

## RELAYS

### 208 AND 214 TYPES

### REQUIREMENTS AND ADJUSTING PROCEDURES

#### 1. GENERAL

- 1.01 This section covers 208 and 214 type relays.
- 1.02 This section is reissued to revise the procedure for checking contact separation and to add procedures for checking the operated and unoperated armature gaps. Detailed reasons for reissue will be found at the end of the section.
- 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 Operate: A relay is said to operate if, when current is connected to its winding, the armature moves sufficiently to cause the back contact to break and the front contact to make.
- 1.05 Non-Operate: A relay is said to non-operate if, when current is connected to its winding, the armature does not move sufficiently to close any front contact or to reduce the back contact pressure enough to cause an unreliable contact.
- 1.06 Hold: A relay is said to hold if, after the relay has operated and the current is reduced abruptly the armature

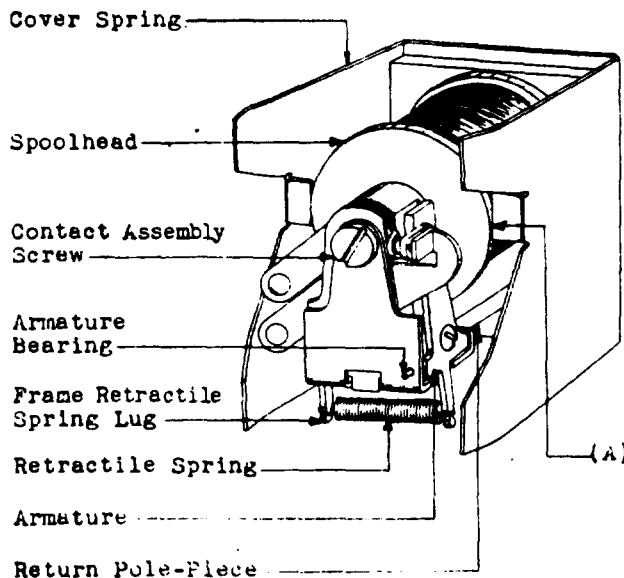


Fig. 1 - No. 214A Relay With Cover Removed

does not move sufficiently to cause the contact that has been made to become unreliable or to make the contact that has been broken.

1.07 Release: A relay is said to release if the armature moves from the core sufficiently to break the contact that has been closed and to make the contact that has been broken.

1.08 Bonding straps, when installed on a relay, shall be mounted in accordance with Section 040-230-811 covering flexible bonding straps for 208 type relays.

#### 2. REQUIREMENTS

2.01 Cleaning: The contacts shall be cleaned when necessary in accordance with the section covering cleaning of relay contacts and parts.

2.02 Mounting: Relays shall be fastened securely to the mounting plate. This shall be checked for by applying a vertical and a horizontal pressure to the relay and not by attempting to turn the relay. Gauge by feel.

#### 2.03 Cover Spring Pressure

(a) The cover spring shall have sufficient pressure against the cover to hold the cover securely in place. Gauge by feel.

(b) Fig. 1 (A): The prongs of the cover spring shall rest on the front spoolhead when the cover is off. Gauge by eye.

2.04 Contact Alignment - Fig. 2 (A): With the end play of the armature taken up in both directions, the point of contact shall fall wholly within the circumference of the opposing contact disc except for opposing contacts having the same diameter, in

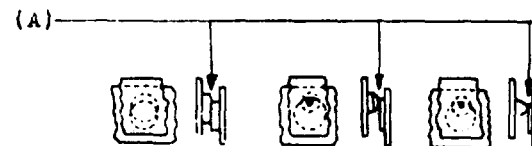


Fig. 2 - Contact Alignment

which case the centers shall not be out of alignment more than 25% of the diameter of the contacts. Gauge by eye.

2.05 Armature Movement: The armature shall move freely in its bearings. Gauge by feel.

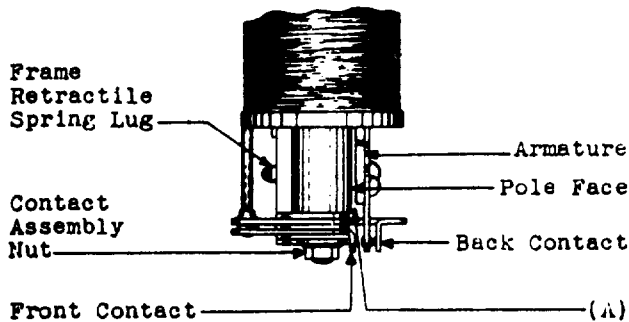


Fig. 3 - Unoperated Armature Air-Gap

2.06 Unoperated Armature Air Gap - Fig. 3 (A): Unless otherwise specified on the circuit requirement table the unoperated armature air gap shall be as specified in Table "A" below. The gap shall be measured at the point of minimum separation between the armature and pole face when the armature is touching the back contact. Use the Nos. 73A, B and 73D gauges. Disregard "Not enter" notation on the No. 73B gauge.

- (a) To check use the proper blade of the No. 73 type gauge. The minimum gauge shall enter of its own weight and the maximum gauge shall not enter, with the exception of the .008" gauge, which may enter but if it does so shall fit snugly.

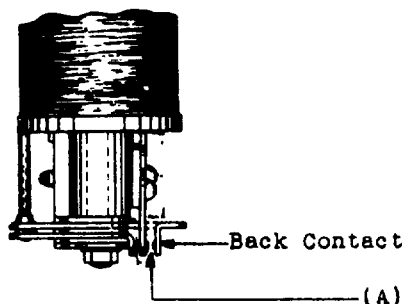


Fig. 4 - Contact Separation

When the .013"-.017" gauge is used, it will be necessary to move the gauge horizontally the full width of the armature to insure that the point of minimum separation is gauged. The .013" blade shall not bind and the .017" blade shall bind.

2.07 Contact Separation - Fig. 4 (A): Unless otherwise specified on the circuit requirement table, the contact separation shall be as specified in Table "A" below. Use the No. 74D gauge and check the separation between the back contacts with the relay electrically operated.

Relay Code	Table "A"			
	Unoperated Armature Air Gap		Contact Separation	
	Min.	Max.	Min.	Max.
208B,C,E,F,) G,M,N,S,) T,U,W,Y,) AA,AB, ) AC,AD )	.013"	.017"	.004"	.007"
208H,J,K,L) 214A )	.007"	.008"	.003"	.004"
208P,R,AE,) AF )	.018"	.022"	.004"	.007"

2.08 Operated Armature Air-Gap: The armature shall not touch the pole face when the relay is electrically operated. → Gauge by eye and feel.

- (1) In case of doubt the requirement may be checked by inserting a strip of KS-7743 paper separator or equivalent, approximately 1 in. long between the armature and pole face and operating the relay electrically. The requirement is met if the paper can be removed without binding.

### 2.09 Electrical Requirements

(a) The relay shall meet the electrical requirements specified on the circuit requirement table.

- (b) (214 Type Relays only) The cover may be either on or off when applying the electrical requirements.

2.10 Frame Retractable Spring Lug shall not be bent more than 45° either way from vertical. Gauge by eye.

### 3. ADJUSTING PROCEDURES

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

Code No.	Description
<u>Tools</u>	
46	3/8" Hex. Single End Socket Wrench
220	3/16" Hex. Single End Socket Wrench

<u>Code No.</u>	<u>Description</u>
264	Retractable Spring Lug Adjuster
485A	Smooth Jaw Pliers
-	3" Cabinet Screwdriver

Gauges

73A	.018" and .022" Thickness Gauge
73B	.007" and .008" Thickness Gauge
73D	.013" and .017" Thickness Gauge
74D	Thickness Gauge Nest

Materials

KS-7743	Paper Separator
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Test Apparatus

35 Type	Test Set
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3.01 Cleaning (Rq.2.01)

- (1) Clean the contacts in accordance with the section covering cleaning of relay contacts and parts.
- (2) If the contacts are burnished, check the contact separation, unoperated armature air-gap and operated armature gaps.

3.02 Mounting (Rq.2.02)

- (1) To tighten relays which are loose on the mounting plate securely tighten the mounting nut with the No. 46 wrench.

3.03 Cover Spring Pressure (Rq.2.03)

- (1) If the cover springs do not have sufficient pressure against the relay cover, increase the tension by adjusting the front end of the springs with the No. 485A pliers. Bend the spring outward and then bend the tip in to facilitate slipping on the cover.
- (2) If the cover springs have excessive tension, decrease the tension by adjusting the spring toward the coil with the No. 485A pliers.
- (3) If the prongs of the cover spring do not rest on the front spoolhead, remove the mounting nut with the No. 46 wrench and then remove the relay from the mounting plate. Remove the cover

spring from the relay and bend inward the rear of the spring. Reassemble the cover spring on the relay, replace the relay on the mounting plate and tighten the mounting nut securely.

3.04 Contact Alignment (Rq.2.04)

- (1) If the contacts are out of line from front to rear refer the matter to the supervisor.
- (2) If the contacts are out of line vertically correct as follows: Loosen the contact assembly at the front of the relay and then shift the contact lugs until the contacts line up properly. Retighten the assembly securely without shifting the positions of the contacts. Use the No. 220 wrench to loosen and tighten the assembly on relays equipped with nuts and the 3" cabinet screwdriver on relays equipped with screws. If impossible to align the contacts in this manner, adjust the front and back contact lugs (not the armature contact lug) up or down as required with the No. 485A pliers.

3.05 Armature Movement (Rq.2.05)

- (1) If the armature does not move freely refer the matter to the supervisor.

3.06 Unoperated Armature Air-Gap (Rq.2.06)3.07 Contact Separation (Rq.2.07)3.08 Operated Armature Air-Gap (Rq.2.08)

- (1) Unoperated Armature Air-Gap: To change the unoperated armature air-gap, insert the proper gauge between the armature and pole face and adjust the back contact lug to the right or left as required with the No. 264 adjuster as shown in Fig. 5. Do not adjust the armature contact lug. Twisting the adjuster to the left decreases the gap and twisting it to the right increases the gap. In using the gauges, insert the "enter" gauge, corresponding to the minimum limit of the gap specified for the relay being adjusted, and adjust the lug so that the gauge can be inserted and withdrawn with very little friction. This will insure that the minimum limit is met and the maximum can be checked with the "not enter" or thicker blade of the gauge. The "not enter" end of the No. 73B gauge may enter with little friction on relays requiring this gauge.

- (2) Contact Separation: To change the contact separation adjust the front contact lug to the right or left as required. Do not adjust the armature contact lug. Adjust the lug to the left to increase the separation and to the right to decrease the separation. Use the No. 485A pliers to adjust the front contact lug to the left. Apply them over

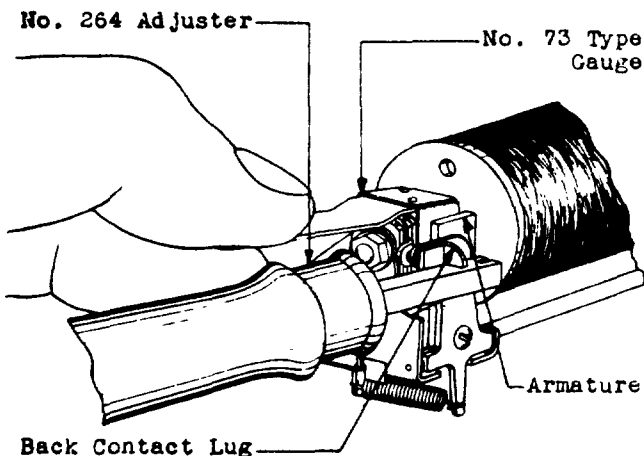


Fig. 5 - Adjusting Unoperated Armature Air-gap

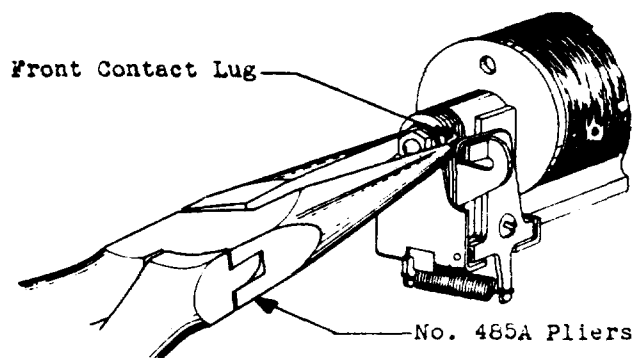


Fig. 6 - Adjusting for Contact Separation by Adjusting Front Contact Lug to Left

the contact assembly screw or nut and the lug as shown in Fig. 6 exercising care not to mar the contact. Use the 3" cabinet screwdriver as shown in Fig. 7 to adjust the lug to the right inserting it between the lug assembly and the lug and prying the lug to the right.

(3) Operated Armature Air-gap: In general, the operated armature air-gap requirement will be automatically met if the relay meets its contact separation and unoperated armature air-gap requirements. In case it is not met correct as follows: First attempt to correct by reducing the contact separation towards the minimum in accordance with the method outlined in (2). If it is not possible to correct the fault in this way, make a further attempt to correct it by increasing the armature gap

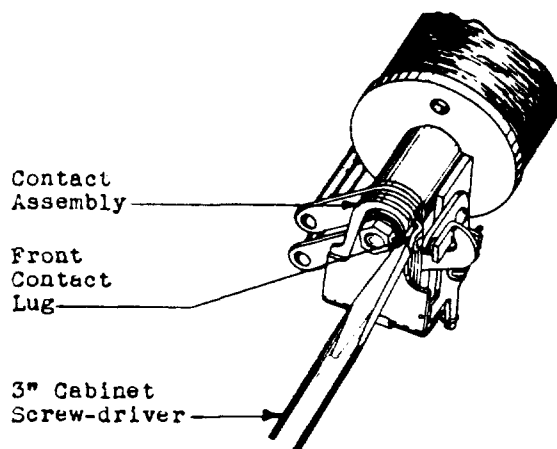


Fig. 7 - Adjusting for Contact Separation by Adjusting Front Contact Lug to Right

towards the maximum in accordance with the method outlined in (1) and again adjusting the contact separation towards the minimum.

### 3.09 Electrical Requirements (Rq.2.09)

### 3.10 Frame Retractable Spring Lug (Rq.2.10)

(1) Operate and Hold: If the relay fails to meet its operate or hold requirement it is probably due to the tension of the retractile spring being too great. Reduce the tension of the retractile spring by adjusting the frame retractile spring lug to the right using the No. 264 adjuster as shown in Fig. 8. Do not adjust the armature retractile spring lug as this may result in the bending of the bearing pin.

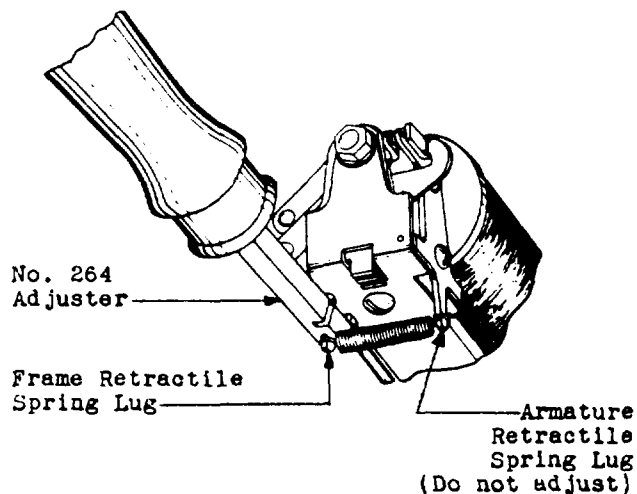


Fig. 8 - Adjusting for Electrical Requirements

(2) Non-operate and Release: If the relay fails to meet its non-operate or release requirement it is probably due to the tension of the retractile spring being too light. Increase the tension of the retractile spring by adjusting the frame retractile spring lug to the left using the No. 264 adjuster as shown in Fig. 8. Do not adjust the armature retractile spring lug.

(3) Do not bend the frame retractile spring lug to an angle greater than 45° either way from the vertical. If the relay cannot be made to meet its electrical requirements by adjusting the lug within these limits, the fault may be due to a defective retractile spring. In this case replace the retractile spring. If a new spring is put on the relay, see that it is the proper one, as piece part numbers of the springs vary with the relay code.

#### REASONS FOR REISSUE

1. To refer to Section 040-230-811 for information regarding application of bonding straps. (1.08)
2. To add a procedure for checking the un-operated armature air-gap. (2.06)
3. To revise the method of checking the contact separation (2.07).
4. To add a method for checking the operated armature air-gap. (2.08)
5. To bring the list of tools, gauges, materials and test apparatus up-to-date. (3.001)
6. To specify that the cover may be either on or off when applying the electrical requirements. (2.09(b)).