOTICE	SYSTEM SERIES J	No. 3705-001
		STYLE/MODEL J500, J600, J700	PAGE 1 OF 1
		TOP UNIT NO.	

INCORPORATION DATE	UNITS AFFECTED	UNIT DESCRIPTION
October 1, 1965	Before J217862R	Carriage
STD. INSTALL. TIME	INSTALLATION PACKAGE NO. AND PKG. PRICE	DATE
Approx. 1/4 hr.		12-17-65

TITLE

Improved Platen Twirler

CONDITION: Platen twirler loose on platen shaft.

CAUSE: Over stressing of retaining spring X, Plate 1, Series J Parts Catalog, Form 2905, due to short length required to fit in slot of platen twirler.

CORRECTION: Install improved twirler containing longer hub than twirler Y, Plate 1, which permits use of longer spring X81-7 thereby reducing stress and insuring longer life of spring.

PART REQUIRED:

Number	Description	Qty.	Unit List Price
1231 1684	Twirler assembly includes spring X81-7	1	$1.35

NOTE: This improved twirler utilizes the same spring used in the Series J400 twirler (AN, Plate 2, Series J Parts Catalog, Form 2900, dated 9-20-65).

Burroughs FIELD ENGINEERING TECHNICAL OPERATIONS	RELIABILITY IMPROVEMENT NOTICE	SYSTEM SERIES J	No. 3705-002
		STYLE/MODEL J700	PAGE 1 OF 1
		TOP UNIT NO.	

INCORPORATION DATE	UNITS AFFECTED	UNIT DESCRIPTION
Oct. 25, 1965	Before J226651F	Multiplying Keyboard

STD. INSTALL. TIME	INSTALLATION PACKAGE NO. AND PKG. PRICE	DATE
Approx. 1 hr.		3-15-66

TITLE

Multiplying Keys Fail to Trip Drive

CONDITION: Failure to trip drive when using multiplying keys 6 thru 9.

CAUSE: Simultaneous depression of multiplying keys causes a hold up of the indexing slides in the multiplying keyboard.

CORRECTION:

1. On machines before serial number J179779F install bellcrank assembly 1230 1313, (AG, Plate 24, Series J Parts Catalog, Form 2905) (no change in part number), with re-dimensioned and hardened stud and roller.

2. On machines before serial number J195287F replace cam 1230 1362 (AK, Plate 36) with modified cam 1231 0736.

3. On machines before serial number J226651F replace spring (AT, Plate 16), with 81826 spring.

PARTS REQUIRED:

Number	Description	Qty.	Unit List Price
1230 1313	Bellcrank assembly	1	$4.00
1231 0736	Restoring cam	1	.50
81826	Spring	1	.21

Burroughs FIELD ENGINEERING TECHNICAL OPERATIONS	RELIABILITY IMPROVEMENT NOTICE	SYSTEM SERIES J	No. 3705-003
		STYLE/MODEL J500, J600, J700	PAGE 1 OF 1
		TOP UNIT NO.	

INCORPORATION DATE	UNITS AFFECTED	UNIT DESCRIPTION
Dec. 22, 1965	Before J236102F	Keyboard

STD. INSTALL. TIME	INSTALLATION PACKAGE NO. AND PKG. PRICE	DATE
Approx. 1/2 hr.		3-15-66

TITLE

Machines Throwing Nines After Total Operation

CONDITION: Machines throwing nines on a list operation following a total operation.

CAUSE: Escapement arm (K, Plate 10, Series J Parts Catalog, Form 2905), sticking due to glue soaking through felt pad. The felt pad is located under the keyboard bottom plate, and over the formed portion of the escapement arm.

CORRECTION: Remove felt pad.

Burroughs FIELD ENGINEERING TECHNICAL OPERATIONS	RELIABILITY IMPROVEMENT NOTICE	SYSTEM SERIES J	No. 3705-004
		STYLE/MODEL J500, J600, J700	PAGE 1 OF 1
		TOP UNIT NO.	

INCORPORATION DATE	UNITS AFFECTED	UNIT DESCRIPTION
Jan. 25, 1966	Before J242287F	Power

STD. INSTALL. TIME	INSTALLATION PACKAGE NO. AND PKG. PRICE	DATE
Approx. 1/2 hr.		3-15-66

TITLE

Machine Fails To Operate

CONDITION: Machine fails to operate.

CAUSE: Switch points (G, Plate 37, Series J Parts Catalog, Form 2905) loose, not making contact.

CORRECTION: Install lockwasher on nuts holding switch points.

WARNING: Before switch cover (M, Plate 37) is removed for any reason, hold or strap down safety arm (B, Plate 37) to prevent tension of spring (A, Plate 37) stretching switch spring (K, Plate 37).

NOTE: Machines before serial number J224200F -- To eliminate interference between switch cover (M, Plate 37) and end of arm of upper switch point bracket (H, Plate 37) slightly open right end plate of switch cover as viewed from rear of machine.

PART REQUIRED:

Number	Description	Qty.	Unit List Price
X275-23	Lockwasher	2	$ .05

Burroughs FIELD ENGINEERING TECHNICAL OPERATIONS	RELIABILITY IMPROVEMENT NOTICE	SYSTEM SERIES J	No. 3705-005
		STYLE/MODEL J600, J700	PAGE 1 OF 2
		TOP UNIT NO.	

INCORPORATION DATE	UNITS AFFECTED	UNIT DESCRIPTION
Oct. 1, 1965	Before J217862F	Carriage
STD. INSTALL. TIME	INSTALLATION PACKAGE NO. AND PKG. PRICE	DATE
Approx. 1/4 hr		3-15-66

TITLE

Carriage Spacing

CONDITION: Incorrect 5/6" spacing.

CAUSE: Overthrow of the platen due to inertia from heavy twirler (Y, Plate 1, Series J Parts Catalog, Form 2905) and/or too early release of segment A of Fig. II-31, Series J Instruction Book.

CORRECTION: Install new twirler 1231 1684 which is lighter in weight and may be recognized by the omission of the ribs within the body of the twirler.

NOTE: Twirler 1JC20-7 should not be used on these machines.

Tests and Adjustments:

1. To assure full 5/6" spacing on machines after serial number J202620F, depress the total key and manually cycle the machine. The space wheel B (Fig. II-31, Series J Instruction Book) should rotate through five teeth.

2. To prevent overthrow of the 5/6 spacing, the disengagement of toothed segment A should release from space wheel B when the sixth tooth of the space wheel comes to within .005" to .010" of the upper surface of segment A.

   Following the disengagement of the tooth segment A, the roller of detent C (Fig. II-30) should locate the platen in its normal position and should also rest in the middle of the fifth tooth on detent wheel D (Fig. II-30).

To Adjust: Rotate eccentric L (Fig. II-31).

PART REQUIRED:

Number	Description	Qty.	Unit List Price
1231 1684	Twirler assembly includes spring X81-7	1	$1.35

Burroughs FIELD ENGINEERING TECHNICAL OPERATIONS	RELIABILITY IMPROVEMENT NOTICE	SYSTEM SERIES J	No. 3705-006
		STYLE/MODEL J500, J600, J700	PAGE 1 OF 1
		TOP UNIT NO.	

INCORPORATION DATE	UNITS AFFECTED	UNIT DESCRIPTION
Jan. 21, 1966	Before J242326F	Power

STD. INSTALL. TIME	INSTALLATION PACKAGE NO. AND PKG. PRICE	DATE
Approx. 1/2 hr.		3-15-66

TITLE

Noisy Drive Assembly

CONDITION: Excessive gear noise.

CAUSE: Contour of teeth on gear (AE, Plate 37, Series J Parts Catalog, Form 2905) does not mesh freely with gear (AA, Plate 16, Series J Parts Catalog, Form 2905).

CORRECTION: Replace gear (AE, Plate 37). Teeth of gear are now cut with a contour which gives quieter, freer mesh.

PART REQUIRED:

Number	Description	Qty.	Unit List Price
2JD148-1	Pinion and brake drum gear	1	$1.50

Burroughs FIELD ENGINEERING TECHNICAL OPERATIONS	RELIABILITY IMPROVEMENT NOTICE	SYSTEM SERIES J	No. 3705-007
		STYLE/MODEL J500, J600, J700	PAGE 1 OF 1
		TOP UNIT NO.	

INCORPORATION DATE	UNITS AFFECTED	UNIT DESCRIPTION
Feb. 28, 1966	Before J245000F	Keyboard

STD. INSTALL. TIME	INSTALLATION PACKAGE NO. AND PKG. PRICE	DATE
Approx. 1/4 hr.		3-15-66

TITLE

Hard Key Depression

CONDITION: Hard key depression of number keys on listing keyboards.

CAUSE: Excessive spring tension on redesigned keyboard interlock mechanism incorporated in machines from serial number J171591F.

CORRECTION: Replace spring (N, Plate 12, Series J Parts Catalog, Form 2905) with spring 82809.

NOTE: Stronger spring 3280 1/8 replaced spring 10686 1/2 when modified keyboard interlock was incorporated.

PART REQUIRED:

Number	Description	Qty.	Unit List Price
82809	Spring	1	$.31

Burroughs FIELD ENGINEERING TECHNICAL OPERATIONS	RELIABILITY IMPROVEMENT NOTICE	SYSTEM SERIES J	No. 3705-008
		STYLE/MODEL J500, J600, AND J700	PAGE 1 OF 1
		TOP UNIT NO.	
STD. INSTALL. TIME	UNITS AFFECTED Before J271093F	UNIT DESCRIPTION Intermediate Rack Stops	
TITLE Product Improvement - Intermediate Rack Stops			DATE 10-3-66

CONDITION: Intermediate Rack Stops - Manufacturing change only.

CORRECTION: Intermediate Rack Stops 1231 1577 made from powdered metal and torsion springs 1231 1585 are being incorporated in machines starting with Serial Number J271093F.

INSTALLATION REQUIREMENTS: A complete set of intermediate rack stops 1231 1577 and torsion springs 1231 1585 should be installed whenever it becomes necessary to replace one or more rack stops in machines before Serial Number J271093F.

PARTS REQUIRED:

Number	Description	Qty.	Unit List Price
1231 1577	Intermediate Rack Stop for J500, J600, and J700	As Req.	$.16
1231 1585	Torsion Spring	As Req.	$.07

Burroughs FIELD ENGINEERING TECHNICAL OPERATIONS	RELIABILITY IMPROVEMENT NOTICE	SYSTEM SERIES J	No. 3705-009
		STYLE/MODEL J500, J600, J700	PAGE 1 OF 1
		TOP UNIT NO.	
STD. INSTALL. TIME Approx. ½ Hr.	UNITS AFFECTED Before J247193F	UNIT DESCRIPTION Adding Section	
TITLE Scattered Printing			DATE 10-3-66

CONDITION: Scattered Printing

CAUSE: Uneven tension of type bar springs JX213 (BP, Plate 29, Series J Parts Catalog, Form 2905) used in machines before Serial Number J247193F.

CORRECTION: New springs 1026 4414 manufactured to correct specifications are now available and have been incorporated in all currently manufactured machines starting with Serial Number J247193F.

INSTALLATION REQUIREMENTS: A complete set of the new springs 1026 4414 should be installed whenever it becomes necessary to replace one or more type bar springs in machines before serial number J247193F.

PART REQUIRED:

Number	Description	Qty.	Unit List Price
1026 4414	Type Bar Spring	1	$.29

Burroughs FIELD ENGINEERING TECHNICAL OPERATIONS	RELIABILITY IMPROVEMENT NOTICE	SYSTEM SERIES J	No. 3705-010
		STYLE/MODEL All Styles	PAGE 1 OF 1
		TOP UNIT NO.	
STD. INSTALL. TIME	UNITS AFFECTED After J263118F	UNIT DESCRIPTION Motor	
TITLE Motor Anchoring.			DATE 10-3-66

CONDITION: Motor shifting during transport.

CAUSE: Failure of bolts AT, Plate 42, Series J Parts Catalog, Form 2905, to anchor the motor firmly in place.

CORRECTION: Lockwasher 1256 7764 and longer bolts 1231 6949 are now being used to ensure that the motor is anchored in place more securely. The bases have been modified to ensure clearance of the longer bolts (no change in part number of bases).

INCORPORATION: The lockwashers and longer bolts are being incorporated in all machines starting with Serial Number J263118F.

PARTS REQUIRED:

Number	Description	Qty.	Unit List Price
1256 7764	Lockwasher	2	$.07
1231 6949	Bolt	2	$.16

Burroughs FIELD ENGINEERING TECHNICAL OPERATIONS	RELIABILITY IMPROVEMENT NOTICE	SYSTEM SERIES J	No. 3705-011
		STYLE/MODEL J600-J700	PAGE 1 OF 1
		TOP UNIT NO.	
STD. INSTALL. TIME Approx. ½ Hr.	UNITS AFFECTED After J266486F	UNIT DESCRIPTION Ribbon Feed	
TITLE Improved Ribbon Guides			DATE 10-3-66

CONDITION: Ribbons fraying and curling.

CAUSE: Due to sharp and rough edges on ribbon guides.

CORRECTION: New plastic ribbon guides 1231 6469 and 1231 6477 (R & S, Plate 5, Series J Parts Catalog Form 2905) containing a smooth surface for the ribbon track are now available and will be incorporated in machines starting with Serial Number J266486F.

PARTS REQUIRED:

Number	Description	Qty.	Unit List Price
1231 6469	Left Ribbon Guide	1	$.16
1231 6477	Right Ribbon Guide	1	$.16

Burroughs FIELD ENGINEERING TECHNICAL OPERATIONS	RELIABILITY IMPROVEMENT NOTICE	SYSTEM SERIES J	No. 3705-012
		STYLE/MODEL All J Series	PAGE 1 OF 1
		TOP UNIT NO.	
STD. INSTALL. TIME	UNITS AFFECTED After J264391F	UNIT DESCRIPTION Packing	
TITLE Shipping Damage			DATE 10-3-66

CONDITION: Machines being damaged during transit.

CAUSE: 1. Damage occurring to parts due to uncontrolled movement of the intermediate keyboard during transit.

2. Polystyrene packing bases breaking and permiting uncontrolled movement of the machine in the shipping carton.

CORRECTION: 1. A red plastic block 1231 9760 has been designed to lock the intermediate keyboard in its restored position during transit and will be incorporated in machines starting with Serial Number J264391F. The block is slotted for easy installation and removal without the use of tools. To install, manually move the intermediate keyboard beyond its normal restored position and place the slot in the red plastic block over the left side frame (to the left of the rubber bumper) and press into place.

NOTE: The red plastic block must be removed before operating the machine to prevent damage to parts.

2. Polystyrene packing bases are now re-enforced to prevent breakage and can be indentified by the wave finish.

Burroughs FIELD ENGINEERING TECHNICAL OPERATIONS	RELIABILITY IMPROVEMENT NOTICE	SYSTEM SERIES J	No. 3705-013
		STYLE/MODEL All	PAGE 1 OF 1
		TOP UNIT NO.	
STD. INSTALL. TIME Approx. 1/2 Hr.	UNITS AFFECTED See Below	UNIT DESCRIPTION Motor	
TITLE Motor Switch Points and Brushes			DATE 12-27-66

CONDITION: Failure of machine to operate.

CAUSE:

1. Switch Points G (Plate 42, Series J Parts Catalog, Form 2905) working loose.
2. Governor Brushes AK (Plate 42) failing to make good contact.
3. Failure of Arm B (Plate 42) to properly close Safety Switch.

CORRECTION:

1. On machines before Serial No. J242281F, install Lock Washers 1256 7715 between the terminal tabs and nuts of switch points G to lock the points securely in place. Incorporated in machines after Serial No. J242280F.
2. On machines before Serial No. J269241F, install Governor Brushes 1230 6346 which now include a spring made from improved material that is copper colored for easy identification (no change in part number). Incorporated in machines after Serial No. J269240F.
3. Bend Safety Switch Arm B to insure positive movement when replacing the case. To reduce noise, Rubber Sleeve 1231 9810 may be added to arm B at its point of contact with the case. A reformed arm B and rubber sleeving has been incorporated in machines after Serial No. 264081F.

WARNING: Before removing switch cover M, hold or strap down safety arm B to prevent tension of spring A from stretching switch spring K.

PARTS REQUIRED:

Number	Description	Qty.	Unit List Price
1256 7715	Lock Washer	2	$ .05
*1230 6346	Governor Brush	2	1.40
1231 9810	Rubber Sleeve	1	.06

*Branch and grip stock of prior Governor Brushes 1230 6346 (without copper colored spring) are to be discarded upon receipt of the improved brushes.

Burroughs FIELD ENGINEERING TECHNICAL OPERATIONS	RELIABILITY IMPROVEMENT NOTICE	SYSTEM SERIES J	No. 3705-014
		STYLE/MODEL J700	PAGE 1 OF 1
		TOP UNIT NO.	
STD. INSTALL. TIME Approx. ¼ Hour	UNITS AFFECTED Before J271575F	UNIT DESCRIPTION Multiplying Keyboard	
TITLE Improved Drive Trip from Multiplying Keys			DATE 12-30-66

CONDITION: Failure of Multiplying Keys to trip the drive when depressed.

CAUSE: Springs D and AR, Plate 28, Series J Parts Catalog, Form 2905, do not have sufficient tension to assure positive movement of hammers B and C.

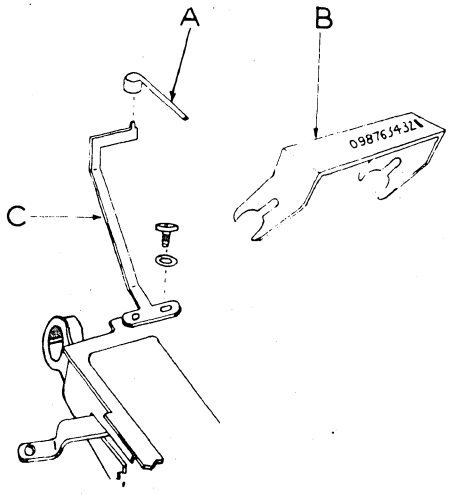
CORRECTION: Replace spring D with spring 1231 7186 and spring AR with spring 83800A.

PARTS REQUIRED:

Number	Description	Qty.	Unit List Price
1231 7186	Spring	1	$.06
83800A	Spring	1	$.27

NOTE: Also, see RIN 3705-002.

Burroughs FIELD ENGINEERING TECHNICAL OPERATIONS	RELIABILITY IMPROVEMENT NOTICE	SYSTEM SERIES J	No. 3705-015
		STYLE/MODEL All	PAGE 1 OF 1
		TOP UNIT NO.	
STD. INSTALL. TIME Approx. 1/2 Hr.	UNITS AFFECTED After J281803F	UNIT DESCRIPTION Intermediate Keyboard	
TITLE Improved Indicator Blind			DATE 3-13-67



CONDITION: Intermediate keyboard failing to escape.

CAUSE: Bent column indicator blind JS6-1(F), Part E, Plate 18, Series J Parts Catalog, Form 2905.

CORRECTION: An improved column indicator (illustrated) is now available and will be used for replacement of the column indicator in all styles of Series J machines above serial number J1001F. All machines manufactured after serial number J281803F will contain the new indicator blind.

PARTS REQUIRED:

	Number	Description	Qty.	Unit List Price
A	1231 6584	Column Indicator Needle	1	$.07
B	1231 6618	" " Plate	1	.14
C	1231 6592	Bracket	1	.25

Burroughs FIELD ENGINEERING TECHNICAL OPERATIONS	RELIABILITY IMPROVEMENT NOTICE	SYSTEM SERIES J	No. 3705-016
		STYLE/MODEL All	PAGE 1 OF 1
		TOP UNIT NO.	
STD. INSTALL. TIME Approx. 1/2 Hr.	UNITS AFFECTED Before J269172F	UNIT DESCRIPTION Base & Case	
TITLE Keyboards Damaged in Transit			DATE 3-13-67

CONDITION: Keyboards being damaged during transit.

CAUSE: Case latches K, Plate 47, Series J Parts Catalog, Form 2905, unlatching allowing the machine case to move during transit.

CORRECTION: Rubber sleeves are now being assembled on the case latches, to prevent the latches from becoming unlatched during transit. The new latches are being incorporated in machines after serial number J269171F.

PARTS REQUIRED:

Number	Description	Qty.	Unit List Price
1232 0057	Right hand latch	1	$.82
1232 0065	Left hand latch	1	.82

Burroughs FIELD ENGINEERING TECHNICAL OPERATIONS	RELIABILITY IMPROVEMENT NOTICE	SYSTEM SERIES J	No. 3705-017 REVISED
		STYLE/MODEL J500 J600 and J700	PAGE 1 OF 1
		TOP UNIT NO.	
STD. INSTALL. TIME Approx. 6 Hrs.	UNITS AFFECTED Before J297552F	UNIT DESCRIPTION Intermediate Rack Stops	
TITLE Wrong Addition - Interference of Torsion Springs			DATE 10-16-68

CONDITION: Wrong addition

CAUSE: Torsion springs (1231 1585 announced in RIN 3705-008) move sideways and interfere with full travel of the type bar adding racks.

CORRECTION: Install redesigned parts. Anchor Shaft 1232 1584 (U, Plate 34, Series J Parts Catalog, Form 2905), was changed in design to contain grooves which hold the torsion springs in alignment and prevent shifting.

Guide Comb 1232 1592 (AK, Plate 29, Series J Parts Catalog, Form 2905) has stock removed along its top edge to eliminate interference of the comb with the tails of the torsion springs.

Type Bar Adding Racks have had stock removed at the point of contact with the torsion springs for additional safety.

Anchor Shaft 1232 1584 and Guide Comb 1232 1592 were incorporated in machines starting with serial number J279651F.

Modified Type Bar Adding Racks were incorporated in machines starting with serial number J297552F.

PARTS REQUIRED:

	Number	Description	Qty.	Unit List Price
	1232 1584	Grooved spring anchor shaft	1	$ 1.25
	1232 1592	Guide Comb	1	.75
		Type Bar Assemblies:		
	1232 5460	Plain with guide stud	1	4.25
	1232 5403	Plain without guide stud	1	4.15
✓	1232 5445	Period left with guide stud	1	4.25
✓	1232 5478	Period left without guide stud	1	4.15
	1232 5411	Period right without guide stud	1	4.15
	1232 5437	Comma right without guide stud	1	4.15
	1232 5429	Comma left with guide stud	1	4.25
	1232 5452	Comma left without guide stud	1	4.15

✓Changes or additions since last issue

Burroughs FIELD ENGINEERING TECHNICAL OPERATIONS	RELIABILITY IMPROVEMENT NOTICE	SYSTEM SERIES J	No. 3705-018 REVISED
		STYLE/MODEL J500 J700 J600 J800	PAGE 1 OF 2
		TOP UNIT NO.	
STD. INSTALL. TIME Approx. 2½ Hrs.	UNITS AFFECTED Before J400000F	UNIT DESCRIPTION Intermediate Rack Stops	
TITLE Wrong Addition - Broken Torsion Spring			DATE 10-16-69

CONDITION: Wrong Addition

CAUSE: Breakage of Torsion Springs, similar to Y, Plate 34, used with Intermediate Rack Stops X, 1231 1577. If machine serial number is below J297552F, see RIN 3705-017.

✓ CORRECTION: Install new Torsion Springs 1233 8703, which have a larger coil diameter to reduce breakage. A complete set of the new torsion springs should be installed when it is necessary to replace one or more springs.

✓ PROCEDURE:

1. Remove base and case.
2. Lift shutter of intermediate keyboard, trip drive and manually cycle machine until all type bars are out to nine position. This step is most important. It relieves the tension in the type bar springs and prevents torquing of the machine.
3. Remove sub-base.
4. Plate 29: Remove two clips AG on shaft AR and spring AO from carry reset bail AP.
5. Move shaft AR to the left and then to the right to allow links from AS to drop downward.
6. Plate 34: Remove two clips T, unhook springs from rack stop W. Remove shaft U.
7. Plate 29: Remove excess stock from lip of guide AK that protrudes through left accumulator sideframe.
8. Remove two clips AG on shaft AF.
9. Plate 34: Loosen nuts H and spread accumulator sideframes.
10. Plate 29: Remove guide AK.

NOTE: This RIN cancels RIN 3705-008

✓ Changes or additions since last issue.

11. Plate 34: Brace accumulator sideframe to machine sideframe and punch out hub on left accumulator sideframe that holds shaft K.

NOTE: To faciliate the removal of this hub, grip hub with pliers and rotate. In some cases it will be necessary to remove excess riveting from inside of the sideframe.

12. Remove clips AG on shaft AT. Move shaft AT to the right through hole left by removal of the hub, and raise the end of the shaft. Shaft AT, the intermediate rack stops, torsion springs, and adding rack stop bail, will now come out as a unit.

13. Reverse the above procedure to replace. To facilitate replacement, a rubber band should be placed around the intermediate rack stops, torsion springs, adding rack stop bail and shaft AT.

14. Replace hub removed in step 11 with a new hub 1234 1715 which is retained with clip 1255 3160.

NOTE: All 1231 4215 Torsion Springs in branch or grip stock should be scrapped.

PARTS REQUIRED:

Number	Description	Qty.	Unit List Price
1233 8703	Torsion Spring	As req.	$ .09
1234 1715	Hub	1	.30
1255 3160	Clip	1	.06

Burroughs FIELD ENGINEERING TECHNICAL OPERATIONS	RELIABILITY IMPROVEMENT NOTICE	SYSTEM SERIES J	No. 3705-019
		STYLE/MODEL See Below	PAGE 1 OF 1
		TOP UNIT NO.	
STD. INSTALL. TIME Approx. 1½ Hrs.	UNITS AFFECTED See Below	UNIT DESCRIPTION Intermediate Keyboard	
TITLE Replacement of Intermediate Keyboard			DATE 10-24-69

MANUFACTURING CHANGE: Intermediate keyboards listed below are now available for replacement in machines between serial numbers J56296D and J241308D.

These keyboards are list 10 columns, total 11 columns, and will replace all intermediate keyboards shown in Series J Parts Catalog, Form 2900, Plate 9.

PARTS REQUIRED:

Number	Description	Qty.	Unit List Price
1234 0881	Monetary Keyboard	1	$ 22.00
1234 0899	Numerical Keyboard	1	21.25

Burroughs FIELD ENGINEERING TECHNICAL OPERATIONS	RELIABILITY IMPROVEMENT NOTICE	SYSTEM SERIES J	No. 3705-020
		STYLE/MODEL All	PAGE 1 OF 1
		TOP UNIT NO.	
STD. INSTALL. TIME Up to ½ hour	UNITS AFFECTED Before J405248F	UNIT DESCRIPTION Motor	
TITLE Shorting of Governor Slip Rings			DATE 5-8-70

CONDITION: Shorting and Arcing of the Governor Slip Rings.

CAUSE: Insulation and diameter of slip rings allow shorting and arcing.

CORRECTION: Install larger diameter slip rings, insulating washers and new style governor brushes with over-all length of 1 3/16 inches.

NOTE: New Style governor brushes (no change in part number), should not be installed on machines before J405248F unless slip rings and insulating washers are also installed.

PARTS REQUIRED:

Ref.	Number	Description	Qty.	Unit List Price
Plate 42				
Z	1230 6437	Nylon Nut	1	$ .08
AJ	1232 3366	Governor Insulating Washer	1	.30
AR	1232 3374	Governor Insulating Washer	1	.30
AQ	1232 3481	Slip Ring	2	.30
Y	1233 8612	Governor Brush	2	.19

Burroughs FIELD ENGINEERING TECHNICAL OPERATIONS	RELIABILITY IMPROVEMENT NOTICE	SYSTEM SERIES J	No. 3705-021
		STYLE/MODEL J800	PAGE 1 OF 1
		TOP UNIT NO. Memory	
STD. INSTALL. TIME Up to 1½ Hours	UNITS AFFECTED ALL	UNIT DESCRIPTION	
TITLE Failing to Carry in Memory			DATE 5-21-70

CONDITION: Incorrect Multiplication

CAUSE: Excessive sideplay of memory carry pawls, BF, Plate 56, Parts Catalog.

CORRECTION: Replace one or more standard carry pawls, BF, with over-size pawls, 1233 5964, until overall side play is less than .004.

Memory carry pawl 1233 5964 (colored red for identification) should be installed as follows:

.004" to .006" play	one required in position 5.
.006" to .008" play	two required in position 3 and 7.
.008" to .010" play	three required in position 3, 5, and 7.
.010" to .012" play	every second position.

The above positions for the red memory carry pawls should not be changed unless overall play cannot be maintained at the maximum of .004"

PARTS REQUIRED:

Number	Description	Qty.	Unit List Price
1233 5964	Memory Carry Pawl (Red Color)	As Req.	$ 1.70

Burroughs FIELD ENGINEERING TECHNICAL OPERATIONS	RELIABILITY IMPROVEMENT NOTICE	SYSTEM SERIES J	No. 3705-022
		STYLE/MODEL All J's	PAGE 1 OF 1
		TOP UNIT NO.	
STD. INSTALL. TIME Up to ½ Hour	UNITS AFFECTED Before J368482J	UNIT DESCRIPTION Power	
TITLE Replaceable Cord Receptacle			DATE 5-22-70

CONDITION: Line cord loose, or breaking of Three-Pin Receptacle.

CAUSE: Tilting machine rearward without removing the line cord.

CORRECTION: Install Bracket Assembly BB (1232 2913) Plate 42, J Parts Catalog, which includes a replaceable line cord receptacle. The new receptacle, 1234 0220, has longer, solid pins for added strength.

PARTS REQUIRED:

Number	Description	Qty.	Unit List Price
1232 2913	Bracket Assembly and Replaceable Three-Pin Receptacle	1	$ 3.10

Burroughs FIELD ENGINEERING TECHNICAL OPERATIONS	RELIABILITY IMPROVEMENT NOTICE	SYSTEM SERIES J	No. 3705- 023
		STYLE/MODEL J800	PAGE 1 OF 1
		TOP UNIT NO.	
STD. INSTALL. TIME Up to 5 Hours	UNITS AFFECTED All Below J471747F	UNIT DESCRIPTION	
TITLE Wear and Distortion of "X" and "=" Drivers			DATE 8-24-70

CONDITION: Machine locked.

CAUSE: Wear on rollers or distortion of the arms on drivers AA and AB, Plate 58, J Parts Catalog.

CORRECTION: Install improved drivers that incorporate a new hardening process.

NOTE: Scrap all drivers in Branch or grip stock.

PARTS REQUIRED:

Number	Description	Qty.	Unit Price List
1231 2609	"=" Driver	1	$ 2.25
1231 2484	"X" Driver	1	2.65

Burroughs FIELD ENGINEERING TECHNICAL OPERATIONS	RELIABILITY IMPROVEMENT NOTICE	SYSTEM SERIES J	No. 3705-024
		STYLE/MODEL J600/J700/J800	PAGE 1 OF 1
		TOP UNIT NO.	
STD. INSTALL. TIME Up to 1/2 Hour	UNITS AFFECTED All Before J452047F	UNIT DESCRIPTION Carriage	
TITLE Improved Ribbon Guides			DATE 2-8-71

CONDITION: Ribbon failing to reverse or pulling off spool.

CAUSE: (1) Too much friction between ribbon and plastic guides A, Plate 7 Series J Parts Catalog, Form 1041696.

(2) Hard ribbon reverse due to tension of spring AG, Plate 5.

CORRECTION:

(1) New style ribbon guides with two steel rollers to reduce friction are now available and have been incorporated in machines starting with Serial Number J452047F.

(2) Spring 1034 6906 with less tension is now used in place of spring AG, Plate 5.

PARTS REQUIRED:

Number	Description	Qty.	Unit List Price
1234 7092	Left Ribbon Guide	1	$ 1.15
1234 7100	Right Ribbon Guide	1	1.15
1034 6906	Spring	1	.98

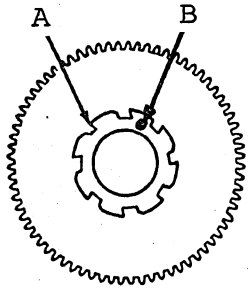
Burroughs FIELD ENGINEERING TECHNICAL OPERATIONS	RELIABILITY IMPROVEMENT NOTICE	SYSTEM SERIES J	No. 3705-025
		STYLE/MODEL All	PAGE 1 OF 1
		TOP UNIT NO.	
STD. INSTALL. TIME Up to ½ hour	UNITS AFFECTED * See Below	UNIT DESCRIPTION Sideframes	
TITLE Erratic Machine Operation			DATE 4-1-71

* J800: Below Serial Number J454883F
  Other J Styles: Below Serial Number J460383F

CONDITION: 1. Erratic machine operation.
2. Motor runs, but machine fails to operate.

CAUSE: 1. Worn or chipped clutch teeth (A on illustration) on hub of drive clutch gear AG, Plate 20, Series J Parts Catalog, Form 1041696.

2. Hub A loose in drive clutch gear AG, Plate 20.



CORRECTION: Install improved drive clutch gear 1018 3614 (no change in part number) which has an improved heat treatment for the clutch teeth of hub (A in illustration) and has the hub pinned in position on the drive gear.

The improved drive clutch gear can be identified by the pin (B in illustration) added to lock the hub to the drive clutch gear.

PARTS REQUIRED:

Number	Description	Qty.	Unit List Price
1018 3614	Drive Clutch Gear	1	$ 7.25

NOTE: Branch and grip stock of old parts should be scrapped upon receipt of new parts.

Burroughs FIELD ENGINEERING TECHNICAL OPERATIONS	RELIABILITY IMPROVEMENT NOTICE	SYSTEM SERIES J	No. 3705-026
		STYLE/MODEL J800	PAGE 1 OF 1
		TOP UNIT NO.	
STD. INSTALL. TIME Up to ½ Hour	UNITS AFFECTED Before J391913F	UNIT DESCRIPTION Memory	
TITLE Failure to Transfer Amounts Into Memory			DATE 4-1-71

CONDITION: Fails to Multiply

CAUSE: Detent S, Plate 57 Parts Catalog, does not hold Pinion Assembly I in the active position.

CORRECTION: Replace Detent S with new detent designed to accommodate an eccentric and allow adjustment. Adjust per Technical Manual, Section VII, Figures VII-30 through -34, Revised March 1970.

NOTE: Make sure that Spearpoint W limits on Eccentric V and K, and not on mounting screws of these eccentrics.

PARTS REQUIRED:

Number	Description	Qty.	Unit List Price
1234 0006	Detent	1	$ 1.55
1233 2912	Eccentric	1	.43
1010 8983	Screw	1	.16

Burroughs FIELD ENGINEERING TECHNICAL OPERATIONS	RELIABILITY IMPROVEMENT NOTICE	SYSTEM SERIES J	No. 3705-027 REVISED
		STYLE/MODEL J800	PAGE 1 OF 1
		TOP UNIT NO.	
STD. INSTALL. TIME Up to ½ Hour	UNITS AFFECTED Before J385057F	UNIT DESCRIPTION Automatic Total Mechanism	
TITLE Failure to Give Automatic Total			DATE 4-8-71

CONDITION: Fails to automatic total.

CAUSE: Excessive side play of early style Trip Slide AX, Plate 54 on Guide Post AY, Plate 20.

CORRECTION: Install redesigned Trip Slide 1232 6443, AX Plate 54; and Guide Post 1232 6450, AY Plate 20. Apply Test and Adjustments per Technical Manual Section VII, Figures VII-55 through -58.

NOTE: All old style Trip Slides in branch or grip stock should be scrapped.

PARTS REQUIRED:

Number	Description	Qty.	Unit List Price
1232 6443	Trip Slide	1	$ 2.15
✓ 1232 6450	Guide Post	1	.11
1255 3129	Clip	1	.08

✓ Changes or additions since last issue.

Burroughs FIELD ENGINEERING TECHNICAL OPERATIONS	RELIABILITY IMPROVEMENT NOTICE	SYSTEM SERIES J	No. 3705-028
		STYLE/MODEL All	PAGE 1 OF 3
		TOP UNIT NO.	
STD. INSTALL. TIME Up to 1 Hour	UNITS AFFECTED Below J453779F	UNIT DESCRIPTION Power	
TITLE Machine Fails to Operate			DATE 4-27-71

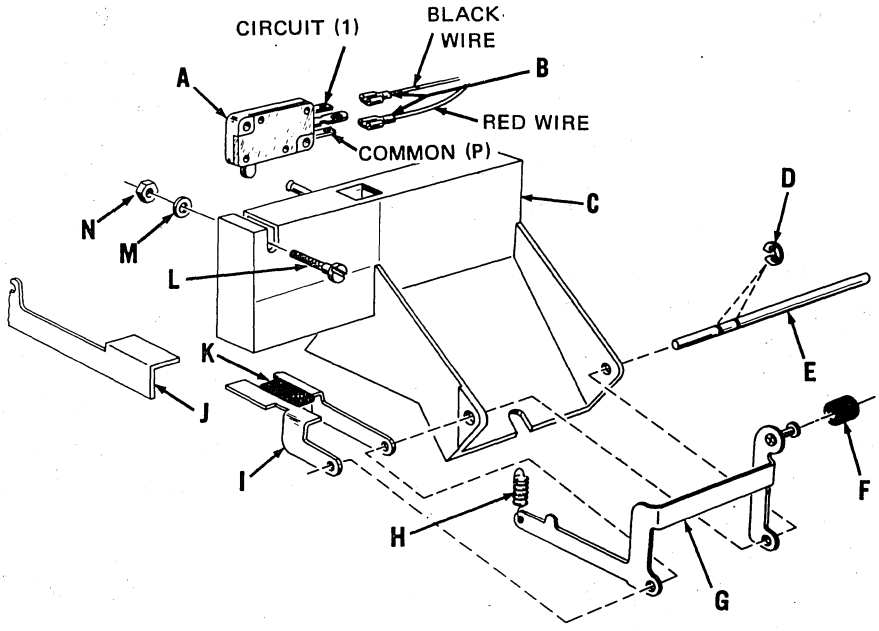
CONDITION: Machine fails to operate; motor will not run.
CAUSE: Type J (F) motor switch fails to operate properly.
CORRECTION: Replace the motor switch with the new style microswitch.

PROCEDURE:

For J500, J600 and J700:

1. Remove the old style motor switch and switch arm AB, Plate 42, Series J Parts Catalog, Form 1041696.

2. Cut off the terminal connections of the red and black wires from the motor.



3. Solder new terminals B to the ends of the red and black wires.

4. Connect the red wire to the common (P) of microswitch A and the black wire to circuit (1).

5. Install microswitch A in plastic cover C using screw L, washer M, and nut N. Before tightening, make sure that the microswitch is up against the inside top of cover C.

6. Install plastic cover C on the motor, using the screws from the old style motor switch cover.

7. Assemble safety arm G and upper switch arm I on shaft E and install as shown by dashed lines in illustration to the plastic cover C using two (2) clips D. Hook spring H on safety arm G to spring anchor on the plastic cover.

8. Install rubber bumper F on safety arm G.

9. Install new switch arm J.

For J800:

Follow steps 1 thru 6 of procedure for J500, J600, and J700. The J800 does not have the same type of safety switch and will not require safety arm G, spring H, and rubber bumper F. Use washer 1017 4902 in place of safety arm.

7. Assemble upper switch arm I and washer 1017 4902 (not illustrated) on shaft E and install on the plastic cover with two (2) clips D.

8. Install new switch arm J.

TESTS AND ADJUSTMENTS:

TEST 1: With machine at normal and line cord removed, release safety arm G, then pivot switch arm J to activate microswitch. Slowly release switch arm J to home position and check that the micro switch is transferred before bumper K of upper switch arm I limits on the bottom of plastic cover C.

ADJUSTMENT: Bend the upper switch arm I up or down as required.

REASON: To insure that contacts of microswitch transfer properly without bottoming plunger in microswitch.

TEST 2: With machine at normal and line cord removed, release safety arm G. Trip the drive with a control key and check that microswitch A is activated.

ADJUSTMENT: Bend the lip of switch arm J as required.

REASON: To insure that contacts transfer to activate microswitch when drive is tripped.

PARTS REQUIRED:

Ref.	Number	Description	Qty.	Unit List Price
A	1234 1178	Microswitch	1	$ 2.75
B	1034 8688	Terminal	2	.08
C	1234 1111	Plastic Cover	1	.48
D	1255 3129	Clip	2	.08
E	1234 1103	Shaft	1	.25
F	1337 4152	Bumper	1	.44
G	1234 1129	Safety Arm	1	.85
H	1028 8629	Spring	1	.51
I	1234 1152	Upper Switch Arm	1	.43
J	1234 1095	Switch Arm	1	1.09
L	1234 1160	Screw	1	.39
M	1010 4982	Washer	1	.19
N	1010 0444	Nut	1	.18
	1017 4902	Washer (J800 only)	1	.38

NOTE: From machine serial number J475495F, washer M has been installed to prevent breakage of plastic cover C due to over tightening of screw L. For machines between J453779F and J475495F, install washer M (1010 4982) on screw L between cover C and nut N.

Burroughs FIELD ENGINEERING TECHNICAL OPERATIONS	RELIABILITY IMPROVEMENT NOTICE	SYSTEM SERIES J	No. 3705-030
		STYLE/MODEL All	PAGE 1 OF 1
		TOP UNIT NO.	
STD. INSTALL. TIME	UNITS AFFECTED Below J525217-024	UNIT DESCRIPTION Carriage	
TITLE Poor Print on New Machines			DATE 12-17-71

CONDITION: Poor print on new machines in columns 1 and 10, approximately every 14 spaces.

CAUSE: Indentations in platen caused by the knurled pressure rollers being in direct contact with the platen during shipment and storage.

CORRECTION: Beginning with machine serial number J525217-024, the pressure roll release lever is being tied off with a plastic strap before machine is packed to prevent direct contact of knurled pressure rollers with the platen.

NOTE: A new "Prepare For Use" slip, advising that the strap be cut and removed before use, is included in each machine.

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Burroughs FIELD ENGINEERING	RELIABILITY IMPROVEMENT NOTICE	SYSTEM SERIES: SERIES J	No. R3705-031
		STYLE/MODEL: J1000	PAGE: 1 OF 1
ORIGINATOR: MSA Central		TOP UNIT NO.	
STD. INSTALL. TIME: 1/4 Hour	UNITS AFFECTED BEFORE- J1600/1700-J268590-021 J1500 - J267938-021	UNIT DESCRIPTION: Keyboard	
TITLE: BROKEN LOWER KEYBOARD PLATE,			DATE: 7-23-75

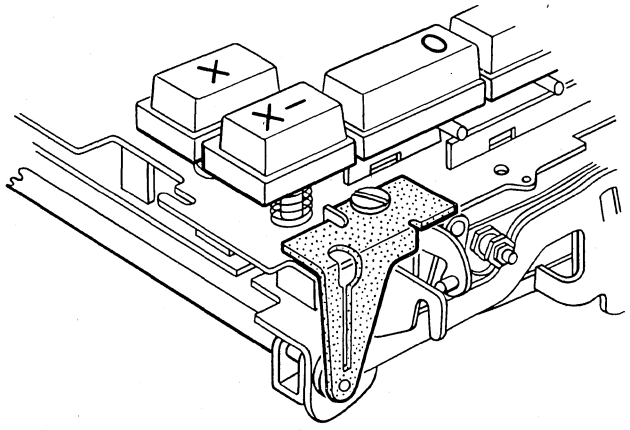
TYPE OF CHANGE

☐ FUNCTIONAL ☐ IMPROVED MAINTAINABILITY ☒ IMPROVED RELIABILITY

CONDITION: Front left corner of lower keyboard plate breaking.

CORRECTION: Install 1247 3427 repairs support.

PROCEDURE: Reference Series J Parts Catalog form 1061710, Plate II-1. Remove screw T and lockplate U from left front of keyboard. Discard lockplate U. Install repair support as shown. Replace screw T.



PARTS REQUIRED:

Part Number	Description	Qty.	Unit List Price
1247 3427	Repair Support	1	$ 1.64

☐ THIS CHANGE IS A RESULT OF FIELD REPORTING

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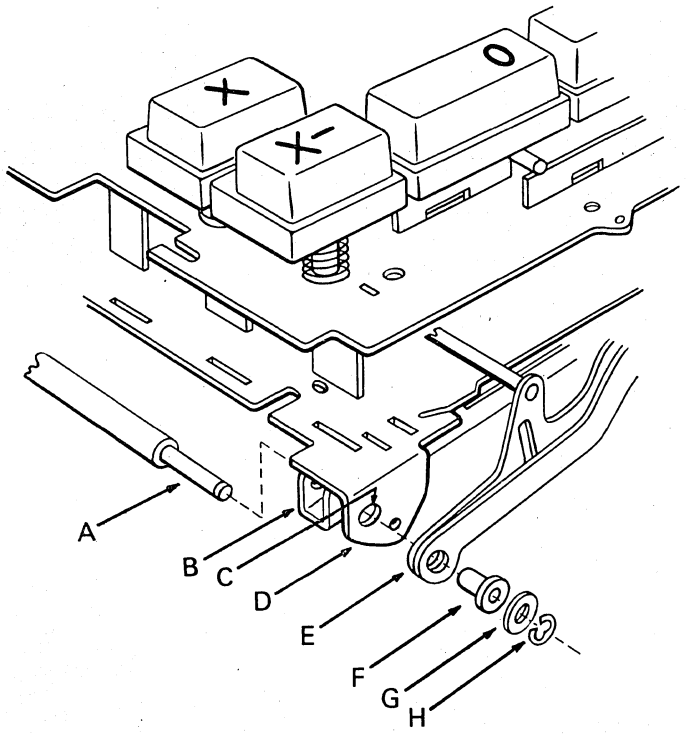
Burroughs FIELD ENGINEERING TECHNICAL OPERATIONS	RELIABILITY IMPROVEMENT NOTICE	SYSTEM SERIES Series J	No. R 3705-032
		STYLE/MODEL J1000	PAGE 1 OF 1
		TOP UNIT NO.	
STD. INSTALL. TIME Approx. ½ Hr.	UNITS AFFECTED Before J267938-021	UNIT DESCRIPTION Keyboard	
TITLE PRINTING 9's			DATE 7-23-75

CONDITION: Printing 9's instead of the indexed amount.

CAUSE: Hole C worn, causing incorrect intermediate keyboard escapement.

CORRECTION: Install a new keyboard that has the improvements incorporated in the construction. Refer to Series J Parts Catalog, Form 1061710, Plate II-1.



FOR REFERENCE ONLY:

Ref.	Number	Description	Qty.	Unit List Price
A	1247 3302	Shaft	1	$ .65
B	1247 3401	Escapement Pawl	1	2.32
F	1247 3294	Bushing	1	.39
G	1010 4446	Clip	1	.18
H	1255 3129	Clip	1	.08

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