28 TELETYPEWRITER KEYBOARD AND BASE (KSR AND RO)

LUBRICATION

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1. GENERAL

1.01 This section provides specific lubrication procedures for the 28 teletypewriter keyboard and base (KSR and RO bases) including variable features. It is being reissued to conform to more of a standard format, and to include recent engineering changes and additions. Since this is a general revision, marginal arrows ordinarily used to indicate changes have been omitted.

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1.02 The photographs show the paragraph numbers referring to particular line drawings of mechanisms, and where these mechanisms are located on the unit. The line drawings are provided to illustrate the points of lubrication and the quantity of lubricant to be used. Parts in the line drawings are shown in an upright position unless otherwise specified.

1.03 The symbols on the illustrations indicate lubrication as follows:

O1	Apply 1 drop of oil.
O2	Apply 2 drops of oil.
O3	Apply 3 drops of oil.
G	Apply thin film of grease.
SAT	Saturate (felt oilers, washers, wicks) with oil.

1.04 Use TP88970 (KS7470) oil at all locations where the use of oil is indicated. Use TP88973 (KS7471) grease on all surfaces where grease is indicated.

1.05 Lubricate the unit just prior to placing it in service. After a few weeks in service, relubricate to make certain that all points receive lubrication. The following lubrication schedule should be followed thereafter:

Operating Speed (WPM)	Lubrication Intervals
60	3000 hours or 1 year*
75	2400 hours or 9 months*
100	1500 hours or 6 months*

*Whichever occurs first.

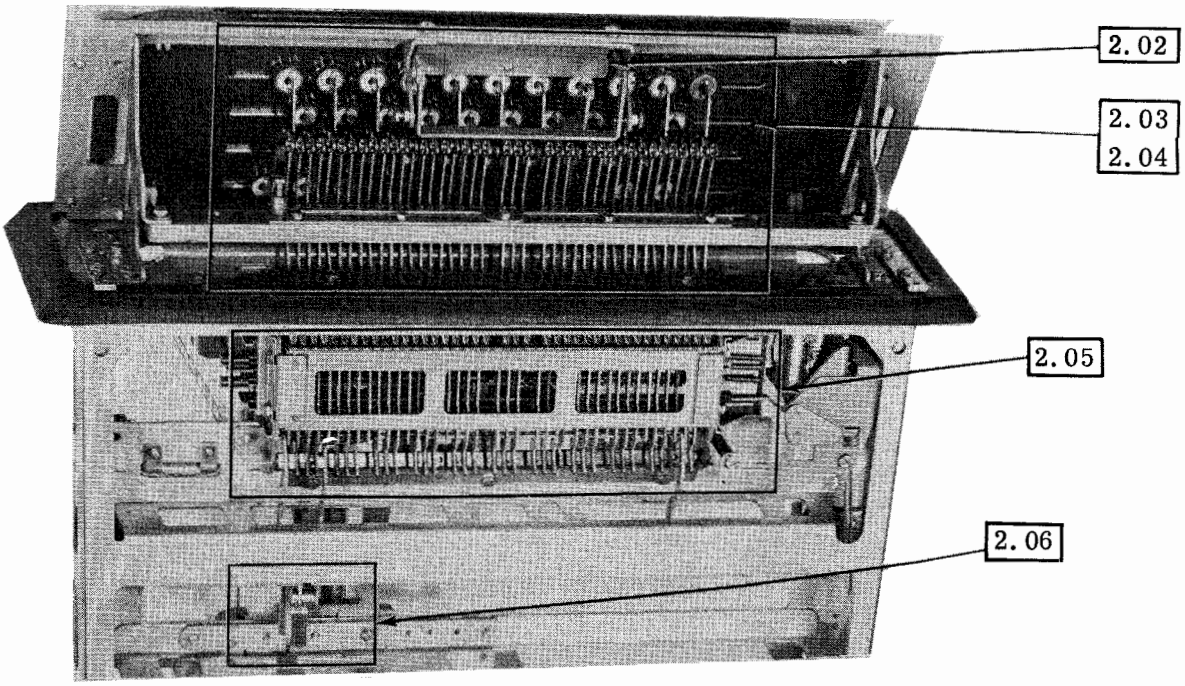
1.06 All spring eyes, spring wicks and felt oilers should be saturated. The friction surfaces of all moving parts should be thoroughly lubricated. However, over-lubrication, which will permit oil or grease to drip or be thrown on other parts should be avoided.

CAUTION: SPECIAL CARE MUST BE TAKEN TO PREVENT ANY OIL OR GREASE FROM GETTING BETWEEN ELECTRICAL CONTACTS.

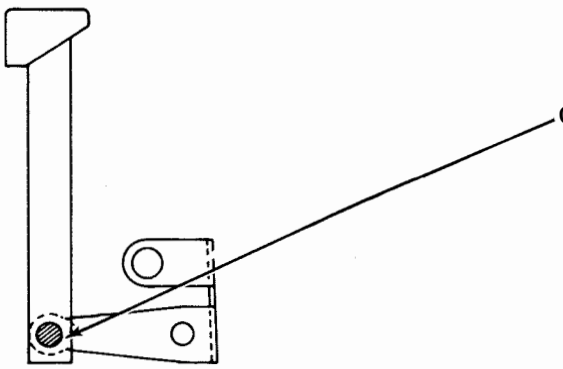
1.07 Apply a thick film of grease to all gears. Apply oil to all cams, including the camming surfaces of each clutch discs.

2. LATER DESIGN KEYBOARD

2.01 Keyboard - Bottom View

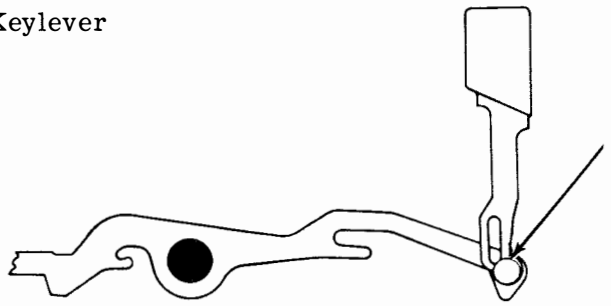


2.02 Spacebar



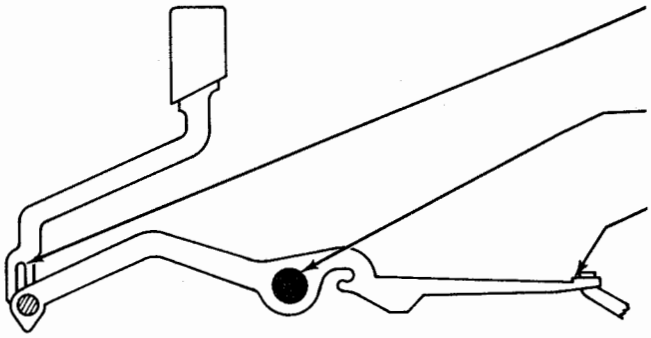
O1	Bearing Surface (Left & Right)	Spacebar

2.03 Keylever



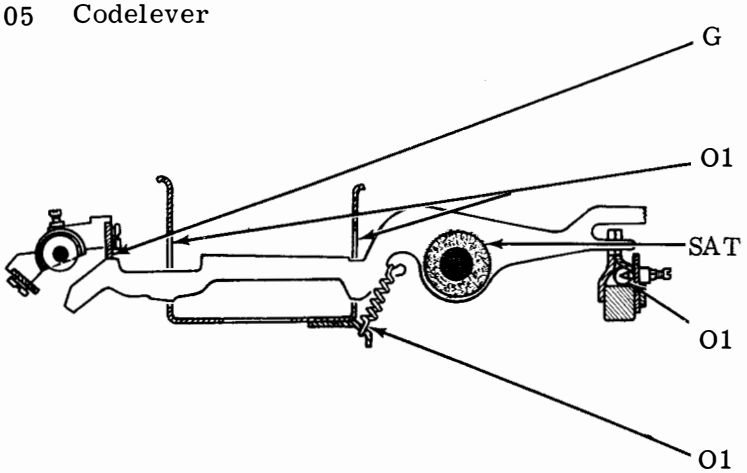
O1	Engaging Surface (36 Levers)	Keytop Levers

2.04 Breaklever



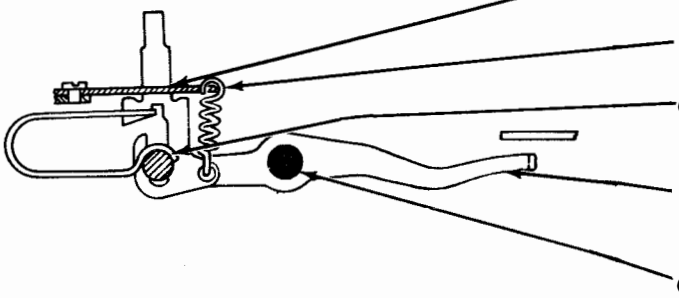
O1	Engaging Surface	Break Keylever
O1	Bearing Surface	Function Lever
G	Contact Surface	Breaklever

2.05 Codelever



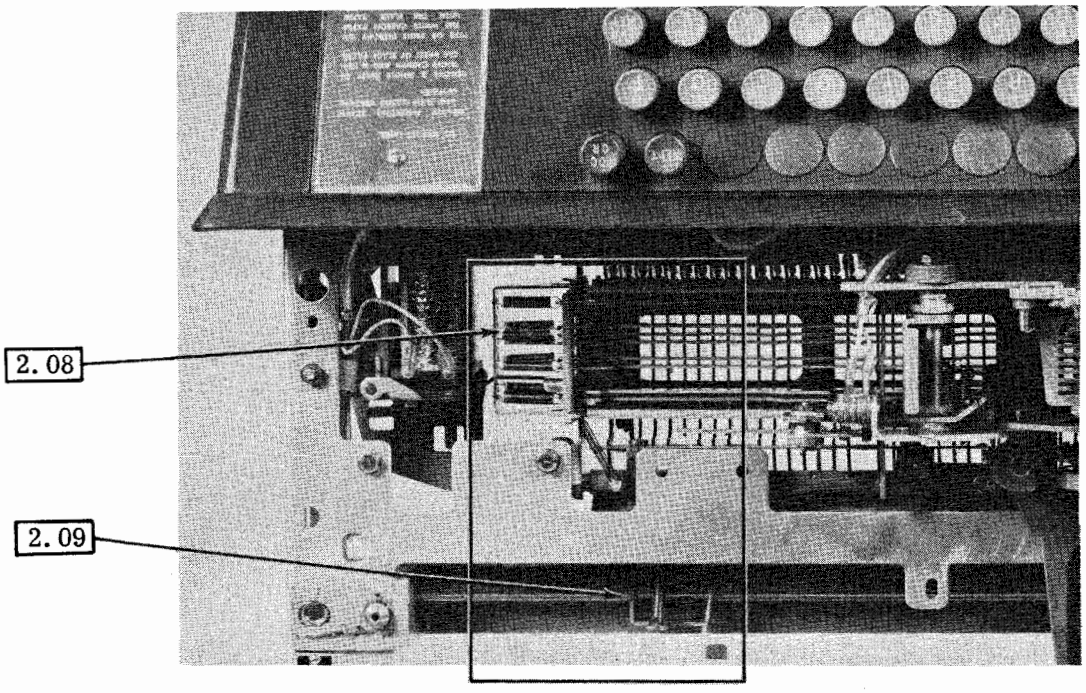
G	Contacting Surface (32 Levers)	Codelever Universal Bail
O1	Guide Slots (32 Levers)	Codelevers
SAT	Felt Washers (6 Washers)	Codelever Shaft
O1	Bearing Surface (32 Wedges)	Lock Ball Track
O1	Hooks - Each End (40 Springs)	Spring

2.06 Keyboard Lock

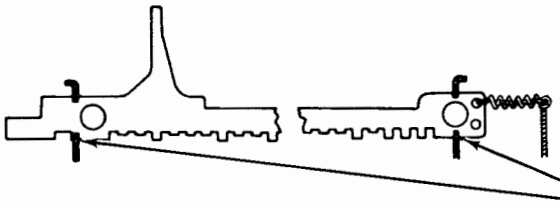


O1	Guide Slot	Keyboard Lock Plunger
O1	Hooks - Each End	Spring
O1	Bearing Surface	Keyboard Locklever
G	Engaging Surface	Keyboard Lock Function Lever
O1	Bearing Surface	Function Bail

2.07 Keyboard - Top View

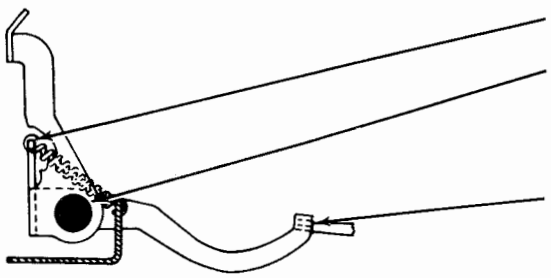


2.08 Codebar



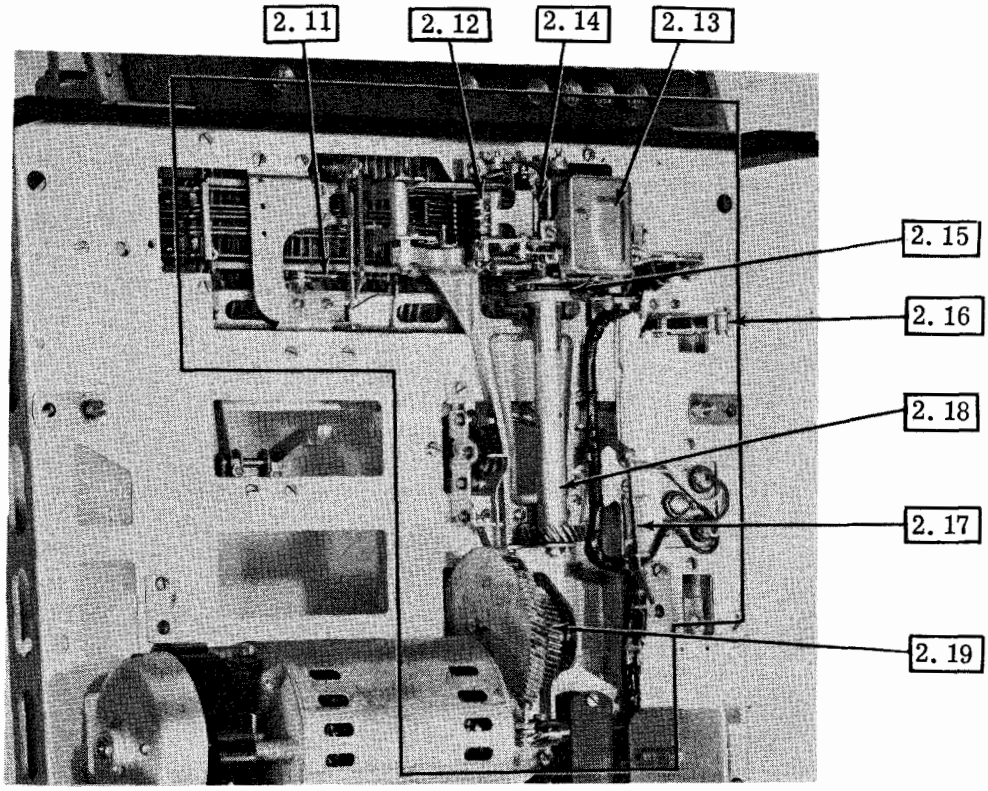
O1	Hooks - Each End (7 Springs)	Spring
O1	Guide Slots (Left and Right - Top and Bottom)	Codebar Guides

2.09 Local Carriage Return



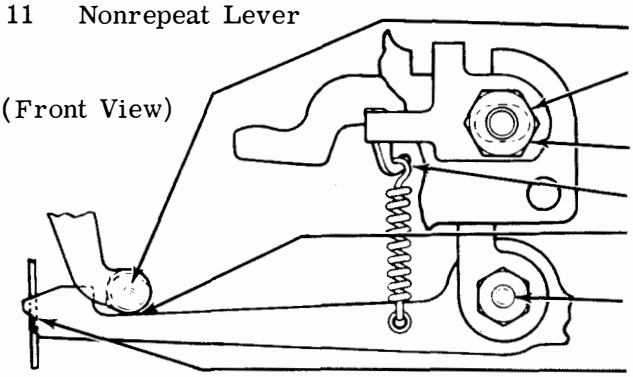
O1	Hooks - Each End	Spring
O1	Bearing Surface (2 Places)	Local Carriage Return Function Bail
G	Engaging Surface	Local Carriage Return Function Lever

2.10 Signal Generator Mechanism - Top Rear View



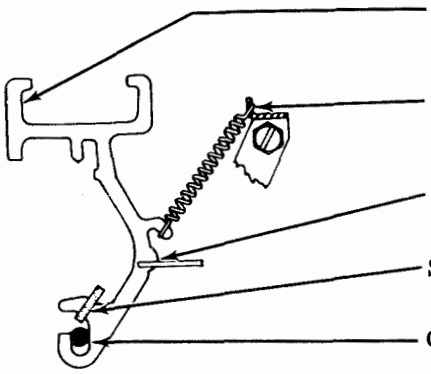
2.11 Nonrepeat Lever

(Front View)



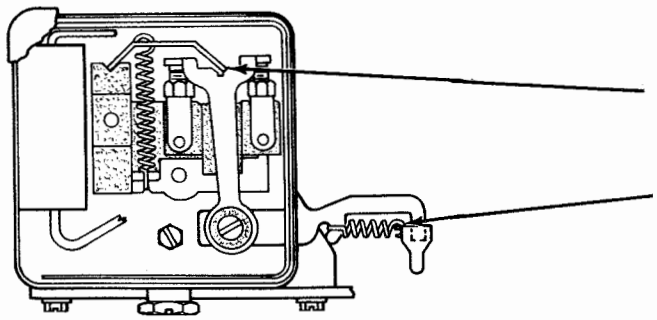
O1	Bearing Surface	Codebar Bail Roller
SAT	Felt Washer (Rear View)	Nonrepeat Lever Crank
O2	Bearing Surface	Nonrepeat Lever Crank
O1	Hooks - Each End	Spring
G	Engaging Surface	Nonrepeat Lever
O2	Bearing Surface	Nonrepeat Lever
O2	Guide Slot	Nonrepeat Lever

2.12 Transfer Lever



O1	Guide Slots	Transfer Levers (7 Levers)
O1	Hooks - Each End (7 Springs)	Spring
O1	Guide Slots	Transfer Levers (7 Levers)
SAT	Felt Washers (4 Washers)	Camming Surfaces
O1	Guide Slots	Transfer Levers (7 Levers)

2.13 Contact Box

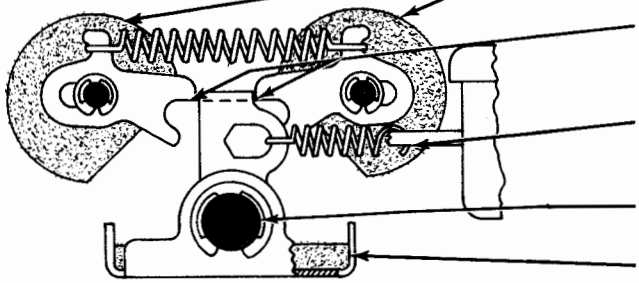


Note: Contact box cover must be removed prior to lubrication. To remove contact box cover, remove securing nut and lockwasher.

G	Engaging Surface	Contact Toggle
O1	Hooks - Each End	Spring

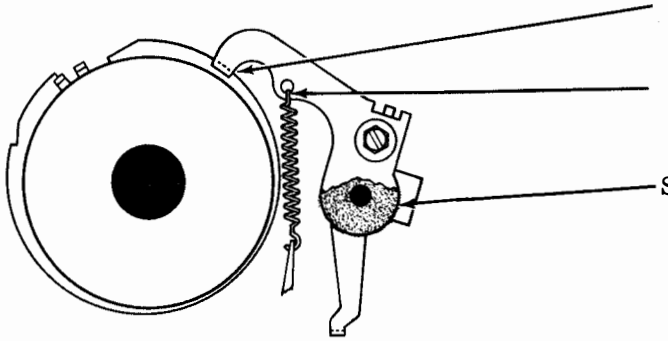
CAUTION: GREASE SPARINGLY - KEEP CONTACTS FREE OF OIL OR GREASE.

2.14 Transfer Bail



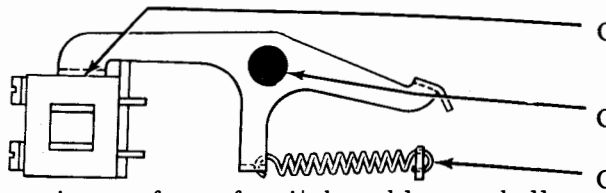
SAT	Felt Washers (2 Washers)	Latches
G	Engaging Surface	Transfer Bail
O1	Hooks - Each End (2 Springs)	Spring
O2	Bearing Surface	Transfer Bail
SAT	Oil Wick	Transfer Bail

2.15 Function Clutch



O2	Latching Surface	Clutch Stop Lever and Clutch Latchlever
O1	Hooks - Each End (2 Springs)	Spring
SAT	Felt Washers (2 Front & Rear)	Clutch Tripbail

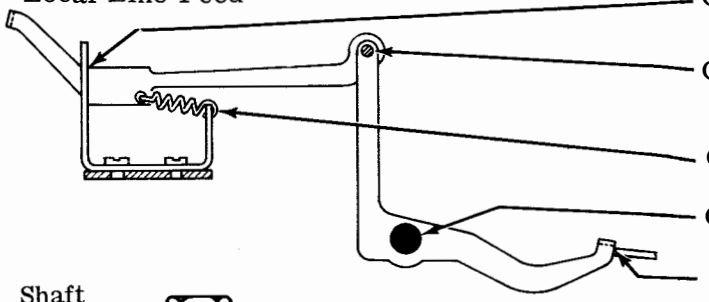
2. 16 Margin Indicator



O1	Engaging Surface (See Note)	Margin Indicator Switch
O1	Bearing Surface	Switch Lever
O1	Hooks - Each End	Spring

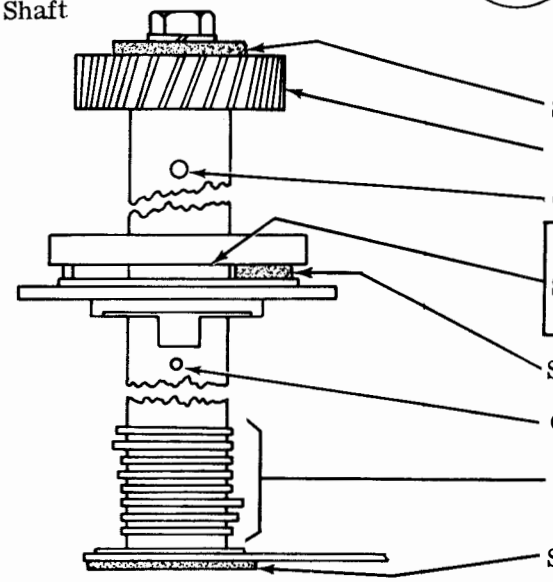
Note: Engaging surface of switch and lever shall not be lubricated if switch has a nylon actuator.

2. 17 Local Line Feed



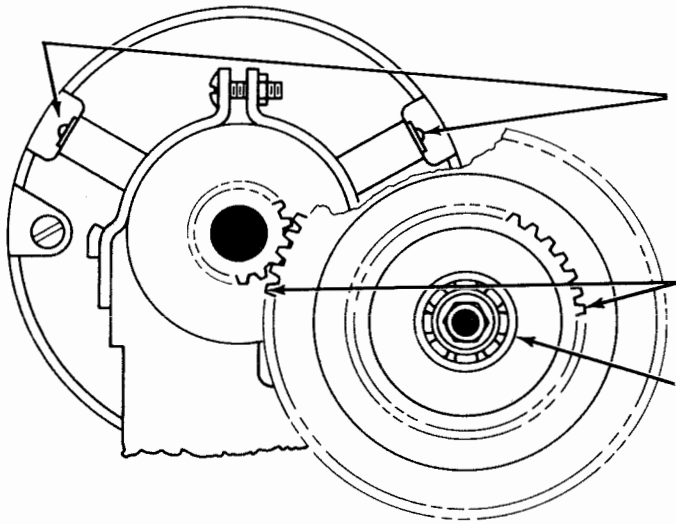
O2	Guide Slot	Local Line Feed Trip Link
O1	Bearing Surface	Local Line Feed Function Lever
O1	Hooks - Each End	Spring
O1	Bearing Surface	Function Bail
G	Engaging Surface	Local Line Feed Function Lever

2. 18 Shaft



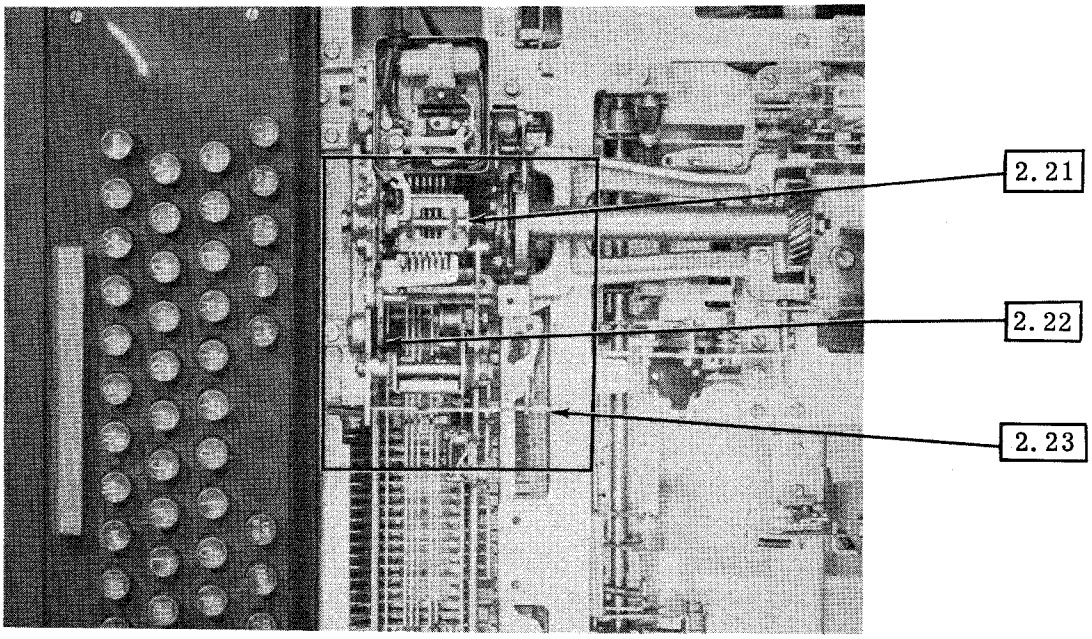
SAT	Felt Washer	Signal Generator Shaft
G	Gear Teeth	Signal Generator Shaft
O20	Oil Hole	Signal Generator Shaft
G	Each Hook	Shoe Lever Spring
SAT	Internal Mechanism	Keyboard Clutch
SAT	Felt Wick	
O20	Oil Hole	Signal Generator Cam
O2	Camming Surface Each Cam	Signal Generator Cam
SAT	Felt Washer	Signal Generator Shaft

2. 19 Intermediate Gear

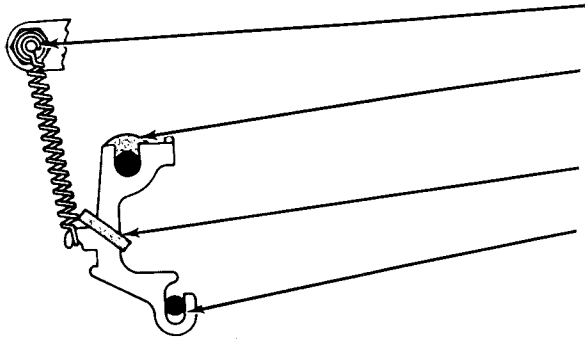


O6	Each Oiler (Total 4 Oilers)	Motor Shaft
G	Teeth (2 Gears)	Intermediate Gears
O2	Ball Bearing (2 Bearings)	Intermediate Gear Shaft

2.20 Signal Generator Mechanism - Right Top View

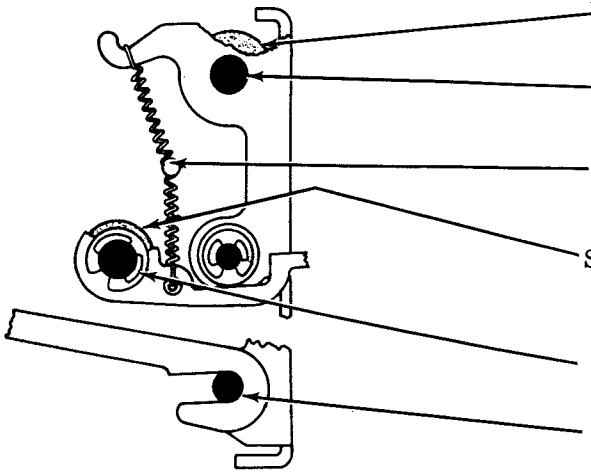


2.21 Locking Bail



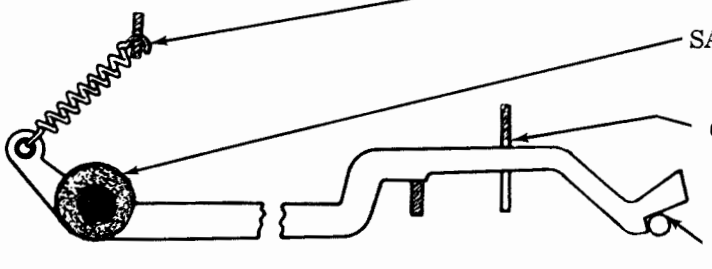
O1	Hooks - Each End	Spring
SAT	Felt Washers (2 Front & Rear)	Locking Bail Post
SAT	Felt Wick	Camming Surfaces
O1	Guide Slots (3 Slots)	Locking Bail

2.22 Codebar Bail



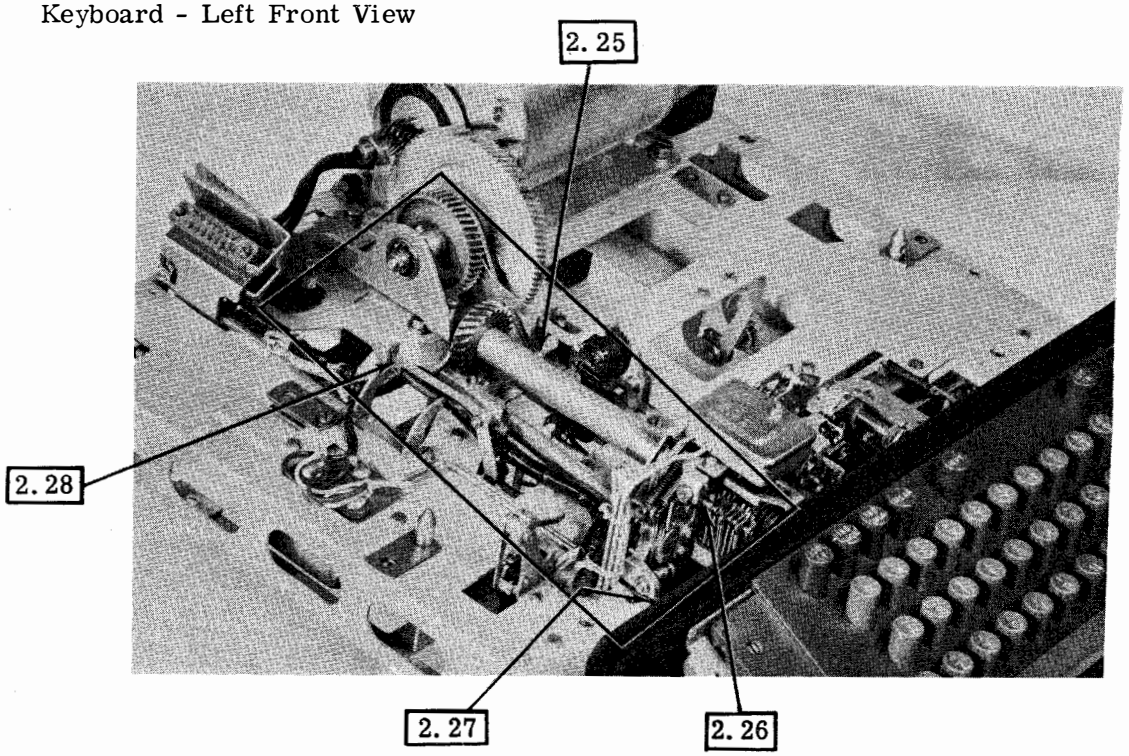
SAT	Felt Washers (2 Washers)	Codebar Bail
O1	Bearing Surface (2 Places)	Codebar Bail
O1	Hooks - Each End (2 Springs)	Spring
SAT	Felt Washer	Codebar Bail
O4	Bearing	Codebar Bail Latch
O2	Bearing Surface	Codebar Bail Latch
O2	Engaging Surface	Eccentric Follower

2.23 Universal Bail Latchlever

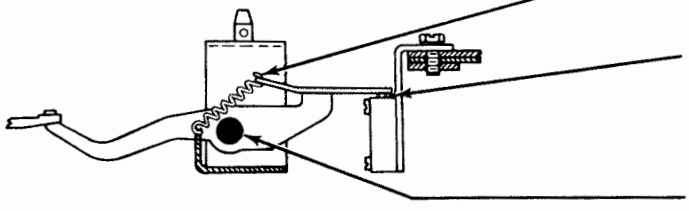


O1	Hooks - Each End	Spring
SAT	Felt Washer	Universal Bail Latchlever
O2	Guide Slot (Each Side of Slot)	Universal Bail Latchlever
G	Engaging Surface	Reset Bail Latch

2.24 Keyboard - Left Front View

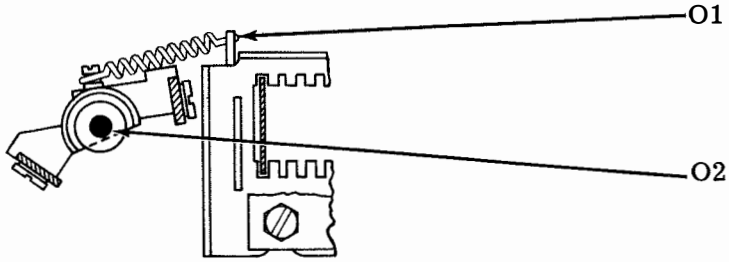


2.25 Electrical Line Break



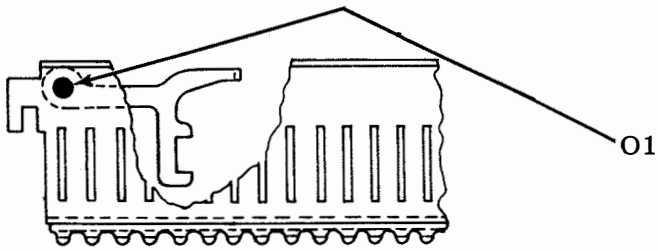
O1	Hooks - Each End	Spring
G	Contact Surface	Sensitive Switch
O1	Bearing Surface	Breaklever

2.26 Codelever Universal Bail



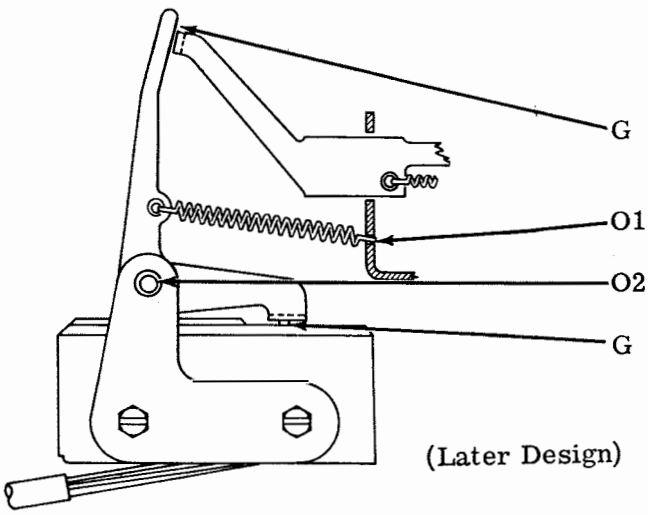
O1	Hooks - Each End	Spring
O2	Bearing Surface	Codelever Universal Bail

2.27 Lockbar Latch



O1	Bearing Surface	Lockbar Latch

2.28 Local Paper Feed-Out

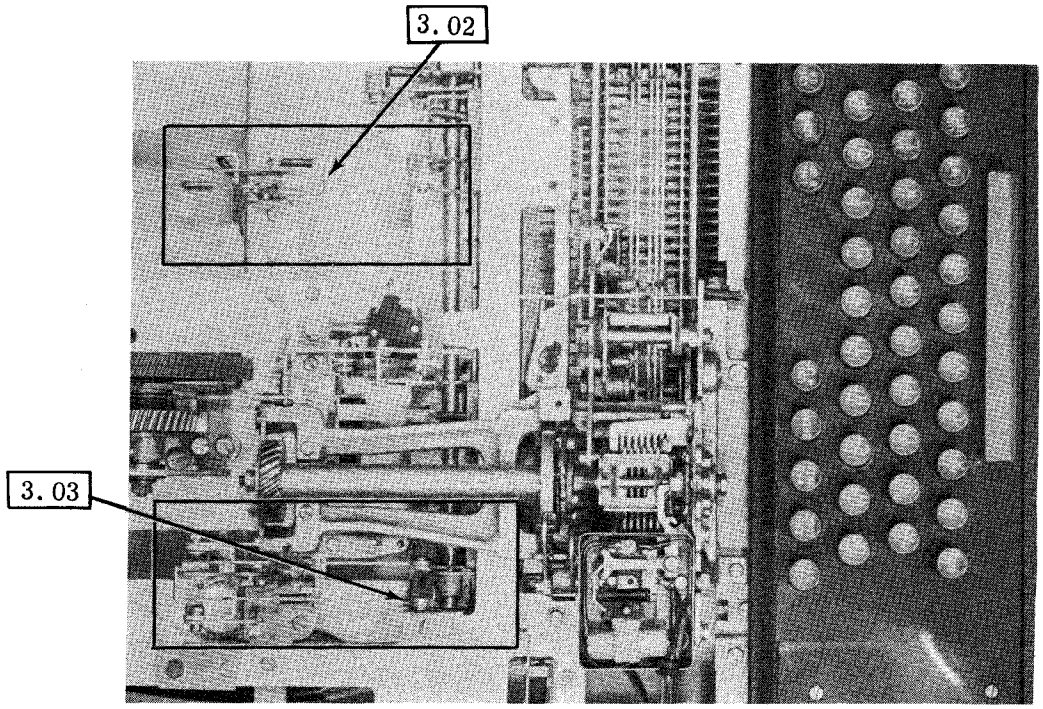


(Later Design)

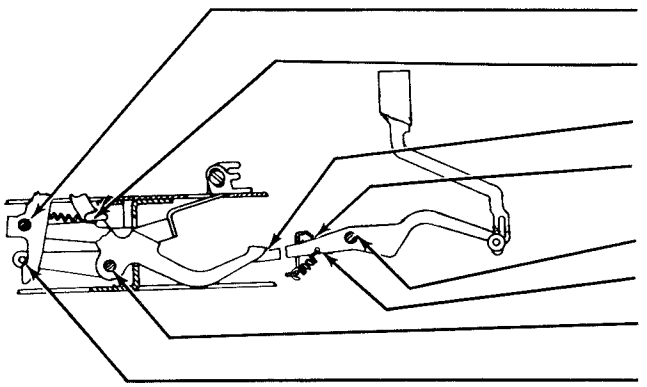
G	Engaging Surface	Local Line Feed Trip Link
O1	Hooks - Each End	Spring
O2	Bearing Surface	Lever
G	Engaging Surface	Magnetic Blowout Switch

3. VARIABLE FEATURES (KEYBOARD)

3.01 Local Backspace and Line Feed Mechanisms - Left Top View



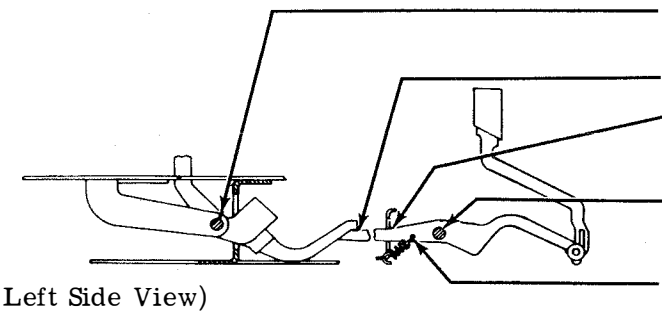
3.02 Local Backspace



(Left Side View)

O2	Bearing Surface	Local Backspace Transfer Bail
O1	Hooks - Each End	Spring
G	Engaging Surface	Function Lever
O1	Guide Slots (2 Places)	Guide Bracket
O1	Bearing Surface	Function Lever
O1	Hooks - Each End	Spring
O2	Bearing Surfaces (2 Places)	Operating Bail
O2	Engaging Surface	Operating Bail

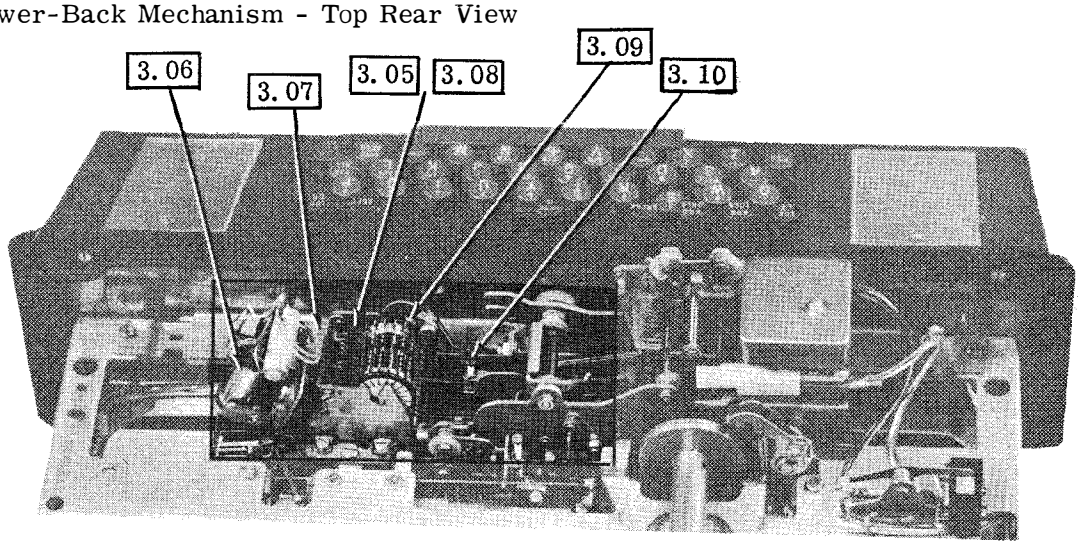
3.03 Local Reverse Line Feed



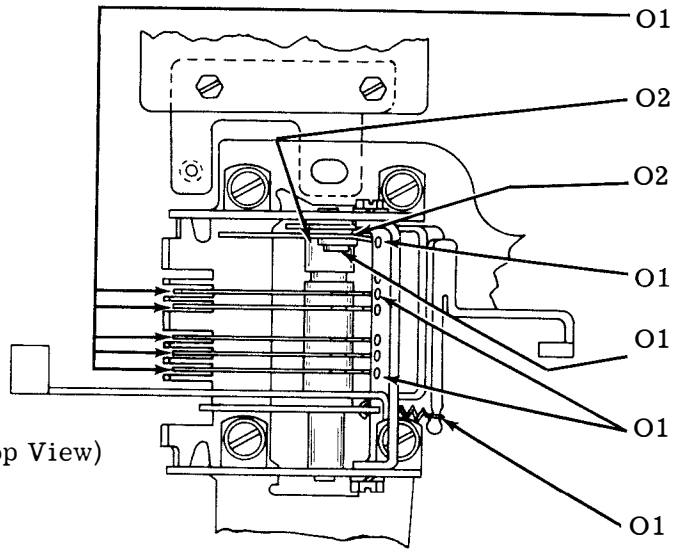
(Left Side View)

O2	Bearing Surface	Local Reverse Line Feed Operating Bail
G	Engaging Surface	Function Lever
O1	Guide Slots (2 Slots)	Function Lever
O1	Bearing Surface	Function Lever
O1	Hooks - Each End	Spring

3.04 Answer-Back Mechanism - Top Rear View

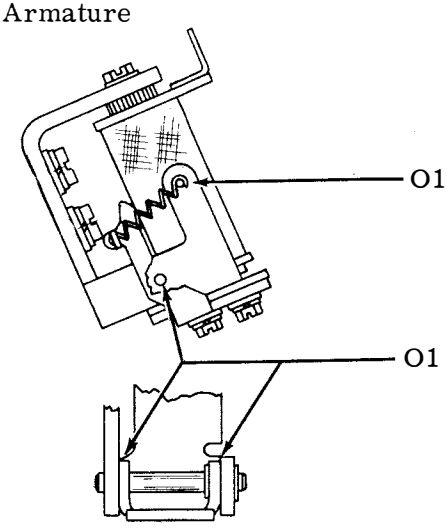


3.05 Answer-Back - Sensing Levers



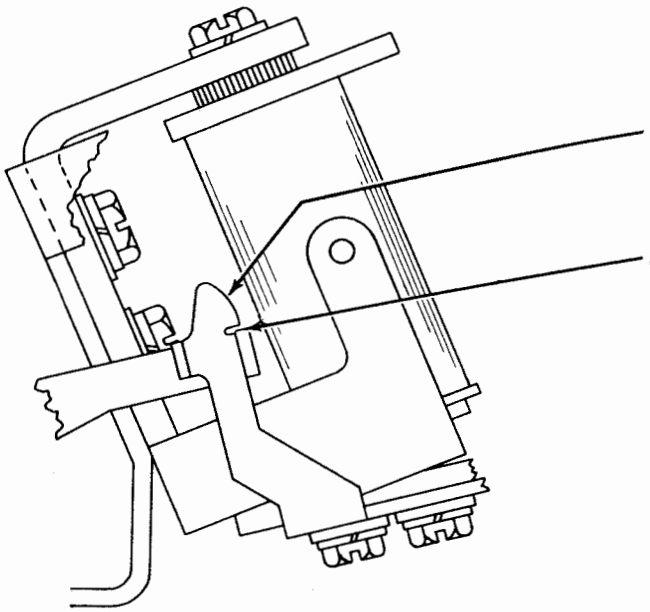
O1	Camming Surfaces (5 Places)	Sensing Levers
O2	Bearing Surface	Detent Lever
O2	Bearing Surface	Detent Lever and Roller
O1	Hook - Each End	Spring
O1	Bearing Surface	Detent Lever Roller
O1	Hooks - Each End (5 Springs)	Springs
O1	Hook - Each End	Spring

3.06 Answer-Back - Armature

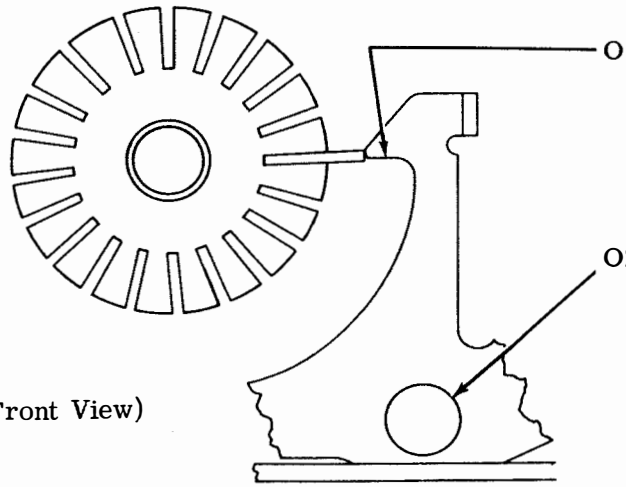


O1	Hook - Each End	Spring
O1	Bearing Surfaces (2 Places)	Armature and Shaft

3.07 Answer-Back Stop Lever



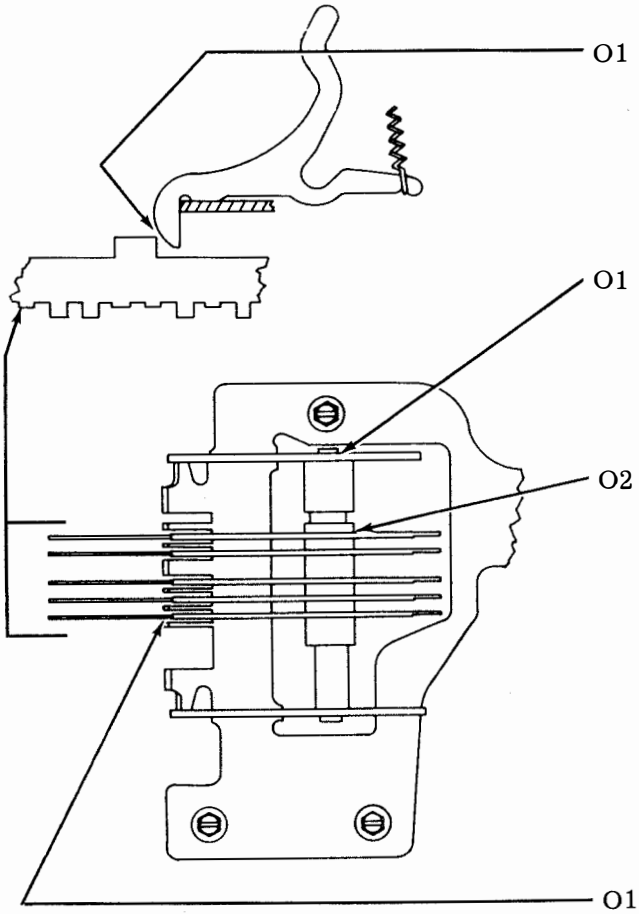
O1	Contacting Surface	Latch and Stop Lever
O1	Latching Surface	Latch and Stop Lever



(Front View)

O1	Camming Surface	Stop Lever
O2	Bearing Surface (2 Places)	Stop Lever and Lever Pivot

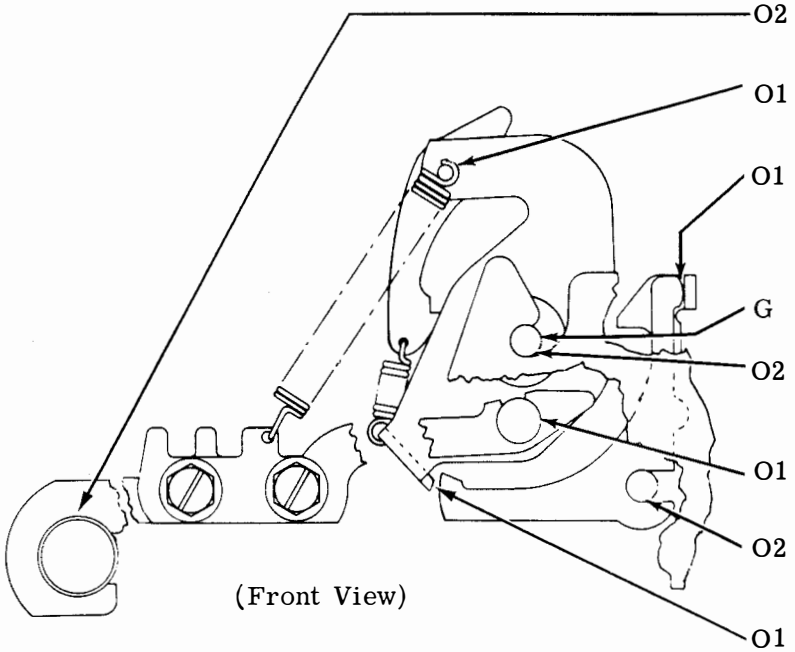
3.08 Answer-Back - Codebars and Sensing Levers



(Top View)

O1	Engaging Surfaces (5 Places)	Sensing Levers and Codebars
O1	Bearing Surface (Both Sides)	Levers Pivot and Side Plate
O2	Bearing Surfaces (5 Levers)	Sensing Levers and Levers Pivot
O1	Guiding Surfaces (5 Places)	Sensing Levers and Mounting Plate

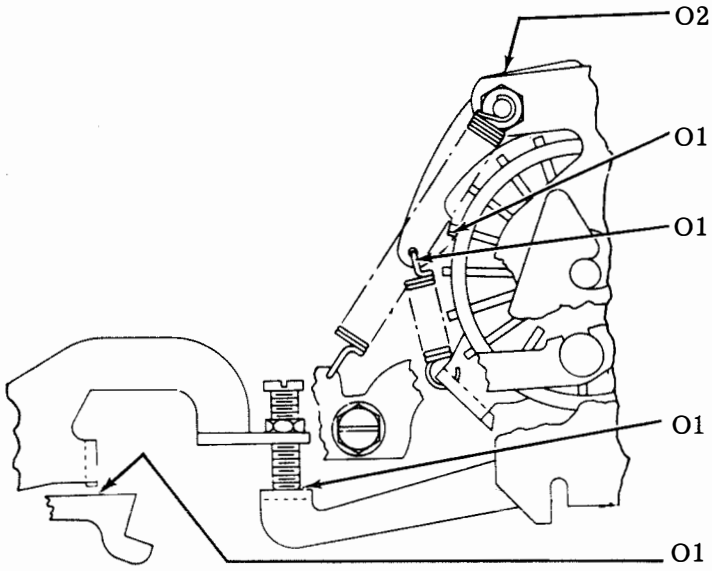
3.09 Answer-Back Driving Mechanism



(Front View)

O2	Bearing Surface	Eccentric Stud and Drive Link
O1	Hook - Each End	Spring
O1	Engaging Surface	Blocking Lever and Stop Lever
G	Shaft	Drive Plate
O2	Bearing Surface (2 Plates)	Drive Plate Shaft and Side Plate
O1	Engaging Surface	Drive Link and Stud
O2	Bearing Surface	Blocking Lever and Lever Pivot
O1	Engaging Surface	Blocking Lever and Extension

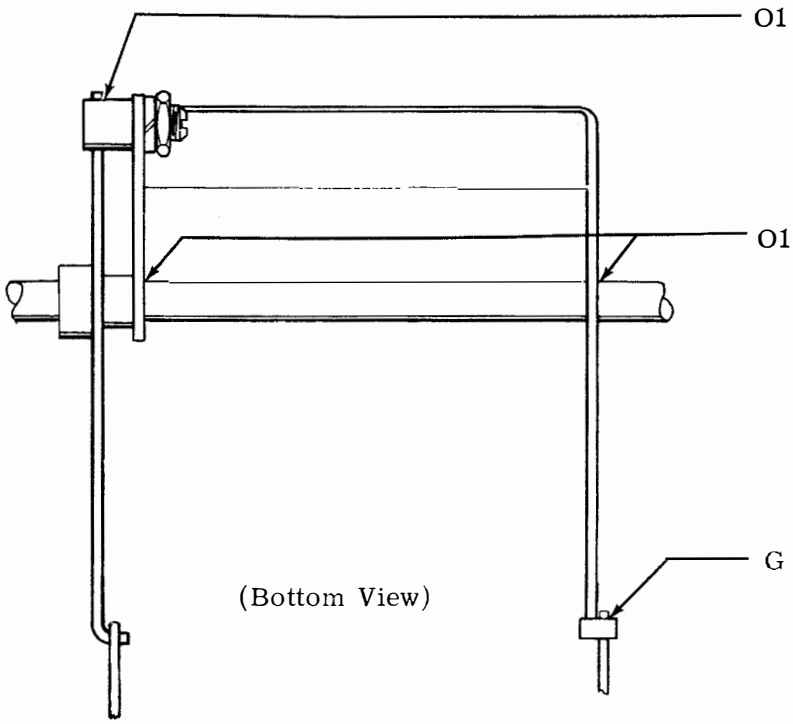
3.10 Answer-Back Stepping Pawl



(Front View)

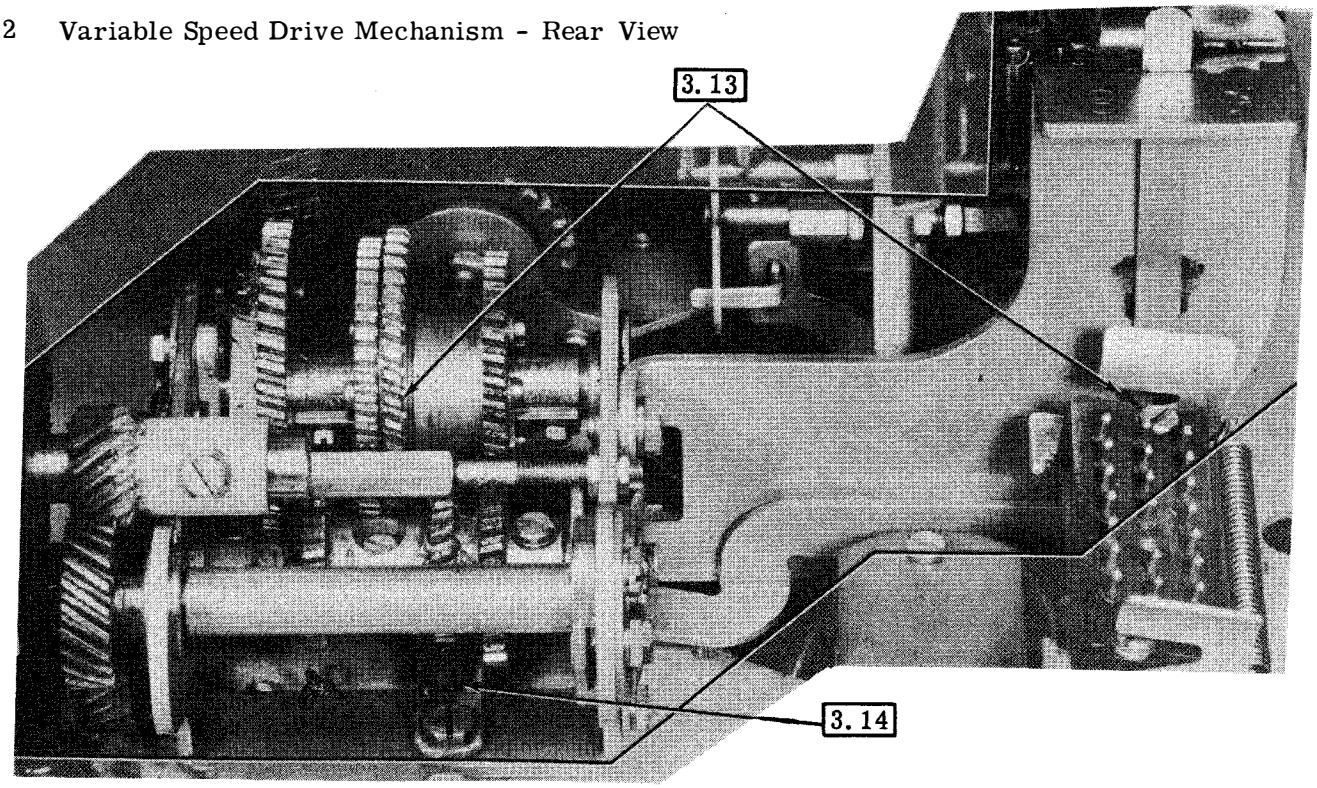
O2	Bearing Surface	Stepping Pawl and Eccentric Stud
O1	Contacting Surfaces	Stepping Pawl and Codeblades
O1	Hook - Each End	Spring
O1	Contacting Surface	Adjusting Screw
O1	Contacting Surface	Lever and Latch

3.11 Answer-Back Keyboard Lock Bail

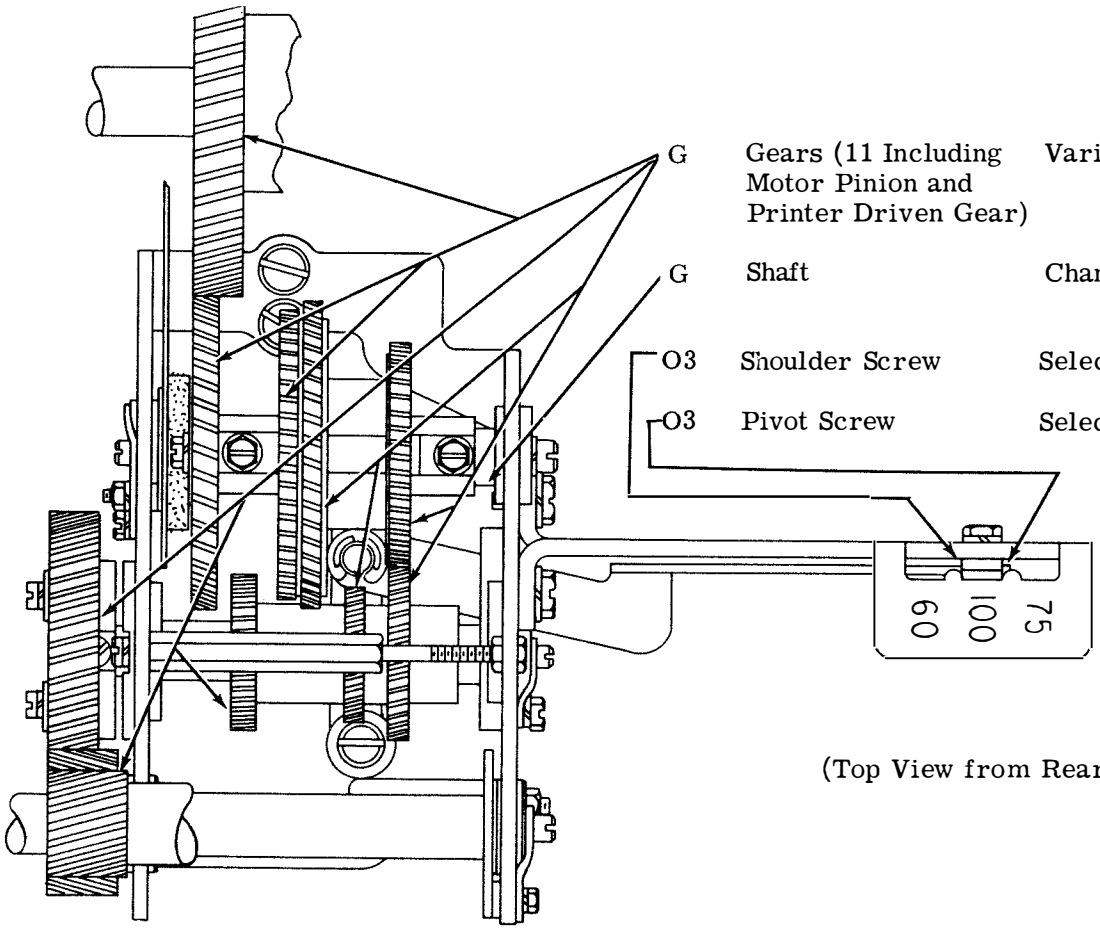


O1	Engaging Surfaces	Eccentric and Locklever
O1	Bearing Surfaces	Function Lever and Bail
G	Contacting Surface	"Here Is" Lever and Bail

3.12 Variable Speed Drive Mechanism - Rear View



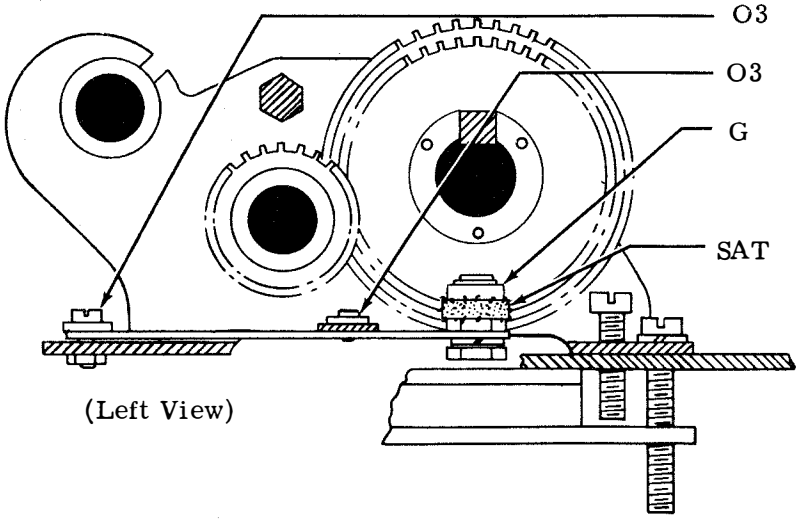
3.13 Variable Speed Drive - Speed Selecting Mechanism



G	Gears (11 Including Motor Pinion and Printer Driven Gear)	Variable Speed Drive
G	Shaft	Change Gear Slide
O3	Shoulder Screw	Selector Eccentric
O3	Pivot Screw	Selector Lever

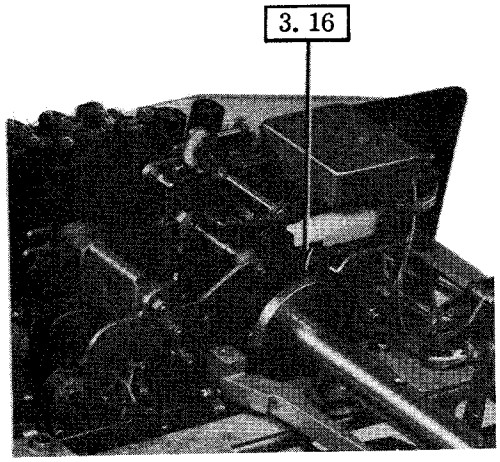
(Top View from Rear)

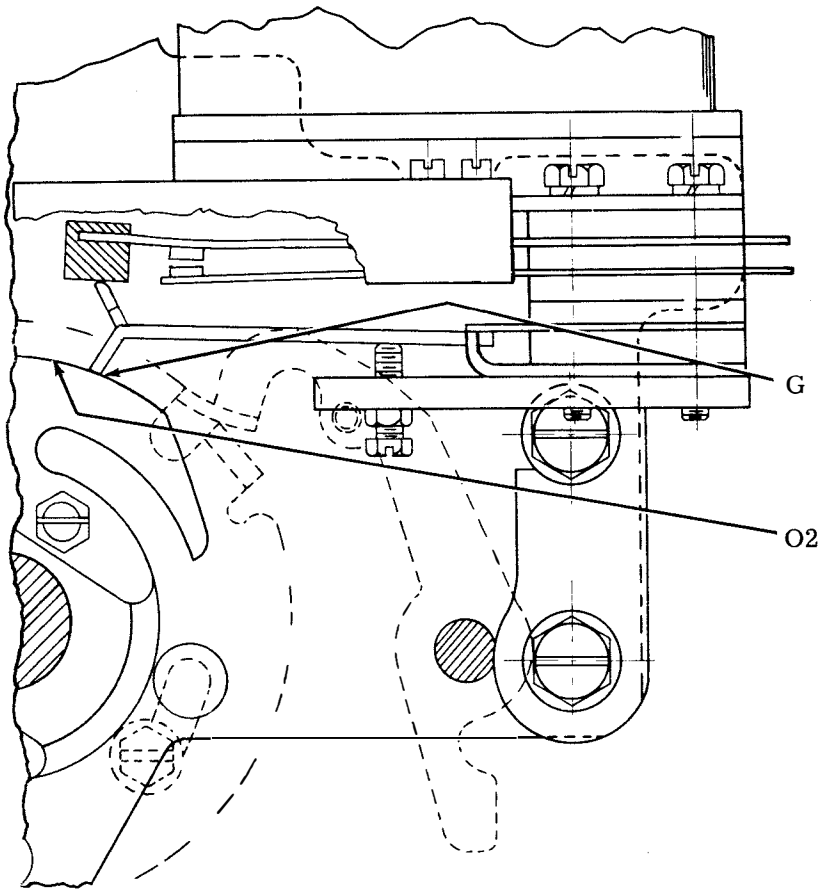
3.14 Variable Speed Drive - Speed Selecting Mechanism (Continued)



3.15 Blinding (Pulsing) Contact - Left Rear View

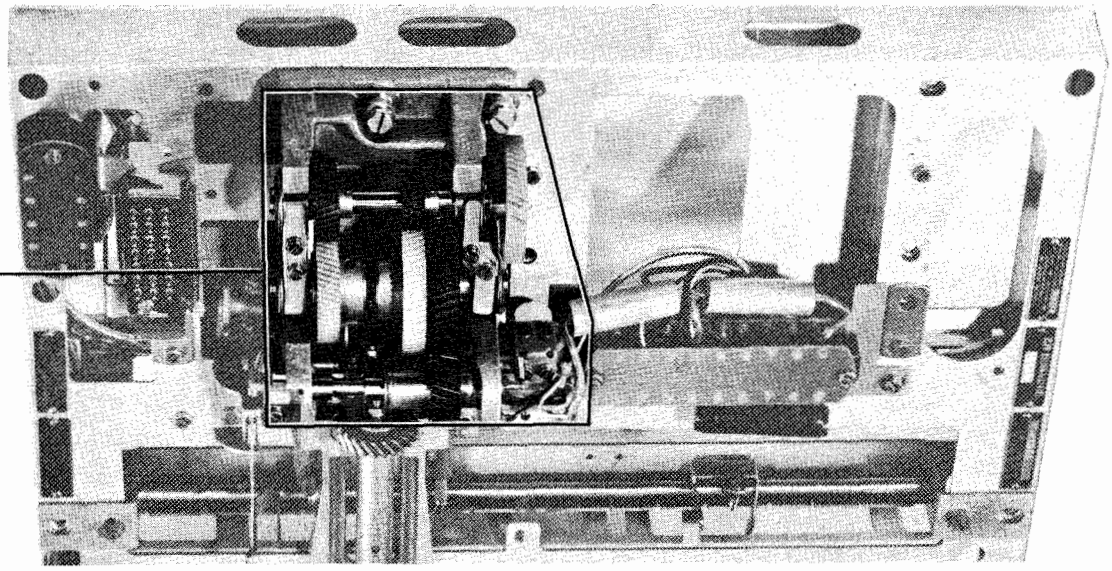
3.16 Cam Follower



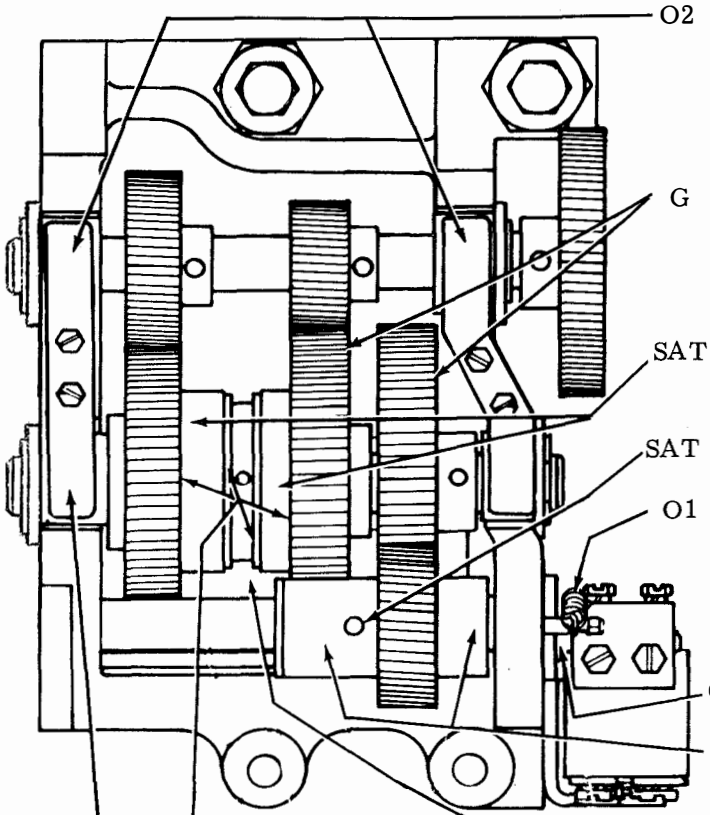


Note: Avoid getting grease or oil on contact surfaces.

3. 17 Remote Control Gear Shift Mechanism - Top View (Tilted Forward)

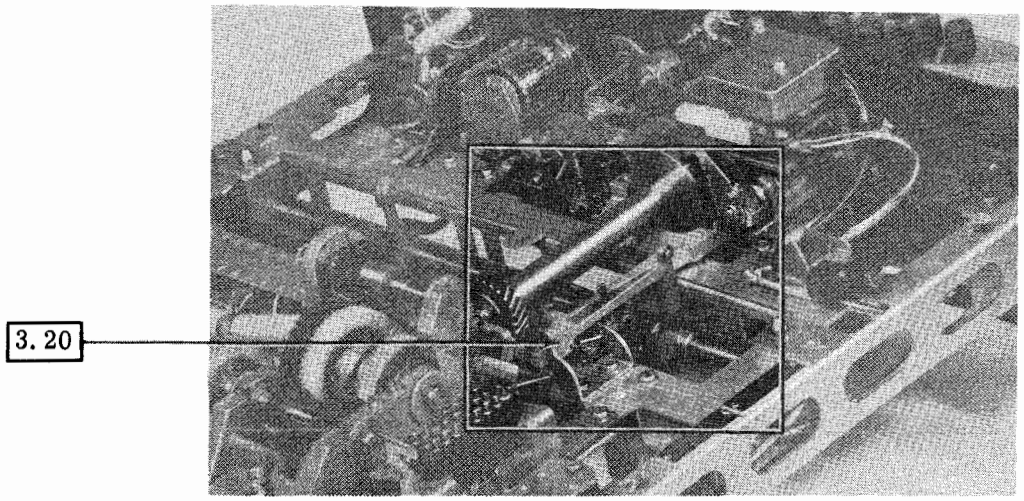


3. 18 Remote Control Gear Shift

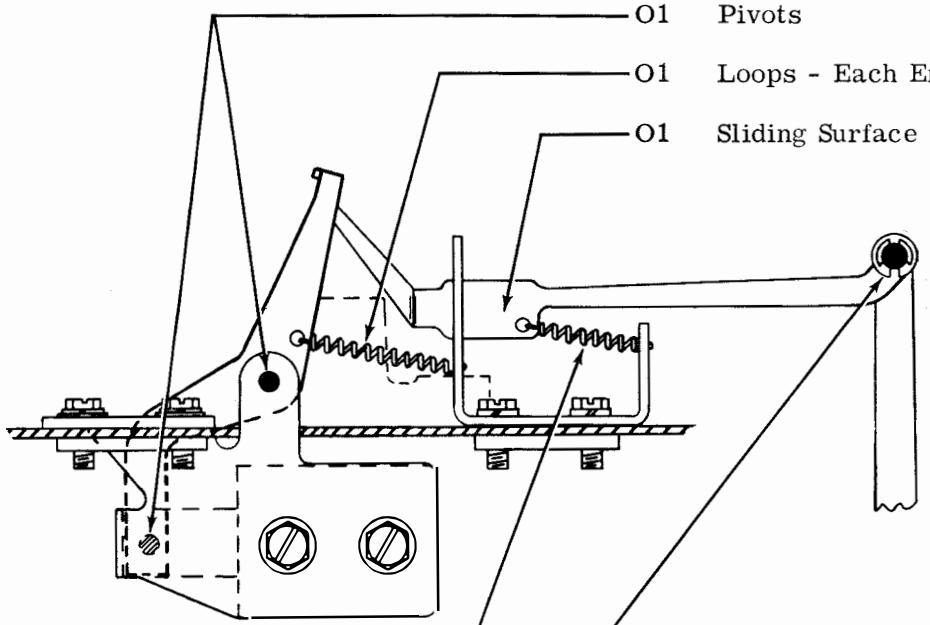


O2	Oilite Bearing (2) (Oil Each Side Of Bearings)	Driven Gear Bearings
G	Gear Teeth	Eight Gear Including Motor Pinion
SAT	Felt Wicks (2)	Spring Clutches
SAT	Felt Wick	Idler Gear
O1	Loops - Each End	Armature Spring
O2	Bearing Points	Armature Shaft
O2	Oilite Bearings (2) (Oil Each Side Of Bearings)	Idler Gear Bearings
O1	Clutch Springs and Hubs (Light Film During Reassembly)	Spring Clutches
O2	Oilite Bearing Washers (4)	Spring Clutches
O2	Oilite Bearings (2) (Oil Each Side)	60 and 100 wpm Driver Gear Bearings

3. 19 Form Feed-Out - Left Rear View

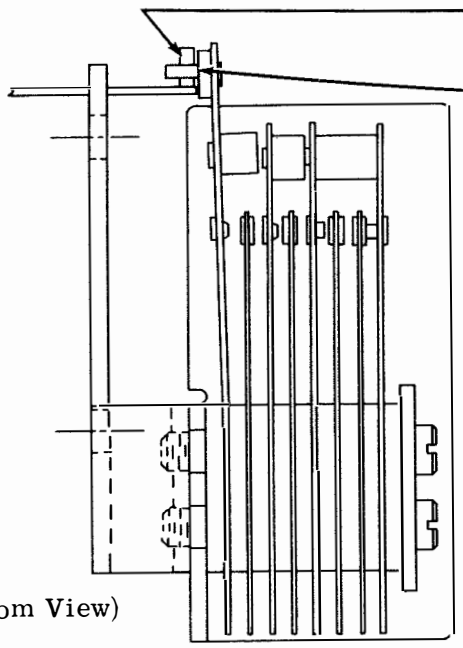


3. 20 Form Feed-Out



O1	Pivots	Trip Lever
O1	Loops - Each End	Solenoid Torsion Spring
O1	Sliding Surface	Form Feed-Out Link
O1	Pivot	Form Feed-Out Link
O1	Loops - Each End	Form Feed-Out Link Spring

3. 21 Lockbar Contact

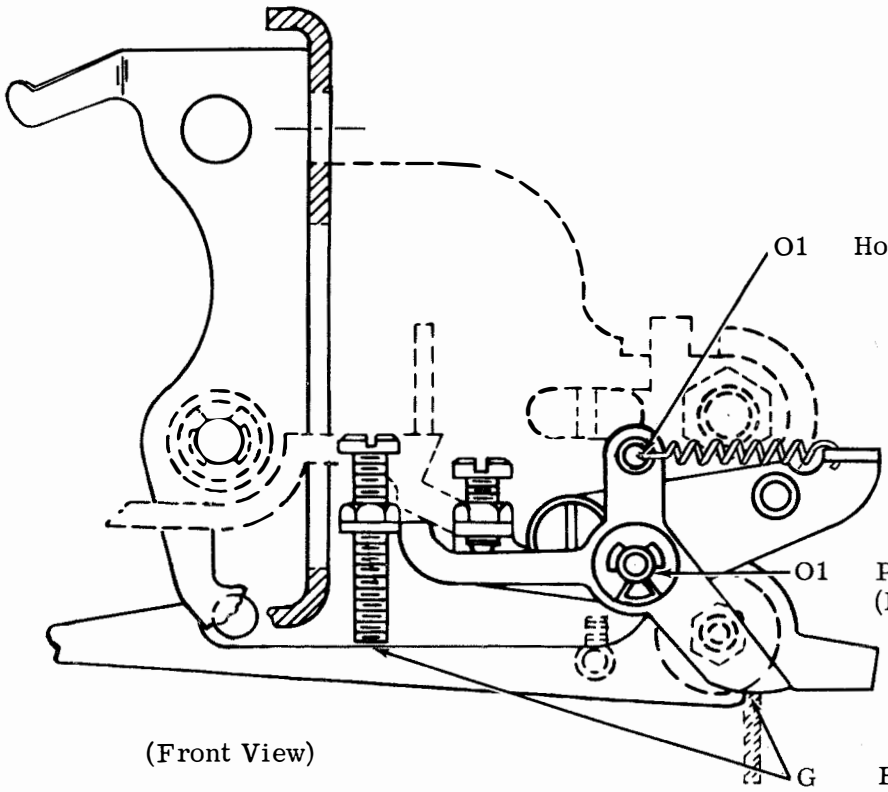


(Bottom View)

O1	Pivot Point	Lever
G	Engaging Surface	Lockbar Lever and Contact Insulator

Note: Avoid getting oil or grease on contact surfaces.

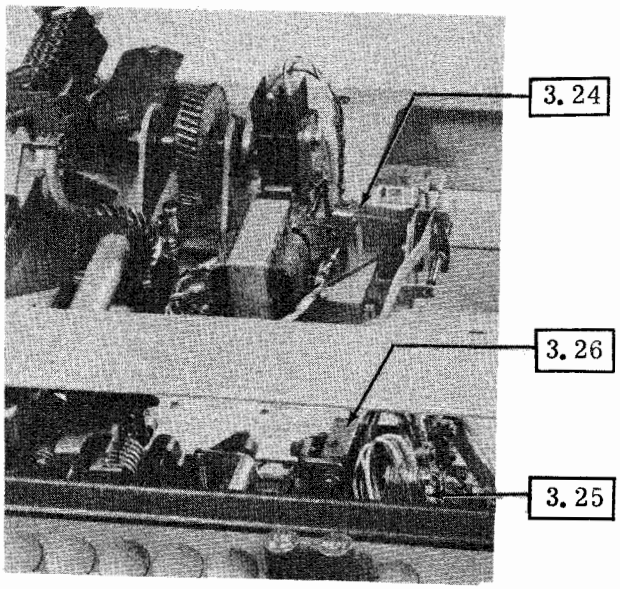
3. 22 Repeat on Space Mechanism



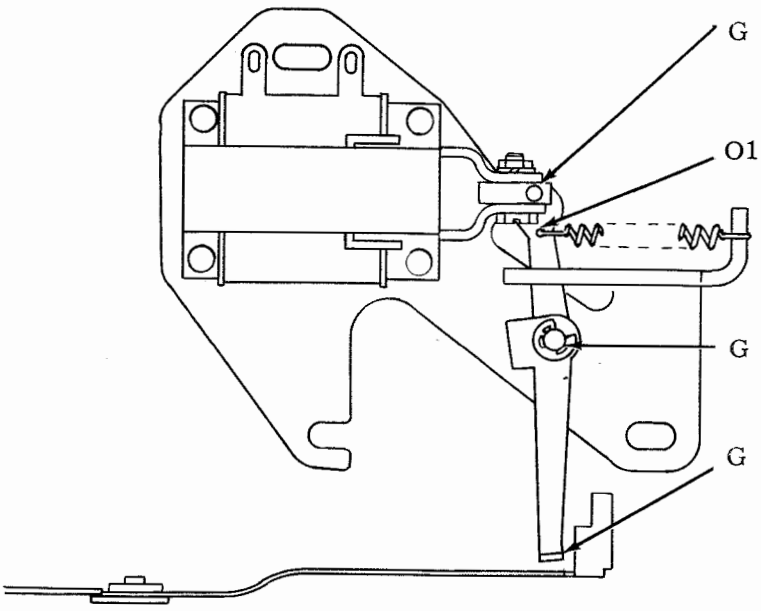
(Front View)

O1	Hooks	Spring
O1	Pivot (Both Sides)	Space Repeat Lever
G	Engaging Surfaces	Nonrepeat Lever and Space Keylever

3.23 Keyboard - Top View

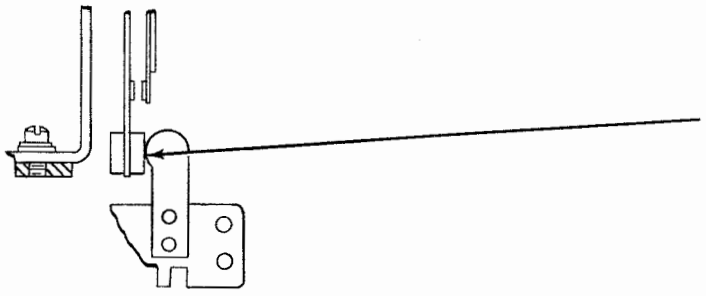


3.24 Solenoid Bail



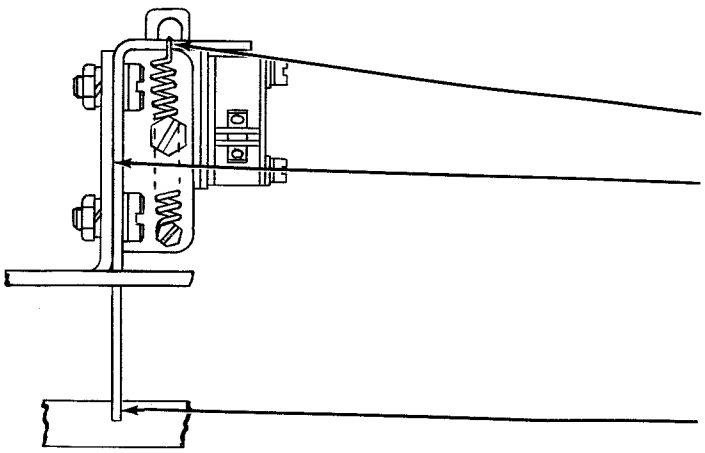
G	Fork and Pin	Solenoid Armature
O1	Hooks - Each End	Spring
G	Bearing Surface and Retaining Ring	Solenoid
G	Engaging Surface	Backspace Link

3.25 Off-Line Contacts



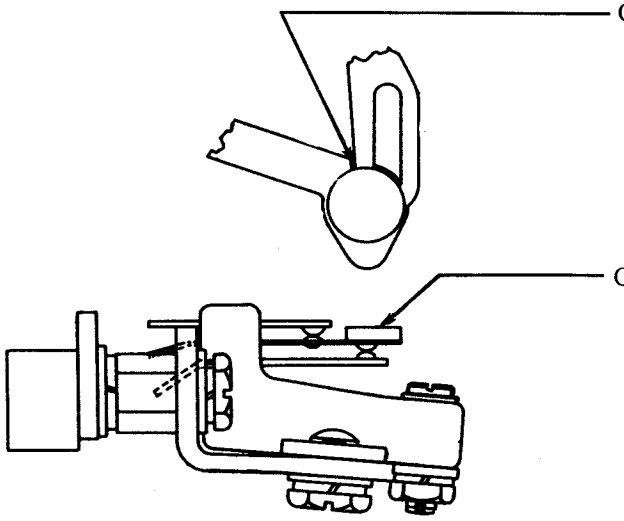
G	Engaging Surface	Contact Insulator

3.26 Switch Operating Lever



O1	Hooks - Each End	Spring
O2	Sliding Surface	Operating Lever
G	Engaging Surface	Function Lever

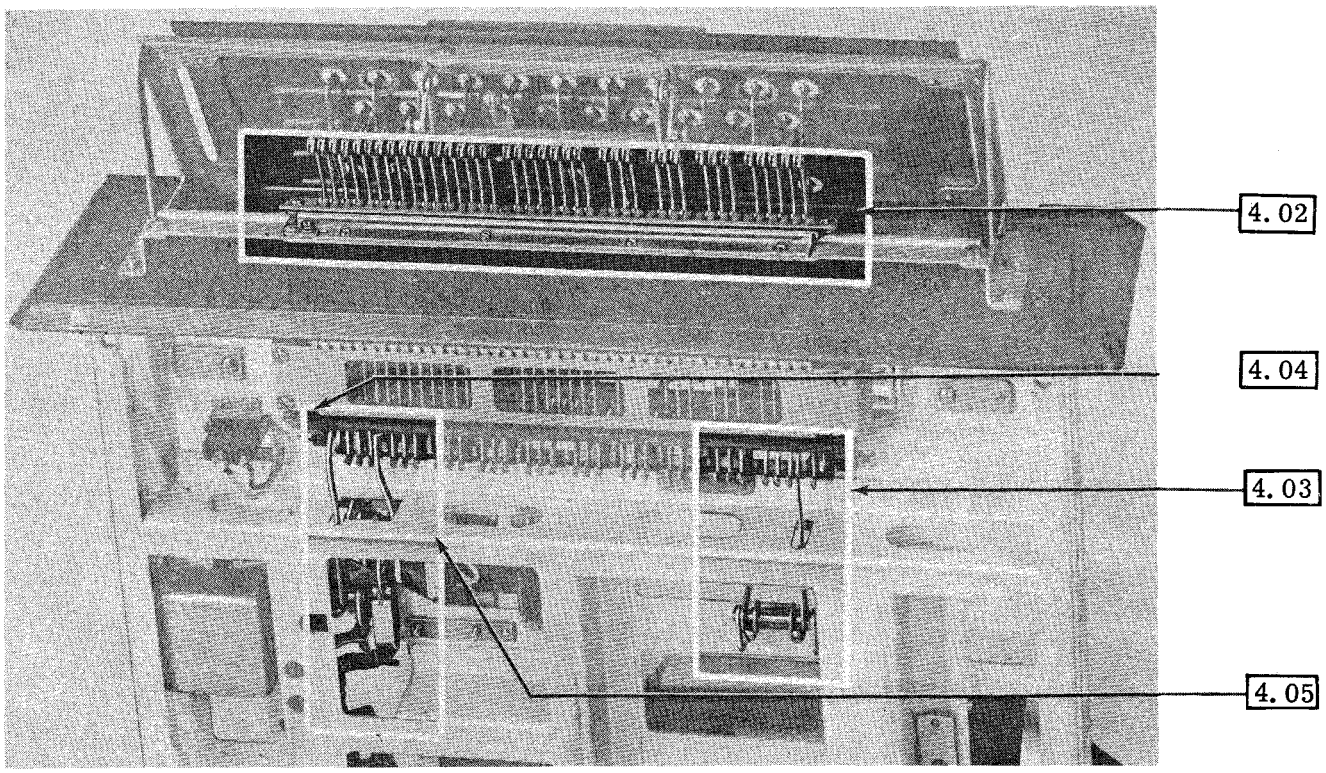
3.27 Universal Keyboard Switch (Not Shown on a Locator Photograph)



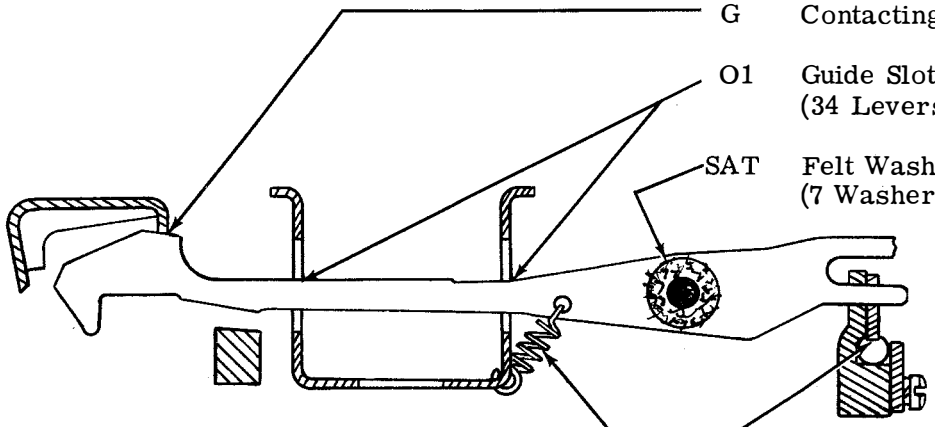
O1	Bearing Surface	Function Lever and "Here Is" Keylever Assembly
G	Bearing Surface	Contact Insulator

4. EARLIER DESIGN KEYBOARD

4.01 Keyboard - Bottom View

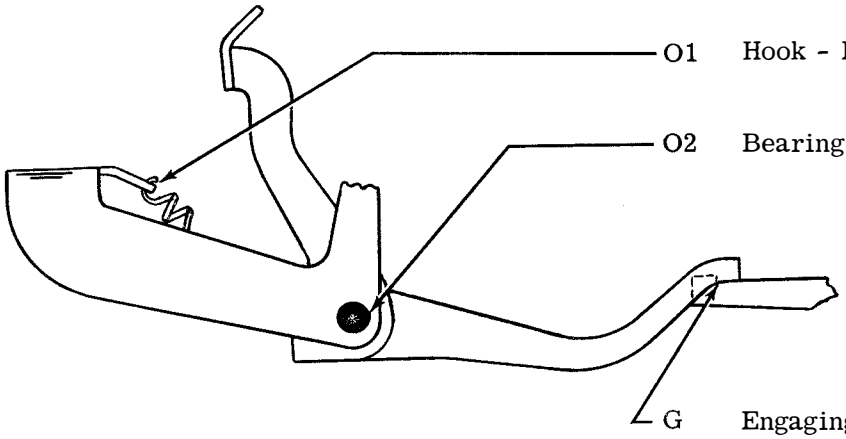


4.02 Codelever



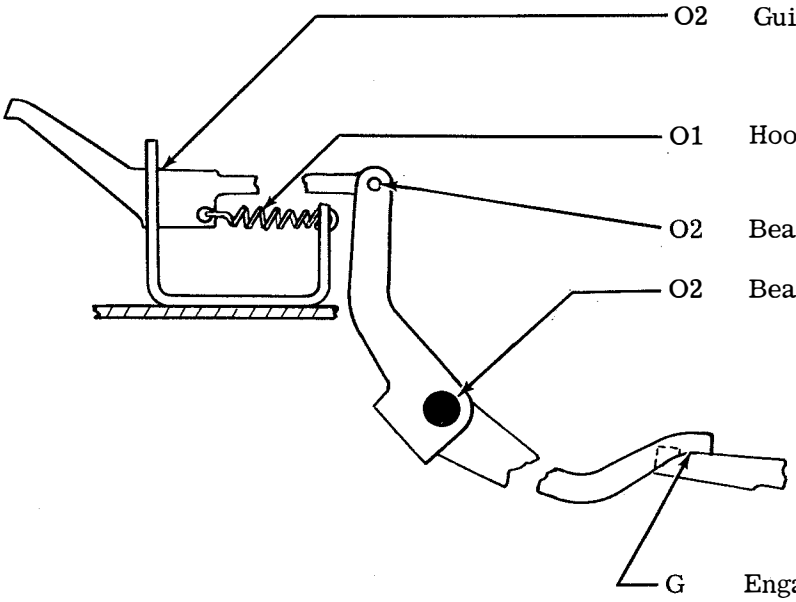
G	Contacting Surface	Codelever Bail
O1	Guide Slots (34 Levers)	Codelever
SAT	Felt Washers (7 Washers)	Codelever Shaft
O1	Bearing Surfaces (34 Wedges)	Lock Ball Track
O1	Hooks - Each End (38 Springs)	Spring

4.03 Local Carriage Return



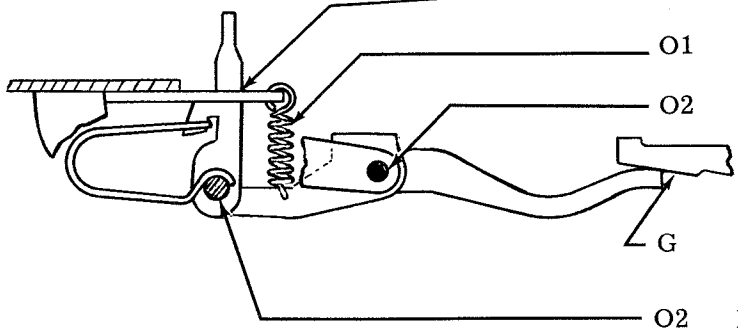
O1	Hook - Each End	Spring
O2	Bearing Surface	Local Carriage Return Trip Shaft
G	Engaging Surface	Local Carriage Return Function Arm

4.04 Local Line Feed



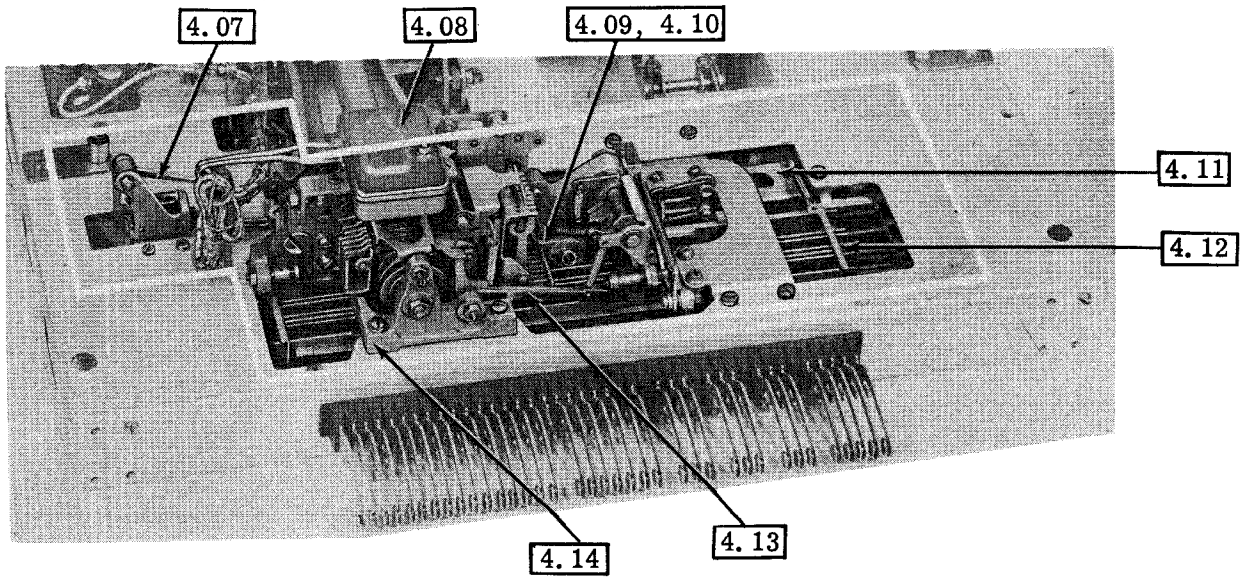
O2	Guide Slot	Local Line Feed Trip Link
O1	Hooks - Each End	Spring
O2	Bearing Surface	Local Line Feed Arm
O2	Bearing Surface	Local Line Feed Trip Shaft
G	Engaging Surface	Local Line Feed Function Arm

4.05 Keyboard Lock

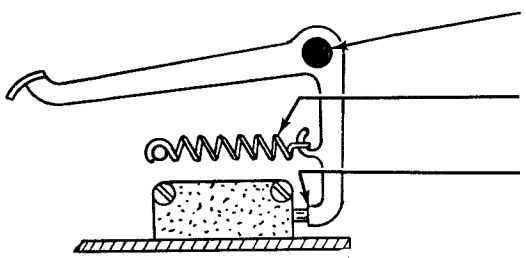


O2	Guide Slot	Keyboard Lock Plunger
O1	Hooks - Each End	Spring
O2	Bearing Surface	Keyboard Lock Plunger
G	Engaging Surface	Keyboard Lock Function Arm
O2	Bearing Surface	Keyboard Lock Arm Trip Shaft

4.06 Codebar Mechanism - Top Front View

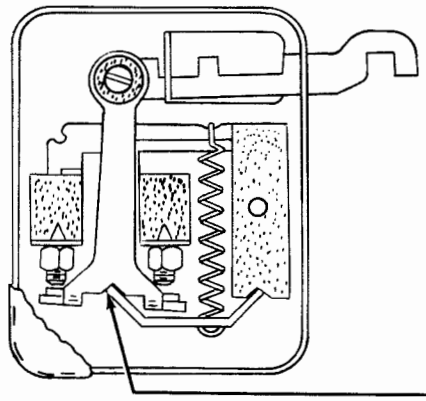


4.07 Margin Indicator



O2	Bearing Surface	Margin Indicator Contact Lever
O1	Hooks - Each End	Spring
O1	Contacting Surface	Switch Plunger

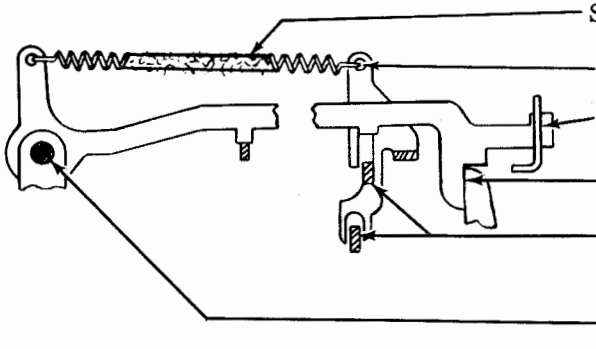
4.08 Contact Box



Disassembly: Remove nut and lockwasher securing contact box cover and remove cover.

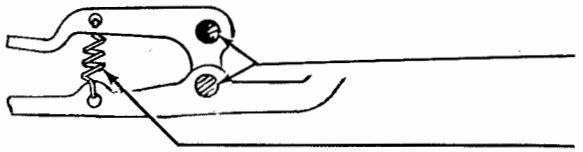
G	Engaging Surface	Contact Toggle

4.09 Codebar



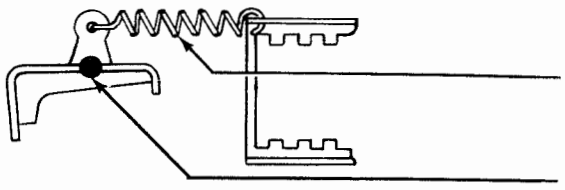
SAT	Felt Wick	Spring Wick
O1	Hooks - Each End	Spring
O2	Guiding Surface	Codelever Bail Latchlever
G	Engaging Surface	Codelever Bail
O2	Guiding Surfaces (2 Places)	Nonrepeat Bell Cranks
O2	Bearing	Codelever Bail Latchlever

4.10 Codebar (Continued)



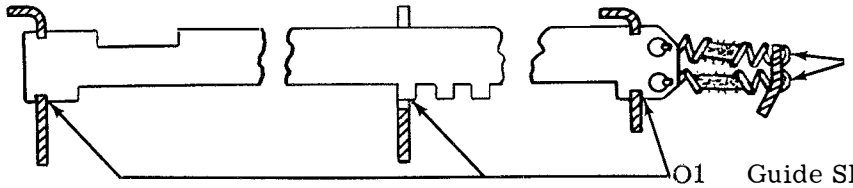
O2	Bearing Surfaces (2 Places)	Nonrepeat Bell Crank
O1	Hooks - Each End	Spring

4.11 Codelever Bail



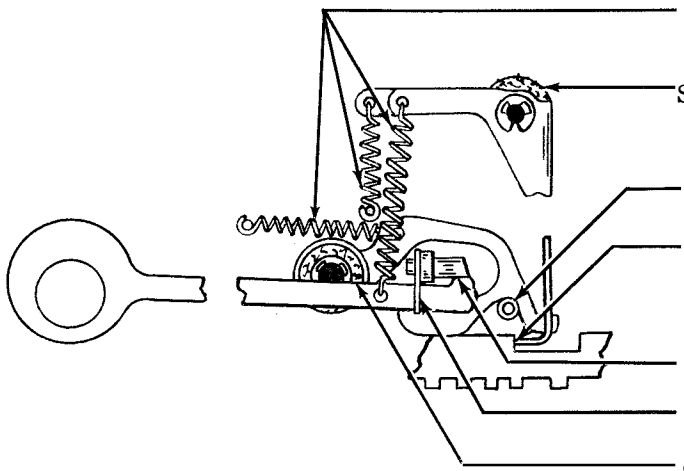
O1	Hooks - Each End	Spring
O2	Bearing Surfaces (Right and Left)	Codelever Bail

4.12 Codebar (Continued)



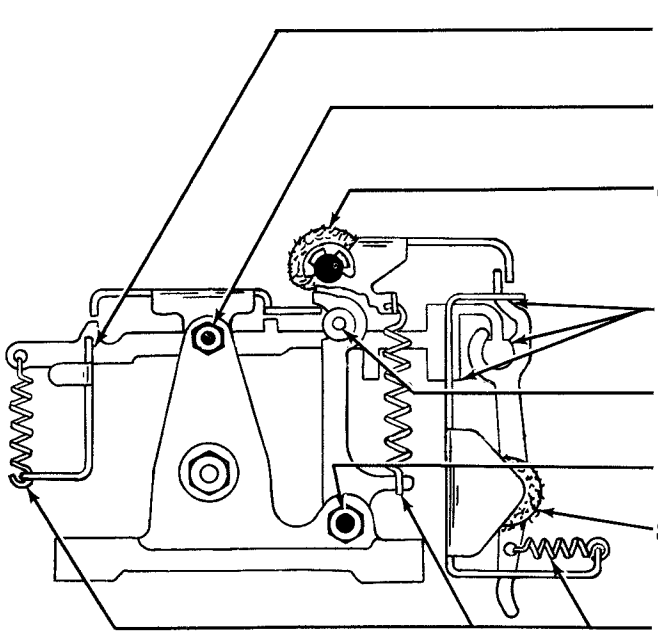
O1	Hooks - Each End (7 Springs)	Spring
O1	Guide Slots - Left, Right and Center (7 Codebars)	Codebar Guides

4.13 Codebar Bail and Eccentric Follower



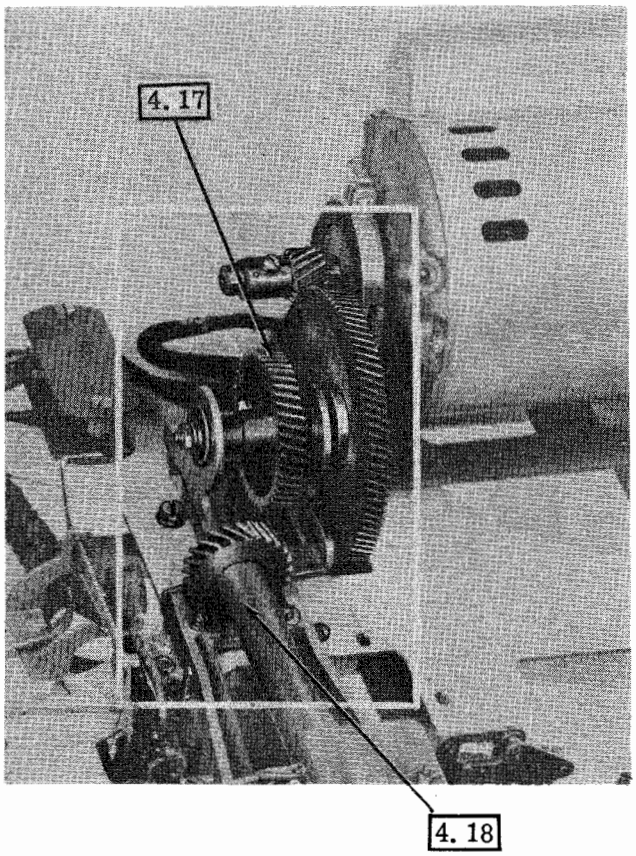
O1	Hooks - Each End (4 Springs)	Spring
SAT	Felt Washers (Front and Rear)	Codebar Bail Bearing
O2	Bearing Surface	Codebar Bail Roller
O1	Engaging Surface (7 Places)	Codebar Bail
O2	Engaging Surface	Eccentric Follower
O2	Guide Slot	Eccentric Follower
SAT	Felt Washer	Codebar Bail Latch-lever

4.14 Keyboard Selector

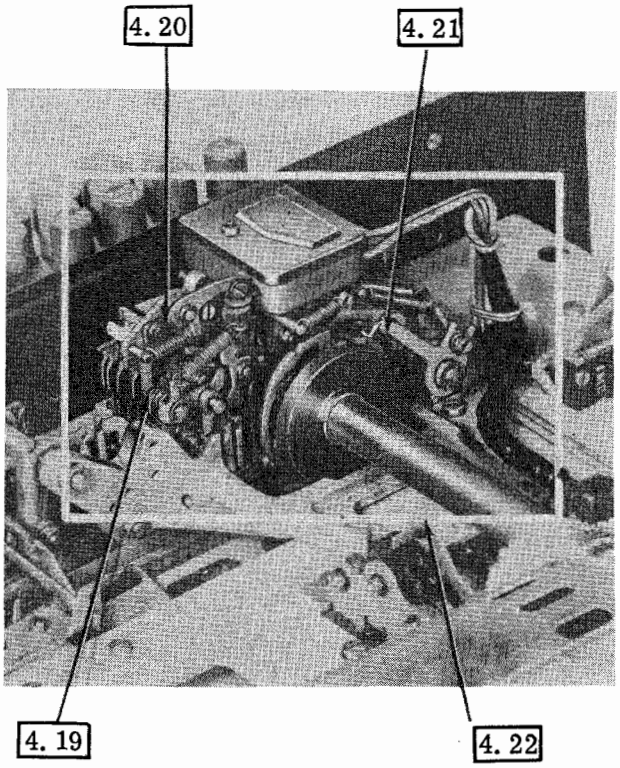


O2	Guide Slots (7 Slots)	Selector Levers
O2	Bearing Surface (Front and Rear)	Rocker Bail
SAT	Felt Washers (2 Washers - Front and Rear)	Locking Bail Shaft
O2	Guide Slots (7 Slots)	Selector and Transfer Levers
O2	Roller Bearings (2 Rollers)	Rocker Bail Detent
O2	Bearing Surface	Rocker Bail Detent
SAT	Felt Washers (2 Washers - Front and Rear)	Transfer Levers Shaft
O1	Hooks - Each End (3 Springs)	Spring

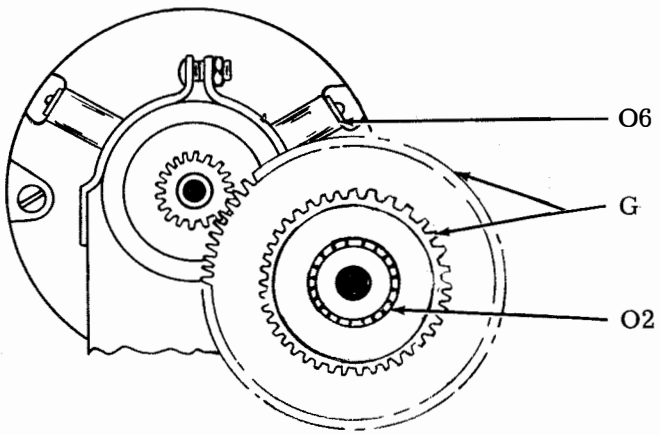
4.15 Intermediate Gear - Front View



4.16 Signal Generator Mechanism - Left Rear View

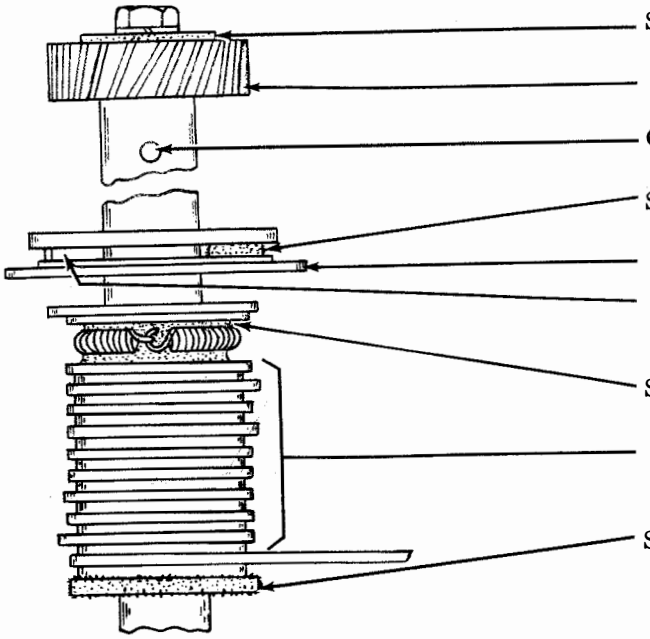


4.17 Intermediate Gears



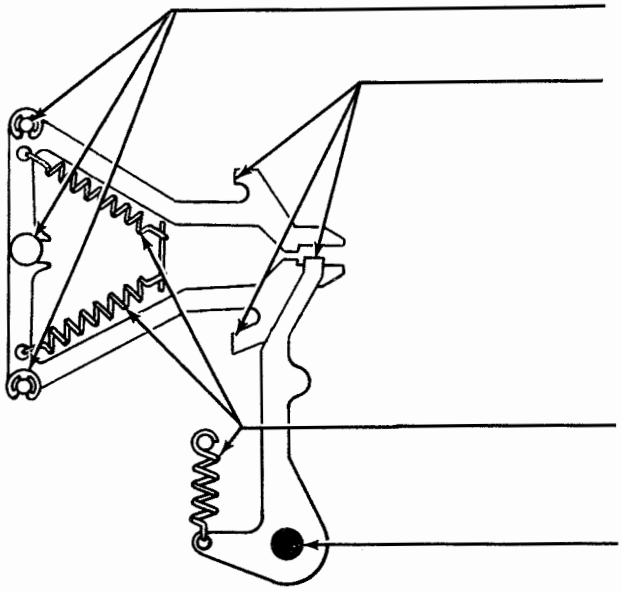
O6	Each Oiler (Total 4 Oilers)	Motor Shaft
G	Teeth (2 Gears)	Intermediate Gears
O2	Ball Bearing	Intermediate Gear Shaft

4.18 Signal Generator Shaft



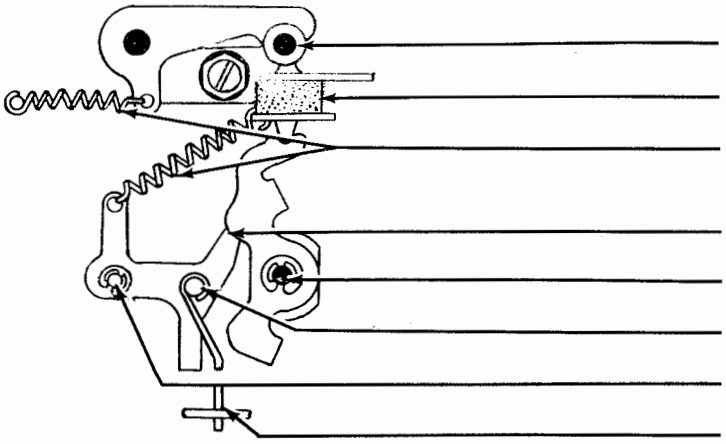
SAT	Felt Washer	Signal Generator Shaft
G	Gear Teeth	Signal Generator Gear
O20	Oil Hole	Signal Generator Shaft
SAT	Internal Mechanism	Keyboard Cam Clutch
O2	Camming Surface	Clutch Disc
G	Each Eye	Shoe Lever Spring
SAT	Felt Oiler	Cam Sleeve Felt
O2	Camming Surface Each Cam	Signal Generator Cam Sleeve
SAT	Felt Washer	Signal Generator Shaft

4.19 Intermediate Levers



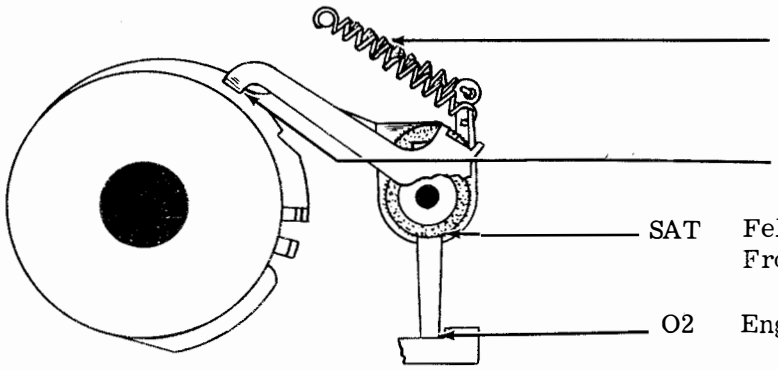
O2	Bearing Surface (3 Guides)	Intermediate Lever Rollers
O2	Engaging Surfaces (3 Places)	Intermediate Levers
O1	Hooks (Each End)	Spring
O2	Bearing Surface	Flutter Lever

4.20 Signal Generator Mechanism



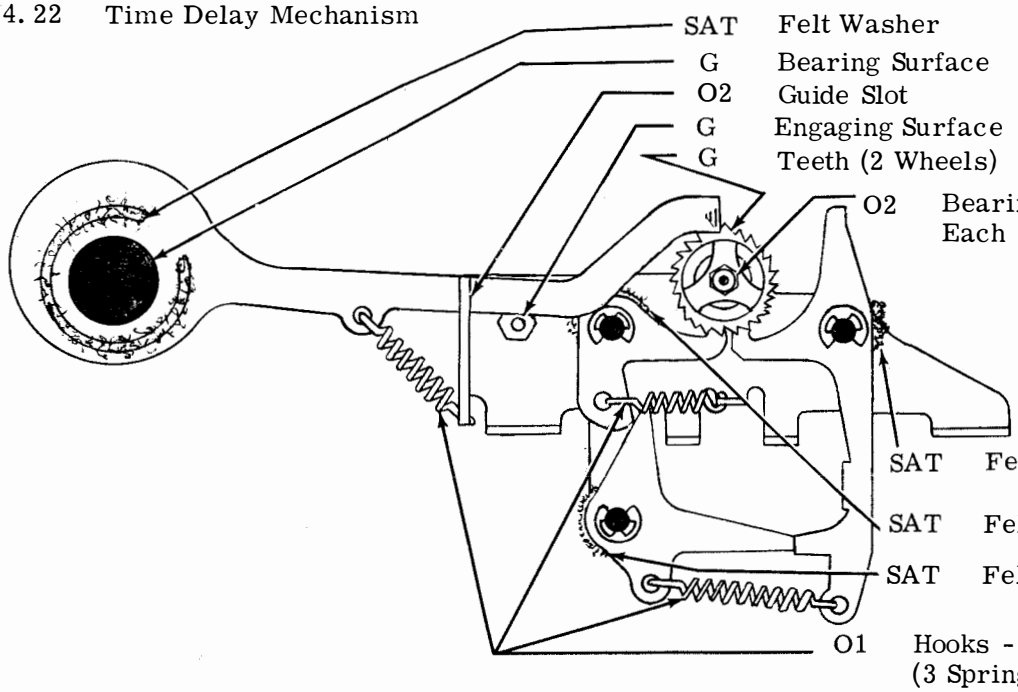
O2	Bearing Surface	Detent Toggle
SAT	Felt Washer	Detent Toggle
O1	Hooks - Each End (2 Springs)	Spring
O2	Engaging Surface	Break Bail
O2	Bearing Surface	Oscillating Lever
O2	Bearing Surface	Break Rod
O2	Bearing Surface	Break Lever
O2	Guide Hole	Break Rod

4.21 Signal Generator Clutch



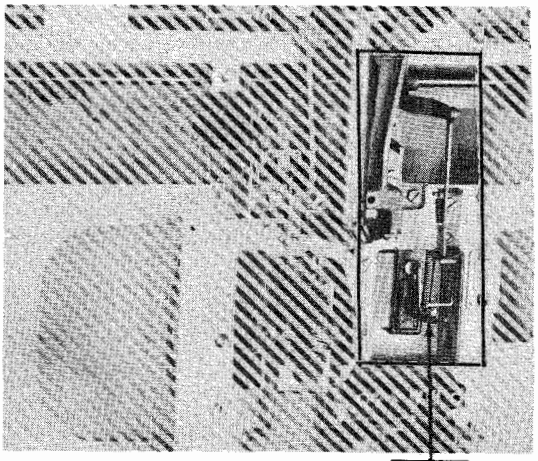
SAT	Felt Washers (2 Front & Rear)	Throwout Bail and Tripbail
O2	Engaging Surface	Clutch Tripbail

4.22 Time Delay Mechanism

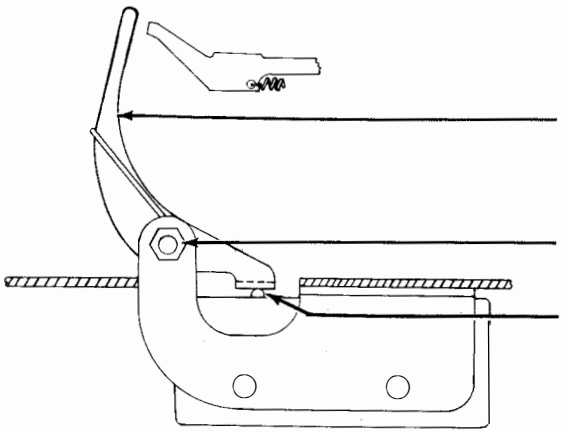


SAT	Felt Washer	Eccentric Follower Pawl
G	Bearing Surface	Eccentric Follower Pawl
O2	Guide Slot	Eccentric Follower Pawl
G	Engaging Surface	Eccentric Follower Pawl
G	Teeth (2 Wheels)	Ratchet Wheels
O2	Bearing Surface Each End	Ratchet Wheel Shaft
SAT	Felt Washer	Contact Pawl
SAT	Felt Washer	Latch Pawl
SAT	Felt Washer	Latchlever
O1	Hooks - Each End (3 Springs)	Spring

4.23 Paper Feed-Out Mechanism - Top View

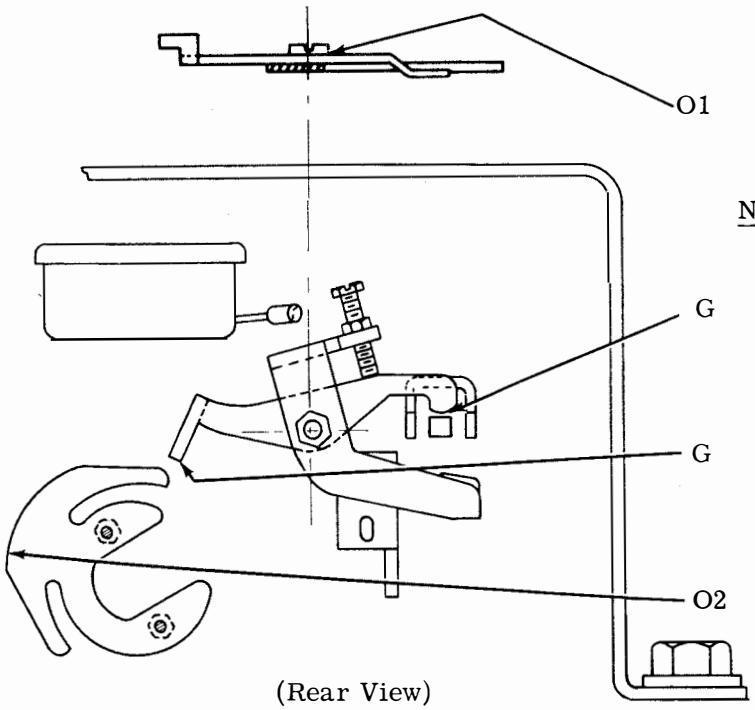


4.24 Paper Feed-Out



O2	Bearing Surface	Switch Lever
O2	Pivot Point	Torsion Spring
G	Engaging Surface Thin Film	Switch Plunger

4.25 Answer-Back Blinding (Pulsing) Contact
(not shown on Locator Photograph)



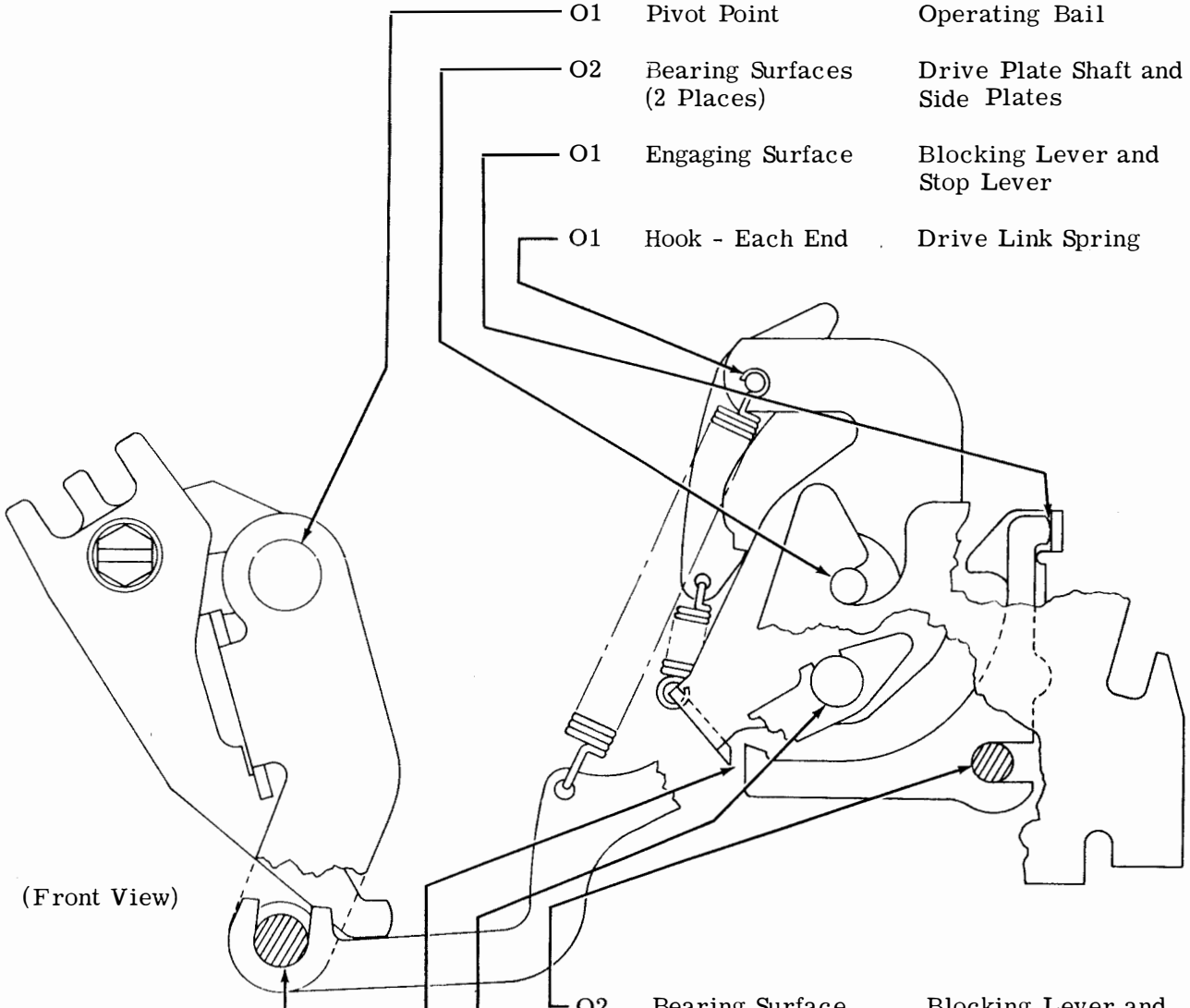
O1	Head of Shoulder Screw (Do Not Over Lubricate)	Finger Pivot

Note: Keep oil and grease off of contacts

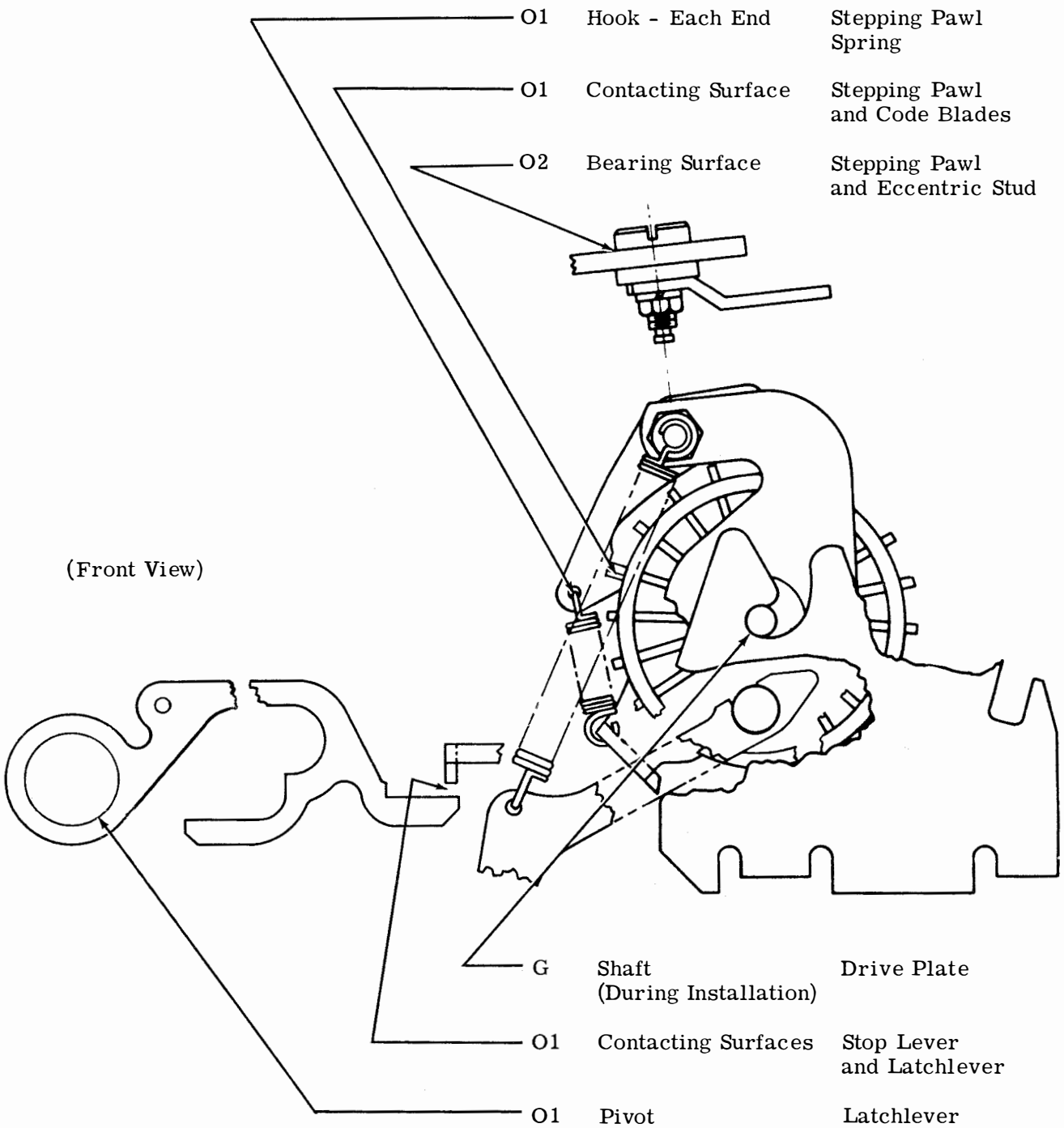
G	Contacting Surface	Finger and Swinger
G	Camming Surface	Finger Extension
O2	Contacting Surface	Cam

(Rear View)

4.26 Answer-Back Drive Mechanism

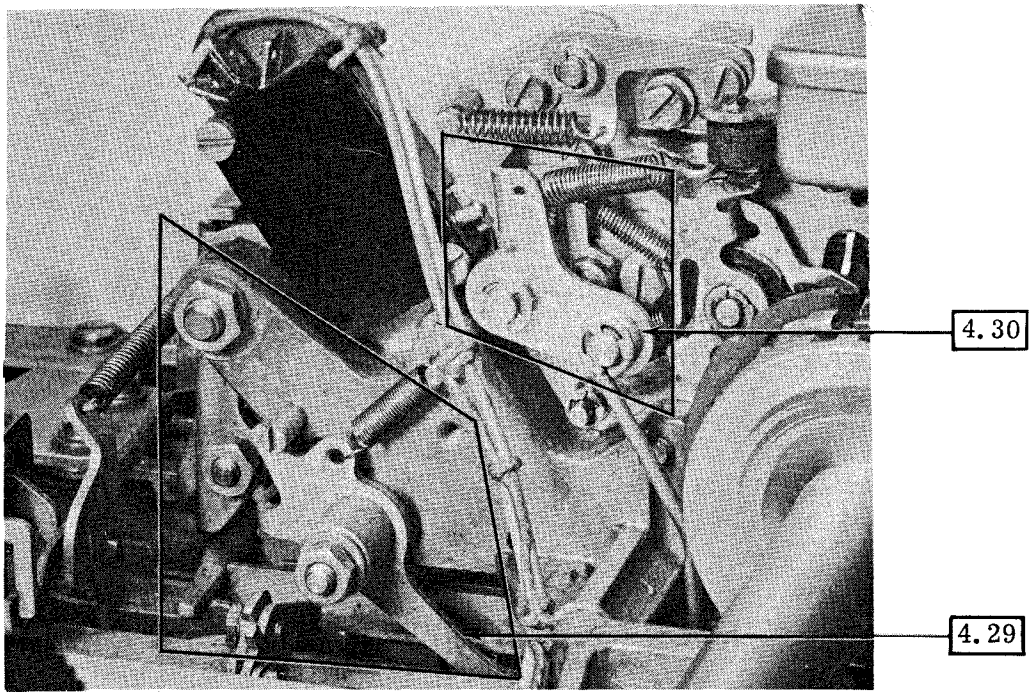


4.27 Answer-Back Drive Mechanism (Continued)

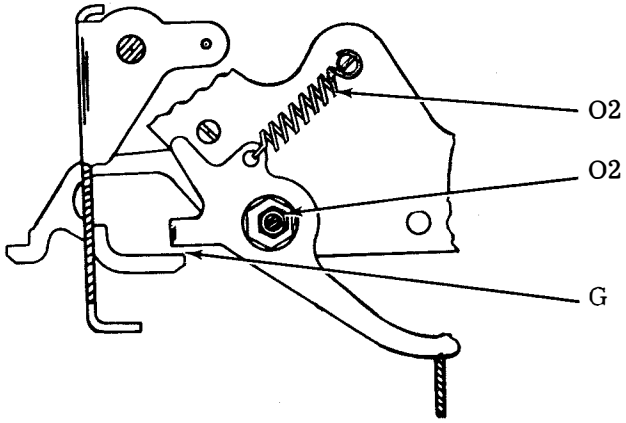


Note: Lubricate Sensing Lever and Codebar Mechanisms per Paragraphs 3.05, 3.06, 3.07 and 3.08.

4.28 Repeat Space and Signal Line Break - Left Rear View

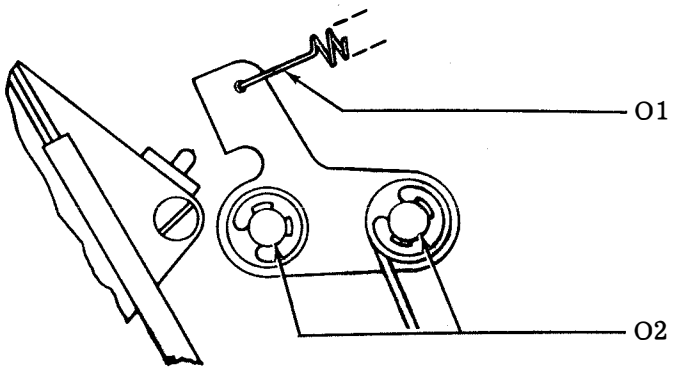


4.29 Repeat on Space



O2	Hooks - Each End	Spring
O2	Bearing Surfaces (2 Places)	Mounting Stud
G	Contact Surfaces (2 Places)	Repeat Trip Lever

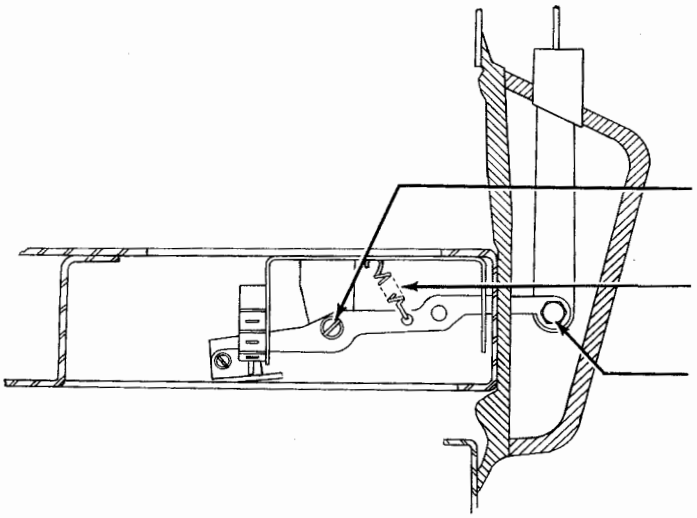
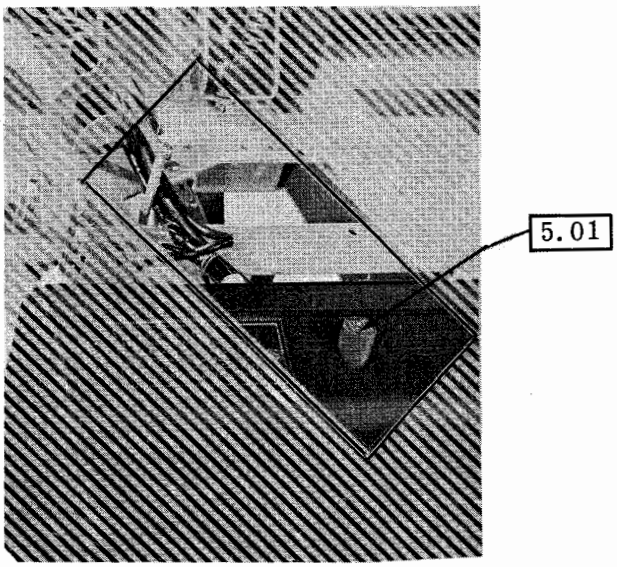
4.30 Signal Line Break (Electrical)



O1	Hooks - Each End	Spring
O2	Pivots (2 Places)	Break Lever

5. RECEIVE-ONLY (RO) BASE

5.01 Signal Line Break



5.02 Signal Line Break Mechanism - Left Top View