

## KEYS

### A-3, B-11, 69, 183, 242, 492, 508, 521, AND 539 TYPES

### REQUIREMENTS AND ADJUSTING PROCEDURES

#### 1. GENERAL

1.01 This section covers A-3, B-11, 69, 183, 242, 492, 508, 521 and 539 type keys.

1.02 This section is reissued to incorporate material from the addendum in its proper location. In this process marginal arrows have been omitted.

1.03 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.

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

1.05 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.

1.06 *The normal (unoperated) position* is that position in which the crimps of the plunger springs are resting in the recesses of the plunger with the normally open contacts open, and the normally closed contacts closed.

1.07 *The operated position* is that position in which the plunger is depressed to the limit of its stroke with the normally closed contacts open and the normally open contacts closed.

1.08 *The operated position of a rotating plunger type key* is that position in which the plunger is depressed to the limit of its stroke

and then rotated to the locked position. In this position the normally closed contacts are open and the normally open contacts closed.

#### 2. REQUIREMENTS

##### 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 *Plunger Movement* — Fig. 1(A) — The plunger shall operate freely and shall not bind or appear sluggish in restoring to normal. Gauge by eye and feel.

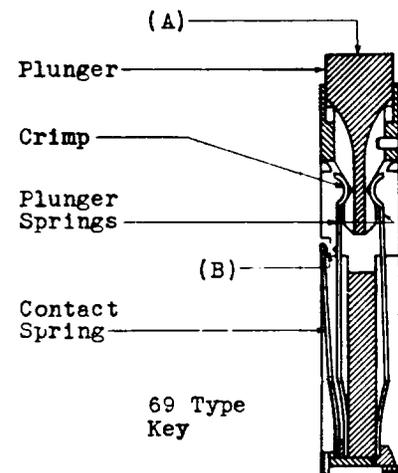


Fig. 1

\*2.03 *Contact Alignment* — Fig. 2(A) — Contacts shall line up so that the point of contact falls wholly within the boundary of the opposing contact. Gauge by eye.

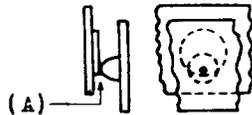


Fig. 2

**\*2.04 Contact Separation:** Fig. 1(B) — (A3-, B11-, 69-, 242-, 492-, 508-, 521-, and 539-type Keys) — There shall be a separation between open contacts of

**Test** — Min. 0.010 inch

**Readjust** — Min. 0.012 inch

Gauge by eye.

Use the KS-6909 gauge as a reference.

**\*2.05 Spring Clearance:** Fig. 3(A) — (A3-, B11-, 69-, 183-, 242-, 508-, 521-, and 539-type Keys) — When the plunger is removed from the key, there shall be a clearance between the crimps of the plunger springs and between other springs designed never to make contact with each other of

**Test** — Min. 0.010 inch

**Readjust** — Min. 0.012 inch

Gauge by eye.

Use the KS-6909 gauge as a reference.

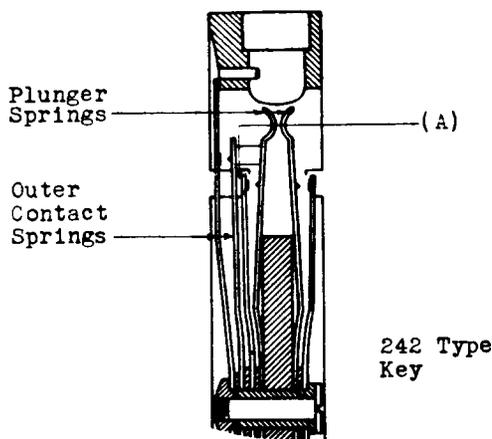


Fig. 3

**\*2.06 Contact Pressure** — Fig. 4(A) — (69, 183, 492, 508, 521 and 539 Type Keys and the Outer Contacts Only of the 242 Type Key) When

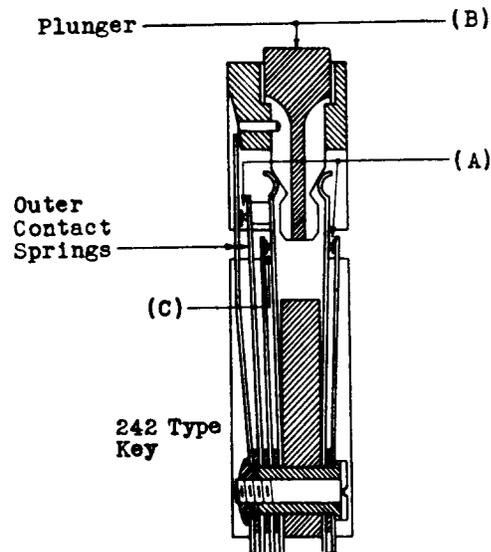


Fig. 4

the key is in the operated position the pressure between closed contacts shall be:

**Test** — Min. 50 grams

**Readjust** — Min. 55 grams

Use the No. 68-B gauge.

**\*2.07**

(a) **Contact Follow:** Fig. 4(A) — (69-, 492-, 508-, 521-, and 539-type Keys and Outer Contacts Only of the 242-type Keys) — There shall be a follow on all normally open contacts after making of

**Test** — Min. 0.008 inch

**Readjust** — Min. 0.010 inch

Gauge by eye.

Use the KS-6909 gauge as a reference.

(b) Fig. 4(C) — (Inner Contacts of the 242 Type Key) These contacts shall have as much follow as possible.

**\*2.08 Plunger Travel** (A-3 and B-11 Type Keys Only) There shall be a travel of the plunger after all normally open contacts are closed of:

**Test** — Min. .030"

**Readjust** — Min. .035"

Gauge by eye.

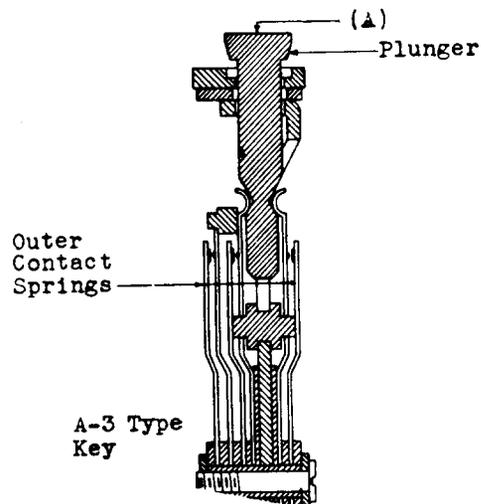


Fig. 5

**2.09 Plunger Operate Pressure** — Fig. 4(B), Fig. 5(A) — The pressure required to depress a plunger to its extreme operated position shall be:

<b>Test</b>	— Min. 550 grams
	Max. 1400 grams
<b>Readjust</b>	— Min. 675 grams
	Max. 1400 grams

Use the No. 79-B gauge to check the minimum and the No. 79-E gauge to check the maximum requirements.

### 3. ADJUSTING PROCEDURES

#### 3.001 List of Tools, Gauges and Materials

CODE OR SPEC NO.	DESCRIPTION
<b>TOOLS</b>	
303	Spring Adjuster
KS-6015	Duck-bill Pliers
KS-6320	Orange Stick
—	Bell System P-Long Nose Pliers — 6-1/2" per A.T.&T.Co. Drawing 46-X-56
—	Bell System Cabinet Screwdriver 3-1/2" per A.T.&T.Co. Drawing 46-X-40
—	Bell System 4" Regular Screwdriver per A.T.&T.Co. Drawing 46-X-34

CODE OR SPEC. NO.	DESCRIPTION
<b>GAUGES</b>	
68-B	70-0-70 Gram Gauge
79-B	0-1000 Gram Push-Pull Tension Gauge
79-E	0-3000 Gram Push-Pull Tension Gauge
KS-6909	Thickness Gauge Nest
<b>MATERIALS</b>	
KS-2423	Cloth
KS-7860	Petroleum Spirits
—	Toothpicks, Hardwood, Flat at One End and Pointed at the Other

**3.002** When adjusting the 508, 521 and 539 type keys remove the key from the box using the 3-1/2" cabinet screwdriver to remove the mounting screws and adjust the key in the same manner as the 69 type keys.

#### 3.01 Cleaning (Reqt 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 and M-2.

#### 3.02 Plunger Movement (Reqt 2.02)

**M-1** If the plunger fails to operate freely, it is probably due to dirt or a gummy substance forming on the bearing surfaces of the crimps of the plunger springs and the surfaces of the plunger on which the springs bear, or due to improper spring tensions. To determine whether or not this condition exists, withdraw the plunger with the fingers and if necessary clean it with a KS-2423 cloth moistened with petroleum spirits. An orange stick may be used as an aid in applying the cloth to the bearing surfaces of the plunger. At this time also remove any gummy deposit that may have collected on the sides of the slot of the mounting.

**M-2** Before replacing the plunger, examine the surfaces of the crimps of the plunger springs. If they are dirty, clean the plunger springs with a toothpick which has been dipped in petroleum spirits. Do not use the same toothpick for more than one operation.

**M-3** If the plunger operates freely but is sluggish in restoring to normal after the plunger, plunger springs and plunger slot have been cleaned, see that it is guided entirely by the key mounting and does not bind against it. This condition may result when the tensions of the opposite plunger springs are unequal. In this case, the plunger springs with the plunger removed will assume a position to one side of the long axis of the key mounting.

#### A-3 and B-11 Type Keys

**M-4** If the tension of the plunger springs is unequal and this tension causes the key unit to bind on the key frame, remove the key from the keyshelf and adjust the plunger springs with the No. 303 spring adjuster applied as shown in Fig. 7.

#### 69, 183, 242, 492, 508, 521 and 539 Type Keys

**M-5** If the tension of the plunger springs is unequal on keys mounted with retaining strips, remove the retaining strip screws with the 3-1/2" cabinet screw-driver and then remove both retaining strips. Remove the mounting screws if provided, after which the key mounting may be lifted out of the keyshelf as limited by the wiring.

**M-6** Loosen the spring assembly clamping screw with the 4" regular screw-driver and remove it. Also remove the springs and insulators from the key mounting.

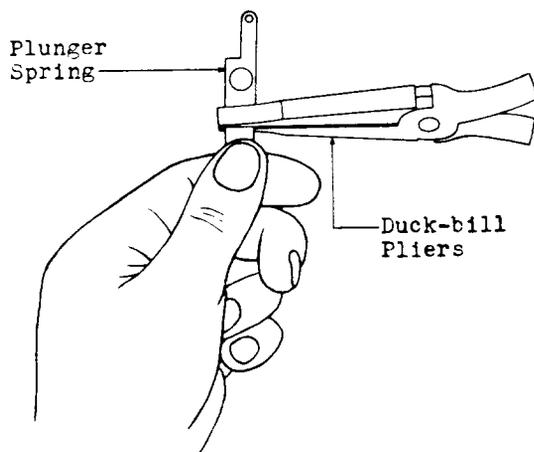


Fig. 6 - Method of Adjusting Plunger Springs of 69, 183, 242, 508, 521 and 539 Type Keys

**M-7** To adjust the tension of both plunger springs so that they are approximately equal, apply the duck-bill pliers at a point approximately 1/3 of the distance from the spring mounting screw hole to the crimp of the spring as shown in Fig. 6. After making adjustments, reassemble the key and check to see that the plunger does not bind.

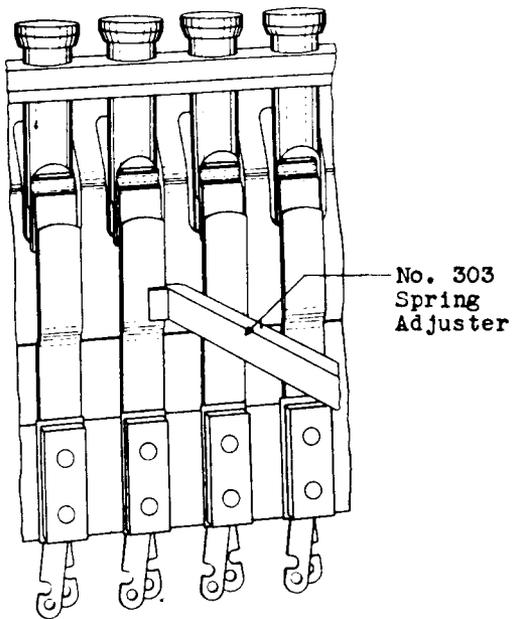
**M-8** After adjusting the plunger springs of any of the above mentioned keys check all other requirements.

- 3.03 **Contact Alignment** (Reqt 2.03)
- 3.04 **Contact Separation** (Reqt 2.04)
- 3.05 **Spring Clearance** (Reqt 2.05)
- 3.06 **Contact Pressure** (Reqt 2.06)
- 3.07 **Contact Follow** (Reqt 2.07)
- 3.08 **Plunger Travel** (Reqt 2.08)
- 3.09 **Plunger Operate Pressure** (Reqt 2.09)

**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. In adjusting the springs take care not to kink them. Do not straighten kinked springs unless the kink interferes with the proper adjustment of the key. Removing kinks tends to weaken the spring and shorten the life of the key.

**M-2 Contact Alignment:** At the time the other adjustments are being made see that the contact point lies wholly within the corresponding disc and as near the center as possible. If it is necessary to shift the springs on the 69, 183, 242, 492, 508, 521, and 539 type keys loosen the spring assembly clamping screw as outlined in procedure 3.02. Use the 3-1/2" cabinet screw-driver on the A-3 and B-11 keys. Then shift the springs as required. Take care not to break or damage the spring assembly insulators when making this adjustment.

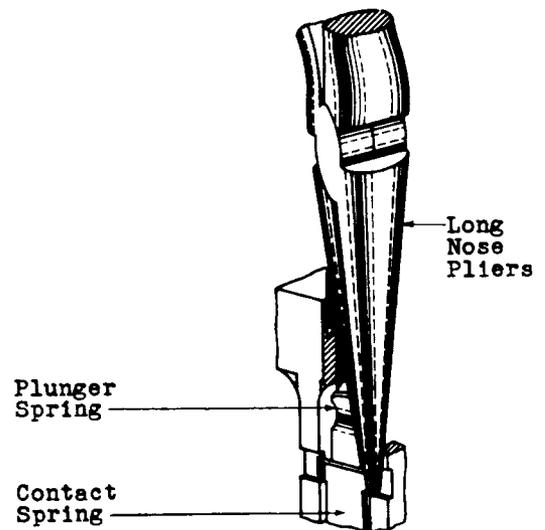
**M-3 Contact Separation A-3 and B-11 Type Keys:** If the separation between the contacts on these keys is not satisfactory, adjust as required with the No. 303 spring adjuster. Adjusting should be done close to the bend in the spring as shown in Fig. 7.



**Fig. 7 – Method of Adjusting Springs of A-3 and B-11 Type Keys**

**M-4 Contact Separation 69, 492, 508, 521, and 539 Type Keys:** If there is not sufficient separation between the contacts of keys of these types, carefully lift the contact spring away from its associated plunger spring to permit grasping the projections on either side of the spring with the long nose pliers as shown in Fig. 8. To increase the contact separation bend the projections forward, that is, toward the contact side of the spring. To reduce the contact separation, bend the projections backwards, or proceed as outlined below. If it is impossible to obtain a satisfactory contact separation without excessive bending of the projections on the contact spring, the plunger spring is probably distorted. In this case, remove and adjust it as specified in procedure 3.02.

**M-5** If the contact separation is excessive as indicated by the lack of follow, first, make sure that plunger spring is in its correct adjustment as covered in procedure 3.02. Then correct the separation by placing the key on its side and pressing down on the outside spring with the 3-1/2" cabinet screw-driver just over the contact point and between the two projections as shown in Fig. 9. Place the long axis

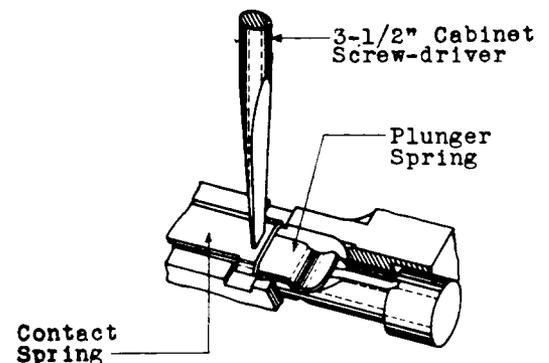


**Fig. 8 – Method of Adjusting for Contact Separation on 69, 492, 508, 521 and 539 Type Keys**

of the screw-driver parallel to the top edge of the spring. A slight amount of pressure will be sufficient to flatten out the two projections allowing the outside spring to set closer to the plunger spring.

**M-6 Contact Separation 183, 242 Type Keys:** If the separation between the contacts on these keys is not satisfactory, adjust as outlined in procedure 3.02, M-5, M-6 and M-7.

**M-7 Spring Clearance:** To check that the proper clearance exists between the plunger springs and springs designed never to make contact with each other, remove the



**Fig. 9 – Method of Adjusting for Contact Separation on 69, 492, 508, 521 and 539 Type Keys**

plunger from the mounting and observe the separation between the various springs. If springs touch each other it may be due to the springs being kinked. Straightening the springs will usually rectify any trouble that may exist.

**M-8** If the clearance between the crimps of the plunger springs is insufficient, the plunger may fail to meet the maximum pressure requirement. In this case, check the tension required to operate the plunger and if it is not satisfactory, adjust as outlined in procedure 3.02, M-4 to M-8. In some cases it may be necessary to adjust the contact springs.

**M-9 Contact Pressure:** Foreign matter wedged between contact springs may prevent the springs from making contact when the plunger is operated. Remove the foreign matter with a toothpick which has been dipped in petroleum spirits. Do not use the same toothpick for more than one operation.

**M-10** If the contact pressure still is not within the specified limits adjust the contact spring as outlined in M-8.

**M-11 Contact Follow:** If the contact follow is not satisfactory adjust as outlined in M-4 to M-5 inclusive as required.

**M-12 Plunger Travel:** If the travel of the plunger is not satisfactory, adjust the contact springs as outlined in M-3. In making this adjustment be sure that requirement 2.04 is met.

**M-13 Plunger Operate Pressure:** If the plunger is stiff and fails to meet the plunger operate requirement, withdraw the plunger with the fingers and examine it and the bearing surfaces of the plunger springs to determine whether or not a gummy substance has formed on them. If necessary clean the plunger and the plunger springs as covered in procedure 3.02, M-1 and M-2.

**M-14** If, after cleaning, the key still fails to meet the maximum limit of the requirement, reduce the tension of the contact or plunger springs toward the minimum limit. If the key fails to meet the minimum limit, increase the tension of the contact or plunger springs. In readjusting the plunger springs, the tension of each plunger spring should be changed an approximately equal amount.