TIME-DELAY RELAY, KS-15513
WESTINGHOUSE ELECTRIC CORPORATION
REQUIREMENTS AND ADJUSTING PROCEDURES

1. GENERAL

1.01 This section covers time-delay relay, KS-15513, manufactured by Westinghouse Electric Corporation. The relays are primarily used with the 900-type power plant control circuits.

1.02 This section is reissued to cover a general revision of the requirements and procedures. Detailed reasons for reissue will be found at the end of the section. Since this section covers a general revision, the arrows ordinarily used to indicate changes have been omitted.

1.03 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.

1.04 ***Asterisk:*** Requirements are marked with an (*) when to check for them would necessitate dismantling or dismounting of apparatus, or would affect the adjustment involved or other adjustments. No check need be made for these requirements unless the apparatus or part is made accessible for other reasons, or its performance indicates that such a check is advisable.

1.05 The KS-15513 time-delay relay consists of 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.

1.06 Two different designs of the KS-15513 time-delay relay manufactured by the Westinghouse Electric Corporation are in use in the field. The earlier design requires removal from the panel for the lubrication of the motor bearing while the later design is equipped with an oiling device which provides means for the lubrication of the motor bearing without removing the relay from the panel. The oiling device can be installed on the earlier design in accordance with Section 040-664-811.

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 ***One drop of oil*** for the purpose of this section, is the amount of Westinghouse Electric Corporation No. S-1723639 oil discharged from the nozzle of the No. 486A oilcan when the sides of the can are depressed once and held depressed until the drop is released from the nozzle.

1.09 Because of the relatively high voltage on the terminals, all requirements except the electrical requirements should be checked, and all adjusting procedures performed with the associated circuit removed from service except the procedure for the lubrication of the motor bearing of the KS-15513 time-delay relay equipped with an oiling device. When the relays are in main control cabinets, take them out of service as covered in the section covering the operating methods. When checking the electrical requirements, see that the contacts are disconnected from the associated circuit.

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

1.10 To check or adjust for any requirement, remove the thumb nuts and remove the cover.

2. REQUIREMENTS

2.01 ***Mounting of Relay and Cover***

(a) The relay shall be fastened securely to its mounting.

Gauge by feel.

(b) Thumb nuts shall hold the relay cover securely in place.

Gauge by feel.

2.02 ***Cleaning***

(a) Contacts shall be cleaned when necessary as covered in Section 069-306-801.

(b) Other parts shall be cleaned when necessary in accordance with approved procedures.

2.03 ***Lubrication***

(a) Fig. 2(A)—The clutch pinion bearing shall be adequately lubricated with the Westinghouse Electric Corporation No. S-1723639 oil. When lubrication is necessary, one drop of oil shall be applied to the clutch shaft between the clutch discs.

*(b) Fig. 3(A) — The motor bearing of the relay not equipped with an oiling device shall be adequately lubricated with the Westinghouse Electric Corporation No. S-1723639 oil. When lubrication is necessary, the oil shall be applied to the bearing packing.

(c) Fig. 4(A) — The motor bearing of the relay equipped with an oiling device shall be adequately lubricated with the Westinghouse Electric Corporation No. S-1723631 vial. When lubrication is necessary, the oil shall be applied to the oiling device.

(d) ***Recommended Lubrication Intervals:*** It is recommended that the clutch pinion bearing be lubricated at intervals of 12 months and the motor bearing at intervals of 36 months. These intervals may be extended if periodic inspections have indicated that local conditions are such as to insure that requirements (a), (b), and (c) are met during the extended intervals.

2.04 ***Record of Lubrication:*** During the period of installation, a record shall be kept by date of the lubrication and this record shall be turned over to the telephone company with the equipment. If no lubrication has been done, the record shall so state.

2.05 ***Freedom of Operation***

(a) The armature shall move freely on its bearings.

Gauge by feel.

To check this requirement, manually operate the armature.

2.06 ***Contact Follow***

(a) There shall be a follow of the NO contacts of

1/16 inch

after making contact.

Gauge by eye.

To check the requirement, manually operate the relay with the latch arms tripped observing the travel of the contacts after they make.

(b) There shall be a follow of the right-hand NC contacts (motor circuit) of

Min 1/16 inch
Max 3/32 inch

after making contact.

Use the R-8550 scale.

To check the requirement, proceed as follows. Manually operate and hold operated the relay with the latch arms tripped. Hold the R-8550 scale horizontally at right angles to the right-hand NC contact spring assembly, place the scale on the edge of the contact support. Position the calibrated edge of the scale over the center of the contacts. Make sure that the end of the scale will not interfere with the movement of the contact springs and the armature. Slowly release the armature observing the travel of the contacts after they make. When in doubt use the KS-14250, L1 flashlight to determine the point at which the contacts make. To use the flashlight, connect the terminals of the flashlight by means of No. 1W13B cords to the contact spring supports at the end near the contact spring assembly mounting screw.

2.07 ***Separation Between Latch Arms and Contact Fingers:*** When the armature is released, the separation between the end of the

latch arms and the movable contact fingers shall be

Min 0.015 inch

Use the R-8550 scale.

2.08 ***Operation of Clutch***

(a) The clutch discs shall fully mesh after the relay is operated but before the armature has reached the limit of its stroke.

Gauge by eye.

To check operate the armature manually and note that the teeth of the clutch discs fully mesh.

(b) After the clutch discs fully mesh, there shall be follow of the clutch spring of

3/64 inch

Gauge by eye.

To check operate the armature manually and note that after the clutch discs fully mesh there is further movement of the clutch spring.

(c) When the armature is released from the operated position, there shall be clearance between the clutch discs such that the trip discs will reset without interference.

Gauge by eye.

(d) With the front clutch disc at the limit of its outward travel there shall be perceptible clearance between the clutch spring and the washer at the front of the clutch pinion and between the clutch spring and the dial plate.

Gauge by eye.

2.09 ***Operation of Trip Mechanism:*** The trip mechanism shall reset promptly when the armature is released.

Gauge by eye.

2.10 ***Operation of Motor:*** The motor shall operate to drive the gear train and tripping mechanism.

Gauge by eye.

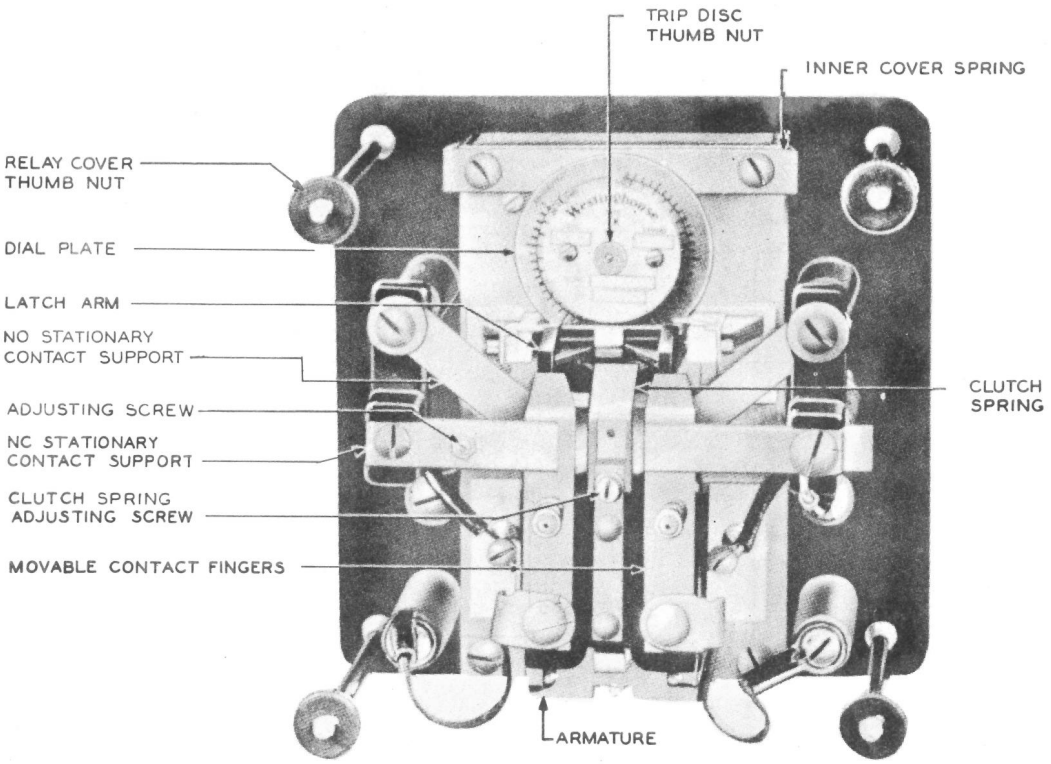

Fig. 1 – KS-15513 Time-delay Relay

2.11 ***Timing Requirements***: The time delay shall be as specified on the circuit requirement table or other job information.

Use any available clock or watch.

2.12 ***Electrical Requirements***

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

2.13 ***Temperatures:*** The temperature shall not exceed the following values.

	MAX
Motor	90C (194F)
Coil	105C (221F)
Contacts	115C (239F)

Use the Kimble thermometer.

If the temperature is thought to be excessive, check as follows. Hold the bulb of the thermometer against the hottest spot in question, covering that part of the bulb not in contact with the apparatus by a piece of felt, or the equivalent.

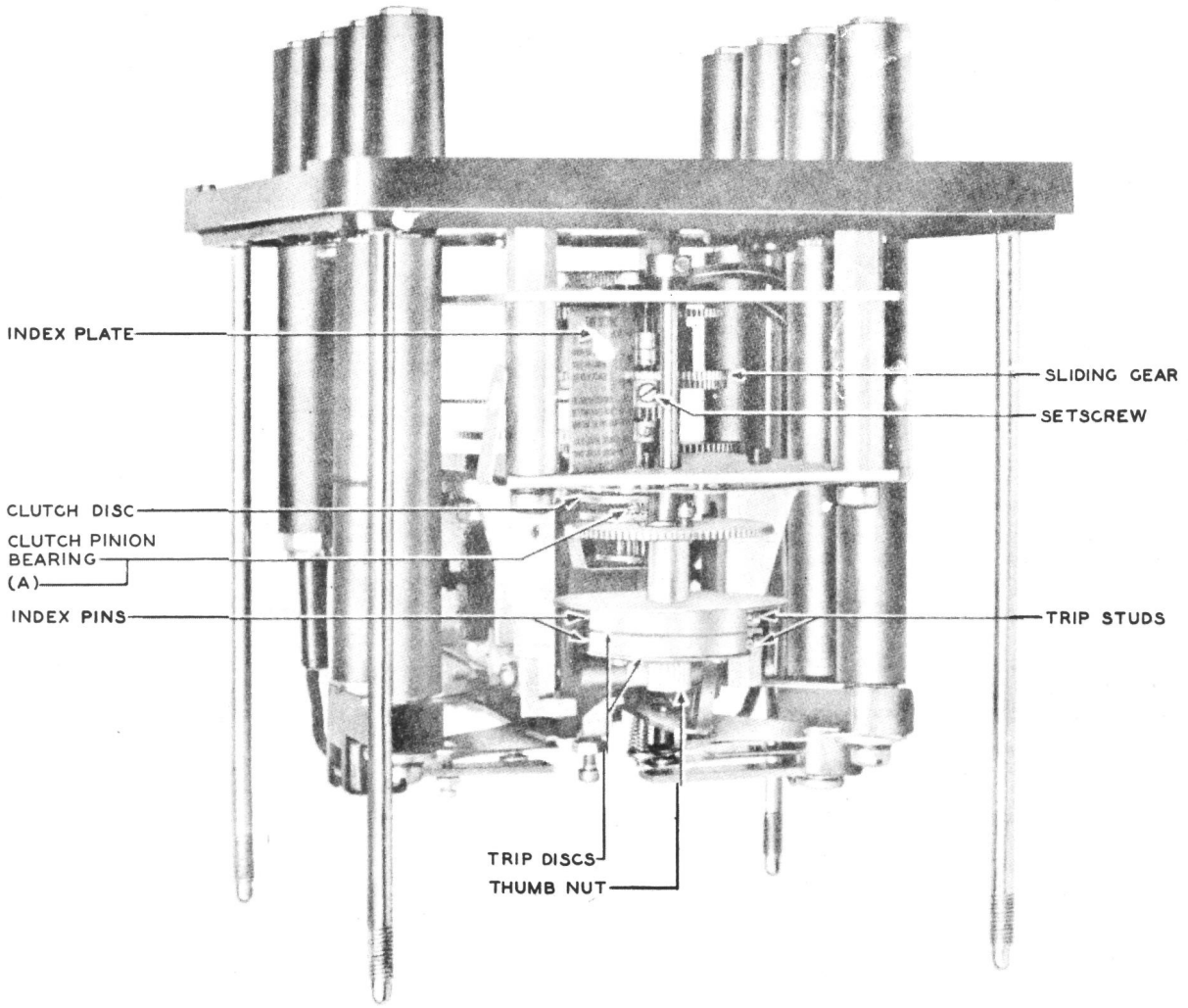

Fig. 2 – Clutch Pinion Bearing

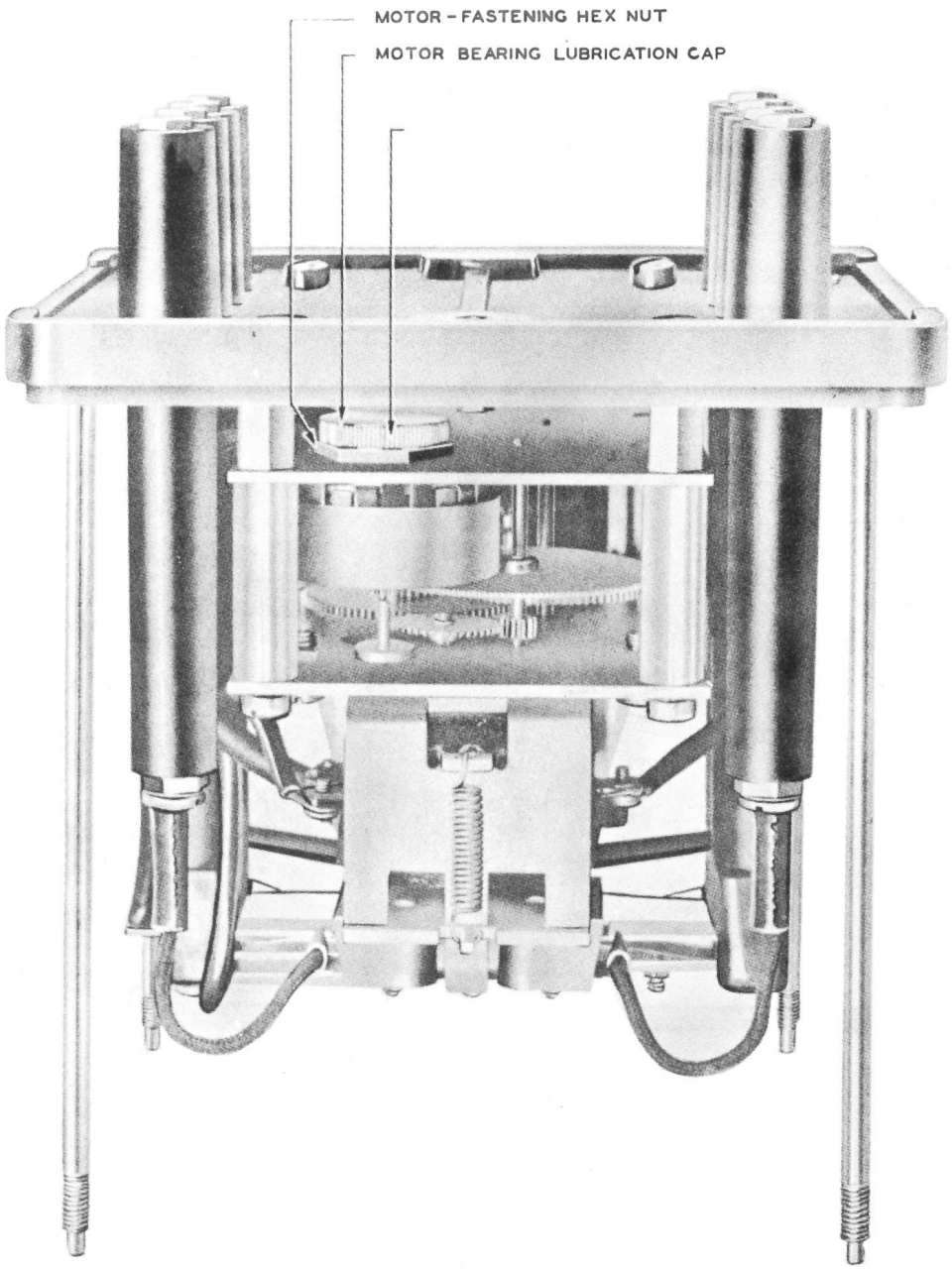

Fig. 3 – Motor Bearing

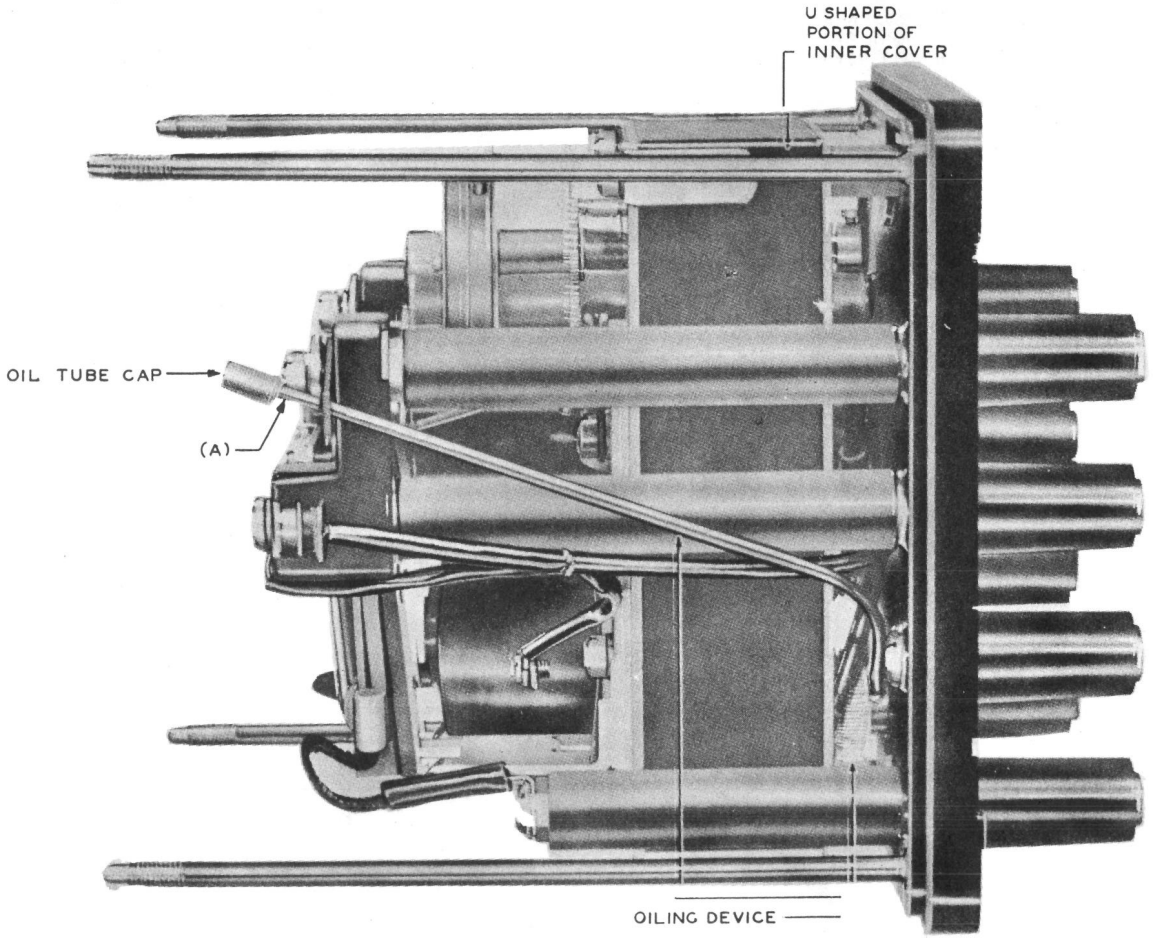

Fig. 4 – KS-15513 Time-delay Relay Equipped With an Oiling Device

3. ADJUSTING PROCEDURES

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

CODE OR SPEC NO.	DESCRIPTION
TOOLS	
265C	Contact Burnisher Holder
388A	3/16- and 1/4-inch Open Double-end Offset Wrench
485A	Pliers
486A	Oilcan
KS-6854	Screwdriver
KS-14162	Brush
KS-14250, L1	Flashlight
R-5850 (Modified)	3/4-inch Open-end Wrench, With Head Thickness Ground Down to 3/32 inch
—	6-1/2-inch P-Long-nose Pliers
—	4-inch Regular Screwdriver
—	5-inch Regular Screwdriver
—	Westinghouse Electric Corporation No. S-1724231 Vial (includes vial, syringe, and 1 ounce oil)
GAUGES	
R-8550	6-inch Steel Scale
—	Clock or Watch
R-1032 Detail 1 or 2	Thermometer
—	Voltmeter, ac, Weston Model 528, Range 0-150-300
MATERIALS	
KS-2423	Cloth
KS-7860	Petroleum Spirits
—	Felt Pad
—	Westinghouse Electric Corporation No. S-1723639 Oil, Silicone, (1-oz Bottle) or Dow-Corning Co No. 200 Fluid
TEST APPARATUS	
1W13B (2 required)	Cord (one end equipped with KS-6278 connecting clip)
KS-6780 (As required)	Connecting Clip
—	Autotransformer, Continuously Tapped (Variac, 2 amp, 230-volt input, Type V-5HMT)
—	No. 14 Wire

3.002 ***General:*** Care should be exercised when using KS-7860 petroleum spirits in power rooms where there are dc machines, since commutation may be adversely affected by the softening of the commutator film by the fumes. To avoid the need for burnishing the commutators of the dc machines after doing any cleaning operations called for in this section, provide adequate ventilation, use the absolute minimum amount of petroleum spirits required for the cleaning operation, and keep the container closed when not in use.

3.01 ***Mounting of Relay and Cover*** (Rq 2.01)

(1) Tighten loose screws with the 5-inch regular screwdriver.

(2) Tighten loose thumb nuts using the fingers.

3.02 ***Cleaning*** (Rq 2.02)

(1) ***Contacts:*** Clean contacts as covered in Section 069-306-801. If contacts are badly pitted refer the matter to the supervisor.

(2) ***Clutch:*** If the movement of the front clutch disc along the shaft is impeded by dirt, remove it with a KS-14162 brush moistened with KS-7860 petroleum spirits.

(3) ***Cover:*** Clean the inside of the cover by wiping it with a clean KS-2423 cloth.

(4) Clean other parts of the timer with a clean KS-2423 cloth.

3.03 ***Lubrication*** (Rq 2.03)

(1) ***Clutch Pinion Bearing:*** Apply one drop of oil to the bearing using the No. 486A oilcan.

(2) ***Relays Not Equipped With Oiling Device:*** Using the 4-inch regular screwdriver, disconnect the leads from the terminals tagging the leads to facilitate reconnecting them. Using the 5-inch regular screwdriver, remove the relay mounting screws. Remove the relay from the panel. When necessary remove the inner cover enclosing the motor and gear train by pushing the ends of the U-shaped portion outwards and off. Hold the motor fastening nut with the modified R-5850 wrench to prevent it from loosening and remove the knurled bearing cap with the P-long-nose pliers. Using the No. 486A oilcan, apply the Westinghouse No. S-1723639 oil to the motor bearing packing until it is saturated. Mount the bearing cap, tightening it firmly. Remount the cover or covers and connect the relay in the circuit.

(3) ***Relays Equipped With Oiling Device:*** Remove the knurled cap from the oil tube. Lubricate as follows using the No. S-1724231 vial. Depress the rubber bulb to remove any oil and air in the bulb. While holding the depressed end insert the nozzle into the oil in the vial. Allow the bulb to fill to capacity by slowly releasing the bulb. Insert the nozzle into the oil tube. Slowly depress the bulb until all the oil is discharged. Allow approximately 5 minutes to elapse to permit the oil to reach the oil reservoir cap before mounting the cap in place. Screw the cap on the oil tube. Remount the cover.

3.04 ***Record of Lubrication*** (Rq 2.04)
(No Procedure)

3.05 ***Freedom of Operation*** (Rq 2.05)

(1) If the armature appears to bind, remove dirt or other obstructions as covered in 3.02.

3.06 ***Contact Follow*** (Rq 2.06)

(1) Using the No. 485A pliers adjust the contact springs and stop springs as required.

3.07 ***Separation Between Latch Arms and Contact Fingers*** (Rq 2.07)

(1) If the separation between the end of the latch arms and the movable contact fingers is not satisfactory, proceed as follows. Loosen and hold the locknut of the left-hand NC. stationary contact support with the No. 388A wrench. Using the KS-6854 screwdriver turn the screw as required. Tighten the locknut securely. Check that the separation between the arms and fingers is approximately the same.

3.08 ***Operation of Clutch*** (Rq 2.08)

(1) Adjust the position of the clutch spring adjusting screw as required. To do this loosen and hold the locknut with the No. 388A wrench. Using the KS-6854 screwdriver, adjust the screw as required until the teeth of the clutch discs are fully meshed and the clutch spring just touches the clutch pinion without deflection. Then turn the adjusting screw one quarter to one half turn clockwise. Tighten the locknut securely.

3.09 ***Operation of Trip Mechanism*** (Rq 2.09)

(1) If the trip mechanism does not reset satisfactorily, see that there is no interference between the clutch discs. Check requirement 2.09. If the trip mechanism still does not reset satisfactorily, clean as covered in 3.02.

3.10 ***Operation of Motor*** (Rq 2.10)

(1) If the motor fails, refer the matter to the supervisor.

3.11 ***Timing Requirements*** (Rq 2.11)

(1) If the relay fails to meet the specified time-delay requirements, proceed as follows.

(2) Relocate the sliding gear assembly as follows. Remove the inner cover by pushing the ends of the U-shaped portion outwards and off. Using the KS-6854 screwdriver, loosen the setscrew that holds the sliding gear assembly 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 remount the inner cover.

(3) Set the trip discs as follows. 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.

3.12 ***Electrical Requirements*** (Rq 2.12)

(1) A check of the operation of the relay is made by connecting the Weston Model 528 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 the Weston Model 528 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 requirements 2.02, 2.03, 2.04, 2.08, and 2.09 met, refer it to the supervisor for replacement.

3.13 ***Temperatures*** (Rq 2.13)

(1) If the temperatures exceed the specified limit, see that requirements 2.02 and 2.05 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.

REASONS FOR REISSUE

1. To add a paragraph covering the difference in the design features of the relays used in the field (1.06).
2. To add the definition of a drop of oil (1.08).
3. To revise and amplify the information for disconnecting the relay from the power supply (1.09).
4. To add a paragraph covering removal of the cover (1.10).
5. To add the requirement for mounting of the cover and to omit the requirement for mounting of various parts of the relay [2.01(b)].
6. To revise the requirement for cleaning contacts and to add the requirement for cleaning of other parts of the relay (2.02).
7. To amplify the requirement for freedom of operation of armature to add a check method (2.03).
8. To revise the lubrication requirement for the clutch pinion bearing and to add the lubrication requirement for the relay equipped with the oiling device (2.04).
9. To add the requirement for record of lubrication (2.05).
10. To amplify the requirement for contact follow to add check methods (2.06).
11. To add the requirement for separation between latch arms and contact fingers (2.07).
12. To add the check method for operation of clutch and to revise the requirements for the clutch spring [2.08(a), (b), and (d)].
13. To revise the electrical requirements to omit reference to temperature for checking (2.12).
14. To revise the requirement for temperature to replace a mercury-filled thermometer by a spirit-filled thermometer and to add the check method (2.13).
15. To omit the requirement for contact alignment.
16. To revise the list of tools, gauges, materials, and test apparatus (3.001).
17. To add a procedure covering the use of petroleum spirits for cleaning purposes (3.002).

18. To revise and amplify the procedure covering mounting of relay and cover (3.01).
19. To add Fig. 4.
20. To revise and amplify the procedure covering cleaning (3.02).
21. To revise and amplify the procedure covering lubrication (3.04).
22. To revise the procedure covering contact follow (3.06).
23. To add the procedure covering separation between latch arms and contact fingers (3.07).
24. To revise the procedure covering operation of clutch (3.08).
25. To revise the procedure covering operation of trip mechanism (3.09).
26. To revise the procedure covering temperature to omit the check method (3.13).