

BELL SYSTEM PRACTICES
Private Branch Exchange
Inst. and Mtce.

SECTION B460.051
Issue 1, 2-10-50
AT&TCo Standard

RELAYS
271 TYPE

1. GENERAL

1.01 This section covers the 271 type relay which was developed initially for key equipments.

1.02 Reference shall be made to Section B400.001 covering general requirements and definitions for additional information necessary for proper application of the requirements listed herein.

1.03 The 271 type relay consists of a U type relay having standard contact springs in the top spring combination and an independent thermal unit which consists of a heater unit and associated bimetallic contact springs in the bottom spring combination.

1.04 Operate

(a) The U type portion of the relay is said to operate if, when current is connected to its winding, the armature moves sufficiently and without perceptible hesitation to cause all normally open contacts to close and all normally closed contacts to open and to cause at least one stop disc to touch the core.

(b) The thermal unit portion of the relay is said to operate if, when current is connected to its winding, the

bimetallic contact spring adjacent to the winding moves sufficiently to break contact with the opposing bimetallic contact spring.

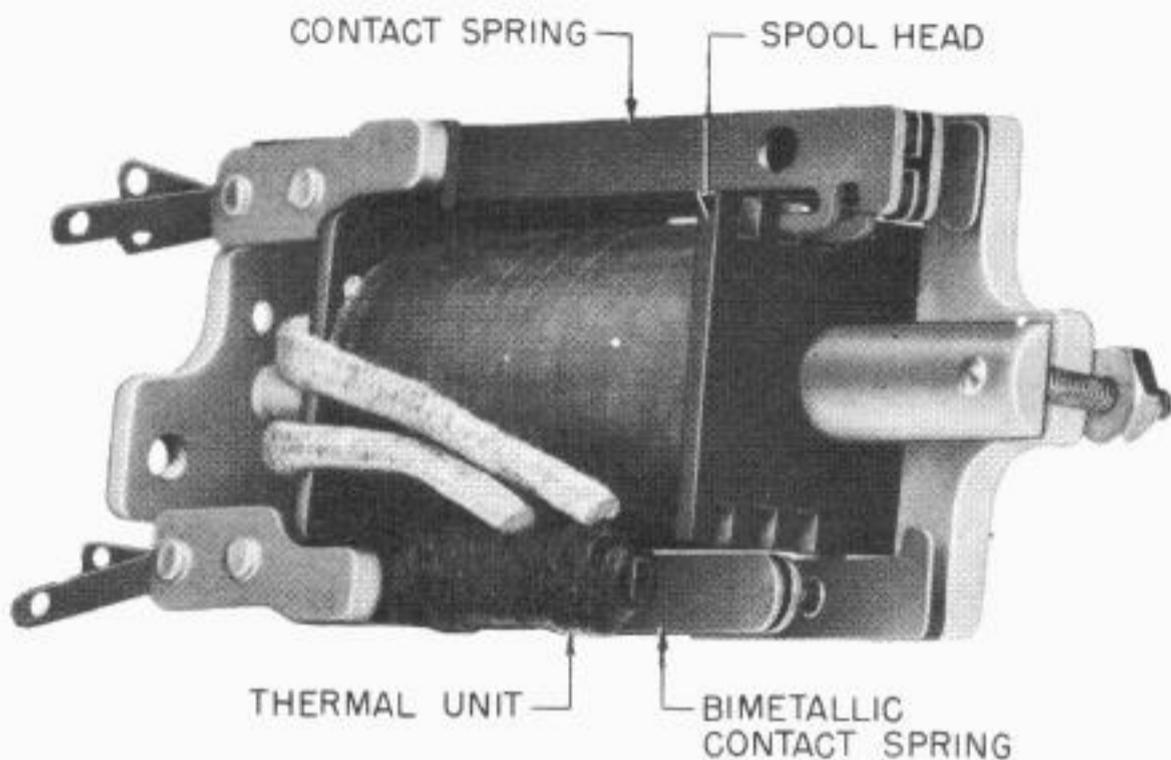


FIG. I - GENERAL VIEW SHOWING THERMAL UNIT

1.05 Armature gap is the gap between the core and the nearer stop disc on the armature in any position the armature may assume between the unoperated and operated positions of the U type portion of the relay.

1.06 Armature travel is the armature gap when the armature is resting against the adjusting stud.

1.07 The term contact spring when used in this section includes unless otherwise specified, the contact bars welded to the end of the spring. The front end of the spring may or may not be bifurcated.

1.08 A pretensioned spring is a spring which has been tensioned during manufacture. Such a spring may be recognized by one or more distinct bends between the insulators and the contact end of the spring.

1.09 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.

1.10 The terms contact make or contact break apply to the electrical circuit between the two springs. Contact make may involve the closing of only one pair of two parallel pairs of contacts. Contact break involves the opening of both parallel pairs of contacts.

1.11 The year of manufacture is stamped on the spoolhead preceded by dashes, 3 to indicate the 1st quarter, 2 the 2nd quarter, 1 the 3rd quarter or none the last quarter.

2. REQUIREMENTS

2.01 Cleaning: The contacts and other parts of the relay shall be cleaned when necessary in accordance with Section B503.605 covering cleaning of relay contacts and parts. After cleaning any contact on springs of the top spring combination, a check shall be made to see that both contacts on the bifurcated spring involved close as specified in 2.18 (c).

2.02 Relay Mounting: Relays shall be fastened securely to the mounting plate. Gauge by feel by grasping the core

and armature between the thumb and forefinger and attempting to move the relay.

2.03 Vertical Clearance

(a) There shall be a clearance between the springs of the relay and apparatus mounted directly above or below of

Min. 1/4"

Gauge by eye.

Note: This clearance is satisfactory if it can be obtained by removing the covers of the apparatus directly above or below provided such covers are readily removable.

(b) Springs and thermal unit winding shall not touch the relay cover.

Gauge by eye.

2.04 Cover Spring and Cover Guide Pressure and Cover Cap Tightness

(a) The cover cap on relays so equipped shall fit snugly. The cover shall remain in place when the cover cap is being removed from the relay.

Gauge by feel.

(b) Fig. 2 (A): The cover spring shall bear on the front spoolhead when the cover is off.

Gauge by feel.

(c) Fig. 2 (B): The free end of the cover guide shall bear on the core when the cover is removed.

Gauge by feel.

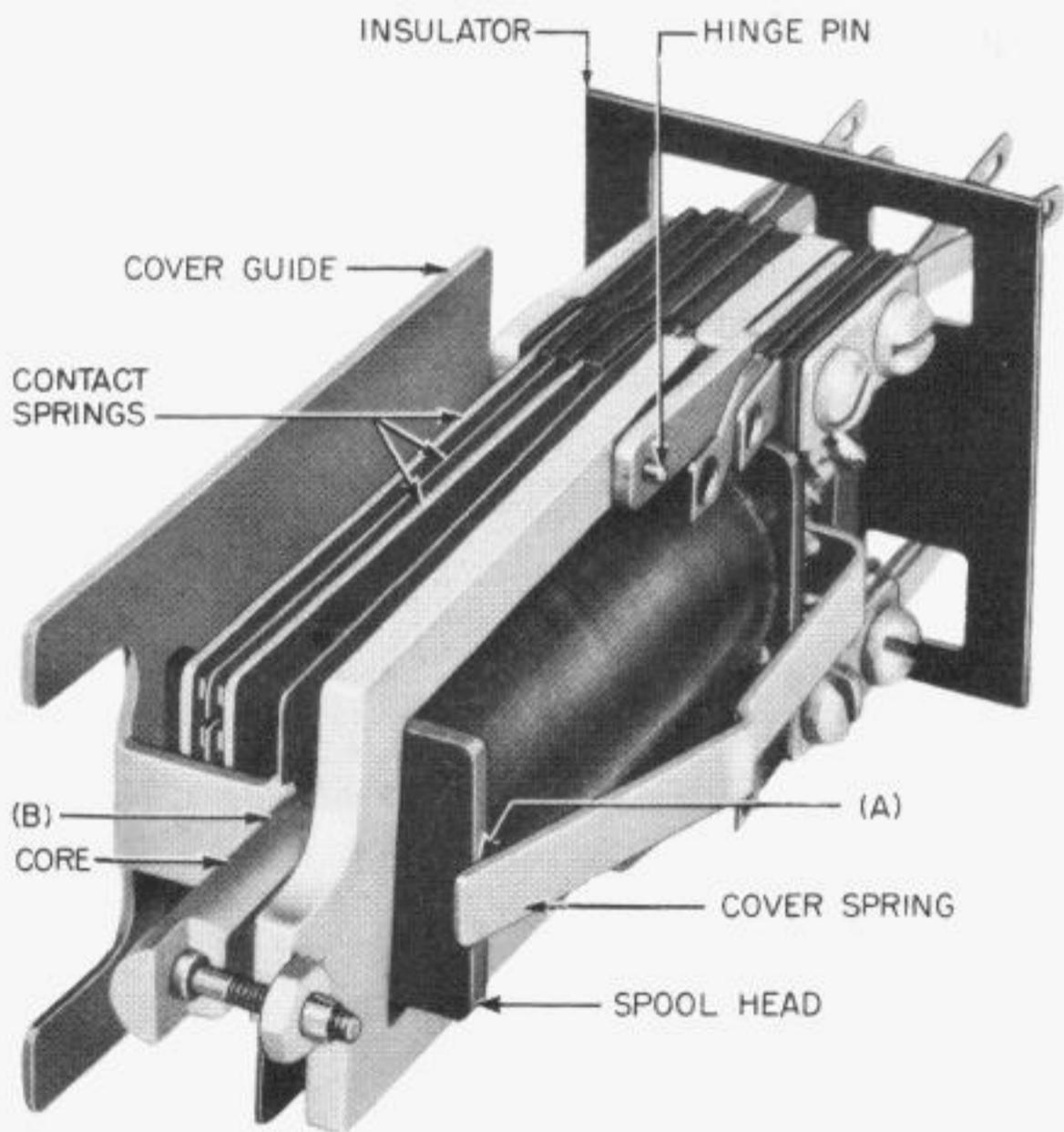


FIG.2 - RELAY ARRANGED FOR MOUNTING
INDIVIDUAL COVER

2.05 Contact Alignment

(a) Fig. 3(A): The contact alignment on springs of the top spring combination shall be within the limits indicated in Fig. 3.

Gauge by eye.

(b) Fig. 4(A): The contacts on the bi-metallic springs shall line up so that the point of contact falls wholly within the boundary of the opposing contact.

Gauge by eye.

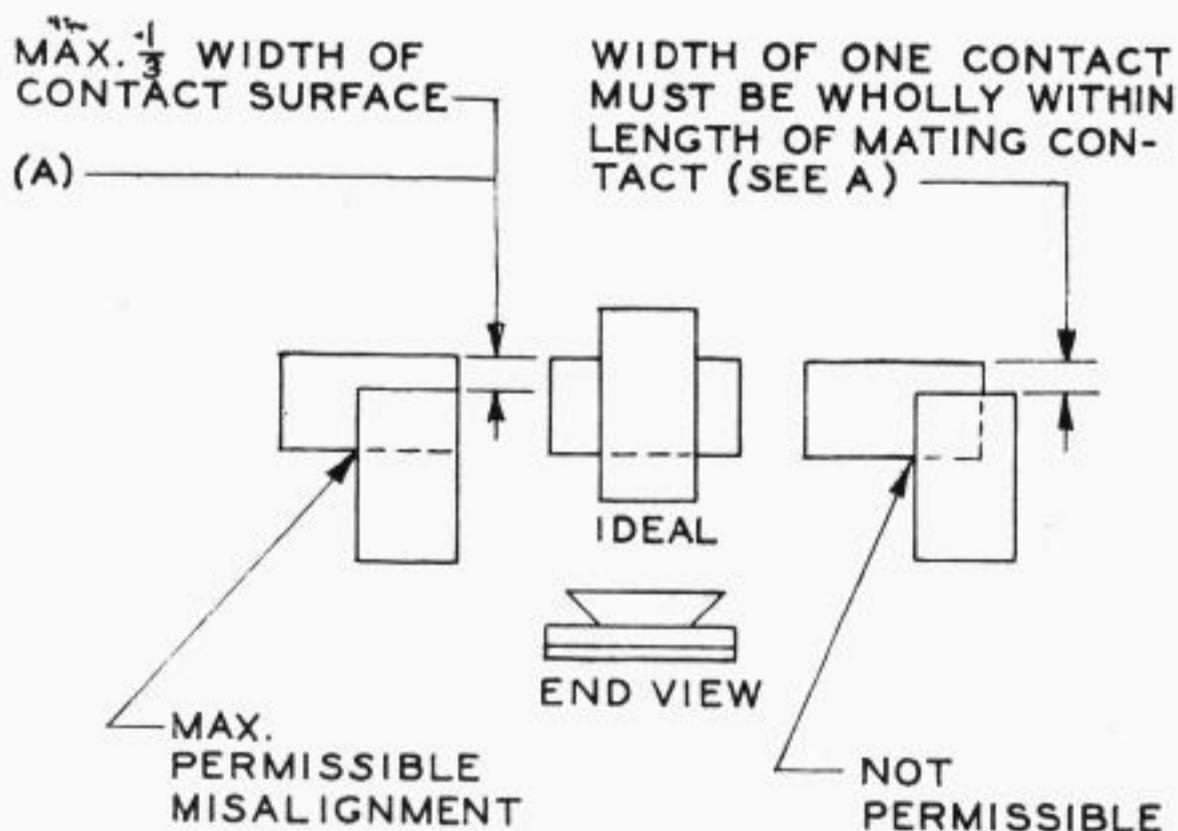


FIG. 3 - ALIGNMENT OF HEAVY CONTACTS -
PLAN VIEW OF CONTACT SURFACES

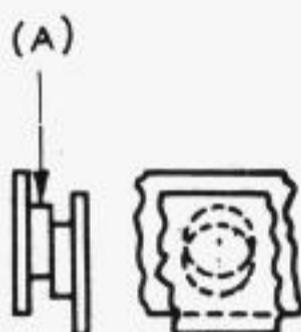


FIG. 4-ALIGNMENT OF CONTACTS
ON BIMETALLIC SPRINGS

2.06 Spring Tang Position - Fig. 5(A):

(a) The spring tang shall not rub on the spoolhead when moved from its normal position of rest on the spoolhead in the direction of the travel of the spring.

Gauge by eye.

(b) On relays manufactured prior to the second quarter of 1948, the full width of the spring tang shall lie entirely within the projection of the top and bottom edges of the slots in the spoolhead as shown in Fig. 5.

Gauge by eye.

(c) On relays manufactured during the second quarter of 1948 and subsequently, the spring tang may project $1/3$ its width above the top edge of the slot in the spoolhead.

Gauge by eye.

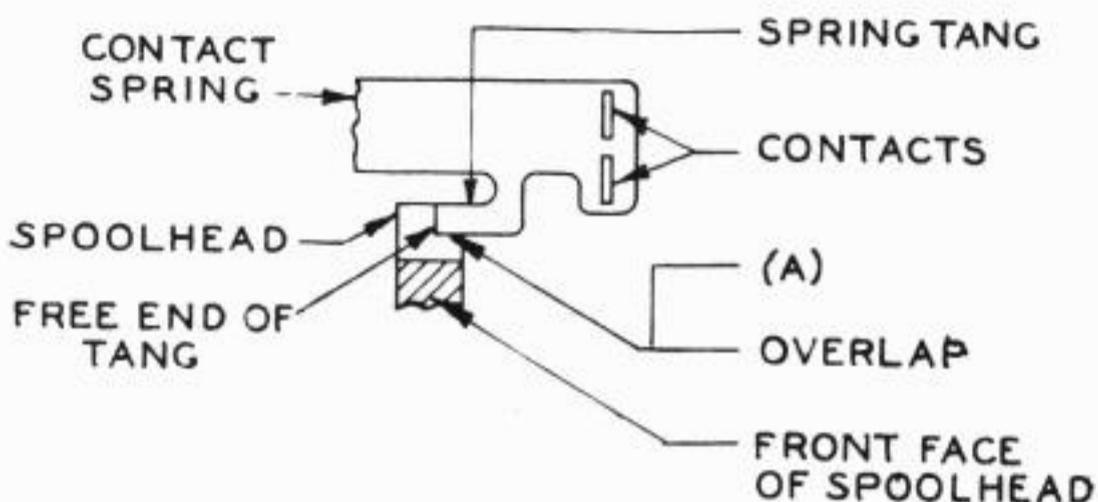


FIG.5 - SPRING TANG POSITION

2.07 Adjusting Stud Clearance - Fig. 6(A):
There shall be a clearance between the armature and the adjusting stud in all positions of the armature travel.

Gauge by eye.

2.08 Adjusting Nut Tightness: The adjusting nut shall be sufficiently tight on the stud to prevent its being turned with a torque of 3 ounce-inches.

To check this requirement attempt to turn the adjusting nut with the thumb and forefinger. In case of doubt this may be checked by the use of the No. 474A wrench and the No. 70D gauge. With the wrench on the nut, the gauge shall be applied in the hole in the free end of the wrench and the nut shall not turn when a pressure of 40 grams is applied, at right angles to the wrench, in a clockwise direction as shown in Fig. 7.

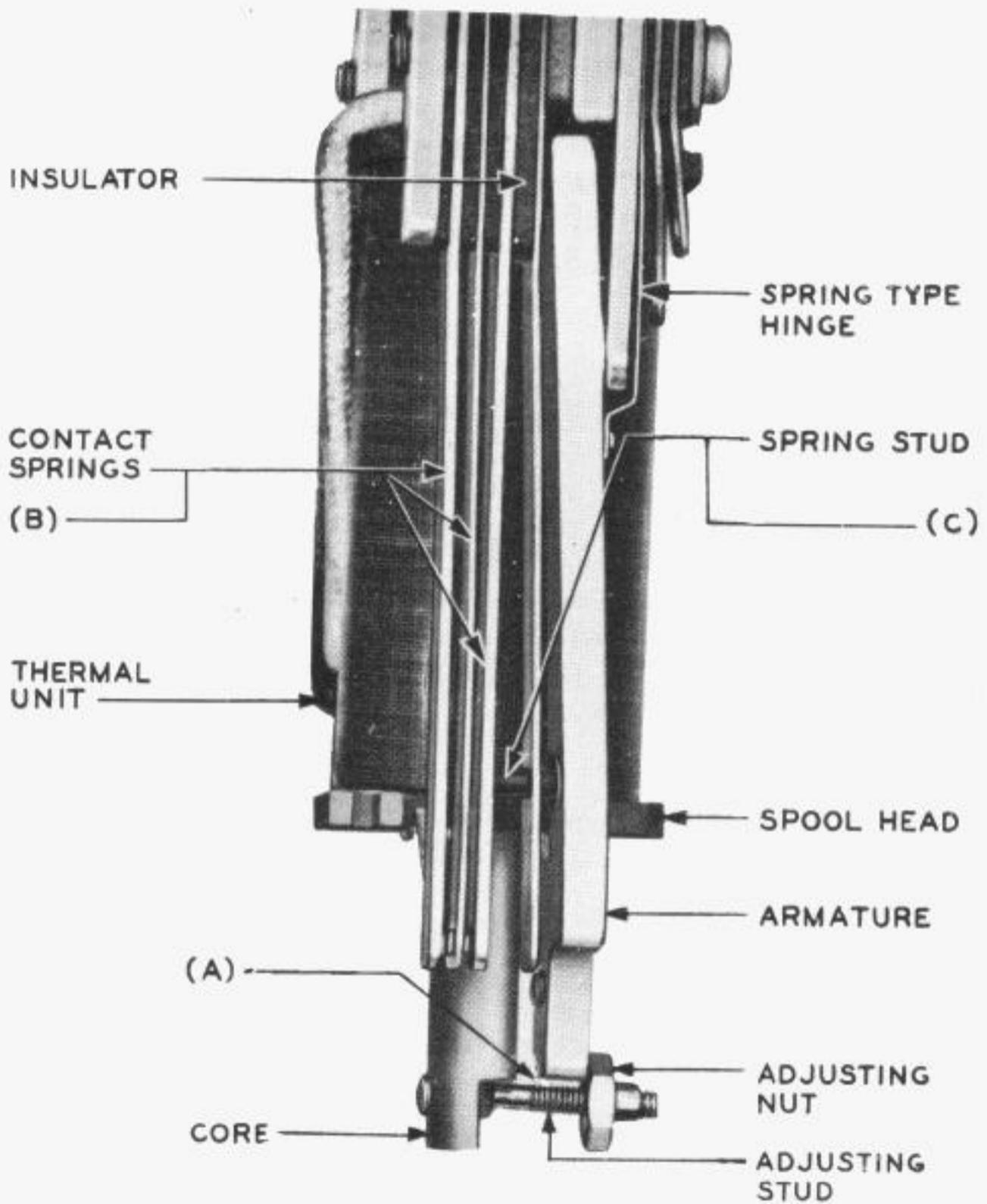


FIG. 6 — TOP VIEW

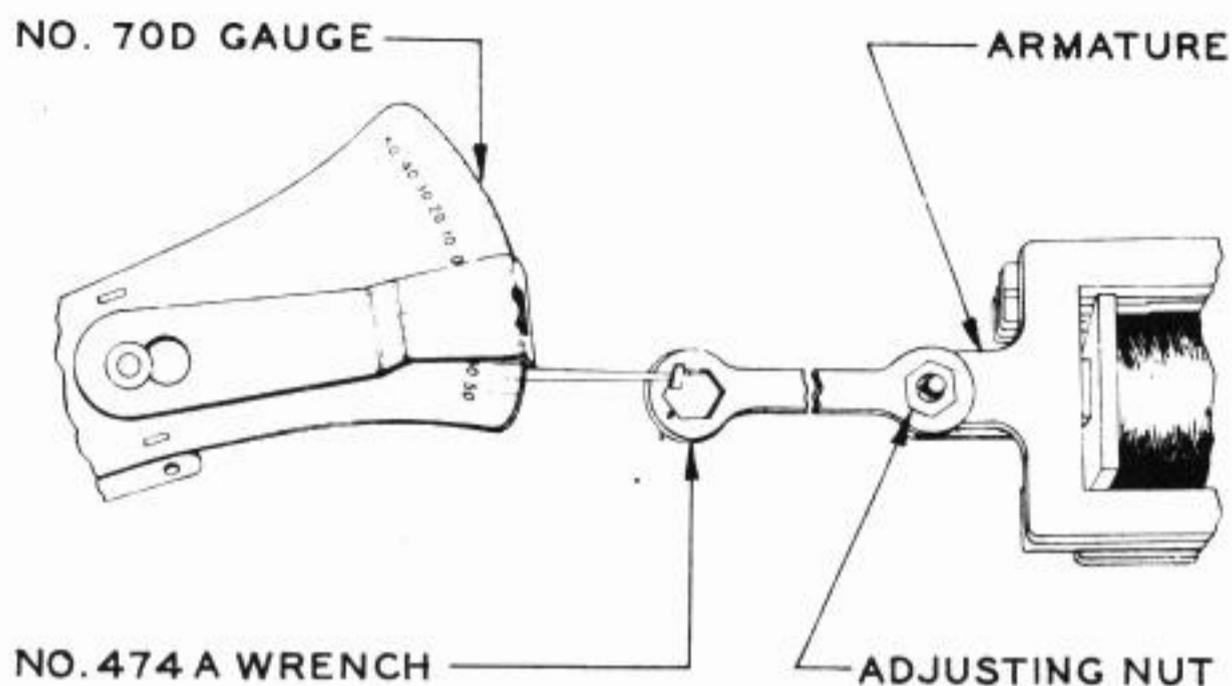


FIG. 7 - METHOD OF CHECKING TIGHTNESS OF ADJUSTING NUT

2.09 Armature Position - Fig. 8(A): Both legs of the armature shall bear against the hinge bracket with the U type relay portion of the relay in the operated position and shall also bear against the hinge bracket after the relay has released.

Operate the relay electrically and gauge by eye.

2.10 Armature Travel

(a) The armature travel shall be in accordance with the value specified for the relay in the armature travel column on the circuit requirement table. The armature travel tolerance shall be $+.003$ "

Use the No. 131A gauge and check as follows.

To check the armature travel requirement, attempt to insert a gauge .003" larger than the specified gap with the long axis of the gauge in a horizontal position as shown in Fig. 9. If the gauge enters it should enter with a snug fit. Do not force the gauge.

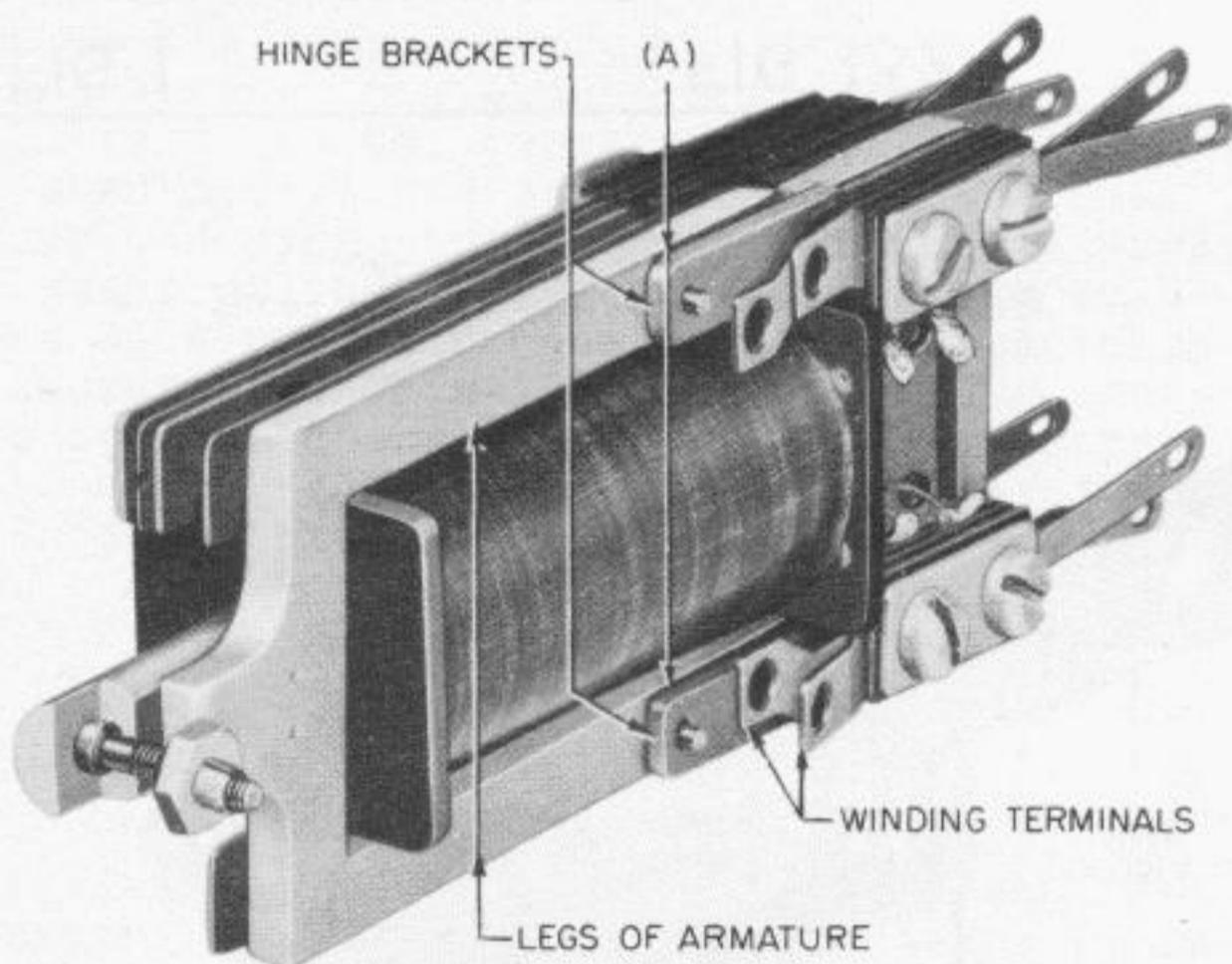


FIG.8 - GENERAL VIEW

2.11 Spring Tension

(a) The tension of each spring measured in grams shall be in accordance with the information given in the particular figure

on page 12 which is referred to in the Fig. No. column of the circuit requirement table.

- (b) The springs shall be tensioned toward the armature unless otherwise

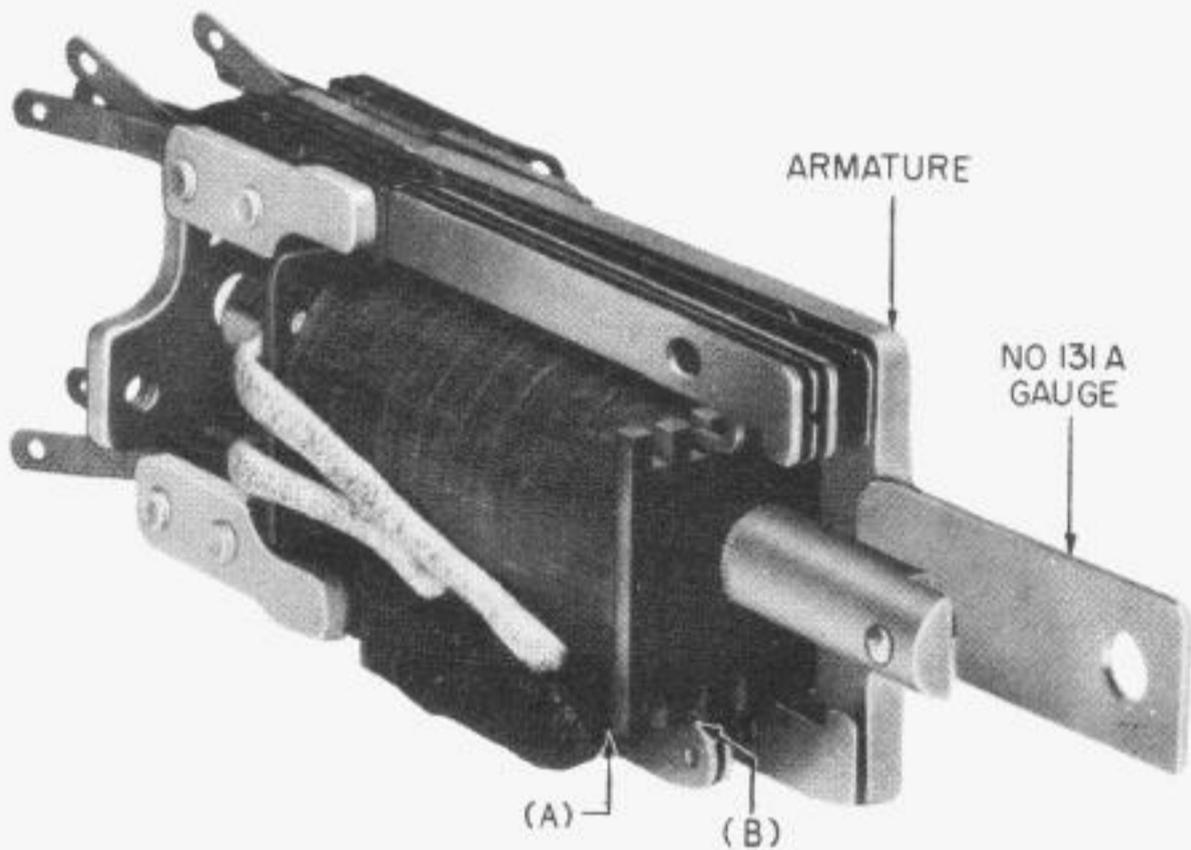
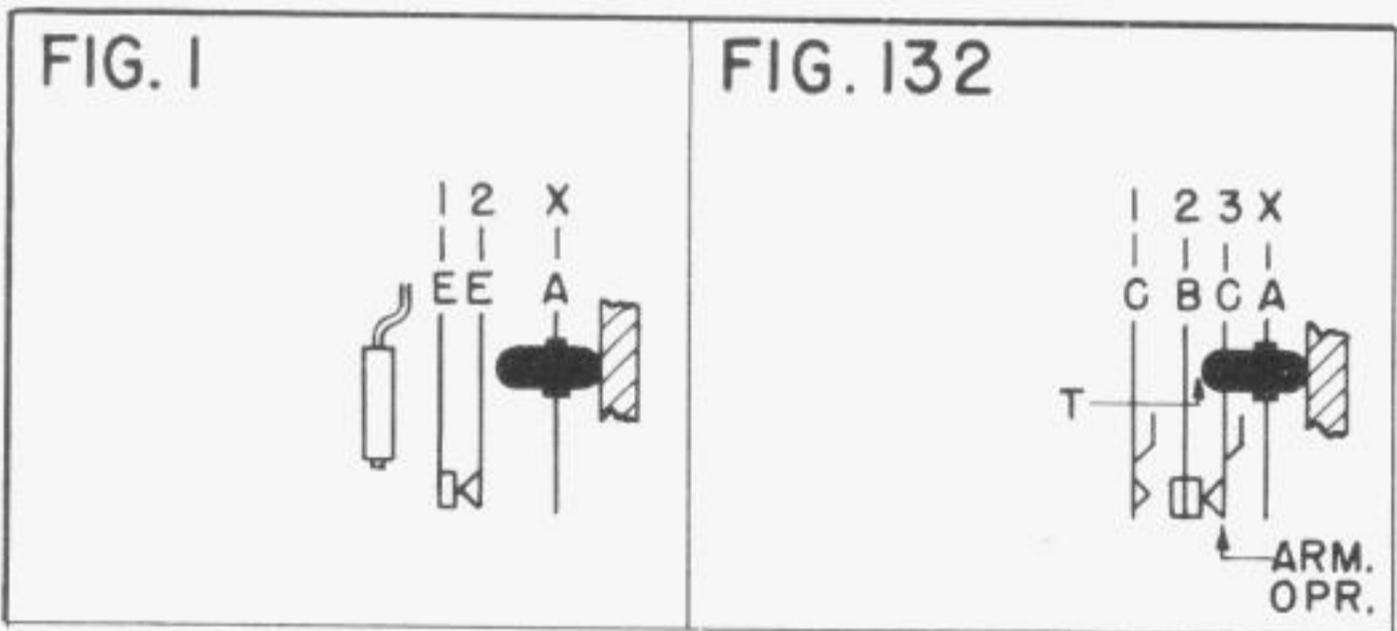


FIG.9 - POSITION OF GAUGE WHEN CHECKING ARMATURE TRAVEL



specified. Unless the abbreviation "Arm. Opr." is shown associated with an arrow mark leading to a spring, the tension shall be measured with the armature in the unoperated position. A spring tensioned against the spoolhead shall register the required tension just as the tang of the spring leaves the spoolhead. A spring whose contacts are tensioned against the contacts of an opposing spring shall register the required tension just as the contacts break. A spring tensioned against the armature through a stud shall register the required tension just as the stud leaves the armature. Use the Nos. 70H or 70J gauge to check the tension. Apply the gauge so that the tip of the gauge engages both prongs of the bifurcated springs as indicated in Fig. 10. When gauging tensions on solid springs apply the tip of the gauge near the front end of the spring just in front of the contacts.

(c) Balancing Springs (Springs designated "A" on figures on page 12)

(1) The combined tension of all "A" springs on the relay shall be sufficient to hold the armature against the adjusting nut with sufficient pressure to insure that requirement 2.12 is met.

(2) Where the relay is equipped with a pin type hinge, in no case shall the tension in one spring combination be more than 2-1/2 times that in the other spring combination.

To check this pressure, block the armature unoperated using the No. 508A armature blocking tool. Check the pressure of the stud against

the armature by applying the tip of the No. 70H gauge to the "A" spring just in front of the stud.

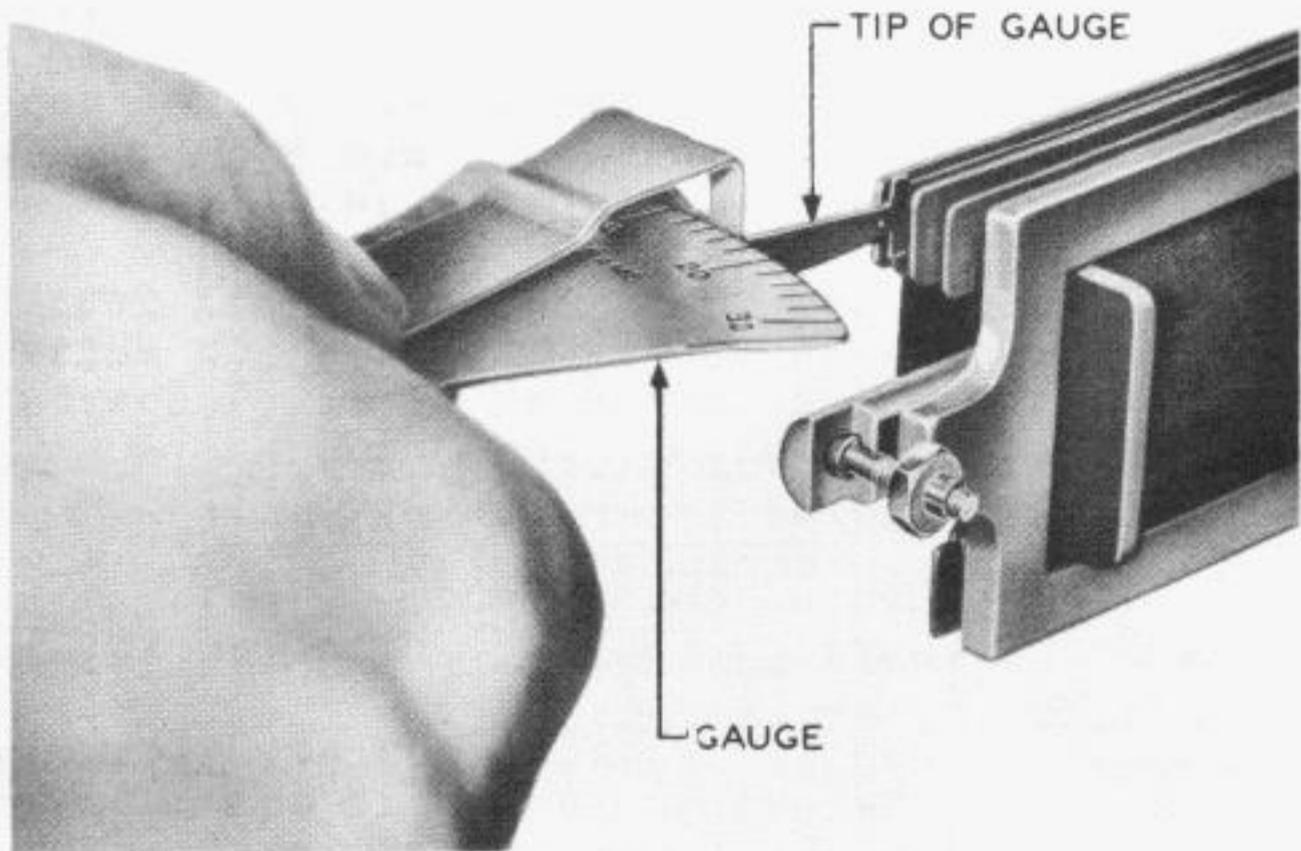


FIG. 10 — METHOD OF CHECKING
SPRING TENSION

(d) Moving Springs (Springs designated "B" on figures on page 12) A "B" spring shall have a tension of

Test - Min. 18 grams
Readjust - Min. 20 grams

To check apply the No. 70H gauge so that the tip of the gauge engages both prongs of the bifurcated spring.

(e) Spoolhead Springs (Springs designated "C" on figures on page 12)
A "C" spring shall have a tension of

Test - Min. 25 grams
Readjust - Min. 30 grams

To check apply the tip of the No. 70D gauge just in front of the contacts of the "C" spring.

(f) Bimetallic Springs (Readjust Only)
(Springs designated "E" on figure on page 12). The "E" springs shall be tensioned toward each other so that the tension of the "E" spring adjacent to the thermal unit winding against the opposing "E" spring shall be

Min. 25 grams, Max. 30 grams

To check apply the tip of the No. 70D gauge in front of the contacts of the "E" spring adjacent to the thermal unit winding.

2.12 Armature Back Tension - Fig. 11(A):
The armature shall be held against the adjusting nut with a pressure of

Test - Min. 18 grams
Readjust - Min. 22 grams

Use the No. 70H gauge applied to the back of the armature at a point approximately midway between the points where the stop discs are normally located as indicated in Fig. 11.

2.13 Spring Stud Clearance: The spring studs shall clear the springs through which they pass, in all positions of the armature travel.

Gauge by eye.

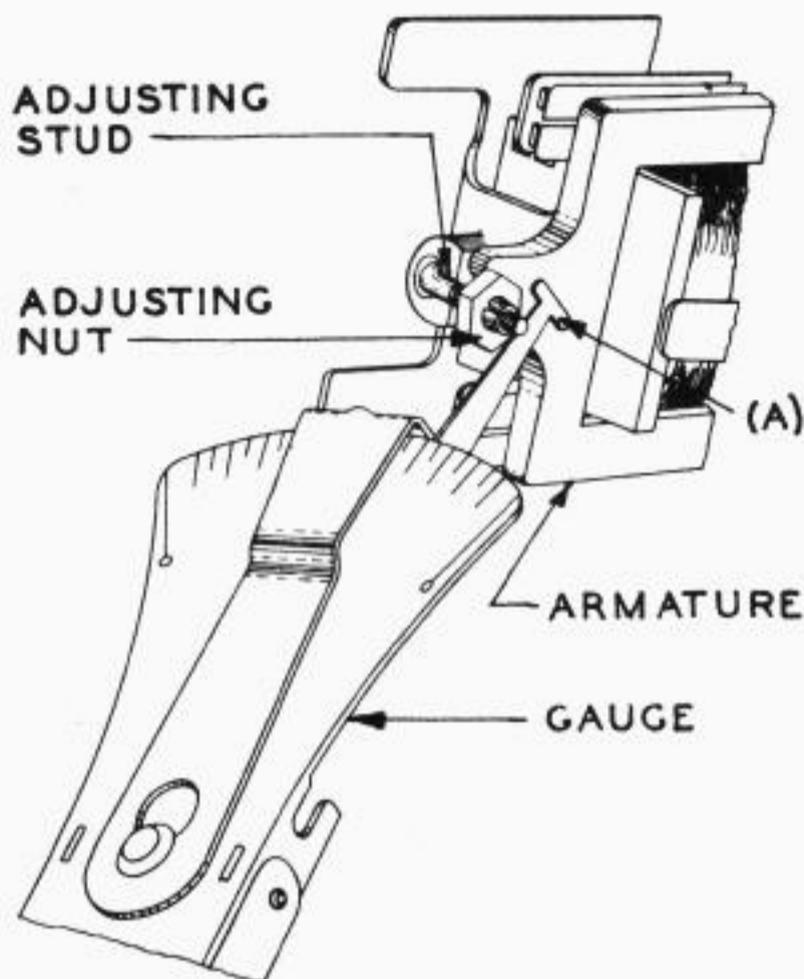


FIG. II - METHOD OF CHECKING ARMATURE
BACK TENSION

2.14 Straightness of Springs - Fig. 6(B):

(a) On relays manufactured prior to the third quarter of 1949, 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") springs a kink is permitted provided it is within 1/4" from where the spring leaves the insulators. A gradual bow in a spring is permissible.

Gauge by eye.

(b) On relays manufactured during the third quarter of 1949 and subsequently, requirement (a) above is waived.

2.15 Separation Between Springs: The clearance between adjacent springs whether in the unoperated or the electrically operated position of the relay shall be

Min. .008"

Gauge by eye.

2.16 Bimetallic Contact Spring Clearance

(a) Fig. 9(A): There shall be a clearance between the nearest point on the thermal unit winding and the adjacent bimetallic spring, with the spring in the unoperated position of

Min. .040"

Gauge by eye.

(b) Fig. 9(B): The clearance between the edge of the bimetallic springs and the spoolhead shall be

Min. .016"

Gauge by eye.

2.17 Stud Gap - Fig. 6(C)

(a) Stud Gap Designated T: With the relay unoperated, the clearance between the stud and the spring at the points designated T in the figure on page 12 shall be

Min. .006"

This requirement is met if there is a clearance between the spring and the stud with the No. 133A gauge inserted between the armature and the end of the stud which rests against the armature.

Gauge by eye.

(1) The use of the No. 510C test lamp equipped with the No. 561A straight tip to illuminate the stud gap will facilitate gauging this requirement. Do not attempt to check the stud gaps by moving the armature toward the core manually since, when the armature is released it may not restore to its position against the front ends of the yoke thus causing false contact operation. To check the stud gaps place the No. 510C test lamp so that the gap is illuminated on the side away from the eye and sight through the stud gap toward the light as shown in Fig. 12.

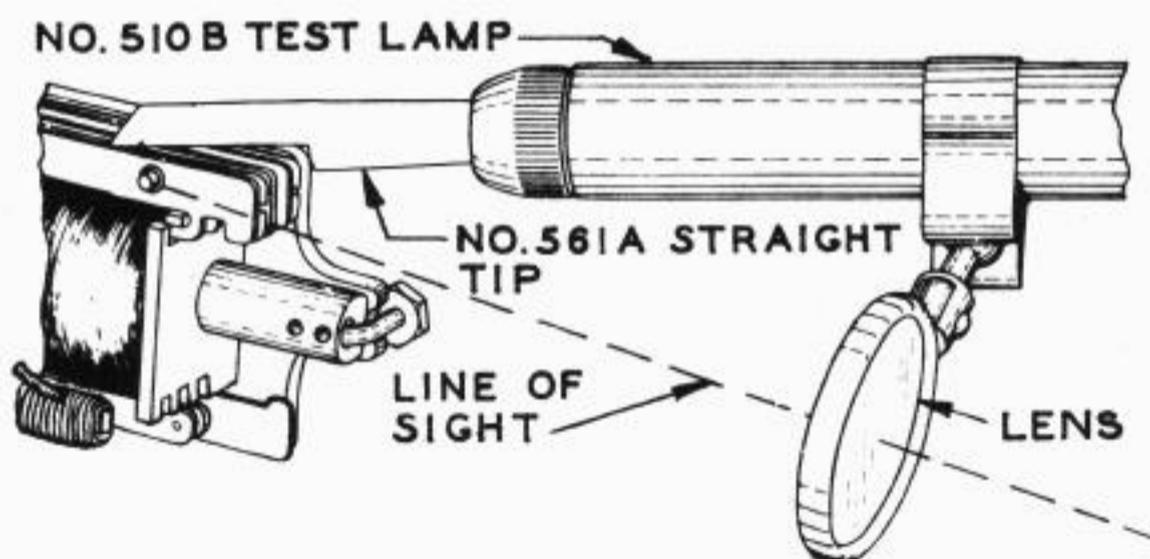


FIG. 12 - METHOD OF GAUGING STUD GAP USING NO. 561A STRAIGHT TIP

2.18 Contact Make (U Type Relay Portion)

(a) Both contacts on the bifurcated spring shall make with their associated contacts with the relay in the electrically operated position for normally open contacts and in the unoperated position for normally closed contacts.

Gauge by eye and feel.

(b) With the relay electrically energized against a gauge of the thickness indicated below inserted in the armature gap, normally open contacts shall meet the following conditions.

Contacts Shall Not Make	At Least One Pair of Contacts Shall Make
<u>Test</u> .018"	<u>Test</u> .008" (See Note)
<u>Readj.</u> .015"	<u>Readj.</u> .010"

Use the No. 131A gauge.

Note: At the time of turnover this requirement is met if the contacts close with at least one pair of contacts when the relay is electrically energized against an .008" 132 type gauge on the specified test or readjust current or against a .009" gauge (R-2703) on central office battery in series with a No. 525 (or equivalent 276 ohm) receiver.

(1) To check that the requirement is met operate the relay electrically. Release the relay and insert a No. 131A gauge of the proper thickness in the armature gap taking care that the long axis of the gauge is horizontal as shown in Fig. 9. Energize the relay and note whether the contacts close. In case of doubt as to whether a contact is closed apply the KS-6320 orange stick to the tip of the solid spring and attempt to move the spring toward its associated contact spring. A perceptible movement of the solid spring without a corresponding movement of the bifurcated spring indicates that the contact is not closed. In case of doubt as to whether the requirement is met release and reoperate the relay with the gauge in place and recheck for contact closure as covered above.

(2) When the circuit requirement table specifies insulating individual contacts on the relay being tested or adjusted it will be satisfactory when checking for contact make to remove the insulating paper when checking the individual contact. In this case, it may be necessary to open the contact manually using the KS-6320 orange stick to release the relay.

(c) Readjust Only: Whenever a particular contact requires cleaning or buildup removal or when readjustments are made on a contact spring the following requirements shall be met, in addition to (b), on the contacts affected by the cleaning or the adjustment.

(1) Normally Open Contacts: Both contacts on the bifurcated spring shall make when the relay is energized against a .004" gauge inserted as covered in (b). Use the No. 131A gauge.

(2) Normally Closed Contacts: Both contacts on the bifurcated spring shall break from their associated contacts at approximately the same time. Operate the relay manually and gauge by eye.

2.19 Contact Separation (U Type Portion Only): The separation between each pair of contacts normally open or between each pair of contacts that are opened when the relay is electrically operated shall be

Min. .005"

Gauge by eye.

On normally closed contacts the requirement is met if the contacts break when the relay is electrically energized against a .004" blade of the No. 131A gauge inserted into the armature gap.

To check contact separation on relays on which the contacts are pitted, move the spoolhead spring manually toward its associated spring. A perceptible movement of the spring (at least .005") before the contacts make, indicates a satisfactory minimum contact separation.

2.20 Contact Sequence: Both pairs of normally closed contacts of the break-make unit shall break before either pair of normally open contacts of such a unit makes.

Gauge by eye.

2.21 Electrical Requirements: The relay shall meet the electrical requirements specified on the circuit requirement table.

3. ADJUSTING PROCEDURES3.001 List of Tools, Gauges, Materials and Test Apparatus

<u>Code or Spec.No.</u>	<u>Description</u>
<u>Tools</u>	
300	Spring Adjuster
363	Spring Adjuster
474A	3/16" x 1/4" Hex. Closed End Offset Wrench
505A	Spring Adjuster (for .013" Springs)
507A (2 required)	Spring Adjuster (for .030" Springs)
508A	Armature Blocking Tool
510C	(Must be equipped with No. 561A straight tip, W2CB (24V) or W2BL (48V) cord)
KS-6320	Orange Stick
-	4" Regular Screwdriver
-	3" Cabinet Screwdriver
-	6-1/2" P-Long Nose Pliers
<u>Gauges</u>	
70D	50-0-50 Gram Gauge
70H	0-30 Gram Gauge
70J	0-150 Gram Gauge

Code or
Spec. No.

Description

Gauges

131A	Thickness Gauge Nest (Consists of a nest of 132 Type Gauges)
133A	Stud Gap Gauge
R-2703	.009" Thickness Gauge

Test Apparatus

35 Type	Test Set
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3.01 Cleaning (Rq. 2.01)

(1) Clean the contacts and other parts of the relay in accordance with Section B503.605. After cleaning check that requirement 2.18 (c) is met and, if necessary, adjust as covered in 3.18.

3.02 Relay Mounting (Rq. 2.02)

3.03 Vertical Clearance (Rq. 2.03)

(1) To tighten mounting screws use the 4" regular screwdriver. To position the relay on the mounting plate slightly loosen the mounting screws of the relay affected with the 4" regular screwdriver and shift the relay as required. Retighten the mounting screws securely, taking care that the relay is in proper alignment and that there is the specified clearance both above and below the relay.

3.04 Cover Spring and Cover Guide Pressure and Cover Cap Tightness (Rq. 2.04)

(1) If the cover spring does not rest on the spoolhead or if the cover is not held securely on the relay adjust the spring with the No. 300 spring adjuster, applying it near the crook in the spring as shown in Fig. 13. If it is not possible to correct the condition in this manner, proceed as outlined under (2).

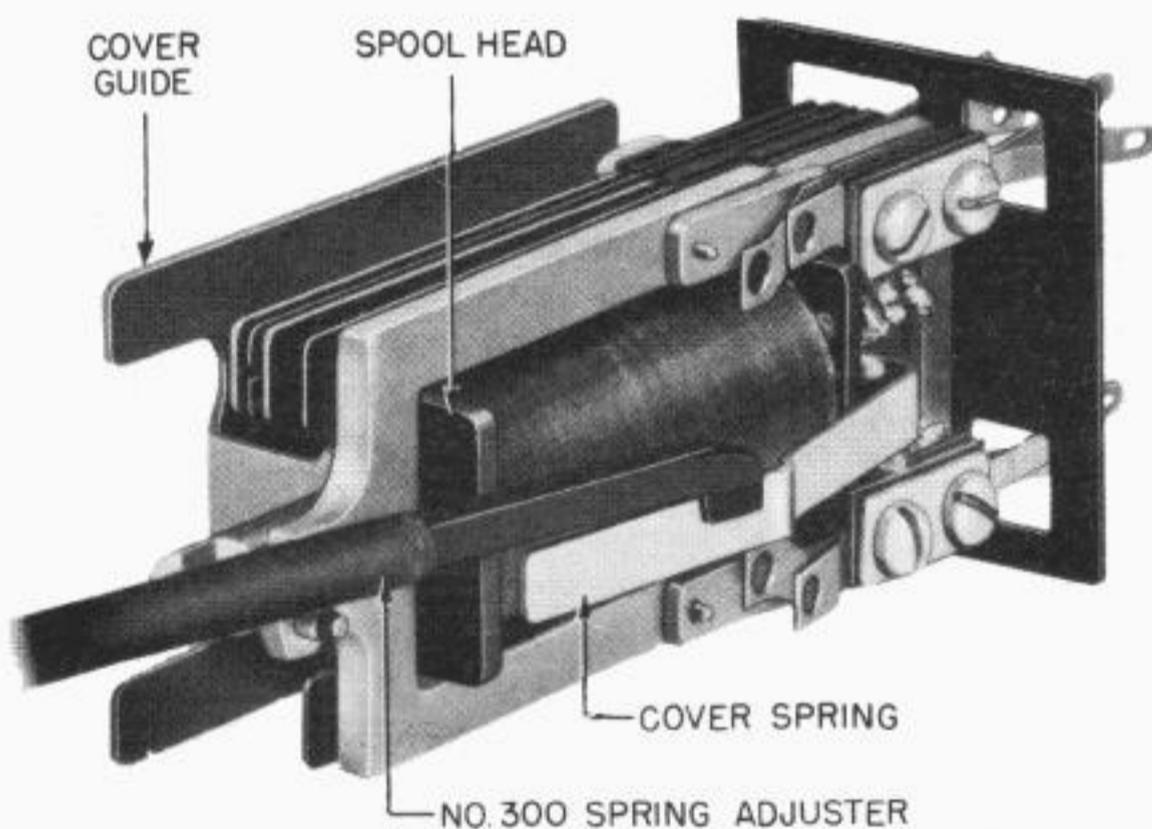


FIG.13- METHOD OF ADJUSTING COVER SPRING PRESSURE

(2) Remove the relay from the mounting plate and remove the screws which hold the cover guide and cover spring in position using the 3" cabinet screwdriver. Adjust the cover spring manually by bowing it at the crook in the spring. To adjust the cover guide after it has been removed, bend the part that

is secured by the screws as required using the long nose pliers. Remount the cover guide and the cover spring and tighten the mounting screw securely.

(3) If the cover cap does not fit properly adjust the cover cap prongs as required using the long nose pliers.

- 3.05 Contact Alignment (Rq. 2.05)
- 3.06 Spring Tang Position (Rq. 2.06)

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

3.07 Adjusting Stud Clearance (Rq. 2.07)

(1) If the armature rubs against the adjusting stud grasp the adjusting nut with the long nose pliers and bend the adjusting stud as required. In this operation exercise care not to damage the threads on the stud or to loosen the stud. If the stud cannot be adjusted to provide the proper clearance in this manner or if the stud is loose in the core refer the matter to the supervisor.

3.08 Adjusting Nut Tightness (Rq. 2.08)

(1) To tighten loose adjusting nuts, back off the adjusting nut from the adjusting stud using the No. 474A wrench until its slotted portion is free of the stud. Then force the slotted parts of the nut closer together using the long nose pliers as shown in Fig. 14.

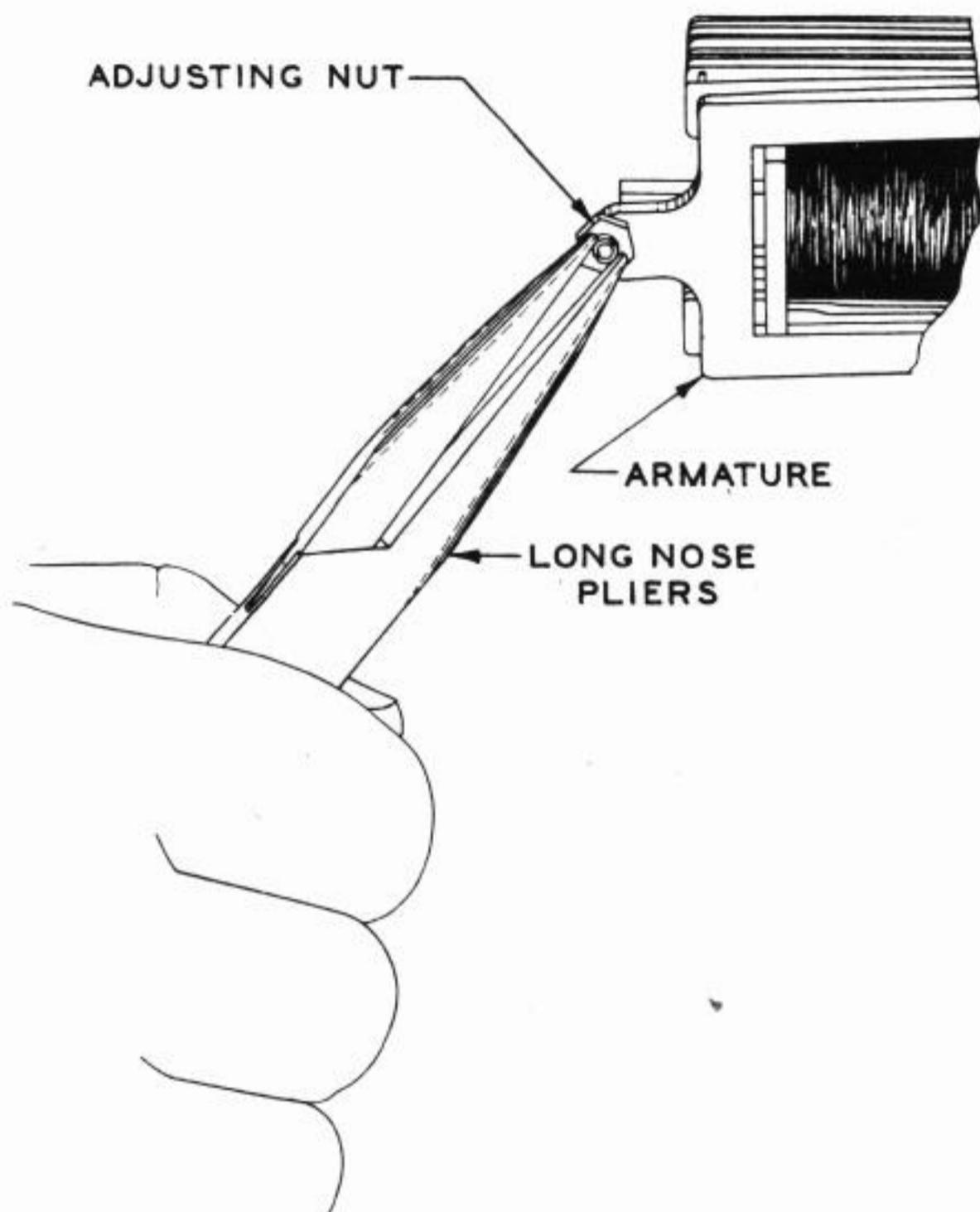


FIG.14-METHOD OF TIGHTENING
ADJUSTING NUT ON STUD

3.09 Armature Position (Rq. 2.09)

(1) If the armature does not rest against the hinge bracket after the relay has been electrically operated and released, check that the tension of the balancing springs in the top and bottom spring combinations are approximately equal. If they are not approximately equal, adjust as covered in 3.11-3.16 (7). If after making this adjustment the requirement is still not met in both the operated and unoperated positions of the relay, it is an indication that the hinge bracket is not properly positioned or the armature hinge pins are bent. In this case refer the matter to the supervisor.

3.10 Armature Travel (Rq. 2.10)

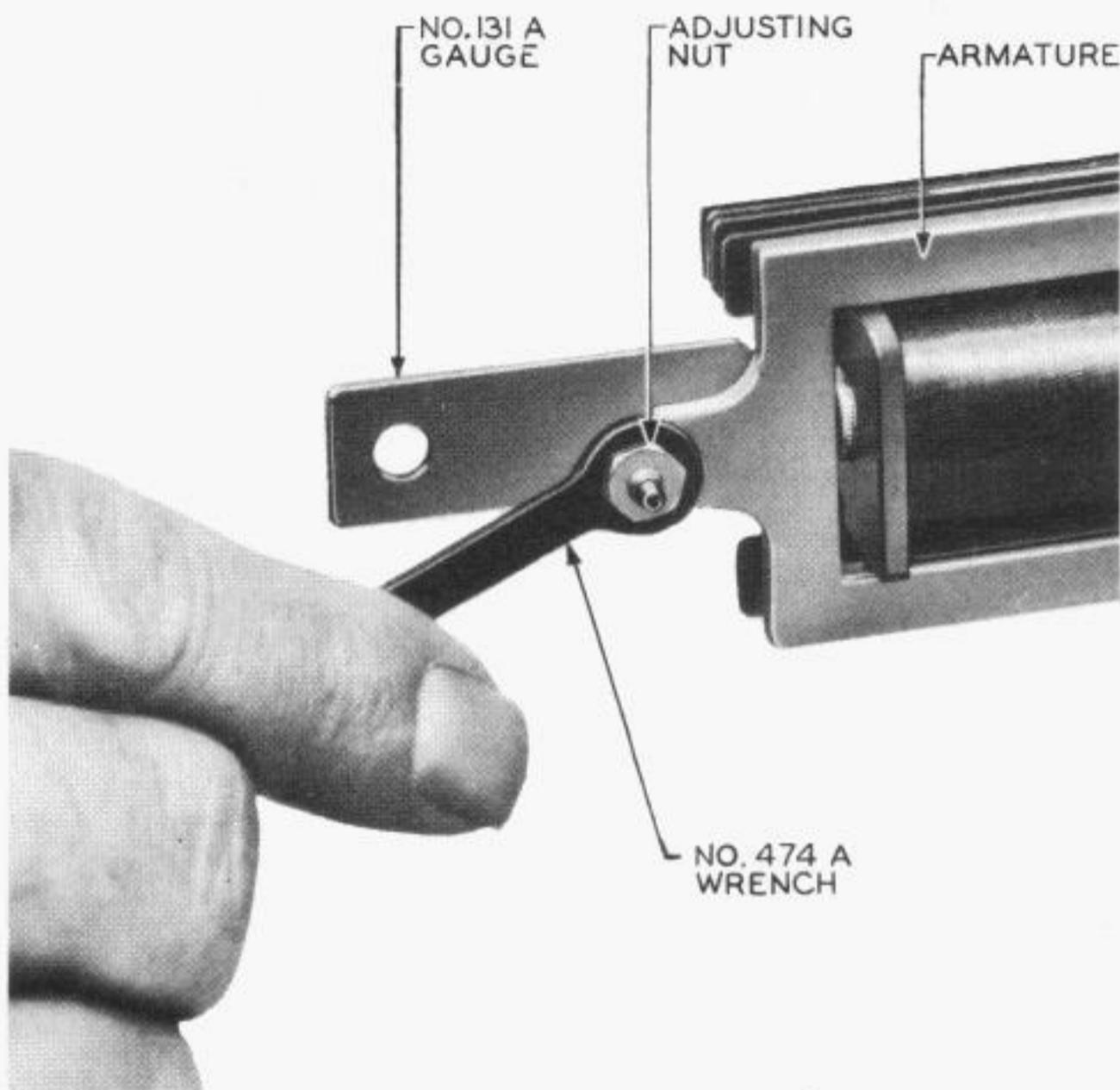
(1) To adjust the armature travel insert into the armature gap, as shown in Fig. 15, the No. 131A gauge corresponding to the armature travel specified on the circuit requirement table. Take care that the long axis of the gauge is parallel to the horizontal center line of the core. Turn the adjusting nut with the No. 474A wrench until friction is felt against the gauge and check that requirement 2.08 is met.

- 3.11 Spring Tension (Rq. 2.11)
- 3.12 Armature Back Tension (Rq. 2.12)
- 3.13 Spring Stud Clearance (Rq. 2.13)
- 3.14 Straightness of Springs (Rq. 2.14)
- 3.15 Separation Between Springs (Rq. 2.15)
- 3.16 Bimetallic Contact Spring Clearance
(Rq. 2.16)

Spring Tension

(1) Spring tensions are specified on a minimum basis. They have, however,

in the case of moving springs a direct bearing on the electrical performance of the relay and if they are greatly in excess of the specified minimum, the relay may fail to meet its electrical requirement in which case it will be necessary to reduce the tensions.



* FIG. 15 — METHOD OF ADJUSTING FOR ARMATURE TRAVEL

(2) To adjust the springs for tension, use the No. 505A spring adjuster for .013" springs, and the No. 507A spring adjuster for .030" springs. It is especially

important to use the No. 505A spring adjuster on .013" springs since the use of any adjuster having a wider slot may result in unsatisfactory adjustment and may affect the adjustment of the adjacent springs.

Pretensioned Springs

(3) When the springs have been pretensioned do not attempt to remove the bends as the adjustment will be destroyed. Exercise care not to slide or draw the spring adjuster over a bend in a pretensioned spring.

(4) To adjust a pretensioned spring for tension, place the slotted portion of the spring adjuster against the spring to be adjusted on the side toward the mating spring just behind the contacts. Tilt the adjuster so that it rests on the mating spring and using this spring as a guide, slide the adjuster back to the base of the spring. Roll the adjuster over the spring to be adjusted so that the spring fits into the slot in the adjuster. When adjusting a balancing spring, use an adjacent spring as a guide. Adjust the spring to the right or left as required taking care not to tilt the spring or disturb adjacent springs. Adjust the stationary springs toward the armature. Do not adjust the spring any more than it is necessary since repeated adjustments may injure the spring. Take care when adjusting the springs to adjust them in line with their movement and to avoid tilting. Tilted contact springs cause unequal contact separation of the two pairs of contacts and may result in the failure of one of the contacts on the bifurcated spring to close. If the requirements cannot be met refer the matter to the supervisor.

(5) If the studs touch the springs through which they pass, this may be due to a twist in the spring to which the stud is attached. To correct this apply the proper spring adjuster to the spring at fault as covered in (4) except that in this case do not slide the adjuster to the base of the spring. Adjustment should be made at a point at least $1/4$ " forward from the insulators but not over a pretensioned bend. Adjust the spring so that there is the required clearance between the stud and the springs.

Non-Pretensioned Springs

(6) To adjust a non-pretensioned spring for tension, 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. 16. Adjust the spring to the right or to the left as required, exercising care not to disturb adjacent springs. Do not adjust the spring any more than is necessary since repeated adjustment may injure 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 on the bifurcated spring to close.

(7) If the spring is excessively bowed or bent or if there is not the proper clearance between springs or between the thermal unit winding and the adjacent spring, straighten the spring before adjusting to meet the spring tension requirement. To straighten

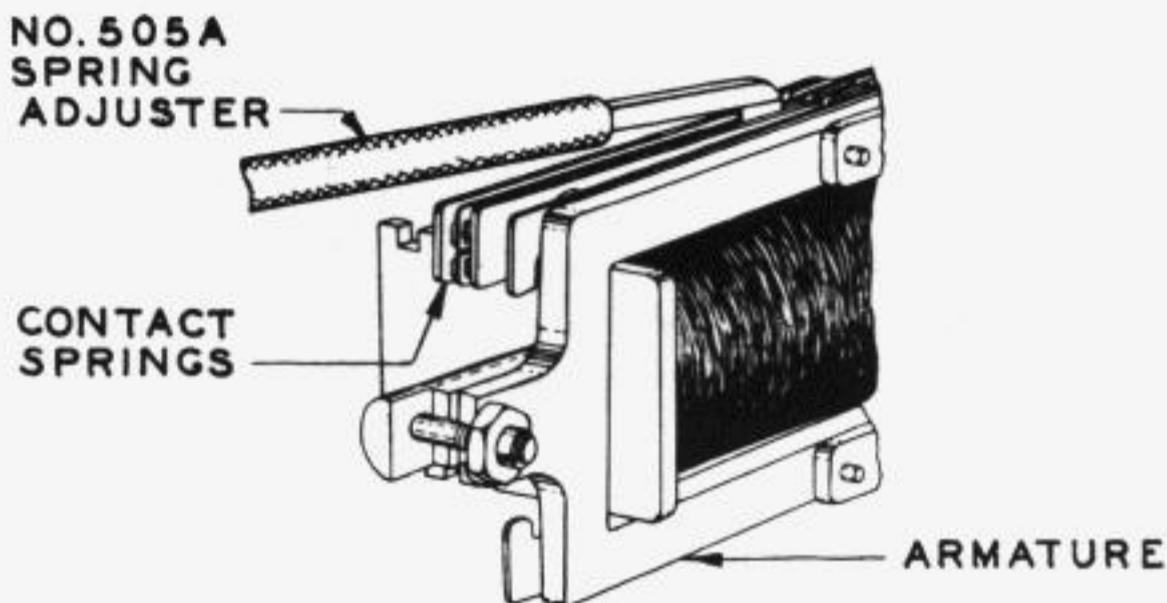


FIG.16 - METHOD OF ADJUSTING SPRING TENSION

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 spring is approximately straight. Take care when making this adjustment to avoid tilting the springs.

(8) If the desired tension cannot be obtained by adjusting as outlined in (6) 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. 16. 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 armature, as indicated in Fig. 17. Then move the adjuster to the base of the spring and adjust as covered in (6). 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.

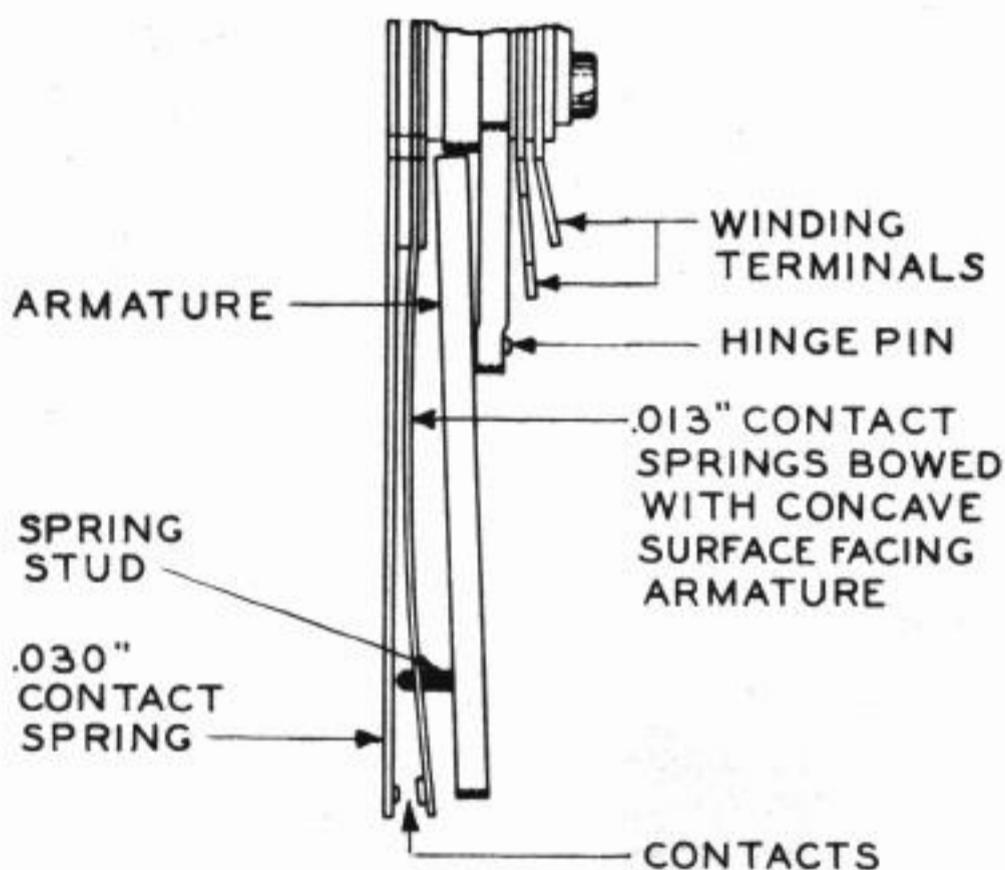


FIG.17 - POSITION OF BOWED SPRING BEFORE FINAL TENSION ADJUSTMENT

(9) If the studs touch the spring 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 the required clearance between the stud and the springs.

(10) Kinked Springs: Do not straighten kinked springs unless the kink interferes with proper adjustment of the spring assembly. Removing kinks tends to weaken the spring and to 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") springs is permissible when necessary to obtain required tension. A gradual bow, however, is permissible.

Adjustment for Pressure of Armature
Against the Adjusting Nut

(11) If the armature is not held against the adjusting nut with the specified pressure or where the relay is equipped with a pin type hinge and the portion of this pressure in one spring combination is more than 2-1/2 times that of the other spring combination alter the tension of the "A" springs as necessary using the No. 505A spring adjuster as covered in (4) and (6) depending on whether the relay is equipped with pretensioned or non-pretensioned springs respectively.

To check the tension of the "A" spring in each spring combination, block the armature unoperated using the No. 508A armature blocking tool and apply the tip of the No. 70H gauge to the "A" spring just in front of the stud.

- 3.17 Stud Gap (Rq. 2.17)
- 3.18 Contact Make (Rq. 2.18)
- 3.19 Contact Separation (Rq. 2.19)
- 3.20 Contact Sequence (Rq. 2.20)

(1) Stud Gap and Contact Make: To adjust to meet these requirements, adjust the spring tangs to the right or left as required, using the No. 507A spring adjuster, meanwhile holding the spring with another No. 507A spring adjuster as shown in Fig. 18. It is satisfactory, if, in making this adjustment, the spring tang does not rest flat against the spoolhead. Exercise care, however, to see that requirement 2.06 covering spring

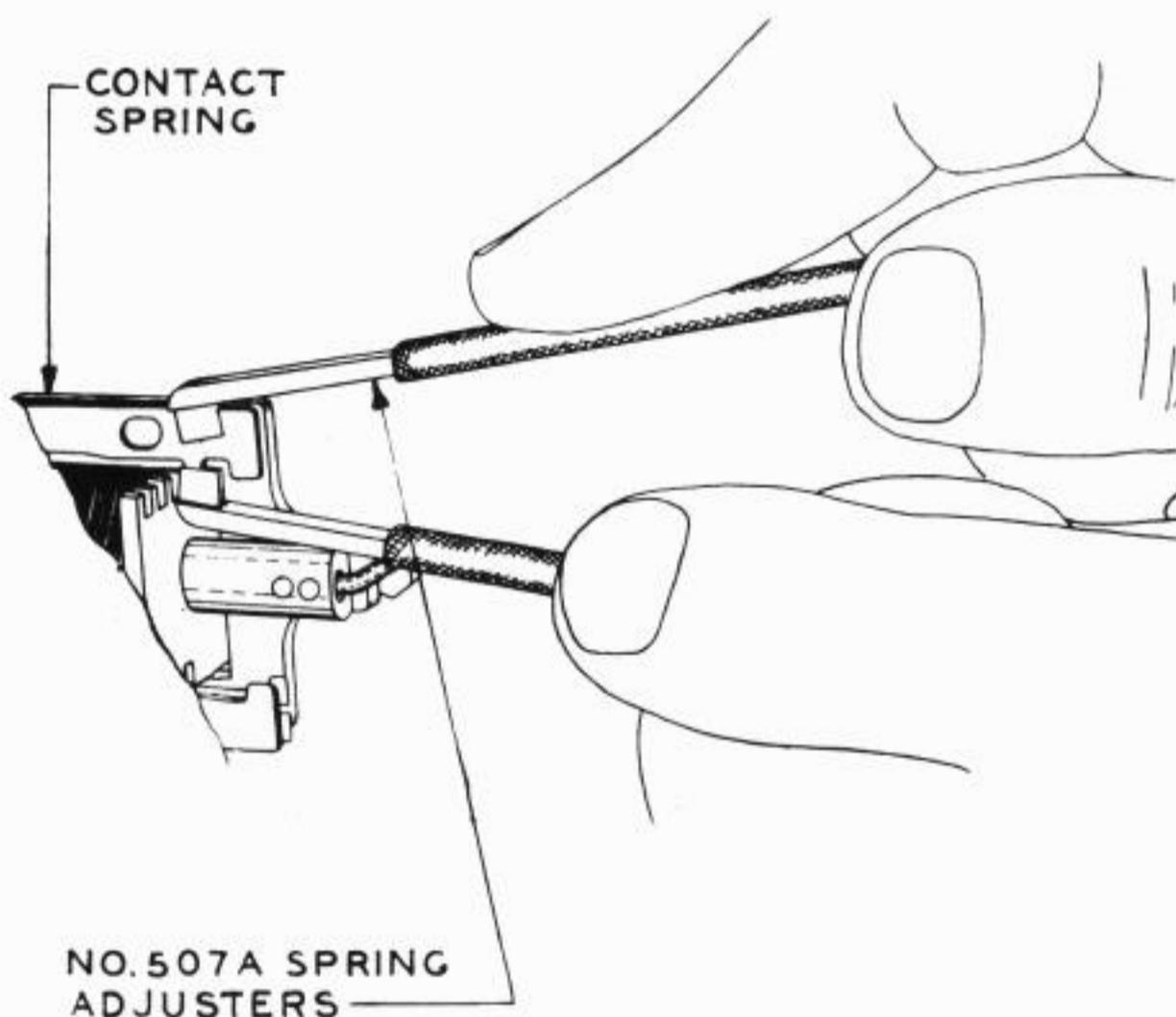


FIG. 18 - METHOD OF ADJUSTING SPRING TANG

tang position is met. If failure to meet the contact make requirement is due to misalignment of the prongs of the bifurcated spring, adjust the individual prongs with the No. 363 spring adjuster so that both prongs are approximately in the same vertical plane.

(2) Adjust so that there are stud gaps at the points indicated in the spring combination figures on page 12. The use of the No. 510C test lamp equipped with the No. 561A straight tip to illuminate the stud gap will facilitate making this adjustment.

(3) Contact Separation: To correct the contact separation adjust the spring tang on spoolhead springs as covered in (1) or adjust the moving springs with a No. 505A spring adjuster. In adjusting the front contact separation, adjust the spring tangs on the spoolhead spring so that the contact separation is sufficient to insure that the spring sequence requirement will be met under operating conditions. If the requirement is not met due to the misalignment of the prongs of the bifurcated spring, adjust the individual prongs with the No. 363 spring adjuster so that the contact separation at both prongs is approximately the same and so that the two prongs of the bifurcated spring are approximately in the same vertical plane.

(4) Contact Sequence: To adjust for contact sequence, modify the spring tensions, contact make, stud gap and contact separation adjustments as required.

3.21 Electrical Requirements (Rq. 2.21)

(1) To meet the operate requirements on the U type portion of the relay, decrease the tension of the moving springs (including balancing springs) toward the minimum. If the requirements cannot be met in this manner, increase the stud gap as covered in 3.17 (1). If the requirements still cannot be met check that the armature rests against the hinge bracket in the operated position and if it does not, refer the matter to the supervisor.

(2) If the relay fails to meet the timing requirements for the thermal unit specified on the circuit requirement table, attempt to correct this condition by adjusting the bimetallic spring tension toward the maximum using the method specified under 3.16 (6). If the relay still fails to meet its electrical requirements refer the matter to the supervisor.

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