35 KEYBOARD AND BASE FOR KEYBOARD SEND-RECEIVE (KSR) AND RECEIVE-ONLY (RO)

TELETYPEWRITER SETS

DESCRIPTION AND OPERATION

1. GENERAL

1.01   This section is reissued to include the latest engineering changes concerning gold-plated contacts. Arrows in the margins indicate changes or additions.

KEYBOARD

1.02   The 35 Keyboard (Figures 1, 2 and 3) supports the motor unit and the typing unit, and incorporates code selecting and signal generating mechanisms. Signal line and power line circuits are also included. The keys are positioned in a four row arrangement with most punctuation marks, and special symbols and functions, available in upper case positions. The keyboard, with typing unit and motor unit mounted in position, is placed within the cabinet. The front of the keyboard protrudes beyond the cabinet and is fitted with a rubber pad that seals the edges of the aperture for a silencing effect. Motive force for activating the keyboard is derived from the motor by way of the typing unit. The keyboard may or may not be equipped with an answer-back.

RECEIVE-ONLY BASE

1.03   The 35 Receive-Only Base is used in place of the keyboard when receiving facilities only are required. It supports the motor unit and the typing unit, and provides for local carriage return and local line feed operation of the typing unit. It does not incorporate code selecting and signal generating mechanisms. The base may or may not be equipped with an answer-back.

1.04   The wall mounted Receive-Only Base has the same features as the table and floor model (Figure 4) except for the intermediate shaft assembly and the motor location (2.03 and 2.06).

ANSWER-
BACK

INTERMEDIATE
SHAFT

TRANSFER
LEVERS

NONREPEAT
LEVER MECHANISM

SIGNAL
GENERATOR
SHAFT

CODEBARS

CODEBAR BAIL
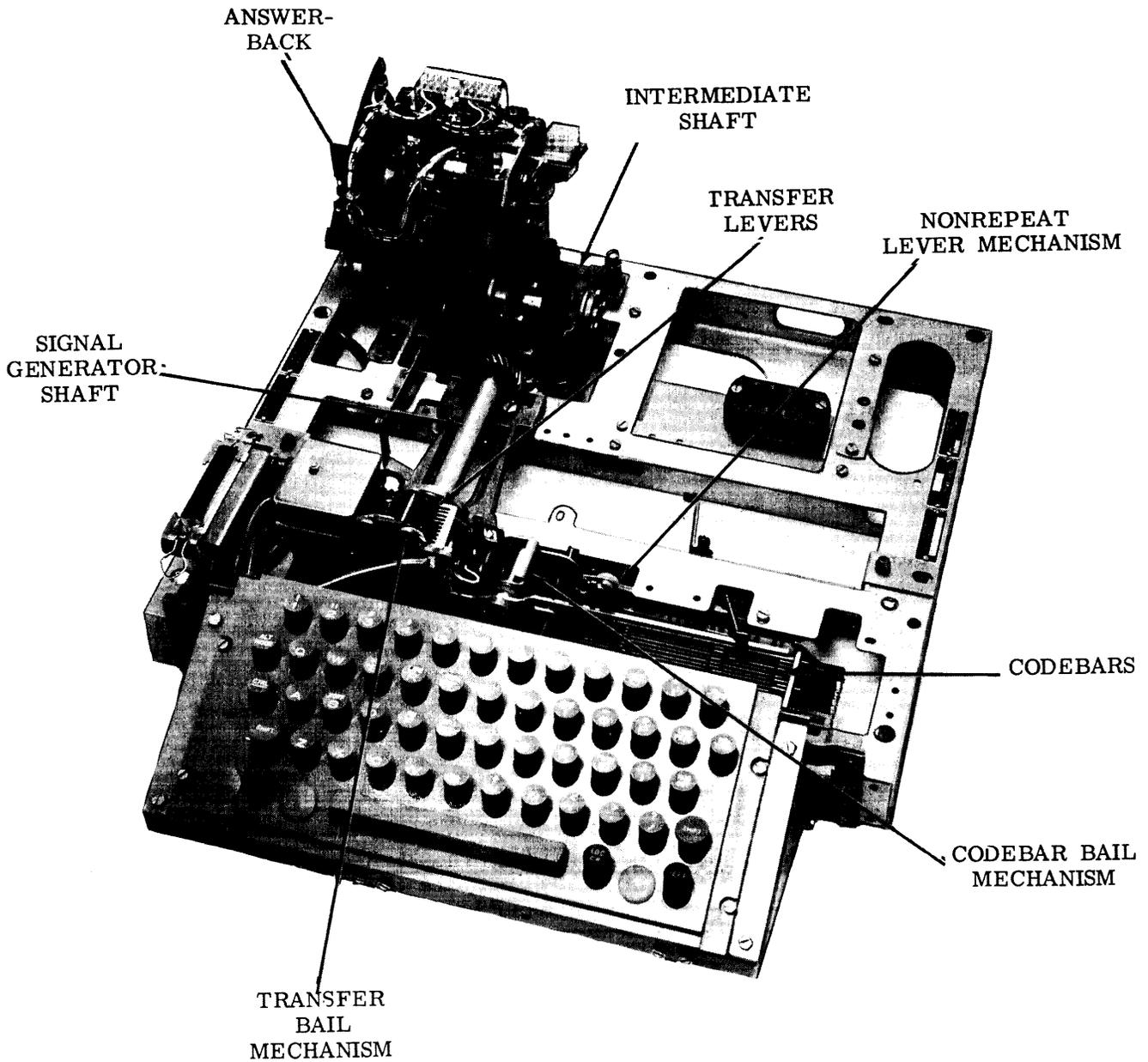MECHANISM

TRANSFER
BAIL
MECHANISM

Figure 1 -   35 Keyboard for Send-Receive Sets (Front View)

SIGNAL GENERATOR

1.05 The signal generator consists of a frame assembly; front and rear plate assemblies; gear, shaft, clutch and cam assembly; and a contact box assembly (Figure 9).

1.06 The clutch stop and latchlevers are mounted on the frame.

1.07 The codebar assembly and nonrepeat lever with its guide are mounted on the rear.

1.08 The front plate acts as a mount for the detent plate assembly; transfer bail and stud; transfer levers with their guides, springs, and mounting studs; and the locking bail with its stud and spring.

1.09 The cam, clutch, and shaft assembly is mounted between the front and rear plates. The cam is one piece of machined steel with ten lobes. The eight lobes which generate pulse signals, are equal in contour and are positioned at uniform angles with one another. The number four cam differs in contour, and is used to actuate the transfer lever locking bail.

1.10 The universal bail latchlever with its eccentric bushing is fastened to the right front of the frame. This latchlever extends to the rear over the codebar bail latch and the nonrepeat lever pawl.

1.11 The contact box assembly is mounted on the front plate. It is composed of a fiber insulating strip, a contact toggle assembly, phenolic base, and drive link.

1.12 The signal contacts may be made of either tungsten or gold-plated tungsten.

> Note: Gold-plated contacts may be used for both standard applications (including those with data sets) and special low-level applications. However, once used for standard application, they may not be suitable for special low-level application.

2. PRINCIPLES OF OPERATION

GENERAL

2.01 These paragraphs cover the operating principles and descriptions of the 35 Keyboard and Base for Keyboard Send-Receive and Receive-Only Sets.

KEYBOARD

2.02 The Keyboard embodies a sheet metal structure on which an intermediate shaft assembly, a codebar mechanism with keylevers, and a signal generator mechanism are mounted. It also contains a margin indicator switch mechanism, and provides mounting facilities for a typing unit and a motor unit. All electrical wiring is brought into the keyboard through a receptacle mounted at the left side of the keyboard base. A main cable interconnects the various electrical components with this receptacle. (Answer-back has separate plug.)

> Note: The main power switch, margin indicator lamp, signal bell and copy illuminating lamps are mounted on the keyboard on wall mounted models.

INTERMEDIATE SHAFT ASSEMBLY

2.03 The intermediate shaft assembly located in the rear central portion of the keyboard, supports the helical gear assembly. The helical gear assembly transfers, the motive force to the typing unit main shaft, and (if present) answer-back assembly. On table and floor models, the motor unit is mounted on top of the base, and the intermediate shaft assembly contains two helical gears. The motor engages the intermediate shaft assembly by means of the motor pinion and intermediate shaft driving gear. On wall mounted models the intermediate shaft assembly contains one helical gear and one pulley. The motor unit mounts below the base, and its pinion engages with and drives a belt. The belt in turn engages with and drives the pulley and the attached intermediate shaft assembly.

CODEBAR MECHANISM AND SIGNAL GENERATOR. (See Figures 5, 8, and 9.)

2.04 As a code selecting keytop is depressed, the corresponding codelever rotates about its pivot point. The rear end of the codelever comes up and rotates the universal bail. The extension arm on the top of the universal bail moves out of engagement with the step at the rear end of the universal bail latch. This occurs when the key and corresponding codelever are about two-thirds of the way toward full stroke. The universal bail latch then moves downward under spring force developed by the universal bail latch spring. As this latch comes down, it strikes the codebar reset bail latchlever and carries it downward. When the corner

of the reset bail latch descends beyond the center line of the needle bearing (mounted on the reset bail), the various spring forces acting on the reset bail cause it to swing to the right. This in turn allows the various codebars to move to the right (in the direction of the spring forces acting on each codebar). While this is happening, the codelever is moved up to its full position. Therefore, the codelever may stop some of the codebars from moving to their extreme right hand position. The codebars have vertical extensions that engage a curved part of the signal generator transfer levers. Those codebars that are permitted to move to the extreme right also move the corresponding transfer lever to the right. However, those codebars that are stopped, because their teeth en-

gage the actuated codelever, do not quite touch or move their corresponding transfer levers. Hence, these transfer levers remain in their normal left hand position (Figure 9).

2.05 Simultaneously with the trip-off of the reset bail and the movement of the codebars to the right, the clutch tripbar (located in the rear slots of the codebar guides) moves to the right. This clutch tripbar engages the clutch stop lever and moves it out of latch with the clutch stop lug. Up to this point, all of the action has been caused by manual operation of the keytop and its associated codelever (Figure 5).

2.06 The motor unit supplies the mechanical power to drive the associated typing unit
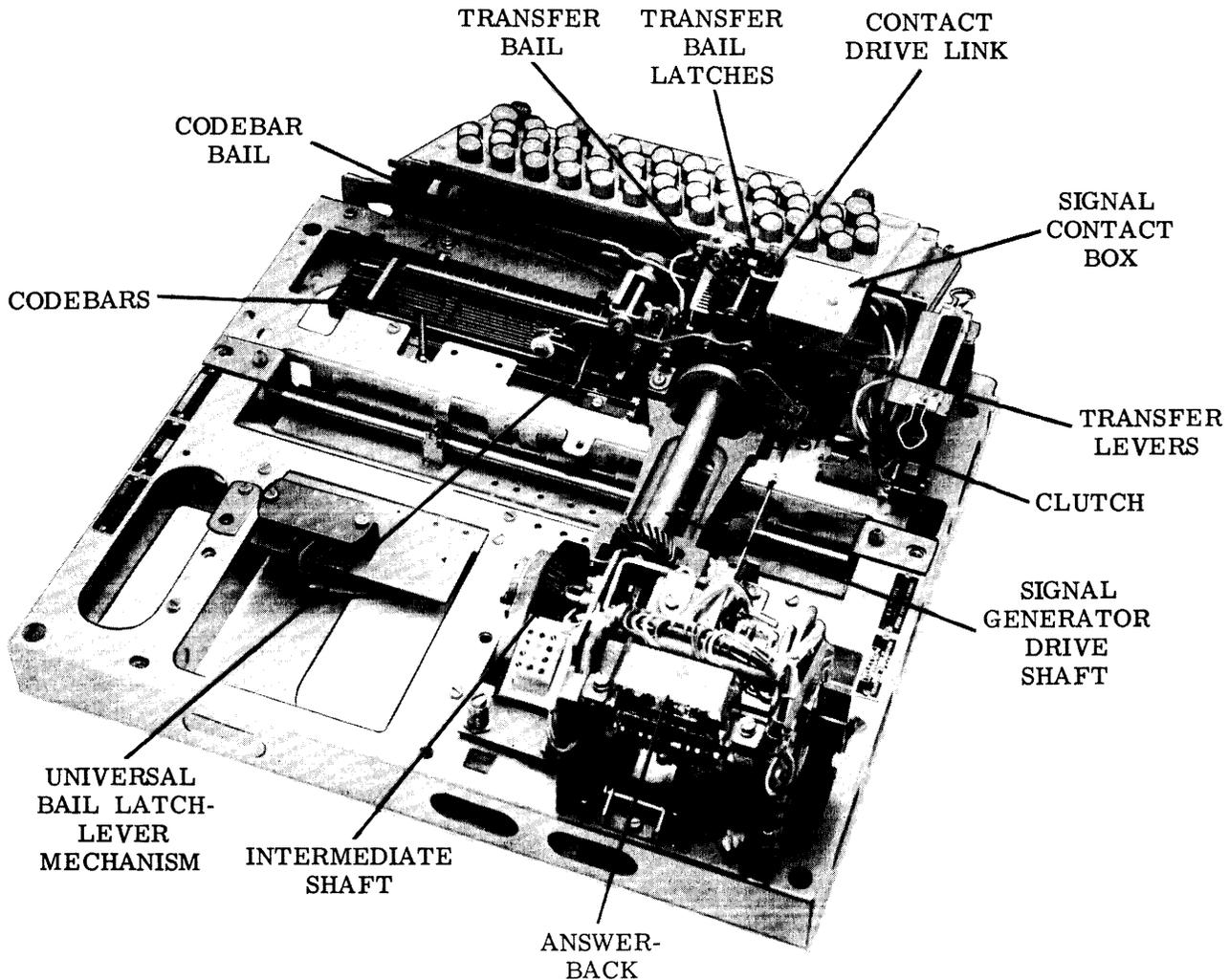

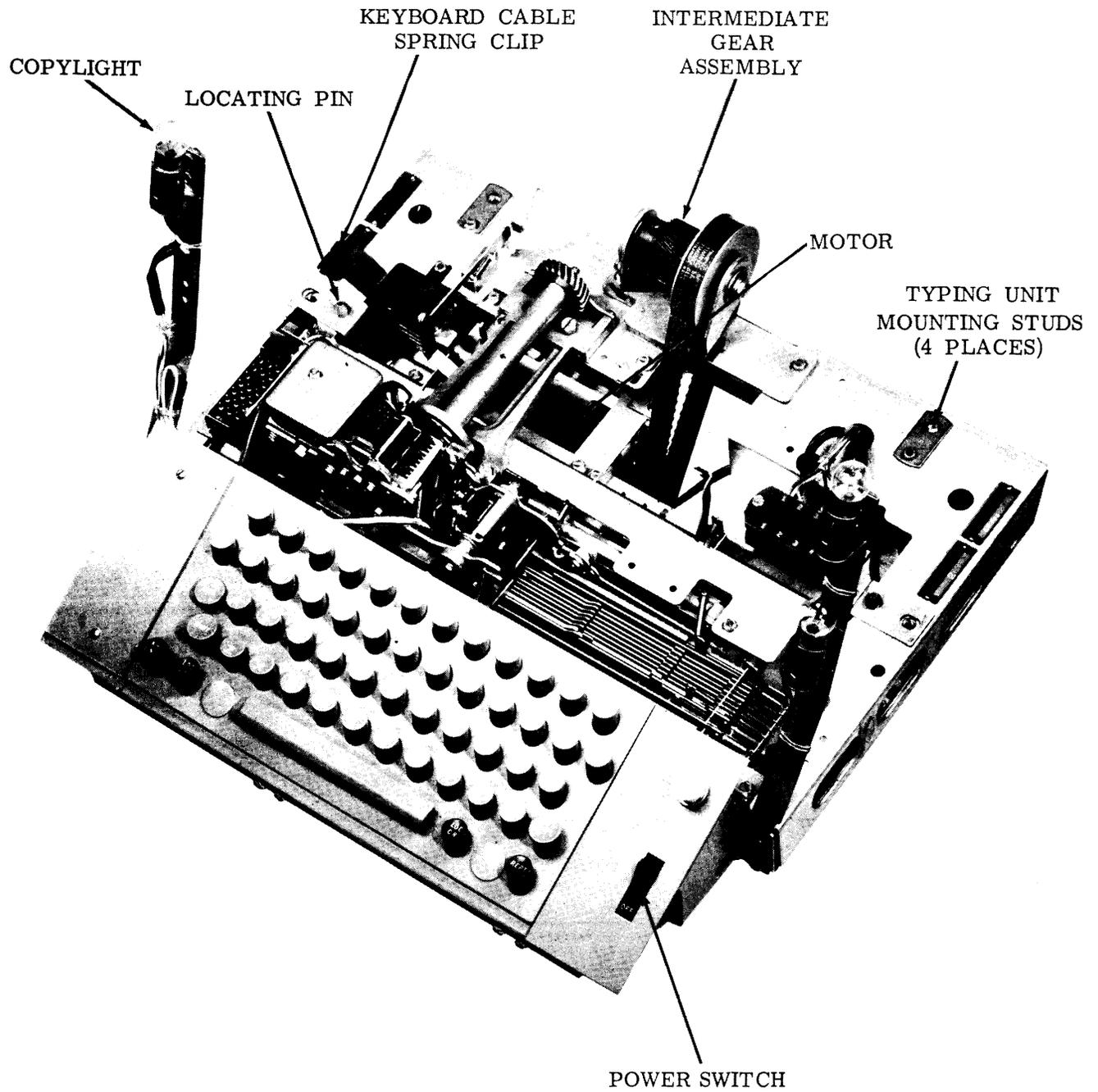Figure 2 - 35 Keyboard for Send-Receive Sets (Rear View)

COPYLIGHT

LOCATING PIN

KEYBOARD CABLE
SPRING CLIP

INTERMEDIATE
GEAR
ASSEMBLY

MOTOR

TYPING UNIT
MOUNTING STUDS
(4 PLACES)

POWER SWITCH

Figure 3 - 35 Keyboard for Wall Mounted Send-Receive Sets

and the signal generator shaft that is geared to the typing unit main shaft. The motor unit is mounted on top of the keyboard base, on the right rear corner on table and floor models, and below the keyboard base, on the left rear side, on wall mounted models.

2.07 Once the clutch is tripped, it rotates con-
tinuously as long as the keyboard is turned on. Since the clutch shoes are mounted on a plate that is part of the cam assembly, the cam begins to rotate (clockwise when viewed from the front of the keyboard).

2.08 The arrangement of the cam assembly is
such that the fourth cam from the rear begins to push downward on its corresponding transfer lever. At almost the same time, the first cam from the front begins to move the transfer lever locking bail upward. The blade portion of this locking bail goes up beside a downward projection on each transfer lever. The "locking" projection is left or right of the locking bail, depending upon the position of the transfer lever (as set up by the permutation action of the codebars). Thus, in the first few degrees of cam rotation, the permutated position of the transfer levers is located into posi-
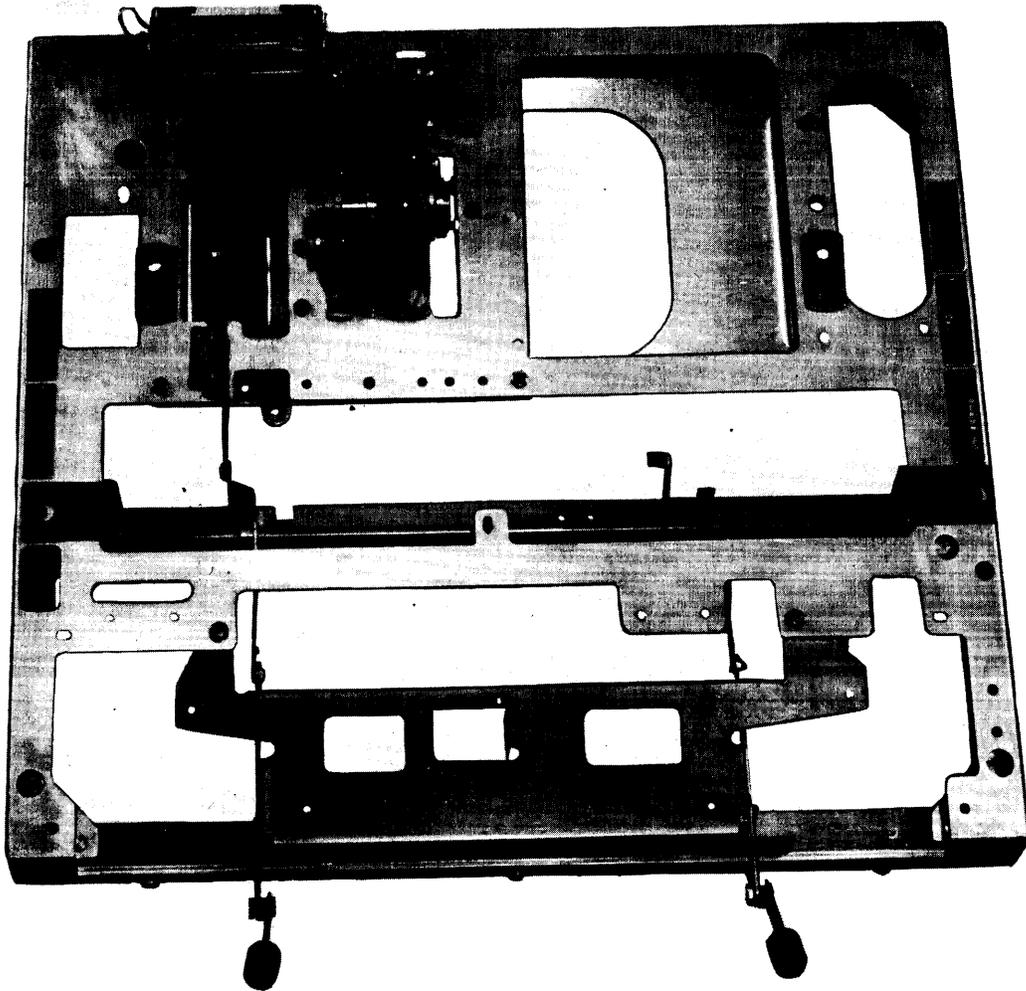

Figure 4 - 35 Receive-Only Base for Table and Floor Model Sets

tion and the codebars are free to be reset in their normal latched position.

2.09 The cams and their corresponding transfer levers are numbered from rear to front. The number 4 cam engages its transfer lever first; and moves it down. Since the start pulse is always spacing, no codebar is required to engage this lever. Hence it is always held to the left by its spring. Therefore, as the fourth cam moves the lever down, the hook at the upper right side of the transfer lever engages the right side of the transfer (rocker) bail. This tips the transfer bail to the right and pulls the contact drive link to the right. The resulting action of the contact toggle is such that the left set of contacts acts as a pivot and the right hand con-

tacts begin to open. The right hand contacts are the ones that control the signal current in single contact type operation. When these contacts are open, the result is no current in the signal circuit. Therefore, the first pulse, the start pulse of any character code is a spacing (no current) pulse.

2.10 The number 1 cam and the transfer lever move downward next. In turn, the upper left hook of the associated transfer lever pulls down on the rocker bail (holding it to the right or tilting it back to the left). This pushes the drive link to the left (or right) resulting in closing the right (or left) contacts and allowing a marking (or spacing) pulse to be transmitted.
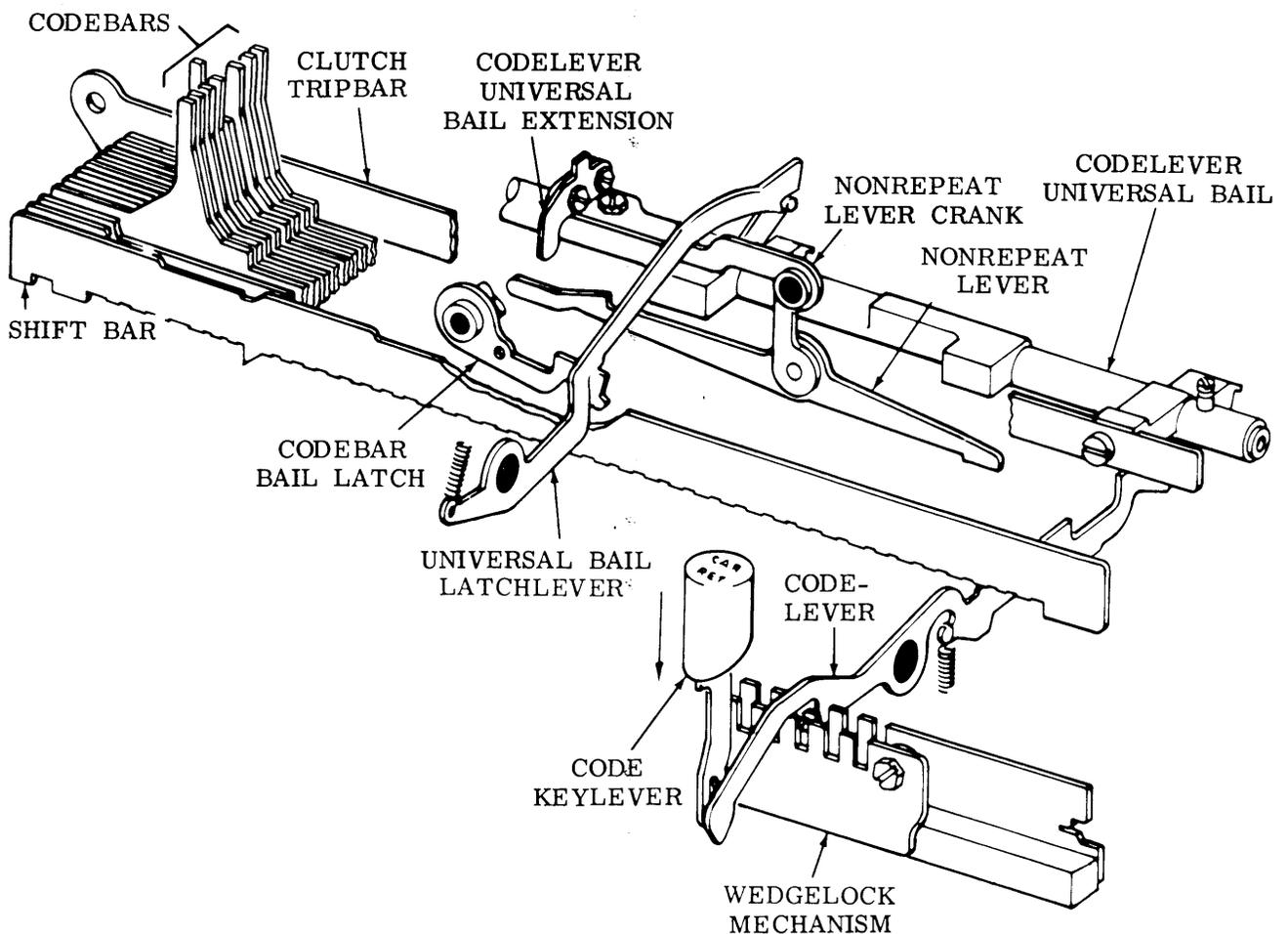

Figure 5 - Codebar and Codelever Universal Bail Mechanism

2.11 Similarly, the remaining transfer levers are pulled downward by their respective cams. The resulting pulse is marking if the transfer lever is to the right or spacing if it is to the left. The last transfer lever is held to the right by a stop pin. Therefore, the last pulse (the stop pulse) is always marking (current on).

2.12 The locking bail is actuated by a cam lobe. This cam begins to move the locking bail up into its locking position almost as soon as the cam starts to rotate (Figure 9). Full lock position occurs approximately at the half-way point of the start pulse (48-1/2 degrees of rotation). The dwell on the first cam from the front holds the lock bail in its lock position until after the beginning of the last pulse. Then the cam pulls the bail down out of lock, and all transfer levers are free to return to their initial positions at a point about half-way through the stop pulse.

2.13 Reset of the codebars is accomplished by means of an eccentric on the front of the cam assembly, which drives an eccentric follower arm (Figure 7). This arm engages a stud on the side of the codebar reset bail and pulls the reset bail to the left as the cam rotates. At the peak position of the reset eccentric, the codebar reset bail latch is clear of the needle bearing stud. This permits the latch spring to pull the latch up into locking position and the codebar reset bail is latched as the eccentric drives the follower arm back to its initial position. As the codebar reset bail is moved to the left (into
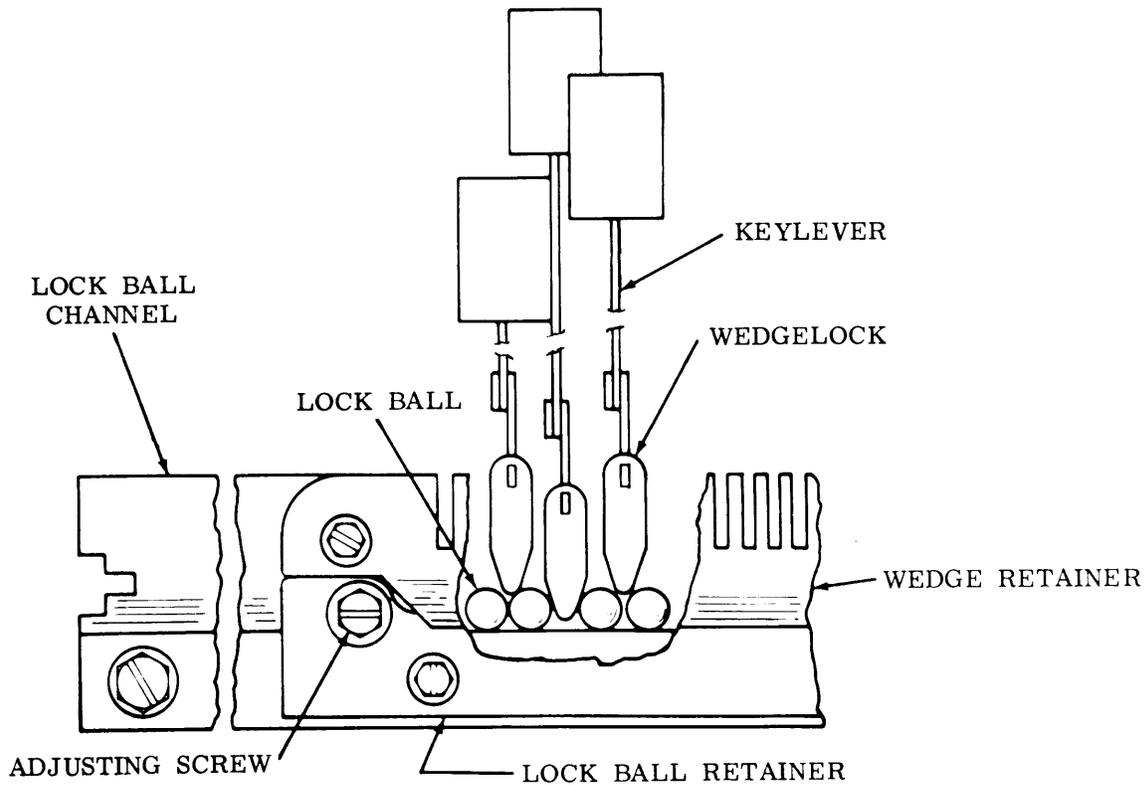

Figure 6 - Wedgelock Mechanism

reset), it engages projections on the permutation codebars, clutch tripbar, and a step on the non-repeat lever. Thus, all of these elements are moved to the left into latched reset position.

2.14 The reset eccentric is so positioned in angular relationship to the remainder of the cam that pick-up of the codebars and non-repeat lever begins at 92-1/2 degrees. At 145 degrees, the codebars have been moved to the left a sufficient distance to permit the code lever (that determined the permutation) to drop down out of the universal bail. This permits the universal bail to rotate forward and kick the nonrepeat lever down and off the reset bail. At the same time, the extension of the universal bail moves in under its latchlever and holds this latchlever up almost in the same position that the pawl on the nonrepeat lever had held it in the early reset movement. With the universal bail latch held up, the reset bail continues to move to the left. Full rest occurs at approximately 180 degrees of cam rotation. As soon as the universal bail is permitted to move forward, a second keytop can be depressed. However, from that point on, full time of cam rotation must expire before a third and successive keytops can be operated.

LOCAL CARRIAGE RETURN MECHANISM

2.15 Operation of the local carriage return keylever causes its function lever to raise the forward end of the local carriage return bail (Figure 10). The bail rotates about its pivot point until the upper end engages the carriage return lever on the typing unit. Thus, the carriage return mechanism on the local typing unit is made to operate without disturbing the other typing units on the same line circuit.

LOCAL LINE FEED MECHANISM

2.16 Operation of the local line feed keylever causes its function lever to raise the forward end of the local line feed bail (Figure 12). The bail rotates about its pivot point and the upper end pushes the trip link until the link engages the line feed clutch trip lever on the typing unit. Thus, the line feed mechanism on the local typing unit is made to operate without disturbing the other typing units on the same line circuit.
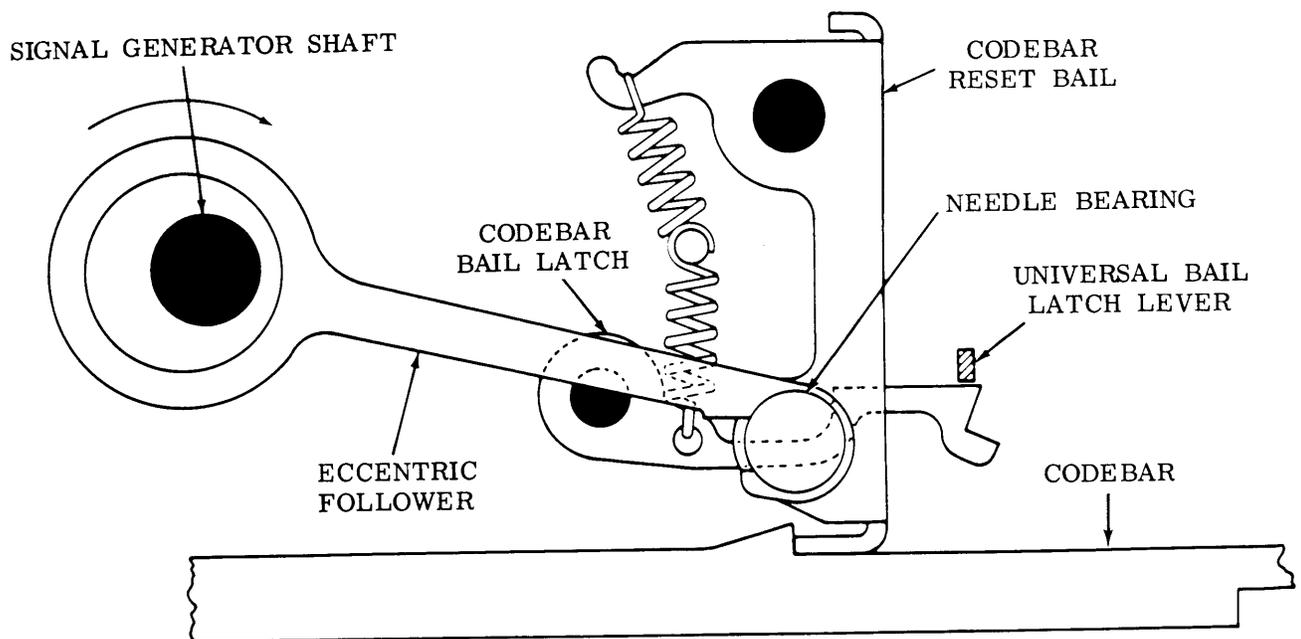

Figure 7 – Codebar Bail Mechanism

REPEAT MECHANISM

2.17 Operation of the repeat keylever simultaneously with one of the keylevers or the spacebar disables the nonrepeat mechanism and causes the character or function selected to be repeated as long as the repeat keylever is held operated. The operated repeat keylever causes its function lever to raise the right end of the nonrepeat lever (Figure 13), and rotate it about its pivot point. In this position, the nonrepeat keylever cannot be engaged and operated by the codebar bail. Therefore, the nonrepeat bell crank will not reset the operated codelever bail latchlever which then maintains both the codelever bail and the codebar bail latchlever in their operated positions until the repeat keylever is released.

MARGIN INDICATOR MECHANISM

2.18 The margin indicator cam disc on the typing unit spring drum rotates with the drum as printing or spacing occurs. As the end of each line is approached, the cam surface of the disc makes contact with the margin indicator contact lever and rotates it clockwise about its pivot point (Figure 14). When the contact lever leaves the switch plunger, the margin indicator switch operates and closes the circuit to a margin indicator light. A carriage return cycle returns the cam disc to its starting position and the margin indicator switch opens.

CONTROL KEY MECHANISM

2.19 Depression of the control key introduces the upper case of a specific key by the deletion of the number 7 pulse. This is accomplished by the control codelever blocking the number 7 codebar from falling to the right.
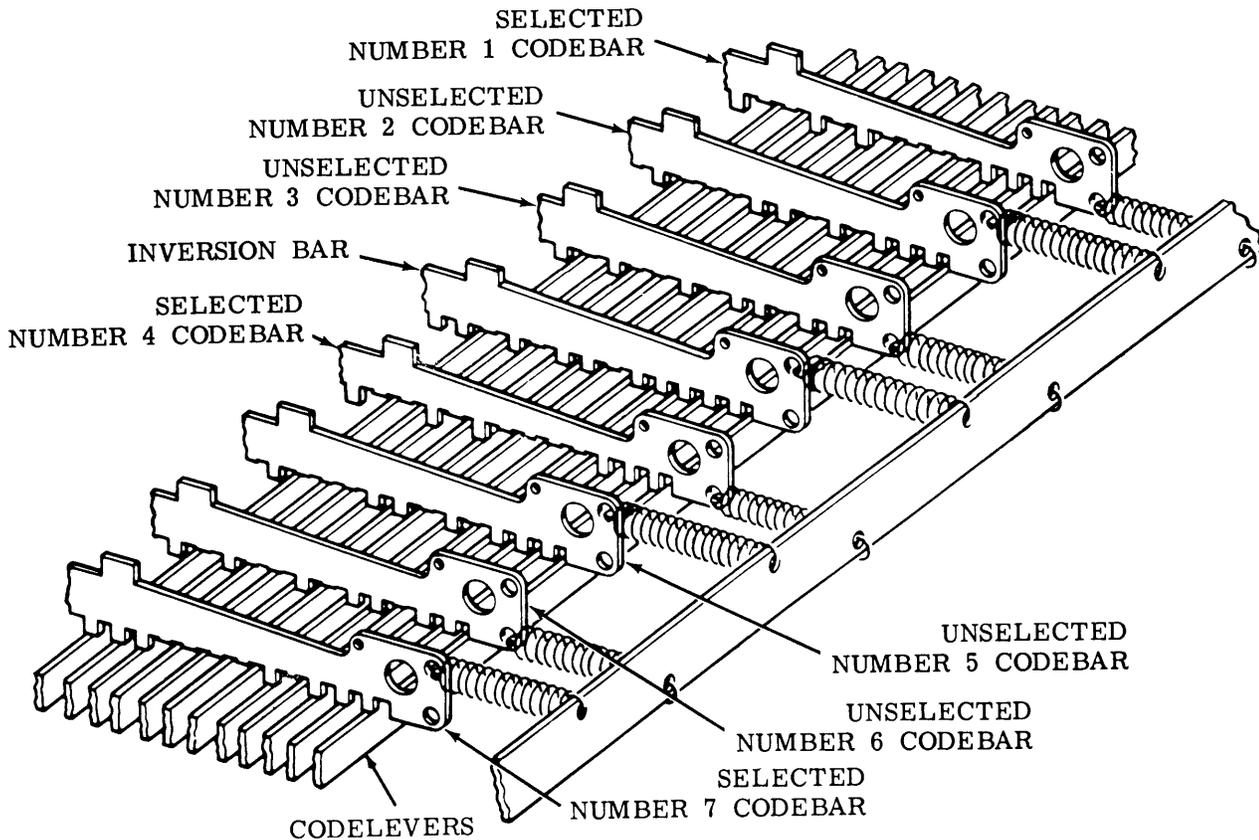

Figure 8 - Codebar Selection

CONTACT BOX
SPRING   SPACING CONTACT
(SHOWN CLOSED)

MARKING CONTACT
(SHOWN OPEN)

CONTACT TOGGLE

DRIVE LINK

ECCENTRIC

CONTACT BOX

DRIVE LINK

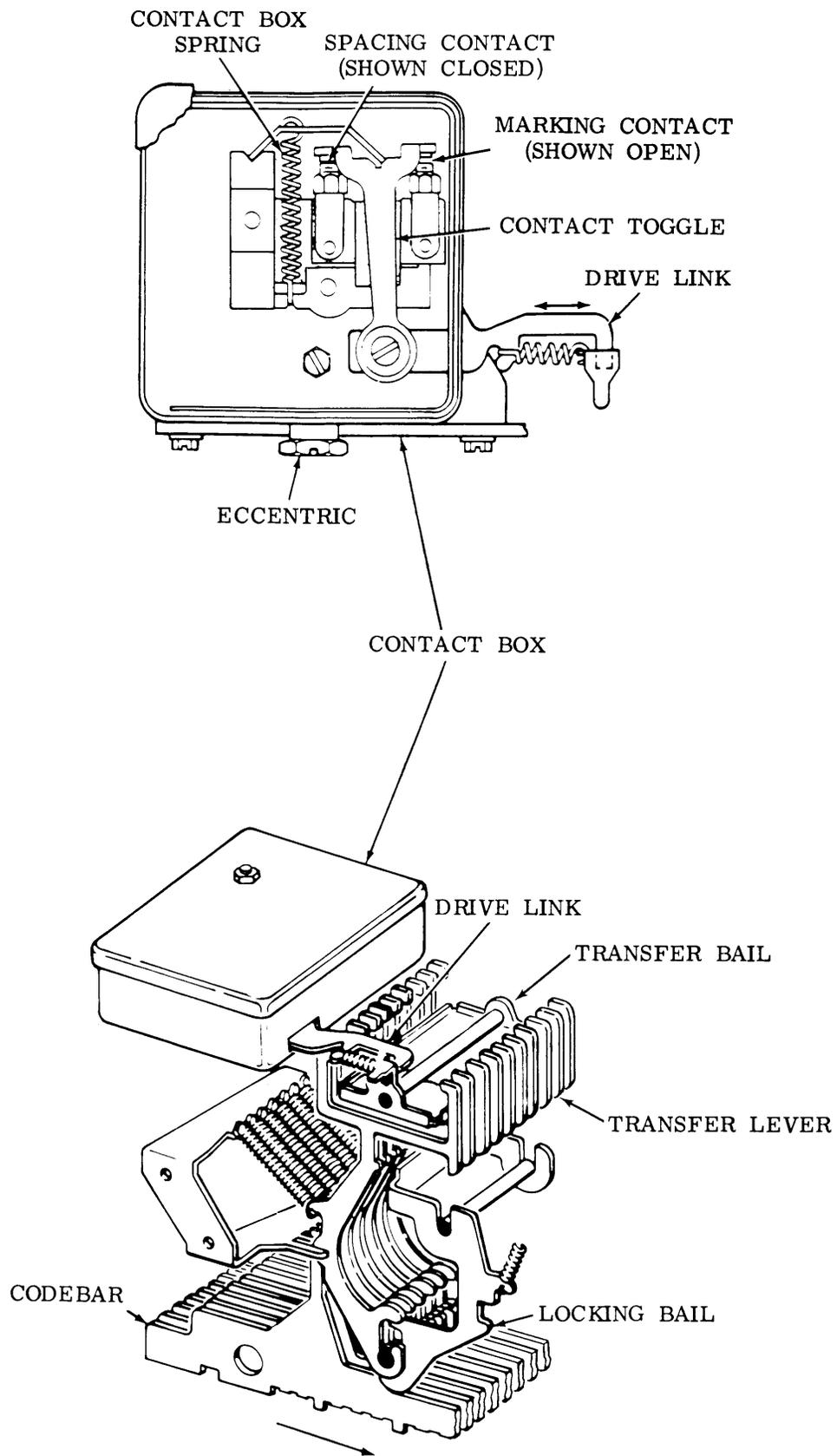TRANSFER BAIL

TRANSFER LEVER

CODEBAR

LOCKING BAIL

Figure 9 – Transfer Lever Mechanism and Contact Box Mechanism

SHIFT KEY MECHANISM

2.20 To obtain a shift bit inversion case char-
       acter, the enlarged shift key (at either
side of the keyboard) is held down while de-
pressing a complimentary key. This shift key
preconditions the keyboard for the function of
adding or deleting (as the case may be) the num-
ber 5 code bit to obtain its complimentary key
code. This is accomplished by means of a shift
codelever engaging a diagonal camming surface,
on the under side of the shift lockbar (outside
slot of the codebar guide), and directing its
motion to the left. As this motion develops, the
bail riding the upper diagonal camming surface

is raised. This permits the inversion codebar
(feed hole slot) to fall only when the compli-
mentary key is depressed. This inversion bar,
upon falling to the right, operates a transfer
lever number 5 pulse by a mechanical connec-
tion. The code transmitted is then the addition
or omission of the number 5 pulse combined
with the transfer levers selected by the com-
plimentary key.

3. RECEIVE ONLY BASE

3.01 The Receive-Only Base is a sheet metal
       structure which supports an intermediate
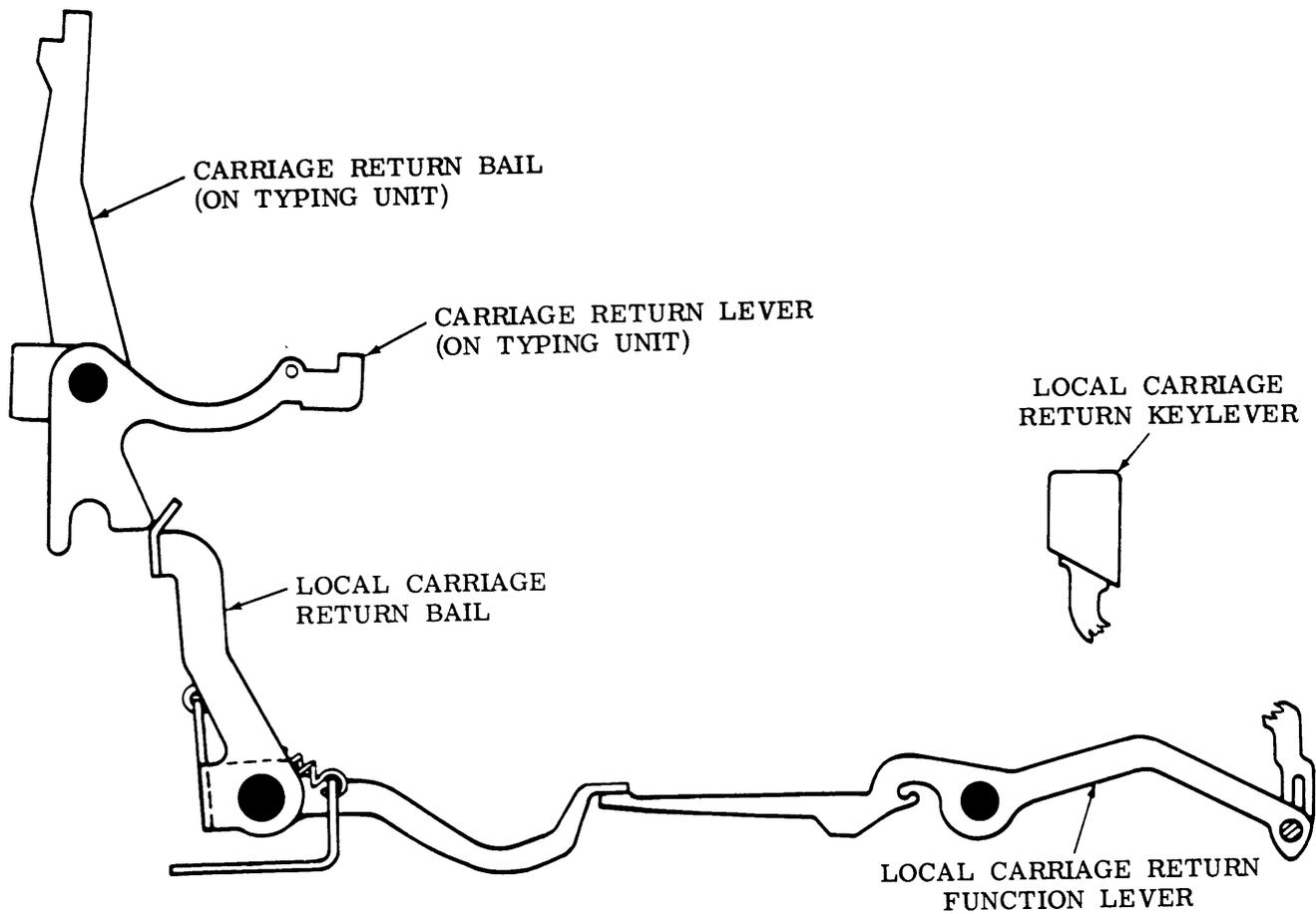shaft assembly (Paragraph 2.03) and provides

Figure 10 - Local Carriage Return Mechanism

mounting facilities for a typing unit and a motor unit. On the front of the base two offline function keylevers, local carriage return and local line feed (Paragraphs 2.15 and 2.16), are mounted. All electrical wiring is brought into the base through a receptacle mounted at the left rear of the base. A main cable interconnects the various electrical components with this receptacle. The base may or may not be equipped with an answer-back.

4. VARIABLE FEATURES

EVEN PARITY (See Figure 11)

A. General

4.01 In keyboards equipped to provide an even parity output, the eight bit of the signal code may be either marking or spacing, in order to always supply an even number of marking pulses for each code combination transmitted.

B. Shift With Even Parity

4.02 Depression of the shift key and its related mechanism inverts the number 5 and number 8 marking bits to spacing or spacing bits to marking as the case may be. This is a means of obtaining an upper case or symbol associated with a particular keytop and is accomplished by holding down the enlarged SHIFT key (at either side of the keyboard) while depressing a complimentary key. The shift codelever prevents the no. 5 codebar from falling and at the same time conditions the keyboard for the function of inverting the space-to-mark bit or the mark-to-space bit as required to obtain its complimentary key code with parity. This is accomplished by means of a shift codelever engaging a diagonal camming surface on the underside of the shift lockbar directing its motion to the left. The shift lockbar serves a dual purpose: it blocks out the selected group of keys and inhibits the complimentary keys from being actuated prematurely. As the motion to the left develops, the upper bail riding the upper diagonal camming surface on the shift lockbar, is raised. This raises the blocking tine and permits the no. 5 inversion codebar, if coded marking, to fall. At the same time a pivoted follower attached to the shift lockbar, rides up a "V" shaped camming surface on the control lockbar. This raises the blocking surface of the lower blocking bail allowing the no. 8 inversion codebar to fall, if coded marking, and blocks the no. 8 codebar. Upon falling to the right, the codebars unlatch their respective

transfer levers causing the proper permutation to be generated.

C. Control Key With Even Parity

4.03 Depression of the CTRL (control) key will cause the seventh bit to space and the eighth bit to invert. This is a means of obtaining a control function with an even parity bit. It is accomplished by holding the control key down while depressing a complimentary key. The control key operates a control lockbar, which serves the purpose of both blocking out those keys to which a control is not associated and preventing a complimentary key from being actuated prematurely, by means of its saw tooth design. The control key codelever engages a diagonal camming surface on the underside of the control lockbar directing its motion to the left, as it blocks the no. 7 codebar from falling to the right (mark position). As motion develops, the follower engages the "V" shaped camming surface of the control lockbar, and moves up, raising the lower blocking bail. The lower bail, in its upward travel, unblocks the no. 8 inversion codebar and permits it to fall to the right (if coded marking). As the codebars fall to the right they operate their respective transfer levers causing the proper permutation to be generated.

4.04 The design of the keyboard allows the depression of the shift and control keys simultaneously. Holding the shift and control key down while depressing the proper complimentary key will generate S3 through S7 and NULL. As the shift and control keys are depressed their key codelevers engage a diagonal camming surface on the underside of their respective lockbars directing them to move to the left. As the shift lockbar moves, its upper diagonal camming surface causes the upper blocking bail to rise, unblocking the no. 5 inversion codebar so that it may fall to the right if marking. The shift key codelever blocks the no. 5 codebar. As the control lockbar moves, the follower attached to the shift lockbar rides in the "V" shaped camming surface on the control lockbar. Since the total travel of the two lockbars is the same the follower will not ride up on either of the camming surfaces and the lower blocking bail remains in its normal position. This causes the no. 8 inversion codebar to remain blocked and allows the no. 8 codebar to fall to the right when marking. The codebars, upon falling to the right, permit the proper combination of marking bit 1 through 8 to be generated.

5. **TECHNICAL DATA**

A. **Signal**

Code . . . . Sequential, 11-unit
eight-level, start-stop

Operating Limits:
Voltage . . . . 3 to 260 v dc
Current . . . . 0 to 60 milliamperes

B. **Operating Speeds**

Standard Speed. . . 60, 75 or 100 words per
minute with standard
speed change gears

Intermediate Speed. . . . Available by using
special speed
change gears

Special Speed . . . . . Available by using a
governor controlled
motor in place of the
synchronous type
normally used

C. **Electrical Requirements**

5.01 Electrical contacts for certain optional
features, such as the answer-back mech-
anism, and signal regenerator circuit generally
require 110 v ac circuitry, however the specific
nature of these circuits depend on the external
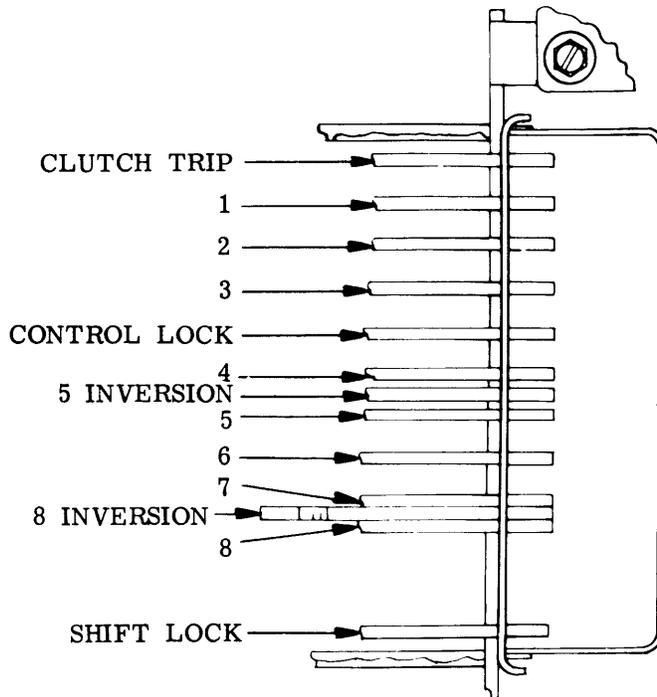controls operated by the contacts.

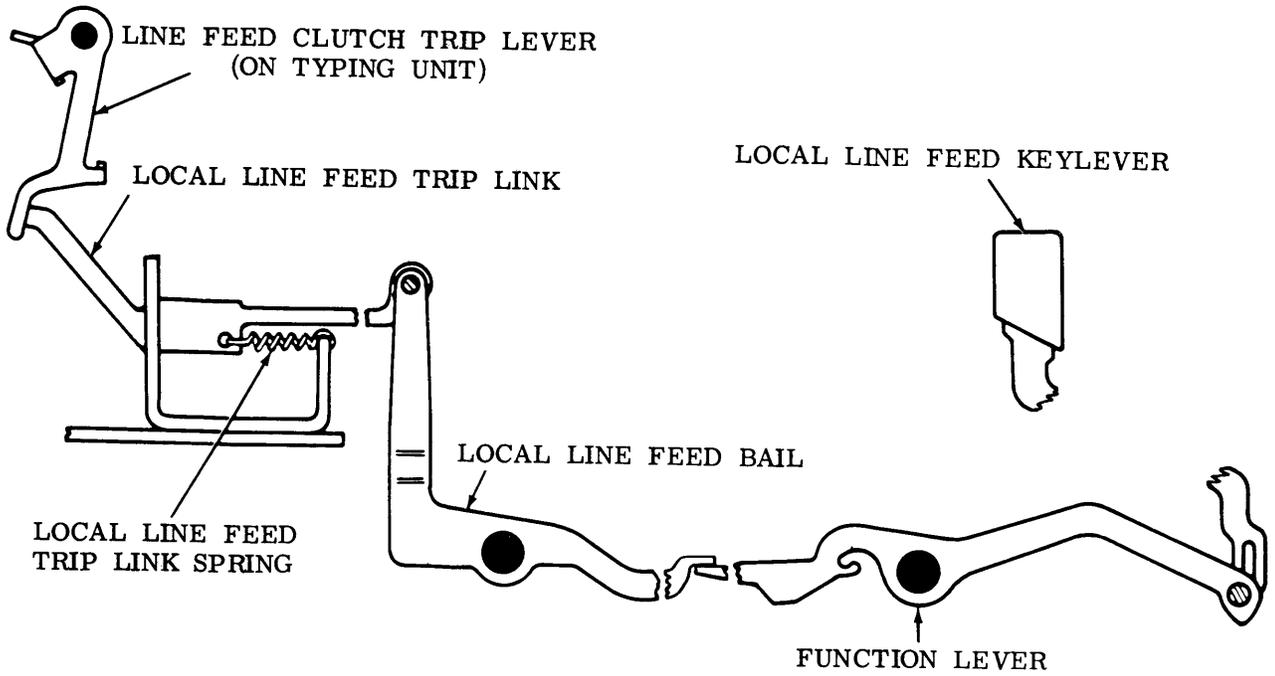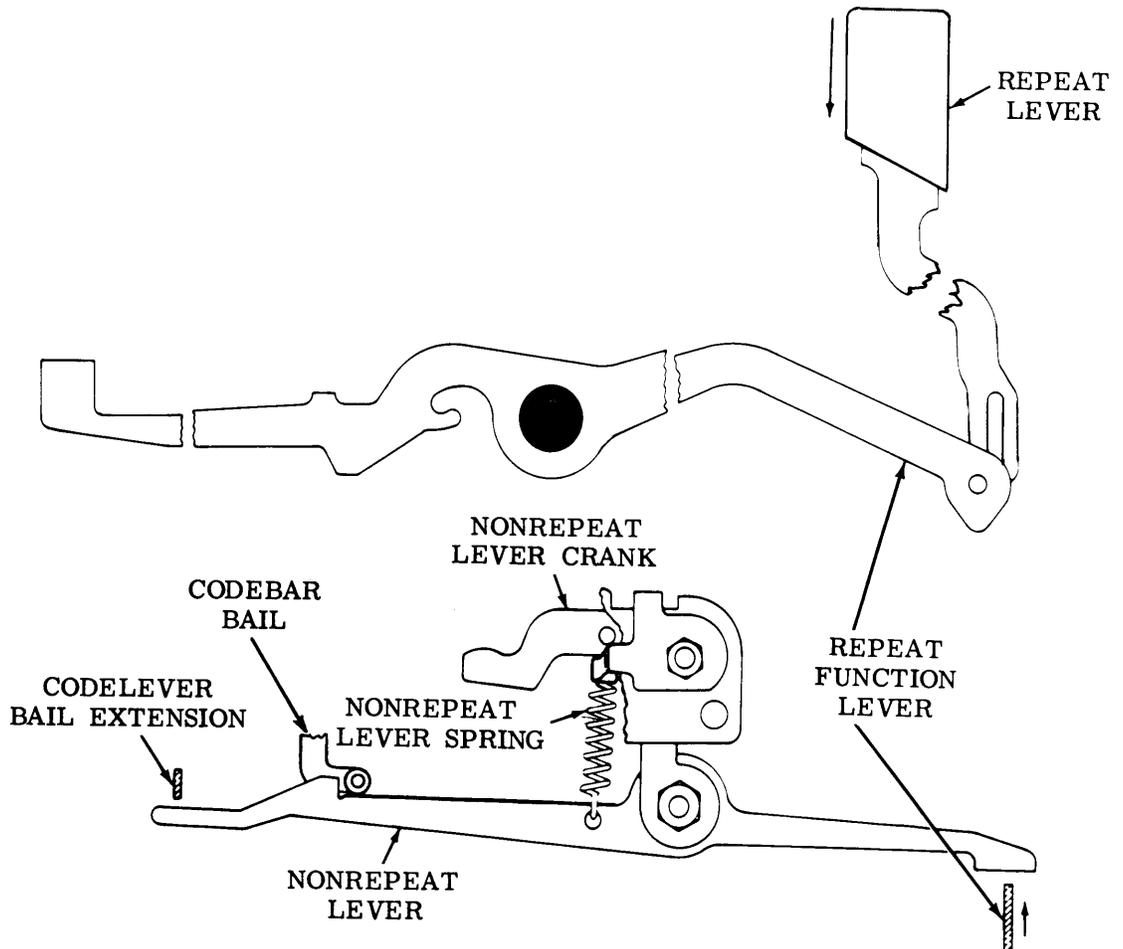Figure 11 - Codebar Arrangement With Even Parity

LINE FEED CLUTCH TRIP LEVER
(ON TYPING UNIT)

LOCAL LINE FEED TRIP LINK

LOCAL LINE FEED KEYLEVER

LOCAL LINE FEED
TRIP LINK SPRING

LOCAL LINE FEED BAIL

FUNCTION LEVER

Figure 12 - Local Line Feed Mechanism

REPEAT
LEVER

NONREPEAT
LEVER CRANK

CODEBAR
BAIL

CODELEVER
BAIL EXTENSION

NONREPEAT
LEVER SPRING

REPEAT
FUNCTION
LEVER

NONREPEAT
LEVER

Figure 13 - Repeat Mechanism

MARGIN INDICATOR
CONTACT LEVER
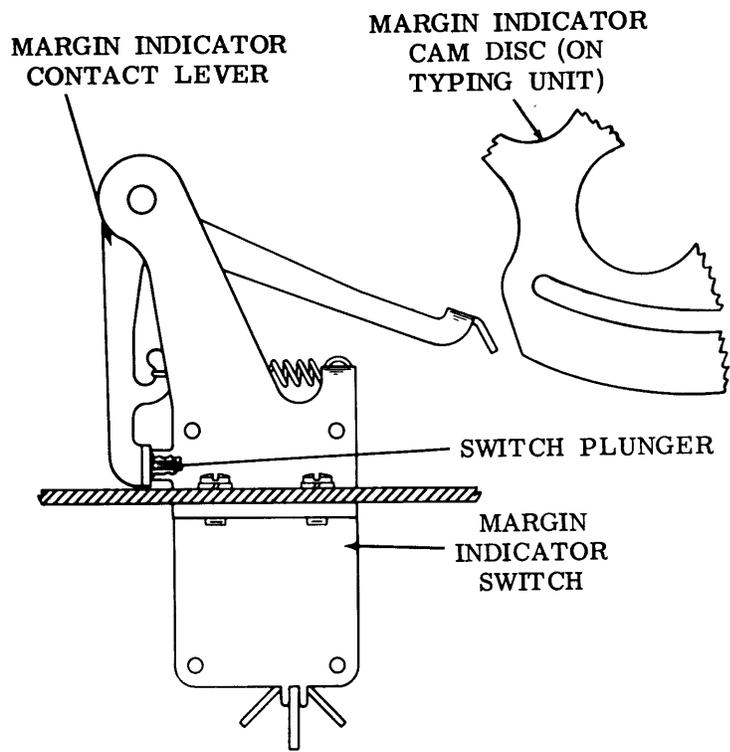
MARGIN INDICATOR
CAM DISC (ON
TYPING UNIT)

SWITCH PLUNGER

MARGIN
INDICATOR
SWITCH

Figure 14 – Margin Indicator Mechanism