BULLETIN 256B

ADJUSTMENTS AND LUBRICATION

MODEL 28
NON-TYPING REPERFORATOR
LRPE

TELETYPE®
CORPORATION

SUBSIDIARY OF Western Electric Company INC.
CHICAGO, ILLINOIS, U.S.A.

© 1968 AND 1969 TELETYPE CORPORATION IN UNITED STATES. COPYRIGHT IN ALL COUNTRIES PARTICIPATING IN INTERNATIONAL CONVENTION AND PAN AMERICAN CONVENTIONS. ALL RIGHTS RESERVED INCLUDING RIGHTS OF TRANSLATIONS INTO ALL LANGUAGES.

Printed in U.S.A.
### LIST OF EFFECTIVE PAGES

October, 1960
Supersedes August, 1959 issue.

<table>
<thead>
<tr>
<th>PAGE NUMBER</th>
<th>CHANGE IN EFFECT</th>
<th>PAGE NUMBER</th>
<th>CHANGE IN EFFECT</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Change 2</td>
<td>1-19 to 21</td>
<td>Change 2</td>
</tr>
<tr>
<td>B</td>
<td>Change 1</td>
<td>1-22 to 23</td>
<td>Change 1</td>
</tr>
<tr>
<td>C to D</td>
<td>Change 2</td>
<td>1-24</td>
<td>Change 2</td>
</tr>
<tr>
<td>1-1</td>
<td>Change 1</td>
<td>1-25 to 30</td>
<td>Change 1</td>
</tr>
<tr>
<td>1-2</td>
<td>Change 2</td>
<td>1-31</td>
<td>Change 2</td>
</tr>
<tr>
<td>1-3</td>
<td>Original</td>
<td>1-32 to 33</td>
<td>Change 2</td>
</tr>
<tr>
<td>1-4</td>
<td>Change 1</td>
<td>1-34</td>
<td>Change 2</td>
</tr>
<tr>
<td>1-5 to 1-6</td>
<td>Original</td>
<td>1-35 to 52</td>
<td>Change 1</td>
</tr>
<tr>
<td>1-7</td>
<td>Change 1</td>
<td>1-53 to 68</td>
<td>Change 2</td>
</tr>
<tr>
<td>1-8</td>
<td>Change 2</td>
<td>2-1 to 5</td>
<td>Original</td>
</tr>
<tr>
<td>1-9</td>
<td>Original</td>
<td>2-6</td>
<td>Change 1</td>
</tr>
<tr>
<td>1-10 to 1-11</td>
<td>Change 2</td>
<td>2-7</td>
<td>Original</td>
</tr>
<tr>
<td>1-12 to 1-16</td>
<td>Change 1</td>
<td>2-8 to 9</td>
<td>Change 1</td>
</tr>
<tr>
<td>1-17</td>
<td>Change 2</td>
<td>2-10 to 12</td>
<td>Change 2</td>
</tr>
<tr>
<td>1-18</td>
<td>Change 1</td>
<td>3-1 to 3-2</td>
<td>Change 1</td>
</tr>
</tbody>
</table>

The above list indicates the effective pages as of the date of issue. Upon receipt of change pages, insert them numerically and discard superseded pages.
## SECTION 1 - ADJUSTMENTS

<table>
<thead>
<tr>
<th>Page</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>1-1</td>
<td>1-1</td>
</tr>
<tr>
<td>1-2</td>
<td>1-1</td>
</tr>
<tr>
<td>1-4</td>
<td>1-1</td>
</tr>
<tr>
<td>1-6</td>
<td>1-1</td>
</tr>
<tr>
<td>1-6</td>
<td>1-1</td>
</tr>
<tr>
<td>1-6</td>
<td>1-1</td>
</tr>
<tr>
<td>1-6</td>
<td>1-1</td>
</tr>
<tr>
<td>1-6</td>
<td>1-1</td>
</tr>
<tr>
<td>1-6</td>
<td>1-1</td>
</tr>
<tr>
<td>1-6</td>
<td>1-1</td>
</tr>
<tr>
<td>1-6</td>
<td>1-1</td>
</tr>
<tr>
<td>1-6</td>
<td>1-1</td>
</tr>
<tr>
<td>1-6</td>
<td>1-1</td>
</tr>
<tr>
<td>1-6</td>
<td>1-1</td>
</tr>
<tr>
<td>1-6</td>
<td>1-1</td>
</tr>
<tr>
<td>1-6</td>
<td>1-1</td>
</tr>
<tr>
<td>1-6</td>
<td>1-1</td>
</tr>
<tr>
<td>1-6</td>
<td>1-1</td>
</tr>
<tr>
<td>1-6</td>
<td>1-1</td>
</tr>
<tr>
<td>1-6</td>
<td>1-1</td>
</tr>
<tr>
<td>1-6</td>
<td>1-1</td>
</tr>
<tr>
<td>1-6</td>
<td>1-1</td>
</tr>
<tr>
<td>1-6</td>
<td>1-1</td>
</tr>
<tr>
<td>1-6</td>
<td>1-1</td>
</tr>
<tr>
<td>1-6</td>
<td>1-1</td>
</tr>
<tr>
<td>1-6</td>
<td>1-1</td>
</tr>
<tr>
<td>1-6</td>
<td>1-1</td>
</tr>
<tr>
<td>1-6</td>
<td>1-1</td>
</tr>
</tbody>
</table>

### ADJUSTMENTS

**Automatic Non-Interfering Letters**

- Tape Feed Out Mechanism
  - Adjusting Lever
  - Drive Arm Adjusting Plate
  - Follower Lever
  - Latch Lever
  - Ratchet Stop Block
  - Rear Check Pawl
  - Release Arm
  - Reset Bell Latch
  - Reset Bell Lever
  - Safety Latch
  - Tape Length Adjusting Plate
  - Time Delay Lever
  - Clutch Shoe Lever
  - Code Reading Contacts
    - Contact Bracket
    - Contact Mounting Bracket
    - Contact Mounting Plate
    - Marking Contact Backstops
    - Spacing Contact Backstop
    - Test To Zero Test Set
    - Test 600 O.P.M., Units or lower only
    - Test 1200 O.P.M., Units only
    - Function Clutch Drum End Play
    - Function Clutch Reset Cam
    - Function Clutch Trip Lever
    - Power Backspace Mechanism
      - Armature Hinge
      - Armature Up-Stop
      - Drive Link
      - Feed Pawl
      - Latch
      - Latch Extension
      - Non Repeat Arm
    - Punch Mechanism
      - Detent
      - Feed Hole Lateral Alignment
      - Feed Hole Spacing
      - Feed Pawl
      - Punch Mounting Position
      - Punch Pin Penetration
      - Punch Rocker Arm Position
      - Punch Slide Downstop Position
      - Punch Slide Guide Position
      - Punch Slide Reset Pawl
      - Reset Bell Trip Lever
      - Tape Guide
      - Release Downstop Bracket

### SPRING TENSIONS

- Adjusting Lever
- Automatic Non-Interfering Letters
  - Tape Feed Out Mechanism
    - Drive Arm Spring
    - Feed Pawl and Front Check Pawl Springs
    - Latch Lever Spring
    - Ratchet Return Spring
    - Rear Check Pawl Spring
    - Release Arm Spring
    - Release Lever Spring
    - Reset Bell Latch Spring
    - Reset Bell Trip Lever Spring
    - Safety Latch Spring
    - Time Delay Lever Spring
  - Code Reading Contacts
    - Marking Contact
    - Spacing Contact
    - Swinger Contact
  - Clutch Shoe
  - Clutch Shoe Lever
  - Function Clutch Latch Lever
  - Function Clutch Release
  - Main Trip Lever
  - Power Backspace Mechanism
  - Armature Bail
b. REPERFORATOR BASE

ADJUSTMENTS
Gear Mesh 1-58
Switch Lever 1-57
Switch Mechanism Mounting Plate 1-57
Tape - Out Lever 1-56
Timing Belt 1-58
Wire Tape Guide 1-58

SPRING TENSIONS
Switch Lever 1-56
Tape - Out Lever 1-56
SECTION 1

ADJUSTMENTS AND SPRING TENSION

1. INTRODUCTION

a. This bulletin presents maintenance information for the Teletype Model 28 Non-Typing Reperator. It is divided into three sections which cover adjustments, lubrication, and disassembly respectively.

b. It is assumed that the mechanisms illustrated in this bulletin are being viewed from a position in front of the equipment, unless the illustrations are specifically labeled otherwise. In the line drawings, pivot points are shown by circles that are solid black to indicate fixed points and cross-hatched to indicate movable points. References in the text to LEFT or RIGHT, UP or DOWN, FRONT or REAR apply to the unit in its normal operating position with the viewer facing the selector and the punch.

c. The spring tensions given in this bulletin are indicated values and should be checked with Teletype scales in the positions shown in the drawings. Springs which do not meet the requirements, and for which there are no adjusting procedures, should be discarded and replaced by new springs.

d. When rotating the main shaft of the reperator by hand, the clutches do not fully disengage upon reaching their stop positions. In order to relieve the drag on the clutches and permit the main shaft to rotate freely, apply a screwdriver to the stop lug of each cam disk and push in the normal direction of rotation until the latch lever falls into the notch in the cam disk. This procedure should always be followed prior to applying power to the unit or when a requirement calls for a clutch to be disengaged.

e. To manually operate the non-typing reperator, first attach an armature clip to the selecting mechanism as follows: Carefully place the flat-formed portion of the clip over the armature between the pole pieces, and lock the extruded projection under the armature. Hook the clip's other end over the bakelite guard. The spring pressure of the clip will hold the armature in its marking (attracted) position. Rotate the main shaft counterclockwise until the clutches reach their stop position. Fully disengage the clutches as previously instructed. Release the armature momentarily, to allow the selector clutch to engage. Turn the main shaft slowly until all the push levers have fallen to the left of their selector levers. Strip the push levers from the selector levers corresponding to the spacing elements of the code combination to be processed (the push levers and selector levers are numbered in succession 1 to 5 from rear to front). The main shaft can then be rotated until the required condition is set up, or the character or function represented by the code combination is cleared through the unit.

f. All contacts should meet squarely. Smaller contacts should fall wholly within the circumference of larger mating contacts. Contacts that are the same size should not be out of alignment by more than 25% of the contact diameter. Avoid sharp kinks or bends in the contact springs.
a. NON-TYPING REPERFORATOR

NOTE
WHEN THIS EQUIPMENT IS USED ON THE REPERFORATOR TRANSMITTER SET OR THE AUTOMATIC SEND-RECEIVE KEYBOARD, SEE BULLETIN 248b OR 250b RESPECTIVELY FOR INTERRELATE ADJUSTMENTS BETWEEN THE ASSOCIATED UNIT AND THE NON-TYPING REPERFORATOR.

CLUTCH SHOE LEVER (BOTH CLUTCHES)
REQUIREMENT
GAP BETWEEN CLUTCH SHOE LEVER AND ITS STOP LUG SHOULD BE 0.055 INCH TO 0.085 INCH GREATER WHEN CLUTCH IS ENGAGED THAN WHEN CLUTCH IS DISENGAGED.
TO CHECK
DISENGAGE CLUTCH AND MEASURE GAP. ALIGN HEAD OF DRUM MOUNTING SCREW WITH STOP LUG. ENGAGE CLUTCH. MANUALLY PRESS SHOE LEVER AGAINST STOP LUG AND ALLOW TO SNAP APART. MEASURE GAP WITH CLUTCH ENGAGED.
TO ADJUST
ENGAGE WRENCH OR SCREWDRIVER WITH LUG ON ADJUSTING DISK. ROTATE DISK WITH CLAMP SCREWS LOOSENED.

NOTE
AFTER MAKING ADJUSTMENT, DISENGAGE CLUTCH. REMOVE DRUM MOUNTING SCREW. ROTATE DRUM IN NORMAL DIRECTION AND CHECK TO SEE IF IT DRAGS ON SHOE. IF IT DOES, REFINE ADJUSTMENT.

FIGURE 1. FUNCTION AND SELECTOR CLUTCHES
CLUTCH SHOE LEVER SPRING TENSION

REQUIREMENT
CLUTCH ENGAGED. CAM DISK HELD TO PREVENT TURNING. SPRING SCALE PULLED AT TANGENT TO CLUTCH.
MIN. 16 OZS.
MAX. 22 OZS.
TO MOVE SHOE LEVER IN CONTACT WITH STOP LUG.

NOTE
IN ORDER TO CHECK THIS SPRING TENSION, IT IS NECESSARY TO REMOVE CLUTCH FROM MAIN SHAFT. THEREFORE, IT SHOULD 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 TANGENT TO FRICTION SURFACE.
MIN. 3 OZS.
MAX. 5 OZS.
TO START SHOE MOVING AWAY FROM SECONDARY SHOE AT POINT OF CONTACT.

FUNCTION CLUTCH LATCH LEVER SPRING

REQUIREMENT
FUNCTION CLUTCH IN STOP POSITION BUT LATCH LEVER UNLATCHED.
MIN. 12 OZS.
MAX. 15 OZS.
TO START LATCH LEVER MOVING

FIGURE 2. CLUTCH SPRING TENSIONS
NOTE
THE ADJUSTMENTS ON PAGES 1-4 THROUGH 1-10 ARE APPLICABLE ONLY TO UNITS EQUIPPED WITH TWO CYCLE SELECTORS.

TO FACILITATE MAKING THE FOLLOWING ADJUSTMENTS, REMOVE THE RANGE FINDER ASSEMBLY AND SELECTOR MAGNET ASSEMBLY. TO INSURE BETTER OPERATION, PULL A PIECE OF CLEAN 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 THE ARMATURE.

SELECTOR ARMATURE
NOTE
THESE REQUIREMENTS NEED NOT BE MADE NOR CHECKED IF THE SELECTOR MAGNET BRACKET AND RECEIVING MARGIN REQUIREMENTS ARE MET.

(1) REQUIREMENT
CLEARANCE
MIN. 0.025 INCH
MAX. 0.045 INCH
BETWEEN ARMATURE CLAMP STRIP AND MAGNET BRACKET CASTING.

(2) REQUIREMENT
OUTER EDGE OF ARMATURE SHOULD BE FLUSH WITHIN 0.015 INCH WITH OUTER EDGE OF POLE PIECES.
TO ADJUST
POSITION ARMATURE SPRING ADJUSTING NUT TO HOLD ARMATURE FIRMLY AGAINST PIVOT EDGE OF CASTING. POSITION ARMATURE WITH MOUNTING SCREWS LOOSENED.

SELECTOR ARMATURE DOWNSTOP BRACKET
REQUIREMENT
REMOVE OIL SHIELD. WITH MAGNET DE-ENERGIZED, LOCK LEVERS ON HIGH PART OF THEIR CAM, AND ARMATURE RESTING AGAINST ITS DOWNSTOP, CLEARANCE BETWEEN END OF ARMATURE AND LEFT END OF LEFT POLE PIECE.
MIN. 0.025 INCH
MAX. 0.030 INCH
TO ADJUST
POSITION DOWNSTOP BRACKET WITH MOUNTING SCREW LOOSENED. REPLACE OIL SHIELD AND CHECK OIL SHIELD ADJUSTMENT, FIGURE 6.

FIGURE 3. SELECTOR ARMATURE AND DOWNSTOP BRACKET

CHANGE 1
RANGE FINDER KNOB PHASING

REQUIREMENT
WITH RANGE FINDER KNOB TURNED CLOCKWISE TO END OF RACK, ZERO MARK ON SCALE SHOULD BE IN LINE WITH Scribed LINE ON RANGE FINDER PLATE ± 6 POINTS.
TO ADJUST POSITION KNOB WITH MOUNTING NUT LOOSENED.

NOTE
REPLACE SELECTOR MAGNET ASSEMBLY AND RANGE FINDER ASSEMBLY

---

SELECTOR CLUTCH STOP ARM

REQUIREMENT
RANGE SCALE SET AT 60. SELECTOR CLUTCH disengaged. ARMATURE IN MARKING POSITION. CLUTCH STOP ARM SHOULD ENGAGE CLUTCH SHOE LEVER BY APPROXIMATELY FULL THICKNESS OF SHOE LEVER.
TO ADJUST POSITION STOP ARM ON STOP ARM BAIL WITH CLAMP SCREW LOOSENED.

FIGURE 4. RANGE FINDER MECHANISM
SELECTOR MAGNET BRACKET

(1) REQUIREMENT
SPACING LOCK LEVER ON HIGH PART OF CAM, ARMATURE IN CONTACT WITH POLE PIECE. CLEARANCE BETWEEN SPACING LOCK LEVER AND ARMATURE EXTENSION.
MIN. 0.015 INCH
MAX. 0.025 INCH
TO ADJUST
LOosen TWO MAGNET BRACKET MOUNTING SCREWS AND ADJUSTING LINK CLAMP SCREW. POSITION MAGNET BRACKET AND TIGHTEN LINK CLAMP SCREW ONLY.

(2) REQUIREMENT
MARKING LOCK LEVER ON LOW PART OF CAM, MAGNET ENERGIZED, ARMATURE IN CONTACT WITH POLE PIECE. CLEARANCE BETWEEN LOWER SURFACE OF ARMATURE EXTENSION AND UPPER SURFACE OF MARKING LOCK LEVER.
MIN. 0.002 INCH
MAX. 0.005 INCH
TO ADJUST
POSITION UPPER END OF MAGNET BRACKET. TIGHTEN MOUNTING SCREWS AND RECHECK (1).

FIGURE 5. SELECTOR MAGNET BRACKET
(1) Magnet de-energized, stop arm bail on low part of its cam. Clearance between start lever and oil shield. Min. 0.020 inch Max. 0.030 inch

(2) Magnet energized, stop arm bail on high part of its cam. Clearance between end of armature and oil shield. Min. 0.010 inch

To adjust position shield with mounting screw loosened. Make sure oil shield mounting stud is secure before making adjustment.

Figure 6. Oil shield and selector cam lubricator
RESET BAIL SPRING

PUSH LEVER SPRING

REQUIREMENT
PUSH LEVERS IN SPACING POSITION.
MIN. 1-1/2 OZS.
MAX. 2-1/2 OZS.
TO MOVE PUSH LEVER FROM SELECTOR LEVER.

PUSH LEVER SPRING

REQUIREMENT
PUSH LEVERS IN SPACING POSITION.
PUSH LEVER RESET BAIL ON LOW PART OF CAM.
MIN. 1-1/2 OZS.
MAX. 2-1/2 OZS.
TO MOVE RESET BAIL FROM CAM.

PUSH LEVER SPRING

REQUIREMENT
PUSH LEVER RESET BAIL LATCHED ON PUSH LEVER GUIDE (RAISE PUSH LEVER BAIL AND PUSH TOWARD REAR), SELECTOR LEVERS ON HIGH PART OF THEIR CAMS.
MIN. 1-1/2 OZS.
MAX. 2-1/2 OZS.
TO START EACH SELECTOR LEVER MOVING.

SELECTOR LEVER SPRING

SELECTOR LEVER

SELECTOR LEVER SPRING

SELECTOR LEVER CAM

FIGURE 7. SELECTOR MECHANISM SPRINGS
START LEVER SPRING REQUIREMENT
LATCH LEVER SPRING UNHOOKED, STOP ARM BAIL IN INDENT OF ITS CAM.
RANGE SCALE SET AT 60.
MIN. 9-1/2 OZS.
MAX. 13 OZS.
TO START STOP ARM MOVING.

STOP ARM

STOP ARM BAIL

START LEVER SPRING

CAM DISK

LATCH LEVER

SELECTOR CLUTCH LATCH LEVER SPRING REQUIREMENT
LATCH LEVER RESTING ON LOW PART OF CAM DISK.
MIN. 2-1/2 OZS.
MAX. 4 OZS.
TO START LATCH LEVER MOVING.

FIGURE 8. SELECTOR MECHANISM SPRINGS
MARKING LOCK LEVER SPRING
REQUIREMENT
MAGNET ENERGIZED. SELECTOR CLUTCH DISENGAGED.
MIN. 9 OZS.
MAX. 12 OZS.
TO START LEVER MOVING.

SPACING LOCK LEVER SPRING
REQUIREMENT
MAGNET ENERGIZED. SELECTOR CLUTCH DISENGAGED.
MIN. 19 OZS.
MAX. 26 OZS.
TO START LEVER MOVING.

SELECTOR ARMATURE SPRING
(1) REQUIREMENT (WHEN NO DISTORTION TEST SET IS AVAILABLE)
MARKING LOCK LEVER, SPACING LOCK LEVER, AND START
LEVER ON HIGH PARTS OF THEIR CAMS.
MIN. 2 OZS.
MAX. 2-1/2 OZS.
TO PULL ARMATURE TO MARKING POSITION
(2) REQUIREMENT (WITH DISTORTION TEST SET)
SELECTOR SHOULD BE RELATIVELY FREE OF
INTERNAL BIAS WHEN
CHECKED AS SPECIFIED
IN THE INSTRUCTIONS
FURNISHED WITH SET.
TO ADJUST
POSITION THE
ADJUSTING NUT.

FIGURE 9. SELECTOR MECHANISM SPRINGS
THE ADJUSTMENTS ON PAGES 1-11 THROUGH 1-17 ARE APPLICABLE ONLY TO UNITS EQUIPPED WITH ONE CYCLE SELECTORS.

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.

(1) REQUIREMENT (ARMATURE CLAMP STRIP) CLEARANCE BETWEEN ARMATURE CLAMP STRIP AND CASTING.
MIN. 0.025 INCH  
MAX. 0.045 INCH

(2) REQUIREMENT (ARMATURE ALIGNMENT) FRONT EDGE OF ARMATURE SHOULD BE FLUSH WITHIN 0.015 INCH WITH FRONT EDGE OF POLE PIECES.

(3) REQUIREMENT (ARMATURE BACKSTOP ALIGNMENT) CLEARANCE BETWEEN SIDES OF BACKSTOP AND SIDES OF ARMATURE EXTENSION.
MIN. 0.010 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.

FIGURE 16 SELECTOR MAGNET AND ARMATURE MECHANISM
SELECTOR MAGNET BRACKET

(1) REQUIREMENT
SPACING LOCK LEVER ON 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
LOOSE 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 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.
MAX. 0.003 INCH
TO ADJUST
POSITION UPPER END OF MAGNET BRACKET. TIGHTEN TWO MAGNET BRACKET MOUNTING SCREWS. RECHECK REQUIREMENT (1).

FIGURE 11. SELECTOR MAGNET BRACKET
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 UNDER 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.

FIGURE 12. SELECTOR MECHANISM

CHANGE 1
**Figure 13. Selector Cam Clutch**

- **Selector 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 all 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 should have some end play
  - Max. 0.010 inch
  - To adjust position clutch drum with mounting screw loosened.
FIGURE 14. SELECTOR CLUTCH MECHANISM

CHANGE 1
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 SHOULD 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 SHOULD ENGAGE CLUTCH
SHOE LEVER BY APPROXIMATELY FULL THICKNESS OF SHOE LEVER.
TO ADJUST
POSITION STOP ARM ON STOP ARM BAIL WITH CLAMP SCREW LOOSENED.

FIGURE 15. RANGE FINDER MECHANISM
SELECTOR RECEIVING MARGIN

WHEN A SIGNAL DISTORTION TEST SET IS USED FOR DETERMINING THE RECEIVING MARGINS OF THE SELECTOR, AND WHERE THE CONDITION OF THE COMPONENTS IS EQUIVALENT TO THAT OF NEW EQUIPMENT, THE RANGE AND DISTORTION TOLERANCES BELOW SHOULD BE MET.

SELECTOR RECEIVING MARGIN MINIMUM REQUIREMENTS

<table>
<thead>
<tr>
<th>Current</th>
<th>Points Range with Zero Distortion</th>
<th>Percentage of Marking and Spacing Bias Tolerated</th>
<th>End Distortion Tolerated with Scale at Bias Optimum Setting</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.060 AMP.</td>
<td>72</td>
<td>40</td>
<td>35</td>
</tr>
<tr>
<td>(WINDINGS 75 PARALLEL)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0.020 AMP.</td>
<td>72</td>
<td>40</td>
<td>35</td>
</tr>
<tr>
<td>(WINDINGS SERIES)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

TO ADJUST: REFINE THE SELECTOR ARMATURE SPRING (FIGURE 12)

FIGURE 16. SELECTOR CLUTCH MECHANISM
FUNCTION CLUTCH RESET CAM

REQUIREMENT
RESET CAM RESTING ON HIGH PART OF ITS PIN. CLEARANCE BETWEEN MAIN TRIP LEVER AND RELEASE.

ONE-CYCLE SELECTOR TWO-CYCLE SELECTOR
MIN. 0.010 INCH MIN. 0.015 INCH
MAX. 0.030 INCH MAX. 0.025 INCH

TO ADJUST
POSITION RESET CAM ON ITS SHAFT WITH CLAMP SCREW LOOSENED.

FUNCTION CLUTCH TRIP LEVER

(1) REQUIREMENT
FUNCTION CLUTCH TRIP LEVER SHOULD ENGAGE CLUTCH SHOE LEVER BY FULL THICKNESS OF SHOE LEVER ON LUG WHERE BITE IS LEAST.

(2) REQUIREMENT
CLUTCH TRIP LEVER SHOULD HAVE SOME END PLAY.
MAX. 0.006 INCH

TO ADJUST
POSITION TRIP LEVER ON SHAFT WITH CLAMP SCREW LOOSENED.

FIGURE 17. FUNCTION CLUTCH RESET CAM AND TRIP LEVER
(b) Release Downstop Bracket

Requirement

With Function Clutch tripped, clearance between Trip lever and Clutch Shoe lever:

Min. 0.002 inch --- Max. 0.045 inch

At point where clearance is least.

(On two-stop clutches, use stop which has least clearance)

To adjust

Remove tape guard, position downstop bracket with mounting screws friction tight.

Figure 18. Function Mechanism
MAIN TRIP LEVER SPRING TENSION
REQUIREMENT
TRIP CAM FOLLOWER LEVER ON HIGH PART OF ITS CAM.
MIN. 2-1/2 OZS.
MAX. 4 OZS.
TO START TRIP LEVER MOVING.

FUNCTION TRIP CAM

ADJUSTING LEVER SPRING
TRIP CAM FOLLOWER LEVER
ADJUSTING LEVER
LOCK NUT

ADJUSTING LEVER SPRING TENSION
REQUIREMENT
TRIP CAM FOLLOWER LEVER ON HIGH PART OF ITS CAM AND MAIN TRIP LEVER HELD AWAY FROM ADJUSTING LEVER.
MIN. 2-1/2 OZS.
MAX. 4 OZS.
TO START ADJUSTING LEVER MOVING.

MAIN TRIP LEVER SPRING

TRIP CAM FOLLOWER LEVER
REQUIREMENT
FOLLOWER LEVER ON HIGH PART OF ITS CAM. CLEARANCE BETWEEN MAIN TRIP LEVER AND RELEASE.
ONE-CYCLE SELECTOR MIN. 0.025 INCH MAX. 0.050 INCH
TWO-CYCLE SELECTOR MIN. 0.005 INCH MAX. 0.020 INCH
TO ADJUST POSITION ADJUSTING LEVER AT PRY POINT WITH LOCK NUT LOOSENED.

FUNCTION CLUTCH RELEASE SPRING
REQUIREMENT
FUNCTION CLUTCH TRIPPED. MAIN SHAFT ROTATED UNTIL RELEASE IS RESET ON MAIN TRIP LEVER.
MIN. 5 OZS.
MAX. 8 OZS.
TO START RELEASE MOVING.

FUNCTION CLUTCH RELEASE
RELEASE SPRING
MAIN TRIP LEVER

FIGURE 19. FUNCTION CLUTCH TRIP MECHANISM

CHANGE 2
ROCKER BAIL

REQUIREMENT

WITH ROCKER BAIL POSITIONED TO ITS EXTREME LEFT AND UPPER ROLLER IN CONTACT WITH FUNCTION CAM:

MIN. SOME --- MAX. 0.003 INCH
CLEARANCE BETWEEN CAM AND LOWER ROLLER AT POINT OF LEAST CLEARANCE.

TO ADJUST POSITION LOWER ROLLER MOUNTING SCREW IN ELONGATED SLOT WITH LOCK NUT LOOSENED. CHECK THROUGHOUT A COMPLETE REVOLUTION FOR BINDS.

ROCKER BAIL GUIDE BRACKET

(UNITS WITH ONE-STOP FUNCTION CLUTCH)

REQUIREMENT

ROCKER BAIL ROLLERS SHOULD ENGAGE FULL THICKNESS OF FUNCTION CAM

TO ADJUST POSITION ROCKER BAIL AND GUIDE BRACKET WITH GUIDE BRACKET MOUNTING SCREWS LOOSENED.

ROCKER BAIL GUIDE BRACKET

(UNITS WITH TWO-STOP FUNCTION CLUTCH)

REQUIREMENT

CLEARANCE BETWEEN UPPER ROLLER AND RESET PINS; BETWEEN LOWER ROLLER SCREW HEAD AND FRONT CAM; BETWEEN ROCKER BAIL AND REAR ROCKER CAM.

MIN. 0.010 INCH

TO ADJUST POSITION ROCKER BAIL WITH GUIDE MOUNTING SCREWS LOOSENED.

FIGURE 20. ROCKER BAIL AND GUIDE BRACKET.
PUNCH MOUNTING POSITION - PRELIMINARY

REQUIREMENT
PUNCH MOUNTING SCREWS AND MOUNTING STUD SHOULD BE CENTRALLY LOCATED IN THEIR ELONGATED MOUNTING SLOTS.

TO ADJUST
REMOVE MOUNTING STUD AND LOOSE TWO PUNCH MECHANISM MOUNTING SCREWS AND BRACKET MOUNTING SCREW. POSITION PUNCH MECHANISM SO TAPPED HOLE OF FRAME IS CENTRALLY LOCATED IN LOWER ELONGATED SLOT OF PUNCH MECHANISM BACKPLATE. TIGHTEN TWO PUNCH MECHANISM MOUNTING SCREWS. REPLACE AND TIGHTEN MOUNTING STUD. TIGHTEN BRACKET MOUNTING SCREW.

PUNCH MOUNTING POSITION - FINAL

NOTE
THIS ADJUSTMENT SHOULD BE MADE AFTER THE PUNCH SLIDE GUIDE POSITION ADJUSTMENT. FIGURE 23.

REQUIREMENT
LETTERS CODE COMBINATION SELECTED AND FUNCTION CLUTCH TRIPPED. CLEARANCE BETWEEN PUNCH SLIDE AND PUNCH SLIDE LATCH
MIN. 0.020 INCH
MAX. 0.030 INCH

TO ADJUST
LOOSEN PUNCH MECHANISM MOUNTING SCREWS, BRACKET MOUNTING SCREW, AND MOUNTING STUD. PLACE TIP OF SCREWDRIVER BETWEEN SCREW AND RIM OF PRY HOLE AND PRY PUNCH MECHANISM UP OR DOWN. TIGHTEN ALL SCREWS.

FIGURE 21. PUNCH MOUNTING
NOTE
BEFORE PROCEEDING WITH THE PUNCH UNIT ADJUSTMENTS, CHECK THE ROCKEB BAIL ROLLER ADJUSTMENT.

PUNCH ROCKEB ARM POSITION

REQUIREMENT

1. TRIP FUNCTION CLUTCH AND ROTATE MAIN SHAFT UNTIL ROCKEB BAIL UPPER ROLLER IS ON HIGH PART OF ITS CAM. PLACE 159926 GAUGE AS SHOWN. TAKE UP PLAY TO MAKE CLEARANCE BETWEEN GAUGE AND FEED PAWL STUD A MINIMUM.
   (1) CLEARANCE BETWEEN FEED PAWL STUD AND GAUGE
       MIN. 0.002 INCH
       MAX. 0.005 INCH
   (2) ROCKER ARM SHAFT END PLAY
       MIN. 0.002 INCH
   (3) CLEARANCE BETWEEN ROCKER ARM AND BEARING HUB
       MAX. 0.015 INCH

TO ADJUST

SELECT BLANK CODE COMBINATION AND TRIP FUNCTION CLUTCH. REMOVE PUNCH SLIDE GLIDE, LOOSEN DOWNSTOP STUDS, AND ROTATE MAIN SHAFT UNTIL ROCKEB BAIL UPPER ROLLER IS ON HIGH PART OF ITS CAM. WITH CLAMP SCREW LOOSENED, POSITION ROCKEB ARM AXIALLY AND HORIZONTALLY ON TOGGLE BAIL SHAFT TO MEET REQUIREMENTS. TIGHTEN CLAMP SCREW. PLACE DOWNSTOP IN ITS LOWEST POSITION AND TIGHTEN DOWNSTOP STUDS. REPLACE PUNCH SLIDE GLIDE AND POSITION IT SO THAT ITS SLOTS ARE ALIGNED (AS GAUGED BY EYE) WITH CORRESPONDING PUNCH PINS. TIGHTEN MOUNTING NUTS.

FIGURE 22. PUNCH ROCKEB ARM
(B) PUNCH SLIDE DOWNSTOP POSITION

**REQUIREMENT**
FUNCTION CLUTCH DISENGAGED AND LATCHED IN POSITION WHICH GIVES LEAST CLEARANCE BETWEEN SLIDES AND DOWNSTOP, AND PLAY IN LEFT END OF PUNCH SLIDES TAKEN UP TOWARD TOP, CLEARANCE BETWEEN DOWNSTOP PLATE AND PUNCH SLIDE HAVING LEAST CLEARANCE MIN. SOME MAX. 0.008 INCH

**NOTE**
WITH UNIT IN STOP POSITION, CHECK FOR SOME CLEARANCE. SELECTOR LEVERS SHOULD RETURN FREELY WHEN PUSHED IN NOT MORE THAN 1/16 INCH.
TO ADJUST
REMOVE PUNCH SLIDE GUIDE, LOOSEN DOWNSTOP PLATE MOUNTING STUDS AND POSITION DOWNSTOP PLATE. TIGHTEN STUDS AND REPLACE GUIDE SO THAT PUNCH SLIDES ALIGN WITH PUNCH PINS AS GAUGED BY EYE.

(A) PUNCH PIN PENETRATION

**REQUIREMENT**
LETTERS MANUALLY SELECTED, CLUTCH ENGAGED AND ROTATED UNTIL PUNCH PINS HAVE TRAVELED MAXIMUM DISTANCE INTO THE DIE PLATE, CLEARANCE BETWEEN LOWER EDGE OF PUNCH RETRACTOR BAIL AND UPPER SIDE OF GUIDE PLATE (MEASURED AT LEFT EDGE OF PUNCH PINS WHERE CLEARANCE IS LEAST), MIN. 0.060 INCH MAX. 0.070 INCH
TO ADJUST
ROTATE THE TOGGLE BAIL ECCENTRIC SHAFT WITH ITS LOCK NUT LOOSENED, KEEP THE INDENTATION IN THE ECCENTRIC SHAFT TO THE LEFT OF A VERTICAL CENTERLINE THROUGH THE SHAFT.

(C) PUNCH SLIDE GUIDE POSITION

**REQUIREMENT**
LETTERS SELECTED, FUNCTION CLUTCH ENGAGED AND ROTATED UNTIL THE PUNCH SLIDES JUST TOUCH THE PUNCH PINS, THE PUNCH SLIDES SHOULD ALIGN CENTRALLY WITH THEIR RESPECTIVE PUNCH PINS (GAUGED BY EYE).
TO ADJUST
POSITION THE PUNCH SLIDE GUIDE WITH ITS MOUNTING NUTS LOOSENED.

FIGURE 23. PUNCH SLIDE AND PUNCH PINS

CHANGE 2
Figure 24. Punch Mechanism Reset Bail

(1) Requirement
Letters combination selected, function clutch tripped, punch slides against their downstop. Trip cam follower lever on high part of trip cam. Some clearance between lower edge of slide and upper edge of reset bail at slide having least clearance. Max. 0.007 inch when play is taken up to make clearance a minimum.

(2) Requirement
Clutches disengaged and latched. Reset bail should fully engage notches in punch slides. To adjust position reset bail trip lever by means of its adjusting slot, with its clamp screw loosened.
FIGURE 25. PUNCH UNIT RESET AND FEEDING MECHANISM

PUNCH SLIDE RESET BAIL

REQUIREMENT
BLANK COMBINATION SELECTED.
FUNCTION CLUTCH DISENGAGED AND LATCHED.
CLEARANCE BETWEEN PUNCH SLIDE LATCH
AND PUNCH SLIDE HAVING LEAST CLEARANCE.
MIN. 0.015 INCH
MAX. 0.025 INCH
TO ADJUST
ROTATE RESET BAIL ECCENTRIC SHAFT WITH ITS
LOCK NUT LOOSENED. KEEP INDENTATION IN
SHAFT ABOVE CENTERLINE THROUGH SHAFT.

PUNCH SLIDE LATCH SPRING TENSION

REQUIREMENT
MAGNET ENERGIZED. SELECTOR AND FUNCTION
CLUTCH DISENGAGED AND LATCHED.
MIN. 3/4 OZS.
MAX. 1-3/4 OZS.
TO START EACH LEVER MOVING.

FEED PAWL

REQUIREMENT
FUNCTION CLUTCH DISENGAGED, INDENTATION
IN DETENT LEVER ECCENTRIC AT RIGHT ANGLE
TO LEVER, DETENT ROLLER IN CONTACT WITH
RATCHET WHEEL, HIGH PART OF FEED PAWL
ECCENTRIC TO THE RIGHT OF ITS LOCK SCREW,
THE FEED PAWL SHOULD ENGAGE THE FIRST
TOOTH BELOW A HORIZONTAL CENTERLINE
THROUGH THE RATCHET WHEEL WITH NO
PERCEPTIBLE CLEARANCE.
TO ADJUST
ROTATE THE FEED PAWL ECCENTRIC WITH
LOCK NUT LOOSENED.

NOTE
THIS ADJUSTMENT IS RELATED TO FEED HOLE
SPACING AND THE TWO ADJUSTMENTS MUST
BE MADE AT THE SAME TIME.
FEED HOLE SPACING (PRELIMINARY)

REQUIREMENT
INDENT OF DIE WHEEL ECCENTRIC STUD POINTING DOWNWARD.
TO ADJUST
POSITION DIE WHEEL ECCENTRIC STUD WITH LOCK NUT LOOSENED.
NOTE:
BEFORE PROCEEDING WITH THE FOLLOWING ADJUSTMENTS, CHECK BOTH TAPE GUIDE
SPRING TENSIONS (FIGURE 22).

FEED HOLE SPACING (FINAL)

(1) REQUIREMENT
WITH TAPE SHOE BLOCKED AWAY FROM FEED WHEEL, FEED PAWL AND DETENT
DENGAGED, AND TAPE REMOVED, FEED WHEEL SHOULD ROTATE FREELY. CHECK
THROUGH 3 OR 4 REVOLUTIONS OF FEED WHEEL.

(2) REQUIREMENT
PERFORATE IN ORDER SIX SEQUENCES MADE UP OF NINE BLANK CODE COMBINATIONS
FOLLOWED BY A LETTERS COMBINATION. OPEN CHADS SO CODE HOLES ARE VISIBLE.
PLACE TAPE OVER SMOOTH SIDE OF 156011 GAUGE SO FIRST NO. 2 CODE HOLE
IS CONCENTRIC WITH FIRST 0.072-INCH HOLE IN GAUGE (SEE NOTE BELOW).
SECOND THROUGH FIFTH HOLES IN GAUGE SHOULD BE VISIBLE THROUGH NO. 2 CODE
HOLES IN TAPE. CIRCULAR PORTION OF SIXTH NO. 2 CODE HOLE SHOULD BE ENTIRELY
WITHIN 0.086-INCH HOLE IN GAUGE.

TO ADJUST
(A) WITH TAPE REMOVED, POSITION DIE WHEEL ECCENTRIC STUD (INDENT KEPT BELOW
CENTER OF STUD) WITH LOCK NUT LOOSENED SO DIE WHEEL JUST BINDS ON FEED WHEEL.
BACK OFF ECCENTRIC SO DIE WHEEL IS JUST FREE (CHECK THROUGH 3 REVOLUTIONS).
(B) REFINE ABOVE ADJUSTMENT TO MEET REQUIREMENT (2). MOVE INDENT IN ECCENTRIC
STUD TOWARD FEED WHEEL TO DECREASE SPACING AND AWAY FROM FEED WHEEL TO
INCREASE SPACING. CAUTION: WITH TAPE REMOVED, MAKE SURE FEED WHEEL AND
DIE WHEEL DO NOT BIND. RECHECK REQUIREMENT (1). IF NECESSARY, REFINE.

NOTE:
FIRST THROUGH FIFTH HOLES IN GAUGE ARE SAME SIZE AS CODE HOLES IN TAPE (0.072
INCH DIAMETER). SIXTH HOLE IN GAUGE IS LARGER (0.086 INCH). THIS ARRANGEMENT
allows f 0.007 INCH VARIATION IN 5 INCHES.

FIGURE 26. TAPE FEED MECHANISM
DETENT

REQUIREMENT
A PIECE OF TAPE CONTAINING NINE FEED HOLES FOLLOWED BY A LETTERS COMBINATION PERFORATED ON THE REPERFORATOR MUST CONFORM TO THE 156011 TAPE GAUGE. THE LATERAL CENTERLINE THROUGH THE CODE HOLES IN THE TAPE SHOULD COINCIDE WITH A LATERAL CENTERLINE THROUGH THE HOLES IN THE GAUGE.

TO ADJUST
ROTATE THE DETENT ECCENTRIC CLOCKWISE TO MOVE THE FEED HOLES TOWARD THE HINGED EDGE OF THE CODE HOLES AND COUNTERCLOCKWISE TO MOVE THE FEED HOLES TOWARD THE TRAILING EDGE OF THE CODE HOLES. TIGHTEN THE ECCENTRIC LOCK NUT AND REFINING THE FEED PAWL ADJUSTMENT.

RECHECK FEED PAWL ADJUSTMENT

FIGURE 27. PUNCH DETENT
FEED HOLE LATERAL ALIGNMENT

REQUIREMENT
WHEN A PIECE OF TAPE CONTAINING NINE
FEED HOLES FOLLOWED BY A LETTERS COM-
BINATION ARE PERFORATED BY THE REPERFOR-
ATOR AND CHECKED BY THE TAPE GAUGE,
THE CODE HOLES IN THE TAPE SHOULD BE
CONCENTRIC WITH THE HOLES IN THE GAUGE

TO ADJUST
TURN THE FEED WHEEL ADJUSTING SCREW IN
OR OUT WITH ITS LOCK NUT LOOSENED.
REFINE DETENT ADJUSTMENT
IF NECESSARY.

FIGURE 28. TAPE FEED MECHANISM
PUNCH SLIDE SPRING

REQUIREMENT
LETTERS COMBINATION SET UP AND PUNCH SLIDES IN SELECTED POSITION UNDER THE PUNCH PINS.
MIN. 2-1/4 OZS.
MAX. 3-1/4 OZS.
TO START EACH SLIDE MOVING

PUNCH BLOCK

RETRACTOR SPRING

RETRACTOR BAIL

PUNCH PIN RETRACTOR SPRING
(1) REQUIREMENT (COMPRESSION SPRING ONLY)
CLUTCH DISENGAGED AND LATCHED,
PUNCH RETRACTOR BAIL SPRINGS UNHOOKED AT LOWER END. SCALE APPLIED TO NO. 3 PUNCH PIN
MIN. 7 OZS.
MAX. 25 OZS.
TO LIFT RETRACTOR BAIL AWAY FROM LOWER GUIDE OF PUNCH BLOCK.

(2) REQUIREMENT (COMBINED COMPRESSION AND RETRACTOR BAIL SPRING) CLUTCH DISENGAGED AND LATCHED, RETRACTOR BAIL SPRINGS HOOKED, SCALE APPLIED TO NO. 3 PUNCH PIN TO START THE RETRACTOR BAIL MOVING.
MIN. 4 LBS.
MAX. 5 LBS.

NOTE
TO FACILITATE REHOOKING TENSION SPRINGS
PLACE PUNCH PINS IN HIGHEST POSITION.

FIGURE 29. PUNCH MECHANISM SPRINGS
FIGURE 30. TAPE GUIDE SPRINGS

TAPE GUIDE SPRING (TAPE CHUTE)

REQUIREMENT
CLUTCH DISENGAGED AND TAPE THREADED THROUGH THE PUNCH ASSEMBLY
IT SHOULD REQUIRE
MIN. 1/2 OZ.
MAX. 1 OZ.

TO JUST MOVE THE SPRING AWAY FROM THE TAPE
TO ADJUST
BEND THE SPRING

TAPE GUIDE SPRING (PUNCH BLOCK)

(1) REQUIREMENT
WITH TAPE REMOVED FROM PUNCH BLOCK, TAPE GUIDE SPRING SHOULD RESET AGAINST CLEARANCE SLOT IN BLOCK IN A SYMMETRICAL MANNER AS GAUGED BY EYE.

(2) REQUIREMENT
WITH TAPE IN THE PUNCH BLOCK AND THE REPERFORATOR OPERATING UNDER POWER, THE SPRING SHOULD NOT DISTORT THE EDGE OF THE TAPE
TO ADJUST
BEND THE SPRING AND POSITION IT WITH ITS MOUNTING SCREW LOOSENED
FEED PAWL SPRING

REQUIREMENT
FUNCTION CLUTCH DISENGAGED AND LATCHED, DETENT SPRING UNHOOKED FROM TOGGLE BAIL
MIN. 3 OZS.
MAX. 4-1/2 OZS.
TO START THE DETENT LEVER MOVING

FIGURE 31. TAPE FEED MECHANISM SPRINGS
TAPE GUIDE

REQUIREMENT
ADJUSTING PLATE RESTING AGAINST BACKSTOP POST AND TAPE IN PUNCH.
CLEARANCE BETWEEN BOTTOM OF TAPE GUIDE AND TAPE
MIN. 0.002 INCH
MAX. 0.006 INCH
TO ADJUST
POSITION ADJUSTING PLATE WITH ITS CLAMP SCREW LOOSENED.

TAPE DEPRESSOR SLIDE SPRING

REQUIREMENT
ROCKER BAIL IN ITS EXTREME LEFT POSITION
MIN. 1 OZ.
MAX. 2 OZS.
TO START DEPRESSOR SLIDE MOVING

TAPE SHOE TORSION SPRING

REQUIREMENT
MIN. 13 OZS.
MAX. 18 OZS.
TO MOVE TAPE SHOE FROM FEED WHEEL.

FIGURE 32. TAPE GUIDE AND TAPE DEPRESSOR SLIDE
ARMATURE HINGE
REQUIREMENT
WITH ARMATURE HELD AGAINST POLE FACE (ARMATURE BAIL SPRING UNHOOKED)
MAX. 0.004 INCH
BETWEEN ARMATURE AND MAGNET MOUNTING BRACKET WITH PLAY TAKEN UP FOR MINIMUM.
TO ADJUST
WITH MOUNTING SCREWS LOOSENED,
POSITION HINGE. WHILE ADJUSTMENT
IS BEING MADE, ARMATURE SHOULD
TOUCH FRONT AND REAR OF POLE FACE.

*NOTE:
THIS ADJUSTMENT IS MADE AT FACTORY AND SHOULD NOT BE DISTURBED UNLESS A
REASSEMBLY OF THE UNIT IS UNDERTAKEN. IF NECESSARY TO MAKE THIS ADJUSTMENT,
THE PUNCH UNIT SHOULD BE REMOVED. SEE DISASSEMBLY AND REASSEMBLY. REMAKE
PUNCH UNIT POSITION ADJUSTMENT.

FIGURE 33. POWER DRIVE BACKSPACE MECHANISM
**Figure 34. Power Drive Backspace Mechanism**

**Drive Link Requirement**
- Backspace mechanism in operated position. Feed wheel in detented position. Latch engaged with eccentric arm. High part of eccentric to right. Clearance between feed pawl and feed wheel ratchet tooth.

**Drive Link Screw**
- Min. some 0.003 inch

**To Adjust**
- By means of pry point, position adjusting link with drive link screw friction tight.

**Armature Bail Extension**

**Note:**
- This adjustment is made at factory and should not be disturbed unless a re-assembly of the unit is undertaken. If necessary to make this adjustment, punch should be removed. See disassembly and reassembly, remake punch position adjustment.

**Latch Extension Requirement**
- Backspace mechanism in unoperated position. High part of eccentric to left. Armature against pole face. Latch resting on eccentric arm notch. Clearance between top of armature bail extension and latch extension min. 0.005 inch max. 0.020 inch

**To Adjust**
- Swing magnet clockwise or counterclockwise, as necessary, with mounting screws friction tight.
LATCH EXTENSION SCREW

ARMATURE BAIL EXTENSION

LATCH EXTENSION

ARM SHOWN IN ITS HIGHEST POINT OF TRAVEL.

LATCH

ECCENTRIC

ECCENTRIC ARM

LATCH REQUIREMENT

BACKSPACE MECHANISM IN UNOPERATED POSITION. ARMATURE OFF POLE FACE (DE-ENERGIZED). LATCH EXTENSION AGAINST END OF ARMATURE BAIL EXTENSION. ECCENTRIC ARM AT ITS CLOSEST POINT TO UNDERSIDE OF LATCH. CLEARANCE BETWEEN LATCH AND ECCENTRIC ARM.

MIN. 0.005 INCH
MAX. 0.025 INCH

TO ADJUST
POSITION LATCH WITH LATCH EXTENSION SCREW LOOSENED.

FIGURE 35. POWER DRIVE BACKSPACE MECHANISM
NON-REPEAT ARM REQUIREMENT
BACKSPACE MECHANISM IN UNOPERATED POSITION. CLEARANCE BETWEEN TOP SURFACE OF NON-REPEAT ARM AND LOWEST POINT OF LATCH EXTENSION
MIN. 0.002 INCH
MAX. 0.010 INCH
TO ADJUST
POSITION ADJUSTING ARM WITH ARM SCREW LOOSENED FRICITION TIGHT.

FIGURE 36. POWER DRIVE BACKSPACE MECHANISM
LATCH SPRING
REQUIREMENT
BACKSPACE MECHANISM IN UNOPERATED POSITION.
MIN. 2 1/2 OZS.
MAX. 3 1/2 OZS.
TO START LATCH MOVING.

FEED PAWL SPRING
REQUIREMENT
BACKSPACE MECHANISM IN UNOPERATED POSITION.
MIN. 1-3/4 OZS.
MAX. 3-3/4 OZS.
TO START FEED PAWL MOVING.

BELL CRANK SPRING
REQUIREMENT
SPRING UNHOOKED FROM PLATE EXTENSION.
MIN. 19 OZS.
MAX. 23 OZS.
TO PULL TO INSTALLED LENGTH.

PLATE EXTENSION
BELL CRANK SPRING

GEAR SEGMENT SPRING
REQUIREMENT
SPRING UNHOOKED FROM BELL CRANK SPRING POST.
MIN. 22 OZS.
MAX. 26 OZS.
TO PULL TO INSTALLED LENGTH.

LATCH SPRING

GEAR SEGMENT SPRING

BELL CRANK

LATCH EXTENSION SPRING
ARMATURE BAIL SPRING

LATCH EXTENSION SPRING
REQUIREMENT
SPRING UNHOOKED FROM LATCH EXTENSION.
MIN. 3/4 OZ.
MAX. 1 1/4 OZS.
TO PULL TO INSTALLED LENGTH.

ARMATURE BAIL

FIGURE 37. POWER DRIVE BACKSPACE MECHANISM
CODE READING AND TIMING CONTACTS

NOTE 1
UNLESS SPECIFICALLY STATED OTHERWISE, THE FOLLOWING CODE READING CONTACT ADJUSTMENTS APPLY TO BOTH THE TRANSFER (BREAK BEFORE MAKE) TYPE AND MAKE TYPE CONTACTS. WHEN AN ADJUSTMENT IS APPLICABLE TO BOTH TYPES, THE TRANSFER TYPE CONTACTS ARE USED IN THE ILLUSTRATIONS.

NOTE 2
IT IS RECOMMENDED THAT THE FOLLOWING ADJUSTMENTS BE MADE WITH THE CODE READING CONTACT ASSEMBLY REMOVED FROM THE UNIT.

WHEN USING THE CONTACT SPRING BENDER, START WITH THE CONTACT PILE-UP FARthest FROM THE HANDLE OF THE TOOL AND WORK TOWARD THE HANDLE SO AS NOT TO DISTURB ADJUSTMENTS ALREADY MADE.

MARKING CONTACT BACKSTOPS
REQUIREMENT
AS GAUGED BY EYE, FIVE MARKING CONTACT SPRINGS SHOULD ALIGN WITH EACH OTHER AND BE PARALLEL WITH MOUNTING PLATE.
TO ADJUST BEND MARKING CONTACT BACKSTOPS.

MARKING CONTACT SPRINGS-PRELIMINARY
REQUIREMENT
WITH SWINGER CONTACT SPRING HELD AWAY:
MIN. 2 OZS.
MAX. 6 OZS.
TO MOVE EACH SPRING AWAY FROM BACKSTOP.
TO ADJUST BEND MARKING CONTACT SPRINGS.
NOTE TO INCREASE TENSION OF MARKING CONTACT SPRING, IT MAY BE NECESSARY TO BEND BACKSTOP AWAY FROM SPRING, BEND SPRING AND THEN RE-BEND BACKSTOP TO MEET REQUIREMENT OF MARKING CONTACT BACKSTOPS ADJUSTMENT (ABOVE).

FIGURE 38. CODE READING CONTACTS
SWINGER CONTACT SPRINGS—PRELIMINARY
REQUIREMENT
MIN. 30 GRAMS
MAX. 40 GRAMS
TO OPEN MARKING CONTACTS.
TO ADJUST
BEND SWINGER CONTACT SPRINGS.

NOTE:
SPACING CONTACTS (ON TRANSFER TYPE CONTACT ASSEMBLIES ONLY)
ARE NORMALLY OPEN WHEN CONTACT ASSEMBLY IS REMOVED FROM UNIT.

SPACING CONTACT BACKSTOPS (APPLIES TO TRANSFER TYPE CONTACTS ONLY)
REQUIREMENT
GAP BETWEEN SPACING CONTACTS
MIN. 0.025 INCH
MAX. 0.030 INCH
TO ADJUST
BEND SPACING CONTACT BACKSTOPS.

SPACING CONTACT SPRINGS—PRELIMINARY
(APPLIES TO TRANSFER TYPE CONTACTS ONLY)
REQUIREMENT
MIN. 30 GRAMS
MAX. 40 GRAMS
TO MOVE EACH CONTACT SPRING AWAY FROM BACKSTOP
TO ADJUST
BEND SPACING CONTACT SPRINGS.

NOTE:
TO INCREASE TENSION OF SPRING, IT MAY BE NECESSARY TO BEND BACKSTOP
AWAY FROM SPRING, BEND SPRING, AND THEN RE-BEND BACKSTOP TO MEET
REQUIREMENT OF SPACING CONTACT BACKSTOPS ADJUSTMENT ABOVE.

FIGURE 39. CODE READING CONTACTS
NOTE:
The following code reading contact adjustments should be made with the contact assemblies mounted on the unit.

(1) REQUIREMENT
FUNCTION Clutch fully disengaged. Clearance between punch slide insulator and closest marking contact point.
Min. 0.070 inch
Max. 0.090 inch

(2) REQUIREMENT
Letters combination selected and punch pins in highest position. Swinger contact springs should be parallel to punch slide insulator as gauged by eye.
To adjust position contact mounting bracket with mounting screws loosened.

CONTACT MOUNTING PLATE
Requirement
Each swinger contact spring should be aligned with its associated punch slide insulator as gauged by eye.
To adjust position contact mounting plate with mounting screws loosened.

FIGURE 40. CODE READING CONTACTS

CHANGE 1
CONTACT BRACKET—PRELIMINARY (APPLIES TO TRANSFER TYPE CONTACTS ONLY)

(1) REQUIREMENT

MANUALLY SELECT BLANK CODE COMBINATION. ROTATE MAIN SHAFT UNTIL FUNCTION CLUTCH TRIPS. THE CLEARANCE BETWEEN SPACING CONTACT SPRING AND ITS BACKSTOP. MAX. 0.008 INCH

(2) REQUIREMENT

MANUALLY SELECT LETTERS CODE COMBINATION. ROTATE MAIN SHAFT UNTIL FUNCTION CLUTCH TRIPS. CLEARANCE BETWEEN PUNCH SLIDE INSULATOR AND SWINGER CONTACT SPRING. MIN. 0.028 INCH

TO ADJUST
POSITION CONTACT BRACKET WITH ITS MOUNTING SCREWS. LOOSENED TO MEET REQUIREMENT (1). TO PRY BRACKET TO LEFT, INSERT SCREWDRIVER BETWEEN BRACKET AND LEFT EDGE OF MOUNTING SCREWS; TO PRY BRACKET TO RIGHT, INSERT SCREWDRIVER BETWEEN BRACKET AND RIGHT EDGE OF MOUNTING SCREWS. CHECK REQUIREMENT (2). IF NOT MET, REFINE ADJUSTMENT.

FIGURE 41. CODE READING CONTACTS
CONTACT BRACKET—PRELIMINARY (APPLIES TO MAKE TYPE CONTACTS ONLY)

(1) REQUIREMENT
MANUALLY SELECT BLANK CODE COMBINATION. ROTATE MAIN SHAFT UNTIL FUNCTION CLUTCH TRIPS AND PUNCH SLIDES ARE AGAINST THEIR RESPECTIVE LATCHES.
GAP BETWEEN CONTACTS.
MIN. 0.010 INCH
MAX. 0.015 INCH (SEE NOTE)

NOTE:
FOR UNITS USED ON ASR (AUTOMATIC SEND RECEIVE) SETS, THE CONTACT GAP SHOULD BE 0.015 TO 0.020 INCH.

(2) REQUIREMENT
MANUALLY SELECT LETTERS CODE COMBINATION. ROTATE MAIN SHAFT UNTIL FUNCTION CLUTCH TRIPS. CLEARANCE BETWEEN PUNCH SLIDE INSULATOR AND SWINGER CONTACT SPRING:
MIN. 0.028 INCH

TO ADJUST
POSITION CONTACT BRACKET WITH MOUNTING SCREWS FRICION TIGHT. TO PRY BRACKET TO LEFT, INSERT SCREW DRIVER BETWEEN BRACKET AND LEFT EDGE OF MOUNTING SCREW; TO PRY BRACKET TO RIGHT, INSERT SCREW DRIVER BETWEEN BRACKET AND RIGHT EDGE OF MOUNTING SCREW.

FIGURE 42. CODE READING CONTACTS
NOTE: 
THERE ARE TWO TYPES OF TIMING CONTACT ASSEMBLIES, SINGLE AND DOUBLE. SINGLE CONTACT ASSEMBLIES HAVE A FRONT CONTACT ONLY, NO REAR CONTACT. IF UNIT IS EQUIPPED WITH A DOUBLE CONTACT ASSEMBLY, THE FOLLOWING ADJUSTMENTS APPLY TO BOTH FRONT AND REAR CONTACTS.

NOTE: 
IN CASE OF SINGLE-CONTACT ASSEMBLY, MAKE CERTAIN CONTACT BRACKET MOUNTING SCREWS ARE CENTRALLY LOCATED IN ELONGATED SLOTS, AND PROCEED TO NEXT ADJUSTMENT.

CONTACT MOUNTING SCREWS
CONTACT SPRINGS
CONTACT BACKSTOP (DOUBLE CONTACT ASSEMBLY)
REQUIREMENT
SWINGER OF EACH CONTACT HELD AGAINST ITS BACKSTOP BY ITS OPERATING BAIL AND SPRING, AND CONTACT BRACKET MOUNTING SCREWS CENTRALLY LOCATED IN ELONGATED SLOTS, CLEARANCE BETWEEN OPERATING BAILS MIN. 0.040 INCH ON UNITS EQUIPPED WITH MAX. 0.045 INCH ONE-CYCLE CAMS.

AT POINT OF LEAST CLEARANCE.
TO ADJUST BEND FRONT BACKSTOP LEG.

REAR OPERATING BAIL
FRONT OPERATING BAIL
CONTACT BRACKET MOUNTING SCREWS
FRONT BACKSTOP LEG

CONTACT ALIGNMENT
REQUIREMENT
WHEN PARTS ARE IN ENGAGEMENT: (1) OPERATING BAIL CENTRALLY LOCATED WITH RESPECT TO SWINGER, (2) MATING CONTACT POINTS ALIGNED.
TO ADJUST POSITION CONTACT SPRINGS WITH CONTACT MOUNTING SCREWS LOOSENED.

FIGURE 43. TIMING CONTACTS
NOTE:
IT IS RECOMMENDED THAT THE FOLLOWING TIMING CONTACT ADJUSTMENTS
BE MADE WITH CONTACT ASSEMBLIES REMOVED FROM THE UNIT.

RIGHT CONTACT SPRING

NOTE
THIS ADJUSTMENT APPLIES ONLY TO
ASSEMBLIES WITH LEAF CONTACT SPRING
AND STIFFENER SHOWN BY DOTTED LINES.
REQUIREMENT
SWINGER HELD AGAINST BACKSTOP.
MIN. 1 OZ.
MAX. 5 OZS.
TO MOVE SPRING AWAY FROM STIFFENER.
TO ADJUST
BEND RIGHT (THICK) CONTACT SPRING.

RIGHT CONTACT GAP (NORMALLY CLOSED WHEN
CONTACT ASSEMBLY IS REMOVED FROM UNIT).
REQUIREMENT
SWINGER HELD AGAINST ITS BACKSTOP.
GAP BETWEEN CONTACTS:
MIN. 0.020 INCH
MAX. 0.025 INCH
TO ADJUST
BEND RIGHT CONTACT SPRING.

SWINGER CONTACT SPRING—PRELIMINARY
REQUIREMENT
OPERATING BAIL HELD AWAY FROM SWINGER:
MIN. 4-1/2 OZS.
MAX. 5-1/2 OZS.
TO OPEN RIGHT SIDE OF CONTACT
TO ADJUST
BEND SWINGER CONTACT SPRING. RECHECK
RIGHT CONTACT GAP AND READJUST IF NECESSARY.

LEFT CONTACT GAP (NORMALLY OPEN WHEN
CONTACT ASSEMBLY IS REMOVED FROM UNIT)
REQUIREMENT
OPERATING BAIL HELD AWAY FROM
SWINGER, GAP BETWEEN CONTACTS:
MIN. 0.020 INCH
MAX. 0.025 INCH
TO ADJUST
BEND STIFFENER.

LEFT CONTACT SPRING—PRELIMINARY
REQUIREMENT
SWINGER HELD AGAINST BACKSTOP BY
ITS OPERATING BAIL AND SPRING.
MIN. 4-1/2 OZS.
MAX. 5-1/2 OZS.
TO OPEN LEFT SIDE OF CONTACT.
TO ADJUST
BEND LEFT CONTACT SPRING. RECHECK
RIGHT CONTACT GAP AND LEFT CONTACT GAP, AND READJUST IF NECESSARY.

FIGURE 44. TIMING CONTACTS
NOTE:
THE FOLLOWING TIMING CONTACT ADJUSTMENTS SHOULD BE MADE WITH CONTACT ASSEMBLY MOUNTED ON UNIT.

OPERATING BAIL SPRINGS

REQUIREMENT
OPERATING BAIL HELD SO THAT SWINGER IS AGAINST BACKSTOP
MIN. 7 OZS.
MAX. 12 OZS.
TO PULL SPRING TO INSTALLED LENGTH.

CONTACT BRACKET
OPERATING BAIL SPRINGS
MOUNTING SCREWS
BACKSTOP

CONTACT BRACKET-PRELIMINARY (FOR UNITS EQUIPPED WITH ONE-CYCLE CAMS)
LOosen LOCKING SCREW. POSITION CAM FOLLOWER ARM, BY MEANS OF ITS ELONGATED MOUNTING HOLE, TO ITS MINIMUM LENGTH ON OPERATING BAIL. TIGHTEN LOCKING SCREW.

REQUIREMENT
SELECTOR AND FUNCTION CLUTCHES DISENGAGED AND LATCHED. CLEARANCE BETWEEN CAM FOLLOWER ROLLER AND FUNCTION CAM.
MIN. 0.050 INCH
MAX. 0.055 INCH

TO ADJUST
POSITION CONTACT BRACKET WITH MOUNTING SCREWS LOOSENED.

NOTE:
ON UNITS EQUIPPED WITH DOUBLE CONTACT ASSEMBLIES, RECHECK CONTACT BACKSTOP ADJUSTMENT. IF REQUIREMENT IS NOT MET, REFINE CONTACT BRACKET ADJUSTMENT.

CONTACT BRACKET-PRELIMINARY (FOR UNITS EQUIPPED WITH TWO-CYCLE CAMS)
LOosen LOCKING SCREW. POSITION CAM FOLLOWER ARM, BY MEANS OF ITS ELONGATED MOUNTING HOLES, TO ITS MAXIMUM LENGTH ON OPERATING BAIL. TIGHTEN LOCKING SCREW.

REQUIREMENT
SELECTOR AND FUNCTION CLUTCHES DISENGAGED AND LATCHED. CLEARANCE BETWEEN BAIL AND SWINGER INSULATOR OF PILE-UP HAVING LEAST CLEARANCE SHOULD BE 0.118 INCH MINUS CLEARANCE "X" BETWEEN BACKSTOP AND SWINGER INSULATOR.

TO ADJUST
POSITION CONTACT BRACKET WITH ITS MOUNTING SCREWS LOOSENED.

NOTE
THE RANGE OF THIS ADJUSTMENT IS 0.005 INCH.
FOR EXAMPLE; IF CLEARANCE "X" IS 0.080 INCH, THE NOMINAL ADJUSTMENT IS 0.038 INCH AND THE RANGE OF ADJUSTMENT IS 0.035 INCH TO 0.040 INCH.
THE FOLLOWING TESTS REQUIRE THE USE OF A TELETYPE SIGNAL DISTORTION TEST SET. THEY SHOULD BE MADE AFTER THE CONTACT ASSEMBLIES HAVE BEEN ADJUSTED AS INSTRUCTED ON THE PRECEDING PAGES. WHERE REQUIREMENTS ARE NOT MET, DESIGNATED ADJUSTMENTS MUST BE REFINED. AND/OR RELATED LENGTHS MAY HAVE TO BE CHANGED TO MEET TIMING REQUIREMENTS.

TESTS ON 600 OPERATION PER MINUTE UNITS OR LOWER SHOULD BE MADE WITH THE PERFORATOR OR REPERFORATOR AND THE TEST SET OPERATING AT 600 O.P.M. TESTS ON 900 O.P.M. UNITS USED ON THE AUTOMATIC SEND-RECEIVE (ASR) SET SHOULD BE MADE WITH THE TEST SET OPERATING AT 600 O.P.M. AND USING KEYBOARD TRANSMISSION. TESTS ON 1200 O.P.M. UNITS SHOULD BE MADE WITH THE REPERFORATOR OPERATING AT 1200 O.P.M. AND THE TEST SET EQUIPPED WITH A TWO CYCLE SCALE AND OPERATING AT 600 O.P.M.

OBSERVATIONS ARE TO BE MADE OF A NEON TRACE ON THE GRADUATED DISK OF A TEST SET. TRACE WILL HAVE TENDENCY TO "JUMP"; THAT IS, IT WILL NOT BE STEADY ENOUGH TO BE ACCURATELY MEASURED. VARIATION MAY BE AS HIGH AS TEN DIVISIONS ON SCALE. MINIMUM SIGNAL LENGTH IS MEASURED BETWEEN LATEST START AND EARLIEST END OF ALL TRACES, MAXIMUM SIGNAL LENGTH IS MEASURED BETWEEN EARLIEST START AND LATEST END OF ALL TRACES.

TO ZERO TEST SET
CONNECT NEON TRACE TO NO. 1 CODE READING CONTACT (REARMOST). WITH UNIT RECEIVING LETTERS CODE COMBINATIONS, OBSERVE AND NOTE POINT AT WHICH TRACE ENDS. TRACES WILL JUMP AS DESCRIBED ABOVE; NOTE EARLIEST END OF TRACES. REPEAT FOR REMAINING CONTACTS. OF ALL TRACES OBSERVED, CHOOSE ONE THAT STARTS THE LATEST. SET "START-ZERO" MARK OF SCALE AT LATEST START OF CHOSEN TRACE. RECORD EARLIEST END OF CHOSEN TRACE FOR FUTURE ADJUSTMENT REFERENCES.

FIGURE 46. SIGNAL DISTORTION TEST SET
CODE READING CONTACTS

(1) ZERO TEST SET AS PREVIOUSLY INSTRUCTED.

(2) CONNECT NEON TRACE TO MARKING SIDE OF A CODE READING CONTACT
(NORMALLY OPEN WHEN UNIT IS IN IDLE CONDITION). WITH UNIT RECEIVING CONTINUOUS LETTERS CODE COMBINATIONS, OBSERVE TRACE. REPEAT FOR ALL FIVE CONTACTS.

REQUIREMENTS
A. SIGNAL LENGTH FOR EACH CONTACT TRACE AND COMBINED CONTACT TRACES.
   MIN. 450 DIVISIONS
   MAX. 994 DIVISIONS
B. BOUNCE SHOULD END WITHIN MAX. OF 20 DIVISIONS OF LATEST START AND Earliest End of All Traces.

(3) (APPLIES TO TRANSFER TYPE CONTACTS ONLY) CONNECT NEON TRACE TO BOTH SIDES OF CONTACT. WITH UNIT RECEIVING LETTERS CODE COMBINATIONS, OBSERVE TRACE.

REQUIREMENTS
A. BREAK IN TRACE INDICATING BREAK BEFORE MAKE.
   MIN. 10 DIVISIONS
B. SIGNAL LENGTH OF SPACING SIDE OF CONTACT
   MIN. 100 DIVISIONS
C. BOUNCE SHOULD END WITHIN 30 DIVISIONS OF LATEST START AND Earliest End of Trace.

(4) TO ADJUST
A. IF REQUIREMENTS UNDER (2) A., (3) A., OR (3) B. ARE NOT MET, REFINE CONTACT BRACKET ADJUSTMENT. WHEN REFINING (2) A., ATTEMPT TO ADJUST TOWARD MAXIMUM SIGNAL LENGTH.
B. IF BOUNCE REQUIREMENTS UNDER (2) B. AND (3) C. ARE NOT MET, REFINE SWINGER CONTACT SPRING AND SPACING CONTACT SPRING TENSIONS.
C. IF ANY REFINEMENTS ARE NECESSARY, REPEAT COMPLETE TEST PROCEDURE.

FIGURE 47. SIGNAL DISTORTION TEST SET
NOTE
TEST PROCEDURES ON THIS PAGE APPLY TO 1200 O.P.M. UNITS ONLY.

CODE READING CONTACTS
(1) ZERO TEST SET AS PREVIOUSLY INSTRUCTED.
(2) CONNECT NEON TRACE TO MARKING SIDE OF A CODE READING CONTACT
(NORMALLY OPEN WHEN UNIT IS IN IDLE CONDITION). WITH UNIT RECEIVING
LETTERS CODE COMBINATIONS, OBSERVE TRACE. REPEAT FOR ALL FIVE
CONTACTS.
A. SIGNAL LENGTH FOR EACH CONTACT TRACE AND COMBINED CONTACT TRACES
MIN. 450 DIVISIONS
MAX. 594 DIVISIONS
B. BOUNCE SHOULD END WITHIN MAX. OF 20 DIVISIONS OF LATEST START
AND EARLIEST END OF ALL TRACES.
(3) TO ADJUST
A. IF REQUIREMENTS UNDER (2) A. ARE NOT MET, REFINE CONTACT
   BRACKET ADJUSTMENT. ATTEMPT TO ADJUST TOWARD MAXIMUM SIGNAL LENGTH.
B. IF BOUNCE REQUIREMENTS UNDER (2) B. ARE NOT MET, REFINE MARKING
   CONTACT SPRING AND SWINGER CONTACT SPRING TENSIONS.
C. IF ANY REFINEMENTS ARE NECESSARY, REPEAT COMPLETE TEST PROCEDURE.

FIGURE 48. SIGNAL DISTORTION TEST SET
NOTE:
TEST PROCEDURES ON THIS PAGE AND THE FOLLOWING PAGE APPLY ONLY TO 600 O.P.M. UNITS (WESTERN UNION PLAN 55 SYSTEM) USING ONE-CYCLE CAMS.

TIMING CONTACTS
(1) ZERO TEST SET AS PREVIOUSLY DESCRIBED.
(2) FRONT CONTACT
   A. CONNECT NEON TRACE TO RIGHT SIDE OF FRONT CONTACT (NORMALLTY OPEN WHEN UNIT IS IN IDLE CONDITION). WITH UNIT RECEIVING CONTINUOUS LETTERS CODE COMBINATIONS, OBSERVE TRACE.
   REQUIREMENTS
   1. LATEST END MIN. OF 35 DIVISIONS BEFORE EARLIEST END OF CODE READING CONTACT TRACES.
   2. EARLIEST START MIN. OF 35 DIVISIONS AFTER LATEST START OF CODE READING CONTACT TRACES.
   3. MIN. TRACE LENGTH 200 DIVISIONS.
   4. BOUNCE SHOULD END WITHIN MAX. 5 DIVISIONS OF LATEST START AND EARLIEST END OF ANY TRACE.
   B. RECORD LATEST START AND EARLIEST END OF TRACE.
   C. (APPLIES ONLY IF COMPLETE TRANSFER CONTACT IS USED). CONNECT NEON TRACE TO BOTH SIDES OF FRONT CONTACT. OBSERVE TRACE.
   REQUIREMENT
   1. BREAK IN TRACE AT TWO PLACES TO INDICATE BREAK BEFORE MAKE.
   MIN. 10 DIVISIONS
   (TEST CONTINUED ON NEXT PAGE)

FIGURE 49. SIGNAL DISTORTION TEST SET.
TIMING CONTACTS CONT'D

(3) REAR CONTACT
A. Connect neon trace to right side of rear contact (normally open when unit is in idle condition). With unit receiving letters code combinations, observe trace.
Requirements
1. Latest end of trace min. of 35 divisions before earliest end of trace of right side of front contact recorded in (2) B.
2. Min. trace length 111 divisions.
3. Earliest start of trace min. of 25 divisions after latest start of trace of right side of front contact recorded in (2) B.
4. Bounce should end within max. 6 divisions of latest start and earliest end of any trace.
B. (Applies only if complete transfer contact is used). Connect neon trace to both sides of rear contact. Observe trace.
Requirements
1. Break in trace at two places to indicate break before make.
Min. 10 divisions

(4) TO ADJUST
A. If trace lengths under (2) A, 1, and (3) A, 2, are both short, refine contact bracket adjustment. If only one trace is short, refine contact backstop adjustment and check right contact gap, left contact gap, swinger contact spring, and left contact spring adjustments.
B. If break before make requirements under (2) C, 1, and (3) B, 1, are not met, refine right contact gap, left contact gap, swinger contact spring, and left contact spring adjustments.
C. If any refinements are necessary, repeat complete test procedure.

FIGURE 50. SIGNAL DISTORTION TEST SET
TEST PROCEDURES ON THIS PAGE APPLY ONLY TO 600 O.P.M. UNITS (BELL 8281 SYSTEM) USING ONE-CYCLE CAMS.

TIMING CONTACTS

(1) ZERO TEST SET AS PREVIOUSLY DESCRIBED.

(2) REAR CONTACT
   A. CONNECT NEON TRACE TO RIGHT SIDE OF REAR CONTACT (NORMALLY OPEN WHEN UNIT IS IN IDLE CONDITION). WITH UNIT RECEIVING LETTERS CODE COMBINATIONS OBSERVE TRACE. REQUIREMENTS
      1. EARLIEST START MIN. OF 35 DIVISIONS AFTER START ZERO MARK.
      2. LATEST END MIN. OF 35 DIVISIONS BEFORE EARLIEST END OF CODE READING CONTACT TRACES RECORDED WHEN ZEROING TEST SET.
      3. MIN. TRACE LENGTH 225 DIVISIONS.
      4. BOUNCE SHOULD END WITHIN MAX. 5 DIVISIONS OF START AND END OF ANY TRACE.

(3) FRONT CONTACT
   A. CONNECT NEON TRACE TO BOTH SIDES OF FRONT CONTACT. WITH UNIT RECEIVING LETTERS CODE COMBINATIONS, OBSERVE TRACE.
   REQUIREMENTS
      1. BREAK IN TRACE TO INDICATE BREAK BEFORE MAKE.
      2.ブEWEEN EARLIEST STARTS OF TRACES OF RIGHT AND LEFT (NORMALLY OPEN AND NORMALLY CLOSED) SIDES OF CONTACT.
      MIN. 325 DIVISIONS—MAX. 420 DIVISIONS
      3. BOUNCE SHOULD END WITHIN MAX. 5 DIVISIONS OF LATEST START AND EARLIEST END OF ANY TRACE.

(4) TO ADJUST
   A. IF TIMING REQUIREMENTS UNDER (2) A. 1., 2., 3., AND (3) A. 1. AND 2. ARE NOT MET, REFINE CONTACT BRACKET ADJUSTMENT AND/OR RIGHT CONTACT GAP, LEFT CONTACT GAP, SWINGER CONTACT SPRING, AND LEFT CONTACT SPRING ADJUSTMENTS.
   B. IF BOUNCE REQUIREMENTS UNDER (2) A. 4. AND (3) A. 3. ARE NOT MET, REFINE SWINGER CONTACT SPRING AND LEFT CONTACT SPRING TENSIONS.
   C. IF ANY REFINEMENTS ARE NECESSARY, REPEAT COMPLETE TEST PROCEDURE.

FIGURE 51. SIGNAL DISTORTION TEST SET
TEST PROCEDURES ON THIS PAGE APPLY ONLY TO 600 O.P.M. UNITS (FAA ADIS) USING ONE-CYCLE CAMS.

NOTE

TIMING CONTACTS
(1) ZERO TEST SET AS PREVIOUSLY DESCRIBED.
(2) REAR CONTACT
   A. CONNECT NEON TRACE TO LEFT SIDE OF REAR CONTACT (NORMALLY CLOSED WHEN UNIT IS IN IDLE CONDITION). WITH UNIT RECEIVING LETTERS CODE COMBINATION OBSERVE TRACE.
   REQUIREMENTS
      1. EARLIEST START MIN. OF 35 DIVISIONS BEFORE EARLIEST END OF ALL CODE READING CONTACTS.
      2. LATEST END MIN. OF 35 DIVISIONS AFTER THE LATEST START OF ALL CODE READING CONTACTS.
      3. BOUNCE SHOULD END WITHIN MAX. 10 DIVISIONS OF START AND END OF ANY TRACE.
(3) TO ADJUST
   A. IF TIMING REQUIREMENTS UNDER (2) A. 1. AND 2. ARE NOT MET, REFINE CONTACT BRACKET ADJUSTMENT AND/OR RIGHT CONTACT GAP, LEFT CONTACT GAP, SWINGER CONTACT SPRING AND LEFT CONTACT SPRING ADJUSTMENTS.
   B. IF BOUNCE REQUIREMENTS UNDER (2) A. 3. ARE NOT MET, REFINE SWINGER CONTACT SPRING AND LEFT CONTACT SPRING TENSIONS.
   C. IF ANY REFINEMENTS ARE NECESSARY REPEAT COMPLETE TEST PROCEDURE.

FIGURE 52. SIGNAL DISTORTION TEST SET
NOTE
TEST PROCEDURES ON THIS PAGE AND THE FOLLOWING PAGE APPLY TO 1200 O.P.M. UNITS ONLY.

TIMING CONTACTS
(1) ZERO TEST SET AS PREVIOUSLY DESCRIBED.
(2) FRONT CONTACT
A. CONNECT NEON TRACE TO RIGHT SIDE OF FRONT CONTACT (NORMALLY OPEN WHEN UNIT IS IN IDLE CONDITION). WITH UNIT RECEIVING LETTERS CODE COMBINATIONS, OBSERVE TRACE.
REQUIREMENTS
1. EARLIEST START MIN. 75 DIVISIONS AFTER START-ZERO MARK.
2. LATEST END MIN. 75 DIVISIONS BEFORE EARLIEST END OF CODE READING CONTACTS RECORDED WHEN ZEROING TEST SET.
3. SHORTEST TRACE LENGTH MIN. OF 285 DIVISIONS.
4. BOUNCE SHOULD END WITHIN MAX. OF 10 DIVISIONS OF EARLIEST START AND LATEST END OF ANY TRACE.
B. CONNECT NEON TRACE TO BOTH SIDES OF FRONT CONTACT. WITH UNIT RECEIVING LETTERS CODE COMBINATIONS, OBSERVE TRACE.
REQUIREMENT
1. MIN. 10 DIVISION BREAK IN TRACE AT FOUR PLACES TO INDICATE BREAK BEFORE MAKE.

TEST CONTINUED ON NEXT PAGE.

FIGURE 53. SIGNAL DISTORTION TEST SET
(3) REAR CONTACT
   A. CONNECT NEON TRACE TO BOTH SIDES OF REAR CONTACT. WITH UNIT RECEIVING LETTERS CODE COMBINATIONS, OBSERVE TRACE REQUIREMENTS
      1. MIN. 10 DIVISION BREAK IN TRACE AT FOUR PLACES TO INDICATE BREAK BEFORE MAKE.
      2. BETWEEN EARLIEST START OF ANY NORMALLY OPEN CONTACT TRACE TO EARLIEST START OF NEXT NORMALLY CLOSED CONTACT TRACE. MIN. 320 DIVISIONS MAX. 380 DIVISIONS

(4) TO ADJUST
   A. IF TRACE LENGTHS UNDER (2) A. 2. AND (3) A. 2. ARE BOTH TOO SHORT, REFINE CONTACT BRACKET ADJUSTMENT. IF TRACE LENGTH UNDER (2) A. 3. ONLY IS SHORT, REFINE CONTACT BACKSTOP ADJUSTMENT AND RECHECK TRACE LENGTH IN (3) A. 2.
   B. IF TIMING REQUIREMENTS UNDER (2) A. 1. AND (2) A. 2. ARE NOT MET, REFINE TRACE LENGTH AS IN (4) A. ABOVE, AND/OR RIGHT CONTACT GAP, LEFT CONTACT GAP, SWINGER CONTACT SPRING, AND LEFT CONTACT SPRING ADJUSTMENTS.
   C. IF BREAK BEFORE MAKE REQUIREMENTS UNDER (2) B. 1. AND (3) A. 1. ARE NOT MET, REFINE RIGHT CONTACT GAP, LEFT CONTACT GAP, SWINGER CONTACT SPRING, AND LEFT CONTACT SPRING.
   D. IF BOUNCE REQUIREMENTS UNDER (2) A. 4. ARE NOT MET, REFINE SWINGER CONTACT SPRING AND LEFT CONTACT SPRING TENSIONS.
   E. IF ANY REFINEMENTS ARE NECESSARY, REPEAT COMPLETE TEST PROCEDURE.

FIGURE 54. SIGNAL DISTORTION TEST SET
b. REPERFORATOR BASE

TAPE-OUT LEVER

REQUIREMENT
TAPE-OUT LEVER SHOULD BE ABLE TO PUSH BOTH SWITCH LEVERS AWAY FROM SWITCH ACTUATORS BUT SHOULD NOT BE ABLE TO LIFT WOOD FILLER WITH DEPLETED TAPE ROLL OUT OF SLOTS IN TAPE CONTAINER.

TO ADJUST IF REQUIREMENT IS NOT MET, CHECK TAPE OUT LEVER AND SWITCH LEVER SPRING TENSIONS (BELOW).

TAPE-OUT LEVER SPRING

REQUIREMENT
MIN. 6 OZS.
MAX. 8 OZS.
TO PULL SPRING TO LENGTH OF 1-17/32 INCHES.

TAPE OUT LEVER SPRING

(WOOD FILLER)

DEPLETED TAPE ROLL

TAPE CONTAINER

TAPE OUT LEVER

SWITCH ACTUATORS

SWITCH LEVERS

SWITCH LEVER SPRINGS

(RIGHT SIDE VIEW)

SWITCH LEVER SPRINGS (2)

REQUIREMENT
MIN. 1-3/4 OZS.
MAX. 2-1/4 OZS.
TO PULL SPRING TO LENGTH OF 1-5/16 INCHES.

FIGURE 55. TAPE OUT MECHANISM
NOTE:
THE INNER ELEMENTS ARE THESE NEARER THE MOUNTING PLATE, THE OUTER ELEMENTS, THOSE FARHER FROM THE MOUNTING PLATE.

NOTE:
ADJUSTMENT CAN BE FACILITATED BY REMOVING SWITCH MECHANISM FROM TAPE CONTAINER.

FIGURE 56. TAPE OUT MECHANISM
TIMING BELT

REQUIREMENT
SLIGHT PRESSURE (8 ± 1 OZ.) AT CENTER
OF SPAN SHOULD DEFLект BELT:
MIN. 3/32 INCH
MAX. 5/32 INCH
CAUTION: BELT SHOULD NOT BE TIGHT.

TO ADJUST
POSITION INTERMEDIATE DRIVE ASSEMBLY WITH
MOUNTING SCREWS LOOSENED.

GEAR MESH

REQUIREMENT
MOTOR DRIVE GEAR AND INTERMEDIATE
SHAFT DRIVEN GEAR SHOULD MESH AT
RIGHT ANGLES.

TO ADJUST
POSITION DRIVE ASSEMBLY WITH
MOUNTING SCREWS LOOSENED, RE-
CHECK TIMING BELT ADJUSTMENT (ABOVE).

WIRE TAPE GUIDE

REQUIREMENT
TAPE SHOULD PASS FREELY THROUGH
WIRE GUIDE AND BE ALIGNED WITH
PERFORATOR GUIDE ASSEMBLY.

TO ADJUST
BEND OR POSITION WIRE GUIDE

FIGURE 57. INTERMEDIATE DRIVE PARTS
c. MOTOR UNIT

**MOTOR ADJUSTING STUD**

**REQUIREMENT**
BARELY PERCEPTIBLE BACKLASH BETWEEN DRIVE GEAR AND DRIVEN GEAR AT POINT WHERE BACKLASH IS LEAST.

**TO ADJUST**
WITH LOCK NUT LOOSENED, POSITION ADJUSTING STUD. TIGHTEN NUT WHILE HOLDING STUD IN POSITION.

---

**MOTOR**

**REQUIREMENT**
OILERS SHOULD BE UPWARD AND APPROXIMATELY EQUIDISTANT FROM A VERTICAL LINE THROUGH MOTOR SHAFT.

**TO ADJUST**
POSITION MOTOR WITH CLAMP SCREWS (2) LOOSENED

---

**CAUTION:**
IF MOTOR BECOMES BLOCKED FOR SEVERAL SECONDS, THERMAL CUT-OUT SWITCH WILL BREAK CIRCUIT. SHOULD THIS HAPPEN, ALLOW MOTOR TO COOL AT LEAST 5 MINUTES BEFORE DEPRESSING RED RESET BUTTON.

---

**FIGURE 58. MOTOR UNIT**
(C) RELEASE LEVER SPRING

TO CHECK TRIP SELECTOR CLUTCH. ROTATE MAIN SHAFT UNTIL RESET CAM FOLLOWER IS ON PEAK OF RESET BAIL CAM. WITH SPRING HOOK, HOLD FRONT RATCHET CHECK PAWL AWAY FROM RELEASE LEVER. REQUIREMENT
MIN. 5 OZS. — MAX. 7 OZS.
TO START RELEASE LEVER MOVING.

(E) SAFETY LATCH SPRING

TO CHECK TRIP FUNCTION CLUTCH BY PIVOTING MAIN TRIP LEVER COUNTERCLOCKWISE (SEE FIGURE 19). ROTATE MAIN SHAFT UNTIL DRIVE LINK IS TO EXTREME LEFT. TRIP SELECTOR CLUTCH AND ROTATE MAIN SHAFT UNTIL RESET CAM FOLLOWER IS ON PEAK OF CAM.

REQUIREMENT
MIN. 1-1/2 OZS. — MAX. 3 OZS.
TO PULL SPRING TO INSTALLED LENGTH.

FIGURE 59. AUTOMATIC NON-INTERFERING LETTERS TAPE FEED OUT MECHANISM
(C) **FEED PAWL AND FRONT CHECK PAWL SPRINGS**

**REQUIREMENT**

With unit in feed out cycle (see "to check" of rear check pawl adjustment below):

- Min. 1 oz. — Max. 3 ozs.
- To pull each spring to installed length.

**(D) REAR CHECK PAWL SPRING**

**REQUIREMENT**

- Min. 28 grams — Max. 56 grams
- To start rear check pawl moving.

**(A) REAR CHECK PAWL**

**TO CHECK**

Place unit in feed out cycle by positioning release lever on lower step of latch lever and advancing high part of time delay cam beyond time delay lever (as shown in figure 62.). Position feed pawl to extreme left.

**REQUIREMENT**

- Min. 0.010 inch — Max. 0.020 inch
- Between rear check pawl and ratchet tooth.

**TO ADJUST**

With clamp screw loosened, position rear check pawl by means of pry point.

**(B) RATCHET STOP BLOCK**

**TO CHECK**

With unit in stop position, place release lever on lower step of latch lever. Permit stop on front ratchet to rest against stop block. Rotate main shaft until feed pawl is in extreme right position.

**REQUIREMENT**

- Min. 0.002 inch — Max. 0.010 inch
- Between front check pawl and front ratchet tooth.

**TO ADJUST**

With two clamp screws loosened, position stop block by means of pry point.

**FIGURE 60.** AUTOMATIC NON-INTERFERING LETTERS TAPE FEED OUT MECHANISM
(B) TIME DELAY LEVER SPRING
REQUIREMENT
WITH UNIT IN STOP POSITION:
MIN. 2 OZS. --- MAX. 3 OZS.
TO PULL SPRING TO INSTALLED LENGTH.

RESET CAM FOLLOWER
ON HIGH PART OF CAM

RELEASE LEVER

RESET BAIL
CAM

TIME DELAY
LEVER SPRING

(A) TIME DELAY LEVER

(1) TO CHECK
TRIP SELECTOR CLUTCH AND ROTATE
MAIN SHAFT UNTIL RESET CAM FOLLOWER IS ON HIGH PART OF RESET BAIL CAM.

REQUIREMENT
MIN. 0.040 INCH --- MAX. 0.060 INCH
CLEARANCE BETWEEN TIME DELAY LEVER AND
HIGH PART OF TIME DELAY CAM.

(2) REQUIREMENT
WITH UNIT IN STOP POSITION:
MIN. SOME
CLEARANCE BETWEEN TIME DELAY LEVER AND
HIGH PART OF TIME DELAY CAM.

TO ADJUST
WITH CLAMP SCREW LOOSENED, POSITION
ECCENTRIC BUSHING.

(C) RATCHET RETURN SPRING
REQUIREMENT
WITH UNIT IN STOP POSITION:
MIN. 5 OZS. --- MAX. 7 OZS.
TO PULL SPRING TO INSTALLED LENGTH.

RATCHET RETURN SPRING
ECCENTRIC BUSHING

FIGURE 61. AUTOMATIC NON-INTERFERING LETTERS TAPE FEED OUT MECHANISM
RELEASE ARM

TO CHECK
PLACE UNIT IN FEED OUT CYCLE BY POSITIONING RELEASE LEVER ON LOWER STEP OF LATCH LEVER. ADVANCE RATCHETS BEYOND TIME DELAY (HIGH PART OF TIME DELAY CAM BEYOND TIME DELAY LEVER). POSITION FEED OUT CAM AS SHOWN.

REQUIREMENT
MIN. 0.010 INCH --- MAX. 0.025 INCH BETWEEN DRIVE ARM AND RELEASE ARM.

TO ADJUST WITH CLAMP NUT LOOSEND, POSITION RELEASE ARM BY MEANS OF ECCENTRIC SCREW ON TIME DELAY LEVER.

ECCENTRIC SCREW (CLAMP NUT ON OTHER END)

FIGURE 62. AUTOMATIC NON-INTERFERING LETTERS TAPE FEED OUT MECHANISM

CHANGE 2
(A) **Drive Arm Spring**

Place unit in feed out cycle by positioning release lever on lower step of latch lever and advancing high part of time delay cam beyond time delay lever (as shown in Figure 62). Rotate main shaft until drive arm roller is on low part of feed out cam.

**Requirement**
- Min. 20 ozs. — Max. 30 ozs.
- To start drive arm moving.

---

(B) **Drive Arm Adjusting Plate**

To check:
- Set up blank code combination (-----) in selector. Place unit in feed out cycle by positioning release lever on lower step of latch lever and advancing high part of time delay cam beyond time delay lever (as shown in Figure 62). Rotate main shaft until drive arm roller is on low part of feed out cam. Make sure that reset bail is in lower position.

**Requirement**
- Min. 0.010 inch — Max. 0.030 inch
- Between punch slide and punch slide latch at slide where clearance is least.

To adjust:
- With clamp screw loosened, position drive arm adjusting plate by means of pry point.

---

**Figure 63. Automatic Non-Interfering Letters Tape Feed Out Mechanism**
(B) ADJUSTING LEVER

TO CHECK
PLACE UNIT IN FEED OUT CYCLE BY POSITIONING RELEASE LEVER ON LOWER STEP OF LATCH LEVER AND ADVANCING HIGH PART OF TIME DELAY CAM BEYOND TIME DELAY LEVER (AS SHOWN IN FIGURE 62.), POSITION MAIN SHAFT SO THAT DRIVE ARM ROLLER IS ON LOW PART OF FEED OUT CAM.

REQUIREMENT
1. MIN. 0.010 INCH --- MAX. 0.030 INCH BETWEEN RELEASE AND MAIN TRIP LEVER.
2. SOME CLEARANCE BETWEEN MAIN TRIP LEVER AND DOWNSTOP BRACKET.

TO ADJUST
WITH CLAMP SCREW LOOSENED, POSITION ADJUSTING LEVER BY MEANS OF PRY POINT.

(A) FOLLOWER LEVER

REQUIREMENT
WITH FOLLOWER LEVER ON HIGH PART OF TRIP CAM:
1. MIN. 0.010 INCH --- MAX. 0.030 INCH BETWEEN RELEASE AND MAIN TRIP LEVER.
2. SOME CLEARANCE BETWEEN MAIN TRIP LEVER AND DOWNSTOP BRACKET.

TO ADJUST
WITH LOCK NUT LOOSENED, POSITION ADJUSTING ARM BY MEANS OF PRY POINT.

FIGURE 64. AUTOMATIC NON-INTERFERING LETTERS TAPE FEED OUT MECHANISM

CHANGE 2
RESET BAIL TRIP LEVER

1. To check:
   - Select letters code combination (12345).
   - Rotate main shaft until function clutch trips.
   - Position punch slides against downstop.

   Requirement:
   - Min. 0.008 inch --- Max. 0.020 inch
   - Between punch slide and reset bail.

2. Requirement:
   - With clutches fully disengaged (see par. 2.D.), reset bail should fully engage notches in punch slides.

   To adjust:
   - With clamp screw loosened, position reset bail trip lever by means of adjusting slot.

FIGURE 65. AUTOMATIC NON-INTERFERING TAPE FEED OUT MECHANISM
TAPE LENGTH ADJUSTING PLATE

NOTE: TAPE FED OUT CAN BE SET FOR ANY LENGTH UP TO 18 INCHES.

(1) TO CHECK
PLACE MECHANISM IN FEED OUT CYCLE BY POSITIONING RELEASE LEVER ON LOWER STEP OF LATCH LEVER. MANUALLY ADVANCE RATCHETS TO POSITION WHERE NEXT ROTATION OF MAIN SHAFT WILL STOP FEED OUT CYCLE. (FEED PAWL MUST BE IN DEEP TOOTH OF REAR RATCHET.)

REQUIREMENT
MIN. 0.002 INCH --- MAX. 0.020 INCH BETWEEN ADJUSTING PLATE AND LATCH LEVER.

(2) REQUIREMENT
WHEN OPERATING UNDER POWER, UNIT SHOULD FEED OUT CORRECT LENGTH OF TAPE.

TO ADJUST
WITH SPRING POST LOOSENED, POSITION ADJUSTING PLATE.

FIGURE 66. AUTOMATIC NON-INTERFERING LETTERS TAPE FEED OUT MECHANISM

CHANGE 2
**A. Reset Bail Latch**

1. To check (vertical clearance)
   - Select letters code combination (12345).
   - Rotate main shaft until function clutch trips and punch slides are to extreme left.
   - Set up blank code combination (------) in selector by stripping all push levers from selecting levers (see figure 7). Rotate main shaft until punch slides are just latched.
   - Requirement: Min. 0.008 inch — Max. 0.020 inch between reset bail and reset bail latch.
   - To adjust:
     - With mounting screws loosened, position mounting plate by means of pry points.

2. Requirement (horizontal clearance)
   - With clutches disengaged.
   - Min. 0.005 inch — Max. 0.020 inch between reset bail and reset bail latch.
   - To adjust:
     - Position reset bail so that approx. half its thickness is below top surface of its latch. With clamp screw loosened, position reset bail latch by means of pry point.

3. To check
   - Select letters code combination (12345).
   - Rotate main shaft until function clutch trips.
   - Set up blank code combination (------) in selector by stripping all push levers from selecting levers (see figure 7). Rotate main shaft to stop position.
   - Requirement: Punch slides latched by punch slide latches.
   - To adjust:
     - Refine (1) and (2) above.

**B. Reset Bail Latch Spring**

- Requirement
  - With unit in stop condition:
    - Min. 1 oz. — Max. 3 ozs.
    - To start reset bail latch moving.

**C. Reset Bail Trip Lever Spring**

- To check:
  - Disengage both clutches.
  - Trip function clutch by pivoting main trip lever counterclockwise (see figure 7).
  - Hold reset bail trip lever up against reset bail.
- Requirement:
  - Min. 18 ozs. — Max. 24 ozs.
  - To pull spring to installed length.

---

**Figure 67. Automatic Non-Interfering Letters Tape Feed Out Mechanism**

1-68 CHANGE 2
SECTION 2
LUBRICATION

1. GENERAL

1.01 The reperforator should be lubricated as directed in this section. The figures indicate points to be lubricated and the kind and quantity of lubricant to be used. Lubricate the reperforator just prior to placing it in service. After a few weeks in service, re-lubricate to make certain that all points receive lubrication. Thereafter, lubricate every 500 hours of operation or every six months, whichever occurs first.

1.02 Use Teletype KS-7470 oil at all locations where the use of oil is indicated. Use KS-7471 grease on all surfaces where grease is indicated.

1.03 All felt oilers should be saturated. The friction surfaces of all moving parts should be lubricated. Over-lubrication which will permit oil or grease to drip or be thrown on other parts should be avoided. Special care must be taken to prevent any oil or grease from getting between the selector armature and its magnet poleface or between electrical contacts.

1.04 Apply a thin film of grease to all gears.

1.05 Apply oil to all cams, including the camming surface of each clutch disk.

1.06 The photographs show the paragraph number referring to particular line drawings of mechanisms and where these mechanisms are located on the unit. Parts in the line drawings are shown in an upright position unless otherwise specified.

1.07 The illustration symbols indicate the following lubrication directions.

- 0 Apply 1 drop of oil.
- 02 Apply 2 drops of oil.
- 04 Apply 4 drops of oil.
- SAT Saturate with oil.
- G Apply thin film of grease.
2.01 SELECTOR MECHANISM

02 BEARING GUIDE SLOTS (5 SLOTS)

SAT FELT WICK

02 ENGAGING SURFACE

TIP OF ARMATURE EXTENSION

02 ENGAGING SURFACES (5 LEVERS)

PUSH LEVERS

02 GUIDE SLOT

MARKING LOCK LEVER

FILL OIL CUP

SELECTOR LUBRICATOR ASSEMBLY

02 GUIDE SLOTS

SELECTOR AND PUSH LEVERS

02 HOOKS - EACH END (14 SPRINGS)

SELECTOR SPRINGS

02 BEARING GUIDE SLOTS

SELECTOR AND LOCK LEVER GUIDE SLOTS

2.03 SELECTOR CAM AND CLUTCH

04 INTERNAL MECHANISM FELT WICK

SAT SELECTOR CLUTCH

02 OIL HOLES - 2

CAM SLEEVE BEARING

02 CAMMING SURFACES

SELECTOR CAM SLEEVE

02 CAMMING SURFACE

CLUTCH DISK
2.04 RANGE FINDER

- ENGAGING SURFACE
- SAT FEEL WICK
- CLUTCH LATCH LEVER
- CLUTCH LATCH LEVER WICK
- HOOK - EACH END
- LATCH LEVER SPRING

2.05 PUNCH UNIT

2.06 PUNCH PINS AND RETRACTOR BAIL

- GUIDES AND NOTCHES (3 PLACES)
- HOOKS-EACH END (4 SPRINGS)
- SPRINGS
- BEARING SURFACE (2-FRONT & REAR)
- SAT FEEL WASHERS (2-FRONT & REAR)
- PUNCH PINS
- ROCKER BAIL SPRING
- RETRACTOR SPRINGS
- RETRACTOR BAIL
- RETRACTOR BAIL
2.07 FEED WHEEL MECHANISM

- Bearing Surface
- Ratchet Teeth (2 Places)
- SAT Felt Washer

FEED WHEEL KNOB
FEED WHEEL
FEED WHEEL
DIE WHEEL

SAT Felt Washers (2)
HOOKS - EACH END (2 Springs)
SAT Felt Washer

SPRING WICKS
SPRING
FEED PAWL

2.08 TAPE SHOE

- Bearing Surface
- Bearing Surface (2) (Front and Rear)

TAPE SHOE
TAPE SHOE ARM

2.09 PUNCH SLIDE MECHANISM

- Guide Slots
- Hooks - Each End (5 Springs)
- Engaging Surfaces (5 Latches)
- Bearing Surface (5 Latches)
- Hooks - Each End (5 Springs)
- Engaging Surface (5)

PUNCH SLIDE AND DEPRESSOR SLIDE GUIDE
PUNCH SLIDE SPRINGS
PUNCH SLIDE LATCH
PUNCH SLIDE LATCH
PUNCH SLIDE LATCH SPRING
RESET BAIL

2.10 ROCKER ARM

- Felt Washer
- Engaging Surface
- Felt Wick
- Hooks - Each End
- Bearing Surface
- Drive Link
- Rocker Arm
- Spring Wick
- Spring
- Rocker Arm

ORIGINAL
2.11 Reset Bail Mechanism

- SAT Felt Washer (2 Washers - Front & Rear)
- TOGGLE LINKS
- ENGAGING SURFACE
- SAT Felt Washers (2 Washers - Front & Rear)
- TOGGLE BAIL
- SAT Felt Washers (2 Washers - Front & Rear)
- TOGGLE BAIL

2.12 Main Shaft and Timing Contacts

2.13 Timing Contacts

- G Contacting Surface
- OPERATING BAIL
- 0 Hooks - Each End (2 Springs)
- OPERATING BAIL SPRINGS
- SAT Felt Washers
- OPERATING BAIL SHAFT
- SAT Felt Washer
- CAM FOLLOWER ARM
2.17 ROCKER BAIL MECHANISM

2.18 ROCKER BAIL MECHANISM

- SAT: FELT WICK
- DRIVE LINK WICK
- 02 ROLLERS - 2
- ROCKER BAIL ROLLERS
- 02 GUIDE SLOT
- ROCKER BAIL GUIDE
- SAT: FELT WICK - USE OIL HOLE
- ROCKER BAIL SHAFT
- 02 PIVOT
- ROCKER BAIL SHAFT

2.19 MAIN TRIP LEVER MECHANISM

- 02 ENGAGING SURFACE
- RELEASE
- 02 GUIDE SLOT
- RELEASE BACKSTOP
- SAT: FELT WICK
- RELEASE BACKSTOP WICK
- 02 PIVOT
- RELEASE
- 02 PIVOT
- MAIN TRIP LEVER
- 0 HOOKS - EACH END (3 SPRINGS)
- TRIP MECHANISM SPRINGS
- 02 ENGAGING SURFACES
- MAIN TRIP LEVER
- 02 PIVOT
- TRIP CAM FOLLOWER LEVER
2.20 BACKSPACE MECHANISM AND MAIN SHAFT

2.21 MAIN AND JACK SHAFT MECHANISMS (TWO SHAFT UNITS)
2.22 MANUAL BACKSPACE MECHANISM

- 02 BEARING SURFACE (REAR)
- G GEAR TEETH
- G GEAR SEGMENT
- 02 BEARING SURFACE
- 0 HOOKS-EACH END
- G CONTACT SURFACE
- 0 HOOKS-EACH END (3 SPRINGS)
- 0 BEARING SURFACE

- BELL CRANK
- RAKE SHAFT
- FEED PAWL
- PAWL SPRING
- FEED PAWL
- SPRING

2.23 POWER DRIVE BACKSPACE MECHANISM

- 02 BEARING SURFACE
- 02 SLIDING SURFACE
- 02 BEARING SURFACE
- 02 ROTATING SURFACE
- 02 BEARING SURFACE
- 0 HOOKS-EACH END (2 SPRINGS)

- LINK
- ECCENTRIC DRIVE ARM FORK
- ARM
- ECCENTRIC
- ARMATURE BAIL
- SPRINGS

CHANGE 1
2.24 NON-TYPING REPERFORATOR

2.25 AUTOMATIC NON-INTERFERING LETTERS TAPE FEED OUT MECHANISM

- O HOOKS-EACH END
- O2 BEARING SURFACE
- O HOOKS-EACH END
- SPRING
- RELEASE ARM
- SPRING
- O2 BEARING SURFACES (2)
- O2 BEARING SURFACE
- O HOOKS-EACH END
- LATCH LEVER
- TIME DELAY LEVER
- SPRING
- G CAMMING SURFACE
- TIME DELAY CAM
- O2 BEARING SURFACE
- TIME DELAY CAM
2.28 AUTOMATIC NON-INTERFERING LETTERS TAPE FEED OUT MECHANISM

- O HOOKS-EACH END
- O2 BEARING SURFACES (PLACE BETWEEN RATCHETS)
- G TEETH
- O HOOKS-EACH END
- O PIVOT POINT
- SPRINGS (2)
- RATCHETS (2)
- RATCHETS (2)
- REAR CHECK PAWL

2.29 AUTOMATIC NON-INTERFERING LETTERS TAPE FEED OUT MECHANISM

- O HOOKS-EACH END
- O PIVOT POINT
- O PIVOT POINT
- O CONTACT SURFACES (2) RESET BAIL
- SPRING
- RESET BAIL LATCH
- RESET BAIL LINK
- O CONTACT SURFACE
- O CONTACT SURFACE
- O HOOKS-EACH END
- RESET BAIL TRIP LEVER
- RESET BAIL LINK
- SPRING

CHANGE 2
1. GENERAL

a. The disassembly procedure presented in this section will break the Model 28 Non-Typing Reperforator down into its major subassemblies. Teletype Parts Bulletin 11728 shows the complete breakdown of the unit and includes illustrations of parts referred to below.

b. If a part that is mounted on shims is to be removed, the number of shims used at each of its mounting screws should be noted so that the same shim pile-up can be replaced when the part is remounted.

c. Retaining rings are made of spring steel and therefore have a tendency to release suddenly. Loss of these rings can be minimized as follows: Hold the retaining ring by hand to prevent it from rotating. Place the blade of a suitable screwdriver in one of the slots in the retaining ring. Rotate the screwdriver in a direction to increase the diameter of the ring and the ring will come off easily without springing away.

2. NON-TYPING REPERFORATOR

a. To Remove Non-Typing Reperforator from its Base (RT set):

   (1) Remove the mounting screw that secures the tape alarm cable clamp.

   (2) Remove the hex mounting nut that secures the reperforator cable clamp adjacent to the reperforator 32 point connector.

   (3) Remove the mounting screws that secure the 32 point connector.

   (4) Remove the mounting screw that secures the 156184 anchor bracket to the base. Remove the three mounting screws that secure the reperforator frame to the base. Lift the reperforator from the base.

b. To Remove Non-Typing Reperforator from its Base (ASR set):

   (1) Disconnect the leads from the selector magnet.

   (2) If unit is equipped with power backspace, disconnect the leads from the backspace magnet.

   (3) If unit is equipped with code reading and timing contacts, remove associated connector or disconnect leads from contacts.

(4) Loosen the two set screws on the 158020 coupling located on the 158073 rear shaft (see Teletype Parts Bulletin 1169B) and slide the coupling to the rear. Remove the mounting screw that secures the 156184 anchor bracket to the base. Remove the three mounting screws that secure the reperforator frame to the base. Carefully lift the reperforator from the base, being careful not to damage the code bar extensions or any associated springs.

c. To Remove Non-Typing Reperforator from its Base (other than RT or ASR sets):

   (1) Disconnect the leads from the selector magnet.

   (2) If unit is equipped with code reading and timing contacts, remove associated connector or disconnect leads from contacts.

   (3) Remove the mounting screw that secures the 156184 anchor bracket to the base. Remove the three mounting screws that secure the reperforator frame to the base. Remove the timing belt from the sprocket on the rear of the main shaft. Lift the reperforator from the base.

   (4) To replace the non-typing reperforator on its base:

      (a) Place the reperforator on its base so that its three mounting holes line up with those on the base. On ASR sets, be careful not to damage the code bar extensions or the punch slide latches. Loosen the mounting screw that secures the 156184 anchor bracket to the punch assembly frame. Thread the previously removed mounting screw through the anchor bracket into the proper tapped hole in the base, but do not tighten the screw. Start the remaining three mounting screws through the reperforator frame mounting holes into the tapped holes in the base; do not tighten the screws. Press the anchor bracket against the base and tighten the screw that secures the bracket to the punch assembly frame. Tighten the screw that secures the bracket to the base. Tighten the three screws that secure the reperforator frame to the base.

      (b) Reconnect any wires that were disconnected during the disassembly. Replace any cable clamps that were removed during the disassembly.

      (c) On RT and ASR sets, refer to Bulletins 248B and 250B respectively for interrelated adjustments.
between perforator unit and base or perforator unit and keyboard.

(d) On other than RT and ASR sets, loosen the three mounting screws that hold the intermediate drive assembly (or gear shift mechanism) on the base. Install the timing belt. Make the Timing Belt adjustment, page 1-41.

d. To Remove Selector Mechanism:

(1) Remove the screw, lock washer, and nut from the 150001 selector clutch drum. Place the 152410 or 158903 reset bail in its raised position. While holding the 152432 or 158929 stop arm and 152405 or 158902 marking lock lever to the left, grasp the cam-clutch by the cam disk (not by the drum) and pull forward while rotating the cam-clutch slowly. The cam-clutch should come off easily; it should not be forced.

(2) Unhook the spring on the 150355 function clutch latch lever. Remove the 156472 spring post by removing its lock nut and lock washer. Remove the 151442 screw and lock washer that secure the 152402 selector lever guide to the selector plate. Remove the 152457 or 159189 oil wick, and remove the 159467 wick holder by means of its mounting screw and lock washer. Remove the selector mechanism.

(3) To replace the selector mechanism, reverse the procedure used to remove it.

e. To Remove Punch Mechanism:

(1) Unhook the 82787 spring and disconnect the 156412 drive link from the 156884 rocker arm.

(2) Remove the three screws, or two screws and one stud, that secure the 156024 punch assembly rear plate to the 159472 main plate. Remove the punch assembly.

(3) If unit is equipped with power backspace, move the punch assembly to the left to disengage it from the slot in the 159961 eccentric arm.

(4) To remount the punch assembly, reverse the procedure used to remove it. Make certain that the 156059 reset bail engages the slot in the 159430 trip lever.

f. To Remove Rocker Ball Assembly:

(1) Unhook the 82787 spring and disconnect the 156412 drive link from the 156884 rocker arm.

(2) Remove the nut, lock washer, and 156921 adjusting lever guide, and remove the 156366 rocker ball shaft. Remove the rocker ball assembly.

(3) To replace the rocker ball assembly, reverse the procedure used to remove it.

g. To Remove Main Shaft Assembly:

(1) Remove the selector cam-clutch as described in paragraph 2.d.(1) above.

(2) Remove the 87401 spring from the function clutch latch lever. Remove the retaining ring, spring washer, and flat washers from the forward end of the main shaft.

(3) For single-shaft units only, remove the screw and lock washer from the 150000 function clutch drum.

(4) Remove the screw and lock washer from the 156236 collar. Remove the screw and lock washer from the 158745 bearing clamp.

(5) Pull main shaft out toward the rear, removing the function clutch and 156236 collar in the process.

(6) To replace the main shaft assembly, reverse the procedure used to remove it. NOTE: When the main shaft is inserted into the function clutch assembly, hold the drum and cam disk firmly together so that the drum is not pushed off the clutch.