SERIES P

FULL KEYBOARD

ADDING and BOOKKEEPING MACHINES

Burroughs

FIELD ENGINEERING

TECHNICAL MANUAL

Printed in U.S. America Cover Revised 11-1-65

Form 3784

✓ 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

FULL KEYBOARD

ADDING and BOOKKEEPING MACHINES

INSTRUCTION BOOK

Section I

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INTRODUCTION

Printed in U.S. America 7-15-64

For Form 3784

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Full Keyboard Adding and Bookkeeping Machines

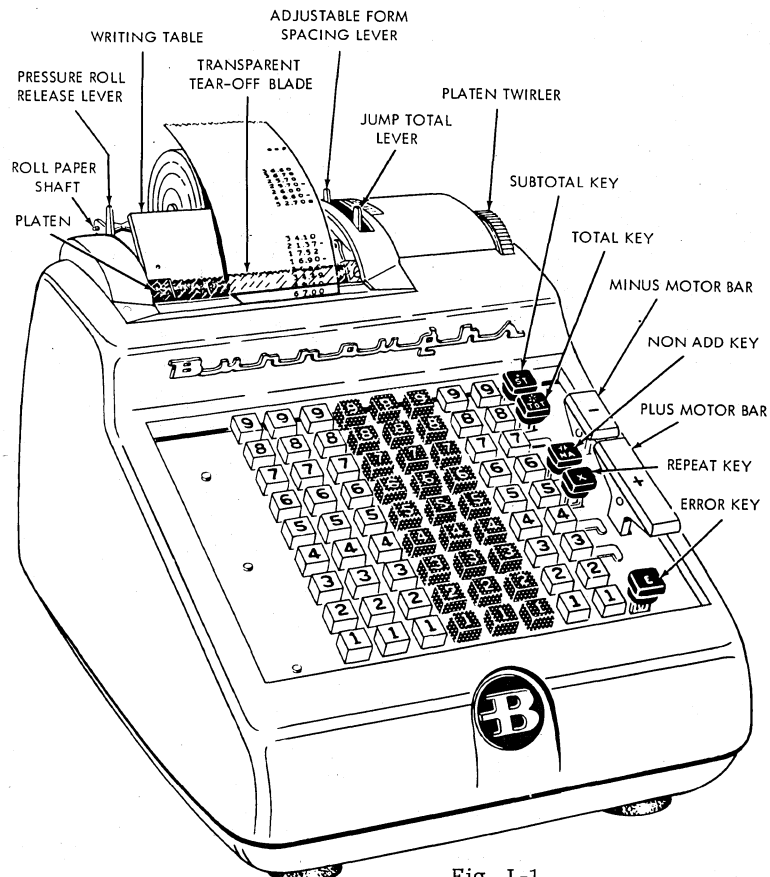


Fig. I-1

Series P machines include several individual series such as Series P100, P200, P300, P400, P600, etc. Each of these series is subsequently divided into styles - with each style adapted to perform specific applications.

Except for features that are applicable to only certain series and/or styles, the number, construction, and arrangement of the registers contained within the machine constitute the major difference in the various series.

The chart below shows the differences:

Machine Series	Number of Registers	Location In Accumulator Section	Function
P100	1	Lower	Add
P200	1	Lower	Add and Subtract
P300	2	Upper and Lower	Add
P400	2	Upper and Lower	Add and Subtract
P600	2	Upper and Lower	Add and Subtract
P700	2	Upper and Lower	Add and Subtract
P1100	2	Upper and Lower	Add and Subtract

These machines which are hand and hand-electric construction, are compact, yet contain practical and proven mechanical principles for efficient operation. The keyboard and functional control keys are so arranged that ease of machine operation is assured. Up to 13 columns of keys are contained within the keyboard for listing figures or other information to be printed either on roll paper or bookkeeping forms.

Machines with single or duplex registers are available - some for accumulating add items only and others for accumulating add and subtract items- many styles are constructed for printing minus balance totals.

The wide range of keyboard and accumulator mechanisms and numerous optional features permit flexibility of applications and a wide use of these machines, therefore, a thorough understanding of their application will obviously facilitate their servicing.

Complete information relative to all types of current installations is readily available through the "Branch Advertising and Reference File" which is kept up-to-date with current applications and should be referred to from time to time.

OPERATION CONTROL KEYS

The Total Key

Amounts that have been added or subtracted are printed and the accumulator 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. On machines constructed with the "Minus Balance Feature", depression of the total key will print a minus balance symbol (-*) to the right of the totaled amount if the amount having been previously subtracted was larger than that added.

The Sub-Total Key

Added and subtracted amounts that have been accumulated will be printed and retained in the accumulator when the sub-total key is depressed. Separate sub-total symbols are also printed for sub-totaled plus amounts (•) and sub-totaled minus amounts (—•).

The Repeat Key

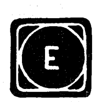
The repeat key is used when an indexed amount is to be added a number of times in succession such as a multiplication operation. This key eliminates the need of re-indexing the amount after each machine operation.

The Non-Add Key

Amounts indexed on the keyboard may be printed but not added by depressing the non-add key. These amounts being printed are generally used for identification purposes such as account numbers, etc.

The non-add key when depressed, indexes the non-add symbol (-/-) to print with the indexed amounts, disables the accumulator mechanism and operates the machine.

The Error Key



Series P keyboards are designed for easy error corrections. If an incorrect key is depressed, correction may be made by simply depressing the correct key in the same column. If the entire amount is incorrect, correction may be made by the depression of the error key.

SERIES P100 ADDING MACHINES FILLS WIDE VARIETY OF APPLICATIONS

Series P100 hand or hand-electric constructed machines accumulate plus items only. In these machines, the amounts indexed print on a roll paper tape or other forms inserted in the carriage. A total of the accumulated amount is obtained by simply depressing the total key. Items may be repeated by depressing the repeat key and may be printed without accumulating by depresssing the non-add key. These machines, containing a 3 7/8" carriage may be used for accumulating figures such as those appearing on deposit slips, statements, inventory lists, etc.

With various mechanisms changed or altered, Series P100 machines may be used for adding fractions, inches, hours and minutes. They are also used to simultaneously list and accumulate two sets of figures such as quantity on the left side of the keyboard, and price on the right side of the keyboard. Therefore, when the total key is depressed, the total quantity and total price are printed on the tape.

SERIES P200 MACHINES PROVIDE PLUS AND MINUS TOTALS

Series P200 machines, which may be either manually or electrically operated, accumulates both plus and minus amounts from the depression of designated motor bars or keys. Some styles of machines in this series are constructed with a direct minus balance mechanism that produces instantaneous minus balance totals while, other styles not so constructed produce complementry totals that require subtracting from a clear machine to produce a minus total.

Series P200 machines may be constructed with either a 3 7/8" carriage similar to the one used on Series P100 machines or a 12 1/4" carriage which can handle forms up to 11 7/8" wide for journalizing, columnar listing, or report writing, etc. Many features are available for these machines such as keyboard calendar feature or fractions which may be either added or subtracted and are automatically converted to whole numbers.

Total, non-add, and repeat operations are obtained on these machines in the same manner as on Series P100 machines.

SERIES P300 MACHINES PROVIDE TWO ADDING REGISTERS

Series P300 machines, which may also be either manually or electrically operated, are similar in construction to the Series P100 machines. The addition of a second independently controlled adding register gives the machine a wide variety of applications requiring multiple totals.

One of the most extensive fields for the two register adding machines is in the cash machine line. With the addition of a cash drawer and, by utilizing the two totals, the customer has a break down of individual sales totals during specified periods of time and a gross total of sales at the end of the period.

Amounts so indexed on the keyboard may be added simultaneously in both registers by using the motor bar, or may be added in one or the other register independently by using specified operation control keys.

THREE REGISTER - COMMERCIAL TELLER MACHINES FILLS TWOFOLD PURPOSE OF A VALIDATING- RECEIPTING MACHINE AND AN ADDING MACHINE

These machines are provided with three adding registers, the locked keyboard feature and several carriage styles to suit specific validating-receipting applications.

When applied to bank teller use, the three registers are used to accumulate "cash in items", "cash out items", and "miscellaneous amounts". The construction of the machine protects both the bank and the customer by enforcing the correct sequence of operations through the use of keyboard and motor bar interlocks.

A deposit validation begins with the teller locating the carriage in the "list" (left hand) position and pre-listing the amounts shown on the deposit slip by using the "List Motor Bar" and

"List Total Key". After verifying the amount shown on the deposit slip, the carriage is then located in the "validating" (right hand) position and the amount of the deposit is indexed on the keyboard. The deposit slip and a receipt is then inserted in the validating chutes with the receipt located foremost and "Teller Key No. 1" (OCK 6-0) is then depressed.

This operation prints the amount of the deposit on the receipt along with other identifications and actuates the keyboard locks to block the depression of all keys and motor bars except "Teller Key No. 2" (OCK 5-0) and the multiple receipt lever. If additional receipts are required, the multiple receipt lever is moved rearward to release "Teller Key No. 1" for subsequent operations. Through alternate use of the multiple receipt lever and "Teller Key No. 1", any number of receipts may be printed, all bearing the same amount and identifying figures. Upon completion of each receipt validation operation, the receipt is removed from the chute and handed to the depositor.

Following the validation of receipts, "Teller Key No. 2" (OCK 5-0) is depressed to validate the deposit slip by printing the same amount and identifying figures as appeared on the receipt. This operation releases the keyboard lock that had taken place during the previous "Teller Key No. 1" operation.

The final step of the deposit transaction concerns the accumulation of the cash involved in the deposit and the recording of this amount on either the deposit slip or a separate cash ticket by indexing this cash figure on the keyboard and depressing the "Cash In Key" (OCK 4-0) which will cause the amount to be added into register "A"' (cash in register). The deposit slip or cash ticket is then removed from the chute and retained by the bank for use by their proof department.

Cash paid out during the day is accumulated in register "B" and is entered in the machine by the use of "Cash Out" motor bar.

The third register in this machine (register "C") is advantageous because the teller need not disrupt the "Cash in" or "cash out" totals to accomplish miscellaneous adding.

Optional construction, making use of the three registers, furnishes a machine that may also be applied to other commercial needs.

SERIES P400 MACHINES USED FOR MULTIPLE TOTAL APPLICATIONS

The Series P400 machine is a two register adding and subtracting machine. It may be used as a standard adding machine to accumulate one set of figures or, it may be used to simultaneously accumulate two sets of figures - including both plus and minus items. Placing of the "Register Selection Lever" (lever located in the forward right hand portion of the machine) in "A" position or "B" position permits single accumulation of figures, and, by placing the lever in "AB" (center) position simultaneous accumulation of plus or minus amounts is permitted. Plus and minus totals of these accumulations are printed on the tape and are identified with an "A" or "B" and the proper total symbol.

These machines are adaptable to a wide variety of applications by locating the "Number, Split, and Normal Lever" (located in the upper left hand forward portion of the machine) in either one of its three positions and by having the "Register Selection Lever Control Key" (latch down key located immediately below the total key) either depressed for manual selection of registers or released for automatic selection of registers.

Items may be accumulated in alternate registers to provide a means of listing quantity and value, old and new balances, debits and credits etc. when the Number, Split and Normal Lever is located in its rightmost (normal) position and the Register Selection Lever Control Key is released.

When selective listings are required for pre-listing or post-listing charges and credits, separate totals of debits and credits are wanted or, when listing for a trial balance etc., the "Number, Split, and Normal Lever" is retained in its rightmost position and the Register Selection Lever Control Key is latched down permitting manual movement of the Register Selection Lever from "A" to "B" position or vice versa.

With the "Number Split and Normal Lever" located in its split (center) position, the Register Selection Lever Control Key latched down, and the Register Selection Lever located in "AB" position, figures may be listed on both sides of the keyboard and added simultaneously in both registers. This provides a means of converting the machine into a four total machine for obtaining group totals and grand totals of listed amounts.

Figures may be indexed in the last five columns (for descriptive purposes) at the same time that amounts are indexed in the first eight columns (for accumulating purposes) when the "Number, Split and Normal Lever" is located in its number (left hand) position. When a total is taken with the lever in this position, printing of the last five columns is automatically prevented thus permitting printed totals of only the amounts indexed for accumulating purposes.

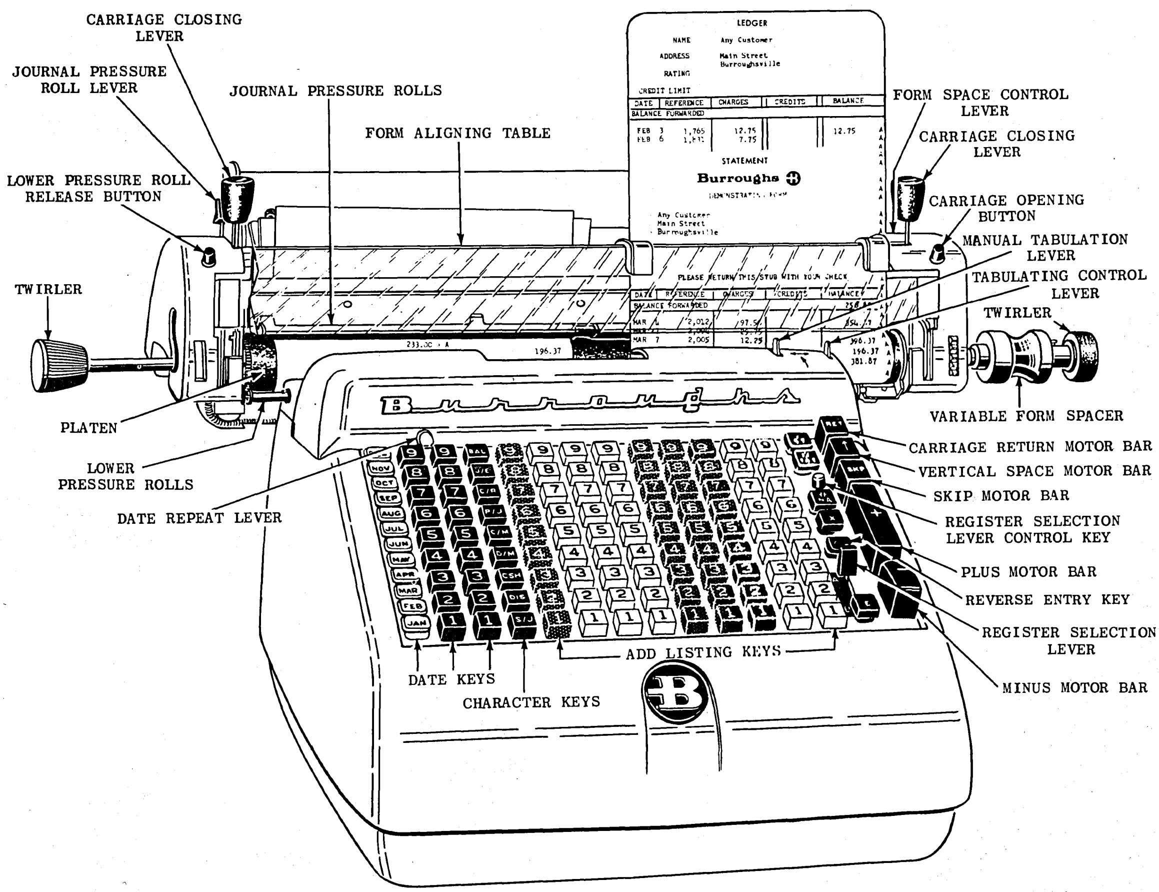


Fig. I-7

SERIES P600 ACCOUNTING MACHINES PROVIDE A WIDE RANGE OF APPLICATIONS

The Series P600 bookkeeping machine is adaptable to such operations as posting accounts payable or accounts receivable, etc. Many of the features of the Series P400 machines are retained in the Series P600 machine permitting amounts to be added (black) or subtracted (red) in either of the two registers or, in the case of a multiple total machine, alternately added or subtracted in either register. Plus or minus totals and subtotals may be obtained from a register either automatically or from the depression of the total or subtotal key.

Simplicity of operation and flexibility of application is obtained through the use of up to five motor bars, a two position register selection lever, the reverse entry key and, a 15" front feed tabulating carriage (often referred to as an MRC carriage) which is motor returned and is equipped with a stop and control bar that may be interchanged when more than one accounting application is to be handled by one machine.

Form Space Control Lever

The position of this lever at 0, 1, or 2 determines the number of spaces the forms will space up when the operation of the machine actuates the spacing mechanism providing form space of 0", 1/6", or 1/3". The platen will space according to the setting with one exception i.e. when the carriage tabulating control lever is in the forward position and the space adjustment set at 0" a single space will result. This permits miscellaneous listing of amounts without changing the setting from the normal horizontal posting setting (0"). For listing, a position without a carriage opening control should be selected, because this control is not inactivated by the tabulating control lever.

Carriage Closing Levers

Either one of the two carriage closing levers may be moved forward (towards the keyboard) to close the carriage when the carriage has been opened either manually or automatically. The machine will not operate from any source with the carriage open because a "handle break"will occur thus effecting a safeguard preventing listing and non printing amounts with the carriage open.

Carriage Opening Button

This button is sometimes referred to as "Form Aligning Table Release Button" gives the operator the option of manually opening the carriage in any given position to insert or align forms.

Form Aligning Table

The form aligning table is a full width transparent insert containing a scribed line for visible alignment. This aligning table latches and causes the lower pressure rolls to be partially closed when it is moved towards the platen.

Lower Pressure Roll Release Button

When aligning front feed forms with the carriage open, depressing this button closes the lower pressure rolls and holds the forms in alignment against the platen. The lower pressure rolls will also close automatically with the closing of the carriage. This button may be held in the depressed position during a carriage opening operation, thus preventing the release of front inserted forms and avoiding the possible necessity of re-alignment.

Tabulation Control Lever

This lever, when located in forward position (toward keyboard) prevents carriage tabulation during miscellaneous listing operations and, when located rearward, permits the carriage to tabulate during posting operations.

Manual Carriage Tabulation Lever

Rearward movement of this lever permits the carriage to move leftward to the next adjacent stop position and, if held rearward will permit the carriage to move to the extreme leftward position. This lever will also disable automatic totals if called for by a carriage control.

Journal Pressure Roll Lever

This lever controls the upper pressure roll which holds the journal or rear-feed forms securely in place. Moving this lever to the rear raises the upper pressure roll and tear off blade approximately 1/4" to facilitate the insertion of the journal below the tear-off blade.

Date Repeat Lever

When the two position date repeat lever is located to the left, the date keys indexed on the keyboard are repeated on each machine operation. When located to the right, the date keys will restore on each machine operation and are also restorable by the Error Key.

The Motor Bars

Series P600 machines (as mentioned earlier) are constructed with up to five motor bars. Bar 2 is used for the most common accounting operation. The other bars are used for the unusual or exceptional entry. It should be noted that the function of this machine is to add unless another function is indexed or programed by automatic controls on the control bar.

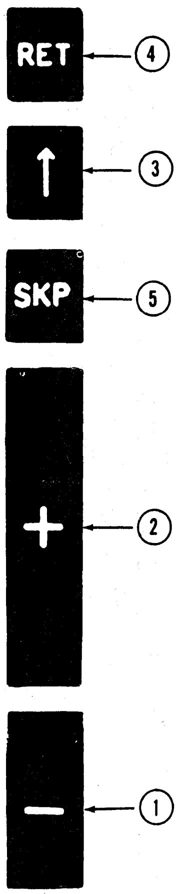


Fig. I - 8

Motor Bar No. 4 operates the machine, adds, prints in black, spaces forms, returns the carriage to an intermediate stop, disables automatic carriage opening, and may be used in conjunction with motor bar No. 1.

Motor Bar No. 3 operates the machine, adds, prints in black, spaces the forms, prevents tabulation of the carriage, and may be used in conjunction with motor bar No. 1.

Motor Bar No. 5 operates the machine, adds, prints in black, indexes a carriage skip to the next skip release position, and may be used in conjunction with motor bar No. 1.

Motor Bar No. 2 operates the machine, adds, prints in black, and tabulates to next carriage stop.

Motor Bar No. 1 operates the machine, indexes subtraction, prints in red, and tabulates to next carriage stop.

LEDGER POSTING

Before posting operation is started, the following conditions should be checked on the machines:

a. The carriage return disabling lever on the back of the machine should be in its left (enabling) position.
b. The selective limits stops should be set for the type of posting to be done.
c. The form space control lever should be positioned in its forward (no space) position.
d. The tabulation control lever should be positioned in its forward (non-tabulating) position.
e. The register selector lever control key should be latched depressed.
f. The date repeat lever should be in its left hand (repeat) position.
g. The correct date should be indexed on the keyboard.
h. Register "A" and "B" should be clear. To clear the registers, use the manual carriage tabulating lever to move the carriage to the third stop position on the proof tape or journal to permit full print of the totaled amounts with identifying symbols. (Carriage may be returned by hand to the desired position.) Locate the register selector lever in "A" position and depress the total key, move the register selector lever to

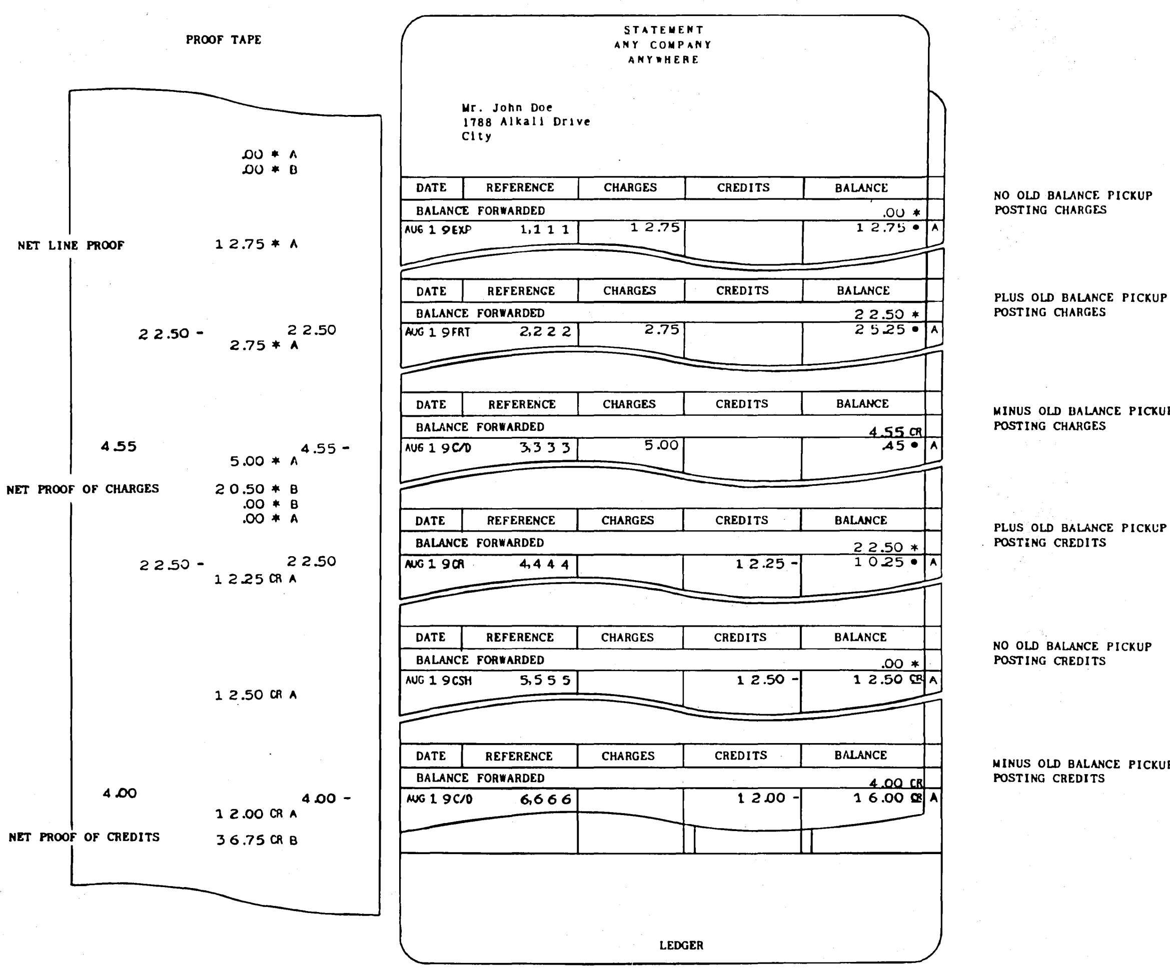


Fig. I - 9

"B" position and again depress the total key, this clears both registers. It should be noted that whenever a transfer control is present in an active stop, any amounts totaled from register "A" will accumulate in register "B" therefore, to print totals from both registers always total "B" and then "A", then "B" a second time to clear the machine.

i. The tabulation control lever should now be moved rearward to its tabulating position and the carriage moved to the fourth stop position.

j. The register selector lever should be located in "A" position.

After the above mentioned conditions are checked, the machine is ready for posting operations. An accounts receivable (charges and credits) operation may be performed in the following manner:

A ledger card and statement are selected. The amount of the old balance on the ledger card is indexed on the keyboard. The ledger card and statement collated and then inserted into the front of the open carriage and between the guides on the form aligning table.

The form aligning table is then raised and the last printing line on the form is aligned to the scribed line on the aligning table. The pressure roll release button is then depressed and the carriage is closed.

If the old balance is a plus amount, the plus motor bar (motor bar No. 2) is depressed. If the old balance is a minus amount, the subtract motor bar (motor bar No. 1) is depressed.

The reference number is indexed to the left of the tens of cents column, and the character (if required) is indexed in column 10. The plus motor bar is then depressed.

The amount of the charge or credit is indexed on the keyboard and the plus motor bar depressed. After this posting has been printed, the carriage will now automatically tabulate into the last carriage stop position and an automatic sub-total of register "A" will take place. Upon completion of the automatic sub-total operation, the carriage will automatically open (to permit the removal of the ledger card and statement) and then return to the first carriage stop position.

The carriage is now manually closed and the old balance is observed on the previous line of posting on the statement. If the old balance is a plus amount, it is indexed on the keyboard and the plus motor bar is depressed. If the old balance is a minus amount the reverse entry key is depressed. The carriage will now tabulate into position three, an automatic total of register "A" will take place, the amount will be transferred into register "B", the carriage then automatically opens and tabulates to (starting) position five. One line of posting of accounts receivable is now completed and subsequent postings may be made.

Totals are obtained after all items are posted. The carriage is first moved to the third stop position. The tabulation control lever is moved forward and the register selector lever is moved to "B" position. The total key is depressed and a total of the charges or credits posted is printed.

FORM LAYOUT AND OPERATION SHEET USED FOR MACHINE ANALYSIS

The "Form Layout" is a simple means of illustrating forms, controls, and operations required for a specified application. This sheet also gives a sample posting of the particular machine for which the form layout has been proposed, and specific mechanical conditions requisite to the proper machine functioning.

Upper Portion of Sheet

The layout is fully identified in its upper right corner as to the branch, machine style, customer, application and other pertinent information.

A printing control chart located in the upper left corner shows the four combinations of printing obtained through a printing control shaft. Columns in which the printing is to be blocked are indicated by an "X" and a carriage controlled cipher split is indicated by an "0" on a line between columns. To the right of each printing combination is shown the identifying number of the control roll used to obtain that particular printing combination. When no roll is required, a cipher is shown in the "roll number" column.

Below the upper scale, a description of the forms to be used is shown with an illustration of the relative position of these forms as they fit around the platen.

Right Side of Sheet

Space is provided on the right side of the sheet for a detailed step by step explanation of the operating instructions to perform the posting for which the specified machine was built.

The first number appearing at the top of the "carriage position number" column in the operating instructions indicates the position in which the carriage is located when starting a posting run.

Lower Portion of Sheet

Within the schedule illustrated just above the lower scale on the sheet, the location of carriage tabulating stops on the stop bar is illustrated in addition to an explanation of the various carriage controlled machine functions (lanes of control).

Stop positions, which are numbered from left to right, are represented on the layout by a vertical line drawn from the line "Position Number" to the top edge of the lower scale. This line represents the stop as assembled on the control bar at that position.

Left Side of Sheet

Form and printing limitations of both front feed forms and forms used around the platen are indicated on the left side of the sheet. From the information given under form limitations, the maximum width of forms and their locations in the carriage may be determined. From the information given under printing limitations, the minimum length of the forms may be determined.

NOTE: A comprehensive study of the "Form Layout" that accompanies each machine will provide service personnel an understanding of the machines operation and functions and will be a definite aid in affectively maintaining performance of the machine.

Basic Functions

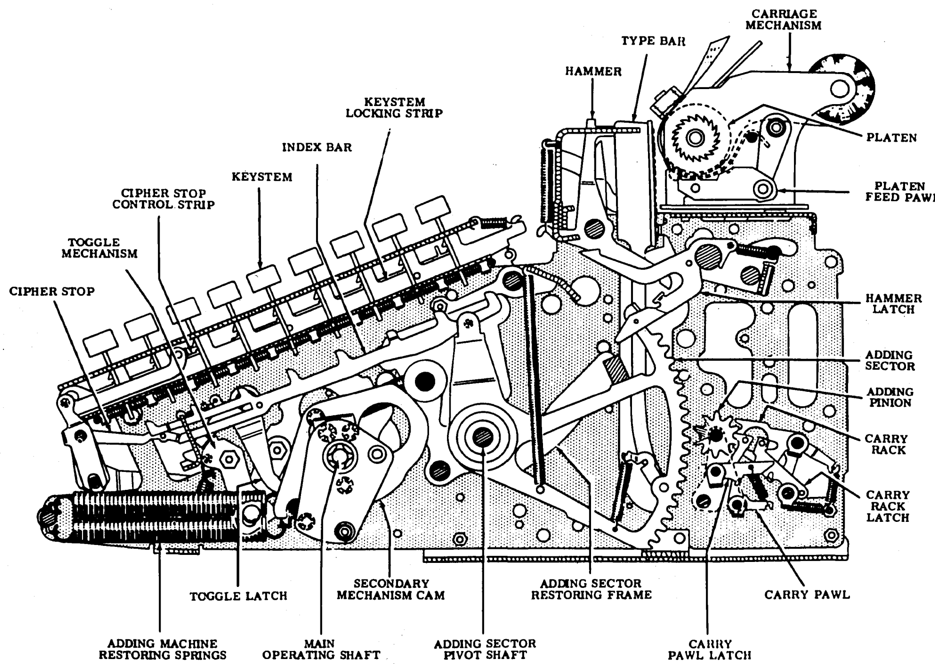


Fig. I-10

As pointed out on page 3 Burroughs Series P Machines include several individual series which are subsequently divided into styles that may be manually or electrically operated. These machines all follow the same basic construction consisting of a Carriage Mechanism, Keyboard Mechanism, Printing Mechanism, Accumulator Mechanism and a Power Mechanism.

THE CARRIAGE

A wide range of carriage styles employed on Series P machines help provide flexibility of applications but the basic carriage as illustrated

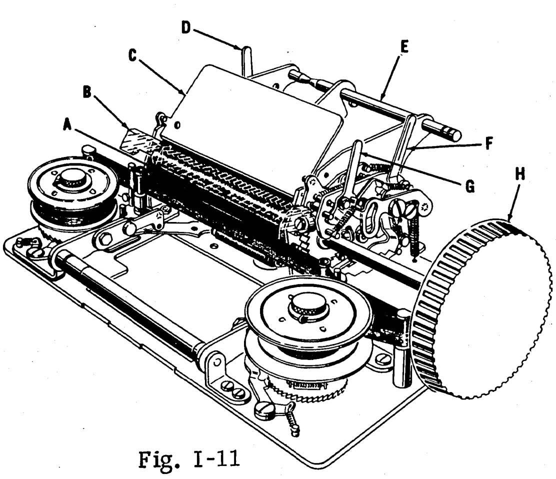


Fig. I-11

is a 3 7/8" carriage known as the style NA-2 carriage which accommodates either 2 1/4" or 3 7/16" roll paper being easily and quickly installed. The roll paper is placed on Shaft E so the paper will feed from the bottom. The end of the paper is placed down and behind the platen A and twirler H is turned to feed the paper up behind tearoff blade B while the writing table C is held forward. The paper may then be straightened when pressure roll release lever D is held forward.

Carriage spacing (feeding of the paper) during listing operations is controlled through lever F which may be set to control the spacing up to 5/6" - in multiples of 1/6". During total operations, spacing is controlled through lever G. It may be set in either of two positions - rearward proving 5/6" spacing or forward permitting spacing as indicated by the position of lever F.

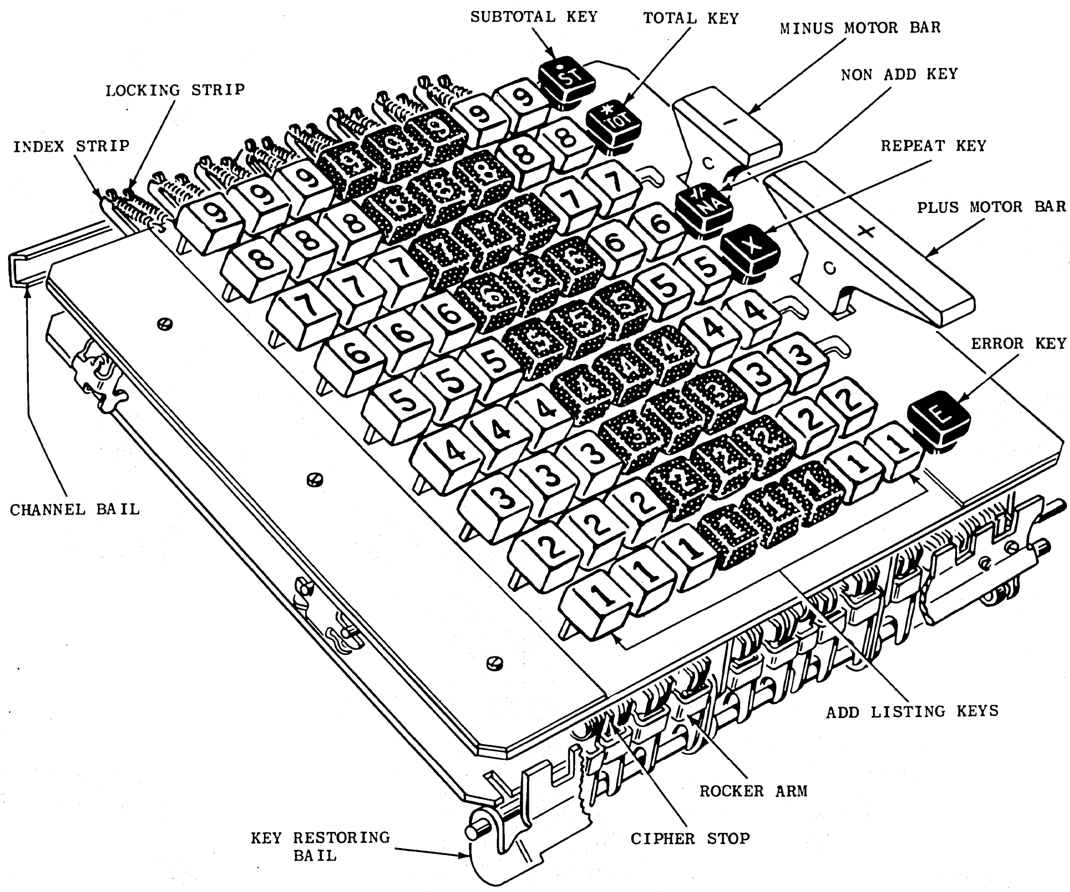


Fig. I-12

SHORT-CUT, FULL KEYBOARD

Key depressions on Series P keyboards are light providing maximum operator speed with minimum effort. This speedy short-cut keyboard features simultaneous, one operation depression of amount keys and motor bar.

The keys numbered 1 thru 9 used to index amounts (or figures) in the machine are commonly known as "listing" keys and are arranged in columns which is the major part of the keyboard.

The keys located in the extreme right hand column are known as operation control keys and are used for controlling various operations of the machine. On electrically operated machines, most of these keys are live keys - no motor bar depression is required.

This keyboard is designed for easy error corrections. If a wrong key is depressed, correction is made by depressing the correct key in the same column. If the entire amount is wrong, corrections are made by simply depressing the error key.

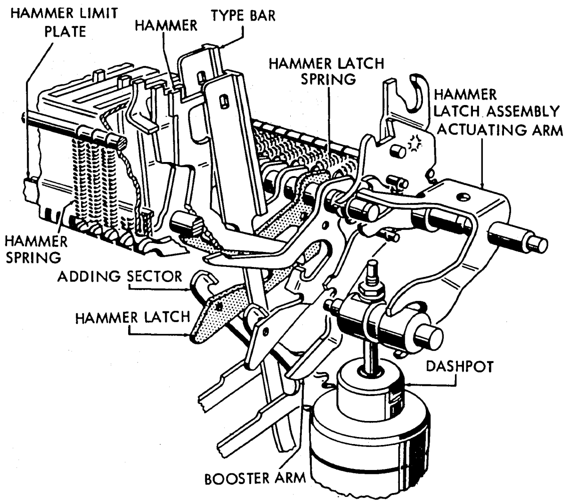


Fig. I-13

THE PRINTING MECHANISM

The printing mechanism provides the means by which the various calculations of the machine may be recorded. During printing operations, the type bars are moved rearward by the hammers until the type comes into contact with an inked ribbon resulting in the amount being printed on the roll paper.

THE ACCUMULATOR MECHANISM

The adding sectors, include a type bar, are limited in their upward movement during listing operations by their corresponding index bar limiting against the depressed keys or by the cipher stop in the columns in which no keys are depressed.

Adding is accomplished by meshing the teeth of the adding pinions with the teeth of the adding sectors during the early part of the return stroke of the machine operation so the pinions will be turned counterclockwise as the adding sectors return to their home (normal) position.

When an adding pinion is turned more than nine points, a wide tooth on the pinion trips a carry pawl which, through its associated parts in the carry mechanism, advances the next left pinion one point to add one in the same manner as when making a mental calculation.

Totaling is accomplished by meshing the adding pinions with the teeth of the adding sectors at the beginning of the forward stroke of the machine operation. During this operation the adding sectors will continue their upward travel until stopped by the wide tooth of the adding pinions limiting on the uppermost surface of their matching carry pawl in the carry mechanism. This positions the type bars to print the amount that had been accumulated in the pinions.

Sub-totaling combines the controls of totaling and adding operations. During the forward stroke, the operation is the same as a total operation except the pinions remain meshed with the adding sectors for the return stroke which is the same as an adding operation. Thus, the amount accumulated is printed, identified with a sub-total symbol and retained in the adding pinions.

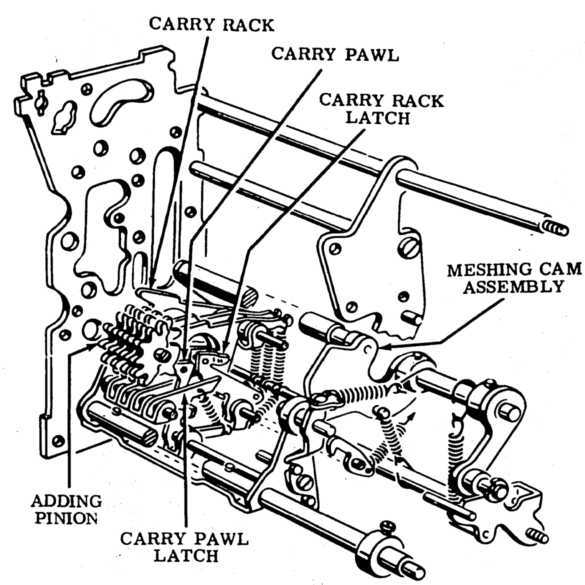


Fig. I-14

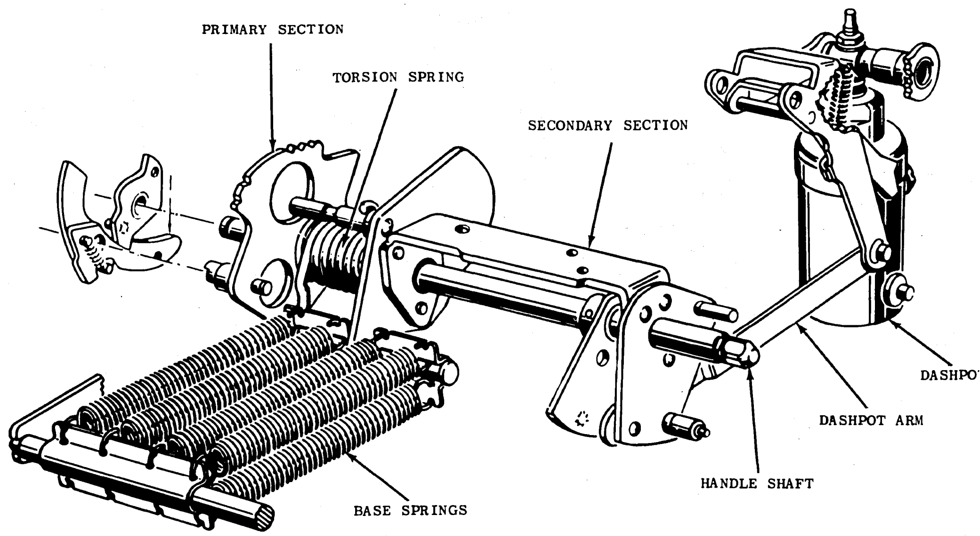


Fig. I-15

THE POWER MECHANISM

As pointed out on page4, Series P machines may be either manually or electrically operated. The main operating mechanism of these machines consists of two sections namely, the primary section, and the secondary section which are joined together by a yielding connection in the form of a torsion spring. An oil filled dashpot being connected directly to the secondary mechanism provides a means of controlling the speed of the secondary mechanism for proper functioning of the various mechanisms in the machine.

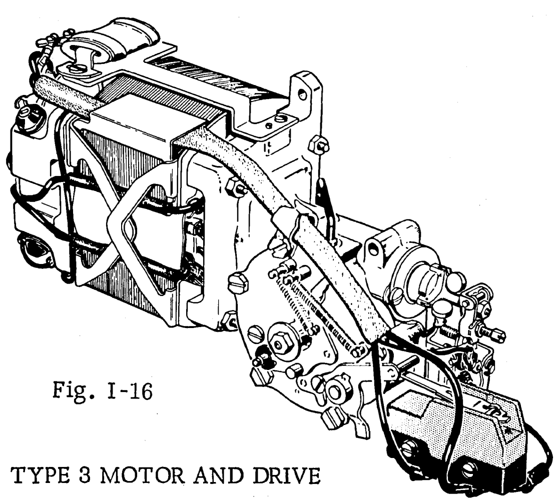


Fig. I-16

TYPE 3 MOTOR AND DRIVE

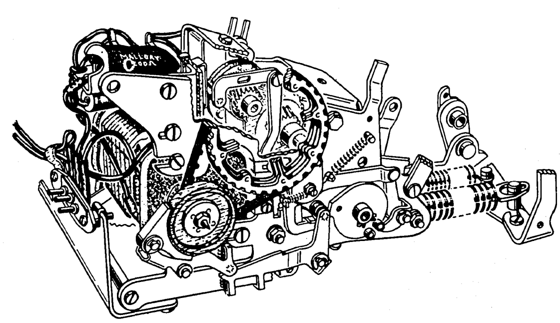


Fig. I-17

TYPE P2 MOTOR AND DRIVE

Power for the electric operation of these machines is supplied by either a governor controlled Type 3 Motor which developes approximately 1/15 horsepower or a governor controlled Type P2 Motor which developes approximately 1/40 horsepower. Construction of the drive mechanism provides a mechanical lock between a clutch pawl and drive gear as a result of motor bar or operation control key depression thus connecting the power from the motor to a drive shaft, and thru a link, transmits power to the primary- secondary sections for machine operation.

(This page distributed to libraries only. File after Page X2-6, Sec. I)

Lovejoy

INSTRUCTION OUTLINE

SUBJECT P-2A (P600)

(A one week course)

(One Week) (5 Days) (40 Hours)

LESSON #1 (8 Hours)

1. Explanatory Lecture on the following subjects. Use a P612 machine. 2 Hours.

   NOTE: Remove Case and Base.

   (A) Application: Pages 7, 8, 9, 10, 11, 12, Section I. Form Lay-out DM2118.
   (B) Outer carriage. Pages 5, 6, Section VII.
   (C) Inner carriage. Page 7, Section VII.
   (D) Carriage opening indexing. Pages 9, 10, Section VII.
   (E) Release of carriage latch. Page 10, Section VII.
   (F) Carriage opening delayed by machine operation. Page 11, Sec. VII.
   (G) Carriage opening blocks machine operation. Page 11, Section VII.
   (H) Carriage opening disabling mechanism. Page 12, Section VII.
   (I) Carriage non-tabulation. Pages 12, 13, Section VII.
   (J) Manual carriage and aligning table opening. Page 13, Section VII.

2. Study and Review Period.

   Assign the trainee 4 hours in which he is to read the lesson material, trace out the movements on the machine, familiarize himself with the mechanisms, learn the adjustments, and make notes of any item not clear to him.

3. Recap and Quiz.

   Determine by thorough questioning that the trainee understands the purpose, construction, operation, and adjustments of each subject named above. Answer in detail his questions on items that were not clear to him. 1 hour.

4. Mechanical Work. 1 hour.

   (A) Remove and replace carriage as outlined in the Servicing Procedures.
   (B) Remove and replace M.R.C. Unit as outlined in the Servicing Procedures.

INSTRUCTION OUTLINE

SUBJECT P-2A (P600)

(A one week course)

LESSON #2 (8 Hours)

1. Explanatory Lecture on the following subjects. 1 1/2 hours.

   (A) Pressure rolls are opened to facilitate insertion of forms. Page 14, Section VII.
   (B) Aligning table and pressure roll control. Page 15, Section VII.
   (C) Forms are controlled during printing. Pages 15, 16, 17, Section VII.
   (D) Vertical sopacing indexed by the spacing control lever. Page 17, Section VII.
   (E) Carriage control indexes single spacing. Page 18, Section VII.
   (F) Single spacing indexed by tabulation control lever, vertical space bar, or carriage return bar. Pages 18, 19, Section VII.
   (G) Platen control mechanism controls spacing. Pages 19, 20, 21, Section VII.

2. Study and Review Period.

   Assign 4 1/2 hours to the trainee in which he should proceed as described in Lesson #1.

3. Recap and Quiz.

   Proceed similarly as in Lesson #1. 2 hours.

4. No Mechanical Work.

INSTRUCTION OUTLINE

SUBJECT P-2A (P600)

(A one week course)

LESSON #3 (8 Hours)

1. Explanatory Lecture on the following subjects. 1 hour.

   (A) Carriage released during return stroke of machine operation. Page 21, Section VII.
   (B) Governor controlled carriage tabulation. Pages 22, 23, Section VII.
   (C) Carriage tabulation delays trip and is cushioned by air pot control. Pages 23, 24, Section VII.
   (D) Manual carriage tabulation. Page 24, Section VII.
   (E) Carriage return indexed from control cam, carriage return bar, and dashpot assembly, is actuated through motor power. Pages 25, 26, Section VII.
   (F) Motor power returns carriage.
   (G) Control cam normalizes carriage return. Page 27, Section VII.
   (H) Carriage return indexed by return motor bar. Pages 28, 29, 30, Section VII.
   (I) Carriage return indexing disabled from vertical space bar, tabulation control lever, or carriage return disabling lever. Pages 31, 32, Section VII.
   (J) Skip indexing. Pages 32, 33, Section VII.
   (K) Skip release. Page 34, Section VII.
   (L) Safeguard interlocks. Pages 34, 35, Section VII.
   (M) Motor bar and control key interlocks safeguard machine operations. Page 36, Section VII.

2. Study and Review Period.

   Assign 4 1/2 hours to the trainee in which he should proceed as described in Lesson #1.

3. Recap and Quiz.

   Proceed similarly as in Lesson #1. 1 hour.

4. Mechanical Work. 1 1/2 hours.

   (A) Remove and replace M.R.C. Unit as outlined in Servicing Procedure.
   (B) Remove and replace panel as outlined in Servicing Procedures.

INSTRUCTION OUTLINE

SUBJECT P-2A (P600)

(A one week course)

LESSON #4 (8 Hours)

1. Explanatory Lecture on the following subjects. 1 hour.

   (A) Printing mechanism actuated by primary section and dashpot assembly. Page 37, Section VII.
   (B) Hammers released by dashpot assembly. Page 37, Section VII.
   (C) Ribbon crossfeeds during the return stroke of the machine operation and is automatically reversed. Page 38, Section VII.
   (D) Red ribbon lift mechanism indexed from carriage control. Page 39, Section VII.
   (E) Four position printing control mechanism indexes various printing combinations. Pages 39, 40, Section VII.
   (F) Hammer latch retains hammer to cause non-printing. Pages 40, 41, Section VII.
   (G) Cipher splits indexed from four position printing control shaft. Pages 41, Section VII.
   (H) Closed account mechanism prints a symbol and two ciphers. Page 42, Section VII.
   (I) Two ciphers print with symbol. Pages 42, 43, Section VII.
   (J) Printing in column 13 with type bar in cipher position. Pages 43, 44, Section VII.

2. Study and Review Period.

   Assign 3 1/2 hours to the trainee in which he should proceed as described in Lesson #1.

3. Recap and Quiz.

   Proceed similarly as in Lesson #1. 1 hour.

4. Mechanical Work. 2 1/2 hours.

   (A) Remove and replace hammerhead as outlined in the Servicing Procedures.
   (B) Remove and replace printing control shaft as outlined in the Servicing Procedures.

INSTRUCTION OUTLINE

SUBJECT P-2A (P600)

(A one week course)

LESSON #5 (8 Hours)

1. Explanatory Lecture on the following subjects. 1 1/2 hours.

   (A) Accumulation. Page 44, Section VII.
   (B) Register selector lever - "A" and "B" positions. Pages 44, 45, Section VII.
   (C) Register "B" accumulation. Page 45, Section VII.
   (D) Transfer of register "A" totals to register "B" - carriage controlled. Page 46, Section VII.
   (E) Register "B" listed items. Page 47, Section VII.
   (F) Register "B" totaling. Page 47, Section VII.
   (G) Simultaneous Addition. Page 48, Section VII.
   (H) Register identification - balance transfer operation. Pages 48, 49, Section VII.
   (I) Selector position chart. Page 49, Section VII.
   (J) Non-add of register "A" indexed by carriage control - lane 3. Pages 50, 51, Section VII.
   (K) Subtraction, registers "A" and "B" - indexed from carriage control - Lane 4. Page 51, Section VII.
   (L) Subtraction carriage controlled, normalized by key in position 4-0. Pages 52, 53, Section VII.
   (M) Automatic total mechanism. Pages 54, 55, Section VII.
   (N) Power indexing. Page 55, Section VII.
   (O) Power cam functions. Page 55, Section VII.
   (P) Result key depression. Page 56, Section VII.
   (Q) Machine drive clutch trip. Pages 56, 57, Section VII.
   (R) Automatic total disabling from motor bars. Pages 57, 58, Section VII.
   (S) Machine operation is prevented until result key is latched. Page 59, Section VII.
   (T) Drive trip from result key power mechanism. Page 59, Section VII.
   (U) Automatic totals disabled by tabulation control lever. Page 60, Section VII.
   (V) Automatic total disabled by manual carriage tabulation. Pages 60, 61, 62, 63, Section VII.

2. Study and Review Period.

   Assign 4 hours to the trainee in which he should proceed as described in Lesson #1.

3. Recap and Quiz.

   Proceed similarly as in Lesson #1. 1 hour.

4. Mechanical Work.

   Have trainee reform Preventive Maintenance as outlined in The Servicing Procedures.

5. Cover with trainee the following P600 Correction Indexes. 1/2 hour.

#1002-II	#1016-IV
#1003-I, II	#1017-II
#1007-III	#1019-III
#1008-I, II, III, IV	#1020-II
#1009-III	#1021-II
#1011-I, II, IV	#1023-I, III
#1012-II, III	#1027-I
#1013-I, V	#1028-I, III
#1014-VI, VII	#1030-I

6. Prepare Service Training Report, Form 1591, at the end of the last day's guide.

Burroughs

FULL KEYBOARD

ADDING and BOOKKEEPING MACHINES

INSTRUCTION BOOK

Section II

●

SERIES P100

Printed in U.S. America 7-15-64

For Form 3784

TABLE OF CONTENTS

INDEX OF MECHANISMS (Continued)

CARRIAGE MECHANISM

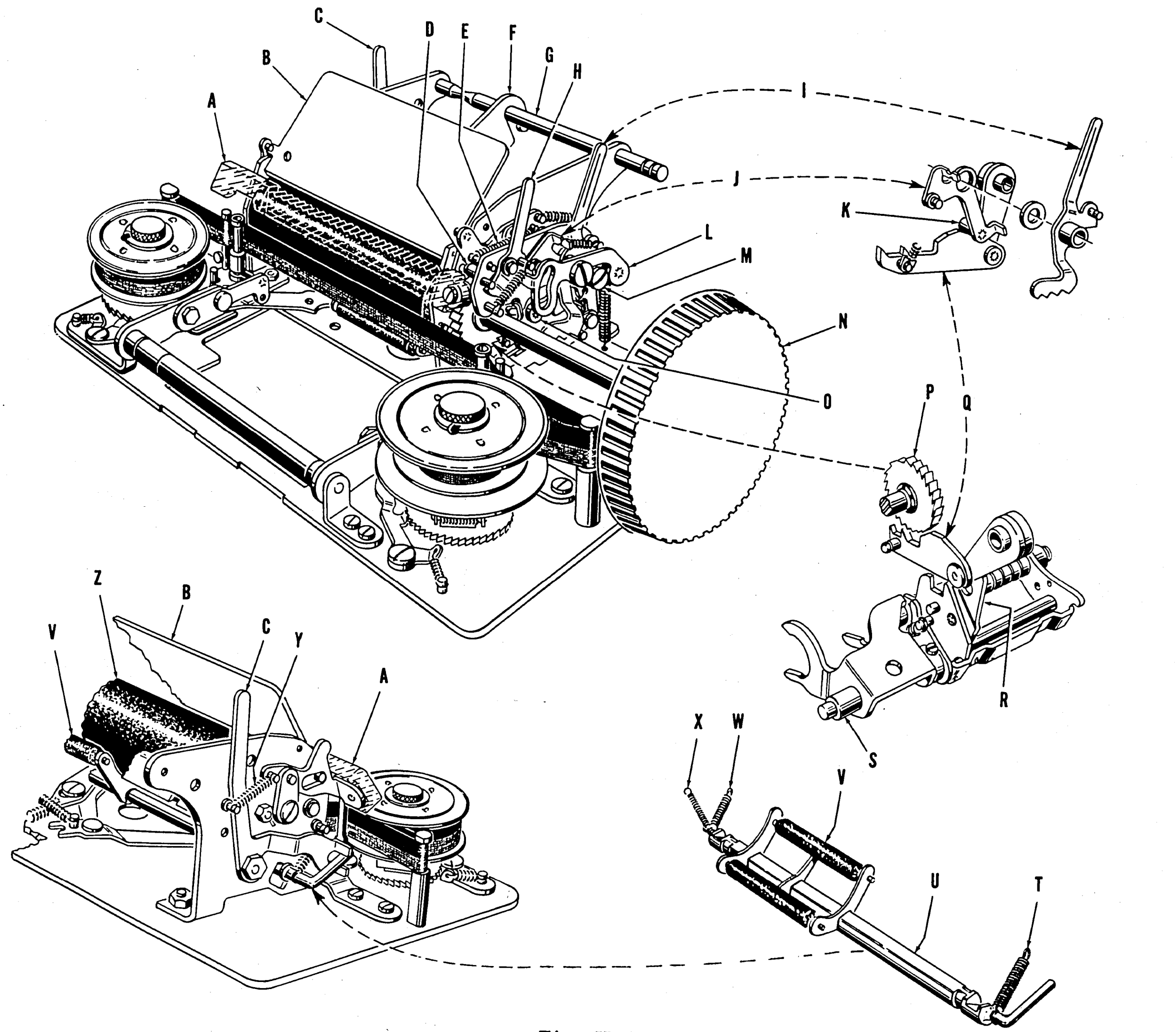


Fig. II-1

CARRIAGE 3 7/8" REAR FEED

The carriage serves the dual purpose of providing a means of advancing the roll paper or forms as well as a printing surface for the type while recording the various machine operations and calculations.

The roll paper is mounted on shaft G, the leading end of the paper, which is unwound from the bottom of the roll, is inserted down and behind platen Z. The paper, as it passes around the platen, feeds between the platen and pressure rolls V. The pressure rolls, which are under the tension of springs T, W, and X, ensures the paper being advanced the amount established by the position of lever I. Movable tear-off blade A affords a convenience for placing the paper under the blade, particularly when the machine is used for printing on narrow forms.

Straightening of the forms or roll paper is accomplished by moving lever C forward thus releasing tension of pressure rolls V permitting adjustment to the forms or roll paper.

CARRIAGE FEED PAWL IS ACTUATED BY HAMMER LATCH SHAFT ASSEMBLY

During the forward stroke of the machine operation as shaft assembly S oscillates rearward, feed pawl Q indexes to engage ratchet gear P through arm R.

At the beginning of the return stroke of the machine operation, shaft assembly S oscillates forward which, through arm R swings feed pawl Q forward to engage and rotate ratchet gear P and platen Z thus vertically spacing the form or roll paper. As ratchet gear P is rotated, detend D seats in a notch between two teeth of the gear to insure uniform spacing.

Near the end of the forward stroke, feed pawl Q contacts roll 0 and is disengaged from ratchet gear P.

FORM SPACING UP TO 5/6" - IN MULTIPLES OF 1/6"

Space control lever I, with five positions, controls feed pawl Q to space the platen in multiples of 1/6".

Feed pawl Q contains two projections: one engages ratchet gear P for 1/6" spacing and both engage for more than 1/6" spacing.

Lever H is a separate control for 5/6" spacing during total operations. With lever H forward, all machine operations space as indicated by lever I, with lever H positioned rearward, total operations space 5/6" irrespective of the position of lever I, and all other operations space as indicated.

Movement of lever I to any of its five positions moves stud K through bellcrank J. During the forward stroke of a listing operation as feed pawl Q is moved rearward, its upper surface cams against stud K. Feed pawl Q is thus positioned so that during the return stroke, ratchet gear P is turned the required number of spaces.

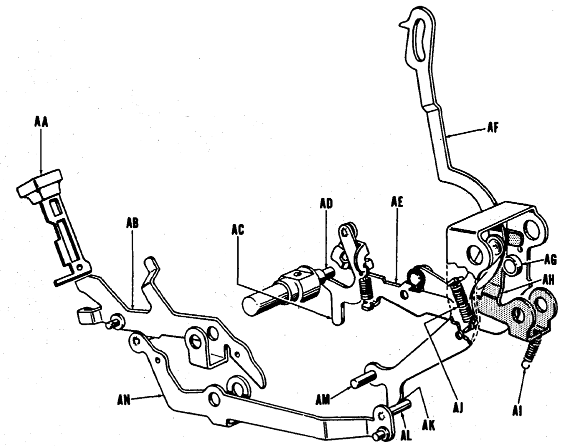


Fig. II-2

PLATEN SPACES 5/6" DURING TOTAL OPERATIONS

When lever H (Fig. II-1) is in its rearward position, 5/6" spacing during total operations permits printed amounts advancement beyond the cutting edge of tear-off blade A, Fig. II-1.

Depression of total key AA positions the forward portion of bail assembly AE into the path of dashpot hanger shaft AD through arms AB and AN.

During the forward stroke of the total operation, shaft AD engages bail assembly AE which, through roll AG engaging a cam surface on arm AH moves link AF downward through yielding connection spring AJ. Downward movement of link AF rocks bellcrank J. (Fig. II-1) to position stud K, (Fig. II-1) for 5/6" spacing.

When lever H, (Fig. II-1) is in its forward position, 5/6" spacing during total operations is prevented. With lever in its forward position, the lip on arm L, (Fig. II-1) limits on the hook portion of the lever and subsequently the downward movement of link AF is prevented and spring AJ is expanded.

Tests and Adjustments

1. To ensure free movement of pressure roll shaft U -
Lever C should be free to return to normal under spring tension.
TO ADJUST, check shaft U for being properly lubricated; and check springs T, W, and X for being in good condition.
2. To safeguard against overadjustment of arm assembly AE-
Stud AL should be centrally located in the enclosed slot in the right accumulator sideframe when the machine is at home position.
TO ADJUST, bend the rearmost portion of arm AN.
3. To provide maximum indexing of bail assembly AE from the depression of total key AA-
There should be minimum clearance between stud AL and the lowermost portion of the leg of bail assembly AE at point AK when the machine is home.
TO ADJUST, manually hold bail assembly AE upward, pull the handle forward to locate the full stroke pawl in the first notch of the full stroke segment.
Weave the U form of bail assembly AE.
4. To ensure full side engagement of roll AG with the vertical cam portion of arm AH -
Bail assembly AE should have a minimum amount of side play.
TO ADJUST, re-position the set collar located within the U form of bail assembly AE.
5. To ensure a full engagement of shaft AD with the foremost portion of bail assembly AE-
With the total key depressed and the handle pulled forward to locate the full stroke pawl in the first notch of the full stroke segment, the leftmost portion of shaft AD should be fully engaged with the foremost portion of bail assembly AE.
TO ADJUST, bend the forward portion of bail assembly AE.

NOTE: When making adjustment No. 5 care should be taken that projection AC is properly aligned to limit on the flat surface of the dashpot cap.
6. To ensure 5/6" spacing during total operations when lever H is in its rearward position -
The projection on the uppermost portion of link AF should have a safe hold on the lip on the forward portion of arm L when the machine is slowly operated during the forward stroke with the total key depressed, lever I located in No. 5 position and lever H positioned rearward.
TO ADJUST, bend the lip on arm L rearward, but not so far as to bind on the forward edge of link AF.
NOTE: After adjustment No. 6 has been made, the lip on arm L should have a safe hold on the hook portion of lever H during a machine operation with the total key depressed and lever H in its forward position.
7. To ensure 5/6" spacing when lever I is located in No. 5 position. -
Lever I should limit against hub M when the lever is located in No. 5 position.
TO ADJUST, bend the lowermost curved portion of link AF.
NOTE: After adjustment No. 7 has been made, the hook portion of lever H should clear under the lip on arm L as the lever is moved forward.
8. To ensure correct 1/6" spacing when lever I is located in No. 1 position -
Feed pawl Q should properly space the platen 1/6" when lever I is located in No. 1 position and spring E is removed.
TO ADJUST, tilt roll K.
9. To ensure correct 2/6" spacing when lever I is located in No. 2 position -
The forward projection on feed pawl Q should clear under the lowermost tooth of ratchet gear P during the return stroke of a machine operation with lever I located in No. 2 position.
TO ADJUST, bend the lip on bellcrank J.

KEYBOARD MECHANISM

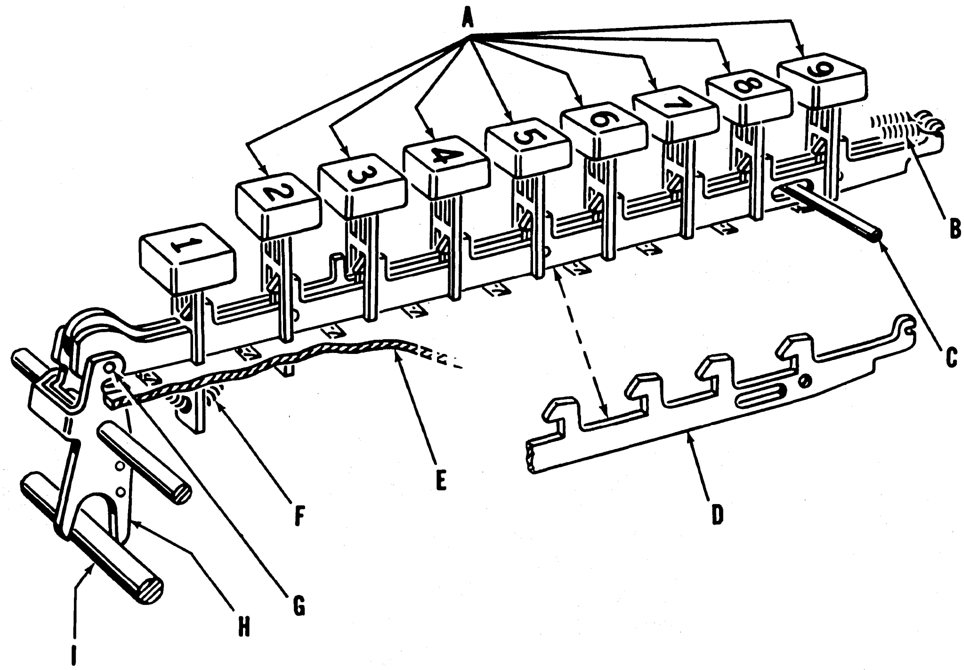


Fig. II-3

The various functions of the machine are indexed by depression of keys on the keyboard. With keys depressed, the moving parts of the machine are indexed or positioned to produce the results desired as the machine operation progresses.

As pointed out in Section 1, the keys numbered 1 thru 9 are known as "listing keys" They are arranged in columns and rows and make up the major portion of the keyboard. The "listing" keys are used to index amounts or figures in the machine. Light depression of these keys is provided by suspending locking strip D from shaft C in the rear and stud G in the front; also by suspending index strip AK from shaft C in the rear and stud AD in the front. The suspension of these strips prevents them rubbing on the keyboard bottom plate E as the keys are being depressed.

Depression of a key cams locking strip D rearward until the upper slot in the keystem permits the hooked projection of the locking strip to move forward into the keystems upper slot by the tension of spring B thus latching the keystem depressed. As machine starts operating locking strip D moves further forward presenting a flat surface under non depressed keystems A thus preventing their depression after the machine operation is started.

Depressed keys remain locked down until near the end of the return stroke of the machine operation when locking strips D are moved rearward through the action of shaft I of the keyboard restoring mechanism. At that time, the depressed keys are released and are returned to non depressed position by springs F.

Automatic cancellation of an incorrectly indexed key is accomplished by simply depressing the correct key in the same column. Locking strip D moves rearward releasing the incorrectly listed key, then forward to latch the correct key down.

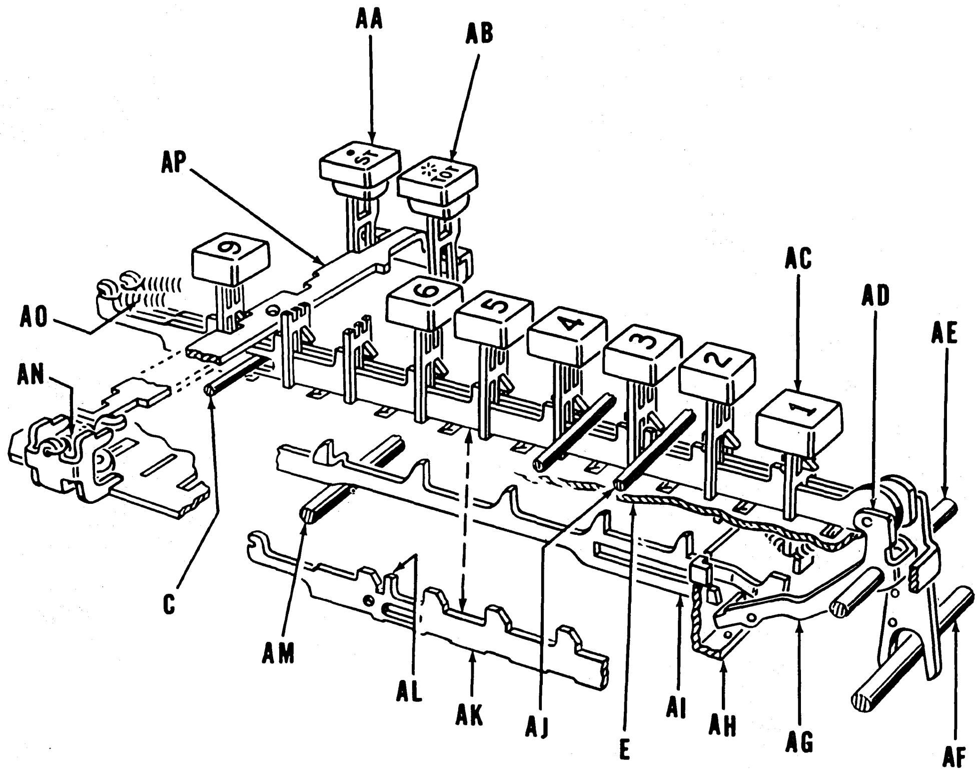


FIG. II-4

CIPHER STOPS POSITIONED BY INDEX STRIPS

The purpose of the cipher stops AG is to prevent the forward movement of index bars AI in columns where no keys are depressed.

Spring AO holds the index strips forward against shaft AJ, with the index strips so positioned, cipher stops AG are positioned to locate the lip on their rearmost portion in the path of the lowermost forward portion of index bars AI.

During the forward stroke of a machine operation, shaft AJ moves forward and away from an upright projection on the forward portion of index strips AK. If no listing keys are depressed, index strips AK also move slightly forward until projection AL limits against the wide portion of total control strip AP thus retaining the lip on the cipher stop in the path of index bars AI.

Depression of listing key AC cams index strip AK rearward, rocking cipher stop AG downward to position its lip below index bar AI. The index bar is now free to move forward on a machine operation and limit on the depressed keystem.

During a total or a sub-total operation the cipher stops must clear index bars AI permitting the index bars to move forward as accumulated amounts are cleared from the adding pinions. This is accomplished through the depression of keys AA or AB. Depression of these keys cams total control strip AP to the right, positioning a cutout in control strip AP in front of upright projection AL. During the forward stroke of a total or sub-total operation, index strip AK moves forward with shaft AJ to limit projection AL in the cutout portion of total control strip AP. This additional forward movement of the index strip AK positions the lip of cipher stop AG between the two prongs on the forward portion of index bar AI. Index bar AI is now free to move forward and be limited by the amount accumulated on the adding pinions (see subject "Total Limit" - page 29).

Tests and Adjustments

1. To assure free forward movement of index bars AI.
Index bars AI should clear under shaft AE and over shaft AM; also, the foremost portion of the index bars should clear the "U" form of cipher stops AG as the handle is pulled slowly forward with nines indexed on the keyboard.
TO ADJUST:
a. Weave the offset portion of the adding sector up or down to position index bars AI for proper clearance over shaft AM.
b. Bend the foremost portion of index bars AI for proper clearance under shaft AE and for clearance with the "U" form of the cipher stops.
2. To safeguard against a side weave of cipher stops AG and assure a rigid limit of index bars AI against the cipher stops at cipher position - Cipher stops AG should be positioned to provide a central alignment of the narrow portion of their lips with the forward end of index bars AI and at the same time the horizontal arm of the cipher stops should be parallel with the forward end of the index bars.
TO ADJUST, bend the horizontal arm of the cipher stop.
3. To assure unobstructed engagement of the aligning shaft G, (Fig. II-11, Page 16) with the adding sectors when the adding sectors are located in cipher position - There should be from .008" to .015' clearance between the forward end of index bars A1 and the lips of cipher stops AG when the machine is home.
NOTE: Before proceeding with the following test, check for sector limit shaft to be properly adjusted. (See Tests and Adjustment, Page 23).
a. With the machine clear, depress the total key and pull the handle slightly forward. Insert the handle of a keyboard brush (which is approximately 5/16" thick) under the forward base spring retaining shaft and up between the handle shaft and the cross strap of the secondary mechanism.
b. Manually move index strips AK rearward and forward and check the lip on the cipher stops AG to have a slight drag on the forward end of the index bars AI.
TO ADJUST, bend the lip of the cipher stops AG.

NOTE: When making the above adjustment, care must be taken that .008" to .015" clearance is retained between the lip of the cipher stop and the forward end of the index bar when the machine is at home position. Loss of this clearance could result in incorrect totals due to failure of the cipher stops to move up out of the path of the index bars during the total operations and/or automatic printing of nines in columns where no amounts are indexed due to the cipher stops failing to be properly positioned to block index bars movement.
4. To assure unobstructed engagement of the aligning shaft with the adding sectors when the adding sectors are limited by depressed keystems- An individually depressed keystem should limit its corresponding index bar AI so as to permit only a minimum amount of upward or downward movement in the adding sector as the aligning shaft enters the tooth spaces of the adding sector. The following method is suggested for making the test:
a. Depress a row of keys.
b. Pull the handle all the way forward, then release it to a point where the aligning shaft moves out of the tooth spaces of the adding sectors.
c. Pull the handle forward again to move the aligning shaft into the tooth spaces of the adding sectors and check for minimum upward or downward movement of the type bars.
TO ADJUST, with numeral keys depressed, bend the lowermost portion of the keystem forward or rearward.
NOTE: To obtain the correct position of the adding sectors when No. 9 keys are depressed, raise or lower bail C (Fig. II-17, Page 22).
5. To safeguard against the automatic printing of nines in columns where no keys are depressed during listing operations following total or sub-total operations -

Total control strip AP, when manually moved to the right and then released, should be free to fully return toward the left by tension of spring AN
TO ADJUST, remove total control strip AP and check it for being straight; also, check for clearance between the right end of strip AP and the keyboard bottom plate E.

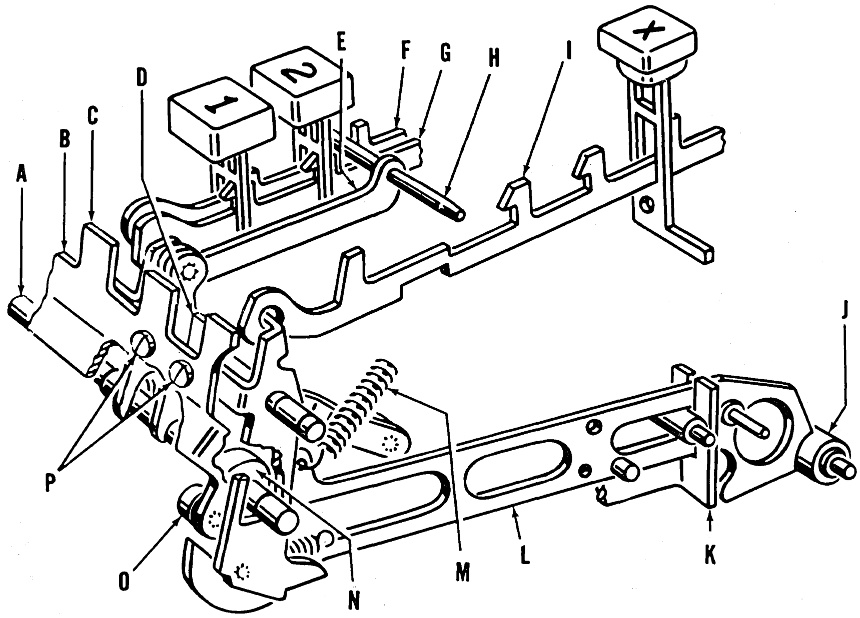


Fig. II-5

KEY RELEASE MECHANISM

Keys depressed at the beginning of a machine operation are released automatically upon completion of the operation. Improper keys which have been depressed may be released before the machine operation by depression of the error key.

At the beginning of the forward stroke of a machine operation, roll J (of the main operating section) moves rearward away from key restoring slide L permitting the latter to be pulled rearward and upward under the tension of spring M. As slide L moves upward and rearward its foremost hooked portion is placed behind roll O.

Near the end of the return stroke of the machine operation, roll J drives key restoring slide L forward until the latter contacts brace K and is caused to be rotated counterclockwise to it's home position. During its forward travel, the keyboard restoring slide L rocks bail B and shaft assembly A through rolls O and N respectively. The rocking of bail B restores the indexed keys by moving locking strips G and I rearward by lips C. The rocking of shaft assembly A moves index strips F rearward through links E and shaft H. This action is necessary - following a total and sub-total operation to move the index strips out of the Notches in the total control strip AP (Fig. II-4) permitting the strip's return to home position.

Tests and Adjustments

1. To safeguard against an interference of the foremost portion of locking strips G and index strips F with the lips C of bail B while indexing amounts on the keyboard-
There should be approximately .010" clearance between lips C and the foremost portion of the locking strips G and index strips F when the machine is at home position.
TO ADJUST, bend lips C.

2. To assure the correct relative position of lips C to the foremost portion of the locking strips G and index strips F -
Lips C should be centrally aligned with the foremost portion of the locking strips G and index strips F.
TO ADJUST, loosen screws P and re-position guide plate D.

3. To assure full restoration of all indexed amount and operation control keys -
All indexed keys should fully release before the end of the return stroke when the machine is manually operated slowly with a full row of keys depressed.
TO ADJUST, bend lips C.

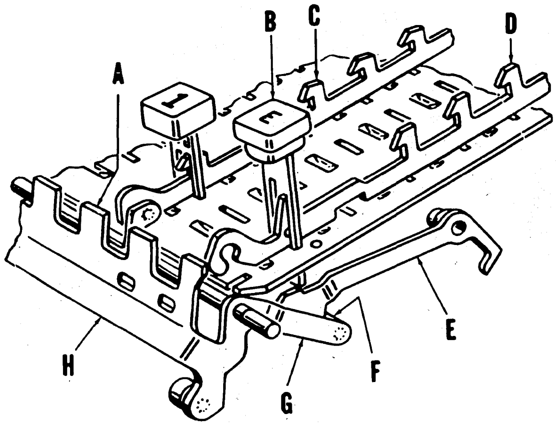


Fig. II-6

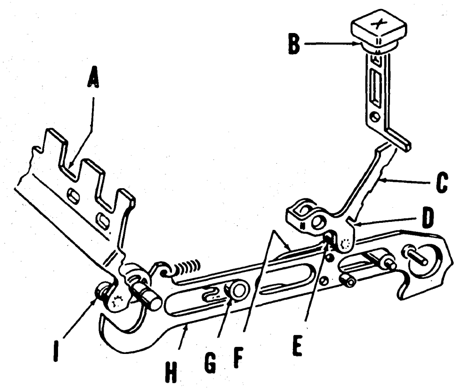


Fig. II-7

ERROR KEY MECHANISM

As previously stated, improperly indexed keys may be released before the machine is operated by depression of the error key.

Depression of error key B lowers lever E which, through roll F rocks bail H. Rocking of bail H moves locking strips C rearward through lips A to release the incorrectly indexed keys. Depression of error key B also moves locking strip D rearward through its camming surface. Rearward movement of locking strip D releases incorrectly indexed operation control keys as its hooked projections are moved out of the slots in the keystems.

Tests and Adjustments

1. To assure full restoration of indexed keys from error key depression -
Index a row of keys across the keyboard and depress the error key slowly. Check for the indexed keys to be fully restored just before the error key is fully depressed.
TO ADJUST overall, bend arm G up or down.
TO ADJUST for individual columns, bend lips A.

REPEAT KEY MECHANISM

The repeat key is used when an amount is to be added a number of times in succession, such as a multiplication operation. Use of this key eliminates the need of re-indexing the amount after each machine operation.

On some electrically operated machines, the depression of the repeat key trips the drive mechanism to operate the machine; the key is manually held depressed for the required number of operations. On hand operated machines, the repeat key latches down in the conventional manner when depressed and is released by the error key after the required number of operations have been completed.

During a machine operation with key B not depressed, roll E on lever C rides on the lip of intermediate arm F which is raised on each machine operation through roll G and key restoring slide H. With key B depressed there is no movement of lever C and, therefore, the upward movement of intermediate arm F and the key restoring slide H is prevented thus preventing the foremost portion of restoring slide H from moving up behind roll I. With the key restoring slide H held in this lowered position, bail A is not rocked during the return stroke of the machine operation and subsequently the indexed keys will remain depressed for the next operation.

Tests and Adjustments

1. To assure the proper functioning of the repeat key mechanism -
With repeat key B manually held down there should be a non-binding clearance between the bottom of repeat keystem B and the top of lever C.
TO ADJUST, bend lever C by using screw driver slot D.

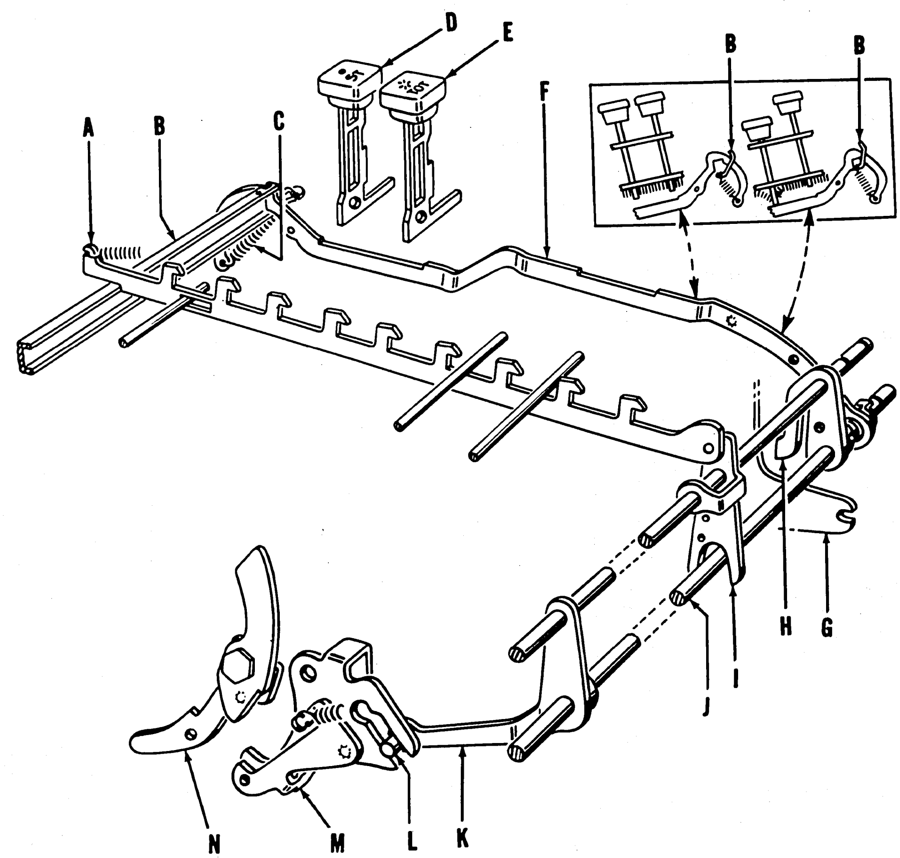


Fig. II-8

KEYBOARD SAFEGUARD (HANDLE BREAK) MECHANISM

In order to insure the accuracy of the machine calculations, certain safeguards are provided to prevent the operator from intentionally or inadvertently manipulating the numeral and/or operation control keys during machine operations.

On normal machine operations shaft assembly J swings rearward until projection H of shaft assembly J limits on right side frame G. Arm K is pinned to, and moves with shaft assembly J to position stud L in the upper portion of the slot in hook M and subsequently swings hook M out of the path of pawl N of the main operating section thus permitting an uninterrupted machine operation. If, through a misadjustment or misoperation of the machine the movement of shaft assembly J is interrupted and arm K does not move high enough to position stud L in the upper portion of the slot in hook M, hook M will not swing clear of pawl N and a handle break will occur, i.e., the power being applied to the primary mechanism is disconnected and the machine will return to home position.

The movement of shaft assembly J may be interrupted and a handle break occur if a listing key is partially indexed or off adjustment. A condition of this type prevents the full forward movement of locking strip A which in turn restricts the movement of rocker arm I. As shaft assembly J swings rearward, it limits prematurely against the rear leg of rocker arm I thus failing to move arm K high enough to position stud L in the upper portion of the slot in hook M to swing the hook out of the path of pawl N.

The movement of shaft assembly J may also be interrupted causing a handle break if a total or sub-total operation is attempted with a listing key depressed. If an operation of this type was permitted it is possible that the amount printed would be less than the amount being cleared from the accumulator. To illustrate, let us assume that 123 had been accumulated in the machine. On the following operation, let us again assume that the operator indexed the number 5 key in column one and, inadvertently depressed the total key. As the forward stroke of the machine operation progresses, the adding pinions are meshed with the adding sectors as demanded by total operation and, as the adding sector in column one moves up under spring tension it will be prematurely limited at number 3 position by the adding pinion in column one. This same condition could arise on a total operation if a listing key of a smaller amount than previously accumulated was accidentally indexed during this total operation.

As shaft assembly J swings rearward on each machine operation, it carries link F rearward with it. The hooked portion on the rear of link F rides in the slot of channel bail B and is held upward in the slot of channel bail B by spring C. On total or sub-total operations link F is lowered as keys D or E are depressed thus placing the step of the hooked portion of link F in the path of the lower shelf of channel bail B. If, on a total or sub-total operation, no listing keys are depressed, shaft assembly J will swing rearward moving link F rearward to rock channel bail B and the machine operation is free to continue. If, however, a listing key is depressed at the time a total or sub-total is attempted, the rearward movement of shaft assembly J is blocked and a handle break will occur. This is due to the shorter travel of locking strip A when a listing key is depressed. The locking strip will limit on the crossbar of the keystem instead of passing under the crossbar as occurs when the keystem is not depressed. This shorter travel of the locking strip restricts the movement of channel bail B as it is rocked against the rear of the locking strip by link F. Restricting the movement of channel bail B and subsequently link F and shaft assembly J results in hook M being held in the path of pawl N.

Tests and Adjustments

1. To assure proper functioning of the handle break mechanism -

a. With no keys depressed on the keyboard, pull the handle forward slowly and check for slight clearance between hook M and pawl N.

b. Depress the total key and a listing key. Pull the handle forward slowly and check for stud L to stop at the top of the long dwell in hook M. There should be only slight movement in hook M at this time.

TO ADJUST, bend arm K as required, being sure that stud L remains in a horizontal position.

OPERATION CONTROL KEY INTERLOCKS

The operation control key interlocks prevent the depression of more than one control key at a time. If two or more operation control keys were permitted to be fully depressed simultaneously and a machine operation attempted, a lockup or wrong addition could result.

Interlocks C are located between locking strip D and permanent strip B. The foremost interlock movement is controlled by shaft A while the rearmost interlock movement is limited by plate E which is fixed in keyboard bottom plate F. The interlocks float between the controlled foremost interlock and fixed plate E with only enough movement to permit the thickness of one keystem between them at one time.

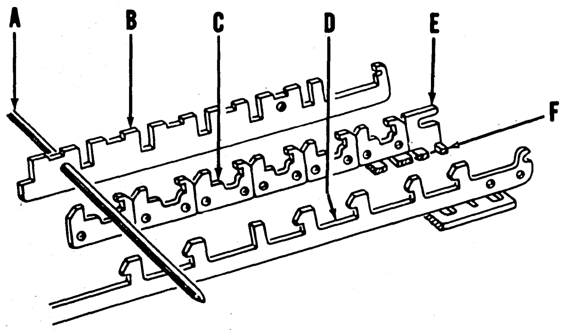


Fig. II-9

Interlocks of various designs are provided to be used with flexible control keys. Interlock AC safeguards against manipulation of the total and sub-total keys after the machine operation begins. The forward portion of interlock AC swings upward through spring AE as roll AB moves away from the rearmost portion of the interlock. If through manipulation, the total or sub-total key is depressed after the machine operation begins, rocker arm AF, which is controlled by locking strip AA, will be delayed in rocking rearward, giving the lip on the foremost portion of interlock AC time to position behind the step of the rocker arm. This restricts the rearward movement of shaft assembly J (Fig. II-8) and a handle break will occur.

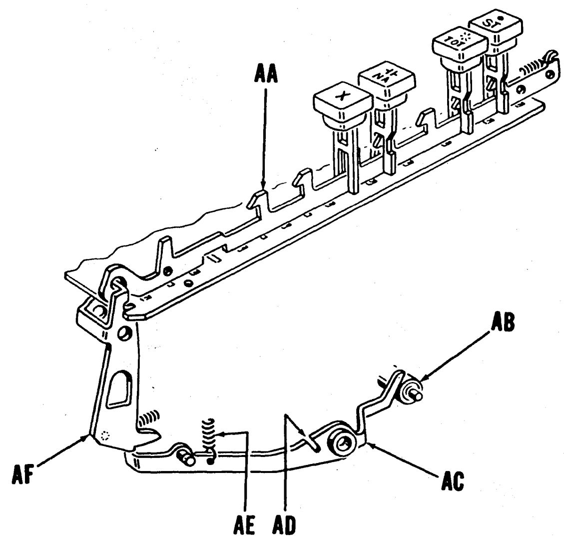


Fig. II-10

Tests and Adjustments

1. To safeguard against the manipulation of the total keys -
   a. With the machine home, check for the lip on the foremost portion of interlock AC to have approximately 1/32" clearance under the lowest point of rocker arm AF.
   b. Attempt to depress a total key at the same time the handle is started forward and check for the lip of interlock AC to position in the path of rocker arm AF.

TO ADJUST, bend interlock AC by using screw driver slot AD.

PRINTING MECHANISM

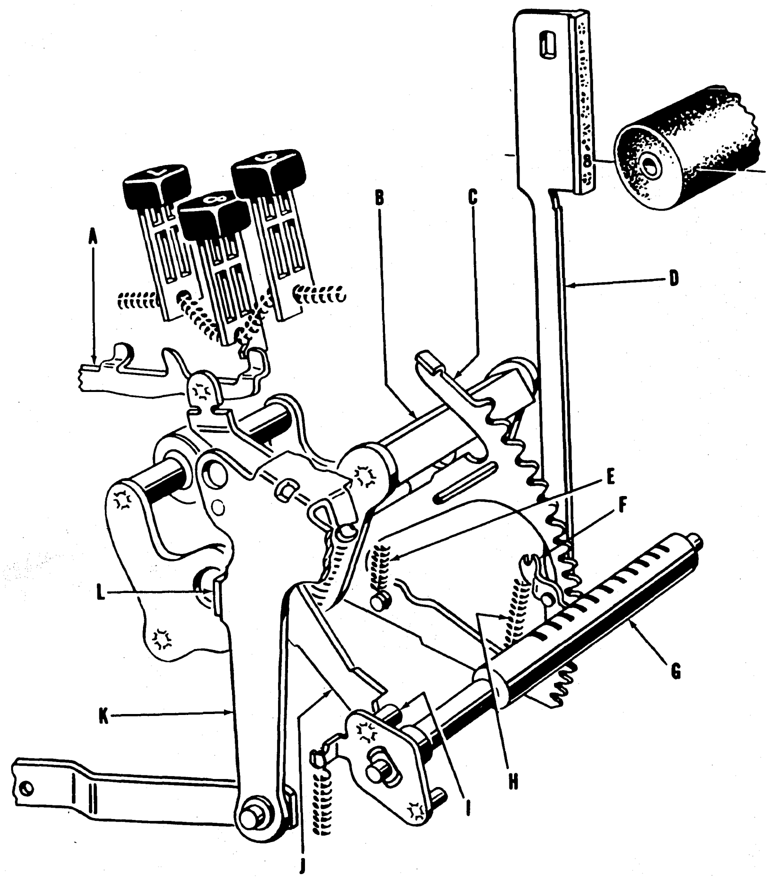


Fig. II-11

The printing mechanism provides a means of recording the various calculations of the machine in a legible form for visual reading.

Depression of a listing key, as illustrated, establishes a limit for the forward travel of index bar A. At the beginning of the forward stroke of a machine operation, restoring frame B moves away from adding sectors C permitting the tension of springs E to raise the adding sectors until index bars A limits against the depressed keystems. Type bar D, being attached to the adding sectors by clip F and spring H, rises with the adding sector to locate a specified figure, corresponding to the indexed key on the keyboard, in printing position.

During a total or a sub-total operation, the travel of adding sectors C and consequently the upward travel of the type bars are governed by the amount being cleared from adding pinions (see Total Limit, Page 29).

Following the upward travel of the type bars and just prior to the end of the forward stroke, arm J of the dashpot arm assembly K, rotates aligning shaft G through stud I. As aligning shaft G is rotated, its formed bottom outline of the slots move in between the teeth of the adding sectors. This action by the aligning shaft locks the sectors in alignment just prior to printing, resulting in a uniform alignment of the print.

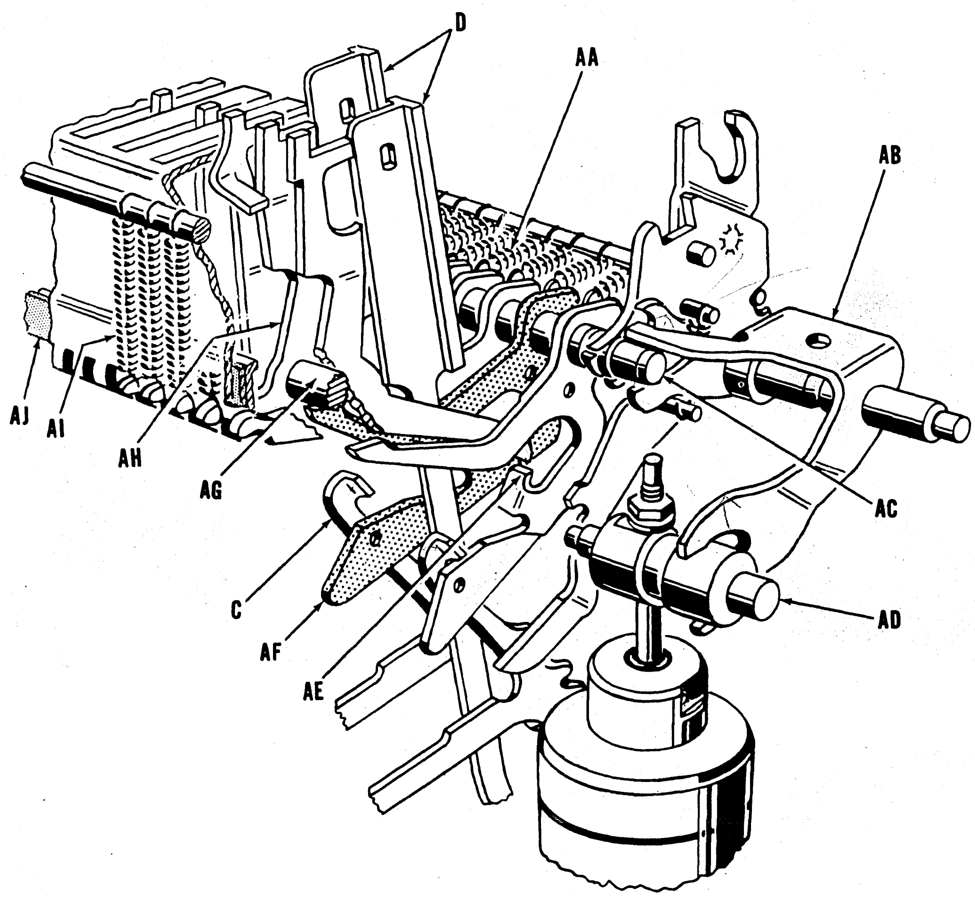


Fig. II-12

HAMMERS DRIVE TYPE BARS REARWARD TO PRINT

Printing takes place near the end of the forward stroke, following the positioning and aligning of the type bars D.

As sector C moves upward during the forward stroke of the machine operation, the formed ear on the uppermost portion of the adding sector moves away from hammer latches AF permitting springs AA to pull the hammer latches upward until their uppermost portion limits against the underside of shaft AG and lip AE of latches AF are positioned in line with the foot of hammers AH. As the forward stroke of the machine operation progresses, hammer latch assembly actuating bail AB, actuated by dashpot shaft assembly AD, rocks hammer latch shaft assembly AC and hammer latches AF upward and rearward. As latches AF move upward and rearward, lip AE of the active hammer latches engage the foot of hammers AH to cock the latter expanding springs AI. As the hammers are being cocked, type bars D follow the uppermost portion of the hammer forward through spring H tension. Further movement of the hammer latch assembly cams lip AE of the active hammer latches off the foot of hammers AH releasing the latter where the tension of springs AI drive the hammers against the type bars. The type bars in turn are thrown rearward against the inked ribbon where the specified character or figure is printed on the recording tape.

NOTE: It may be observed that hammer latches AF in the last four columns are copper plated to identify them as having a slightly longer uppermost portion to contact on the underside of shaft AG sooner than the latches to the right of them.

Earlier contact of these copper plated latches against shaft AG provides an earlier hammer release and fire of the four left hammers. This early hammer fire eliminates any interference between the overlapping tails of these hammers with the remaining hammers as the latter fire, which enables the remaining hammers to exert maximum impact of the type bars against the ribbon and platen.

After the hammers are fired, they are limited by limit plate AJ which is tapered to limit the hammers on the left later than those on the right to arrest any overthrow of the active hammers thus preventing cipher imprints from appearing in the inactive columns to the left of indexed amounts. This could be caused by an active hammer contacting the overlapping tails BC (Fig. II-13) of the adjoining inactive hammer to the left hard enough to jar the inactive hammer and cause a cipher imprint to appear.

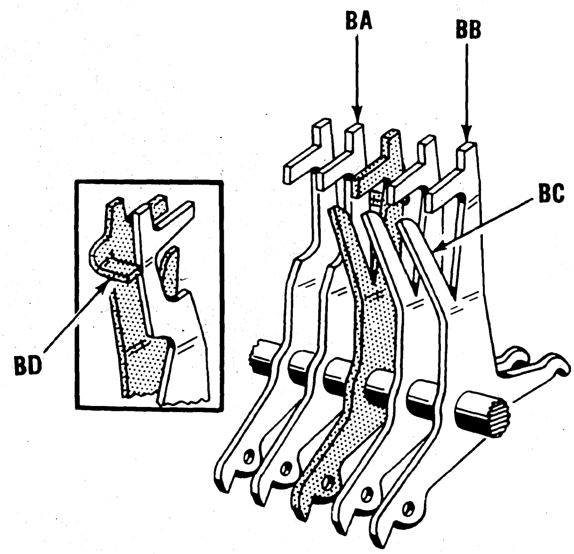


Fig. II-13

Automatic printing of ciphers to the right of an indexed amount (in columns where no amounts are indexed) is accomplished through overlapping tails BC which extend from left to right. As hammer BB is cocked, overlapping tail BC will cock the adjoining hammer to the right. This action continues across the hammer section as long as overlapping tails are present.

A permanent split in the automatic cipher print is obtained by removing overlapping tail BC in the specified column.

Printing of a cipher to the left of units (for example .05) is accomplished through overlapping tail BD which is on the front of the hammer in the ten cent column (column 2) and extends to the right in front of the units of cents hammer (column 1). As the units of cents hammer (column 1) is cocked, the hammer in column two is also cocked to print a cipher in that column.

Tests and Adjustments

1. To assure correct timing of aligning shaft G, Fig. II-11

With 9's indexed in the first, middle and last columns on the keyboard, bring the handle forward until the type bars just reach the nine position. At this point it must be possible to depress the type bars manually, but a slight forward movement of the handle must bring the aligning shaft in to block any movement of the type bars.

TO ADJUST, bend lip L (of arm J) to reposition arm J up or down as required.

2. To assure correct timing of the hammer fire -

After making test No. 1, check for the hammers to fire just after the aligning shaft is fully seated in the sectors.

TO ADUST, bend the upper prong of actuating arm AB for an earlier or later contact with shaft assembly AD.

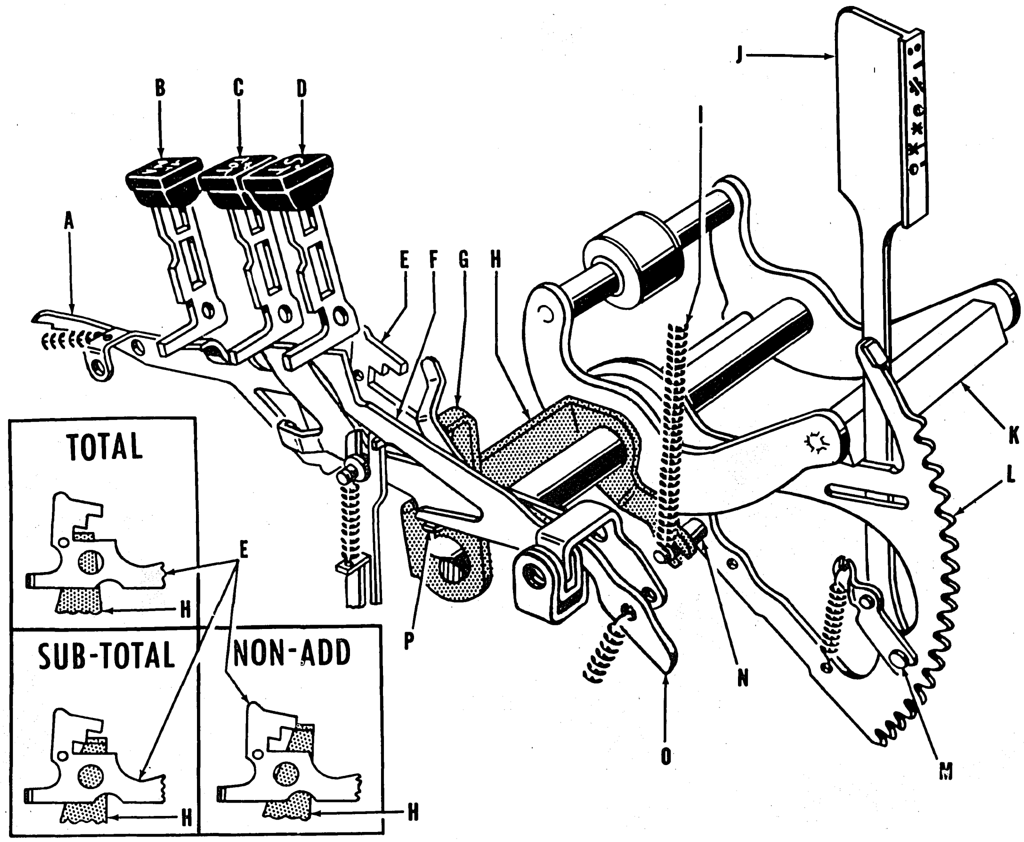


Fig. II-14

SYMBOL PRINTING

Symbol type bar J, located in column O, prints specified symbols to the right of printed amounts. In Series P100 machines, the symbol type bar may contain up to a maximum of ten individual characters (10 pitch) which are indexed through the depression of various operation control keys for identifying the operation taking place.

Depression of total key C lowers total arm O which, through lip P, lowers symbol indexing arm E. On the forward stroke of the machine operation, as restoring frame K moves up and away from symbol sector L, spring I pulls symbol sector L upward which, through stud N, rotates bail H until lip G of bail H limits on symbol indexing arm E as illustrated to position type bar J for printing a specified symbol.

Depression of sub-total key D lowers sub-total arm F. Lowering of sub-total arm F positions symbol index arm E through lip P to limit bail H through lip G as illustrated for printing a specified symbol.

Depression of non-add key B lowers non-add arm A which, through its rearmost portion contacting the foremost portion of symbol index arm E, positions the symbol index arm to limit bail H through lip G as illustrated for printing a specified symbol.

Printing of a symbol is generally prevented in column O when no operation control keys are depressed. This is accomplished in the same manner as when no numeral keys are depressed in the amount columns; i.e. lip AF of adding sector AE retaining hammer latch AC in a lowered position where it will not be permitted to engage the hammer.

By trimming off the forward projection of hammer latch AD (in column 0), the latch is held at all times in an active position by spring AB and will engage hammer AA (in column 0) to print a specified symbol (which is located in the cipher position on the type bar) during machine operations with no operation control key depressed.

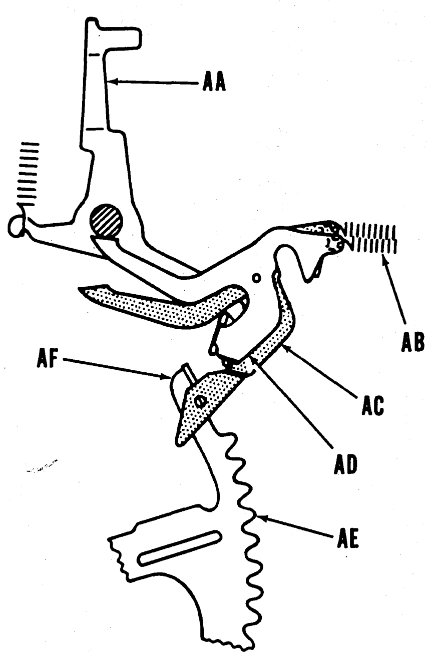


Fig. II-15

Tests and Adjustments

1. To assure that symbol index arm E may fully restore to normal position at the end of a machine operation in which an operation control key had been depressed -
There should be approximately .010" clearance between the forward edge of lip G and symbol index arm E when symbol index arm E is in home position. (Machine at home position)
TO ADJUST, weave the horizontal portion of bail H.

2. To assure the correct symbol to print from indexed control keys -
The control keys, whether latched down or held depressed against their limit, should align their corresponding step of symbol index arm E in the path of lip G.
TO ADJUST,

a. From total key, bend lip P

b. From sub-total key, bend the lower portion of sub-total arm F where it contacts lip P.

c. From non-add key, bend the rearmost portion of non-add arm A where it contacts the forward end of symbol index arm E.

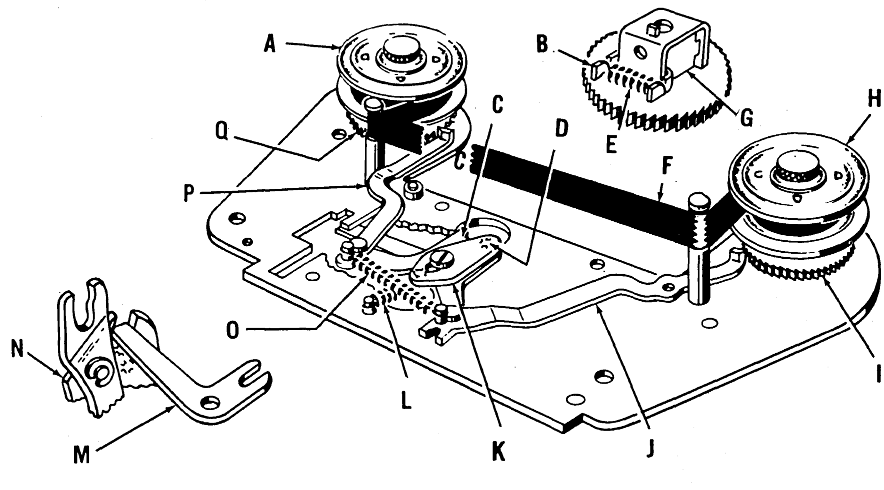


Fig. II-16

RIBBON FEED AND REVERSE MECHANISM

A uniform shade of printing and even wear of inked ribbon F is obtained by crossfeeding the ribbon during each machine operation and automatically reversing the direction of the crossfeeding when all of the ribbon has been unwound from either spool.

Ribbon F is stored on spools A and H and feeds between the type bars and the recording media. As the type bars are thrown rearward (by the hammers) an imprint of the figure or character on the face of the type bar is transferred on to the recording media.

Bell crank M rides in the notch of arm N (N being part of assembly AC, Fig. II-12) and is actuated on each machine operation. Stud D on slide K, extends through either one of two pockets in detent C and downward into the fork of bell crank M. As bellcrank M is actuated, both slide K and detent C are actuated giving movement to feed arms J and P which in turn engage ratchet wheels I and Q respectively to feed the ribbon which is kept taut during the feed by friction plates B and G through spring E.

Positioning of stud D in either of the two pockets in detent C permits only one of the two ribbon feed arms to be active at a time; i.e., if feed arm P is active, it will continue to turn ratchet wheel Q winding the ribbon onto spool A until spool H is empty. When spool H is emptied the pull of the ribbon prevents further turning of ratchet wheel Q. A further attempt by feed arm P to turn ratchet wheel Q overcomes the tension of spring L repositioning stud D into the alternate pocket of detent C; this reverses the action of the feed arms. Feed arm P is now inactive and feed arm J becomes active to feed the ribbon on spool H.

Tests and Adjustments

1. To assure proper feeding of the ribbon - Feed arms J and P should pick up not less than four or more than five teeth of ratchet wheels I and Q when active and should clear the ratchet wheels when inactive.
TO ADJUST, bend feed arm J and P toward or away from the ribbon posts.
2. To assure proper functioning of the ribbon reverse mechanism -
   a. The ribbon should be held taut between the spools without sag.
   b. The ribbon should reverse on the first machine stroke after a spool has been emptied.
TO ADJUST:
   a. Remove coils from, or expand springs E.
   b. Remove coils from, or expand spring J also, check for proper lubrication in the two pockets of detent C.
NOTE: A machine lock could result from a hard left to right ribbon reverse during the forward stroke of a machine operation due to the added load placed on the torsion spring of the main operating section.

ACCUMULATION

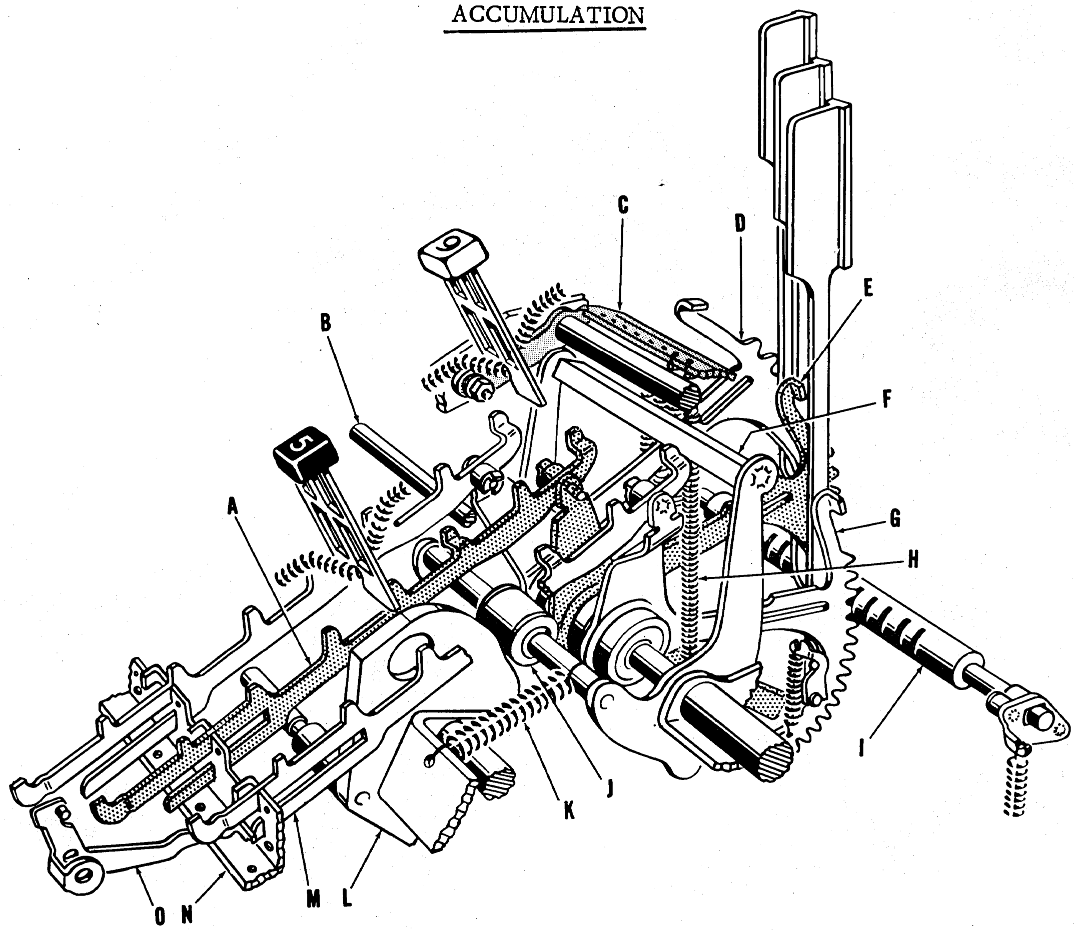


Fig. II-17

ACCUMULATION OF INDEX AMOUNTS

Accumulation of amounts in the machine may be accomplished by two methods, i.e.
(a) turning an adding pinion up to nine points by an adding sector, (e) turning an adding pinion one point by a carry mechanism.

Indexing of a listing key on the keyboard is the first step in the process of accumulating amounts. During a listing operation, the depressed keystem releases a sector and acts as it's limit, controlling the amount of movement adding sectors E and their associated adding pinions will receive.

Restoring bail F, through roll J and secondary cam L, holds the adding sectors at home position. During the forward stroke of a machine operation as cam L rotates, spring K causes roll J of restoring bail F to follow cam L thus raising restoring bail F permitting the adding sectors in the active columns to be raised through the tension of springs H until index bar A limits against the depressed keystems 1 thru 8. When number 9 keys are depressed, the adding sectors limit against the edge of bail C. Adding sectors in inactive columns (columns in which no keys are depressed) are held at home position by the foot of cipher stops O being located in the path of index bars M. Tie strip N and shaft B act as supports for the index bars, while the cutout slots in aligning shaft I act as guides, maintaining the lateral alignment of the adding sectors with the adding pinions.

ECCENTRIC LIMIT SHAFT

Eccentric limit shaft AB safeguards against downward overthrow of the adding sectors beyond their home position when increasing the amount on the adding pinions to nine. Such an overthrow of the adding sectors at this time could cause the wide tooth of the adding pinion to trip off an unwanted carry resulting in over addition.

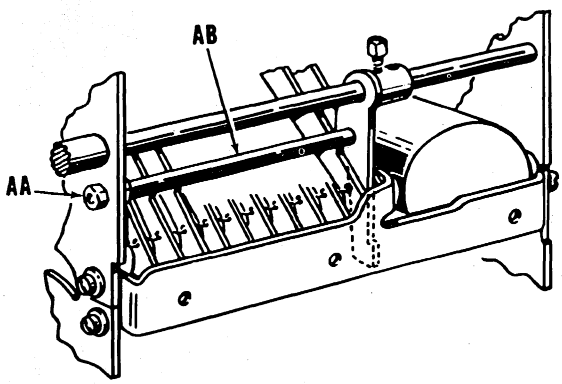


Fig. II-18

Tests and Adjustments

1. To safeguard against unwanted carries resulting from an overthrow of the adding sectors as they are restored to normal at the end of the return stroke of a listing operation-
With the machine home, eccentric limit shaft AB should be positioned to provide a non-binding contact against the bottom of the longest adding sector.
TO ADJUST, loosen nut AA and turn eccentric limit shaft AB.

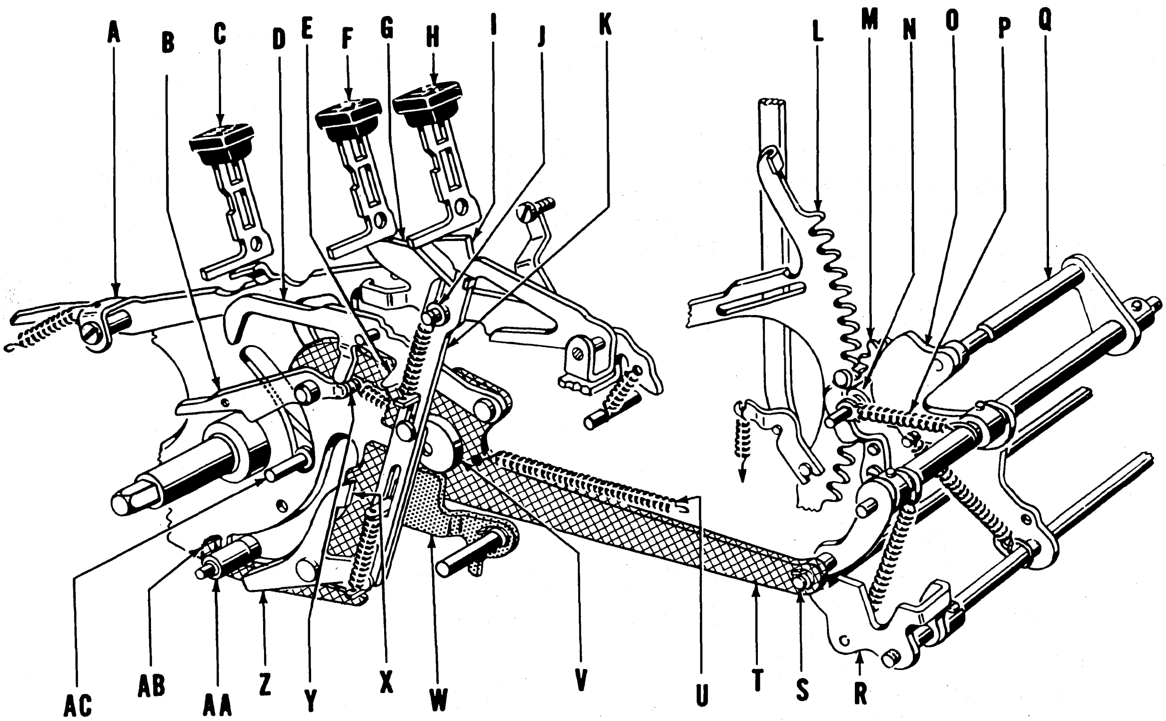


Fig. II-19

ACCUMULATOR MESHING CONTROLS

NOTE; Before proceeding with the following subject, a clear understanding should be had of the following terminology:

(A) "Adding pinions being in mesh" - means that the adding pinions have been moved forward into mesh with the teeth of the adding sectors.

(B) "Adding pinions being out of mesh" - means that the adding pinions are positioned rearward and are in mesh with the teeth of the carry racks.

When the machine is at home position, adding pinions M are out of mesh with the adding sectors L. Meshing of the adding pinions with the adding sectors during listing and totaling operations is secured by rocking cam assembly 0 through accumulator control arm assembly T; the latter being connected to cam assembly 0 through stud S.

Various keyboard controls determines the time during machine operations in which the accumulator control arm assembly T is actuated by the secondary mechanism through stud AC or roll AA engaging pawls B and Z or hooks D and AB.

Rearward movement of the accumulator control arm assembly rotates cam assembly 0 counter clockwise which, through roll N moves adding pinions M forward into mesh with the adding sectors L. Forward movement of the accumulator control arm rotates cam assembly 0 clockwise permitting the tension of spring P to move the adding pinions rearward out of mesh with the adding sectors and into mesh with the carry racks.

LISTING OPERATION

At the beginning of the forward stroke of a listing operation, roll AA moves away from hook AB permitting spring U to move the accumulator control arm assembly rearward approximately 1/16". Toward the end of the forward stroke, stud AC passes under pawl B permitting the step of pawl B to drop behind stud AC. The 1/16" rearward movement of the accumulator control arm assembly at the beginning of the forward stroke is required to assure a safe latching lead of pawl B behind stud AC during a fast operation.

At the beginning of the return stroke, stud AC engages pawl B to drive the accumulator control arm assembly rearward and subsequently moving the adding pinions into mesh with the adding sectors. The adding pinions remain in mesh with the adding sectors during the return stroke at which time the indexed amounts will be added onto the adding pinions. At the end of the return stroke, following the full restoration of the adding sectors, roll AA engages hook AB to pull the accumulator control arm forward thus permitting spring P to pull the adding pinions out of mesh as cam assembly O is raised.

Detent R retains cam assembly O in its lowered position after stud AC leaves pawl B during the listing operation thus safeguarding against a premature raising of cam assembly O due to an upward snap of the carry racks against the underside of roll Q during the carry rack resetting.

TOTAL OPERATION

As pointed out in Section I, a total of the previously accumulated amount is obtained by the depression of the total key.

Depression of total key F lowers total arm G which in turn raises pawl B into inactive position through hook D and raises pawl Z into active position through stud J and link K.

On the forward stroke of a total operation, roll AA drives accumulator control arm assembly T rearward through pawl Z. The rearward movement of the accumulator control arm assembly, through cam assembly 0, meshes adding pinions M with adding sectors L. The adding pinions remain in mesh with the adding sectors throughout the forward machine stroke during which the upward travel of each adding sector is stopped by the wide tooth of the adding pinions limiting on the carry pawls.

Toward the end of the forward stroke of the total operation, stud AC engages hook D pulling the accumulator control arm assembly forward disengaging the adding pinions from the adding sectors. The adding pinions are now clear at zero and in mesh with the carry racks as the adding sectors return to their home position on the return stroke of the total operation.

SUB-TOTAL OPERATION

The sub-total key is used when it is desired to print the amount accumulated on the adding pinions but retain the amount on the pinions for accumulation of additional amounts.

Depression of sub-total key H lowers sub-total arm I which, through link K raises pawl Z into the path of roll AA. As on a total operation, the adding pinions are meshed with the adding sectors at the beginning of the forward stroke through roll AA, pawl Z, accumulator control arm assembly T and cam assembly 0.

Due to hook D not being lowered from the depression of the sub-total key, stud AC passes under the hook at the end of the forward stroke and the accumulator control arm assembly T remains positioned rearward to keep the adding pinions in mesh with the adding sectors during both the forward and return strokes thus retaining the accumulated amounts in the adding pinions.

Near the end of the return stroke, roll AA engages hook AB pulling the accumulator control arm assembly forward to disengage the adding pinions from the adding sectors.

NON-ADD OPERATION

As stated in Section I, the non-add key is used when printing but not accumulating indexed amounts which are required for identification purposes such as account numbers, etc.

Depression of non-add key C lowers non-add arm A which, through its lowermost portion contacting stud Y, rocks pawl B upward and out of the path of stud AC. On the return stroke of the machine operation, stud AC passes under pawl B, the adding pinions are not brought into mesh with the adding sectors and the amount indexed on the keyboard is simply printed on the recording tape.

Tests and Adjustments

1. To safeguard against elimination of indexed amounts -
The step of pawl B should have safe latching lead behind stud AC at the end of the forward stroke of a listing operation.
TO ADJUST, first check the accumulator control assembly T for being free with spring U unhooked, then check the toggle adjustments as outlined on page 32.
2. To assure full restoring of the machine at the end of the return stroke of a listing operation-
With the machine home, there should be slight clearance between roll AA and hook AB.
TO ADJUST, bend hook AB.
3. To assure proper functioning of the total mechanism -
With total key F latched depressed, operate the machine and check for stud AC to pass under pawl B with clearance during the return stroke.
TO ADJUST, bend the lower forward projection on total arm G that contacts hook D.
4. To assure proper functioning of the non-add mechanism -
With non-add key C latched depressed, operate the machine and check stud AC to pass under pawl B with clearance during the return stroke.
TO ADJUST, bend the lip on non-add arm A that is contacted by the non-add keystem C.

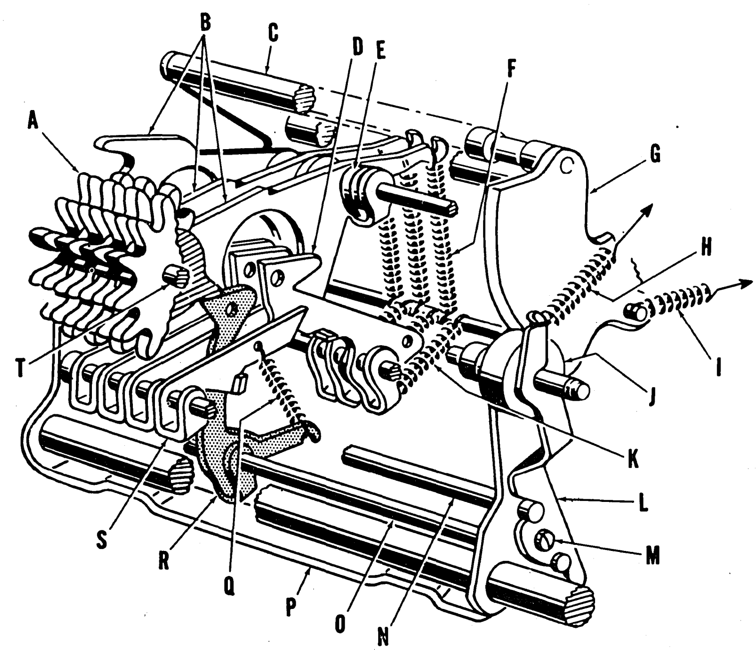


Fig. II-20

THE ACCUMULATOR

Series P100 machines are designed to accumulate plus amounts only. As outlined under Fig. II-17 , accumulation of amounts may be accomplished by two methods, i.e. (a), turning an adding pinion up to nine points by an adding sector, (b), turning an adding pinion one point by a carry mechanism.

Frame assembly P, which contains adding pinions A, carry pawls R, and carry pawl latches S is rocked forward at the beginning of the return stroke of a listing operation by cam G through roll J and, is brought rearward at the end of the return stroke of a listing operation by spring H as cam G is raised.

Each adding pinion A contains ten teeth, one of which is wider than the others and is known as a carry cam (or wide tooth). When the accumulator is clear (after having taken a total operation) the wide tooth of the adding pinions are positioned rearward over carry pawls R.

THE CARRY MECHANISM

Carries are accomplished in two stages, i.e. (1) the initial carry which takes place when adding pinions A are in mesh with the adding sectors, (2) the completed carry which takes place as the adding pinions are meshed with the carry racks B.

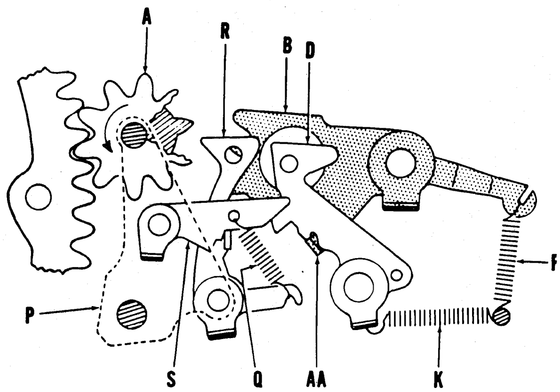


Fig. II-21

INITIAL CARRY

As the amount on any one adding pinion is increased beyond nine, the wide tooth (located in cipher position on the adding pinion) is rotated past carry pawl R rocking the latter rearward where it becomes latched on the second step of carry pawl latch S into an initial carry. NOTE: It should be noted that carry pawls R are positioned within frame P so that each carry pawl is aligned with the carry rack latch D in the adjacent column to its left. For example - carry pawl R in column one is aligned with carry rack latch D in column two; carry pawl R in column two is aligned with carry rack latch D in column three etc.

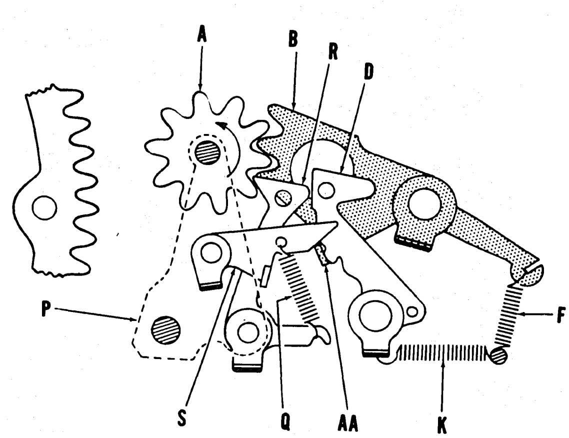


Fig. II-22

COMPLETED CARRY

At the end of the return stroke of the listing operation as the adding pinions move out of mesh with the adding sectors and into mesh with carry racks B, carry pawl R which had been latched rearward into an initial carry, contacts the upper foremost portion of carry rack latch D moving the latter rearward to release carry rack B , in the adjacent column to the left. As carry rack B is released, spring F moves the carry rack into carried position, rotating the next adding pinion A one tooth space to complete the carry.

Collars E prevent an overthrow of carry rack latches D as the latter are moved rearward during a carry operation thus safeguarding against the carry racks from moving high enough to turn an adding pinion more than one tooth space.

CARRY RESETTING

Resetting of a carry involves resetting of both carry pawls R and carry racks B. Carry pawls R are reset by lip AA on carry racks B lifting the carry pawl latches S as the carry racks raise during a carry operation.

Carry racks B are reset by shaft C as cam assembly G is lowered at the beginning of the return stroke of the next listing operation. Shaft C is lowered each time the adding pinions are engaged with the adding sectors, but only at the beginning of the return stroke of a listing operation is it necessary to lower the shaft enough to reset the carry racks.

Block W (Fig. II-19) provides a means of disengaging pawl Z (Fig. II-19) from roll AA (Fig. II-19) before shaft C moves down far enough to reset the carry racks during total operations. Resetting of the carry racks during total operations is not essential and, due to the normal early disengagement of roll AA (Fig. II-19) from pawl Z (Fig. II-19); thus preventing the carry racks which may at times not be fully reset and subsequently a lock up between the adding pinions and carry racks might occur.

TOTAL LIMIT

As pointed out under Fig. II-19 in subject "Total Operation", adding pinions A are meshed with the adding sectors and turned clockwise during the forward stroke also, the upward travel of the adding sectors is limited by the wide tooth of the adding pinions limiting on carry pawls R, i.e. carry pawls R are so designed with a flat surface on their uppermost portion that prevents the passage of the wide tooth of the adding pinions beyond the carry pawls when contacting the latter on the top.

Tests and Adjustments

1. To assure free movement of adding pinions A -
Adding pinions A should have from .003" to .015" overall side play within frame P.
TO ADJUST, replace space collars on right end of pinion shaft T. See Accumulator Collar Chart, Plate 7, Series P Accumulation Parts Catalog, for correct space collar.
2. To assure free movement of frame P; also correct alignment of adding pinions A and carry racks B -
With frame P limiting against the accumulator left sideframe, there should be .003" to .006" clearance between set collar AB, Plate 1, Series P Accumulation Parts Catalog and the accumulator right sideframe.
TO ADJUST, re-position collar AB, Plate 1 in Parts Catalog.
3. To assure the proper functioning and free movement of carry pawls R -
Carry pawls R should align with the wide tooth of adding pinions A, with the uppermost postion of carry rack latches D and should have from .003" to .015" over all side play.
TO ADJUST,
A. Bend the upper portion of carry pawls R to obtain correct alignment with the wide tooth of adding pinions A and carry rack latches D.
B. Open or close the "U" form of carry pawls R for correct side play.
4. To assure the proper functioning and free movement of carry rack latches D -
Carry rack latches D should align with the upper portion of carry pawls R and should have from .003" to .015" over-all side play.
TO ADJUST:
A. Bend the upper portion of carry rack latches D to obtain the correct alignment with the upper portion of the carry pawls R.
B. Open or close the "U" form of the carry rack latches D for correct side play.
5. To assure the proper functioning and free movement of carry racks B -
Carry racks B should align with their respective adding pinions A and should have from .003" to .015" over-all side play.
TO ADJUST:
A. Bend the forward portion of carry racks B to obtain the correct alignment with adding pinion A.
B. Open or close the "U" form of the carry racks B for correct side play.

POWER MECHANISM

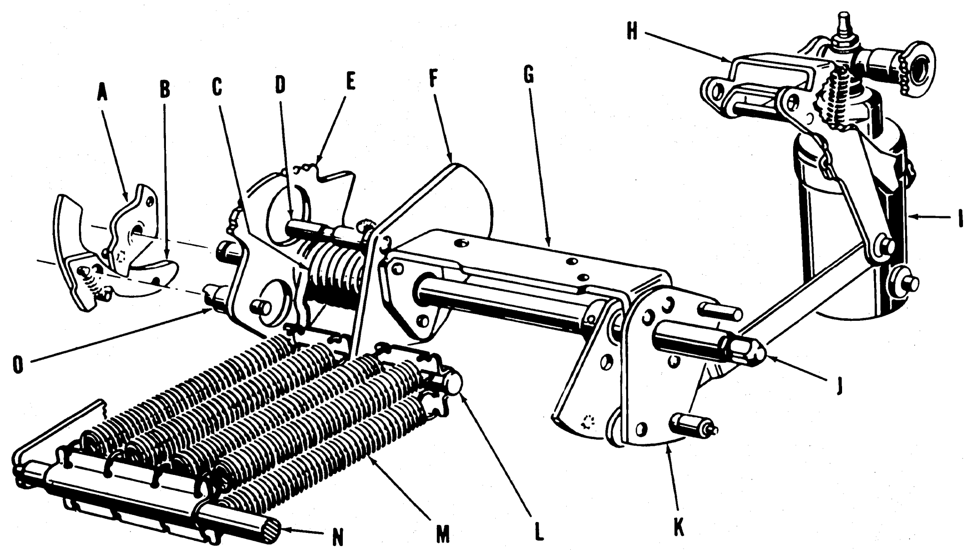


Fig. II-23

The main operating section provides a means through which power is furnished to the various mechanisms within the machine.

This mechanism consists of a primary section and a secondary section which are connected through a yielding connection in the form of a torsion spring. The primary mechanism is made up of handle shaft J, full stroke segment E, drive pawl A, and pawl B while the secondary section consists of cam F, bail G, and segment K.

Torsion spring C furnishes a uniform transmission of power from the primary section to the secondary section permitting proper functioning of the various mechanisms within the machine in addition to providing a yielding connection between these two sections to safeguard against machine damage should a lock up occur.

NOTE: It should be noted before proceeding further, that, during manual operations of the machine, the forward limit of the main operating section is a face portion of square stud O limiting in the rear end of a crescent shaped slot in the left sideframe. Also, when the machine restores to home, the normal limit for the main operating section and therefore the machine is this same stud limiting in the forward end of the crescent-shaped slot.

In machines constructed for hand operations only, the power used to drive the machine is applied through handle shaft J, which rotates freely within full stroke segment E. Drive pawl A is keyed to handle shaft J and Pawl B is fastened to full stroke segment E. In machines of hand electric construction, the reverse is true; i.e. drive pawl A is not keyed to handle shaft J while full stroke segment E is pinned to the handle shaft, thus making it possible to manually operate an electric machine should a power failure occur.

Base springs M are expanded on the forward stroke of a machine operation, and their tension supplies the power to restore the machine to home position on the return stroke.

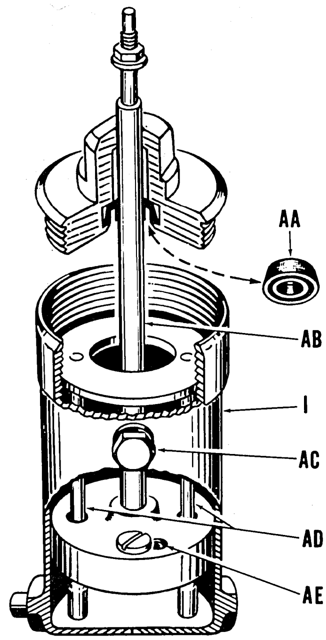


Fig. II-24

DASH POT ASSEMBLY

The speed of the secondary section and, therefore, the speed of the various mechanisms within the machine is controlled by dashpot assembly I.

Plunger AB is connected to the secondary section through dashpot arm H (Fig. II-23). Flow of oil, contained in cylinder I, controls the speed at which the plunger may travel. On the forward stroke of a machine operation, plunger AB travels upward and the oil is free to pass through two small ports in the plunger around rods AD. Rubber sleeve AA acts as a wiper to remove oil from the plunger shaft and, ball valve AE is closed as the plunger moves upward.

On the return stroke during the machine operation, the plunger is traveling downward. Oil is now free to pass around ball valve AE in addition to passing through the small ports. Rods AD are increased in diameter at their lower ends to reduce the flow of oil through the ports in the latter stage of the return stroke. This affords a cushioning effect as the machine restores to home position.

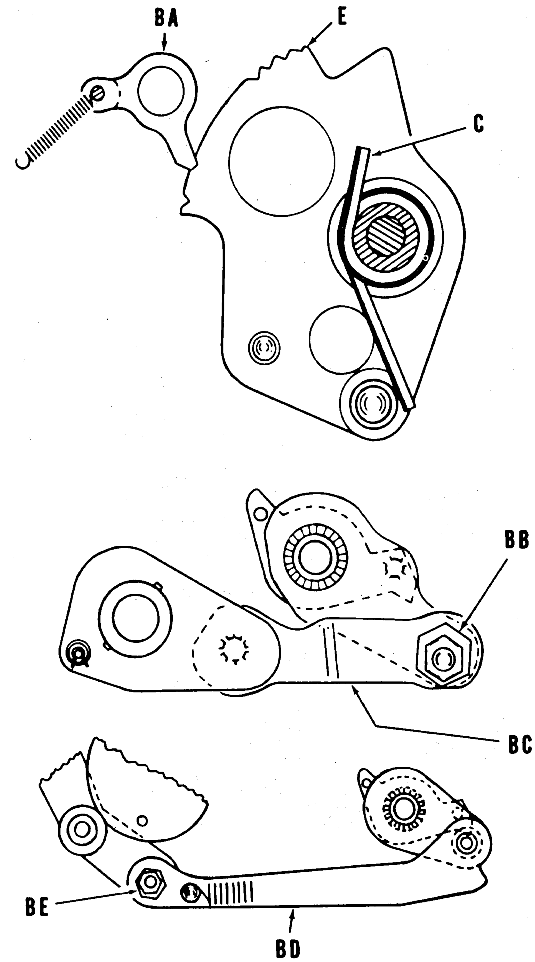


Fig. II-25

PRIMARY MECHANISM FORWARD STROKE CONTROLS

Full forward movement of the primary section is compelled on manual operations by full stroke pawl BA dropping into the notches of full stroke segment E. On electrically operated machines, full movement of the primary mechanism is controlled through drive link BC and eccentric BB (Type 3 Motors) or drive link BD and eccentric BE (Type P2 Motors).

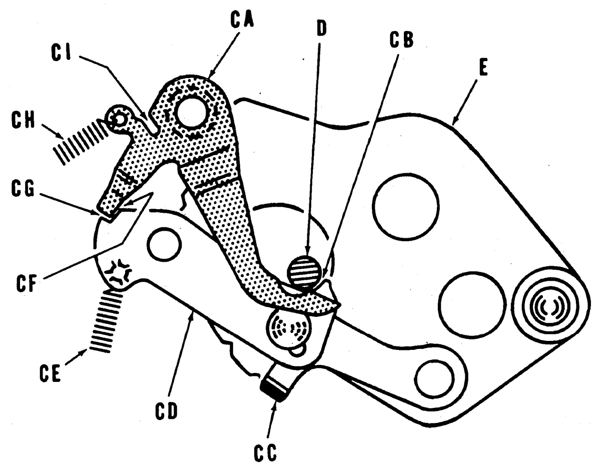


Fig. II-26

TOGGLE MECHANISM

During fast machine operations, the primary section may reach its full forward travel before the secondary section. This is caused by the restraining action given the secondary section by the dashpot assembly.

The toggle mechanism, consisting of toggle CD and toggle latch CA locks the primary section in its forward position until the secondary section has completed its full forward travel thus safe-guarding against a short stroke of the secondary section and assuring full actuation of the various mechanisms within the machine.

One link of toggle CD is secured to the machine left sideframe while the other link is fastened to full stroke segment E of the primary section. During the forward stroke of a machine operation, toggle CD is opened by the movement of segment E. As the machine operation continues, toggle CD moves upward by spring CE until lip CC limits against segment E at which time the toggle is located slightly above center position. The locking action of the toggle retains the primary section in its forward position until the secondary section reaches its forward position where stud D releases the toggle, permitting the primary and secondary sections with the machine to restore to home position.

Latch CA, by dropping into a notch in the toggle, as the latter moves up above center, prevents the toggle from rebounding down below center and a subsequent early release of the primary section. Latch CA is released by stud D just prior to the release of the toggle.

On slow manual operations of the machine, there is no lag of the secondary section behind the primary section and, as the toggle approaches its locking position, stud D, of the secondary section, contacts and forces the toggle downward thus preventing it from locking the primary in a forward position.

Tests and Adjustments

1. To safeguard against a short stroke of the secondary section -
The toggle mechanism should lock the primary section forward until the secondary section has reached its full forward travel. With all the blades of feeler gauge Kit 124 3/4 A (approximately 1/16") inserted between shaft L and cam F, (Fig. II-23) pull the handle all the way forward and with the machine remaining in this position (not manually held) make the following tests:

A. There should be minimum clearance between stud D and toggle CD at point CB.

B. Latch CA should drop into the notch of the toggle with just enough clearance at point CG to permit minimum rebound of the toggle when the latter is pressed downward. This is a safeguard against the toggle rebounding down below center.
C. There should be approximately 3/64" clearance at point CF. This is to assure that latch CA is clear of the notch in the toggle just prior to stud D releasing the toggle.

TO ADJUST:
A. With the machine locked forward, bend stud D forward or rearward as required.
B. With the machine locked forward, bend stud D up or down as required.
C. With the machine still locked forward, bend latch CA at point CI, being careful not to overadjust.

2. To assure the correct speed of the secondary section -
Dashpot assembly I should contain sufficient oil to provide the correct speed of the secondary section.

TO ADJUST:
To fill the dashpot, fully depress plunger AB, remove screw AC and fill the cylinder to the level of the screw opening with machine oil 16249245. After filling the cylinder, it is advisable to replace screw AC, finger tight, then operate the machine several times before completely tightening the screw. This permits excess air to be expelled aroung the screw opening rather than around the cap where oil leakage might occur.

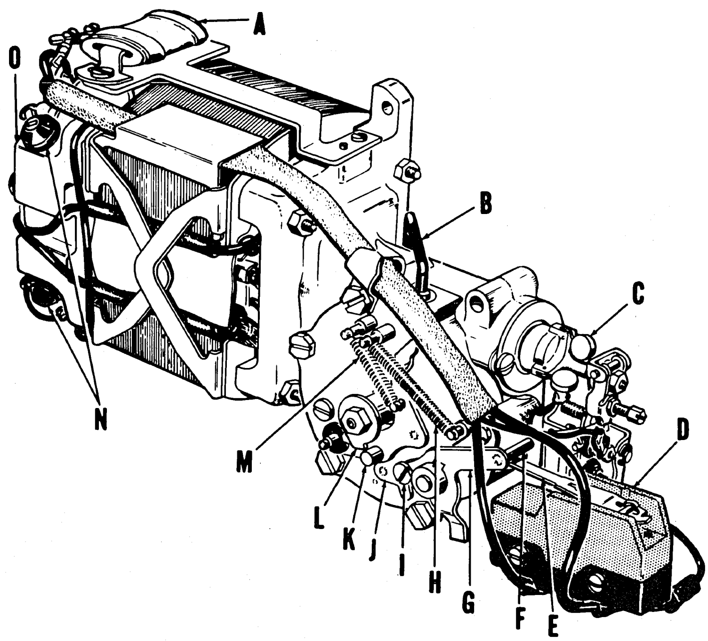


Fig. II-27

TYPE THREE MOTOR AND DRIVE

The Type Three Motor and Drive assembly is the first of two types of power units used on Series P electrically operated machines. This assembly is fastened to the machine left side frame and drives the machine through the forward stroke. The motor which is speed controlled, operates on either alternating or direct current, developing approximately 1/15 horsepower at 3.000 r.p.m.

Depression of a specified operation control key or motor bar initiates a power driven machine operation by closing microswitch D and tripping a clutch mechanism. Torque from the motor is then applied to the machine through a drive mechanism.

Brush receptacles retaining the motor brushes are anchored in plastic housing 0 by set screws in the rear of the plastic housing. The opening in the brush receptacle is formed so as to limit the depth at which the brush spring may enter, thereby preventing damage to the commutator surface if the brush is permitted to wear excessively before replacement. To reduce wearing of the motor brushes, the commutator should be dressed occasionally by using a cleaning paddle, Kit 194 1/2 which is inserted through the opening in the rear of the plastic housing.

Bearings at either end of the armature shaft are of the sealed ball bearing type and require no lubrication.

A detachable line cord is provided on many current styles of machines. A plug receptacle mounted on the machine rear sub-base is designed with connectors to facilitate removal of the motor. A third (center) prong on the receptacle serves as a ground.

A condenser located on the underside of the plastic housing is composed of two strips of tinfoil separated by strips of non-conducting material. Its purpose is to prolong the life of the switch and governor contact points by absorbing the electrical charges which tend to arc between the points as they are separated.

Resistor A, which is made of a coil of special alloy wire set in a porcelain mold, sets up a resistance to the flow of current to the motor as the governor points open. A steady, partial flow of current passes through the resistor to the motor to provide a smooth motor performance while the remainder of the current is dispersed in the form of heat thus controlling the speed of the motor and prolonging the life of the governor contact points.

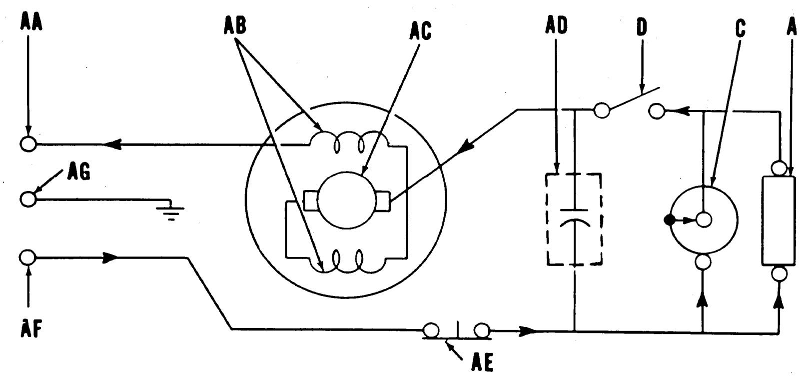


Fig. II-28

ELECTRICAL CIRCUIT

The electrical circuit of the P100 machine equipped with a type 3 motor is illustrated by the accompanying schematic diagram.

The current enters the circuit at terminal AF. If handle switch AE is closed, current flows on to resistor A. A portion passes through the resistor and a portion through governor C. Flow of current continues to main switch D, when closed, completes the circuit on through the motor brushes to armature AC, the motor fields AB and out at terminal AA. Condenser AD is connected across the governor C and resistor A. Terminal AG represents the ground connection.

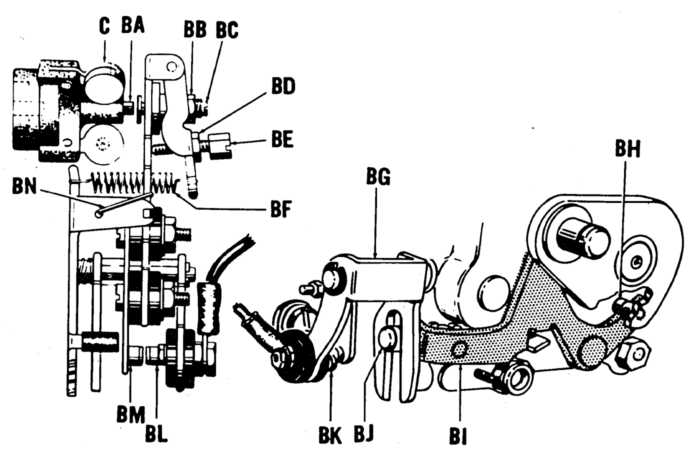


Fig. II-29

GOVERNOR MECHANISM

The governor mechanism safeguards against the motor from driving the machine beyond its maximum safe operating speed - 130 strokes per minute by diverting the flow of current to the motor through resistor A (Fig. II-27).

As the speed of the motor builds up beyond its safe operating rate, centrifugal force causes weights C to swing in a wider arc, driving pin BA against screw BC, overcoming the tension of spring BF and subsequently separating governor points BM and BL. The contact points will then remain separated until the motor slows down and weights C again return to a smaller arc permitting current flow thru the governor assembly.

During each operating cycle of the drive mechanism, roll BH rocks arm BI which, through stud BJ riding up and down in the forked portion of arm BG provides a wiping action of governor point BK. This assures a prompt, even separating and closing of the governor points.

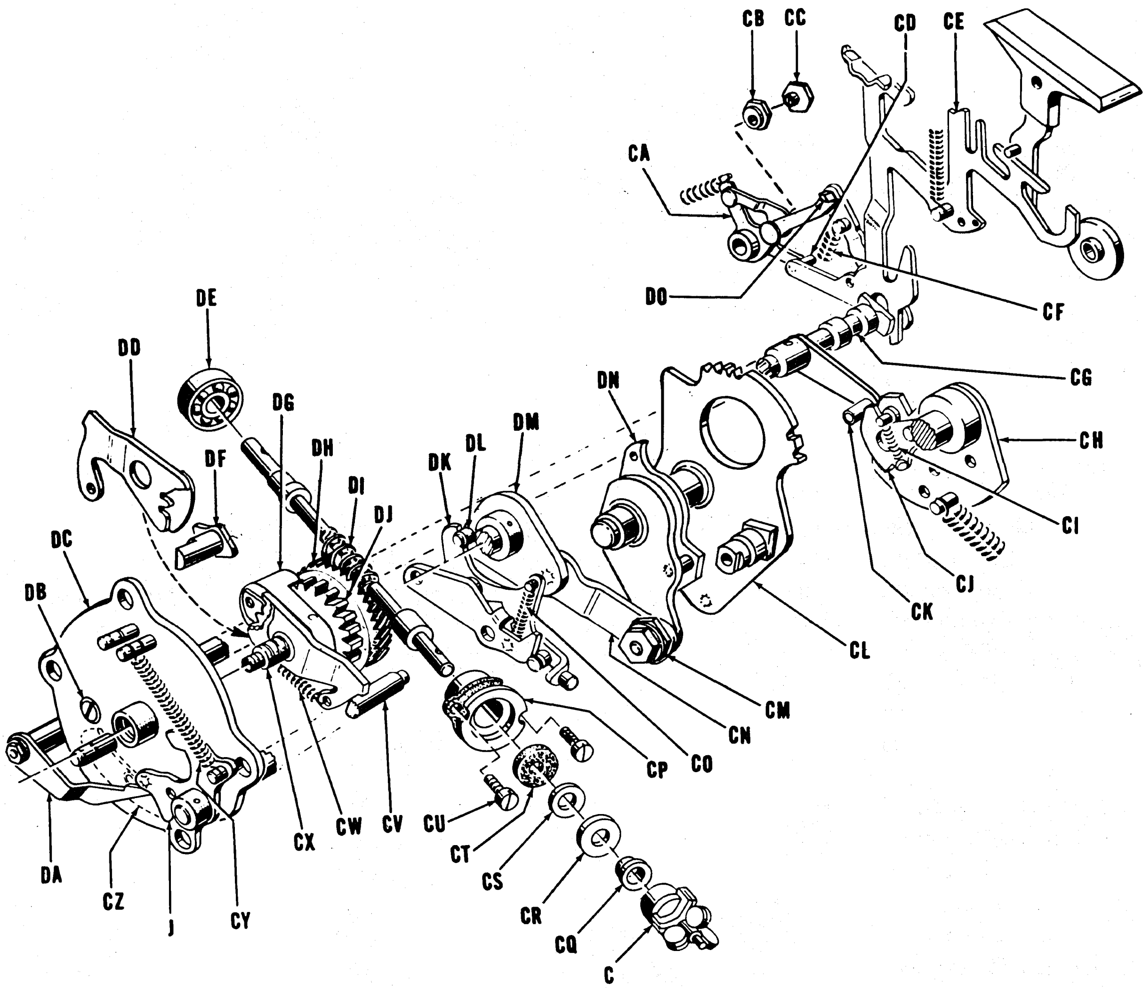


Fig. II-30

DRIVE MECHANISM

A motor driven machine operation is provided when the electrical circuit is completed and the drive clutch is tripped. This is accomplished through depression of the motor bar or an operation control key.

The accompanying illustration depicts the drive mechanism when the machine is at home position. Torque from the motor turns drive gear DH and DJ through worm gear DI. Drive gear DH contains 41 teeth while worm gear DI contains 2 teeth thus providing a 20 1/2 to 1 gear ratio of the drive mechanism.

The drive shaft assembly, including retainer DG, shaft CX, and arm DM remain stationary and independent of the revolving drive gears as long as clutch dog DF is disengaged from drive gear DJ.

Depression of the motor bar or an operation control key lowers intermediate motor bar CE. Lowering of the intermediate motor bar rocks latch CA through stud CD, out of engagement with the square stud in arm DO thus permitting arm DO to be pulled downward by spring CF to turn trip shaft assembly CG. Turning of shaft assembly CG raises arm DA which in turn rocks hook J, releasing arm K (Fig. II-27) closing the points of microswitch D, (Fig. II-27).

Hook J, being pinned to shaft CV, rotates the shaft permitting clutch dog indexing arm DD to drop past the cutout portion of shaft CV through the tension of spring CW. As arm DD drops, it rocks clutch dog DF into a tooth space of drive gear DJ thus locking drive shaft assembly CX to revolving gears DH and DJ.

As drive shaft assembly CX revolves primary power section CL is rocked through arm DM, drive link CN, eccentric CM, drive pawl DN and pawl B, (Fig. II-23), the latter being fastened to the primary power section CL.

Segment CZ, which is secured to the inside of the drive housing cover, holds clutch dog DF engaged with gear DJ during that interval of a machine operation where the toggle mechanism is released and the initial pull of the base springs taking over, could cause the clutch dog to become disengaged from gear DJ.

Near the complete revolution of the drive shaft assembly, the high point of cam L (Fig. II-27) passes over the roll on arm K (Fig. II-27) to reset the arm and open the microswitch points and, at the same time, spring CY resets hook J to restore shaft CV. As shaft CV is restored, clutch dog indexing arm DD comes to rest on the shaft and clutch dog DF is rocked out of the tooth space in gear DJ, thus disengaging the drive shaft assembly from the drive gears. The drive shaft assembly is retained in its home position by arm DK through roll DL to assure full disengagement of the clutch dog.

Should an operator ride the total key following a listing operation in which a relay carry is taking place and manage to trip the drive initiating a total operation before carries from the preceding listing operation are completed may result in a wrong addition or a lock-up. The delayed clutch trip mechanism safeguards against this possibility.

Roll CK rocks passby pawl CJ forward on the forward stroke of a machine operation and rides on the surface of cam CH. Toward the end of the return stroke, roll CK leaves cam CH and rides on the surface of passby pawl CJ. The outline of the passby pawl prevents roll CK and subsequently trip shaft assembly CG from restoring until the very end of the return stroke thereby preventing a second trip of the drive mechanism until carries have been completed.

To assure the proper lubrication of the drive mechanism, approximately 1/2 ounce of drive oil (S165 1/2 B) is contained in the drive housing. Oil is added to the drive by removing filler screw DB. The correct oil level is approximately 1/8" below the filler opening. Tube B (Fig. II-27) serves as a breather for the drive mechanism, preventing oil from being forced through the housing as heat builds up during sustained use. The tube extends around the housing to safeguard against oil leakage while the machine is in transit.

Tests and Adjustments

1. To safeguard against premature release of the clutch -
Manually release latch CA from square stud on arm DO and move arm DO downward slowly.
Check for hook J to be disengaged from the stud in arm K simultaneously with the engaging of roll CK with cam CH.
TO ADJUST, bend arm DA.

2. To assure closing the microswitch points without excessive overthrow -
With the motor bar or an operation control key held fully depressed, there should be from .125" to .140" clearance between the underside of arm E and the body of switch D.
TO ADJUST, bend finger G.

3. To assure proper indexing of machine functions from operation control key 6-0 before tripping the clutch and, to provide a basic adjustment (adjustment of other operation control keys and motor bars) -
With operation control key 6-0 latched down, trip latch CA should have a full hold on square stud D0 and not more than .005" clearance between stud CD and the forward finger of trip latch CA.
TO ADJUST, turn eccentric CB.

4. To assure proper indexing of machine functions before tripping the clutch and provide a safe minimum release clearance for the clutch trip mechanism when operation control keys or motor bars are fully depressed -
With any operation control key or motor bar (except operation control key 6-0 or live repeat key) latched down, there should be no movement of trip latch CA and, when fully depressed, there should be no less than

.015" clearance between the latching step of trip arm CA and square stud DO.
TO ADJUST, bend the projections on intermediate motor bar CE that are contacted by the various operation control keys.
5. To assure safe indexing of the repeat key function -
There should be a safe passing clearance between latch CA and square stud DO when the repeat key (O.C.K. 5-0) is fully depressed.
TO ADJUST, bend the projection on intermediate motor bar CE which is contacted by the repeat keystem.
6. To assure proper functioning of the governor control -
A. Check governor weights C and pin BA for free.
B. Place a .050" feeler gauge between pin BA and screw BC. Motor should just start to operate when the drive is tripped. Place a .010" feeler gauge at the same point. Motor should operate normally when the drive is tripped.
C. Check for correct crank speed (between 144 and 147 strokes per minute) by tripping the drive with the drive mechanism disengaged from the machine and counting the drive revolutions.
TO ADJUST:
A. Lubricate governor parts with S131A machine oil.
B. Loosen nut BB and turn screw BC. Retighten nut BB.
C. Loosen nut BD and turn screw BE. Retighten nut BD.
7. To assure a full forward stroke of the machine on each electric powered operation - There should be .020" to .030" clearance between the square portion of the large stud in primary section CL and the rearward end of the slot in the left machine sideframe at the end of the forward stroke of a motor driven machine operation.
TO ADJUST: with the machine at home position, set eccentric CM with its high point upward. Trip the clutch and manually operate the machine to the end of forward stroke by manually turning the motor. Turn eccentric CM clockwise to reduce clearance between the square portion of the large stud in primary section CL and the rearward end of the slot in the left machine sideframe or counterclockwise to increase.
8. To assure re-engagement of the drive with the primary power mechanism following a handle break -
There should be a minimum of .005" latching lead between drive pawl DN and pawl B (Fig. II-23) as the two re-engage after a handle break.
TO ADJUST, refine adjustment No. 7 above.
NOTE: If adjustment No. 7 has been properly made, there will usually be a satisfactory latching lead between the two pawls without further adjustment. If not, be sure eccentric CM has its high point above center before attempting to refine adjustment No. 7.

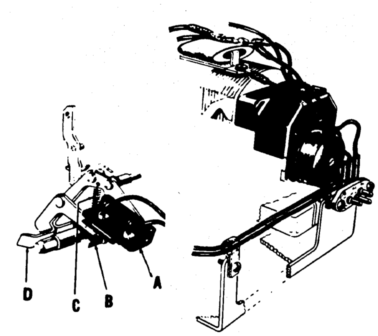


Fig. II-31

MANUAL OPERATION SAFEGUARD SWITCH

This mechanism safeguards the operator against possible injury by preventing motor driven machine operations with the handle inserted.

Insertion of the handle into the machine rocks bellcrank D thereby lowering insulated stud B attached to the rear of the bellcrank. Lowering of stud B permits spring tension to open the contacts of microswitch A, thus interrupting the circuit to the motor.

When the handle is removed from the machine, spring C pulls bellcrank D to close the microswitch contacts. The electrical circuit is now completed through the microswitch and a motor driven machine operation is permitted.

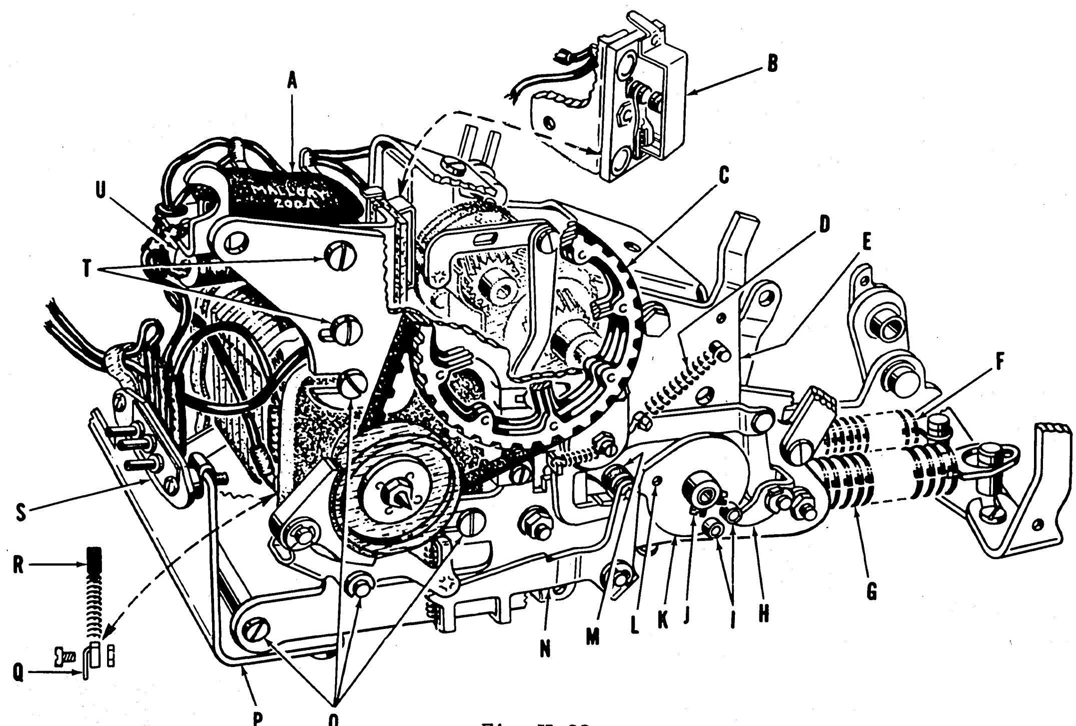


Fig. II-32

TYPE P2 MOTOR AND DRIVE

The type P2 Motor and Drive assembly is the second of two types of power units used on Series P electrically operated machines. This assembly, although different in design than the Type 3 motor and drive assembly, also fastens to the machine left side frame and serves the same purpose, that of driving the machine through the forward stroke of an operation. The motor which is speed controlled, operates on either alternating or direct current, developing approximately 1/40 horsepower at 6000 r.p.m.

Depression of a specified operation control key or motor bar initiates a power driven machine operation by actuating microswitch B completing the electrical circuit and tripping a clutch mechanism. Torque from the motor is then applied to the machine, through belt C and a system of gears which produce the desired crank speed of the drive mechanism. Power spring G assists the motor in driving the machine through the forward stroke, affording movement to cam EP (Fig. II-36). During the return stroke of the machine operation, power spring G is expanded through motor power, thus storing power for a following machine operation.

Clips Q hold motor brushes R in the brush receptacle. To reduce wearing of brushes R, the commutator should be dressed occasionally by using a cleaning stone, Kit 195.

A detachable line cord is provided. Plug receptacle S, mounted on auxiliary base P, contains a third (center) prong which serves as a safety ground connection.

Condenser U is composed of two strips of tinfoil separated by strips of non-conducting material. Its purpose is to prolong the life of the switch and governor contact points by absorbing the electrical charges which tend to arc between the points as they are separated.

Resistor A, which is made of a coil of special alloy wire set in a porcelain mould, sets up a resistance to the flow of current to the motor as the governor points open. A steady, partial flow of current passes through the resistor to the motor to provide a smoother motor performance while the remainder of the current is dispersed in the form of heat thus controlling the speed of the motor and prolonging the life of the governor contact points.

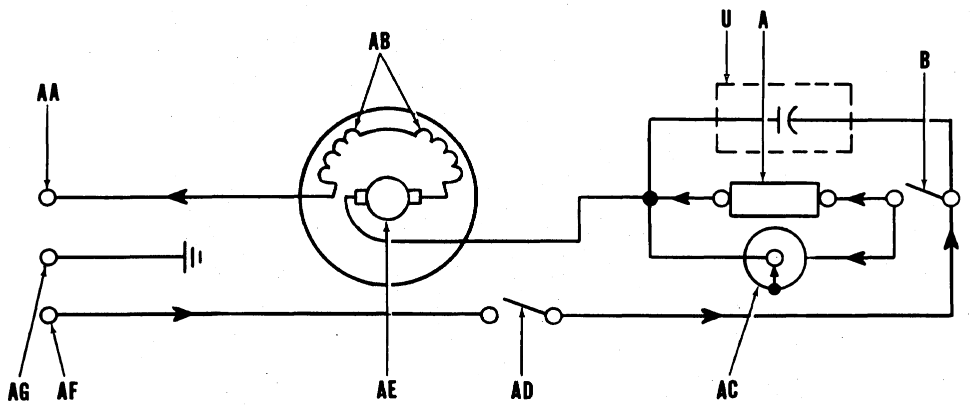


Fig. II-33

ELECTRICAL CIRCUIT

The electrical circuit of the P100 machine equipped with a Type P2 motor is illustrated by the accompanying schematic diagram.

The current enters the circuit at terminal AF. If handle switch AD is closed, current flows to main switch B which, when closed, passes current to resistor A and governor AC. Current passes through the governor and continues on through the motor brushes to armature AE, the motor fields AB and out terminal AA. Terminal AG represents the ground connection.

GOVERNOR MECHANISM

Governor BC safeguards against the motor driving the machine beyond its maximum safe operating speed 130 strokes per minute by diverting the flow of current to the motor through resistor A.

The governor is mounted on shaft BF and revolves with the shaft during a machine operation. If the speed of the motor builds up beyond its safe operating rate, centrifugal force separates contact points BG expanding spring BD. The contact points will then remain separated until the motor slows down to its safe operating speed at which time spring BD will again close the contact points.

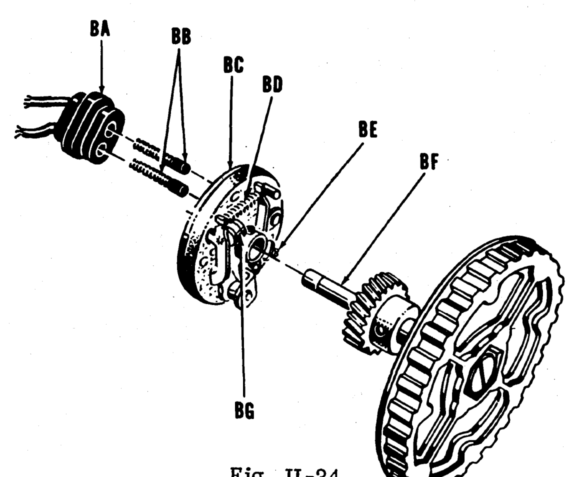


Fig. II-34

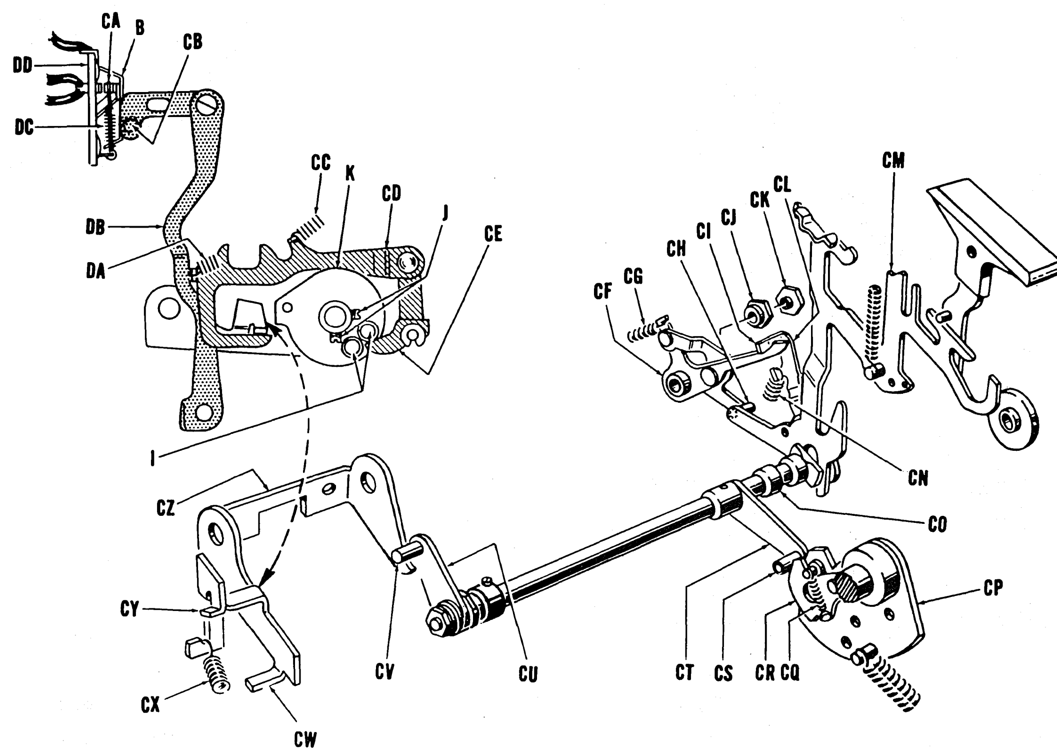


Fig. II-35

MICROSWITCH CONTROL

A motor driven machine operation is provided when the electrical circuit is completed and the drive clutch is tripped. This is accomplished through the depression of a motor bar or an operation control key.

Depression of the motor bar or a specified operation control key lowers intermediate motor bar CM. Lowering of the intermediate motor bar rocks latch CF through stud CH out of engagement with lip CI, thus permitting arm CL to be pulled downward through the tension of spring CN and turn shaft assembly CO. Turning of shaft assembly CO rotates arm CU and rocks bail CZ through stud CV. Rocking of bail CZ lowers the rearmost portion of actuating arm CD out of the path of the lip on arm DB permitting spring DA to pull arm DB forward which in turn moves insulated stud CB from leaf spring B permitting spring DC to move switch points CA and complete the electrical Circuit.

The switch points are opened at the end of drive cycle as actuating arm CD is raised through the tension of spring CC and moved rearward by the action of rolls I on projection CE of actuating arm CD assembly as cam K completes its revolution.

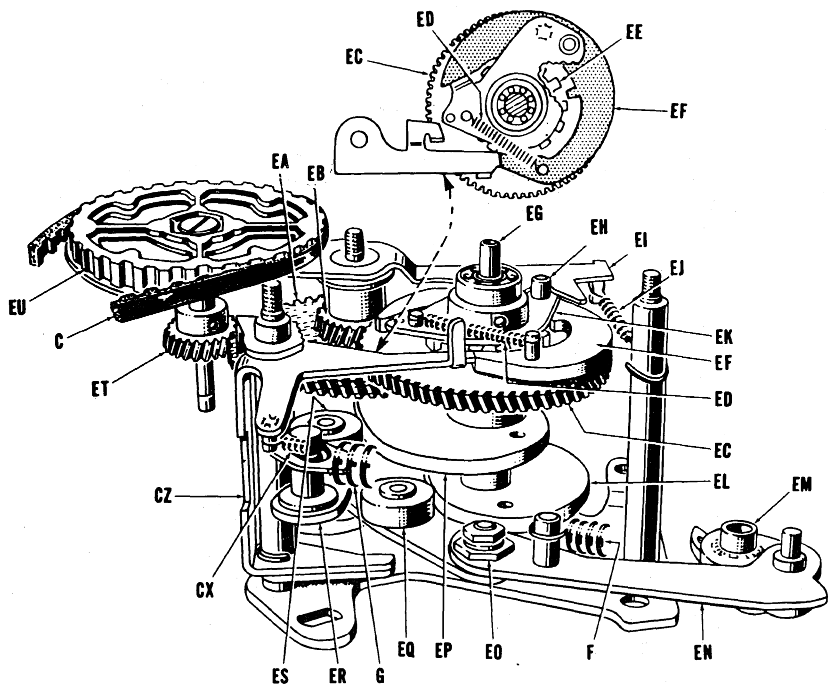


Fig. II-36

CLUTCH MECHANISM

The accompanying illustration depicts the drive mechanism (which contains a 41 to 1 gear ratio) when the machine is in home position. Torque from the motor drives pulley EU through belt C. Pulley EU in turn drives gear EC through gears ET, EA and EB. Gear EC turns freely on drive shaft assembly EG until the clutch is tripped. Drive shaft assembly EG, including clutch dog assembly EF, shaft EG, cams EP and EL remain stationary, independent of revolving gear EC as long as the clutch dog is not engaged with gear EE.

As previously outlined under "Microswitch Control", bail CZ is rocked from the depression of the motor bar or a specified operation control key. As bail CZ is rocked, its foremost portion is lowered out of the path of clutch dog EF permitting engagement of the tooth portion of the clutch dog with a tooth space of gear EE by spring ED. Clutch dog assembly EF and shaft assembly EG carrying cams EL and EP are now locked together, and revolve with drive gear EC. The additional driving force of power spring G is applied to the machine through arm ER, roll ES and cam EP.

As cam EL rotates, the primary power section is rocked through roll EQ, eccentric EO, arm EN, drive pawl EM and pawl B (Fig. II-23), the latter being fastened to the primary power section.

Spring F assures re-engaging drive pawl EM with pawl B (Fig. II-23) in the event a handle break occurs.

Following a complete cycle of drive shaft assembly EG, the machine operation is completed and trip bail CZ is restored to home position by spring CX. As the drive shaft assembly cycle is completed, clutch dog EF re-engages bail CZ and is moved out of engagement with the tooth space in gear EE. As the clutch dog is disengaged from gear EE, roll EH moves into the pocket of detent EI as the latter is pulled down by spring EJ. This detenting action assures a safe passing clearance between the clutch dog and the teeth of gear EE.

Machines equipped with the Type P2 motor and drive assembly also contain pawl CR and roll CS to provide the same delayed clutch trip safeguard as previously outlined under Type 3 motor and drive assembly, Fig. II-30

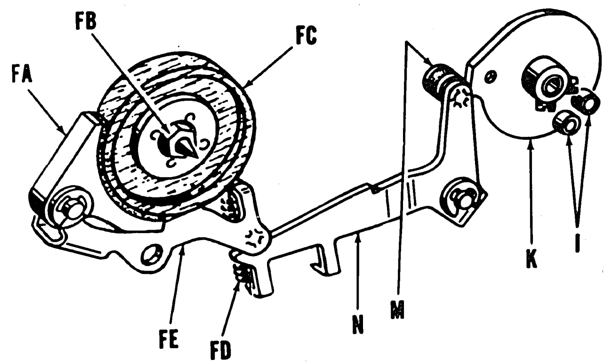


Fig. II-37

MOTOR BRAKE MECHANISM

Brake shoe FA is applied to brake wheel FC following each machine operation to reduce the undesirable noise caused by the motor and drive coming to rest.

With the machine at home position, the tension of spring FD holds brake shoe FA against the brake wheel. As a motor driven machine operation begins, the high point of cam K moves away from roll M permitting spring FD to move the foremost portion of lever FE downward, thus relieving the pressure of the brake shoe from against the brake wheel as the torque in the motor causes the brake shoe to be thrown rearward. The brake shoe will remain rearward, clear of the brake wheel, until the end of the drive cycle when the high point of cam K re-engages roll M.

Tests and Adjustments

1. To assure correct drive belt tension and prevent excessive wear of governor and motor shaft bearings -
There should be slight slack in drive belt C.
TO ADJUST, loosen four screws O and shift motor forward or rearward. Tighten screws O.
2. To assure correct positioning of switch bracket DD -
With the machine at home position, insulated stud CB should position leaf spring B rearward to retain switch points CA in open position; also, with the drive tripped, stud CB should clear leaf spring B to permit spring DC to close the points.
TO ADJUST, loosen screws T and move switch bracket DD all the way forward. Then, move the bracket rearward to a point that will provide just minimum of clearance between the lip on the lowermost portion of arm DB and the rearmost portion of arm CD.
3. To assure opening the switch and applying the brake at the end of the machine operation - Hole L should align with the .127" hole in side of frame E.
TO ADJUST, loosen two screws J and position cam K.
4. To safeguard against premature release of the clutch -
Trip the drive mechanism, manually operate the machine by rotating the motor until near the end of a complete cycle just before roll CS drops off the passby pawl CR, check for minimum clearance between stud CV and bail CZ.
TO ADJUST, weave bail CZ.
5. To assure a safe hold of the foremost portion of trip bail CZ on clutch dog EF -
Trip the drive mechanism, manually operate the machine by rotating the motor until near the end of a complete cycle and check for the forward projection on left side of trip bail CZ to clear the teeth of gear EE. Complete the machine cycle and with the drive mechanism at home position, check the foremost portion of trip bail CZ to have a full hold on clutch dog EF.

TO ADJUST, bend lip CW for earlier or later limit on the underside of sideframe E.

6. To assure proper indexing of machine functions from OCK 6-0 before tripping the clutch and, to provide a basic adjustment (adjustment of other OCK's and motor bars)
With OCK 6-0 latched down, trip latch CF should have a full hold on lip CI and not more than .005" clearance between stud CH and the adjusting arm of latch CF.
TO ADJUST, turn eccentric CJ.

7. To assure proper indexing of machine functions before tripping the clutch and, to provide a safe minimum release clearance for the clutch trip mechanism when operation control keys or motor bars are fully depressed -
With any OCK or motor bar depressed (except OCK 6-0 or live Repeat Key) latched down, there should be no movement of trip latch CF and, when fully depressed, there should be no less than .015" clearance between the latching step of CF and lip CI.
TO ADJUST, bend the projections on intermediate motor bar CM that are contacted by the various OCK's and motor bars.

8. To assure safe indexing of the repeat key function -
With a live repeat key fully depressed, there should be a clearance of .015" to .040" between latch CF and lip CI.
TO ADJUST, bend the projection of intermediate motor bar CM which is contacted by the repeat key.

9. To assure correct switch point closing time -
With any OCK depressed, check for .005" to .012" clearance between the underside of the formed lip on arm DB and actuating arm CD.
TO ADJUST, bend lip CY.

10. To assure proper machine speed - 120 to 130 strokes per minute -
Governor BC should be adjusted to provide between 144 to 147 strokes per minute of drive arm EN when pawl EM is held disconnected from pawl B (Fig. II-23).
TO ADJUST, turn screw BE clockwise to increase speed and counterclockwise to reduce speed.

11. To assure a full forward stroke of the machine on each electric powered operation -
There should be .020" to .030" clearance between the square portion of the large stud in the primary section CL (Fig. II-30) and the rearward end of the slot in the left machine sideframe at the end of the forward stroke of a motor driven machine operation.
TO ADJUST, turn eccentric EO.

12. To assure re-engagement of the drive with the primary power mechanism following a handle break -
There should be a minimum of .005" latching lead between drive pawl EM and pawl B (Fig. II-23) as the two re-engage after a handle break.
TO ADJUST, refine adjustment No. 11 above.

REVIEW ITEMS OF SERIES P100 MACHINES

1. What is the purpose of pressure rolls V, Fig II-1?
2. How are the pressure rolls released?
3. How is the paper guided around the platen Z, Fig. II-1?
4. What is the purpose of the movable tear-off blade A, Fig. II-1?
5. What is the purpose of lever I, Fig. II-1?
6. How is 5/6" spacing accomplished during a total operation?
7. What is the forward limit for locking strips D, Fig. II-3 (a) during a listing operation with numeral keys depressed? (b) during a listing operation with no keys depressed? (c) during a total operation?
8. What is the forward limit for index strips AK, Fig. II-4 (a) during a listing operation with numeral keys depressed? (b) during a listing operation with no keys depressed? (c) during a total operation?
9. What amount would be accumulated if both the No. 5 key and the No. 8 key in the same column were depressed during a listing operation?
10. What is the purpose of the total control strip AP, Fig. II-4?
11. What is the purpose of the keyboard safeguard (handle break) mechanism?
12. What causes a handle break to occur (a) when a key is partially depressed? (b) when the total key and a listing key are depressed?
13. What prevents the hammers AH, Fig. II-12 from being released during a blank machine operation?
14. How are the type bars limited when a No. 9 key is depressed?
15. What is the purpose of the aligning shaft G, Fig. II-11?
16. How are the hammers released to print an indexed amount?
17. When should the hammers be released?
18. How are the ciphers printed to the right of printed amounts?
19. How are ciphers to the left of printed amounts prevented from printing?
20. How are the symbols indexed?
21. How does the ribbon feed take place?
22. When does the ribbon feed relative to the machine operation?
23. What causes the ribbon to reverse?
24. What position should the aligning shaft G. Fig II-11 be in at the time the hammers fire?
25. How are the adding pinions brought into mesh with the adding sectors?
26. In what direction do the adding pinions turn when adding amounts?
27. How and when do the adding pinions move out of mesh with the adding sectors during listing operations?
28. How and when are the adding pinions moved into mesh with the adding sectors during total operations?
29. In what direction do the adding pinions turn during a total operation?
30. How are the adding sectors prevented from rising until the adding pinions are moved into mesh with the adding sectors during a total operation?
31. How is a carry initiated?
32. How is a carry completed?
33. How are the carry racks B, Fig. II-20 prevented from being reset during a total operation?
34. What limits the upward travel of the adding sectors on a total operation?
35. How do the various sections of the machine receive power from the main operating section?
36. How are full machine strokes compelled during hand operations?
37. What is the purpose of the torsion spring C. Fig. II-23?

38. How does the main operating section function during a machine operation when the handle is snapped forward?
39. What is the purpose of the toggle latch CA, Fig. II-26 and how does it function?
40. What is the purpose of the dashpot mechanism?
41. How is the clutch engaged from a motor bar depression (a) Type 3 motor? (b) Type P2 motor?
42. How are the switch points closed from a motor bar depression (a) Type 3 motor? (b) Type P2 motor?
43. What test is made to determine the correct speed of an electrically operated machine?
44. What test and adjustment is made to determine that the machine is being driven the correct distance on the forward stroke by (a) Type 3 motor? (b) Type P2 motor?
45. How does the governor function, and what effect does opening the governor points have on the operation of (a) Type 3 motor? (b) Type P2 motor?
46. What is the purpose of spring G, Fig. II-32?
47. What is the purpose of spring F, Fig. II-32?

Burroughs

FULL KEYBOARD

ADDING and BOOKKEEPING MACHINES

INSTRUCTION BOOK

Section III

●

SERIES P200

Printed in U.S. America 7-15-64

For Form 3784

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CARRIAGE MECHANISM

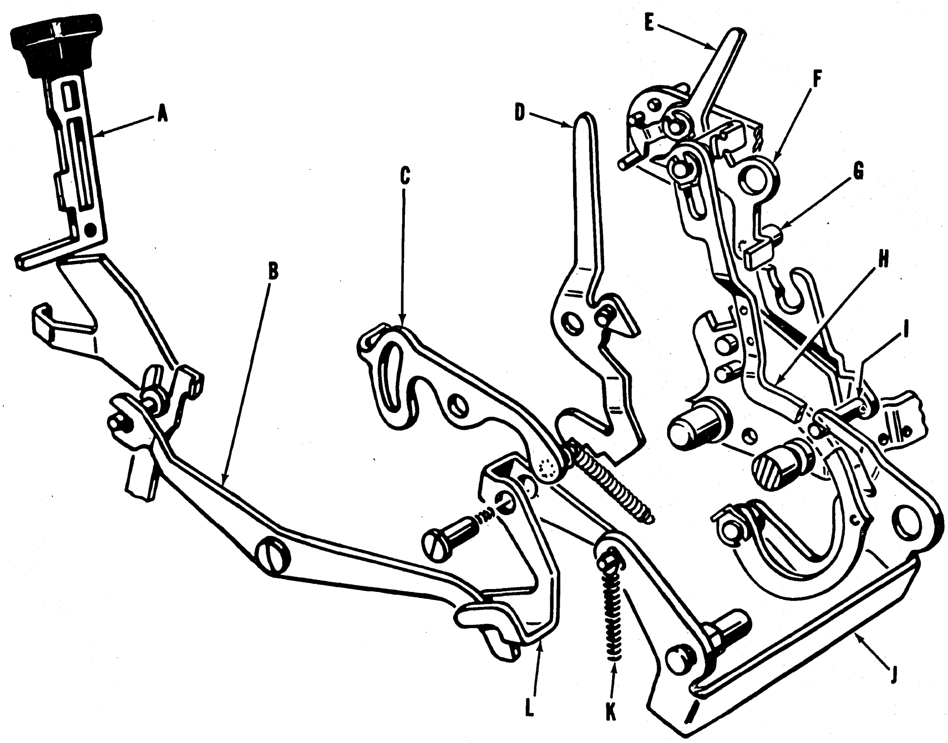


Fig. III-1

FORM SPACING 5/6" FROM TOTAL KEY

This control permits the selection of 5/6" spacing of the platen during total operations when lever E is located in its rearward position. Basically the spacing controls and operation is the same as that described under Fig. II-2, the only principal difference being in the method of controlling the indexing for 5/6" spacing from the depression of total key A.

Depression of total key A rocks the rearmost portion of arm B out of the path of the lower most portion of bell crank L. During the forward stroke of a total operation, stud I moves out of the path of the finger of bail J permitting the latter to be rocked by spring K. Rocking of bail J rocks bell crank F through link H thus positioning stud G on bell crank F to control the platen feed pawl for 5/6" spacing.

When lever E is in its forward position, spacing during total operations is the same as indicated by the spacing control lever D.

During listing operations, arm B limits bail J through bell crank L to prevent 5/6" spacing except during those operations in which the space control lever D is positioned for such.

Tests and Adjustments

1. To prevent 5/6" spacing during listing operations when spacing control lever D is in other than No. 5 position -
   There should be minimum clearance between the rearmost portion of arm B and the lowermost portion of bell crank L when arm B is manually raised and lowered.
   TO ADJUST, bend the lower portion of bell crank L.
2. To ensure unobstructed movement of bail J during total operations -
   There should be minimum clearance betweem the under side of the rearmost portion of arm B and the lowermost portion of bell crank L when the machine is slowly operated with the total key locked depressed.
   TO ADJUST, bend the rearmost portion of arm B.
3. To ensure 5/6" spacing during total operations when lever E is in its rearward position -
   The projection on the uppermost portion of link H should have a safe hold on the lip on arm C when the machine is slowly operated during the forward stroke with the total key depressed, lever D in No. 5 position, and lever E positioned rearward.
   TO ADJUST, bend the lip on arm C rearward, but not so far as to bind on the forward edge of link H.
   NOTE: After adjustment No. 3 has been made, the lip on arm C should have a safe hold on the projection on link H during a machine operation with the total key depressed and lever E in its forward position.

KEYBOARD MECHANISM

CIPHER STOPS AND KEYSTEMS PREVENT UNWANTED CARRIES DURING MINUS OPERATIONS

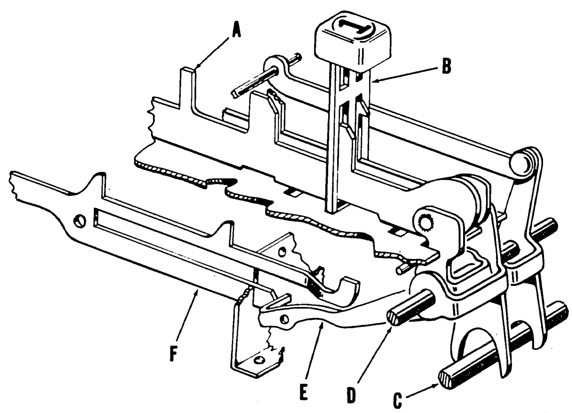


Fig. III-2

The keyboard mechanism on Series P 200 machines is of the same basic construction as described under Series P 100 machines in Section II.

On Series P 200 machines prior to serial number P 314900D, the foot of each cipher stop E must be correctly adjusted to prevent the possibility of setting up an unwanted carry during plus and minus operations. On machines beginning with the above serial number, this danger was minimized during minus operations by a change in the design of the carry pawls and the wide tooth of the minus pinions.

Should a cipher stop be incorrectly adjusted to permit excessive clearance between its foot and the forward portion of index bar F, unwanted carries could be tripped off in the following manner:

During a minus operation in which a cipher is indexed in the same column that a nine had previously been added in the upper pinion, the upward travel of the adding rack, as the aligning shaft moves out during the return stroke, may cause the upper pinion to be turned clockwise and the lower pinion counterclockwise sufficiently to cause the wide tooth of the lower pinion to index a carry pawl into an initial carry.

During a plus operation, a similar condition could take place in a column where a cipher is indexed in the same column that a nine had previously been added in the lower pinion. At this time, the lower pinion would be turned clockwise and the upper pinion counterclockwise sufficiently to cause the wide tooth of the upper pinion to index a carry pawl into an initial carry when the adding rack moves slightly upward as the aligning shaft moves out.

The correct alignment of the keystems on Series P 200 machines is just as important as the correct adjustment of the cipher stops. An almost unlimited number of combinations of figures may be arranged to illustrate the danger of improperly adjusted keystems in relation to the upright projections on index bars F.

An adding rack that has been pulled down to its correct position (by the aligning shaft) because of improper adjustment of the keystem may cause a carry to be set up. To illustrate, let us assume that the number five key in column one is out of adjustment. The key is depressed, the handle is brought forward and the aligning shaft engages the adding rack. In this position, the upper pinion is in cipher position with its wide tooth located under the upper spear point of the carry pawl. The accumulating section is then moved into mesh with the adding racks and the aligning shaft is disengaged from the adding racks. At this point, the adding rack will travel up until the index bar limits against the keystem causing the upper pinion to move the carry pawl into an initial carry position.

Still assuming that the same number five keystem is out of adjustment on a machine that did not contain the re-designed carry pawls and minus pinions, we will consider the possibility of a wrong addition through the lower pinion during a minus operation. The following problem is an example:

With the machine in a clear minus balance position, five is subtracted in column one. Then, in the same column five is added and another five is subtracted, the wide tooth of the lower pinion becomes positioned under the lower spear point of the carry pawl as the tumbling section tumbles into minus position. The release of the aligning shaft follows the tumble and the uncontrolled adding rack changes its position through the index bar limiting against the depressed keystem. This movement of the adding rack may be sufficient to cause the lower pinion to move the carry pawl into an initial carry position. This would change the nature of the answer to the above example from a minus balance of five to a minus balance of fifteen.

Tests and Adjustments

1. To assure forward movement of index bars F -

   Index bars F should clear under shaft D and over the shaft similar to M, Plate 65, Sideframe Parts Catalog; also, the foremost portion of the index bars should clear the "U" form of cipher stops E as the handle is pulled slowly forward with nines indexed on the keyboard.

   TO ADJUST:

   A. Weave the offset portion of the adding rack to position index bar F for proper clearance with the shaft similar to M, Plate 65.

   B. Bend the foremost portion of index bars F for proper clearance under shaft D and for clearance with the "U" form of cipher stops E.

2. To safeguard against a side weave of cipher stops E thus assuring a rigid limit of index bars F against the cipher stops at cipher position -

   Cipher stops E should be positioned to provide a central alignment of the narrow portion of their feet with the forward end of index bars F and at the same time the horizontal arm of the cipher stops should be parallel with the forward end of the index bars.

   TO ADJUST, bend the horizontal arm of the cipher stops.

3. To safeguard against a carry during a substract operation in which a cipher is indexed in a column where nine had previously been added also, to assure unobstructed engagement of the aligning shaft when the adding sectors are located at cipher position -

   On machines before serial number P 314900D, the foot of cipher stops E should have a slight drag against the forward end of index bars F; on machines beginning with serial number P 314900D, there should be from .008" to .015" clearance between the forward end of index bars and the foot of the cipher stops.

   NOTE: Before proceeding with the following test, the sector limit shaft AB, Fig. II-18 should be properly adjusted.

   a. Depress the total key, pull the handle forward until the roll on the restoring frame is positioned on the dwell of secondary cam F, Fig II-23 and the roll on the right end of shaft C is located in the upper pocket of the key restoring slide.

   NOTE: To retain the machine in the above position, insert the handle of keyboard brush (which should be approximately 5/16" thick) under shaft N, Fig. II-23 and up between main operating shaft J, Fig. II-23 and bail G, Fig II-23.

   b. Manually move index strips rearward and forward and check the foot of cipher stops to have a slight drag on the forward end of index bars F. On machines beginning with serial number P 314900D there should be between .008" to .015" clearance between the foot of cipher stops E and the forward end of index bars F.

   TO ADJUST, bend the foot of cipher stops E.

4. To assure the correct relative position of the lowermost portion of depressed keys to the upright projections on index bars F -

An individually depressed key should limit its corresponding index bar F so as to permit the aligning shaft to enter the tooth spaces of the adding racks without moving the latter upward or downward. The following method is suggested for making the test:

a. Depress a row of keys.

b. Pull the handle all the way forward then release it to the point where the aligning shaft is permitted to move out of the tooth spaces of the adding racks.

c. Pull the handle forward again to move the aligning shaft back into the tooth spaces, and check for upward or downward movement of the type bars.

TO ADJUST, bend the lowermost portion of each keystem that is not properly aligned.

NOTE: To obtain the correct position of the adding racks when No. 9 keys are depressed, raise or lower bail C, Fig. II-17.

PRINTING MECHANISM

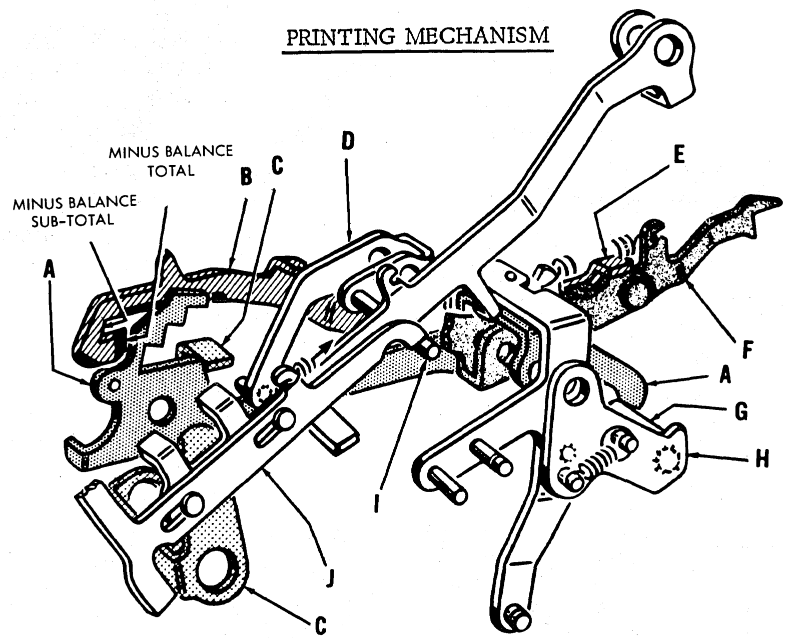


Fig. III-3

SYMBOL PRINTING FROM MINUS MOTOR BAR AND CONTROL KEYS

In addition to the symbols which are printed as outlined in Section II, additional symbols are required on Series P 200 machines to identify minus listing operations and minus balance total and sub-total operations. Depression of the minus motor bar or total and sub-total keys positions either symbol index arms A or B to limit the travel of the symbol sector.

Indexing of symbol index arm A for limiting bail C on its uppermost step for the printing of a minus symbol occurs when depression of the minus bar rocks bell crank H which through stud G, rocks symbol index arm A.

When a minus balance occurs in the machine, slide J is moved forward to position its rearward lip over stud I of bell crank D, rocks symbol index arm A to position its forward portion down out of the path of bail C. Depression of the total and sub-total keys also raises the rearmost portion of sub-total arm F which through lip E, positions symbol index arm B for limiting bail C on either of its two steps for the printing of the minus balance total and sub-total symbols.

Tests and Adjustments

1. To assure that symbol index arm A is positioned out of the path of bail C during minus balance total operations -
   The lip of bail C should have a safe clearance over the uppermost portion of symbol index arm A during the forward stroke of a minus balance machine operation with either the total or sub-total key latched depressed.
   TO ADJUST, bend the lip on the rearmost portion of slide J.
2. To assure that bail C limits on the correct step of symbol index arm B during minus balance total and sub-total operations -
   Symbol index arm B should be positioned to permit the lip of bail C to limit on its respective steps during the forward stroke of minus balance machine operation with either the total or sub-total key latched depressed.
   TO ADJUST, bend lip E.

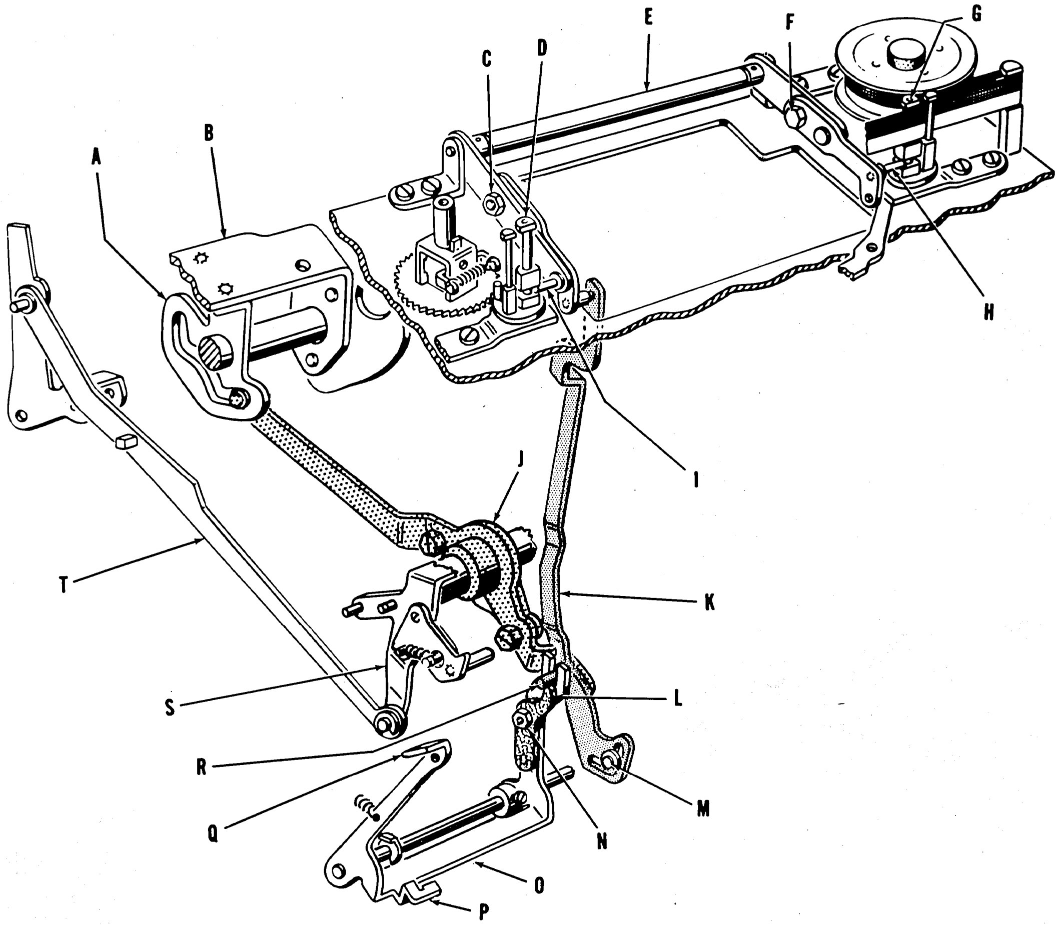


Fig. III-4

RED RIBBON LIFT MECHANISM

The red ribbon lift mechanism, which is indexed during substract and minus balance total and sub-total operations, provides a means of positioning the red portion of the ribbon in line with the type face for printing information such as credits and minus balances in red.

As subtract lever T is moved rearward during subtract and minus balance total operations, the rearmost portion of the lever rocks bail O. Bail O with its forked portion engaging stud R, then moves the lowermost portion of lift arm K rearward to align its horizontal slot with stud M.

During the forward stroke of a machine operation with subtract lever T positioned rearward, power arm J (which is actuated by internal cam A) rocks bail assembly E through stud M and lift arm K. Rocking of bail assembly E raises ribbon lift posts D and G through studs H and I to position the red portion of the ribbon into printing position.

During the forward stroke of plus operations as secondary section B rocks internal cam A counterclockwise, power arm J is rocked causing stud M to move up into the vertical slot of lift arm K without affecting the normal position of lift arm K, thus leaving the black portion of the ribbon in printing position.

Tests and Adjustments

1. To assure that bail O receives maximum movement during minus operations without interferring with the full depression of the subtract motor bar-
   There should be from .005" to .030"

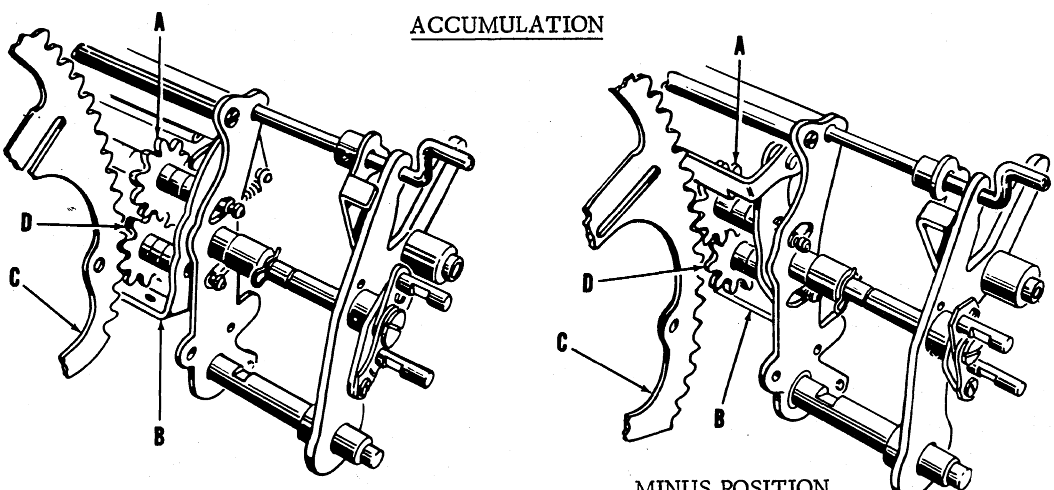
clearance between the rearmost portion of subtract lever T and lip Q when the subtract motor bar is manually held depressed and bail O is manually held rearward.
TO ADJUST, weave bail O.

2. To safeguard against stud M binding in the horizontal slot in lift arm K while indexing the red ribbon lift mechanism -
Limit plate L should be positioned to permit stud M to move freely in the horizontal slot of lift arm K as bail O is slowly rocked rearward.
TO ADJUST, loosen nut N and position limit plate L up or down, tighten nut N.

3. To safeguard against partial indexing of ribbon lift mechanism during plus listing or totaling operations -
Stud M should move freely in the vertical slot of lift arm K as the machine is slowly operated during plus listing and totaling operations.
TO ADJUST, bend lip P.

4. To assure proper lift of the ribbon for positioning its red portion in line with the type face -
Index all 5's in the keyboard and depress the subtract motor bar. Operate machine and check the type to contact the red portion of the ribbon centrally.
TO ADJUST, turn eccentrics C and F.

ACCUMULATION



PLUS POSITION MINUS POSITION

Fig. III-5

ACCUMULATION OF INDEXED AMOUNTS

Accumulator control during listing operations is accomplished in Series P 200 machines in the same manner as in Series P 100 machines. The accumulator consists of two sets of intermeshed pinions - upper pinions A (which are set at cipher position) being known as the add pinions and lower pinions D (which are set at nine position) known as the minus pinions.

Controls are provided in these machines to ensure meshing the correct set of pinions with the carry racks to receive carries that take place when the accumulator comes out of mesh with adding racks C.

A tumbling action of frame B (which contains both sets of pinions) permits only one set of pinions to be meshed with adding racks C during listing and totaling operations. The pinions that are meshed with the carry racks when the accumulator is in home position are known as the active wheels. The pinions in mesh with adding racks C when the accumulator is forward are known as the intermediate wheels, i.e. during plus listing and total operations, lower pinions D are in mesh with adding racks C and during subtract listing and minus balance total operations, upper pinions A are in mesh with adding racks C.

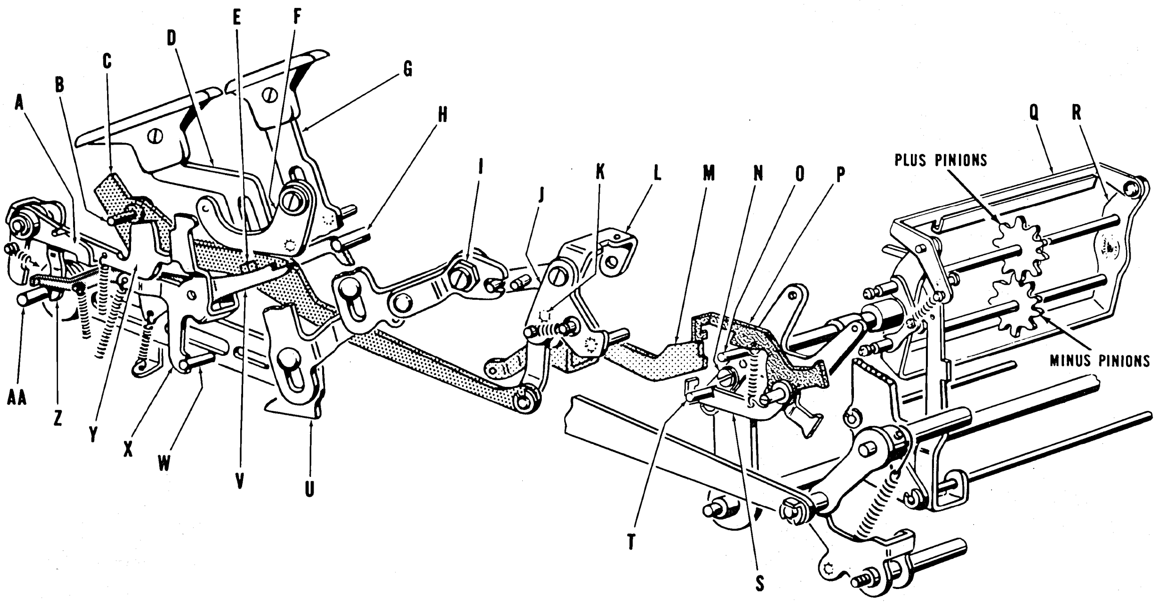


Fig. III-6

SUBTRACT OPERATION

When minus bar G is depressed, square stud E is positioned behind the step of latch V through bell crank L and subtract lever C. Early in the machine operation, timing arm Y moves upward in front of stud B and is held by latch X to retain the subtract mechanism indexed after latch V is released by stud H (of the secondary mechanism) near the end of the forward stroke. As latch V is moved down by stud H, the lip on the forward portion of the latch becomes engaged by latch A thus preventing the step of latch V from re-engaging square stud E during the return stroke.

Near the end of the return stroke, stud W disengages latch X from timing arm Y, permitting the latter to be pulled downward and subtract lever C to return to normal (add) position. As timing arm Y moves downward, its lower edge engages a lip on latch A moving the latter down out of engagement with latch V.

Interlock F prevents the depression of plus motor bar D after minus bar G has been depressed and vice versa.

When the machine is in normal (add) position, i.e., when the upper pinions are meshed with the carry racks, stud O is positioned rearward and stud T is positioned forward. Also, the step of latch S is positioned behind stud T and the rear of arm M is holding latch P up out of engagement with stud O.

Depression of minus bar G disengages latch S from stud T through bell cranks L and J, stud K, and arm M, to permit the adding pinions to be tumbled.

At the beginning of the return stroke as the adding pinions move into mesh with the adding racks, forward movement of stud T is blocked by arm M causing frame R to tumble. Thus the upper pinions are meshed with the adding racks and latch P is positioned behind stud O to maintain the lower pinions in subtract position.

During the first add operation following a subtract operation, the adding pinions are tumbled back to add position. When arm M is in normal (add) position, the rear of the arm holds latch P up and out of engagement with stud O. Therefore, as the pinions are moved into mesh with the adding racks during the add operation, forward movement of stud O is blocked by arm M. This action causes frame R to tumble to add position thus permitting latch S to move up behind stud T to hold the upper pinions in add position.

TUMBLING FRAME IS SAFEGUARDED AGAINST PARTIAL MOVEMENT

Latches P or S, Fig. III-6, when positioned behind studs O or T, Fig. III-6, also arm BC by limiting shaft BB supports tumbling frame R, Fig III-6 while the pinions are in mesh with the adding racks. Partial movement of the tumbling frame and the subsequent movement of bail Q, Fig. III-6 into the path of the upper pinions during plus and minus listing operations could result in the machine becoming locked up during the return stroke.

Shaft assembly BF also provides support to the tumbling frame through lip BE being located either in front or the rear of shaft BD while the pinions are in mesh with the carry racks during plus and minus operations.

Without this support, movement of the carry racks during a relay carry may cause the pinions to move far enough forward to prevent their wide teeth from completely indexing the carry pawls, thus resulting in the loss of carries.

BAIL Q PREVENTS PINIONS FROM TURNING DURING TUMBLING

Bail Q which is meshed with the upper pinions during tumbling from plus to minus or vice versa, prevents partial turning of the pinions, thereby safeguarding against a point to point lock of the teeth of the pinions and the teeth of the adding racks.

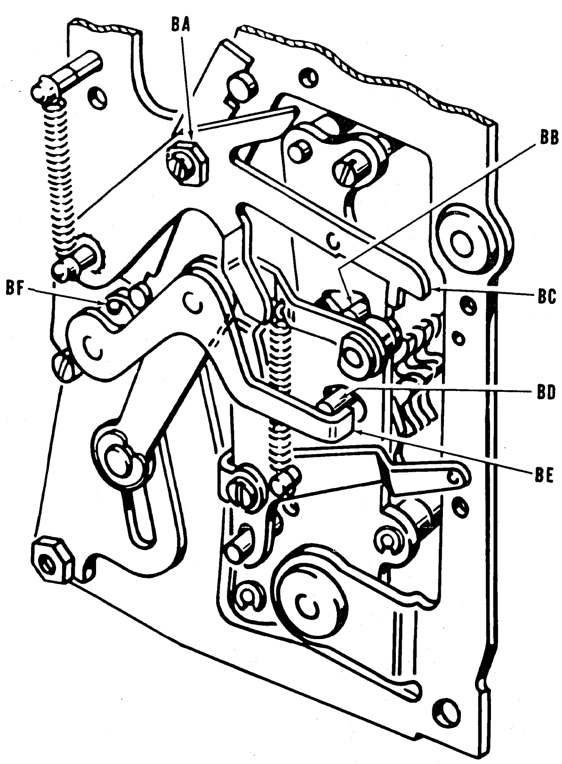


Fig. III-7

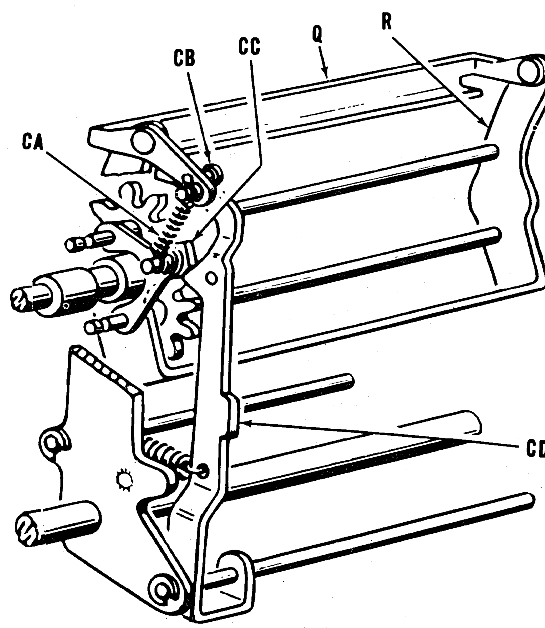


Fig. III-8

As tumbling frame R begins to tumble from plus to minus or vice versa, spear point CC of frame R rocks bail Q into engagement with the upper pinions through arm CD and stud CB. As tumbling frame R completes its tumble, spring CA is permitted to pull bail Q out of engagement with the upper pinions.

Tests and Adjustments

1. To assure full depression of subtract motor bar G on machines not equipped with interlock F -
   There should be .010" clearance between the rear leg of plug motor bar D and the stud in the foremost portion of arm M when the screw and eccentric I are loose and the plus motor bar is fully depressed.
   TO ADJUST, weave the rear leg of plus motor bar D.
2. To assure indexing the subtract mechanism before the drive clutch is tripped -
   There should be 1/32" latching lead of square stud E with the step of latch V when subtract motor bar G is held fully depressed.
   TO ADJUST, turn eccentric I.
3. To assure the release of the subtract mechanism at the end of a minus operation -
   When the machine is in home position, there should be .005" to .010" clearance between the formed ear of timing arm Y and the forward edge of latch X as timing arm Y is manually raised.
   TO ADJUST, bend the uppermost portion of latch X while holding the lowermost portion of the latch.
4. To safeguard against premature release of the subtract mechanism resulting in the loss of relay minus carries -
   Stud B should have approximately .005" to .020" clearance over timing arm Y as stud B is moving rearward during the depression of subtract motor bar G.
   TO ADJUST, bend tail Z to or from shaft AA.
5. To assure correct function of tumbling frame R when tumbling from plus to minus and vice versa -
   There should be slight clearance between the rear step of arm M and the bottom of stud O when the pinions are in subtract position, machine in home position.
   TO ADJUST, bend the rear of arm M up or down.
6. To assure that arm M will disengage latches P or S from studs O or T -
   Arm M should have a full laterial hold on latches P and S when the arm is in its raised or lowered positions.
   TO ADJUST, weave the rearmost portion of arm M.
7. To assure tumbling the pinions to add position at the correct time during the return stroke of a machine operation -
   a. With the pinions in add and the machine operated to the first notch of the full stroke segment, manually mesh the pinions with the adding racks. In this position, stud O should contact the upper vertical edge on the rear of arm M without binding.
   TO ADJUST, reposition stud O.
   b. With the pinions in subtract and the machine operated to the first notch of the full stroke segment during a subtract operation, manually mesh the pinions with the adding racks. In this position, stud T should contact the lower vertical edge on the rear of arm M without binding.
   TO ADJUST, reposition stud T.
8. To assure that the pinions are held in mesh with carry racks during power and relay carries -
   a. When the pinions are in add position and the machine in home position, latch S should be snugly positioned behind stud T without binding.
   TO ADJUST, hold the rear arm of latch S and bend the forward portion of the latch up to shorten or down to lengthen.
   b. When the pinions are in subtract position and the minus motor bar is depressed, latch P should be snugly positioned behind stud O without binding.
   TO ADJUST, hold the rear arm of latch P and bend the forward portion of the latch down to shorten or up to lengthen.
   c. When the pinions are in minus position

and the machine in home position, ear BE should have minimum clearance in front of pinion shaft BD.
TO ADJUST, tilt ear BE forward or rearward.

9. To safeguard aginst the pinions weaving away from the adding racks during plus and minus operations -
With nines in the lower pinions, minus motor bar G depressed, manually operate the machine on the return stroke until the upper pinions are in mesh with the adding racks. In this position, the projection on the foremost portion of arm BC should have a slight drag on shaft BB as arm BC is manually raised and lowered.
TO ADJUST, turn eccentric BA.

10. To safeguard against a point to point lock of the teeth of the pinions and the teeth of the adding racks as frame R tumbles from plus to minus and vice versa -
Bail Q should have an even hold, just short of a bind, on the upper pinions during the tumbling of frame R. Bail Q should also have clearance over the upper pinions as the upper pinions are rotated.
TO ADJUST, weave arm on right side of bail Q to lower or raise stud CB.

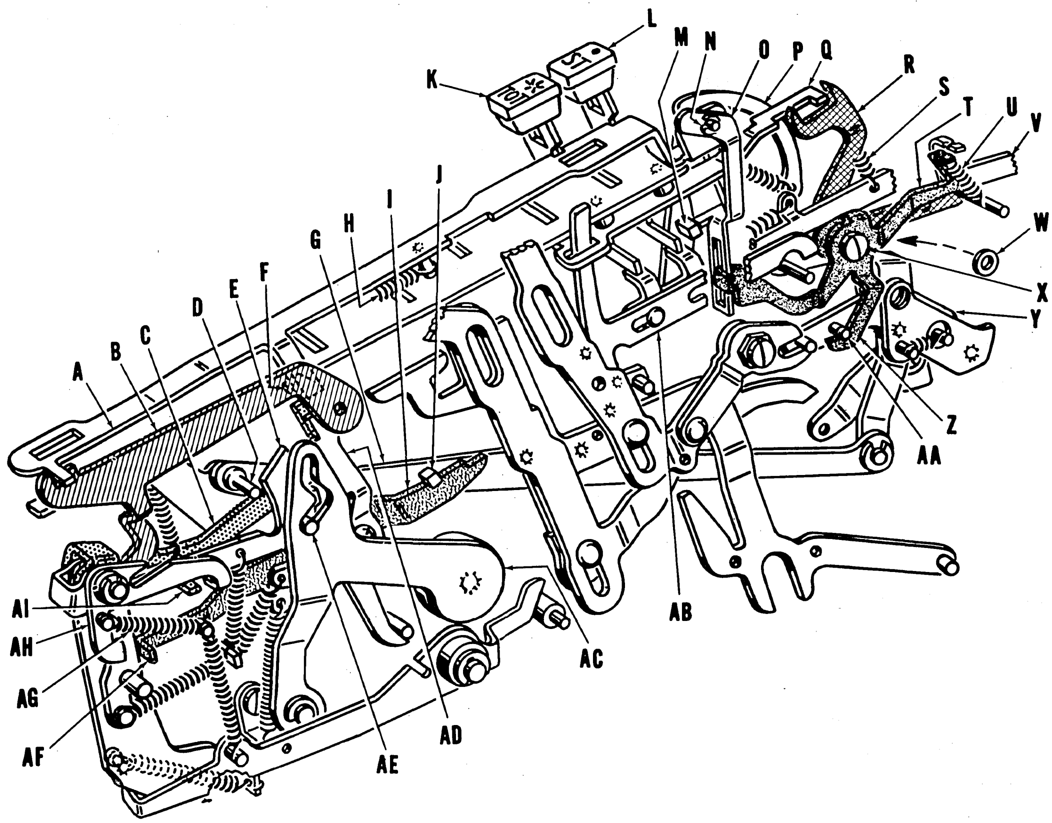


Fig. III-9

TIMING CONTROL

Slide A and timing arm AC safeguards against possible loss of carries and/or complementary totals during plus and minus operations.

As previously outlined in "Subtract Operation" Fig III-6, timing arm E moves up in front of stud D at the beginning of the forward stroke operations, thus permitting latch AH (under the tension of spring AG) to limit against lip AF of latch I.

Near the end of the forward stroke as the stud in the secondary section releases latch I from square stud J, the forward end of latch I is raised and engaged by latch AH.

Latch AH holds latch I to clear square stud J until near the end of the return stroke when timing arm E is restored which rocks latch AH away from latch I.

During subtract operations timing arm AC, which is controlled by stud AE limiting on the high point of the internal cam in timing arm AC, delays the return to add position of subtract lever G. This delayed return of the subtract lever safeguards against a premature release of latch P, Fig. III-6, from stud O, Fig. III-6, and the subsequent partial movement of the tumbling frame and bail Q, Fig. III-6, which could result in the loss of relay carries.

Slide A and its associated parts provide a means for the immediate depression of the total and sub-total keys following plus and minus operations with a debit balance in the machine; also safeguards against complementary totals caused by a premature depression of the total or sub-total key following plus and minus operations with a minus balance in the machine.

Slide A may be positioned in one of two positions, i.e., in its normal (forward) position, the total and sub-total keys may be depressed through the notches in the slide and, in its rearward position the notches are located to the rear of the total and sub-total keys thus blocking their depression.

At the beginning of the forward stroke of a plus operation, link P is moved rearward causing square stud M to rock the lowermost portion of arm O rearward without disturbing the normal position of slide A.

When the minus bar is depressed, bell crank Y is rocked which, through stud AA contacting finger Z (of bell crank T), rocks the foremost portion of bell crank T into the path of the lowermost portion of arm O thus causing arm O to pull slide A as link P and square stud M move rearward during the forward stroke.

Near the end of the return stroke, latch C is moved down out of the path of slide A by timing arm E contacting lip AI, thus permitting the slide to return to its normal (forward) position under the tension of spring H. The forward movement of slide A rocks timing arm B upward which delays the forward movement of the slide to safeguard against the depression of the total keys until after a relay carry can be completed.

During minus balance total and sub-total operations, rearward movement of slide A is disabled due to square stud M being positioned below the forward finger of arm O as link P is lowered by the depression of the total keys.

Tests and Adjustments

1. To safeguard against the subtract mechanism remaining indexed following a minus operation -
   Latch AH should move under lip AF with .010" clearance at the end of the forward stroke of a subtract operation.
   TO ADJUST, bend the inner rear curved portion of latch I to or from the stud in the secondary mechanism.
2. To assure releasing latch I at the end of a subtract operation -
   Latch AH when normal, should clear lip AF by approximately .015".
   TO ADJUST, bend the rearmost portion of latch AH up or down.
3. To assure the restoration of subtract lever G is retarded through timing arm AC and stud AE -
   Timing arm AC should be free and should have a full hold on stud AE.
   TO ADJUST, bend the lower portion of timing arm AC.
4. To assure the correct timing for release of timing arm E -
   Timing arm E should be positioned to permit the upper edge of its lip to be approximately flush with the upper edge of latch AD when the handle is forward during an add operation; timing arm E should also be positioned to provide approximately .010" clearance of stud D over the upper edge of timing arm E as the minus bar is depressed.
   TO ADJUST, bend the vertical leg of timing arm E.
5. To safeguard against latch C releasing slide A prematurely -
   There should be approximately .010" clearance between the lowermost portion of lip F and the top edge of the vertical portion of latch C when the machine is normal (home position).
   TO ADJUST, bend lip AI.
6. To assure latch C has a safe hold on slide A during subtract operations -
   The vertical projection of latch C should be centrally aligned with lip F when the minus bar is depressed and the handle forward.
   TO ADJUST, bend the rearmost portion of latch C.
7. To assure that latch C moves up and holds slide A in its correct position -
   There should be minimum (pass by) clearance between the rear edge of the vertical projection on latch C and the forward edge of lip F when the minus bar is depressed and the handle is forward.
   TO ADJUST, bend the forward vertical projection of slide A.

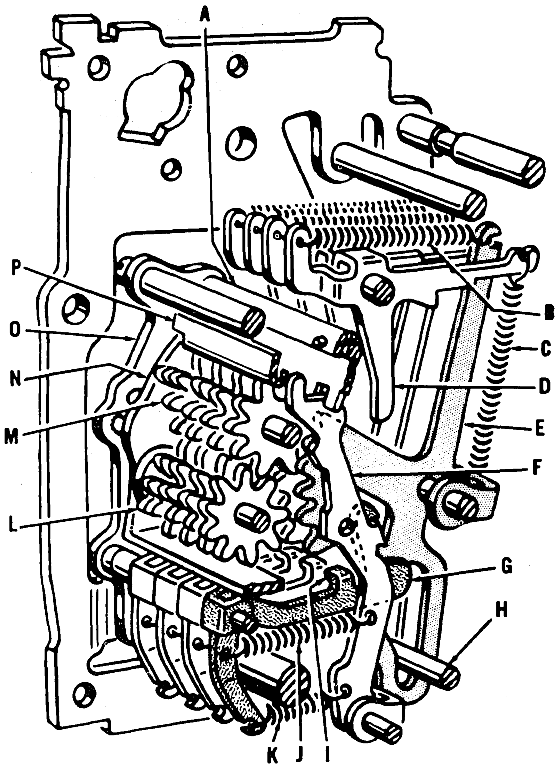


Fig. III-10

THE ACCUMULATOR MECHANISM

As explained under subject "Accumulation of Indexed Amounts", Fig. III-5, the Series P 200 accumulator consists of two sets of intermeshed pinions - upper pinions M (which are set at cipher position) being known as the add pinions and lower pinions L (which are set at nine position) known as the minus pinions.

During plus operations when upper pinions M are clear (after having taken a plus total operation) the wide tooth (cipher tooth) of these pinions are located under the upper spear point of carry pawls F. This location of the wide tooth at cipher position is required due to the clockwise turning these pinions receive during plus operations as lower pinions L are turned counterclockwise by the adding racks.

During minus operations when lower pinions L are clear (after having taken a minus balance total) the wide tooth of the lower pinions are likewise located under the lower spear point of carry pawls F. This location of the wide tooth at cipher position is also required due to the clockwise turning these pinions receive during minus operations as upper pinions M are turned counterclockwise by the adding racks.

Carries resulting from addition or subtraction are produced in two stages:
The initial carry, which takes place while upper pinions M or lower pinions L are in mesh with the adding racks and the completed carry, which is produced when the active pinions are in mesh with carry racks E.

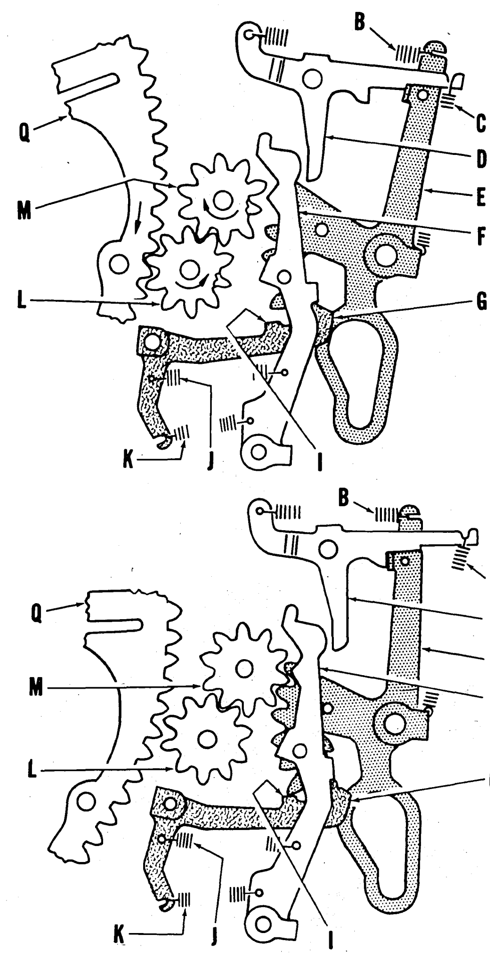


Fig. III-11

PLUS CARRY

An initial plus carry is produced when the wide tooth of upper pinion M (which is being turned clockwise) rocks carry pawl F rearward to become latched by carry pawl latch G moving upward.

Completion of a plus carry results when the rearward portion of carry pawl F rocks carry rack latch D as the accumulator moves out of mesh with adding racks Q. The rocking of latch D raises its rearward step clear of the lip on carry rack E, permitting spring B to rock carry rack E downward. Carry rack E then rotates upper pinion M (to the left) clockwise to advance it one point.

MINUS CARRY

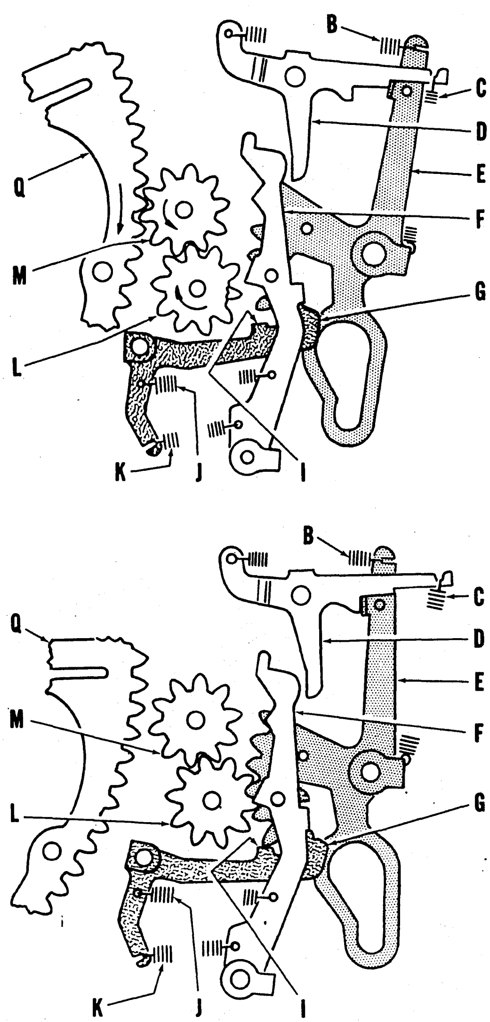


Fig. III-12

An initial minus carry is produced when the wide tooth of lower pinion L (which is being turned clockwise) rocks carry pawl F rearward to be latched by carry pawl latch G moving upward.

Completion of a minus carry is accomplished in the same manner as that of a plus carry, with one exception: lower pinion L being in mesh with carry rack E as the carry rack is released, is rotated and advanced one point.

CARRY RESETTING

Resetting of a carry involves resetting of both carry pawls F and carry racks E. Resetting of carry pawls F takes place when carry rack E moves downward. The latter, contacting lip I, lowers latch G, permitting springs J and K to pull the carry pawl forward to normal.

Resetting of carry racks E results when accumulator section O (Fig. III-10) moves forward to mesh the pinions with the adding racks. As accumulator section O moves forward, shaft H (Fig. III-10) moves downward and contacts the forward portion of the internal cam of carry racks E, permitting the rearward step of latch D to engage the lip of the carry racks.

Springs C safeguards against latches D moving upward through vibration and the subsequent release of carry racks E resulting in unwanted carries.

Tests and Adjustments

1. To assure the correct alignment of pinions L and M with carry racks E -
   With frame O limiting against the accumulator left side frame, there should be .003" to .006" clearance between set collar CD, Plate 4, Accumulation Parts Catalog, and the accumulator right side frame.
   TO ADJUST, re-position set collar CD, Plate 4.
2. To assure free movement of pinions L and M -
   Pinions L and M should have approximately

.005" overall side play.
TO ADJUST, replace space collar on the right of pinion shaft. See Plate 8, Accumulation Parts Catalog, Form 2984-4, for correct space collar.

3. To assure free movement of carry pawls F - Carry pawls F should be centrally aligned in the slots of bail A and should also have approximately .005" overall side play.
   TO ADJUST:
   a. Bend the uppermost portion of pawls F to obtain the correct alignment in the slots of bail A.
   b. Open or close the "U" form of carry pawls F for correct side play.
4. To assure correct normal and initial carry positions of carry pawls F - Carry pawl latches G should have no more than .010" overall side play.
   TO ADJUST, open or close the "U" form of latches G.
5. To assure free movement and correct alignment of carry racks E - Carry racks E should have no more than .010" overall side play.
   TO ADJUST, open or close the "U" form of carry racks E.
6. To assure free movement and correct alignment of carry rack latches D with carry pawls F - Carry rack latches D should have no more than .010" overall side play; the lowermost portion of latches D should also be centrally aligned with the rearmost portion of carry pawls F.
   TO ADJUST:
   a. Bend the "U" form of latches D for correct side play.
   b. Bend the lowermost portion of latches D for correct alignment with carry pawls F.
7. To assure carry rack latches D are raised sufficiently to release carry racks E during the completion of a carry - There should be .010" minimum, and .015" maximum clearance between the rearmost portion of carry pawls F and the lowermost portion of latches D when the machine is normal.
   TO ADJUST:
   a. With the machine normal, place the shank of screw driver kit 6A through the opening in the accumulator right side frame and then through the opening in the lowermost portion of carry racks E.
   b. Release all carry racks E from latches D.
   c. Move carry pawls F rearward (using a spring hook) into initial carried position.
   d. Release carry pawls F from initial carry position by pushing downward on the rearmost portion of latches G. Observe the downward movement of latches D as the carry pawls are released; this downward movement, which should be approximately .010" represents the amount of lift that carry pawls F give latches D over the lips on carry racks E as the accumulator section moves into mesh with the carry racks to complete the carry.

TOTAL STOP BAIL

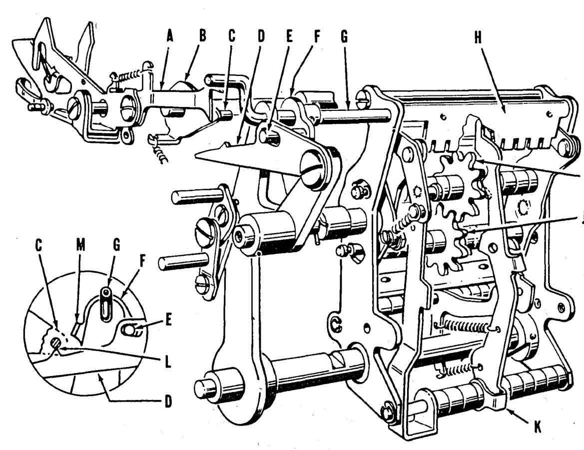


Fig. III-13

Total stop bail H provides a means of holding carry pawls K stationary as the wide tooth of pinions I and J limit against the pawls during plus and minus totals and sub-total operations. Bail H also holds carry pawls K to safeguard against inertial carries as the accumulator moves into mesh with the adding racks during plus and minus listing operations.

During the forward stroke of listing operations as aligning shaft B is turned into engagement with the adding racks, stud C rocks, bail H through arm D, stud E, and shaft G. As bail H is rocked, it is positioned up behind carry pawls K to prevent them from lagging behind under their own weight and setting up carries as the accumulator moves into mesh.

During the return stroke as the aligning shaft disengages the adding racks, stud C moves away from arm D permitting bail H to be moved back to normal by the carry pawls as they are moved rearward by the wide tooth of the pinions to initiate a carry.

When the total and sub-total keys are depressed, arm A is raised into path of shaft G.

At the beginning of the forward stroke of a machine operation with either the total or sub-total key depressed, shaft G contacts arm A causing bail H to be moved behind the carry pawls and block the latter as the wide tooth of the pinions limits against them.

Near the end of the forward stroke as the accumulator section moves out of mesh, shaft G moves away from arm A permitting bail H to be moved back to normal by the carry pawls as they are cammed rearward during the first listing operation in which an initial carry takes place.

Tests and Adjustments

1. To safeguard against bail H interfering with the rearward movement of carry pawls K as the latter are cammed rearward during carry operations -
   There should be .020" to .030" clearance between lip M and frame F when the handle is advanced to the third notch of the full stroke segment on a listing operation, accumulator manually meshed with the adding racks, and the carry pawls in an initial carry position.
   TO ADJUST, bend lip M.
2. To safeguard against inertial carries and the loss of carries by assuring the correct timing of bail H during plus and minus listing operation -
   Bail H should be held against carry pawls K while the accumulator section is moving into mesh and should be free to move away from the carry pawls as the carry pawls are moved rearward when adding nine to a nine.
   a. Remove latch P, Fig. III-6, for accessibility to stud C and arm D.
   b. Trip all the carry racks into carries position.
   c. Pull the handle all the way forward and insert the shaft of bender Kit 66A, No. 1, in the lower rearward opening of the accumulator right side frame.
   d. Permit the machine to restore until limited by the bender.
   e. In this position, there should be .014" to .050" clearance between stud C and arm D at point L.
   TO ADJUST, tilt stud E by bending part F.

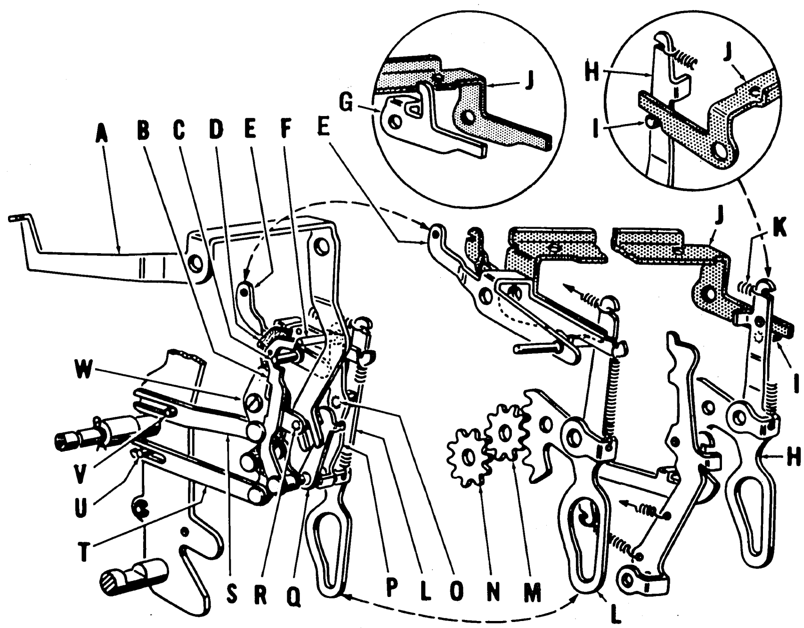


Fig. III-14

AUTOMATIC ONE AND MINUS BALANCE MECHANISM

A minus balance occurs when the amount in the minus pinions exceeds the amount on the plus pinions. Since, in a clear machine the wide teeth of the plus pinions are positioned at cipher position and the wide teeth of the minus pinions are positioned at nine, a negative one (which is automatic) is added to the first minus pinion before a true minus balance total can be taken.

During the first add listing operation following a minus balance total, a positive one (which is also automatic) is added to the first plus pinion to provide a true amount for a plus balance total should one be taken.

Carry rack L in column one is controlled by latches E and J, the latter being designed in the form of a bail. In turn latch E is controlled by lift arms B and D while latch J is controlled by carry rack H in the last column. In machine containing less than ten columns adding capacity, latch J is controlled by arm G located in the last adding column. Therefore to release carry rack L, latches E and J must be disengaged from the carry rack.

When the tumbling frame is in add position, latches E & J both engage carry rack L.

When the tumbling frame is in subtract position, latch E is held out of engagement with carry rack L by lift arm B. Near the end of the return stroke of a subtract operation, pinion shaft U moving rearward disengages latch E from carry rack L through link T, lift arm B and stud C.

During a subtract operation in which the amount being subtracted causes the amount on the minus pinions to exceed the amount on the plus pinions, a relay carry will occur causing carry rack H in the last column to be released. Forward movement of carry rack H raises latch J through roller I to permit carry rack L (in column one) to be released and add one to the first lower pinion.

As carry rack L moves into carried position, arm P which is connected to carry rack L by stud O, moves forward causing stud F to reverse the position of lift arms B and D. Stud F moving forward rocks lift arm B forward which, through lever W rocks lift arm D rearward thus causing stud R (of lever W) to move downward in the slot of bail A rocking the foremost portion of the latter upward.

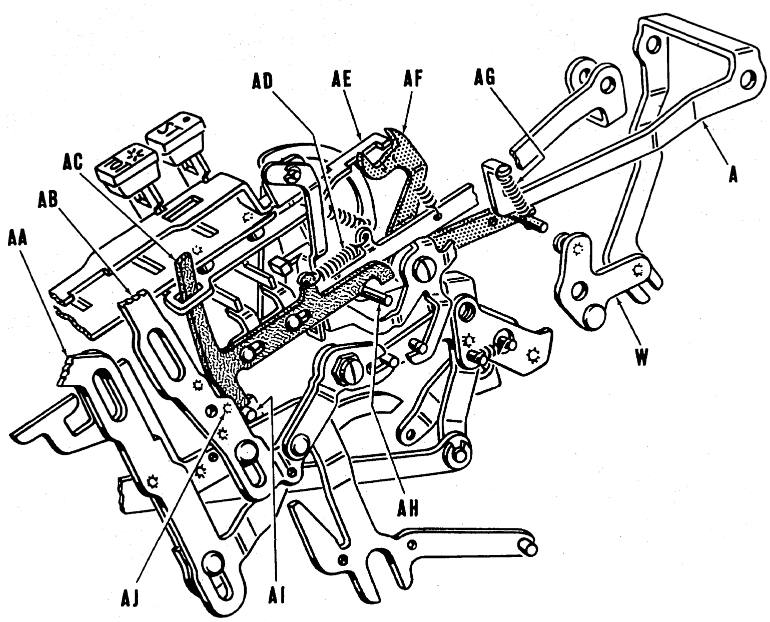


Fig. III-15

TOTAL CONTROL SLIDE IS CONTROLLED THROUGH BAIL A

Upward movement of the foremost portion of bail A rocks bell crank AF through spring AG. Rocking of bell crank AF moves slide AE forward to position the lower forward leg of slide AC from over stud AI of the plus motor bar AA to over stud AJ of the minus motor bar AB thus assuring that the tumbling frame will remain in subtract position during minus balance totals. Forward movement of slide AC also locates its lower rear lip over stud AH to index the symbol index arm for a minus balance symbol when the total key is depressed as outlined under Fig. III-3.

ONE IS AUTOMATICALLY ADDED TO PLUS PINIONS

A positive one is automatically added to the first plus pinions during the first plus listing operation following a minus balance total operation. Refer to Fig. III-14 and III-15.

During this add operation, the tumbling frame is tumbled to mesh plus pinions M with the carry racks in order to receive the automatic plus one. As the accumulator moves into mesh with the carry racks, pinion shaft V raises outer latch E through link S, lift arm D and stud C.

Since the accumulator is in a clear minus balance condition following a minus balance total operation, the wide teeth of minus pinions N are at cipher position and the wide teeth of the plus pinions M are at nine position. Therefore, adding amounts to the plus pinions causes a relay carry to take place across the plus pinions and the subsequent release of carry rack H in the last column. Forward movement of carry rack H raises latch J through roller I to permit carry rack L (in column one) to be released and add one to the first upper pinion.

As carry rack L moves into carried position, arm P moves forward causing stud F to reverse the position of lift arms B and D. Stud F moving forward rocks lift arm D forward which, through lever W rocks lift arm B rearward thus causing stud R to move upward in the slot of bail A causing the foremost portion of the latter to move downward.

Downward movement of the foremost portion of bail A normalizes bell crank AF and slide AE permitting spring AD to pull slide AC rearward to locate its lower forward leg over stud AI in plus motor bar AA to assure the tumbling frame will remain in add position during plus totals.

Tests and Adjustments

1. To assure slide AE is correctly located when in a minus balance position - There should be only a minimum amount of upward movement in the horizontal arm of bail A when the machine is in a clear minus balance position and the stud in the rearmost portion of bell crank AF is manually moved slowly down and up.
   TO ADJUST, weave bail A.

REVIEW ITEMS OF SERIES P 200 MACHINES

1. Why are there two sets of adding pinions meshed together in a Series P 200 machine?

2. What is the position of these pinions when the machine is in clear plus position?

3. What is the relative position of the wide tooth on the plus and minus pinions to the carry pawls when the machine is in clear plus position?

4. Why do the minus pinions go into mesh with the adding racks during an add operation?

5. In what direction do the plus pinions turn during an add operation?

6. How are the pinions tumbled from plus to minus position?

7. What test and adjustment is applied to bail Q (Fig. III-8)?

8. What may result if bail Q (Fig. III-8) does not have clearance over the adding pinions as the pinions are rotated?

9. What prevents excess movement of the adding pinions during the tumble of the section?

10. How is the tumbling section held during a subtract operation?

11. What is the purpose of slide A (Fig. III-9)?

12. What is the purpose of timing arm AC (Fig. III-9)?

13. How is the non-add key blocked against depression when the minus bar is depressed?

14. How is the minus pinion in column one automatically advanced one point when a minus amount exceeds the amount on the plus pinions?

15. How and when is slide AC (Fig. III-15) actuated to locate its lower forward leg over the stud in the minus motor bar?

16. How is a minus balance total symbol indexed?

17. How is the plus pinion in column one automatically advanced one point during the first plus listing operation following a minus balance total?

18. What affect does a plus automatic one have on the position of slide AC (Fig. III-15)?

19. How is the red ribbon lift mechanism indexed?

20. How is the red ribbon lift mechanism actuated?

Burroughs

FULL KEYBOARD

ADDING and BOOKKEEPING MACHINES

INSTRUCTION BOOK

Section IV

●

SERIES P300

Printed in U. S. America 7-15-64

For Form 3784

TABLE OF CONTENTS

CARRIAGE MECHANISM

FORM SPACING 5/6" FROM REGISTER "A" TOTAL KEY AND REGISTER "B" TOTAL LEVER

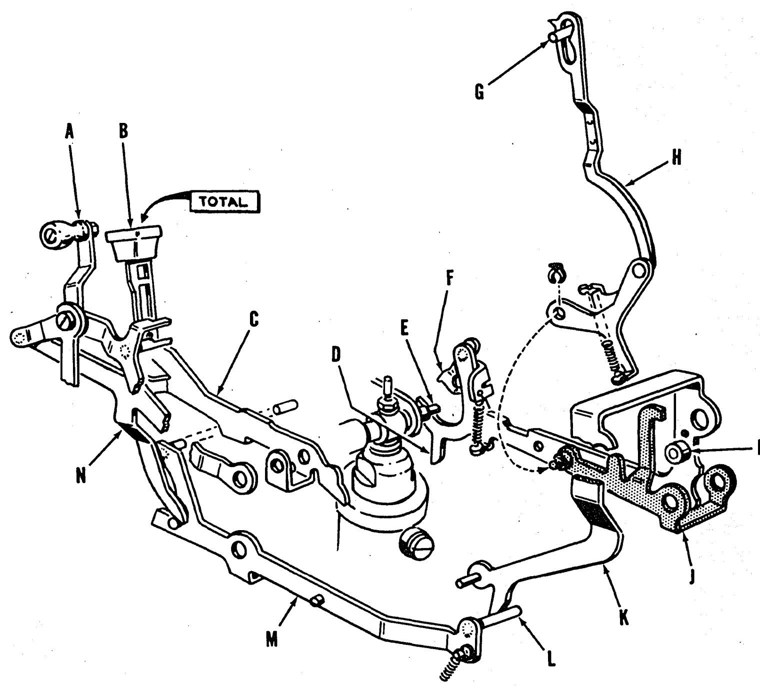


Fig. IV-1

This mechanism provides 5/6" spacing during total operations from registers "A" and "B" when space control lever (I, Fig. 1, Sec. II) is in its rearmost position.

Depression of key B (register "A") or forward movement of lever A (register "B") lowers arm C or N respectively. Lowering of arm C or N rocks lever M which, through stud L and bail assembly K positions pawl F over dashpot hanger shaft E. During the forward stroke of a total operation, shaft E raises pawl F rocking bail assembly K which through roll I rocks arm J lowering link H. Lowering of link H lowers stud G to complete the indexing of a 5/6" spacing operation.

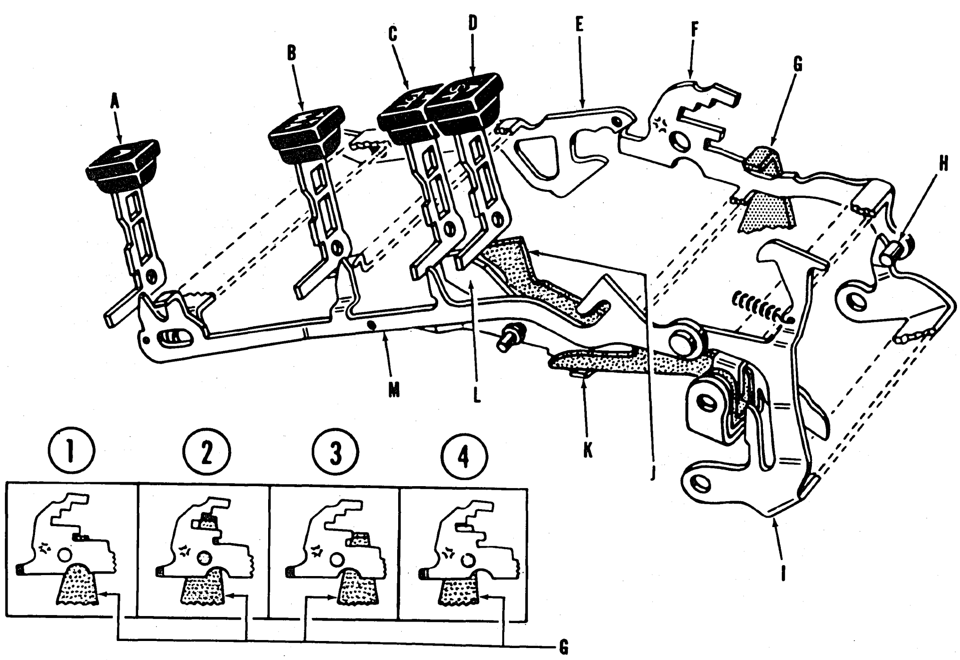
Completion of the 5/6" spacing operation is identical to that of the Series P100 machines as outlined in Section II.

Tests & Adjustments

1. To safeguard against overadjustment of bail assembly K -
   Stud L should be centrally located in the enclosed slot in the right accumulator side frame when the machine is normal.
   TO ADJUST, bend the rearmost portion of arm M.
2. To provide maximum indexing of bail assembly K from depression of register "A" total key B and from forward movement of register "B" total lever A -
   There should be minimum clearance between stud L and its point of contact with the right projection of bail assembly K when the machine is normal.
   TO ADJUST, manually hold the arm of assembly K upward. Pull the handle forward to locate the full stroke pawl in the first notch of the full stroke segment. Weave the bail portion of bail assembly K.

3. To assure full engagement of roll I with the vertical portion of arm J -
Bail assembly K should have minimum side play.
TO ADJUST, reposition the set collar located within the bail portion of bail assembly K.
4. To assure full engagement of shaft E with pawl F of bail assembly K -
With the total key depressed and the handle pulled forward to locate the full stroke pawl in the first notch of the full stroke segment, the leftmost portion of shaft E should be fully engaged with pawl F.
TO ADJUST, bend the forward portion of bail assembly K.
NOTE: When making this adjustment, care should be taken that projection D is properly located to limit on the flat surface of the dashpot cap.

SYMBOL PRINTING - TWELVE PITCH SECTOR



(Fig. IV-2)

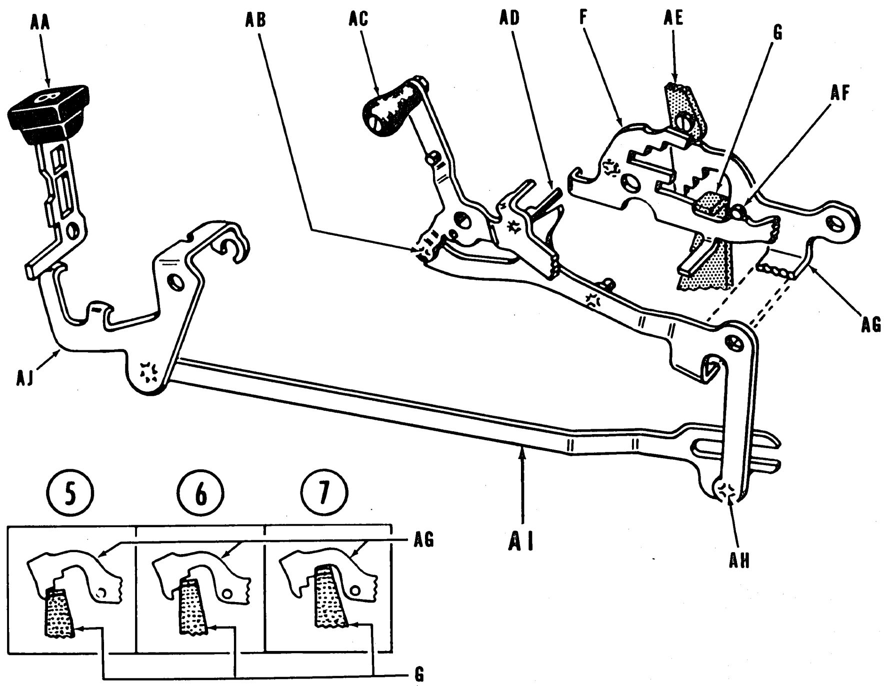
The symbol type bar located in column O on Series P300 machines may contain a maximum of twelve individual characters (12 pitch) as compared to the ten pitch sector found on Series P100 machines. The additional symbol locations are required to identify register "B" keyboard controls.

SYMBOL INDEXING ARM POSITIONED THROUGH REGISTER "A" CONTROLS

Depression of key A moves register "B" control link M rearward rocking arm I. Rocking of arm I through stud H, positions symbol index arm F (insert 1) for printing a specified symbol.

Depression of key B lowers non-add arm E which, through the forward projection of symbol indexing arm F, positions the symbol indexing arm (insert 2) for printing a specified symbol.

Depression of key C or D, through total arm L or sub-total arm J respectively, and lip K, of symbol indexing arm F positions symbol indexing arm F (inserts 3 and 4) for printing a specified symbol.



(Fig. IV-3)

AUXILIARY SYMBOL INDEX ARM POSITIONED THROUGH REGISTER "B" CONTROLS

Depression of key AA, through bellcrank AJ, link AI and stud AH positions auxiliary symbol indexing arm AG (insert 5) for a specified symbol.

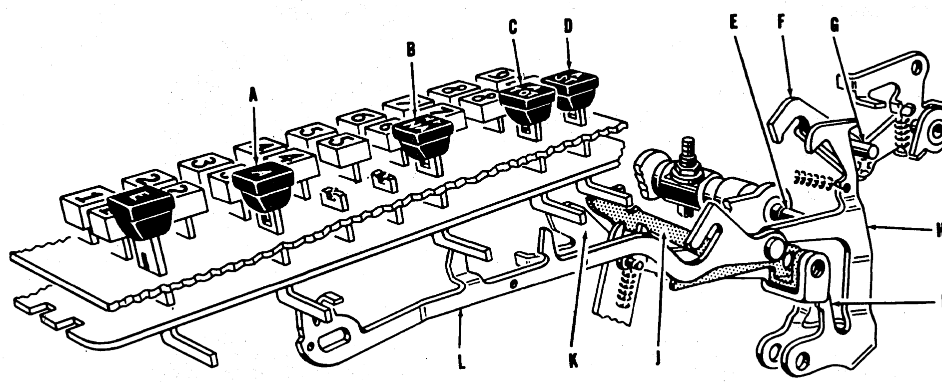
Forward or rearward movement of lever AC, through stud AB or stud AD positions auxiliary symbol indexing arm AG (inserts 6 and 7) for printing a specified symbol. Symbol indexing arm F is lowered to an inactive position, through stud AF, to clear the lip of bail G.

Tests and Adjustments

1. To assure reset of bail G -
With the machine normal, there should be approximately .010" reset clearance of the lip of bail G behind the rearmost step of symbol indexing arm F.
TO ADJUST, weave the "U form" of bail G.
2. To assure correct symbol to print from register "A" controls -
The operation control keys whether latched down or held firmly depressed, should properly position the symbol indexing arms.
TO ADJUST,
   a. From key A, bend the bail portion of arm I.
   b. From key B, bend the lip of non-add arm E.
   c. From key C, bend lip K up or down.
   d. From key D, bend the finger on arm J which controls lip K.
3. To assure correct symbols to print from register "B" controls -
Key AA, whether latched down or held firmly depressed, and lever AC, whether latched or held firmly in its forward or rearward position, should properly position the symbol indexing arms.
TO ADJUST,
   a. From key AA, bend the lower rear finger of arm AG.
   b. From lever AC, bend the right forward portion of symbol indexing arm AG.

Note: The home position for auxiliary symbol indexing arm AG is against projection AE of the keyboard. The home position of symbol indexing arm F is against stud AF.

ACCUMULATOR CONTROLS - REGISTER "A" AND "B"



(Fig. IV-4)

The accumulating section of the Series P300 machine is similar to that of the Series P100 machine with the addition of a second independently controlled adding register (register "B") located above the lower adding register (register "A") making it possible to accumulate two separate totals.

At normal, the controls of both register "A" and register "B" are positioned to add indexed amounts. Depression of specified control keys on the keyboard repositions these controls to total, sub-total, or non-add one or the other register. Depression of the motor bar does not reposition these register controls so simultaneous addition in both registers results from its use.

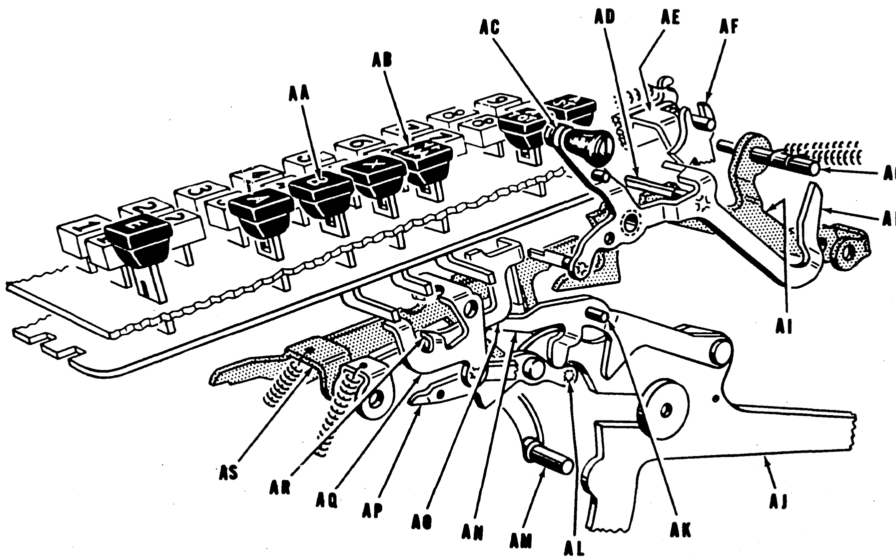
REGISTER "B" NON-ADD CONTROLS

When indexed amounts are to be non-added in both registers or added in the lower register only, or when previously accumulated amounts are to be cleared from the lower register, the non-add controls for the upper register must be indexed. This is accomplished through the depression of Operation Control Keys 3-0, 6-0, 8-0 and 9-0 which positions pawl F rearward clear of stud E of the dashpot hanger assembly.

Depression of key A or B positions pawl F rearward through the rearward movement of link L, arm H, and stud G.

Depression of key C positions pawl F rearward through total arm K, projection I, arm H, and stud G.

Depression of key D positions pawl F rearward through sub-total arm J, projection I, arm H, and stud G.



(Fig. IV-5)

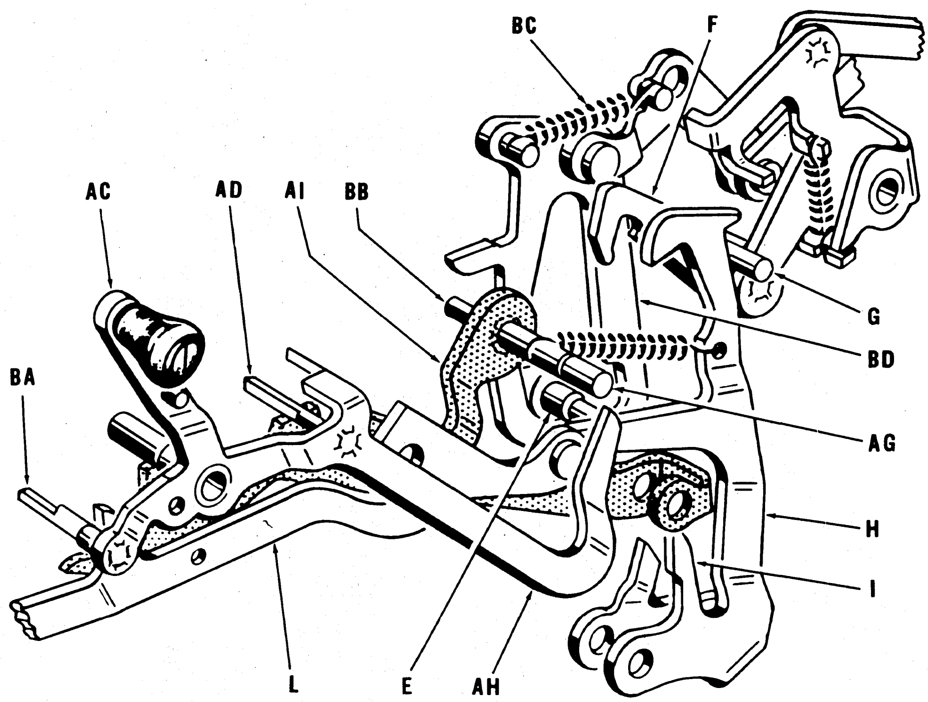
REGISTER "A" NON-ADD CONTROLS

When indexed amounts are to be non-added in both registers or added in register "B" (upper register) only, or when previously accumulated amounts are to be cleared from register "B", the non-add controls for the lower register must be indexed. This is accomplished through depression of operation control keys 4-0 and 6-0 and through forward or rearward movement of register "B" total and sub-total lever AC which raises the forward portion of register "A" listing pawl AP. The non-add machine operation is then the same as that of Series P100 machine.

Depression of key AA raises the forward portion of pawl AP through bellcrank AQ, stud AR, arm AO and register "A" total hook AN.

Depression of key AB raises the forward portion of pawl AP through non-add arm AS and stud AL.

Rearward or forward movement of lever AC raises the forward portion of pawl AP through the lowering of arm AI by stud AD (rearward movement) or hook AH and stud AG (forward movement). As arm AI moves downward, the forward projection of the arm contacts stud AK lowering total hook AN.



(Fig. IV-6)

REGISTER "B" TOTAL AND SUB-TOTAL INDEXING CONTROLS

A total of listed amounts previously accumulated in the upper register is accomplished by moving lever AC (Operation Control Lever No. 51) forward.

Movement of lever AC forward swings arm AI downward through hook AH and stud AG. As arm AI swings downward, stud BB moves away from internal pawl BD, permitting spring BC to move the lower rear step of the internal pawl over stud E (Fig. IV-4). Movement of lever AC forward also moves link L rearward, through stud BA, contacting the inclined finger on link L. The rearward movement of link L through arm H and stud G repositions pawl F rearward. With internal pawl BD and pawl F (Fig. IV-5) so positioned, a total of the upper register is indexed.

A sub-total of listed amounts previously accumulated in the upper register is accomplished by moving lever AC rearward.

Movement of lever AC rearward swings arm AI downward, through stud AD, permitting spring BC to position the lower rear step of internal pawl BD over stud E (Fig. IV-4). Pawl F is not repositioned through the rearward movement of lever AC. With internal pawl BD and pawl F so positioned, a sub-total of the upper register is indexed.

REGISTER "A" TOTAL AND SUB-TOTAL INDEXING CONTROLS

A total or sub-total of the lower register is accomplished in exactly the same manner as on the Series P100 machine. Refer to the coverage in Sec. II for information concerning these controls.

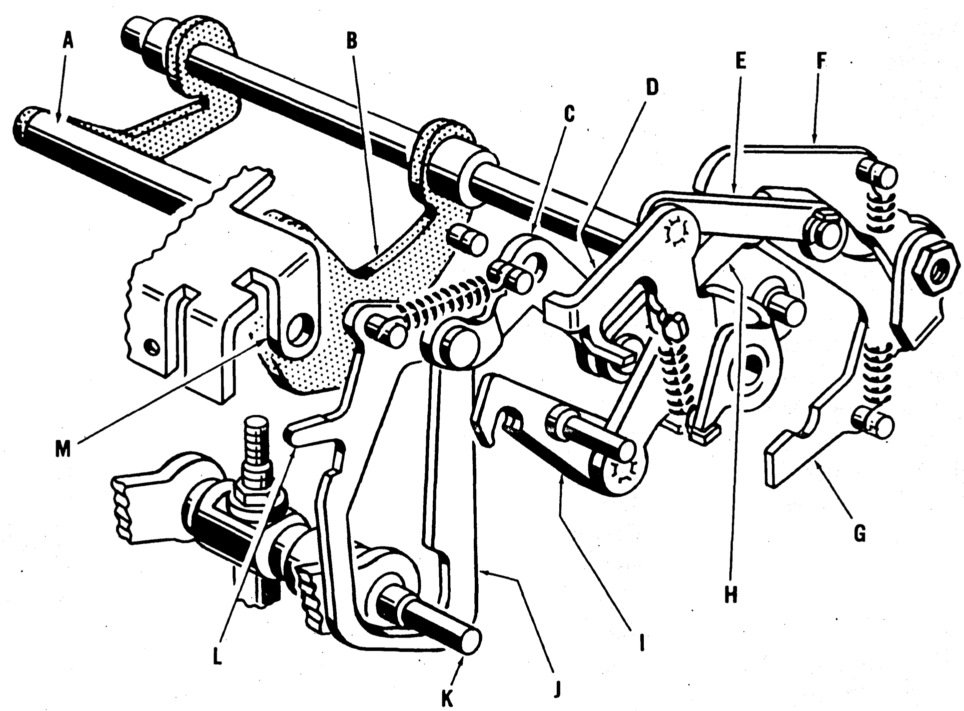
Tests and Adjustments

1. To assure proper indexing of the upper register non-add mechanism from various sources -
With a non-add operation indexed, arm H should position pawl F rearward sufficiently to clear stud E as stud E travels downward

on the return stroke of a machine operation.
TO ADJUST,

a. From OCK 3-0 bend the upper portion of arm H.
b. From OCK 6-0, bend the inclined finger of link L that key B contacts.
c. From OCK 8-0, bend projection I for an earlier or later contact by the bail portion of total arm K.
d. From OCK 9-0, bend projection I for an earlier or later contact by the bail portion of sub-total arm J.

REGISTER "B" MESHING CONTROLS



(Fig. IV-7)

These controls provide a means of meshing the upper (register "B") pinions with the adding sectors during listing, totaling, and subtotaling operations.

Stud K, of the dashpot assembly, travels upward during the forward stroke of a machine operation and downward during the return stroke. Internal pawl J and pawl I, indexed through keyboard controls, are actuated by stud K during various stages of the machine operation to move the upper pinions into mesh or out of mesh with the adding sectors.

LISTING OPERATION

During the forward stroke of a listing operation, stud K clears the lower rear step of internal pawl J. The upper pinions remain rearward out of mesh with the adding sectors.

At the beginning of the return stroke, stud K engages and drives pawl I downward. The downward movement of pawl I, through bell-crank D and link E rocks cam assembly B, moving the register "B" pinions into mesh with the adding sectors where they remain until the end of the return stroke. Toward the end of the return stroke, stud K engages the lower portion of internal pawl J (which has been raised at the beginning of the return stroke, through the reciprocating action of pawl I, bellcrank D, links E and H, and bellcrank C) driving internal pawl J downward, disengaging the register "B" pinions from the adding sectors.

Detent G retains cam assembly B in its lowered position after stud K leaves pawl I on the return stroke of a listing operation. This safeguards against premature raising of the cam assembly - permitting the register "B" pinions to leave the adding sectors before addition is completed - when the carry racks snap upward during carry resetting.

TOTAL AND SUB-TOTAL OPERATION

With a total or sub-total of register "B" indexed, the lower rear step of internal pawl J is positioned over stud K. As stud K travels upward, at the beginning of the forward stroke, internal pawl J is raised which, through links C and H and cam assembly B, moves the register "B" pinions into mesh with the adding sectors. The pinions remain in mesh with the adding sectors through the forward stroke where amounts are cleared from the pinions.

As internal pawl J is raised, its forward projection L contacts lip M of the hammerhead, camming the step of the internal pawl off stud K. The disengagement of internal pawl J from stud K at this time is necessary to limit the downward movement of cam assembly B at a point where the pinions are fully meshed with the adding sectors but, before shaft A has been lowered sufficiently to contact the released carry racks. The hold of internal pawl J on stud K is not sufficient beyond this point to assure full resetting of the carry racks. If internal pawl J should lose its hold on stud K with carries partially reset, a point-to-point lock (adding pinions to carry racks) or overaddition could occur.

Detent F assists in retaining cam assembly B in this semi-lowered position.

Toward the end of the forward stroke of a total or sub-total operation, stud K raises pawl I, (which had been lowered at the beginning of the forward stroke, through the reciprocating action of internal pawl J, links C, H, and E and bellcrank D) which, through bellcrank D and cam assembly B, disengages the pinions from the adding sectors.

During the return stroke of a sub-total operation, the pinions are brought back into mesh with the adding sectors as stud K engages and lowers pawl I. The pinions remain in mesh with the adding sectors through the return stroke, where the amount cleared from the pinions on the forward stroke is returned to the pinions. As the return stroke is completed, stud K engages and lowers internal pawl J moving the pinions rearward out of mesh with the adding sectors.

Tests and Adjustments

1. To safeguard against a point-to-point lock (register "B" pinions to carry racks) or wrong addition during a total operation -
   a. Internal pawl J should have a safe hold over stud K when lever AC (Fig. IV-6) is latched forward or rearward.
   b. Internal pawl J should be cammed off stud K just before shaft A contacts the released carry racks.

TO ADJUST:
   a. Weave stud BB (Fig. IV-6).
   b. Bend projection L.

REVIEW ITEMS OF SERIES P300 MACHINES

1. How is bail assembly K, Fig. IV-1, indexed to space the carriage 5/6" on total operations?

2. How is a symbol indexed from O.C.K. 3-0?

3. How is a symbol indexed from O.C.K. 4-0?

4. When and how is the upper register moved into and out of mesh with the adding sectors on a listing operation?

5. When and how is the upper register moved into and out of mesh with the adding sectors on a totaling operation?

6. How does a sub-total of the upper register differ from a total operation?

7. How is the lower register non-added from O.C.K.'s 4-0, 6-0, and O.C.L. No. 51?

8. How does a carry take place in the upper register?

9. How are the carry racks in the upper register reset on a listing operation?

10. How are the carry racks in the upper register prevented from being reset during a total operation?

11. How is the upper register non-added?

12. What is the purpose of lever AC, Fig. IV-5?

13. How is lever AC latched in its forward and rearward position?

14. How is lever AC blocked against movement during a machine operation?

15. How are the operation control keys blocked against depression when lever AC is latched in either its forward or rearward position?

Burroughs

FULL KEYBOARD

ADDING and BOOKKEEPING MACHINES

INSTRUCTION BOOK

Section V

●

SERIES P THREE REGISTER

Printed in U. S. America 2-15-65

For Form 3784

TABLE OF CONTENTS

SERIES P THREE REGISTER

Series P Three Register

CARRIAGE MECHANISM

The 7 1/2", two position carriage is a basic feature on certain styles of the Series P, three register machine that provides additional protection and convenience of two recording tapes; one for validating - receipting operations and the other for miscellaneous listings.

Shifting of the carriage, positions either the validating portion of the carriage, equipped with a rewind device for use with a double wound carbonized journal roll; or the listing portion of the carriage, equipped to use a single wound roll, either being in alignment with the printing section.

The platen is split to permit independent spacing control in either carriage position. An interlock is provided to prevent validating while the carriage is located to the left (list) position.

FRONT VIEW

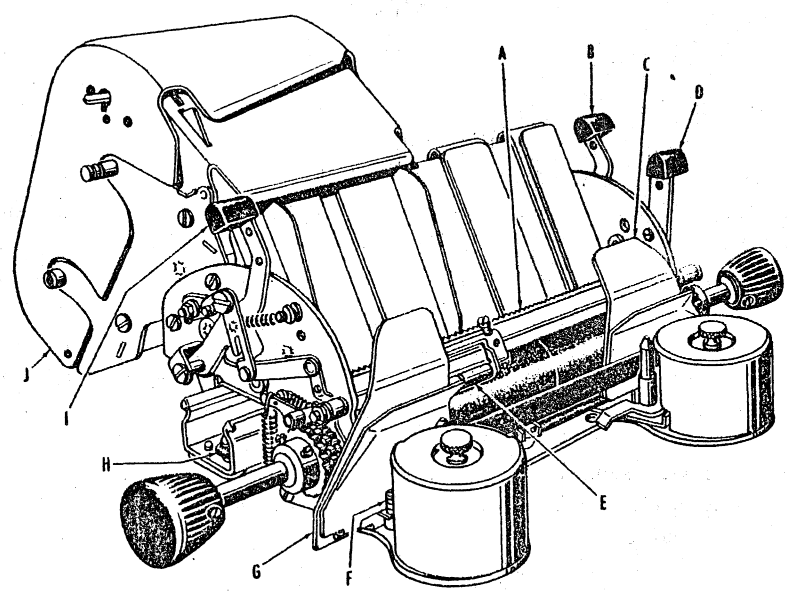


Fig. V-1

The carbonized journal roll is stored in rewind device J and feeds around the platen and under tear off blade A. The first ply may be torn off at intervals for proving while the second ply feeds back for storage in the rewind device. The listing paper is stored on the right side of the carriage and also feeds around the platen, up and under tear off blade A. Movement of lever I releases the pressure rolls to permit re-alignment of the paper rolls.

Form chutes C and G are so designed for a safeguard against possible tearing the listing and journal tapes as the carriage is shifted from right to left and vice versa. Auxiliary guide roll E may be installed should excessive bulging of the journal roll paper exist.

Forms to be validated are placed in form chutes C and G where they are supported while printing takes place. The height of form chutes C and G may be altered by adding to or removing space collars F, thereby raising or lowering the printing line on the forms.

REAR VIEW

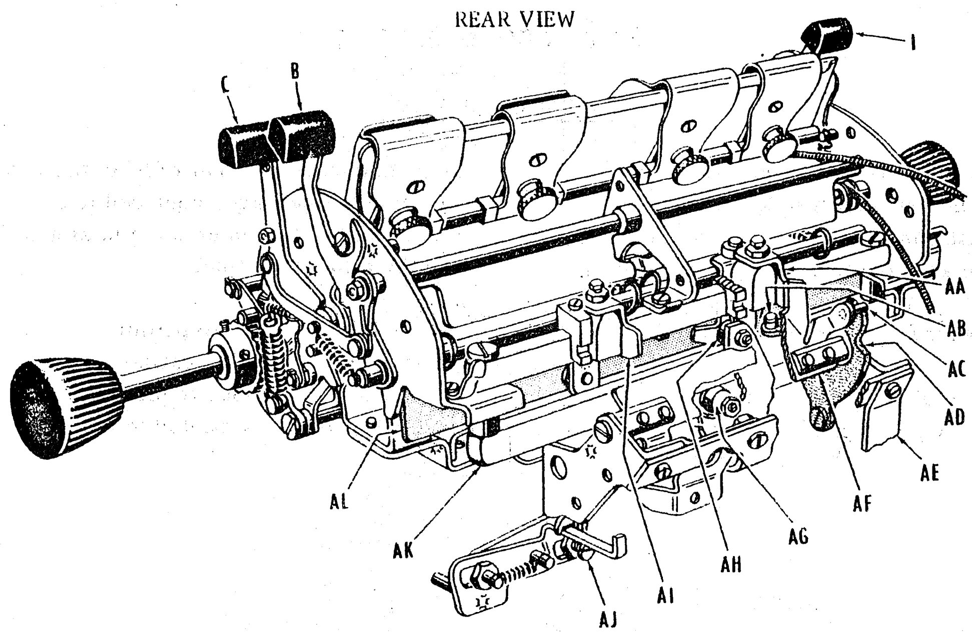


Fig. V-2

The carriage is retained in either validating or listing position by stops AA or AI limiting against the lip of tabulating bail assembly AF.

Tabulation of the carriage to listing position is accomplished by moving lever B forward which rocks bail AL. As bail AL is rocked, lever AD is moved rearward through roll AB, rocking the tabulating bail assembly AF through stud AC. The rocking of the tabulating bail assembly releases the carriage where tension of spring H, Fig. V-1 tabulates the carriage to listing position. The carriage is manually returned to validating position.

Third rail AK, riding between rolls AG and AH, support the upper (movable) portion of the carriage.

Screw AJ and brace AE support the lower (stationary) portion of the carriage.

PLATEN SPACING CONTROLS

Carriage feed pawls BX and BU, fastened to spacing bail BW, are actuated on each machine operation and engage ratchet wheels BZ and BO, respectively, spacing the platen. Non-space of either or both sides of the split platen is accomplished by rocking shutters BV and BY into active position. When in active position, the lip of the shutters prevent the carriage feed pawls from engaging the ratchet wheels.

When the carriage is in validating position, spacing control bail BI is held rearward by springs CA and BL. With spacing control bail BI so positioned; shutter BV is rocked to active position through link BK and shutter BY is rocked to inactive position through spacing control bail BA and link CB. Moving the carriage to list position rocks bail BI forward, through screw BH, arm BB and roll BC. This reverses the action of the shutters. Shutter BV is now inactive while shutter BY is active

PLATEN SPACING CONTROLS

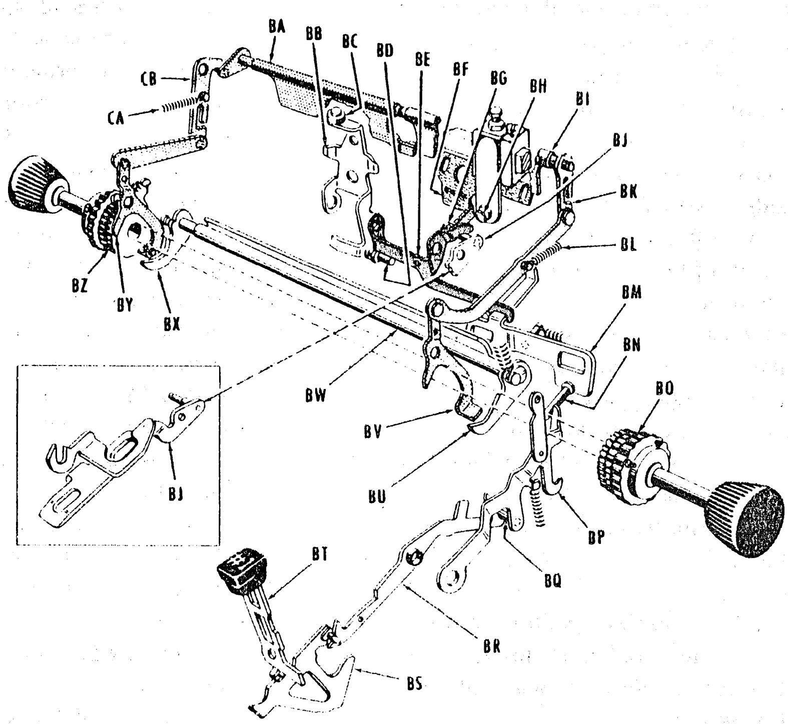


Fig. V-3

Bail BA is rocked to non-space the left portion of the platen during a receipting operation from Teller Key No. 1 (O.C.K. 6-0). Depression of key BT rocks non-add arm BS and lever BR raising arm BP through stud BQ. As arm BP is raised, it cams slide BM to the left through stud BN, moving the rear projection of bail BE over roll BG (of slide BJ). As the machine operation progresses, roll BG moves rearward rocking bail BE which in turn rocks non-space control arm BB through stud BD. As arm BB is rocked, spacing control bail BA is moved forward through roll BC to swing shutter BY into active position.

Tests and Adjustments

1. To provide rigid support for the movable portion of the carriage and still permit free carriage tabulation and returning -
Roll AG should have minimum clearance under rail AK and roll AH should have minimum clearance over rail AK.
TO ADJUST, turn eccentric screws supporting the rolls and lock in place with the locknuts.
2. To provide rigid support for the stationary portion of the carriage -
Screw AJ should be positioned to just contact the machine case.
TO ADJUST, turn screw AJ in or out as required and lock in place with the locknut.
NOTE: The following tests and adjustments should be made in the sequence given.
3. To assure proper functioning of non-space mechanism from a Tell Key No. 1 (O.C.K. 6-0) machine operation -
   a. Brace BF should support roll BG without a sag or bind and the forward projection of the brace should align with the left half of roll BG.
   b. With the machine normal (at home) and the play in bail BE held to the left, (without changing the normal position of slide BM) the rear projection of bail BE should not position over roll BG.

c. With O.C.K 6-0 in a latched down position, the inclined camming surface or arm BP should be raised above stud BH.

d. With O.C.K 6-0 in a latched down position, the rear projection of bail BE should be fully positioned over the right half of roll BG.

e. With O.C.K 6-0 in normal (not depressed) position, manually shift bail BE to the left and check for minimum clearance of the rear projection of bail BE over roll BG.

f. With the carriage shifted to the right and bail BA rearward, check for roll BC to just contact bail BA.

g. On an O.C.K 6-0 machine operation, shutter BY should be rocked sufficiently to cover the tooth of ratchet gear BZ which is normally engaged by spacing pawl BX.

TO ADJUST:

a. Loosen the two screws holding brace BF and move the brace up or down. Bend the forward projection of brace BF to the left or right.

b. Bend the rear projection of bail BE to the right or left.

c. Weave the lower projection of arm BP that contacts stud BQ, to raise or lower stud BQ in relation to lever BR.

d. Bend the rear projection of arm BP toward or away from the right side frame.

e. Bend the lip on the lowermost portion of arm BB forward or rearward.

f. Bend the upper portion of arm BB.

g. Use a screw driver or pliers to spread or close the slot in link CB.

4. To assure proper functioning of the non-space mechanism from carriage controls -

a. With the carriage shifted to the left, shutter BY should be rocked sufficiently to cover the tooth of ratchet gear BZ which is normally engaged by space pawl BX.

b. With the carriage shifted to the left, shutter BV should be rocked sufficiently to expose one tooth of rachet gear BO.

TO ADJUST:

a. Turn screw BH in or out and lock with the locking nut.

b. Use a screw driver or pliers to spread or close the slot in link BK.

LOCKED KEYBOARD MECHANISM

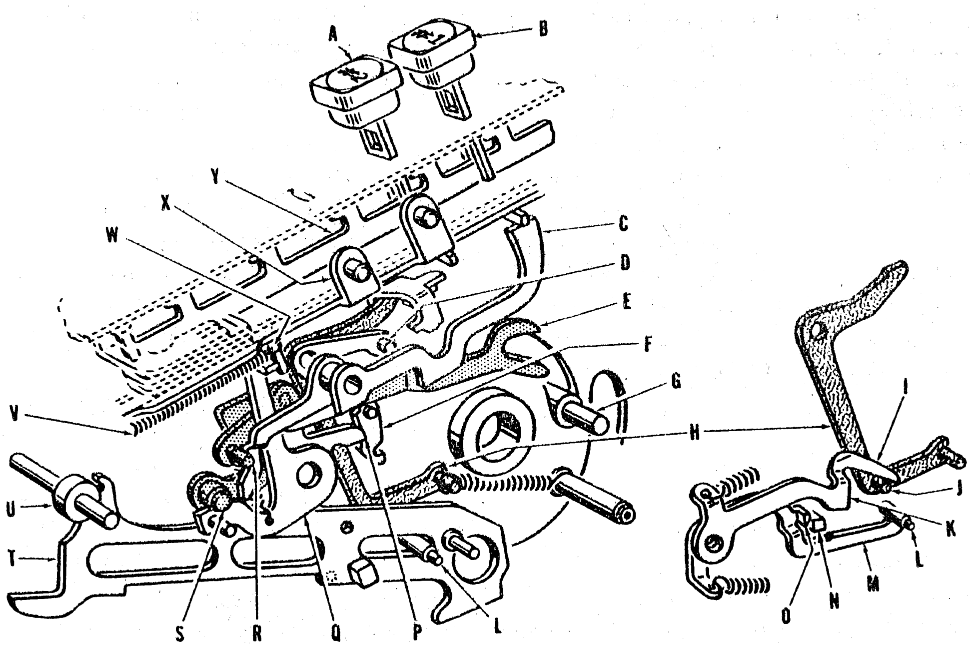


Fig. V-4

Keyboard safeguard locks are actuated at the beginning of a validating operation and release at the completion of the operation, thus preventing a change of the amount indexed on the keyboard insuring the correct sequence of operation.

Key B (Teller Key No. 1) actuates safeguard locks to block the depression of all keys and motor bars except OCK 5-0 and multiple receipt lever AD, Fig. V-5. Depression of key B lowers forked arm E through lever C and stud R. During the forward stroke of the machine operation, stud G (of the secondary mechanism) engages the forked portion of arm E driving it forward to latch its finger P on the upper step of latch F. As arm E is being latched, roll S is lowered which in turn lowers the foremost portion of key restoring slide T positioning its uppermost pocket in line with roll U thus preventing the release of the indexed keys during the return stroke of the machine operation.

Depression of OCK's 4-0, 7-0, 8-0, 9-0 and the motor bars are blocked as roll S swings lever Q, away from stud W, permitting spring V to pull slide X forward. Forward movement of slide X also positions a cutout in the slide under key A permitting its depression. Operation of multiple receipt lever AD, Fig. V-5, is permitted as roll S swings lever Q to raise the rearmost portion of arm AJ, Fig. V-5, out of the path of roll AF, Fig. V-5, through levers AO and AL, Fig. V-5.

Should a repeat operation be attempted from key B, a handle break will occur since key restoring slide T, in its lowered position, has its rearward travel limited by interlock M being positioned in the path of stud N.

Following a validating operation from OCK 6-0, key A is depressed restoring key B, through locking strip Y permitting arms C and E to restore to normal. On the forward stroke of the machine operation, stud G passes under forked arm E caming it upward to release latch F from finger P through stud D. With key A depressed, lever H is rocked, locating stud J out of the path of latch K permitting the latter to be pulled down by spring tension. Downward movement of latch K lowers latch M out of the path of stud N thru lip O thus disabling the handle break mechanism previously set up to safeguard against a second operation from Key B without first using lever AD, Fig. V-5.

MULTIPLE RECEIPT LEVER (O.C.L. NO. 54) PERMITS MULTIPLE RECEIPT OPERATIONS

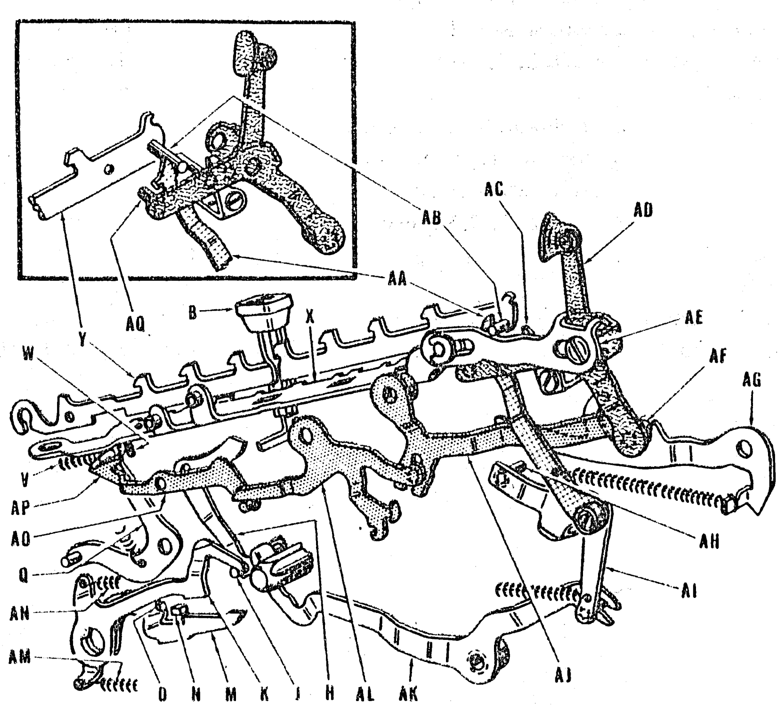


Fig. V-5

MULTIPLE RECEIPT LEVER (O.C.L.NO. 54) PERMITS MULTIPLE RECEIPT OPERATIONS

Rearward movement of lever AD releases key B (O.C.K. 6-0), blocks key A, Fig. V-4, (O.C.K. 5-0), and re-positions latch M. Key B is released as lever AD rocks arm AA rearward through stud AQ. Arm AA moves locking strip Y rearward through stud AB releasing key B. Key A, Fig. V-4, is blocked against depression as lever AD moves rearward pulling slide X rearward through link AE positioning a lip of slide X under the keystem. In order to prevent a handle break, rearward movement of lever AD rocks symbol index arm AI through detent AG and stud AH to re-position latch M below stud N through arm AK, lever H, latch K and lip O.

Tests and Adjustments

1. To assure a locked keyboard from a machine operation with O.C.K. 6-0 depressed -
   a. Stud G should just clear over the lower prong of forked arm E during the forward stroke of a machine operation with O.C.K. 6-0 latched depressed.
   b. Finger P (of forked arm E) should latch on the upper step of latch F with slight lead during the forward stroke of a machine operation with O.C.K. 6-0 latched depressed.
   c. Key restoring slide T should be positioned through roll S to permit its upper pocket to contact roll U on the return stroke of a machine operation with O.C.K. 6-0 latched depressed.

   TO ADJUST:
   a. Bend the foremost portion of lever C to or from stud R.
   b. Adjust the offset portion of forked arm E.
   c. Tilt roll S up or down.
2. To assure the release of the locked keyboard mechanism -

   Stud G should raise forked arm E sufficiently during the forward stroke of a machine operation with O.C.K. 5-0 latched depressed to release latch F from finger P.

   TO ADJUST: Operate the machine manually on an O.C.K. 5-0 operation, and check for approximately 1/64" clearance between finger P and latch F as forked arm E is raised to its high point, bend the lower prong of arm E.

   NOTE: After bending the fork of arm E, recheck test No. 1 (a).
3. To assure a handle break taking place should a misoperation by the operator occur during a validating operation -
   a. Latch M should have minimum clearance under stud N on a normal machine operation, also latch M should block the travel of stud N if a repeat O.C.K.6-0 is attempted.
   b. Latch K should have minimum clearance over stud N on an OCK 5-0 operation, following an OCK 6-0 operation, also latch K should block the travel of stud N if a repeat OCK 5-0 operation is attempted.
   c. Stud N should clear both latches on a multiple receipt operation indexed through lever AD.

   TO ADJUST:
   a. Latch M limits on stud L. Bend the rear portion of latch M to raise or lower the latch in respect to stud N.
   b. Latch K limits on stud L when in its lowered position. Bend finger I to raise or lower latch K in respect to stud N.
   c. Bend the foremost portion of arm AK.

MOTOR BAR AND CONTROL KEY INTERLOCKS

Various interlocks block simultaneous depression of operation control keys and/or motor bars to safeguard against misoperation of the machine during individual steps of the validation operation.

SLIDE BLOCKS DEPRESSION OF INCORRECT CONTROL KEYS AND MOTOR BARS DURING VALIDATING OPERATIONS

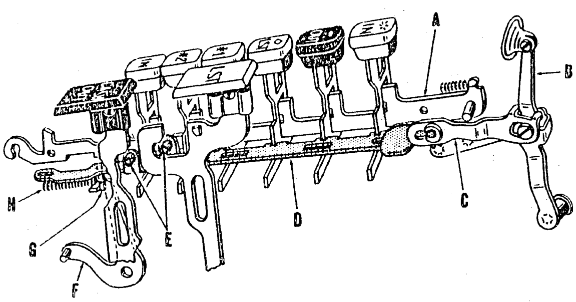


Fig. V-6

Slide D may assume either of the three following positions depending upon the operation in progress:

a. With the machine normal (at home) and slide D in its No. 1 position, a lip of slide D blocks depression of O.C.K. 5-0.

b. With O.C.K. 6-0 keyboard lock active, lever F is positioned away from stud G permitting spring H to move slide D to its forward No. 2 position. In this position, the lips of slide D block depression of O.C.K. 4-0, 7-0, 8-0, and 9-0 while studs E (of slide D) block the depression of the motor bars.

c. Depression of a motor bar moves slide D rearward through studs E to its No. 3 position where the lips of the slide block the depression of the operation control keys.

Rearward movement of lever B re-positions slide D through link C, to its No. 1 position to block depression of O.C.K. 5-0 and permit subsequent depression of O.C.K. 6-0. At this stage of the validating operation, O.C.K. 's 4-0, 7-0, 8-0, and 9-0 are blocked by locking strip A, and the motor bars are blocked by interlocks AB and AC (Fig. V-7) positioned through a lip on lever AL, Fig. V-5.

MOTOR BAR INTERLOCKS

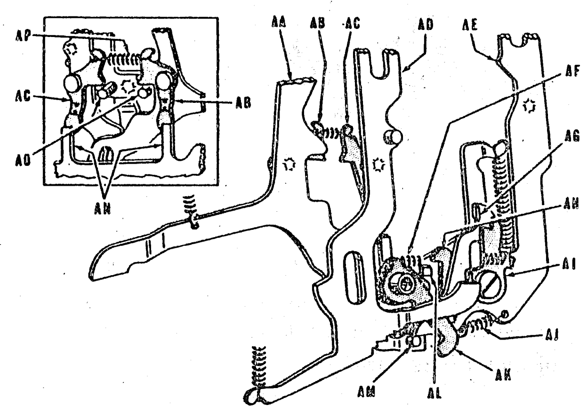


Fig. V-7

Simultaneous depression of motor bars and/or operation control keys is prevented by indexing various interlocks in the following manner:

a. Motor bar AD (LST) is blocked by interlock AK swinging under a lip on the lowermost portion of motor bar AD when motor bar AE (Cash Out) is depressed.

b. Motor bar AE (Cash Out) is blocked by interlock AH swinging over stud AL when O.C.K. 8-0 (Cash Out Total Key) is depressed.

c. Motor bar AE (Cash Out) is blocked by interlock AI swinging under lip AG when motor bar AD (LST) is depressed.

d. Motor bar AD (LST) is blocked by interlock AC limiting on forward finger AN when motor bar AE (Cash Out) is depressed.

e. Motor bar AE (Cash Out) is blocked by interlock AB limiting on rearward finger AN when motor bar AD (LST) is depressed.

f. Simultaneous depression of motor bars AE (Cash Out) and AD (LST) is blocked after an OCK 6-0 operation, by interlocks AB and AC limiting on fingers AN.

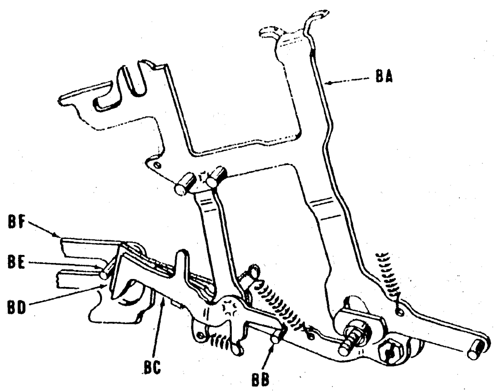


FIGURE V-8

Interlocks BC and BD safeguard against wrong selection of register and locked machine resulting from the incorrect indexing of various mechanisms from snap depressions of motor bars and operation control keys.

Depression of the intermediate motor bar BA lowers interlock BC out of the path of stud BE. On the forward stroke of a machine operation with an OCK or motor bar latched down, stud BE passes over interlock BC permitting the full rearward movement of key restoring slide BF. If a snap depression of a motor bar or OCK should trip the drive but failed to latch down, interlock BC will position in the path of stud BE causing a handle break.

Interlock BD, which is slightly longer than interlock BC, is normally positioned under stud BE. Upon completion of a validating operation from Teller Key No. 1 (OCK 6-0), interlock BD is located in the path of stud BE to assure full depression of Teller Key No. 2 (OCK 5-0) and the subsequent full indexing of its associated parts.

ERROR KEY INTERLOCK

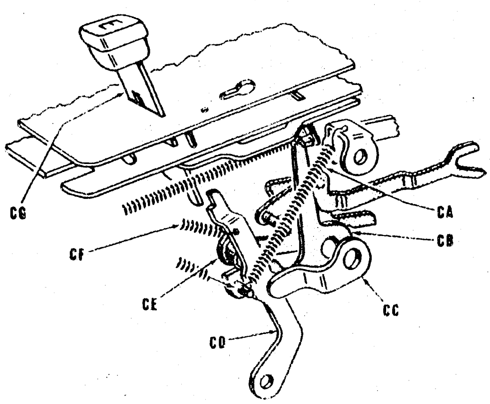


FIGURE V-9

Interlock CD blocks the depression of error key CG after a Teller Key No. 1 (OCK 6-0) validating operation.

The lowering of roll CE (S, Fig. V-4) during an OCK 6-0 operation, swings lever CB permitting spring CF to pull interlock CD forward to position its uppermost portion under the error keystem.

Tests and Adjustments

1. To safeguard against slide D, Fig. V-6 blocking the motor bars and operation control keys, except OCK 5-0, with the machine normal -
Slide D should be retained in its normal (No. 1) position by the lip of F contacting Stud G.
TO ADJUST, bend the lip of lever F forward or rearward.

2. To assure a handle break occurs on a snap partial depression of the motor bars
Stud BE, Fig. V-8, should pass over interlocks BC and BD with minimum clearance on a normal machine operation also on an OCK 5-0 operation with the keyboard restoring slide BF in its lowered position.
TO ADJUST,
   a. Bend the lip of interlock BD.
   b. Bend the rear tail of interlock BC to or from stud BB.

3. To assure blocking the depression of error key CG, Fig. V-9, during a validating operation -
Interlock CD should be positioned properly under keystem CG.
TO ADJUST, bend guide CC.
NOTE: Guide CC should be positioned so as not to interfere with spring CA when roll CE is in its lowered position.

CARRIAGE CONTROLLED INTERLOCKS

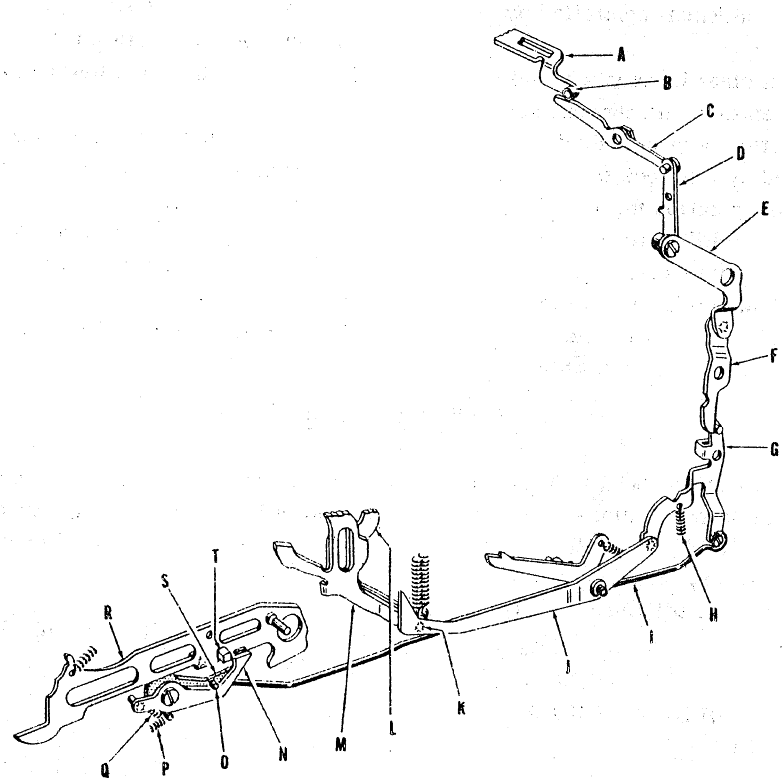


Fig. V-10

Machines equipped with a 7 1/2", two position carriage, are provided with a carriage controlled interlock to safeguard against a validating operation with the carriage located in a list position. With the carriage in list position, the interlock is active permitting machine operations from the list bar (LST) or from OCK 7-0 (List Total Key) only. With the carriage in validating position, the interlock is not active, thus permitting machine operations from motor bars and control keys.

Control plate assembly A, which is assembled to, and moves with, the upper raceway, positions roll B of rocker arm C as the carriage is shifted to list position. With roll B clear of rocker arm C, link D and levers E, F, and G are rocked by the tension of spring H. Rocking of lever G moves wire I rearward to position interlocks N and S upward, into the path of stud T on key restoring slide R.

If a machine operation is attempted from a motor bar or an operation control key other than the List Motor Bar M or OCK 7-0 (List Total Key); a handle break will occur since the rearward travel of stud T is limited by interlock S. Depression of the List Motor Bar or OCK 7-0 lowers motor bar M or intermediate bar L, respectively. The lowering of L or M rocks lever J, through stud K. Rocking of lever J repositions interlocks N and S through lever G and wire I, out of the path of stud T, thereby permitting a machine operation to take place.

Shifting of the carriage to validating position locates roll B over rocker arm C, rocking the latter which raises link D. Raising of link D rocks levers E, F, and G, expanding spring H and moving wire forward to lower interlocks N and S out of the path of stud T.

Interlock N safeguards against a machine operation by limiting the rearward travel of stud T should an operator inadvertently shift the carriage to list position after an OCK. 6-0 validating operation.

Tests and Adjustments

1. To assure the proper functioning of the handle break mechanism as controlled by carriage location -
   Stud T should just clear interlocks N and S on a machine operation with the carriage located in validating position. Stud T should be blocked by interlock N on an attempted machine operation from OCK 5-0 when the carriage is shifted to list position, following an OCK 6-0 machine operation with the carriage in validating position. Stud T should be blocked by interlock S on an attempted machine operation from other operation control keys or motor bar except OCK 7-0 and List Motor Bar with the carriage located in list position.
   TO ADJUST, bend the lower projection of lever F.
2. To assure that a machine operation is possible from OCK 7-0 and List Motor Bar when the carriage located in list position -
   Interlocks N and S should be positioned to clear stud T through the depression of OCK 7-0 or List Motor Bar.
   TO ADJUST, bend the foremost arm of lever G.

SYMBOL PRINTING

The symbols identifying the various operations of the machine from the motor bars, operation control keys and the multiple receipt lever, are located on a symbol type bar in column O and print immediately to the right of printed amounts.

MOTOR BAR 101 (CASH OUT) SYMBOL PRINTS IN COLUMN O

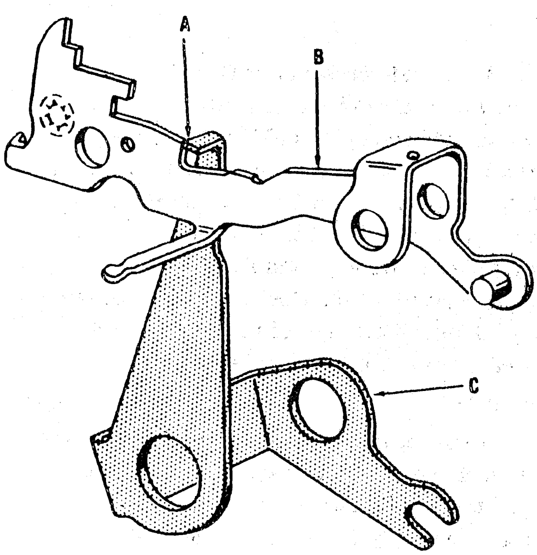


Fig. V-11

Depression of the cash out motor bar gives no movement to symbol indexing arm B, which remains at normal (home position) to limit bail C at point A. Hammer latch in column O has no tail, thus permitting a specified symbol to be printed without upward movement of the symbol sector.

OCK 8-0 (CASH OUT TOTAL KEY) INDEXES SYMBOL IN COLUMN O

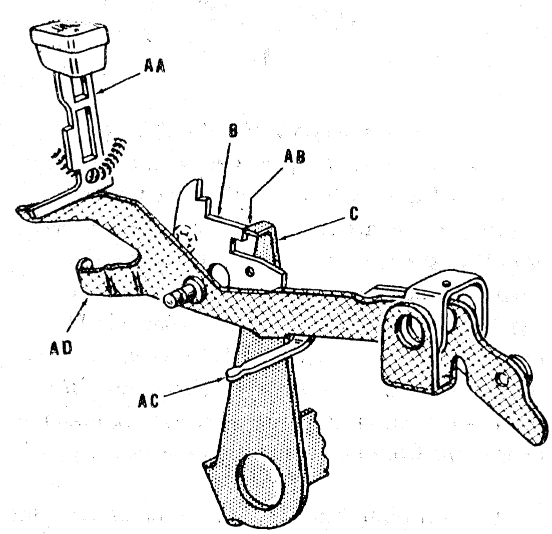


Fig. V-12

Depression of key AA lowers total arm AD to position symbol indexing arm B through lip AC. Symbol indexing arm B limits bail C at point AB for printing a specified symbol.

MOTOR BAR 102 (LST) INDEXES SYMBOL IN COLUMN O

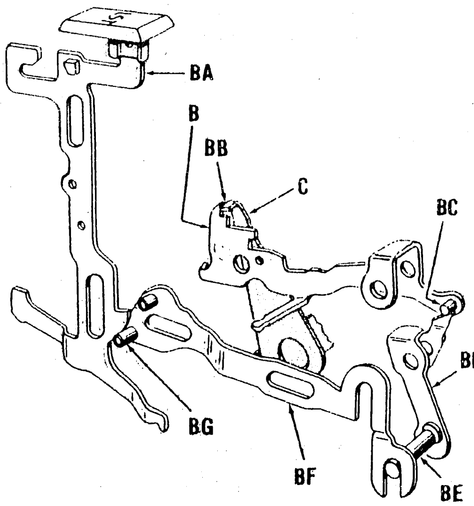


Fig. V-13

Depression of motor bar BA cams slide BF rearward through roll BG. Rearward movement of slide BF rocks bellcrank BD through stud BE. The rocking of bellcrank BD positions symbol index arm B through stud BC, to limit bail C at point BB for printing a specified symbol.

OCK 7-0 (LIST TOTAL KEY) INDEXES SYMBOL IN COLUMN O

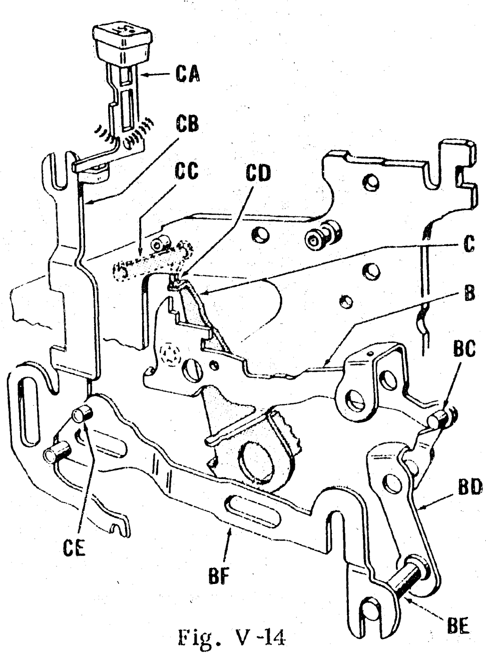


Fig. V-14

Depression of key CA lowers slide CB which cams slide BF rearward through roll CE. As slide BF moves rearward, it pivots bellcrank BD through stud BE to swing symbol indexing arm B through stud BC, out of the path of bail C. On the forward stroke of a machine operation, bail C clears symbol indexing arm B and is limited by limit plate CC at point CD for printing a specified symbol.

OCK 4-0 (CASH IN KEY) INDEXES SYMBOL IN COLUMN O

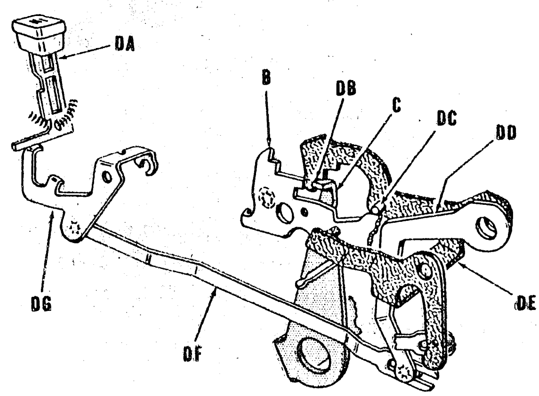


Fig. V-15

Depression of key DA rocks lever DD through bellcrank DG and arm DF. Lever DD contacting the bail portion of symbol indexing arm DE, rocks the latter, positioning it in line with bail C. As symbol indexing arm DE is rocked, stud DC lowers symbol indexing arm B out of the path of bail C so that bail C is free to move on the forward stroke of a machine operation and limit on symbol indexing arm DE at point DB for printing a specified symbol.

OCK 9-0 (CASH IN TOTAL KEY) INDEXES SYMBOL IN COLUMN O

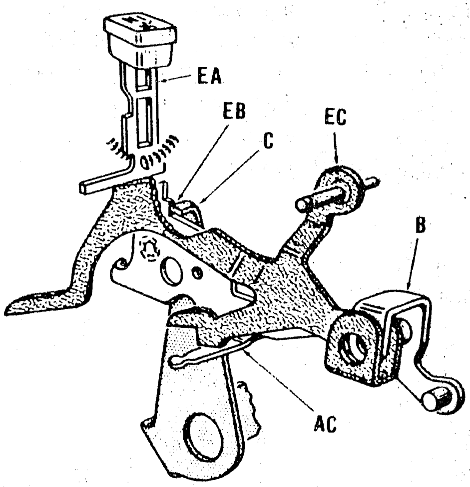


Fig. V-16

Depression of key EA lowers arm EC, which in turn lowers symbol indexing arm B through lip AC, to limit bail C at point EB for printing a specified symbol.

OCK 5-0 (TELLER KEY NO. 2) INDEXES SYMBOL IN COLUMN O

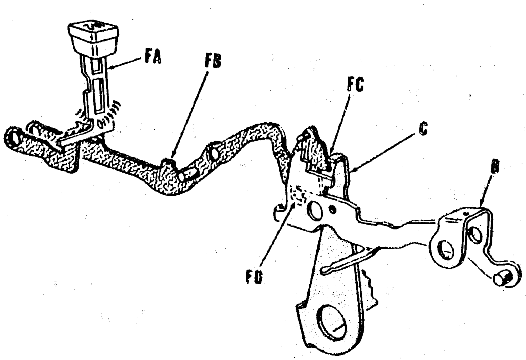


Fig. V-17

Depression of key FA lowers arm FB which through stud FD lowers symbol indexing arm B out of the path of bail C. On the forward stroke of a machine operation bail C clears over symbol indexing arm B and limits at point FC for printing a specified symbol.

OCK 6-0 (TELLER KEY NO. 1) INDEXES SYMBOL IN COLUMN O

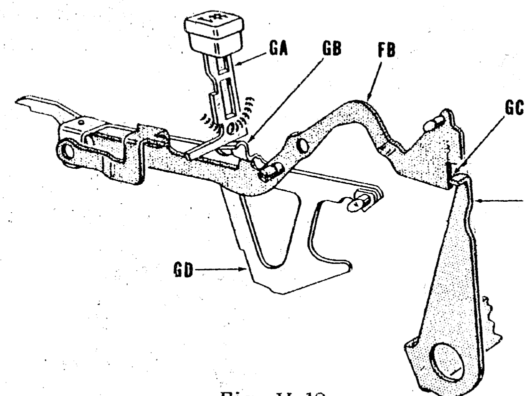


Fig. V-18

Depression of key GA lowers non add arm GD which through lip GB positions arm FB to limit bail C at point GC for printing a specified symbol.

LEVER 54 (MULTIPLE RECEIPT LEVER) INDEXES SYMBOL IN COLUMN O TO PRINT OVER PREVIOUSLY PRINTED SYMBOL

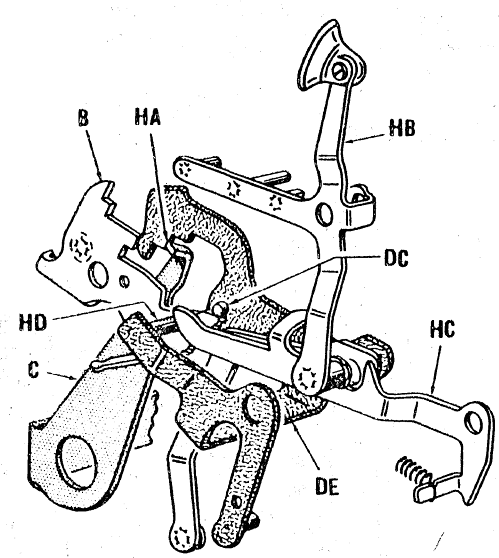


Fig. V-19

When lever HB is moved rearward, detent arm HC is pivoted so that its foremost portion contacts stud HD. Further rearward movement of lever HB lowers symbol indexing arm DE which, through stud DC lowers symbol indexing arm B out of the path of bail C. On the forward stroke of a machine operation, bail C clears over symbol indexing arm B and limits on symbol indexing arm DE at point HA for printing a specified symbol.

Tests and Adjustments

1. To assure correct symbols to print from motor bar BA (Fig. V-13) and key CA (Fig. V-14)
Motor bar BA and key CA, whether latched down or held firmly depressed, should properly position the symbol indexing mechanism.
TO ADJUST, bend the "U" form on the rear portion of slide BF.

2. To assure correct symbol to print from OCK 4-0 (Cash in Key) -
Key DA (Fig. V-15) whether latched down or held firmly depressed, should properly position the symbol indexing mechanism.
TO ADJUST, bend the lip on lever DD, where it contacts symbol indexing arm DE.

3. To assure correct symbol to print from multiple receipt lever HB (Fig. V-19) -
Lever HB, whether latched rearward or manually held rearward, should properly position the symbol indexing mechanism.
TO ADJUST, tilt stud HD up or down.

CONSECUTIVE NUMBERING AND DATING DEVICE - ROTARY

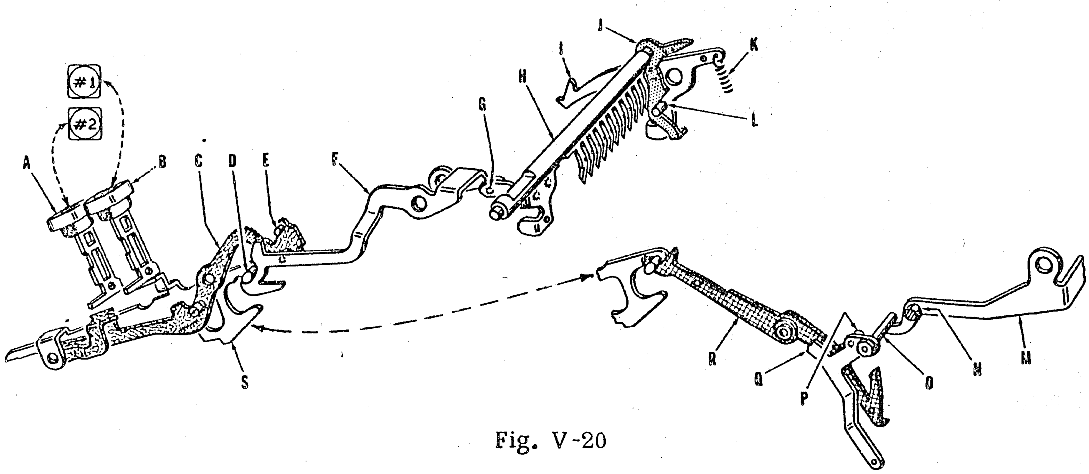


Fig. V-20

This mechanism provides a means of printing an identifying serial number and date on the documents used during validating operations.

Printing of this mechanism takes place during validating operations from Teller Keys No. 1 and 2. Advancement takes place only during the first validating operation with the Teller Key No. 1 depressed.

Depression of key B (Teller Key No. 1) lowers non-add arm S to rock arms F and R through stud D. Rocking of arm R raises lever Q through stud P, moving stud O away from the arm of bail M. Moving of stud O away from bail M permits spring AB, Fig. V-21 to rock bail M and raise slide AA, Fig. V-21 thus advancing the consecutive numbering device.

Rocking of arm F rotates bail H, through stud G, to swing arm J away from stud L thus permitting spring K to index hammer latch I for printing of the consecutive numbering device.

TELLER KEY NO. 2 INDEXES PRINTING OF CONSECUTIVE NUMBERING DEVICE

Depression of key A lowers arm C, rocking arm F through stud E. Rocking of arm F rotates bail H completing the indexing of consecutive numbering device in the same manner as described under Teller Key No. 1.

CONSECUTIVE NUMBERING DEVICE NON ADVANCES FROM MULTIPLE RECEIPT LEVER (OCL #54)

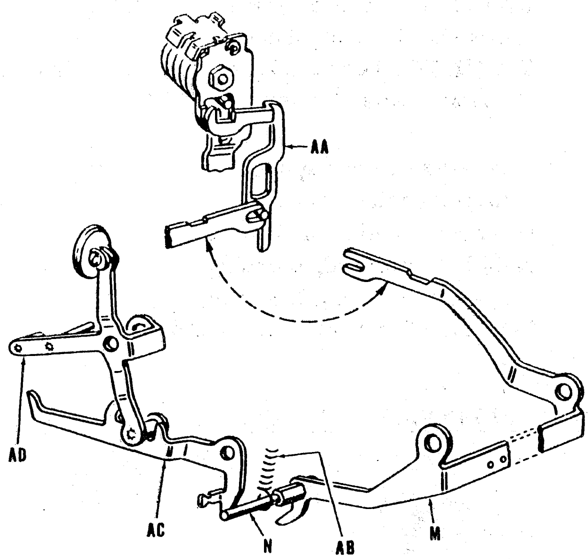


Fig. V-21

The advance of the consecutive numbering device is disabled during a multiple receipt operation due to the necessity of printing the same information on all additional receipts as appearing on the original receipt of the same transaction.

Rearward movement of multiple receipt lever AD rocks detent AC to cam stud N downward and overcome spring AB. Downward movement of stud N positions bail M and slide AA to disable the advancement of the consecutive numbering device.

Tests and Adjustments

1. To safeguard against advancing the consecutive numbering device during a multiple receipt operation
   Slide AA should be lowered sufficiently, through the movement of lever AD, to clear the stud in the advancing bail of the numbering device.
   TO ADJUST, weave bail M.

THE ACCUMULATOR MECHANISM

The accumulator mechanism of the Series P three register machine consists of an upper register (register "A", used for accumulating "Cash In" amounts) and two lower registers (register "B", used for accumulating "Cash Out" amounts and register "C", used for accumulating "Listed" amounts). Register "A" is identical in construction to the upper register of the Series P300 machines while registers "B" and "C" consists of alternately placed adding pinions AF assembled on shaft AA that will shift .095" from right to left or vice versa to limit on nuts AC and AI for locating either the odd number pinions (register "B") or the even number pinions (register "C") in line with the adding sectors, carry pawls, and carry racks.

Tests and Adjustments

NOTE: When making tests and adjustments on the lower registers, it is very important that they be made accurately and in the proper sequence. It is not advisable to make any one adjustment without first checking all preceding tests.

1. To assure clearance between the teeth of the active register pinions and the slots in comb (F, Fig. V-25) while the pinions are being rotated -
   NOTE: To simplify making test No. 1, the directions given for this test only are as observed from the rear of the machine.
   a. Index a 9 in the 5th column on the keyboard, depress the "Cash Out" motor bar and operate the machine slowly on the return stroke.
   b. On the return stroke, with the pinions shifted to the right and limiting on nuts AC, check for .012" clearance between the left side of the active pinion as it is being rotated, and the tooth of comb F.
   c. Index a 9 in the 5th column on the keyboard, depress the "LST" motor bar and operate the machine slowly during the return stroke.

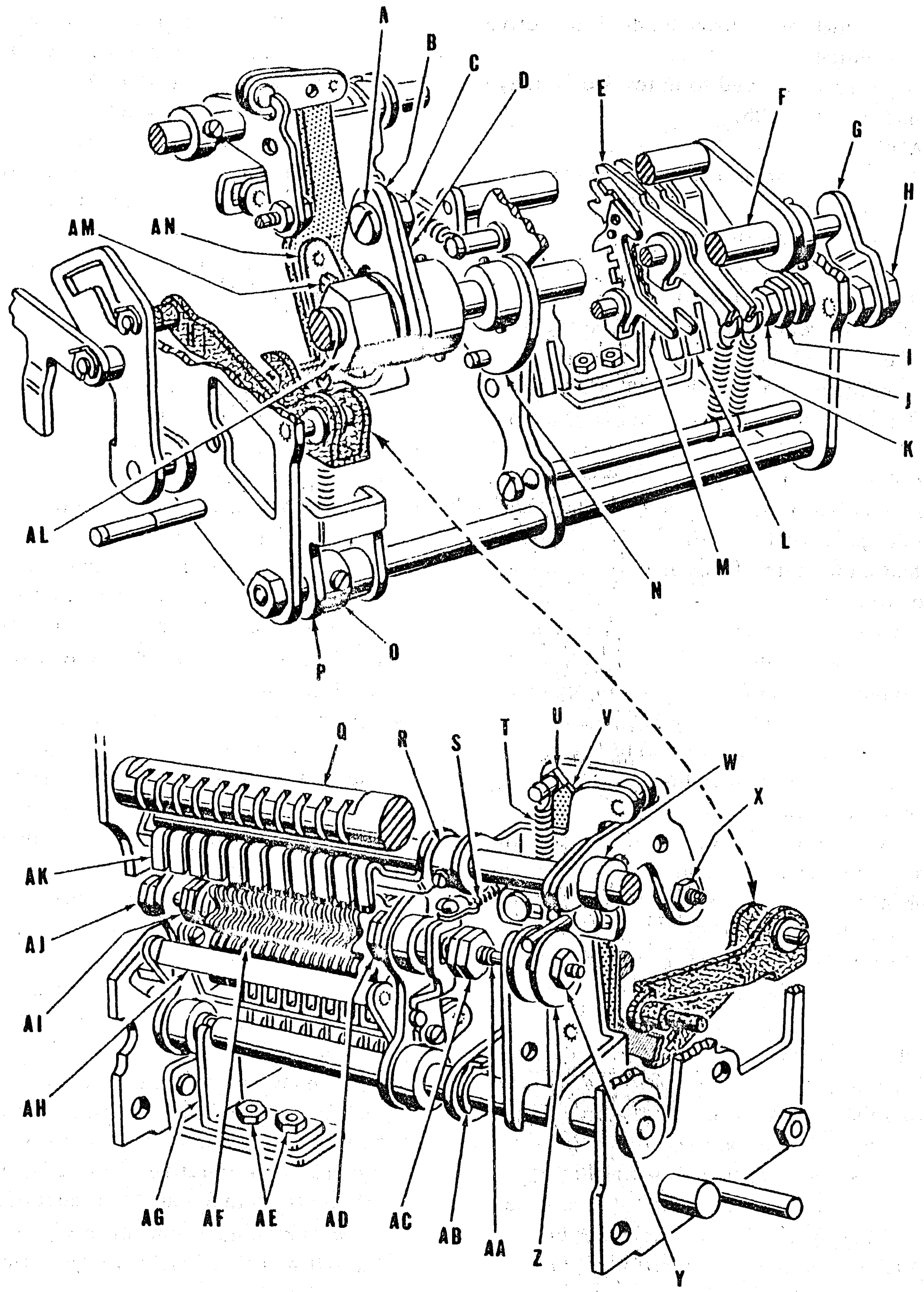


Fig. V-22

d. On the return stroke, with the pinions shifted to the left and limiting on nuts AJ, check for .012" clearance between the left side of the active pinion, as it is being rotated, and the tooth of comb F.

TO ADJUST, turn nuts AC and AJ.

2. To safeguard against an initial carry being set up by a narrow tooth of an active register pinion

There should be minimum clearance between the carry pawls and narrow teeth of the active register pinions.

NOTE: Parts referred to in test No. 2 may be found in Fig. V-25.

TO ADJUST.

a. Remove the accumulator section from the machine.
b. Remove the register pinion framework from the accumulator.
c. Unhook springs M from carry pawls L.
d. With the register pinions shifted first to the left and then to the right, check for minimum clearance between carry pawls L and the narrow teeth of active pinions H.

NOTE: When making this adjustment, take the play out of the carry pawls by holding their upper portion to the right (to the left when facing rear of machine) toward the active pinion.

e. Swing carry pawls L out of comb K and weave as required.
f. Replace pinion framework and accumulator in machine.

3. To safeguard against a possible machine lock resulting from an adding sector catching the wide tooth of an inactive register pinion - The pinions of the active register should align with the adding sectors and the slots in guide comb AK.

a. Add 5's in register "B".
b. List 9's to add in register "C" and pull the handle forward to the last notch in the full stroke segment.
c. Tip the machine on end and continue the operation.
d. As the adding sectors turn the active register pinions on the return stroke, check for clearance between the right side of the adding sectors and the wide tooth of the adjoining inactive pinion.

NOTE: The adding sectors should favor the left side of the active pinion.

TO ADJUST:

a. Remove the accumulator from the machine.
b. Remove the small screw in the accumulator left side frame anchoring guide comb AK. This permits the comb to swing down to rest on the pinions and facilitates their alignment with the slots in the comb.
c. Loosen the screw in set collar R and place a .008" feeler gauge between the left side frame and comb AK. Re-tighten set collar R against comb AK.
d. Unhook springs S and T.
e. Loosen screws AE and nuts X.
f. With the register pinions manually shifted to the left and held out of mesh with the carry racks, move the pinion framework to the left or right to centrally align the 9th pinion from the right with the slot in the comb.
g. Repeat test (f) with the pinions manually shifted to the right and check the 10th pinion from the right to align centrally with the slot in the comb.
h. Tighten screws AE.
i. Tighten nuts X equally to retain the position of the shift bracket.
j. Loosen set collar R, remove .008" feeler gauge and replace the screw which anchors comb AK to the left side frame.
k. Tighten set collar R against the shift bracket.

4. To assure full shift of register pinions when moved into register "B" and register "C" - There should be equal throw of spear point V on either side of detent U when shifted to register "B" or register "C" position.

TO ADJUST:

a. With spring S and T unhooked, back off nuts Y on either side of yoke Z.
b. Position the register pinions centrally between register "B" and register "C".
c. Align spear point V, point to point, with detent U.
d. Tighten nuts Y equally against yoke Z.

NOTE: This adjustment should be followed by rechecking the throw of spear point V and a more exact adjustment made by backing off and tightening nuts Y as required.

5. To assure equal movement of post AK to the left and to the right when positioned by blade B -

There should be equal clearance between blade B and post AK when the pinions are shifted into register "B" and register "C" position.

TO ADJUST:

a. Index register "B" by manually positioning post AK to the left of blade B and lower blade B to fully position the register pinions to the left.

b. Check for no bind between blade B and post AK at this point.

c. Index register "C" by manually positioning post AK to the right of blade B and lower blade B to fully position the register pinions to the right.

d. Check for no bind between blade B and post AK at this point.

e. Loosen nuts H and position shaft F through plate G as required.

6. To assure that bail AH fully engages the pinions at the same time as blade B is initiating the shift -
There should be approximately .025" to .035" clearance between blade B and the top of post AM, with blade B in normal position.

TO ADJUST, loosen nuts AL and C and turn eccentric screw A to raise or lower blade B.

7. To safeguard against wrong addition caused by the wide tooth on an inactive pinion interfering with a carry rack as a carry is taking place -
The carry racks should align with the narrow teeth of the active pinions.

a. Add 1's in register "B".
b. Add 9's in register "C .
c. Index 1 in column 1 on the keyboard, depress the "LST" motor bar, and manually operate the machine.
d. Manually hold up each individual carry as it is taking place and check for clearance between the right side of the carry rack and the wide tooth of the adjoining inactive pinion.

TO ADJUST, loosen nut J and turn adjusting nut I, to properly position guide comb L.

8. To safeguard against a premature raising of cam assembly F during the carry rack resetting -
Detent P should align with the register meshing arm on cam assembly F.

TO ADJUST, loosen screw of set collar O and move detent P to right or left.

ADDING CAPACITY INCREASED TO TEN COLUMNS IN REGISTER "A"

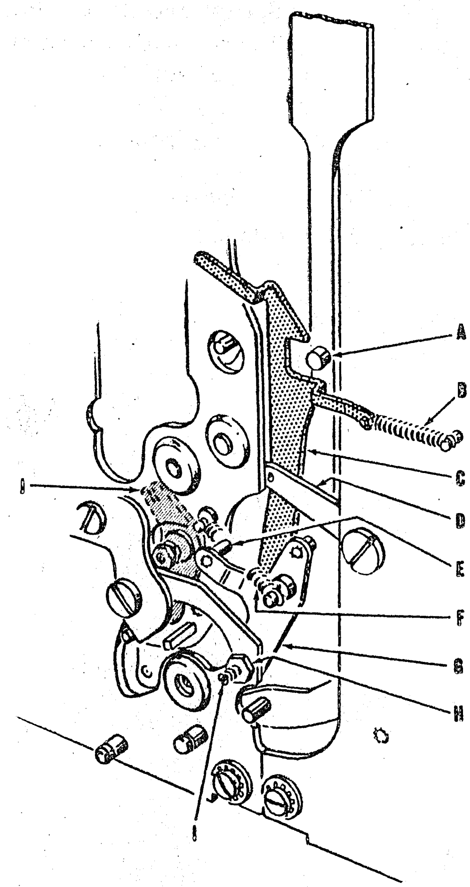


Fig. V-23

A full ten column adding and totaling capacity of register "A" (upper register) may be provided in some styles of three register machines. This is accomplished by permitting the adding sector in column ten to function during register "A" operations but blocking its movement during register "B" and "C" total operations.

Blocking the upward travel of the sector in column ten during register "B" and "C" total operations is necessary because the construction of these registers are limited to a maximum of nine columns capacity.

At the beginning of the forward stroke of a register "B" or "C" total operation as the register moves into mesh with the adding sectors, register side frame J moving forward, rocks arm G forward through stud E, permitting the tension of spring B to position hooked arm C over stud A. With hooked arm C so positioned, the type and the adding sector in column ten remains in normal (lowered) position.

Tests and Adjustments

1. To assure a safe hold of hooked arm C on stud A -
Depress the "Cash Out" total key (OCK 8-0) and pull the handle forward until the aligning shaft just seats in the tooth space of the adding sector. Rock the handle at this point and check for no upward or downward movement of the type bar.

TO ADJUST, loosen nut H and turn eccentric screw I.

REGISTERS "B" AND "C" SELECTION - LISTING AND TOTALING

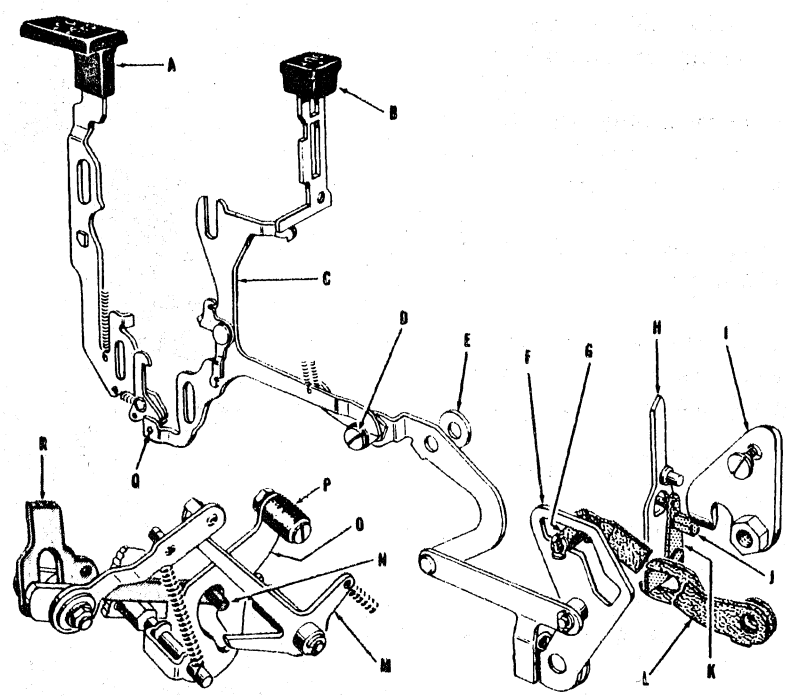


Fig. V-24

Depression of motor bar A (Cash Out) or key "B" (OCK 8-0) selects register "B" by lowering intermediate bar C through stud Q which, through eccentric D and link E positions enclosed cam F rearward. The rearward positioning of enclosed cam F raises forked arm L through stud G, to swing bellcrank K, positioning stud J to the left of blade I.

No indexing of a mechanism is required for the selection of register "C". With the machine normal (home position), enclosed cam F is positioned forward with roll G located to the rear of the slot in the cam. With roll G so located, forked arm L is lowered, positioning stud J, through bellcrank K, at the right of blade I. Depression of the List Motor Bar or List Total Key (OCK 7-0) merely trips the drive to initiate the register shift through the action of blade I during the machine operation.

Overthrow detent O safeguards against incorrect selection of registers from the snap depression of motor bars or operation control keys. Stud N (on intermediate motor bar R), riding in the cutout of detent O, moves the detent rearward as a motor bar or operation control key depression begins. Weight P tends to hold the detent rearward as stud N continues to travel downward.

During a normal depression of a motor bar or operation control key, overthrow detent O has sufficient time to reposition forward, permitting stud N to bottom in the cutout of the detent and trip latch M. On a snap depression, overthrow detent O does not have sufficient time to reposition forward thus downward travel of stud N is blocked and latch M is not tripped.

Tests and Adjustments

1. To assure proper indexing of register "B" mechanism from OCK 8-0 (Out Total Key) and Cash Out Motor Bar -

With register "B" indexed, roll G should be positioned approximately 1/16" forward in the upper slot of enclosed cam F.

TO ADJUST:

a. Hold Cash Out Motor Bar fully depressed; clearance between roll G and the forward end of the enclosed cam must be maintained.
b. With the Cash Out Motor Bar latched down; roll G must have approximately 1/16" more than full hold on rear portion of the upper slot of the enclosed bar.
c. Repeat tests (a) and (b) using OCK 8-0.
d. Loosen the screw holding eccentric D and turn the eccentric.

REGISTER SHIFT MECHANISM

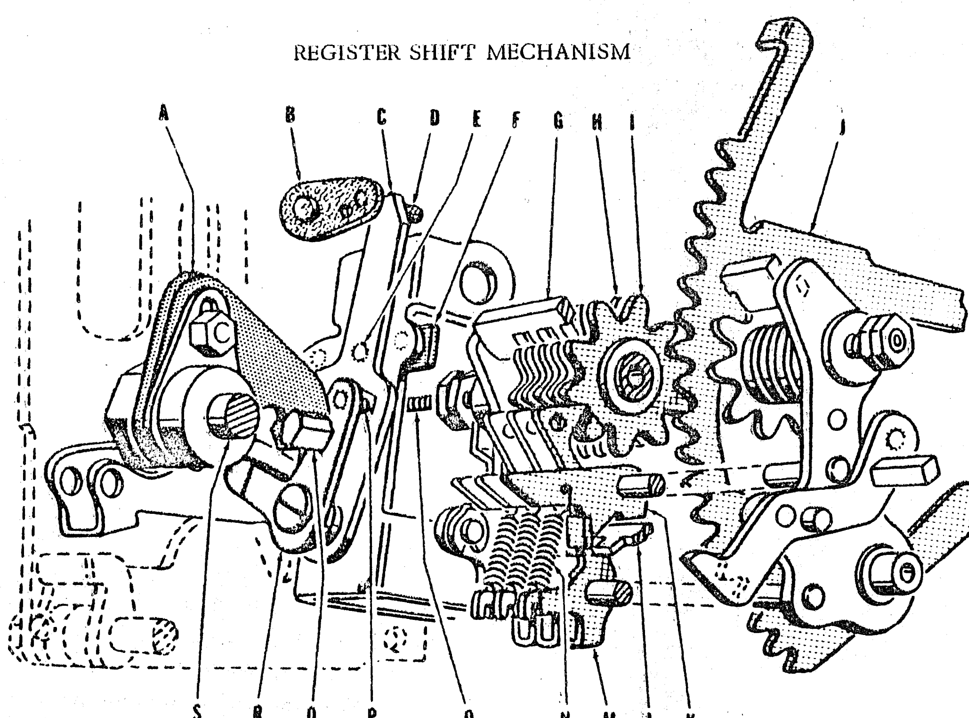


Fig. V-25

Shifting of the register pinions from register "B" position to register "C" position or vice-versa takes place during a machine operation as the adding pinions leave the carry racks to mesh with the adding sectors J. Blade A moves with shaft assembly S. As shaft S rotates, blade A engages post Q, driving it to the right or left depending upon the register selected. The movement of post Q, through bellcrank R and stud P positions spear point C to the left or right of stud D on detent B. The movement of spear point C, through stud E, slide F, stud AB (Fig. V-26) yolk AA (Fig. V-26) and shaft O shifts the pinions of the register selected in line with the adding sectors J.

ACTIVE PINIONS ARE ALIGNED WITH CARRY PAWLS TO INITIATE CARRIES

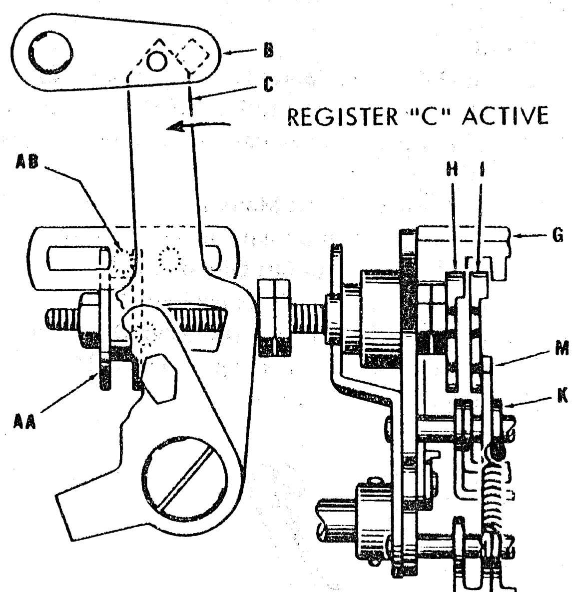


Fig. V-26

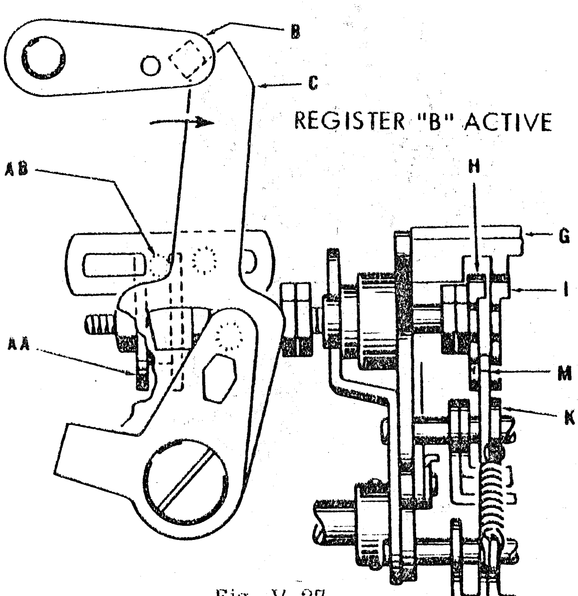


Fig. V-27

The cross shifting action of the two sets of register pinions permits only one set of pinions to be active at a time. With register "C" shifted to active position, Fig. V-26, pinion I is aligned with the adding sector and is free to turn in the cut out portion of comb G. The wide tooth of active pinion I is aligned with carry pawl M to initiate a carry, should one occur. Pinion H of inactive register B is shifted out of alignment with the adding sector and carry pawl and is prevented from turning by comb G. In Fig. V-27, pinion H, of register B is shifted to active position and pinion I of register "C" is shifted to inactive position.

BAIL SAFEGUARDS AGAINST PINIONS FROM TURNING DURING SHIFTING

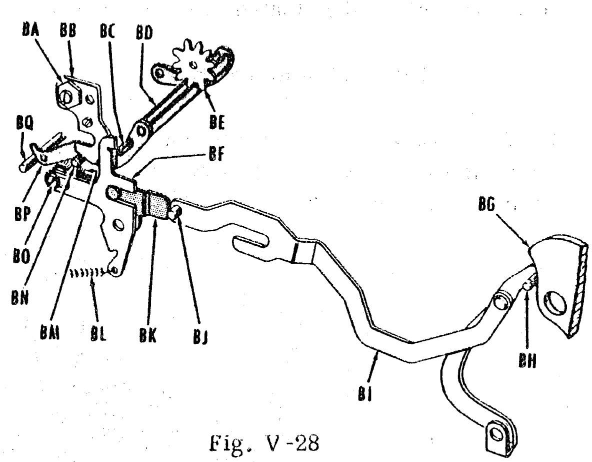


Fig. V-28

As the pinions are shifted from register "B" to register "C" position or vice-versa, bail BD is moved into mesh with the adding pinions to safeguard against a possible lock resulting from the tooth of a partially turned pinion contacting a carry pawl or a tooth of an adding sector. As the register section moves forward during a machine operation; tail BP of bail BD moves away from shaft BQ, permitting spring BM to swing bail BD into mesh with register pinions. As the register section meshes with the adding sectors, bail BD is cammed out of mesh with the pinions through stud BN contacting plate BB.

With the machine in home position, latch BF is held rearward by cam BG of the primary section, through stud BH, arm BI and stud BJ. On the forward stroke of a machine operation, cam BG moves away from stud BH permitting spring BL to swing latch BF against stud BC. As the pinions are meshed with the adding sectors, bail BD is cammed out of mesh with the pinions by plate BB, permitting latch BF to swing over stud BC. Latch BF thus retains bail BD out of mesh with the adding pinions while the register section moves rearward and a possible relay carry is taking place. At the end of the return stroke of a machine operation, cam BG contacts stud BH to re-position latch BF behind stud BC.

Tests and Adjustments

1. To assure a relay carry taking place without interference from bail BD -
   a. There should be approximately .010" latching lead of latch BF over stud BC as the register pinions are meshed with the adding sectors.
   b. There should be approximately .030" clearance between the rear side of stud BC and the front face of latch BF with the machine in home position.

   TO ADJUST:
   a. Loosen the two screws holding plate BB and turn eccentric BA.
   b. Loosen screw BO and move latch BF forward or rearward.

REGISTER(S) INDEXING CONTROLS

These controls provide a means of indexing the engagement or disengagement of the adding pinions of the registers with the adding sectors. The listing and totaling controls of register "A" are similar to those of the upper register in the Series P300 machine.

Register "A" Non-Add Controls

Depression of key B or C contacts the upright projections of arm assembly G moving the latter rearward to raise pawl E through stud F. Depression of motor bar A or D, through studs M or L respectively, swings lever N to move arm assembly G rearward to raise pawl E through stud F. Depression of key J or K rocks arm I which through projection H moves arm assembly G rearward to raise pawl E through stud F.

Register "B" & "C" Non-Add Controls

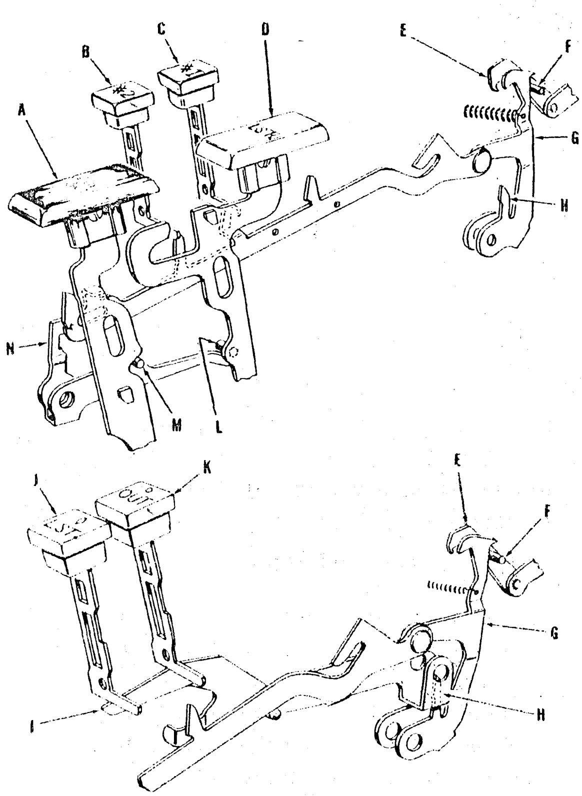


Fig. V-29

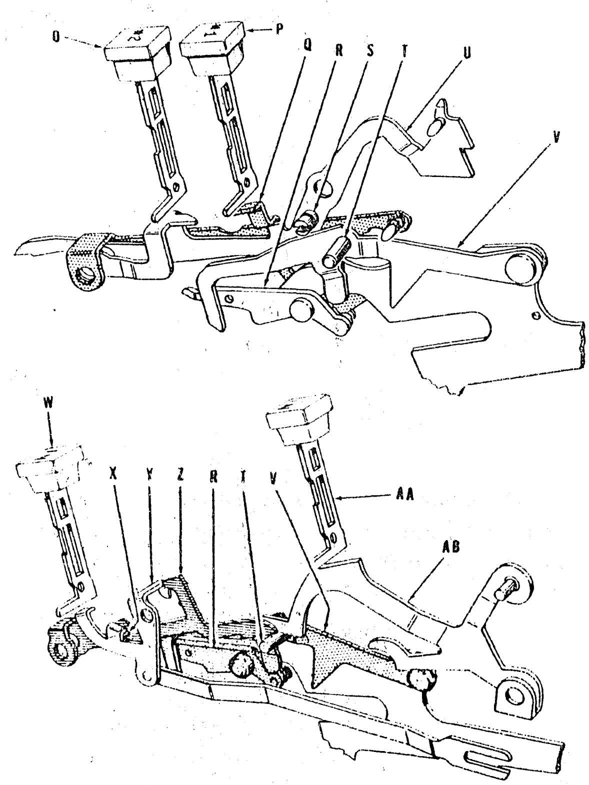


Fig. V-30

Depression of key O or P lowers total hook V, through arm U and stud S; or through non add arm Q positioning listing pawl R for non-add of registers "B" or "C". Depression of key W, through bellcrank Y, and stud X, arm Z and stud T, lowers total hook V to position listing pawl R for non-add of registers "B" and "C". Depression of key AA lowers total hook V, through lever AB and stud T to position listing pawl R for non-add of registers "B" and "C".

Tests and Adjustments

1. To assure non-add of register "A" as indexed from the motor bars -
Depression of motor bar A or D should move arm assembly G rearward sufficiently to position pawl E for non-add of register "A".

TO ADJUST:

a. Bend the inner arm of lever N for more or less throw of arm assembly G from both motor bars.
b. Tilt stud M, or bend the rear portion of the outer arm of lever N for more or less throw of arm assembly G from individual motor bars.

COUNTER DIAL MECHANISM ADVANCE - DISABLED FROM MULTIPLE RECEIPT LEVER

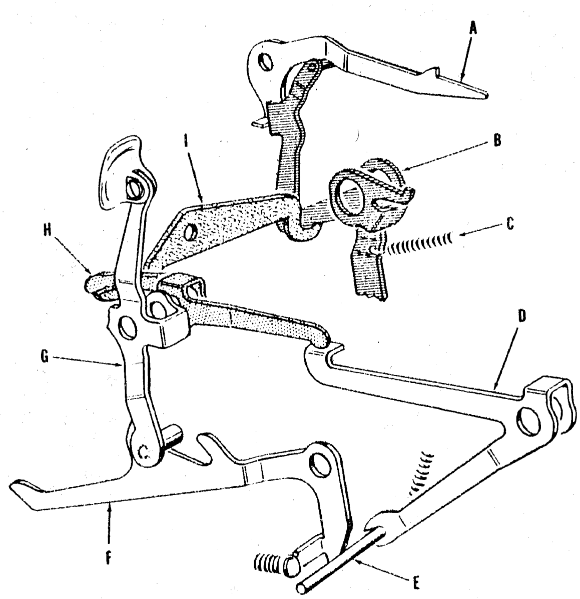


Fig. V-31

The counter dial mechanism advances once for each transaction, i.e., during the validating operation from OCK 6-0. This mechanism disables the advance when multiple receipts of a transaction are being printed.

Rearward movement of multiple receipt lever G moves stud F rearward through the rocking of detent arm F. Movement of stud E rocks levers D, H, and I, permitting spring C to restore arm B to normal and lower arm A to prevent the advance of the counter dial mechanism.

Tests and Adjustments

1. To safeguard against advancing the counter dial mechanism during a multiple receipt operation -
Arm A should be lowered sufficiently through the movement of lever G, to clear the lip of the counter dial actuating bail.
TO ADJUST, bend the forked arm of lever D.

REVIEW ITEMS OF SERIES P THREE REGISTER MACHINE

1. How is spacing of the left portion of the carriage disabled when the carriage is shifted to "List" position?

2. How is spacing of the right portion of the carriage disabled when the carriage is shifted to "Validating" position?

3. How is spacing of the left portion of the carriage disabled during OCK 6-0 operation with the carriage located in "Validating" position?

4. Why is it necessary to block certain controls during the validating operation?

5. How is a repeat machine operation prevented from OCK 5-0 and OCK 6-0?

6. How is the simultaneous depression of OCK 8-0 (Cash Out Total Key) and motor bar 101 (Cash Out) prevented?

7. What is the purpose of interlock CD, Fig. V-9?

8. From what two sources is a machine operation possible while the keyboard lock is active?

9. How is a handle break prevented when OCL No. 54 (Multiple Receipt Lever) is moved rearward following an OCK 6-0 operation?

10. How is OCL No. 54 released following a multiple receipt operation?

11. How is the advance of the consecutive numbering device disabled on subsequent depressions of OCK 6-0 following the first OCK 6-0 operation?

12. At what time during an add operation does the register shift take place?

13. At what time during a total operation does the register shift take place?

14. What is the limit for the register pinions when shifted into register "B" and into register "C" position?

15. What is the purpose of bail BD, Fig. V-28?

16. Why is it necessary to hold bail BD, Fig. V-28 out of engagement with the register pinions as the pinions move out of mesh on an add operation?

17. How are the register pinions shifted by the action of blade A, Fig. V-25?

18. What could result if a tooth of an adding sector caught the wide tooth of the adjoining inactive pinion on the forward stroke of a total operation?

19. What could result if a tooth of an adding sector caught the wide tooth of the adjoining inactive pinion on the return stroke of an add operation?

20. How is the alignment of the adding sectors and active register pinions maintained?

21. How is the alignment of the carry racks and active register pinions maintained?

22. How is the alignment of the carry pawls and the wide tooth of the active pinions maintained?

23. From what two sources is the counter dial advance disabled, following an initial OCK 6-0 operation?

Burroughs

FULL KEYBOARD

ADDING and BOOKKEEPING MACHINES

INSTRUCTION BOOK

Section VI

●

SERIES P400

Printed in U.S. America 3-1-65

For Form 3784

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Series P 400

CARRIAGE MECHANISM

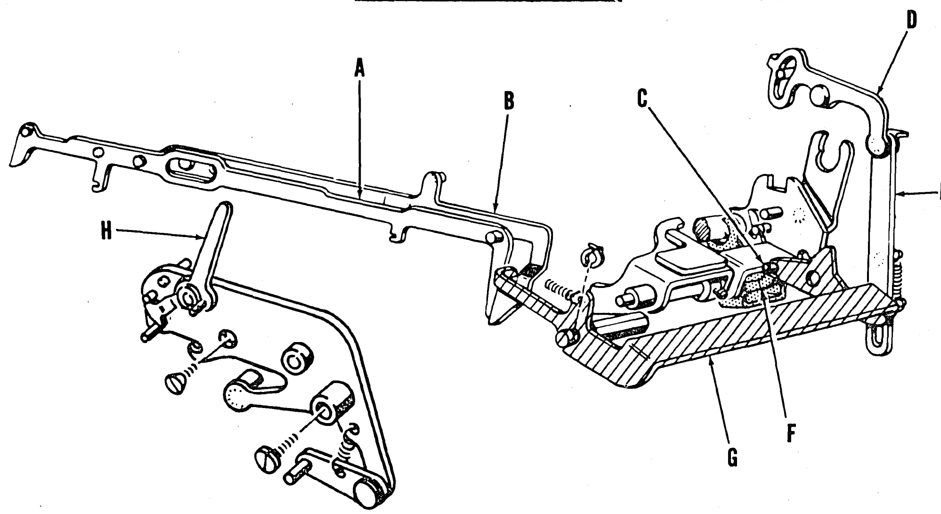


Fig. VI-1

FORM SPACING FROM TOTAL KEY

This control permits the selection of 5/6" spacing of the platen during total operations when lever H is located in its rearward position. Basically the spacing controls and their operation is the same and described under Fig. II-2, the principal difference being in the method of controlling the indexing for 5/6" spacing from the depression of the total key.

Depression of the total key moves slide B rearward and slide A forward, out of the path of bail G. During the forward stroke of a total operation, arm F moves out of the path of stud C permitting spring tension to rock bail G. Rocking of bail G rotates a bellcrank similar to J, Fig. II-1 through link E and arm D controls the platen feed pawl for 5/6" spacing.

When lever H is in its forward position, spacing during total operations is the same as indicated by the spacing control lever.

During listing operations, slides A and B limit bail G and prevents. 5/6" spacing except during those operations in which the space control lever is positioned.

Tests and Adjustments

1. To prevent 5/6" spacing during listing operations when the space control lever is positioned in other than No. 5 position -
   The lip on the foremost portion of bail G should have minimum clearance over the stop on the rearmost portion of slides A and B when the machine is in home position.
   TO ADJUST, bend the foremost portion of bail G.
2. To insure disabling the 5/6" spacing during total operations when lever H is located in its forward position -
   a. As lever H moves forward, its hook portion should have minimum clearance under the lip of the foremost portion of arm D.
   b. During a machine operation with the total key depressed and lever H located in its forward position, the lip on the foremost portion of arm D should have a full hold on the hook portion of lever H.

TO ADJUST:
   a. Weave bail G.
   b. Bend the lip on the foremost portion of arm D.

KEYBOARD MECHANISM

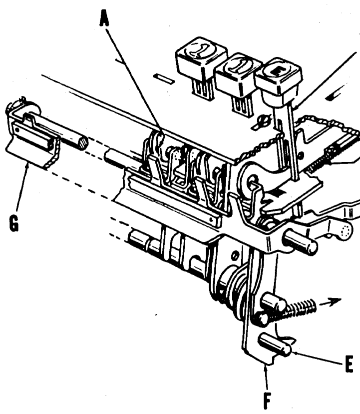


Fig. VI-2

The keyboard mechanism on Series P400 machines is of the same basic construction as described under Series P100 machines in Section II.

ERROR KEY RELEASES LISTING KEYS, OPERATION CONTROL KEYS, AND MOTOR BARS

This mechanism releases incorrectly indexed listing keys, operation control keys, and motor bars before the machine is operated. Depression of error key B lowers arm D and rocks bail G on which projections along its upper side move locking strips A rearward thus releasing the depressed keystems which restore through the tension of springs C.

Rocking of bail G also swings rocker arm F; its stud E contacting the lip on the foremost portion of arm V, Fig. VI-5 moves latches U, Fig. VI-5 clear of the notches on the motor bar. The motor bars is then released and restored by spring tension.

Tests and Adjustments

1. To assure release of incorrectly indexed listing and operation control keys -
   All keys should be free when error key B is fully depressed.
   TO ADJUST, for all columns, open or close the slot in the foremost portion of arm D; for individual columns, bend the upright projections on bail G.
2. To assure the release of the motor bars from the depression of the error key -
   Latches U, Fig. IV-5, should clear the notches on the motor bars when error key B is fully depressed.
   TO ADJUST, bend the upright projection on the right end of bail G.

REPEAT KEY AND REGISTER SELECTOR LEVER CONTROL KEY INTERLOCK

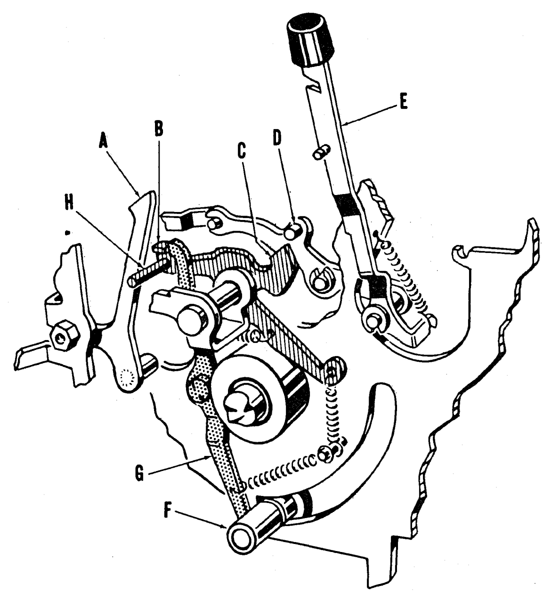


Fig. VI-3

With the register selector lever control key E unlatched, the register selector lever automatically alternates from "A" to "B" position or vice versa at the end of each machine operation, and the repeat key (O.C.K. 5-0) is blocked against depression. When key E is unlatched, stud D is positioned over the rearmost portion of arm C and thus prevents rocking of arm C and depression of the repeat key.

With key E latched down, depression of the repeat key lowers arm A; its stud H positions the rearmost portion of arm C in the path of stud D to block the release of key E.

During the forward stroke of a machine operation with the repeat key held depressed; the hook portion of latch G moves over lip B as roll F moves rearward. Latch G then holds arm C so its rearmost portion remains in the path of stud D until the end of the return stroke thus safeguarding against possible release of key E if the repeat key is released before the machine operation has been completed. Near the end of the return stroke roll F disengages latch G from lip B permitting arm C to be pulled down by spring tension.

Tests and Adjustment

1. To assure disengagement of latch G from lip B -
   There should be approximately .010" clearance between lip B and the upper portion of latch G when the machine is in home position.

   TO ADJUST, bend the lowermost portion of latch G.

REPEAT TOTAL OPERATIONS SAFEGUARD MECHANISM

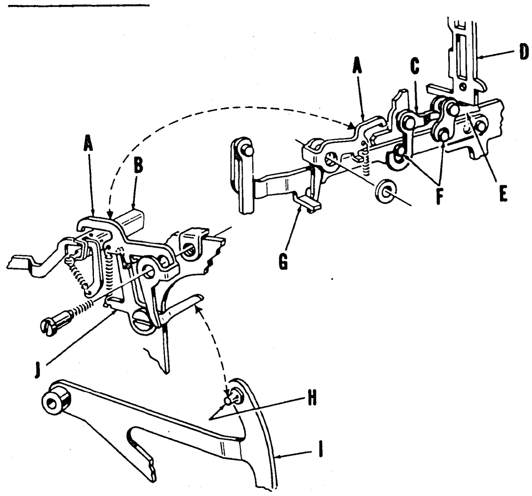


Fig. VI-4

When total keys are held depressed during continuous total operations; a safeguard (handle break) operation occurs to prevent complementary totals. This safeguard is required when the register selector lever automatically shifts to or from a register having a minus amount when the alternate register has a plus amount.

When control key E, Fig. VI-3, is unlatched for automatic selection of registers, the shifting of the register selector lever will restore slides A or B, Fig. VI-36, to normal (add) position should the slides be in their forward (minus) position. When the total keys are held depressed, the upper projections on the slides limit on the depressed keystem thus preventing the slides from returning to their forward (minus) position when the register selector lever again shifts to the alternate register position.

As total keys D are depressed, bellcrank C or E, through studs F, moves slide G rearward permitting interlock A to be pulled downward into engagement with latch J.

During the forward stroke of a machine operation and as segment arm I moves upward; stud H releases latch J from interlock A permitting interlock A to be pulled downward into engagement with channel bail B.

If the total keys are manually held depressed through a machine operation, slide G remains rearward and interlock A remains engaged with channel bail B to cause a handle break.

If the total keys are released, slide G returns to normal raising interlock A out of engagement with bail B.

Tests and Adjustments

1. To assure latching of the interlock -
   There should be approximately .010" clearance between the lip of interlock A and the step on latch J when the machine is in home position.
   TO ADJUST, bend the tail of interlock A to or from the lip of slide G.
2. To assure engagement of interlock A with the channel bail -
   During the forward stroke of a machine operation with the total key depressed, latch J should be moved far enough by stud H to release interlock A and permit it to engage bail B.
   TO ADJUST, bend the rearward tail of latch J for an earlier contact with stud H.

MOTOR BAR AND CONTROL KEY INTERLOCKS

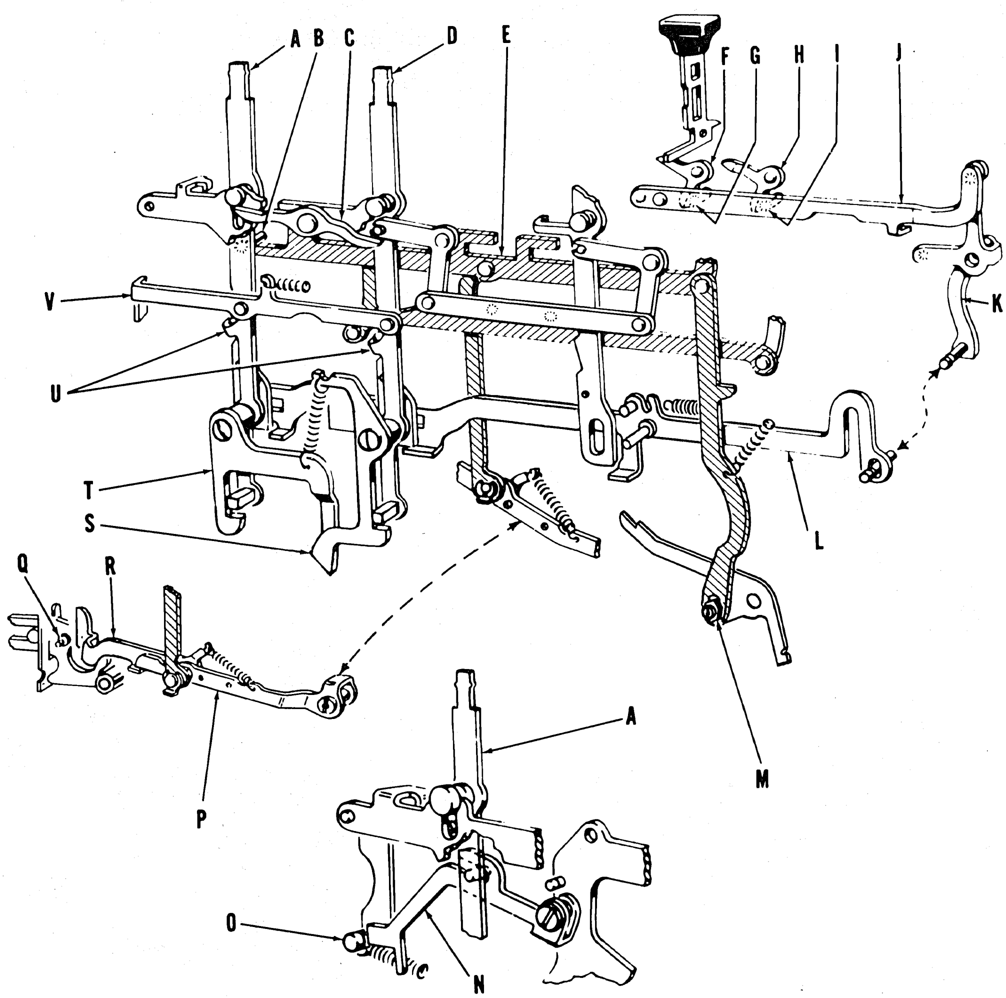


Fig. VI-5

Simultaneous depression of operation control keys and/or motor bars is prevented by interlocks to safeguard against a machine lockup and wrong addition.

Depression of the total or sub total key rocks bellcranks F or H respectively and through stud G or stud I moves slide J rearward. Slide J rocks link K and moves interlock L forward to locate its formed ears under minus bar A and plus bar D thus blocking their depression.

Depression of either minus bar A or plus bar D locates the lowermost portion of the depressed motor bar into the path of interlock L, thereby preventing the forward movement of interlock L should an attempt be made to depress the total keys. Simultaneous depression of minus bar A and plus bar D is blocked by interlock C.

Operation of the machine and a subsequent lock resulting from a snap partial depression of the non-add key is prevented by interlock R blocking the full rearward movement of stud Q thus creating a safeguard operation.

Interlock T prevents a snap depression of minus bar A during the latter part of an add operation to eliminate the minus wheels being partially shifted while a relay carry is taking place. This partial shifting, if permitted, could cause the wheels to be located out of alignment with the carry racks and may result in either a loss of carry or a lockup.

Interlock S prevents a snap depression of plus bar D during the latter part of a minus operation. If the plus bar could be depressed while a minus carry originating in column 6 or 7 is taking place, a loss of carry or a lockup could result in the following manner:

> A plus operation could start to take place causing the wheels to be located out of alignment with the carry racks before the carry is completed to column 13, then back to column one through bail F, Fig. VI-36, and then over to the column in which the carry originated.

Tests and Adjustments

1. To assure that any OCK or motor bar when depressed will be latched down before the drive trip takes place, also that the drive will be tripped when any OCK or motor bar is fully depressed -
   Drive trip latch should maintain a full hold on the drive trip arm when any OCK or motor bar is latched depressed and there should also be approximately .015" clearance between the formed lip on the drive trip arm and the drive trip latch when any OCK or motor bar is fully depressed.
   TO ADJUST:
   a. For OCK 6-0, turn eccentric M.
   b. For all other OCK's and motor bars, bend the individual finger on intermediate motor bar E that the OCK or motor bar contacts.
2. To safeguard against simultaneous depression of a motor bar and an OCK (except OCK 5-0) -
   There should be approximately .010" clearance between the rear surface of the lowermost portion of motor bars A and D and the formed ears of interlock L when the motor bars are slowly depressed.
   TO ADJUST, bend the "U" form on the rear of interlock L.
3. To safeguard against a misoperation or a locked machine from a snap partial depression of OCK 6-0 -
   There should be minimum clearance of stud Q over the upper point of interlock R during a machine operation with either a motor bar or an operation control key latched down.
   TO ADJUST, bend the forward portion of arm P.
4. To assure release of the motor bars during machine operations -
   Latches U should be moved far enough forward to clear the steps on motor bars A and D when the machine is operated.
   TO ADJUST, bend the lip on the foremost portion of arm V.

PRINTING MECHANISM

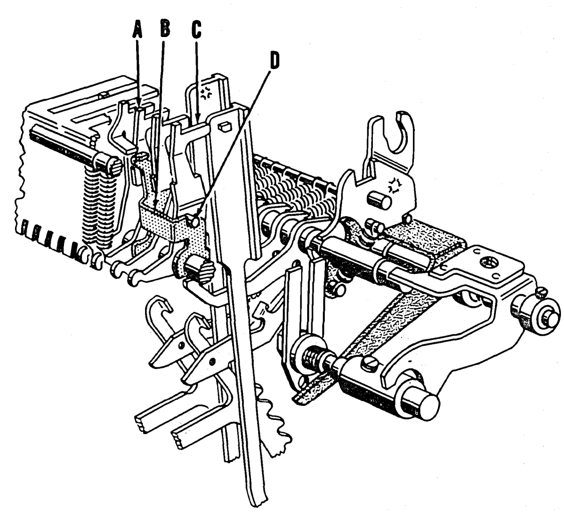


Fig. VI-6

The printing mechanism of the Series P400 machine is of the same basic construction as that in Series P100 machines described in Section II. An additional column of printing (known as column "00") has been added to the right of column "0" for the purpose of printing an identifying symbol of the active register.

Hammer C in this column is not cocked by a hammer latch such as the hammers in the other columns but is cocked by coupler B that is connected to hammer C through stud D and in turn actuated by hammer A in column one.

Positioning of the type bars in columns "0" and "00" for the printing of identifying symbols is controlled respectively by index bars that are limited by an operation control key, register selector lever, or a motor bar.

SYMBOL INDEXING IN COLUMN "0" IS BLOCKED DURING PLUS LISTING OPERATIONS

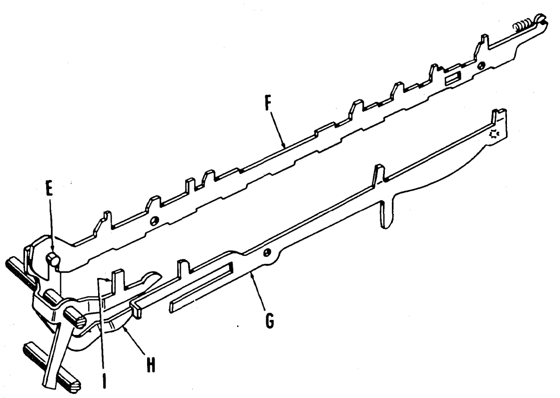


Fig. VI-7

Printing of a symbol during plus listing operations is prevented by rocker arm H blocking the forward movement of index bar G in column "0". Depression of an OCK cams index strip F rearward and through stud E moves rocker arm H out of the path of index bar G to permit its forward movement and the subsequent printing of a specified symbol.

REGISTER "A" AND/OR "B" ACCUMULATION IDENTIFIED BY SYMBOLS

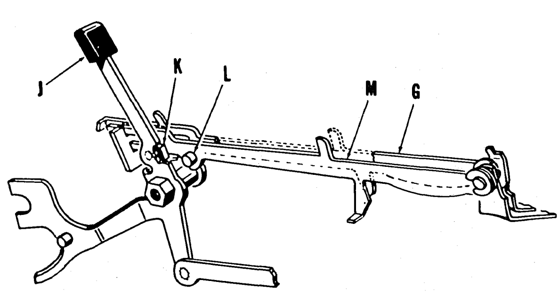


Fig. VI-8

Two positions ("A" and "B") of register selector lever J determine the location of stud K which in turn acts as a limit for the forward travel of index bar M (Column "00") through stud L.

NON PRINT SYMBOL "AB" REGISTER SELECTOR LEVER IN "AB" POSITION

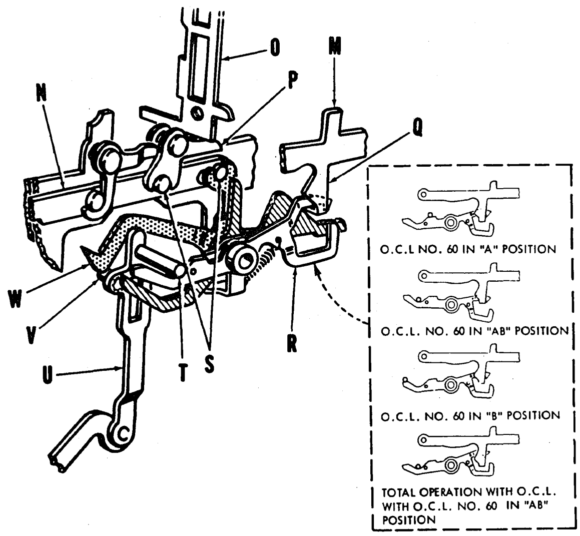


Fig. VI-9

The three position of register selector lever J, Fig. VI-8, determine the location of stud T in the pocket of rocker arm R thus permitting the upper hook portion of the rocker arm to block projection Q and prevent forward movement of index bar M. Preventing the forward movement of index bar M eliminates the subsequent printing of the "AB" symbol during the forward stroke of the machine operation.

Depression of total key 0 rocks bellcrank P and through its fork and rear stud S, moves slide N rearward and moves arm W downward by its front stud S. As arm W moves downward, it contacts stud V lowering link U. Stud T on link U locates the front lower hook portion of rocker arm R to limit projection Q for the printing of the "A" symbol.

When register selector lever J, Fig. VI-8, is in "A" or "B" position, stud T is positioned either in front of or behind the pocket in rocker arm R. Printing of either the "A" or "B" symbol as described in Fig. VI-8 is thus permitted by stud T holding the forward portion of rocker arm R out of the path of projection Q.

MINUS SYMBOL INDEXING COLUMN 0

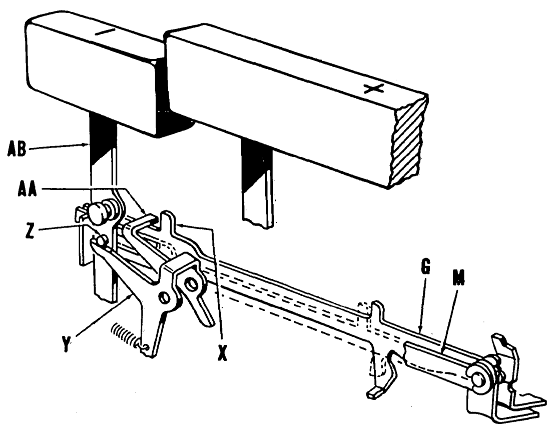


Fig. VI-10

Depression of minus bar AB rocks bellcrank Y through stud Z. Rocking of bellcrank Y lowers lip AA into the path of projection X to provide a limit for the minus symbol and at the same time lip AA lowers rocker arm H, Fig. VI-7 through projection I, Fig. VI-7, permitting index bar G to move forward.

NON-ADD OPERATIONS INDEX SYMBOL IN COLUMN "0" AND PREVENTS SYMBOL IN COLUMN "00"

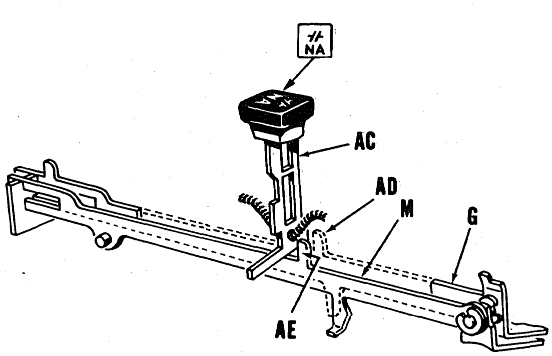


Fig. VI-11

Depression of non-add key AC blocks the forward movement of index bar M (Column "00") at point AE. During the forward stroke of a machine operation (with key AC depressed), index bar G (Column "0") moves forward until projection AD limits against the rearward portion of key AC to index a non-add symbol.

PLUS TOTAL SYMBOL INDEXING

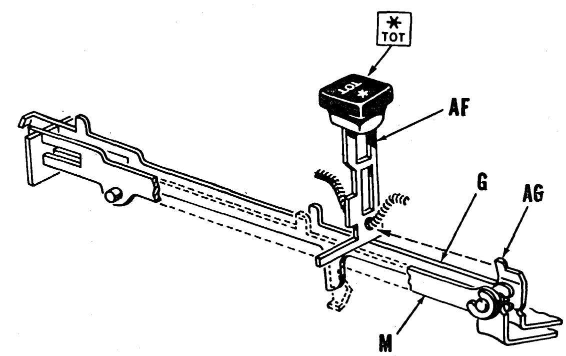


Fig. VI-12

Depression of total key AF positions the lowermost portion of the keystem into the path of projection AG permitting index bar G (Column "0") to travel forward until limited by the depressed key for indexing a total symbol.

PLUS SUB-TOTAL SYMBOL INDEXING

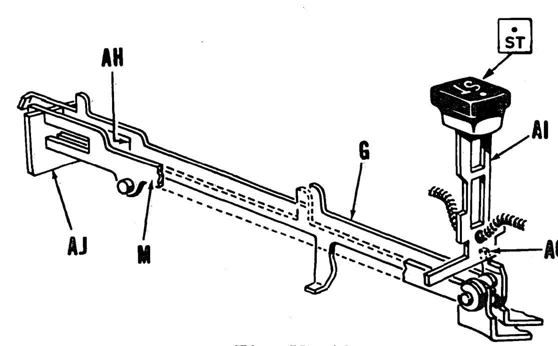


Fig. VI-13

Depression of sub-total key AI positions the lowermost portion of the keystem behind projection AG permitting index bar G (Column "0") to travel forward until point AH limits against guide AJ for indexing a sub-total symbol.

MINUS TOTAL SYMBOL INDEXING

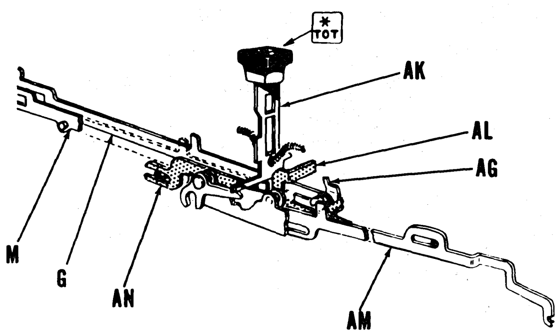


Fig. VI-14

In minus balance position, slide AM is positioned forward to locate its forward upright projection under total keystem AK. Depression of key AK lowers the forward portion of slide AM which in turn lowers slide AN to position lip AL into the path of projection AG. During the forward stroke of a machine operation, travel of index bar G (Column "0") for indexing a minus total symbol is limited by lip AL limiting against the rearmost portion of key AK.

Minus Sub-Total Symbol Indexing

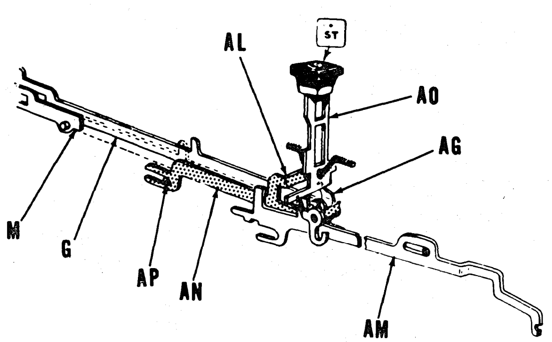


Fig. VI-15

In minus balance position, slide AM is positioned forward locating its rearward upright projection under keystem AO. Depression of key AO lowers the forward portion of slide AM which in turn lowers slide AN to position lip AL in front of keystem AO and in the path of projection AG.

During the forward stroke of a machine operation, travel of index bar G (Column "0") for indexing a minus sub-total symbol is limited by slide AN limiting against stud AP.

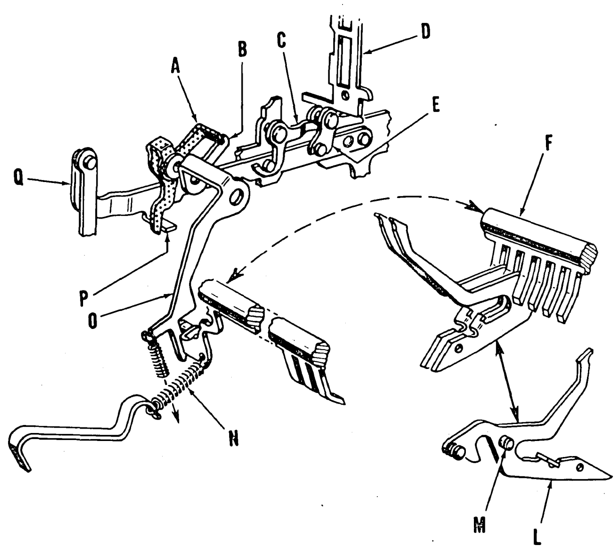
Tests and Adjustments

1. To safeguard against printing a symbol in column "0" during repeat plus operations - There should be minimum (non-binding) clearance between the leg of rocker arm H, Fig. VI-7, and the lip on the foremost portion of index bar G, Fig. VI-7, when the machine is in home position and rocker arm H is manually lowered and raised.
TO ADJUST, weave the upper right end of the adding sector in column "0" forward or rearward.
2. To safeguard against printing the "AB" symbol when register selector lever J, Fig. VI-8, is located in "AB" position -
There should be minimum clearance between the rear of the lip on projection Q, Fig. VI-9, and the upper hook portion of rocker arm R, Fig. VI-8, as the register selector lever is slowly moved into "AB" position.
TO ADJUST, bend projection Q.
3. To assure that the adding rack in column "0" is correctly located to permit proper aligning shaft engagement during a machine operation with non-add key AC, Fig. VI-11 depressed - There should be minimum (non-binding) clearance between the rearward portion of key AC, Fig. VI-11 and the front edge of projection AD, Fig. VI-11 when key AC is slowly depressed.
TO ADJUST, locate the lowermost portion of key AC.
4. To assure that total key AF, Fig. VI-12 limits the forward travel of index bar G, Fig. VI-12 (Column "0") during plus total operations Projection AG, Fig. VI-12 should have full lateral hold on keystem AF during the forward stroke of a plus total operation.
TO ADJUST, weave the upper right end of the adding sector in column "0" up or down.
5. To assure that the adding rack in column "0" is correctly located to permit proper aligning shaft engagement during minus balance totals - With the machine in minus balance position and during the forward stroke with the total key depressed, lip AL, Fig. VI-14, should limit the

travel of the adding rack in column "0" to permit the aligning shaft to move into the tooth spaces of the adding rack with minimum upward or downward movement of the adding rack.
TO ADJUST, check slide AN, Fig. VI-14 for being free, then locate lip AL forward or rearward.

6. To assure that the adding rack in column "0" is correctly located to permit proper aligning shaft engagement during minus balance subtotals -
With the machine in minus balance position and during the forward stroke with the sub-total key depressed, stud AP, Fig. VI-15 should limit the forward travel of slide AN, Fig. VI-15 so as to limit the travel of the adding rack in column "0" to permit the aligning shaft to move into the tooth spaces of the adding rack with minimum upward or downward movement of the adding rack.
TO ADJUST, locate lip AL, Fig. VI-15 forward or rearward and recheck for condition stated in Test 5.

HAMMERBLOCK - CONTROLLED BY TOTAL KEYS



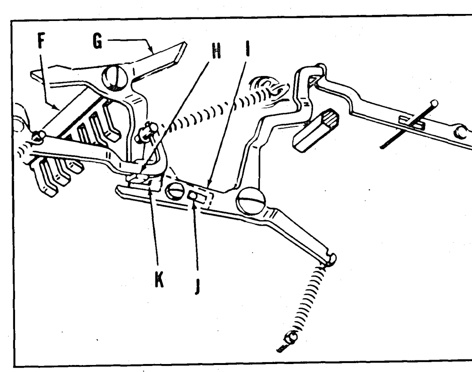


Fig. VI-16

Printing of specified columns is controlled by the total keys preventing the print of folio numbers with totals when the number, split, and normal lever is located in number position (extreme left).

Depression of total or subtotal keystem D rocks bellcrank C or E which through the stud in slide Q, moves slide Q rearward rocking bellcrank A through lip P. Bellcrank A rocks arm B downward raising the rear end of bail 0 permitting spring N to rock bail F which in turn is held rearward by latch K engaging the lip on arm G. Rocking of bail F positions its fingers into the path of rolls M on latches L thus preventing latches L from contacting the hammers in the columns to be hammerblocked as the adding sectors move up.

Tests and Adjustments

1. To assure full movement of bail F when a total key is depressed -
There should be minimum clearance between the lowermost finger on bail 0 and the roll on the right end of bail F when either the total or subtotal keys are latched depressed.
TO ADJUST, bend the lip on bellcrank A.

2. To safeguard against hammer latches L engaging the hammers in the columns to be hammer-blocked -
There should be .010" to .015" clearance between the lip on hammer latches L and the lowermost portion of the hammers in the columns to be hammerblocked during a total operation with nines in the accumulator and the handle pulled to the second notch of the full stroke segment.
TO ADJUST, loosen screw J and re-position latch K.

RED RIBBON LIFT MECHANISM

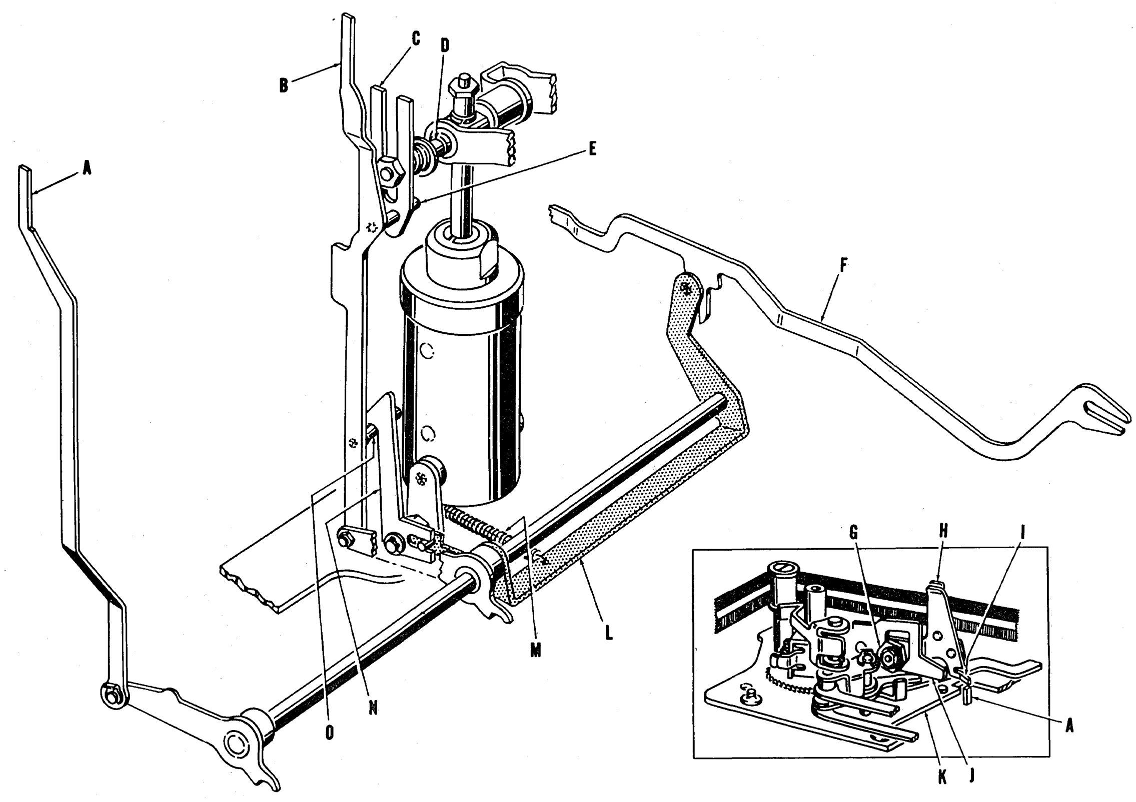


Fig. VI-17

Normal tracking of the ribbon is in the black inked band. However, when a machine operation is performed using minus amounts, the ribbon is raised to place the red inked band on line with the type face for printing information such as credits and minus balances in red.

When the minus bar is depressed, bail L is rocked through the rearward movement of subtract link F. Rocking of bail L disengages latch N from stud O thus permitting lift arms A and B to be raised during the forward stroke through friction plate C. Friction plate C, is actuated by the leftmost portion of dashpot hanger shaft D, is connected to lift arm B through stud E.

As lift arms A and B move up, their uppermost portion raises the right and left ribbon lifters H to position the red inked band of the ribbon into printing position. Projections I in ribbon lifters H are provided as a means of compensating for the variation in the height of lift arms A and B.

During the forward stroke of a machine operation in which the printing of amounts in red is not required, hanger shaft D moves up in the slot of friction plate C without disturbing the normal position of lift arms A and B.

Tests and Adjustments

1. To assure disengagement of latch N from stud O -
Latch N should be moved far enough forward to clear stud O when the minus motor bar is latched depressed.
TO ADJUST, weave bail L.
2. To assure full black printing impressions of plus items and full red printing impressions of minus operations -
   a. With ribbon lifters A and B fully restored to normal position, the uppermost edge of the ribbon should be 1 7/32" above carriage bottom plate K.
   b. Depress the minus bar and advance the handle to locate the full stroke pawl in the last notch in the full stroke segment. Eccentric in ribbon lifters H should contact the upper edge of the opening in plates J.

TO ADJUST:
   a. Turn eccentrics G.
   b. Bend projection I in lifters H.

ACCUMULATION

ADDING SECTOR AND TYPE BAR POSITIONING FROM KEYBOARD MECHANISM

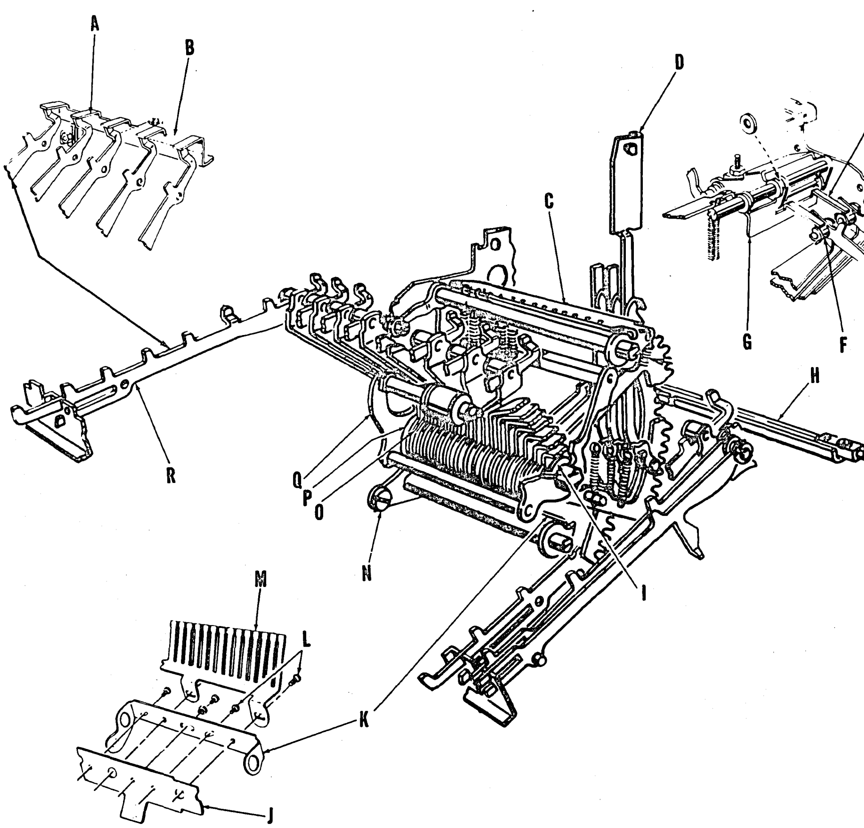


Fig. VI-18

This mechanism provides a means of locating the adding sectors and type bars in a position corresponding to keys indexed on the keyboard.

The adding sectors which are assembled within restoring frame Q with collars I, O, and P. Adding sectors carry type bars D and are controlled through movement of index bars R contacting their upright projections aginst depressed keystems 1 through 8. When a No. 9 key is depressed, the adding sectors move upward to limit on bail C; and when no keys are depressed, forward movement of index bars R is limited at cipher position by the foot of the cipher stops.

Sector limit plate J limits the downward movement of the adding sectors to prevent their overthrow which may result in:

a. A point-to-point lock of the adding pinions and the adding sectors during a safeguard operation with the total key and a listing key depressed.
b. Overaddition caused by tripping off carries when adding the figure 9.

Guides H and M, in addition to the slots provided in the aligning shaft, guide the adding sectors to maintain their alignment with the adding pinions.

Blanks B and G prevent excessive upward movement of the adding sectors in columns 1, 2, and 8 through 13 during machine operations in which these adding sectors are inactive. Excessive upward movement of these adding sectors may prevent full engagement of the aligning shaft with the adding sectors, resulting in an uneven print.

Tests and Adjustments

1. To obtain the correct starting point before making adjustments 2 and 3 -
With the machine in home position and resting on the rear edges of the accumulator frames, the upright right-angled portion of retaining bail K should be positioned to its full limit toward the adding sectors.
TO ADJUST, loosen screw N and position bail K.
2. To maintain the correct alignment of the adding sectors with the adding pinions -
Guide M should limit against the machine left sideframe.
TO ADJUST, loosen two screws L and position guide M.
3. To safeguard against a point-to-point lock of the adding pinions and the adding sectors or tripping off carries when adding the figure 9 -
Limit plate J should have a snug non-binding limit against the lowermost portion of the adding sectors when the machine is in home position.
TO ADJUST, loosen two screws L and position limit plate J.
4. To assure that brace G remains in a fixed position -
Brace G should be held rigid.
TO ADJUST, bend the lips on the upper portion of brace G.
5. To safeguard against excessive upward movement of the adding sectors in columns 1 and 2 -
With the machine in home position, there should be a snug, non-binding fit between fingers E and rolls F.
TO ADJUST, bend fingers E.
6. To safeguard against excessive upward movement of the adding sectors in columns 8 through 13 -
With the machine in home position, there should be a snug, non-binding fit between fingers A and the No. 8 projections of index bars R; and during the return stroke of a machine operation with No. 9 listing keys depressed in columns 8 through 13, the No. 8 projections of index bars R should clear beneath fingers A to permit proper positioning of the cipher stops.
TO ADJUST, bend fingers A.

REGISTER SELECTOR LEVER ALTERNATES AUTOMATICALLY

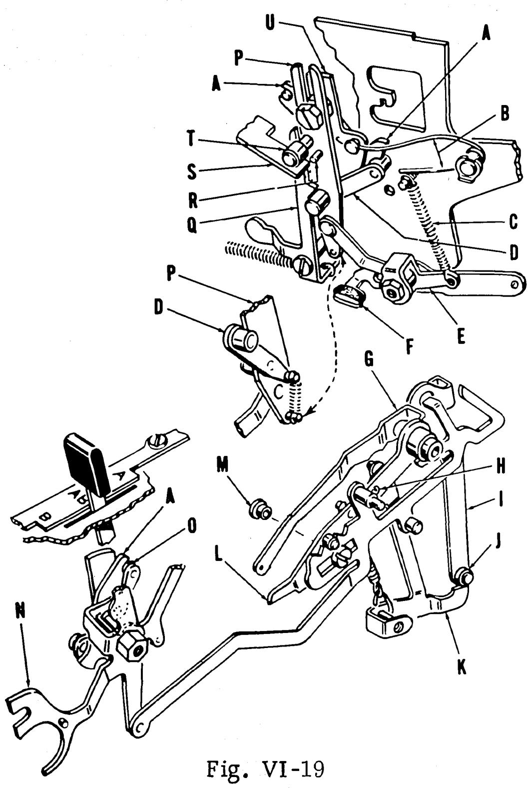


Fig. VI-19

Automatic alternating selection of registers "A" and "B" during machine operations (when the register selector lever control key in position 7-0 is released) permits accumulating in alternate registers while listing consecutively. This provides a means by which old and new balances, debits and credits, tax and amounts, etc., may be listed during the same run.

During the early part of the forward stroke of a machine operation with the register selector control key AA, Fig. VI-20 in released position, arm S (which is fastened to the secondary power mechanism) moves away from roll T permitting link P to move downward through arm E and spring C. Downward movement of link P positions the roll on arm D against the lowermost portion of the spear point of pawl A and, at the same time limits stud R on the step of latch Q to safeguard against automatic shifting of register selector lever N should a handle break occur. As the forward stroke continues, the foremost portion of the dashpot actuating arm assembly rocks latch Q away from stud R to permit link P to move farther downward and the roll on arm D to be indexed on the opposite side of the spear point on pawl A. Near the end of the forward stroke, detent L is raised by the upward movement of the roll on the secondary mechanism permitting the uppermost portion of latch K to be pulled under square stud H to retain detent L out of engagement with the tooth portion of register selector lever N as the latter shifts.

Near the end of the return stroke, arm S engages roll T. The latter, through link P, moves the roll on arm D into engagement with pawl A to reverse the position of lever N through stud O. As lever N completes its shifting, roll J of segment arm assembly I rocks latch K out of engagement with square stud H permitting detent L to be pulled down into engagement with the tooth portion of lever N.

REGISTER SELECTOR LEVER CONTROL KEY DISABLES AUTOMATIC SHIFTING

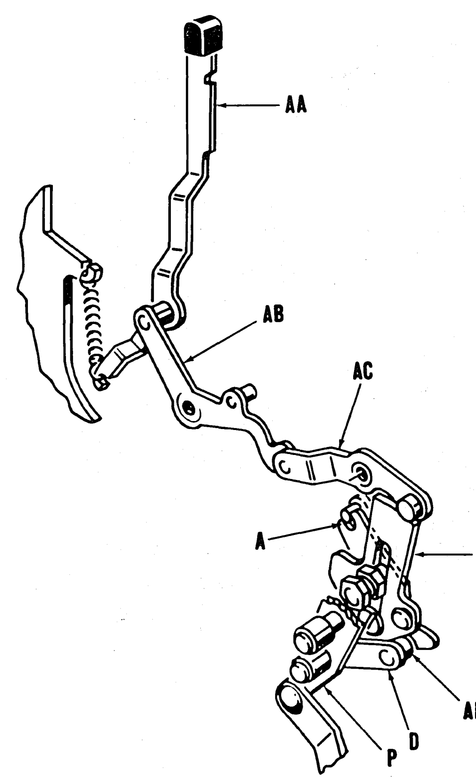


Fig. VI-20

Depression and latching of control key AA disables automatic shifting of the register selector lever thereby permitting the operator to manually select registers when listing plus and minus amounts.

Depression of control key AA lowers slide U through arms AB and AC. Lowering of slide U moves and retains roll AD out of the pocket in pawl A to permit manual shifting of the register selector lever. Depression of control key AA also lowers arm G, Fig. VI-19 into the path of a stud in the uppermost portion of latch K, Fig. VI-19 preventing it from engaging square stud H, Fig. VI-19, and the subsequent latching of detent L, Fig. VI-19 in a raised position.

Tests and Adjustments

1. To assure free movement of the register selector lever -
Lever N should be aligned centrally in the slot of the upper keyboard plate and should be free on bushing M.
TO ADJUST, bend lever N.
2. To ensure against a safeguard operation when the register selector lever is correctly located in any of its three positions; and to assure a safeguard operation when the lever is partially shifted -
The forked end of lever N should not be in the path of the lower shaft of the key restoring rack assembly during the forward stroke of a machine operation with lever N located in any of the three operating positions.
TO ADJUST, bend the front portion of lever N up or down.
3. To assure correct timing for the release of link assembly P -
The offset tail of latch Q should be centrally aligned with the foremost portion of the dashpot actuating arm assembly. Latch Q should also be moved from under stud R immediately after the full stroke pawl enters the first notch of the full stroke segment during the forward stroke of a machine operation.
TO ADJUST, bend the offset tail of latch Q.
4. To ensure a true home limit of the machine's main drive assembly -
With the machine in home position, there should be approximately .015" clearance between roll T and arm S when link P is manually held upward.
TO ADJUST, loosen the brace under arm S and bend arm S up or down; then reposition the brace for a snug fit to the underside of arm S.
5. To assure equal alternating throw of the register selector lever -
With key AA, Fig. VI-20 released and the machine operated slowly during the return stroke, lever N should have equal alternating throw in the slot of the upper keyboard plate.
TO ADJUST, bend the upper arm of lever N to tilt stud O.
6. To assure arm D reverses position -
Link P should have sufficient downward movement during the forward stroke of a machine operation to permit the roll on arm D to clear the bottom point of slide U by approximately .010".
TO ADJUST, loosen the two screws retaining limit arm F and raise or lower the rearward portion of arm F.
7. To assure full restoration of slide U -
Slide U should move to its uppermost position when key AA, Fig. VI-20 is slowly released.
TO ADJUST, check slide U for being free; also check the condition of spring B.
8. To assure lever N is fully positioned before latch K releases detent L -
The rearward leg of latch K should limit on stud J and its upper front edge should limit against square stud H when the machine is in home position.
TO ADJUST, bend the rearward leg of latch K up or down.
9. To ensure latch K non-engaging square stud H during a machine operation with key AA, Fig. VI-20 latched depressed -
Arm G should prevent latch K from engaging square stud H when key AA is latched depressed, handle pulled forward to locate the full stroke pawl in the first notch in the full stroke segment and detent L manually raised.
TO ADJUST, bend the foremost portion of arm G to or from the stud in arm AB, Fig. VI-20.
10. To assure latch K engages square stud H during a machine operation with key AA, Fig. VI-20 released -
There should be a minimum of .010" clearance

between the underside of arm G and the stud in the uppermost portion of latch K when key AA is released, handle pulled forward to locate the full stroke pawl in the first notch of the full stroke segment and detent L latched upward by latch K. TO ADJUST, re-check adjustment No. 9.

REGISTER SELECTOR LEVER BLOCKED WHEN TOTAL KEYS ARE DEPRESSED

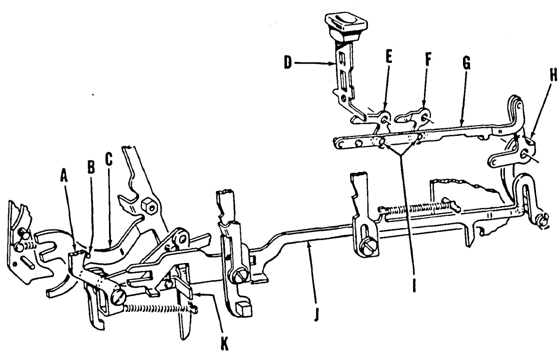


Fig. VI-21

With a minus balance in a selected register interlock J safeguards against printing complements by preventing the shifting of register selector lever C to the opposite register position after the total keys have been depressed far enough to be latched down without tripping the drive.

Depression of total keys D moves slide G rearward through bellcrank E or F and stud I. Slide G, through crank H positions interlock J in the path of lip K preventing the shift of lever C through stud B attempting to rock lever A. Lever A movement is blocked by the step on the lower leg of lever assembly A limiting under lip K.

REGISTER "A" AND "B" MESHING CONTROLS - LISTED ITEMS

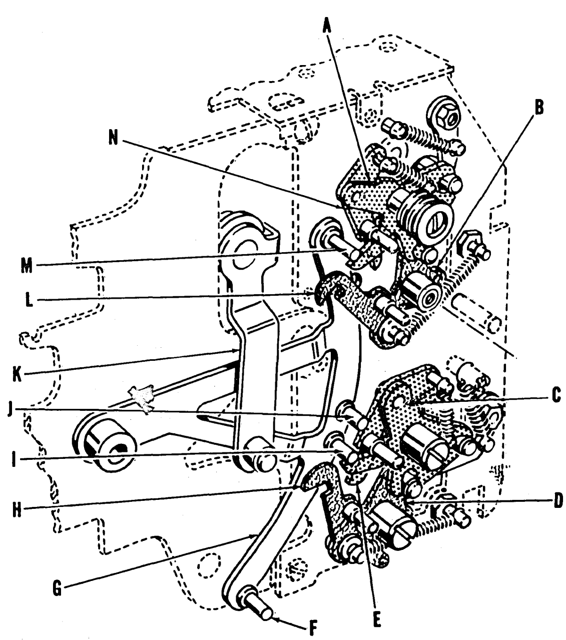


Fig. VI-22

These controls provide a means of engaging and disengaging the adding pinions of registers "A" and "B" with the adding sectors.

Positioning of the register selector lever in one of its three positions - "A", "AB", or "B" - determines the register selection. Engagement and disengagement of registers "A" and "B" adding pinions with the adding sectors is controlled by segment G. The latter through its connection to the dashpot arm assembly by link K, receives an oscillating action during each machine operation. Studs J and M of segment arm G actuate register "A" and studs F and I of segment G actuate register "B".

REGISTER "A" MESHING CONTROLS - LISTED ITEMS

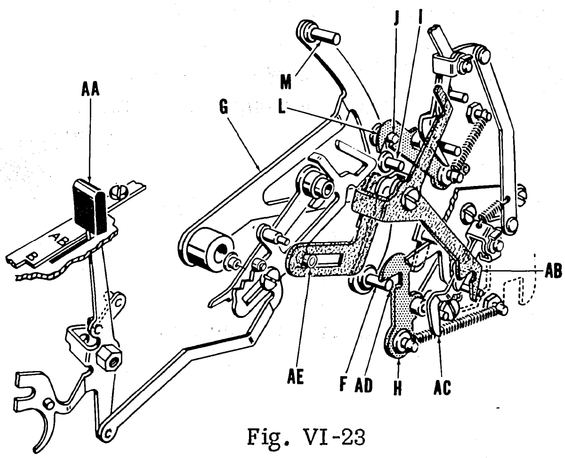


Fig. VI-23

At the beginning of the return stroke as segment G starts downward, stud J engages notch of pawl L and through assemblies B and A, Fig. VI-22 engages the adding pinions of register "A" with the adding sectors. Near the end of the return stroke, stud M engages the forward finger of assembly A, Fig. VI-22 to disengage the adding pinions from the adding sectors.

Movement of register selector lever AA into "A" position causes roll AE to rock crank AB which through its contact with a stud in arm AC, moves AC rearward to move pawl H out of the path of stud F, thus preventing register "B" from being active.

REGISTER "B" MESHING CONTROLS - LISTED ITEMS

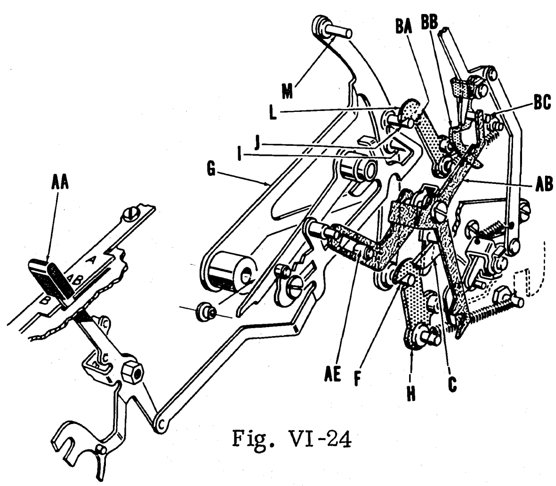


Fig. VI-24

Engagement of stud F with pawl H at the beginning of the return stroke and engagement of stud I with the forward finger of assembly C, Fig. VI-22 engages and disengages the adding pinions of register "B" with the adding sectors in the same manner as described for register "A" in Fig. VI-23.

Movement of lever AA into "B" position causes roll AE to rock crank AB and through its contact with stud BC, moves arm BB rearward to raise pawl L out of the path of stud J, thus preventing register "A" from being active.

REGISTERS "A" AND "B" MESHING CONTROLS - LISTED ITEMS WITH REGISTER SELECTOR LEVER IN "AB" POSITION

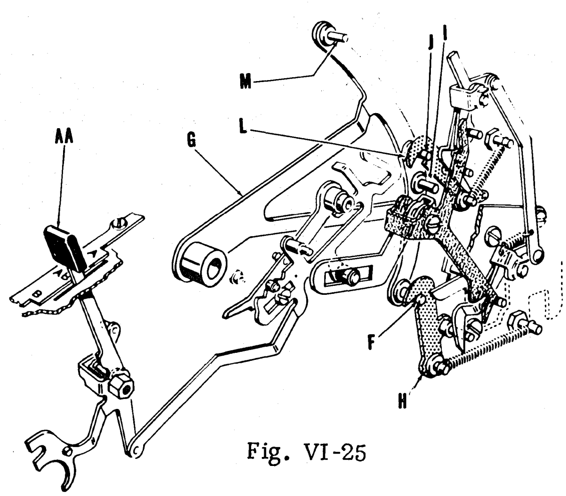


Fig. VI-25

With lever AA located in "AB" position, upper pawl L and lower pawl H remain at normal and are engaged at the beginning of the return stroke of a machine operation by studs J and F respectively to simultaneously engage the adding pinions of registers "A" and "B" with the adding sectors as described in Fig. VI-23 and VI-24.

Disengagement of the adding pinions of both registers from the adding sectors is accomplished in the same manner as described for registers "A" and "B" in Fig. VI-23 and VI-24.

NON-ADD REGISTER "A" AND "B" WITH REGISTER SELECTOR LEVER LOCATED IN "AB" POSITION

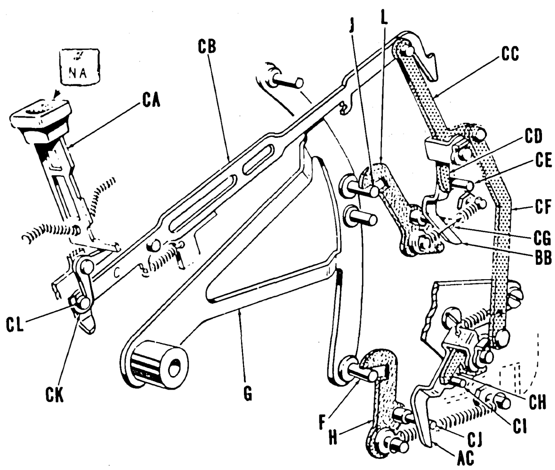


Fig. VI-26

The non-add key permits printing of descriptive figures without accumulating in either register "A" or "B". Depression of the key holds the accumulator listing pawls disengaged thus preventing meshing the adding pinions with the adding sectors during the return stroke of a machine operation.

Depression of non-add key CA moves slide CB forward through bellcrank CK and stud CL to rock arm assembly CC. Rocking of assembly CC raises pawl L out of the path of stud J (to non-add register "A") through finger CD, stud CE, finger BB, and stud CG. Rocking of arm assembly CC also raises pawl H out of the path of stud F (to non-add register "B") through link CF, finger CH, stud CI, finger AC, and stud CJ.

Tests and Adjustments

1. To safeguard against a false normal limit of segment G when the machine is in home position -
There should be approximately .005" clearance between stud M and the forward finger of assembly A and between stud I and the forward finger of assembly C when the machine is in home position.
TO ADJUST, bend the forward finger of assemblies A and C.

2. To assure that the forward fingers of assemblies A and C are engaged by studs M and I to move registers "A" and "B" out of mesh -
At the end of the return stroke of a listing operation with register selector lever AA, Fig. VI-23, located in "AB" position, studs M and I should have a full lateral hold on the forward fingers of assemblies A and C.
TO ADJUST, bend the forward fingers of assemblies A and C.

3. To safeguard against meshing register "B" during the return stroke of a listing operation with register selector lever AA located in "A" position -
With lever AA located in "A" position, there should be approximately 1/32" clearance between stud F and pawl H at point AD, Fig. VI-23, as segment G moves downward during the return stroke of a listing operation.
TO ADJUST, bend the lowermost portion of arm AB, Fig. VI-23.

4. To safeguard against meshing register "A" during the return stroke of a listing operation with register selector lever AA located in "B" position -
With lever AA located in "B" position, there should be approximately 1/32" clearance between stud J and pawl L at point BA, Fig. VI-24, as segment G moves downward during the return stroke of a listing operation.
TO ADJUST, bend the uppermost portion of arm AB.

5. To safeguard against accumulating amounts in register "A" and "B" during non-add operation -
With non-add key CA, Fig. VI-26 locked depressed, there should be no less than .010" clearance between stud J and pawl L and between stud F and pawl H as segment G moves down at the beginning of a return stroke during a non-add operation.
TO ADJUST, bend finger CD to increase clearance between stud J and pawl L; bend finger CH to increase clearance between stud F and pawl H.

REGISTERS "A" AND "B" CONSTRUCTION

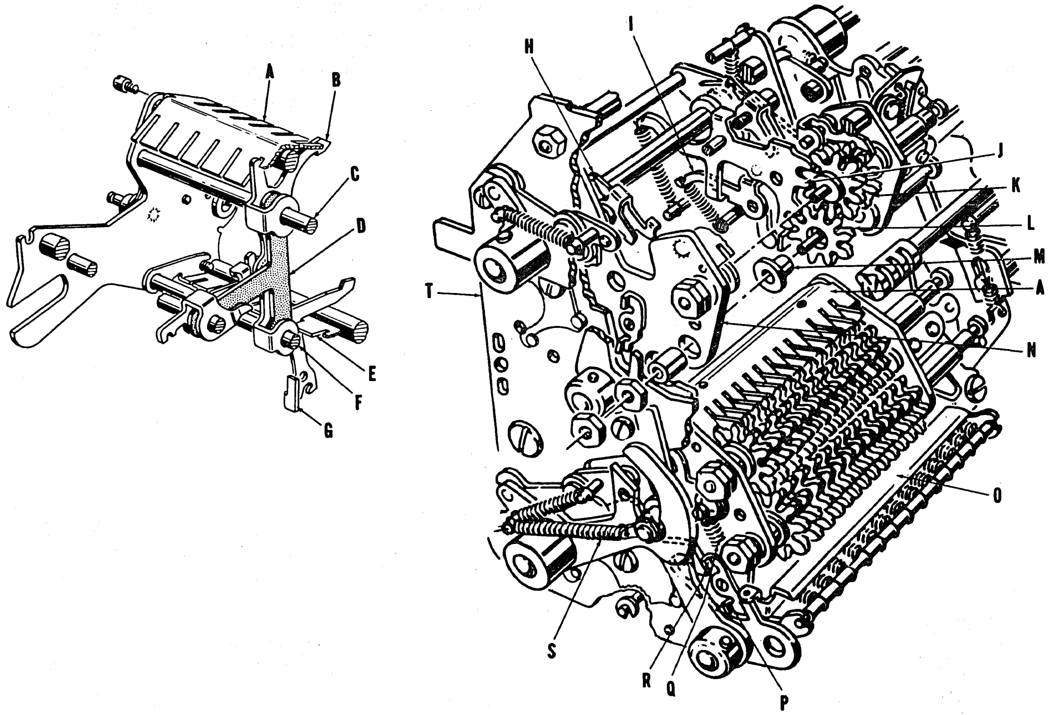


Fig. VI-27

As explained in Section I, the Series P400 machine consists of two registers - "A" (upper) and "B" (lower). These registers are identically constructed and independently controlled. Each register consists of meshed pinions K and L. Upper pinions K (which are set at cipher position) being known as the plus pinions and lower pinions L (which are set at nine position) known as the minus pinions.

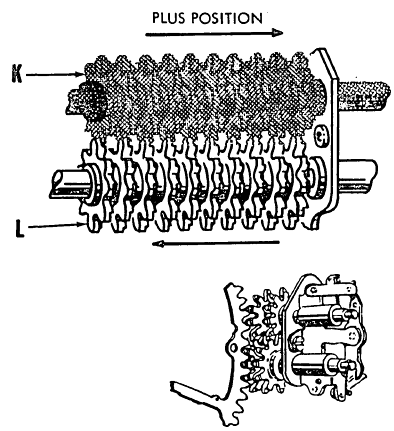
Bail O which is meshed with lower pinions L during the time the accumulator is moving into mesh with the adding sectors or carry racks for each machine operation, thereby preventing a partial turn of the pinions; thus providing a safeguard against a point to point lock of the pinions with either the adding sectors or the carry racks.

As pinions assembly N moves forward and lip R moves away from the rearward projection on sideframe T, spring Q is permitted to pull bail O up into mesh with lower pinions L. As pinion assembly N completes its forward movement, lip P contacts the upright projection on sideframe T causing bail O to be moved out of mesh with the lower pinions.

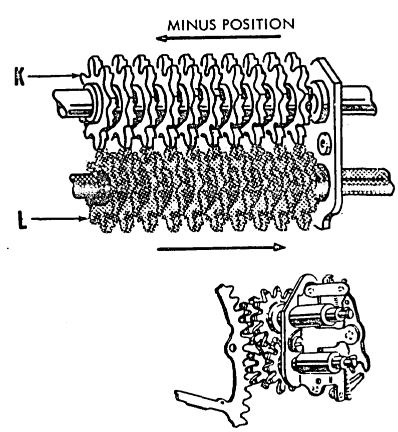
Support brace D prevents an inherent weave of shafts C and F and the subsequent loss of relay carries which may occur due to carry pawls G failing to raise the carry racks latches high enough to release the carry racks.

Springs S safeguards against over and under addition in registers "A" and "B" during plus and minus operations by assuring a consistent clearance between the lip on the lowermost portion of carry pawls G and the feet of the carry latches when the accumulator is out of mesh.

ACTIVE AND INTERMEDIATE PINIONS



ADDING PINIONS IN PLUS POSITION



ADDING PINIONS IN MINUS POSITIONS

Fig. VI-28

A cross-sliding action (.060") of the two sets of pinions permits only one set to be meshed with the adding sectors during listing and total operations. The pinions meshed with the adding sectors during listing and totaling operations and with the carry racks when the accumulator is normal are known as the intermediate wheels. The pinions aligned with the carry pawls are known as the active wheels.

Tests and Adjustments

1. To safeguard against bail O, Fig. VI-27, interfering with the free movement of the lower pinions -
The upper edge of bail O should have approximately .010" clearance below the point of the teeth of the lower pinions when the pinions are in mesh with either the adding sectors or the carry racks.
TO ADJUST, bend lips P and/or R.

CARRY MECHANISM

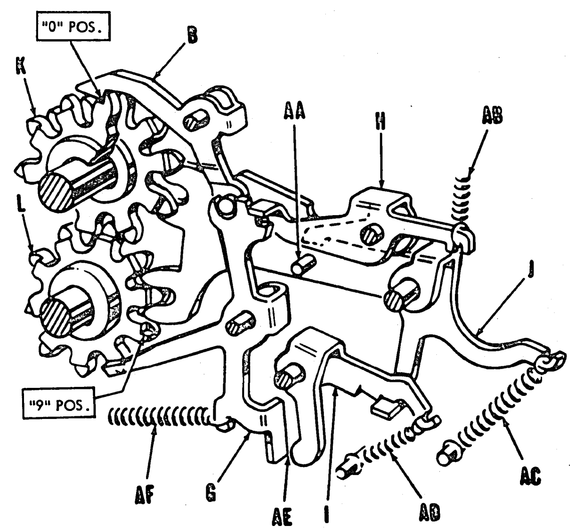


Fig. VI-29

Carries resulting from addition or subtraction are produced in two stages: the initial carry, which takes place while pinions K or L are in mesh with the adding sectors; and the completed carry, which is produced when the pinions are disengaged from the adding sectors and are meshed with carry racks J.

PLUS CARRY

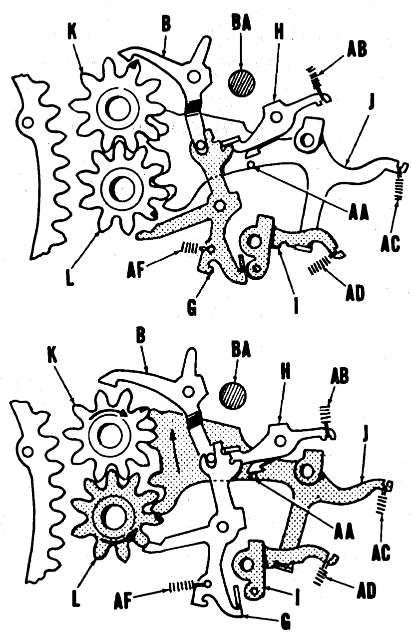


Fig. VI-30

An initial plus carry is produced when the wide tooth of upper pinion K (which is being turned clockwise) rocks carry pawl B. The latter, through its forked connection with carry pawl G, moves the latter rearward to become latched by the lip of latch H moving downward onto its lower step.

Completion of a plus carry results when the lip on the lower-most portion of carry pawl G rocks latch I as the accumulator moves out of mesh with the adding sectors. The rocking of latch I raises its rearward step clear of the lip on carry rack J, permitting spring AC to rock carry rack J upward. Carry rack J then rotates lower pinion L counterclockwise, which in turn rotates upper pinion K clockwise to advance it one point.

MINUS CARRY

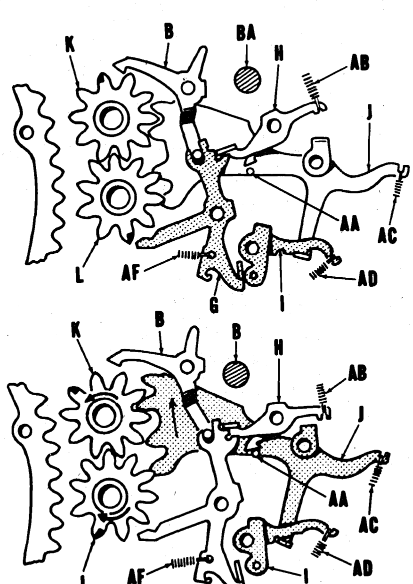


Fig. VI-31

An initial minus carry is produced when the wide tooth of lower pinion L (which is being turned clockwise) rocks carry pawl G rearward to become latched by latch H moving down onto its lower step.

Completion of a minus carry is accomplished in the same manner as that of a plus carry, with one exception: upper pinion K being in mesh with carry rack J, is rotated counterclockwise, which in turn rotates the lower pinion clockwise to advance it one point.

CARRY PAWL RESETTING

Resetting of carry pawls B and G takes place when carry racks J moves upward. The latter, through stud AA, raises latch H permitting spring AF to pull the carry pawls back to normal.

CARRY RACK RESETTING

Resetting of carry racks J results as the accumulator moves into mesh with the adding sectors. As the accumulator moves forward, shaft BA moves downward and contacts the upper flat surface of carry racks J, moving the latter downward permitting the rearward step on latches I to engage the lip of the carry racks.

Tests and Adjustments

1. To assure free movement of carry pawls B -
   Carry pawls B should have approximately .005" over-all side play and should be centrally aligned in the slots of guide A, Fig. VI-27.
   TO ADJUST, bend carry pawls B.
2. To assure free movement of carry pawls G -
   Carry pawls G should have .005" overall side play, should be centrally aligned in the slots of guide E, Fig. VI-27, and should be free on the stud in upper carry pawls B.
   TO ADJUST, bend carry pawls G.
3. To assure the correct normal and initial carry positions of carry pawls B and G -
   Latches H should have less than .010" over-all side play.
   TO ADJUST, open or close the "U" form of latches H.
4. To assure free movement and proper alignment of carry racks J -
   Carry racks J should have less than .010" over-all side play.
   TO ADJUST, open or close the "U" form of carry racks J.
5. To assure free movement and proper alignment of carry rack latches I -
   Carry rack latches I should have between .010" and .015" over-all side play.
   TO ADJUST, open or close the "U" form of latches I.
6. To assure free movement of pinions K and L -
   Pinions K and L should be free to spin.
   TO ADJUST, replace bushings M, Fig. VI-27.
7. To safeguard against over and under addition -
   When the accumulator is in mesh with the carry racks, there should be not less than .006" and not more than .010" clearance between the lip on the lowermost portion of carry pawls G and the lower leg of carry rack latches I at point AE, Fig. VI-29 if no initial carry has been created.

   TO ADJUST, bend the lip on the lowermost portion of carry pawls G.

SUBTRACT OPERATION

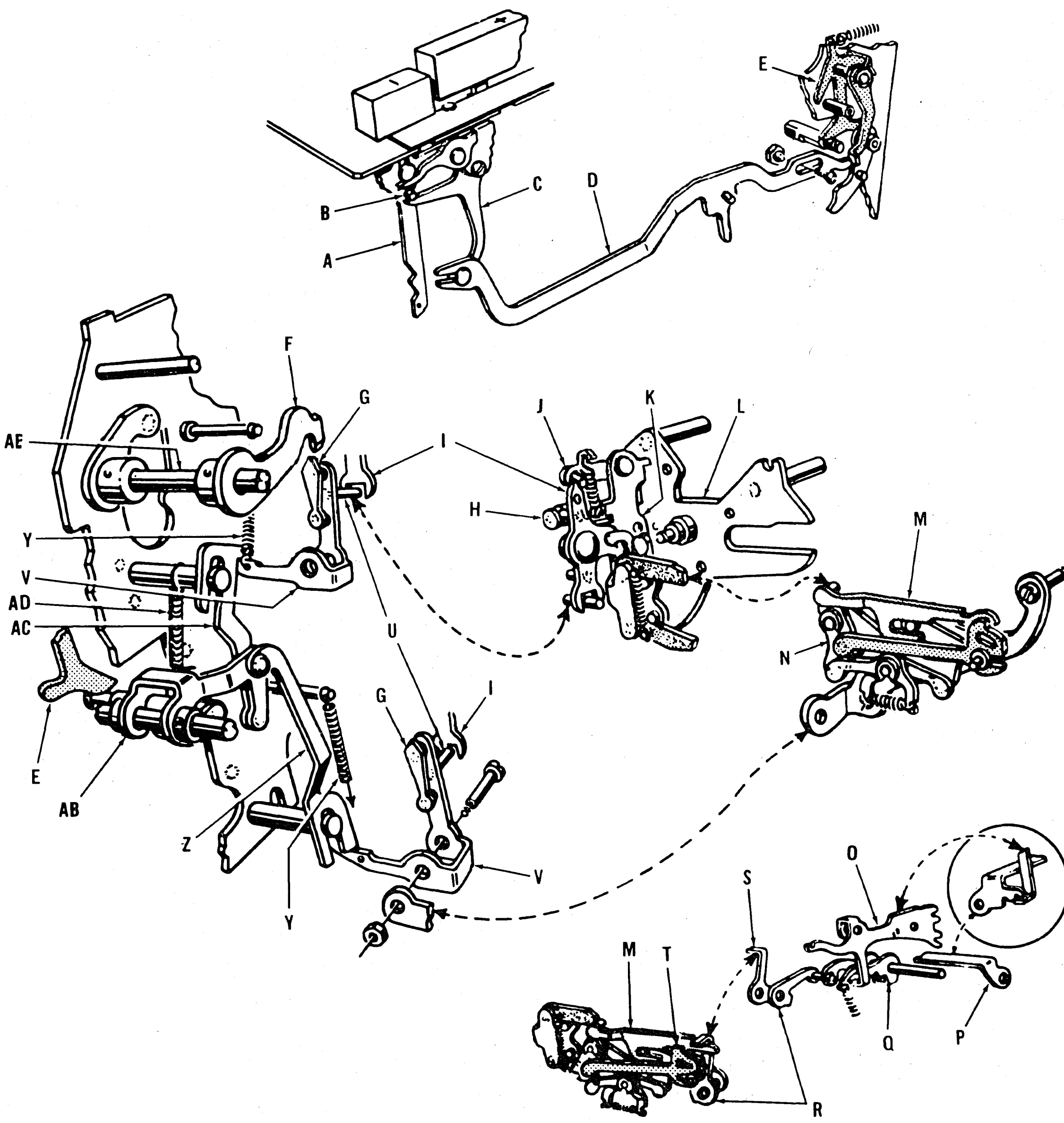


Fig. VI-32

When subtracting amounts in registers "A" and/or "B" the upper pinions of each register are shifted to the left and the lower pinions to the right. Therefore, the pinions being meshed with the adding sectors at the beginning of the return stroke, are turned in the opposite direction when subtracting. This shifting of the pinions is indexed from the minus motor bar or from the total keys when a minus balance is in the machine.

Depression of minus bar A rocks assembly AB through stud B, arm C, link D, and bellcrank E. Rocking of assembly AB lowers links Z and AC which rock spear point assemblies V to locate spear points G to the right of arms F.

At the beginning of the return stroke as the accumulator pinions move into mesh with the adding sectors, arms F move downward against the inclined surfaces on the left side of spear points G to further rock spear point assemblies V. This latter movement of assemblies V through studs U, pivots rocker arms I to shift pinion shafts H and locate the upper pinions to the left and the lower pinions to the right. Rocker arms I are then held in their respective positions through detents J.

As rocker arms I are pivoted to shift the pinion shafts, the upper finger of assembly K is pulled down into the path of lift arm M.

Near the end of the return stroke as pinion assembly L moves rearward, the upper finger of assembly K contacts the stud on lift arm M moving the latter rearward to raise latch Q off the lip of carry rack O through bail S. Carry rack O remains in latched position at this time through bail P, which is actuated only when a relay carry takes place beyond the capacity of the machine.

As minus bar A returns to normal, spear point assemblies V are positioned through springs Y and AD to index shifting of the pinions to add position.

Tests and Adjustments

1. To assure the correct relative position of arms F to spear point assemblies V -
   Shaft assemblies AD (upper and lower) should have no sideplay when the machine is in home position.
   TO ADJUST, use adjusting screws at the right end of shaft assemblies AD.
2. To safeguard against complementary answers during plus totals following minus operations -
   With registers "A" and "B" in add position, the horizontal arm on spear point assemblies V should have .005" clearance under links Z and AC when bellcrank E is manually held all the way rearward.
   TO ADJUST, bend the horizontal arm of spear point assemblies V.
3. To assure correct indexing of the subtract shift mechanism -
   The high point on the camming portion of bellcrank E should be located on the center of the stud on assembly AB when minus bar A is latched depressed.
   TO ADJUST, bend the outward arm of bellcrank E.
4. To safeguard against a false limit of assembly AB at normal -
   The forward edge of the inner arm of bellcrank E should limit against the post in the side frame when minus bar A is at upward limit.
   TO ADJUST, bend the lower leg of bellcrank D, Fig. 36, Sec. VI.
   NOTE: After completing adjustment No. 4, there should be no clearance between the rearward edge of the lower leg of bellcrank D, Fig. 36, Sec. VI, and the stud on link D when link D is in add position.
5. To assure full shifting of the adding pinions from plus to minus position and from minus to plus -
   Arms F should have equal clearance either side of spear points G when the adding pinions are fully meshed with the adding sector during the return stroke of plus and minus operations.
   TO ADJUST, bend arms F.

REGISTER "A" AND "B" TOTAL MECHANISM

Totaling of amounts previously accumulated in register "A" and "B" is controlled by position of the register selector lever. When the register selector lever is in "A" position, a total of register "A" may be taken; when in "B" position, a total of register "B" may be taken; but when the register selector lever is located in "AB" position, only register "A" totals are provided.

REGISTER "A" TOTAL OPERATION WITH REGISTER SELECTOR LEVER LOCATED IN "A" POSITION

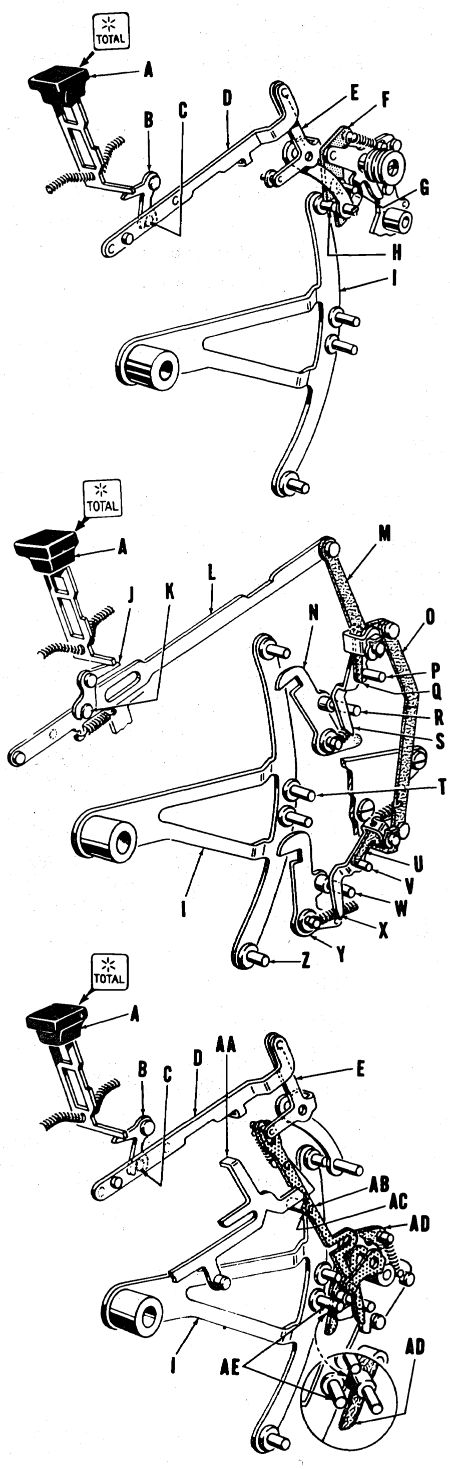


Fig. VI-33

To total accumulated amounts in register "A", the register "A" total pawl F is indexed while the register "B" total pawl AD and the registers "A" and "B" listing pawls are made inactive.

When register selector lever AA is in "A" position, its rearmost portion is positioned over stud AC to block upward movement of link AB and to hold register "B" total pawl AD out of the path of stud AE as arm E is rocked from depression of total key A - thereby preventing register "B" totals.

Depression of total key A moves slide D rearward through bellcrank B and stud C. Movement of slide D rocks crank E and by its lower portion moving away from stud G permits total pawl F movement into the path of stud H. Depression of the total key also moves slide L forward through bellcrank J and stud K. Forward movement of slide L rocks arm M and by finger Q, stud P, finger S, and stud R, raises register "A" listing pawl N out of the path of stud T preventing meshing the adding pinions with the adding sectors during the return stroke. Also, rocking of arm M raises link O which, through finger U and stud V, and finger X and stud W, moves the step of register "B" listing pawl Y out of the path of stud Z to prevent adding in register "B".

At the beginning of the forward stroke of a machine operation with total key A depressed, segment I moves upward and stud H engages register "A" total pawl F moving the adding pinions into mesh with the adding sectors. Near the end of the forward stroke, stud T engages the hook portion of listing pawl N to pull the adding pinions from sector mesh position.

When the subtotal key is depressed, listing pawl N is not raised because slide L is inactive. Therefore stud T engages listing pawl N during the return stroke to re-engage the adding pinions with the adding sectors which returns the accumulated amounts to the adding pinions. Near the end of the return stroke, the adding pinions are moved out of mesh in the same manner as described under Register "A" and "B" Meshing Controls - Listed Items Figs. VI-23 and VI-24.

REGISTER "A" TOTAL OPERATION WITH REGISTER SELECTOR LEVER LOCATED IN "AB" POSITION

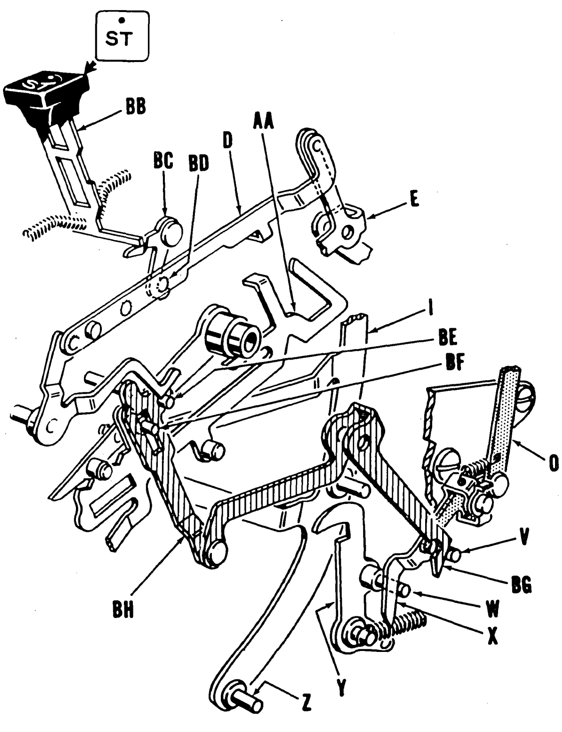


Fig. VI-34

When register selector lever AA is located in "AB" position, the amount previously accumulated simultaneously into registers "A" and "B" will be cleared out of register "A" and retained in register "B" thus providing a subsequent grand total.

Depression of the total key (when the register selector lever is located in "AB" position) indexes the register "A" total pawl, disables the registers "A" and "B" listing pawls and register "B" total pawl in the same manner as described under Register "A" Total Operation With Register Selector Lever Located in "A" Position, Fig. VI-33.

Depression of subtotal key BB moves slide D rearward through bellcrank BC and stud BD. Rearward movement of slide D rocks bellcrank BE; its heel contacting stud BE, lowers link BH to rock arm BG. Rocking of arm BG raises register "B" listing pawl Y out of the path of stud Z (to disable register "B") through stud V, finger X, and stud W.

Movement of register "A" adding pinions into and out of mesh with the adding sectors during total and subtotal operations when the register selector lever is located in "AB" position is the same as described under Register "A" Total Operations With Register Selector Lever Located in "A" Position, Fig. VI-33.

REGISTER "B" TOTAL OPERATIONS WITH REGISTER SELECTOR LEVER LOCATED IN "B" POSITION

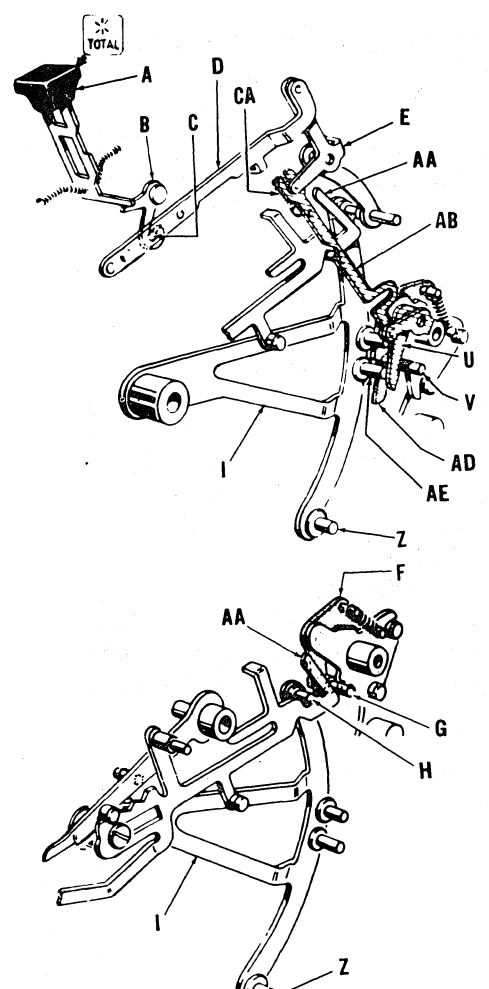


Fig. VI-35

To total accumulated amounts in register "B", the register "B" total pawl is indexed while the register "A" total pawls and the registers "A" and "B" listing pawls are made inactive.

When register selector lever AA mechanism is moved into "B" position, its rearmost finger moves register "A" total pawl F out of the path of stud H through stud G.

Depression of total key A moves slide D rearward through bellcrank B and stud C. Movement of slide D rocks crank E permitting link AB to be raised by spring CA. Raising of link AB moves finger U out of the path of stud V allowing register "B" total pawl AD to move into the path of stud AE. Depression of the total key also raises register "B" listing pawl Y, Fig. VI-34 (to prevent moving the adding pinions back into mesh with the adding sectors on the return stroke) in the same manner as described in Register "A" Total Operations With the Register Selector Lever Located in "A" Position, Fig. VI-33.

At the beginning of the forward stroke of a machine operation with total key A depressed, segment I moves upward and stud AE engages register "B" total pawl AD meshing the adding pinions with the adding sectors.

Near the end of the forward stroke, stud Z engages the hook portion of register "B" listing pawl Y, Fig. VI-34 to pull the adding pinions out of mesh.

When the subtotal key is depressed, pawl Y, Fig. VI-34 is not raised out of the path of stud Z, Fig. VI-34 because slide L, Fig. VI-33 is inactive. Consequently the adding pinions of register "B" are moved in and out of mesh with the adding sectors in the same manner as that described under Register "A" and "B" Meshing Controls Listed Items, Fig. VI-22.

Tests and Adjustments

1. To assure that register "B" is disabled during register "A" total operation -
There should be no downward movement in the lower portion of link AB when the register selector lever is shifted into either "A" or "B" position; and there should be no upward movement in the lower portion of link AB when total key A is depressed with the register selector lever in either "A" or "B" position.
TO ADJUST, change length of link AB at its adjusting slot.
2. To safeguard against actuation of register "B" during register "A" subtotals -
There should be approximately .015" clearance between stud Z and the step on pawl Y during the return stroke of a machine operation with the subtotal key depressed and the register selector lever located in "AB" position.

TO ADJUST, bend the lower portion of arm BG.
3. To assure that register "A" is disabled during register "B" total operation -
There should be approximately .020" clearance between stud H and the step on register "A" total pawl F as segment I moves upward during the forward stroke of a machine operation with the total key latched depressed.
TO ADJUST, bend the vertical finger on the rearmost portion of register selector lever AA.

MINUS BALANCE MECHANISM

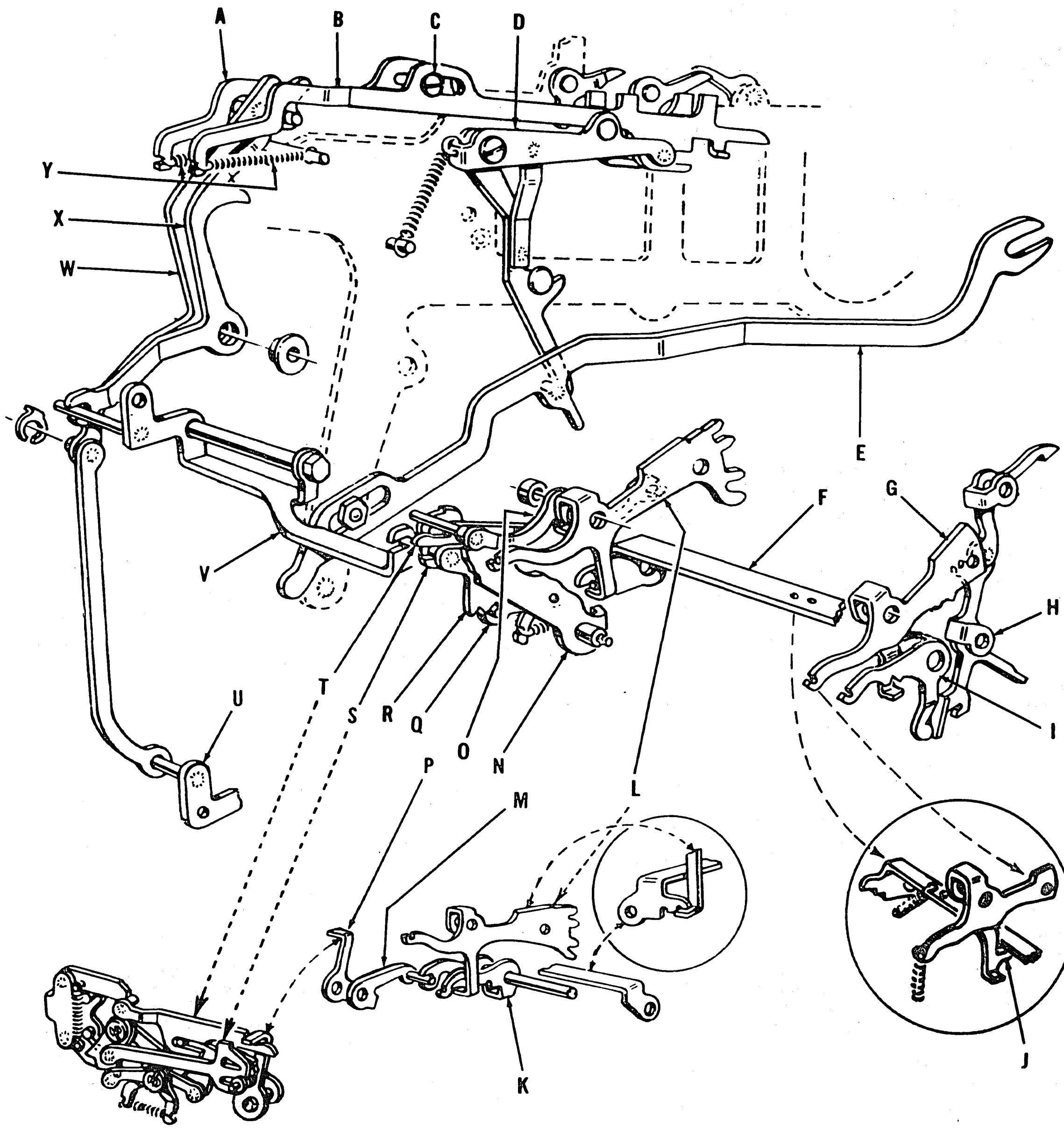


Fig. VI-36

A minus balance occurs when the amount in the minus pinions exceeds the amount on the plus pinions. Since, in a clear machine the wide teeth of the plus pinions are positioned at cipher position and the wide teeth of the minus pinions are positioned at nine, a negative one (which is automatic) is added to the first minus pinions before a true minus balance total can be taken.

During the first add listing operation following a minus balance total, a positive one (which is also automatic) is added to the first plus pinion to provide a true amount for a plus balance total should one be taken.

Carry rack L in column one is controlled by latches K and F, the latter being designed in the form of a bail. In turn, latch K is controlled by lift arms S and T while bail F is controlled by blank carry rack G located immediately to the left of the last carry column. Therefore, to release carry rack L, latch K and bail F must be released from the carry rack.

FIRST LOWER PINIONS ADVANCED ONE POINT AND MINUS BALANCE MECHANISM INDEXED

During a minus operation as the accumulator moves out of mesh, lift arm T moves rearward and engages lip P to rock bail M and lift latch K out of engagement with carry rack L.

When amounts being subtracted exceeds the amounts previously added, the capacity of the accumulator is exceeded by the relay carry. This condition causes the wide tooth of the last lower adding pinion to rock carry pawl H rearward which, through its lowermost lip contacting latch I raises the latter clear of the lip on G permitting the latter to move up under spring tension and rock bail F through finger J. Carry rack L is thereby permitted to be pulled up into carried position to advance the first lower adding pinion one point (negative automatic one).

Indexing of the minus balance mechanism in register "A" and/or "B" is accomplished through upward movement of carry rack L which rocks arm O. The latter through its long stud moves lift arm T downward causing lift arm S to move upward and detent R to reverse position. As detent R reverses position, it swings bails U and/or V to rock arms W and/or X forward permitting springs Y to pull slides A and/or B forward thus locating their upright projections under the total keys. When the total keys are depressed, slides A and/or B are lowered and link E is indexed into subtract position through the rocking of bell-crank D.

FIRST UPPER PINION ADVANCED ONE POINT AND MINUS BALANCE MECHANISM NORMALIZED

As the accumulator moves out of mesh during the first added amount operation following a minus balance total operation, lift arm S raises latch K through bail M. When the amount being added exceeds the capacity of the upper pinions, the relay carry causes the wide tooth of the last upper pinion to rock the upper carry pawl which, through its forked connection with carry pawl H, rocks the latter rearward. Rearward movement of carry pawl H raises latch I clear of the lip on blank carry rack G permitting the latter to rock bail F through finger J. Carry rack L is thereby permitted to be pulled up into carried position to advance the first upper pinion one point (positive automatic one). At the same time, carry rack L, through the long stud in arm O, moves lift arm S downward to reverse the position of detent R. Detent R in turn rock bails U and/or V, moving slides A and/or B back to normal through arm W and/or X to normalize the minus balance mechanism.

Tests and Adjustments

1. To assure correct functioning of bail F -
Bail F should be free and the steps on its right end should be parallel to the lip on carry rack L.
TO ADJUST, weave bail F.
2. To safeguard against printing complements and incorrect symbols -
There should be approximately .010" clearance between the front ends of the slots in slides A and B and the stud containing screw C when the stud in detent arm Q is seated in the rear pocket of detent R.
TO ADJUST, weave bails U and/or V.
3. To assure maximum forward movement of slides A and B -
With the machine in minus balance position, the rear ends of the slots in slides A and B should limit against the stud containing screw C with no interference from arms W and X.
TO ADJUST, weave bails U and/or V; recheck test No. 2.

4. To assure that latch K is raised in preparation of an automatic one -
The forked portion of latch K should have a safe hold on the stud of bail M.
TO ADJUST, bend the forked portion of latch K.
5. To assure maximum upward travel of carry rack L -
There should be approximately .010" clearance between the stud on the rearmost portion of arm O and brace N as carry rack L moves up into a carried position.
TO ADJUST, tilt the stud on the rearmost portion of arm O.

MINUS BALANCE SLIDES NORMALIZED THROUGH SHIFTING OF REGISTER SELECTOR LEVER

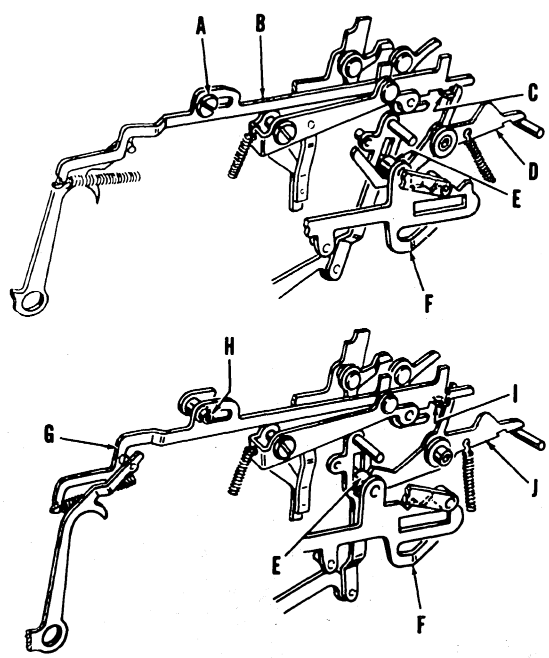


Fig. VI-37

Complementary totals are safeguarded against by preventing indexing of the subtract mechanism from the depression of the total and subtotal keys.

Should a minus balance total be taken from either register and then the register selector lever shifted to the opposite register position; and should the register in the opposite position contain a plus balance amount, depression of either total key without this safeguard would index the subtract mechanism. Indexing of the subtract mechanism would cause the adding pinions of the register containing the plus balance amount to be shifted to subtract position, and would result in a complementary total.

When arm F is shifted into register "B" position through the register selector lever, roll E moves against the inclined finger on the rearward portion of rocker arm D; its vertical finger, contacts lip C and moves slide B rearward out of the path of total keystems.

When arm F is shifted into register "A" position through the register selector lever, roll E moves against the inclined surface on the rearward portion of rocker arm J which, through its vertical finger contacts lip I and moves slide G rearward out of the path of total keystems.

When slides B and G are moved rearward, their upright projections are moved from under the total and subtotal keystems thereby preventing indexing of the subtract mechanism during total operation.

Tests and Adjustments

1. To assure that slide B is correctly positioned when the register selector lever is shifted to register "B" position -
There should be .010" clearance between the front end of the slot in slide B and the stud containing screw A when register "A" contains a minus balance and arm F is shifted to register "B" position.
TO ADJUST, bend the vertical finger of rocker arm D.
2. To assure that slide G is correctly positioned when the register selector lever is shifted to register "A" position -
There should be .010" clearance between the front end of the slot in slide G and stud H when register "B" contains a minus balance and arm F is shifted to register "A" position.
TO ADJUST, bend the vertical finger of rocker arm J.

TOTAL TIMING MECHANISM

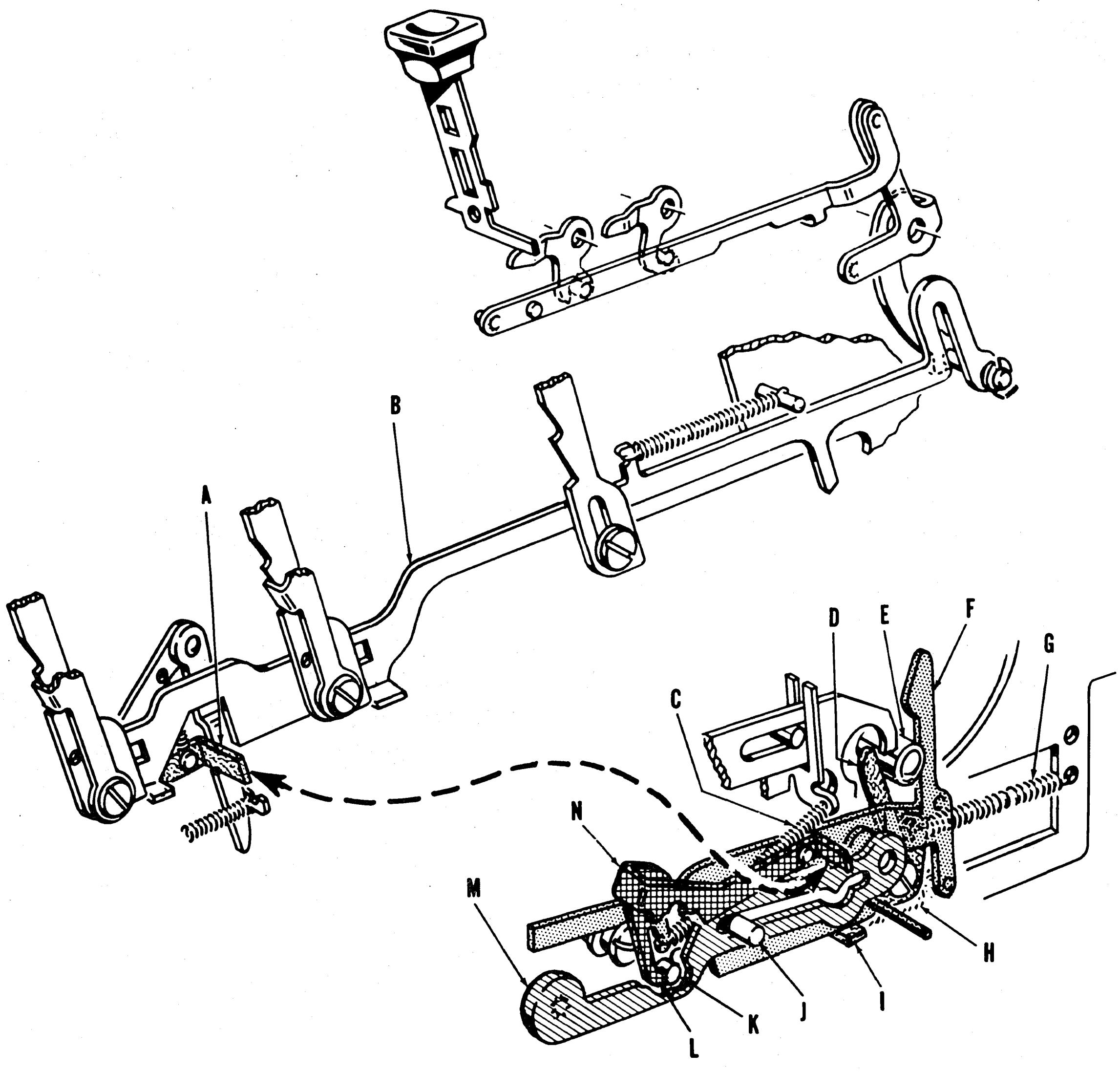


Fig. VI-38

This mechanism safeguards against complementary results by preventing depression of the total and subtotal keys until slides A and B, Fig. VI-36, have assumed their correct positions during minus balance and plus balance operations.

During the forward stroke of a machine operation, slide F is moved rearward by roll E and is latched in this position by lip I. As slide F moves rearward, stud J is located into the rearward portion of the internal cam in timing arm M, and stud K is moved away from tail L to permit spring C to raise lip A into the path of slide B to block depression of the total and subtotal keys.

At the end of the return stroke, lip I is disengaged from slide F through roll E contacting finger D. Disengagement of lip I from slide F permits spring H to pull slide F forward. This forward movement of slide F is retarded by the travel of stud J in the internal cam of timing arm M.

TOTAL TIMING MECHANISM - MODIFIED

(From serial number P426524S)

This mechanism is a modification of that shown on Page 34, Fig.VI-38, Form 3784. Its function is the same, that is to safeguard against complementary results by blocking the depression of O.C.K.'s 8-0 and 9-0 until such times as the negative total lock slides assume their correct positions.

The functional difference between the two mechanisms is :-

1. Fig.VI-38, Form3784, Mechanism.
Slight pressure on either of O.C.K.'s 8-0 or 9-0 during the machine operation, prior to the result operation, prevents release of the interlock. The operator must relieve the O.C.K. of all pressure, in order to allow the interlock to release, and then index the O.C.K. for initiation of the result key machine operation.

2. Modified Mechanism
If steady but not undue pressure is applied to the result key it can be indexed fully, without interruption, as soon as the machine homes and the modified interlock normalises.

Very heavy pressure, however, will result in interlock non-release and the operator must relieve the O.C.K. of all pressure before the O.C.K. for the result operation can be indexed.

The basic mechanical differences are :-

Interlock I, Fig.VI-41, is fitted with roller N instead of the earlier formed ear.

Spring K, Fig.VI-41, is stronger than the spring fitted to the earlier mechanism.

Wiggle-woggle timer is fitted with a double pocket.

The effect of these modifications is to enable the restoration of slide A, Fig.VI-39, to knock roller N, Fig.VI-41, out of the notch in interlock slide O when steady (not heavy) pressure is being applied to either O.C.K.'s 8-0 and 9-0 and to permit the full indexing without interruption.

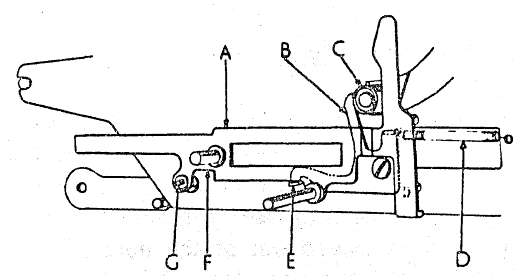


Fig.VI-39

Interlock slide A, driven by roller C (part of the secondary section) should move far enough to be safely latched by B. Slide A remains latched until such times as the returning roller C lowers lip E, by contacting the upper arm of B.

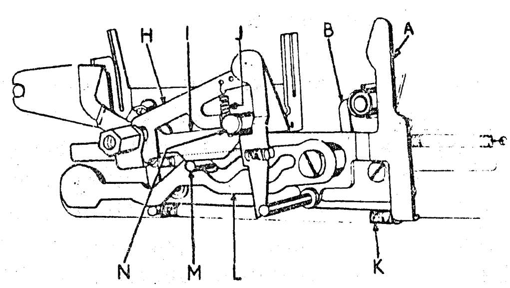


Fig. VI-40

When slide A moves toward its latched position stud M moves through the double pocket cam outline of L and assumes a position at the extreme rear of the cam slot. When slide A restores its speed of restoration is retarded because of the need to oscillate weighted timer arm L.

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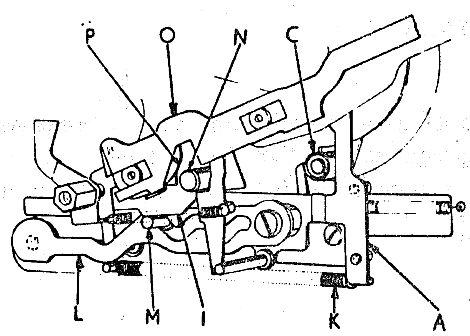

Fig. VI-41

When slide A moves into the latched position roller N, part of I, moves upward into the notch of interlock slide O and effectively blocks depression of the total and sub-total keys until the roller is moved out of the notch. The release of roller N takes place when the machine reaches the home position and roller C, Fig. VI-39, contacts the upper leg of B to lower ear E. Slide A commences its homing operation but is delayed by the process of stud M oscillating the weighted timer arm L.

When slide A nears its home position stud G, Fig.VI-39, contacts the lower leg of I, and even though steady pressure from the result key binds link O against roller N, knocks the latter out of the notch in O and allows the result key to be completely indexed without interruption.

It should be appreciated, however, that very heavy pressure on the result key will bind interlock O so firmly against roller N that the force exerted by stud G on arm I will not knock roller N out of the notch in O. Under these circumstances release the pressure on the O.C.K., roller N will then fall away and the result key can be indexed.

TEST AND ADJUSTMENTS

1. Test : (a) On a very slow handle pull, roller C, when it has moved slide A to the peak of stroke, should allow formed ear E to limit against the top of the notch in A without any excess movement of A beyond ear E.

(b) Machine normal, there should be approx. .005" clearance between E and the lower edge of A.

Adjustment : (a) Bend the vertical arm of A, as required.

(b) Bend the upper arm of B, as required.

Reason : To prevent machine lock; to ensure correct function of interlock slide A.

Note : If roller C fails to move slide A far enough for ear E to move into the notch of A a machine lock may occur. Roller C is found behind the vertical arm of the prematurely restored slide. This lock is dangerous because it has the effect of loosening the stud upon which roller C rotates.

2. Test : As timing arm L moves up and down, when stud M moves in either direction in the cam slot, the weighted end of L should have good working clearance with slide A.

Adjustment : Bend the front end of L, as required.

Reason : To safeguard against any interference between L and A.

3. Test : Machine normal and roller N lifted manually into the notch of O there should be just passing clearance of N with the blocking edge of the notch in O.

Adjustment : It should not be necessary to bend the stock of I to secure clearance. Operate on the swan neck of interlock slide O.

Reason : To ensure that roller N will block the forward movement of interlock slide O.

As slide F returns to the home position, stud K contacts tail L to lower lip A out of the path of slide B thus permitting depression of the total keys.

Tests and Adjustments

1. To safeguard against lip A interfering with normal forward movement of slide B -
   There should be approximately .010" clearance between the upper edge of lip A and the lower edge of slide B when slide B has been moved forward from depression of the total keys.
   TO ADJUST, bend tail L to or from stud K.
2. To assure lip A will block the forward movement of slide B until slides A and B, Fig. VI-36 have assumed their correct positions during plus and minus balance operations -
   With the total keys at upward limit, lip A should have non-binding clearance with the forward edge of the step in slide B when arm N is raised or lowered by manually moving slide F rearward.
   TO ADJUST, bend lip A.
3. To safeguard against premature depression of the total keys -
   When the machine is in home position, there should be approximately .005" clearance between lip I and the lower edge of slide F.
   TO ADJUST, bend finger D to or from roll E.

POWER MECHANISM

The main operating section of Series P400 machines is basically the same in construction as described under Series P100 machine in Section II.

The dashpot mechanism for these machines is also of the same construction as used in Series P100 machines with one exception, i.e., the plunger shaft is longer to permit its attachment to a newly located hanger.

Power for the electric operation of these machines is supplied by the basic type 3 motor and drive which requires the same tests and adjustments as outlined on pages 37 and 38, Section II.

REVIEW ITEMS OF SERIES P400 MACHINES

1. How is 5/6" spacing obtained on a 3 7/8" carriage during a total operation when the spacing control lever is located in 1/6" spacing position?

2. How are two consecutive total operations prevented when the total key is held depressed?

3. When the number, split, and normal lever is located in the far left-hand position, how is printing of the left hand columns prevented during total operations?

4. What is the purpose of the index bars in columns 0 and 00?

5. What limits the travel of the index bar in column 00 during plus and minus operations?

6. How is the index bar in column 0 blocked when the machine is operated with the plus motor bar depressed?

7. Where does the index bar in column 0 limit when the machine is operated with the minus bar depressed?

8. How is the index bar in column 0 blocked when the machine is operated with the repeat key depressed?

9. How does depression of the minus motor bar permit moving forward of the index bar in column 0 during minus operations with the repeat key depressed?

10. How is the index bar in column 00 limited during plus and minus total operations?

11. How is the register selector lever actuated?

12. What prevents the register selector lever from shifting during a machine operation in which a handle break takes place?

13. How does depression of the register selector lever control key prevent automatic shifting of the register selector lever?

14. How are register "A" and "B" moved into and out of mesh with the adding sectors during listing operations?

15. How is register "B" disabled when the register selector lever is in "A" position?

16. Which set of adding pinions move into mesh with the adding sectors during a plus listing operation with the register selector lever located in "B" position?

17. Which set of adding pinions is in mesh with the carry racks when a carry takes place?

18. How does an initial plus carry take place?

19. In what direction are the adding pinions turned by the carry racks during the completion of a carry?

20. When and how are the carry pawls reset?

21. When and how are the carry racks reset?

22. What takes place when the minus motor bar is depressed and the machine operated?

23. When and how does a negative automatic one take place?

24. How is the subtract mechanism indexed during a minus balance total operation?

25. When and how does a plus automatic one take place?

26. How are slides A and/or B, Fig. VI-36, made ineffective during a plus automatic one?

27. What provision is made for the release of a plus or minus automatic one in machines of less than 13 columns of adding capacity?

28. What safeguard has been provided to prevent premature depression of the minus motor bar following a plus operation?

29. What could result if the minus motor bar could be prematurely depressed following a plus operation?

30. How does depression of the total key prevent depression of the motor bars?

Burroughs

FULL KEYBOARD

ADDING and BOOKKEEPING MACHINES

INSTRUCTION BOOK

Section VII

●

SERIES P600

Printed in U. S. America 4-19-65

For Form 3784

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Series P 600

CARRIAGE MECHANISM

CARRIAGE 15" (STYLE C), FRONT FEED, TABULATING AND MOTOR RETURNED

The 15" front feed carriage holds ledgers and statements inserted from the front, and journal paper inserted from the rear. Spring tension tabulates the carriage to the left and motor power returns the carriage to the right. This carriage, consisting of two units, the outer carriage and the inner carriage, is constructed as an automatic carriage and aligning table opening mechanism.

FRONT VIEW - OUTER CARRIAGE

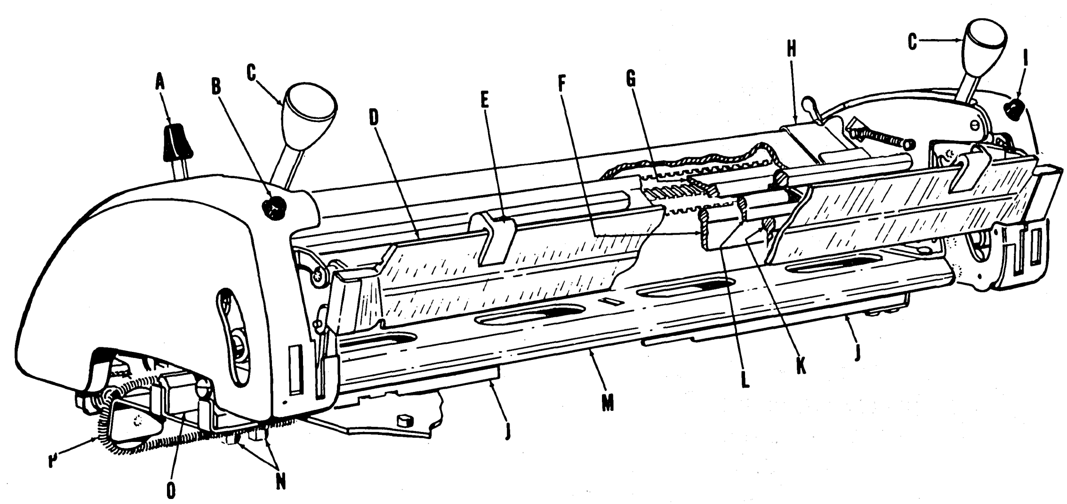


Figure VII-1

The outer carriage (which carries the inner carriage unit) is the tabulating and returning medium and travels on carriage rails J and O; the latter being fastened to the carriage bottom plate.

Ledgers and statements are located in the carriage by form guides E and H and aligning table D. The maximum width of the front feed forms is 14 3/4". The minimum distance between side by side forms inserted from the front of the carriage is 1/8" due to form guides E and H. The first printing line on front feed forms should be at least 1 3/8" from the top of the form to permit aligning the form with the scribe mark on the transparent blade of form aligning table D when the table is closed. After the form aligning table has been closed it may be reopened by depressing button I when the carriage is in an opened position.

Automatic carriage opening, carriage controlled spacing, carriage opening interlock and platen pressure roll opening are actuated through bails F, G, K, and L respectively.

REAR VIEW - OUTER CARRIAGE

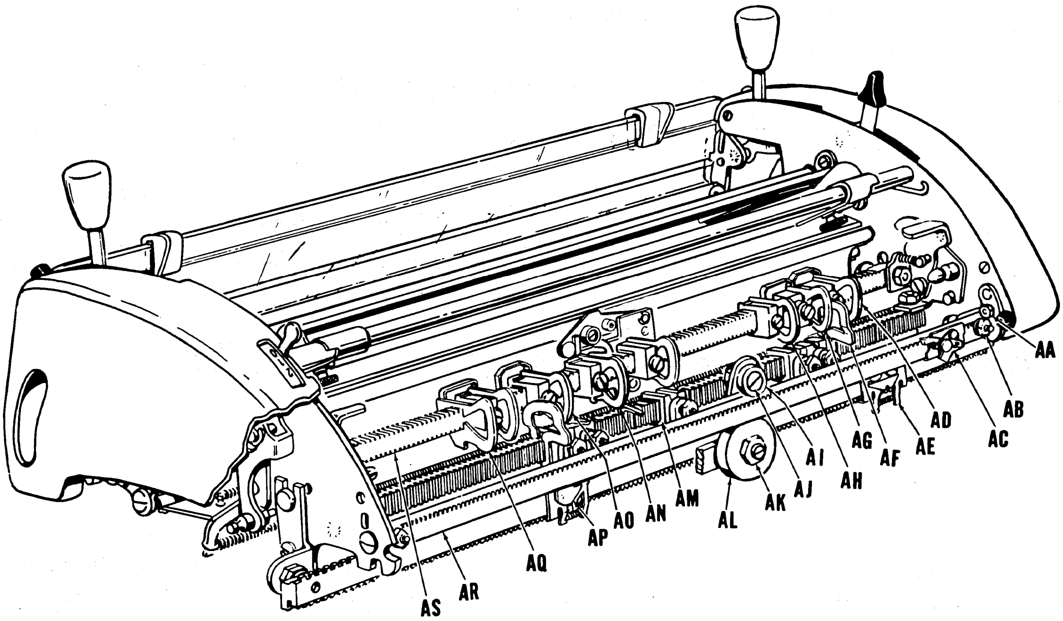


Figure VII-2

The outer carriage carries stop and control bar assembly AS which limits the carriage in various positions and indexes the various carriage controlled machine functions.

Many styles of limit stops are used on the stop bar; hand tabulation double space AD, tabulation single space AG, tabulating no space AH, skip tabulating no space AN, skip tabulating double space AO, and non-tabulating no space AQ. Other styles of limit stops are used but not illustrated in Fig. VII-2 are as follows: Hand tabulating no space, non-tabulating single space, non-tabulating double space, tabulating double space, single space skip tabulating and single space hand tabulating.

Carriage tabulation is assured by locating the limit stops at least 7 notches apart on the stop bar. To assure printing all columns on the forms, the leftmost limit stop should be five or more notches from the left end of the stop bar. The rightmost stop should be seven or more notches from the right end of the stop bar.

Carriage controlled machine functions are indexed by control rolls assembled on hangers AM which accommodate 7 lanes of control. The seven lanes of control are (Starting from the top), lane 1 - Four position printing; lane 2 - Rotary or Red Ribbon; lane 3 - Non-add register "A"; lane 4 - Subtract from plus motor bar; lane 5 - transfer register "A" totals to register "B" - transfer register "A" subtotals to register "B" or simultaneous addition registers "A" and "B", depending on the size of the control roll; lane 6 - Automatic total carriage control or automatic subtotal carriage control, depending on the size of the control roll; and lane 7 - Skip tabulation release.

Early constructed machines used only five lanes of control which were as follows: Lane 1 - Four position printing; lane 2 - Rotary or Red ribbon; Lane 3 - Non-add register "A"; lane 4 - Subtract from plus motor bar; and lane 5 - Non-add register "B".

Correct indexing of carriage controlled machine functions in predetermined stop positions requires centrally aligned hangers AM with their related limit stops.

The rear portion of the carriage is supported in correct position by third rail AR riding between rolls AI and AL.

INNER CARRIAGE

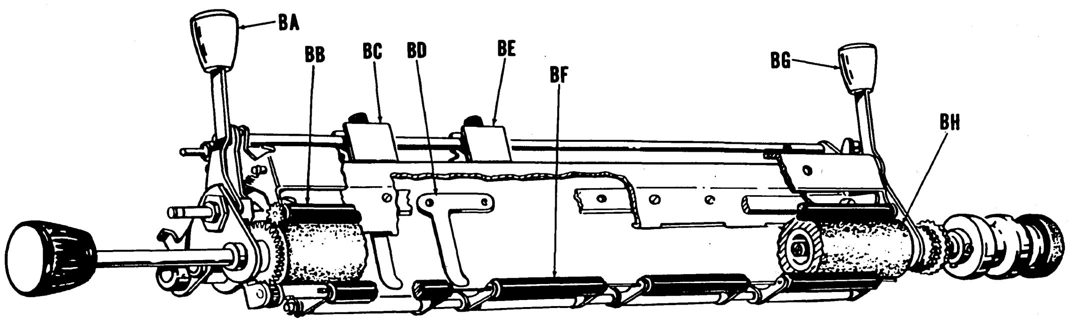


Figure VII-3

The inner carriage consists of platen BH, geared platen pressure rolls BF, geared journal roll BB, and journal bands BD.

Levers BA and BG moving rearward, rocks the inner carriage rearward to open position. When the carriage is open, lever A, Fig. VII-1 moving rearward opens the journal pressure roll to permit insertion of the journal paper around the platen. The maximum width of journal paper that may be used is 14 1/4" due to the positioning of journal guides BC and BE. Journal bands BD facilitate insertion of journal paper which is held snugly against the platen by pressure roll BB.

Should forms be inserted in front of the journal paper; the first printing line on the front feed forms should be less than 7" from the bottom of the form. Platen pressure rolls BF which are opened as the carriage opens, are closed partially by depression of button B, Fig. VII-1 and are fully closed when the carriage is closed to hold the front feed forms to the platen.

Vertical spacing of forms is accomplished through rotation of platen BH and pressure rolls BF.

Tests and Adjustments

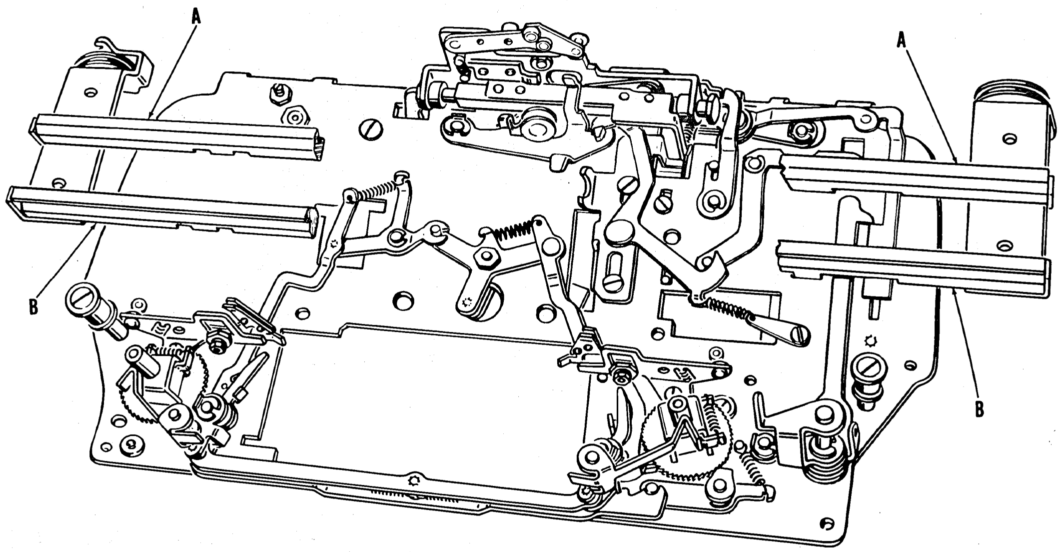


Figure VII-4

1. To assure free and uninterrupted movement of the carriage during tabulation and return - There should be no excess play between the carriage raceway and the raceway bearings.
TO ADJUST, make the following tests and adjustments in the sequence as outlined below.
   a. Remove tabulating spring P, Fig. VII-1, stop and control bar unit AS, Fig. VII-2, and the journal paper roll.
   b. Position guide rolls AI and AL, Fig. VII-2 in an inactive (loose) position.
   c. Loosen all screws holding the carriage bottom plate to the M.R.C. unit.
   d. Locate the carriage in a central position and re-tighten the screws loosened in step c.

   NOTE: Care must be taken that the carriage bottom plate is not twisted as the screws are tightened.
   e. Loosen the eight screws holding rails A and B.
   f. Move the carriage to the extreme left then position the front and rear bearing and retainer assemblies leftward as far as possible by pushing the latter with a long thin screwdriver.
   g. Position carriage rails A and B to remove all excess play between the raceway and the bearings, tighten the screws holding the left end of rails A and B to the carriage bottom plate.
   h. Move the carriage to the extreme right then position the front and rear bearing and retainer assemblies rightward as far as possible by pushing the latter with a long thin screwdriver.
   i. Position carriage rails A and B to remove all excess play between the raceway and bearings, tighten the screws holding the right end of rails A and B to the carriage bottom plate.
   j. With the carriage in the extreme left position, locate support roll AL, Fig. VII-2 to just contact rail AR, Fig. VII-2 by turning eccentric AK, Fig. VII-2.
   k. With the carriage in the extreme right position, raise or lower the left end of rail AR, Fig. VII-2 to just contact roll AL, Fig. VII-2 by turning eccentric screw AA, Fig. VII-2.
   l. With the carriage in any position, roll AI, Fig. VII-2 should be positioned by turning eccentric screw AJ, Fig. VII-2 to provide a slight rubbing contact of the roll on rail AR, Fig. VII-2.

AUTOMATIC CARRIAGE AND ALIGNING TABLE OPENING

When performing ledger posting (tabulation control lever rearward) the platen assembly, aligning table, and pressure rolls must be opened for the purpose of inserting and removing ledger and statement forms.

The mechanism described herein does this operation automatically in any stop position where a carriage opening indexing key is installed in the stop and control bar unit for this purpose.

In addition to automatic carriage opening from a machine operation, opening may also be performed manually. Carriage and aligning table closing is manual.

Opening and closing the aligning table is controlled by and coordinated with carriage opening and closing. However, the aligning table may be closed independently of the carriage closing, and after having been closed with the carriage open it again may be opened manually.

When the carriage and aligning table are opened automatically and the aligning table is closed; the closing action of the aligning table releases the pressure rolls from fully opened position (provided for easy form insertion) to a partial closed position. This partial closing of the pressure rolls provides enough tension against the inserted forms to hold the forms aligned during the carriage closing operation. The partially closed pressure rolls also provides early retention of the forms during carriage closing operations.

CARRIAGE OPENING INDEXING

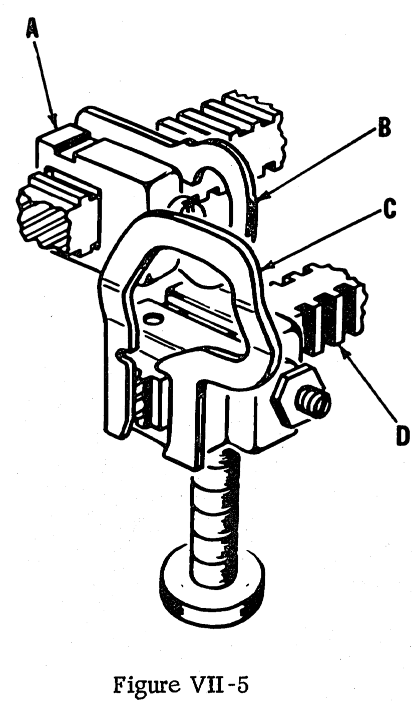


Figure VII-5

Selection of a carriage opening position is accomplished by placing carriage opening indexing key C in notches of bar D so its left side will align with the right edge of backing block A. This is three notches, in bar D, to the right of tabulator stop B. A key is installed in each carriage position in which a carriage opening is desired. One or more keys may be used, depending upon layout requirements.

When carriage opening indexing key C is fully seated on bar D, the bottom of its forward leg will cam slide A, Fig. VII-6 forward as the carriage tabulates into carriage stop position. When indexing key C is raised, with the nib at the end of the rearward leg against the lower edge of the bar, the key will pass above slide A, Fig. VII-6 and will not index an automatic carriage opening.

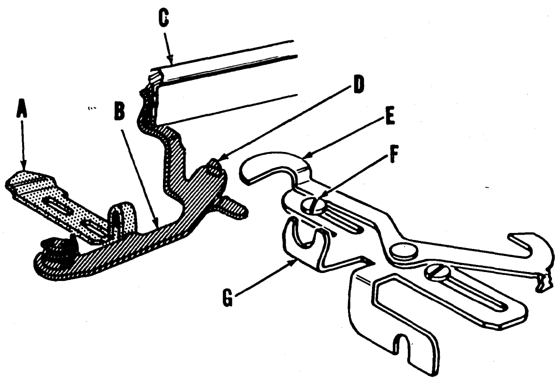


Figure VII-6

Full movement of slide A when driven forward by indexing key C, Fig. VII-5 should move lever B forward until there is only slight play between the lever and bail C. At no time should the indexing key cause lever B to actuate bail C.

When lever B is held forward by the indexing key against slide A, latch E will position behind milled stud D at the end of the forward stroke of the machine operation. As the machine returns to home position, forward movement of slide G causes latch E to move lever B further forward, which in turn swings bail C forward. Continued forward movement of slide G causes latch E to cam against screw head F, to disconnect latch E from stud D thus permitting lever B and bail C to restore to home position.

RELEASE OF CARRIAGE LATCH

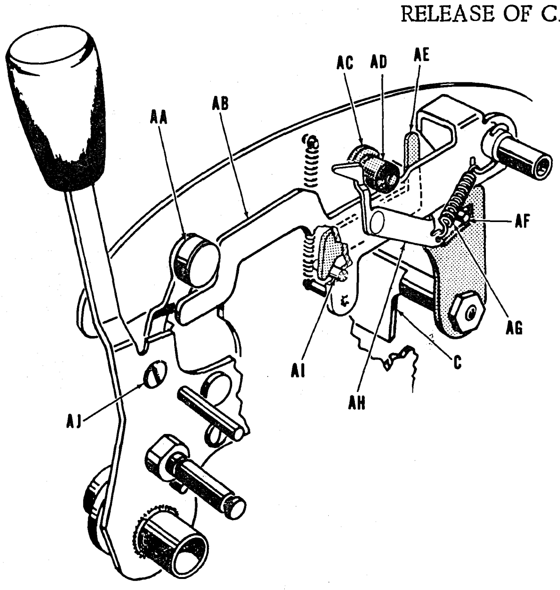


Figure VII-7

When bail C swings forward during a machine operation, stud AF (in bail assembly C) rocks arm AC rearward so that roll AD (in arm AC) moves on an inclined surface of latch arm AB. As roll AD moves on the inclined surface of latch AB, the front of the latch is lowered out of the path of inner carriage assembly AA. Actual carriage opening is delayed until the end of the return stroke after form feeding is completed.

As arm AC is rocked rearward, auxiliary latch AE positions behind stud AI. Thus, arm AC is prevented from restoring (when latch E, Fig. VII-6 disengages stud D, Fig. VII-6) thus holding latch AB from accidental re-engagement of the roll in arm AA. If latch AB were permitted to re-engage the roll in arm AA at this time, the carriage would be prevented from opening at the end of the machine operation, as explained under the next heading.

Detent AH and spring AG cushions carriage opening mechanism and prevents bounce of upper pressure roll to safeguard against journal paper bulge.

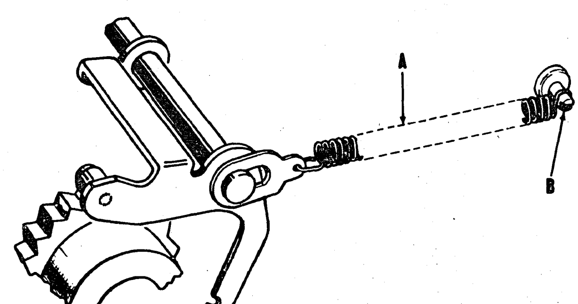


Figure VII-8

Power for the carriage opening operation is provided by spring A. One end of the spring is attached to the inner carriage assembly and the other end is anchored to fixed post B.

CARRIAGE OPENING DELAYED BY MACHINE OPERATION

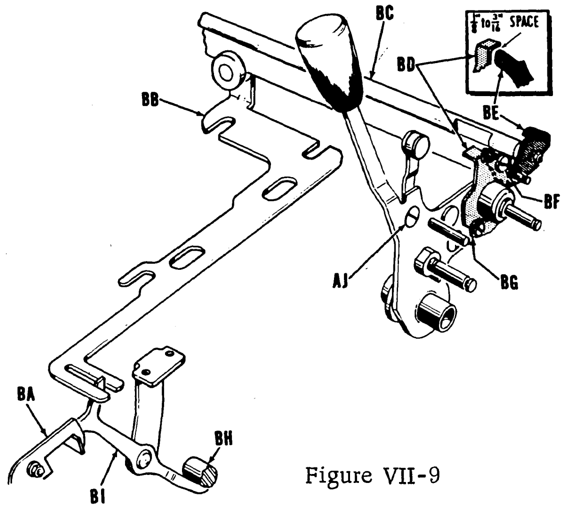


Figure VII-9

The preparatory steps to carriage opening are completed early in the return stroke of the machine operation. However, the carriage is not permitted to open until the machine operation is completed, so that form spacing will not be jeopardized. If no provision had been made for this delay, the platen could be raised from home position before the space pawl is actuated, and the spacing could be lost.

At the start of a machine operation; dash pot hanger shaft BH moves upward from lever BI, permitting forward movement of the top end of the lever. This forward movement of lever BI permits slide BA to be pulled forward thus releasing the handle break mechanism to permit the machine operation. Forward movement of lever BI moves slide BB forward and the flanged roll on its rearmost portion, rocks bail BC. Rocking of bail BC raises arm BE to block the formed lip of control plate BD on the inner carriage frame.

CARRIAGE OPENING BLOCKS MACHINE OPERATION

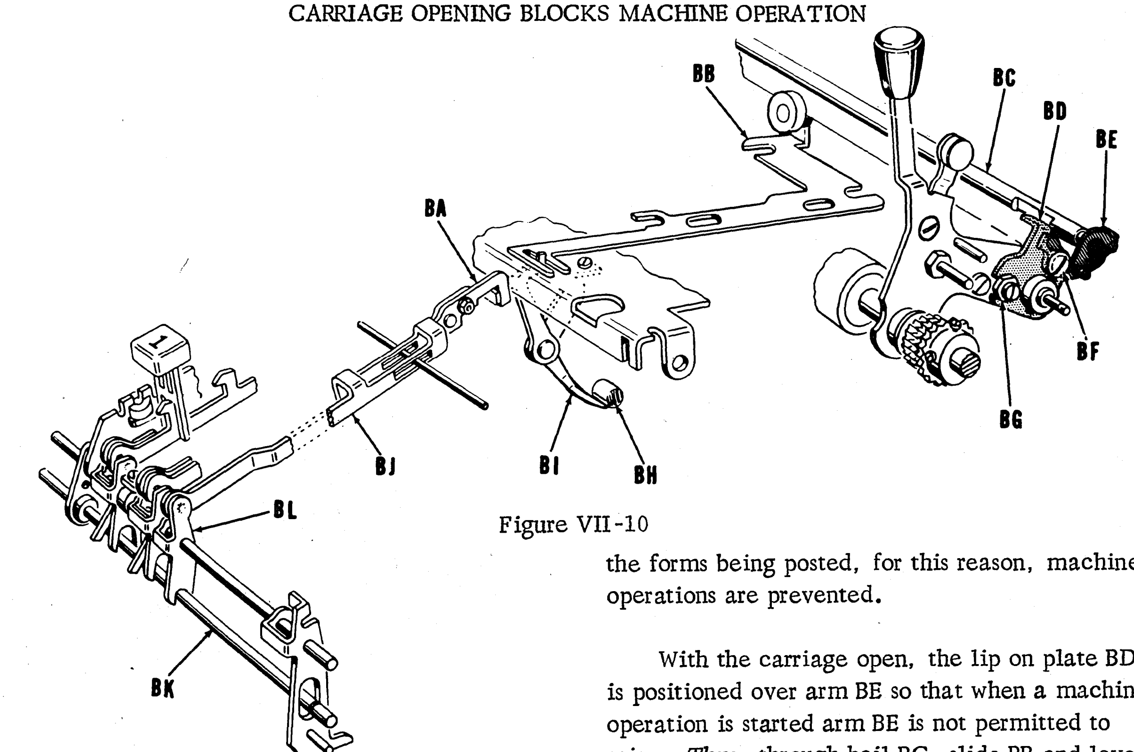


Figure VII-10

Machine operations with the carriage open could be damaging to the printing mechanism and could permit introduction of amounts into the accumulators without recording the amounts on the forms being posted, for this reason, machine operations are prevented.

With the carriage open, the lip on plate BD is positioned over arm BE so that when a machine operation is started arm BE is not permitted to raise. Thus, through bail BC, slide BB and lever BI, slide BA is held rearward holding key restoring rack assembly BK forward through rocker arm BL causing a safeguard partial machine (handle break) operation.

CARRIAGE OPENING DISABLING MECHANISM

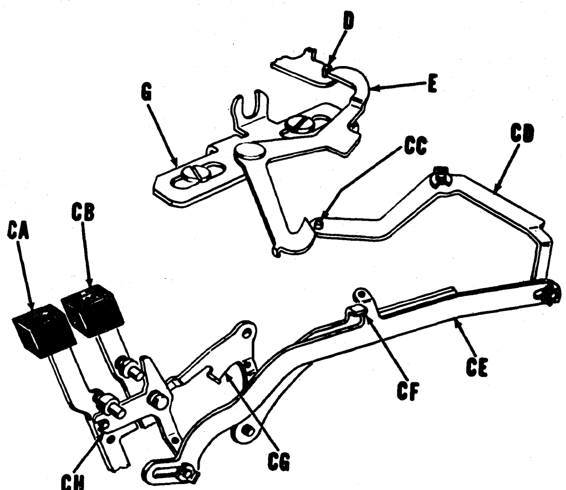


Figure VII-11

When the carriage is limited by a tabulator stop against the tabulation bail assembly and a carriage opening indexing key is active, use of either the vertical space bar or the carriage return bar will disable the carriage opening mechanism.

Depression of vertical space bar CA rocks bellcrank CH and drives link CE rearward placing stud CC (in bellcrank CD) into the path of the extended arm in latch E.

During the machine operation as slide G moves rearward, arm of latch E contacts stud CC and holds latch E from engagement of stud D.

Depression of carriage return bar CB through bellcrank CG moves link CF rearward. Rearward movement of link CF moves link CE rearward in the same manner and with the same results as when link CE is driven rearward by the vertical space bar depression.

CARRIAGE NON-TABULATION

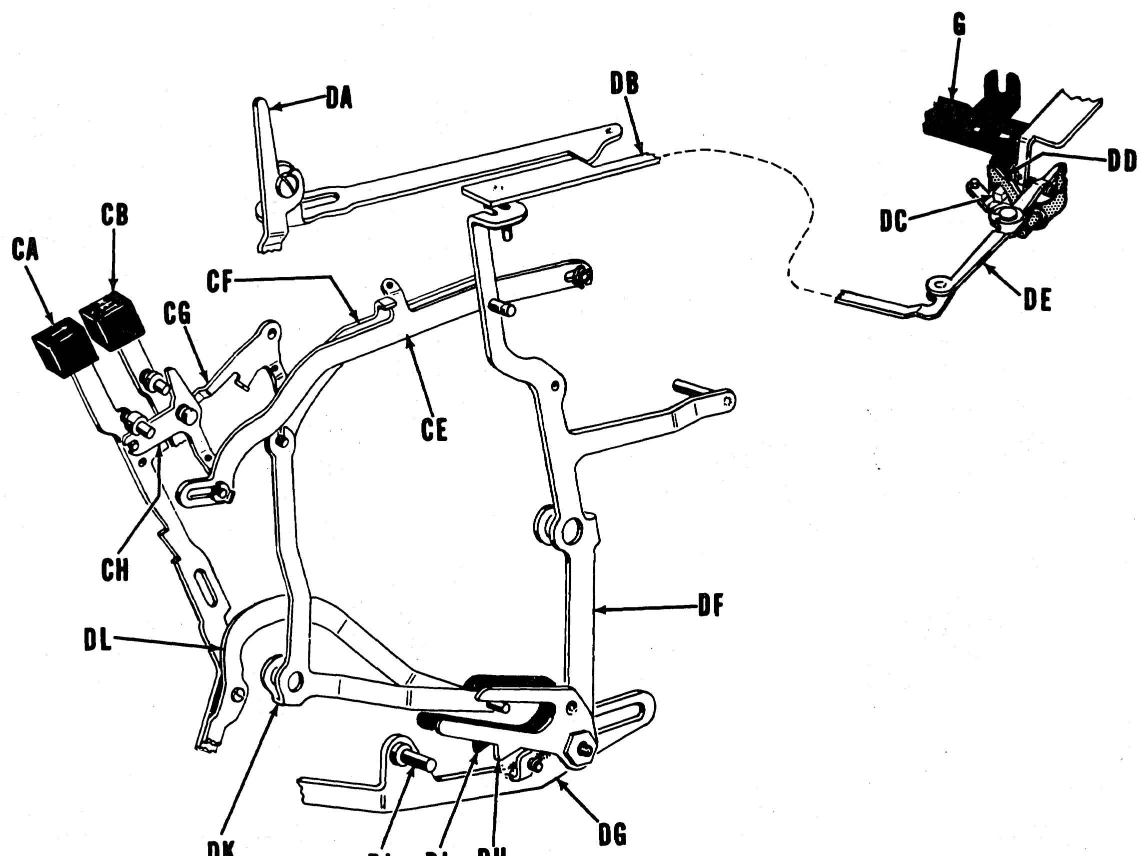


Figure VII-12

Tabulation of the carriage is prevented by actuating the non-tabulation mechanism from the tabulation control lever DA and the depression of either the vertical space bar CA or carriage return bar CB.

Forward movement of tabulation control lever DA raises the step of pawl DD above the square stud DC (in slide G) through slide DB and lever DE.

Depression of vertical space bar CA through arm DL permits positioning pawl DI by spring tension in the path of stud DJ. Slide DG is driven rearward on each machine operation and when pawl DI is lowered, the lower end of lever DF is driven rearward moving slide DB forward into a non-tabulating position in the same manner as if lever DA had been moved forward.

Depression of carriage return bar CB through bellcrank CG rocks lever DK permitting pawl DH to position in the path of stud DJ with the same results as obtained by lowering pawl DI from the vertical space bar depression.

MANUAL CARRIAGE AND ALIGNING TABLE OPENING

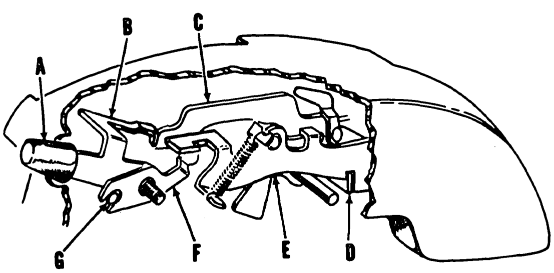


Figure VII-13

There are occasions when it is desirable to manually open the carriage or aligning table for the purpose of form handling without a machine operation to straighten, reposition, exchange, insert or remove the forms.

If the carriage and aligning table are closed; depression of button A will open both. Should only the aligning table be closed, depression of button A will open it.

Depression of opening button A through stud G, raises the rearward end of lever F. Raising of lever F lifts latch assembly E above latch plate D to release the aligning table.

As no machine operation is required to open the carriage and that dash pot hanger shaft BH, Fig. VII-9 is holding arm BE, Fig. VII-9 clear of the formed lip on plate BD, Fig. VII-9 when the machine is in home position; the inner carriage will be released from the depression of opening button A lowering latch C through extension B.

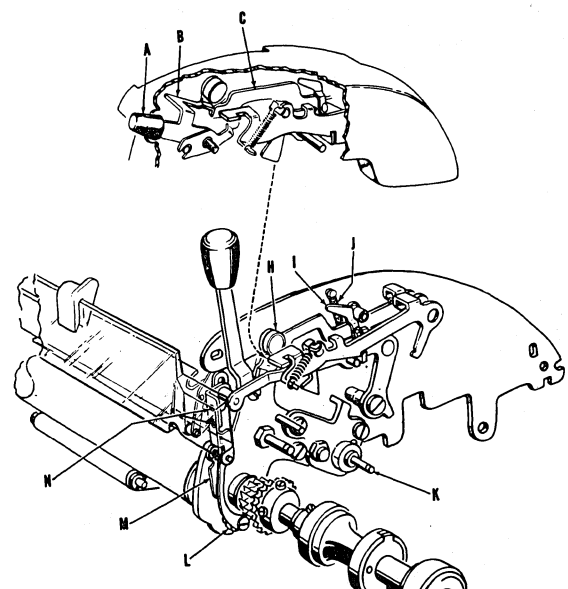


Figure VII-14

As the inner carriage is released, it swings rearward on shaft K (through the tension of spring A, Fig. VII-8) causing roll H to cam arm C, Fig. VII-13 (which is under the tension of spring J) downward. When the carriage is fully opened, roll H is positioned behind the step of arm C, Fig. VII-13 to lock the carriage open. When the carriage is in this position, detent I, under spring tension, moves over roll H to assure holding the carriage in a full open position.

PRESSURE ROLLS ARE OPENED TO FACILITATE INSERTION OF FORMS

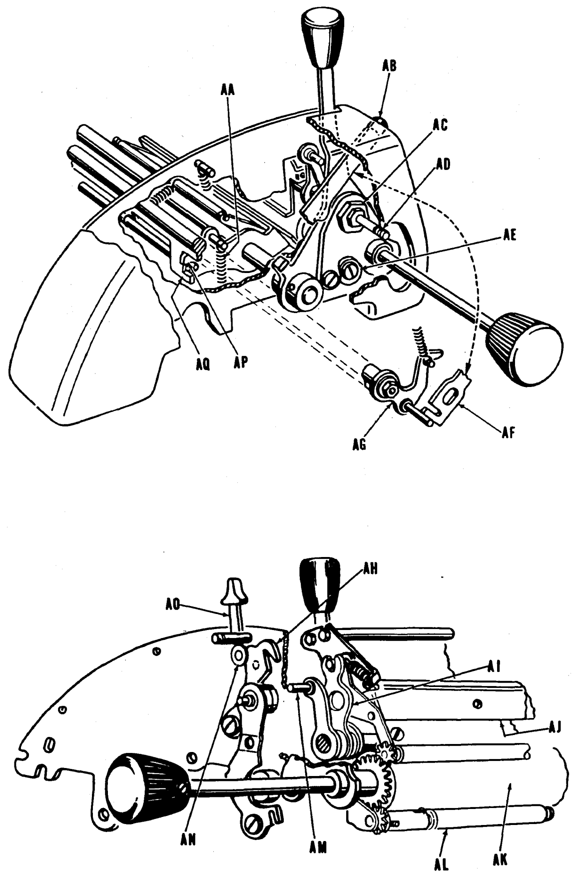


Figure VII-15

The platen pressure rolls (which are geared to the platen) are opened during carriage opening to permit insertion of forms from the front. As the carriage is being opened, the projection of arm AP limiting on the hook of bail AQ causes platen pressure rolls AL to be held away from platen AK. When the carriage is being closed, forms are held in position by the platen pressure rolls which are closed by the depression of button AB located in the left carriage side frame cover. Depression of button AB moves the hook of bail AQ from under the projection of arm AP through slide AF and bellcrank AG. This permits spring AA (one on each end of carriage) to rock pressure rolls AL against the platen through arm AP to secure the aligned forms.

The geared journal pressure roll assembly AJ is manually opened for insertion of journal paper if the carriage and form aligning table are open. The geared journal pressure roll assembly is opened by moving lever AO rearward. This causes arm AH through studs AN and AM, and bail AI to rock journal pressure roll assembly AJ away from platen AK.

ALIGNING TABLE AND PRESSURE ROLL CONTROL

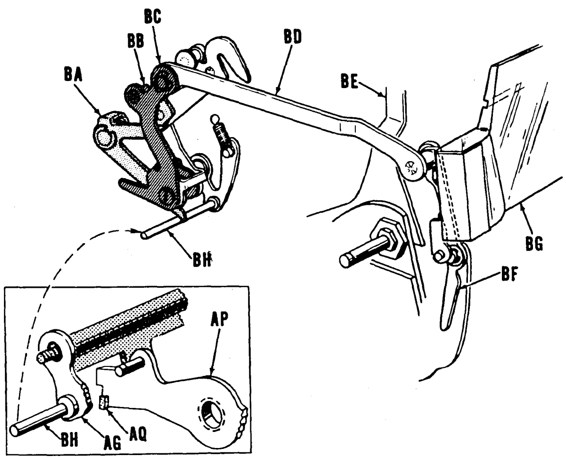


Figure VII-16

The clear plastic aligning table serves three basic functions:

1. When open, it serves as a guide and support for insertion of ledger forms into the carriage.
2. When closed, it is a gauge for aligning the ledger forms to the printing line.
3. When closed, it holds the ledger forms against the platen and away from the type as the type are being indexed to printing position.

As the carriage opens, link BD is moved forward and as link BD moves forward the upper edge of aligning table BG swings forward around its lower pivot.

Closing the carriage by forward movement of lever C, Fig. VII-1 or by the closing lever at the right side of the carriage moves link BD rearward by inner carriage assembly BE and arm BF restoring aligning table BG to a closed position.

As the carriage is being closed, the platen moves forward against the pressure rolls moving arm AP away from bail AQ.

When the aligning table is manually closed with the carriage open for aligning forms to the printing line; rearward movement of link BD moves arm BC rearward and roll BB in arm BC contacts the pass-by pawl in lever BA, lowering stud BH so that an intermediate step in arm AP is engaged. This permits the pressure rolls to move closer to the platen into a partially closed position so the ledger forms may be shifted for alignment but still held firmly enough to retain position as the carriage is closed.

FORMS ARE CONTROLLED DURING PRINTING

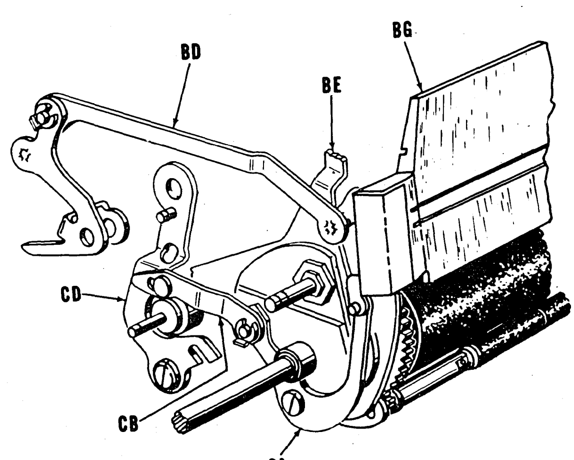


Figure VII-17

During the forward machine stroke and before printing takes place, the lower edge of the aligning table swings rearward toward the platen to clear the type being indexed to printing position, and to hold the form firmly against the platen to insure against shadow printing.

During machine operations the carriage is locked in printing position, hence link BD is not actuated; however the connection between link BD and aligning table becomes an upper pivot for the aligning table. As feed bail assembly CD is actuated rearward during the forward machine stroke, link CB rocks lever CA which swings the lower edge of the aligning table toward the platen. Toward the end of the return machine stroke, bail CD moves forward and the aligning table returns to normal position.

Tests and Adjustments

NOTE: Unless otherwise specified, tests should be made with the power off.

1. To provide full and uniform printed impressions of indexed amounts -
   With the machine in home position and the carriage closed, move the carriage all the way to the left. The platen should be positioned in relation to the printing line so that the type have uniform top and bottom contact with the platen.
   TO ADJUST, perform the following steps:
   a. Turn eccentric L, Fig. VII-14 and eccentric AE, Fig. VII-15 downward to provide space for adjusting.
   b. Turn the eccentric AJ, Fig. VII-7 to position the platen.
   c. Move the carriage all the way to the right and turn eccentric AC, Fig. VII-15 to level the left end of the platen with the right end.
   d. Turn eccentric L, Fig. VII-14 and eccentric AE, Fig. VII-15 upward to provide minimum play between roll AA, Fig. VII-7 and latch AB, Fig. VII-7.
2. To assure automatic carriage opening during a machine operation when an opening indexing key is active -
   a. With indexing key C, Fig. VII-5 positioned to move slide A, Fig. VII-6 and lever B, Fig. VII-6; forward latch E, Fig. VII-6 should have 1/32" latching lead over stud D, Fig. VII-6 when the machine is advanced to the last notch in the full stroke segment.
   TO ADJUST, open or close the adjustment form at the front end of slide A, Fig. VII-6.
   b. With lever B, Fig. VII-6 moved forward by slide A, Fig. VII-6; bail C should not have more than 1/32" play. Test at right, central, and left carriage positions. Movement of bail C, Fig. VII-6 at this time could cause stud AF, Fig. VII-7 to move arm AC, Fig. VII-7 prematurely and possibly result in premature carriage opening.
   TO ADJUST, bend the upward extension of lever B, Fig. VII-6.
3. To assure retention of an indexed carriage opening until the end of a machine operation -
   With the carriage in an automatic opening position, manually control the return operation of the machine. Latch E, Fig. VII-6 should not release from stud D, Fig. VII-6 until latch AE, Fig. VII-7 drops behind stud AI, Fig. VII-7.
   TO ADJUST, grind stock from the front end of latch AE, Fig. VII-7.
4. To assure latching the carriage in closed position -
   Manually permit the carriage to open slowly. Latch AE, Fig. VII-7 should release from stud AI, Fig. VII-7 as the roll in arm AA, Fig. VII-7 imparts maximum depressing action to latch AB, Fig. VII-7.
   TO ADJUST, bend the upward extension in latch AE, Fig. VII-7.
5. To assure a handle break operation with the carriage open -
   a. With the machine in home position and the carriage closed, there should be 1/8" to 3/16" space (up and down) between the lip of latch plate BD, Fig. VII-9 and latch BE, Fig. VII-9.
   TO ADJUST, bend the upward extension of slide BB, Fig. VII-9 that contains the flanged roll.
   b. With the carriage open, advance the machine to handle break position. The handle break latch should have at least half hold on the handle break hook.
   TO ADJUST, loosen the screw in link BA, Fig. VII-9 and take up all play in the link, then tighten the screw.
6. To safeguard against printing and spacing in carriage opening positions -
   With the machine advanced to the first notch in the full stroke segment, depression of latch AB, Fig. VII-7 should result in minimum rearward movement of arm AA, Fig. VII-7.
   TO ADJUST, loosen screw BF, Fig. VII-9 and the screw in eccentric BG, Fig. VII-9 slightly and turn eccentric BG, Fig. VII-9 then retighten the screws.
   NOTE: During manual machine operation following the above test, latch BE, Fig. VII-9 should raise until limited by the post in the carriage sideframe. If there is too much friction with latch plate BD, Fig. VII-9 the eccentric in the latch plate should be turned back slightly.
7. To assure partial pressure roll closing when the aligning table is raised for aligning forms -

With the carriage open, manually raise aligning table BG, Fig. VII-16. As roll BB, Fig. VII-16 passes over the passby pawl in lever BA, Fig. VII-16 bail AQ, Fig. VII-16 should be released from the lower step and engage the upper step in arm AP, Fig. VII-16.
TO ADJUST, bend the lower extension in lever BA, Fig. VII-16.

8. To assure full and uniform printing without interference from the aligning table -
With an amount indexed in the keyboard, advance the machine manually until printing takes place. There should be not less than 1/16" clearance between the type bar and the aligning table when the type bars are pressed against the platen.
TO ADJUST, bend the rear part of arm CA, Fig. VII-17.
NOTE: There is an arm CA, Fig. VII-17 at each end of the carriage, the aligning table should be kept parallel with the platen by adjusting both arms.

9. To assure 1/6" horizontal spacing of printing lines when posting to ledger cards -
The aligning table should be raised or lowered to permit use of the scribed line in the table when aligning forms.
TO ADJUST, loosen nuts N, Fig. VII-14 in each end of the aligning table and position the table, then tighten nuts N, Fig. VII-14.

VERTICAL SPACING PERMITS COLUMNAR LISTING

Columnar listing on the forms in any carriage position is accomplished by the vertical spacing mechanism, which may be indexed by the spacing control lever, a carriage control, the tabulation control lever, or the vertical space motor bar. Even and full spacing of the forms is assured by the platen control mechanism.

VERTICAL SPACING INDEXED BY THE SPACING CONTROL LEVER

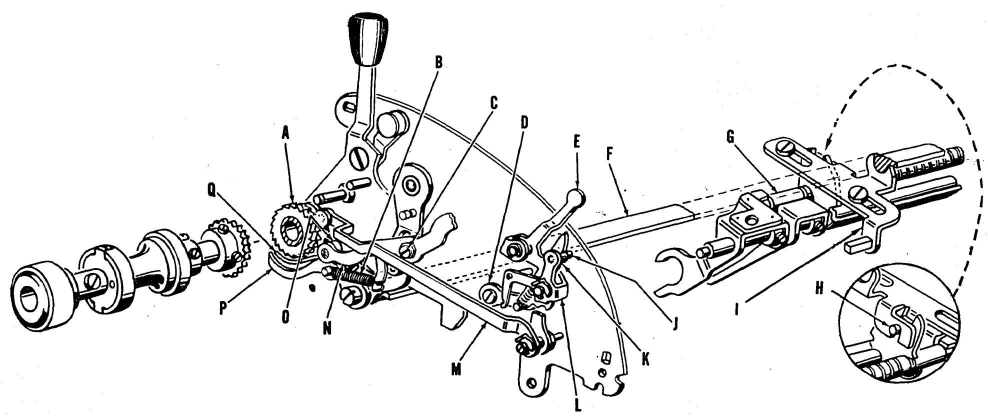


Figure VII-18

Spacing control lever E may be located in any of three positions. When lever E is in the forward position, non-spacing (O) of the platen is indexed; in the central position, single (1/6") spacing is indexed; and in the rearward position, double (1/3") spacing is indexed. Moving lever E positions shutter Q through bellcrank L and link M controlling spacing pawl P for pickup of no teeth, one tooth, or two teeth of spacing gear A. Detent D under tension of spring K retains the spacing control lever in the selected position.

Spacing pawl P is moved rearward and forward during each machine operation. During the forward stroke of the machine operation, the dashpot hanger rocks hammer latch assembly G and through stud H, slide I, and bail F moves spacing pawl P rearward. During the return stroke of the machine operation, spacing pawl P is moved forward by hammer latch assembly G. As pawl P is moved forward, spring B causes pawl P to engage the teeth of spacing gear A and turn the platen the number of spaces determined by the position of space control lever E. Spacing pawl P is cammed downward by roll O in arm N to disengage the spacing pawl from the spacing gear at the end of the return stroke.

CARRIAGE CONTROL INDEXES SINGLE SPACING

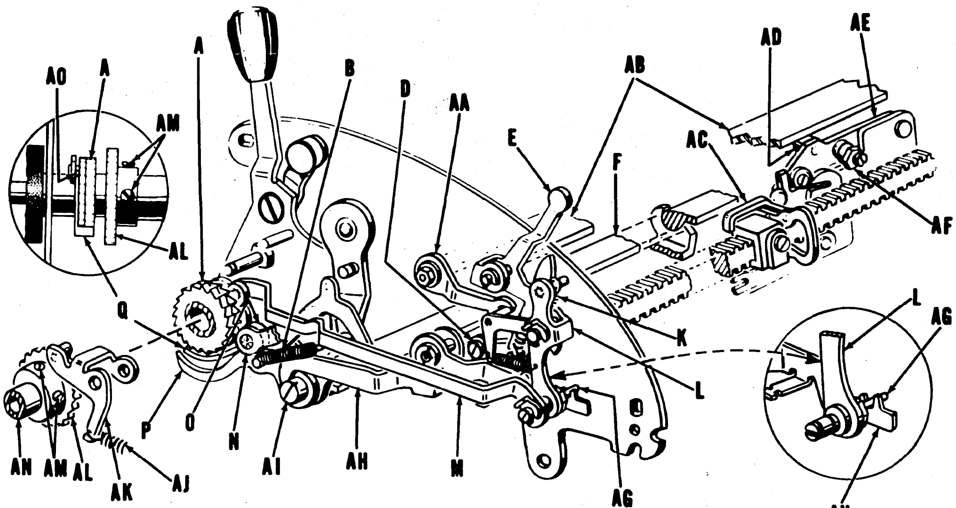


Figure VII-19

When the spacing control lever E is located in the non-space position, single spacing is obtained from a carriage control. The cam surface on limit stop brace AC raises arm AE through eccentric AF when the carriage is positioned by the selected stop. Arm AE through stud AD, bail AB, arm AA, bellcrank L, and link M moves shutter Q to permit the space pawl to engage the spacing ratchet and advance the platen one space during the machine operation.

Carriage controlled spacing is assured by latch AH which retains shutter Q in single space position until the form spacing has been completed. As the spacing pawl is moved rearward, spring tension raises the rearmost portion of latch AH to engage stud AG and hold the carriage controlled spacing indexed. Near the end of the machine operation, screw AI moving forward rocks latch AH to release the carriage controlled spacing mechanism to normal.

SINGLE SPACING INDEXED BY TABULATION CONTROL LEVER, VERTICAL SPACE BAR, OR CARRIAGE RETURN BAR

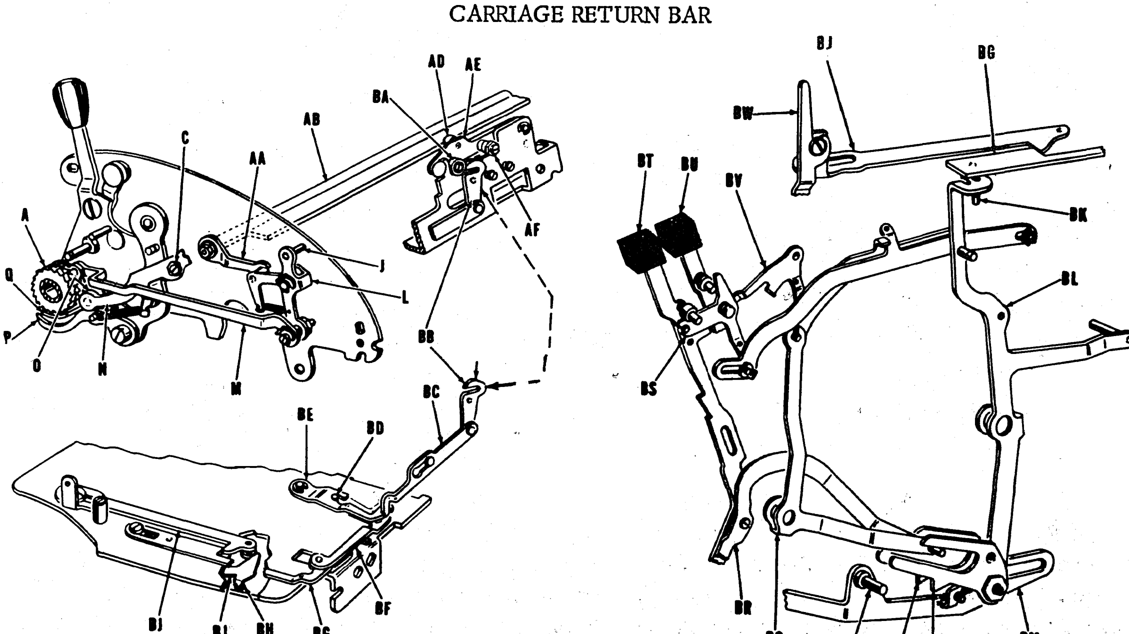


Figure VII-20

Single spacing is indexed when the tabulation control lever BW is moved forward to non-tabulating position, lever BW, through slide BJ, slide BG, bellcrank BF, stud BD, arm BE, and slide assembly BC rocks arm BB toward the right side of the machine. Arm BB, through eccentric roll BA, arm AE, stud AD, bail AB, arm AA, bellcrank L, and link M positions shutter Q to permit the spacing pawl to advance the platen one space during the machine operation. Detent BI retains the tabulation control lever in a forward position by spring tension.

Single spacing is indexed from the depression of vertical space bar BT through arm BR, permitting lowering of pawl BO by spring tension into the path of stud BP in slide BM. Slide BM is driven rearward on each machine operation and when pawl BO is lowered the lower end of lever BL is driven rearward. As lever BL is rocked, slide BG is moved forward in the same manner as when lever BW is moved forward and shutter Q is positioned to permit engagement of the spacing pawl and the platen advances one space.

Single spacing is indexed from the depression of return bar BU through bellcrank BV rocking lever BQ permitting pawl BN to lower into the path of stud BP with the same results that are obtained by lowering pawl BO from the vertical space bar depression.

PLATEN CONTROL MECHANISM CONTROLS SPACING

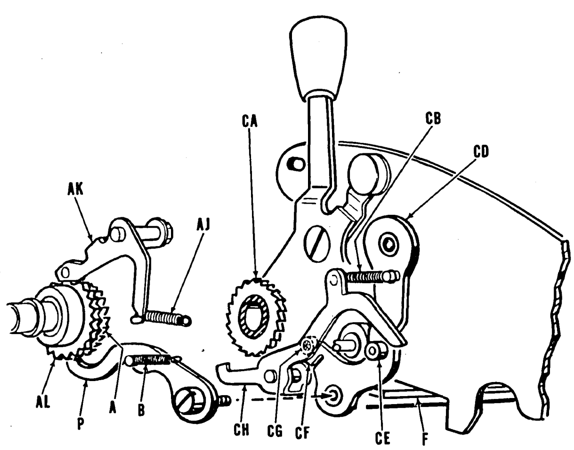


Figure VII-21

Full and even spacing of the platen is assured by the platen control mechanism which prevents overthrow of the platen.

During the return stroke of the machine operation, spacing bail F moves arm CD and roll CE forward. This permits spring CB to position the forward hook portion of detent CH in mesh with gear CA after the spacing pawl begins to advance the platen. The hook portion of detent CH positioned in front of a tooth of gear CA prevents the spacing pawl from overthrowing the platen. Near the end of the return stroke, projection CF contacts roll CG to disengage detent CH from gear CA. Tension of spring AJ holds the roll of detent AK in the pocket of detent gear AL to hold the platen during printing.

Tests and Adjustments

1. To assure that spacing bail F, Fig. VII-19, is parallel to, and straight in the carriage -
   With the machine in home position, manually move the carriage from right to left. The carriage should move freely and there should be no movement of overthrow detent CH, Fig. VII-21.
   TO ADJUST:
   a. Loosen screws AI, Fig. VII-19, in the right and left ends of spacing bail F, Fig. VII-19, and move the spacing bail all the way upward. Now, lower the spacing bail .010" to .020" below the carriage side frames and tighten the screws.
   NOTE: Open carriage and check that the spacing bail doesn't interfere with Plate BD, Fig. VII-9, or the carriage will not open fully.
   b. Weave arm CD, Fig. VII-21 to align the bail parallel with the carriage and to pass freely through the fork of slide I, Fig. VII-18.
2. To assure positive form spacing when indexed through other than carriage controls -

a. With the machine in home position and no spacing operation indexed from either lever E, Fig. VII-19 or bail AB, Fig. VII-19, check the front edge of shutter Q, Fig. VII-19 to be on a line with the rear edge of a tooth in space ratchet A, Fig. VII-19.

NOTE: A convenient method of determining the correct relationship between shutter Q, Fig. VII-19 and a tooth of space ratchet A, Fig. VII-19 is provided by aligning the front edge of groove AO, Fig. VII-19 with a tooth in the space ratchet.

b. With the tabulation control lever rearward and the carriage in a position where no carriage space cam is active, move space lever E, Fig. VII-19 to single space position and turn eccentrics AF, Fig. VII-19 and BA, Fig. VII-20 with the high sides upward. The front edge of shutter Q, Fig. VII-19 should align with the rear edge of the tooth in space - ratchet A, Fig. VII-19 which is normally exposed for single spacing.

c. With the carriage positioned where no carriage space cam is active, move tabulation control lever forward and space lever to no-space position. The front edge of shutter Q, Fig. VII-19 should align with the rear edge of the tooth in space ratchet A, Fig. VII-19, which is normally exposed for single spacing.

d. With the carriage positioned where no carriage space cam is active, move tabulation control lever forward and space control lever to no-space position. Unhook spring AJ, Fig. VII-19 and operate the machine slowly on the return stroke. Check the space pawl P, Fig. VII-19 to advance the platen one full space before being cammed out of the ratchet gear tooth.

e. With the machine in home position, the front end of overthrow detent CH, Fig. VII-21 should have approximately 1/32" clearance under the teeth of overthrow gear CA, Fig. VII-21.

f. With the carriage positioned where no carriage space cam is active, move tabulation control lever forward and space control lever to no-space position. Operate the machine slowly on the return stroke to the point where space pawl P, Fig. VII-21 is just cammed clear of the tooth in ratchet gear A, Fig. VII-21. Check for overthrow detent CH, Fig. VII-21 to remain positioned in the teeth of overthrow gear CA, Fig. VII-21 while holding the machine in this position, attempt to advance the platen. Platen advance should be prevented.

TO ADJUST:

a. Loosen two screws AM, Fig. VII-19 and turn platen shaft AN, Fig. VII-19 being certain that detent AK, Fig. VII-19 remains bottomed in the teeth of wheel AL, Fig. VII-19.

b. Weave the upward extension of bellcrank L, Fig. VII-18 for earlier or later contact of lever E, Fig. VII-18 with stud J, Fig. VII-18.

c. Turn eccentric BA, Fig. VII-20. If the eccentric does not provide enough movement, bend the forward arm of bellcrank L, Fig. VII-20, then turn eccentric BA, Fig. VII-20.

d. Turn eccentric C, Fig. VII-20 for earlier or later disengagement of the space pawl from the ratchet wheel.

e. Bend the formed projection of the lower end of arm CD, Fig. VII-21 that contacts roll CG, Fig. VII-21.

f. Bend the rear extension of overthrow detent CH, Fig. VII-21 toward or away from roll CE, Fig. VII-21.

3. To assure positive form spacing from carriage control -

a. With space cam AC, Fig. VII-19 in active position under roll on eccentric AF, Fig. VII-19, the tabulation control lever rearward, and the space control lever in no-space position, the front edge of shutter Q, Fig. VII-20 should align with the rear edge of the tooth in space ratchet A, Fig. VII-19 that is normally exposed for single spacing.

b. With the tabulation control lever rearward, space control lever in no-space position, and with a single space control active, advance the handle to the last notch of the full stroke segment. There should be .005" latching lead of eccentric stud AG, Fig. VII-19 into the pocket in the rearmost portion of AH, Fig. VII-19.

c. With the machine in home position and space control lever set at no-space position, manually move lever E, Fig. VII-19 back and forth. Check for .005" to .010" clearance of eccentric stud AG, Fig. VII-19 over the rearmost portion of AH, Fig. VII-19.

TO ADJUST:

a. Turn eccentric AF, Fig. VII-19.

NOTE: When this adjustment is correctly made, and lever E, Fig. VII-18 is moved into single space position, the projection in lever E, Fig. VII-18 should just contact stud J, Fig. VII-18.

b. Turn eccentric stud AG, Fig. VII-19.

c. Bend the forward end of AH, Fig. VII-19 to provide more or less throw from screw AI, Fig. VII-19.

AUTOMATIC CARRIAGE TABULATION

Automatic carriage tabulation during the machine operation moves the carriage from one stop position to another by spring tension to permit printing amounts in various columns on the forms. During the machine operation rocking of the hammer latch section releases the carriage to permit the carriage to move to the left under spring tension.

CARRIAGE RELEASED DURING RETURN STROKE OF MACHINE OPERATION

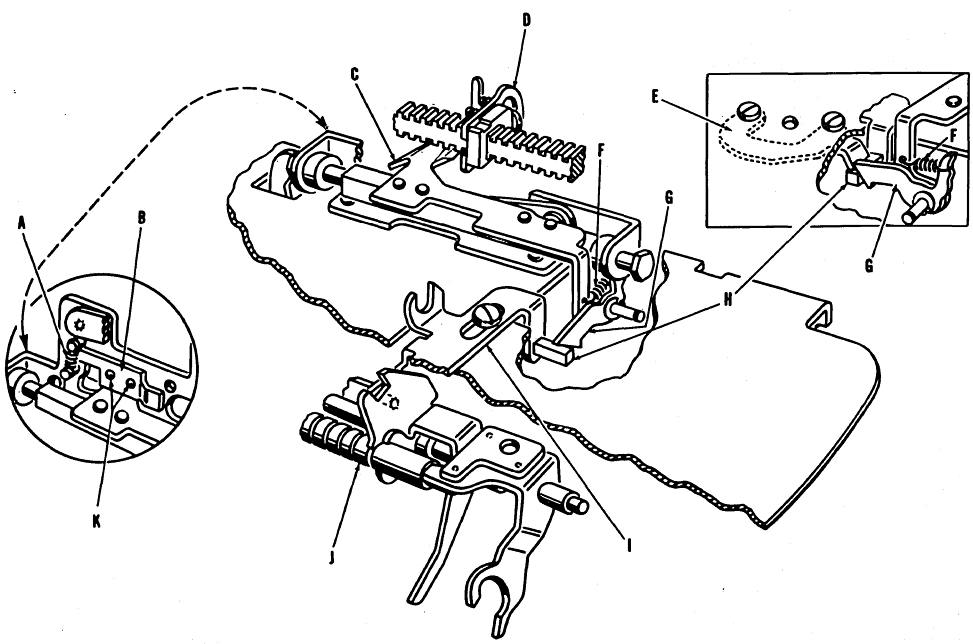


Figure VII-22

During the forward stroke of the machine operation, hammer latch section J is rocked rearward moving slide I to position square stud H behind the hook of pawl G. Tension of spring F holds the hook down over the stud.

During the return stroke of the machine operation as hammer latch section J is rotated counterclockwise, slide I moves square stud H forward. Stud H, being positioned behind the hook of pawl G rocks tabulating bail assembly C clockwise so its formed ear clears below limit stop D. This releases the carriage for leftward movement by spring tension. Later, during the return stroke, pawl G contacts camming plate E and is disengaged from square stud H. Disengagement of pawl G permits spring A to restore tabulating bail assembly C, thereby positioning the formed ear of the tabulating bail in the path of the next limit stop to the right.

GOVERNOR CONTROLLED CARRIAGE TABULATION

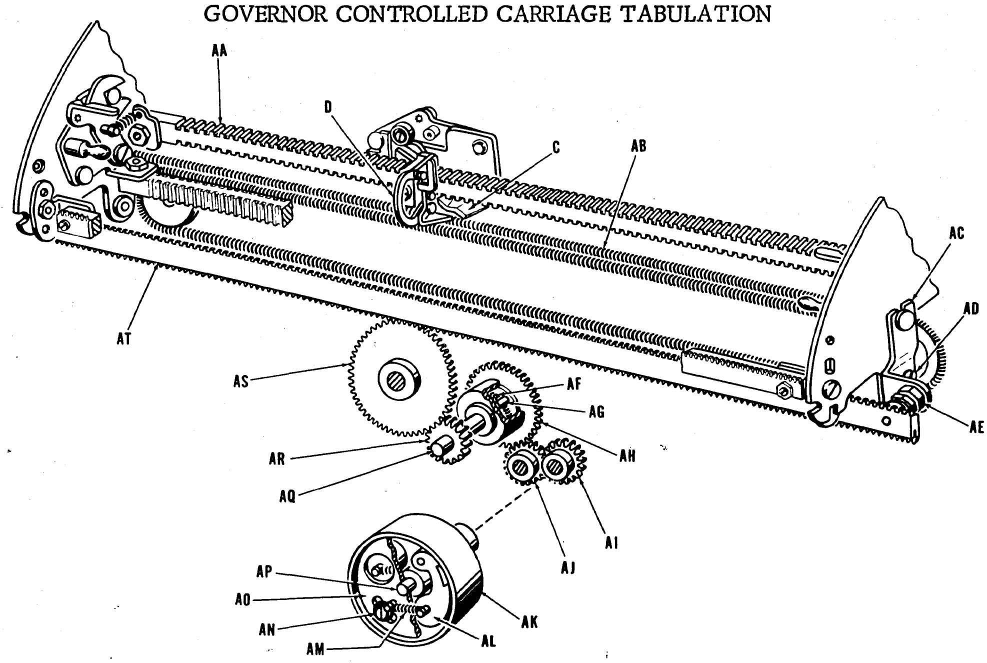


Figure VII-23

When the formed ear of tabulating bail assembly C is lowered below carriage limit stop D, tension of spring AB pulls the carriage to the left.

The speed of the carriage moving to the left is regulated by governor AK. Toothed rack bar AT on the carriage is meshed with gear AS, and as the carriage moves to the left, gear AS is turned clockwise (looking from the rear of the machine). Gear AS turns gear AR and springs AF causes rolls AG to bind between the drum on gear AH and the square hub of shaft AQ. This clutch action causes gear AH to rotate counterclockwise with gear AQ. Gear AH, through gears AJ and AI, turn governor shaft AP. The centrifugal force created by the rotating speed of the governor shaft throws weights AL outward against the tension of spring AM and provides mechanical drag on the inside of the governor drum. Thus, a braking action is used to governor the speed of the carriage during carriage tabulation.

During carriage return, gear AR turning in a clockwise direction (from the rear of the machine) causes rolls AG to move against the tension of springs AF. This permits the rolls to turn freely inside the drum on gear AH, thereby disabling the clutch during carriage returning.

Tests and Adjustments

1. To align rack AT with gear AS -
The lower teeth of rack AT should be centrally located in the teeth of gear AS when the carriage is in any stop position.
TO ADJUST, turn nuts AE on the right or left ends of rack AT to position the rack forward or rearward.
NOTE: When tightening the rack to arms AC, the rack should be moved to the right end of the slotted holes in arms AC to prevent slipping of the rack during carriage returning.

2. To assure non-binding between rack AT and gear AS -
There should be slight play between gear AS and rack AT when the carriage is in any stop position.
TO ADJUST, loosen screws AD in the carriage right and left sideframes and raise or lower brackets AC, then tighten screws AD.

3. To assure smooth movement and constant speed of the carriage during tabulation -
With the stop and control bar removed from

the machine, the carriage should move freely all the way from the rightmost carriage position to the leftmost position at approximately the same speed as during carriage return.
TO ADJUST, loosen screws AN and turn plate AO for more or less tension on springs AM.

4. To safeguard against the tabulating bail missing the limit stops when the carriage tabulates -
When the carriage is in any stop position, the formed ear of tabulating bail C should have a full hold on limit stop D.
TO ADJUST, loosen screws K, Fig. VII-22, raise or lower limit plate B, Fig. VII-22, adjust to limit stop that has the least hold, retighten screws K, Fig. VII-22.
5. To assure that the tabulating bail assembly is rocked far enough to permit carriage tabulation - During the return stroke of the machine operation, the formed ear of tabulating bail C should be moved approximately 1/32" below limit stop D.
TO ADJUST, move camming plate E, Fig. VII-22, forward or rearward on the carriage bottom plate to cause a later or earlier disengagement of pawl G, Fig. VII-22 from square stud H, Fig. VII-22.

CARRIAGE TABULATION DELAYS DRIVE TRIP AND IS CUSHIONED BY AIR-POT CONTROL

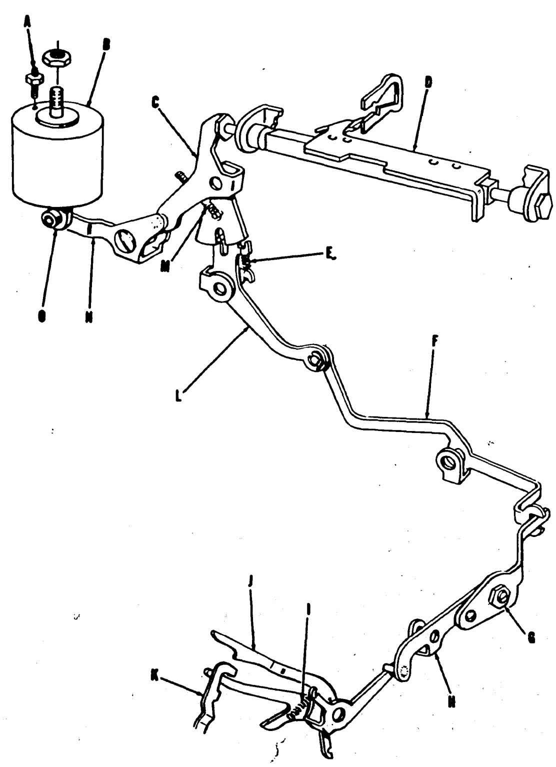


Figure VII-24

During carriage tabulation the drive trip is blocked to prevent indexing of a subsequent machine operation before the carriage tabulation is completed. Smooth and quiet carriage tabulation is provided by an air-pot which absorbs the shock of the carriage limiting against the tabulating bail assembly.

Tabulating bail assembly D is moved toward the right side of the machine by spring M and lever C when the formed ear of the tabulating bail is lowered for carriage tabulation.

Rocking of lever N, through lever C, causes air-pot plunger O to be lowered. The lower arm of lever C through levers L, F, and H, permits spring I to position latch J under the offset of drive trip arm K when the drive is restored. Therefore, a subsequent machine operation is prevented until carriage tabulation is completed.

Tabulating bail D is moved toward the left side of the machine to rock lever C when the carriage limits on the formed ear of the tabulating bail near the end of the carriage tabulation.

Rocking of lever C moves the air-pot plunger into air-pot B through lever N, the air compression and controlled escapement absorbing the shock of the carriage limiting on the tabulating bail.

The lower arm of lever C moves latch J from under the offset on drive trip arm K through levers L, F, and H.

Spring E in lever L assembly makes carriage installation easy if the MRC unit is on the machine.

Tests and Adjustments

1. To assure cushioning the carriage when the carriage is limited by the tabulating bail assembly and to provide a starting point for adjustment No. 3 -
The air hole in air-pot B should align with adjustable screw A.
TO ADJUST, remove screw A. Turn air-pot B until the air hole aligns with the hole for screw A in the carriage bottom plate. Replace screw A to seat lightly in the air hole of air-pot B, then back off screw A about one quarter turn until best cushioning action is attained and tighten the lock nut.
2. To permit the drive clutch to trip when the carriage is limited by the tabulating bail -
With the tabulating control lever forward and the carriage is limited by the tabulating bail assembly, depress the plus motor bar, the offset in arm D should move past the step of latch J with not more than 1/32" clearance.
TO ADJUST, turn eccentric G for more or less clearance.
3. To permit the tabulating spring to completely move the carriage in any stop position -
Hold the carriage to provide 1/64" clearance between the formed ear of the tabulating bail assembly and a stop in the seventh notch from the right end of the stop bar and depress the plus motor bar. When the carriage is released and permitted to limit against the tabulating bail assembly, latch J should be raised to permit drive trip arm K to move downward.
TO ADJUST, back off screw A to reduce the cushioning effect of air-pot B.

MANUAL CARRIAGE TABULATION

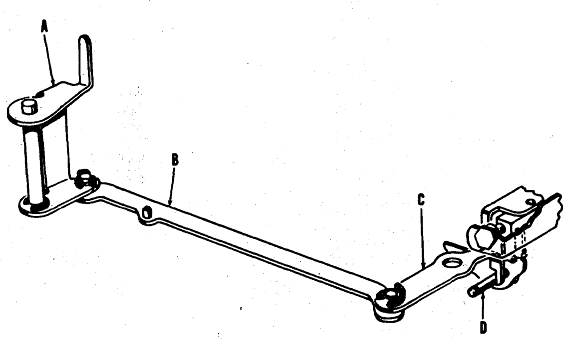


Figure VII-25

Manual tabulation of the carriage from right to left permits the carriage to be located in any stop position without operation of the machine.

Movement of lever A rearward, through link B, rocks lever C, and through stud D rocks the carriage tabulating bail assembly permitting carriage movement toward the left. Carriage movement will continue until lever A is released, which permits restoration of the tabulating bail assembly and engagement of a limit stop or until the carriage reaches its fixed leftward limit.

Tests and Adjustments

1. To assure free tabulation of the carriage when using the manual tabulation lever -
With lever A rearward, the tabulator limit stops should have 1/32" passing clearance over the tabulating bail assembly.
TO ADJUST, advance or retard the contact of lever C with stud D by bending.

CARRIAGE RETURN INDEXED FROM CONTROL CAM, CARRIAGE RETURN BAR, AND DASHPOT ASSEMBLY, IS ACTUATED THROUGH MOTOR POWER

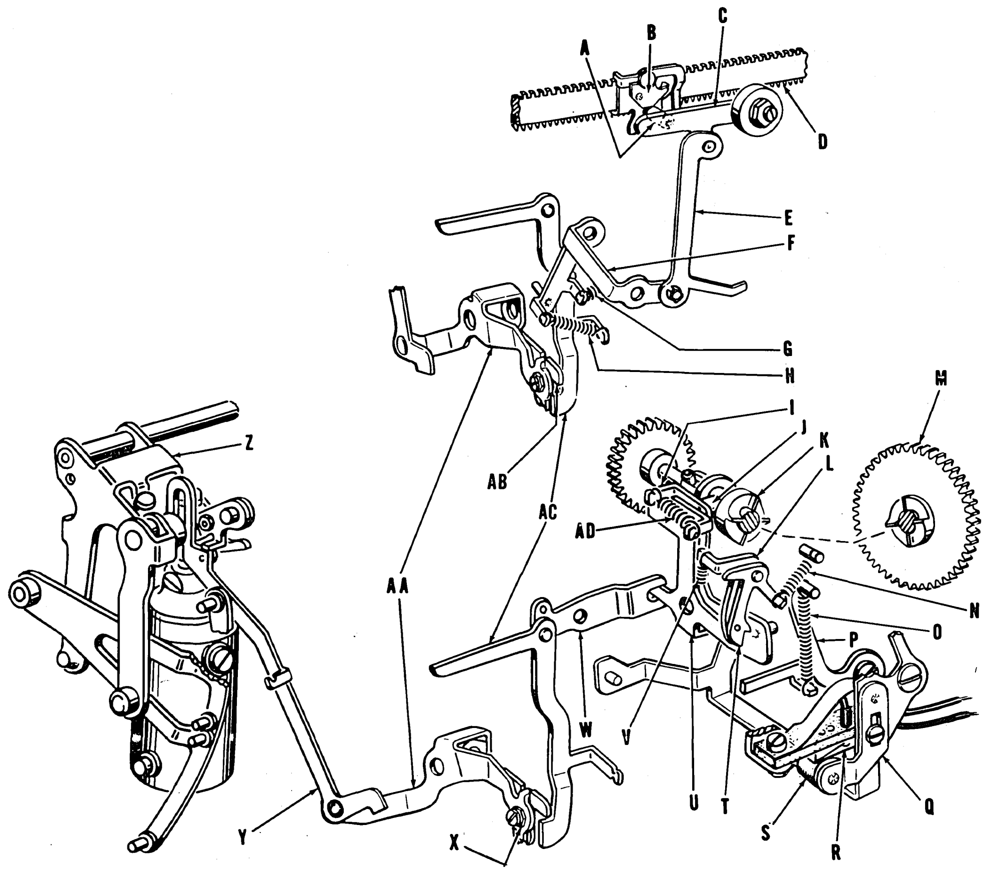


Figure VII-26

The carriage is returned to the right from a stop position containing a return indexing cam by motor power. The MRC mechanism is partially indexed by the indexing cam located on the carriage return rack and is completely indexed by actuation of the dashpot hanger. The MRC mechanism is set to inactive status by a carriage return cam on the carriage return rack after the carriage has been returned to the predetermined stop position.

Partial indexing of the MRC mechanism to active carriage return occurs when cam B positions the step of arm AC under adjustable plate AB through roll A, arm C, link E, bail F, and spring H.

Spring H provides a yielding connection which permits a manual disable of the carriage return indexing mechanism after indexing cam B is positioned over roll A.

Cam B is adjustable on carriage return rack D and should be positioned directly over roll A when the carriage is in a stop position from which a carriage return is to be automatically indexed.

Spring G restores the partial indexing mechanism to normal, at the beginning of the return stroke of the machine operation.

Indexing of the MRC mechanism is completed near the end of the forward machine stroke when the carriage return clutch is engaged through movement of the dashpot arm assembly.

Dashpot arm assembly Z moving upward moves the rearward arm of bail AA downward through link Y. The rearward arm of bail AA, through plate AB, arm AC, arm W, lever U, spring AD, arm I, and roll J, engages return clutch member K with the clutch member on gear M. Springs N and V position latches T and L to,respectively, retain levers U and I in indexed position. Motor power is assured to completely return the carriage when the rear arm of lever U lowers lever P to close the points of the MRC switch. Spring AD provides a yielding connection which permits lever U to be completely indexed if the teeth of clutch member K comes point to point with the teeth of the clutch member on gear M as the carriage return clutch is being engaged.

Latch T retains lever U in a rearward position until the teeth of clutch member K have moved off the teeth of the clutch member on gear M. At this time, spring AD moves lever I rearward and through roll J engages the carriage return clutch.

MOTOR POWER RETURNS CARRIAGE

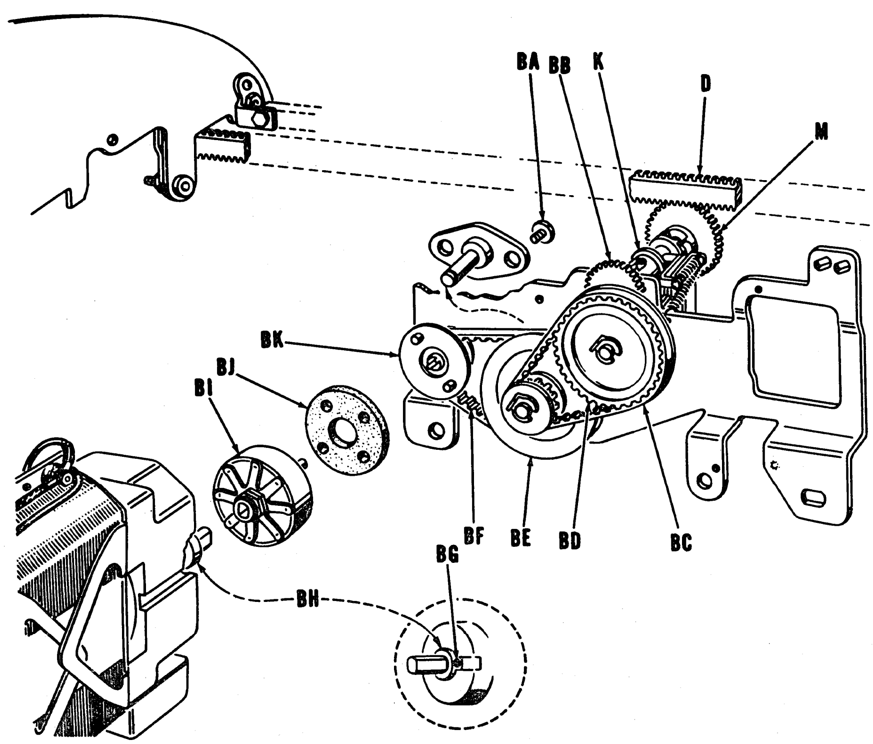


Figure VII-27

The carriage is returned through motor power after the carriage return clutch has been engaged. The armature turns gear M through friction safety clutch BI, leather washer BJ, pulley BK, belt BF, pulley assembly BE, belt BC, pulley assembly BD, gear BB, and clutch member K. Gear M is in mesh with carriage return rack D and moves the carriage toward the right side of the machine through the rack which is attached to the carriage side frames. Friction safety clutch BI permits the armature to continue turning if the carriage is obstructed in any way during the carriage return.

Leather washer BJ provides a universal type of connection between the MRC unit and motor unit. Therefore, the MRC unit may be installed without exactly aligning pulley BK with the armature shaft.

CONTROL CAM NORMALIZES CARRIAGE RETURN

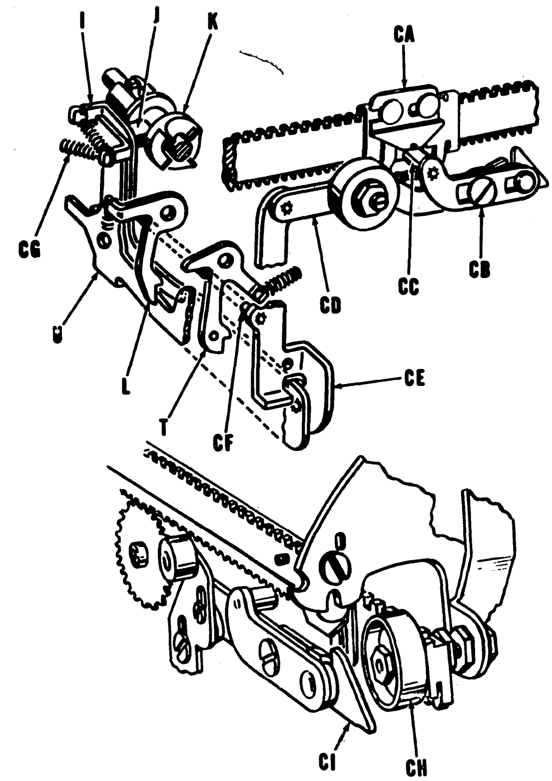


Figure VII-28

The MRC clutch is disengaged when the carriage is returned to a stop position containing a carriage return deactivating cam. When the carriage is returned to the right, cam CA moving over roll CC moves latches T and L toward the right side of the machine through arm CD, link CE, and stud CF. Continued upward movement of link CE moves clutch member K forward through lever U, lever I, and roll J. Spring CG retains clutch member K in a forward (disengaged) position. Cam CA is adjustable on the carriage return rack. When the carriage is limited by a limit stop after the carriage has been returned, roll CC should align with the cut out in cam CA. This assures complete returning of the carriage before the carriage return mechanism is disengaged. Should the carriage be manually returned to a stop position that locates cam CA to the left of roll CC, disengagement of the clutch members is accomplished through safety release cam CI engaging eccentric roll CH. Without cam CI and roll CH, the carriage when returning could reach its extreme right hand limit before the MRC clutch members could be disengaged thus causing damage to the clutch.

CARRIAGE RETURN INDEXED BY RETURN MOTOR BAR

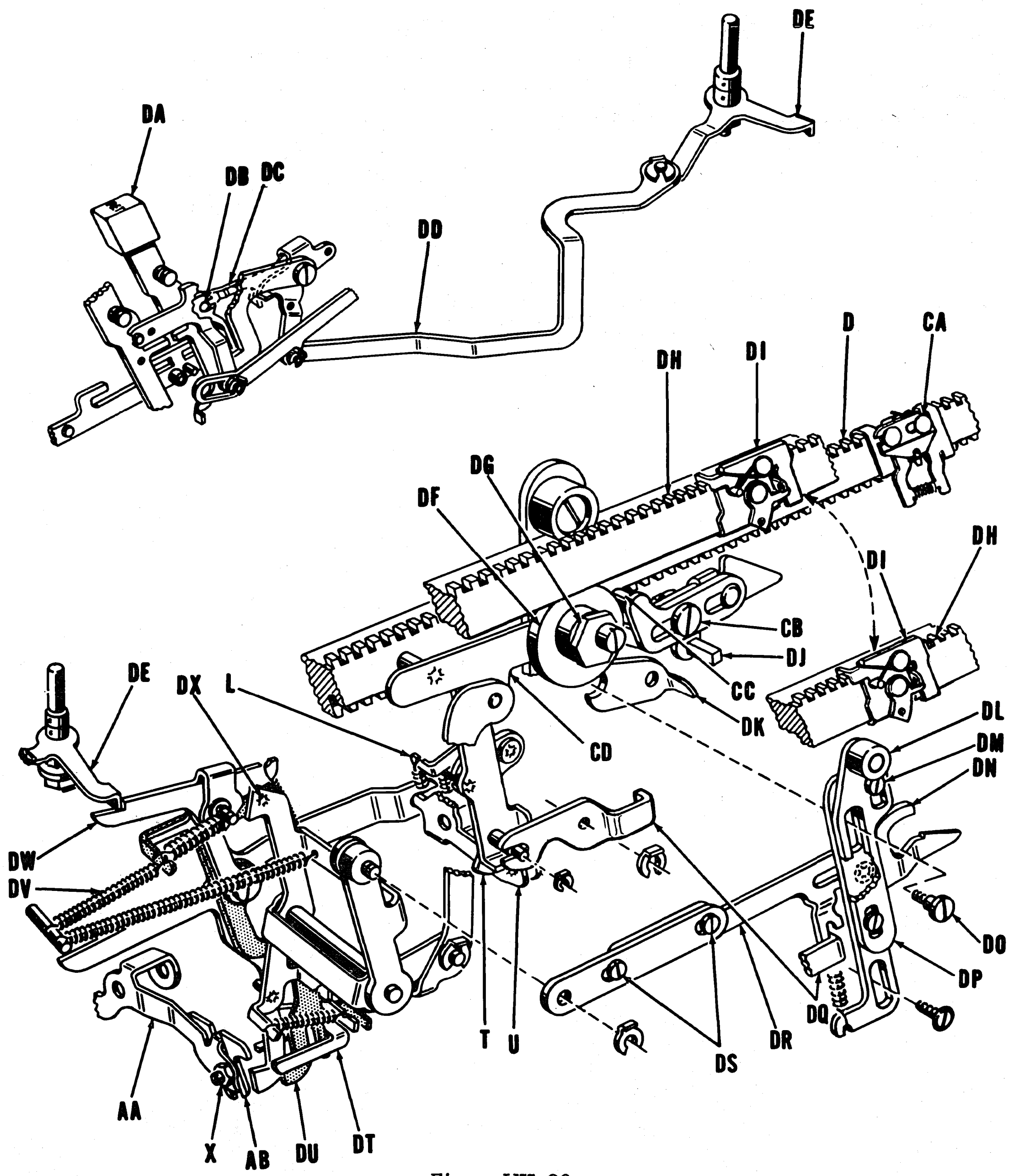


Figure VII-29

Motor bar DA provides a means for returning the carriage to a predetermined stop position during multiple posting operations. If an intermediate carriage return has been indexed by carriage return motor bar DA, slide DR is latched on lip DK with the lower projection of the slide positioned over the lip of bellcrank DQ. Disengagement of the clutch during the intermediate return operation takes place as cam DI passes over roll DL lowering slides DP and DR and the projection on the lower portion of slide DR rocks bellcrank DQ. The leverage of bellcrank DQ assures release of latches T and L and positive disengagement of the clutch during the intermediate carriage return operation. A broken joint between latch DW and arm DU safeguards against damage to the unit if motor bar DA is depressed while the carriage is positioned with sliding cam CA over roll CC. With cam CA over roll CC, square stud DJ is positioned to the left of projection DN preventing any lateral movement of slide DR.

An additional safeguard is provided to prevent damage to the unit if a second intermediate carriage return is attempted by holding down motor bar DA following an initial return which has positioned sliding cam DI over roll DL.

Depression of motor bar DA through stud DB and bellcrank DC moves link DD rearward rocking bellcrank DE. Rocking of bellcrank DE moves latch DW to the left, positioning the foot of arm DU under adjustable plate AB on actuating arm AA. Toward the end of the forward stroke of a machine operation, actuating arm AA lowers arm DU to index the intermediate carriage return. As arm DU is lowered, the left projection of latch DW contacts stud DX, rocking latch DW and disengaging it from the lip of bellcrank DE. Spring DV restores arm DU to its normal position. A second intermediate carriage return cannot be indexed until motor bar DA is released and depressed a second time.

Tests and Adjustments

1. To assure a full hold of adjustable plate AB, Fig. VII-26, on the step of arm AC, Fig. VII-26, if a carriage return is indexed and to provide clearance between plate AB, Fig. VII-26, and arm AC, Fig. VII-26, if carriage return is not indexed -
When the carriage return index cam B, Fig. VII-26 is located over roll A, Fig. VII-26 and the carriage return disabling lever positioned to the left; plate AB, Fig. VII-26, should have a full hold on the step of arm AC, Fig. VII-26 as the machine is operated.
TO ADJUST, weave bail F, Fig. VII-26, to move the stud away from arm AC, Fig. VII-26.
2. To assure enough movement of arm AC, Fig. VII-26 to engage clutch member K, Fig. VII-26 with the clutch member on gears M, Fig. VII-26 and to permit latch T, Fig. VII-26, to latch over lever U, Fig. VII-26 -
When the carriage return disabling lever is positioned to the left and cam B, Fig. VII-26 is positioned over roll A, Fig. VII-26; latch T, Fig. VII-26 should move over lever U, Fig. VII-26 with approximately 1/32" clearance as the machine is manually operated by turning the motor.
TO ADJUST, turn eccentric nut X, Fig. VII-26 to raise or lower plate AB, Fig. VII-26 on bail AA, Fig. VII-26. At times it may be necessary to turn plate AB, Fig. VII-26 end for end.
3. To assure that the motor operates until the carriage is completely returned -
When latches T and L, Fig. VII-26 are holding clutch member K, Fig. VII-26 engaged with the clutch member on gear M, Fig. VII-26; roll S, Fig. VII-26 should be lowered far enough to permit at least a .015" feeler gauge to be inserted between roll S, Fig. VII-26 and leaf spring R, Fig. VII-26 without opening the points of the microswitch.
TO ADJUST, loosen screw and position switch control arm Q, Fig. VII-26; then tighten screw.
4. To assure complete disengagement of the MRC clutch after the carriage has been returned to the predetermined stop position -
When cam CA, Fig. VII-28 is located directly over roll CC, Fig. VII-28 and clutch member K, Fig. VII-28 held rearward and with gear M, Fig. VII-26, held forward; there should be a minimum of .010" clearance between the teeth of clutch member K, Fig. VII-28 and the teeth of the clutch member on gear M, Fig. VII-26.
TO ADJUST, turn eccentric CB, Fig. VII-28, to give more or less throw to lever U, Fig. VII-28. Do not adjust roll CC, Fig. VII-28 high enough to create a bind.
5. To assure disengagement of the clutch members before the carriage reaches its extreme right hand limit -
There should be approximately 1/64" clearance between the upper edge of cam CI, Fig. VII-28 and roll CH, Fig. VII-28 when the carriage is held in its rightmost position to locate cam CI, Fig. VII-28 directly under roll CH, Fig. VII-28, as cam CI, Fig. VII-28 is held depressed manually.
TO ADJUST, turn eccentric roll CH, Fig. VII-28.
6. To assure opening the MRC switch points after the carriage has been completely returned -
When the carriage return clutch is completely disengaged and lever P, Fig. VII-26 opens the MRC switch points through switch control arm

Q, Fig. VII-26; lever P, Fig. VII-26 should be limited to permit slight clearance between the vertical projections of leaf spring R, Fig. VII-26 and the bottom of the microswitch mounting plate.

TO ADJUST, bend the upper vertical arm of lever P, Fig. VII-26 to limit sooner or later.

7. To provide smooth and quiet function of the friction clutch -

When the machine is in home position and the end play of the armature is held rearward, friction clutch BI, Fig. VII-27, should hold leather washer BJ, Fig. VII-27 tightly against geared pulley BK, Fig. VII-27.

TO ADJUST, loosen set screw BG, Fig. VII-27 and hold the armature and friction clutch rearward. Move collar BH, Fig. VII-27 rearward against the friction clutch and tighten screw BG, Fig. VII-27.

8. To prevent excessive wear of the bearings for pulleys BE and BD, Fig. VII-27 and to assure that belts BF and BC turn pulleys BE and BD, Fig. VII-27 -

When the machine is in home position, the teeth of belts BF and BC, Fig. VII-27 should seat snugly in the teeth of pulleys BE and BD, Fig. VII-27 without binding the pulleys.

TO ADJUST, loosen screws BA, Fig. VII-27 to permit pulley BE, Fig. VII-27 to position itself by its own weight. Tighten the screws.

9. To assure enough movement of arm DU, Fig. VII-29 to permit latching of arm U, Fig. VII-29 by latch T, Fig. VII-29 -

With the return motor bar depressed, manually operate the machine by turning the motor and check for approximately 1/32" latching lead of latch T, Fig. VII-29 over arm U, Fig. VII-29.

TO ADJUST, turn eccentric X, Fig. VII-29.

10. To assure engagement of the lip of bellcrank DE, Fig. VII-29 on the step of latch DW, Fig. VII-29 when the return motor bar is depressed -

With the machine in home position, the formed lip of bellcrank DE, Fig. VII-29 should have approximately 1/32" lead on the step of latch DW, Fig. VII-29.

TO ADJUST, bend the projection on the lower portion of arm DU, Fig. VII-29 toward or away from guide plate DT, Fig. VII-29.

11. To assure release of the clutch during an intermediate carriage return operation -

With lip DK, Fig. VII-29 square with respect to the unit, depress the return motor bar and check for .010" to .015" latching lead of slide DR, Fig. VII-29 over lip DK, Fig. VII-29.

TO ADJUST, loosen screws DS, Fig. VII-29 and reposition the slide.

NOTE: Be careful not to over adjust or the lip of bellcrank DQ, Fig. VII-29 will not clear the lower projection of slide DR, Fig. VII-29 on a carriage return indexed through carriage controls.

12. To safeguard against indexing an intermediate carriage return from the return motor bar while the carriage is located in an automatic carriage return shut-off position -

With cam CA positioned over roll CC, Fig. VII-28; check for no more than 1/64" clearance between square stud DJ, Fig. VII-29 and the end of projection DN, Fig. VII-29.

TO ADJUST, bend the vertical portion of projection DN, Fig. VII-29 to the left or right.

13. To assure latching of slide DR, Fig. VII-29, on lip DK, Fig. VII-29 -

Depress the return motor bar and check for projection DN, Fig. VII-29 to just clear under stud DJ, Fig. VII-29 as slide DR, Fig. VII-29 moves to latch on lip DK, Fig. VII-29.

TO ADJUST, bend the horizontal portion of projection DN, Fig. VII-29 up or down.

14. To safeguard against damage to the unit if the return motor bar is held depressed, attempting a second intermediate return, with shut-off cam DI, Fig. VII-29 over roll DL, Fig. VII-29 -

Depress the carriage return key and operate the machine with a handle. Check for .020" to .030" clearance of the step of latch DW, Fig. VII-29 under the lip of bellcrank DE, Fig. VII-29.

TO ADJUST, bend the rear portion of bellcrank DE, Fig. VII-29 up or down.

CARRIAGE RETURN INDEXING DISABLED FROM VERTICAL SPACE BAR, TABULATION CONTROL LEVER, OR CARRIAGE RETURN DISABLING LEVER

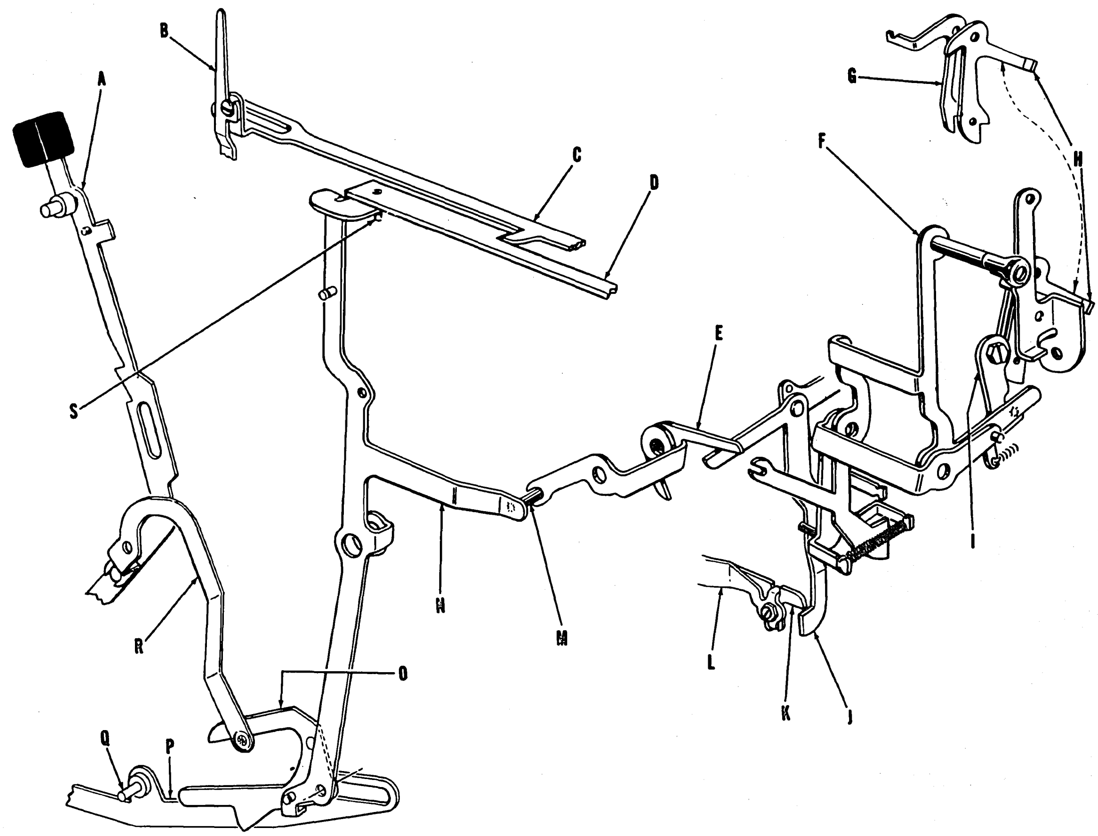


Figure VII-30

Carriage return is disabled for columnar listing when the carriage is in a stop position containing a carriage return indexing cam. Carriage return is disabled when the vertical space bar is used, when the tabulation control lever is in a forward position, or when the carriage return disabling lever is positioned to the right. Should a power failure occur during carriage returning, manual movement of the carriage is also permitted by moving the carriage return disabling lever to the right to disengage the carriage return clutch.

Depression of the vertical space bar A through arm R permits pawl O to lower (under spring tension) into the path of stud Q in slide P. Slide P is driven rearward on each machine operation and when pawl O is lowered, the lower end of lever N is driven rearward. As lever N is rocked bail E is rotated which moves arm J toward the left side of the machine to prevent plate K from actuating the carriage return clutch.

Shifting forward of the tabulation control lever B moves the step of arm J from under plate K through slide C, slide D, stud S, lever N, stud M and bail E.

Movement of lever F to the right raises latches G and H to permit the carriage return clutch to disengage and the MRC switch to open when the motor is stopped during carriage return. Also, the lower arm of lever F moves the step of arm J from under plate K to prevent engagement of the carriage return clutch again. The carriage return disabling lever is retained in either its right or left hand position by detent I.

Tests and Adjustment

1. To prevent false limiting of arm J when the carriage is located to index a carriage return operation -
   a. When the carriage is located to index a carriage return operation, carriage return disabling lever F in its leftmost position, and the tabulation control lever moved rearward, there should be minimum clearance between the lower arm of carriage return disabling lever F and the formed ear of arm J.
   b. When the carriage is located to index a carriage return operation, carriage return disabling lever F in its left hand position, and the tabulation control lever rearward, there should be minimum clearance between the rear arm of bail E and the horizontal arm of arm J.

   TO ADJUST:
   a. Disconnect arm N from stud S. Weave the bail portion of carriage return disabling lever F for more or less clearance. Connect arm N to stud S.
   b. Bend the rear arm of bail E up or down for more or less clearance.

CARRIAGE SKIP TABULATION

Direct tabulation of the carriage through one or more stop positions to a predetermined stop position is provided by depressing the skip bar which trips the machine drive and indexes the skip functions. Actual lowering of the tabulating bail assembly which releases the carriage to tabulate, is performed by the machine operation resulting from skip bar depression.

The skip operation is terminated by a control roll installed in lane 7 of the first control roll hanger located leftward of the selected carriage stopping position. Thus, the tabulating bail assembly is restored in sufficient time to engage the desired tabulator stop.

The skip tabulating mechanism works in conjunction with the mechanism described in "Automatic Carriage Tabulation", Fig. VII-22 of this manual. Indexing the skip mechanism holds the tabulating bail assembly C, Fig. VII-22 lowered after latch G, Fig. VII-22 is released from square stud H, Fig. VII-22 until the skip mechanism is released by a control roll in lane 7.

SKIP INDEXING

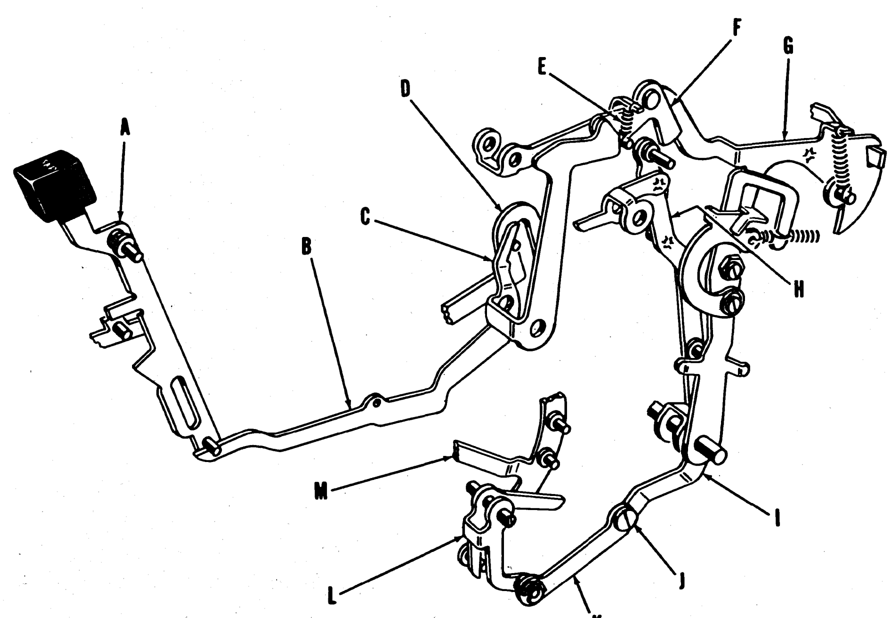


Figure VII-31

Depression of skip bar A rocks lever B so that the rearward end of the lever moves away from pawl F. Pawl F follows lever B under tension of spring E until it is positioned directly over the stud in drive arm H. Toward the end of the forward stroke lever G is raised through the lower stud in segment M, lever L, link K, bellcrank I, driver H, and pawl F.

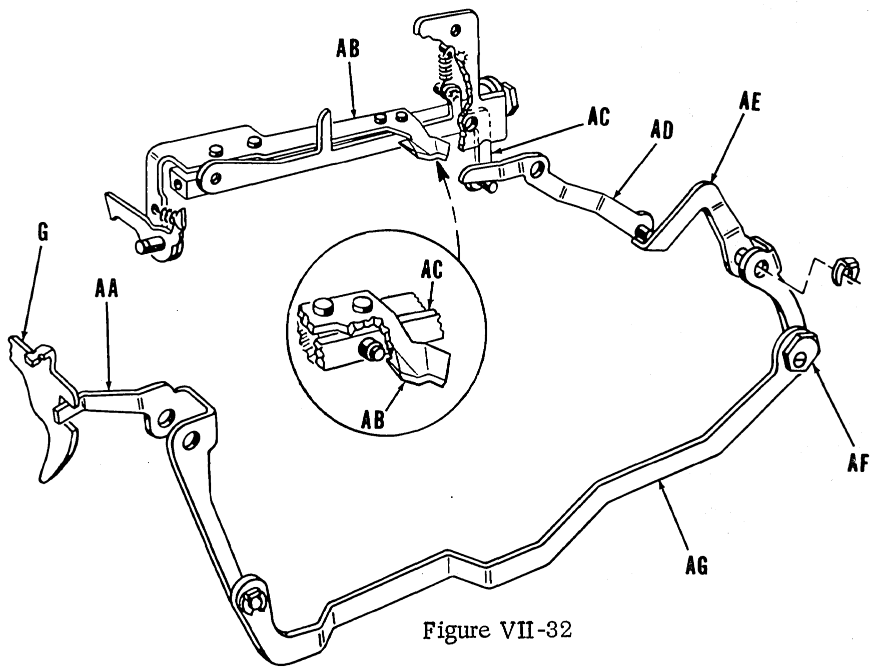


Figure VII-32

As lever G is raised, bellcrank AA is rocked thus moving its lower extension and link AG to the right. Movement of link AG to the right rocks lever AE so that its upper end is raised to lower the right end of lever AD. Lowering lever AD lowers lever AC so that the tabulating bail assembly AB will remain lowered until the skip mechanism is released by a control roll.

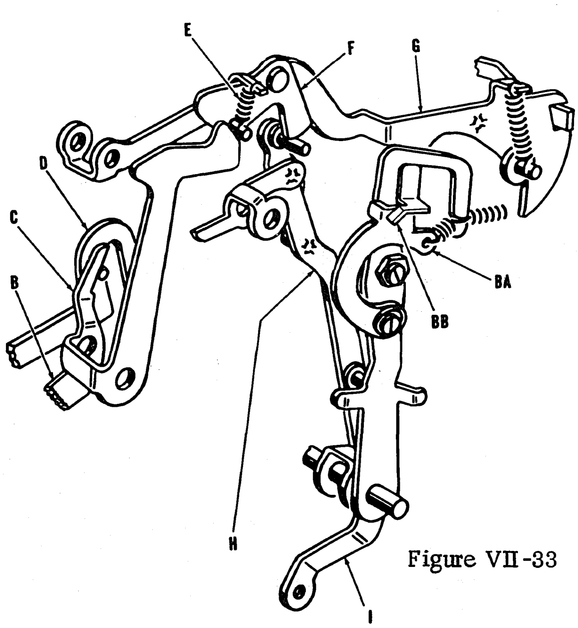


Figure VII-33

When lever G is raised by drive arm H, the formed lip of lever G is raised high enough to permit latch BA to swing under lip BB. Latch BA maintains the skip mechanism indexed between the time the skip bar is released near the end of the machine operation, and the contact of the control lever in lane 7 by a No. 1 control roll.

An optional arrangement is available, when the posting plan shows a need to provide carriage skip operation from a result key depression. A stud is added to link D which contacts extension C of lever B in order to index the skip mechanism in the same manner as when indexed by skip bar depression. When a carriage skip is desired from a selected result position of the layout and not other result position, the undesired skip indexing can be released by installing a control roll to stop the carriage with the next right tabulator stop.

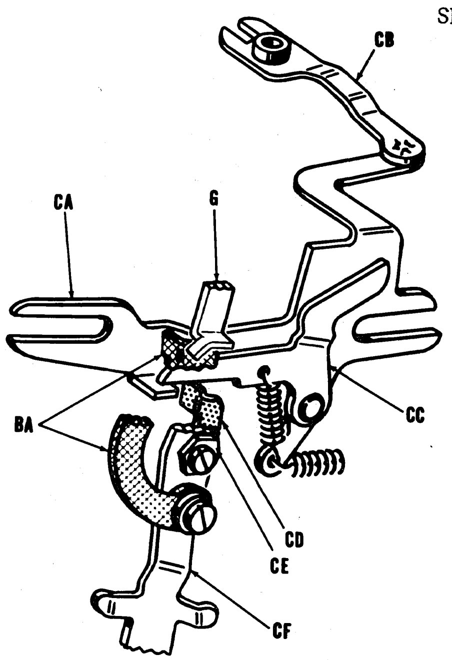


Figure VII-34

SKIP RELEASE

Movement of the carriage toward the left (when the skip mechanism is indexed) continues until a No. 1 control roll contacts the control lever in lane 7. As the control roll actuates the control lever, slide CA is driven forward through connecting lever CB.

With the skip indexed so that pawl CC is limiting on the lip of slide CA, forward movement of slide CA causes the step in pawl CC to contact the formed lip in plate CD. Plate CD is attached to arm CF by screw and eccentric CE so that as slide CA continues forward movement, latch BA is driven from under the formed lip of lever G. As lever G is released, the skip mechanism releases tabulating bail assembly AB, Fig. VII-32, permitting restoration of the latter to normal and ready to engage the next tabulator stop at the right of the releasing control roll.

SAFEGUARD INTERLOCKS

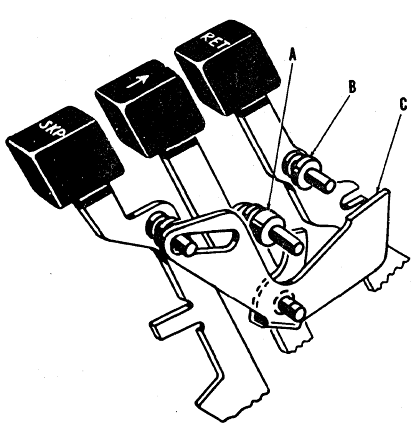


Figure VII-35

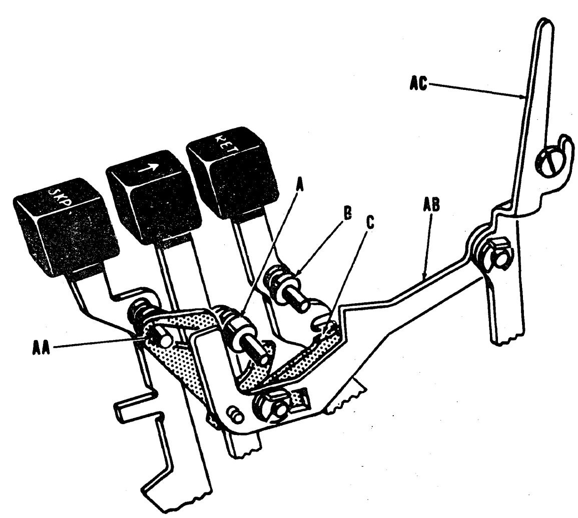


Figure VII-36

Depression of motor bars having conflicting functions must be prevented. Depression of the skip bar lowers the front end of interlock C so that the inner wing of the interlock moves under stud A in the vertical space bar and the other wing moves under stud B in the return bar, thereby blocking these two bars from depression. Depression of either the vertical space bar or the return bar will block movement of interlock C and prevent depression of the skip bar.

With the tabulation control lever moved forward for vertical listing, accidental carriage movement in either direction which could be caused in inadvertent depression of either the skip bar or return bar is prevented by blocking the depression of these two bars.

Forward movement of tabulation control lever AC moves interlock slide AB under stud AA in the skip bar and stud B in the return bar, to effectively prevent depression of either bar when listing operations are being performed.

Tests and Adjustments

1. To assure uninterrupted carriage travel through intermediate tabulator stops located between the starting and stopping positions of a skip operation -
   a. With the skip bar latched depressed and the handle forward, upward movement of drive arm H, Fig. VII-33 should raise lever G, Fig. VII-33 for .030" passing clearance of latch BA, Fig. VII-33 under formed lip BB, Fig. VII-33.
   b. With the carriage limited by a tabulator stop, manually latch lever G, Fig. VII-33 on latch BA, Fig. VII-33. Move the carriage slightly to the right to permit the tabulating bail assembly AB, Fig. VII-32 to drop down. Then, move the carriage to the left until the tabulator stop is directly over the leading edge of the tabulating bail assembly. There should be 1/32" passing clearance between the tabulator stop and the tabulating bail assembly.

   TO ADJUST:
   a. Turn eccentric screw J, Fig. VII-31.
   NOTE: Eccentric screw J, Fig. VII-31 is also used when adjusting the register "A" to "B" balance transfer mechanism. When making this adjustment, the other use of eccentric screw J, Fig. VII-31 must also be considered.
   b. Turn eccentric AF, Fig. VII-32.
2. To assure unlatching an indexed skip by a control roll in lane 7 -
   Manually index a skip operation, then control the movement of the carriage toward the left until a control roll contacts the control lever in lane 7. At the point of farthest movement of the lever, latch CD, Fig. VII-34 should be moved forward 1/32" passing clearance of formed extension on lever G, Fig. VII-34.
   TO ADJUST, turn eccentric CE, Fig. VII-34.
3. To assure stopping the carriage on the next right tabulator stop after a control roll contacts the control lever in lane 7 -
   With the carriage limited by a tabulator stop in which a control in lane 7 contacts the skip release lever; manually index a skip and move the carriage slightly to the right permitting the dropdown of the tabulating bail assembly. Then, very slowly manually control leftward carriage movement to determine that the tabulator stop is safely by the leading edge of the tabulator bail assembly before the skip mechanism is released. The skip mechanism should release as soon as possible after the tabulator stop has passed the leading edge of the tabulating bail assembly by its own thickness.
   TO ADJUST, reposition the control roll hanger.
4. To assure clearance between the carriage tabulation power spring and the control lever in lane 7 -
   Move the carriage from end to end of the raceway. There should be 1/32" clearance between the control lever in lane 7 and power spring B.
   TO ADJUST, turn eccentric A.

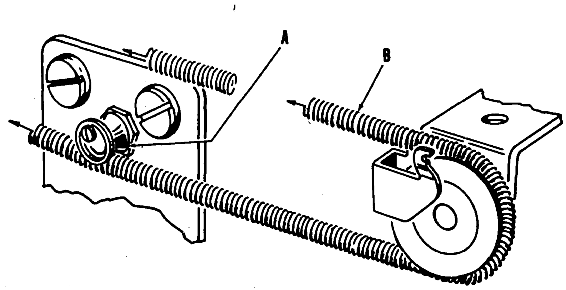


Figure VII-37

KEYBOARD MECHANISM

MOTOR BAR AND CONTROL KEY INTERLOCKS SAFEGUARD MACHINE OPERATIONS

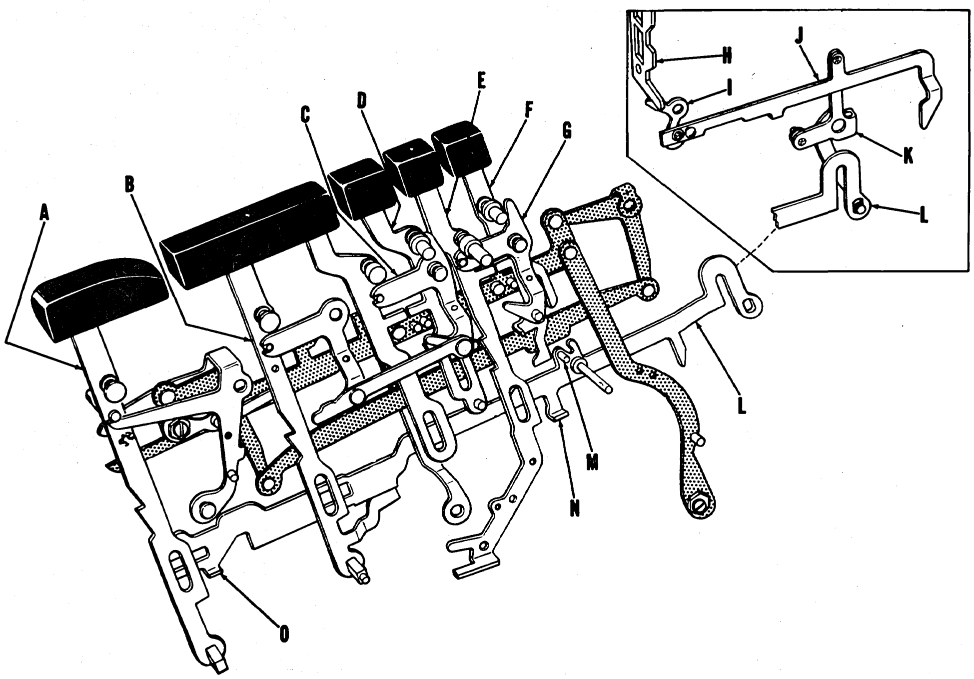


Figure VII-38

The motor bar interlocks prevent accidental simultaneous depression of the operation control keys and/or motor bars during selected machine operations.

Depression of a total or subtotal result key always positions total interlock slide L forward thus placing stud M under the lower portion of the return bar F. Slide L is actuated through bell-crank I, slide J, and lever K. Conversely, depression of the return motor bar blocks forward movement of slide L through stud M to prevent depression of a result key.

Depression of a total or subtotal result key moves formed ear N of total interlock slide L under the step of vertical space bar E to prevent depression of the vertical space bar. Conversely, depression of the vertical space bar blocks forward movement of formed ear N of total interlock slide L to prevent depression of a result key.

Depression of a total or subtotal result key moves formed ear O of total interlock slide L under the step of minus bar A, to prevent depression of the minus bar. Conversely depression of the minus bar blocks forward movement of formed ear O of total interlock slide L to prevent depression of a result key. There is no interlock between total and subtotal and plus motor bar B thus automatic total and subtotal may function when motor bar B is depressed.

Interlock G prevents simultaneous depression of return motor bar and skip motor bar. Interlock C prevents simultaneous depression of plus motor bar and skip motor bar.

For other motor bar interlock functions, refer to keyboard, Section VI of this manual.

PRINTING MECHANISM

PRINTING MECHANISM ACTUATED BY PRIMARY SECTION AND DASHPOT ASSEMBLY

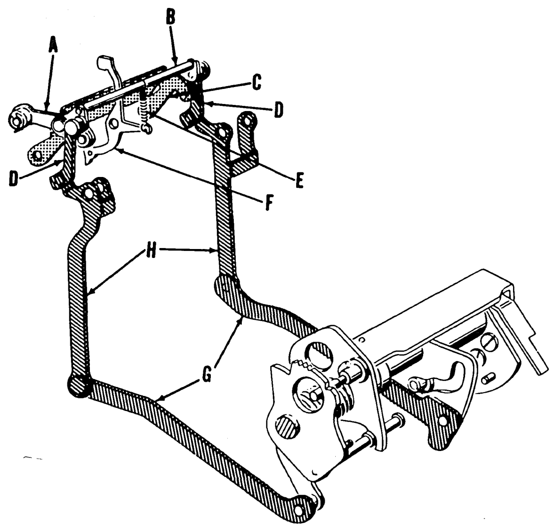


Figure VII-39

The hammers in the printing mechanism are in a forward position when the machine is resting at home position. As the machine operates, the primary section expands the hammer springs thus storing power to throw the hammers and indexed type bars for printing action when the hammers are released by action of the dashpot assembly.

Early in the machine operation, the primary section expands hammer springs E through links G, levers H, links D, arms A, and shaft B. Movement of arms A causes restoring bail C to be moved rearward away from hammer F. Hammer latch AB, Fig. VII-40 holds the hammer causing the hammer spring to be expanded.

HAMMERS RELEASED BY DASHPOT ASSEMBLY

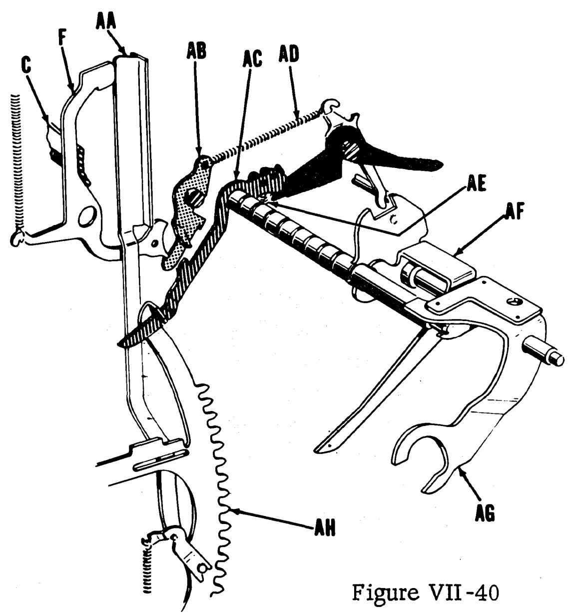


Figure VII-40

During the forward stroke of the machine operation, adding sector AH moves upward to position type bar AA for printing. The formed ear of the adding sector moving upward permits spring AE to position the projection of hammer latch actuating arm AC in front of the lower step of hammer latch AB. At the same time, the dashpot assembly moving upward causes hammer latch assembly AF to rock clockwise through forked arm AG. Arm AC moving rearward rocks hammer latch AB against the tension of spring AD. As hammer latch AB is rocked and releases hammer F; the hammer spring, which has been expanded, drives the hammer and indexed type bar rearward causing printing on the forms. Automatic printing of ciphers to the right is accomplished through the overlapping tails of hammer latches AB. Restoring bail C, moving forward during the return stroke of the machine operation restores the hammer to be latched by AB.

Permanent cipher splits are located in the printing mechanism to accommodate the calendar feature and character printing.

RIBBON CROSS FEEDS DURING THE RETURN STROKE OF THE MACHINE OPERATION AND IS AUTOMATICALLY REVERSED

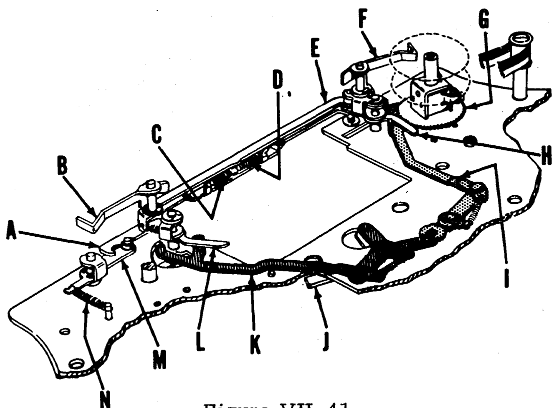


Figure VII-41

A uniform shade of printing and even wear of the ribbon is obtained by cross feeding the ribbon during each machine operation and automatically reversing the direction of cross feeding when all the ribbon has been unwound from either spool.

Cross feeding of the ribbon is accomplished during the return stroke of the machine operation. The hammer latch assembly rocking clockwise during the forward stroke of the machine operation, moves ribbon feed arms I and K rearward through bellcrank J. During the return stroke, as the hammer latch assembly rocks counterclockwise; feed arms I and K move forward. The forward formed ear of active feed arm I, moving forward and being engaged with ratchet gear G, rotates the ratchet gear to wind the ribbon on the left ribbon spool.

The position of link A held by detent M determines which feed arm is active. When detent M is in the left pocket of link A; link A positions arm H permitting engagement of feed arm I with ratchet gear G and arm L holds feed arm K out of engagement with the right ribbon ratchet gear. When detent M is in the right pocket of link A; link A positions arm H to hold feed arm I out of engagement with ratchet gear G, and locates arm L so feed arm K engages the right ribbon ratchet gear.

When all of the ribbon is unwound from either spool the direction of cross feeding of the ribbon is automatically reversed. Spring tension moves sensing finger B or F into the square opening of the respective ribbon spool just before the ribbon is completely unwound. Continued movement of the spool in the same direction moves link E to expand spring C or D. Springs C and D connect link E to link A. When the tension of spring C or D overcomes the tension of detent spring N, link A is moved in the same direction as link E. Change of position link A causes arms H and L to move in the opposite direction. Feed arm I being engaged with ratchet gear G may prevent link A from completely reversing the position of arms H and L during the return stroke of the machine operation. Therefore, during the forward stroke of the subsequent machine operation when feed arm I is moving rearward, spring C through link A completely reverses the position of arms H and L. Movement of arm H disengages feed arm I from ratchet gear G and movement of arm L permits engagement of feed arm K with the right ribbon ratchet gear. Thus, during subsequent machine operations, the direction of ribbon cross feeding is reversed. To insure that ribbon reverses; the ribbon should be attached to both spools in such a manner so the square opening in the spool is completely exposed when all of the ribbon is unwound from either spool.

Tests and Adjustments

1. To assure ribbon reverse when all of the ribbon is unwound from either spool -
   When sensing finger B or F is located in the square opening of the respective ribbon spool and the spool continues to move in an unwinding direction, the sensing finger should remain in the square opening as the ribbon spool pushes against the formed ear of the sensing finger.
   TO ADJUST, bend the formed ear of the sensing finger.
2. To assure one ribbon feed arm is inactive when the other ribbon feed arm is active -
   When detent M is located on the high point between the two pockets of link A, feed arms I and K should both be held clear of their respective ribbon ratchet gears.
   TO ADJUST, bend the rearmost formed ear on feed arm I or K.

RED RIBBON LIFT MECHANISM INDEXED FROM CARRIAGE CONTROL

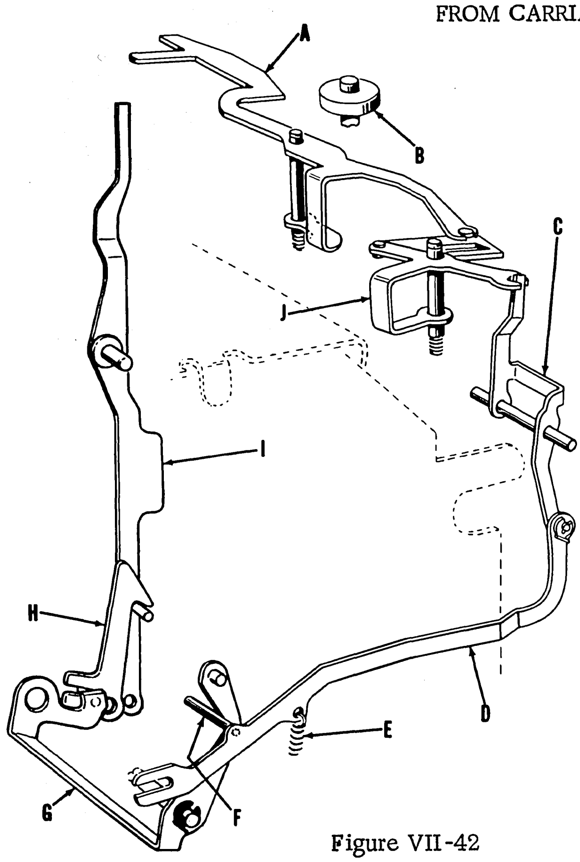


Figure VII-42

Information such as the date reference number, credits, and minus balances, is printed in red when the red ribbon lift mechanism lifts the ribbon to print through the lower portion of the ribbon. The red ribbon lift mechanism is indexed by a carriage control and is actuated by the dashpot hanger as explained in Section VI of this manual.

The red ribbon lift mechanism is indexed any time the hook on arm H is disengaged from stud on ribbon lift arm I.

When control roll B in lane 2 rocks control arm A, hook H is disengaged from the stud on ribbon lift arm I through bail J, bail C, link D, stud F, and bail G. Spring E restores the carriage controlled indexing mechanism by placing hook H over stud in I when the carriage tabulates off the stop.

FOUR POSITION PRINTING CONTROL MECHANISM INDEXES VARIOUS PRINTING COMBINATIONS

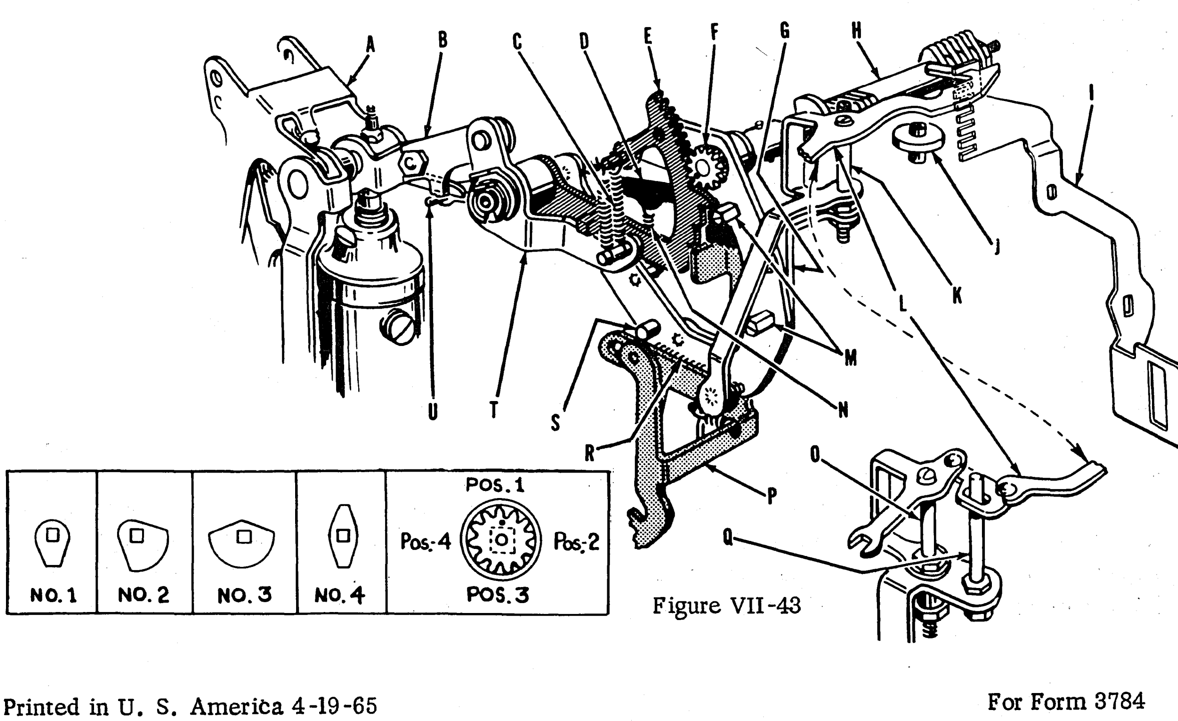


Figure VII-43

Four different printing combinations are obtained from the four position printing control mechanism which is indexed by a carriage control in lane 1 and actuated by the dashpot assembly. The different printing combinations are provided by cams that cause specified columns to non-print. The cams are active in one or more of the four positions of the printing control shaft. The No. 1 printing control cam is active in only one position of the printing control shaft, the No. 2 cam in two adjacent positions, the No. 3 cam in three positions, and the No. 4 cam in two opposite positions.

The four positions of the printing control shaft are indexed by different sized control rolls on the control bar. A No. 1 control roll having the greatest diameter is the largest of the rolls and indexes No. 4 position of the printing control shaft; a No. 2 roll having a lesser diameter indexes No. 3 position ; a No. 3 roll having the least diameter indexes No. 2 position; and no roll permits the printing control shaft to remain in No. 1 position. The No. 1 position of the printing control shaft is indicated by the mark on gear F of the printing control shaft and should line with the lowest tooth of rack E.

PRINTING CONTROL MECHANISM INDEXED BY CARRIAGE CONTROL IN LANE 1

Indexing of the printing control mechanism occurs when control roll J in lane 1, through control arm L and spring R, causes bail P to move rearward. At the beginning of the machine operation, dashpot assembly A moves upward causing the projection of arm B to move away from stud U. This permits spring N to rock lever D which, through the notched teeth on its rearward arm, contacts the formed ear of bail P to hold the bail in an indexed position.

DASHPOT ASSEMBLY ACTUATES PRINTING CONTROL SHAFT

As the machine operation continues and dashpot assembly A continues moving upward, arm B lowers geared segment E through lever T and spring C. Segment E moving downward rotates printing control shaft H, through gear F, to the printing position determined by the size of the control roll used. If no roll, a No. 3 roll or a No. 2 roll is used, downward movement of segment E is limited by the formed ear of bail P; if a No. 1 control roll is used, segment E limits on stud S.

HAMMER LATCH RETAINS HAMMER TO CAUSE NON-PRINTING

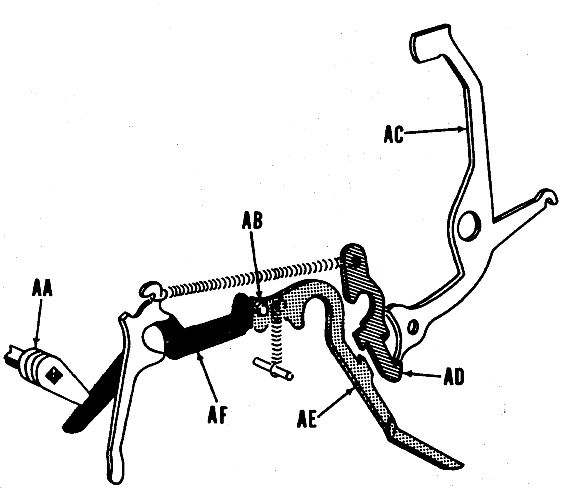


Figure VII-44

Positioning of the printing control shaft causes cam AA to rock control lever AF. The forward projection of lever AF moving upward under stud AB holds the step of actuating arm AE away from the step of hammer latch AD when the printing mechanism is actuated. Thus, hammer latch AD holds hammer AC to prevent printing in a specified column. Because of the overlapping tails on hammer latches AD, the printing control mechanism will non-print a column only if nothing is indexed to the left of the column or if a cipher split is active to the left of the column.

Tests and Adjustments

1. To assure full contact between the control arm in each lane of control and the respective control roll -

When the carriage is moved back and forth past the stop position in which the most control rolls are located, control arms L, Fig. VII-43 in the various lanes of control should align centrally with their respective control rolls.
TO ADJUST, loosen control arm guide I, Fig. VII-43. Raise or lower posts K and O, Fig. VII-43. Realign guide I, Fig. VII-43 and tighten.

2. To provide starting point for adjustments 3 and 4 -
When the stop and control bar assembly is removed from the machine and the machine is at home position; the link actuated by control arm L, Fig. VII-43 should be limited by post Q, Fig. VII-43.
TO ADJUST, weave bail P, Fig. VII-43 to provide slight clearance between the formed ear of bail P, Fig. VII-43 and the bottom step of segment E, Fig. VII-43.

3. To assure sufficient movement of the control arms to index the various carriage controlled machine functions -
When the carriage is moved back and forth past the stop position in which the least number of control rolls are located, the control arms in the lanes of control which do not have a control roll active should just contact the collars on the control roll hanger.
TO ADJUST, move lower control bar in the stop and control bar assembly forward or rearward.

4. To assure turning the printing control shaft to the position which corresponds to the size of the control roll active in lane 1 -
When the machine is operated with a control roll active in lane 1, lever D, Fig. VII-43 should contact the formed ear of bail P, Fig. VII-43 without moving the bail.
TO ADJUST, weave bail P, Fig. VII-43.

CIPHER SPLITS INDEXED FROM FOUR POSITION PRINTING CONTROL SHAFT

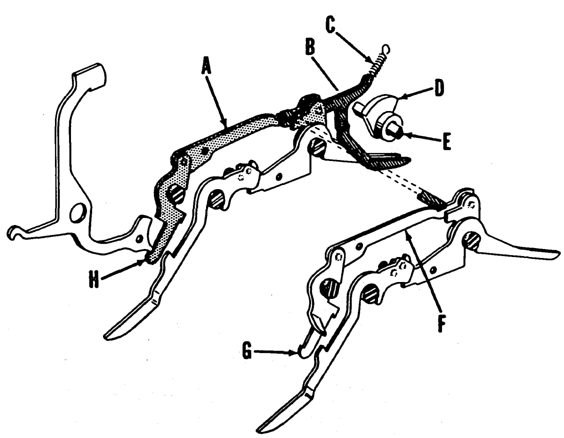


Figure VII-45

Various printing combinations are obtained with cipher splits which are indexed in conjunction with the four position printing control. A coupler latch is used in place of an overlapping tail to connect the adjacent column on the left to the column on the right of the split position.

A cam on the four position printing control shaft raises the coupler latch to separate the two columns and thus prevent printing ciphers to the right on an amount.

The cipher split is set up to separate two columns when printing control shaft E is rotated. Turning of the four position printing control shaft causes cam D to rock coupler latch B raising the formed ear of latch B above the step of link F. This permits hammer latch G to retain the hammer on the right of the split position when hammer latch H and link A are actuated on the left side of the split position. Thus, ciphers are prevented from printing to the right of an amount. The cipher split is inactive and ciphers will print to the right of an amount when cam D is moved away from coupler latch B. Spring C holds the formed ear of latch B behind the step of link F. This permits hammer latch H to actuate hammer latch G through link A, latch B, and link F.

CLOSED ACCOUNT MECHANISM PRINTS A SYMBOL AND TWO CIPHERS

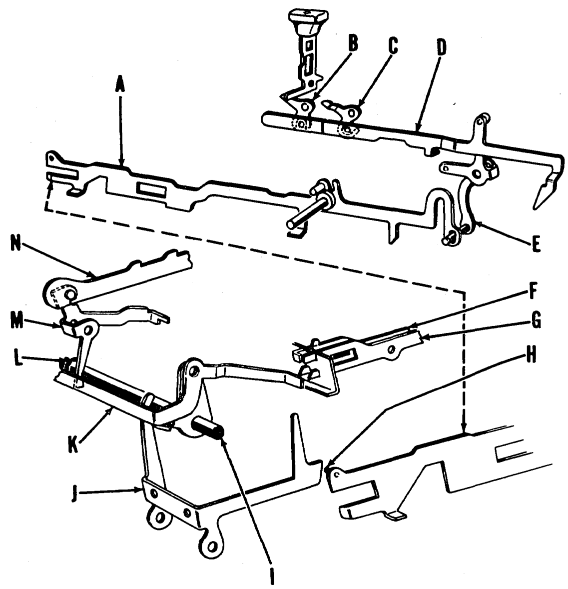


Figure VII-46

To indicate that an account is closed or that the register is clear, two ciphers and a symbol are printed when a total or subtotal key is depressed. Associated with this feature is the printing of a cipher in column 2 when an amount is listed in column 1. Ciphers and symbols are prevented from printing during a machine operation in which no figures are indexed on the keyboard.

Printing of symbols in Columns "O" and "OO" during clear total operations occurs when depression of a result key, through bellcrank B or C, slide D, lever E, total interlock slide A, and stud H, rocks bail J. The upper arm of bail J holds the formed ear on the right arm of bail K below index bars F and G.

Symbols may be printed in columns "O" and "OO" during a non-add or a subtract motor bar operation in which an amount has been indexed on the keyboard. Depression of an amount key moves the lower arm of cipher stop M against bail K through index strip N to hold the formed ear of bail K below index bars F and G when key restoring rack I moves rearward. To permit date and character columns print without printing the symbol or ciphers the lower arm of cipher stop M is shortened to ride over bail K.

Symbols in columns "O" and "OO" are prevented from printing during a motor bar operation when no keys are indexed on the keyboard. The key restoring rack, moving rearward, swings the formed ear of bail K into the path of index bars F and G through spring L. Index bars F and G are also blocked as described in "Printing," Section VI of this manual.

TWO CIPHERS PRINT WITH SYMBOL

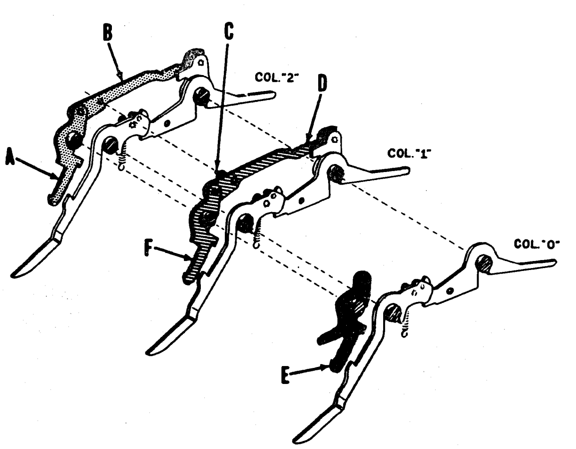


Figure VII-47

Symbol printing occurs when hammer latch E, in column "O", releases the hammer in the symbol column. Hammer latch E has a reverse overlapping tail and when moved downward actuates hammer latch F to cause the printing of a cipher in column 1. The printing of a cipher in column 2 occurs when the hammer latch in column 1 actuates hammer latch A through link D, stud C, and link B. Stud C also provides the connection between columns 1 and 2 which causes the printing of a cipher in column 2 when an amount is printed in column 1.

Tests and Adjustments

1. To assure non-printing of the symbol columns during a motor bar operation when no keys are indexed on the keyboard -
When the machine is operated during a motor bar operation to mesh the sector aligning shaft with the sectors and no keys are indexed on the keyboard, the formed ear on the right arm of bail K, Fig. VII-46 should have rubbing contact on the forward ends of index bars F and G, Fig. VII-46 in columns "O" and "OO" respectively.
TO ADJUST, bend the formed ear on the right arm of bail K, Fig. VII-46.
2. To assure printing of the symbol columns when the machine is operated during a non-add or a subtract motor bar operation with an amount on the keyboard -
When the machine operation is stopped at the first notch of the full stroke segment with an amount indexed on the keyboard, there should be approximately .015" clearance between the formed ear of bail K, Fig. VII-46 and the underside of index bars F and G, Fig. VII-46 in columns "O" and "OO".
TO ADJUST, bend the right arm of bail K, Fig. VII-46 for more or less clearance. After making this adjustment, check adjustment No. 1.
3. To assure printing of the symbol columns when a result key is depressed -
When a result key is depressed and the machine is operated index bars F and G, Fig. VII-46 in columns "O" and "OO" should move forward over the formed ear on the right arm of bail K, Fig. VII-46 with approximately 1/32" clearance.
TO ADJUST, weave bail J, Fig. VII-46 to give more or less movement to bail K, Fig. VII-46.

PRINTING IN COLUMN 13 WITH TYPE BAR IN CIPHER POSITION

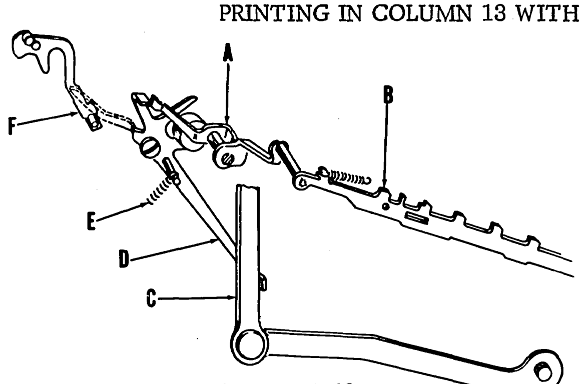


Figure VII-48

Twelve months indexed in column 13 of the keyboard for Series P600 machines are printed from a twelve pitch type bar. Therefore, one of the months is printed when the type bar is in cipher position. When the type bar is in cipher position indexing of a month key moves the keyboard index strip rearward to permit release of the hammer and cause printing. Also, hammer latch actuating arm F is cut off to clear the formed ear of the adding sector. Depression of a month key in column 13 lowers the rearward arm of bail A, through index strip B to clear the upper formed ear on lever D. As the machine operates; lever C moves rearward, permitting spring E to rock lever D. As the arm of lever D moves away from the stud on arm F; arm F moves upward to release the hammer latch and permit printing.

Printing in column 13 is prevented when the machine is operated without a key depressed in column 13. The rearward arm of bail A prevents lever D from moving as the machine operates. Thus, the rearward arm of lever D retains the hammer latch actuating arm below the hammer latch to prevent printing.

Tests and Adjustments

1. To assure blocking the printing of column 13 with no keys indexed -
   a. With machine normal, lip of lever D should clear index bail A with minimum clearance. TO ADJUST, bend index bail A forward or rearward as required.
   b. Handle rocked forward, index bail A should have at least 3/4 hold on lip of lever D. TO ADJUST, bend index bail A up and down as required.
2. To assure printing column 13 when a key is indexed -
   a. With any key indexed column 13, advance the handle, lip of lever D should clear over bail A and the stud in hammer latch actuating arm F should clear rear finger of lever D. TO ADJUST, bend blocking arm of bail A down and bend rear finger of lever D up. Recheck Test #1.

ACCUMULATION

The accumulator section of the Series P600 machine is of the same basic construction as described under Series P400 machine Section VI.

Ledger posting requires use of register "A" as a crossfooter and register "B" as a grand total accumulating register. When a posting operation also requires a "Line Proof" of each posting to an account, a means of transferring the posted item to the accumulator register is needed as an adjunct of the printing operation.

REGISTER SELECTOR LEVER - "A" AND "B" POSITIONS

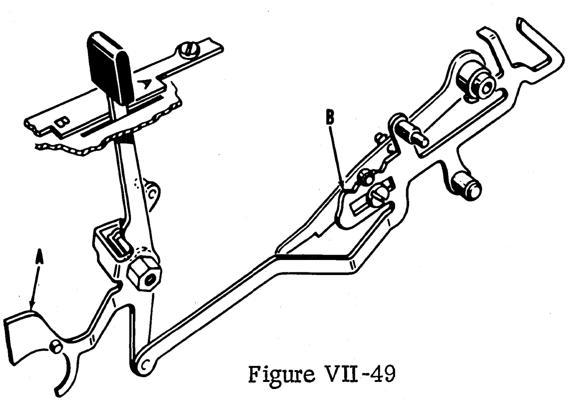


Figure VII-49

Machines containing the register "A" to register "B" transfer mechanism do not have an "AB" position for the register selector lever. Simultaneous addition in both registers is accomplished through lane 5 control that will be explained in the subject "Simultaneous Addition".

The functions of register "A" meshing controls remain unchanged as described under Figures VI-22 and VI-33 inasmuch as the normal functions of adding, subtracting, non-adding, totaling, and subtotaling are all required in the course of crossfooter performance. Non-add of register "A" indexed by carriage control will be explained later in this section of the book.

Operation of the machine in the former "AB" position is prevented by providing only two pockets (one for "A" position and one for "B" position) in portion B of register selector lever A. Unless the register selector lever is fully located in either "A" or "B" position, a safeguard partial machine operation (handle break operation) will occur due to the foremost portion of lever A blocking the rearward travel of the key restoring shaft.

With register selector lever A located in register "A" position, added items are not identified with a symbol except when the tabulation control lever is in the forward position for listing purposes. However, totals and subtotals are identified by printing "A" to the right of the functional symbol.

REGISTER "B" ACCUMULATION

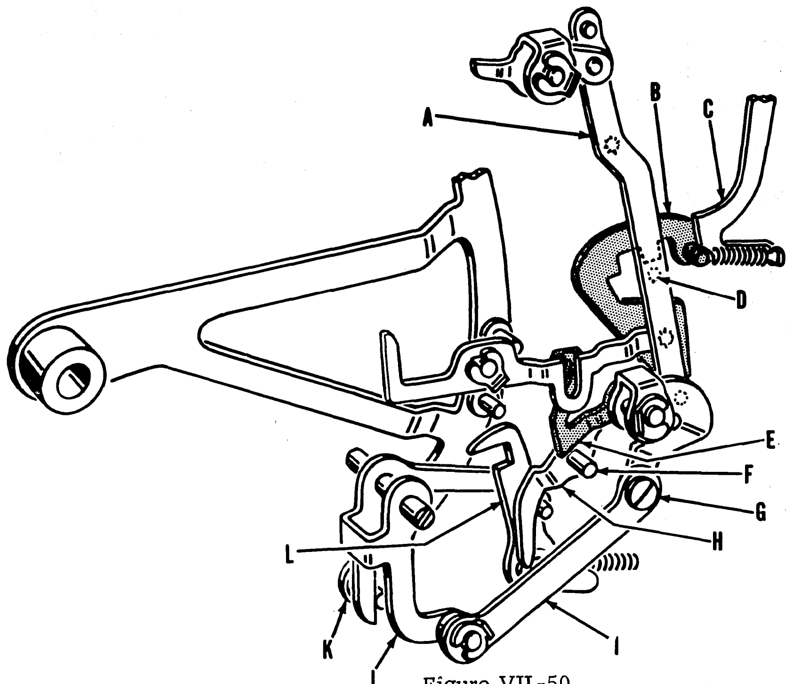


Figure VII-50

When the tabulating control lever is rearward, listing indexed amounts in register "B" is prevented. When the lever is forward, listing in either register "A" or "B" is permitted. Totals and subtotals are permitted from either registers when the lever is forward or rearward.

During ledger posting operations (tabulation control lever at rearward position) register "B" is non-added unless a register "A" total is taken with a No. 1 control roll active in control lane 5.

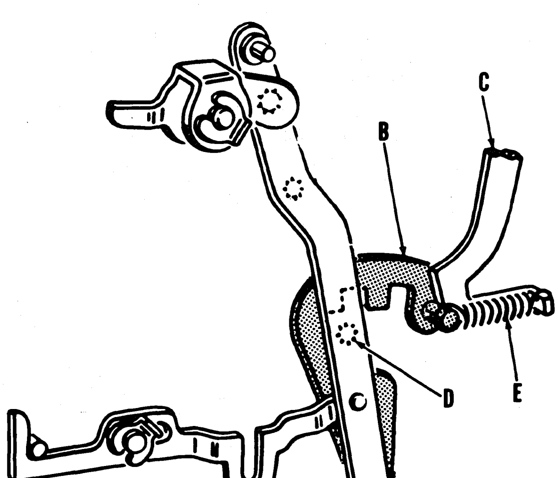


Figure VII-51

When control lever C is in normal position (no roll active in lane 5), selector B is positioned with its rearward step over stud D in driving link A. Near the end of the forward stroke of the machine operation; segment K, through bellcrank J and link I raises driving link A and selector B. Lever E (part of selector B) is thereby rocked, lowering arm H through contact with stud F to inactivate register "B" listing pawl L. Thus register "B" remains out of mesh with the adding sectors during the machine operation.

With a No. 1 roll active in lane 5, the right end of control lever C is moved rearward and selector B follows under tension of spring E to position the forward step of the selector over stud D as illustrated.

During a machine operation with the forward step of the selector over stud D, the same amount of movement is imparted to selector B as when there is no roll active. Therefore, an indexed amount will be non-added in register "B" during any machine operation with the register selector lever in register "A" position and with a No. 1 roll in active position, except during a register "A" total operation.

TRANSFER OF REGISTER "A" TOTALS TO REGISTER "B" - CARRIAGE CONTROLLED

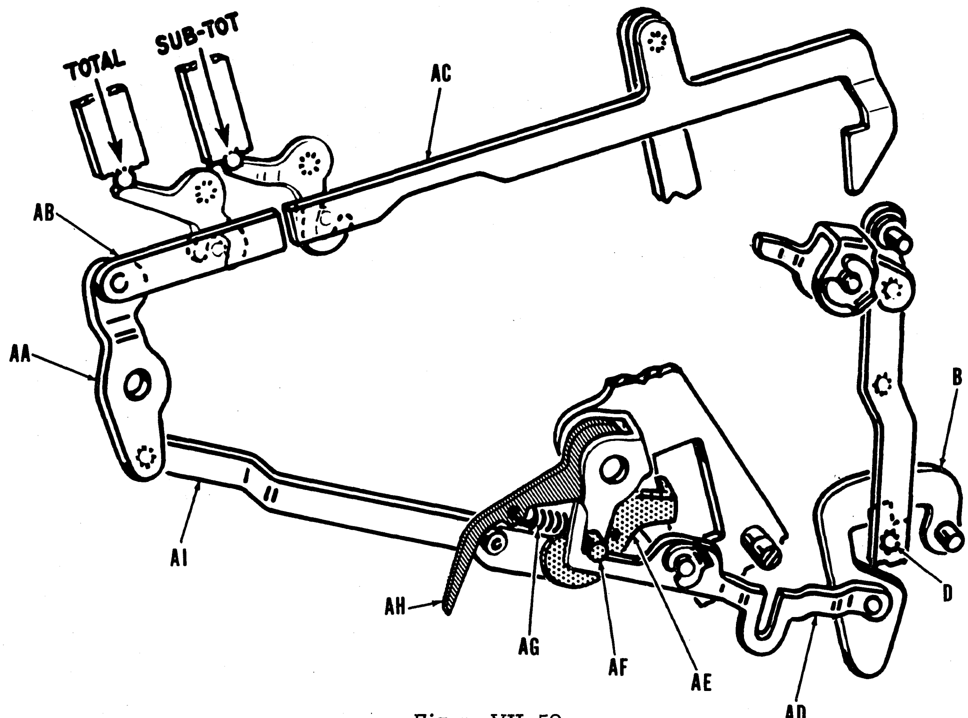


Figure VII-52

With a No. 1 roll active in lane 5, depression of the total key moves slide AB rearward and lever AA, moves link AI forward. Depression of the total key also moves slide AC rearward to provide symbol control which is covered under Fig. VII-56.

Forward movement of link AI moves link AD forward through bellcrank AE and stud AF. This action positions the forward pocket of selector B over stud D preventing upward movement of selector B as stud D moves upward during the forward stroke of the machine operation. When selector B remains in its normal (lowered) position; register "B" listing pawl L, Fig. VII-50 remains indexed in an active position thus engaging the register "B" adding pinions with the adding sectors at the beginning of the return stroke of the register "A" total operations. Thus, any amount totaled from register "A" during the forward stroke of a register "A" total operation with a No. 1 roll active in lane 5 will be added into register "B" during the return stroke.

Fixed alignment of the forward pocket of selector B with stud D when the total key is depressed is assured by a lip on bellcrank AE limiting in an opening in the control panel plate. Arm AH and spring AG provide a yielding connection so that the total key will latch when depressed without causing a bind in the mechanism.

Depression of the subtotal key moves slide AC but does not move slide AB thus the mechanism indexed through slide AB is not activated and register "B" is non-added during a register "A" subtotal operation.

REGISTER "B" LISTED ITEMS

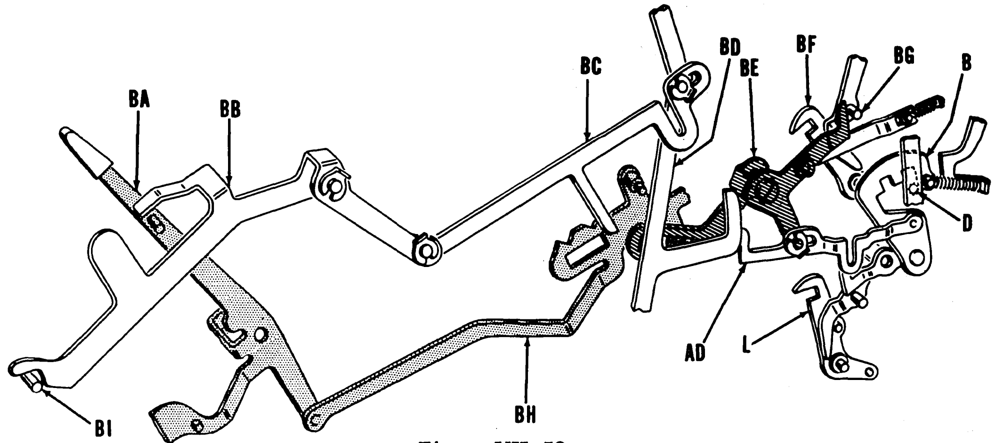


Figure VII-53

It is desirable at times to use register "A" for vertical listing and totaling of amount either separately or alternately with register "B". To vertical list in register "B", the tabulation control lever is moved forward to non-tabulate position and register selector lever BA is moved to register "B" position.

Moving the tabulation control lever forward raises detent BB above shaft BI through lever BD and link BC thus permitting machine operation with the register selector lever in "B" position.

Forward movement of register selector lever BA raises register "A" listing pawl BF through lever BE and stud BG, also, moves selector B forward to position its rearward pocket over stud D through arm BH and link AD.

During the machine operation with selector B so positioned, register "B" listing pawl remains in active position to mesh register "B" adding pinions with the adding sectors during the return stroke. Register "A" remains inactive during this operation due to listing pawl BF being in a raised position.

REGISTER "B" TOTALING

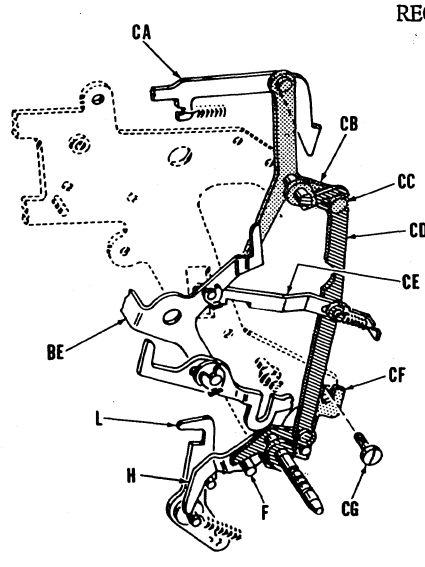


Figure VII-54

The functions during the forward stroke of a machine operation with the register selector lever in "B" position and the total key depressed are the same as those described in "Accumulation", Sec. VI of this manual.

As previously outlined; when the register selector lever is moved to register "B" position, lever BE is rocked. Rocking of lever BE moves link CE and arm CD rearward to position the forward pocket of the "L" shaped slot in arm CD over stud CC of lever CB. Depression of the total key moves slide CA forward rocking lever CB. Rocking of lever CB raises register "B" listing pawl L through stud CC, link CD, finger H, and stud F to prevent re-engagement of register "B" adding pinions with the adding sectors during the return stroke.

SIMULTANEOUS ADDITION

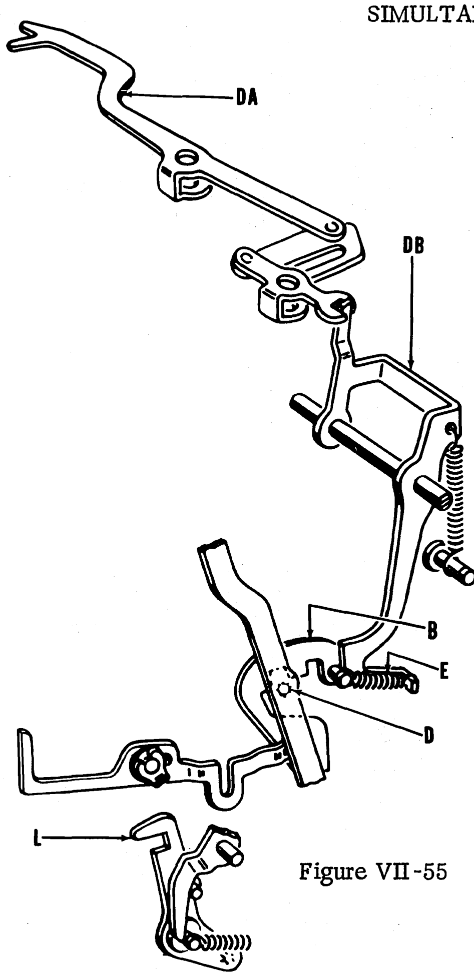


Figure VII-55

When ledger posting is performed and the line proof method of proving the posting is not used, simultaneous addition of the posted item into both registers may be provided. Addition into register "A" is covered in "Accumulation Section VI of this manual". Addition into register "B" is provided by installing a No. 2 1/2 roll in lane 5 in the carriage position in which simultaneous adding is desired.

As the No. 2 1/2 roll in lane 5 actuates control lever DA, the lower end of lever DB is moved rearward and through spring E moves selector B rearward in the same manner as when a No. 1 roll is in active position. However, the No. 2 1/2 roll being smaller than the No. 1 roll; the movement of the lever is only enough to position the forward pocket of selector B over stud D in the driver arm. During the machine operation, stud D enters the forward pocket of selector B permitting register "B" listing pawl L to remain active. Thus, both registers are meshed with the adding sectors during the return stroke.

REGISTER IDENTIFICATION - BALANCE TRANSFER OPERATION

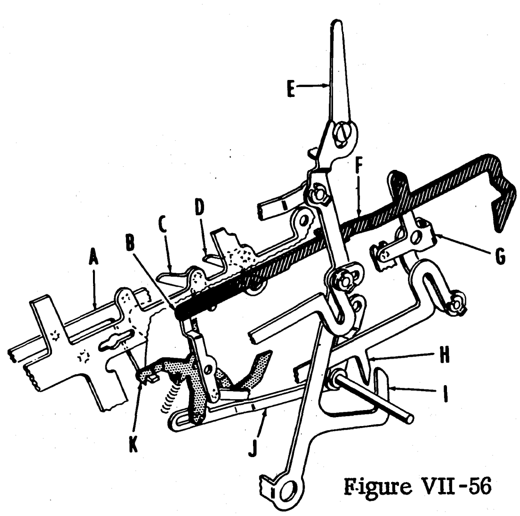


Figure VII-56

During ledger posting when amounts are accumulated in register "A", except when transferring register "A" totals to register "B"; need for a register identification is not required.

When tabulation control lever E is in a rearward (tabulating) position, the rearward hook portion of lever I is also rearward and is clear of the stud in link J permitting hook K to hold index bar A (in column "OO") at home position. Thus the register designating symbol is not printed during accumulating operations.

Depression of the total key through bellcrank C and slide B, or depression of the subtotal key through bellcrank D, moves slide F rearward rocking lever G and moving slide H forward. When slide H is moved forward the lower projection of the slide contacts the stud in link J to raise hook K out of the path of index bar A so the register designating symbol will be printed during result key operation.

Movement of tabulating control lever E forward to vertical list position moves lever I forward to raise latch K through link J. With latch K raised, normal register designation is permitted to print during both listing and totaling operations.

SELECTOR POSITION CHART

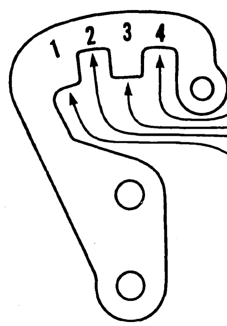


Figure VII-57

REGISTER SELECTOR LEVER POSITION	FUNCTION	CONTROL ROLL USED	SELECTOR POSITION	RESULT OBTAINED
A	Listing	none	3	Non-add Reg. "B"
A	Reg. "A" Total	none	3	Non-add Reg. "B"
A	Listing	2 1/2	2	Adds Reg. "B"
A	Reg. "A" Total	2 1/2	2	Adds Reg. "B"
A	Listing	1	1	Non-add Reg. "B"
A	Reg. "A" Total	1	2	Adds Reg. "B"
B	Listing	2 1/2, 1, or none	4	Adds Reg. "B"
B	Reg. "B" Total	2 1/2, 1, or none	4	Totals Reg. "B"

NON-ADD OF REGISTER "A" INDEXED BY
CARRIAGE CONTROL - LANE 3

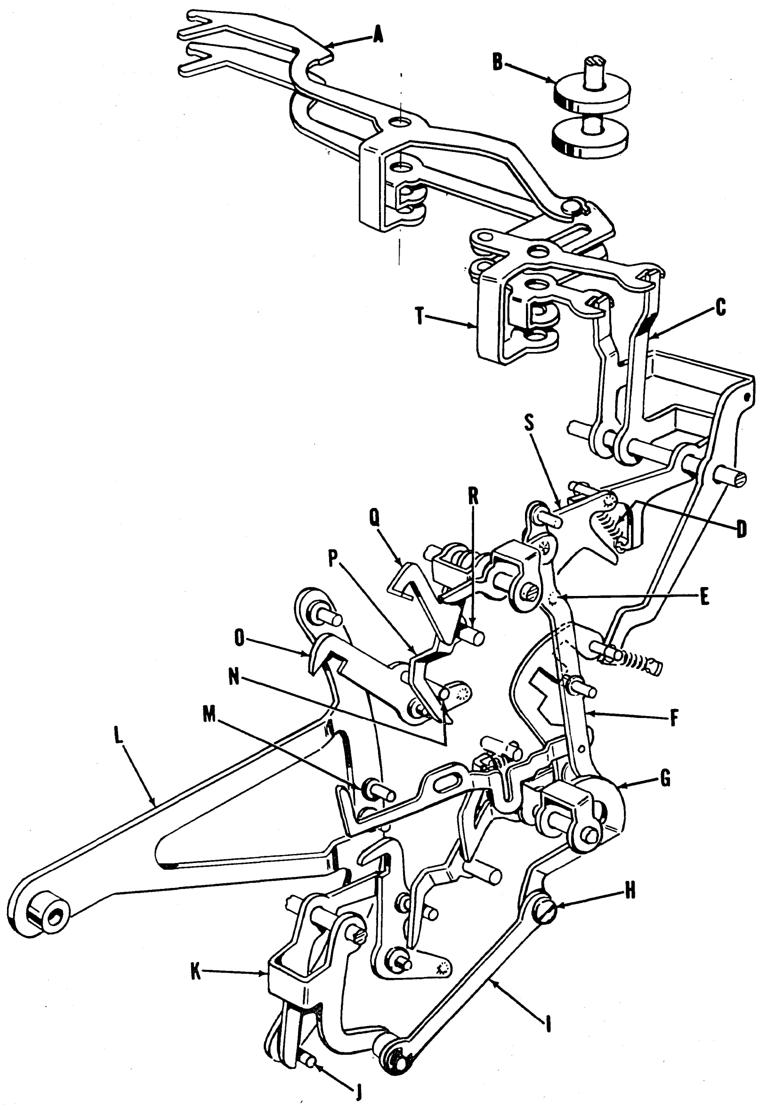


Figure VII-58

Register "A" listing pawl O is made inactive when a carriage control is used in lane 3 for indexing the non-add mechanism and the register selector lever is in "A" position. The non-add mechanism is only partially indexed when the carriage is positioned to make a control active in lane 3 and is then fully indexed through segment L as the machine operates.

Partial indexing of register "A" non-add mechanism occurs when roll B (in lane 3) through control arm A, bail T, bail C, and spring D positions the step of pawl S over the upper stud E in link F.

Complete indexing of the non-add mechanism occurs near the end of the forward stroke of the machine operation as segment L moves upward. Upward movement of segment L raises link F through stud J, upper arm of bail K, link I, and arm G. When the step of pawl S is positioned over stud E in link F (and link F is moved upward); register "A" listing pawl O is raised out of the path of stud M through pawl S, arm Q, stud R, finger P, and stud N thus non-adding register "A".

Lead for pawl S over the upper stud E of link F is provided by stud J restoring and holding bail K near the end of the return stroke of the machine operation.

When a subtotal operation of register "A" is indexed and a carriage control is active in lane 3, the register will be totaled since the register "A" listing pawl is made inactive during a carriage controlled non-add operation. Printing of the subtotal symbol will not be affected during this operation.

SUBTRACTION, REGISTERS "A" AND "B" - INDEXED FROM CARRIAGE CONTROL - LANE 4

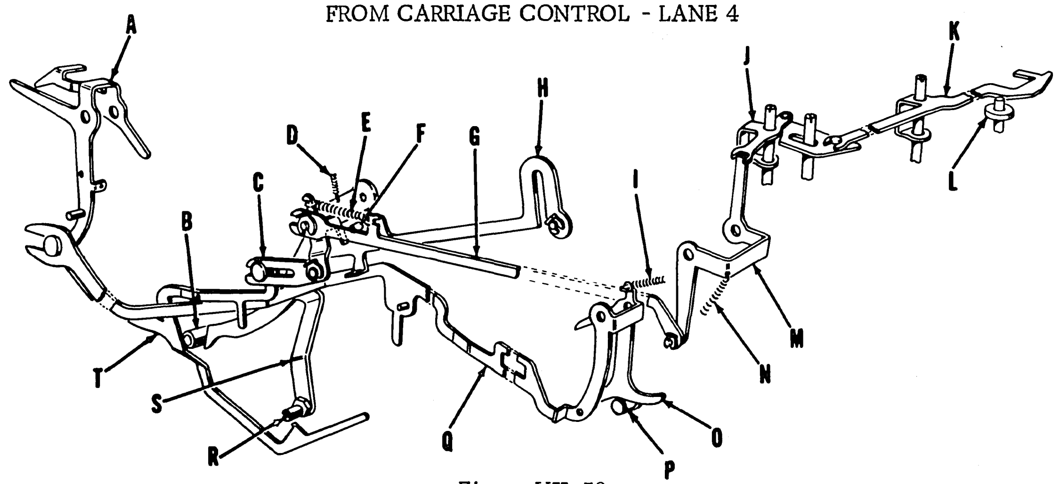


Figure VII-59

A carriage control roll in lane 4 is used to index a subtract operation in registers "A" and/or "B" (register "B" being made active by the installation of a No. 2 roll in lane 5) when the plus or vertical space motor bar is used to operate the machine. The carriage control in lane 4 causes the subtract linkage (which is normally actuated from the depression of the minus motor bar) to be actuated by the secondary mechanism during the machine operation from the depression of these two motor bars.

Indexing of the carriage controlled subtract mechanism occurs when the carriage is positioned with a control roll active in lane 4. Control roll L, through control arm K, bail J, bail M, link G, spring E, and bellcrank C, positions the step on the lower arm of lever T into the path of stud R.

At the beginning of the forward stroke of the machine operation; roll B (of the secondary mechanism) moves rearward and rocks arm S and stud R and lever T rocks subtract bellcrank A thus indexing the subtract mechanism through arm Q and bail O.

Near the end of the return stroke of the machine operation, stud B clears cam surface of arm S, spring D restores arm S, and spring I restores bail O and arm Q. Spring N restores the carriage controlled subtract indexing mechanism after the control roll has moved from the control arm.

Spring E provides a yielding connection between link G and bellcrank C thus permitting the carriage controlled subtract indexing mechanism to be disabled from depression of the total or subtotal key. Depression of the total or subtotal key moves slide H forward causing stud F to contact the formed ear of bellcrank C and move the step on the lower arm of lever T out of the path of stud R.

SUBTRACTION, CARRIAGE CONTROLLED, NORMALIZED BY KEY IN POSITION 4-0

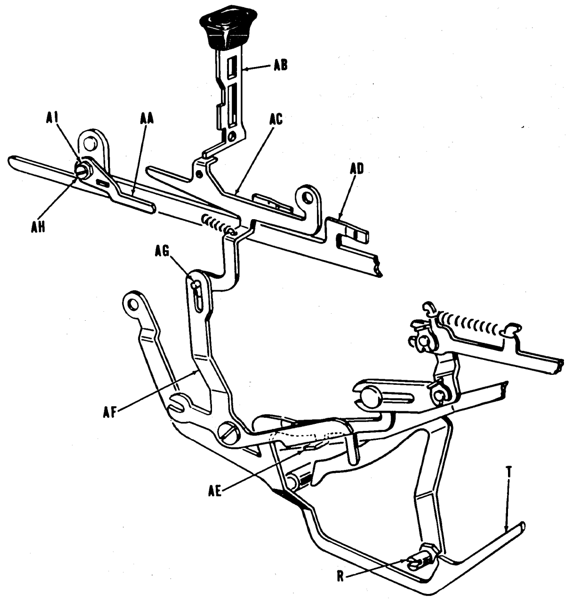


Figure VII-60

Key AB, commonly known as the reverse entry key, disables the carriage controlled subtraction of the second old balance pickup when the amount in the balance column of the statement or ledger is shown as a credit amount.

Depression of key AB disables indexing of the subtract mechanism and trips the drive clutch. Disabling of the subtract mechanism is indexed through arm AC, stud AG, bellcrank AF, and lip AE which combine to lower the hook portion of lever T out of the path of stud R. The drive is tripped through arm AC and finger AA lowering intermediate motor bar AD.

Tests and Adjustments

NOTE: The following tests and adjustments should be made in the sequence outlined to avoid any readjusting.

1. To assure positive adding and non-adding operations in register "B" -
With no roll active in lane 5 and the handle forward to the last notch in the full stroke segment, there should be 1/32" passing clearance between listing pawl L, Fig. VII-50 and the lower stud in segment K, Fig. VII-50.
TO ADJUST, turn eccentric G, Fig. VII-50.
2. To assure disabling listing pawl L, Fig. VII-54 during register "B" totals -
   a. Link CD and lever CB, Fig. VII-54 should align with each other to provide free parallel action of the link on stud CC, Fig. VII-54.
   b. With the machine in home position, stud CC, Fig. VII-54 should align centrally with the forward pocket in link CD, Fig. VII-54.

   TO ADJUST:
   a. Bend the link or the lever.
   b. Loosen screw CG, Fig. VII-54 and adjust blank CF, Fig. VII-54 to provide the correct limit of link assembly CD, Fig. VII-54.
3. To assure non-adding register "B", no control roll active in lane 5 -
With the register selector lever in register "A" position and no control roll in active position, the rearward step of selector B, Fig. VII-50 should be centrally aligned over stud D, Fig. VII-50. When aligned, there should be approximately 3/16" clearance between link A, Fig. VII-50 and the spring stud in selector B.
TO ADJUST, weave the bail portion of control lever C, Fig. VII-50.
4. To assure non-adding register "B" when a No. 1 roll is active in lane 5 and a total key is not depressed -
With the register selector lever in "A" position and a No. 1 roll active in lane 5, the forward step of selector B, Fig. VII-51 should have at least a flush hold over stud D, Fig. VII-51.
TO ADJUST, reposition the adjustable stop and control bar to provide more or less throw to control lever DA, Fig. VII-55.
5. To assure accumulation in register "B" when the register selector lever is in "B" position -
Selector B, Fig. VII-53 should be positioned so that its rearward pocket is centrally aligned over stud D, Fig. VII-53.
TO ADJUST, open or close the "U" form in link AD, Fig. VII-53.
6. To assure accumulation in register "B" during register "A" totals with a No. 1 roll active in lane 5 -
With the register selector lever in "A" position and a No. 1 roll active in lane 5, depression of the total key should provide the following:

a. Cause the formed lip of bellcrank AE, Fig. VII-52 to limit in the opening of the control panel with slight or no expansion of spring AG, Fig. VII-52.
b. Position the forward pocket in selector B, Fig. VII-52 centrally over stud D, Fig. VII-52.

TO ADJUST, bend the upright projection on the forward portion of link AD, Fig. VII-52.

7. To assure printing register designating symbols when the tabulating control lever is in forward (vertical listing) position -
The hook portion of lever I, Fig. VII-56 should (through link J, Fig. VII-56) raise hook K, Fig. VII-56 for providing 1/32" passing clearance of the lip on index bar A, Fig. VII-56.
TO ADJUST, bend the hook portion of lever I, Fig. VII-56.
8. To assure printing register designating symbols when the tabulating control lever is in rearward (ledger posting) position and the total or subtotal key is latched down -
The projection of link H, Fig. VII-56 should raise hook K, Fig. VII-56 providing 1/32" passing clearance of the lip on index bar A, Fig. VII-56.
TO ADJUST, open or close the "U" form of link H, Fig. VII-56.
9. To assure indexing a non-add operation for register "A" -
When the machine is operated with a No. 1 control roll active in lane 3; stud M, Fig. VII-58 should have approximately 1/32" clearance with register "A" listing pawl O, Fig. VII-58.
TO ADJUST, turn eccentric screw H, Fig. VII-58 for more or less clearance.
10. To assure complete indexing of a subtract operation by a control roll in lane 4 and the machine operation -
    a. When control roll L, Fig. VII-59 moves control arm K forward; the step on the lower arm of lever T, Fig. VII-59 should move up behind stud R, Fig. VII-59 with approximately 1/32" clearance.
    b. When a control roll is active in lane 4 and the machine is operated; camming-bail O Fig. VII-59 should be moved rearward to position the high portion of the cam surface over the center of roll P, Fig. VII-59.

    TO ADJUST, turn eccentric stud R, Fig. VII-59 to obtain condition A and B.
11. To assure tripping the drive clutch from the depression of OCK 4-0 -
The drive clutch should be tripped from the slow depression of key AB, Fig. VII-60 after the key has been latched depressed.
TO ADJUST, loosen screw AH, Fig. VII-60 and turn eccentric AI, Fig. VII-60 to reposition finger AA, Fig. VII-60.

AUTOMATIC TOTAL MECHANISM

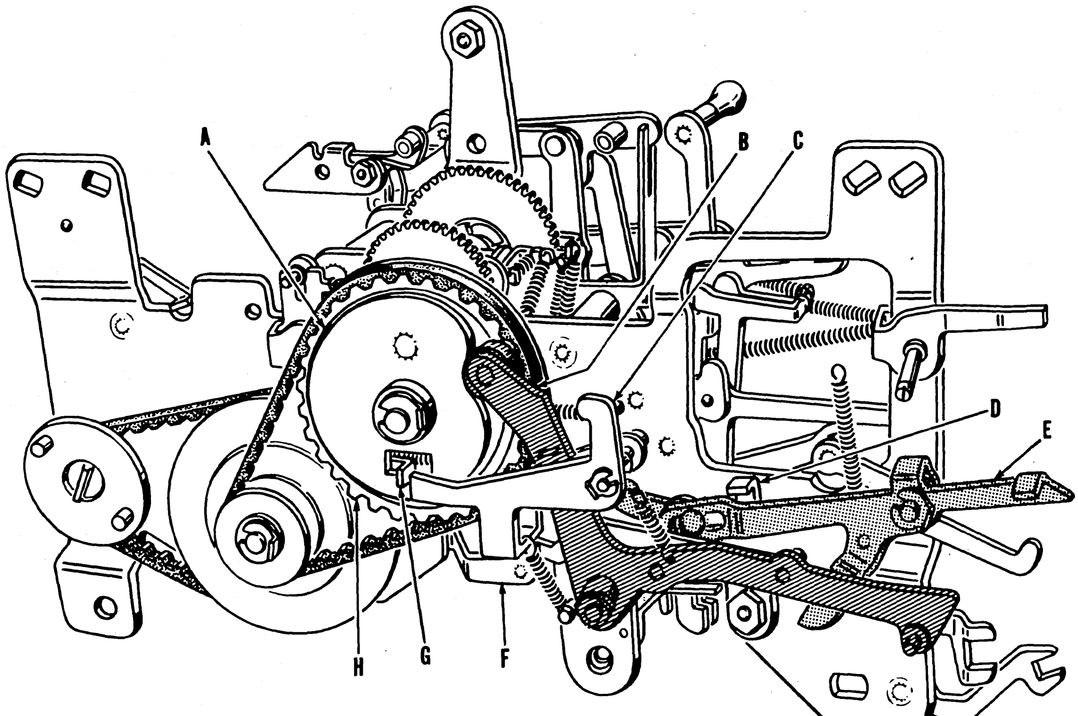


Figure VII-61

When posting on ledgers or statements, operations such as totals and subtotals are often performed one or more times during each posting cycle and can be entirely controlled by machine operations. These repetitious operations usually are performed automatically by the machine thus permitting the operator to accomplish other selective work while the machine operations are taking place.

For the purpose of simplicity, all actions that are common to both total and subtotal functions will be referred to as totals, except where specifically stated otherwise.

Automatic totals and subtotals are comprised of two separate functions:

1. The total indexing mechanism depresses the selected result key to a latched down position.
2. Latching down of the result key indexes the regular totaling operation in the same manner as when the key is manually depressed.

Power for driving the automatic total indexing mechanism is provided through a power take off from the mechanism covered in "Motor Power Returns Carriage", Fig. VII-27.

The power take off is provided by adding clutch teeth to gear H for driving cam A through clutch pawl G.

Indexing the power source for automatic totals is attained through lever E raising a tripping slide into the path of the formed lip on lever D. Lever D is driven by the carriage when it actuates the air pot assembly by a tabulator stop contacting the tabulating bail assembly D, Fig. VII-24.

Lever B, which is driven by cam A, has the following functions in the course of the total indexing operations.

1. Actuates the result key depression mechanism.
2. Resets clutch pawl limit bail C.
3. Controls the motor switch, through

clutch pawl C and arm F.

4. Restores lever E to normal.

Coverage of these functions is incorporated in the following detailed outline of the automatic totaling mechanism.

POWER INDEXING

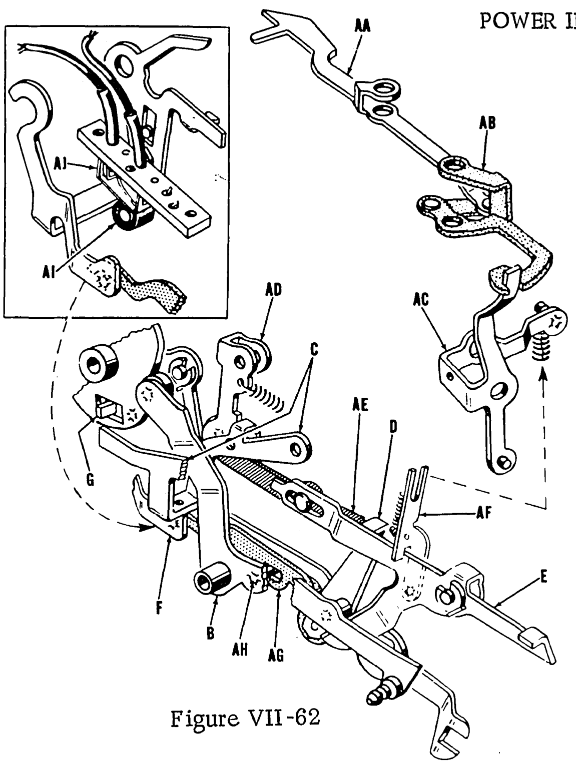


Figure VII-62

Tabulation of the carriage into a stop position which contains a control roll in lane 6 actuates control lever AA, bail AB and lever AC. Rocking of lever AC raises tripping slide AE in the path of the formed lip on bellcrank D through link AF and lever E.

Bellcrank D (coupled to the air pot mechanism) is rocked to the left as the carriage settles against the tabulating bail assembly. When tripping slide AE is raised, bellcrank D drives latch AD from under the formed lip of clutch pawl limit bail C permitting bail C to be pulled downward by spring tension and clutch pawl G to engage the clutch teeth of the drive gear.

As bail C moves downward it actuates switch control arm F to position roll AI (in switch arm F) away from switch assembly AJ thus closing the switch points to energize the motor.

POWER CAM FUNCTIONS

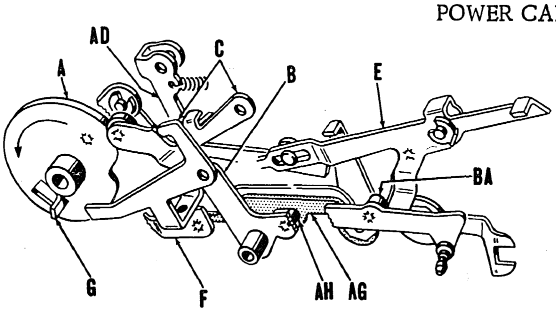


Figure VII-63

The primary purpose of cam A is to cause the depression of the result keys. However, the cam also performs other functions in connection with power control.

When cam A has driven lever B to its maximum throw; lever B, by contacting the upper projection of bail C will raise the latter high enough to permit latch AD to reset under the formed lip of C. As the roll in lever B drops into the pocket of cam A; bail C limits the movement of clutch pawl G causing the latter to become disengaged from the drive gear.

As cam A actuates lever B; stud AH lowers arm AG to retain switch control arm F in its lowered position and the switch points closed during the driving cycle. As the roll in lever B drops into the pocket of cam A; arm AG is released permitting the switch points to open.

Lowering the right end of lever B by cam A causes roll BA (in lever B) to contact the lower extension of lever E moving the latter out of the path of lip D preventing repeat result key operations during subsequent machine operations where there is no control roll active in lane 6.

RESULT KEY DEPRESSION

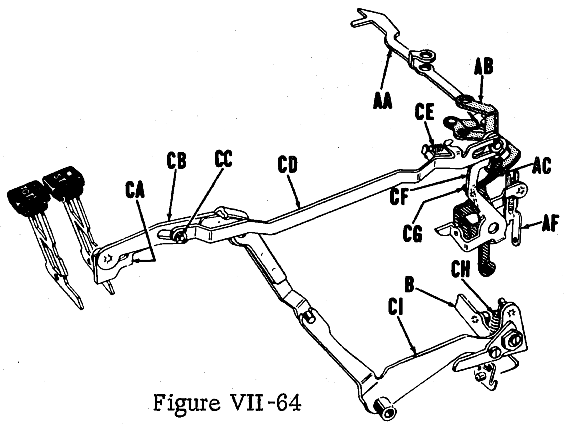


Figure VII-64

The automatic total indexing mechanism is constructed as that selector slide CA is normally located over the foot of the subtotal keystem thus resulting in a subtotal operation taking place when the indexing mechanism is activated by a small (#2 1/2) roll. A large (#1) roll, in addition to activating the totaling operation, shifts selector slide CA from over the foot of the subtotal keystem to over the foot of the total keystem so that the total key will be depressed.

If tabulation of the carriage locates a #2 1/2 roll on carriage control lever AA, then levers AA, AB, and AC are moved far enough to activate the total indexing mechanism through link AF. Movement of the levers by the control roll positions lever AC against stud CG in lever CF but does not move lever CF or link CD and selector slide CA remains over the foot of the subtotal keystem. When the total indexing mechanism is activated, lever B is driven downward. Lowering of lever B rocks lever CI through spring CH, which in turn rocks the front end of bellcrank CB downward. Downward movement of bellcrank CB and selector slide CA lowers the subtotal key to a latched positioned. Latching the result key indexes a result key machine operation in the same manner as when the key is manually depressed.

When a total operation is desired, a No. 1 or No. 5 control roll (depending on the "Form Layout" for machine application) is used in lane 6 to actuate control lever AA. The additional movement provided by the No. 1 or No. 5 control roll causes lever AC, stud CG (In lever CF), spring CE and link CD to move selector slide CA forward. Thus, selector slide CA is positioned over the foot of the total keystem providing a total operation. The additional movement needed to index slide CA over the foot of the total keystem is permitted through the slots in link CB and slide CA.

MACHINE DRIVE CLUTCH TRIP

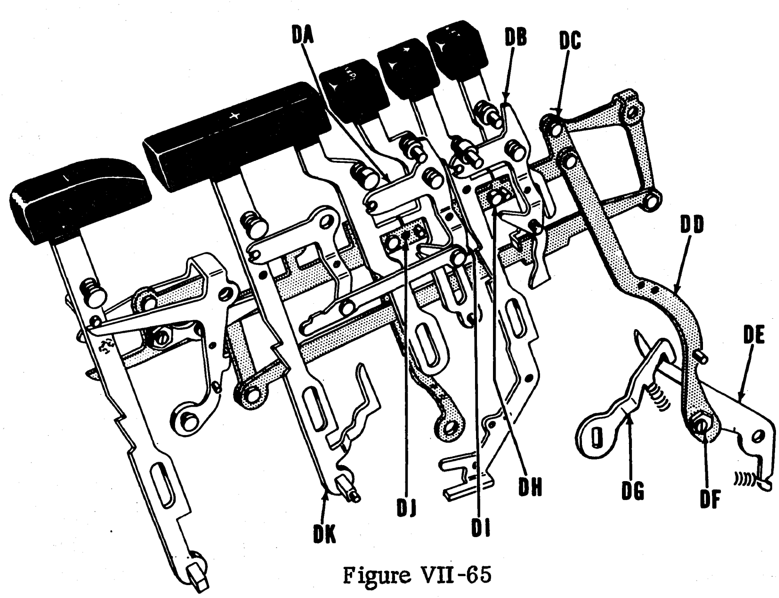


Figure VII-65

Machines containing automatic totals and subtotals require that tripping the machine drive clutch mechanism must be done from two sources. This is necessary to safeguard against the indexing of conflicting functions, such as would occur if an auxiliary motor bar or an operation control key were held depressed as the carriage tabulation indexes a totaling cycle.

The first source is from the subtract bar, skip bar, vertical space bar, return bar, or an operation control key (OCK) through a stud or an extension in each motor bar or OCK contacting intermediate motor bar DC.

Depression of a motor bar or an OCK lowers intermediate motor bar DC and link DD releases drive trip arm DG by lowering latch DE. It may be noted that through a bellcrank and tie bar construction of intermediate motor bar DC, uniform movement is transmitted to the trip mechanism from all actuating motor bars and OCK's. Link DD being connected to latch DE by eccentric DF affords one place of adjustment common to the various actuating motor bars and OCK's included in the first source of drive tripping.

The second source is tripping of the machine drive clutch from the plus motor bar through the stud in the bottom of stem DK of the bar assembly. This connection will be covered in detail under its own subject. However, observe that there is no stud DH in hole DJ and as a result intermediate motor bar DC is not actuated by a plus motor bar depression.

The plus motor bar is held aligned on its guide posts for free action during depression by bellcrank assembly DA. Observe that rearward bellcrank DI of assembly DA blocks depression of the skip bar when the plus bar is depressed and also blocks the plus bar when the skip bar is depressed.

Depression of the vertical space bar rocks bellcrank DB to block depression of the return bar. Conversely depression of the return bar blocks depression of the vertical space bar.

AUTOMATIC TOTAL DISABLING FROM MOTOR BARS

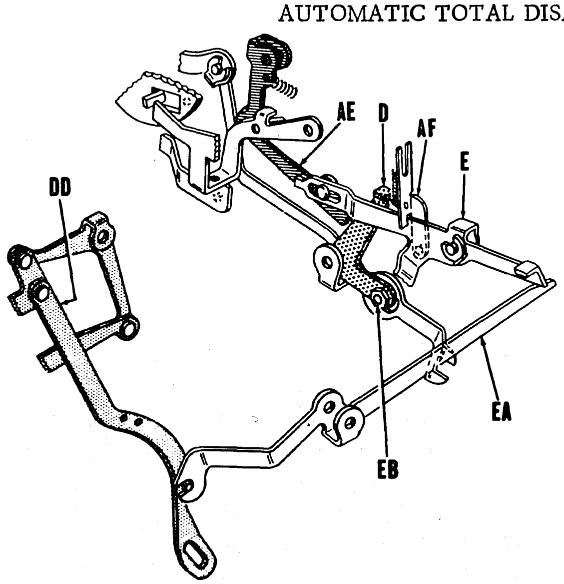


Figure VII-66

When the carriage tabulates into an automatic total position, and any motor bar or OCK held depressed, except the plus motor bar, will prevent the automatic total operation; also, the machine will not operate. This is necessary to safeguard against indexing conflicting functions, such as would occur if the auxiliary motor bar or OCK were held depressed as the carriage tabulation indexes a total cycle.

Depression of any motor bar or OCK that trips the machine drive clutch through intermediate motor bar DC, lowers link DD which rocks lever EA. Rocking of lever EA raises its rearmost portion to block the indexing of lever E, thereby preventing link AE from positioning in front of the formed lip on lever D. Thus, the formed lip of lever D positions over the right end of lever AE as the carriage comes to rest against the tabulating bail assembly, thus the totaling cycle is not indexed.

When the depressed motor bar or OCK restores, lever EA releases lever E to seek an indexed position due to the control roll contacting the control lever causing the spring on link AF to be expanded thus causing link AE to raise until limited on the underside of the formed lip on lever D.

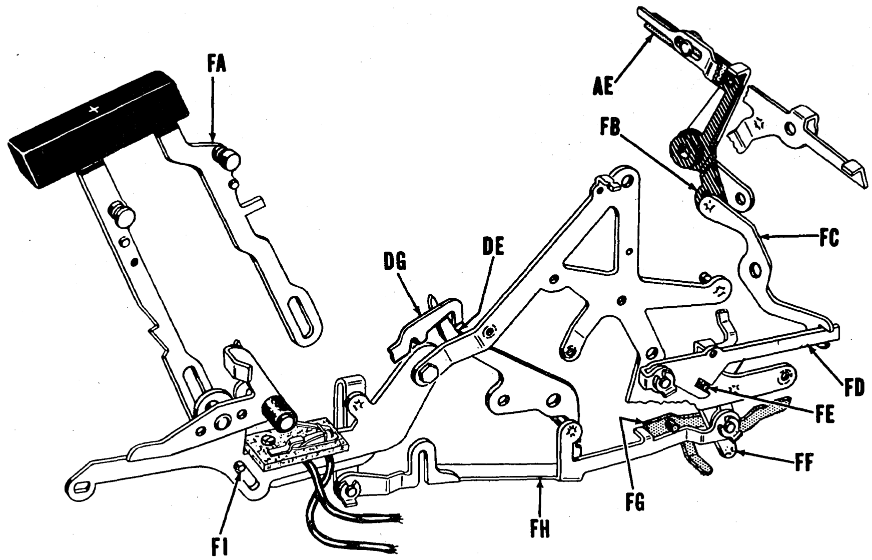


Figure VII-67

Following release of the motor bar or OCK that had been held depressed as the carriage tabulated into an automatic total position; depression of plus bar FA rocks the upper end of lever FB leftward activating the total indexing mechanism through bellcrank FI, link FH, pawl FG, lever FD, and lever FC. Link FH also lowers latch DE to release drive trip arm DG in anticipation of an automatic total operation.

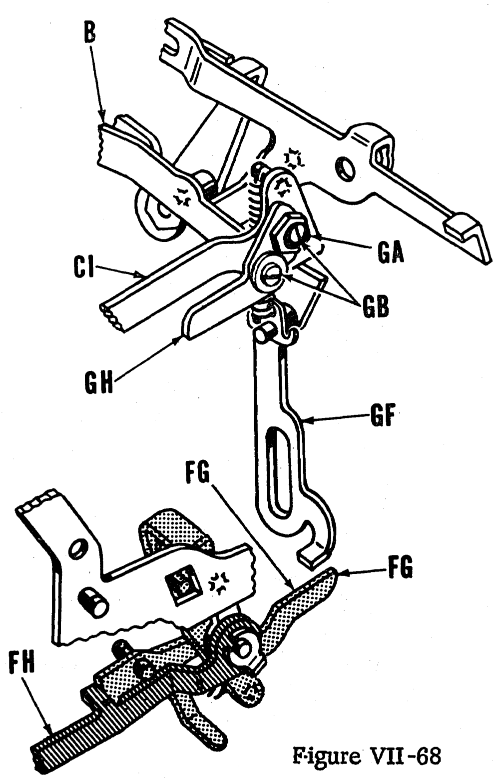
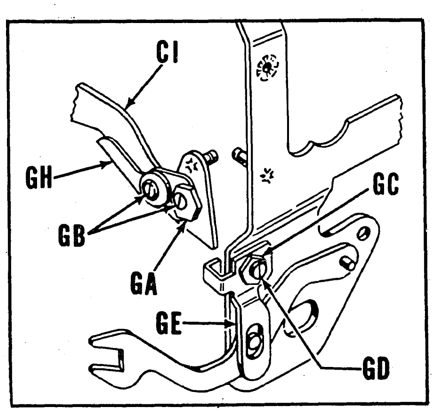


Figure VII-68



Should the plus motor bar be held depressed throughout the total operation causing the machine drive to be tripped to a repeat operation, the second operation will not produce a repeat total operation.

Lowering arm B during the total indexing operation lowers link GF and uncouples pawl FG from link FH to safeguard against link FH from driving pawl FG the second time.

MACHINE OPERATION IS PREVENTED UNTIL RESULT KEY IS LATCHED

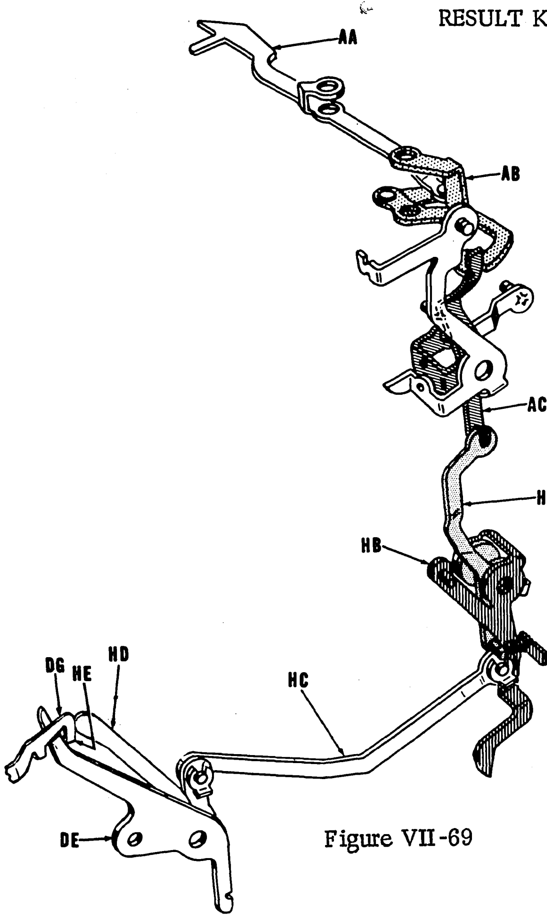


Figure VII-69

The machine operation of the totaling cycle must be delayed until the result key indexing mechanism has safely latched the result key depressed. To safeguard against premature tripping of the machine drive mechanism, actuation of lever AA moves latch HD through levers AB, AC, HA, HB, and lever HC to block lip HE in the drive trip arm DG. Thus, latch HD blocks the machine drive from tripping until the result key is latched down.

DRIVE TRIP FROM RESULT KEY POWER MECHANISM

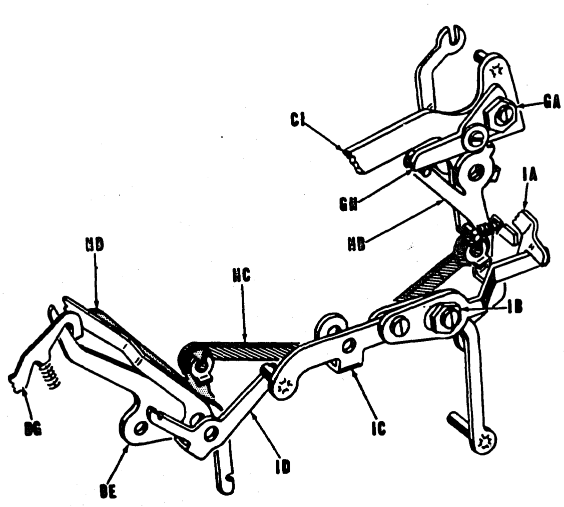


Figure VII-70

Machines containing the automatic total mechanism require release of drive trip arm DG from the following sources:

1. From result keys - Link DD, Fig. VII-65 lowering latch DE, Fig. VII-65.
2. From carriage tabulation - Lever IA rocking lever IC to raise latch ID.
3. From automatic total indexing - lowering of arm CI during total indexing lowers arm GH to rock lever HB. As the lower end of lever HB swings rearward, link HC raises latch HD to release trip arm DG.
   With trip arm DG released from latches DE, ID, and HD, the drive is permitted to trip and a total operation is performed in the same manner as if the total key had been manually depressed.

AUTOMATIC TOTALS DISABLED BY TABULATION CONTROL LEVER

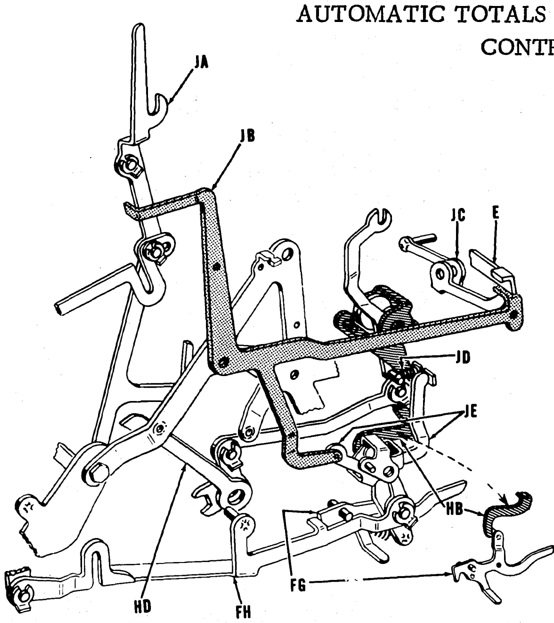


Figure VII-71

Forward movement of tabulating control lever JA disables automatic totals so manual listing operations may be performed in carriage positions where automatic totals are normally provided during posting operations.

As lever JA is moved forward, the uppermost portion of lever JB is also moved forward which raises its two rearward projections. The upper projection of lever JB blocks lever E preventing the indexing of a total cycle from the lane 6 control lever.

The lower projection of lever JB rocks lever JE and, by expanding spring JD, raises latch HD into an inactive position above the drive trip arm DG, Fig. VII-70. Rocking lever JE by lever JB also rocks lever HB to raise pawl FG above the formed lip on link FH in order to prevent the total mechanism being tripped by plus motor bar depression during listing operations.

Moving the carriage return control lever on the back of the return unit to its non-return position also rocks lever E through lever JC producing the same results as provided when the tabulation control lever is moved forward.

AUTOMATIC TOTAL DISABLED BY MANUAL CARRIAGE TABULATION

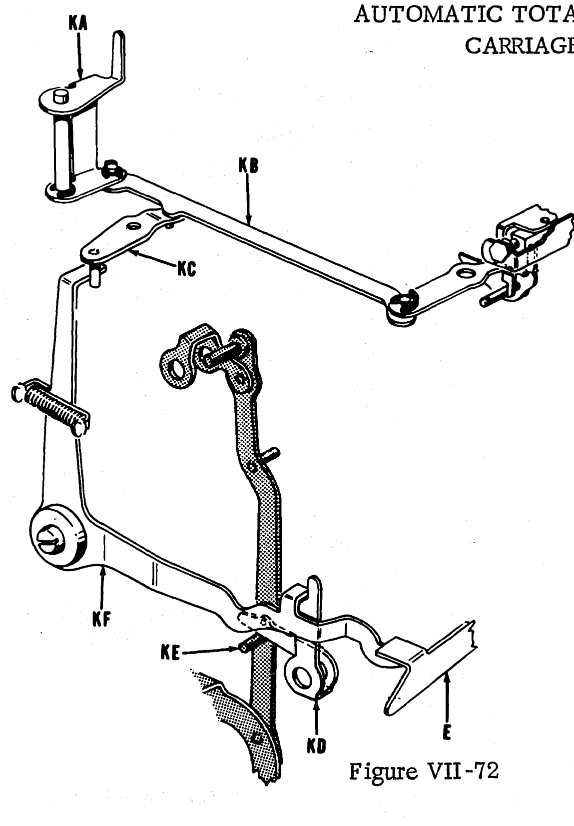


Figure VII-72

Accumulated amounts in Register "A" must be safeguarded from automatic totaling operations when the carriage is manually tabulated. Thus, the automatic total mechanism is disabled through action of manual tabulation lever KA.

Rearward movement of lever KA moves link KB rearward and rocks lever KC, raising the rearmost portion of lever assembly KF which is retained in an upward position by latch KD until the latter is released by stud KE during the machine operation following a manual carriage tabulation.

With lever KF retained in an upward position by latch KD, lever E is prevented from indexing into an automatic total position.

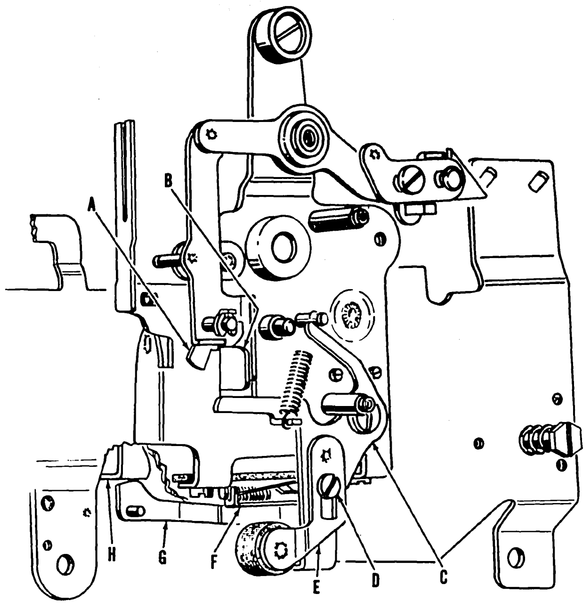


Figure VII-73

Tests and Adjustments

NOTE: The following tests and adjustments should be performed with the power turned off unless otherwise specified.

1. To assure energizing the motor during the complete cycle of the total indexing mechanism -
   a. With the machine and total indexing mechanism in home position, i.e., clutch pawl limit arm H, Fig. VII-73 in its upward (latched) position, there should be 1/32" clearance between limit arm H and arm G, Fig. VII-73.
   b. With the machine and total indexing mechanism in home position, there should be 1/32" clearance between lever B, Fig. VII-73 and the horizontal branch of bail assembly C, Fig. VII-73.
   c. With the machine and total indexing mechanism in home position, manually latch lever B, Fig. VII-73 under latch A, Fig. VII-73. With a .003" feeler gauge placed between the fiber roll on slide E, Fig. VII-73 and switch F, Fig. VII-73 the switch should not open. With a .010" feeler gauge placed between the fiber roll and the switch, the switch should be open.

   TO ADJUST:
   a. Bend arm G, Fig. VII-73 of bail assembly C, Fig. VII-73.

   NOTE: Support the bail portion of the assembly when bending the arm to avoid distorting the bail.

   b. Bend the horizontal branch of bail assembly C, Fig. VII-73.
   c. Position slide assembly E, Fig. VII-73, then tighten screw D, Fig. VII-73.
2. To assure positive indexing of the automatic total mechanism from carriage tabulation - With all controls indexed for carriage tabulation, lever KF, Fig. VII-72 released from latch KD, Fig. VII-72 and the carriage in a total indexing position, manual movement of link AE, Fig. VII-66 to the left should provide 1/16" clearance between link AE, Fig. VII-66 and the formed lip of lever D, Fig. VII-66.

   TO ADJUST, turn eccentric EB, Fig. VII-66.
3. To assure tripping the automatic total mechanism from plus motor bar depression when normal tripping has been blocked from a held down motor bar or OCK at the time when the carriage tabulates into a total position -
   a. With the controls indexed as in test No. 2, there should be not more than 1/32" clearance between the front of pawl FG, Fig. VII-67 and the formed lip in slide FH, Fig. VII-67.
   b. With the power on and the carriage positioned one or more stop positions to the right of a totaling position, depress a listing key and the plus motor bar. Permit the machine to operate until a handle break operation stops the machine in a total position. Disconnect the power and release the depressed listing key and motor bar with the error key. With the power off and motor bar again depressed, manually hold link AE, Fig. VII-67 leftward, there should be 1/16" clearance between link AE, Fig. VII-67 and bellcrank FB, Fig. VII-67 and, there should be no cramp between arm FD, Fig. VII-67 and lever FC, Fig. VII-67.

   TO ADJUST:
   a. Open or close the adjusting loop in the front end of link FH, Fig. VII-67.
   b. Bend arm FD, Fig. VII-67.

4. To assure correctly timed drive tripping from motor bar or OCK depression -
   a. Select the motor bar (except the plus bar) or OCK which has the latest latching into a depressed position, slow depression of the selected bar to a latched position should not release trip arm DG, Fig. VII-65 from latch DE, Fig. VII-65. Further depression of the motor bar or OCK should release arm DG, Fig. VII-65.
   b. Slow depression of the plus motor bar to a latched position should not release trip arm DG, Fig. VII-67 from latch DE, Fig. VII-67. Further depression of the plus motor bar should release arm DG, Fig. VII-67.
   c. With the carriage holding the air cushion closed, there should be 1/32" passing clearance of arm DG, Fig. VII-70 past latch ID, Fig. VII-70.

   TO ADJUST:
   a. Turn eccentric DF, Fig. VII-65.
   b. Tilt the projection in link FH, Fig. VII-67 which contains the stud that contacts latch DE, Fig. VII-67.
   c. Turn eccentric IB, Fig. VII-70.
5. To assure correctly timed indexing of the machine total operation after the automatic total indexing mechanism has latched the result key -
   a. With the controls indexed as in test No. 2 and the automatic subtotal mechanism manually advanced until there is 1/32" separation between levers B and CI, Fig. VII-68. In this position, limit plate GE, Fig. VII-68 should be raised to contact lever CI, Fig. VII-68.
   b. With an automatic total indexed, manually cycle the total indexing mechanism until there is a slight separation of levers B and CI, Fig. VII-68. There should be approximately .015" passing clearance between latch HD, Fig. VII-70 and trip arm DG, Fig. VII-70.

   TO ADJUST:
   a. Turn eccentric GC, Fig. VII-68.
   b. Loosen screws GB, Fig. VII-68 slightly, turn eccentric GA, Fig. VII-68.
6. To prevent indexing an automatic total operation during manual carriage tabulation -
   With the carriage in an automatic total position, slowly move the manual tabulating lever rearward, as the upper surface of the formed lip in lever KF, Fig. VII-72 is level with the step in latch KD, Fig. VII-72 lever KF, Fig. VII-72 should contact the formed lip in lever E, Fig. VII-72.
   TO ADJUST, bend the rearmost portion of lever KF, Fig. VII-72.
7. To safeguard against an automatic total operation when a motor bar (except the plus bar) or an OCK is depressed and the carriage is located in an automatic total position -
   With the carriage located in an automatic total position and with lever KF, Fig. VII-72 retained by latch KD, Fig. VII-72, depress any motor bar (except the plus bar) or OCK. There should be 1/32" clearance between the rearward end of lever EA, Fig. VII-66 and the right end of lever E, Fig. VII-66.
   TO ADJUST, bend lever EA, Fig. VII-66.
8. To safeguard against an automatic total operation when the tabulation control lever is in forward position for listing operations -
   With lever KF, Fig. VII-72 retained by latch KD, Fig. VII-72, movement of lever JA, Fig. VII-71 to its forward position should provide 1/32" clearance between lever KF, Fig. VII-72 and lever E, Fig. VII-72.
   TO ADJUST, bend the rearward branch of lever JB, Fig. VII-71.
9. To safeguard against an automatic total cycle from depression of the plus motor bar when the carriage is located in an automatic total position and the carriage return mechanism is disabled -
   With the motor return carriage control lever positioned to the right and lever KF, Fig. VII-72 latched on latch KD, Fig. VII-72, there should be 1/32" clearance between lever E, Fig. VII-71 and the formed lip in the rearmost branch of lever JB, Fig. VII-71.
   TO ADJUST, tilt the left end of lever JC, Fig. VII-71.
10. To safeguard against repeat totals should the plus motor bar be held depressed during an automatic total operation -
   Manually cycle an automatic total indexing operation until there is a slight separation of levers B and CI, Fig. VII-68.
   There should be 1/32" passing clearance of the formed lip in link FH, Fig. VII-68 under pawl

FG, Fig. VII-68.
TO ADJUST, bend the rear extension of pawl FG, Fig. VII-68.

11. To safeguard against an automatic total operation from the plus motor bar depression when the carriage is tabulating between stops or being returned by the motor -
With the carriage located in an automatic total position, manually move the carriage to the right until there is 1/16" clearance between the tabulator stop and the right edge of the tabulating bail assembly. There should be 1/32" passing clearance of the formed lip of link FH, Fig. VII-68 under pawl FG, Fig. VII-68.
TO ADJUST, tilt the lower extension of lever assembly IC, Fig. VII-70.

12. To prevent blocking normal listing machine operations by the automatic total mechanism -
With the carriage in an automatic total position and the tabulation control lever moved to its forward position, there should be 1/32" passing clearance of trip arm DG, Fig. VII-70, past latch HD, Fig. VII-70.
TO ADJUST, bend the upper rearward branch of lever JE, Fig. VII-71.

13. To safeguard against an automatic total operation from plus motor bar depression when the carriage is located in an automatic total position and the tabulation control lever in forward position -
There should be 1/32" passing clearance of the formed lip in link FH, Fig. VII-67 under pawl FG, Fig. VII-67 when the carriage is located in an automatic total position and the tabulation control lever is in forward position.
TO ADJUST, bend the lower hooked portion of lever HB, Fig. VII-71.

14. To assure activating the automatic total mechanism following a manual carriage tabulation operation -
There should be 1/32" passing clearance of the formed lip on lever KF, Fig. VII-72 past latch KD, Fig. VII-72 when the machine is manually operated until stud KE, Fig. VII-72 has reached its maximum upward travel.
TO ADJUST, bend the forward branch of latch KD, Fig. VII-72.

POWER

ELECTRICAL CIRCUIT

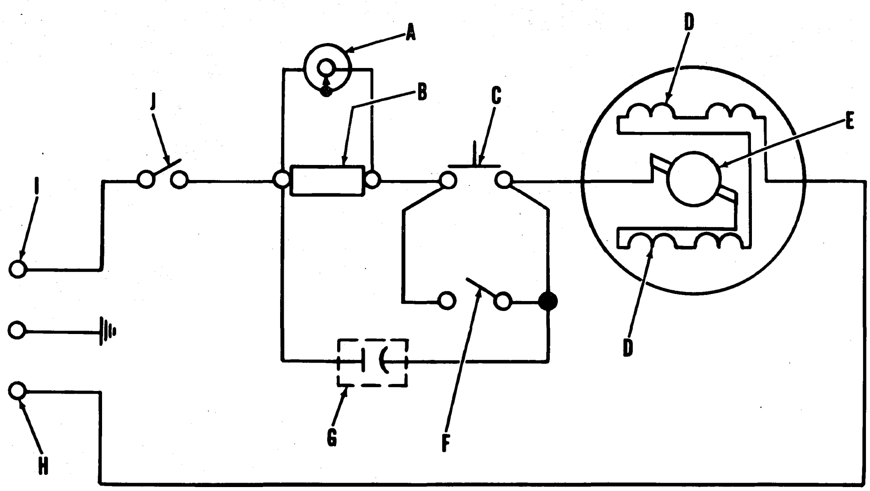


Figure VII-74

The electrical circuit of the P600 machine is illustrated by the accompanying schematic diagram.

The circuit begins with upper terminal I for the line cord and goes to handle switch J. Switch J is opened to break the circuit when the handle is in the machine and is closed to complete the circuit when the handle is removed. From switch J the circuit continues through governor A to motor switch C. Closing of switch C completes the circuit through the motor brushes, armature E, and motor fields D to lower terminal H for the line cord.

M.R.C. switch F is closed to provide a complete circuit when motor switch C is opened at the end of the return stroke. Thus motor power is provided to fully return the carriage after the return stroke of the machine is completed.

Condenser G is connected across resistor B, governor A, motor switch C, and M.R.C. switch F. The condenser absorbs the charge as the points open, thereby reducing arcing and minimizing burning and pitting of the points.

Resistor B is connected in the circuit across governor A and condenser G. A certain amount of current is permitted to pass through the resistor thus by-passing the governor and further reducing arcing of the governor points. The resistor also dissipates in the form of heat the electrical charge stored in the condenser.

THE P600 THREE TOTAL ACCOUNTING MACHINE

The basic difference between the Three-Total Styles and the regular Two Total Styles is that the lower accumulating section consists of two adding registers, designated 'B' and 'C', instead of the regular 'B' add/subtract register.

The two adding sections occupy the same physical space as the regular register. Since the 'B' and 'C' adding pinions are side by side on the same shaft, and selection is obtained by shifting the pinions to the right or to the left, only one set of adding pinions (either 'B' or 'C') may be selected at the same time as register 'A'.

Because the pinions are shifted from 'B' to 'C' or 'C' to 'B' by a mechanism which takes the place of the regular subtract indexing mechanism, only addition is possible. Thus, if register 'B' or 'C' is selected with register 'A' and the control for the latter is subtract, the amount indexed on the keyboard subtracts in register 'A', but adds in either of 'B' or 'C'.

Transfer Total options are as follows:

Gross Accumulation - plus and minus totals in 'A' transfer add only to 'B' or 'C'.

Plus Amounts Only - plus totals in 'A' transfer to 'B' or 'C', minus totals in 'A' non-transfer.

Carriage control lane 5 selects register 'B' with a 2 1/2 roll and register 'C' is selected with a 1 roll.

Carriage control lane 3, as well as controlling the add and non-add functions of register 'A', also indexes the Transfer Total mechanism.

In the following instructions, the Register Selector Lever for registers "A", "B" and "C" is referred to as O.C.L. 60.

O. C. L. 60 - 'B' AND 'C' POSITIONS, INDEXES SYMBOLS IN COLUMN 00

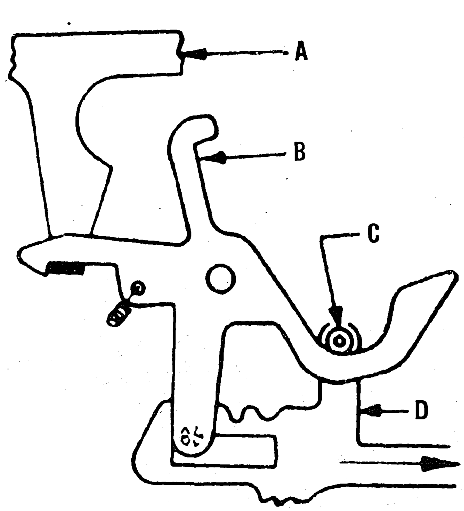


Fig. VII -75

O.C.L. 60 at register 'A' position, the hook of latch B holds index bar A (Column 00) at normal thereby preventing symbol indexing.

When O.C.L. 60 is moved to register 'B' position, roller C (part of slide D) contacts the rear arm of latch B and raises the hook above the lip of index bar A. This allows symbol 'B' to index when the machine is operated with amount keys indexed.

When O.C.L. 60 is moved to register 'C' position, roller C moving along the upper surface of the rear arm of B keeps the hook held above the lip of the index bar. This allows symbol 'C' to index when the machine is operated with amount keys depressed.

Part B differs from the regular part only in the outline of the rear arm. This outline is broadened to advance the contact with the roller C and raise the hook of B when O.C.L. 60 is at 'B'.

The limits for indexing bar A are the same as for P 400 machines. The 'A' limit for P 400 coincides with the 'A' Three Total limit; the

'AB' limit for P 400 coincides with the 'B' Three Total limit, and the 'B' limit for P 400 coincides with the 'C' Three Total limit. The symbol type bar is, therefore, designated 'A', 'B' and 'C' instead of 'A', 'AB' and B.

O. C. L. 60 - 'B' AND 'C' POSITIONS DISABLE 'A' TOTAL PAWL

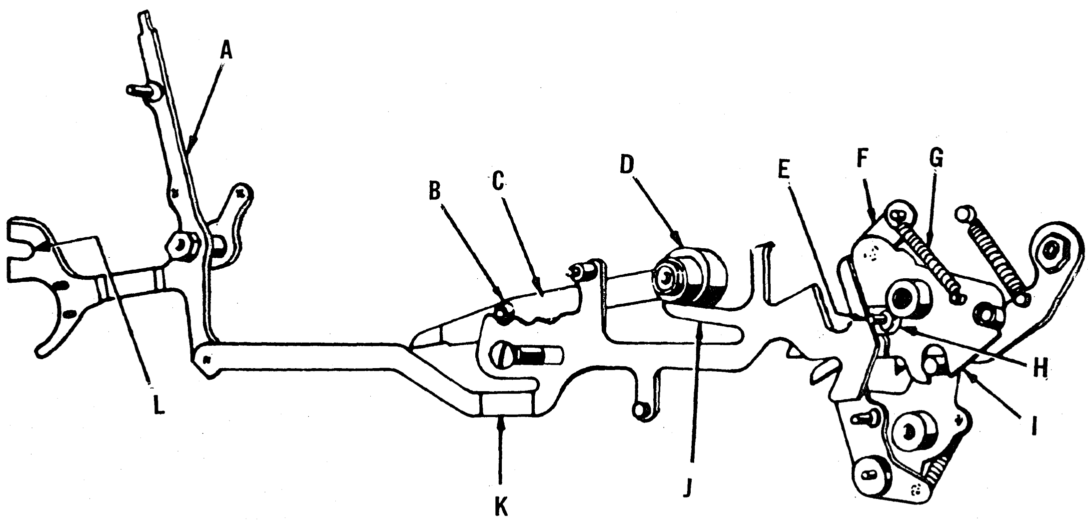


Fig. VII-76

Total pawl F for register 'A' must be disabled when O.C.L. 60 is in the 'B' or 'C' position to prevent 'A' register from being engaged with the adding sectors.

Lever A (O.C.L. 60) is shown in the 'C' position, where it is detented by roller B in the forward pocket of K. In this position arm J is supported by hub D.

O.C.L. 60 at register 'A' position - Spring G holds pawl F active.

O.C.L. 60 at register 'B' position - Slide K is moved rearward to contact stud E and move pawl F to its disabled position.

O.C.L. 60 at register 'C' position - Slide K moves further rearward contacting stud E to move pawl F. This extra movement of pawl F is allowed by the long slot H in pawl assembly I.

Pocket L is required because the machine must operate with lever A in the center ('B') position.

O. C. L. 60 - 'B' AND 'C' POSITIONS DISABLE 'A' LISTING PAWL (Fig. VII-77)

O.C.L. 60 in the 'B' or 'C' position makes it necessary to disable listing pawl E to prevent meshing of register 'A' with the adding sectors.

O.C.L. 60 at register 'A' position - In this position listing pawl E is active, since A is well clear of stud C.

O.C.L. 60 at register 'B' position - When slide G moves rearward, roller F (in the slot of A) moves the upper arm of A to contact stud C and move intermediate lever B rearward. The tail of B contacts stud D and moves listing pawl E into the inactive (non-add) position.

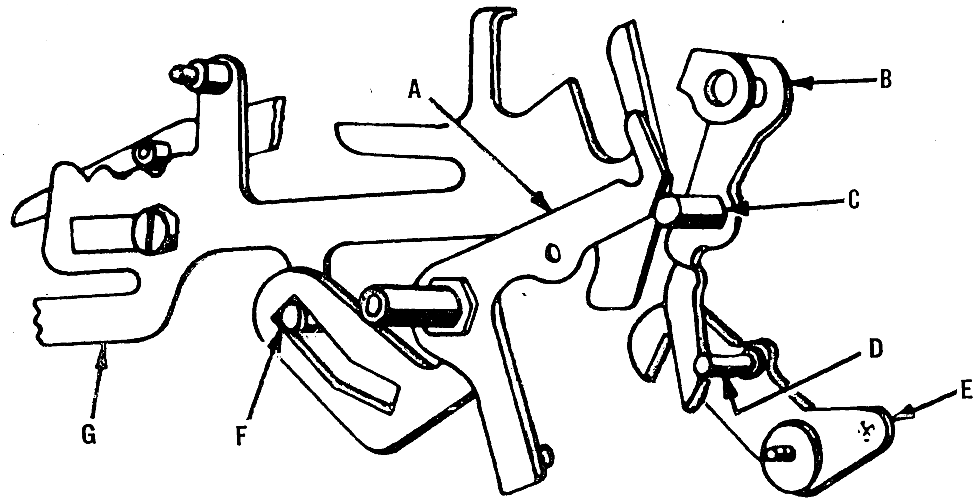


Fig. VII-77

O.C.L. 60 at register 'C' position - Slide G moving further rearward continues to hold A in contact with stud C, holding pawl E in the inactive position.

The cam slot of A gives rapid movement to part B as slide G moves from 'A' to 'B' position, and no further movement to B as the slide moves from 'B' to 'C' position.

O. C. L. 60 AND O. C. K. 8-0 DISABLE UPPER AND LOWER LISTING PAWLS

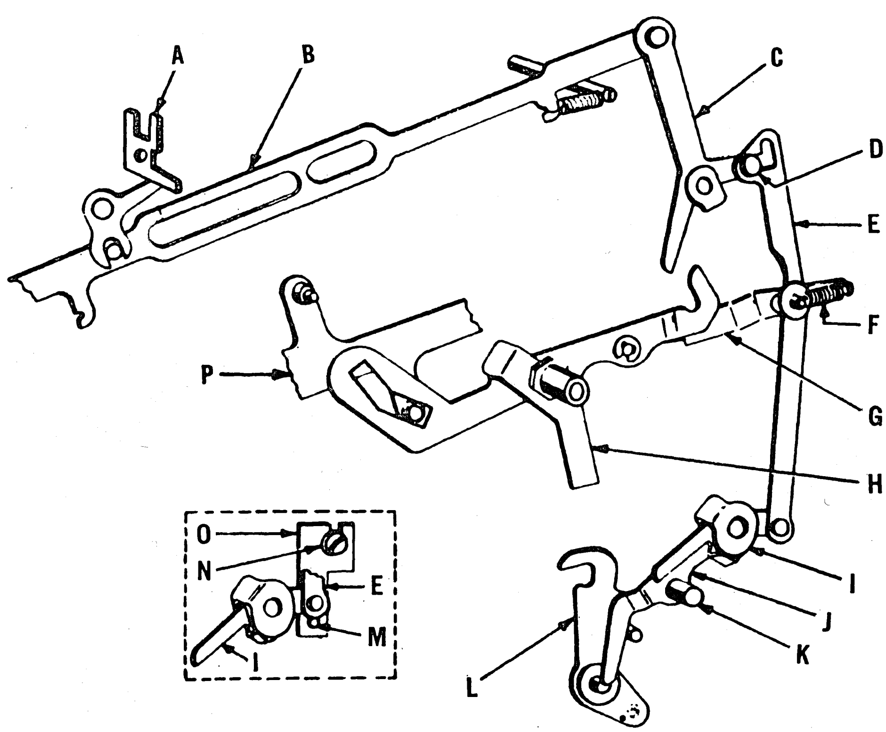


Fig. VII-78

O.C.L. 60 at register 'A' position - With the total key (O.C.K. 8-0) depressed, the upper listing pawl is disabled and the lower listing pawl is active. This prevents meshing register 'A' with the adding sectors during the return stroke of the total operation but allows the transfer of amounts from 'A' to register 'B' or 'C'.

Slide P, (Fig. VII-78) locates link G so that button stud D aligns with the vertical part of the L shaped slot of link E. Depression of total key A rocks lever C, and disables the upper listing pawl by the forward leg of C. Button stud D idling in the slot of E leaves the lower listing pawl L active.

O. C. L. 60 at register 'B' or 'C' position - With total key depressed both upper and lower pawls L should be disabled. Slide P locates link G and allows spring F to align the horizontal part of the L shaped slot with stud D. Depression of total key A, disables the upper pawl as before, and disables the lower pawl by raising link E, rocking I to contact stud K on part J, tail of J contacting stud on pawl L, disabling it.

Adjustable plate O provides the normal limit for link E and ensures that the proper alignment of the L shaped slot is maintained with button stud D.

O. C. L. 60 INDEXES CROSS SLIDING OF ADDING PINIONS

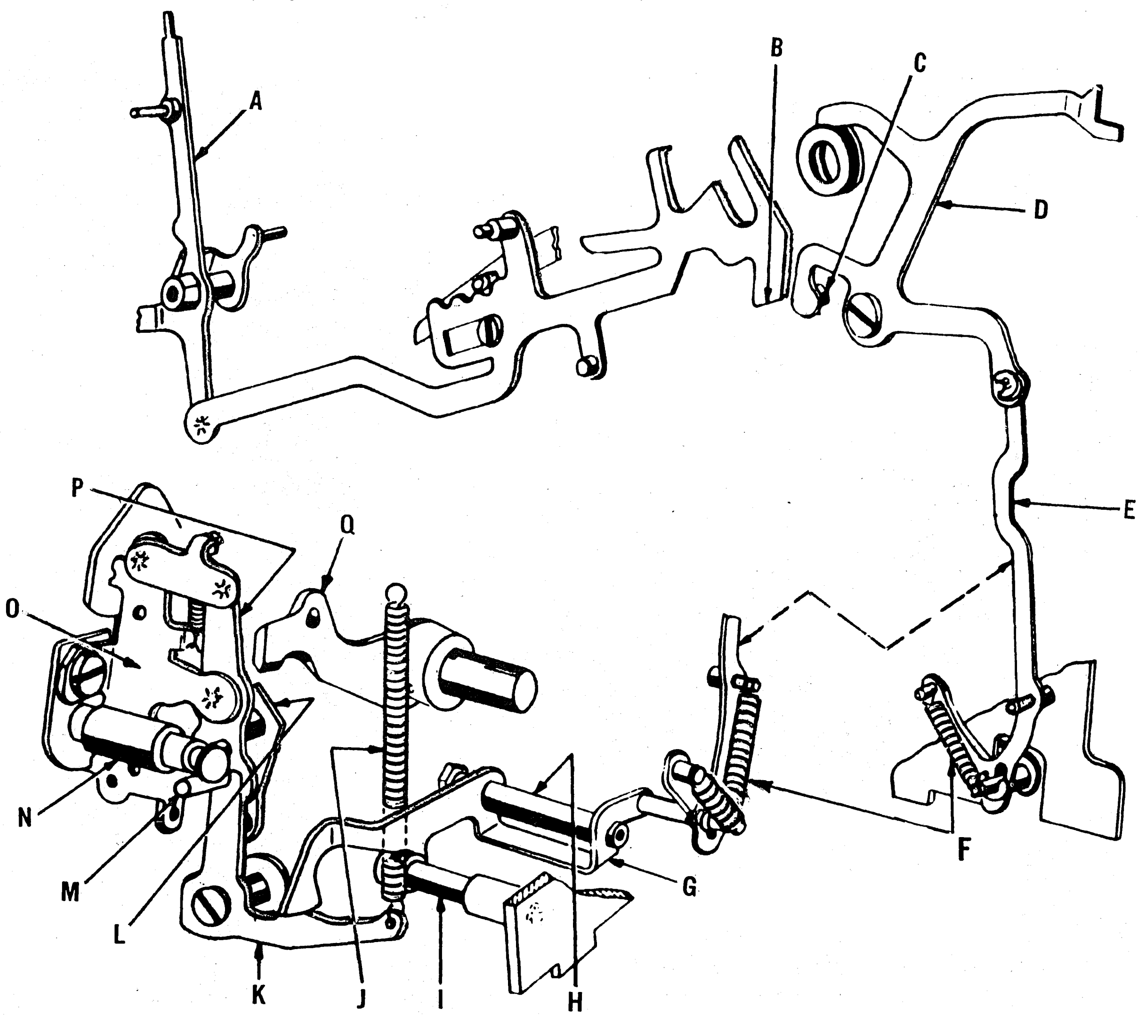


Fig. VII-79

When O.C.L. 60 is moved from 'A' to 'B' position, projection B is moved toward stud C, but not far enough to contact C. Because assembly D is not moved, the cross-sliding mechanism remains at normal and adding pinions at 'B' remain at 'B' when the machine operates.

Further movement of O.C.L. 60 from 'B' to 'C' moves projection B over stud C and cams the latter downward. Lever D, as it rocks, raises link E and thru spring joint F rocks lever G. The forward arm of G contacts spearpoint assembly K and rocks the latter until stud M limits against the right hand side of the open slot of P. The spring jointed connection between E and G ensures full movement of stud M without binding lever A.

Spearpoint L, is aligned so that hatchet Q, when the accumulating section is meshed, moves the adding pinions from 'B' to 'C' thru part P and shaft N. The pinions remain detented in the 'C' position until such times as lever A is moved 'C' to 'B' or 'A' and another machine operation is made. When lever A is moved from 'C' to 'B' or 'A', stud M limits against the left hand side of the open slot of P. Machine operation now permits Q to cross-slide the adding pinions from 'C' to 'B' position. This shows how register 'C' is indexed by carriage control, using the upper stepped portion of lever D.

The purpose of supporting arm J by hub D (Refer to Fig. VII-76) is to prevent upward weave of projection B when stud C is cammed downward. This ensures full movement of stud M and correct relationship of L to hatchet Q.

O. C. L. 60 INDEXES CONTROL SELECTOR FOR ADD/NON ADD OF REGISTERS 'B' AND 'C'

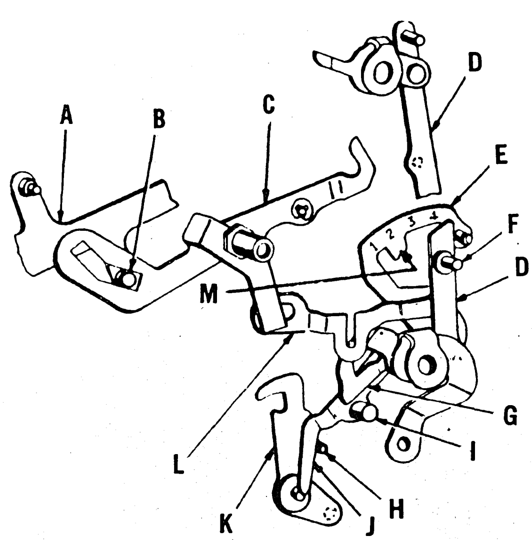


Fig. VII-80

The illustration shows slide A in the register 'C' position which aligns selector E in an add position (position 4 aligned with drive stud F of linkage D).

When slide A is in the register 'B' position selector E aligns in an add position (position 3 aligned with driver stud F).

Movement of selector E to position 3 or 4 is obtained by slide A moving roller B in the enclosed cam of C. Part C is rocked and thru a stud connection moves adjustable link L forward. Since L is connected to selector E the latter is moved forward and aligns in position 3 or 4, according to the position of O.C.L. 60.

Positions 3 and 4 of selector E selected by O.C.L. 60 in its 'B' and 'C' positions respectively, are not changed by any control roll which may activate the carriage control lever in lane 5.

Position 2 of E is a non-add position obtained by stud F raising E by means of projection M, rocking G, stud H, and thru the tail of J, rocks stud I moving pawl K rearward into its non-add position.

The add positions 1, 3 and 4 of selector E allows driver stud F to idle upward without lifting selector E and listing pawl K remains active.

O. C. L. 60 AT 'A' - CARRIAGE CONTROLLED SELECTION OF REGISTERS 'B' AND 'C'

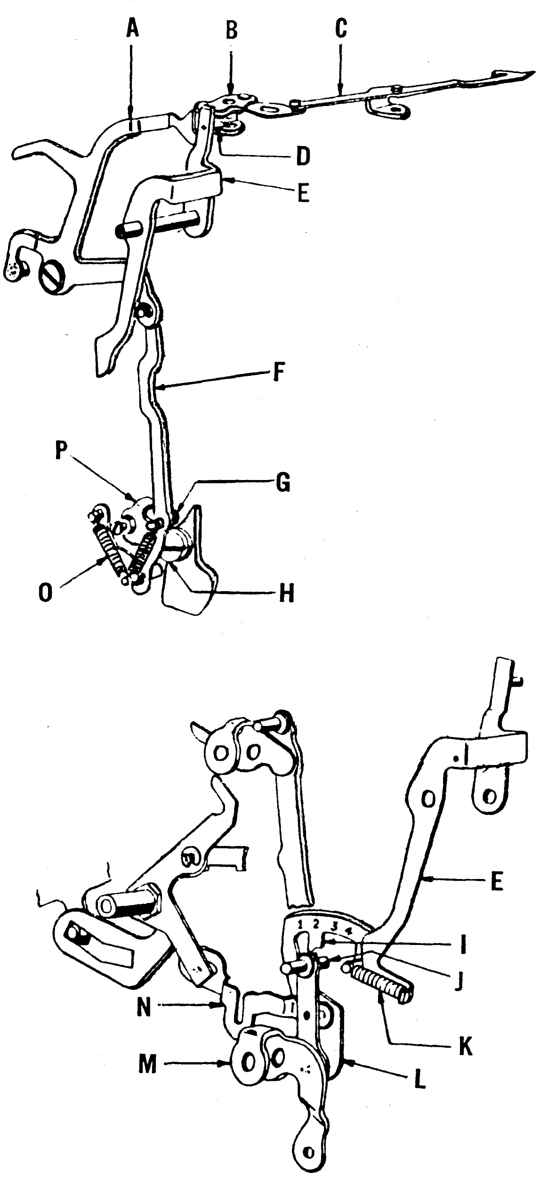


Fig. VII-81

O.C.L. 60 must be located in 'A' for posting operations. This gives a basic condition of add 'A' and non-add 'B' or 'C'.

The alignment of stud D (Refer to Fig VII-81) to the upper stepped portion of lever A is maintained by the limit of stud G on part P. Without this limit, control could be lost by the step of A passing under stud D.

The non-add position of selector L is obtained when the stud on L limits against lever E (lever C at normal). This position should accurately align projection I with driver stud J.

Register 'B' Add is obtained when a 2 1/2 roll actuates control lever C (Lane 5), moving linkage B and thru its forked end moving lever E, allowing spring K to pull selector L into the No. 1 position.

Position 1 aligns the pocket of L with stud J and adds, because J idles in the pocket without raising L. The active register is 'B' because the 2 1/2 roll does not move linkage F far enough to index cross-sliding of the adding pinions.

Register 'C' Add is obtained when a No. 1 roll actuates control lever C. This moves selector L into position 1 for add. The increased movement of lever F moves stud D into contact with the upper stepped portion of A.

Stud D rocks A and raises F sufficiently to index the cross-sliding of adding pinions from 'B' to 'C' when the lower section meshes with the adding sectors.

The slot at the front of link N permits selector L to move to position 1 when O.C.L. 60 is at 'A' and control lever C is activated by a 2 1/2 or a 1 roll.

Series P600

SELECTOR POSITION CHART

O.C.L. 60 REGISTER SELECTOR LEVER	FUNCTION	ROLL USED LANE 5	SELECTOR POSITION	RESULT OBTAINED
A	LISTING	0	2	NON ADD B
A	TOTAL A	0	2	NON ADD B
A	LISTING	2-1/2	1	ADD B
A	TOTAL A	2-1/2	1	ADD B
A	LISTING	1	1	ADD C
A	TOTAL A	1	1	ADD C
* B	LISTING	0, 2-1/2	3	ADD B
* B	TOTAL B	0, 2-1/2	3	TOTAL B
C	LISTING	0, 2-1/2, 1	4	ADD C
C	TOTAL C	0, 2-1/2, 1	4	TOTAL C

* A NO. 1 ROLL USED IN LANE 5 WITH O.C.L. 60 AT 'B' INDEXES 'C'

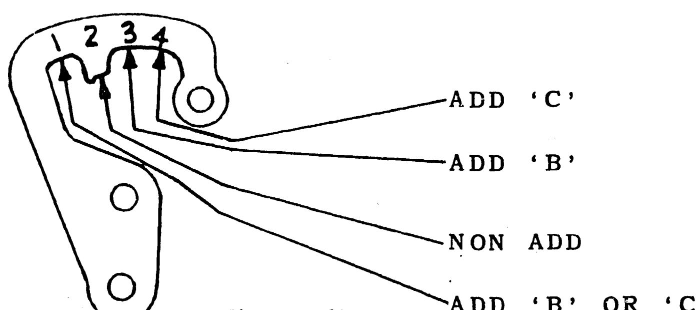


Fig. VII-82

CARRIAGE CONTROLLED ADD/NON - ADD OF REGISTER 'A'

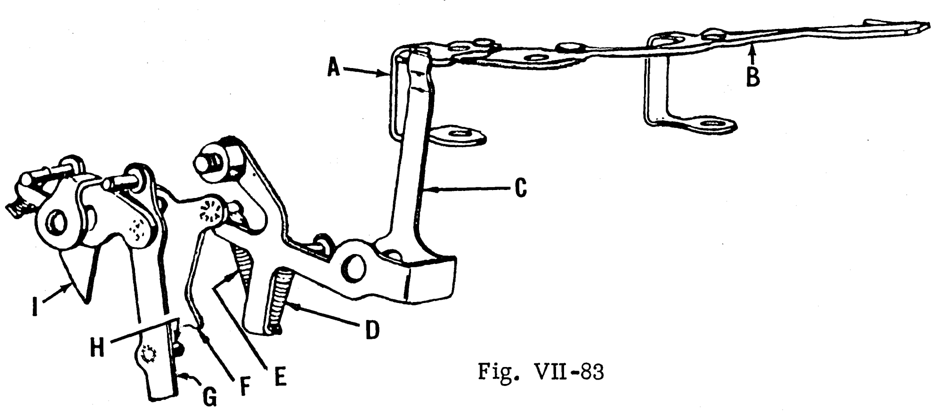


Fig. VII-83

Carriage control lane 3 provides for the add/non-add functions of 'A' and is also used for indexing Transfer Total.

The mechanism is designed to give the following functions:

0 Roll - Register 'A' Add
2 1/2 Roll - Register 'A' Non-Add
1 Roll - Register 'A' Add

0 Roll - Since Lever B is not actuated, pawl F is not moved. Pawl F, in normal position, allows register A to add, because stud H idles in front of pawl F when linkage G is driven, and listing pawl remains active.

2 1/2 Roll - This roll actuates lever B, moving A and C far enough to position pawl F over stud H. During machine operation linkage G and stud H raises pawl F contacting part I to disable the register A listing pawl for non-add of register 'A'.

Spring D restores the entire mechanism when the roll moves away from lever B. Spring E restores pawl F to the front arm of lever C.

1 Roll - This function enables amounts to be listed in 'A' in a certain carriage position (where Transfer Total is indexed) and for the Total in 'A' to be transferred to 'B' or 'C' in the same carriage position, giving individual and group totals.

Lever B, positions pawl F fully forward; in this position, stud H idles up behind the pawl and does not disable the register A listing pawl. Amounts are thus listed in 'A' but not in 'B' or 'C' which is non-added. When the total key is depressed the amount is transferred to 'B' or 'C'.

TRANSFER TOTAL MECHANISM

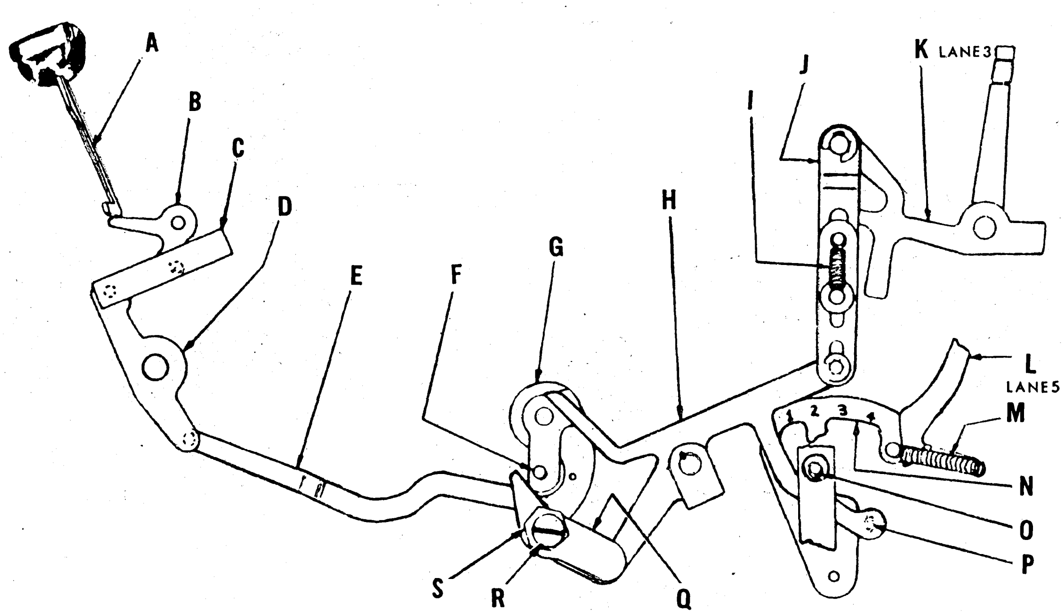


Fig. VII-84

Totals of register 'A' are transferred to register 'B' or 'C', one of two ways:

1. Gross Accumulation - plus and minus amounts in 'A' transfers as add only to 'B' or 'C'.

2. Plus Amounts Only - plus amounts in 'A' transfers as add to 'B' or 'C', minus amounts are not transferred.

Control Lanes 3 and 5 are indexed, Lane 3 with a No. 1 roll to index transfer, Lane 5 with a 2 1/2 roll to index transfer to 'B' or a 1 roll to index transfer to 'C'.

GROSS ACCUMULATION (Fig. VII-84).

For this explanation assume that 'A' transfers to 'C'.

Index lane 5 with a No. 1 roll. Lever L moves rearward and spring M moves selector N from position 2 to 1. This permits registers 'A' and 'C' to add.

Index Lane 3 with a No. 1 roll, selector N moves to position 2. This permits register 'A' to add, and non-adds register 'C'. The repositioning of selector N from 1 to 2 is obtained by lever K lowering link J and rocking multi-arm lever H. When H is rocked, the lower arm which carries stud P cams selector N from position 1 to 2. At the same time adjustable link Q is raised toward stud F.

Do not depress the total key, but take a listing stroke and note that register 'A' adds and register 'C' non-adds.

Index total key A and note that selector N is moved from position 2 to 1. When the machine operates, the amount in 'A' is transferred to 'C'. Total key A rocks bellcrank B and thru slide C rocks lever D. Lever D, in turn moves link E and rotates G on its pivot post. The rotation of G moves stud F toward adjustable link Q. Stud F cams link Q downward and multi-arm lever H is rocked. Stud P is raised from selector N, and spring M pulls the selector from 2 to 1. Operate the machine and note that register 'A' totals (plus or minus) transfers to register 'C'.

PLUS AMOUNTS ONLY

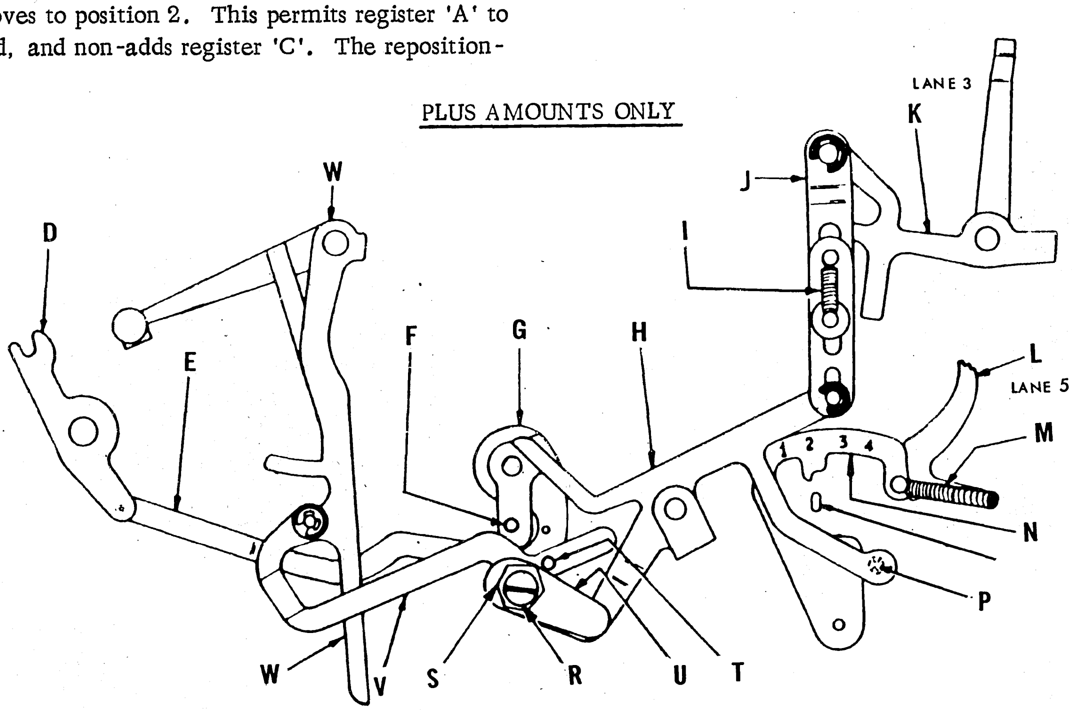


Fig. VII-85

Since minus totals of 'A' do not transfer there is a tie-up with the minus non-transfer.

Assume as for Fig. VII-84 that Lanes 3 and 5 are indexed by No. 1 rolls. Selector N is located in position 2 and adjustable blank U lifts stud T and moves the hump of link V into the patch of stud F.

Plus Transfer - With a plus amount in 'A' depress the total key. Thru D, E and G, stud F is moved toward the hump of link V and stud T cams adjustable link U downward. This, in turn, rocks multi-arm lever H and raises stud P from selector N. Spring M pulls selector N from 2 to 1. Operate machine and note that stud O, idling in the position 1 pocket allows register 'C' to accumulate the plus amount totalled out of 'A'.

Minus Non-Transfer - With a minus amount in 'A', depress the total key. As stud F is moved toward the hump of V, bellcrank W moves V rearward. This allows stud T to follow the sloping contour of adjustable link U and lowers link V out of the path of stud F. This prevents lever H from being rocked by the total key, and selector N remains in position 2. Machine operation results in stud O raising selector N and non-adding 'C'.

Tests and Adjustments
(Fig. VII-75 through VII-85)

NOTE: Follow the sequence to avoid readjusting.

1. To prevent loss of movement of the parts indexed by slide K (Fig. VII-76).
   a. Move O.C.L. 60 to 'C' position, arm J should just contact the underside of hub D.

TO ADJUST, bend arm J.

2. To ensure cross-sliding of adding pinions (Fig. VII-79).
   a. The shaft which carries hatchet Q and the meshing cams should be free but have minimum end play.
   b. Hatchet Q should have equal play on both sides of spearpoint L.
   c. O.C.L. 60 at 'A' and adding pinion assembly at 'B' - index control lever Lane 5 with a No. 1 roll. Spearpoint L should move to the right until stud M limits against leg of P, springs F should expand not more than 1/32".
   d. With a No. 1 roll indexing lane 5, the position of link E should not change as O.C.L. 60 is moved from 'A' to 'C' and vice-versa.

TO ADJUST:

a. Turn screw in P, (Fig. VII-81) and tighten nut.
b. Carefully bend hatchet Q to the left or right as required, hold Q near hub.
c. Weave bail G across bridge with two benders. Check for being free after adjusting.
d. Bend the arm which carries stud C, until C just contacts projection B.

3. To establish the basic non-add position No. 2 of selector L (Fig. VII-81).

With O.C.L. 60 at 'A' and Lane 5 control lever at normal, move driver M upward until stud J just moves into the pocket of projection I. Hold thus and move lever E rearward. There should be a minimum of movement of I toward stud J.

TO ADJUST, weave the bridge of lever E. Check E for being free after adjusting.

4. To ensure that Control Lane 5 (2 1/2 or 1 roller active) selects position 1 of L (Fig. VII-81).

Index lever C with a 2 1/2 roll. Selector L should align in position 1 and stud J (when M is raised) should have clearance from the front face of projection I.

TO ADJUST, open or close the U form of N. Check N for free after adjusting.

5. To establish home position of assembly H (Fig. VII-84).

The front leg of H should limit upon the post which pivots part G without disturbing the home limit of A (Fig. VII-83).

TO ADJUST, bend the front leg of H for earlier or later limit.

6. To ensure non-transfer when selector N is in position 2 (Fig. VII-84).

Index lanes 3 and 5 with No. 1 rolls. Stud P should cam selector N from position 1 to position 2. Lift link which carries stud O, stud O should move into the pocket of non-add projection I (Fig. VII-81) without camming N forward.

TO ADJUST, bend the rear arm of H (carrying stud P) up or down.

7. To ensure transfer (Fig. VII-84).

Index lanes 3 and 5 with 1 roll and depress key A. Stud F, thru Q (Fig. VII-84) or U (Fig. VII-85) should move stud P upward and allow spring M to pull N from 2 to 1. Stud O when raised should have minimum clearance from the front face of projection I (Fig. VII-81). TO ADJUST, turn eccentric S and tighten screw R.

NOTE: Part V should have a little play under stud F (Fig. VII-85) to allow passing clearance of V when bellcrank W is indexed on minus totals.

8. To ensure that amounts transfer and register 'B' and 'C' subtotal (Fig. VII-78).

Move O.C.L. 60 to 'B' the horizontal slot of E should align freely with button stud D. TO ADJUST, raise or lower limit plate O.

ADDING PINION CROSS SLIDING MECHANISM

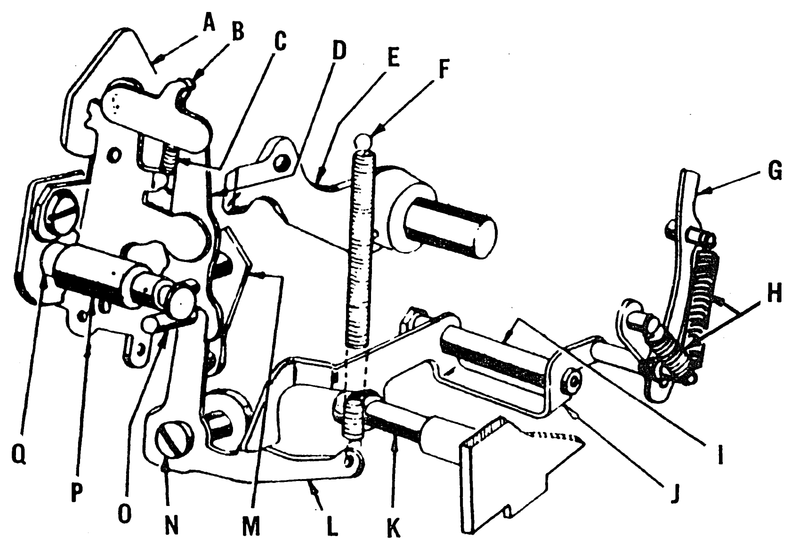


Fig. VII-86

Register 'B' adding pinions align with the adding sectors and carry racks when the hub of shaft P limits on side-member A. Shaft P is held with pressure upon side-member A by spear-point D, detent B and spring C.

Register 'C' adding pinions align with the adding sectors and carry racks when the flange collar Q limits upon a hub (not shown) on the inner face of member A.

The cross-sliding movement of the pinions is approximately .090". Because the movement is .030" more than the regular construction, spearpoint M has a different outline to the regular part.

Cross-sliding should not begin until the adding pinions are snugly located by the nursemaid bail.

To ensure accurate alignment of the adding pinions with the adding racks and the carry racks, collar Q is made in four lengths, .317" cadium plated, .327" steel colored, .337" copper plated, .322" black.

The method of cross-sliding is similar to the regular construction i.e., hatchet E camming spearpoint M, first one way and then the other. Linkage G indexes part L instead of the usual subtract indexing linkage.

REGISTER 'B' AND 'C' CARRY MECHANISM

This mechanism, since only add carries are involved, is a simplified version of the regular carry mechanism.

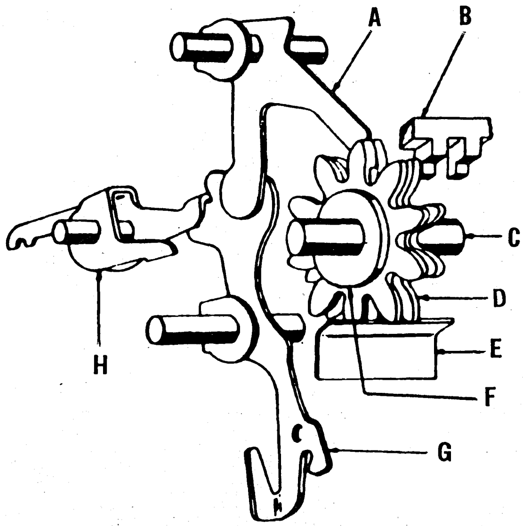


Fig. VII-87

The active pinion D aligns with the slot of comb B. The inactive pinion is prevented from turning by the stepped portions of the same comb.

Bail E prevents movement of all pinions when the register meshes with the adding sectors, when the section disengages, and during cross-sliding. The 10 pitch detent bail E is illustrated.

Carry pawl A and lower part G are located by separate guide combs. The guide comb for pawl A also serves as an over-throw limit which prevents latch H from getting below the second step of part G.

Detent comb B, which detents both 10 and 12 pitch adding pinions, is described under "Inactive Pinions are held by Comb (Figure VII-89)".

The special nursemaid bail, which detents both 10 and 12 pitch adding pinions, is described under "Bail detents Pinions (Figure VII-90)".

Carry pawl A has an outline to conform with the pinion tooth, which prevents movement of the pawl during transfer operations. Transfer operations 'A' to 'B' or 'C' causes the wide tooth of the adding pinions to limit hard against pawl A when adding sectors are released.

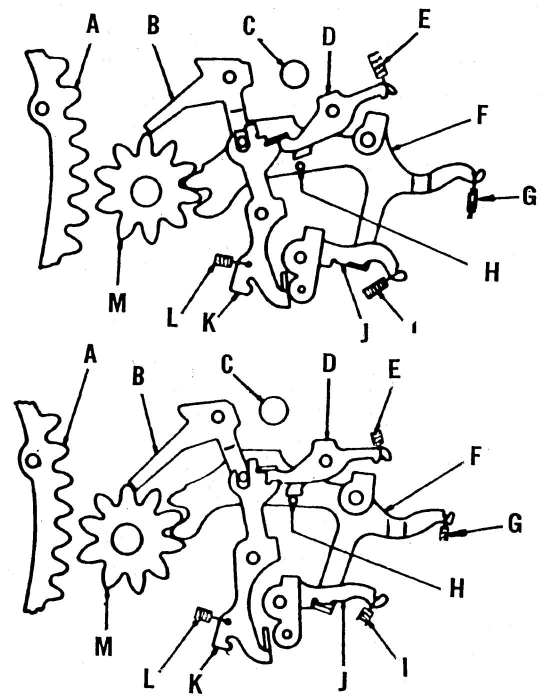


Fig. VII-88

<u>A Carry is Set (Fig. VII-88)</u> - When the active pinion M is turned by adding rack A, in a counter-clockwise direction, until the wide tooth contacts the underside of pawl B. Pawl B is rocked, and thru a forked connection with K, allows latch D to move from the first step to the second step of K. Latch D holds K, on the second step until pinion M meshes with carry rack F.

<u>A Carry is Completed (Fig. VII-88)</u> - When pinion M meshes with carry rack F, part K contacts and raises carry rack latch J. Carry rack F is rocked upward by spring G, to the carried position, (see lower diagram) and turns the adjacent pinion M one point.

Carry Pawl Resetting

When carry rack F moves upward, stud H raises latch D above the first step of K and allows spring L to reset B and K.

Carry Rack Resetting

Carry racks F are reset by shaft C when the register assembly is meshed with adding sectors A. As the register moves forward, shaft C moves downward and contacts the upper flat surface of carry rack F, moving the latter downward, permitting the rearward step on latch J to engage the lip of the carry racks.

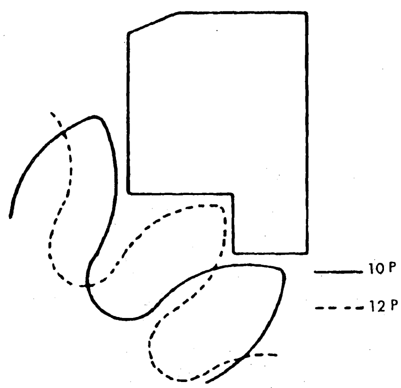


Fig. VII-89

Inactive Pinions are held by Comb (Fig. VII-89) - The illustration shows how the regular 10 pitch pinion straddles the two steps of the comb and how the 12 pitch pinion tooth enters the pocket formed by the two steps. One comb, therefore, suffices, for 10 pitch machines and for machines with decimal columns and one twelfth fractions: for example, machines of penny and farthings sterling construction.

Bail detents Pinions (Fig. VII-90) - The illustration shows a modification to the 10 pitch detent bail. This specially shaped bail detents both 10 and 12 pitch pinions. This is the bail required for machines with decimal columns and one twelfth fractions: for example, machines of penny and farthings sterling construction.

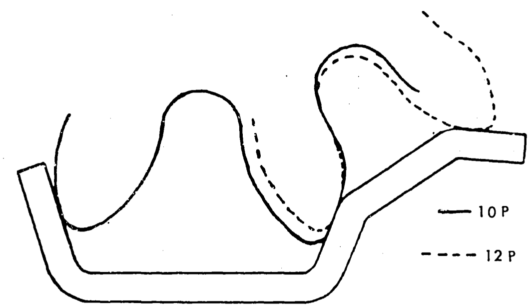


Fig. VII-90

To reduce the weight of this bail, and ensure speed of action, the 12 pitch detenting outline is trimmed away in all of the 10 pitch positions. Despite the reduction in weight this bail requires a spring which is stronger than the regular spring. A spring which fully activates the bail before cross-sliding of the adding pinions takes place.

Tests and Adjustments (Figure VII-86 through Fig. VII-90).

NOTE: These tests and adjustments apply particularly to machines of L.S.D. and L.S.D. & F. sterling construction, but the essentials also apply to 10 pitch construction.

Full entry of the aligning shaft into the teeth of the adding sectors is essential before adding pinions cross-slide. Therefore, cipher stop, keystem and adding sector brace adjustments must be correct before the following sequence of adjustments is applied.

1. To ensure alignment of adding pinions and adding sectors and clearance of the sector with the adjacent wide tooth to the left.

Mesh pinions with adding sectors and check for full hold of sector on the thin regular teeth.
TO ADJUST - Fit appropriately dimensioned spacer 1, (Fig. VII-86). Spacer is available in four sizes .317", .322", .327" and .337".

2. To ensure minimum side play of accumulator meshing shaft.

With machine normal, there should be just minimum play consistent with free action.
TO ADJUST - Turn screw in bracket P, (Fig. VII-81) and tighten nut.

3. To ensure correct position of hatchet E, (Fig. VII-86).

Hatchet E should have equal play on register 'B' and 'C' sides of spearpoint M.

TO ADJUST - Carefully align E, holding stock as near to shaft as possible when bending.

4. To ensure correct position of detent comb B (Fig. VII-87).

Comb B is staked by the Factory at each end to prevent lateral movement in slot. The shaft retainer ear (on both sides) is also peened over B to prevent up and down movement.

TO ADJUST - Check for play, and if necessary stake ends of B and peen ear of shaft retainer.

5. To ensure correct function of bail E, (Fig. VII-87).

   a. Pinion assembly at mid-meshing point, bail E should fully detent all pinions holding them without play (10p and 12p).
   b. Pinions meshed with carry racks, there should be .030" clearance of the top of the adding pinion tooth and the nearest part of bail E. Trip carry rack to turn pinion through one point when this check is made.
   c. Pinions meshed with adding sectors, there should be .015" to .020" clearance of bail E with the tip of adding pinion tooth.

TO ADJUST:

   a. Weave bail E at ends to secure a parallel condition.
   b. Bend the lower side frame projection.
   c. Bend the upper side frame projection.

NOTE: For (b) & (c) avoid bending the formed ears of bail E. Adjustment (b) may need refinement later. Check adjustment (No. 6).

6. To ensure no hold up of relay carry.

   a. Machine normal, there should be .012" clearance (as near as possible) between the formed ear of K, (Fig. VII-88) and carry rack latch J.
   b. Add all nines and then a one in the first column. Slow handle operation, the relay carry should not be held up by a late release of bail E, (Fig. VII-87).

TO ADJUST:

   a. Bend ear of K, Fig. VII-88.
   b. See No. 5b - gradually reduce the .030" clearance, little by little, until a clearance is secured which is consistent with no hold up of relay carry (but not less than .015").

7. To ensure no interference of adding pinions during cross-sliding (Fig. VII-87).

Adding pinions at mid-point of meshing, bail E holding 10p. and 12p. pinions without play.

Adding pinion teeth should be held clear of the active steps of detent comb B and clear of carry pawl A.

Clearance can be checked by manually holding bail E clear of teeth, and turning pinions to contact the steps of B or carry pawl A. When bail B is allowed to restore the pinions should be turned very slightly into a position of clearance. The respective movement of the extreme left and right pinions should be approximately the same.

TO ADJUST - If bail E is parallel to the adding pinions the adjustment called for should be satisfactory. If necessary refine the adjustment by weaving ends of bail E.

NOTE: If it is found necessary to refine the adjustment of bail E re-check adjustments Nos. 5 and 6.

P600 CARRIAGE RETURN UNIT SWITCH OPERATING MECHANISM (Fig. VII-91)

This switch operating mechanism supercedes the earlier mechanism which used an open type microswitch.

The enclosed type microswitch E, held by clips D to bracket B, is located out of the way of any oil, grease or dirt which may fall from the M.R.C. unit.

Switch E is operated by parts M and K which are connected by spring P to afford a yielding joint. When driver Q is moved downward it contacts M which pivots on the eccentric shoulder of O. Spring P pivots lever K, on the eccentric shoulder of O, and the formed ear of K moves upward to actuate the plunger of switch E and close the circuit to the motor. When driver Q is held latched by the inner and outer latches the ear of K should maintain switch E in the 'On' position.

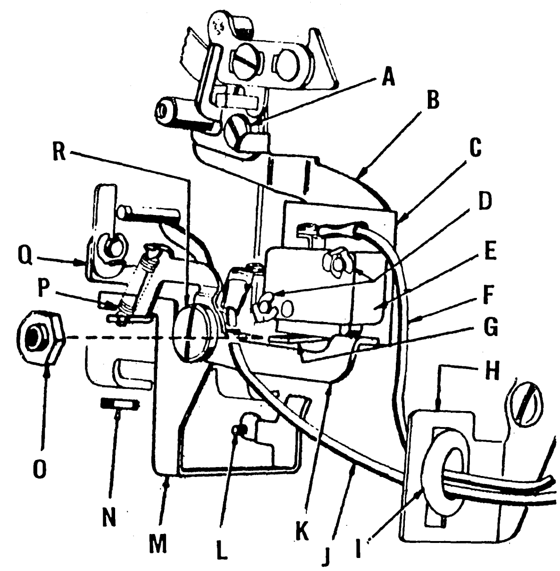


Fig. VII-91

Spring P, in conjunction with ear G, prevents damage to switch E when driver Q is moved beyond the latched position.

The eccentric shoulder of O, provides a means of adjusting the ear of K to the plunger of E.

Stud L moves bail M when the switch is actuated by the auto-totals mechanism.

Tests and Adjustments

NOTE: Before adjusting, loosen screw A and move switch E and bracket B to lower position, then tighten A.

1. To ensure positive function of switch E.
   a. Bail M, held upward against limit stud - there should be .010" clearance between ear of K and plunger of E.
   b. Driver Q in its latched position - the movement of K should be sufficient to close switch E and move plunger a further .010" to .015".
   c. Driver Q in its latched position - there should be .010" to .015" clearance between K and formed ear G.

TO ADJUST:
   a. Turn eccentric O and tighten screw R.
   b. Bend the arm of bail M where contact is made by Q.
   c. Bend ear G.

AUTOMATIC TOTAL DISABLING FROM MINUS SIGN OF REGISTER "A"

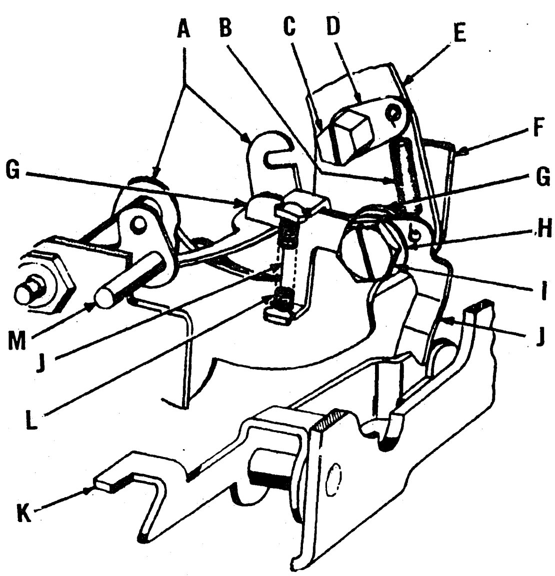


Fig. VII-92

This mechanism allows automatic total and subtotal operations when the sign of register 'A' is plus; but prevents these operations when the sign of register 'A' is minus.

Automatic operations take place when lever K is permitted to fully index. Automatic operations are prevented when lever K is blocked by part J.

Assume that the sign of register 'A' is plus. Bail A locates stud M in its downward position. Because of the tensions applied by springs B and L, arm G rests upon bail A and the rearward part of J is held clear of lever K. The latter, therefore, may index fully to auto-totals. When the sign of register 'A' is changed from plus to minus, bail A moves stud M to its upper position. Bail A raises arm G which in turn positions part J directly over lever K. The latter, therefore, can only be partially indexed and accordingly prevents auto-operations.

The notched profile of J, where it contacts K, ensures a positive blocking action, even when J is not centrally aligned with K.

The flexible joint between parts G and J permits full movement of stud M from the lower to the upper position in the event of lever K being prematurely indexed. It also prevents bail A from being bent by arm G should the carriage be moved quickly through auto-total positions. The rapid movement of K, when this happens, rocks K into contact with blocking leg of J too hard.

This mechanism relies on the blocking leg of J being moved into the blocking or non-blocking position (by the operation of the auto-one mechanism) before lever K is indexed by the control roll in lane 6. Therefore, tabulation from a carriage position (where add or subtract items may change the position of bail A) into a position where a total or subtotal indexes lever K requires a minimum distance of 1.2" between stops.

When the carriage rests in the position (where the auto-operation has been prevented) the operator may print the minus total or subtotal by depressing Motor Bar 2. This follows the regular practice used when auto-totals are disabled by the normal interlocks. An alternative to using Bar 2 would be to manually move the carriage to another position for adjustment or correction of the minus amount in register 'A'. Motor bars 1, 3, 4 and 5 should not be depressed even though these bars will not operate machine. If however, one of these bars is depressed and then released by the Error Key, arm DG (refer to Fig. VII-70) is freed from latch DE (refer to Fig. VII-70) and drops onto the upper face of the third latch. The third latch is held thus by the pressure exerted upon it by the trip arm until such times as the carriage (manually moved) seats against the stop block. An automatic operation ensues (a subtotal) even though a total was indexed in the position from which the carriage was moved.

Tests and Adjustments

NOTE: Be sure that the carriage tabulating speed and the rapid function of the Auto-One mechanism are satisfactory before beginning adjustments.

1. To ensure that arm G exerts the minimum opposition to bail A.

The tension of spring B should be just sufficient to limit arm G upon bail E in its plus sign position (stud M downward).

TO ADJUST, loosen hexagon headed screw C and position spring anchor D as required. Then tighten C.

2. To ensure that leg of J does not interfere with lever K when bail A is located with stud M downward.

Index amount in register 'A' to move stud M to its lower position. When lever K is indexed manually, it should move up without contacting the front edge of J.

TO ADJUST, hold J securely by the front portion and bend the rear leg of J.

3. To ensure that J prevents automatic operations.

Index amount in register 'A' to move stud M to its upper position. Move K upward until it is limited by J. Part AE, (refer to Fig. VII-66) should be held below lever D, (refer to Fig. VII-66) with safe clearance.

TO ADJUST, lengthen or shorten offset of the rear leg of J, as required.

Re-check Tests and Adjustment No. 2

4. To ensure free and full movement of bail A when the carriage selects the No. 3 and No. 1 roll positions of the hammer block.

Index amount in register 'A' to move stud M to its upper position. Manually move hammer block bail P (refer to Fig. VII-43) to position selected by No. 1 roll. Arm G should have a minimum of .010" play with the lower edge of the lip of the hammer block bail.

TO ADJUST, remove arm G and file stock from its upper edge.

Series P600

CARRIAGE RETURN IS DELAYED

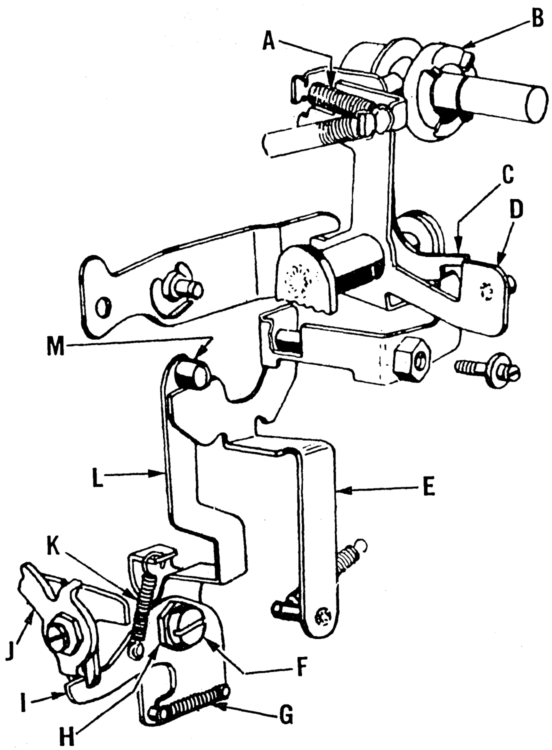


Fig. VII-93

The carriage return clutch is normally engaged at the end of the forward stroke; but in order to delay the return of the carriage from the selected position until the indexed register has been selected, a delay mechanism for the carriage return is necessary.

During the forward stroke of the machine driver J rocks lever I and locates roller M over the camming surface of lever E. Lever E being held, presents a blocking surfact to auxiliary clutch lever C.

Driver J, continuing its movement, performs the regular function of latching clutch lever D thru the outer latch. Since lever E blocks auxiliary lever C, the spring joint across the two clutch levers yields and the clutch does not engage.

Driver J returning to normal during the return stroke of the machine allows roller M to move just clear of the camming surface of lever E. Because the blocking function of part E is now removed, spring A is permitted to move clutch member B into engagement with the return gear and the carriage starts to return.

The carriage return delay mechanism ensures that the register selection lever (O.C.L. 60) having been moved from 'A' to 'B' stays at 'B'. Without this mechanism carriage return takes place a long time before pawl assembly D (refer to Fig. VII-94) is raised by the secondary. During the early stages of return, a No. 1 roll could actuate slide L and allow sufficient time for assembly D to drop and be raised at the end of the machine operation. This may move the register selection lever from 'B' to 'A' when operational requirements call for it to remain at 'B'.

Tests and Adjustments

1. To ensure that clutch member B does not secure a partial engagement with the return gear when roller M is positioned over the camming surface of blocking lever E.

Pull machine handle forward. Roller M should move over the camming surface of lever E without play or bind. Rock lever E to feel for play.

TO ADJUST, position eccentric H and tighten screw F.

NOTE: Excessive bind of roller M upon the camming surface of lever E may permit expansion of spring G and failure of lever L to locate in its blocking position.

2. To ensure that the clutch engagement is sufficiently delayed.

With machine normal, lever E should move upwards by the side of roller M with not more than .005" clearance. Clearance can be felt by rocking L.

TO ADJUST, bend the vertical arm of lever L so that roller M is located as stated. If this adjustment requires excessive bending of lever L, recheck adjustment 1.

NOTE: If the machine is operated by handle (power off) in a position where carriage return is indexed and the clutch members are engaged, lever E will move up the side of roller M. If the handle is pulled a second time roller M will be blocked by lever E and spring G will be expanded, thereby preventing damage to parts E and L.

REGISTER 'B' TOTALS AND SUB-TOTALS CARRIAGE CONTROLLED

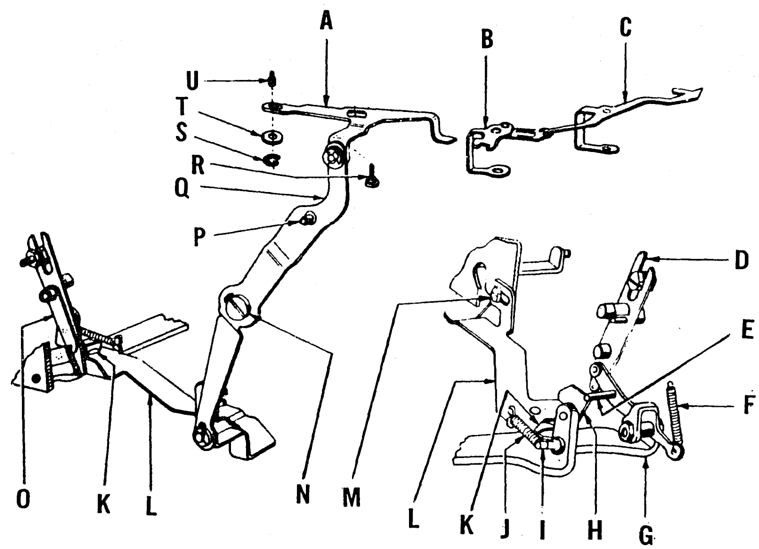


Fig. VII-94

This feature, which is only a means of moving the register selection lever (O.C.L. 60) from 'A' to 'B' or 'B' to 'A', operates in conjunction with the regular automatic total and sub-total mechanism. Movement of O.C.L. 60 from 'A' to 'B' is indexed in a carriage position in which the machine operates before the carriage moves into the auto-total position.

One machine operation is required to move O.C.L. 60 from 'A' to 'B'; another machine operation is required to move the lever from 'B' to 'A'. (This latter function may be obtained in the actual position where the 'B' total or sub-total is taken.)

This operation requires that O.C.K. 7-0 be unlatched and a No. 1 roll actuate control lever C in lane 3.

REGISTER LEVER IS MOVED FROM 'A' TO 'B' (FIG. VII-94)

Slide A is held to the underside of the carriage baseplate by screw R and post U. Screw R enters the center slot of 'A', passes through the carriage base plate, and screws into a carriage rail. Post U is riveted into the carriage base plate and slide A is held by washer T and clip S.

Lever Q pivots upon post P and is guided by shoulder screw N at the central slot. Post P, part of the special control panel plate, is longer than the regular post.

Slide L is located by two screws, K and M. The former screws into the front tie strap G and the latter enters a hole in the right hand side frame.

Spring J holds slide L and its connected parts Q and A at normal. This places vertical projection H (part of slide L) in such a position as to block the downward passage of stud E.

With O.C.K. 7-0 unlatched move the carriage into a position where a No. 1 roll activates control lever C. Lever C rocks lever B and the latter, in turn, but only in its final stage of movement, contacts the formed leg of slide A. Slide A, moves forward and rocks lever Q. Lever Q moves slide L rearward and takes projection H out of the path of stud E.

Operate the machine handle and allow pawl assembly D to be lowered during the early stages of the forward stroke. As the machine returns to normal arm O moves O.C.L. 60 from 'A' to 'B', or if the selection lever was at 'B' moves it to 'A'.

Assume, therefore, that the selection lever is moved from 'A' to 'B', and this completed, the carriage moves (tabulation or return) to a stop position where a No. 2 1/2 or a No. 1 roll indexes the control lever in lane 6. The machine operates as soon as it reaches this selected position and because O.C.L. 60 has been pre-indexed to 'B' an automatic total or sub-total is secured from register 'B'.

The register selection lever remains at 'B' until such times as another machine operation is made in a carriage position where a No. 1 roll actuates lever C. This operation may be seen by using two adjacent carriage positions, one in which it is required to move O.C.L. 60 from 'A' to 'B' and the second in which it is required to take a total of register 'B' and having done so, move the lever from 'B' to 'A'. In the first position a No. 1 roll should index lever C and in the second a No. 1 roll should index the control lever in lane 6 and another No. 1 roll index lever C.

LANE 3 CONTROLS REGISTER 'A' ADD OR NON-ADD (FIG. VII-95)

The basic function of lane 3 is register 'A' add and non-add control. To this has been added the auxiliary function of selecting or changing the position of O.C.L. 60. Since set-up requirements need some flexibility of add and non-add control in conjunction with the availability of changing the position of O.C.L. 60, provision is made as follows:

Option 1

a. Non-Add 'A' and activate O.C.L. 60 - No. 1 roll.
b. Add 'A' only - No. O roll.

Option 2

a. Add 'A' and activate O.C.L. 60 - No. 1 roll.
b. Non-add 'A' only - No. 2 1/2 roll.
c. Add 'A' only - No. O roll.

These options are secured by two different pawls D. The pawls are moved by the various sized rolls for certain positions with stud E in driver F. The positions are clarified by the illustrations of the individual pawls.

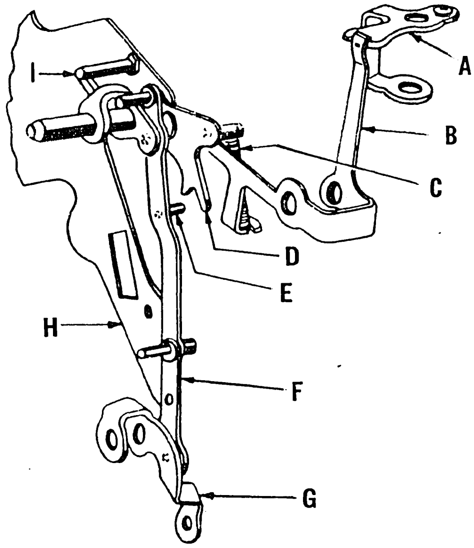
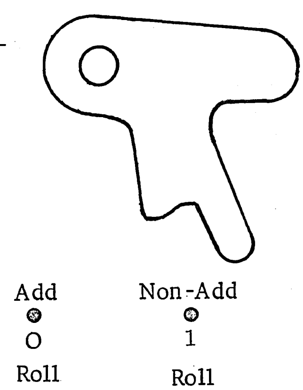


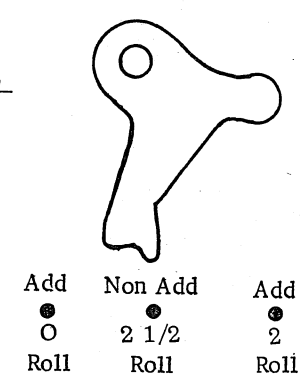
Fig. VII-95

Option 1



Option 1 uses the standard pawl and standard driver F.

Option 2



Option 2 uses the non-standard pawl and a modified driver F. The position of stud E is altered to suit the modified pawl.

REGISTER SELECTION LEVER SHIFT IS ALLOWED WITH CARRIAGE CONTROL LEVER AT '↑' (FIG. VII-96)

'↑', When the carriage control lever A is set at '↑', slide L (refer to Fig. VII-94) is moved rearward so that when O.C.K 7-0 is released, shuttle of the register selection lever is obtained in the regular manner.

Stud E, part of control lever A serves as the pivot for roller D. Therefore, forward movement of slide A moves roller D and in turn slide B moves forward. The forward position of slide A is the same as that indexed by a No. 1 roll on lane 3 control lever. The register shift mechanism is permitted to operate when O.C.K. 7-0 is released.

Roller D is shown holding slide B in the forward position.

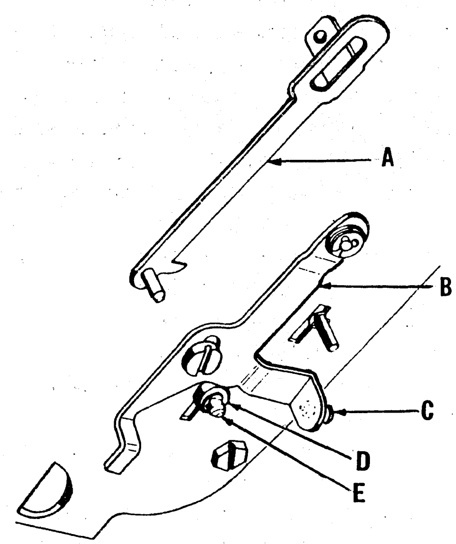


Fig. VII-96

REVIEW ITEMS FOR SERIES P600 MACHINES

1. What two units make up the carriage?
2. Of what does each of these units consist?
3. What are the seven lanes of carriage control and how are they numbered?
4. How is the form aligning table opened when the carriage is closed?
5. How is the form aligning table closed when the carriage is closed?
6. How are the platen pressure rolls opened as the carriage is opened and how are they closed as the carriage is closed?
7. When the form aligning table is manually closed with the carriage open, how are the platen pressure rolls partially closed?
8. How are the platen pressure rolls manually closed?
9. How is a machine operation prevented when the carriage is open?
10. How is opening of the carriage prevented during a machine operation?
11. From what four sources is vertical spacing indexed?
12. How is vertical spacing controlled by the space control lever?
13. How does a spacing cam index vertical spacing?
14. How is spacing indexed by the tabulation control lever or vertical space bar?
15. How does the platen control mechanism operate?
16. How is the carriage released to tabulate during the machine operation?
17. When is the carriage governor active?
18. When and how is the carriage governor disabled?
19. How is a machine operation prevented during carriage tabulation?
20. What is the purpose of the airpot and how does it operate?
21. How is the carriage manually released to tabulate?
22. From what sources is carriage tabulation disabled?
23. How is carriage tabulation disabled?

24. How is carriage return indexed?
25. Why are two latches required to hold the carriage return mechanism indexed?
26. How is automatic carriage and aligning table opening indexed?
27. How is automatic carriage opening delayed?
28. How is automatic carriage opening disabled when a carriage opening indexing key is active?
29. How does motor power return the carriage?
30. How is the carriage return mechanism normalized?
31. Where are the cams positioned to index and normalize a carriage return?
32. From what sources is carriage return disabled?
33. How is carriage returning disabled?
34. How is skip tabulation indexed?
35. How is skip tabulation released?
36. When does the ribbon wind on the right ribbon spool during the machine operation? On the left ribbon spool?
37. When is the direction of cross feeding of the ribbon reversed?
38. How does the ribbon reverse mechanism operate?
39. How is the red ribbon mechanism indexed from carriage control?
40. How does the primary section expand the hammer springs?
41. How are the hammers released to cause printing after the hammer springs are expanded?
42. How is the four position printing control mechanism indexed?
43. How is the printing control shaft actuated?
44. How does a printing control cam prevent printing in a column?
45. How does the cipher split mechanism prevent printing to the right of a split position?
46. How is printing permitted in Cols. 0, 1, and 2 during a clear total operation?
47. How is printing in Cols. 0 and 00 prevented during a motor bar operation without an amount indexed on the keyboard?
48. How does printing occur in Column 13 when the type bar is in cipher position?
49. How is a carriage controlled non-add operation indexed for register "A"?
50. How does the machine operation actuate the carriage controlled non-add mechanism?
51. How is a carriage controlled subtract operation indexed?
52. How does the machine operation actuate the subtract mechanism?
53. How is register "B" made an active register?
54. How do you transfer totals from register "A" to register "B"?
55. How is automatic subtotals indexed?
56. How is automatic totals indexed?
57. What two sources trip the machine drive mechanism on machines containing automatic totals?
58. How are automatic totals disabled from motor bars and OCK's except the plus motor bar?
59. How is an automatic machine operation prevented until a result key is latched depressed?
60. What three sources release the drive trip arm during an automatic total operation?
61. What three sources disable automatic totals?

Burroughs

FULL KEYBOARD

ADDING and BOOKKEEPING MACHINES

INSTRUCTION BOOK

Section VIII

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SERIES P FEATURES

Printed in U.S. America 9-20-65

For Form 3784

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Series P Features

CARRIAGE MECHANISMS

REWIND DEVICE

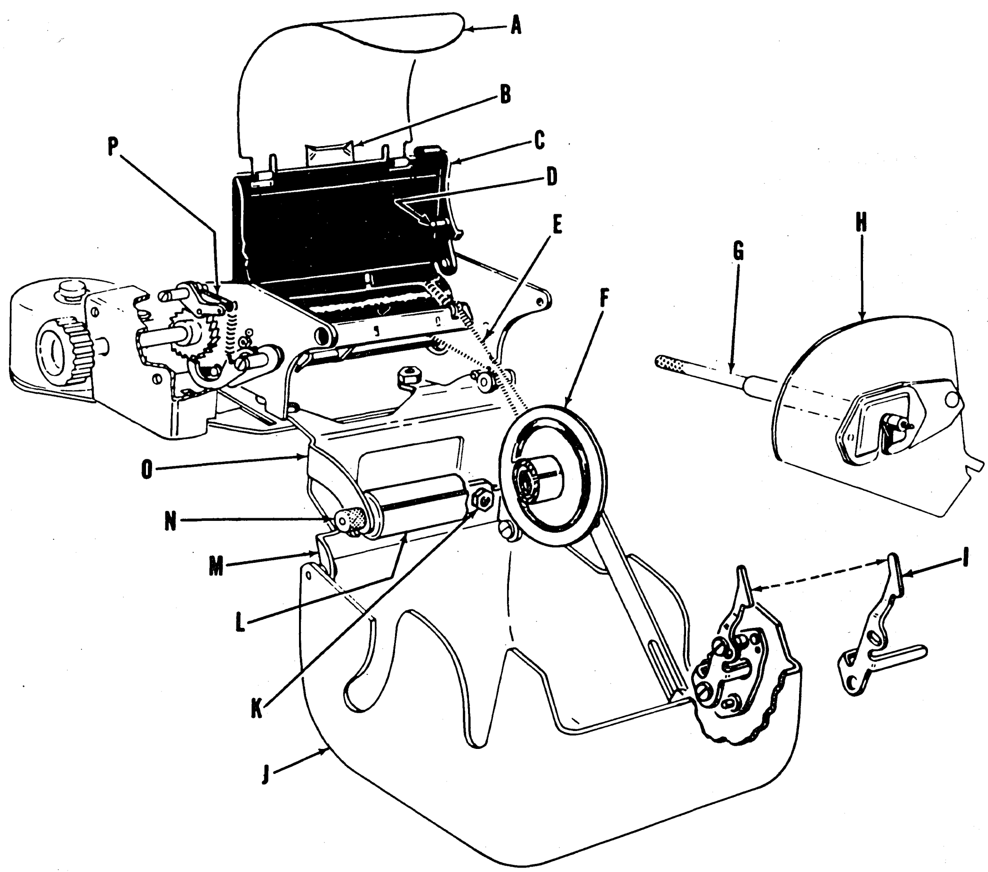


Fig. VIII-1

The rewind device provides a means of transporting and storing the roll paper after printing. This mechanism may be used on various styles of carriages including the 3 7/8", 6" front feed, and the 7 1/2". Although the appearance may vary with the style of carriage the function remains the same.

Roll paper (either 2 1/4" or 3 7/16") is placed on shaft G and feeds around the platen and over writing table C and shield A. The end of the paper is threaded into the slot of spool L. Cover J is closed and latched with latch I and stud D.

As the platen turns, rewind spool L is rotated through rewind spring belt E. The paper is stored on spool L and is removed from the device by pulling out plunger N. Guard F prevents the rewinding paper from catching on spring E.

Detent P serves as a protective feature, preventing the platen from being turned back thereby safeguarding against alterations of recorded amounts.

Tests and Adjustments

1. To assure proper alignment of the rewind cover with the carriage sideframes -
   Rewind cover J should align squarely with the carriage sideframes and swing open and closed freely.
   TO ADJUST:
   a. Loosen nuts K and reposition bracket M.
   b. File rewind cover J for clearance of the carriage sideframes.

2. To assure latching and unlatching of the rewind cover -
   Latch I should latch under stud D when the rewind cover is closed and should release freely from the stud when lowered.
   TO ADJUST, bend latch I.

3. To assure free movement of rewind spool L -
   With rewind spring belt E removed from around the rewind spool, check the rewind spool for being free to rotate.
   TO ADJUST, bend the rear projections of bracket O.

4. To assure the proper functioning of paper shield A -
   When in its rearward position, shield A should be flush and parallel to the edge of plate H.
   TO ADJUST, bend the corners of limit B.

DOUBLE WOUND PAPER INSERTION

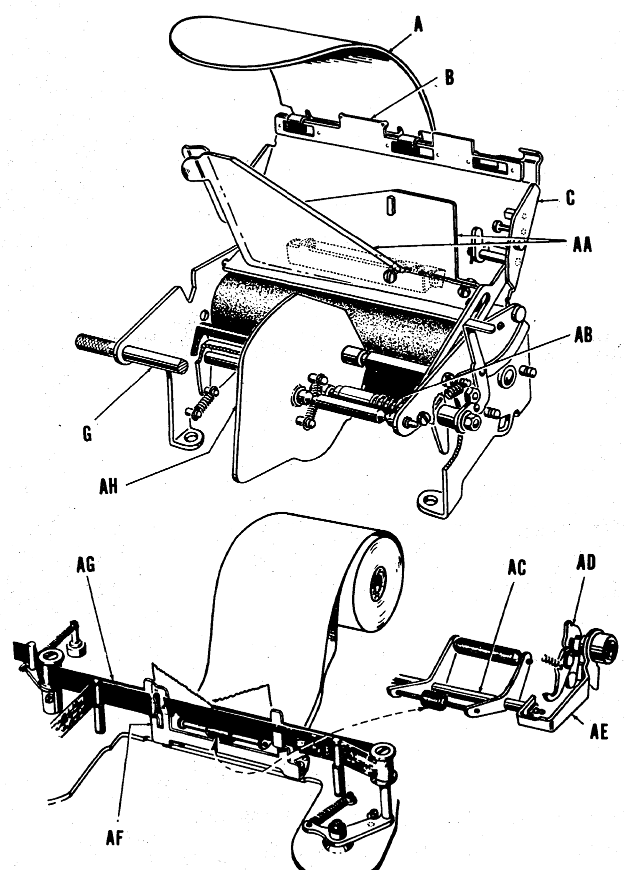


Fig. VIII-2

Rewind carriages handling double wound (2 ply) paper are equipped with a double ribbon mechanism to obtain a print of amounts on both paper plies. The inner ply of paper feeds between the strands of ribbon AG and under the tear-off blade where it can be torn off at intervals for use as a receipt. The outer ply feeds behind both strands of the ribbon under the tear-off blade and on to the rewind device where it is stored. This outer ply provides a record of each transaction for audit purposes.

Knives AA and form fingers AF facilitate insertion of the double wound paper. The roll paper is placed on shaft G feeding from the top (as indicated by the red scribe mark on plate AH). The writing table and knives swing forward and the paper is placed in between the knives. One ply is torn off, the knives are swung rearward and the second ply is torn off. The paper is removed from the knives and fed in behind and around the platen. The reverse angle of the cut on the paper plies cause the form fingers AF to guide each ply of the paper in proper position in respect to the ribbon strands.

Pressure roll release arm AE is furnished on carriages using double wound paper for maintaining alignment of the two plies and prevent pleating of the outer ply which could raise the ribbon above the printing line.

Arm AD engages the rear lip of the pressure roll release arm at the end of the forward stroke after printing has taken place, moving the forward portion of the arm downward, lowering shaft AC, releasing the pressure rolls and permitting the paper to realign itself.

Plate AH, under the tension of spring AB, applies an even pressure on the side of the roll to safeguard against shifting or unwinding of the roll which could affect the paper feed.

REWIND COVER, LATCH AND LOCK

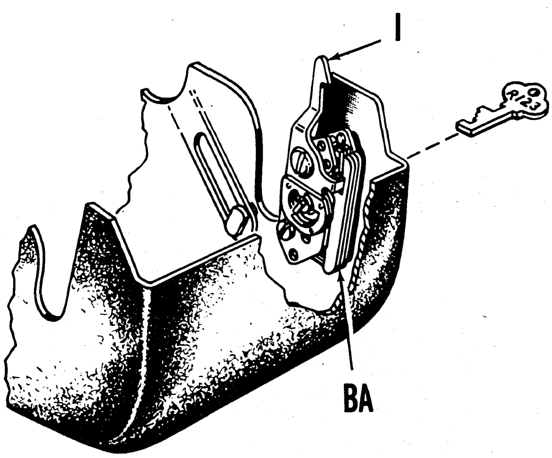


Fig. VIII-3

The rewind cover may be retained in closed position through manual latch I or locked closed by means of a lock assembly. Variations in lock combinations may be obtained by regrouping tumblers BA.

5/6" SPACING CONTROL

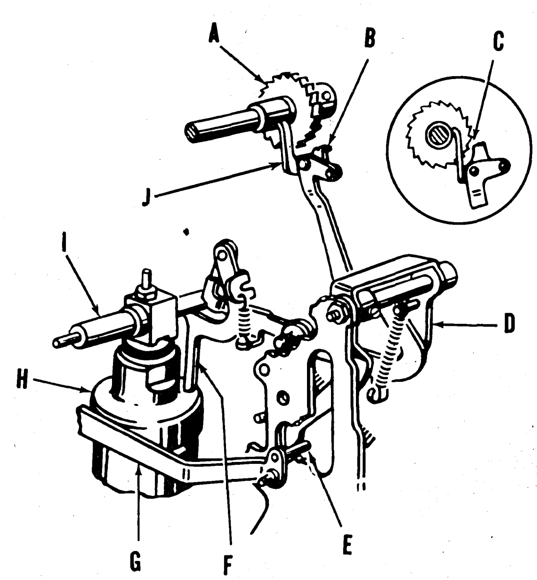


Fig. VIII-4

Depression of a specified operation control key rocks arm G and stud E, rocks bail assembly D, placing the pass-by pawl on the forward arm of bail assembly D over dashpot hanger shaft I. As shaft I is raised during the forward stroke of a machine operation, bail assembly D is raised. On the return stroke as bail assembly D is restoring to normal; lips B engage the teeth of spacing gear A to space the platen 5/6". Lip J contacts the sleeve on the platen shaft at the end of the return stroke of the machine operation and disengages lips B from spacing gear A.

Tests and Adjustments

1. To assure correct 5/6" platen spacing -
   a. With bail assembly D in its normal position (projection F resting on dashpot cap H), bail assembly D should have minimum clearance over stud E.
   b. With the total key depressed, lips B should have minimum clearance behind spacing gear A at point C; and, at the end of the return stroke of a total operation, lips B should fully disengage from spacing gear A. Also, during the return stroke, spacing gear A should be rotated five full spaces.

TO ADJUST:
   a. Weave bail assembly D.
   b. Bend finger J.

3 7/8" AND 6" CARRIAGE-SPACING CONTROLS

Space or non-space of the platen may be indexed from carriage or keyboard controls superseding the normal operation of the machine, i.e., shifting a moveable carriage to a predetermined stop position or depressing a specified control key actuates controls permitting or preventing the spacing pawl from engaging the spacing gear.

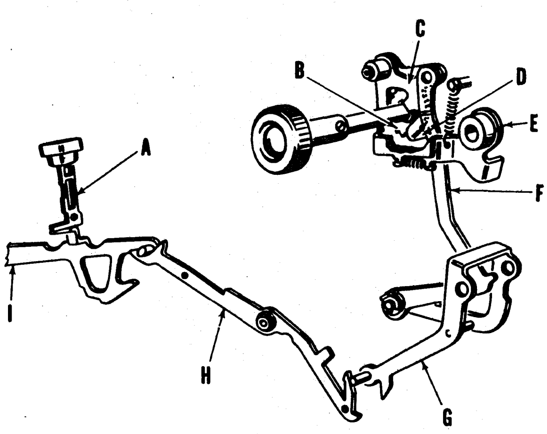


Fig. VIII-5

Figs. VIII-5 and VIII-6 illustrates the non-space controls usually found in validating - receipting machines equipped with a 3 7/8" carriage.

Depression of key A rocks non-add arm I, lever H, and bail G. Rocking of bail G lowers link F to rock shutter C downward into active position. With shutter C active, lip D prevents the platen feed pawl from engaging spacing gear B. Shutter C also disables the pressure roll release by expanding the broken joint in pressure roll release arm E, thereby preventing possible shadow print.

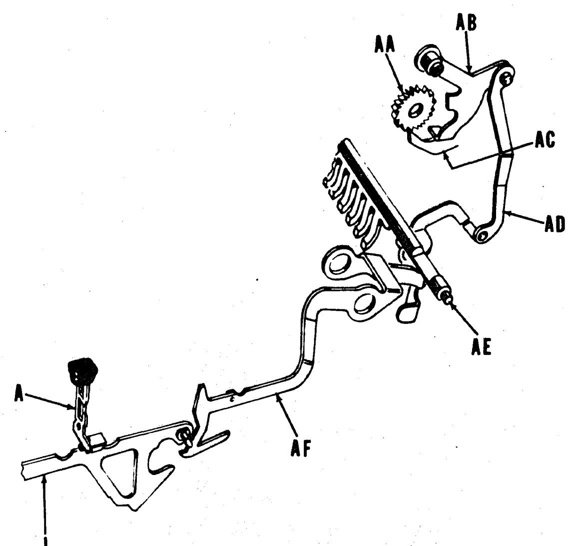


Fig. VIII-6

Depression of key A through non-add arm I and lever AF rocks shaft AE to lower link AD. Lowering of link AD swings lever AB downward, preventing feed pawl AC engaging spacing gear AA.

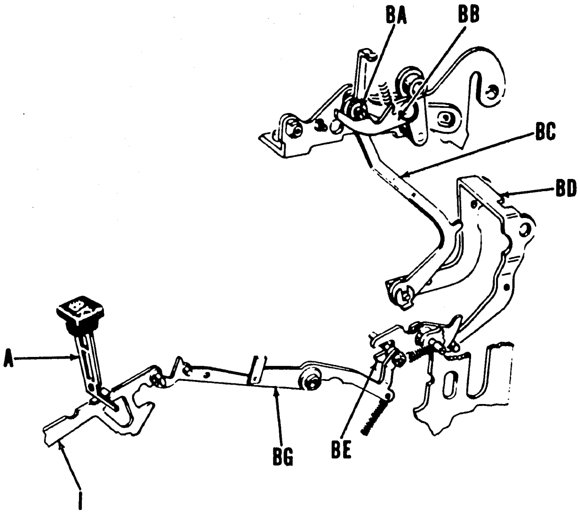


Fig. VIII-7

Fig. VIII-7 illustrates the non-space control usually found on validating-receipting machines equipped with a 6" carriage.

Depression of key A through non-add arm I, levers BG and BE rocks bail assembly BD to lower link BC. Lowering of link BC through stud BA prevents feed pawl BB engaging the spacing gear.

Tests and Adjustments

1. To assure spacing or non-spacing of the platen -
   a. Lip D, Fig. VIII-5 should have a safe clearance over the feed pawl during a normal spacing operation but should block the carriage feed pawl engagement with spacing gear B, Fig. VIII-5 when platen non-spacing is indexed from a key on the keyboard.
   b. The lip on shutter AB, Fig. VIII-6 should have a safe clearance over the feed pawl during a normal operation but should block the carriage feed pawl engagement with spacing gear AA when platen non-spacing is indexed from a key on the keyboard.
   c. Stud BA, Fig. VIII-7 should have safe clearance over feed pawl BB, Fig. VIII-7 during a normal spacing operation but should block carriage feed pawl BB, Fig. VIII-7 engagement with the spacing gear when platen non-spacing is indexed from a key on the keyboard.

   TO ADJUST, weave bail G, Fig. VIII-5.

2. To assure disabling pressure roll release arm E, Fig. VIII-5 on a non-space operation -
   a. There should be approximately 5/32" clearance between the foremost end of arm E, Fig. VIII-5 and the carriage bottom plate when the handle is pulled all the way forward.
   b. The left front projection of arm E, Fig. VIII-5 should have full hold on the right end of the pressure roll shaft when the machine is in home position.
   c. The left front projection of arm E, Fig. VIII-5 should have minimum clearance in front of the pressure roll shaft when a non-space operation is indexed from a key on the keyboard.

   TO ADJUST:
   a. Bend the rear right angle lip of arm E, Fig. VIII-5 which is contacted by the feed pawl.
   b. Bend the foremost "U" form of arm E, Fig. VIII-5. Recheck for flush lateral hold on the large diameter portion of the pressure roll shaft.
   c. Peen the foremost finger of shutter C, Fig. VIII-5 near the top.

12 1/4" CARRIAGE - SPACE, NON-SPACE CONTROLS

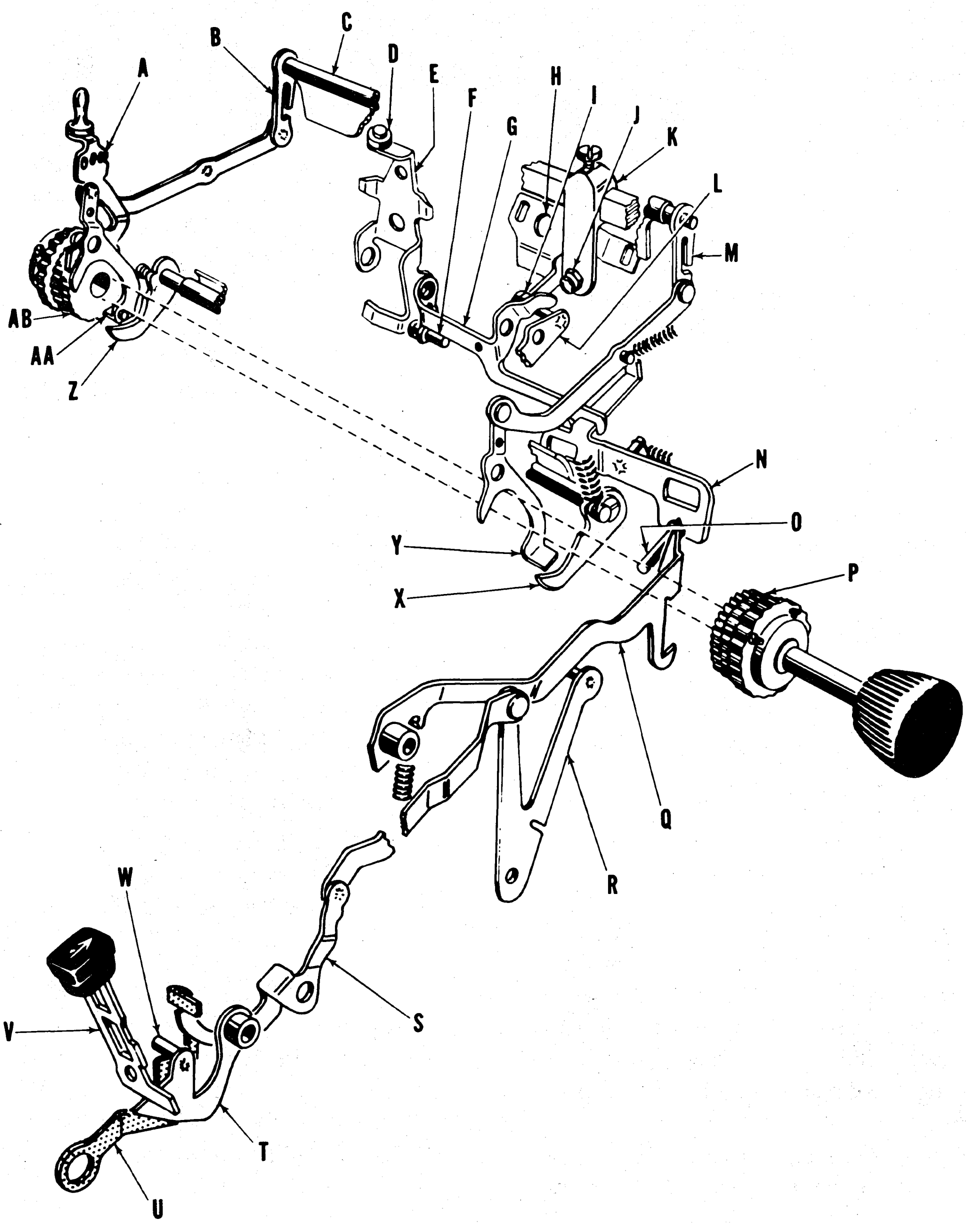


Fig. VIII-8

Feed pawls X and Z are actuated during each machine operation to space or non-space both sides of the split platen. Normally, shutter Y and AA are active preventing the feed pawls engagement with the spacing gears which prevents form spacing. However, depression of a specified control key in the keyboard or shifting of the carriage to a form space position moves the shutters to inactive position and permits the feed pawls to engage the spacing gears and rotate the platen to space the form.

Depression of key V rocks lever T and stud W lowers arm U. Lowering of arm U through levers S, R, and Q moves slide N to the left. With slide N positioned to the left; the rearward hooked projection of bail G is over rightmost roll I. As the machine operation progresses, arm L moves rearward rocking bail G, which in turn rocks bail E through stud F. Rocking of bail E moves spacing control bail C forward through roll D, positioning shutters Y and AA into inactive position, permitting space pawls X and Z to engage the spacing gears.

Shifting the carriage to a form space position locates stop K directly behind bail E. With the carriage as positioned, screw J retains bail E and spacing control bail C forward with shutters Y and AA in an inactive position. Space pawls X and Z are permitted to engage the spacing gears.

Lever A selects non-space, single or double space of the forms.

Tests and Adjustments

1. To assure proper functioning of non-space mechanism as indexed through keyboard controls -
   a. Brace H should support roll I without sagging or binding of the roll, and the forward projection of the brace should align with left half of roll I.
   b. With the machine in home position and the play in bail G held to the left (without changing the normal position of slide N), the rear hooked projection of bail G should not position over roll I.
   c. With key V in normal position and bail G manually shifted to the left, there should be minimum clearance of the rear projection of bail G over roll I.
   d. With the carriage shifted to the right and bail C rearward, roll D should just contact bail C.

   TO ADJUST:
   a. Loosen the two screws holding brace H and move the brace up or down. Bend the forward projection of brace H to the left or right.
   b. Bend the rear hooked projection of bail H to the right or left.
   c. Bend the lip on the lower projection of bail E forward or rearward.
   d. Bend the upper portion of bail E.

2. To assure proper functioning of the non-space mechanism from carriage controls -
   With the carriage shifted to the left (stop K directly behind bail E) and lever A in its rearward (non-space) position, shutters Y and AA should be rocked sufficiently to expose one tooth of the spacing gears.
   TO ADJUST, turn screw J in or out and lock with the locking nut for adjustment on both shutters, or using a screw driver or pliers spread or close the slot in links B and M.

6" FRONT FEED CARRIAGE

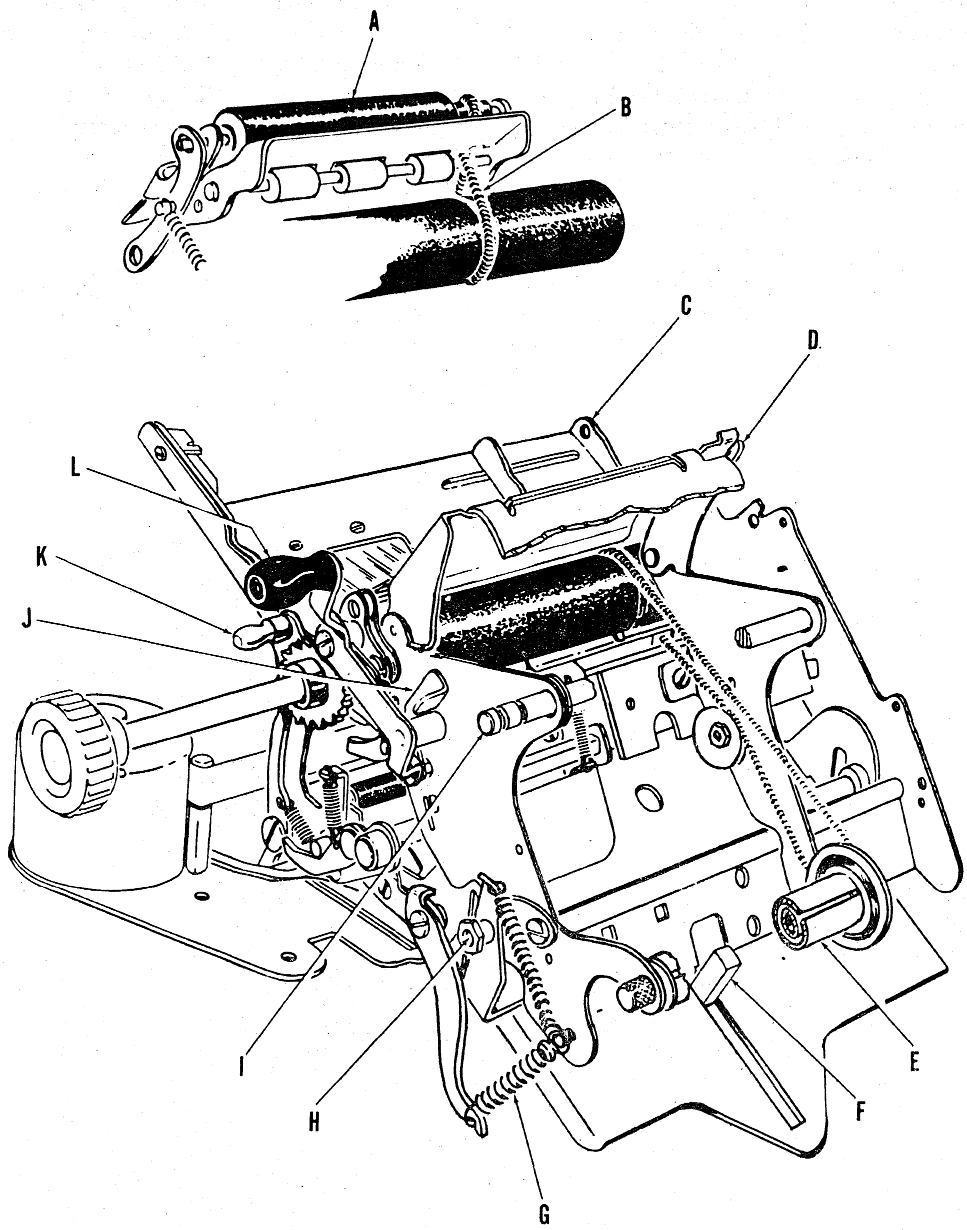


Fig. VIII-9

An essential factor in validating-receipting operations is the rapid insertion and alignment of forms. Applications requiring the insertion of a passbook or ledger card find the front feed carriage advantageous.

The carriage may be opened manually by lever K, or automatically by a machine operation. Movement of lever K releases the upper portion of the carriage which pivots on screws H, and tension of spring G opens the carriage.

With the carriage open, the platen is separated from the pressure rolls thus providing space for insertion of forms. Form aligning table C swings downward to facilitate form insertion.

The depth to which the form may be inserted is regulated by adjustable limit stop F. The carriage is manually closed through lever L.

Additional pressure rolls are provided on the front feed carriage to safeguard against form shifting while printing or spacing. The pressure rolls are released through lever J.

The carbonized roll paper is mounted on shaft I, feeds around the platen, up and over writing table D and on to rewind spool E.

Some styles of front feed carriages are not equipped with a rewind device. On these carriages, upper pressure roll mechanism A is provided. Spring belt B turns the upper pressure roll, keeping slack out of the paper thereby providing smooth paper feed.

FORM LIMIT STOP - SELECTIVE AND ADJUSTABLE

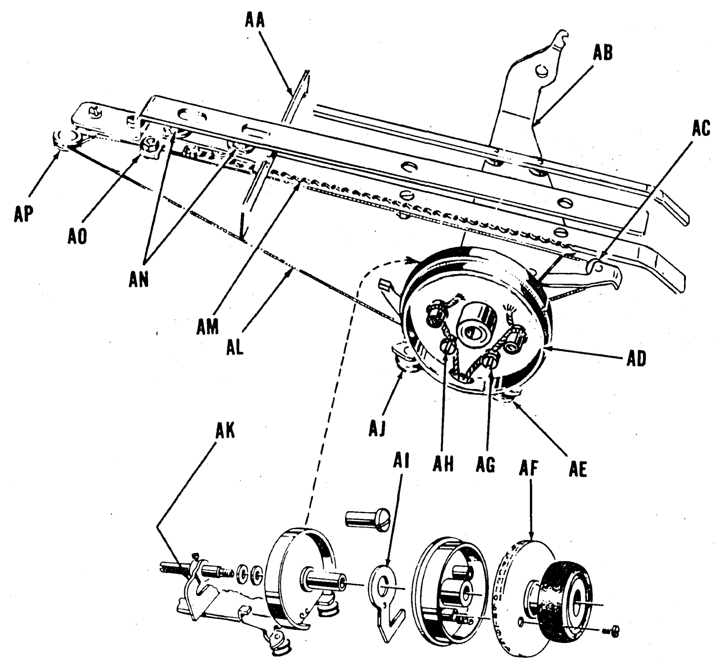


Fig. VIII-10

The selective form limit stop mechanism is provided on some front feed carriages to facilitate the insertion of columnar forms. Before the form is inserted, the desired printing line is selected by setting dial AF on the number corresponding to the desired printing line. Turning of dial AF, through cord AL, locates form limit stop AA in proper position on rack AM limiting the depth to which the form may be inserted.

Stop AI limits the movement of dial AF in either direction, thereby safeguarding against breakage of cord AL. The particular stop AI to be used is determined by the angle at which No. 1 graduation varies from an imaginary line drawn through the two screw holes in the dial. The following table may be used:

Angle	Stop
30^{o}	No. 1
33^{o}	No. 2
40^{o}	No. 3
0^{o}	No. 4

AUTOMATIC CARRIAGE OPENING

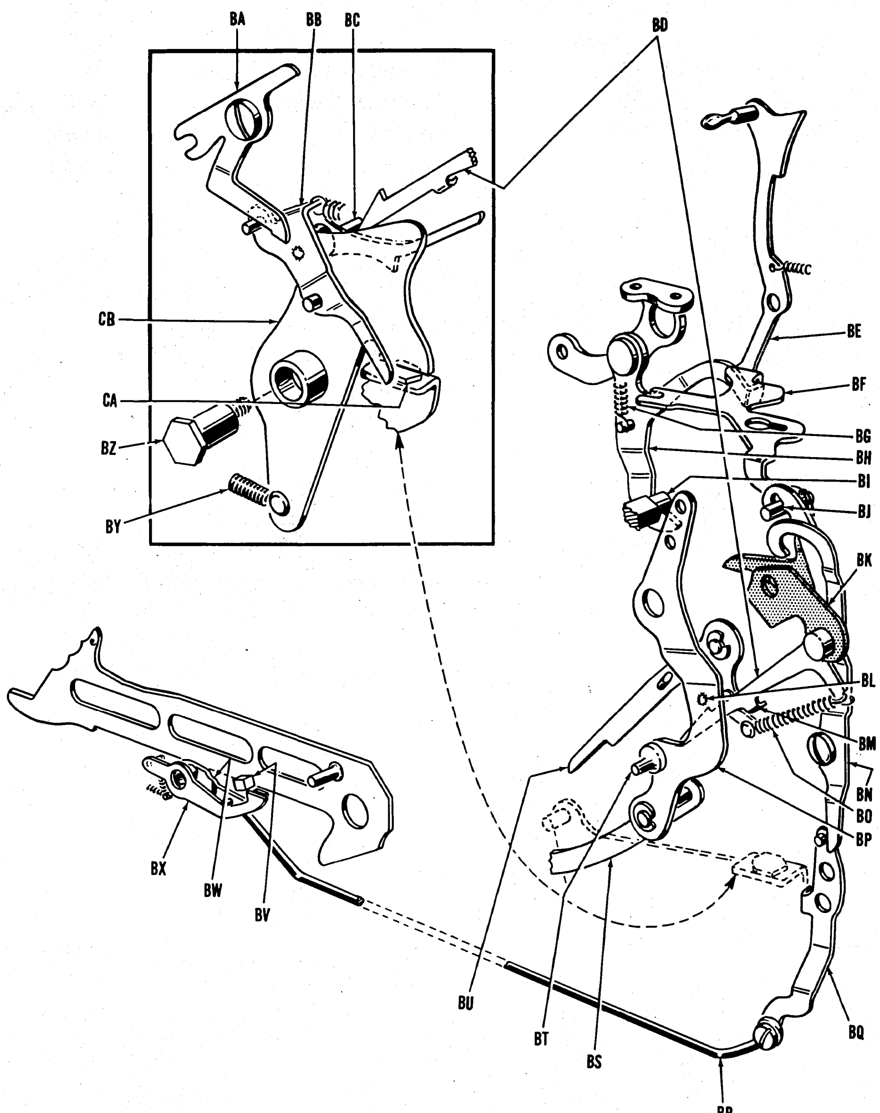


Fig. VIII-11

Automatic carriage opening is indexed when the step on the inner arm of pawl BB is positioned in the path of stud BT.

In some machines, the normal position of pawl BB is in the path of stud BT. The pawl must be positioned out of the path of the stud by keyboard controls to disable automatic carriage opening. In other machines the reverse is true, pawl BB is normally out of the path of stud BT and must be positioned in the path of the stud to index automatic carriage opening.

During a machine operation, arm BP is driven rearward, then forward, through link SS and the secondary power section. With automatic carriage opening indexed, stud BT engages the step of pawl BB at the beginning of the return stroke, driving pawl BB and rocker arm assembly CB forward. As rocker arm assembly CB moves forward, stud BC moves away from hook BD permitting the tension of spring BO to position the step of hook BD in the path of stud BL.

Toward the end of the return stroke, stud BC latches on the step of latch BU holding rocker arm assembly CB forward with spring BY expanded. Following the latching of stud BC (and the rocker arm assembly) on latch BU, stud BL engages the step of hook BD moving BD forward, rocking bail assembly BK and through stud BJ moves slide BF rearward. Rearward movement of slide BF rocks lever BE, automatically opening the carriage.

At the end of the return stroke, lip BM contacts the lower rear projection of latch BU, raising the latch and releasing rocker arm assembly CB. Tension of spring BY returns the rocker arm assembly to normal. Stud BC releases hook BD from stud BL permitting hook BD, assembly BK and slide BF to restore to normal.

Interlocks Safeguard Against Misoperation

A machine operation is prevented when the carriage is open. With the carriage open, slide BF is held rearward and stud BJ, levers BN and BQ, and wire BR positions latches BW and BX into the path of stud BV on the restoring slide. Latch BW is active when a machine operation is attempted with the carriage open on all operations except an operation following depression of OCK 6-0. On an OCK 6-0 operation, the restoring slide is in its lowered position and an earlier limit must be provided to assure that a safeguard partial machine operation (handle break) will take place. Latch BX provides the earlier limit.

An additional safeguard is provided by interlock BH. At the beginning of a machine operation, dashpot hanger shaft BI is raised permitting the tension of spring BG to raise interlock BH. With the interlock raised; the lip on its rear projection is positioned behind the foot of carriage opening lever BE thereby preventing the carriage from being opened after a machine operation has begun.

AUTOMATIC CARRIAGE OPENING DISABLING MECHANISM

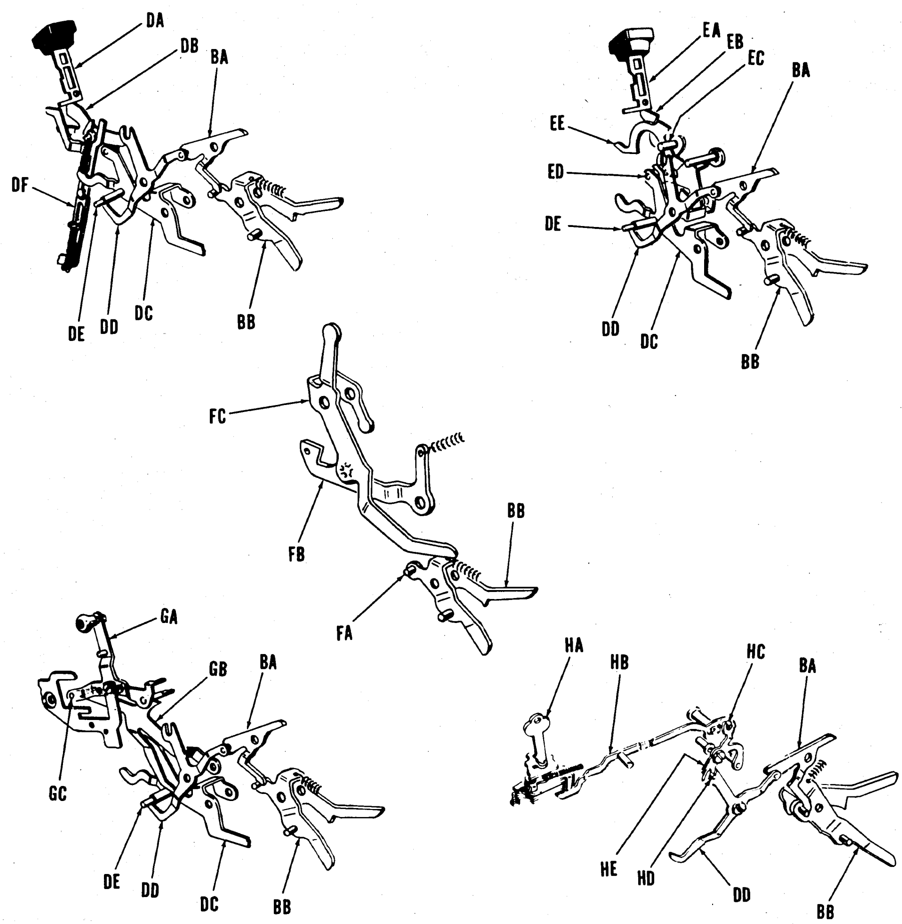


Fig. VIII-12

When the machine construction calls for pawl BB to be normally positioned in the path of stud BT, Fig. VIII-11, the carriage will automatically open during each machine operation unless pawl BB is repositioned by the depression of a specified OCK.

Depression of key DA (OCK 8-0) repositions pawl BB through arm DB, link DF, arm DC, stud DE, Lever DD, and bellcrank BA.

Depression of key EA (OCK 9-0) repositions pawl BB through arm EB, stud EC, arm EE, stud ED, arm DC, stud DE, lever DD, and bellcrank BA.

Shifting of lever FC (OCL #54) rearward repositions pawl BB as the foot of lever FC contacts stud FA. Detent FB retains lever FC in its rearward position.

Shifting of lever GA (OCL #51) repositions pawl BB through stud GC, arm GB, and stud DE (on arm DC), lever DD and bellcrank BA.

Turning of key HA (position 2-0) repositions pawl BB through link HB, stud HC, arm HE, stud HD, lever DD, and bellcrank BA.

Tests and Adjustments

1. To assure correct positioning of the selective form limit stop -
With the form limiting against stop AA, Fig. VIII-10, take a sample print and check alignment of the print with the line of the form.
TO ADJUST, loosen nuts AN, Fig. VIII-10 and shift stop AA, Fig. VIII-10.
NOTE: Eccentric screw BZ, Fig. VIII-11 and limit screw CA, Fig. VIII-11 were required on ticket making machines using a rocker arm mechanism similar to CB, Fig. VIII-11. Their effect on the operation of the mechanism covered here is limited. Before proceeding with the following adjustments, turn the high side of eccentric screw BZ, Fig. VIII-11 toward the front of the machine and turn limit screw CA, Fig. VIII-11 all the way into the bracket and lock with the lock nut.

2. To assure full movement of slide BF, Fig. VIII-11 -
Slide BF, Fig. VIII-11 should be moved rearward sufficiently to rock lever BE, Fig. VIII-11 and open the carriage.
TO ADJUST, weave the bail portion of bail assembly BK, Fig. VIII-11.

3. To assure the carriage opening mechanism restores to normal -
Latch BU, Fig. VIII-11 should be raised sufficiently at the end of the machine operation to release stud BC, Fig. VIII-11 and rocker arm CB, Fig. VIII-11.
TO ADJUST, bend latch BU, Fig. VIII-11 to close the clearance between the lower rear projection of latch BU, Fig. VIII-11 and lip BM, Fig. VIII-11.

4. To assure the disabling of the automatic carriage opening mechanism from keyboard controls -
With operation control key DA or EA, Fig. VIII-12 depressed or operation control lever FC, or GA, Fig. VIII-12 indexed or with key HA, Fig. VIII-12 half turned counterclockwise; stud BT, Fig. VIII-12 should clear the step of pawl BB, Fig. VIII-12 at the beginning of the turn stroke of a machine operation.
TO ADJUST, bend the rearmost projection of lever DD, Fig. VIII-12.

5. To assure a safeguard partial machine operation (handle break) when a machine operation is attempted with the carriage open -
Following both an OCK 6-0 and an OCK 5-0 machine operation, manually open the carriage and check first for both latches BW and BX, Fig. VIII-11 to be positioned behind stud BV, Fig. VIII-11, then for only latch BW, Fig. VIII-11 to be positioned behind stud BV, Fig. VIII-11.
TO ADJUST, bend the lower projection of lever BN, Fig. VIII-11.

CARRIAGE 12 1/4" (W2)

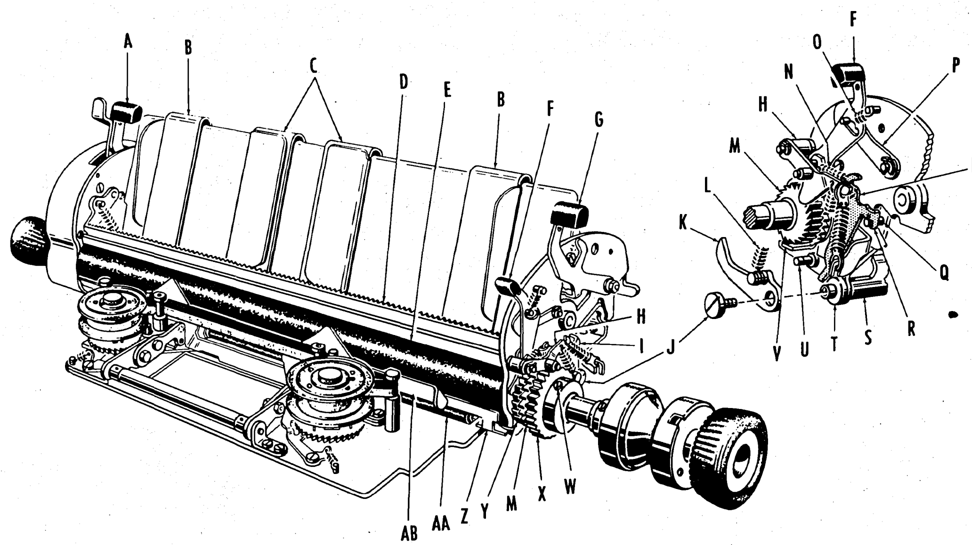


Fig. VIII-13

The 12 1/4" Style W2 carriage accommodates forms or various widths of roll paper up to 11 7/8" wide. Forms and roll paper are inserted downward behind platen E and fed up between the platen and pressure rolls AA. Shifting of the carriage provides a means of posting amounts in the various columns of forms.

Form guides B and paper guides C are adjustable to accommodate various widths of forms and roll paper. Insertion of heavy or multiple forms is facilitated by guide strip I and moveable tearoff blade D.

Easy alignment of the printing media is made possible by a latching device that holds pressure roll release lever A when the latter is moved forward to release the tension of pressure rolls AA from platen E.

The removeable cover on the rear of the carriage retains the two plastic roll paper holders in any desired position along width of the carriage.

VERTICAL SPACING INDEXED BY SPACING CONTROL LEVER

Spacing control lever F may be located in any of three positions - forward, intermediate, or rearward. When lever F is in the forward position, non-spacing (0") of the platen is indexed; in the intermediate position, single (1/6") spacing is indexed; and in the rearward position, double (1/3") spacing is indexed. Moving lever F positions shutter V to permit space pawl K to pick up no teeth, one tooth, or two teeth of spacing gear M. Detent P under the tension of spring O retains the spacing control lever in the selected position.

Spacing pawl K is moved rearward and forward by spacing bail S during each machine operation. As pawl K is moved forward, spring L causes engagement of pawl K with the teeth of spacing gear M and rotates the platen the number of spaces determined by the position of space control lever F. At the end of the return stroke, spacing pawl K is cammed downward by stud U and is disengaged from the spacing gear.

Full and even spacing of the platen is ensured by the platen control mechanism which prevents overthrow of the platen. During the forward stroke, stud Q contacts lip R to move detent I out of engagement with gear Y. During the return stroke as stud Q moves forward, spring N rocks detent I into engagement with gear Y just as spacing pawl K is being disengaged from gear M, thus preventing overthrow of the platen.

REAR VIEW

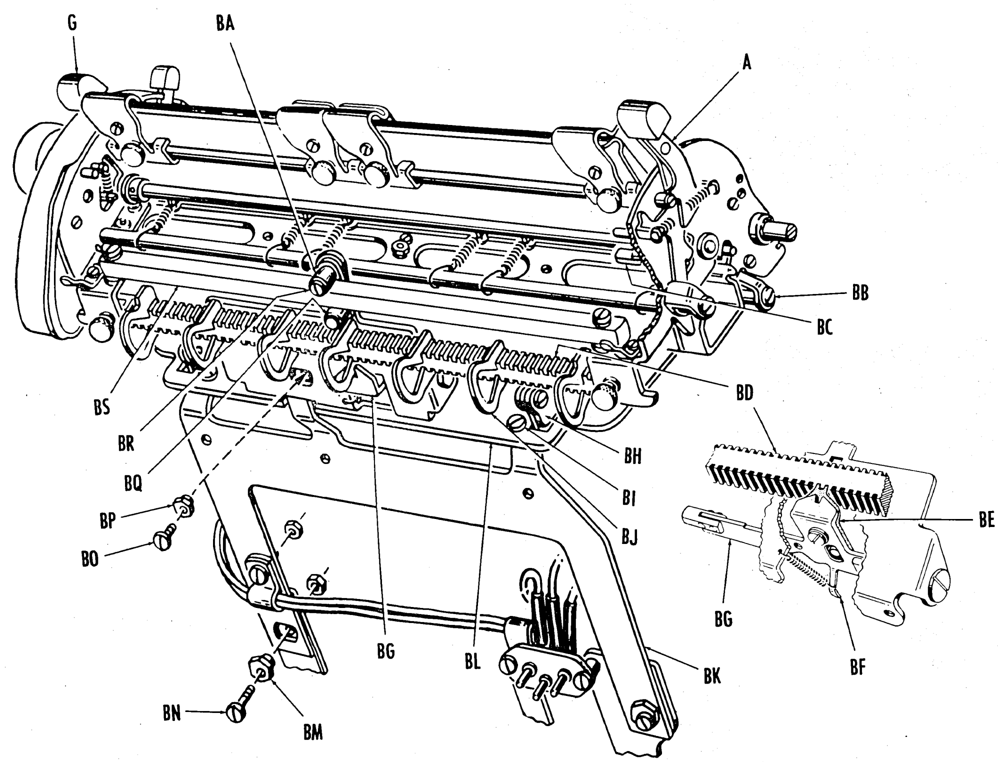


Fig. VIII-14

The rear portion of the carriage is supported by rail BS riding between rolls BA and BQ; brace BK supports the rearmost portion of the carriage bottom plate.

The carriage can be manually located in any predetermined stop position.

Forward movement of lever G lowers the notched portion of bail BG out of the path of carriage stops BJ and permits manual movement of the upper (moving) portion of the carriage. Universal stop BE, which may be installed in Field machines, provides a means of latching the upper (moving) portion of the carriage on any tooth of stop bar assembly BD.

1/2" SPACING CONTROLLED BY LEVERS F AND CD

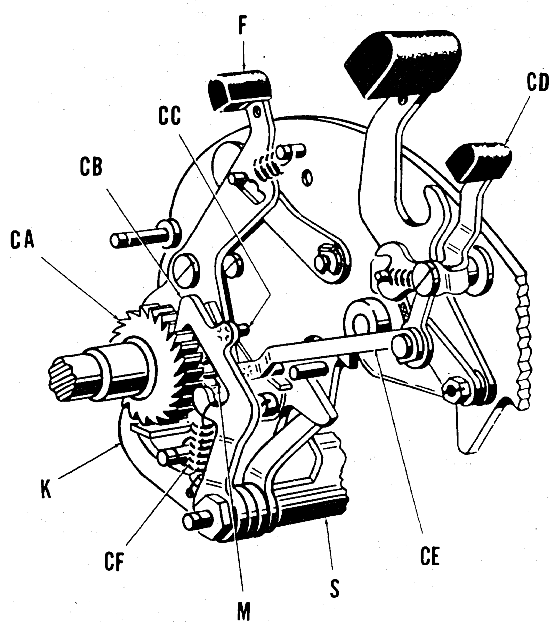


Fig. VIII-15

Locating of lever F in its forward position and lever CD in its rearward position enables 1/2" spacing of the platen during the machine operation. As lever CD is moved rearward arm CE moves down and out of the path of stud CC positioning spacing pawl CB into the path of spacing gear CA by spring CF.

During the forward stroke of the machine operation as bail S, Fig. VIII-13 moves rearward, spacing pawl CB engages spacing gear CA and rotates the platen 1/6". During the return stroke, spacing pawl K moves forward engaging spacing gear M to rotate the platen two spaces (2/6") thus making a form space up of 1/2" on the roll paper or form.

Tests and Adjustments

NOTE: Position eccentric screw BR, Fig. VIII-14 to provide maximum clearance between the under side of roll BA, Fig. VIII-14 and the upper side of rail BS, Fig. VIII-14 while making tests 1 through 11.

1. To assure full contact of pressure roll assembly AA, Fig. VIII-13 and platen E, Fig. VIII-13 -
Lip BC, Fig. VIII-14 and lip of lever A, Fig. VIII-14 should be parallel with approximately 1/32" clearance between the two lips when slight downward pressure is applied to lip BC, Fig. VIII-14.
TO ADJUST, bend lip BC, Fig. VIII-14 downward and/or lip of lever A, Fig. VIII-14 upward.

2. To assure easy insertion of heavy or multiple forms -
There should be approximately .010" to .012" clearance between guide strip Z, Fig. VIII-13 and platen E, Fig. VIII-13.
TO ADJUST, bend guide strip Z, Fig. VIII-13 where necessary.

3. To assure correct travel of vertical spacing pawl K, Fig. VIII-13 regardless of carriage position -
The bail of vertical spacing assembly S, Fig. VIII-13 should clear pressure roll assembly AA, Fig. VIII-13 when the machine is at home position, and should also clear the forward side of the lower raceway when the machine is at full forward position.
TO ADJUST, use the following method:
   a. Position the carriage to the right
   b. Loosen screws J, Fig. VIII-13 and BB, Fig. VIII-14
   c. Lock pressure roll release lever A, Fig. VIII-13 forward
   d. Position the uppermost portion of bail assembly S, Fig. VIII-13 forward
   e. Apply slight forward pressure to bail assembly S, Fig. VIII-13 and tighten screw J, Fig. VIII-13.
   f. Release pressure roll lever A, Fig. VIII-13 and shift the carriage to the left.
   g. Pull the handle part way forward and tighten screw BB, Fig. VIII-14 while holding bail assembly S, Fig. VIII-13 in position.

4. To assure synchronizing star wheel X, Fig. VIII-13 with gear Y, Fig. VIII-13 -
With the machine locked during forward stroke by the full stroke pawl being in the first notch of the full stroke segment, detent H, Fig. VIII-13 should be fully seated in the teeth of star wheel X, Fig. VIII-13 when detent I, Fig. VIII-13 is fully engaged with gear Y, Fig. VIII-13.
TO ADJUST, use the following method:
   a. Pull the handle until the full stroke pawl drops into the first notch of the full stroke segment.
   b. Loosen the two screws W, Fig. VIII-13.
   c. Manually turn the platen clockwise until detent I, Fig. VIII-13 is fully seated.
   d. Tighten the two screws W, Fig. VIII-13.

5. To safeguard against possible overthrow of the platen during vertical spacing -
There should be a maximum of 1/32" clearance between the point of detent I, Fig. VIII-13 and the teeth of gear Y, Fig. VIII-13 when the machine is in home position.
TO ADJUST, bend the lower tail of detent I, Fig. VIII-13 to or from bushing T, Fig. VIII-13.

6. To assure synchronizing downward travel of platen control detent I, Fig. VIII-13 with rotation of gear Y, Fig. VIII-13 -
Detent I, Fig. VIII-13 should begin to enter the advancing tooth space of gear Y, Fig. VIII-13 immediately after the point of the previous tooth of gear Y, Fig. VIII-13 passes the point of detent I, Fig. VIII-13.
TO ADJUST, bend lip R, Fig. VIII-13.

7. To provide correct timing for release of feed pawl K, Fig. VIII-13 from gear M, Fig. VIII-13 -
Feed pawl K, Fig. VIII-13 should rotate the platen sufficiently to permit full seating of detent H, Fig. VIII-13 into the tooth space of star wheel X, Fig. VIII-13 before detent I, Fig. VIII-13 is disengaged from gear Y, Fig. VIII-13.
TO ADJUST, raise or lower limit stud U, Fig. VIII-13.

8. To assure that the carriage stops in predetermined stop positions when manually tabulated -
The notched portion of tabulating bail BG, Fig. VIII-14 should move freely into full engagement with carriage stops BJ, Fig. VIII-14 when tabulating lever G, Fig. VIII-14 is normal and the carriage is slowly moved to right or left from between any two carriage stops.
TO ADJUST, bend projection BF, Fig. VIII-14.

9. To provide support to the upper (moving) portion of the carriage -
The right angle ears of bracket BK, Fig. VIII-14 should be flush against the underside of the carriage bottom plate BL, Fig. VIII-14.
TO ADJUST, use the following method:
   a. Remove screw BO and eccentric BP, Fig. VIII-14.
   b. Loosen screws BN, Fig. VIII-14.
   c. Tighten six screws BI, Fig. VIII-14.
   d. Turn eccentrics BM, Fig. VIII-14 clockwise until tight with their high points downward. Tighten screws BN, Fig. VIII-14.
   e. Replace screw BO and eccentric BP, Fig. VIII-14.

10. To provide support to the carriage bottom plate -
Eccentric BP, Fig. VIII-14 should provide maximum support to the center of carriage bottom plate BL, Fig. VIII-14.
TO ADJUST, loosen screw BO, Fig. VIII-14 and turn eccentric BP, Fig. VIII-14 with its high point upward.

11. To obtain desirable print of the type -
Platen assembly E, Fig. VIII-13 should be positioned to provide a full print of the type face.
TO ADJUST, use the following method:
   a. Locate the carriage at central then extreme left positions and check for a good print of all figures, symbols, and characters. Locate the carriage at central, extreme right and extreme left positions and check for a minimum of imprint from the 3's and 5's while printing 4's.
   b. Loosen the screws holding right and left brackets BH, Fig. VIII-14 and adjust the slots in the brackets; then tighten the screws.

c. The rightmost type bar should clear the edge of line finder AB, Fig. VIII-13 when the type bar is manually moved rearward having the machine in home position and the carriage located in central position.

d. Loosen the screws holding the line finder and reposition the line finder for clearance with the type bar.

12. To assure free movement of the upper (moving) portion of the carriage - Roll BA, Fig. VIII-14 should just touch the upper surface of support rail, BS, Fig. VIII-14 when the carriage is shifted to any stop position.

TO ADJUST, turn eccentric screw BR, Fig. VIII-14.

CARRIAGE 12 1/4" TABULATING (STYLE B)

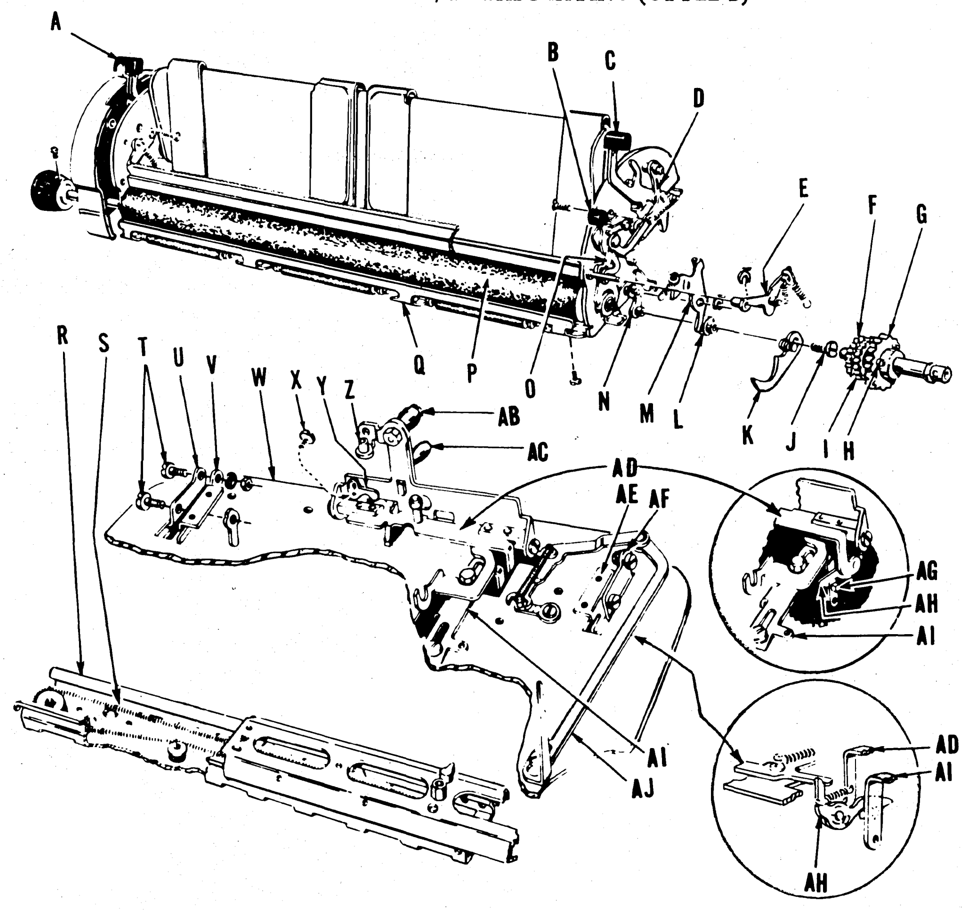


Fig. VIII-16

The 12 1/4" Style B carriage, basically is of the same construction as the 12 1/4 Style W2 carriage to accommodate forms or various widths of roll paper up to 11 7/8" wide. Forms or roll paper are inserted from the rear in the same manner as on Style W2 carriage. Insertion of heavy or multiple forms is facilitated by guide strip Q, and easy alignment of the media is made possible by a latching device that holds the pressure roll release lever A open.

When tabulating lever AJ is positioned rearward, pawl AH is indexed into the path of stud AG as slide assembly AI is moved rearward during the forward stroke of a machine operation.

As slide assembly AI moves forward during the return stroke of the machine operation, stud AG engages pawl AH swinging tabulating bail assembly AD. Swinging of tabulating bail assembly AD moves lip BG, Fig. VIII-17 out of the path of tabulating stops BH, Fig. VIII-17 permitting the carriage tabulation to the left by spring S.

Space selector lever B is positioned to permit no spacing (0") single spacing (1/6") or double spacing (2/6") by controlling the number of teeth on spacing gear I picked up by spacing pawl K.

When lever B is located in non-space position, bail BF, Fig. VIII-17 and lever assembly O provide a control for mechanical spacing of the form and/or roll paper at selected carriage positions. As the carriage tabulates; cam BL, Fig. VIII-17 contacts roll Z to rock bail BF, Fig. VIII-17. Bail BF, Fig. VIII-17, through its keyed connection to lever assembly O, moves the blocking ear on the lowermost portion of assembly O out of the path of spacing pawl K permitting platen spacing.

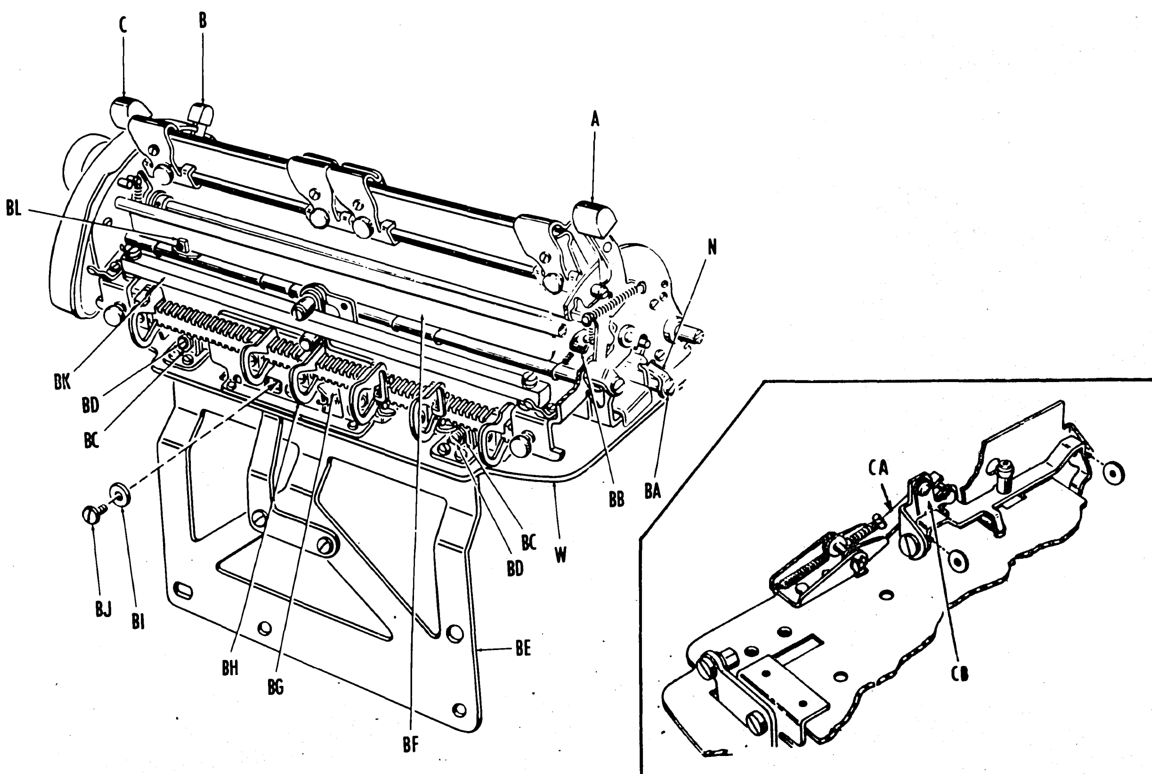


Fig. VIII-17

Tests and Adjustments

1. To provide support to the upper (moving) portion of the carriage -
Brace BE, Fig. VIII-17 should provide maximum support to carriage bottom plate W, Fig. VIII-16.
TO ADJUST, use the following method:
   a. Remove screw BJ and washer BI, Fig. VIII-17.
   b. Loosen screws BD, Fig. VIII-17.
   c. Turn eccentrics BC, Fig. VIII-17 clockwise until tight with their high points downward. Tighten screws BD, Fig. VIII-17.
   d. Replace screw BJ and washer BI, Fig. VIII-17.

2. To obtain desirable print of the type face - Platen assembly P, Fig. VIII-16 should be positioned to provide a full print from the type face.
TO ADJUST, remove screw AB, Fig. VIII-16; then loosen screws T, Fig. VIII-16 and raise or lower brackets V and AE, Fig. VIII-16.
NOTE: After making adjustment No. 2, place the bit of a screwdriver in the slot of brackets V and AE, Fig. VIII-16, and bend the lowermost portion of the brackets downward to limit against the top of the lowermost portion of the spotwelded brackets U and AF, Fig. VIII-16.

3. To assure free movement of the upper (moving) portion of the carriage -
There should be minimum clearance between roll AC, Fig. VIII-16 and the bottom of square bar BK, Fig. VIII-17.
TO ADJUST, turn eccentric screw AB, Fig. VIII-16.

4. To assure correct travel of the vertical spacing pawl regardless of carriage position -
The bail of vertical spacing assembly N, Fig. VIII-16 should clear the pressure roll assembly when the machine is at home position, and should also clear the forward side of raceway R, Fig. VIII-16 when the machine is at extreme forward position.
TO ADJUST, use the following method:
a. Position the carriage to the right.
b. Loosen screws J, Fig. VIII-16 and BA, Fig. VIII-17.
c. Lock pressure roll release lever A, Fig. VIII-16 forward.
d. Position the uppermost portion of the bail assembly N, Fig. VIII-16 forward.
e. Apply slight forward pressure to the bail of assembly N, Fig. VIII-16 and tighten screw J, Fig. VIII-16.
f. Release pressure roll lever A, Fig. VIII-16 and shift the carriage to the left.
g. Pull the handle part way forward and tighten screw BA, Fig. VIII-17 while holding the bail of assembly N, Fig. VIII-16 in position.

5. To assure full contact of pressure roll assemblies and the platen -
Lip BB, Fig. VIII-17 and the lip of lever A, Fig. VIII-17 should be parallel; and there should be approximately 1/32" clearance between the two lips when slight downward pressure is applied to lip BB, Fig. VIII-17.
TO ADJUST, bend lip BB, Fig. VIII-17 downward and/or lip of lever A, Fig. VIII-17 upward.

6. To assure synchronizing the star wheel with the spacing gear -
With the machine positioned during its forward stroke by the full stroke pawl being in the first notch of the full stroke segment, detent E, Fig. VIII-16 should be fully seated in the teeth of star wheel G, Fig. VIII-16 when detent M, Fig. VIII-16 is fully engaged with spacing gear F, Fig. VIII-16.
TO ADJUST, use the following method:
a. Pull the handle forward until the full stroke pawl drops into the first notch of the full stroke segment.
b. Loosen the two screws H, Fig. VIII-16.
c. Manually turn the platen clockwise until detent M, Fig. VIII-16 is fully seated.
d. Tighten the two screws H, Fig. VIII-16.

7. To safeguard against possible overthrow of the platen during vertical spacing -
There should be a maximum of 1/32" clearance between the point of detent M, Fig. VIII-16 and the teeth of spacing gear F, Fig. VIII-16 when the machine is in home position.
TO ADJUST, bend the lower tail of detent M, Fig. VIII-16 to or from bushing L, Fig. VIII-16.

8. To assure synchronizing downward travel of the platen control detent with rotation of the spacing gear -
Detent M, Fig. VIII-16 should begin to enter the advancing tooth space of spacing gear F, Fig. VIII-16 immediately after the point of the previous tooth of gear F, Fig. VIII-16 passes the point of detent M, Fig. VIII-16.
TO ADJUST, bend the rearward portion of detent M, Fig. VIII-16.

9. To provide correct timing for release of the feed pawl from the spacing gear -
Pawl K, Fig. VIII-16 should advance the platen sufficiently permitting full seating of detent E, Fig. VIII-16 into the tooth space of star wheel G, Fig. VIII-16 before detent M, Fig. VIII-16 is disengaged from spacing gear F, Fig. VIII-16.
TO ADJUST, raise or lower the limit stud for pawl K, Fig. VIII-16.

10. To assure engaging the feed pawl with the spacing gear for 1/6" spacing when the space selector lever is set in no-space (0") position and the carriage located in the selected position for automatic spacing -
With the space selector lever set in non-space position and the carriage located to position the center of cam BL, Fig. VIII-17 against roll Z, Fig. VIII-16; the lower lip of assembly O, Fig. VIII-16 should be positioned to permit the engagement of pawl K, Fig. VIII-16 with spacing gear I, Fig. VIII-16 during the return stroke of a machine operation.
TO ADJUST, open or close the slot at point D, Fig. VIII-16.

11. To assure actuation of the carriage tabulating pawl through tabulating lever AJ, Fig. VIII-16 -
Pawl AH, Fig. VIII-16 should have a full lateral hold on the leftmost portion of lever AJ, Fig. VIII-16 when the lever is in non-tabulating position.
TO ADJUST, bend the upper finger of pawl AH, Fig. VIII-16.

12. To assure correct indexing of the tabulating pawl when shifting the tabulating control lever AJ, Fig. VIII-16 -
Stud AG, Fig. VIII-16 should be fully positioned under latch AH, Fig. VIII-16 with approximately 1/32" latching lead at the end of the machine stroke following a carriage tabulation.
TO ADJUST, loosen screw X, Fig. VIII-16 and reposition limit plate Y, Fig. VIII-16. Tighten screw X, Fig. VIII-16.

13. To safeguard against the carriage tabulating past the tabulating stops -
The contacting surface of rocker arm CA, Fig. VIII-17 should have just a full hold on a tabulating stop at the beginning of the return stroke of a machine operation with tabulating lever AJ, Fig. VIII-16 located rearward.
TO ADJUST, reposition limit plate CB, Fig. VIII-17.

BELL MECHANISM

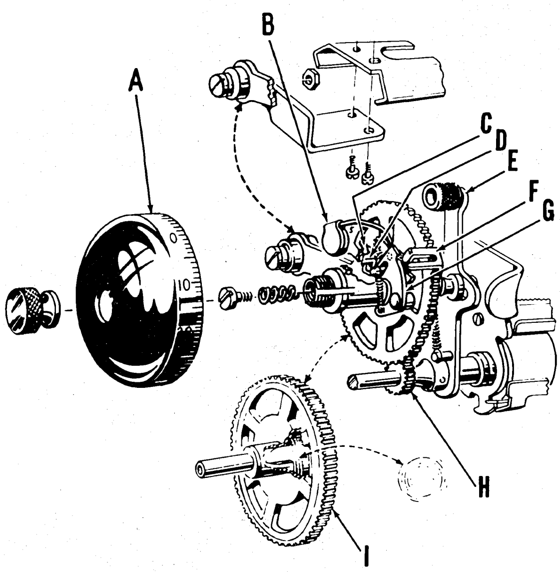


Fig. VIII-18

This mechanism provides a bell warning when a predetermined number of vertically listed items have been completed, and a uniform horizontal starting line for all columns.

The graduations on indicator A indicate the number of items that may be listed before the bell warning sounds. The indicator is set for any number up to 100 by pulling lever E forward and then pulling indicator A to the left and turning to and releasing it at the desired number.

During the machine operation (with lever E rearward) indicator A revolves through the engagement of hammer assembly G with gear I which is turned by pinion H as the platen rotates. As the cipher position on indicator A reaches the pointer on arm F, a rearward finger on the pointer trips hammer assembly G, causing hammer B to strike indicator A and produce the bell warning.

When the platen is manually rotated rearward, pinion H turns gear I until stud C limits on detent D, thus providing a uniform starting position for all columns on the forms.

Tests and Adjustments

1. To assure the correct location of the pointer on arm F -
   With lever E forward and indicator A manually turned counter clockwise until stud C limits on detent D, the pointer on arm F should be aligned with graduation at cipher position.
   TO ADJUST, bend the forward finger of the pointer on arm F.

2. To assure a bell warning at the correct time -
   With the indicator set at a predetermined position and the machine operated the number of strokes indicated, the bell warning should ring as the pointer on arm F reaches cipher position.
   TO ADJUST, bend the rearmost finger of the pointer on arm F.

PASSBOOK CARRIAGE

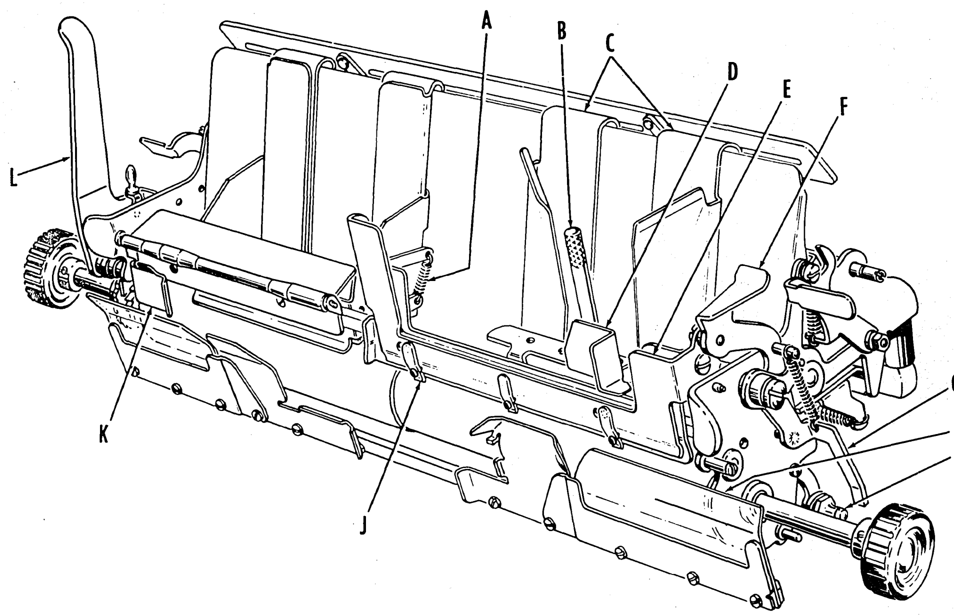


Fig. VIII-19

This carriage, which is manually returned, is an adaptation of the 12 1/4 tabulating carriage designed to accommodate passbooks in addition to a journal roll.

A split platen assembly provides use of a journal roll around its left section and the insertion and positioning of the passbook around its right section.

Alignment of the passbook is provided by adjustable guide D. Fingers J hold the passbook tight against the platen while printing.

Tests and Adjustments

1. To assure free insertion of the passbook -
   a. The right half of the platen should be free to rotate.
   b. Form chutes C should be in proper alignment.
   c. Adjustable guide D should be aligned with the edge of the passbook.
   d. Fingers D should not interfere with insertion of the passbook and should hold the passbook in position when the form holder is closed.

   TO ADJUST:
   a. Clean and oil the platen bearings.
   b. Reposition the form chutes.
   c. Loosen screw B and reposition guide D.
   d. Bend fingers J.

2. To assure closing the form holder at the beginning of a machine operation -
   Stud I should release latch G at the beginning of a machine operation before printing has taken place.
   TO ADJUST, bend latch G forward or rearward.

CARRIAGE TABULATING CONTROL BRAKE

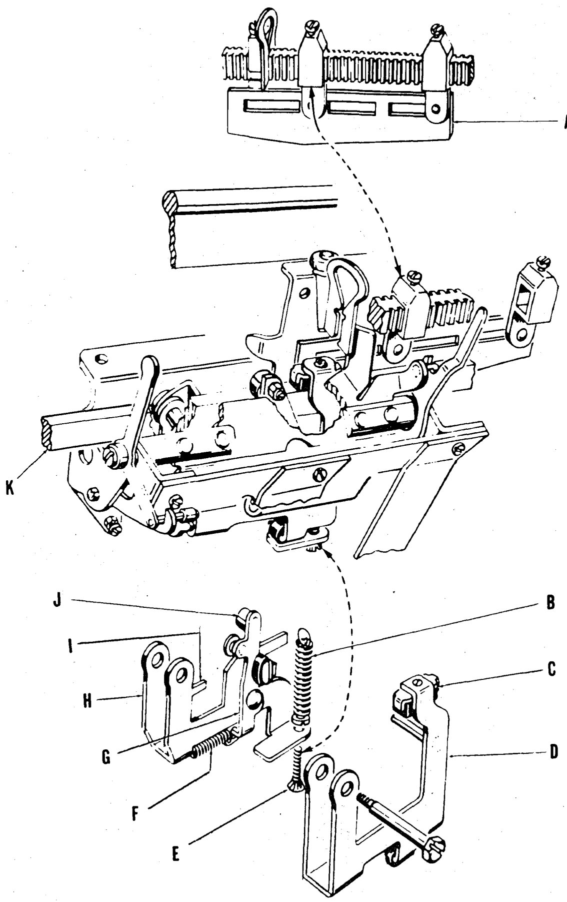


Fig. VIII-20

This mechanism assures uniform speed of the carriage when tabulating between widely separated stops.

As the carriage tabulates, inclined skid A lowers roll J and arm G, bracket H and spring B lowers brake arm D. Brake pad C, being lowered with brake arm D, applies pressure to rail K retarding the speed of the carriage during tabulation.

As the high point of skid A moves beyond roll J, spring B contracts. The pressure of brake pad C on rail K is thus decreased, permitting the carriage tabulating spring S, Fig. VIII-16 which has been decreased in tension as a result of carriage tabulation, to move the carriage into remaining stop positions.

When the carriage is returned, skid A through roll J rocks arm G to the right, expanding spring F. Consequently spring B is not expanded, and brake pad C remains inactive until the low point of skid A is beyond roll J. As the low point of skid A is returned beyond roll J, spring F restores arm G to active position in preparation for a subsequent carriage tabulation.

Tests and Adjustment

1. To safeguard against loss of brake pad C - With the carriage shifted to the left and upward pressure applied to bracket H, check for brake pad C not to be removable.
TO ADJUST, bend projection I up or down.

2. To assure proper braking action - Insert a sample form around the platen, and with the carriage positioned where spring B is expanded to its maximum, check for free carriage movement into the next stop position.
TO ADJUST, turn screw E.

FORM CHUTES AND FORM FINGERS

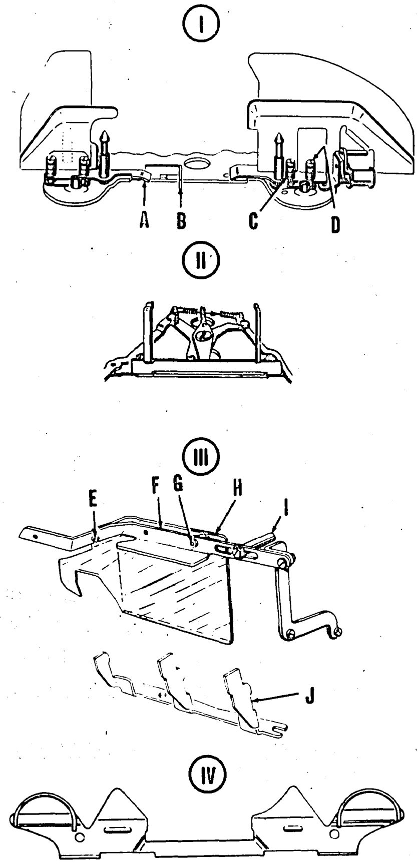


Fig. VIII-21

Form chutes and form fingers of various styles are available to hold forms in position while printing is taking place.

Form chutes similar to those in illustration No. 1 are assembled to the carriage bottom plate of validating-receipting machines. The chutes are flanged on their outer edges to permit easy insertion of forms. The bottom edge of the form rests on support plates A. Finger B supports the center of the form.

Illustration No. 2 shows a style of form fingers used to deflect thick or multiple forms around the platen, preventing the forms from interfering with the type bars and ribbon.

A plastic form guide assembly similar to that shown in illustration No. 3 is used on utility, validating-receipting machines. This plastic shield H permits viewing the printed transaction line while supporting the forms and also prevents interference between thick, card-type forms and the type bars.

Form support J is used with the plastic type form guide when printing 5/32" from the bottom of the form. The upper extension of the support fingers also prevent interference of the form with the type bars as the latter are raised to printing position. The finger on the right end of support J is placed between the first and second type bars and the center finger is placed between the eight and ninth type bars.

Limit stop I, being adjustable to various size forms provides a right hand limit for the form.

The shelf-like extension on the front of support bar F prevents the operators inadvertent interference with the type bars while holding or moving the form.

Form guides similar to those in illustration No. 4 may be found on certain styles of 12 1/4" carriages. The guide is extended outward to the right and left to guide forms around the platen in all carriage position.

Tests and Adjustments

1. To assure printing on the printing line - Insert a form in the form chutes, take a sample print and measure the distance from the lower edge of the form to the printing line.
   TO ADJUST, add, remove, or relocate space collars C over or under the support plates to raise or lower the plates.

2. To assure correct positioning of plastic shield H -
   a. Plastic shield H should not interfere with

movement of the rotary consecutive numbering device.

b. The lower edge of the plastic shield should be aligned horizontally with and exert slight pressure on the platen.

TO ADJUST:

a. Loosen screws E and G and shift plastic shield H to right or left.

b. Bend support bar F.

✓SHUTTLE CARRIAGE MECHANISM - SERIES P 100, P 200, P 2200, P 300, AND P 2300 MACHINES

The shuttle carriage mechanism provides alternate carriage printing positions with variations in space between printed columns from 1 1/2" to 2 1/8" in steps of 1/8". This mechanism permits setting to any one of the various shuttling selections with a minimum amount of effort.

The shuttle control lever (OCL No. 53) inactivates the shuttle mechanism when set to the left and activates the mechanism when set to the right. Movement of the control lever in either direction is prevented until the carriage is shuttled to its left position where accumulation, printing, and spacing functions are provided when the machine is used for listing and totaling operations.

During shuttling operations; when the carriage is shuttled to the left, printing is on the right side of the form and when the carriage is shuttled to the right printing is on the left side of the form.

Due to the additional mechanical load of shuttling the carriage, the machine speed will be reduced during shuttling operations by 8 to 10 operations per minute.

Series P 100, P 2100, P 200 and P 2200 machines, being of a single register construction provide accumulation and printing in the right printing column and non-adding and printing, with cipher split, in the left printing column.

In addition to the shuttle control slide (OCL No. 53), Series P 300 and P 2300 machines also contain a register control lever (OCL No. 52) which is interlocked with the shuttle control slide. The interlocks prevent setting of controls in such a manner as to cause malfunction of the machine. A malfunction could result, for example, if normal listing and totaling were attempted with the carriage shuttled to the right where non add and cipher split function could be in effect.

With OCL No. 53 moved to the left (normal position) and OCL No. 52 moved to right (normal listing position); movement of OCL No. 52 toward the left will automatically shift OCL No. 53 to the right into shuttle position.

With OCL No. 53 moved to the right (shuttle position) and OCL No. 52 moved to the left (used only when carriage shuttling is active); movement of OCL No. 53 to the left will automatically shift OCL No. 52 to the right, its normal duplex position.

When OCL No. 53 is to the right (shuttle position) OCL No. 52 may be positioned either to the right or left. The functions of the machine in these lever positions are as follows:

REGISTER CONTROL LEVER (OCL No. 52) TO THE RIGHT

1. Right printing column -
   a. Registers "A" and "B" add
   b. Full print
   c. Form space

2. Left printing column -
   a. Registers "A" and "B" non-add
   b. Cipher split between columns 2 and 3. This provides numerical punctuation when amounts are indexed in columns to the left of column 2.
   c. Forms non-space.

REGISTER CONTROL LEVER (OCL No. 52) TO THE LEFT

1. Right printing column -
   a. Register "A" adds
   b. Register "B" non-adds
   c. Full print
   d. Forms space

2. Left printing column -
   a. Register "A" non-adds.
   b. Register "B" adds
   c. Full print
   d. Forms non-space

NOTE: With the register control lever positioned to the left and the carriage shuttled to the left where register "B" non-adds, a sub-total of register "B" will cause the register to be totaled and the sub-total symbol printed.

CARRIAGE TABULATION LEVER LOWERS STOP BLOCK

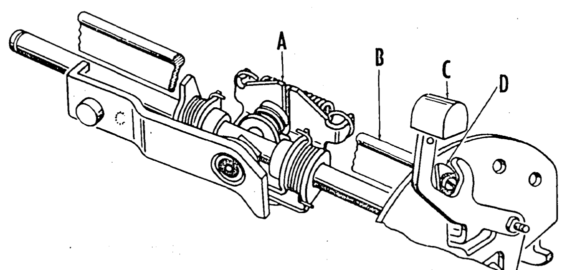


Fig. VIII-22

When tabulating lever C is moved forward, tabulating bail B contacts the vertical projection on stop block assembly A, lowering the assembly to clear the carriage stops.

Tests and Adjustments

1. To prevent a bind between the vertical projection of stop block assembly A and the carriage base plate -
   There should be approximately .020" passing clearance between the stop block and the tabulation stops with lever C fully depressed. TO ADJUST, position limit D.

CARRIAGE DETENTED IN RIGHT AND LEFT POSITIONS

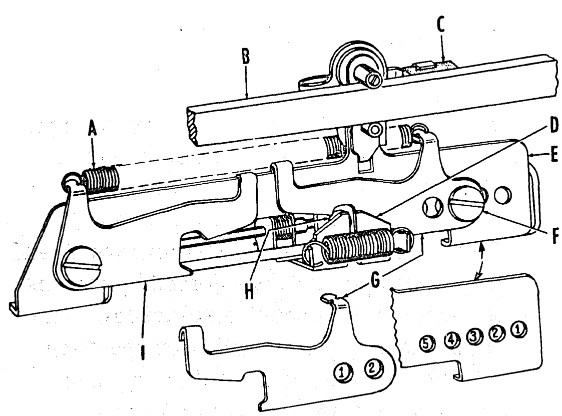


Fig. VIII-23

The carriage is detented in right or left positions by detents I and G. Two holes in detent G and five holes in bracket E are provided for changing the location of detent G when the throw of the shuttle mechanism is altered.

Spring mounted felt pad C provides a braking action for the carriage by maintaining friction on carriage support bar B.

√VERTICAL SPACING CONTROLLED BY CARRIAGE POSITION

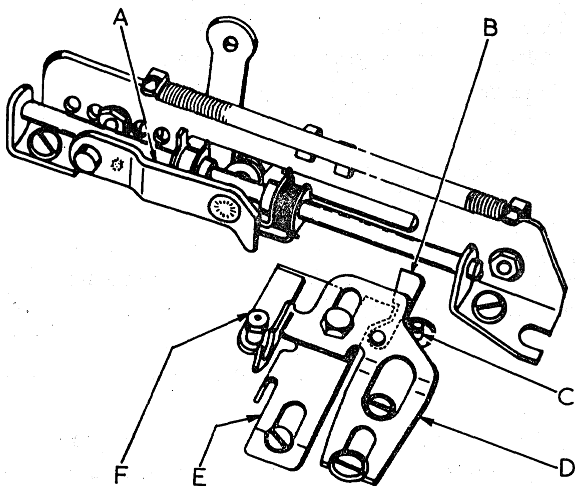


Fig. VIII-24

The feed control mechanism consists of slides D and E and coupling latch B (which pivots on a stud in upper slide D). The platen space bail rides in the fork of slide D.

Latch B is maintained in active position by stud C, (stud B on arm A Fig. VIII-27) enabling the latch to position over the corner of slide E.

On the forward machine stroke, lower slide E is moved rearward, taking upper slide D and carriage feed bail rearward through contact with latch B.

On the return stroke, the platen space bail is moved forward by roll F on lower slide E and upper slide D is restored by the platen space bail. Form space results from the normal function of the feed pawl and the platen ratchet wheel.

When the carriage moves into the left printing position, latch B is moved to inactive position by shuttle link A.

Tests and Adjustments

1. To assure a good hold of latch B on lower slide E without a false limit of stud C.

With link A moved to the left side, stud C should hold latch B engaged with lower slide E. Feel for .005" to .010" play of latch B between slide E and stud C.

TO ADJUST - carefully bend arm carrying stud C to position the stud.

REGISTER AND SHUTTLE CONTROL LEVERS CO-ORDINATING INTERLOCK

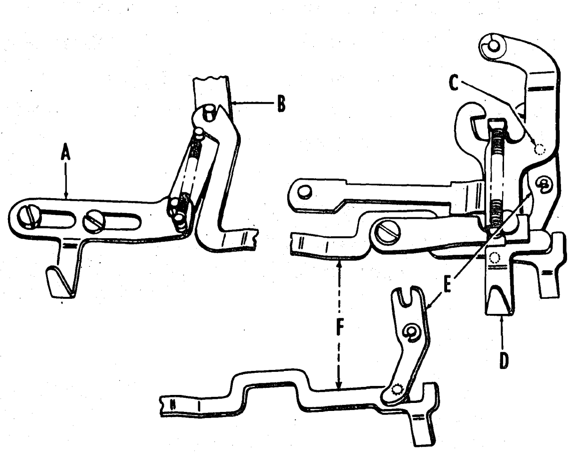


Fig. VIII-25

Shuttle control lever A is coupled to lever B which in turn is coupled to link F. Thus, lever A and register selection lever D are coupled within the limits of the open pocket in the right end of link F by lever E which forks stud C in lever D.

Correct setting of shuttle control lever A and register selection lever D is enforced by the linkage between the two control mechanisms. The lever combinations permit sufficient operating flexibility to provide any needed arrangement and safeguards against machine malfunctions that could result from the incorrect setting of levers A or D.

The combinations and safeguards are as follows:

1. Listing - Lever A toward the left (normal) - lever D toward the right - this is the normal setting for all straight listing (adding) operations.

2. Shuttling - Lever A toward the right (shuttling) permits:
   a. Lever D to be positioned to the right for non-add operations.
   b. Lever D to be positioned to the left for add operations.

   The two positions for lever D are permitted because the stud in the front of lever E can move from end to end in the large pocket in the right end of link F as lever D rocks lever E through stud C.

3. With lever A toward the right and lever D toward the left, moving lever A toward the left will move lever D toward the right. This prevents accidental non-adding during listing operations.

4. With lever A toward the left and lever D toward the right, moving lever D toward the left will move lever A toward the right. This enforces carriage shuttling when lever D is moved to the position that is used only for shuttling operations.

√SHUTTLE CONTROL LEVER BLOCKS OCK'S (SERIES P 300 AND P 2300)

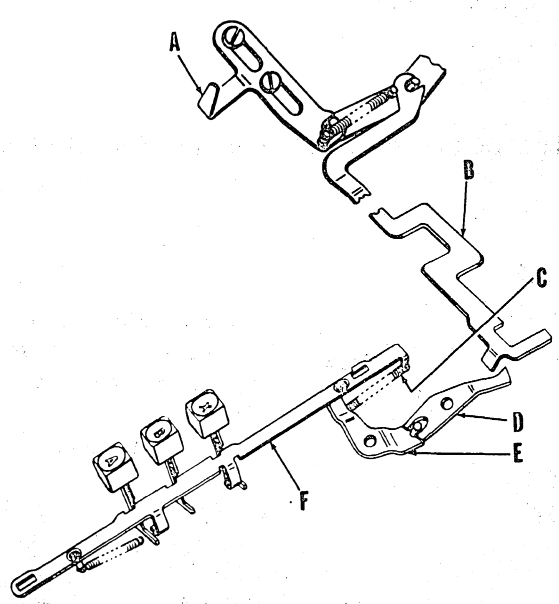


Fig. VIII-26

When shuttle control lever A is moved to shuttle position the downward lip of slide B contacts lever D and bellcrank E with spring C moves blocking slide F forward to block OCK's 3-0, 4-0, and 5-0 against depression.

Tests and Adjustments

1. To assure blocking OCK's 3-0, 4-0, and 5-0 when the carriage is under shuttle control -

When shuttle control lever A is in normal position, the OCK's should align with the slots in slide F. When the shuttle control lever is in shuttle position, slide F should freely enter the notches in the keystems.
TO ADJUST, bend the downward lip of slide B.

√CARRIAGE SHUTTLE BLOCKS RESULT KEYS - SERIES P 100, P 2100, P 300 AND P 2300 MACHINES

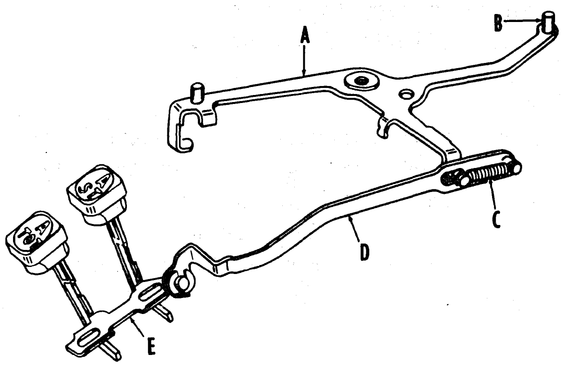


Fig. VIII-27

When the carriage is shuttled to the right, link A, Fig. VIII-24, latch B, Fig. VIII-24, stud B in lever A, spring C, and link D moves blocking slide E forward into the slots in the total and subtotal keystems, thus blocking the keys against depression.

Tests and Adjustments

1. To prevent depression of the total keys as the carriage moves into the left printing position -
   With the carriage shuttled to the left, there should be not more than .010" clearance between the projections on slide E and the total and subtotal keystems.
   TO ADJUST, bend link D at its offset.

√CARRIAGE SHUTTLE BLOCKS RESULT KEYS - SERIES P 200 AND P 2200 MACHINES

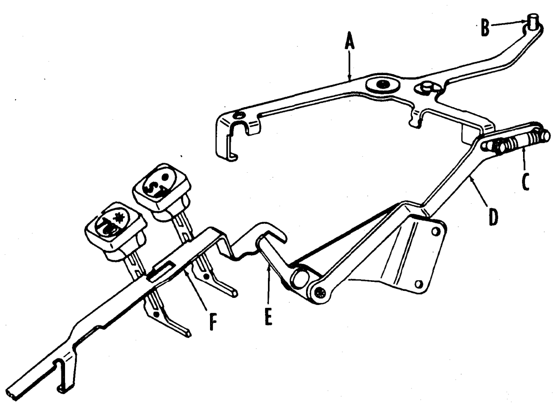


Fig. VIII-28

When the carriage is shuttled to the right, link A, Fig. VIII-24, latch B, Fig. VIII-24, stud B in lever A, spring C, link D, and lever E moves blocking slide F rearward into the slots in the total and subtotal keystems thus blocking the keys against depression.

Tests and Adjustments

1. To prevent depression of the total keys as the carriage moves into the left printing position -
   With the carriage shuttled to the left, there should be not more than .010" clearance between the forward edge of the cut-outs in slide F and the total and subtotal keystems.
   TO ADJUST, bend link D at its offset.

CIPHER SPLIT - CARRIAGE CONTROLLED

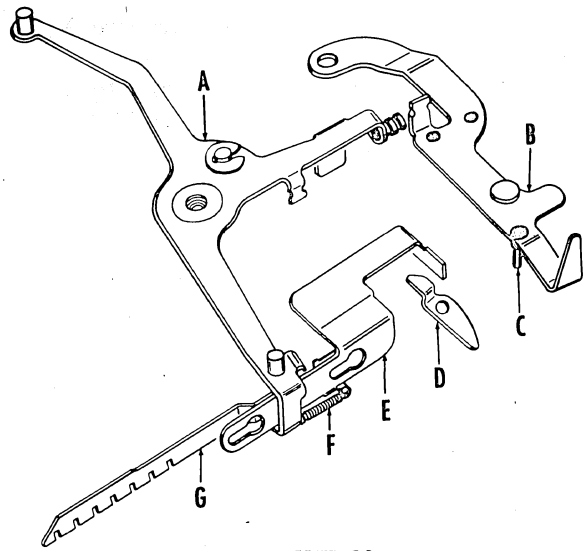


Fig. VIII-29

On Series P 100, P 2100, P 200 and P 2200 machines when the carriage is shuttled to the right, lever A is rocked so that its forward projection is moved to the left. This movement, through spring F, moves slide G to the left to uncouple the hammer latches in columns two and three, or any coupled columns that may be contained in the machine.

Series P 300 and P 2300 machines function in the same manner as Series P 100, P 2100, P 200 and P 2200 machines when register control lever B is to the right. When the register control lever is moved to the left, the cipher split is not desirable and must be disabled.

Movement of lever B to the left - through stud C, lever D and slide E, holds slide G to the right to prevent uncoupling the hammer latches.

✓ REGISTER "A" ADD AND NON-ADD - CARRIAGE CONTROLLED - SERIES P 100, P 2100, P 200, P 2200, P 300 AND P 2300 MACHINES

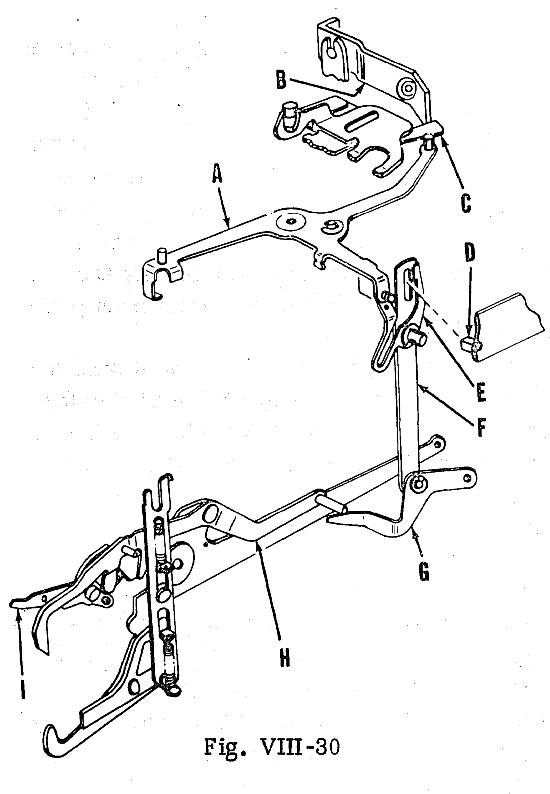


Fig. VIII-30

Positive control of adding and non-adding of register "A" in machines containing the shuttle mechanism is provided by the control mechanism being in non-add position when the machine is in home position.

As the machine restores to home position the rearward end of lever M, Fig. VIII-32 is raised. This movement raises link F, lever G and the rearward end of lever H. Raising the rearward end of lever H lowers its foremost portion and disables listing pawl I.

With the carriage shuttled to the left, the right branch of lever A is rocked rearward by spring tension, holding latch E in link F clear of square stud D in the auxiliary side frame. Because latch E is clear of stud D, link F is free to follow lever M, Fig. VIII-32 during the machine operation, and pawl I is activated engaging the register with the adding sectors during the return machine stroke.

With the carriage shuttled to the right, lever A is driven by link B, moving the right branch of the lever forward. As the right branch of lever A moves away from the forward extension of latch E the latch positions over square stud D, holding link F, lever G, and the rearward end of lever H upward to maintain listing pawl I in non-add position during the machine operation.

Tests and Adjustments

1. To assure non-adding register "A" unless an add operation is indexed -
With the carriage shuttled to the right, latch E should have .030" lead over square stud D.
TO ADJUST, turn eccentric N, Fig. VIII-32

2. To assure complete machine return to home position after each machine operation -
With the machine in home position, link F should have .010" vertical play above lever M, Fig. VIII-32.
TO ADJUST, tilt the rearward portion of lever H for earlier or later contact of the stud in lever H with lever G.

3. To assure accumulation in register "A" when an add operation is indexed -
With the carriage shuttled to the left, latch E should have .010" passing clearance of square stud D.
TO ADJUST, open or close the adjusting slot in latch E, Fig. VIII-30.

✓REGISTER "B" ADD AND NON-ADD - CARRIAGE CONTROLLED - SERIES P 300 AND P 2300 MACHINES

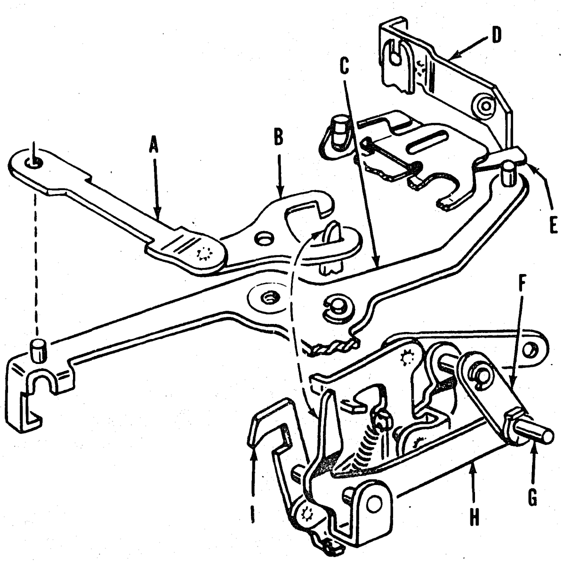


Fig. VIII-31

In a similar manner to that used in controlling register "A", the register "B" listing pawl is indexed to non-add by lever M, Fig. VIII-32 when the machine is returned to home position. Lever M, Fig. VIII-32 contacts stud G, in lever H, actuating H and also raising bellcrank F through which stud G extends. As the rearward extension of bellcrank F is raised, its forward end lowers the rearward extension of listing pawl I positioning the pawl to a non-add position.

Operation of the machine which lowers lever M, Fig. VIII-32 permits lever H to lower and rock bellcrank F away from listing pawl I so adding may be performed in register "B". During a non-add operation, hook B retains lever H so that pawl I remains inactive. Position of hook B determines adding or non-adding in register "B". Hook B is controlled from the carriage position and from the register control lever position in the following manner:

1. With the register control lever positioned toward the right and the carriage shuttled to the left, hook B is positioned centrally clearing the vertical branch of lever H. In this position, a machine operation activates listing pawl I and accumulation to take place.

2. With the register control lever positioned toward the right and the carriage shuttled to the right, the left step of hook B should hold the vertical branch of lever H from movement and listing pawl I remains inactive thus non-adding register "B".

3. Movement of the register control lever changes the pivotal point of hook B. Thus, with the register control lever toward the left and the carriage shuttled to the left, the right step of hook B holds the vertical branch of lever H from movement and listing pawl I remains inactive to non-add register "B".

4. With the register control lever positioned toward the left and the carriage shuttled to the right, hook B is positioned centrally to clear the vertical branch of lever H. In this position, a machine operation activates listing pawl I and listed amounts are accumulated.

Tests and Adjustments

1. To assure non-adding register "B" unless an add operation is indexed -
During a non-add machine operation with the vertical branch of lever H limited by a step of hook B, there should be .030" passing clearance of the stud on the right end of the dashpot hanger shaft with listing pawl I.
TO ADJUST, bend the vertical branch of lever H forward or rearward.

√ SHUTTLE MECHANISM IS ACTUATED BY PRIMARY POWER MECHANISM

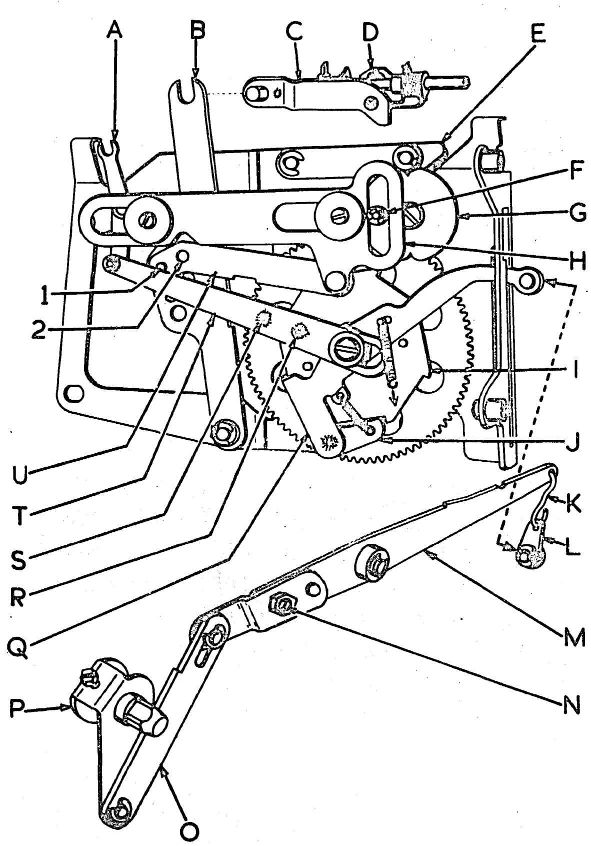


Fig. VIII-32

The shuttle mechanism is actuated through the primary power mechanism thus permitting the mechanism to be activated during both power and handle driven operations.

Arm P is keyed directly to the handle shaft and when the machine is operated, lever M is actuated through drive pitman O. During the forward stroke of the machine operation, the rearward end of lever M is lowered so link L, wire hook K, lever Q is actuated, moving drive pawl J toward the left engaging the next tooth on ratchet gear assembly I.

Gear assembly I is meshed with intermediate gear assembly G. Intermediate gear assembly G is detented in one of two positions by the roll in detent arm E dropping into one of the two pockets in the rim of the assembly.

During the return stroke when reverse action takes place; drive pawl J turns gear assembly I rotating intermediate gear G one half cycle (180°) and the roll in detent arm E drops into the alternate pocket. During this half cycle, roll F in gear G, moves to the opposite side of the gear pivot, moving slide H in the process. Slide H contains link U which is attached to shuttle arm B so that movement of slide H in either direction causes corresponding movement of shuttle arm B. Movement of shuttle arm B moves stop block D, and the carriage through link C.

When shuttle control lever A, Fig. VIII-25 is in normal position, lever A being connected to the shuttle control lever by lever B, Fig. VIII-25 positions control link T so that stud R blocks lever Q so drive pawl J does not engage the next tooth of gear assembly I. Thus, carriage shuttling is prevented during the machine operation.

Movement of the shuttle control lever to shuttle position moves stud R out of the path of lever Q thus activating carriage shuttle movement.

Disabling the shuttle mechanism with the carriage shuttled to the right is prevented by arm B blocking movement of stud S in link T. Thus, link T which is connected to the shuttle control lever by levers A and B, Fig. VIII-25 prevents movement of the control lever until the carriage is shuttled to the left. Disabling the shuttle mechanism in this position, if permitted, would enable listing and totaling operations with the machine under other than normal function control.

Tests and Adjustments

1. To assure a positive carriage shuttle operation when the shuttle control lever is moved to shuttle position -
   With the handle forward to position the full stroke pawl in the last notch of the full stroke segment and the roll in detent arm E seated in one of the pockets in the rim of gear assembly G, drive pawl J should have a maximum of .060" latching lead over a tooth of gear assembly I.
   TO ADJUST, correctly mesh the teeth of gear assembly I with the teeth of gear assembly G.
   NOTE: The teeth of the gear assemblies are marked for correct meshing.

2. To assure that carriage is properly detented in left and right positions.
   a. On a slow handle operation there should be a slight under-drive of gear disc G.
   b. The stroke of arm B should be equalized between the right and left positions.
   TO ADJUST - (a) Position eccentric N in lever M (Fig. VIII-32).
   NOTE: When making this adjustment ensure that latch E (Fig. VIII-30) still has .030" latching lead over square stud D(Fig. VIII-30).
   b. Position eccentric C (Fig. VIII-33) and lock with screw. Check that lockwasher is placed under screw head.

√CARRIAGE TRAVEL IS ADJUSTABLE

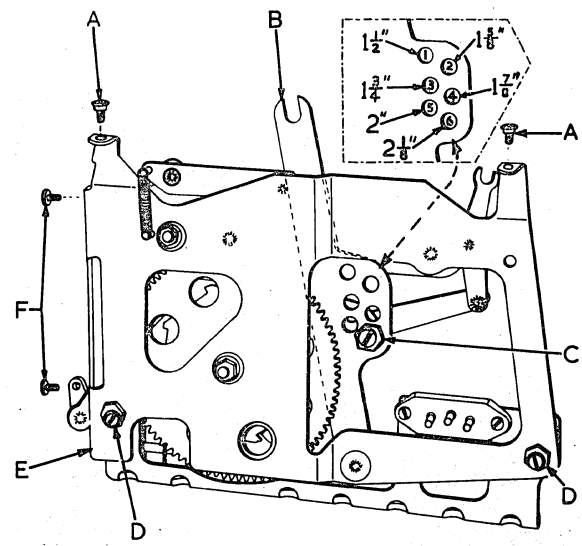


Fig. VIII-33

The distance between printing positions during carriage shuttle operations is adjustable in steps of 1/8"; minimum span of 1 1/2" and maximum span of 2 1/8". The variations in carriage movement are provided by coupling one of two holes in link U, Fig. VIII-32 with one of the six holes in shuttle arm B, Fig. VIII-33 using eccentric C as a coupling between the link and shuttle arm.

After changing eccentric C from one combination to another, detent G, Fig. VIII-23 should also be repositioned so as to be co-ordinated with the changed carriage travel.

To change the span between printing positions proceed as follows:

a. Operate the machine to position the full stroke pawl in the last notch of the full stroke segment placing shuttle lever B (Fig. VIII-33) toward the left.

b. Unhook spring A, Fig. VIII-23 and remove screw, locking washer, and nut F, Fig. VIII-23.

c. Remove eccentric C, lockwasher and screw.

d. Align the appropriate hole in U, Fig.VIII-32 with the selected hole in shuttle arm B (Fig. VIII-33) as shown in the chart below, then install screw and eccentric C, lockwasher and screw

e. Position detent G, Fig. VIII-23 over roll H, Fig. VIII-23, install and tighten screw F, Fig. VIII-23 in the aligned holes in detent G, Fig. VIII-23, and bracket E, Fig. VIII-23. Then rehook spring A, Fig. VIII-23.

√ The following chart denotes the available printing span combinations:

Carriage Travel	Arm B Fig. VIII-33	Link U Fig. VIII-32	Detent G Fig. VIII-23	Bracket E Fig. VIII-23
1 1/2"	1	2	1	5
1 5/8"	2	1	2	3
1 3/4"	3	2	1	4
1 7/8"	4	1	2	2
2"	5	2	1	3
2 1/8"	6	1	2	1

Assembly Procedure:

The following procedure is required to assemble shuttle operating unit E, Fig. VIII-33 to the machine:

a. Assemble plate E, Fig. VIII-33 with the upper formed projection flush against the carriage bottom plate and loosely install screws F, Fig. VIII-33.

b. Install and tighten screws A, Fig. VIII-33.

c. Install screws and eccentrics D, Fig. VIII-33 and remove the play with the eccentrics, turning their high side upward, then tighten the screws in the eccentrics.

d. Tighten screws F, Fig. VIII-33.

√ Changes or additions since last issue.

SHUTTLE CARRIAGE
SERIES P410, P420 and P460 MACHINES

The shuttle carriage mechanism provides alternate carriage printing positions with variations in space between printed columns from 1-1/2" to 2-1/2" in increments of 1/8". Stock machines are set to the following carriage throw when built: Style P410, 2"; P420, 2-1/2"; and P460, 1-7/8". Carriage throw may be changed to any one of the various shuttling positions in Field machines.

Shuttle control lever (referred to from now on as OCL 53) inactivates shuttle when it is shifted to the left and activates shuttle when moved to the right. Movement of OCL 53 from 'Shuttle' to 'Normal" is prevented when the carriage is in the right position, thereby ensuring that the carriage is only at 'Normal' in the left position where the basic controls allow 'A' and 'B' listing, full print and form space.

During shuttle operations, amounts print in the right column when the carriage is moved to the left and print in the left column when the carriage is moved to the right.

Register control lever (referred to from now on as OCL 52) is provided on machines with 'A' and 'B' registers. This lever is interlocked in such a way with OCL 53 as to prevent controls giving machine malfunction.

With OCL 53 set to the left (Normal) and OCL 52 set to the right (⊣/⊢/AB), movement of OCL 52 toward the left automatically shifts OCL 53 to the right (Shuttle).

With OCL 53 set to the right (Shuttle) and OCL 52 set to the left (B/A), movement of OCL 53 toward the left automatically shifts OCL 52 to the right (⊣/⊢ /AB).

When OCL 53 is at 'Shuttle', OCL 52 may be moved to either right or left position. The functions out of these two positions are as follows:

Register Control Lever (OCL 52) to the Right

1. Right printing column -
   (a) 'A' and 'B' registers add or subtract.
   (b) Full print.
   (c) Form space.
2. Left printing column -
   (a) 'A' and 'B' registers non-add.
   (b) Cipher split is 'active'.
   (c) Form non-space.

Register Control Lever (OCL 52) to the Left

1. Right printing column -
   (a) 'A' register add or subtract.
   (b) 'B' register non-add.
   (c) Full print.
   (d) Form space.
2. Left printing column -
   (a) 'B' register add or subtract.
   (b) 'A' register non-add.
   (c) Full print.
   (d) Form non-space.

The machine speed during the shuttle operations is reduced to a speed within the range of 105/115 strokes per minute.

Because of confliction, the feature of single or double cipher clear signal is omitted.

Only one cipher split is available:
Decimal Currency - columns 3/2.
L.S.D. Currency - columns 4/3.
L.S.D. & F Currency - columns 5/4.
The position may be modified from standard if the request is clearly shown on the order to the factory. Requests to supply more than one cipher split may be considered under a Custom Build program.

All shuttle operations are made with the Register Selector Lever at 'AB'. If this lever is moved to 'A' or 'B' positions, an interlock causes a handle-break. This interlock is disabled by OCK's 8-0 and 9-0 to enable totals and subtotals to print. This same interlock is also disabled when OCL 53 is moved to 'Normal'.

The feature 'Number, Split and Normal' which is basic to style P402 is omitted on the 13 col. shuttle machines.

Shuttle machines of only 10 column capacity give a printing limitation of 5/8" minimum from the left end of the platen to center of the figure printed out of column 10.

Carriage Tabulation Lever lowers Stop Block

When tabulation lever A is moved forward, bail D contacts vertical projection F of stop block assembly L and lowers the latter to move stop jaws H and J clear of the carriage stop C.

The release of lever A allows assembly L to move upward under the combined tension of springs K. Spring I and sliding jaws H and J pro-

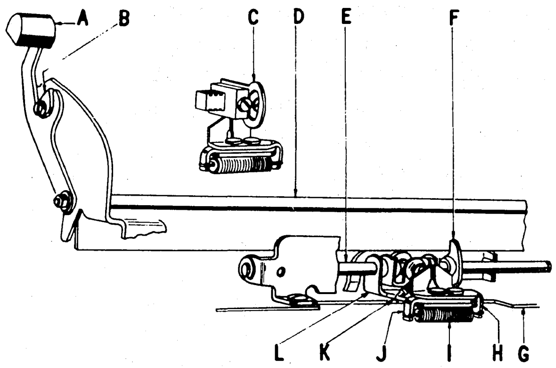


Fig. VIII-33-1

vide a yielding connection which cushions the carriage against shock during shuttle operations in either direction.

Test and Adjustment

To ensure that lever A lowers stop jaw assembly L clear of the carriage stop C but without binding L upon carriage base plate G -

There should be approximately .020" passing clearance between jaws H and J and the carriage stop C, with lever A fully advanced.

To Adjust, position limit B.

Carriage is detented in the Right and Left Positions

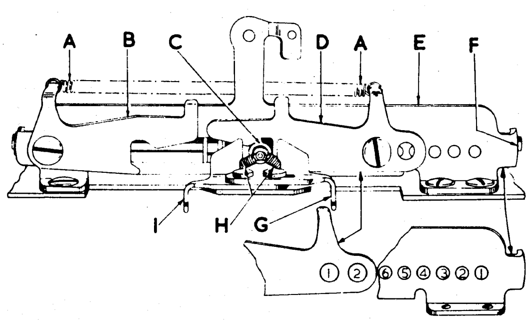


Fig. VIII-33-2

The carriage is detented in the right and left positions by detents B and D respectively. Roller C is held in pocket of the detent by the tension of spring A. Roller C is part of the inner stop jaw assembly which slides along shaft F. Spring A is sufficiently long to provide for all the various positions of detent D.

The diversity of holes in bracket E and detent D provide for the changes of shuttle throw. The method of altering the shuttle throw is covered in detail under the heading 'Shuttle Throw is Adjustable' Fig. VIII-33-13.

The illustration shows stop jaws G and I in their fully yielded positions. This has been done to expose roller C and to illustrate how springs H are anchored at one end to a spring stud which also serves as the bearing pin for roller C.

Friction Pad provides Braking Action to Carriage

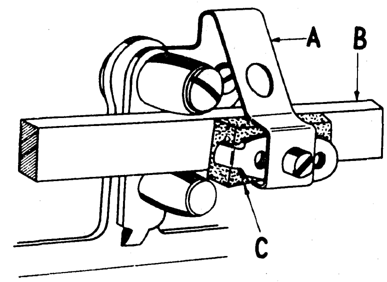


Fig. VIII-33-3

Felt pad C exerts considerable pressure upon square shaft B by means of leaf spring A. This braking effect prevents uncontrolled, violent movement into the detent position.

Co-ordinating Interlock for OCL 53 and OCL 52.

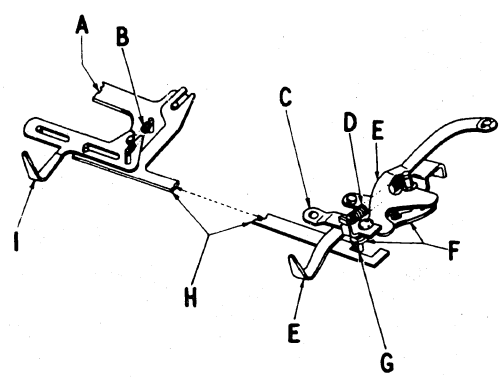


Fig. VIII-33-4

Lever I (OCL 53) is coupled to lever A which in turn is coupled to link H. Lever E (OCL 52) is coupled to lever F and the front stud G in lever F lies in the open pocket of link H. Thus, lever I and lever E are coupled within the limit of the open pocket in the right end of link H.

Correct setting of OCL 53 and OCL 52 is enforced by the linkage between the two control levers. The lever and slide combinations provide sufficient flexibility to permit the needed operational functions and prevent machine malfunctions that could arise from incorrect settings.

The combinations and safeguards are as follows:

1. Listing. Lever I toward the left (Normal). Lever E toward the right (-//-/AB).

This is the normal setting for all straight listing - adding and subtracting operations.

2. Shuttle. Lever I toward the right (Shuttle) permits -

(a) Lever E to be positioned to the right for -//-/AB operations.

(b) Lever E to be positioned to the left for A/B operations.

The two positions of OCL 52 are permitted because stud G in lever F can move from end to end in the open pocket of link H.

3. With lever I toward the right and lever E toward the left, moving lever I toward left will move lever E toward the right (-//-/AB position). This prevents accidental non-adding during straight listing operations.

4. With lever I toward the left and lever E toward the right, moving lever E toward the left (A/B) position will move lever I toward the right. This enforces carriage shuttling when lever E is moved to the position used only for shuttle operations.

Lever E is detented by part C and spring D. Lever I is detented only in 'Shuttle' position by a slight pocket in I and spring B.

Shuttle Control of Form Space

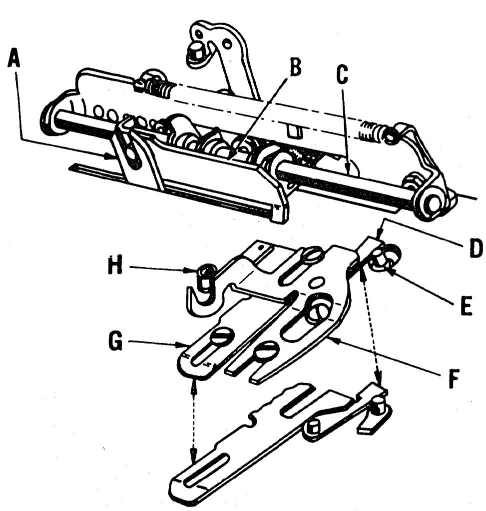


Fig. VIII-33-5

The feed control mechanism consists of two slides F and G and coupling latch D. The latter has a stud pivot for which the journal is a hole in slide F. The platen feed bail rides in the fork of upper slide F.

When shuttle arm A is located to the left, the spring tension supplied by arm E engages coupler D with the driving edge of slide G. On the forward stroke, slide G, by means of coupler D, moves slide F and the carriage feed bail rearward.

On the return stroke of the machine, roller H contacts the platen feed bail so that slide F is restored by its fork connection with the feed bail. Form space results from the normal function of the feed pawl and the platen ratchet wheel.

When shuttle arm A is held to the right, the toe of part B contacts D and disconnects the latter from slide G. The machine operation now moves slide G only, thereby, securing non-space.

Test and Adjustment

To ensure that coupler D secures a good hold of driver G without providing a false limit for arm E -

Shuttle arm A moved to the left side, stud E should hold coupler D engaged with driver G. Feel for approximately .005" to .010" play of D between G and the stud in E.

To Adjust, carefully bend arm E to position the stud as required.

Break Operation if Register Control Lever is in any Position other than 'AB'

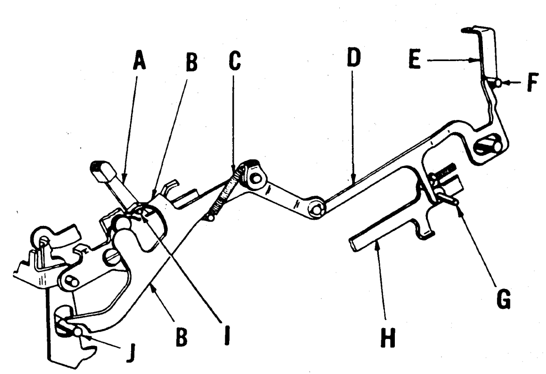


Fig. VIII-33-6

Register Control lever A is shown in the 'B' register position. Because of the conformation of the front operating ear of interlock B, spring C lowers interlock B into the path of shaft J and a listing operation brings about a break operation.

When lever A is moved into the 'AB' position, stud I raises interlock B out of the path of shaft J and permits machine operation.

Movement of lever A into the 'A' register position allows interlock B to lower itself into the path of shaft J because stud I is moved under the rear operating ear of B. Break operations are again secured from listing operations.

When lever A is in any position other than 'AB', depression of the total or subtotal key raises interlock B clear of shaft J and allows the key indexed operation. Depression of OCK 8-0 or 9-0 moves interlock slide H forward for stud G to contact the front leg of link D and, thereby, raise interlock B.

Movement of OCL 53 from 'Shuttle' to 'Normal' moves part E for stud F to contact the upper projection of link D and prevents interlock B from being lowered into the path of shaft J when lever A is moved out of the 'AB' position. Part E is coupled to slide H, Fig. VIII-33-4 by a stud and fork connection.

Tests and Adjustments

1. To ensure the correct function of interlock B in all three positions of lever A -

(a) Lever A in 'AB' position, interlock B should be held approximately 1/8" above shaft J.

(b) Lever A in 'A' or 'B' register positions, interlock B should limit upon shaft J.

To Adjust:

(a) Bend the right angle form of B to lie parallel with stud I.

(b) Bend the front and rear operating ears of B without disturbing the right angle form.

2. To ensure that interlock B is disabled by OCK 8-0, 9-0 and OCL 53 -

Move lever A to 'A' register position and depress OCK 8-0 or OCK 9-0. Interlock B should be raised clear of shaft J by approximately 1/16".

Move OCL 53 to 'Normal', interlock B should be raised clear of shaft J by approximately 1/16".

To Adjust, bend the lower and upper projections of link D.

Interlock Prevents Depression of Total Keys

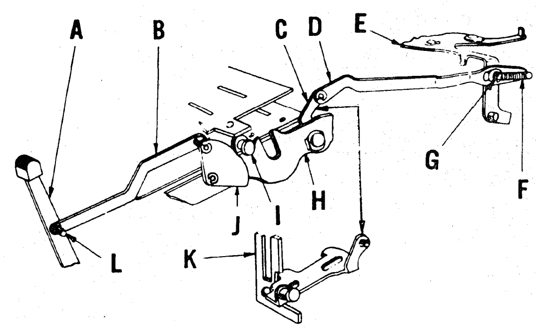


Fig. VIII-33-7

Interlock C moves under the notch in keystem K when the shuttle arm A, Fig. VIII-33-5 is in the right hand position. The vertical leg of lever E is moved toward the front of the machine and in doing so expands spring F. Under the tension of spring F, link D moves interlock C into the blocking position.

When lever C normalizes (shuttle arm A, Fig. VIII-33-5, moves to left hand position) interlock C is pulled away from the notch in the total and subtotal keys which allows register totals to be taken in the carriage position in which the amounts were accumulated (OCL 52 at -//- /AB).

Cam J allows a register 'B' total or subtotal to be taken (OCL 52 at B/A) in the carriage position where the 'B' amounts were accumulated. When lever A is moved from 'AB' to 'B', cam J contacts roller I and normalizes interlock C. This movement is possible because of the yielding joint provided by the slot in link D and spring F.

Test and Adjustment

To ensure correct function of interlock C-

Link D and interlock C should not provide a false limit for lever E when shuttle arm A, Fig. VIII-33-5, is in the left hand position. Some play of link D should be felt when it is pushed rearward (.030" to .040").

To Adjust, lengthen or shorten offset of link D as required, keeping both ends of D parallel to C and the vertical leg of E.

Interlock prevents Malfunction from Subtotal Key

If a subtotal of register 'B' is taken in a non-add 'B' position, the amount would 'total' but

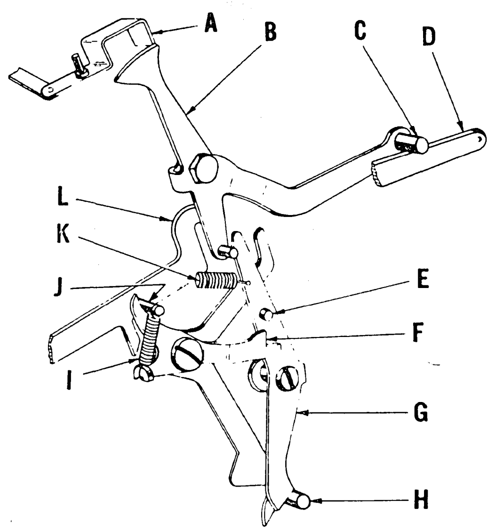


Fig. VIII-33-8

print the subtotal symbol were it not for interlock F.

In the non-add 'B' position, blocking arm A allows free passage of lever B when shuttle arm D is lowered. Spring K pulls lever G to move stud H for non-add of register 'B'.

When interlock slide L is moved by the depression of the subtotal key, stud J rocks latch F. The front end of latch F positions itself into the path of stud E. Thus, when spring K attempts to pull lever G, movement is blocked by F. Since stud H is not moved into the non-add 'B' position, a true subtotal of register 'B' is obtained.

Cipher Split is Controlled by Position of Shuttle Mechanism and OCL 52

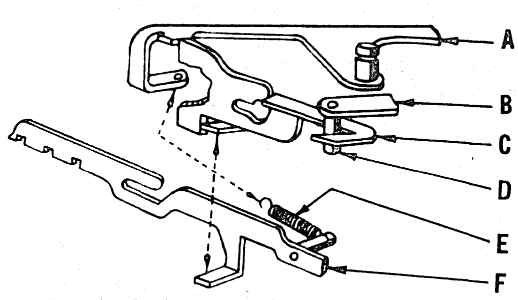


Fig. VIII-33-9

The cipher split is made active when the front arm of lever A (activated by the shuttle mechanism) moves to the left and moves slide F through spring E.

OCL 52 (-//-/AB); OCL 53 (Normal)

Levers are set this way for normal straight listing. The cipher split is not 'active' because lever A normalizes slide F through auxiliary slide C.

OCL 52 (A/B); OCL 53 (Shuttle)

Levers are set this way for adding amounts in registers 'A' and 'B' alternatively. The cipher split is not active in either carriage position.

When the carriage is in the right hand printing position, slide F is held 'inactive' by lever A and auxiliary slide C.

When the carriage is in the left hand printing position, lever A is moved to expand spring E but slide F is prevented from becoming 'active' by stud D of lever B (the latter is same as F, Fig. VIII-33-4).

OCL 52 (-//-/AB); OCL 53 (Shuttle)

Levers are set this way for non-adding numbers in the left hand printing position of the carriage and adding amounts in 'A' and 'B' registers in the right hand position. The cipher split is 'active' only in the left hand printing position.

When the carriage is in the left hand printing position, lever A is moved to expand spring E. Slide F moves into the 'active' position under the tension of spring E because stud D is positioned to give free movement of auxiliary slide C.

When the carriage is in the right hand position, lever A normalizes auxiliary slide C and via the formed ear holds slide F 'inactive'.

Register 'A' Add and Non-Add Control

Register 'A' adds when lever A is held in its normal position by spring B.

Register 'A' non-adds when the shuttle mechanism moves lever A. The vertical leg of A is moved toward the front of the machine and via spring C rocks lever E for the bottom end of E to contact stud F. Lever G moves rearward to contact stud H of listing pawl I and move the latter into the 'non-add' position.

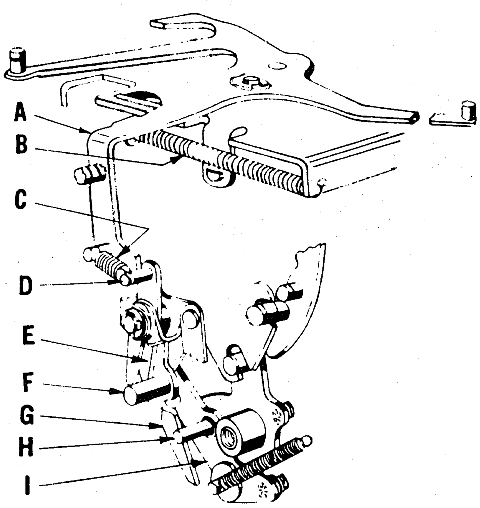


Fig. VIII-33-10

The non-add position of pawl I is maintained by lever A until the latter normalizes during the return stroke.

Register 'B' Add and Non-Add Control

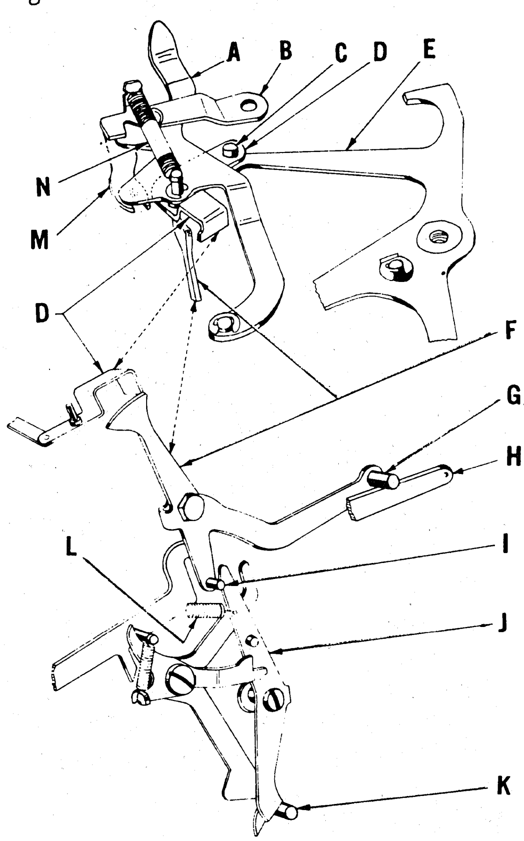


Fig. VIII-33-11

Register 'B' add and non-add is controlled by a non-blocking or a blocking position of part D relative to lever F.

If lever F is blocked by part D, register 'B' adds, but when part D allows free passage of lever F register 'B' non-adds.

The blocking and non-blocking positions of D are decided by the position of A (OCL 52) and the position of lever E. Lever A moving within the limits of the detent pockets of B moves D relative to F. Movement of lever E when actuated by the shuttle mechanism also changes the position of D relative to F because of the coupling between these two parts at stud C.

OCL 52 (A/B); OCL 53 (Shuttle)

When the control levers are set as above and the carriage is in the left printing position, part D presents a blocking surface to lever F and because of this register 'B' adds or subtracts.

When the carriage, however, is in the right printing position, part D is moved to the left of F (facing front of machine). This allows free passage of lever F when the machine operates and accordingly register 'B' non-adds.

OCL 52 (-//-/AB); OCL 53 (Shuttle)

When the control levers are set as above and the carriage is in the left printing position, part D, located to the right of lever F, allows free passage of lever F when the machine operates and accordingly register 'B' non-adds.

When the carriage, however, is in the right position, part D presents a blocking surface to lever F and as a result register 'B' adds or subtracts.

OCL 52 (-//-/AB); OCL 53 (Normal)

These are the control lever settings for straight listing. Part D presents a blocking surface to lever F and register 'B' adds or subtracts.

Non Add of Register 'B'

The illustration shows part D in the non-blocking position which allows free passage of lever F when the machine is operated.

Shuttle drive lever H, when machine is normal, holds lever F, via stud G, with lead over the forming of part D. Stud I contacting lever J, holds spring L under tension and locates the bottom of J well clear of stud K.

Machine operation, forward stroke, moves the rear end of lever H downward and allows spring L to rock lever J because F is allowed free passage by D. Full movement of J moves stud K into the non-add position. Stud K performs the same function as does stud F for register 'A', see Fig. VIII-33-10.

Machine operation, return stroke, restores lever H, restores lever F beyond part D and via stud I rocks lever J away from stud K and spring L is put under tension.

Add or Subtract of Register 'B'

For machine operations in which register 'B' is engaged for add or subtract, part D is positioned to block lever F.

Movement of lever H will, therefore, only allow spring L to pull lever F into contact with the forming of D. The very limited stroke of lever J holds the latter clear of stud K and as a result register 'B' adds or subtracts.

Test and Adjustment

To ensure that part D does not bind against lever F when D is being driven by lever E from the non-blocking (left) to the blocking position (center).

Eccentric D, Fig. VIII-33-12, for the shuttle throw lever should be properly adjusted before this test is made. Start with D in the left, non-blocking position. Operate machine with handle and on the return stroke see that lever F restores sufficiently early to prevent a cramp between F and D.

To Adjust, bend the horizontal arm of F to advance or retard the timing.

Shuttle Mechanism is Actuated by Primary Section

The shuttle mechanism is actuated from the primary section of the machine. This method of drive permits the shuttle mechanism to be activated by power operations and by handle pull operations.

Arm A is keyed directly to shaft AI and is held laterally on the same shaft by screw B. During the forward stroke of the machine, arm A, via link AJ, rocks lever H about pivot stud E. Coupler G is attached to stud Q in drive lever R, and when lever H pivots upon stud E, drive lever R is

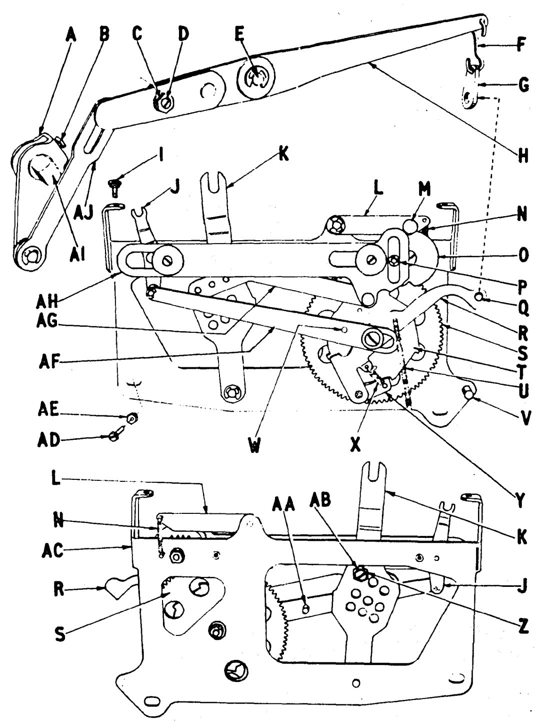


Fig. VIII-33-12

allowed to limit against stud V. Spring U supplies the spring tension to hold lever R limited against V. Provided geared detent O is correctly located by its notch and roller M, pawl Y will secure lead over the next tooth in T.

Geared wheel S (of which T is a part) is meshed with geared detent O. Detent O is provided with two pockets which are diametrically opposite.

During the return stroke of the machine, arm A, via link AJ, lever H, chain link F and coupler G, restores drive lever R and in doing so permits pawl Y to push toothed plate T and gear wheel S far enough for detent O to move from pocket to pocket relative to roller M. Geared detent O is turned through one half cycle every shuttle operation.

In making the half cycle, roller P moves to the opposite side of the pivot of O and moves slide AH in the process. To slide AH is attached link AG which in turn is attached to shuttle arm K by screw AB and eccentric Z.

Thus the rotation of geared detent O through one half cycle moves shuttle arm K and with it the carriage stop jaw assembly and, of course, the movable carriage assembly.

When OCL 53 is at 'Normal', lever J positions link AF so that the full movement of driver R is prevented by limit stud W. Pawl Y does not secure lead over a tooth in T and accordingly shuttle operations are disabled.

When OCL 53 is at 'Shuttle', lever J positions link AF so that limit stud W is taken out of the path of driver R and shuttle operations are secured.

OCL 53 can not be moved from Shuttle to Normal when arm K is in the right hand position. Shuttle arm K blocks movement of link AF by means of stud AA. If OCL 53 could be moved to normal under this condition it would be possible to make listing and totaling operations other than those prescribed by the normal controls.

Tests and Adjustments

1. To ensure a positive carriage shuttle operation -

This test is made with the shuttle plate assembly AC removed from machine. Pull lever R downward to limit upon stud V. Check for roller M to be positively seated in a notch of O. Drive pawl Y should have not more than .060" latching lead over a tooth in plate T.

To Adjust, correctly mesh the teeth of gear S with the teeth of O.

Note: The teeth of the gear assemblies are marked for correct meshing.

2. To ensure that plate assembly AC is properly located -

The formed ears of AC should limit against underside of carriage base plate and eccentric AE should support AC at the sub-base fixing points.

To Adjust, install shoulder screws I and fully tighten. Then turn eccentrics AE to support AC in the slots and lock in position with screws AD.

3. To ensure that carriage is properly detented in left and right positions -

(a) On a slow handle operation there should be a slight under-drive of gear disk O.

(b) The stroke of arm K should be equalized between the right and left positions.

To Adjust:

(a) Position eccentric D in throw lever H and lock with nut C.

(b) Position eccentric Z and lock with screw AB. Check that lockwasher is placed under head of screw AB.

Shuttle Throw is Adjustable

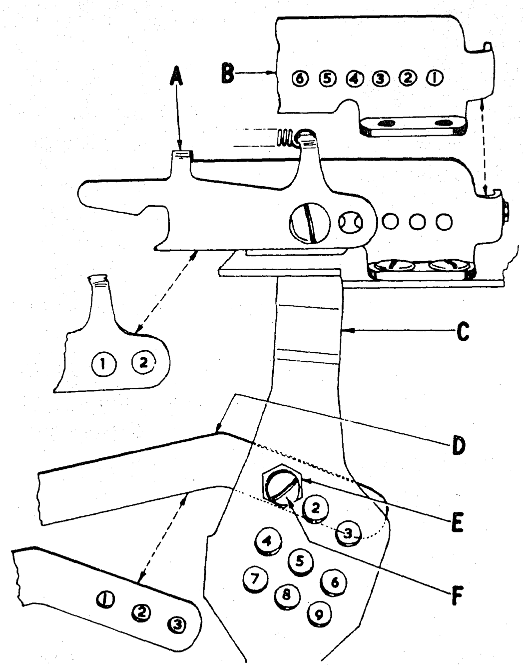


Fig. VIII-33-13

The distance between the right and left printing positions is adjustable from 1-1/2" to 2-1/2" in steps of 1/8".

The variations of throw are provided by the three holes in link D and the nine holes in shuttle arm C, using the eccentric E and screw F as the coupling between D and C.

Detent A requires coordinating with bracket B to suit the stroke of C.

To change the span between printing positions proceed as follows:

(a) Operate machine to place shuttle arm C toward the left.

(b) Unhook the spring from detent A. Remove the holding screw, lock washer and nut for A.

(c) Remove screw F, eccentric E and lockwasher.

(d) Align the appropriate hole in D with the selected hole in C (see chart below). Install eccentric E, screw F and lockwasher under head of screw. Do not tighten screw F yet.

√ (e) Position detent A over the roller in the stop jaw assembly, install screw, nut and lockwasher in the aligned holes of A and bracket B.

(f) Rehook spring on detent A.

(g) Adjust eccentric E as outlined in Test and Adjustment No. 3 'Shuttle Mechanism is actuated by Primary Section', Fig. VIII-33-12. Then fully tighten screw F.

The available printing span combinations are as follows:

Carriage Travel	Arm C	Link D	Detent A	Bracket B
1 1/2	1	1	1	6
1 5/8	2	2	2	4
1 3/4	3	3	1	5
1 7/8	4	1	2	3
2	5	2	1	4
2 1/8	6	3	2	2
2 1/4	7	1	1	3
2 3/8	8	2	2	1
1 1/2	9	3	1	2

Note: Fig. VIII-33-13 shows the mechanism set for 1 1/2" span.

√ Changes or additions since last issue.

KEYBOARD MECHANISMS

CALENDAR FEATURE - No. 4 KEYBOARD

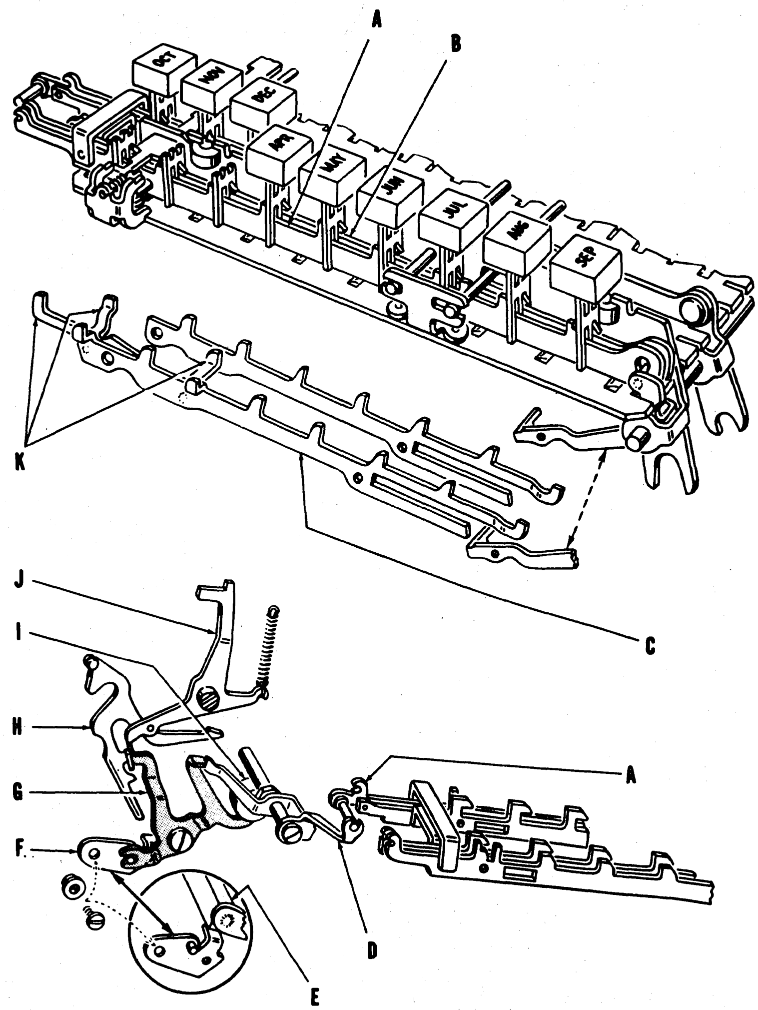


Fig. VIII-34

Month keys to print January through December are substituted for numeral keys on certain styles of Series P machines. This feature may be found on either a No. 4 or No. 5 keyboard. Both use a twelve pitch adding sector (all twelve months on one type bar) but differ in the arrangement of keys on the keyboard.

Column ten and positions 7, 8, and 9 of column nine are bridged through index strip A, locking strip B, and index bar C, and function as one column to index the twelve positions of the type bar in column ten. Three additional projections K on index bar C limit against the Jan., Nov., and Dec. keystems. The remainder of column, not included in the calendar feature, contains numeral keys (1 through 6) which may be used for accumulation of amounts or for indicating tens of days in conjunction with the calendar feature.

To print 12 months from a 12 pitch adding sector, it is necessary to print one month with index bar C at home (cipher) position. For this operation, the tail of hammer latch H is trimmed allowing engagement of latch H with hammer J without movement of the adding sector.

During a machine operation with no keys depressed, the column non prints because hammer latch H is held out of engagement with hammer J by bellcrank G which is blocked by bail D.

With a month key depressed, rearward movement of index strip A rocks bail D out of the path of bellcrank G, permitting upward movement of hammer latch H to engage hammer J during the forward stroke of a machine operation. Printing will take place.

With a month key depressed and during the return stroke of an operation, restoring frame E rocks arm F. Rocking of arm F returns bellcrank G to normal, permitting the rear extension of bail D to be raised (after the release of the depressed month key) into blocking position thus preventing printing of a month until a month key is again depressed.

CALENDAR FEATURE - NO. 5 KEYBOARD

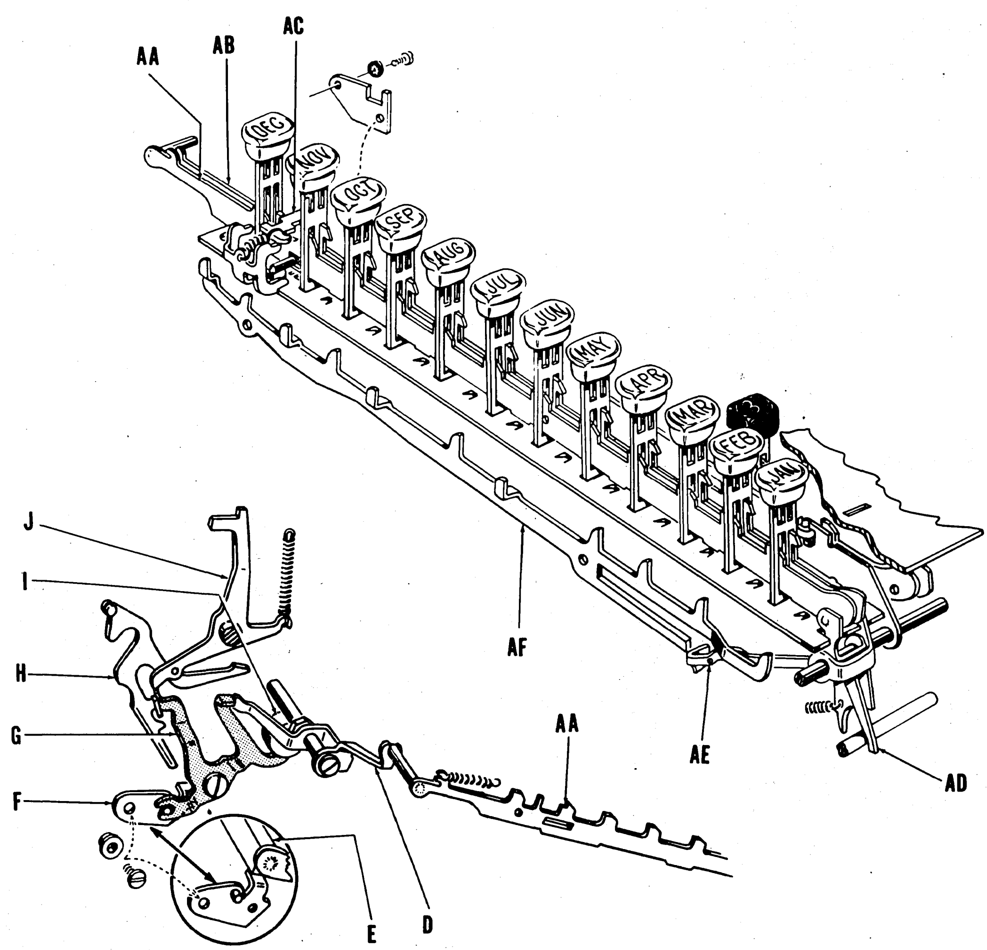


Fig. VIII-35

To provide increased keyboard capacity, twelve month keys are contained in one column of the No. 5 keyboard. This keyboard is generally the same in construction to the No. 4 keyboard except (because of twelve keystems being contained in the month column) the three links and shaft used to restore index strips AA are omitted and leg AD has been added to the cipher stops AE. The added leg to the cipher stops moves index strips AA rearward prior to the restoration of total strip AC during total operations.

As previously stated under Fig. VIII-34, one month prints with index bar AF at cipher position - the tail of hammer latch H being trimmed and allowing engagement of latch H with hammer J without movement of the adding sector.

Hammer latch H is held out of engagement with hammer J through bellcrank G and bail D until a month key is depressed.

Depression of a month key rocks bail D out of the path of bellcrank G permitting hammer latch H to move upward and engage hammer J during the forward stroke of a machine operation.

Bellcrank G is returned to normal through restoring frame E and arm F on the return stroke of a machine operation (as described under Fig. VIII-34) where it blocks the upward movement of latch H until a month key is again depressed.

Tests and Adjustments

1. To assure correct location of the rear extension of bail D -
During the forward stroke of a machine operation in which a month key is indexed, the forward lip on bellcrank G should have approximately .010" resetting clearance behind the rear extension of bail D and should have a flush hold on bail D during the forward stroke of a machine operation in which no key is indexed.
TO ADJUST, weave bail D.

2. To assure resetting of bellcrank G -
During the return stroke of a machine operation in which a month key is indexed, the forward lip on bellcrank G should have approximately .010" resetting clearance behind the rear extension of bail D.
TO ADJUST, bend the forked portion of bellcrank G.

3. To safeguard against a false normal limit of restoring frame E -
With no month keys indexed and the machine in home position, the forward extension of bellcrank G should have minimum clearance under collar I.
TO ADJUST, bend the forward extension of bellcrank G.

DATE REPEAT AND NORMAL MECHANISM

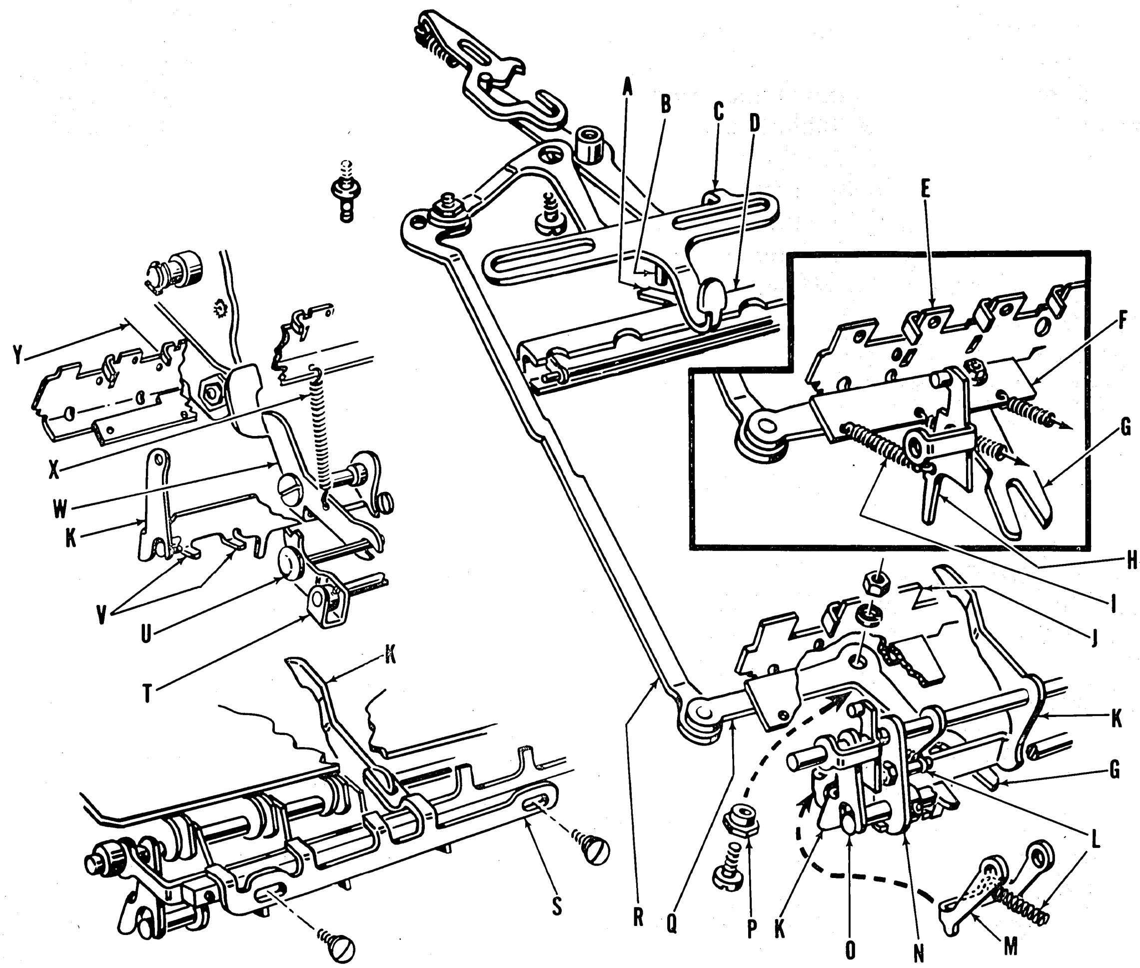


Fig. VIII-36

This mechanism provides a means by which the operator, through manipulation of the date - repeat and normal lever C, may either prevent or permit restoration of the keys in the date columns during machine operations.

Normal date operations (keys to restore) occur when bail K is in its rightmost position. Repeat date operations (keys to remain depressed) occur when bail K is in its leftmost position. Positioning of bail K is controlled from lever C through link R and bellcrank Q.

With lever C and bail K in their rightmost position, the fork of bail K engages shaft O, and the rear arm of bail K is aligned with the cut-out portion (to the right of surface J) in guide strip E. In this position, bail K rocks with the key restoring movement of shaft O to actuate rocker arms H, thus moving the keyboard locking strips rearward to release the depressed keys.

With lever G and bail K in their leftmost position, bail K clears shaft O, and the rear arm of bail K aligns with surface J (of guide strip E). In this position, bail K and rocker arms H are not actuated from the key restoring movement of shaft O, and the indexed keys remain depressed.

Partial shifting of lever C aligns stud B with finger A (on channel bail D) causing a safeguard partial machine operation (handle break) should the machine be operated with lever C in this position. Stud B, by limiting against finger A, also prevents shifting of lever C during machine operations.

BAIL AND LATCH SAFEGUARDS AGAINST RELEASE OF DATE KEYS DURING HANDLE BREAK OPERATIONS

Auxiliary bail M minimizes the vibration of bail K when in repeat position during a machine operation in which a handle break occurs. This eliminates the tendency of bail K to strike rocker arms H and the subsequent release of the date keys.

Near the end of the return stroke as shaft O swings forward, the rear arm of bail K limits on surface J (of guide strip E) expanding spring L and preventing further movement of bail K and rocker arms H, thus retaining the keys depressed in pre-selected columns.

Latch T, engaging bail K when bail K is in repeat position, delays the forward movement of bail K to safeguard against the release of keys in pre-selected columns during a handle break situation in electrically operated machines.

When bail K is located in its rightmost position, prong G limits the upward movement of latch T; when bail K is located in its leftmost position, latch T is pulled up into engagement with bail K by spring X at the beginning of the forward stroke as link Y moves away from arm W.

During the return stroke, link Y contacts the lip on the rearmost portion of arm W, causing W to disengage latch T from bail K.

INTERLOCK SAFEGUARDS AGAINST SIMULTANEOUS DEPRESSION OF ALL KEYS IN DATE COLUMN

Keyboard interlocks (illustrations 2, 3, and 4, Plate 113, Series P Keyboard Parts Catalog, Form 2984) are placed between the locking strip and the index strip in keyboard columns containing the Permanent Repeat Features - Without Enforced Designation.

This construction prevents simultaneous depression of an entire column of keys in permanent repeat columns which, if permitted, could not be restored without removing the case.

Tests and Adjustments

1. To assure engagement of bail K with shaft O -
   As lever C is slowly moved to the left, the forked portion of bail K should move freely over shaft O.
   TO ADJUST, weave bail K.

2. To assure equalized movement of bail K as lever C is alternately shifted to right and left -
   As lever C is slowly shifted to the right and left, fingers V should limit against assembly N.
   TO ADJUST, turn eccentric P.

3. To safeguard against a false limit of the rear arm on bail K during the forward stroke -
   With lever C located in its right-hand (normal) position, there should be minimum clearance between the rear arm of bail K and surface J.
   TO ADJUST, bend the rear arm of bail K.

4. To assure the correct upward limit for safeguard latch T -
   NOTE: The following test should be made only with the motor and drive installed and properly adjusted.
   With the machine in home position and lever C located in its right-hand (normal) position, the right prong of fork G should have approximately 1/32" clearance over the upper side of stud U.
   TO ADJUST, bend the lip on the rearmost portion of arm W.

ENFORCED USE OF KEYS MECHANISM

Machines equipped with the enforced use of keys mechanism (commonly called enforced designation mechanism) require combination of keys to be depressed before a machine operation can take place. Many combinations of enforcements are available. Improper indexing of keys, where an enforcement is active results in a safeguard partial machine operation ("handle break").

ENFORCED USE OF KEYS - ONE COLUMN

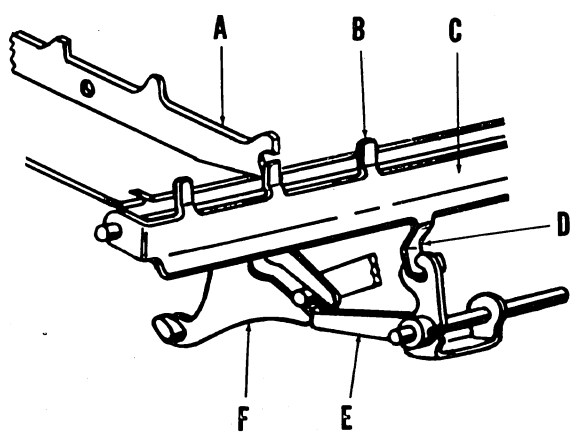


Fig. VIII-37

Depression of a key moves control strip A forward, rocking bail C through lips B. Rocking of bail C swings arm E downward out of the path of hook F permitting a machine operation. If more than one column of enforcement is required, additional control strips A are used. The forward portion of a control strip A in any column may lower arm E, through lip B and bail C.

ENFORCED USE OF KEYS - TWO OR MORE COLUMNS

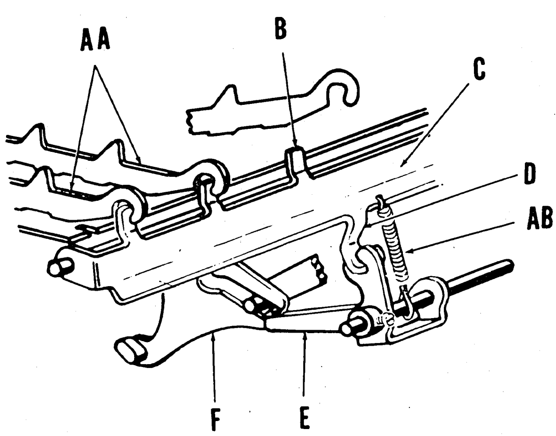


Fig. VIII-38

The tension of spring AB tends to swing bail C downward. However, bail C is prevented from swinging downward through its lips B limiting against the hook portion of control strips AA.

Depression of keys moves control strips AA forward and away from lips B.

Keys must be depressed in all columns included in the enforcement group before bail C is free to swing downward and lower arm E out of the path of hook F.

TWO OR MORE COMBINATIONS OF ENFORCEMENTS REQUIRE MULTIPLE BAILS

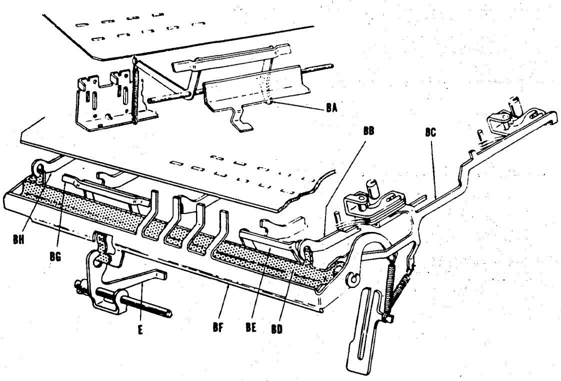


Fig. VIII-39

When more than one enforcement is required, an arrangement similar to that shown in Fig. VIII-39 is used. The enforcement may require the positioning of one or more bails before a machine operation is permitted.

Arm E is controlled directly by bail BD and indirectly by bails BE, BF, and BG through bail BD.

The enforcement feature may be disabled from a lock located in either position 2-0 or 7-0.

DISABLING OF ENFORCEMENT THROUGH SPECIFIED CONTROL KEYS, LEVER AND LOCKS

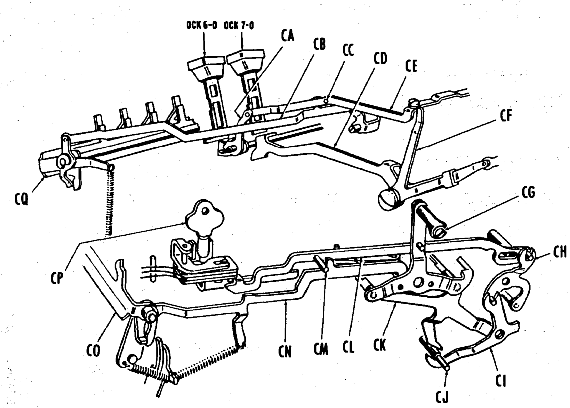


Fig. VIII-40

It is sometimes desired to disable the enforced designation feature from the depression of certain operation control keys or movement of an operation control lever.

Depression of OCK's 7-0 or 6-0 moves link CB forward, rocking bail CQ to disable the enforcement and permit a machine operation to take place. OCK 7-0 moves link CB through lever CD, bellcrank CF, link CE, and stud CC. OCK 6-0 moves link CB through arm CA, link CE, and stud CC.

Forward or rearward movement of lever CG, through arm CK, stud CJ, and bellcranks CI and CH, moves link CL rearward. Rearward movement of link CL through stud CM moves link CN rearward rocking bail CO, thereby disabling the enforcement.

Turning key CP (lock position 2-0) moves link CL rearward and stud CM and link CN rocks bail CO disabling the enforcement.

Tests and Adjustments

1. To assure a machine operation when keys are properly indexed on the keyboard -
   a. Depress a key in the keyboard and check for control strip A, Fig. VIII-37 to rock bail C, Fig. VIII-37 and lower arm E, Fig. VIII-37 sufficiently to clear hook F, Fig. VIII-37.

   b. Depress a key on the keyboard moving only one control strip AA, Fig. VIII-38 forward and check for no movement of arm E, Fig. VIII-37; then depress keys in all columns included in the enforcement and check the tension of spring AB, Fig. VIII-38 to rock arm E, Fig. VIII-37 clear of hook F, Fig. VIII-37.

TO ADJUST, bend foot D, Fig. VIII-37 for over-all adjustment, or bend lips B, Fig. VIII-37 for individual adjustments.

2. To safeguard against interference between enforcements within a group -
Check, in turn, each enforcement within the group for release or non release of the enforced designation feature.
TO ADJUST:
   a. From bail BF, Fig. VIII-39, bend the lips on the upper side of the bail for individual adjustment, or the foot of the bail for overall adjustment.
   b. From bail BD, Fig. VIII-39, bend the lips on the upper side of the bail for individual adjustment (both strips BB and BH, Fig. VIII-39 must be forward for release) or the foot of the bail for overall adjustment.
   c. From bails BE and BG, Fig. VIII-39, first adjust bail BD, Fig. VIII-39 then bend arms BA, Fig. VIII-39 if necessary.
   d. From locks in position 2-0 and 7-0, bend arm BC, Fig. VIII-39 where it engages bail BD, Fig. VIII-39.

ENFORCED SUB-TOTAL, TOTAL MECHANISM - CARRIAGE CONTROLLED

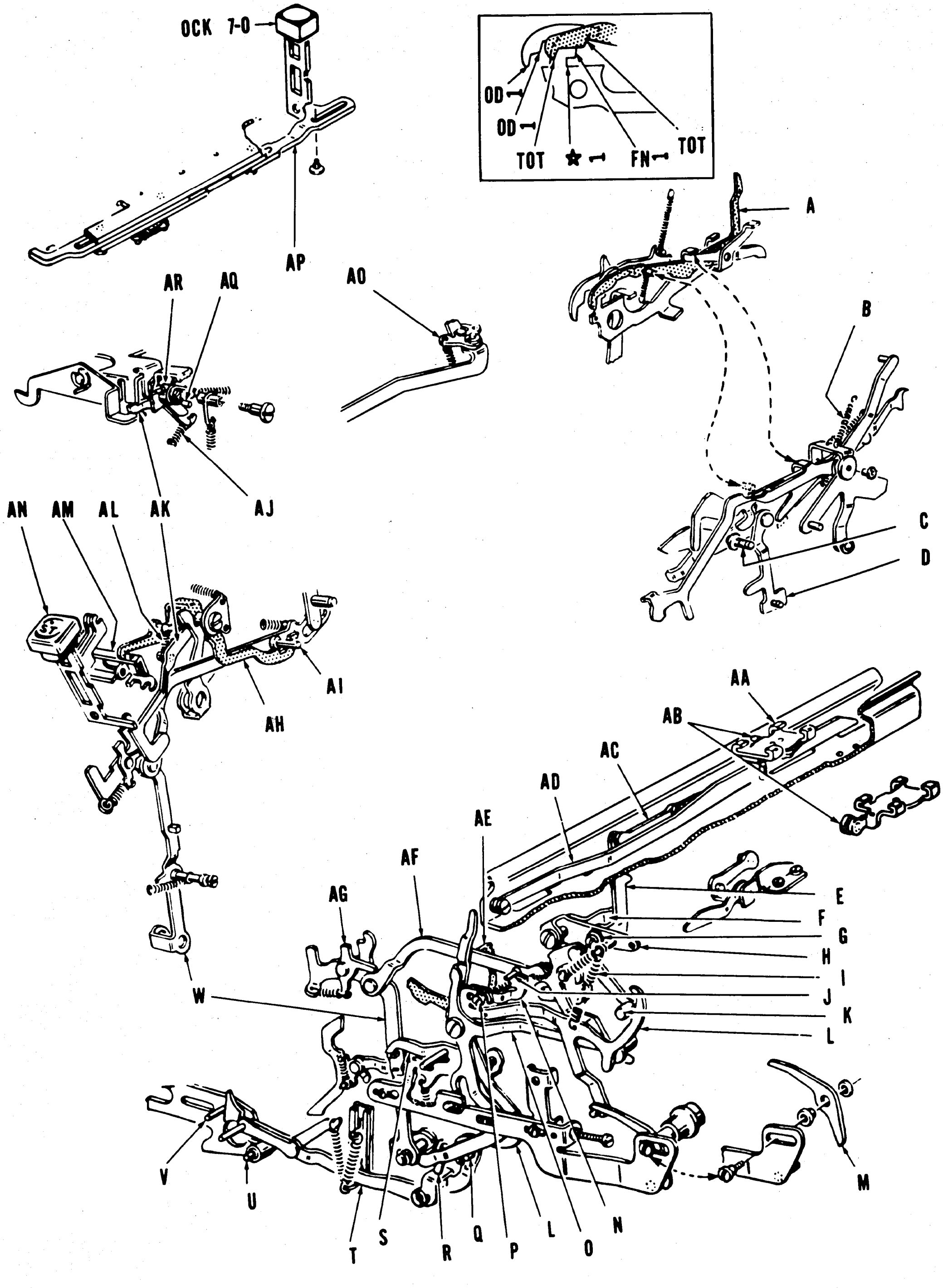


Fig. VIII-41

This feature compels a sequence of operations in which the sub-total must be taken in the last carriage position, the carriage then shifted back to first position and the total taken before further listing can be accomplished.

As the carriage tabulates into the last carriage position (new balance), control roll AB contacts the higher surface of skid AD rocking arm AC, raising link E and rocking bellcrank D. As bellcrank D is rocked, roll K cams against the inclined finger of bellcrank L rocking the latter so that its lower forward extremity moves away from stud Q. Arm T moves into the path of stud V to cause a 'handle break'.

As bellcrank H is rocked (upon tabulation of the carriage into last position), link AF is positioned rearward where its foremost upright projection blocks depression of the total key. Should the total key be partially depressed as the carriage tabulation into last position (thus blocking the rearward movement of link AF) stud J would position the finger on bellcrank H to contact the stud in bellcrank O, positioning bellcrank O so the foot on its lower forward extremity holds arm T in a 'handle break position.

Depression of the sub-total key, which is possible with link AF positioned rearward by the carriage, will lower arm T out of the path of stud V permitting a sub-total operation.

Depression of sub-total key AN (in the last carriage position) through arm D moves link AF farther rearward, permitting engagement of latch S on the square stud in the vertical arm of link AF. Upon completion of the sub-total operation, latch S remains engaged with the square stud and holds link AF in this rearward position where it allows depression of the total key but blocks (through pawl AG) depression of the sub-total key.

As link AF is moved to and latched in its rearward position (during the sub-total operation), stud J in link AF moves the finger on bellcrank H into contact with stud in bellcrank O. Bellcrank O is positioned so the foot on its lower forward extremity prevents arm T from being lowered out of the path of stud V thus preventing a machine operation should a total or a repeat sub-total operation be attempted before shifting the carriage out of new balance position.

As the carriage is shifted to proof position (first carriage position) following the sub-total operation in the new balance position, control roll AB moves off of skid AD, spring I rocks bellcrank H so its finger releases the stud in bellcrank O, and bellcrank O is rocked so its foot is moved forward out of the path of stud R. Upon depression of the total key, arm T is lowered out of the path of stud V to permit a total operation.

During the total operation (in proof position) stud U contacts the pivot arm of latch S, rocking the latter so its upper portion contacts stud C (which acts as a fulcrum) raising latch S out of engagement with the square stud in the vertical arm of link AF. Thus link AF is released and restored by spring B.

Inasmuch as the number of posting total symbols must agree with the number shown on the counter dial and use of the total key in listing positions is also permitted; two total symbols are provided to distinguish between posting totals and general totals. The symbols TOT or $\underline{\text{TOT}}$ (minus balance) identifies posting totals and prints on subsequent total operations following an enforced sub-total, total operation. Symbols TOT and $\underline{\text{TOT}}$ do not print with the enforcement feature disabled. Symbol indexing arm A which is disabled through stud AE during enforced sub-total, total operation indexes the general total symbols.

Slide AP prevents depression (by riding the key) of OCK 7-0 during a subtract operation in which the amount subtracted is smaller than the amount previously added. By thus blocking OCK 7-0, non-interference with the sequence of operation is assured as the carriage is tabulating into the last position (new balance). Otherwise, should the operator depress OCK 7-0 as the carriage moves into new balance position, it would be necessary (to enable a sub-total operation) to move the carriage toward the right, operate the machine, and relocate the carriage in new balance position.

Prevention of a repeat sub-total operation and the subsequent overaddition of the item counter if the operator "rides" the sub-total key (following a new balance operation and at the same time shifts the carriage to proof position) is accomplished by the hook on the forward portion of arm AH dropping over channel bail AM.

Depression of sub-total key AN lowers arm AK and spring AL attempts to rock arm AH. The movement of arm AH, being limited by studs AI and AQ, causes expansion of spring AL.

During the forward stroke of a sub-total operation, arm W is moved rearward, locating stud AI over the pocket in the rearmost of arm AH. This rearward position of stud AI permits the hook on the forward portion of arm AH to be pulled down by spring AL. As channel bail AM returns to normal (with the sub-total key held depressed) the hook portion of arm AH engages the channel bail.

When a second sub-total operation is attempted (with the sub-total key held depressed) the engagement of the hook portion of arm AH with the channel bail prevents the latter's forward movement, causing a partial machine safeguard operation (handle break).

When the sub-total key is released, arms AK and AH are restored to normal by spring AJ, permitting a total operation in proof position.

Tests and Adjustments

1. To assure the normal position of the carriage controlled enforcement when the carriage is in other than new balance position -
   a. With the carriage in other than new balance position, link E should limit on top of the hammerhead plate and roll K should seat in the lower pocket of bellcrank L.
   b. With the carriage in other than new balance position and with spring I unhooked, the lower corner of arm T should be located approximately 1/16" below stud V when the handle is pulled forward.

   TO ADJUST:
   a. Bend the arm carrying roll K forward or rearward.
   b. Bend arm T.

2. To assure initial indexing of the total and sub-total enforcement mechanism as the carriage is moved into new balance position -
   a. Control roll AB should contact skid AD (to rock bellcrank H) as soon as the carriage tabulates out of the carriage position preceding the new balance position.
   b. With the carriage in new balance position, link F should limit against the bottom of the hammerhead plate.

   TO ADJUST:
   a. Reposition mounting plate AA.
   b. Turn eccentric G.

3. To safeguard against taking a total operation in new balance position -
   Unhook spring I, depress the total key and move the carriage into new balance position. Check for the bottom edge of the foremost portion of arm T to be located approximately 1/16" below stud V.
   Arm T and stud V should be similarly located when the total key is not depressed and arm AF latched rearward by latch S.
   NOTE: When making the above test, care should be taken (as the carriage is moved) that roll K does not become lodged on the upper point of bellcrank L.
   TO ADJUST, bend the rear portion of arm O.

4. To assure that a machine operation takes place from depression of OCK 7-0 -
   With a minus balance in the machine, the carriage located in new balance position and spring I unhooked, depress OCK 7-0 and pull the handle part way forward. Check for approximately 1/32" clearance of arm T over stud V.
   TO ADJUST, bend the lip on the upper vertical arm of arm O.

5. To safeguard against interference with the carriage controlled enforcement mechanism - With the carriage located in other than new balance position, spring I hooked up and latch S disengaged from square stud in arm W, pull the handle forward and check for stud V to clear under arm T by approximately 1/32". Shift the carriage into new balance position, depress the sub-total key and check for stud V to clear over arm T by approximately 1/32". TO ADJUST, bend the lower leg of bellcrank L.

6. To assure proper functioning of the carriage controlled enforcement mechanism during a total operation -
With the carriage located in other than new balance position, arm AF latched rearward by latch S and the total key depressed, pull the handle forward and check for stud V to pass over arm T with maximum clearance.
With the total key remaining depressed, unlatch arm W from latch S, pull the handle forward and check for arm T to block stud V.
TO ADJUST, loosen screw P and locate arm N to its rear, uppermost position.

7. To assure disabling the carriage controlled enforcement mechanism from a lock in the right side of the case -
With the key turned in the lock in the right side of the case, arm AF should be moved rearward sufficiently to permit the sub-total key to be depressed with its keystem passing in front of pawl AG.
TO ADJUST, bend the upper portion of bellcrank M.

8. To safeguard against a repeat sub-total operation in new balance position -
   a. The rearmost portion of arm AH should be aligned with the shoulder of stud AI.
   b. Spring anchor AQ should clear set collar AR.

TO ADJUST:
   a. Bend the rearmost portion of arm AH.
   b. Bend spring anchor AO upward to about 45^o angle.

LOCK MECHANISMS

LOCKS TO PREVENT MACHINE OPERATIONS

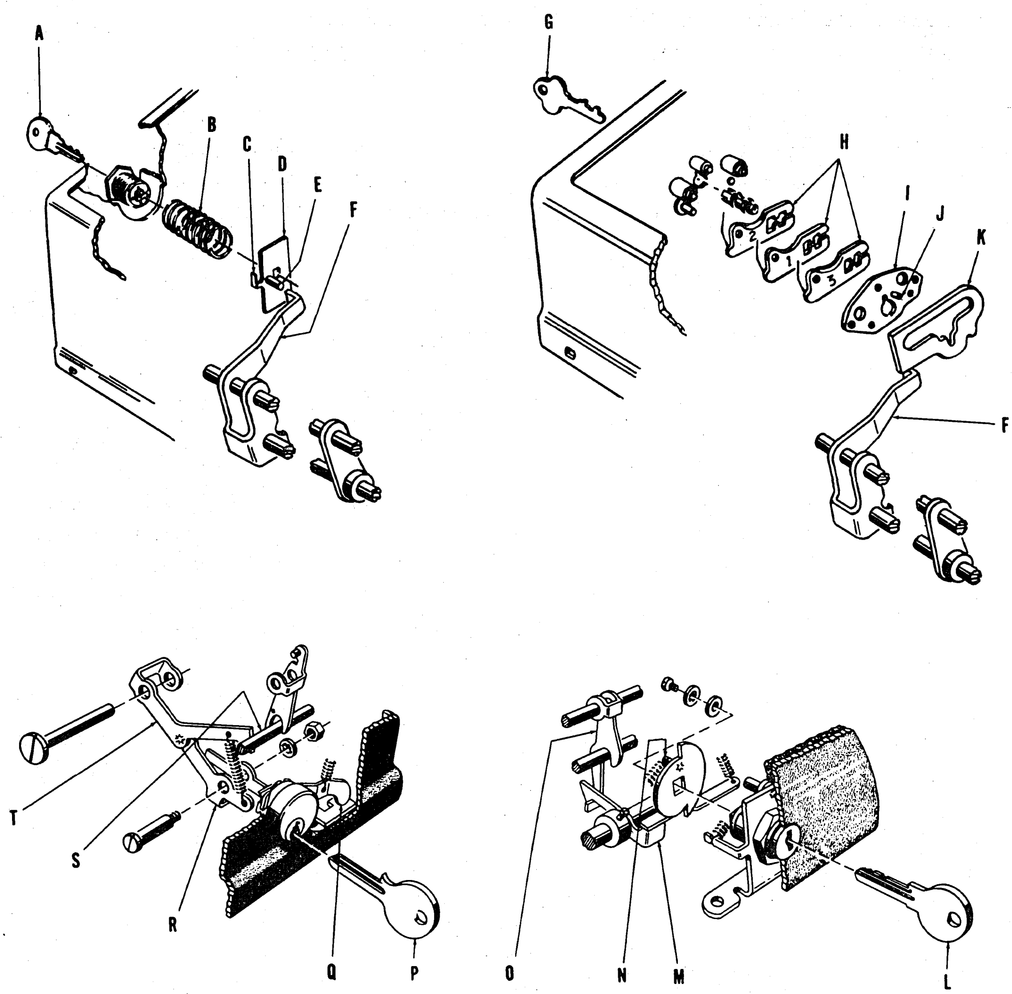


Fig. VIII-42

It is sometimes desired to lock a machine against operation during an operator's absence to safeguard against altering the amounts already accumulated. Several key actuated locks with various combinations are available for this purpose.

Turning key A (in position 77) rotates plate D positioning stud E over the lip of arm F, thereby blocking upward movement of the latter and resulting in a "handle break" should a machine operation be attempted. Spring B prevents plate D from vibrating into a blocking position during sustained machine use.

NOTE: For key removable in both locked and unlocked position, lip C is removed permitting a full 90° turn of the key thereby aligning the key with the slots in the lock.

A Burroughs lock may be used in position 77 in place of the cylinder type lock if so desired.

Turning key G moves slide K forward, over the lip of arm F blocking upward movement of the latter and resulting in a "handle break" should a machine operation be attempted.

Lock tumblers H may be rearranged to produce various combinations.

NOTE: For key removable in both locked and unlocked position, a plate similar to I is used but with stud J removed, permitting complete rotation and removal of key G.

Key P is used with the plunger lock in Class 8, 9, and 10 machines in position 79. No turning of the key is required. Without a key, arm T is in blocking position, preventing the rearward movement of shaft S. Insertion of the key rocks lever Q. Rocking of lever Q in turn rocks arms R and T, raising arm T out of blocking position and permitting a machine operation to take place.

Key L is used with a cylinder type lock in Series P 600 machines in position 79. Without a key, hooked arm M is positioned over the lip of latch O. With hooked arm M so positioned, rearward travel of the keyboard restoring shaft assembly is prevented, resulting in "handle break" should a machine operation be attempted.

As key L is turned 90^{o} (clockwise), spring stud N rocks hooked arm M clear of the lip on latch O.

LOCKS LOCATED ON KEYBOARD

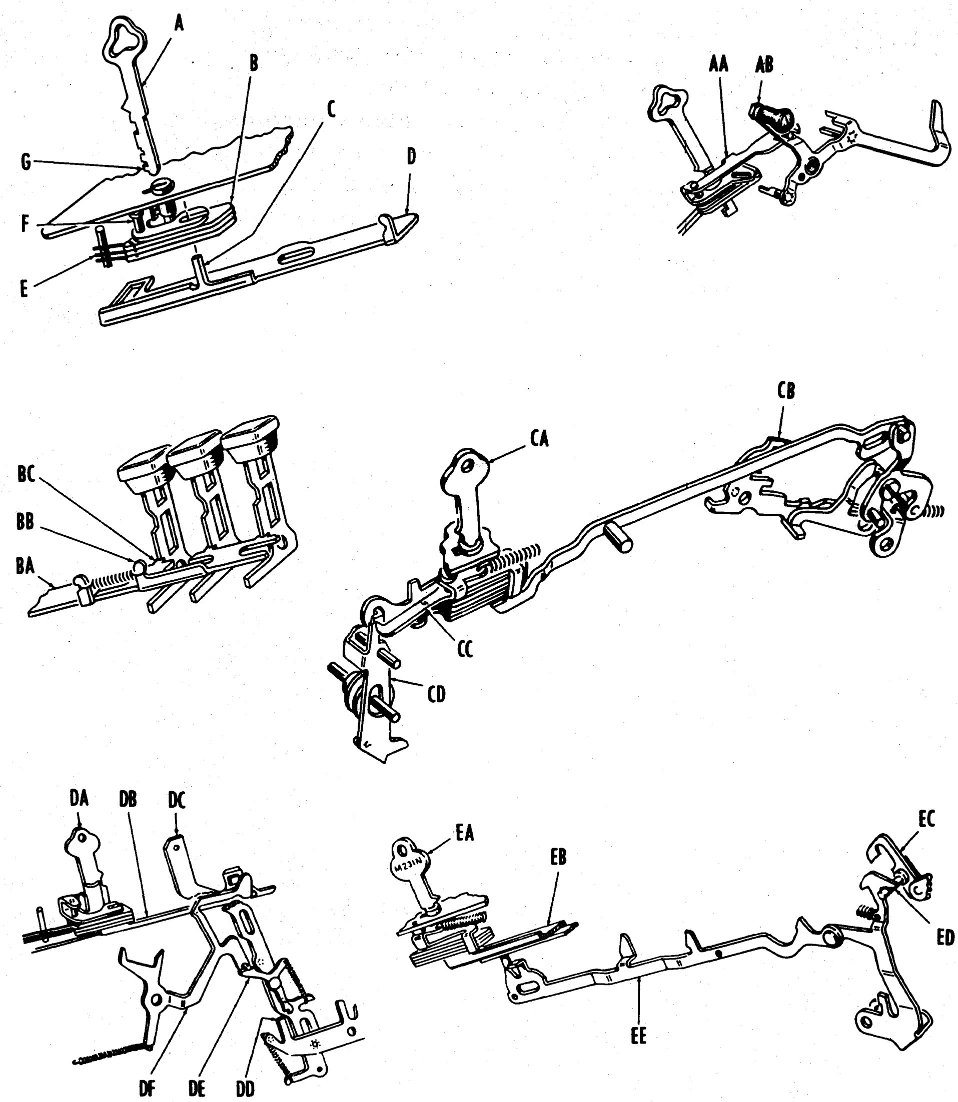


Fig. VIII-43

Locks located in positions 2-0 and 7-0 on the keyboard are the Burroughs type. A slide similar to slide D is riveted to the keyboard bottom plate. Projection C extends upward through tumbler B. The tumblers pivot on post F and are held in normal position by springs E.

As key A is turned, tumblers are positioned by depth of notches in key A so projection C can pass through the aligned slots in tumblers B into either a locked or unlocked position.

Lever AB (OCL No. 51) may be locked against movement by interlock AA actuated through a key in lock position 7-0.

Operation Control Keys 7-0 (three register construction), 8-0, and 9-0 may be locked against depression through slides BA and BB which are actuated by a key located in 2-0 or 7-0. Projections BC when positioned in a notch of the keystems prevent key depression.

Lock in position 2-0 on certain Class 10 cash machines positions symbol indexing arm CB to identify the operation taking place.

Interlock arm CC, actuated by key CA, is used at times as a safeguard to prevent a machine operation with the key partially turned. Unless the key is completely turned, the hook of arm CC is positioned in front of rocker arm CD, causing a "handle break".

Non-add of register "B" is accomplished when key EA (position 2-0) is turned. Slide EB-moving rearward, moves slide EE rearward contacting stud ED thereby inactivating register "B" listing pawl EC.

Motor bar DC may be locked against depression through a lock in position 2-0. Turning key DA moves slide DB rearward contacting arm DF, thereby positioning interlock DE over projection DD.

CIPHER SPLITS

As outlined under Fig. II-13, ciphers normally print to the right of printed numerals in the columns where no amounts are indexed. A permanent cipher split in the automatic cipher printing is obtained by removing the overlapping tail of the hammer in the specified column.

CONTROLLED CIPHER SPLITS

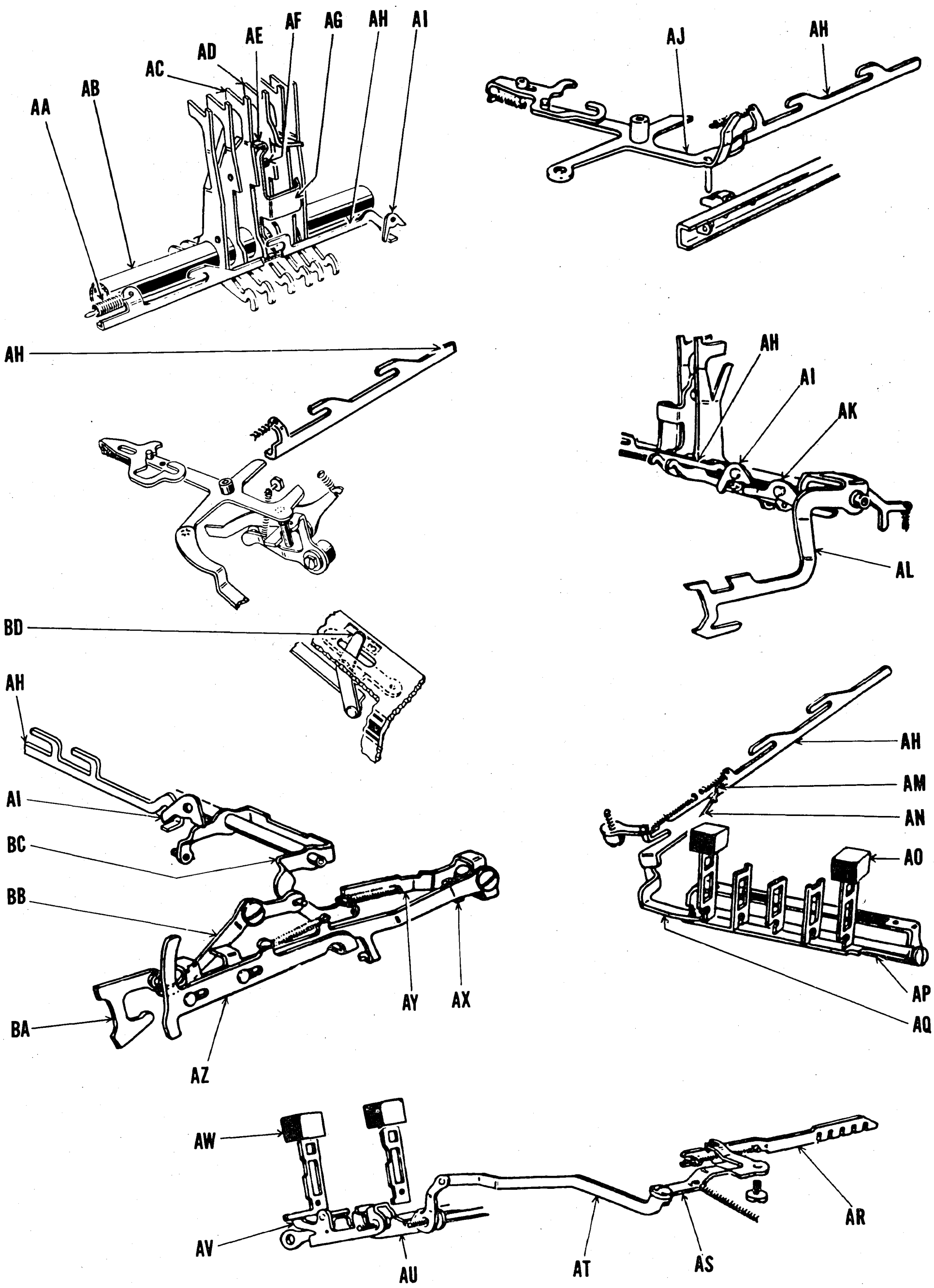


Fig. VIII-44

The controlled cipher split mechanism consist of coupler AG which is connected to hammer AD, through stud AF and moves with the hammer at all times. A projection on the lower portion of coupler AG extends into a slot in slide AH. Movement of slide AH therefore results in lateral movement of the coupler.

The tension of spring AA may be directed to either hold coupler AG in its leftmost (non-split) position or in its rightmost (split) position.

With coupler AG shifted to the left, its lip AE is in the path of hammer AC. Cocking hammer AC therefore results in hammer AD being cocked and no split occurs.

Shifting coupler AG to the right positions lip AE out of the path of hammer AC resulting in a split in the print of ciphers (in this instance between columns 2/3).

When used in conjunction with the features Number, Split and Normal - Number, Count and Normal - Date, Count and Normal - Date, Split and Normal - Split, Count and Normal - and Number and Normal, the controlled cipher split mechanism is actuated through the movement of lever AJ (OCL No. 53). Series P 100, P 200, and P 300 machines contain lever BD (OCL No. 55) for this purpose.

Cross shifting of slide AH and the resultant indexing of the cipher split mechanism is accomplished through the depression of various control keys.

Depression of the total keys or the non-add key rocks control arm AL rocking bellcranks AK and AI thus moving slide AH to the right.

Lowering of non-add arm BA or control arm AZ, through depression of specified control keys on a minus balance machine equipped with the extended total feature moves slide AH to the right through lever BB, bail BC and bellcrank AI or through lip AX, arm AY, bail BC, and bellcrank AI.

Depression of a character key in a column on the left side of the keyboard (on certain styles of validating-receipting machines) rocks flanged shaft AP and its projection AQ moves slide AN to the left. Slide AN moves independently of slide AH permitting the use of two individual couplers and two controlled cipher splits.

Depression of key AW (Number Key) through arms AV and AU, and link AT rocks bellcrank AS which shifts slide AR to the left indexing a split.

HAMMERBLOCK MECHANISM

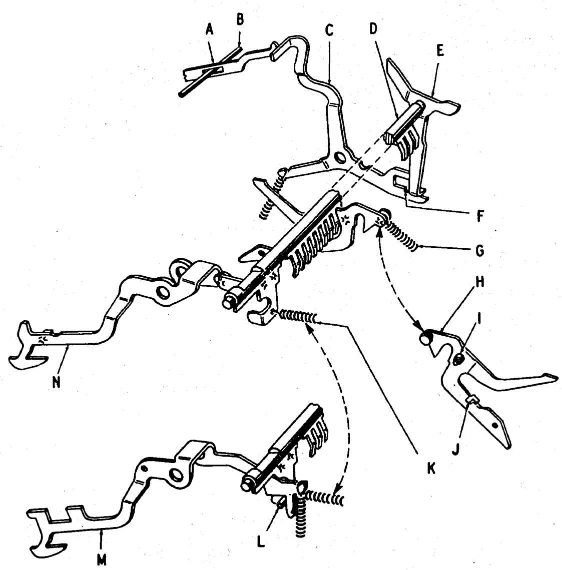


Fig. VIII-45

A non-print of specified columns (hammer-block) is affected when the fingers of bail D are rocked rearward, against rolls I on hammer latches H. With the fingers of bail D rearward, lips J on the hammer latches will clear the hammers as the latches are rocked upward and rearward during the forward stroke of a machine operation. Non-print of specified columns results.

When used in conjunction with the keyboard calendar feature for example, print or non-print of the date columns is controlled through a hammerblock. The hammerblock may be actuated through various keyboard controls.

The fingers of hammerblock bail D may be positioned forward, away from rolls I or rearward against the rolls as normal positions, depending upon individual machine construction.

In the upper illustration of Fig. VIII-45 the fingers of hammerblock bail D are held rearward against rolls I as a normal position, through the tension of spring K resulting in non-print of specified columns. Depression of a control key which lowers arm N disables the hammerblock by rocking the fingers of bail D forward.

The lower illustration of Fig. VIII-45 shows the fingers of the hammerblock bail being held forward as a normal position by stud L limiting against a finger on the rearmost portion of arm M resulting in a print of specified columns. Depression of a control key which rocks arm M raises its rear projection clear of stud L permitting spring K to rock hammerblock bail D rearward thus placing its fingers against rolls I to block the print of specified columns.

On the forward stroke of a machine operation with a hammerblock indexed, shaft B moves forward permitting keyboard slide A to move forward. With slide A forward, the step on the rear arm of detent C positions in front of the lip on arm E preventing arm E and therefore the fingers of bail D from being forced forward by the combined tensions of hammer springs G which tend to overcome the tension of spring K.

HAMMERBLOCK CONTROL - SERIES P 400 MACHINES

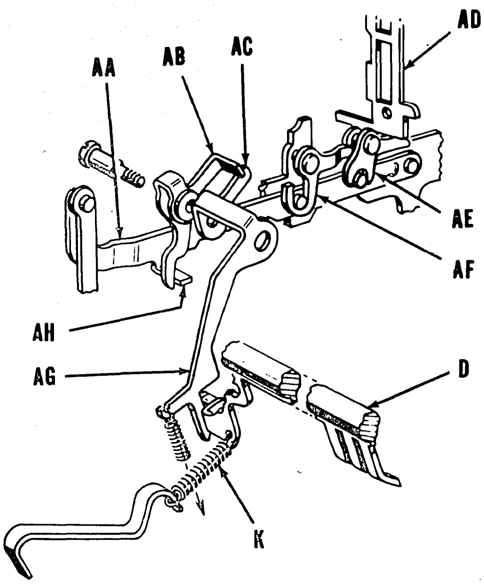


Fig. VIII-46

Printing in specified columns on Series P 400 machines is controlled by the total keys preventing the printing of folio numbers with totals when the 'Number Split and Normal' lever is in number position (extreme left).

Depression of the total or sub-total keystem rocks bellcrank AF or AE and studs in slide AA moves slide AA rearward rocking bellcrank AB through lip AH. Bellcrank AB rocks finger AC downward raising the rear end of bail AG permitting spring K to rock bail D. The fingers of bail D thus are rocked into the path of rolls I, Fig. VIII-45 on latches H, Fig. VIII-45 thereby preventing the latches from contacting the hammers as the adding sectors move upward.

CARRIAGE CONTROLLED HAMMERBLOCK

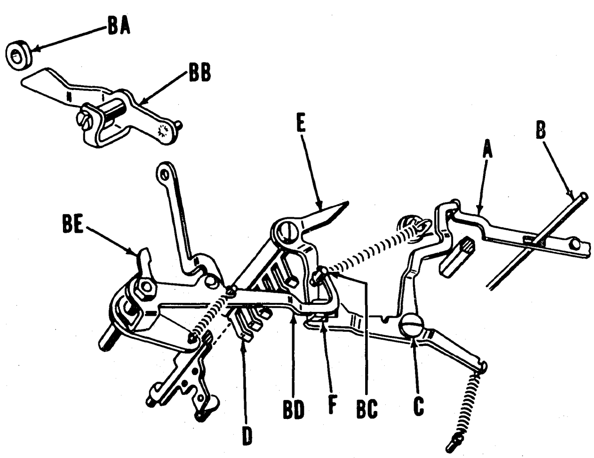


Fig. VIII-47

Date columns are permitted to print when a carriage control roll is in position to disable the hammerblock mechanism.

As the carriage tabulates into date position, roll BA, through rocker arm BB, hooked arm BD, and stud BC, permits rocking bail D by spring tension past the step of limit arm C. The fingers of bail D are moved out of the path of rolls I, Fig. VIII-45 permitting engagement of the hammer latches with the hammers as the adding sectors move upward.

During each machine operation forward movement of keyboard slide A permits arm C movement. When no control roll is located on rocker arm BB, arm C rotates and the foot of arm E limits against step F, thus holding bail D in the path of roll I, Fig. VIII-45 and providing positive hammerblock of the columns to be non-printed.

Tests and Adjustments

1. To assure disabling the hammerblock mechanism from the depression of a specified Operation Control Key -
   With arm N, Fig. VIII-45 lowered from the depression of a specified control key; check for engagement of lips J, Fig. VIII-45 of the hammer latches with the hammers during the

forward stroke of a machine operation.
TO ADJUST, bend the rear projection of arm N, Fig. VIII-45.

2. To assure indexing of hammerblock from the depression of the total or sub-total keys on Series P 400 machines -
There should be minimum clearance between the lowermost finger on bail AG, Fig. VIII-46 and the roll on the right end of bail D, Fig. VIII-46 when either the total or sub-total key is depressed.
TO ADJUST, bend the lip on bellcrank AB, Fig. VIII-46.

3. To assure retaining bail D, Fig. VIII-47 is in a hammerblock position when the carriage is located in other than date position -
There should be minimum clearance between the vertical edge of step F, Fig. VIII-47 and the lip on the lowermost portion of arm E, Fig. VIII-47 when the machine is operated slowly during the forward stroke.
TO ADJUST, bend projection BE, Fig. VIII-47.

4. To assure printing when the carriage is located in date position -
There should be minimum clearance between the underside of the lip on arm E, Fig. VIII-47 and the horizontal edge of step F, Fig. VIII-47 as hooked arm BD, Fig. VIII-47 is manually raised.
TO ADJUST, bend the rearmost portion of arm C, Fig. VIII-47.

NON-PRINT, NON-SPACE MECHANISM

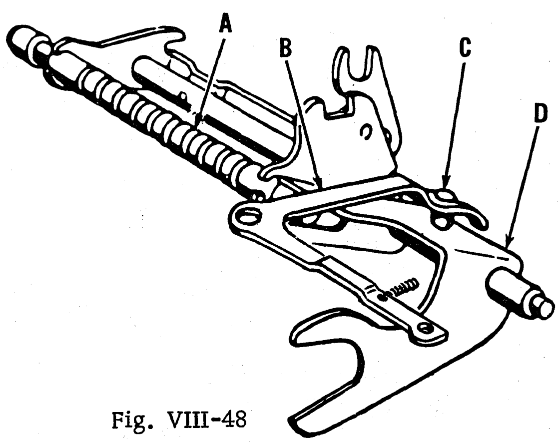


Fig. VIII-48

A non-print, non-space operation is accomplished by shifting actuating bail D to the right, through bellcrank B and stud C. With bail D shifted to the right, hammer latch shaft assembly A is not actuated during a machine operation.

NON-PRINT, NON-SPACE ACTUATED FROM OCK 4-0

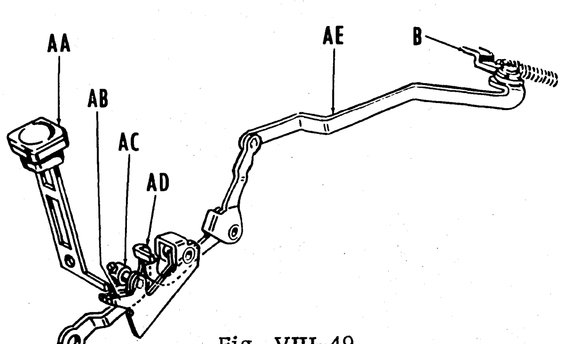


Fig. VIII-49

Depression of key AA (OCK 4-0) lowers lever AB and through collar AC, lowers arm AD. Lowering of arm AD moves link AE forward, rocking bellcrank B and shifting actuating bail D, Fig. VIII-48 to the right.

NON-PRINT, NON-SPACE ACTUATED FROM MINUS BALANCE RELEASE KEY

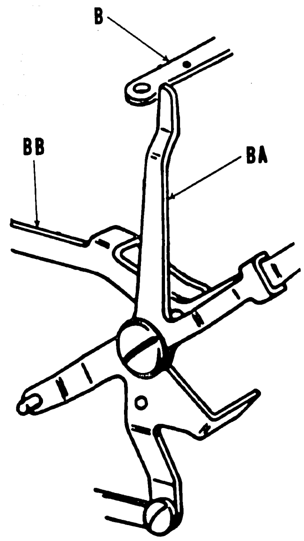


Fig. VIII-50

Depression of the minus balance release key (OCK 7-0) rocks lever BB, lever BA and bellcrank B, thus shifting actuating bail D, Fig. VIII-48 to the right.

NON-PRINT, NON-SPACE ACTUATED FROM OCK 3-0

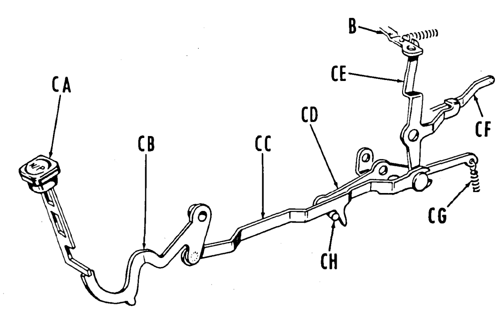


Fig. VIII-51

Certain styles of Series P bookkeeping machines with the N/P key located in position 3-0 require this feature.

Depression of key CA lowers lever CB, moving link CC rearward. Rearward movement of link CC rocks lever CE and bellcrank B, disengaging actuating bail D, Fig. VIII-48 from hammer latch shaft A, Fig. VIII-48.

Spring CG through lever CD restores the plus motor bar. Lever CB, which pivots on the plus motor bar retaining post, prevents the use of the usual spring for this purpose. The lower projection on link CC, engaging stud CH, prevents fouling the arm of the plus motor bar under link CC.

The lower formed ear is removed from the rear arm of lever CE to prevent adding one unit to the minus wheels through lever CF when using key CA.

Tests and Adjustments

1. To assure indexing the print and space mechanism from depression of key AA, Fig. VIII-49 (OCK 4-0) -
   With key AA, Fig. VIII-49 latched depressed, actuating bail D, Fig. VIII-48 should be fully disengaged from shaft assembly A, Fig. VIII-48.
   TO ADJUST, bend the lip on the rear portion of arm AD, Plate VIII-49.

NON-PRINT, NON-SPACE ON EACH MACHINE OPERATION EXCEPT FROM SPECIFIED CONTROL KEYS AND LEVERS - DISABLED FROM OCL NO. 54

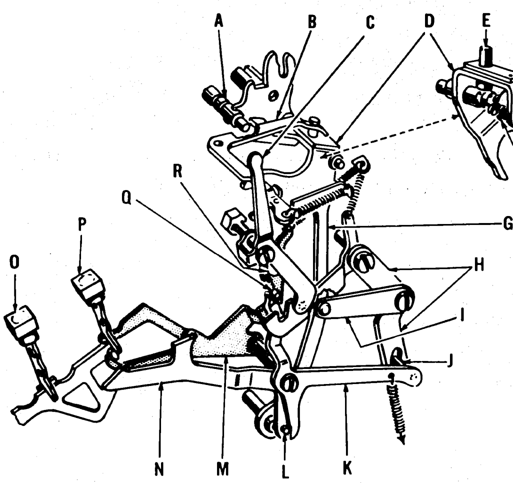


Fig. VIII-52

Machines equipped with this feature non-print and non-space on each machine operations except from specified operation control keys when lever C, Fig. VIII-52 or AA, Fig. VIII-53 is located in its forward position. With lever C or AA forward, bail assembly D, Figs. VIII-52 and VIII-53 is shifted to the right, out of engagement with shaft A.

CLASSES 8 AND 10 MACHINES

In classes 8 and 10 machines, depression of specified oontrol keys through arm M and stud Q or movement of the total, sub-total lever through arm N and stud L rocks arm K positioning its stud J upward in the slot of arm H. With stud J so positioned, arm H is moved to the rear and through link I, arm G and bellcrank B shifts bail assembly D to the left into engagement with shaft A.

Disabling the non-print, non-space mechanism is accomplished by shifting lever C to the rear. Projection R on lever C rocks arm M and stud Q, arm K, and stud J moves arm H to the rear. With arm H rearward, link I, arm G, and bellcrank B shifts bail assembly D to the left into engagement with shaft A. Normal print and space operations will then take place from all keyboard controls.

CLASS 9 MACHINES

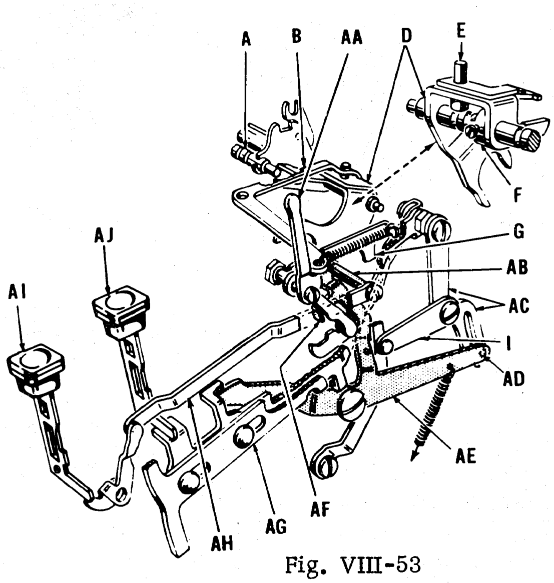


Fig. VIII-53

In class 9 machines equipped with this feature, the operation is much the same as in Class 8 and 10 machines.

With lever AA positioned forward, non-print, non-space occurs on each machine operation except when disabled through specified operation control keys.

Depression of total key AJ through arm AG or non-add key AI through arm AH and stud AB rocks arm AE positioning its stud upward in the slot of arm AC. With stud AD so positioned, arm AC, link I, and arm G are moved rearward and through bellcrank B positions bail assembly D to the left into engagement with shaft A.

The non-print, non-space feature is disabled as lever AA is moved rearward. The lower extension of lever AA contacts lip AF raising the rear extension of arm AE and arms AC, G, and bellcrank B shifts bail assembly D to the left engaging shaft A.

Tests and Adjustments

1. To safeguard against an overthrow of bail assembly D when indexed, and a possible bind between the bail assembly and shaft A -
With bail assembly D manually held into engagement with shaft assembly A, collar F should be set to a snug fit against stud E.
TO ADJUST, reset collar F.

2. To assure a safe hold of bail assembly D when arm G is rearward -
With a print operation indexed through a control key, bail assembly D should have a safe hold on shaft assembly A.
TO ADJUST, bend the upper portion of arm G forward or rearward.

3. To assure indexing a print and space operation from depression of specified control keys and from the total, sub-total lever -
Depression of specified control keys and movement of the total, sub-total lever should position the stud in arm K or AE upward in the slot of arm H or AC.
TO ADJUST:
   a. From total key P, Fig. VIII-52, bend the rear projection of arm K, Fig. VIII-52.
   b. From non-add key O, Fig. VIII-52, bend the lower forward projection of arm M, Fig. VIII-52.
   c. From total-subtotal lever C, Fig. VIII-52, bend the lower projection of arm N, Fig. VIII-52.
   d. From total key AJ, Fig. VIII-53, bend the rear projection of arm AE, Fig. VIII-53.
   e. From non-add key AI, Fig. VIII-53, tilt stud AB, Fig. VIII-53.

4. To assure disabling the non-print, non-space feature from the rearward movement of lever C, Fig. VIII-52, or lever AA, Fig. VIII-53 -
Rearward movement of lever C, Fig. VIII-52 or lever AA, Fig. VIII-53 should sufficiently position stud J, Fig. VIII-52 or AD, Fig. VIII-53 upward in the slot of arm H, Fig. VIII-52 or AC, Fig. VIII-53 respectively, assuring disengagement of bail assembly D, Fig. VIII-52 from shaft assembly A, Fig. VIII-52.
TO ADJUST, bend the upright projection of arm M, Fig. VIII-52 or AE, Fig. VIII-53.

PRINTING MECHANISM - ROTARY

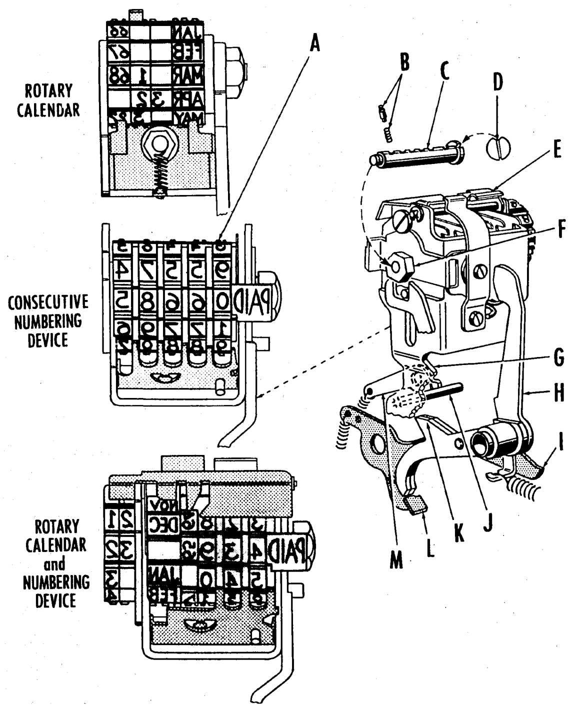


Fig. VIII-54

This mechanism may function as a calendar feature or as a consecutive numbering device.

Rotary frame G is mounted on a post in the accumulator left sideframe. The shank of the rotary frame may be offset to the left for clearance of the printing head.

Five rotary wheels A may be assembled within frame G. Where additional wheels are required, as on a combination rotary calendar feature and numbering device, one or two wheels may be mounted outside, at the right of the frame on an extended rotary wheel shaft C.

Springs and plungers B assist in maintaining alignment of the rotary wheels.

Detent M serves as a protective device, preventing manual rearward movement of the rotary mechanism against the platen when the machine is in home position, thus safeguarding against a false validation. During the forward stroke of a machine operation and just prior to printing, the hammer latch shaft engages the rear portion of detent M rocking it clear of stud J.

With a print of the rotary indexed, latch I is positioned so its lip L will engage hammer H. During the forward stroke of a machine operation, rearward movement of latch I cocks hammer H expanding its firing spring. Hammer fire takes place as the forward projection of latch I limits on the hammer shaft, camming lip L off the foot of the hammer.

CONSECUTIVE NUMBERING DEVICE ADVANCES BEFORE PRINTING

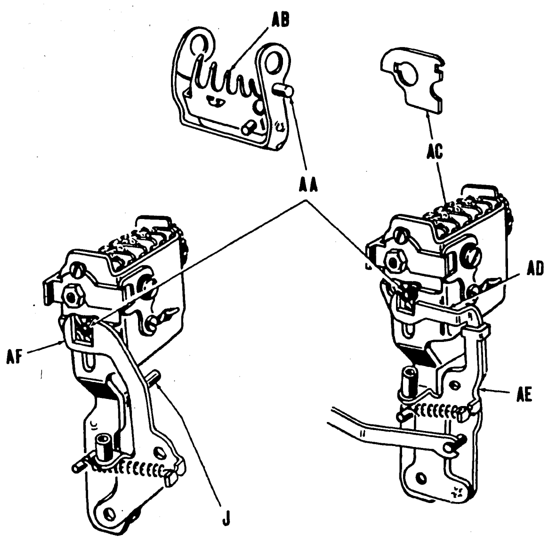


Fig. VIII-55

Advance of the consecutive numbering device takes place in most cases during the forward stroke of a machine operation and before printing.

Projection K, Fig. VIII-54 on the rotary hammer, drives against stud J to index the rotary forward. As the rotary moves forward, stud AA, in advancing bail AB, is blocked by stop AF so further forward movement of the rotary rocks advancing bail AB. As bail AB is rocked, its fingers engage the steps of the numbering wheels, advancing the wheels one digit.

Stop AD, guided by bracket AE, is raised into active position (into the path of stud AA) or lowered into inactive position through various controls, thus selectively advancing or non-advancing the numbering device.

Separator plates AC safeguards against a rotary wheel being turned by an adjacent wheel when ink and foreign matter becomes accumulated in the rotary wheels.

CONSECUTIVE NUMBERING DEVICE ADVANCES AFTER PRINTING

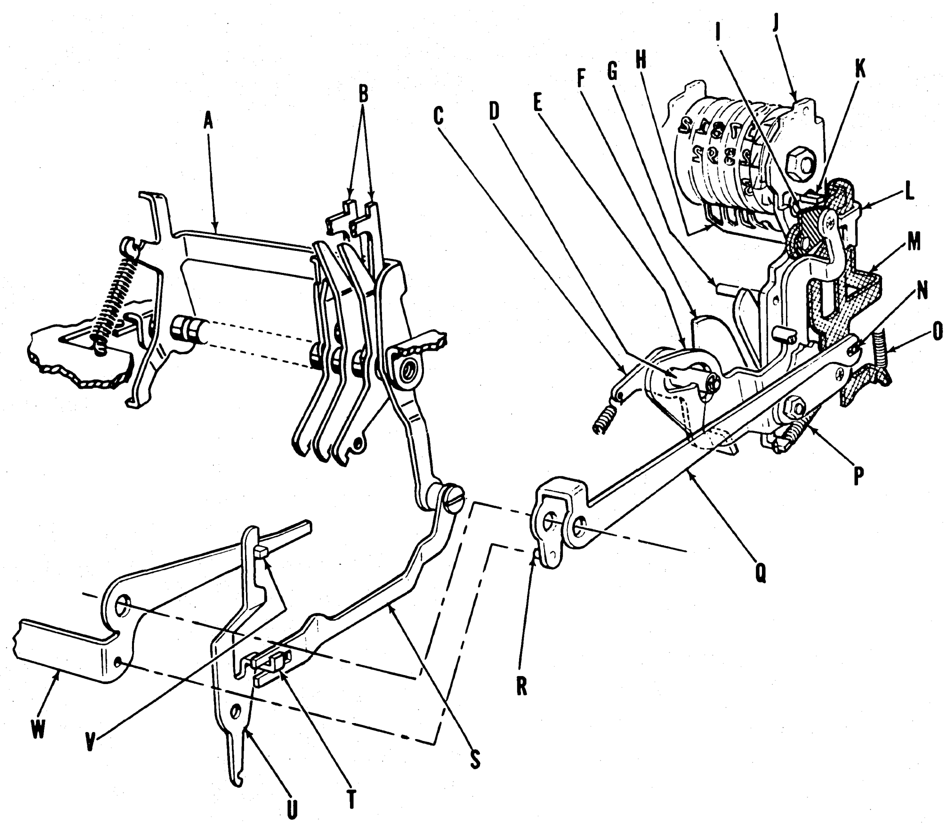


Fig. VIII-56

In some machines it is desirable that the consecutive numbering device advance during the return stroke of a machine operation.

At the beginning of the forward stroke of a machine operation with a specified operation control key depressed, the leftmost portion of bail W moves slightly upward through spring tension until stud V in bail W limits against the hook portion of latch U. Movement of bail W also imparts upward movement to arm Q through stud R.

As the forward stroke of the machine operation continues, forward movement of bail A moves arm S rearward, disengaging latch U from stud V thus permitting bail W and arm Q to be moved further upward by spring O. Upward movement of arm Q at this time raises slide M (which is guided by bracket L) positioning pawl I (on arm E) against the bottom of stud K. At this time, the uppermost portion of arm E is driven forward by roll D (which is fastened to the left end of the hammer latch shaft) moving upward and rearward in the enclosed cam of arm E.

At the beginning of the return stroke, roll D moves forward and downward through the enclosed cam of arm E driving the uppermost portion of arm E rearward and pawl I engaging stud K rocks advancing bail H; its fingers engaging the steps of the numbering wheels, advancing the wheels one digit.

Near the end of the return stroke, roll D engages and lowers the arm of bail W permitting latch U to re-engage stud V.

When the machine is in home position, plate F is positioned between stud G and roll D, and serves as a protective device, thus preventing manual rearward movement of the rotary mechanism against the platen, thus safeguarding against false validation.

Tests and Adjustments

1. To assure proper timing for printing of the rotary mechanism -
The rotary should print either simultaneously or immediately after the printing of the regular type.
TO ADJUST, bend the upper forward extension of latch I, Fig. VIII-54 up or down.
NOTE: Before making the above adjustment, actuating bail AB, Fig. II-12 should be checked for not being twisted.

2. To assure legible print of the rotary -
Check the print of the rotary type to be "on its feet" - equally legible on top and bottom of figures.
TO ADJUST:
   a. Loosen screw F, Fig. VIII-54 and direct notch D, Fig. VIII-54 in the screwdriver slot of the rotary wheel shaft to the rear. This assures that plungers B, Fig. VIII-54 will be directed toward the printing line and provides a starting point for final type alignment.
   b. Rotate shaft Č, Fig. VIII-54 as required and tighten nut F, Fig. VIII-54.

3. To assure advancement of the consecutive numbering device before printing -
With the machine in home position and rotary frame G, Fig. VIII-54 held forward against hammer H, Fig. VIII-54, there should be minimum clearance between stud AA, Fig. VIII-55 and the forward prong of stop AF, Fig. VIII-55. Also, during the forward stroke of a machine operation as latch I, Fig. VIII-54 is about to release hammer H, Fig. VIII-54, there should be minimum play between the rotary frame and hammer H, Fig. VIII-54, and no more than 1/64" clearance between stud AA, Fig. VIII-55 and the rear of the slot in the rotary frame.
TO ADJUST, check stud J, Fig. VIII-54 for being tight and square, and bend stop AF or AD, Fig. VIII-55 forward or rearward.

4. To safeguard against advancing the rotary during the return stroke of a blank machine operation -
With the rotary indexed to advance and latch U, Fig. VIII-56 held inward, latch U, Fig. VIII-56 should have .020" to .030" latching lead over square stud V, Fig. VIII-56.
TO ADJUST, bend latch U, Fig. VIII-56 at its offset.

5. To safeguard against advancing the rotary during the return stroke of a non-advance operation -
With the rotary indexed to advance, with no amount indexed and the machine operated; pawl I, Fig. VIII-56 should clear stud K by .015" to .030".
TO ADJUST, bend the "U" form portion of arm Q, Fig. VIII-56.

6. To assure full advance of the rotary wheels during the return stroke of a machine operation -
On a rotary advance operation, pawl I, Fig. VIII-56 should drive stud K, Fig. VIII-56 to within .015" to .020" of the end of the slot in the rotary frame.
TO ADJUST, bend the forward portion of arm E, Fig. VIII-56.

PROTECTIVE DEVICES

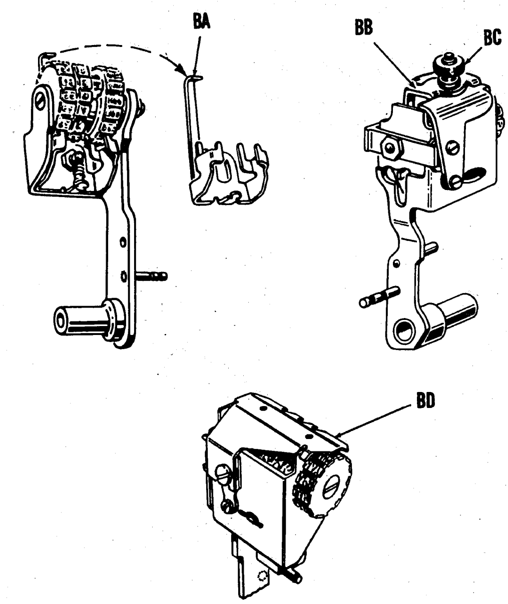


Fig. VIII-57

Detents similar to E, Fig. VIII-54 also BA and BB safeguard against date wheels being accidently turned when forms are rapidly inserted or withdrawn from the ticket chute. Formed fingers on the detents enter into the notches in the month and day wheels.

To reset the month and day wheels, detent E, Fig. VIII-54 is flipped upward, detent BA is pressed downward, and detent BB is released after first loosening nut BC.

Shield BD is also used as a protective device to safeguard against interference with the rotary wheels.

LOGO AND IDENTIFICATION TYPE

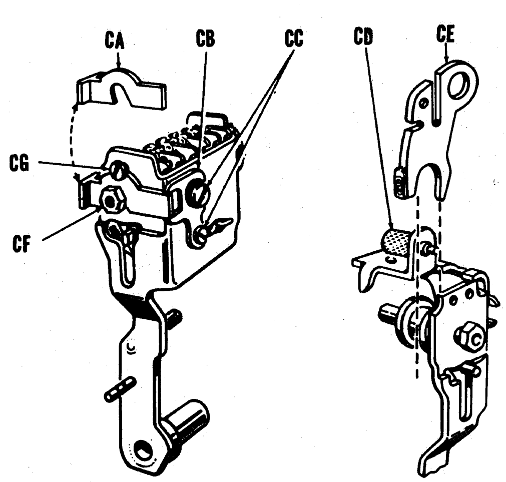


Fig. VIII-58

Logo type CA, which is retained by screw CG, is slotted to provide a means of installation without removing nut CF, the removal of which would disturb the positioning of shaft C, Fig. VIII-54 and therefore the alignment of the rotary wheels.

Logotype CA is not interchangeable with earlier style logotype which were not slotted.

Identification type CE identifies the operator of a specified machine. The type is removable for possession by the operator. The identification type is inserted just inside the rotary left sideframe, over a collar on the rotary shaft. Plunger CA retains the type in printing position.

Tests and Adjustments

1. To safeguard against accidental turning of the year date wheels -
The fingers of detents BA, BB, Fig. VIII-57 and E, Fig. VIII-54 should align centrally with the notches of the date wheels.
TO ADJUST, bend the fingers of the detents.

2. To assure legible print of the logotype -
Check the print of the logotype to be "on its feet" - equally legible on top and bottom of figures.
TO ADJUST, loosen screws CG and CC, Fig. VIII-58 and swing anchor plate CB, Fig. VIII-58 to right or left.

ROTARY CONTROLS

To better understand the rotary controls, it should be remembered that when dealing with the rotary calendar feature, only print/non-print controls must be considered; however, when dealing with the rotary consecutive numbering device a control of advance/non-advance as well as print/non-print, must be considered.

Print/non-print of the rotary calendar feature or consecutive numbering device may be controlled through either; a hammerblock, a backbail control, a carriage control or through OCL No. 53.

Advance/non-advance of the consecutive numbering device may be controlled through hammerblock or backbail controls only.

NOTE: As space does not permit a description of all available rotary controls, only those most commonly used are covered.

PRINT OF ROTARY - CONTROLLED THROUGH HAMMERBLOCK

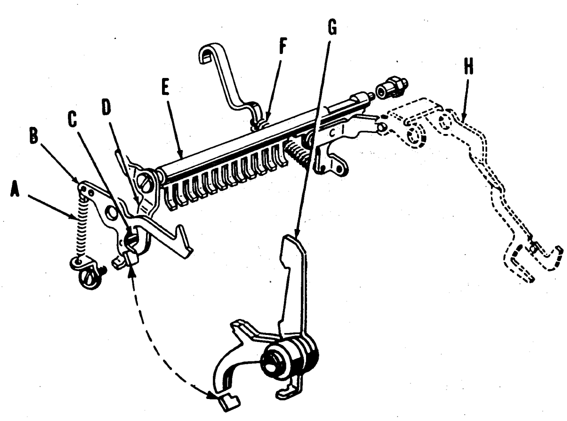


Fig. VIII-59

The tension of spring F holds hammerblock bail E and arm D rearward thus positioning the lip of hammer latch B clear of rotary hammer G. Depression of a specified control key rocks an arm similar to H (depending on the control keys active) and bail E moves arm D away from stud C permitting the tension of spring A to position the lip of hammer latch B into the path of rotary hammer G.

PRINT OF ROTARY - BACK BAIL CONTROL

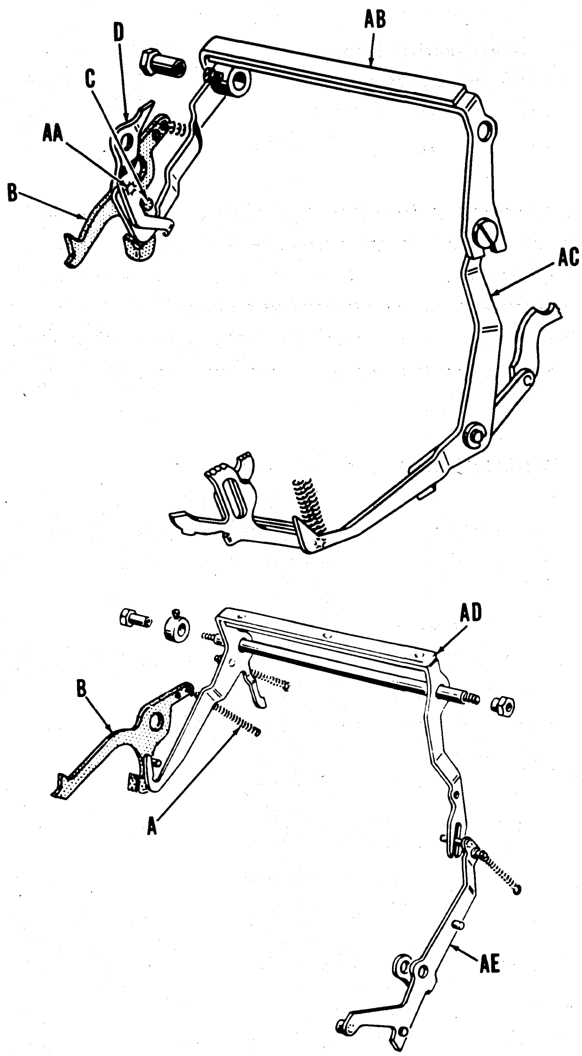


Fig. VIII-60

When other features in the machine prevent the use of a hammerblock bail to control the rotary, the back bail controls are used.

Hammer latch B is normally positioned to engage the rotary hammer on each machine operation except where the depression of a specified control key or motor bar repositions the hammer latch through arm AC, back bail AB, and stud C.

Non-print of date columns in conjunction with non-print of the rotary is accomplished as the hooked arm of bail AB repositions the hammerblock bail E, Fig. VIII-59 through stud AA and arm D.

The normal position of back bail AB prevents a print of the rotary. Depression of a specified key through arm AE raises the hooked arm of back bail AD permitting spring A tension to swing latch B into print position.

PRINT OF ROTARY - CARRIAGE CONTROLLED

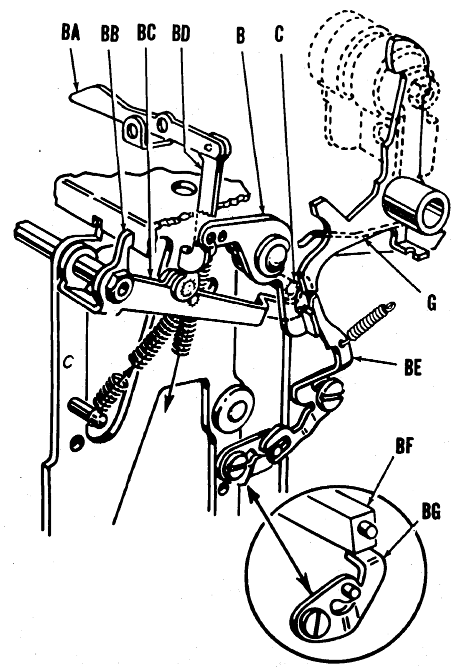


Fig. VIII-61

With the carriage located in other than date position, the forward hooked portion of arm BC is in a lowered position, in the path of stud C in hammer latch B.

Indexing of a rotary print takes place as the carriage is shifted into date position. With the carriage in date position, cam BA is rocked through a roll on the carriage. Rocking of cam BA raises link BD which in turn raises the forward hooked portion of arm BC.

With arm BC raised, latch B is free to move into print position (into the path of hammer G) during the machine operation, as restoring bail BF moves away from arm BG and bellcrank BE.

PRINT OF ROTARY - CONTROLLED THROUGH OPERATION CONTROL LEVER NO. 53

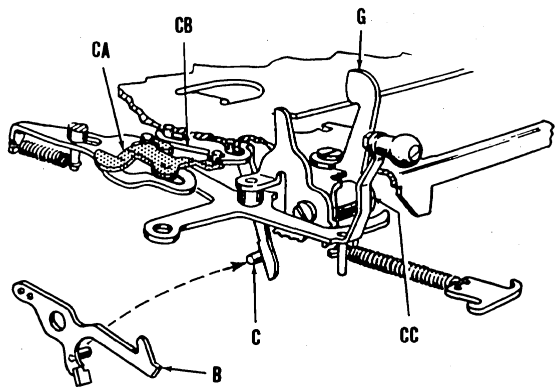


Fig. VIII-62

With lever CC located in its left print position, hammer latch B is free to swing upward during a machine operation to engage and cock rotary hammer G. Moving lever CC to the right, to non-print position, slide CB moves rearward, through bellcrank CA. The lower projection of slide CB engages stud C, moving the stud and therefore latch B rearward, into non-print position.

PRINT OF ROTARY MECHANISM - SERIES P 600 MACHINES

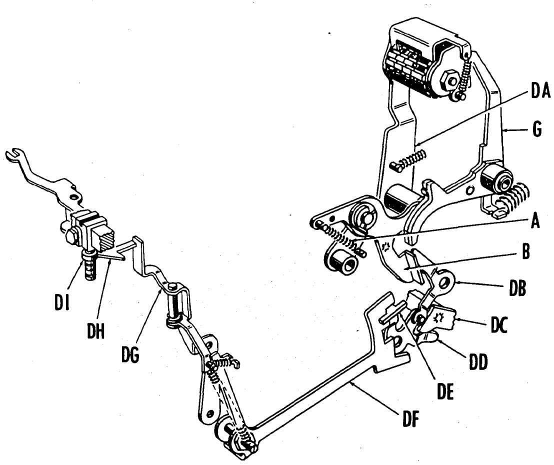


Fig. VIII-63

Rotary mechanism DA is mounted on the inside of the accumulator left side frame (as illustrated) on machines of 10 column construction, and on the outside of the frame on machines of 13 column construction.

Print of the rotary is indexed only by carriage control. A number 3 control roll in lane 2 indexes print of the rotary (a number one roll in lane 2 indexes the red ribbon lift mechanism).

With a number 3 control roll DI located on lever DH, lever DG positions limit arm DF so its deepest pocket aligns with lip DE on arm DD. During a machine operation, restoring bail assembly DC moves away from arm DD permitting the tension of spring A to move hammer latch B into the path of hammer G.

Printing takes place in the same manner as on other Series P machines.

As the machine restores to home position, bail assembly DC rocks arm DD and lever DB thereby restoring hammer latch B to non-print position.

ADVANCE OF ROTARY CONSECUTIVE NUMBERING DEVICE - THROUGH HAMMERBLOCK AND BACK BAIL CONTROL

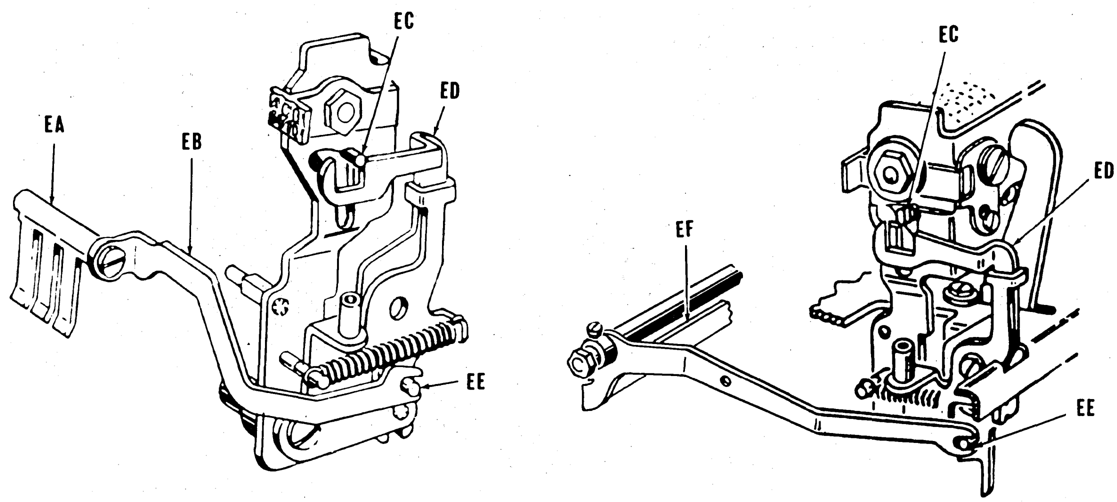


Fig. VIII-64

Advance or non-advance of the rotary consecutive numbering device is controlled through hammerblock bail EA and arm EB, or through back bail EF.

The hammerblock bail and the back bail are actuated through the depression of specified control keys of motor bars to raise or lower stop ED through stud EE.

ADVANCE OF ROTARY CONSECUTIVE NUMBERING DEVICE AND DISABLING OF ADVANCE - VALIDATING - RECEIPTING MACHINES

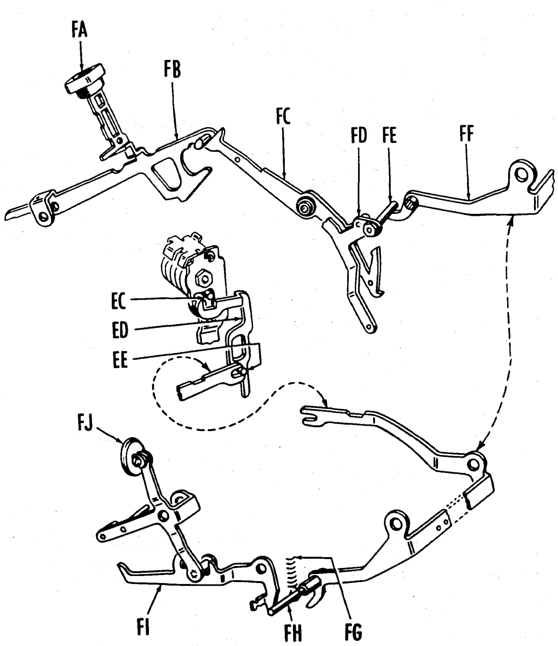


Fig. VIII-65

On validating-receipting machines, advance of the rotary consecutive numbering device is indexed through the depression of specified operation control keys. Depression of key FA (OCK 6-0) rocks arms FB and FC which raises arm FD and stud FE thus permitting spring FG to rock back bail FF and its forked arm with stud EE raises stop ED into the path of stud EC.

Disabling of the advance, during the printing of multiple receipts, is indexed by the rearward movement of multiple receipt lever FJ. When lever FJ is moved rearward, detent arm FI cams stud FH downward (overcoming the tension of spring FG) and bail FF and stop ED is restored to non-advance position of the consecutive numbering device.

NON-ADVANCE OF ROTARY - CONTROLLED THROUGH OPERATION CONTROL KEYS AND TOTAL, SUB-TOTAL LEVER (OCL NO. 54)

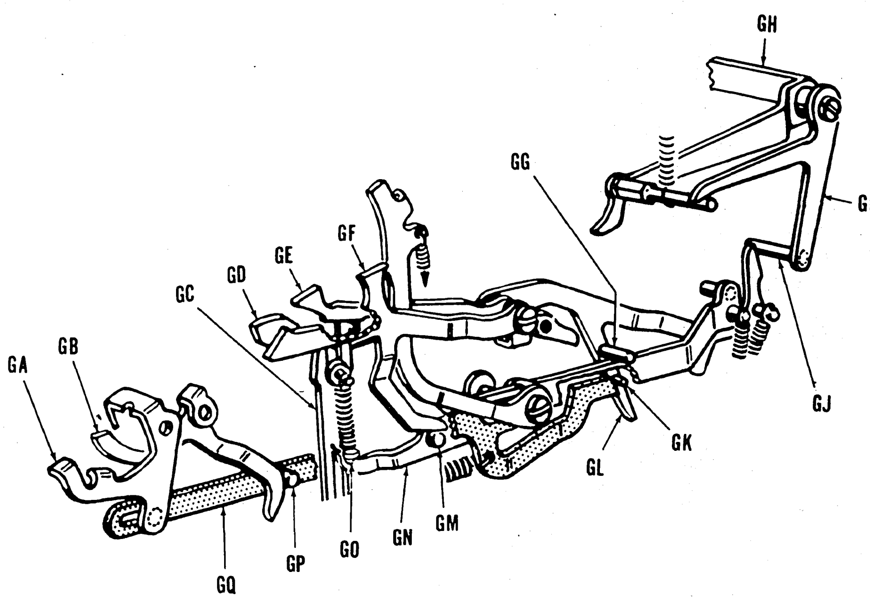


Fig. VIII-66

With back bail GH raised at normal, the consecutive numbering device advances during each machine operation if a rotary print is also indexed. Lowering of bail GH and disabling of the advance is accomplished through the depression of specified control keys.

Depression of OCK 4-0 through bellcrank GA or depression of OCK 5-0 rotates bellcrank GB with stud GP and slide GQ moves rearward. The rear arm of slide GQ contacts stud GK raising lever GL. Raising of lever GL, through stud GJ and bellcrank GI repositions back bail GH to lower stop ED, Fig. VIII-65.

Depression of OCK 8-0 or 9-0 lowers lever GD or GE respectively. Lowering of lever GD or GE lowers slide GC and its lip GO rocks lever GN. Rocking of lever GN, through stud GG raises lever GL and stud GJ and bellcrank GI repositions back bail GH to lower stop ED, Fig. VIII-65.

Forward or rearward movement of the total, sub-total lever through stud GM swings lever GN downward and stud GG rocks lever GL. Rocking of lever GL through stud GJ and bellcrank GI repositions back bail GH to lower stop ED, Fig. VIII-65.

Tests and Adjustments

1. To assure disabling print of the rotary mechanism from depression of specified operation control keys -
Index a non-print of the rotary mechanism from the keyboard and check for safe pass-by clearance between latch B, Fig. VIII-59 and hammer G, Plate VIII-59.
TO ADJUST, bend the bail portion of bail AB, Fig. VIII-60.

2. To assure non-print of the rotary mechanism when the carriage is located in other than date position -
During a machine operation, with the carriage located in other than date position, the fork of bail BC, Fig. VIII-61 should prevent the lip of hammer latch B, Fig. VIII-61 from engaging hammer G, Fig. VIII-61.
TO ADJUST, bend projection BB, Fig. VIII-61.

3. To assure print of the rotary mechanism on

Series P 600 machines when indexed by carriage control -

a. With no roll on lever DH, Fig. VIII-63 check for minimum clearance between the forward projection on lever DH, Fig. VIII-63 and the uppermost projection on lever DG, Fig. VIII-63. Limit arm DF, Fig. VIII-63 should rest on lip DE. Fig. VIII-63 at normal.

b. Shift the carriage to locate a No. 3 roll on lever DH, Fig. VIII-63 and check for lip DE, Fig. VIII-63 to be aligned centrally with the deep pocket of limit arm DF, Fig. VIII-63.

TO ADJUST:

a. Bend the uppermost projection on lever DG, Fig. VIII-63.

b. Bend the vertical arm of lever DF, Fig. VIII-63.

4. To assure disabling advance of the rotary mechanism from the rearward movement of lever FJ, Fig. VIII-65 (OCL No. 54) -
Stop ED, Fig. VIII-65 should be lowered sufficiently through the rearward movement of lever FJ, Fig. VIII-65 to clear stud EC, Fig. VIII-65.
TO ADJUST, weave bail FF, Fig. VIII-65 as required.

5. To assure disabling advance of the rotary mechanism from the depression of OCK's 4-0, 5-0, 8-0, and 9-0, and from movement of the total, sub-total lever -
Bail GH, Fig. VIII-66 when actuated from each of the above sources should lower stop ED, Fig. VIII-64 sufficiently to clear stud EC, Fig. VIII-64.
TO ADJUST, bend the lower arm of bellcrank GI, Fig. VIII-66 for earlier or later contact of stud GJ, Fig. VIII-66 on the cam surface of lever GL, Fig. VIII-66.

DOUBLE RIBBON MECHANISM

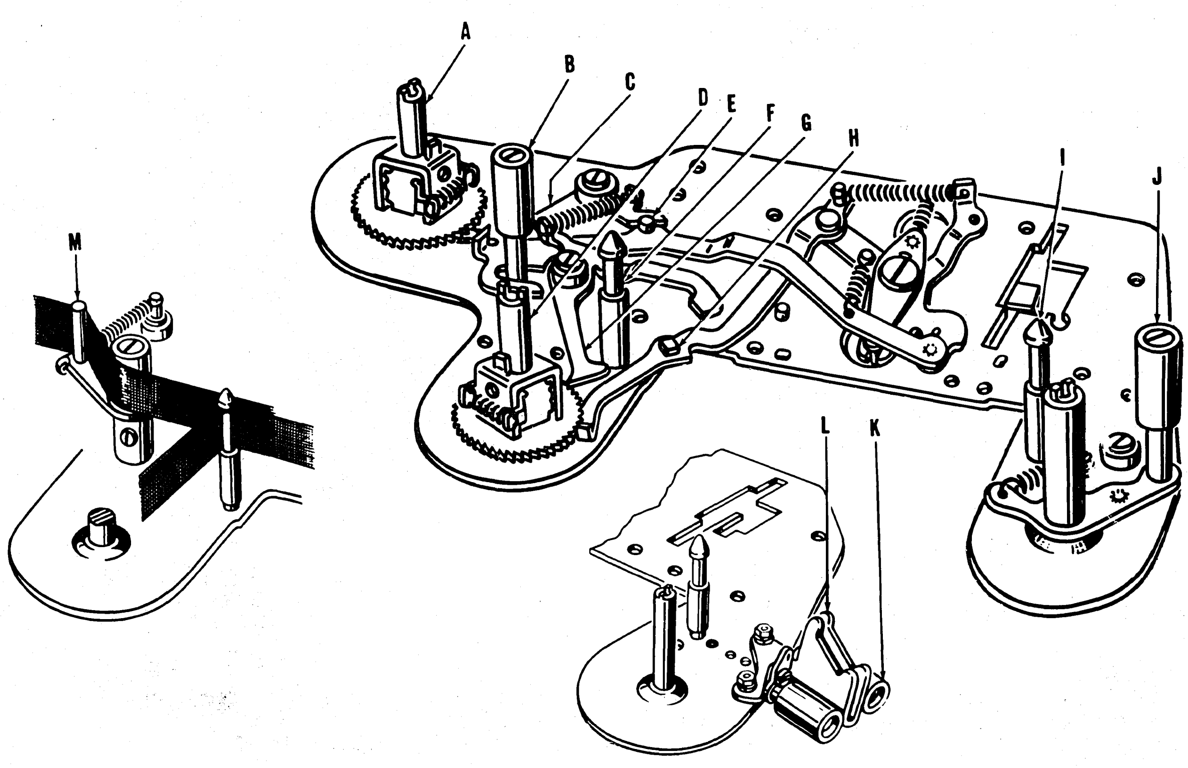


Fig. VIII-67

The double ribbon mechanism is generally used on validating-receipting machines as it provides an original print of the transaction on two individual forms or on both plies of double wound paper.

The ribbon feeds from a spool mounted on post A, in front of roll B, across the span of type and around idler J, then back across the span of type and passes to the rear of posts I and F to a spool mounted on post D.

The ribbon reverse mechanism functions in the same principle as that on the single ribbon mechanism. Idler J takes up slack which developes in the ribbon when a ribbon reverse takes place.

Pawls C and G are alternately active. The active pawl is engaged with and prevents the back-up of the driven ratchet wheel. The inactive pawl is held out of engagement with the inactive ratchet wheel by either stud E or H.

On 6" front feed carriages equipped for left and right hand form insertion, idler M is located on the left side of the bottom plate. Guides L and rolls K direct the ribbon downward, clear of the forms being inserted from the right.

On 3 7/8" carriages equipped for left and right hand form insertion, guides L and rolls K are used but a ribbon idler is not required.

SIGNATURE PRINTING MECHANISM

The signature printing mechanism provides a means of printing appropriate signatures and/or titles (by the use of a die) on documents during various applications such as check writing or validating and receipting operations.

CONTROL MECHANISM IS INDEXED BY OPERATION CONTROL KEYS OR MOTOR BAR

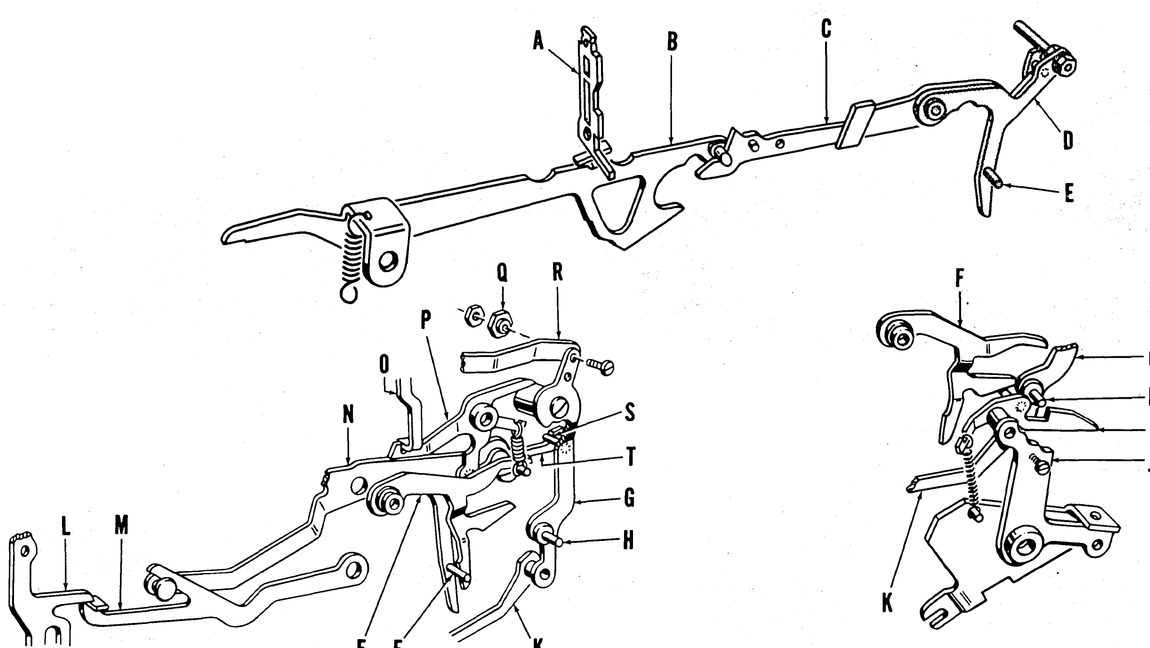


Fig. VIII-68

Depression of key A (OCK 6-0) rocks lever B and its rearmost arm rocks arms C and D and stud E rocks arm F. Depression of motor bar L rocks arms M and N and stud E rocks arm F. Rocking of arm F permits pawl T to be raised into the path of stud S and pawl I to move up into the path of stud H.

At the beginning of the forward stroke, arm G is rocked by power arm K (the latter being fastened to the secondary mechanism). Rocking of arm G disengages the forward portion of hook P from arm O by stud S engaging pawl T; also, rocks arm J through stud H engaging pawl I.

SIGNATURE CYLINDER IS ACTUATED FOR PRINTING DURING THE FORWARD STROKE

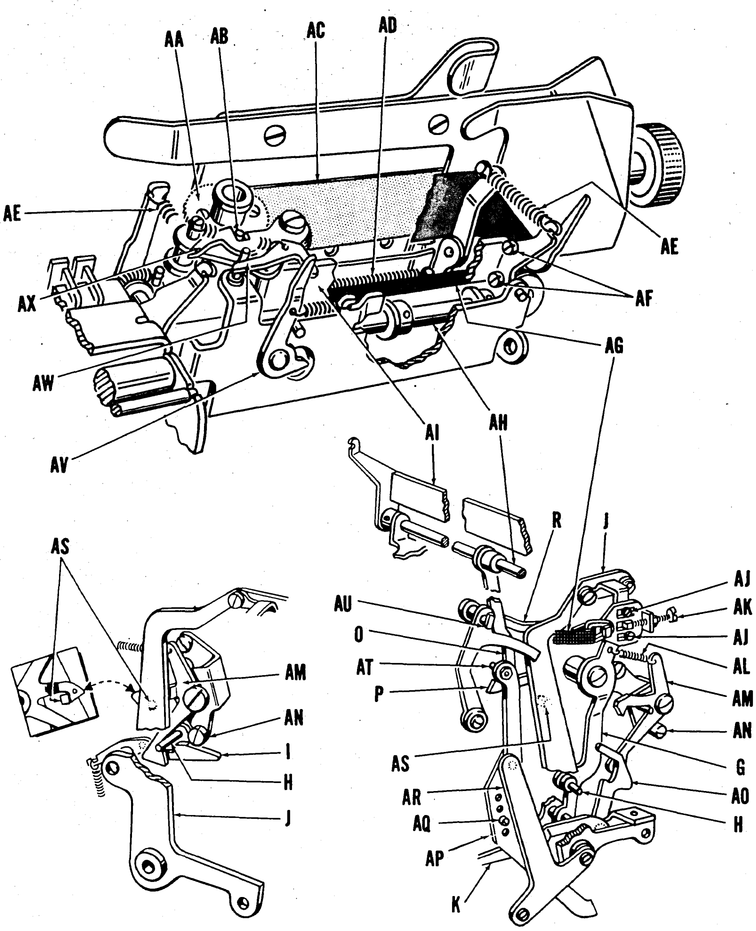


Fig. VIII-69

As arm G is rocked; stud S, Fig. VIII-68 engages pawl T, Fig. VIII-68 moving forward portion of latch P out of the path of arm O and, at the same time, link R, Fig. VIII-68 moves stud AU out of the path of arm O permitting springs AE to move the signature cylinder towards platen AC through shaft assembly AH and plate AI. Rearward movement of the cylinder being controlled by screw AQ limiting against arm AP. Rocking of arm G also permits stud H to engage pawl I pulling arm J rearward and draw-band AG moves the signature cylinder assembly to the right. As the cylinder begins to move rearward, latch AX becomes disengaged from stud AB permitting the cylinder to rotate because its knurled uppermost portion is in contact with the platen AC. As arm J reaches its rearmost position, latch AM drops over square stud AS to retain the signature cylinder assembly in its rightmost position until the machine return stroke has started. Latch AX engages stud AB preventing rotation of the signature cylinder during the return stroke.

At the beginning of the return stroke stud H engages pawl AO to rock arm AR and its uppermost portion in moving rearward contacts arm O to rock plate AI forward and moves the signature cylinder away from the platen. As stud H moves forward during the return stroke, latch AM is disengaged from square stud AS permitting spring AD to pull the signature cylinder back to its original position (normal) as stud H moves out of the path of pawl I.

RETURN STROKE IS DELAYED DURING HANDLE BREAK OPERATIONS

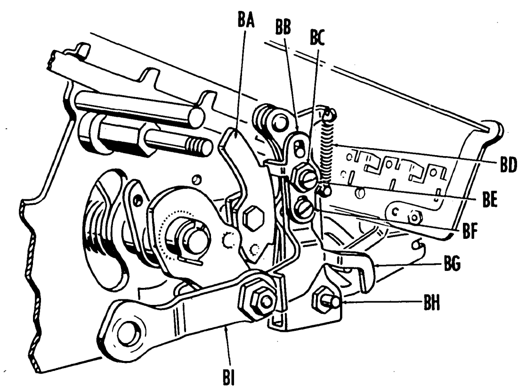


Fig. VIII-70

Should a safeguard partial machine stroke (handle break) take place during a machine operation in which the signature printing mechanism has been indexed, the partial forward stroke of the machine operation causes the signature cylinder to be partially moved toward the right and, as the machine returns to home position the excessive speed of the machine's return could cause the signature cylinder to spin into a position where latch AX would fail to engage stud AB.

During the forward stroke of a machine operation as drive link BI moves rearward, crank AB is swung rearward by spring BD until limited by stud BH, thereby positioning the formed lip of BB in line with the upper step of anchor plate BA. When a "handle break" happens, the full restoration of the machine will be delayed by anchor plate BA limiting on the formed lip of BB until drive link BI returns to home position (normal) at which time it contacts and moves arm BG and the formed lip of BB out of engagement with anchor plate BA permitting the machine to fully restore at normal speed.

Tests and Adjustments

1. To assure the correct normal position of latch P, Fig. VIII-68 -
The rearmost portion of latch P, Fig. VIII-68 should be aligned to limit on the hub portion of arm C, Fig. VIII-68, and the front hook portion of latch P, Fig. VIII-68 should have no more than .015" clearance under the lowermost ear of arm O, Fig. VIII-68.
TO ADJUST, bend the rearmost portion of latch P, Fig. VIII-68.

2. To assure a full normal position of the signature cylinder during a machine operation in which the signature printing mechanism is not indexed -
There should be from .003" to .010" latching lead of the forward portion of latch P, Fig. VIII-68 with the formed lip on arm O, Fig. VIII-68.
TO ADJUST, turn eccentric Q, Fig. VIII-68.

3. To assure the release of arm O, Fig. VIII-68 for permitting the rearward travel of the signature cylinder at the beginning of the forward stroke of a signature printing operation -
There should be from .003" to .008" latching lead of latch T, Fig. VIII-68 in front of stud S, Fig. VIII-68 as the signature printing mech-

anism is indexed from the depression of an OCK or motor bar.
TO ADJUST, lengthen or shorten the offset portion of latch T, Fig. VIII-68.

4. To assure the full rearward travel of arm J, Fig. VIII-68 during the forward stroke of a signature printing operation -
Pawl I, Fig. VIII-68 should be fully moved up into the path of stud H, Fig. VIII-68 when the motor bar or an OCK is latched depressed.
TO ADJUST:
   a. If the signature printing control mechanism is being indexed from the motor bar, bend the lip on the foremost portion of arm M, Fig. VIII-68.
   b. If the signature printing control mechanism is being indexed from an OCK, bend the lowermost tail of arm D, Fig. VIII-68.

5. To safeguard against the release of arm J, Fig. VIII-68 before the signature cylinder has completed one complete revolution for the full print of the signature -
Latch AM, Fig. VIII-69 should drop over square stud AS, Fig. VIII-69 with a minimum of lead before pawl I, Fig. VIII-68 is disengaged from stud H, Fig. VIII-68.
TO ADJUST, turn eccentric AN, Fig. VIII-69.
NOTE: Before proceeding with test No. 6 the following adjustments should be made, these adjustments are performed only to facilitate making adjustment No. 6 and will be rectified when making adjustments No. 6 and No. 8.
   a. Back off screw AK, Fig. VIII-69 and loosen the two screws AJ, Fig. VIII-69 to relieve tension of draw band AG, Fig. VIII-69, tighten screws AJ, Fig. VIII-69.
   b. Adjust eccentrics AF, Fig. VIII-69 for locating plate AI, Fig. VIII-69 to provide a full contact of the knurled portion on the uppermost portion of cylinder AA, Fig. VIII-69 with platen AC, Fig. VIII-69 at the beginning of the forward stroke.

6. To safeguard against further lateral movement of cylinder AA, Fig. VIII-69 after being detented by latch AX, Fig. VIII-69 engaging stud AB, Fig. VIII-69 -
Stud AB, Fig. VIII-69 should be engaged by latch AX, Fig. VIII-69 simultaneously with the engagement of latch AM, Fig. VIII-69 with square stud AS, Fig. VIII-69 as the machine is operated slowly during the forward stroke of a machine operation in which a signature printing mechanism is indexed.
TO ADJUST, loosen two screws AJ, Fig. VIII-69, turn adjusting screw AK, Fig. VIII-69 in or out as required, tighten two screws AJ, Fig. VIII-69.

7. To assure complete indexing of pawl AO, Fig. VIII-69 over stud H, Fig. VIII-69 before the machine begins to return to home position -
Stud H, Fig. VIII-69 should have a safe lead over the step of pawl AO, Fig. VIII-69 before the full stroke pawl drops off the full stroke segment during the forward stroke of a machine operation in which the signature printing mechanism is indexed.
TO ADJUST, re-locate screw AQ, Plate VIII-69 in arm AP, Fig. VIII-69.

8. To assure a uniform printing of the signatures and/or titles -
Index the signature printing mechanism, operate the machine by the motor, check for a full legible print of the signature and/or titles.
TO ADJUST, turn eccentric screws AF, Fig. VIII-69. This adjustment should be made by turning the upper eccentric AF, Fig. VIII-69 first.

9. To assure the correct impression of the signature die against the ribbon and forms -
The signature die should provide a suitable density of the reproduced signature and/or title print on the form being used.
TO ADJUST, turn eccentric stud AT, Fig. VIII-69.

10. To assure a safe hold of the formed lip of adjusting plate BB, Fig. VIII-70 on anchor plate BA, Fig. VIII-70 during a handle break operation -
The formed lip of adjusting plate BB, Fig. VIII-70 should have a safe hold on anchor plate BA, Fig. VIII-70 during the return stroke of a "handle break" operation and should also

have approximately .010" to .020" clearance with the forward edge of anchor plate BA, Fig. VIII-70 during the return stroke of a normal machine operation.
TO ADJUST, bend the forward leg of arm BG, Fig. VIII-70 to or from stud BH, Fig. VIII-70.

11. To safeguard against signature cylinder AA, Fig. VIII-69 from spinning and not becoming latched in normal position by latch AX, Fig. VIII-69 engaging stud AB, Fig. VIII-69 during the return stroke of "handle break" operation - With a form inserted into the right hand ticket chute, index the signature printing mechanism, partially depress a numeral key to create a "handle break", turn the motor manually until the "handle break" occurs and the formed lip of BB, Fig. VIII-69 limits the upward travel of anchor plate BA, Fig. VIII-69. Then manually pull the handle until limited by the "break" mechanism, as the handle is returned slowly, signature cylinder AA, Fig. VIII-69 should rotate sufficiently to permit latch AX, Fig. VIII-69 to engage stud AB, Fig. VIII-69.
TO ADJUST, turn eccentric BC, Fig. VIII-69.
NOTE:
1. If sufficient adjustment can not be made by turning eccentric BC, Fig. VIII-69, install new limit plate with different width lip as shown under either AD or AE, Plate 4, Series P Sideframe Parts Catalog.
2. Arm AV, Fig. VIII-69 is no longer installed in current machines and may be removed from field machines.

AUTOMATIC COUNT MECHANISM

This feature which generally includes a controlled cipher split provides a means of securing a total of the number of listed items. Items listed while using specified operation control keys may be counted or not counted as desired.

In Class 10 and Series P 300 machines; the count of items may be obtained in either or both registers, although in actual practice it is usually found in the lower register only.

CLASS 8 AND 10 - SERIES P 100 AND P 300 MACHINES

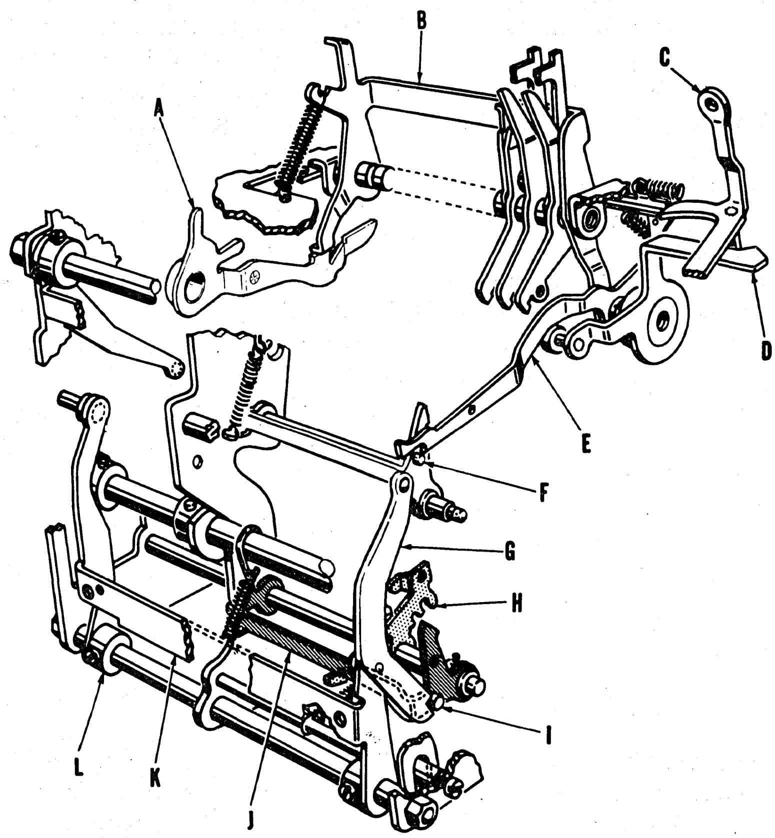


Fig. VIII-71

Rocker arm D and detent for lever C provide the following selections: (1) full printing capacity and no count - with lever C in its right-hand position; (2) cipher split and automatic count - with lever C in central positions; (3) cipher split and no count - with lever C in its left hand position.

Disabling of the count mechanism results from the shifting of lever C to its left-hand or right hand position. When thus positioned, the stud in lever C is away from the camming surface of rocker arm D permitting a spring to raise the rear portion of rocker arm D which, in turn raises arm E to its inactive positions (arm E up out of the path of stud F).

Counting of listed items takes place during the forward stroke of the machine operation. The active hammer (or hammers) rocks bail B, positioning its lower foot into the path of booster arm A. The booster arm (moving upward) contacts the foot of bail B, continuing the movement of the bail and arm E contacting stud F rocks link G downward and stud I rocks bail J. As bail J is rocked; carry rack latch H is tripped producing a count by releasing the carry rack.

PRINTED AND NON-PRINTED ITEMS MAY BE COUNTED

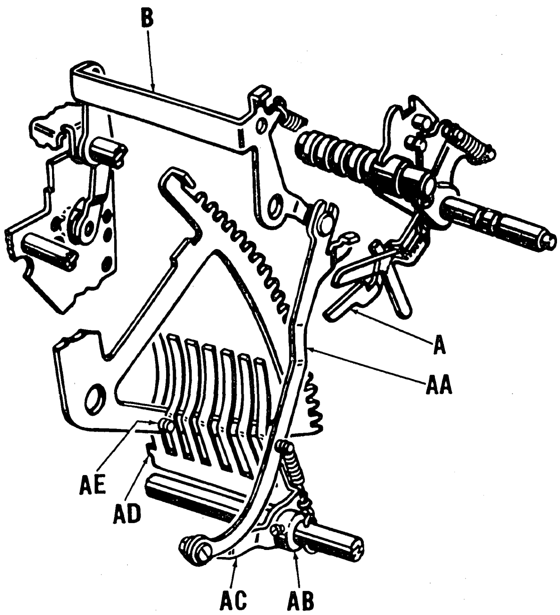


Fig. VIII-72

This mechanism provides a means of indexing an automatic count of both printed and non-printed items through the upward movement of the adding sectors actuating link AA. Since the indexing of an automatic count does not involve an additional load to the adding sector springs, free movement of the adding sectors is assured as they move up to their indexed position.

As an adding sector moves upward, stud AE rocks comb AD rearward, positioning link AA so that its lip is moved into the path of the raised surface of booster arm A. Booster arm A contacts the lip on link AA as the machine operation continues thus completing the upward movement of link AA actuating bail B and produces an automatic count as described under Fig. VIII-71.

Tests and Adjustments

1. To assure free movement of comb AD -
Comb AD should have approximately .005" side play.
TO ADJUST, reposition collar AB.

2. To safeguard against the adding sector springs interfering with the movement of comb AD -
The adding sector springs should be hooked to stud AE with the open side of the eye away from comb AD.
TO ADJUST, reposition the adding sectors springs.

3. To safeguard against excessive load being placed on the adding sector springs -
Link AA should have free movement.
TO ADJUST, align arm AC with the lowermost portion of link AA.

4. To safeguard against booster arm A missing link AA during a count operation -
Booster arm A should have a full lateral hold on the lip of link AA during a machine operation in which a count is to take place.
TO ADJUST, bend the forward portion of booster arm A.

5. To assure the correct relative position of the lip on link AA to booster arm A -
With an adding sector located at No. 1 position, booster arm A should have a safe hold on the lip of link AA. During a blank operation there should be a safe clearance between booster arm A and the lip on link AA.
TO ADJUST, bend arm AC up or down.

AUTOMATIC COUNT - CLASS 9 AND SERIES P 200 MACHINES WITHOUT MINUS BALANCE

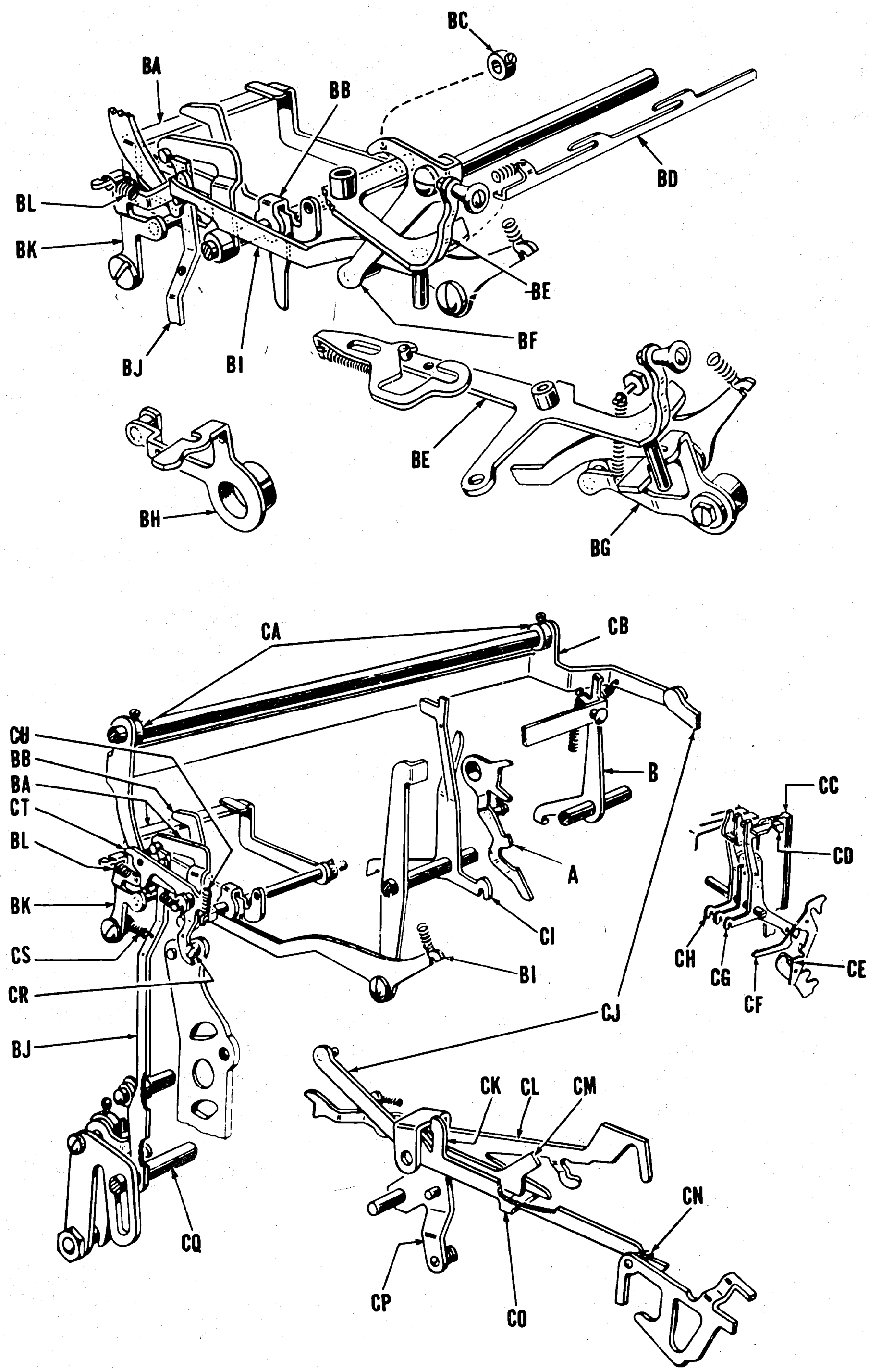


Fig. VIII-73

In these machines, a means of readily increasing or decreasing the count's column capacity is provided. In addition to the count of added items, a net count can be obtained by a variation of this mechanism (projection CK is removed and hammer CH, hammer latch CF, and stud CD are included) providing a reduction of the count when subtracted amounts are printed.

Manipulation of lever BE (OCL No. 53) enables a segregation of specified printing and adding columns for the automatic count and also permits the restoration of the machine to full adding and printing capacity.

During the forward stroke of a machine operation during which an item is to be counted (lever BE in its central position), the active hammer (or hammers) rocks bail B so that its lower foot is positioned into the path of booster arm A. As booster arm A moves upward, it contacts the foot of bail B continuing the rocking movement of the bail, and through arm BI positions detent BK rearward where its offset lip clears the rearward step of latch CT. As the stud in detent BK is moved rearward, link BJ is moved rearward by spring CS to limit against the stud in the upper portion of bail BA.

During the return stroke (as the accumulator wheels are being meshed with the adding sectors) screw CR moves away from the lower extension of latch CT permitting spring CU to position latch CT into the path of the lip on detent BK retaining BK in its rearward position after booster arm A is lowered.

As carry rack reset shaft CQ moves downward (during the return stroke), link BJ is positioned under the stud in bail BA by spring CS; and when the carry reset shaft is raised, link BJ raises bail BA to produce an automatic count, through the raising of latch BB releasing the carry rack.

At the end of the return stroke, screw CR releases latch CT, permitting spring BL (on detent BK) to move detent BK forward to disengage link BJ from the stud in bail BA, thus restoring the mechanism.

AUTOMATIC COUNT MAY BE DISABLED THROUGH VARIOUS SOURCES (Fig. VIII-73)

Shifting of lever BE to the right (on machines equipped with rocker arm BF), causes its formost extension to position slide BD to the right to disable the cipher split; and its right-hand extension rocks arm BF raising the rearward portion of arm BI.

Depression of various control keys actuates arm CJ and bail CB in the following manner to raise the rearward portion of arm BI;

1. By depression of the total key through arm CM and lip CO.
2. By depression of the sub-total key through arm CL and lip CO.
3. By depression of the non-add key through stud CN.
4. By depression of the minus bar through lever CP and projection CK.

CAPACITY OF AUTOMATIC COUNT MAY BE READILY INCREASED OR DECREASED (FIG. VIII-73)

The design of parts described below facilitates the increase or decrease of the count's column capacity.

Latch BB may be installed in any column to obtain the desired count capacity.

Bail BA is designed to actuate latch BB irrespective of the column in which the latch is installed.

NOTE: When the column capacity of the automatic count is increased or decreased, the hammerhead split should be repositioned to conform to the new location of latch BB.

Count mechanisms which produce an automatic reduction of the count when subtract amounts are printed, are equipped with the parts listed and described in the following:

Arm CJ with its projection CK removed permits actuating the minus bar without disabling the count.

Hammer latch CF, with added stock at point CE, will not engage hammer CG until the symbol sector raises beyond its No. 1 position (minus position); thus preventing movement of bail B and an automatic count during blank subtract operations.

Hammer CH (in the tens column) with an overlapping arm extending across the rear of hammer CG (symbol hammer) actuates the symbol hammer in all operations during which an amount is printed.

Symbol type bar CC, equipped with stud CD remains inactive during add operations (due to the stud's limiting on the hammerhead comb) and permits the printing of the minus symbol on subtract operations when amounts are printed (the stud clears over the hammerhead comb).

On machines equipped with the count mechanism but not constructed to print ciphers in the first and second columns during blank total operation (closed account mechanism), stud CD is removed. Hammer latch identified as No. 13, Plate 5, Series P Printing Parts Catalog, and hammer, identified as No. 5, Plate 3, Series P Printing Parts Catalog, replace hammer latch CF and hammer CG.

Tests and Adjustments

1. To assure the correct location of bail CB -
Bail CB should have minimum side play and should clear arm BI and link BJ.
TO ADJUST, reset collars CA.

2. To assure free movement of bail BA -
Bail BA should be free with minimum of side play.
TO ADJUST, reset collar BC.

3. To assure correct position of bail B when normal and during a count operation -
Detent BK should have approximately .010" latching lead to the rear of latch CT at the end of the forward stroke of a count operation.
Arm BI should have approximately .010" resetting clearance to the front of the offset lip on detent BK at the end of the return stroke of an operation when the count mechanism is disabled.
TO ADJUST, weave bail B.

4. To assure the correct relative position of the foot of bail B to booster arm A -
Booster arm A should have a safe hold on the foot of bail B during a printing operation; and should have minimum clearance with the foot during an operation in which no amount is printed.
TO ADJUST, bend the foot of bail B.

5. To assure arm BI is correctly indexed during machine operations when an automatic count does not take place -
Arm BI should have approximately .010" clearance over detent BK during non-add, subtract, total, and sub-total operations.
TO ADJUST:
   a. With non-add key depressed - bend the forward extension of arm CJ.
   b. With the minus bar depressed - bend projection CK.
   c. With the total or sub-total key depressed - bend lip CO.

6. To assure arm BI is correctly indexed during a machine operation with lever BE located in its right-hand position -
Arm BI should clear over the offset lip on detent BK (during a machine operation in which an amount is printed) when lever BE is located in its right-hand (normal) position.
TO ADJUST, on machines equipped with rocker arm BF, raise or lower the right-hand extension of lever BE, and on machines equipped with rocker arm BH or BG, weave the upper arm of the rocker arm forward or rearward.

7. To safeguard against a premature release of detent BK during a count operation -
Latch CT should hold detent BK in a rearward position until bail BA has raised latch BB to produce an automatic count.
TO ADJUST, bend the lower extension of latch CT to or from screw CR.

AUTOMATIC COUNT - SERIES P 400 MACHINES

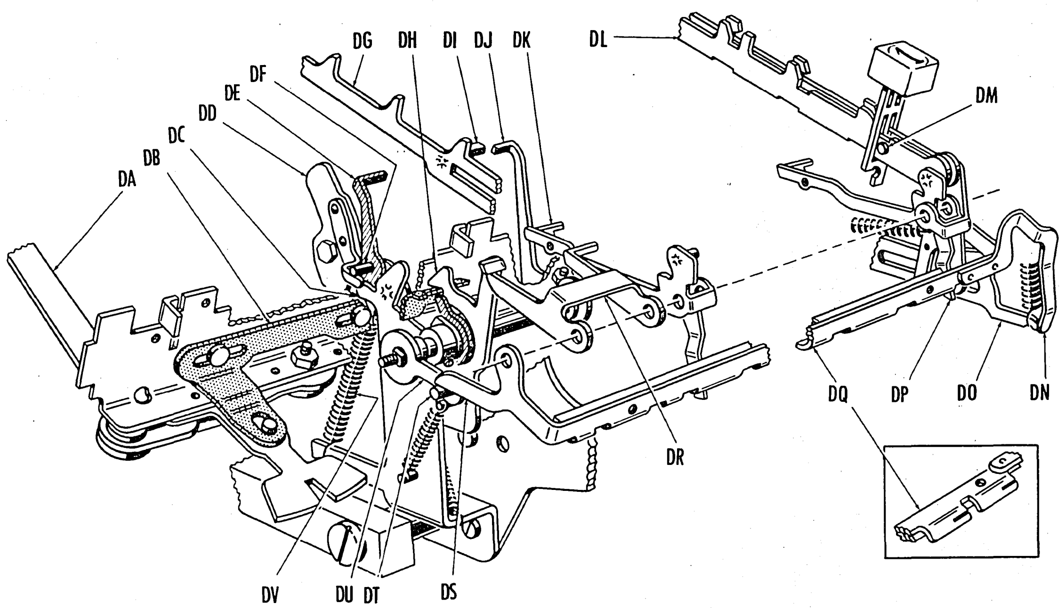


Fig. VIII-74

The automatic count mechanism in Series P 400 machines provides a net count of plus and minus listed items in registers "A" and/or "B", depending upon the position of the Register Selector Lever (OCL No. 60).

NOTE: It should be understood that the automatic count of plus and minus listed items may at times affect the correct operation of the automatic one mechanism resulting in untrue totals.

When lever DA (OCL No. 63) is located in its left-hand (normal) position, slide DB is located to block the movement of shaft assembly DU through finger DC. When lever DA is located in its central (count) position, a cut out portion of slide DB is located in line with finger DC, permitting full movement of shaft assembly DU during a count operation.

During the forward stroke of a machine operation with no keys depressed and lever DA located in its central position, bail DQ is permitted to swing and locate its finger DS upward out of the path of stud DT permitting upward movement of the arm on the forward portion of shaft assembly DU. As the arm on shaft assembly DU moves upward; lever DH is located so the lip on its uppermost portion is out of the path of bail DR, thus permitting free movement of bail DR as cipher stop DK moves up into the path of index bar DG (index bar in first count column) retaining the adding sector in this column at cipher position. Upward movement of the arm on shaft assembly DU also permits spring DV to pull arm DJ downward out of the path of square stud DI.

When a key is depressed in a column to the right of the first count column; rearward movement of index strip DL rocks the cipher stop in that column positioning its finger DP in the path of bail DQ.

During the forward stroke of the machine operation, movement of bail DQ is blocked and finger DS is located to block the full upward movement of stud DT and shaft assembly DU. This partial movement of shaft assembly DU permits full downward movement of lever DH holding cipher stop DK out of the path of index bar DG through bail DR. Partial movement of shaft assembly DU also locates arm DJ in the path of square stud DI permitting forward travel of index bar DG forward to a number one position for adding one in the first count column when the plus or minus pinions are in mesh with the adding sectors.

During the return stroke of the machine operation; the lip on anchor plate DD engages stud DF moving arm DE upward and locating shaft assembly DU in normal position.

Tests and Adjustments

1. To safeguard against an interference of bail DQ with the foot of cipher stops DP as numeral keys are depressed -
Finger DN of bail DQ should just contact the foremost portion of key restoring slide DO when the machine is in home position, lever DA in count (center) position, and all number one keys to the right of the count section depressed. This may be observed by noting no movement of bail DQ as the machine reaches home position.
TO ADJUST, bend finger DN.

2. To provide uniform clearance of the foot of cipher stops DP with the edge of bail DQ -
There should be .005" maximum clearance between the leg of cipher stops DP and the edge of bail DQ when the machine is in home position, lever DA in count position, and all number one keys in the columns to the right of the count section depressed.
TO ADJUST, bend the slotted portions of bail DQ.

3. To assure a safe clearance between the foot of cipher stop DK and the underside of index bar DG in the first count column during a count operation; also to assure a minimum of downward movement of cipher stop DK during a total operation -
There should be .015" to .020" clearance between the foot of cipher stop DK and the underside of index bar DG when the machine is operated in the following manner:
   a. Locate lever DA in count position.
   b. Depress No. 6 key in column one, advance the handle, and observe the clearance between the foot of cipher stop DK under index bar DG.
   c. Repeat step 'b' above, individually depress the No. 6 keys in each column to the right of the first count column and observe the amount of clearance between the foot of cipher stop DK under index bar DG and establish the column that produces the least amount of clearance.
TO ADJUST, tilt arm DU to locate stud DT to or from finger DS on bail DQ.

4. To assure the correct relative position of lip DJ to square stud DI during count and non-count operations -
   a. Lip DJ should have a safe clearance over square stud DI when lever DA is located in normal (to the right) position, No. 5 key in the first count column is depressed and the handle is pulled forward.
   b. Lip DJ should have a safe hold against square stud DI when lever DA is located in count position, and any key to the right of the first count column is depressed and the handle is pulled forward.
   c. Lip DJ should have a safe clearance under square stud DI when lever DA is located in count position, No. 5 key in the first count column depressed and the handle pulled forward.
TO ADJUST, for steps a, b, and c, weave the arm containing lip DJ.

5. To assure the correct No. 1 location of the adding sector in the first count column during a count operation -
There should be a slight downward movement of the adding sector in the first count column as the aligning shaft enters the tooth spaces of the adding sector during the forward stroke of a count operation.
TO ADJUST, bend lip DJ forward or rearward.

COUNTER DIAL MECHANISM

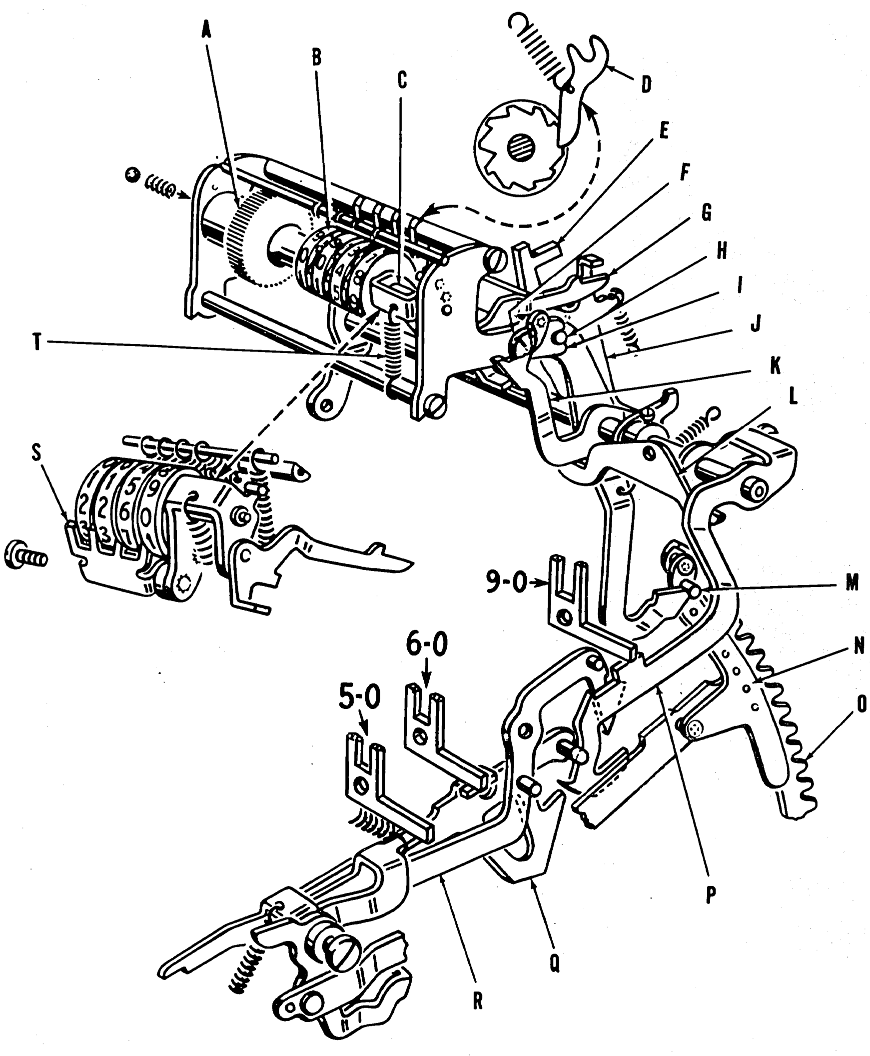


Fig. VIII-75

The counter dial mechanism counts the number of items listed. The count may be a total of all items listed or a count of those items listed from specified control keys only.

COUNTER DIAL - CLASSES 8, 9, AND 10 MACHINES

The counter dial mechanism is mounted on the hammerhead through brackets I which fork over studs H and are retained by screws F.

Due to mechanical conflict, some styles of Class 8, 9, and 10 machines require the removal of the keyboard first, before the counter dial mechanism can be removed.

Dial wheels B are mounted on shaft C and are advanced one digit, through advancing bail S during a machine operation in which an amount key is depressed and a count of items is indexed through the depression of a specified control key.

Detent D prevents the dial wheels from being accidently turned backward. Turning knurled knob A restores the dial wheels to cipher position.

Advance of the counter dial mechanism is indexed through the depression of a specified control key. On the forward stroke of a machine operation as symbol sector O rises to locate the appropriate symbol, stud M positions on the point of the lower extension of arm K, rocking the latter and moving the step of driving arm G upward into the path of the lip on actuating bail J. Actuating bail J is moved forward by hammer E (in an amount column) as the hammer is cocked. Forward movement of actuating bail J moves driving arm G forward, rocking advancing bail S thus advances the dial wheels one digit. Spring T restores driving arm G to normal.

NOTE: Stud M is riveted to segment N which in turn is riveted to symbol sector O. The symbol sector itself contains a slot instead of a hole to facilitate its removal from the adding sector shaft. With the sector removed, stud M may be relocated on segment N to index the advancement of the counter dial from other control key sources.

Symbol sector O is raised during a machine operation through spring tension. If the upward travel of the sector is blocked, stud M may not locate directly on the point of arm K and advancement of the counter dial would not take place.

Validating and receipting machine require a more positive method of indexing the advancement of the counter dial mechanism.

On these machines, depression of OCK's 5-0 and 6-0 through arms R and Q respectively, and depression of OCK 9-0 lowers arm P. Lowering of arm P rocks crank L which in turn rocks arm K positioning driving arm G upward in the path of the lip on actuating bail J.

COUNTER DIAL ADVANCE DISABLED

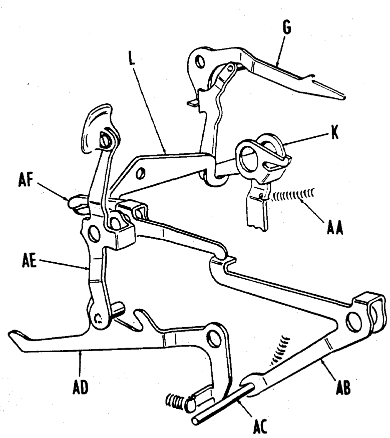


Fig. VIII-76

On validating-receipting machines, advance of the counter dial is disabled when printing multiple (additional) receipts of the same transaction.

Moving lever AE (OCL No. 54) rearward cams detent arm AD downward to move stud AC. Movement of stud AC rocks levers AB, AF, and L permitting spring AA to restore arm K to normal and lower driving arm G thereby preventing an advance of the counter dial.

Tests and Adjustments

1. To assure indexing advancement of the counter dial from all sources -
   With the advance of the counter dial indexed, the step of driving arm G should be raised into the path of the lip on actuating bail J.
   TO ADJUST, bend the rear portion of driving arm G.

2. To assure advancement of the counter dial mechanism -
   Bail J should move driving arm G forward far

enough to advance the dial wheels slightly past center to assure seating of detents D.
TO ADJUST, weave the lip of bail J.

3. To safeguard against advancing the counter dial mechanism during a multiple receipt operation on validating-receipting machines - Arm G should be lowered sufficiently through the movement of lever AE, Fig. VIII-76, to clear under the lip of the counter dial actuating bail.
TO ADJUST, bend the forked arm of lever AB, Fig. VIII-76.

COUNTER DIAL MECHANISM - SERIES P 100, P 200, P 300 MACHINES

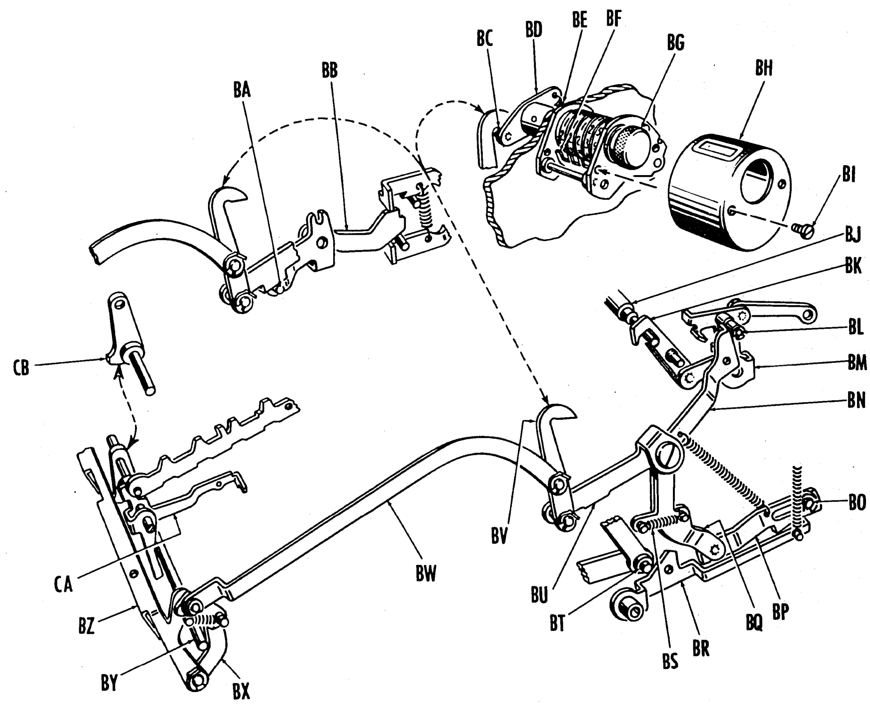


Fig. VIII-77

On Series P 100, P 200, and P 300 machines the counter dial is located on the right side of the machine case.

The counter dial is similar in construction to that used on Class 8, 9, and 10 machines. The dial wheels are advanced one digit during each machine operation when an amount key is depressed and a count of items is indexed through the depression of a specified control key.

Metal cover BH is held in place by two screws BI.

Turning knurled knob BG restores the dial wheels to cipher position.

An amount key depressed on the keyboard indexes a count by rocking cipher stop CA downward, positioning the lower forward extension of the cipher stop forward.

During the forward stroke of a machine operation with an amount key depressed, the rearward travel of bail BZ and connecting link BX are blocked by the lower forward extension of the cipher stops. As the machine operation progresses the right end of shaft BY contacts connecting link BX rocking it rearward which in turn drives link BW rearward, positioning hook BV over stud BC in rocker arm BD. Lowering of hook BV at the beginning of the return stroke actuates rocker arm BD through stud BC which in turn actuates advancing bail BF advancing the dial wheels one digit. Spring BE restores rocker arm BD.

Hook BV is lowered by action of lever BU during the return stroke of a listing operation.

When counting items that are being accumulated in the upper register of Series P 300 machines, lever BU is actuated by roll BL and arm BN as bellcrank BM and hook BK are rocked by stud BJ on the dash pot hanger shaft assembly.

When counting items that are being accumulated in the lower register, arm BU is actuated by arm BQ and link BP, as accumulator control bail BO moves rearward.

For a count of add listed amounts only on Series P 200 machines, hook BV is prevented from lowering during minus operations. Depression of the subtract motor bar or subtract key rocks arm BB, positioning stud BA upward, against the formed lip of arm BU. As accumulator control bail BO moves rearward on the return stroke of a machine operation, link BP is pulled rearward rocking arm BQ and expanding the broken joint provided by spring BS. Hook BV is not lowered and the counter dial is not advanced.

Interlock BR latches on the step of link BP, preventing a premature release of the accumulator control bails which could interfere with resetting of the carry racks. The premature release of the accumulator control bails is most evident when lowering of hook BV is blocked during a minus operation as spring BS presents an added load. Interlock BR is released near the end of the return stroke as stud BT on the dash pot actuating arm moves forward, passing over the inclined projection on the top of interlock BR releasing it from the step of link BP.

Tests and Adjustments

1. To assure the normal position of bail BZ - Bail BZ should limit squarely on projections CB when at normal.
TO ADJUST, weave bail BZ.

2. To safeguard against advance of the counter dial during a machine operation when no listing keys are depressed -
Remove the carriage so that hook BV and stud BC may be observed with the case on. Operate the machine with no keys depressed and check for minimum clearance between the point of hook BV and stud BC as hook BV is lowered during the return stroke.
TO ADJUST, shorten or lengthen link BW at its offset.

3. To assure latching of link BP on interlock BR -
When actuated from the upper, or the lower register, link BP should latch on interlock BR with .010" to .020" latching lead.
TO ADJUST:
   a. From the lower register, shorten or lengthen interlock BR by bending it at its offset.
   b. From the upper register, shorten or lengthen arm BN by bending it at its offset.

4. To assure releases of interlock BR from link BP at the end of the return stroke -
On the return stroke of a machine operation with stud BT on the high point of interlock BR, there should be 1/32" clearance between the step of link BP and the lip on the rear of interlock BR.
TO ADJUST, bend the rear of interlock BR up or down.

EXTENDED TOTAL MECHANISM

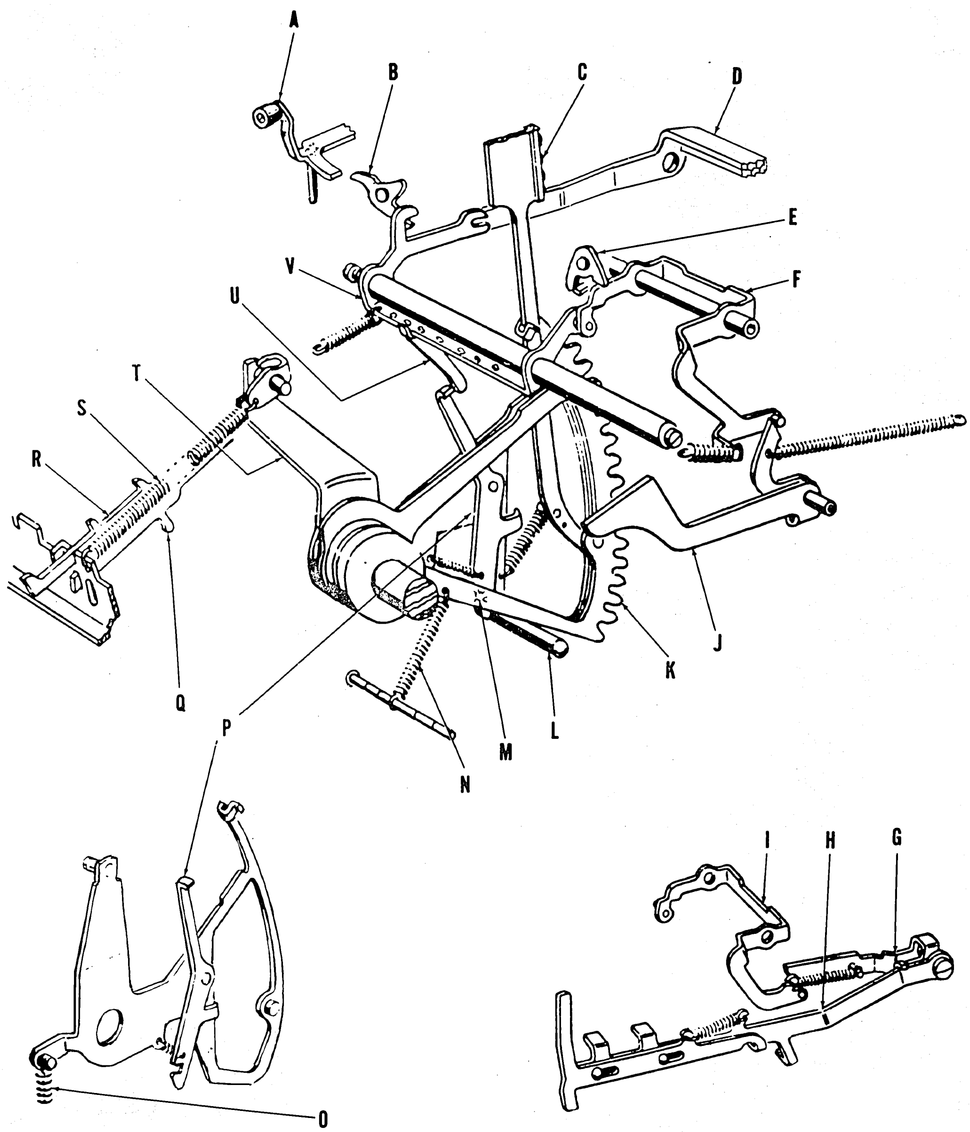


Fig. VIII-78

The extended total feature permits the use of specified columns on the left of the machine as non-add columns without reducing the adding capacity of the machine. This feature consists of two distinct mechanisms. First, the controlled cipher split (covered under Fig. VIII-44) and second, twin sectors K and T in each extended column, sector K with, and sector T without teeth.

Type bar C and index bar R are attached to the toothless sector. This permits amounts to be printed but not added in these columns. Machines containing this feature have a standard accumulator, therefore if capacity of the listing columns is exceeded, the amount carries over into the extended columns.

Due to the limited clearance between the double sectors in the extended columns and the next column to the left of extended columns, the spring which normally raises the adding sector is replaced by either spring S or O.

Depression of the total and sub-total keys or movement of the total/sub-total lever disables the cipher split through bellcrank E and couples toothless sector T to regular adding sector K by hook P and stud M as fingers U are rocked rearward.

Sector K (which only rises when it is coupled to the toothless sector) is held in its lowered position by spring N.

Classes 8 and 10, Series P 100 and Series P 300 machines index the extended total mechanism through arm J, bails F and V, and fingers U while Class 9 and Series P 200 machine use arms H and G, and bail I.

Moving lever A to the right disables the cipher split and couples the sectors together, through bellcrank B, thus providing full listing and totaling capacity of the machine.

EXTENDED TOTAL - INDEXED THROUGH BACK BAIL CONTROLS

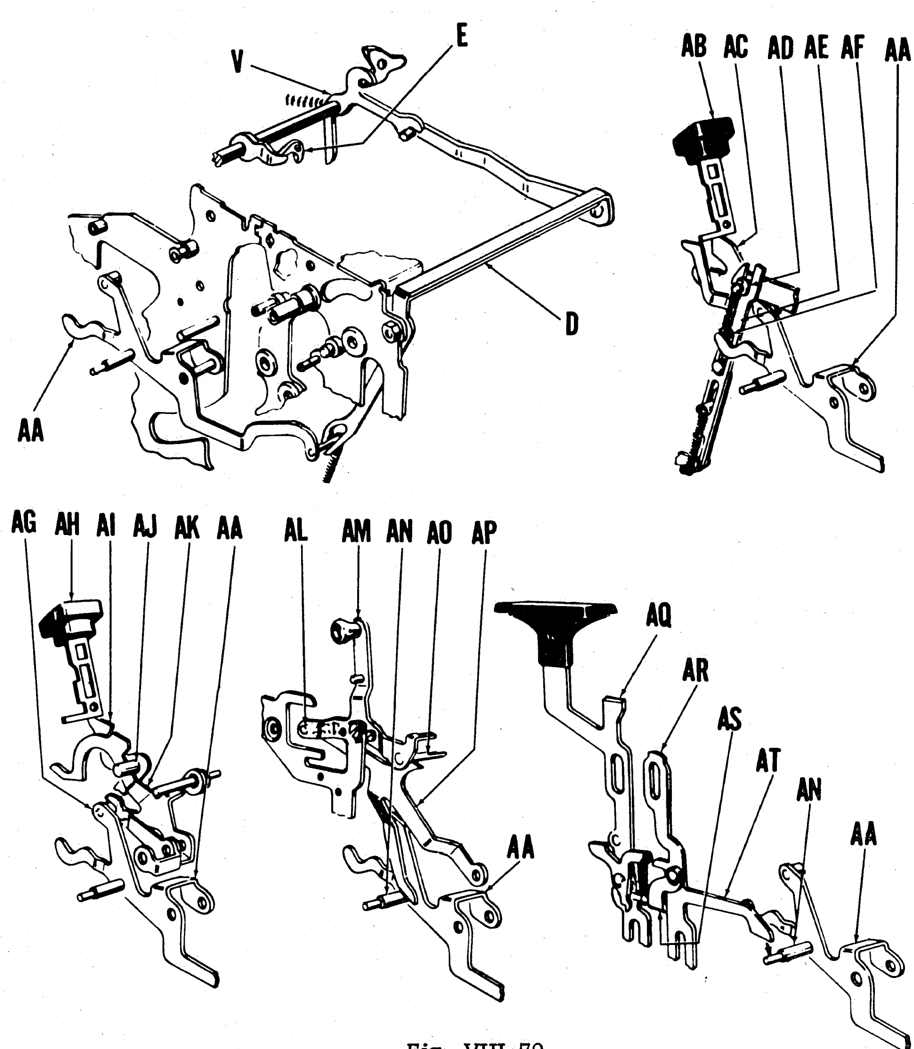


Fig. VIII-79

Back bail controls for coupling the extended total sectors together may be actuated from various sources, some of which are covered here.

Rocking of bail D and resulting movement of bail V and bellcrank E is accomplished through rocking of arm AA.

Depression of key AB (OCK 8-0) rocks arm AA through arm AC, stud AD, link AE, and lip AF.

Depression of key AH (OCK 9-0) rocks arm AA through arm AI, stud AJ, arm AK, and stud AG.

Forward or rearward movement of lever AM (OCL No. 51) rocks arm AP through studs AL or AO. Rocking of arm AP in turn rocks arm AA through stud AN.

Depression of motor bar AQ (Motor Bar 101) lowers intermediate motor bar AR through lip AS. Lowering of intermediate motor bar AR rocks arm AA through projection AT and stud AN.

EXTENDED TOTAL - UPPER REGISTER ONLY

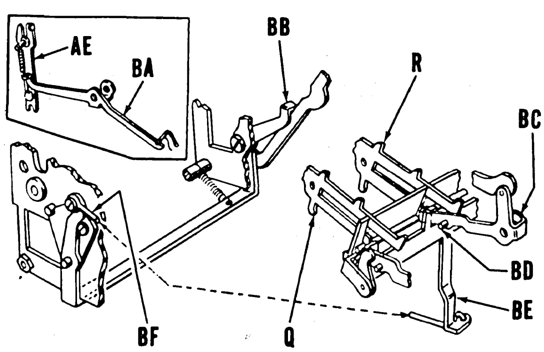


Fig. VIII-80

This mechanism prevents the sectors in the extend columns from rising during a total or sub-total of the lower register.

Depression of the lower register total/sub-total keys rocks bail BB through link AE and lever BA. Rocking of bail BB rocks bail BE through wire BF. The projections on bail BE blocks the upward movement of cipher stops BC, by studs BD thus preventing the cipher stops from moving into total position.

Tests and Adjustments

1. To assure indexing of extended total mechanism through depression of specified keyboard controls - Index an extended total from various sources and check for full movement of bail V, Fig. VIII-78.
TO ADJUST, weave the bail portion of bails F or D, Fig. VIII-78.

2. To assure coupling toothless sector T, Fig. VIII-78 to regular sector K, Fig. VIII-78 - Index an extended total on the keyboard and check for hooks P, Fig. VIII-78 to locate over studs M, Fig. VIII-78 without drag or bind.
TO ADJUST:
   a. For horizontal alignment, bend fingers U, Fig. VIII-78.
   b. For vertical alignment, adjust eccentric shaft L, Fig. VIII-78.
NOTE: Eccentric shaft L, Fig. VIII-78 is also the home (normal) limit for the adding sectors. Check test and adjustment No. 1, Fig. II-18.

3. To assure proper alignment of the type - Obtain a sample print of each row of figures across the keyboard and check for minimum up and down movement of the type bars as the aligning shaft engages the teeth of the adding sectors.
TO ADJUST:
   a. For ciphers, adjust the foot of the cipher stops as outlined in test No. 3, Fig. II-4.
   b. For figures 1 thru 8, adjust the keystems as outlined in test No. 4, Fig. II-4.
   c. For figures 9, bend projections Q, Fig. VIII-78.

TRANSFER TOTALS - BALANCE SCHEDULING MACHINES

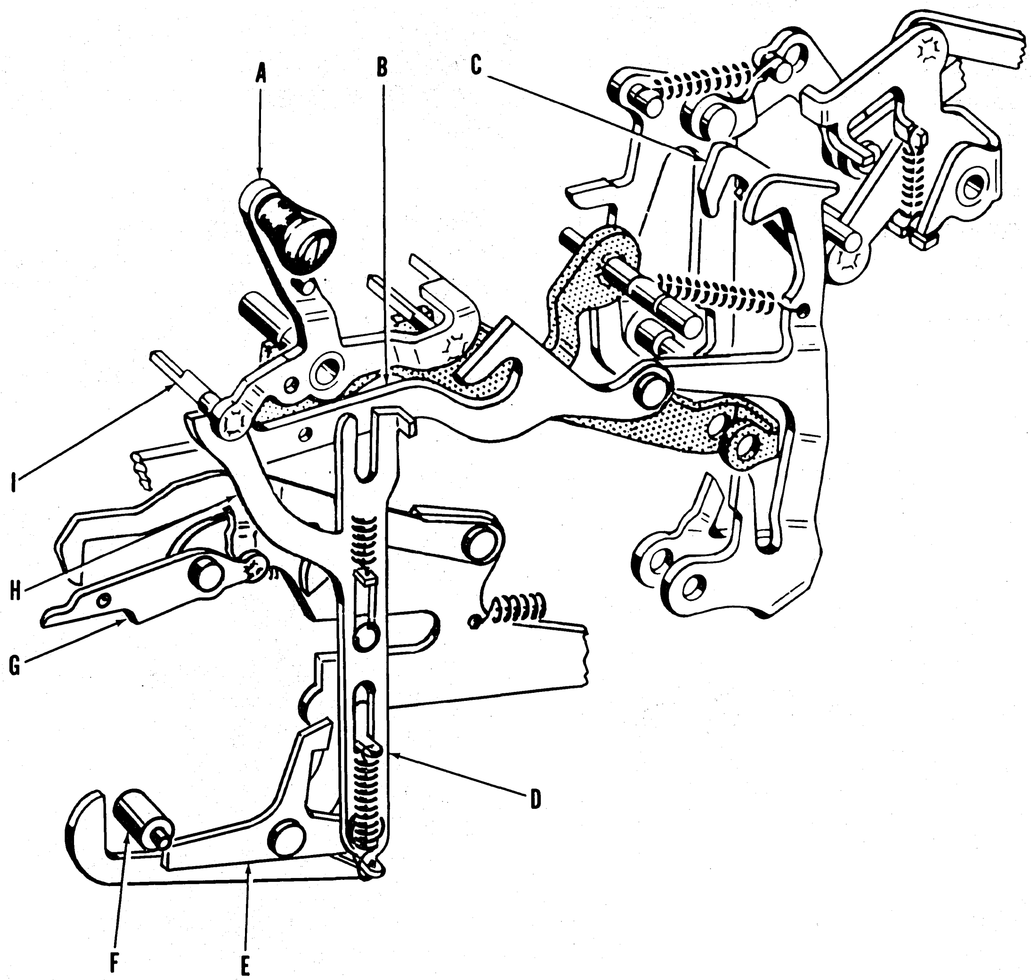


Fig. VIII-81

Balance scheduling operations call for amounts previously accumulated in register "A" to be added into register "B". This is accomplished by sub-totaling register "A" while at the same time adding into register "B".

Forward movement of sub-total lever A, through projection H lowers link D. Lowering of link D rocks pawl E into the path of roll F (on the secondary mechanism). With pawl E so positioned and pawl G remaining in its lowered position, register "A" is sub-totaled.

The projection on register "B" control link B normally engaged by stud I to reposition pawl C and non-add register "B" is removed. Link B is not moved rearward and pawl C remains forward in list position.

REGISTER "B" SUB-TOTAL FROM OCK 9-0 - PREMIUM POSTING AND RECEIPTING MACHINES

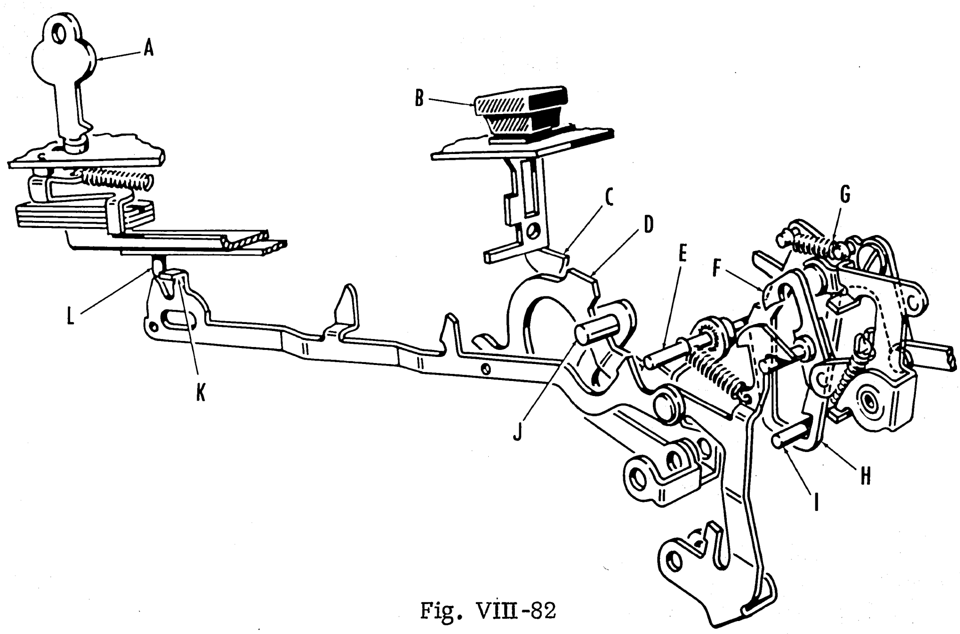


Fig. VIII-82

This mechanism provides a means of obtaining sub-totals of amounts in register "B" from the depression of OCK 9-0, rather than from the rearward movement of OCL No. 51.

Depression of key B lowers arm C, and stud J rocks arm D. Rocking of arm D positions stud E forward permitting spring G to pull pawl H forward and locate its step into the path of stud I.

During the forward stroke, stud I engages pawl H moving register "B" into mesh with the adding sectors where it remains until stud I moves down and re-engages pawl H near the end of the return stroke to pull register "B" out of mesh.

REGISTER "A" IS DISABLED FROM DEPRESSION OF OCK 9-0

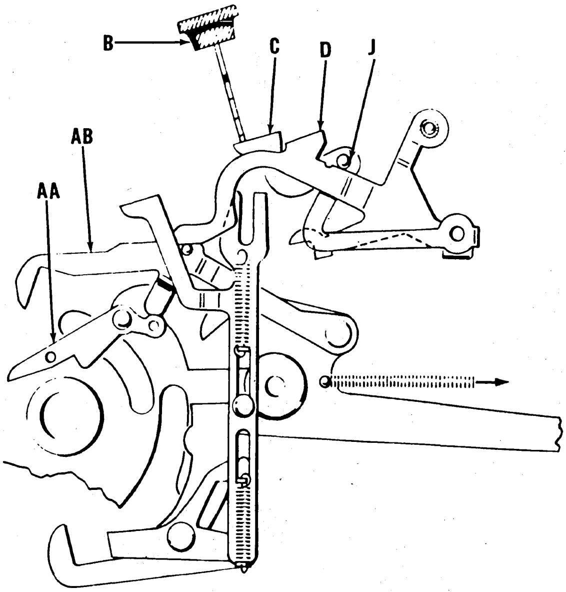


Fig. VIII-83

Depression of key B (OCK 9-0) lowers arm C and stud J lowers arm D. Lowering of arm D rocks hook AB downward raising listing pawl AA out of the path of stud AC, Fig. II-19 to prevent moving register "A" into mesh during the return stroke.

Tests and Adjustments

1. To safeguard against clearing register "B" during a machine operation with OCK 9-0 depressed -
   With the sub-total key depressed, and key A turned counter clockwise (as illustrated) to non-add register "B" on listing operations, stud I should clear the nose of pawl F and locate in its pocket at the end of the forward stroke.
   TO ADJUST, bend lip K to or from stud L.

2. To safeguard against moving register "A" into mesh with the adding sectors during the return stroke of a register "B" sub-total operation -
   Pawl AA, Fig. VIII-83 should be held clear of stud AC, Fig. II 19 during the return stroke of a machine operation with key B depressed.
   TO ADJUST, bend the forward portion of arm D.

FRACTIONS

Many denominations of fractions are available on various styles of Series P machines. Fractions may be used for calculation of monetary units or for numerical units, such as pounds, bushels, etc.

Usually, fraction columns are located on the right side of the keyboard and are used in conjunction with standard 10 pitch construction. When a combination of different denominations of fractions are located in the same machine, such as 1/12 and 1/16 fractions, the columns overlap. The 1/12 fraction may be located in column one and extend over into top of column two with the 1/16 fractions located on column three extending (to the right) into the lower positions of column two.

Fractions of different denominations will be found arranged on the machine in the way best suited to the individual machine construction.

The basic denominations and their arrangements are covered here.

FRACTIONS 1/8 - CLASS 8, 9, 10 AND SERIES P 100, P 200, P 300 MACHINES

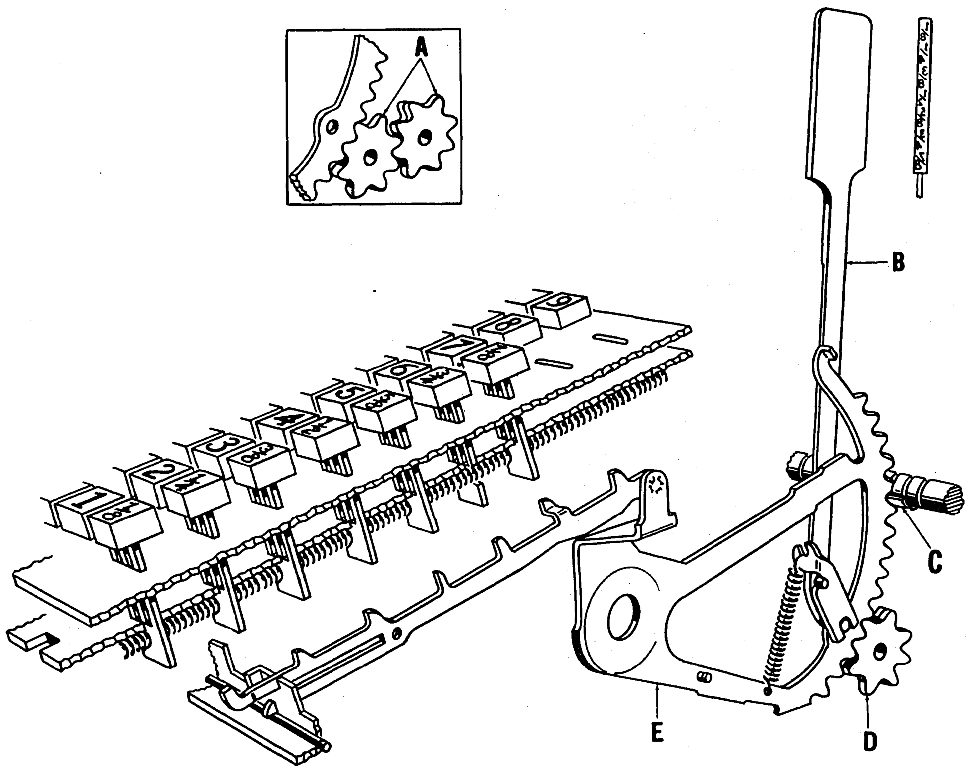


Fig. VIII-84

One eighth fraction construction on Class 8, 9, 10, and Series P 100, P 200, P 300 machines is similar to the standard 10 pitch construction. The standard 10 tooth adding pinion is replaced with 8 tooth pinion D on Class 8, 10 and Series P 100, P 300 machines or with 8 tooth pinions A on Class 9 and Series P 200 machines.

The standard 10 pitch adding sector is replaced with 8 pitch adding sector E. Accumulating more than 7 units on the 8 tooth pinions sets up an initial carry in the next adjacent left column. The carry takes place in the same manner as on standard 10 pitch construction.

Keys 1/8 through 7/8 are located in one column on the keyboard.

Lip C is fastened to the aligning shaft and rocks into a tooth space in the 8 pitch adding sector just prior to printing. This assures uniform alignment of the 1/8 fraction type with the standard 10 pitch type.

FRACTIONS 1/12 - CLASS 8, 9, 10 AND SERIES P 100, P 200, P 300 MACHINES

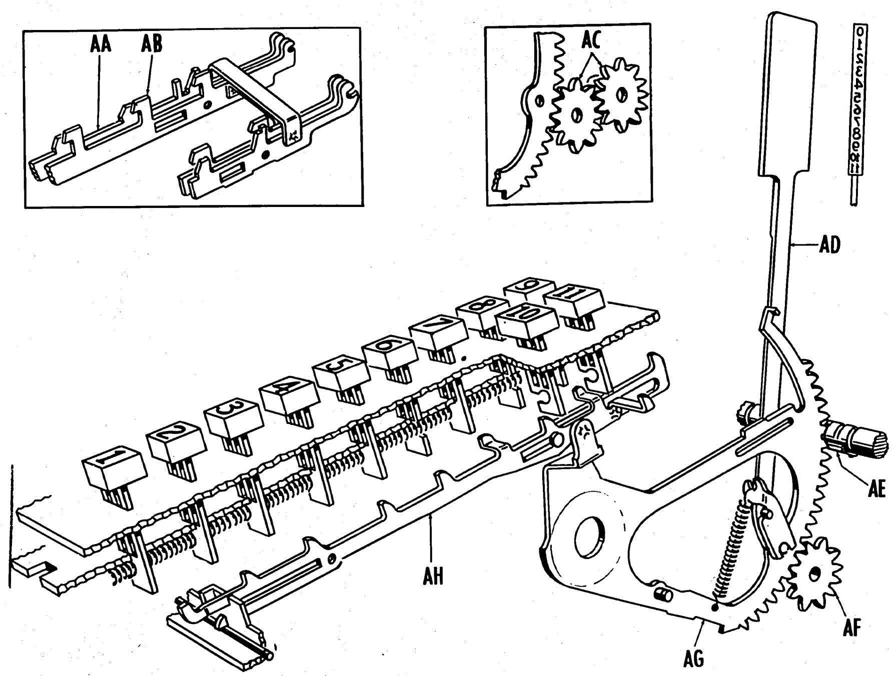


Fig. VIII-85

One twelfth fraction construction on Class 8, 9, 10 and Series P 100, P 200, and P 300 machines is also similar to the standard 10 pitch construction. The standard 10 tooth adding pinion is replaced with 12 tooth adding pinion AF on Classes 8, 10 and Series P 100, P 300 machines or with 12 tooth pinions AC on Class 9 and Series P 200 machines.

The standard 10 pitch adding sector is replaced with 12 pitch adding sector AG. Accumulating more than 11 units on the 12 tooth pinion sets up an initial carry into the next adjacent left column. The carry takes place in the same manner as on standard 10 pitch construction.

Keys 1 through 9 are located in one column on the keyboard and keys 10 and 11 are located in the adjoining column.

Index strips AA and locking strips AB are bridged to accommodate indexing fractions larger than 9/12.

During a machine operation, index bar AH limits on the depressed keystems thereby limiting the upward travel of sector AG and type bar AD. The rearmost projection on index bar AH is free to slide forward as the index bar restores to normal. The presence of a crossbrace at the rear of the index bar makes this sliding connection necessary.

Lip AE is fastened to the aligning shaft and rocks into a tooth space in the 12 pitch adding sector just prior to printing. This assures uniform alignment of the 1/12 fraction type with the standard 10 pitch type.

FRACTIONS 1/16 - CLASS 8, 10 AND SERIES P 100, P 300 MACHINES

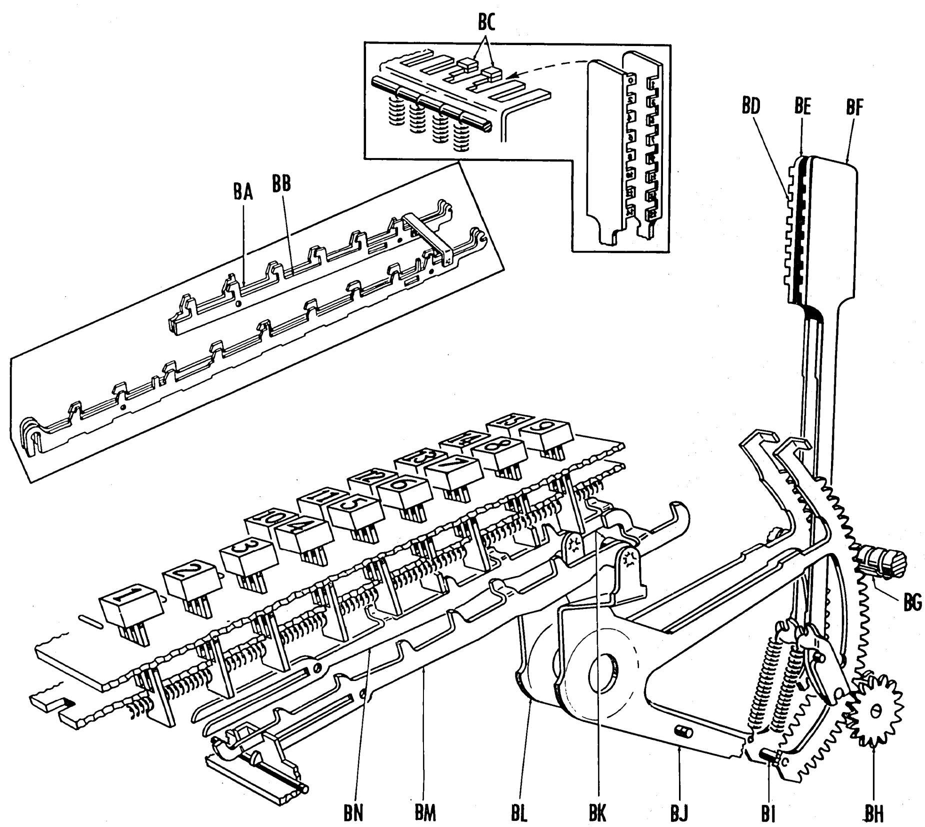


Fig. VIII-86

One sixteenth fractions requires two columns on the keyboard on Class 8, 10 and Series P 100, P 300 machines. Index strips BA and locking strips BB are bridged to accommodate the indexing of fractions larger than 9/16.

During a machine operation, index bar BM or BN limits on depressed keystems thereby limiting the upward travel of the adding sectors. Sectors BJ and BL are joined together by pin BI. Only sector BJ meshes with an adding pinion, the other sector being a dummy, used only for indexing.

Adding pinion BH contains 16 teeth and one carry tooth which is bridged to the left across sector BL. Rotating pinion BH more than 15 units sets up an initial carry in the column adjacent to the left of the two fraction columns.

In order to obtain a legible print, the figures are contained on two type bars. Type bar BF contains even numbered figures (2 thru 14) while type bar BE contains odd numbered figures (1 thru 15). The type bars are offset as illustrated with the offsets intermeshing to maintain uniform vertical alignment of odd and even numbered figures.

Both type bars rise together (bring attached to sectors BJ and BL which are linked together) and fire together. The rearward travel of the type bar not actually printing is arrested as its lugs BD engage blocks BC on the comb of the hammerhead.

Tests and Adjustments

NOTE: To assure proper functioning of the

1/16 fraction mechanism, close attention should be paid to the cipher stop and key-stem adjustments as outlined in Fig. II-4.

1. To safeguard against interference of the No. 9 and No. 14 keystems with the movement of the adding sectors -
Manually operate the machine with the No. 9 and then the No. 14 key depressed and check for collars BK to clear under the keystems with minimum clearance.
TO ADJUST, bend adding sector BJ or BL up or down at their offset.

2. To assure a legible print -
Blocks BC must be centrally aligned with lugs BD on the inactive type bar as printing is taking place.
TO ADJUST, bend the projections containing blocks BC up or down.

FRACTIONS 1/16, PLUS ONE CONSTRUCTION - CLASS 9 AND SERIES P 200 MACHINES

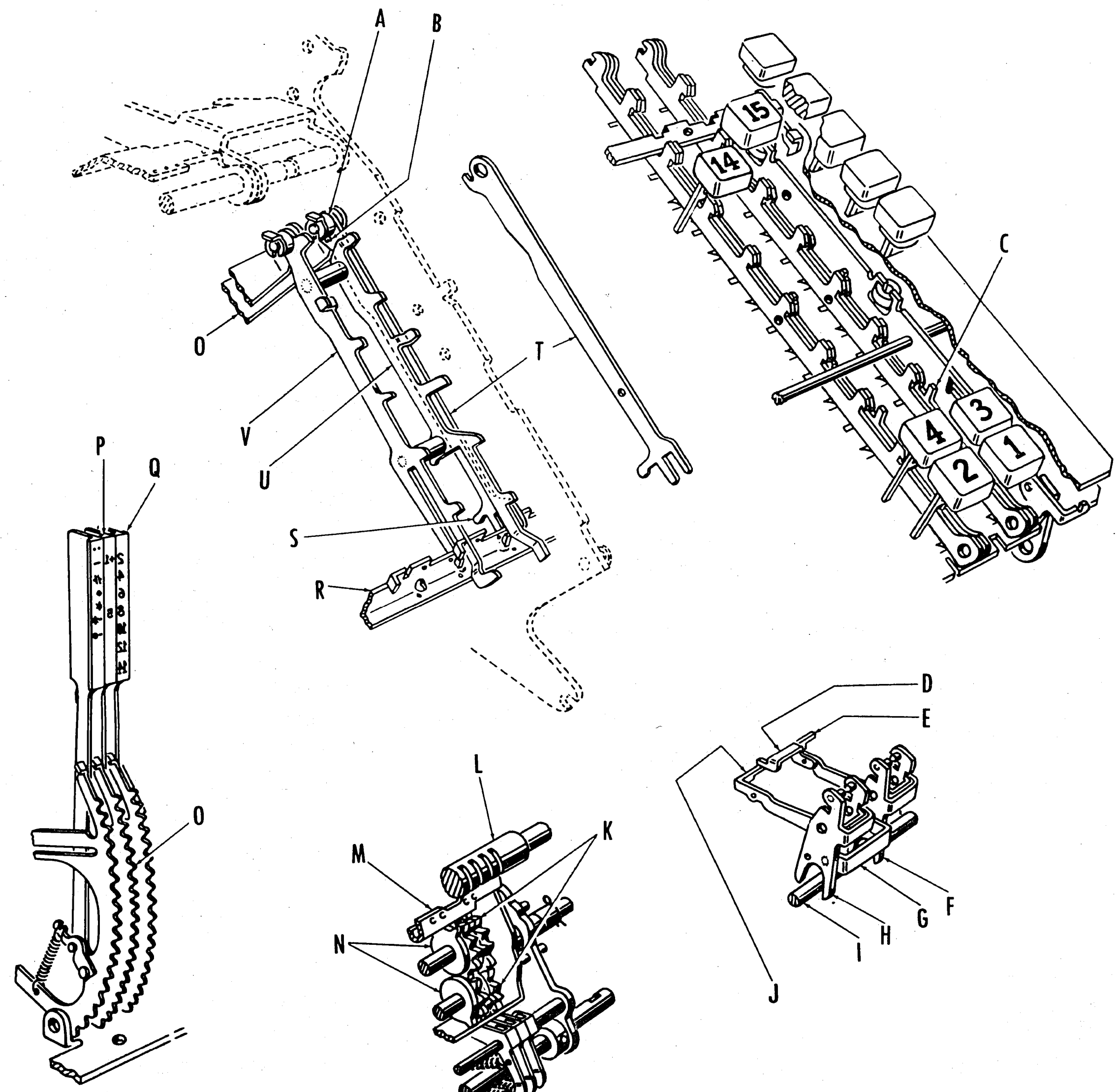


Fig. VIII-87

Due to the tumbling action of the two sets of adding pinions in Class 9 and Series P 200 machines with double wheel construction, standard 16 pitch adding pinions and adding sectors cannot be used. In place, the "plus one" construction, consisting of a 10 pitch adding pinion and adding sector in the first column and a 8 pitch adding pinion and adding sector in column two is used on these machines.

Projection S on index bar T limits the forward travel of the index bar on brace R. Type bar P cannot raise above +1 position.

Cipher stop E contains finger D which lowers cipher stop J (in column two) when a key (1 thru 15) is depressed in column one.

Bail M is provided with a lip to retain the position of the 1/8 adding pinion in column two during a tumbling operation.

The odd numbered keys in column one control the travel of index bar V through its bridged portion U.

Adding pinions K in column one being of ten pitch construction have five carry teeth to provide a means of tripping off an initial carry into column two each time two units are accumulated in the odd number column.

The even numbered keys in column two control the travel of index bar V.

Adding pinions N in column two being of eight pitch construction provide a means of tripping off an initial carry into column three when they are turned more than eight digits.

Depression of a key in column one (1 thru 15) cams control strip C rearward rocking cipher stops E and J downward. With cipher stop E down, index bar T moves forward during a machine operation, to limit on brace R and print the +1 character.

If for example the number 9 key is depressed, the bridged index bar U limits against the number 9 keystem and type bar Q prints "8". At the same time, column one positions and the entire printed amount is "8 + 1".

Depression of the number one key places the lowermost portion of the number one keystem into the path of the foremost portion of bridged index bar U preventing it from moving forward, resulting in a print of the +1 character only.

When two odd amounts are accumulated in column one, a carry is produced into column two which is eight pitch construction (1/8 = 2/16). For example, the odd five key is depressed and the machine operated. The print reads 4 + 1. Repeating this operation, column one carries into column two as 1/8 or 2/16 - thus 4 + 4 + 2 = 10.

When totaling an odd amount, type bar Q raises until limited by the even amount accumulated on pinions N and type bar P rises until it is limited by the odd amount accumulated on pinions K. For example, assume that 7 has been accumulated in the machine. A total operation would print 6 + 1*

Tests and Adjustments

1. To assure free movement of index bar T - There should be .005" clearance between set collar A and index bar T, and screw B should be positioned forward and downward.
TO ADJUST, loosen screw B and reposition set collar A.

2. To safeguard against a bind between aligning shaft L and adding sector O -
During the forward stroke of a machine operation with the number one key in column one depressed, index bar T should permit aligning shaft L to move into the tooth spaces of adding sector O with approximately 1/64" downward movement of sector O.
TO ADJUST, bend projection S.

3. To assure positive limiting of index bar U -
During the forward stroke of a machine operation with a key three through thirteen depressed, index bar U should have a full lateral hold on

the keystems in column one.
TO ADJUST, weave the adding sector in column two.

4. To safeguard against interference between finger D and index bar V -
Finger D should have safe clearance with the side of the foremost portion of index bar V when the machine is in home position.
TO ADJUST, bend the formed projection on the left side of finger D.
NOTE: When making this adjustment, support cipher stop E against bending.

5. To assure positive hold of finger D on cipher stop J -
Finger D should have safe hold on the foot of cipher stop J when a key in column one is depressed.
TO ADJUST, bend finger D forward or rearward.

6. To safeguard against interference between finger D and cipher stop J -
a. There should be light contact of cipher stop J against the underside of finger D. Added slight manual upward pressure applied to cipher stop J should not move finger D.
b. There should be immediate downward movement of cipher stop J as cipher stop E is lowered through depression of a key in column one.

TO ADJUST, bend finger D upward or downward.
NOTE: After making this adjustment, recheck test 2 and 3.

7. To assure flexibility of the keyboard -
Individually depressed keys in column one should release fully depressed keys in column two and vice versa.
TO ADJUST, weave strap G.
NOTE: After making this adjustment, the front legs of rocker arms F and H should limit against shaft I.

CASH DRAWERS

CASH DRAWER HOUSING AND TILL - STYLES 12, 13, 14, 15

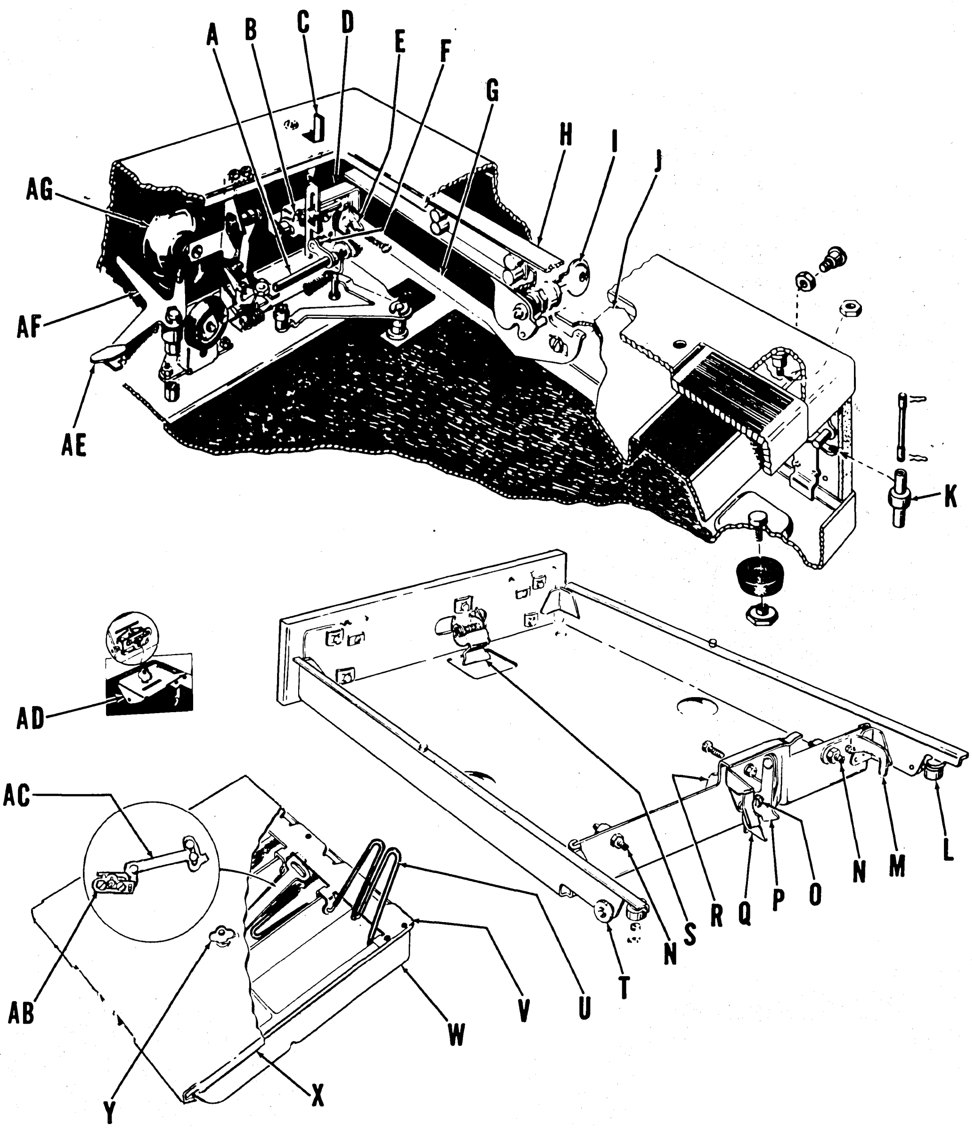


Fig. VIII-88

Normally a single cash drawer assembly is mounted under a machine and may be opened automatically through a machine operation or manually through the depression of a lever on the right side of the cash drawer housing. If more than one cash drawer is used, the drawers are stacked one on top of the other. When drawers are stacked, only the top drawer may be opened automatically. The remaining drawers are opened manually.

Deflector plate J prevents bills catching on the underside of the housing as the cash drawer opens.

Cash till W is retained in the cash drawer by latch S. Spring retainers U holds bills in their compartments.

Cover X is available to cover the entire cash till. It is locked in place by key Y, through lock AB and arm AC which positions under plate V. A coin compartment cover and lock AD is also available.

The cash drawer rolls on raceways H are mounted on the side of the cash drawer housing. Rollers K, L, and T guide and support the drawer, assuring smooth movement when opening and closing.

Removal of the cash drawer from its housing is possible after raising latch R.

Finger Q positions behind pass-by pawl AE as the drawer is closed and actuates arm AF to ring alarm bell AG each time the drawer is opened.

The cash drawer may be locked closed by turning key I clockwise. Turning key I clockwise, through slide G, bail D, and arm B swings the lower end of actuating slide C rearward to clear stud F.

MANUAL CASH DRAWER OPENING MECHANISM

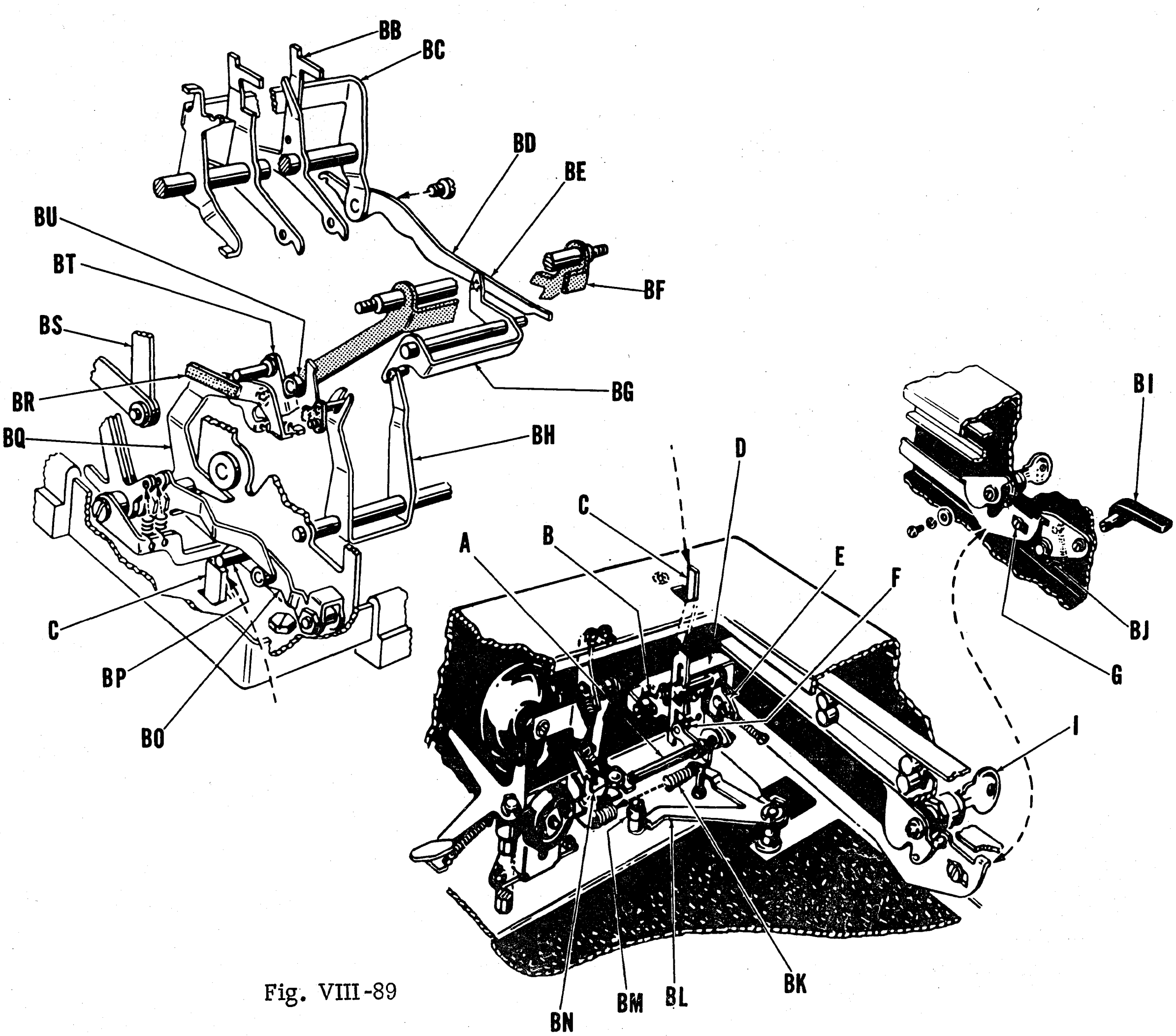


Fig. VIII-89

Depression of lever BI rocks roller BJ upward against the cam surface of slide G moving it rearward. Rearward movement of slide G rocks bail D and arm B lowers actuating slide C. Lowering of actuating slide C, through stud F, rocks shaft A.

Rocking shaft A disengages it from hook P, Fig. VIII-88 on the cash drawer, permitting the tension of spring BK, through bellcrank BL and roller BM to drive the cash drawer forward. Shaft A is retained in rotated position by latch BN until the drawer is closed. As the drawer is closed, hook P, Fig. VIII-88 passes over shaft A where finger Q, Fig. VIII-88 contacts latch BN and releases the shaft thus eliminating possible interference between the shaft and the hook.

Turning key I counterclockwise (on machines with automatic cash drawer opening controls) opens the drawer in the same manner as the depression of lever BI on manually opened drawers.

AUTOMATIC CASH DRAWER OPENING MECHANISM

Depression of specified control keys indexes automatic cash drawer opening.

Certain control keys completely index automatic cash drawer opening when depressed. This is accomplished by direct positioning of pawl BT into active position in the path of dashpot arm BS. During the forward stroke of the machine operation, dashpot arm BS moves rearward, rocking pawl BT and bellcrank BQ rearward. Rearward movement of bellcrank BQ lowers arm BO and stud BP lowers actuating slide C. Lowering actuating slide C causes its step to contact stud F rotating shaft A thereby releasing the cash drawer.

Partial indexing of an automatic cash drawer opening operation is accomplished through the depression of certain other specified control keys. Complete indexing is accomplished only when an amount is printed.

Depression of these control keys merely raises the rear portion of arm BD, through arm BR and bails BH and BG. With the rear portion of arm BD raised, it is in alignment with projection BE on back bail BF. Cocking of hammers BB moves bail BC forward which in turn drives arm BD rearward against projection BE. Back bail BF is thereby rocked which through roll BU positions pawl BT into active position in the path of dashpot arm BS.

INDEXING THE AUTOMATIC CASH DRAWER OPENING MECHANISM

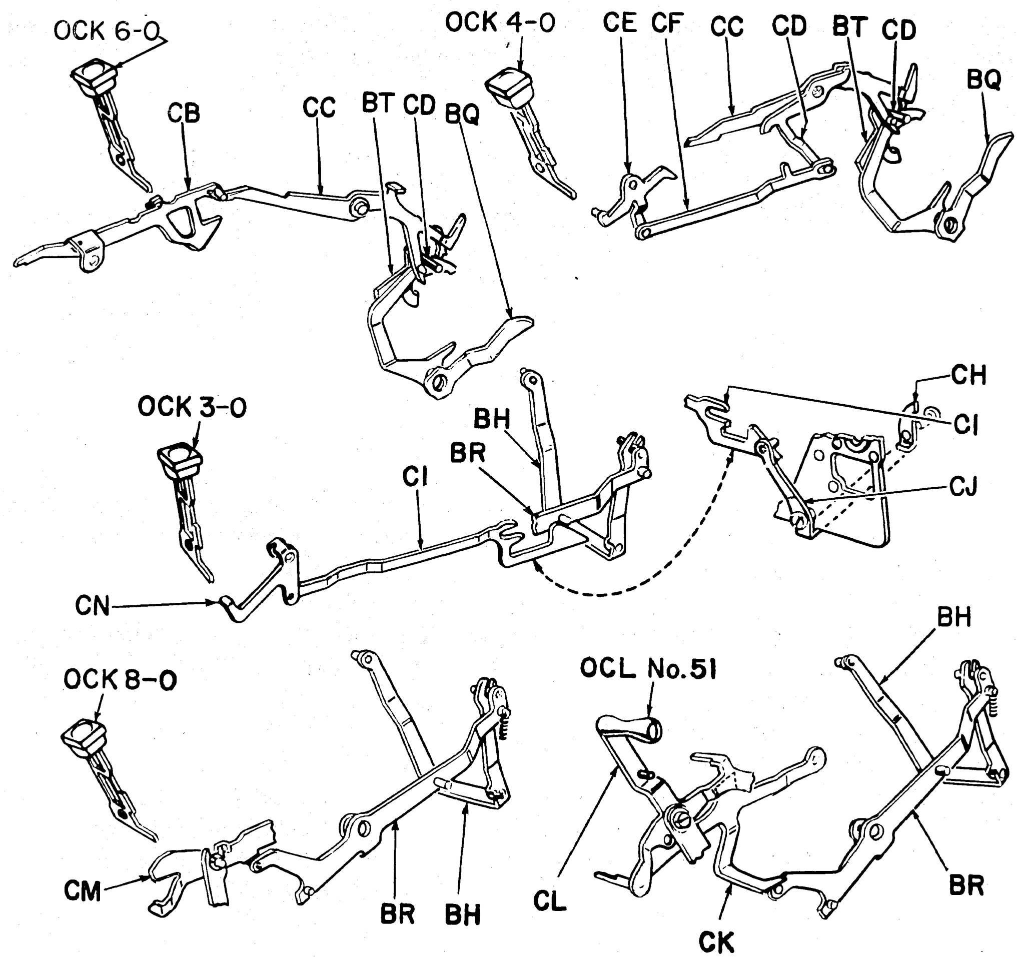


Fig. VIII-90

Depression of OCK 6-0, through non-add arm CB and arm CC; or depression of OCK 4-0, through bellcrank CE, link CF, and levers CG and CC, positions pawl BT through stud CD into active position (in the path of dashpot arm BS, Fig. VIII-89). With pawl BT so positioned, automatic cash drawer opening is indexed.

Depression of OCK 3-0, through bellcrank CN, link CI, arm BR, and bail BH; or depression of OCK 8-0 through arms CM and BR, and bail BH; or movement of OCL No. 51 through arms CK and BR, and bail BH positions arm BD, Fig. VIII-89 upward. With arm BD, Fig. VIII-89 so positioned, automatic cash drawer opening is partially indexed. Complete indexing takes place only if an amount is printed, as previously described.

Opening of the cash drawer is usually accompanied by 5/6" spacing which is also indexed through arm BR. Cash drawer opening from OCK 3-0 without 5/6" spacing is required on certain machine styles. Depression of OCK 3-0 on these machine styles moves slide CI rearward rocking bail CJ. Projection CH on bail CJ rocks bail BH which, through bail BG, Fig. VIII-89 raises the rear portion of arm BD, Fig. VIII-89, partially indexing a cash drawer opening operation.

Tests and Adjustments

1. To assure proper positioning of pawl BT, Fig. VIII-89 at normal and when indexed -
   a. With the machine in home position and no cash drawer opening operation indexed on the keyboard, check for no false limit of pawl BT, Fig. VIII-89 on the lowermost projection of arm CC, Fig. VIII-90 or on roll BU, Fig. VIII-89 and, for safe clearance of pawl BT, Fig. VIII-89 under dashpot arm BS, Fig. VIII-89 on the forward stroke of a machine operation.
   b. With a cash drawer opening operation indexed through an operation control key raising arm CC, Fig. VIII-90 or through arm BD, Fig. VIII-89 rocking bail BF, Fig. VIII-89, operate the machine on the forward stroke and check for pawl BT, Fig. VIII-89 to have a safe hold on dashpot arm BS, Fig. VIII-89.

   TO ADJUST, bend the lowermost projection of arm CC, Fig. VIII-90 or weave the bail portion of bail BF, Fig. VIII-89.

2. To assure correct positioning of arm BD, Fig. VIII-89 -
   Arm BD, Fig. VIII-89 should clear under projection BE, Fig. VIII-90 on a machine operation with cash drawer opening not indexed and should also have a safe hold on projection BE, Fig. VIII-89 when actuated with a cash drawer opening indexed.
   TO ADJUST, weave the bail portion of bail BG, Fig. VIII-89.

3. To assure latching the cash drawer closed - Close the cash drawer slowly and check the following:
   a. Finger Q, Fig. VIII-88 should release latch BN, Fig. VIII-89 immediately after hook P, Fig. VIII-88 clears over the left end of shaft A, Fig. VIII-88.
   b. Hook P, Fig. VIII-88 should have approximately 1/32" latching lead beyond shaft A, Fig. VIII-88 and when closed the front surface of the drawer should be flush with the front of the cash drawer housing.

   TO ADJUST:
   a. Bend finger Q, Fig. VIII-88.
   b. Loosen screw O, Fig. VIII-88 and reposition hook P, Fig. VIII-88.

4. To assure cash till W, Fig. VIII-88 is securely held in the cash drawer -
   Place the cash till in the cash drawer and check for no end play of till.
   TO ADJUST, turn screws N, Fig. VIII-88 in or out.

CASH DRAWER HOUSING AND TILL - STYLE 22

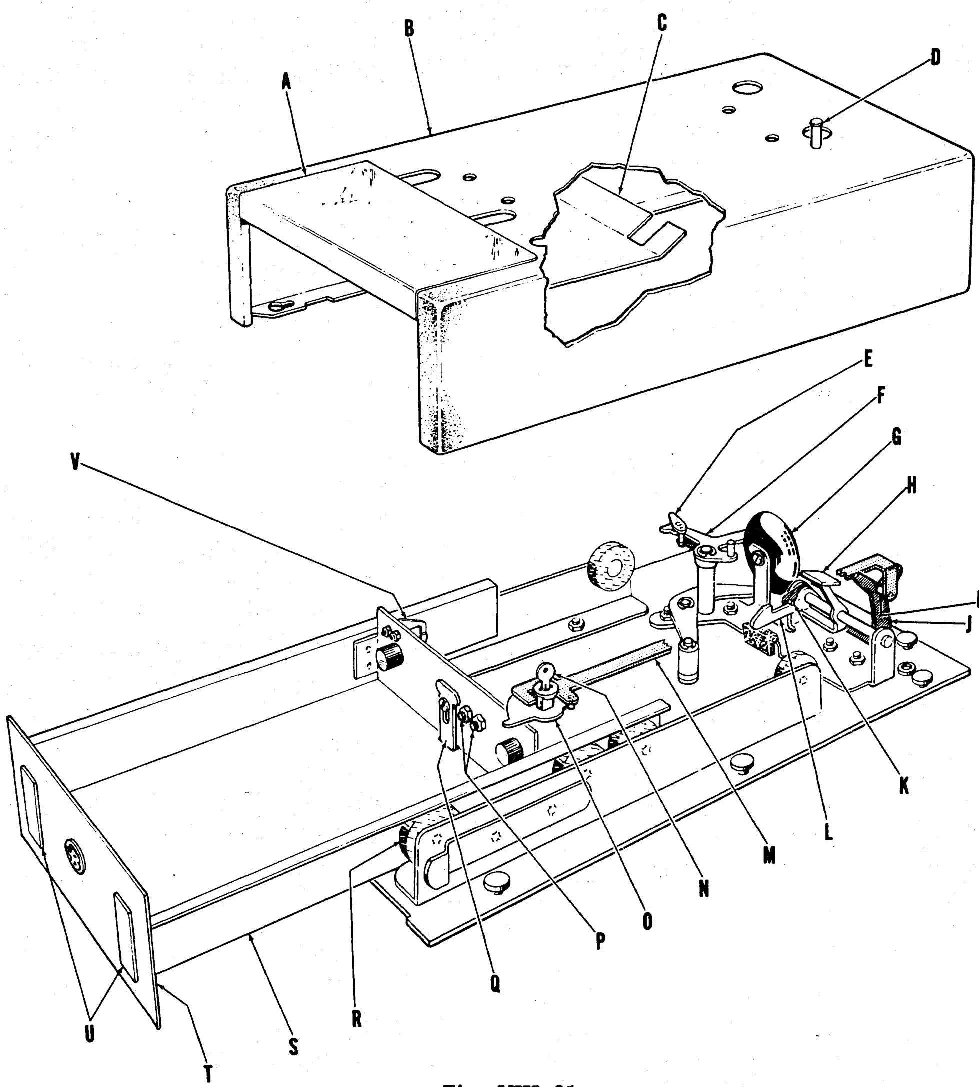


Fig. VIII-91

The style 22 cash drawer assembly is designed to permit the machine to be either permanently attached to the drawer housing or to just set on the housing.

The drawer may be manually opened by turning key N counter clockwise or automatically opened during a machine operation through the downward movement of plunger D.

Stacking of multiple Style 22 drawers is not permissible due to the location of lock and key N, i.e., no means is provided for the opening of the lower drawer.

Deflector plate C prevents bills from catching on the underside of housing B as the drawer opens.

Change plate A is formed to permit crimping it to housing B thus eliminating the need of retaining posts.

Face plate T is held in position by retaining plates U, two hexagon nuts and two speed nuts.

Cash drawer S rolls on eight nylon rollers R assuring smooth movement when opening and closing.

Removal of cash drawer S from its housing is possible after raising latch Q.

Finger V positions behind pass-by pawl E as the drawer is closed and actuates arm F to ring alarm bell G each time the drawer is opened.

The cash drawer may be locked closed by turning key N clockwise. Turning key N clockwise positions the hook portion of bail J up into engagement with a latching plate mounted on the rear of the drawer (by two screws P) through plate O, slide M, stud I and bail J.

The cash drawer may be manually opened by turning key N counter clockwise which lowers latch L out of engagement with the latching plate on the rear of the drawer through slide M, stud I, bail J, and stud K.

Automatic opening of the cash drawer from specific control keys takes place in the same manner as described under Fig. VIII-89 and VIII-90. As plunger D is depressed, its lowermost portion rocks formed lip H to lower latch L out of engagement with the latching plate on the rear of the drawer.

✓OPTICAL CHARACTER RECOGNITION (OCR)

OCR printing is a method of preparing media for automatic processing by computer systems, thus eliminating the need for keypunching or other data conversion procedures. Optical scanners measure the reflected light and so determine the characters printed on the tape in contrast to light and dark.

The IBM 1285 reads adding machine tapes printed by Burroughs Series P machines equipped with IBM type font type bars, qualified paper and a special inked ribbon. It is very important that all tapes submitted have clear and fully formed characters as well uniformed inking to be acceptable. for scanning.

READABLE CHARACTER FONTS IBM 1428

The IBM 1285 Optical Reader can accept input from Series P Machines equipped with IBM 1428 type font type bars, 10 columns only, narrow carriage, single ply roll paper, and OCR special inked ribbons as covered in the Burroughs Equipment Price Book Optional Features section.

Burroughs OCR special inked ribbons and single ply roll paper are listed in Business Machine Supplies Price List.

COMMAS AND DECIMALS

All decimal points and commas must be no larger than .030" in their printed horizontal dimension, and .034" in their vertical dimension. A space of .020" minimum must exist between every part of any two adjacent characters, decimals, or commas used with the IBM 1428 type font.

PAPER

Roll paper must meet the following requirements: (Burroughs single Ply Roll Paper meets all of these specifications.)

Basic Weight: 15 to 20 pound (weight of 500 sheets 17" x 22")

Thickness: .0025" to .0045".

Reflectance:

The paper must be white enough to reflect at least 55% as much light as would be reflected from a surface of magnesium oxide (commonly used as a standard of whitness).

Cleanliness:

A measure of paper quality is the mark count. A mark is a visible imperfection that cannot be contained in an area measuring 4 x 10^{-6} square inches. Paper used in the IBM 1285 must have a mark count of less that 150 marks per 1,000 square inches. No more than 50% of the marks may exceed .0001 square inch.

NOTE:
Excessively flourescent paper must not be used for the IBM 1285. These papers contain compounds that generate light when excited by light. This heightens apparent whiteness and contrast when printed. If the paper used is suspected of containing fluorescent compounds, refer to your branch office for assistance in making evaluation.

PRINT FORMAT

The scan technique in the IBM 1285 allows considerable flexibility of print format. However, certain limiting conditions must be met regarding the position of printed lines, spacing, and the use of special characters.

PRINTING POSITION

Distance from End of Tape:

There must be at least 12" of unprinted tape at either end of the roll.

Distance from Edge or Tape:

No part of a character may be within .1" of either edge of the tape. The entire low-order character in a line to be read must be within .4" of the right edge of the tape. If a line is not to be read, the low-order character must be at least .6" from the edge.

CHARACTER SPACING

There must be at least .020" between every part of two adjacent characters. There must not be more than ten characters per inch in a printed line.

LINE SPACING

Printed lines must be separated by a continuous, clear band at least .050" high. There is no maximum limit to the space that can be left between lines.

BLANKED FIELDS

A single vertical strip can be blanked out of the scan area by using two format-blank knobs on the display panel. The strip can be anywhere on the tape. A blank space of at least .200" must separate characters that are to be read from those within the blanked vertical strip.

SPLICES

The IBM 1285 can read paper rolls up to 200 feet long. Those rolls that require header information are not spliced to the end of another tape because header information can be keyed in only when a tape is initially loaded.

Splices must meet the following specifications:

1. All edges (cut tape and splicing tape) must be perpendicular within $\pm$ 2 degrees to the edge of the tape.
2. The splice must be able to withstand a seven-pound tensile force.
3. Only pressure-sensitive transparent tape may be used.
4. The splicing tape may not extend beyond the tape edge but must extend to within 1/4" or less of the tape edge.
5. The total thickness of the splice, including papers and tape, may not exceed .015".
6. The tapes spliced must have the same width and must be aligned within .032" in 12".
7. The splicing tape must be applied only to the bottom (unprinted) side of the tape.
8. Butt splices: The maximum gap between the ends of the tapes is .015".
9. Overlapping splices:
   a. The tape may not overlap more than 1/8".
   b. The leading tape must lap on top of the trailing tape when passing through the transport.
   c. The ends of the tape may not be folded or creased.
10. No part of a printed character can occur within .25" of any part of a splice, including the splicing tape.

TEARS

1. A tear on either edge may not be longer

than 1/4 inch.

2. It must not result in document material being folded in so as to cover readable printing.
3. There must be at least 18 inches between tears.
4. No tears may exist in the printed line.
5. Except for a folded tear (as noted previously) the document must contain no areas of missing material.

OTHER DOCUMENT REQUIREMENTS

1. Surface mutilations due to foreign material such as staples, paper clips, adhesive tapes, etc. are not acceptable.
2. Materials which tend to change the reflectance characteristics of the base paper such as gum, wax, grease, glue, spilled liquids, or dirt are not acceptable.
3. Documents which have been folded, creased, or warped are acceptable only after they have been reconditioned to meet the following requirement: All portions of the document must lie between two parallel planes separated by a maximum distance of 1/8 inch under the weight of a flat, 80-column tabulating card.
4. Creases, wrinkles, and folds may not occur within two inches of the leading end of the document (that end which is fed into the IBM 1285 first).

PRINT QUALITY

The quality of printing produced by Series P machines that prepare rolls for the IBM 1285 depends on:

1. The adjustment and maintenance condition of the Series P machine.
2. The condition of the ribbon.
3. The paper used.

CHARACTER-STROKE WIDTH

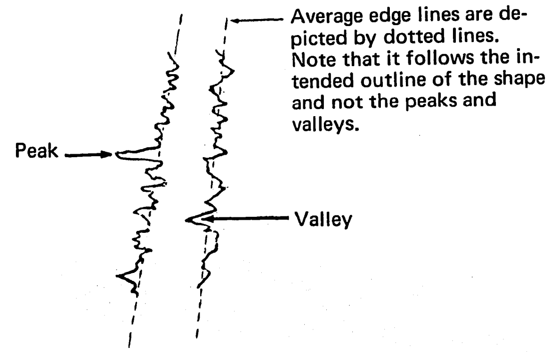


Fig. VIII-92

When viewed through a magnifier, the character stroke of ribbon printing appears ragged and lacks sharpness of edge definition. The stroke-width requirements outlined in this section are given as the distance between average edges of character strokes. The average edge of a character stroke is defined as an imaginary line drawn through the peaks and valleys of the printed edge. This is illustrated in Figure VIII-92. This average-edge line averages out the peaks and valleys (within certain limitations given in this section) to show the intended shape of the character. In fact, although imaginary, this average-edge line is closely analogous to the line actually read by the IBM 1285, in that it does actually sense and ignore extraneous bulges and voids on the edge of a character (again, within the limitations given in this section). The direction of the line at a given point is determined by the average peaks and valleys along a .025" increment of the character stroke. If the width of a line is relatively uniform, then the average edges representing each side of the line are parallel. If the line appears tapered, then the average-edge lines are tapered and not parallel.

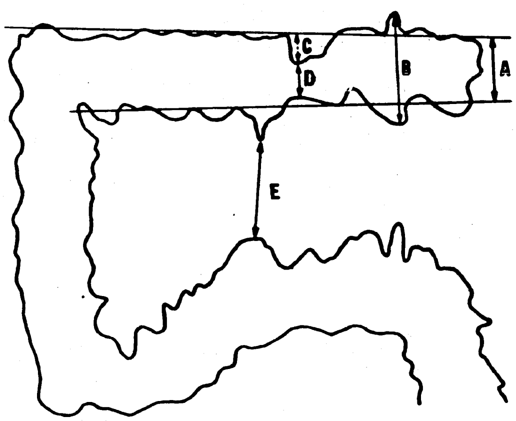


Fig. VIII-93

Based on this definition, the minimum and maximum dimensions in Figure VIII-93 are:

A Average stroke width: .008" - .020".

B Maximum height of peaks in excess of average width: .008".

C Minimum depth of valleys less than average width: .008". This applies to two valleys directly opposite each other on the two edges of a stroke. D is an exception to this allowance.

D Minimum actual width of a stroke at a point: .006".

E Minimum distance between actual edges of different strokes: .007". A character that does not meet requirement "E" is not acceptable even if the character is acceptable under requirements A, B, C, and D.

REFLECTANCE

The light reflected from the inked area that forms the printed character must be less than 50% as much as that reflected from the surrounding background paper. This reflectance must not vary more than 20% in .025" increments of stroke length. These percentages are given as those allowable when measured by using the IBM 1285 reading system.

VOIDS AND BREAKTHROUGHS

An area within the intended character stroke which does not meet the reflectance requirement is permissible if not too large. A void is an island of insufficiently inked paper within the area of the character stroke. A breakthrough is a discontinuity in the intended line. Voids are measured by their largest dimension. The size of a breakthrough is defined as the average of:

1. The closest the broken line comes to meeting measured parallel to the direction of the line, and
2. The distance between the closest points on each side of the final breakthrough at which the inked area crosses either average edge, also measured parallel to the direction of the line.

The maximum permissible size of a void or breakthrough is .006". Not more than one void or breakthrough larger than .003" may occur in any .090" of stroke length.

OPTICAL NOISE

Ink splatters, erasures, paper imperfections, and any other source of a change in reflectance other than the printed character are treated alike. This optical noise may not cause the reflectance of any .030" by .035" area to vary more than 15% from the average reflectance of the paper.

PRINT REGISTRATION

The reading band for every printed line is defined as an area of the document whose height is .122" for the IBM 1428 type font. The reading-band width is equal to the width of the document. All characters in the line must be entirely within this band. Character skew (the angle between the vertical center line of a character and the right edge of the paper) must not exceed three degrees.

SERIES P

FULL KEYBOARD

ADDING and BOOKKEEPING
MACHINES

SECTION

IX

Burroughs

FIELD ENGINEERING

TECHNICAL MANUAL

SERVICING
PROCEDURES

Printed in U.S.America 10-20-65

For Form 3784

INDEX

PREVENTIVE MAINTENANCE GUIDE

CLASSES 8, 9, 10, SERIES P 100 THRU P 400 AND SERIES P 1200 THRU P 2200

Each Preventive Maintenance Inspection is to be directed toward the cleaning, correct lubrication and adjustment of the machine. Throughout the inspection, particular attention should be given to the condition and operation of parts and mechanisms. Parts showing evidence of pending mechanical failure should be replaced.

It is also important that "Reliability Improvement Notice" parts be installed at the time of the "Preventive Maintenance Inspection" when use of such parts will improve performance, minimize customer interruptions and reduce service time.

APPROVED LUBRICANTS AND CLEANING AGENTS

1. Machine Oil 1624 9245 - to be used to fill dashpots and oil all shaft bearings, pivot points, rollers, oil holes and metal to metal contact of moving parts.
2. Machine Grease 1624 9427 - to be used on all cams, forked arms and slots where contact is made with studs and heavy working parts.
3. Drive Oil 1624 9401 - to be used in enclosed drive clutch and gear cases.
4. Case Cleanser and Polish 1624 9146 - (soap and water if real dirty) to be used for cleaning cases and bases.
5. Platen Restorer S3 - to be used to clean the platen, pressure rolls and twirlers.

MAINTENANCE

1. Inquire of the operator whether the machine has been performing satisfactorily and if any peculiarities of operation that may require correction have been observed.
2. Perform operating tests on the machine, following the suggestions given in "Operating Tests", Section IX, Page 7, Series P Instruction Book.
3. Check the machine speed.
4. Check the outside surface of the machine for loose fittings, defective or missing parts and oil leaks around the rubber feet.
5. Inspect the carriage.
   a. Check the condition of platen, pressure rolls, twirler, paper guides and springs.
   b. Clean platen and pressure rolls with platen restorer S3.
   c. Clean all carriage parts, apply oil 1624 9245 to bearings for platen shaft and pressure rolls.
   d. Test the paper feed tension of the platen and pressure rolls by manually holding the paper in the opposite direction to the paper feed during paper spacing.
   e. Check the ribbon feed and reverse, apply a light amount of grease 1624 9427 in the two pockets of the detent portion of the ribbon feed arms also on the two posts on which the ratchet gears pivot.
6. Remove the roll paper, case, carriage and machine base.
7. Inspect the Keyboard Mechanism.
   a. Clean between the keys with a keyboard brush or cleaning cloth.
   b. Check all keystems for free action and interlocks for proper function and good condition.
   c. Lubricate the keyboard, apply oil 1624 9245 being sure to remove all excess oil.
8. Inspect the Printing Mechanism.
   a. Clean the type bars by raising all the type to "nine" position and brush the type faces with a wire brush. Then raise each type bar individually to "Nine" position and wipe both sides of the type bar with a cleaning cloth.
   b. Check the type bars for freedom of movement, up and down, as well as forward and back.
   c. Check the peculiarities in the printing mechanism that were observed when performing the machine operating tests.

d. Lubricate the printing mechanism, apply oil 1624 9245.
e. Check the condition of the ribbon with the operator and recommend a new one if any question as to its condition.

9. Inspect the Power Section
a. Lubricate all cams and rollers on the primary and secondary sections; apply grease 1624 9427.
b. Check the dashpot for proper oil level, fill if required, use oil 1624 9245.

NOTE: The following steps apply to electric machines:

c. Check condition of wires and connections.
d. Check governor weights and pin for being free, lubricate with oil 1624 9245.
e. Check the governor switch points for condition.
f. Check brushes for free movement in brush holder and clean if necessary. Replace brushes if worn.
g. Remove all carbon dust.
h. Add oil to the drive if necessary to bring oil level up to within 1/8" of filler opening; use drive oil 1624 9401.
i. If machine speed is questionable, check for correct crank speed of 144 to 147 strokes per minute as outlined in test and adjustment 6C, Page 38, section II, Series P Instruction Book.

10. Inspect the Accumulating Mechanism
a. Check any peculiarities of the accumulating mechanism that were observed when performing the machine operating tests.
b. Check the adding pinions for freedom of movement.
c. Check the accumulator meshing controls for proper functioning.
d. Check the carry pawls, carry pawl latches, carry racks and carry rack latches for being free.
e. Lubricate the accumulator; use oil 1624 9245.

11. Inspect the Right Side Frame Section
a. Check for loose screws, nuts and damaged springs.
b. Check for all parts assembled on the outside and inside of the frame for general condition, free action, alignment, latching lead and adjustments.
c. Apply oil 1624 9245 to all pivot and bearing points.

12. Inspect the Left Side Frame Section
a. Follow the same procedure as outlined in step 11 above.

13. Test machine functions to be sure that any peculiarities pointed out by the operator or observed while performing inspection have been corrected.
14. Reinstall the machine base, case and carriage.
15. Clean all keytops and motor bars.
16. Ask the operator to test the machine while you are engaged in making out your report.

PREVENTIVE MAINTENANCE GUIDE

SERIES P 600 MACHINES

Each Preventive Maintenance Inspection is to be directed toward the cleaning, correct lubrication and adjustments of the machine. Throughout the inspection; particular attention should be given to the condition and operation of parts and mechanisms. Parts showing evidence of pending mechanical failure should be replaced.

It is also important that "Reliability Improvement Notice" parts be installed at the time of the "Preventive Maintenance Inspection" when use of such parts will improve performance, minimize customer interruptions and reduce service time.

APPROVED LUBRICANTS AND CLEANING AGENTS

1. Machine Oil 1624 9245 - to be used to fill dashpots and oil all shaft bearings, pivot points, rollers, oil holes and metal to metal contact of moving parts.
2. Machine Grease 1624 9427 - to be used on all cams, forked arms and slots where contact is made with studs and heavy parts.
3. Drive Oil 1624 9401 - to be used in enclosed drive clutch and gear cases.
4. Case Cleaner and Polish 1624 9146 - (soap and water if real dirty) to be used for cleaning cases and bases.

5. Platen Restorer S3 - to be used to clean the platen, pressure rolls, and twirlers.

MAINTENANCE

1. Inquire of the operator whether the machine has been performing satisfactorily and if any peculiarities of operation that may require correction have been observed.
2. Perform operating tests on the machine; following the suggestions given in "Operating Tests", Section IX, Page 7, Series P Instruction Book.
3. Check the machine speed.
4. Check the outside surface of the machine for loose fittings, defective or missing parts and oil leaks around the rubber feet.
5. Inspect the Carriage
   a. Remove the machine case and base.
   b. Check the condition of platen, pressure rolls, twirler, paper guides and springs.
   c. Clean platen and pressure rolls with platen restorer S3.
   d. Test the pressure rolls for free rotation and adequate lubrication.
   e. Check the carriage raceways for condition and for being properly adjusted as outlined in Fig. VII-4, Page 8, Section VII, Series P Instruction Book.
   f. Lubricate carriage raceways - use machine grease 1624 9427.
   g. Remove the right and left carriage end covers and check parts for general condition and proper lubrications, apply oil 1624 9245 to all pivot and bearing points.
   h. Check the automatic carriage opening mechanism for proper function.
   i. Check for proper paper feed. Replace carriage end covers.
   j. Check the ribbon feed and reverse mechanism for proper function.
6. Inspect the Keyboard Mechanism
   a. Clean between the keys with a keyboard brush or cleaning cloth.
   b. Check all keystems for free action and interlocks for proper function and good condition.
   c. Lubricate the keyboard; apply oil 1624 9245 being sure to remove all excess oil.
7. Inspect the Printing Mechanism
   a. Clean the type bars by raising all type to "nine" position and brush the faces with a wire brush. Then raise each type bar individually to "nine" position and wipe both sides with a dry cloth.
   b. Check the type bars for freedom of movement, up and down as well as forward and rearward.
   c. Check any peculiarities in the printing mechanism that were observed when performing the machine operating tests.
   d. Check the four position printing control mechanism.
   e. Lubricate the printing mechanism; apply oil 1624 9245.
   f. For machines constructed with red ribbon mechanism as described in Fig. VI-17, Page 14, Section VI, Series P Instruction Book; apply grease 1624 9427 to the forked portion of friction plate C.
   g. Check the condition of the ribbon with the operator and recommend a new one if there is any question as to its condition.
8. Inspect the Power Section
   a. Lubricate all cams and rollers on the primary and secondary sections; apply grease 1624 9427.
   b. Check the dashpot for proper oil level; fill if required. Use oil 1624 9245.
   c. Check condition of wires and connections.
   d. Check governor weights and pin for being free; lubricate with oil 1624 9245.
   e. Check the governor points for condition.
   f. Check brushes for free movement in brush holder and clean if necessary. Replace brushes if worn.
   g. Remove all carbon dust.
   h. Add oil to the drive if necessary to bring oil level up to within 1/8" of filler opening; use drive oil 1624 9401.
   i. If machine speed is questionable; check for correct crank speed of 144 to 147 strokes per minute as outlined in test and adjustment 6C, Page 38, Section II, Series P Instruction Book.
9. Inspect the M. R. C. Unit
   a. Examine drive belts for condition. Replace belts if any slight degree of wear or damage is found.

b. Check the mesh and alignment of the rack gear and rack bar as outlined in test No. 1, Fig. VII-23, Page 22, Section VII, Series P Instruction Book.
c. Apply oil 1624 9245 to all pivot and bearing points and grease 1624 9427 to all gears.

10. Inspect the Accumulating Mechanism
a. Check any peculiarities of the accumulating mechanism that were observed when performing the machine operating tests.
b. Check the adding pinions for freedom of movement.
c. Check the accumulator meshing controls for proper functioning. Minimum play in both positions.
d. Check the automatic totaling mechanism in those machines containing this feature.
e. Lubricate the accumulating mechanism; use of oil 1624 9245.

11. Inspect the Right Side Frame Section
a. Check for loose screws, nuts and damaged springs.
b. Check all parts for wear and freedom of movement.
c. Check all controls and interlocks to function properly.
d. Lubricate all moving and pivot points; use oil 1624 9245.

12. Inspect the Left Side Frame Section
a. Follow the same procedure as outlined in step 11 above.

13. Test machine functions to be sure that any peculiarities pointed out by the operator or observed while performing inspection have been corrected.
14. Reinstall the machine base and case.
15. Clean all keytops and motor bars.
16. Ask the operator to test the machine while you are engaged in making out your report.

OPERATING TESTS SERIES P

SERIES P MACHINES EXCEPT SERIES P 400 AND P 600

1. Make a test run of the complete keyboard and all symbols. This test provides a means of checking for wrong accumulation, type alignment, printing impression, damaged or worn type and listing and totaling capacity.

```
             .00 *
 99,999,999.99
 88,888,888.88
 77,777,777.77
 66,666,666.66
 55,555,555.55
 44,444,444.44
 33,333,333.33
 22,222,222.22
 11,111,111.11
 99,999,999.95 ●
            .05
            .00 *
            .00 #
            .01 -
            .01 -●
            .01 -*
            .00 -*
 11,111,111.11
 20,202,020.20 -
  9,090,909.09 -*
            .00 -*
```

2. Check for shadow printing by performing the following test:

```
            .00 -*
            .00 -*
 99,000,000.00
 99,000,000.00
  9,900,000.00
  9,900,000.00
    990,000.00
    990,000.00
     99,000.00
     99,000.00
      9,900.00
      9,900.00
        990.00
        990.00
         99.00
         99.00
          9.90
          9.90
           .99
           .99
           .09
           .09
 19,999,999.96 ●
 19,999,999.96 *
            00 *
```

3. A repeat test is made by making the following test run:
   a. With the repeat key held depressed; repeat the figure "1" four times in each column.
   b. List "1" in all columns of the machine - and with the repeat key held depressed; repeat four times. Then repeat all other figures on the keyboard four times in the same way.
   c. Depress the total key. The total should be 44,444,444.24 on ten column machines.
4. Check the depression of the total key after slowly releasing the non add key.
5. Check the platen for correct spacing.
   a. Make sure the platen may be turned backwards except on the machines equipped with the non turn back platen feature.
   b. Check the pressure roll release lever for releasing the roll paper.
6. 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 999,999.99*. Ten column machines without the minus balance feature, subtract .01 and total 99,999,999.99*.
   b. Perform the following test to check the automatic one:

```
.00 -*     .00 *
.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, continue this procedure across the keyboard:

```
  .00 -*      .00 ●
  .00 -●      .00 *
  .00 -*
  .09 -       .09
  .10         .10 -
  .01 ●       .01 -●
  .01 *       .01 -*
  .99 -       .00 -*
 1.00         .99
  .01 ●      1.00 -
  .01 *       .01 -●
  .00 *       .01 -*
 9.99 -       .00 -*
10.00        9.99
  .01 ●     10.00 -
  .01 *       .01 -●
  .00 *       .01 -*
              .00 -*
```

   d. Perform each of the following tests three times to receive a carry and 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 *
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 -*
```

SERIES P 400 AND P 600 MACHINES

1. Make a test run of the complete keyboard and all symbols. On Series P 600 machines, print columns 10, 11, 12, and 13 when the carriage is located in the stop position that permits printing the date and character columns. This test checks for wrong accumulation, type alignment, printing impression, damaged or worn type and listing and totaling capacities.

			.00●	A
			.00*	A
			.00●	B
			.00*	B
DEC	99	BAL	9,999,999.99	
NOV	88	CR	8,888,888.88	
OCT	77	J/E	7,777,777.77	
SEP	66	C/M	6,666,666.66	
AUG	66	C/M	5,555,555.55	
JUL	55	CSH	4,444,444.44	
JUN	55	CSH	3,333,333.33	
MAY	44	FRT	2,222,222.22	
APR	33	EXP	1,111,111.11	
MAR	22	DIS	9,999,999.95●	A
FEB	22	DIS	9,999,999.95●	B
JAN	11	C/D	.05#	
			.05	
			.00*	A
			.00*	B
			.01-	
			.01 CR	A
			.01 CR	A
			.01 CR	B
			.01 CR	B

2. Check the functioning of the repeat key by making the following test run:
   a. With the repeat key held depressed, repeat the figure "1" four times in each column.
   b. Index "1" in all columns of the machine. With the repeat key held depressed, repeat four times. Repeat all other rows of keys on the keyboard four times in the same manner.
   c. Depress the total key. The total should be 4,444,444.24.
3. Check repeating of subtract items.
   a. Depress the repeat key and minus bar simultaneously when amount keys are indexed on the keyboard. Release the minus bar after the first operation.
4. Check the machine to "handle break".
   a. The machine should "Handle break" when amount keys and total keys are depressed together and when total keys are held depressed.
   b. When the register selector normalizing key in position 7-0 is released, the register selector lever should not change position during a "handle break".

5. Check the correct functioning of the register selector lever when the key in position 7-0 is released by performing the following test four times.

.00*	A
.00*	B
.01-	A
.01	B
.01CR	A
.01●	B
.01CR	A
.01●	B
.01CR	A
.01●	B
.01CR	A
.01●	B
.01CR	A
.01*	B

6. Check for shadow print by performing the following test:

```
          .00*   A
          .00*   B
9,900,000.00
9,900,000.00
  990,000.00
  990,000.00
   99,000.00
   99,000.00
    9,900.00
    9,900.00
      990.00
      990.00
       99.00
       99.00
        9.90
        9.90
         .99
         .99
         .09
         .09
1,999,999.96*    A
1,999,999.96*    B
```

7. Check the automatic one by performing the following test:

```
.00*   A
.00*   B
.01-
.02
.02-
.02
.02-
.02
.02-
.02
.02-
.02
.02-
.01 CR A
.01 CR A
.00 CR A
.01 CR B
.01 CR B
.00 CR B
```

```
.00*   A
.00*   B
.01
.02-
.02
.02-
.02
.02-
.02
.02-
.02
.02-
.02
.01●   A
.01*   A
.00*   A
.01●   B
.01*   B
.00*   B
```

8. Check for releasing an unwanted carry by performing the following test. Cause the machine to "handle break" four times (using the total key and amount key) after listing each subtract item.

```
          .00*      A
          .00*      B
1,111,111.11
          .02-
          .10-
         1.00-
        10.00-
       100.00-
     1,000.00-
    10,000.00-
   100,000.00-
 1,000,000.00-
          .01  CR   A
          .01  CR   A
          .01  CR   B
          .01  CR   B
          .00  CR   A
          .00  CR   B
          .01
          .01●      A
          .01●      B
          .01*      A
          .01*      B
          .00*      A
          .00*      B
```

9. Check for receiving a carry and actuating the automatic one from each column by performing the following tests:

.00*		A
.00*		B
.09		A
.10-		A
.01	CR	A
.00	CR	A
.90		A
1.00-		A
.10	CR	A
.00	CR	A
9.00		A
10.00-		A
1.00	CR	A
.00	CR	A
90.00		A
100.00-		A
10.00	CR	A
.00	CR	A
900.00		A
1,000.00-		A
100.00	CR	A
.00	CR	A
9,000.00		A
10,000.00-		A
1,000.00	CR	A
.00	CR	A
90,000.00		A
100,000.00-		A
10,000.00	CR	A
.00	CR	A
900,000.00		A
1,000,000.00-		A
100,000.00	CR	A
.00	CR	A
.01		A
.01*		A
.00*		A

10. For Series P 600 machines, operate the machine according to the various applications for which it is used and check the following carriage controlled functions to be correct:

a. Stop positions
b. Machine operations
c. Printing control selections.
d. Tabulation and carriage return.

REMOVAL AND REPLACEMENT PROCEDURES

CASE - SERIES P 100, P 200, P 300, P 2200 MACHINES

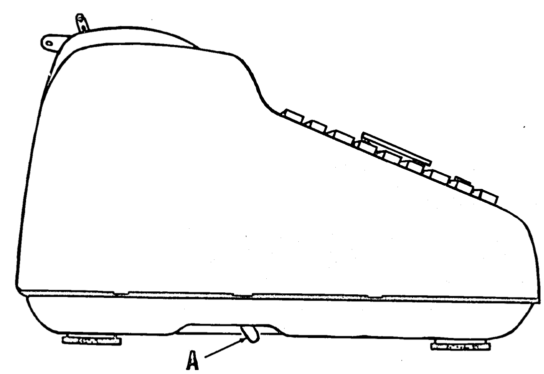


Fig. IX-1

A. Removal
1. Roll paper
2. Push the latching arms A rearward (which extend through the base on both sides near the center of the machine) to unlatch the case.
3. Raise the front of case to approximately a 045° angle, then with a rearward and upward movement, remove the case.

B. Replacement
1. Install all parts removed by reversing the above procedure.

CASE - SERIES P 1200, P 1300, P 1400 MACHINES

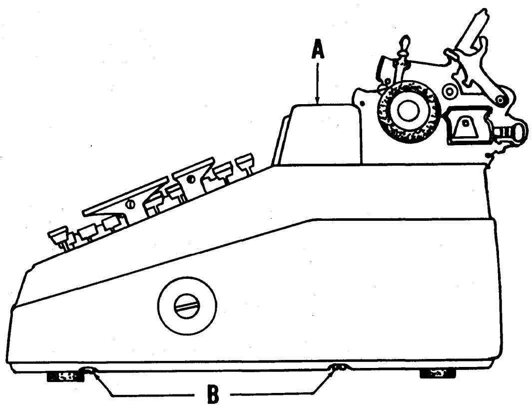


Fig. IX-2

A. Removal
1. Roll paper
2. Ribbon cover A by pulling same straight upward.
3. Carriage
4. Hammerhead cover.
5. Four self tapping screws B (two on each side of machine)
6. Lift case straight upward.

B. Replacement
1. Install all parts removed by reversing the above procedure.

BASE - SERIES P 100, P 200, P 300 MACHINES

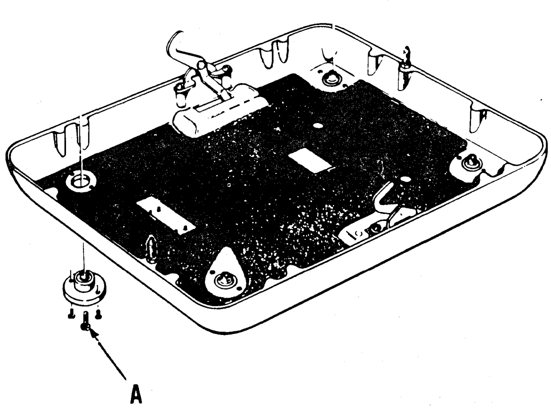


Fig. IX-3

A. Removal
1. Case
2. Invert the machine and remove four screws A from center of the four shock mount feet. Lift the base from machine.

B. Replacement
1. Install all parts removed by reversing the above procedure.

BASE - SERIES P 2200 MACHINES

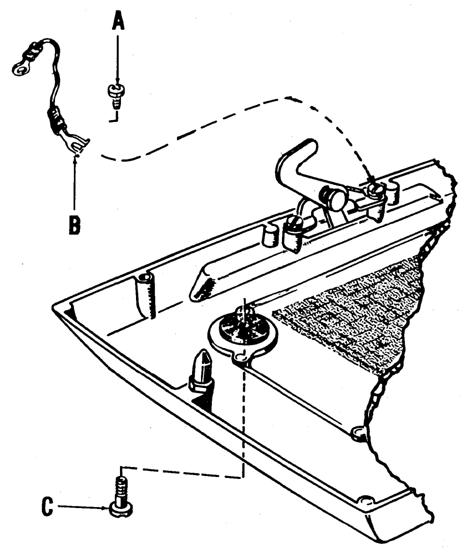


Fig. IX-4

A. Removal
1. Case
2. Disconnect wire B by loosening screw A.
3. Invert the machine and remove four screws C from center of the four shock mount feet, lift the base from machine.

B. Replacement
1. Install all parts removed by reversing the above procedure.

BASE - SERIES P 1200, P 1300, P 1400 MACHINES

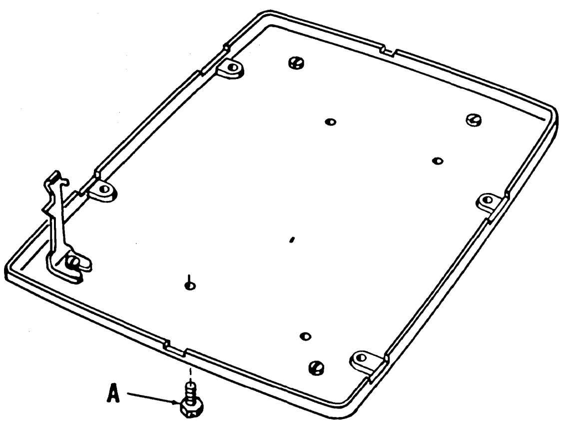


Fig. IX-5

A. Removal
1. Case
2. Invert the machine and remove four screws A, lift the base from the machine.

B. Replacement
1. Install all parts removed by reversing the above procedure.

CASE - SERIES P 600 MACHINES

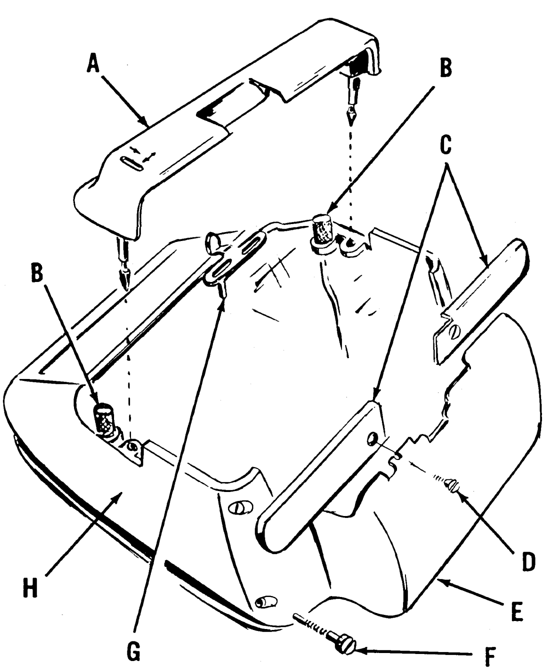


Fig. IX-6

A. Removal
1. Remove ribbon cover A by lifting it upward.
2. Remove lever G.
3. Remove four screws F and rear case section E.
4. Remove two screws D and tabulating spring covers C.
5. Remove two knurled nuts B.
6. Raise the forward end of front case section H and slide the front case section from under the carriage.

B. Replacement
1. Replace all parts removed by reversing the above procedure.

BASE - SERIES P 400, P 600 MACHINES

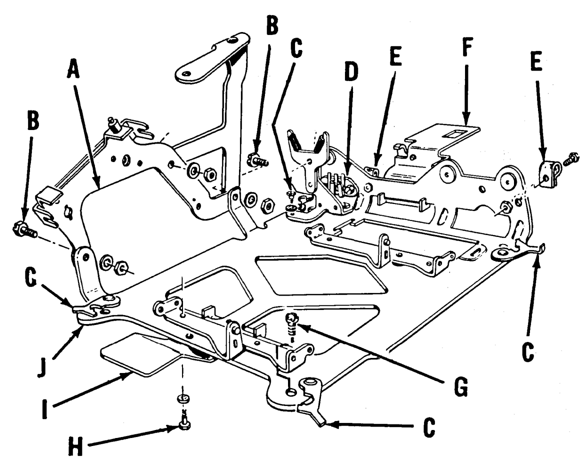


Fig. IX-7

A. Removal
1. Remove the case.
2. Loosen four screws G.
3. Swing the four retaining hooks C from under the head of the four screws G.
4. Grasp the machine by the lifting plates F and I and lift the machine from the base.

B. Replacement
1. Replace all parts removed by reversing the above procedure.

SUB-BASE - SERIES P 400, P 600 MACHINES

A. Removal
1. Remove the case
2. Remove the base
3. Disconnect the three wires from the line cord receptacle D, Fig. IX-7.
4. Break the connection in the wire leading from the handle switch to the motor and remove the two handle switch wires from brackets E, Fig. IX-7.
5. Remove two screws B, Fig. IX-7 and bracket A, Fig. IX-7.
6. Turn the machine over and remove four screws G, Fig. IX-7 and sub-base J. Fig. IX-7.

B. Replacement
1. Replace all parts removed by reversing the above procedure.

NOTE: Turn the machine right side up before tightening the two screws B, Fig. IX-6.

CARRIAGE 3 7/8" STYLE NA-2

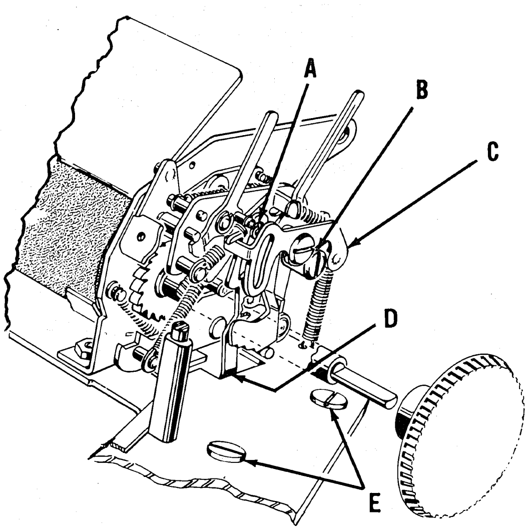


Fig. IX-8

A. Removal
1. Remove the machine case
2. Remove screw B and part C
3. Remove clip A and release link D
4. Remove three screws E securing the carriage bottom plate to the hammerhead.
5. Remove the carriage by lifting straight upward.

B. Replacement
1. Replace all parts removed by reversing the above procedure.

C. Check for correct carriage spacing as outlined in tests No. 6 thru 9, page 7, Section II.

CARRIAGE 12 1/4 STYLE B - SERIES P 400 MACHINES

A. Removal
1. Remove the ribbon cover.
2. Remove the screw and eccentric (from rear of carriage) that provide the adjustment for support to the rear of the carriage.
3. Remove the four screws that hold the carriage to the hammerhead.

B. Replacement
1. Replace all parts removed by reversing the above procedure. When installing the four screws holding the carriage to the hammerhead, installation should be made in the following manner:
   a. Loosely install a screw in the right rear (pilot) hole.
   b. Install and tighten the remaining three screws in a counterclockwise sequence.
   c. Tighten the first screw installed.
2. Adjust for the following condition:
   The eccentric that provides support to the rear of the carriage should be positioned to provide maximum support to the center of the carriage bottom plate.

CARRIAGE 15" STYLE C - SERIES P 600 MACHINES

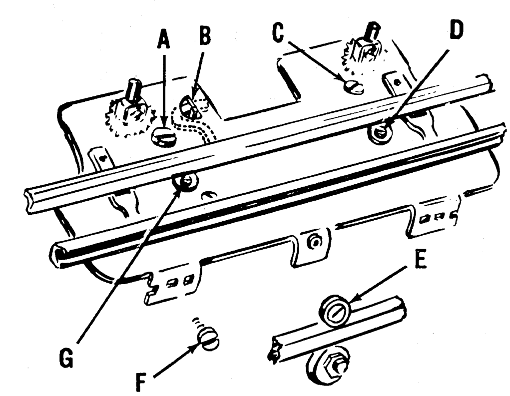


Fig. IX-9

A. Removal
1. Remove the ribbon cover.
2. Remove the rear section of the case and the two tabulating spring covers.
3. Remove roll E for the third rail.
4. Remove four screws F holding the M.R.C. Unit to the carriage.
5. Remove screws C and D in the left side of the carriage bottom plate.

NOTE: Support the carriage to prevent the carriage from falling.

6. Remove screws A and G in the right side of the carriage bottom plate.
7. Lift the carriage from the machine.

NOTE: If the machine is equipped with a form pressure bail, remove the latter before operating the machine with the carriage off.

B. Replacement
1. Replace all parts removed by reversing the above procedure.
2. Check the ribbon feed bellcrank and the slide on the carriage bottom plate to be engaged by the hammer latch section.
3. Check connection B in the carriage opening interlock linkage to be properly engaged.
4. Check the stud in the slide on the right end of the carriage bottom plate to engage the vertical space bar linkage.
5. Check the following tests and adjustments for being correct:
   a. Adjustment 1, Page 8, Section VII.
   b. Adjustments 1 thru 9, Pages 16, 17, Section VII.
   c. Adjustments 1 thru 3, Pages 20, 21, Section VII.
   d. Adjustments 1 thru 3, Page 24, Section VII.
   e. Adjustments 1 thru 14, Pages 29, 30, Section VII.
   f. Adjustment 1, Page 32, Section VII.
   g. Adjustments 1 thru 4, Page 35, Section VII.

PLATEN - SERIES P 600 MACHINES

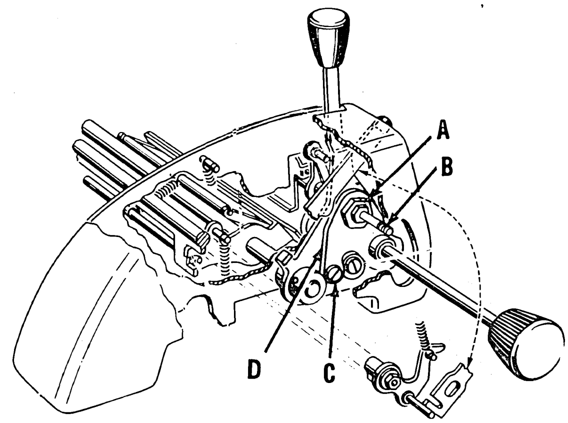


Fig. IX-10

A. Removal
1. Remove the variable line spacer assembly from the platen shaft.
2. Remove the left platen twirler.
3. Remove the carriage end covers.
4. Remove the platen spacing gear assembly from right end of the platen shaft.
5. Remove the linkage connected to the left end of the form aligning table.
6. Open the carriage and the journal pressure roll.
7. Remove screw C.
8. Remove screw B and Eccentric A.
9. Remove left platen end plate D.
10. Raise the left end of the platen and pull the platen through the opening in the left carriage side frame.

B. Replacement
1. Replace all parts removed by reversing the above procedure.
2. Adjust for the following condition:
   Turn eccentric A to raise or lower the platen for printing which corresponds to the printing on the right end of the platen. Tighten screw B.

KEYBOARD - SERIES P 100

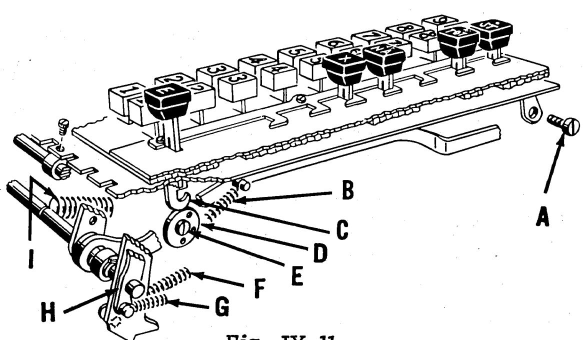


Fig. IX-11

A. Removal
1. Remove machine case and base.
2. Remove the carriage.
3. Remove the touch bar.
4. Remove screw A and its corresponding screw on the left side.
5. Loosen screw E then turn eccentric washer D clockwise slightly.
6. Unhook springs B, F, G and I.
7. Remove retainer H.
8. Raise the rear of keyboard to free hooks C.
9. Remove the keyboard by holding its rearmost portion upward and then pulling the keyboard forward.

B. Replacement
1. Install all parts removed by reversing the above procedure.
2. Check for correct cipher stop adjustments as outlined on page 10, Section II.

KEYBOARD - SERIES P 200, P 2200 MACHINES

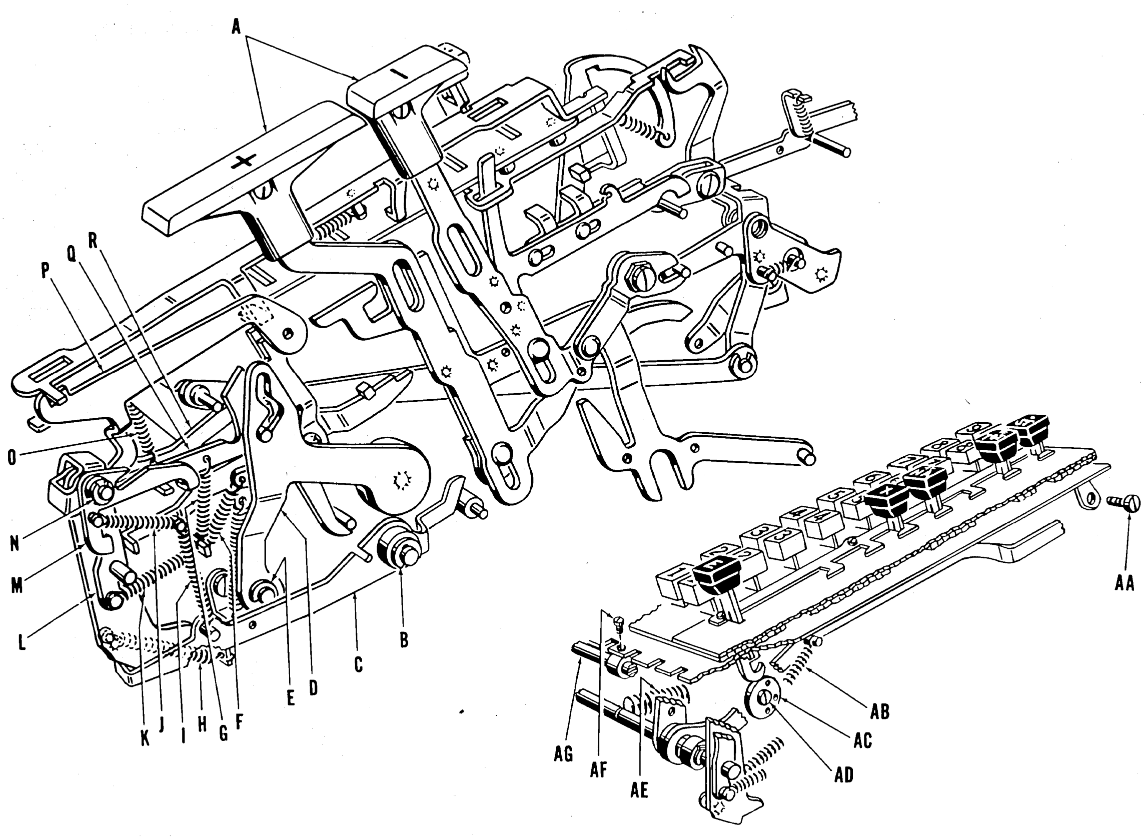


Fig. IX-12

A. Removal
1. Remove the machine case and base.
2. Remove the carriage.
3. Remove touch bars A.
4. Unhook top of spring I.
5. Remove clip B and interlock C.
6. Remove clip E and counter balance arm D.
7. Unhook springs F, G, H, J, K
8. Remove clip N and latch M.
9. Remove retainer L.
10. Unhook spring AE.
11. Loosen screw AF.
12. Unhook spring O.
13. Move shaft AG to the left approximately 1/2"
14. Remove timing arm Q, counter balance arm P, and latch R as a unit.
15. Unhook spring AB.
16. Loosen screw AD then turn eccentric washer AC clockwise slightly.
17. Remove screw AA also a screw similar to AA located in the left rear portion of the keyboard.
18. Remove the keyboard by first raising the rearmost portion of the keyboard then pulling the latter forward.

B. Replacement
1. Install all parts removed by reversing the above procedure.

KEYSTEM

A. Removal
1. Remove the machine case and base.
2. Remove total strip A, Plate 101, Keyboard Parts Catalog.
3. Remove shafts U and V, Plate 101, also shaft K, Plate 113.
4. Remove retainer CT, Plate 100.
5. Remove screw AZ, Plate 103.
6. Remove key release bail BS, Plate 101, by first moving shaft BO, Plate 101, slightly to the right until clear of left end of the bail then moving the shaft to the left until clear of the bail.
7. Unhook the springs from the rear of the locking strip and index strip in the column in which the keystem is to be removed.
8. Insert a follow up shaft from the left end and move shaft BO, Plate 101, to the right as far as the column in which the keystem is to be removed.
9. Remove cipher stop M, Plate 101 from the front end of the index strip in the column in which the keystem is to be removed.
10. Remove the rocker arm J, Plate 101, from the front end of the locking strip in the column in which the keystem is to be removed.
11. Remove index strip X, Plate 101 and the locking strip BD, Plate 101, by pulling the latter forward in the column in which the keystem is to be removed.
12. Unhook the forward end of spring N, Plate 102, in the column in which the keystem is to be removed.
13. Remove the desired keystem by pulling the latter upward.

B. Replacement
1. Install all parts removed by reversing the above procedure.

ACCUMULATOR SECTION - SERIES P 100 MACHINE

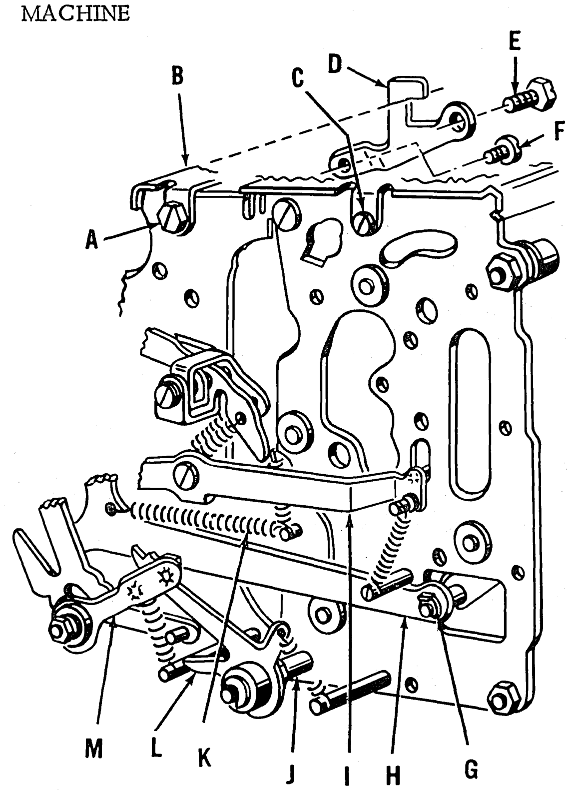


Fig. IX-13

A. Removal
1. Remove the machine case, carriage, base, and sub-base.
2. Remove the motor and drive (Figs. IX-75, IX-76).
3. Remove hammerhead B after first removing screws A, E, and F, retainer D, screw C, and its corresponding screw on the left side.
4. Remove arms I and M.
5. Remove latch L and screw stud J.
6. Unhook spring K.
7. Remove clip G.
8. Release arm H.
9. Remove the accumulator section.

B. Replacement
1. Install all parts removed by reversing the above procedure.
2. Check the following tests and adjustments for being correct.
   a. Adjustments 1, 2, Page 18, Section II.
   b. Adjustments 1 thru 5, Page 29, Section II.

ACCUMULATOR SECTION - CLASS 10 THREE REGISTER MACHINE

NOTE: All references will be found in Section V, Series P Instruction Book, Form 3784.

A. Removal
1. Hammerhead Section
   a. Remove lever AD, Fig. V-5.
   b. Remove rotary numbering device
   c. Remove two rear screws retaining the hammerhead to the accumulator section.
   d. Remove the support for left front of hammerhead which is held by left rear keyboard retaining screw.
   e. Move the shaft which holds arm F, Fig. V-20 to the left and leave the arm in the machine while removing the hammerhead.
   f. Index all nines on the keyboard and pull handle to raise all the sectors to nine position, remove the hammerhead by raising the latter straight up.
2. Accumulator Section
   a. Disconnect upper register meshing controls.
   b. Remove stud O, Fig. V-20.
   c. Disconnect register shift arm E, Fig. V-24.
   d. Remove arm J, Fig. V-10.
   e. Remove the screw retaining drive trip latch.
   f. Remove the clip holding registers B and C accumulator control arm and disconnect arm from meshing assembly.
   g. Disconnect "List Key" interlock I, Fig. V-10.
   h. Remove screw retaining left side of accumulator section to the cross brace.
   i. Unhook necessary springs and pull accumulator section to the rear.

B. Replacement
1. Replace all parts removed by reversing the above procedure.
2. Check adjustments 1 thru 8, Pages 17, 18, 19, Section V.

REGISTERS "B" AND "C" - CLASS 10 THREE REGISTER MACHINE

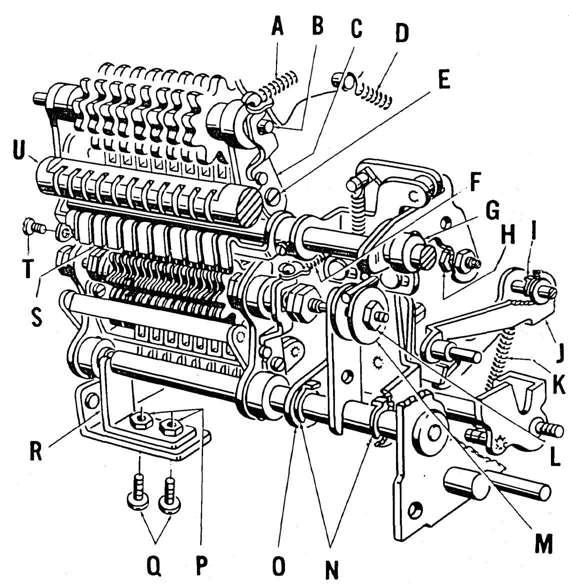


Fig. IX-14

A. Removal
1. Remove the accumulator section from the machine.
2. Remove remaining screws and nuts holding the accumulator right sideframe to the accumulator section.
3. Remove clip I.
4. Remove nut H.

5. Unhook spring K.
6. Remove arm J.
7. Remove accumulator right sideframe.
8. Remove aligning shaft U.
9. Remove clips N.
10. Remove nut L.
11. Remove set collar G.
12. Remove shift bracket O and yoke M.
13. Remove screw T.
14. Unhook springs A and D.
15. Trip off all carries in the upper register.
16. Remove screw E and retainer C.
17. Slide pinion shaft B to the right enough to clear left side of frame.
18. Remove upper register section by moving it forward and to the right.
19. Remove spring F.
20. Remove nuts P and screws Q.
21. Remove bracket R.
22. Trip off carries in the lower register.
23. Remove lower register section by moving forward and to the right.

B. Replacement

1. Replace all parts removed by reversing the above procedure.
2. After re-assembly the lower registers and associated parts in the accumulator and before re-assembling the accumulator section to the machine, it is recommended that tests and adjustments 3 thru 8, pages 18, 19 Section V be made.

NOTE: The tests and adjustments referred to above are written to apply to an accumulator already assembled to the machine, however, they may readily be made while the accumulator is off the machine by manually indexing the mechanisms for the test purposes, and making the necessary adjustments at that time.

ADDING PINIONS, REGISTERS "B" AND "C" - CLASS 10 THREE REGISTER MACHINES

A. Removal

1. With the lower register section removed from the accumulator section; remove bail E.
2. Remove limit nuts H and A.
3. Remove screw C and retainer B.
4. Remove screw G.
5. Remove pin F.

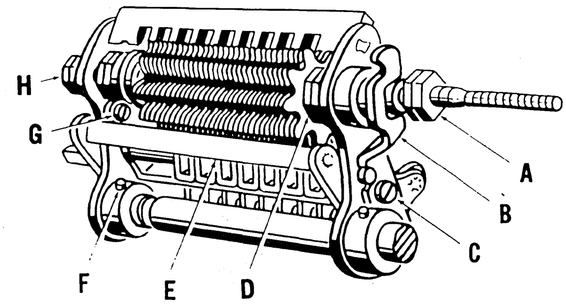


Fig. IX-15

6. Remove register section left sideframe.
7. Remove register pinions and shaft.
8. Remove nuts D.
9. Remove pinions from pinion shaft.

B. Replacement

1. After replacing pinions on shaft, turn inside nut D finger tight and lock with outside nut D.
2. Replace all parts removed by reversing the above procedure.
3. After re-assembling the register pinion section, it is necessary to make tests 1 and 2, pages 16, 17, 18, Section V.

NOTE: The tests adjustments referred to above are written to apply to the pinion section when assembled to the machine, however, the tests may readily be made while the register section is out of the machine by manually indexing the mechanism for test purposes and making necessary adjustments at this time.

TYPE BAR - SERIES P 400 AND P 600 MACHINES

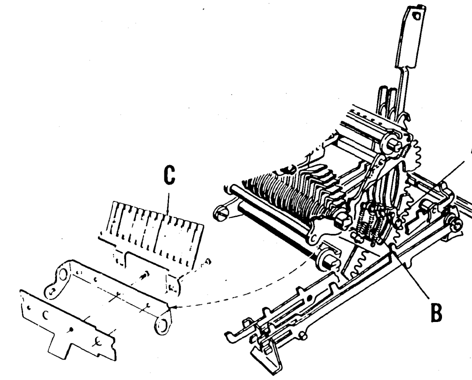


Fig. IX-16

A. Removal - P400
1. Remove the carriage, case, base and sub-base.
2. Position the register selector lever (O.C.L. No. 60) in "B" position and add nines in the columns to the right of the column containing the type bar to be removed.
3. Depress the sub-total key and operate the machine on the forward stroke to locate the full stroke pawl in the last notch of the full stroke segment.
4. Lay the machine on its left side.
5. Remove guide C.
6. Unhook spring B.
7. Disengage clip A from the stud in the type bar, letting the clip lay on the adding sector.
8. Remove the desired type bar by pulling it upward.

NOTE: When pulling the type bar upward, it may be necessary to spread the hammer latches to permit passage of the two studs in the lowermost portion of the type bar.

B. Replacement - P 400
1. Install all parts removed by reversing the above procedure.

C. Removal - P 600
1. Remove the case, base and sub-base.
2. Disconnect the carriage opening interlock link between keyboard columns 2 and 3 from the key restoring rack assembly at the front of the keyboard.
3. Remove the form pressure bail (if the machine is so equipped) from the printing head by turning the four flat-sided studs 1/4 turn.
4. Remove the form aligning table.
5. Position the carriage so that the type bar to be removed is aligned between the pressure rolls. Open the carriage and close the pressure rolls.
6. Complete the type bar removal as outlined under A above.

D. Replacement - P 600
1. Install all parts removed by reversing the above procedure.

MOTOR BAR CONTROL PANEL - CLASS 10 THREE REGISTER MACHINES

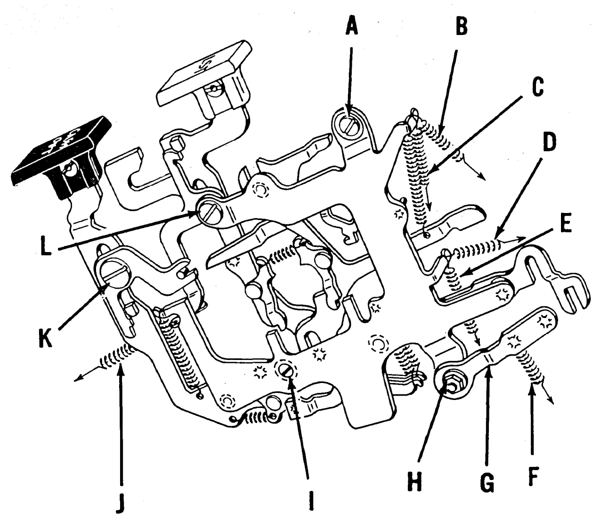


Fig. IX-17

A. Removal
1. Unhook springs B, C, D, E, F and J.
2. Remove screws A, I, K, L and nut H.
3. Remove arm G.
4. Remove motor bar control panel.

B. Replacement
1. Install all parts removed by reversing the above procedure.

CONTROL PANEL - SERIES P 400 AND SERIES P 600 MACHINES

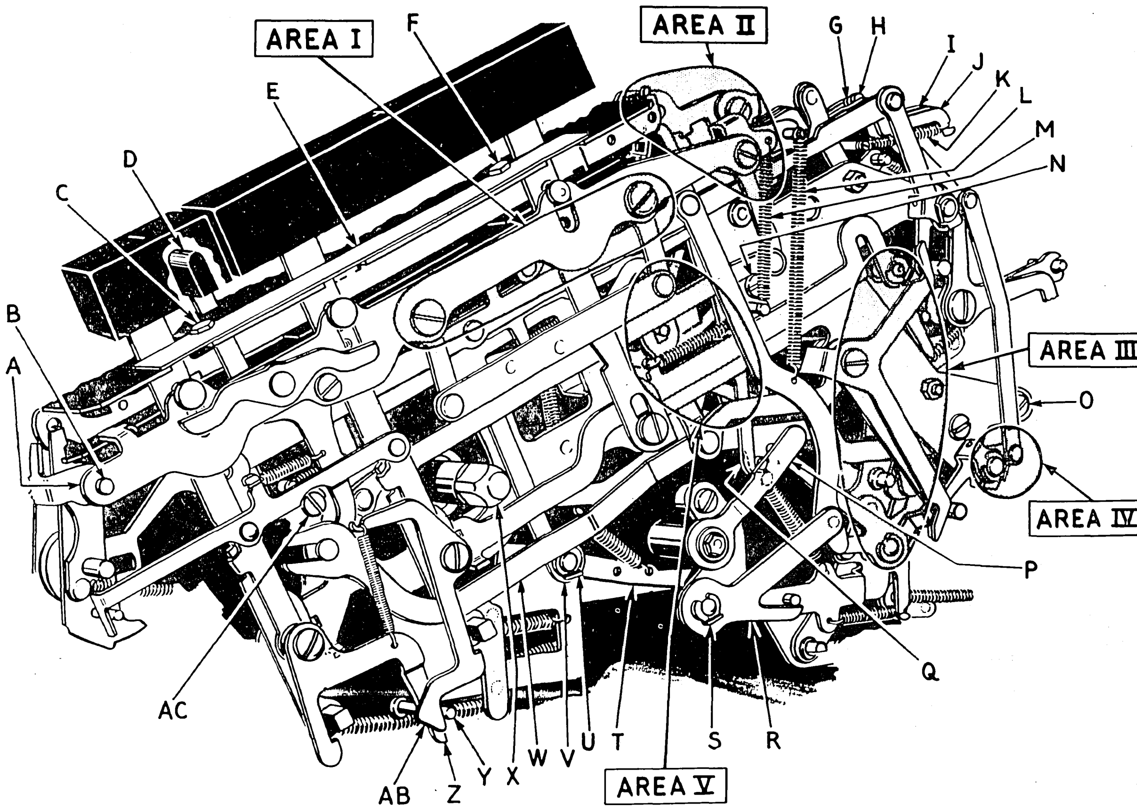


Fig. IX-18

NOTE: When applying this procedure, care must be exercised that no parts are forced into or out of position, and that excessive pressure is not applied to the panel while replacing it.

A. Removal - P 400
1. Place lever D in "AB" position.
2. Loosen screws C and F.
3. Remove plate E.
4. Unhook springs K from slides I and J.
5. Unhook springs L and M.
6. Remove clip S and arm R.
7. Remove clip U and disconnect link V from interlock T.
8. Remove screws N and O.
9. Loosen screw AC sufficiently to permit removal of the panel.
10. Remove the panel by applying an outward and slightly upward movement to the panel.

B. Replacement - P 400
1. Place lever D in "AB" position.
2. Position bell cranks AD (Area I) as illustrated.

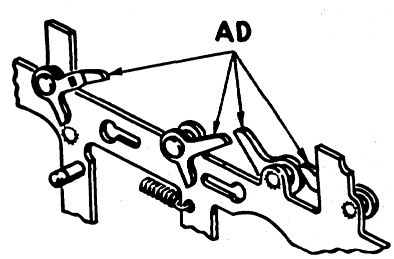


Fig. IX-18 AREA I

Note: Care must be taken that bell cranks AD do not get out of their correct position during the following procedure.

3. Place handle shaft X through the opening in the control panel as illustrated.
4. Position arm Q behind arm P; this may be accomplished by tilting the rear of the control panel slightly upward and the upper portion of the control panel outward.
5. Position interlocks Z and AB to the front of stud Y.
6. Insert shaft B into the hole in the foremost portion of plate A.
7. Position stud AE (Area V) into the slot of vertical arm AF, and roll AH (Area V) into the slot of the arm AG, as illustrated.

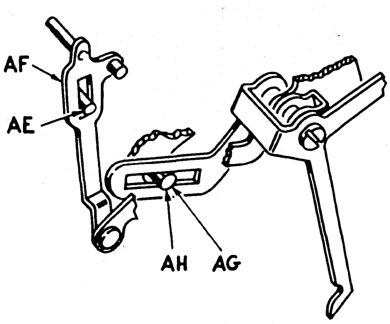


Fig. IX-18 AREA V

Note: A slight inward pressure should be applied to the control panel with the left hand, while proceeding with steps 8 through 12.

8. Raise the rearmost portions of slides I and J above arms G and H.
9. Place arms G and H between slides I and J.
10. Position the rearmost portion of arm W (Area IV) in front of the lip on bail AI, as illustrated.
11. a. Position lip AV (Area II) to the rear of tail AT when replacing the control panel on Style P 401 machines, as illustrated.

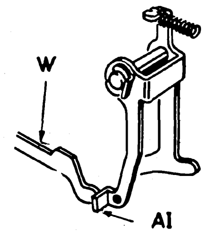


Fig. IX-18 AREA IV

b. Position lip AV (Area II) between tails AT and AU when replacing the control panel on Style P 402 machines, as illustrated.

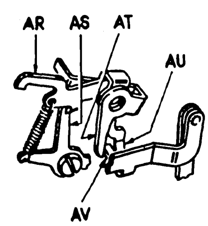


Fig. IX-18 AREA II

12. Position stud AK (Area III) to the rear of arm AJ, stud AL (Area III) to the rear of finger AM, stud AN (Area III) to the rear of finger AO, and stud AP (Area III) to the rear of finger AQ, as illustrated.

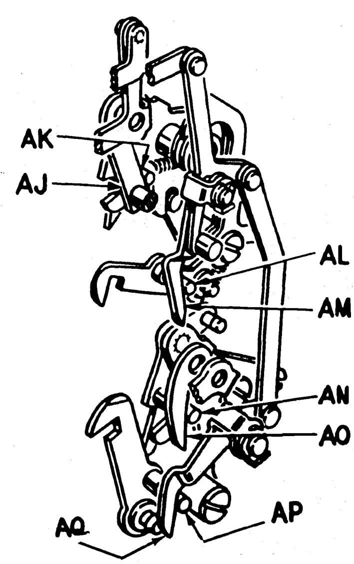


Fig. IX-18 AREA III

Note: Before proceeding with the following steps, it may be necessary to recheck the position of the parts as outlined in steps 5, 10, 11, and 12 to assure that the panel is resting against and in line with the locations for screws N, O, and AC.

13. Replace screws N and O but do not tighten.
14. Tighten screw AC.
15. Tighten screws N and O.
16. Replace arm R and clip S.
17. Connect link V to interlock T and replace clip U.
18. Connect springs K to slides I and J.
19. Connect springs L and M as illustrated.
20. Replace plate E and tighten screws C and F.
    Note: See illustration of Area II for parts referred to in step 21 below.
21. Check step of latch AS for being located under the lip on interlock AR.

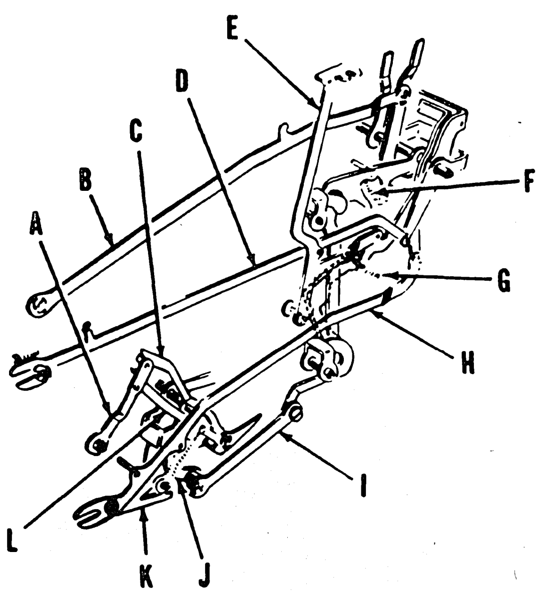


Fig. IX-19

C. Removal - P 600

1. Remove the carriage (Page 14) and base (Page 13).
2. Lay the machine on its left side.
3. Remove the two screws and the handle switch.
4. Remove arm E.
5. Remove carriage controlled red ribbon lift indexing link H.
6. Remove delayed drive trip latch C.
7. Disconnect the rear end of carriage controlled subtract link D.
8. Remove link B.
9. Remove drive trip arm A.
10. Remove arm K.
11. Remove drive trip arm latch L.
12. Disconnect springs F and G.
13. Disconnect link I from arm J.
14. Continue removing the control panel as outlined under A above.

D. Replacement - P 600

1. Replace the control panel and parts in reverse order.

CONTROL PANEL - SERIES P 600 WITH AUTOMATIC FEATURES

Removal

1. Machine case, carriage and base.

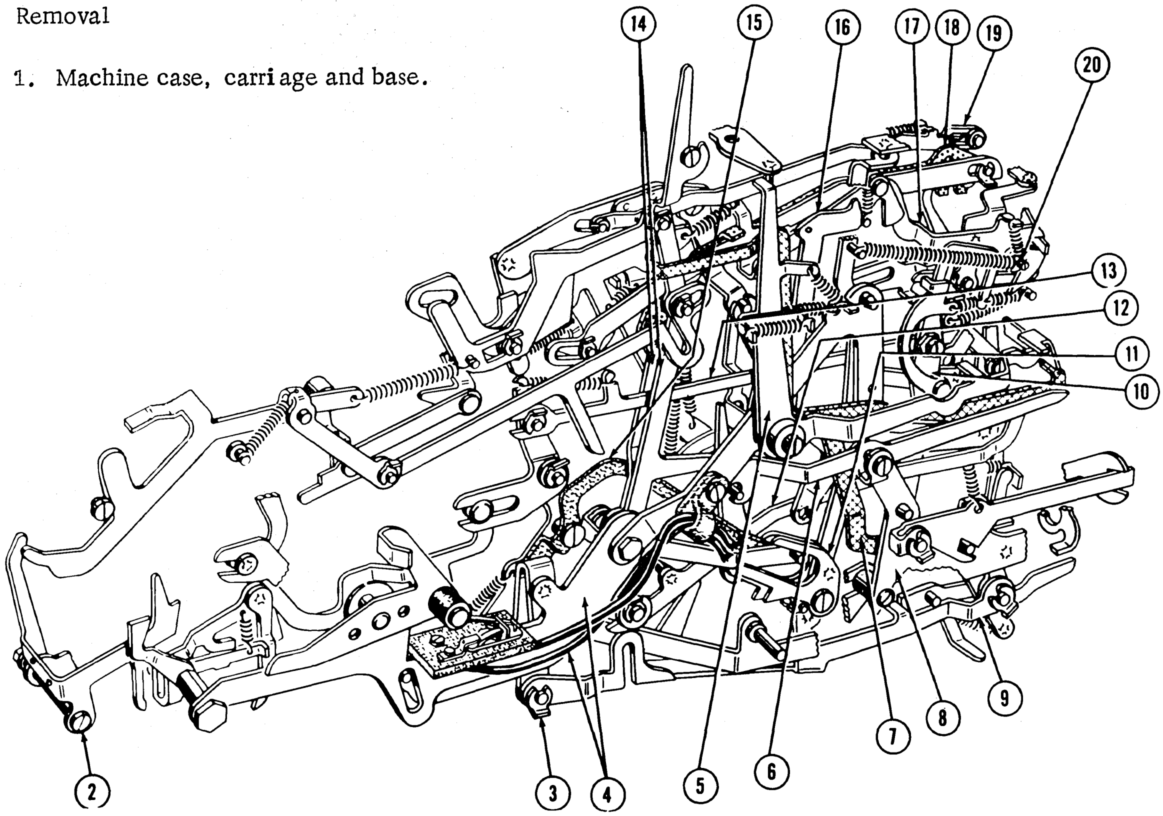


FIGURE IX-19 A

CIRCLED NUMBERS (2 THROUGH 20) LOCATE STEPS OUTLINED IN THE FOLLOWING TEXT.

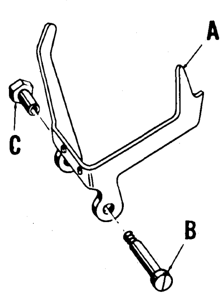


FIGURE IX-20

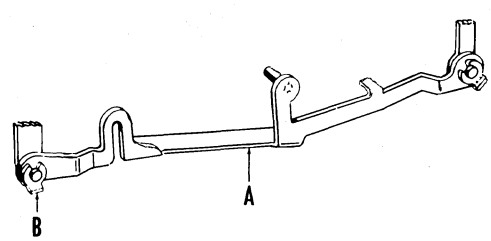


FIGURE IX-21

(2) Screw B, nut C and bail A.

(3) Clip B holding link A to the motor bar bell crank.

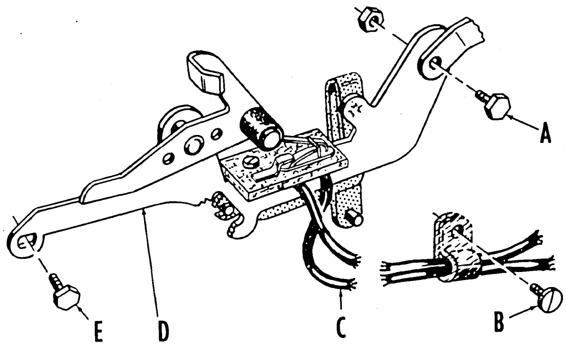


Fig. IX-22

(4) Screws A, B, and E, handle switch bracket D and lead wires C.

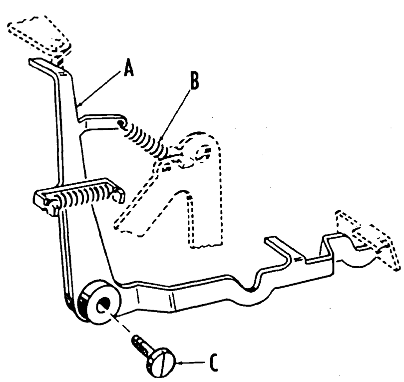


Fig. IX-23

(5) Unhook spring B, then remove screw C and lever A.

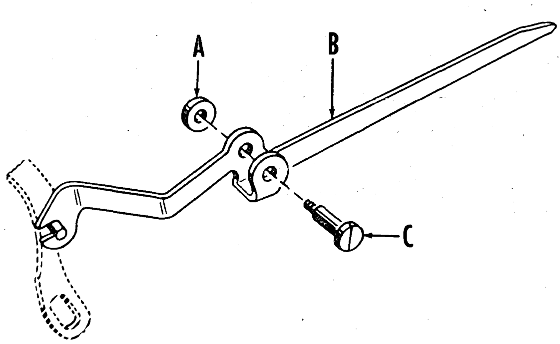


Fig. IX-24

(6) Screw C and lever B.
Note: Space washer A behind lever B.

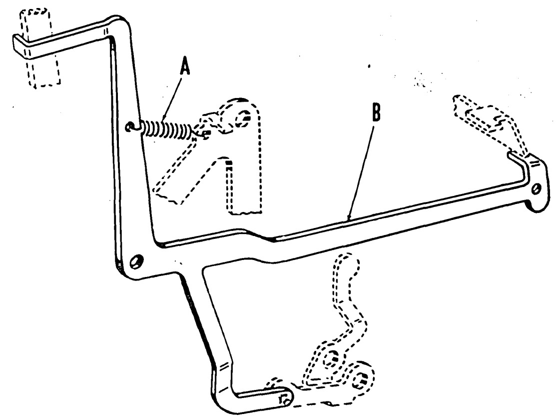


Fig. IX-25

(7) Unhook spring A, then remove lever B.

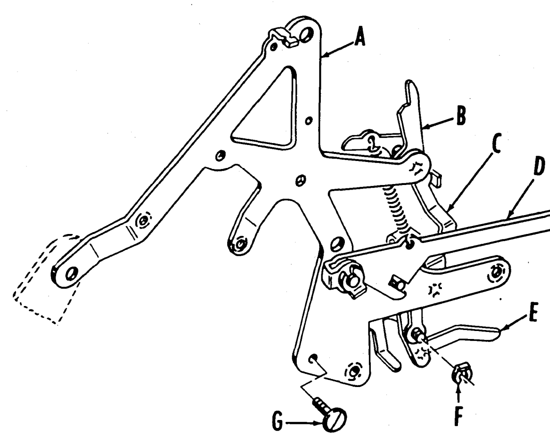


Fig. IX-26

(8) Screw G and clip F, then parts A, B, C, D, and E as a unit.

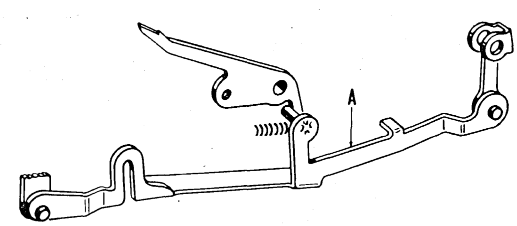


Fig. IX-27

(9) Remove link A.

Servicing Procedures

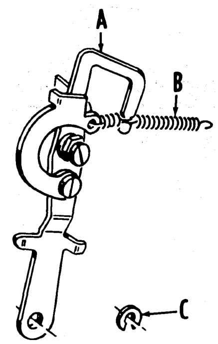


Fig. IX-28

(10) Unhook spring B, then remove clip C and skip indexing arm A.

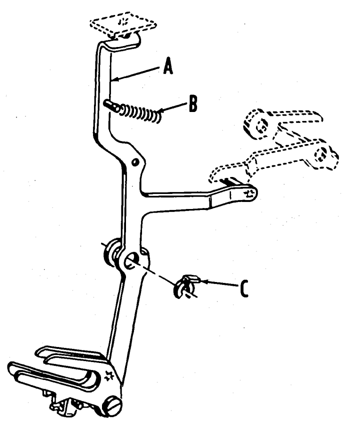


Fig. IX-29

(11) Unhook spring B, then remove clip C and lever A.

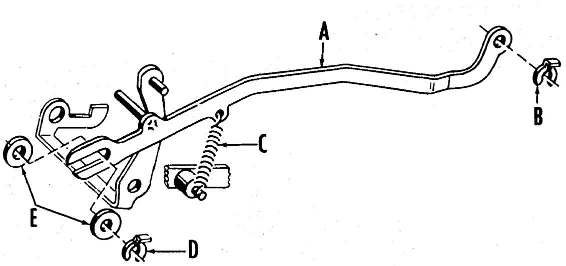


Fig. IX-30

(12) Clips B and D, spring C, spacers E and red ribbon indexing arm A.

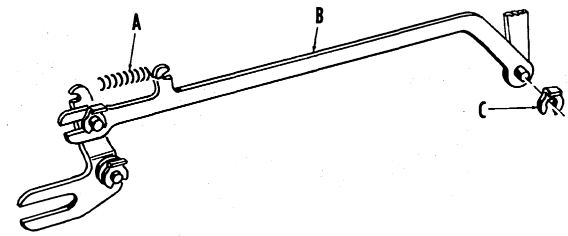


Fig. IX-31

(13) Unhook spring B, then remove clip C and skip indexing arm A.

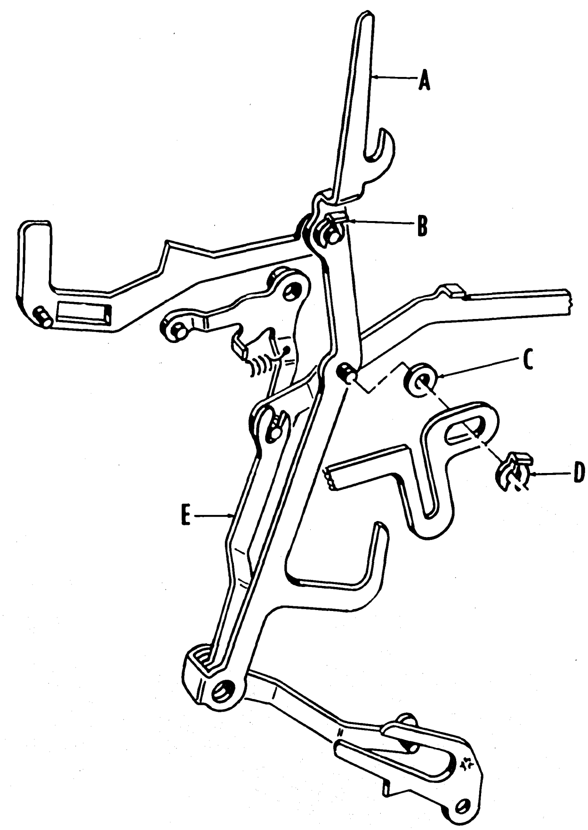


Fig. IX-32

(14) Clips B and D, and spacer C, then remove lever A and bellcrank E.

Servicing Procedures

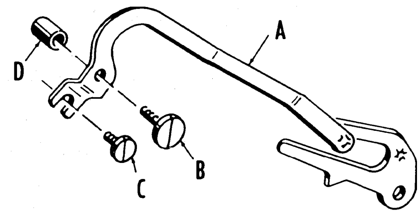


Fig. IX-33

(15) Loosen screw C, then remove screw B spacer D and arm A.

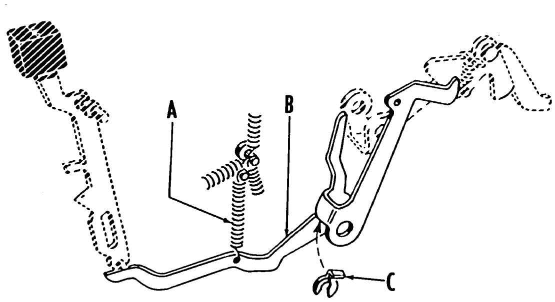


Fig. IX-34

(16) Unhook spring A, then remove clip C and arm B.

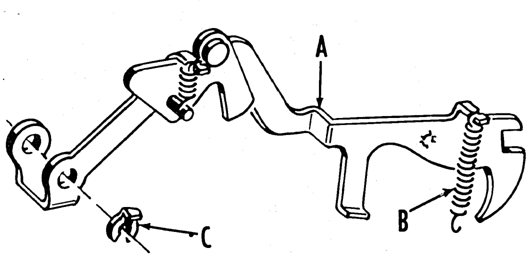


Fig. IX-35

(17) Unhook spring B, then remove clip C and arm A.

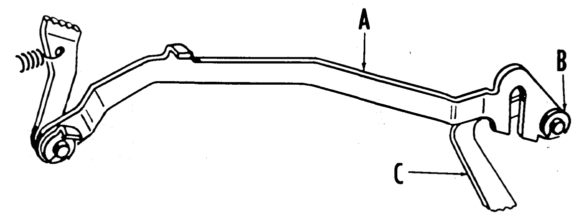


Fig. IX-36

(18) Clip B, and disconnect skip indexing linkage A from lever C.

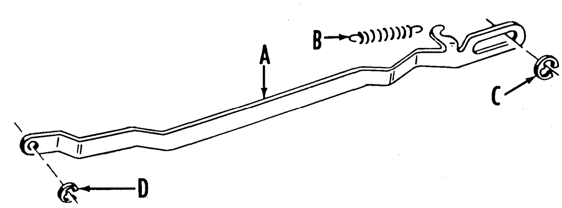


Fig. IX-37

(19) Unhook spring B, then remove clips C and D and automatic total indexing link A.

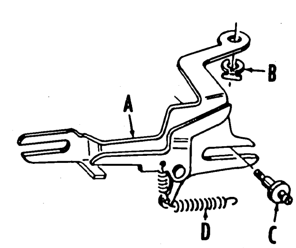


Fig. IX-38

(20) Unhook spring D, then remove clip B, screw stud C and slide A.

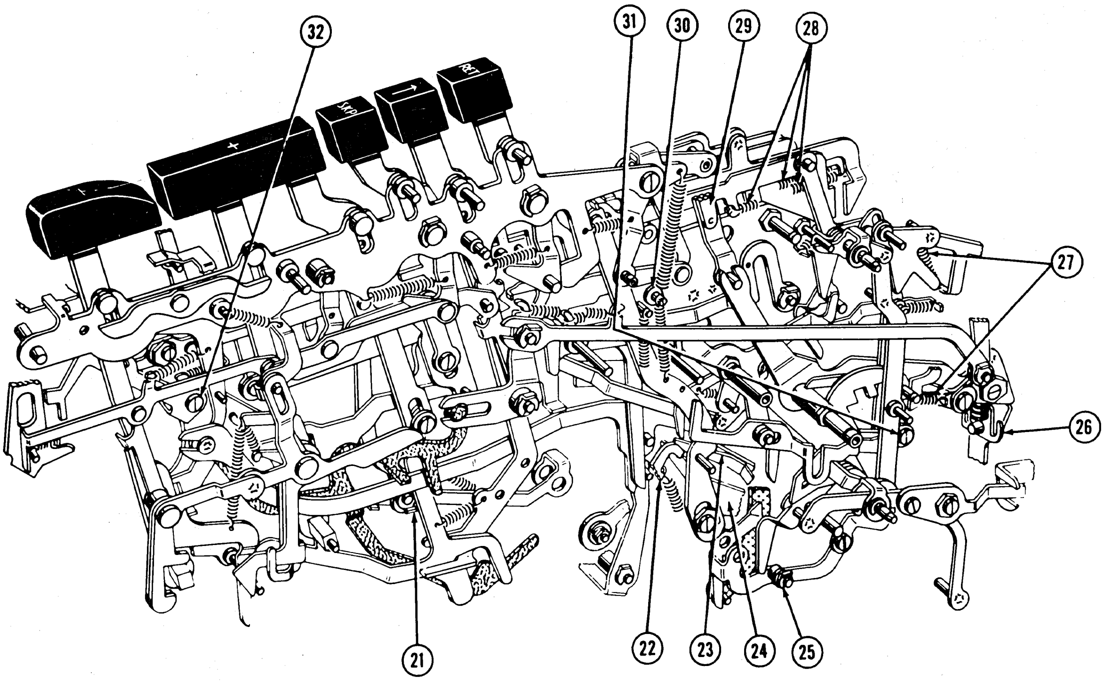


Fig. IX-39

CIRCLED NUMBERS (21 THROUGH 32) LOCATE STEPS OUTLINED IN THE FOLLOWING TEXT.

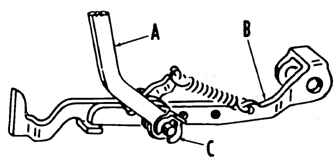


Fig. IX-40

(21) Clip C, and disconnect link A from interlock B.

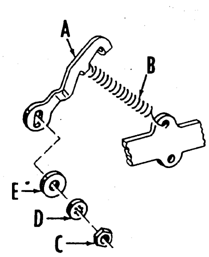


Fig. IX-41

(22) Unhook spring B, then remove nut C, lock washer D, washer E and arm A.

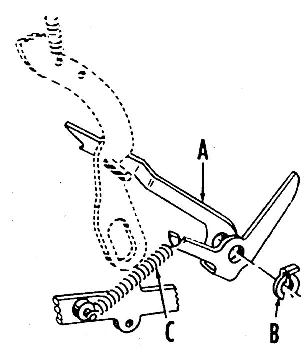


Fig. IX-42

(23) Unhook spring C, then remove clip B and latch A.

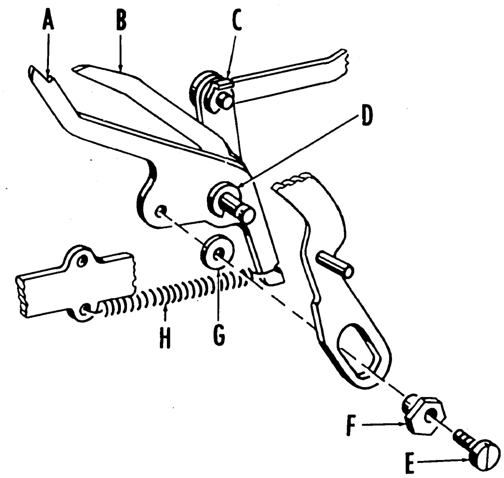


Fig. IX-43

(24) Unhook spring H. Mark the position of eccentric nut F. Remove the following; clips C and D, screw E, eccentric nut F, washer G, and latches A and B.

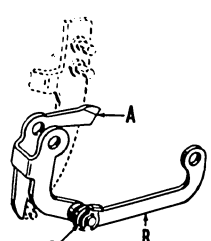


Fig. IX-44

(25) Clip C, and disconnect link B from bellcrank A.

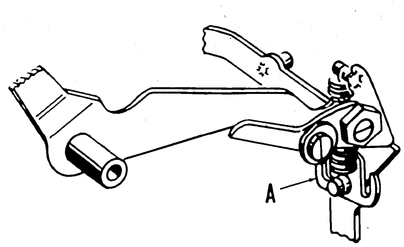


Fig. IX-45

(26) Spring assembly A.

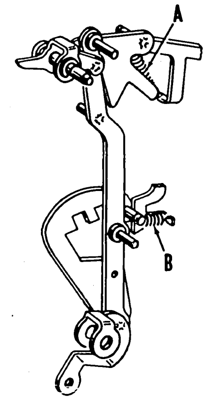
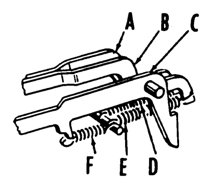


Fig. IX-46

(27) Unhook springs A and B.



(28) Unhook springs D, E, and F from slides A, B, and C respectively

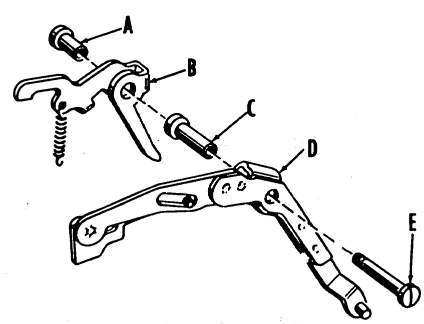


Fig. IX-47

(29) Screw E, spacer C and power arm D.

Note: After removing power arm D, screw E may be replaced to retain latch B and spacer A in position.

Servicing Procedures

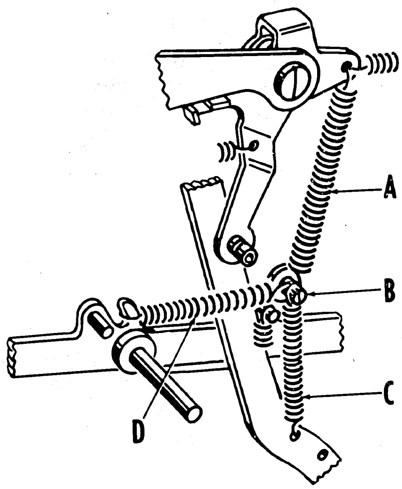


Fig. IX-48

30 Unhook springs A, C, and D and remove spring anchor screw B.

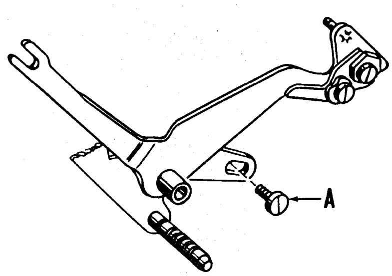


Fig. IX-49

31 Remove screw A.

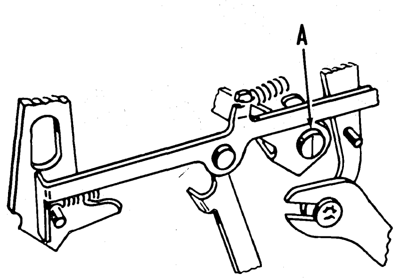


Fig. IX-50

32 Loosen screw A sufficiently to permit removal of the panel.

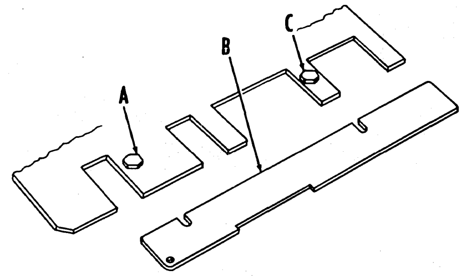


Fig. IX-51

33 Loosen screws A and C and remove plate B.

34 Carefully lay the machine on its left side and remove the panel by first moving the front end upward and then forward.

Replacement

35 Carefully lay the machine on its left side and center the register selector lever between "A" and "B" positions.

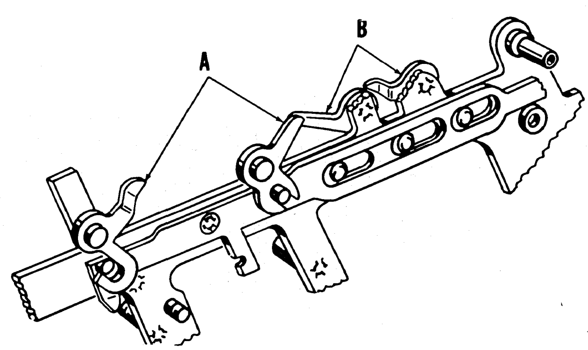


Fig. IX-52

36 Bellcranks A and B must be positioned, and held positioned, as illustrated while assembling panel to machine.

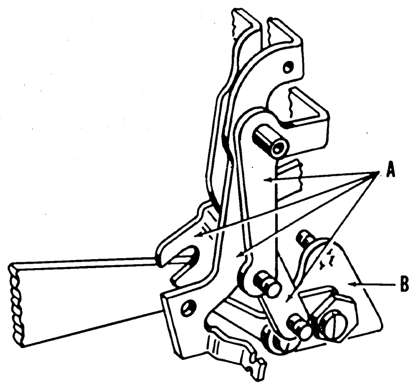


Fig. IX-53

(37) Maneuver the panel into its approximate position by guiding power total arm B to the inside of levers A then lowering the front end of the panel into position.

Note: A slight inward pressure should be applied to the panel with the left hand, while proceeding with steps 38 through 48.

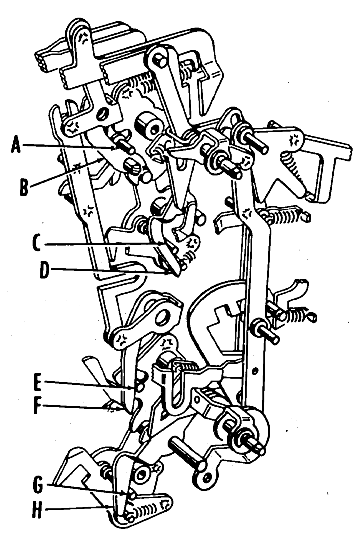


Fig. IX-54

(38) Position stud A to the rear of arm B, stud C to the rear of finger D, stud E to the rear of finger F and stud G to the rear of finger H.

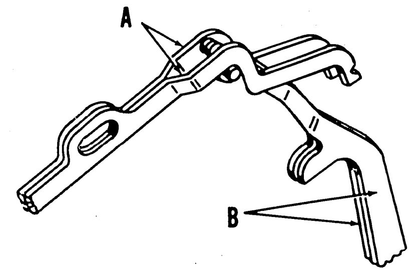


Fig. IX-55

(39) Raise the rearmost portion of slides A so they will rest on the studs in levers B.

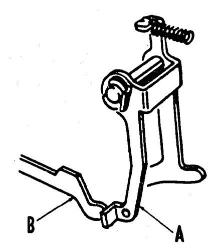


Fig. IX-56

(40) Position the rearmost portion of subtract slide B in front of the lip on bail A.

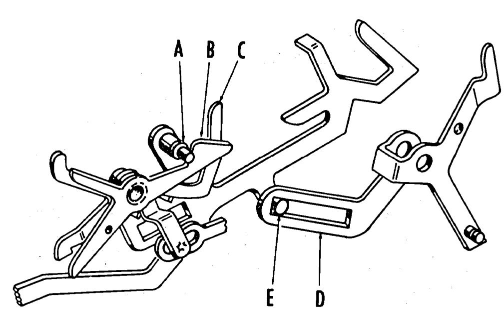


Fig. IX-57

(41) Position stud A over levers B and C, and roll E into the slot of lever D.

Servicing Procedures

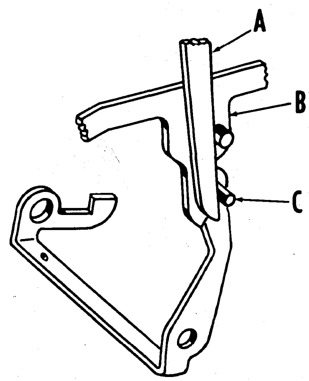


Fig. IX-58

(42) Position arms A and B in front of stud C in the red ribbon lift bail.

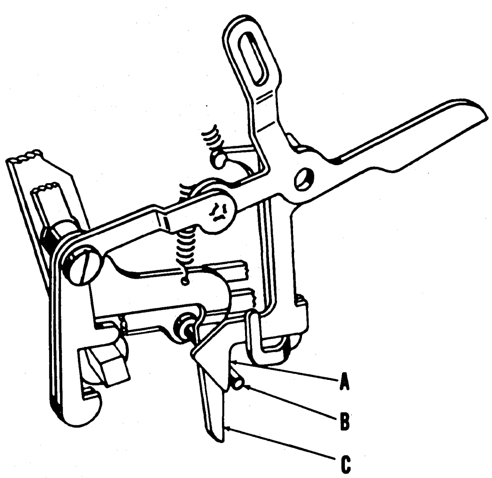


Fig. IX-59

(43) Position interlocks A and C in front of stud B.

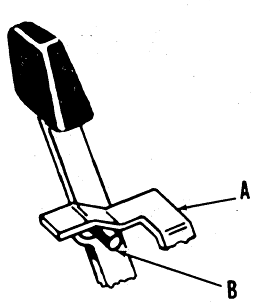


Fig. IX-60

(44) Position lip A above stud B.

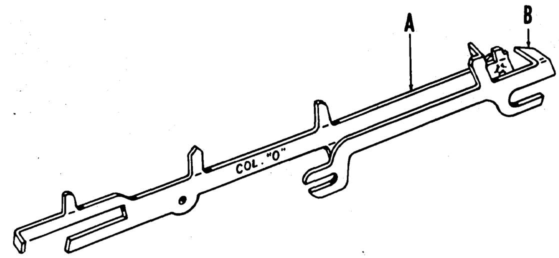


Fig. IX-61

(45) Position lip B on the minus balance symbol indexing slide behind index bar A.

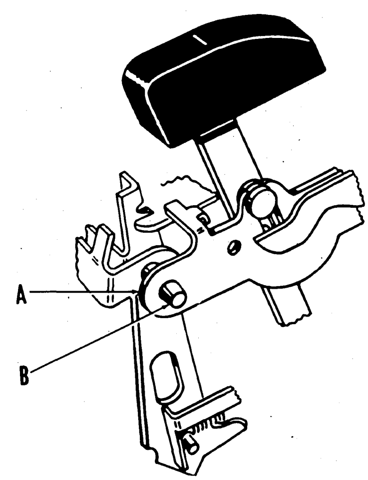


Fig. IX-62

(46) Insert shaft B into the hole in plate A.

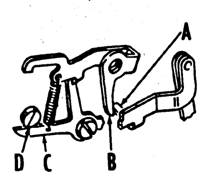


Fig. IX-63

(47) Position lip A to the rear of projection B, and projection C below keyboard retaining screw D.

48 Replace the three panel anchoring screws (Steps 30, 31, and 32) but do not tighten.

Note: Before tightening the three anchoring screws it is advisable to check the position of the parts as outlined in steps 35 through 47 to assure that the panel is seated properly.

49 Proceed with the replacement of parts by reversing steps 1 through 33.

M.R.C. UNIT - SERIES P 600 MACHINES

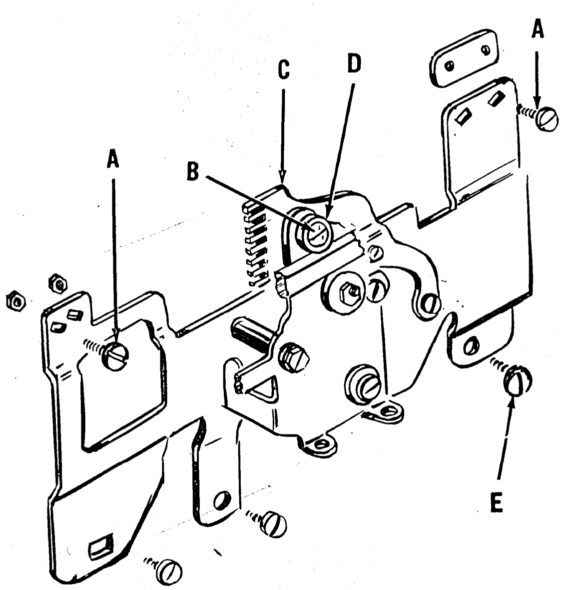


Fig. IX-64

A. Removal
1. Remove the rear case section and the tabulating spring covers.
2. Remove control arm guide C.
3. Break the knife connection in the wires from the M.R.C. switch.
4. Remove roll D.
5. Remove four screws A holding the M.R.C. unit to the carriage.
6. Remove three screws E holding the M.R.C. unit to the sub-base.
7. Remove the rubber molding from the rear of the base.
8. Move the bottom of the M.R.C. unit rearward and remove the M.R.C. unit from the machine.

B. Replacement
1. Install all parts removed by reversing the above procedure.
2. Adjust for the following condition:
   a. To support the carriage against upward strain from any source. Roll D should have slight rubbing contact on the carriage third rail when the carriage is in any stop position.
   TO ADJUST, turn eccentric screw B to raise or lower roll D.

C. Adjustments, New M.R.C. unit installation: Perform adjustments as outlined on pages 29 and 30, Section VII.

TABULATING CLUTCH ASSEMBLY

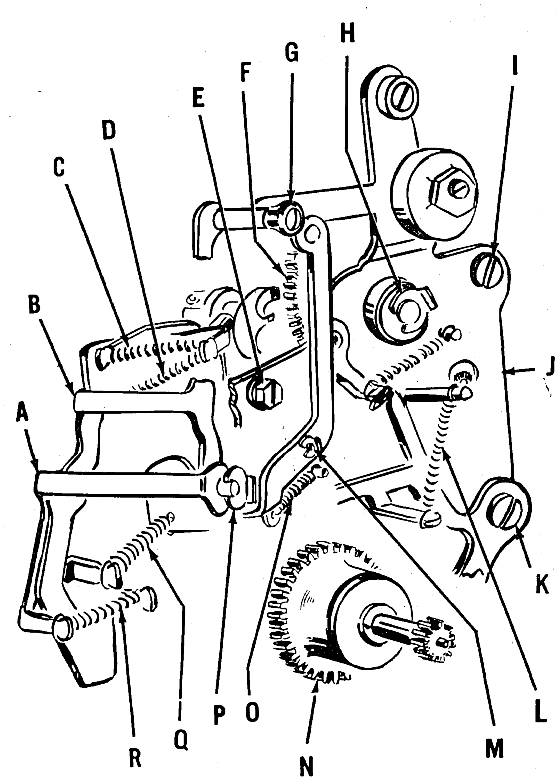


Fig. IX-65

A. Removal
1. Remove the M.R.C. unit (Figure IX-64).
2. Unhook springs C, D, L, O, Q and R.
3. Remove clip P and the space collar.
4. Remove clip H and the space washer.
5. Remove clip M.
6. Remove screws E, I and K.
7. Disconnect link G from bail A.
8. Pull bails A and B as far off their post as possible.
9. Lift off plate J.
10. Remove gear F.
11. Lift off clutch assembly N. Care should be taken not to knock off the springs in the clutch when the clutch shaft is removed from the clutch gear case.

B. Replacement
1. Install all parts removed by reversing the above procedure.

PRINTING HEAD - SERIES P 600

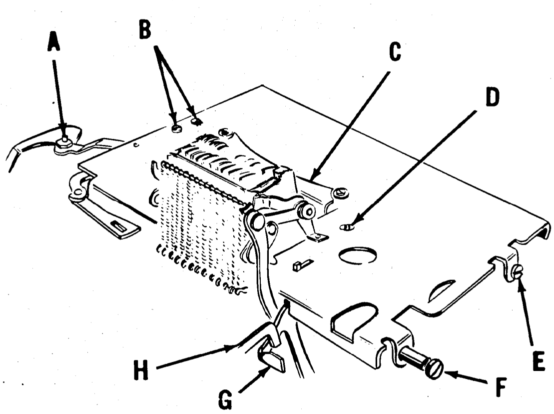


Fig. IX-66

A. Removal

1. Remove case (Figure IX-6), carriage (Figure IX-9) and M.R.C. unit (Figure IX-64).
2. Remove screw A to disconnect the date repeat link.
3. Remove two screws B and the calendar feature brace under the left side of the printing head.
4. Unhook and remove the hammer springs from the hammers.
5. Remove two screws and hammer latch guide C.
6. Remove screw D from the post supporting the printing head.
7. Remove screws E and F from the right side of the printing head.
8. Remove the two screws similar to screws E and F from the corresponding positions under the left side of the printing head.
9. Index the top row of keys on the keyboard. Without depressing a motor bar, pull the handle as far forward as possible and block the handle in this position.
10. Disengage slide H from formed ear G in the carriage opening interlock linkage and lift the printing head off the machine.

B. Replacement
1. Check the red ribbon lift arms to be in a rearward position.
2. Install all parts removed by reversing the above procedure.

CIPHER SPLIT MECHANISM - SERIES P 600

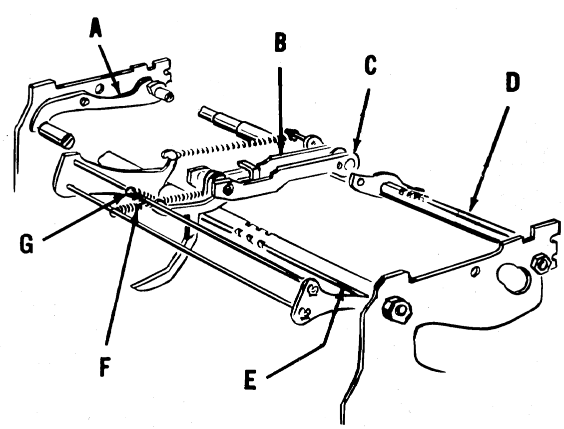


Fig. IX-67

A. Removal
1. Remove the printing head (Figure IX-66).
2. Unhook springs F and G.
3. Loosen the nuts on both ends of shafts D and E.
4. Remove the screw and locking plate A.
5. Turn shafts D and E approximately 1/4 turn to permit the removal of the cipher split mechanism.

6. Remove cipher split linkages B and C from the machine.

NOTE: When the Cipher Split Mechanism is located in the position immediately to the left of the Closed Account Mechanism, remove the closed account linkage with the right link of the cipher split mechanism.

B. Replacement
1. Install all parts removed by reversing the above procedure.

PRINTING CONTROL SHAFT - SERIES P 600

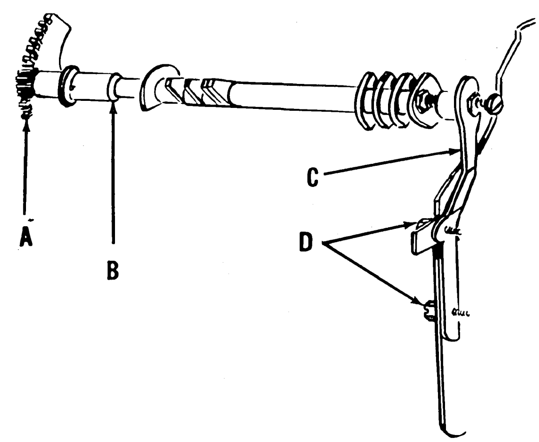


Fig. IX-68

A. Removal
1. Remove the M.R.C. unit (Figure IX-64).
2. Remove screws D and bracket C.
3. Remove printing control shaft B.

B. Replacement
1. Install all parts removed by reversing the above procedure.
2. Check the mark on the gear of the printing control shaft to be opposite the first (bottom) tooth of geared segment A for the printing control mechanism.

C. Check adjustments 1 through 4 as outlined on pages 40 and 41 Section VII for being correct.

LIFT ARM ASSEMBLY - REGISTER "B" SERIES P 400

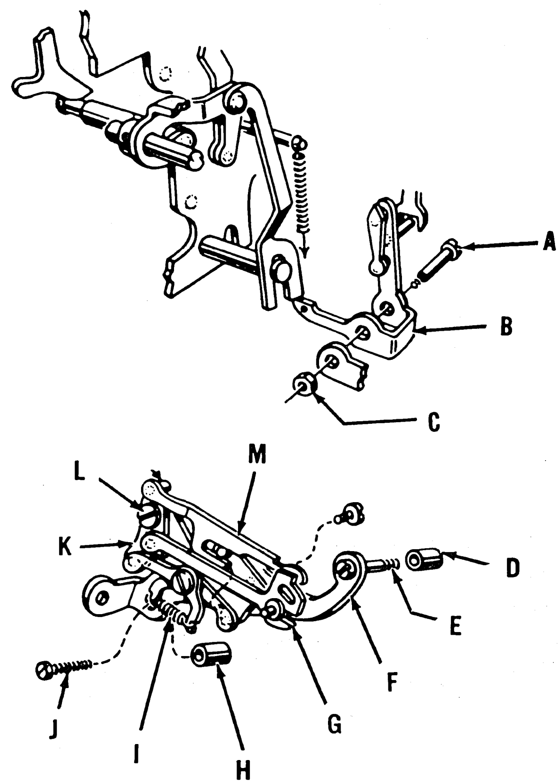


Fig. IX-69

A. Removal
1. Remove the carriage, case and base.
2. Remove nut C, screw A and Assembly B.
3. Remove screw E and collar D.
4. Remove spring I.
5. Remove screw J and collar H.
6. Remove bracket F containing the lift arm assembly.
7. Remove screw L that retains detent K.
8. Remove lift arms M and G with detent K.

B. Replacement
1. Install all parts removed by reversing the above procedure.

NOTE: When installing bracket F (containing the lift arm assembly) locate the latter in proper position and replace collar D and screw E.

Servicing Procedures

REGISTER "B" - SERIES P 400

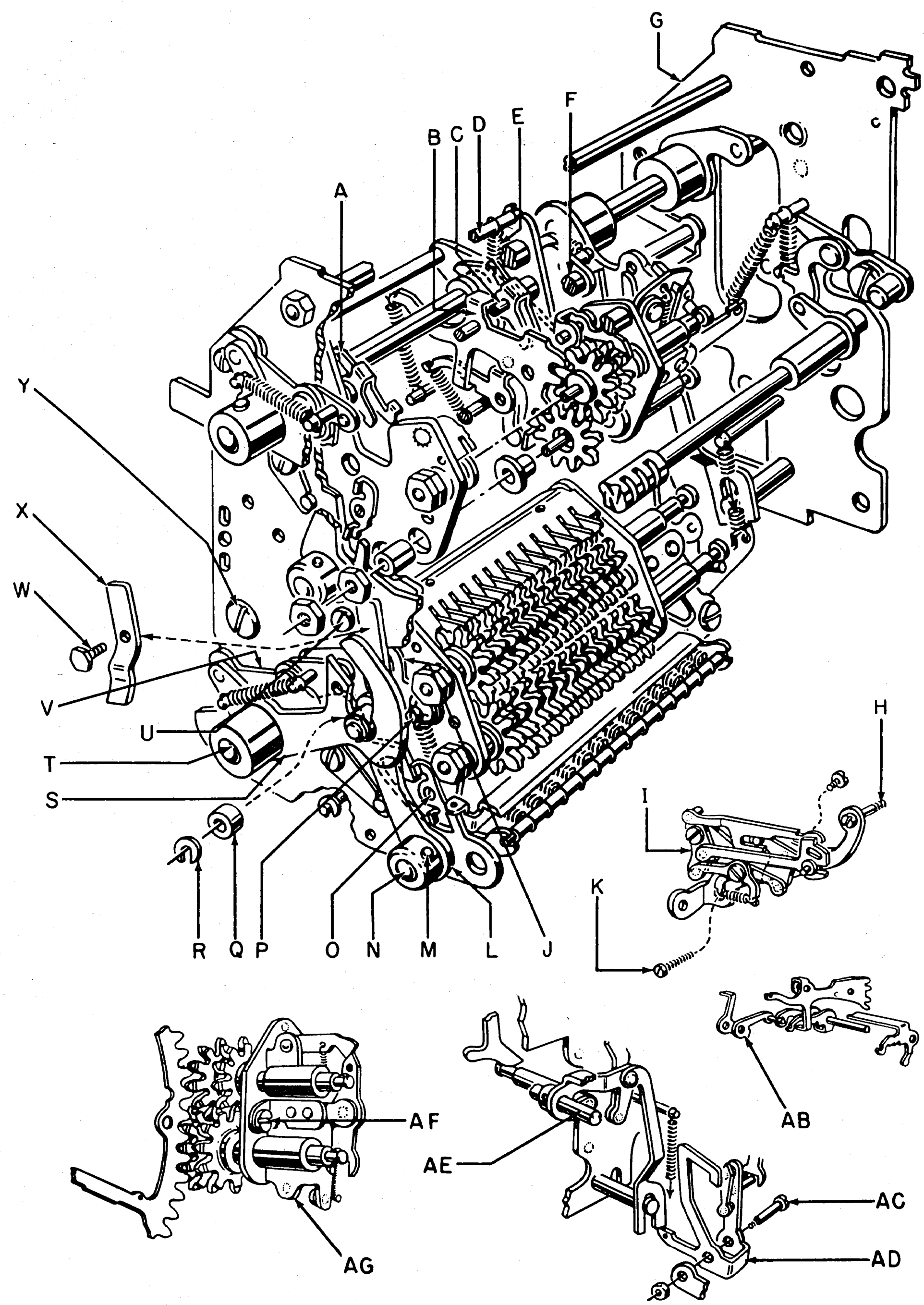


Fig. IX-70

A. Removal

1. Remove the carriage (Figure IX-19), case (Figure IX-6) and base (Figure IX-7).
2. Remove the motor and drive (Figure IX-75).
3. Remove the hammerhead (Figure IX-66) and accumulator section.

4. Remove accumulator sideframe G.
5. Remove lower screw AC and spearpoint assembly AD.
6. Remove lower screw AF and pinion shift mechanism AG.
7. Remove screws H and K, lift arm assembly I, and bellcrank AB.
8. Remove screw Y, shaft AE and spacer.
9. Position lower left drive cam S for accessibility to the screws that retain right and left linkage V, then remove the right and left screws, linkages V and shaft F.
10. Remove springs E and the spring shaft in register "B".
11. Remove retaining pin and lower left drive cam S.
12. Remove assembly T from right side of accumulator section.
13. Remove screw W and retaining plate X.
14. Remove clips R and rolls Q from right and left sides of accumulator section.
15. Remove retaining pin M and arm L from left side of accumulator section.
16. Remove assembly N from right side of accumulator section.
17. Remove lower spring anchor screw P.
18. Position retaining clip J so as to expose lower shaft C.
19. Remove lower shaft C and thin space washer, all carry pawl latches A.
20. Remove left lower screw O.
21. Position all carry racks B in carry position.
22. Remove register "B".

B. Replacement
1. Install all parts removed by reversing the above procedure.
2. Check adjustments 1 through 7, Page 25, Section VI.

CARRY RACK - SERIES P 400

A. Removal
1. Remove the carriage, case, and base.
2. Remove the motor and drive (Figure IX-75).
3. Remove screw O and retainer plate N.
4. Operate the machine sufficiently on a minus balance total to mesh the adding pinions with the adding sectors.
5. Remove clips Q and rolls P from right and left sides of the accumulator.

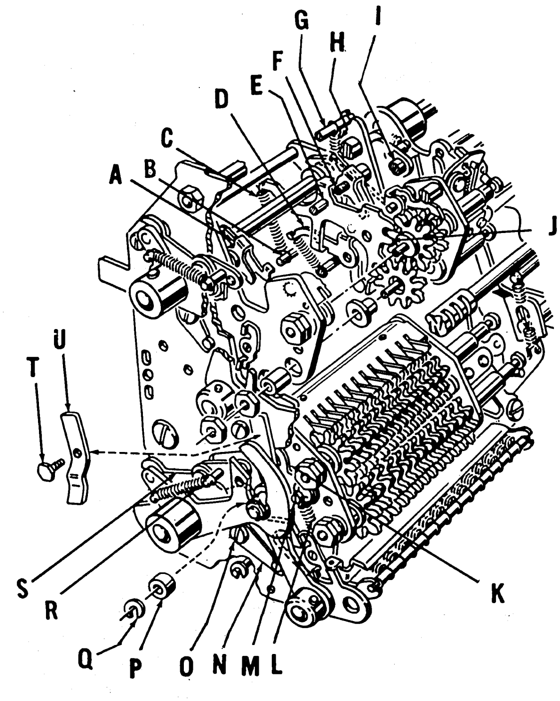


Fig. IX-71

6. Unhook spring L from spring anchor screw M.
7. Unhook spring R and remove arm assembly S.
8. Remove carry reset shaft I.
9. Remove screw T and guide U.
10. Remove screw M from left side and companion screw from right side.
11. Move shaft retainers K (on right and left sides) rearward and downward.
12. Unhook springs C and H and remove shafts B and G.
13. Push shafts E and F to the left (using two shafts 1-6900 as a follow up) far enough to clear the desired carry rack J.

NOTE: The carry pawl latch A above the carry rack to be removed, does not have to be removed.

14. Remove the desired carry rack J by applying downward and rearward movement.

B. Replacement
1. Install all parts removed by reversing the above procedure.

NOTE: Care should be taken that the tail of latch A is over the lip on the lowermost portion of the carry rack.

ADDING PINIONS - SERIES P 400

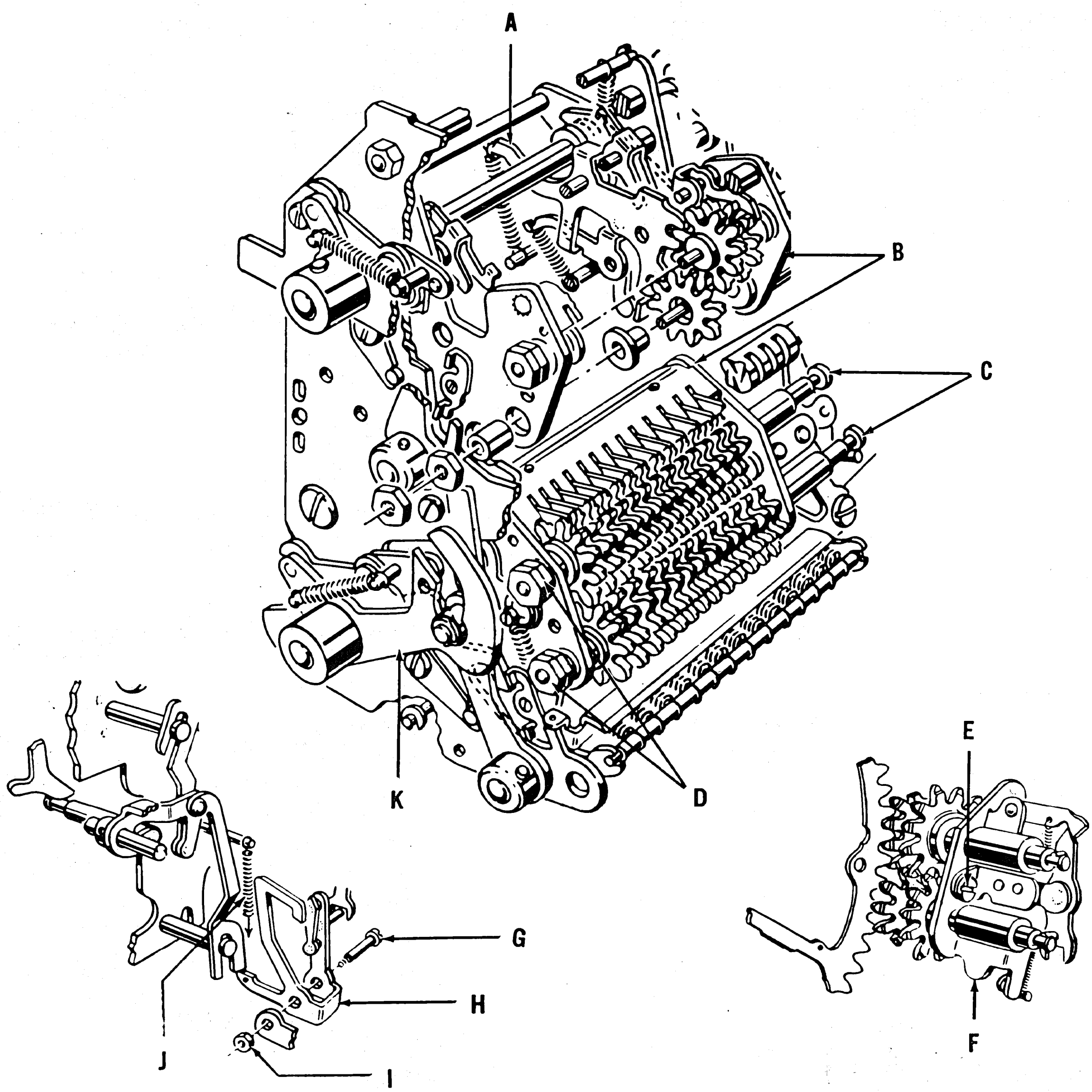


Fig. IX-72

A. Removal
1. Remove the carriage, base and case.
2. Remove the accumulator section.
3. Unhook spring J.
4. Remove nut I, screw G and bellcrank H.
5. Disengage the pinion assembly B from the carry racks A by manually depressing cam K.
6. Remove screw E and assembly F.
7. Return the pinion assembly B into engagement with carry racks A.
8. Remove nuts D.
9. Push shafts C to the right (using two 1/8" diameter shafts as a follow-up) to clear the desired adding pinion.

B. Replacement
1. Install all parts removed by reversing the above procedure.

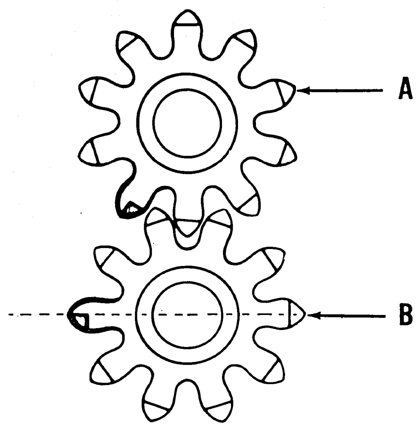


Fig. IX-73

NOTE: When assembling the adding pinions, the wide tooth of lower pinion B should be placed on a horizontal line pointing toward the front of the machine; and when upper pinion A is meshed with lower pinion B, the wide tooth of upper pinion A should be placed over the first tooth above the wide tooth of pinion B, as illustrated.

C. Check adjustments 1 through 7, page 25, Section VI.

AUTOMATIC REGISTER POWER SHIFT MECHANISM SERIES P 400

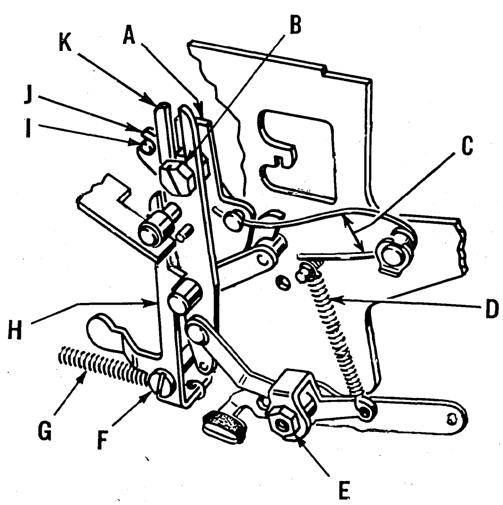


Fig. IX-74

A. Removal
1. Remove carriage, case and base.
2. Place O.C.L. No. 60 in "A" position and unlatch O.C.K. 7-0.
3. Stand the machine on its rearward end.
4. Unhook spring G.
5. Remove screw F and latch H.
6. Unhook spring D.
7. Remove shoulder nut E.
8. Pull the handle forward to position the full stroke pawl into the last notch of the full stroke segment.
9. Remove actuating arm K by moving its forward portion to the left and then pulling downward.
10. Disengage spring wire C from the stud in slide A.
11. Remove screw B with a long screw driver placed through the opening in the left sideframe.
12. Remove slide A.

B. Replacement
1. Install all parts removed by reversing the above procedure.

NOTE: (1) When tightening screw B, care should be taken that spring wire C does not get behind the head of screw B. (2) After screw B has been tightened, recheck fork J for being engaged with stud I.

C. Check adjustments 1 through 10, page 18, Section VI.

TYPE 3 MOTOR AND DRIVE ASSEMBLY

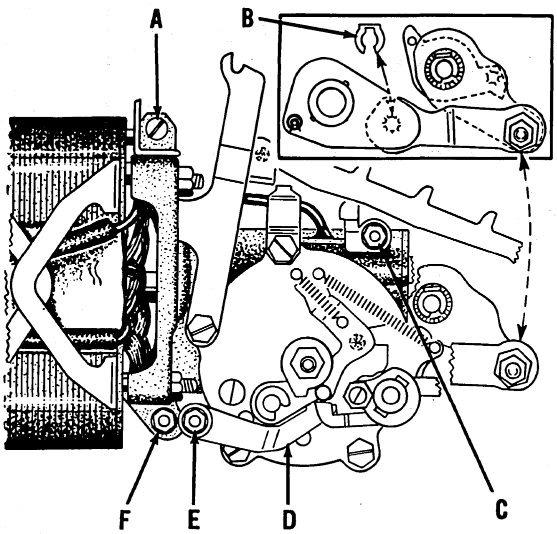


Fig. IX-75

A. Removal
1. Remove the carriage, case and base.
2. Disconnect slip connectors on plug recepta-cle.
3. Remove nut E and drive trip arm D.
4. Remove nuts C and F.
5. Remove screw A.
6. Remove clip B on drive linkage.
7. Remove the motor and drive assembly.

B. Replacement
1. Install all parts removed by reversing the above procedure.

TYPE P2 MOTOR AND DRIVE ASSEMBLY

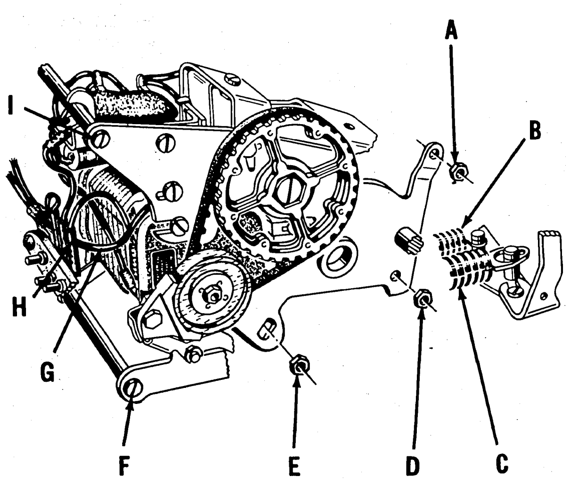


Fig. IX-76

A. Removal
1. Remove carriage, case and base.
2. Disconnect slip connectors H and wire G.
3. Unhook springs B and C.
4. Remove nuts A, D and E.
5. Remove screws F and I.
6. Remove retaining clip from forward end of drive link.
7. Remove motor and drive assembly.

B. Replacement
1. Install all parts removed by reversing the above procedure.

RIBBON INSTALLATION - SERIES P 600

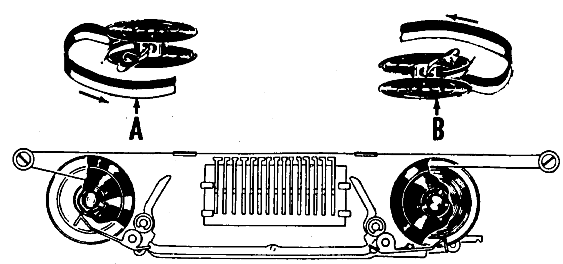


Fig. IX-77

A new ribbon should be installed in the machine in such a manner as to permit the square opening in the hub of the ribbon spool to be completely clear when all of the ribbon is unwound from either spool.

When the new ribbon is wound on its spool as shown in A, it should be installed on the left ribbon post and the free end attached to the empty spool as shown in A.

After the new ribbon is attached to the empty spool, it should be threaded in the machine as illustrated and the spools installed on the ribbon posts.

SERIES P

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Printed in U.S. America 10-20-65