BULLETIN 243B

ADJUSTMENTS AND LUBRICATION
MODEL 28

TRANSMITTER DISTRIBUTOR - LBXD
BASES - LBXB, LCXB, LMXB
CABINETS - AC, LBAC

TELETYPEx®
CORPORATION
SUBSIDIARY OF Western Electric Company INC.
SKOKIE, ILLINOIS, U.S.A.
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# LIST OF EFFECTIVE PAGES

**MAY, 1963**

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<table>
<thead>
<tr>
<th>Page Number</th>
<th>Change In Effect</th>
</tr>
</thead>
<tbody>
<tr>
<td>A to F</td>
<td>Change 4</td>
</tr>
<tr>
<td>1-1 to 1-4</td>
<td>Change 4</td>
</tr>
<tr>
<td>1-5, 1-6</td>
<td>Change 5</td>
</tr>
<tr>
<td>1-7 to 1-12</td>
<td>Change 4</td>
</tr>
<tr>
<td>1-13, 1-14</td>
<td>Change 5</td>
</tr>
<tr>
<td>1-15 to 1-17</td>
<td>Change 4</td>
</tr>
<tr>
<td>1-18</td>
<td>Change 5</td>
</tr>
<tr>
<td>1-19 to 1-23</td>
<td>Change 4</td>
</tr>
<tr>
<td>1-24</td>
<td>Change 5</td>
</tr>
<tr>
<td>1-25 to 1-46</td>
<td>Change 4</td>
</tr>
<tr>
<td>1-47 to 1-51</td>
<td>Change 5</td>
</tr>
<tr>
<td>1-52, 1-53</td>
<td>Change 4</td>
</tr>
<tr>
<td>1-54, 1-55</td>
<td>Change 5</td>
</tr>
<tr>
<td>2-1 to 2-4</td>
<td>Change 4</td>
</tr>
<tr>
<td>3-1 to 3-13</td>
<td>Change 4</td>
</tr>
<tr>
<td>3-14</td>
<td>Change 5</td>
</tr>
<tr>
<td>3-15 to 3-17</td>
<td>Change 4</td>
</tr>
<tr>
<td>4-0 to 4-7</td>
<td>Change 4</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 Upon receipt of change pages, insert them numerically and discard any superseded pages.
TRANSMITTER DISTRIBUTOR (L8XD) WITH BASE (L8XB) AND MOTOR UNIT (LMU)
## CONTENTS

### SECTION 1
**BASIC FEATURE ADJUSTMENTS**

1. INTRODUCTION .......................... 1-1
2. GENERAL ............................... 1-1
3. ADJUSTMENTS AND SPRING TENSIONS .... 1-2
   a. Transmitter Distributor ............... 1-2

<table>
<thead>
<tr>
<th>ADJUSTMENTS</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cam Follower Guide</td>
<td>1-7</td>
</tr>
<tr>
<td>Cam Shaft Bearing Retainer</td>
<td>1-3</td>
</tr>
<tr>
<td>Cam Sleeve End Play</td>
<td>1-3</td>
</tr>
<tr>
<td>Clutch Armature Air Gap</td>
<td>1-4</td>
</tr>
<tr>
<td>Clutch Shoe Lever</td>
<td>1-6</td>
</tr>
<tr>
<td>Clutch Trip Assembly</td>
<td>1-4</td>
</tr>
<tr>
<td>Clutch Trip Lever Upper Extension</td>
<td>1-6</td>
</tr>
<tr>
<td>Contact Slide Lever</td>
<td>1-31</td>
</tr>
<tr>
<td>Clutch Lever Switch Bracket</td>
<td>1-23</td>
</tr>
<tr>
<td>Cover Plate</td>
<td>1-32</td>
</tr>
<tr>
<td>Distributor Block Assembly</td>
<td>1-9</td>
</tr>
<tr>
<td>Distributor Contact Gap</td>
<td>1-9</td>
</tr>
<tr>
<td>Feed Lever Set Collar</td>
<td>1-10</td>
</tr>
<tr>
<td>Feed Pawl</td>
<td>1-27</td>
</tr>
<tr>
<td>Feed Wheel Detent</td>
<td>1-26</td>
</tr>
<tr>
<td>Front Panel</td>
<td>1-32</td>
</tr>
<tr>
<td>Idler Gear Assembly</td>
<td>1-3</td>
</tr>
<tr>
<td>Instructions for Replacing and Positioning</td>
<td></td>
</tr>
<tr>
<td>Storing Switch Assembly (Transfer Type)</td>
<td></td>
</tr>
<tr>
<td>Magnet Bracket</td>
<td>1-5</td>
</tr>
<tr>
<td>Oil Reservoir</td>
<td>1-29</td>
</tr>
<tr>
<td>Push Lever</td>
<td>1-28</td>
</tr>
<tr>
<td>Sensing Pin</td>
<td>1-25</td>
</tr>
<tr>
<td>Slide Lever</td>
<td>1-16</td>
</tr>
<tr>
<td>Storing Switch Assembly</td>
<td>1-15</td>
</tr>
<tr>
<td>Storing Switch Assembly Replacement</td>
<td>1-15</td>
</tr>
<tr>
<td>Storing Switch Contacts</td>
<td>1-12</td>
</tr>
<tr>
<td>Storing Switch Contact Assembly (Transfer</td>
<td>1-13</td>
</tr>
<tr>
<td>Type)</td>
<td></td>
</tr>
<tr>
<td>Backstop-Normally Closed Contact</td>
<td>1-13</td>
</tr>
<tr>
<td>Normally Open Contact Gap</td>
<td>1-14</td>
</tr>
<tr>
<td>Spring Tension - Normally Closed Contact</td>
<td>1-13</td>
</tr>
<tr>
<td>Spring Tension - Normally Open Contact</td>
<td>1-13</td>
</tr>
<tr>
<td>Swinger Spring Tension</td>
<td>1-13</td>
</tr>
<tr>
<td>Storing Switch Contact Gap</td>
<td>1-31</td>
</tr>
<tr>
<td>Storing Switch Guides</td>
<td>1-11</td>
</tr>
<tr>
<td>Tape Guide</td>
<td>1-19</td>
</tr>
<tr>
<td>Tape Guide Plate</td>
<td>1-19</td>
</tr>
<tr>
<td>Tape Lid</td>
<td>1-17</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>SPRING TENSIONS</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Armature Bail</td>
<td>1-4</td>
</tr>
<tr>
<td>Auxiliary Lever</td>
<td>1-28</td>
</tr>
<tr>
<td>Cam Follower Lever</td>
<td>1-7</td>
</tr>
<tr>
<td>Clutch Latch Lever</td>
<td>1-5</td>
</tr>
<tr>
<td>Clutch Shoe</td>
<td>1-2</td>
</tr>
<tr>
<td>Clutch Shoe Lever</td>
<td>1-2</td>
</tr>
<tr>
<td>Clutch Trip Lever</td>
<td>1-5</td>
</tr>
<tr>
<td>Contact Slide Lever</td>
<td>1-11</td>
</tr>
<tr>
<td>Control Lever Detent</td>
<td>1-18</td>
</tr>
<tr>
<td>Cover Plate Detent</td>
<td>1-32</td>
</tr>
<tr>
<td>Distributor Rocker</td>
<td>1-8</td>
</tr>
<tr>
<td>Distributor Rocker Compression</td>
<td>1-8</td>
</tr>
<tr>
<td>Feed Lever</td>
<td>1-10</td>
</tr>
<tr>
<td>Feed Pawl</td>
<td>1-27</td>
</tr>
<tr>
<td>Feed Ratchet Detent</td>
<td>1-26</td>
</tr>
<tr>
<td>Latch Lever</td>
<td>1-30</td>
</tr>
<tr>
<td>Latch Stripper Ball</td>
<td>1-29</td>
</tr>
<tr>
<td>Push Lever</td>
<td>1-30</td>
</tr>
<tr>
<td>Push Stripper Ball</td>
<td>1-28</td>
</tr>
<tr>
<td>Sensing Ball</td>
<td>1-25</td>
</tr>
<tr>
<td>Sensing Pin</td>
<td>1-25</td>
</tr>
<tr>
<td>Slide Lever</td>
<td>1-16</td>
</tr>
<tr>
<td>Start-Stop Bail Yield</td>
<td>1-23</td>
</tr>
<tr>
<td>Storing Switch Contact Extension</td>
<td>1-11</td>
</tr>
<tr>
<td>Tape Lid</td>
<td>1-18</td>
</tr>
<tr>
<td>Tape Lid Release Plunger</td>
<td>1-18</td>
</tr>
<tr>
<td>Tape-Out Bail Yield</td>
<td>1-22</td>
</tr>
<tr>
<td>Tape-Out Extension Bail</td>
<td>1-22</td>
</tr>
<tr>
<td>Tape-Out Pin</td>
<td>1-22</td>
</tr>
<tr>
<td>Tight Tape Bail Yield</td>
<td>1-24</td>
</tr>
</tbody>
</table>

b. Self Contained Set Base (LBXB) ................ 1-33

<table>
<thead>
<tr>
<th>ADJUSTMENTS</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intermediate Gear Assembly</td>
<td>1-33</td>
</tr>
<tr>
<td>Motor Pinion</td>
<td>1-33</td>
</tr>
</tbody>
</table>

c. Multiple Transmitter Distributor Base (LMXB) 1-34

<table>
<thead>
<tr>
<th>ADJUSTMENTS</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Counter Shaft</td>
<td>1-35</td>
</tr>
<tr>
<td>Cover Plates</td>
<td>1-36</td>
</tr>
<tr>
<td>Filler Plates</td>
<td>1-36</td>
</tr>
<tr>
<td>Motor Pinion</td>
<td>1-34</td>
</tr>
</tbody>
</table>

d. Automatic Send-Receive Set Transmitter      1-37

## CHANGE 4
<table>
<thead>
<tr>
<th>Paragraph</th>
<th>Page</th>
<th>Paragraph</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>ADJUSTMENTS</td>
<td>1-37</td>
<td>7, 42 Unit Code</td>
<td>1-48</td>
</tr>
<tr>
<td>Base (LCXB) Driving Shaft</td>
<td>1-37</td>
<td>(d) Auxiliary &quot;B&quot; Contact (LBXD7 and 14 - 7, 42 Unit Code)</td>
<td>1-49</td>
</tr>
<tr>
<td>Transmitter Distributor</td>
<td>1-37</td>
<td>(e) Auxiliary Contact (LBXD9 - 7, 42 Unit Code)</td>
<td>1-49</td>
</tr>
<tr>
<td>Driven Gear</td>
<td>1-37</td>
<td>(f) Auxiliary Contact (LBXD8 and 22 - 7, 42 Unit Code)</td>
<td>1-49</td>
</tr>
<tr>
<td>e. Synchronous and Governed Motors (LMU)</td>
<td>1-38</td>
<td>(g) Auxiliary Contact (LBXD800 - 11,00 Unit Code)</td>
<td>1-49</td>
</tr>
<tr>
<td>ADJUSTMENTS</td>
<td>1-38</td>
<td>(h) Auxiliary Contact (LBXD17 and 21 - 7,50 Unit Code)</td>
<td>1-49</td>
</tr>
<tr>
<td>Governed Motor Positioning</td>
<td>1-38</td>
<td>4. Transmitter Contacts - 5 and 8 Level Units</td>
<td>1-50</td>
</tr>
<tr>
<td>Governor Contact</td>
<td>1-38</td>
<td>(a) Preliminary</td>
<td>1-50</td>
</tr>
<tr>
<td>Governor Contact Backstop</td>
<td>1-38</td>
<td>(b) Requirement - LBXD1, 2, 5, 7, 8, 9, 11, 14, 16, 17, 21, 22 and 800 (7, 42 and 7, 50 Unit Code)</td>
<td>1-50</td>
</tr>
<tr>
<td>Governor Motor Speed</td>
<td>1-38</td>
<td>(c) Requirement - LBXD1, 2, 11, 16, and 18 (7, 00 Unit Code)</td>
<td>1-50</td>
</tr>
<tr>
<td>Synchronous Motor Positioning</td>
<td>1-38</td>
<td>(d) Requirement - LBXD4, 6 and 23 (7, 42 Unit Unit)</td>
<td>1-50</td>
</tr>
<tr>
<td>SPRING TENSIONS</td>
<td>1-39</td>
<td>(5) Transmitter Auxiliary Contacts (Make-Only Type)</td>
<td>1-51</td>
</tr>
<tr>
<td>Governor Brush</td>
<td>1-39</td>
<td>(a) Preliminary</td>
<td>1-51</td>
</tr>
<tr>
<td>f. Cabinets</td>
<td>1-40</td>
<td>(b) Requirement - LBXD1, 2 and 11 (7, 42 Unit Code)</td>
<td>1-52</td>
</tr>
<tr>
<td>ADJUSTMENTS</td>
<td>1-41</td>
<td>(c) Requirement - LBXD4, 5, 6, 7, 14 and 23 (7, 42 Unit Code)</td>
<td>1-52</td>
</tr>
<tr>
<td>Front Door (AC)</td>
<td>1-41</td>
<td>(d) Requirement - LBXD1, 2 and 11 (7, 00 Unit Code)</td>
<td>1-53</td>
</tr>
<tr>
<td>Front Door Latch (AC)</td>
<td>1-41</td>
<td>(6) Transmitter Auxiliary Contacts (Transfer Type)</td>
<td>1-53</td>
</tr>
<tr>
<td>Rear Doors (LBAC)</td>
<td>1-40</td>
<td>(a) Preliminary</td>
<td>1-53</td>
</tr>
<tr>
<td>Rear Door Catches (LBAC)</td>
<td>1-40</td>
<td>(b) Requirement - LBXD8, 22, and 800 (7, 42 Unit Code)</td>
<td>1-54</td>
</tr>
<tr>
<td>Table Top (AC)</td>
<td>1-41</td>
<td>(c) Requirement - LBXD9 (7, 42 Unit Code)</td>
<td>1-54</td>
</tr>
<tr>
<td>4. DISTRIBUTOR AND TRANSMITTER CONTACT STROBING</td>
<td>1-43</td>
<td>(d) Requirement - LBXD16 (7, 00 Unit Code)</td>
<td>1-55</td>
</tr>
<tr>
<td>a. General</td>
<td>1-43</td>
<td>(e) Requirement - LBXD18 (7, 00 Unit Code)</td>
<td>1-56</td>
</tr>
<tr>
<td>b. Contact Strobing Procedure - 1 Cycle Cam</td>
<td>1-44</td>
<td>(f) Requirement - LBXD17 and 21 (7, 50 Unit Code)</td>
<td>1-57</td>
</tr>
<tr>
<td>(1) Distributor Contacts - 5 Level Units</td>
<td>1-44</td>
<td>(5) Transmitter Auxiliary Contacts (Make-Only Type)</td>
<td>1-51</td>
</tr>
<tr>
<td>(a) Preliminary</td>
<td>1-44</td>
<td>(b) Requirement - LBXD1, 2 and 11 (7, 42 Unit Code)</td>
<td>1-52</td>
</tr>
<tr>
<td>(b) Stop Contact</td>
<td>1-44</td>
<td>(c) Requirement - LBXD4, 5, 6, 7, 14 and 23 (7, 42 Unit Code)</td>
<td>1-52</td>
</tr>
<tr>
<td>(c) #2 and #4 Contacts</td>
<td>1-45</td>
<td>(d) Requirement - LBXD1, 2 and 11 (7, 00 Unit Code)</td>
<td>1-53</td>
</tr>
<tr>
<td>(d) #1, #3 and #5 Contacts</td>
<td>1-45</td>
<td>(6) Transmitter Auxiliary Contacts (Transfer Type)</td>
<td>1-53</td>
</tr>
<tr>
<td>(2) Distributor Contacts - 8 Level Units</td>
<td>1-47</td>
<td>(a) Preliminary</td>
<td>1-53</td>
</tr>
<tr>
<td>(a) Stop Contact</td>
<td>1-47</td>
<td>(b) Requirement - LBXD8, 22, and 800 (7, 42 Unit Code)</td>
<td>1-54</td>
</tr>
<tr>
<td>(b) #0, #2, #4 and #6 Contacts</td>
<td>1-47</td>
<td>(c) Requirement - LBXD9 (7, 42 Unit Code)</td>
<td>1-54</td>
</tr>
<tr>
<td>(c) #1, #3, #5 and #7 Contacts</td>
<td>1-47</td>
<td>(d) Requirement - LBXD16 (7, 00 Unit Code)</td>
<td>1-55</td>
</tr>
<tr>
<td>(3) Distributor Auxiliary Contacts - 5 and 8 Level Units</td>
<td>1-48</td>
<td>(e) Requirement - LBXD18 (7, 00 Unit Code)</td>
<td>1-56</td>
</tr>
<tr>
<td>(a) Auxiliary &quot;C&quot; Contact (LBXD1, 2, 16 and 18 - 7, 00 Unit Code)</td>
<td>1-48</td>
<td>(f) Requirement - LBXD17 and 21 (7, 50 Unit Code)</td>
<td>1-57</td>
</tr>
</tbody>
</table>
## CONTENTS (Cont'd.)

<table>
<thead>
<tr>
<th>Paragraph</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>c. Contact Strobing Procedure - 2 Cycle Cam (LBX19)</td>
<td>1-58</td>
</tr>
<tr>
<td>(1) Distributor Contacts - #1 through #5</td>
<td>1-58</td>
</tr>
<tr>
<td>(2) Distributor Auxiliary &quot;C&quot; Contact</td>
<td>1-58</td>
</tr>
<tr>
<td>(3) Transmitter Contacts - #1 through #5</td>
<td>1-59</td>
</tr>
<tr>
<td>(4) Transmitter Auxiliary Contacts</td>
<td>1-59</td>
</tr>
<tr>
<td>(a) Requirement - Auxiliary &quot;A&quot; Contact</td>
<td>1-60</td>
</tr>
<tr>
<td>(b) Requirement - Auxiliary &quot;B&quot; Contact</td>
<td>1-60</td>
</tr>
</tbody>
</table>

### SECTION 2
VARIABLE FEATURE ADJUSTMENTS

<table>
<thead>
<tr>
<th>ADJUSTMENTS</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Line Shunt Switch (160370)</td>
<td>2-4</td>
</tr>
<tr>
<td>Line Shunt Switch (172847)</td>
<td>2-4</td>
</tr>
<tr>
<td>Line Shunt Switch (Multiple Base)</td>
<td>2-4</td>
</tr>
<tr>
<td>Tape Deflector Mechanism</td>
<td>2-3</td>
</tr>
<tr>
<td>Deflector Bracket</td>
<td>2-3</td>
</tr>
<tr>
<td>Deflector Spring</td>
<td>2-3</td>
</tr>
<tr>
<td>Tape Lid Pin</td>
<td>2-2</td>
</tr>
<tr>
<td>Tape Lid Spring</td>
<td>2-2</td>
</tr>
<tr>
<td>Tape-Out Pin Spring Bracket</td>
<td>2-2</td>
</tr>
<tr>
<td>Tape-Out and Tape Lid Pin Dowstop</td>
<td>2-2</td>
</tr>
<tr>
<td>Tape-Out and Tape Lid Switch</td>
<td>2-1</td>
</tr>
<tr>
<td>Tape-Out and Tape Lid Switch Bracket</td>
<td>2-2</td>
</tr>
</tbody>
</table>

### SECTION 3
LUBRICATION

#### 1. INTRODUCTION

#### 2. GENERAL

#### 3. LUBRICATION

| a. Transmitter Distributor | 3-2 |
| a.01 Clutch Trip Assemblies | 3-2 |
| a.02 Storing Switch Assemblies | 3-3 |
| a.03 Distributor and Sensing Shaft Assemblies | 3-4 |
| a.04 Distributor Block Assembly | 3-5 |
| a.05 Clutch Assemblies | 3-5 |
| a.06 Oil Reservoir | 3-6 |
| a.07 Tape Sensing Mechanism | 3-7 |
| a.08 Latch and Pusher Stripper Bail | 3-7 |
| a.09 Pusher Levers | 3-8 |
| a.10 Feed Mechanism | 3-8 |
| a.11 Feed Mechanism | 3-9 |
| a.12 Tape-Out and Control Mechanism | 3-10 |

<table>
<thead>
<tr>
<th>Paragraph</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. Tight Tape Slide Arm Assembly</td>
<td>3-10</td>
</tr>
<tr>
<td>a.14 Start-Stop Slide Arm Assembly</td>
<td>3-10</td>
</tr>
<tr>
<td>a.15 Tape-Out and Tape Lid Mechanism</td>
<td>3-11</td>
</tr>
<tr>
<td>a.16 Tape Lid and Tape Guide</td>
<td>3-12</td>
</tr>
<tr>
<td>a.17 Cover Plate</td>
<td>3-13</td>
</tr>
<tr>
<td>a.18 Deflector Bracket</td>
<td>3-13</td>
</tr>
<tr>
<td>b. Bases</td>
<td>3-14</td>
</tr>
<tr>
<td>b.01 Motor Unit</td>
<td>3-14</td>
</tr>
<tr>
<td>b.02 Intermediate Gear Assembly</td>
<td>3-14</td>
</tr>
<tr>
<td>b.03 LCXB - Base for Transmitter Distributor used in Automatic Send-Receive Cabinet</td>
<td>3-15</td>
</tr>
<tr>
<td>b.04 Drive Gear Assembly</td>
<td>3-16</td>
</tr>
<tr>
<td>c. Cabinets</td>
<td>3-17</td>
</tr>
</tbody>
</table>

### SECTION 4
DISASSEMBLY AND REASSEMBLY

#### 1. GENERAL

#### 2. DISASSEMBLY AND REASSEMBLY OF (LBXD) TRANSMITTER DISTRIBUTOR

| a. Motor Cover and Front Panel Removal | 4-1 |
| b. Removal of Transmitter Distributor from Base | 4-1 |
| c. Cover Plate | 4-1 |
| d. Top Plate | 4-1 |
| e. Tape Guide Plate | 4-1 |
| f. Oil Reservoir Assembly | 4-1 |
| g. Distributor Block Assembly | 4-1 |
| h. Idler Gear Assembly | 4-1 |
| i. Distributor Shaft Assembly | 4-1 |
| j. Sensing Shaft Assembly | 4-1 |
| k. Feed Wheel Assembly | 4-2 |
| l. Storing Switch Assembly | 4-2 |
| m. Pusher and Latch Levers | 4-2 |
| n. Sensing Pins | 4-2 |
| o. Switch Actuating Mechanism (Start-Stop, and/or Tight Tape) | 4-2 |
| p. Center Plate Assembly | 4-2 |
| q. Sensing Assembly | 4-2 |
| r. Clutch Trip Assembly | 4-2 |
| s. Frame Assembly | 4-2 |

#### 3. DISASSEMBLY AND REASSEMBLY OF BASE (LCXB) THAT SUPPORTS THE TRANSMITTER DISTRIBUTOR ON THE AUTOMATIC SEND- RECEIVE SET

<p>| a. Housing | 4-3 |
| b. Front Cover Plate | 4-3 |</p>
<table>
<thead>
<tr>
<th>Paragraph</th>
<th>Page</th>
<th>Paragraph</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>c. Mounting Screws</td>
<td>4-3</td>
<td>a. Mounting</td>
<td>4-4</td>
</tr>
<tr>
<td>d. Cable Connectors</td>
<td>4-3</td>
<td>b. Transmitter-Distributor Unit</td>
<td>4-4</td>
</tr>
<tr>
<td>e. Driving Gear Assembly (Speed Change Requirements)</td>
<td>4-3</td>
<td>5. DISASSEMBLY AND REASSEMBLY OF MULTIPLE MOUNTED TRANS-</td>
<td>4-6</td>
</tr>
<tr>
<td>f. Base Mounting Hardware</td>
<td>4-3</td>
<td>MITTER DISTRIBUTOR UNITS</td>
<td></td>
</tr>
<tr>
<td>4. DISASSEMBLY AND REASSEMBLY OF THE APPARATUS CABINET FOR</td>
<td></td>
<td>a. General</td>
<td>4-6</td>
</tr>
<tr>
<td>HOUSING ONE OR TWO SELF-CONTAINED TRANSMITTER DIS-</td>
<td></td>
<td>b. Transmitter Distributor Unit, Multiple Mounted</td>
<td>4-6</td>
</tr>
<tr>
<td>TRIBUTOR UNITS - AC</td>
<td>4-4</td>
<td>c. Base for Multiple Arrangement</td>
<td>4-6</td>
</tr>
</tbody>
</table>
SECTION 1

BASIC FEATURE ADJUSTMENTS

1. INTRODUCTION

a. This bulletin presents maintenance information for the Teletype Model 28 LBXD Transmitter Distributor. It is divided into four sections covering, respectively, basic feature adjustments, variable feature adjustments, lubrication, and disassembly and reassembly.

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, fixed pivot points are shown by solid black circles and moveable points are shown by cross-hatched circles. 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 reading head to the viewer's right.

2. GENERAL

a. Section 1 contains adjustment information common to all LBXD Transmitter Distributor units. Also included in this section is the strobing procedure to be followed for proper timing of the transmitter and distributor contacts.

b. In the adjustments and spring tensions covered in this section, location of clearance, position of parts, and point and angle of scale applications are illustrated by drawings. A complete adjusting procedure should be read before making the adjustment or checking the spring tension. The adjustments are arranged in a sequence that should be followed if a complete re-adjustment of the unit were undertaken.

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 drive shaft gear by hand, the rotation is counterclockwise as viewed from the exposed side of the drive shaft gear.

e. When the requirement calls for a clutch to be DISENGAGED, the clutch shoe lever must be fully latched between its trip lever and latch lever so that the clutch shoes 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 rotating either the sensing or distributor shaft by hand, the respective clutch may not fully disengage upon reaching its stop position. To disengage the clutch, rotate the clutch to its stop position, apply a screwdriver to the cam disk stop lug, and move the disk in the normal direction of the shaft rotation until the latch lever seats in its notch in the disk.

f. Tools required to make adjustments and check spring tensions are not supplied with the equipment, but are listed in Teletype Bulletin 1124B. If parts are removed, all adjustments which the removal of parts might facilitate should be made before the parts are replaced. When a part mounted on shims is removed, the number of shims at each mounting screw should be noted so that the identical shim pile-up can be made when the part is remounted. Unless stated otherwise, all nuts and screws that were loosened should be tightened after an adjustment has been made.

g. The covers may be removed for inspection and minor repair of the unit. However, when more extensive maintenance is to be undertaken, it is recommended that the unit be removed from its sub-base to disconnect the power and to permit the unit to be inverted.

h. All contact points should meet squarely. Contacts with the same diameter should not be out of alignment more than 25% of the contact diameter. Avoid sharp kinks or bends in the contact springs.
3. ADJUSTMENTS AND SPRING TENSIONS
   a. TRANSMITTER DISTRIBUTOR

   NOTE: REQUIREMENTS A AND B ARE ADJUSTED AT THE FACTORY AND SHOULD NOT BE DISTURBED UNLESS ASSOCIATED MECHANISMS HAVE BEEN REMOVED FOR SERVICING OR THERE IS REASON TO BELIEVE THAT THE REQUIREMENTS ARE NOT MET. THE FOLLOWING REQUIREMENTS APPLY TO BOTH THE SENSING CLUTCH AND DISTRIBUTOR CLUTCH.

   (A) CLUTCH SHOE LEVER SPRING

   REQUIREMENT
   CLUTCH ENGAGED AND CAM DISK HELD TO PREVENT TURNING. SCALE PULLED AT TANGENT TO CLUTCH. MIN. 15 OZS., MAX. 20 OZS.
   TO MOVE CLUTCH SHOE LEVER IN CONTACT WITH STOP LUG.

   (B) CLUTCH SHOE SPRING

   NOTE: IT IS NECESSARY TO REMOVE THE CLUTCH FROM THE MAIN SHAFT TO FACILITATE THIS CHECK.

   REQUIREMENT
   CLUTCH DRUM REMOVED. SCALE APPLIED TO PRIMARY SHOE AT A TANGENT TO THE FRICTION SURFACE. MIN. 3 OZS., MAX. 5 OZS.
   TO START PRIMARY SHOE MOVING AWAY FROM SECONDARY SHOE AT POINT OF CONTACT.

FIGURE 1-1. CLUTCH MECHANISM
NOTE: THE FOLLOWING REQUIREMENTS APPLY TO BOTH THE DISTRIBUTOR AND SENSING CAM SLEEVES. THESE MECHANISMS SHOULD NOT BE DISTURBED UNLESS THERE IS REASON TO BELIEVE THE REQUIREMENTS ARE NOT MET.

(A) CAM SLEEVE END PLAY

NOTE
MAKE THIS ADJUSTMENT PRIOR TO ASSEMBLING GEAR.
REQUIREMENT
MIN. SOME
MAX. 0.010 INCH
PLAY BETWEEN SLEEVE AND SPACER.
TO ADJUST
REMOVE CLUTCH DRUM DRIVE GEAR AND LOOSEN DRUM MOUNTING SCREW. RELEASE CLUTCH AND POSITION CAM SLEEVE. TIGHTEN CAM SLEEVE MOUNTING SCREW AND REINSTALL DRIVE GEAR.

(C) IDLER GEAR ASSEMBLY

REQUIREMENT
CLEARANCE BETWEEN IDLER GEAR AND SENSING SHAFT GEAR AND BETWEEN IDLER GEAR AND DISTRIBUTOR SHAFT GEAR AT POINT WHERE BACKLASH IS MINIMUM.
MIN. SOME
MAX. 0.003 INCH
TO ADJUST
POSITION IDLER GEAR ASSEMBLY WITH LOCK NUT LOOSENED. RE-CHECK GEAR PLAY THROUGH ONE REVOLUTION OF GEARS.

(B) CAM SHAFT BEARING RETAINER

REQUIREMENT
WHEN MOUNTING SHAFT ASSEMBLY, BEARING SHALL SEAT PROPERLY. (NO CLEARANCE PERMISSIBLE BETWEEN BEARING AND MOUNTING SURFACE.)
TO ADJUST
ROTATE BEARING RETAINER 180 DEGREES AND POSITION BY PUSHING DOWNWARD FIRMLY.

FIGURE 1-2. CAM SHAFTS
NOTE: REQUIREMENTS APPLY TO BOTH CLUTCH TRIP MECHANISMS.

(A) CLUTCH ARMATURE AIR GAP

REQUIREMENT
AIR GAP BETWEEN ARMATURE AND MAGNET ASSEMBLY BRACKET WITH ARMATURE Flush AGAINST MAGNET CORE.
MIN. 0.004 INCH
MAX. 0.008 INCH

TO ADJUST
REMOVE ARMATURE EXTENSION SPRING, POSITION HINGE WITH SPRING POST AND HINGE MOUNTING SCREW LOOSENED, RECHECK AIR GAP AND REPLACE SPRING.

(B) CLUTCH TRIP ASSEMBLY MOUNTING PLATE

REQUIREMENT
CLEARANCE BETWEEN END OF ARMATURE BAIL AND LATCHING SURFACE OF CLUTCH TRIP LEVER LOWER EXTENSION WITH CLUTCH TRIP LEVER RESET EXTENSION ON HIGH PART OF CAM. (TAKE-UP PLAY IN PARTS FOR MINIMUM CLEARANCE.)
MIN. 0.020 INCH
MAX. 0.030 INCH

TO ADJUST
POSITION PLATE WITH SCREWDRIVER IN LOWER ADJUSTING SLOT WITH PLATE ADJUSTING SCREW AND PLATE MOUNTING SCREW LOOSENED. (TAKE-UP PLAY IN TRIP LEVER IN DIRECTION OF CAM.)

(C) ARMATURE BAIL SPRING

REQUIREMENT
TRIP LEVER RESET EXTENSION ON HIGH PART OF CAM. SCALE APPLIED TO LATCHING END OF ARMATURE BAIL.
MIN. 3 OZS.
MAX. 4-1/2 OZS.
TO START ARMATURE BAIL MOVING.

FIGURE 1-3. CLUTCH TRIP MECHANISM

CHANGE 4
NOTE: REFER TO REQUIREMENTS IN PRECEDING PAGE.

(A) CLUTCH LATCH LEVER SPRING

REQUIREMENT
CLUTCH LATCH LEVER ON LOW PART OF CLUTCH DISK AND UNIT UPRIGHT. SCALE APPLIED TO BENT EAR OF LATCH LEVER HORIZONTALLY.
MIN. 2-1/2 OZS.
MAX. 4-1/2 OZS.
TO START LATCH LEVER MOVING.

(B) CLUTCH TRIP LEVER SPRING

REQUIREMENT
WITH CLUTCH JUST TRIPPED, HOLD ARMATURE AGAINST CORE. SCALE APPLIED TO TRIP LEVER LOWER EXTENSION IN LINE WITH SPRING.
MIN. 2 OZS.
MAX. 3-1/2 OZS.
*2 CYCLE UNITS.

(C) MAGNET BRACKET

REQUIREMENT
CLEARANCE BETWEEN ARMATURE BAIL AND TOP EDGE OF TRIP LEVER LOWER EXTENSION WITH CLUTCH TRIP LEVER RESET EXTENSION ON HIGH PART OF CAM AND ARMATURE FLUSH AGAINST CORE. (TAKE-UP PLAY FOR MINIMUM CLEARANCE.)
MIN. 0.030 INCH
MAX. 0.040 INCH
TO ADJUST INSERT SCREWDRIVER IN UPPER SLOT AND PIVOT BRACKET, WITH BRACKET MOUNTING SCREW AND CLAMP SCREW LOOSENED.

FIGURE 1-4. CLUTCH TRIP MECHANISM

CHANGE 5
NOTE: REQUIREMENTS A AND B APPLY TO BOTH CLUTCHES.

(A) CLUTCH TRIP LEVER UPPER EXTENSION

(1) REQUIREMENT
CLUTCH TRIP LEVER LATCHED (CLUTCH IN STOP POSITION).
CLUTCH TRIP LEVER UPPER EXTENSION SHALL FULLY ENGAGE CLUTCH SHOE LEVER.
TO ADJUST
POSITION UPPER EXTENSION, WITH CLUTCH TRIP LEVER CLAMPING SCREW LOOSENED.

(2) REQUIREMENT
WITH ARMATURE IN ATTRACTION POSITION, THERE SHALL BE SOME CLEARANCE BETWEEN CLUTCH TRIP LEVER UPPER EXTENSION AND STOP LUG WHEN CLUTCH IS ROTATED TO MAKE CLEARANCE A MINIMUM.

TO ADJUST REFININE REQUIREMENT (1), IF NECESSARY, SO THAT CLUTCH TRIP LEVER UPPER EXTENSION IS UNDER OR OVER FLUSH WITH STOP LUG BY NOT MORE THAN 0.015 INCH

(b) CLUTCH SHOE LEVER

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 ADJUST
ENGAGE A WRENCH OR SCREWDRIVER ON A SCREW ON THE ADJUSTING DISK. ROTATE DISK WITH CLAMP SCREWS LOOSENED AND CLUTCH DISENGAGED.

NOTE
AFTER ADJUSTMENT, DISENGAGE CLUTCH, REMOVE DRUM MOUNTING SCREW AND ROTATE DRUM IN ITS NORMAL DIRECTION OF ROTATION TO MAKE CERTAIN THAT IT DOES NOT DRAG ON SHOE. IF DRUM DRAGS, REFINISH ABOVE ADJUSTMENT.

FIGURE 1-5. CLUTCH MECHANISM
NOTE
REMOVE OIL RESERVOIR AND DISTRIBUTOR BLOCK ASSEMBLY TO FACILITATE ADJUSTMENT.

(A) CAM Follower Guide Requirement
1. Center cam follower engages cam by full thickness of follower when moved from side to side in its guide slot.
2. In similar manner, other follower should engage cam by at least 75% of follower thickness.
3. All followers move freely in their guide slots.
To adjust, position cam follower guide with its mounting screws loosened.

(B) Cam Follower Lever Spring Requirement
Cam follower lever on high part of cam. Scale applied just below sliding surface of lever horizontally.
Min., 1/2 oz.
Max., 1-1/2 oz.
To start each lever moving.

FIGURE 1-6. DISTRIBUTOR CONTACT MECHANISM

CHANGE 4
(A) DISTRIBUTOR ROCKER SPRING
TO CHECK
POSITION EACH CONTACT SCREW SO ITS
CONTACT SURFACE IS ABOUT 1/32 INCH
FROM EDGE OF BLOCK.
REQUIREMENT
WITH COMPRESSION SPRINGS REMOVED,
HOLD DISTRIBUTOR BLOCK IN HORIZONTAL
POSITION. PUSH SPRING SCALE
DOWNWARD (VERTICALLY).
MIN. 3 OZS.
MAX. 4 OZS.
TO SEPARATE CONTACTS.

SEE NOTE

CONTACT SCREW
ROCKER SPRING
DISTRIBUTOR BLOCK
COMPRESSION SPRING

(B) DISTRIBUTOR ROCKER COMPRESSION SPRINGS
REQUIREMENT
WITH COMPRESSION SPRINGS INSTALLED,
AND BLOCK IN A HORIZONTAL POSITION,
APPLY SPRING SCALE AT LOWER END OF
ROCKER AND PUSH DOWNWARD.
MIN. 5-1/2 OZS.
MAX. 9-1/2 OZS.
TO SEPARATE CONTACTS.

NOTE
WITH DISTRIBUTOR BLOCK REMOVED, ADJUST
CONTACTS SO THAT THERE IS 0.070 TO 0.080
INCHES BETWEEN ROCKER LEVERS AND OIL
GUARD.

FIGURE 1-7. DISTRIBUTOR CONTACT MECHANISM
(D) DISTRIBUTOR CONTACT GAP
REQUIREMENT
CONTACT GAP, WITH CAM FOLLOWER ON
HIGH PART OF CAM:
MIN. 0.020 INCH
MAX. 0.030 INCH
TO ADJUST
TRIP CLUTCH MANUALLY TO POSITION CAM.
TURN CONTACT SCREW TO ADJUST. CHECK
ALL CONTACTS.

(C) DISTRIBUTOR BLOCK ASSEMBLY
REQUIREMENT
ROCKERS SHOULD FULLY ENGAGE IN-
SULATED PORTIONS OF RESPECTIVE CAM
FOLLOWER LEVERS.
TO ADJUST
POSITION DISTRIBUTOR BLOCK WITH
MOUNTING SCREWS LOOSENED.

NOTE
FOR REFINEMENT OF DISTRIBUTOR CONTACT ADJUSTMENTS, REFER TO PARAGRAPH 4,
DISTRIBUTOR AND TRANSMITTER CONTACT STROBING.

FIGURE 1-8. DISTRIBUTOR CONTACT MECHANISM
(A) **FEED LEVER SET COLLAR**

**REQUIREMENT**
- MIN. SOME
- MAX. 0.015 INCH

CLEARANCE BETWEEN FEED LEVER AND COLLAR WHEN FEED LEVER IS FREE IN ITS GUIDE SLOT.

TO ADJUST
- POSITION FEED LEVER WITH SET COLLAR SCREWS LOOSE. FEED LEVER SHOULD MOVE FREELY WITHOUT BINDING AT GUIDE OR COLLARS.

**NOTE**
- AFTER TIGHTENING SET SCREWS, RECHECK ADJUSTMENT FOR BINDS BETWEEN FEED LEVER AND COLLARS, AND BETWEEN FEED LEVER AND GUIDE.

(b) **FEED LEVER SPRING**

TO CHECK
- ROTATE SENSING SHAFT UNTIL CLUTCH IS IN STOP POSITION.

**REQUIREMENT**
- MIN. 10 OZS.
- MAX. 17 OZS.

TO MOVE FEED LEVER AWAY FROM CAM.

**NOTE**
- ON "FEED BEFORE READ" UNITS, THIS ADJUSTMENT IS MADE WITH THE FEED LEVER CAM FOLLOWER ROLLER ON THE LOW PART OF THE SENSING CAM.

---

**FIGURE 1-9. FEED LEVER MECHANISM**
(A) STORING SWITCH CONTACTS

TO CHECK
REMOVE STORING SWITCH ASSEMBLY.
REQUIREMENT
CONTACT LEVER EXTENSIONS SHOULD
BE PERPENDICULAR TO STORING BLOCK.
TO ADJUST
TURN EACH CONTACT SCREW WITH
ALLEN WRENCH. GAUGE BY EYE.

(B) STORING SWITCH CONTACT LEVER
EXTENSION SPRING
REQUIREMENT
MIN. 1-3/4 OZS.
MAX. 3-1/2 OZS.
TO START EACH CONTACT LEVER
EXTENSION MOVING.

(C) STORING SWITCH GUIDES
PRELIMINARY – BEFORE SWITCH ASSEMBLY IS SECURED
TO UNIT, ROTATE SLIDE ECCENTRIC TO MAKE CLEAR-
ANCE BETWEEN SLIDE STOP POST AND END CONTACT
LEVER SLIDES MINIMUM.

(1) REQUIREMENT
MIN. 0.005 INCH
MAX. 0.012 INCH
CLEARANCE BETWEEN END SLIDES AND STOP
POST. (HOLD SLIDES AWAY FROM STOP POST).
NOTE
AFTER CONTACT LEVER SLIDE ADJUSTMENT
(Figure 1-30), CLEARANCE MAY BE 0.005 TO
0.015 INCH.

(2) REQUIREMENT
CONTACT LEVER SLIDES FREE IN GUIDE SLOTS
AND PARALLEL TO SIDE PLATES (GAUGE BY
EYE).
TO ADJUST
POSITION GUIDE WITH ITS MOUNTING SCREWS
LOOSENED.

(D) CONTACT SLIDE LEVER SPRINGS
TO CHECK
SELECT BLANK COMBINATION, TRIP SENSING CLUTCH AND ROTATE
SHAFT UNTIL LATCHES MOVE AWAY FROM SLIDES. HOLD CONTACT
EXTENSION LEVERS AWAY.
REQUIREMENT
MIN. 4 OZS.
MAX. 6 OZS.
TO START EACH SLIDE LEVER MOVING.

FIGURE 1-10. STORING SWITCH MECHANISM
STORING SWITCH ASSEMBLY REPLACEMENT

REQUIREMENT
STORING SWITCH ASSEMBLY SHOULD ALIGN WITH LATCH LEVERS SO THAT LATCH LEVERS AND SLIDES FUNCTION WITHOUT BINDING.

TO CHECK
MANUALLY PUSH LATCH BAIL FOLLOWER AWAY FROM CAM UNTIL LATCHES ARE FREE FROM GUIDE, RELEASE LATCH BAIL FOLLOWER AND NOTE IF LATCHES FALL INTO THEIR RESPECTIVE SLOTS.

TO ADJUST
PIVOT STORING SWITCH WITH STORING SWITCH MOUNTING SCREWS LOOSENED. RECHECK REQUIREMENT.

---

FIGURE 1-11. STORING SWITCH MECHANISM
STORING SWITCH CONTACT ASSEMBLY (TRANSFER TYPE)

NOTE

FOLLOWING ADJUSTMENTS (FIGURES 1-12 AND 1-13) ARE TO BE MADE WITH THE CONTACT ASSEMBLIES REMOVED FROM THE UNIT. USE A 172060 ADJUSTING TOOL TO BEND THE CONTACTS. FOR EACH ADJUSTMENT START WITH THE CONTACT PILE-UP FARDEST FROM THE HANDLE OF THE BENDING TOOL TO AVOID DISTURBING COMPLETED ADJUSTMENTS.

(1) BACKSTOP - NORMALLY CLOSED CONTACT REQUIREMENT
FIVE OR EIGHT NORMALLY CLOSED CONTACT LEAFS PARALLEL TO MOUNTING PLATE AND IN LINE WITH EACH OTHER AS GAUGED BY EYE.
TO ADJUST BEND BACKSTOP.

(2) SPRING TENSION - NORMALLY CLOSED CONTACT REQUIREMENT
WITH SWINGER CONTACT HELD AWAY
MIN. 2 OZS.
MAX. 6 OZS.
TO MOVE EACH NORMALLY CLOSED LEAF AWAY FROM BACKSTOP.
TO ADJUST BEND NORMALLY CLOSED LEAF SPRING

NOTE
TO INCREASE TENSION OF NORMALLY CLOSED LEAF, IT MAY BE NECESSARY TO BEND BACKSTOP AWAY FROM LEAF, BEND LEAF, AND THEN REMAKE ADJUSTMENT (1).

(3) SWINGER SPRING TENSION REQUIREMENT
MIN. 35 GRAMS
MAX. 50 GRAMS
TO OPEN NORMALLY CLOSED CONTACT
TO ADJUST BEND SWINGER LEAF

FIGURE 1-12. TRANSFER TYPE STORING SWITCH MECHANISM

CHANGE 5
(4) **NORMALLY OPEN CONTACT GAP**

**REQUIREMENT**
- MIN. 0.010 INCH
- MAX. 0.015 INCH

**CLEARANCE**

**TO ADJUST**
- BEND NORMALLY OPEN CONTACT BACKSTOP

(5) **SPRING TENSION - NORMALLY OPEN CONTACT**

**REQUIREMENT**
- MIN. 35 GRAMS
- MAX. 50 GRAMS

**TO MOVE EACH NORMALLY OPEN LEAF AWAY FROM ITS BACKSTOP**

**TO ADJUST**
- BEND NORMALLY OPEN LEAF SPRING

**NOTE**

TO INCREASE TENSION OF NORMALLY OPEN LEAF SPRING, IT MAY BE NECESSARY TO BEND BACKSTOP AWAY FROM LEAF, BEND LEAF, AND THEN REMAKE ADJUSTMENT (5).

**FIGURE 1-13. TRANSFER TYPE STORING SWITCH MECHANISM**
INSTRUCTIONS FOR REPLACING AND POSITIONING STORING SWITCH ASSEMBLY (TRANSFER TYPE)

PLACE SWITCH ASSEMBLY ON LOWER SURFACE OF MAIN CASTING. EXERCISE CARE IN SEATING SLIDE LEVERS AGAINST PUSHER LEVERS AND LATCH LEVERS IN APPROPRIATE SLOT OF SLIDE LEVER GUIDE.

STORING SWITCH ASSEMBLY

REQUIREMENT

WITH TOP PLATE IN PLACE, SELECT A LETTERS - BLANK - LETTERS COMBINATION AND OBSERVE LATCH AND PUSHER LEVER ACTION. STORING SWITCH SHOULD ALIGN WITH LATCH LEVER SO THAT LATCH LEVERS AND SLIDES FUNCTION WITHOUT BINDING.

TO ADJUST

POSITION SWITCH ASSEMBLY WITH ITS MOUNTING SCREWS LOOSENED. RECHECK REQUIREMENT AFTER TIGHTENING SCREWS.

NOTE

A MINOR ADJUSTMENT OF THE SENSING PIN AND PUSHER LEVER GUIDE MAY BE NECESSARY.

FIGURE 1-14. TRANSFER TYPE STORING SWITCH MECHANISM
FIGURE 1-15. TRANSFER TYPE STORING SWITCH MECHANISM

CONTACT ASSEMBLY BRACKETS

ALLEN SOCKETS

MOUNTING BAR LOCK NUTS

BRACKET MOUNTING SCREWS

MOUNTING BARS

CONTACT ASSEMBLY BRACKETS

BRACKET PIVOT SCREW

SLIDE LEVER REQUIREMENT
MIN. 0.005 INCH
MAX. 0.020 INCH
CLEARANCE BETWEEN ALL SENSING SLIDES AND CONTACT SWINGERS.

TO CHECK
STORING SWITCH ASSEMBLY INSTALLED (SEE FIGURE 1-14). SENSING SLIDES SELECTED AND LATCHED.

TO ADJUST
LOosen MOUNTING BAR LOCK NUTS AND BRACKET MOUNTING SCREWS TO FRICtion TIGHT. INSERT AN ALLEN WRENCH IN END OF CONTACT ASSEMBLY MOUNTING BAR, POSITION CONTACT ASSEMBLY BY RotATING BAR TO PIVOT CONTACT ASSEMBLY. CHECK AT ALL SWINGERS.

SENSING CONTACTS (A) [SPACING MARKING]

READING CONTACTS (B) [SPACING MARKING]

SLIDE LEVER SPRING

TO CHECK
PLACE SLIDE LEVERS IN UPPERMOST POSITION (BLANK SELECTED, LATCHES STRIPPED). HOOK SPRING SCALE IN THE SPRING LOOP.

REQUIREMENT
MIN. 6 OZS.
MAX. 9 OZS.
TO PULL EACH SPRING TO ITS INSTALLED LENGTH.
TAPE LID - LATE DESIGN (SEE FIGURE 1-41 FOR EARLY DESIGN)

NOTE

REMOVE TOP AND TAPE GUIDE PLATES. LUBRICATE MATING SURFACES PRIOR TO ADJUSTMENT.

(1) REQUIREMENT
MIN. SOME
MAX. 0.010 INCH
CLEARANCE BETWEEN PIVOT SHOULDER AND TAPE LID WHEN LID IS PRESSED AGAINST NOTCH IN TAPE GUIDE PLATE, AND FEED WHEEL SLOTS AND TAPE-OUT PIN HOLES ARE LINED UP.
TO ADJUST
LOosen TAPE LID BRACKET MOUNTING NUTS. USING A 156743 GAUGE, LINE UP FEED WHEEL GROOVE IN TAPE LID WITH SLOT IN TAPE GUIDE PLATE. POSITION TAPE LID BRACKET TO MEET REQUIREMENT.

(2) REQUIREMENT - (SEE FIGURE 1-17).

FEED WHEEL SLOT

PLUNGER

TAPE LID

GAUGE

ECCENTRIC MOUNTING POST NUT

LATCH POST

LATCH BAIL

(3) REQUIREMENT
SOME END PLAY IN RELEASE PLUNGER WHEN LID IS LATCHED AGAINST TAPE GUIDE PLATE
TO ADJUST
WITH ECCENTRIC MOUNTING POST NUT FRICtion TIGHT AND TAPE LID RAISED, ROTATE HIGH PART OF ECCENTRIC POST TOWARDS MOUNTING BRACKET. CLOSE TAPE LID, RO- TATE ECCENTRIC COUNTERCLOCKWISE (AS VIEWED FROM SLOTTED END OF ECCENTRIC POST) UNTIL FLAT OF LATCH POST FULLY ENGAGES LATCH BAIL FLAT. ROTATE ECCENTRIC CLOCKWISE TO TAKE UP ALL PLAY IN PARTS, AND TO SEAT OPEN END OF TAPE LID AGAINST TAPE GUIDE PLATE.
TO CHECK
WITH TAPE LID HELD DOWN MANUALLY, LATCH TIP SHOULD CLEAR LATCH POST WHEN RELEASE BUTTON IS OPERATED. WITH TAPE LID LATCHED, TIP OF LATCH SHOULD PROJECT BEYOND FLAT OF LATCH POST, AND THERE SHOULD BE SOME END PLAY IN RELEASE BUTTON.

FIGURE 1-16. TAPE LID MECHANISM
(2) REQUIREMENT
WITH TAPE LID FRONT BEARING SURFACE TOUCHING TAPE GUIDE PLATE, CLEARANCE BETWEEN TAPE LID AND TAPE GUIDE PLATE:
MIN. 0.010 INCH
MAX. 0.018 INCH
MEASURED AT TAPE LID FIN IN LINE WITH REAR TAPE GUIDE. 2ND. FIN FROM REAR
NOTE
WHEN BOTH TOP AND TAPE GUIDE PLATES ARE ASSEMBLED ON UNIT, LEFT EDGE OF LID MAY TOUCH TOP PLATE AND SOME CHANGE IN THIS CLEARANCE MAY BE EXPECTED.
TO ADJUST
WITH TAPE LID BEARING BRACKET MOUNTING SCREWS FRICITION TIGHT, AND TAPE LID PRESSED AGAINST TAPE GUIDE PLATE, POSITION BEARING BRACKET. RECHECK REQUIREMENT (1).

(1) AND (3) REQUIREMENTS — (SEE FIGURE 1-16).

---

TAPE LID SPRING
TO CHECK
OPEN TAPE LID, HOLD UNIT SO TAPE GUIDE PLATE IS HORIZONTAL. APPLY SCALE AT TOP OF LID IMMEDIATELY LEFT OF TAPE-OUT PIN HOLE, HOLD PLUNGER FULLY DEPRESSED.
REQUIREMENT
MIN. 3 OZS.  *MIN. 1/8 OZ.
MAX. 4-1/2 OZS.  MAX. 1 OZ.
TO MOVE OPEN END OF TAPE LID AGAINST TAPE GUIDE PLATE.
*EIGHT LEVEL UNITS

START-STOP LEVER DETENT BAIL

CONTROL LEVER DETENT SPRING
TO CHECK
PLACE CONTROL LEVER IN RUN POSITION.
REQUIREMENT
MIN. 14 OZS.
MAX. 22 OZS.
TO START DETENT BAIL MOVING AWAY FROM CONTROL LEVER DETENT.

---

TAPE LID RELEASE PLUNGER SPRING
TO CHECK
HOLD TAPE GUIDE PLATE SO TOP SURFACE IS HORIZONTAL. OPEN TAPE LID.
REQUIREMENT
MIN. 28 OZS.
MAX. 48 OZS.
TO START TAPE LID BAIL MOVING.

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FIGURE 1-17. TAPE LID MECHANISM
TAPE GUIDE PLATE

(1) REQUIREMENT
SHOULDER OF FEED WHEEL POST SHOULD NOT INTERFERE WITH TOP PLATE OR TAPE GUIDE
PLATE MOUNTING BRACKETS.
TO ADJUST
ROTATE FEED WHEEL POST WITH ITS MOUNTING NUT LOOSENED.

(2) REQUIREMENT
TAPE GUIDE PLATE SHOULD REST FIRMLY AGAINST AT LEAST THREE PROJECTIONS OF THE
FRONT AND REAR PLATE.
TO ADJUST
WITH TAPE-OUT DOWNSSTOP IN ITS LOWERMOST POSITION, AND TAPE GUIDE PLATE
MOUNTING BRACKET (FRONT AND REAR) NUTS FRICITION TIGHT, TRIP CLUTCH AND RO-
TATE SHAFT UNTIL SENSING PINS ARE IN THEIR UPPERMOST POSITION. WITH TAPE LID
RAISED AND CONTROL LEVER IN RUN POSITION, PRESS TAPE GUIDE PLATE INTO POS-
ITION. GUIDE MOUNTING SCREWS INTO NOTCH OF FRONT AND REAR PLATE, AND
PLACE SENSING PINS ADJACENT TO LEFT EDGE OF GUIDE PLATE. PLACE TAPE-OUT PIN
INTO ITS HOLE. TIGHTEN EACH BRACKET MOUNTING.

(3) REQUIREMENT
OUTER EDGES OF MOUNTING BRACKETS AND OUTER EDGES OF MOUNTING STUD
SHOULders SHOULD ALIGN AND PROJECT EQUALLY ON FRONT AND REAR BRACKETS.
TO ADJUST
MOVE TAPE GUIDE PLATE TOWARD FRONT OR REAR. TIGHTEN NUTS ONLY AFTER TOP
PLATE IS ADJUSTED (SEE FIGURE 1-19).
TOP PLATE

(1) REQUIREMENT
   TOP PLATE FLUSH TO 0.003 INCH UNDER FLUSH WITH TAPE GUIDE PLATE WITHIN WIDTH
   OF TAPE LID.
   TO ADJUST
   LOOSEN MOUNTING BRACKET NUTS UNTIL BRACKETS ARE FRICTION TIGHT. PRESS TOP
   PLATE INTO POSITION. TOP PLATE SHOULD REST ON AT LEAST THREE PROJECTIONS OF
   SIDE PLATES. MAKE SURE THE TIGHT-TAPE ARM EXTENSION IS UNDER THE TOP PLATE.

(2) REQUIREMENT
   FEED WHEEL SLOT AND TAPE GUIDE PLATE SLOT SHOULD LINE UP
   TO ADJUST
   MOVE TOP PLATE TO LINE UP FEED WHEEL SLOT. DO NOT DISTURB REQUIREMENT (2) OF
   TAPE GUIDE PLATE ADJUSTMENT (SEE FIGURE 1-18).

(3) REQUIREMENT
   WITH TAPE LID LATCHED, CLEARANCE BETWEEN TAPE LID EXTENSION COVERING FEED
   WHEEL SLOT, AND TOP PLATE:
   MIN., 0.010 INCH
   MAX., 0.020 INCH
   MEASURED AT CURVED PORTION OF TOP PLATE, AND
   MIN., 0.010 INCH
   MAX., 0.025 INCH
   MEASURED AT FLAT PORTION OF TOP PLATE.
   ALSO:
   MIN., 0.010 INCH
   MAX., 0.018 INCH
   CLEARANCE BETWEEN TAPE LID AND TAPE GUIDE PLATE MEASURED IN AREA BETWEEN
   TAPE GUIDES (PLAY IN TAPE LID TAKEN TOWARD TAPE GUIDE PLATE).
   TO ADJUST
   LOOSEN TWO SCREWS HOLDING TAPE LID MOUNTING BRACKETS TOGETHER, AND
   POSITION TAPE LID. RECHECK ADJUSTMENTS (1) AND (2) OF TAPE LID ADJUSTMENT
   (SEE FIGURE 1-16).

FIGURE 1-19. TOP PLATE ASSEMBLY

CHANGE 4
(2) REQUIREMENT
MIN. 0.008 INCH
MAX. 0.015 INCH
CLEARANCE BETWEEN NORMALLY OPEN
CONTACTS.
TO ADJUST
FORM UPPER CONTACT LEAF WITH A
110445 SPRING BENDER.
NOTE
WHEN REPLACING SWITCH ASSEMBLY,
MAKE SURE CONTACT SWINGER IS OVER
TAPE-OUT PIN EXTENSION, AND EXTEN-
SION BAIL SPRING CLIP IS KEPT HORIZON-
TAL.

(A) TAPE-OUT SWITCH
TO CHECK
REMOVE COVER AND TOP PLATE. LOOSEN
TAPE-OUT SPRING ADJUSTING BRACKET.
POSITION BRACKET SO TAPE-OUT EXTEN-
SION IS NOT TOUCHING SWINGER PAD.

(I) REQUIREMENT
MIN. 8 GRAMS
MAX. 15 GRAMS
TO JUST SEPARATE NORMALLY CLOSED
CONTACTS (SCALE AT CENTER OF SWINGER
PAD).
TO ADJUST
DISCONNECT TAPE-OUT EXTENSION BAIL.
REMOVE SWITCH ASSEMBLY (SEE FIGURE
2-1). FORM CONTACT SWINGER WITH A
110445 SPRING BENDER.

(B) TAPE-OUT PIN
(1) REQUIREMENT
WHEN CONTROL LEVER IS IN FREE WHEEL OR
STOP POSITION, TAPE-OUT PIN SHOULD BE
FLUSH TO 0.010 INCH BELOW SURFACE OF
TAPE GUIDE PLATE.
TO ADJUST
POSITION TAPE-OUT PIN DOWNSTOP WITH
ITS MOUNTING NUT LOOSENED.

(2) REQUIREMENT
WITH CONTROL LEVER IN RUN POSITION:
MIN. 0.055 INCH
CLEARANCE BETWEEN TAPE-OUT PIN EXTEN-
SION AND CONTROL LEVER BAIL EXTENSION.
TO ADJUST
POSITION EXTENSION BAIL WITH ITS MOUNT-
ING SCREW LOOSENED.

(C) TAPE-OUT SWITCH BRACKET
TO CHECK
INSERT PIECE OF UN-PERFORATED TAPE UNDER
TAPE LID.
REQUIREMENT
MIN. 0.006 INCH
MAX. 0.020 INCH
CLEARANCE BETWEEN TAPE-OUT PIN EXTEN-
SION AND CONTACT SWINGER PAD.
TO ADJUST
POSITION SWITCH BRACKET WITH ITS MOUNTING
SCREW LOOSENED.

FIGURE 1-20. TAPE-OUT SWITCH ASSEMBLY

CHANGE 4
(A) **TAPE-OUT BAIL YIELD SPRING**
TO CHECK
PLACE CONTROL LEVER IN RUN POSITION.
REQUIREMENT
MIN. 3 OZS.
MAX. 5 OZS.
TO SEPARATE BAILS.

(B) **TAPE-OUT EXTENSION BAIL SPRING**
TO CHECK
PLACE CONTROL LEVER IN RUN POSITION.
REQUIREMENT
MIN. 1 OZ.
MAX. 2-1/2 OZS.
TO START BAIL MOVING.

(C) **TAPE-OUT PIN SPRING**
TO CHECK
PLACE CONTROL LEVER IN RUN POSITION.
REQUIREMENT
MIN. 38 Grams
MAX. 45 Grams
TO MOVE PIN FLUSH WITH TAPE GUIDE PLATE
TO ADJUST
POSITION SPRING BRACKET WITH ITS MOUNTING SCREWS LOOSENED, RECHECK REQUIREMENT.

**FIGURE 1-21. TAPE-OUT PIN AND BAIL ASSEMBLY**
START-STOP BAIL YIELD SPRING
TO CHECK
PLACE CONTROL LEVER IN RUN POSITION
REQUIREMENT
MIN. 4 OZS.
MAX. 6 OZS.
TO SEPARATE BAILS.

CONTROL LEVER SWITCH BRACKET
(1) REQUIREMENT
WITH CONTROL LEVER IN RUN POSITION:
MIN. 0.005 INCH
MAX. 0.015 INCH
CLEARANCE BETWEEN SWITCH ACTUATOR AND BAKELITE PAD ON SWINGER.

(2) REQUIREMENT
START-STOP AND TIGHT TAPE SWITCH ACTUATORS SHOULD FULLY ENGAGE BAKELITE PAD ON SWINGER.
TO ADJUST
POSITION SWITCH BRACKET WITH ITS MOUNTING SCREWS LOOSENED.
NOTE
IF TIGHT TAPE SWITCH ACTUATOR RESTS AGAINST BAKELITE PAD, HOLD ACTUATOR AWAY.

FIGURE 1-22. START-STOP SWITCH ASSEMBLY

CHANGE 4
(A) TIGHT-TAPE, CONTROL LEVER SWITCH

(2) REQUIREMENT
WITH CONTROL LEVER IN RUN POSITION:
MIN. 0.050 INCH
MAX. 0.070 INCH
CLEARANCE BETWEEN SWITCH BACKSTOP
AND BAKELITE PAD ON SWINGER WHEN
SWITCH CONTACTS ARE CLOSED.
TO ADJUST
BEND SWITCH BACKSTOP WITH
110445 SPRING BENDER.

NOTE
MAKE REQUIREMENT (1) ADJUSTMENT
BEFORE ASSEMBLING SWITCH TO UNIT.

(1) REQUIREMENT
MIN. 3 OZS.
MAX. 4 OZS.
TO JUST SEPARATE CONTACTS.
TO ADJUST
BEND CONTACT SWINGER WITH A 110455
SPRING BENDER.

(C) TIGHT TAPE BAIL YIELD SPRING
TO CHECK
OPEN TAPE LID, OPERATE CONTROL LEVER
TO FREE-WHEELING POSITION,
REQUIREMENT
MIN. 2 OZS.
MAX. 3-1/2 OZS.
TO SEPARATE BAILS.

(B) TIGHT TAPE ARM
TO CHECK
OPERATE CONTROL LEVER TO RUN POSITION.
REQUIREMENT
TIGHT TAPE SWITCH CONTACTS SHALL OPEN
WHEN TIGHT TAPE ARM IS RAISED:
MIN. 0.045 INCH
MAX. 0.075 INCH
ABOVE TAPE GUIDE PLATE.
TO ADJUST
WITH CLAMP SCREW FRICTION TIGHT, POSI-
TION BAILS, BY MEANS OF FRY POINT, TO
MEET REQUIREMENT.

FIGURE 1-23. TIGHT TAPE MECHANISM
(A) SENSING BAIL SPRINGS TO CHECK
REMOVE TOP PLATE. WITH BLANK TAPE UNDER TAPE LID, TRIP CLUTCH MAGNET AND MANUALLY ROTATE SHAFT UNTIL SENSING BAIL IS IN UPPERMOST POSITION. APPLY SCALE TO BAIL BETWEEN SPRINGS. REQUIREMENT
MIN. 1/4 OZ.
MAX. 2 OZS.
TO START BAIL MOVING.

(C) SENSING PIN TO CHECK
REPLACE TOP PLATE. DISENGAGE SENSING CLUTCH.
REQUIREMENT
WITH SENSING BAIL ECCENTRIC INDENT TOWARD RIGHT, TIP ON HIGHEST SENSING PIN SHALL BE FLUSH TO 0.005 INCH BELOW TOP SURFACE OF TAPE GUIDE PLATE.
TO ADJUST
LOOSEN ECCENTRIC SHAFT LOCK NUT AND POSITION ECCENTRIC. RECHECK REQUIREMENT AFTER LOCK NUT IS TIGHTENED.

FIGURE 1-24. SENSING PIN ASSEMBLY
(A) FEED WHEEL DETENT

NOTE
PLACE CONTROL LEVER IN STOP POSITION.
IF UNIT HAS A SPRING BIASED CONTROL
LEVER, MAKE ADJUSTMENT WITH LEVER IN
RUN POSITION.
TO CHECK
PLACE A "LETTERS" PERFORATED TAPE OVER
FEED WHEEL, TAKING UP PLAY IN FEED HOLES
TOWARD THE RIGHT.
REQUIREMENT
SENSING PINS CENTRALLY LOCATED IN CODE
HOLES.
TO ADJUST
POSITION FEED WHEEL DETENT ECCENTRIC
WITH ITS LOCK SCREW FRICITION TIGHT.
HIGH PART OF ECCENTRIC SHOULD BE TO-
WARD RIGHT. HOLD ECCENTRIC AND
TIGHTEN GUIDE POST AND LOCK SCREW.
RECHECK ADJUSTMENT.
NOTE
HOLD FEED PAWL AWAY TO FACILITATE AD-
JUSTMENT.

(B) FEED RATCHET DETENT SPRING

REQUIREMENT
WITH FEED PAWL HELD AWAY FROM
RATCHET WHEEL:
MIN. 7 OZS.
MAX. 13 OZS.
TO MOVE DETENT ROLLER AWAY FROM
FULLY DETENTED POSITION.

FIGURE 1-25. TAPE FEED MECHANISM
(B) FEED PAWL SPRING
TO CHECK
PLACE CONTROL LEVER IN STOP POSITION.
REMOVE TOP PLATE. DISENGAGE CLUTCH.
REQUIREMENT
MIN. 1/4 OZ.
MAX. 1-1/2 OZS.
TO START FEED PAWL MOVING.

(A) FEED PAWL
TO CHECK
PLACE CONTROL LEVER IN RUN POSITION.
REMOVE TOP PLATE. TRIP CLUTCH, AND ROTATE CAM
SHAFT UNTIL FEED ROLLER IS ON HIGH PART OF CAM.
ROTATE RATCHET WHEEL UNTIL OIL HOLE IS UP. TAKE
UP PLAY BY PRESSING DOWN LIGHTLY ON RIGHT END
OF FEED PAWL BAIL.
REQUIREMENT
MIN. SOME
MAX. 0.003 INCH
CLEARANCE BETWEEN FEED PAWL AND RATCHET TOOTH.
TO ADJUST
POSITION FEED LEVER BY MEANS OF THE ADJUSTING
SLOT WITH ITS LOCK NUT LOOSENED.

FIGURE 1-26. TAPE FEED MECHANISM
(A) **PUSHER STRIPPER BAIL SPRING**

**TO CHECK**

SELECT BLANK COMBINATION. TRIP CLUTCH AND ROTATE SHAFT TO STOP POSITION.

**REQUIREMENT**

MIN. 7 OZS.
MAX. 11 OZS.

TO START BAIL MOVING AWAY FROM CAM.

---

(C) **AUXILIARY LEVER SPRING**

**TO CHECK**

EACH AUXILIARY LEVER ON LOW PART OF ITS CAM. SCALE APPLIED TO LEVER JUST RIGHT OF SPRING. PUSHER LEVER HELD AWAY.

**REQUIREMENT**

MIN. 1/2 OZ.
MAX. 3 OZS.

TO START AUXILIARY LEVER MOVING.

---

(B) **PUSH LEVER**

**REQUIREMENT**


MIN. 0.020 INCH
MAX. 0.045 INCH

**TO ADJUST**

WITH PUSH LEVER ECCENTRIC SHAFT LOCK NUT (FRONT PLATE) LOOSENED AND HIGH PART OF ECCENTRIC LOCATED TOWARD THE UPPER RIGHT, ROTATE ECCENTRIC TOWARD RIGHT OR LEFT.

---

**FIGURE 1-27. SENSING MECHANISM**
(B) **OIL RESERVOIR**

**REQUIREMENT**

Each oil wick rests lightly on high parts of front and rear cam of each cam sleeve.

**TO ADJUST**

Trip both armatures and rotate shaft until high part of front and rear cam of each sleeve is under its wick. Position oil reservoir assembly with its mounting screws (4) loosened. When cam sleeve is rotated, teeth of wick retainer should not deflect upward more than 1/32 inch (gauge by eye). Refine adjustment by slightly bending teeth on wick comb spring.

---

(A) **LATCH STRIPPER BAIL SPRING**

**TO CHECK**

Trip clutch, rotate shaft so latch bail follower roller is on low part of cam. Apply scale to top of latch stripper bail.

**REQUIREMENT**

- **MIN.** 2-3/4 OZS.
- **MAX.** 6 OZS.

To start latch stripper bail moving.

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**FIGURE 1-28. SENSING MECHANISM SPRINGS**

CHANGE 4
(C) LATCH LEVER SPRING
To check
Select blank combination, trip sensing clutch and rotate shaft to stop position. Slide levers should be in uppermost position.
Requirement
Min. 1 oz.
Max. 3 ozs.
To start latch lever moving.
Note
Take care not to damage push lever springs in checking requirement.

(b) PUSH LEVER SPRING
To check
Select "letters" combination, and latch sensing clutch. Trip clutch and rotate shaft until push levers are stripped.
Requirement
Min. 1/4 oz.
Max. 1-1/2 ozs.
To start push lever moving.
Note
Be sure contact slides do not interfere with movement of push levers.

FIGURE 1-29. SENSING MECHANISM SPRINGS
(A) CONTACT SLIDE LEVER
REQUIREMENT
CLEARANCE BETWEEN CLOSEST PUSH LEVER AND CONTACT LEVER SLIDE WHEN SENSING PINS ARE IN UPPERMOST POSITION, PUSH LEVERS ARE SELECTED AND LATCH LEVERS ARE STRIPPED.
MIN. 0.005 INCH
MAX. 0.015 INCH
TO CHECK
TRIP SENSING SHAFT CLUTCH AND ROTATE SHAFT UNTIL SENSING PINS ARE IN UPPERMOST POSITION. TRIP LATCH LEVERS MANUALLY.
TO ADJUST
POSITION ECCENTRIC SHAFT TOWARD THE RIGHT WITH LOCKING NUTS LOOSENED, BEGIN WITH HIGH PART OF ECCENTRIC IN UPPERMOST RIGHT QUADRANT.
NOTE
RECHECK STORING SWITCH GUIDES ADJUSTMENT (FIGURE 1-10)

(B) STORING SWITCH CONTACT GAP
(1) REQUIREMENT
BLANK COMBINATION SELECTED, CLUTCH TRIPPED, AND SHAFT ROTATED ONE REVOLUTION TO STOP POSITION.
MIN. 0.015 INCH
MAX. 0.020 INCH
GAP BETWEEN EACH CONTACT LEVER EXTENSION AND ITS CONTACT SCREW.
TO ADJUST
ROTATE INDIVIDUAL CONTACT SCREW.

(2) REQUIREMENT
MIN. 0.010 INCH
CLEARANCE BETWEEN CONTACT SLIDE AND CONTACT LEVER EXTENSION (SENSING PIN CONTACTS ONLY).
TO CHECK
SELECT "LETTERS"COMBINATION, TRIP CLUTCH AND ROTATE SHAFT TO STOP POSITION. TRIP CLUTCH AND ROTATE SHAFT UNTIL SENSING PINS ARE IN UPPERMOST POSITION.
TO ADJUST
REFINE REQUIREMENT (1)
REQUIREMENT
MIN. 0.020 INCH
MAX. 0.030 INCH
GAP BETWEEN AUXILIARY "A" AND "B" CONTACTS WHEN CONTACTS ARE FULLY OPENED.
TO ADJUST
ROTATE INDIVIDUAL CONTACT SCREW.

NOTE
THE ABOVE REQUIREMENTS ARE FINAL, EXCEPT IN LOCATIONS WHERE A DxD OR LSS TEST SET IS AVAILABLE. SEE PARAGRAPH 4 FOR STROB INFORMATION.

FIGURE 1-30. STORING SWITCH MECHANISM
(A) COVER PLATE

(1) REQUIREMENT
COVER PLATE HELD FLUSH AGAINST TOP PLATE BY DETENT ACTION.

(2) REQUIREMENT
COVER PLATE RESTS ON AT LEAST THREE SIDE FRAME PROJECTIONS.

(3) REQUIREMENT
FRONT EDGE OF COVER AND TOP PLATES IN LINE.

TO ADJUST
LOosen DETENT NUTS ON SIDE FRAMES, AND MOVE THEM TO EXTREME LOWER RIGHT POSITION. TIGHTEN NUTS. LOOSEN FOUR BRACKET MOUNTING NUTS ON COVER PLATE. PLACE COVER INTO POSITION, AND POSITION TO MEET REQUIREMENTS. TIGHTEN NUTS. RECHECK AND REFINE REQUIREMENTS.

COVER PLATE DETENT SPRING TO CHECK
REMOVER COVER PLATE.
REQUIREMENT
MIN. 28 OZS.
MAX. 48 OZS.
TO START PLUNGER MOVING

(B) FRONT PANEL

NOTE
REMOVE COVER PLATE PRIOR TO INSTALLING OR REMOVING FRONT PANEL. PANEL SLIDES SHOULD ENGAGE GUIDES ON BASE SO THAT TOP EDGE OF PANEL PASSES UNDER TAPE GUIDE PLATE.

(1) REQUIREMENT
FRONT PANEL LATCHES SECURELY AT LOWER RIGHT AND LEFT CORNERS, AND PANEL SLIDES FULLY ENGAGE BASE GUIDES.
MIN. 0.085 INCH
MAX. 0.105 INCH
CLEARANCE BETWEEN BOTTOM EDGE OF BASE RAIL AND PANEL GUIDE FLANGE.

TO ADJUST
REMOVE TRANSMITTER FROM BASE. USE SHIMS TO OBTAIN LATERAL POSITION OF PANEL SLIDES, AND POSITION GUIDES VERTICALLY (PLACE UNUSED SHIMS UNDER HEAD OF MOUNTING SCREW). REPLACE TRANSMITTER ON BASE.

(2) REQUIREMENT
MIN. 0.015 INCH
MAX. 0.060 INCH
CLEARANCE BETWEEN PANEL TOP EDGE AND FRONT EDGE OF COVER AND TAPE GUIDE PLATES. THE UPPER PANEL SIDES SHOULD NOT TOUCH THE COVER AND TAPE GUIDE PLATE EAVES.

TO ADJUST
WITH FRONT PANEL IN PLACE, LOOSEN PANEL GUIDE MOUNTING SCREWS AND POSITION THE GUIDE. TO FACILITATE ADJUSTMENT, REMOVE THE FOUR VIBRATION MOUNT NUTS AND SWING SUB-BASE AWAY.

FIGURE 1-31. COVER AND PANEL ASSEMBLY
b. SELF CONTAINED SET BASE (LBXB)

(A) INTERMEDIATE GEAR ASSEMBLY

NOTE

REMOVE GEAR GUARD.

(1) REQUIREMENT
AT LEAST 0.010 INCH CLEARANCE BETWEEN DISTRIBUTOR SHAFT DRIVING GEAR, AND INTERMEDIATE GEAR BRACKET BEARING CLAMP.

TO ADJUST
POSITION DRIVING GEAR WITH ITS MOUNTING SCREW LOOSENCED.

(2) REQUIREMENT
SOME CLEARANCE BETWEEN DISTRIBUTOR SHAFT DRIVEN GEAR AND INTERMEDIATE GEAR BRACKET BEARING CLAMP.

TO ADJUST
POSITION INTERMEDIATE GEAR BRACKET WITH ITS MOUNTING SCREWS LOOSENCED.

(3) REQUIREMENT
MIN. SOME
MAX. 0.003 INCH CLEARANCE BETWEEN DISTRIBUTOR SHAFT DRIVING AND DRIVEN GEARS AT POINT WHERE BACKLASH IS MINIMUM.

(4) REQUIREMENT
INTERMEDIATE GEAR HOUSING PARALLEL TO BASE.

TO ADJUST
POSITION INTERMEDIATE GEAR BRACKET WITH ITS MOUNTING SCREWS LOOSENCED.

(B) MOTOR PINION (SELF CONTAINED UNIT)

(1) REQUIREMENT
MIN. SOME
MAX. 0.003 INCH BACKLASH BETWEEN MOTOR PINION GEAR AND INTERMEDIATE GEAR.

(2) REQUIREMENT
MOTOR PARALLEL TO BASE.

TO ADJUST
POSITION MOTOR WITH ITS MOUNTING SCREWS LOOSENCED. TIGHTEN MOUNTING SCREWS. ROTATE SHAFT AND RECHECK REQUIREMENT.

CAUTION
IF THE MOTOR SHOULD BECOME BLOCKED FOR SEVERAL SECONDS, THE THERMAL CUT-OUT SWITCH WILL BREAK THE CIRCUIT. SHOULD THIS HAPPEN, ALLOW THE MOTOR TO COOL AT LEAST 5 MINUTES BEFORE MANUALLY DEPRESSING THE RED BUTTON. AVOID REPEATED DEPRESSION.

FIGURE 1-32. BASE AND MOTOR GEARS

CHANGE 4
c. MULTIPLE TRANSMITTER DISTRIBUTOR BASE (LMXB)

ADJUSTING STUD

LOCK NUTS

MOTOR PINION

INTERMEDIATE GEAR

COUNTER SHAFT

DRIVING GEAR

DRIVEN GEAR

(A) MOTOR PINION (MULTIPLE MOUNTED UNIT)
REQUIREMENT --- PINION AND INTERMEDIATE GEAR
SHOULD HAVE A BARELY PERCEPTIBLE AMOUNT
OF BACKLASH AT POINT OF MINIMUM CLEARANCE
(CHECK FOR ONE REVOLUTION OF INTERMEDIATE GEAR).
TO ADJUST --- WITH ITS LOCK NUTS LOOSENED,
POSITION THE ADJUSTING STUD UP OR DOWN.

FIGURE I-33. MULTIPLE TRANSMITTER DISTRIBUTOR BASE
COUNTER SHAFT REQUIREMENT

BARELY PERCEPTIBLE AMOUNT OF BACKLASH BETWEEN COUNTER SHAFT DRIVING GEAR AND ITS ASSOCIATED TRANSMITTER DISTRIBUTOR DRIVEN GEAR AT POINT OF LEAST CLEARANCE.

TO ADJUST

1. WITH LOCATING PLATE MOUNTING SCREWS FRICITION TIGHT, POSITION PLATE AT CENTER OF ITS ADJUSTMENT RANGE.
2. INSERT AN LBXD UNIT (WITH CRADLE) INTO LEFT MOUNTING POSITION ON BASE. POSITION LOCATING PLATE TO MEET REQUIREMENT, TIGHTEN PLATE MOUNTING SCREWS.
3. REMOVE LBXD FROM LEFT POSITION, AND PLACE IT IN RIGHT MOUNTING POSITION. LOosen MOUNTING SCREWS ON COUNTERSHAFT PEDESTALS AND POSITION RIGHT END OF COUNTER SHAFT TO MEET REQUIREMENT.
4. TIGHTEN ALL MOUNTING SCREWS, CHECK FOR BOUNDS, AND RECHECK REQUIREMENTS IN RIGHT AND LEFT MOUNTING POSITIONS. REFINE IF NECESSARY.

FIGURE 1-34. MULTIPLE TRANSMITTER DISTRIBUTOR BASE
(B) FILLER PLATES

REQUIREMENT

TOP SURFACE OF FILLER PLATE SHOULD ALIGN WITH UPPER SURFACE OF BOTH TOP PLATE AND TAPE GUIDE PLATE. COMMON EDGES SHOULD BEAR AGAINST EACH OTHER.

TO CHECK

(1) LAY A STRAIGHTEDGE ACROSS TOP PLATES AND FILLER PLATES, 1/4" FROM COVER PLATE. GAP BETWEEN EACH PLATE AND STRAIGHTEDGE, 1/8" ON EACH SIDE OF EDGE BETWEEN TOP AND FILLER PLATES (5 EDGES) SHALL BE FLUSH TO 0.010 INCH.

(2) LAY A STRAIGHTEDGE ACROSS TAPE GUIDE PLATES AND FILLER PLATES, 1/8" FROM LOWER EDGE OF TAPE GUIDE PLATES. GAP BETWEEN STRAIGHTEDGE AND EACH TAPE GUIDE PLATE 1/8" ON EACH SIDE OF EDGE BETWEEN TAPE GUIDE AND FILLER PLATES (5 EDGES) SHALL BE FLUSH TO 0.010 INCH.

TO ADJUST

POSITION FILLER PLATE AND ITS BRACKETS WITH THE BRACKET MOUNTING SCREWS AND PLATE MOUNTING NUTS FRICTION TIGHT.

(A) COVER PLATES

(1) REQUIREMENT

WITH THREE LBXD UNITS IN POSITION ON THE BASE, THE COVER PLATES SHOULD ALIGN HORIZONTALLY, AND THE MATING EDGE OF EACH COVER PLATE AND TOP PLATE SHALL BE FLUSH.

TO ADJUST

POSITION COVER PLATE WITH ITS DETENTING NUTS LOOSENED (SEE FIGURE

(2) REQUIREMENT

EDGE OF COVER PLATE OPPOSITE DRIVING GEAR SHALL ALIGN WITH EDGE OF TOP PLATE.

TO ADJUST

POSITION COVER PLATE WITH THE CORNER PLATE DETENT MOUNTING NUTS AND SPRING PLATE MOUNTING NUTS FRICTION TIGHT.

NOTE

WHEN LESS THAN 3 LBXD UNITS ARE USED ON THE BASE, THE UNUSED COMPARTMENT CONTAINS A DUMMY UNIT. POSITION THE TOP PLATE AND COVER IN A MANNER SIMILAR TO ADJUSTMENT PROCEDURE (A).

FIGURE 1-35. MULTIPLE TRANSMITTER DISTRIBUTOR BASE
d. AUTOMATIC SEND-RECEIVE SET TRANSMITTER DISTRIBUTOR BASE (LCXB)

NOTE 1. OVERSIZE HOLES (3) PROVIDED FOR HORIZONTAL ALIGNMENT OF DRIVE SHAFTING.
NOTE 2. BASES EQUIPPED WITH ISOLATING MEMBERS FOR NOISE REDUCTION.
NOTE 3. OVERSIZE HOLES PROVIDED IN BUSHINGS (3) ATTACHED TO BASE OF LBXD (FIG. 4-2). MAKE CERTAIN THAT MOUNTING BUSHINGS ARE SCREWED IN AS FAR AS THEY WILL GO. NO VERTICAL ADJUSTMENT IS NEEDED.

NOTE 4. PROVIDE SOME CLEARANCE BETWEEN COUPLING AND ISOLATOR.
NOTE 5. INSTALL GROUND STRAP BETWEEN REAR SHOULDER STUD AND RIGHT SIDE OF ISOLATED LCXB BASE.

(A) BASE (LCXB) DRIVING SHAFT REQUIREMENT
DRIVING SHAFT AND COUPLING SHAFT SHOULD ALIGN WITH KEYBOARD-PERFORATOR POWER SHAFTING.
TO ADJUST POSITION THE LCXB BASE WITH ITS MOUNTING SCREWS LOOSENED.

(B) TRANSMITTER DISTRIBUTOR DRIVEN GEAR REQUIREMENT
DRIVING AND DRIVEN GEARS SHOULD ALIGN, AND THERE SHOULD BE A MINIMUM AMOUNT OF BACKLASH BETWEEN GEAR TEETH.
TO ADJUST POSITION LBXD WITH ITS MOUNTING SCREWS LOOSENED.

FIGURE 1-36. AUTOMATIC SEND RECEIVE SET TRANSMITTER DISTRIBUTOR BASE (LCXB)
IF THE MOTOR SHOULD BECOME BLOCKED FOR SEVERAL SECONDS, THE THERMAL CUT-OUT SWITCH WILL BREAK THE CIRCUIT. SHOULD THIS HAPPEN, ALLOW THE MOTOR TO COOL AT LEAST 5 MINUTES BEFORE MANUALLY DEPRESSING THE RED BUTTON. AVOID REPEATED DEPRESSION.

SYNCHRONOUS MOTOR POSITIONING REQUIREMENT
TWO OILERS SHOULD BE UPWARD AND APPROXIMATELY EQUIDISTANT FROM A VERTICAL LINE THROUGH THE MOTOR SHAFT. TO ADJUST POSITION THE MOTOR WITH THE TWO CLAMP SCREWS LOOSENED.

GOVERNED MOTOR POSITIONING REQUIREMENT
MOTOR SHOULD BE CENTRALLY POSITIONED IN ITS RUBBERMOUNTS SO AS TO PROVIDE AT LEAST 0.020 CLEARANCE BETWEEN THE MOTOR HOUSING AND THE CRADLE AT THE GOVERNOR END. THE CABLE SHOULD ALSO CLEAR THE GROMMET IN THE SCREEN BY AT LEAST 0.030 INCH.

A. GOVERNOR CONTACT REQUIREMENT
THE CONTACTS SHOULD MEET SQUARELY AND NOT OVERLAP MORE THAN 0.010 INCH.
TO ADJUST POSITION THE STATIONARY CONTACT AND CONTACT ARM WITH THE CLAMP SCREW AND POST LOOSENED.

B. GOVERNOR CONTACT BACKSTOP REQUIREMENT
CLEARANCE BETWEEN THE MOVABLE CONTACT ARM AND ITS E C C E N T R I C BACKSTOP.
MIN. 0.030 INCH
MAX. 0.050 INCH
TO ADJUST ROTATE THE ECCENTRIC BACKSTOP WITH CLAMPING SCREW LOOSENED.

FIGURE 1-37. SYNCHRONOUS AND GOVERNED MOTORS
(A) GOVERNOR BRUSH SPRING TENSION REQUIREMENT
GOVERNOR FAN REMOVED,
MIN. 4 OZS,
MAX. 6 OZS,
TO MOVE THE SPRING FLUSH WITH BRUSH COVER.

(B) GOVERNED MOTOR SPEED ADJUSTMENT REQUIREMENT ---
WITH THE TARGET ILLUMINATED AND VIEWED THROUGH THE VIBRATING SHUTTERS OF A 120 VPS TUNING FORK, THE SPOTS SHOULD APPEAR STATIONARY WHILE THE MOTOR IS ROTATING,
TO ADJUST ---
STOP THE MOTOR AND TURN THE ADJUSTING SCREW AS INDICATED ON THE GOVERNOR COVER.

FIGURE 1-38. SYNCHRONOUS AND GOVERNED MOTORS
f. CABINETS

(A) REAR DOORS
REQUIREMENT
When fully closed, doors should be flush with structural member of cabinet.

TO ADJUST
Bend flange at upper right hand corner of left door (as viewed from rear).

(B) REAR DOOR CATCHES
REQUIREMENT
When closed, doors should fit firmly against magnetic door catches.

TO ADJUST
Position catches with mounting screws loosened.

FIGURE 1-39. CABINET, MULTIPLE MOUNTING
(A) **FRONT DOOR**
REQUIREMENT
CLEARANCE BETWEEN TOP EDGE OF DOOR AND
LOWER EDGE OF TABLE TOP, AND BETWEEN
LOWER EDGE OF DOOR AND THE BOTTOM EDGE
OF CABINET SHOULD BE EQUAL (GAUGE BY
EYE).
TO ADJUST
WITH HINGE MOUNTING SCREWS LOOSENED,
POSITION THE HINGE.

(C) **FRONT DOOR LATCH**
REQUIREMENT
LATCH BOLT EXTENDS:
MIN. 5/32 INCH
MAX. 7/32 INCH
BETWEEN EDGE OF DOOR.
TO ADJUST
POSITION BOLT WITH ITS CLAMPING
SCREWS LOOSENED.

(b) **TABLE TOP**
REQUIREMENT
TABLE TOP FLUSH ON BOTH SIDES.
TO ADJUST
WITH ITS MOUNTING SCREWS LOOSENED,
POSITION TOP IN ITS ELONGATED MOUNTING HOLES.

FIGURE 1-40. CABINET, TABLE TYPE
TAPE LID - EARLY DESIGN (SEE FIGURE 1-16 FOR LATE DESIGN)

NOTE

REMOVE TOP AND TAPE GUIDE PLATES. LUBRICATE PRIOR TO ADJUSTMENT.

(1) REQUIREMENT (PRELIMINARY)

MIN. SOME
MAX. 0.010 INCH.
CLEARANCE BETWEEN PIVOT SHOULDER AND TAPE LID WHEN LID IS PRESSED AGAINST NOTCH IN TAPE GUIDE PLATE, AND FEED WHEEL SLOTS AND TAPE-CUT PIN HOLES ARE LINED UP.

TO ADJUST

LOosen TAPE LID BRACKET MOUNTING NUTS. USING A 156743 GAUGE, LINE UP FEED WHEEL GROOVE IN TAPE LID WITH SLOT IN TAPE GUIDE PLATE. POSITION TAPE LID BRACKET TO MEET REQUIREMENT.

(2) REQUIREMENT

TAPE LID FRONT BEARING SURFACE (A) SHALL TOUCH TAPE GUIDE PLATE. CLEARANCE (B) MEASURED AT FIN OF TAPE LID IN LINE WITH REAR TAPE GUIDE (SEE NOTE 2):

MIN. 0.010 INCH
MAX. 0.018 INCH

NOTE 1

WHEN BOTH PLATES ARE ASSEMBLED ON UNIT, LEFT EDGE OF LID MAY TOUCH TOP PLATE AND SOME CHANGE IN THIS CLEARANCE MAY BE EXPECTED.

TO ADJUST

WITH TAPE LID BEARING BRACKET MOUNTING SCREWS FRICITION TIGHT, AND TAPE LID PRESSED AGAINST TAPE GUIDE PLATE, POSITION BRACKET. RECHECK REQUIREMENT (1).

(3) REQUIREMENT

RELEASE PLUNGER SHALL HAVE SOME END PLAY WHEN LID IS LATCHED AGAINST TAPE GUIDE PLATE.

TO ADJUST

WITH ECCENTRIC MOUNTING POST LOCK NUT FRICITION TIGHT AND LID RAISED, ROTATE HIGH PART OF ECCENTRIC TOWARD TAPE GUIDE PLATE. CLOSE LID AND AND ROTATE ECCENTRIC TOWARD BRACKET UNTIL LATCH JUST FALLS UNDER FLAT ON POST. RECHECK BY DEPRESSING PLUNGER WITH LID HELD DOWN. TIP OF LATCH SHOULD CLEAR POST AS PLUNGER IS OPERATED.

FIGURE 1-41. TAPE LID MECHANISM
4. DISTRIBUTOR AND TRANSMITTER CONTACT STROBING

a. GENERAL

(1) The following adjustment procedure outlines pulse length requirements for transmitter distributor units operating at various speeds (OPM) and transmission patterns (i.e., 7.00, 7.42, or 7.50 unit code). In all cases, both the test set and the unit under test must be operating at the same speed for proper strobing. All pulse length requirements are made with respect to a 7.42 unit code test set scale, regardless of the cam arrangement of the transmitter distributor.

(2) When discussing the operating speed of a unit, a number of different terms may be used to represent the same speed. A typical teletypewriter or data channel, for example, may be described in terms of modulation rate (BAUD), or rate of transmission of information (WPM or OPM). In the following strobing procedure, reference is made to both OPM and BAUD. In other parts of this bulletin, reference is also made to WPM. These three terms, although defined differently, can be used interchangeably to represent the operating speed of any Teletype Transmitter Distributor unit.

(3) The term OPM is an abbreviation for operations per minute. OPM is defined as follows:

\[ OPM = \frac{c}{\text{sec}} \times 60 \text{ min} \]

That is, the speed of a unit, in operations per minute (OPM), is equal to the transmission rate, in characters per second (c/sec), times 60 sec/min. Since a character is transmitted each operation, this term provides a measure of the amount of information which may be transmitted by the unit.

(4) The term WPM is an abbreviation for words per minute. WPM is defined as follows:

\[ WPM = \frac{c}{\text{sec}} \times 60 \text{ min} \quad \text{or} \quad WPM = \frac{c}{6 \text{ word}} \]

That is, the speed of a unit, in words per minute (WPM), is equal to the transmission rate, in characters per second (c/sec), times 60 sec/min, divided by 6 c/word. It may be noted, from observation of the defining formulas for OPM and WPM, that a close relationship exists between these terms. The only difference in the defining formulas is that equation (2) has an extra term (6 c/word) which appears as a denominator. From the above two equations, a third one may be derived. Since \( OPM = \frac{c}{\text{sec}} \times 60 \text{ sec/min} \), we can replace the numerator of equation (2) -- which is \( \frac{c}{\text{sec}} \times 60 \text{ sec/min} \) -- by OPM. The result will be:

\[ WPM = \frac{OPM}{6 \text{ word}} \]

Formula (3) is a valid one to use when converting from one term to the other as long as the exact values, and not approximate values, for WPM or OPM are used. For example, one of the standard Teletype Transmitter Distributor operating speeds is generally stated as being 60 WPM. This value, however, is only an approximate one used to simplify discussion of the unit. In all cases, units transmitting 60 WPM are actually operating at 368 OPM. By formula (3), it can readily be calculated that the unit is transmitting not 60 WPM, but 61.33 WPM:

\[ WPM = \frac{OPM}{6 \text{ word}} \quad \text{; WPM} = \frac{368}{6} = 61.33 \]

The following table is provided to aid in determining the operating speed of a unit when either OPM or WPM (actual or approximate) is known. It is not a complete listing of all available speeds, but is representative of the speeds most in use.
Operations Per Minute (OPM)  | Words Per Minute (WPM)  
-------------------------------|------------------------
  360  |  61.33  |  60  
  390  |  65.00  |  65  
  423.6 |  71.43  |  70  
  460  |  76.66  |  73  
  600  | 100.00  | 100  
  636  | 106.00  | 106  
  642  | 107.15  | 107  

(5) The remaining term, BAUD, is defined as a unit of telegraphic speed—or modulation rate—which indicates the time duration of the shortest signal element of a transmitted character. The defining formula for BAUD is:

\[
\text{Formula (4)} \quad \text{BAUD} = \frac{\text{OPM} \times \text{UNIT CODE}}{60 \text{ sec} \over \text{min}}
\]

or

\[
\text{Formula (5)} \quad \text{BAUD} = \frac{\text{UNIT CODE}}{\text{sec} \times \text{OPM}}
\]

This term differs from the first two defined in that, while OPM and WPM provide an indication of the amount of information transmitted by a unit, the term BAUD is most correctly used when referring to the binary digital modulation rate of the information transmitted.

(6) The objective of this discussion has been to introduce the technician to the above terms, so that their usage will be better understood by him. Finally, by use of the five defining formulas, the technician should be able to convert from one type of speed terminology to another, if the need should arise.

b. CONTACT STROBING PROCEDURE - 1 CYCLE CAM

NOTE

To strobe the distributor and sensing contacts, a Signal Distortion Test Set (DXD) or Stroboscopic Test Set (LSS) may be used. For operation of these sets, refer to Bulletin 181B or 261B respectively.

(1) Distributor Contacts - 5 Level Units

NOTE

The following procedure pertains to the LBXD1, 2, 4, 5, 6, 7, 8, 9, 11, 14, 16, 17, 18, 21, 22, and 23, transmitter distributor units.

(a) Preliminary - Connect a test set to the output of the distributor contacts. Test set and transmitter distributor must be operating at the same speed.

(b) Stop Contact Requirement - Insert a "blank" perforated tape into the transmitter distributor sensing head. Trip the distributor clutch (on some units, the distributor clutch may be tripped electrically via operation of the sensing shaft). Orient the test set scale so the 142 mark of its stop segment is aligned with the end of the stop pulse image.

Requirement (See Figure 1)

<table>
<thead>
<tr>
<th>Length of stop pulse to be:</th>
</tr>
</thead>
<tbody>
<tr>
<td>106 scale divisions (7.00 unit code cam)</td>
</tr>
<tr>
<td>148 scale divisions (7.50 unit code cam)</td>
</tr>
</tbody>
</table>

To Adjust

Rotate distributor stop contact adjusting screw.
NOTE 1

(1) Allowable pulse variation for LBXD 1, 2, 8, 9, 11, 16, 17, 18, 21, and 22 is ±3%.
(2) Allowable pulse variation for LBXD 4, 5, 6, 7, 14, and 23 is ±4%.

NOTE 2

4% is equivalent to 4.24 scale divisions (7.00 unit code), 5.68 scale divisions (7.42 unit code), and 5.92 scale divisions (7.50 unit code). 3% is equivalent to 3.18 scale divisions (7.00 unit code), 4.26 scale divisions (7.42 unit code), and 4.44 scale divisions (7.50 unit code).

---

FIGURE 1. STOP CONTACT REQUIREMENTS

(c) \#2 and \#4 Contact Requirements - Replace the "blank" perforated tape with an "R" perforated tape. Align the end of the stop pulse image with the 142 scale division on the stop segment of the test scale.

Requirement (See Figures 2, 3, and 4)
\#2 and \#4 pulse images equal in total length within ±3% (LBXD 1, 2, 8, 9, 11, 16, 17, 18, 21, and 22), or ±4% (LBXD 4, 5, 6, 7, 14, and 23) of each end of the pulse image transition points on the test set scale (see Table 1).

To Adjust
Rotate \#2 and \#4 contact adjusting screws.

(d) \#1, \#3 and \#5 Contact Requirements - Replace the "R" perforated tape with a "Y" perforated tape. Align the end of the stop pulse image with the 142 scale division on the stop segment of the test set scale.

Requirement (See Figures 2, 3, and 4)
\#1, \#3, and \#5 pulse images equal in total length within ±3% (LBXD 1, 2, 8, 9, 11, 16, 17, 18, and 22), or ±4% (LBXD 4, 5, 6, 7, 14, and 23) of each end of the pulse image transition points on the test set scale (See Table 1).

To Adjust
Rotate \#1, \#3, and \#5 contact adjusting screws.

NOTE 1

4% is equivalent to 4.24 scale divisions (7.00 unit code), 4.00 scale divisions (7.42 unit code), and 3.96 scale divisions (7.50 unit code). 3% is equivalent to 3.18 scale divisions (7.00 unit code), 3.00 scale divisions (7.42 unit code), and 2.97 scale divisions (7.50 unit code).
# TABLE 1

**PULSE IMAGE TRANSITION POINTS ON TEST SET SCALE**

<table>
<thead>
<tr>
<th>TEST SCALE SEGMENT</th>
<th>7.00 UNIT CODE</th>
<th>7.42 UNIT CODE</th>
<th>7.50 UNIT CODE</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>BEGIN AT SCALE DIV.</td>
<td>END AT SCALE DIV.</td>
<td>BEGIN AT SCALE DIV.</td>
</tr>
<tr>
<td>STOP</td>
<td>36 IN STOP</td>
<td>142 IN STOP</td>
<td>0 IN STOP</td>
</tr>
<tr>
<td>1</td>
<td>6 IN #1</td>
<td>12 IN #2</td>
<td>0 IN #1</td>
</tr>
<tr>
<td>2</td>
<td>12 IN #2</td>
<td>18 IN #3</td>
<td>0 IN #2</td>
</tr>
<tr>
<td>3</td>
<td>18 IN #3</td>
<td>24 IN #4</td>
<td>0 IN #3</td>
</tr>
<tr>
<td>4</td>
<td>24 IN #4</td>
<td>30 IN #5</td>
<td>0 IN #4</td>
</tr>
<tr>
<td>5</td>
<td>30 IN #5</td>
<td>36 IN STOP</td>
<td>0 IN #5</td>
</tr>
</tbody>
</table>

**FIGURE 2. DISTRIBUTOR CONTACT REQUIREMENTS - 7.00 UNIT CODE**

**FIGURE 3. DISTRIBUTOR CONTACT REQUIREMENTS - 7.42 UNIT CODE**

**FIGURE 4. DISTRIBUTOR CONTACT REQUIREMENTS - 7.50 UNIT CODE**
NOTE 2

To determine the end of the number 5 pulse image, it may be necessary to hold the stop contact open.

(2) Distributor Contacts - 8 Level Units

(a) Stop Contact Requirement - The following procedure pertains to the LBX8D800 Transmitter Distributor unit. Connect the test set and load a "blank" perforated tape into the unit as outlined in paragraph 4.a.(1)(a) and (b).

Requirement (See Figure 5)
Length of stop pulse to be:
135 scale divisions (11.00 unit code cams - 8 level).

To Adjust
Rotate distributor stop contact adjusting screw.

NOTE

Allowable pulse variation for LBX8D800 is ± 3%. 3% is equivalent to 4.05 scale divisions for an 11.00 unit code - 8 level unit.

FIGURE 5. STOP CONTACT REQUIREMENT

(b) #0, #2, #4, and #6 Contacts - Replace the "blank" perforated tape with a tape having the #0, #2, #4, and #6 levels punched. Align the end of the stop pulse image with the 142 scale division on the stop segment of the test scale.

Requirement (See Figure 6)
#0, #2, #4, and #6 pulse images equal in total length within ± 3% of each end of the pulse image transition points on the test set scale (see Table 2).

To Adjust
Rotate #0, #2, #4, and #6 contact adjusting screws.

(c) #1, #3, #5, and #7 Contacts - Replace the 0-2-4-6 perforated tape with a tape having the #1, #3, #5, and #7 levels punched. Align the end of the stop pulse image with the 142 scale division on the stop segment of the test scale.

Requirement (See Figure 6)
#1, #3, #5, and #7 pulse images equal in total length within ± 3% of each end of the pulse image transition points on the test set scale (see Table 2).

To Adjust
Rotate #1, #3, #5, and #7 contact adjusting screws.

NOTE 1

3% is equivalent to 2.03 scale divisions (11.00 unit code - 8 level).

NOTE 2

To determine the end of the number 7 pulse image, it may be necessary to hold the stop contact open.
### TABLE 2

**EIGHT LEVEL PULSE IMAGE TRANSITION POINTS**

ON FIVE LEVEL TEST SET SCALE - 11.00 UNIT CODE

<table>
<thead>
<tr>
<th>CODE PULSE</th>
<th>END AT SCALE DIVISION</th>
<th>BEGIN AT SCALE DIVISION</th>
</tr>
</thead>
<tbody>
<tr>
<td>STOP</td>
<td>7 IN STOP SEGMENT</td>
<td>142 IN STOP SEGMENT</td>
</tr>
<tr>
<td>0</td>
<td>67 IN START SEGMENT</td>
<td>35 IN #1 SEGMENT</td>
</tr>
<tr>
<td>1</td>
<td>35 IN #1 SEGMENT</td>
<td>2 IN #2 SEGMENT</td>
</tr>
<tr>
<td>2</td>
<td>2 IN #2 SEGMENT</td>
<td>70 IN #2 SEGMENT</td>
</tr>
<tr>
<td>3</td>
<td>70 IN #2 SEGMENT</td>
<td>37 IN #3 SEGMENT</td>
</tr>
<tr>
<td>4</td>
<td>37 IN #3 SEGMENT</td>
<td>5 IN #4 SEGMENT</td>
</tr>
<tr>
<td>5</td>
<td>5 IN #4 SEGMENT</td>
<td>72 IN #4 SEGMENT</td>
</tr>
<tr>
<td>6</td>
<td>72 IN #4 SEGMENT</td>
<td>40 IN #5 SEGMENT</td>
</tr>
<tr>
<td>7</td>
<td>40 IN #5 SEGMENT</td>
<td>7 IN STOP SEGMENT</td>
</tr>
</tbody>
</table>

![Distributor Contact Requirements Diagram]

**FIGURE 6. DISTRIBUTOR CONTACT REQUIREMENTS - 11.00 UNIT CODE**

(3) **Distributor Auxiliary Contacts - 5 and 8 Level Units (See Figure 7)**

(a) **Requirement - Auxiliary "C" Contact (LBXD 1, 2, 16, and 18 - 7.00 unit code)**

Auxiliary "C" contact should:

- Close at $29.5 \pm 5$ divisions in start segment
- Open at $48 \pm 8$ divisions in stop segment

*Close at $39 \pm 6$ divisions in start segment
*Open at $95 \pm 5$ divisions in #5 segment
*LBDX16

To Adjust

- Rotate distributor auxiliary contact adjusting screw.

(b) **Requirement - Auxiliary "C" Contact (LBXD 1 and 2 - 7.42 unit code)**

Auxiliary "C" contact should:

- Close at $11.5 \pm 5$ divisions in start segment
- Open at $13 \pm 8$ divisions in stop segment

To Adjust

- Rotate distributor auxiliary contact adjusting screw.

(c) **Requirement - Auxiliary Contact (LBXD 4, 5, 6, 7, 11, 14, and 23 - 7.42 unit code)**

Auxiliary contact should:

- Close at $32 \pm 15$ divisions in start segment
- Open at $29 \pm 15$ divisions in stop segment

To Adjust

- Rotate distributor auxiliary contact adjusting screw.
(d) Requirement – Auxiliary "B" Contact (LBXD 7 and 14 - 7.42 unit code)
Auxiliary "B" contact should:
Close at 25 ± 15 divisions in #1 segment
Open at 75 ± 15 divisions in #5 segment

To Adjust
Rotate distributor auxiliary contact adjusting screw.

(e) Requirement – Auxiliary Contact (LBXD 9 - 7.42 unit code)
Auxiliary contact should:
Close at 32 ± 20 divisions in start segment
Open at 65 ± 10 divisions in stop segment.

To Adjust
Rotate distributor auxiliary contact adjusting screw.

(f) Requirement – Auxiliary Contact (LBXD 8 and 22 - 7.42 unit code)
Auxiliary contact should:
Close at 110 ± 5 divisions in stop segment
Open at 31 ± 8 divisions in stop segment

To Adjust
Rotate distributor auxiliary contact adjusting screw.

(g) Requirement – Auxiliary Contact (LBXD 800 - 11.00 unit code)
See requirement (f).

(h) Requirement – Auxiliary Contact (LBXD 17 and 21 - 7.50 unit code)
Auxiliary contact should:
Close at 32 ± 20 divisions in start segment
Open at 30 ± 10 divisions in stop segment

To Adjust
Rotate distributor auxiliary contact adjusting screw.

---

FIGURE 7. DISTRIBUTOR AUXILIARY CONTACT REQUIREMENTS
(4) Transmitter Contacts - 5 and 8 Level Unit (See Figure 8)

(a) Preliminary

1. Test set connected to the output of the distributor contacts.

2. Insert a "letters" perforated tape into the transmitter distributor sensing head. Align the end of the distributor stop pulse image with the 142 scale division on the stop segment of the test set scale.

3. Connect the input of the test set to the respective contact of the storing switch.

NOTE

LBXD 1, 2, and 11 - Contact #1 through #5 shall have no electrical breaks during the transmitted (distributor) code pulses. Any electrical breaks occurring within the ± 3% tolerance limits of the distributor contacts are acceptable). When reading successive marking code perforations, the time of contact opening shall not exceed 1.5 ns.

LBXD 4, 5, 6, 7, 14, 23, and 800 - Contacts #1 through #5 (or #0 through #7) shall have no electrical breaks during the transmitted (distributor) code pulses (see Tables 1 & 2 for transition points) greater than 2-1/2 scale divisions at 600 and 636 OPM; 2 scale divisions at 420 and 460 OPM, and 1-1/2 scale divisions at 368 and 390 OPM. No more than one break is permissible.

LBXD 8, 9, 16, 17, 18, 21, and 22 - Contacts #1 through #5 shall have no electrical breaks during the transmitted (distributor) code pulses. Any electrical breaks occurring within the ± 3% tolerance limits of the distributor contacts or in the transition area are acceptable.

(b) Requirement - LBXD 1, 2, 5, 6, 7, 8, 9, 11, 14, 16, 17, 21, 22, and 800 (7, 42, 750 and 11, 00 unit code)

Before 80 divisions in start segment
After 20 divisions in stop segment

To Adjust
Position respective contact adjusting screw, or refine transfer contact adjustments as necessary.

NOTE

Beginning and end of pulse image may overlap within transition area.

(c) Requirement - LBXD 1, 2, 11, 16, and 18 (7.00 unit code)

The beginning and end of each contact trace shall occur:
Before 26 divisions in start segment
After 56 divisions in stop segment

To Adjust
Position respective contact adjusting screw, or refine transfer contact adjustments as necessary.

NOTE

Beginning and end of pulse image may overlap within transition area.

(d) Requirement - LBXD 4, 6, and 23 (7.42 unit code)

At 600 OPM
The beginning and end of each contact trace shall occur:
Before 30 divisions in start segment
After 40 divisions in stop segment
At 460 OPM
The beginning and end of each contact trace shall occur:
Before 45 divisions in start segment
After 31 divisions in stop segment

At 368 OPM
The beginning and end of each contact trace shall occur:
Before 55 divisions in start segment
After 25 divisions in stop segment

To Adjust
Position respective contact adjusting screw, or refine transfer contact adjustments as necessary.

NOTE
Beginning and end of pulse image may overlap within transition area.

---

DISTRIBUTOR STOP PULSE ALIGNED
WITH 142 SCALE DIVISION.

---

20 DIV. → 90 DIV.

56 DIV. → 26 DIV.

40 DIV. → 20 DIV.

31 DIV. → 43 DIV.

25 DIV. → 55 DIV.

TRACE MAY OVERLAP WITHIN THIS TRANSITION AREA

LBXD 1, 2, 5, 7, 8, 9, 11, 14, 16, 17, 21, 22 AND 800

LBXD 1, 2, 11, 16, AND 18

LBXD 4, 6, AND 23 - 600 OPM

LBXD 4, 6, AND 23 - 460 OPM

LBXD 4, 6, AND 23 - 368 OPM

TRACE MAY OVERLAP WITHIN THIS TRANSITION AREA

FIGURE 8. TRANSMITTER CONTACT REQUIREMENTS

(5) Transmitter Auxiliary Contacts (Make-Only Type)

(a) Preliminary

1. Both magnets de-energized, distributor and transmitter shaft clutches latched and in the stop position. Turn motor off.

2. Hold distributor and transmitter shaft gears against rotation. Energize both clutch trip magnets.

3. Release gears and turn motor on.

4. Align the end of the distributor stop pulse image with the 142 scale division on the stop segment of the test set scale.

CHANGE 5
(b) Requirements - LBXD 1, 2, and 11 (7.42 unit code) - See Figure 9

1. Requirement - Auxiliary "A" Contact
   Auxiliary "A" contact should:
   Close at 72 ± 8 divisions in #5 segment
   Open at 19 ± 20 divisions in #1 segment

2. Requirement - Auxiliary "B" Contact
   Auxiliary "B" contact should:
   Close at 65 ± 12 divisions in start segment
   Open at 15.5 ± 8 divisions in #4 segment

To Adjust
Position respective contact adjusting screws as necessary.

---

(c) Requirement - LBXD 4, 5, 6, 7, 14 and 23 (7.42 unit code) - See Figure 10

1. Requirement - Auxiliary Contact
   Auxiliary contact should:
   Close at 10 ± 30 divisions in start segment
   Open at 60 ± 30 divisions in #4 segment

2. Requirement - Clutch Trip Contact
   With distributor clutch trip contact electrically isolated from circuit, clutch trip contact should:
   Close at 30 ± 30 divisions in #4 segment
   Open at 70 ± 30 divisions in #5 segment

To Adjust
Position respective contact adjusting screws as necessary.
(d) Requirements LBXD 1, 2, and 11 (7.00 unit code) - See Figure 11

1. Requirement - Auxiliary "A" Contact
   Auxiliary "A" contact should:
   Close at 90 ± 8 divisions in #5 segment
   Open at 36.5 ± 20 divisions in #1 segment

2. Requirement - Auxiliary "B" Contact
   Auxiliary "B" contact should:
   Close at 83 ± 12 divisions in start segment
   Open at 33.5 ± 8 divisions in #4 segment

To Adjust
Position respective contact adjusting screws as necessary.

DISTRIBUTOR STOP PULSE ALIGNED
WITH 142 SCALE DIVISION

FIVE STOP START ONE TWO THREE FOUR FIVE STOP

AUX, "A"

36.5 DIV.

AUX, "B"

83 DIV.

33.5 DIV.

FIGURE 11. LBXD 1, 2, AND 11 TRANSMITTER AUXILIARY CONTACT REQUIREMENTS

(6) Transmitter Auxiliary Contacts (Transfer Type)

(a) Preliminary

1. Refer to paragraph 4.b.(5)(a) 1. through 4.

2. In the following requirements, reference is made to "marking contacts" and "spacing contacts". The figure below explains which contacts are being referred to.

(b) Requirements - LBXD 8, 22, and 800 (7.42 unit code) - See Figure 12

1. Clutch Trip Contacts
   Requirement - Marking Contacts
   Contacts should:
   Close at 90 ± 10 divisions in start segment
   Open at 64 ± 20 divisions in #2 segment

CHANGE 4
Requirement - Spacing Contacts
Contacts should:
Open at 80 ± 10 divisions in start segment
Close at 74 ± 20 divisions in #2 segment

To Adjust
Refine transfer contact adjustments as necessary.

2. Auxiliary Contacts

Requirement - Marking Contacts
Contacts should:
Close at 80 ± 10 divisions in #2 segment
Open at 31 ± 20 divisions in stop segment

Requirement - Spacing Contacts
Contacts should:
Open at 72 ± 10 divisions in #2 segment
Close at 41 ± 20 divisions in stop segment

To Adjust
Refine transfer contact adjustments as necessary.

FIGURE 12. LBXD 8, 22, AND 800 TRANSmitter AUXILIARY CONTACT REQUIREMENTS

(c) Requirements - LBXD 9 (7.42 unit code) - See Figure 13

1. Auxiliary "A" Contacts

Requirement - Marking Contacts
Contacts should:
Close at 50 ± 10 divisions in stop segment
Open at 85 ± 10 divisions in stop segment

Requirement - Spacing Contacts
Contacts should:
Open at 36 ± 20 divisions in stop segment
Close at 106 ± 20 divisions in stop segment

To Adjust
Refine transfer contact adjustments as necessary.
2. Auxiliary "B" Contacts
   Requirement - Marking Contacts
   Contacts should:
   Close at 30 ± 10 divisions in #4 segment
   Open at 70 ± 20 divisions in #5 segment

   Requirement - Spacing Contacts
   Contacts should:
   Open at 20 ± 10 divisions in #4 segment.
   Close at 80 ± 20 divisions in #5 segment.

To Adjust
Refine transfer contact adjustments as necessary.

FIGURE 13. LBXD 9 TRANSMITTER AUXILIARY CONTACT REQUIREMENTS

(d) Requirements - LBXD 16 (7.00 unit code) - See Figure 14

1. Auxiliary "A" Contacts
   Requirement - Marking Contacts
   Contacts should:
   Open at 70.5 ± 10 divisions in start segment
   Close at 90 ± 20 divisions in #5 segment

   Requirement - Spacing Contacts
   Close at 90.5 ± 10 divisions in start segment
   Open at 80 ± 20 divisions in #5 segment

   To Adjust
Refine transfer contact adjustments as necessary.

2. Auxiliary "B" Contacts
   Requirement - Marking Contacts
   Contacts should:
   Open at 6 ± 10 divisions in stop segment
   Close at 83 ± 20 divisions in start segment
Requirement - Spacing Contacts
Contacts should:
Close at $16 \pm 10$ divisions in stop segment
Open at $73 \pm 20$ divisions in start segment

To Adjust
Refine transfer contact adjustments as necessary.

FIGURE 14. LBXD16 TRANSMITTER AUXILIARY CONTACT REQUIREMENTS

(e) Requirements - LBXD 18 (7.00 unit code) - See Figure 15

1. Auxiliary "A" Contacts
   Requirement - Marking Contacts
   Contacts should:
   Close at $68 \pm 10$ divisions in stop segment
   Open at $103 \pm 10$ divisions in stop segment

   Requirement - Spacing Contacts
   Contacts should:
   Open at $54 \pm 20$ divisions in stop segment
   Close at $124 \pm 20$ divisions in stop segment

   To Adjust
   Refine transfer contact adjustments as necessary.

2. Auxiliary "B" Contacts
   Requirement - Marking Contacts
   Contacts should:
   Close at $48 \pm 10$ divisions in #4 segment
   Open at $68 \pm 20$ divisions in #5 segment

   Requirement - Spacing Contacts
   Contacts should:
   Open at $38 \pm 10$ divisions in #4 segment
   Close at $98 \pm 20$ divisions in #5 segment

   To Adjust
   Refine transfer contact adjustments as necessary.
(f) Requirements - LBXD 17 and 21 (7.50 unit code) - See Figure 16

1. Auxiliary "A" Contact
   Requirement - Marking Contacts
   Contacts should:
   Close at 48 ± 10 divisions in stop segment
   Open at 82 ± 10 divisions in stop segment

   Requirement - Spacing Contacts
   Contacts should:
   Open at 33 ± 20 divisions in stop segment
   Close at 103 ± 20 divisions in stop segment

   To Adjust
   Refine transfer contact adjustments as necessary.

2. Auxiliary "B" Contacts
   Requirement - Marking Contacts
   Contacts should:
   Close at 27 ± 10 divisions in #4 segment
   Open at 67 ± 20 divisions in #5 segment

   Requirement - Spacing Contacts
   Contacts should:
   Open at 17 ± 10 divisions in #4 segment
   Close at 77 ± 20 divisions in #5 segment

   To Adjust
   Refine transfer contact adjustments as necessary.
DISTRIBUTOR STOP PULSE ALIGNED WITH 142 SCALE DIVISION

48 DIV.

33 DIV.

AUX. "A" - MARKING

AUX. "A" - SPACING

AUX. "B" - MARKING

AUX. "B" - SPACING

FIGURE 16. LBXD 17 AND 21 TRANSMITTER AUXILIARY CONTACT REQUIREMENTS

c. CONTACT STROBING PROCEDURE - 2 CYCLE CAM (LBXD 19)

NOTE
To strobe a transmitter distributor operating at 1200 OPM (200 WPM), replace the test set 1 cycle measuring scale with a 2 cycle scale. Refer to Bulletin 1818 and 2618 respectively, for 200 WPM operation of the DXD or LSS test sets (not all LSS test sets require a measuring scale change in order to strobe units operating at 200 WPM).

(1) Distributor Contacts - #1 through #5

(a) Adjust the stop pulse length as outlined in paragraph 4.b.(1)(a) and (b). For 1200 OPM operation, stop pulse length variation is ±5%.

(b) Replace the "blank" perforated tape with an "R" perforated tape. Align the ends of the stop pulse images with the 142 scale divisions on the stop segments of the test set scale. Adjust the #2 and #4 contact adjusting screws as outlined in paragraph 4.b.(1)(c), allowing ±5% pulse length variation.

(c) Replace the "R" perforated tape with a "V" perforated tape. Align the ends of the stop pulse images with the 142 scale divisions on the stop segments of the test set scale. Adjust the #1, #3, and #5 contact adjusting screws as outlined in paragraph 4.b.(1)(d), allowing ±5% pulse length variation.

NOTE
To determine the end of the number 5 pulse image, it may be necessary to hold the stop contact open.

(2) Distributor Auxiliary "C" Contact (See Figure 17.)

Align the end of the stop pulse image with the 142 scale division on the stop segment of the test scale.
Requirement
Auxiliary "C" contact should:
Close at 34 ± 15 divisions in start segment
Open at 28 ± 15 divisions in stop segment

To Adjust
Rotate auxiliary contact screw to meet requirement.

FIGURE 17. LBXD19 DISTRIBUTOR AUXILIARY CONTACT REQUIREMENTS -

(3) Transmitter Contacts - #1 through #5  (See Figure 18)

NOTE
Follow test procedure outlined in paragraph 4.b.(4)(a). through 3.

Requirement
The beginning and end of each contact trace shall occur:
Before 85 divisions in start segment
After 15 divisions in stop segment

To Adjust
Position respective contact adjusting screw as necessary.

NOTE
Beginning and end of pulse image may overlap within transition area.

FIGURE 18. LBXD19 TRANSMITTER CONTACT REQUIREMENTS

(4) Transmitter Auxiliary Contacts  (See Figure 19)

NOTE

(a) Requirement - Auxiliary "A" Contact
Auxiliary "A" Contact should:
Close at 12.5 ± 15 divisions in start segment
Open at 26 ± 15 divisions in #4 segment.
(b) Requirement - Auxiliary "B" contact

Auxiliary "B" Contact should:
- Close at 4 ± 5 divisions in start segment
- Open at 66 ± 13 divisions in #2 Segment

To Adjust
- Rotate auxiliary contact screws to meet requirements.

FIGURE 19. LBX19 TRANSMITTER AUXILIARY CONTACT REQUIREMENTS
SECTION 2

VARIABLE FEATURE ADJUSTMENT

TAPE-OUT AND TAPE LID SWITCH

NOTE

MAKE THIS ADJUSTMENT BEFORE ASSEMBLING SWITCH TO UNIT.

(1) REQUIREMENT
MIN. 8 GRAMS
MAX. 15 GRAMS
TO JUST SEPARATE NORMALLY CLOSED CONTACTS (APPLY SCALE TO CENTER OF NYLON PAD).
TO ADJUST
BEND CONTACT SWINGER WITH A 110445 SPRING BENDER.

(2) REQUIREMENT
MIN. 0.008 INCH
MAX. 0.015 INCH
GAP BETWEEN NORMALLY OPEN CONTACTS.
TO ADJUST
BEND UPPER CONTACT LEAF WITH A 110445 SPRING BENDER.

NOTE

TO REMOVE TAPE-OUT AND TAPE LID SWITCH ASSEMBLY
(1) REMOVE COVER AND TOP PLATES.
(2) REMOVE 111342 SPRING ATTACHED TO BRACKET ON 158535 GUIDE POST.
(3) LOOSEN SCREW SECURING GUIDE POST TO REAR PLATE.
(4) REMOVE SCREW AND LOCK WASHER FROM FRONT END OF GUIDE POST.
(5) REMOVE ADJUSTING SCREW FROM LOWER END OF SWITCH BRACKET.
(6) GUIDE POST AND SWITCH ASSEMBLY CAN NOW BE REMOVED. TAKE CARD NOT TO DISTORT SWITCH LEAF SPRINGS

TO REPLACE SWITCH ASSEMBLY
REVERSE DISASSEMBLY PROCEDURE.

FIGURE 2-1. TAPE-OUT AND TAPE LID SWITCH ASSEMBLY

CHANGE 4
(b) TAPE-OUT PIN SPRING BRACKET

**REQUIREMENT**
- MIN. 38 GRAMS
- MAX. 45 GRAMS
- TO DEPRESS TAPE-OUT PIN UNTIL FLUSH WITH TAPE GUIDE PLATE.
- TO ADJUST
  - POSITION TAPE-OUT PIN SPRING BRACKET WITH ITS MOUNTING SCREWS FRICION TIGHT. TIGHTEN SCREWS AND RECHECK REQUIREMENT.

(A) TAPE-OUT AND TAPE LID SWITCH BRACKET

**REQUIREMENT**
- MIN. 0.006 INCH
- MAX. 0.020 INCH
- CLEARANCE BETWEEN TAPE-OUT PIN EXTENSION AND CONTACT SWINGER INSULATOR WHEN TAPE-OUT PIN IS HELD DOWN.
- TO ADJUST
  - INSERT A LENGTH OF UN-PERFORATED TAPE UNDER TAPE LID, ADJUST SWITCH BRACKET WITH ITS MOUNTING SCREW LOOSENED.

(C) TAPE-OUT AND TAPE LID PIN DOWNSTOP

**REQUIREMENT**
- WHEN DEPRESSED TO THEIR LOWERMOST POSITIONS, TAPE-OUT AND TAPE LID PINS SHOULD BE FLUSH TO 0.005 INCH BELOW SURFACE OF TAPE GUIDE PLATE.
- TO ADJUST
  - POSITION RESPECTIVE DOWNSTOP POST WITH ITS MOUNTING NUT LOOSENED.

(D) TAPE LID PIN SPRING

**REQUIREMENT**
- MIN. 1-1/2 OZS.
- MAX. 3 OZS.
- TO MOVE TAPE LID PIN FLUSH WITH TOP SURFACE OF TOP PLATE.

(E) TAPE LID PIN

**TO CHECK**
- REMOVE COVER PLATE

(2) REQUIREMENT
- WITH TAPE LID OPEN, AND Normally OPEN CONTACTS CLOSED BY TAPE LID PIN:
  - MIN. 0.010 INCH
  - CLEARANCE BETWEEN SHOULDER ON PIN AND BOTTOM SURFACE OF TAPE GUIDE PLATE

(1) REQUIREMENT
- WITH TAPE LID CLOSED:
  - MIN. 0.005 INCH
  - CLEARANCE BETWEEN TAPE LID PIN AND SWINGER INSULATOR.
- TO ADJUST
  - LOOSEN CLAMP SCREW TO FRICION TIGHT AND ADJUST TAPE LID PIN BY MEANS OF ITS Pry POINT.

FIGURE 2-2. TAPE-OUT AND TAPE LID PIN MECHANISM
TAPE DEFLECTOR MECHANISM

NOTE
DEFLECTOR IS HINGED TO SWING IN EITHER OF TWO POSITIONS:
1. OPERATING POSITION (LEFT SIDE) - DEFLECTS TAPE BACK TO OPERATOR.
2. NON-OPERATING POSITION (RIGHT SIDE) - ALLOWS TAPE TO FOLLOW NORMAL PATH TO REAR OF UNIT.

(A) DEFLECTOR BRACKET
REQUIREMENT
WHEN DEFLECTOR IS IN OPERATING POSITION, DEFLECTOR TANG SHALL BE CENTRALLY LOCATED IN TOP PLATE HOLE.
TO ADJUST
POSITION BRACKET WITH ITS MOUNTING SCREWS LOOSENED.

(B) DEFLECTOR SPRING
REQUIREMENT
MIN. 1-1/2 OZS.
MAX. 4 OZS.
TO START DEFLECTOR MOVING.
TO ADJUST
WITH SCREW WHICH ANCHORS SPRING TO FILLER PLATE LOOSENED, POSITION SPRING IN ITS ELONGATED MOUNTING SLOT. IF NECESSARY, BEND SPRING.

FIGURE 2-3. TAPE DEFLECTOR MECHANISM
LINE SHUNT SWITCH (160370)

TO CHECK

REMOVE UNIT FROM SUB-BASE.

(1) REQUIREMENT
LINE SHUNT SWITCH CONTACTS SHOULD BE CLOSED.

(2) REQUIREMENT
CLEARANCE BETWEEN ENGAGING SURFACE OF SWITCH PLUNGER AND ITS MOUNTING BRACKET:
MIN. 0.772 INCH
MAX. 0.802 INCH

TO ADJUST
POSITION SWITCH WITH ITS MOUNTING NUTS LOOSENED.

LINE SHUNT SWITCH (172847)

(1) REQUIREMENT
LINE SHUNT SWITCH CONTACTS OPEN WHEN TRANSMITTER DISTRIBUTOR LEFT REAR MOUNTING SCREW IS TIGHTENED.

(2) REQUIREMENT
LINE SHUNT SWITCH CONTACTS CLOSED WHEN LEFT REAR MOUNTING SCREW IS LOOSENED.

TO ADJUST
BACK OFF LEFT REAR MOUNTING SCREW 1/2 TURN. POSITION SWITCH ACTUATOR (SWITCH MOUNTING SCREWS FRICITION TIGHT) AGAINST THE TRANSMITTER MOUNTING SCREW UNTIL THE CONTACTS JUST CLOSE (SWITCH ACTUATOR SHOULD BE APPROXIMATELY HORIZONTAL). TIGHTEN SWITCH MOUNTING SCREWS. CHECK SWITCH OPERATION AND REFINISH ADJUSTMENT IF NECESSARY.

(A) LINE SHUNT SWITCH (MULTIPLE BASE)

TO CHECK
PLACE A TRANSMITTER DISTRIBUTOR IN ONE OF THE MOUNTING POSITIONS. NOTE THE POINT (A) AT WHICH THE CONNECTOR PLUG BEGINS TO ENGAGE THE CONNECTOR RECEPTACLE, AND THE POINT (B) WHERE THE PLUG FULLY ENGAGES THE RECEPTACLE.

REQUIREMENT
LINE SWITCH SHALL ACTUATE (CONTACTS CLOSE) BEFORE UNIT IS WITHDRAWN ONE HALF THE DISTANCE BETWEEN POINTS (A) AND (B).

TO ADJUST
WITH SWITCH BRACKET MOUNTING SCREWS FRICITION TIGHT, POSITION SWITCH BY MEANS OF ITS PRY POINT. CHECK ALL LINE SHUNT SWITCHES.

FIGURE 2-4. LINE SHUNT SWITCHES
SECTION 3

LUBRICATION

1. INTRODUCTION

a. This section provides lubrication information for the Teletype Model 28 (LBXD) Transmitter Distributor.

CAUTION

The transmitter distributor is shipped with the oil reservoir empty. Remove the cover plate for access to the reservoir. Fill the oil reservoir according to the lubrication instructions on page 3-6.

b. On the following pages, the general areas of the equipment are shown by photographs. The specific points to receive lubricant are indicated by line drawings and descriptive text. The symbols in the text indicate the following directions:

O  Apply one drop of oil.
02  Apply two drops of oil.
03  Apply three drops of oil, etc.
G  Apply thin coat of grease.
SAT  Saturate with oil (teit washers, etc.)

Teletype KS7470 oil and KS7471 grease should be used at all lubrication points.

2. GENERAL

a. The equipment should be thoroughly lubricated, but over-lubrication which might allow oil to drip or grease to be thrown on other parts, should be avoided. Exercise special care to prevent lubricant from getting between armature and pole faces. Keep all electrical contacts free from oil or grease.

b. The following general instructions supplement the specific lubricating points illustrated in this section.

(1) Apply one drop of oil to all spring hooks.

(2) Apply a light film of oil to all cam surfaces.

(3) Apply a coat of grease to all gears.

(4) Saturate all felt washers, oilers, etc.

(5) Apply oil to all pivot points.

(6) Apply oil to all sliding surfaces.

c. The transmitter distributor should be lubricated before being placed in service or prior to storage. After a few weeks of service, re-lubricate to make certain that all specified points have received lubricant. Thereafter, the following schedule should be adhered to:

<table>
<thead>
<tr>
<th>OPERATING SPEED</th>
<th>LUBRICATION INTERVAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>60 W. P.M.</td>
<td>3000 hours or 1 year *</td>
</tr>
<tr>
<td>75 W. P.M.</td>
<td>2400 hours or 9 months *</td>
</tr>
<tr>
<td>100 W. P.M.</td>
<td>1500 hours or 6 months *</td>
</tr>
</tbody>
</table>

*Whichever occurs first.
3. LUBRICATION
   a. TRANSMITTER DISTRIBUTOR

a.01 CLUTCH TRIP ASSEMBLIES

- 0 HOOKS - EACH END
- ANTI-BACKLASH SPRING
- SAT FELT WASHERS
- O2 PIVOT POINTS
- SAT ARMATURE SHAFT
- O HOOKS - EACH END
- ARMATURE BAIL SPRING
- SAT ARMATURE SHAFT
- O PIVOT POINTS
- CLUTCH TRIP LEVER SPRING
- SAT OIL WICK

CHANGE 4
a.02 STORING SWITCH ASSEMBLIES

NOTE
KEEP CONTACTS FREE OF GREASE
a.03 DISTRIBUTOR AND SENSING SHAFT ASSEMBLIES

G

GEARS (2)

CLUTCH

OIL HOLES (2)

SAT

FELT WICKS

CAM SLEEVE

BEARINGS (4)

IDLER GEAR SHAFT

FELT WICKS (4)

CAM SLEEVE

3-4 CHANGE 4
a.04 DISTRIBUTOR BLOCK ASSEMBLY

- G PIVOT POINTS
- CONTACT LEVERS
- G CONTACT POINTS
- CONTACT LEVERS
- O CAMMING SURFACE
- CAM FOLLOWER LEVER
- O GUIDE SLOTS
- CAM FOLLOWER LEVER
- O HOOKS - EACH END
- CAM FOLLOWER LEVER SPRINGS
- O LOOPS
- COMPRESSION SPRING
- O2 PIVOT POINT
- CAM FOLLOWER LEVER

a.05 CLUTCH ASSEMBLIES

- O HOOKS - EACH END
- CLUTCH SHOE LEVER SPRING
- SAT FELT WICK (2 PLACES)
- CLUTCH SHOE
- O HOOKS - EACH END
- CLUTCH SHOE SPRING

CHANGE 4
NOTE
OIL DEPTH NOT TO EXCEED 7/8 INCH. USE A 0.010 INCH FLAT GAUGE FROM 117781 SET OF GAUGES AS A DIP STICK.
α.07 TAPE SENSING MECHANISM

O SLIDING SURFACE
O HOOKS - EACH END
O PIVOT
O HOOKS - EACH END
O PIVOT POINT
G ENGAGING SURFACE
SAT FELT WICK
O CAM SURFACE
O2 PIVOT POINT

α.08 LATCH AND PUSHER STRIPPER BAIL

O HOOKS - EACH END
O2 PIVOT POINT
SAT FELT WASHER
O HOOKS - EACH END
SAT FELT WASHER
O2 PIVOT POINT

CHANGE 4
a.09 PUSHER LEVERS

- PIVOT POINTS
- HOOKS - EACH END
- SLIDING SURFACES
- HOOKS - EACH END
- PIVOT POINTS

- AUXILIARY LEVERS
- AUXILIARY LEVER SPRING
- PUSH LEVERS
- PUSH LEVER SPRINGS
- PUSH LEVERS

a.10 FEED MECHANISM

- SAT FELT WASHERS
- SAT FELT WASHER
- SLIDING SURFACE

- PIVOT SHAFT
- FEED LEVER
- FEED LEVER

CHANGE 4
a.12 TAPE-OUT AND CONTROL MECHANISM

- Hooks Each End
- Pivots
- Control Bail
- Yield Spring
- Control Bail

a.13 TIGHT TAPE SLIDE ARM ASSEMBLY

- Sliding Surface
- Pivot Point
- Tight Tape Bail
- Pivot
- Intermediate Bail
- Yield Spring
- Slide Arm Assembly
- Point of Contact
- Pivot
- Slide Arm Assembly
- Pivot
- Slide Arm Assembly

a.14 START-STOP SLIDE ARM ASSEMBLY

- Pivot
- Sliding Surface
- Yield Bail
- Yield Spring
- Pivot
- Slide Arm Assembly

3-10

CHANGE 4
a.15 TAPE-OUT AND TAPE LID MECHANISM

- O SLIDING SURFACE
- G CONTACT POINT
- O HOOKS - EACH END SPRING
- O2 GUIDE SLOT
- TAPE-OUT PIN
- TAPE-OUT PIN EXTENSION
- TAPE-OUT PIN GUIDE POST
- O SLIDING SURFACE
- O2 GUIDE SLOT
- TAPE LID PIN
- TAPE LID PIN GUIDE POST
a.16 (EARLY DESIGN)

- O PIVOTS
- SAT FELT WASHER
- TIGHT TAPE BAIL
- TAPE LID SHAFT
- O HOOKS – EACH END
- TAPE LID RELEASE SPRING
- O PIVOT – EACH END
- RELEASE BAIL SHAFT
- O HOOKS – EACH END
- DETENT SPRING
- O LATCHING SURFACE
- TAPE LID LATCH

a.17 COVER PLATE

- O SLIDING SURFACE
- COVER PLATE DETENTS AND SPRINGS
- O ENGAGING SURFACE
- DETENTING NUTS (FRONT & REAR PLATE)

a.18 DEFLECTOR BRACKET

- TOP PLATE
- TAPE DEFLECTOR
- FILLER PLATE
- 01 BEARING SURFACE (BOTH SIDES)
- DEFLECTOR PIVOT
- G ENGAGING SURFACE
- DEFLECTOR DETENT SPRING
b.01 MOTOR UNIT

O6 BALL OILER (BOTH ENDS)

LUBRICATE MOTOR BEARING EVERY FOUR MONTHS.

*IF MOTOR IS DISASSEMBLED, REPACK BEARINGS WITH BEACON 325 GREASE (TELETYPE PART NO. 195298) OR ITS EQUIVALENT.

b.02 INTERMEDIATE GEAR ASSEMBLY

TEETH INTERMEDIATE GEAR

TEETH DISTRIBUTOR SHAFT DRIVING GEAR

CHANGE 5
b.03 LCXB - BASE FOR TRANSMITTER DISTRIBUTOR USED IN AUTOMATIC SEND-RECEIVE CABINET

GEAR TEETH

DRIVE SHAFT AND COUPLING SHAFT GEARS

GEAR TEETH

TRANSMITTER DISTRIBUTOR DRIVE SHAFT

a.18

b.04

CHANGE 4
c. CABINETS

(REAR VIEW)
FIGURE 4-1. TRANSMITTER DISTRIBUTOR (LBXD) - FRONT VIEW

FIGURE 4-2. TRANSMITTER DISTRIBUTOR (LBXD) - BOTTOM VIEW
SECTION 4
DISASSEMBLY & REASSEMBLY

1. GENERAL

a. This section presents disassembly and reassembly instructions necessary to break the transmitter distributor (LBXD) into its various subassemblies. The instructions are arranged in a sequence which should be followed only when a complete disassembly of the unit is required. Disassembly of a specific subassembly (for replacement or repair purposes) would normally require removal of associated subassemblies in the same area. Refer to Teletype Parts Bulletin 1165B for detailed illustrations of the parts referred to in the text.

b. Perform any necessary adjustments after reassembly of the unit.

NOTE
Retaining rings (tru-arc) are spring steel and have a tendency to release suddenly. To minimize loss of these rings, remove them according to the following procedure. Hold the ring to prevent it from rotating. Place a screwdriver blade in one of the slots of the ring. Rotate the screwdriver in a direction to increase the diameter of the ring. The retaining rings will come off easily without flying.

c. Unless otherwise specified, reassembly - or replacement - of an assembly is accomplished by reversing the disassembly procedure. When necessary, specific reassembly instructions are provided.

2. DISASSEMBLY AND REASSEMBLY OF (LBXD) TRANSMITTER DISTRIBUTOR (Refer to Figures 4-1 and 4-2)

a. Motor Cover and Front Panel Removal

(1) To remove the motor cover, lift it carefully upward to clear the mechanism.

(2) To remove the front panel, pull outward on the lower right and left rear corners of the front panel, and slide the panel forward. To replace, mate the front panel slides with the frame slides. Push slowly toward the rear, applying even pressure at each edge of the front plate.

b. Removal of Transmitter Distributor from Base - To remove the transmitter distributor from the base, remove the three mounting screws which secure the unit to the base. Slide the unit forward and lift upward to disconnect the latches and electrical connectors.

c. Cover Plate - Remove the cover plate by lifting the left end upward, and sliding the plate toward the left to disengage the spring clip.

d. Top Plate

(1) Remove the top plate by loosening the front and rear mounting screws. Lift the plate upward.

(2) To replace, guide the mounting screws into their respective notches on the front and rear plates. Align the sensing pins and feed wheel with their respective slots.

e. Tape Guide Plate

(1) The tape guide plate is removed by loosening the front and rear mounting screws and sliding the plate upward.

(2) To replace, guide the mounting screws into their respective notches on the front and rear plate. Guide the tape-out pin into its hole, and locate the sensing pins against the left edge of the tape guide plate.

f. Oil Reservoir Assembly - To remove the oil reservoir assembly, unhook the springs attached to the underside of the cross bar. Remove the four screws which secure the cross bar to the front and rear plates and lift the assembly upward.

g. Distributor Block Assembly - To remove the distributor block assembly remove the nuts that secure the cable connector to the rear plate (if unit is so equipped). Remove the three screws which secure the assembly and lift it out. On those units where the electrical connector is mounted on the bottom of the unit casting, lift the assembly out only far enough for servicing.

h. Idler Gear Assembly - To remove the idler gear, remove the lock nut securing the shaft to the rear plate. This assembly should be removed before removal of the sensing and distributor shaft assemblies.

i. Distributor Shaft Assembly - To remove the distributor shaft, remove the three mounting screws which secure each bearing clamp to the front and rear plates.

j. Sensing Shaft Assembly - To remove the sensing shaft, remove the three mounting screws which secure each bearing clamp to the front and rear plates.
k. Feed Wheel Assembly

(1) To remove the feed wheel assembly, remove the nut which secures the feed wheel mounting post to the front plate. Remove the post, with wheel, from the unit.

(2) When replacing the assembly, make sure the shoulder of the mounting post will not interfere with the top plate or guide plate front mounting brackets when these plates are installed.

l. Storing Switch Assembly

(1) Non-Transfer Type Contacts

(a) Remove the two screws which secure the cable connector to the bracket beneath the casting. Remove the four mounting screws which secure the assembly to the casting. Remove the switch assembly, taking care not to damage the contact lever slides.

(b) Reverse the above procedure to reinstall the storing switch assembly. Replace the left front screw first, and use it as a pivot point when aligning the slides with their respective pusher and latch levers.

(2) Transfer Type Contacts

(a) To remove the storing switch assembly, remove the four screws which secure the assembly to the main casting. Withdraw the switch far enough to permit servicing, without disconnecting any electrical connections (if possible). When removing the switch, take care not to damage the contact lever slides.

(b) Replace the storing switch assembly according to paragraph 2.1. (1)(b) above.

m. Pusher and Latch Levers

(1) Remove the pusher lever springs. Remove the pusher levers by sliding them downward.

(2) To remove the latch levers, remove the latch lever springs. Remove the 158846 spring post attached to the front plate. Remove the latch levers by rotating them counter-clockwise and lifting upward.

n. Sensing Pins

(1) Position the 158322 sensing ball eccentric shaft to move the sensing ball to the left (toward sensing cam sleeve).

(2) Rotate the sensing shaft until the sensing ball is in its uppermost position.

(3) Remove all the sensing pin springs. Rotate the bell cranks downward and remove each sensing pin assembly.

(4) When replacing the sensing pins, make sure the sensing ball is in position as outlined in (1) and (2) above.

o. Switch Actuating Mechanism (Start-Stop, and/or Tight Tape).

(1) To remove the switch slide arm assembly, remove the two screws, one nut, and spacer which secure the intermediate plate to the center plate. Remove the nut which secures the ball mounting post to the center plate. Remove the intermediate plate, and remove the ball and slide arm assembly. To replace, reverse disassembly procedure.

(2) To remove the tape-out switch, remove the mounting screws that secure the switch to the front plate. Loosen the screw securing the 158535 post to the center plate. Remove the screw far enough to allow post removal. Replace in reverse order.

p. Center Plate Assembly - To remove the center plate assembly, remove the two screws which secure the 158535 post in position. Remove the post and studs. Remove the screw, lock washer, and flat washer from the rear of the 158531 shaft. Pull away by lifting up on the center plate (the center plate is hooked over the pivot shaft), and working it out to the right.

q. Sensing Assembly - To remove the sensing mechanism, remove the pivot shaft by loosening the nut, set collars and the two retaining rings. Slide the shaft out and remove latch ball, pusher ball and the feed lever assemblies. Remove the sensing ball.

r. Clutch Trip Assembly - To remove either clutch trip assembly, remove the mounting screws and nuts. On earlier units, remove the electrical connector mounting screws. Remove the clutch trip assemblies with connector, switches, and associated cabling. On later units, the wiring will be long enough to permit most servicing without completely removing the assembly. If necessary, unsolder the leads at the magnet coils.

s. Frame Assembly - Remove all screws and/or nuts that secure eccentric shaft to side frame and/or casting. Remove all screws mounting front and rear plates to casting and disassemble completely.
3. DISASSEMBLY AND REASSEMBLY OF
BASE (LCXB) THAT SUPPORTS THE
TRANSMITTER DISTRIBUTOR ON THE
AUTOMATIC SEND-RECEIVE SET (Refer
to Figure 4-3)

a. Housing - Pull the Front Panel forward
to disengage the right and left spring latch. Re-
move the 82730 shoulder screw, and the 151623
screw with its 2069 lock washer and 1/7535
washer from the right end of the 150286 cross
bar. With the screws that secure the left end of
the bar loosened, remove the cross bar. Re-
place in the reverse order.

CAUTION
On units equipped with noise reduction feature,
no portion of the transmitter distributor (covers,
etc.) or its drive mechanism should come into
direct contact with the cabinet. Position trans-
mitter distributor as follows:

(1) Lower edge of top plate and tape
guide plate should clear front cover by at least
1/32 inch.

(2) Clearance between edge of front
cover and unit should be at least 1/32 inch.

(3) To adjust - refine cradle height,
and/or front rail position.

b. Front Cover Plate - Remove the screws,
lock washers, and flat washers which secure the
front cover plate to the transmitter distributor.

c. Mounting Screws - Remove the three
screws, lock washers, and flat washers which
secure the transmitter distributor to the base.
Replace in reverse order, and position the unit
for minimum backslash of the driving gear.

d. Cable Connectors - To disconnect the
main cable of the base from the associated equip-
ment, remove the lock nuts that secure the plug
to its receptacle (on units so equipped). Replace
in reverse order, routing the cable away from
any moving parts.

e. Driving Gear Assembly (Speed Change
Requirements)

(1) Gear Guard - To remove the 152045
gear guard, remove its mounting screw,

(2) Motor Pinion

(a) Units with noise reduction iso-
lating members - Loosen the set screws in
the 158020 rubber coupling on the 158079 shaft
and the coupling attached to the motor pinion.
Replace the gear set with the new speed, set of
gears.

(b) Units with noise reduction iso-
lating members - Disassemble in the same man-
ner as paragraph (a) above, except for the motor
pinion. Remove the 161301 post (2) which secures
the isolator to the motor shaft. Note that the
isolator has two projections which engage the
counterbored mounting holes (2) in the pinion.
To reassemble, apply a thin film of grease to
the motor shaft. Place the isolator over the hub
of the pinion and press the projection (shoulder)
down into the counterbored holes in the pinion.
Slip the assembly on the motor shaft with the teeth
toward the motor. Push each post through the
respective hole in the isolator and secure them
to the motor shaft.

(3) LCXB Drive Shafts

(a) Speed Change Set of Gears -
Remove Gear Guard. Remove the screw and lock
washer securing the 158012 shaft. Remove the
gear mounting screws. When a new speed is re-
quired, replace the gear and pinion with the ap-
propriate gear set and reassemble in the reverse
order. If the base is to be removed, loosen the
158020 rubber coupling set screws.

(b) Transmitter-Distributor Drive
Gear

1. Units without noise reduc-
tion isolating member - Remove the screw and
lock washer which secure the 159836 gear to the
main shaft. Replace in reverse order.

2. Units with noise reduction
isolating members - Remove the two 161301 posts
which secure the isolator and gear to the 159838
shaft. The isolator may be removed if further
disassembly is required. Reassemble in reverse
order, first applying a light film of grease to the
159838 shaft extension. Place the isolator over
the hub of the nylon gear. Press the projections
(shoulders) down into the counterbored holes in
the gear. Slip the gear with the isolator over
the greased shaft (gear teeth toward the bracket).
Push the posts down through the holes in the iso-
lator and screw them into the shaft.

f. Base Mounting Hardware

(1) Units without noise reduction iso-
lating members - Remove the three screws, lock
washers, and flat washers that secure the base
casting to the cradle of the cabinet. Replace in
reverse order, but leave the screws friction tight
for shaft alignment.

(2) Units with noise reduction isolating
members - Remove the nut, lock washer, flat
washer and rubber bushing from each of the studs
attached to the cradle. Remove the ground strap
lug from the rearmost stud. Replace in reverse
order. Be sure to replace the ground strap on
top of the flat washer on the rear stud.

CHANGE 4
4. DISASSEMBLY AND REASSEMBLY OF THE APPARATUS CABINET FOR HOUSING ONE OR TWO SELF-CONTAINED TRANSMITTER DISTRIBUTOR UNITS - AC (Refer to Figure 4-4)

a. Mounting - For installations over a 4 inch square electrical duct, remove the duct covers from either side of the cabinet.

NOTE

The cabinet door may be arranged to open from the left or right side. Refer to the adjustment requirement should the cabinet be relocated and it is desired to swing the door in the opposite direction.

b. Transmitter-Distributor Unit - Disassembly and reassembly of the basic unit is covered in the preceding paragraphs except for minor variations which are self-explanatory.
FIGURE 4-4. TRANSMITTER DISTRIBUTOR CABINET (AC) FOR MOUNTING ONE OR TWO TRANSMITTER DISTRIBUTOR (LBXD) UNITS.
5. **DISASSEMBLY AND REASSEMBLY OF MULTIPLE MOUNTED TRANSMITTER-DISTRIBUTOR UNITS** (Refer to Figures 4-5 and 4-6)

   a. General

   (1) To remove the transmitter distributor from the multiple base, open the hinged front portion of the cover to provide access to each transmitter and its attached cradle. Lift off the cover plate. Remove the clamp screw which anchors the cradle in its slide, then lift upward and pull forward to disengage the unit.

   (2) Lift the cover upward and move toward the front.

   b. **Transmitter-Distributor Unit, Multiple Mounted**

   **NOTE**

   Reference to right or left, etc. applies to the unit as mounted on the multiple base.

   (1) Remove the two screws and lock washers which secure the electrical connector to the rear of the cradle. When the screws are replaced make sure that the head of each screw is on the outside of the cradle.

   (2) Remove the two screws and lock washers that secure the casting to the rear of the cradle. Remove the screw, lock washer and nut that secures the casting to the front of the cradle. Note that the 158581 bushing is mounted with its hex head on the top side of the casting whereas on the self contained and the ASR application the bushing is inverted. Remove the cradle.

   (3) Remove the screws, lock washers, and flat washers which secure the tape deflector to the top and filler plates.

   (4) Remove the filler plate mounting screws.

   (5) The disassembly of the basic unit is identical to that as described in paragraph 2, except for minor variations which are self-explanatory.

   (6) Reassemble in the reverse order. Exercise care so as not to damage the cable, cable connector or switches.

   c. **Base for Multiple Arrangement**

   (1) Remove Motor Mounting screws without disturbing the shaft height unnecessarily.

   (2) Disassemble the left end of the countershaft assembly by removing the 151859 screw, 121575 screw and three 153839 screws in the hub; do not allow the horseshoe retainer to fall off the shaft. When a speed change is to be made, replace with the appropriate gear.

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*Figure 4-5. Multiple Transmitter Distributor Base (LMXB) and Cover*
(3) Reassemble as follows: Place the 161512 retainer on the shaft to the right and adjacent to the left bearing. On the left side of the bearing, place the 112864 washer. Place the 161570 nut plate in the counterbore of the 162033 gear. On the other side of the gear place the 161564 spacer, driven gear and 161563 hub. Secure this assembly with three 153839 screws and 2191 lock washers (friction tight) and place on the shaft so that the 162033 gear is to the right of the driven gear. Tighten the three screws.

Next to the 161563 hub place the 112864 washer and secure the pile-up of parts with the 121575 screw, 2669 lock washer, and 84579 washer. Secure the hub to the shaft with the 151569 screw, 2191 lock washer, and 150432 flat washer. This assembly procedure must be followed to insure clamping the inner race of the bearing.

(4) Further disassembly is self-evident. Reassemble the entire unit in the reverse order (except paragraph (3) above).