32 AND 33 TYPING UNIT

PRINCIPLES OF OPERATION

1. GENERAL

1.01 This section is issued to provide principles of operation for the 32 and 33 typing unit and to present the principles as a

separate section. It describes the code used by the typing unit to transmit and receive messages, outlines in general terms the overall operation, and explains in detail the operation of the components that make up the typing unit.

1.02   References to "left," "right," "front," or "rear," etc, consider the typing unit to be viewed from a position where the carriage faces up and the selector mechanism is located to the viewer's left. In the illustrations, fixed pivots are solid black, and floating pivots—those mounted on parts that move, are cross-hatched.

TELETYPEWRITER CODE

1.03   Teletypewriters transmit and receive messages by means of a binary permutation code (Figures 1 and 2). The characters making up the messages (letters, numerals, symbols, functions, etc) are represented by pre-arranged combinations of binary intelligence elements (also referred to as levels, or bits), each of which may be in one of two states—on or off. Depending on whether a 5- or 8-level code is employed, each combination consists of five, six, seven, or eight intelligence elements. The total number of permutations available in a given code is equal to 2 to the nth power, where "n" is the number of intelligence elements. For example, in a 6-level code, there are 2 to the 6th power, or 64, permutations.

1.04   In the various stages of a communication system using teletypewriter equipment, the above code may occur in a number of different forms, including parallel or sequential electrical pulses, mechanical positions of parts, code holes in paper tape, and tone frequencies. For transmission purposes, it is placed in an electrical form referred to as a start-stop signaling code, or simply a teletypewriter code (Figures 1 and 2). The intelligence elements are applied sequentially to a signal line as current or no-current time intervals. Intervals during which current flows in the signal line are referred to as "marking" elements, and intervals during which no current flows as "spacing" elements. To insure synchronization between the transmitting and receiving equipment, a start element, which is always "spacing," is added at the beginning of each combination of intelligence elements, and a stop element, which is always "marking," is added at the end.

1.05   In different signaling codes, the length of the stop element may vary. For example, in the teletypewriter code illustrated in Figure 1, the length of the stop element is 1.5 times the other elements. Thus, the transmission of a character requires 7.5 units of time. It is therefore said to have a 7.5-unit transmission pattern.

A.   32 Typing Units

1.06   The teletypewriter code accommodated by the 32 typing unit is illustrated in Figure 1. Since it has five intelligence elements and its stop element is 1.5 units of time, it is a 5-level code with a 7.5-unit transmission pattern. It has 2 to the 5th power, or 32 available permutations.

1.07   To accommodate more than 32 characters, a letters-figures shift is designed into the typing unit. This is similar to the lower and upper case of a typewriter and permits each code combination, excluding the two used to shift the equipment, to represent two characters.

1.08   A character arrangement is shown on the chart in Figure 1. The black circles represent marking elements; the blank squares represent spacing elements. When the "letters" code combination (12345) is transmitted, it conditions all typing units connected to the circuit to print, at the receipt of all following code combinations, the characters in the letters (lower case) line on the chart. Similarly, when the "figures" code combination (12-45) is transmitted, it conditions the typing units to print the characters or perform the functions in the figures (upper case) line on the chart.

B.   33 Typing Units

1.09   The American Standard Code for Information Interchange (ASCII) accommodated by the 33 typing unit is illustrated in Figure 2. Since it has eight intelligence elements and its stop element is 2 units of time, it is an 8-level code with an 11-unit transmission pattern. However, at the present it utilizes only the first seven intelligence elements, the eighth being used to provide an error detection feature called "even parity." When "even parity" is not provided, the eighth intelligence element is always transmitted as a marking element. Thus, it has 2 to the 7th power, or 128, available permutations. Of these combinations, 64

TRANSMISSION
SEQUENCE

5-LEVEL BINARY PERMUTATION CODE

CHARACTER ARRANGEMENTS

CURRENT WAVE FORM FOR LETTER "Y"

Figure 1 — Teletypewriter Code (5-Level)
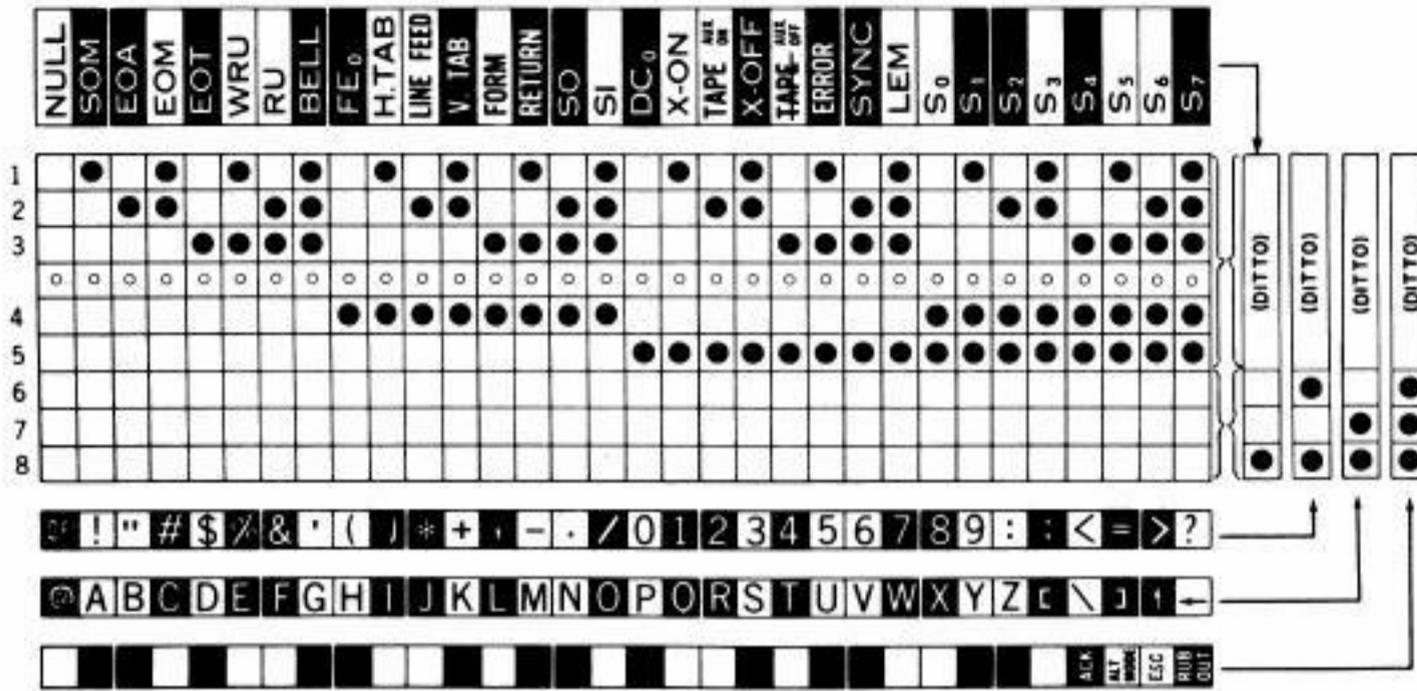
CHARACTER ARRANGEMENT (ASCII CODE)
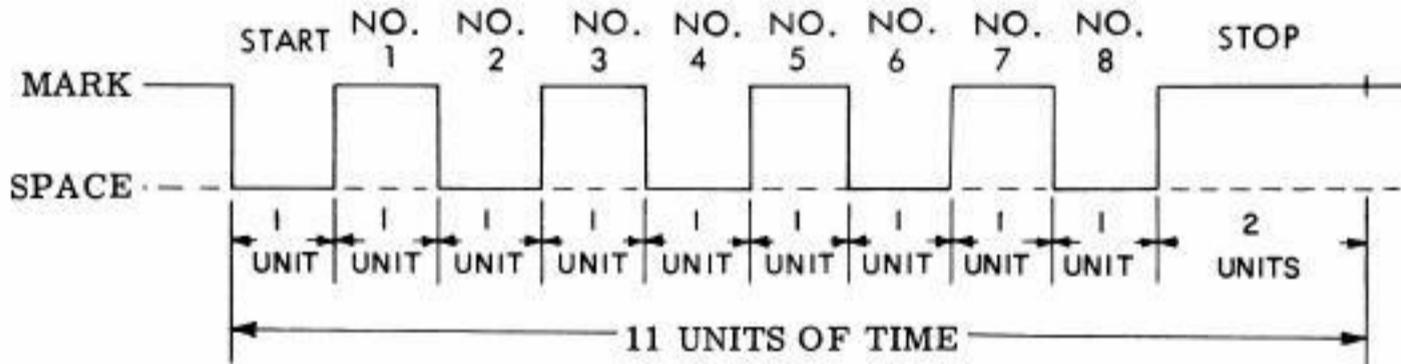
CURRENT WAVE FORM FOR LETTER "U" (WITH "EVEN PARITY")

Figure 2 — Teletypewriter Code (8-Level)

are assigned to printing characters. The rest are devoted to control (nonprinting) characters, or are unassigned.

Note: "Even parity" is an error detection feature which provides for adding a pulse whenever the number of marking pulses in a code combination is odd.

1.10   The character arrangement for the ASCII code is shown on the chart in Figure 2. The black circles represent marking elements,

the blank squares spacing elements. The main block gives the arrangements of elements 1 through 5. The four smaller blocks at the right give the arrangements of elements 6 and 7 for the four rows of characters as indicated by the arrows. When "even parity" is provided; characters and functions which have white backgrounds in the character arrangement chart have the eighth intelligence element spacing—dark backgrounds have the eighth intelligence element marking. For keyboard transmission, two SHIFT keys and a CTRL key are used as covered in the appropriate keyboard section.

GENERAL OPERATION (Figures 3, 4 and 5)

1.11   Figure 3 is a pictorial schematic of a
        basic typing unit's operation. Figures
4 and 5 show the sequence of events involved
in receiving a character.

A.   Power Distribution

1.12   As shown in the middle portion of Figure
        3, ac electrical power is applied to a
motor through a motor switch, which may be
manually or automatically controlled. The motor
converts the electrical power to rotary motion,
which is transferred by intermediate drive
parts to a distributor shaft. The latter drives a
main shaft and, through a clutch, provides
motion to a distributor mechanism. The main
shaft, through various clutches, distributes
motion to a selector mechanism, a codebar
mechanism, a function mechanism, a spacing
mechanism, a carriage, and, in the case of
sprocket feed typing units, a platen.

B.   Transmission

1.13   The upper portion of the diagram (Fig-
        ure 3) illustrates transmission, which is
effected by an operator depressing the keys of
a keyboard. Assume that the D key is manually
depressed. A codebar mechanism converts this
selective action to mechanical positions corres-
ponding to the code combinations representing
the letter D. These positions, in turn, set up
the code combination in a set of keyboard con-
tacts, and, by parallel output, the code com-
bination is transmitted to the distributor. The
distributor then translates the parallel output
from the keyboard contacts into a corresponding
start-stop signaling code combination and ap-
plies it to the transmission facilities, which
carry it to distant stations. Since a local
selector magnet driver is connected to the
transmission facilities, it also receives the
signals.

C.   Reception and Printing

1.14   The lower portion of the diagram (Fig-
        ure 3) illustrates reception and printing.
Assume that the start-stop signaling code com-
bination representing the letter D, which may
have been originated either remotely or by the
local keyboard, is received from the trans-
mission facilities by the selector magnet driver.
The driver converts it to a form suitable to
operate the selector mechanism. The selector

then translates it to mechanical positions which
are transferred to the codebar mechanism.

1.15   Under the control of the codebar mechan-
        ism, rotary and vertical positioning
mechanisms on the carriage position a type-
wheel so as to select the letter D embossed
on its surface. A printing mechanism, by
means of a print hammer, drives the typewheel
against an inked ribbon and the paper to print
the character. A ribbon mechanism feeds the
ribbon and reverses its direction of feed when
a spool is depleted.

D.   Function Mechanism

1.16   Controlled by the codebar mechanism,
        a function mechanism enables the typing
unit to perform functions supplementary to
printing. The standard functions consist of
"space," "carriage return," "line feed," "blank,"
"bell," and, in the case of 32 typing units,
"letters" and "figures." In response to the
reception of "letters" or "figures" code com-
bination, the function mechanism conditions the
codebar mechanism to cause printing in the
lower or upper case, respectively. It also
causes the codebar mechanism to suppress
printing on receipt of all functions.

E.   Spacing Mechanism

1.17   A spacing mechanism positions the car-
        riage so that the characters are properly
located horizontally on the paper. It spaces the
carriage each time printing occurs and when the
"space" code combination is received. The
function mechanism suppresses spacing on the
receipt of all functions except "space." At the
receipt of "carriage return" code combination,
the function mechanism causes the spacing
mechanism to return the carriage to the left
margin, so that a new printing line can be
started.

F.   Paper Feed Mechanism (Friction Feed
      Typing Units)

1.18   A paper feed mechanism positions the
        paper vertically so that the characters
are properly located in lines on the paper. At
the receipt of the "line feed" code combination,
the function mechanism causes the line feed
mechanism to raise the paper to the next print-
ing line.

G. Form-Out Mechanism (Sprocket Feed Typing Units)

1.19   A form-out mechanism positions the form vertically so that the characters are properly located in lines on the form. At the receipt of the "line feed" or "form-out" code combination, the main shaft, through a line feed clutch, causes the platen to raise the form to either the next printing line or one form length, depending upon which function ("line feed" or "form-out") is used.

2. DETAILED PRINCIPLES OF OPERATION

POWER DISTRIBUTION

A. Motor

2.01   Rotary mechanical motion for the typing unit is generated by synchronous motors. The motors are described in the appropriate description section.

2.02   The motor ordinarily used on 33 typing units has a run winding and a start winding connected in parallel. (See the appropriate schematic wiring diagram.) The start winding is in series with an electrolytic capacitor and the contacts of a current-sensitive start relay. When the motor circuit is closed, the initial surge of current energizes the relay coil, which closes the relay contacts. The magnetic flux produced by the operating and start windings starts the rotor turning. As the rotor accelerates, the current through the windings, capacitor, and relay decreases. When it drops to a predetermined level, the relay coil opens the contacts and removes the start coil from the circuit. Using the operating coil alone, the motor continues to accelerate until it reaches synchronous speed.

2.03   The motor ordinarily used on 32 typing units is similar, but has a run capacitor in addition to a start capacitor.

B. Distribution

2.04   As shown in Figure 6, the rotary motion produced by the motor is transferred through a motor pinion, an intermediate gear pulley, and a motor belt to a distributor gear pulley. The latter drives a main shaft gear and also a distributor clutch, which provides motion for the keyboard and distributor mechanism.

2.05   The main shaft, through various clutches, distributes motion to the various mechanisms on the typing unit (excluding the distributor). A selector clutch provides motion for the selector. A codebar clutch drives the codebar mechanism, and a function clutch furnishes motion to a function rocker shaft, a function stripper bail, a carriage drive bail, and a print-suppression latch.

C. Clutches

2.06   The operation of all clutches is basically the same. A typical clutch is shown in Figure 7.

2.07   A clutch drum is attached to and rotates in unison with a shaft. In their stop position, a trip lever and a latchlever hold a shoe lever, two shoes, a cam disc, and cam sleeve stationary.

2.08   When the trip lever moves away from the shoe lever, the latter, under spring pressure, moves away from a stop-lug on the cam disc. Through two lugs, the shoe lever expands the shoes until they contact the notched inner surface of the drum. The drum causes the shoes to start to rotate, and the shoes, in turn, through a lug on the cam disc, rotate the disc and the attached cam sleeve. The clutch is now engaged, and the cam sleeve rotates in unison with the shaft.

2.09   When the trip lever moves to its stop position, it is struck by the shoe lever. The cam disc continues to rotate until the latchlever seats in its notch, and the shoe lever and stoplug are pinched together by the trip lever and latchlever. A spring holds the shoes together, so they no longer contact the drum. Thus, the clutch is again disengaged as shown in Figure 7.

TRANSMISSION

A. General

2.10   Transmission of messages is accomplished by an operator selectively depressing the keys and spacebar of the keyboard in the same manner as in typing. The downward movement of each key or the spacebar is translated by a codebar mechanism into a mechanical arrangement corresponding to the code combination representing the character on the keytop.

MANUAL DEPRESSION OF "D" KEY   KEYBOARD

KEYBOARD CONTACTS

CODEBAR
MECHANISM   MECHANICALLY POSITIONS,   PARALLEL O
                   "D" CODE COMBINATION   "D" CODE COM

                   MOTION FOR KEYBOARD   MOTIO
                                                    DISTRI

TRANSMISSION

POWER   MOTOR
         SWITCH

AC POWER   MOTIO
SOURCE
DISTRIBUTION
                   MOTOR   INTERMEDIATE   DISTRIBUTOR S
                                   DRIVE PARTS

LF

RECEPTION &   PAPER OR FORM
PRINTING   FEED MECHANISM   CARRIAGE

                                                                PRINT

                                 HAMMER STRIKES
                                 TYPEWHEEL   POWER
                                                                BAIL

FEEDS PAPER   PRINTING MECHANISM
OR FORM
                                                                V
                                                                PO
                                                                M

                                              CONTROL OF
                                              ROTARY MECHANISM
PAPER
OR FORM   TYPEWHEEL
                                    ROTARY
                                    POSITIONING
            D   MECHANISM

                   CONTROL OF TYPEWHEEL

                   INK FOR PRINTING

                                                                RIBBO

KEY

| TRANSFER OF INTELLIGENCE | → MECHANICAL | ⇢ ELECTRICAL |
| TRANSFER OF ENERGY | → MECHANICAL | ⇢ ELECTRICAL |

TO TRANSMISSION FACILITIES

TPUT
BINATION

N FOR
BUTOR

DISTRIBUTOR

START-STOP SIGNALS FOR "D"

Note: For explanation of diagram see Paragraphs 1.13 through 1.22.

Mechanisms are arranged to show functional relationship.
For physical relationship, see the appropriate description section.

MAIN SHAFT

MOTION FOR SELECTOR

MOTION FOR FUNCTION MECHANISM

AFT

MOTION FOR CARRIAGE

CARRIAGE DRIVE BAIL

LF

SP & CR

SUPPRESSION

SP, CR & SP

SUPPRESSION

MOTION FOR CODEBAR MECHANISM

SPACING MECHANISM

FUNCTION MECHANISM

ERTICAL SITIONING ECHANISM

CONTROL OF VERTICAL MECHANISM

PRINT SUPPRESSION

LTRS, & FIGS

SP, CR, LF, BELL, LTRS & FIGS

CODEBAR MECHANISM

MECHANICALLY POSITIONS

"D" CODE COMBINATION

SELECTOR MECHANISM

SELECTOR MAGNET DRIVER

START-STOP SIGNALS FOR "D"

START-STOP SIGNALS FOR "D"

N MECHANISM

SIGNAL LINE
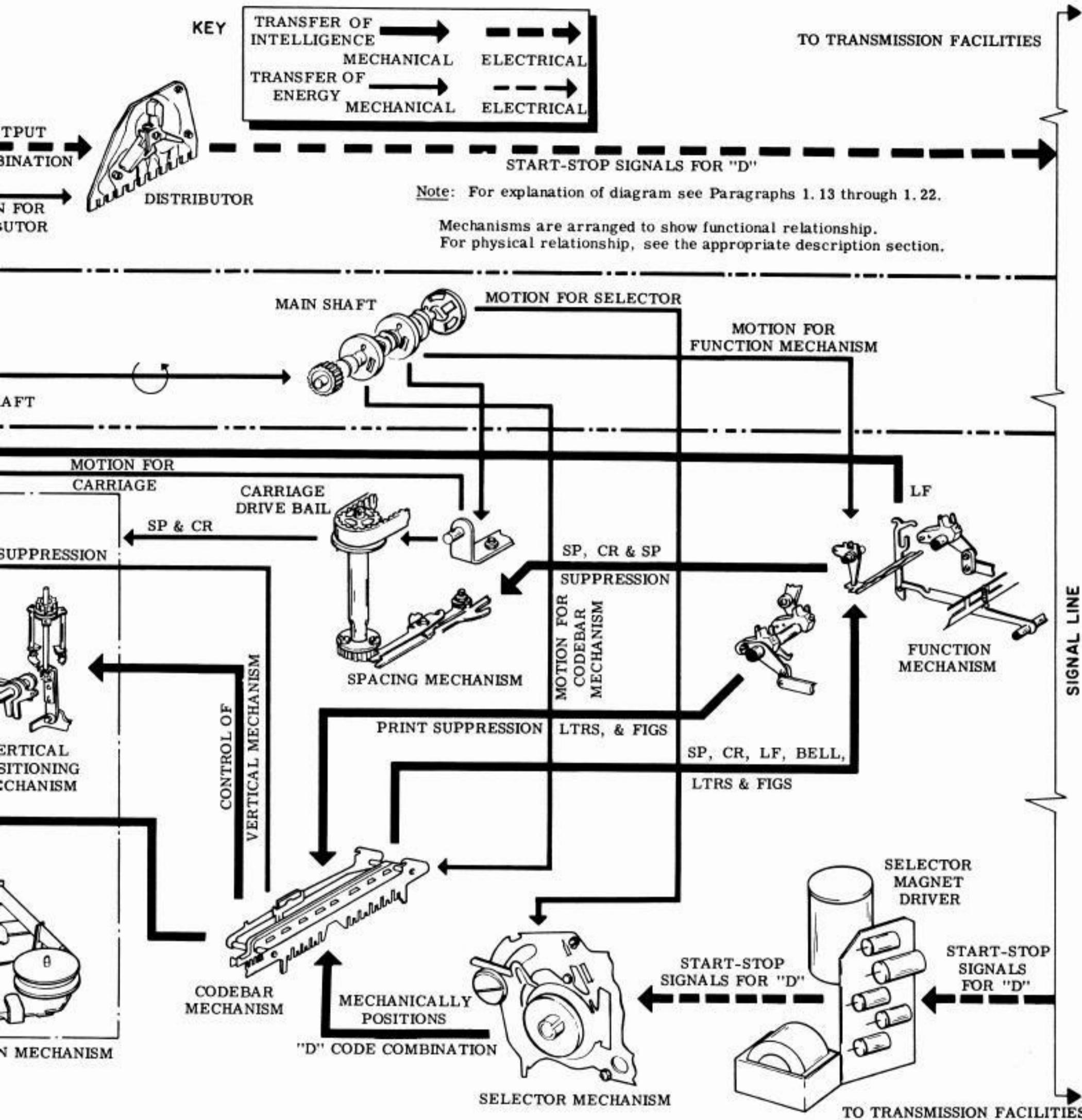
TO TRANSMISSION FACILITIES

Figure 3 — Schematic Diagram -
Typing Unit Operation

Figure 4 — Sequence Diagram - 32 Typing Unit Operation
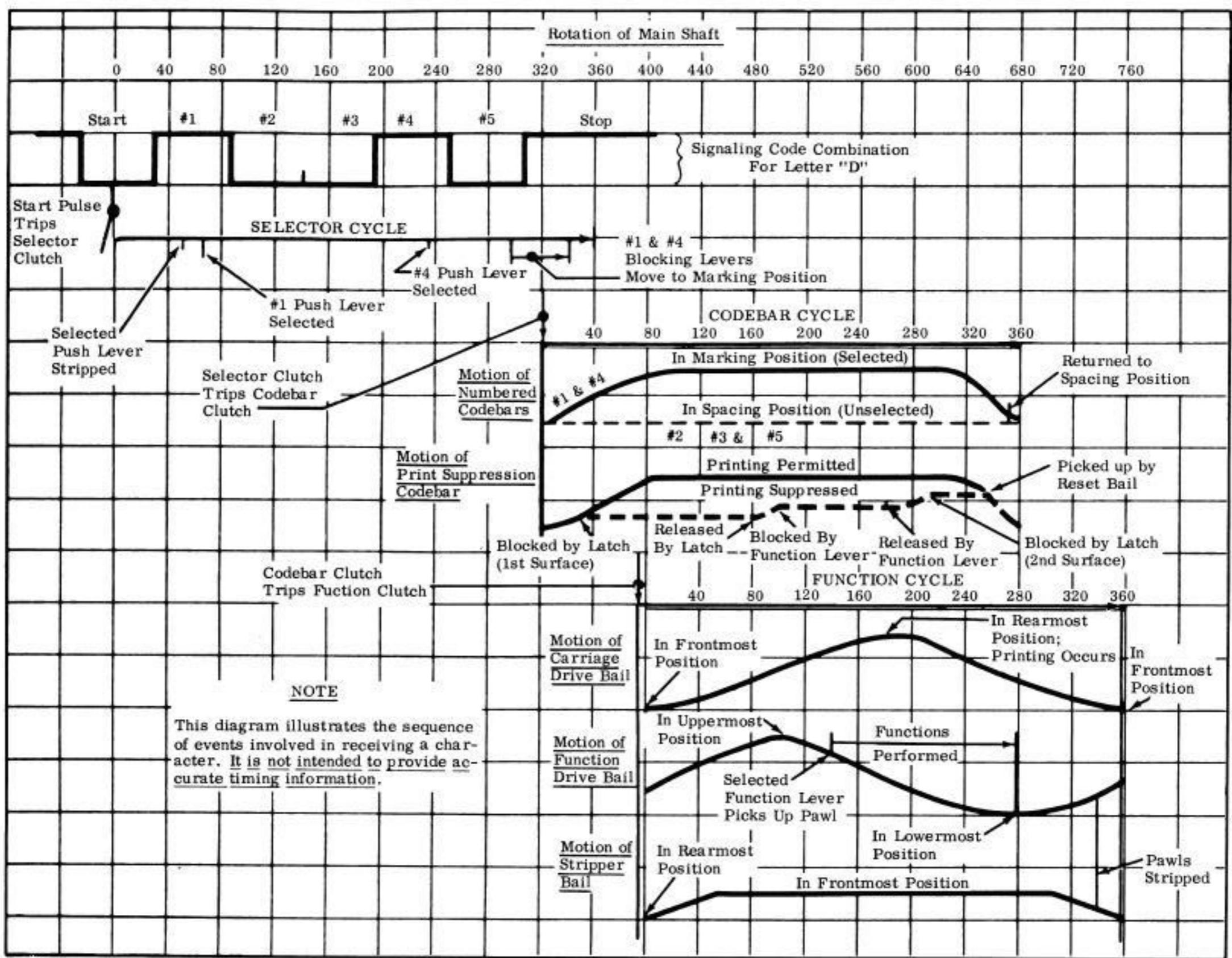
Figure 5 — Sequence Diagram - 33 Typing Unit Operation

Rotation of Main Shaft

| 0 | 40 | 80 | 120 | 160 | 200 | 240 | 280 | 320 | 360 | 400 | 440 | 480 | 520 | 560 | 600 | 640 | 680 | 720 | 760 |

| Start | #1 | #2 | #3 | #4 | #5 | #6 | #7 | #8 | Stop |

Signaling Code Combination
For Letter "D"

Start Pulse
Trips
Selector
Clutch

SELECTOR CYCLE

#3 and #7
Blocking Levers
Move to Marking Position

#7 Push Lever
Selected

#3 Push Lever
Selected

Selected
Push Lever
Stripped

Selector Clutch
Trips Codebar
Clutch

Motion of
Numbered
Codebars

CODEBAR CYCLE

| 40 | 80 | 120 | 160 | 200 | 240 | 280 | 320 | 360 |

In Marking Position (Selected)

Returned to
Spacing Position

#3 & #7

In Spacing Position (Unselected)

#1, #2, #4, #5, #6, & #8

Motion of
Print Suppression
Codebar

Printing Permitted

Picked up by
Reset Bail

Printing Suppressed

Released
By Latch

Blocked By
Function Lever

Released By
Function Lever

Blocked by Latch
(2nd Surface)

Blocked by Latch
(1st Surface)

Codebar Clutch
Trips Fuction Clutch

FUNCTION CYCLE

| 40 | 80 | 120 | 160 | 200 | 240 | 280 | 320 | 360 |

Motion of
Carriage
Drive Bail

In Frontmost
Position

In Rearmost
Position;
Printing Occurs

In
Frontmost
Position

NOTE

This diagram illustrates the sequence
of events involved in receiving a char-
acter. It is not intended to provide ac-
curate timing information.

Motion of
Function
Drive Bail

In Uppermost
Position

Functions
Performed

Selected
Function Lever
Picks Up Pawl

In Lowermost
Position

Pawls
Stripped

Motion of
Stripper
Bail

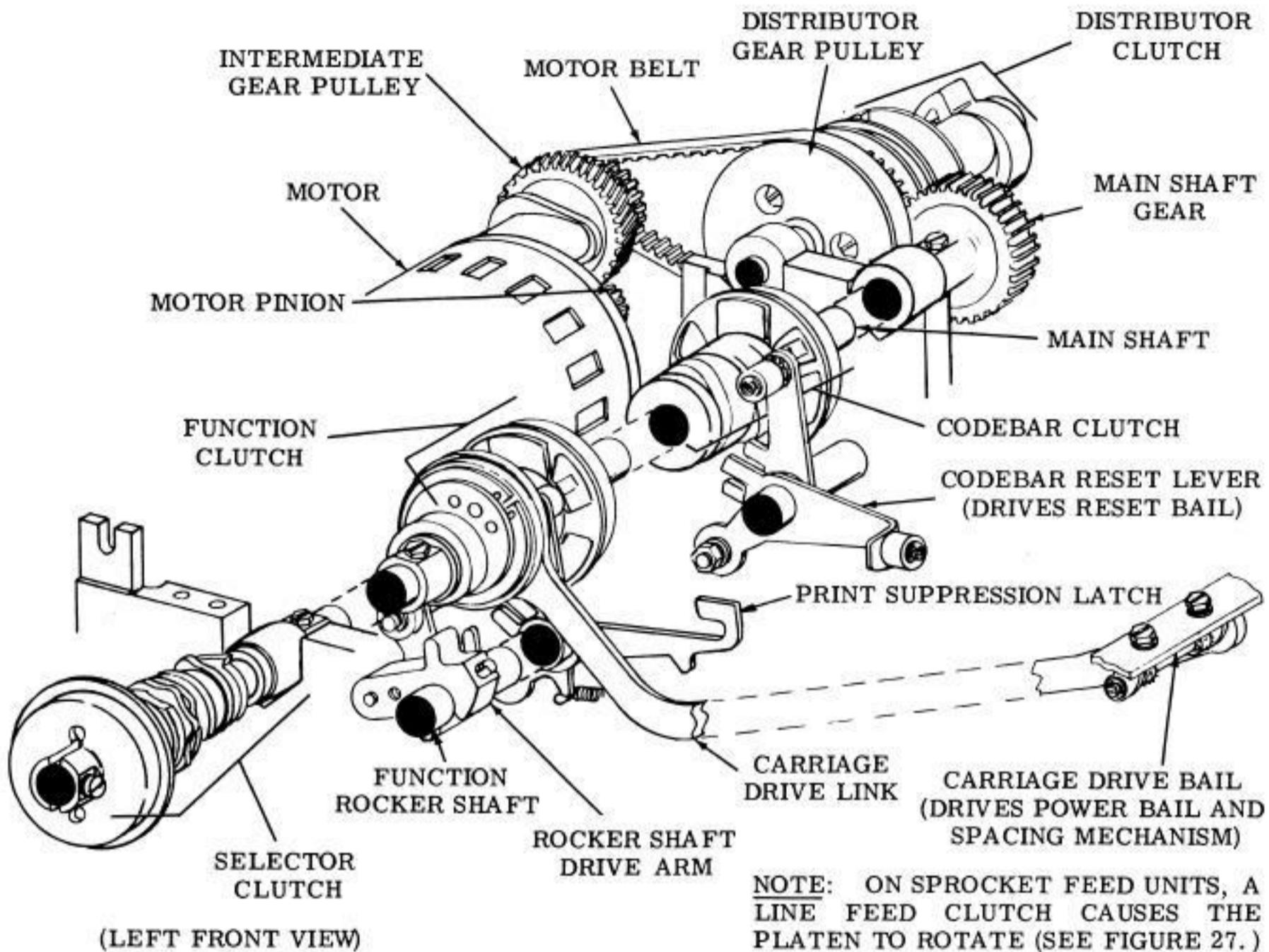In Rearmost
Position

In Frontmost Position

Figure 6 — Power Distribution

The mechanical arrangements set up the code combinations in a set of keyboard contacts, and, by parallel output, the code combinations are transmitted to a distributor mechanism. A universal mechanism trips a distributor clutch, and a distributor mechanism then translates the parallel output from the keyboard contacts into corresponding start-stop signals for application to the transmission facilities.

Note: For a further discussion of transmission principles, see the appropriate keyboard section.

B. Distributor Mechanism

2.11 The distributor mechanism is illustrated in Figures 8 and 9.

2.12 The distributor mechanism receives the parallel output of the keyboard contacts which have been mechanically arranged into code combinations and converts it to start-stop signals and applies them to the signal line. The mechanism receives rotary motion from a distributor gear pulley attached to the drum of a distributor clutch. The clutch disc is connected to a distributor shaft. A brush holder mounted on the shaft carries two carbon brushes which are electrically connected by a spring and ride on an inner and outer disc, respectively. The discs are part of a printed circuit card that provides facilities for interconnecting the distributor with other apparatus. The outer disc is divided into segments—ten for 33 typing units, seven for 32 typing units. The segments correspond to the elements of the teletypewriter code described in 1.03 through 1.10.
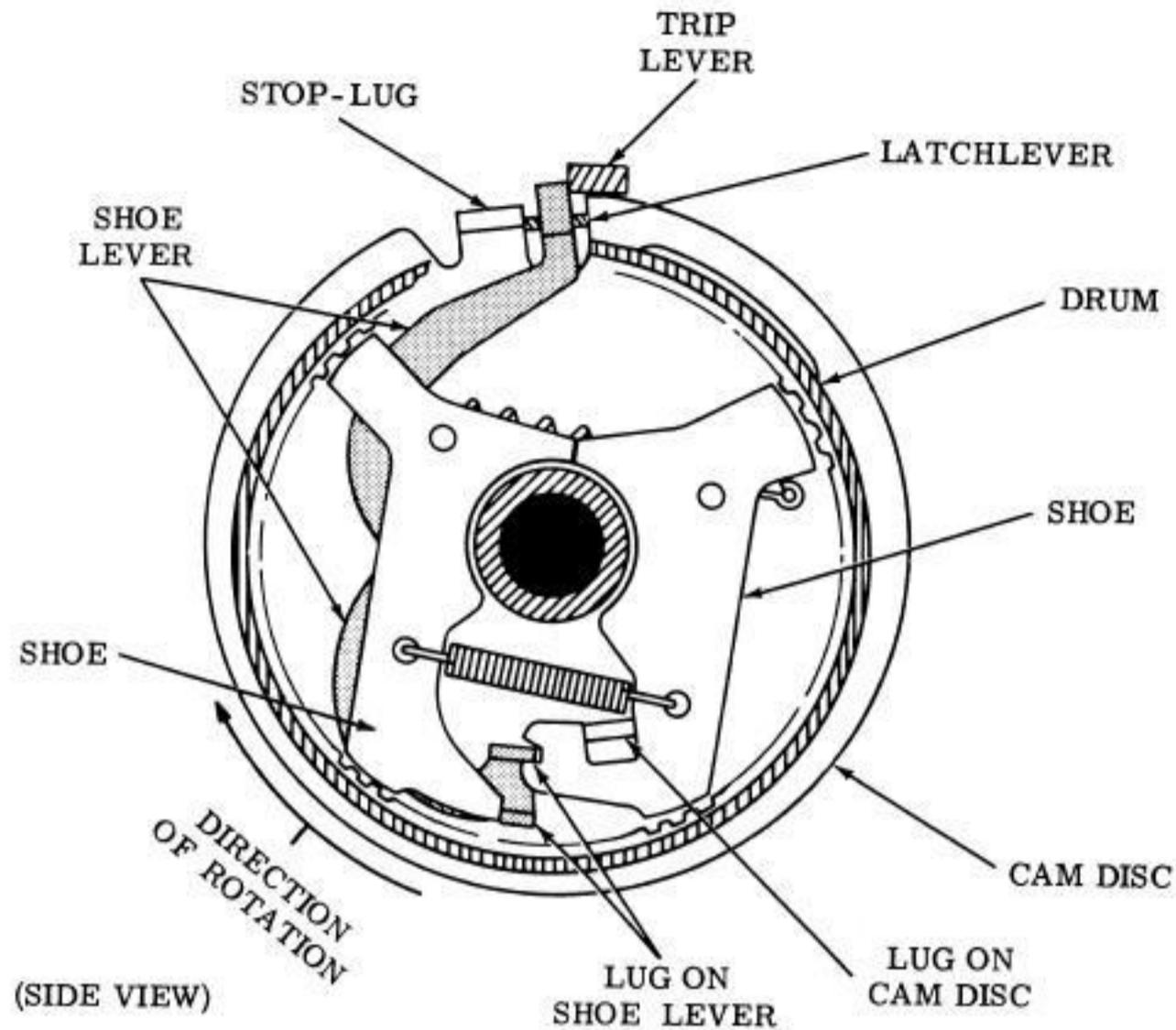
Figure 7 — Clutch

2.13 In the stop position, the distributor clutch is disengaged (latched), and the outer brush rests on the stop segment. When a key-lever is depressed, the proper code combination is set up in the keyboard contacts, and the universal lever moves to its up position. The motion of the transfer lever is conveyed by an H-plate to a distributor trip linkage on the typing unit. The trip linkage pivots a trip bail, which carries a trip lever rearward out of the way of the distributor clutch's shoe lever. The clutch engages and rotates the shaft and brush holder. The outer brush passes over the segments on the outer disc in the following order:

(a) Start, no. 1 through no. 5, and stop, for 32 typing units.

(b) Start, no. 1 through no. 8, and stop, for 33 typing units.

2.14 Near the end of the shaft's revolution, a roller on the clutch disc pivots a follower lever which moves the trip bail

and lever frontwards. This motion is trans-ferred through the trip linkage and H-plate to the universal lever, which is moved to its down position, where it is latched. When the clutch completes its revolution, the shoe lever strikes the trip lever, and the clutch disengages.

2.15 The effect of the above operations is to apply a start-stop code combination to the signal line corresponding to the combination set up in the keyboard contacts. This can best be shown by an example. Figure 9 is a simpli-fied schematic of a 32 typing unit distributor.

(a) In the stop position, the outer brush rests on the stop segment, and the current flows in the signal circuit which is closed. (The signal path is from one side of the line through the start segment, the inner disc, the brushes, the stop segment, the common terminal, and the break con-tact to the other side of the line.) Thus a marking condition exists. Assume again that

DISTRIBUTOR GEAR PULLEY

CLUTCH DRUM

TRIP LEVER

TRIP BAIL

CLUTCH DISC

BRUSH

ROLLER

SPRING

FOLLOWER LEVER

INNER DISC

BRUSH

DISTRIBUTOR TRIP LINKAGE

BRUSH HOLDER

H-PLATE

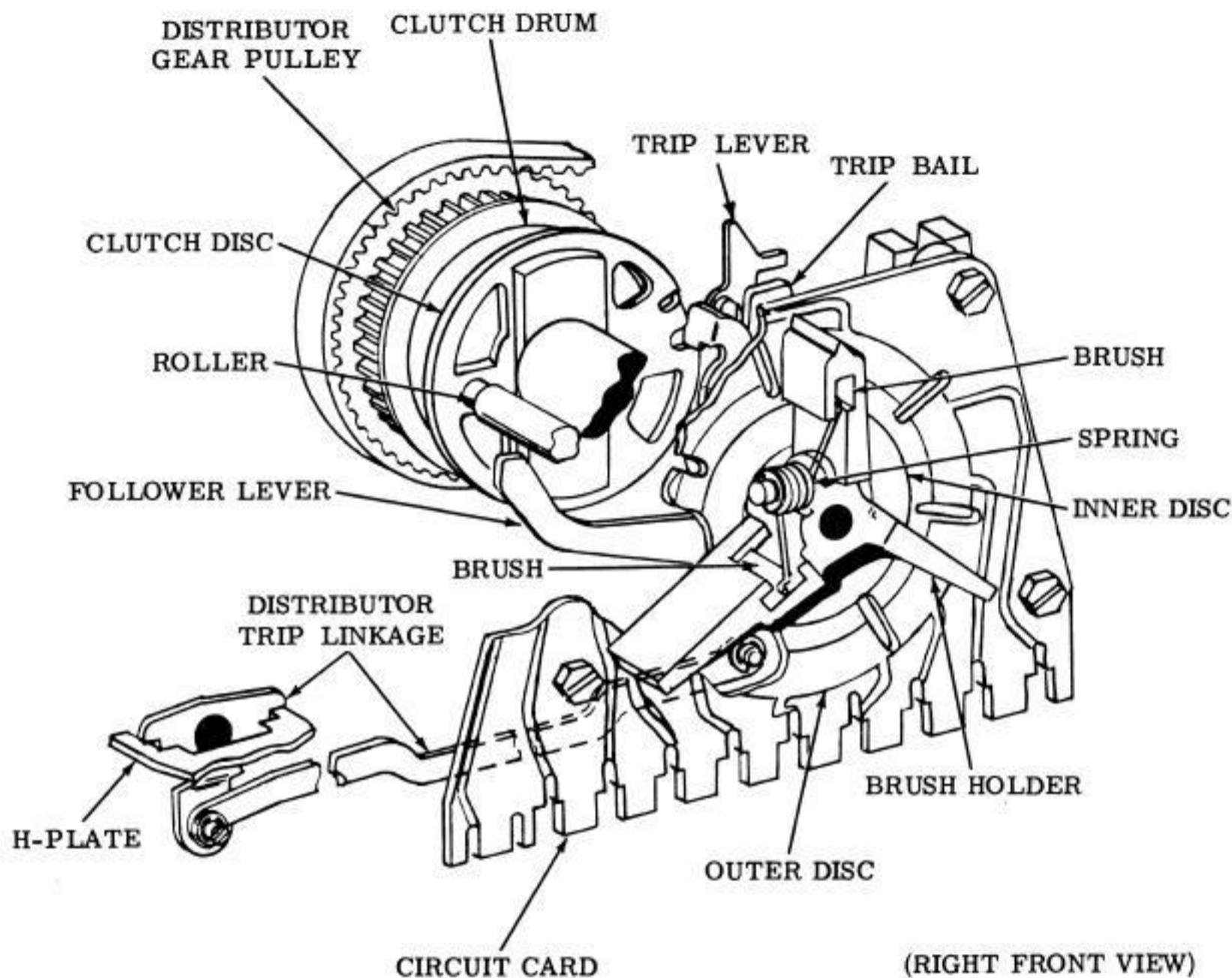OUTER DISC

CIRCUIT CARD

(RIGHT FRONT VIEW)

Figure 8 — Distributor Mechanism

the D key is depressed. The (1--4-) code combination is set up in the keyboard contacts.

(b) The distributor clutch is tripped, and the brush holder begins its revolution. While the brush is on the start segment, the circuit is open, no current flows, and a spacing element is transmitted. While it is on the no. 1 segment, the circuit is closed. (The signal path is through the start segment, the inner disc, the brushes, the no. 1 segment, the closed no. 1 contact, the common terminal, and the break contact.) Thus, current flows, and a marking element is transmitted. While the brush is on the no. 2 and no. 3 segments, since

the no. 2 and no. 3 contacts are open, the circuit is broken, no current flows, and spacing elements are transmitted. In a similar manner, a no. 4 marking element and a no. 5 spacing element are transmitted. When the brush reaches the stop segment, the distributor clutch is disengaged, and the line again becomes marking.

2.16 The operation of a 33 typing unit distributor is similar to that explained for the 32 typing unit distributor, except that, as previously noted in 2.12, the outer distributor disc is divided into ten segments, and the distributor generates an 8-level ASCII code (Figure 2).
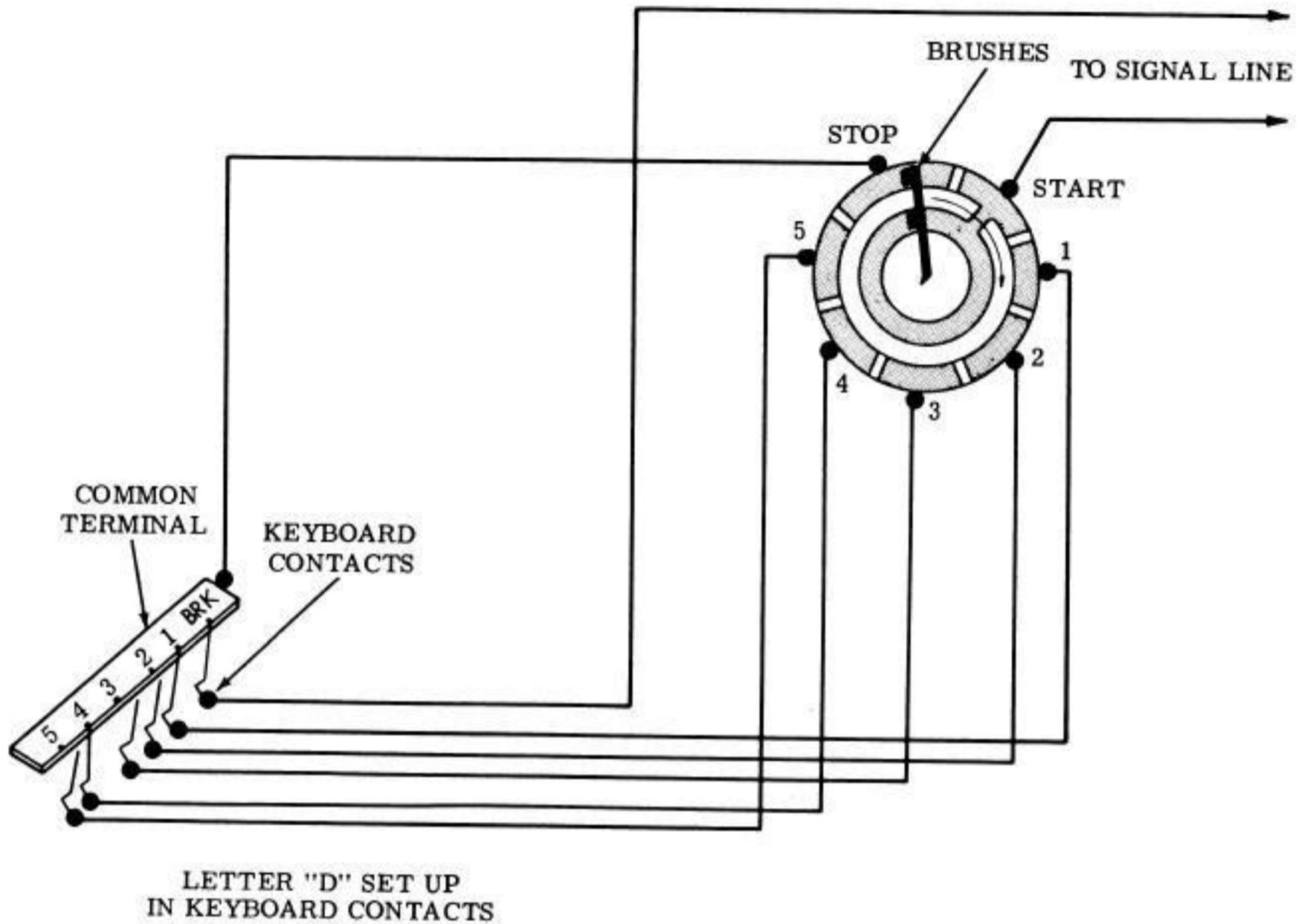
LETTER "D" SET UP
IN KEYBOARD CONTACTS

Figure 9 — Signal Wiring - 32 Typing Unit Distributor

RECEPTION AND CONVERSION

A. Selector Mechanism

2.17 The selector mechanism receives the signaling code combinations from the selector magnet driver and converts them to corresponding mechanical arrangements that control the codebar mechanism. The selector mechanism is described in the appropriate description section. Figures 10 and 11 illustrate the selector mechanism.

2.18 A magnet coil is wired by two leads to the output of the selector magnet driver. In the stop condition, the output of the selector magnet driver is marking, and the coil is energized and holds the armature against a magnet core. When a code combination is received, the start pulse (spacing) de-energizes the coil, and the armature moves rearward to its spacing position out of the way of the start lever (Figure 10). The latter moves up and carries an associated start cam follower into the indent in its cam. The follower, in turn, moves an attached trip lever up and out of engagement with the clutch shoe lever. A selector clutch engages and makes one complete revolution (the clutch "cycles") during which the start cam holds the start lever out of the way of the armature.

2.19 As the selector clutch cycles, a spacing locklever, a stripper bail, a codebar clutch's trip follower arm, and selector levers (five for 32 typing units; eight for 33 typing units) ride on individual cams under spring pressure.
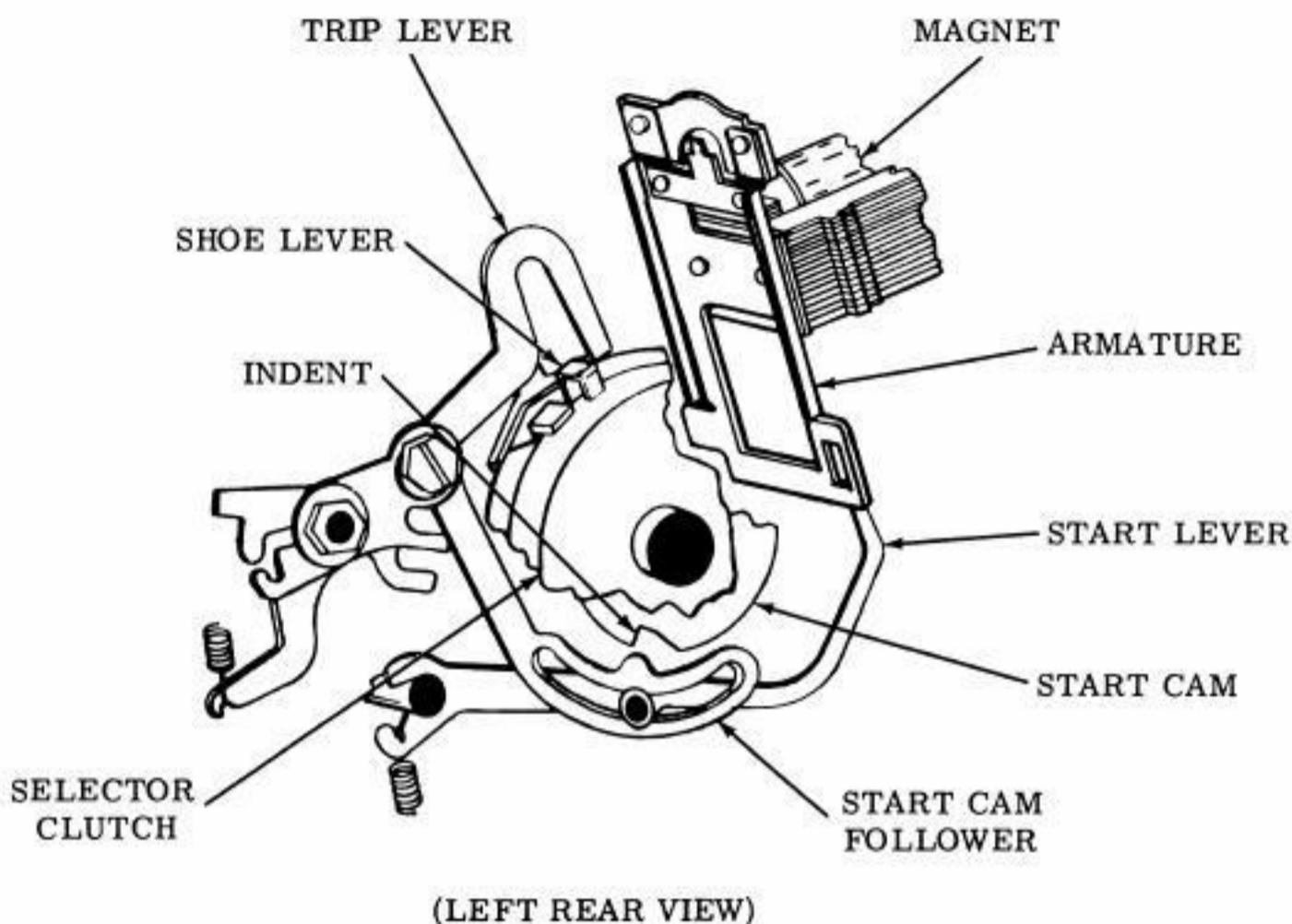
Figure 10 — Selector Trip Mechanism

2.20 Near the beginning of the cycle, the stripper cam pivots the stripper bail, which strips any push levers selected during the previous cycle from their respective selector levers and leaves them in their unselected position in front of the selector levers. The design of the selector clutch is such that, as each element of the code combination is received following the start element, an indent in the corresponding selector lever cam and the spacing locklever cam are presented to their respective levers. Since the operation of each selector linkage will be the same, only one of them is described below.

2.21 If the intelligence element is spacing, it de-energizes the magnet coil, and the armature moves to its spacing (rear) position. The spacing locklever is permitted to move up, and it holds the armature in this position during the sampling interval (Figure 11). The selector lever is prevented from moving up into the indent of its cam by the

armature, and the push lever remains in its unselected (spacing) position in front of the lever.

2.22 On the other hand, if the element is marking, the armature moves forward to its marking position, out of the way of the selector lever, and blocks the spacing locklever. The selector lever moves up into the indent of its cam, locking the armature in its marking position during the sampling interval (Figure 11) and permitting its spring-biased push lever to move rearward under the selector lever.

2.23 As the code combination is received, each intelligence element is sampled in turn, and the corresponding selector levers and push levers are positioned accordingly (Figures 4 and 5). The contours of the selector cams are such that, near the end of the cycle, they drive the selector levers and selected push levers counterclockwise (as viewed from the left) to their marking position in which
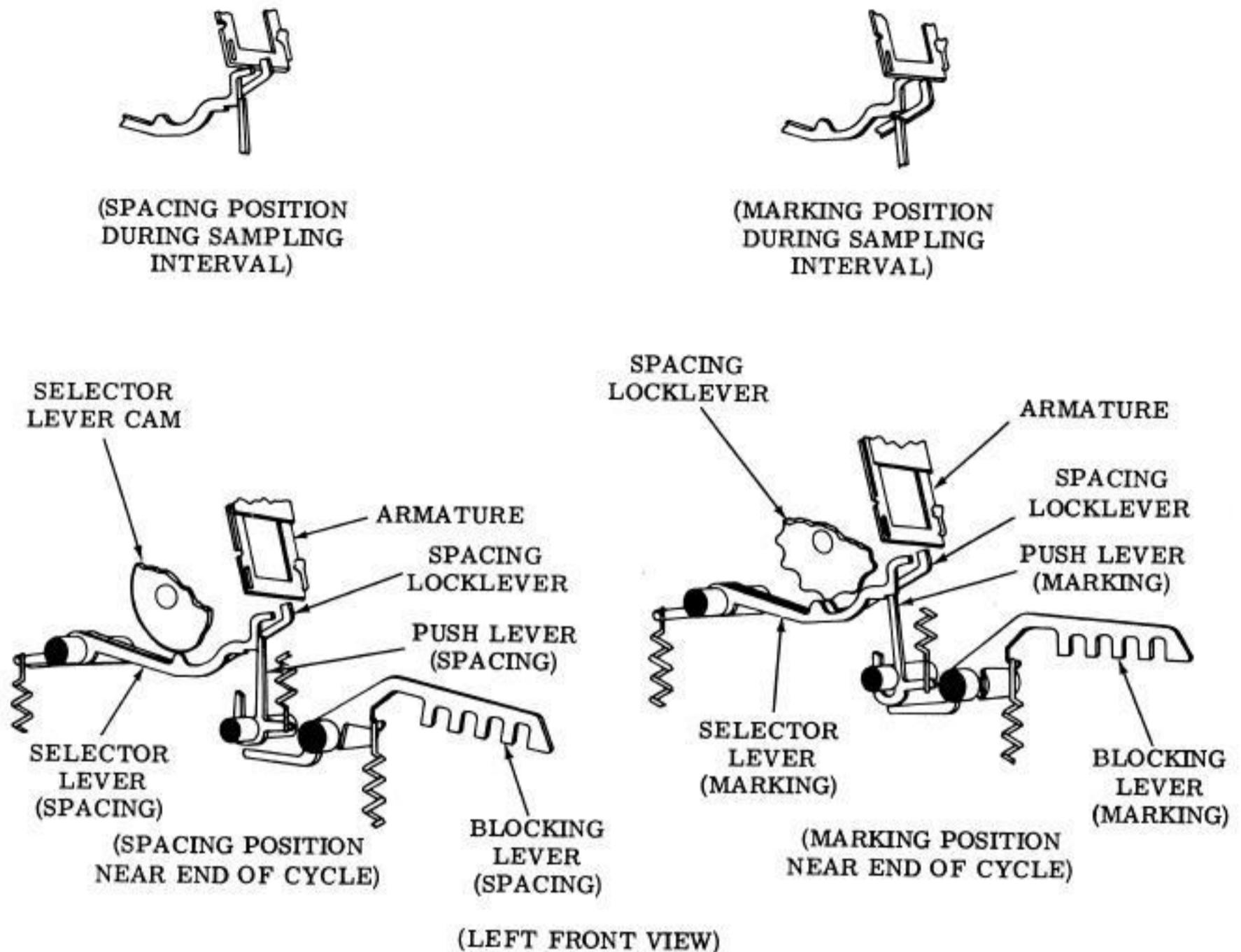
(SPACING POSITION
DURING SAMPLING
INTERVAL)

(MARKING POSITION
DURING SAMPLING
INTERVAL)

SPACING
LOCKLEVER

ARMATURE

SELECTOR
LEVER CAM

ARMATURE

SPACING
LOCKLEVER

SPACING
LOCKLEVER

PUSH LEVER
(SPACING)

PUSH LEVER
(MARKING)

SELECTOR
LEVER
(MARKING)

SELECTOR
LEVER
(SPACING)

BLOCKING
LEVER
(MARKING)

(SPACING POSITION
NEAR END OF CYCLE)

BLOCKING
LEVER
(SPACING)

(MARKING POSITION
NEAR END OF CYCLE)

(LEFT FRONT VIEW)

Figure 11 — Selector Mechanism

their slotted portion is up (Figure 11). The blocking levers associated with the unselected push levers remains in the spacing position in which their slotted portion is down.

2.24   Near the end of the cycle, the trip follower arm is moved rearward by its cam and trips the codebar clutch.

2.25   When the stop element (marking) is received at the end of the code combination, the armature moves to its marking position above the start lever, where it prevents the start cam follower from falling into the indent in its cam (Figure 10). In this position, the follower holds the trip lever down so that,

when the selector clutch completes its cycle, its shoe lever strikes the trip lever, and the clutch is disengaged.

2.26   As an example, assume that the letter D (1--4-) or (--3---7-) code combination is received by a 32 or 33 typing unit (Figure 3). The start pulse (spacing) trips the selector clutch, which begins its cycle. The stripper bail strips the selected push levers from the selector levers. The intelligence pulses are sampled in order, and the no. 1 and 4 or no. 3 and 7 push levers are selected. Near the end of the cycle, the selector clutch cams the no. 1 and 4 or no. 3 and 7 push levers down, and they pivot the no. 1 and 4 or no. 3

and 7 blocking levers to their marking position, while the no. 2, 3, and 5 or no. 1, 2, 4, 5, 6, and 8 blocking levers remain in their spacing position. The trip cam causes the trip follower arm to trip the codebar clutch. The stop pulse (marking) disengages the selector clutch, and the selector is returned to its stop position.

Note: The 8-level code combination given for D is the "even parity" code combination.

B. Range Finder

2.27 For optimum operation of the typing unit, the selector must sample the code elements at the most favorable time. The range finder provides a means of determining this time by establishing a range of operating margins.

2.28 When a range finder knob is loosened, a pointer may be moved along a range scale by a handle. This changes the angular position of the trip levers and latchlevers with respect to the main shaft, and thus changes the position where the selector clutch begins and ends its cycle. The effect of this operation is to change the time in the cycle when the selector samples each code pulse.

2.29 Rotating the pointer counterclockwise from 60, the center of the scale, causes the selector to sample the trailing portion of the pulse. Rotating the pointer clockwise causes the selector to sample the leading edge. To establish the margins of the operating range, the pointer is moved first in one direction, then in the other, until errors in printing occur. The pointer is then set at the center of the range, and the knob tightened.

C. Codebar Mechanism

2.30 The codebar mechanism illustrated in Figure 12 controls the printing and function mechanism. It is described in the appropriate description section.

2.31 As mentioned in 2.24 above, near the end of the selector cycle, the selector clutch pivots the codebar clutch's trip follower arm. The arm, through a trip shaft, pivots a trip lever out of the way of the shoe lever. The codebar clutch engages and makes one revolution (cycles) (Figures 4 and 5).

2.32 As the codebar clutch cycles, a codebar reset lever follows its camming surface under the pressure of a codebar reset bail's spring. Early in the cycle, the cam, through the reset lever, permits the reset bail to pivot counterclockwise.

2.33 There are ten codebars in the 33 typing unit and eight codebars in the 32 typing unit. As the reset bail pivots, the numbered codebars (excluding the no. 0 codebar in 32 typing units) are permitted under spring pressure to move up and to the left, and sense the position of the corresponding selector blocking levers. If a blocking lever is in its marking position (up), it permits its codebar to move all the way up and to the left, to its marking position (Figures 4 and 5). But if the blocking lever is in its spacing position (down), a projection on the lever holds the codebar down in its spacing position. The operation of the print suppression codebar is described in 2.67 through 2.71. The operation of the no. 0 codebar on 32 typing units is described in 2.56. The operation of the automatic carriage return-line feed codebar is described in paragraph 2.115 through 2.117. Function levers under the codebars and carriage slides that ride on top of the codebars sense their positions and use them to control various operations, as will be described in succeeding paragraphs.

2.34 Early in the cycle, a trip cam pivots a follower arm, which trips the function clutch (Figures 4 and 5).

2.35 Near the end of the codebar cycle, the cam, through the reset lever, pivots the reset bail clockwise. The latter thus returns the bars to their stop (down and right) position.

2.36 As an example, take the reception of the letter D (1--4-) or (--3---7-) code combination treated in 2.26. The no. 1 and 4 or no. 3 and 7 blocking levers move to their marking position, and the trip cam trips the codebar clutch, which begins its cycle. The reset bail permits the codebars to sense the position of the blocking levers. The no. 1 and 4 or no. 3 and 7 codebars are permitted by their blocking levers to move up and to the left to their marking position. The remaining bars are held down in their spacing position. The codebar clutch trips the function clutch. Near the end of the cycle, the reset bail returns the bars to their stop position.

Note: The 8-level code combination given for D is the "even parity" code combination.

FUNCTION MECHANISM

2.37 The function mechanism illustrated in Figure 13 enables the typing unit to perform functions at the receipt of the proper code combinations. Functions are operations supplementary to printing the message, such as moving the carriage back to the left margin (carriage return) and moving the paper up (line feed) so that a new line can be printed.

2.38 As mentioned in 2.34, early in the codebar cycle, a cam pivots the function trip follower arm, which moves the function trip lever out of engagement with its shoe lever. The function clutch engages and makes

one complete revolution (cycles). A function drive cam, through a follower arm and drive arm, causes the function rocker shaft to rock. The function rocker shaft, in turn, through two drive linkages, moves a function drive bail up during the first part of the cycle and down during the middle portion (Figures 4 or 5).

2.39 The under side of the codebars are coded by a series of notches and projections. Under the codebars are a number of function levers which pivot on the same shaft as the function drive bail and are connected to the bail by springs. As the bail moves up, the springs pull the levers up so that they sense the codebars. If a lever encounters one or
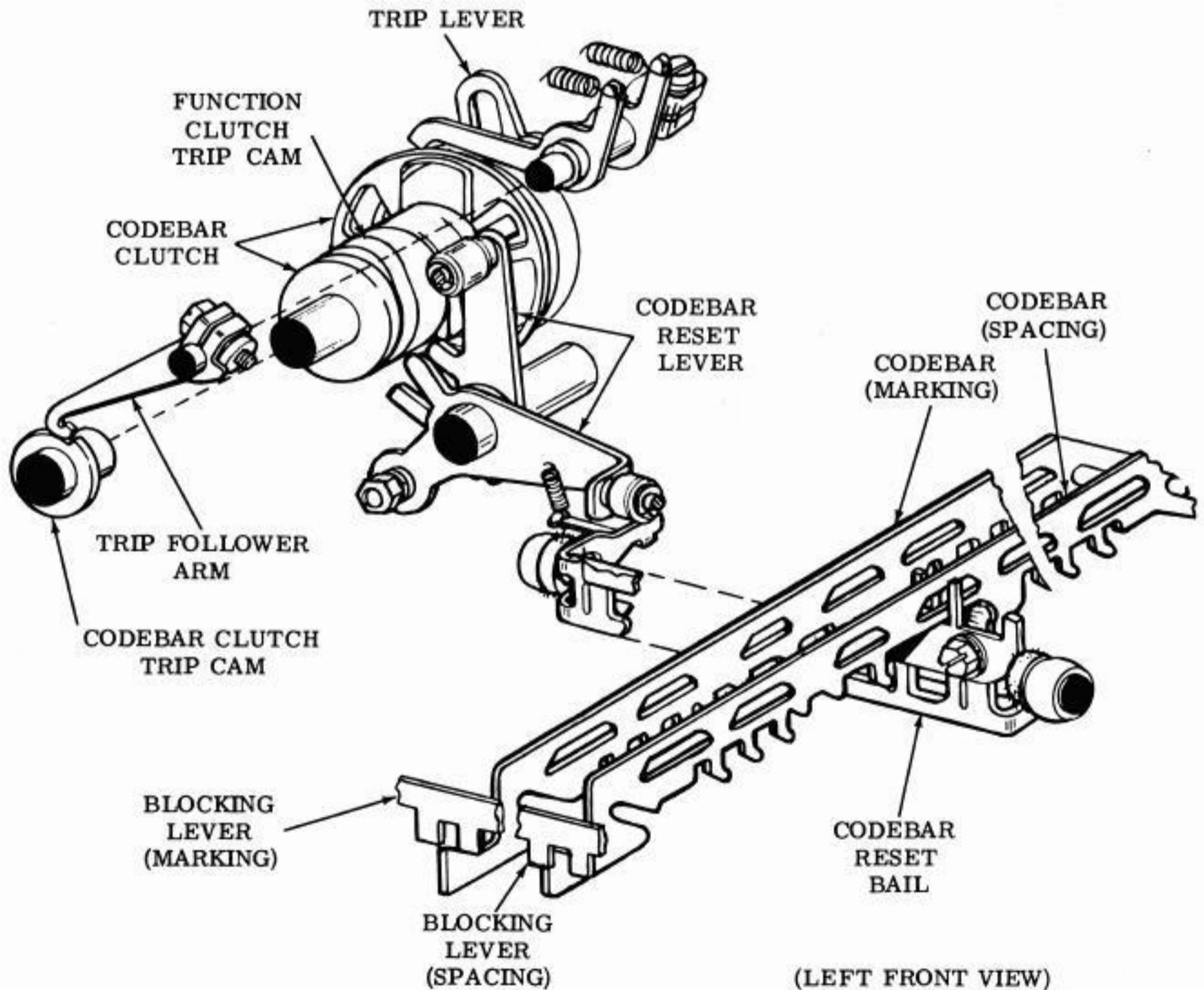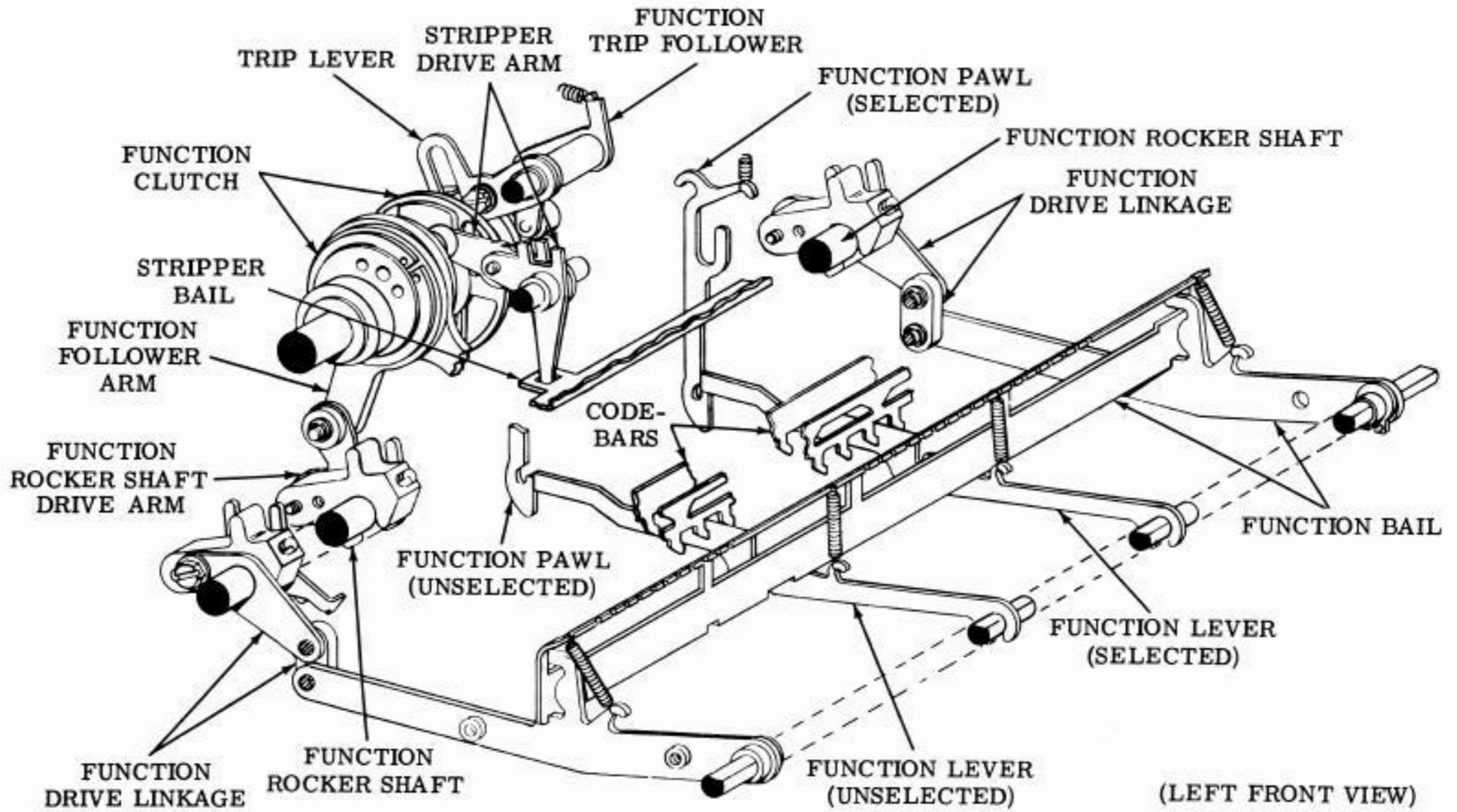

Figure 12 — Codebar Mechanism

Figure 13 — Function Mechanism

more projections, it is retained in its down position against the tension of its spring. On the other hand, if the slots line up such that an opening is provided for a lever, it moves all the way up to its selected position.

2.40 In most cases, when a function lever moves up to a certain level, it is latched by an associated function pawl. Then, when the drive bail pulls the lever and latched pawl down during the middle portion of the cycle, the pawl provides the motion to effect the function.

2.41 Near the beginning of the function cycle, a cam pivots a drive arm which moves the function stripper bail frontward (Figures 4 or 5). Near the end of the cycle, the cam permits the drive arm under spring pressure to move the stripper bail rearward and strip any latched function pawls from their selected function levers.

2.42 The operation of the individual function levers and pawls is covered under the individual functions.

PRINTING

A. General

2.43 A carriage accomplishes the printing of messages on paper or forms. The carriage is described in the appropriate description section. Printing is controlled by the code elements described in 1.03 through 1.10. Although the 32 and 33 typing unit carriages are the same, the numbers of the code elements controlling the specific operations are different.

B. Typewheel

2.44 The characters used in printing are embossed on the cylindrical surface of a typewheel. A typewheel character arrangement is shown in Figure 14, in which the cylindrical surface is rolled out flat and illustrated from the back, or inside. The characters are arranged in 16 vertical rows of 4 characters each. For the sake of explanation, the typewheel is divided into clockwise and counterclockwise fields to indicate in which direction the typewheel is rotated to select the rows. The rows are then numbered 1 through 8 in each direction from the borderline between the fields. The characters in each row are designated the "1st" through the "4th" from top to bottom.

2.45 Again, for the sake of explanation, a printing area is indicated in Figure 14. This is the area the selected character must be in if it is to be printed when the print hammer strikes the typewheel. As shown in the figure, the borderline between the fields is under the printing area when the typing unit is in the stop condition. During the first part of each function cycle, vertical and rotary positioning mechanisms impart separate, but simultaneous, motions to the typewheel to select the proper character. The rotary mechanism rotates it either clockwise or counterclockwise to align the proper row with the printing area. The vertical mechanism raises it to place the proper character in the printing area. During the latter part of the function cycle, the typewheel is returned to its stop position.

2.46 For example, assume that the code combination representing the letter D is received by the typing unit. The rotary mechanism rotates the typewheel four and one-half rows clockwise, and the vertical mechanism raises it two characters, plus the distance below the printing area. The print hammer drives it forward, and the typewheel imprints the letter "D" on the paper or form. The positioning mechanisms then return the typewheel to its stop position.
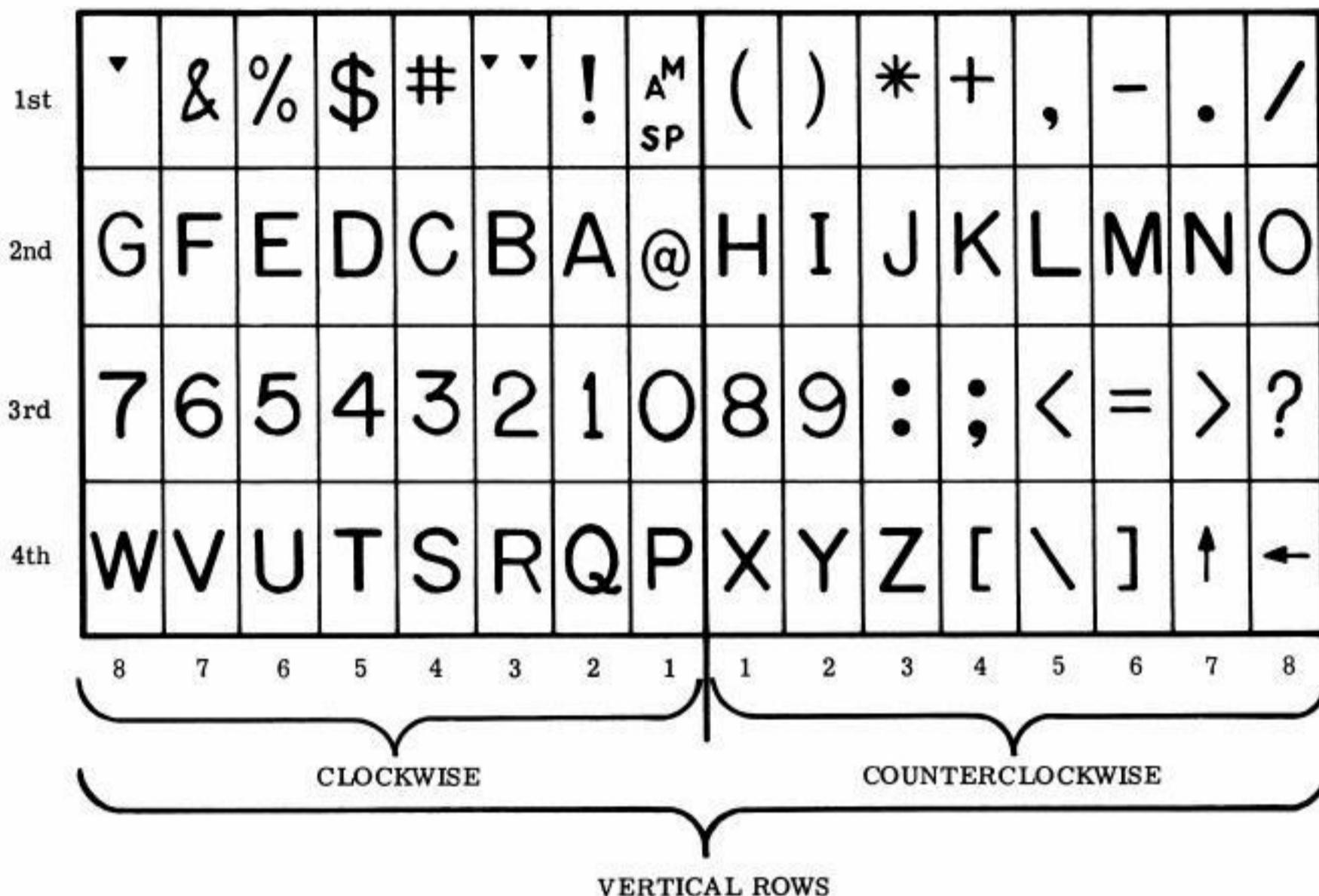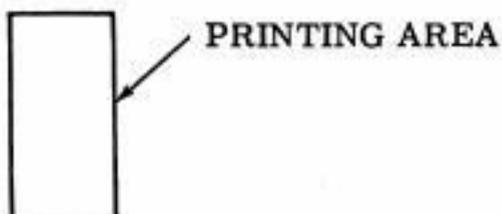
C. Power

2.47 As the function clutch cycles (2.38), an eccentric cam imparts oscillating motion through a carriage drive link to a carriage drive bail (Figure 6). The bail pivots rearward during the first part of the cycle and frontward to its stop position during the latter part (Figures 4 or 5). In doing so, it causes a power bail on the carriage to pivot first clockwise (as viewed from the left), then counterclockwise (Figure 15). The power bail has two rollers that move along the drive bail and permit it to receive the motion regardless of the carriage's position along the printing line.

D. Rotary Positioning

Direction of Rotation

2.48 Which way the typewheel rotates from the stop position is determined by the no. 3 code element on 32 typing units and the no. 4 element on 33 typing units. If this element is marking, the wheel is rotated counterclockwise. If it is spacing, the wheel is rotated clockwise.

PRINTING AREA

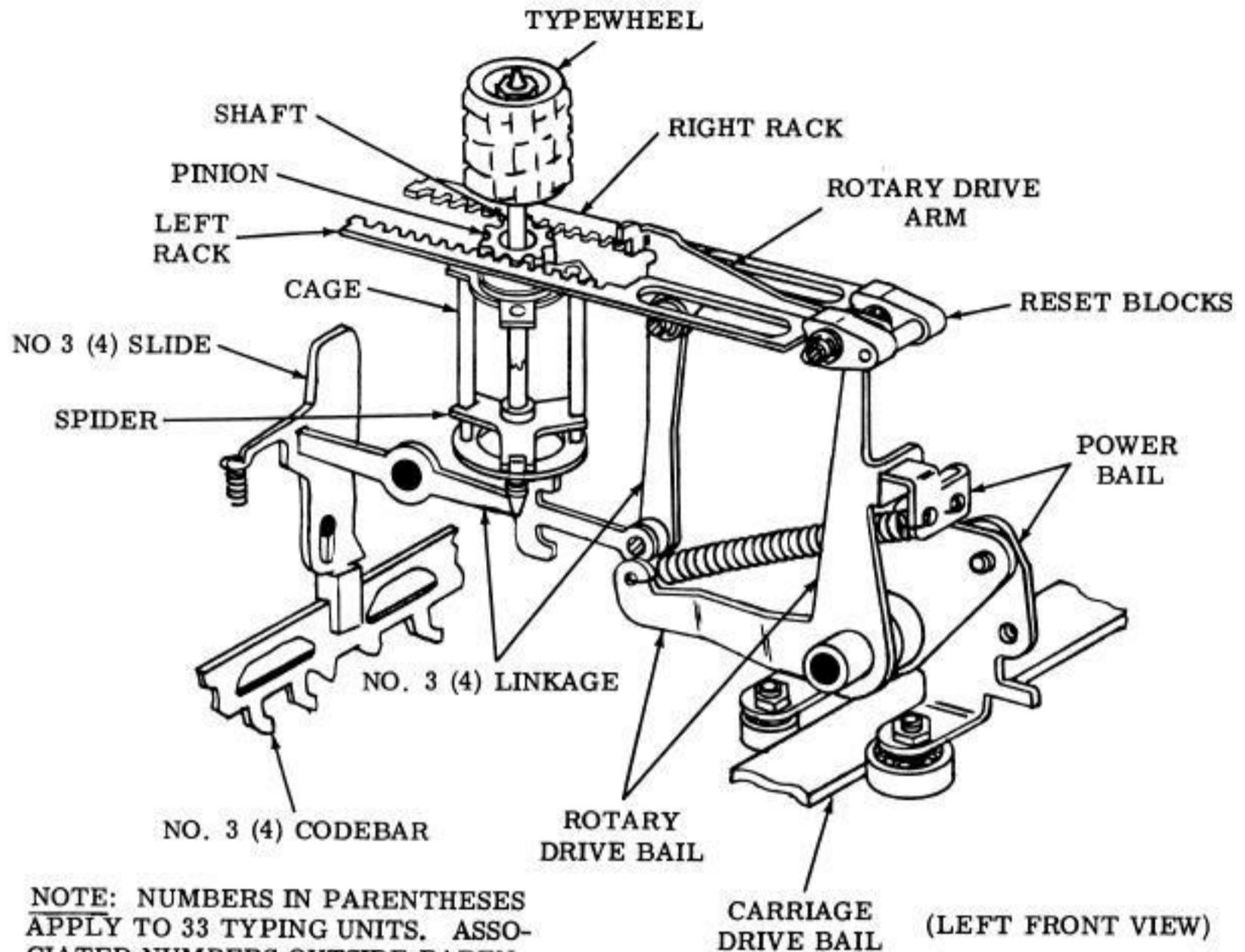|															

1st: ▾ & % $ # ▾▾ ! AM SP ( ) * + , – . /

2nd: G F E D C B A @ H I J K L M N O

3rd: 7 6 5 4 3 2 1 0 8 9 : ; < = > ?

4th: W V U T S R Q P X Y Z [\ ] ↑ ←

8 7 6 5 4 3 2 1 | 1 2 3 4 5 6 7 8

CLOCKWISE   COUNTERCLOCKWISE

VERTICAL ROWS

(SHOWN IN STOP POSITION)

Figure 14 - Typical Typewheel Character Arrangement (As Printed)

Note: Numbers in parentheses apply to 33 typing units. Associated numbers outside parentheses apply to 32 typing units.

2.49 When a code combination is received in which the no. 3 (4) element is marking, the no. 3 (4) codebar moves up and to the left early in the codebar cycle. A following slide, through a linkage, moves a rotary drive arm down so that it engages a left rotary rack, but not a right one. If the no. 3 (4) element is spacing, the alternate condition exists, in which the no. 3 (4) codebar is down, and the drive arm is up, where it engages the right rack, but not the left.

2.50 A rotary drive bail is held against the power bail by a spring. As these bails rock clockwise (as viewed from the left) during the first part of the function cycle, the drive arm, which is attached to the rotary positioning bail, moves toward the front. If the arm is down (no. 3 (4) element marking), it pulls the left rack with it, and the rack rotates a rotary

TYPEWHEEL

SHAFT

PINION

LEFT
RACK

CAGE

NO 3 (4) SLIDE

SPIDER

RIGHT RACK

ROTARY DRIVE
ARM

RESET BLOCKS

POWER
BAIL

NO. 3 (4) LINKAGE

NO. 3 (4) CODEBAR

ROTARY
DRIVE BAIL

NOTE: NUMBERS IN PARENTHESES
APPLY TO 33 TYPING UNITS. ASSO-
CIATED NUMBERS OUTSIDE PAREN-
THESES APPLY TO 32 TYPING UNITS.

CARRIAGE
DRIVE BAIL   (LEFT FRONT VIEW)

Figure 15 — Rotary Positioning Mechanism

pinion, a cage, a spider, a shaft, and the attached wheel counterclockwise (as viewed from the top). On the other hand, if the arm is up (no. 3 (4) element spacing), it pulls the right rack toward the front, and rotates the typewheel clockwise. As the power bail and rotary drive bail rock back to their stop position during the latter part of the function cycle, two reset blocks on the drive bail return the racks and the typewheel to their stop position.

Degree of Rotation

2.51   How far the typewheel rotates in either direction is determined by the no. 1 and no. 2 code elements and the no. 0 codebar on the 32 typing unit and the no. 1, 2, and 3 code elements on the 33 typing unit. (See Figures 16 and 17.)
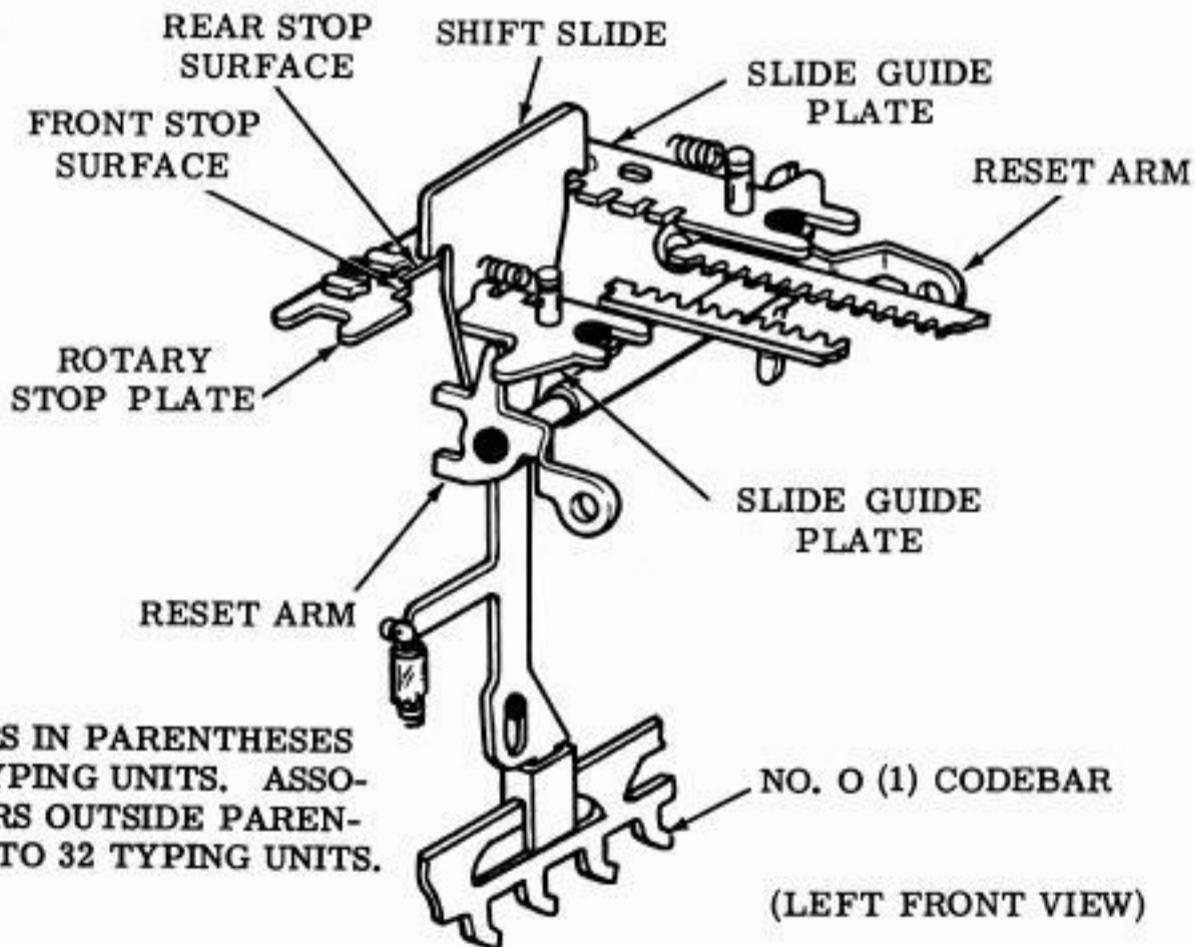
Note: Numbers in parentheses apply to 33 typing units. Associated numbers outside parentheses apply to 32 typing units.

2.52   When the no. 1 (2) and no. 2 (3) code elements are both spacing, the corresponding codebars and their following rotary stop slides remain down. A common stop slide, which is moved by the other two, also remains down. As one of the racks is pulled frontward, the opposite rack is driven rearward by the pinion and strikes the common stop (the one nearest the front). This permits the pinion to rotate the typewheel enough for vertical row "1" or "2" (depending on the position of the no. 0 (1) codebar, as covered in 2.56 below) of either the clockwise or counterclockwise field to be aligned with the
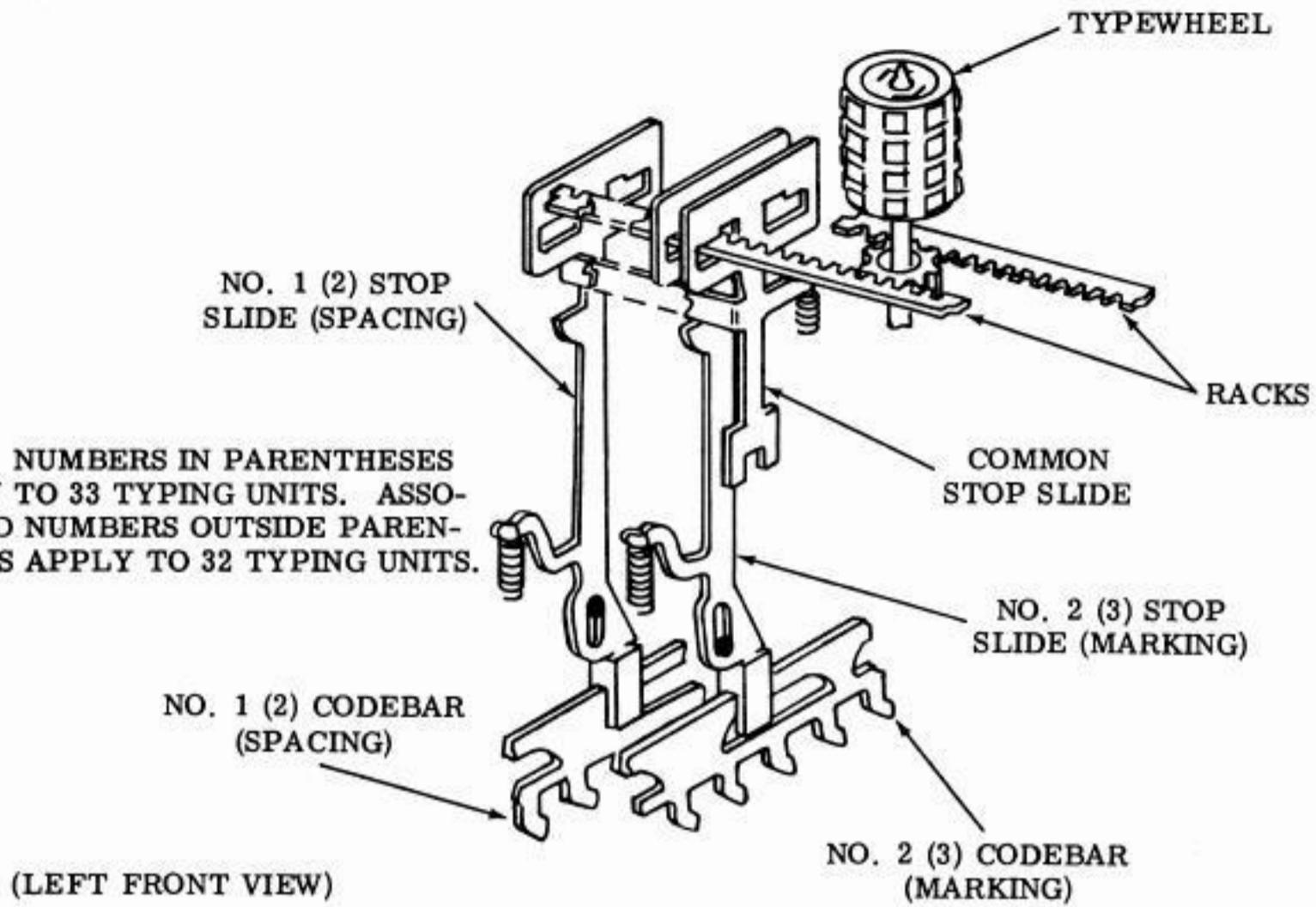
TYPEWHEEL

NO. 1 (2) STOP
SLIDE (SPACING)

RACKS

NOTE: NUMBERS IN PARENTHESES
APPLY TO 33 TYPING UNITS. ASSO-
CIATED NUMBERS OUTSIDE PAREN-
THESES APPLY TO 32 TYPING UNITS.

COMMON
STOP SLIDE

NO. 2 (3) STOP
SLIDE (MARKING)

NO. 1 (2) CODEBAR
(SPACING)

NO. 2 (3) CODEBAR
(MARKING)

(LEFT FRONT VIEW)

Figure 16 — Rotary Positioning Mechanism

REAR STOP
SURFACE

SHIFT SLIDE

SLIDE GUIDE
PLATE

FRONT STOP
SURFACE

RESET ARM

ROTARY
STOP PLATE

SLIDE GUIDE
PLATE

RESET ARM

NOTE: NUMBERS IN PARENTHESES
APPLY TO 33 TYPING UNITS. ASSO-
CIATED NUMBERS OUTSIDE PAREN-
THESES APPLY TO 32 TYPING UNITS.

NO. O (1) CODEBAR

(LEFT FRONT VIEW)

Figure 17 — Rotary Positioning Mechanism

printing area at the time of printing. When a rack is stopped, the rotary bail stops, and its spring extends as the power bail continues its travel.

2.53 When the no. 1 (2) element is marking and the no. 2 (3) is spacing, the no. 1 (2) codebar and slide moves up, and the no. 1 (2) slide lifts the common slide. In this position, holes in the common slide permit whichever rack is moving toward the rear to pass through and strike the no. 2 (3) slide (second from the front), which is down. Thus, the vertical row "3" or "4" is aligned with the printing area.

2.54 When the no. 2 (3) element is marking and the no. 1 (2) is spacing, the no. 2 (3) slide is moved up and lifts the common stop. The rack that is moving rearward passes through holes in these slides and strikes the no. 1 (2) slide (third from the front), which is down. Thus, the vertical row "5" or "6" is aligned with the printing area.

2.55 When both the no. 1 (2) and no. 2 (3) elements are marking, the no. 1 (2) and no. 2 (3) and common slides are moved up and permit the rack to pass through their holes and strike the shift slide (farthest from the front). Thus, the vertical row "7" or "8" is aligned with the printing area.

Odd or Even Rows

2.56 Whether the odd or even rows are selected depends on the position of the no. 0 codebar on 32 typing units and the no. 1 codebar on 33 typing units. When this codebar is up, the even rows are selected; when it is down, the odd rows are selected. In 33 typing units, the no. 1 code element controls the position of this codebar. In 32 typing units, it is controlled by the letters-figures shift mechanism, which responds to the "letters" and "figures" code combinations.

(a) 33 Typing Unit:

(1) The upper portion of the stop slides moves up and down in slots in two guideplates. When one of the racks moves toward the rear and strikes one of the slides, the slides and guideplates are pushed toward the rear until the shift slide strikes the rotary stop plate. During the latter part of the function cycle, the guides and slides are returned to their stop position by reset arms, which are

part of the printing mechanism. (See 2.63 through 2.71.)

(2) When the no. 1 code element is spacing, the no. 1 codebar and its following slide remain down, and the shift slide strikes the front stop surfaces on the stop plate. This results in vertical row "1," "3," "5," or "7" being aligned with the printing area at the time of printing.

(3) On the other hand, when the no. 1 code element is marking, the no. 1 codebar and the shift slide are up where the latter presents a narrower outline to the stop plate. Thus, when the slide moves toward the rear, it fits into a cutout in the plate and strikes rear stop surfaces. The difference results in one more row rotation of the typewheel, and vertical row "2," "4," "6," or "8" is aligned with the printing area.

(b) 32 Typing Unit Letters-Figures Shift:

(1) When the 32 typing unit is in the "letters" condition, the no. 0 codebar is blocked by a letters blocking lever (Figure 18), whose extension engages one of the codebar's slots. When the codebar bail rocks to the left early in each codebar cycle, the no. 0 codebar is held in its down position. Thus, the odd rows will be selected, as covered in 2.56 (a).

(2) On receipt of the "figures" code combination, the codebars permit a figures function lever to rise to its up position, where it is latched by its function pawl. Then, as the lever and pawl are pulled down by the function bail during the middle portion of the function cycle, an extension on the pawl moves the letters blocking lever to its down position, where it is latched by its pawl and no longer blocks the no. 0 codebar. The typing unit is now in "figures" condition, and the no. 0 codebar will move to its up position each codebar cycle until the "letters" code combination is received. This results in the selection of the even rows as covered in 2.56 (a).

(3) On receipt of the "letters" code combination, the codebars permit a letters function lever to move to its up position, where it is latched by its function pawl. As the lever and pawl are pulled
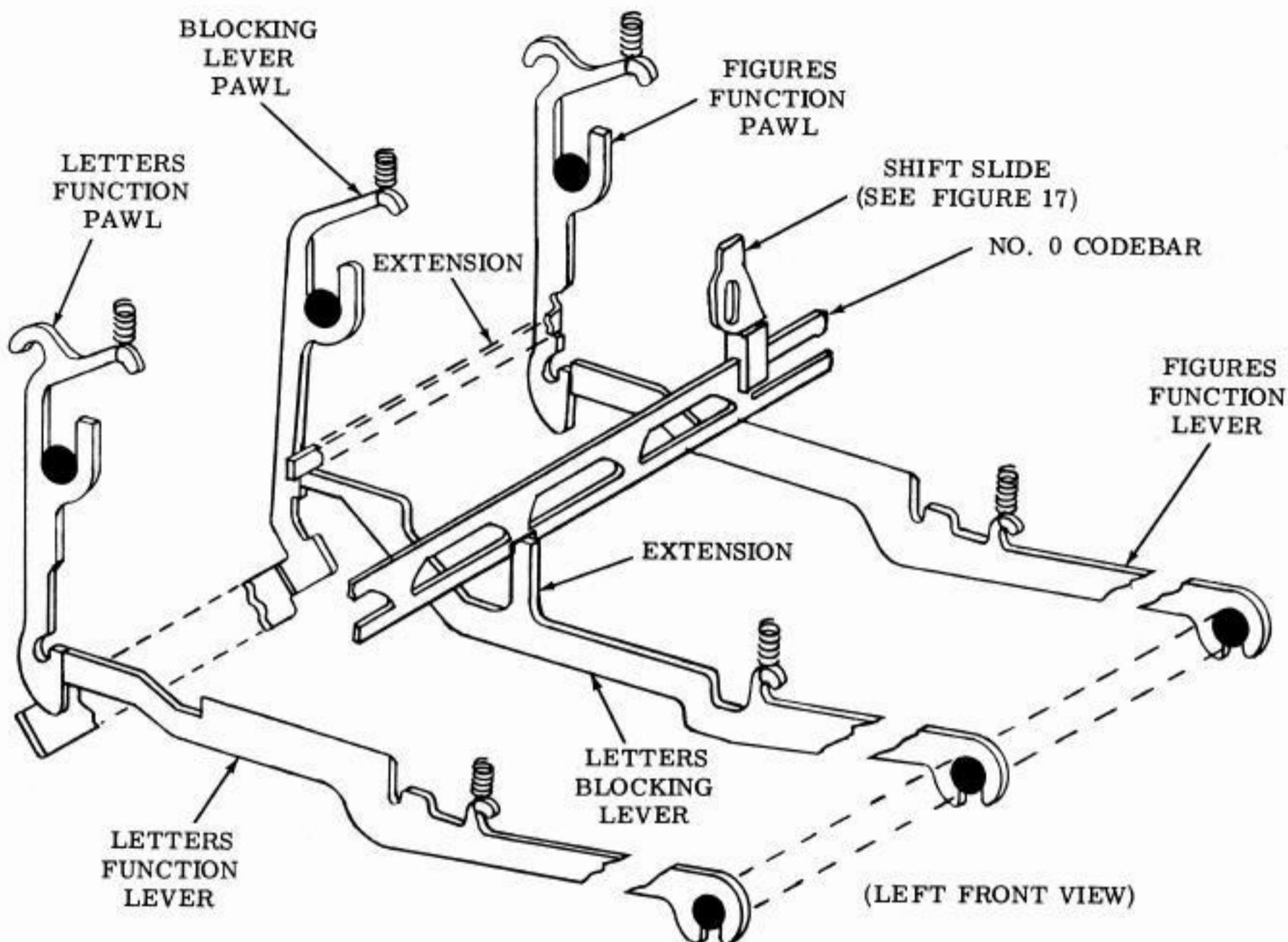
Figure 18 — Letters-Figures Shift Mechanism

down by the function bail during the middle portion of the cycle, the pawl contacts a slanting extension of the blocking lever's pawl and moves it rearward until it unlatches the blocking lever. The latter is then permitted to move up and block the no. 0 codebar. Thus the typing unit is returned to the "letters" condition.

E. Vertical Positioning

2.57 The vertical positioning mechanism positions the typewheel so that the proper character in the selected row is in the printing area at the time of printing. It is controlled by the no. 4 and no. 5 code elements on 32 typing units and by the no. 5 and no. 7 elements on 33 typing units. (See Figure 19.)

Note: Numbers in parentheses apply to 33 typing units. Associated numbers outside parentheses apply to 32 typing units.

2.58 A vertical drive bail is held against the power bail by a spring. When these bails rock clockwise (as viewed from the left) during the first part of the function cycle, the vertical drive bail, through a drive arm, lifts the spider, typewheel shaft, and typewheel. How far the typewheel is raised is determined by three stop arms that are positioned in response to the no. 4 (5) and no. 5 (7) code elements. When the
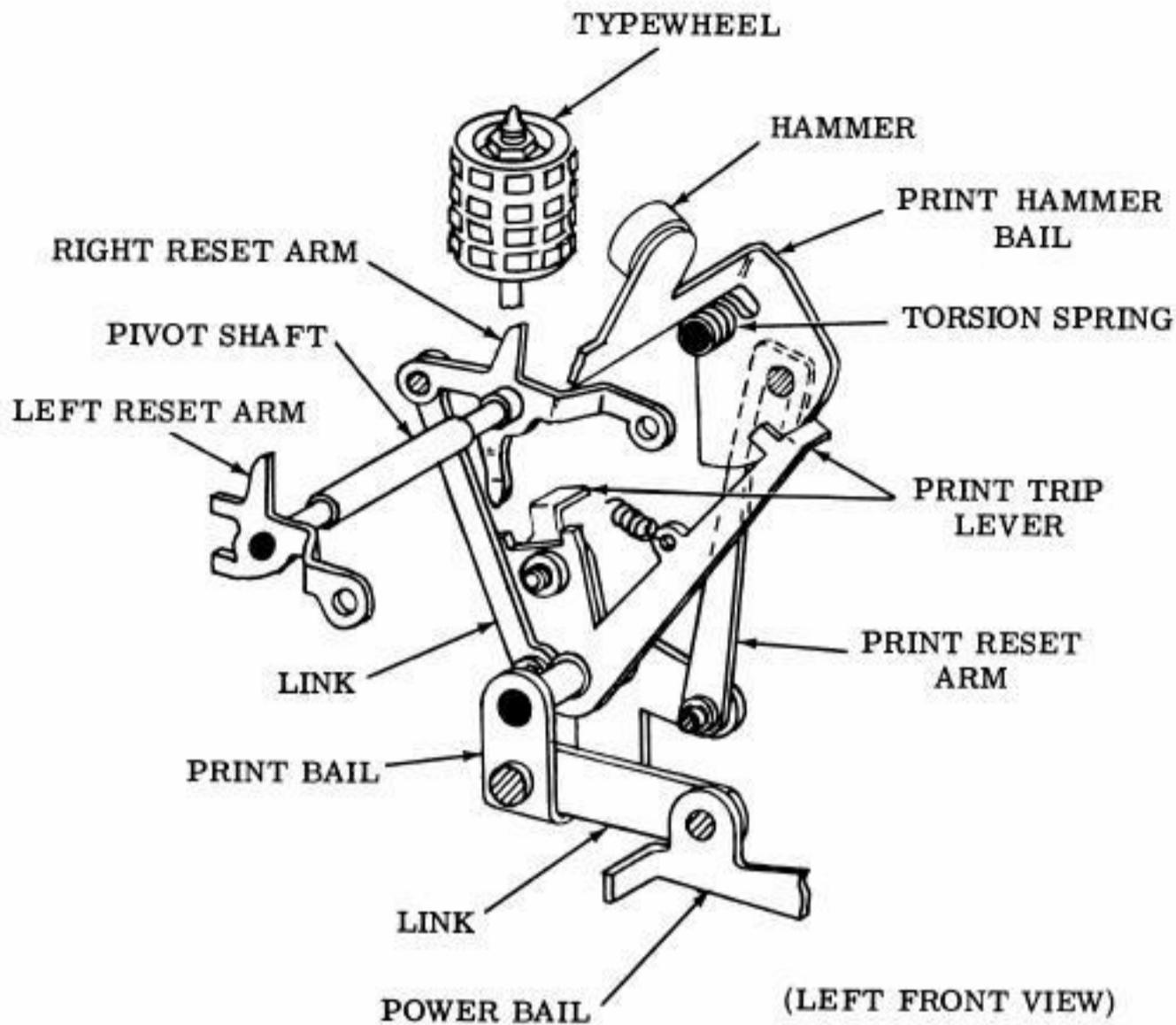
Figure 20 — Printing Mechanism

out of the way. The bail strikes the no. 5 (7) stop arm (the shortest), and the third character is placed in the printing area.

2.62   When both the no. 4 (5) and no. 5 (7) elements are marking, all three stop arms are pivoted out of the way. The bail moves up until it strikes a shoulder on the common stop arm, and the fourth character is placed in the printing area.

F. Printing Mechanism

Printing

2.63   The printing mechanism is illustrated in Figure 20.

2.64   After the typewheel has been positioned during the first half of the function cycle, the printing mechanism supplies the impact

which drives the selected character against the ribbon and paper. Provisions are included whereby printing is suppressed during functions.

2.65   As the power bail rocks during the first part of the function cycle, it imparts through a link, counterclockwise motion (as viewed from the left) to a print bail. This bail, through a link and pivot shaft, pivots two reset arms. Midway in the cycle, the right arm moves a print trip lever out of engagement with a shoulder on the print hammer bail. A torsion spring snaps the hammer bail rearward, and the hammer drives the typewheel and ribbon against the paper. Thus, the imprint of the selected character is transferred to the paper. The lower end of the typewheel's shaft pivots on the vertical drive arm (Figure 19) and permits the wheel to be driven rearward. The hammer bail has a soft head which strikes the typewheel without damage.
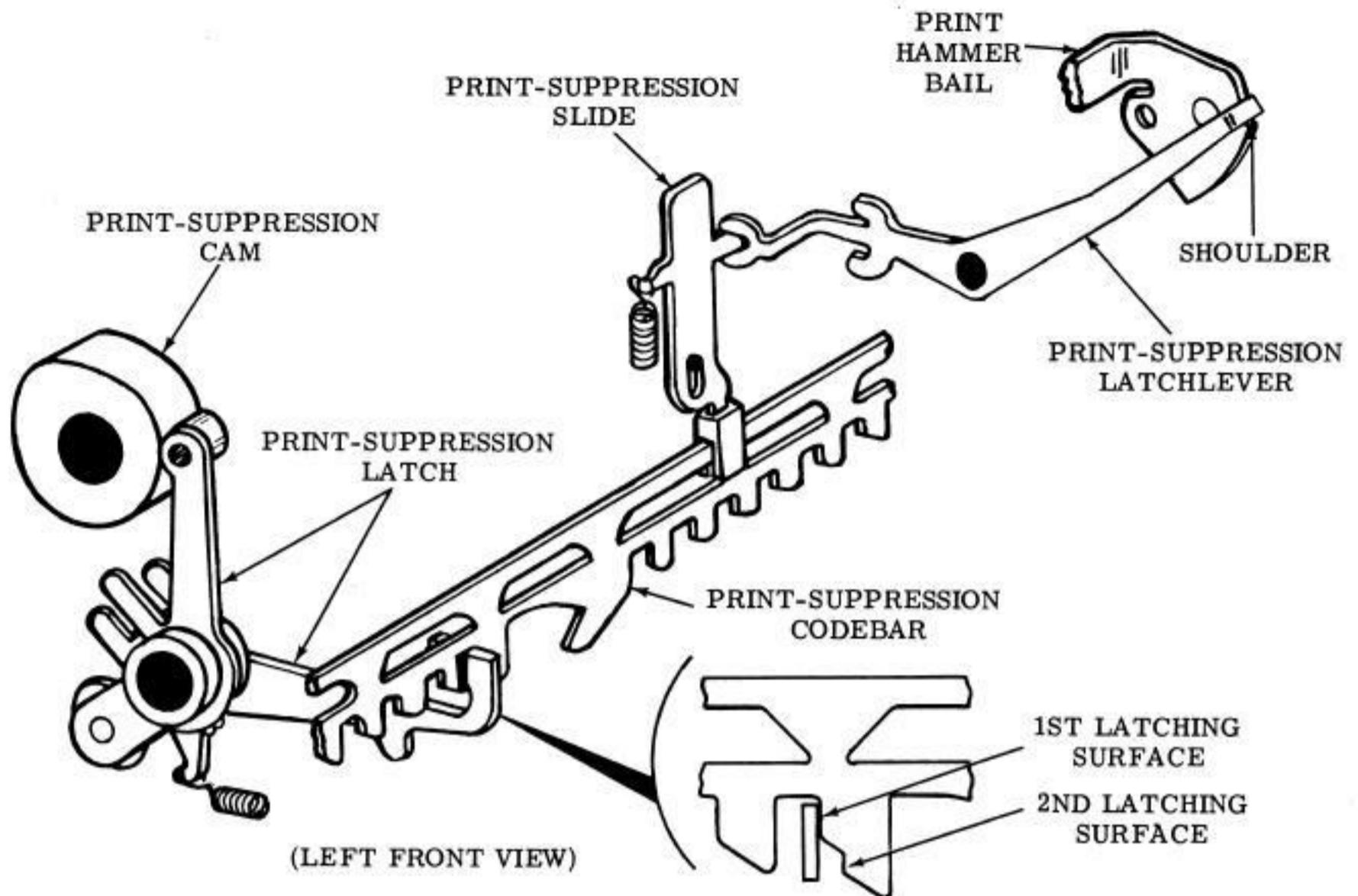
Figure 21 — Print Suppression Mechanism

2.66 During the last half of the cycle, the power bail returns the printing parts to their stop position, and a print reset arm attached to the print bail returns the print hammer bail to its stop position, where it is latched by the print trip lever.

Printing Suppressed

2.67 The printing suppression mechanism is illustrated in Figure 21.

2.68 Whenever a function code combination is received, printing is suppressed. As the other codebars rise early in the codebar cycle, a print-suppression codebar is held down by a print-suppression latch (Figures 4 or 5). Early in the function cycle, after any of the function levers has been selected, the latch is pivoted away from the codebar by a print-suppression cam on the function clutch.

2.69 If no function lever has been selected, the print-suppression codebar moves up and to the left to its selected position. A print-suppression slide follows the motion of this codebar and pivots a print-suppression latch-lever out of the way of the shoulder on the print hammer bail. Thus, when the print trip lever releases the bail, its hammer is permitted to strike the typewheel, and printing occurs as covered in 2.64 through 2.66.

2.70 On the other hand, if any function lever moves up to its selected position, it engages one of a series of notches in the print-suppression codebar. When the latch releases the codebar, the selected function lever prevents it from moving all the way to its selected position. Thus, the print-suppression latch-lever is not pivoted and catches the shoulder when the hammer bail is released by the trip lever. The hammer does not reach the type-wheel, and printing is suppressed.

2.71 As the selected function lever moves down and withdraws from the notch in the print-suppression codebar, the latch, which has been returned to its stop position, engages a second latching surface on the codebar. This prevents the codebar from rising when the function lever is withdrawn, thus causing printing to occur before the print hammer is completely reset in its stop position. The print-suppression codebar is completely reset with the rest of the codebars at the end of the code-bar cycle, and at that time the latch engages the first latching surface (Figures 4 or 5).

G. Ribbon Mechanism

2.72 The ribbon mechanism is illustrated in Figure 22.

2.73 The ribbon mechanism supplies the ink for printing. As the typing unit operates, the mechanism feeds the ribbon from one spool to the other, and reverses the direction of feed
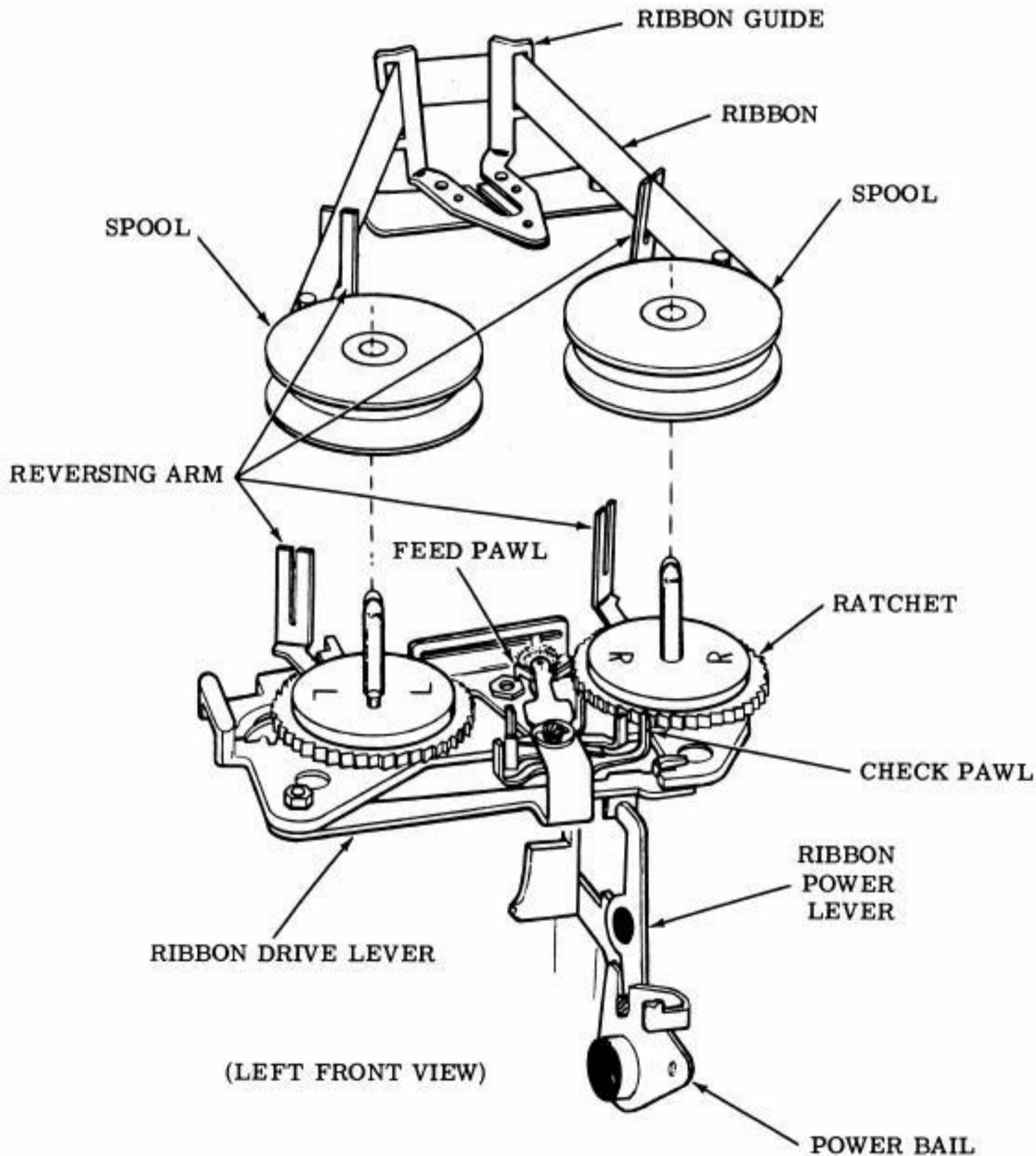

Figure 22 — Ribbon Mechanism

when the spool is nearly depleted. It is described in the appropriate description section.

2.74   As the power bail rocks during the first part of the function cycle, it pivots a ribbon power lever, which moves a ribbon drive lever rearward. A feed pawl which rides on the drive lever acts on a ratchet to rotate a ribbon spool. A check pawl drops into the succeeding tooth and detents the ratchet until it is again rotated during the next operation.

2.75   The mechanism continues to rotate one spool until the other is nearly depleted. An eyelet in the ribbon then engages a ribbon reversing arm. As the eyelet is pulled against the arm, the latter moves to a point where a detent spring shifts it to its alternate position, where one of its reversing extensions falls ahead of an extension on the feed pawl. As the pawl moves frontward, during the last half of the cycle, it strikes the arm's extension and is pivoted to its alternate position against the other ratchet. In doing this, it strikes an extension on the check pawl and pivots it to its alternate position against the other ratchet. The depleted spool is now rotated to take up the ribbon until the other spool is nearly depleted, when reversal again takes place.

2.76   The ribbon guide, which is spring biased upward, is mounted so that it will slide up and down on posts. As the print pivot shaft turns during the first half of the cycle (see 2.65 above), the two pivot arms permit the guide to rise so that it is between the selected character and the paper midway in the cycle. At this time the print hammer drives the typewheel and the ribbon against the paper. During the last half of the cycle, the pivot arms retract the guide and ribbon to their stop position so that the printed characters are visible.

H.   Example

32 Typing Unit

2.77   Assume that the typing unit is in the "letters" condition and that the letter D code combination (1--4-) is received. The no. 1 and no. 4 codebars move up and to the left to their marking position early in the codebar cycle. Since the no. 3 codebar is down, the rotary drive arm moves up and engages the right rack. Since the no. 1 codebar is up and the no. 2 is down, the no. 1 and common stop slides are moved up. Since the typing unit is in the "letters" condition, the no. 0 codebar keeps the

shift slide down. Since the no. 4 codebar is up and the no. 5 is down, the no. 4 and common stop arms are pivoted out of the way of the vertical drive bail.

2.78   As the power bail rocks clockwise (as viewed from the left) during the first part of the function cycle, the following occurs:

(a)   The rotary drive arm pulls the right rack forward and rotates the typewheel clockwise.

(b)   The left rack, driven by the typewheel's pinion, moves rearward, passes through a hole in the common slide, and strikes the no. 2 stop slide.

(c)   The stop slides and their guides are moved rearward, and the wider outline of the shift slide strikes the front stop surfaces of the stop plate.

(d)   Thus, the proper vertical row is aligned with the printing area.

2.79   Concurrent with the rotary positioning, the vertical drive bail moves up until it strikes the no. 5 stop arm, and the letter D is placed in the printing area.

33 Typing Unit

2.80   Assume that the letter D code combination (--3----7-) is received. The no. 3 and 7 codebars move up and to the left to their marking position early in the codebar cycle. Since the no. 4 codebar is down, the rotary drive arm moves up and engages the right rack. Since the no. 2 codebar is down and the no. 3 codebar is up, the no. 3 and common stop slides are moved up. Since the no. 1 codebar is down, the shift slide is down. Since the no. 5 codebar is down and the no. 7 codebar is up, the no. 7 and common stop arms are pivoted out of the way of the vertical drive bail.

Note: The 8-level code combination given for D is the "even-parity" code combination.

2.81   As the power bail rocks clockwise (as viewed from the left) during the first part of the function cycle, the following occurs:

(a)   The rotary drive arm pulls the right rack frontward and rotates the typewheel clockwise.

(b) The left rack, driven by the typewheel pinion, moves rearward, passes through holes in the no. 3 and common slides, and strikes the no. 2 stop slide. The stop slides and their guides are moved rearward, and the wider outline of the shift slide strikes the front stop surfaces of the stop plate. Thus, the vertical row "5" is aligned with the printing area.

2.82 Concurrent with the rotary positioning, the vertical drive bail moves up until it strikes the no. 7 stop arm, and the second character in vertical row "5" is placed in the printing area. (See Figure 14.)

32 and 33 Typing Units

2.83 Since no function lever has been selected in either case given, the print-suppression codebar moves up and to the left early in the cycle and moves the print-suppression latch-lever away from the print hammer bail. Midway in the cycle, the right reset arm moves the print trip lever out of engagement with the shoulder on the hammer bail, and the bail snaps
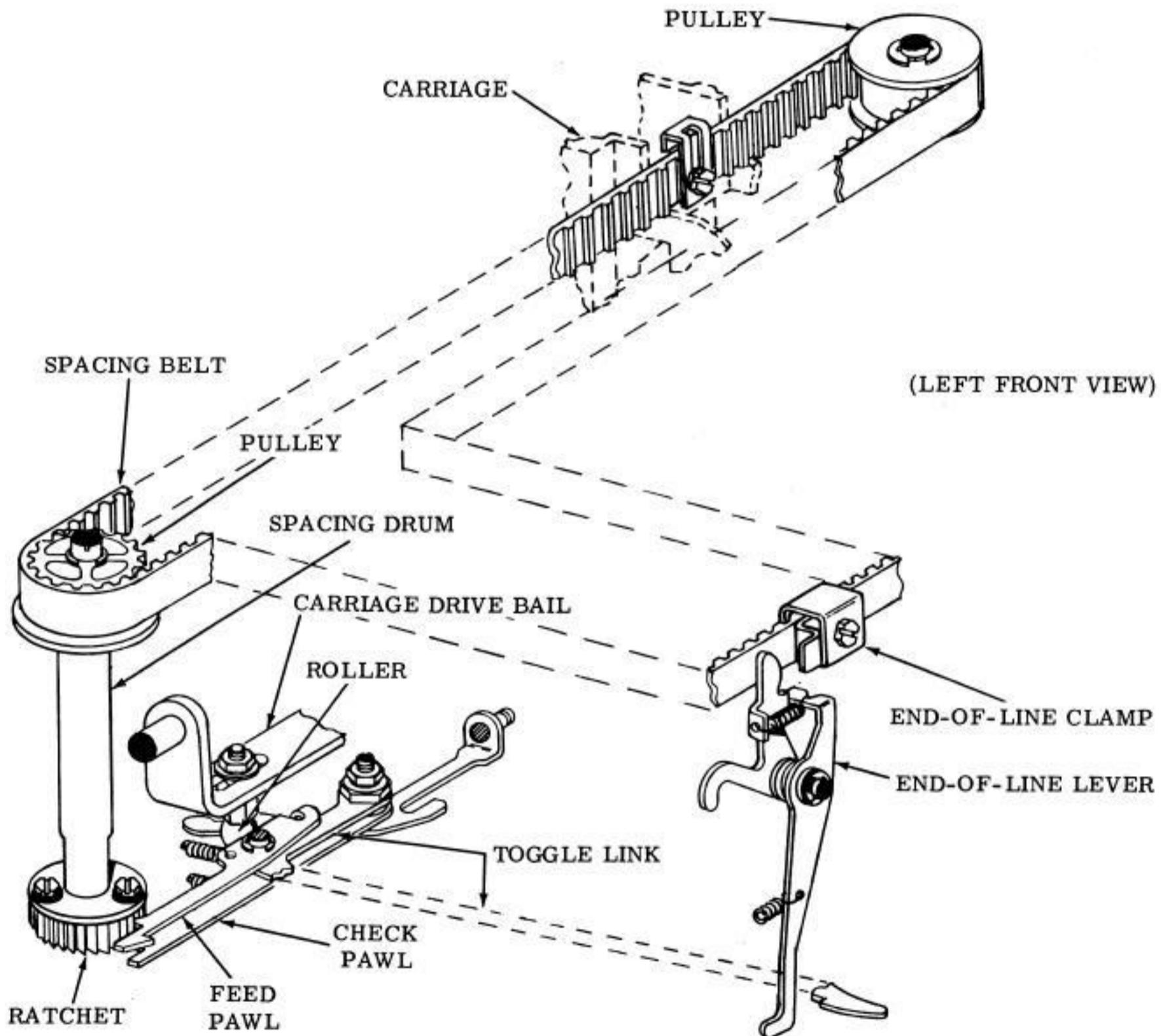

Figure 23 — Spacing Mechanism

rearward and drives the letter D and the ribbon against the paper. During the last half of the cycle, the parts are returned to their stop position.

SPACING

A. General

2.84   The spacing mechanism illustrated in Figure 23 positions the carriage so that the printed characters are properly horizontal on the paper. Each time a character is printed, the carriage is positioned one character to the right. Spacing is suppressed on all functions except "space" when spacing occurs and printing is suppressed. At the end of the printing line, spacing is suppressed, and the typing overprints. When the "carriage return" function is received, the carriage is returned to the left margin. The spacing mechanism is described in the appropriate description section.

Note: With the automatic carriage return-line feed feature, spacing is not suppressed at the end of a line. Also, the typing unit does not overprint at the end of a line. The carriage is returned automatically to the left margin when it reaches a predetermined point. (See 2.115 through 2.117.)

B. With Printing

2.85   As the carriage drive bail moves rearward during the first half of the function cycle, a small roller mounted near its left pivot permits a toggle linkage, consisting of a spacing feed pawl and toggle link, to buckle under spring pressure. The pawl moves to the right and engages the next tooth on a ratchet, which is part of a spacing drum. When the roller is moved frontward during the last half of the function cycle, it unbuckles the toggle linkage, and the pawl is moved to the left and rotates the drum one tooth. This motion is imparted by a pulley at the top of the drum to a spacing belt, which is looped around a pulley on the right side of the typing unit. The spacing belt, in turn, moves the carriage to the right one space against the tension of a large carriage return spring. The carriage is held in this position by a check pawl, which engages the spacing drum's ratchet.

C. Space Suppression

2.86   The space suppression mechanism is illustrated in Figure 24.

2.87   On Functions:

(a) On every function except "space," spacing as well as printing must be suppressed. When a character to be printed is received, the print-suppression codebar moves up and to the left, as detailed in 2.67 through 2.71. In doing so, it pivots a space suppression latch so that it is moved to the right, out of the way of the toggle linkage. This permits the linkage to buckle and effect spacing as described in 2.85 above.

(b) On the other hand, when a function is received, the print-suppression codebar remains down and to the right, as described in 2.67 through 2.71, and thus does not pivot the space-suppression latch. In this position, the space-suppression latch engages the toggle linkage and prevents it from buckling all the way, and the feed pawl does not move far enough to the right to engage the next tooth. Thus, the spacing drum is not rotated, and the carriage is not spaced.

2.88   At End-of-Line: When the carriage reaches the right margin, a clamp on the spacing belt pivots an end-of-line lever counterclockwise. In this position, a latching surface on the spacing toggle link engages the end-of-line lever and prevents the linkage from buckling and effecting spacing. Thus, spacing is suppressed, and the typing unit overprints at the right margin until the "carriage return" code combination is received.

Note: With the automatic carriage return-line feed feature, spacing is not suppressed at the end of a line. Also, the typing unit does not overprint at the end of a line. The carriage is returned automatically to the left margin when it reaches a predetermined point. (See 2.115 through 2.117.)

D. Space Function

2.89   The space function mechanism is illustrated in Figure 24.

2.90   When the "space" code combination is received, the codebars permit a space function lever to move up to its selected position early in the function cycle. This motion is transferred, through a space linkage, to a space lever, which moves the print-suppression latch out of the way of the toggle linkage. Thus, the spacing linkage is permitted to buckle

SPACE FUNCTION LEVER   SPACE LINKAGE

PRINT-SUPPRESSION
CODEBAR

SPACE-SUPPRESSION
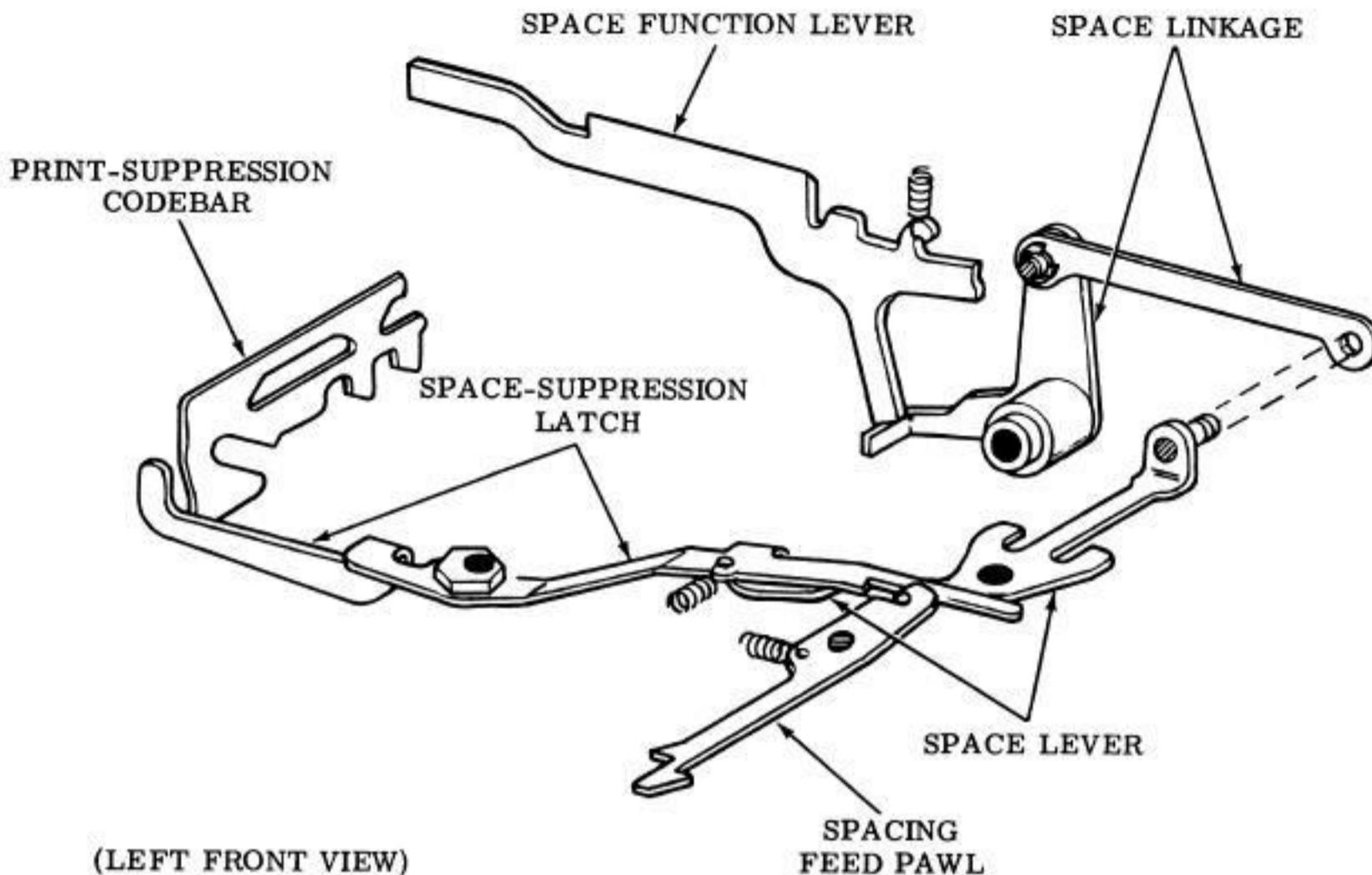LATCH

SPACE LEVER

(LEFT FRONT VIEW)

SPACING
FEED PAWL

Figure 24 — Space Function and Space-Suppression Mechanism

completely and effect spacing as covered in 2.85. Printing is suppressed as described in 2.67 through 2.71.

E. Carriage Return

2.91   The carriage return mechanism is illus-
        trated in Figure 25.

2.92   When the "carriage return" code com-
        bination is received, the codebars per-
mit the function lever to move up to its selected position during the first part of the function cycle. In this position, the lever is latched by its function pawl. As the function bail moves the lever and the pawl downward during the middle portion of the cycle, an extension on the pawl pivots a carriage return activating lever. This motion is transferred through a carriage return linkage to a carriage return lever, which is moved frontward, where it is latched by both the carriage return latch-lever and the carriage return latch.

2.93   In moving frontward, the carriage return
        lever carries the spacing feed and check
pawls out of engagement with the ratchet on the spacing drum. The carriage return spring then pulls the carriage back to the left margin. As the carriage nears the left margin, a lobe plate on the carriage strikes the carriage return un-latch lever and causes the carriage return un-latch lever to unlatch the carriage return lever, but the carriage return lever latch continues to keep the carriage return lever latched in its front position. The carriage return lever re-mains latched by the carriage return lever latch until a code combination is received which does not suppress spacing. When a "non space-suppression" code combination is received, the spacing feed pawl moves to the right to engage the next tooth on the ratchet on the spacing drum. During this action, the spacing feed pawl strikes the carriage return lever latch and releases the carriage return lever. The latter moves rearward under spring pressure and permits the spacing feed and check pawls to again engage the spacing drum feed ratchet.
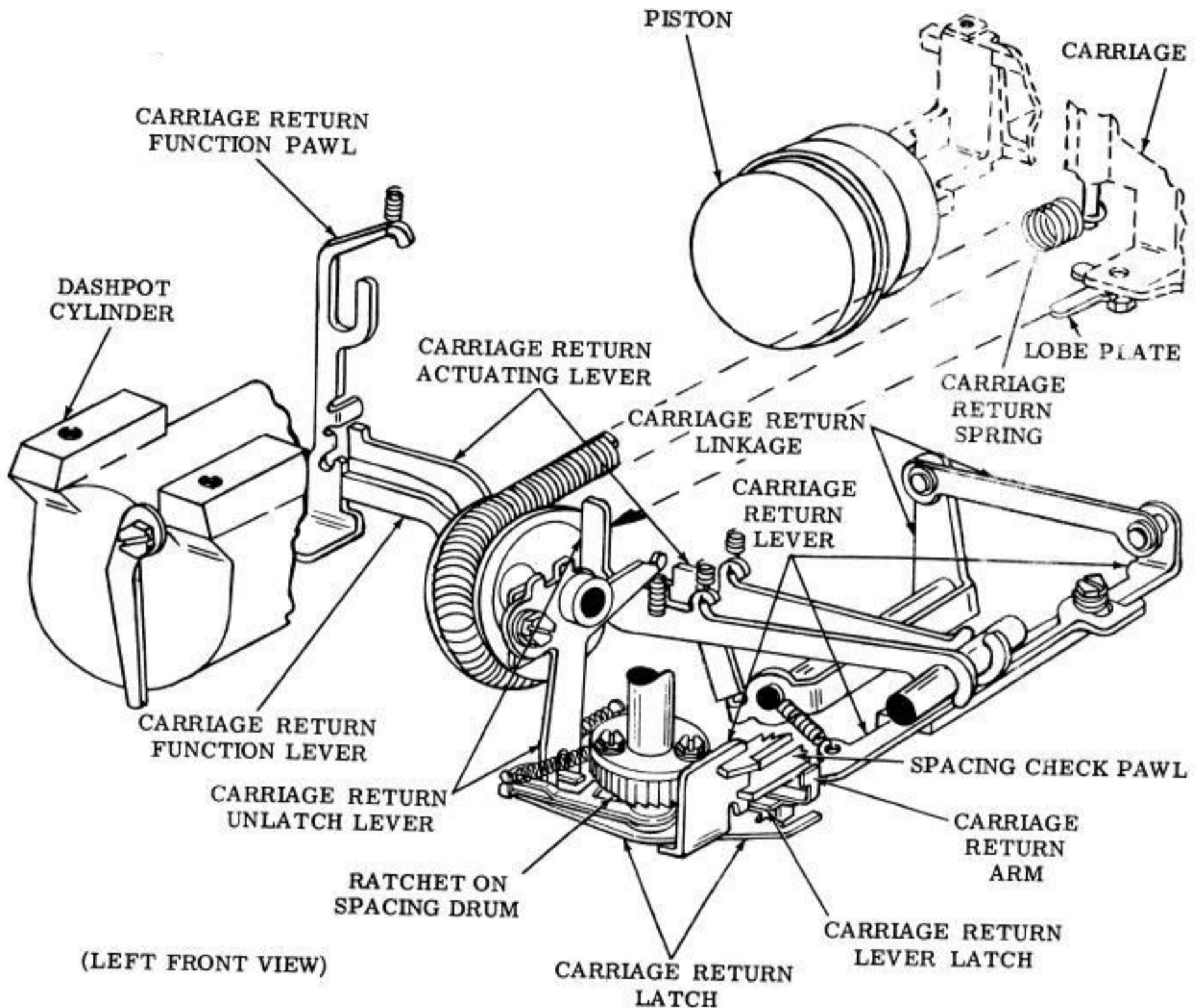
Figure 25 — Carriage Return Mechanism

Late in the function cycle, the carriage return function pawl is stripped from its function lever by the stripper bail.

2.94 As the carriage approaches the left margin at relatively high speed, a piston on the carriage enters a dashpot cylinder and compresses the air ahead of it. The air forms a cushion which slows the carriage and then, as it escapes through a small, variable hole at the left end of the cylinder, permits the carriage to be stopped at the left margin without excessive shock.

PAPER OR FORM FEEDING

A. Friction Feed Typing Units

2.95 The paper feed mechanism used on friction feed typing units is illustrated in Figure 26.

2.96 The paper feed mechanism positions the paper vertically, so that the printed characters are properly located in lines on the paper. It feeds the paper on receipt of the "line feed" code combination. It may be adjusted for either single or double line feed.

2.97 The paper feeds off a roll and is led around a platen that positions it vertically in front of the typewheel. A paper guideplate leads it down around the platen. A pressure roller, which sits in a cutout in the guide, holds the paper against the platen, so that it is fed when the platen rotates. A curved wire shaft biases the pressure roller and the guideplate against the paper. The pressure is released by a lever on the right end of the shaft. The paper is held around the front of the platen by a wire guide and is led up out of the typing unit by a deflector guide. It can be manually fed by a knob on the left end of the platen

2.98 When the "line feed" code combination is received, the codebars permit the line feed function lever to move up to its selected position early in the function cycle. The function lever, in turn, moves up a line feed blocking lever, which is engaged by the latching surface of a line feed drive link. As the left drive arm on the function rocker shaft moves down during the middle portion of the cycle, a line feed arm engages the blocking lever and moves it down. This motion is transferred, through a line feed linkage, to a pawl which engages a ratchet on the left end of the platen. The pawl rotates the platen and
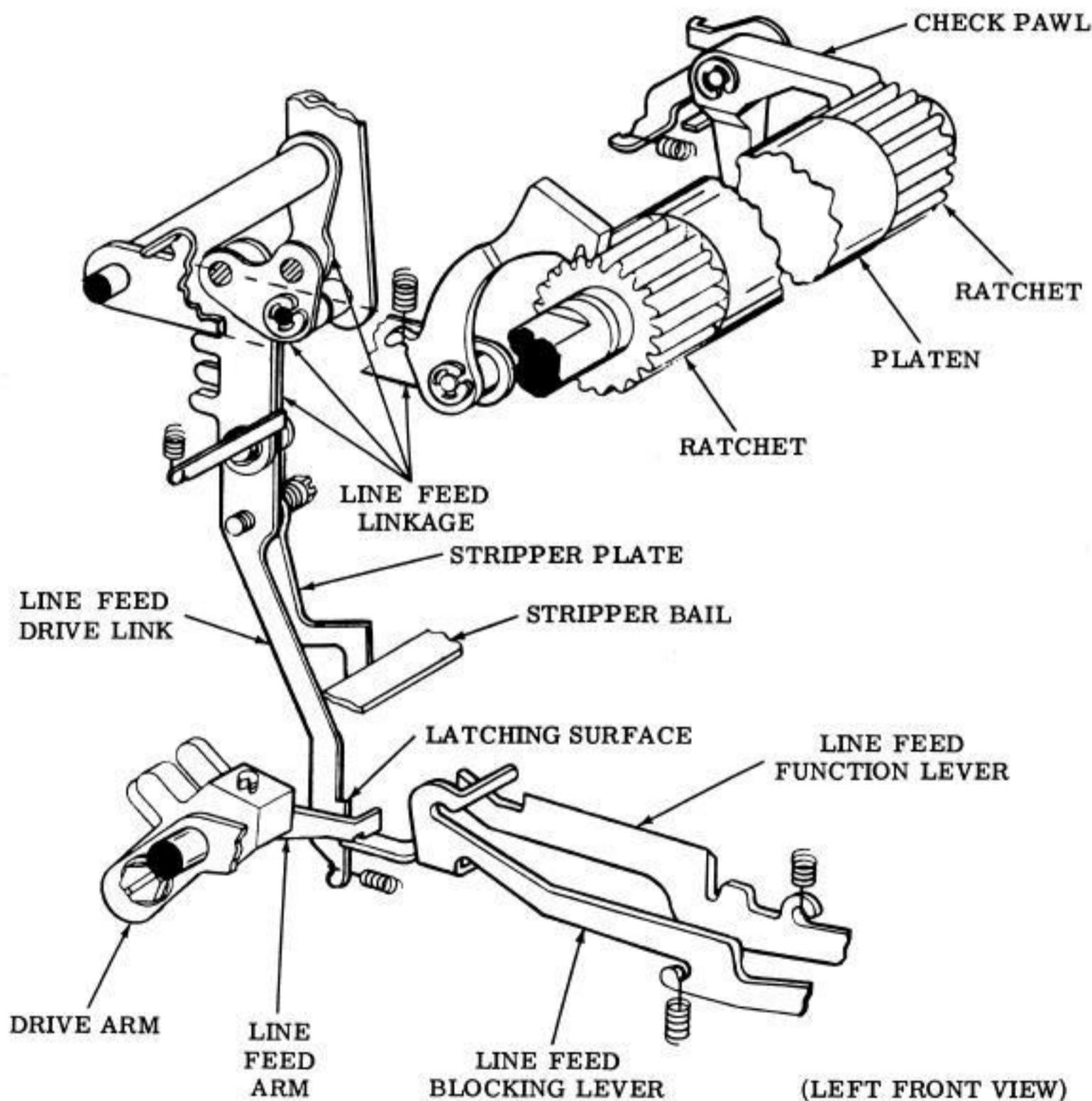

Figure 26 — Paper Feed Mechanism (Friction Feed).

thus feeds the paper up one or two lines of printing, depending on what the mechanism is adjusted to do.

2.99   The pawl is guided into the teeth by two guide posts. A check pawl riding on a ratchet at the right end of the platen holds the paper in position until the platen is again rotated. At the end of the cycle, the function stripper bail contacts a stripper plate and strips the drive link from the blocking lever, which is returned to its unoperated position.

B.   Sprocket Feed Typing Units

General

2.100   The platen drive mechanism (Figure 27) rotates the platen and positions forms vertically so that the printed characters are properly located in lines on the forms. The platen drive mechanism is activated through the form-out mechanism (Figures 28 and 29) and controlled by the line feed clutch. It feeds forms upon receipt of either the "line feed" or "form-out" code combination and may be adjusted for single or double line feed.

2.101   Forms feed from a conveniently located stack of forms. They feed under a paper roll spindle and, if used, a low-paper arm and a paper-out arm. From here, the forms, led by a paper guideplate, engage sprocket pins and advance between the platen and two paper guides until positioned vertically in front of the typewheel. The two paper guides and a wire guide hold the forms to the front of the platen and insure that the forms advance around the platen while moving up and out of the typing unit. As the forms move out of the typing unit, they go over the paper roll spindle, which separates in-coming from out-going forms.

Note: Forms can be manually fed by depressing the center knob and rotating the platen knob located on the left end of the platen.

Line Feed

2.102   When a "line feed" code combination is received, the codebars permit the line feed function lever to move up to its selected position early in the function cycle, where it is latched by its associated function pawl. During the middle portion of the function cycle, the line

feed function pawl is pulled down and, by way of a lug, contacts and pulls down the line feed strip pawl (Figure 28) until a tail on the line feed strip pawl contacts the line feed lever. The line feed strip pawl continues downward and rotates the line feed lever and line feed lever extension. While rotating, the line feed lever extension contacts the trip lever extension. Further downward rotation causes the trip lever to rotate and trip the line feed clutch.

2.103   The tripping of the line feed clutch causes it to become engaged and to rotate. This rotation, directly, through the platen drive mechanism (Figure 27) causes the platen to rotate and effects line feed.

2.104   Late in the function cycle, the line feed strip pawl, in its downward movement, contacts the line feed strip function lever and cams itself out of engagement with the lug on the line feed function pawl. When this happens, the line feed strip pawl returns to its unoperated position and allows the line feed lever and line feed lever extension to rotate upward under spring tension. Thus, the line feed lever extension rotates out of contact with the trip lever extension. Almost simultaneously, the trip lever, under spring tension, rotates down and catches a shoe lever and disengages the line feed clutch.

2.105   Single or double line feed is accomplished, depending upon whether the trip lever, after being tripped, catches the first or second shoe lever. The particular shoe lever caught by the trip lever depends upon the time between the trip lever's tripping of the line feed clutch and the subsequent contact with a shoe lever to disengage the line feed clutch. This time is related to the amount of downward travel of the line feed strip pawl before its tail makes contact with the line feed lever. This downward travel is controlled by an adjustment.

Form-Out

2.106   When a "form-out" code combination is received, the codebars permit the form-out function lever (Figure 29) to move to its selected position early in the function cycle, where it is latched by its associated function pawl. During the middle portion of the function cycle, the form-out function pawl is pulled down and contacts the extension of the latchlever assembly. Further downward travel of the form-out function pawl rotates the latchlever assembly and causes the form-out lever to unlatch. Then,
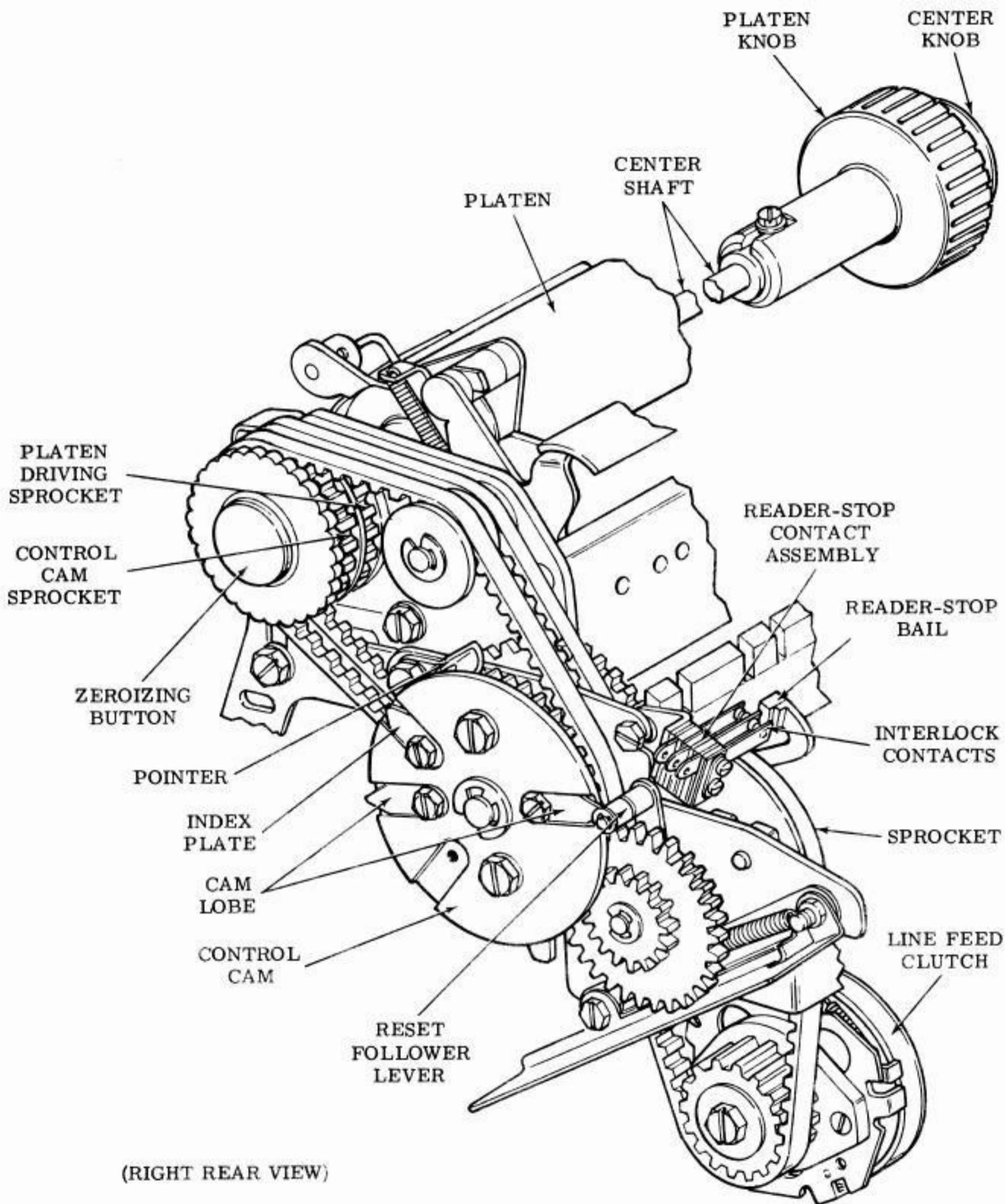
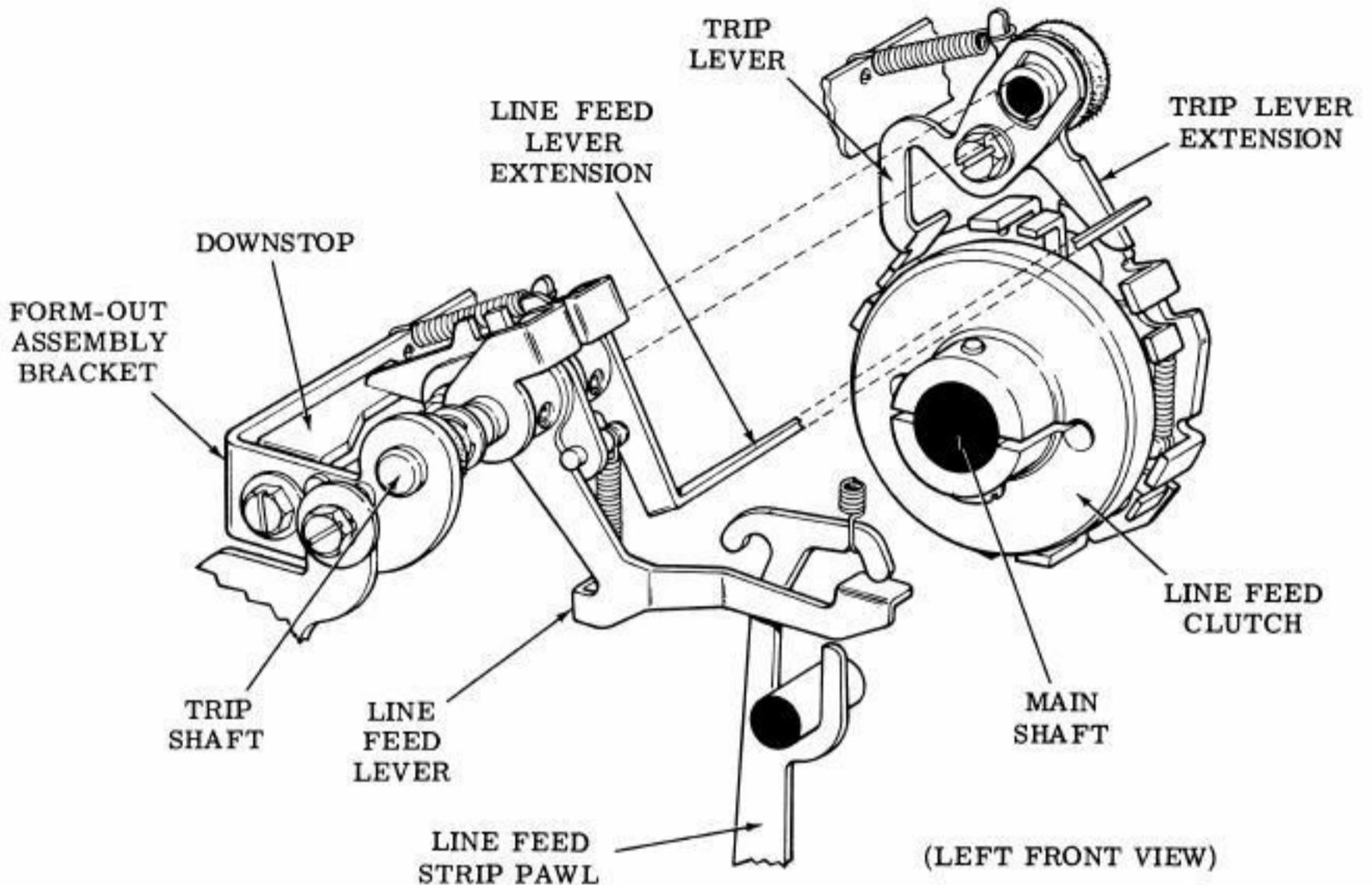Figure 27 — Platen Drive Mechanism (Sprocket Feed)

Figure 28 — Form-Out Mechanism (Sprocket Feed)

the formout lever and the form-out lever extension, under spring tension, rotates downward, and the form-out lever extension contacts the trip lever extension and causes the trip lever to rotate and trip the line feed clutch.

2.107 The tripping of the line feed clutch causes it to become engaged and to rotate. This rotation, directly, through the platen drive mechanism (Figure 27), causes the platen to rotate and effects form-out.

Note: At the end of the function cycle, the function stripper bail strips the form-out function pawl from the form-out function lever, and the form-out function pawl, under spring tension, assumes its unoperated position. This action allows the latchlever assembly to rotate upward, under spring tension, to a position where it will latch the form-out lever (2.110) when permitted.

2.108 As long as the form-out lever stays in its operated position, the platen will rotate and feed out a form, except as regulated by the control cam. Whenever the platen rotates, the control cam, being related to the platen by belts and gears, also rotates. The rotating control cam, through cam lobes, a reset follower lever, and a reset bail, initiates the action to terminate the advance of the platen and, thus, the feeding of a form.

2.109 When a cam lobe contacts the reset follower lever and rotates it toward the rear of the typing unit, a reset bail also rotates and, in rotating, pivots the form-out lever extension away from the trip lever extension. As a result, the trip lever is allowed to engage the next shoe lever and disengages the line feed clutch, which terminates form-out.

2.110   With form-out just terminated, the reset follower lever remains on the high part of a cam lobe, and the form-out lever is blocked by the reset bail from rotating to its latched position. When a "line feed" code combination is received, however, the control cam will rotate, and the reset follower lever will move from the high point of a cam lobe. This causes the reset bail to rotate downward and move away from the form-out lever extension. As a result, the form-out lever is permitted to be latched in its unoperated position, and ready to receive a "form-out" command.

Note: For reasons explained in 2.110, at the end of each form-out cycle, the form has to be fed one line before form-out can again be executed.

Composite Operation of Mechanism

2.111   Whenever the platen rotates after receiving either a "line feed" or "form-out" code combination, the control cam sprocket also rotates. Through belts and gears, the rotation of the control cam sprocket also causes the control cam to rotate. The gearing is arranged so that, with a given form length, one complete rotation of the control cam sprocket results in one complete rotation of the control cam. A variety of form lengths can be accommodated by selecting and installing an appropriate set of gears.

2.112   Several "line feed" code combinations may be received before a "form-out" code combination is received. Thus, a form may be advanced several printing lines before a command to feed out the form is received. The control cam remembers the number of printing lines that have been advanced, and, when a "form-out" code combination is received, it controls the amount a form is fed out, so that the succeeding form is positioned into the same starting position as the preceding form.

2.113   Upon receipt of a "form-out" code combination by an Automatic Send-Receive Teletypewriter Set, the reader-stop bail is rotated toward the front of the typing unit by the form-out lever extension. This action causes the interlock contacts of the reader-stop contact assembly to be operated with the following results:

(a)   A pair of normally closed contacts are opened during the "form-out" function. This stops the tape reader from trans-

mitting and prevents the typing unit from printing characters "on the fly," while a form is being advanced.

(b)   A pair of normally open contacts are closed. This keeps the typing unit motor operating in case the typing unit is turned off before the form-out cycle is completed. Thus, synchronization of the forms is maintained.

END-OF-LINE BELL

2.114   As the carriage moves to the right during printing, the carriage upper rear roller makes contact with and depresses a latch which is secured to a lever mounted on the rear rail. As the latch is depressed, the lever is rotated and moves the automatic carriage return-line feed codebar to the right a short distance, where a notch in the codebar permits the bell function lever to move up to its selected position, where it is latched by its function pawl. During the middle portion of the function cycle, the lever moves the pawl down against the pressure of the latter's spring. When the stripper bail strips the pawl late in the function cycle, the pawl moves up and causes a clapper mounted on a wire spring to snap up and ring a gong.

Note: An alternative method of performing the same operation proceeds in the same manner as above, except that a projection on the carriage picks up the automatic carriage return-line feed codebar at a predetermined point and moves the codebar to the right a short distance until a notch in the codebar permits the bell function lever to move up to its selected position.

AUTOMATIC CARRIAGE RETURN-LINE FEED

2.115   As described for the alternate method in the note above, the carriage picks up the automatic carriage return-line feed codebar at a predetermined point and moves it to the right. When the carriage reaches the right margin, a notch in the codebar permits an automatic carriage return-line feed function lever to move up to its selected position, where it is latched by its function pawl.

2.116   The automatic carriage return-line feed function lever, in turn, moves the line feed blocking lever up to where it is latched by the line feed link. Line feed then occurs as described in 2.95 through 2.99 or 2.102 through 2.105.

FORM-OUT LEVER

TRIP SHAFT

RESET BAIL

FORM-OUT ASSEMBLY BRACKET

TRIP LEVER EXTENSION

FORM-OUT LEVER EXTENSION

RESET BAIL

READER-STOP BAIL

LINE FEED CLUTCH

MAIN SHAFT

FORM-OUT FUNCTION PAWL

FORM-OUT FUNCTION LEVER

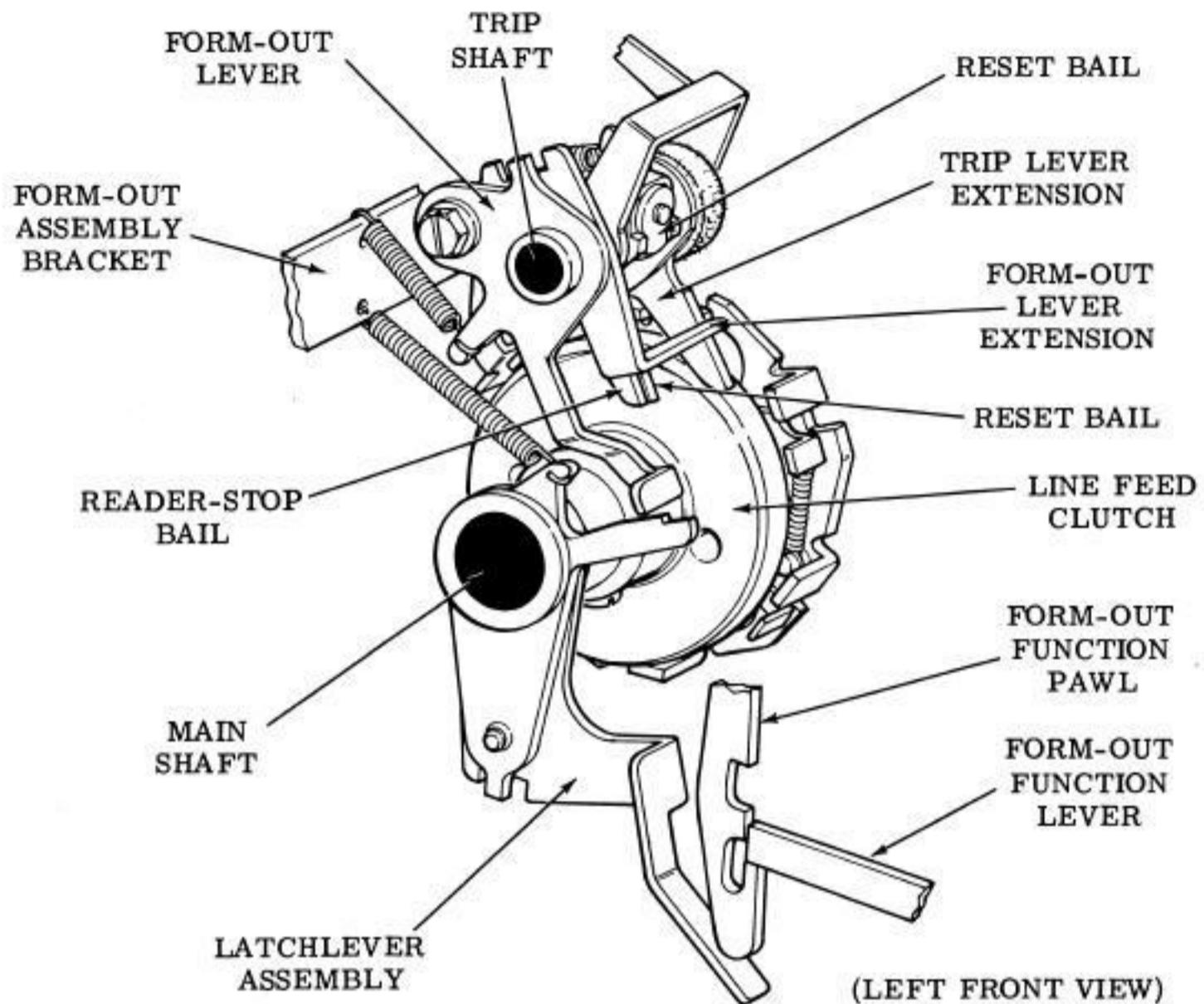LATCHLEVER ASSEMBLY

(LEFT FRONT VIEW)

Figure 29 — Form-Out Mechanism (Sprocket Feed)

2.117   When the automatic carriage return-line feed function lever and its function pawl are pulled down during the middle portion of the cycle, the pawl encounters an extension on the carriage return function pawl and moves it down. Carriage return then occurs as described in 2.91 through 2.94.

ANSWER-BACK MECHANISM

A.   General

2.118   An answer-back mechanism, illustrated in Figure 30, automatically transmits a predetermined sequence of characters for identification purposes. The basic mechanism may be actuated in two ways:

(a)   Remotely, by the reception of a predetermined call character.

(b)   Locally by the depression of the HERE-IS key.

(c)   In addition, as an optional feature, it may be actuated by a trip-magnet mechanism at the receipt of a signal generated by external equipment, such as a data set. The mechanism is described in the appropriate description section.

2.119   A drum is coded with characters making up the answer-back sequence. When the answer-back mechanism is actuated, it rotates the drum, which sets up the code combinations in a set of answer-back contacts. The distributor converts the positions of the contacts to start-stop signals for transmission. After the answer-back sequence has been transmitted, the answer-back mechanism returns itself to its unoperated condition. For operational considerations that
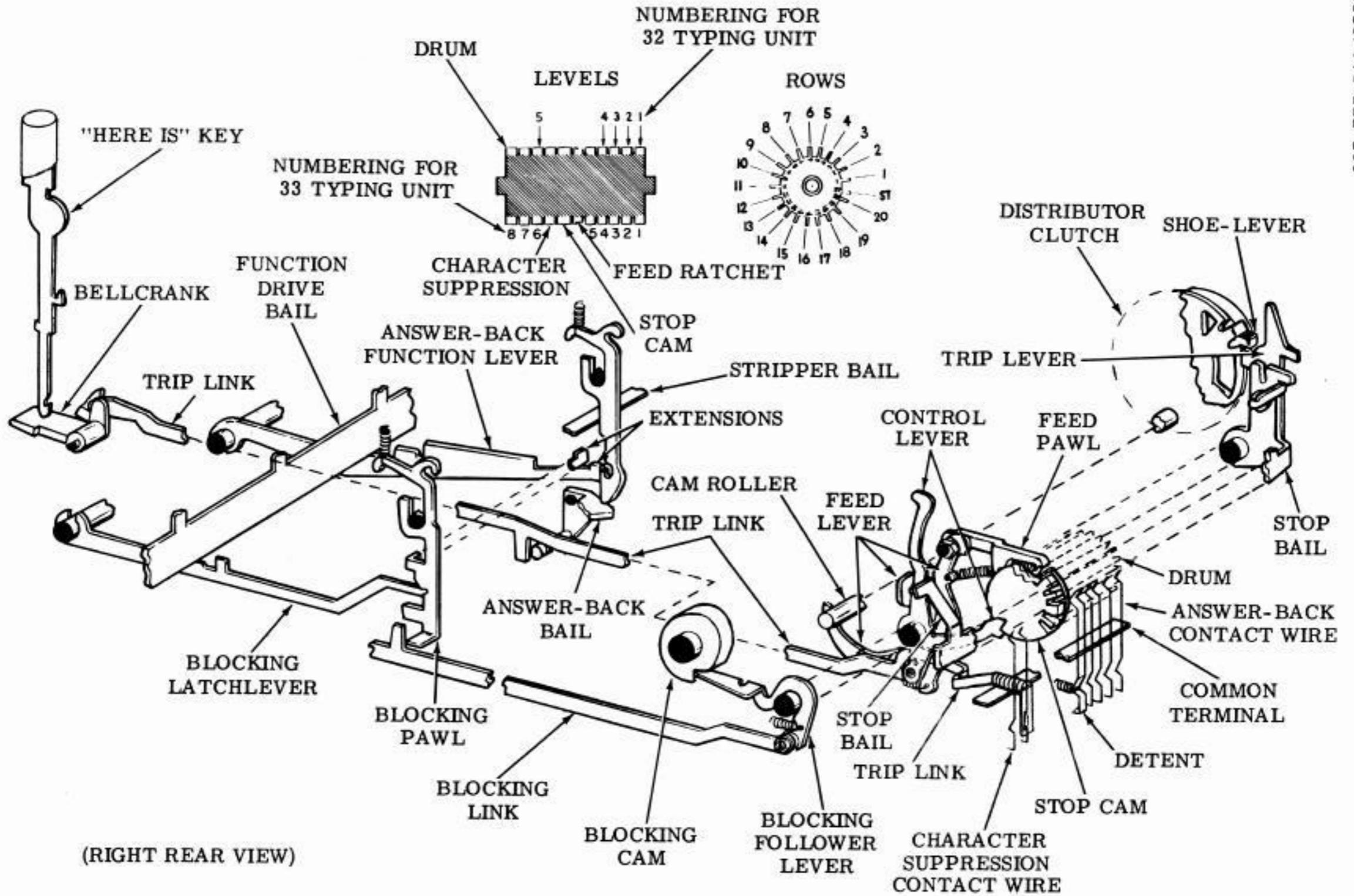
Figure 30 — Answer-Back Mechanism

will be described below, provisions are made for shunting the signal line during sensing of the first answer-back character of each cycle of operation and for preventing the answer-back mechanism from being actuated by the local generation of the answer-back call character.

Note: See the appropriate installation section for further information on answer-back drum coding.

B. Drum

2.120   Viewing it from the rear, the drum has 11 levels from right to left, as follows:

(a) Five numbered levels.

(b) Feed ratchet.

(c) Stop cam.

(d) Character suppression.

(e) Three more numbered levels.

2.121   The numbering for 32 and 33 typing units is illustrated in Figure 30. Viewing it from the numbered end, it has 21 rows, ST (start) and 1 through 20. The feed ratchet is used to rotate the drum as described in 2.124 below. The stop cam, which has four removable tines, controls the length of the answer-back sequence, as described in 2.134 below. The character suppression level is used to shunt the first answer-back character from the signal line and delete errors as described in 2.129 through 2.130 below. By breaking off tines in the various rows at the numbered intelligence levels, the drum may be coded to generate the proper answer-back characters. For example, if the first character of an answer-back message to be transmitted by a 32 (5-level) or 33 (8-level) typing unit is the letter D code combination (1--4-) or (--3---7-), tines at either the no. 1 and 4 levels or the no. 3 and 7 levels should be broken off in the appropriate row, where the answer-back message is to start. The second character of the answer-back message would be coded into the next succeeding row.

Note 1: All answer-back messages should be preceded at least by the "carriage return" code combination and "line feed" code combination. On 32 (5-level) typing units, the answer-back message should also be preceded by the "letters" code combination.

Note 2: The 8-level code combination given for the letter D is the "even parity" code combination.

C. Remote Actuation—Function Mechanism

2.122   The function mechanism must be arranged to actuate the mechanism upon receipt of the proper call character start-stop signal.

2.123   When the answer-back call character start-stop signal is received by the typing unit, the codebars permit the answer-back function lever to move up to its selected position, where it is latched by its function pawl. As the function lever and pawl are moved down by the function drive bail during the middle portion of the function cycle, the pawl pivots an answer-back bail, which moves a trip link frontward. The trip link pivots a control lever out of an indentation in the stop cam. The control lever, through the stop bail, moves the trip lever rearward, out of engagement with the shoe lever, and trips the distributor clutch.

2.124   When the distributor clutch begins its cycle, a cam roller moves up and permits a feed lever to pivot rearward against the control lever. A feed pawl pivoted on the feed lever is moved rearward, where it picks up the next tooth on the drum's ratchet. Near the end of the function cycle, the answer-back function pawl is stripped from its function lever by the stripper blade. The control lever, under spring pressure, tends to return to its unoperated position in the indentation of the stop cam. This would terminate the answer-back operation by disengaging the distributor clutch. However, since the feed pawl is now engaged with the next ratchet tooth, the spring pressure on the control lever is not strong enough to overcome the combined pressure of the feed lever spring and the drum's detent, and the mechanism remains in its operated condition through the first distributor cycle.

2.125   Near the end of the distributor cycle, the cam roller on the distributor clutch moves the feed lever and feed pawl frontward, and the pawl acts on the ratchet to rotate the drum one tooth. The stop cam on the drum now prevents the control lever and trip lever from returning to their stop position. The distributor clutch thus continues to cycle and rotate the answer-back drum.

2.126 The answer-back contacts are wired in parallel with the keyboard contacts to the segments of the distributor disc. As the drum is rotated during the answer-back operation, the contact wires, under spring pressure, sense each row of tines in turn. If a tine has been broken off at a given level in a row, the associated wire moves frontward to its marking position against a common terminal. On the other hand, if a tine is present, it holds the spring away from the terminal in its spacing position. As the distributor clutch cycles, the distributor converts the positions of the contacts to sequential start-stop signals for transmission in the same manner as described in 2.11 through 2.16 for the keyboard contacts.

2.127 The drum continues to rotate until the next indentation in the stop cam is presented to the control lever. The latter then moves into the indentation and returns the associated parts to their unoperated position. The shoe lever then strikes the trip lever and disengages the distributor clutch. The mechanism is thus returned to its unoperated condition.

D. Local Actuation—HERE IS Key

2.128 When the HERE IS key is manually depressed, it pivots a bellcrank, which moves the trip link frontward. The trip link pivots the control lever to its operated position, and the answer-back operation is the same as that described in 2.122 through 2.127 above.

E. First Character Suppression

2.129 Since the answer-back, keyboard, and tape reader (where used) contacts are wired in parallel with the distributor disc, the answer-back contacts must all be in their spacing position when the mechanism is unoperated, so that they do not interfere with keyboard or tape reader transmission. Therefore, inasmuch as the answer-back feed mechanism does not feed the drum until near the end of the first cycle, the first character sensed should be all spacing to prevent garbling of the regular message sent from the keyboard and/or tape reader. However, an all "spacing" character is undesirable in some systems. Therefore, a way is provided for shunting transmission from the signal line during the sensing of the first answer-back character.

2.130 As described in 2.123 above, the trip link moves frontward when an answer-back sequence is initiated and remains there until it is terminated. In this position, it permits a character suppression contact wire to sense the drum's character-suppression level. The character-suppression contact is wired so that it shunts transmission from the outgoing signal line when it is closed. The tine at the character-suppression level of the first character of each cycle of an answer-back sequence must always be broken off in order to accomplish this. Thus the character-suppression contact wire is selected and keeps the line marking until the second character is sensed. The tines are left in the character-suppression level in other rows, except for certain conditions, such as to correct coding errors or to vary the message length. This allows, in effect, a one-character delay before the message coded into the answer-back drum is transmitted. At the end of the operation, the trip link again moves rearward and holds the wire unselected, while the mechanism is unoperated.

F. Answer-Back Suppression on Transmission

2.131 Since the typing unit receives every code combination that it transmits, the sending of the answer-back call character would actuate the local answer-back mechanism as well as the one at the distant station. To prevent this, a blocking mechanism is provided which prevents the function mechanism from operating in the answer-back area during transmission.

2.132 As the distributor clutch cycles, a blocking cam pivots a blocking follower lever which pulls a blocking link rearward. The link pivots a blocking pawl rearward until it releases a blocking latchlever which, under spring pressure, moves up against the function drive bail. When the function drive bail and the blocking latchlever move up during the first part of the function cycle, the blocking latchlever cams the blocking pawl further rearward where an extension on the pawl is over an extension on the answer-back function lever. The function lever is thus prevented from moving up far enough to be latched by its pawl and initiate the answer-back sequence.

2.133 During the latter part of the distributor cycle, the blocking cam allows the blocking link to move frontward to its unoperated position. As the function drive bail moves down during the middle portion of the function cycle,

it drives the blocking latchlever downward to the point where the blocking pawl is permitted to pivot frontward to its unoperated position. Thus every time a character is initiated locally, the distributor clutch cycles and operates the blocking mechanism which prevents the answer-back function lever from sensing the codebars and initiating the answer-back sequence regardless of what character is processed by the typing unit. On the other hand, when remotely initiated characters are received, the distributor clutch does not cycle, the blocking mechanism is not operated, and the function lever is permitted to sense the codebars and initiate the answer-back sequence upon receipt of the predetermined call-character signal.

G. Length of Answer-Back Sequence

2.134 The length of the answer-back sequence can be varied either by altering the stop-cam level or the character-suppression level.

(a) Stop cam: The answer-back mechanism can be coded for either 1-, 2-, or 3-cycle operation by removing the appropriate tine(s) from the stop-cam level. In 1-cycle operation, the stop cam in row "6" is removed. This coding yields a maximum of 20 rows which are available for coding different characters into the answer-back drum. There are actually 21 rows on the answer-back drum, but only 20 rows can be used for coding since one row (2.130) is suppressed. The number of rows available for message coding is summarized below for 1-, 2-, or 3-cycle operation:

Cycle Operation	Actual Rows	Available Rows
1	21	20
2	10(11)*	9(10)*
3	7	6

*Alternately one, then the other.

When multiple-cycle operation is employed, the answer-back sequence must be coded in each segment of the answer-back drum so that the same message will be transmitted each time the answer-back mechanism is initiated.

(b) Character Suppression: Quite often, due to message length, messages coded into the answer-back drum do not require the use of every available row for coding. Unneeded rows are eliminated from the message transmission by removing the unneeded character suppression tine(s). The answer-back drum will stop through its complete cycle, but the transmission of the coded characters from the unneeded rows will be shunted from the signal line.

Note: The character-suppression tine in the last row of a cycle should not be removed on 33 typing units used in systems where a response to each answer-back actuation signal must always be obtained. If the tine is removed, the answer-back mechanism will not respond to consecutive answer-back actuation signals. This is due to the operating characteristics of the typing unit which, when the character-suppression tine in the last row of a cycle is removed, leaves the answer-back blocking panel blocking at the end of the answer-back drum cycle of operation. The answer-back blocking pawl will remain blocking until after another character is received through the selector mechanism. The subsequently received character causes the function mechanism to reset the answer-back blocking pawl to its unblocking position. After being reset and upon receipt of an answer-back actuation signal, the answer-back mechanism will be triggered. Hence, with the character-suppression tine removed from the last row of an answer-back cycle, typing unit answer-back mechanisms will only respond to every other answer-back actuation signal unless an intervening character is received through the selector mechanism.