METAL-ENCLOSED, FUSED-INTERRUPTER SWITCH INSTRUCTIONS

STANDARD MANUAL OPERATING MECHANISM

The I-T-E interrupter switch operating mechanism is a stored-energy device. This stored-energy device operates independently of the speed with which the operator moves the manual handle to open or close switch.

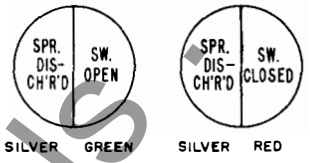


Fig. 1

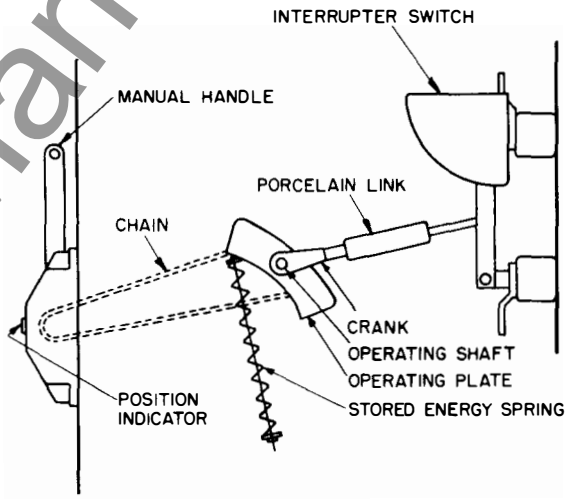
OPERATING SEQUENCE

1- Check worded and color-coded position indicator (Fig. 1) built into manual handle housing which indicates switch and spring position.

2- If manual handle includes a Kirk interlock, make sure it is unlocked before actuating manual handle. (For interlock operation, see Fig. 3.)

3- With switch in closed position as in Fig. 2, handle is in the up position. Rotate handle 180° applying approximately 50 lbs pressure. A chain-driven sprocket crank compresses the stored-energy spring until completely compressed or charged. When spring is charged, it moves over-center, discharging and driving operating plate which is connected to operating shaft. Switch is opened by porcelain links and cranks attached to shaft.

4- With switch in open position, handle will be in the down position. To close switch, reverse operating procedure.



INTERRUPTER SWITCH CLOSED
SPRING IN DISCHARGED POSITION

Fig. 2

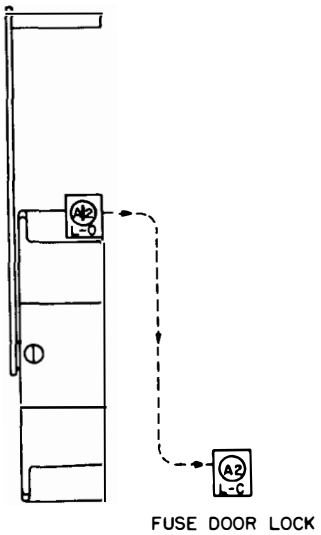
Fig. 3 is a typical example of interlocking to prevent access to fuses until switch is open. Two keys are supplied, one with each lock. Before operation, one key must be removed and placed under supervisory control or destroyed. One key remains in lock cylinder as shown.

INTERLOCK OPERATING SEQUENCE

1 - Open switch, turn Key A2 on handle-interlock to lock open, and remove key.

2 - Insert key into interlock on fuse door and turn to unlock.

3 - Open fuse door, Key A2 is now held captive. To restore service, reverse procedure.



FUSE DOOR LOCK

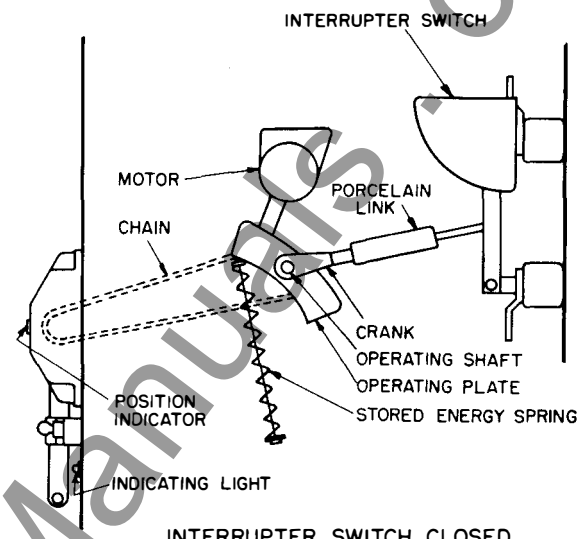
Fig. 3

STANDARD MOTOR OPERATING MECHANISM

When standard mechanism is supplied with motor (Fig. 4), operation of the stored-energy device becomes automatic. The operation is the same as described on Page 1, except motor is used to charge spring rather than manual handle. With automatic operation, the manual handle is only used when motor control power is not available. Thus, normal operation is completely electric and manual handle operation requires a safety interlock to separate electric and manual operation.

Safety interlock and emergency manual handle operation is described on Page 4.

Fig. 5 is a typical example of interlocking to prevent access to fuses until switch is open. Four keys are supplied, one with each lock. Before operation, two keys must be removed and placed under supervisory control or destroyed. Two keys remain in lock cylinders as shown.



INTERRUPTER SWITCH CLOSED
SPRING IN DISCHARGED POSITION

Fig. 4

INTERLOCK OPERATING SEQUENCE

1 - With switch in open position, turn Key A-1 then remove and insert in A-1 cylinder on handle-interlock.

2 - Turn Key A-2 to lock open and remove key.

3 - Insert key into interlock on fuse door and turn to unlock.

4 - Open fuse door, Key A-2 is now held captive.

To restore service, reverse procedure.

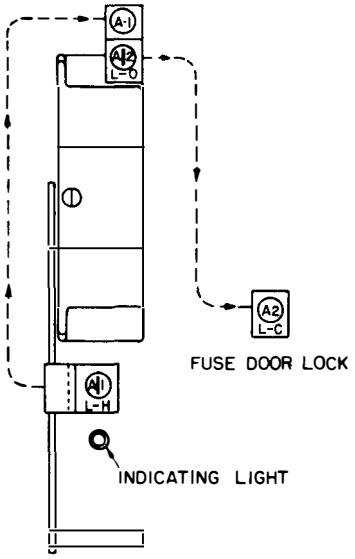
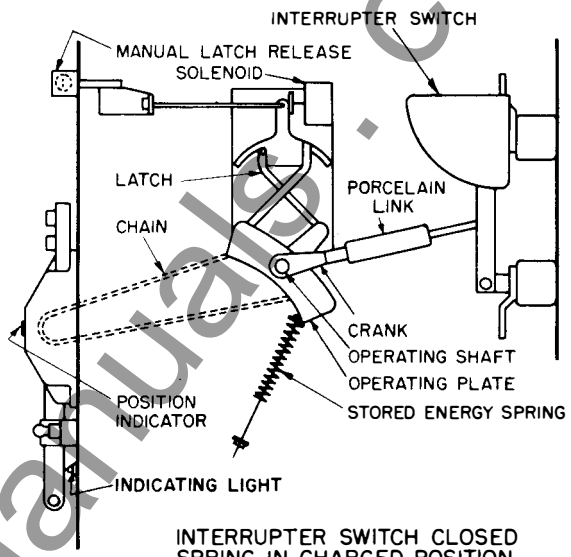


Fig. 5

STANDARD LATCHED OPERATING MECHANISM WITH AND WITHOUT MOTOR

When standard mechanism is supplied with latch (Fig. 6), operation of the stored-energy device is the same as described on Page 1 for Manual Operation, or Page 2 for Motor Operation. The addition of latch to mechanism permits capture of stored-energy spring for either an opening or closing switch operation by means of a solenoid. When motor is used to charge spring, normal operation is completely electric as described on Page 2. The safety interlock and emergency manual handle operation is described on Page 4. When motor is not supplied, manual handle must be used to charge spring after each opening or closing operation as described on Page 4. For manual means of operating latch, see Fig. 7 and description below.



INTERRUPTER SWITCH CLOSED SPRING IN CHARGED POSITION

Fig. 6

Fig 7 is typical of interlocking:

A. To prevent access to fuses until switch is open.

B. For manual emergency means to operate latch. Five keys are supplied, one with each lock. Before operation, 3 keys must be removed and placed under supervisory control or destroyed. Two keys remain in lock cylinders as in Fig. 7.

INTERLOCK OPERATING SEQUENCE

C. For locking switch open for fuse access.

1 - With switch in open position, turn Key A-1 then remove and insert in A-1 cylinder on handle-interlock. Light will go out indicating open circuit.

2 - Turn Key A-2 to lock open and remove key.

3 - Insert key into interlock on fuse door and turn to unlock.

4 - Open fuse door, Key A-2 is now held captive. To restore service, reverse procedure.

D - For manual emergency operation of latch.

1 - Turn Key A-1 holding manual handle and remove key. Light will go out indicating open circuit.

2 - Insert Key A-1 into manual-latch-release lock, and turn to release latch and operate switch.

3 - To return to normal electric operation, return Key A-1 to manual handle lock. Light will indicate closed circuit.

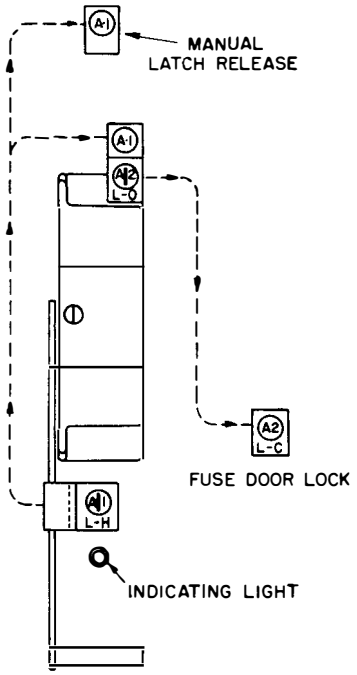


Fig. 7

MANUAL HANDLE OPERATION WITH ELECTRIC MOTOR AND/OR LATCH

When control power is not available, the following sequence is used for manual operation.

1 - To free handle, turn key 90° to right, shown in Fig. 8. Lock releases handle arm and actuates a safety switch to open electric circuit. Indicating light provides positive visual indication of circuit condition. Light should go on when control power for electric operation is available.

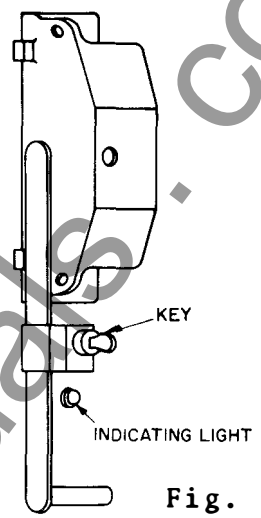


Fig. 8

2 - Slide latch block on handle arm down to clear "DK" lock shown in Fig. 9.

3 - With handle arm in free-wheeling position, locate handle arm in proper position for operation. Switch closed, handle arm up as shown in Fig. 10. Switch open handle arm down. Push in handle arm as shown in Fig. 10 to engaged position. While holding handle arm in engaged position, rotate handle arm 180° to operate. After rotating 180° handle arm will return to free-wheeling position. If mechanism is equipped with latch, see paragraph 5.

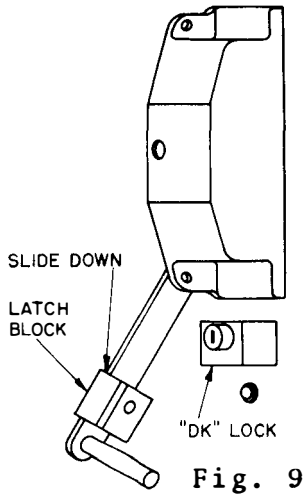


Fig. 9

4 - Slide latch block up handle arm and place in proper position as shown in Fig. 8. Turn key 90° to left. Handle arm is now locked and electric circuit closed.

5 - Latched mechanism with or without motor adds two additional switch conditions. (Spring charged to close, switch open and spring charged to open, switch closed. Check worded and color-coded position indicator Fig. 1.) To lock switch open, note spring must be discharged. With switch open spring charged, place handle in up position push in handle arm as shown in Fig. 10 to engaged position. While holding handle arm in engaged position, rotate handle arm 180° to discharge spring.

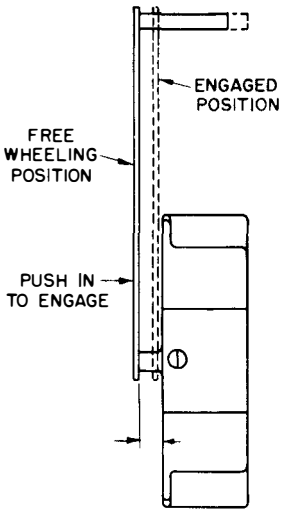


Fig. 10 ①

POWER SWITCHING CENTERS

INSTRUCTIONS

5KV to 15KV, INDOOR AND OUTDOOR
600, 1200 & 2000 AMPERES

4630-S

I-T-E IMPERIAL CORPORATION

INDEX OF CONTENTS

CAUTION: DURING INSTALLATION AND MAINTENANCE PERIODS, CUBICLE SHOULD NEVER BE ENTERED UNLESS MAIN BUS, OR LINE AND/OR LOAD TERMINALS ARE DE-ENERGIZED.

NOTE: ALTHOUGH FUSES ARE NORMALLY ACCESSIBLE WITH INTERRUPTER SWITCH OPEN, CAUTION MUST BE OBSERVED IN CASE OF POSSIBLE BACK FEED.

These instructions do not purport to cover all details or variations in equipment nor to provide for every possible contingency to be met in connection with installation, operation, or maintenance. Should further information be desired or should particular problems arise which are not covered sufficiently for the purchaser's purposes, the matter should be referred to the I-T-E Imperial Corporation.

I. INSTALLATION

A — INDOOR

1. All PSC shipments of three bays or less will be shipped intact; those in excess of three bays will be suitably split for ease in handling.
2. Upon receipt of shipment, check for transportation damage. If damage exists, enter claim with carrier.
3. Remove all exterior packing, open doors and unbolt skid, Fig. 1.
4. With a crane and the lifting lugs, lift shipping section off skid and place over anchor bolts in proper position. Bolt down. Note square washers (A) should be used to hold assembly to floor, Fig. 2 (Anchor bolts and nuts, by customer, mounted as shown).

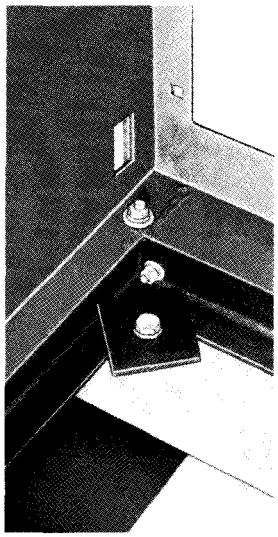


Fig. 1 4630-XX

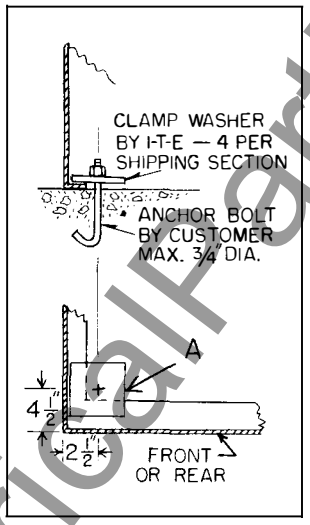


Fig. 2

5. Open all doors, front and rear, and inspect interior, removing all interior packing and bracing, Fig. 3.
6. If PSC is shipped in a single unit, skip this step. If shipping splits were necessary, note the following:—
   a. Supplied loose, for each shipping split:
      1. One 3-phase set of main bus,
      2. One ground bus,
      3. Bolts and nuts to bolt shipping sections together,
      4. One set low-voltage wires if necessary.
   b. Arrange sections in proper order on pad and bolt down.
   c. Bolt shipping splits together with bolts supplied, Fig. 4. Some bolts (A) & (B) may have to be removed before putting shipping splits together.
   d. Install main bus links, Fig. 5.
   e. Install ground bus and any necessary ground connections within unit, Figs. 6 and 7.
   f. If low-voltage wiring runs across a shipping split, matched numbered terminal blocks are supplied on either side of the split and suitable wire is furnished for connections, Fig. 8.
      1. Whenever a switch or thermostat controls a group of accessories, the source must be connected in the bay containing the switch, otherwise the source can be connected in any bay.
      2. When more than one type of accessory (heaters and lights) are supplied, they are wired for individual feed. The customer may parallel circuits as required.

      Terminals are identified as follows:
      a. Heater circuit — X1 & Y1
      b. Light circuit — X2 & Y2
      c. Outlet circuit — X3 & Y3
7. Check entire PSC for loose connections, cracked or chipped insulators, etc.

4842-A

Fig. 3

I. INSTALLATION (cont'd)

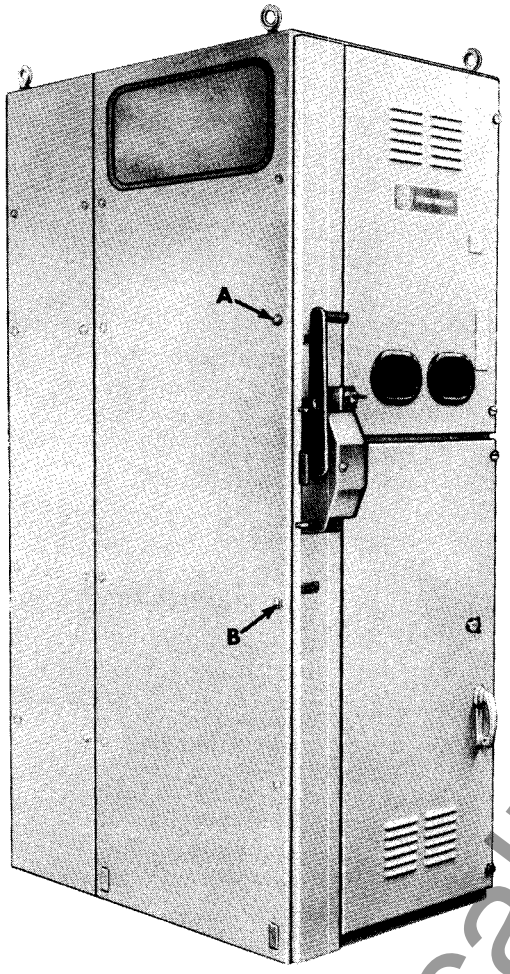


Fig. 4 4630-YY

8. Using duplicate keys to defeat interlock system, test switches for proper operation. (When received, note that each key interlock is provided with a key. All spare keys must be removed and destroyed, or given to a responsible person before energizing, to insure proper operation of interlock system.)

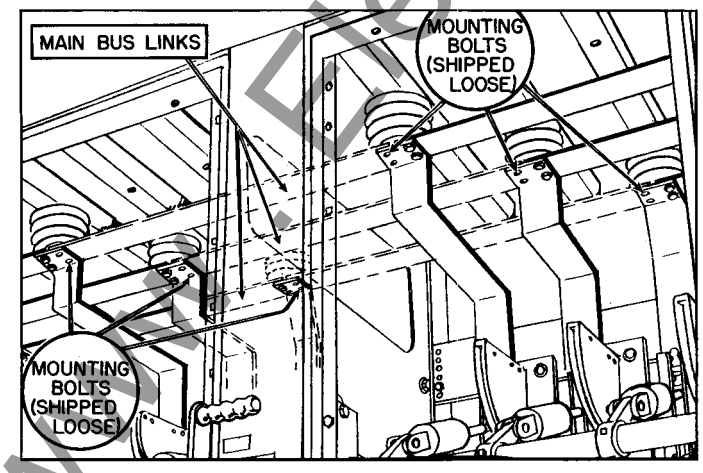


Fig. 5

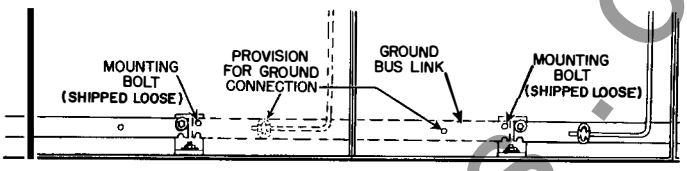


Fig. 6

Fig. 7 4630-G

9. It is desirable, with all switches closed, to run a megger test on all phases to ground and also phase to phase (A-B, B-C) before making cable connections to unit. The megger reading should be a minimum of 800 megohms for such tests. Note: lightning arresters may affect megger readings as follows:
   a. Distribution class — no affect.
   b. Intermediate or station class arresters due to the ground leakage resistors should read approximately 250-300 megohms.

   If readings are affected, isolate the arresters and retest.

10. Make all incoming and outgoing connections including low-voltage wiring, if any.

11. Close doors, removing all duplicate interlock keys to insure proper operation of interlock system, and energize.

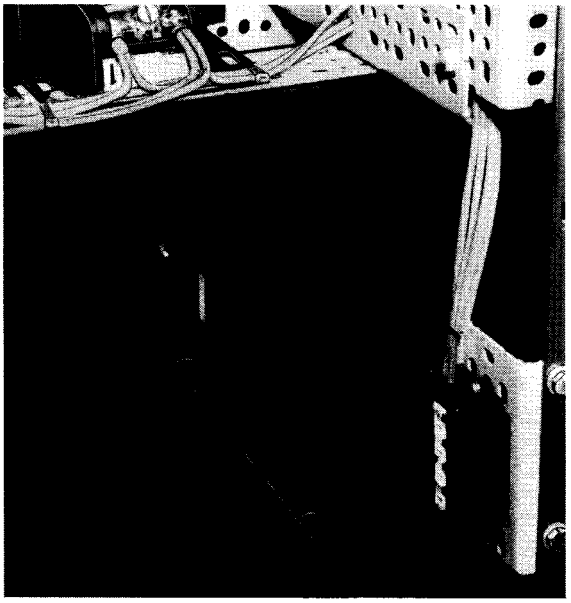
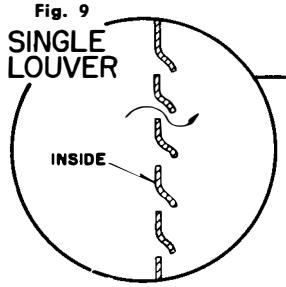


Fig. 8 4630-V

I. INSTALLATION (cont'd)

GENERAL DETAILS — CONSTRUCTION AND AUXILIARIES

Fig. 9



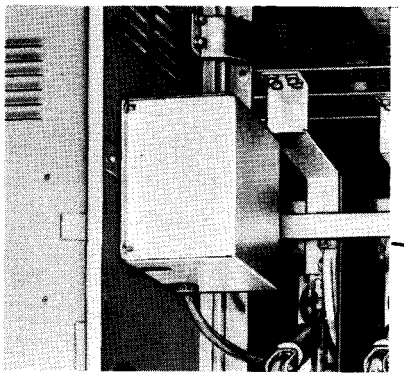
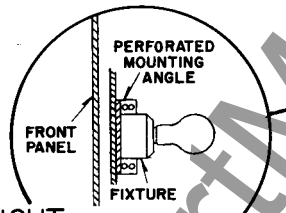
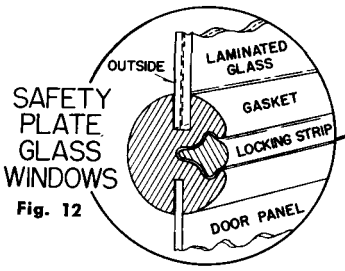


Fig. 10



LIGHT MOUNTING

Fig. 11



SAFETY PLATE GLASS WINDOWS

Fig. 12

STANDARD KIRK KEY INTERLOCK

Fig. 13

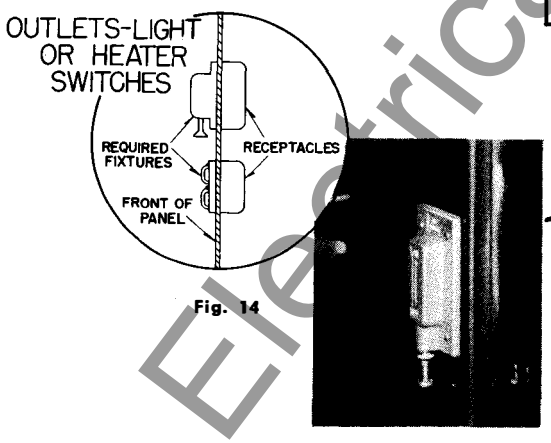
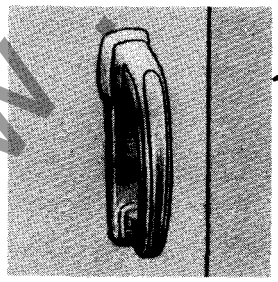


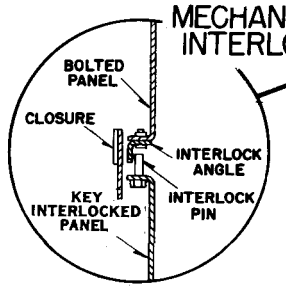
Fig. 14

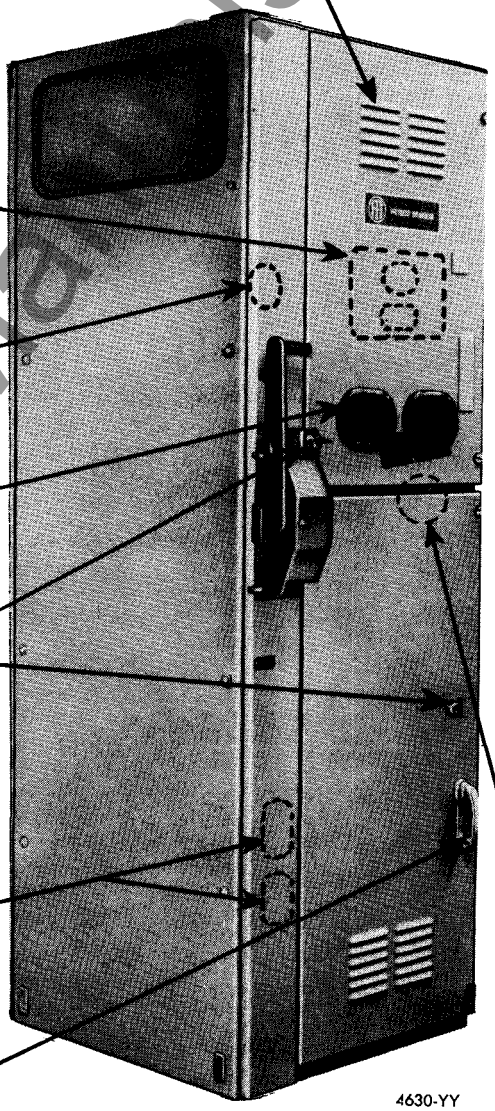
Fig. 15



DOOR HANDLE WITH PADLOCK PROVISION

Fig. 16



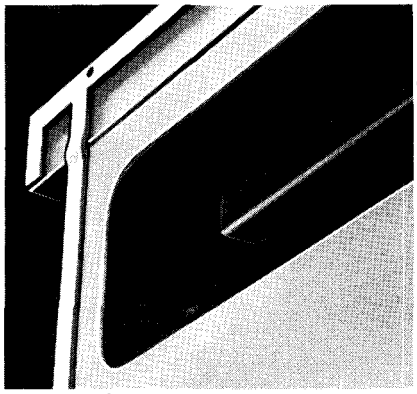


4630-YY

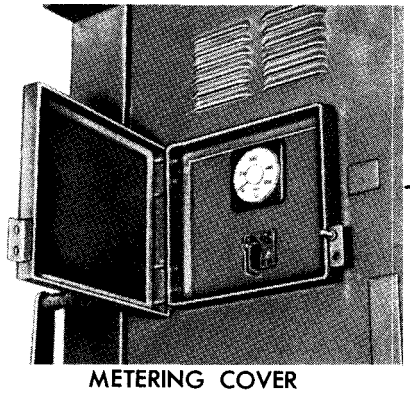
Supplied as optional when specified—
Figs. 10, 11 and 14

I. INSTALLATION (cont'd)

GENERAL DETAILS—OUTDOOR CONSTRUCTION



JOINT GASKETING
Fig. 17



METERING COVER
Fig. 19

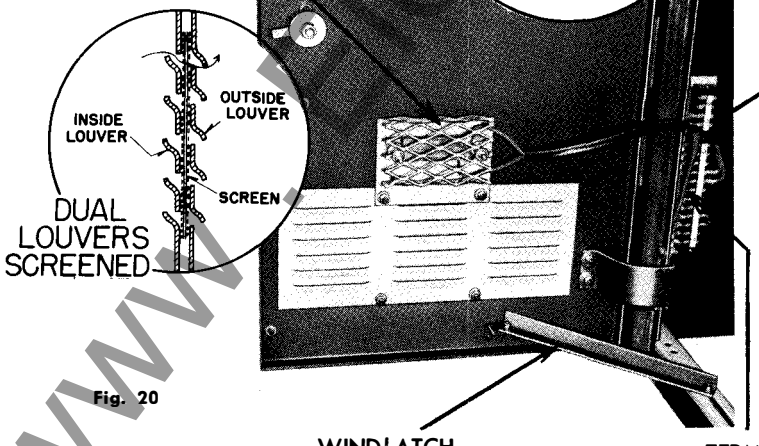


Fig. 20

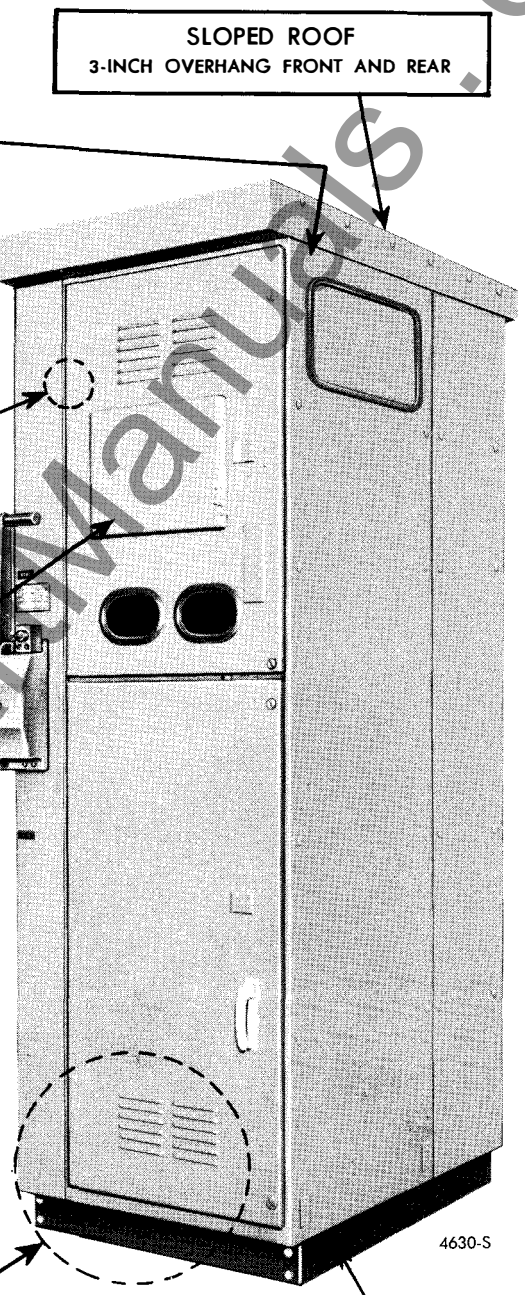
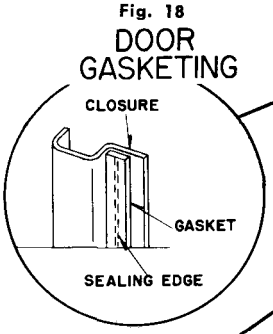
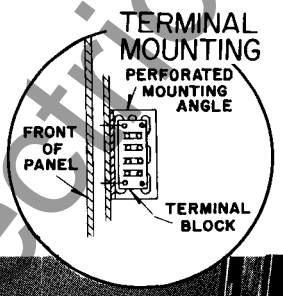
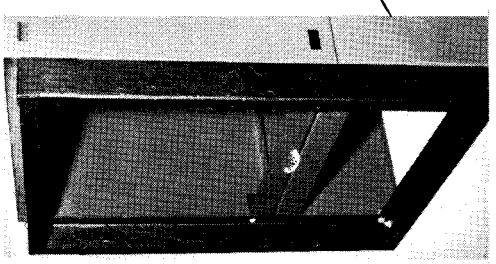


Fig. 18







CHANNEL BASE - ASPHALTIC COATED
Fig. 21

I. INSTALLATION (cont'd)

B — OUTDOOR

For outdoor PSC assemblies, the installation instructions of the indoor PSC assemblies should be followed exactly, together with the following additions.

Refer to pages 5 and 6 for details of the following:

1. The basic outdoor construction differs from the indoor type in that it has:
   a. Sloped overhanging roof section, bolted and gasketed on the top of each bay.
   b. Gasketed door frames and meter compartment covers, Figs. 18 and 19.
   c. If a rear section is added for extra depth, the two frames are bolted and gasketed together.
   d. A steel channel base frame for each bay, asphalt coated, on which the actual unit is bolted, Fig. 21.
   e. Gasketing is also provided between all bays.
2. If a PSC has two or more shipping splits, rubber gaskets are supplied in place, Fig. 17.

II. OPERATION

A — UNFUSED SWITCH WITH MANUALLY-ACTUATED SPRING-OPERATING MECHANISM

In this arrangement the handle mechanism is coupled through chain and sprocket with the spring-operating mechanism. If the handle mechanism has a Kirk key interlock, make sure it is unlocked before actuating the handle.

1. Moving handle up or down, whichever is synonymous with the switch operation, will charge the spring of the operating mechanism. Immediately when the spring is fully charged it will operate the switch independently from the handle itself.
2. A position indicator built into the handle housing will indicate the correct switch position. (Shown below).
   a. Silver-green — Spring discharged —Switch open
   b. Silver-red — Spring discharged — Switch closed

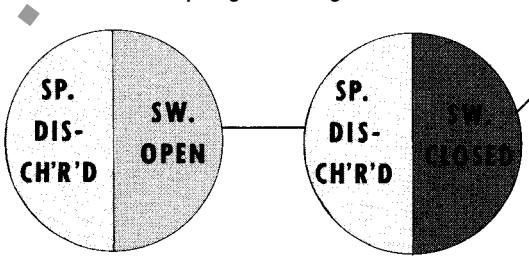
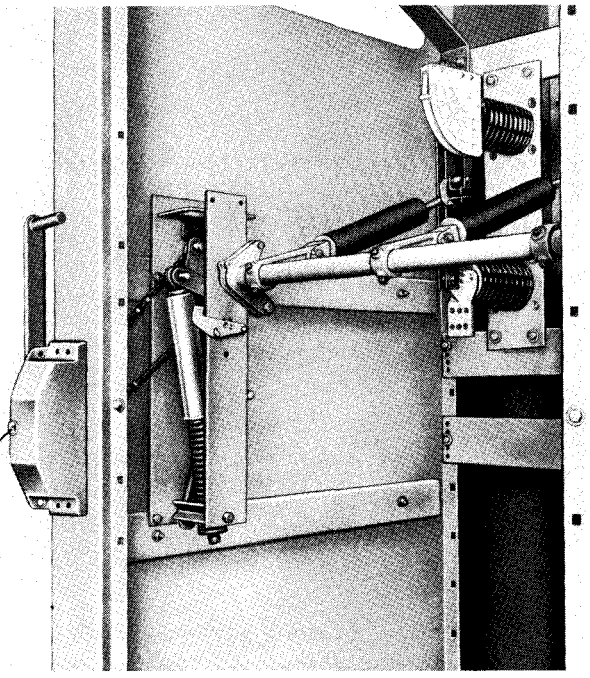


Fig. 22
Silver-Green

Fig. 23
Silver-Red



4871-C

Fig. 24. Front chain drive connected to shaft through stored-energy spring operator for maximum fault closing.

II. OPERATION (cont'd)

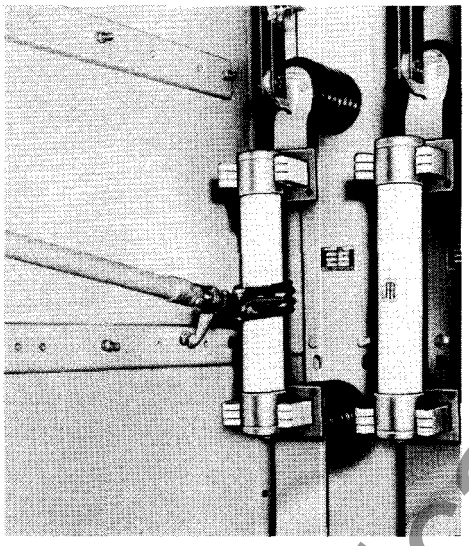
B — FUSED SWITCH WITH MANUALLY-ACTUATED SPRING-OPERATING MECHANISM

A fused switch is an arrangement where the fuses are mounted either below or above the switch, see Fig. 26.

The door allowing access to the fuses is always interlocked with the switch-operating mechanism, so that it can only be opened when the switch is in the open position. Switch access door can only be opened after fuse access door is open. See also under interlocks.

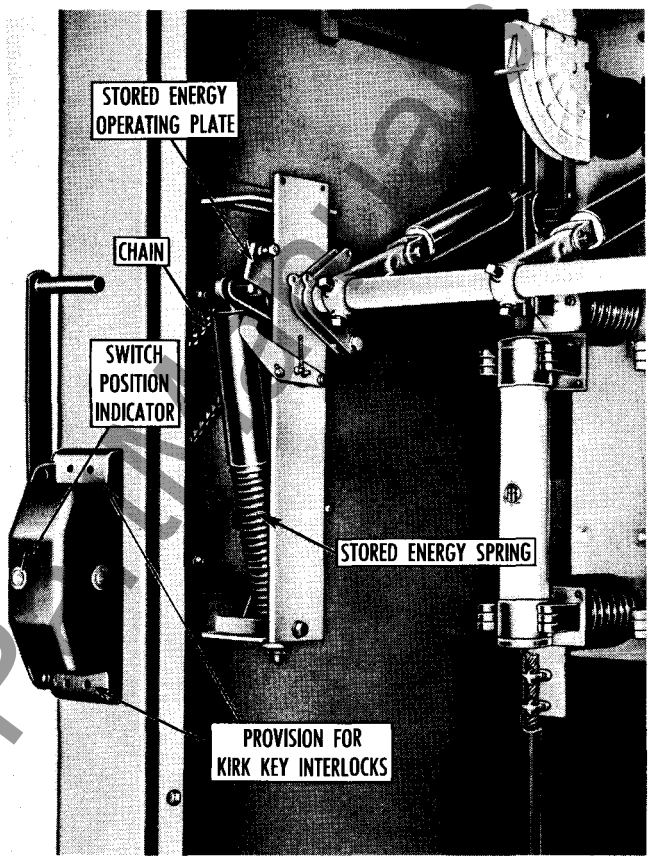
The functions of the manually-actuated spring-operating mechanism are the same as described under II., A.

Fuses can be removed with the fuse tool which can be supplied as accessory equipment with the Power Switching Center, see Fig. 25.



4661-V

Fig. 25 Fuse tool in use, removing fuse.



4871-D

Fig. 26 Fused switch with manually actuated spring operating mechanism.

INTERLOCKS

1. FUSED SWITCH

Interlocks prevent access to fuses while switch is closed. Refer to Fig. 27, page 9, and Fig. 13, page 5.

Two keys are supplied, one with each interlock. For safe operation, one key must be removed and destroyed.

Units are shipped with fuse access door closed and locked and switch closed.

To gain access to fuses, proceed as follows:

a. Open switch, turn Key A2 on handle-interlock to lock open, and remove key.

b. Insert key into interlock on fuse access door and turn to unlock.

c. Open fuse access door, Key A2 is now held captive.

To restore service, reverse above procedure c, b, a.

NOTE: Fuse access door must be closed tightly before it can be locked and key can be obtained.

2. BUS TIE SWITCH — TWO INCOMING LINES

Interlocks prevent paralleling of incoming lines, loads can be fed from either line. Refer to Fig. 28.

Three keys are supplied, one with each interlock.

For safe operation, one key must be removed and destroyed.

Normally bus tie switch C is open and locked open.

Two incoming line switches A and B are closed, and the keys of their interlocks are held captive.

To close bus tie switch proceed as follows:

a. Open line switch (either A or B), turn Key A1 to lock open and remove key.

b. Insert key interlock on bus tie switch C and turn to unlock.

c. Close bus tie switch, key is now held captive.

To restore service, reverse above procedure c, b, a.

II. OPERATION (cont'd)

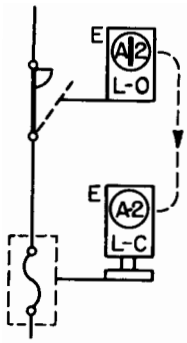


Fig. 27

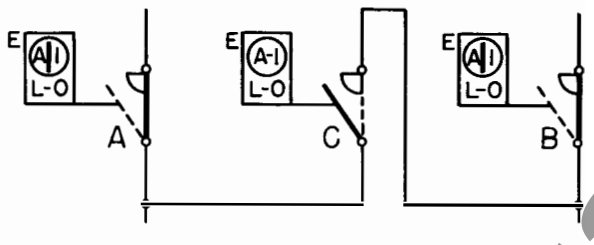


Fig. 28

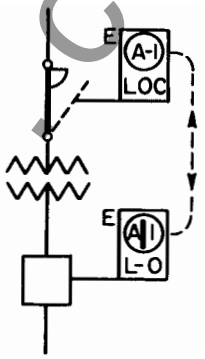


Fig. 29

3. SWITCH INTERLOCKED WITH PRIMARY OR SECONDARY BREAKER

Interlock prevents operation of switch when breaker is closed, Fig. 29. Two keys are supplied, one with each interlock. For safe operation, one key must be removed and destroyed.

Switch and breaker are closed, Key A1 is held captive in breaker interlock.

a. Open breaker and turn key in interlock to lock open and remove key.
b. Insert key into switch interlock LOC and turn key to unlock, key is then held captive.
c. Open switch.
d. Turn key to lock switch in open position.
e. To restore service, unlock switch, close it, lock closed, and obtain key.
f. Insert key into breaker interlock, unlock and close breaker, key is then held captive.

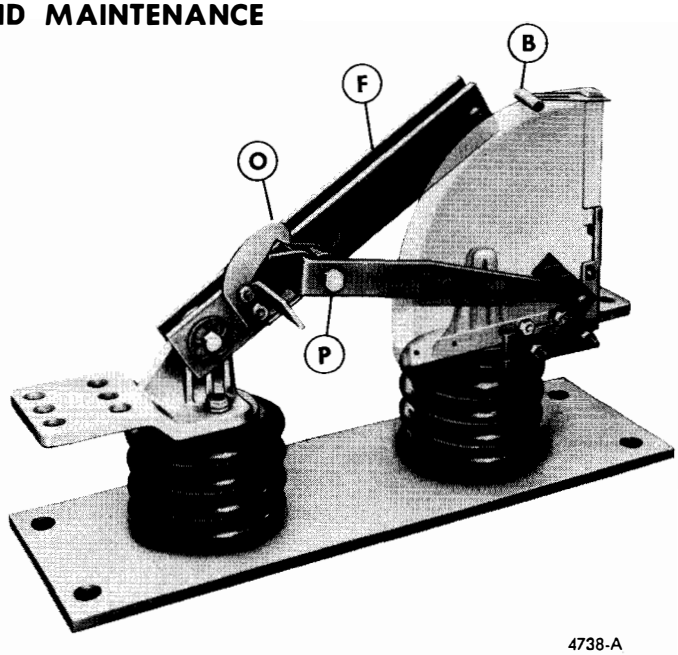
III. INSPECTION AND MAINTENANCE

A — SWITCH AND FUSES

The interrupting contacts, quick-break blade and arc chute gradually erode when interrupting current, and should be visually inspected after approximately 100 normal load-interrupting operations. This inspection can be performed by opening the switch and noting the condition of the quick-break blades.

Fig. 30. 4033-B
End of auxiliary blade showing erosion of arcing tip.

If the moving arcing electrode (on the tip of the auxiliary, quick-break blade) shows bad erosion, Fig. 30 (approximately one-third burned away), the arc chute and quick-break blade should be replaced. To replace arc chute, loosen locknuts holding arc chute to support, (Fig. 32), pull arc chute away from switch base, rotating toward hinge, and remove. Discard and replace with new unit. To replace quick-break blade, remove bolt P, (Fig. 31) and lift off used blade.



4738-A
Fig. 31. Main blade opening, auxiliary blade about to be released. Half af arc-chute removed.

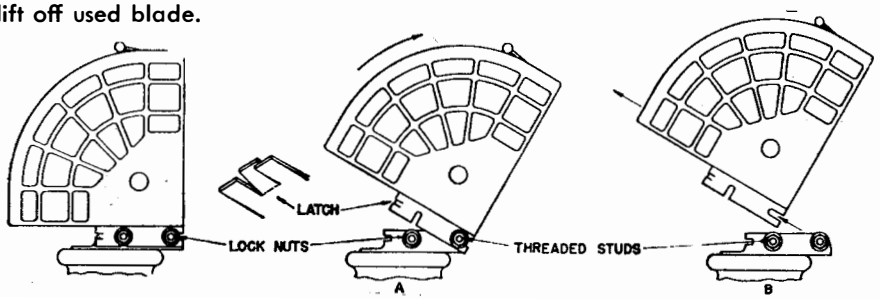


Fig. 32. Progressive steps in arc-shute removal.

III. INSPECTION AND MAINTENANCE (cont'd)

Quick-Break Blades

During switch operation, quick-break blade should not release until it is pulled out of contact by hook O, Fig. 31. When closing, quick-break blade should not leave flipper C, Fig. 35, until jaw blades R, have made contact.

Contact Adjustment

Should it ever be necessary to adjust the hinge contact pressure—(First) Loosen pressure adjusting nut S (Fig. 35) until there is negligible contact pressure (no clearance), (Second) tighten nut one-half turn. Hinge friction should be sufficient to hold a 4.8-kv blade (9-inch insulator centers) in any position and to just allow a 13.8-kv blade (12-inch insulator centers) to fall. No adjustment is required on jaw contact.

Fuses

I-T-E CL fuses are normally utilized in this type of equipment. The following instructions are for replacing fuse units after interruption:

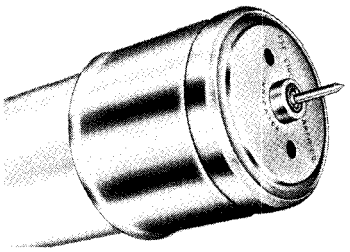


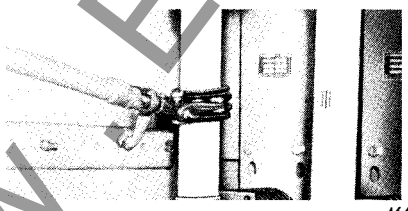
Fig. 33 4661-Q

1. When indicating pin is in the extended position, Fig. 33, the fuse **must** be replaced.
2. To replace fuses, grasp with fuse tool, Fig 34, and remove. Replace with new unit.

Lubrication

Switches that are normally closed, only require lubrication of jaw contacts approximately every 500 open-close operations. Use grade E NO-OX-ID or equivalent.

Switches that are open long periods of time should have jaw contacts cleaned and greased lightly with grade E NO-OX-ID as service conditions dictate.

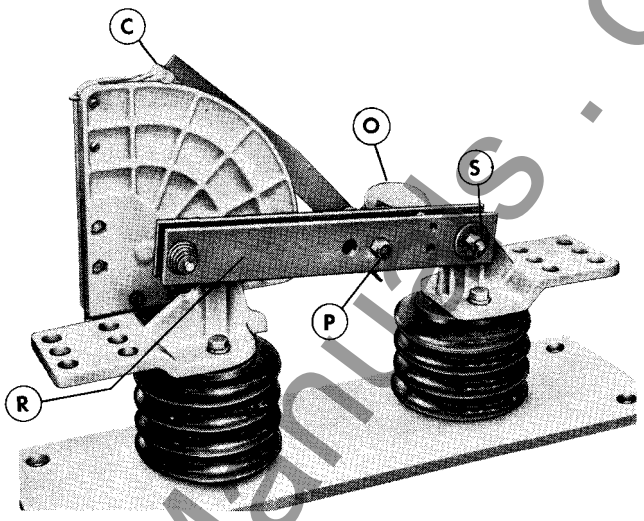


4661-V

Fig. 34

Cleaning

If required, clean all insulators with detergent (not soap) and water, or if there is considerable dirt accumulation, use trichlorethylene ($CHCLCCL_2$). Be careful to dry well with a soft clean cloth before reengergizing.



4738-C

Fig. 35. Main blade closing, auxiliary blade restrained and about to be released for closing.

B — SPRING-OPERATING MECHANISM

Check chain drive and spring-operating mechanism for loose or worn parts. All pivoting and moving surfaces, especially the chain, to be lubricated with molykote G or an equivalent good grade of grease.

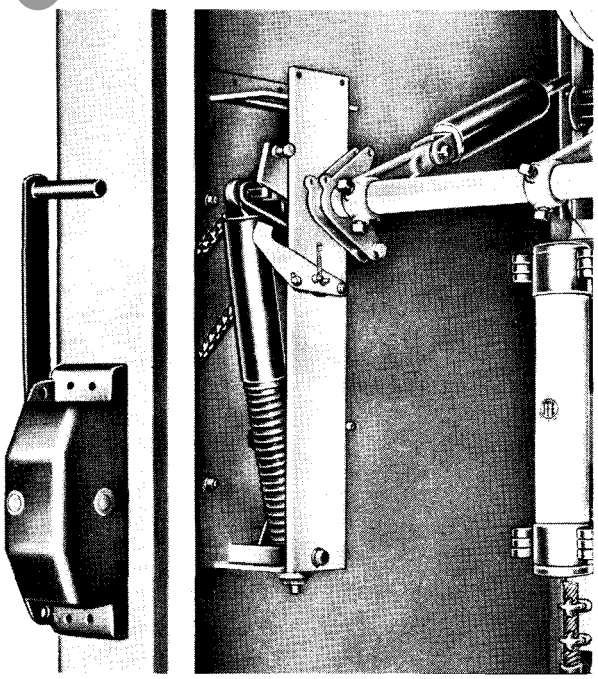


Fig. 36 4871-DC

Emergency—If the interrupter switch has been closed on a faulted circuit, it is recommended that the switch itself be inspected as soon as practical thereafter. Both the switch and operating mechanism are capable of closing on the single assembly rated fault without damage, and thereafter, of carrying and interrupting full rated load current without exceeding NEMA temperature rise limits.

IV. SPARE AND REPLACEMENT PARTS

For normal maintenance it is recommended that the user maintain the following spare parts stock (quantity is for 5 switches in operation):

Item	Description	Quantity
1	Insulating links (for switch mech.) Fig. 37	1 set
2	Quick-break blade, Fig. 38	3 each
3	Arc chute, Fig. 39	3 each
4	Flipper assembly, Fig. 39	3 each
5	Thumb screw and captivated nut, Fig 40.	6 each
6	Insulators A-20, Fig. 41	4 each
	A-30, Fig. 42	2 each

NOTE: When ordering spare parts, state I-T-E shop order (S.O.) number, G.A. drawing number and serial number of each bay for which parts are being ordered as well as item number, description and quantity. For mounting dimensions and instructions, see DB Section 1632. For prices, refer to I-T-E representative.

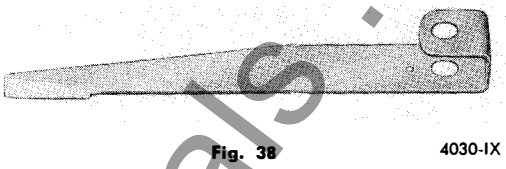


Fig. 38 4030-IX

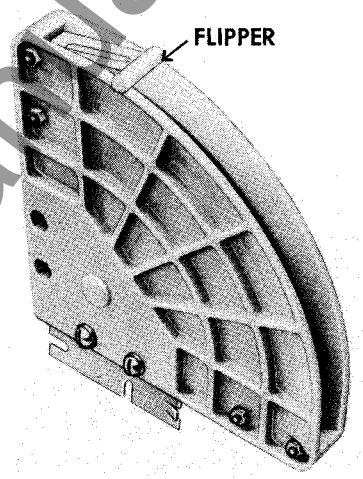


Fig. 39 4630-IX

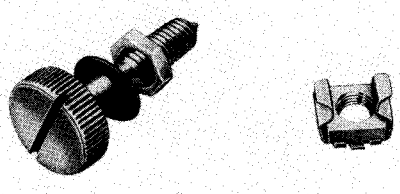


Fig. 40 4630-SS

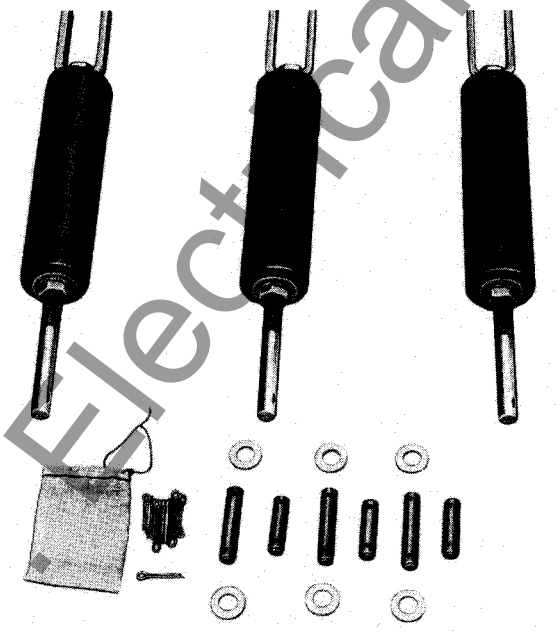


Fig. 37 4593-F

Fig. 41 4630-4

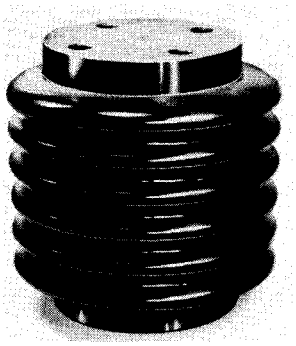


Fig. 42 4630-5

I-T-E IMPERIAL CORPORATION

Supersedes IB-1700

IB-1700-1A-2M-1268
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