

TIME DELAY RELAY, KS-15513

1. GENERAL

- 1.01 This section covers time delay relays, KS-15513, intended for use in the J86621 control cabinet in 900-type power plants.
- 1.02 This section is reissued to revise oiling instructions on the motor and clutch pinion and to change the type of oil used.
- 1.03 Reference shall be made to Section A400.001 covering General Requirements and Definitions for additional information necessary for the proper application of the requirements listed herein.
- 1.04 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.
- 1.05 Requirements and associated procedures 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.
- 1.06 The KS-15513 timing relay contains a relay, a synchronous motor, a gear train, and a tripping mechanism. The gear train may be set for any one of three ratios. The tripping mechanism, which is adjustable for time delay, is driven by the motor through a clutch operated by the relay. The relay contacts are prevented from operating by latches which are tripped by the tripping mechanism at the end of the delay interval. When the relay coil is de-energized, the entire apparatus resets itself.
- 1.07 For the purpose of this section, whether contacts of a relay are normally open (NO) or normally closed (NC) depends on the position of these contacts when the operating coil is de-energized and not on the position the contact may normally be in for a particular application.
- 1.08 Before doing any work on this apparatus, see that service is maintained and disconnect the equipment from the power supply.

2. REQUIREMENTS

2.01 Mounting

- (a) The relay shall be fastened securely to its mounting.
- (b) Screws which hold the various parts of the relay together shall be secure.
Gauge by feel.

2.02 Contact surfaces shall be clean and free from build-ups which might interfere with reliable contact. Gauge by eye.

2.03 Contact Alignment

- (a) Each pair of contacts shall be aligned so that, when they are completely closed, the centers of the contact surfaces shall coincide, within 1/32-inch maximum. Gauge by eye.

2.04 Contact Follow

- (a) There shall be additional movement of the operating mechanism after the contacts touch. This usually results in the sliding of one contact on the other or in an increase in the contact pressure and is known as contact follow. Contact follow for the NO contacts shall be approximately 1/16 inch. For the NC contact in the motor circuit, after the right-hand contact finger engages the latch arm, the follow shall be 1/16-inch minimum and 3/32-inch maximum. Gauge by eye.

2.05 Freedom of Operation

- (a) The armature shall move freely on its hinge. Gauge by feel.
- (b) The trip mechanism shall reset promptly when the relay is released. Gauge by eye.

#2.06 Motor

- (a) The bearings shall be lubricated with Westinghouse S# 1723639 oil after every ← three years in service.
- (b) The motor shall operate to drive the gear train and tripping mechanism.
Gauge by eye.

#2.07 Gear Train and Clutch

- (a) The clutch pinion bearing shall be lubricated with one drop of Westinghouse S# 1723639 oil after every year of service. ←
- (b) When the armature is held closed, the teeth in the clutch faces shall have a full mesh and the follow of the clutch spring shall be 1/32-inch minimum and 3/64-inch maximum. Gauge by eye.
- (c) When the armature is released, the clutch faces shall have sufficient separation to prevent interference when resetting the trip discs. Gauge by eye.
- (d) The gears and gear shafts require no ← lubrication. ←

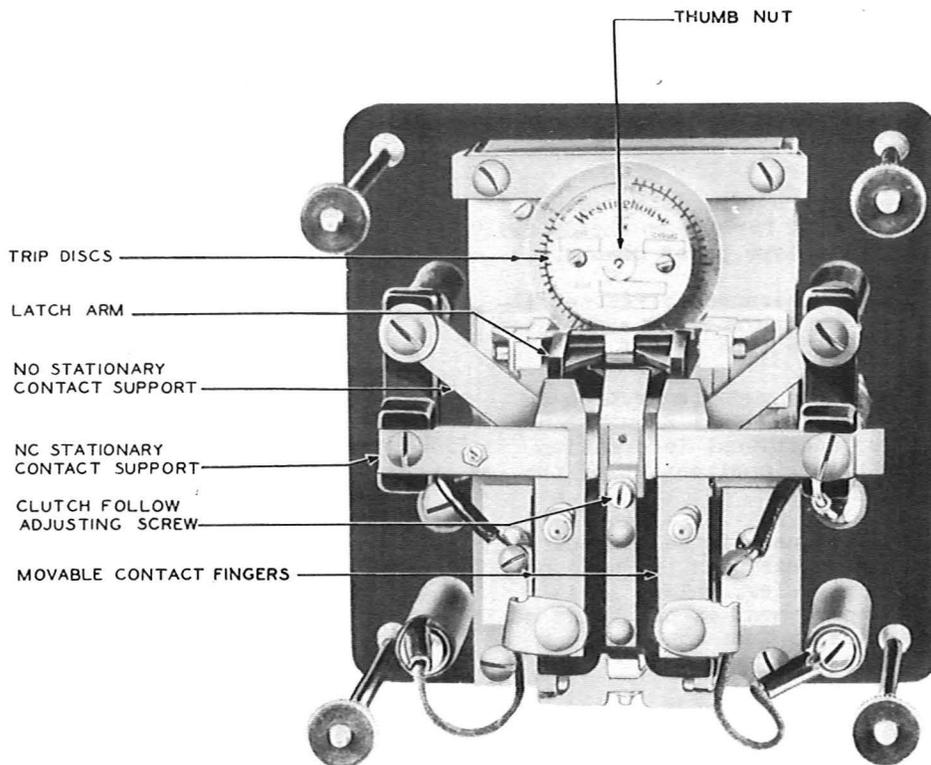


Fig. 1 - KS-15513 Relay

2.08 Time Delay and Trip Mechanism

(a) The time delay shall be as specified in the circuit requirements table or other job information. Use any available clock or watch.

2.09 Electrical Requirements

(a) The relay shall meet the electrical requirements specified in the circuit requirements table or other job information.

(b) When electrical requirements are not so specified, operation of the relay shall be checked at the minimum voltage given on the nameplate.

(c) Check of electrical requirements may be made at the temperature at which the relay is found by the testman, 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 coil shall be energized for at least one hour prior to the test.

(e) Where C is specified in the circuit requirements table, the relay coil shall be de-energized for at least 2 hours prior to the test.

*#2.10 The temperature shall not exceed

	<u>Max</u>
Motor	90C (194F)
Coil	105C (221F)
Contacts	115C (239F)

If the temperature is thought to be excessive, measure by thermometer.

3. ADJUSTING PROCEDURES

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

Tools

Brush, KS-14162

Burnisher, No. 265C

→Oilcan, 486A Tool

Pliers, duck-bill, KS-6015, 6 inches

Pliers, P-long-nose, 6-1/2 inches

Screwdriver, KS-6854, 3-1/2 inches

Test Set, 81A

→Wrench, open end, 3/4 in., such as R-5850 with
→head thickness ground down to 3/32 inch

CLUTCH PINION
BEARING LUBRICATION
POINT

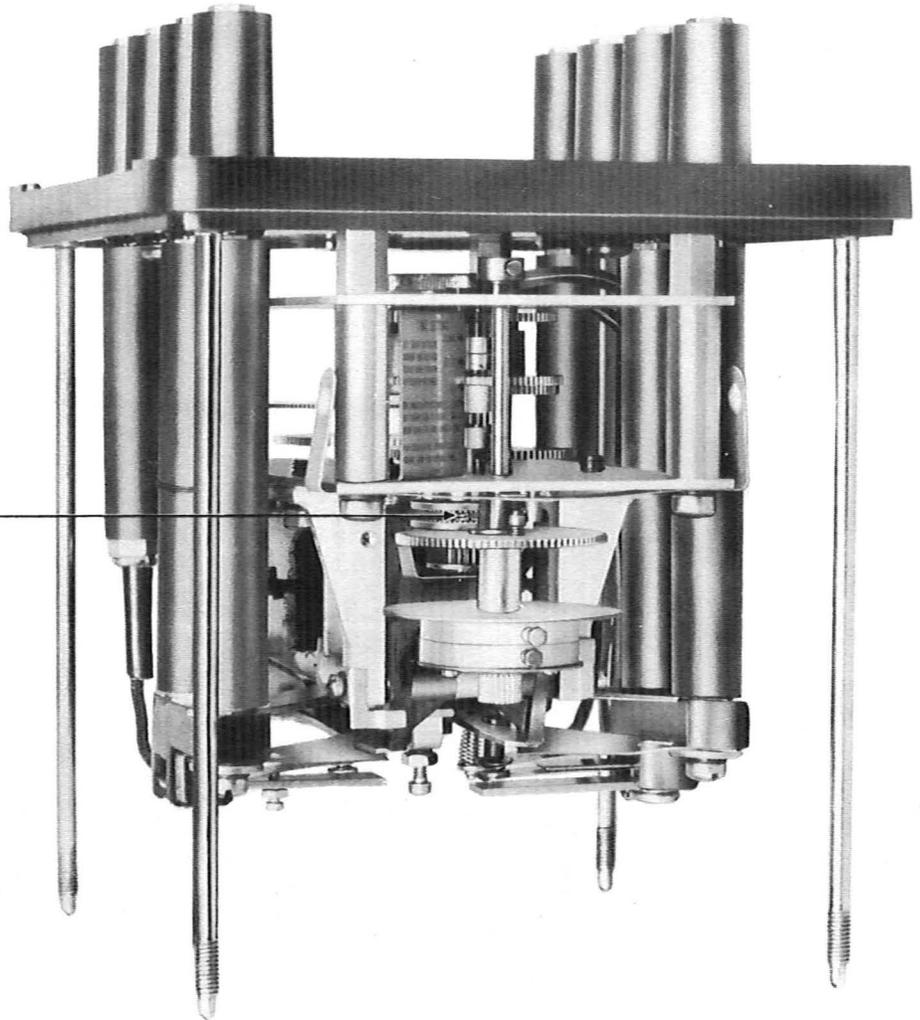


Fig. 2 - Clutch Pinion Bearing

Gauges

Clock or watch, as available

Voltmeter, ac, Weston model 528, range 300

Materials (See Sections A710.011 and A710.012)

Cloth, abrasive, 150 grade

Cloth, cleaning, twill-jean, D-98063

Oil, silicone, Westinghouse Elec. Co,
S# 1723639, 1 oz bottle, or Dow Corning
Co # 8760-1

Pad, felt

Spirits, petroleum

Test Apparatus

Autotransformer, continuously tapped,
(Variac, 2.5 amp, 230V input, Type V-5,
HMT or equivalent; General Radio Co,
Cambridge, Mass. suggested)

3.002 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 electrical requirements, lengths of No. 14 wire or of flexible cord, such as is commonly used in lighting circuits, are required. KS-6780 clips are suggested for connecting the leads to the relay.

Caution: See that this apparatus is disconnected from the power supply before handling.

3.01 Mounting (Rq 2.01)

(1) Tighten loose screws with the appropriate screwdriver.

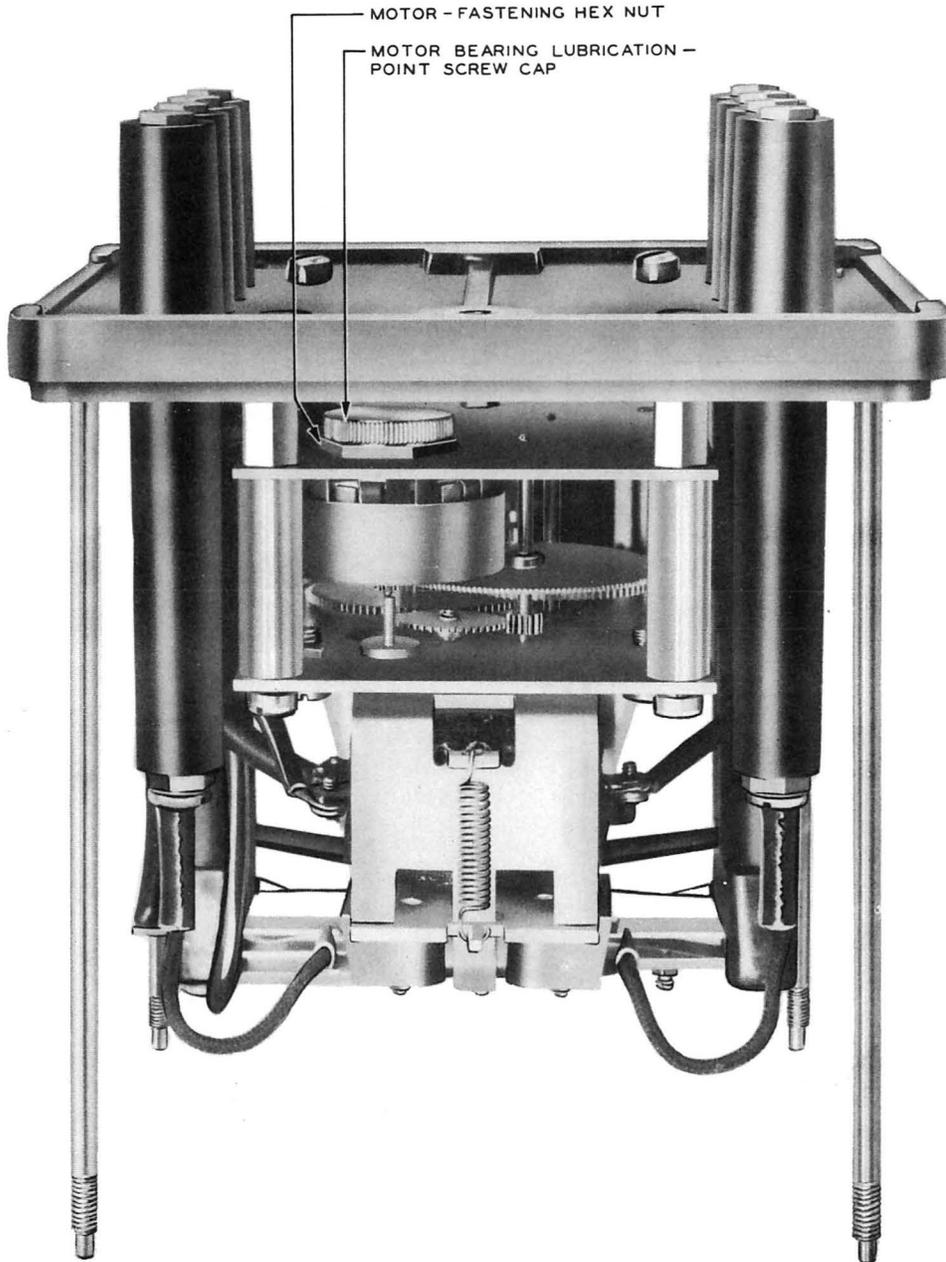


Fig. 3 - Motor Bearing

3.02 Contact Surfaces (Rq 2.02)

(1) 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 the contacts polished or shining. Clean them by wiping with a cloth moistened with petroleum spirits, followed by a dry cloth. The contacts should be disconnected from the power supply during the cleaning operation.

(2) There shall be as little smoothing of contacts as is consistent with satisfactory operation. Contacts should be smoothed while closed, when practicable. For contacts disconnected from the power supply, insert a burnishing tool or a strip of abrasive cloth (for contacts connected to power, abrasive cloth only) between the contacts to be smoothed, and draw it back and forth until the build-ups are reduced enough to insure reliable contact. Clean the contacts as outlined in (1) above after smoothing.

(3) Contacts which are badly worn should be replaced, together with their associated springs.

3.03 Contact Alignment (Rq 2.03)

(1) Correct by making necessary adjustments with pliers or by loosening screws which hold the contacts in place. Retighten the screws when the adjustment is completed. If these procedures are ineffective, the relay should be replaced.

3.04 Contact Follow (Rq 2.04)

(1) To check follow, manually operate the relay with the latch arms tripped, observing the travel of the operating mechanism after the contacts under check make contact. An 81A test set connected across the contacts will be helpful in determining the point at which they make.

(2) In general, correction for the lack of follow involves either the adjustment of contacts to increase the contact pressure or, if this is not feasible, the replacement of weakened springs or other appropriate parts, including the contacts themselves.

3.05 Freedom of Operation (Rq 2.05)

(1) To check the armature for freedom of operation, operate it manually, observing its action. Remove dirt or other obstructions.

(2) Observe the action of the trip discs and mechanism when the relay is de-energized. Look for and remove dirt.

#3.06 Motor (Rq 2.06)

(1) To conveniently lubricate the motor bearing, it is necessary to remove the relay from the panel. Shut down the associated plant or use temporary strapping as required. Remove the relay from the panel and take the relay cover off. Remove the inner cover enclosing the motor and gear train by pushing the ends of the U-shaped piece outwards and off. Hold the motor fastening nut with a thin open-end wrench to prevent it from loosening and remove the knurled bearing cap with long-nose pliers. Using a curved spout oilcan, apply oil to the motor bearing packing until it is saturated. Restore the bearing cap, tightening it firmly. Reassemble the covers and reconnect the relay to the associated plant.

(2) In the event of failure of the motor to operate, the matter should be referred to the supervisor for replacement of the motor or of the entire relay.

#3.07 Clutch and Pinion Bearing (Rq 2.07)

(1) To lubricate the clutch pinion bearing, dip a toothpick or a fine wire in the oil and apply it to the clutch shaft between the clutch discs. Avoid an excess of oil.

(2) Adjust the follow of the clutch spring by means of the adjusting screw in the front of the armature. A one-quarter turn will change the follow 1/32 inch. Too much follow will prevent the clutch from being opened positively when the relay is de-energized.

(3) If the movement of the front clutch disc along the shaft is impeded by dirt, it should be removed with a KS-14162 brush moistened with petroleum spirits.

3.08 Time Delay and Trip Mechanism (Rq 2.08)

(1) The time delay is determined by the gear ratio selected and by the setting of the trip discs. To obtain access to the gear train, remove the cover strip which is held in place by a spring. With the screwdriver, loosen the setscrew which holds an assembly of a hub and two gears to the shaft. Slide the hub along the shaft until the larger gear is opposite the arrow on the index plate corresponding to the desired time scale, for example, 5 minutes. See that there is a full mesh of the sliding gear with the appropriate fixed gear, tighten the setscrew, and replace the cover.

(2) To set the trip discs, loosen the thumb nut which locks the discs to their shaft. Rotate them until their index pins are opposite the desired scale marking. Securely tighten the thumb nut. After setting, check with a clock or watch and readjust the discs until the correct timing is obtained.

3.09 Electrical Requirements (Rq 2.09)

(1) A check of the operation of the relay is made by connecting a voltmeter across the coil terminals. If there is no indication on the voltmeter, a study of the associated circuit is necessary to determine 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. If no indication appears on the voltmeter, the coil is open and the relay should be replaced.

(2) Connect the ac supply to the input of a continuously tapped autotransformer protected by a 2-1/2- or 3-ampere fuse. Connect the relay coil and a voltmeter across

the output of the autotransformer and adjust to specified values.

(3) If the relay fails to operate at the specified minimum voltage with 2.02, 2.04, 2.05, and 2.07 met, refer it to the supervisor for replacement.

*#3.10 Temperature (Rq 2.10)

(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 with a piece of felt or the equivalent.

(2) If the temperature exceeds the specified limit, see that 2.02, 2.03, and 2.04 are met. If these requirements are met and the temperature is above the specified limit and the maximum voltage given on the nameplate is not exceeded, refer the matter to the supervisor as the affected part or the entire relay may have to be replaced.