RELAYS

KS-5656 AND KS-5658

REQUIREMENTS AND ADJUSTING PROCEDURES

1. GENERAL

1.01 This section covers two Allied Control Co., Inc. double coil, multicontact relays, KS-5656 and KS-5658. The former has two similar coils, wound on two cores, connected permanently together. The latter uses a single core on which are wound a normal shunt coil and, opposing it, a series coil, one end of which is connected to one of the contacts.

1.02 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.

1.03 Requirements and associated procedures marked with a number sign (#) need not be checked by the installer unless it is thought that the requirement is not being met or performance indicates that such a check is advisable.

1.04 Requirements marked with an asterisk (*) need not be checked during maintenance unless the apparatus or part is made accessible for other reasons, or performance indicates that such a check is advisable.

1.05 For the purpose of this section, whether contacts are normally open (NO) or normally closed (NC) depends on the position of these contacts when no operating current is flowing in the coil and not on the position the contact may normally be in for a particular application. NO contacts and NC contacts are sometimes known as front and back contacts, respectively.

1.06 A relay is said to operate when the armature has moved sufficiently for NC contacts to open and NO contacts to close with reliable contact.

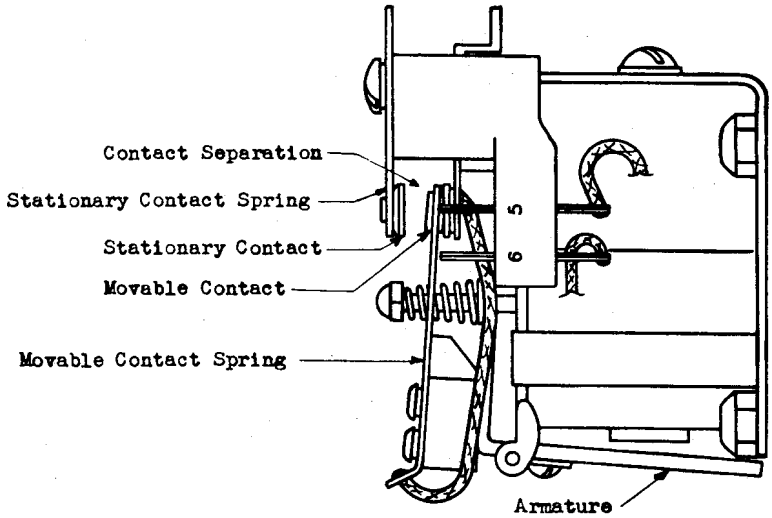
1.07 A relay is said to release when the armature has moved sufficiently for NO contacts to open and NC contacts to close with reliable contact.

1.08 With specific reference to the KS-5658 relay, it is said to hold, if, after it has operated under the influence of its shunt coil it does not release within the limit specified, under the influence of current in its series coil so poled as to oppose the effect of the current in its shunt coil.

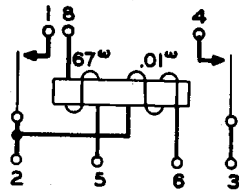
1.09 When work is done on a relay in an operating circuit, see that service is maintained. Do not touch at the same time live terminals or parts which are at different potentials, or otherwise short circuit them.

2. REQUIREMENTS

2.01 Relay Mounting: The relay shall be fastened securely to its mounting. The component parts shall be held together securely. Gauge by feel.



End View



Connection Diagram

Fig. 1 - KS-5658 Relay

2.02 Contact surfaces shall be clean and free from build-ups. Gauge by eye.

2.03 Contact Alignment

(a) Each pair of contacts of unequal diameter shall be aligned so that the periphery of the smaller lies entirely within the corresponding periphery of the larger. Where the diameters are approximately equal, the overlap shall not exceed
Maximum 1/32"
Gauge by eye.

2.04 Contact separation between movable and stationary contacts shall be
Minimum 0.025"
Use thickness gauge.

2.05 Contact Sequence

(a) All NO contacts shall make and break approximately simultaneously.

(b) All NC contacts shall break and make approximately simultaneously.
Gauge by eye.

2.06 Contact pressure with contacts closed shall be
KS-5656 35 grams minimum
KS-5658 50 grams minimum
Use tension gauge.

2.07 Electrical Requirements

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

(b) Where electrical requirements are not specified in the circuit requirements table, the relay shall meet the following:

KS-5656 - List 1

Operate 0.060 amp.

KS-5658 - List 1

	Shunt Coil	Series Coil
Operate	0.115 amp.	0.0 amp.
Hold	0.168 amp.	5.4 amp.
Release	0.168 amp.	7.0 amp.

Use 35 type test set and locally wired checking circuit.

(c) Check of electrical requirements may be at the temperature at which the relay is found by the test man, unless H (hot) or C (cold) is specified in the circuit requirements table.

(d) Where H is specified in the circuit requirements table without heating instructions, the relay coils shall be energized for at least one hour prior to the test.

(e) Where C is specified in the circuit requirements table without cooling instructions, the relay shall be deenergized for at least 2 hours prior to the test.

*#2.08 Temperatures: If the temperature is thought to be excessive, measure with thermometer. The temperature of the coils and contacts shall not exceed
Maximum 105C(221F)

3. ADJUSTING PROCEDURES

3.001 List of Tools, Gauges, Materials and Test Apparatus (Equivalents may be substituted if desired.)

Tools

Burnishing tool, No. 265C
Clip, No. 365 tool (2 req'd per cord for strapping)
Cord, No. 1W13A
Pliers, duck-bill, KS-6015
Screwdriver, KS-6854
Screwdriver, 3" cabinet

Gauges

Ammeter, d-c, Weston Model 280, ranges 30-3-1.5
Gauge, No. 68B, 70-0-70 grams
Gauge, push-pull tension, No. 79C, 200 grams
Gauge, nest thickness, KS-6909
Thermometer, R1032, Detail 1 or 2
Voltmeter, d-c, Weston Model 280, ranges 150-60-3 or 180-60-3

Materials (See Sections 065-330-101 and 065-370-101.)

Bond paper, KS-7187
Cloth, abrasive, 150 grade
Cloth, cleaning, twill jean, D-98063
Pad, felt
Spirits, petroleum

Test Apparatus

Test set, 35 type

3.002 Strapping and Insulating: To maintain service while work is being done affecting closed contacts of working circuits, bridge the current-carrying contacts, making the connections at the most convenient points in the circuit other than at the relay, if practicable. No.1W13A cords (3'-0") with No. 365 clips at each end are suggested for strapping. No.1W13B cords (6'-0") or KS-6278 clips are equally satisfactory, as are also lengths of No. 14 wire with KS-6780 clip or universal test clips (Graybar Catalogue). Bond paper should be used for insulating live parts, including open contacts, and should be shaped or bent as necessary to provide protection with a minimum of interference with the work being done.

3.003 General Procedure

(1) It is recommended that requirements be checked and any required adjustments be made in the order outlined in the following paragraphs.

(2) When checking mechanical requirements and readjusting, the relay should be disconnected from the power supply if possible. Where it is not possible to disconnect the relay from the power supply, bridge around contacts (see 3.002), insulate between contacts with a strip of bond paper, and disconnect leads, as necessary in order to maintain circuit conditions unchanged. If it becomes necessary to remove the relay from its mounting in order to obtain access to the parts, proceed as follows. Disconnect all power supply from the relay windings and contact circuits by opening switches, if provided, or by removing the fuse or fuses. Then unsolder the leads from the relay terminals and remove the mounting screws with the 3" cabinet screwdriver.

Caution: Use care when working in close quarters with live parts.

3.01 Relay Mounting (Rq.2.01)

(1) Tighten loose mounting screws with the 3" cabinet screwdriver. The various screws on the relay itself can be tightened with the KS-6854 screwdriver.

3.02 Contact Surfaces (Rq.2.02)

(1) In working circuits, contacts which are closed and carrying current which should not be broken, should be bridged. (See 3.002.) In working circuits, contacts which are open and should not be closed shall be kept separated by inserting a strip of bond paper between the movable and stationary contacts or a lead shall be disconnected. To close an NO contact, hold the armature against the pole face, being careful not to force the armature out of alignment. NC contacts of a relay which is found operated in a working circuit may be closed by opening one connection to the coil after first bridging or insulating the other contacts, as necessary.

(2) The purpose of cleaning contacts is to remove any gummy or dirty substance that would interfere with reliable contact. It is not necessary or desirable to keep contacts polished or shining. Clean contacts by wiping with a cloth moistened with petroleum spirits, followed by a dry cloth.

(3) There shall be as little smoothing of contacts as is consistent with satisfactory operation. Contacts should be smoothed while closed. For contacts disconnected from the power supply, insert a burnishing tool or strip of abrasive cloth (with contacts connected to the power supply, use abrasive cloth only) between the contacts to be cleaned, and draw it back and forth until the build-ups are reduced enough to insure satisfactory operation. Then clean the contacts as outlined in (2) above.

(4) Contacts which are badly worn should be replaced. With the KS-6854 screwdriver, remove the pair of contacts with their associated springs, and replace them with a new pair.

3.03 Contact Alignment (Rq.2.03)

(1) Shape, with pliers, a contact spring that is slightly bent. Any contact spring that becomes badly bent out of shape should be removed and reshaped, or replaced with a new contact spring.

(2) A contact which is not bent can be aligned by loosening the attaching screws and moving the contact into alignment. Retighten the screws.

3.04 Contact Separation (Rq.2.04)

(1) The contacts must be disconnected from the power supply when checking separation with the thickness gauge.

(2) To correct contact separation, adjust the movable contact spring with the duck-bill pliers, as required. After correcting, check 2.03, 205, 2.06, and 2.07.

3.05 Contact Sequence (Rq.2.05)

(1) If the contacts on opposite sides of the armature do not make or break approximately simultaneously, look for contact springs which have become bent. Correct by reshaping contact springs with the pliers as required to bring them into alignment with the others of the group. Check the other requirements after any change.

3.06 Contact Pressure (Rq.2.06)

(1) In readjusting, it is desirable to have as much tension as possible on the various springs consistent with meeting other requirements. In adjusting the contact springs, tension the corresponding springs of the assemblies on both sides of the armature so that the tensions are approximately equal. Either the fan type gauge or the push-pull tension gauge may be used for measuring contact pressures. When

access to the contact springs is impossible with the fan type gauge, the push-pull gauge must be used. When one contact spring is reshaped or otherwise changed, or when the position of a stationary contact is changed, recheck the contact pressure on all the contacts on the relay.

(2) To measure the contact pressure of the NO contacts, hold the armature securely against the pole face, taking care not to force the armature out of alignment. Place the gauge against the contact spring as near to the moving contact as possible and exert a pressure with the gauge away from the stationary contact. Read the gauge as the moving contact leaves the associated stationary contact.

(3) To measure the contact pressure of the NC contacts, proceed in a manner similar to that outlined above but allow the armature to be held in its nonoperated position by its spring.

(4) The contact pressure may be adjusted by tensioning the contact springs, as required, with the pliers. The armature spring tension is not adjustable.

3.07 Electrical Requirements (Rq.2.07)

(1) A check of the operation of a voltage-rated relay is made by connecting a voltmeter across the coil terminals. If there is no reading on the voltmeter, a study of the associated circuit is necessary to find whether the absence of voltage indicates a circuit fault or is a condition to be overcome by blocking a relay or otherwise changing circuit conditions. Failure to operate with rated voltage at the coil terminals may sometimes be corrected by readjustment, but in some cases it may be due to an open coil. To check for an open coil, connect the voltmeter in series with the operating voltage and the coil. No reading on the voltmeter when connected in series, after a reading when connected in parallel with the coil, indicates that the coil is open and should be replaced.

(2) When readjusting or when checking for any electrical requirement except the check of operation discussed in (1) above, the relay should be disconnected from the working circuit if possible. Where this is not possible, bridge around contacts and insulate between contacts, as necessary in order to maintain circuit conditions unchanged. Disconnect all coil terminals before making test connections discussed below.

(3) Where test set preparation has not been specified in the circuit requirements table it is suggested that all relay coil terminals be disconnected and both battery and ground be furnished through the test set with B/G preparation.

(4) To check the KS-5658, List 1, relay for hold and release, connect the 35 type test set to terminals 8 and 5 in the usual manner and set up a circuit consisting of a 2-volt storage battery, a switch, rheostat, ammeter, and terminals 2 and 6, in series, making the polarity of terminal 2 the same as that of terminal 8. Any battery switch (Graybar Catalogue) will suffice and it is suggested that a 38-A, 42-A, or 43-A rheostat be used. This connection gives current in the series coil oppcsing that in the shunt coil, which is the normal circuit condition.

(5) Operate, hold, and release adjustments may be made by changing contact pressures, but in no case should the pressure be less than the specified minimum.

(6) Usually, the armature pulls all the way up to the core when the operate current is applied. If it does not, it may be an indication of excessive contact pressure of the NO contacts, a bind in the hinge structure, or an obstruction in the armature gap. If necessary, reduce the contact pressure as outlined in 3.06, exercising care not to change the contact sequence.

(7) If the relay does not release on open circuit, check the armature for binding and clean or replace it. Check the armature spring to see that it has sufficient tension to return the armature to the nonoperated position. Replace the relay if the tension is insufficient.

(8) When any change is made in mechanical settings during adjustment for electrical requirements, recheck the mechanical requirements.

*#3.08 Temperature (Rq.2.08)

(1) Hold the bulb of the thermometer against the hottest spot in question, covering that part of the bulb not in contact with the relay by a piece of felt or the equivalent.

(2) If the temperature exceeds the specified limits, see that 2.01, 2.02, 2.03, and 2.06 are met. If these requirements are met and the temperature is still above the specified limit with nameplate rated voltage not exceeded, refer the matter to the supervisor as the coil or contact assembly may have to be replaced.