

## DASHPOT RELAYS

### INTERNALLY ADJUSTED AND EXTERNALLY ADJUSTED REQUIREMENTS AND ADJUSTING PROCEDURES

#### 1. GENERAL

1.01 This section covers internally adjusted and externally adjusted dashpot relays.

1.02 This section is reissued to cover revisions in the requirements and adjusting procedures covering oil supply. 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 Normal Position

(a) Externally Adjusted: The relay is in the normal position when the operating lever is resting against the side of the relay frame and all normally open contacts are open.

(b) Internally Adjusted: The relay is in the normal position when the operating lever is resting against the operating lever stop and all normally open contacts are open.

1.05 Operated Position (Both Types): The relay is in the operated position when all normally open contacts are closed with the specified follow.

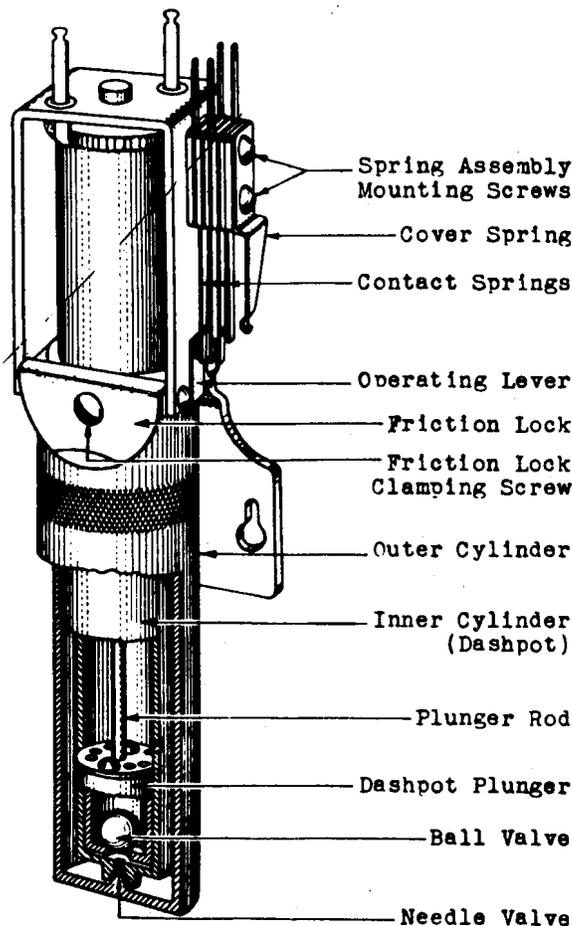


Fig. 1 - Externally Adjusted Dashpot Relay

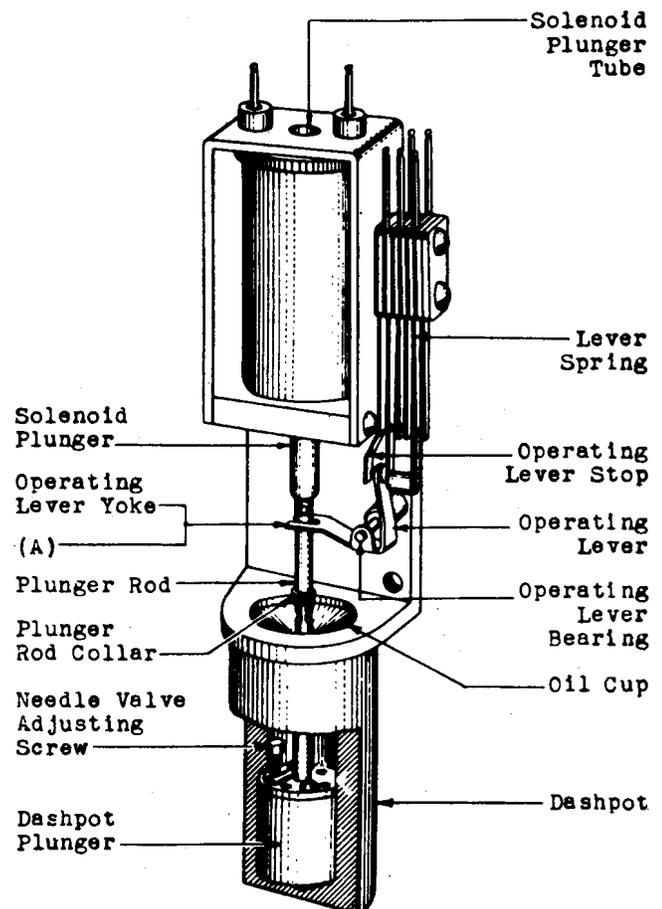


Fig. 2 - Internally Adjusted Dashpot Relay

**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 in accordance with approved procedures.

**2.02 Oil Supply**

- (a) Before turnover to the Telephone Company, the outer cylinder or dashpot shall be filled with the following quantity of KS-8321 dashpot oil.

Internally Adjusted 5 cc.  
Externally Adjusted 13 cc.

Caution: Do not dilute the KS-8321 dashpot oil.

- (b) After turnover to the Telephone Company, the oil shall be changed whenever necessary to meet the specified speed or stroke requirements and the quantity of oil used shall be as specified in (a).

Note: Ordinarily the oil should not require replacement for several years.

- 2.03 Cover Spring Tension - Fig. 3 (A) - (Externally Adjusted): The cover spring shall hold the cover firmly in place. Gauge by feel.

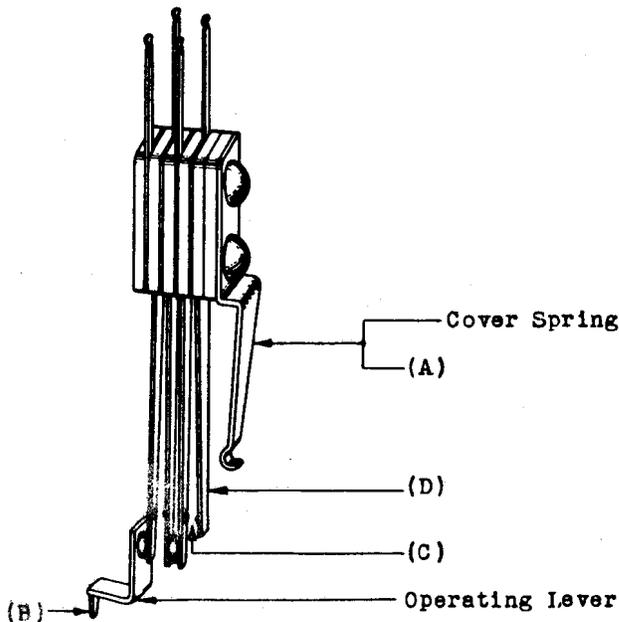


Fig. 3 - Spring Assembly - Externally Adjusted Dashpot Relay

**2.04 Operating Lever Movement**

- (a) Externally Adjusted - Fig. 3 (B) - The operating lever shall operate without bind. Gauge by feel.
- (b) Internally Adjusted - Fig. 2 (A) - The operating lever yoke shall clear the plunger rod on both sides and shall operate without bind. Gauge by eye and feel.

- 2.05 Contact Alignment - Fig. 4 (A) - Contacts shall not be out of alignment more than 1/3 of their base diameters. Gauge by eye.



Fig. 4 - Contact Alignment

- 2.06 Contact Separation - Fig. 3 (C) - The separation between any pair of contacts normally open or between any pair of contacts that are opened when the relay is operated shall be  
 Min. .010"  
 Use the KS-6909 gauge.

**2.07 Contact Follow**

- (a) The contact follow shall be .015". Gauge by eye. The thickness of a lever spring is .015".
- (b) Fig. 3 (D) - In the case of a make-make spring combination this requirement applies only to the contact making last.

- 2.08 Spring Alignment: Contact springs shall be free of excessive or irregular bends and the bowing for contact follow shall not exceed 1/32" in the free length of the spring. Gauge by eye.

- 2.09 Operating Lever Clearance - Fig. 5(A) - (Internally Adjusted): With the operating lever against the operating lever stop the clearance between the operating lever bushing and the lever spring shall be  
 Max. .015"  
 Gauge by eye. The thickness of a lever spring is .015".

- 2.10 Stroke (Internally Adjusted): The plunger shall pull up slowly to a point within 1/8" from the end of the plunger stroke before the oil is exhausted. The plunger shall then move rapidly through the remainder of its stroke so as to give positive operation to the springs. Gauge by eye.

**2.11 Speed**

(a) The relay shall meet the speed requirements shown on the circuit requirement table. Use a stop watch.

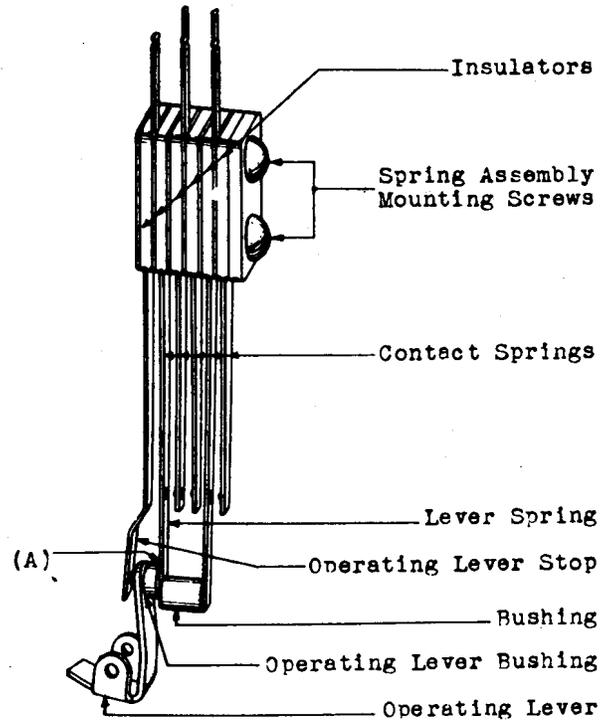


Fig. 5 - Spring Assembly - Internally Adjusted Dashpot Relay

(b) Unless otherwise specified the speed of the dashpot shall be adjusted with the oil at room temperature.

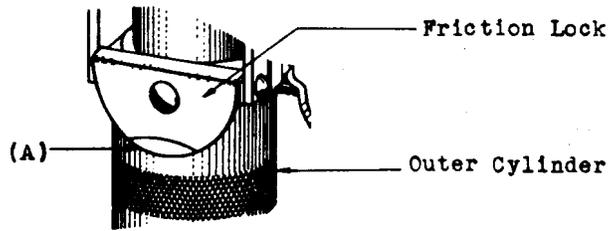


Fig. 6 - Cylinder Locking Arrangement Externally Adjusted Dashpot Relay

**2.12 Tightness of Friction Lock - Fig. 6(A) - (Externally Adjusted):** The friction lock shall hold the outer cylinder firmly in place. Gauge by feel.

**3. ADJUSTING PROCEDURES**

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

<u>Code No.</u>	<u>Description</u>
<u>Tools</u>	
206	30° Offset Screwdriver
207	90° Offset Screwdriver
-	KS-7782 Parallel Jaw Pliers
-	6-1/2" P- Long Nose Pliers
-	3" Cabinet Screwdriver
-	KS-6320 Orange Stick
<u>Gauges</u>	
-	KS-6909 Thickness Gauge Nest
-	Stop Watch or Second Indicating Watch
<u>Materials</u>	
-	KS-2423 Cloth or D-98063 Cloth
-	KS-8321 Dashpot Oil (Obtainable in 5 and 13 cc. glass bottles)
-	KS-7860 Petroleum Spirits
-	Toothpicks, Hardwood, Flat at One End and Pointed at Other

**3.01 Cleaning (Rq.2.01)**

- (1) Clean the contacts in accordance with the section covering cleaning of relay contacts and parts.
- (2) Clean the other parts as outlined in 3.02.

**3.02 Oil Supply (Rq.2.02)**

- (1) When necessary to replenish the oil, proceed as follows.
- (2) Externally Adjusted: Loosen the friction lock clamping screw with the 3" cabinet screwdriver and remove the outer and inner cylinders by turning them in a counter-clockwise direction. Drain the oil from the outer and inner cylinders. Clean the outer and inner surfaces of both cylinders, the plunger rod, solenoid plunger and solenoid plunger tube with a cloth moistened with KS-7860 petroleum spirits. Cleaning the inner surfaces of both cylinders and the solenoid plunger tube will be facilitated if part of a cloth is wrapped around the KS-6320 orange stick and the cloth then worked around the parts.

**3.02 (Continued)**

(3) Internally Adjusted: Remove the dashpot by turning it in a counter clockwise direction. Drain the oil from dashpot and clean the parts as outlined in (2). Clean as much of the solenoid plunger as can be withdrawn from the solenoid plunger tube and wipe out the top of the oil cup. It may also be advisable to clean the plunger solenoid tube at this time. To do this remove the relay from its mounting by removing the mounting screws with the 3" cabinet screwdriver. Then remove the screws holding the top and bottom parts of the relay together with the 3" cabinet screwdriver and pull the top part from the bottom part. Clean the tube as outlined in (2). Reassemble the top and bottom parts of the relay and mount the relay securely in place.

(4) Both Types of Relays: After the parts have been cleaned proceed as follows. In the case of the externally adjusted relay, mount the plunger in the inner cylinder (dashpot) and mount the cylinder securely in place on the relay. Refill the outer cylinder (or in the case of the internally adjusted relay, the dashpot) with a fresh supply of KS-8321 dashpot oil which has been allowed to attain the normal room temperature before the stroke and speed adjustments are made. Mount the outer cylinder or the dashpot securely in place.

**3.03 Cover Spring Tension (Rq.2.03)  
(Externally Adjusted)**

(1) If the cover spring fails to hold the cover snugly, tension the cover spring close to the point where it leaves the insulators with the P-long nose pliers.

**3.04 Operating Lever Movement (Rq.2.04)**

(1) Externally Adjusted: If the operating lever binds or otherwise does not perform its required functions, adjust it as follows:

(2) After loosening the friction lock clamping screw with the 3" cabinet screwdriver, remove the outer and inner cylinders by turning them in a counter-clockwise direction. With the cylinders removed, remove the two screws which hold the cylinder adjusting collar to the relay frame using the 3" cabinet screwdriver.

(3) Bind of the operating lever may be due to a deposit of gummy oil on the bearing points. To remove this, apply KS-7860 petroleum spirits with a clean toothpick to soften the matter and then

remove it with the other end of the toothpick.

(4) Before replacing the cylinder adjusting collar on the relay frame insert the solenoid plunger in the solenoid and move it manually to the operated position observing that there is sufficient movement of the operating lever to permit the specified follow of the contacts when they are adjusted to the specified contact separation. To increase the contact follow increase the angle between the two arms of the operating lever with the KS-7782 pliers.

(5) Replace the cylinder adjusting collar and the inner and outer cylinders by reversing the procedure outlined in (2).

(6) Internally Adjusted: If the operating lever yoke interferes with the movement of the plunger rod, replace the relay.

(7) If the operating lever binds on its bearings due to dirt or a gummy substance, clean it as follows: Apply a few drops of KS-7860 petroleum spirits with a clean toothpick and then operate the operating lever manually. Remove the dirt with the other end of the toothpick. Repeat this until all dirt is apparently removed. Do not use the same toothpick for two operations. If the bind is still present, replace the relay.

**3.05 Contact Alignment (Rq.2.05)**

(1) If the contacts are not in proper alignment, loosen the spring assembly mounting screws slightly with the 3" cabinet or the Nos. 206 and 207 offset screwdrivers and shift the springs as required. Tighten the screws securely after the springs are set properly.

**3.06 Contact Separation (Rq.2.06)****3.07 Contact Follow (Rq.2.07)****3.08 Spring Alignment (Rq.2.08)**

(1) To adjust for contact separation or contact follow, place the KS-7782 pliers on the spring to be adjusted and slide it up to where the springs leave the clamping plate and insulators and adjust the spring to the right or left as required.

(2) If difficulty is experienced in meeting the contact follow requirement when the contacts are adjusted to the specified contact separation, adjust the operating lever as outlined in 3.C4.

(3) If a spring is excessively bowed or bent, straighten the spring as follows. Place the KS-7782 pliers on the spring and slide it up to a point just above the bow or bend and, while exert-

## 3.06-3.08 (Continued)

ing pressure to the right or left as required, draw the pliers downward the length of the bow. Repeat this operation until the spring is approximately straight. Take care when adjusting the springs to adjust them in line with their movement and to avoid tilting the spring.

3.09 Operating Lever Clearance (Rq.2.09)  
(Internally Adjusted)

(1) If the clearance between the operating lever bushing and the lever spring is not satisfactory, adjust the operating lever stop toward the plunger rod by applying the KS-7782 pliers just below the offset in the spring and adjust the spring to the left.

3.10 Stroke (Rq.2.10)  
(Internally Adjusted)

(1) If the plunger stroke is not satisfactory, drain, clean and refill the dashpot as outlined in 3.02 and recheck the stroke requirement.

(2) If the requirement cannot be met, refer the matter to the supervisor.

3.11 Speed (Rq.2.11)

(1) Externally Adjusted: If the relay fails to operate in the specified time, loosen the friction lock clamping screw with the 3" cabinet screwdriver and turn the outer cylinder in a clockwise direction to make it slower or counter-clockwise to make it faster.

(2) Internally Adjusted: If the relay does not meet its speed requirements, remove the dashpot by turning it in a counter-clockwise direction. Adjust the needle valve adjusting screw by turning it in a clockwise direction if the relay operates too fast or in a counter-clock-

wise direction if the relay operates too slow, with the KS-7782 pliers. Exercise care in doing this not to strip the threads of the needle valve adjusting screw.

3.12 Tightness of Friction Lock (Rq.2.12)  
(Externally Adjusted)

(1) If the friction lock does not hold the outer cylinder in place, tighten the friction lock clamping screw. If this does not clear the trouble, note that the lock rests on the cylinder. If it does not, remove the clamping screw and adjust the lock inward with the P-long nose pliers. Remount the lock and tighten the screw securely.

REASONS FOR REISSUE

1. The requirement covering Oil Supply (2.02) was revised to specify KS-8321 dashpot oil instead of KS-6201 dashpot oil and to omit the oil replacement interval.
2. To revise the requirement covering Contact Follow (2.07) to specify one value for test and readjust and to specify the method of gauging the requirement.
3. To revise the requirement covering Spring Alignment (2.08) to specify a limit for bowing of the springs.
4. To revise the requirement covering Operating Lever Clearance (2.09) to specify a maximum clearance between parts.
5. To revise the requirement covering Stroke (2.10) to specify one value for test and readjust.
6. To revise the List of Tools, Gauges and Materials wherever necessary.
7. To revise the procedure covering Oil Supply to specify use of petroleum spirits.

Bell Telephone Laboratories, Inc.