

## KEYS 493-TYPE REQUIREMENTS AND ADJUSTING PROCEDURES

### 1. GENERAL

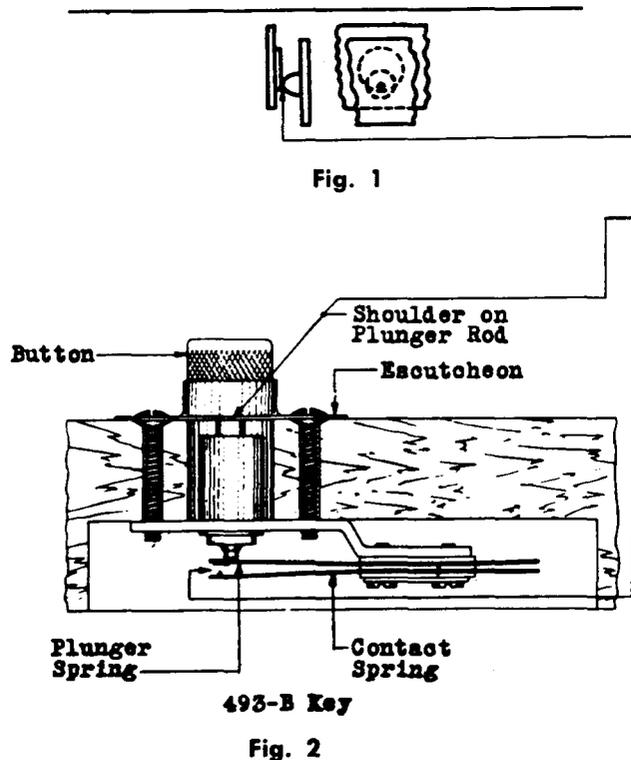
- 1.01 This section covers 493-type keys.
- 1.02 This section is reissued to incorporate material from the addendum in its proper location. In this process marginal arrows have been omitted.
- 1.03 Reference shall be made to Section 020-010-711, covering General Requirements and Definitions for additional 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 which cannot be checked for, due to the location of the apparatus, or where the application of the requirement would affect other adjustments, are marked with an

asterisk (\*). These requirements need not be checked for unless the apparatus 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 plunger is at the upper limit of its stroke and the contacts are open.

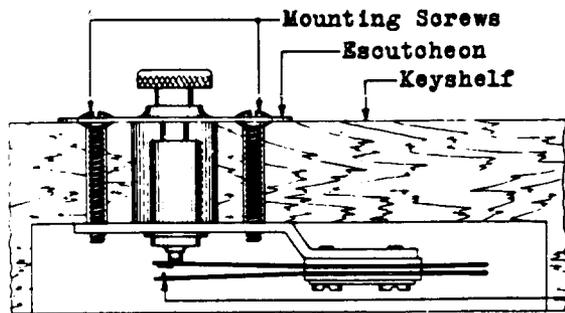
1.07 *The Operated Position* is that position in which the plunger is depressed to the bottom of its stroke and the normally open contacts are closed.

1.08 *One Dip of KS-8496 No. 3 Compound* for the purpose of this section is the amount of compound retained on the KS-14164 Artists show card brush after being dipped into the compound to a depth of 3/8" and quickly removed without allowing the bristles to touch the side of the container.



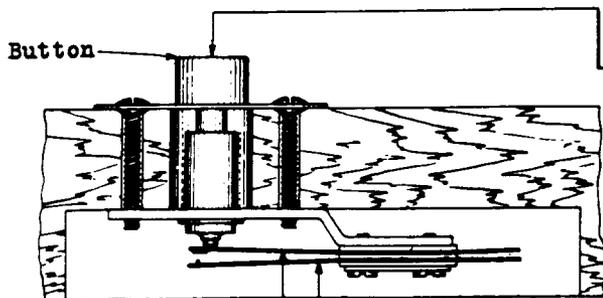
### 2. REQUIREMENTS

- 2.01 *Mounting*: The key shall be firmly mounted on the keyshelf. Gauge by feel.
- \*2.02 *Location of Key Button (493-B and C Keys Only)*: The key button shall be seated firmly against the lockwasher on the plunger rod. Gauge by feel.
- \*2.03 *Contact Alignment*: Contacts shall line up so that the point of contact falls wholly within the circumference of the opposing contact disc. Gauge by eye.
- \*2.04 *Contact Separation*: There shall be a separation between all open contacts of:
  - (a) *493-A and B Keys*
  - Test* — Min. .045"
  - Readjust* — Min. .050"
 Gauge by eye.



493-A Key

Fig. 3



Plunger Spring Contact Spring

493-C Key

Fig. 4

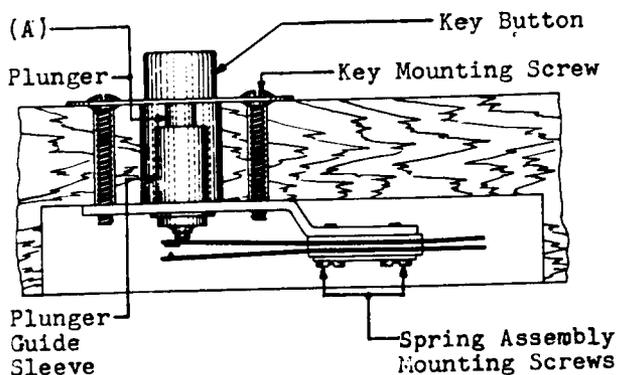


Fig. 6 - No. 493C Key

(b) **493-C Key**

**Test** — Min. .030"

**Readjust** — Min. .035"

Gauge by eye.

(c) The contact separation may be checked by noting the travel of the plunger before the contact spring starts to move.

**\*2.05 Contact Pressure:** There shall be a pressure between all closed contacts of:

**Test** — Min. 50 grams

**Readjust** — Min. 55 grams

Use the 79-C gram gauge.

**\*2.06 Contact Follow:** There shall be a contact follow on all contacts of:

**Test** — Min. .008"

**Readjust** — Min. .010"

Gauge by eye.

**2.07 Plunger Operate Pressure:** The pressure required to depress a plunger to the limit of its stroke shall be:

(a) **493-A and B Keys**

**Test** — Min. 680 grams, Max. 1245 grams

**Readjust** — Min. 795 grams, Max. 1245 grams

Gauge by feel.

(b) **493-C Key**

**Test** — Min. 680 grams, Max. 1020 grams

**Readjust** — Min. 795 grams, Max. 1020 grams

Gauge by feel.

**2.08 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.

**2.09 Lubrication**

(a) Fig. 6 (A) — The plunger shall be adequately lubricated with KS-8496 No. 3 compound. When lubrication is necessary one dip of the compound shall be applied to the plunger near the top of the plunger guide sleeve.

**(b) Recommended Lubrication Intervals:**

After turnover it is recommended that the part listed in requirement (a) be cleaned and lubricated at intervals of two years. This interval may be extended if periodic inspections have indicated that local conditions are such as to insure that the requirements will be met during the extended interval.

**2.10 Record of Lubrication:** During the period of installation, a record shall be kept, by date, of the lubrication and this record shall be turned over to the Telephone Company with the equipment. If no lubrication has been done, it shall be so stated.

**3. ADJUSTING PROCEDURES**

CODE OR SPEC NO.	DESCRIPTION
<b>TOOLS</b>	
KS-6015	Duck-bill Pliers
KS-6320	Orange Stick
KS-14164	Artist's Show Card Brush
—	Bell System Cabinet Screw-driver — 3-1/2" per A.T.&T.Co. Drawing 46-X-40
<b>GAUGES</b>	
79-C (or the re-placed 79-A)	0-200 Gram Push-Pull Tension Gauge
<b>MATERIALS</b>	
KS-2423	Cloth
—	Toothpicks, hardwood, flat at one end and pointed at the other
KS-7860	Petroleum Spirits
KS-8496	No. 3 Compound

**3.01 Mounting (Reqt 2.01)**

**M-1** If the key is loose in its mounting tighten the mounting screw securely with the 3-1/2" cabinet screwdriver.

**3.02 Location of Key Button (Reqt 2.02)**

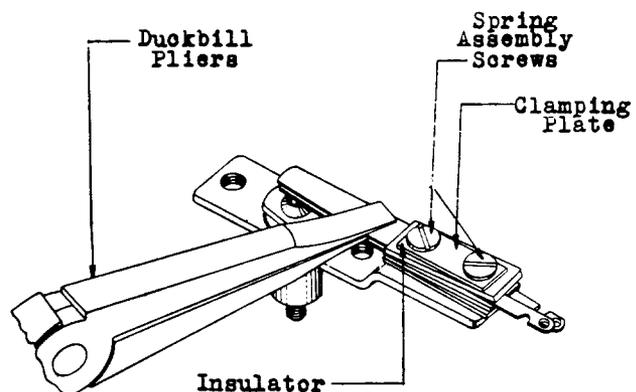
**M-1** If the key button is not firmly seated against the shoulder on the plunger rod proceed as follows: Hold the plunger rod

firmly with the duck-bill pliers applied at the contact end. Turn the button with the thumb and fingers until it is firmly seated against the shoulder on the plunger rod.

**3.03 Contact Alignment (Reqt 2.03)****3.04 Contact Separation (Reqt 2.04)****3.05 Contact Pressure (Reqt 2.05)****3.06 Contact Follow (Reqt 2.06)**

**M-1** Unless otherwise specified adjust for contact separation, contact pressure and contact alignment as follows: Remove the spring assembly from the keyshelf or mounting by removing the mounting screws with the 3-1/2" cabinet screw-driver and adjust the springs near the point where the spring leaves the clamping plate and insulators with the duck-bill pliers applied as shown in Fig. 5. In extreme cases it may be necessary to bend the spring near the contact end in order to meet the requirements for contact separation and contact follow. This procedure should be used only when the adjustments previously specified fail to bring about the desired results. 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 kink. Removing kinks tends to weaken the spring and shorten the life of the key.

**M-2 Contact Alignment:** At the time the other spring adjustments are being made, see that the contact points lie wholly within the periphery of the corresponding discs. If necessary, loosen the spring assembly screws with the 3-1/2" cabinet screw-driver and shift the springs until each contact point lies wholly within the corresponding contact



**Fig. 5 – Method of Adjusting Contact Springs**

disc preferably as near the center as possible. Then tighten the screws securely.

**M-3 Contact Separation and Contact Follow:**

To check for contact separation and contact follow raise the keyshelf so that the contact springs may be observed and slowly operate and release the key. The contact separation can be checked visually by using the thickness of the two springs as an aid in gauging the travel of the plunger spring before and after breaking contact with the contact spring. The thickness of the plunger spring is .0225" and that of the contact spring is .020".

**M-4 Contact Pressure:** To check for contact pressure raise the keyshelf and hold the plunger in its operated position. Apply the bevelled edge of the prong or hook of the 79-C gauge between the contact and the plunger springs holding the gauge in a direction which is perpendicular to the surface of the spring. With the keyshelf in a vertical position the gauge should be held in a horizontal position.

**M-5** Foreign matter wedged between the contact and plunger springs may prevent the springs from making contact when the key is operated. If necessary remove the spring assembly from the keyshelf or mounting as described in M-1 and remove the foreign matter with a toothpick which has been dipped in petroleum spirits.

**M-6** Remount the spring assembly and check the requirements for plunger operate pressure since the adjustment of the contact spring will alter the pressure required to operate the key.

**3.07 Plunger Operate Pressure (Reqt 2.07)**

**M-1** If the key does not meet the plunger operate pressure requirement remove the mounting screws with the 3-1/2" cabinet screwdriver and then remove the spring assembly from the slot in the keyshelf. Increase or decrease the tension of the plunger and contact springs as required using the duck-bill pliers applied near the point where the spring leaves the insulators as shown in Fig. 5. A gauge for measuring the pressure specified in requirement 2.07 is being developed. Until this gauge is available it will be satisfactory to estimate the pressure by "feel".

**M-2** If the maximum limit is not met by this procedure it is probably due to the key button binding on the key escutcheon. Check for this by removing the spring assembly. If the button is free in the frame but binds due to dirt remove the button and clean it with a piece of KS-2423 cloth which has been moistened with petroleum spirits.

**M-3** Replace the key and tighten the mounting screw securely. Adjustments covered in procedure 3.03 should also be checked to insure that these adjustments have not been disturbed.

**3.08 Cleaning (Reqt 2.08)**

**M-1** Clean the contacts in accordance with the section covering cleaning procedures for key contacts. Clean other parts in accordance with procedures 3.03, M-5 and 3.07, M-2.

**3.09 Lubrication (Reqt 2.09)**

(1) Remove the key mounting screws with the 3" cabinet screwdriver and remove the key from the mounting. Hold the bottom of the plunger with the fingers and remove the key button by turning it in a counterclockwise direction as viewed from the top. Remove the spring assembly mounting screw nearer the contact end of the springs with the 3" cabinet screwdriver and loosen the other mounting screw. Shift the springs sufficiently to allow for the removal of the plunger and remove the washer from the plunger. Clean the plunger with a clean D-98063 cloth moistened with KS-7860 petroleum spirits. Then clean the inside of the guide sleeve with the KS-14164 Artists show card brush moistened with the petroleum spirits. Do not use the same brush that is used for lubricating the plunger. Reassemble the key in the reverse order from which it was disassembled.

(2) Apply one dip of the KS-8496 compound on the plunger between the keybutton and the guide sleeve with the KS-14164 Artists show card brush. Rotate and operate the plunger several times to distribute the lubricant. Remount the key in the mounting and insert and securely tighten the mounting screws.

**3.10 Record of Lubrication (Reqt 2.10)**

No procedure.