

## KEYS 580A AND 581A REQUIREMENTS AND ADJUSTING PROCEDURES

### 1. GENERAL

- 1.01 This section covers the Nos. 580A and 581A keys.
- 1.02 This section is reissued to delete references to Plant Series sections not presently available.
- 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 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 position for No. 580A and No. 581A keys is that position in which the lever key button is in the extreme pulled out position and the lever portion of the button is at the top and the normally open contacts are open and the normally closed contacts are closed.
- 1.06 The operated position of a No. 580A key is that position in which the lever key button is rotated from the normal position to the extreme position in a clockwise direction and the normally open contacts are closed and the normally closed contacts are open.
- 1.07 The operated position of a No. 581A key is that position in which the lever key button is pushed in from the normal position to the extreme pushed-in position and the normally closed contacts are open.
- 1.08 A pair of contacts as referred to in this section consists of a single contact bar on one contact spring and the corresponding contact bar on the opposing contact spring.
- 1.09 A pretensioned spring is a spring which has been tensioned during manufacture. Such a spring may be recognized by a distinct kink between the insulators and the contact end of the spring at approximately 1/3 the distance from the insulators.

### 2. REQUIREMENTS

#### GENERAL REQUIREMENTS

##### 2.01 Cleaning

(a) Contacts shall be cleaned when necessary in accordance with approved procedures. After cleaning any contact a check shall be made to see that both contacts on the bifurcated spring involved close as specified in 2.03(b).

(b) Other parts of the Nos. 580A and 581A keys shall be cleaned in accordance with approved procedures.

##### 2.02 Contact Alignment

(a) Fig. 1 (A): On all keys equipped with standard contacts the contacts shall line up so that the width on the contact surface of each contact bar falls wholly within the length of its mating bar. Gauge by eye.

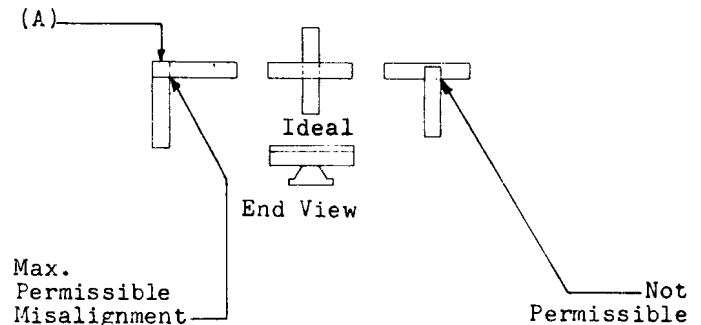


Fig. 1 - Alignment of Standard Contacts - Plan View of Contact Surfaces

(b) Fig. 2 (A): On all keys equipped with heavy contacts the contact alignment shall be within the limits indicated in Fig. 2. Gauge by eye.

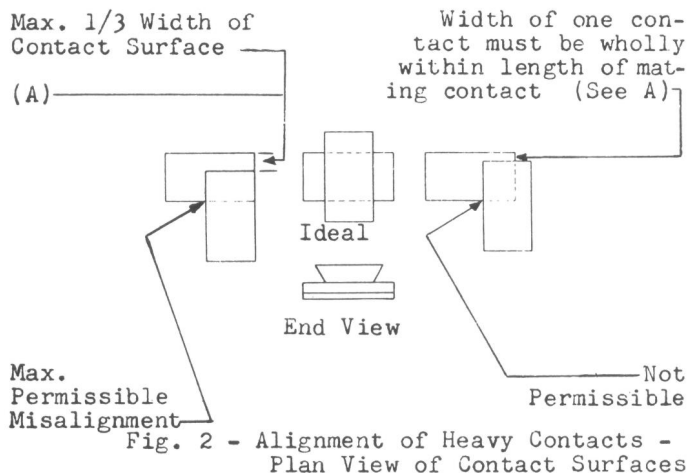
##### 2.03 Contact Make

(a) Both contacts of bifurcated contact springs shall make with their associated contacts in the fully operated or non-operated position of the springs, whichever position represents the closed position of the contacts. Gauge by eye and feel.

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(b) Readjust Only: After a particular contact is cleaned, build up is removed or adjustments are made on a contact spring, both contacts on the bifurcated spring shall make approximately simultaneously with their associated contacts if it is a make contact or shall break approximately simultaneously with their associated contacts if it is a break contact. Gauge by eye.

2.04 Straightness of Springs: All springs other than pretensioned springs shall be free of sharp bends or kinks due to adjustment except that in the case of thin (.013" or .018") springs a kink may be permitted provided that it is within 1/4" from where the spring leaves the insulators. A gradual bow in a spring is permissible. Gauge by eye.



**REQUIREMENTS FOR NO. 580A KEY**

2.05 Key Mounting: Keys shall be fastened securely to the mounting plate. Gauge by feel by grasping the push-turn rod between the thumb and forefinger and attempting to move the key.

**2.06 Vertical Clearance**

(a) There shall be a clearance between the springs of the key and apparatus mounted directly above or below of Min. 1/4" Gauge by eye.

(b) Springs shall not touch the key cover. Gauge by eye.

**2.07 Rocker Arm Clearance - Fig. 3 (A):**

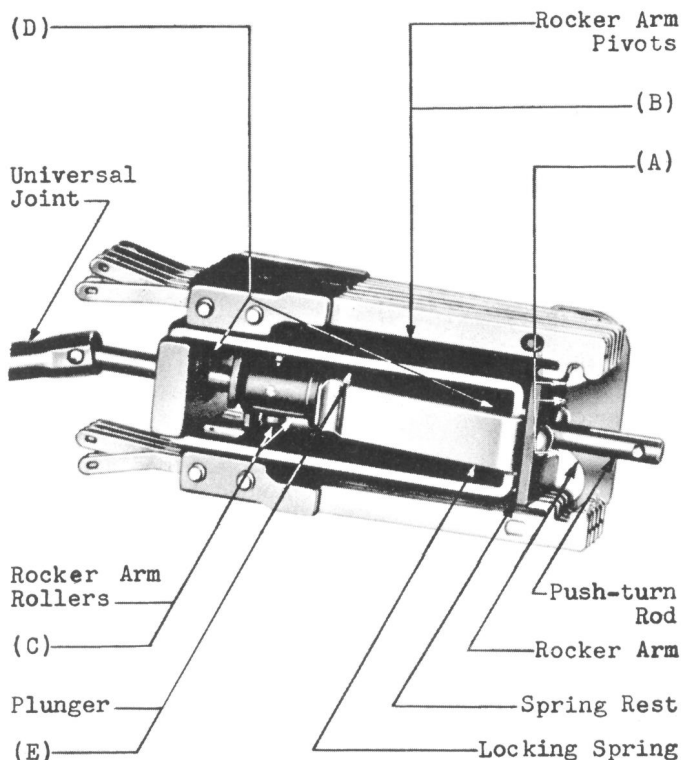
There shall be a clearance between the rocker arm and the sides and bottom of the notch in the spring rest, in all positions of the key of Min. .015"

Gauge by eye. The thickness of the No. 2 spring (top or bottom) of the spring combination shown in Fig. 7 is .013"

**2.08 Freedom of Movement of Parts**

(a) Rocker Arm and Rocker Arm Rollers - Figs. 3(B) and 3(C): The rocker arm and rocker arm rollers shall move freely on their pivots.

Gauge by eye or feel. Check the movement of the key manually operating the rocker arm to permit free roller movement and turn the rollers with a toothpick.



**(b) Push-turn Rod and Plunger -**

Fig. 3 (D) and 3 (E): The push-turn rod shall slide and rotate freely in its bearings, and the plunger shall rotate freely on the push-turn rod with the pressure of the locking spring removed. Gauge by eye and feel.

**2.09 Spring Tang Position - Fig. 4(A)**

(a) The spring tang shall not rub on the spring rest when moved from its normal position of rest on the spring rest in the direction of the travel of the spring. Gauge by feel and eye.

(b) The spring tang shall overlap the spring rest as shown in Fig. 4(A) and the spring tang may project one-third of its width above the top edge of the spring rest. Gauge by eye.

**2.10 Spring Tension**

(a) All springs shall be tensioned toward the rocker arm. The tension of each spring measured in grams shall be in accordance with the information given in Fig. 7. Unless otherwise specified or unless the abbreviation "Rocker Arm Opr." is shown associated with an arrow mark leading to a spring

in Fig. 7, the tensions shall be measured with the rocker arm in the normal position. A spring tensioned against the spring rest, rocker arm or stud shall register the required tension just as the spring leaves the spring rest, rocker arm or stud. A spring whose contacts are tensioned against the contacts of an opposing spring shall register the required tension just as the contacts break. Use the No. 70J or 70H gauge to check the tension. The tension of all springs having contacts shall be measured in front of the contacts. Apply the gauge so that the tip of the gauge engages both prongs of the bifurcated springs as indicated in Fig. 5. When gauging tension on solid springs apply the tip of the gauge near the front end of the spring just in front of the contacts.

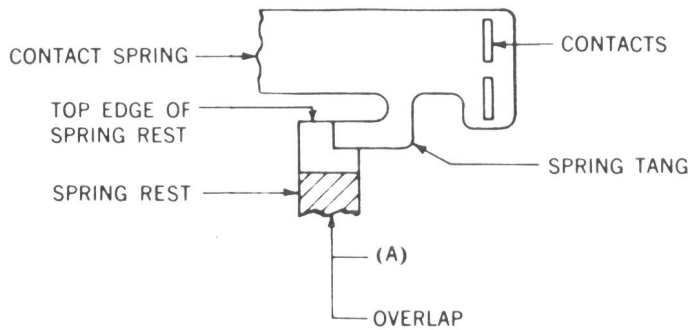


Fig. 4—Position of Spring Tang

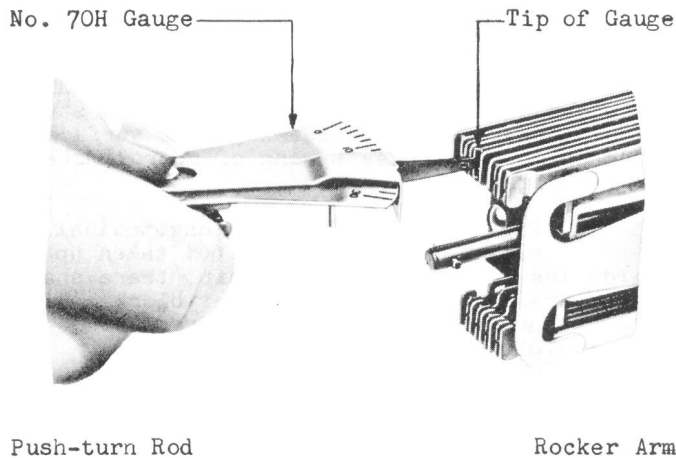


Fig. 5 - Method of Checking Spring Tension

(b) "A" Springs: Where the letter "A" appears associated with a particular spring it means that this spring need have no definite tension but shall be tensioned towards the rocker arm.

(c) "B" Springs: Where the letter "B" appears associated with a particular spring it means that this spring together with

the tensions of any "A" and "D" springs which may in turn be tensioned against it shall have a combined tension of

Min. 25 grams

However, the "B" spring shall rest against its spring rest without the aid given by the other spring or springs. Use the No. 70H gauge applied to the "B" spring.

(d) "F" Springs: In the unoperated position of the key, spring "F" shall hold the rocker arm against its stop. The tension of these springs shall be measured just behind the end of the rocker arm.

2.11 Spring and Stud Clearance - Fig. 6 (A): The spring studs shall clear the springs through which they pass, in all positions of the key. Gauge by eye.

2.12 Separation Between Springs - Fig. 6 (B): There shall be a clearance between adjacent springs whether in the operated or normal positions of the key of Min. .008" Gauge by eye.

In any intermediate position between the operated and normal positions, this clearance shall be Min 0.006 inch

Gauge by eye.

2.13 Stud Gap: With the key in the normal position there shall be a clearance between the stud and spring, at points marked "R" and "S" in Fig. 7. Gauge by eye.

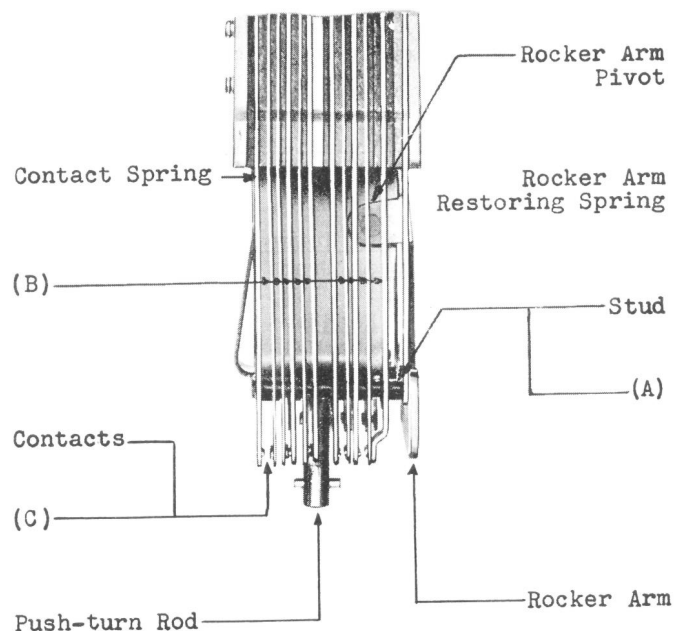


Fig. 6 - No. 580A Key - Top View

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**2.14 Contact Separation - Fig. 6 (C):**

The contact separation between each pair of contacts normally open or between each pair of contacts that are opened when the key is operated shall be

Min. .012"

Gauge by eye. The thickness of the No. 2 spring (top or bottom) of the spring combination shown in Fig. 7 is .013".

**2.15 Contact Follow**

(a) The contact follow of normally open contacts shall be

Min. .015"

Gauge by eye as outlined in (b).

Exception: The contact follow for normally open springs 1 and 2 top shown in Fig. 7 shall be

Min. .010"

Gauge by eye as outlined in (b).

(b) The contact follow requirement is met if in the operated position the spring rest spring is off the associated stop so that there is a clearance between the spring and the stop. Where the spring rest spring does not leave the associated stop when the key is in the operated position, move the spring rest spring away from its stop with the KS-6320 orange stick and observe that the mating spring follows sufficiently to meet the requirement.

**2.16 Contact Sequence - Fig. 7**

(a) Normal Contact Sequence - Break-Make Combinations: Normally closed contacts designated "M" shall break before the normally open contacts of the same assembly, designated "O" make. Gauge by eye.

(b) Other Contact Sequence: When specified on the circuit drawing.

All Springs Tensioned Toward Rocker Arm  
Tension in Grams

	Test		Readi		
	Min	Max	Min	Max	
A =	-	-	-	-	See Rq 2.10(b)
B =	-	-	-	-	See Rq 2.10(c)
C =	25	-	30	-	See note
D =	5	-	6	-	
F =	60	110	70	100	See Rq 2.10(d)
X =	Rocker Arm Restoring Springs				
M & O	- Contact Sequence - See Rq 2.16(a)				
R & S	- Stud Gap - See Rq 2.13				

Note: When a "C" spring has one or more springs tensioned against it, the readjust minimum 30-gram requirement shall be met without the aid of the other spring or springs.

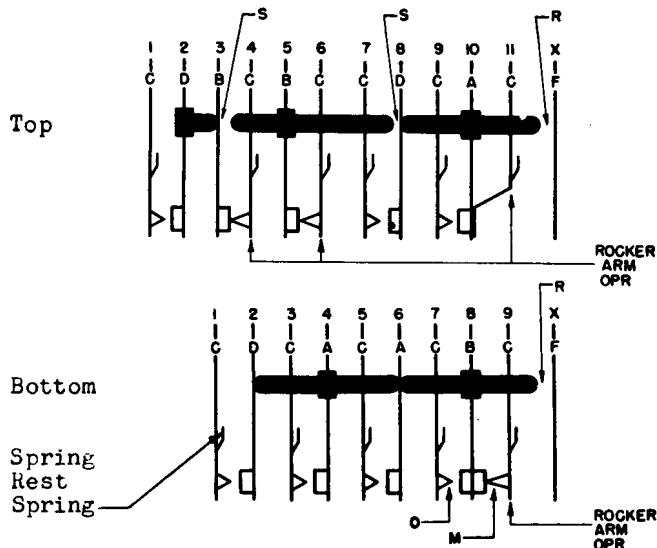


Fig. 7 - Spring Combination - No. 580A Key

**REQUIREMENTS FOR NO. 581A KEY**

**2.17 Plunger Block Position**

(a) Fig. 8 (A): With the key in the normal position, the center of the stud on the plunger block shall be approximately in line with the center of the crimp at the end of the key spring. Gauge by eye.

(b) Fig. 8 (B): With the longitudinal play in the push-turn rod taken up towards the front of the cord unit there shall be a clearance between the surface of the stud on the plunger block and the adjacent surface of the crimp on the key spring of approximately 3/32". Gauge by eye.

(c) Fig. 8 (C): With the longitudinal play in the push-turn rod taken up towards the front of the cord unit, there shall be a clearance between the plunger block and the push-turn rod bushing in the frame of Min. .010" Gauge by eye.

(d) With the lever key button in the extreme pushed-in position, there shall be a clearance between the plunger block and the No. 582A and No. 583A keys. Gauge by eye.

**2.18 Contact Pressure:** The combined pressure of both pairs of closed contacts shall be

Min 35 grams

Use the No. 70J gauge. The pressure shall be divided between both pairs of contacts so that the pressure of an individual pair of contacts when closed shall be minimum 12 grams. Both pair of contacts shall make or break at the same time. Gauge by eye.

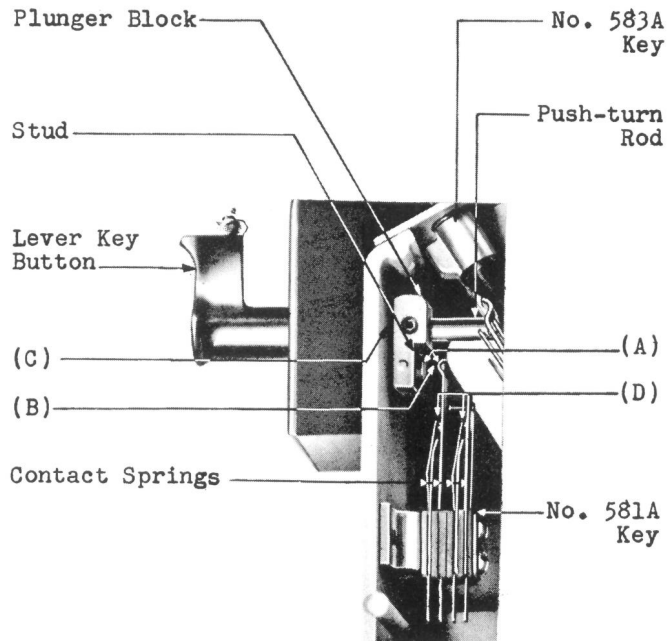


Fig. 8 - No. 581A Key - Plunger Block Position

#### 2.19 Contact Separation - Fig. 8 (D):

The contact separation between any pair of contacts when the key is in the operated position shall be

Min. .020"

Gauge by eye. The thickness of the stop spring is .020".

#### 2.20 Contact Follow: The contact follow on all contacts shall be

Min. .008"

Gauge by eye.

### 3. ADJUSTING PROCEDURES

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

Code or Spec.No.	Description
<u>Tools</u>	
363	Spring Adjuster
485A	Smooth Jaw Pliers
486A	Oil Can (Two Required)
505A	Spring Adjuster (For .013" Springs)
506A	Spring Adjuster (For .018" and .023" Springs)
507A	Spring Adjuster (For .030" Springs)
-	3" Cabinet Screwdriver
-	5" Regular Screwdriver
-	6" Cabinet Screwdriver
-	No. 6 Allen Set Screw Wrench
KS-6320	Orange Stick

#### Gauges

70H	0-30 Gram Gauge
70J	0-150 Gram Gauge
131A	Thickness Gauge Nest

#### Materials

KS-7470	Oil
KS-7860	Petroleum Spirits
D-98063	Cloth
or	
KS-2423	Cloth
-	Hardwood Toothpick - Flat on One End, Pointed at the Other

3.002 If necessary to remove the keys, remove the No. 348A plug from the jack bus terminal. Loosen the two cowl fasteners, located at the top and bottom of the cord unit, by turning them towards the left (counter-clockwise) with the 5" regular screwdriver and remove the cord unit.

### GENERAL PROCEDURES

#### 3.01 Cleaning (Rq. 2.01)

(1) Clean the contacts of the key in accordance with the section covering cleaning of key contacts. After cleaning check that requirement 2.03 (a) is met and if necessary adjust as covered in 3.03.

#### 3.02 Contact Alignment (Rq. 2.02)

#### 3.03 Contact Make (Rq. 2.03)

#### No. 580A Key

(1) If the contacts do not line up properly it is probably due to the springs having shifted in the assembly. In this case refer the matter to the supervisor.

(2) If both contacts on the bifurcated springs do not make contact in the closed position of the contacts it may be due to a twist in the spring or misalignment of the two prongs of the bifurcated spring. Correct for a twisted spring by using the No. 505A or 506A spring adjuster applied near the point where the spring leaves the insulator. To correct misalignment of the prongs of the bifurcated spring use the No. 363 spring adjuster and adjust the upper and lower prong of the bifurcated spring. It is recommended that in adjusting as covered above the two prongs of the bifurcated springs be adjusted to make contact with the opposing contacts as near simultaneously as possible.

#### No. 581A Key

(3) If the contacts do not line up properly, remove the spring assembly mounting bracket screws with the 3" cabinet screwdriver and remove the spring assembly

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bracket. Loosen the spring assembly screws with the 3" cabinet screwdriver and shift the springs until requirement 2.02 is met. Then tighten the screws securely and remount the spring assembly on the frame and check that requirements 2.17 (b) and 2.18 are met.

(4) If both contacts on the bifurcated spring do not make contact in the closed position of the contacts it may be due to a twist in the spring or misalignment of the two prongs of the bifurcated spring. Correct for a twisted spring by using the No. 363 spring adjuster. To correct for misalignment of the prongs of the bifurcated springs use the No. 363 spring adjuster and adjust the right or left prong of the bifurcated spring. Apply the spring adjuster just below the contacts.

### 3.04 Straightness of Springs (Rq. 2.04)

(1) No. 580A Key: If a spring is excessively bowed or bent or there is not the proper clearance between springs, straighten the spring before adjusting to meet the spring tension requirement. To straighten the spring apply the proper spring adjuster to the spring just back of the bow or bend and while exerting pressure to the right or left as required, draw the spring adjuster forward the length of the bow. Repeat this operation as required until the springs is approximately straight. Take care when making adjustments to avoid tilting the springs.

(2) No. 581A Key: The bifurcated springs on the No. 581A key are pretensioned therefore no adjusting should be required except as outlined for meeting requirements 2.02 and 2.20.

## PROCEDURES FOR NO. 580A KEY

### 3.05 Key Mounting (Rq. 3.05)

### 3.06 Vertical Clearance (Rq. 3.06)

(1) To tighten mounting screws use the 6" cabinet screwdriver. To position the key on the mounting plate slightly loosen the mounting screws of the key affected with the 6" cabinet screwdriver and shift the key as required. Retighten the mounting screws securely, taking care that the key is in proper alignment and that there is the specified clearance both above and below the key.

### 3.07 Rocker Arm Clearance (Rq. 2.07)

(1) If there is insufficient clearance between the rocker arm and the sides or the bottom of the spring rest, loosen the spring rest mounting screws with the 3" cabinet screwdriver and adjust the position of the spring rest. Tighten the spring rest mounting screws securely. Check that all requirements are met.

### 3.08 Freedom of Movement of Parts (Rq. 3.08)

(1) If the keys are sluggish in restoring it may be due to low tension of the

rocker arm springs ("F" springs). Check the tension of these springs and if necessary increase the tension.

(2) If a rocker arm does not operate freely on its pivots apply a few drops of KS-7860 petroleum spirits with a No. 486A oil can to the pivots and operate the part several times. Hold the D-98063 cloth under the key while applying the petroleum spirits to catch any that may drop and wipe any surplus from the key with the cloth. Using another No. 486A oil can, apply one drop of KS-7470 oil at each pivot of the rocker arm. If the key is being lubricated, apply one drop of the lubricant at each end of the universal joint, which connects the handle to the key and apply one drop of lubricant to the edges of the guide slots in the frame which interlock the push and rotary action of the key. Wipe off surplus lubricant with a D-98063 cloth. If the rocker arm still does not operate freely refer the matter to the supervisor.

(3) If the rollers do not operate freely on their bearings apply a few drops of petroleum spirits with a No. 486A oil can at each end of the roller and rotate the roller, if possible, with a toothpick. Hold a piece of paper under the key while applying the petroleum spirits to catch any that may drop and wipe any surplus from the key with the D-98063 cloth. Using the No. 486A oil can apply one drop of KS-7470 oil at each end and on the outside surface of the rollers. Wipe off surplus lubricant with the D-98063 cloth. If the rollers still do not operate freely refer the matter to the supervisor.

(4) If the push-turn rod does not slide or rotate freely in its bearings it may be due to tight rocker arm or rollers or to tight or dirty rod bearings. Correct tight rocker arms and rollers as outlined in (2) and (3). Clean the push-turn rod at the bearings by applying several drops of petroleum spirits with the No. 486A oil can at each bearing and operate the key several times to the operated position. Hold the D-98063 cloth under the key while applying the petroleum spirits to catch any that may drop and wipe any surplus from the key with the cloth. Apply one drop of KS-7470 oil with another No. 486A oil can at each end of each bearing and also to the plunger where it engages the locking spring. If the rod still does not operate freely refer the matter to the supervisor.

### 3.09 Spring Tang Position (Rq. 2.09)

(1) If the spring tang does not overlap the spring rest sufficiently it is probably due to the springs having shifted in the assembly. In this case refer the matter to the supervisor.

### 3.10 Spring Tension (Rq. 2.10)

### 3.11 Spring and Stud Clearance (Rq. 2.11)

### 3.12 Separation Between Springs (Rq. 2.12)

(1) To adjust the springs for tension, use the No. 505A spring adjuster for .013" springs, the No. 506A adjuster for .018"

springs and the No. 507A spring adjuster for the .030" springs. It is especially important to use the No. 505A on .013" springs since the use of any adjuster having a wider slot may result in unsatisfactory adjustment and may affect the adjustment of adjacent springs. Place the spring adjuster on the spring just back of the operating stud and slide it back to the base of the spring as indicated in Fig. 9. Adjust the spring to the right or left as required, exercising care not to disturb adjacent springs. Do not adjust the spring any more than is necessary since repeated adjustment weakens the spring. Take care when adjusting the springs to adjust them in line with their movement and to avoid tilting. Tilted springs cause unequal contact separation of the two pairs of contacts and may result in the failure of one of the contacts of the bifurcated spring to close.

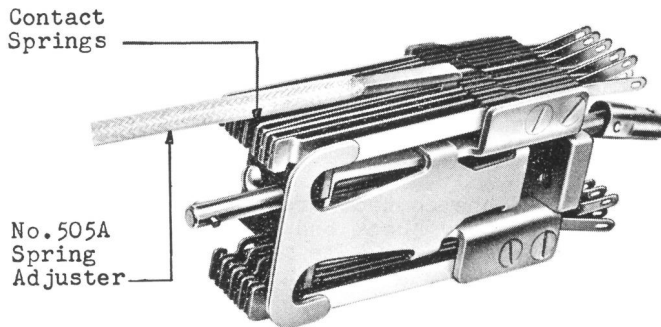


Fig. 9 - Method of Adjusting for Spring Tension

(2) If the desired tension can not be obtained by adjusting as outlined in (1) without bowing the spring beyond its permissible limit or reducing the clearance between the springs below the specified minimum, apply the proper spring adjuster to the spring just back of the operating stud and slide it back to the base of the spring as indicated in Fig. 9. Then draw the adjuster forward the length of the spring meanwhile applying pressure as required so that the spring is formed into a slight gradual bow with the concave surface facing the rocker arm, as indicated in Fig. 10. Then move the adjuster to the base of the spring and adjust as covered in (1). The magnitude of the bow to be formed in the spring must be learned by experience and should be such that when the final tension adjustment is made at the base the spring will be approximately straight.

(3) If the studs touch the springs through which they pass, it is probably due to a twist in the spring to which the stud is attached as a result of adjustment. To correct this apply the proper spring adjuster to the spring at fault and adjust it so that there is required clearance between the stud and the springs.

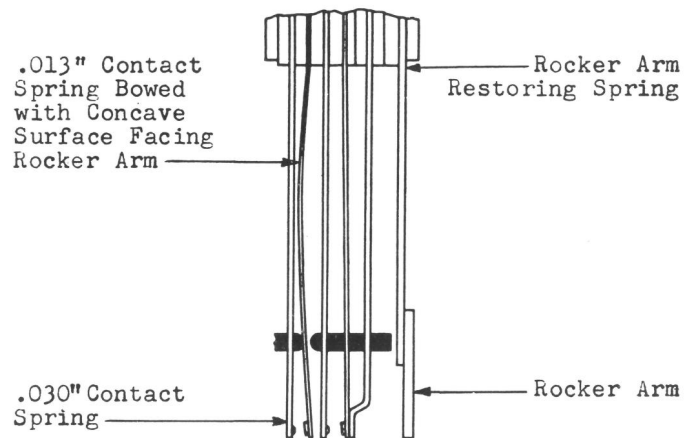


Fig. 10 - Position of Bowed Spring Before Final Tension Adjustment

(4) Kinked Springs: Do not straighten kinked springs unless the kink interferes with proper adjustment of the spring assembly. Removing the kinks tends to weaken the spring and shorten its life. Normally straight springs that have been adjusted should have no sharp bends due to adjustment except that a kink near the base of thin (.013" and .018") springs is permissible when necessary to obtain required tensions. A gradual bow however is permissible.

- 3.13 Stud Gap (Rq. 2.13)
- 3.14 Contact Separation (Rq. 2.14)
- 3.15 Contact Follow (Rq. 2.15)
- 3.16 Contact Sequence (Rq. 2.16)

(1) To adjust for the "R" stud gaps (Fig. 7) adjust the end of the rocker arm which rests against the "F" springs with the No. 485A pliers. Adjust for the "S" stud gaps (Fig. 7) by adjusting the spring tang of the associated spring controlling the gap. Adjust the tang to the right or left as required, using the No. 507A spring adjuster, while holding the spring with another No. 507A spring adjuster as shown in Fig. 11. It is satisfactory if, in making this adjustment, the spring tang does not rest flat against the spring rest. Exercise care however to see that requirement 2.09 covering spring tang position is met.

(2) To correct the contact separation, adjust the moving springs with a No. 505A or No. 506A spring adjuster, using the No. 505A adjuster whenever possible or adjust the spring tang of the springs which rest against the spring rest as outlined in (1).

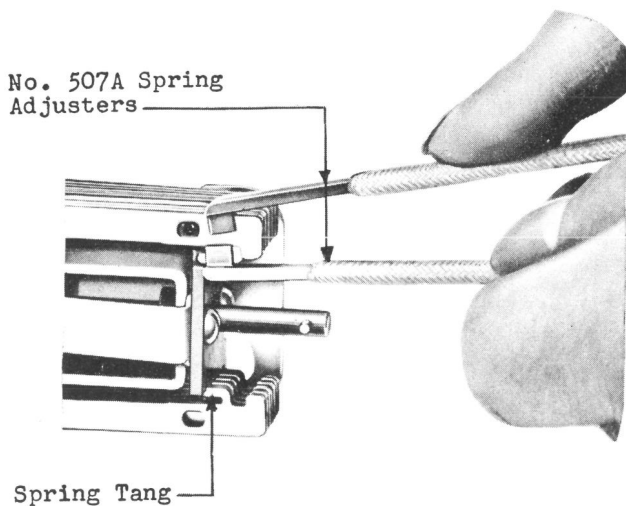


Fig. 11 - Method of Adjusting Spring Tangs

(3) To correct for contact follow, adjust the tang of the spring rest spring to the right or left as outlined in (1) and then check that 2.15 is met.

(4) To adjust for contact sequence, modify the spring tension, stud gap and contact separation adjustments as required.

PROCEDURES FOR NO. 581A KEY

- 3.17 Plunger Block Positions (Rq. 2.17)
- 3.18 Contact Pressure (Rq. 2.18)
- 3.19 Contact Separation (Rq. 2.19)
- 3.20 Contact Follow (Rq. 2.20)

(1) To correct for plunger block position, operate the lever key button to the operated position and with the No. 6 Allen set screw wrench loosen the Allen set screw accessible in this position of the plunger block. Return the lever key button to the normal position and loosen the other Allen set screw and with the play in the push-turn rod taken up toward the key under adjustment, reset the plunger block to meet requirement 2.17. Then tighten the screws and check that requirement 2.19 (b) is met.

(2) To correct for contact separation or contact follow, adjust the moving spring with the No. 485A pliers. Check that requirements 2.17 (b) and 2.19 are met.

(3) If the contact pressure is not satisfactory check that the contact follow requirement 2.20 is met.