

CHAPTER 4 SCHEDULED MAINTENANCE

4-1. INTRODUCTION. This chapter contains preventive maintenance and performance test procedures, for Model 28 Compact Page Printer (CPP) KSR and RO teletypewriter sets, to be accomplished on a scheduled basis. The purpose of scheduled maintenance is to anticipate and eliminate potential trouble sources in an effort to minimize interruptions to service. Recommended preventive maintenance actions are tabulated in a scheduled maintenance action index along with suggested intervals of performance and references to paragraphs containing specific instructions for performing maintenance actions. The scheduled maintenance actions in this manual are cancelled when the Planned Maintenance System (PMS) is implemented for this equipment aboard your ship or station.

4-2. SCHEDULED MAINTENANCE ACTION INDEX. Table 4-1 lists scheduled maintenance actions to be performed on CPP teletypewriter sets. The Periodicity column indicates the interval and sequence of maintenance action performance. D denotes daily, W denotes weekly, M denotes monthly, Q denotes quarterly, and R denotes as required. The Maintenance Action column briefly describes the maintenance action to be performed. The Reference column lists the paragraph describing the maintenance action in further detail.

4-3. EQUIPMENT AND MATERIALS REQUIRED. The following equipment and materials are required to accomplish preventive maintenance and

performance test procedures included in this chapter.

Clean, lint-free cloths.

Cleaning solvent:
Trichloroethane O-T-620

Lubricants: Oil, MIL-L-17672
Grease, MIL-G-23827

Test equipment and tools listed in table 1-5.

4-4. SAFETY PRECAUTIONS. The following are general safety precautions that are not related to any specific procedures and therefore do not appear elsewhere in this publication. These are recommended precautions that personnel must understand and apply during many phases of operation and maintenance.

a. Keep Away From Live Circuits. Operating personnel must at all times observe all safety regulations. Do not replace components or make adjustments inside the equipment with the primary power applied. Under certain conditions, dangerous potentials may exist when the power control is in the off position due to charges retained by capacitors. To avoid casualties, always remove power and discharge and ground a circuit before touching it.

b. Do Not Service Or Adjust Alone. Under no circumstances should any person reach into or enter the enclosure for the purpose of servicing or adjusting the equipment except in the presence of someone who is capable of rendering aid.

c. Resuscitation.

Personnel working with or near high voltage should be familiar with modern methods of resuscitation. Such information may be obtained from the Bureau of Medicine and Surgery.

4-5. PREVENTIVE MAINTENANCE PROCEDURES. The following paragraphs contain scheduled preventive maintenance procedures referenced in table 4-1.

a. Daily Inspection and Cleaning. Daily inspection and cleaning of the teletype machine is performed as follows:

CAUTION

Never increase tension on print hammer for darker print; replace the ribbon. When replacing type box, ensure that it is properly positioned and securely fastened. Ensure that ribbon is correctly installed.

(1) Inspect ribbon for wear and frayed edges; replace if required.

(2) Inspect wire rope for frayed ends, cuts, and broken strands; replace if required.

(3) Inspect type and type box for excessive wear on pallets; clean with stiff brush if smudging is evident.

(4) Inspect machine for loose, broken, or worn parts.

CAUTION

While cleaning teletype machine, ensure that springs

and adjustable parts are not disturbed.

(5) Inspect machine for dust, lint, and paper shavings.

(6) Wipe inside and outside of machine with soft, lint-free cloth.

(7) Check paper supply: ensure paper roll is correctly installed; ensure that sufficient paper is provided on roll.

b. Weekly Inspection and Cleaning. Weekly inspection and cleaning of the teletype machine is performed as follows:

NOTE

When a signal test set is not available, the orientation range can be determined while receiving the characters RY from the keyboard or a distant station.

(1) Check orientation range as follows:

(a) Set POWER switch to ON.

(b) Supply loop current and test signal.

(c) Rotate range finder knob in one direction until errors appear in copy.

(d) Retract range finder setting slowly until errors disappear. Note number of points indicated.

(e) Rotate range finder knob in opposite direction and determine points

Table 4-1. Scheduled Maintenance Action Index

Periodicity	Maintenance Action	Reference
D	Inspect and clean as necessary.	4-5a
D	Check paper supply.	4-5a (7)
D	Inspect and lubricate if necessary.	4-6, 4-7
W	Check points of range.	4-5b (1)
W	Clean selector magnet pole faces.	4-5b (2)
W	Check keyboard contact wires.	4-5b (3)
W	Check distributor code level contacts.	4-5b (4)
W	Check distributor solenoid contacts gap.	4-5b (5)
W	Lubricate.	4-6, 4-7
W	Check operation of keyboard.	2-3
M	Disassemble and inspect.	4-5c
M	Inspect main shaft.	4-5c (2)
M	Inspect function box.	4-5c (3)
M	Inspect keyboard.	4-5c (4)
M	Inspect selector mechanism.	4-5c (5)
M	Reassemble.	4-5c (6)
M	Check left margin.	4-5c (7)
M	Check right margin.	4-5c (8)
Q	Disassemble and clean in cleaning solvent.	4-5d
Q	Lubricate.	4-6, 4-7
Q	Check adjustments.	4-5d (6)
Q	Inspect selector mechanism.	4-5c (5)
Q or R	Conduct performance tests.	4-8

indicated as described in steps (c) and (d) above. Note number of points indicated.

(f) Difference between number of points indicated in steps (d) and (e) above should be 72 points (minimum).

(2) Clean selector magnet pole faces by running a clean piece of bond paper between them. Do not use teletype paper.

(3) Check keyboard contact wire clearances (use feeler gauge). With keyboard in reset condition and T-levers in marking positions, clearances between contact wires and terminals should be from 0.010 inch (minimum) to 0.025 inch (maximum). With keyboard in reset condition and T-levers in spacing condition, clearances between contact wires and terminals should be from 0.020 inch (minimum) to 0.040 inch (maximum).

(4) Check distributor code level contact gaps (use feeler gauge). Place cam follower lever on high part of cam by tripping clutch manually and rotating distributor shaft. Clearance between first six contact gaps from clutch end of shaft should be from 0.020 inch (minimum) to 0.030 inch (maximum).

(5) Check distributor solenoid contact gap. With distributor clutch in latched or stop position, solenoid contact gap should be from 0.025 inch (minimum) to 0.030 inch (maximum).

c. Monthly Inspection and Cleaning. Monthly inspection and cleaning of the

teletype machine is performed as follows:

(1) Disassemble major units from machine; remove cover, typing unit, keyboard, and motor unit from keyboard base. (Refer to disassembly procedures in paragraph 6-12a through 6-12l.)

(2) Inspect main shaft. Check all clutches and wicks, paying particular attention to evidence of wear on clutches.

(3) Inspect function box. Check alignment of function pawls and spring tensions. Check adjustment of stripper blade. Check rear of function box for bits of paper or accumulations of dirt. Clean as required.

(4) Inspect keyboard. Inspect gear shift assembly for worn or cracked teeth on gears. Check for accumulations of dirt or grease, and clean as required. Pay particular attention to evidence of loose parts from automatic typer. Check local off-line functions for proper operation.

(5) Inspect selector mechanism for missing springs.

(6) Reassemble machine. (Refer to reassembly procedures in paragraphs 6-12m through 6-12x.) Prior to reassembly, replace all worn, broken, or missing parts as required. Ensure that typing unit seats properly on keyboard base. Set gears by turning fan on rear of motor in a counterclockwise direction, as viewed from the fan end.

(7) Check left margin. With type box clutch disengaged, spacing drum in its

return position, and type box shifted to letters position, the clearance between the left edge of platen and letters print indicator should be between 15/16 inch and 1-1/6 inches.

(8) Check right margin. Observe that carriage return and line feed occur after 74th character, with a slight overprint.

d. Quarterly Inspection and Cleaning. Quarterly inspection and cleaning of the teletype machine is performed as follows:

(1) Set power switch to OFF; disconnect power cord from primary ac power source; remove loop current.

(2) Disassemble components as described in paragraph 4-c(1); remove platen, type box, and selector assembly.

CAUTION

Ensure that springs are not disengaged, or other parts disturbed in cleaning. Avoid getting dust or dirt into bearings or other moving parts. Cleaning with air hose should be avoided.

(3) Clean machine thoroughly using approved cleaning solvent and clean, soft, lint-free cloths.

(4) Relubricate machine. Refer to lubrication procedures in paragraphs 4-6 and 4-7.

(5) Reassemble machine.

(6) Check following adjustments and readjust if necessary:

(a) Left margin (Friction feed - paragraph 6-3.1h(2)) (Sprocket feed - paragraph 6-3.1c(1)) (earlier design - paragraph 6-7.1j(2)).

(b) Right margin (Friction feed - paragraph 6-3.1h(15), 3.6h(17)) (Sprocket feed - paragraph 6-3.1c(3)) (earlier design 6-7.1h(7)), (Variable feature - 6-5f(17) (earlier design variable feature - 6-9.1a(12)).

(c) Dash-pot vent screw (paragraph 6-3.1h(10)).

(d) Carriage draw-wire rope (paragraph 6-3.1h(3)).

NOTE

Adjust clutches to the high side for 100-wpm operation.

(e) All clutches.

4-6. TYPING UNIT LUBRICATION. The following paragraphs provide typing unit lubrication instructions and specify lubrication intervals (table 4-2) which depend on the amount of daily operation and the speed of operation. Lubrication methods for the typing unit are presented in lubrication charts located at the end of this chapter and indexed in table 4-3. The lubrication charts consist of photographs and line drawings. Photographs show the general area to be lubricated. Callouts on the photographs refer to line drawings indicating each specific mechanism to be lubricated and method of lubrication.

Table 4-2. Lubrication Interval
(Based on 5-Day Week)*

Daily Operation of Keyboard

Speed (wpm)	0-8 hrs	8-16 hrs	16-24 hrs
60	52 wks	39 wks	26 wks
66	52 wks	39 wks	26 wks
75	52 wks	39 wks	26 wks
100	39 wks	26 wks	13 wks
Newly Installed Equipments (All Speeds)	3 wks	2 wks	1 wk

*For a 6-day week operation, reduce lubrication intervals 15 percent.
For a 7-day week operation, reduce lubrication intervals 30 percent.

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a. References to front, rear, left, right, etc., in the lubrication charts, apply to the typing unit as viewed by the operator facing the unit.

b. Lubricate the typing unit just prior to placing it in service. After 300 to 500 operating hours, relubricate the typing unit. Recheck all clutch gaps; reset if necessary. Thereafter, use the lubrication intervals specified in table 4-2.

WARNING

Disconnect power before applying any lubricant.

c. Apply a thick film of grease to all gears and the spacing clutch trip cam plate. Apply oil to all cams, including the camming surfaces of each clutch disc. The following symbols apply to the specific lubrication instructions indicated in the line drawings.

<u>Symbol</u>	<u>Meaning</u>
O -	Apply MIL-L-17672
G -	Apply MIL-G-23827
SAT -	Saturate with MIL-L-17672 oil

d. Apply MIL-L-17672 oil wherever the use of oil is indicated. Apply MIL-G-23827 grease on all surfaces wherever indicated. Whenever clutches are disassembled, apply a thin coat of grease to the shoe lever spring loops, and oil to the internal mechanisms. Fill lubricator reservoir at indicated intervals.

e. Lubricate the typing unit thoroughly. Saturate all felt washers and oilers, and apply oil to each end of all springs. Apply oil to points where it will adhere and not run off. Avoid over-lubrication. Keep electrical contacts and wire insulations free of lubricants. In general, apply oil to all bearings, wicks, and locations where parts rub, slide, or move with respect to each other. Apply grease to gear teeth and points of heavy pressure.

4-7. KEYBOARD UNIT LUBRICATION. The following paragraphs provide keyboard unit lubrication instructions and specify lubrication intervals which depend on the amount of daily operation and the speed of operation. Lubrication methods for the keyboard unit are presented in lubrication charts located at the end of this chapter and indexed in table 4-4. The lubrication charts consist of photographs and line drawings. Photographs show the general area to be lubricated. Callouts on the photographs refer to line drawings indicating each specific mechanism to be lubricated and method of lubrication.

a. References in the lubrication charts made to left or right, top or bottom, and front or rear, apply to the mechanism in its normal operating position as viewed by the operator facing the unit.

b. All felt lubricating washers and all moving surfaces should be thoroughly lubricated. However, over-lubrication which would allow oil to drip, or grease to be thrown, on other parts should be avoided. Exercise special care to avoid

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getting oil or grease on electrical contact surfaces.

c. Lubricate the keyboard unit before putting the set into service or before placing it in storage. After a short period of service, relubricate the set to make certain that no areas have been missed. Thereafter, lubricate the mechanisms and units according to the schedule in table 4-2.

d. The following list of symbols applies to the specific lubrication instructions indicated in the line drawings.

- D Keep dry - no lubricant permitted.
- G Apply thin coat of grease.
- O Apply 1 drop of oil.
- O2 Apply 2 drops of oil.
- O3 Apply 3 drops of oil, etc.
- OS Oil sparingly (1 or 2 drops only).
- OSD Oil sparingly or leave dry. (See NOTE below.)
- OSL Oil sparingly or liberally.
- SAT Saturate with oil.

NOTE

Applies to all areas not contacted by other parts.

CAUTION

Do not allow oil or grease to obstruct the light path between lamp assemblies and

photoelectric cells in the keyboard transmitter and distributor.

e. Use MIL-L-17672 oil at all locations where the use of oil is indicated. Use MIL-G-23827 grease on all surfaces where grease is indicated.

4-8. SCHEDULED PERFORMANCE TESTS. Performance tests consist of mechanical adjustment checks, described in paragraphs 4-8b and 4-8c, and operational tests described in paragraph 4-8d.

a. Preliminary Instructions. Prior to performing mechanical adjustment checks, disassemble machine as follows:

WARNING

Disconnect power from unit. Failure to comply can cause serious injury.

(1) Remove cover:

- (a) Depress plungers on sides of dome.
- (b) Open window door by lifting from rear.
- (c) Disconnect copy light plug.
- (d) Push cover latches toward rear and lift cover.

(2) Remove typing unit:

- (a) Disconnect P103 from J103.

(b) Remove B plug by pushing clips together at bottom.

(c) Remove four screws which mount typing unit on base.

(d) With left hand under rear frame and right hand on side of front plate above dash pot, lift typing unit from base.

b. Keyboard Unit Adjustment Checks. The following paragraphs describe procedures for checking keyboard unit adjustments.

(1) Check keyboard shutter window gap as follows:

(a) Refer to figure 6-152.

(b) Depress LTRS key to move all T-levers to their lowest position.

(c) Lift first and last shutter with approximately one ounce of force.

(d) Measure clearance between upper edge of shutter window and shutter plate.

(e) Clearance should be between 0.065 inch and 0.075 inch. If clearance is not within specified limits, perform adjustment procedures described in paragraph 6-4.2a(1).

CAUTION

Exercise care to ensure no wires are broken when removing keyboard transmitter.

(2) Remove keyboard transmitter as follows:

(a) Disengage reset linkage from reset lever.

(b) Remove four mounting screws.

(c) Lift keyboard transmitter from base.

(3) Check keyboard universal link clearance as follows:

(a) Refer to figure 6-100 (low-level - figure 6-153).

(b) Push universal lever down until latched by latch lever.

(c) Measure clearance between universal link and frame.

(d) Clearance should be between 0.089 inch and 0.103 inch. If clearance is not within the specified limits, perform adjustment procedures described in paragraph 6-4.1a(1) (high level) or paragraph 6-4.2a(2) (low-level).

(4) Replace and position keyboard transmitter as follows:

(a) Position keyboard transmitter on base so that slot ends in left and right brackets are against rear mounting screws.

(b) Secure transmitter with four mounting screws.

(c) Engage reset linkage with reset lever.

(5) Check distributor clutch drum (low-level only) as follows:

(a) Refer to figure 6-155.

(b) With clutch manually disengaged and pressed against clutch drum, measure gap between ring and hub protrusion.

CAUTION

Do not distort ring while measuring gap.

(c) Gap should be between 0.005 inch and 0.010 inch. If gap is not within specified limits, perform adjustment procedure described in paragraph 6-4.2(1).

(d) Visually inspect distributor clutch drum to determine drive arm is parallel to surface of drum assembly. If they are not parallel, manually bend drive arm until they become parallel as gauged by eye.

(6) Check distributor clutch shoe lever gap as follows:

(a) Refer to figure 6-119 (low-level-figure 6-156).

(b) Disengage clutch.

(c) Measure gap between clutch shoe lever and stop lug. Record the value.

(d) Engage clutch.

(e) Repeat step (c).

(f) Subtract the value obtained in step (c) from that obtained in step (e).

(g) The measurement in step (e) should be 0.055 to 0.085 inch greater than the measurement in step (c). If the difference is not within the specified limits, perform adjustment procedure described in paragraph 6-4.1b(5) (high-level) or paragraph 6-4.2a(2) (low-level).

(7) Check distributor clutch trip lever engagement as follows:

(a) Refer to figure 6-116 (low-level-figure 6-157).

(b) Ensure that clutch trip lever engages clutch shoe lever by full thickness of clutch shoe lever.

(c) If full engagement does not exist, perform the adjustment procedure described in paragraph 6-4.1b(2) (high-level) or paragraph 6-4.2b(3) (low-level).

(8) Check distributor clutch magnet plate (low level only) as follows:

(a) Refer to figure 6-158.

(b) Disengage clutch.

(c) Set the control lever to REMOTE position.

(d) Ensure latch bail is against armature.

(e) Measure gap between latch bail and trip lever.

(f) Gap should be between 0.020 inch and 0.040 inch. If gap is not within specified limits, perform adjustment procedure described in paragraph 6-4.2b(4).

(g) Set control lever to LOCAL position.

(9) Check distributor gear backlash as follows:

(a) Refer to figure 6-136 (low-level - figure 6-150).

(b) Hold pinion gear stationary.

(c) Rotate driven gear back and forth while observing amount of backlash between pinion gear and driven gear at point in travel where clearance is minimum. As gauged by eye and feel, backlash should be barely perceptible (0.002 to 0.005).

(d) If backlash adjustment is necessary, perform procedure described in paragraph 6-4.1c(5) (low-level - paragraph 6-4.2c(5)).

(10) Check distributor reset lever clearances (low-level only) as follows:

(a) Refer to figure 6-160.

(b) Engage distributor clutch and rotate until reset lever is at lowest point.

(c) Measure clearance between latchlever and reset lever, and between the base and the distributor and keyboard links.
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(c) Clearance between latchlever and reset lever should not be less than 0.030 inch nor more than 0.045 inch. Clearance between the base and the distributor and keyboard links should not be less than 0.050 inch nor more than 0.090 inch. If either clearance exceeds specified limits, perform adjustment procedure described in paragraph 6-4.2b(6).

(11) Check distributor latch bail clearance (low-level only) as follows:

(a) Refer to figure 6-161.

(b) Disengage clutch.

(c) Ensure keyboard is reset.

(d) Set control lever to REMOTE position.

(e) Insert a 0.025-inch gauge between bottom of armature and latch bail.

(f) Measure clearance between front of tab on armature and rear of tab on latch bail.

(g) Clearance should be between 0.010 inch and 0.018 inch. If clearance is not within specified limits, perform adjustment procedure described in paragraph 6-4.2b(7).

(h) Return control lever to LOCAL position.

(12) Check distributor clutch trip armature aire gap as follows:

(a) Refer to figure 6-115.

(b) Hold armature flush against magnet core.

(c) Measure clearance between armature and magnet assembly bracket.

(d) Clearance should be between 0.004 inch and 0.008 inch. If clearance is not within specified limits, perform adjustment procedure described in paragraph 6-4.1b(1).

(13) Check keyboard contact wire clearances as follows:

(a) Refer to figure 6-101.

(b) Place keyboard in reset condition.

(c) Set T-levers in marking position.

(d) Using feeler gauge, check clearance between contact wires and terminal is from 0.010 inch (minimum) to 0.025 inch maximum.

(e) Set T-levers in spacing condition.

(f) Check clearance between contact wires and terminal is from 0.020 inch (minimum) to 0.040 inch (maximum). If not, perform adjustment procedure described in paragraph 6-4.1a(2).

(14) Check distributor code level contacts as follows:

(a) Refer to figure 6-123.

(b) Place cam follower lever on high part of cam by tripping clutch manually and rotating distributor shaft.

(c) Using feeler gauge, check first six contact gaps from clutch end of shaft. Gaps should be from 0.020 inch (minimum) to 0.030 inch (maximum). If not, perform adjustment procedure described in paragraph 6-4.1b(9).

(15) Check distributor solenoid contact gap as follows:

(a) Refer to figure 6-125.

(b) Place distributor clutch in latched or stop position.

(c) Using feeler gauge, check solenoid contact gap is from 0.025 inch (minimum) to 0.030 inch (maximum). If not, perform adjustment procedure described in paragraph 6-4.1b(11).

c. Typing Unit Mechanical Adjustment Checks.
The following paragraphs describe procedures for checking typing unit adjustments.

(1) Check range finder knob phasing as follows:

(a) Refer to figure 6-71.

(b) Rotate range finder knob either clockwise or counterclockwise to the stop.

(c) Zero on range scale should be within three points of index mark. If zero is more than three points away from index, perform adjustment procedure described in paragraph 6-3.1g(6).

(d) Rotate knob to set 60 on range scale at index.

(2) Check selector clutch stop arm as follows:

(a) Refer to figure 6-71.

(b) Set range scale at 60.

(c) With selector clutch disengaged and armature in marking position, clutch stop arm should engage clutch shoe lever by approximately the full thickness of shoe lever. If not, perform adjustment procedure described in paragraph 6-3.1g(7).

(3) Check selector clutch drum end play as follows:

(a) Refer to figure 6-80.

(b) With clutch latched in stop position, measure cam-clutch assembly end play.

(c) Cam-clutch assembly should have some end play, but not to exceed 0.010 inch. If end play adjustment is necessary, perform procedure described paragraph 6-3.1g(17).

(4) Check code bar clutch trip lever end play as follows:

(a) Refer to figure 6-34.

(b) Disengage selector clutch and code bar clutch.

(c) Code bar clutch trip lever should engage clutch shoe lever by full thickness of clutch shoe lever, and trip shaft should have some end play, but not to exceed 0.006 inch.

(d) If either engagement or end play adjustment is necessary, perform procedure described in paragraph 6-3.1d(5).

(5) Check function clutch trip lever end play as follows:

(a) Refer to figure 6-41.

(b) Disengage code bar clutch and function clutch.

(c) Function clutch trip lever should engage clutch shoe lever by full thickness of clutch shoe lever. (Check at lug with least bite on three stop clutches). Trip lever shaft should have some end play, but not to exceed 0.006 inch.

(d) If either engagement or end play adjustment is necessary, perform procedure described in paragraph 6-3.1d(13).

(6) Check clutch trip shaft set collars as follows:

(a) Refer to figure 6-39 (earlier design - figure 6-239).

(b) Measure spacing cutout lever end play.

(c) Lever should have some end play, not to exceed 0.008 inch.

(d) Measure line feed clutch latch lever side play.

(e) Lever should have some side play, not to exceed 0.008 inch.

(f) If side play adjustment is required, perform procedure described in paragraph 6-3.1d(11) (earlier design - paragraph 6-7.1d(2)).

(7) Check type box clutch trip lever eccentric post as follows:

(a) Refer to figure 6-42.

(b) Disengage type box clutch.

(c) Ensure that trip lever engages clutch shoe lever by full thickness of shoe lever.

(d) If full engagement does not exist, perform adjustment procedure described in paragraph 6-3.1d(14).

(8) Check spacing clutch trip lever as follows:

(a) Refer to figure 6-38 (earlier design - figure 6-241).

(b) Disengage clutch.

(c) Trip clutch trip lever and rotate main shaft until trip lever is over shoe lever. Take up play of shoe lever inward by snapping trip lever over shoe lever.

(d) Check clearance between shoe lever and drum at each of three stop positions to determine which stop yields greatest clearance.

(e) With trip lever at stop position which yields greatest clearance, rotate main shaft slowly until trip lever just falls off stop lug. Check clearance between

trip lever and drum. Clearance should be from 0.018 to 0.035 inch less than clearance between shoe lever and drum.

(f) If clearance adjustment is necessary, perform procedure described in paragraph 6-3.1d(10) (earlier design - paragraph 6-7.1d(4)).

(9) Check line feed clutch trip lever eccentric post as follows:

(a) Refer to figure 6-43.

(b) Disengage clutch.

(c) Trip clutch trip lever and rotate main shaft until trip lever is over shoe lever. Take up play of shoe lever inward by snapping trip lever over shoe lever.

(d) Check clearance between shoe lever and drum of each of three stop positions to determine which stop yields greatest clearance.

(e) With trip lever at stop position which yields greatest clearance, rotate main shaft slowly until trip lever just falls off stop lug. Check clearance between trip lever and drum. Clearance should be from 0.018 to 0.035 inch less than clearance between shoe lever and drum.

(f) If clearance adjustment is necessary, perform procedure described in paragraph 6-3.1d(15).

(10) Check line feed clutch trip lever adjusting screw as follows:

(a) Refer to figure 6-43.

(b) Set line feed function slide arm in rear position and clutch trip lever against its eccentric post.

(c) Hold trip arm against the function slide arm and measure clearance between end of trip lever adjusting screw and trip arm. Clearance should not exceed 0.006 inch.

(d) If clearance adjustment is necessary, perform procedure described in paragraph 6-3.1d(16).

(11) Check line feed spur gear detent eccentric as follows:

(a) Refer to figure 6-20.

(b) Disengage line feed clutch.

(c) Rotate platen until detent stud is seated between two teeth on line feed spur gear.

(d) When hand wheel is released, manually set the teeth on the feed bars into engagement with the teeth on the line feed spur gear.

(e) The detent stud should contact one gear tooth and be not more than 0.010 inch from other tooth. If adjustment is necessary, perform procedure described in paragraph 6-3.1c(6).

(12) Check line feed clutch phasing as follows:

(a) Refer to figure 6-21.

(b) Disengage line feed clutch.

(c) Both line feed bars should engage teeth of line feed spur gear and be flush with each other.

(d) If adjustment is necessary, perform procedure described in paragraph 6-3.1c(8).

(13) Check spacing gear clearance as follows:

(a) Refer to figure 6-94.

(b) With carriage fully returned, hold spacing driving gear stationary and gently rotate driven gear back and forth.

(c) Ensure backlash between gears is barely perceptible, without bind, at closest point in travel. If backlash adjustment is necessary, perform procedure described in paragraph 6-3.1h(18).

(14) Check spacing gear phasing as follows:

(a) Refer to figure 6-94.

(b) Engage spacing clutch.

(c) Observe index line on spacing pawl is midway between the two lines on pawl retaining washer. If adjustment is necessary, perform procedure in paragraph 6-3.1j(18).

(15) Check rocker shaft bracket eccentric stud as follows:

(a) Refer to figure 6-45.

(b) Disengage type box clutch and take up play toward front.

(c) Measure gap between lower side of lock lever roller and top edge of shoulder on horizontal positioning lock lever. Gap should be between 0.055 inch and 0.090 inch. If not, perform adjustment procedure described in paragraph 6-3.1e(3).

(16) Check clutch shoe levers as follows:

(a) Refer to figure 6-35.

(b) Disengage clutch and measure gap between clutch shoe lever and its stop lug. Record measurement.

(c) Engage and rotate clutch until clutch shoe lever is towards bottom of unit.

(d) With clutch engaged, again measure gap between clutch shoe lever and its stop lug. Measurement should be 0.055 inch to 0.085 inch greater than measurement obtained in step (b) above. If adjustment is necessary, perform procedure described in paragraph 6-3.1d(7).

(e) Repeat steps (a) through (d) for each clutch.

(17) Check code bar shift lever drive arm as follows:

(a) Refer to figure 6-5 (earlier design - figure 6-229).

(b) Engage and rotate code bar clutch until

code bar shift lever link is in uppermost position.

(c) There should be some clearance, but not to exceed 0.025 inch, between top of code bar shift lever link roller and top of cam slots in top of code bar shift levers. If adjustment is necessary, perform procedure described in paragraph 6-4q.

(d) Code bar shift lever link shaft should have some end play but not to exceed 0.006 inch. If adjustment is necessary, perform procedure described in paragraph 6-3.1a(5), earlier design - paragraph 6-7.1a(1).

(18) Check transfer lever eccentric as follows:

(a) Refer to figure 6-7.

(b) Set up a letters (12345) code combination.

(c) Disengage selector clutch.

(d) Engage and rotate code bar clutch until code bar shift lever link is in uppermost position.

(e) With play of shift bar taken up for maximum clearance, measure clearance between rear code bar shift lever and code bar shift bar farthest from shift lever.

(f) Clearance should be 0.010 to 0.025. If not, perform adjustment procedure described in paragraph 6-3.1a(8).

(19) Check intermediate arm back stop bracket as follows:

figure 6-8. (a) Refer to

(b) Set up a blank (-----) code combination.

(c) Disengage selector and code bar clutches.

(d) Take up play to obtain maximum clearance between front code bar shift lever and inner step of code bar shift bar farthest from shift lever, then measure clearance.

(e) Clearance should be from 0.010 inch to 0.025 inch. If not, perform adjustment procedure described in paragraph 6-3.1a(9).

(20) Check code bar shift lever link brackets as follows:

(a) Refer to figure 6-4 (earlier design link guide bracket - figure 6-230).

(b) Set up a letters (12345) code combination.

(c) Engage and rotate code bar clutch until code bar shift lever link is in uppermost position.

(d) Ensure code bars are detented.

(e) With play taken up for maximum clearance, measure clearance between right side of front code bar shift lever and shoulder of closest code bar shift bar. Clearance should be between 0.002 inch and 0.025 inch.

(f) Set up a blank (-----) code combination.

(g) Repeat steps (c) and (d).

(h) With play taken up for maximum clearance, measure clearance between left side of rear code bar shift lever and shoulder of closest code bar shift bar. Clearance should be between 0.002 inch and 0.025 inch.

(i) If clearance in either step (e) or (h) above is not within specified limits, perform adjustment procedure described in paragraph 6-3.1a(4) (earlier design link guide bracket - paragraph 6-7.1a(2)).

(21) Check type box clutch trip lever as follows:

(a) Refer to figure 6-36 (variable feature - figure 6-170).

(b) Engage and rotate code bar clutch until trip shaft cam follower roller is on lowest surface of code bar clutch cam.

(c) Align type box clutch disc stop lug with trip lever.

(d) Measure clearance between trip lever and stop lug. Clearance should be from 0.025 inch to 0.045 inch.

(e) Measure type box clutch latchlever side play. There should be some side play but it should not exceed 0.008 inch.

(f) If clearance measured in step (d) or side play measured in step (e) exceed specified limits, perform adjustment procedure described in paragraph 6-3.1d(8) (variable features - paragraphs 6-5c(4), 6-5m(3)).

(22) Check carriage draw-wire rope as follows:

(a) Refer to figure 6-85.

(b) Engage and rotate type box clutch 180 degrees.

(c) As gauged by feel, rear upper cable should have slightly greater tension than front cable.

(d) Measure clearance between lower draw-wire rope and carriage return latch bail post. Clearance should be 0.006 inch minimum.

(e) Measure clearance between lower draw-wire rope and left horizontal positioning drive linkage. Clearance should be 0.030 inch minimum.

(f) If either clearance is insufficient, perform adjustment procedure described in paragraph 6-3.1h(3).

(23) Check oscillating rail slide position as follows:

(a) Refer to figure 6-91 (earlier design - figure 6-257).

(b) Move type box carriage to right until feed pawl farthest advanced engages tooth immediately above cut-away section on spacing drum ratchet.

(c) Measure clearance between oscillating rail slide and right rear draw-wire pulley at point on pulley where clearance is minimal.

(d) Clearance should be between 0.025 inch and 0.050 inch. If clearance is not within the specified limits, perform adjustment procedure described in paragraph 6-3.1h(13) (earlier design - paragraph 6-7.1h(9)).

(24) Check printing carriage lower roller as follows:

(a) Refer to figure 6-58.

(b) Move printing carriage to right.

(c) Operate manual carriage return while holding printing carriage to right. Allow carriage to slowly return.

(d) Observe play of carriage on track is minimal over full length of track.

(e) If adjustment of eccentric bushing or sliding screw is necessary, perform procedure described in paragraph 6-3.1f(4).

(25) Check printing carriage position as follows:

(a) Refer to figure 6-60.

(b) Set up M (--345) code combination.

(c) Position printing carriage at approximate midpoint of platen.

(d) Engage and rotate type box clutch 180 degrees.

(e) From top view, as gauged by eye, ensure that M type pallet is centered

on printing hammer when hammer is touching pallet.

(f) If adjustment is necessary, perform procedure described in paragraph 6-3.1f(6).

(26) Check printing hammer bearing stud as follows:

(a) Refer to figure 6-61.

(b) Set up a period (--345) code combination in upper case.

(c) Position printing carriage at approximate midpoint of platen.

(d) Engage and rotate type box clutch 180 degrees.

(e) From right view, as gauged by eye, ensure that period type pallet fully engages printing hammer when hammer is touching pallet.

(f) If adjustment is necessary, perform procedure described in paragraph 6-3.1f(7).

(27) Check spacing trip lever bail cam plate as follows:

(a) Refer to figure 6-96.

(b) With spacing trip lever arm in upward position, engage and rotate type box clutch 180 degrees.

(c) Disengage all function pawls from function bars.

(d) Measure clearance between top surface of

trip lever arm extension and spacing trip lever shoulder.

(e) Clearance should be between 0.010 inch and 0.040 inch. If clearance exceeds specified limits, perform adjustment procedure described in paragraph 6-3.1h(21).

(28) Check printing track as follows:

(a) Refer to figure 6-62.

(b) Set up blank (-----) code combination in figures.

(c) Position printing arm slide alternately over each printing track mounting screw.

(d) Position printing hammer operating bail latching extension in line with left face of latch shoulder.

(e) Measure clearance between latching extension and latch shoulder.

(f) Clearance should be between 0.015 inch and 0.040 inch. If clearance exceeds specified limits, perform adjustment procedure described in paragraph 6-3.1f(12). Hold clearance to maximum.

NOTE

Cycle unit between each check.

(29) Check printing hammer stop bracket as follows:

(a) Refer to figure 6-57 (earlier design - figure 6-246).

(b) Set up M
(--345) code combination.

(c) Engage and
rotate type box clutch
180 degrees.

(d) Hold
printing hammer stop bracket
towards type pallet with
eight ounces of force.

(e) Measure
clearance between printing
hammer and M type pallet across
entire length of pallet.

(f) Clearance
should be between 0.005 inch and
0.035 inch. If clearance is not
within specified limits, perform
adjustment procedure described
in paragraph 6-3.1f(2) (earlier
design - paragraph 6-7.1f(2)).

(30) Check printing
arm as follows:

(a) Refer to
figure 6-57 (earlier design -
figure 6-246).

(b) Position
printing track in its extreme
downward position.

(c) Set
printing hammer operating bail
against its stop.

(d) Take up
play for maximum by lightly
pressing down on printing arm
slide and measure clearance
between secondary printing arm
and forward extension of
printing hammer operating bail.

(e) There
should be some clearance, not to
exceed 0.015 inch.

(f) Position
printing track in its extreme
upward position.

(g) Disengage
type box clutch.

(h) Measure
clearance between right face of
operating bail latching exten-
sion and left face of latch sur-
face. Check right and left
positions.

(i) Clearance
should be 0.006 inch minimum.

(j) If clear-
ance measured in steps (d) or
(i) is not within specified
limits, perform adjustment
procedure described in figure
6-3.1f(1) (earlier design -
paragraph 6-7.1f(3)).

(31) Check function
reset bail blade as follows:

(a) Refer to
figure 6-12 (earlier design -
figure 6-234).

(b) Engage and
rotate code bar clutch until
shoe lever just touches trip
lever.

(c) Disengage
all function pawls from function
bars.

(d) Unlatch all
function lever latches from
function levers.

(e) Using
spring puller, pull each func-
tion bar to rear and measure
clearance between each function
bar and function reset bail
blade.

(f) Clearance
should be between 0.018 inch and
0.035 inch. If clearance is not
within specified limits, perform
adjustment procedure described
in paragraph 6-3.1b(6) (earlier
design - paragraph 6-7.1b(4)).

(32) Check carriage return latch bail as follows:

- (a) Refer to figure 6-86.
- (b) Manually return carriage.
- (c) Take up play in carriage return bail to right by holding right side against retainer.
- (d) Measure clearance between carriage return lever and carriage return latch bail.
- (e) Clearance should be between 0.004 inch and 0.040 inch. If clearance is not within specified limits, perform adjustment procedure described in paragraph 6-3.1h(5).

(33) Check carriage return lever as follows:

- (a) Refer to figure 6-87.
- (b) Set up carriage return (---4-) code combination.
- (c) Engage and rotate function clutch until stop lug is toward bottom of unit.
- (d) Rotate spacing drum clockwise until carriage return latch bail over-travels carriage return lever.
- (e) Measure clearance between latching surface of carriage return latch bail and top of carriage return lever.
- (f) Clearance should be between 0.006 inch and 0.035 inch. If clearance is not within specified limits, perform

adjustment procedure described in paragraph 6-3.1h(7) (variable feature - paragraph 6-5b(1)).

(34) Check left margin as follows:

- (a) Refer to figure 6-18 (sprocket feed) or 6-84 (line feed). (For earlier design line feed, refer to figure 6-252.)
- (b) Manually return carriage.
- (c) Shift type box to letters condition.
- (d) Ensure front feed pawl is farthest advanced.
- (e) Measure clearance between left edge of platen and letters print indicator.
- (f) Clearance should be between 15/16 inch and 1-1/16 inch. If clearance is not within the specified limits, perform adjustment procedure described in paragraph 6-4am, steps (1) through (7).
- (g) Take up play in spacing shaft by rotating driven gear clockwise from a front view.
- (h) Measure clearance between feed pawl and shoulder of ratchet tooth immediately above pawl. There should be some clearance, not to exceed 0.008 inch.
- (i) Engage and rotate spacing clutch until rear feed pawl is farthest advanced and clutch is disengaged.
- (j) Manually return carriage.

(k) Observe rear feed pawl drops into indentation between ratchet wheel teeth, and bottoms firmly in notch. If adjustment is necessary, perform procedure described in paragraph 6-3.1c(1) (sprocket feed) or 6-3.1h(2) (line feed). (For earlier design line feed, refer to paragraph 6-7.1h(2)).

(35) Check shift linkage as follows:

(a) Refer to figure 6-54.

(b) Position carriage near midpoint at platen.

(c) Set up 0 (not zero) (---45) code combination.

(d) Engage and rotate type box clutch 180 degrees.

(e) Note position of printing hammer in relation to 0 (not zero) type pallet when hammer is pushed in to touch pallet.

(f) Manually buckle right shift linkage.

(g) Position of printing hammer in relation to 9 type pallet should be same as it was in relation to 0 (not zero) type pallet in step (e).

(h) Repeat steps (b) through (g) using W and 2 type pallets and (12--5) code combination.

(i) If adjustment is necessary, perform procedure described in paragraph 6-3.h(5).

(36) Check stripper blade drive cam position as follows:

(a) Refer to figure 6-15.

(b) Note amount of over-travel between upper peak of stripper blade drive cam and stripper blade drive arm.

(c) Engage and rotate function clutch 180 degrees.

(d) Note amount of over-travel between lower peak of stripper blade drive cam and stripper blade drive arm.

(e) Amount of over-travel in steps (b) and (d) should be equal as gauged by eye. If adjustment is necessary perform procedure described in paragraph 6-3.1b(9).

d. Operational Tests. Operational tests for high-level CPP equipment are discussed below in paragraph 4-8d(1) and for low-level CPP equipment in paragraph 4-8d(2).

(1) Operational Tests (High-Level). Figure 4-1 shows test setup required to perform high-level CPP test procedures described in table 4-5. If abnormal indications are encountered during a test, refer to Troubleshooting Index, table 5-1, in Chapter 5. Prior to conducting the tests, perform the following initial control setting on the AN-UGM8B(V) and TS-2616/UGM test sets shown in figure 4-1.

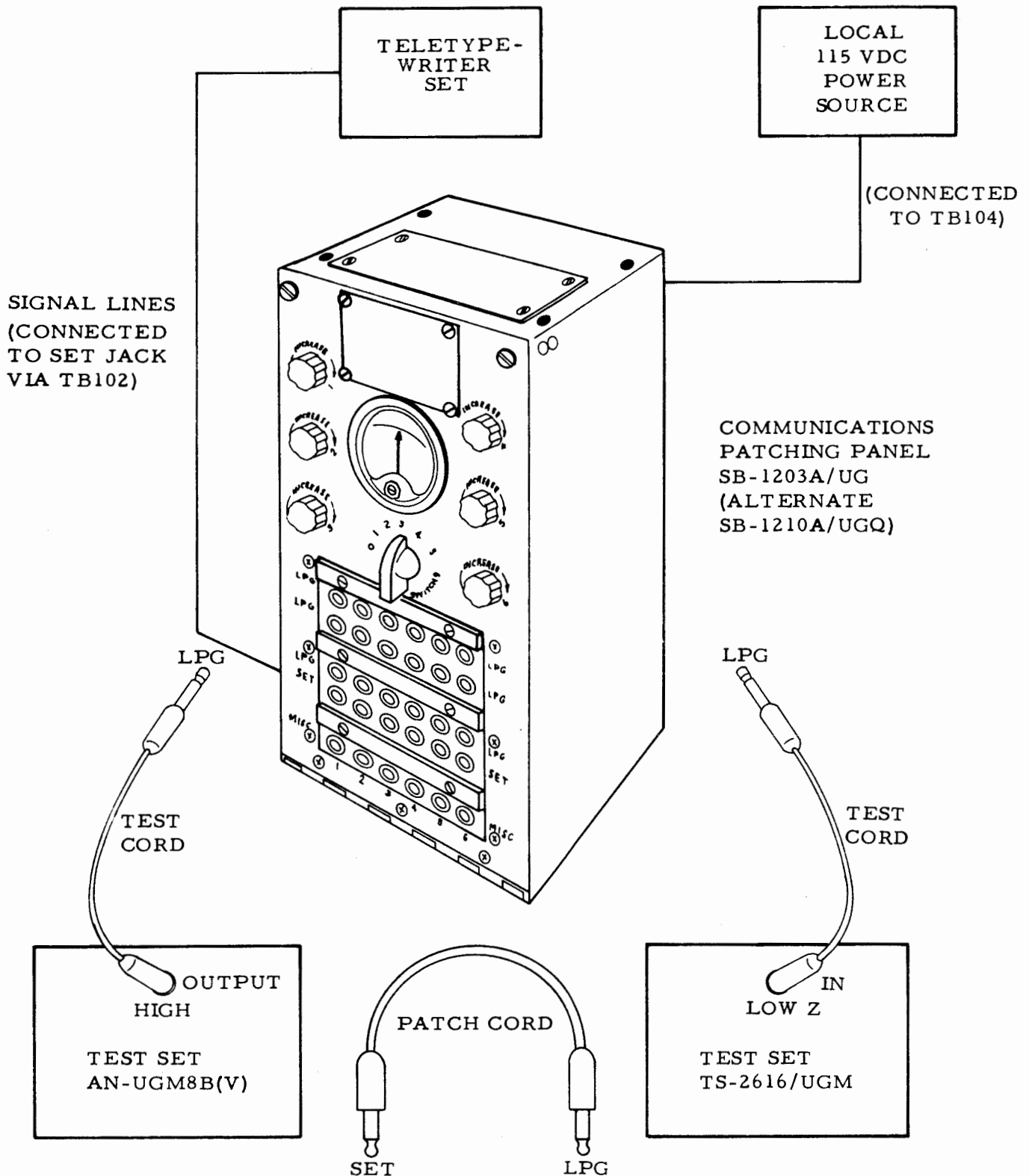


Figure 4-1. CPP Test Setup (High-Level)

Table 4-5. Operational Test Procedures (High-Level)

Step	Action	Normal Indication	Reference Table 5-1
<p>1.</p> <p>a.</p> <p>b.</p> <p>c.</p> <p>d.</p> <p>e.</p> <p>f.</p> <p>g.</p>	<p><u>Preliminary</u></p> <p>Ensure test set controls are set as indicated in paragraph 4-8d (1).</p> <p>Ensure power switch on CPP is set to OFF.</p> <p>Refer to figure 4-1.</p> <p>Ensure CPP and local 115 VDC power source are correctly connected to patching panel (See NAVSHIPS 0967-874-1010, formerly NAVSHIPS 95718.)</p> <p>Plug test cords into OUTPUT HIGH jack on AN/UGM-8B(V) and IN LOW Z jack on TS-2616/UGM.</p> <p>Plug test set power cords into 115-VAC power outlets.</p> <p>Plug test cord from AN/UGM-8B(V) into LPG jack (top row) in same channel as SET jack for CPP is located.</p>		

Table 4-5. Operational Test Procedures (High-Level) - Continued

Step	Action	Normal Indication	Reference Table 5-1
h.	On patching panel, set current meter SWITCH to CPP channel. Rotate current ADJUSTMENT control fully counterclockwise.		
2.	<u>Typing Unit Range Check.</u>		
a.	Set POWER ON/OFF switch on AN/UGM-8B(V) to ON.		
b.	Set power switch on CPP to ON.		
c.	On patching panel, rotate channel current ADJUSTMENT control for reading of 60 on current meter.		
d.	Press LOC LF and LOC CR keys on AN/UGC-20B keyboard.		
e.	Set SIGNAL PATTERN switch on AN/UGM-8B(V) to FOX.	(1) Typing unit types test message.	
		(2) Letters-figures shift and figures-letters shift operate properly.	Items 9 and 10.
		(3) Normal carriage return and line feed operate properly.	Items 11 and 13.

Table 4-5. Operational Test Procedures (High-Level) - Continued

Step	Action	Normal Indication	Reference Table 5-1
f.	Adjust range finder knob on selector assembly to determine minimum and maximum settings at which message is typed without error.		
g.	Note difference between minimum and maximum settings obtained in step f.	72 (minimum difference)	Item 1
h.	<p>Place range finder on optimum setting as follows:</p> <p>(1) Add low and high readings obtained in step f.</p> <p>(2) Divide by 2.</p> <p>(3) Resulting number is optimum setting.</p>		
3.	<u>Typing Unit Quality of Print Check.</u>		
a.	While typing unit is receiving test message, observe quality of printed copy.	<p>(1) Characters are positioned on straight vertical line.</p> <p>(2) Uniform spacing between characters.</p> <p>(3) Clear type.</p>	<p>Item 2</p> <p>Item 3</p> <p>Item 4</p>

Table 4-5. Operational Test Procedures (High-Level) - Continued

Step	Action	Normal Indication	Reference Table 5-1
		(4) Proper, error-free test pattern typed.	Item 5
b.	Manually operate ribbon lever inward, on side where ribbon is being unwound.	(5) Proper ribbon feed. Ribbon reverses.	Item 6 Item 7
c.	Repeat step b, using other ribbon lever.	Ribbon reverses.	Item 7
d.	Set SIG PATTERN switch on AN/UGM-8B(V) to STDY MK.		
4.	<p data-bbox="369 857 772 915"><u>Typing Unit Distorted Signal Check.</u></p> <p data-bbox="617 951 697 977">NOTE</p> <p data-bbox="369 1013 961 1107">This test checks the ability of the typing unit to copy a distorted signal.</p> <p data-bbox="369 1143 911 1237">a. Ensure DISTORTION SELECT switch on AN/UGM-8(V) is set to MARK BIAS.</p>		

Table 4-5. Operational Test Procedures (High-Level) - Continued

Step	Action	Normal Indication	Reference Table 5-1
b.	Set PERCENT DISTORTION switches as follows: (1) TENS: 40 (2) UNITS: 0		
c.	Set SIGNAL PATTERN switch on AN/UGM-8B(V) to FOX.	Must copy one line with not more than one error.	Item 8
d.	Set DISTORTION SELECT switch to SPACE BIAS.	Same as step e.	Item 8
e.	Set DISTORTION SELECT switch to MARK END.	Same as step e.	Item 8
f.	Set PERCENT DISTORTION switches as follows: (1) TENS: 30 (2) UNITS: 5		Item 8
g.	Set DISTORTION SELECT switch to SPACE END.	Same as step e.	Item 8
h.	Set DISTORTION SELECT switch to SWITCH BIAS.	Same as step e.	Item 8
i.	Set POWER ON OFF switch on AN/UGM-8B(V) to OFF.		
j.	Set power switch on CPP to OFF.		

Table 4-5. Operational Test Procedures (High-Level) - Continued

Step	Action	Normal Indication	Reference Table 5-1
5.	<u>Typing Unit Proper Function Operation Check.</u>		
a.	Unplug AN/UGM-8B(V) test cord from patching panel.		
b.	Remove patch cord connected between SET and LPG jacks.		
c.	Set power switch on CPP to ON.		
d.	Adjust channel current ADJUSTMENT control for reading of 60 on current meter.		
e.	Press FIGS key.		
f.	Press S key.	Signal bell rings.	Item 12
g.	Set single/double line feed lever (inside) to number 1 position.		
h.	Press LINE FEED key.	Typing unit single line feeds.	Item 14
i.	Set single/double line feed lever to number 2 position.		
j.	Repeat step h.	Typing unit double line feeds.	Item 14

Table 4-5. Operational Test Procedures (High-Level) -- Continued

Step	Action	Normal Indication	Reference Table 5-1
k.	Press LOC CR key to return carriage.		
l.	Press M and REPT keys simultaneously until full line of Ms has been printed, carriage has returned, and printing has started on next line. Count characters.	(1) There shall be 72 clear characters. (2) The 74th character shall strike over the 73rd character. (3) The 75th character shall print approximately in center of page, beneath 32nd through 42nd character. (4) The 76th character shall print exactly under 1st character. (5) The 77th character shall print exactly under 2nd character.	Items 15 and 16 Items 15 and 16 Items 15 and 16 Items 15 and 16 Items 15 and 16
m.	Press RETURN key.	Carriage returns and line feeds.	Items 17 and 20
n.	Press LINE FEED key.	No line feed occurs.	Items 17 and 20
o.	Repeat step n.	No line feed occurs.	Items 17 and 20

Table 4-5. Operational Test Procedures (High-Level) - Continued

Step	Action	Normal Indication	Reference Table 5-1
p.	Repeat step n.	Line feed occurs.	Items 17 and 20
6.	<u>Local Functions Check.</u>		
a.	Press LOC CR key.	Carriage returns.	Item 18
b.	Press and hold LOC LF key.	Line feed occurs continuously until key is released.	Item 19
7.	<u>Keyboard Proper Operation Check.</u>		
a.	Press each character and function key.	Selected character prints or selected function operates. (Keys operate easily.)	Item 22
b.	Set power switch on CPP to OFF.		
8.	<u>Keyboard Distortion Check.</u>		
a.	Refer to figure 4-1.		
b.	On patching panel, connect patch cord between CPP channel SET jack and LPG (top row) jack.		
c.	Plug TS-2616/UGM test cord into CPP channel LPG (2nd row) jack.		

Table 4-5. Operational Test Procedures (High-Level) - Continued

Step	Action	Normal Indication	Reference Table 5-1
d.	Set POWER switch on TS-2616/UGM to ON.		
e.	Set power switch on CPP to ON.		
f.	<p>Observe reading on PERCENT DISTORTION meter on TS-2616/UGM while pressing the following keys:</p> <ul style="list-style-type: none"> (1) REPT and E (2) REPT and LF (3) REPT and Space (4) REPT and CR (5) REPT and T (6) REPT and R (7) REPT and Y (8) REPT and A (9) REPT and M (10) REPT and LTRS 	5-percent (maximum).	Item 21

Table 4-5. Operational Test Procedures (High-Level) - Continued

Step	Action	Normal Indication	Reference Table 5-1
g.	Set DISTORTION SELECT switch on TS-2616/UGM to BIAS.		
h.	Repeat step f.	5-percent (maximum).	Item 21

AN/UGM-8B(V)

POWER ON OFF switch to OFF.

DISTORTION SELECT switch to MARK BIAS.

PERCENT DISTORTION switch to 0.

STOP LENGTH SYNC-START/STOP switch to S/S 1.42.

CHARACTER RELEASE switch to FRFE RUN.

SIGNAL PATTERN switch to STDY MK.

RATE switch to 74.2.

LOOP POLARITY switch to either + or - to cause meter to deflect to right.

LOOP ADJ control fully counterclockwise.

HIGH-LEVEL OUTPUT MODE switch to EXT NEUT.

MARK SPACE switches to any position.

TS-2616/UGM

AC power switch to off (down) position.

PEAK RESET switch to AUTO.

RATE-BAUDS switch to 74.2.

CODE LEVEL switch to 5.

DISTORTION SELECT switch to PEAK-TOTAL.

TRANSITION SELECT switch to ALL.

INPUT POLARITY switch to either + or - to cause meter to deflect to right.

INPUT SELECT switch to NEUTRAL 60.

INPUT FILTER switch to IN.

(2) Operational Tests (Low-Level). Figure 4-2 shows test setup required to perform low-level CPP procedures described in table 4-6. If abnormal indications are encountered during a test, refer to Troubleshooting Index, table 5-1, Chapter 5. Prior to conducting the tests, perform the initial control settings on the AN/UGM-8B(V) and TS-2616/UGM test sets as described in paragraph 4-8d (1).

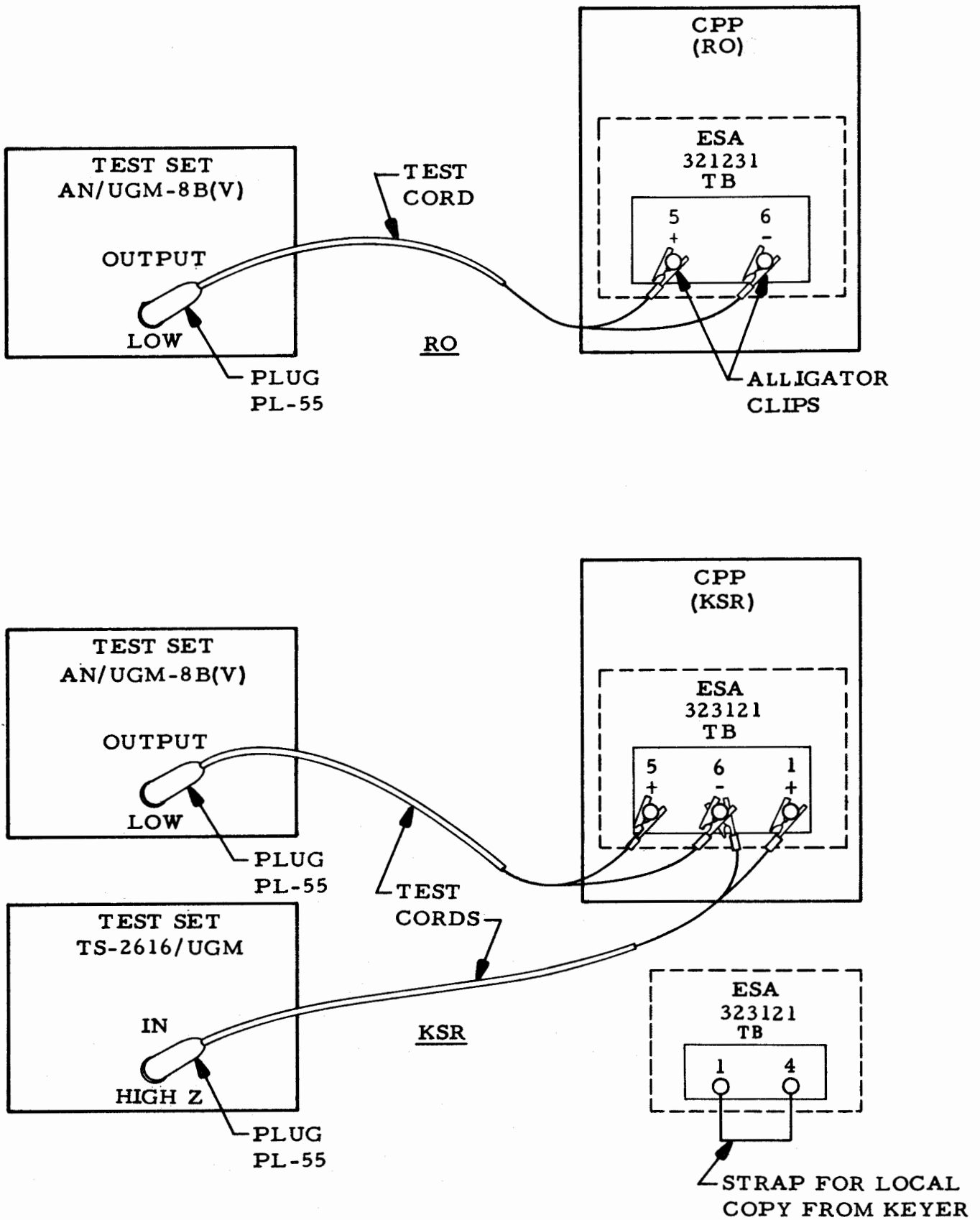


Figure 4-2. CPP Test Setup (Low-Level)

Table 4-6. Operational Test Procedures (Low-Level)

Step	Action	Normal Indication	Reference Table 5-1
<ol style="list-style-type: none"> 1. a. b. c. d. e. f. 2. a. 	<p><u>Preliminary</u></p> <p>Ensure test set controls are set as indicated in paragraph 4-8d.</p> <p>Ensure power switches on CPP and ESA are set to OFF.</p> <p>Connect AN/UGM-8B(V) test set to ESA 321231 (RO) or ESA 323121 (KSR) as shown in figure 4-2.</p> <p>Connect TS-2616/UGM test set to ESA 323121 (KSR) as shown in figure 4-2.</p> <p>Plug test cords into OUTPUT LOW jack on AN/UGM-8B(V) and IN HIGH Z jack on TS-2616/UGM.</p> <p>Plug test set power cords into 115-vac power outlets.</p> <p><u>Typing Unit Range Check.</u></p> <p>Set POWER ON/OFF switch on AN/UGM-8B(V) to ON.</p>		

Table 4-6. Operational Test Procedures (Low-Level) - Continued

Step	Action	Normal Indication	Reference Table 5-1
b.	Set power switch on CPP and ESA to ON.		
c.	Set SIGNAL PATTERN switch on AN/UGM-8B(V) to FOX.	(1) Typing unit types test message. (2) Letters-figures shift and figures-letters shift operate properly. (3) Normal carriage return and line feed operate properly.	Items 9 and 10. Items 11 and 13.
d.	Adjust range finder knob on selector assembly to determine minimum and maximum settings at which message is typed without error.		
e.	Note difference between minimum and maximum settings obtained in step d.	72 (minimum difference)	Item 1
f.	Place range finder on optimum setting as follows: (1) Add low and high readings obtained in step d. (2) Divide by 2. (3) Resulting number is optimum setting.		

Table 4-6. Operational Test Procedures (Low-Level) - Continued

Step	Action	Normal Indication	Reference Table 5-1
3.	<p><u>Typing Unit Quality of Print Check.</u></p> <p>a. While typing unit is receiving test message, observe quality of printed copy.</p> <p>b. Manually operate ribbon lever inward, on side where ribbon is being unwound.</p> <p>c. Repeat step b, using other ribbon lever.</p> <p>d. Set SIG PATTERN switch on AN/UGM-8B(V) to STDY MK.</p>	<p>(1) Characters are positioned on straight vertical line.</p> <p>(2) Uniform spacing between characters.</p> <p>(3) Clear type.</p> <p>(4) Proper, error-free test pattern typed.</p> <p>(5) Proper ribbon feed.</p> <p>Ribbon reverses.</p> <p>Ribbon reverses.</p>	<p>Item 2</p> <p>Item 3</p> <p>Item 4</p> <p>Item 5</p> <p>Item 6</p> <p>Item 7</p> <p>Item 7</p>
4.	<p><u>Typing Unit Distorted Signal Check.</u></p>		

Table 4-6. Operational Test Procedures (Low-Level) - Continued

Step	Action	Normal Indication	Reference Table 5-1
	<p style="text-align: center;">NOTE</p> <p>This test checks the ability of the typing unit to copy a distorted signal.</p>		
a.	Ensure DISTORTION SELECT switch on AN/UGM-8B(V) is set to MARK BIAS.		
b.	Set PERCENT DISTORTION switches as follows: (1) TENS: 40 (2) UNITS: 0		
c.	Set SIGNAL PATTERN switch on AN/UGM-8B(V) to FOX.	Must copy one line with not more than one error.	Item 8
d.	Set DISTORTION SELECT switch to SPACE BIAS.	Same as step c.	Item 8
e.	Set DISTORTION SELECT switch to MARK END.	Same as step c	Item 8
f.	Set PERCENT DISTORTION switches as follows: (1) TENS: 30 (2) UNITS: 5		Item 8

Table 4-6. Operational Test Procedures--(Low Level)- Continued

Step	Action	Normal Indication	Reference Table 5-1
g.	Set DISTORTION SELECT switch to SPACE END.	Same as step c.	Item 8
h.	Set DISTORTION SELECT switch to SWITCH BIAS.	Same as step c.	Item 8
i.	Set POWER ON OFF switch on AN/UGM-8B(V) to OFF.		
j.	Set power switches on CPP and ESA to OFF.		
k.	Disconnect AN/UGM-8B(V) test cord from ESA.		
5.	<u>Typing Unit Proper Function Operation Check (KSR Only).</u>		
a.	Install strap between TB1 and TB4 of ESA 323121 as shown in figure 4-2.		
b.	Set power switches on CPP and ESA to ON.		
c.	Press FIGS key.		
d.	Press S key.	Signal bell rings.	Item 12
e.	Set single/double line feed lever (inside) to number 1 position.		

Table 4-6. Operational Test Procedures (Low-Level) - Continued

Step	Action	Normal Indication	Reference Table 5-1
f.	Press LINE FEED key.	Typing unit single line feeds.	Item 14
g.	Set single/double line feed lever to number 2 position.		
h.	Repeat step f.	Typing unit double line feeds.	Item 14
i.	Press LOC CR key to return carriage.		
j.	Press M and REPT keys simultaneously until full line of Ms has been printed, carriage has returned, and printing has started on next line. Count characters.	<p>(1) There shall be 72 clear characters.</p> <p>(2) The 74th character shall strike over the 73rd character.</p> <p>(3) The 75th character shall print approximately in center of page, beneath 32nd through 42nd character.</p> <p>(4) The 76th character shall print exactly under 1st character.</p> <p>(5) The 77th character shall print exactly under 2nd character.</p>	<p>Items 15 and 16</p> <p>Items 15 and 16</p> <p>Items 15 and 16</p> <p>Items 15 and 16</p> <p>Items 15 and 16</p>

Table 4-6. Operational Test Procedures (Low-Level) - Continued

Step	Action	Normal Indication	Reference Table 5-1
k.	Press RETURN key.	Carriage returns and line feeds.	Items 17 and 20
l.	Press LINE FEED key.	No line feed occurs.	Items 17 and 20
m.	Repeat step l.	No line feed occurs.	Items 17 and 20
n.	Repeat step l.	Line feed occurs.	Items 17 and 20
6.	<u>Local Functions Check (KSR Only).</u>		
a.	Press LOC CR key.	Carriage returns.	Item 18
b.	Press and hold LOC LF key.	Line feed occurs continuously until key is released.	Item 19
7.	<u>Keyboard Proper Operation Check (KSR Only).</u> Press each character and function key.	Selected character prints or selected function operates. (Keys operate easily.)	Item 22
8.	<u>Keyboard Distortion Check (KSR Only).</u>		
a.	Set POWER switch on TS-2616/UGM to ON.		

Table 4-6. Operational Test Procedures (Low-Level) - Continued

Step	Action	Normal Indication	Reference Table 5-1
b.	Observe reading on PERCENT DISTORTION meter on TS-2616/UGM while pressing the following keys: (1) REPT and E (2) REPT and LF (3) REPT and Space (4) REPT and CR (5) REPT and T (6) REPT and R (7) REPT and Y (8) REPT and A (9) REPT and M (10) REPT and LTRS	5-percent (maximum).	Item 21
c.	Set DISTORTION SELECT switch on TS-2616/UGM to BIAS.		
d.	Repeat step b.	5-percent (maximum).	Item 21

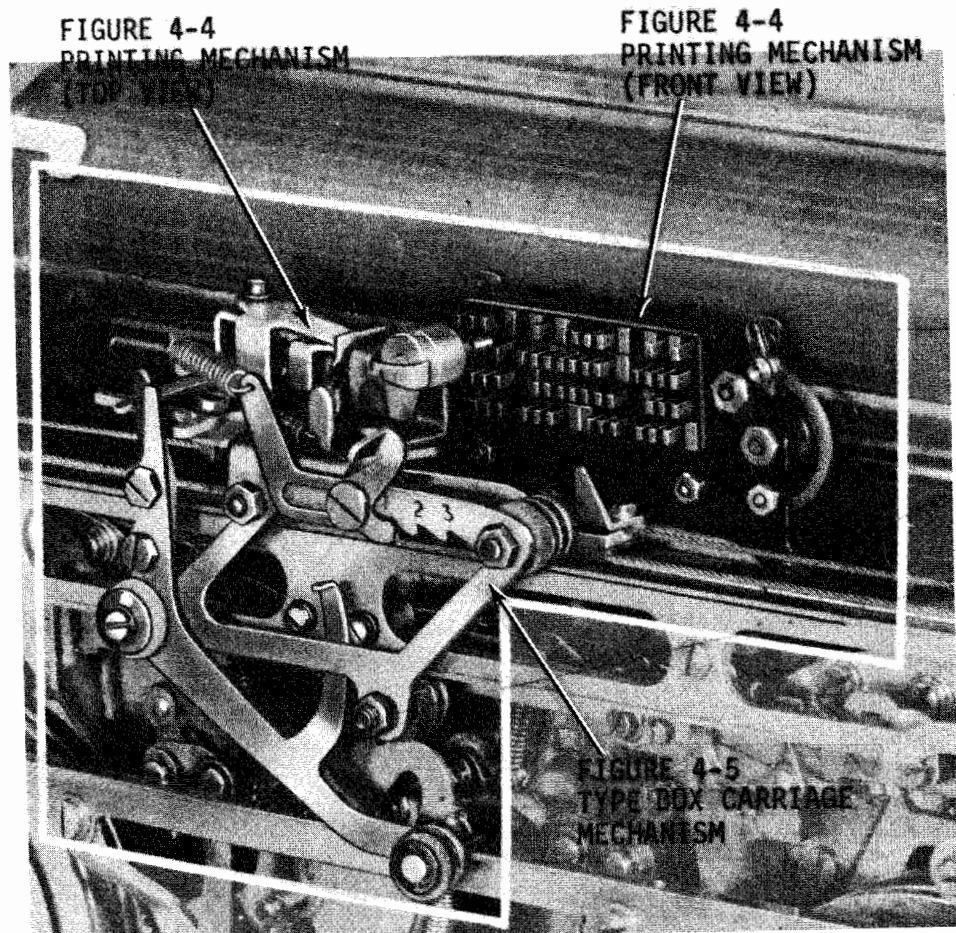
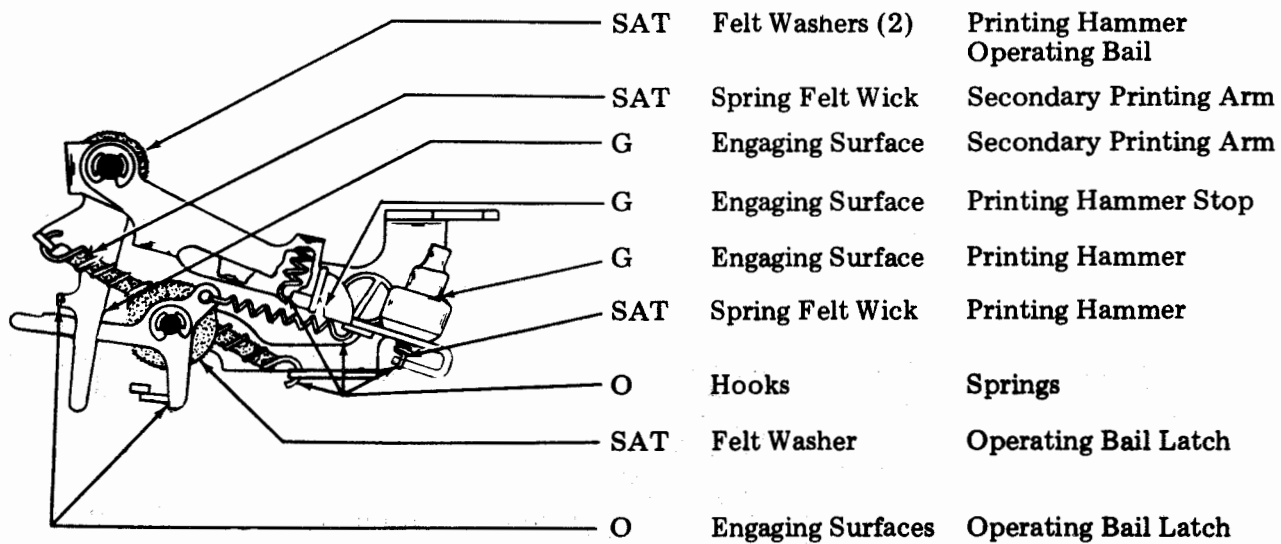
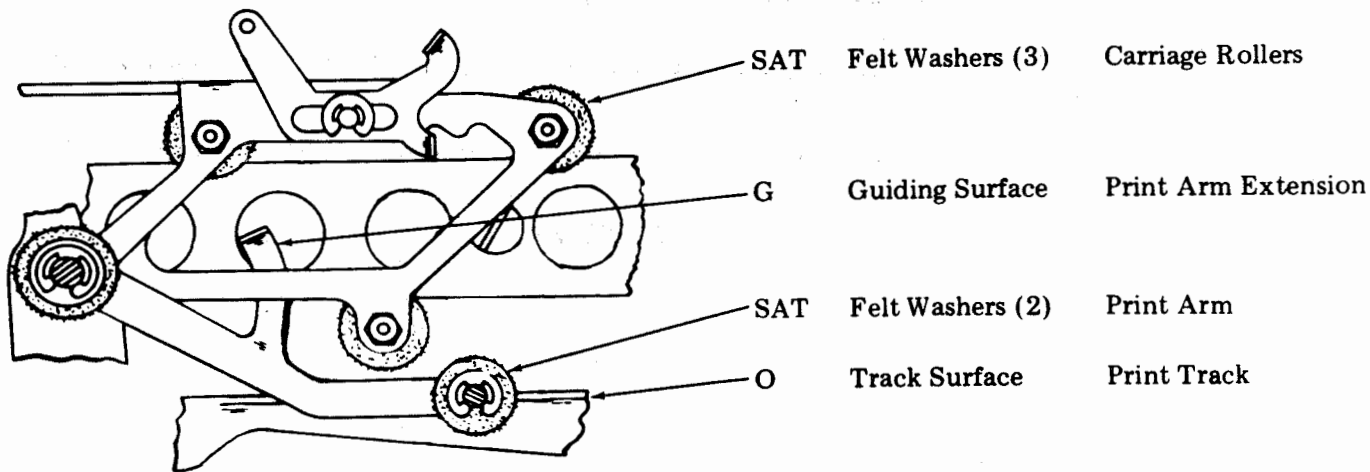


Figure 4-3. Printing Area (Front View)



(TOP VIEW)



(FRONT VIEW)

Figure 4-4. Printing Mechanism

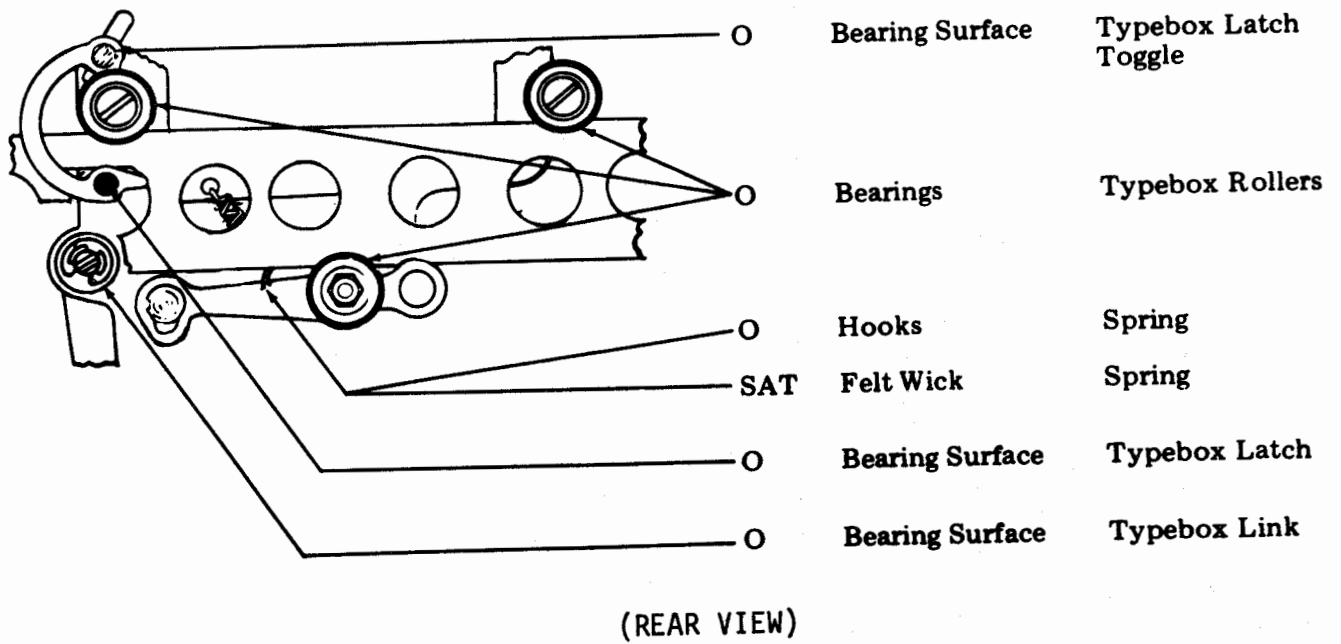


Figure 4-5. Type Box Carriage Mechanism

FIGURE 4-7
PAPER FEED
MECHANISM



Figure 4-6. Paper Feed Area

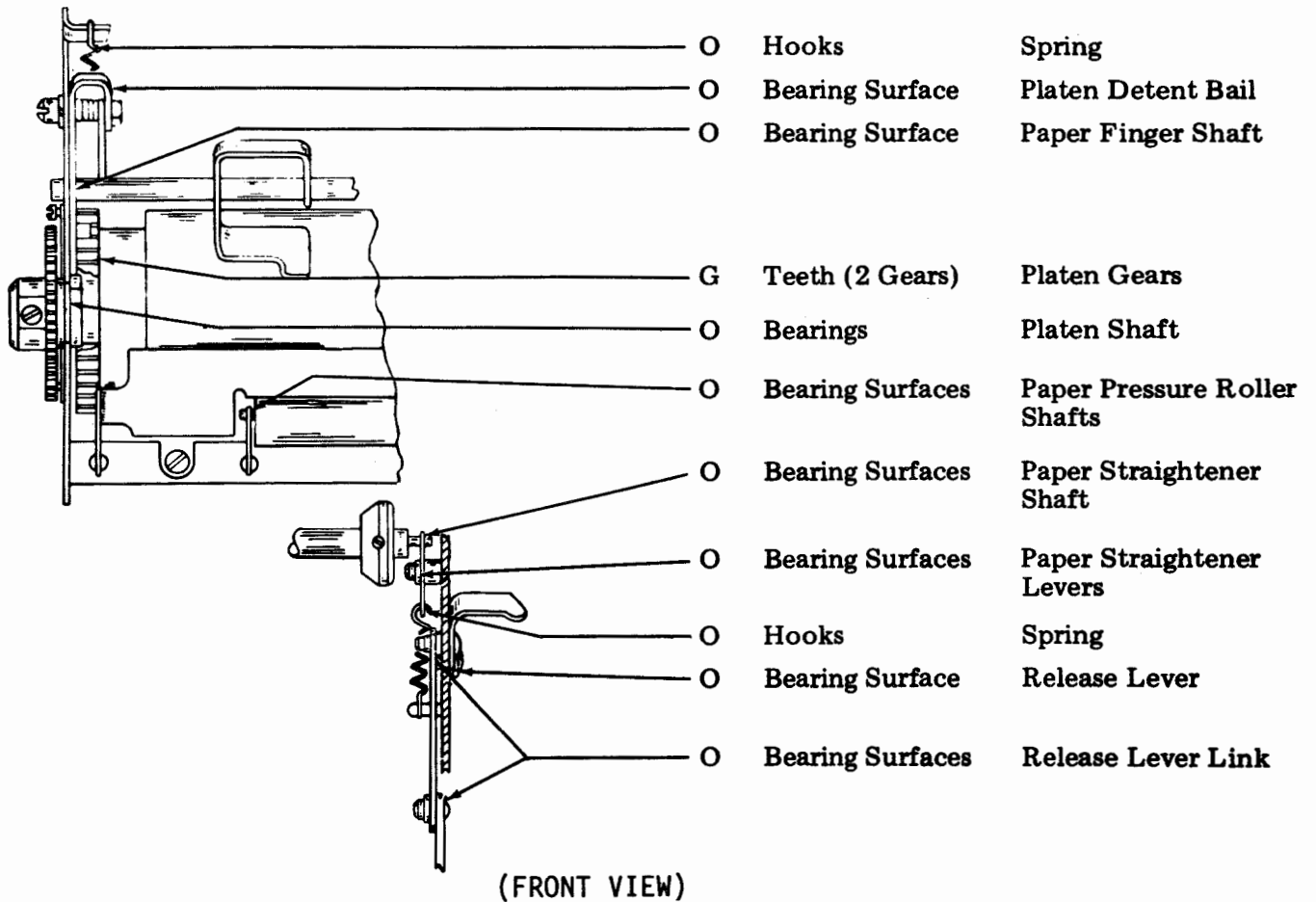


Figure 4-7. Paper Feed Mechanism

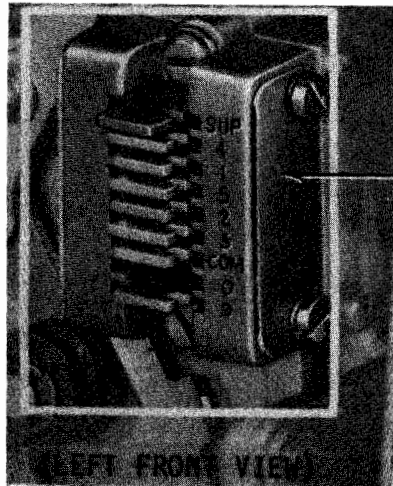


FIGURE 4-9
CODE BAR
DETENTS

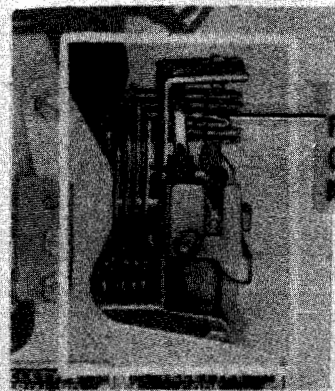
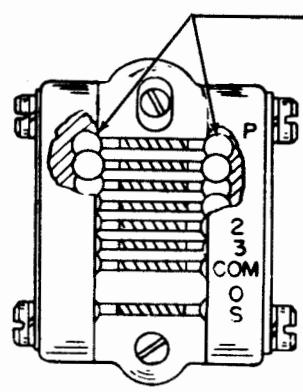


FIGURE 4-10
CODE BAR
MECHANISM

Figure 4-8. Code Bar Area



(LEFT SIDE VIEW)

Figure 4-9. Code Bar Detents

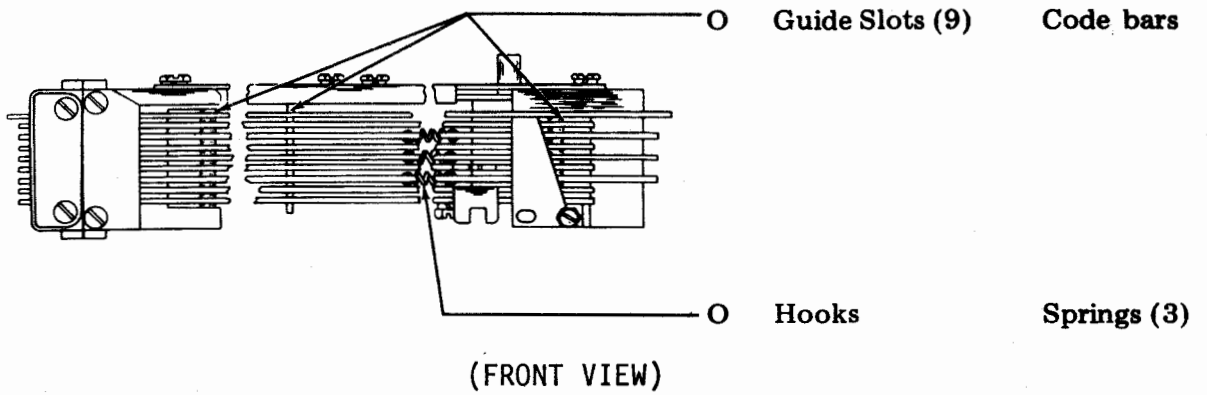


Figure 4-10. Code Bar Mechanism (A)

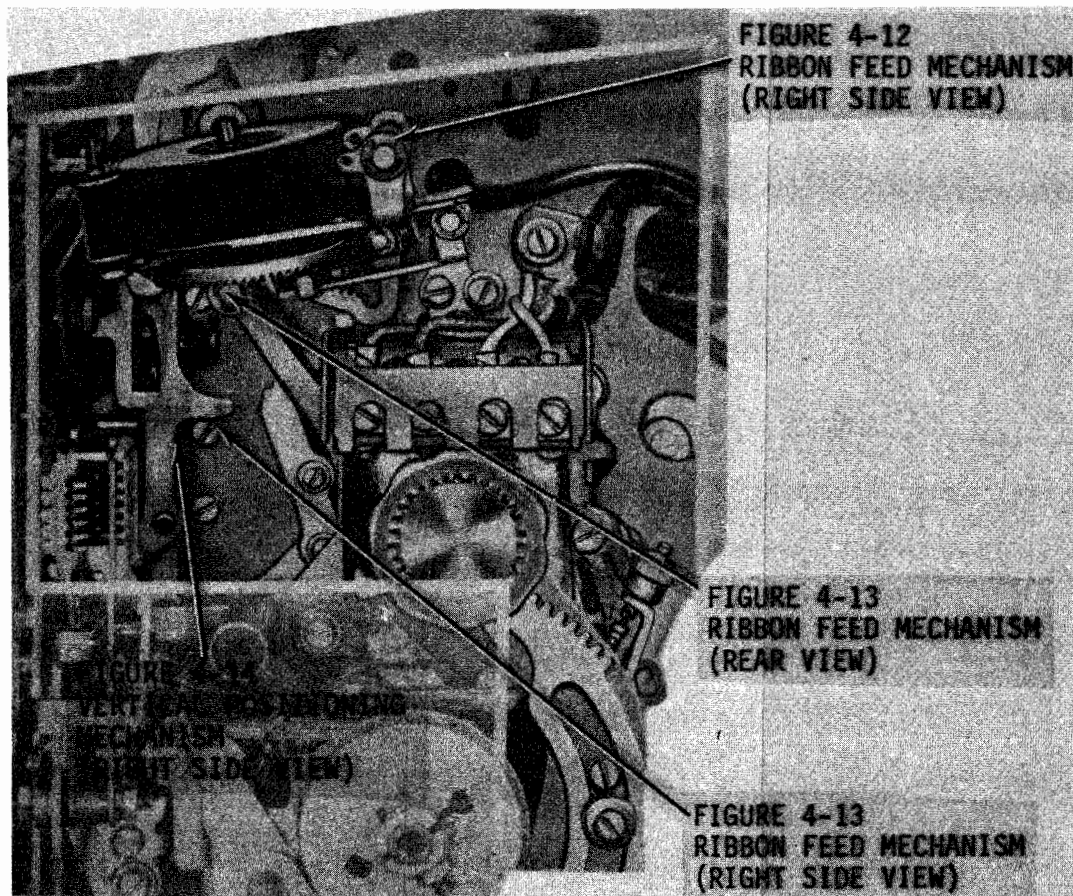


Figure 4-11. Ribbon Area (A)

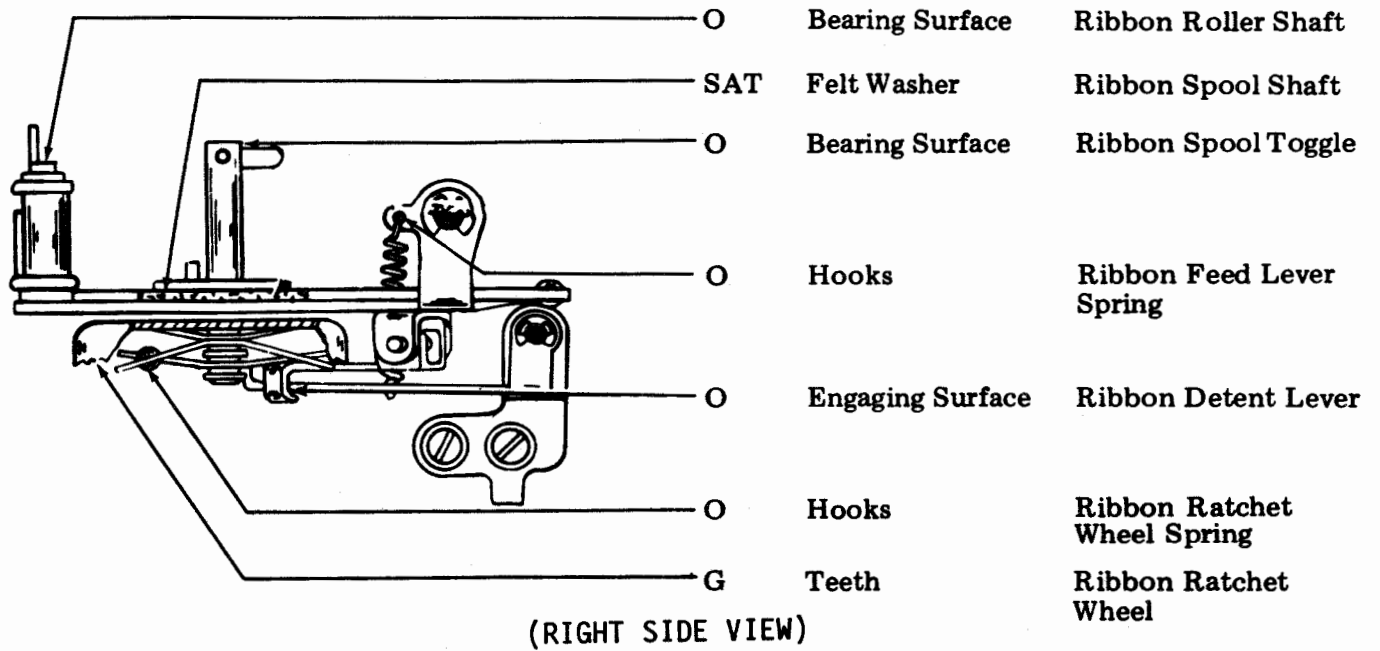


Figure 4-12. Ribbon Feed Mechanism (A)

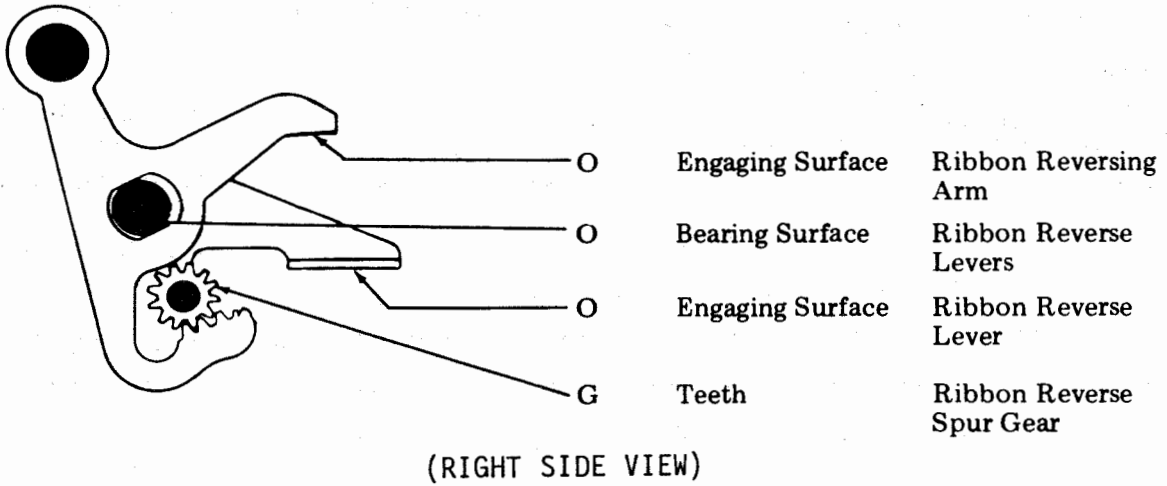
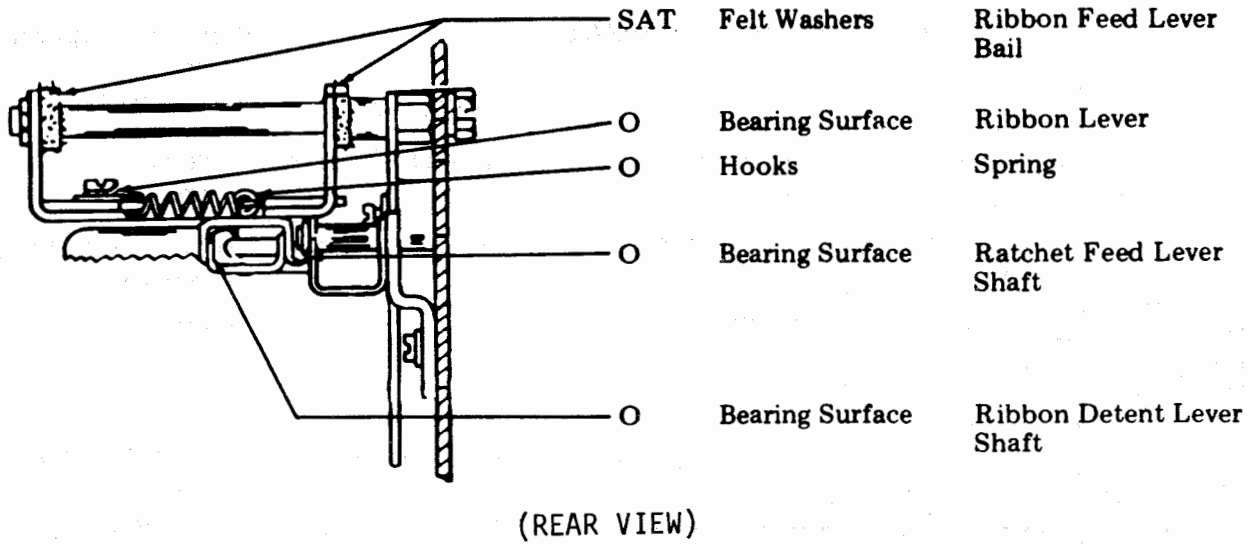
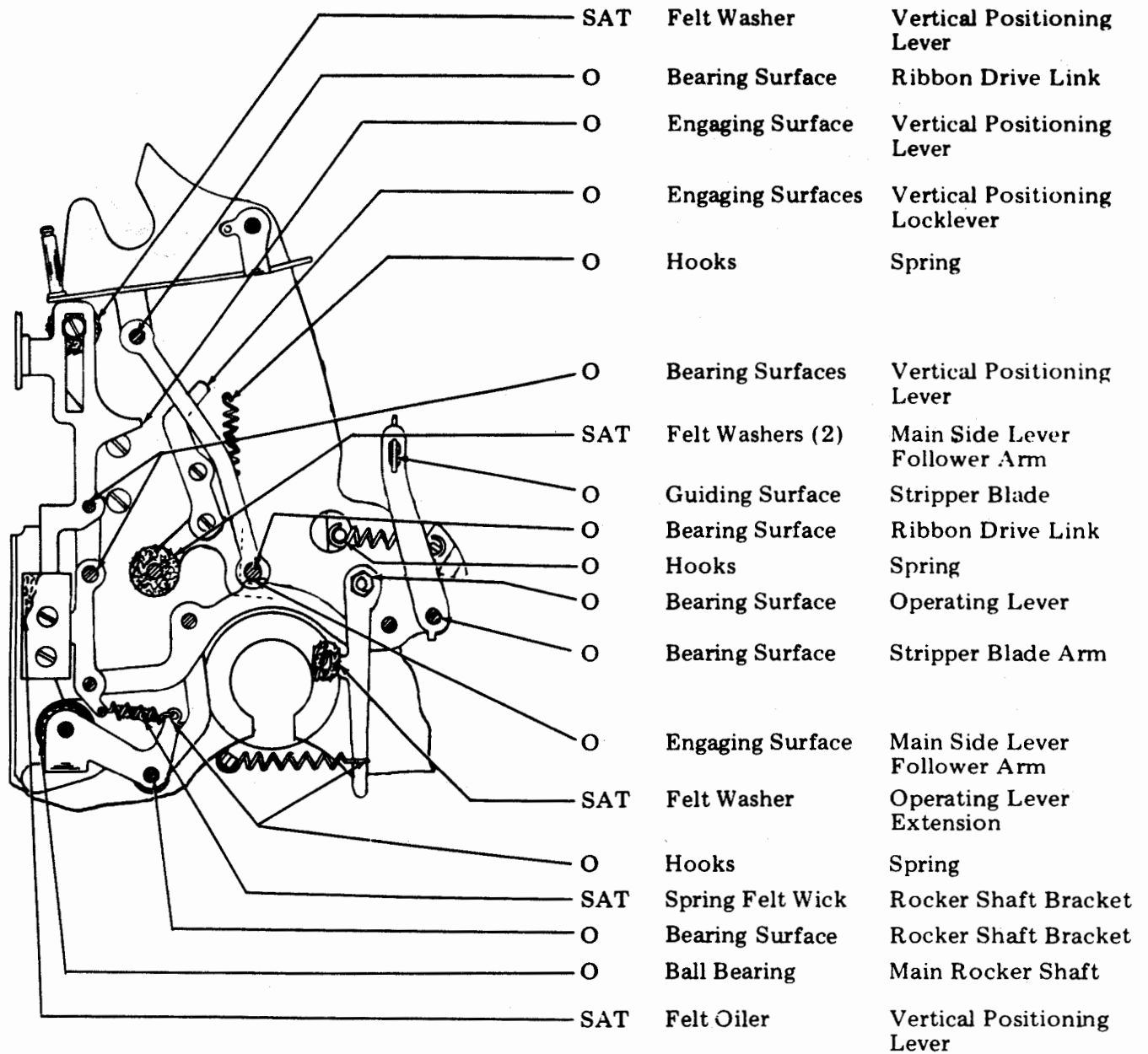


Figure 4-13. Ribbon Feed Mechanism (B)



(RIGHT SIDE VIEW)

Figure 4-14. Vertical Positioning Mechanism

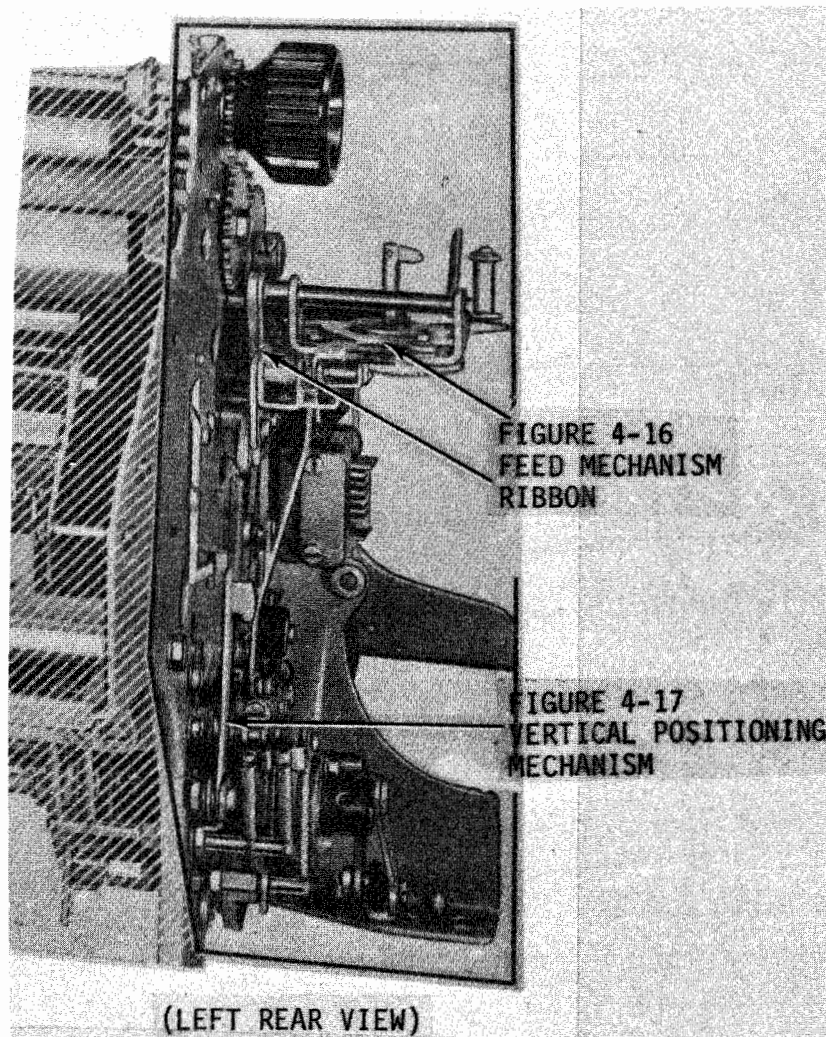
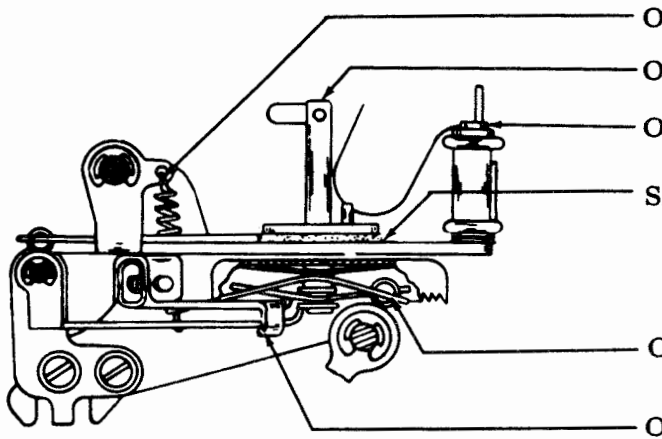
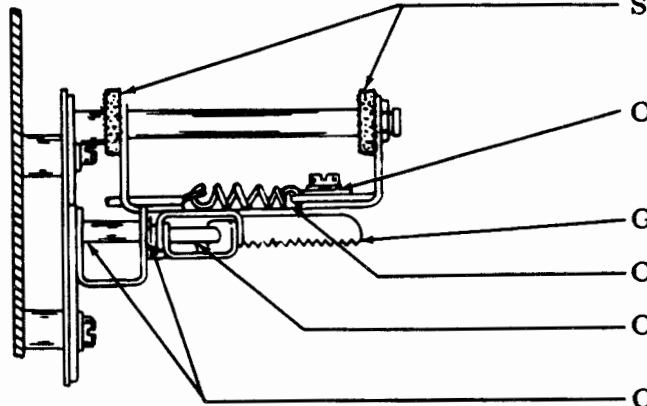


Figure 4-15. Ribbon Area (B)



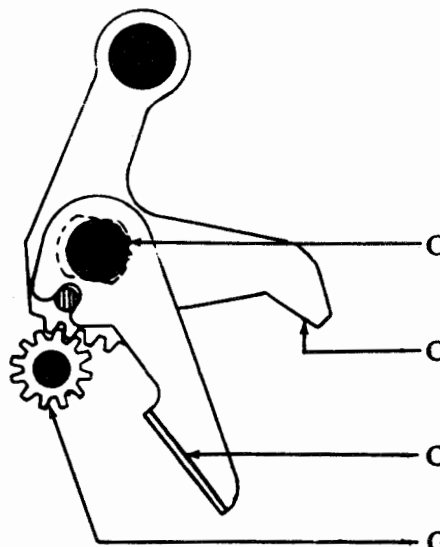
- O Hooks
- O Bearing Surface
- O Bearing Surface
- SAT Felt Washer
- O Hooks
- O Engaging Surface
- Spring
- Ribbon Spool Shaft
- Ribbon Roller Shaft
- Ribbon Spool Shaft
- Spring
- Ribbon Detent Lever

(LEFT SIDE VIEW)



- SAT Felt Washers
- O Bearing Surface
- G Teeth
- O Hooks
- O Engaging Surface
- O Bearing Surfaces
- Ribbon Feed Lever Bail
- Ribbon Reverse Lever
- Ribbon Ratchet Wheel
- Spring
- Ribbon Detent Lever Shaft
- Ratchet Feed Lever Shaft

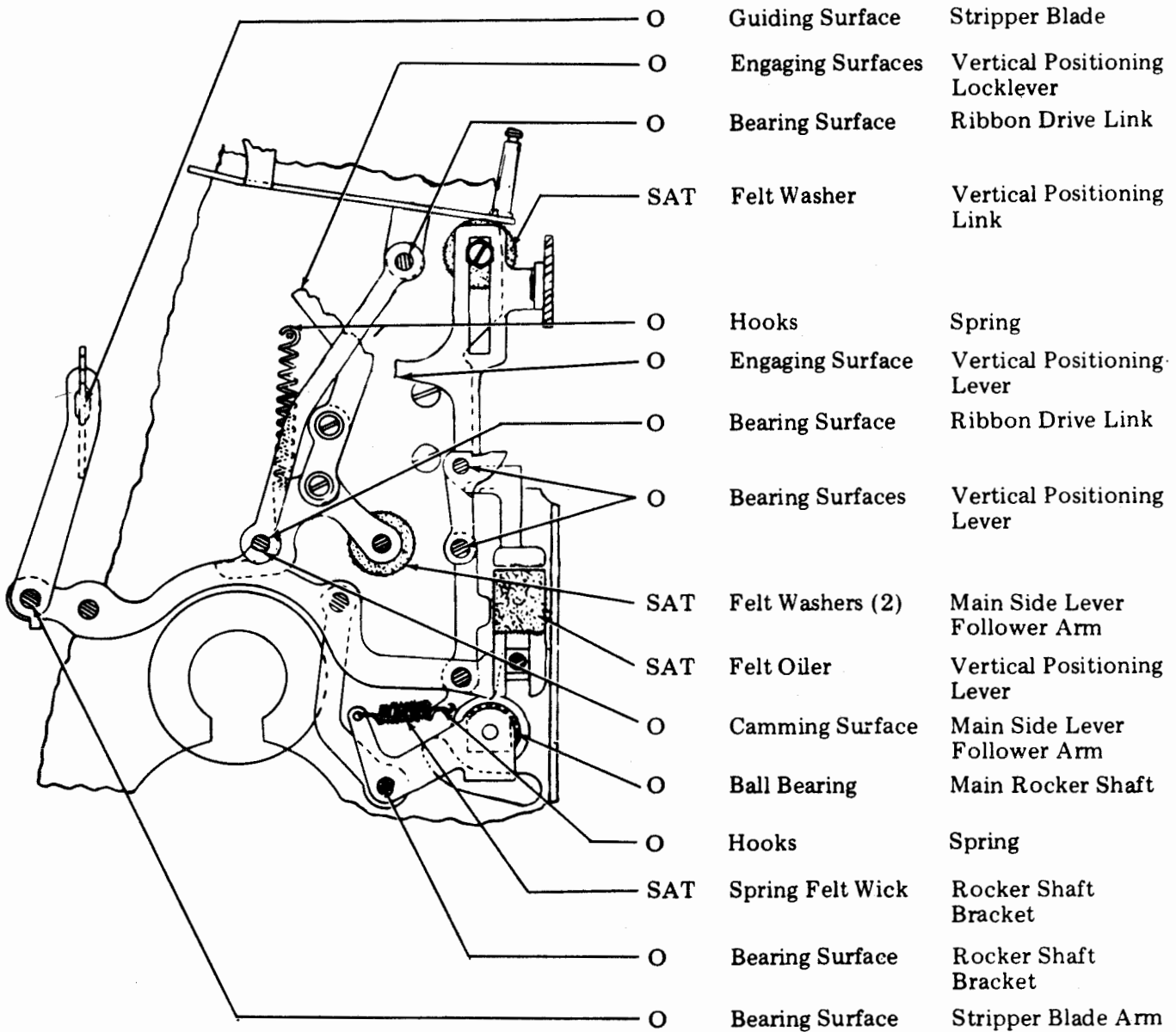
(REAR VIEW)



- O Bearing Surface
- O Engaging Surface
- O Engaging Surface
- G Teeth
- Ribbon Reverse Lever
- Ribbon Reversing Lever
- Ribbon Reverse Lever
- Ribbon Reverse Spur Gear

(LEFT SIDE VIEW)

Figure 4-16. Ribbon Feed Mechanism (C)



(LEFT SIDE VIEW)

Figure 4-17. Vertical Positioning Mechanism

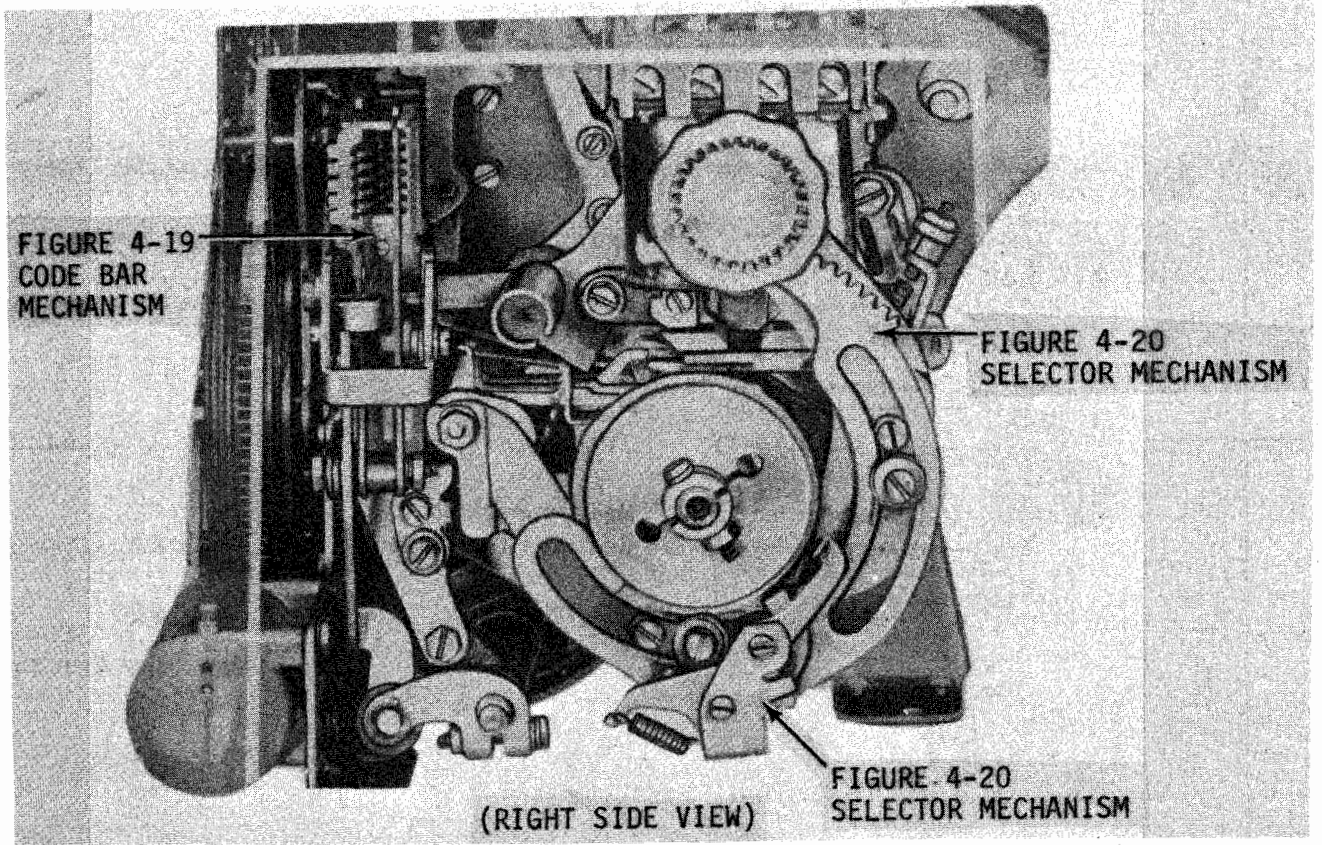


Figure 4-18. Selector Area

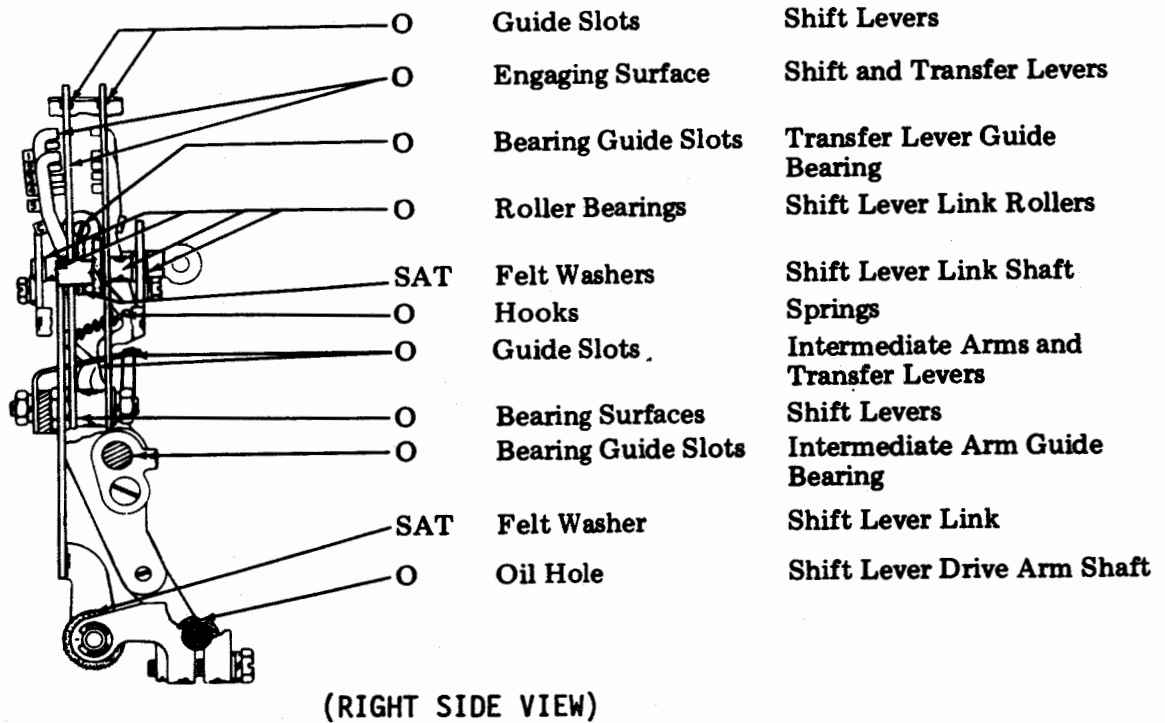


Figure 4-19. Code Bar Mechanism (B)

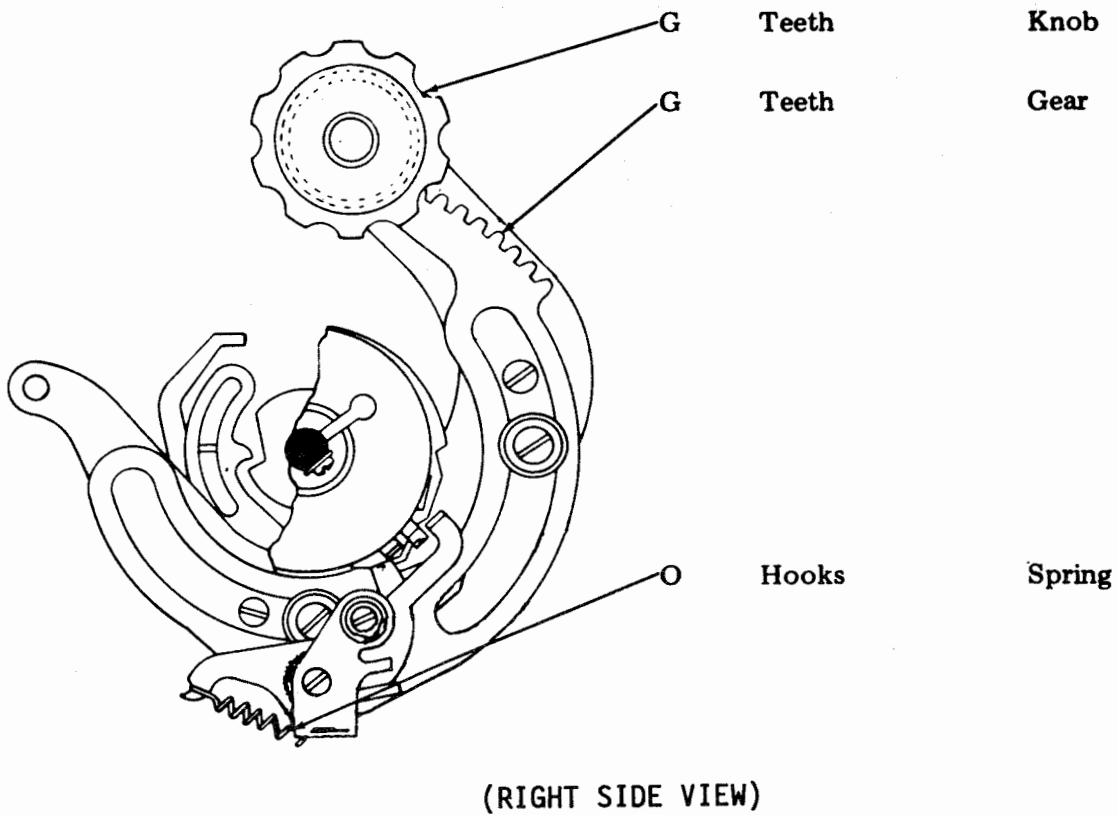
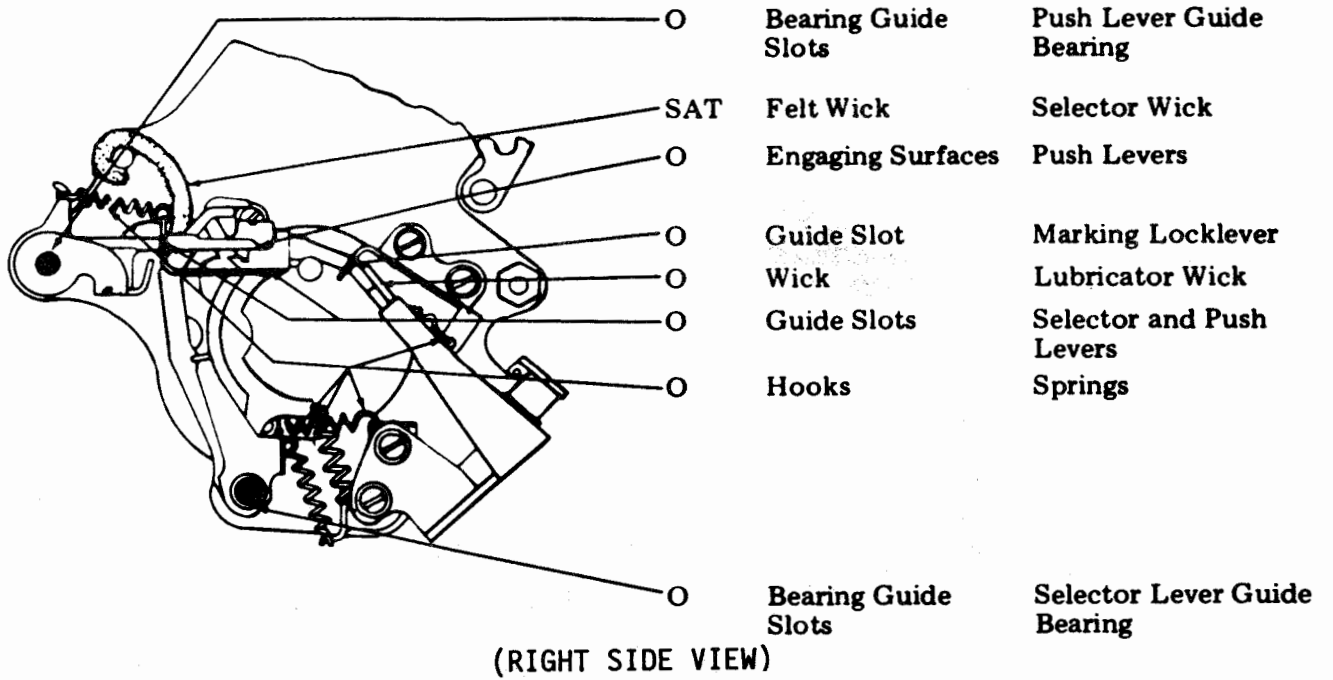


Figure 4-20. Selector Mechanism

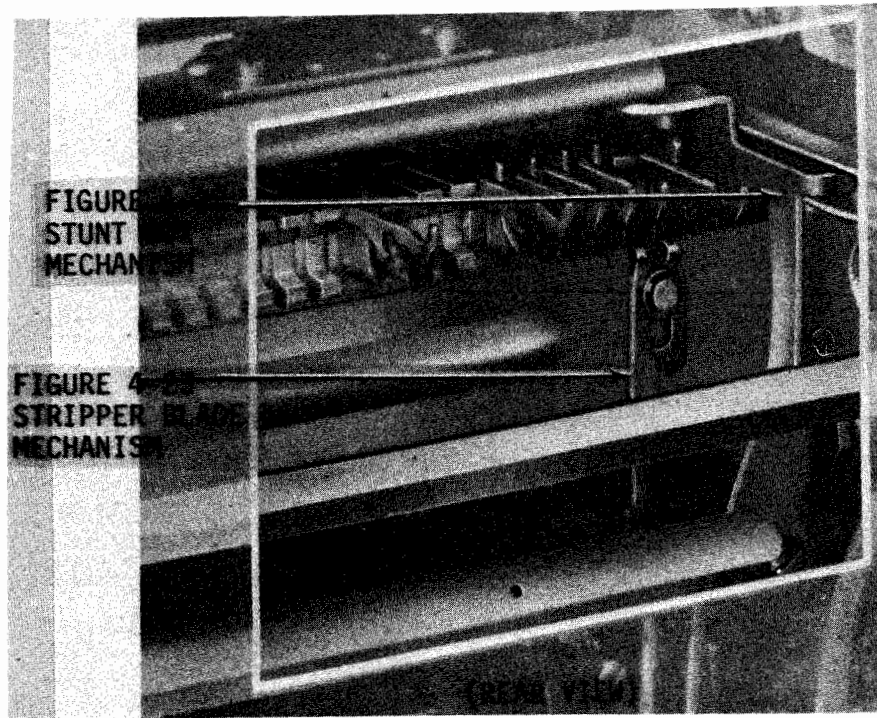


Figure 4-21. Function Area (A)

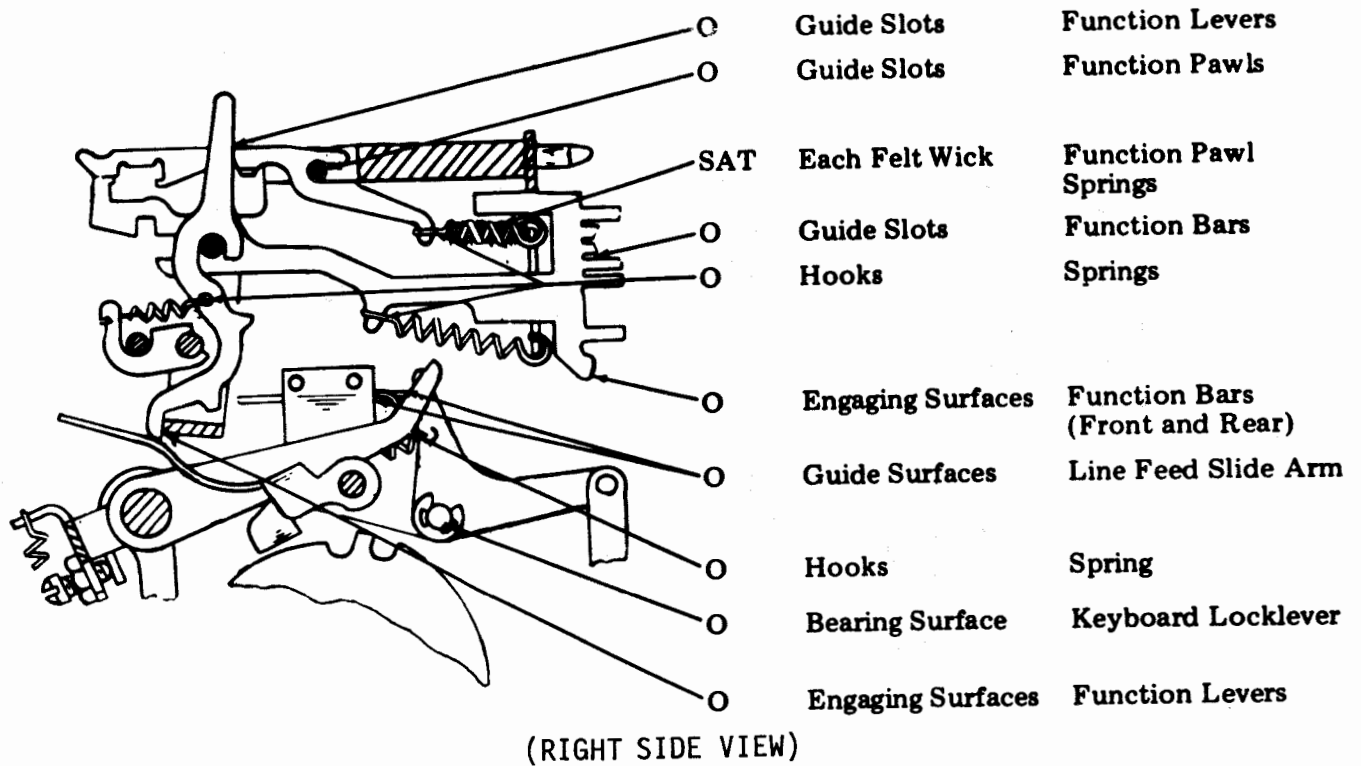
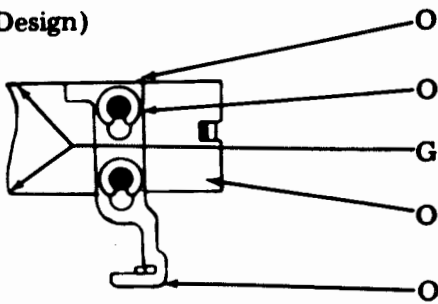


Figure 4-22. Stunt Box Mechanism

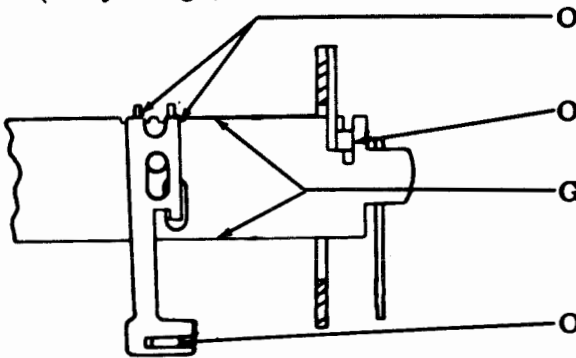
(Late Design)



(REAR VIEW)

- Engaging Surface Line Feed Stripper Slide
- Guide Surfaces Stripper Slide
- Engaging Surfaces Stripper Blade
- Guide Surfaces Stripper Blade
- Engaging Surface Stripper Blade

(Early Design)



(REAR VIEW)

- Engaging Surfaces Line Feed Function Pawl Stripper
- Guiding Surface Stripper Blade
- Upper and Lower Surface Stripper Blade
- Guiding Surface Stripper Bail

Figure 4-23. Stripper Blade Mechanism

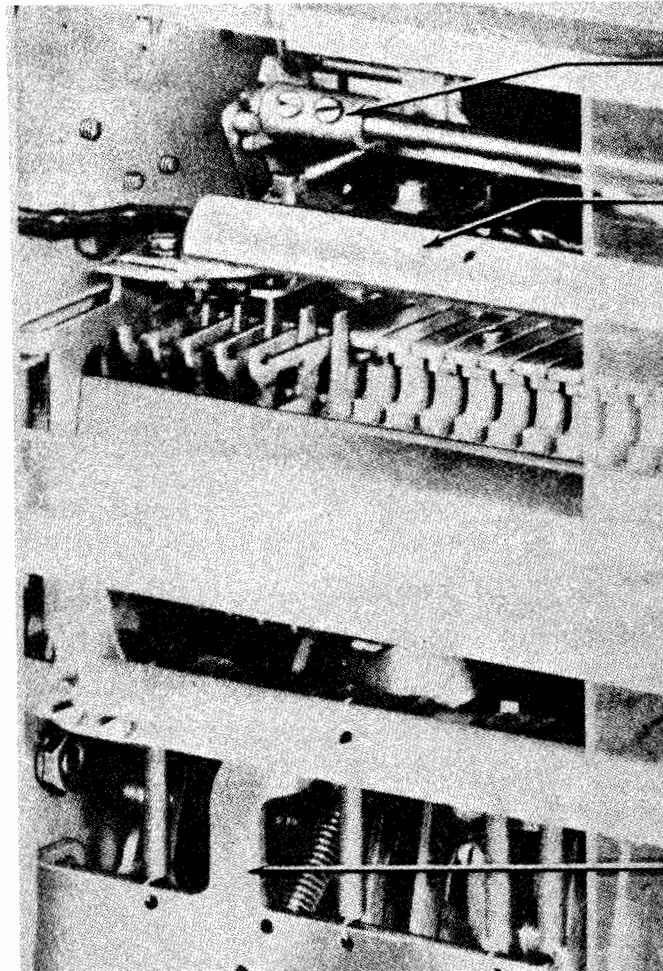


FIGURE 4-25
RIBBON REVERSE
MECHANISM

FIGURE 4-26
SHIFT
MECHANISM

FIGURE 4-27
FUNCTION ROCKER
SHAFT MECHANISM

(REAR VIEW)

Figure 4-24. Function Area (B)

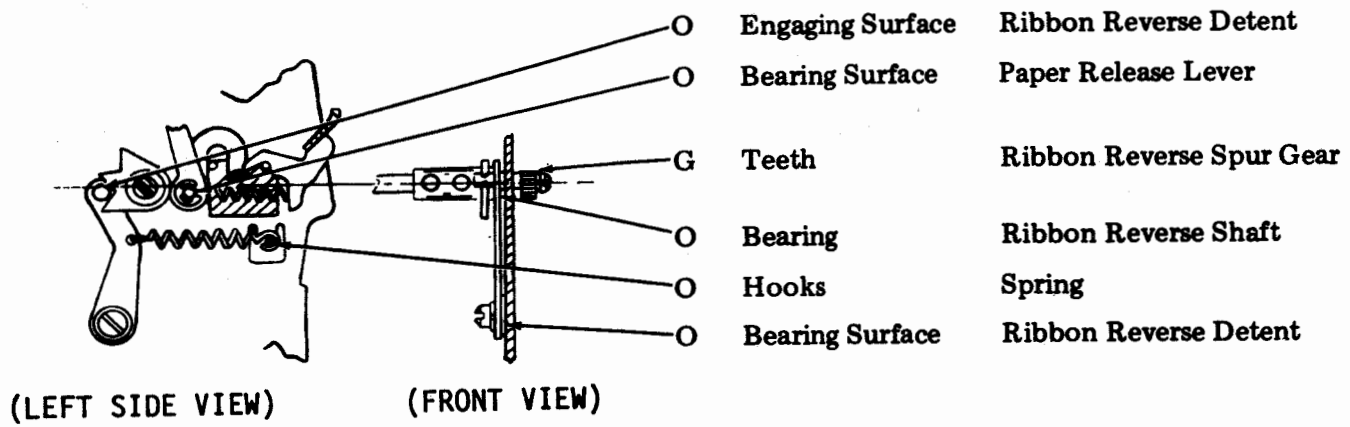


Figure 4-25. Ribbon Reverse Mechanism

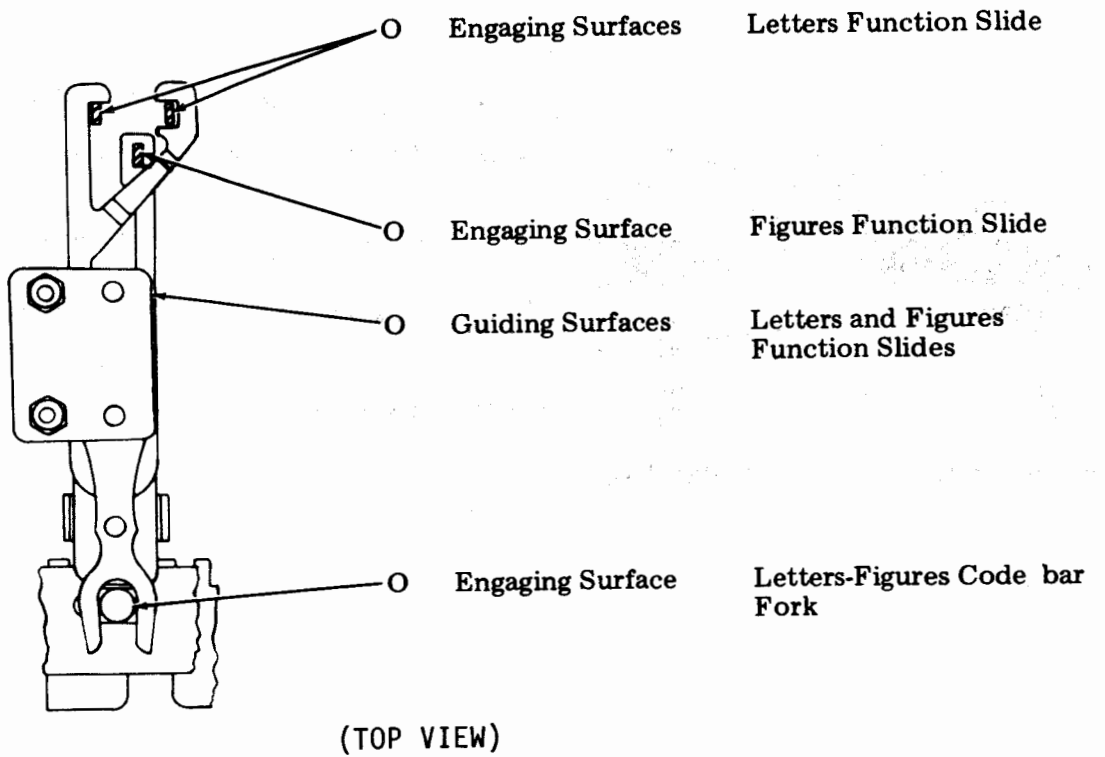


Figure 4-26. Shift Mechanism

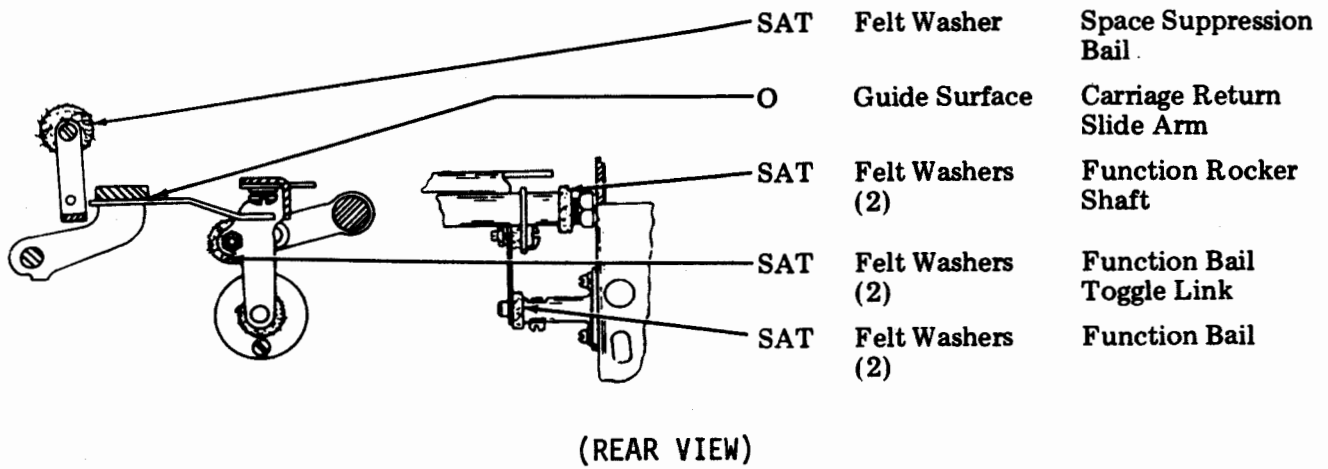


Figure 4-27. Function Rocker Shaft Mechanism

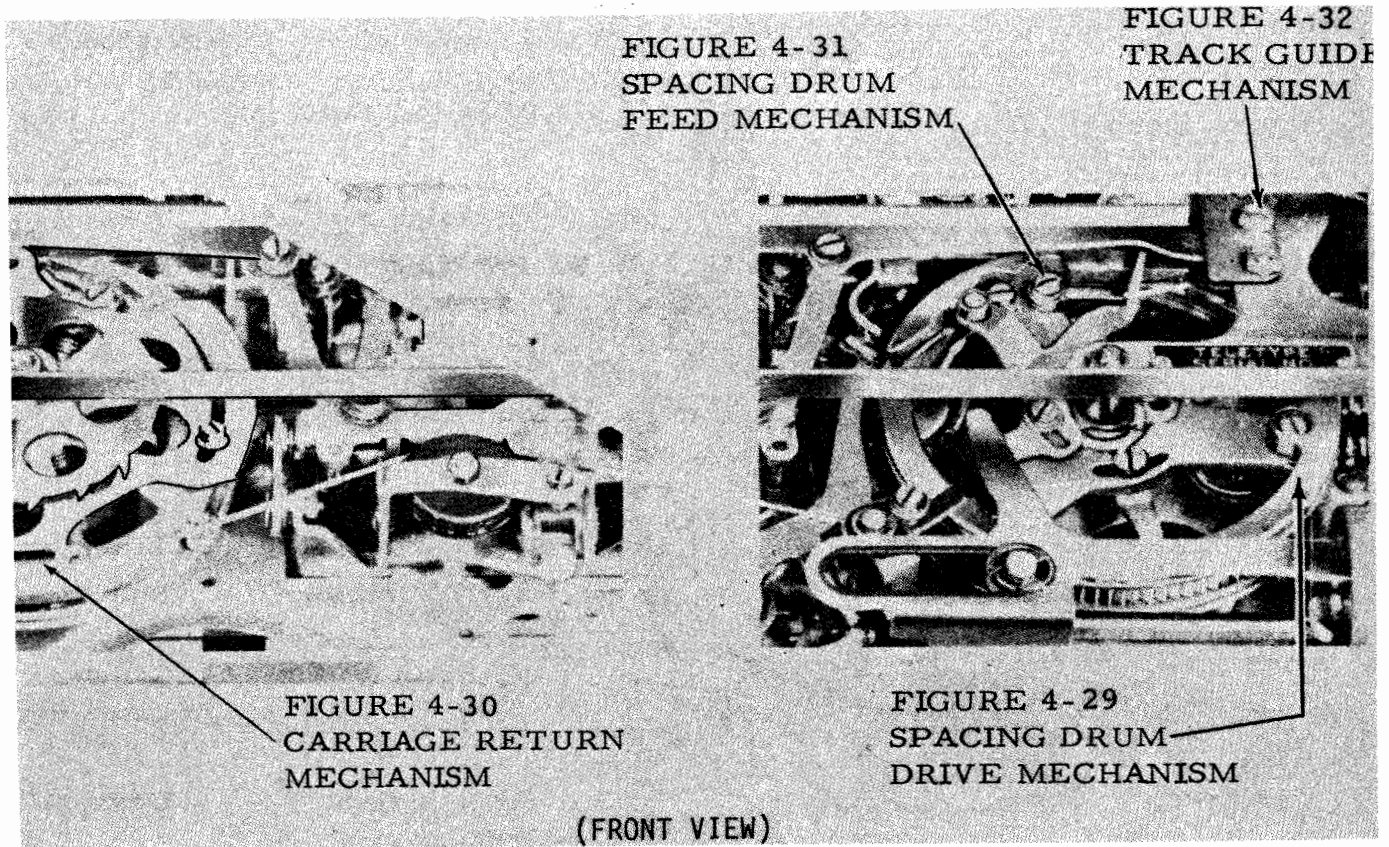


Figure 4-28. Spacing Area

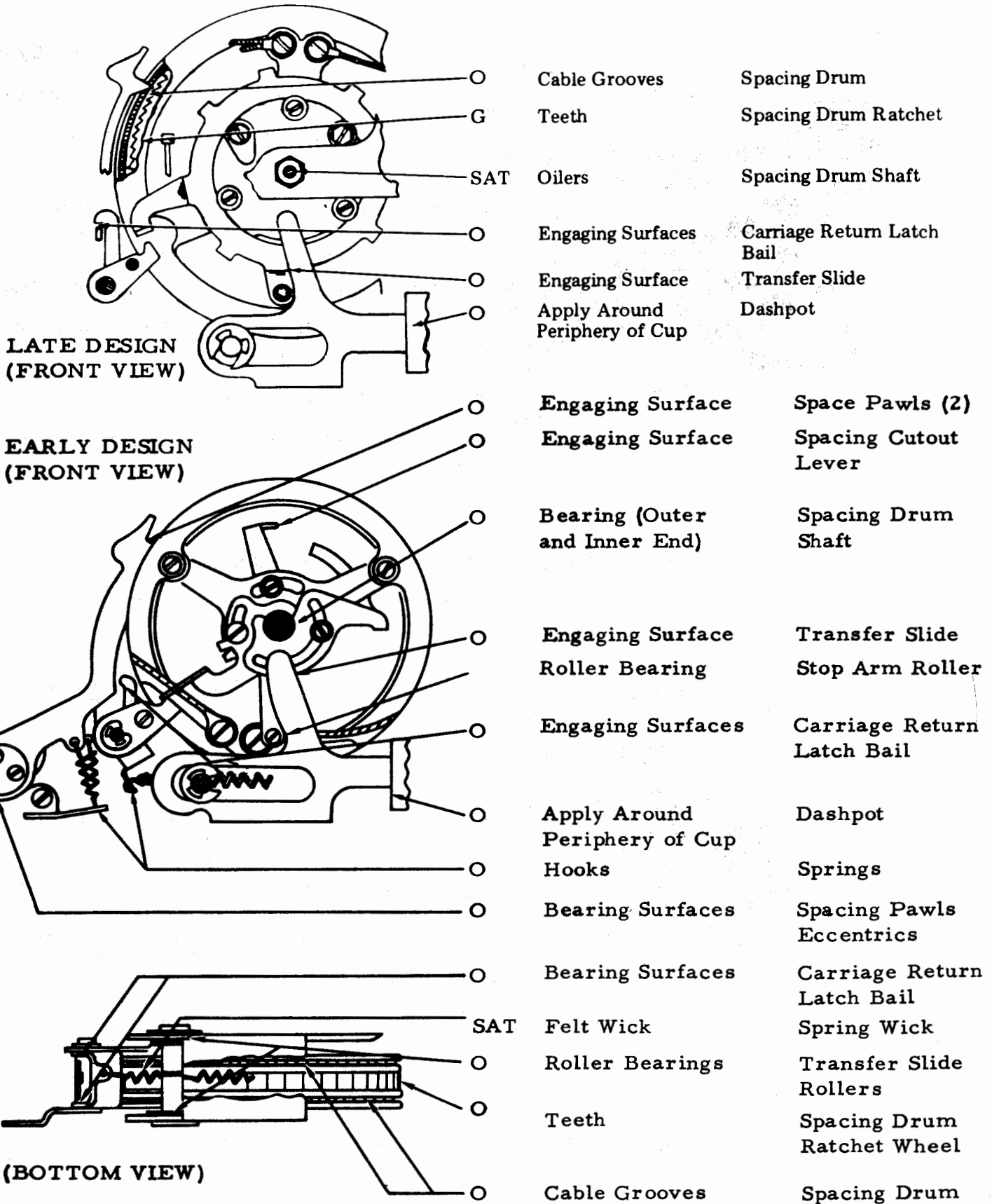


Figure 4-29. Spacing Drum Drive Mechanism

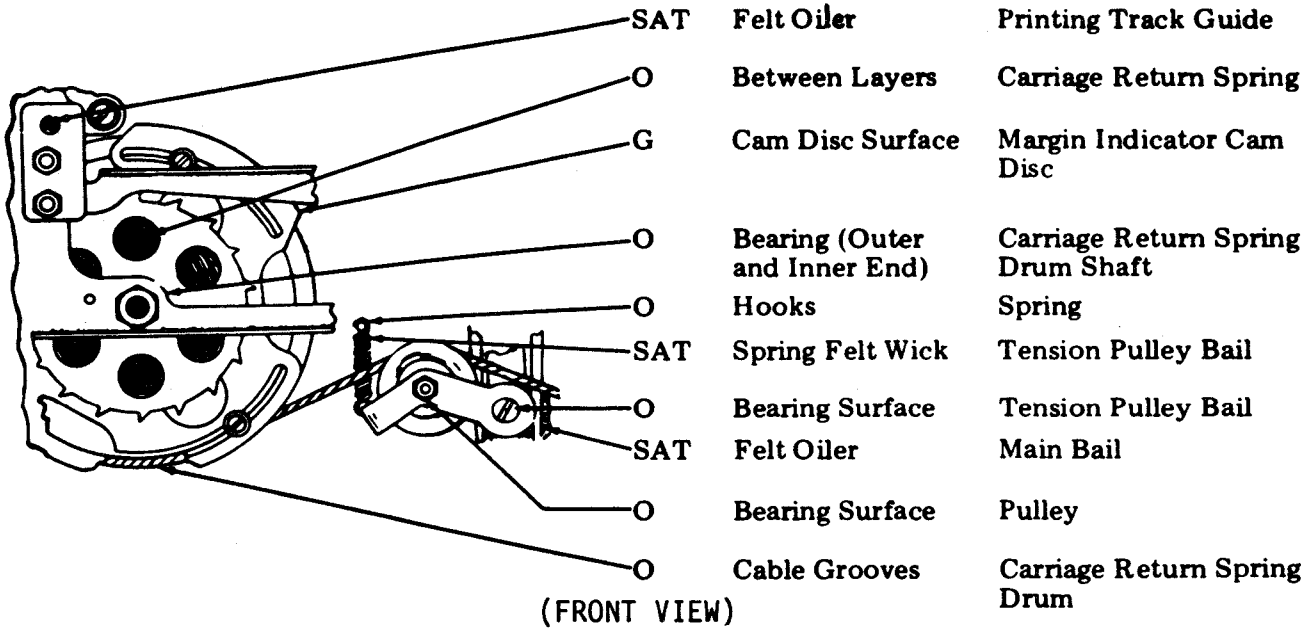


Figure 4-30. Carriage Return Mechanism

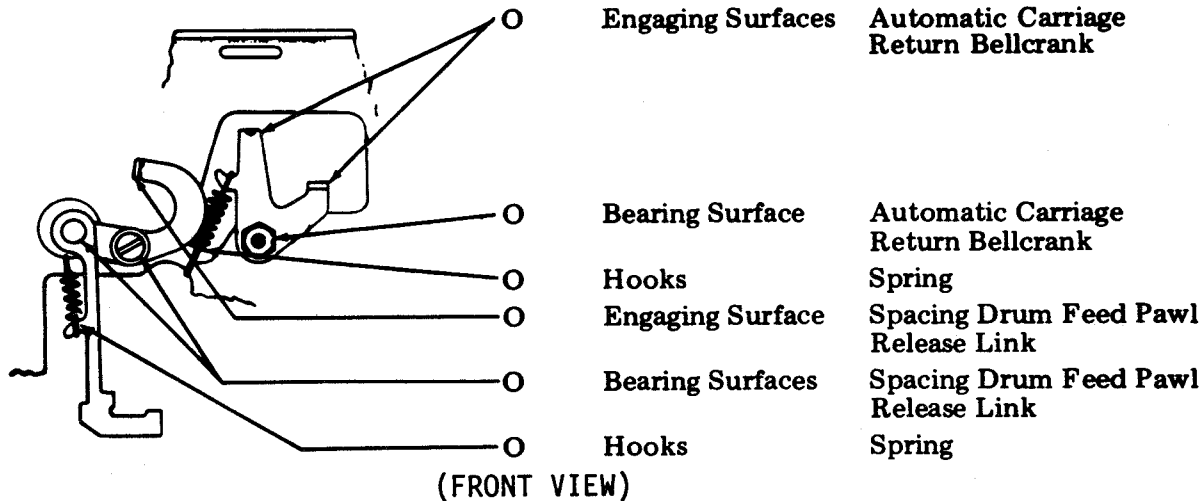


Figure 4-31. Spacing Drum Feed Mechanism

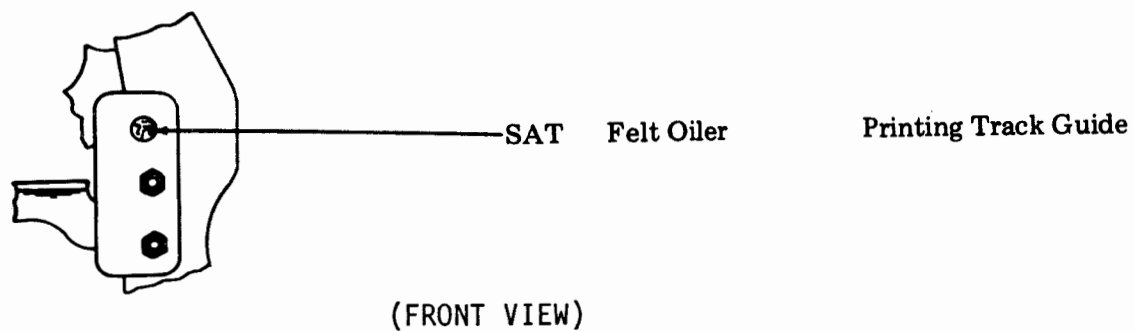


Figure 4-32. Track Guide Mechanism

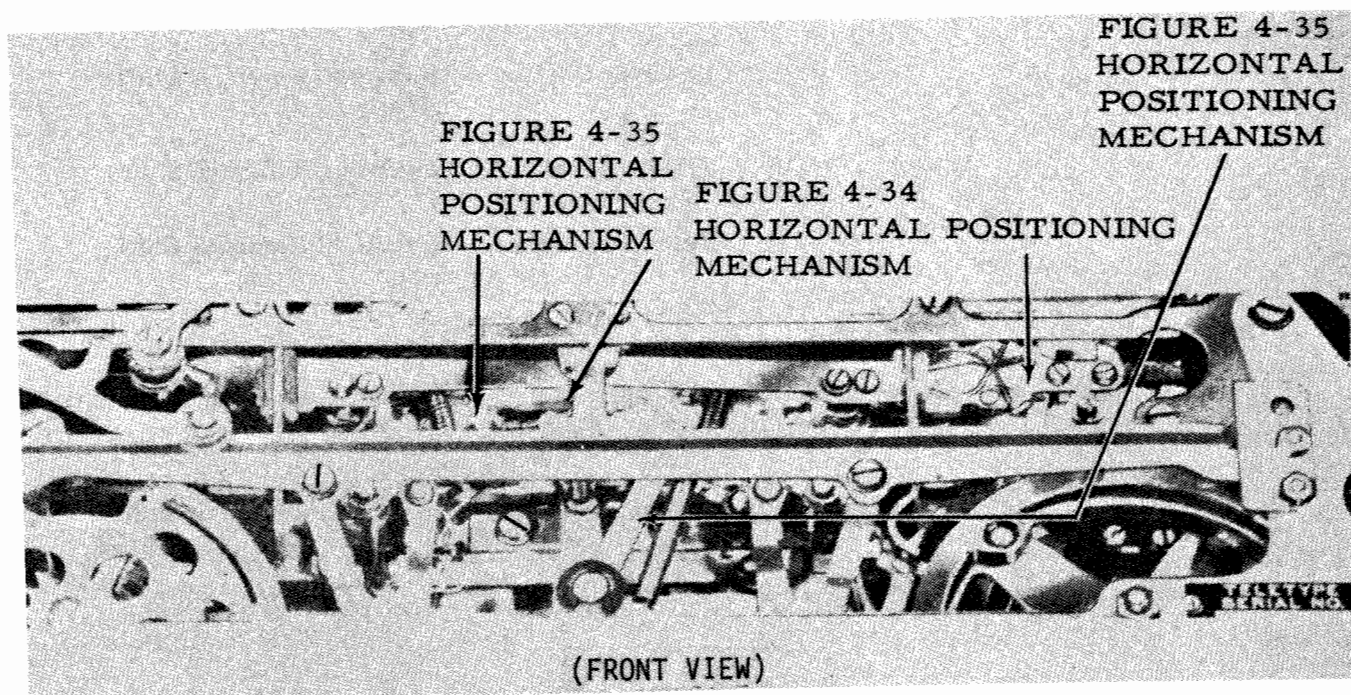


Figure 4-33. Horizontal Positioning Area

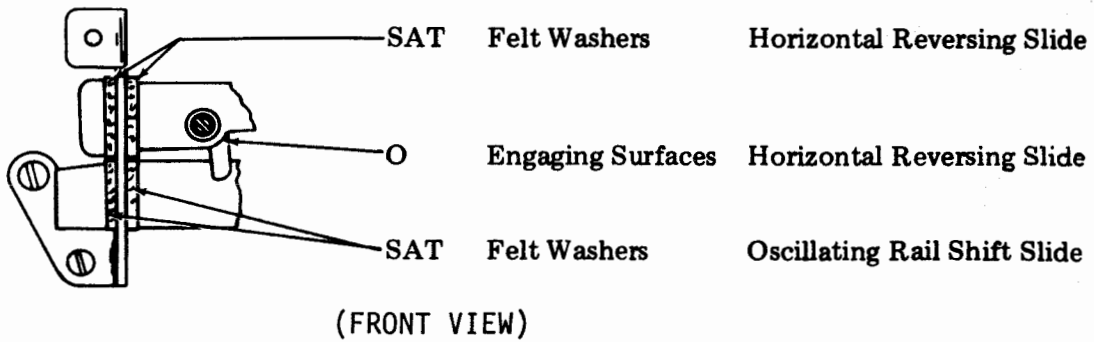
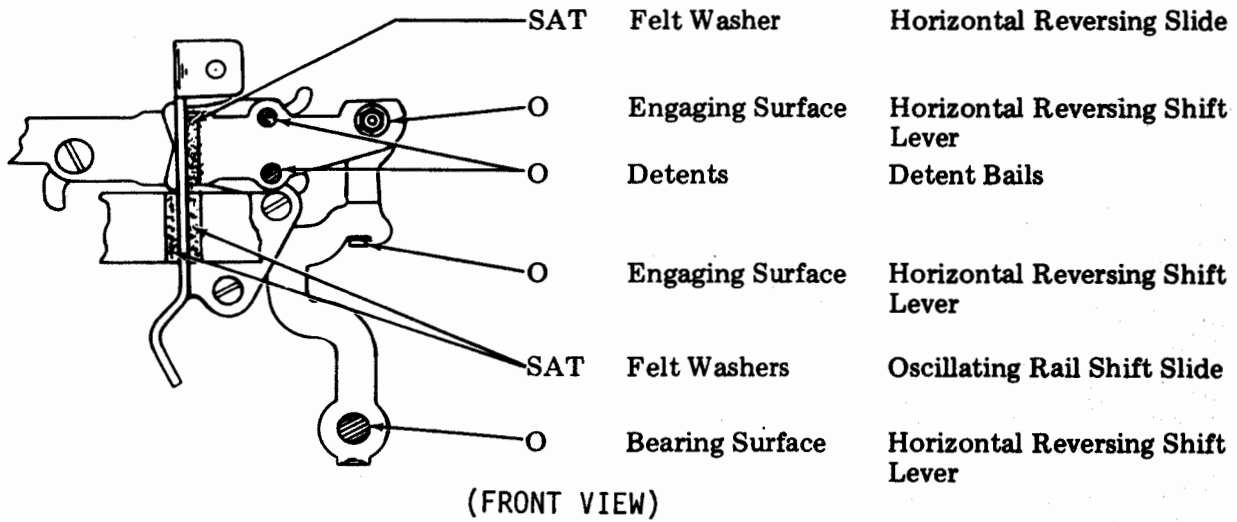


Figure 4-34. Horizontal Positioning Mechanism (A)

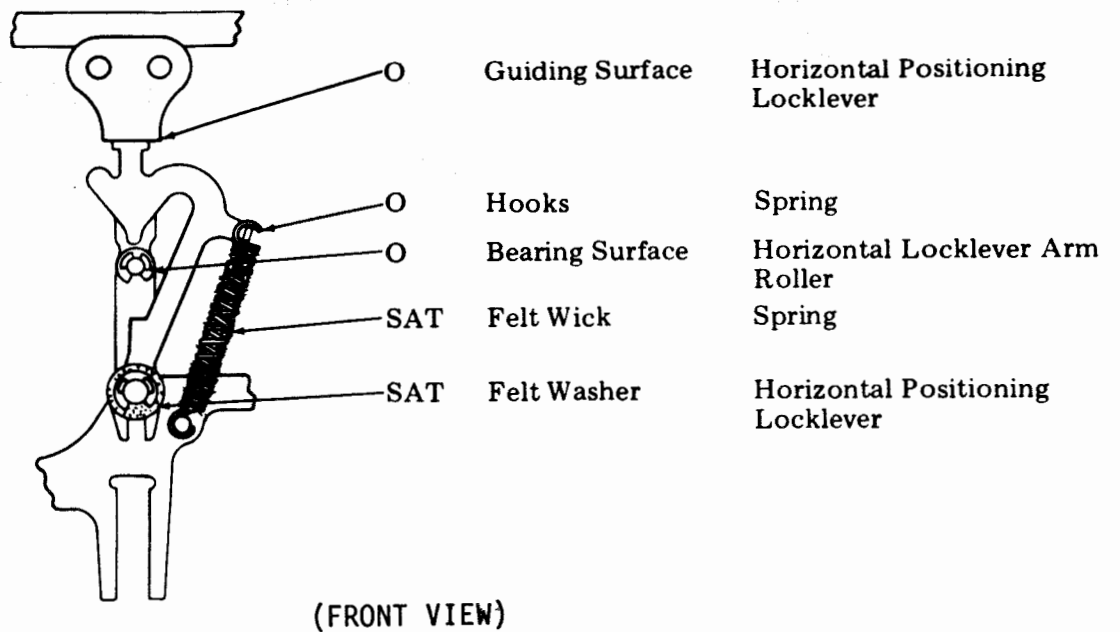
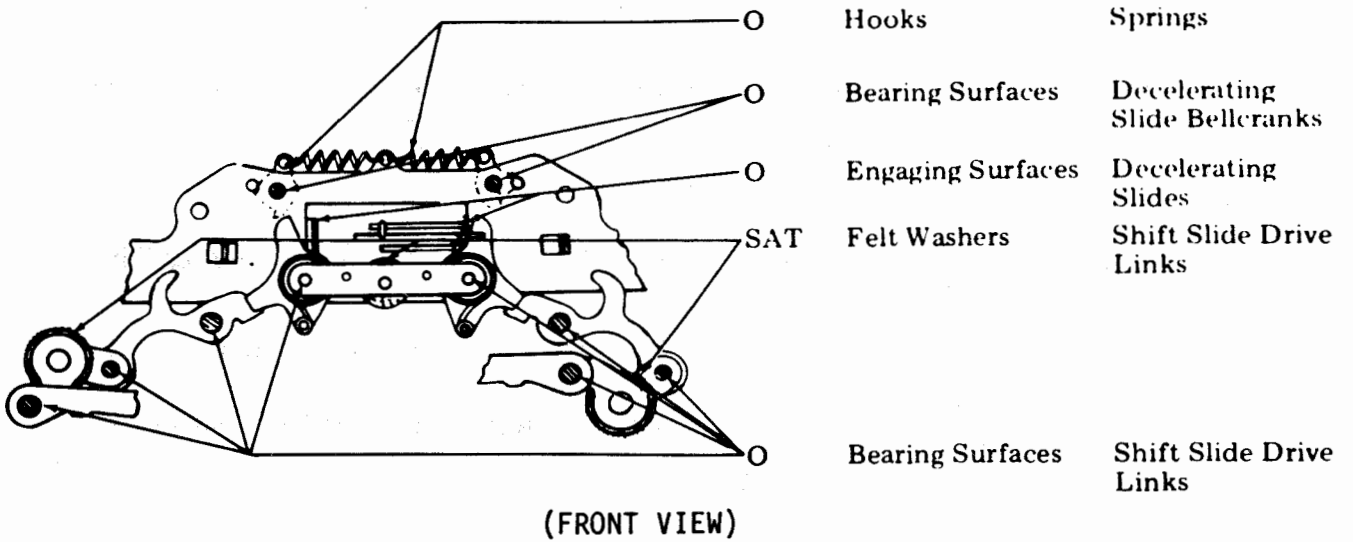
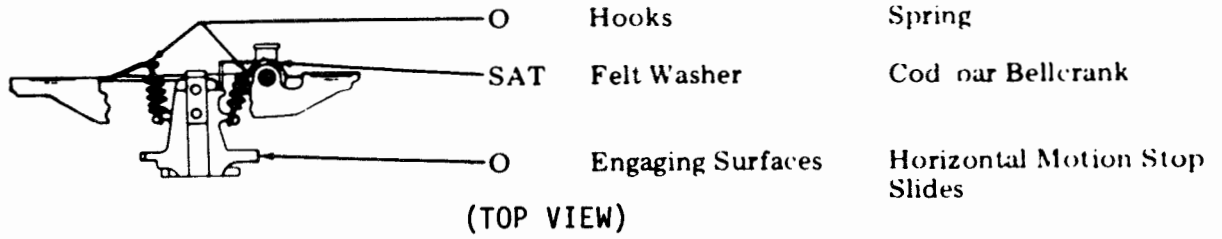


Figure 4-35. Horizontal Positioning Mechanism (B)

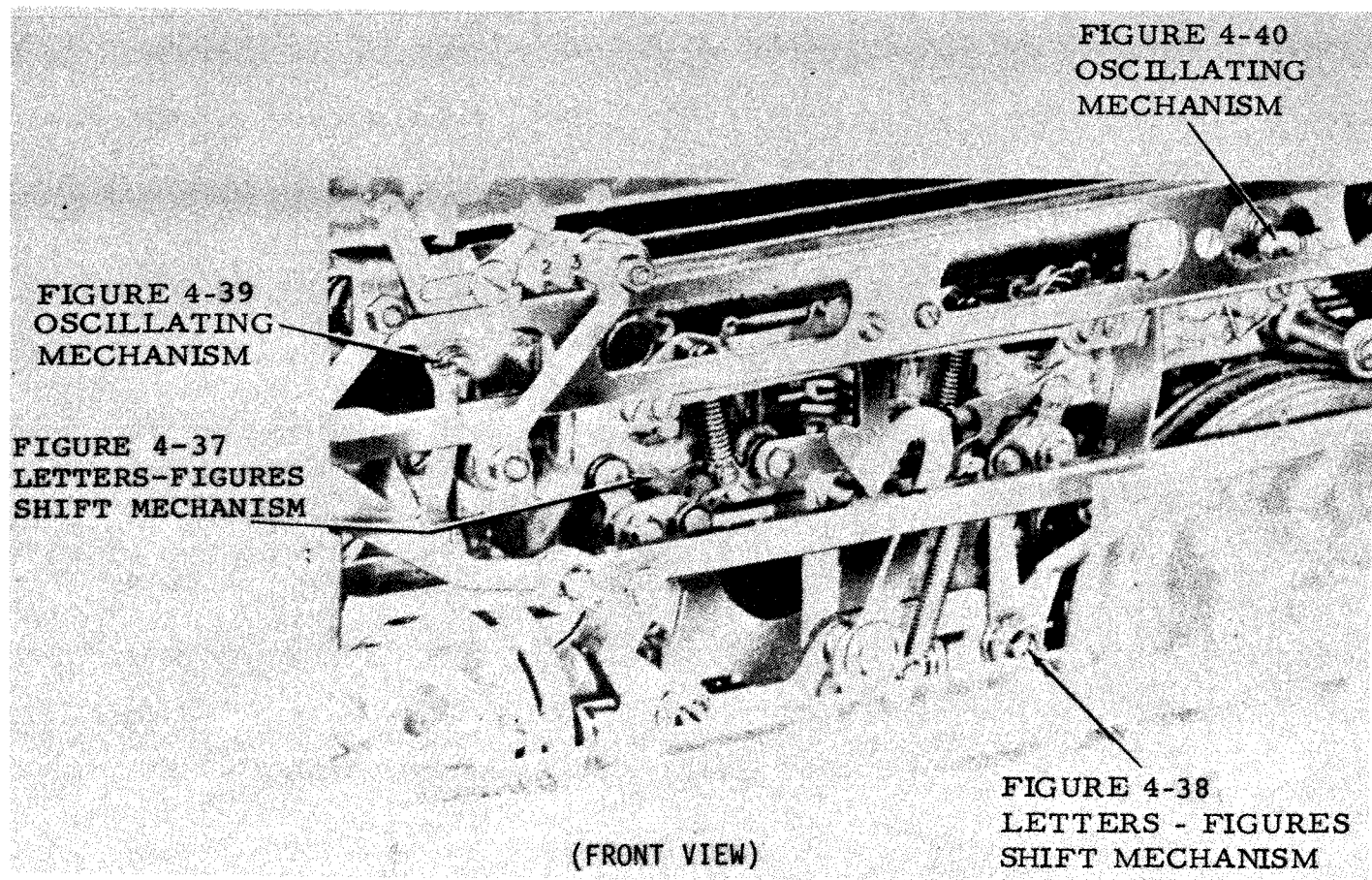


Figure 4-36. Letters-Figures Shift Area

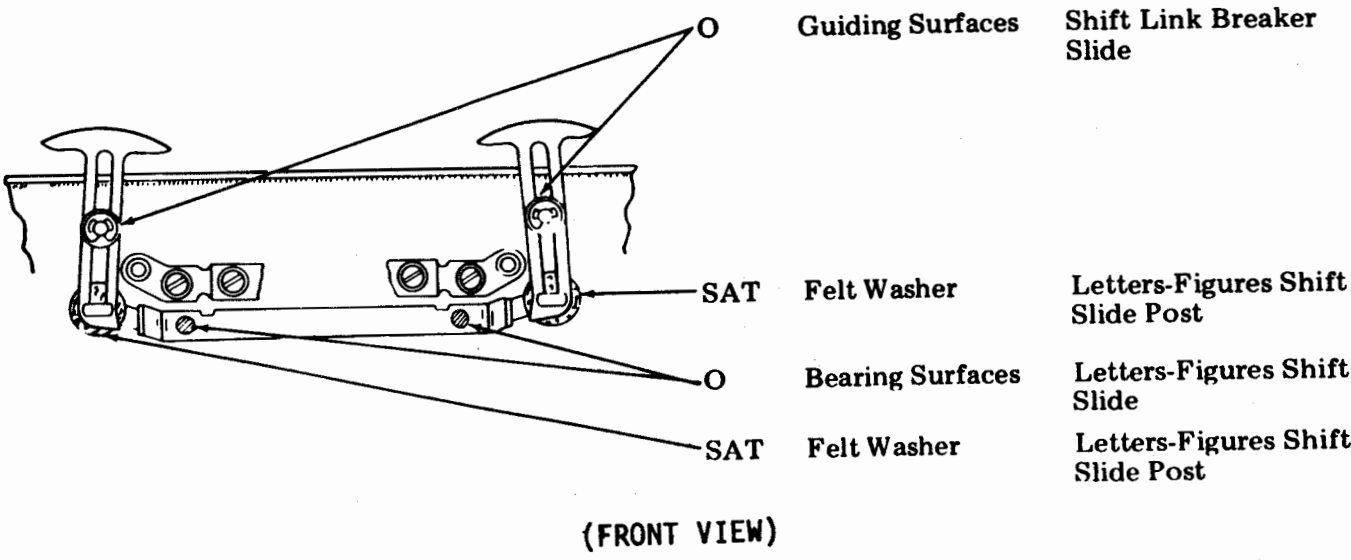
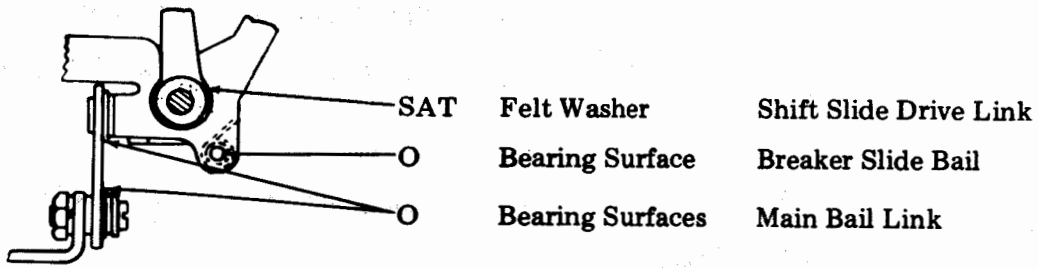
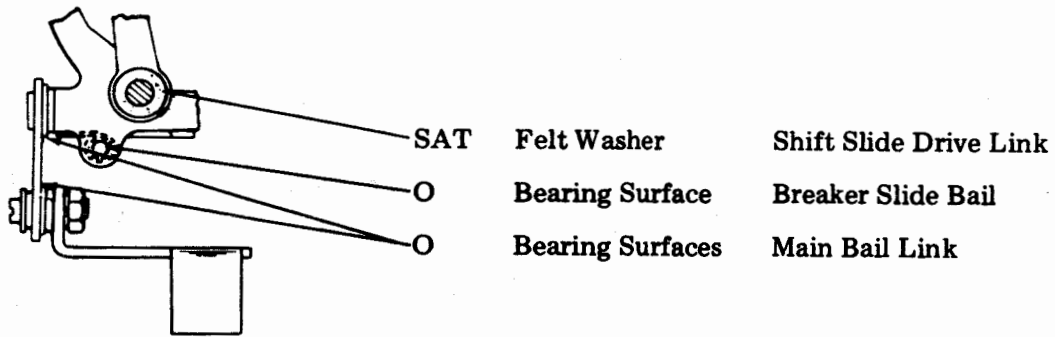


Figure 4-37. Letters-Figures Shift Mechanism (A)



(FRONT VIEW)



(FRONT VIEW)

Figure 4-38. Letters-Figures Shift Mechanism (B)

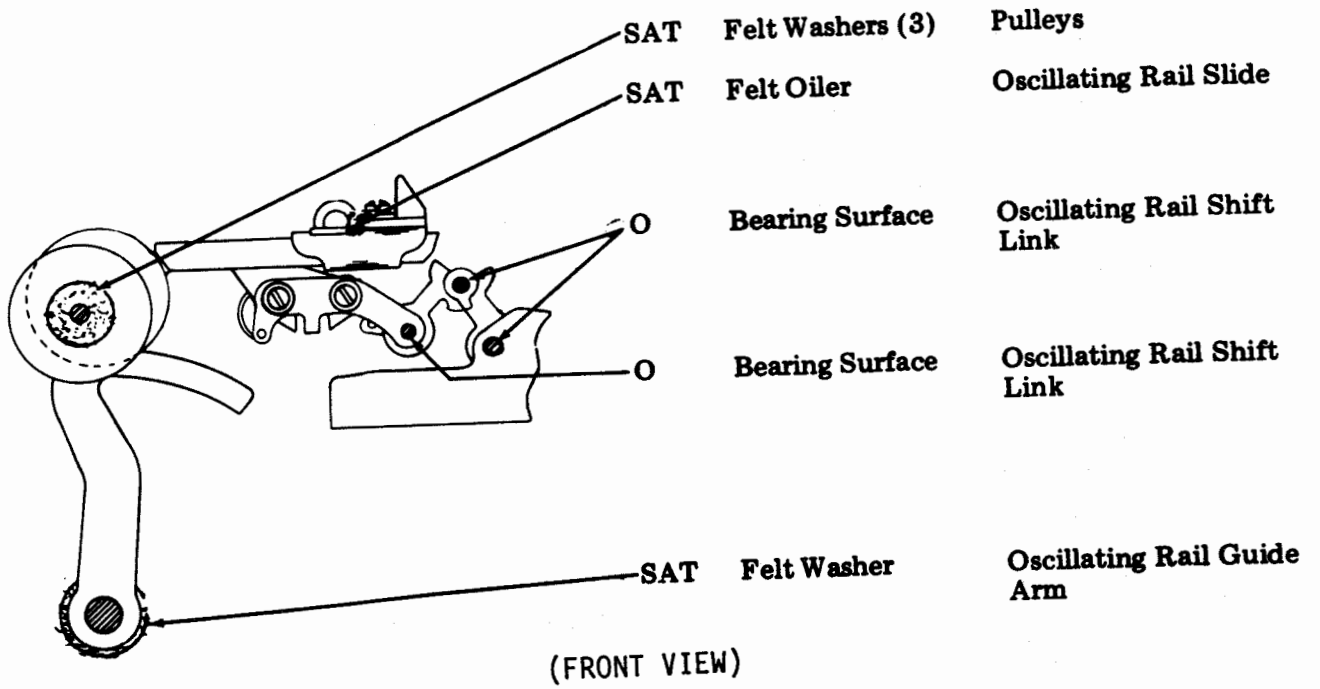


Figure 4-39. Oscillating Mechanism (A)

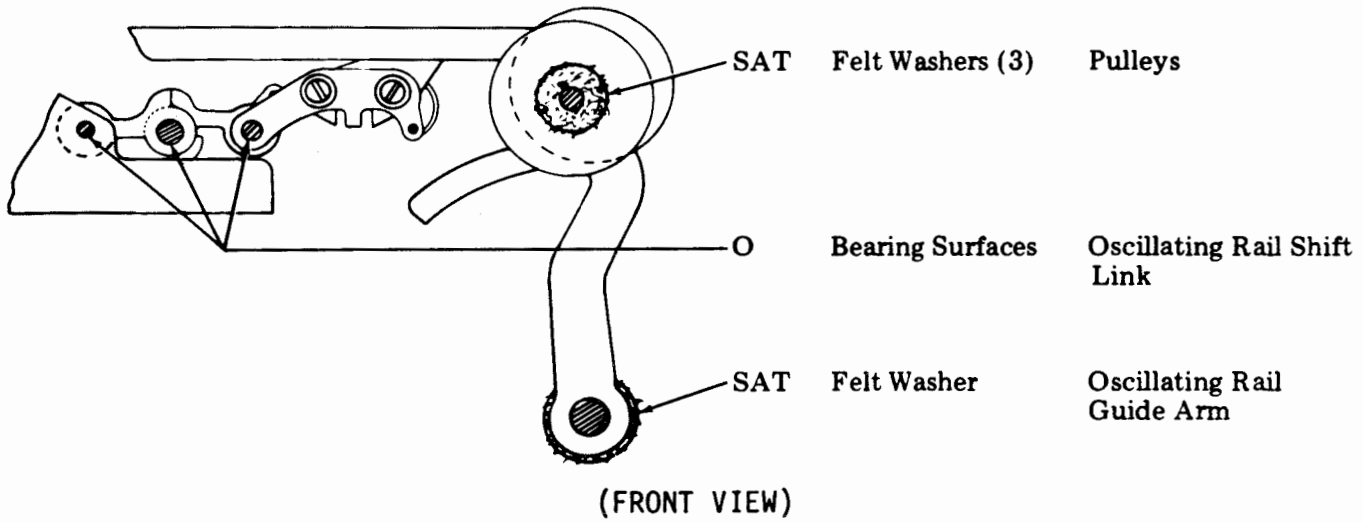
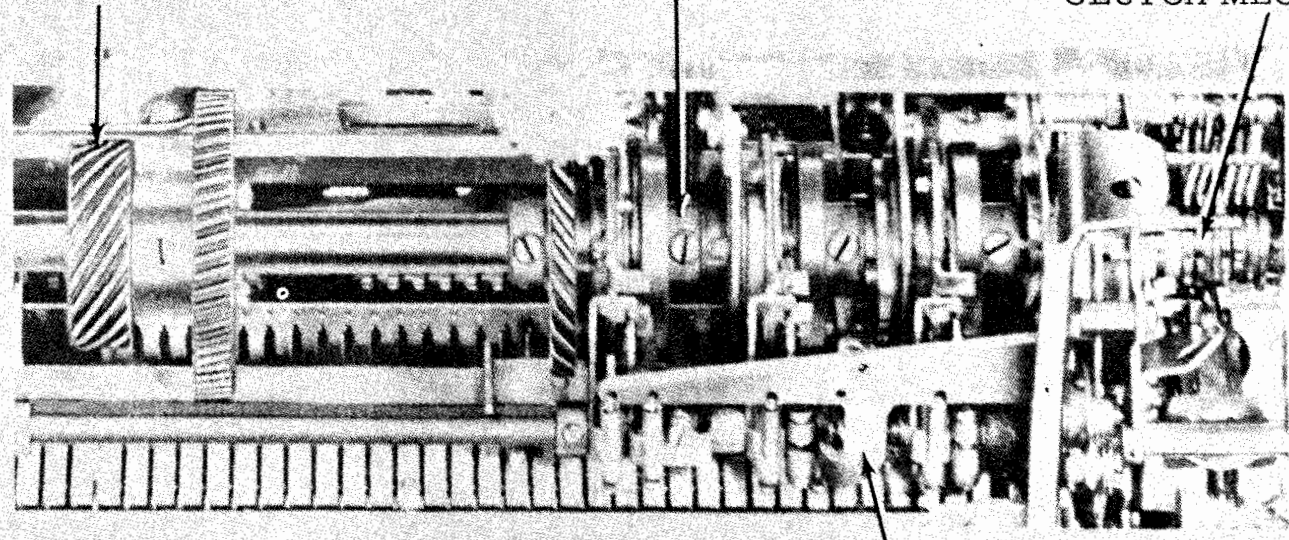


Figure 4-40. Oscillating Mechanism (B)

FIGURE 4-42
MAIN SHAFT
MECHANISM

FIGURE 4-43
MAIN SHAFT
MECHANISM

FIGURE 4-44
SELECTOR CAM
CLUTCH MECHANISM



(BOTTOM VIEW)

FIGURE 4-45
MAIN SHAFT -
CLUTCHES; GEARS

Figure 4-41. Main Shaft Area

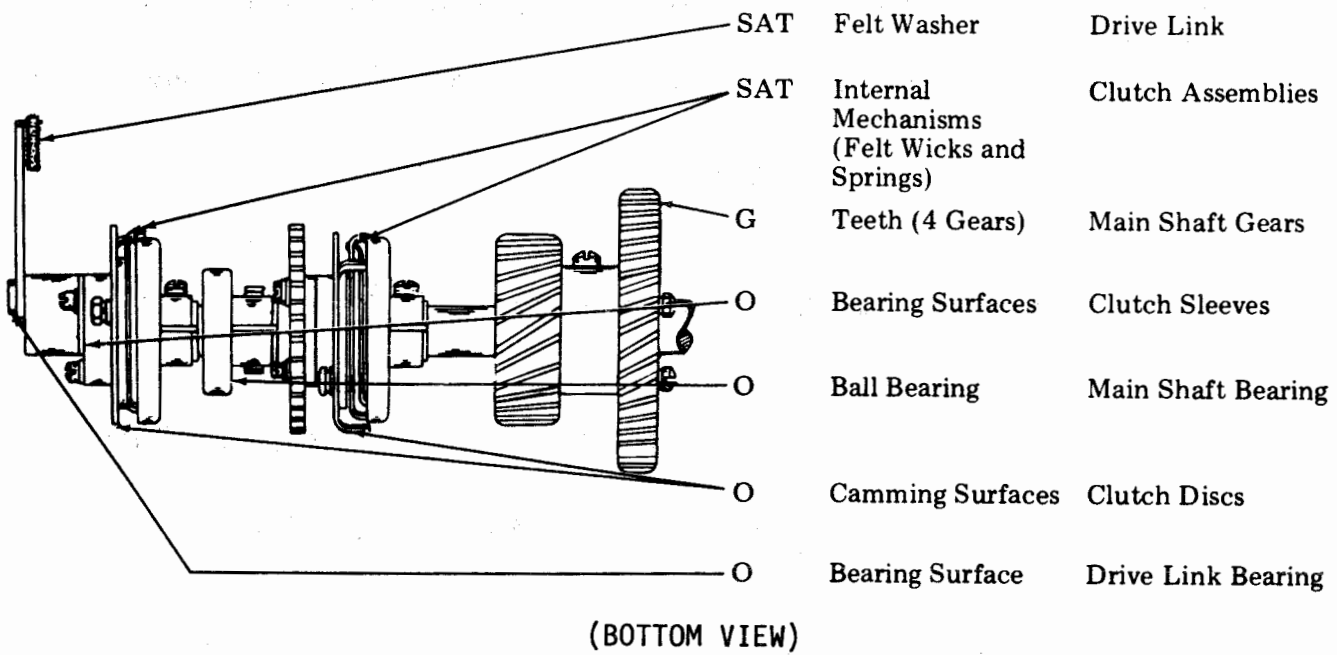


Figure 4-42. Main Shaft Mechanism (A)

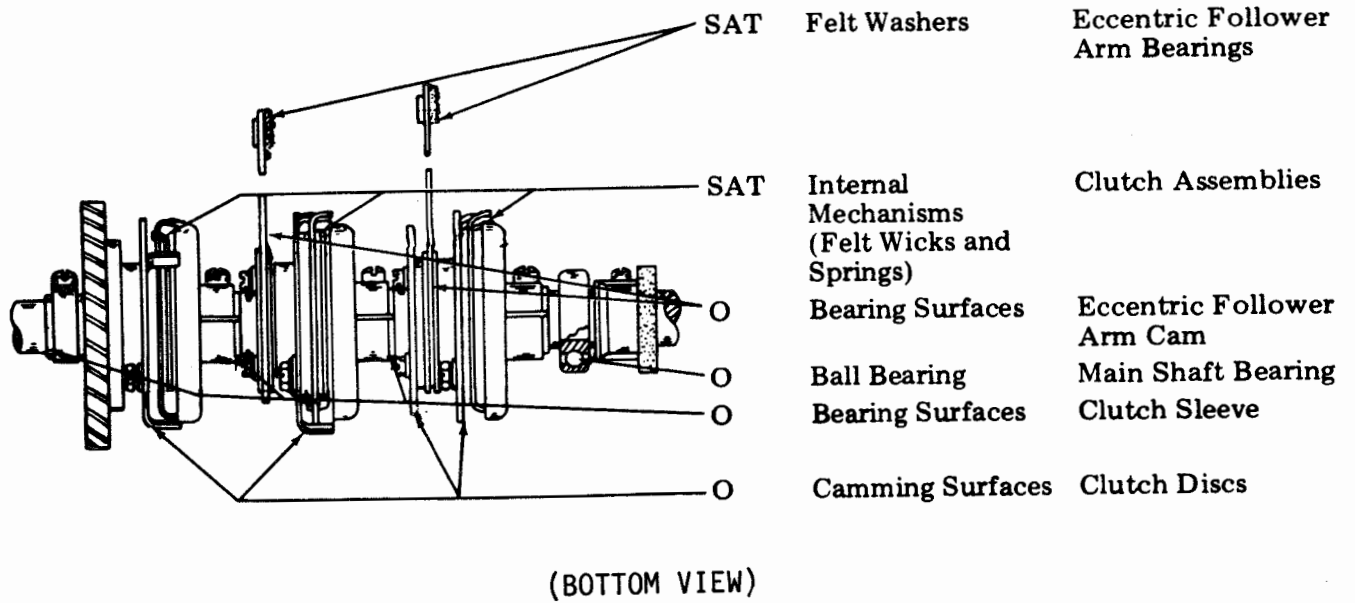


Figure 4-43. Main Shaft Mechanism (B)

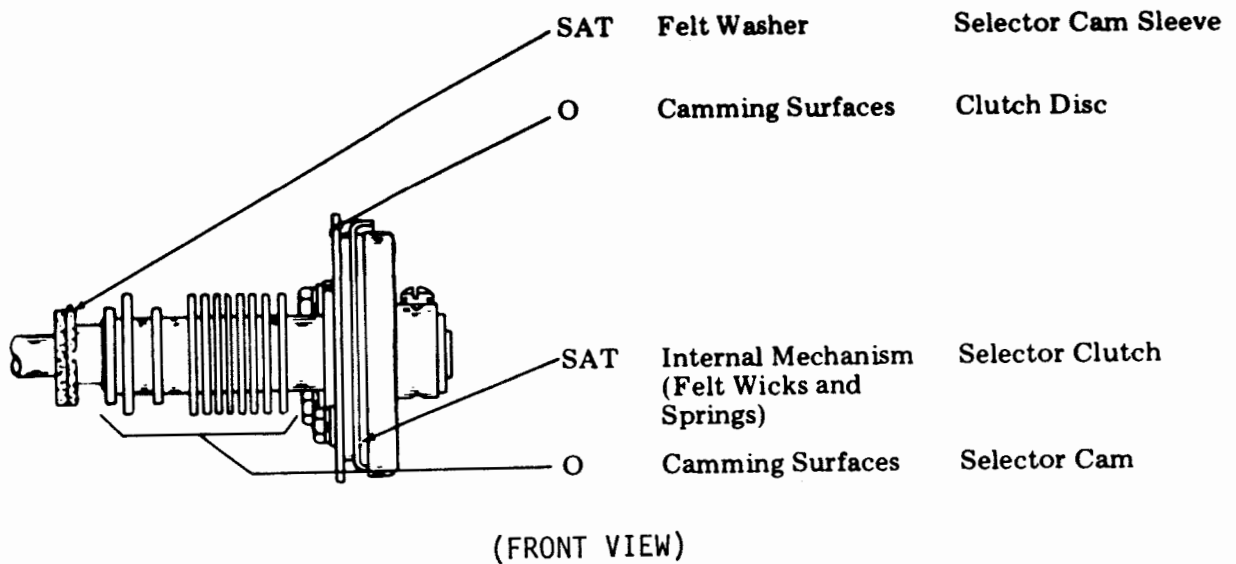


Figure 4-44. Selector Cam Clutch Assembly

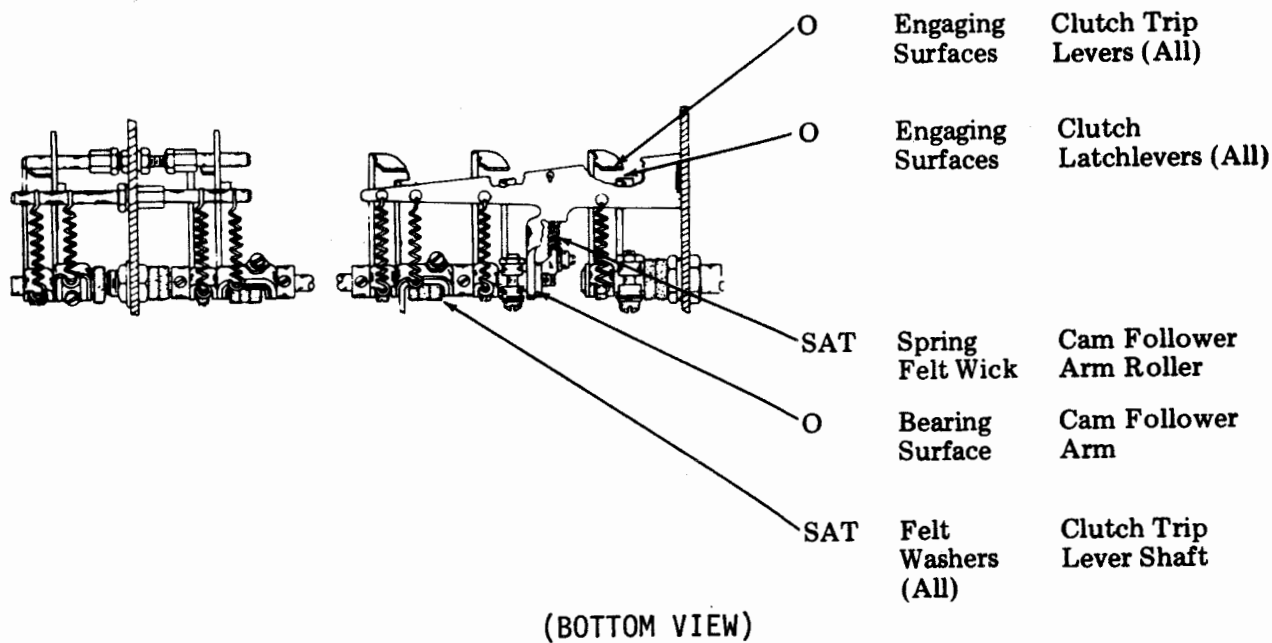
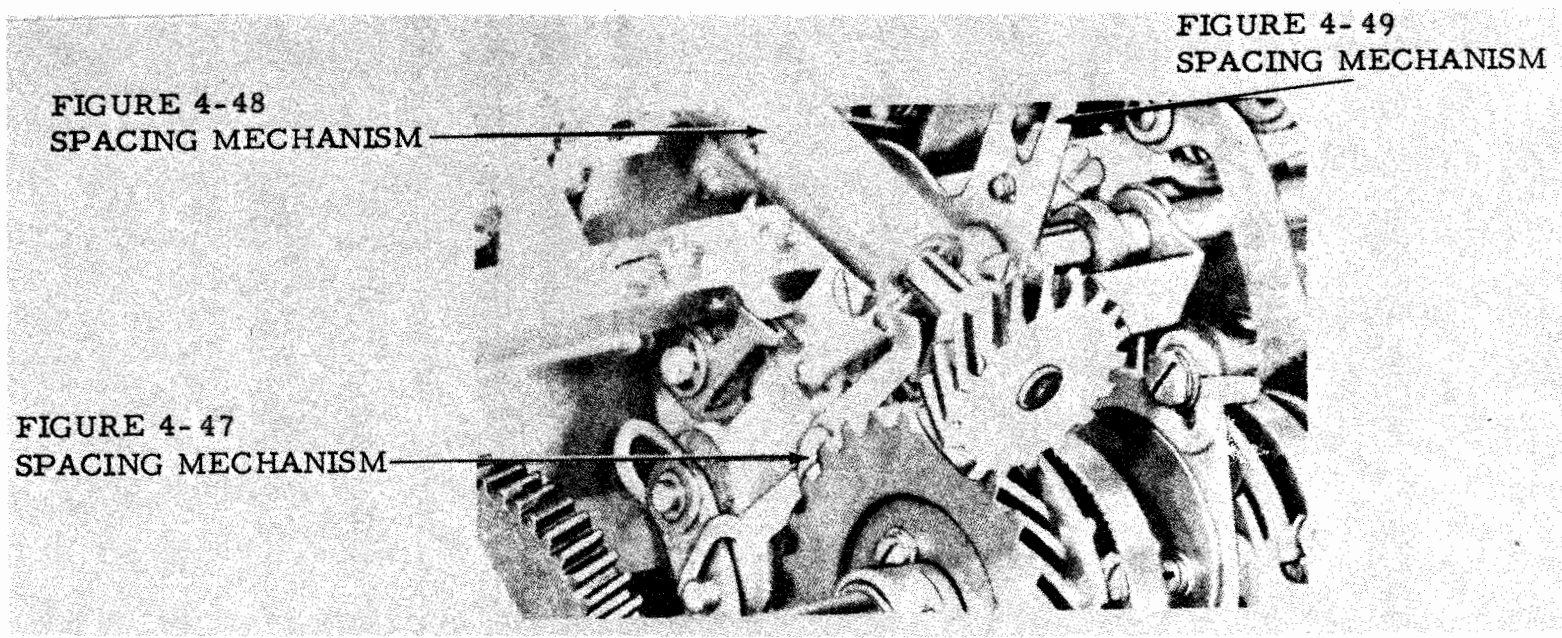


Figure 4-45. Main Shaft-Clutches; Gears



(BOTTOM VIEW)

Figure 4-46. Spacing Area

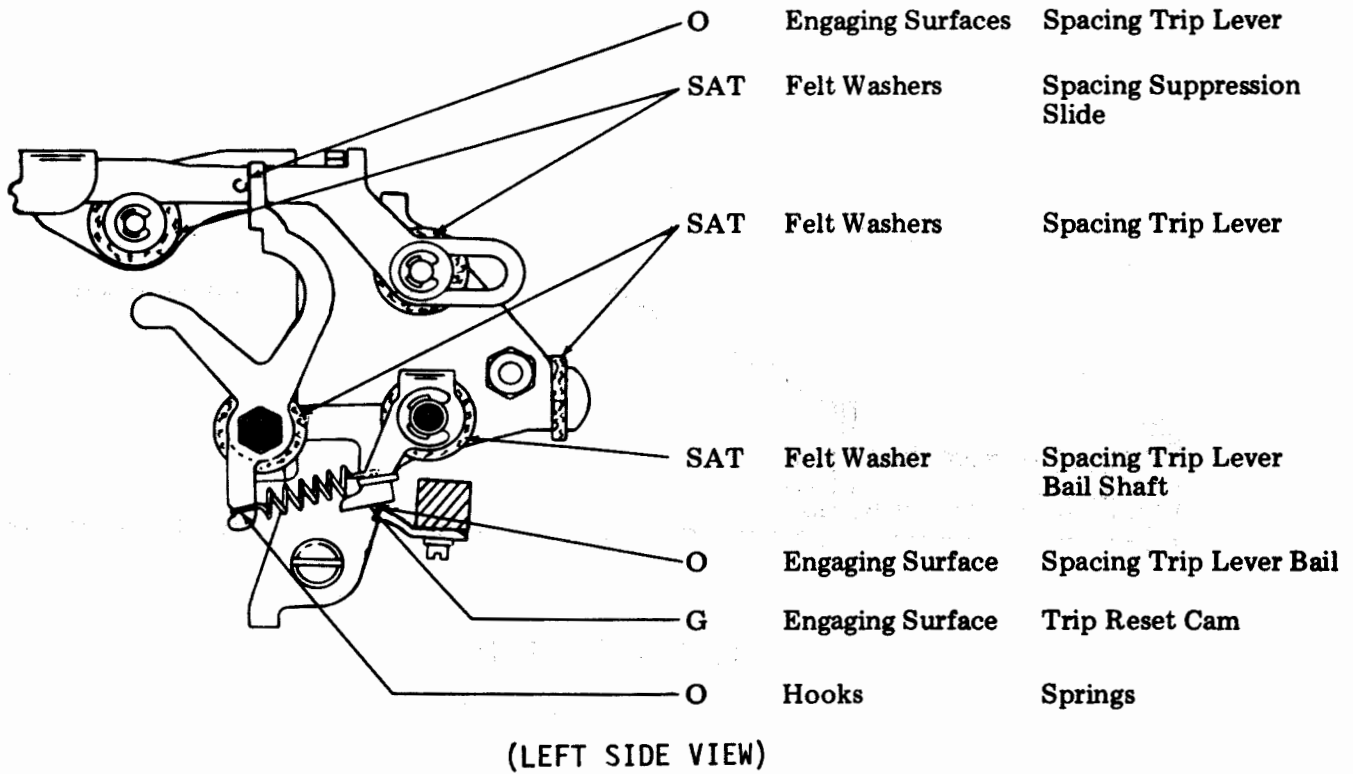


Figure 4-47. Spacing Mechanism (A)

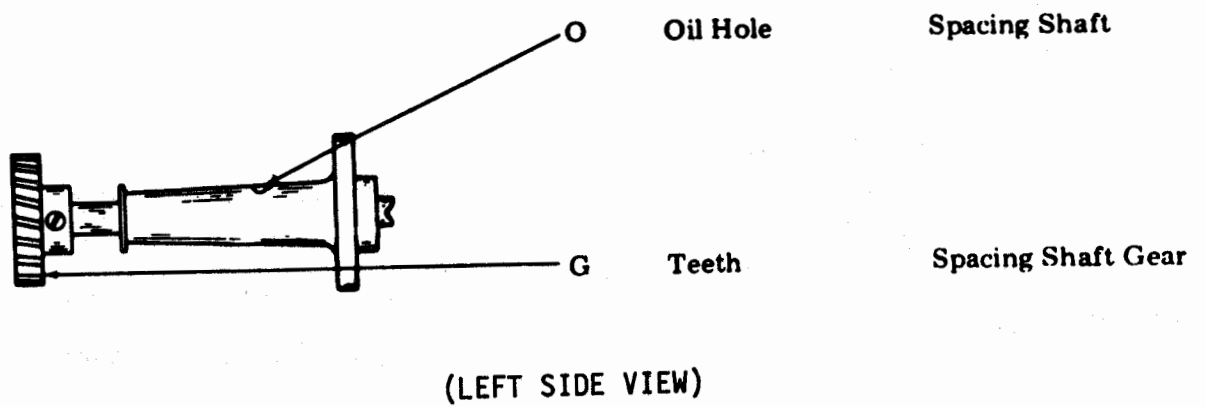


Figure 4-48. Spacing Mechanism (B)

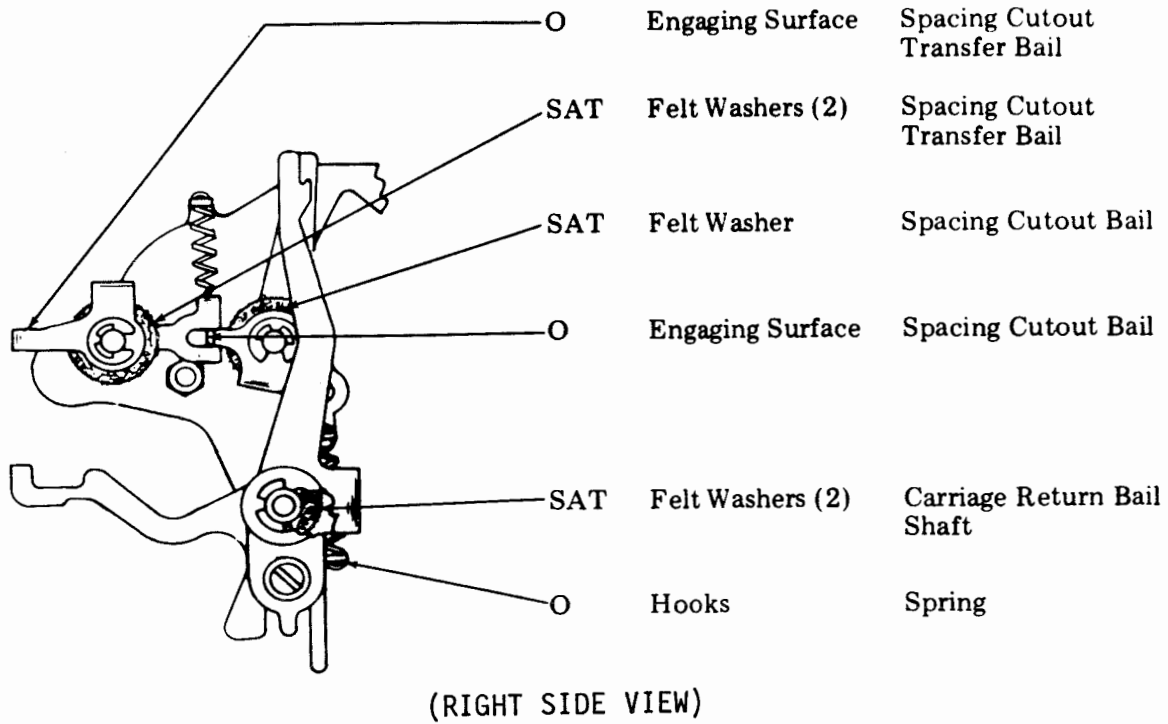


Figure 4-49. Spacing Mechanism (C)

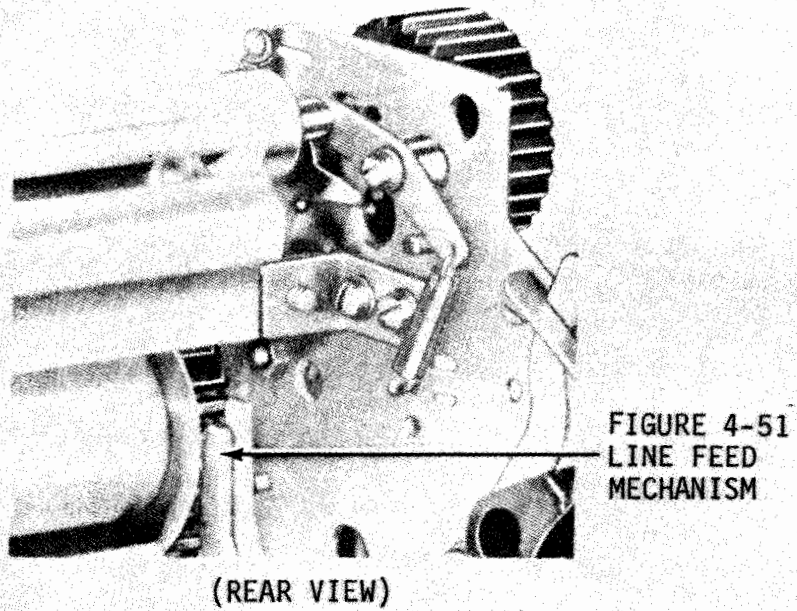


Figure 4-50. Line Feed Area (A)

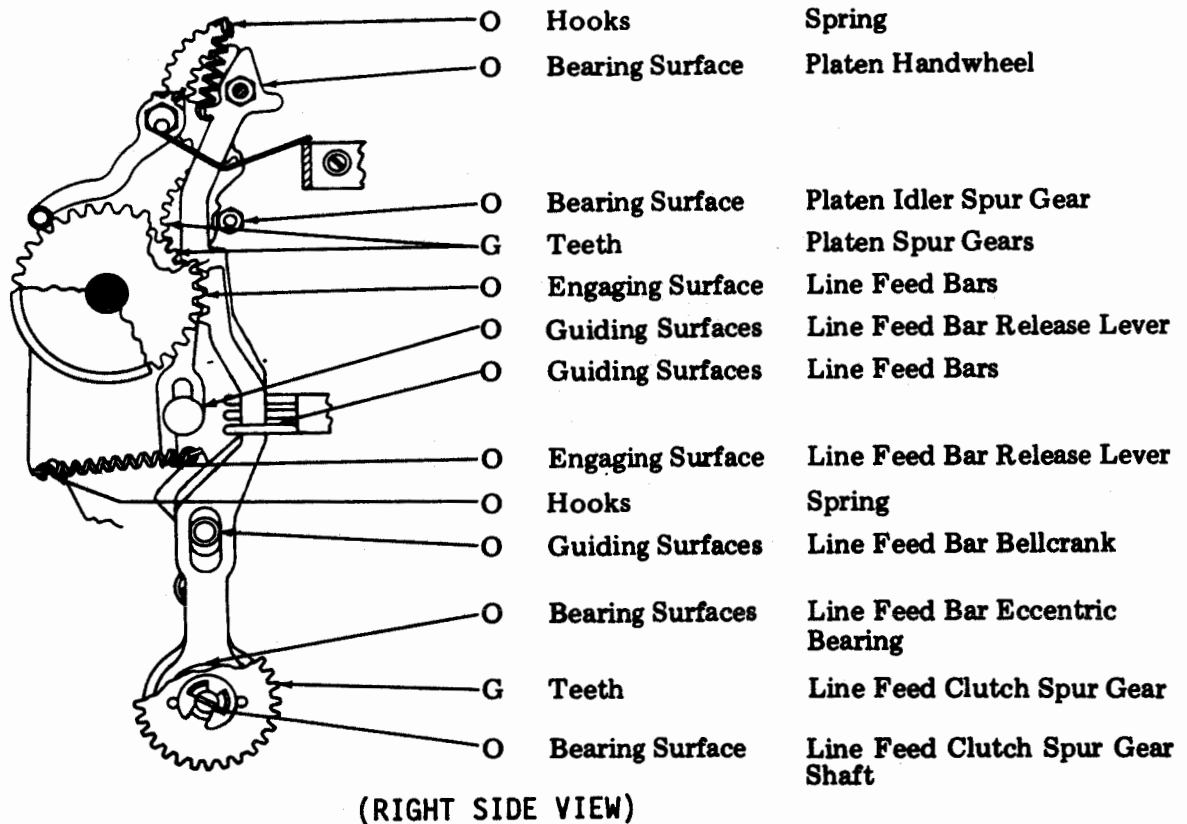


Figure 4-51. Line Feed Mechanism (A)

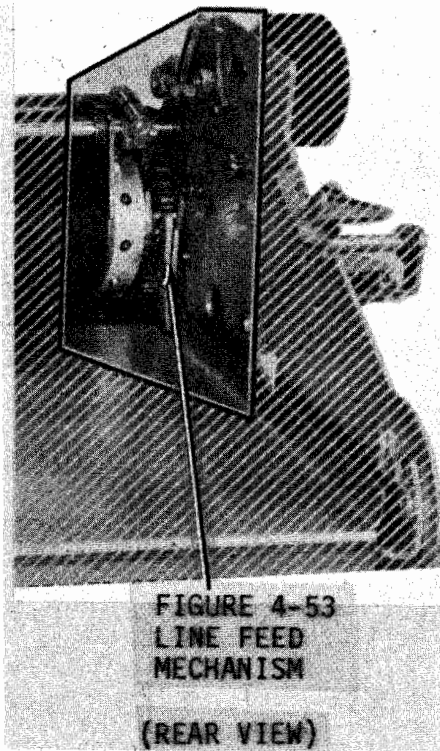


FIGURE 4-53
LINE FEED
MECHANISM
(REAR VIEW)

Figure 4-52. Line Feed Area (B)

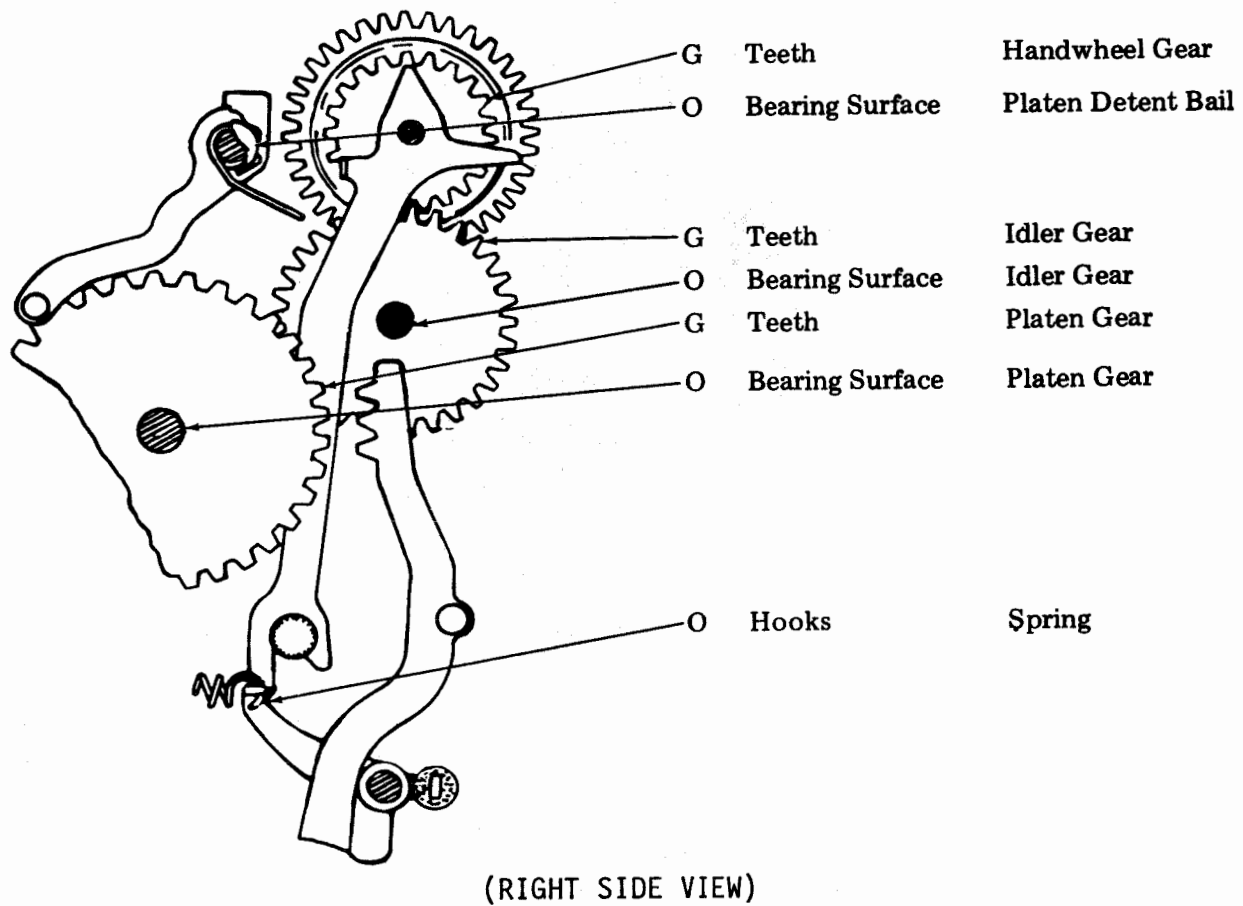


Figure 4-53. Line Feed Mechanism (B)

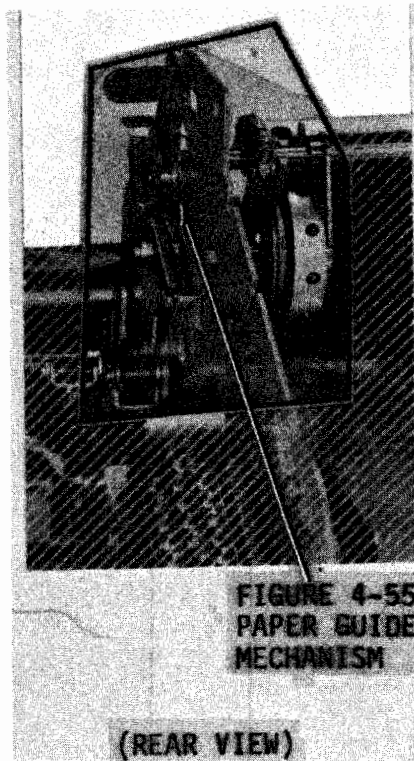


Figure 4-54. Paper Guide Area

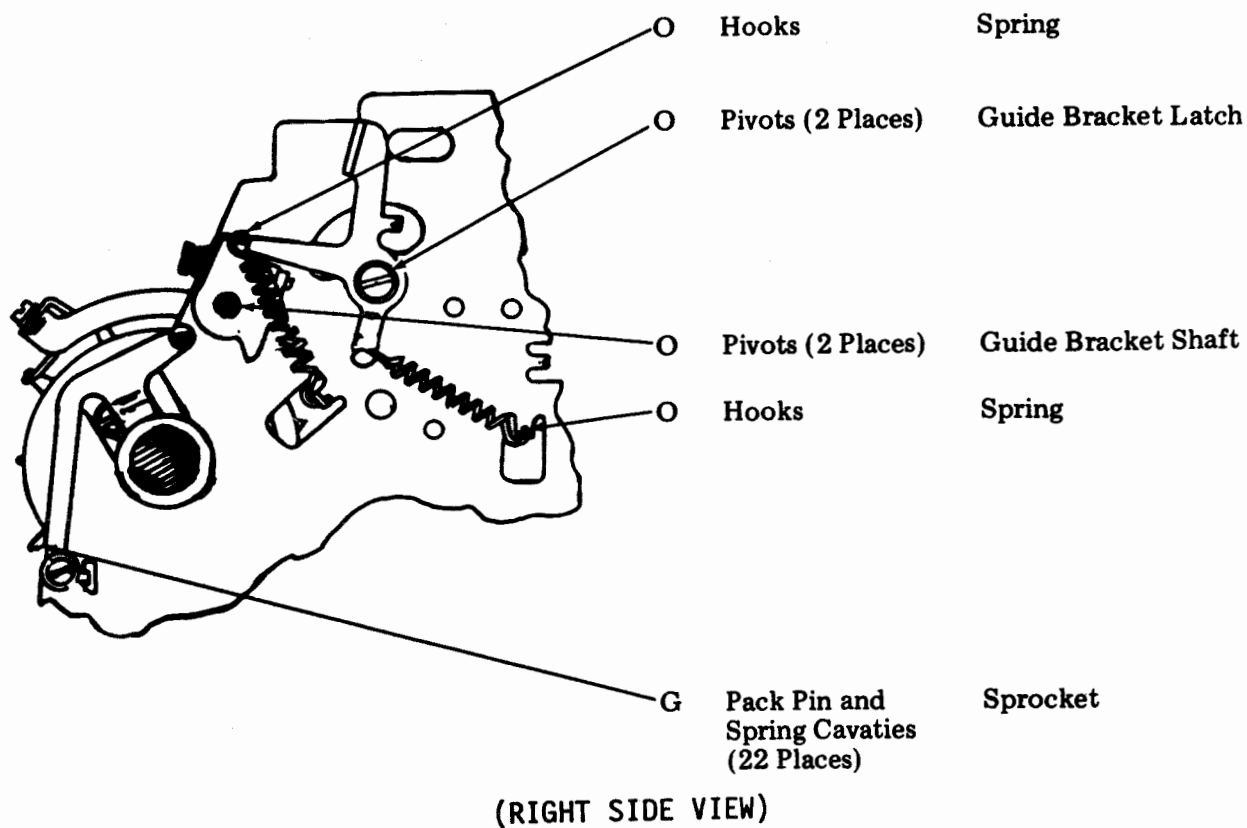


Figure 4-55. Paper Guide Mechanism

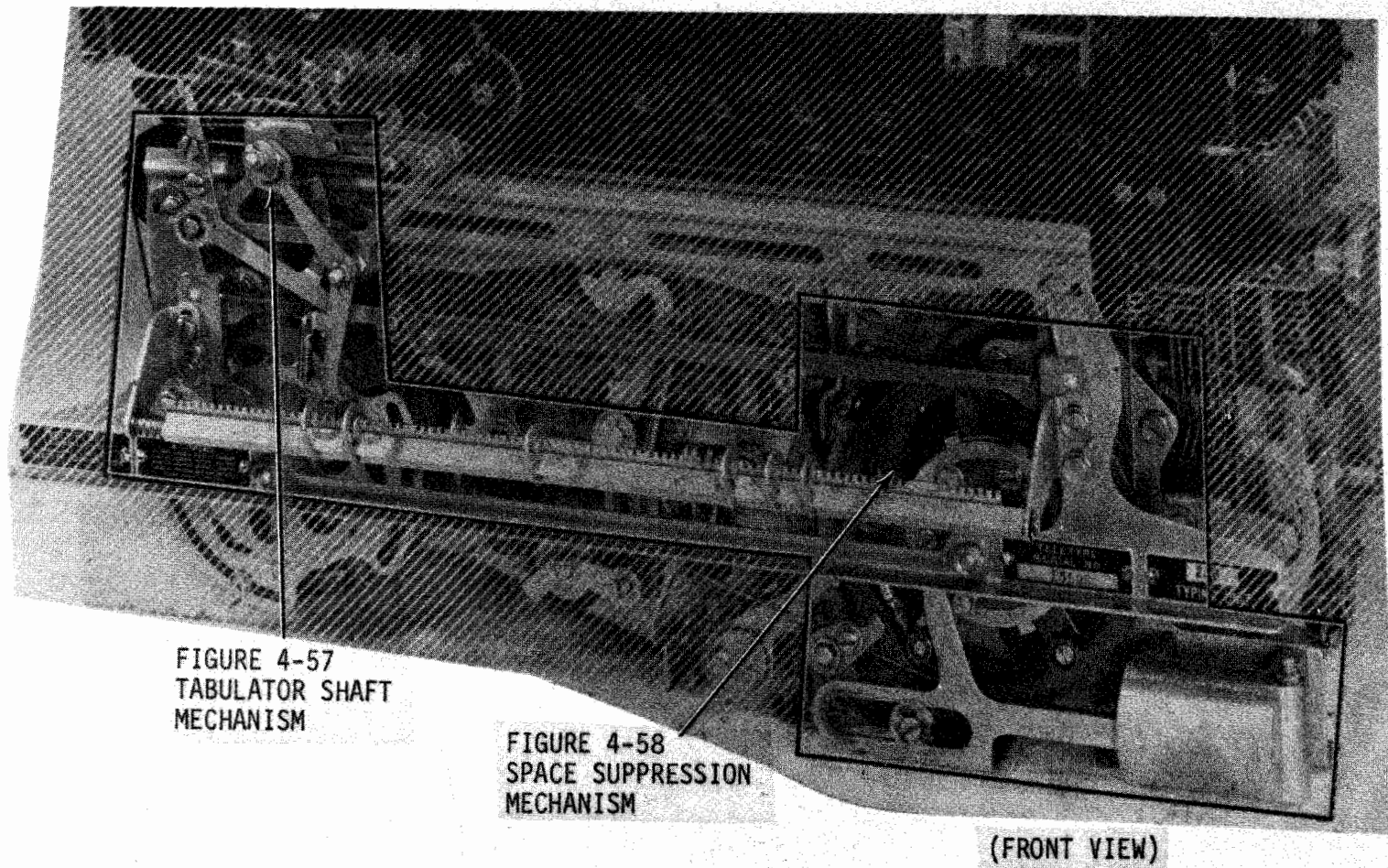


FIGURE 4-57
TABULATOR SHAFT
MECHANISM

FIGURE 4-58
SPACE SUPPRESSION
MECHANISM

(FRONT VIEW)

Figure 4-56. Horizontal Tabulator Mechanism (Early Design)

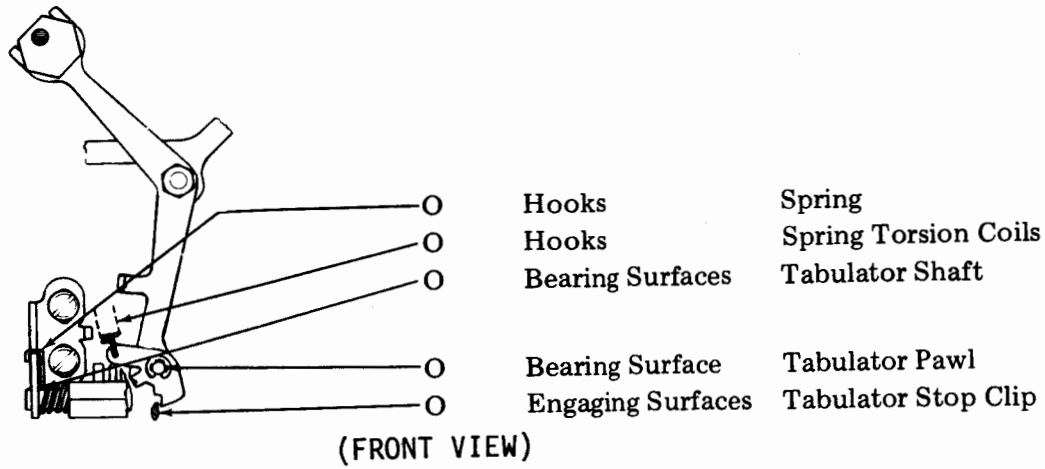


Figure 4-57. Tabulator Shaft Mechanism

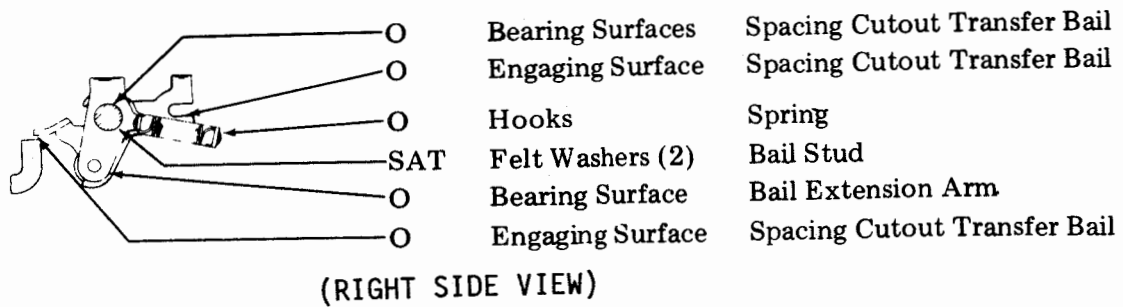


Figure 4-58. Space Suppression Mechanism

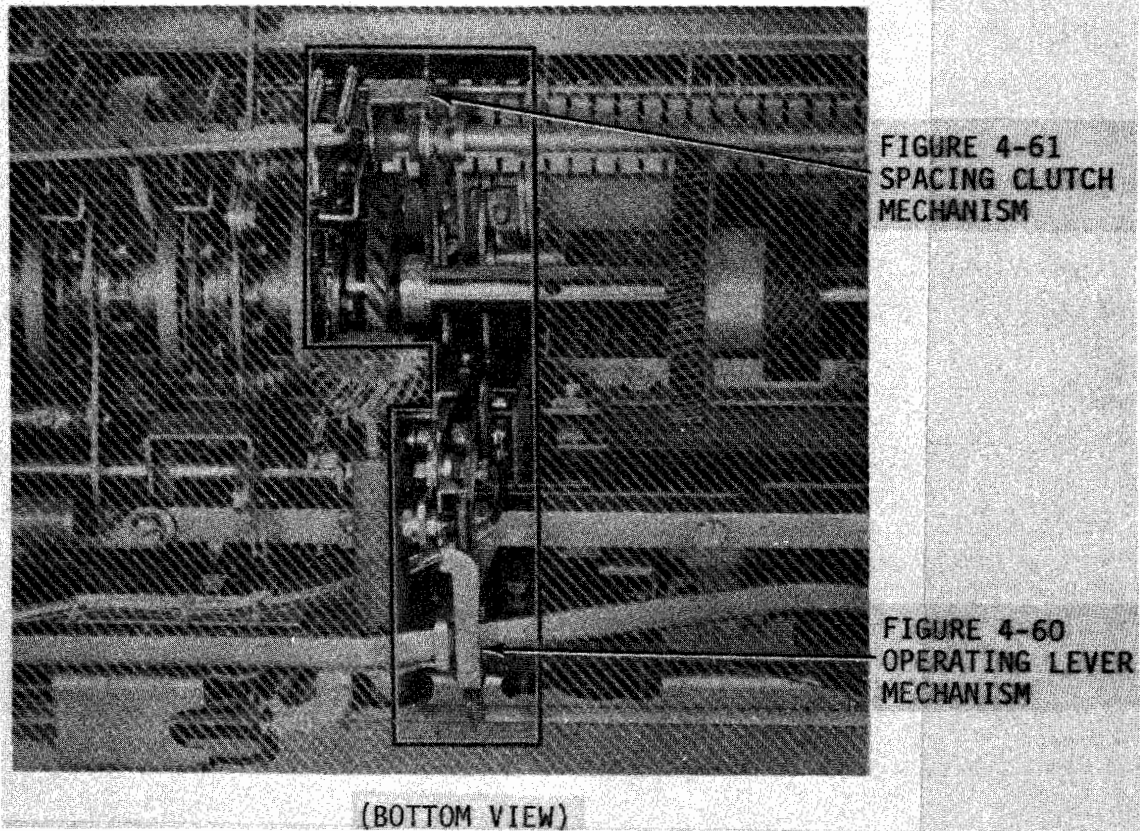


Figure 4-59. Horizontal Tabulator Mechanism (Early Design)

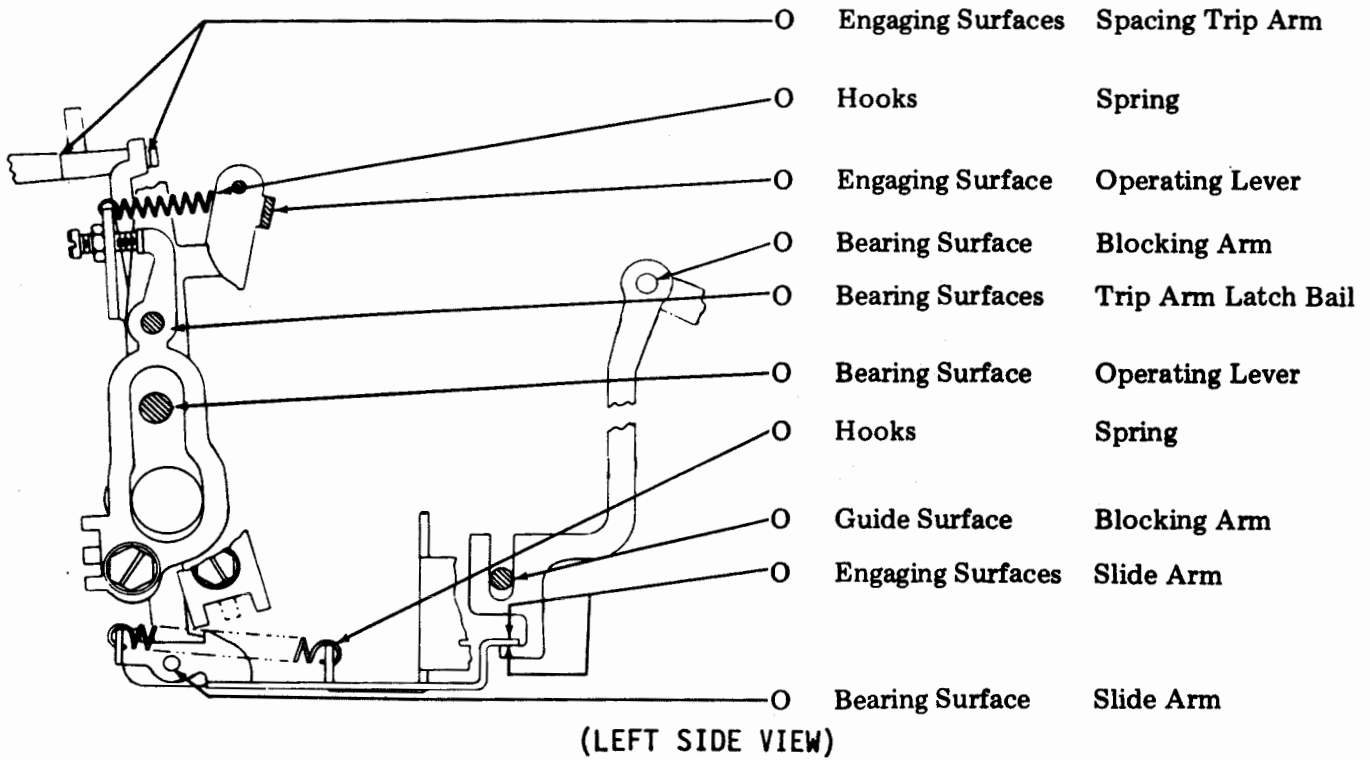


Figure 4-60. Operating Lever Mechanism

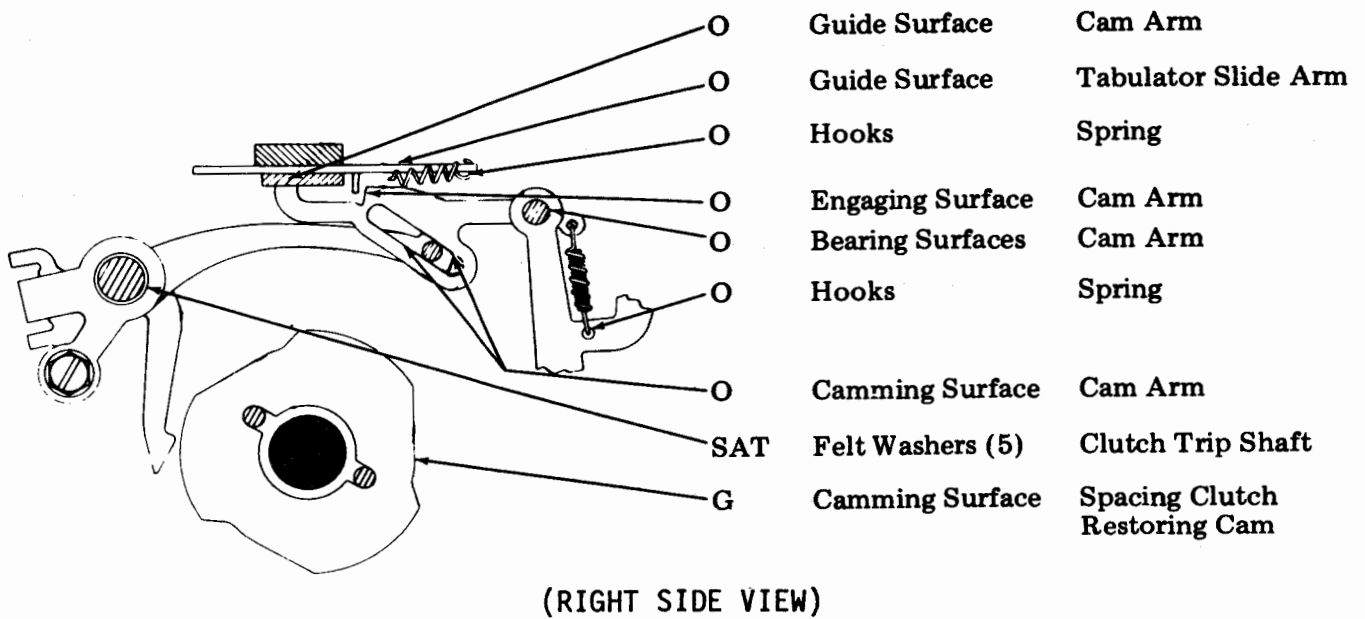


Figure 4-61. Spacing Clutch Mechanism

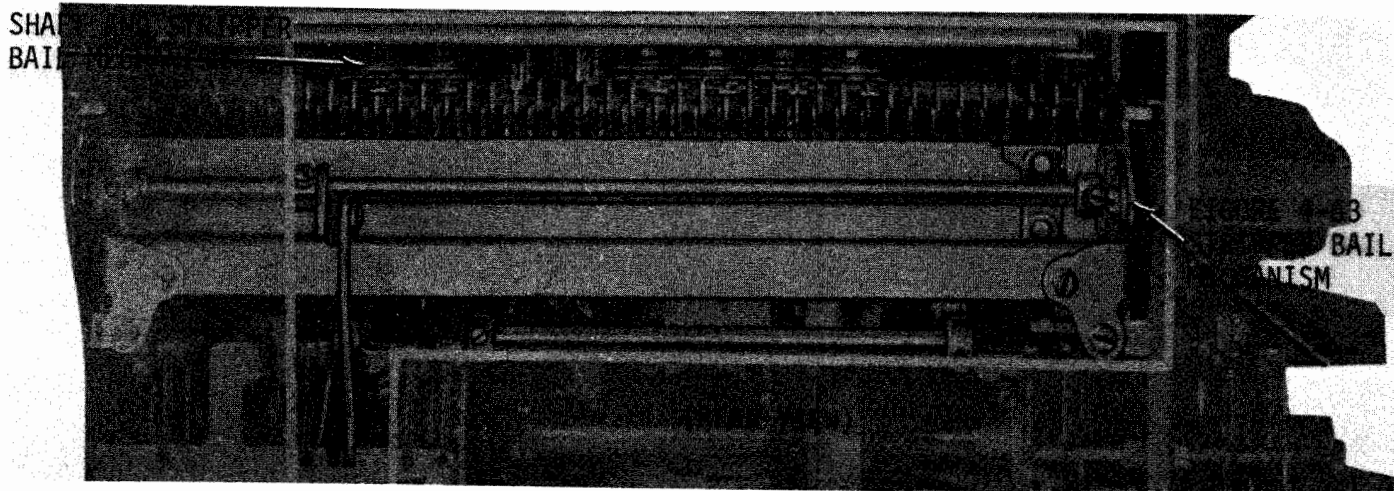


Figure 4-62. Selective Calling Mechanism

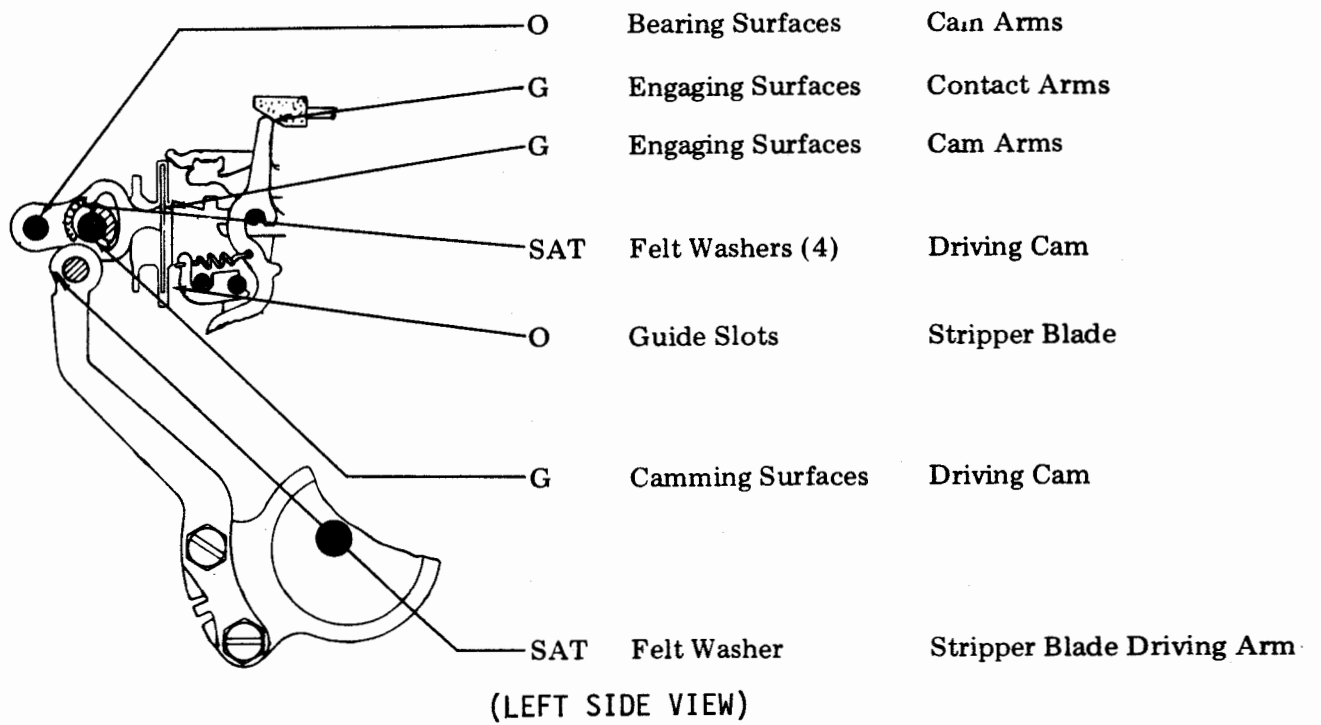


Figure 4-63. Stripper Bail Mechanism

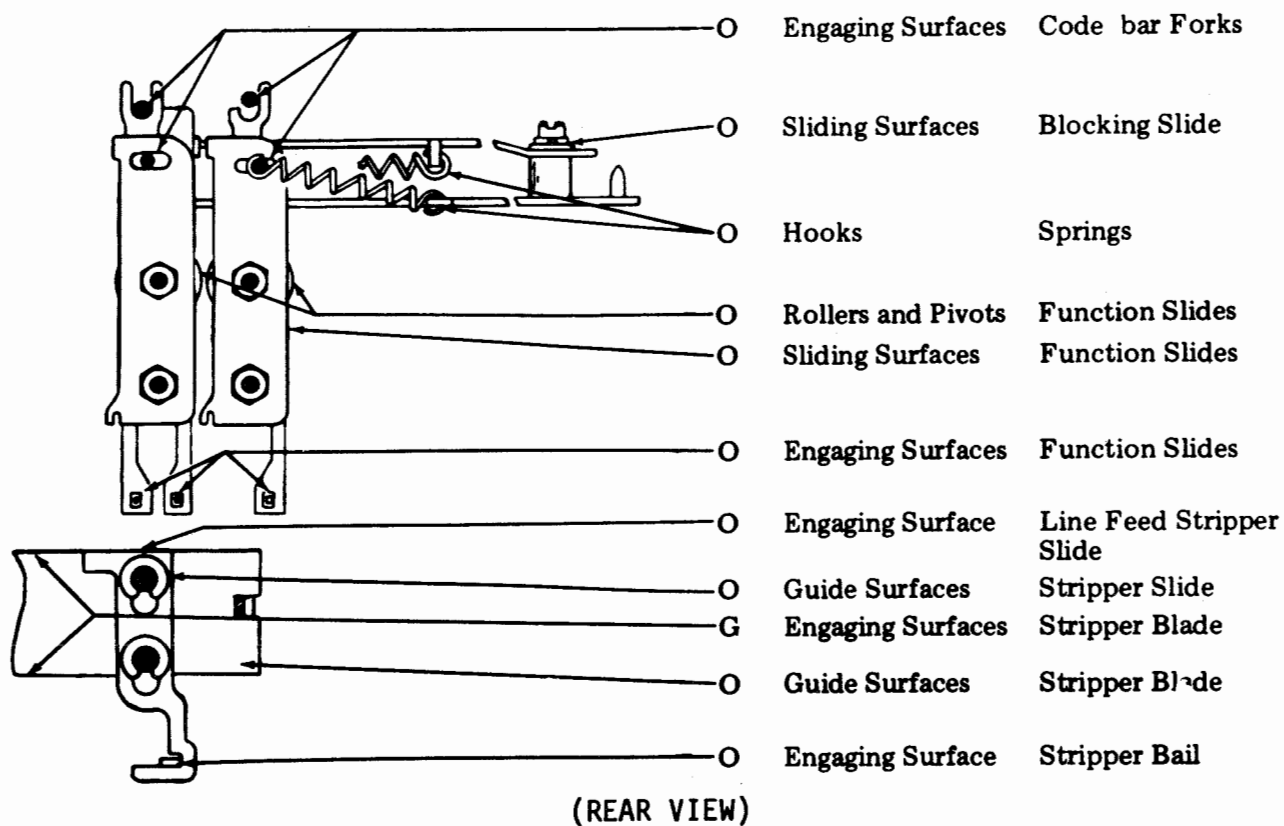


Figure 4-64. Shift and Stripper Bail Mechanism

FIGURE 4-66
SINGLE-DOUBLE
LINE FEED MECHANISM

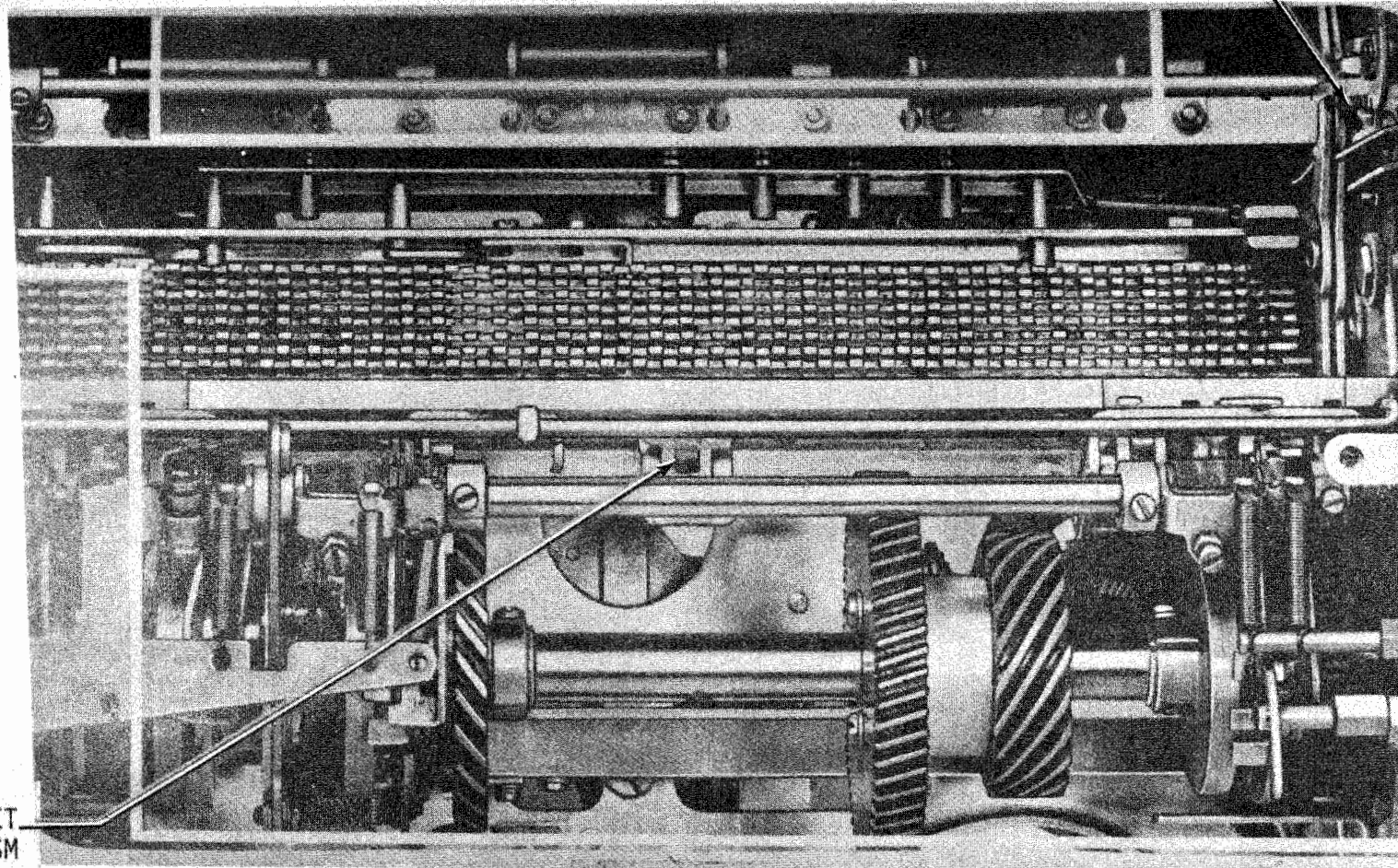


FIGURE 4-67
FUNCTION RESET
BAIL MECHANISM

(REAR VIEW)

Figure 4-65. Selective Calling Mechanism

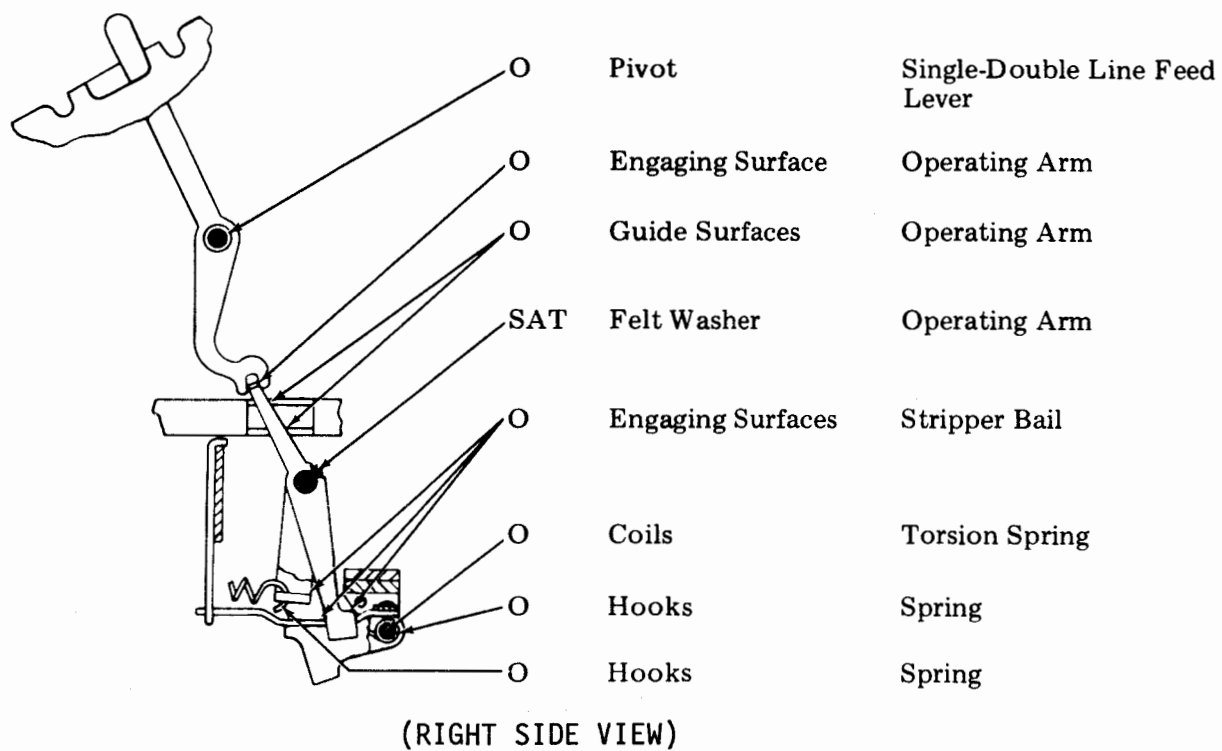


Figure 4-66. Single-Double Line Feed Mechanism

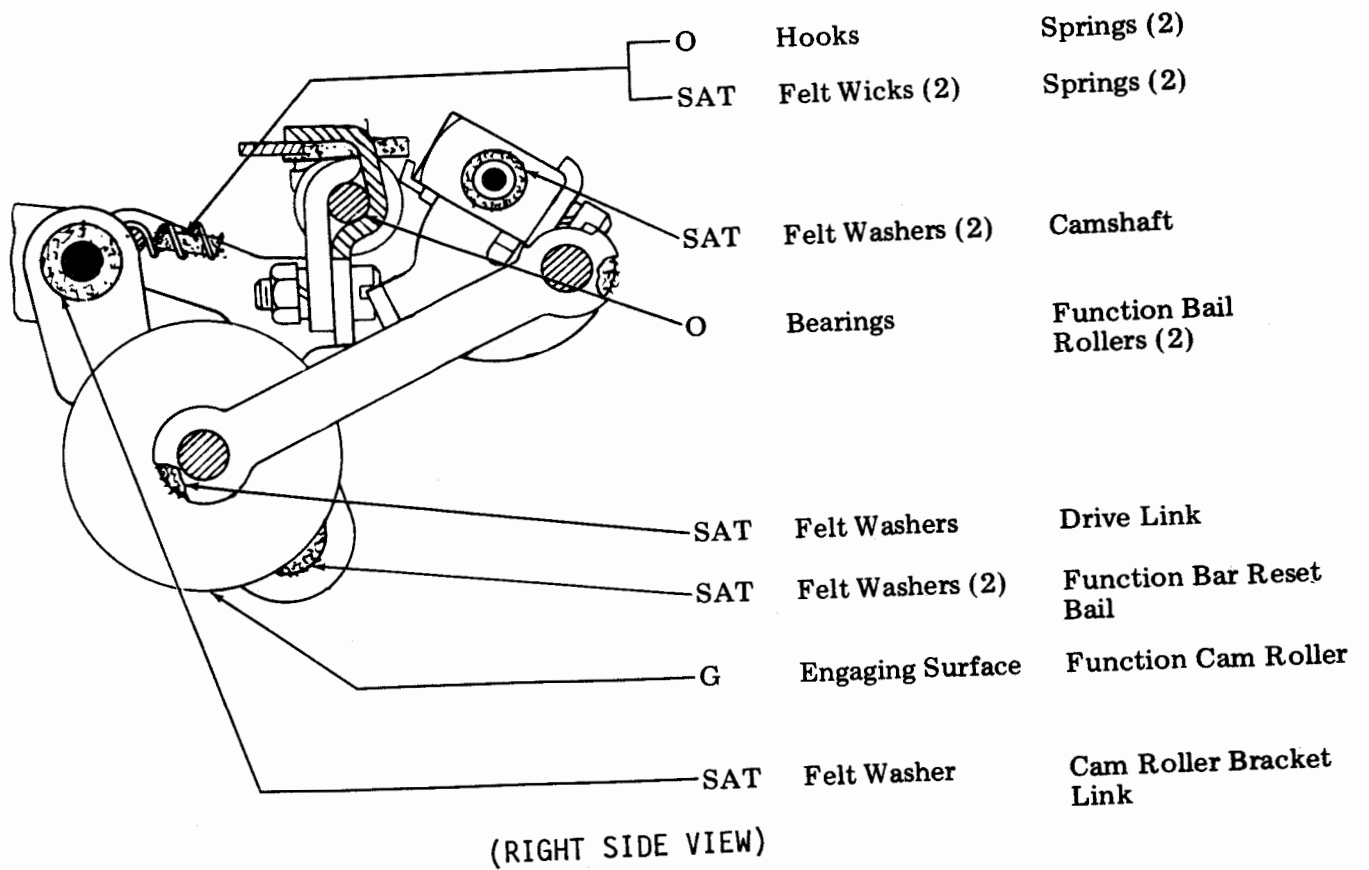


Figure 4-67. Function Reset Bail Mechanism

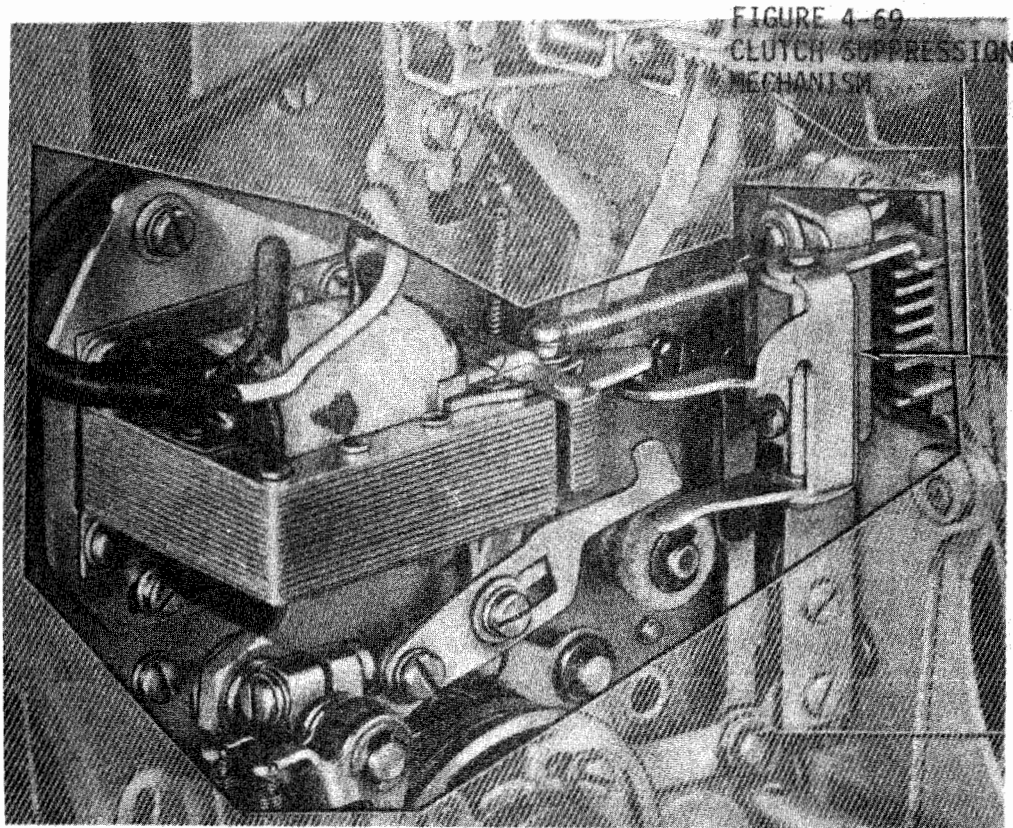


Figure 4-68. Selective Calling Mechanism

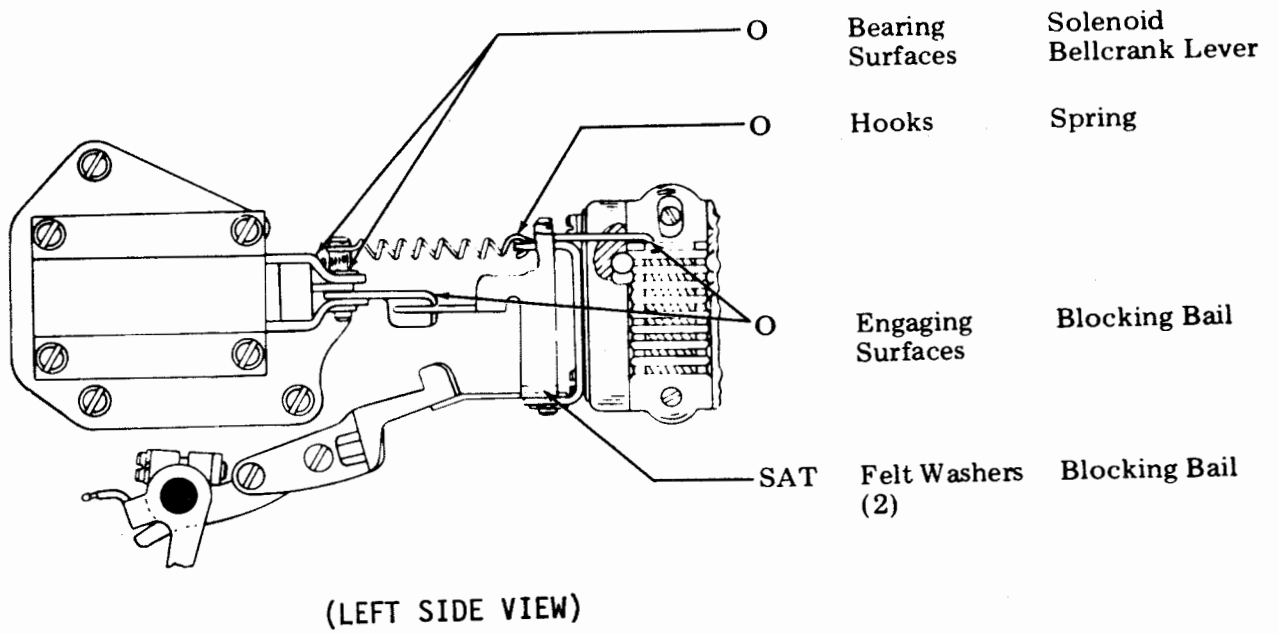


Figure 4-69. Clutch Suppression Mechanism

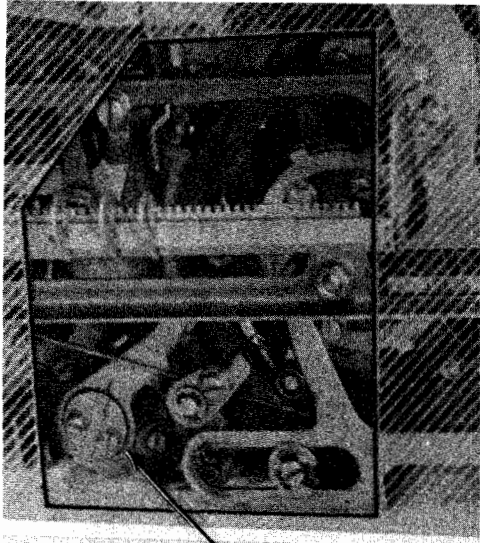


FIGURE 4-71
PAWL MECHANISM

(FRONT VIEW)

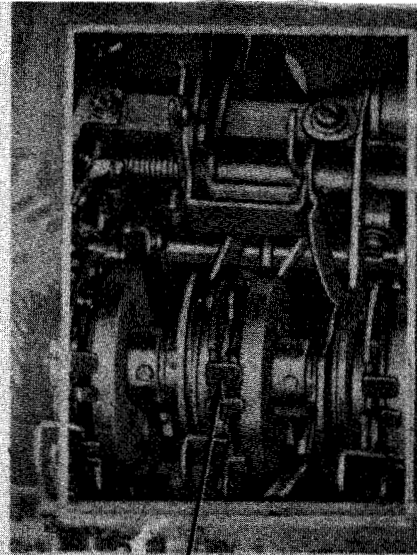


FIGURE 4-72
TRIP MECHANISM

(BOTTOM VIEW)

Figure 4-70. Local Backspace Mechanism

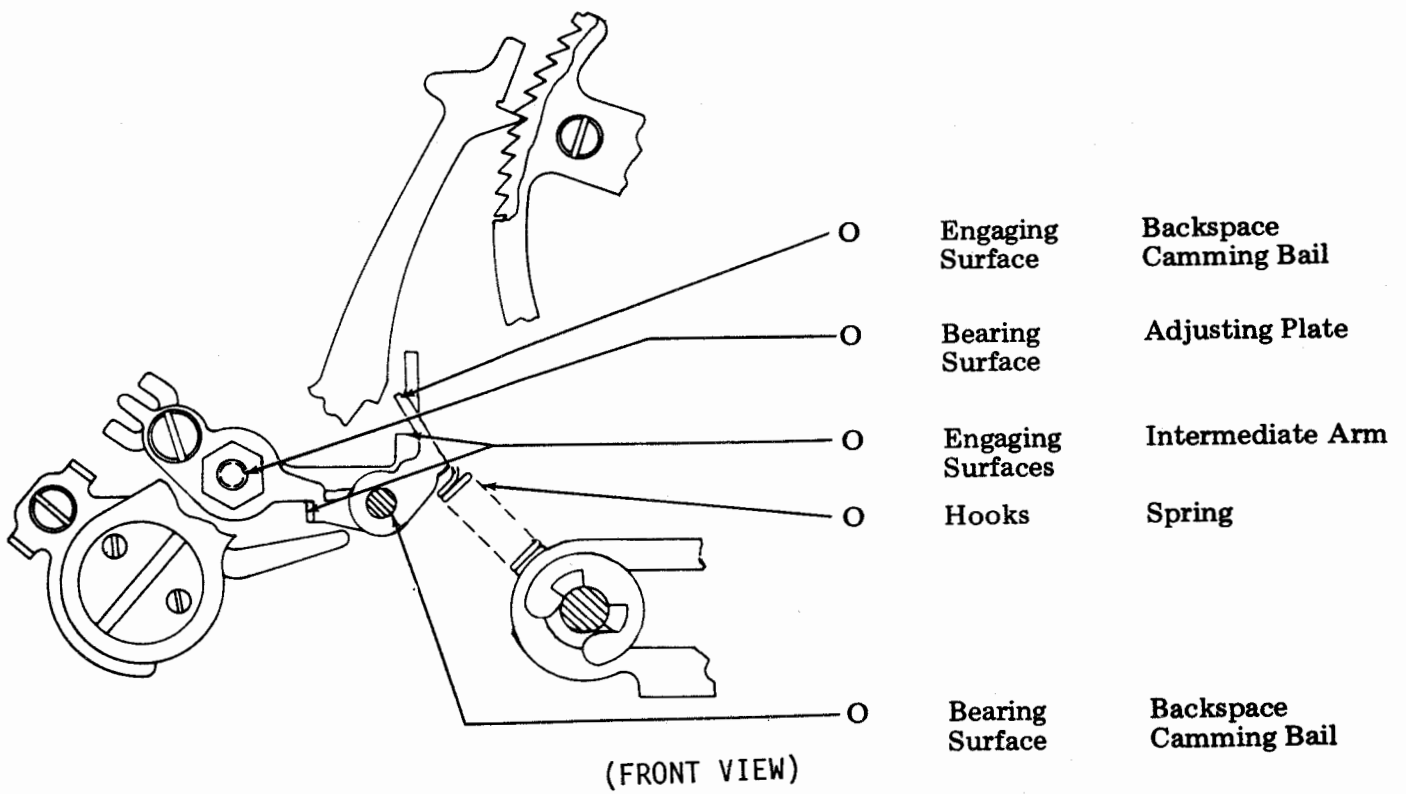


Figure 4-71. Pawl Mechanism

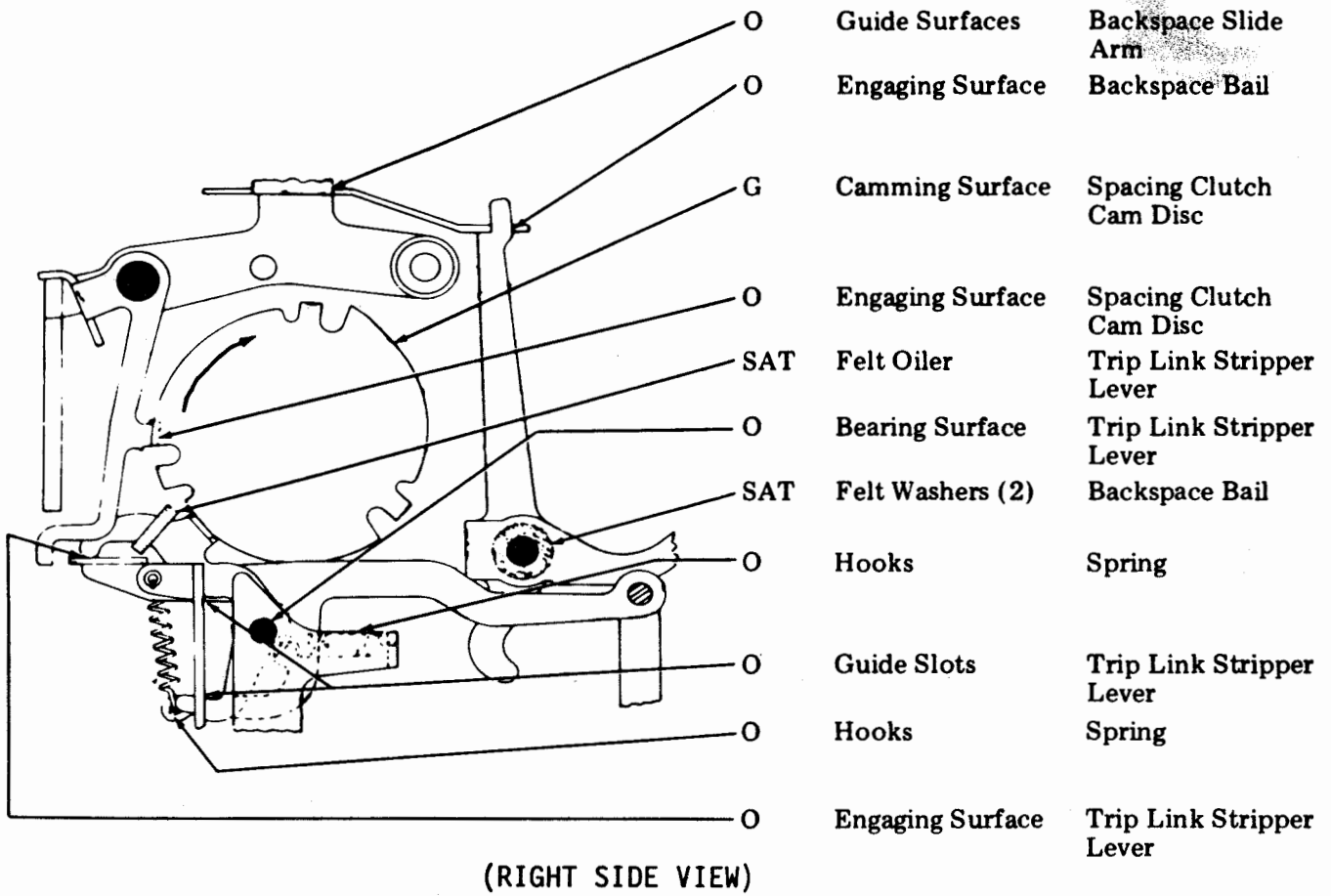


Figure 4-72. Trip Mechanism

TRIP MECHANISM

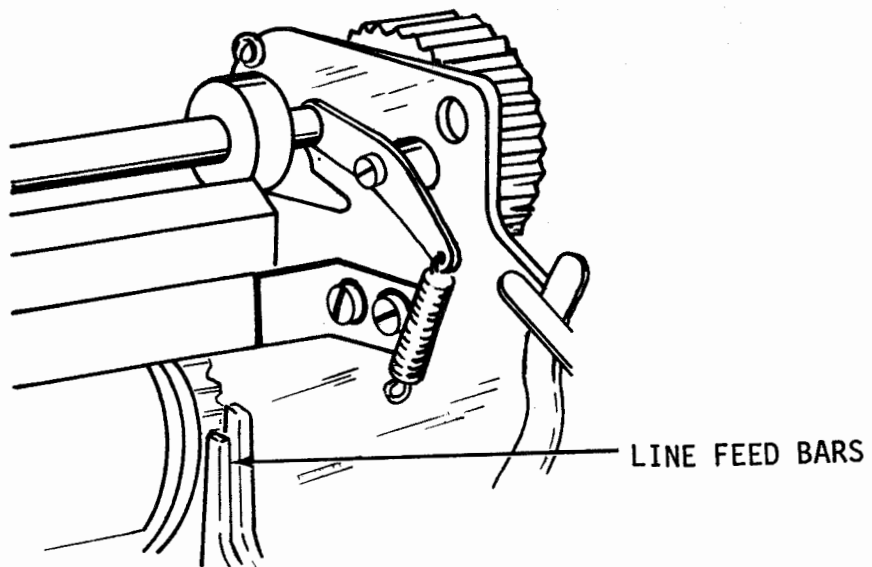
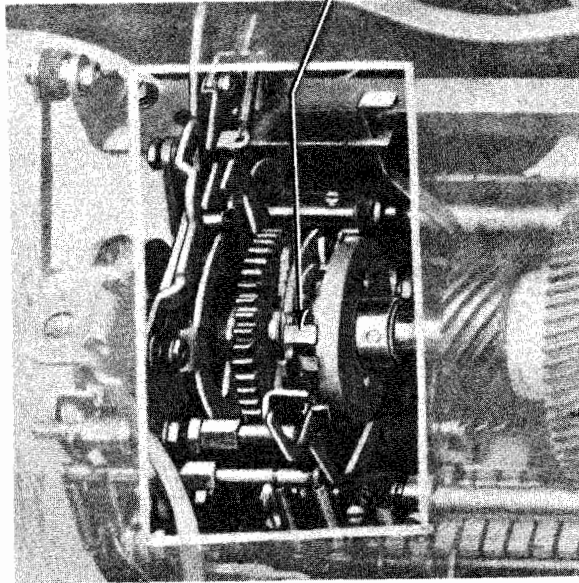


Figure 4-73. Reverse Line Feed Mechanism

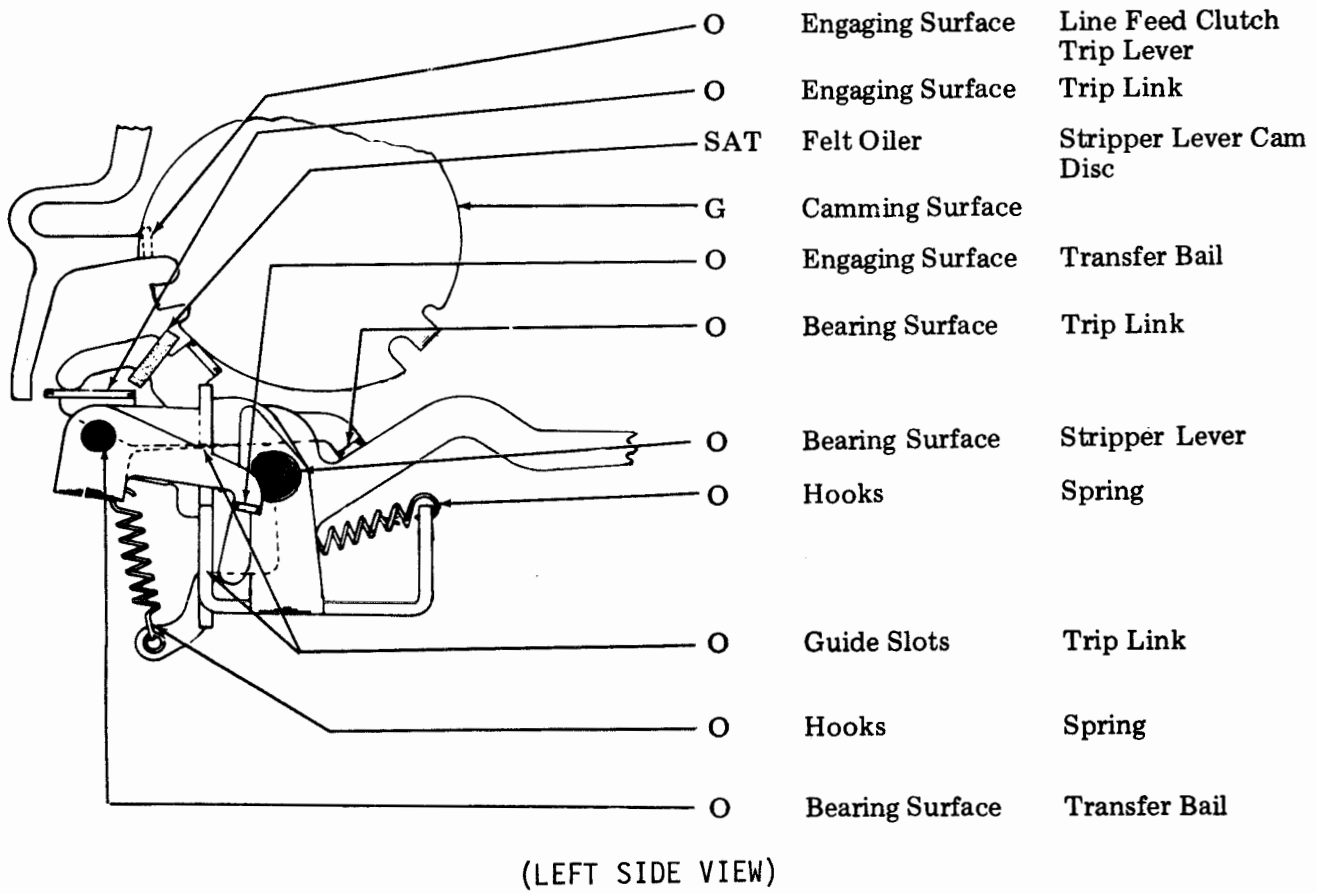


Figure 4-74. Trip Mechanism

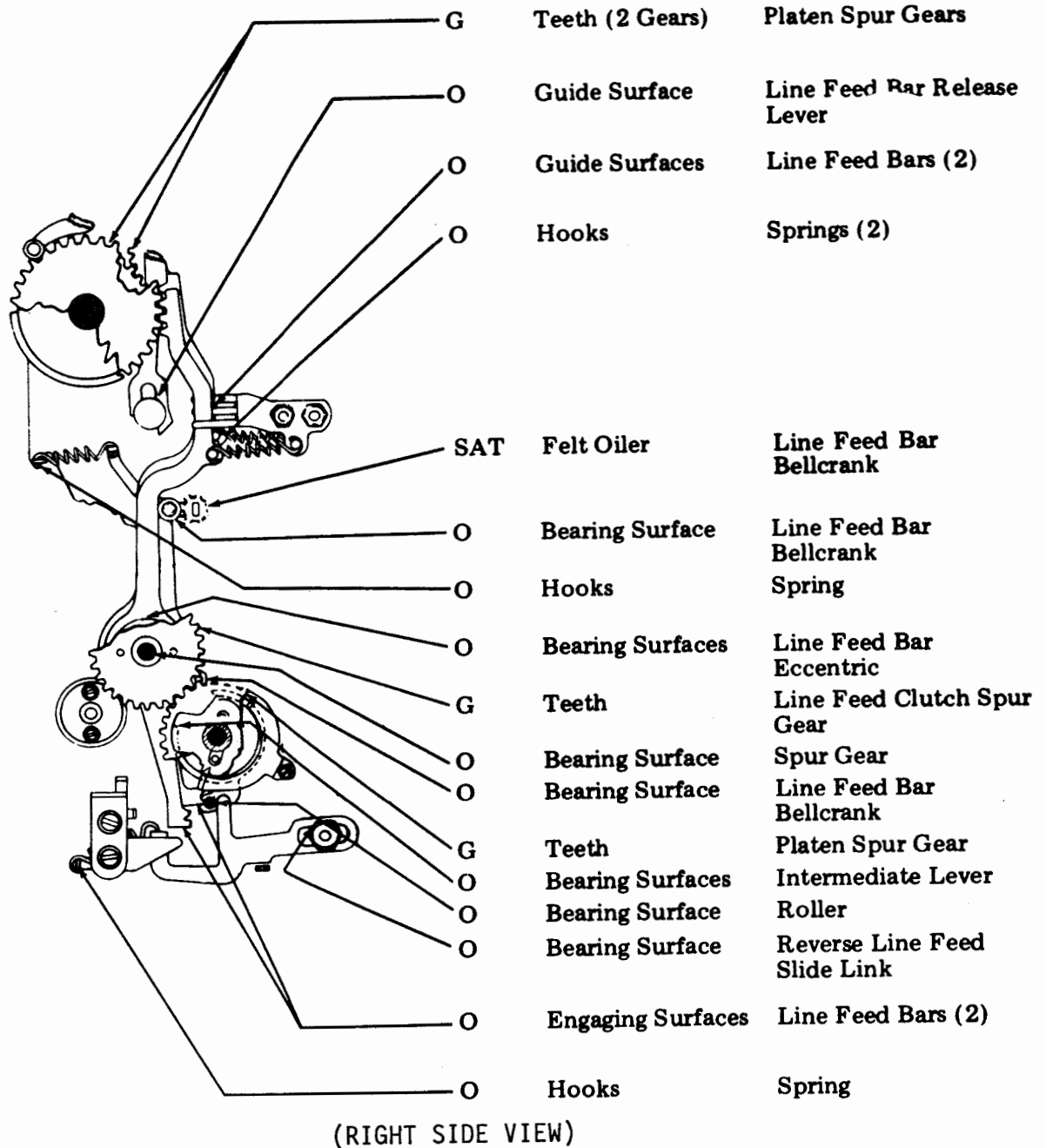


Figure 4-75. Line Feed Mechanism (C)

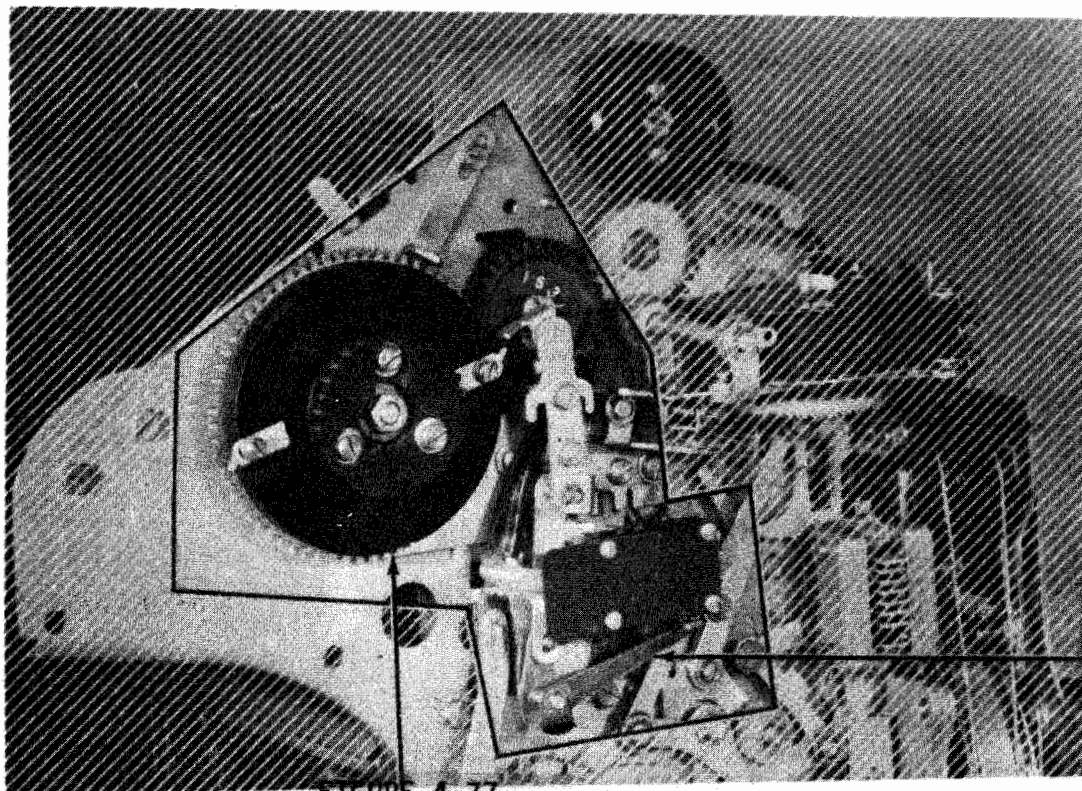


FIGURE 4-77
DRIVE MECHANISM

(LEFT REAR VIEW)

FIGURE 4-78
PAPER-OUT ALARM
MECHANISM

Figure 4-76. Page Feed-Out Mechanism

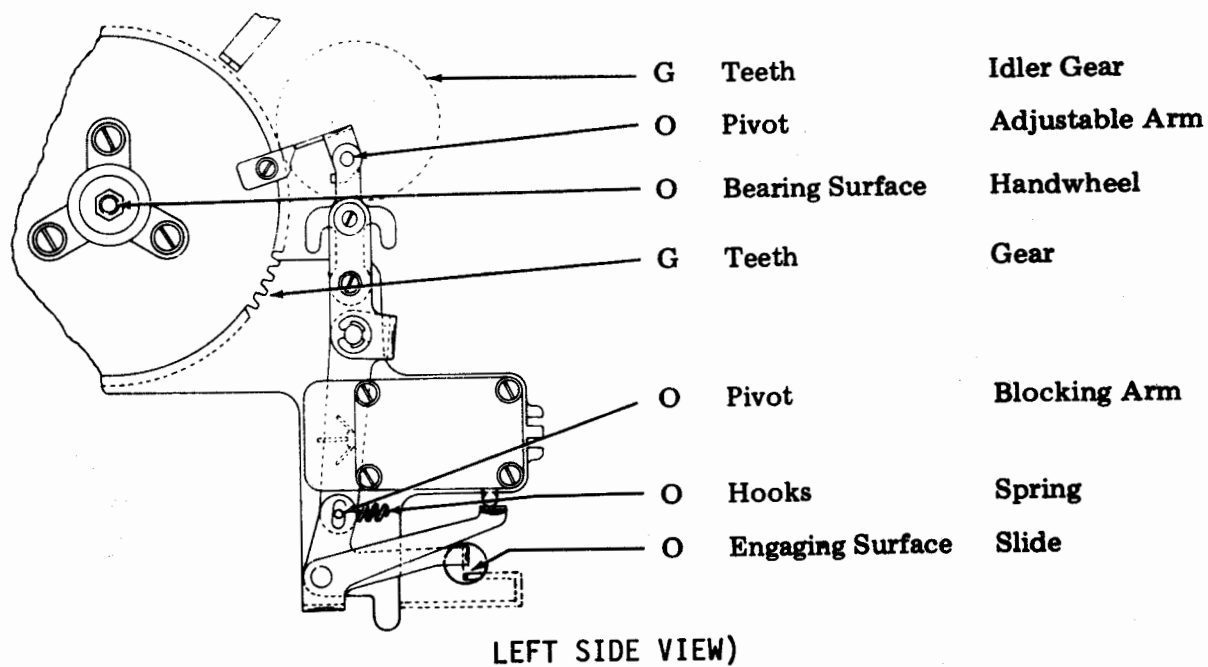


Figure 4-77. Drive Mechanism

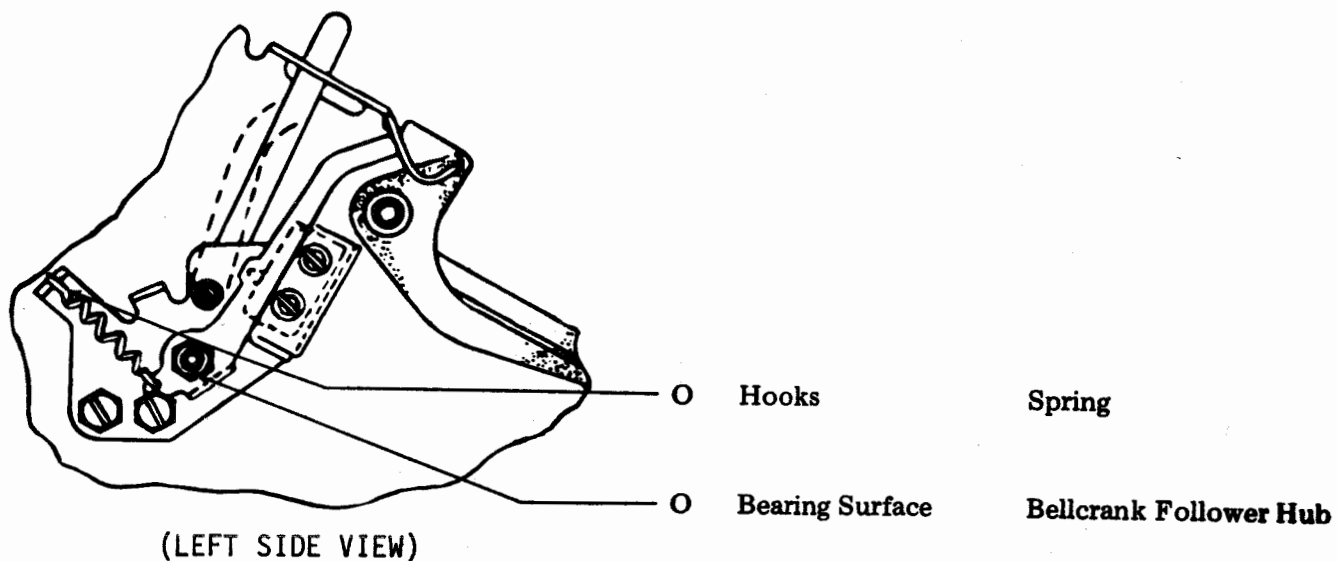


Figure 4-78. Paper-Out Alarm Mechanism

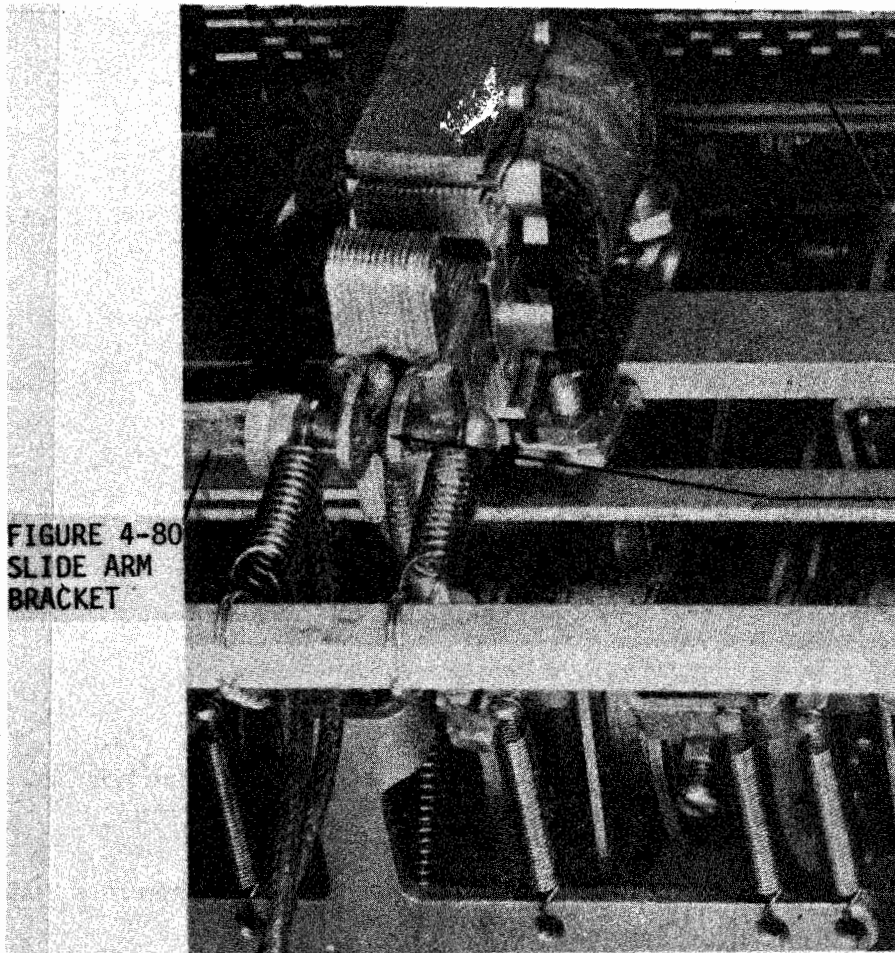


FIGURE 4-80
SLIDE ARM
BRACKET

FIGURE 4-81
COMPRESSION
SPRING

FIGURE 4-82
TRIP MECHANISM

(REAR VIEW)

Figure 4-79. Continuous Spacing Mechanism

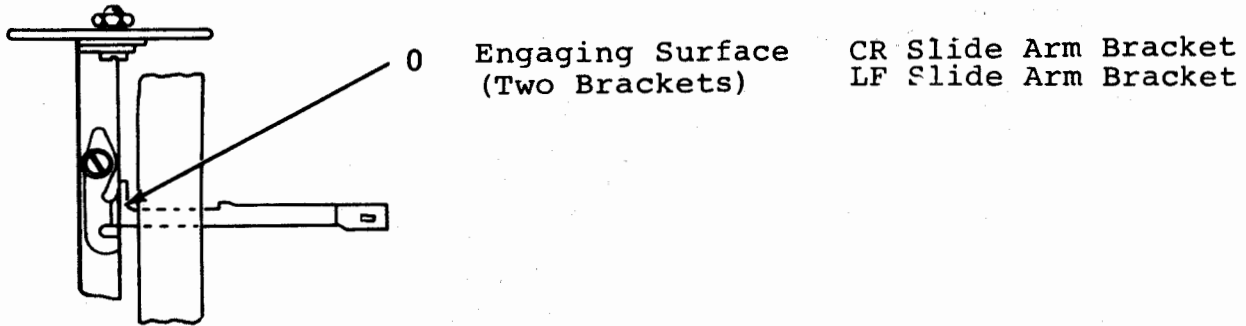


Figure 4-80. Slide Arm Bracket

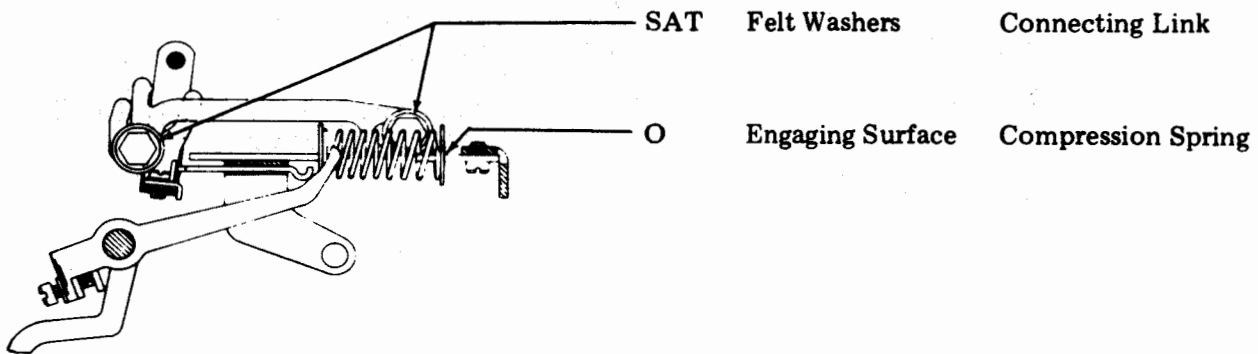


Figure 4-81. Compression Spring

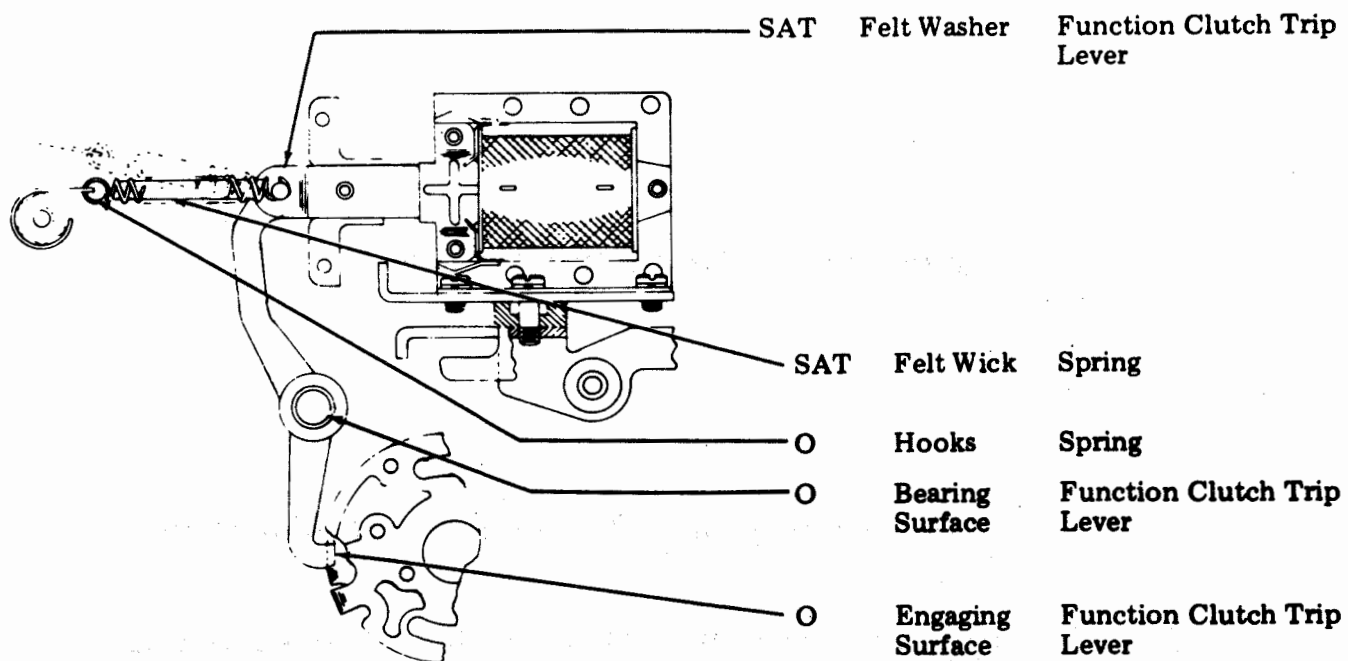


Figure 4-82. Trip Mechanism

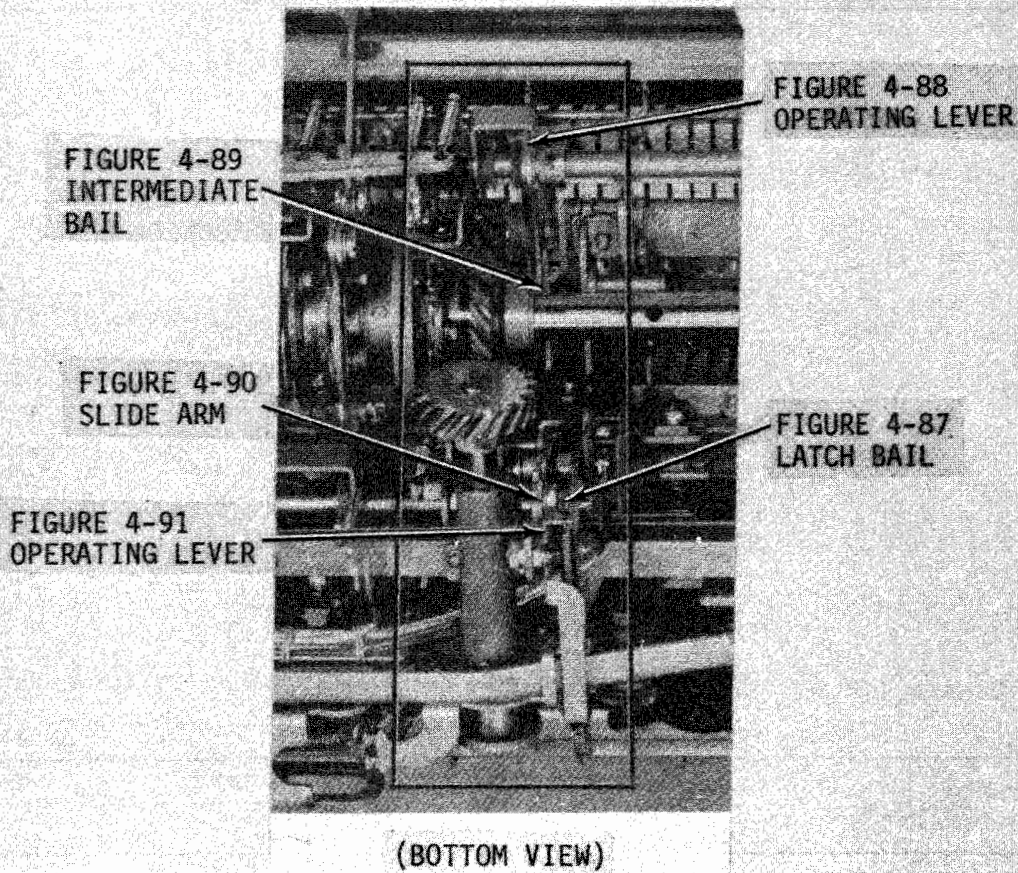
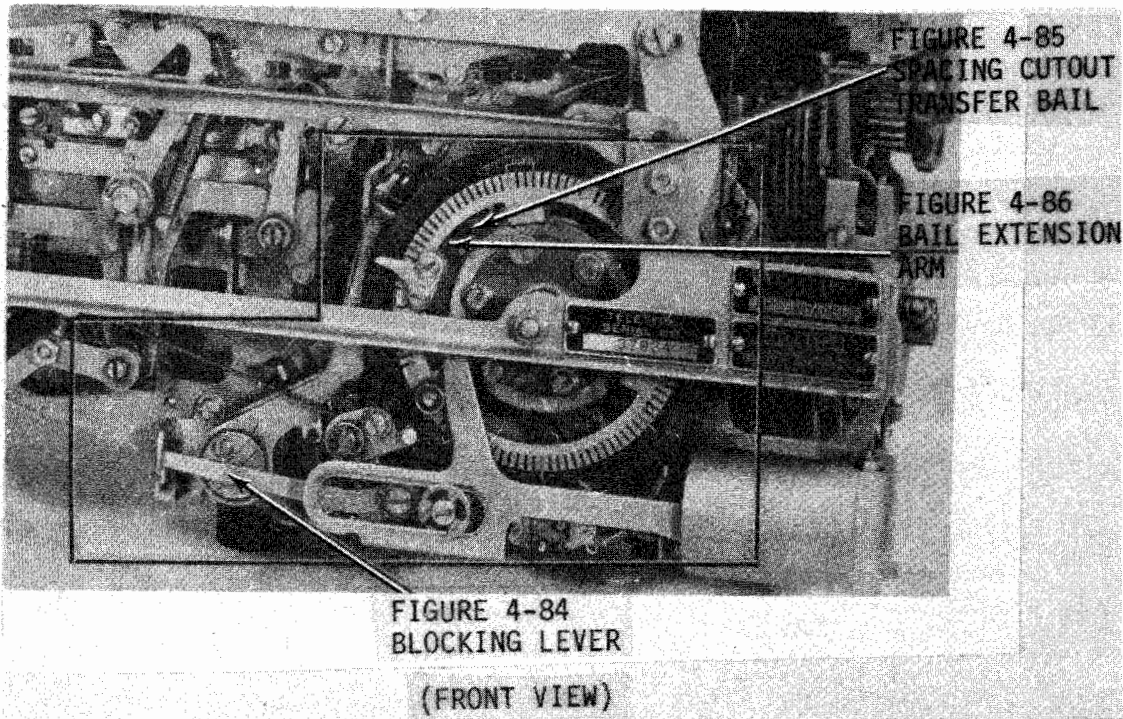


Figure 4-83. Horizontal Tabulator Mechanism (Late Design)

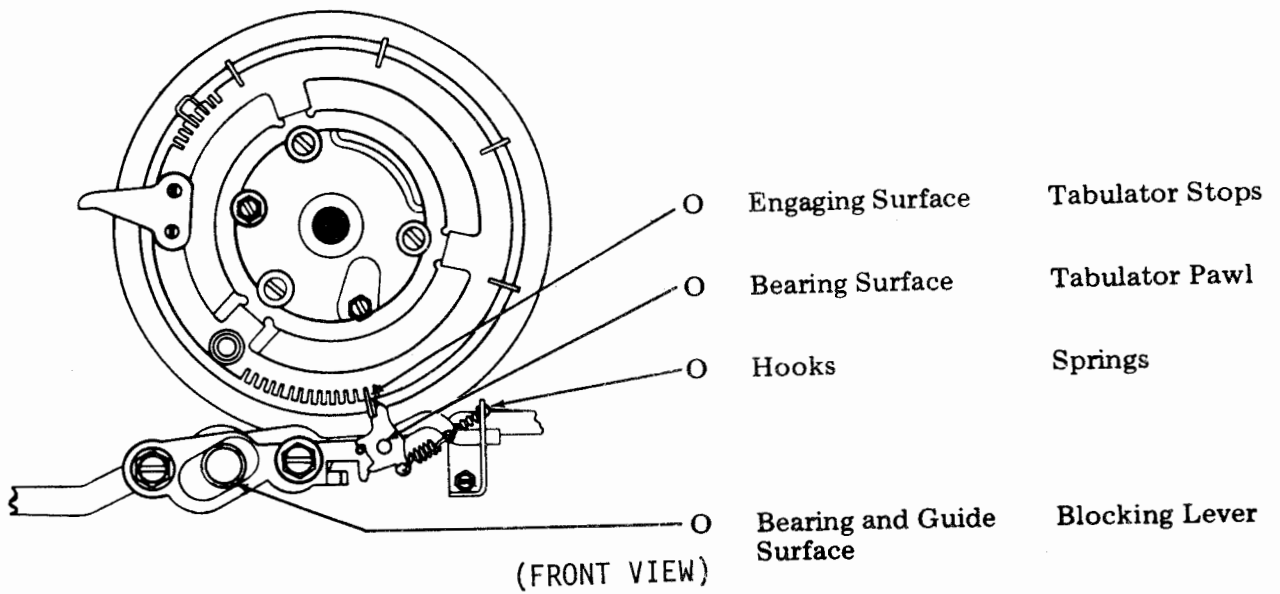


Figure 4-84. Blocking Lever

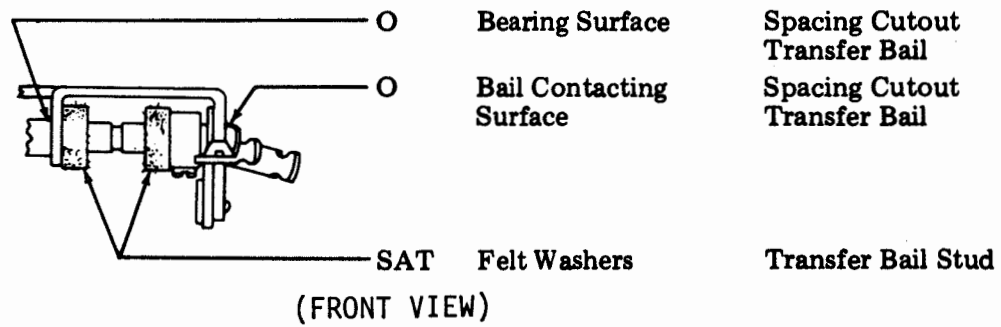


Figure 4-85. Spacing Cutout Transfer Bail

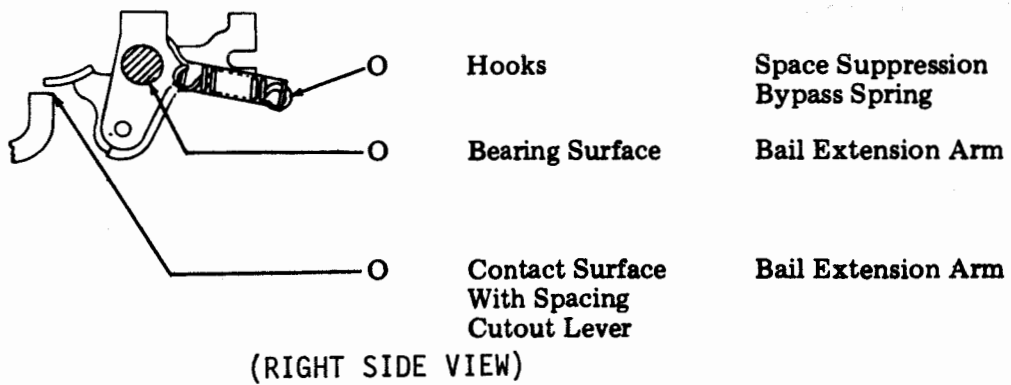


Figure 4-86. Bail Extension Arm

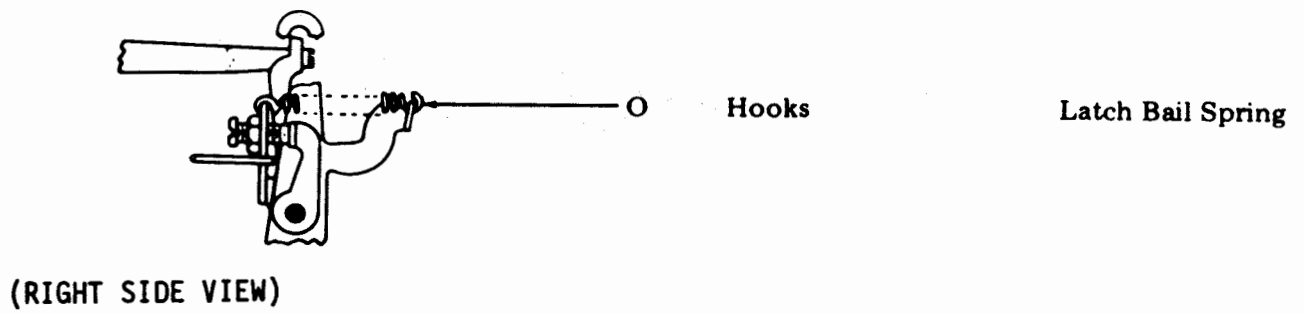


Figure 4-87. Latch Bail

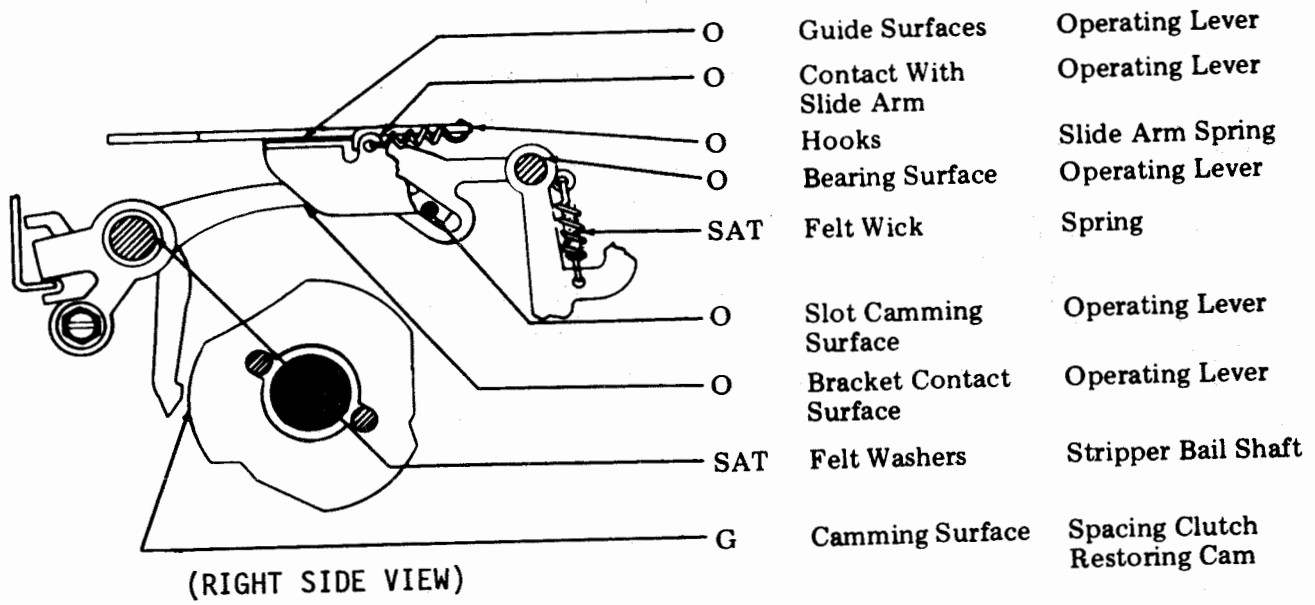


Figure 4-88. Operating Lever

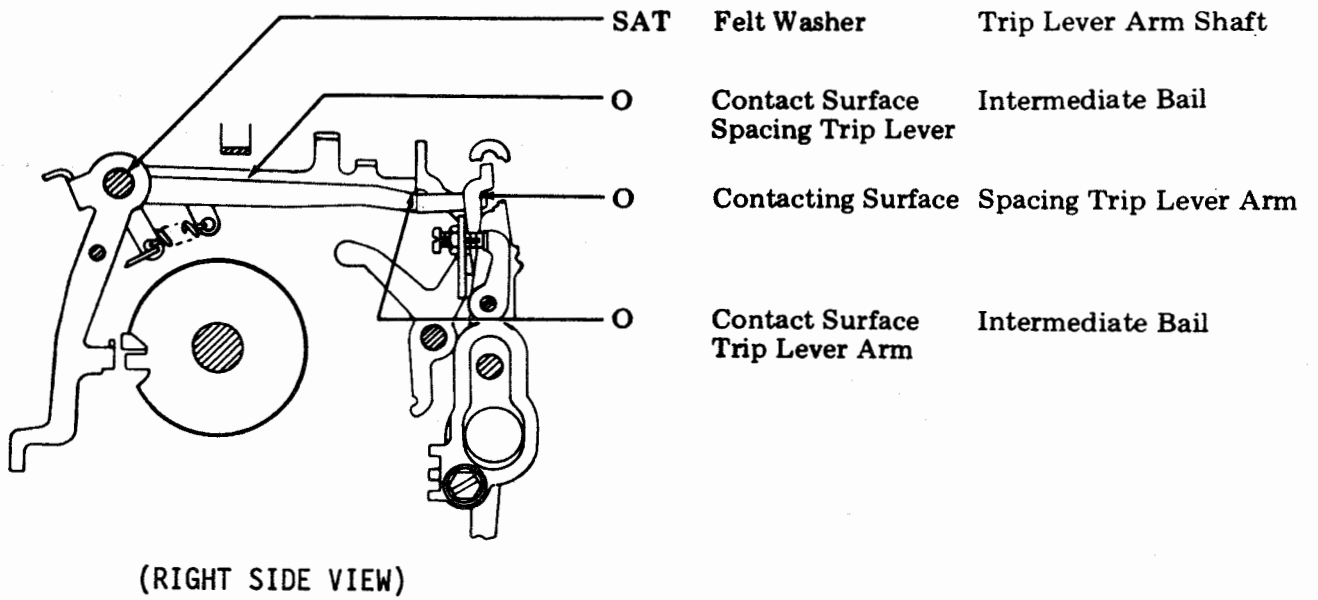


Figure 4-89. Intermediate Bail

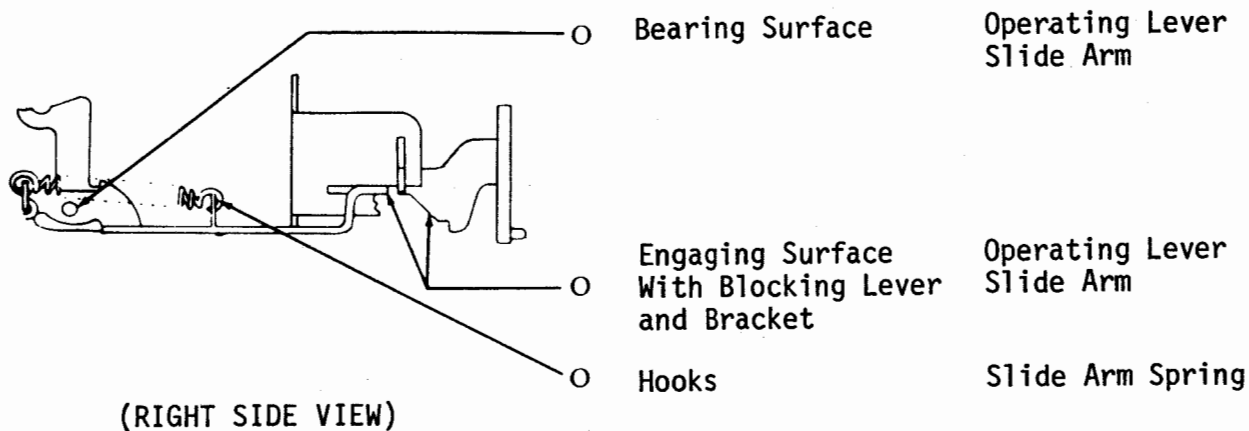


Figure 4-90. Slide Arm

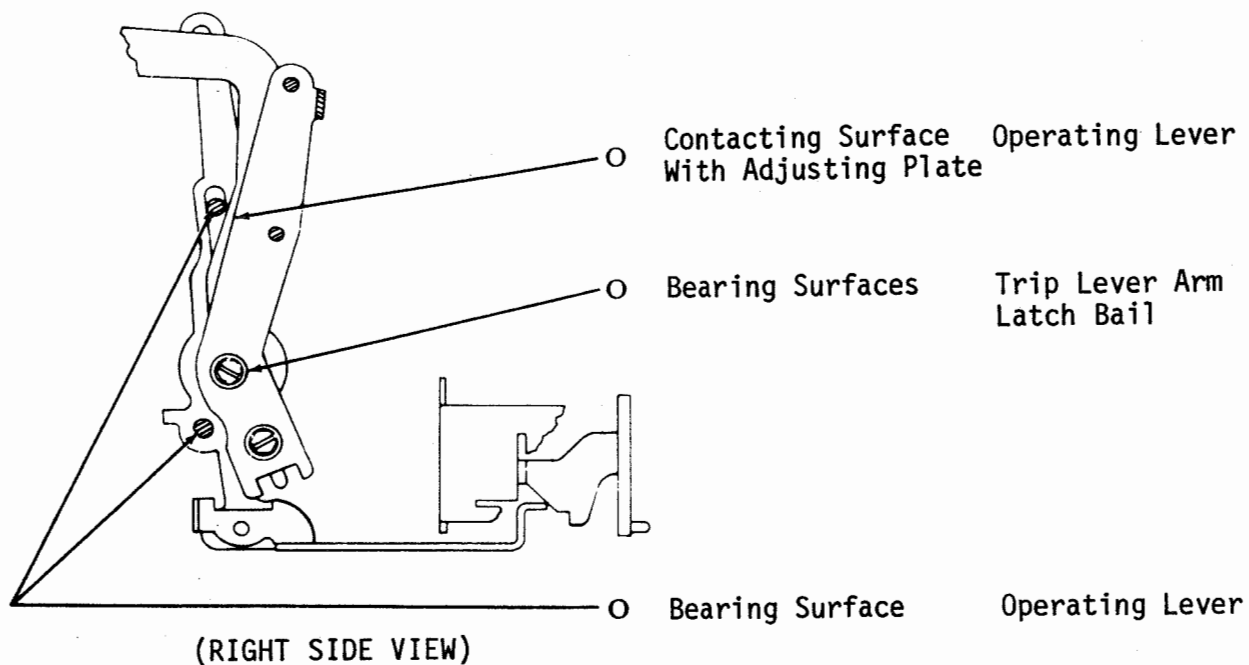


Figure 4-91. Operating Lever

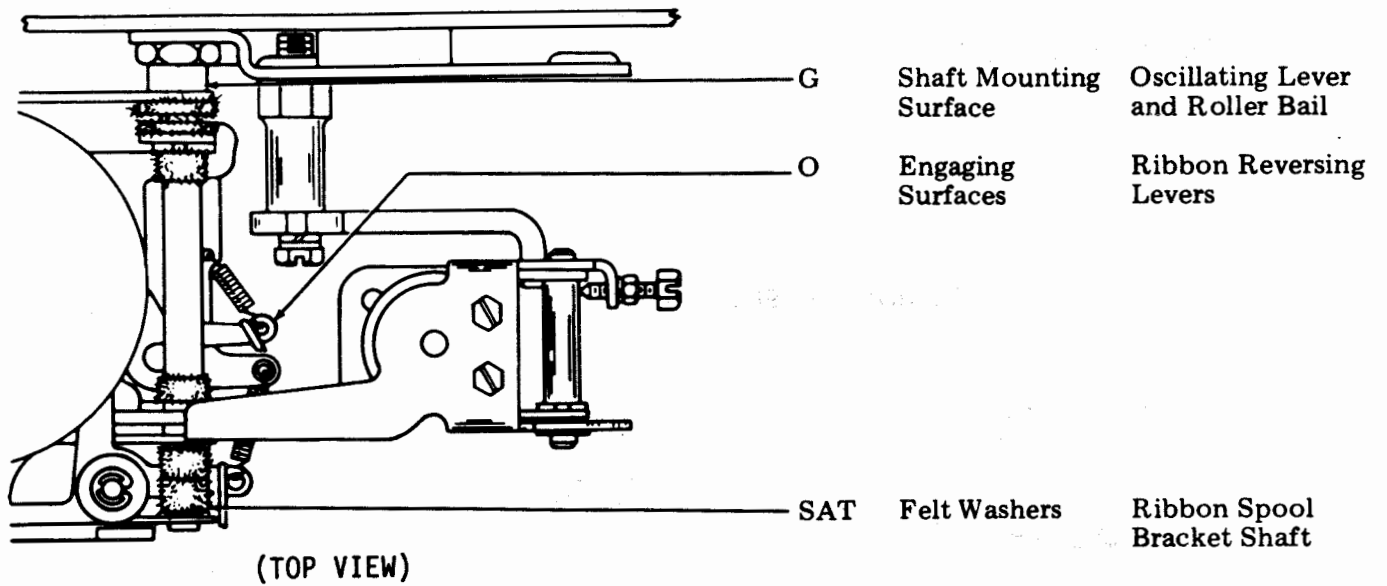


Figure 4-92. Two-Color Ribbon Mechanism Oscillating Lever

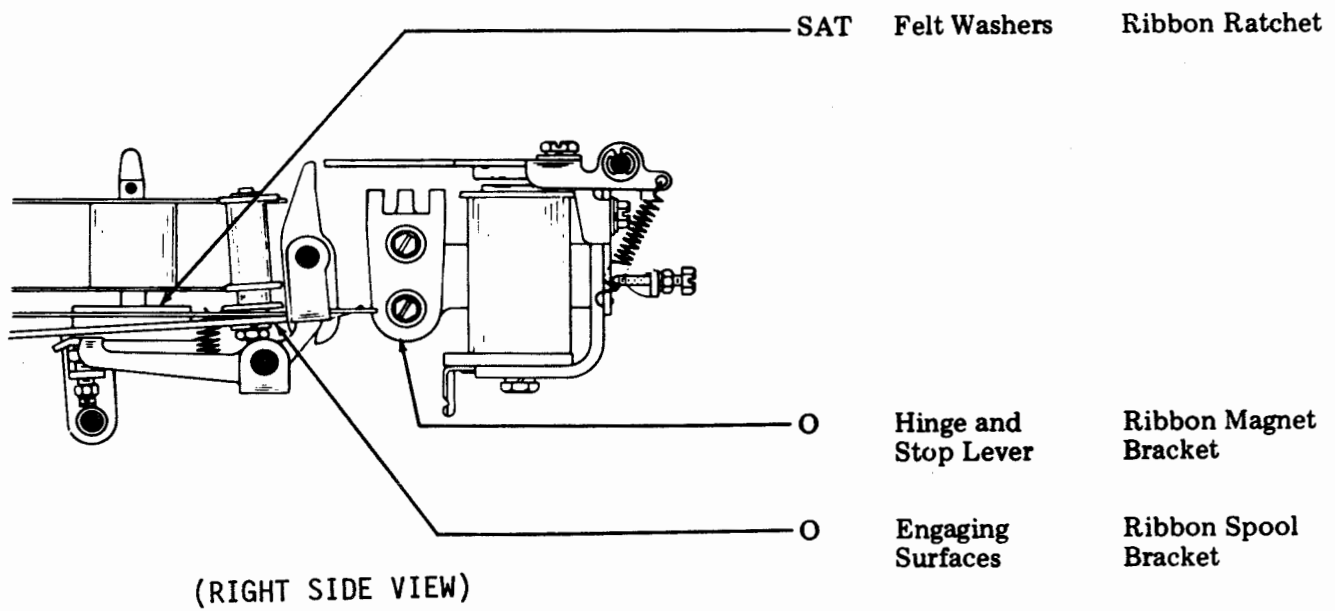


Figure 4-93. Two-Color Ribbon Mechanism Ribbon Operating Mechanism

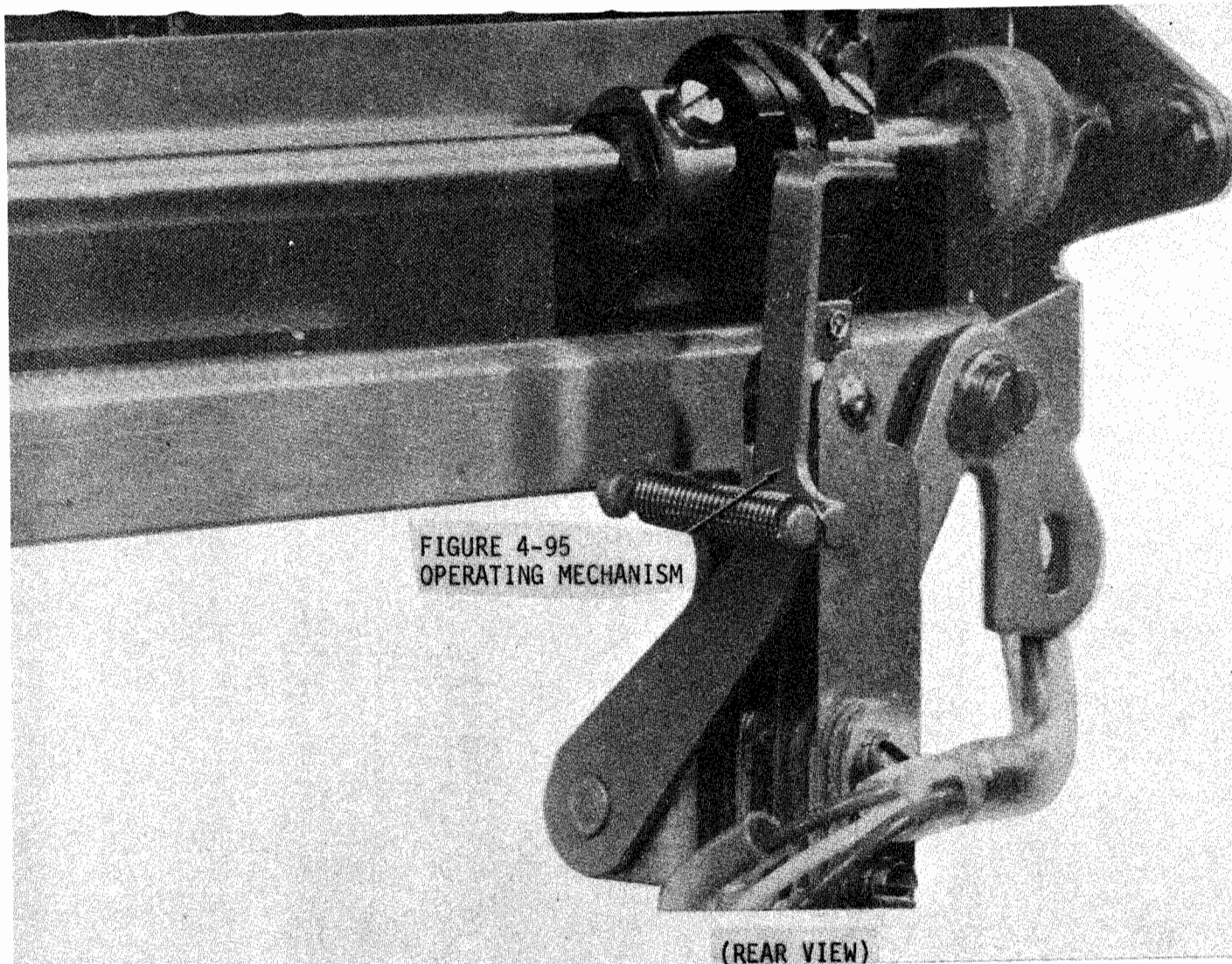


Figure 4-94. Universal Contact Stunt Box Mechanism

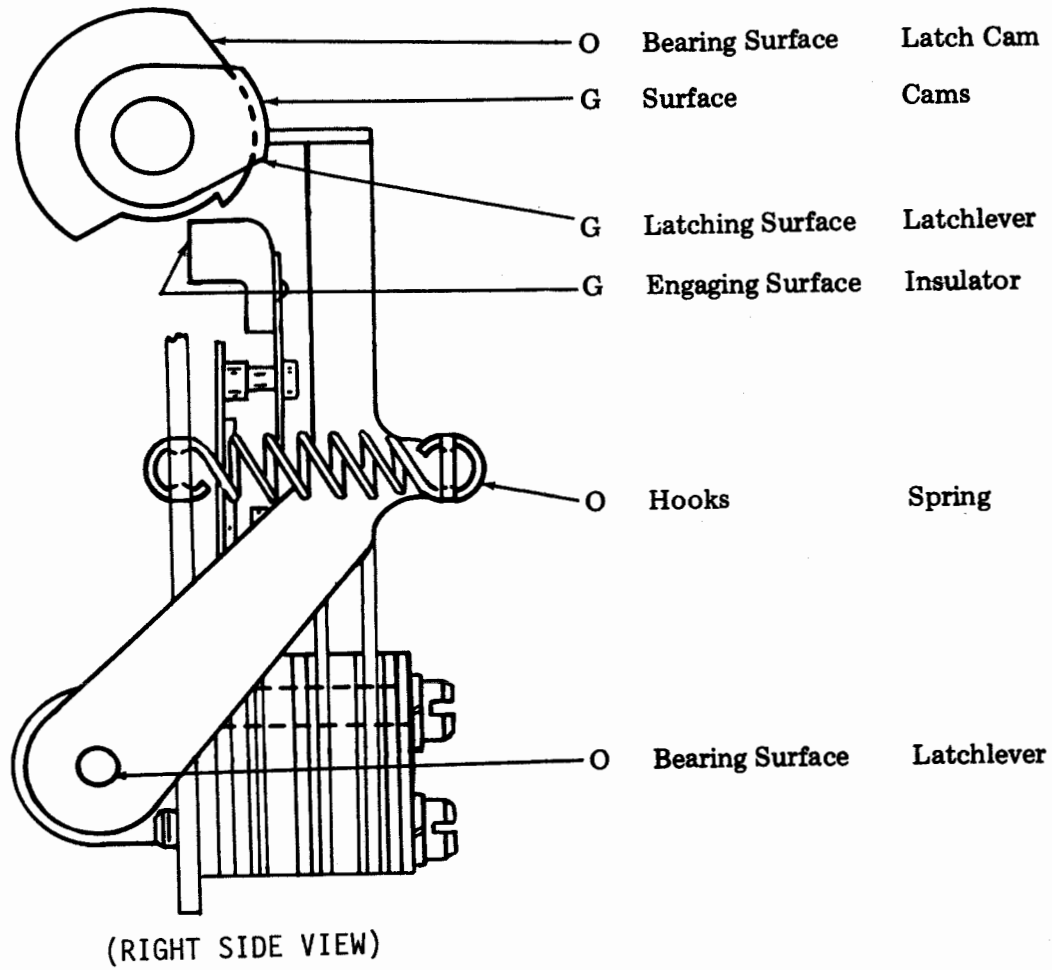


Figure 4-95. Operating Mechanism

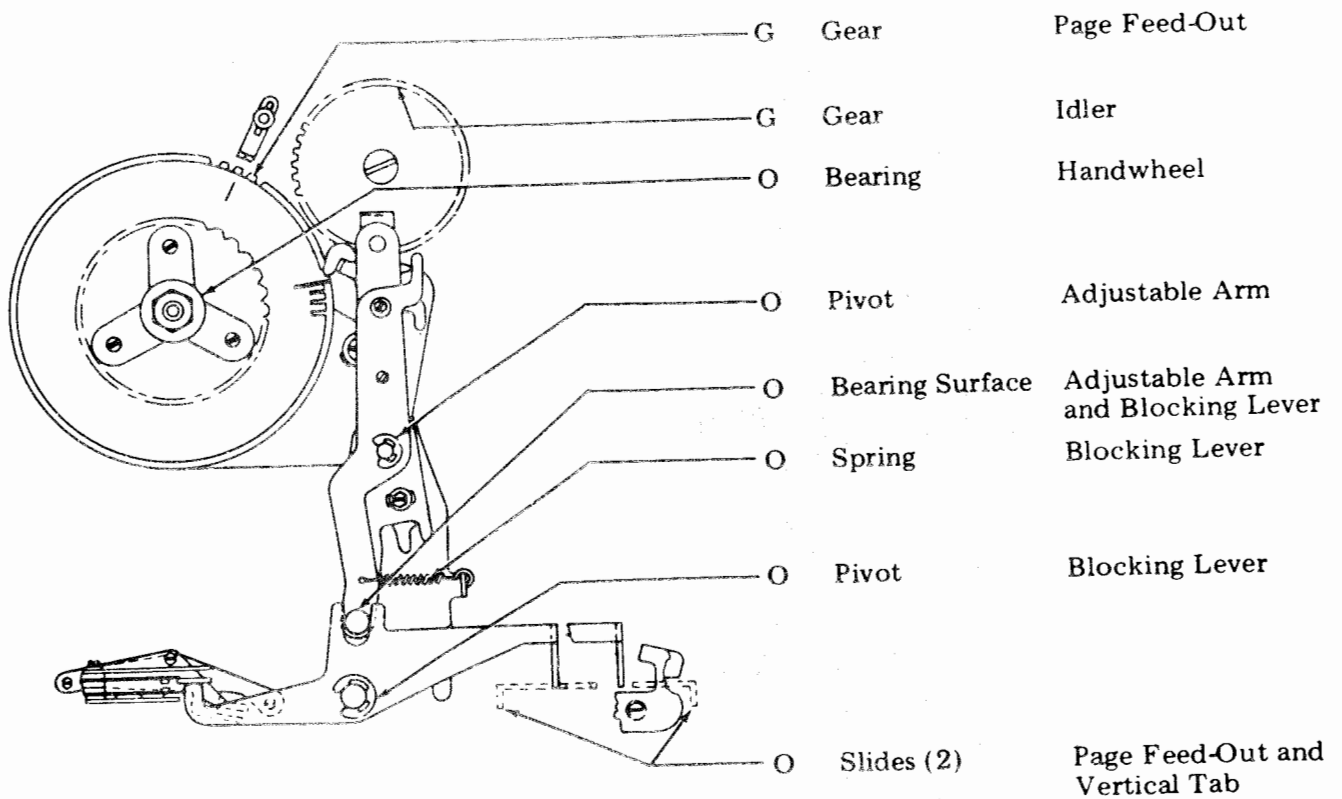


Figure 4-96. Vertical Tabulation and Transmitter Distributor Control Mechanism

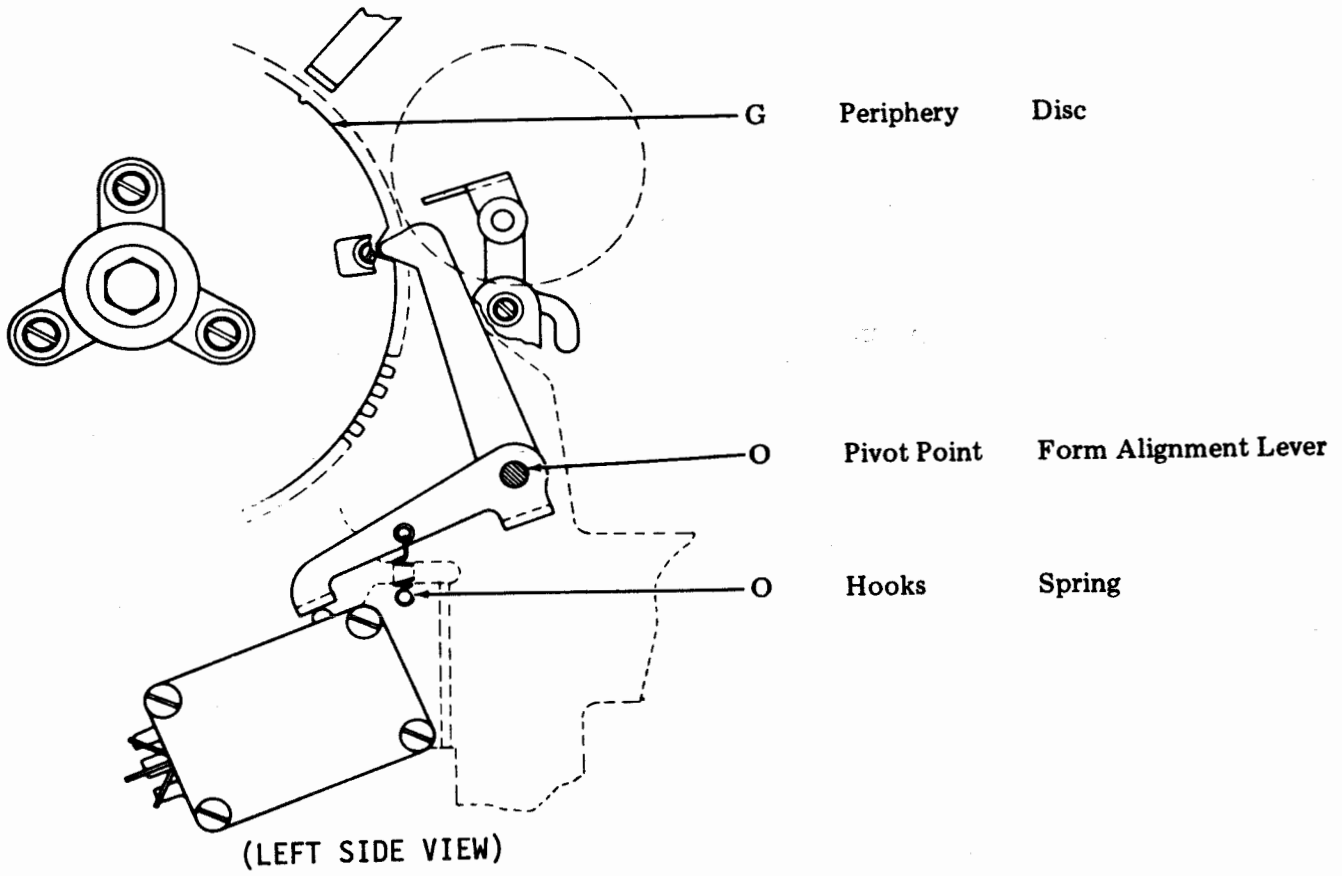


Figure 4-97. Form Alignment Switch Mechanism

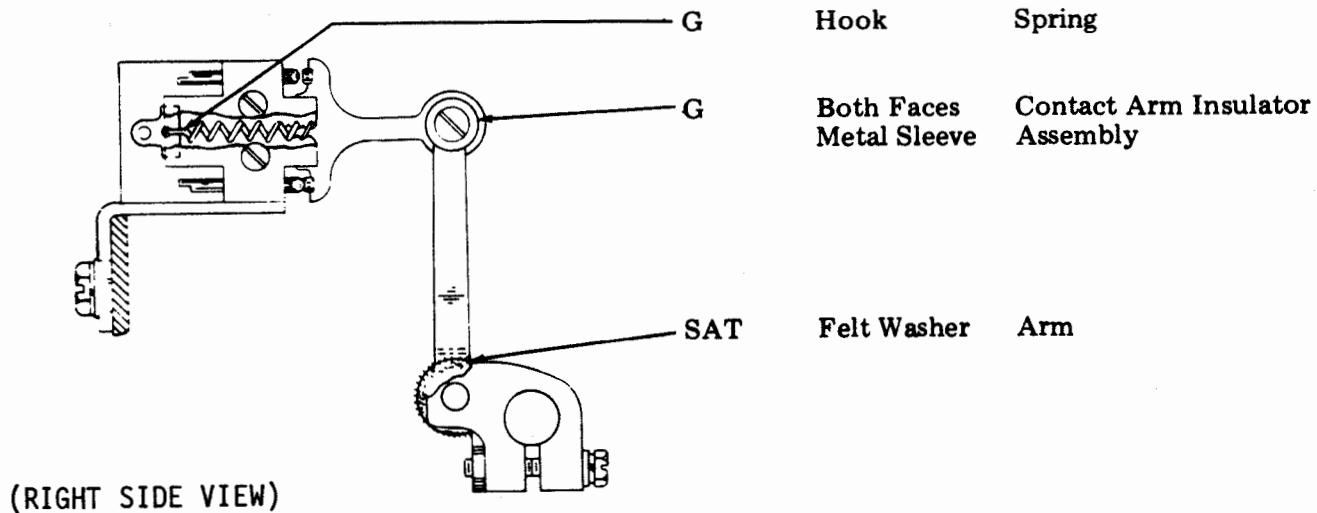


Figure 4-98. Universal Contact Selector Mechanism

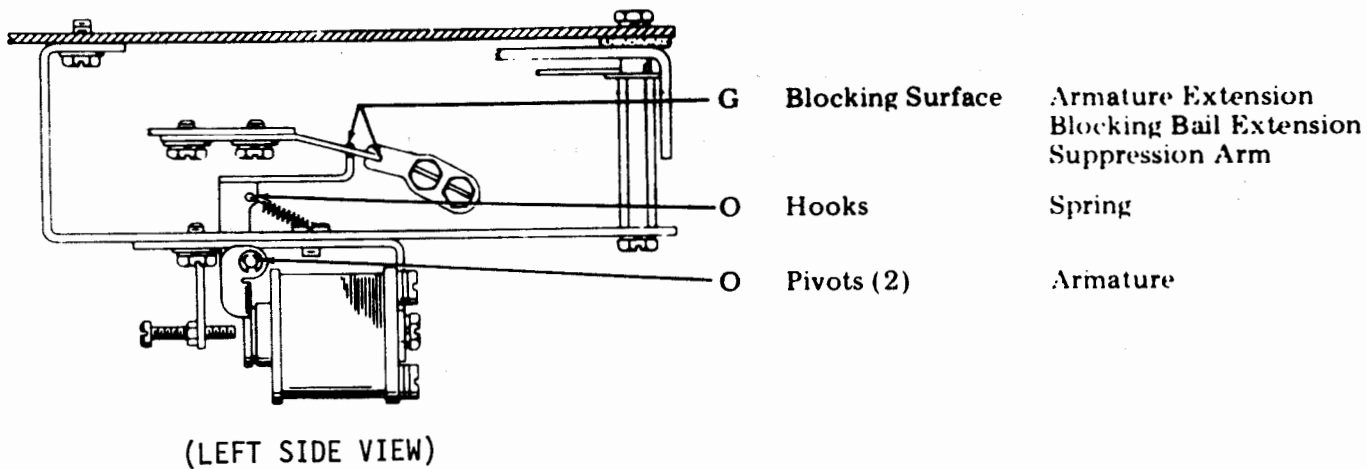


Figure 4-99. DC Magnet-Operated Print Suppression Mechanism

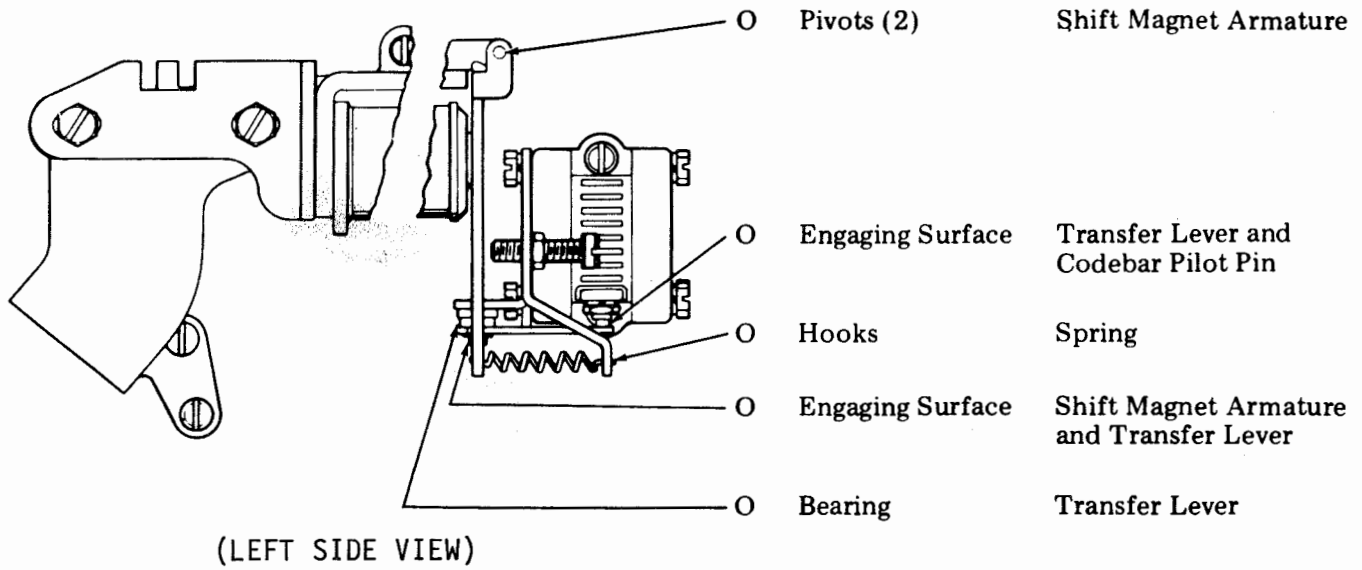


Figure 4-100. Letters-Figures Code Bar Shift Magnet Mechanism

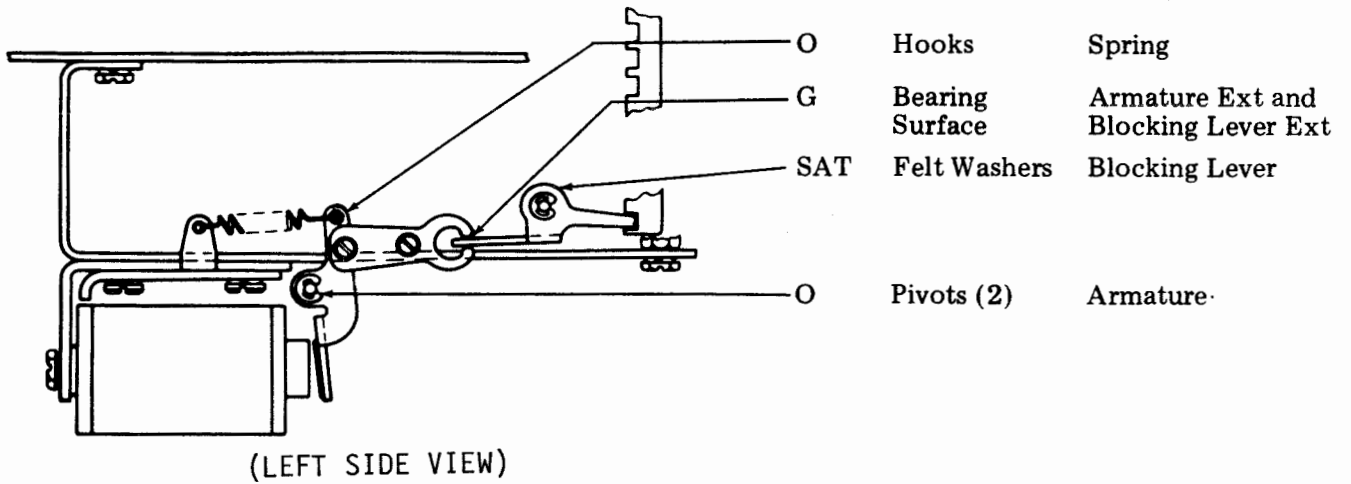


Figure 4-101. Print Suppression and Off-Line Stunt Shift Control Mechanism

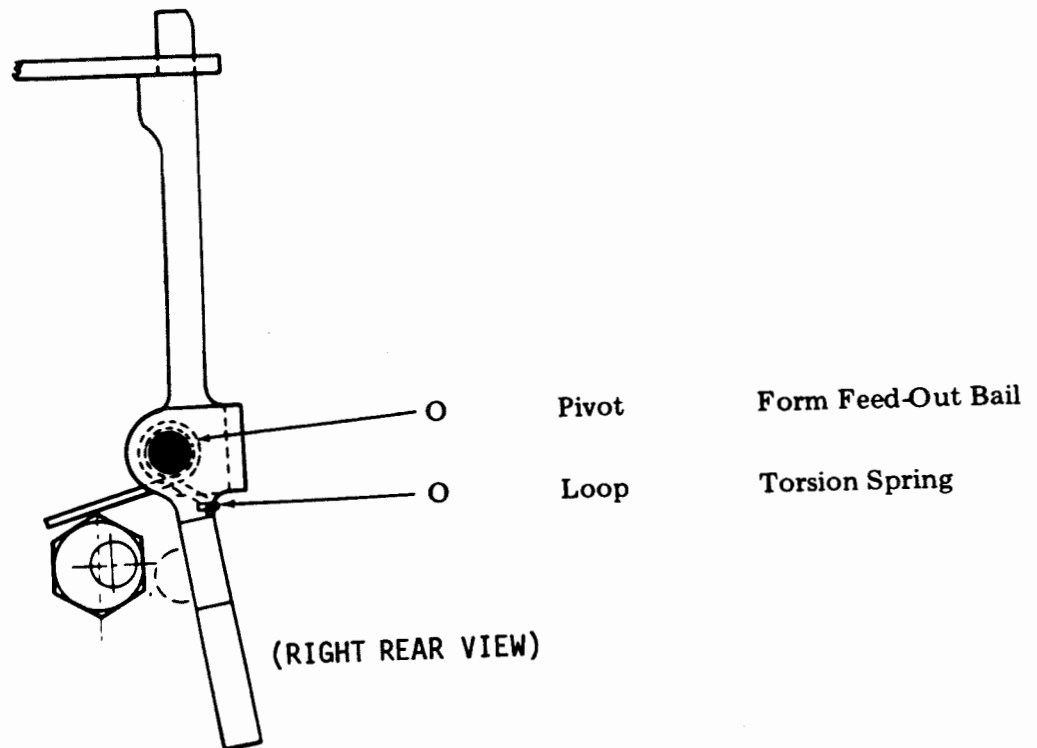


Figure 4-102. Form Feed-Out Mechanism

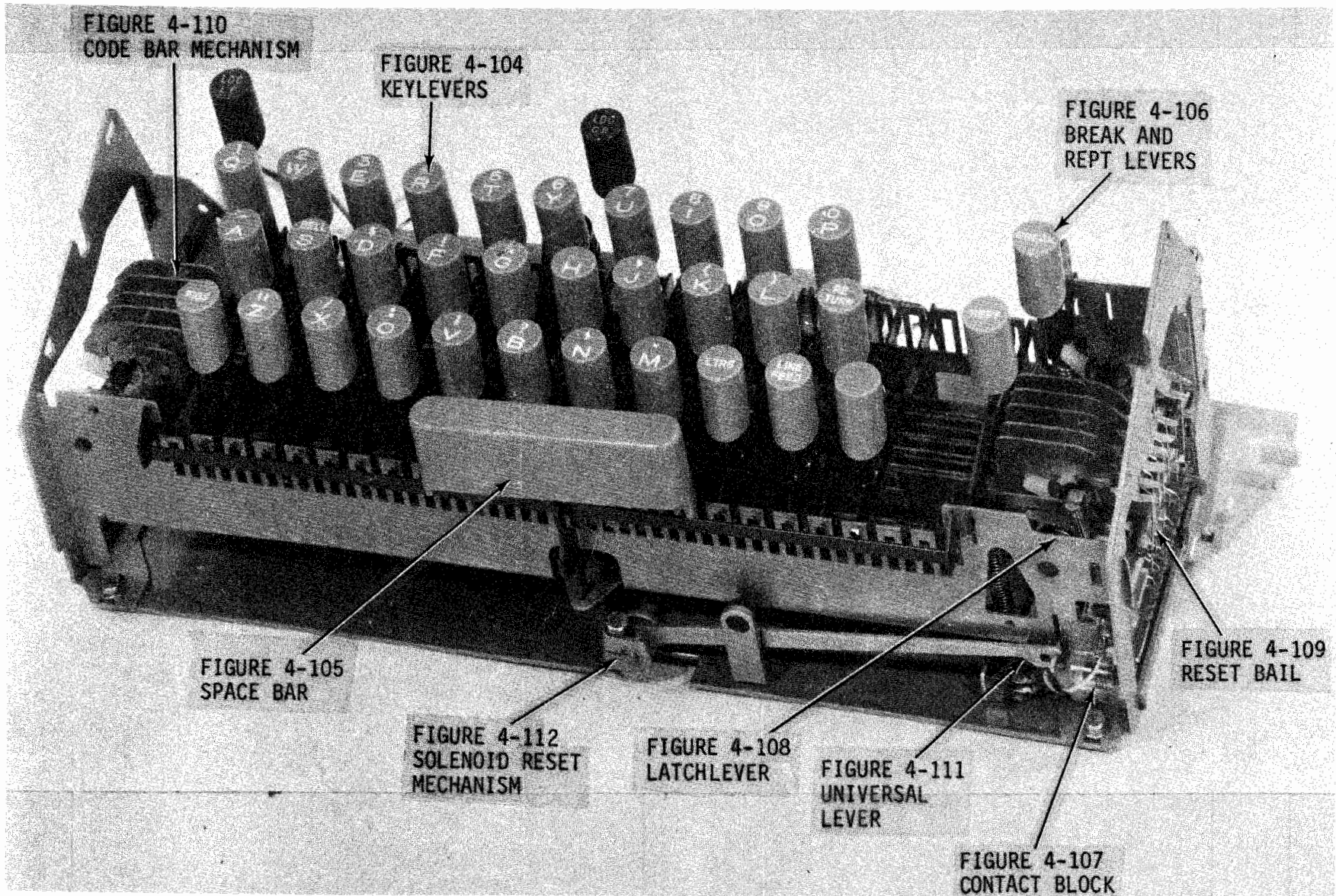


Figure 4-103. Keyboard Transmitter Mechanism

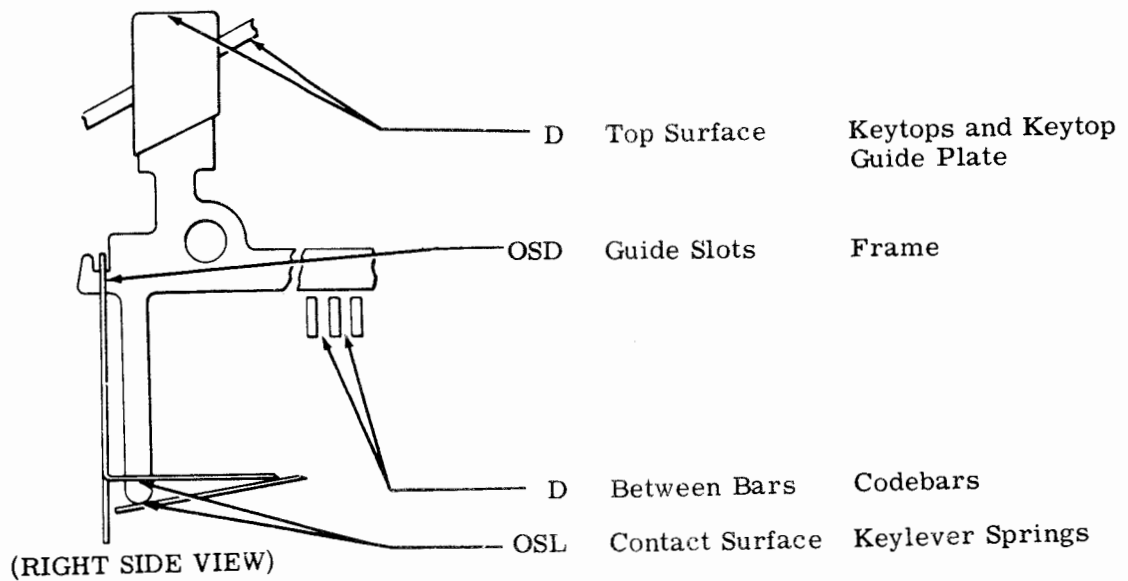


Figure 4-104. Keylevers

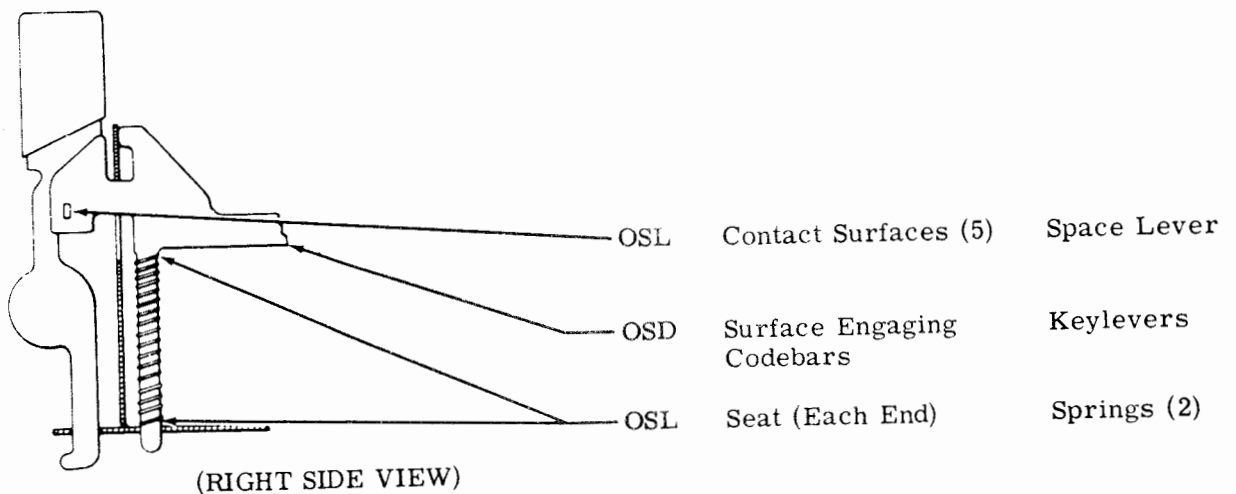


Figure 4-105. Spacebar

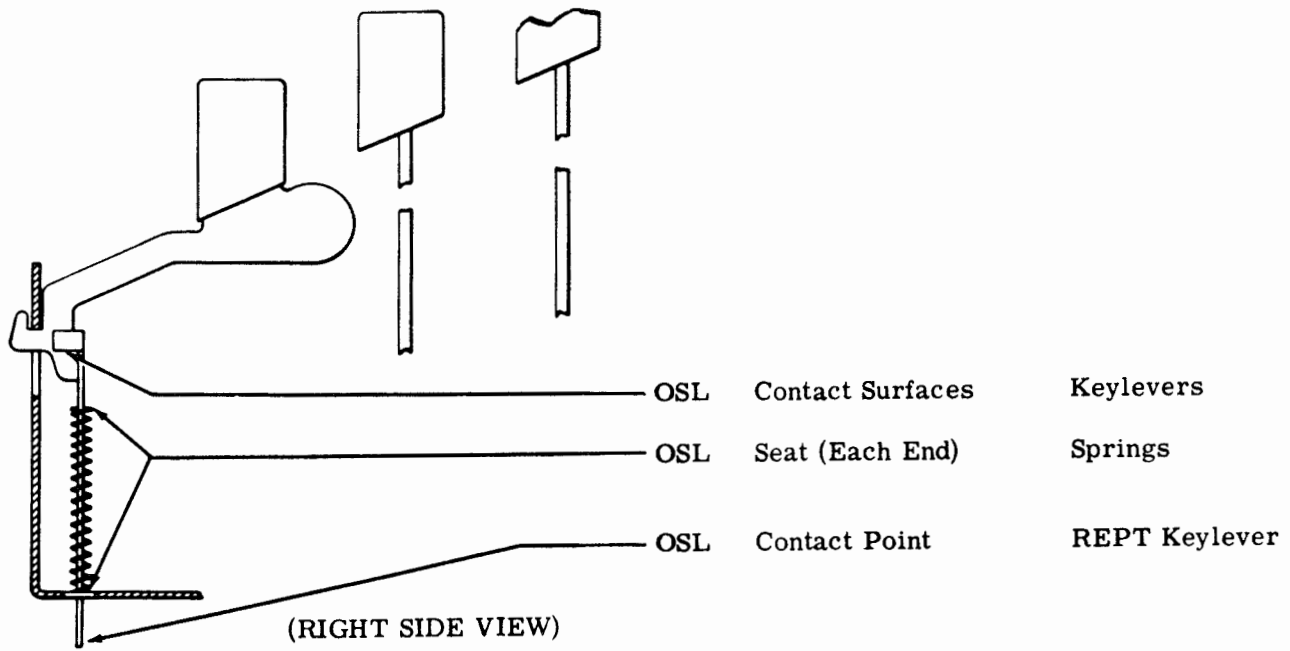


Figure 4-106. Break and REPT Levers

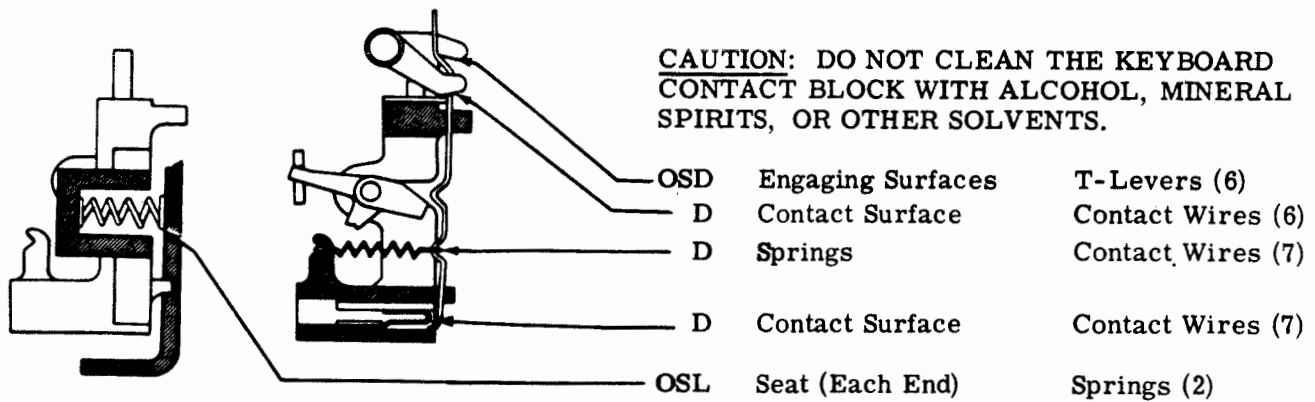


Figure 4-107. Contact Block

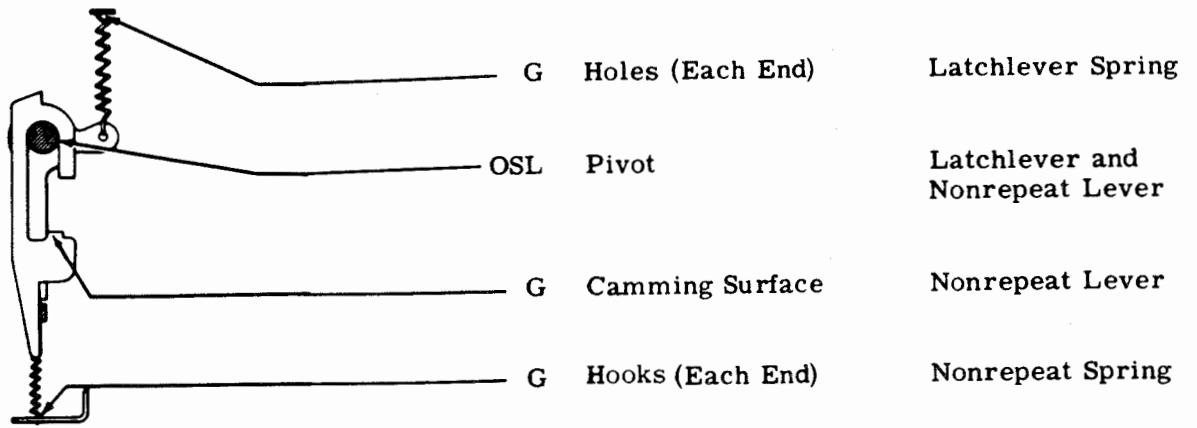


Figure 4-108. Latchlever

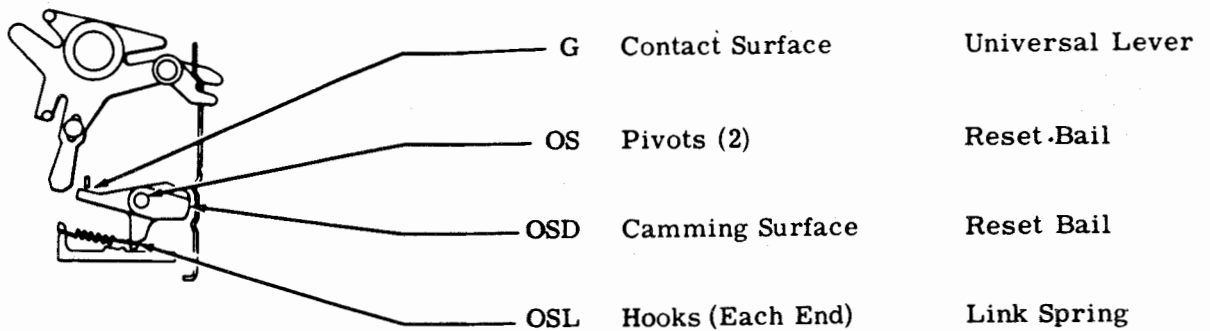


Figure 4-109. Reset Bail

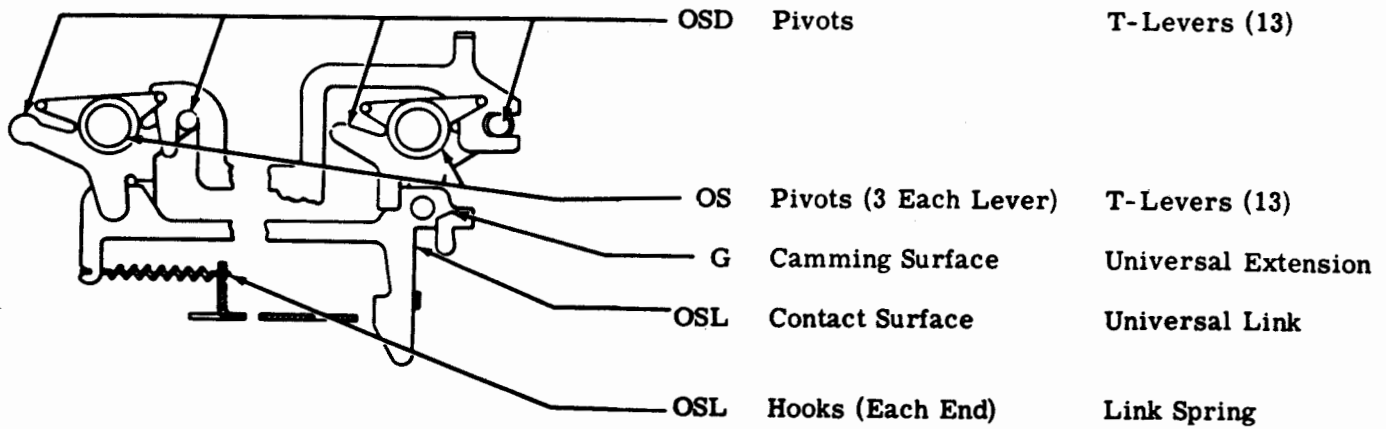


Figure 4-110. Code Bar Mechanism

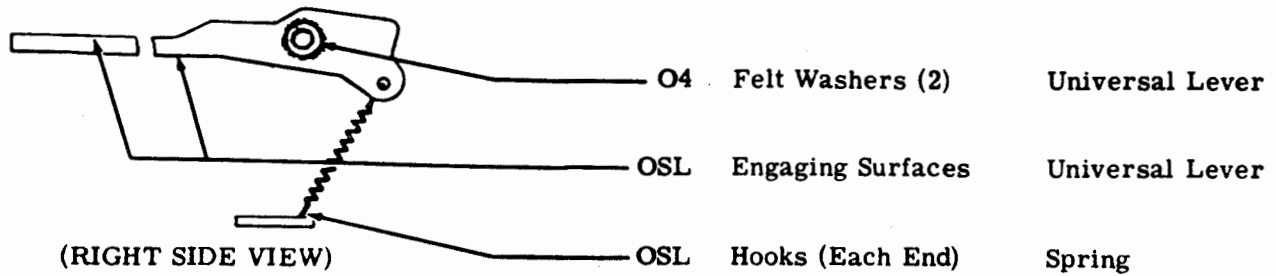


Figure 4-111. Universal Lever

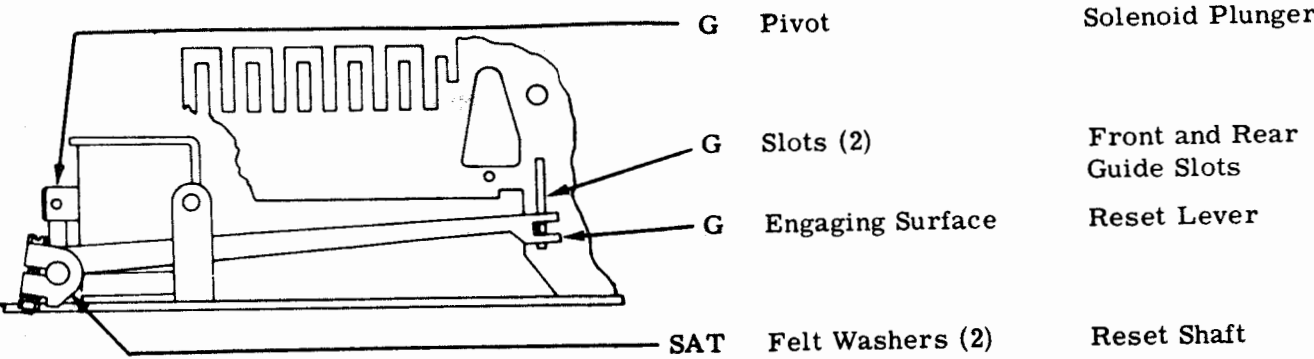


Figure 4-112. Solenoid Reset Mechanism

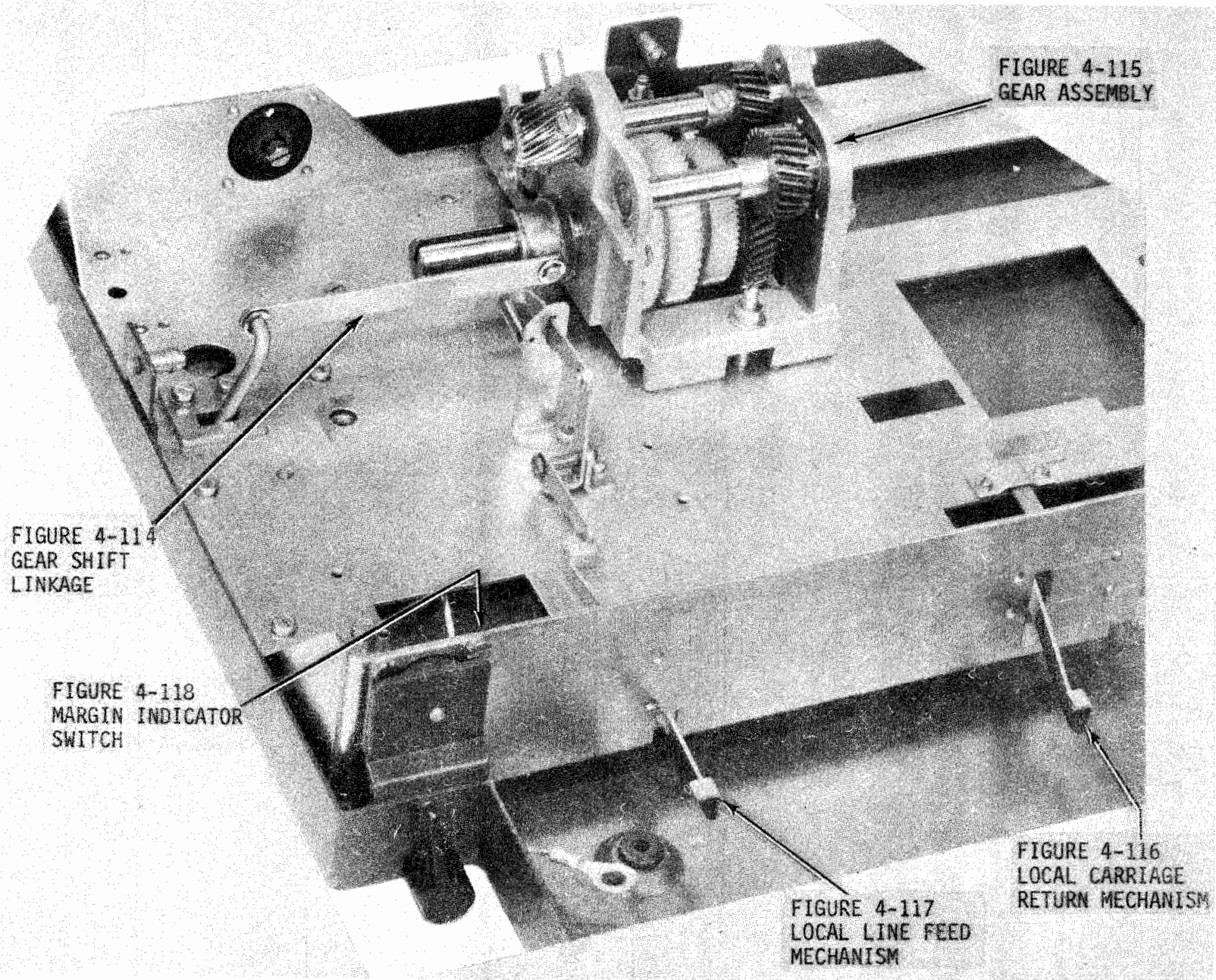


Figure 4-113. Gear Shift Assembly

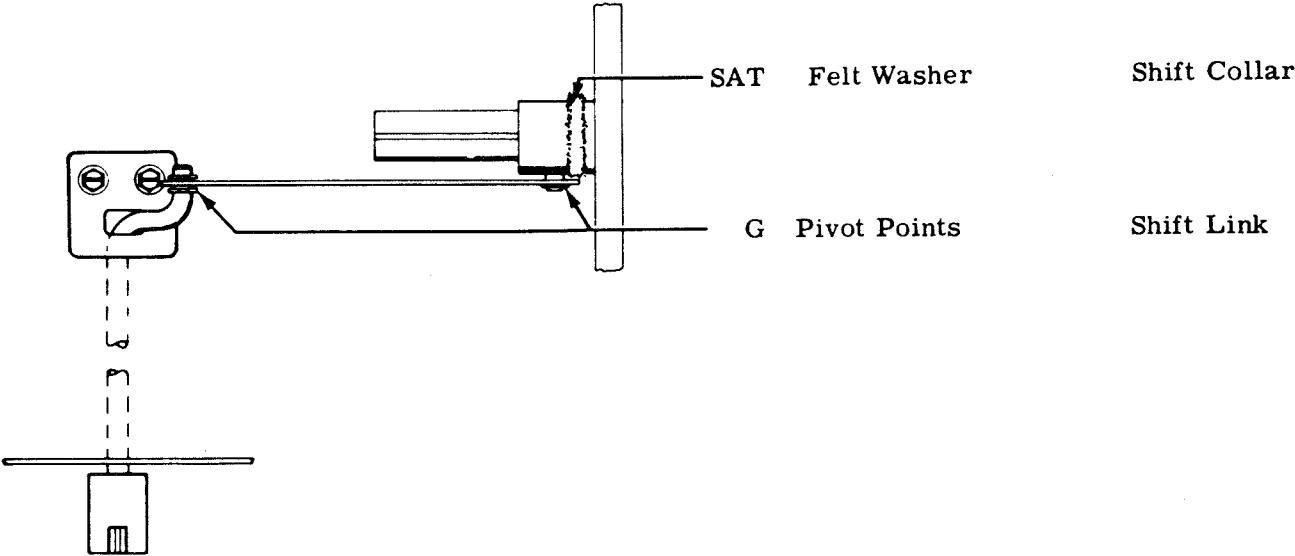


Figure 4-114. Gear Shift Linkage

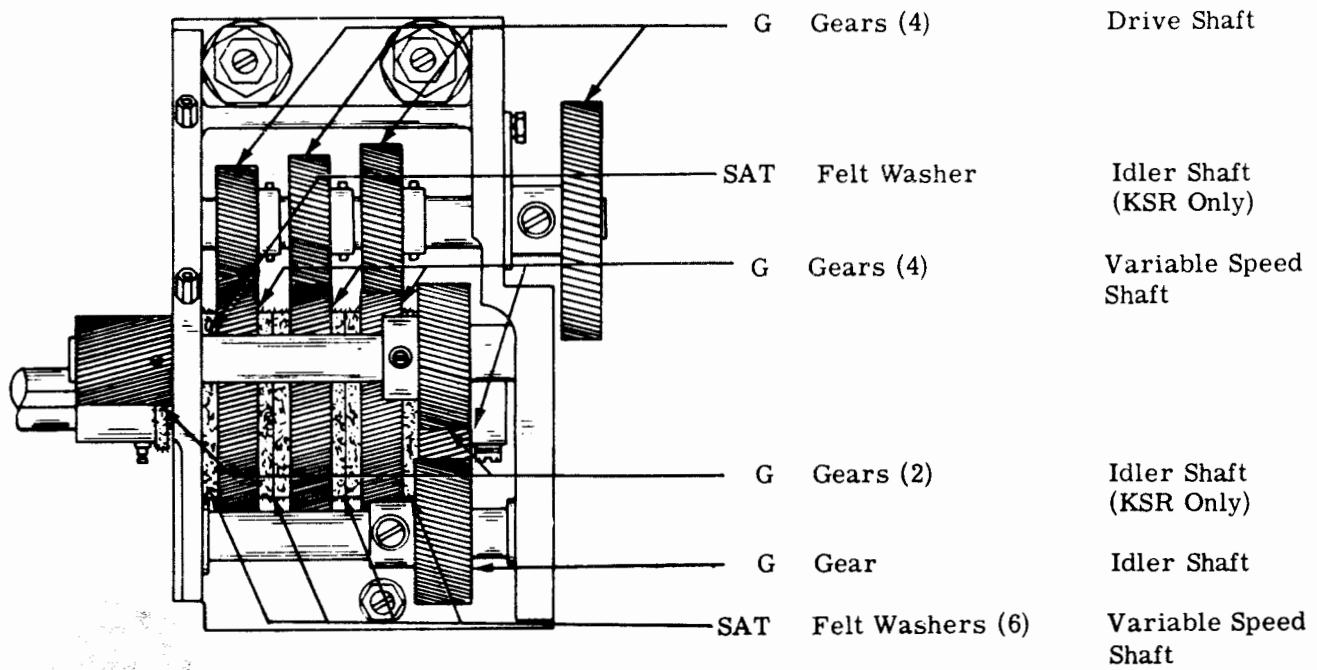


Figure 4-115. Gear Assembly

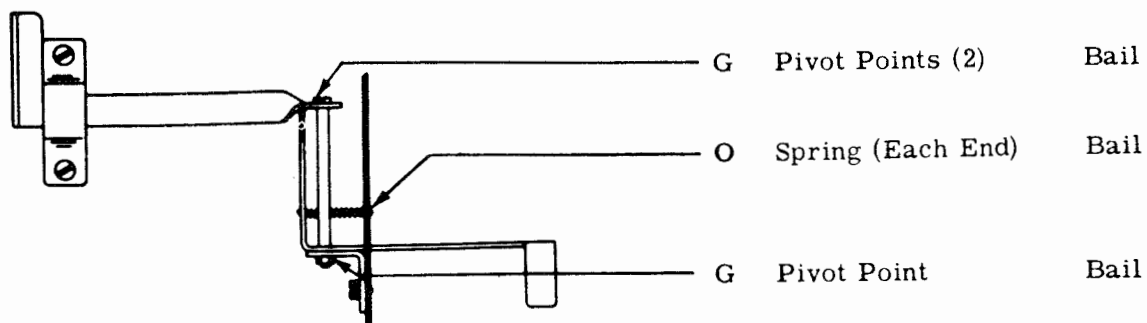


Figure 4-116. Local Carriage Return Mechanism

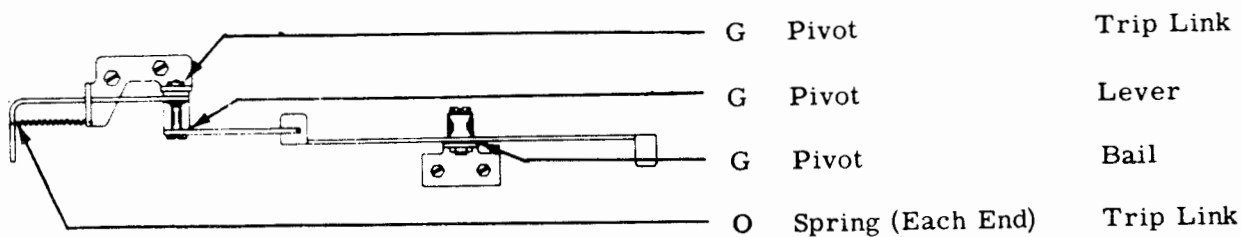


Figure 4-117. Local Line Feed Mechanism

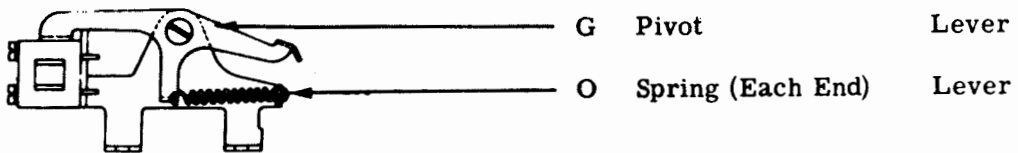


Figure 4-118. Margin Indicator Switch

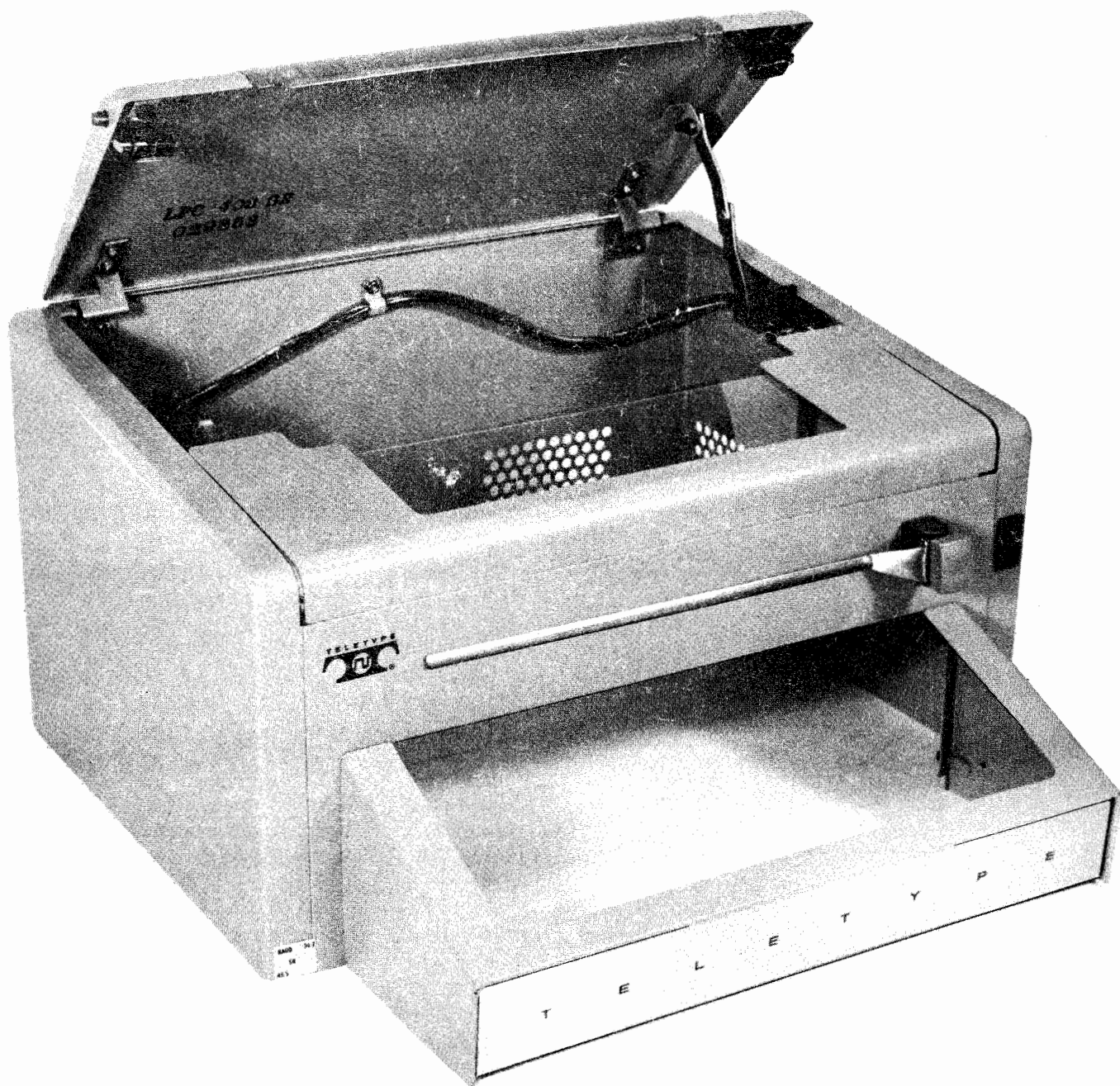


Figure 4-119. Cover Unit

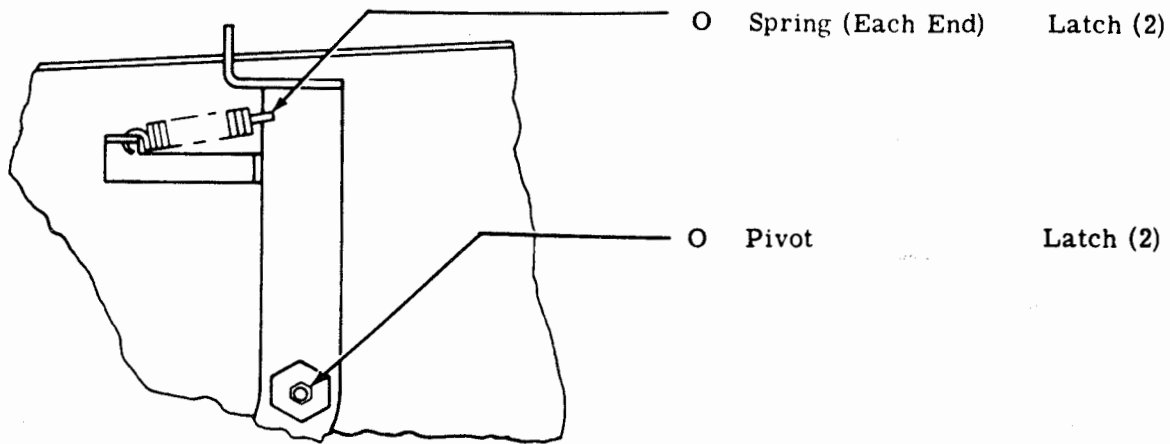


Figure 4-120. Cover Latch Mechanism

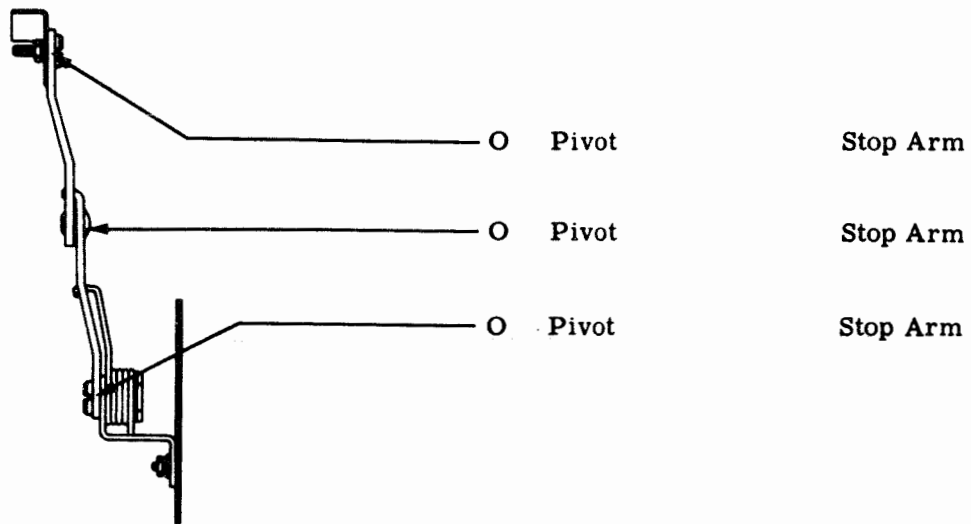


Figure 4-121. Dome Stop Arm

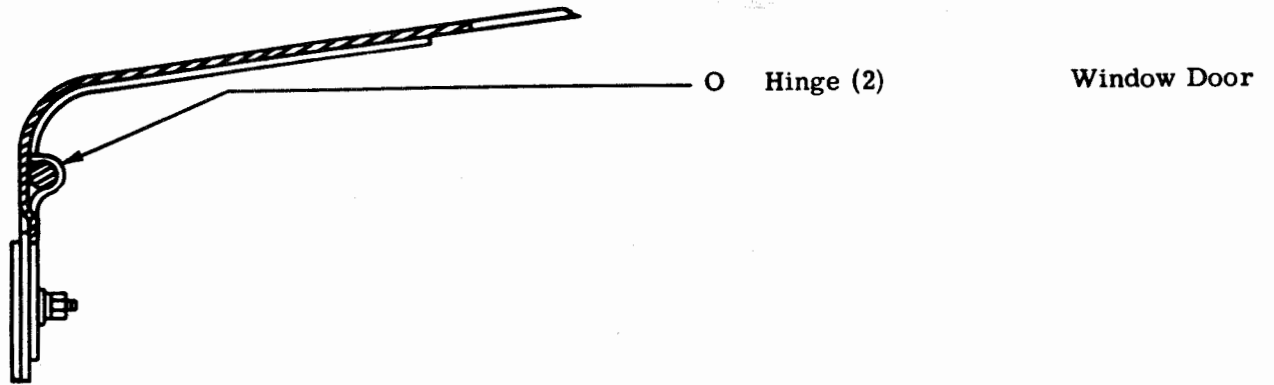


Figure 4-122. Window Door Hinge

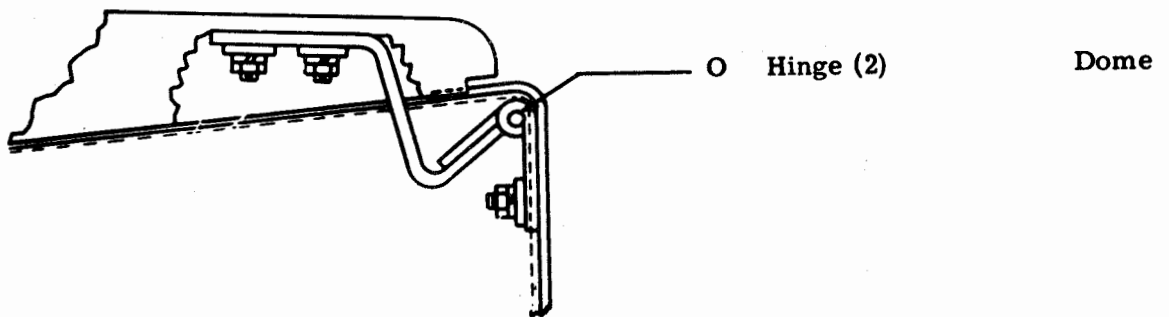


Figure 4-123. Dome Hinge

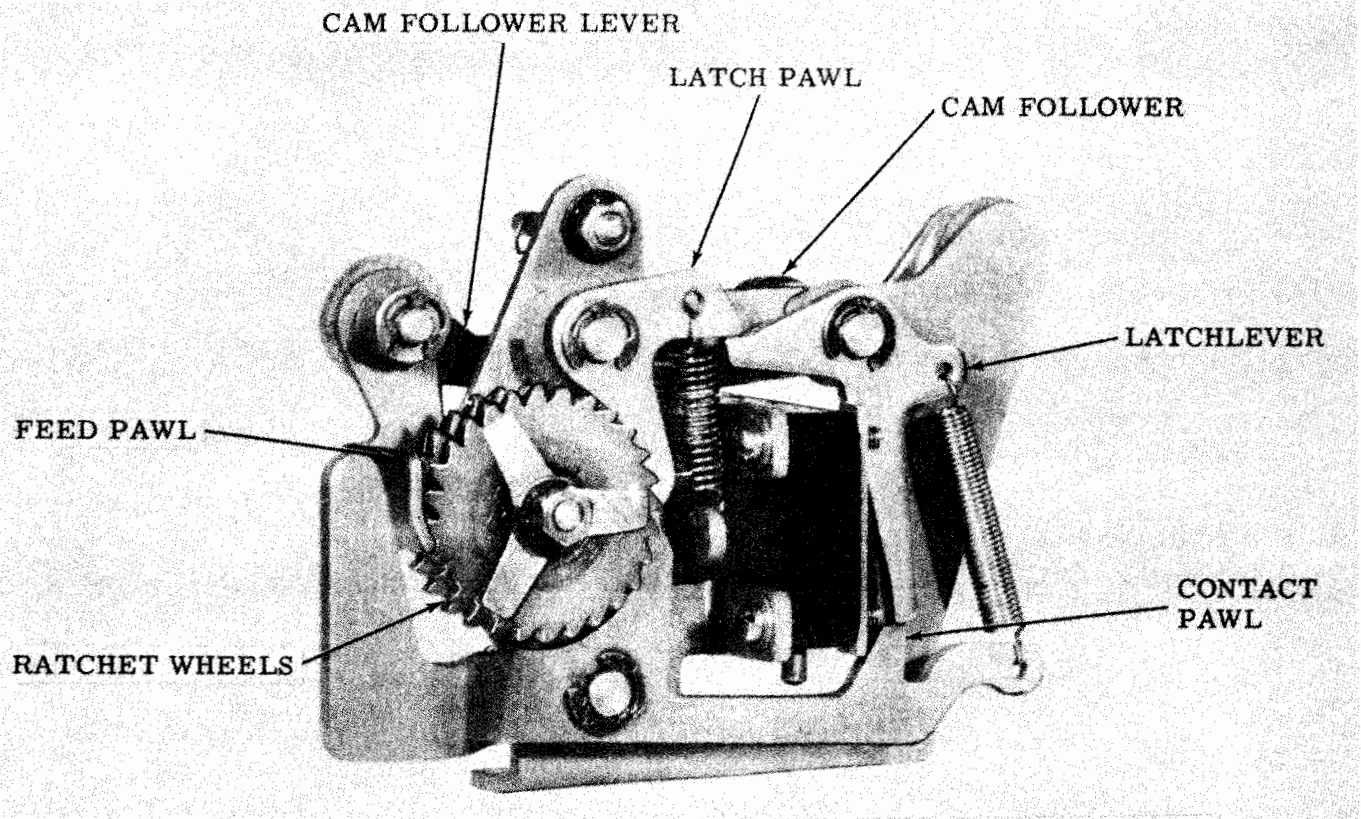


Figure 4-124. Time Delay Mechanism

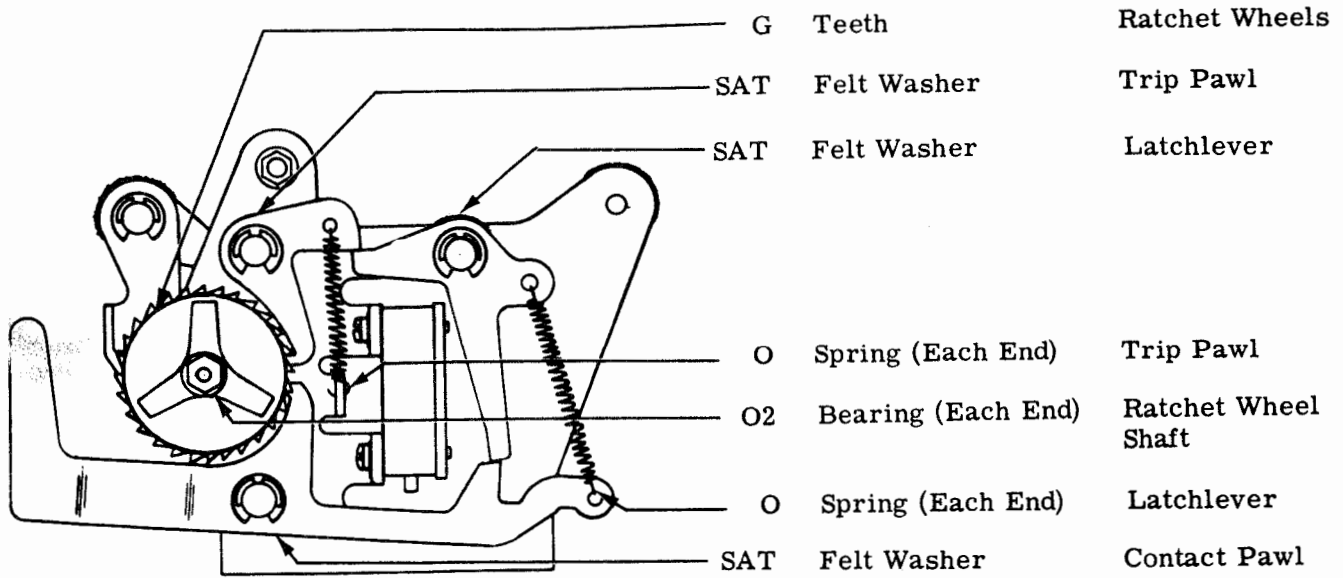


Figure 4-125. Trip and Reset Mechanism

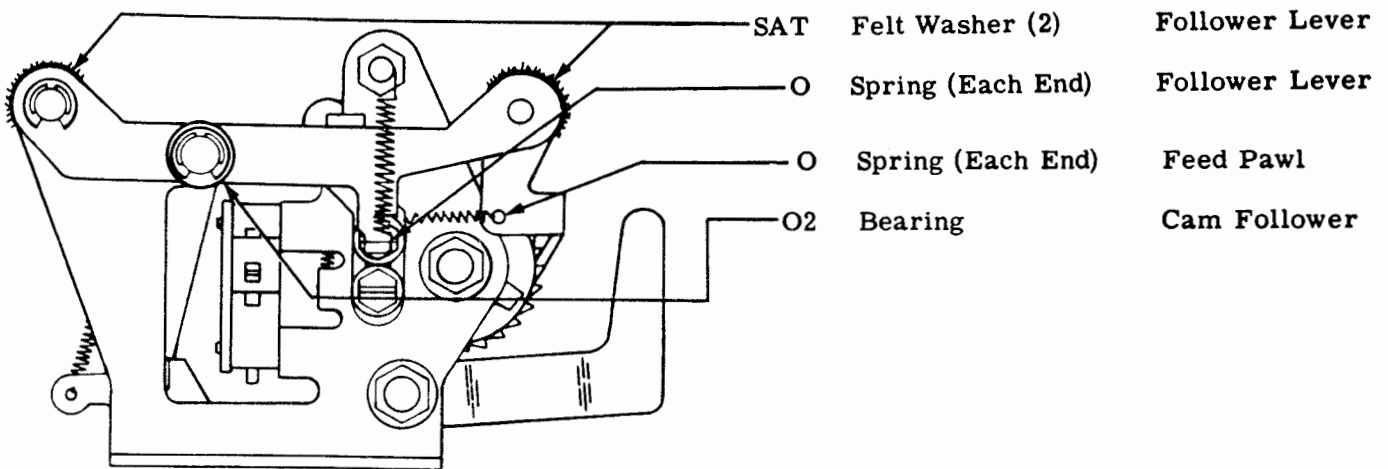


Figure 4-126. Cam Follower and Feed Mechanism

