# 28 Typing Unit

## Requirements and Adjustments

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### Automatic carriage-return line-feed mechanism

- Carriage-return line-feed bell-crank spring
- Carriage-return latch bail and spring
- Carriage-return lever
- Carriage-return spring
- Dashpot-vent screw
- Left margin
- Spacing-feed-pawl release-link spring
- Transfer-slide spring

### Clutch Mechanism

- Codebar clutch
- Drum position
- Function clutch
- Latchlever spring (except selector)
- Line-feed clutch
- Selector clutch (see selector mechanism)
- Shoe mechanism (all clutches)
- Spacing clutch
- Typebox clutch

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1. GENERAL

1.01 This section contains the requirements and adjustments for the 28 typing unit. The material herein, together with that in the general requirement section and the sections giving the requirements for auxiliary features, horizontal tabulation, and sprocket feed, provides the complete adjusting information for the maintenance of the 28 typing unit.

1.02 The section is reissued to revise various adjustment requirements in accordance with the changes authorized for this apparatus by the P98 series Bell System Practices listed at the end of this section and to include other authorized revisions and additions as to bring the section up to date. Since this reissue presents a general revision and rearrangement of material, marginal arrows ordinarily used to indicate changes have been omitted.

1.03 The 28 typing unit may be safely placed in any of the three following positions for servicing: (1) in an upright position on its four feet, (2) tilted backward so that it rests on its rear feet and the rear points of the side frames, (3) bottom upward so that it rests on the two upper points of each side frame. In addition, the typing unit may be placed on its end for servicing by use of a TP159358 modification kit.

1.04 Where a requirement calls for the clutch to be disengaged, the clutch shoe-lever must be fully latched between its triplever and latchlever so that the clutch shoes (as shown in 2.26) release their tension on the clutch drum. When engaged, the clutch shoe-lever is unlatched and the clutch shoes are wedged firmly against the clutch drum.

Note: When the main shaft of the typing unit is rotated by hand, the clutches do not fully disengage upon reach-
ing their stop positions. In order to relieve the drag on the clutches and permit the main shaft to rotate freely, use a screwdriver to apply pressure on the stop lug of each clutch disc (as shown in 2.26) to cause it to engage its latchlever, and thus fully disengage the internal expansion clutch. This procedure should always be followed before placing the typing unit on the base and switching on the power.

1.05 Manual Selection of Characters or Functions: The selection of characters or functions for checking the performance of a 28 typing unit while it is removed from its associated base may be obtained by manually operating the typing unit by one of the following methods, whichever is preferred.

(a) Method in Which Selected Character or Function Does Not Remain Set Up on the Codebars:

(1) Attach the armature clip, which is provided in the maintenance tool kit, to the selector-magnet armature, carefully inserting the flat-formed end of the armature clip over the top of the armature between the pole pieces and then hooking the projection under the edge of the armature. Finally, hook the top end of the armature clip over the top of the bakelite guard of the selector-coil terminal. The spring tension of the armature clip is sufficient to hold the selector-magnet armature in the marking (attracted) position.

(2) While holding the selector-magnet armature operated by means of the armature clip, use the handwheel included with the special tools for servicing a 28 typing unit to manually rotate the main shaft in a counterclockwise direction until all the clutches are brought to the stop position.

(3) Fully disengage all the clutches in accordance with 1.04, Note.

(4) Release the selector-magnet armature momentarily to permit the selector clutch to engage.

(5) Turn the main shaft slowly until selector lever No. 5 just reaches the peak of its cam.

(6) From the selector levers, strip the pushlevers that are spacing in the code combination of the character or function that is being selected. (The selector levers, shown in 2.10, move in succession, starting with the inner lever, No. 1.)

(7) Continue to rotate the main shaft until all the operations initiated by selector action clear through the unit.
(8) The selected character or function can be repeated as often as desired by operating the codebar clutch tripshaft lever and manually rotating the main shaft.

(b) Method in Which Selected Character or Function Remains Set Up on the Codebars:

(1) Follow the procedures previously given in (a) (1) through (a) (2).

(2) Momentarily release the selector-magnet armature and again rotate the main shaft to insure that all pushlevers are in the marking position.

(3) Fully disengage all the clutches in accordance with 1.04, Note.

(4) From the selected levers, strip the pushlevers that are spacing in the code combination of the character or function that is being selected. (The selector levers, shown in 2.10, move in succession, starting with the inner lever, No. 1.)

(5) Engage the codebar clutch by operating the codebar clutch tripshaft lever.

(6) Continue to manually rotate the main shaft until the selection clears through the unit.

(7) Since the selected character or function remains set up on the codebars, the selection may be repeated as often as desired by operating the codebar-clutch tripshaft lever and rotating the main shaft.

(c) If it is necessary to operate the 28 typing unit under power, proceed as follows.

Caution: Where the unit must be checked with power connected, appropriate precautionary measures should be taken to avoid accident.

(1) Turn off the power.

(2) Follow the procedures previously given in (b) (1) through (b) (4).

(3) Manually operate the codebar clutch tripshaft lever to engage the codebar clutch.

(4) Turn on the power until the selection clears through the unit.

(5) Since the selected character or function remains set up on the codebars, the selection may be repeated as often as desired by manually operating the codebar clutch tripshaft lever and then operating the unit under power.
Caution: Because the codebar clutch tripshaft lever is mounted extremely close to moving parts, it should never be manually operated when the power is on.

1.06 Parts Requiring Routine Check: To prevent undue wear of the print hammer and type pallets, each time the 28 typing unit is given routine servicing, the following adjustments should be checked, and remade if necessary, in accordance with this section.

- Lower draw wire rope: 2.45.
- Printing-carriage position: 2.59.
- Printing-hammer bearing stud: 2.59.
- Printing track: 2.63.
- Printing-hammer stop bracket: 2.64, and Note; 2.65, and Note.
- Dashpot-vent screw: 2.49, and check transfer slide for binds.

2. REQUIREMENTS AND ADJUSTMENTS

2.01 The following figures show the adjusting tolerances, positions of parts, and spring tensions. The illustrations are arranged so that the adjustments are in the sequence that would be followed if a complete readjustment of a 28 typing unit were being made. In some cases where an illustration shows interrelated parts, the sequence that should be followed in checking the requirements and making the adjustments is indicated by the letters (A), (B), (C), etc.
NOTE

To facilitate making the following adjustments, remove the range finder and selector magnet assemblies. To insure better operation, pull a piece of KS bond paper between the armature and the pole pieces to remove any oil or foreign matter that may be present. Make certain that no lint or pieces of paper remain between the pole pieces and armature.

---

**2.02 Selector Magnet Mechanism**

**NOTE**

This requirement need not be made nor checked if the selector magnet bracket and receiving margin requirements are met.

1. **Requirement (Armature Clamp Strip)**
   - Clearance between armature clamp strip and casting
   - Min. 0.025 inch
   - Max. 0.045 inch

2. **Requirement (Armature Alignment)**
   - Outer edge of armature shall be flush within 0.015 inch with outer edge of pole pieces.

3. **Requirement (Armature Backstop Alignment)**
   - Clearance between sides of backstop and sides of armature extension
   - Min. 0.016 inch

To adjust:

1. Position armature spring adjusting nut to hold armature firmly against pivot edge of casting.
2. Position armature and backstop with mounting screws loosened.
2.03 Selector Magnet Mechanism.

(1) REQUIREMENT

SPACING LOCK LEVER ON EACH HIGH PART OF CAM. ARMATURE IN CONTACT WITH POLE PIECE. CLEARANCE BETWEEN END OF ARMATURE EXTENSION AND SHOULDER ON SPACING LOCK LEVER.
MIN. 0.020 INCH
MAX. 0.035 INCH

TO ADJUST
LOOSEN TWO MAGNET BRACKET MOUNTING SCREWS AND ADJUSTING LINK CLAMP SCREW. POSITION MAGNET BRACKET BY MEANS OF ADJUSTING LINK AND TIGHTEN LINK CLAMP SCREW ONLY.

(2) REQUIREMENT

SPACING LOCK LEVER ON EACH HIGH PART OF CAM. ARMATURE IN CONTACT WITH POLE PIECE. SOME CLEARANCE BETWEEN UPPER SURFACE OF ARMATURE EXTENSION AND LOWER SURFACE OF SPACING LOCK LEVER WHEN LOCK LEVER IS HELD DOWNWARD.
MIN. 0.003 INCH
MAX. 0.003 INCH

TO ADJUST
POSITION UPPER END OF MAGNET BRACKET. TIGHTEN TWO MAGNET BRACKET MOUNTING SCREWS. RECHECK REQUIREMENT (1).

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REQUIREMENTS
AND
ADJUSTMENTS

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2.04 Selector Magnet and Selector Clutch Mechanism

- **SELECTOR ARMATURE SPRING REQUIREMENT**
- MARKING LOCK LEVER, SPACING LOCK LEVER, AND START LEVER ON HIGH PART OF THEIR CAMS. SCALE APPLIED AS NEARLY VERTICAL AS POSSIBLE END OF ARMATURE EXTENSION APPROX. 3 OZS.
- TO PULL ARMATURE TO MARKING POSITION, IT MAY BE NECESSARY TO READJUST THIS SPRING TENSION WHEN MAKING DISTORTION TOLERANCE TESTS OF THE UNIT.
- TO ADJUST POSITION ADJUSTING NUT.

- **START LEVER**
- **MARKING LOCK LEVER**
- **SPACING LOCK LEVER**
- **MARKING LOCK LEVER SPRING**

**LETTERS COMBINATION SELECTED, MAIN START ROTATED UNTIL SELECTOR CLUTCH IS DISENGAGED, PUSH SCALE APPLIED TO LOWER EXTENSION OF LOCK LEVER MIN. 1+ 2 OZS, MAX. 3 OZS, TO START LEVER MOVING.**
2.05 Selector Clutch Mechanism

**Selector Push Lever Spring Requirement**
- Push lever in spacing position.
  - MIN. 3/4 OZ.
  - MAX. 1-1/2 OZS.
- To move push lever from selector lever, check five springs.

**Selector Lever Spring Requirement**
- Typing unit upside down.
- Reset bail on peak of its cam.
  - MIN. 1-1/4 OZS.
  - MAX. 2-1/2 OZS.
- To start each lever moving.
- Check five springs. If necessary, unhook start lever spring to check No. 4 selector lever spring.

**Selector Clutch Drum Requirement**
- Clutch latched in stop position. Clutch drum against shoulder on main shaft. Cam-clutch assembly shall have some end play.
  - MAX. 0.010 INCH
- To adjust position clutch drum with mounting screw loosened.

**Typing Unit Requirements and Adjustments**

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2.06 Selector Clutch Mechanism

- **PUSH LEVER RESET BAIL**
  - **SPRING**
  - **SPACING LOCK LEVER**
  - **LATCH LEVER**
  - **SELECTOR CLUTCH LATCH LEVER SPRING**
  - **SPACING LOCK LEVER SPRING**
  - **LATCH LEVER SPRING**

**REQUIREMENT**

- **PUSH LEVER RESET BAIL SPRING**
  - **MIN. 4 OZS.**
  - **MAX. 8 OZS.**
  - **TO MOVE BAIL FROM CAM.**

- **SPACING LOCK LEVER SPRING**
  - **MIN. 0 OZS.**
  - **MAX. 6 OZS.**
  - **TO MOVE SPACING LOCK LEVER FROM ITS PIVOT SHAFT.**

- **LATCH RESTING ON LOW PART OF ITS CAM DISK.**
  - **MIN. 0 OZS.**
  - **MAX. 3-1/2 OZS.**
  - **TO START LATCH MOVING.**

**SELECTOR ARMATURE RELEASED. SPACING LOCK LEVER ON LOW PART OF ITS CAM. SPRING SCALE APPLIED TO LOWER END OF SPACING LOCK LEVER.**
  - **MIN. 3 OZS.**
  - **MAX. 6 OZS.**
  - **TO MOVE SPACING LOCK LEVER FROM ITS PIVOT SHAFT.**
2.07 Range Finder Mechanism (Later Design)

NOTE: REPLACE RANGE FINDER AND SELECTOR MAGNET ASSEMBLY.

RANGE FINDER KNOB PHASING REQUIREMENT
WITH RANGE FINDER KNOB TURNED TO EITHER END OF RACK, ZERO MARK ON SCALE SHALL BE WITHIN 3 POINTS OF Scribed LINE ON RANGE FINDER PLATE.

TO ADJUST
REMOVE MOUNTING NUT, DISENGAGE KNOB FROM RACK AND POSITION KNOB. RE-ENGAGE KNOB WITH RACK AND REPLACE MOUNTING NUT.

RANGE FINDER KNOB PHASING
WITH RANGE FINDER KNOB TURNED TO EITHER END OF RACK, ZERO MARK ON SCALE SHALL BE WITHIN 3 POINTS OF SCRIBED LINE ON RANGE FINDER PLATE.

TO ADJUST
REMOVE MOUNTING NUT, DISENGAGE KNOB FROM RACK AND POSITION KNOB. RE-ENGAGE KNOB WITH RACK AND REPLACE MOUNTING NUT.

SELECTOR CLUTCH STOP ARM REQUIREMENT
RANGE SCALE SET AT 60. SELECTOR CLUTCH DISENGAGED. ARMATURE IN MARKING POSITION. CLUTCH STOP ARM SHALL ENGAGE CLUTCH SHOE LEVER BY APPROXIMATELY FULL THICKNESS OF SHOE LEVER.

TO ADJUST
POSITION STOP ARM ON STOP ARM BAIL WITH CLAMP SCREW LOOSENED.

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2.08 Range Finder Mechanism (Earlier Design)

(A) RANGE FINDER KNOB PHASING

REQUIREMENT

WITH RANGE FINDER KNOB TURNED TO EITHER END OF RACK, ZERO MARK ON SCALE SHALL BE IN LINE WITH SCRIBED LINE ON RANGE FINDER PLATE + 3 POINTS.

TO PHASE

REMOVE PLATE AND POSITION KNOB WITH MOUNTING NUT LOOSENED.

(B) SELECTOR CLUTCH STOP ARM

REQUIREMENT

RANGE SCALE SET AT 60, SELECTOR CLUTCH DISENGAGED, ARMATURE IN MARKING POSITION. CLUTCH STOP ARM SHALL ENGAGE CLUTCH SHOE LEVER BY APPROXIMATELY FULL THICKNESS OF SHOE LEVER.

TO ADJUST

POSITION STOP ARM ON STOP ARM BAIL WITH CLAMP SCREW LOOSENED.
NOTE: BAIL LEVER GUIDE ADJUSTMENT APPLIES ONLY TO UNITS EQUIPPED WITH ADJUSTABLE GUIDES.

SELECTOR MAGNET

MOUNTING NUT

RANGE FINDER PLATE

STOP ARM BAIL

START LEVER (EXTENSION)

START LEVER

START LEVER SPRING

SELECTOR CLUTCH MECHANISM

START LEVER SPRING

LATCH LEVER SPRING UNHOOKED. STOP ARM BAIL IN INDENT OF ITS CAM RANGE SCALE SET AT 60.

MIN. 2-1/2 OZS.

MAX. 4-1/2 OZS.

TO START THE STOP ARM MOVING.

BAIL LEVER GUIDE

REQUIREMENT

SOME CLEARANCE BETWEEN EACH SIDE OF GUIDE FORK AND EXTENSION OF START LEVER THROUGHOUT ITS TRAVEL.

TO ADJUST POSITION BAIL LEVER GUIDE WITH MOUNTING NUT LOOSENED.

2.09 SELECTOR CLUTCH MECHANISM

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2.10 Codebar Shift Mechanism

**Common Transfer Lever Spring Tension Requirement**
- **Transfer Lever in Spacing Position**: Scale applied near upper end of common transfer lever.
  - **Min.**: 1/2 oz.
  - **Max.**: 1-1/4 oz.
  - To start lever moving.

**Transfer Lever Outer Step**
- **Transfer Lever Inner Step**

**Transfer Lever Eccentric Requirement**
- **Push Levers Positioned for E or LF or Letters, Selector Clutch Disengaged, Code Bar Shift Lever Link in Uppermost Position**, clearance between rear code bar shift lever and code bar shift bar farthest from rear code bar shift lever.
  - **Min.**: 0.010 inch
  - **Max.**: 0.025 inch

**Note**: To start intermediate arm moving.
- **Max. 2-1/2 ozs.**

**Common Transfer Lever Spring Requirement**
- **Transfer Lever Held in Spacing Position**.
  - **Min.**: 1-1/2 oz.
  - **Max.**: 2-1/2 ozs.
  - To start intermediate arm moving.

---

**Diagram Description**
- Diagram showing the components of the codebar shift mechanism including the rear code bar shift lever, transfer lever, eccentric bushing, transfer lever eccentric requirement, and common transfer lever spring requirement.

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**Selector Lever**
- **(Right Side View)**

**Push Lever (Selected)**
- **Intermediate Arm**
2.11 Codebar Shift Mechanism

**INTERMEDIATE ARM BACKSTOP BRACKET REQUIREMENT**

- Push levers not selected, all code bar shift bars to the right.
- Selector clutch disengaged, code bar shift lever link in lowermost position.
- Clearance between front code bar shift lever and inner step of code bar shift bar farthest from front code bar shift lever.
- Min. 0.010 inch
- Max. 0.025 inch
- When play in parts is taken up for maximum clearance.

To adjust position backstop bracket with its two clamp screws loosened.

**CODE BAR SHIFT LEVER LINK BRACKET**

**SELECTOR CAM LUBRICATOR REQUIREMENT**

- The lubricator tube shall clear the high part of the lock lever cam.
- Min. 0.020 inch
- The high part of the selector lever cams shall touch the lubricator wick, but shall not raise it more than 1/32 inch.

To adjust position the lubricator bracket with its mounting screws loosened.

**NOTE:** There shall be some clearance between the marking lock lever spring and the lubricator reservoir.

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2.12 Codebar Shift Mechanism (Later Design)

TRANSFER LEVERS

CODE BAR SHIFT LEVER

ROLLER

CODE BAR SHIFT LEVER DRIVE ARM

REQUIREMENT

CODE BAR SHIFT LEVER LINK IN THE UPPERMOST POSITION. THERE SHALL BE SOME CLEARANCE BETWEEN THE TOP OF THE ROLLERS AND THE TOP OF THE CAM SLOTS IN THE CODE BAR SHIFT LEVERS. MAX. 0.025 INCH ON THE CLOSEST LEVER.

TO ADJUST LOOSEN THE CLAMP SCREW. POSITION THE CODE BAR SHIFT LEVER DRIVE ARM ON ITS SHAFT TO MEET THE REQUIREMENT AND TO PROVIDE SOME END PLAY, NOT MORE THAN 0.006 INCH.
2.13 Codebar Shift Mechanism (Earlier Design)

**Codebar Shift Lever Drive Arm**

**Requirement**
- Codebar shift lever link in the uppermost position.
- There shall be some clearance between the top of the rollers and the top of the cam slots in the code bar shift levers.
- Max. 0.025 inch on the closest lever.

To adjust:
- Loosen the clamp screw.
- Position the code bar shift lever drive arm on its shaft to meet the requirement and to provide some end play, not more than 0.006 inch.
2.14 Codebar Shift Mechanism (Later Design)

**CODE BAR SHIFT LEVER LINK BRACKET**

**REQUIREMENT**
MOTION OF FRONT AND REAR CODE BAR SHIFT LEVERS SHALL BE EQUALIZED WITH RESPECT TO CODE BAR TRAVEL.

**TO CHECK (FRONT)**
SELECT BLANK COMBINATION AND ROTATE MAINSHAFT UNTIL CODE BAR SHIFT LEVER LINK REACHES HIGHEST TRAVEL. TAKE UP PLAY FOR MAXIMUM CLEARANCE. CLEARANCE BETWEEN FRONT CODE BAR SHIFT LEVER AND SHOULDER ON NEAREST CODE BAR SHIFT BAR.
MIN. 0.002 INCH
MAX. 0.025 INCH

**TO CHECK (REAR)**
SELECT LETTERS COMBINATION. CHECK CLEARANCE BETWEEN REAR CODE BAR SHIFT LEVER AND SHOULDER ON NEAREST CODE BAR SHIFT BAR IN SAME WAY.
MIN. 0.002 INCH
MAX. 0.025 INCH

**TO ADJUST**
POSITION ADJUSTING PLATES (FRONT AND REAR) WITH CLAMP SCREWS LOOSENED.

---

![Diagram of Codebar Shift Mechanism](image-url)
2.15 Codebar Shift Mechanism (Earlier Design)

- Codebar shift mechanism
- Code Bar Shift Bar (Marking)
- Code Bar Shift Bar (Spacing)
- Transfer Levers
- Code Bar Shift Lever Link
- Guide Bracket

**Requirement**
Motion of front and rear code bar shift levers shall be equalized with respect to code bar travel.

**To Check (Front)**
Select blank combination and rotate main shaft until code bar shift lever link reaches highest travel. Take up play for maximum clearance. Clearance between front code bar shift lever and shoulder on nearest code bar shift bar.

- Min. 0.002 inch
- Max. 0.025 inch

**To Check (Rear)**
Select letters combination, check clearance between rear code bar shift lever and shoulder on nearest code bar shift bar in same way.

- Min. 0.002 inch
- Max. 0.025 inch

**To Adjust**
Position code bar shift lever link guide bracket by means of mounting screws (3).
2.16 Clutch Mechanism and Codebar Clutch Tripshaft Mechanism

To adjust position Codebar Clutch Trip lever on its shaft with clamp screw loosened, making sure Trip shaft has min. some, max. 0.006 inch end play.

Trip shaft lever spring tension requirement:
- Trip shaft lever on low part of cam, Codebar clutch engaged.
- Rotate 1/4 turn.
- Min. 2 ozs.
- Max. 0 ozs.
- To start lever moving.

Codebar Clutch Trip lever requirement (not illustrated):
- Selector clutch and Codebar Clutch disengaged, Trip the Codebar Clutch Trip lever by operating Trip shaft lever.
- Slowly rotate main shaft until Clutch shoe lever is aligned with stop lug of Codebar Clutch Trip lever. Take up Clutch shoe lever play inward by snapping the end of Trip shaft lever.
- Measure and record clearance between Clutch drum and shoe lever. Slowly rotate main shaft until stop lug of Codebar Clutch Trip lever falls off stop lug of Clutch cam disk. Clearance between Codebar Clutch Trip lever and Clutch drum shall be min. 0.015 inch max. 0.035 inch less than clearance between Clutch drum and shoe lever.

To adjust position Codebar Clutch Trip lever with clamp screw loosened, making sure Trip shaft has min. some, max. 0.006 inch end play.
2.17 Function Clutch Mechanism

CLAMP SCREW

FUNCTION CLUTCH

CLUTCH SHOE LEVER

CAM FOLLower ARM

ROLLER

CLUTCH TRIP LEVER

FUNCTION CLUTCH TRIP LEVER

REQUIREMENT

CODE BAR CLUTCH AND FUNCTION CLUTCH DISENGAGED. FUNCTION CLUTCH TRIP LEVER SHALL ENGAGE CLUTCH SHOE LEVER BY FULL THICKNESS OF SHOE LEVER. (CHECK AT LUG WITH LEAST BITE ON TWO STOP CLUTCHES).

TO ADJUST POSITION TRIP LEVER ON ITS SHAFT WITH CLAMP SCREW LOOSENED, LETTING SHAFT HAVE END PLAY

MIN. SOME

MAX. 0.006 INCH

CODE BAR CLUTCH CAM

CODE BAR CLUTCH CAM FOLLower SPRING

TENSION

REQUIREMENT

CAM FOLLOWER ROLLER ON THE LOW

PART OF CAM

THE SPRING UNHOOKED FROM SPRING BRACKET.

MIN. 20 OZS.

MAX. 24 OZS.

TO PULL SPRING TO INSTALLED LENGTH.
(A) Clutch Trip Shaft Set Collar

(1) Requirement

Spacing cut-out lever shall have side play
Min. Some
Max. 0.008 inch

To adjust

Position spacing cut-out lever set collar

---

(B) Anti-Deflection Plate

For units so equipped

With typing unit upside down and function, spacing, line feed, and type box clutches disengaged and latched

Min. 1 lb., Max. 3 lbs.

To pull trip shaft away from anti-deflection plate

To adjust

Position plate with mounting screws loosened

---

(2) Requirement

Approximate alignment of right end of stop extensions on trip lever and shoe lever

To adjust

Position line feed clutch lever set collar

(3) Requirement

Line feed clutch latch lever shall have side play

Min. Some
Max. 0.008 inch

To adjust

Position line feed clutch latch lever set collar

---

(Left side view, upside down)
2.19 Tripshaft Mechanism (Earlier Design)

(A) CLUTCH TRIP SHAFT SET COLLARS

(1) REQUIREMENT

<table>
<thead>
<tr>
<th>Requirement</th>
</tr>
</thead>
<tbody>
<tr>
<td>SPACING CLUTCH LATCH LEVER SHALL HAVE SIDE PLAY</td>
</tr>
<tr>
<td>MIN. SOME</td>
</tr>
<tr>
<td>MAX. 0.008 INCH</td>
</tr>
<tr>
<td>TO ADJUST</td>
</tr>
<tr>
<td>POSITION SPACING CLUTCH LATCH LEVER SET COLLAR.</td>
</tr>
</tbody>
</table>

(2) REQUIREMENT

<table>
<thead>
<tr>
<th>Requirement</th>
</tr>
</thead>
<tbody>
<tr>
<td>APPROXIMATE ALIGNMENT OF RIGHT END OF STOP EXTENSIONS ON TRIP LEVER AND SHOE LEVER.</td>
</tr>
<tr>
<td>TO ADJUST</td>
</tr>
<tr>
<td>POSITION LINE FEED CLUTCH TRIP LEVER SET COLLAR.</td>
</tr>
</tbody>
</table>

(3) REQUIREMENT

<table>
<thead>
<tr>
<th>Requirement</th>
</tr>
</thead>
<tbody>
<tr>
<td>LINE FEED CLUTCH LATCH LEVER SHALL HAVE SIDE PLAY</td>
</tr>
<tr>
<td>MIN. SOME</td>
</tr>
<tr>
<td>MAX. 0.008 INCH</td>
</tr>
<tr>
<td>TO ADJUST</td>
</tr>
<tr>
<td>POSITION LINE FEED CLUTCH LATCH LEVER SET COLLAR.</td>
</tr>
</tbody>
</table>

NOTE: ANTI-DEFLECTION PLATE ADJUSTMENT APPLIES ONLY TO UNITS. SO EQUIPPED.

(LEFT SIDE VIEW, UPSIDE DOWN)

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28 TYPING UNIT REQUIREMENTS AND ADJUSTMENTS

Page 25
2.20 Spacing Clutch Mechanism (Later Design)

**Spacing Clutch Trip Lever**

**Requirement**

Clearance between trip lever and clutch drum shall be 0.018 to 0.035 inch less than clearance between shoe lever and drum at stop showing greatest clearance. There shall be some overbite on all stop lugs. Gauge by eye.

**To Check**

Disengage the clutch, trip clutch trip lever and rotate main shaft until trip lever is over the shoe lever. Take up play of shoe lever inward by snapping the trip lever over the shoe lever. Check clearance between shoe lever and drum at each stop position. With the trip lever at the stop position which yields greatest clearance, rotate main shaft slowly until the trip lever just falls off the stop lug. Check clearance between trip lever and drum.

**To Adjust**

Position the trip lever by means of its clamp screw.

**Spacing Clutch Trip Lever Spring**

**Requirement**

Clutch engaged and rotated until trip lever rests on stop lug.

<table>
<thead>
<tr>
<th>Clutch</th>
<th>Min.</th>
<th>Max.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Spacing</td>
<td>11 ozs.</td>
<td>14 ozs.</td>
</tr>
<tr>
<td>Line Feed</td>
<td>9 ozs.</td>
<td>12 ozs.</td>
</tr>
<tr>
<td>Type Box</td>
<td>5 ozs.</td>
<td>7 1/4 ozs.</td>
</tr>
</tbody>
</table>

To move lever away from stop lug.
2.21 Spacing Clutch Mechanism (Earlier Design)

SPACING CLUTCH IN STOP POSITION. TRIP THE SPACING CLUTCH TRIP LEVER SLOWLY ROTATE MAIN SHAFT UNTIL STOP LUG OF SPACING CLUTCH TRIP LEVER IS ALIGNED WITH CLUTCH SHOE LEVER. TAKE UP CLUTCH SHOE LEVER PULL INWARD BY SNAPPING THE TRIP LEVER OVER SHOE LEVER. MEASURE AND RECORD CLEARANCE BETWEEN CLUTCH DRUM AND SHOE LEVER. REPEAT FOR EACH OF OTHER TWO STOPS. PLACE SPACING CLUTCH IN STOP POSITION AT SHOE LEVER FARTHEST FROM CLUTCH DRUM. CLEARANCE BETWEEN TRIP LEVER AND CLUTCH DRUM SHALL BE MIN. 0.018 INCH, MAX. 0.035 INCH LESS THAN CLEARANCE BETWEEN DRUM AND SHOE LEVER.

TO ADJUST
ADJUST BY MEANS OF TRIP LEVER CLAMP SCREW (OR ADJUSTING SCREW AND LOCKNUT IN UNITS SO EQUIPPED).

SPACING CLUTCH TRIP LEVER

SPACING CLUTCH TRIP LEVER SPRING TENSION

CLUTCH TRIP LEVER SPRING TENSION

Clutch engaged and rotated until trip lever rests on stop lug.

Clutch min. max.
Spacing 11/32" 16/32"
Line Field 9/32" 12/32"
Type Box 5/32", 7-1/4/32"
To move lever away from stop lug.

28 TYPING UNIT
REQUIREMENTS AND
ADJUSTMENTS

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2.22 Typebox Clutch and Line-feed Clutch Mechanisms

(A) Typebox Clutch Trip Lever Eccentric Post Requirement
Typebox Clutch disengaged. Trip lever shall engage the clutch shoe lever by the full thickness of the shoe lever to adjust position the trip lever eccentric post.

(B) Line Feed Clutch Trip Lever Adjusting Screw Requirement
Line feed function slide arm in rear position. Clutch trip lever against its eccentric post. Trip arm held against its function slide arm. Some clearance between the end of the trip lever adjusting screw and the trip arm. Max. 0.006 inch to adjust position the adjusting screw.

(C) Line Feed Clutch Trip Lever Eccentric Post Requirement
Clearance between trip lever and clutch drum shall be 0.018 to 0.035 inch less than clearance between shoe lever and drum at stop which shows greatest clearance. There shall be some overbite on all three stop lugs as gauged by eye. To check: disengage the clutch. Trip clutch trip lever and rotate main shaft until trip lever is over the shoe lever. Take up play of shoe lever inward by snapping the trip lever over the shoe lever. Check clearance between shoe lever and drum at each stop position. With the trip lever at the stop position which yields greatest clearance, rotate main shaft slowly until the trip lever just falls off the stop lug. Check clearance between trip lever and drum.

To adjust back off trip lever adjusting screw and position trip lever eccentric stop post.
2.23 Typebox Clutch Mechanism

![Typebox Clutch Mechanism Diagram]

**TYPEBOX CLUTCH TRIP LEVER**

1. **REQUIREMENT**
   - Clutch trip shaft cam follower roller on lowest surface of cam (located on code bar clutch). Clearance between inner face of typebox clutch trip lever and the clutch disk stop lug.
   - **STANDARD** with stuntbox:
     - **MIN:** 0.045
     - **MAX:** 0.060

   To adjust:
   - Loosen clamp screw and position stop.

2. **REQUIREMENT**
   - When positioning the trip arm determine that the latch lever has some side play.
   - **MAX:** 0.008 inch

   To adjust:
   - Position the clutch trip arm on its shaft with the clamp screw loosened.

---

28 Typing Unit Requirements

P34.612 Adjustments

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2.24 Typebox Clutch Mechanism (Selective Calling)

**Typebox Clutch Trip Lever**
(Selective - Calling units with or without Off-Line Shift Solenoid)

Use standard adjustments.

**Print suppressor code bar spring requirement**
Suppressor code bar to left.
Min. 4-1/2 OZS. --- Max. 7-1/2 OZS.
To start code bar moving, code bar should be free of binds.
2.25 Clutch Shoe Mechanism (All Clutches)

TO ADJUST CLUTCH SHOE LEVER

REQUIREMENT

GAP BETWEEN CLUTCH SHOE LEVER AND ITS STOP LUG SHALL BE 0.055 INCH TO 0.085 INCH GREATER WHEN CLUTCH IS ENGAGED THAN WHEN THE CLUTCH IS DISENGAGED.

To check


Note

ON MULTIPLE STOP CLUTCHES CHECK THE CLEARANCE AT THE STOP LUG THAT IS ADJACENT TO THE NOTCH IN THE CLUTCH ADJUSTING DISK.

LOosen THE TWO CLAMP SCREWS ON THE CLUTCH DISK. ENGAGE A WRENCH OR SCREWDRIVER ON THE LUG OF THE ADJUSTING DISK AND ROTATE THE DISK.
2.26  Clutch Mechanism (Left View)

**CLUTCH SHOE LEVER SPRING TENSIONS**

**REQUIREMENT**
- **MIN. 15 OZS.** ONE-STOP CLUTCHES
- **MAX. 20 OZS.**

**MIN. 16 OZS.** MULTIPLE-STOP CLUTCHES
- **MAX. 22 OZS.**

TO MOVE THE SHOE LEVER IN CONTACT WITH THE STOP LUG.

**CLUTCH DRUM POSITION (EXCEPT SELECTOR)**

**REQUIREMENT**
- CLUTCH SHOE LEVER HELD DISENGAGED. CLUTCH SHALL HAVE SOME END PLAY
  - **MAX. 0.015 INCH**

TO ADJUST,

POSITION EACH DRUM AND SPACING CLUTCH SET COLLAR WITH MOUNTING SCREWS LOOSENED.

**CLUTCH SHOE SPRING TENSION**

**NOTE**

IN ORDER TO CHECK THIS SPRING TENSION, IT IS NECESSARY TO REMOVE THE CLUTCH FROM THE MAIN SHAFT. THEREFORE, IT SHALL NOT BE CHECKED UNLESS THERE IS GOOD REASON TO BELIEVE THAT IT DOES NOT MEET ITS REQUIREMENT.

**REQUIREMENT**
- CLUTCH DRUM REMOVED. SPRING SCALE APPLIED TO PRIMARY SHOE AT A TANGENT TO THE FRICTION SURFACE
  - **MIN. 3 OZS.**
  - **MAX. 5 OZS.**

TO START THE PRIMARY SHOE MOVING AWAY FROM SECONDARY SHOE AT POINT OF CONTACT.
2.27 Spacing Mechanism

(b) Spacing Gear Phasing Requirement

Spacing Clutch Disengaged. Index line on the spacing pawl shall be as near as possible to the center of the two lines on the pawl retaining washer.

To adjust, remove the mounting screw from the spacing shaft gear. Hold the pawls in alignment and engage the spacing shaft gear with the clutch gear at a point where the spacing shaft gear mounting screw hole is in line with the tapped hole in the spacing shaft and insert the mounting screw.

28 Typing Unit Requirements and Adjustments

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2.28 Line-feed and Rocker Shaft Mechanisms

LINE FEED CLUTCH PHASING

**REQUIREMENT**
- LINE FEED CLUTCH (ENGAGED)
- BOTH LINE FEED BARS SHALL ENGAGE TEETH OF LINE FEED SPUR GEAR
- TO ADJUST
  - LOOSEN ASSEMBLY BEARING POST MOUNTING SCREWS.
  - MESH LINE FEED ECCENTRIC SPUR GEAR WITH CLUTCH GEAR.

**LINE FEED BARS ENGAGED**

**LINE FEED SPUR GEAR**

**INNER BEARING RACE**

**MOUNTING SCREWS**

**ROCKER SHAFT LEFT BRACKET**

**ASSEMBLY BEARING POST**

**LEFT SIDE FRAME**

**ECCENTRIC BEARING**

**ROCKER SHAFT LEFT BRACKET**

**REQUIREMENT**
- ROCKER SHAFT LEFT BRACKET FIRMLY SEATED AGAINST INNER BEARING RACE.
- TO ADJUST
  - HOLD ROCKER SHAFT IN EXTREME LEFT POSITION AND POSITION THE BRACKET AGAINST THE INNER BEARING RACE. MOUNT SCREW AS LOOSENED.
2.29 Typebox Shift and Positioning Mechanisms

ROCKER SHAFT BRACKET ECCENTRIC STUD

**REQUIREMENT**

TYPE BOX CLUTCH DISENGAGED. PLAY IN LOCKING ARM TAKEN TOWARDS FRONT. GAP BETWEEN LOWER SIDE OF LOCK LEVER ROLLER AND TOP EDGE OF SHOULDER ON HORIZONTAL POSITIONING LOCK LEVER:

MIN: 0.055 INCH

MAX: 0.090 INCH

**TO ADJUST**

POSITION ECCENTRIC STUD IN LOWER END OF ROCKER SHAFT LEFT BRACKET. KEEP HIGH PART OF ECCENTRIC (MARKED WITH DOT) BELOW CENTER LINE OF DRIVE LINK.

ANY CHANGE IN THIS ADJUSTMENT WILL REQUIRE A RECHECKING OF THE FOLLOWING ADJUSTMENTS: HORIZONTAL POSITIONING DRIVE LINKAGE, RIGHT VERTICAL POSITIONING LEVER ECCENTRIC STUD, LEFT VERTICAL POSITIONING LEVER ECCENTRIC STUD, VERTICAL POSITIONING LOCK LEVER, RIBBON FEED LEVER STOP BRACKET, FUNCTION STRIPPER BLADE ARMS, SPACING TRIP LEVER BAIL CAM PLATE, PRINTING TRACK, PRINTING ARM, REVERSING SLIDE BRACKETS, AND RIBBON REVERSING MECHANISM.

**BREAKER SLIDE BAIL SPRING**

**REQUIREMENT**

BREAKER LEVER IN LOWER POSITION.

MIN: 1/2 OZ.

MAX: 1 3/4 OZ.

TO START BAIL MOVING.
2.30 Vertical Positioning Mechanism (Right View)

(A) RIGHT VERTICAL POSITIONING LEVER

ECCENTRIC STUD

REQUIREMENT

TYPE BOX CLUTCH DISENGAGED, COMMON CODE BAR IN SPACING POSITION. PLAY TAKEN UP BY PRESSING DOWNWARD ON COMMON CODE BAR AT GUIDE BLOCK.

MIN. 0.030 INCH
MAX. 0.050 INCH

CLEARANCE BETWEEN THE TOE OF VERTICAL POSITIONING LEVER AND THE BOTTOM OF THE COMMON CODE BAR WHEN PLAY IS TAKEN UP TO MAKE CLEARANCE A MINIMUM.

TO ADJUST

POSITION THE ECCENTRIC STUD IN THE RIGHT ROCKER SHAFT BRACKET. POSITION HIGH PART OF ECCENTRIC (MARKED WITH DOT) TOWARD THE REAR.

...
2.31 **Vertical Positioning Mechanism (Left View)**

**VERTICAL POSITIONING LOCK LEVER**

**SPRING TENSION REQUIREMENT**
- TYPE BOX CLUTCH DISENGAGED,
  - MIN. 2 OZS
  - MAX. 4 OZS
- TO START LOCK LEVER MOVING,
  - CHECK RIGHT AND LEFT SPRINGS.

**LEFT VERTICAL POSITIONING LOCK LEVER**

**COMMON CODE BAR**

**VERTICAL POSITIONING LEVER TOE**

**LEFT VERTICAL POSITIONING LEVER**

**LEFT VERTICAL POSITIONING LEVER TOE**

**COMMON_CODE BAR**

**LEFT VERTICAL POSITIONING LEVER TOE**

**RIGHT AND LEFT VERTICAL POSITIONING LEVERS SHALL BUCKLE EQUALLY WITHIN 0.006 INCH.**

**TO CHECK**
- COMMON_CODE BAR IN SPACING POSITION.
- TRIP TYPE BOX CLUTCH.
- ROTATE MAIN SHAFT UNTIL RIGHT VERTICAL POSITIONING LEVER TOE TOUCHES COMMON_CODE_BAR,
  - BUCKLING ITS LOWER LINK 0.008 INCH (MAXIMUM).
- LEFT VERTICAL POSITIONING LEVER TOE SHALL TOUCH COMMON_CODE_BAR,
  - BUCKLING ITS LOWER LINK EQUALLY WITHIN 0.006 INCH.

**TO ADJUST**
- POSITION ECCENTRIC STUD ON ROCKER SHAFT LEFT BRACKET INNER ARM.
  - POSITION HIGH PART OF CAM (MARKED WITH DOT) TOWARD REAR.

---

**28 TYPING UNIT REQUIREMENTS AND ADJUSTMENTS**

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2.32 **Spacing Mechanism (Later Design)**

**Note:** If the following adjustments are remade, check the related adjustments in 2.50, 2.52, and 2.59.
2.33 **Spacing Mechanism (Earlier Design)**

**Note:** If the following adjustments are remade, check the related adjustments in 2.51, 2.53, and 2.59.

![Diagram of Spacing Mechanism](image)

**OSCILLATING RAIL SLIDE**

**OSCILLATING RAIL SLIDE POSITION**

**WIRE ROPE CLAMP SCREW**

**WIRE ROPE**

**PULLEY**

**AUTOMATIC CARRIAGE RETURN ARM**

**SPACING PAWL**

**RATCHET WHEEL**

**SPACING CUTOUT LEVER**

**SPACING FEED PAWL SPRING TENSION**

**NOTE:**

On units equipped for 6 spaces per inch, this tension shall be MIN. 8 OZS.
MAX. 10 OZS.

To pull springs to installed length.
2.34 Spacing Unit

(A) Spacing Trip Lever Bail Cam Plate Requirement
Spacing Trip Lever Arm in upward position. Type Box Clutch rotated through approximately one-half of its cycle. All function pawls disengaged from function bar. Clearance between top surface of Trip Lever Arm extension and Spacing Trip Lever Shoulder
Min. 0.010 inch
Max. 0.040 inch
To adjust position Cam Plate on Rocker Shaft with Mounting Screws loosened. Position forward edge of Cam Plate parallel to shaft.

(B) Spacing Trip Lever Spring Requirement
Type Box Clutch disengaged.
Min. 2.0 ozs
Max. 5 ozs
To start Lever moving.

(C) Spacing Trip Lever Bail Spring Tension Requirement
Spacing Trip Lever Bail against stop. Spacing Trip Lever Bail Spring unhooked.
Min. 8 ozs
Max. 12 ozs
To pull spring to installed length.
2.35 Function-bar Reset Bail Mechanism (Later Design)

(0) FUNCTION RESET BAIL SPRING TENSION
WITH TYPING UNIT UPSIDE DOWN, HOLD 1 CODE BAR IN ITS MOUNTING POSITION SO THAT NO FUNCTION BAR IS SELECTED. ROTATE THE MAIN SHAFT UNTIL THE FUNCTION RESET BAIL SPRINGS ARE IN THEIR MINIMUM LENGTH POSITION, PLACE PULL ROD OF 32 OUNCE SCALE BETWEEN CLUTCH TRIP SHAFT AND SPACE SUPPRESSION BAIL, HOOK SCALE ON FRONT EDGE OF RESET BAIL (AT MIDDLE OF BAIL) AND PULL TOWARD REAR. MIN. 10 OZS. MAX. 22 OZS.

TO START BAIL MOVING, PLACE PULL ROD OF 32 OUNCE SCALE BETWEEN CLUTCH TRIP SHAFT AND SPACE SUPPRESSION BAIL, HOOK SCALE ON FRONT EDGE OF RESET BAIL (AT MIDDLE OF BAIL) AND PULL TOWARD REAR. MIN. 10 OZS. MAX. 22 OZS.

(A) FUNCTION RESET BAIL BLADE

(1) REQUIREMENT
FUNCTION AND TYPE BOX CLUTCHES DISENGAGED; FUNCTION PAWLS UNLATCHED; FUNCTION BAR HELD IN MAXIMUM REARWARD POSITION, CLEARANCE BETWEEN FUNCTION BAR AND RESET BAIL BLADE:
MIN. 0.018 INCH MAX. 0.035 INCH

TO CHECK:
MEASURE CLEARANCE AT BARS LOCATED IN STUNT BOX SLOTS 1, 4, 11, 18, 23, 32, 38 AND 41. IF THERE IS NO BAR IN A DESIGNATED SLOT, USE NEAREST BAR. IF THERE IS A BAR ON EACH SIDE OF A DESIGNATED VACANT SLOT, USE BAR IN HIGHEST NUMBERED SLOT. (NOTE: FACING REAR OF UNIT, SLOTS ARE NUMBERED FROM LEFT TO RIGHT).

TO ADJUST:
POSITION BLADE ON RESET BAIL WITH ITS MOUNTING SCREWS FRICTION TIGHT.

(2) REQUIREMENT
FUNCTION PAWL SHALL OVER TRAVEL FUNCTION BAR BY A MIN. OF 0.002 INCH

TO CHECK:
IF CARRIAGE RETURN LEVER ADJUSTMENT HAS NOT BEEN MADE, ITS CLAMP SCREW SHALL BE LOOSENED, POSITION FUNCTION CLUTCH SO THAT LUG ON CLUTCH DISK IS TOWARD BOTTOM OF UNIT, STRIP OFF ANY SELECTED FUNCTION PAWLS, HOLD FUNCTION LEVER IN MAXIMUM REARWARD POSITION (DO NOT PUT OVER 2.15S. OF TENSION ON LEVER) AND HOLD FUNCTION PAWL TO REAR WITH A TENSION OF 32 OZS. (AS LOAD ON RESET BAIL AFFECTS OVER TRAVEL, DO NOT LATCH MORE THAN ONE PAWL AT A TIME). MEASURE CLEARANCE. REPEAT FOR EACH FUNCTION PAWL ON STUNT BOX.

TO ADJUST:
IF NECESSARY, REFINE REQUIREMENT (1) WITHIN THE FOLLOWING LIMITS:
MIN. 0.018 INCH MAX. 0.035 INCH

28 TYPING UNIT REQUIREMENTS AND ADJUSTMENTS

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2.36 Function-bar Reset Bail Mechanism (Earlier Design)

THIS ADJUSTMENT APPLIES ONLY TO UNITS WITH TWO-STOP FUNCTION CLUTCHES.

FUNCTION BAR IN MAXIMUM REARWARD POSITION. CLEARANCE BETWEEN FUNCTION BAR AND RESET BAIL BLADE

MIN. 0.018 INCH MAX. 0.035 INCH

TO CHECK

MEASURE CLEARANCE AT BARS LOCATED IN STUNT BOX SLOTS: 1, 4, 11, 18, 23, 33, 38, AND 41. IF THERE IS NO BAR IN A DESIGNATED SLOT, USE NEAREST BAR. IF THERE IS A BAR ON EACH SIDE OF A DESIGNATED VACANT SLOT, USE BAR IN HIGHEST NUMBERED SLOT. (NOTE: FACING REAR OF UNIT, SLOTS ARE NUMBERED FROM LEFT TO RIGHT)

TO ADJUST

POSITION BLADE ON RESET BAIL WITH BLADE MOUNTING SCREWS FRICTION TIGHT.

FUNCTION CLUTCH DISENGAGED AT STOP POSITION GIVING LEAST CLEARANCE. TYPE BOX CLUTCH DISENGAGED. ALL FUNCTION PAWLS UNLATCHED FROM THEIR FUNCTION BARS. TO ADJUST

FUNCTION CLUTCH DISENGAGED AT STOP POSITION GIVING LEAST CLEARANCE. TYPE BOX CLUTCH DISENGAGED. ALL FUNCTION PAWLS UNLATCHED FROM THEIR FUNCTION BARS.

FUNCTION BAR HELD IN MAXIMUM REARWARD POSITION. CLEARANCE BETWEEN FUNCTION BAR AND RESET BAIL BLADE

MIN. 0.018 INCH MAX. 0.035 INCH

TO CHECK

MEASURE CLEARANCE AT BARS LOCATED IN STUNT BOX SLOTS: 1, 4, 11, 18, 23, 33, 38, AND 41. IF THERE IS NO BAR IN A DESIGNATED SLOT, USE NEAREST BAR. IF THERE IS A BAR ON EACH SIDE OF A DESIGNATED VACANT SLOT, USE BAR IN HIGHEST NUMBERED SLOT. (NOTE: FACING REAR OF UNIT, SLOTS ARE NUMBERED FROM LEFT TO RIGHT)

TO ADJUST

POSITION BLADE ON RESET BAIL WITH BLADE MOUNTING SCREWS FRICTION TIGHT.

FUNCTION BAR IN MAXIMUM REARWARD POSITION. CLEARANCE BETWEEN FUNCTION BAR AND RESET BAIL BLADE

MIN. 0.018 INCH MAX. 0.035 INCH

TO CHECK

MEASURE CLEARANCE AT BARS LOCATED IN STUNT BOX SLOTS: 1, 4, 11, 18, 23, 33, 38, AND 41. IF THERE IS NO BAR IN A DESIGNATED SLOT, USE NEAREST BAR. IF THERE IS A BAR ON EACH SIDE OF A DESIGNATED VACANT SLOT, USE BAR IN HIGHEST NUMBERED SLOT. (NOTE: FACING REAR OF UNIT, SLOTS ARE NUMBERED FROM LEFT TO RIGHT)

TO ADJUST

POSITION BLADE ON RESET BAIL WITH BLADE MOUNTING SCREWS FRICTION TIGHT.

FUNCTION CLUTCH DISENGAGED AT STOP POSITION GIVING LEAST CLEARANCE. TYPE BOX CLUTCH DISENGAGED. ALL FUNCTION PAWLS UNLATCHED FROM THEIR FUNCTION BARS.

FUNCTION BAR HELD IN MAXIMUM REARWARD POSITION. CLEARANCE BETWEEN FUNCTION BAR AND RESET BAIL BLADE

MIN. 0.018 INCH MAX. 0.035 INCH

TO CHECK

MEASURE CLEARANCE AT BARS LOCATED IN STUNT BOX SLOTS: 1, 4, 11, 18, 23, 33, 38, AND 41. IF THERE IS NO BAR IN A DESIGNATED SLOT, USE NEAREST BAR. IF THERE IS A BAR ON EACH SIDE OF A DESIGNATED VACANT SLOT, USE BAR IN HIGHEST NUMBERED SLOT. (NOTE: FACING REAR OF UNIT, SLOTS ARE NUMBERED FROM LEFT TO RIGHT)

TO ADJUST

POSITION BLADE ON RESET BAIL WITH BLADE MOUNTING SCREWS FRICTION TIGHT.
2.37 FIGS-LTRS Shift Mechanism (Later Design)

NOTE 1.
FOR UNITS WITH ADJUSTABLE GUIDE PLATES AND ONE-STOP FUNCTION CLUTCHES, PROCEED AS SPECIFIED.

NOTE 2.
FOR UNITS WITH ADJUSTABLE GUIDE PLATES AND TWO-STOP FUNCTION CLUTCHES, CHANGE FIRST SENTENCE IN REQUIREMENT (I) TO "DISENGAGE FUNCTION CLUTCH AT STOP GIVING LEAST CLEARANCE." THEN PROCEED AS SPECIFIED.

FIGS-LTRS SHIFT CODE BAR OPERATING MECHANISM

(1) REQUIREMENT
WITH FUNCTION CLUTCH ROTATED UNTIL CLUTCH DISK STOP LUG IS TOWARD BOTTOM OF UNIT, HOOK FIGURES FUNCTION PAWL OVER THE END OF THE FUNCTION BAR. CLEARANCE BETWEEN UPPER GUIDE PLATE EXTENSION AND SHIFT SLIDE.
MAX. 0.020 WHEN PLAY IS TAKEN UP FOR MAXIMUM.

(2) REQUIREMENT
WITH 32 OZ. PULL APPLIED TO FUNCTION PAWL
MIN. 0.002 INCH
BETWEEN SHOULDER OF FIGURES FUNCTION PAWL AND FACE OF FUNCTION BAR.

(3) REQUIREMENT
REPEAT THE PROCEDURE FOR THE LETTERS FUNCTION PAWL CHECK MAX. CLEARANCE BETWEEN LOWER GUIDE PLATE EXTENSION AND SHIFT SLIDE. CHECK MIN. CLEARANCE BETWEEN SHOULDER OF LETTER FUNCTION PAWL AND FACE OF FUNCTION BAR.
TO ADJUST POSITION UPPER AND/OR LOWER GUIDE PLATE BY THE ADJUSTING SLOT WITH THE CLAMP NUTS LOOSENED.
NOTE: 1. THIS ADJUSTMENT APPLIES ONLY TO UNITS WITH NON-ADJUSTABLE GUIDE PLATES

GUIDE PLATE EXTENSION

GUIDE PLATE

MOUNTING NUTS

LETTER FUNCTION SLIDE

Fig. 1 - Top View

FUNCTION BAR

Figures Function Slide

Max. 32 ozs.

Fig. 2 - Right Side View

Function Lever

Function Pawl

Function Bar

Figs. - Ltrs Shift Code Bar Operating Mechanism

Requirement: (For Two-S Top Function Clutch)

DISENGAGE FUNCTION CLUTCH AT POSITION GIVING LEAST CLEARANCE. ROTATE TYPE BOX CLUTCH 1/2 REVOLUTION. HOLD FIGURES FUNCTION LEVER IN REARWARD POSITION WITH TENSION OF 32 OZS.

CLEARANCE BETWEEN THE FUNCTION PAWL SHOULDER AND FACE OF FUNCTION BAR

MIN: 0.0021 INCH

MAX: 0.015 INCH

When play in pawl is taken for maximum clearance.

DISENGAGE FIGURES FUNCTION PAWL. CHECK LETTERS FUNCTION PAWL IN SAME MANNER.

Requirement: (For One-S Top Function Clutch)

CHANGE FIRST SENTENCE IN ABOVE REQUIREMENT TO: "ROTATE FUNCTION CLUTCH UNTIL TRIP LEVER JUST TOUCHES SHOE LEVER." Then proceed as specified.

To adjust

Position shift assembly with clamp screws loosened. Take up play in mounting holes to rear.

Caution: Manually operate letters and figures function lever alternately. Levers shall be free of binds.
2.39 Shift Mechanism (Selective Calling)

NOTE: TO CHECK REQUIREMENTS (A, B, AND D), SET FUNCTION CLUTCH IN STOP POSITION AND ALL CODE BARS TO THE RIGHT.

(A) CDC SHIFT SLIDE (CODE BAR SHIFT MECHANISM)

REQUIREMENTS
1. WITH FUNCTION CLUTCH IN STOP POSITION, LATCH FUNCTION LEVER (SHIFT MECH.) ON ITS LOWER RELEASING LATCH. NOTCH IN SUPP. CODE BAR SHALL ALIGN WITH NOTCHES IN OTHER CODE BARS WHEN ALL CODE BARS ARE SHIFTED TO THE RIGHT.

TO ADJUST
POSITION UPPER OR LOWER GUIDE PLATE (2.37) WITH ITS CLAMP NUTS LOOSENED

2. REPEAT FOR EACH STUNT CASE CODE BAR SHIFT MECHANISM.

NOTE ... POSITION THE ASSOCIATED GUIDE PLATE SO THAT THE MOVEMENT OF THE FORK IS NOT RESTRICTED WITHIN THE RANGE OF ADJUSTMENT.

(C) TYPE BOX CLUTCH SUPPRESSION ARM
SEE 2.40

(D) OFF LINE SHIFT SOLENOID BRACKET ASSEMBLY (OFF LINE ONLY)

REQUIREMENT
NOTCH IN SUPPRESSION CODE BAR SHALL ALIGN WITH NOTCHES IN OTHER CODE BARS WHEN ALL CODE BARS ARE SHIFTED TO THE RIGHT.

TO ADJUST
POSITION THE SOLENOID BRACKET ASSEMBLY WITH ITS MOUNTING SCREWS LOOSENED.

(B) LOCKOUT SHIFT SLIDE (CODE BAR SHIFT MECHANISM)

REQUIREMENT
WITH FUNCTION CLUTCH IN STOP POSITION, LATCH LOCKOUT SLIDE FUNCTION LEVER, THE NOTCH IN SELECT CODE (ZERO) CODE BAR SHALL ALIGN WITH NOTCHES IN OTHER CODE BARS WHEN ALL CODE BARS ARE SHIFTED TO THE RIGHT.

TO ADJUST
POSITION THE UPPER OR LOWER GUIDE PLATE (2.37) WITH ITS CLAMP NUTS LOOSENED.

NOTE ... POSITION THE ASSOCIATED GUIDE PLATE SO THAT THE MOVEMENT OF THE FORK IS NOT RESTRICTED WITHIN THE RANGE OF ADJUSTMENT.
2.40 Shift Mechanism (Selective Calling)

**Type Box Clutch Suppression Arm (With or Without Solenoid Shift)**

**Requirement**
- Suppression arm in blocking position. Shaft rotated until the function clutch shoe lever is opposite the function clutch trip lever.
  1. At least 0.003 inch clearance between trip arm extension and clutch trip lever.
  2. At least 0.006 inch clearance between the function clutch shoe lever and function clutch trip lever.

To adjust position suppression arm with its mounting screws loosened.

**Solenoid Bracket Mounting Screws Requirement**
- With solenoid unoperated, min. 2 ozs, max. 4 1/2 ozs.
- To pull spring to its installed length.

**Block Extension**

1. Latch function lever of any C.O.G. shift slide (stunt case code bar shift) and rotate main shaft until lower surface of the suppression arm is aligned/approximately with bottom surface of blocking bail extension. Clearance between suppression arm and blocking bail extension with play taken up to produce minimum clearance.
   - Min. 0.008 inch
   - Max. 0.055 inch

To adjust position extension with its mounting screw loosened. Refine the adjustment if necessary, and recheck each shift mechanism.

2. Refine the stunt case code bar shift mechanism adjustment of any shift mechanism that does not meet the above requirement.
2.41 Horizontal-motion-reversing Mechanism (Front View)

(A) REVERSING SLIDE DETENT SPRING

Requirement
Slide in left hand position. Scale hooked in upper right hand detent notch.
Min. 2 ozs.
Max. 4-1/2 ozs.
To start detent moving.

(B) REVERSING SLIDE ADJUSTING STUD

Requirement
Type box clutch disengaged.
With No. 3 code bar in spacing position (right), the reversing slide detent rollers shall be fully seated in the right-hand notches of the detent lever.
With No. 3 code bar in marking position (left), the reversing slide detent rollers shall be fully seated in the left-hand notches of the detent lever.
To adjust position the reversing slide stud in its elongated hole with its mounting nut loosened.

(C) REVERSING SLIDE BRACKETS

Requirement
Type box clutch, code bar clutch, and function clutch disengaged. Reversing slide moved to right and left through its full travel. Right motion shall buckle left horizontal positioning drive linkage and left motion shall buckle right horizontal positioning drive linkage. The amount of buckling in each case shall be
Min. 0.030 inch
Max. 0.045 inch
Measured at point of maximum clearance.
To adjust position each reversing slide bracket with their clamp screws loosened.

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2.42 Horizontal Positioning Drive Mechanism (Later Design) (Front View)

(1) REQUIREMENT

**Horizontal Positioning Drive Linkage**

**VERTICAL LINKAGE**

- Type box clutch disengaged.
- Code bars 4 and 5 to spacing (right).
- Clearance between each side of center horizontal stop slide and decelerating slides, on side where knee: link is straight shall be equal (within 0.008 inch)
- Min. 0.015 inch
- Max. 0.040 inch

**TO ADJUST**

- Loosen bearing stud mounting screws and connecting strip mounting screws friction tight. Position one or both bearing studs on the connecting strip to provide 0.025 inch to 0.035 inch between the center horizontal slide and the decelerating slide on the side where the linkage is not buckled. Tighten the two inner mounting screws. Change position of reversing slide and check opposite clearance. Equalize by shifting both studs and connecting strip as a unit. Hold the drive linkage hub against the lower vertical link of the drive linkage. Tighten the two outer bearing stud mounting screws. Check the linkage for freeness throughout a complete cycle.

![Diagram of Horizontal Positioning Drive Mechanism](image)

(2) REQUIREMENT

The horizontal positioning mechanism must be free of jams or binds.

**TO CHECK**

- Type box clutch latched in stop position. Rotate clutch disk by hand in direction of normal rotation until clutch disk stop arm is in contact with clutch shoe lever. The requirement is met if shoe lever spring returns disk to its normal position.

**TO ADJUST**

- Reposition rocker shaft bracket eccentric stud.
Positioning Drive Mechanism
(Earlier Design) (Front View)

NOTE: THE LOOPS OF THIS SPRING ARE OFF-SET FROM CENTER IN THE SAME DIRECTION. THE SPRING MUST BE HOOKED ON ITS ANCHORS SO THAT THE SIDE OF THE SPRING, ON WHICH THE LOOPS ARE LOCATED, IS TOWARD THE REAR OF THE MACHINE. WHEN REMOVING EITHER SPRING, EXERCISE CARE TO AVOID KINKS IN LOOPS.

**Horizontal Positioning Drive Linkage Spring Tension Requirement**

**Horizontal Stop Slides**

**Clearance between each side of center horizontal stop slide and decelerating slides on side where knee link is straight, shall be equal (within 0.005 inch)**

**Min:** 0.020 inch  
**Max:** 0.040 inch

**To Adjust**

Loosen bearing stud mounting screws and connecting strip mounting screws friction tight. Position one or both bearing studs on the connecting strip to provide 0.025 inch to 0.035 inch between the center horizontal slide and the decelerating slide on the side where the linkage is not buckled. Tighten the two inner mounting screws. Change position of reversing slide and check opposite clearance. Equalize by shifting both studs and connecting strip as a unit. Hold the drive linkage hub against the lower vertical link of the drive linkage. Tighten the two outer bearing stud mounting screws. Check the linkage for freedom through a complete cycle.

**Horizontal Positioning Drive Linkage**

(1) Requirement

Type box clutch disengaged. Code bars 4 and 5 to spacing (right). Clearance between each side of center horizontal stop slide and decelerating slides on side where knee link is straight. Small be equal (within 0.005 inch)

**Min:** 0.020 inch  
**Max:** 0.040 inch

**To Adjust**

Loosen bearing stud mounting screws and connecting strip mounting screws friction tight. Position one or both bearing studs on the connecting strip to provide 0.025 inch to 0.035 inch between the center horizontal slide and the decelerating slide on the side where the linkage is not buckled. Tighten the two inner mounting screws. Change position of reversing slide and check opposite clearance. Equalize by shifting both studs and connecting strip as a unit. Hold the drive linkage hub against the lower vertical link of the drive linkage. Tighten the two outer bearing stud mounting screws. Check the linkage for freedom through a complete cycle.

(2) Requirement

The horizontal positioning mechanism must be free of jams or binds. To check type box clutch latched in stop position rotate clutch disk by hand in direction of normal rotation until clutch disk stop arm is in contact with clutch shoe lever. The requirement is met if shoe lever spring returns disk to its normal position. To adjust reposition rocker shaft bracket eccentric stud.

**28 Typing Unit Requirements and Adjustments**
2.44 Vertical Positioning Mechanism (Left View)

(1) REQUIREMENT

- Letters combination set up on code bars. Main side operating levers at upper end of travel.
- Upper notch of vertical positioning lock lever fully engaged (manually if necessary) with vertical slide projection.
- Upper surface of follower arm rear extension min. in contact with,
  max. 0.004 inch away from inner extension of main side lever.

(2) REQUIREMENT

- With play taken up by pulling upward with 8 oz. tension on type box carriage track,
- Vertical surfaces min. in contact with,
  max. 0.012 inch away from each other.

To adjust position right and left vertical positioning lock levers with clamp screws loosened.

Diagram showing vertical positioning lock lever, left vertical slide projection, clamp screws, inner extension, left main side lever, and left follower arm rear extension.
Loosen the clamp screw and mounting screws.

Front Adjustable Mounting Screws:
Keep having a slighter center tension than the front cable is skewed by reel.

To adjust position:
Loosen screw to an approximate equilibrated position, with the rear cable of the
loosen screw to meet the requirements made certain that the rope moves around its
position one turn only. Position the pulley bearing studs with their mounting screws
position. Pulley bearing cable to extramet right hand position. Loosen rope clamp

to adjust.

To pull spring to position length:
Min. 0.030 inch

Horizontal Positioning Drive Linkage:
Must be at least 0.006 inch from horizontal position mechanism. Clearances must be equal. When moving, the center cable has a slightly greater tension than the right cable as gauged by feel.

Make certain that the rope moves around its clamp screw and mounting screws.
Carriage Return Spring Requirement
Spacing Drum in its returned position. Printing track in lower position. Transfer slide and carriage return latch held away.
Min.: 3 lbs.
Max.: 3-3/4 lbs.
To start the spring drum moving.
To adjust
Rotate the spring drum ratchet wheel with the spring drum nut loosened to increase tension. Operate escapement lever to decrease it.

Spacing Feed Pawl Release Link
Spring Tension Requirement
Min.: 1/2 oz.
Max.: 2-1/2 ozs.
To start spring stretching.
2.47 Carriage-return Mechanism (Front View)

(A) Carriage Return Latch Bail Requirement

- Carriage fully returned
- Play in Carriage return bail taken up to right by holding right side of bail against its retainer.
- Clearance between Carriage return latch bail and carriage return lever.

Min. 0.004 inch
Max. 0.040 inch

To adjust position latch bail plate with clamp screw loosened.

(B) Carriage Return Latch Bail Spring Tension Requirement

- Spacing drum fully returned
- Min. 3 ozs.
- Max. 4 1/2 ozs.
- To start latch bail moving.

28 Typing Unit Requirements and Adjustments

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2.48 Carriage-return Mechanism

REAR VIEW)
CARRIAGE RETURN LEVER
FUNCTION PAWL
CARRIAGE RETURN FUNCTION BAR
UNSHIFT ON SPACE
FICS.
(REAR VIEW)

REQUIREMENT (UNITS EQUIPPED WITH ONE-STOP FUNCTION CLUTCH)
CARRIAGE RETURN FUNCTION SET UP ON SELECTOR. MAIN SHAFT ROTATED UNTIL FUNCTION CLUTCH STOP LUG IS TOWARD BOTTOM OF UNIT. CARRIAGE RETURN FUNCTION PAWL HOOKED OVER ITS FUNCTION BAR. SPACING DRUM HELD SO THAT CARRIAGE RETURN LATCH BAIL IS LATCHED.
CLEARANCE BETWEEN LATCH BAIL AND CARRIAGE RETURN LEVER.
MIN. 0.006 INCH — MAX. 0.035 INCH

(LEFT SIDE VIEW)
CARRIAGE RETURN LATCH BAIL
FEED PAWL
FEED PAWL RELEASE LINK
SPACING DRUM

REQUIREMENT (UNITS EQUIPPED WITH TWO-STOP FUNCTION CLUTCH)
SAME EXCEPT MAIN SHAFT SHALL BE ROTATED UNTIL FUNCTION CLUTCH IS DISENGAGED IN STOP POSITION THAT RESULTS IN LEAST CLEARANCE.
TO ADJUST
POSITION CARRIAGE RETURN LEVER ON CARRIAGE RETURN BAIL WITH CLAMP SCREW LOOSENED.

(RIGHT SIDE VIEW)
CARRIAGE RETURN LEVER
CLAMP SCREW
CARRIAGE RETURN BAIL
2.49 Dashpot and Keyboard-lock Mechanisms

**Dashpot and Keyboard-lock Mechanisms**

- **Transfer Slide Spring Tension**
  - Requirement:
    - Transfer slide in extreme left position.
    - Spring unhooked.
    - Min. 3-1/2 OZS.
    - Max. 4-1/2 OZS.
  - To pull spring to installed length.

- **Keyboard Lock Lever Spring Tension**
  - Requirement:
    - Scale applied to bell crank.
    - Min. 1/2 OZ.
    - Max. 1-1/2 OZS.
  - To start keyboard lock lever moving.

**Adjustments**

- **Transfer Slide Screw**
  - Requirement:
    - Type box carriage shall return from any length of line without bouncing.
    - To check:
      - Printer operated at any speed from automatic transmission with one CR and one LF signal between lines. First character of each line shall be printed in same location as if unit was manually operated slowly.
    - To adjust:
      - Turn down vent screw until slight pneumatic bounce is perceptible. Back off screw until effect disappears.
      - For dashpots with one vent hole: then back screw off one full turn. Tighten nut.
      - For dashpots with two vent holes: then back screw off 1/4 turn. Tighten nut.

**Keyboard Lock Lever Spring Tension**

- (If unit is so equipped)
  - Requirement:
    - Scale applied to bell crank.
    - Min. 1/2 OZ.
    - Max. 1-1/2 OZS.
  - To start keyboard lock lever moving.
2.50 Carriage-return Mechanism (Later Design)

Note 1: For Sprocket-feed Mechanism, see BSP under that title.

Note 2: If the following adjustments are remade, check the related adjustments in 2.32, 2.52, and 2.59.

(A) PRINTING CARRIAGE POSITION
USE STANDARD ADJUSTMENT

(B) LEFT MARGIN

(1) REQUIREMENT
TYPE BOX CLUTCH DISENGAGED. SPACING DRUM IN RETURNED POSITION. TYPE BOX SHIFTED TO LETTERS POSITION.
CLEARANCE BETWEEN LEFT EDGE OF PLATEN AND LETTERS PRINT INDICATOR.
MIN. 15/16 INCH — MAX. 1-1/16 INCH

(C) AUTOMATIC CR-LF BELL CRANK SPRING
FOR UNITS SO EQUIPPED
REQUIREMENT
FUNCTION CLUTCH DISENGAGED.
MIN. 2 1/2 OZS. — MAX. 7 OZS.
TO MOVE THE BELL CRANK.

(7) REQUIREMENT
SPACING CLUTCH DISENGAGED.
FRONT SPACING FEED PAWL
FARthest ADVANCED. SPACING DRUM FULLY RETURNED. PLAY IN SPACING SHAFT GEAR TAKEN UP CLOCKWISE.
CLEARANCE BETWEEN PAWL AND SHOULDER OF RATCHET WHEEL TOOTH IMMEDIATELY AHEAD
MIN. 0.002 INCH
MAX. 0.015 INCH

(3) REQUIREMENT
REAR PAWL, WHEN FARTHEST ADVANCED, SHALL REST AT BOTTOM OF INDENTATION BETWEEN RATCHET WHEEL TEETH.

TO ADJUST
SHIFT TYPE BOX TO LETTERS POSITION. RETURN PRINT CARRIAGE TO ITS LEFT POSITION.
LOOSEN FOUR INDICATED CARRIAGE RETURN RING MOUNTING SCREWS. HOLD CARRIAGE RETURN RING IN ITS COUNTER-CLOCKWISE POSITION. LOCATE TYPE BOX SO ITS LTRS. INDICATOR IS IN THE REQUIRED POSITION. TIGHTEN THE FOUR MOUNTING SCREWS.

NOTE: FOR LINES OTHER THAN 72 CHARACTERS IN LENGTH, THE LEFT MARGIN MAY BE VARIED AS REQUIRED. THIS WILL PERMIT LINES UP TO 85 CHARACTERS IN LENGTH.
2.51 Carriage-return Mechanism (Earlier Design)

Note 1: For Sprocket-feed Mechanism, see BSP under that title.

Note 2: If the following adjustments are remade, check the related adjustments in 2.33, 2.53, and 2.59.

28 Typing Unit Requirements and Adjustments

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2.52 Space Suppression Mechanism (Later Design)

Note 1: If the following adjustments are remade, check the related adjustments in 2.32, 2.50, and 2.59.
2.53 **Space Suppression Mechanism (Earlier Design)**

**Note 1:** If the following adjustments are remade, check the related adjustments in 2.33, 2.46, and 2.59.

---

**SPACE SUPPRESSION MECHANISM**

- **Space Suppression Mechanism (Operating on Base)**
  - Type box carriage in position to print character on which spacing cutout is desired.
  - Front spacing pawl farthest advanced. Clearance between upper edge of spacing cutout lever and cutout transfer bail when spacing cutout transfer bail is held in its extreme upper position.
  - **Min.: 0.006 inch**
  - **Max.: 0.025 inch**
  - **To Adjust:** Position the cutout lever with its clamp screw loosened.

- **Spacing Cutout Transfer Bail Spring Tension Requirement**
  - **Min.: 1 oz.**
  - **Max.: 3-1/2 oz.**
  - **To Start Bail Moving:**

---

**28 Typing Unit Requirements and Adjustments**

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2.54 Decelerating Slide (Later Design)

Decelerating Slide Spring Tension Requirement
Min. 1/2 oz.
Max. 1-1/2 oz.
To start the slide moving with the printing carriage and decelerating slide in their left hand position.
Check the left hand decelerating slide spring.

2.55 Decelerating Slide (Earlier Design)

Decelerating Slide Bell Crank Spring Requirement
Decelerating Slide Bell Crank (Part of Decelerating Slide).
Spring Tension Requirement
Min. 3/4 oz.
Max. 1-3/4 oz.
To start bell crank moving.
Check right and left springs.
2.56 Printing Carriage

WIRE ROPE CLAMP SCREWS

ECCENTRIC OR MOUNTING SCREW

PRINTING CARRIAGE

PRINTING CARRIAGE LOWER ROLLER

REQUIREMENT
CARRIAGE WIRE ROPE CLAMP SCREWS LOOSENED. PLAY OF CARRIAGE ON TRACK WITHOUT BIND, THROUGHOUT TRACK'S FULL LENGTH.

TO ADJUST (ECCENTRIC BUSHING)
POSITION LOWER ROLLER WITH SCREW NUT LOOSENED. KEEP HIGH PART OF ECCENTRIC (CHAMFERED CORNER) TOWARD THE RIGHT.

TO ADJUST (SLIDING SCREW)
POSITION LOWER ROLLER WITH MOUNTING SCREW LOOSENED.

2.57 Typebox Carriage (Later Design)

TYPE BOXLatch

TYPE BOX CARRIAGE ROLLER ARM SPRING

REQUIREMENT
MIN. 28 OZS.
MAX. 36 OZS.

TO START UPPER ROLLER, NEAREST TYPE BOX LATCH, MOVING AWAY FROM CARRIAGE TRACK.

2.58 Typebox Carriage (Earlier Design)

TYPE BOX CARRIAGE ROLLER

REQUIREMENT
MINIMUM VERTICAL PLAY WITHOUT BIND IN TYPE BOX CARRIAGE.

TO CHECK
MOVE CARRIAGE TO RIGHT END OF TRACK. PLACE IN UPPER POSITION. REMOVE DRIVE LINK. CHECK THROUGHOUT ENTIRE TRAVEL OF CARRIAGE.

TO ADJUST
POSITION LOWER ROLLER ARM WITH CLAMP SCREW LOOSENED.
2.59 **Printing Carriage**

**Note:** If the following adjustments are remade, check related adjustments 2.32, 2.46, and 2.52. For units of earlier design, check 2.33, 2.46, 2.47, and 2.53.

![Diagram of Printing Carriage](image)

**Printing Carriage Position**

**Requirement**

- Type box in letters position. M type pallet selected. Type box in printing position.
- M type pallet shall be approximately in center of printing hammer when hammer is just touching M type pallet. Take up play in type box carriage in each direction and set hammer in center of play.

To adjust:

- Position printing carriage on wire rope with clamp screws loosened.

![Diagram of Printing Hammer and Pallet](image)

**Printing Hammer Period Type Pallet**

**Requirement**

- Type box at midpoint of platen and in position to print period. Printing hammer in contact with type pallet and pressed downward at bearing post. Face of hammer shall be fully on end of type pallet.

To adjust:

- Add or remove shims between shoulder on bearing post and stop bracket.
2.60 Typebox Shift Mechanism

SHIFT LINKAGE
REQUIREMENT
CARRIAGE NEAR MIDPOINT OF PLATEN. TYPE BOX IN POSITION TO PRINT.
MANUALLY BUCKLE RIGHT SHIFT LINKAGE. SHIFT TYPE BOX TO LEFT.
PERIOD TYPE PALLET SMALL BE APPROXIMATELY IN CENTER OF PRINT
HAMMER WHEN HAMMER IS JUST TOUCHING PERIOD TYPE PALLET.

TO ADJUST
POSITION LEFT SHIFT LINKAGE ON
OSCILLATOR RAIL WITH TWO CLAMP
SCREWS LOOSENED
TO RECHECK
SHIFT ALTERNATELY FROM W TO
PERIOD. TAKE UP PLAY IN EACH
DIRECTION. REFINE ADJUSTMENT
IF NECESSARY.

2.61 Typebox Shift Mechanism (Later Design)

2.62 Typebox Shift Mechanism (Earlier Design)

28 TYPING UNIT
REQUIREMENTS
AND
ADJUSTMENTS

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2.63 Printing Mechanism

(A) Printing Track

Requirement

Printing track in its extreme downward position. Blank selection in figures.

Printing hammer operating bail, latching extension held with left face in line with the latch shoulder. Printing arm slide positioned alternately over each track mounting screw. Printing bail reset each time. Clearance between latching extension and operating bail latch

Min. 0.015 inch
Max. 0.040 inch

To adjust position the printing track up or down with its mounting screws loosened.

(B) Printing Hammer Plunger Spring

Requirement

Min. 3 ozs.
Max. 5-3/4 ozs.

To start plunger moving.

(C) Printing Hammer Operating Bail Spring Tension

Requirement

Operating bail latched. Spring adjusting bracket in left-hand notch. Hammer yield spring unhooked.

Min. 10 ozs.
Max. 13 ozs.

To start bail moving.

(D) Printing Hammer Yield Spring Tension

Requirement

Printing hammer operating bail against its stop.

Min. 1 oz.
Max. 2-1/2 ozs.

To start hammer bail moving (horizontal position).

(E) Printing Hammer Operating Bail Latch Spring Tension

Requirement

Printing track in its extreme upward position.

Min. 3 ozs.
Max. 4-1/2 ozs.

To start latch moving.
2.64 Printing Mechanism (Later Design)

(A) PRINTING HAMMER STOP BRACKET

REQUIREMENT
TYPE BOX IN POSITION TO PRINT. PRINTING TRACK IN ITS MAXIMUM DOWNWARD POSITION. PRINTING HAMMER STOP BRACKET HELD TOWARD THE PLATEN WITH 8 OZS. OF PRESSURE. CLEARANCE BETWEEN PRINTING HAMMER AND M TYPE PALLAT. MIN. 0.005 INCH MAX. 0.035 INCH CHECK AT BOTH ENDS OF PLATEN.

TO ADJUST POSITION STOP BRACKET BY MEANS OF ITS TWO MOUNTING SCREWS.

(B) PRINTING ARM

(C) TYPE PALLET SPRING TENSION

REQUIREMENT
TYPE BOX REMOVED FROM THE UNIT. 8 OZS. SCALE APPLIED VERTICALLY TO THE END OF THE PALLET SHANK. MIN. 1/4 OZS. MAX. 3/4 OZS.

TO START PALLET MOVING.

THE PRINTING ARM ADJUSTMENT SHALL ALWAYS BE MADE WITH THE PRINTING HAMMER OPERATING BAIL SPRING BRACKET IN THE NO. 1 POSITION. POSITIONS NO. 2 AND 3 ARE TO BE USED ONLY FOR MAKING MULTIPLE COPIES.

THE PRINTING ARM ADJUSTMENT SHALL.

28 TYPING UNIT REQUIREMENTS AND ADJUSTMENTS

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2.65 Printing Mechanism (Earlier Design)

(A) Printing Hammer Stop Bracket

For thick type box with dummy pallets—

Required:
- Type box in blank or CR position (whichever does not print) and near center of platen.
- Printing track in its downward position.
- Printing hammer held against its stop with 8 ozs. of pressure. Clearance between printing hammer and dummy type pallet.

\[
\begin{align*}
\text{MIN:} & \quad 0.008 \text{ inch} \\
\text{MAX:} & \quad 0.020 \text{ inch}
\end{align*}
\]

To adjust:
- Position the stop bracket with its mounting screw and the printing hammer bail pivot stud loosened.

(B) Printing Arm

(1) Requirement:
- Printing track in maximum downward position.
- Printing hammer operating bail against its stop.
- Some clearance between secondary printing arm and forward extension of hammer operating bail.

\[
\text{MAX:} \quad 0.015 \text{ inch}
\]

When printing arm slide is held downward over each printing track, mounting screw for maximum clearance.

(2) Requirement:
- Printing track in uppermost position. Latching extension of printing hammer operating bail shall overtravel latching surface of operating bail latch by

\[
\text{MIN:} \quad 0.006 \text{ inch}
\]

Check right and left position to adjust.
- Position secondary printing arm with clamp screws loosened.

(C) Type Pallet Spring Tension

Required:
- Type box removed from the unit. 8 oz. scale applied vertically to the end of the pallet shank.

\[
\begin{align*}
\text{MIN:} & \quad 1/4 \text{ oz.} \\
\text{MAX:} & \quad 3/4 \text{ oz.}
\end{align*}
\]

To start pallet moving.

NOTE

The printing arm adjustment shall always be made with the printing hammer operating bail spring bracket in the NO. 1 position. Positions NO. 2 and NO. 3 are to be used only for making multiple copies.
2.66 Typebox Alignment Mechanism

NOTE: THIS ADJUSTMENT APPLIES ONLY TO UNITS SO EQUIPPED AND SHALL BE MADE WITH THE TYPEBOX IN ITS UPPER POSITION.

NOTE: SOME TYPING UNITS ARE EQUIPPED WITH A RIBBON GUIDE WHICH HAS A TYPE BOX RETAINING CLIP WITH A LIMITED YIELD. IN CASES WHERE IT IS NECESSARY TO BACK THE ADJUSTING SCREW OUT TO PROVIDE HEAVIER PRINTING AT THE TOP OF A CHARACTER, IT MAY BE NECESSARY TO BEND THE SPRING CLIP ON THE RIBBON GUIDE TOWARD THE FRONT SO THAT THE TAB AT THE BOTTOM OF THE TYPE BOX IS HELD AGAINST THE HEAD OF THE ADJUSTING SCREW.
### 2.67 Ribbon-reverse Mechanism with Toggle-link Detent (Later Design)

**Requirement**
- When right reversing lever is in maximum downward position, the left reversing lever shall be in its maximum upward position.

**To Adjust**
- Loosen the set screws in the detent cam.
- Loosen the left spur gear nut.
- Securely tighten the right spur gear nut.
- Move the right reversing lever to its maximum downward position and hold left reversing lever in its maximum upward position. Then tighten the left spur gear nut.

**Requirement**
- Ribbon reverse detent link buckled in its downward position, clearance between detent link and detent lever

**Min.** some - **Max.** 0.040 inch

When play in the lever is taken up lightly toward the right side of the printer.

**To Adjust**
- Hold left ribbon reversing lever in its downward position, position detent link, and tighten the upper set screw in the hub of the detent link.
- Buckle the detent link upward and tighten lower set screw.

**Requirement**
- Ribbon reverse detent lever spring tension (if unit is equipped)

**Min.** 10 ozs.
**Max.** 18 ozs.

To start detent lever moving toward rear.
2.68 Ribbon-reverse Mechanism with Cam Detent (Earlier Design)

RIBBON REVERSING LEVER - RIGHT
RIBBON REVERSING LEVER - LEFT

(A) RIBBON REVERSE SPUR GEAR

REQUIREMENT
WHEN RIGHT REVERSING LEVER IS IN MAXIMUM DOWNWARD POSITION, THE LEFT REVERSING LEVER SHALL BE IN ITS MAXIMUM UPWARD POSITION.

TO ADJUST
LOOSEN THE SET SCREWS IN THE DETENT CAM. LOOSEN THE LEFT SPUR GEAR NUT. SECURELY TIGHTEN THE RIGHT SPUR GEAR NUT. MOVE THE RIGHT REVERSING LEVER TO ITS MAXIMUM DOWNWARD POSITION AND HOLD LEFT REVERSING LEVER IN ITS MAXIMUM UPWARD POSITION. THEN TIGHTEN THE LEFT SPUR GEAR NUT.

(B) RIBBON REVERSE DETENT

REQUIREMENT
DETENT SEATED APPROXIMATELY EQUAL IN UPPER AND LOWER POSITIONS OF DETENT CAM

TO ADJUST
POSITION CAM ON SHAFT WITH SET SCREWS LOOSE. LET LEFT END OF DETENT STUD BE APPROXIMATELY FLUSH WITH LEFT FACE OF CAM (PLAY IN DETENT TAKEN TO RIGHT OF PRINTER).

(C) RIBBON REVERSE DETENT LEVER SPRING TENSION

REQUIREMENT
DETENT SEATED IN NOTCH OF CAM RIGHT RIBBON REVERSING LEVER HELD DOWNWARD.

MIN. 6-1/2 OZ.
MAX. 9 OZ.

TO START THE DETENT LEVER MOVING.

28 TYPING UNIT REQUIREMENTS AND ADJUSTMENTS

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2.69 Ribbon-feed Mechanism (Left View)

**Ribbon Feed Lever Bracket**

(1) **Requirement (Left-Hand Mechanism)**

- Left Reversing Lever in upward position.
- Ribbon Mechanism in upper position.
- Ratchet wheel held against the detent lever.
- Clearance between the front face of the feed lever and the shoulder of a tooth on the ratchet wheel.

**NOTE**

- Min. 0.015 inch
- Max. 0.025 inch

To adjust position the feed lever bracket with its mounting screws loosened.

**Ribbon Reversing Lever - Left**

**Ribbon Feed Lever Spring Tension**

Requirement

- Ribbon feed levers in uppermost position:
  - For long lever: push downward near its spring.
  - For short lever: push downward at point near long lever spring.

- Min. 3/4 oz
- Max. 2 ozs.

To start feed levers moving, measure all four pawls.

**NOTE:** If minimum requirement of short lever is not met, pull lower end of torsion spring to rear.

**Ribbon Ratchet Wheel Friction Spring Tension**

**Requirement**

- Feed levers disengaged.

- Min. 3 ozs
- Max. 7-1/2 ozs

To start the ratchet wheel moving.
2.70 Ribbon-reverse Mechanism (Top View)

Ribbon Lever Spring Tension Requirement
MIN. 1½ OZS
MAX. 3 OZS
TO START THE LEVER MOVING, CHECK BOTH RIGHT AND LEFT SPRINGS.

Ribbon Lever Spring Requirement
Ribbon Ratchet Wheel Positioned so that each driving pin is toward the outside of the spool shaft.
MIN. 3 OZS
MAX. 5½ OZS
TO START SPOOL SHAFT MOVING.
2.71 Stuntbox Mechanism

(A) FUNCTION LEVER SPRING TENSION

NOTE: IF A FUNCTION LEVER OPERATES A CONTACT OR A SLIDE, HOLD OFF THE CONTACT OR SLIDE WHEN CHECKING THE SPRING TENSION.

REQUIREMENT
FUNCTION LEVER IN UNOPERATED POSITION
SUPPRESSION BAIL HELD FORWARD.
MIN. 1 1/2 OZS.
MAX. 2 3/4 OZS.
TO START FUNCTION LEVER MOVING, CHECK EACH SPRING.

FUNCTION PAWL SPRING

FUNCTION PAWL

FUNCTION BAR SPRING

FUNCTION BAR

FUNCTION LEVER SPRING

SUPPRESSION BAIL

(B) FUNCTION PAWL SPRING TENSION

REQUIREMENT
REAR END OF FUNCTION PAWL, RESTING ON FUNCTION BAR, GIVE STOP FUNCTION CLUTCH UNITS:
MIN. 3 OZS.
MAX. 5 OZS.
TWO STOP FUNCTION CLUTCH UNITS:
MIN. 7 OZS.
MAX. 10-1/2 OZS.
TO START PAWL MOVING.
CHECK EACH SPRING.

FUNCTION PAWL SPRING

FUNCTION PAWL

FUNCTION BAR SPRING

FUNCTION BAR

FUNCTION LEVER SPRING

SUPPRESSION BAIL

(C) FUNCTION BAR SPRING TENSION

REQUIREMENT
FUNCTION CLUTCH DISENGAGED, FUNCTION PAWL HELD AWAY.
MIN. 2-1/2 OZS.
MAX. 3-1/2 OZS.
TO START FUNCTION BAR MOVING.

FUNCTION BAR SPRING

FUNCTION BAR

FUNCTION LEVER SPRING

SUPPRESSION BAIL

CAUTION: SEVERE WEAR TO THE POINT OF OPERATIONAL FAILURE WILL RESULT IF THE TELTYWRITEER IS OPERATED WITHOUT EACH FUNCTION PAWL HAVING EITHER A RELATED FUNCTION BAR OR, WHERE A FUNCTION BAR IS MISSING, A RELATED FUNCTION PAWL CLIP TO HOLD THE FUNCTION PAWL AWAY FROM THE STRIPPER BLADE.
1) REQUIREMENT (RIGHT-HAND POSITION)
The clip shall not prevent the associated function pawl from engaging its function bar.
To adjust:
Position the clip to its extreme right-hand position.

2) REQUIREMENT (CENTER POSITION)
The clip shall hold the function pawl out of engagement with its function bar but shall not interfere with the function lever.
To adjust:
Position the clip with its mounting screw loosened.

3) REQUIREMENT (LEFT-HAND POSITION)
The clip shall hold the function pawl upward out of engagement with its function bar. It shall also hold the top end of the function lever in its rear position.
To adjust:
Position the clip to its extreme left-hand position.
2.73 Line-feed Mechanism (Right View)

Note: For Sprocket-feed Mechanism, see BSP under that title.

PLATEN DETENT BAIL SPRING TENSION
REQUIREMENT
DETENT SEATED BETWEEN TWO TEETH ON
LINE FEED SPUR GEAR.
MIN. 16 OZS.
MAX. 32 OZS.
TO START DETENT BAIL MOVING.

DETENT STUD
DETENT ECCENTRIC

LINE FEED BAR BELL CRANK SPRING
TENSION
REQUIREMENT
LEFT-HAND LINE FEED BAR IN REAR
POSITION
MIN. 19 OZS.
MAX. 24 OZS.
TO START BAR MOVING.

LINE FEED BAR

LINE FEED SPUR GEAR

LINE FEED BAR RELEASE LEVER SPRING
TENSION
REQUIREMENT
MIN. 3 OZS.
MAX. 8 OZS.
TO START LEVER MOVING.

LINE FEED BAR BELL CRANK

HAND WHEEL

PLATEN DETENT BAIL SPRING TENSION
REQUIREMENT
DETENT SEATED BETWEEN TWO TEETH ON
LINE FEED SPUR GEAR. WHEN HAND WHEEL IS
RELEASED, MANUALLY SET THE
TEETH ON THE FEED BARS INTO
ENGAGEMENT WITH THE TEETH
ON THE LINE FEED SPUR
GEAR. THE DETENT STUD
SHALL CONTACT ONE GEAR
TOOTH AND BE NOT MORE THAN
0.010 INCH FROM OTHER TOOTH.
TO ADJUST
ROTATE THE DETENT ECCENTRIC
WITH ITS MOUNTING SCREW
LOOSENED. KEEP HIGH PART OF
ECCENTRIC UPWARD.

(b) PLATEN DETENT BAIL SPRING TENSION
(c) LINE FEED BAR RELEASE LEVER SPRING
(d) LINE FEED BAR BELL CRANK SPRING

(A) LINE FEED SPUR GEAR
DETENT ECCENTRIC

REQUIREMENT
LINE FEED CLUTCH DISENGAGED.
PLATEN ROTATED UNTIL DETENT
STUD IS SEATED BETWEEN TWO
TEETH ON LINE FEED SPUR
GEAR. THE DETENT STUD
SHALL CONTACT ONE GEAR
TOOTH AND BE NOT MORE THAN
0.010 INCH FROM OTHER TOOTH.
TO ADJUST
ROTATE THE DETENT ECCENTRIC
WITH ITS MOUNTING SCREW
LOOSENED. KEEP HIGH PART OF
ECCENTRIC UPWARD.
2.74 **Function-pawl Stripper Mechanism (Later Design)**

**STRIPPER BLADE DRIVE CAM POSITION REQUIREMENT**

STRIPPER BLADE DRIVE CAM SHALL MOVE EACH STRIPPER BLADE CAM ARM AN EQUAL DISTANCE ABOVE AND BELOW CENTER LINE OF ITS PIVOT (GAUGE BY EYE).

A. **UPWARD DIRECTION**

B. **DOWNWARD DIRECTION**

TO CHECK

- WITH FUNCTION CLUTCH DISENGAGED OBSERVE ENGAGEMENT OF STRIPPER BLADE DRIVE CAM (UPPER PEAK) WITH STRIPPER BLADE CAM ARM. THEN ROTATE CLUTCH TO TURN CAM TO ITS EXTREME DOWNWARD POSITION AND OBSERVE ENGAGEMENT OF LOWER CAM PEAK.

TO ADJUST

- WITH STRIPPER BLADE DRIVE ARM MOUNTING SCREWS LOOSENED, EQUALIZE THE OVERTRAVEL OF EACH CAM PEAK.
2.75 Function-pawl Stripper Mechanism (Earlier Design)

Function-pawl Stripper Mechanism

- **Function Pawl**
- **Function Bar**
- **Stripper Blade**
- **Function Stripper Blade Arms Requirement**
  - Type Box Clutch and Function Clutch disengaged.
  - Left line feed function pawl held in its rear position and resting on the upper edge of the stripper blade.
  - Clearance between upper edge of function bar and lower surface of notched section of function pawl.
  - Min. 0.055 inch
  - Max. 0.065 inch
  - The letters function pawl near the opposite end of the stripper blade should have the same clearance.

To adjust:
- Position the shoulder bushing at the lower end of the right and left stripper blade arm with the lock nut loosened.

Note:
- When checking this adjustment, single-double linefeed lever must be in double linefeed position.

2.76 Spacing Suppression Mechanism

- **Spacing Suppression Bail Spring Tension Requirement**
  - Spacing suppression bail in rear position scale applied near center of horizontal portion of bail.
  - Min. 1/2 oz.
  - Max. 1-1/2 oz.
  - To start bail moving.

- **Spacing Suppression Bail**
- **Suppression Bail**
2.77 Line-feed Stripper-bail Mechanism

Line Feed Stripper Bail Spring Tension Requirement
Line Feed Clutch Disengaged.
Scale Hooked Under Line Feed Stripper Bail.
Min. 1/2 oz.
Max. 2 oz.
To start Stripper Bail moving upward.

28 Typing Unit Requirements
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2.78 Single-double Line-feed Mechanism (Later Design)

SINGLE - DOUBLE LINE FEED LEVER

1) REQUIREMENT
LINE FEED CLUTCH DISENGAGED AND
SINGLE - DOUBLE LINE FEED LEVER IN
SINGLE LINE FEED POSITION
MIN. 1/2 OZ.
MAX. 2 OZ.
TO START STRIPPER BAIL ARM MOVING
UPWARD.

2) REQUIREMENT
LINE FEED CLUTCH DISENGAGED AND
SINGLE - DOUBLE LINE FEED LEVER
IN SINGLE LINE FEED POSITION.
MIN. 1/2 OZ.
MAX. 2 OZ.
TO START ARM MOVING TO LEFT.
2.79 Single-double Line-feed Mechanism (Earlier Design)

NOTE. THIS ADJUSTMENT APPLIES ONLY TO UNITS WITH A TWO-STOP FUNCTION CLUTCH

**SINGLE-DOUBLE LINE FEED LEVER Requirement**

SINGLE-DOUBLE LINE FEED LEVER IN SINGLE LINE FEED POSITION. LINE FEED COMBINATION SET UP. MAIN SHAFT ROTATED UNTIL THE LINE FEED FUNCTION PAWL STRIPPER IS IN CONTACT WITH THE LINE FEED FUNCTION PAWL. THE PAWL SHALL OVERLAP THE STRIPPER BY MIN. 1/2 THE PAWL THICKNESS WHEN THE PLAY IN THE PAWL IS TAKEN UP IN A DIRECTION TO MAKE THE OVERLAP MINIMUM.

TO ADJUST POSITION THE LEVER ADJUSTING SCREW.

**ADJUSTING SCREW**

**LINE FEED FUNCTION PAWL STRIPPER**

**STRIPPER BLADE**
**2.80 Horizontal-motion-stop Mechanism**

**HORIZONTAL STOP SLIDE SPRING**

**HORIZONTAL STOP SLIDES**

(FRONT TOP VIEW)

**HORIZONTAL STOP SLIDE SPRING TENSION REQUIREMENT**

*Code bars in marking position (left)*,
*Type box clutch rotated 1/4 turn from its stop position*.
*Horizontal motion decelerating slides held away from horizontal stop slides.*

- Min. 1/2 oz.  Max. 1-1/2 ozs. for upper and lower slides
- Min. 1-3/4 ozs.  Max. 3 ozs. for middle slide to start slide moving.

**Note:** When checking upper and lower slides, hold middle slide 1/32 inch forward.
2.81 **Paper Mechanism**

**Note:** For Sprocket-feed Mechanism, see BSP under that title.
2.82 Paper Mechanism

PAPER FINGER ADJUSTMENT
REQUIREMENT
THE PRESSURE END OF THE PAPER FINGERS SHALL OVERLAP THE PAPER FROM 3/8 INCH TO 1/2 INCH.
TO ADJUST
POSITION THE PAPER FINGERS BY SLIDING THEM ON THEIR SHAFT.

PAPER FINGER SPRING TENSION
REQUIREMENT
PULL UPWARD ON RIGHT PAPER FINGER TO START LEFT PAPER FINGER MOVING FROM PLATEN.
MIN. 3 OZS.
MAX. 6 OZS.

PRESSURE ROLLER LEVER SPRING
REQUIREMENT
MIN. 20 OZS.
MAX. 36 OZS.
TO START EACH CENTER LEVER MOVING ALTERNATELY.

PAPER PRESSURE BAIL SPRING TENSION
REQUIREMENT
SCALE HOOKED OVER PRESSURE BAIL AT EACH END OF PLATEN.
MIN. 7 OZS.
MAX. 20 OZS.
TO MOVE PRESSURE BAIL FROM PLATEN.
2.83 Function Contact Assembly
(With Staked Center Terminal)

NOTE: IF THE SWITCHES ARE REMOVED FROM THE STUNT BOX, THE FOLLOWING REQUIREMENTS APPLY:

(1) PROVIDE AT LEAST 0.006 INCH CLEARANCE BETWEEN THE CONTACT ARM AND THE VERTICAL PORTION OF THE CONTACT CLIP. IF THE SWITCH HAS CONTACTS FRONT AND REAR, THIS CLEARANCE APPLIES TO BOTH FRONT AND REAR. TO OBTAIN THIS CLEARANCE, POSITION THE CONTACT PLATE BEFORE TIGHTENING THE CONTACT PLATE SCREWS.

(2) ON SWITCHES WITH CONTACTS FRONT AND REAR, CHECK TO SEE THAT THERE IS A GAP OF NOT LESS THAN 0.008 INCH BETWEEN THE FORMED-OVER END OF THE FRONT CONTACT CLIP AND THE BOTTOM OF THE CONTACT ARM WHEN THE REAR CONTACT IS CLOSED.
FUNCTION CONTACT ASSEMBLY
(With Contact Arm Spring Loop)

FUNCTION LEVER (UNOPERATED)

FUNCTION LEVER (OPERATED)

CONTACT ARM SPRING

CONTACT ARM

CONTACT PLATE

FUNCTION CONTACT SPRING

CONTACT CLOSED.
MIN. 1 OZ.
MAX. 2 OZ.
TO OPEN SWITCH CONTACT.

CAUTION: CARE SHALL BE EXERCISED IN SOLDERING TO CONTACT SPRINGS. CONTACT SPRINGS ONCE SOLDERED SHALL NOT BE USED AGAIN. TO REPLACE A SPRING, REMOVE THE TWO SCREWS WHICH MOUNT THE SWITCH ASSEMBLY TO THE STUNT BOX. CLEAN SOLDER FROM SPRING, COMPRESS LOOP OF SPRING AND REMOVE FROM CONTACT PLATE. PLACE NEW SPRING IN CONTACT PLATE AND SNAP INTO PLACE. REPLACE CONTACT PLATE. RESOLDER CABLE. DO NOT OVERHEAT.

NOTE: BEFORE TIGHTENING CONTACT PLATE SCREWS PROVIDE A MINIMUM OF 0.006 INCH CLEARANCE HERE. APPLY GREASE TO INSULATOR AND LEVER. ON SWITCHES WITH FRONT AND REAR CONTACTS, THE FRONT CONTACT SHALL HAVE A GAP OF NOT LESS THAN 0.008 INCH WHEN THE REAR CONTACT IS CLOSED.
2.85 Function Contact Assembly
(With One-piece Contact Block)

FUNCTION CONTACT SPRING REQUIREMENT
CONTACT CLOSED.
MIN. 1 OZ.
MAX. 2 OZS.
TO OPEN SWITCH CONTACT.

FUNCTION LEVER (UNOPERATED)

CAUTION: CARE SHALL BE EXERCISED IN SOLDERING TO CONTACT SPRINGS
SINCE EXCESSIVE HEAT WILL ANNEAL THE SPRINGS. CONTACT SPRINGS
ONCE SOLDERED SHALL NOT BE USED AGAIN.

FUNCTION LEVER (OPERATED)
2.86 Function Contact Assembly
(With 28A and 28A-1 Typing Units Only)

(1) REQUIREMENT
FUNCTION LEVER AS SHOWN.
CONTACT GAP
MIN. 0.010 INCH
MAX. 0.020 INCH
TO ADJUST
BEND THE LOWER ELECTRICAL CONTACT.

(2) REQUIREMENT
FUNCTION LEVER AS SHOWN.
MIN. 1-1/4 OZS.
MAX. 1-3/4 OZS.
TO ADJUST
BEND THE UPPER ELECTRICAL CONTACT.

(3) REQUIREMENT
RECHECK REQUIREMENT (1).
2.87 Unshift-on-space Mechanism (Left View)

(1) REQUIREMENT
To prevent unshift-on-space function, provide clearance between the lower edge of the unshift-on-space function pawl and its function bar.
- Min. 0.015 inch
- Max. 0.040 inch
To adjust:
Loosen the lock nut and turn the disabling screw in.

(2) REQUIREMENT
To restore the unshift-on-space function, back off the screw so that pawl fully engages the function bar. Then continue to turn the screw out one to three turns.
2.88 Codebar Detent Mechanism

CODE BAR DETENT

REQUIREMENT
FRONT PLATE REMOVED, ALL CLUTCHES DISENGAGED, SUPPRESSION AND SHIFT CODE BARS SHALL DETENT EQUALLY (GAUGED BY EYE).

TO ADJUST
EQUALIZE THE DETENTING OF THE CODE BARS BY ADDING OR REMOVING SHIMS BETWEEN THE CASTING AND THE CODE BAR BRACKET.

CODE BAR DETENT BRACKET CAREFULLY REMOVED AND CODE BARS RE murderers TO DETENT BALL CONTINUOUSLY PULLED IN DIRECTION OF BALL TRAVEL.
MIN. 1-1/2 OZS.
MAX. 3-1/2 OZS.

TO START BALL MOVING AGAINST COMPRESSION OF SPRING, CHECK EACH BALL.

CODE BAR DETENT SPRING TENSION
(IF SO EQUIPPED)

NOTE
UNLESS THERE IS REASON TO BELIEVE THAT THESE SPRINGS ARE CAUSING OPERATING FAILURE DO NOT CHECK THIS REQUIREMENT.

REQUIREMENT
CODE BAR DETENT BRACKET CAREFULLY REMOVED AND CODE BARS REMOVED FROM DETENT BRACKET SCALE APPLIED TO DETENT BALL AND PULLED IN DIRECTION OF BALL TRAVEL.
MIN. 1-1/2 OZS.
MAX. 3-1/2 OZS.

TO START BALL MOVING AGAINST COMPRESSION OF SPRING, CHECK EACH BALL.

CODE BAR YIELD SPRING (IF SO EQUIPPED)

REQUIREMENT
SELECTOR CLUTCH, CODE BAR CLUTCH, AND TYPE BOX CLUTCH DISENGAGED. NO. 1 CODE BAR IN SPACING POSITION.
MIN. 14 OZS.
MAX. 23 OZS.

TO START CODE BAR SHIFT BAR PILOT MOVING AWAY FROM CODE BAR, CHECK NO. 2 AND COMMON CODE BAR SHIFT BAR IN THE SAME MANNER.
OPERATING UNDER POWER, THE LAMP SHALL LIGHT ON THE DESIRED CHARACTER.

TO ADJUST
SET THE TYPE BOX CARRIAGE TO PRINT THE DESIRED CHARACTER AND POSITION THE CAM DISK COUNTERCLOCKWISE ON THE SPRING DRUM WITH ITS THREE MOUNTING SCREWS LOOSENED SO THAT THE SWITCH JUST OPENS. IF A LINE SHORTER THAN 72 CHARACTERS IS REQUIRED, IT MAY BE NECESSARY TO REMOVE THE CAM DISK SCREWS AND INSERT THEM IN ADJACENT SLOTS IN THE DISK, IF THE RANGE OF ROTATION IN ONE SLOT IS NOT ENOUGH.
Margin-indicating Mechanism (Earlier Design)

Operating under power, the lamp shall light on the desired character. To adjust, set the type box carriage to print the desired character and position the cam disk counterclockwise on the spring drum with its three mounting screws loosened so that the switch just opens. If a line shorter than 72 characters is required, it may be necessary to remove the cam disk screws and insert them in adjacent slots of the disk, if the range of rotation in one slot is not enough.
2.91 Universal Contact (Selector)

(A) CONTACT MOUNTING BRACKET

REQUIREMENT

The drive arm linkage shall be vertically aligned to prevent binds.
To adjust position the contact mounting bracket with its mounting screws loosened.

(B) CONTACT BLOCK

REQUIREMENT

The contact faces shall be in a vertical straight line.
To adjust loosen the two contact mounting screws, press the contact block toward the rear of the typing unit firmly against the screws and tighten the screws.

(C) CONTACT DRIVE ARM POSITION

REQUIREMENT

The contacts shall open equally within 0.010 inch.
To check rotate code bar clutch until it is disengaged and latched in stop position.
Measuring gap between upper contacts, trip code bar clutch and rotate 180 degrees or until lower contact gap reaches its maximum opening. Measure the gap.
To adjust position contact drive arm with its clamp screw loosened.

(D) CONTACT ARM SPRING

REQUIREMENT

With shoulder screw which connects contact arm to drive link removed and spring scale applied vertically upward or downward.
Min. 2 ozs.
Max. 5 ozs.
To open either contact.
2.92 Universal Contact Assembly (Break-Before-Make) Mounted on Stuntbox (Preliminary)

**NOTE**

The adjustments shall be made with the contact bracket assembly removed.

**(A) CONTACT**

1. **REQUIREMENT**
   - The stiffener shall be parallel with the contact bracket.
   - To adjust bend the stiffener.

2. **REQUIREMENT**
   - Each contact spring shall rest against the tip of its stiffener throughout its width.
   - To adjust bend the contact spring.

**(B) NORMALLY OPEN CONTACT GAP REQUIREMENT**

- With the normally closed contact closed
- Min. 0.020 inch -- Max. 0.025 inch
- To adjust -- bend stiffener

**(C) CONTACT SPRING TENSION (تا弹簧)**

- With the swinger held away
- Min. 2 ozs. -- Max. 3 ozs.
- To move each spring away from stiffener.

**NOTE:** If necessary remove and form spring.

**(D) SWINGER SPRING REQUIREMENT**

- Min. 4 ozs. -- Max. 6 ozs.
- To move swinger from normally closed contact.
- To adjust bend swinger.

**NOTES**

1. Check to see that contact points meet squarely.
2. The following adjustments are to be made with contact assembly installed on stunt box.
3. If contact assembly has been removed, a check shall be made to insure that cam has not been installed 180 degrees out of phase. Rotate main shaft so that stripper-shaft driveline moves upward. Latch lever shall then rest against latch cam.

**(E) CONTACT BRACKET REQUIREMENT**

- With the main shaft rotated until the stripper shaft driveline is at its highest position and the latch cam latched by the latch lever, clearance between normally open contact spring and upper end of its stiffener.
- Min. 0.003 inch
- Max. 0.008 inch
- To adjust loosen contact bracket mounting screws. Move bracket to its highest position. With screwdriver in pry point move bracket downward until requirement is met. The width of the latching surface of the latch lever shall extend beyond both cams.
2.93 Universal Contact Assembly (Break-Before-Make) Mounted on Stuntbox (Preliminary)

(A) TIMING

Note

Since the contacts can be adjusted for varied timing, the best procedure is to utilize a distortion test set or an indicator lamp to check for proper adjustment. If this test equipment is not available, adjustment can be made as follows:

(B) DRIVE CAM (TIMING) REQUIREMENT

With the main shaft rotated until the stripper shaft drive link is at its highest position, there shall be

Min. 0.003 inch
Max. 0.008 inch

Between the top of the latch lever and the notch of the latch cam at the closest point when play in stripper bail shaft is taken up for minimum.

To adjust

Turn drive cam on shaft with its mounting screw loosened.

Note

This procedure provides the latest possible closure time. If an earlier closure time is desirable, vary position of cam or use test set.

(C) TRIP CAM (TIMING) REQUIREMENT

With main shaft rotated until the stripper bail shaft has reached its extreme clockwise position, the latch lever shall be resting on the trip cam and the clearance between the latch lever and the latch cam shall be

Min. 0.003 inch
Max. 0.008 inch

To adjust

Rotate trip cam on its shaft with its mounting screw loosened.

Note

This procedure provides the latest possible opening time for the drive cam adjustment. If an earlier opening time is desirable, vary the position of cam, or use a test set.

(D) LATCH LEVER SPRING REQUIREMENT

Latch lever resting on trip cam

Min. 1/2 oz.
Max. 2 ozs.

To move lever away from trip cam.
2.94 Nominal 53.88 Millisecond Spacing Pulse at 100 WPM Operation

NOTE: THE FOLLOWING ADJUSTMENTS SHALL BE MADE ONLY WHERE TIMING REQUIREMENTS ARE SPECIFIED FOR THE NORMALLY CLOSED CONTACTS. THEY MAY BE MODIFIED TO MEET OTHER SPECIFIC REQUIREMENTS.

COMPLETE ALL OF THE FOREGOING STANDARD ADJUSTMENTS FOR THE STUNT BOX UNIVERSAL CONTACT BEFORE PROCEEDING.

(A) NORMALLY OPEN CONTACT GAP (SEE (B) 2.92).
MIN. 0.010 INCH — MAX. 0.025 INCH
IF THERE ARE NO SPECIFIED TIMING REQUIREMENTS FOR THE NORMALLY OPEN CONTACTS. THE CONTACT BRACKET REQUIREMENT IN 2.92 (E) NEED NOT BE MET.

(B) SWINGER INSULATOR CLEARANCE REQUIREMENT
WITH THE STRIPPER SHAFT DRIVELINK AT ITS HIGHEST POINT, THE BAKE LITE INSULATOR ON THE UPPER END OF THE SWINGER SHALL BE SOME TO 0.062 MAX. BELOW START OF LATCH CAM RISE (GAUGED BY EYE).

TO ADJUST
LOOSEN CONTACT BRACKET MOUNTING SCREWS AND POSITION CONTACT BRACKET TO MEET THE REQUIREMENT. THE WIDTH OF THE LATCHING SURFACE OF THE LATCH LEVER SHALL EXTEND BEYOND BOTH CAMS.

(C) TIMING OF NORMALLY CLOSED CONTACTS
PRELIMINARY
WITH THE STRIPPER SHAFT DRIVELINK AT ITS HIGHEST POINT, BEND NORMALLY CLOSED CONTACT STIFFENER TO GIVE MIN. 0.030 INCH — MAX. 0.035 INCH GAP BETWEEN NORMALLY CLOSED CONTACTS.

FINAL
CHECK SPACING PULSE IN ACCORDANCE WITH 2.95. IF NECESSARY, REFINE DRIVE CAM TIMING (B) 2.93 WITHIN SPECIFIED .003 TO .008 LIMITS. RECHECK SPRING TENSIONS (C) AND (D) 2.92. REPEAT STROBE CHECK IF READJUSTMENT WAS NECESSARY.
2.95 **Universal Contact Assembly Mounted on Stuntbox (Final):** The following adjustments shall be applied to the cams that operate the universal contacts to meet the timing requirements of the stripper-blade universal contact. Using a 1A teletypewriter test set, a 28A stroboscopic test set, or equivalent, proceed as shown in TABLE A.

**TABLE A**

<table>
<thead>
<tr>
<th>Procedure</th>
<th>For 83B2 Control Office or Auto. Relay Paint</th>
<th>For WADS “A” Service</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Arrange test set to send into selector magnet of selector mechanism and connect stroboscope in series with 120-volt battery and normally closed universal contact.</td>
<td>Applies</td>
<td>Does not apply</td>
</tr>
<tr>
<td>2. Send repeated LTRS characters from test set and view LTRS characters on stroboscope, adjusting scale to viewed unbiased character.</td>
<td>Applies</td>
<td>Does not apply</td>
</tr>
<tr>
<td>3. View normally closed universal contact on stroboscope while sending repeated LTRS characters from test set (unbiased signal).</td>
<td>Applies</td>
<td>Applies</td>
</tr>
<tr>
<td>4. Adjust cam on right side of universal-contact mechanism until contact closes between 50 to 80 divisions into stop pulse, as viewed on stroboscope.</td>
<td>Applies</td>
<td>Does not apply</td>
</tr>
<tr>
<td>5. <strong>TEST</strong>—With the printer receiving repeated LTRS characters the normally closed contact shall open for 400 ±30 divisions.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

---

**28 TYPING UNIT REQUIREMENTS AND ADJUSTMENTS**

**P34.612**

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### TABLE A (Cont'd)

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<thead>
<tr>
<th>Procedure</th>
<th>For 83B2 Control Office or Auto. Relay Paint</th>
<th>For WADS &quot;A&quot; Service</th>
</tr>
</thead>
<tbody>
<tr>
<td>READJUST — Adjust cam on right side of universal-contact mechanism until contact opens for 400± 15 divisions.</td>
<td></td>
<td>Does not apply Applies</td>
</tr>
<tr>
<td>6. Change stroboscope connections from normally closed contact to normally open contact and observe that contact remains closed for at least 238 divisions. Also note that it closes prior to end of third selective pulse. If the closure time is less than 238 divisions re-check all the mechanical adjustments.</td>
<td></td>
<td>Applies</td>
</tr>
</tbody>
</table>
2.96 Form Feed-out Mechanism

SLIDE ARM

BAIL

SPRING

ECCENTRIC POST

LEFT SIDE FRAME OF TYPING UNIT AS VIEWED FROM RIGHT

FORM FEED-OUT TORSION SPRING TENSION REQUIREMENT
MIN. 1/8 OZ.
MAX. 1-1/4 OZ.
TO START BAIL MOVING TOWARDS REAR OF UNIT.
TO CHECK DISENGAGE LINE FEED CLUTCH TRIP LEVER.

28 TYPING UNIT REQUIREMENTS AND ADJUSTMENTS
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2.97 **Answer-back Stuntbox Contact (TWX)**

![Diagram of Answer-back Stuntbox Contact (TWX)]

**Requirement**

**Clearance between contact insulator and function lever**

Min. some - Max. 0.008 inch

To check:

- STUNTBOX mounted on typing unit and LTRS combination manually set up on typing unit selector. Rotate typing unit main shaft until function lever is in extreme forward position toward contact insulator.

To adjust with contact mounting screws loosened, add or remove shims as required.
3. ASSOCIATED BELL SYSTEM PRACTICES

3.01 The following Bell System Practice contains additional information related to this section.

Subject  
Alphabetical Index of 28-type Equipment, Bell System Practices, and Associated 28 ASR Station Drawings  P34.001

CHANGES AUTHORIZED BY P98. SERIES BELL SYSTEM PRACTICES

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</tr>
<tr>
<td>2.88</td>
<td>CODEBAR YIELD SPRING</td>
<td>P98.861</td>
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