OPERATION • DESCRIPTION • INSTALLATION

INSTRUCTIONS

JF AUTOSTARTER

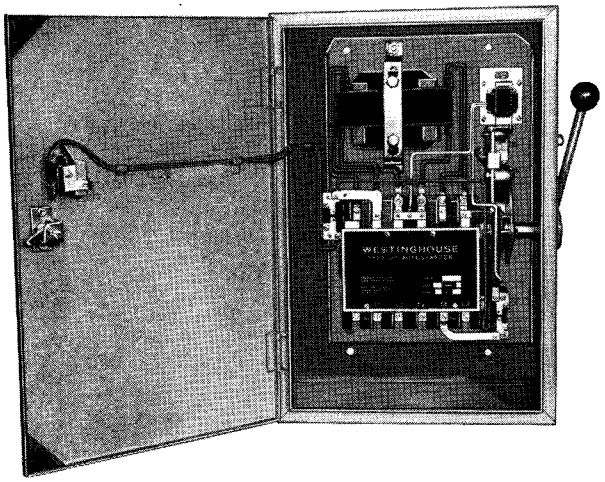


FIG. 1. Size 3 Autostarter

INSTALLATION AND SERVICING

TYPE JF AUTOSTARTERS are manual starters designed to start alternating current motors at reduced voltage through the use of an auto-transformer. I.S. 10-600-11 or I.S. 10-600-12 covers the general operation and installation and is pasted in the cabinet door. This leaflet covers the operation and maintenance in greater detail.

OPERATION

To Start the Motor pull the handle forward as far as it will go. This connects the motor to the line at reduced voltage. Hold the handle firmly against the stop until the motor reaches constant speed. Then throw the handle rapidly toward the back of the cabinet. The handle will remain latched in this position, with the motor connected directly to the line.

To Stop the Motor push the red "stop" button in the front of the cabinet. A pushbutton may be wired into the holding magnet circuit, if desired, to stop the motor from a remote location. See wiring diagrams, Fig. 4, for connections.

ADJUSTMENTS

Holding Magnet. If the holding magnet does not seal quietly adjust as follows: Loosen the four screws holding the magnet adjusting plate so the eccentric pin can be turned either to raise or lower the magnet. The vertical position of the magnet should be adjusted so that with the starter latched in the run position and the magnet sealed and quiet, the rear of the latch lever may be depressed manually sufficiently to give .010″ to .015″ clearance to the magnet roll pin. Be sure the four screws holding the magnet adjusting plate to the starter are retightened securely after the adjustment is made.

Stop Button. The pushbutton in the cabinet door acts, when depressed, to separate the contacts of a snap switch which forms a part of the pushbutton assembly. See Fig. 1. The adjusting screw should be set in such a way that bottoming of the snap switch button does not occur when the pushbutton is released. It should be possible, in this position, to insert the tip of a knife blade between the adjusting screw and the plunger of the snap switch and move the plunger within the approximate limits of .010 to .015 inches. (Assembly in normal position; stop button not depressed.)

DESCRIPTION

Figures 2 and 3 illustrate the operation of the mechanism.

Start Position. When the handle is pulled forward roller "A" moves through path 1 forcing the auxiliary latch out of the way. The auxiliary latch is spring returned to the position shown where it prevents roller "A" from reentering path 1. It also serves to prevent the loss of contact pressure if the operator relaxes his pull on the handle during the starting period. Fig. 2 illustrates the mechanism in the "start" position.

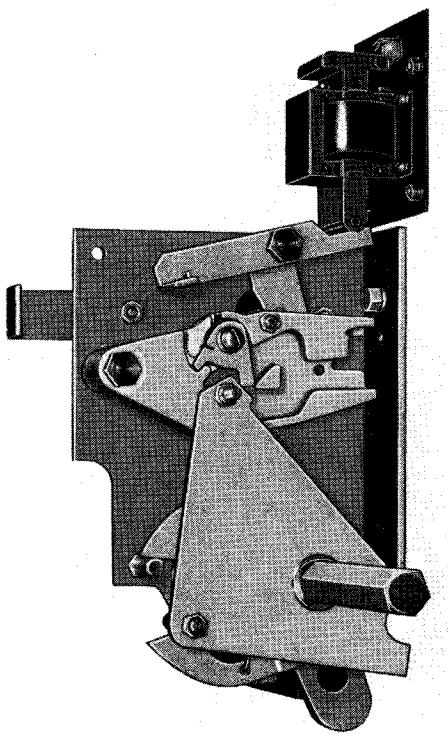


FIG. 2. Operating Mechanism in "Start" Position

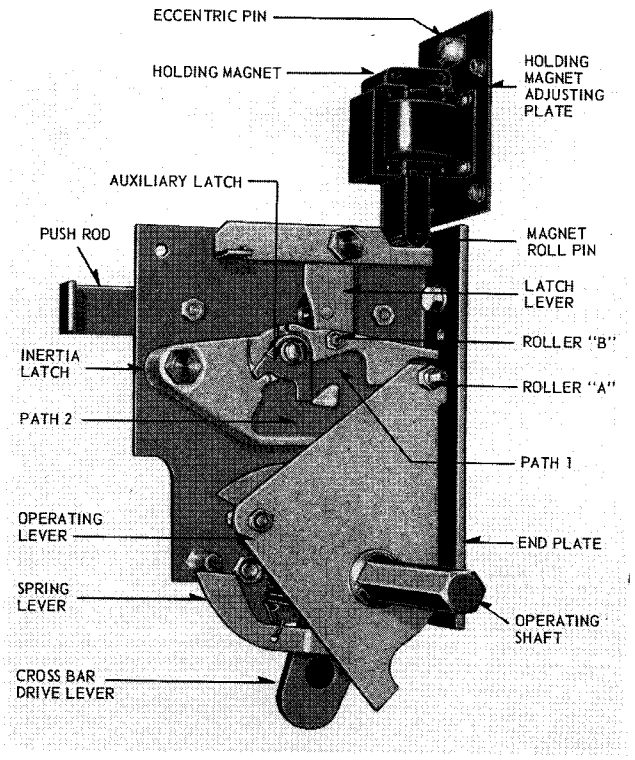


FIG. 3. Operating Mechanism in "Run" Position

Run Position. When the motor reaches constant speed, the operator throws the handle to the "RUN" position. If he does this rapidly (and this is desirable to prevent the motor from slowing appreciably) roller "A" will follow path 2. If, however, there is hesitation while the motor is disconnected from the line, the inertia latch will drop and engage roller "A" preventing the operator from connecting the motor to the line without repeating the start cycle. When the run contacts close the holding magnet is energized, rotating the latch lever to engage roller "B" thus holding the inertia latch down and keeping the run contacts closed.

Fig. 3 Illustrates the mechanism in this position.

Stopping. The motor can be stopped by opening the holding magnet circuit. This is done by the pushbutton operated switch mounted on the cabinet door, by opening of the contacts of either overload relay or by a remote external stop pushbutton. Opening the holding magnet circuit allows the kick-out spring (see Fig. 8) to rotate the latch lever until roller "B" is released, which allows the inertia latch to rotate upward and release roller "A". The contact assembly and centering springs then rotate the hexagonal shaft which opens the "Run" contacts. The projection on the inertia latch stops the rotation when the "off" position is reached. The pushrod mounted on the operating mechanism (see Fig. 3) provides for instantaneous manual tripping, even when the starter is equipped with a time delay low voltage device.

MAINTENANCE

It is advisable to clean the accumulated dust and dirt from the starter once a year or oftener as conditions may dictate. At this time check to be sure that the solenoid, inertia latch, latching lever, and push rod operate freely.

Lubrication. Approximately once a year apply a small amount of cup grease to the main operating shaft bearings. These bearings are part of the cross bar drive levers (see Fig. 3). This will keep the handle and shaft operating freely.

Contacts. The "Run" contacts at the front of the starter are faced with a silver alloy and should not be dressed as discoloration is not harmful to their performance. The copper "Start" contacts near the rear of the starter also should in general not be dressed as they are only in the circuit momentarily and there is little tendency to overheat.

The contacts need not be renewed until a major portion of the thickness of the contact face has been burned away.

Grids. The upper "Start" contacts on Size 4, 5, and 5L starters are provided with Deion grid arc ex-

tinquishers. Normal operation will blacken the grids and arcs moving into them will leave trails on the flat surfaces. This is not harmful. However, the grid stack should be replaced when the grids or the side plates become burned to such an extent that the grids are no longer securely fastened in the assembly. The grids are most easily removed by removing the mounting screw at the top of the stationary contact and sliding the contact and grid assembly down and forward until it can be removed from the switch base. Identifying numbers of principal renewal parts are listed on the leaflet on the cabinet door.

Holding Magnet. To replace the holding magnet coil, first disconnect the coil leads and remove the magnet and adjusting plate assembly from the starter. Using care not to bend or distort magnet parts, the roll pin bridging the plunger legs should next be pressed out to permit removal of the plunger. The retaining hook at one end of the plunger guides should then be straightened out to permit removal of the plunger guides following which the coil may be removed.

The new coil, plunger guides, plunger, and roll pin should now be restored in order, being sure to bend over the ends of the plunger guides and inspect the completed assembly to make sure the plunger can slide freely without friction, sticking or interference of any kind. The magnet and adjusting plate assembly should now be installed in the starter, tightening the four mounting screws only partially, to permit vertical adjustment of the magnet assembly by means of the eccentric pin located near the top of the adjusting plate.

The adjustment of magnet assembly is correct when with the starter latched in the "run" position and the magnet sealed and quiet, the rear of the latch lever may be depressed manually to produce a .010" to .015" clearance between the magnet roll pin and the latch lever. After the magnet assembly is adjusted, the four mounting screws should be tightened securely to complete the job of replacing coil.

TRANSFORMER DESIGN

Type JF Autotransformers are designed to meet NEMA Industrial Control standards for manual starters, section 1C-1-14.05B (July, 1956 revision) which states:

"For medium-duty service, the duty cycle shall consist of one 15 second period out of each 4 minutes for a total of 4 cycles, followed by a rest period of 2 hours, followed by one 15 second period out of each 4 minutes for a total of 4 cycles. The load shall be inductive (0.5 power factor or less) with a value of 3 times the normal full-load current of the motor with which the autotransformer or reactor is to be used and shall be connected to the 65 percent taps." For duty cycles with longer starting period, more than four starts, or higher current, refer inquiry to District Sales office.

In sizes of 50 hp and below (60 cycles), there is a design difference between two and three phase transformers. These transformers have a total of four connection points: 0, 65, 80, and 100%. Transformers larger than 50 hp are identical for two and three phase and have a total of five connection points: 0, 50, 65, 80 and 100%.

For 25 and 50 cycle transformers the change in design occurs at somewhat lower horsepowers.

STARTING TORQUE OBTAINED WITH DIFFERENT TRANSFORMER CONNECTIONS

TRANSFORMER CONNECTIONS	PER CENT OF NORMAL VOLTAGE	PER CENT OF STARTING TORQUE
a. Both Taps	100	100
b. One Tap	100	80
One Tap	80	
c. Both Taps	80	65
d. One Tap	80	55
One Tap	65	
e. Both Taps	65	40
f. One Tap	65	34
One Tap	50	
g. Both Taps	50	25

SPECIAL WIRING INSTRUCTIONS

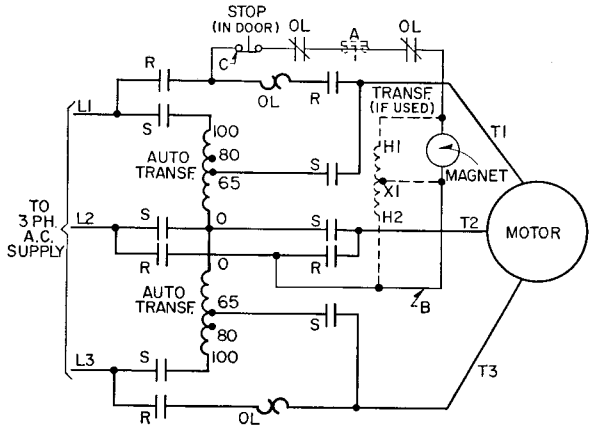
1. To use a 2-phase starter to operate a 3-phase motor.

a. **Sizes 2, 3, 4, 5, 5L**
Connect terminal T2 to T3
Line Connections: L1, L2, L4
Motor Connections: T1, L3, T4

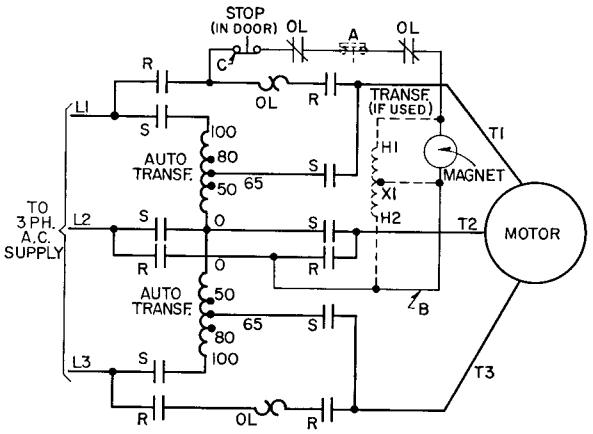
2. To operate a 2-phase 3-wire motor.

a. Size 2-3
Because of a difference between two phase and 3 phase transformers in these sizes a two phase unit must be used.
Connect T2 to T3
Line Connections: L1, L2, L4
Motor Connections: T1, L3, T4

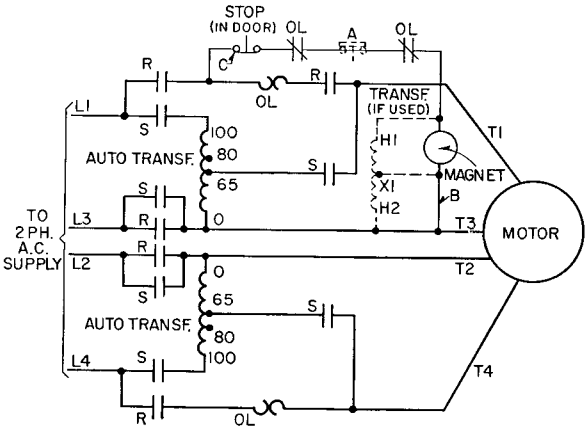
b. **Sizes 4, 5, 5L (Three phase starter)**
Connect the common line lead to L2 and the common motor lead to T2.
Line Connections: L1, L2, L3
Motor Connections: T1, T2, T3



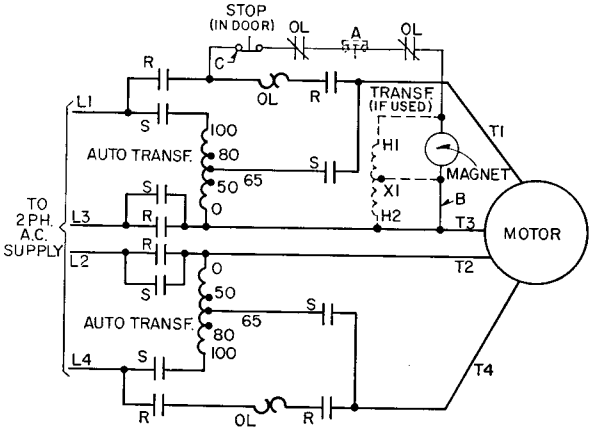
(a). Sizes 2 and 3—3 Phase



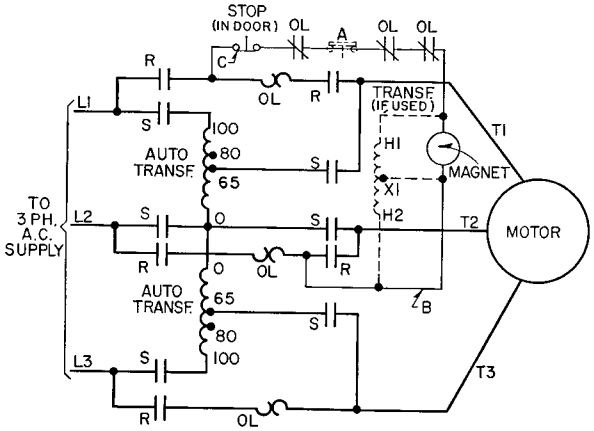
(b). Sizes 4, 5—3 phase



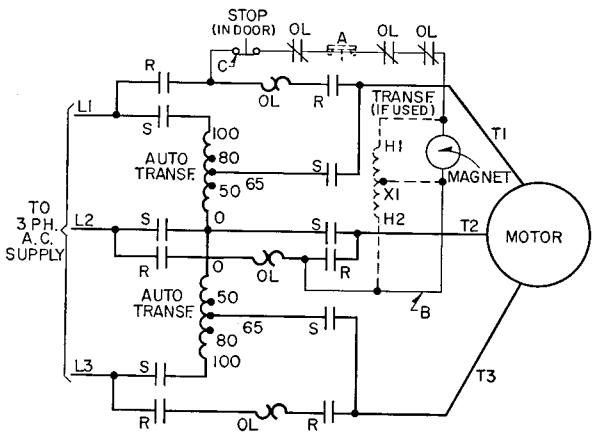
(c) Sizes 2 and 3—2 Phase, 4-Wire



(d) Sizes 4, 5—2 phase, 4-Wire



(e) Sizes 2 and 3—3 Phase, with 3 O.L. Relays

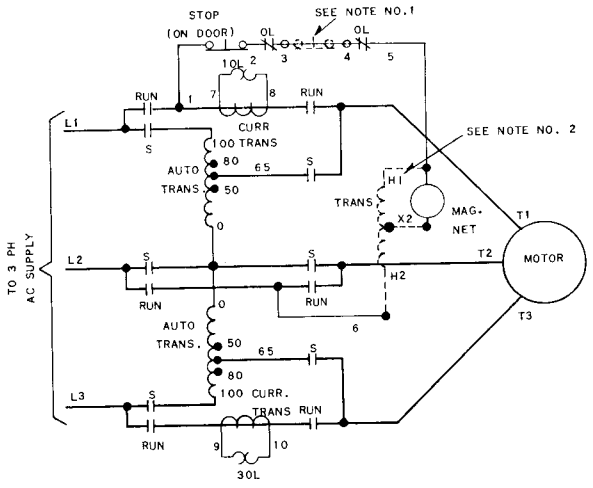


(f) Sizes 4, 5—3 Phase, with 3 O.L. Relays

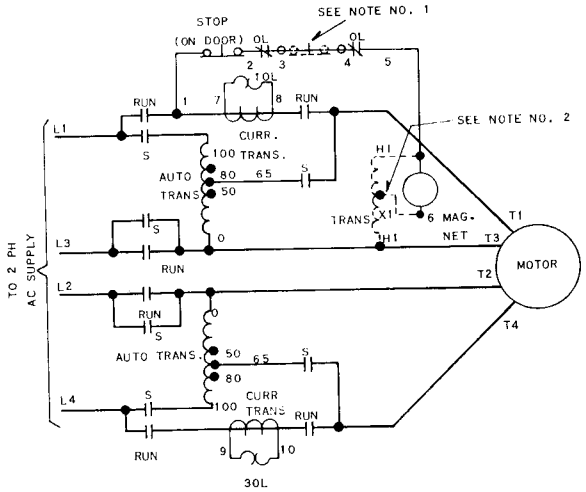
A—Insert Remote Stop P.B. in this Lead if desired.
C—Leads Connect to Terminals Marked ⊣⊢.

B—Lead omitted if Transformer is used.
R—Run Contact. S—Start Contact.

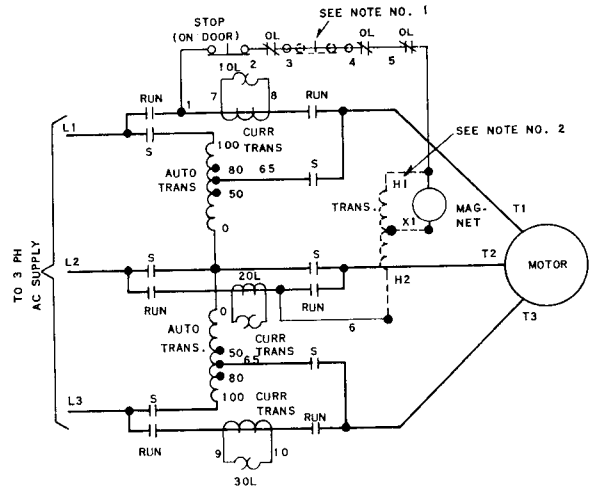
FIG. 4. Schematic Diagrams



(g). Size 5L—3 phase



(h). Size 5L—2 Phase 4-Wire



(i). Size 5L—3 Phase, with 3 O.L. Relays

FIG. 4. Schematic Diagrams

c. Sizes 4, 5, 5L (Two phase starter)
Connect T2 to T3.
Connect the common line lead to 1.2 and the common motor lead to T2.
Line Connections: L1, L2, L4
Motor Connections: T1, L3, T4

OPTIONAL EQUIPMENT

Electrical Interlock. One Type L-60 electrical interlock may be applied to the autostarter in either a normally open or a normally closed position. The interlock is mounted as shown in Fig. 5 where a unit is mounted for normally open service. To add an interlock in the field, order S# 1747 200.

To change a normally open interlock to a normally closed interlock, press part "A" and part "B" upward until part "A" clears the retaining ears. Rotate part "A" sideways as far as it will go, then release part "B". This now makes a normally closed interlock and it is to be mounted inverted relative to the interlock pictured in Fig. 5.

ADJUSTMENT

Normally Open. Adjust for 1/8" overtravel when autostarter is locked in "Run" position, then tighten locknut.

Normally Closed. Adjust contact gap to 3/16" when autostarter is locked in "Run" position, then tighten locknut.

Ammeter. When connecting an Autostarter equipped with a door mounted ammeter and associated current transformer, care must be taken

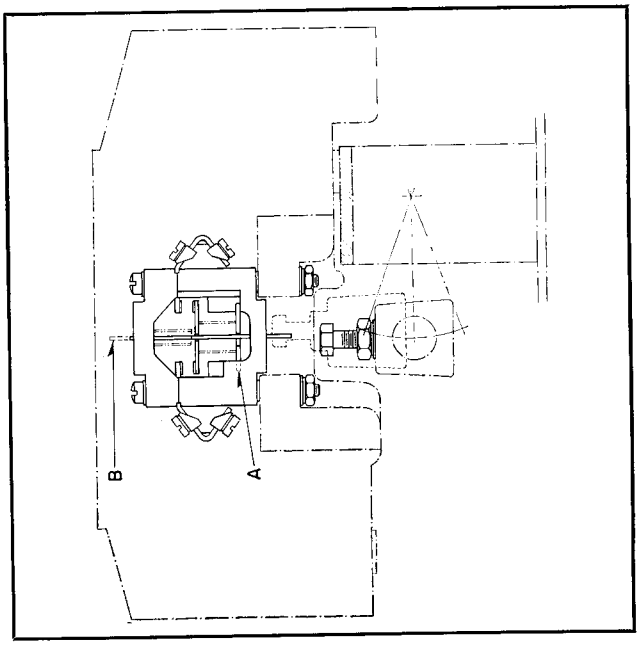


FIG. 5. L-60 Interlock Installation Normally Open Contacts Shown

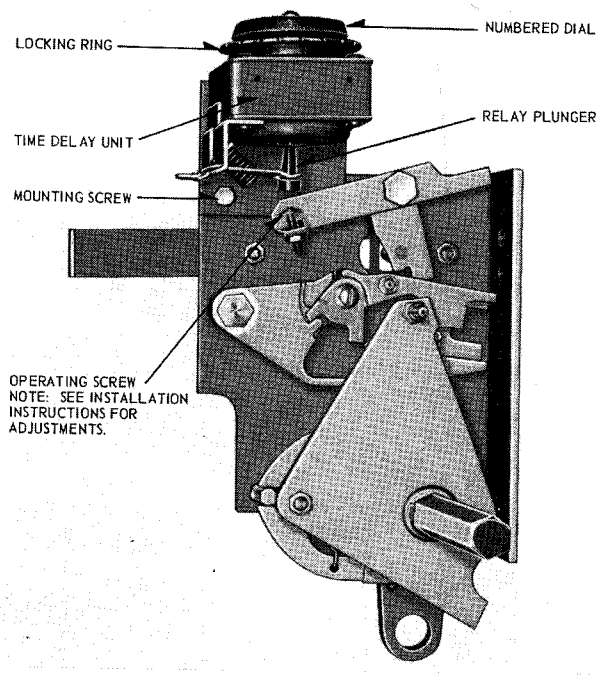


FIG. 6. Low Voltage Time Delay Accessory Mounted (Operating Mechanism in "Off" Position Without Magnet)

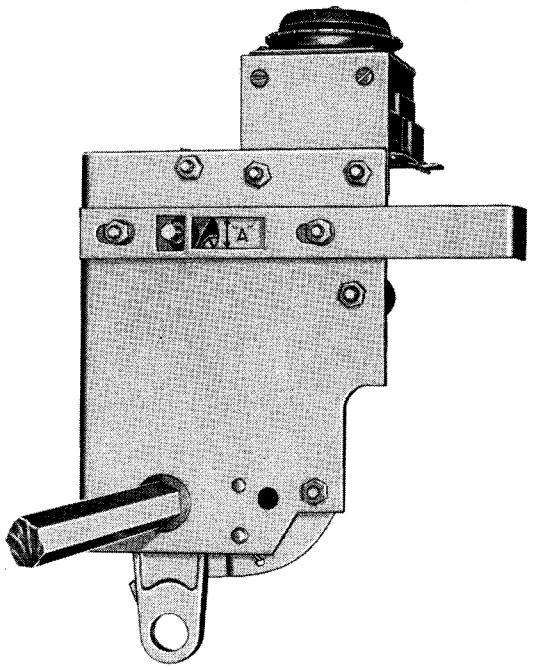


FIG. 7. Left View of Operating Mechanism Assembled to give Low Voltage Time Delay Operation

to pass the T-1 motor lead through the current transformer window.

Third Overload Relay. A third overload relay may be mounted on three phase starters if desired. It is made to take the place of the jumper normally connecting the upper front stationary contact supports of the third and fourth poles.

Order style number of relay assembly plus one heater from the table pasted to the cabinet door.

Relay—Size 2 & 3 . . . . . S# 30B4055G02

Relay Ass'y—Size 4 & 5 . . . . . S# 1776 943

Relay Ass'y—Size 5L. . 25CY—S# 578-D-466G01
60CY—S# 578-D-466G02

LOW VOLTAGE TIME DELAY DEVICE

Description. When it is desirable to have a time delay before the autostarter unlatches in the event of power failure, the starter can be equipped with a time delay unit. This unit consists of a pneumatic time delay device which replaces the kick-out spring and serves to slowly rotate the latch lever until its corner moves past roller "B" allowing the starter to return to the off position. If the power is restored during the time delay period the holding magnet will return the mechanism to the fully latched position, resetting the time delay relay so that the full time delay period is available at a subsequent power failure.

Adjustment. The time delay may be adjusted by turning the numbered dial at the top of the relay. First loosen the locking ring by turning counter clockwise, then adjust the dial by turning counter clockwise to shorten the time delay or clockwise to lengthen the time. Turn the locking ring clockwise to lock the adjustment. See Fig. 6.

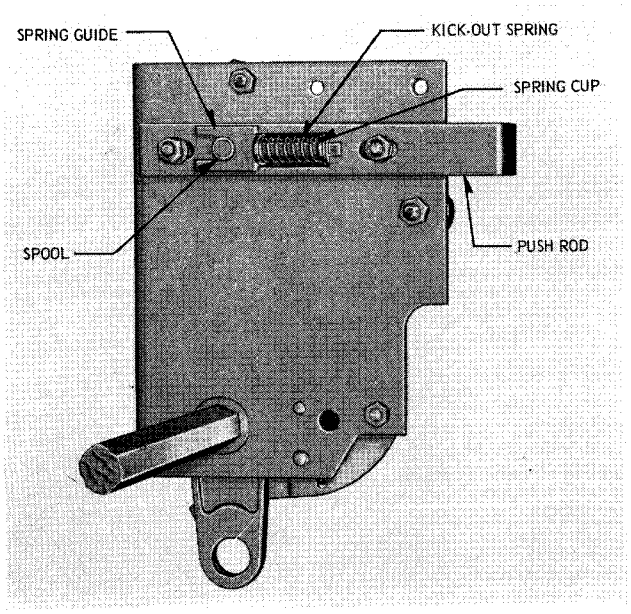


FIG. 8. Left View of Operating Mechanism Assembled to give Instantaneous Trip Operation

Ordering information and installation. Sizes 2, 3, 4, 5. These sizes are normally supplied with an instantaneous trip mechanism which normally employs a kick-out spring assembly as shown in Fig. 8. To convert to time delayed trip operation, install the time delay accessory and remove the kick-out spring assembly as illustrated in Fig. 6 and 7. The space marked "A" of Fig. 7 shows the kick-out spring and guides removed. Adjust the operating screw so there is approximately .015" clearance between the screw and the relay plunger when the holding magnet is fully closed and the relay plunger is pushed upward manually to the limit of its travel.

Order S# 550D406G04 for the time delay accessory.

Size 5L. This size is normally supplied with the time delay trip mechanism. To convert to instantaneous trip remove the time delay relay and install a new push rod and kick-out spring assembly.

Order S# 296B882G02 for the pushrod-kickout spring assembly.

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