

116B1 AND 116C1 RELAY TEST PANELS FOR POLAR RELAYS DESCRIPTION AND APPLICATION

1. GENERAL

1.01 This section describes the 116B1 relay test panel used for applying electrical test and readjust requirements to the 255A polar relay and the 116C1 relay test panel which is used for testing both the 255A and 209 FG polar relays. These test panels provide a relay bias test and a relay sensitivity test.

2. EQUIPMENT FEATURES

2.01 The testing equipment, consisting principally of lever type keys, a Weston Model 269 milliammeter per KS-7419, connecting blocks, and a number of resistances, is assembled on a steel panel and arranged to mount on a standard 23 inch relay rack bay. Figs. 1 and 2 show the front of the 116B1 and 116C1 panels.

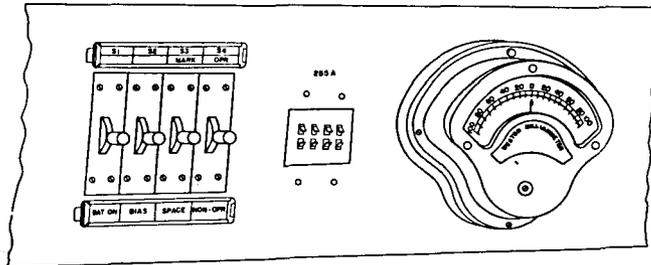


Fig. 1 - Front of 116B1 Panel

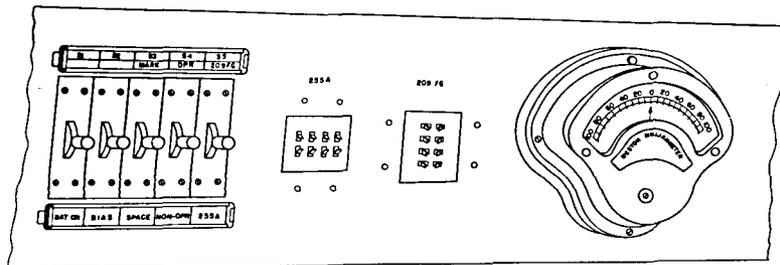


Fig. 2 - Front of 116C1 Panel

2.02 The connecting blocks are provided to accommodate the relays to be tested or adjusted on the relay test panel.

provides, in addition, a test circuit for the 209 FG relay and a key S5, with position designations 255A - 209 FG, for arranging the circuit in accordance with the relay to be tested. Ordinarily the bias test is made first and then the sensitivity test although alternate bias and sensitivity tests are often desirable.

3. OPERATING FEATURES

3.01 When using the relay test panel, the relay to be tested or adjusted is inserted into the proper connecting block.

3.03 The lever type keys, are operated in various combinations as required by the tests to be applied. The function of these keys as indicated by their designations are as follows:

3.02 The test circuit for the 255A relay is identical in the 116B1 and 116C1 relay test panels. The 116C1 panel

(a) 116B1 Relay Test Panel

- (1) Key S1 applies battery to the test circuit when operated to the BAT ON position.
- (2) Key S2 is used for making the bias test. When operated to the BIAS position a relay vibrating circuit is set up (Fig. 3) which causes the relay armature to vibrate at approximately 20 cycles per second. A circuit containing a zero-center meter is connected to the contacts of the relay to indicate per cent bias. If the needle vibrates either on the right (marking) or left (spacing) side of zero, there is bias in the relay.
- (3) Key S3 is simply a reversing switch for the sensitivity test (Fig. 5). In the sensitivity test "soak", "operate" and "non-operate" values of current are furnished to the relay windings which are connected series-aiding. When key S3 is operated to MARK the "operate" current tends to move the relay armature to the M contact. When key S3 is operated to SPACE the relay windings are reversed so that the same current tends to move the relay armature to the S contact. With key S3 in the normal position the circuit to the relay windings is open.

(4) Key S4 is used to set up the circuits to provide the proper value and direction of current for the "soak", "operate" and "non-operate" tests, (Fig. 5). When key S4 is normal (and key S3 operated to SPACE, for example), "soak" current is applied in a direction to move the relay armature to contact M. When key S4 is held to the OPR position, the polarity of the connections to the relay is reversed and a much weaker "operate" current is applied which should move the relay armature to contact S. When key S4 is held to the NON-OPR position, a still weaker or "non-operate" current is applied to the relay windings. The armature should not be operated, but should remain on contact M.

(b) 116C1 Relay Test Panel

Keys S1, S2, S3 and S4 of this panel have functions and position designations identical to the four keys just described for the 116B1 panel. The 5th key in the row, key S5, has been added to set up the proper circuit for the particular relay to be tested and has positions 209 FG and 255A.

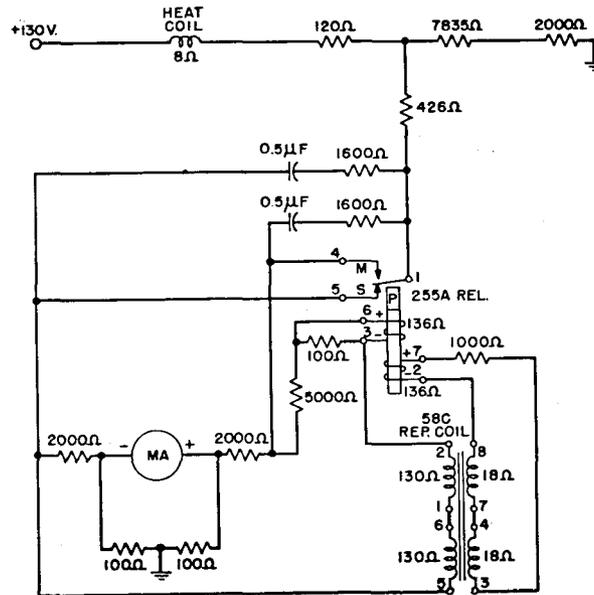


Fig. 3 - Bias Test (255A Relay)

4.01 Bias Test(a) Position of Keys

<u>116B1 Panel</u>	<u>116C1 Panel</u>
Key S1 to BAT ON	Key S1 To BAT ON
Key S2 to BIAS	Key S2 to BIAS
Key S3 Normal	Key S3 Normal
Key S4 Normal	Key S4 Normal
	Key S5 to 20G FG or 255A (de- pending on re- lay under test)

(b) With keys positioned as above the circuit is as illustrated in Fig. 3 and the relay armature vibrates at about 20 cycles through the action of the vibrating circuit. This circuit is similar to that of an ordinary buzzer except that a transformer with a secondary circuit including a relay winding is used to obtain a more accurate control of the speed of vibration.

It is seen that the operation of the relay armature from one contact to the other simply transfers battery from one side to the other of this symmetrical testing circuit. When the armature touches contact S, as indicated in Fig. 3, current from battery flows through the armature and contact S and through part of the meter circuit to ground. It also flows through winding 5-6, 1-2 of the repeat coil, through relay winding 3-6*, through the resistance of 5000 ohms and through

holds the relay armature on its marking contact.

- (1) For the 255A relay the "soak" current is 4.8 milliamperes (Fig. 5) and for the 209 FG relay (116C1 Panel) it is .924 milliampere (Fig. 6).

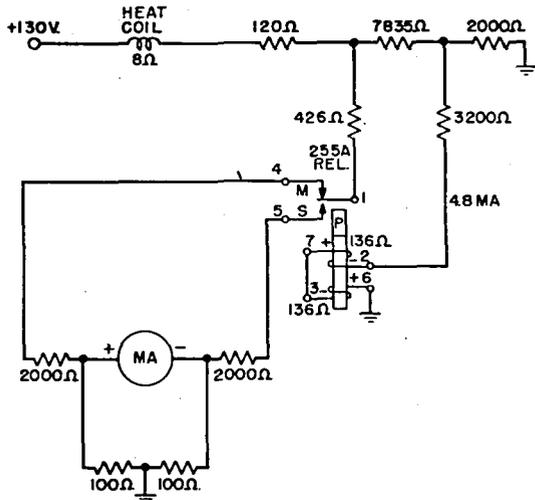


Fig. 5 - Soak Current Test (255A Relay)

- (c) When key S4 is held to the OPR position, a much lower value of current in the opposite direction to that of the soak current is applied to the relay windings which should move the armature from mark to space.

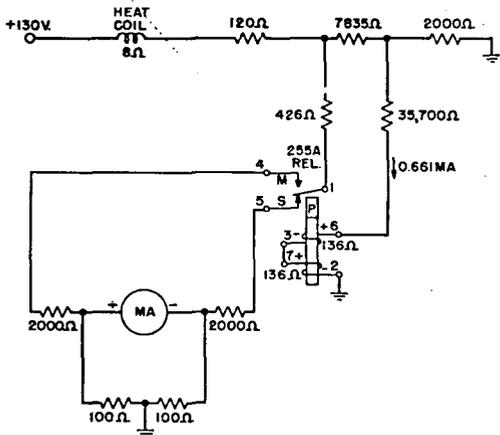


Fig. 7 - Operate Current Test (255A Relay)

- (d) When key S4 is moved to the NON-OPR position, the previous value of soak current is again applied as the key passes through its normal position and then a value of current lower in value but in the same direction

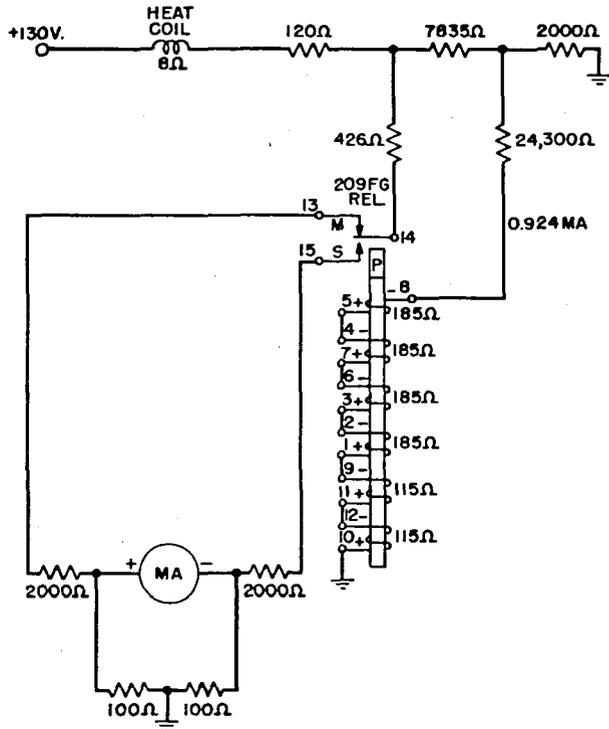


Fig. 6 - Soak Current Test (209 FG Relay)

- (1) For the 255A relay the operate current is .661 milliampere (Fig. 7) and for the 209 FG relay it is .313 milliampere (Fig. 8).

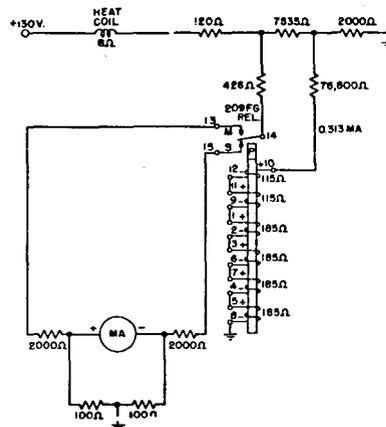


Fig. 8 - Operate Current Test (209 FG Relay)

as the operate current is applied to the relay windings and this current should not move the armature.

- (1) For the 255A relay the non-operate current is .244

milliampere (Fig. 9) and for the 209 FG relay it is .159 milliampere (Fig. 10).

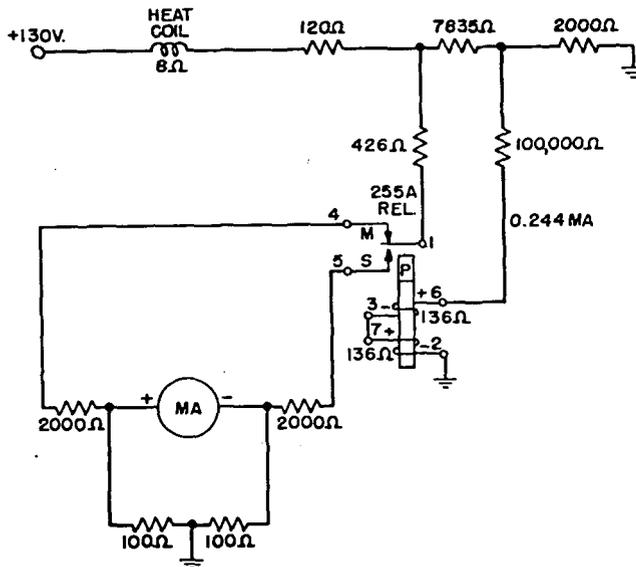


Fig. 9 - Non-Operate Current Test
(255A Relay)

(e) If the relay fails to respond when key S4 is moved to OPR, it is an indication that either or both of the pole-pieces are too close to the armature or that the armature travel is too large. If the relay responds when the key is moved to NON-OPR, either or both of the pole-pieces are not close enough to the armature or the armature travel is too small. Since the armature travel is usually set mechanically to

the proper value before this test is made, the test is essentially an indication of the proper setting of the pole-pieces.

(f) The above sensitivity tests (c), (d) and (e) should be repeated with key S3 operated to MARK. Conditions are the same as described above except that the directions of current flow in the relay windings have been reversed. The soak current will hold the armature to the S contact and the operate current will tend to move the armature from the S to the M contact.

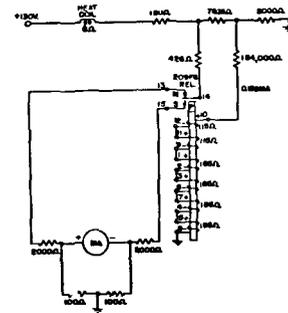


Fig. 10 - Non-Operate Current Test
(209 FG Relay)

4.04 Drawing SD-70294-01 shows the complete circuit arrangement of the 116B1 relay test panel and SD-70463-01 the 116C1 relay test panel. The corresponding equipment drawings are ED-70322-01 and ED-70648-01. A filter (A) has been added to the circuit of the 116B1 relay test panel to serve as a radio interference suppressor.