RELAYS

BF-, BG-, BJ-, BL, AND BM-TYPES

(MINIATURE WIRE-SPRING)

REQUIREMENTS AND ADJUSTING PROCEDURES

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1. GENERAL

1.01 This section covers BF-, BG-, BJ-, BL-, and BM-type relays. All terminals of these relays are arranged for solder connections in a printed wiring board.

1.02 This section is reissued to:

- Add coverage for BM-Type Relays
- Add Addendum 1 changes
- Change armature back tension requirement
- Add spring combinations 236 through 244, 407 and 620 through 624 to Table A.

Since this reissue is a general revision, no revision arrows have been used to denote significant changes. The Equipment Test List is not affected.

1.03 Do not remove contact covers unless necessary in connection with relay testing or maintenance. If it is necessary to remove a cover, remount it as soon as practicable. When removing a cover, take care to avoid interfering with the card or snagging the contact springs. When mounting a cover, make sure the middle clamp of the cover spring is positioned outside the cover and the two adjacent clamps are inside the cover. ***On relays***

manufactured 3rd quarter 1972 and after, there is only one clamp of the cover spring. It should be positioned outside the cover.

1.04 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.

1.05 Miniature wire-spring relays are equipped with an adjustable armature backstop tab which determines the armature travel. Depending on the armature travel provided and the card with which the relay is equipped, make and break contacts in various positions function at successive stages in the armature travel. For example, two successive stages of contact operation are possible on relays having the greatest armature travel. In this case, the contact positions on the relay in which make or break contacts function nearest to the start of the armature travel are designated EM or EB (early make or early break). Last to function are the contacts in positions designated M or B (make or break). Long armature travel is provided on relays having EM or EB positions. It is also used when EBM (early break make) and EMB (early make break) positions are required. If only M, B, and BM (nonsequence break make) positions are necessary, a shorter armature travel is provided.

1.06 Table A shows the various spring combinations provided for these relays and the contact positions used in each spring combination.

1.07 A ***pair of contacts,*** as referred to in this section, consists of the contact on a fixed single spring and the contact on one of the associated movable twin springs.

1.08 The terms ***make contact*** and ***break contact*** apply as the relay is moved to the operated position. However, adjustments of contacts as covered in paragraph 4.07 are made with the relay in the unoperated position.

1.09 A ***pretensioned spring*** is a spring which has been preformed during manufacture. Such a spring may be recognized by one or more distinct bends in the spring. Since the bends provide necessary tensions, they should not be disturbed except during adjustment.

1.10 ***Armature gap*** is the gap between the core and the armature in any position the armature may assume between the unoperated and operated positions of the armature.

1.11 ***Operate:*** A relay is said to operate if, when current is connected to its winding, the armature moves toward the core until the armature rests against the core and all normally open contacts are closed and all normally closed contacts are open.

1.12 ***Nonoperate:*** A relay is said to nonoperate if, when current is applied to its winding, the armature backstop does not move from its position against the core.

1.13 ***Hold:*** The relay is said to hold if, after the relay has been operated on its soak current or on its operate current if a soak is not specified and the current is reduced abruptly to the hold value, the armature does not move from the operate position.

1.14 ***Release:*** A relay is said to release if the armature moves from the core to its unoperated position in which the armature backstop is resting against the core and all normally open contacts are open and all normally closed contacts are closed.

1.15 ***Use of KS-19916, L1, Magnifier and 510C Portable Lamp:*** The KS-19916, L1, magnifier and the 510C portable lamp, equipped with a 561A straight tip, may be used to facilitate gauging and adjustment operations.

1.16 The year of manufacture of BF-, BG-, BJ-, BL- and BM-type relays is stamped on the bobbin, preceded by vertical lines; three to indicate the first quarter, two the second quarter, one the third quarter, or none the last quarter. The numeral 1 may be used instead of the vertical line and may be separated from the year designation by a hyphen. Associated with this stamping, there should be a letter indicating the place of manufacture.

2. REQUIREMENTS

2.01 ***Cleaning:*** The contacts and other parts of the relay shall be cleaned when necessary in accordance with Section 069-306-801. After cleaning any pair of contacts, a check shall be made to see that the movable twin springs are

positioned as specified in requirement in paragraph 2.07. Also, a check shall be made that both contacts of the pair which were cleaned meet requirement in paragraph 2.08.

2.02 ***Contact Cover Tightness*** [Fig. 1(A) or 2(A)]:—The contact cover shall be firmly held in place but shall be sufficiently loose to permit removal with the fingers.

Gauge by feel.

2.03 ***Contact Cover Clearance*** [Fig. 1(A) or 2(A)]: With the contact cover positioned against its stops, there shall be clearance between the cover and adjacent moving parts.

Gauge by eye and feel.

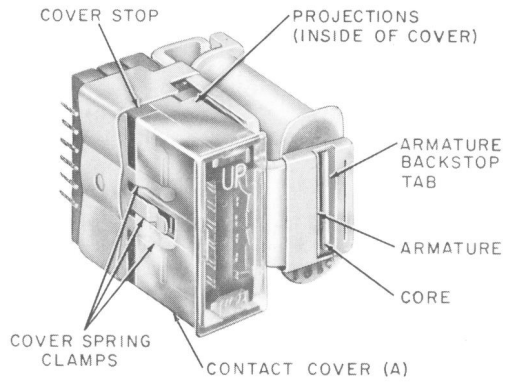

Fig. 1—6-Position Relay (BF-, BG-, BL-Type)

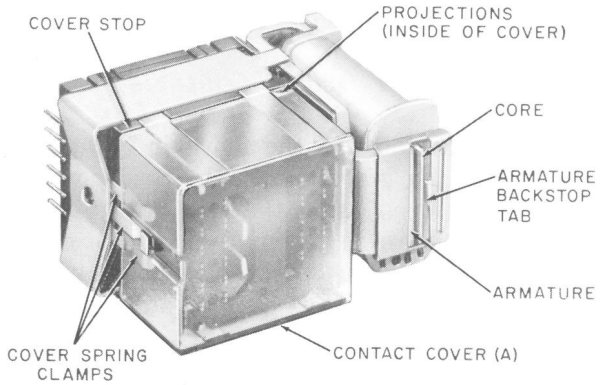

Fig. 2—12-Position Relay (BJ- and BM-Type)

2.04 ***Armature Travel*** [Fig. 3(A)]: With the relay electrically operated, the armature travel measured at the gap between the armature backstop and the core shall not exceed 0.002 inch from the value (0.025) nor exceed 0.003 inch from the value (0.026, 0.036, or 0.042 inch) specified in the ARM TRVL column of the circuit requirements table.

Use the 186-type gauge.

For a 0.025-inch armature travel, the requirement is considered met if a 0.023-inch (186F) gauge just enters the gap but a 0.028-inch (186B and 186E paired) gauge does not enter.

For a 0.026-inch armature travel, the requirement is considered met if a 0.023-inch (186F) gauge just enters the gap but a 0.030-inch (186G) gauge does not enter.

For a 0.036-inch armature travel, the requirement is considered met if a 0.033-inch (186H) gauge just enters the gap but a 0.040-inch (186J) gauge does not enter.

For a 0.042-inch armature travel, the requirement is considered met if a 0.039-inch (186B and 186H paired) just enters the gap but a 0.046-inch (186B and 186J paired) gauge does not enter.

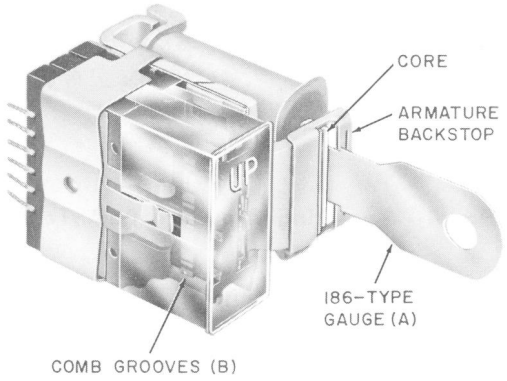

Fig. 3—Measuring Armature Travel With 186-Type Gauge

2.05 ***Armature Back Tension*** Fig. 4(A):

Note: Before measuring back tension on BL-type relays, the core shall be demagnetized.

Where the coil resistance is 116 ohms max, 94 ohms min, a soak current of -.175 amps shall be applied to the relay coil and followed by a no-flux release current of +.0575 amps. For coils with resistance other than indicated, contact your supervisor.

With the relay in the unoperated position, the armature backstop shall bear against the core with a pressure of:

Test Min ▶20◀ grams

Readjust Min 30 grams (See ***Note.***)

Note: A maximum readjust requirement applies to the relay if specified in the circuit requirements table.

Use the 70D gauge, as shown in Fig. 4, applied at the center of the armature in front of the clamp plate shown in Fig. 5. Care shall be taken that the reed of the gauge does not touch the cover.

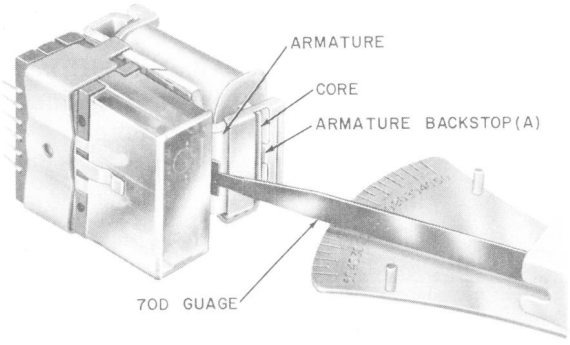

Fig. 4—Measuring Armature Back Tension

2.06 ***Balancing Spring Tension*** [Fig. 5(A) and (B)]: With the relay in the unoperated position, the combined tension of the balancing spring legs shall be sufficient to hold the card lugs against the outer tabs of the clamp plate and the armature backstop tab against the core.

Gauge the position of the card and armature backstop by eye and feel.

To check this requirement, electrically operate and release the relay. Using the KS-6320 orange stick, apply pressure to the edge of the armature backstop toward the core (see Fig. 5) and then alternately to each card lug toward its associated clamp plate tab. The requirement is met if there is no observable movement of the armature backstop tab with respect to the core and no observable movement of either card lug with respect to its associated clamp plate tab.

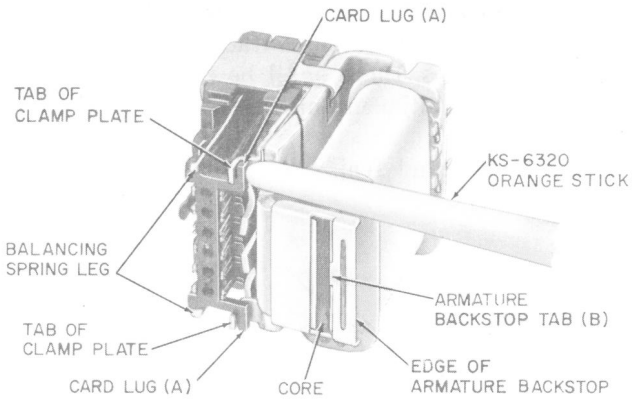

Fig. 5—Checking Balancing Spring

2.07 ***Movable Twin Spring Position*** [Fig. 3(B)]: The twin springs of movable pair shall be in the respective comb grooves associated with the position on the relay in which the springs are mounted.

Gauge by eye.

2.08 ***Make and Break Contacts***

(a) Both contacts of the movable twin springs shall make with their associated single contact on the fixed spring in the electrically operated position of the relay 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 and inserted between the armature and core, with the exception covered in Test (2), the following conditions shall be met (see Fig. 6):

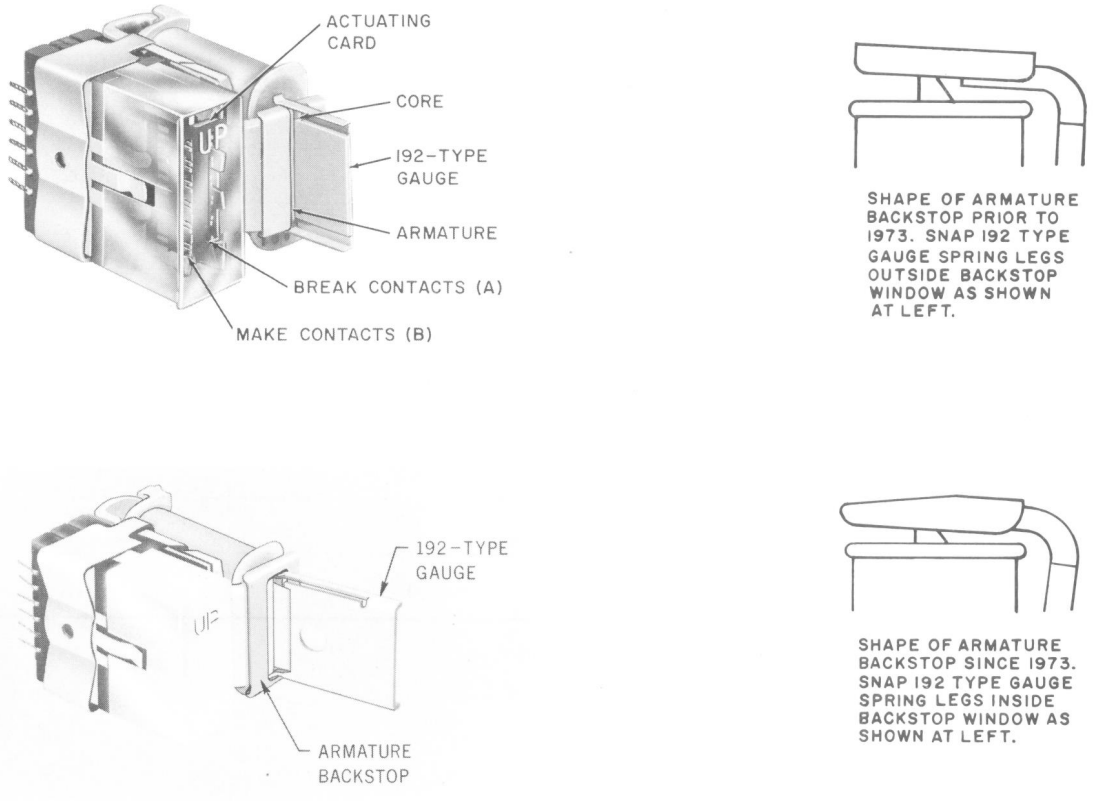

Fig. 6—Contact Gauging With 192-Type Gauge Between Armature and Core (Fully Operated)

(1) The requirement make contacts may be considered met if, when the gauges specified in (b) are used, the movable make contacts come to rest at the end of the armature stroke.

(2) The requirement for break contacts may be considered met if, when the gauges specified in (b) are used, the actuating card causes observable movement of the movable break contacts.

TEST

(1) *Before Turnover*

MAKE CONTACTS	TYPE OF RELAY	NEITHER PAIR OF CONTACTS SHALL MAKE (INCH)	AT LEAST ONE PAIR OF CONTACTS SHALL MAKE (INCH)
MAKE (OR MAKE OF BM)	BF-, BJ-, BL-, BM-	.018	.005
	BG-	.018	.005
EM (EARLY MAKE OR EARLY MAKE OF EMB)	BF-. BJ-, BL-, BM-	.031	.018
	BG-	.031	.018
BREAK CONTACTS		**AT LEAST ONE PAIR OF CONTACTS SHALL NOT BREAK (INCH)**	**BOTH PAIRS OF CONTACTS SHALL BREAK (INCH)**
B (BREAK OF BM)	BF-, BJ-, BL-, BM-	.018	.005
	BG-	.018	.005
EB (EARLY BREAK OR EARLY MAKE OF EBM)	BF-, BJ-, BL-, BM-	.031	.018
	BG-	.031	.018

Use the 191A gauge nest and check as covered in (c) and (d).

(2) *After Turnover*

MAKE CONTACTS	TYPE OF RELAY	NEITHER PAIR OF CONTACTS SHALL MAKE (INCH)	AT LEAST ONE PAIR OF CONTACTS SHALL MAKE (INCH)
	BF-, BG-, BJ-, BL-, BM-	.004*	.002
BREAK CONTACTS		**AT LEAST ONE PAIR OF CONTACTS SHALL NOT BREAK (INCH)**	**BOTH PAIRS OF CONTACTS SHALL BREAK (INCH)**
	BF-, BG-, BJ-, BL-, BM-	.004*	.002

* Gauge inserted between core and armature, backstop, relay unoperated. See Fig. 7.

READJUST

Before and After Turnover

MAKE CONTACTS	TYPE OF RELAY	NEITHER PAIR OF CONTACTS SHALL MAKE (INCH)	AT LEAST ONE PAIR OF CONTACTS SHALL MAKE (INCH)
M (MAKE)	BF-, BJ-, BL-, BM-	.0175	.007
	BG-	.0175	.007
EM (EARLY MAKE)	BF-, BJ-, BL-, BM-	.0285	.0185
	BG-	.0285	.0185
BREAK CONTACTS		**AT LEAST ONE PAIR OF CONTACTS SHALL NOT BREAK (INCH)**	**BOTH PAIRS OF CONTACTS SHALL BREAK (INCH)**
B (BREAK)	BF-, BJ-, BL-, BM-	.0175	.007
	BG-	.0175	.007
EB (EARLY BREAK)	BF-, BJ-, BL-, BM-	.0285	.0185
	BG-	.0285	.0185

2.09 ***Sequence Contacts:***

TEST

(a) EMB (early make break) position: The EM contacts of each EMB position shall make before the B contacts break.

Operate the relay manually and gauge by eye.

(b) EBM (early break make) position: The EB contacts of each EBM position shall break before the M contacts make.

Operate the relay manually and gauge by eye.

READJUST

(c) No requirement. Readjust requirements for make and break contacts [Reqt 2.08(b)] ensure the required sequences.

2.10 ***Electrical Requirements:*** The relay shall meet the electrical requirements specified on the circuit requirements table.

Note: If a hold requirement is specified on the circuit requirements table, the requirement is considered met if, after the relay has operated and the current is reduced abruptly to the hold value, the armature remains in the operated position for at least 2 seconds. The period of 2 seconds may be judged satisfactorily by saying "one hundred and fifty-five," pronouncing each syllable fully and distinctly (after turnover).

2.11 ***Pulse Repeating Requirements:*** When specified on the circuit requirements table, the relay shall meet the percent break limits specified when checked under the conditions covered in Section 040-011-711 or 040-012-711 covering pulse repeating requirements for these relays.

2.12 ***Timing Requirements*** (Applies after turnover only): When specified on the circuit requirements table, the relay shall meet the times specified.

TABLE A—SPRING COMBINATION FIGURE NUMBERS AND CONTACT POSITIONS

CONTACT POSITIONS	SPRING COMBINATION FIGURE NUMBERS								
	1	2	3	4	5	6	7	8	
6	BM	—	BM	BM	B	M	B	BM	
5	—	M	BM	BM	B	M	M	—	
4	B	M	BM	—	B	M	M	—	
3	—	BM	BM	—	B	M	B	—	
2	—	M	BM	BM	B	M	M	—	
1	BM	—	BM	BM	B	M	—	BM	
	9	10	11						
6	M	B	B						
5	—	—	B						
4	—	—	—						
3	—	M	—						
2	—	—	B						
1	M	B	B						
	200	201	202	203	204	205	206	207	
6	EMB	B	EBM	M	B	EBM	EBM	—	
5	—	B	EBM	EBM	M	EBM	—	EBM	
4	—	EBM	EMB	B	EMB	B	EMB	EBM	
3	—	B	EBM	EBM	M	EBM	—	EBM	
2	—	B	EBM	M	EMB	M	—	EBM	
1	EBM	EBM	EMB	EMB	EBM	EMB	EMB	—	
	208	209	210	211	212	213	214	215	
6	M	EMB	EBM	EBM	EBM	EBM	EBM	B	
5	EBM	—	M	EBM	—	M	M	—	
4	EMB	EMB	M	EBM	—	EMB	EM	EMB	
3	EBM	—	M	EBM	M	M	M	M	
2	M	EMB	M	EBM	—	M	M	EMB	
1	EMB	—	EBM	EBM	EBM	EMB	EMB	—	

TABLE A—SPRING COMBINATION FIGURE NUMBERS AND CONTACT POSITIONS (Contd)

CONTACT POSITIONS	SPRING COMBINATION FIGURE NUMBERS								
	216	217	218	219	220	221		223	
6	EBM	EMB	EMB	EMB	—	—		EMB	
5	—	EMB	B	—	EBM	EMB		M	
4	—	—	EBM	M	EBM	M		EM	
3	—	—	B	EMB	EBM	EM		M	
2	—	EMB	B	EMB	EBM	EM		EM	
1	EBM	EMB	EMB	B	EBM	EMB		M	
	224	225	226	227	228	229	230	231	
6	B	M	EMB	EMB	EMB	EBM	EBM	EBM	
5	—	EBM	EM	EBM	EMB	EBM	EBM	—	
4	EMB	B	EBM	EMB	EMB	B	B	EM—	
3	—	EBM	—	EBM	EMB	EBM	EBM	EBM	
2	B	EBM	EMB	EMB	EMB	EBM	EBM	EBM	
1	M	B	B	EBM	EMB	—	B	B	
	232	233	234	235	236	237	238		
6	M	EBM	EBM	B	—	EMB	EBM		
5	EBM	—	EBM	EMB	EBM	EMB	EBM		
4	EBM	M	—	B	EMB	B	EB		
3	EBM	M	EBM	EMB	EBM	EMB	EBM		
2	M	—	EBM	EMB	EBM	EM	M		
1	EBM	EBM	B	B	—	EMB	EBM		
	239	240	241	242	243	244			
6	—	BM	M	—	—	EBM			
5	EBM	B	BM	—	EBM	—			
4	EBM	M	M	—	EMB	EBM			
3	B	—	B	EBM	EBM	—			
2	—	B	BM	—	EMB	—			
1	—	BM	M	—	—	EBM			

TABLE A—SPRING COMBINATION FIGURE NUMBERS AND CONTACT POSITIONS (Contd)

CONTACT POSITIONS	SPRING COMBINATION FIGURE NUMBERS									
	400	401	402	403	404	405	406	407		
12	M	BM	BM	M	M	B	M	—		
11	M	BM	M	B	M	B	—	BM		
10	B	BM	M	B	M	B	M	BM		
9	B	BM	M	B	M	B	—	BM		
8	M	BM	M	B	M	B	M	BM		
7	M	BM	M	M	M	B	—	—		
6	M	BM	M	M	—	B	M	—		
5	M	BM	M	B	—	B	M	BM		
4	B	BM	M	B	—	B	—	BM		
3	M	BM	M	B	—	B	—	BM		
2	M	BM	—	B	M	B	M	BM		
1	M	BM	—	M	M	B	M	—		
	600	601	602	603	604	605	606	607	608	609
12	EMB	EMB	EMB	EMB	EM	EMB	EBM	EMB	EMB	B
11	B	B	EM	EMB	EMB	EMB	M	EMB	EMB	EMB
10	B	—	EMB	EMB	EM	EMB	—	EMB	B	B
9	B	—	EM	EMB	B	B	EBM	EMB	EMB	EMB
8	B	B	—	EMB	EMB	—	M	EMB	EMB	EMB
7	EBM	EBM	EMB	EMB	M	EBM	EBM	EBM	EBM	EB
6	EBM	EBM	EM	EMB	—	EB	—	EBM	EBM	EBM
5	M	EBM	EMB	EMB	EB	M	EBM	EBM	EBM	EB
4	M	EBM	EM	EMB	EBM	EB	M	EBM	EBM	EBM
3	M	EBM	EMB	EMB	EB	EBM	EBM	EBM	M	M
2	M	EBM	—	EMB	EB	—	EBM	EBM	EBM	EBM
1	EBM	EBM	EMB	EMB	—	EBM	—	EBM	EBM	EBM
	610	611	612	613	614	615	616	617		
12	EM	EMB	EBM	—	EMB	—	EBM	M		
11	EMB	EMB	EBM	EMB	B	EBM	M	M		
10	EM	EMB	EBM	EMB	B	EBM	EB	M		

TABLE A—SPRING COMBINATION FIGURE NUMBERS AND CONTACT POSITIONS (Contd)

CONTACT POSITIONS	SPRING COMBINATION FIGURE NUMBERS								
	610	611	612	613	614	615	616	617	
9	EMB	B	EBM	EMB	B	EBM	EB	M	
8	EM	—	EBM	EMB	EMB	EBM	M	M	
7	EMB	EBM	EBM	—	EB	—	EBM	M	
6	EM	EB	EBM	—	—	—	EBM	BM	
5	EMB	EB	EBM	EBM	EBM	EB	EBM	M	
4	EM	M	EMB	EBM	EBM	EB	EBM	M	
3	EMB	EB	EBM	EBM	EBM	EB	EBM	M	
2	EM	EBM	EBM	EBM	EBM	EB	EBM	M	
1	EMB	EBM	EBM	—	—	—	EBM	BM	
	618	619	620	621	622	623	624		
12	EBM	EMB	EMB	EBM	EMB	EBM	—		
11	EBM	EMB	B	EBM	B	EBM	EBM		
10	EBM	EMB	—	EMB	—	B	EBM		
9	EBM	B	—	EBM	—	EMB	EBM		
8	EBM	—	B	EBM	B	EMB	EBM		
7	EBM	EBM	EBM	EMB	—	BM	—		
6	EBM	B	EBM	EBM	EMB	BM	EBM		
5	EBM	B	EBM	EBM	EM	EBM	EBM		
4	EBM	M	EBM	EMB	EM	EBM	B		
3	EBM	B	—	EBM	—	M	EBM		
2	EBM	EBM	EBM	EBM	—	EBM	EBM		
1	EBM	EBM	EBM	EMB	EM	EBM	EBM		

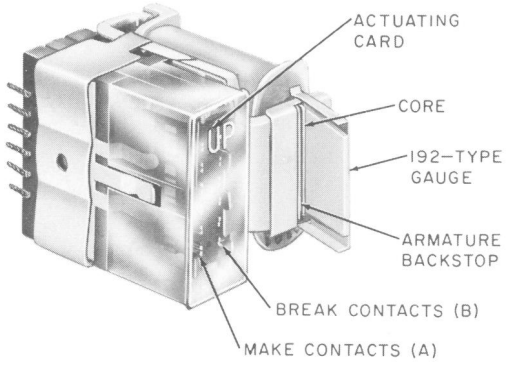

Fig. 7—Contact Gauging With 192-Type Gauge Between Core and Armature Backstop (Relay Unoperated)

3. APPARATUS

3.01 *List of Tools, Gauges, Materials, and Test Apparatus*

CODE OR SPEC NO.	DESCRIPTION
TOOLS	
510C	Portable lamp
535A	Spring adjuster
561A	Tool, straight tip
KS-6015	Pliers
KS-6320	Orange stick
KS-6854	Screwdriver
KS-19914, L1	Wedge
KS-19915, L1	Adjuster
KS-19916, L1	Magnifier
GAUGES	
185A	Gauge (nest of 186-type gauges)
185B	Gauge (nest of 186-type gauges)
191A	Gauge (nest of 192-type gauges)
70D	Gauge
70J	Gauge
MATERIALS	
—	Toothpicks, hardwood, flat at one end and pointed at the other

4. ADJUSTMENT PROCEDURES

4.01 ***Cleaning*** (Reqt 2.01):

(1) Clean the contacts and other parts of the relay in accordance with Section 069-306-801. After cleaning, check that requirements in paragraphs 2.07 and 2.08 are met.

4.02 ***Contact Cover Tightness*** (Reqt 2.02):

(1) If the contact cover is not satisfactorily held in place on the relay, remove the cover and adjust the clamps of the cover spring as required, using the 535A spring adjuster (see Fig. 8 and paragraph 1.03).

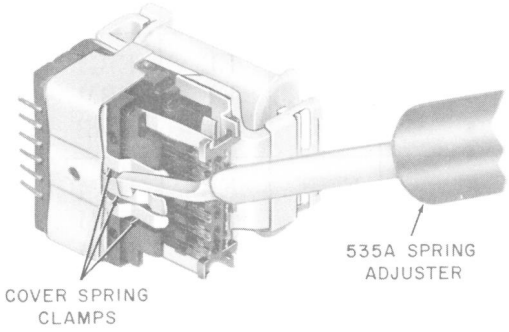

Fig. 8—Adjusting Clamps of Cover Spring

4.03 ***Contact Cover Clearance*** (Reqt 2.03):

(1) Lack of clearance between the cover and adjacent moving parts may occur if the cover is not properly mounted on the relay. If the cover is loose, increase the tension of the cover spring clamps in accordance with paragraph 4.02.

4.04 ***Armature Travel*** (Reqt 2.04):

(1) If the requirement is not met, adjust the armature backstop as necessary by expanding the slot in the backstop with the KS-6854 screwdriver (see Fig. 9) or compressing the slot with the KS-6015 pliers.

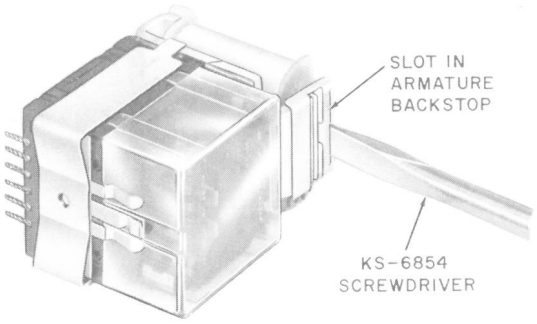

Fig. 9—Method of Adjusting Armature Backstop

4.05 ***Armature Back Tension*** (Reqt 2.05):

4.06 ***Balancing Spring Tension*** (Reqt 2.06):

(1) If the requirements for armature back tension and balancing spring tension are not met, proceed as follows: With the cover removed, block the relay operated using the KS-19914, L1, wedge (see Fig. 10). Then measure the tension of each balancing spring leg. To do this, position the tip of the 70J gauge against the lug of the actuating card at the end of the balancing spring leg as shown in Fig. 10. Move the gauge toward the actuating card until there is an observable gap between the clamp plate tab and the associated lug of the actuating card. With the gauge in this position, note the tension on the gauge.

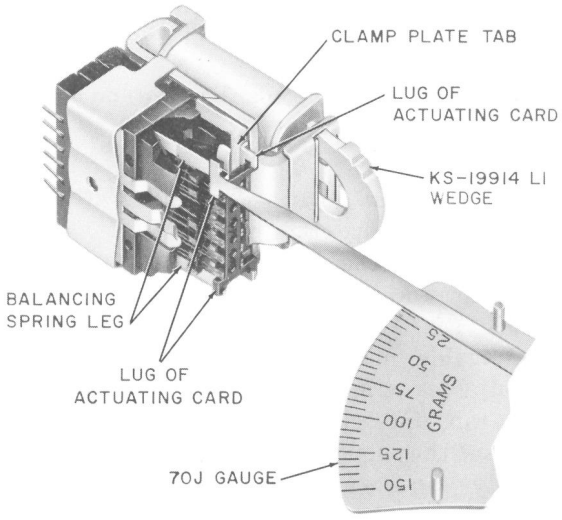

Fig. 10—Measuring Tension of Balancing Spring Leg

(2) If there is considerable difference between the tensions of the balancing spring legs, adjust the leg having the lower tension to a value approximately equal to that of the other leg, using the spring adjuster as covered in (3), (4), and (5). If the requirements are still not met, increase or decrease the tension of both legs as required in accordance with (3), (4), and (5).

(3) The balancing spring is pretensioned during manufacture by means of a bend in each leg of the spring. The bends are located to obtain parallel spring bearing surfaces against the associated areas of the moving card. To increase or decrease the tension of the spring, adjust the bend in each leg. Do not add new bends or change the location of existing bends.

(4) Place the slot of the 535A spring adjuster on the leg of the balancing spring just in back of the two projections at the end of the leg. Slide the adjuster close to the pretensioned bend in the spring (see Fig. 11). Take care not to slide the adjuster over the bend.

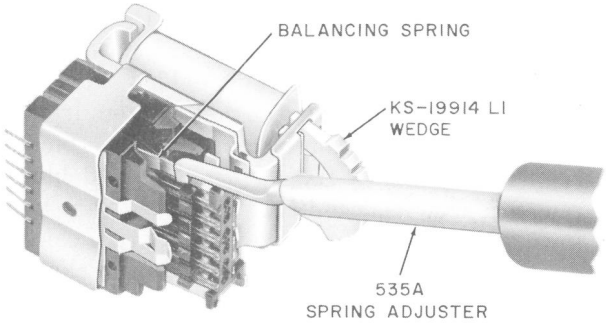

Fig. 11—Method of Adjusting Balancing Spring

(5) To increase the spring tension, move the spring slightly toward the armature using the adjuster and bend the spring slightly away from the armature while maintaining a pressure on the adjuster toward the armature. This pressure on the adjuster is necessary in order to avoid distorting the portion of the balancing spring leg to the rear of the pretensioned bend. To decrease the spring tension, bend the spring slightly toward the armature while maintaining a pressure on the adjuster away from the armature. Take care when adjusting the legs of the spring to adjust them in line with their movement and to avoid tilting the legs. Do not adjust more than necessary since repeated adjustment may injure the spring.

4.07 ***Movable Twin Spring Position*** (Reqt 2.07):

(1) If one of the twin springs of a pair overlies the other, the overlying spring is not in its proper groove in the comb. Where there is a greater space between contacts on other twin pairs, it is an indication that these springs are crossed and not in their respective grooves. In both these cases, position the springs in their respective grooves using a toothpick applied to the tip of the spring. If the springs cannot be

properly positioned, refer the matter to the supervisor.

4.08 ***Make, Break, and Sequence Contacts*** (Reqt 2.08):

4.09 ***Sequence Contacts*** (Reqt 2.09):

(1) Adjustments to meet the make, break, and sequence contact requirements are made by adjusting the position of the associated fixed spring molded block. The block is repositioned by adjusting the bracket lugs which press against the upper and lower portions of the block (see Fig. 12). In the case of 12-position relays (see Fig. 13), two fixed spring molded blocks are used. For these relays, the contact requirements are met by repositioning each molded block as required. When a fixed spring molded block is repositioned, the fixed spring contacts are moved toward or away from the movable spring contacts, depending on the adjustment of the bracket lugs. The distance that each fixed contact is moved will vary in an inverse ratio to its distance from the adjusted lug. Thus, adjustment of the lower lug will cause the greater movement of the fixed contact at position 1 or 7 and negligible movement of the contact at position 6 or 12. This relation should be considered in adjusting the contacts, and the adjustment to obtain the required result should be made with as little bending of the lugs as practicable.

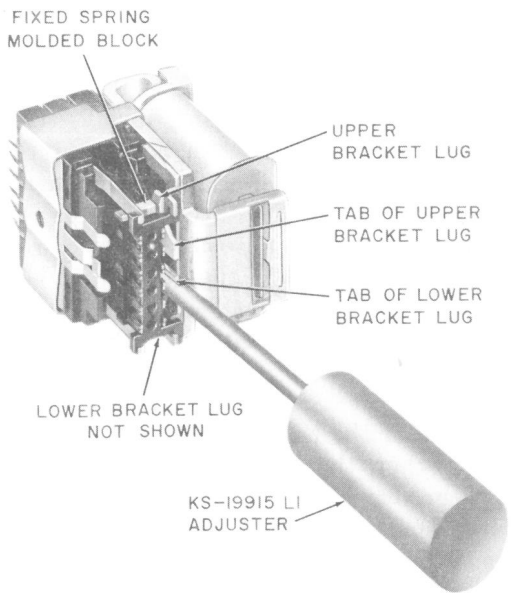

Fig. 12—Method of Adjusting Contact Separation (6-Position Relay Shown)

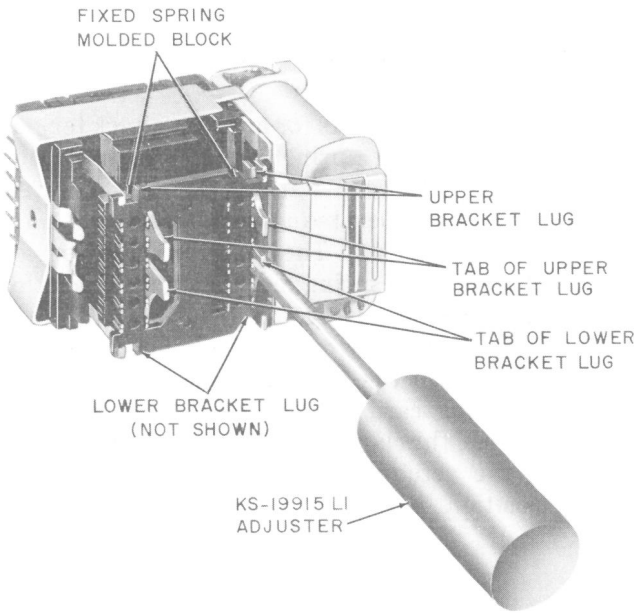

Fig. 13—Showing Tabs for Adjusting Legs on 12-Position Relay

(2) ***Make Contacts:*** To adjust the make contacts, place the KS-19915, L1, adjuster on the tab of the bracket lug to be adjusted taking care to avoid touching the contact springs (see Fig. 12). To increase the separation between the movable make and fixed contacts, rotate the adjuster slightly counterclockwise on the lower tab and clockwise on the upper. To decrease the separation, rotate the adjuster slightly clockwise on the lower tab and counterclockwise on the upper. When the contacts that require adjustment are located near the center of the relay, the best adjustment is usually obtained by adjusting both the upper and lower lugs of the bracket. After completing the adjustment, recheck the contact make and break and contact sequence requirements.

(3) ***Break Contacts:*** To adjust the break contacts, place the KS-19915, L1, adjuster on the tab of the bracket lug to be adjusted, taking care to avoid touching the contact springs (see Fig. 12). To increase the separation between the movable break and fixed contacts, rotate the adjuster slightly clockwise on the tab of the lower lug and counterclockwise on the upper. To decrease the separation, rotate the adjuster slightly counterclockwise on the tab of the lower lug and clockwise on the upper. When the contacts that require adjustment are located near

the center of the relay, the best adjustment is usually obtained by adjusting both the upper and lower lugs of the bracket. After completing the adjustment, recheck the contact make and break and contact sequence requirements.

(4) ***Sequence Contacts*** (EMBs and EBMs): To adjust the sequence contacts, proceed as covered in (2) and (3) for make and break contacts, respectively.

4.10 ***Electrical Requirements*** (Reqt 2.10):

4.11 ***Pulse Repeating Requirements*** (Reqt 2.11):

(1) To meet the operate requirement, decrease the tension in the balancing spring legs as covered in paragraphs 4.05 and 4.06. Then check that requirements in paragraphs 2.05 and 2.06 are met. If the operate requirement or requirement in paragraph 2.06 cannot be met, refer the matter to the supervisor.

(2) To meet the hold requirement, decrease the tension in the balancing spring legs.

(3) To meet the nonoperate requirement, increase the tension of the balancing spring legs to hold the armature backstop against the core.

4.12 ***Timing Requirements*** (Reqt 2.12): If the timing requirements cannot be met with the relay adjusted within the requirements covered in this section, replace the relay.