BULLETIN NO. 5
ISSUE 3
AUGUST, 1936

TELETYPESETTER

ADJUSTMENTS

KEYBOARD TAPE PERFORATOR

TELETYPESETTER
CORPORATION
1400 WRIGHTWOOD AVE.,
CHICAGO, U.S.A.

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Printed in U.S.A.


TELETYPESETTER
PATENTS APPLIED FOR
OFF
ON

TELETYPESETTER KEYBOARD TAPE PERFORATOR

C O N T E N T S

ADJUSTMENTS	Page
Bell Hammer Adjustment	20
Bell Hammer Lever Eccentric Adjustment	20
Counting Pointer Clutch Release Adjustment	18
Counting Pointer Clutch Spring Compression Adjustment	18
Counting Pointer Return Spring Arm Position	18
Counting Selector Bar Assembly Shims Adjustment	1
Counting Selector Bar Link Detents Adjustment	2
Counting Shaft End Play Adjustment	9
Counting Shaft Friction Clutch Adjustment	11
Intermediate Pawl Latch Adjustment	17
Intermediate Pawl Latch Eccentric Screw Adjustment	15
Justification Pointers Return Position Adjustment	14
Left Counting Cross Shaft Adjustments	11
Main Clutch Adjustment (Operating Cam Sleeve Jaw Clutch Adjustment).	4
Motor Position Adjustment	5
Operating Cam Sleeve Friction Clutch Adjustment	27
Perforating Selector Bar Assembly Shims Adjustment	1
Pivot Adjusting Block Screws Friction Adjustment	22
Punch Bar Levers Bearing Bracket Adjustment	23
Punch Bar Lever Detent Adjustment	24
Punch Hammer Operating Lever Adjustment	24
Punch Hammer Pivot Screws Adjustment	24
Punch Hammer Stop Screw Adjustment	24
Punch Unit Adjustment	22
Reset Collar Lever Adjustment	10
Reset Lug Adjustment	15
Retaining Pawl Release Lever Adjustment	14
Return Actuating Lever Adjustment	11
Return Clutch Throw-Out Lever Adjustment	11
Right Counting Cross Shaft Adjustments	14
Shift Bail Adjustment	3

Page

Shift Bail Stop Plate Adjustment 3
Shift Indicating Semaphore Adjustment 22
Shift and Unshift Brackets Adjustment 3
Shift and Unshift Lever Bearing Brackets Adjustments 3
Signal Lamp Contacts Adjustments 19
Space Bar Lever Extension Guide Plate Adjustment 17
Space Bar Stop Adjustment 15
Spacer Rod Adjustment 15
Stop Lever Cam Roller Eccentric Screw Adjustment 6
Stop Lever Latch Adjusting Screw Adjustment 6
Stop Lever Latch Upstop Screw Adjustment 7
Tape Feed Pawl Adjustment 26
Tape Feed Roll Bearing Plate Adjustment 24
Tape Feed Roll Detent Final Adjustment 26
Tape Feed Roll Detent Preliminary Adjustment 25
Tape Guide Adjustment 27
Tape Stripper Plate Adjustment 25
Tape Tension Lever Spring Tension Adjustment 26
Tape Tension Spring Adjustment 27
Transfer Adjustments 7
Universal Bar Backstop Screw Adjustment 6
Zero Lever Adjustments 10

ILLUSTRATIONS

Illustration 1 - Teletypesetter Keyboard Tape Perforator (Top View)
Illustration 2 - Teletypesetter Keyboard Tape Perforator (Bottom View)

LUBRICATION

Adjustable Pointer Unit 30
Counting Shaft Unit 28
Keyboard 31
Main Shaft 29
Miscellaneous 31
Punch Unit 28

SPRING TENSIONS

Back Space Cam Spring Tension 24

	Page
Back Space Pawl Spring Tension	24
Bell Hammer Lever Spring Tension	20
Bell Pawl Spring Tension	22
Counting Pointer Return Spring Tension	19
Intermediate Pawl Latch Spring Tension	17
Intermediate Pawl Spring Tension	18
Justification Pointers Feed Pawl Spring Tension	18
Justification Pointers Return Springs Tensions	19
Key Lever Spring Tension	4
Main Clutch Spring Tension	6
Non-Repeat Latch Spring Tension	7
Punch Bar Lever Detent Spring Tension	24
Punch Control Bail Spring Tension	24
Punch Hammer Spring Tension	27
Retaining Pawl Spring Tension	15
Return Bail Spring Tension	14
Return Clutch Spring Tension	14
Return Clutch Throw-Out Lever Spring Tension	13
Return Clutch Throw-Out Lever Trip-Off Pawl Spring Tension	13
Shift Bail Balancing Spring Tension	4
Shift Bail Detent Spring Tension	4
Signal Lamp Contact Lever Spring Tension	20
Space Bar Lever Extension Spring Tension	17
Spacer Rod Spring Tension	18
Spacing Rack Slide Return Spring Tension	22
Stop Lever Latch Spring Tension	7
Stop Lever Spring Tension	7
Stop Pin Springs Tension	11
Tape Feed Pawl Spring Tension	26
Tape Feed Roll Detent Lever Spring Tension	26
Transfer Bail Spring Tension	9
Universal Bar Spring Tension	7
Zero Lever Spring Tension	11

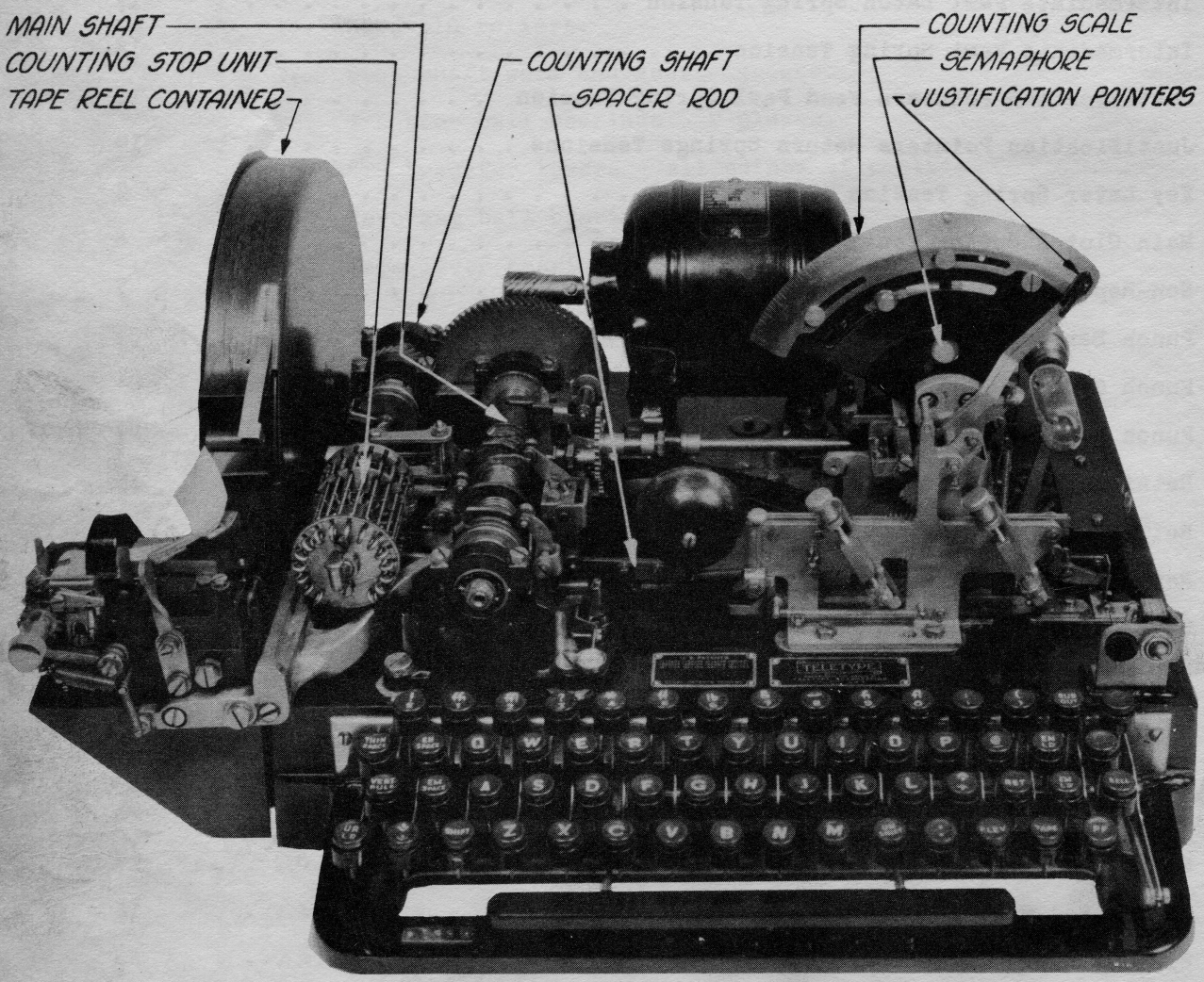


ILLUSTRATION 1

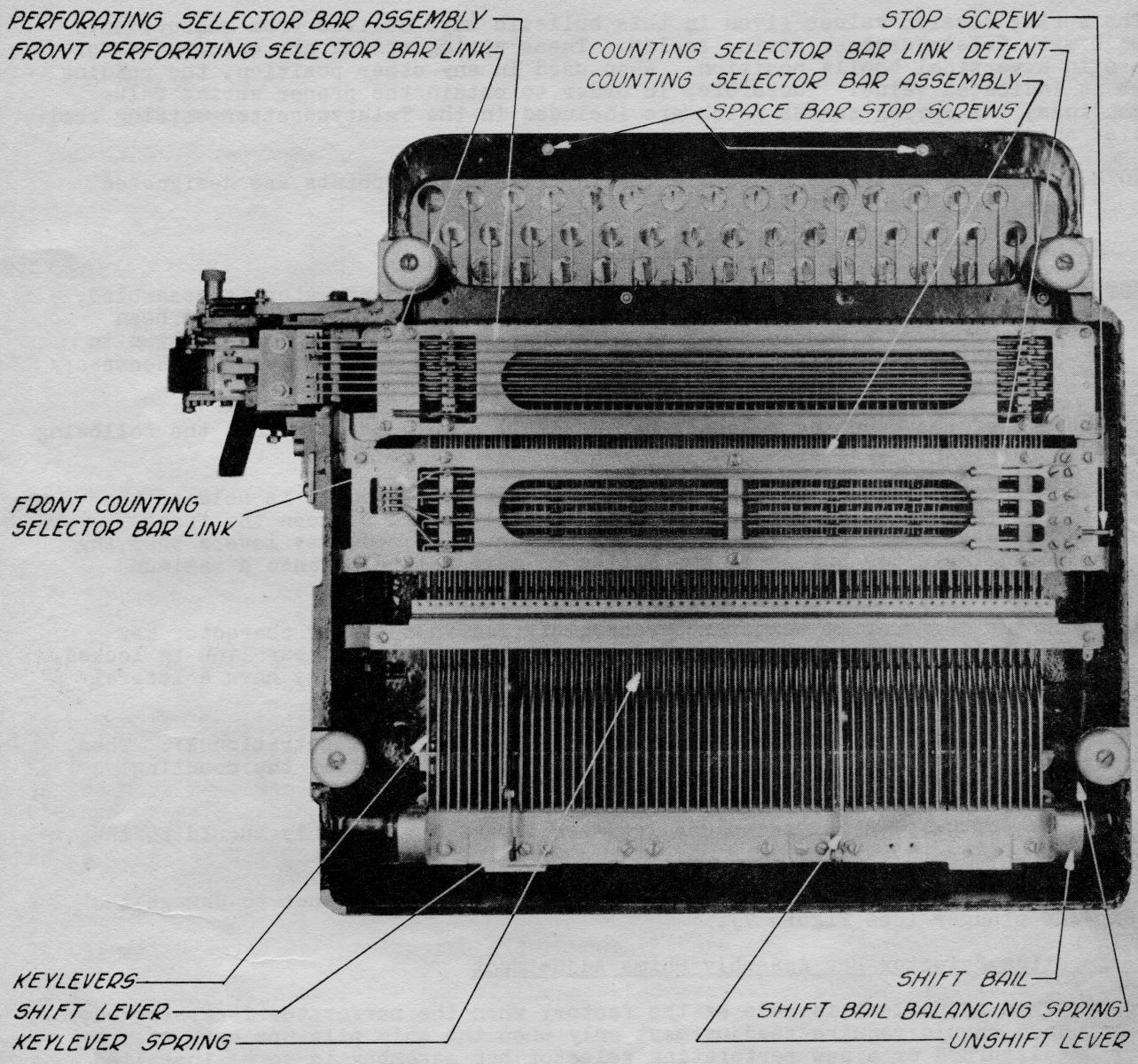


ILLUSTRATION 2

ADJUSTMENTS - TELETYPESETTER KEYBOARD TAPE PERFORATOR

The following adjustments are arranged in a sequence that would be followed if a complete readjustment of the perforator were undertaken. This fact should be kept in mind when a single adjustment is to be made.

The spring tension values given in this bulletin were derived from measurements made with Teletypesetter spring scales. These spring scales are calibrated for use in a vertical "pull" position. When used in any other position, the reading is an indicated value. Therefore, in order to obtain the proper spring value readings, the spring scales which are included in the Teletypesetter catalog tool list should be used.

NOTE: In all the figures of this bulletin, fixed pivot points are designated by solid black circles.

Counting Selector Bar Assembly Shims Adjustment

NOTE: This adjustment is made at the factory when the perforator is assembled, and should require readjustment only when the shim pile-ups have been disturbed or a new counting selector bar assembly is to be installed in the perforator. If either of these changes are made, it will be necessary to check all the associated adjustments.

The height of the counting selector bar assembly should be such that the following requirements are fulfilled:

1. When the front counting selector bar link (Illustration 2) is held to the right, there should be from .015" to .030" clearance between the front counting selector bar and the lugs on the counting code key levers when the counting selector bar is in a position to make this clearance a maximum (See Figure 1 for location of parts).

2. With the perforating selector bar assembly removed and any character key lever held depressed, so that the front counting selector bar link is locked, the rest of the selector bar links should be locked, or may have a lateral play of not more than .020".

To adjust, remove the perforating selector bar assembly (Illustration 2). Then, by means of shims and half (tilt) shims, raise, lower, or tilt the counting selector bar assembly to meet the foregoing requirements.

The number of half (tilt) shims used at each end of the assembly should be the same.

Replace the perforating selector bar assembly, being careful not to damage the trip-off plunger (See Figure 7).

Perforating Selector Bar Assembly Shims Adjustment

NOTE: This adjustment is made at the factory when the perforator is assembled, and should require readjustment only when the shim pile-ups have been disturbed or a new perforating selector bar assembly is to be installed in the perforator. If either of these changes are made, it will be necessary to check all the associated adjustments.

The height of the counting selector bar assembly should be such that the following requirements are fulfilled:

1. With the front perforating selector bar link locked by the depression of the central key lever in the bottom row, the other perforating selector bar links should be locked or have a lateral play of not more than .020".

2. The counting selector bar links should at the same time be just locked or have a lateral play of not more than .030".

NOTE: After making a single adjustment, check related adjustments.

Recheck the foregoing requirements, using the end key levers in the third row from the top.

To obtain these requirements, adjust the height of the perforating selector bar assembly by raising, lowering, or tilting, by means of shims and half (tilt) shims between the assembly and the casting.

The number of half (tilt) shims used at each end of the assembly should be the same.

Counting Selector Bar Link Detents Adjustments

1. Each counting selector bar link detent roller should ride an equal distance into the right and left notches in the counting selector bar links, and the detent rollers should ride fully on their links (See Illustration 2). To adjust, position the detent springs by means of their elongated mounting holes.

2. With the detent roller first in one and then in the other notch in the counting selector bar links, hook an 8 oz. scale over the detent spring just to the right of the roller and pull at right angles to the spring. It should require from 1 to 1 1/2 ozs. to start the detent spring moving. Bend the detent springs, if necessary, to meet this requirement.

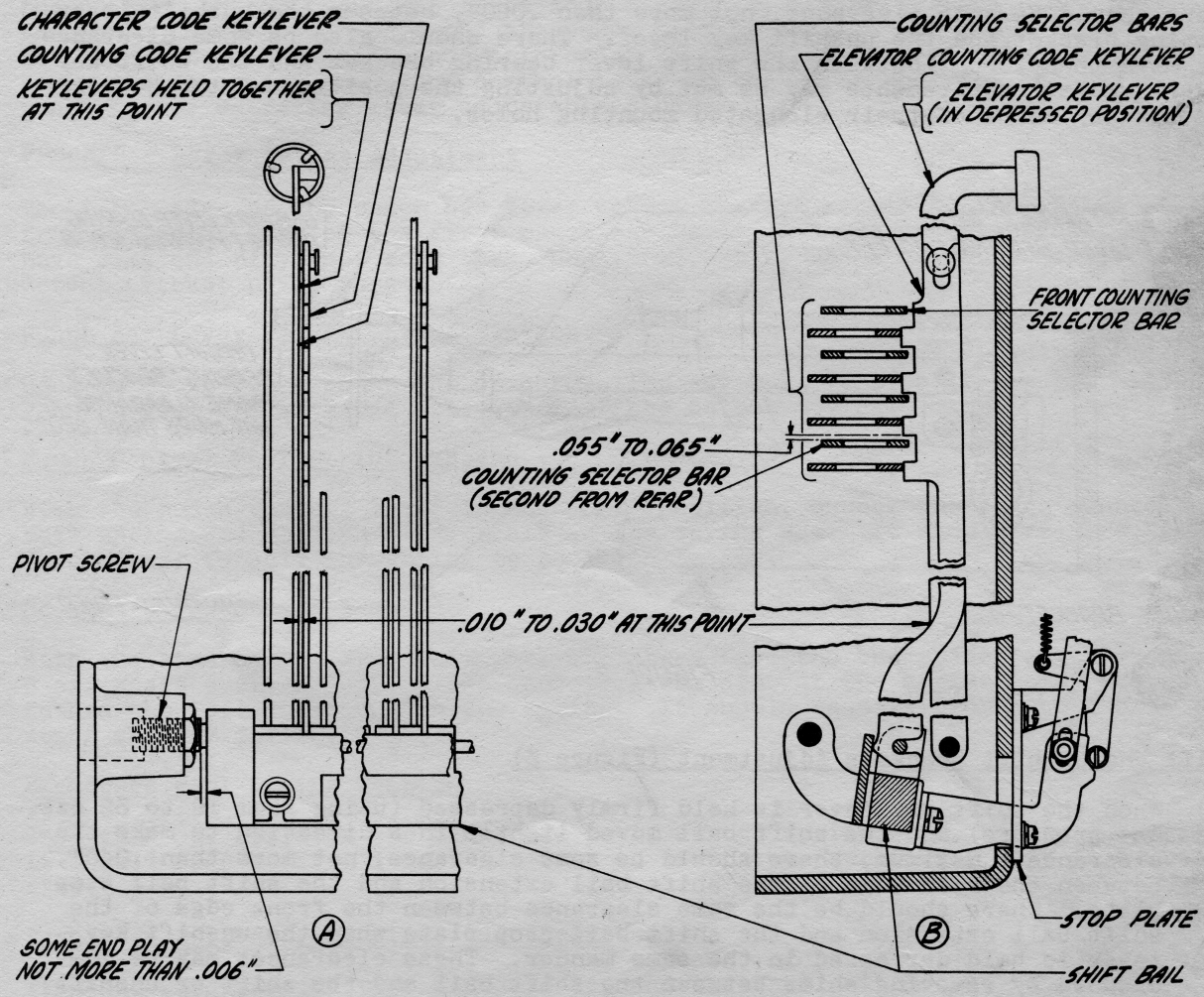


FIGURE I

NOTE: After making a single adjustment, check related adjustments.

Shift Bail Adjustment (Figure 1-A)

With the forward end of the extreme left counting code key lever held against its corresponding character code key lever, there should be from .010" to .030" clearance between the counting code key lever and the character key lever at the point in the bend of the counting code key lever indicated on Figure 1. In a similar manner, and for the same clearance, check the extreme right counting code key lever and character code key lever. Also, the shift bail should have some end play, not more than .006". This adjustment may be made by loosening the shift and unshift brackets on the shift bail and adjusting the position of the shift bail by means of its pivot screws. Readjust the shift and unshift brackets according to the "Shift and Unshift Brackets Adjustment" on page 3.

Shift Bail Stop Plate Adjustment (Figure 1-B)

With the shift bail in the shift position and the elevator key lever held depressed, there should be from .055" to .065" clearance between the second (from the rear) counting selector bar and the lug on the elevator counting code key lever that is immediately to the front of that selector bar. To meet this requirement, adjust the position of the shift bail stop plate by means of its elongated mounting holes.

Shift and Unshift Lever Bearing Bracket Adjustments (Figure 2)

There should be some clearance, not more than .020", between the unshift lever bearing bracket and the unshift key lever. There should also be some clearance, not more than .020", between the shift lever bearing bracket and the shift key lever. These requirements may be met by adjusting the position of the bearing brackets by means of their elongated mounting holes.

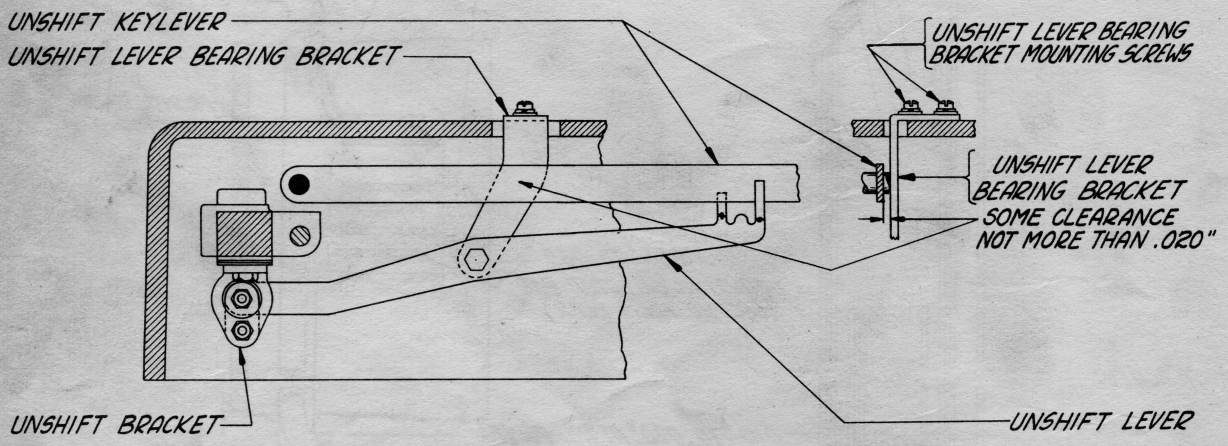


FIGURE 2

Shift and Unshift Brackets Adjustment (Figure 3)

(a) When the shift key lever is held firmly depressed (using from 16 to 32 ozs. key pressure) and the shift bail moved lightly in a direction to make the clearance a maximum, there should be some clearance, not more than .040", between the rear edge of the shift bail extension and the shift bail stop plate. There should be the same clearance between the front edge of the shift bail extension and the shift bail stop plate when the unshift key lever is held depressed in the same manner. These clearances may be increased by removing shims between the shift bail and the shift or unshift brackets. Adding shims will decrease the clearance.

NOTE: After making a single adjustment, check related adjustments.

(b) The shift and unshift levers should engage the shift and unshift key levers properly, and the shift and unshift levers and connecting links should have some side play at their pivot points. To adjust, position the shift and unshift brackets by means of their elongated mounting holes.

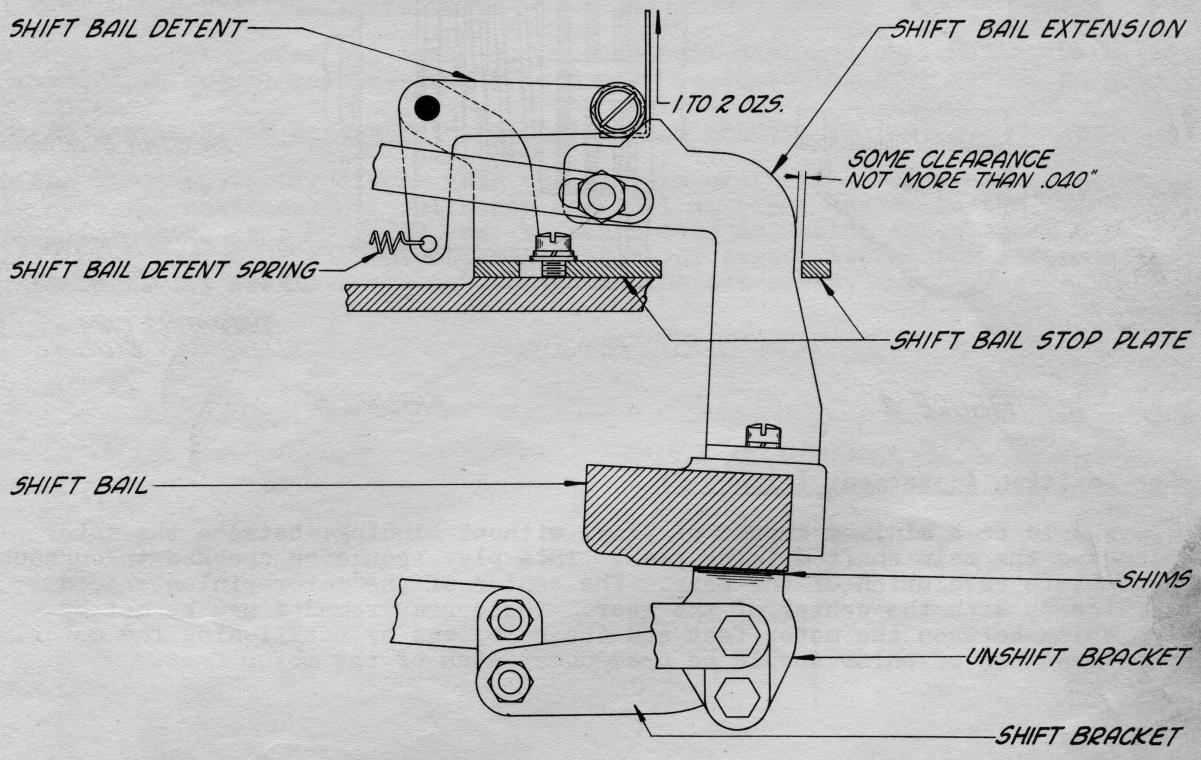


FIGURE 3

Shift Bail Balancing Spring Tension

Unhook the forward end of the shift bail balancing spring (Illustration 2). With the shift bail in the shift (rear) position, hook a 32 oz. scale in the spring eye and pull to its position length (the position opposite where the spring was hooked). It should require from 9 to 11 ozs. to stretch the spring to this length.

Shift Bail Detent Spring Tension (Figure 3)

Hook an 8 oz. scale under the detent roller mounting screw nut and pull upward. It should require from 1 to 2 ozs. to start the detent moving.

Key Lever Spring Tension (Figure 4)

The openings between the ends of all key lever springs should be 1 9/16", excepting the space key lever spring, which should be 1 15/16", as shown in Figure 4. These requirements may be obtained by bending the springs.

Main Clutch Adjustment (Operating Cam Sleeve Jaw Clutch Adjustment) (Figure 5)

With the operating cam sleeve in the stop position (the driven clutch member fully cammed out of mesh with the driving clutch member), the clutch teeth should be separated by from .006" to .010". This clearance may be obtained by loosening the four screws which hold the main shaft bearing caps and adjusting the position of the main shaft to the front or rear.

NOTE: After making a single adjustment, check related adjustments.

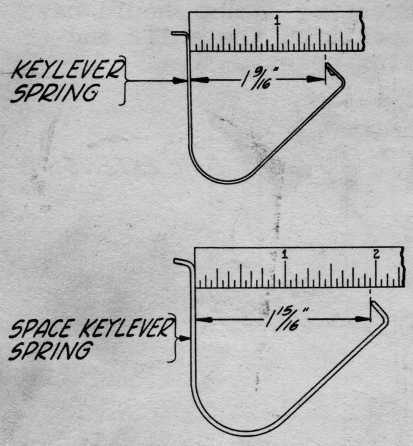


FIGURE 4

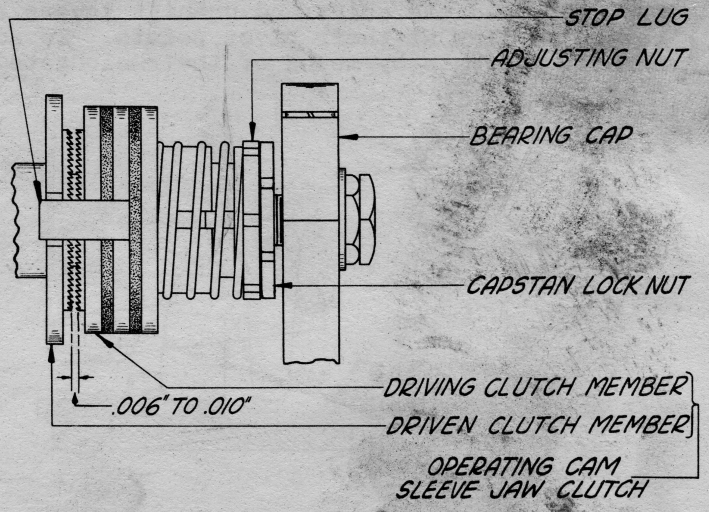


FIGURE 5

Motor Position Adjustment (Figure 6)

There should be a minimum amount of play, without binding, between the motor pinion and the main shaft driving gear. This play should be checked throughout one complete revolution of the gear. The center of the motor pinion should also line up with the center of the gear. These requirements may be met by using shims between the motor feet and the base, and by positioning the motor. The same number of shims should be used under each of the motor feet.

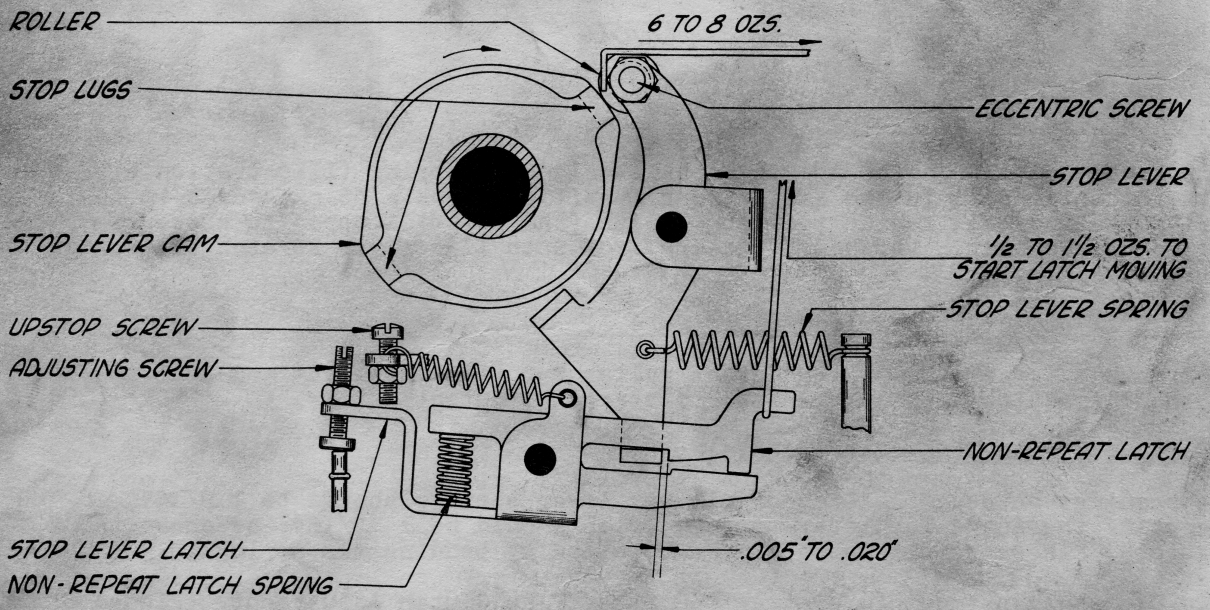


FIGURE 6

NOTE: After making a single adjustment, check related adjustments.

Main Clutch Spring Tension

With the two members of the main clutch in mesh, apply the push end of a 12 lb. scale to the driven member at the stop lug and push in line with the shaft. It should require from 3 to 4 lbs. to just separate the clutch members. (See Figure 5 for location of parts.)

Stop Lever Cam Roller Eccentric Screw Adjustment (Figure 6)

With a key lever held depressed and the stop lever cam roller first on one of the stop lugs which form the high part of its stop lever cam, the stop lever extension should overtravel the non-repeat latch by from .005" to .020". Check for this same clearance with the cam roller on the opposite stop lug. These requirements may be obtained by means of the eccentric screw and lock nut which mount the roller.

Universal Bar Backstop Screw Adjustment (Figure 7)

NOTE: In order to check this adjustment, it will be necessary to remake it. If the adjustment is changed, the "Stop Lever Latch Adjusting Screw Adjustment" will have to be rechecked.

Back off the universal bar backstop screw. With the "R", "Y", and "5" key levers held depressed at the same time, turn the universal bar backstop screw in until it just touches the universal bar "Y" lever. Then turn the screw in approximately two-thirds of a turn, and tighten the lock nut.

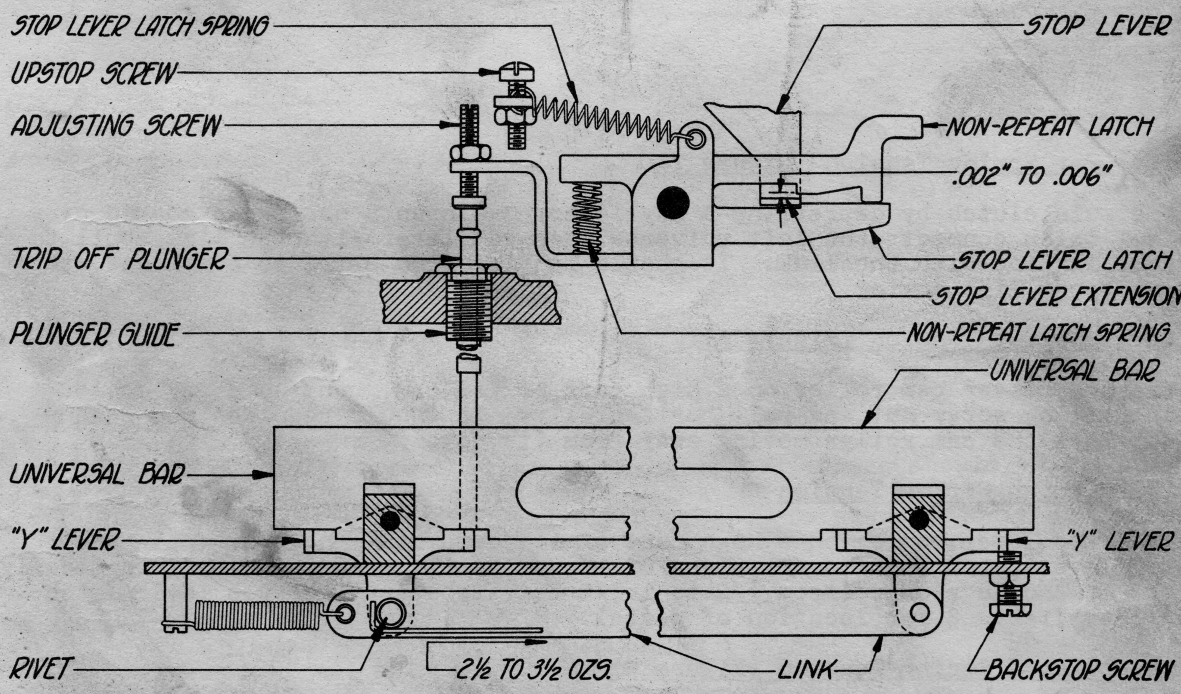


FIGURE 7

Stop Lever Latch Adjusting Screw Adjustment (Figure 7)

With the operating cam sleeve in the stop position, and all the key levers in their unoperated positions, there should be from .002" to .006" clearance between the non-repeat latch and the upper surface of the stop lever extension. To meet this requirement, adjust the stop lever latch adjusting screw.

NOTE: After making a single adjustment, check related adjustments.

Stop Lever Latch Upstop Screw Adjustment (Figure 8)

With any key lever held depressed, there should be from .004" to .025" clearance between the upstop screw and the stop lever latch. Check all key levers. Adjust the stop lever latch upstop screw to meet this requirement.

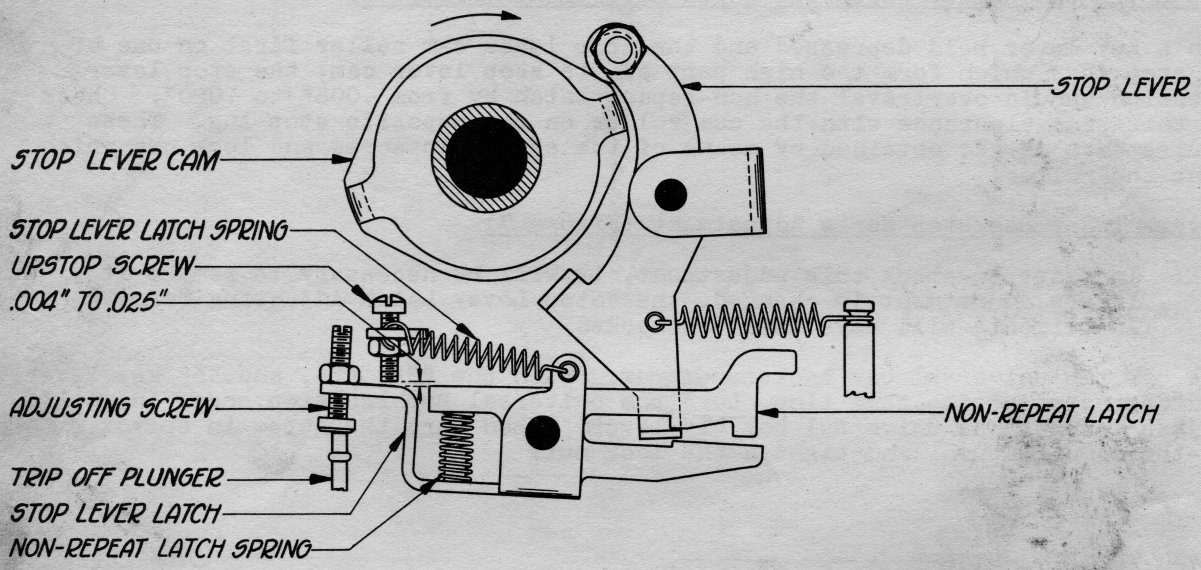


FIGURE 8

Universal Bar Spring Tension (Figure 7)

Trip the main clutch by depressing a key lever. With an 8 oz. scale hooked over the rivet which connects the left universal bar "Y" lever with the link, pull to the right in line with the link. It should require from 2 1/2 to 3 1/2 ozs. to just start the link moving.

Stop Lever Spring Tension (Figure 6)

With the stop lever cam roller on a high part of its cam, hook an 8 oz. scale over the roller screw nut and pull horizontally. It should require from 6 to 8 ozs. to start the cam roller moving away from its cam.

Stop Lever Latch Spring Tension

With the stop lever roller on a high part of its cam, hook an 8 oz. scale under the stop lever latch just to the right of the adjusting screw, and pull vertically upward. It should require from 1/2 to 1 1/2 ozs. to start the stop lever latch moving (See Figure 6 for location of parts).

Non-Repeat Latch Spring Tension (Figure 6)

With the stop lever roller on a high part of its cam, hook an 8 oz. scale under the right end of the non-repeat latch and pull up. It should require from 1/2 to 1 1/2 ozs. to start the non-repeat latch moving.

Transfer Adjustments (Figure 9)

(a) The "T" transfer levers should line up with the counting selector levers (Figure 9-A). Adjust the position of the guide plate and transfer bail bracket, by means of their elongated mounting holes, to meet this requirement. The guide plate will maintain the front to rear position of the

NOTE: After making a single adjustment, check related adjustments.

transfer bail, while the left to right position is being adjusted according to paragraph (c) of this adjustment.

(b) The counting code discs should also line up with the "T" transfer levers. To adjust, position the stop unit bracket by means of its elongated mounting holes (Figure 9-A). Before tightening the mounting screws, hold the stop unit bracket down against the horizontal locating surface on the clutch shaft casting.

(c) With the first and third from the rear counting selector levers to the left, and the second and the fourth to the right, move the left end of the transfer bail down until the "T" transfer levers position the counting code discs against their stops. Under this condition, at least one of the code discs should be moved clockwise against its stop, and at least one which is moved

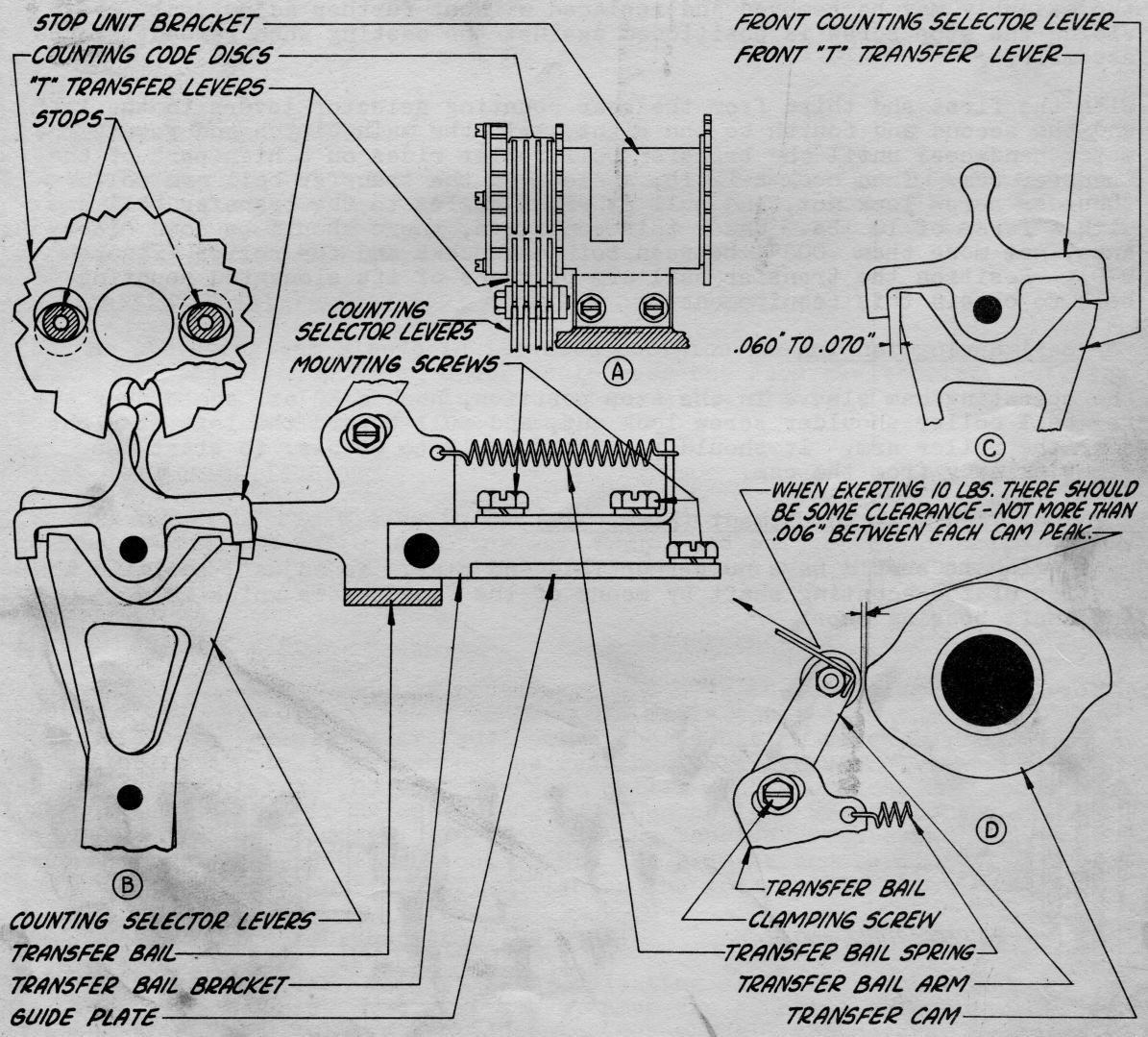


FIGURE 9

NOTE: After making a single adjustment, check related adjustments.

counterclockwise should also be against its stop. To check this adjustment, hold a small screw driver firmly in a counting code disc notch and try to move the code disc to the left and right. If the code disc is against its stop, there will be no perceptible side play. Adjust the left to right position of the transfer bail bracket, by means of its elongated mounting holes, to meet this requirement. Be sure that the transfer bail bracket is against the guide plate before tightening the mounting screws (Figure 9-B).

(d) With the front counting selector lever to the right and the transfer bail roller on a high part of its cam, there should be a clearance of from .060" to .070" between the left end of the front "T" transfer lever and its corresponding counting selector lever (Figure 9-C). To adjust, position the counting selector bar assembly by means of its elongated mounting holes. Then position the stop screw on the counting selector bar detent bracket (Illustration 2) so that it touches the base casting, and tighten the stop screw lock nut. With the stop screw adjusted according to the foregoing, the assembly may be removed and replaced without further adjustment, providing the stop screw is positioned against the casting when remounting the assembly.

(e) With the first and third from the rear counting selector levers to the left and the second and fourth to the right, trip the main clutch and rotate the motor handwheel until the transfer bail roller rides on a high part of the transfer cam. Then hook a 12 lb. scale over the transfer bail arm roller shoulder screw lock nut, and pull at right angles to the transfer bail arm with a force of 10 lbs. Under this condition, there should be some clearance, not more than .006", between both cam peaks and the roller (Figure 9-D). Position the transfer bail arm by means of its elongated mounting hole to obtain this requirement.

Transfer Bail Spring Tension

With the operating cam sleeve in the stop position, hook a 32 oz. scale over the transfer bail roller shoulder screw lock nut, and pull toward the left at right angles to the roller arm. It should require from 19 to 25 ozs. to start the roller moving away from the cam.

Counting Shaft End Play Adjustment (Figure 10)

The counting shaft should have no perceptible end play. To adjust, position the rear section of the counting shaft by means of the four screws which hold the counting shaft bearing caps.

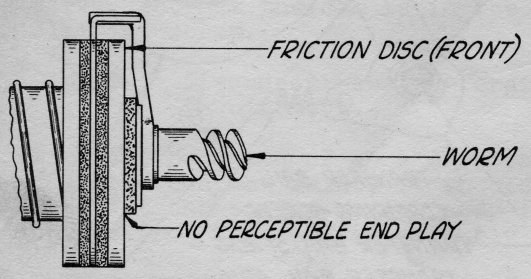


FIGURE 10

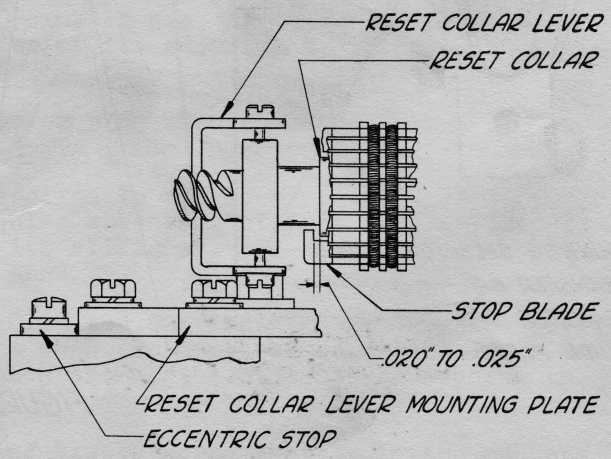


FIGURE 11

NOTE: After making a single adjustment, check related adjustments.

Reset Collar Lever Adjustment (Figure 11)

With the reset collar lever roller first on one and then on the other peak of its cam, so that the reset collar is moved to its extreme rear position, there should be from .020" to .025" clearance between all the stop blades and the reset collar when the play in the lever and the collar is taken up in a direction to make the clearance a maximum. When the play is taken up in the opposite direction, there should be some clearance between all the stop blades and the reset collar. To adjust, back off the eccentric stop and position the reset collar lever mounting plate by means of its elongated mounting holes. Set the eccentric stop against the mounting plate, and tighten screw.

Zero Lever Adjustments (Figure 12)

(a) With the stop blade that is in front of the zero lever in its forward detent position and the zero lever held in its forward position, there should be some clearance, not more than .010", between the front end of the zero lever and the stop blade (Figure 12-A). Check each stop blade for this same clearance. Adjust by means of the zero lever stop screw and lock nut.

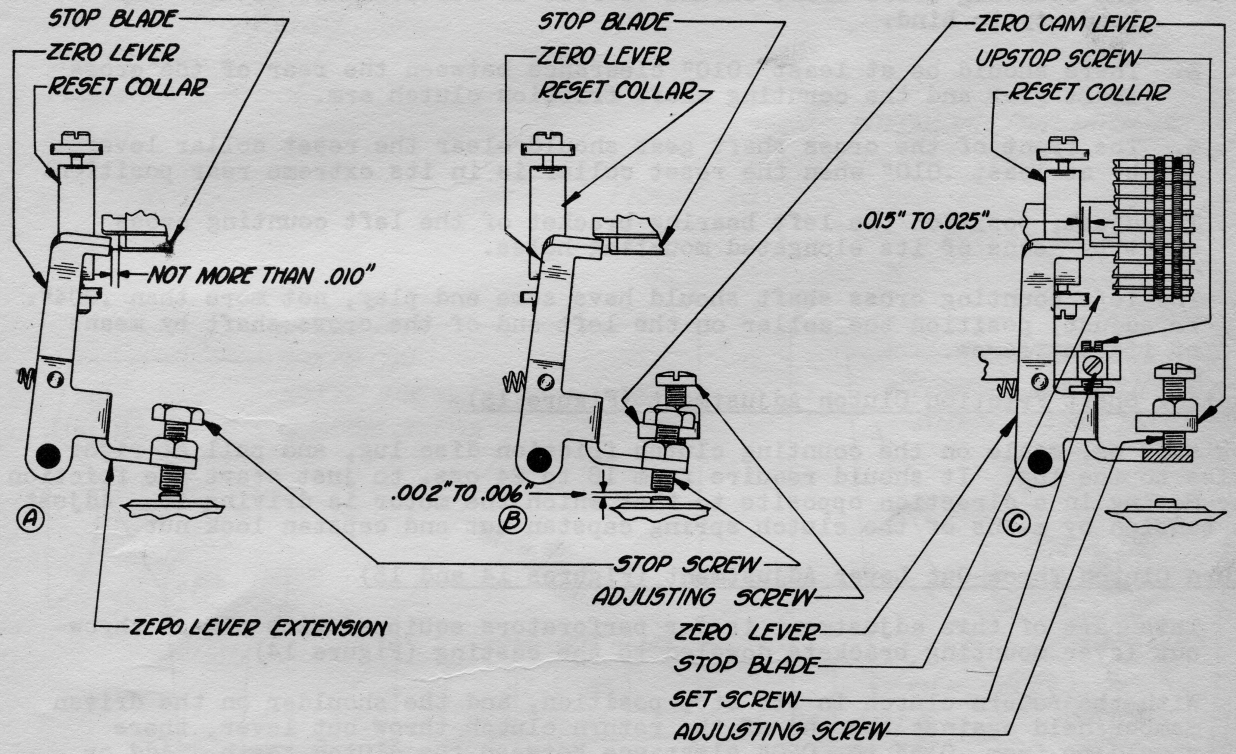


FIGURE 12

(b) With the zero cam lever on a peak of its cam, there should be a clearance of from .002" to .006" between the zero lever stop screw and its stop. Check this clearance on both peaks of the cam (Figure 12-B). Adjust the zero cam lever adjusting screw to obtain this requirement.

(c) With the zero cam lever on a low part of its cam, there should be a clearance of from .015" to .025" between the forward end of the zero lever and any stop blade that is in the reset (rear) position (Figure 12-C). Check each stop blade for this same requirement. Adjust the zero cam lever upstop screw to meet these requirements.

NOTE: After making a single adjustment, check related adjustments.

Zero Lever Spring Tension

With the zero cam lever on a low part of its cam, apply the push end of a 12 lb. scale to the top of the zero lever stop screw. It should require from 1 1/2 to 2 1/4 lbs. to start the lever moving downward.

Stop Pin Springs Tension

With each stop pin in its selected position, hook a 32 oz. scale under the stop pin in front of the center guide disc and pull in line with the pin slot. It should require from 6 to 10 ozs. to start each stop pin moving.

Left Counting Cross Shaft Adjustments

(a) The left bearing bracket of the left counting cross shaft should be positioned so that the following requirements are fulfilled:

1. There should be a minimum amount of play (without binding) between the cross shaft gear and the counting shaft worm. Check for one complete revolution of the cross shaft.

2. The counting cross shaft should be free in its bearings without any tendency to bind.

3. There should be at least .010" clearance between the rear of the cross shaft gear and the counting shaft friction clutch arm.

4. The front of the cross shaft gear should clear the reset collar lever by at least .010" when the reset collar is in its extreme rear position.

To adjust, position the left bearing bracket of the left counting cross shaft by means of its elongated mounting holes.

(b) The left counting cross shaft should have some end play, not more than .004". To adjust, position the collar on the left end of the cross shaft by means of its set screw.

Counting Shaft Friction Clutch Adjustment (Figure 13)

Hook a 32 oz. scale on the counting clutch friction disc lug, and pull at right angles to the lug. It should require from 16 to 24 ozs. to just start the friction disc moving in a direction opposite to that which the motor is driving it. Adjust the tension by means of the clutch spring capstan nut and capstan lock nut.

Return Clutch Throw-Out Lever Adjustment (Figures 14 and 15)

(a) This part of this adjustment is for perforators equipped with clutch throw-out lever mounting brackets doweled to the casting (Figure 14).

With the return clutch in its stop position, and the shoulder on the driven member held against the end of the return clutch throw-out lever, there should be from .015" to .020" clearance between the clutch teeth. Add or remove shims on the throw-out lever stud to obtain this clearance.

(b) This part of this adjustment is for perforators equipped with slotted clutch throw-out lever mounting brackets (Figure 15).

With the return clutch in its stop position, and the shoulder on the driven member held against the end of the return clutch throw-out lever, there should be a clearance of from .015" to .020" between the clutch teeth, when the throw-out lever is parallel to the return cam. Adjust the return clutch throw-out lever bracket by means of its mounting slots to obtain this requirement.

Return Actuating Lever Adjustment (Figures 16 and 17)

With the motor running, depress the return key lever very slowly. The return clutch should engage at the same time, or slightly before the main clutch engages.

NOTE: After making a single adjustment, check related adjustments.

For perforators equipped with the new style return actuating levers with eccentrics (Figure 16), adjust the operating position of the trip-off pawl to obtain this timing by loosening the clamping screw and positioning the return actuating lever by means of the eccentric.

For perforators equipped with the old style return actuating lever without eccentrics (Figure 17), this adjustment is made by means of the shoulder screw that engages the elongated hole in the return key lever extension.

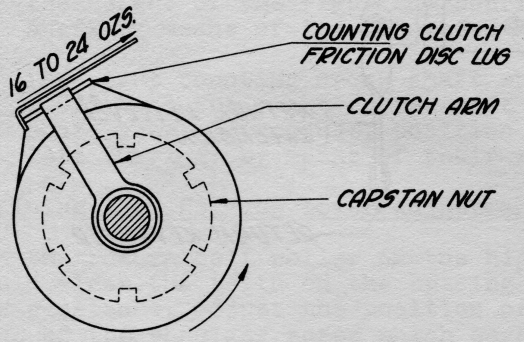


FIGURE 13

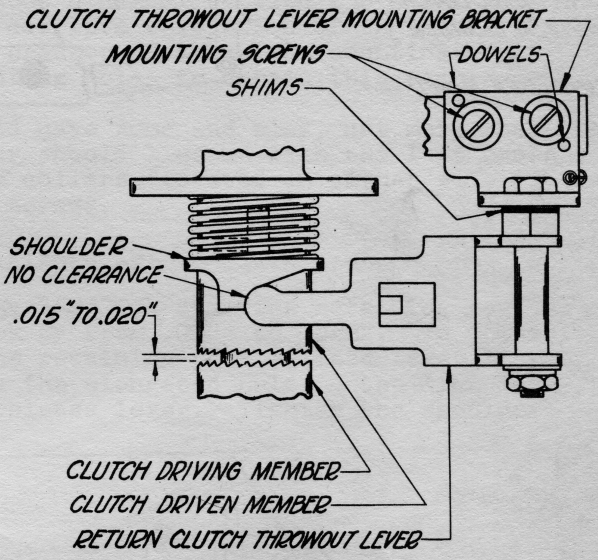


FIGURE 14

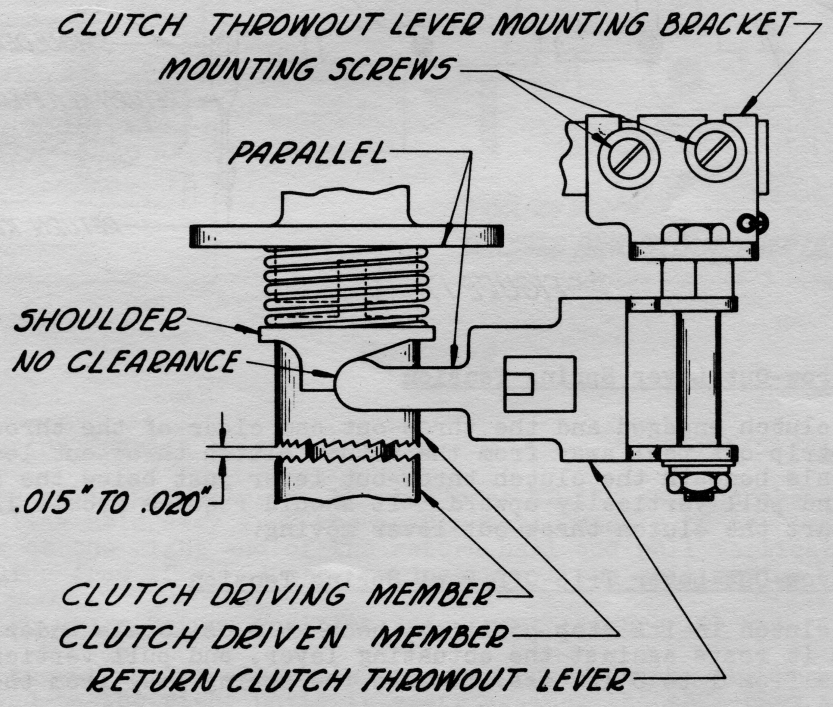


FIGURE 15

NOTE: After making a single adjustment, check related adjustments.

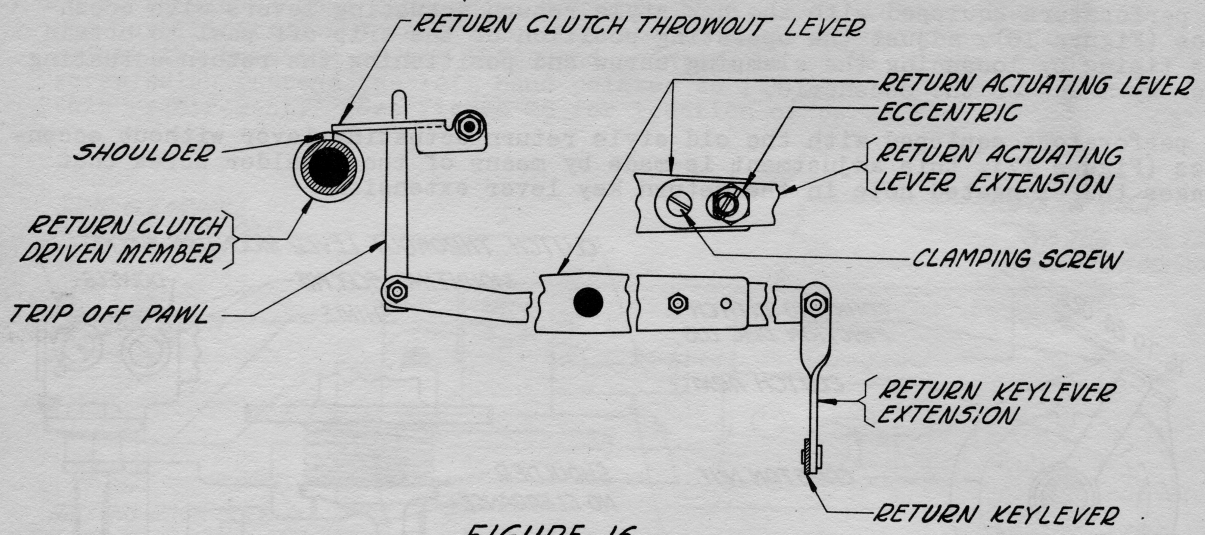


FIGURE 16

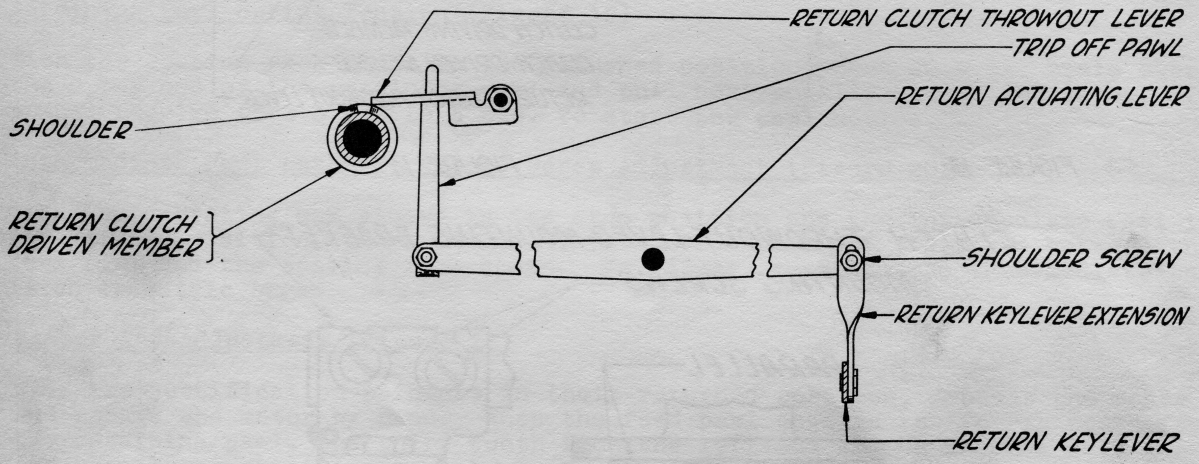


FIGURE 17

Return Clutch Throw-Out Lever Spring Tension

With the return clutch engaged and the throw-out cam clear of the throw-out lever, hold the trip-off pawl away from the return clutch throw-out lever, and hook an 8 oz. scale beneath the clutch throw-out lever just below the spring mounting hole, and pull vertically upward. It should require from 1 1/2 to 2 1/2 ozs. to start the clutch throw-out lever moving.

Return Clutch Throw-Out Lever Trip-Off Pawl Spring Tension

With the return clutch in its stop position, hook an 8 oz. scale under the spring at a point where it rests against the actuating lever, and pull vertically upward. It should require from 1 to 3 1/2 ozs. to move the spring away from the actuating lever.

NOTE: After making a single adjustment, check related adjustments.

Return Clutch Spring Tension

With the return clutch teeth engaged and the return clutch throw-out lever held away from the clutch, a tension of from 3/4 to 1 1/4 lbs. should be required to separate the clutch teeth when pushing with a 12 lb. scale against the shoulder of the return clutch driven member in line with the shaft.

Right Counting Cross Shaft Adjustments

(a) There should be a minimum play (without binding) between the shaft worm and the counting pointer gear. Try one complete revolution of the gear. Adjust the height of the right end bearing bracket of the right counting cross shaft by means of its elongated mounting holes to obtain this requirement.

(b) The right counting cross shaft should have some end play, not more than .004", and the right cross shaft gear should line up with the left cross shaft gear. To adjust, position the collars (located on either side of the left bearing) by means of their set screws.

Retaining Pawl Release Lever Adjustment (Figure 18)

With the return bail roller on the high part of its cam, the retaining pawl should clear the teeth on the spacing rack by from .030" to .045". To obtain this clearance, adjust the position of the retaining pawl release lever link by means of the shoulder screw which engages the elongated hole in the link and connects the link to the retaining pawl release lever. Tighten the shoulder screw lock nut.

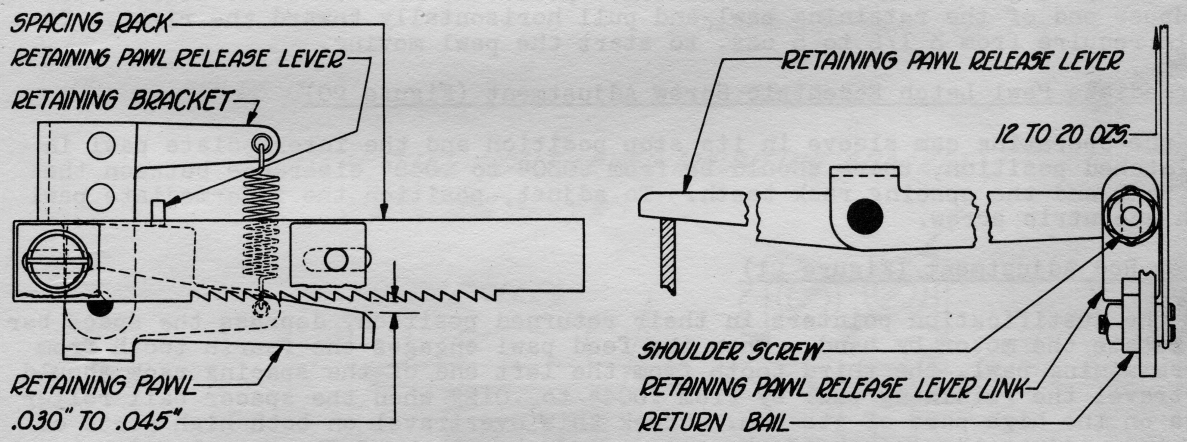


FIGURE 18

Return Bail Spring Tension (Figure 18)

With the return bail cam roller on the low part of its cam and the retaining pawl release lever link held away from the return bail, hook a 32 oz. scale on the shoulder screw at the right end of the return bail and pull vertically upward. It should require from 12 to 20 ozs. to just start the bail moving.

Justification Pointers Return Position Adjustment (Figure 19)

(a) With the operating cam sleeve in its stop position and the spacing rack slide moved to the right until it rests against the left hand shoulder screw (return position), there should be some clearance, not more than .004", between the retaining pawl and the second tooth from the left end of the spacing rack. Position the spacing rack by means of its clamping screw to obtain this requirement.

NOTE: After making a single adjustment, check related adjustments.

(b) There should be some clearance, not more than .010", between the ends of the justification pointers when they are in their returned position. Adjust the position of the left hand pointer, by means of the clamping screw which fastens the left hand pointer to its gear segment, to obtain this requirement. (See Figure 26 for location of parts.)

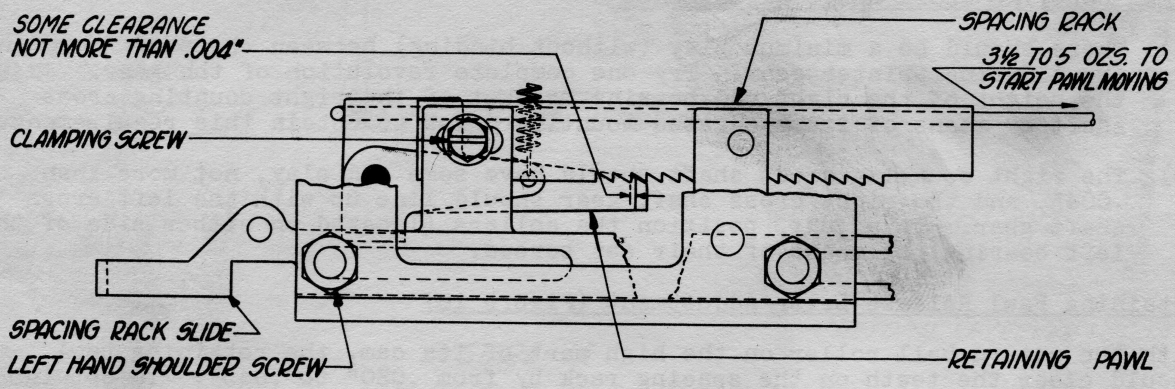


FIGURE 19

Retaining Pawl Spring Tension (Figure 19)

With the spacing rack slide in the returned position, hook an 8 oz. scale over the upper end of the retaining pawl and pull horizontally toward the right. It should require from 3 1/2 to 5 ozs. to start the pawl moving.

Intermediate Pawl Latch Eccentric Screw Adjustment (Figure 20)

With the operating cam sleeve in its stop position and the intermediate pawl in its latched position, there should be from .030" to .045" clearance between the feed pawl and the spacing rack teeth. To adjust, position the intermediate pawl latch eccentric screw.

Spacer Rod Adjustment (Figure 21)

With the justification pointers in their returned position, depress the space bar and rotate the motor by hand. When the feed pawl engages the fourth tooth from the retaining pawl, the third tooth from the left end of the spacing rack should overtravel the retaining pawl by from .004" to .012" when the spacer bail roller rides on the high part of its cam. Check this overtravel on both high parts of its cam. Adjust the length of the spacer rod, by means of its two clamping screws, to meet this requirement.

Reset Lug Adjustment (Figure 21)

The intermediate pawl should overtravel the latching surface of its latch by from .004" to .012" when the spacer bail roller is on a high part of its cam. Check for this same clearance on the other high part of the cam. Adjust the position of the reset lug by means of its elongated mounting holes to obtain this requirement.

Space Bar Stop Adjustment (Illustration 2)

(a) For perforators equipped with space bar having square bar stiffeners (new style).

There should be from .015" to .025" clearance between the space bar and the stop screws when the space bar is held down by depressing the space key lever near the key lever guide. Adjust the space bar stop screws to obtain this clearance.

NOTE: After making a single adjustment, check related adjustments.

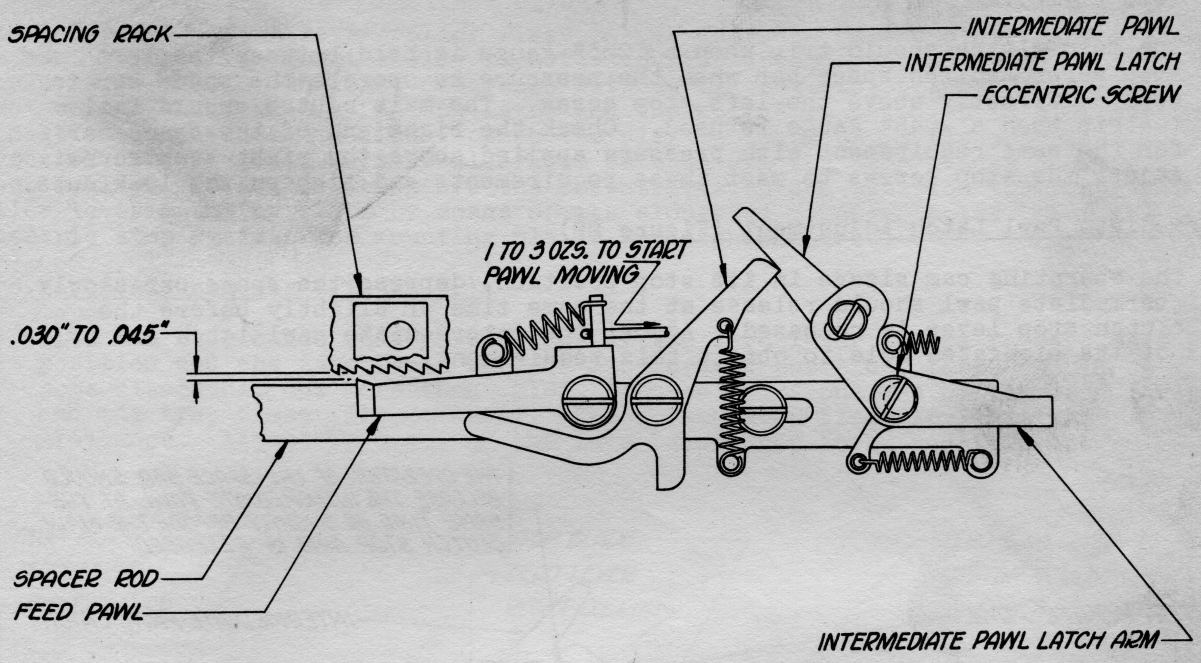


FIGURE 20

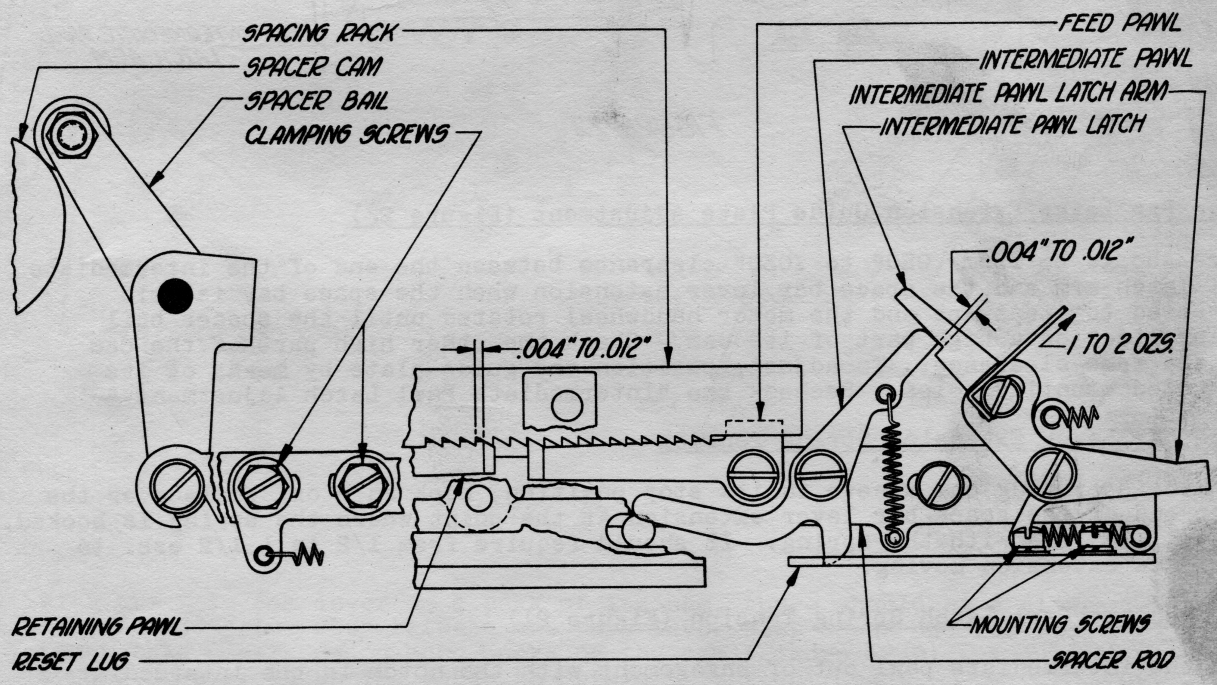


FIGURE 21

(b) For perforators equipped with space bar loops having flat wire stiffeners (old style).

The main clutch should trip when a .035" gauge is held between the left stop screw and the space bar when the pressure to operate the space bar is applied directly above the left stop screw. The main clutch should fail to trip when a .045" gauge is used. Check the right end of the space bar for the same requirement with pressure applied above the right stop screw. Adjust the stop screws to meet these requirements and tighten the lock nuts.

Intermediate Pawl Latch Adjustment (Figure 22)

With the operating cam sleeve in its stop position, depress the space bar slowly. The intermediate pawl should release at the same time or slightly before the main clutch stop lever is released. Adjust the intermediate pawl latch arm by means of its elongated hole to obtain this requirement.

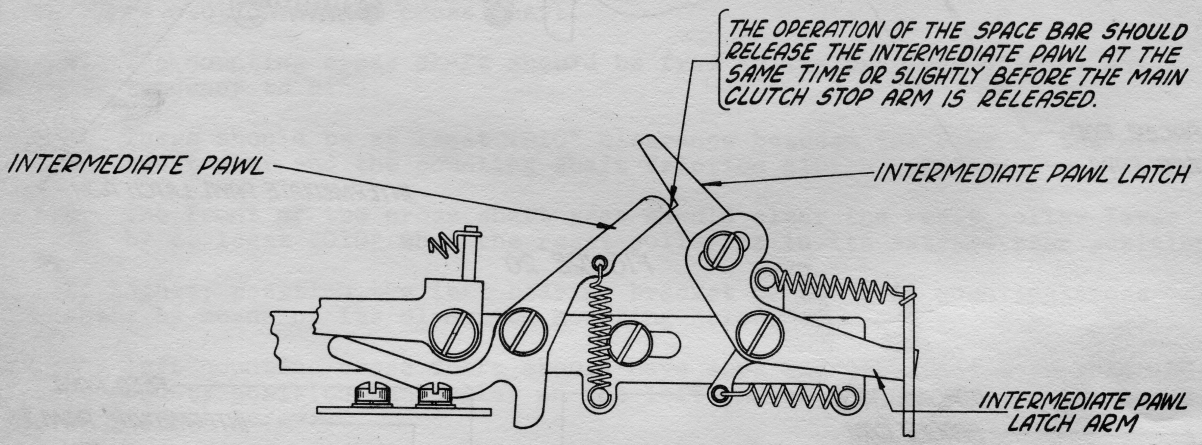


FIGURE 22

Space Bar Lever Extension Guide Plate Adjustment (Figure 23)

There should be from .020" to .030" clearance between the end of the intermediate pawl latch arm and the space bar lever extension when the space bar is held depressed to its stops and the motor handwheel rotated until the spacer bail roller rides on a high part of its cam. Check the other high part of the cam for the same clearance. To adjust, position the guide plate by means of its elongated mounting holes. Recheck the "Intermediate Pawl Latch Adjustment."

Space Bar Lever Extension Spring Tension

With the operating cam sleeve in its stop position, hook an 8 oz. scale over the upper end of the space bar lever extension at the point where the spring is hooked, and pull in line with the spring. It should require from 1/2 to 1 1/2 ozs. to start the extension moving.

Intermediate Pawl Latch Spring Tension (Figure 21)

With the intermediate pawl out of engagement with the notch in the intermediate pawl latch, hook an 8 oz. scale over the head of the intermediate pawl latch clamping screw, and pull at right angles to the pawl latch. A tension of from 1 to 2 ozs. should be required to start the latch moving.

NOTE: After making a single adjustment, check related adjustments.

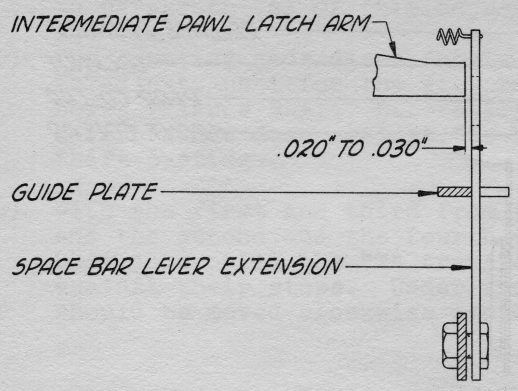


FIGURE 23

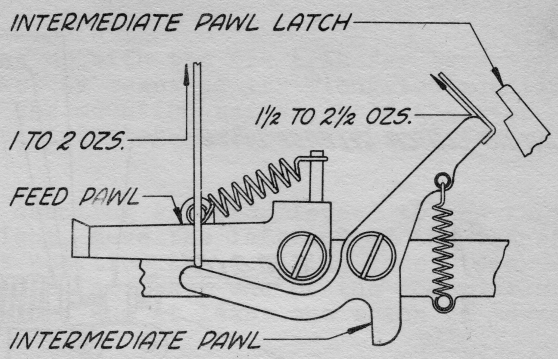


FIGURE 24

Intermediate Pawl Spring Tension (Figure 24)

With the feed pawl and intermediate pawl latch held away from the intermediate pawl, hook an 8 oz. scale over the latching end of the intermediate pawl, and pull at right angles to the pawl. A tension of from 1 1/2 to 2 1/2 ozs. should be required to start the pawl moving.

Justification Pointers Feed Pawl Spring Tension (Figure 20)

With the operating cam sleeve in its stop position and the intermediate pawl in its latched position, hook an 8 oz. scale over the feed pawl spring post, just below the spring, and pull horizontally toward the right. It should require from 1 to 3 ozs. to start the feed pawl moving.

Spacer Rod Spring Tension

With the operating cam sleeve in its stop position, hook a 32 oz. scale over the spacer bail cam roller mounting screw nut, and pull at right angles to the bail. It should require from 12 to 20 ozs. to start the roller moving away from the cam.

Counting Pointer Clutch Spring Compression Adjustment (Figure 25)

Remove the motor handwheel, if necessary, and move the counting pointer to the right end of the scale. With a 12 lb. push scale applied to the rear of the counting clutch release lever, just above the adjusting screw lock nut, a tension of from 6 to 8 lbs. should be required to release the pointer. To obtain the proper spring tension, hold the rear collar with a wrench, and loosen the lock nut on the pointer release plunger. Then apply a wrench to the flats at the rear end of the plunger. To increase the tension, rotate the plunger clockwise; and to decrease the tension, rotate the plunger counterclockwise (as viewed from the front of the perforator). Tighten the lock nut.

Counting Pointer Clutch Release Adjustment

With the counting clutch release lever adjusting screw backed off and the return bail roller on the high part of its cam, move the counting pointer to its extreme right position, and turn in the adjusting screw until the pointer is released, allowing it to return to its starting position. Advance the screw one-quarter of a turn, and tighten the lock nut (See Figure 25 for location of parts).

Counting Pointer Return Spring Arm Position

With the counting pointer against its right-hand stop, the length of the counting pointer return cord should be such that the spring arm is from 1/16" to 3/16" away from the spring post.

NOTE: After making a single adjustment, check related adjustments.

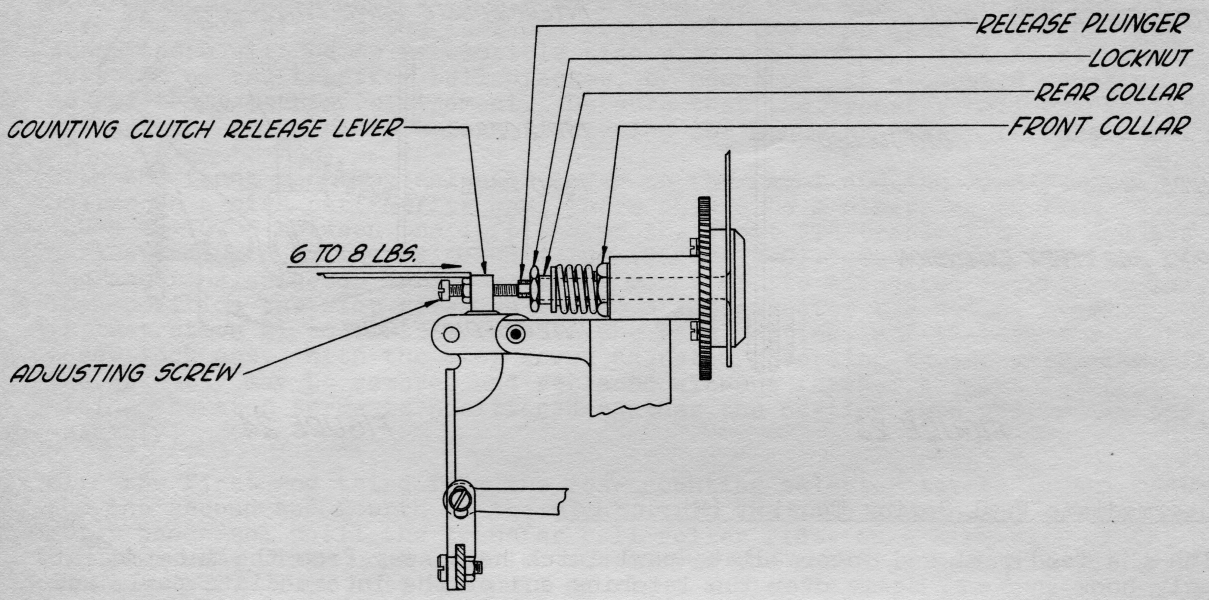


FIGURE 25

Counting Pointer Return Spring Tension

With the counting pointer approximately in the center of the scale, apply the push end of an 8 oz. scale at right angles to the upper end of the counting pointer spring arm. It should require from 3 to 5 ozs. to start the arm moving.

Justification Pointers Return Spring Tensions

With the justification pointers in their stop positions, unhook the upper ends of the justification pointers return springs. Hook an 8 oz. scale in each spring eye, and pull to position length (a point opposite where the springs were hooked). It should require a tension of from 2 1/2 to 4 1/2 ozs. for each spring.

Signal Lamp Contacts Adjustment (Figure 26)

(a) Position the left-hand justification pointers cam, by means of its clamping screw, so that the cam is in the center of its adjustment. Tighten the clamping screw.

(b) CAUTION: Disconnect the perforator power plug when checking this requirement.

With the push end of an 8 oz. scale applied to the lower contact spring, near the contact point, it should require a tension of from 3 to 4 ozs. to start the spring moving away from its stiffener. To adjust, remove the spring from the contact assembly and bend.

(c) There should be a clearance of from .015" to .025" between the contact points of the upper and lower contact springs when the contacts operating lever clears the bakelite tip on the upper contact spring. Adjust by bending the upper contact spring.

(d) With the left and right pivot adjusting blocks approximately in the centers of their adjustments, and the justification pointers advanced five spaces, adjust the position of the contacts bracket so that when the counting pointer

NOTE: After making a single adjustment, check related adjustments.

is moved from the left to the right, the lamp will light when the counting pointer is approximately three scale divisions to the left of the left justification pointer.

Signal Lamp Contact Lever Spring Tension

Set the justification pointers in their returned positions and the counting pointer opposite scale division 30. With an 8 oz. scale hooked in the signal lamp contact lever spring hole, pull vertically upward. It should require a tension of from 2 to 6 ozs. to start the lever moving.

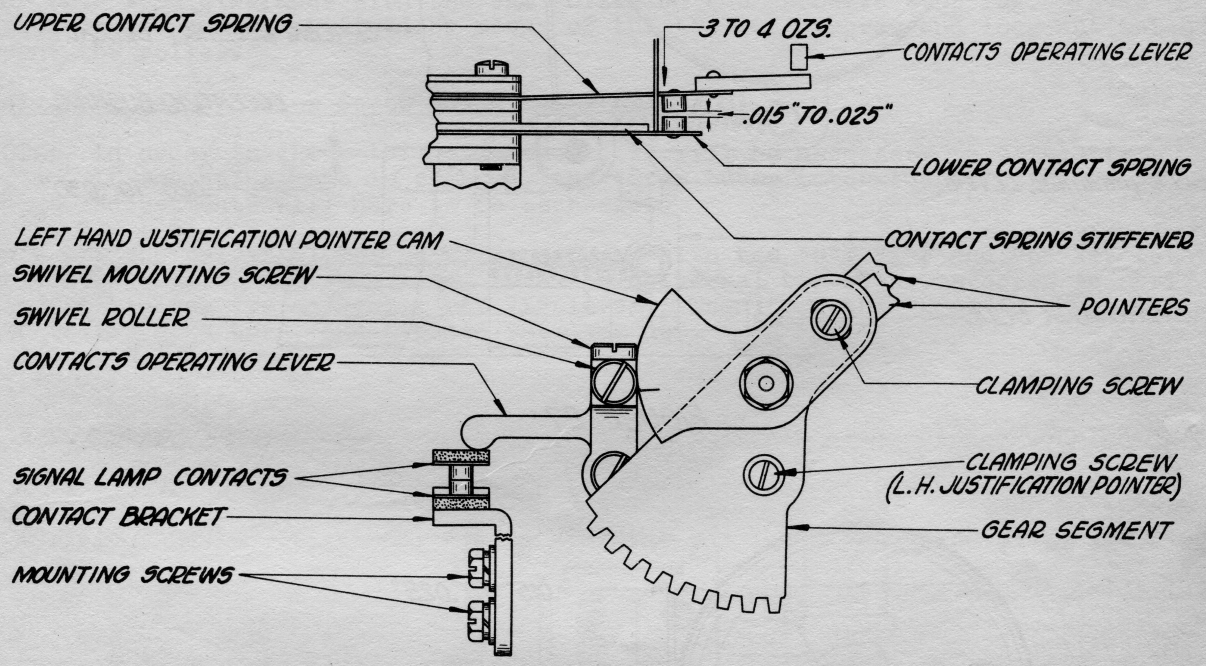


FIGURE 26

Bell Hammer Lever Eccentric Adjustment (Figure 27)

With the justification pointers advanced eight spaces, there should be from .020" to .030" clearance between the upper right end of the bell hammer lever and the lower edge of the spacing assembly bracket. To adjust, position the eccentric bushing by means of its mounting screw, using the right semi-circle of the adjustment only.

Bell Hammer Adjustment (Figure 28)

With the right end of the bell hammer lever against the lower edge of the bracket, there should be from .015" to .025" clearance between the bell and the hammer. Adjust by bending the hammer wire.

Bell Hammer Lever Spring Tension (Figure 28)

With the right end of the bell hammer lever against the lower edge of the bracket, hook a 32 oz. scale under the left end of the lever and pull up vertically. It should require from 6 to 12 ozs. to start the lever moving.

NOTE: After making a single adjustment, check related adjustments.

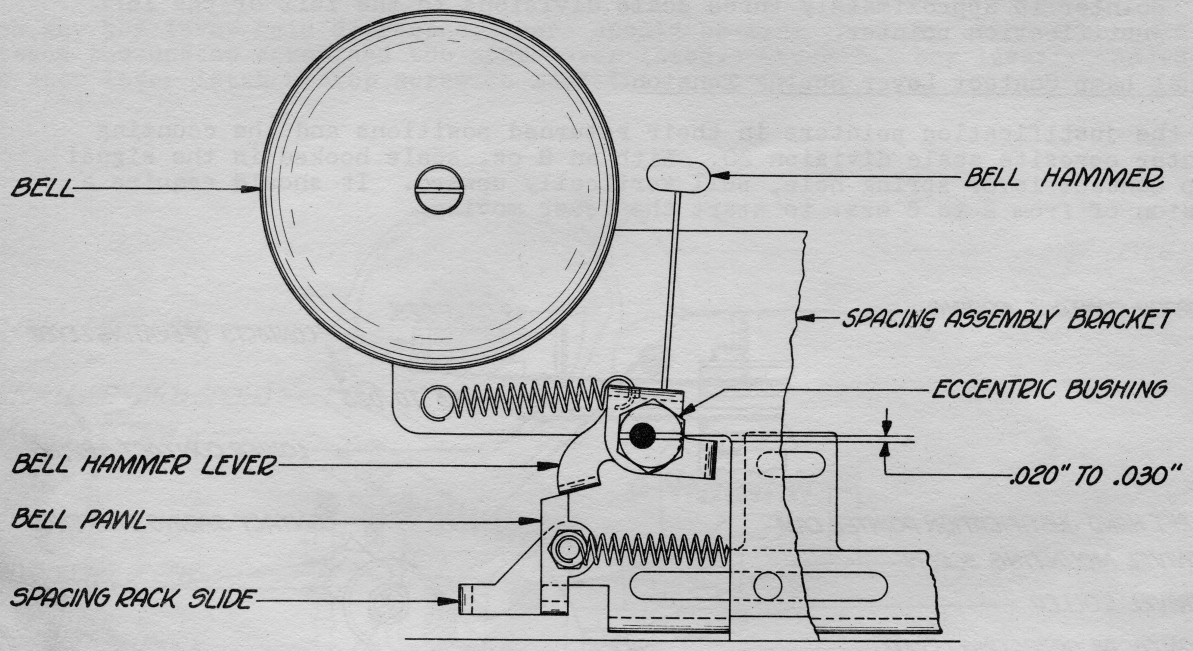


FIGURE 27

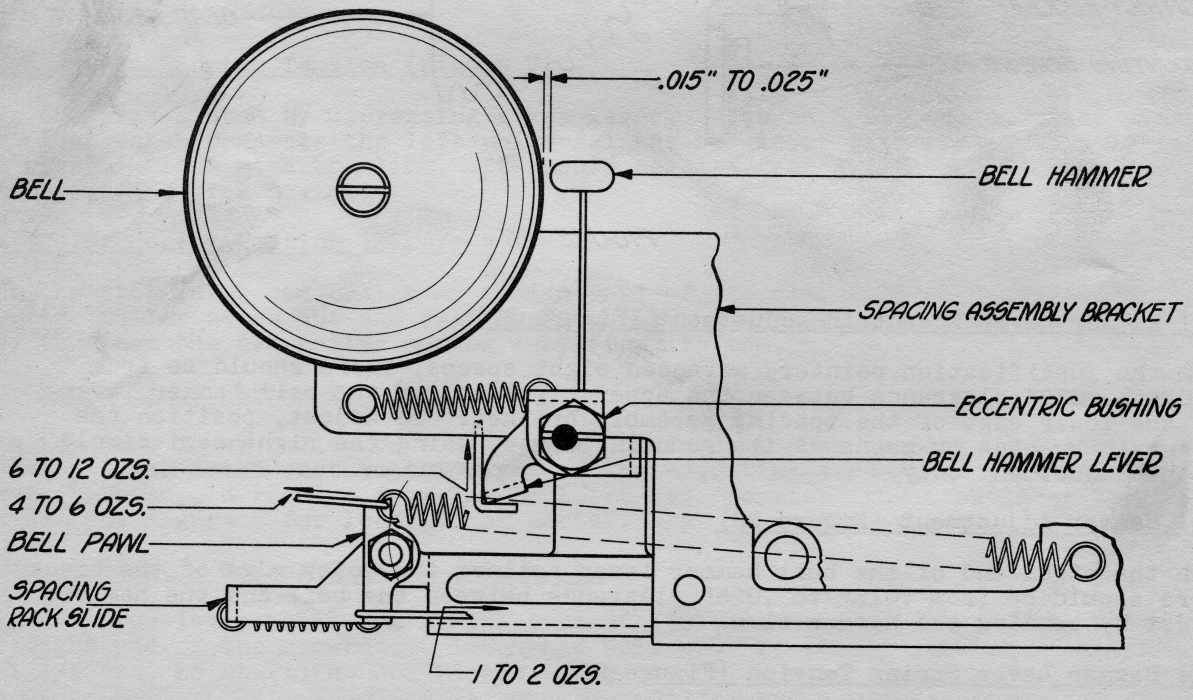


FIGURE 28

Spacing Rack Slide Return Spring Tension (Figure 28)

With the spacing rack slide in its stop position, unhook the return spring and hook an 8 oz. scale in the spring eye. It should require from 4 to 6 ozs. to pull the spring to position length. Replace the spring.

Bell Pawl Spring Tension (Figure 28)

Hook an 8 oz. scale over the lower end of the bell pawl and pull horizontally to the right. It should require from 1 to 2 ozs. to start the pawl moving.

Pivot Adjusting Block Screws Friction Adjustment (Figure 29)

With the pivot adjusting blocks near the centers of their screws, hook a 32 oz. scale over the hexagonal nut set screw and pull at right angles to the set screw. It should require from 20 to 30 ozs. to start each adjusting screw turning. To adjust the friction of each pivot adjusting block screw, loosen the hexagonal nut set screw and position the nut. Tighten the set screw.

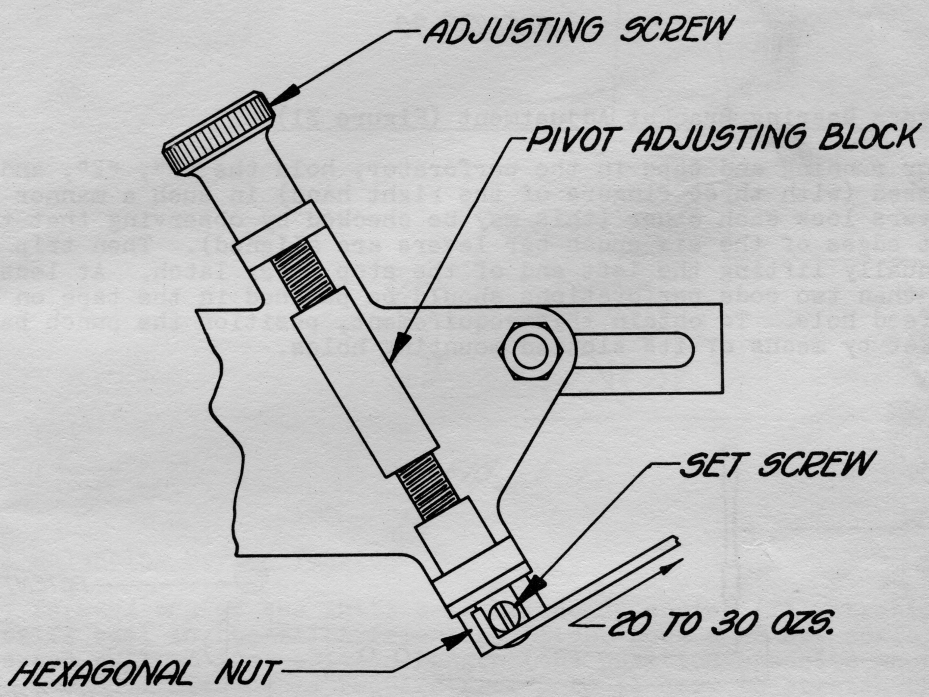


FIGURE 29

Shift Indicating Semaphore Adjustment

The semaphore should show all red when the shift bail is in the shifted position, and all white when in the unshifted position. Adjust the semaphore connecting link by means of its elongated mounting hole to obtain this requirement.

Punch Unit Adjustment (Figure 30)

There should be from .025" to .060" clearance between the upper edges of the front and rear selector bar links and the tops of the slots in their respective punch bar levers. To adjust, loosen the locating plate mounting screws and position the punch unit bracket by means of its elongated mounting holes. Then position the punch unit locating plate securely against the punch unit bracket and tighten the clamping screws.

NOTE: After making a single adjustment, check related adjustments.

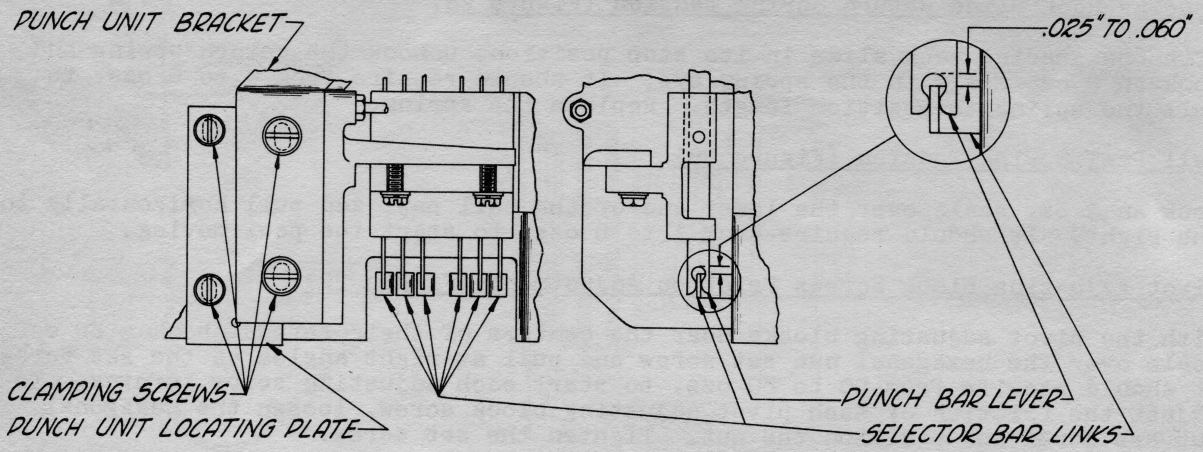


FIGURE 30

Punch Bar Levers Bearing Bracket Adjustment (Figure 31)

With the motor running and tape in the perforator, hold the "R", "Y", and "5" key levers depressed (with three fingers of the right hand) in such a manner that the three key levers lock each other (this may be checked by observing that the right or left edges of the six punch bar levers are aligned). Then trip the main clutch by manually lifting the left end of the stop lever latch. At least one and not more than two code perforations should be punched in the tape on each side of the feed hole. To obtain this requirement, position the punch bar levers bearing bracket by means of its slotted mounting holes.

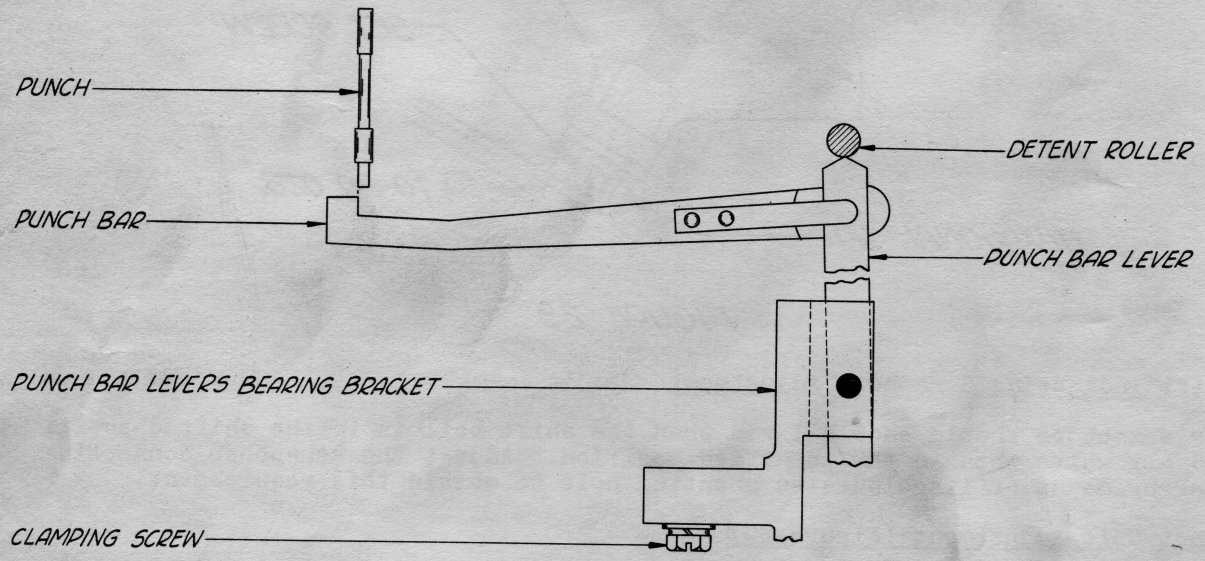


FIGURE 31

NOTE: After making a single adjustment, check related adjustments.

Punch Hammer Pivot Screws Adjustment

With the punch hammer in its lower (unoperated) position, the punch bars should line up under their respective punches when viewed from the left end of the perforator. The punch hammer should also have some end play, not more than .004". To obtain this requirement, adjust the punch hammer by means of its pivot screws.

Punch Hammer Operating Lever Adjustment

Connect the perforator to the proper power supply. The punch hammer operating lever adjustable plunger should be adjusted so that all the punches are driven through the tape, with the proper operating margin. This adjustment may be made as follows: With the punch hammer stop screw backed off, place a piece of tape in the die. Operate the "Rub-Out" key lever (with the motor running), and then back off the punch hammer operating lever adjustable plunger until there is a failure of perforations in the tape. Continue to operate the "Rub-Out" key lever and adjust the operating lever plunger until all the holes are just punched "clean" in the tape; then advance the plunger an additional one-quarter turn and tighten the lock nut. Adjust the punch hammer stop screw according to the following adjustment:

Punch Hammer Stop Screw Adjustment (Figure 34)

With the operating cam sleeve in the stop position and the punch control lever in the "ON" position, there should be some clearance, not more than .006", between the punch hammer stop screw and the punch hammer. Adjust the punch hammer stop screw to obtain this clearance. In order to facilitate the tightening of the stop screw lock nut, put the punch control lever in the "OFF" position and remove the punch hammer operating lever adjustable plunger.

Punch Bar Lever Detent Adjustment

The front edge of the punch bar lever detent bracket should be from 3/16" to 1/4" from the front edge of the first punch bar lever, and the detent bracket should have some end play, not more than .020". Adjust by means of the punch bar lever detent bracket pivot screws.

Punch Bar Lever Detent Spring Tension

Hook an 8 oz. scale under the detent roller and pull vertically upward. It should require from 3/4 to 1 1/4 ozs. to start the detent moving.

Punch Control Bail Spring Tension

With the punch control lever in the "OFF" position, unhook the punch control bail spring and hook an 8 oz. scale in the spring eye. It should require from 4 to 8 ozs. to pull the spring to position length.

Backspace Cam Spring Tension

With the stud on the tape feed pawl held away from the backspace cam, hook an 8 oz. scale over the end of the backspace cam arm, at the spring hole, and pull toward the left in line with the spring. It should require from 3 to 5 ozs. to start the cam moving.

Backspace Pawl Spring Tension

Hook an 8 oz. scale on the backspace pawl, at the spring hole, and pull upward. It should require from 1 to 1 1/2 ozs. to start the pawl moving away from its stop.

Tape Feed Roll Bearing Plate Adjustment

With the feed pawl, tape tension lever, and the feed roll detent lever held away

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NOTE: After making a single adjustment, check related adjustments.

from the feed roll, the feed roll should rotate freely. Adjust the feed roll bearing plate by means of its mounting holes to obtain this condition.

Tape Stripper Plate Adjustment

There should be some clearance, not more than .010", between the upper edge of the tape stripper plate and the feed roll. Adjust the tape stripper plate by means of its elongated mounting holes to obtain this clearance. Try one complete revolution of the feed roll.

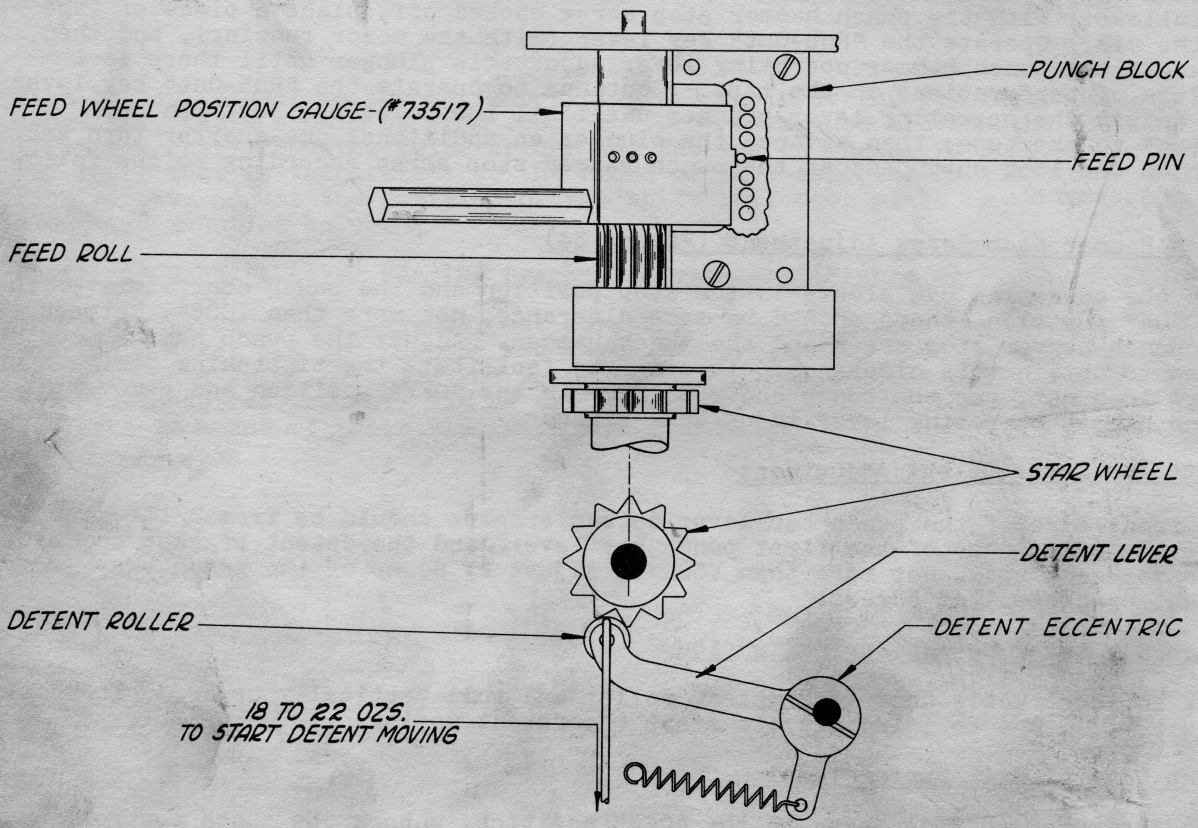


FIGURE 32

Tape Feed Roll Detent Preliminary Adjustment (Figure 32)

With the punch hammer operating lever roller on a high part of its cam, insert the feed roll position gauge (catalog No. 73517) into the punch block so that the projection on the gauge stops against the punch block feed pin. Adjust the position of the feed roll, by means of the feed roll detent eccentric, using the lower semi-circle of its adjustment only, so that a pin of the feed roll will line up with the center hole on the gauge.

NOTE: Because the adjustment of the feed roll detent and the feed pawl are interrelated, it is necessary that the following "Feed Pawl Adjustment" be made before the "Tape Feed Roll Detent Final Adjustment" is made.

NOTE: After making a single adjustment, check related adjustments.

Tape Feed Pawl Adjustment (Figure 33)

The feed pawl should engage a tooth on the feed roll ratchet without overtravel when the main shaft is rotated until the selected punch bars just touch the ends of the punches. Adjust the feed pawl eccentric by means of its mounting screw to obtain this requirement.

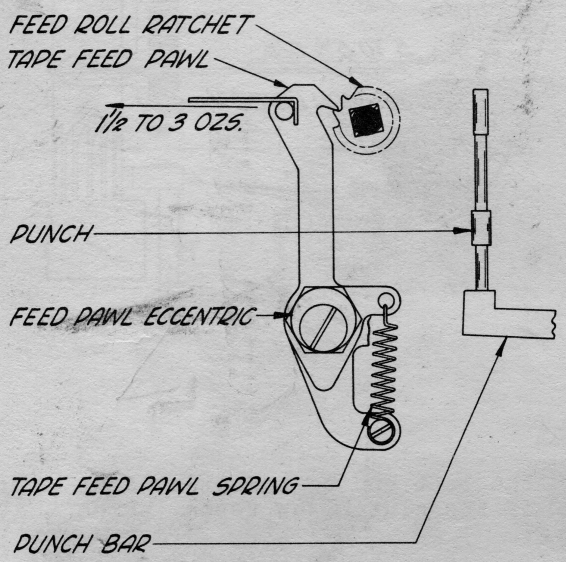


FIGURE 33

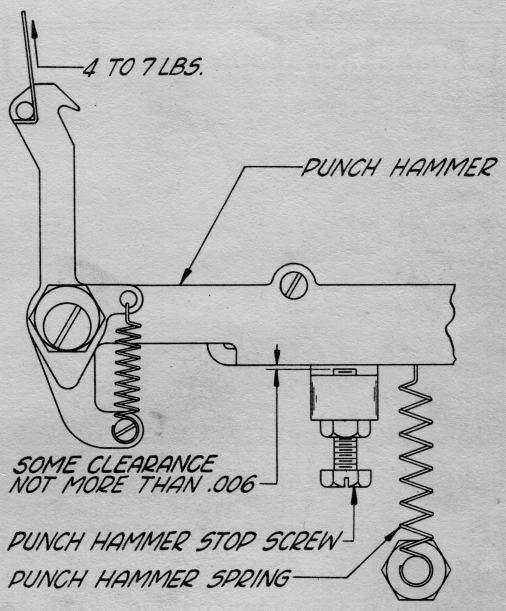


FIGURE 34

Tape Feed Roll Detent Final Adjustment (Figure 35)

Refine the tape feed roll detent adjustment if necessary, so that the perforations in the tape meet the standard spacing of ten holes to the inch. This may be checked by perforating a length of tape consisting of a series of nine "Blanks" ("Tape" Key) followed by a "Rub-Out" combination, and checking it against the tape gauge (catalog No. 2215).

NOTE: If this adjustment is changed, recheck the "Tape Feed Pawl Adjustment."

Tape Tension Lever Spring Tension Adjustment (Figure 36)

Hook an 8 oz. scale over the end of the slotted extension of the tape tension lever and pull at right angles to the lever. It should require from 5 to 5 1/2 ozs. to start the lever moving away from the tape feed roll. To adjust, loosen the tape tension lever shaft lock nut, and turn the spring by rotating the tape tension lever shaft (clockwise to increase and counterclockwise to decrease the tension) to obtain this requirement.

Tape Feed Pawl Spring Tension (Figure 33)

Hook an 8 oz. scale over the stud on the feed pawl and pull horizontally. It should require from 1 1/2 to 3 ozs. to start the pawl moving.

Tape Feed Roll Detent Lever Spring Tension (Figure 32)

Hook a 32 oz. scale over the detent lever at the center of the detent roller

NOTE: After making a single adjustment, check related adjustments.

and pull vertically downward. It should require from 18 to 22 ozs. to start the roller moving away from the star wheel.

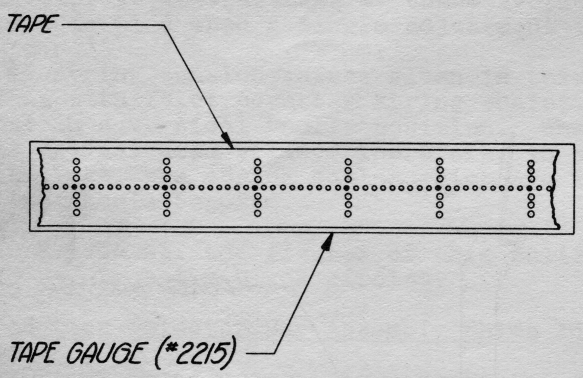


FIGURE 35

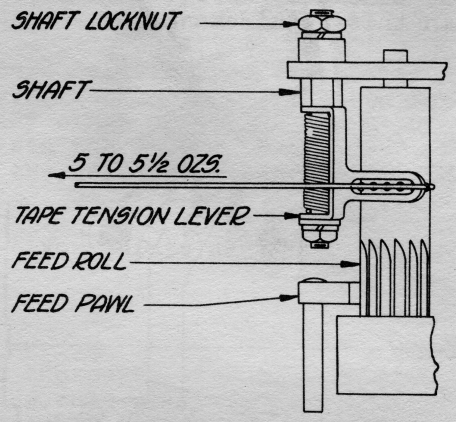


FIGURE 36

Operating Cam Sleeve Friction Clutch Adjustment

CAUTION: While taking this tension, hold down the left end of the stop lever latch to prevent accidental engaging of the clutch jaw teeth, which might result in injury to the fingers.

With the motor running and the clutch disengaged, hook a 32 oz. scale under the stop lug that is engaging the stop lever. It should require from 24 to 32 ozs. to just move the clutch backward from the stop position. Adjust by means of the adjusting nut and then tighten the capstan lock nut (See Figure 5 for location of parts).

Punch Hammer Spring Tension (Figure 34)

With the operating cam sleeve in the stop position, hook a 12 lb. scale on the stud on the feed pawl and pull upward (slightly to the left). It should require from 4 to 7 lbs. to start the punch hammer moving.

Tape Guide Adjustment

The tape guide should be parallel to the top casting and as far to the right as possible. Adjust the position of the tape guide by means of its elongated mounting holes.

Tape Tension Spring Adjustment

There should be some clearance, not more than .006", between the tape tension spring and the plate over which the tape rides. Adjust the tape tension spring by means of its enlarged mounting hole.

NOTE: After making a single adjustment, check related adjustments.

LUBRICATION SPECIFICATION

The oil and grease specified in the supplement furnished with this bulletin should be used to lubricate the perforator.

Unless otherwise specified, one or two drops of oil at each of the places indicated will be sufficient. Use oil for lubrication at all of the places listed below, except where the use of grease is specified.

Punch Unit

1. Adjusting nut - at the punch hammer.
2. Backspace lever - in the guides.
3. Backspace pawl - at the shoulder screw.
4. Detent bail bearings - 2 places.
5. Detent bail roller.
6. Detent eccentric bushing.
7. Detent roller.
8. Feed pawl eccentric bushing.
9. Feed pawl release cam.
10. Feed roll bearing.
11. Punch block oil hole.
12. Punch control bail pivots - 2 places.
13. Punch control lever - pivots and joints.
14. Punch hammer bearings - 2 places.
15. Punch hammer lever shaft - 2 oil holes.
16. Punch joint bearings - 2 places.
17. Punch levers - all points of contact.
18. Tape tension lever bearings - 2 places.
19. Vertical levers - all points of contact.

Counting Shaft Unit

1. Counter cross shaft bearings - 2 places.
2. Code discs - all points of contact.
3. Friction clutch washers - saturate with oil.
4. Gear - grease.
5. Oil cup (at front of unit) - fill.
6. Oil plug (at rear of shaft) - remove and fill with oil.
7. Reset collar - all points of contact.

8. Reset collar lever bearings - 2 places.
9. Shaft ball bearings - 2 places.
10. Stop blades - all points of contact.
11. Stop pins - all points of contact.
12. Stop pin plungers.
13. Stop pin rollers.
14. Stop shaft worm and gear - grease.
15. Transfer bail bearings - 2 places.
16. "T" transfer levers - all points of contact.
17. Zero cam bail bearings - 2 places.
18. Zero lever bearings - 2 places.

Main Shaft

1. Ball bearings - 2 places.
2. Driven clutch cam and follower - grease.
3. Gears - grease.
4. Non-repeat latch - all points of contact.
5. Operating clutch friction washers - saturate with oil.
6. Operating clutch sliding member - oil freely.
7. Plug (at rear of shaft) - remove and fill with oil.
8. Punch hammer cam and roller - grease.
9. Repeat key bearing.
10. Return cam and roller - grease.
11. Return clutch sliding member - oil freely.
12. Return clutch throw-out lever bearings - 2 places.
13. Spacer operating cam and roller - grease.
14. Stop blade reset cam and roller - grease.
15. Stop lever bearings - 2 places.
16. Stop lever cam and roller - grease.
17. Stop lever latch - all points of contact.
18. Transfer bail cam and roller - grease.
19. Trip-off plunger - at the guide.
20. Zero set cam and follower - grease.

Adjustable Pointer Unit

1. Adjusting collar - at prongs.
2. Bell hammer eccentric bushing.
3. Bell pawl - at the stud.
4. Contact lever bearings - 2 places.
5. Feed pawl bearing.
6. Gears and worm - grease.
7. Indicator scale guides.
8. Intermediate pawl - all points of contact.
9. Intermediate pawl latch - all points of contact.
10. Justification pointers - all points of contact.
11. Left pointer rack - all points of contact.
12. Pivot adjusting blocks - at guides.
13. Pointer bracket - oil hole.
14. Release lever bearings.
15. Retaining pawl bearings.
16. Retaining pawl release lever bearings.
17. Return actuating lever bearing points.
18. Return bail bearings.
19. Right pointer rack - all points of contact.
20. Semaphore bearings.
21. Semaphore linkages - all points of contact.
22. Shaft bearings - 2 places.
23. Shift detent - bearing and roller.
24. Space bar lever extension - at the guide.
25. Space rack slide - all points of contact.
26. Spacer bail bearings.
27. Spacer rod - all points of contact.
28. Spacing rack - all points of contact.
29. Spring arm bearing.
30. Swivel and rollers - bearing points.
31. Vertical link bearings.

Keyboard

1. Counting selector bars - in the slots.
2. Counting selector levers - all points of contact.
3. Detent rollers.
4. Perforating selector bars - in the slots.
5. Selector bar links - all points of contact.
6. Shift bail bearings - 2 places.
7. Shift linkages - all points of contact.
8. Space bar loop bearings.
9. Universal bar - in the slots.
10. Unshift linkages - all points of contact.
11. "Y" levers - all points of contact.

Miscellaneous

1. Message line guide - at the rod.
2. Motor - 2 oilers.
3. Motor pinion - grease.
4. Tape reel bearing.