

AUTOTRANSFORMER-TYPE STARTERS
ALLEN-BRADLEY COMPANY
REPLACEMENT PARTS AND PROCEDURES

1. GENERAL

1.01 This section covers the information necessary for ordering parts to be used in the maintenance of the following starters manufactured by the Allen-Bradley Company.

KS-15664	KS-15855
KS-15665	KS-15856
KS-15782	

It also covers procedures for replacing these parts.

1.02 Part 2 of this section covers ordering information for those parts which it is practicable to replace in the field in the maintenance of the above apparatus. No attempt should be made to replace parts not designated except small items such as screws. Part 2 also contains explanatory figures showing the different parts. This information is called Replacement Parts.

1.03 Part 3 of this section covers the approved procedures for the replacement of the parts covered in Part 2. This information is called Replacement Procedures.

2. REPLACEMENT PARTS

2.01 The figures included in this part show the various replacement parts with their corresponding names in their proper relation to other parts of the apparatus.

2.02 When ordering replacement parts, give the name of the component part as shown in the figures of this section and the complete nameplate data and part number of the component or component part, where furnished. In addition, give the nameplate data of the starter. For example, one right hand and left hand overload relay with type N52 thermal elements for Bulletin 709, Size 3 run contactor, Part No. X-159872, used in the Allen-Bradley Company Bulletin 746, Size 44-4A, No. X-218992 starter per KS-15856, L2. When ordering an auxiliary switch for a contactor give the series number of the switch. Do not refer to the BSP number.

2.03 Information enclosed by parentheses () is not ordering information. This information may be references to notes, parts referred to in other portions of the section and not considered replaceable, or part names in general use in the field if these names differ from those assigned by the manufacturer.

2.04 Miscellaneous parts, for example, screws, etc, which are not named in the illustrations and which cannot be obtained locally should be ordered by describing the part and giving the complete nameplate data as referred to in 2.02.

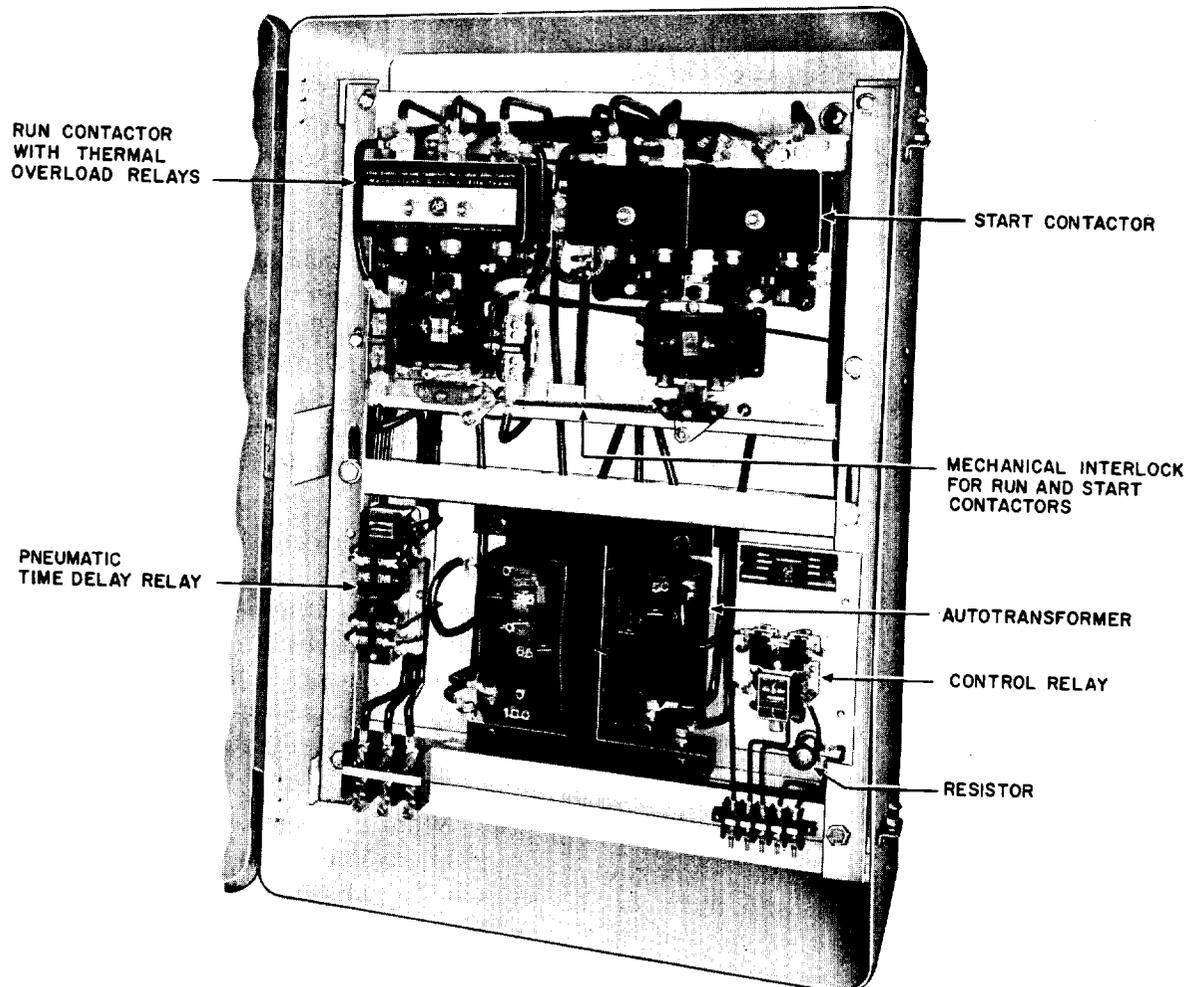


Fig. 1 - KS-1566 Starters — Typical 20-horsepower Unit Shown

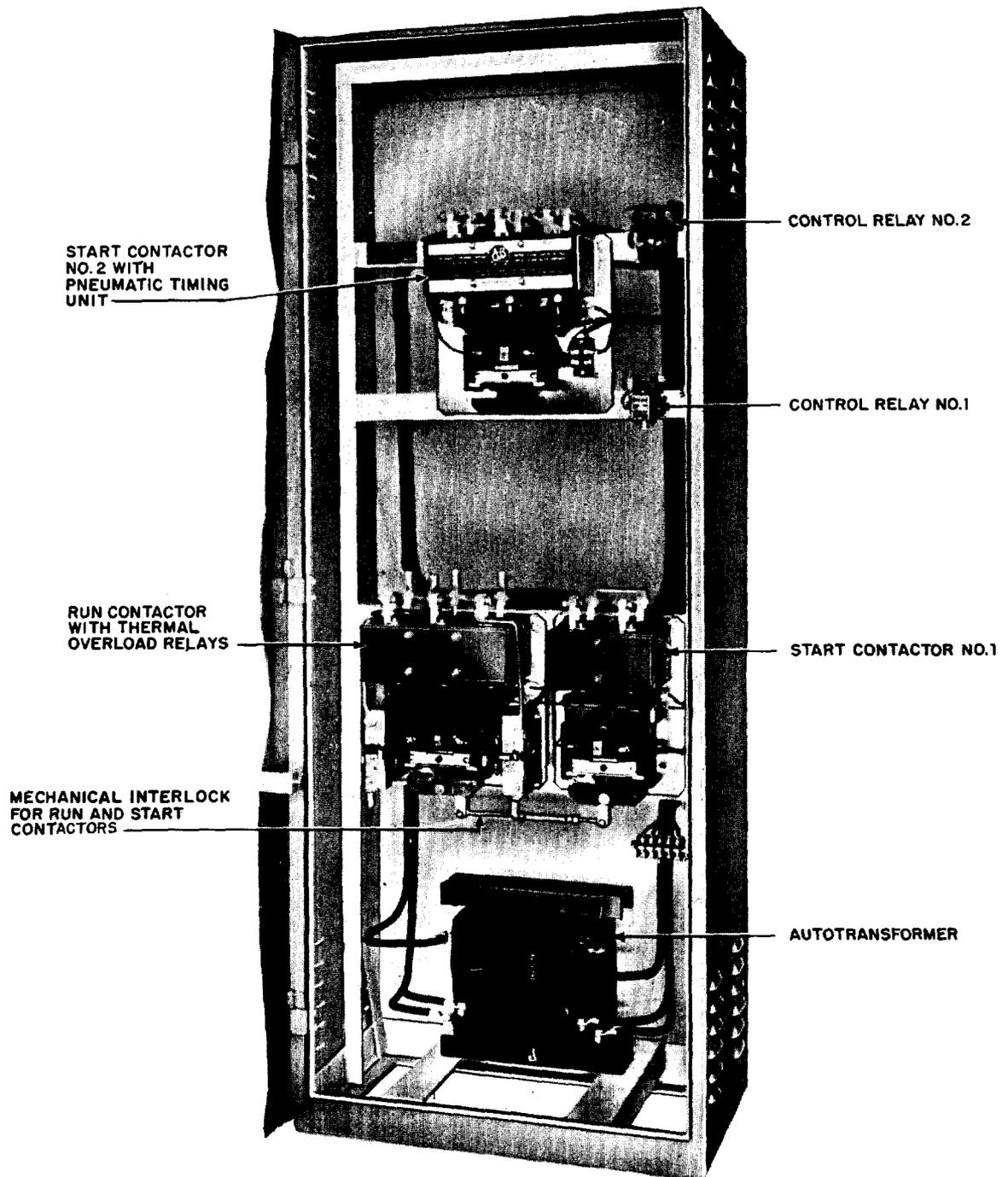


Fig. 2 - KS-15665 Starters — Typical 40- to 50-horsepower Unit Shown

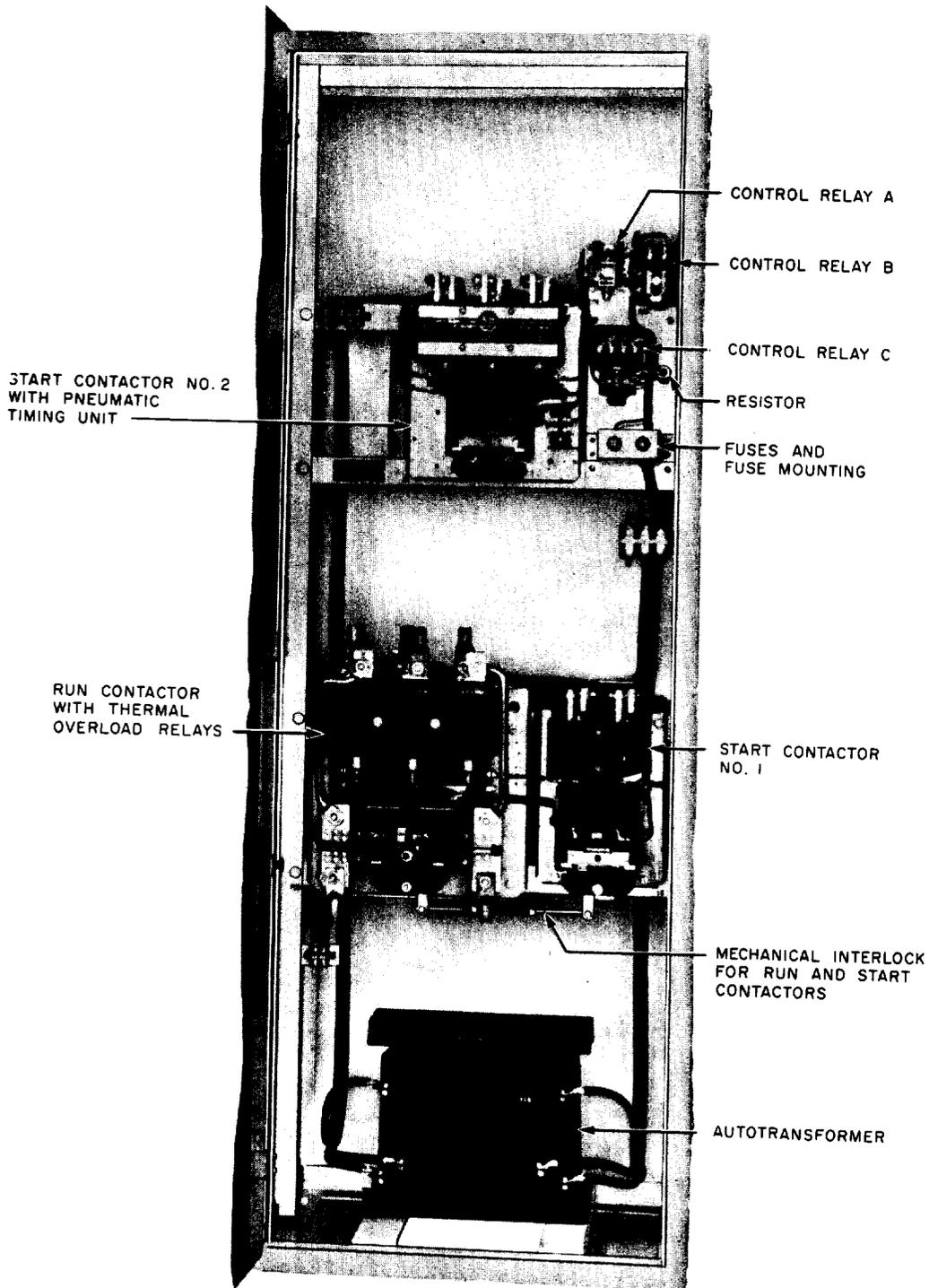


Fig. 3 - KS-15856 Starters — Typical 75-horsepower Unit Shown

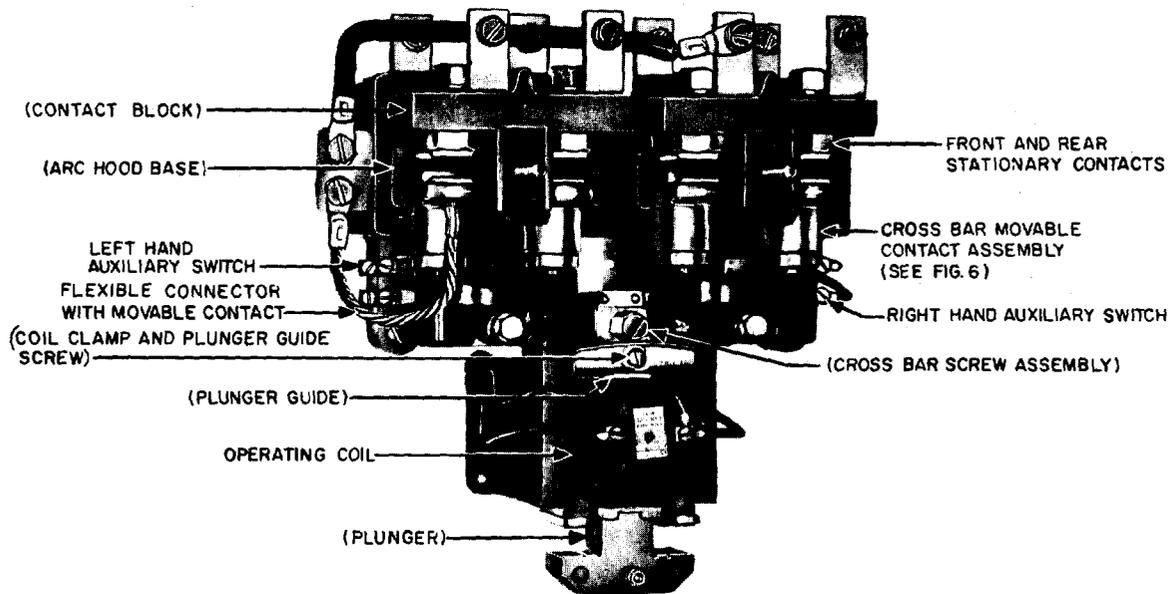


Fig. 4 - Typical Start Contactor With Arc Hood Cover Removed — Bulletin 702

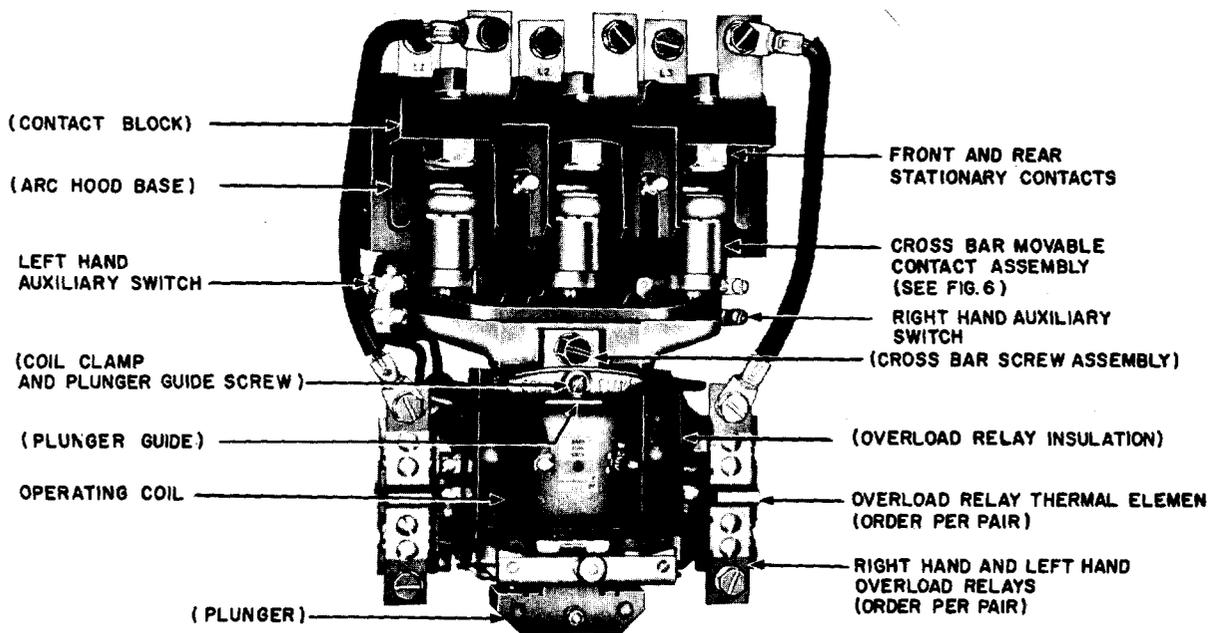


Fig. 5 - Typical Run Contactor With Arc Hood Cover Removed — Bulletin 709

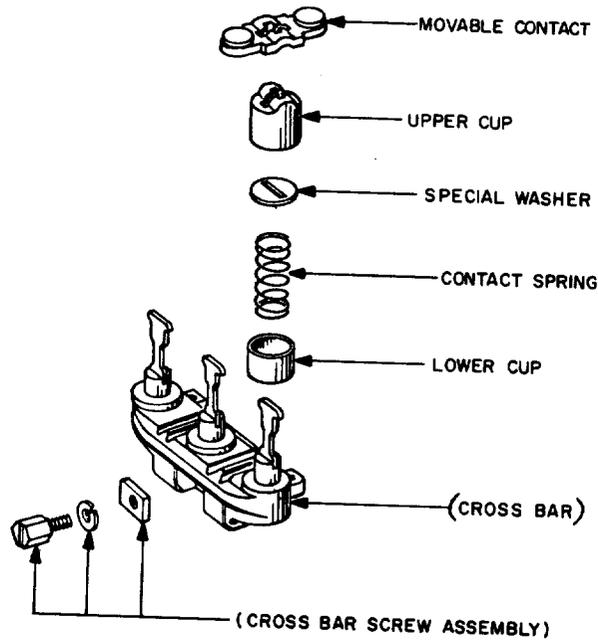


Fig. 6 - Typical Cross Bar Movable Contact Assembly

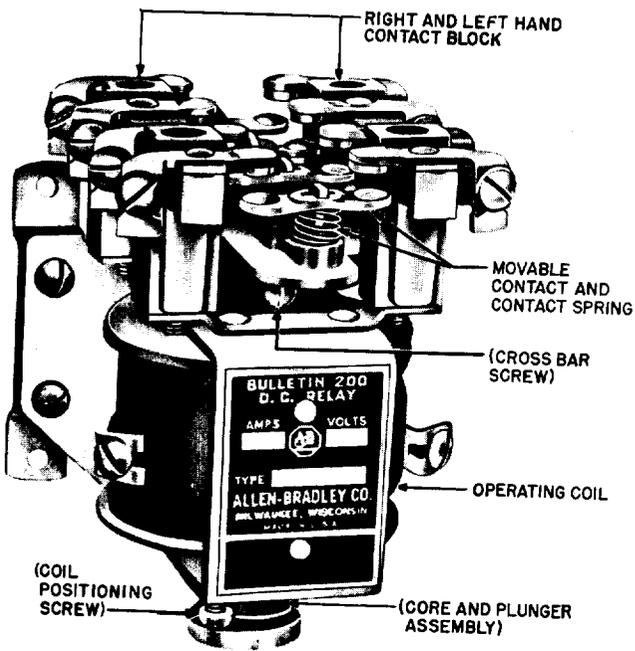


Fig. 7 - Control Relay - Bulletin 200, Type E

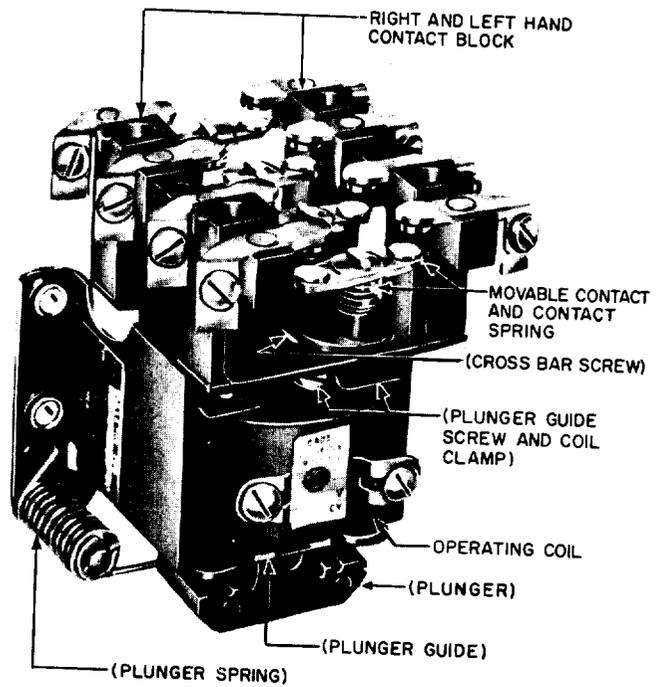


Fig. 8 - Control Relay - Bulletin 700, Type B

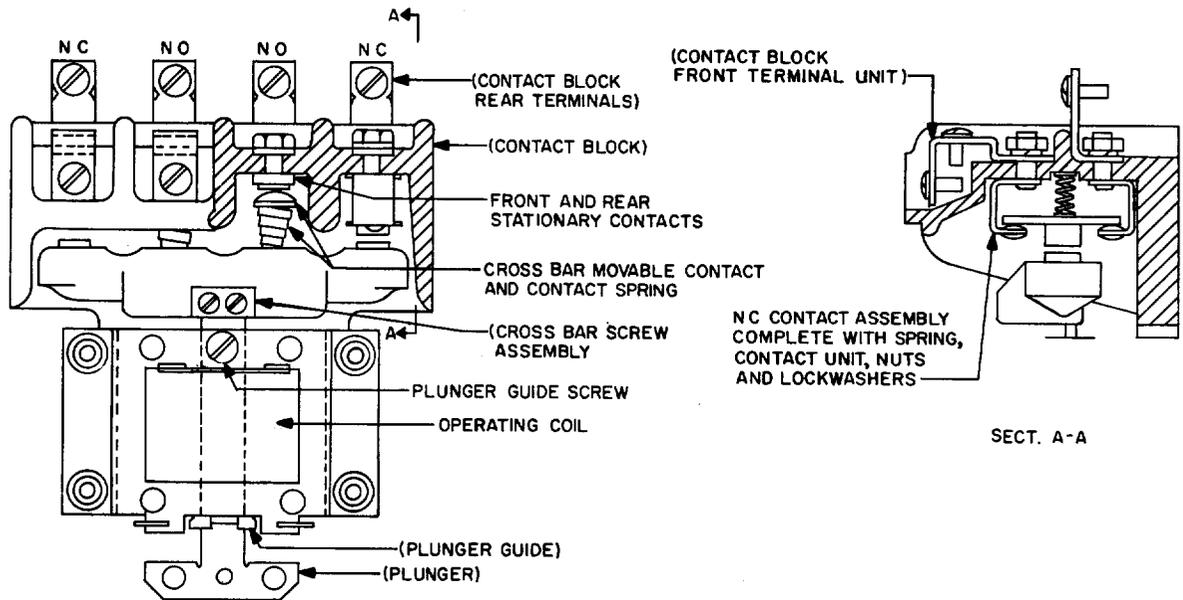


Fig. 9 - Control Relay — Bulletin 702, Size 0

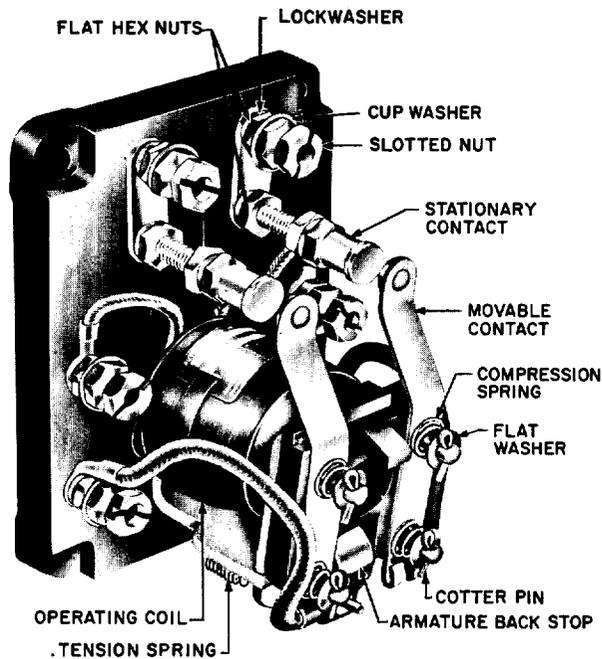


Fig. 10 - Control Relay — Struthers-Dunn

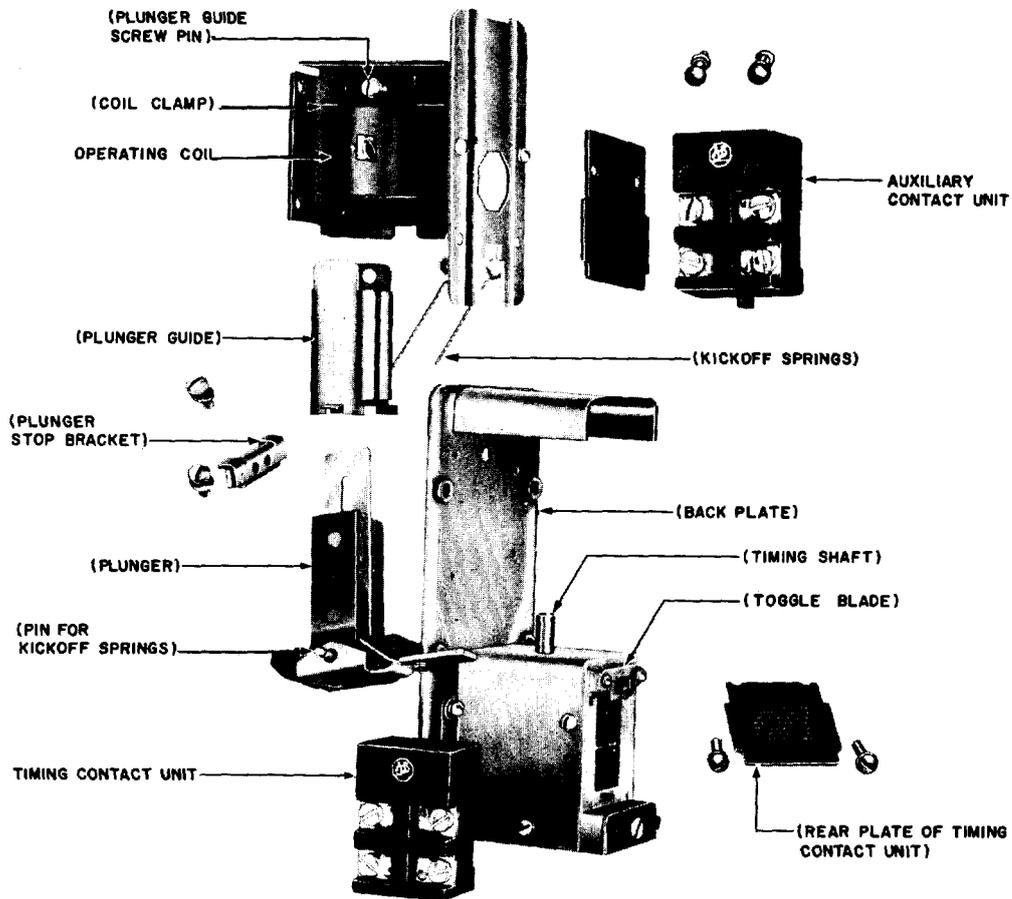


Fig. 11 - Pneumatic Time-delay Relay — Bulletin 849, Style AX

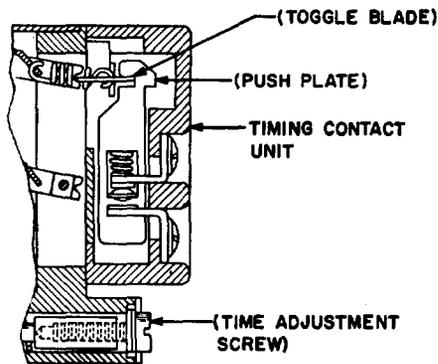


Fig. 12 - Cutaway View of Timing Mechanism —
Bulletins 849 and 896

3. REPLACEMENT PROCEDURES

3.01 List of Tools and Materials

CODE OR SPEC NO.	DESCRIPTION
TOOLS	
246	1/2-inch Open Single-end Flat Wrench
417A (2 Reqd)	1/4- and 3/8-inch Hex. Open Double-end Flat Wrench
418A	7/32- and 5/16-inch Hex. Open Double-end Flat Wrench
KS-6015	Duckbill Pliers
KS-6367	7/16- and 5/8-inch Hex. Open Double-end Flat Wrench
KS-6854	3-1/2 inch Screwdriver
R-1542	Adjustable Wrench
R-3193	9/32- and 11/32-inch Hex. Open Double-end Flat Wrench
—	Long-nose Pliers
—	5-inch E Screwdriver
MATERIALS	
KS-14666	Cleaning Cloth

3.02 Caution: *The starters covered by this section are arranged for automatic starting of motor-generator sets. Before making any replacements, disconnect the ac power supply and battery connections to the starter.*

3.03 After making any replacement of parts, the part or parts replaced shall meet the readjust requirements involved as specified in Section 026-343-701. Other parts whose adjustments may have been disturbed by the replacing operations shall be checked to the readjust requirements and an over-all operation check shall be made of the starter before restoring it to service.

3.04 No replacement procedures are specified for screws and other parts where the replacement procedure consists of a simple operation.

3.05 Whenever it is necessary to disconnect leads, care should be taken to mark or record the position of the leads to facilitate their correct replacement.

3.06 Start and Run Contactors — Bulletin 702 and 709 — Sizes 3, 4, and 5

(a) **Operating Coil:** To replace the coil, allow the plunger to drop down and out by removing the cross bar and plunger guide screws. Remove the coil clamp and pull the plunger guides through the bottom of the coil. Withdraw the coil by lifting it upwards and out. Substitute a new coil and reassemble in the reverse order.

Note: Where a mechanical interlock is used in conjunction with start and run contactors, it may be necessary to remove the interlock to free the plunger.

(b) **Movable Contacts:** With a suitable wrench remove the nuts fastening the arc hood cover to the base and remove the cover. Remove the cross bar screw or screws and draw out the cross bar assembly. Depress the movable contacts to below the notches in the contact support pin, rotate it 90 degrees, and lift the contact off the pin. Remove the upper cup of the enclosed spring in the same manner and release the contact spring. Mount the new springs and associate parts together with new contacts and reassemble in the reverse order.

(c) **Stationary Contacts:** Remove the arc hood cover and cross bar assembly as in (b). Mark and disconnect all leads connected to the contact block terminals and draw out the contact block assembly. Stationary con-

tacts on size 3 contactors can be unscrewed from the tapped holes in the contact block terminals, after removing the contact locking nuts. Stationary contacts on the size 4 and 5 contactors can be drawn downward and out after removing the contact clamping nuts. Replace with new contacts and reassemble the remaining parts in the reverse order.

(d) **Auxiliary switches** are mounted on either side or on both sides of the contact block base and can easily be replaced by removing the necessary mounting screws. To insure proper ordering information, the series number of the individual switch should be given (see 2.02).

(e) **Overload Relays:** To replace an overload relay and its associate thermal element, remove the necessary mounting screws located on the rear of the size 3 contactor and on the front of the size 4 and 5 contactors. On the size 3 contactor, where a relay insulator separates the relay from the solenoid assembly, insert the guide pins in the relay before fastening the relay to the mounting plate. Thermal elements are replaceable by removing the necessary screws on the front of the relay. Be careful to reconnect the leads properly and not to injure any of the working parts.

3.07 Control Relay — Bulletin 200, Type E

(a) **Operating Coil:** To replace the coil, allow the plunger to drop down and out by removing the one cross bar screw. Remove the bottom plate and plunger core freeing the coil from the relay. Replace with a new coil and reassemble in the reverse order.

(b) **Contacts:** The stationary contacts are part of the contact block assemblies and can easily be replaced by remounting new contact blocks. To replace movable contacts, depress the contacts to below the notches in the contact support pin, rotate it 90 degrees, and lift the contact off the pin. Mount new springs and contacts where necessary.

3.08 Control Relay — Bulletin 700, Type B

(a) **Operating Coil:** To replace the coil, allow the plunger to drop down and out by removing the cross bar and plunger guide screws. Remove the coil clamp and pull the plunger guide through the bottom of the coil.

Withdraw the coil by lifting it upward and out and substitute a new coil. When reassembling in the reverse order, the coil clamp must be inserted with the concave side toward the top of the coil.

(b) **Contacts:** The stationary contacts are part of the contact block assemblies and can easily be replaced by remounting new contact blocks. To replace movable contacts, depress the contacts to below the notches in the contact support pin, rotate it 90 degrees, and lift the contact off the pin. Mount new springs and contacts where necessary.

3.09 Control Relay — Bulletin 702, Size 0

(a) **Operating Coil:** To replace the coil, allow the plunger to drop down and out by removing the plunger guide screw and the cross bar screw. Remove the coil clamp and pull out the plunger guides through the bottom of the coil. Withdraw the coil by lifting upward and out. Substitute a new coil and reassemble in the reverse order.

(b) **Contacts:** To replace the movable and stationary contacts, mark and disconnect all leads connected to the contact block terminals. Remove the two screws fastening the contact block to the solenoid assembly and remove the contact block.

(1) **Movable Contacts:** Depress the movable contacts to below the notches in the contact support pin, rotate it 90 degrees, and lift the contact off the pin. Replace weak springs and worn contacts and reassemble in the reverse order.

(2) **Stationary Contacts:** The NO stationary contacts can be unscrewed from the tapped holes in the terminal strip after removing the contact locking nuts. The NC stationary contact unit can be replaced by removing the locking nuts and terminals and drawing the unit downward and out. Replace worn contacts and reassemble in the reverse order.

3.10 Control Relay — Struthers-Dunn

(a) **General:** To replace parts, mark and disconnect all leads from the control relay and remove the relay from the mounting panel.

(b) **Operating Coil:** Remove the tension spring adjustable nut and unhook the spring. Remove the armature back stop screw and lift the armature and movable contact assembly away from the top of the coil. Disconnect the coil leads, noting their connection to the terminal studs. Remove the coil mounting screw on the underside of the base and separate the coil and core. Insert the core in a new coil and remount the remaining parts in the reverse order.

(c) **Movable Contacts:** To replace the movable contact assembly which includes the contact finger with pigtail attached, disconnect the pigtails from the base terminal studs. With the long-nose pliers remove the cotter pins. Remove the washer and compression springs and remove the movable contact assembly. Replace with new assembly and reassemble in the reverse order.

(d) **Stationary Contacts:** To replace a stationary contact, use one No. 417A wrench to turn the contact in a counterclockwise direction and the other No. 417A wrench to hold the locknut under the contact. Remove the contact, leaving the washer in place above the locknut. Replace the contact and reassemble in the reverse order.

(e) **Tension Spring:** To replace the tension spring, remove the tension nut by raising the stud so that the nut clears the stops and remove the nut. This will free the tension stud. Unhook the tension spring from the armature back stop and replace with a new spring.

3.11 *Pneumatic Time-Delay Relay — Bulletin 849, Style AX*

(a) **Operating Coil:** Remove the screws fastening the solenoid assembly to the back plate, push the plunger upward away from the timing shaft, and draw out the solenoid and auxiliary contact unit. Allow the plunger to drop down and out by removing the plunger guide screw pin and the plunger stop bracket. When the plunger is removed, the ends of the kickoff springs will slip out of the holes in the plunger pin. Pull out the plunger guide through the bottom of the coil. To remove the coil, press the coil upward against the coil clamp and draw the coil out. Replace with a new coil and reassemble all parts in the reverse order.

(b) **Timing Contact Unit:** Remove the two screws fastening the unit to the timing mechanism and remove the unit. When replacing the new unit, care must be taken to see that the toggle blade is in the down position so that it fits into the notch in the push plate as shown in Fig. 12. Hold down the timing shaft and flip the blade down; then put the unit in position.

(c) **Auxiliary Contact Unit:** Remove the two screws holding the unit to the front plate; remove the unit and replace with a new unit.

3.12 *Timing Mechanism — Bulletin 896*

(a) **Timing Contact Unit:** The timing mechanism used in conjunction with certain start contactors is also a part of the Bulletin 849 time-delay relay. Replace the timing contact unit as covered in 3.11 (b) and refer to Fig. 12.