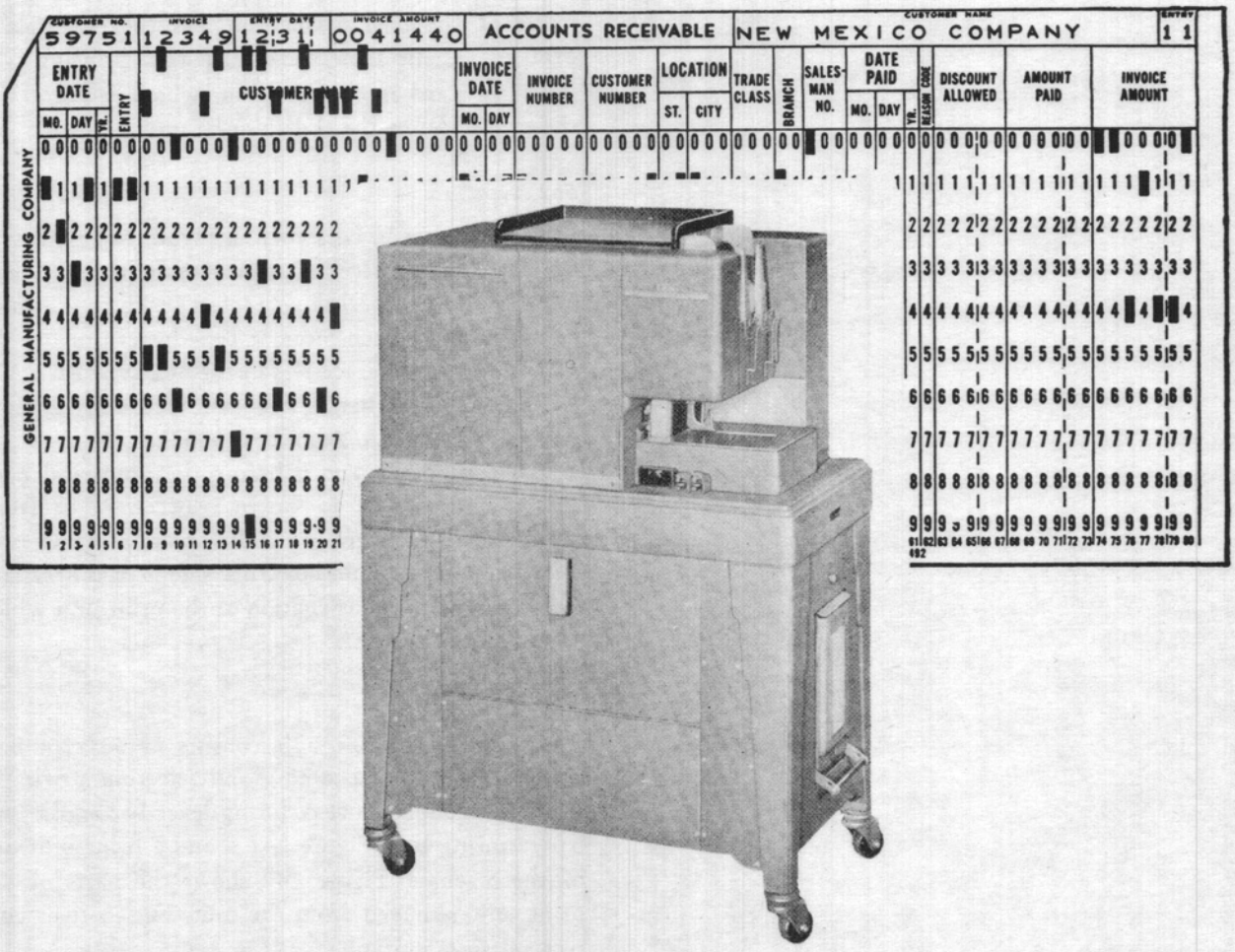


Figure 238. Type 552 and Interpreted Card

TYPE 552 INTERPRETER PRINTING MECHANISM

THE PURPOSE of the 552 Alphabetic Interpreter is to print on a card the same information which is punched in it. This makes possible the visual reading of information punched in a card. Visual reading of a card is desirable when cards are handled manually in some way, such as, selected from a file, or merged manually. Figure 238 shows an Alphabetic Interpreter and a card which has been interpreted.

The 552 Interpreter reads a card and prints the information on the card in the same cycle. The card is fed 12-edge first so that the zone information can be read, and the type bar zoned before the numerical information is read and the type bar stopped. The card is also fed face up because the contact roll also serves as a platen, and the face of the card must be out to receive the printing. Figure 239 shows a sche-

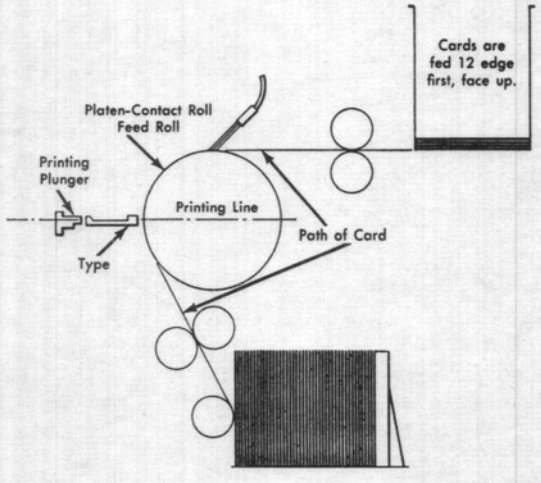


Figure 239. Type 552 Feed Schematic and Printing Essentials

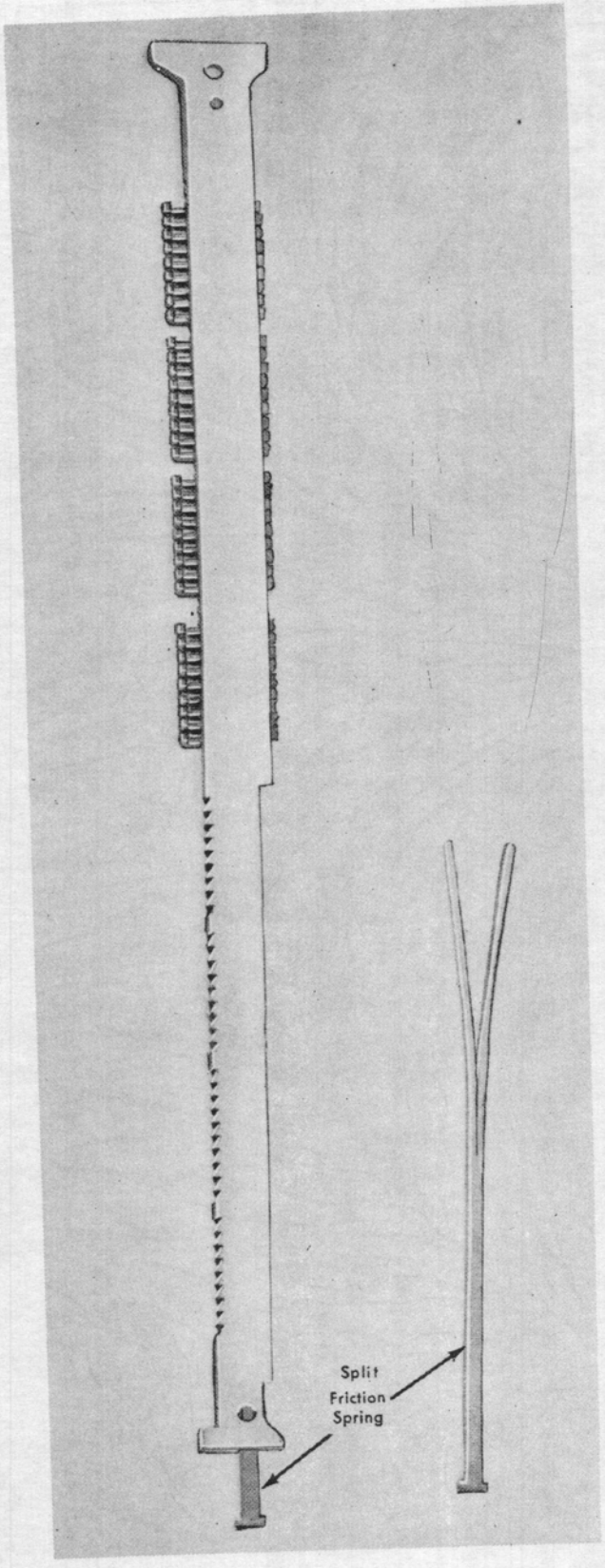


Figure 240. Type 552 Type Bar and Friction Spring

matic of the feed mechanism and the essentials to printing. It also shows that at the time printing takes place the card is upside down, which requires that the type face on the type also be upside down.

552 Type Bar

The 552 type bar is shown in Figure 240. This type bar contains 36 pieces of type (26 alphabetical characters and 10 numerical characters). There is a tooth on the rack for each piece of type instead of one for each numerical character as in the 402 type bar. Also the type in this bar is grouped according to zone punches rather than numerical punches.

The type bar is zoned before the numerical position is selected. To do this, it is necessary to determine from which group of characters printing is to take place. To explain how this is done, it is necessary first to know the construction of the print unit which houses the type bars.

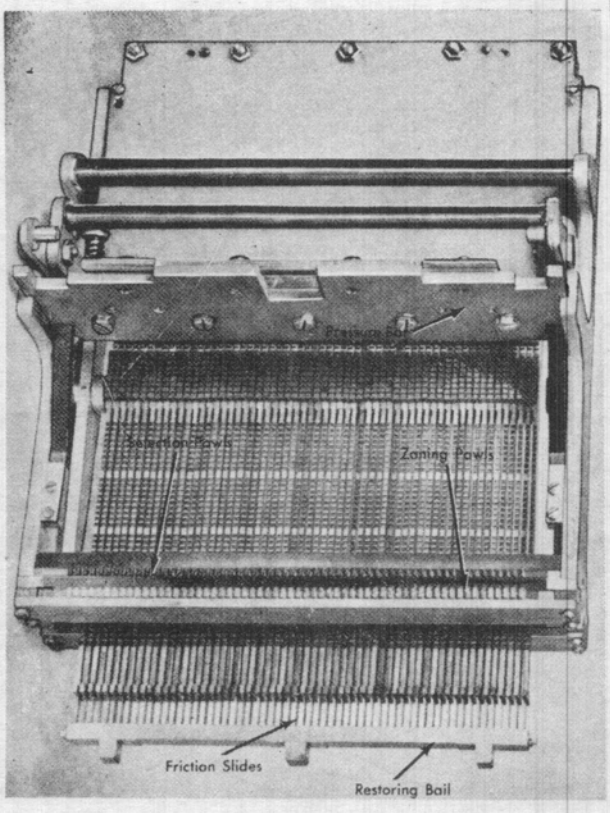
Print Unit

Basically, the print unit consists of 60 type bars and their individual zoning and selecting pawls. It also has a zoning pawl restoring lever bar and a type bar restoring bail. Figure 241 shows a print unit out of the machine. Figure 242 shows the parts of the print unit removed from the unit, but in their correct relative position.

The type bars in this machine are normally held up by a zone pawl resting against a shoulder of the type bar. When the zone pawl is released, the type bars move down to reach the printing position.

Assume the zone pawls are not preventing the downward movement of the type bars. The type bars will then follow the movement of the restoring bail as it moves up and down. The type bars are connected to the restoring bail by means of the split friction spring. The friction between the split spring and the type bar is more than enough to support the weight of the type bar. This prevents the type bars from dropping onto the restoring bail when released, and causes them to move down at the same speed as the restoring bail.

As the type bars move down, a selecting pawl is moved in to engage a tooth in the rack of the type bars to position a specific piece of type to be printed. The restoring bail continues to move down pulling the friction springs out of the type bars which holds the type bar against the selecting pawl.



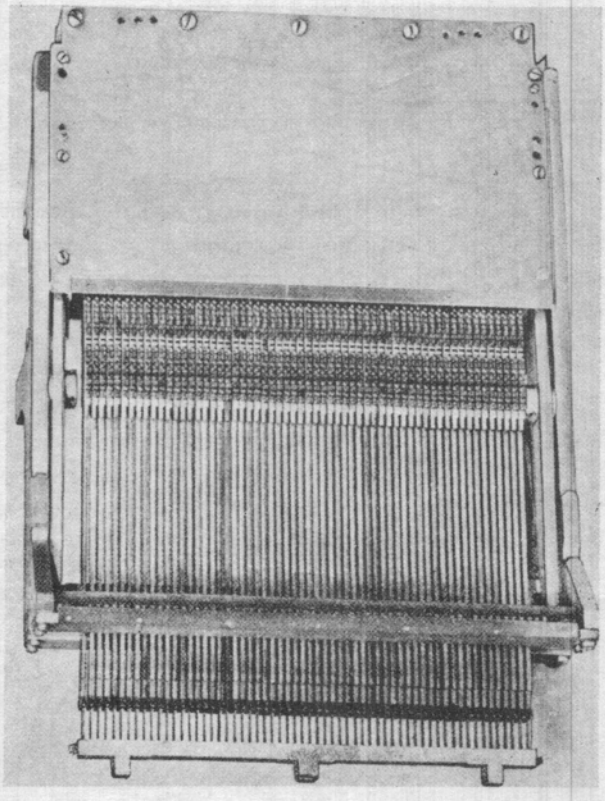


Figure 241. Type 552 Print Unit

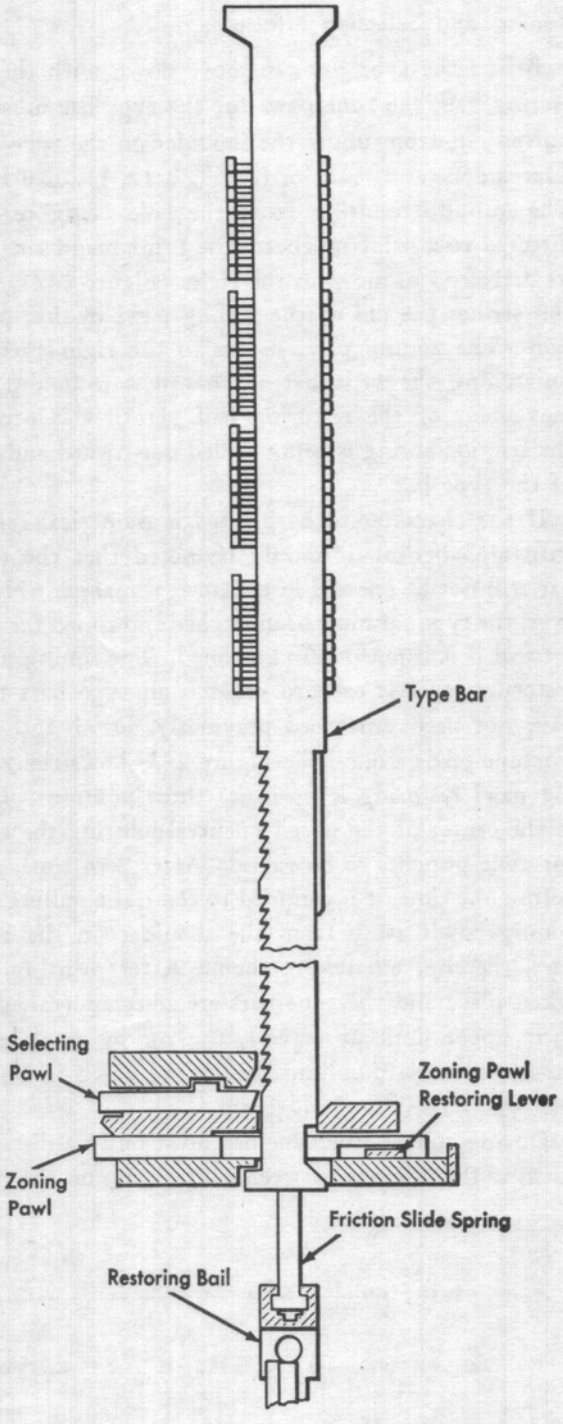


Figure 242. Type 552 Print Unit Mechanisms

Zoning and Selecting Principles

Before the type bar can move down with the restoring bail, the zone pawl for the type bar must be moved out from under the shoulder on the type bar. This is done as a result of reading a 12, 11, or 0-hole. The impulse resulting from the hole being read is directed to a print magnet. The print magnet causes its drive rod to move to the right (Figure 242), and this strikes the tail of the zoning pawl in that position. The zoning pawl moves to the right thereby unlatching the type bar so that it can follow the movement of the restoring bail. Until this occurs, the friction spring is being pulled downward and out of the type bar.

If the character to be printed is numerical rather than alphabetical, it should be noted that the type bar will not be released in the normal manner. However, the type bar must be unlatched and zoned for numerical if it is not otherwise zoned. The zoning pawl restoring lever is used to unlatch all type bars that have not been unlatched previously, just before the machine reads a one-hole. Figure 243 shows the zoning pawl restoring lever in its three positions. It is in the center of the notch (neutral) during the time for zone punches to be sensed. After zero time, and before one time, it is cammed to the right pulling the zoning pawls away from the shoulder on the type bars, thereby, unlatching them. After printing has taken place and the type bars are restored (raised to their upper limit of travel), the zoning pawl lever moves to the left pulling the zoning pawls in under the type bars, relatching them.

During zoning, the type bar must move a distance equal to the distance between zone groups on the type bar while the card is moving only the distance between adjacent punching positions. However, when selecting the numerical information, the type bar has only to move the distance between adjacent teeth on

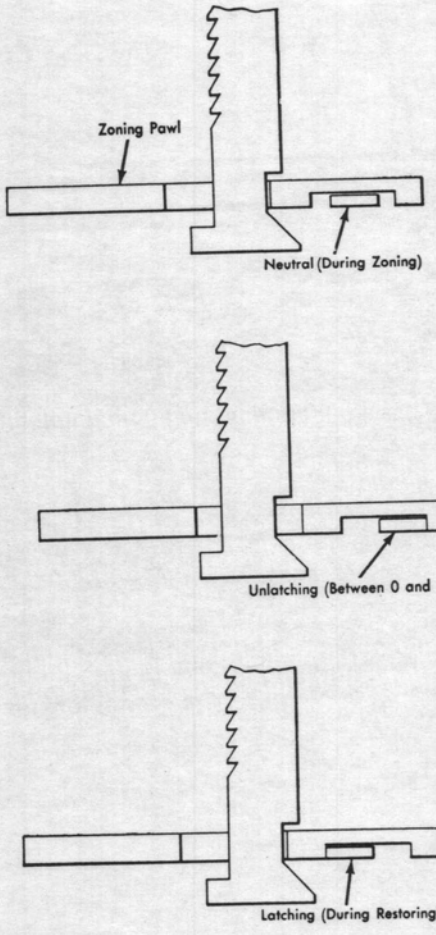


Figure 243. Zoning Pawl Restoring Lever Positions

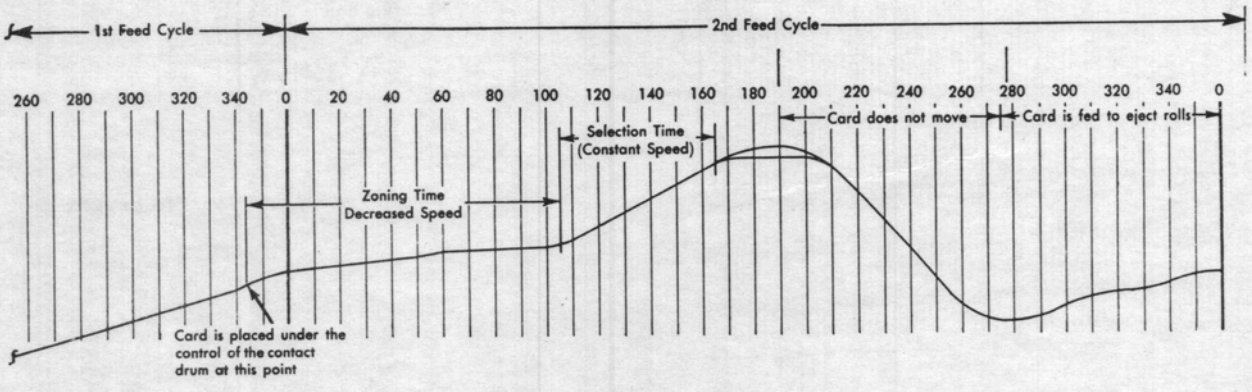


Figure 244. Timing Chart of Card Movement

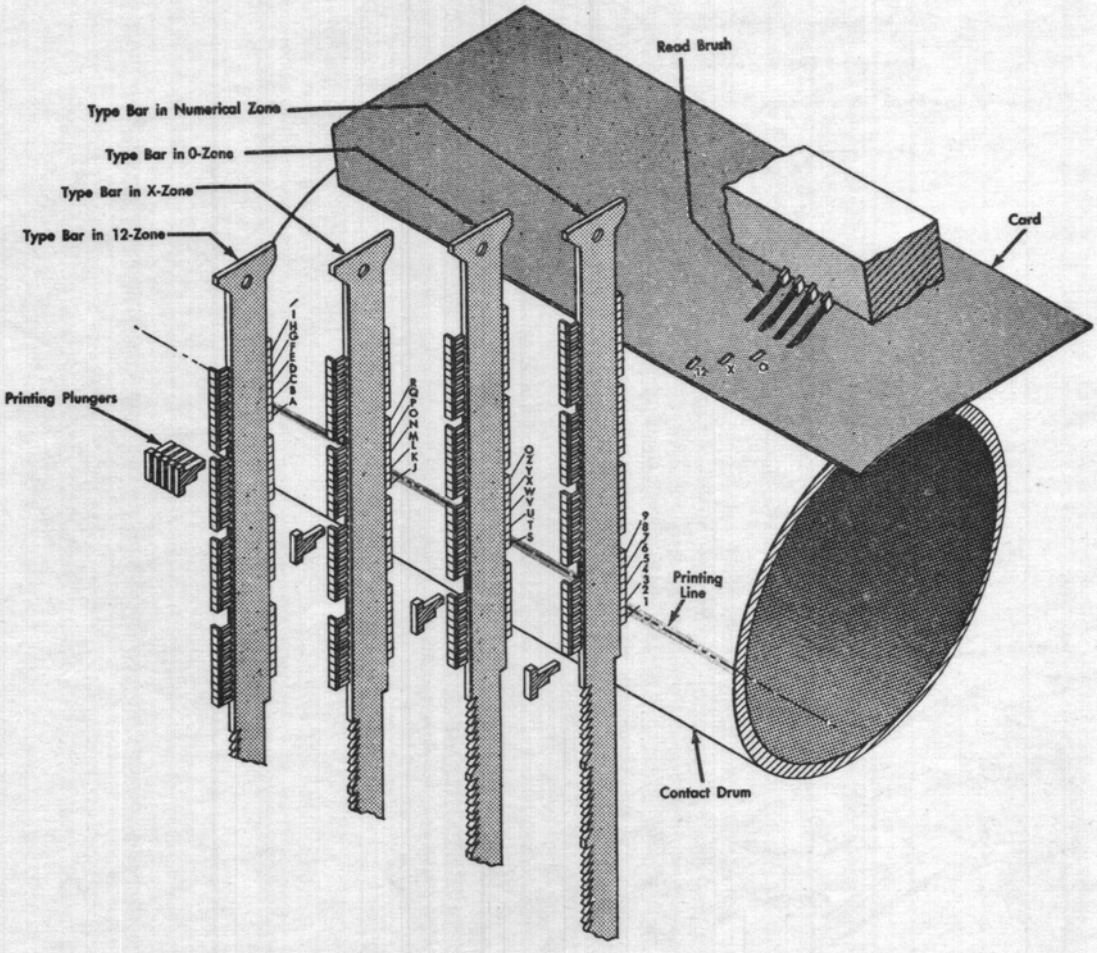


Figure 245. Type Bars with Each Zone Setup

the rack while the card moves the distance between adjacent punching positions. Consequently, the card is driven at variable speeds, slowly during zoning and faster during selection. To enable the type bars to move the distance necessary, the restoring bail and type bars move faster during zoning than during selection.

Figure 244 is a chart showing the card movement during an entire machine cycle. The line indicates relative speeds of card movement. The card actually moves only when the slope is upward, or positive, and the greater the slope the greater the speed. It should be pointed out that the cycle shown is for the time when the card is under the control of the contact drum only. The card moves at a constant speed otherwise.

Type bars zoned from 12-holes start their downward movement before any others. The next group to start down are those for an 11 zone, then a zero zone, and finally those which were not zoned from the card will be zoned for numerical. Figure 245 shows four type bars each of which is zoned for a different zone. As the card moves from 1 to 9, the type bars move down one tooth or piece of type each time the card moves from one punching position to the next.

As the type bars move down together for selection, it is just as important that they move in exact synchronism with the card, as in the Type 402 machine. The type bars, moving down with the restoring bail, are held up by the friction of the split spring alone and this is not positive enough. Also there is no assurance that the type bars are perfectly in line, which they must be in order to print properly. To be certain that these requirements are met, zone bails are provided which align all type bars and determine their movement during selection.

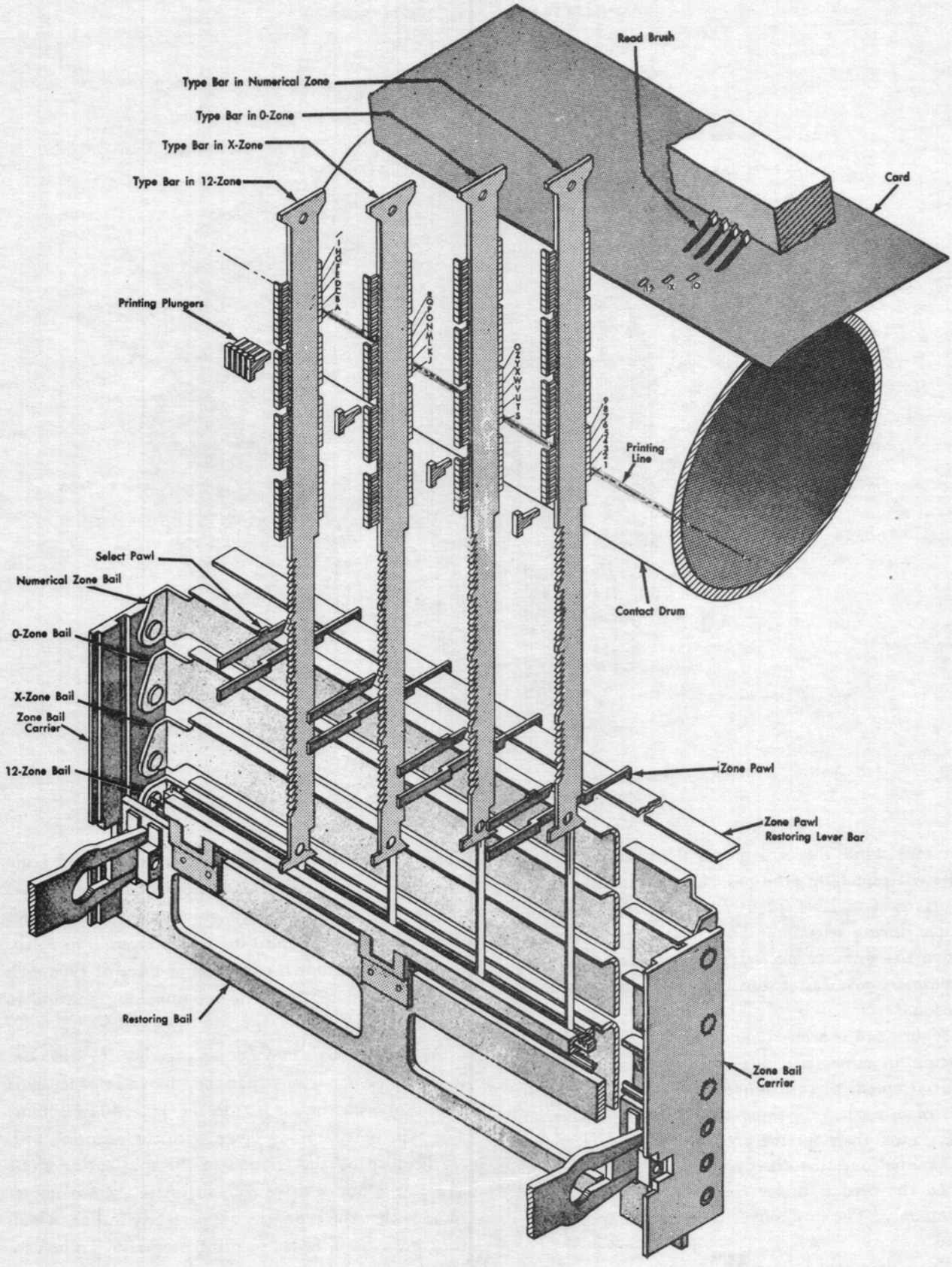


Figure 246. Zoning Bails and Carriers

The zone bails and the zone bail carriers are shown in Figure 246. In this figure, the toes of the type bars are resting on the zone bails. All of the type bars are lined up by the zone bails because the restoring bail is moving faster than the zone bails. The downward movement of the type bars continues at the speed of the zone bails while the restoring bail moves down slightly faster. This holds the type bars against the bails.

The type bars, which are zoned for a 12, must pass the numerical, 11, and 0 zone bails; those which are zoned for an 11 must pass the numerical and 0 zone bails, etc. The zone bails must permit some type bars to pass and yet stop others, with the exception of the 12 zone bail. To enable the zone bails to accomplish this, all but the 12 zone bail are pivoted so that they can be held out of the path of the type bars. Then as the type bars approach the zone bails they are to rest on, the zone bails are pivoted to engage the toe of the approaching type bars. The mechanism used to control the movement of the zone bails under the type bars is shown in Figure 247. As the cam follower moves to the low dwell, the bails will be moved in to engage the toes of the type bars. This will occur between the time that a zero and a one is read.

Very soon after the bails have moved under the toes of the type bars, all type bars which have not previously been unlatched for a 12, 11, or 0 zone will be unlatched so that they can rest on the numercial zone bail during selection time. The type bars are then moved down under the control of the zone bail carrier. The zone bail carrier, controlled by cams, is synchronized with the card movement to insure proper selection.

A select pawl is provided to engage a tooth in the type bar rack and position the type bar to print the desired character. The selecting pawl is moved in to engage a tooth as a result of an impulse from a hole in the card energizing the print magnet. The energization of the print magnet releases the drive rod which strikes the tail of the selecting pawl moving it into the teeth of the type bar rack. The drive rod is the same one used to strike the zoning pawl, and its operation will be covered in detail a little later.

Assume a type bar is zoned 12, when selection begins. The digit punching in the card column wired to this position is a 5. As the 5-hole is read, the impulse ultimately causes the drive rod to strike the tail

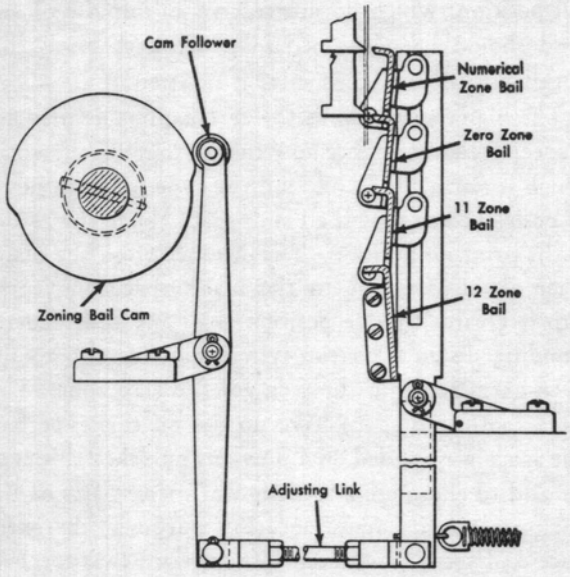


Figure 247. Zoning Bail Cam and Operation

of the selecting pawl in that position. The selecting pawl will move into engagement with the 5th tooth in the 12 zone section of the type bar. Several degrees later, as the bar continues to move downward, the 5 tooth comes to rest on the selecting pawl, thereby positioning the letter E on the printing line.

A 5 will be positioned to print if the type bar is in numerical zone. If selection is made in the 11 zone an N will print, and if in the zero zone, a V will print. However, if there are no holes punched from 1 to 9, the type bar will move to the lower limit of its travel which is determined by the lower limit of travel of the zone bail carrier.

Observation of the type bar shows that the position immediately above the 9, R, and I is blank so that nothing will print if there is no numerical information sensed. However, a zero is in the position above the Z because if a zero is sensed and the type bar is zoned zero, but there is no other numerical information punched in the column, it is a numerical zero and should print as a zero. Special characters can be placed above the I or R to be printed from a 12 zone punch alone or an 11 zone punch alone if it is desired. A special character could also be added in the position below the S for a 0-1 combination. The space above the nine cannot be used for a special character because all type bars are zoned for numerical which are not zoned for either a 12, 11, or 0.

All positions which do not receive an impulse of any kind should be positioned in a blank space so that nothing will be printed in that position.

The blank space above the zero cannot be used for a special character because the zero is in the space which is normally blank, and the type bars can never be positioned so that the blank space above the zero is in the printing position. The distance from the blank space above the nine to the blank space above the zero is greater by one position than any other corresponding distance on the type bar. This also results in an extra tooth in the rack for the zero zone. This extra tooth and space have no use on this type bar. The space was needed on a previous model of this type bar and to eliminate a re-design of many parts of the machine and for manufacturing purposes, the extra space and tooth have been left on the new type bar.

Print Magnet Unit

The print magnet unit provides the electrical control needed so that the machine can be directed to print information which is punched in the card. The print magnet unit is designed to operate the zone pawls and select pawls by means of drive rods. Figure 248 shows a single position of the print magnet unit and its component parts. When the print magnet is energized, the armature unlatches the drive rod lever. The drive rod lever spring causes the drive rod lever to rotate in a counterclockwise direction as soon as it is unlatched. The drive rod lever then moves the drive rod to the right causing it to strike the tail of either the zone pawl or selecting pawl. The drive rod spring, being much weaker than the drive rod lever spring, will be compressed. The purpose of the drive rod spring is to return the drive rod when the drive rod lever is relatched on the armature.

During the time that zones are being sensed, the drive rods are positioned in line with the zone pawls as shown in Figure 248. However, between 0 and 1 time, the pin bail is raised by the drive rod operating arms so that, during selection time, the drive rods will be in line with the selecting pawls.

The drive rods must be restored to their normal position between 0 and 1 time, so that an impulse resulting from a digit-hole can cause the drive rod to strike the selecting pawl. Both the restoring of the print unit mechanism and the raising of the drive rods are controlled by cams, Figure 249 shows the time during the cycle when they occur, and their relationship.

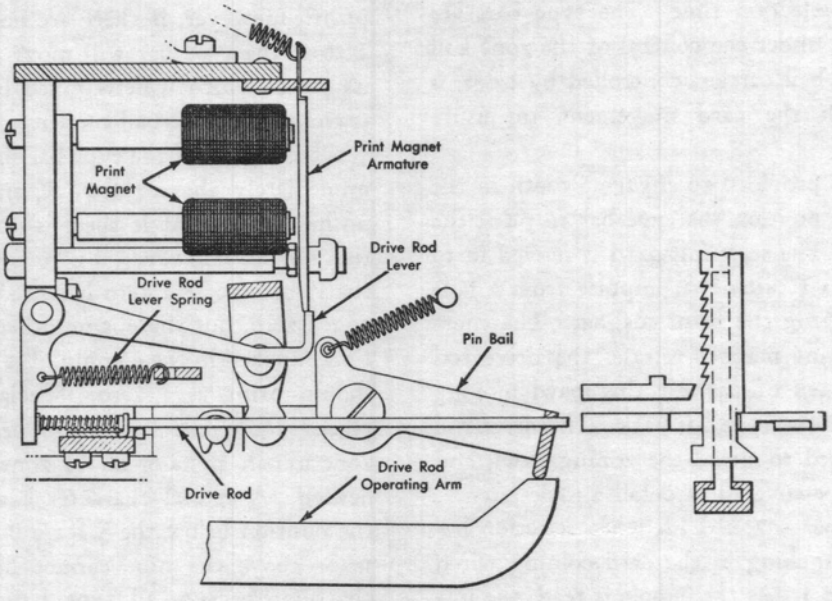


Figure 248. Print Magnet Unit

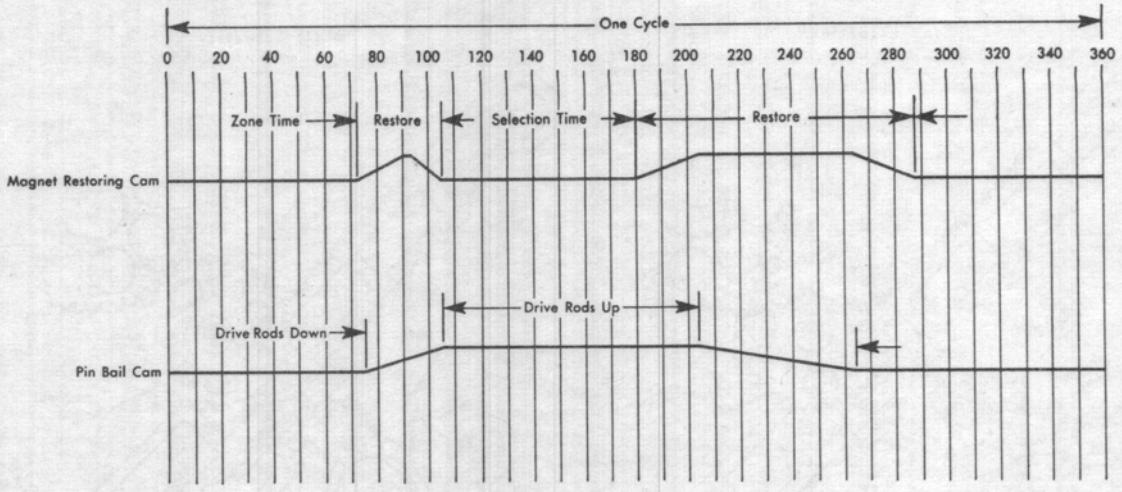


Figure 249. Print Magnet Unit Timing Chart

Printing Plungers and Pressure Bar

It should be remembered that in the Type 402 printing mechanism a hammer was used to strike the type tails to cause printing. That type of printing is referred to as impact printing.

The Type 552 printing is known as pressure printing. The printing plungers do not strike the type tails but instead are pressed against them. Figure 250 shows the pressure bar which holds the printing plungers. There is a printing plunger for each type bar but they all move together with the pressure bar. The pressure bar is operated each cycle by two cams which are geared to make one revolution per machine cycle.

Figure 251 shows the pressure bar and print cams. Two cams mounted on a single shaft operate on the two ends of the pressure bar. The pressure bar is driven toward the type tails as it rides up the high lobes of the print cams. This action presses the printing plungers against the type tails causing printing. To prevent damage to the type and platen, the pressure is transmitted to the printing plungers through a rubber pad.

The leaf spring holds the pressure bar against the print cam. As soon as the pressure bar begins to move from the high dwell to the low dwell on the print cams the spring begins to restore the pressure bar. However, to be certain that the printing plungers are clear of the type tails before the type bars begin to move again, it is cammed back by the return cam and return cam follower.

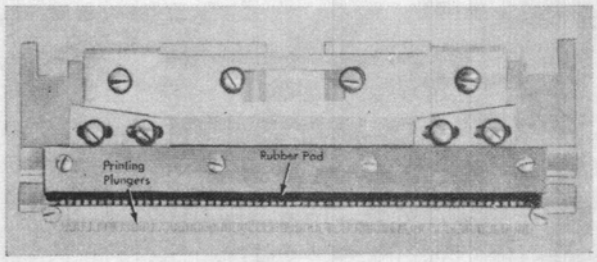


Figure 250. Printing Pressure Bar

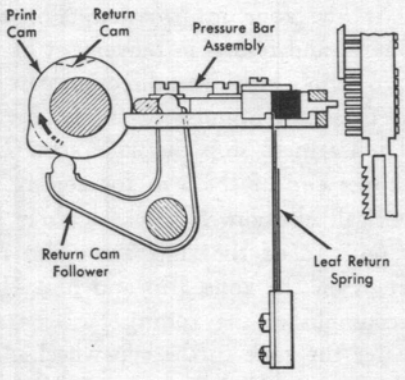


Figure 251. Print Cams and Pressure Bar

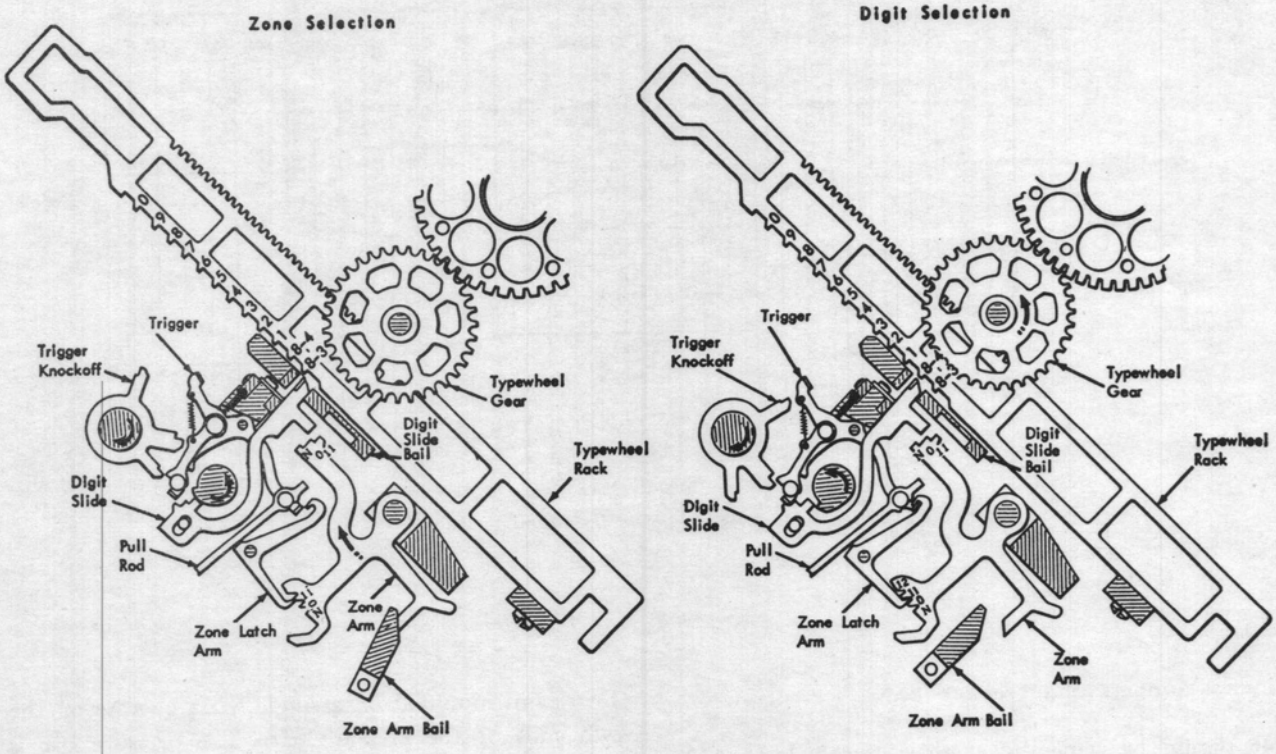


Figure 252. Zone Setup

TYPE 557 PRINTING MECHANISM

Zone Unit (Figure 252)

The three phases of the operation within the zone unit are:

1. Read in the zone information. The zone-arm bail starts at 1° and results in movement of the zone arms upward or in a clockwise direction past the zone latch arm. The zone impulse to the magnet releases the zone latch arm to stop the zone arm. This positions the upper end of the arm for zoning the slide after numerical selection. Notice the three levels on the upper position of the zone arm; also the three selection steps on the zone arm and how their relationship accomplishes the zoning.

2. Transfer the zone to the typewheel. After numerical selection and just before printing, the digit slide bail lowers the slides onto the zone arms. This turns the typewheel to select the zone position within the numerical classification. All zone arms set up for a 12 zone do not stop their respective digit slides. For 12 zones only the digit slides follow the digit slide bail past the zone arms and come to rest when the bail is stopped by the 12 zone stops.

3. Restore the zone latch arm. The zone latch arms are restored by the high point above the 12 tooth of the zone arm. This occurs when the zone-arm is at full downward position, just before reversing its direction of movement.

Numerical Selection

The rack drive cams start moving the racks downward at the beginning of the cycle.

The numerical punches in the card are read after the zones and energize the same print magnet. At-

tracting the armature moves the pull-rod downward to operate the trigger; and because the digit slide is now off the high dwell of the digit slide cam, the digit slide is released and projects into the teeth of the rack to stop the rack and thus control the typewheel for the numerical selection (Figure 253). Note in this illustration the numerical 3 selection on the typewheel and its relationship to the printing hammers. The *N* or numerical character is in position to print.

After the racks have been stopped by the numerical impulses and before print time, the digit slide bail operates to lower the digit slide onto the zone arm. The rack moves down with the digit slide turning the typewheel to select the zone within the numerical classification. Figure 253 illustrates how the digit slide is lowered onto the zone arm that is set up for the 11 zone and how the typewheel is rotated from the N zone character to the 11 zone character to bring the L into the printing position.

Figure 254 is a cross-sectional schematic view of the 557 showing all major operating units. The machine is positioned at print time, with neither zone nor digit select pawls engaged. Notice the hammer cam just ready to release the hammers, the typewheel aligner bail engaged in the typewheel gear, and the rack positioned at its extreme lower limit of travel by the lower typewheel rack stop bar.

Because of no zone or digit selection, the typewheel face aligned with the hammer is blank and nothing will print. For illustrative purposes the special character pawl, latch, and arm are not shown in their actual print-time position. The special character mechanism would be positioned about thirty degrees counterclockwise from its position as shown. However, to show the function of the trigger in unlatching the special character latch and pawl, the illustration is drawn with the special character mechanism in its nonoperated position.

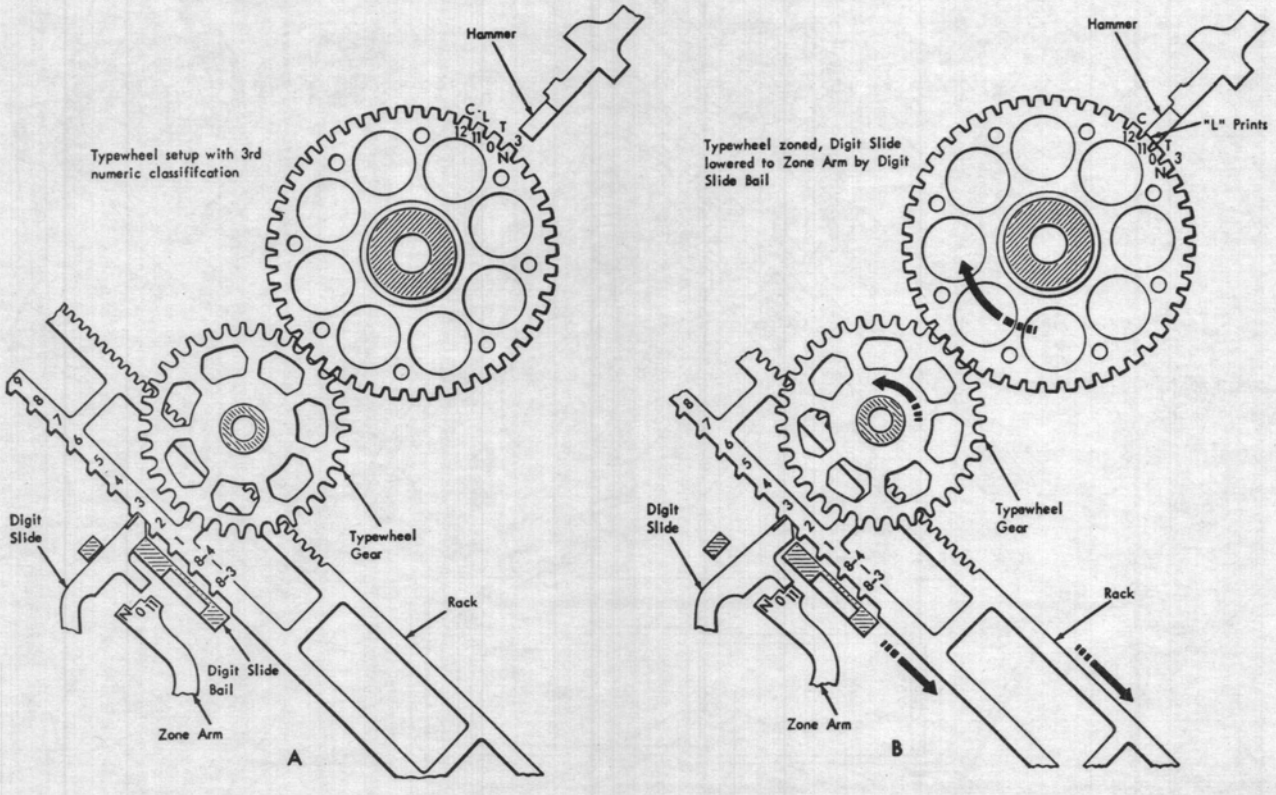


Figure 253. Zone Transfer

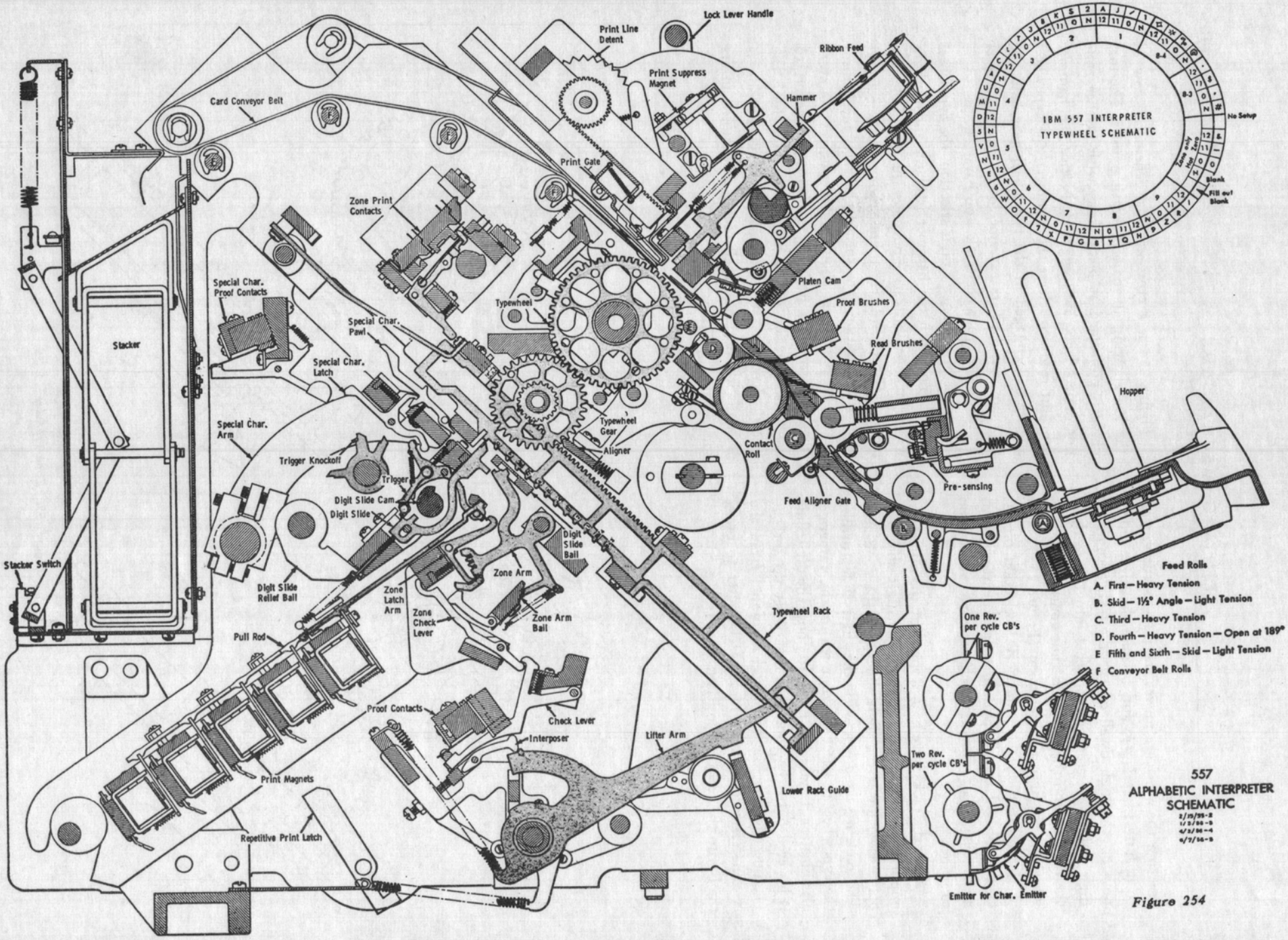

Lock Lever Handle
Print Line Detent
Ribbon Feed
Print Suppress Magnet
Hammer
Card Conveyor Belt
Print Gate
IBM 557 INTERPRETER TYPEWHEEL SCHEMATIC
No Setup
Blank
Fill out Blank
Zone Print Contacts
Special Char. Proof Contacts
Platen Cam
Typewheel
Proof Brushes
Special Char. Pawl
Read Brushes
Stacker
Special Char. Latch
Hopper
Typewheel Gear
Special Char. Arm
Aligner
Contact Roll
Trigger Knockoff
Trigger
Pre-sensing
Digit Slide Cam
Feed Aligner Gate
Digit Slide
Digit Slide Ball
Stacker Switch
Zone Arm
Digit Slide Relief Ball
Zone Latch Arm
Typewheel Rack
Zone Check Lever
Zone Arm Bail
Pull Rod
Proof Contacts
Check Lever
Interposer
Lifter Arm
Print Magnets
Lower Rack Guide
Repetitive Print Latch
Feed Rolls
A. First — Heavy Tension
B. Skid — 1½° Angle — Light Tension
C. Third — Heavy Tension
D. Fourth — Heavy Tension — Open at 189°
E Fifth and Sixth — Skid — Light Tension
F Conveyor Belt Rolls
One Rev. per cycle CB's
Two Rev. per cycle CB's
Emitter for Char. Emitter
557
ALPHABETIC INTERPRETER
SCHEMATIC
2/25/55-2
1/3/56-5
4/2/56-4
4/7/56-5

Figure 254

Triggers and Trigger Knockoff Cam (Figure 254)

The operation of the triggers by the pull-rods has three functions depending upon when the magnets are impulsed.

1. Unlatches the zone latch arms to stop the zone arms.
2. Unlatches the digit slide to stop the racks.
3. Operates the special character latch to unlatch the special character pawl.

The triggers are also operated by the digit slide cam. This occurs during the time when the zone latch arms are being restored to prevent a mechanical interference between the triggers and the zone latch arms as the triggers operate within the gooseneck of the unlatched zone latch arms.

The function of the trigger knockoff cam is to knock off, or restore the print magnet armatures and triggers. Notice on the timing chart of the wiring diagram, the timing relationship at each of the three high dwells:

1. The first high dwell ends just before reading the zones and in addition to restoring the print magnet armature, it also operates the triggers to latch the zone latch arms;
2. The second high dwell ends just before reading of the numerical impulses to operate the triggers to latch the digit slides; this high dwell is longer in duration to fully restore the print magnet armature following a zero impulse;
3. The third dwell ends just before reading the eight impulse for use on machines equipped with special character device.

Digit Slide Cam

The digit slide cam performs three functions:

1. Restrains the digit slides during zone read time to prevent releasing the slides for zones.
2. Restores the digit slide to relatch onto the triggers after the racks are restored.
3. Cams the triggers to move them away from the zone latch arms so that the latch arms can be restored.

Reference to the mechanical timing chart will disclose that the high dwell ends just before reading the 1. The restoring of the slides starts when the racks are almost fully restored.

Digit Slide Bail

The digit slide bail lowers the slides to the zone arms; the racks move with the slides because of the lifter arm spring tension. The position of the zone arms determines the amount of rack movement that will result in turning the typewheels the required distance to select the zone character within the numerical classification. This turning for selecting the zone will be 3 type positions for the 12 zone, 2 for the 11 zone, 1 for the 0 zone and only a slight movement for the N or no zone. The timing chart shows that the bail starts to operate before printing and restores shortly afterwards but before the racks start to restore.

Digit Slide Spring Relief Bail

This bail relieves the spring tension on the slides shortly after the racks and slides are being restored. This reduces the wear on the parts when the racks move up during restoring.

Rack Lifter Arms (Figure 254)

The lifter arm bail operates the 60 lifter arms to move the racks downward during setup time. Springs hold the arms against the bail; and when the digit slide stops the rack, the bail continues on down carrying the other racks.

After printing, the bail moves up, restoring the racks to the top for use on the next cycle.

The mechanical timing chart for the rack drive cams shows two levels of movement: one at the lower and the other on the upward travel. The lower level is an undercut on the front and rear complementary cams to provide latching clearance between the repeat print latch and the complementary cam follower arm on machines equipped with the repetitive print device. On all machines the additional level on the upward travel provides for a ripple restore with the rear end of the bail operating 6° later than the front. This reduces the noise and distributes the load.

Print Aligner (Figure 254)

The print aligner consists of a bail that is inserted into the typewheel gears before printing time to align the typewheels. Clearance is provided between the typewheel gear and the rack to permit the aligner bail to align the typewheel gear without moving the rack.

Zero Contacts (Figure 254)

These contacts provide for the electrical control of zero printing. The low dwell of the cam lowers the levers onto the racks. The cut on the rack is so located that the contacts make only in the position where the rack has been stopped by the hot "0" or not stopped by any digit. The function of the cam is to hold the zero print contact levers clear of the racks, except during setup time, to minimize wear.

Print Gate (Figure 255)

The print gate is positioned by the print-line knob for the desired printing line, and the gate movement is controlled by a rack. A contact is operated by the detent to interlock the machine if the knob is turned while the machine is running or if the knob is left in a half-way position.

The gate is raised and lowered by a cam. When lowered, the gate fingers ride within channels on the shield with the exception of line 1 where it is off the edge of shield. Two stop screws on the print gate control the downward position at line 1. A special camming arrangement consisting of two arms raises the print gate when the print knob is turned from line 1 while the gate is down. This prevents the gate from catching on the edge of the shield.

Print Unit (Figure 255)

Sixty individual hammers are released at the same time by a cam. Springs attached to each of the hammers provide the force to the hammer for printing. The same cam restores the hammers. The lower end of each hammer has a nylon tip that strikes the card.

The hammer camshaft is driven through a one-tooth ratchet on the drive gear. This keeps the cam from turning backwards when closing the upper section.

All sixty hammers may be prevented from striking the card by means of a suppress bail. The bail is mounted on the front and rear arms that pivot about a small shaft above the hammer camshaft.

Located on the hammer camshaft is the print suppress cam that operates a roller on the rear bail arm and allows the print suppress bail to move under the projections of the hammers during print time to suppress printing. For a printing operation, the bail is latched in position so that it cannot follow the suppress cam to prevent printing. The print suppress magnet and armature latch are mounted on the inside of the gear print unit side frame.

Every cycle, the rear suppress bail arm is unlatched from the magnet armature to suppress printing unless it is controlled. This has to be set up by control-panel wiring, which will energize the suppress magnet and latch the bail to allow printing. The hammer stop bar limits the travel of the hammers. This prevents smudging when set up for a blank and prevents embossing when printing a character.

Step-by-Step Review of Printing Operation

1. Trigger knockoff relatches triggers and restores print magnet armatures.

2. Zone punches energize the print magnet, releasing the zone latch arms to stop the zone arms. If no zones are read, the zone arm will stop in the N position. The digit slides do not operate because the digit slide cam is on the high dwell.

3. Rack-drive cams begin to lower racks. Movement of racks is not significant until 1 time.

4. The digit slide spring relief bail applies pressure to the digit slide springs.

5. The trigger knockoff cam relatches triggers and restores print magnet armatures.

6. Numerical punches energize print magnets to release the digit slides and engage the corresponding tooth in the rack. This stops the rack to select the numerical classification on the typewheels.

7. The trigger knockoff relatches the triggers and restores the print magnet armatures. This is just before 8 time and is utilized in machines equipped with the special character device.

8. The hot 0 energizes the print magnet depending on zero contacts and control-panel wiring. This has no significance if previously energized by a numerical impulse. If the magnet is energized, it releases the slide to stop the rack at the 0 tooth to select the zone only classification on the typewheel.

9. The digit slide bail lowers the digit slides down onto the zone arms. Because the slides are engaged in the racks, the typewheels are turned to the 1, 2, or 3 type position to select the zone character in each classification.

10. The print aligner bail engages in the typewheel gears to align the typewheels.

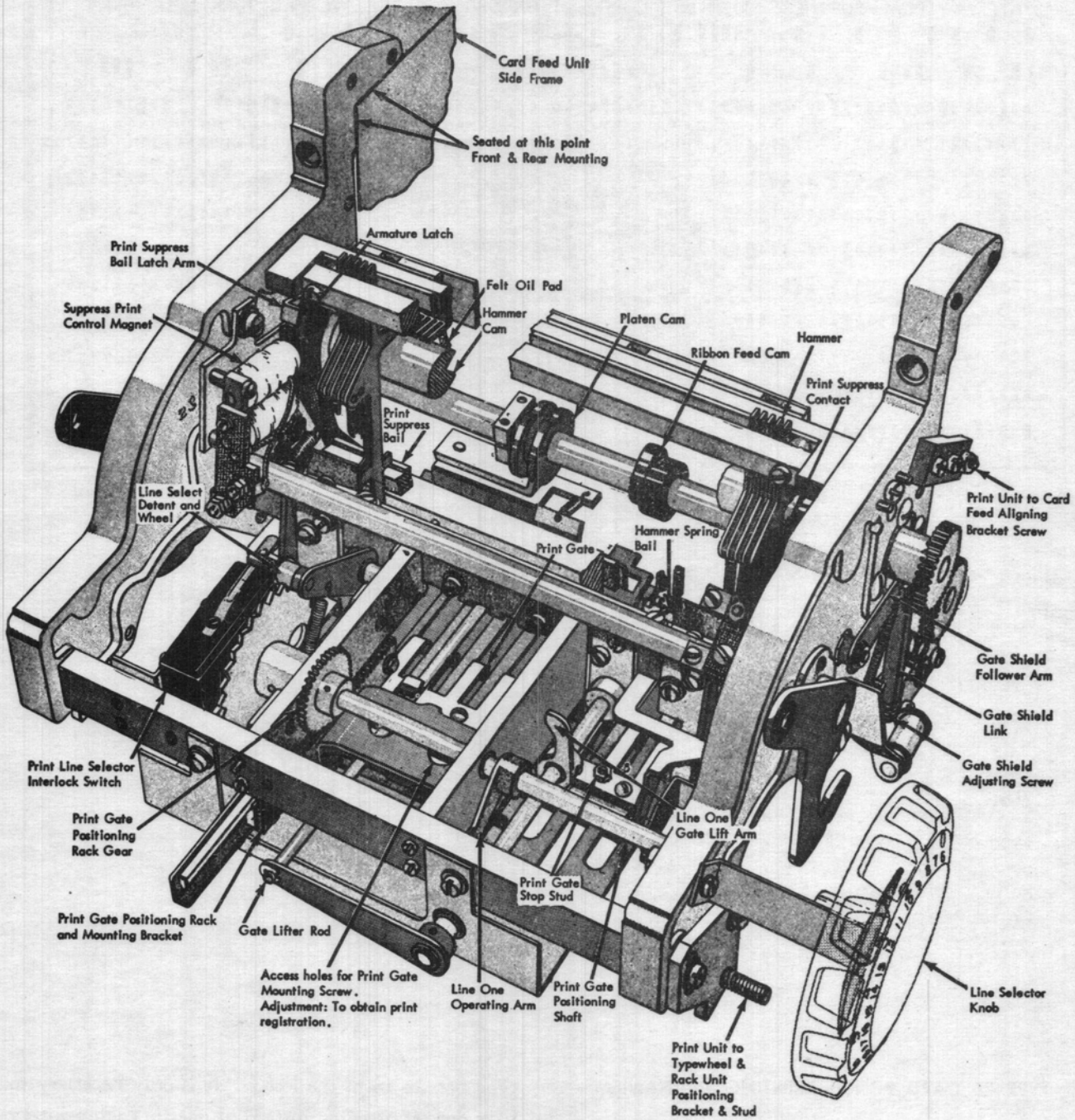


Figure 255. Print Unit

11. The platen cam lowers the card guide, and the shield cam lowers the shield to position the card close to the typewheel faces.

12. All the hammers fire to print the characters set up in the typewheels. The unused positions and zeros to the left do not print because the print magnets were not energized for numerical selection. The rack, therefore, has traveled all the way down, turning the typewheel to the no setup blank position.

13. The hammers, platen, and shield are restored.

14. The print gate is raised, and the card is advanced into the stacker.

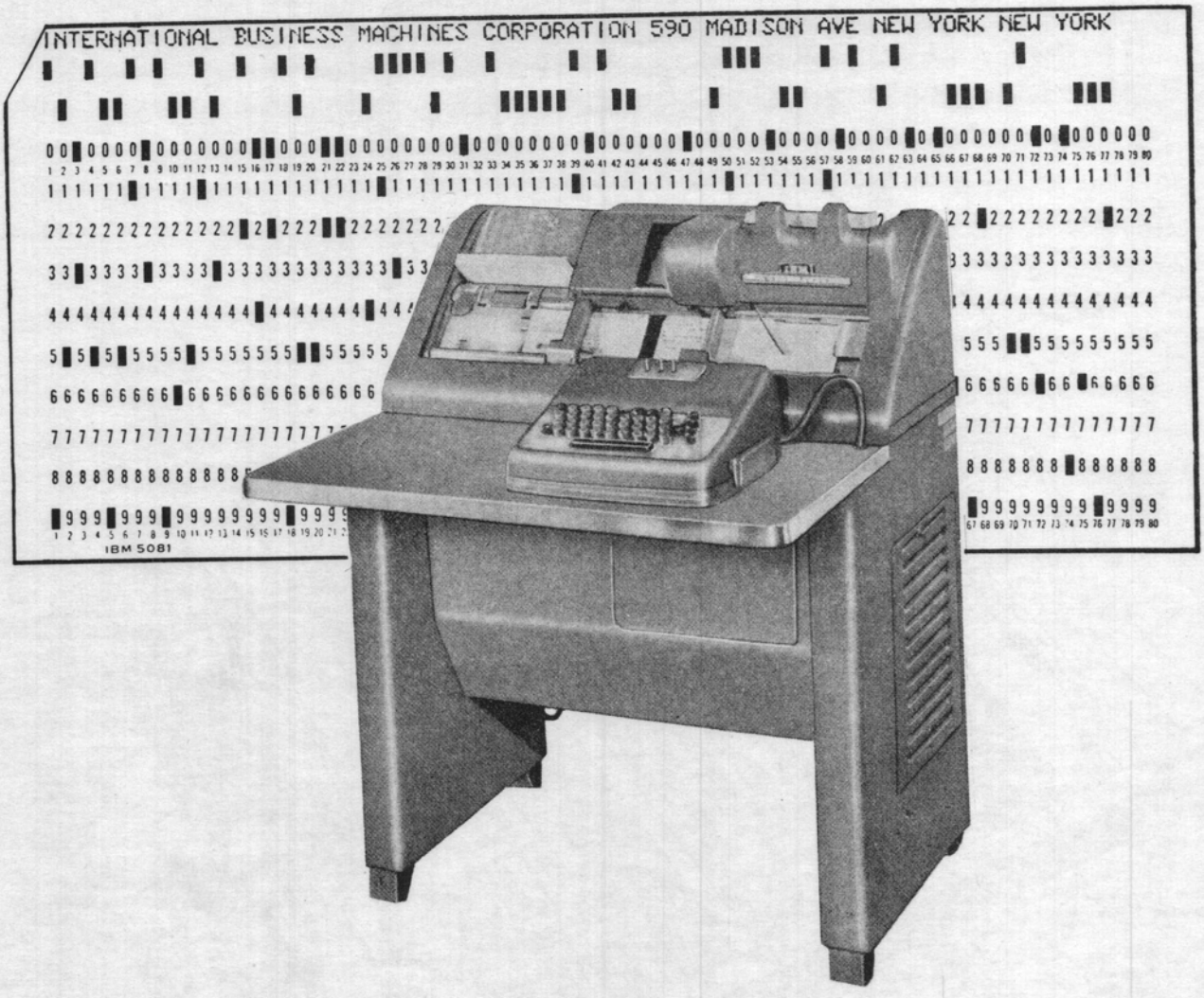


Figure 256. Type 26 Card Punch and Interpreted Card

TYPE 26 CARD PUNCH PRINTING MECHANISM

THE TYPE 26 Card Punch is used to interpret cards as the cards are punched. The Type 26 Card Punch is capable of printing information across the top of the card above each of the 80 card columns. The printing and punching takes place in the same cycle. Figure 256 shows a Type 26 Card Punch and a card which has been punched and printed by it.

This machine uses the pressure method of printing, but it is unique in that it uses stiff wires instead of type bars to form the letters. It is only necessary to have one set of wires, instead of one for each printing position, because the machine punches and prints only one column at a time.

The wire printing unit consists of 35 sturdy, flexible, stainless steel wires, .009" in diameter, and a funnel guide which provides individual passages for the wires. At the small end of this guide, the wires converge and form a rectangle which is the overall size of a character, as seen in Figure 257.

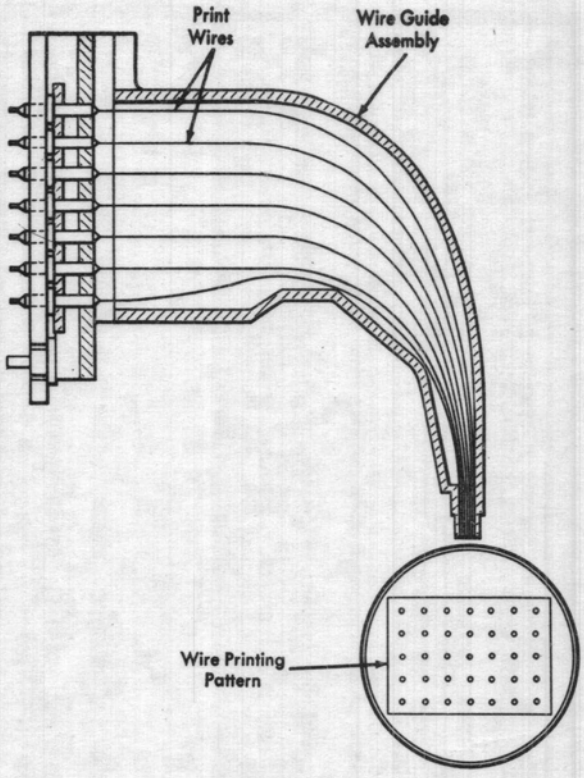


Figure 257. Print Wire Guide

A character is formed and printed by printing a series of closely spaced dots in the shape of the character desired. By pressing on a wire at the wide upper end of the funnel guide, the end of the wire at the small end will be extended to print a dot. If a number of wires are selected and pressed at the same time, a character is printed. An example of wire printing can be seen in Figure 258.

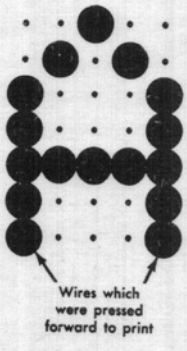


Figure 258. Example of Wire Printing

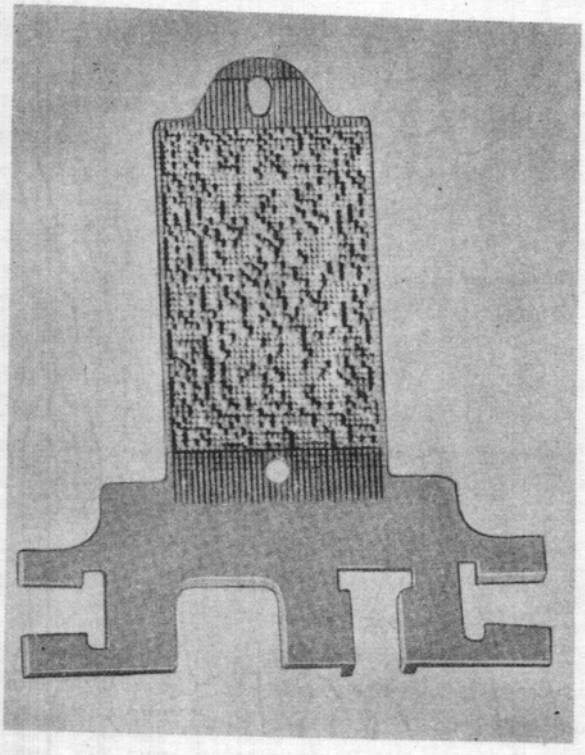


Figure 259. Type 26 Code Plate

Code Plate

To print any character desired, it is only necessary to select the wires to print and provide a means of pressing them simultaneously. A code plate has been designed which will select and transmit pressure to the wires. The code plate, as seen in Figure 259, has projections which outline all characters. The thirty-five wires are sufficient to form all the letters of the alphabet, the numbers 0 through 9, and several special symbols.

The code plate projections are placed so that by shifting the code plate either vertically, horizontally, or both vertically and horizontally, the projections are positioned to form the desired character. Figure 260 is a code plate chart which shows the position of the projections in relation to the 35 print wires. The chart shows the code plate in the normal position, and there are no projections behind any of the 35 wires. If a cycle is taken and the code plate is not shifted, nothing will be printed. This will occur during a spacing operation.

If the code plate as shown in Figure 260 is shifted to the left one square and down one square, the pro-

jections will strike wires to form an A. Recall that the wires converge at the small end of the funnel guide so that, although the wires are widespread at the top, they are held close together at the printing end, with the rectangular form maintained. The wires which are not used to form the A will be over a blank spot on the code plate so that those wires will not be extended to print.

Observe from the same chart, that by shifting the code plate in different combinations, any character can be selected. None of the projections are used for more than one character. The characters appear upside down on the code plate and chart; this is because the code plate is vertical while the card is horizontal. In Figure 261, the print unit is above the 12-edge of the card. The funnel guide has the effect of rotating the character through 90° so that it prints right side up on the card.

Figure 262 is a print code chart which shows the character to be printed, and in small letters the punch code which causes it to be printed. The shift of the code plate can also be determined from this figure. For example, from the normal position, indicated by the blank square approximately in the middle of the

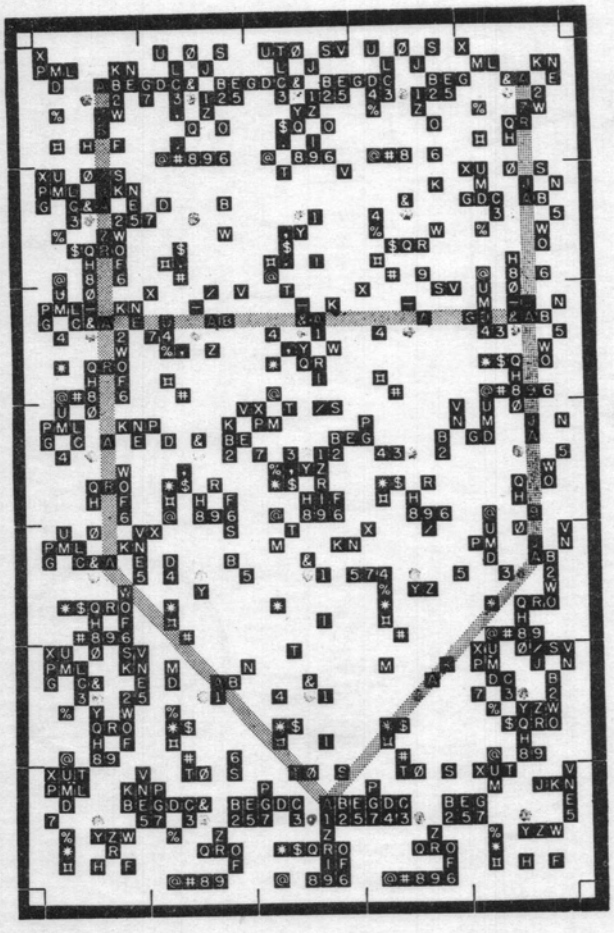


Figure 260. Code Plate Chart

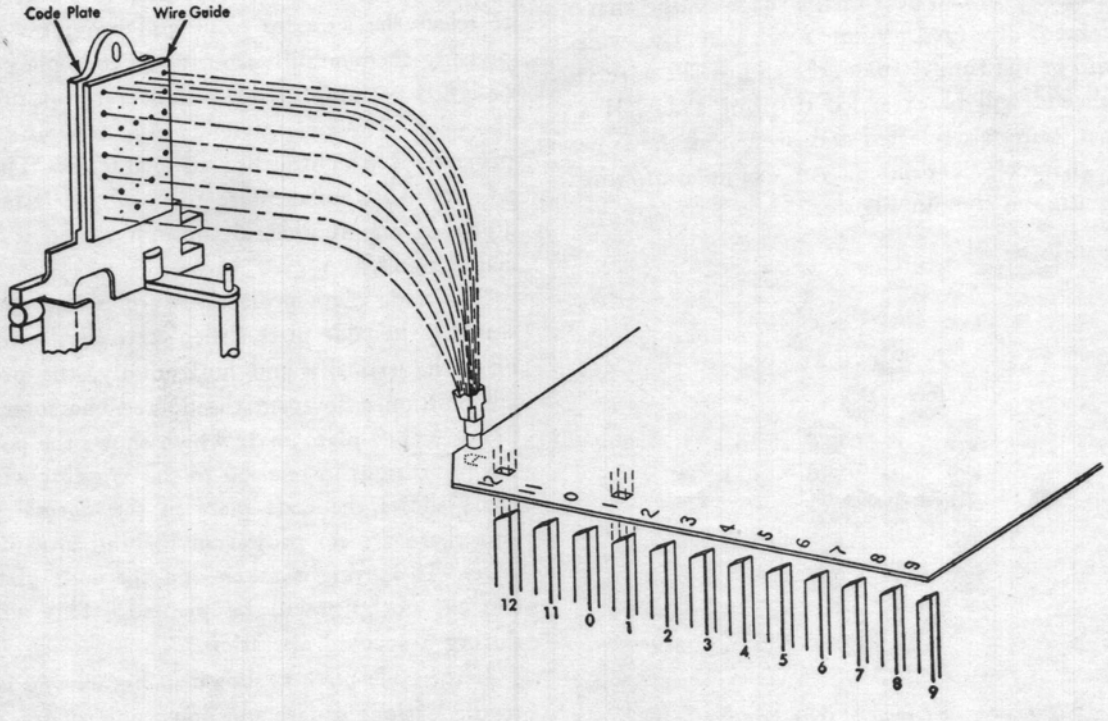


Figure 261. Printing an A

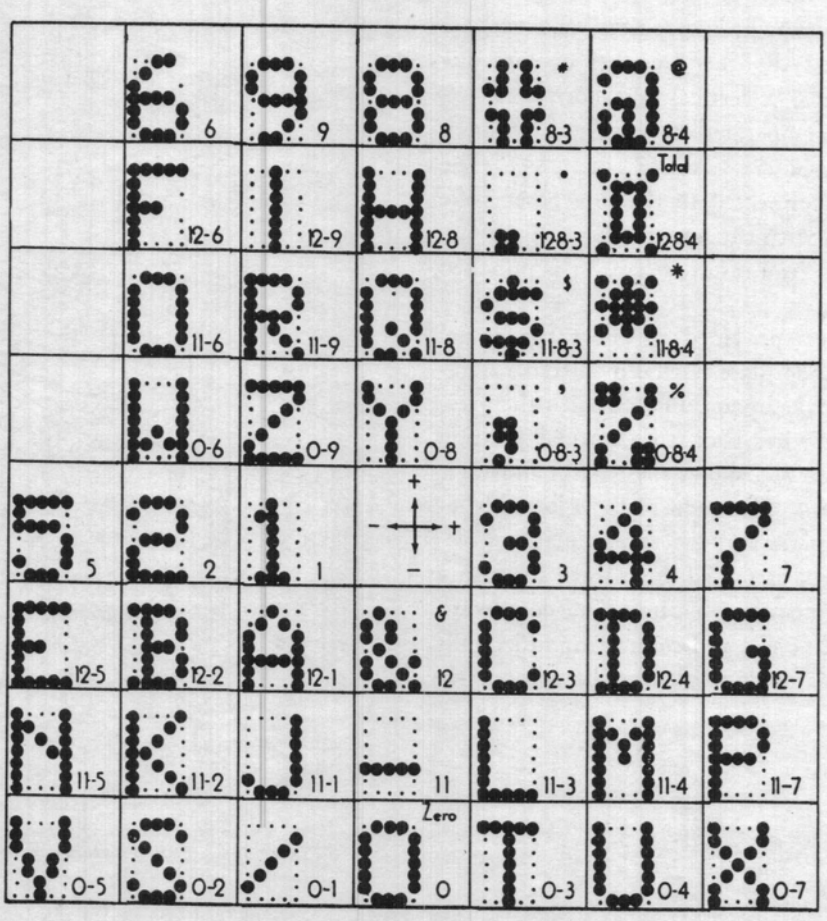


Figure 262. Print Code Chart

chart, the A is displaced one square to the left and one square down. It should be recalled that this was The shift for any character can be determined by the shift required by the code plate to print an A. its disposition from the blank square.

Print Interposers

Print interposers are used to shift the code plate both vertically and horizontally. Figure 263 shows that the code plate is shifted by means of a vertical shift plate and a horizontal shift lever. The horizontal shift lever movement is controlled by the horizontal slide and print interposers. The print interposers are shown in their normal positions, and in this position all interposers have the same width. If the 1 interposer is raised, the cylindrical discs will be able to move into the recesses cut in the interposer. As a result of this action, the spring on the horizontal shift lever will move the horizontal slide in to take up the slack. Consequently, the code plate will be shifted to the left. The recess in the interposer is described as a negative quantity because the code plate is moved to the left. The amount of movement of the code plate will depend on the depth of the cut in the interposer.

If the 3 interposer is moved up, the raised portions of the interposer will force the cylindrical discs apart. This will cause the code plate to be shifted to the right.

The vertical slide and interposers result in a vertical movement of the code plate. The interposers which have a recess cause the code plate to move down; the interposers which have raised portions raise the code plate.

The numbering of the interposers is the same as the punch which operates it. For example, if an A is punched, it should also be printed, and the 12 and 1 interposers will be raised because a 12 and 1 are punched. The two interposers are both "minus one" interposers which is the shift necessary to print an A, as pointed out earlier. In Figure 263, both the 6 and

9 punch operate two print interposers, one vertical and one horizontal. All other punches operate one print interposer, either a vertical or a horizontal.

The interposers are operated by means of a punch extension and interposer yoke (Figure 264). The punch extension is connected to the interposer yoke which will move up with the punch when it is driven up to punch a hole. As a result, whatever is punched will also be printed.

A pressure plate is provided to effect the actual printing after the code plate has been shifted. A return plate which works in conjunction with the pressure plate pulls the wires back to a normal position after printing. Figure 265 shows these parts and their operating mechanism. The code plate is located between the pressure plate and the return plate.

The print drive rod is pulled downward by spring action, under the control of a cam. The downward movement of the drive rod and connecting links pulls the print drive arms downward. As the print drive arms rotate about their pivot points, the points which are connected to the pressure and return plates move to the right. This forces the pressure plate against the code plate, which is forced against the wires to cause printing.

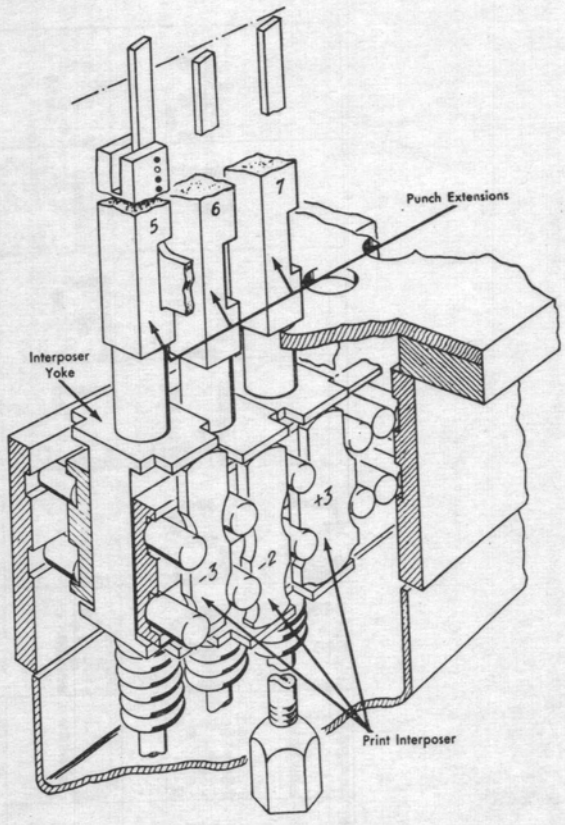


Figure 264. Punch Extensions and Interposer Yokes

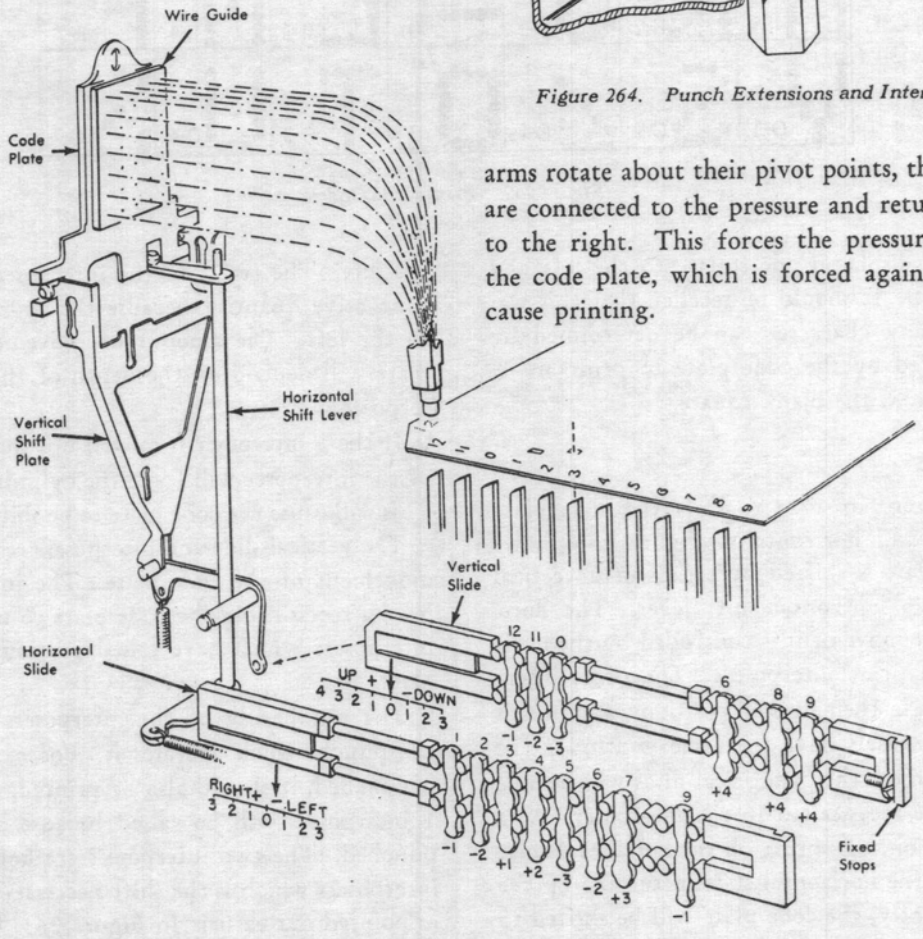


Figure 263. Horizontal and Vertical Shift of the Code Plate

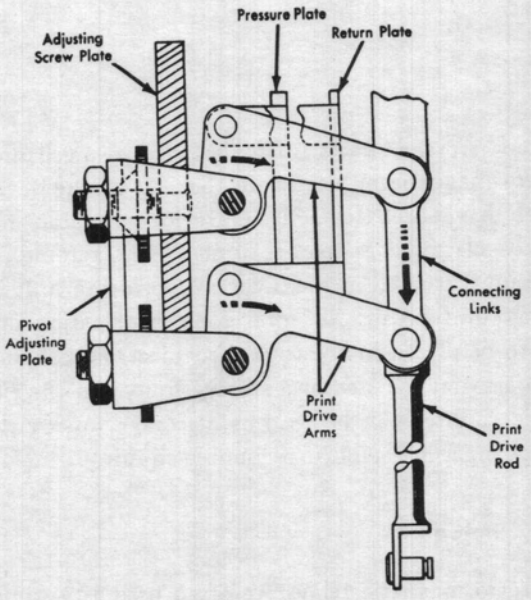


Figure 265. Pressure Plate, Return Plate, and Operating Mechanism

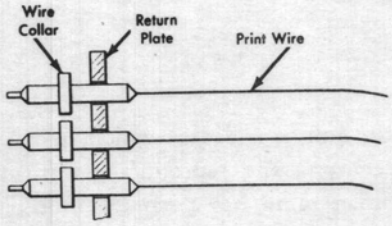


Figure 266. Return Plate and Print Wires

The movement of the print drive rod upward causes the pressure plate to move to the left away from the code plate. The code plate is then returned to normal by spring tension. The return plate also moves to the left pulling the wires back to their normal position. The return plate acts against a collar, which is attached to the print wire and is located between the return plate and code plate (Figure 266).