HIGH-LOW VOLTAGE RELAY
AUTOMATIC ELECTRIC COMPANY
REQUIREMENTS AND ADJUSTING PROCEDURES

1. GENERAL

1.1 This section covers the engineering requirements for the testing and maintenance of the Automatic Electric Company's high-low voltage relay.

1.2 Part 2 of this section gives the requirements for both operating tests and the inspection of the mechanical adjustments which shall be used to determine whether the relay is in the proper condition for delivery to the customer and for service. These are called ***"Test Requirements"***.

1.3 Part 3 of this section is intended for maintenance purposes only. The ***"Test Requirements"*** must be met not only at the time of delivery to the customer but at all times when operating in service. This part gives the approved maintenance methods and materials for use in making adjustments to meet the ***"Test Requirements"*** and will be called ***"Adjustments"***.

1.4 The following is a list of the tools, gauges and materials specified in part 3 for use in inspecting and adjusting the relay.

Tools, Gauges and Materials

4" Screwdriver

5" Duckbill Pliers

#72 Starrett Thickness Gauge, 26 leaves ranging from 0.0015" to 0.025"

Flat Wrench with 1/4" hex. opening

Offset Screwdriver 7" long, 7/64" offset, with blade 9/32" wide and 0.021" thick

Relay Contact Burnisher

35-C Test Set

Hardwood toothpicks, clean, flat at one end and pointed at the other

2. TEST REQUIREMENTS

2.1 Unless otherwise specified, the A.E.Co.'s High-Low Voltage Relay shall meet the test requirements given on Figure 1.

3. ADJUSTMENTS

3.01 ***General:*** It is recommended that routine tests and maintenance adjustments be made in the sequence presented in this section to prevent interference of one test or adjustment with another. Remove leads from terminals "1", "3" and "-" before making tests or adjustments and replace them when adjustments are completed.

3.02 ***Screws and Nuts:*** Any loose screws or nuts, except the two thumb screws used to regulate the spring tension and the two milled nuts used to regulate the armature travel, shall be tightened by turning in a clockwise direction, with a screwdriver or a wrench.

3.03 ***Springs:*** Contact or armature tension springs which do not meet the requirements shall be flattened with a pair of duck-bill pliers.

3.04 ***Alignment:*** Springs, contacts and bushings shall be aligned by loosening the two screws by which the spring assembly is fastened to the body of the relay, moving the springs into their proper positions, and again tightening the screws.

3.05 ***Cleaning:*** Dirty contacts shall be cleaned only when necessary and only in accordance with the following.

3.051 Clean the surfaces and sides of the contact points with a dry toothpick. To do this rub the flat end of a clean toothpick back

and forth several times between the contacts, which should at this time have a slight pressure on the sides of the toothpick, then clean the sides of the contacts with the pointed end.

3.052 Following the use of the dry toothpick, the contacts should be burnished. In burnishing normally open contacts, gently press the contacts together manually to give a slight pressure on the burnisher. In the case or normally closed contacts the tension of the springs themselves will furnish sufficient pressure on the burnisher. Usually, by rubbing the burnisher back and forth between the contacts two or three times the desired result is obtained.

3.053 Pitted contacts should be treated by inserting the burnisher between the contacts and rubbing it back and forth until the pits, if not removed, are appreciably reduced. Abrasives other than the burnisher should never be used.

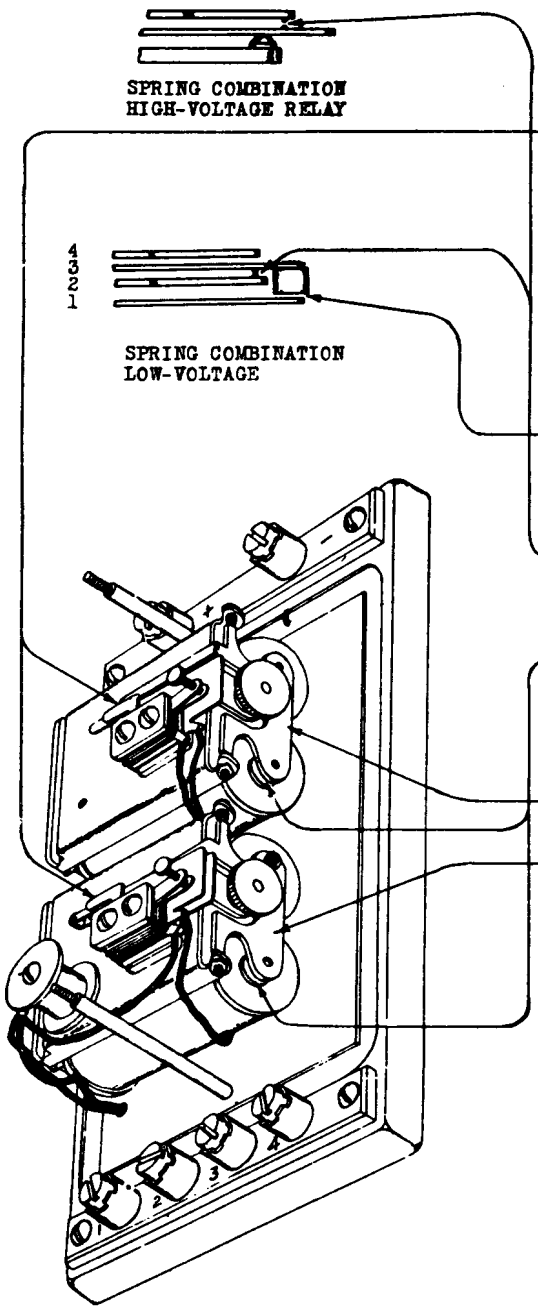
3.06 ***Clearance:*** If the clearance between spring #1 and the bushing attached to spring #3 does not come within the required limits, spring #1 shall be adjusted with the duck-bill pliers to meet this requirement.

3.07 ***Contact Separation:*** If the separation between contacts does not meet the requirements, the stationary contact arm shall be adjusted with the duck-bill pliers to secure the proper clearance.

3.08 ***Cores:*** If the coil cores do not meet the requirements, it will be necessary to replace the complete high-low relay.

3.09 ***Armature:*** The armature stroke shall be adjusted by turning the milled nut so that the required stroke, measured between the armature and the coil cores, is obtained.

3.10 ***Electrical Requirements:*** The electrical requirements shall be met by adjusting the spring tension by means of the thumb screw. The connections given in Figure 2 shall be used for testing the relay. The 35-C test set shall be used to regulate the voltage.



2.01 GENERAL - The requirements are given in the order in which adjustments should be made by the Telephone Company and are both test and readjust requirements. The voltage limits shall be 47 and 52 volts.

2.02 Screws and Nuts - All screws or nuts except the two thumb screws used to regulate the spring tension and the two milled nuts used to regulate the armature travel shall be tight.

2.03 Springs - All contact and armature tension springs shall be flat.

2.04 Alignment - All springs, contacts and bushings shall be so aligned that the contacts will not be out of line more than one-third of their diameter, and that the bushings will strike the springs squarely and approximately in the center.

2.05 Cleaning - Contacts shall be clean.

2.06 Clearance - There shall be a clearance of not less than 0.002" and not more than 0.004" between spring #1 and the bushing attached to spring #3.

2.07 Contact Separation - The separation between contacts in the open position shall be approximately 0.020".

2.08 Cores - The coil cores of each relay shall be equally distant (visual check) from the armature in its operated position.

2.09 Armature

2.091 High Voltage Relay - The armature shall have a stroke of approximately 0.045" but shall not strike the cores.

2.092 Low Voltage Relay - The armature shall have as short a stroke as possible and shall just fail to strike the cores when operated on 52 volts with the 1000 ohm resistance coil short circuited. (The stroke may vary considerably but will probably be near 0.030").

2.10 Electrical Requirements

2.101 High Voltage Relay - The armature shall operate on 52 volts but shall not operate on 51.5 volts.

2.102 Low Voltage Relay - After being operated on 47 volts with the 1000 ohms short-circuited, the relay in series with the 1000 ohms shall not remain operated on 47 volts, but after being operated on 47.5 volts with the 1000 ohms short-circuited the relay in series with the 1000 ohms shall remain operated on 47.5 volts.

Fig. 1 – Test and Readjust Requirements for the A.E.CO's. High-Low Voltage Relay

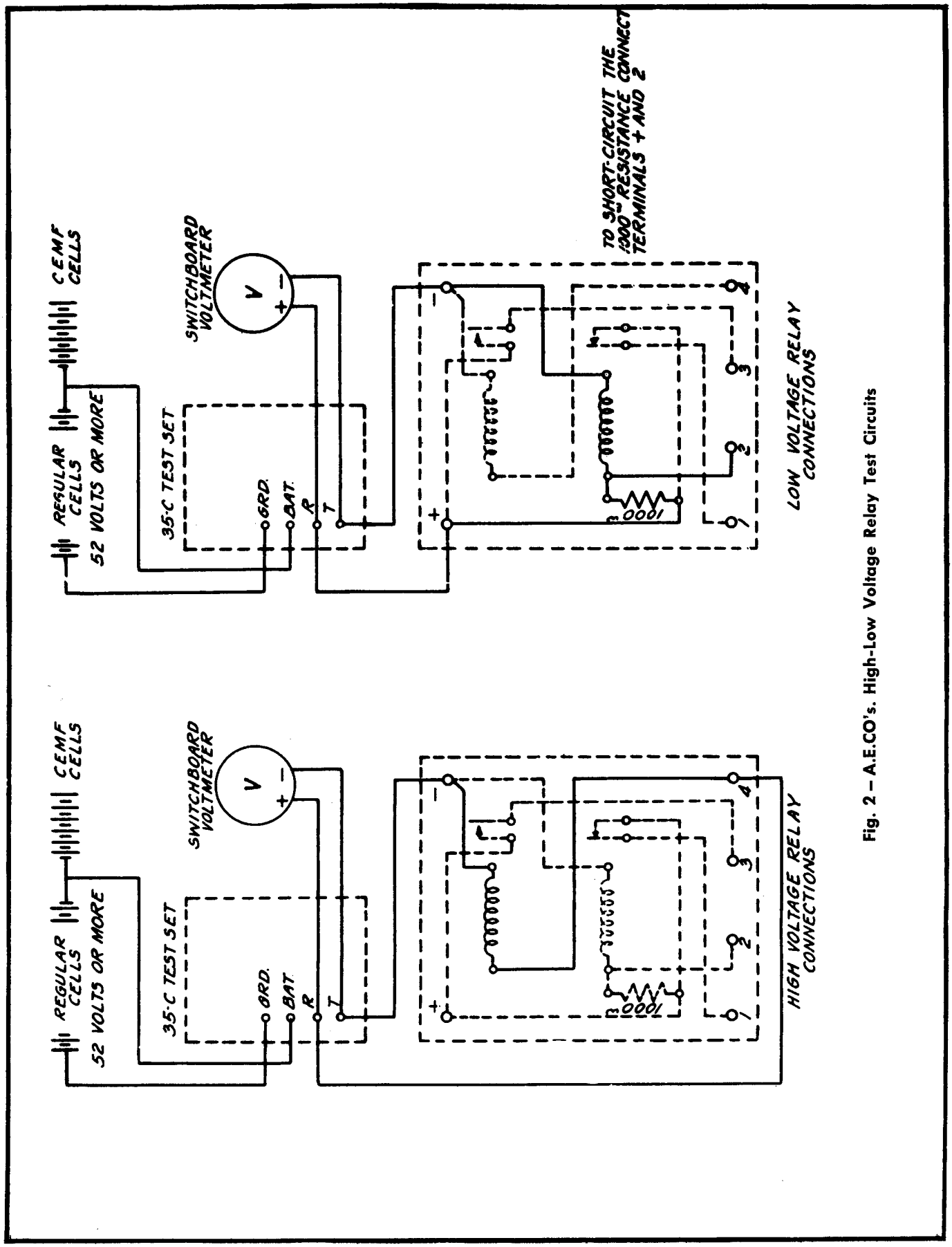


Fig. 2 – A.E.CO's. High-Low Voltage Relay Test Circuits