

## 251-TYPE KEYS REQUIREMENTS AND ADJUSTING PROCEDURES

### 1. GENERAL

1.01 This section covers the 251 type keys.

This section is reissued to incorporate material from the addendum in its proper location.

1.02 Reference shall be made to Section 020-010-711, covering General Requirements and Definitions for additional information necessary for the proper application of the requirements listed herein.

1.03 Part 1, "General" and Part 2, "Requirements" form part of the Western Electric Co. Inc. Installation Department handbook.

1.04 Requirements are marked with an asterisk (\*) when to check for them would necessitate the dismantling or dismounting of apparatus, or would affect the adjustment involved or other adjustments. No check need be made for these requirements unless the apparatus or part is made accessible for other reasons or its performance indicates that such a check is advisable.

1.05 The Normal or Unoperated Position of a Lever is that position in which the lever is perpendicular to the key top and all normally open contacts are open and all normally closed contacts are closed.

1.06 The Operated Position of a Lever is that position in which the lever is thrown to either extreme position and all normally open contacts are closed and all normally closed contacts are open.

### 2. REQUIREMENTS

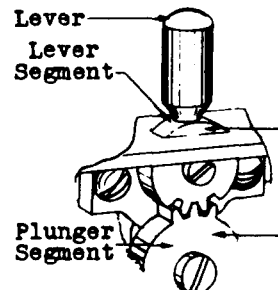


Fig. 2

#### 2.01 Cleaning

(a) Contacts shall be cleaned in accordance with the section covering cleaning procedures for key contacts.

(b) Other parts shall be cleaned in accordance with approved procedures.

\*2.02 Lever and Plunger Segment Movement The lever and the plunger segments shall be free from bind.

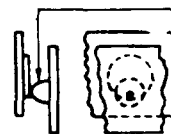
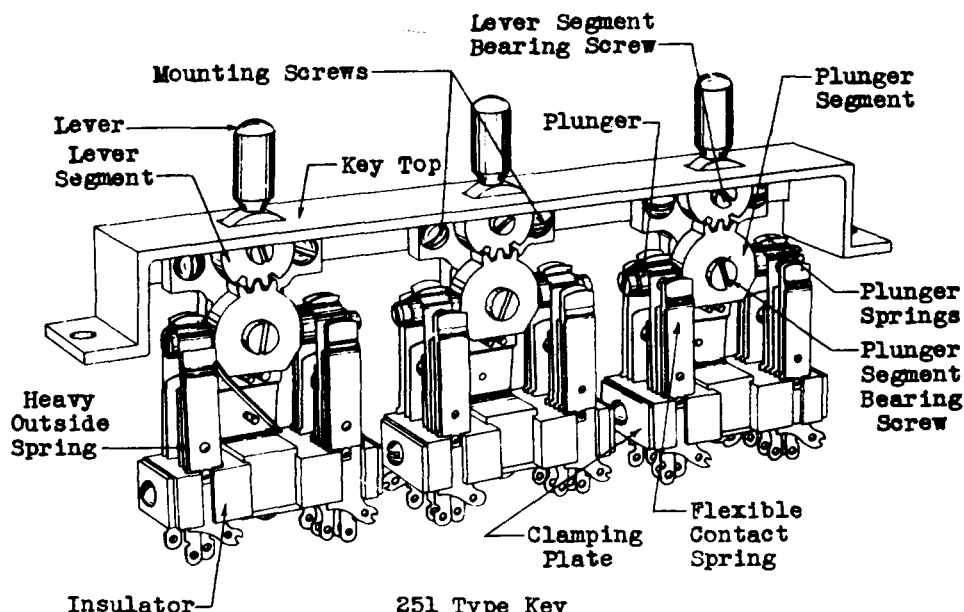


Fig. 3

\*2.03 Contact Alignment The point of contact shall fall wholly within the circumference of the opposing contact disc. Gauge by eye.



251 Type Key  
Fig. 1

See Fig. 4

\*2.04 Contact Separation There shall be a separation between open contacts of:

Test - Min. .010"  
Readjust - Min. .012"

Gauge by eye.

See Fig. 4

\*2.05 Spring Clearance There shall be a clearance between springs designed never to make contact and between any spring and the frame whether in the operated or unoperated position of the key of:

Test - Min. .014"  
Readjust - Min. .016"

Gauge by eye.

See Fig. 4

\*2.06 Plunger Spring Clearance

(a) The plunger springs shall perceptibly (min. .005") clear the rubber plungers simultaneously. Gauge by eye.

(b) When the plunger is resting against the plunger springs of one combination the clearance between the plunger and the opposite spring combination shall be:

Test - Max. .025"  
Readjust - Max. .020"

Gauge by eye.

See Fig. 4

\*2.07 Contact Pressure

(a) There shall be a pressure between the normally closed contacts of:

Test - Min. 150 grams  
Readjust - Min. 170 grams

Use the No. 62-B gauge.

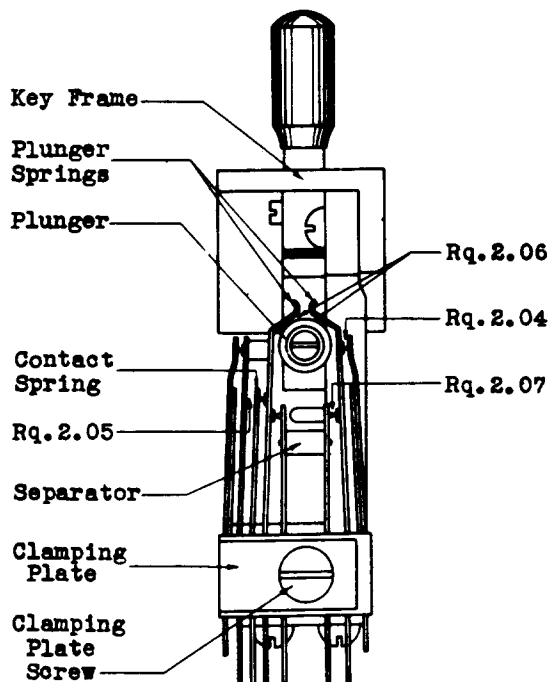


Fig. 4

(b) There shall be a pressure between the normally open contacts when closed of:

Test - Min. 50 grams  
Readjust - Min. 55 grams

Use the No. 68-B gauge

See Fig. 5

\*2.08 Contact Follow There shall be a follow on all normally open contacts after making of:

Test - Min. .008"  
Readjust - Min. .010"

Gauge by eye.

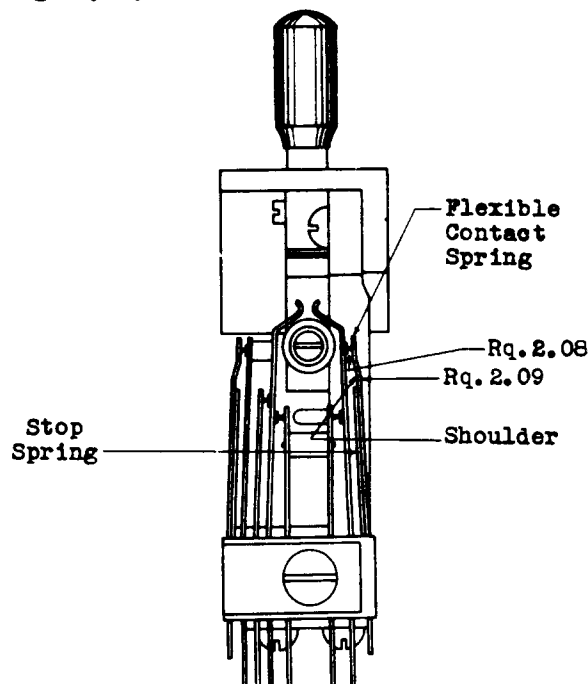


Fig. 5

See Fig. 5

\*2.09 Flexible Spring Position In the unoperated position the flexible contact spring shall rest at least on the end of the stop spring that is nearest the contact on the flexible spring. Gauge by eye.

See Fig. 6

\*2.10 Contact Sequence Requirements

(a) Normal Contact Sequence - Break-Make Combinations Unless otherwise specified, the normally closed contacts operated directly by a plunger spring or an individual assembly shall break before the normally open contacts of the same assembly directly associated with that plunger spring make by:

Test - Min. .005"  
Readjust - Min. .006"

Gauge by eye.

(b) Cross Sequence - Break-Make Spring Combinations on Ringing Spring Assemblies Unless otherwise specified, all normally closed contacts operated by the throw of the

lever shall break before any of the normally open contacts make by:

Test - Min. .005"

Readjust - Min. .006"

Gauge by eye.

(c) Other Contact Sequences When specified on the circuit drawing.

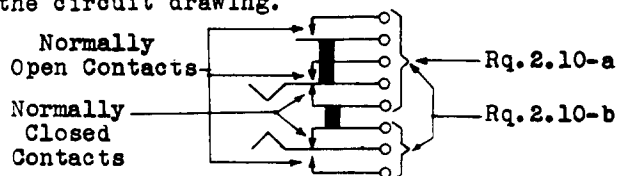


Fig. 6

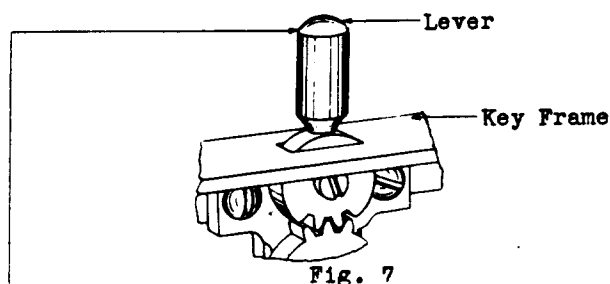


Fig. 7

2.11 Lever Operate Pressure The pressure required to move the lever to the operated position shall be:

Test - Min. 420 grams, Max. 1590 grams

Readjust - Min. 450 grams, Max. 1360 grams

In checking for this requirement, the pressure shall be applied at the top portion of the handle and perpendicular to it.

2.12 Lever Release The pressure required to restore a locking lever from its operated position shall be:

Test - Min. 75 grams

Readjust - Min. 85 grams

Use the No. 62-B gauge

In checking for this requirement, the pressure shall be applied at the top portion of the handle and perpendicular to it.

### 3. ADJUSTING PROCEDURES

#### TOOLS

<u>Code No.</u>	<u>Description</u>
105	Spring Adjuster
371	Spring Adjuster
KS-6015	Duck-bill Pliers
-	Bell System Regular Screw-driver - 4" per A.T.&T. Co. Drawing 46-X-34
-	Bell System P-Long Nose Pliers - 6-1/2" per A.T.&T. Co. Drawing 46-X-56

#### GAUGES

62-B (or the re-placed 62) 0-700 Gram Gauge

68-B (or the re-placed 68) 70-0-70 Gram Gauge

#### MATERIALS

KS-2423 Cloth

KS-7860 Petroleum spirits

- Toothpicks Hardwood, Flat at One End and Pointed at the Other

#### 3.01 CLEANING (Rq.2.01)

M-1 Clean the contacts in accordance with the section covering cleaning procedures for key contacts. Clean other parts in accordance with procedures 3.02, M-1, 3.07, M-5 and 3.11, M-3.

#### 3.02 LEVER AND PLUNGER SEGMENT MOVEMENT (Rq.2.02)

M-1 If the lever or plunger segment binds on its bearing screw, remove the key unit from the key frame as follows: Remove the lever handle, then remove the mounting screws with the 4" regular screw-driver. After removing the unit from the key, remove the bearing screws of the lever and plunger segment with the 4" regular screw-driver. Then clean the mounting frame, lever and plunger segments and bearing screws with a dry KS-2423 cloth. Examine the lever and plunger segment for burrs. If there are no burrs, replace them on the mounting frame. If there are burrs, replace the lever or plunger segment with a new segment as required and then mount it securely on the mounting frame.

#### 3.03 CONTACT ALIGNMENT (Rq.2.03)

#### 3.04 CONTACT SEPARATION (Rq.2.04)

#### 3.05 SPRING CLEARANCE (Rq.2.05)

#### 3.06 PLUNGER SPRING CLEARANCE (Rq.2.06)

#### 3.07 CONTACT PRESSURE (Rq.2.07)

#### 3.08 CONTACT FOLLOW (Rq.2.08)

#### 3.09 FLEXIBLE SPRING POSITION (Rq.2.09)

#### 3.10 CONTACT SEQUENCE REQUIREMENTS (Rq.2.10)

M-1 In making these adjustments consult the associated circuit drawing and circuit requirement table and give proper consideration to the maintenance of any requirement for contact sequence which may be specified thereon. Unless otherwise specified adjust the springs close to the point where the spring leaves the spring assembly clamping plates and insulators, with the No. 105 spring adjuster as shown in Fig. 8 except where the heavy outside springs

are to be adjusted, then use the No. 371 spring adjuster as shown in Fig. 9. In adjusting the springs take care not to kink them. Kinked springs should not be straightened unless the kink interferes with the proper adjustment of the key. Removing kinks tends to weaken the spring and to shorten the life of the key.

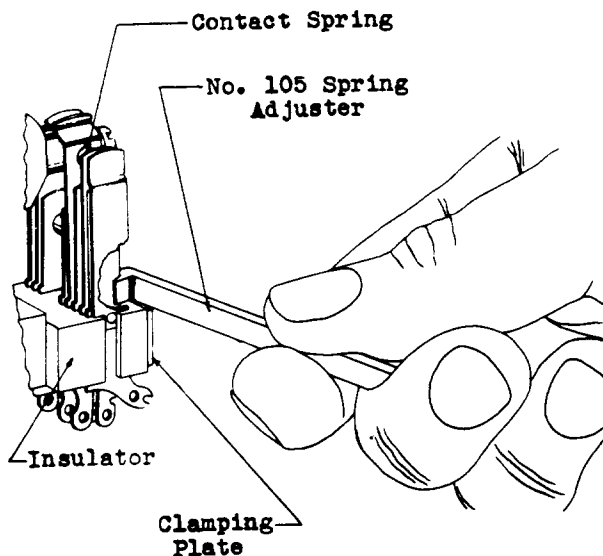


Fig. 8 - Method of Adjusting for Contact Separation

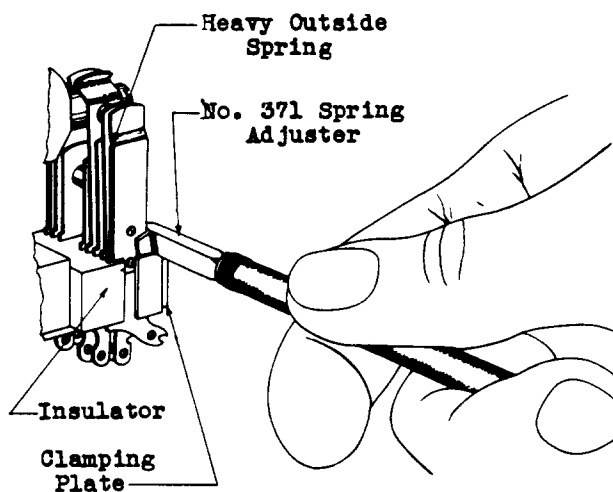


Fig. 9 - Method of Adjusting for Contact Separation

**M-2 Contact Alignment** At the time the other spring adjustments are being made see that the contact point lies wholly within the periphery of the corresponding disc. If it is necessary to shift the springs, remove the key unit as outlined in procedure 3.02, M-1, and loosen the assembly clamping plate screw with the 4" regular screw-driver. Then shift the

springs as required. Take care not to break or damage the spring assembly insulators when making the adjustment.

**M-3 Spring Clearance** Trouble due to springs touching each other which are designed never to make contact is caused either by springs being kinked or due to excessive follow. If the springs are kinked, remove the key unit at fault as outlined in procedure 3.02, M-1 and straighten the springs as required with the duck-bill pliers.

**M-4 Plunger Spring Clearance** If the plunger springs do not clear the plunger simultaneously, remove the key unit at fault from the key frame as outlined in procedure 3.02, M-1 and adjust the lever springs as required with the long nose pliers.

**M-5 Contact Pressure** Foreign matter wedged between the contact springs may prevent springs from making contact when the lever is operated. Remove the foreign matter with a toothpick which has been dipped into petroleum spirits.

**M-6 Contact Follow** If the follow requirement cannot be met by adjusting the springs close to the point where they leave the assembly clamping plates and insulators, the upper part of the spring may be given a slight bend towards the moving spring with the duck-bill pliers. This bend should not be enough however, to make a visible kink in the spring.

**M-7 Flexible Spring Position** If the flexible spring does not rest flat against its stop spring at least at the end of the stop spring due to distortion of the spring, adjust as follows: Remove the key unit at fault as outlined in procedure 3.02, M-1 and insert a toothpick between the two springs close to the point where the springs are riveted together. Then place the duck-bill pliers over both the stop spring and the flexible contact spring close to the point where the toothpick was inserted as shown in Fig. 10 and work the pliers up toward the contact end of the spring. Remove the toothpick after the desired adjustment has been obtained.

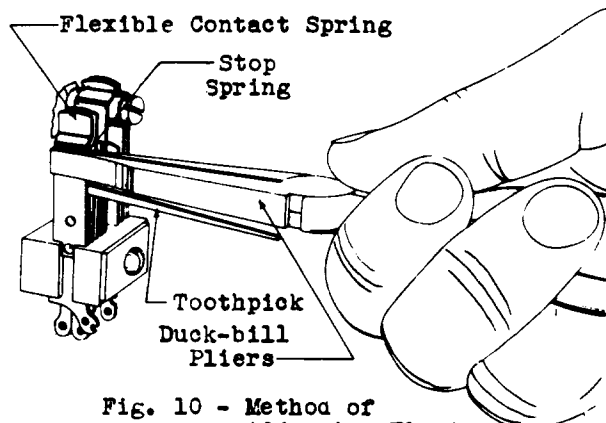


Fig. 10 - Method of Adjusting Flexible Contact Spring

M-8 Normal and Other Sequences When adjusting for contact sequence increase or decrease the contact gap, contact pressure or contact follow as outlined above.

3.11 LEVER OPERATE PRESSURE (Rq.2.11)  
 3.12 LEVER RELEASE (Rq.2.12)

M-1 When making a check for the lever operate or release pressure, apply the pressure to the top of the straight portion of the handle and perpendicular to it. A gauge for measuring the pressure specified in the test and readjust requirements covered by procedure 3.11 is being developed. Until the gauge is available it will be satisfactory to estimate the pressure by "feel".

M-2 If a key fails to meet the minimum requirements, tension the plunger springs so that the lever will have a greater drag on the plunger springs when returning to normal. When readjusting the springs, move the lever against the opposite spring combination. However, always see that when the lever is in the normal

position there is a perceptible clearance between the plunger springs and the plungers.

M-3 If a key fails to meet the maximum requirement for lever operate pressure, inspect the key for bind. In case it does bind, rectify the trouble as covered in procedure 3.02. Also inspect the plunger springs to determine whether or not a gummy substance has formed on these surfaces. If so, clean them with a toothpick which has been dipped in petroleum spirits. Clean the rubber plungers with a clean dry cloth. After each part has been thoroughly dried, reset them in the mounting frame but do not reset the mounting frame in the key base until the following adjustment has been made.

M-4 If the key still fails to meet the maximum pressure requirement for operating a lever it is an indication that the springs have excessive tension. Reduce the tension using the duck-bill pliers taking care not to interfere with any of the previous adjustments.

M-5 Reset the key unit in the key frame.