KEYS
223-TYPE
REQUIREMENTS AND ADJUSTING PROCEDURES

1. GENERAL

1.01 This section covers 223-type keys.

1.02 This section is reissued to bring the information for tools and gauges up to date. Detailed reasons for reissue will be found at the end of the section.

1.03 Reference shall be made to Section 020-010-711 for additional information necessary for the proper application of the requirements listed herein.

1.04 Asterisk: 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 on a 223-type key is that position in which the plunger is at the upper limit of its stroke with the normally open contacts open and the normally closed contacts closed.

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

2. REQUIREMENTS

2.01 Cleaning

(a) Contacts shall be cleaned, when necessary, in accordance with the section covering cleaning of relay contacts and parts.

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

2.02 Plunger Movement: Fig. 1 (A) - The plunger shall operate freely and shall not be sluggish in restoring to the normal position.

Gauge by eye and feel.

*2.03 Contact Alignment: The contacts shall line up so that the point of contact falls wholly within the circumference of the opposing contact disc.

Gauge by eye.

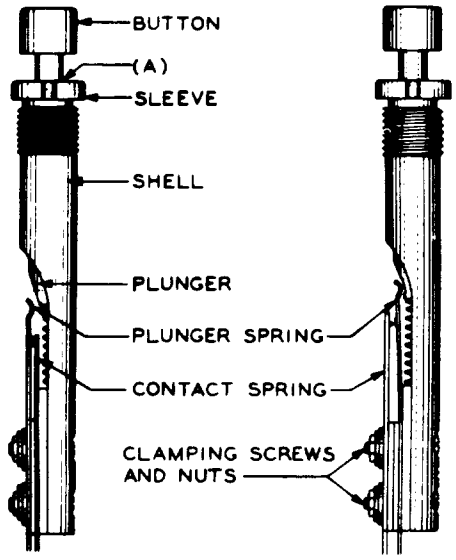

Fig. 1
No. 223B Key

Fig. 2
No. 223C Key

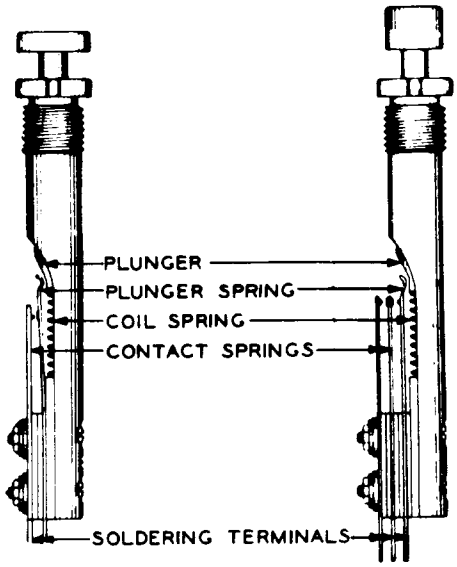

Fig. 3
No. 223D Key

Fig. 4
No. 223E Key

* 2.04 Clearance Between Plunger Spring and Plunger (223B, D, and E Keys Only): Fig. 5 (A) - With the key in its normal position there shall be a clearance between the plunger spring and plunger in at least one position of the plunger.

Gauge by eye.

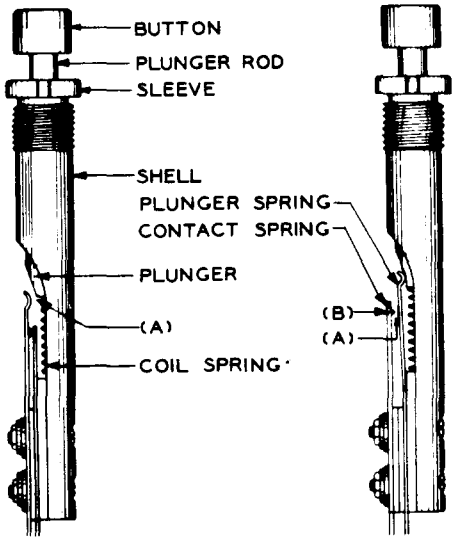

Fig. 5
No. 223B Key

Fig. 6
No. 223C Key

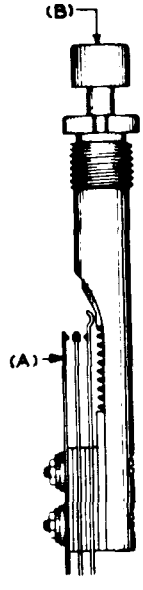

Fig. 7
No. 223E Key

* 2.05 Plunger Travel

(a) 223C Key: The travel of the plunger after the contacts make shall be

Test - Min 0.045 in.
Readjust - Min 0.050 in.

Gauge by eye.

(b) 223D Key: The travel of the plunger from the normal position before the contacts make shall be

0.125 in.

Gauge by eye.

The travel of the plunger after the contacts make shall be

0.060 in.

Gauge by eye.

* 2.06 Contact Separation: Fig. 6 (A) - There shall be a separation between any pair of contacts normally open or between any pair of contacts that are open when the key is operated of

Key	Test	Readjust
223B	Min 0.014 in.	Min 0.016 in.
223C	Min 0.014 in.	Min 0.016 in.
223D	Min 0.010 in.	Min 0.012 in.
223E	Min 0.010 in.	Min 0.012 in.

Gauge by eye.

* 2.07 Contact Pressure: Fig. 6 (B) - There shall be a pressure between all closed contacts of

Test - Min 50 grams
Readjust - Min 55 grams

Use the No. 68B gauge.

* 2.08 Contact Follow (223E Key Only): Fig. 7 (A) - There shall be a follow on the outside contact spring of

Test - Min 0.008 in.
Readjust - Min 0.010 in.

Gauge by eye.

* 2.09 Plunger Operate Pressure: Fig. 7 (B) -

(a) 223B Key: The pressure required to depress the plunger until the contact separation is 0.016 inch shall be

Test - Max 2150 grams
Readjust - Max 2050 grams

Use the No. 79F gauge.

(b) 223C and 223E Keys: The pressure required to depress the plunger until the contacts make shall be

Test	- Min	800 grams
	Max	2150 grams
Readjust	- Min	900 grams
	Max	2050 grams

Use the No. 79F gauge.

(c) 223D Key: The pressure required to depress the plunger to its operated position shall be

Test	- Min	600 grams
	Max	950 grams
Readjust	- Min	675 grams
	Max	900 grams

Use the No. 79B gauge.

3. ADJUSTING PROCEDURES

3.001 List of Tools, Gauges, and Materials

Code or Spec No.	Description
Tools	
72	Combination 5/32-inch and 3/16-inch Hex. Double-end Socket Wrench and Screwdriver
82 or 82B	Pin Wrench (see note) ←
303	Spring Adjuster
KS-7782	Parallel-jaw Pliers ←
Gauges	
68B	70-0-70 Gram Gauge
79B	0-1000 Gram Push-pull Tension Gauge
79F (or the replaced 79E)	0-6000 Gram Push-pull Tension Gauge ←
Materials	
KS-2423	Cloth
KS-7860	Petroleum Spirits
-	Toothpicks, hardwood, flat at one end and pointed at the other

Note: 82B tool will fit all of the keys. 82 tool will fit all except the No. 223D key.

3.01 Cleaning (Rq 2.01)

(1) Clean the contacts when necessary in accordance with the section covering cleaning of relay contacts and parts. Clean other parts in accordance with 3.02.

3.02 Plunger Movement - (Rq 2.02)

(1) If the plunger binds, place a few drops of KS-7860 petroleum spirits between the plunger rod and the sleeve (Fig. 1 (A)). Work the plunger up and down. Repeat this operation if necessary.

(2) If this operation does not remove the bind, examine the plunger and the plunger spring to determine whether a gummy substance has formed over their surfaces. If necessary clean the plunger spring with a toothpick which has been dipped in KS-7860 petroleum spirts and wipe off the plunger with a clean dry KS-2423 cloth.

(3) If binding still occurs, unsolder the wires from the key terminals and remove the key from the keyshelf using the No. 82 or No. 82B wrench to turn the key-sleeve in a counterclockwise direction. Then unscrew the shell from the sleeve and remove the plunger and the coil spring.

(4) Clean each part thoroughly with a KS-2423 cloth which has been moistened with KS-7860 petroleum spirits. After the parts have been cleaned allow them to dry thoroughly before reassembling them in the key.

(5) Before assembling the key, inspect the parts for defects and replace all defective parts. It is advisable to reassemble the key out of the keyshelf and check for plunger movement before placing the key in the keyshelf.

(6) After the desired adjustment for plunger operation has been obtained, restore the key to its position in the keyshelf and resolder the wires.

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

(1) General: 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 shorten the life of the key. Straightening the springs will usually rectify any trouble that may exist because of springs touching each other which are designed to clear at all times. No adjustment which will interfere with the proper contact sequence should be attempted.

(2) Contact Alignment: To realign the contacts, loosen the spring assembly clamping nuts with the wrench of the 72 tool and shift the springs so that each contact point lies wholly within the circumference of the corresponding contact disc, preferably as near the center as possible. Then tighten the nuts securely while holding the clamping screws stationary with the screwdriver of the 72 tool. It may be necessary in some cases to remove the key from the keyshelf as described in 3.02(3) to (6), inclusive, to make this adjustment, but in the majority of cases the clamping screws and nuts will be accessible from the underside of the keyshelf, particularly if the shell is unscrewed from the sleeve with the fingers approximately one-half turn or less so as to make the clamping screws and nuts accessible. After completing the adjustment, tighten the keyshell to the keysleeve with the fingers.

(3) Clearance Between Plunger Springs and Plunger: If necessary to readjust the springs for clearance between the plunger spring and the plunger, plunger travel, contact separation, contact pressure, contact follow, or plunger operate pressure, use the KS-7782 parallel-jaw pliers applied as shown in Fig. 8. In some cases the No. 303 spring adjuster may be found more suitable for adjusting the springs.

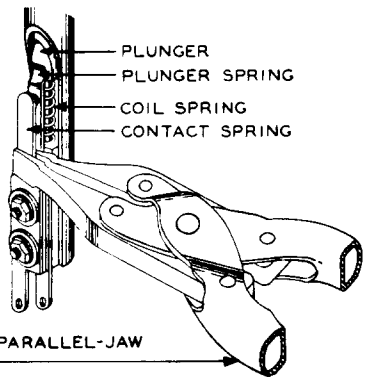

Fig. 8 - Method of Adjusting for Clearance Between Plunger Spring and Plunger, Plunger Travel, Contact Separation, Contact Pressure, Contact Follow, and Plunger Operate Pressure

(4) Plunger Travel: To change the plunger travel or the clearance between the plunger and the plunger spring, adjust the plunger spring towards or away from the plunger as required with the KS-7782 parallel-jaw pliers. Where the key is equipped with a break contact, it will be necessary to adjust the break contact spring in order to change the position of the plunger spring. Since this adjustment will affect the contact separation, contact pressure, and contact follow, consideration should be given at this time to meeting these requirements as described in (5).

(5) Contact Separation, Contact Pressure, and Contact Follow: Foreign matter wedged between the contact springs may prevent the springs from making contact when the plunger is operated. Remove the foreign matter with a toothpick that has been dipped in KS-7860 petroleum spirits. Do not use the same toothpick for more than one operation.

(6) If the follow and separation requirements 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 stationary springs may be given a slight bend toward the moving spring with the KS-7782 parallel-jaw pliers, or with the No. 303 spring adjuster. This adjustment should not be great enough to produce a visible kink in the spring.

(7) Plunger Operate Pressure: When using the No. 79B or No. 79F gauges for checking the pressure required to depress the plunger as specified, it will first be necessary to determine the weight of the gauge plunger and to compensate for this weight so that a true reading will be obtained. In the case of the 79B gauge, this is done by holding the gauge in a vertical position with the zero scale division at the top, and noting the weight of the gauge plunger as indicated on the scale. In the case of the 79F gauge, compensate for the weight of the gauge plunger by holding the gauge in a vertical position with the zero scale division at the bottom, and then turning the adjusting nut to a position where the groove in the nut lines up with the zero position on the scale.

(8) After noting the weight of the plunger and adjusting the 79F gauge to compensate for it, as described in (7), hold the gauge in a vertical position with the zero scale division at the bottom, and note the reading on the gauge when the key plunger is depressed by the gauge to the specified position. In the case of the 79F gauge, the reading obtained will be the true plunger operate pressure. In the case of the 79B gauge, however, the true plunger operate pressure will be the reading obtained plus the weight of the plunger, determined as described in (7).

(9) If the key fails to meet the minimum plunger operate pressure, decrease the clearance between the plunger and plunger spring and recheck the requirements for contact separation, contact

follow, and contact pressure. If the requirement cannot be met after making this adjustment, examine the coil spring to determine whether it is broken or distorted. If it is necessary to replace the coil spring, remove the key from the keyshelf and disassemble it as described in 3.02.

(10) If a key exceeds the maximum plunger operate pressure, increase the clearance between the plunger and the plunger spring and recheck the requirements for contact separation, contact follow, and contact pressure. If the maximum requirement cannot be met after making this adjustment, remove the key from the keyshelf and clean it as described in 3.02.

REASONS FOR REISSUE

1. To delete paragraph referring to Western Electric Company Handbook (1.03).
2. To reword the cleaning requirement and procedure (2.01 and 3.01).
3. To add a new figure of the 223D key (Fig. 3).
4. To revise the list of tools, gauges, and materials (3.001).
5. To revise Fig. 8 to show parallel-jaw pliers.