

BULLETIN NO. 172
ISSUE 2
OCTOBER, 1943

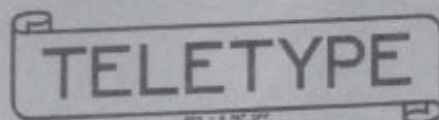
TELETYPE

PRINTING TELEGRAPH SYSTEMS

BULLETIN NO. 172

DESCRIPTION

TYPING REPERFORATOR
(MODEL 14)



REG. U.S. PAT. OFF.
CORPORATION

SUBSIDIARY OF

Western Electric Company

CHICAGO, U.S.A.

BULLETIN NO. 172
ISSUE 2
OCTOBER, 1943

TELETYPE

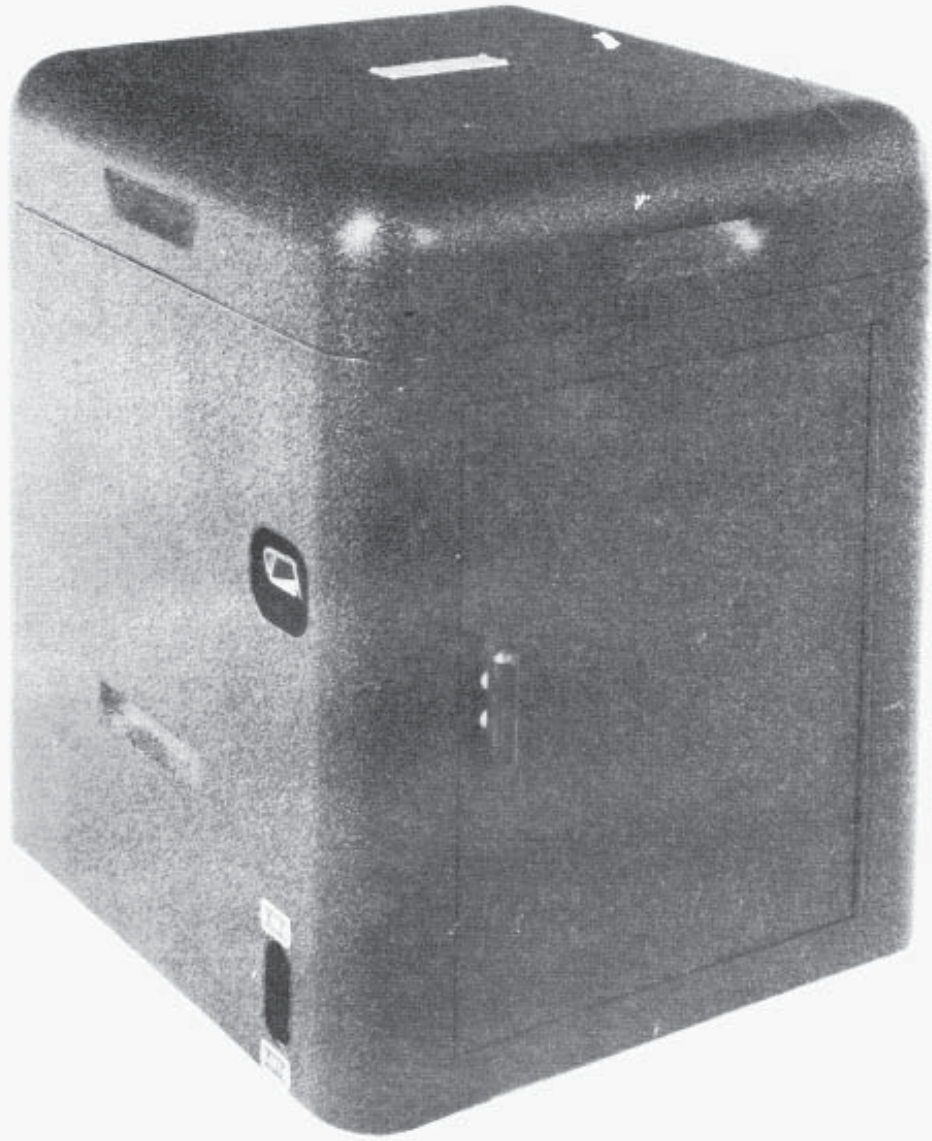
PRINTING TELEGRAPH SYSTEMS

DESCRIPTION
TYPING REPERFORATOR
(MODEL 14)





SENDING-RECEIVING TYPING REPERFORATOR WITH COVER



RECEIVING-ONLY TYPING REPERFORATOR (HIGH BASE)
COMPLETE WITH COVER

DESCRIPTION OF MODEL 14 TYPING REPERFORATOR

C O N T E N T S

	Page
GENERAL	1
SIGNAL CODE	2
DESCRIPTION OF TRANSMITTING UNIT OPERATION	2
DESCRIPTION OF RECEIVING UNIT OPERATION	4
Clutch Throwout Lever	5
Code Bar Locking Lever	6
Main Shaft Assembly	4
Mechanical Tape-Out Alarm	9
Overlap	7
Printing	6
Ribbon Feeding	7
Ribbon Reverse	8
Selecting Mechanism	4
A. Pulling Magnet Selector	4
B. Holding Magnet Selector	5
Signal Bell	8
Spacing	7
Tape Perforation	6
Upper and Lower Case Shift Mechanism	8
MOTOR SPEED CONTROL	9
SYNCHRONISM	9
ORIENTATION	10
DESCRIPTION OF OPTIONAL FEATURES	10
Backspace Mechanism	13
Clutch Throwout Lever Contact Mechanism	12
Keyboard Lockout	13
Line and Selector Circuit Closing Jack	13
Magnet Operated Tape Feed-Out Lever	10
Mechanical End-of-Line Indicator Mechanism	12
Polar-Neutral Key	14
Radio Frequency Induction Suppressors	13
Signal Line Relay	13
Suppression of Printing on Lower Case "Blank" Selection	14
Tape Feed-Out Control Mechanism	11
Unshift on Space	14

GENERAL

The Model 14 Typing Reperforator is a motor driven mechanism for receiving messages over wires and recording the messages in both code perforations and typewritten characters on the same tape. When used with a keyboard transmitter in a local circuit, it also serves the purpose of a keyboard tape perforator. Receiving units of this kind are particularly adaptable for use at message distribution centers because the perforated tape may be used to retransmit the message to one or more stations by means of another unit known as a transmitter-distributor, thus eliminating the necessity for manual transmission by direct keyboard or manual preparation of perforated tape. The typewritten characters on the tape facilitate identification and distribution of the message tape at the message center.

A complete set consists of a typing reperforator unit, a sending-receiving base, or a receiving-only (low) base, or a receiving-only (high) base, and a cover. A complete sending-receiving set, without cover, is shown in Figure 1, a complete receiving-only (low) set, without cover, is shown in Figure 2, and a complete receiving-only (high) set, without cover, is shown in Figure 3. The typing reperforator units used at receiving-only stations are basically the same as those used at sending-receiving stations. A typical typing reperforator unit equipped with a pulling magnet selector is shown in Figure 4. A typical typing reperforator unit equipped with a holding magnet selector is shown in Figure 5. These typing reperforator units consist, essentially, of a motor, a main shaft assembly, a selector mechanism, mechanisms for typing and perforating, a tape feed mechanism, and a ribbon feed mechanism.

Sending-receiving stations employ a base which includes a keyboard transmitter as shown in Figure 6. It consists, essentially, of a tape container, tape-out mechanism, terminal blocks, slip connections, a motor switch, and a transmitting unit. This unit originates electrical impulses of the five-unit signal code for the operation of receiving units at any station to which the signals are transmitted. These signals cause the receiving unit to record the message sent by the keyboard operator. The signals may also be used to operate only the local typing reperforator, preparing perforated tape for use in a transmitter-distributor. This base is also arranged to accommodate certain optional features such as a control relay or a mechanical end-of-line indicator, both of which will be described later along with other optional features.

A typical (low) base for a receiving-only station is shown in Figure 7. It consists of the same essential parts as are provided on the sending-receiving base, except that it does not have a transmitting unit. This base is also arranged to accommodate certain optional features such as a signal line relay base or a control relay, both of which will be described later along with other optional features.

A typical (high) base for a receiving-only station is shown in Figure 8. It consists, essentially, of a frame, a tape reel, terminal blocks, slip connections, and a motor switch. It is also arranged to accommodate certain optional features such as a signal line relay or tape feed-out mechanism, both of which will be described later along with other optional features.

The typing reperforator utilizes standard perforator tape 11/16" wide. A method of tape perforating known as chadless perforating is employed

to permit perforation of the tape in the same space that is occupied by the typewritten characters. The punchings, or chads, are not completely severed from the tape but remain attached to it at their leading edges so as to form lids over the holes. The legibility of the typewritten character is not impaired by this type of perforating because the perforating does not eliminate any portion of the tape.

Typing and perforating occur simultaneously, but due to the fact that the platen is to the right of the perforator die block, characters are typed at the right of their respective perforations. The separation between the typewritten character and its associated perforation is six character spaces. This separation must be taken into account when tearing message tapes from the unit or in cutting the tape. When the tape is to be used for transmission by means of a transmitter distributor, the end of the tape should include all of the typewritten characters in the message, and the first typewritten character of the message must be preceded by at least six sets of code perforations in order to transmit the entire message.

When a message tape is inserted in the tape guide of a transmitter-distributor, if the typewritten symbol of the character to be transmitted is positioned opposite the tape-locating mark impressed in the tape guide, the code perforation for that character will be over the tape sensing pins, in position for transmission. Under this condition, if the tape retainer of the transmitter distributor is fastened over the tape, the tape locating mark will be covered, but the typewritten character will be visible immediately to the right of the tape retainer.

SIGNAL CODE

The signal code used to operate the typing reperforator is known as the five unit code. It consists of 32 arrangements of current and no-current intervals of code combinations, each consisting of five parts. To print a certain character the code combination assigned to that character must be received. These combinations are shown in Figure 9. Each group of five selecting intervals is preceded by a "start" interval and followed by a "stop" interval. The "start" and "stop" intervals are used to maintain synchronism between the transmitting and receiving apparatus.

DESCRIPTION OF TRANSMITTING UNIT OPERATION

The keyboard-base (Figure 6) consists of a set of keys, key levers, a bank of transmitting contact springs, operating cams, clutch, and driving gear. This driving gear is connected through the intermediate gears to the main shaft on the receiving unit which in turn is driven by the motor. The transmitting cams are normally held stationary because the clutch members on the driving shaft are held apart by the clutch throwout lever (Figure 10). When a key is depressed the driven clutch member is permitted to move into mesh with the driving clutch member causing the cam sleeve to revolve. At the end of each revolution the driven clutch member is disengaged by the clutch throwout lever bringing the cams to a stop until the next key is depressed.

Beneath the key levers are five selector bars and a universal bar extending across the width of the keyboard. The selector bars are provided with saw tooth shaped notches, as shown in Figure 11, according to the requirements of the signaling code. These bars rest on rollers and are guided at each

end so that they may be easily moved endwise. When a key is depressed the key lever strikes the slanting sides of these notches moving the bars either to the right or left depending upon whether the impulses corresponding to the bars are to be SPACING or MARKING impulses.

The universal bar, which is connected to the trip-off pawl, controls the starting of the transmitting cams. It is pivoted at both ends in such a manner that the depression of any key moves it downward to actuate the clutch throwout lever. Thus, whenever a key is depressed, the selector bars are set and the universal bar is moved down permitting the transmitting cams to start rotating (Figure 10).

Each selector bar engages a vertical locking lever at its right hand extremity and positions it to correspond with the signal impulse to be transmitted (Figure 11). Each locking lever controls the motion of a contact lever either by allowing the contact lever to close its contact when the cams revolve or by restricting the motion of the contact lever. If the upper end of the locking lever is positioned to the left corresponding to a SPACING impulse, the locking lever engages the contact lever and prevents it from rising into the indent of the cam as the cam rotates, thus holding the circuit open for that impulse (Figure 11-A). If the upper end of the locking lever is positioned to the right corresponding to a MARKING impulse, it does not interfere with the movement of the contact lever (Figure 11-B). Then, as the cam revolves, the contact lever rides on the cam periphery and rises into an indent, thereby allowing its contact to close, sending out a MARKING impulse. As the cams rotate, the impulses, either MARKING or SPACING, are transmitted in succession.

The start-stop cam (Figure 10) controls an additional contact lever which in turn actuates the start-stop contacts. These contacts are opened at the beginning of each revolution of the cam shaft to transmit the start impulse (spacing) and remain open during the transmission of the five selector impulses. After the fifth impulse has been transmitted, the start-stop contacts will again close, sending the stop impulse (marking) to the line. These contacts will remain closed until the next key lever is depressed. At the end of each revolution, the driven clutch member is cammed out of mesh with the driving clutch member by the clutch throwout lever. This action prevents the cams from rotating further until the next key is depressed.

The lock loop is used for the purpose of preventing a change in a selection during the revolution of the cams. It locks the selection set up and prevents the depression of another key until the previous signal has been transmitted. The lock loop is controlled by a cam on the transmitting cam cylinder (Figure 12).

Keyboards may be equipped with a repeat space mechanism which permits the transmission of continuous spaces (Figure 10). When the space key lever is depressed the repeat space rod attached to the space key lever extension will move the intermediate pawl forward, in turn, holding the clutch throwout lever out of engagement with the projection on the driven clutch member. Thus the transmitting cam cylinder will be permitted to revolve continuously until the space key lever is released.

DESCRIPTION OF RECEIVING UNIT OPERATION

MAIN SHAFT ASSEMBLY

Motion for the setting up of selections and for the performance of all functions is derived from cams mounted on the main shaft (Figure 13). This shaft is driven by a motor through the medium of a pinion and worm gear. The selector cam sleeve is fitted over the end of the main shaft and is driven through the medium of a friction clutch formed by two pairs of steel discs separated by felt washers. The main bail cam (which provides motion for all other functions of the receiving unit except selecting, perforating, and spacing) and the punch arm cam are assembled in one unit and are driven by a positive clutch consisting of a driving member and a driven member. A keyboard spiral gear, located near the bottom of the shaft, is provided on units which are used with a keyboard transmitter.

SELECTING MECHANISM

The typing reperforator may be equipped with either of two types of selecting mechanisms - the pulling magnet selector or the holding magnet selector.

(A) PULLING MAGNET SELECTOR

The selecting mechanism translates the signal line impulses into mechanical motion which causes the code bars to be positioned in accordance with the intelligence impulses received during the selecting cycle. This translation is accomplished by the selector magnets which actuate the magnet armature in conjunction with the armature spring (Figure 14). Each selecting cycle is preceded by a no-current, or "start" impulse which permits the selector cam sleeve to start rotating by releasing its stop arm (Figure 15). The armature spring causes the head of the trip-off eccentric screw to depress the trip latch plunger actuating the bell crank and trip latch which unlatches the stop lever.

Each code bar is positioned by a selector cam through the medium of a selector lever, sword, and "T" lever (Figure 14). To illustrate, suppose that a series of impulses corresponding to the code combination for the letter "E" is to be received: At the beginning of the "start" impulse, the armature moves away from the magnet, releasing the stop arm as explained in the preceding paragraph. The selector cam sleeve starts to revolve, and the No. 1 selector cam engages the No. 1 selector lever during the time that the first intelligence impulse of the signal is being received. Since the first intelligence impulse of the "E" code combination is a current impulse, the magnet armature is attracted, bringing the right-hand end of the armature extension into the path of the right-hand sword arm. As the No. 1 cam rotates clockwise, it rotates the No. 1 selector lever counterclockwise causing the No. 1 sword to strike the right-hand end of the armature extension and to pivot at point "A". This positions the No. 1 sword so that when the No. 1 cam rotates past the tip of the No. 1 selector lever, the selector lever spring will cause the sword to depress the left end of the "T" lever, moving the No. 1 code bar to the right. Since the Nos. 2, 3, 4, and 5 intelligence impulses for the "E" selecting cycle are no-current impulses, the magnet armature moves to the released position with the left-hand end of the armature extension in the path of the left-hand sword arm. As the Nos. 2, 3, 4, and 5

cams operate and release their associated selector levers, the associated code bars either remain in their left-hand position or are moved there by the swords. With the No. 1 code bar to the right and the Nos. 2, 3, 4, and 5 code bars to the left, there will be a notch in each code bar opposite the "E" pull bar. Refer to Figure 20 for location of pull bar in relation to code bars.

The pulling magnet armature extension is locked while the positioning of each selector sword is taking place and it is unlocked after the selector cams pass the peaks of their associated selector levers. This is accomplished by a cam operated locking lever which engages a wedge on the armature extension (Figure 16).

(B) HOLDING MAGNET SELECTOR

The holding magnet selector (Figures 17 and 18) is basically the same as the pulling magnet selector. The former, however, has its armature moved against the magnet by a cam, while the latter has its armature attracted to the selector magnet by magnetism.

In the holding magnet selector, the translation of signal line impulses into mechanical motion is accomplished by the selector magnet, the armature, the selector arm, the armature cam, and the armature spring (Figure 17). An extension of the armature, which rides on the armature cam, moves the armature against the magnet at the time a signal line impulse is received. The armature will be held against the magnet if a current (marking) impulse is received and will be released from the magnet if a no-current (spacing) impulse is received. The selector arm is actuated by the armature extension because the selector arm spring makes a yield connection between these two parts. Therefore, the selector arm instead of the armature extension is used to position the swords on holding magnet selectors.

The operation of the swords, "T" levers, and code bars is the same as that described under "(A) PULLING MAGNET SELECTOR."

The holding magnet selector locking mechanism (Figure 19) operates in a manner similar to the locking mechanism of the pulling magnet selector described above. In the latter, the armature extension mounts the locking wedge while in the former the selector arm mounts the locking wedge. Because the armature cam starts to move the armature toward the selector magnet before the locking lever releases the selector arm, the selector arm spring acts as a yield between the armature extension and the selector arm.

CLUTCH THROWOUT LEVER

During the positioning of the No. 5 selector sword, the sixth cam of the selector cam sleeve disengages the clutch stop arm from the driven clutch member (Figure 13) allowing the main shaft clutch spring to move the clutch members into engagement causing the main bail cam and punch arm cam to rotate. At the end of each revolution, the clutch stop arm of the clutch throwout lever engages the cam surface of the projection on the driven clutch member, camming it out of mesh with the driving clutch member. Thus it may be seen that immediately after the completion of a selecting cycle the main bail cam and punch arm cam will be permitted to rotate one revolution to perform the operations required for printing and perforating, respectively.

PRINTING

The power for the performance of printing and other functions (except selecting, perforating and spacing) is derived from the main bail which is operated by the main bail cam through the medium of a bell crank, lever, and plunger (Figure 20). In the normal stop position, the main bail bell crank roller is on the high part of its cam as shown in Figure 20. In this position the main bail engages the hooklike projection of the pull bars, pushing them forward away from the code bars so that the code bars can be positioned by the selector mechanism. When the main bail cam rotates, the main bail bell crank roller rides down the slope of the main bail cam, permitting the main bail spring to raise the bail. As the main bail moves upward, the pull bar springs move the pull bars toward the code bars. The unselected pull bars are blocked by the code bars, but the selected pull bar moves into the path set up by the alignment of notches in the code bars, and a hooklike projection on the rear edge of the selected pull bar is engaged by the main bail, causing the pull bar to be raised. The rack and gear connection between the pull bar and type bar causes the type bar to rotate about its pivot toward the platen. As the pull bar is moved upward, the sloping surface of the rear projection on the pull bar strikes a stripper plate causing the pull bar to be disengaged from the main bail shortly before the type bar reaches the platen. Momentum carries the type bar the remaining distance to the platen. As the main bail cam continues its rotation, it restores the main bail and pull bars to their normal stop position.

Letter characters are printed near the top of the tape and figure characters are printed near the bottom of the tape.

CODE BAR LOCKING LEVER

The code bars are locked in position after each selection by the code bar locking lever, located in the extreme right-hand slot of the pull bar guide (Figure 21A). The locking lever is brought into engagement with "V" shaped notches in the code bars by a spring during the early part of the upward stroke of the main bail. It is cammed out of engagement with the notches by the main bail as the main bail nears the end of its downward stroke. When the code bars are not engaged by the locking lever, they are free to be positioned by the selector swords and "T" levers (Figure 21B).

TAPE PERFORATION

Power for perforating tape is derived from the punch arm cam on the main shaft which actuates the punches by means of the punch bail through the medium of the punch arm casting, punch bail link, and punch selector fingers (Figure 22). The punch selector fingers are positioned by the punch bell crank springs so that the selection set up in the code bars will be perforated in the tape (Figure 22). The positioning of the punch selector fingers takes place early in the upward stroke of the main bail. The motion of the code bar locking lever is utilized to operate the code bar bell cranks which move toward the code bars with the locking lever (Figure 21). If a code bar has been positioned to the right, the motion of the associated code bar bell crank will be blocked by the code bar as the code bar locking lever moves toward the code bars, and the punch selector finger will remain in position to engage the punch as shown in Figure 22. If the code bar has been positioned to the left, the code bar bell crank will be free to follow the code bar lock-

ing lever, and the train of linkage between the code bar bell crank and the punch bell crank will be turned in a clockwise direction, thus moving the punch selector finger to the left so its recess will be under the punch.

Shortly after the punch selector fingers have been positioned, the punch arm cam rotates the punch bail through the medium of the punch arm casting and the punch bail link. As the punch bail cam rotates, the punch-engaging projections of the selector fingers, which are in line with the punches, raise the punches and perforate the tape. A projection on the punch bail engages the feed punch during every operation. An upstop screw in the punch bail limits overtravel of the punches to prevent mutilation of the tape.

SPACING

Tape is spaced by the rotation of the feed roll which has pins on its periphery that engage feed perforations in the tape (Figure 23). The tape is held in engagement with the feed roll by the tape tension lever. The feed pawl, attached to the punch bail, is held in engagement with the feed roll ratchet by a spring and rotates the feed roll by engaging a tooth of the feed roll ratchet during each downward stroke of the punch bail (Figure 22). The feed roll detent insures even spacing of the perforations. Tape may be spaced out of the unit when the signal line is idle by manually operating the tape feed-out lever which is mounted on one of the range finder mounting posts (Figure 4). Operation of this lever allows the selector cam sleeve to rotate freely, causing a series of "Letters" combinations to be perforated in the tape.

OVERLAP

In summarizing the selecting, printing, and perforating operations described in the foregoing, it should be noted that the selecting cycle is followed immediately by the operating cycle. Near the end of the selecting cam sleeve revolution, the sixth cam trips the clutch throwout lever, allowing the main bail cam and punch arm cam to make one revolution. Thus it may be seen that the printing of a character or the operation of a function requires time equivalent to both a selecting and an operating cycle. However, the selection of the next character may be made at the same time that the performance of the previous operation is taking place. This arrangement is known as overlap and is used to facilitate printer operation at high speeds. Without this feature, it would be necessary to allow time for operation after each selection.

RIBBON FEEDING

The ribbon feed lever is operated by an indent in the main bail plunger. Attached to the upper end of the ribbon feed lever is the ribbon feed pawl which engages with the teeth on the ribbon feed ratchet. With each operation of the main bail, the ratchet is rotated a slight amount. This motion is carried through either one of two bevel gears on the ribbon spool shafts, causing one of the ribbon spools to be revolved (Figure 24).

RIBBON REVERSE

Assuming that the ribbon is being wound on the left-hand spool and is almost unwound from the right-hand spool, an eyelet which is fastened to the ribbon will engage and move the right-hand ribbon reverse arm. This arm moves the right-hand ribbon reverse pawl into the path of the ribbon reverse bail (Figure 25). As the bail moves downward it engages the ribbon reverse pawl moving the ribbon feed shaft to the right (Figure 26). This will disengage the left-hand ribbon feed bevel gears and engage the right-hand bevel gears. The ribbon will then be wound on the right-hand spool. The reversing operation takes place in a similar manner on the left-hand side of the assembly when the eyelet near the left end of the ribbon engages with the left-hand ribbon reverse arm.

UPPER AND LOWER CASE SHIFT MECHANISM

The platen consists of a disc of synthetic rubber about 1/4" in diameter mounted on a cylindrical steel rod of the same diameter about 1/2" long. This assembly fits into a well in the platen block which is mounted so that it can be shifted back and forth on the platen shaft beneath the tape (Figure 27).

To print figures when the platen is in the LETTERS position, the "figures" pull bar is selected. As the main bail moves upward, it raises the "figures" pull bar, and a horizontal projection at its lower extremity unlatches the shift lever from the shift bell crank on the platen shaft allowing the platen shift spring to move the platen block to the FIGURES (forward) position. In this position, the platen will support the tape opposite the figures on the type pallets.

When the "letters" pull bar is raised by the main bail, an extension on the pull bar engages the left-hand arm of the shift rocker lever moving the rear extension of the shift rocker arm downward. The shift rocker rotates about its pivot and the upper notched end is moved toward the rear, moving the platen block with it, through the medium of the shift bell crank and the platen shaft. The shift lever latches the shift bell crank when the platen reaches the LETTERS position.

SIGNAL BELL

Some units are arranged to sound a signal bell when upper case "S" is selected. With the platen in the FIGURES (forward) position, the lockout lever arm of the shift mechanism holds the pull bar lockout lever in such a position as to allow the selection of the "Bell" pull bar but to prevent selection of the "S" pull bar (Figure 28-A). With the "Bell" pull bar selected, the main bail engages the notch in the "Bell" pull bar and lifts it upward. A projection near the bottom of the "Bell" pull bar engages the eccentric screw of the bell hammer, causing the hammer to strike the gong (Figure 28-B). With the platen in the LETTERS position, the pull bar lockout lever is positioned so that the "S" pull bar may be selected and the "Bell" pull bar is blocked (Figure 28-C).

MECHANICAL TAPE-OUT ALARM

Keyboard bases and receiving-only (low) bases are provided with a bell mechanism which sounds a warning signal when the supply of tape is nearly exhausted. This mechanism consists of a bell, a bell hammer operated by a post on the keyboard gear, a bell hammer latch, and a tape-out lever.

MOTOR SPEED CONTROL

In order to maintain the motors at the transmitting and receiving stations at the proper speeds, the apparatus is equipped with either constant speed motors (synchronous - will operate only on regulated AC current) or with governed speed motors (will operate on AC or DC current).

When a governed speed motor is used the governor is attached to one end of the motor shaft. This governor and a resistor control the speed of the motor. The motor governor (Figure 29) is used to shunt the resistor in and out of the motor circuit. This is done by means of the governor contact arm. The contact arm spring (Figure 29) holds this contact arm against the stationary contact until the centrifugal force of the contact arm (as the motor and governor rotate) overcomes the tension of the contact arm spring. When the contacts open, the resistor is shunted into the motor circuit, reducing the speed of the motor. When the contacts close, the resistance is shunted out of the motor circuit, increasing the speed of the motor. The rapid operation of these contacts tends to hold the motor at a very nearly constant speed. The tension of the spring determines the speed at which the motor will operate, since it holds the contact of the contact arm against its stationary companion contact. Therefore, the speed may be adjusted by turning the speed adjusting wheel (which extends through the cover of the governor) in a direction to increase or decrease the tension of the spring.

The governor is equipped with a target consisting of alternate black and white spots. A speed indicator (tuning fork with shutters attached to the ends of the tines) is used to visually check the motor speed. With a properly adjusted spring tension, the spots on the target appear to be stationary, when observed through the shutters of the vibrating tuning fork. No speed setting is required on printers equipped with synchronous motors since they are constant speed motors.

SYNCHRONISM

In order that the signals sent out by the transmitter may be interpreted correctly by the receiving units, it is necessary to keep the receiving units in synchronism with the transmitted signals. Synchronism is maintained by having the receiving selector cam sleeve rotate faster than the transmitting cam cylinder and by use of the "start" and "stop" impulses in the following manner:

The reception of the start impulse starts the selector cam sleeve on the receiving unit revolving. At that moment, the selector cam sleeve is in unison with the transmitting cam cylinder. The selector cam sleeve is so constructed that the distance traveled from the position where the cam sleeve starts to move a selector lever to the position where it starts to move the next selector lever is greater than the distance traveled by the transmitting cam cylinder, from where it can control the transmission of one impulse to

where it can control the transmission of the next impulse. In other words, for a certain travel of the transmitting cam cylinder, the corresponding travel for the selector cam sleeve is greater, but as the selector cam sleeve travels faster, it will reach its second position at the same time the transmitting cam cylinder reaches its second position.

The selector cam sleeve completes its revolution before the transmitting cam cylinder, but the transmitting cam cylinder sends out the stop impulse which stops the selector cam sleeve until the transmitting cam cylinder again sends out the start impulse. Usually the selector cam sleeve is one-seventh faster than the transmitting cam cylinder, and the selector cam sleeve is at rest one-seventh of the transmission time. If the speed of the selector cam sleeve is faster or slower than the proper speed, the cam remains at rest more or less, as the case may be. Of course, there may be a slight error in the relative position of the selector cam sleeve in the various positions, but the mechanism is so constructed as to compensate for this and, due to the fact that the selector cam sleeve starts each revolution in unison with the transmitting cam cylinder, this error does not become accumulative.

ORIENTATION

In order to utilize the receiving margin of the selector mechanism to the best advantage, it is necessary to place the starting point of the selector cam sleeve in the most favorable position. This is accomplished by means of the range finding mechanism.

Mounted on the stop lever plate of the range finding mechanism are the stop lever and the trip latch which can be moved, thereby varying the relation between the start of the selector cam sleeve and the time the selector cams operate the selector levers (Figures 14 and 17). A graduated scale indicates the setting of the stop mechanism, and a thumb screw holds it in place after it has been set.

The range is determined while receiving "RY" on the receiving unit, by moving the range finder index arm in one direction until errors appear and then moving it back slowly until the errors disappear, noting the position on the scale. In a similar manner, the other limit of the range is located by moving the index arm toward the opposite end of the scale. The proper setting is midway between these two limits.

DESCRIPTION OF OPTIONAL FEATURES

There are numerous optional features which are applicable to typing reperforator sets. All of these features cannot be incorporated in a given set at the same time, however, nor are they all applicable to any one set individually. The features which are at present available will be described immediately following.

MAGNET OPERATED TAPE FEED-OUT LEVER

Remote control of the tape feed-out features is provided for by the magnet operated tape feed-out lever. It releases the selector cam sleeve so that the sleeve rotates freely, causing a series of "Letters" combinations to be perforated in the tape. The lever is operated by a magnet which is mounted on the rear of the selector mechanism mounting plate. The magnet is energized

through a local circuit.

TAPE FEED-OUT CONTROL MECHANISM

In order to transmit the end of the last message perforated, the tape must be spaced out of the machine. If the tape is to be sent through a transmitter-distributor adjacent to the typing reperforator without severing the tape, it must be spaced far enough to permit the last perforations of the message to be transmitted. If the tape is to be sent through a transmitter-distributor some distance from the typing reperforator, it is only necessary to space the tape so that the end of the printed message clears the tear-off edge of the left-hand tape guide. When this condition is fulfilled, the tape may be torn off. Tape is spaced out by unlatching the selector cam sleeve to allow it to rotate freely. This operation is initiated manually by momentarily depressing a push button on the typing reperforator. This causes a magnet to unlatch the selector cam sleeve and puts into operation a time-delay contact operating mechanism which automatically stops tape feeding after sufficient tape has been spaced out. The circuit is so arranged that this operation can also be initiated from a remote control push button. The time delay feature is adjustable over a limited range to provide for feeding out tape to meet either of the requirements previously mentioned. The operation of the mechanism is explained immediately following:

Referring to the schematic circuit in Figure 30, it will be seen that when either push button is depressed, it opens the circuit to the worm follower disengaging magnet mounted on the tape feed-out mechanism bracket in back of the right-hand ribbon spool cup. When the magnet armature is released it opens its own locking circuit and closes two pairs of contacts (Figure 31). One of these pairs of contacts prepares a circuit to the selector cam trip magnet on the selector mounting plate. This circuit is completed and the selector cam trip magnet is energized when the push button is released. The other pair of contacts prepares a circuit to the worm follower contacts, the function of which will be described later.

Operation of the trip magnet unlatches the selector cam sleeve, allowing the main shaft to rotate and causing the unit to feed tape. Since the selector armature remains in the marking position during the rotation of the selector cam sleeve, the "letters" combination is perforated in the tape. The selector cam trip magnet does not become energized until the circuit through the push button is restored by releasing the push button; therefore, if the tape feed-out push button is held depressed, the feed-out operation will not start.

In addition to opening its own locking circuit and closing two other circuits, release of the worm follower disengaging magnet armature allows the worm follower to become engaged with the teeth of a ratchet driven worm gear. This gear is rotated by a pawl mounted on a lever which is operated by the main bail cam. As the worm rotates it advances the worm follower toward a pair of contacts. When these contacts close, they complete a circuit to the worm follower disengaging magnet which circuit was prepared by the closing of contacts referred to in a preceding paragraph. When the magnet armature is attracted, the magnet locking circuit is restored, the worm follower is disengaged from the worm and the circuit to the selector cam trip magnet is opened, releasing the trip magnet armature, thereby stopping the rotation of the selector cam sleeve.

Provision is made to interrupt tape feeding immediately upon reception of line signals. To accomplish this, the tape feed-out circuit is arranged so that the worm follower disengaging magnet will be energized when the tongue of the line relay touches the No. 5 (spacing) contact. Operation of this magnet will restore the tape feed-out mechanism to its unoperated position, as explained in the preceding paragraph.

When it is desired to prevent operation of the typing reperforator without disconnecting it from the signal line, a tape-arresting circuit may be closed by means of a key at a remote location. This key causes battery to be applied to the selector magnets, thus preventing reception of messages. In addition, the tape-arresting key causes the tape feed-out mechanism relay to operate (Figure 4) which disconnects the tape feed-out circuit from the line relay, thus permitting the tape feed-out mechanism to be put in operation without being subject to stoppage by line signals.

MECHANICAL END-OF-LINE INDICATOR MECHANISM

When a typing reperforator is used with a keyboard transmitter for transmitting on a circuit which includes page printers, the mechanical end-of-line indicator mechanism informs the keyboard operator when to send the "carriage return" and "line feed" signals to avoid overrunning the lines being typed by page printers. The approach of the end of a line is indicated by the lighting of a signal lamp which is mounted on the keyboard base.

The mechanical end-of-line indicator mechanism replaces the standard right-hand ribbon spool bracket assembly. In addition to the parts furnished with the standard ribbon spool bracket assembly, the end-of-line indicator mechanism includes, essentially, a worm and ratchet, a cam follower lever and pawl, a worm follower pivoted on a movable bail, a special carriage return pull bar, a contact assembly, and a signal lamp assembly. All of these parts mount on the typing reperforator unit with the exception of the signal lamp which mounts on the keyboard base.

The worm is operated from the main bail cam on the main shaft of the unit by means of the main bail cam follower, pawl, and ratchet. The worm follower engages the groove in the worm and moves toward the signal lamp contacts as the worm rotates. After a predetermined number of operations, the worm follower closes the signal lamp contacts, causing the lamp to light. The contacts remain closed until the "carriage return" signal is sent or received, at which time an extension on the carriage return pull bar disengages the worm follower from the worm, allowing the signal lamp contacts to open, extinguishing the lamp and permitting the worm follower spring to return the worm follower to its initial position.

CLUTCH THROWOUT LEVER CONTACT MECHANISM

Some units are arranged to close a set of contacts whenever the main shaft clutch throwout lever is operated. These contacts are normally open when the unit is idling but are pushed closed by the cam arm when a key lever is depressed or the "start" impulse is received. These contacts are used to send out timing impulses for synchronization purposes.

BACKSPACE MECHANISM

The backspace mechanism is intended for use on sending-receiving units to enable the operator to backspace tape for the purpose of making corrections. It is operated by means of a backspace lever and a ribbon guide lever located at the front of the receiving unit near the platen mechanism (Figure 4). These levers may be operated individually or jointly by the fingers of one hand. The backspace lever moves the tape backward one space for each operation, and the ribbon guide lever lifts the ribbon guide and ribbon away from the tape, permitting the operator to see the typing on the tape.

SIGNAL LINE RELAY

A signal line relay is employed whenever the length of the signal line or the character of the line circuit requires its use. It may be provided as an external accessory or it may be mounted on the base of the receiving unit if the base is provided with relay mounting and wiring facilities (Figure 8).

There are several types of line relays used, all of which add relatively little inductance to the line circuit. Of the relays which mount on the base of the receiving unit, the main points of difference are their operating current requirements and contact material. Their function is to reproduce the line signals in a local circuit for the operation of the selector magnets.

LINE AND SELECTOR CIRCUIT CLOSING JACK

On bases equipped with line relays, the relay mounting plate is sometimes provided with a jack which automatically shunts the line and selector magnet slip connection terminals when the relay is removed from its mounting. The purpose of this jack is to permit removal of the relay for examination or replacement without opening the signal line or selector circuit. The jack is mounted on the line relay mounting plate and its contacts are held open by a plunger which the relay base depresses when the relay is in place.

KEYBOARD LOCKOUT

Keyboard bases may be equipped with a device which will prevent the key levers from being operated. This device is mounted on the front key lever guide and consists of a comb-shaped lever with elongated mounting holes. The key levers are locked by positioning the lockout lever so that its projections are under the key levers. The right-hand end of the lever is provided with a handle.

RADIO FREQUENCY INDUCTION SUPPRESSORS

Radio frequency induction suppressors may be connected across various operating contacts to suppress radio frequency induction, permitting radio receiving sets to be used in close proximity to the typing reperforator.

SUPPRESSION OF PRINTING ON LOWER CASE "BLANK" SELECTION

The typing reperforator may be provided with a mechanism which suppresses printing when the "blank" selection is received while the platen is in the LETTERS position. This is accomplished by means of a projection on the "blank" type bar which strikes a stop plate mounted on the platen block. The stop plate is shown in Figure 27. When the platen is in the FIGURES position, the stop plate is moved out of the path of the projection on the "blank" type bar, permitting a character to be printed.

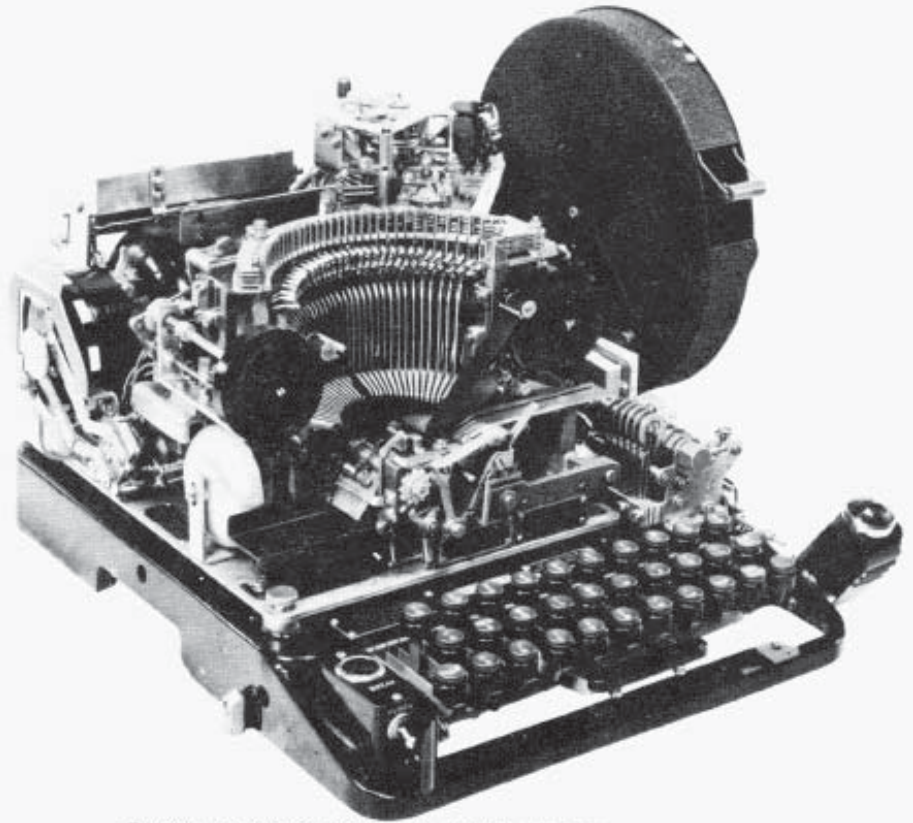
UNSHIFT ON SPACE

On units arranged to unshift on "space" as well as on "letters" combination, an unshift on space pull bar is added. If the unshift on space feature is not desired, the upper end of the unshift on space pull bar may be moved to a slot in the pull bar guide where it will be inoperative. On units of this type, the unshift on space pull bar is selected on the "space" combination and operates the shift rocker lever in the same manner as the "letters" pull bar. The "space" and "letters" pull bars are shown in Figure 27.

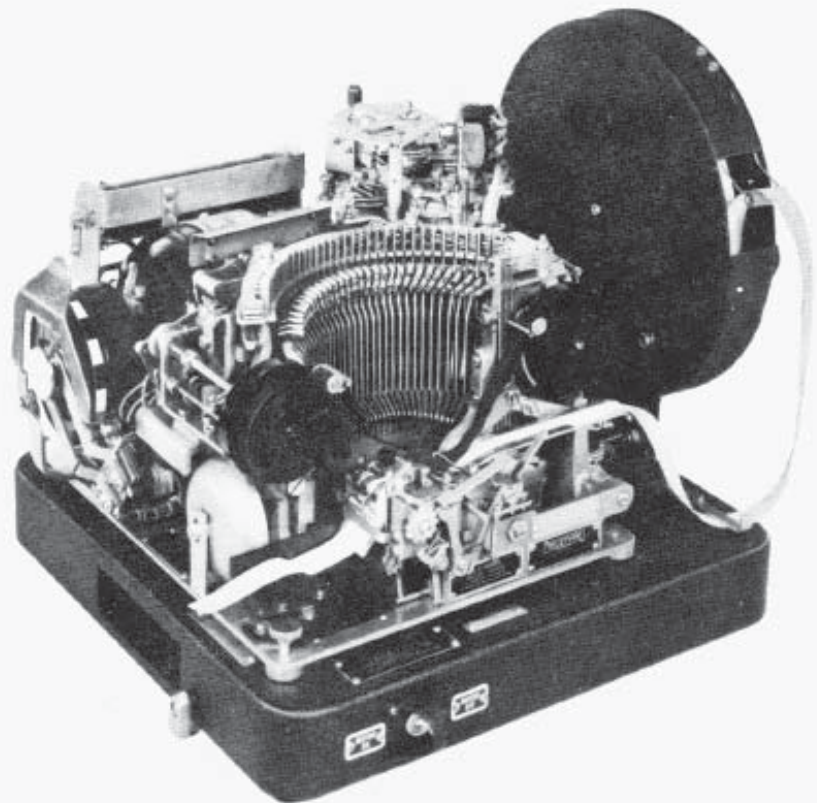
POLAR-NEUTRAL KEY

Bases equipped with a relay may be equipped with a polar-neutral key. This key makes the necessary changes in the circuit which permit the reception or transmission of polar signals when the key is pushed in, or neutral (make-break) signals, when the key is pulled out.

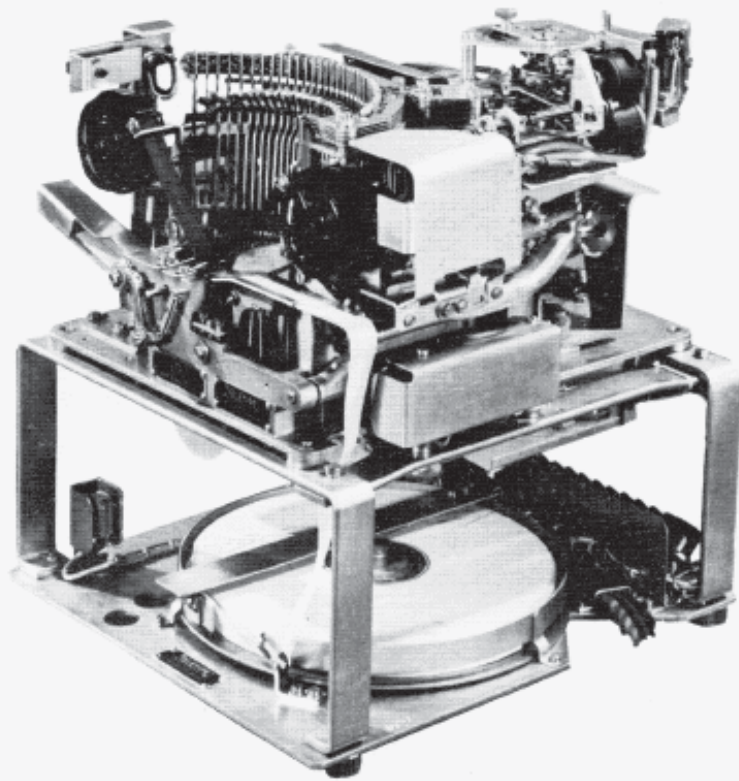
* * *



TYPICAL SENDING-RECEIVING TYPING REPERFORATOR
FIGURE 1



TYPICAL RECEIVING-ONLY (LOW BASE) TYPING REPERFORATOR
FIGURE 2



TYPICAL RECEIVING-ONLY (HIGH BASE) TYPING REPERFORATOR
FIGURE 3

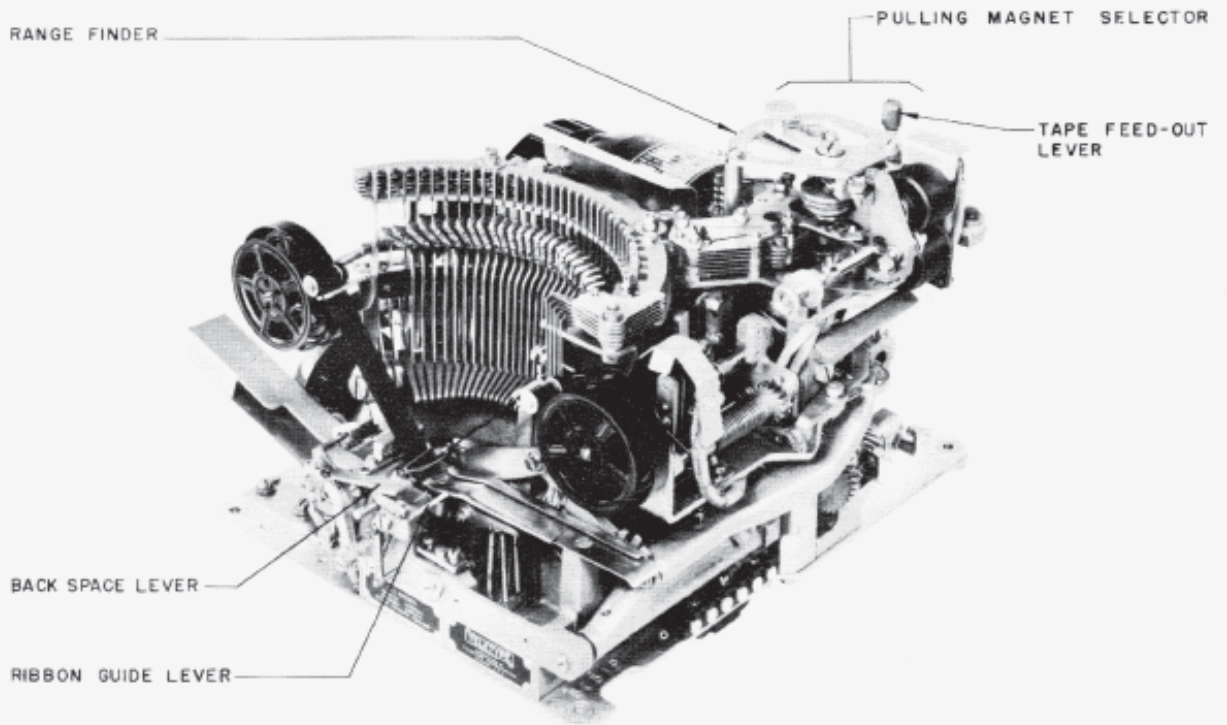


FIGURE 4

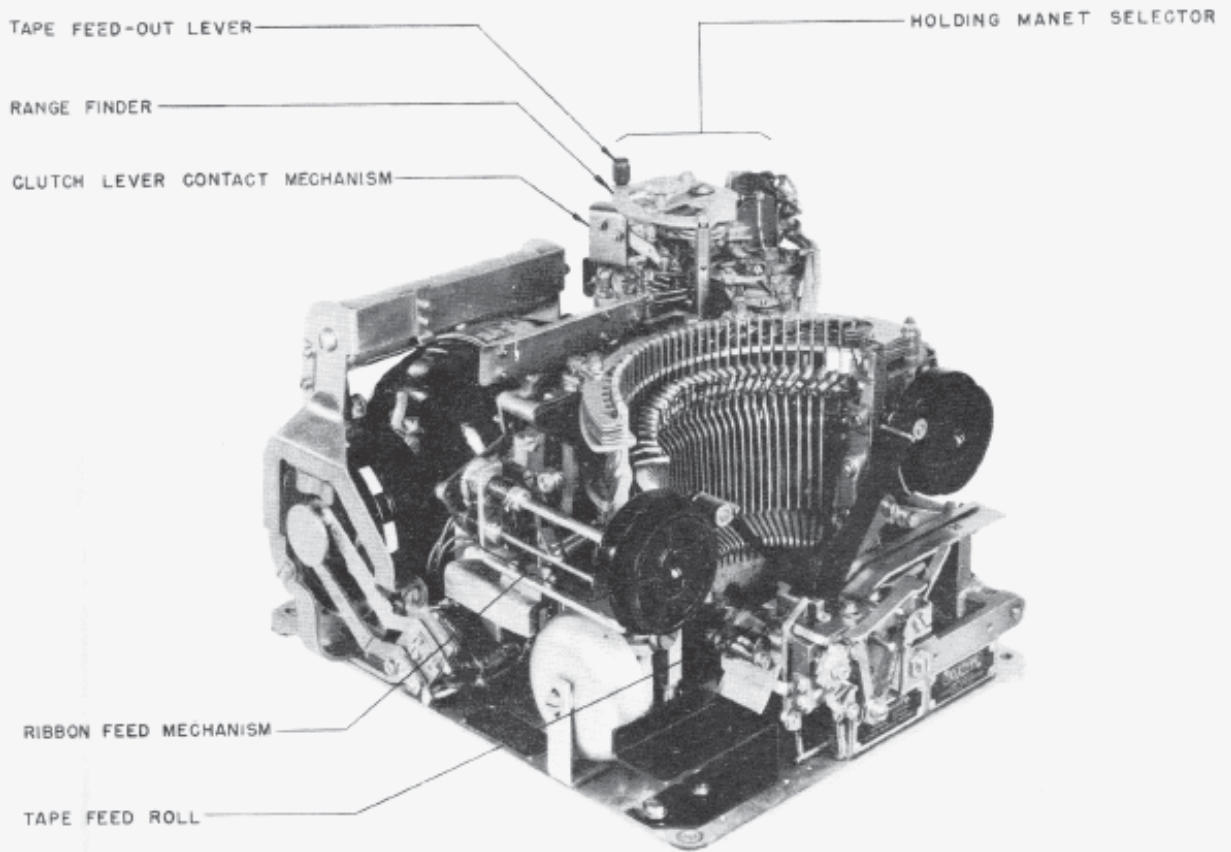
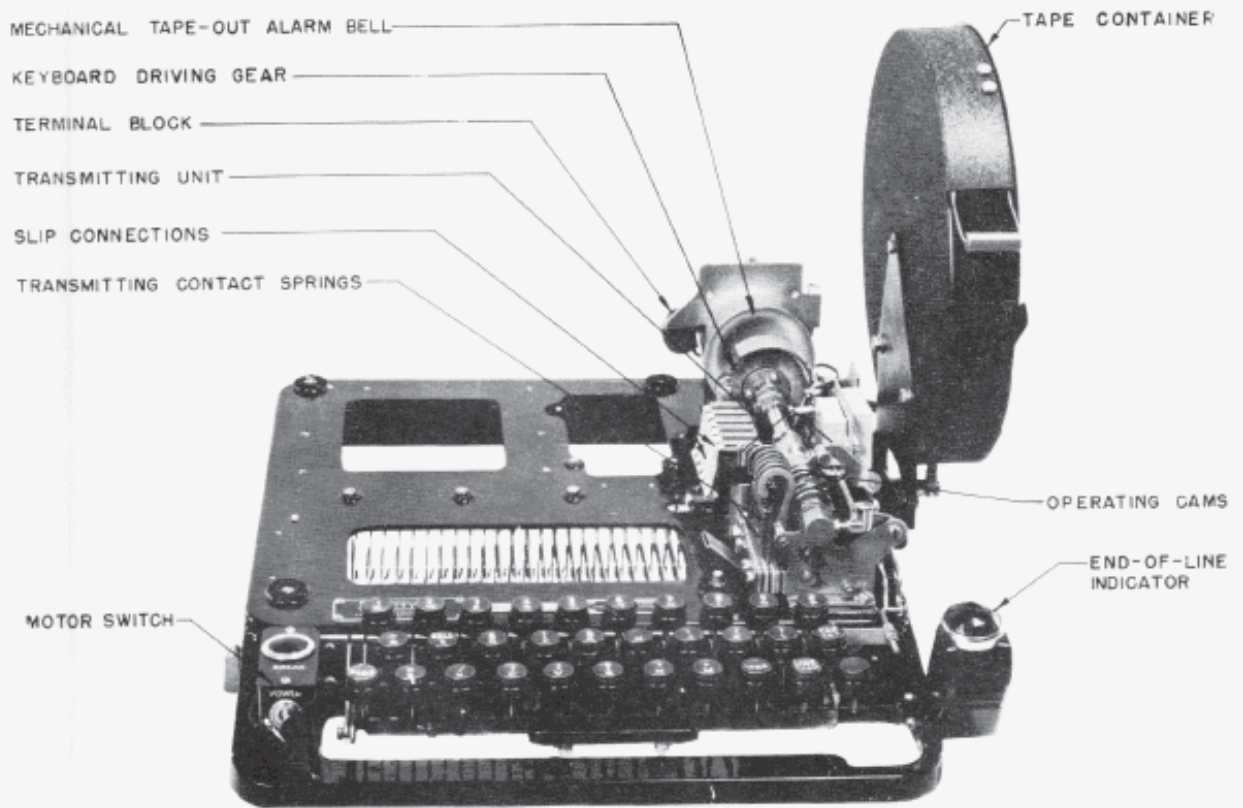
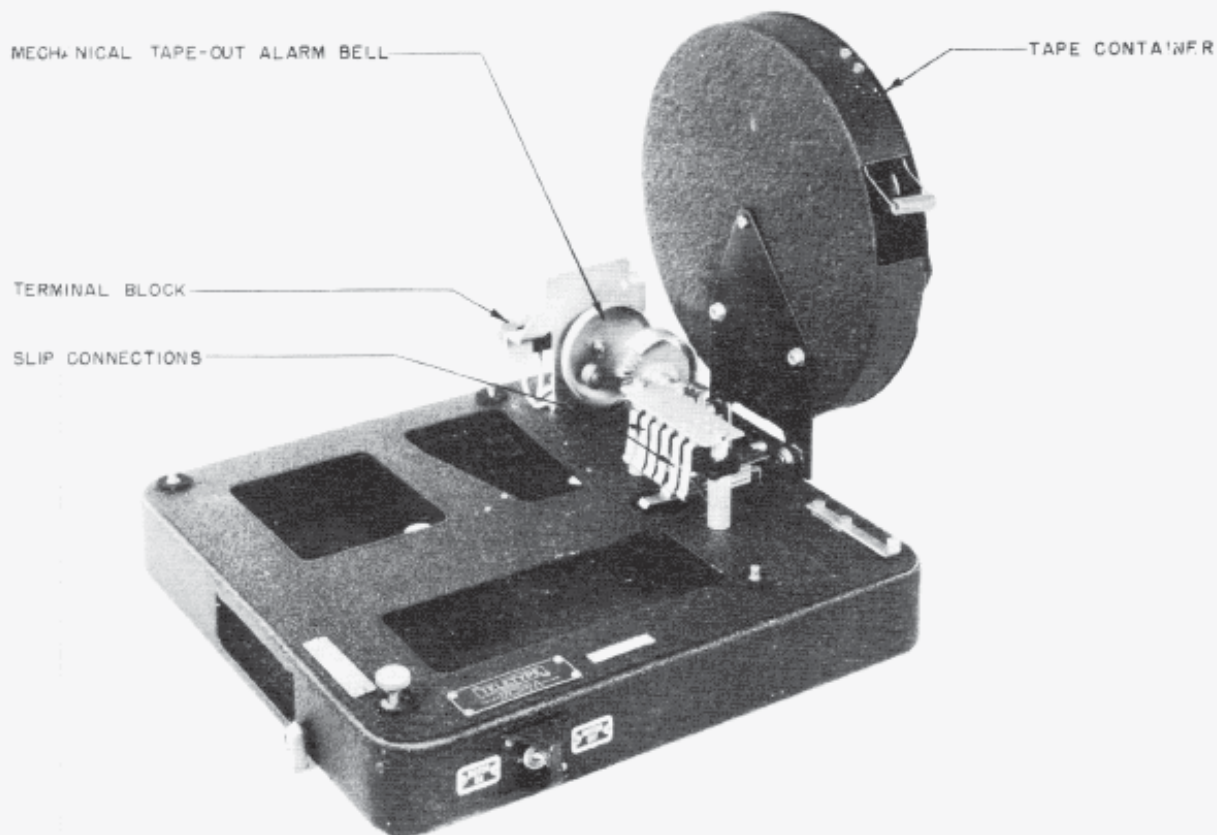


FIGURE 5



KEYBOARD BASE
 FIGURE 6

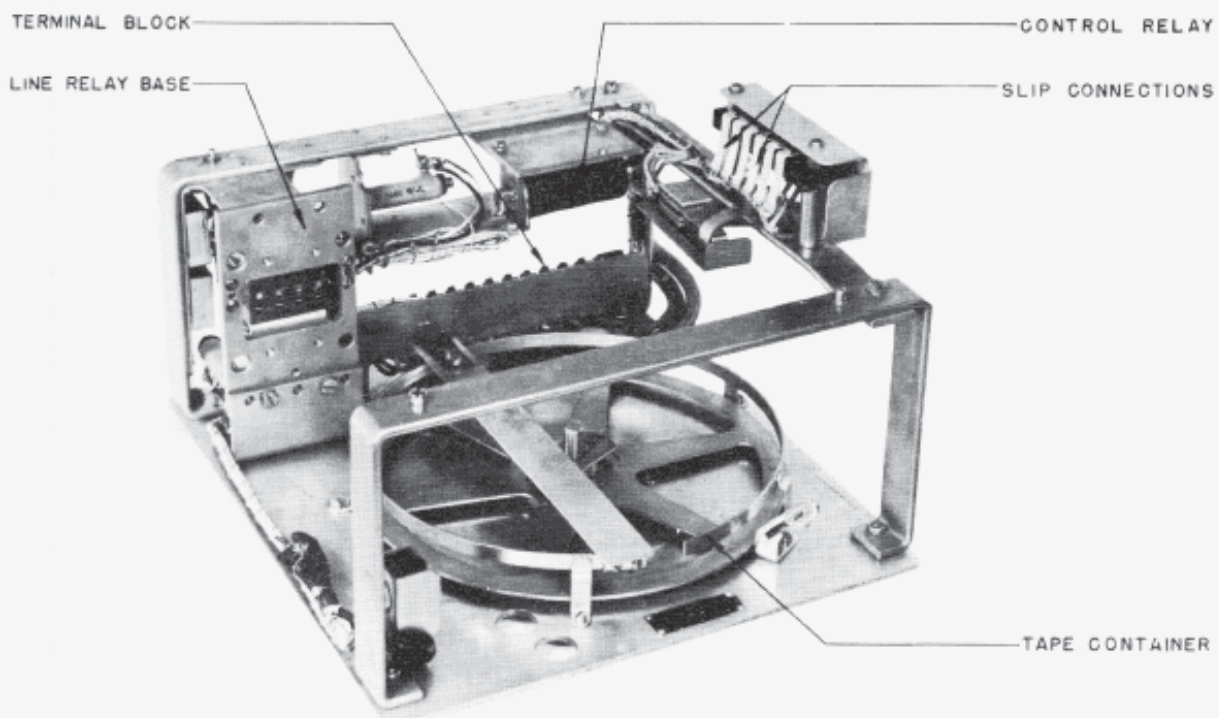
MANET SELECTOR



RECEIVING-ONLY (LOW BASE)

FIGURE 7

TAPE CONTAINER



RECEIVING-ONLY (HIGH BASE)

FIGURE 8

UPPER CASE	WEATHER SYMBOLS	1	⊕	⊙	/	3	-	↓	8	/	-	.	⊕	9	⊙	1	4	Δ	5	7	⊕	2	/	6	+	-	<						
	COMMUNICATIONS	-	?	:	\$	3	!	B	8	*	(.	,	9	⊙	1	4	Δ	5	7	:	2	/	6	"	⊙	<						
LOWER CASE		A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	BLANK	C.R.	L.F.	SPACE	LTR. SHIFT	FIG. SHIFT
	1	●	●		●	●					●	●					●	●		●	●		●	●								●	●
	2	●		●			●			●	●	●					●	●		●	●		●	●							●	●	
	FEED HOLES	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
	3			●			●			●	●			●	●		●	●		●	●		●	●							●	●	
	4		●	●			●			●	●			●	●		●	●		●	●		●	●						●	●		
	5		●					●	●				●	●		●	●		●	●		●	●							●	●		

FIGURE 9

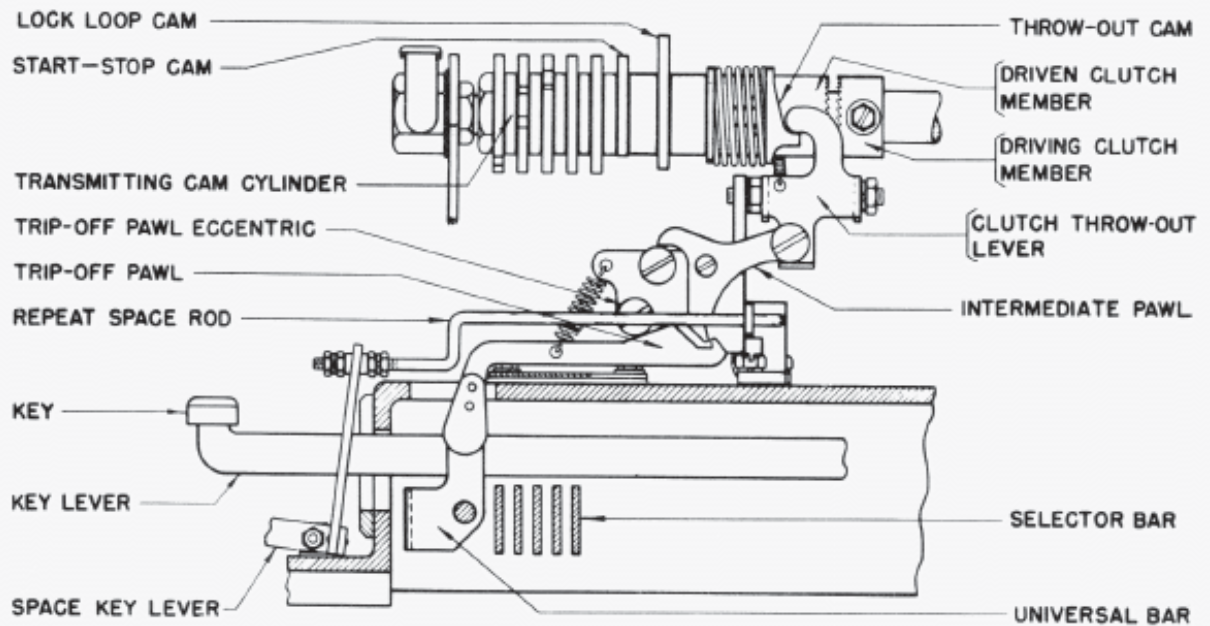


FIGURE 10

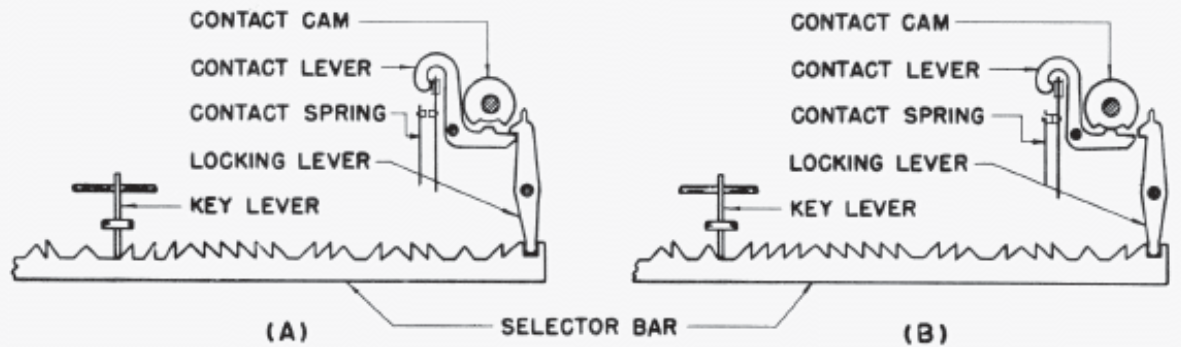


FIGURE 11

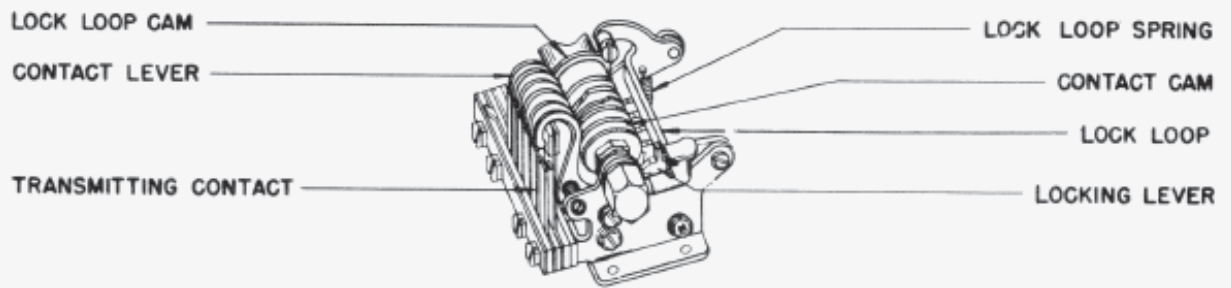


FIGURE 12

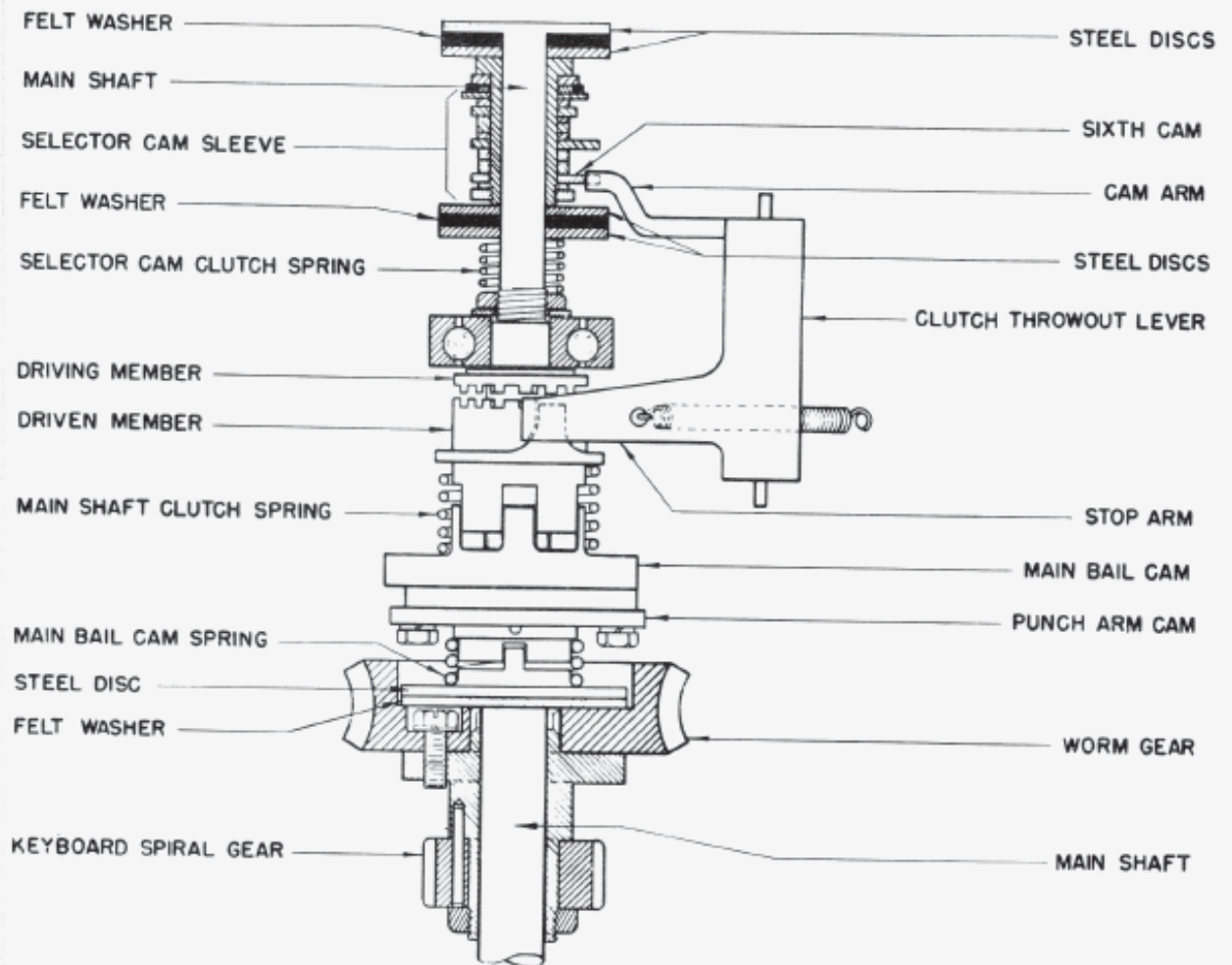


FIGURE 13

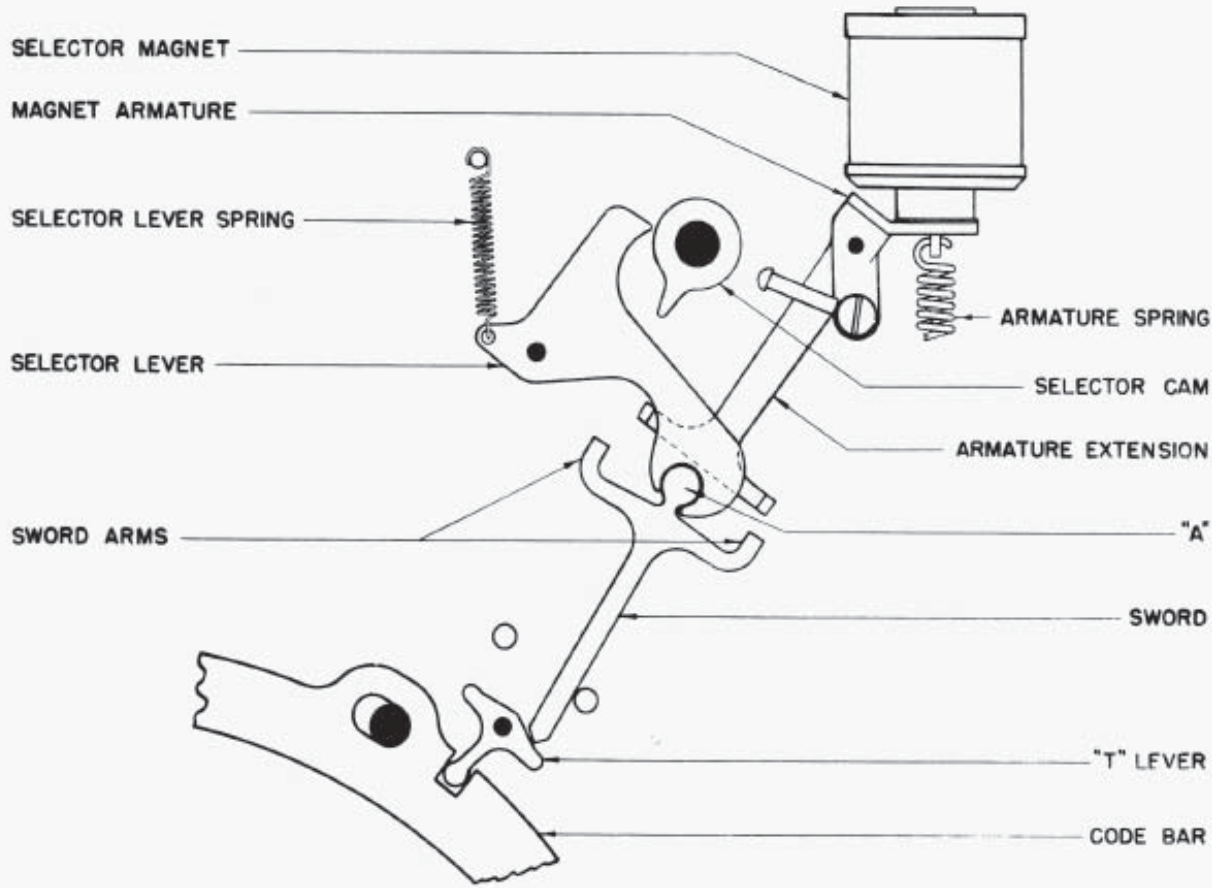


FIGURE 14

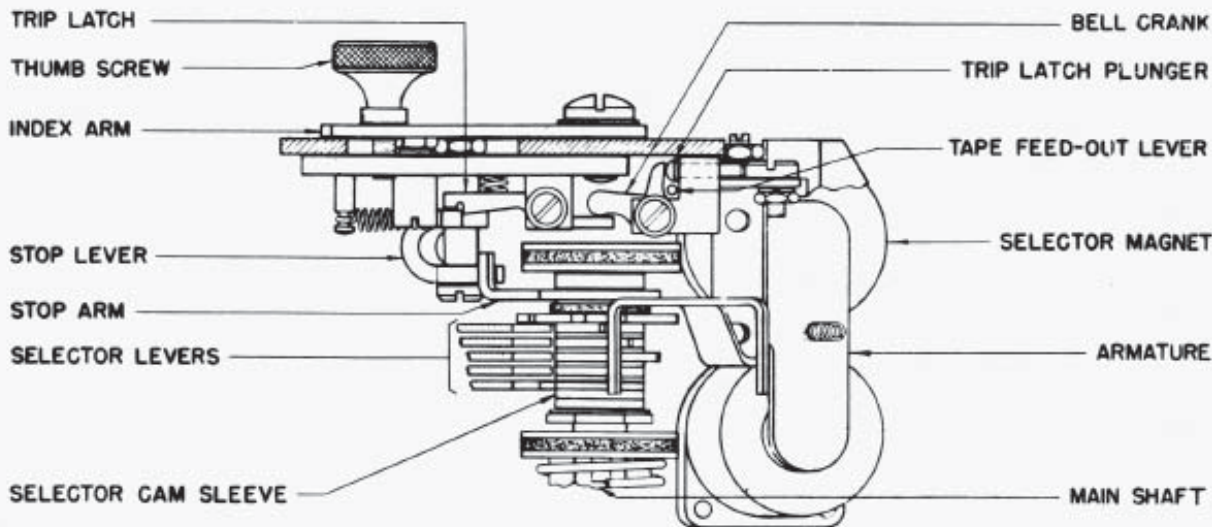


FIGURE 15

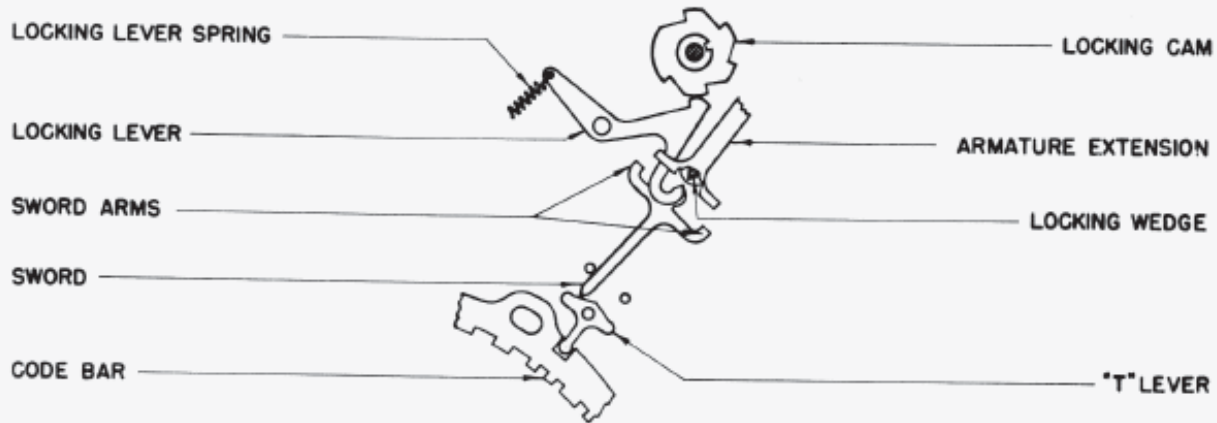


FIGURE 16

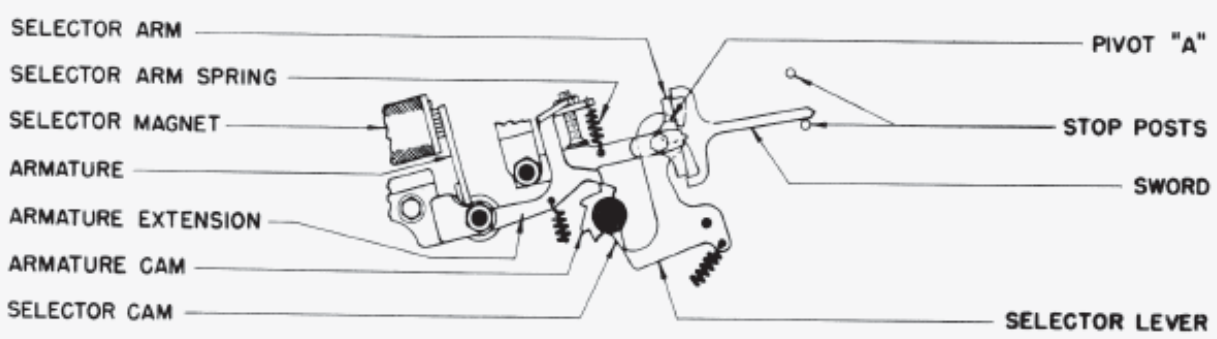


FIGURE 17

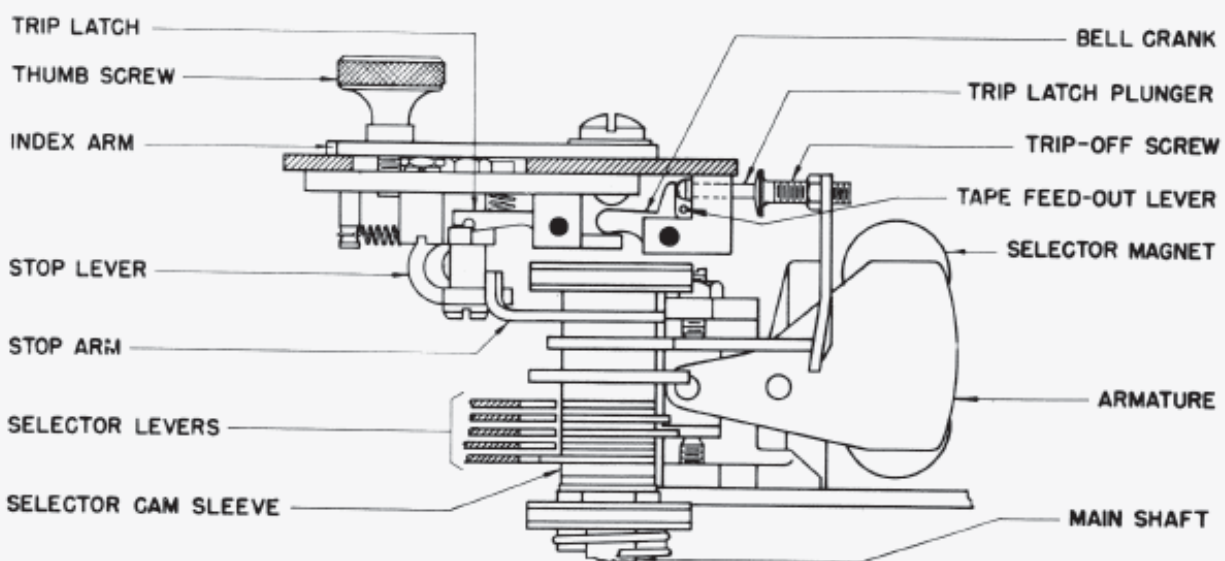


FIGURE 18

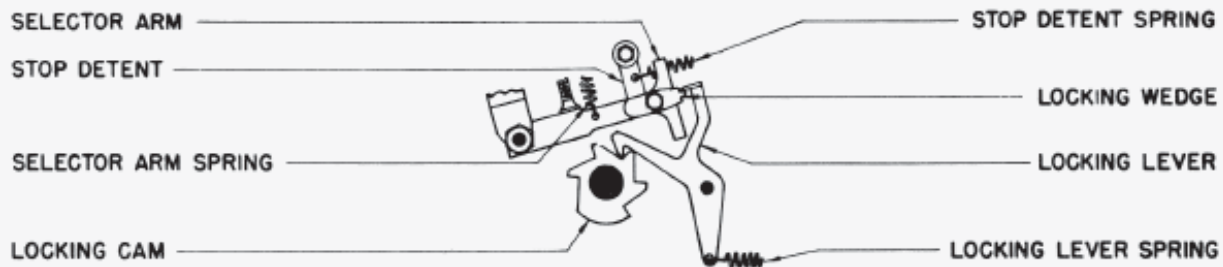


FIGURE 19

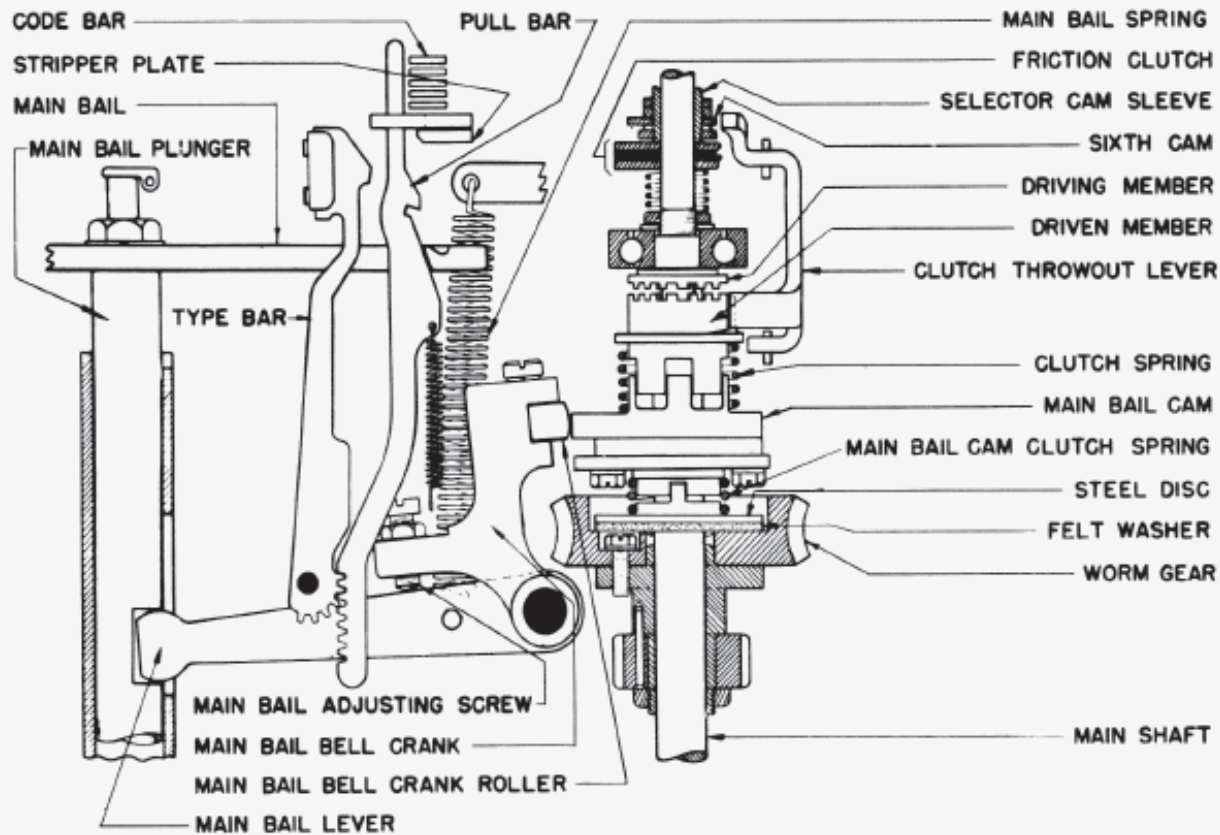


FIGURE 20

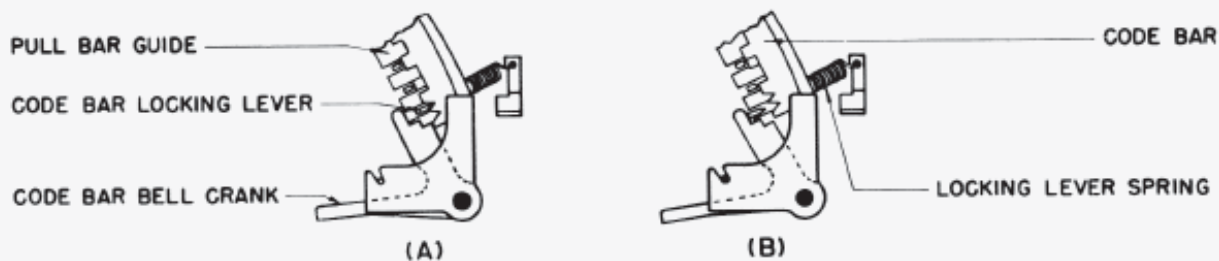


FIGURE 21

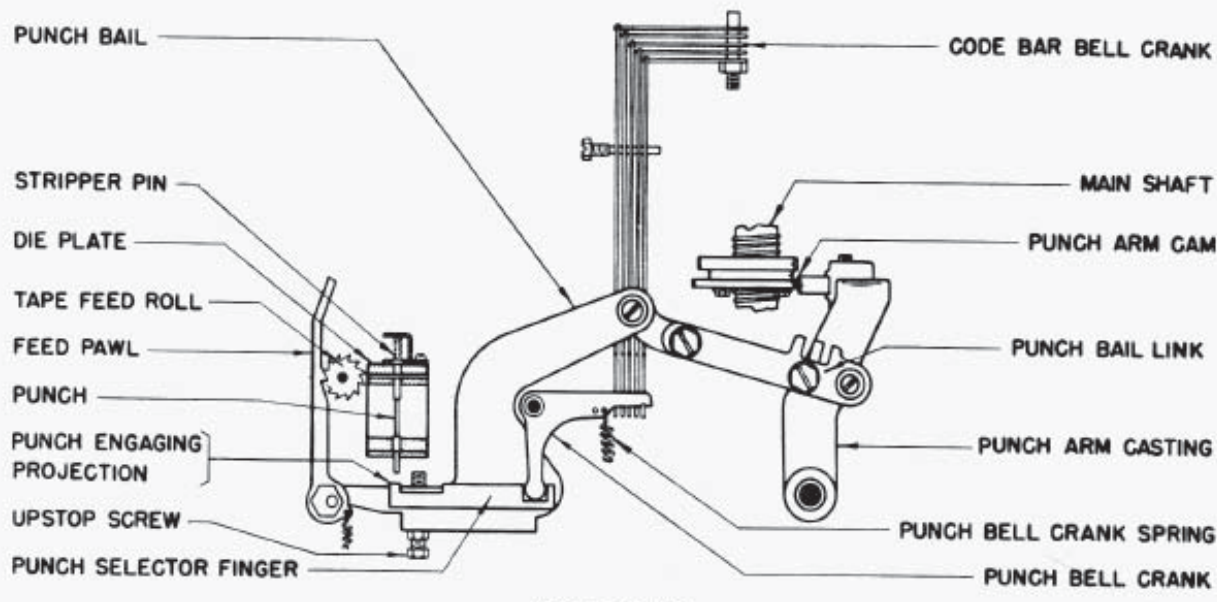


FIGURE 22

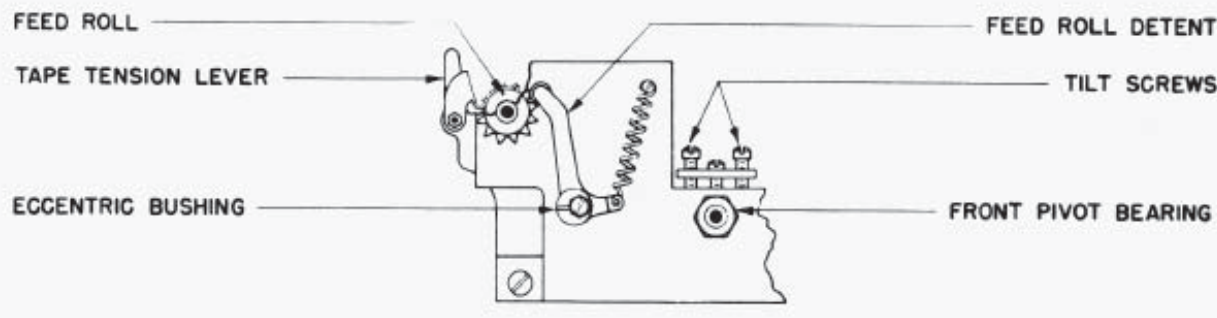


FIGURE 23

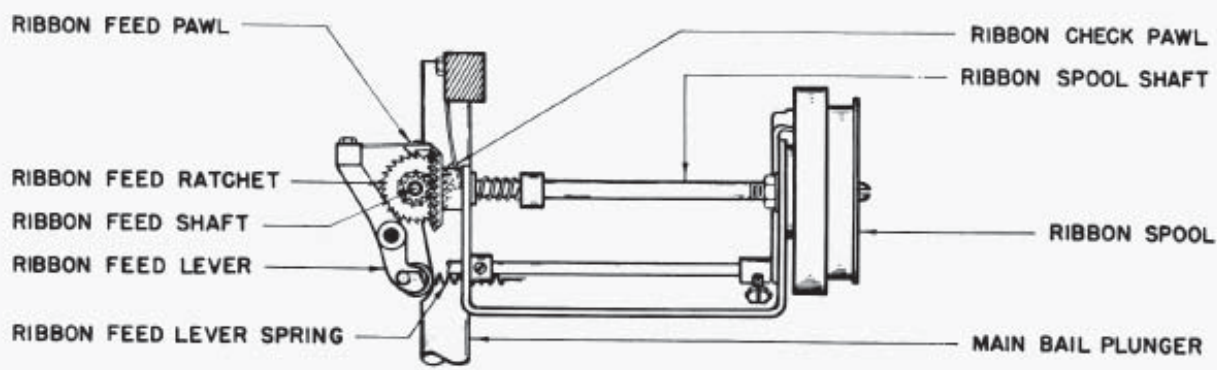


FIGURE 24

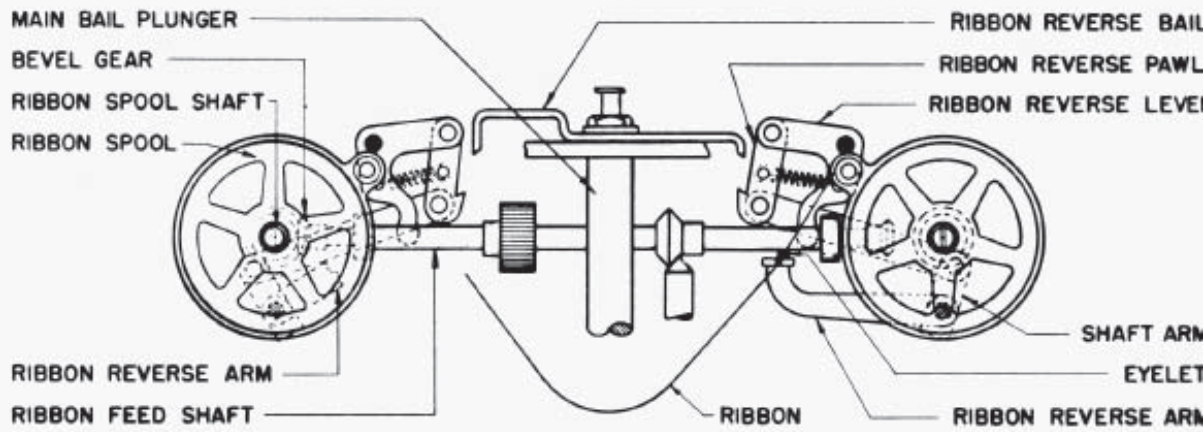


FIGURE 25

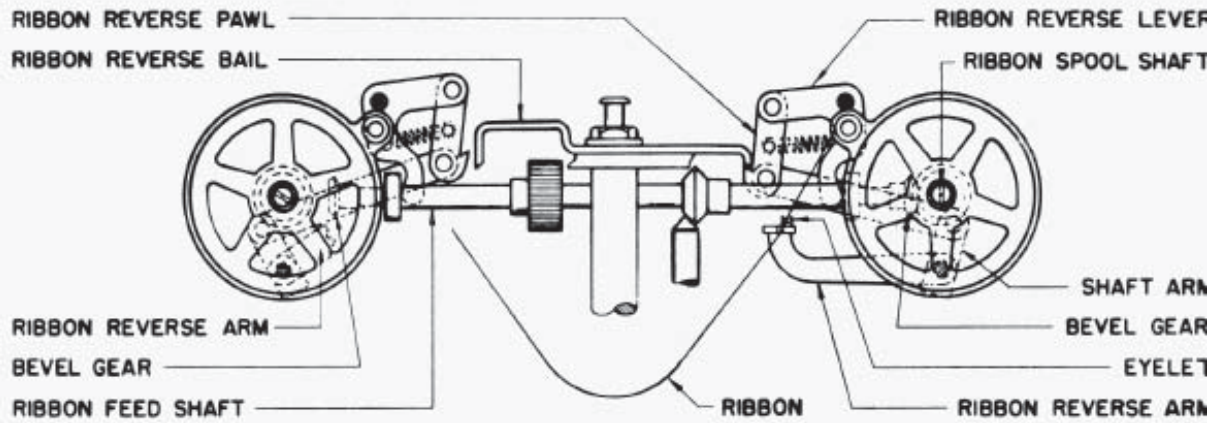


FIGURE 26

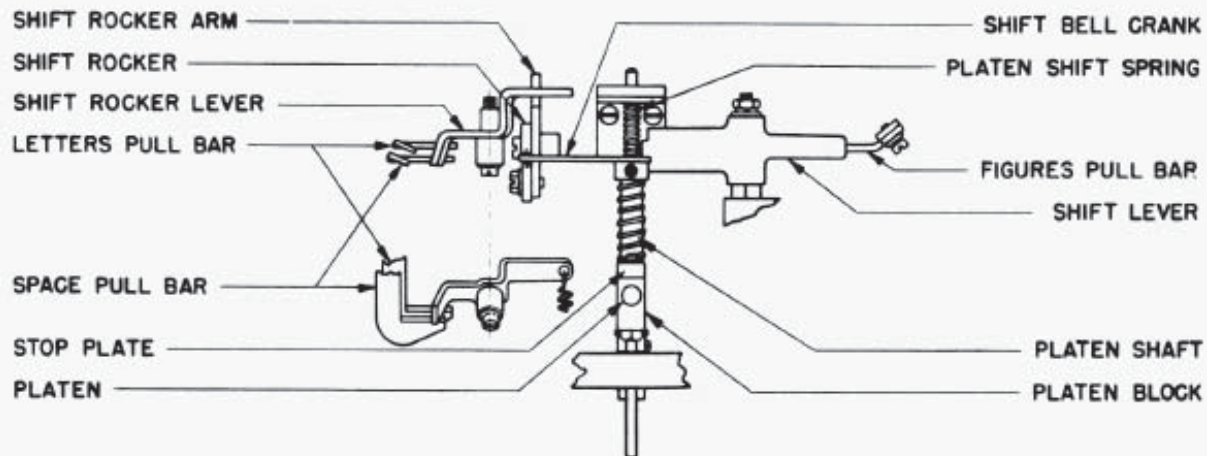


FIGURE 27

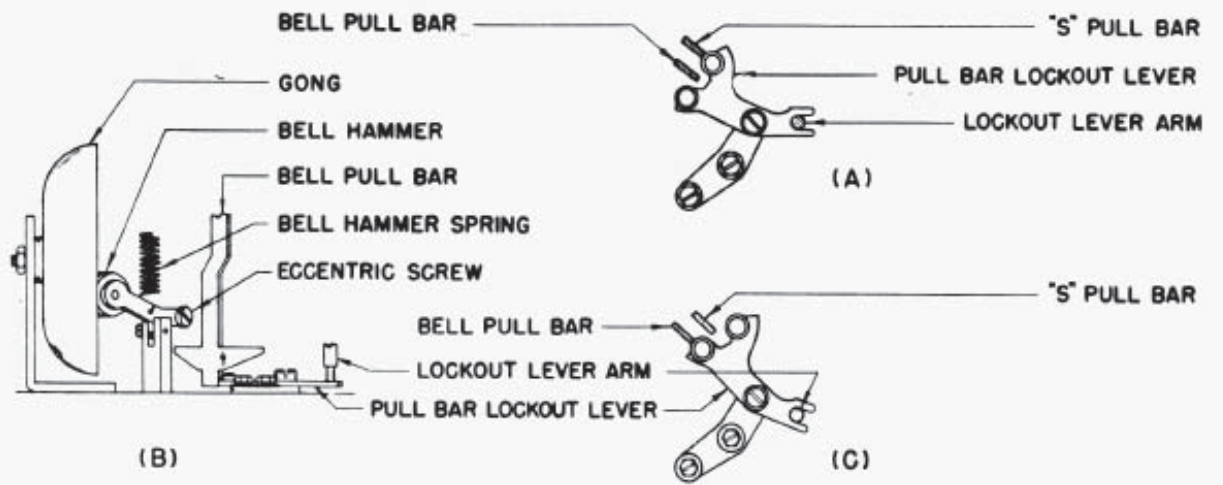


FIGURE 28

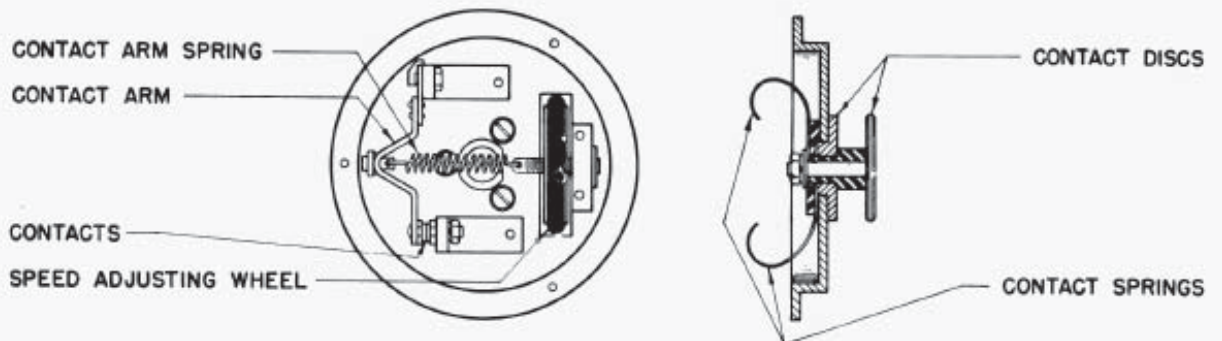


FIGURE 29

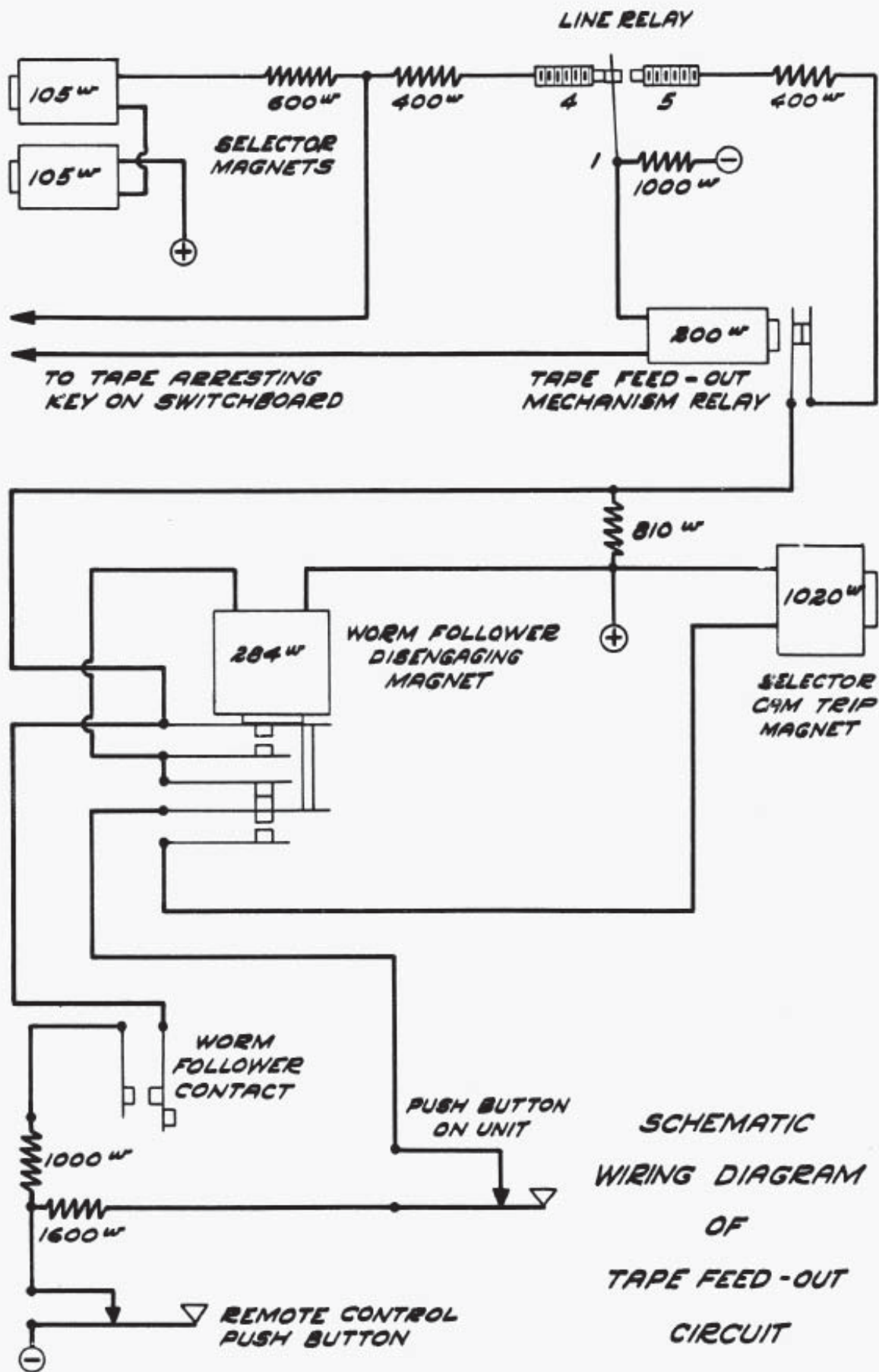


FIGURE 30

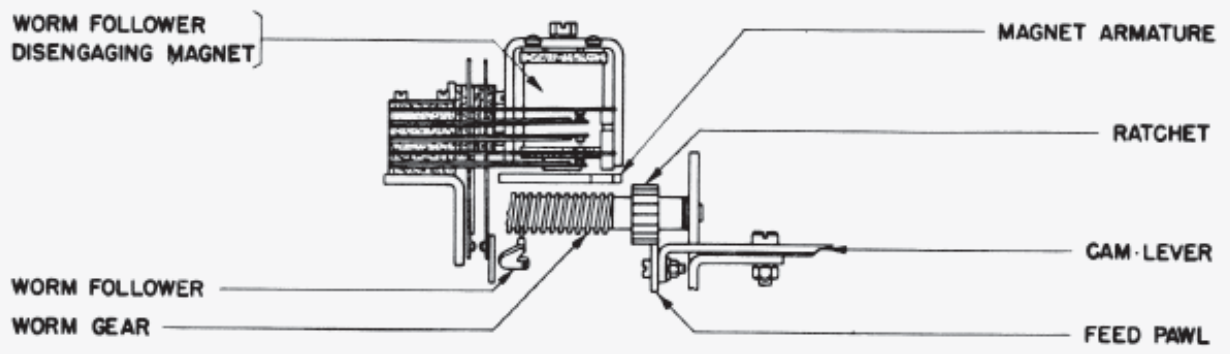


FIGURE 31