TYPE ADM DISCONNECT SWITCH

HIGH VOLTAGE AIR BREAK

DESCRIPTION

APPLICATION

The Type ADM switch is a three pole, manually operated, quick make – quick break switch available in both 600 ampere and 1200 ampere continuous ratings. This device is used primarily as a disconnect switch in AC power systems up to 5500 volts and may be supplied with or without fuses.

The Type ADM switch without fuses is capable of closing under fault conditions and interrupting magnetizing and load currents as indicated in Fig. 2, but is not intended to interrupt fault currents.

When supplied with fuses, the Type ADM switch may be used to provide fault protection up to the interrupting rating of the fuses.

GENERAL

The Type ADM switch is assembled in a welded steel frame which is interchangable with standard 400 ampere Ampgard® motor starter cells. The Type ADM switch may be supplied as an integral part of an Ampgard starter lineup. Also, one or two switches may be mounted in a standard 36" wide, 30" deep, 90" high Ampgard starter enclosure.

The Type ADM switch is designed for operation in an enclosure and should not be operated under load with the enclosure door open.

ARC resistant and flame retardant insulating barriers are mounted between poles and also between the two outside poles and the switch framework.

OPERATING MECHANISM

When the operating handle is moved upward toward the

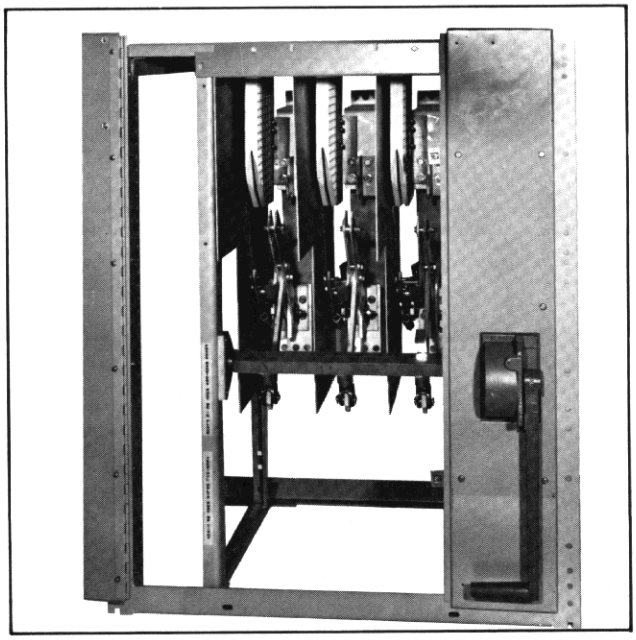


Fig. 1 *1200 Ampere Type ADM Switch (Photo BD 75-0356)*

Maximum Voltage KV	BIL KV	Continuous Amperes	Interrupting Capacity (Amperes)		Momentary Current		Fault Current Closing Asymmetrical KA
			80-100% PF	10% PF or Less	10 Cycles Asymmetrical KA	4 Seconds Symmetrical KA	
5.5	60	600	600	80	40	25	40
5.5	60	1200	1200	160	61	38	61

Fig. 2 *Switch Ratings*

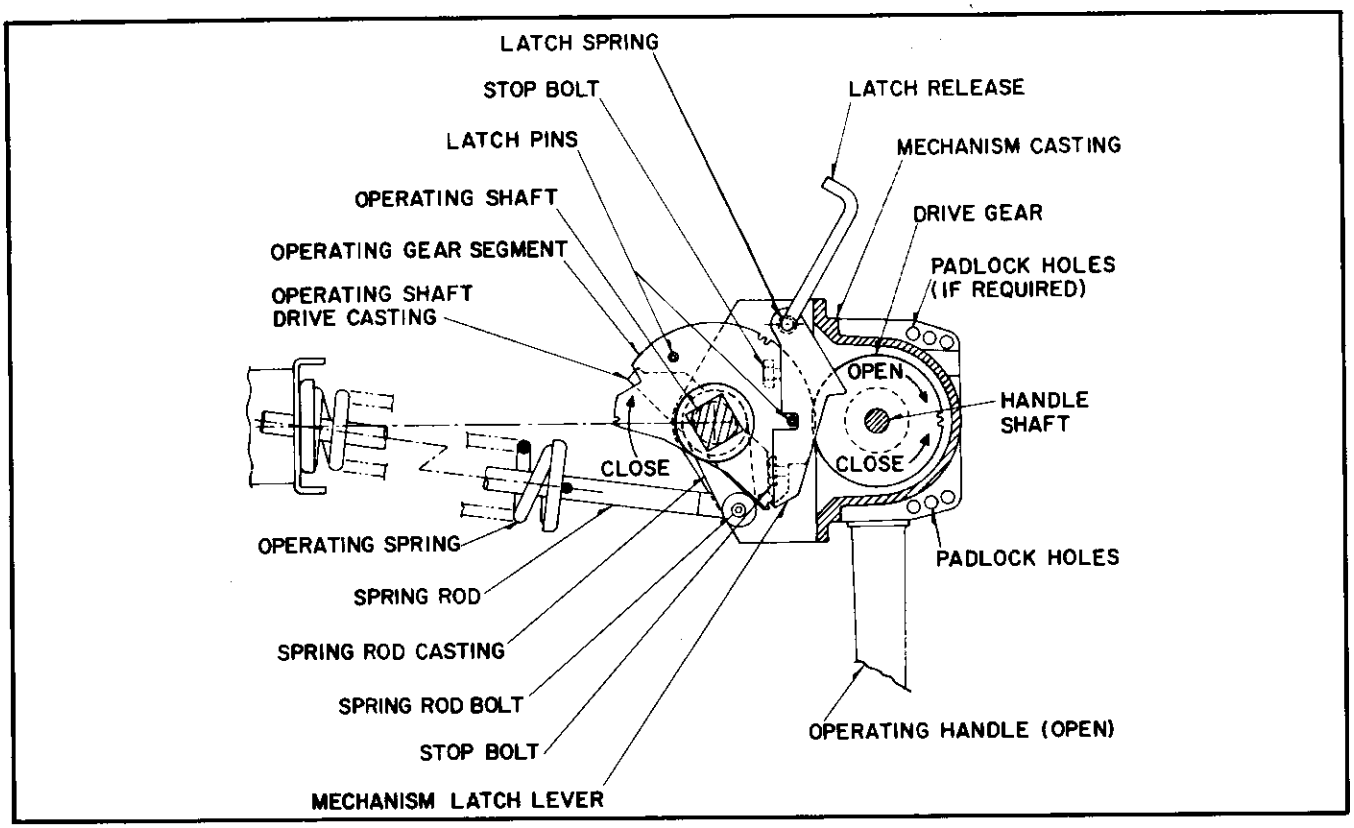


Fig. 3 *Operating Mechanism In The OPEN Position (Dwg. 3497C95)*

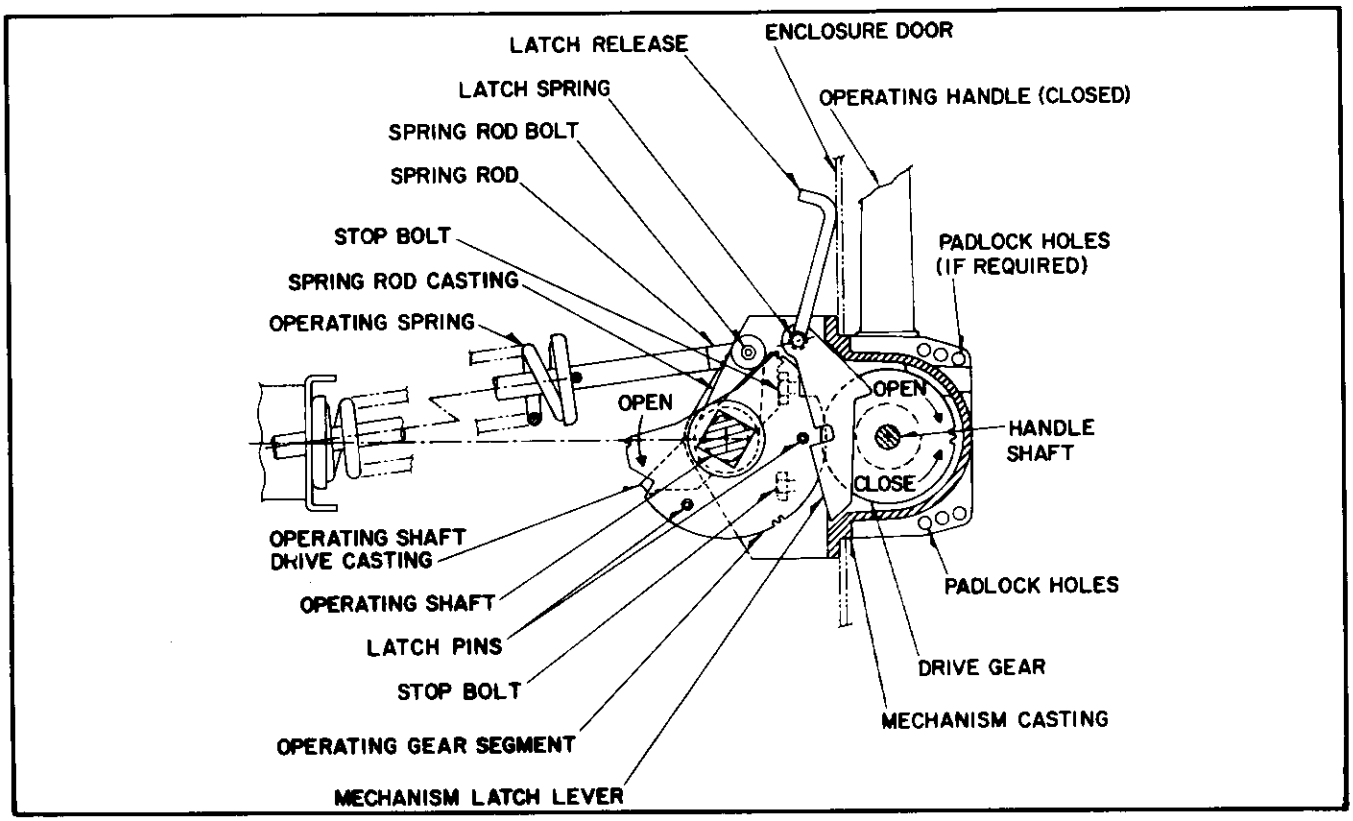


Fig. 4 *Operating Mechanism In The CLOSED Position (Dwg. 3497C96)*

CLOSED position, the operating gear segment will push the spring rod casting in a clockwise direction to compress a powerful operating spring as shown in Fig. 3. The operating gear segment and spring rod casting are free to rotate on the round portion of the operating shaft, so the operating shaft will remain stationary, due to the restraining force of the switch units.

After the spring rod bolt passes dead center, the spring rod casting will continue to travel in the clockwise direction under energy supplied by the operating spring and will ultimately strike the operating shaft drive casting. The operating shaft drive casting is pinned to the operating shaft, so the energy stored in the operating spring, during the earlier portion of the closing cycle, will now be applied to the operating shaft to rotate it in a clockwise direction and close the switch units.

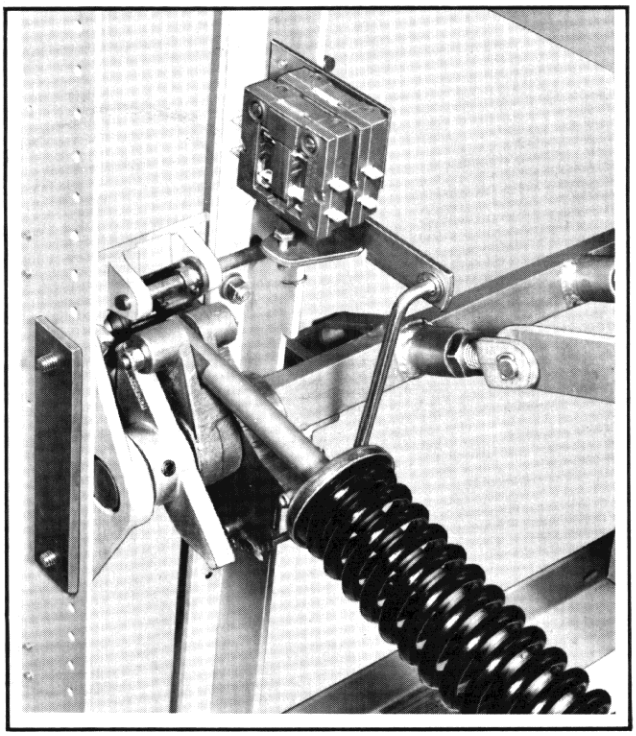


Fig. 5 *Operating Mechanism In The CLOSED Position (Photo BD 72-0287)*

The spring rod casting is free to pull away from the gear segment after it passes dead center so that it is not restrained by the operating handle. In this way the operating speed of the switch is determined by the characteristics of the operating spring alone, and is independent of the speed at which the operator manipulates the operating handle.

To open the switch, the handle is moved downward and the mechanical sequence for closing is repeated to provide positive opening of the contacts. Figures 4 and 5 show the mechanism in the CLOSED position.

MAIN CONTACTS

The main stationary contacts and moving contact blades are made from high conductivity copper with copper tungsten inserts mounted at the points where the contacts first touch during closing. As the switch blades move to the fully closed position, the copper tungsten inserts disengage and final contact is made at contact points on the main body of the stationary and moving contacts.

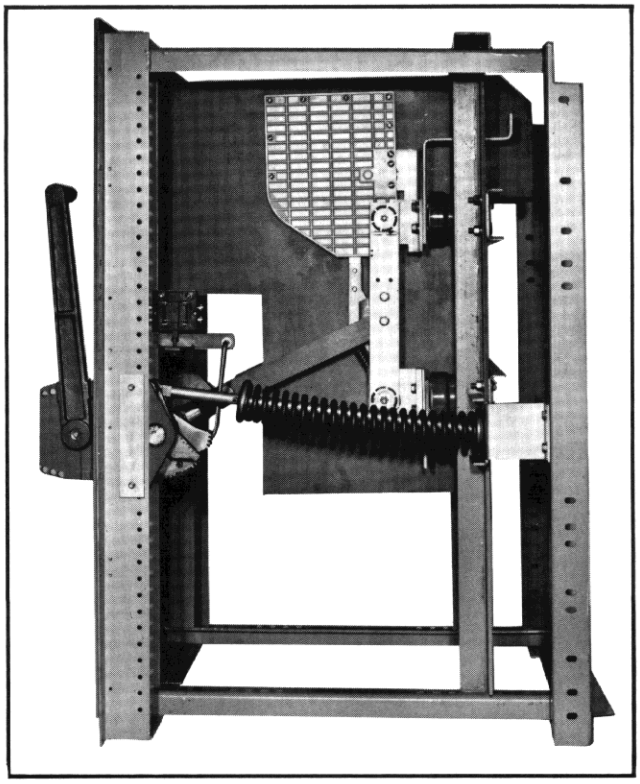


Fig. 6 *1200 Ampere Switch Assembly In The CLOSED Position (Photo BD 75-0355)*

On the 600 ampere switches, the stationary contacts and the stationary members of the hinge assemblies are bare copper. On the 1200 ampere switches these parts are silver plated. The switch blades for both ratings are silver plated.

Phosphorus bronze spring washers are used at both the hinge and main contact points to assure permanent contact force, and graphite grease is used to provide lubrication without jeopardizing conductivity. Fig. 6 shows the 1200 ampere switch in the CLOSED position.

ARC CHUTES

The arc chute sides are made from a urea formaldehyde material which gives off a de-ionizing gas when exposed to a high current arc. Silver tungsten arcing contacts, mounted

within the arc chutes, momentarily delay the flicker blades on opening.

The arc chutes for the 600 ampere switches are 7" high and 7" deep, while the arc chutes for the 1200 ampere switches are 11-1/4 high and 8-7/8 deep.

FLICKER BLADES

The flicker blades are mounted parallel to the main contact blades and are disengaged from their stationary contacts, mounted within the arc chutes, when the main contact blades are fully closed. The flicker blades are made from a spring type copper alloy material and the leading edges are fitted with arc resisting silver tungsten inlays. In the opening sequence, the main blades separate from the stationary contacts first and the current flow is transferred to the flicker blades, which are momentarily restrained by the stationary contacts within the arc chutes. Once the maximum angular movement between the flicker blades and main blades has been reached, the flicker blades start to move out of the arc chute contacts. At this point, the flicker blade springs snap the flicker blades open and the heat of the arcs releases a blast of de-ionizing gas from the arc chute walls to extinguish the arcs.

MECHANICAL INTERLOCKS

When the enclosure door is open, the notch in the mechanism latch lever engages a pin projecting from the side of the operating gear segment as shown in Fig. 3. When the enclosure door is closed, the door will strike the latch release lever to move the mechanism latch lever out of engagement with the pin in the operating gear segment to permit operation of the switch. This interlock may be deliberately defeated by qualified personnel by pushing the latch release lever back manually.

In normal operation, with the enclosure door shut, a hook mounted on the operating shaft will engage a loop on the inside of the enclosure door when the switch is closed. This will prevent the enclosure door from being opened when the switch is closed. In the event of an emergency, and it is necessary to open the enclosure door without first opening the switch, this interlock may be rendered ineffective by removing the screws, from the outside of the door, which attach the interlock loop to the door.

The operating mechanism may be locked in the OPEN position using up to three padlocks. In the event it is desirable to padlock the switch in the CLOSED position, additional holes may be drilled in the mechanism casting to accommodate up to three padlocks.

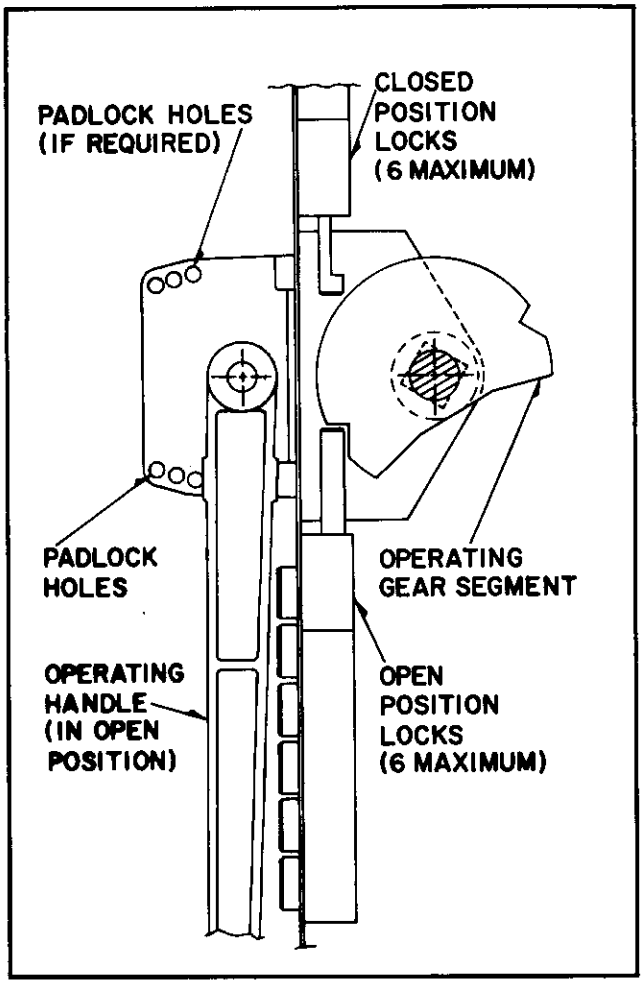


Fig. 7 *Position Of Kirk Key Locks (Dwg. 3497C99)*

In addition to the standard interlocks, provisions have also been made for mounting up to six Kirk key interlocks as shown in Fig. 7.

ELECTRICAL INTERLOCKS

Two Type L-64 electrical interlocks may be mounted just above the operating mechanism as shown in Fig. 5. Any combination of normally open or normally closed circuits is available by selection of the appropriate styles from Fig. 8

Interlock Style	Circuit Combination Provided By One Interlock Assembly
843D943G04	One normally open, One normally closed
843D943G05	Two normally open
843D943G06	Two normally closed

Fig. 8 *Type L-64 Electrical Interlocks*

MAINTENANCE AND REPAIR

GENERAL

This industrial type control is designed to be installed, operated, and maintained by adequately trained workmen. These instructions do not cover all details, variations, or combinations of the equipment, its storage, delivery, installation, check-out, safe operation, or maintenance. Care must be exercised to comply with local, state, and national regulations, as well as safety practices, for this class of equipment.

After installation, and before energizing the equipment for the first time, the insulation resistance between poles and from each pole to ground, should be measured and recorded. It is not practical to specify an absolute value for this reading since it is dependent on other connected apparatus, and conditions of service. However, any unusually low reading or abrupt reduction in this reading would indicate a possible source of trouble, and the cause should be determined and immediately corrected.

Before the switch is placed in service for the first time, or following maintenance work, the switch should be operated slowly by hand two or three times without power to check the alignment and operation of the main and flicker blade contacts (See the section entitled MAIN CONTACTS for operating procedure). After the switch adjustment is found to be satisfactory, the switch should then be closed and opened two or three more times using the operating mechanism.

When the equipment is first put into service it is recommended that the switch be inspected after the first 50 rated current interruptions. In the event the switch has been closed under fault conditions, it should be inspected at the first opportunity at which it can be deenergized.

After the switch has been inspected a number of times at regular intervals, and the condition noted, the frequency of inspection can be increased or decreased to suit the conditions found, since this will depend upon the severity of the switch duty.

A routine maintenance program should include the following salient points.

SAFETY

Be sure that the switch is disconnected from all power sources before servicing the main power circuits. After power has been disconnected from the switch, it is good practice to ground both sides of the switch.

HARDWARE

See that bolts, nuts, washers, cotter pins, and terminal connectors are in place and in good condition. Replace items showing excessive wear or corrosion.

INSULATION

1. Inspect insulators for breaks, cracks, or burns. Clean the insulators where abnormal conditions such as salt deposits, cement dust, or acid fumes prevail. This is necessary to avoid flashover as a result of the accumulation of foreign substances on their surfaces.

2. Measure insulation resistance and check readings against original readings.

CURRENT CARRYING PARTS

The general condition of the main contacts and bolted connections should be noted, especially any discoloration which would indicate excessive heating due to loose hardware, high current, or low contact force.

MAIN CONTACTS

1. To check the operation of the main and flicker blade contacts it is necessary to close and open the deenergized switch slowly by hand as follows:

   (a) Be sure the operating handle is latched in the OPEN position by the door interlock latch as shown in Fig. 3.

   (b) Place a pipe or monkey wrench, with a handle approximately 32" long, on the square operating shaft and push down on the wrench handle to close the contacts. In this mode of operation the operating shaft strikes its stop before the operating spring moves past dead center, so the contacts will not slam closed. Also, they will re-open automatically when force is removed from the wrench handle.

2. With the switch open, check the contact inlays on the stationary contact and on the inside edges of both mov-

ing contact blades for excessive erosion or wear, and for tightness. Also check copper and/or silver plated contact points for excessive wear or pitting.

Badly pitted, burned, or worn contacts should be replaced. If the contact inlays look satisfactory except for sharp edges or rough spots, which might hinder proper closing, they should be cleaned up using a fine file. No attempt should be made to file out the pit marks. Abrasive materials should not be used on the contacts.

The copper and silver plated contact points should not be filed since opening and closing of the switch will clean these contact points.

3. Check the hinge and sliding contact points to see that they are lubricated with a thin layer of graphite grease.

4. Close the switch slowly by hand and check for proper alignment of the moving contact blades with the stationary contacts. Poor alignment may be corrected by loosening the four hinge mounting bolts on top of the insulators and shifting the blade assemblies as required to provide correct alignment.

   In the event the sides of the stationary contacts are not parallel with the moving contact blades, the stationary contacts should be adjusted by loosening their mounting bolts and shifting the position of the stationary contacts on the insulators.

5. Operate the switch slowly by hand and check for any tendency of the switch blades to hang up on closing or opening due to sharp edges or rough spots on the contact inlays.

6. On closing, the main contacts must make contact first on the weld resisting inlays and then transfer their point of contact to the main body of the stationary contact and switch blades. If the contact inlays are worn to the point that initial contact is not made on the contact inlays, both the stationary and moving contacts must be replaced.

7. Contact force at the hinges and main contacts is provided by spring washers which are held in compression by spring bolt assemblies. The spring bolts are fitted with self locking nuts which do not require jamming solid to remain in place on the bolts. These nuts should be tightened with just sufficient torque to provide proper contact force. Care must be taken to be sure the spring bolts are not overtightened, since this may damage the contacts in addition to causing sluggish operation of the switch.

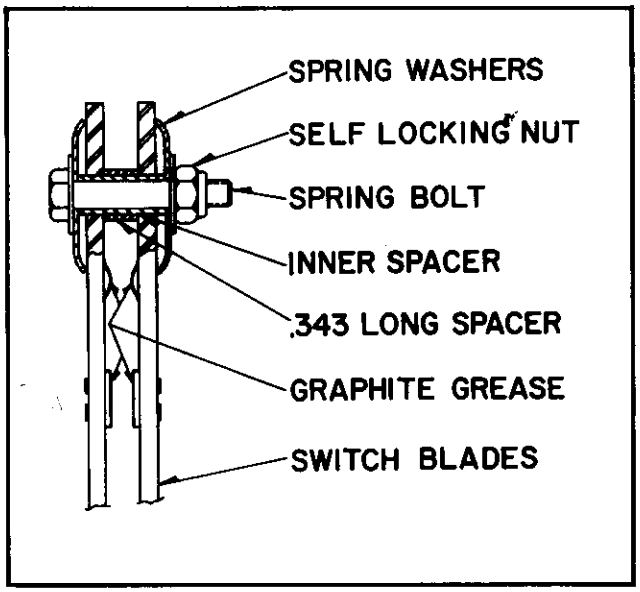


Fig. 9 *Main Contact Assembly (Dwg. 3497C98)*

The outside diameter of the spring bolt spacers should be approximately .005" less than the inside diameter of the mating holes in the switch blades to permit free movement of the switch blades on opening and closing.

(a) MAIN CONTACT FORCE

When the switch is open, the spring bolts should be tightened just enough to take up the play in the spring bolt assemblies and draw the switch blades down until they touch the .343" long spacers mounted on the spring bolt assemblies between the switch blades. The spring washers should not be compressed beyond this point when the switch is open. See Fig. 9 for this assembly.

When the switch is closed, the stationary contacts should pry the contact blades apart, in which event there will be a gap between one or both ends of the .343" long spacer and the adjacent switch blades. The presence of this gap indicates there is spring force at the main contact points. In the event both switch blades are still tight against the .343" long spacer with the switch closed, this indicates insufficient contact force (usually due to worn out contacts), and corrective action must be taken.

(b) HINGE FORCE

The spring bolts at the switch blade hinges should be tightened one full turn after the play is taken up in the spring bolt assemblies.

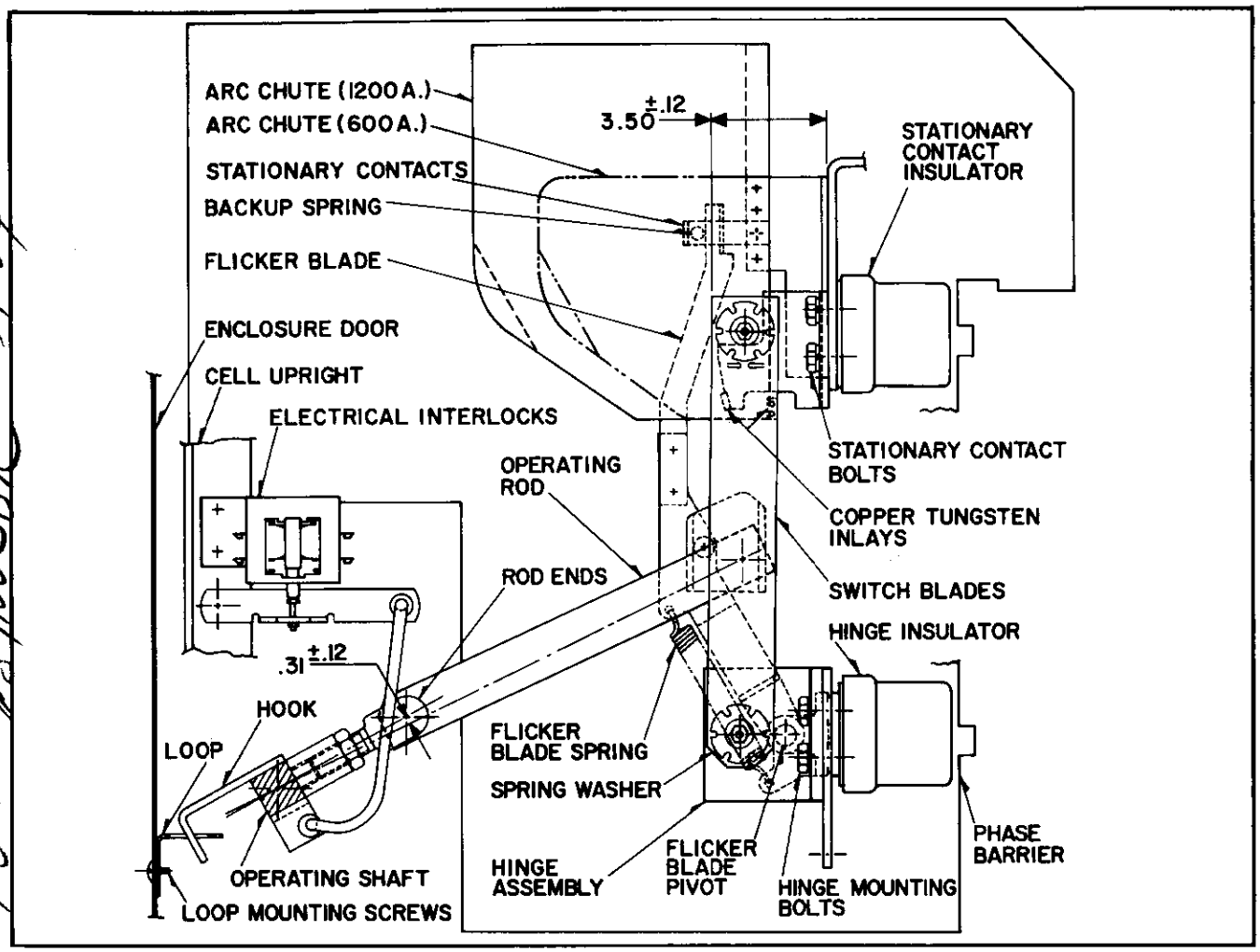


Fig. 10 *General Assembly (Dwg. 3497C94)*

8. The rod ends mounted on the square operating shaft should be adjusted so that all three main contacts touch within .12" of each other and the front edges of the switch blades should come to rest 3.50" ± .12" from the stationary contact mounting surfaces as shown in Fig. 10. In the CLOSED position, both contact projections on the main switch blades must engage the stationary contacts and the flicker blades must also have passed between their stationary contacts. When the switch is closed, however, the contact spring bolt assemblies should not come to rest tight against the shoulders on the stationary contacts and the flicker blades should not be tight against their stops.

9. When new contacts are installed, a light coating of graphite grease must be applied to the hinge and contact points. Before the spring bolts are tightened, the switch units should be operated by hand several times to work the grease into the sliding contact points.

FLICKER BLADES

1. With the switch open, check the condition of the flicker blade contacts. The stationary contacts are mounted within the arc chute and should be checked to see if they are intact, centered in the arc chute, and spring together when the switch is opened. This can be done by shining a light into the flicker blade slots. In the event the moving contacts show considerable erosion, the arc chutes should be dismantled and a more thorough inspection of the stationary contacts and their back up springs should be made.

The stationary and moving contact inlays are made from arc resisting silver and copper tungsten materials and will not require dressing unless rough spots or sharp edges are found, which interfere with the proper opening and closing of the contacts. The front and back edges of the flicker blades should have a radius or bevel of .016" or more in the area where the blades engage the stationary contacts, to aid contact engagement. Large beads of

copper which may collect on the main body of the flicker blades should be removed with a fine file to maintain proper clearance to the arc chute walls. Do not lubricate the flicker blade contacts or use abrasive materials in dressing the contacts.

2. Check the flicker blade assemblies to be sure they are free of friction and that the springs snap the flicker blades back against their stops when the flicker blades are released. The bearing holes in the flicker blade supports should be approximately .005" larger than the pivot shafts and the flicker blade assemblies should have .03" to .09" end play. Two .03" thick teflon washers are mounted between the flicker blade supports and the main switch blades to minimize friction at that point.

3. Close the switch slowly by hand to check the flicker blade operating sequence and alignment. On closing, the flicker blades must not make contact until after the main contacts have started to engage. When the main contacts reach their fully closed position the flicker blades should have passed between their stationary contacts and come to rest on the far side of the stationary contacts. The flicker blades will now be held firmly in place by the stationary contacts until the main contacts open to a gap of .5 inches or more, at which time the flicker blades will hit their forward stops and will be pulled open suddenly by the main contacts. When the flicker blades become disengaged from their stationary contacts, the flicker blades will spring open to their normal position.

   The flicker blades should move into and out of the arc chutes with minimum friction between the flicker blades and the arc chute walls. Slight mis-alignment may be corrected by bending the flicker blades, but to correct for greater mis-alignment, the arc chute mounting bolts must be loosened and the arc chutes shifted as necessary to provide proper alignment.

ARC CHUTES

1. Dust and other foreign matter should be cleaned from the arc chute chambers.

2. Inspect arc chute sides for cracks and excessive erosion and replace if necessary.

3. Check and replace contacts if necessary. Back up springs should be replaced whenever new contacts are installed.

4. Align the arc chutes as described in the flicker blade section.

OPERATING MECHANISM

1. Check and readjust the operating shaft stops if necessary as follows:

   (a) When the switch is in the OPEN position, the pin in the operating gear segment must line up with the notch in the door interlock latch lever and the operating handle should *not* come to rest tight against the handle stop on the front of the mechanism casting.

   (b) When the switch is in the CLOSED position, a second pin in the operating gear segment must line up with the notch in the door interlock latch lever. The operating handle should not come to rest tight against the handle stop, and the switch operating linkage must pass dead center as shown in Fig. 10.

2. The operating gear segment and the spring rod casting must be free to rotate on the round portion of the operating shaft without friction, so that the operating shaft and contacts will not start to move until the operating spring passes dead center. The bores in the gear segment and spring rod casting are approximately .005" larger than the shaft on which they are mounted so the fit of these parts will be rather loose.

   When the operating handle is in either the OPEN or CLOSED position, the operating gear segment should be loose on the operating shaft and there should also be some backlash between it and the operating gear segment. The right side of the mechanism casting is bolted in place using horizontally elongated holes in the side of the right corner post of the switch frame and the left side of the mechanism casting is bolted to a front upright of the switch frame. Backlash in the operating gears can usually be increased and friction in the operating gear segment can usually be reduced by properly aligning the operating mechanism. The right side of the mechanism may be moved in or out in the elongated mounting holes and the left side may be moved out by placing shims between the casting and the switch frame.

3. The operating shaft should be checked for end play to insure that it will not become wedged between its bearings, resulting in sluggish operation of the switch.

4. The force at the end of the operating handle to open or close the switch should be 50 to 65 pounds. Less force than this will indicate a defective operating spring and more force will indicate excessive friction in the operating mechanism. Either condition will tend to reduce the operating speed of the switch and must be corrected.

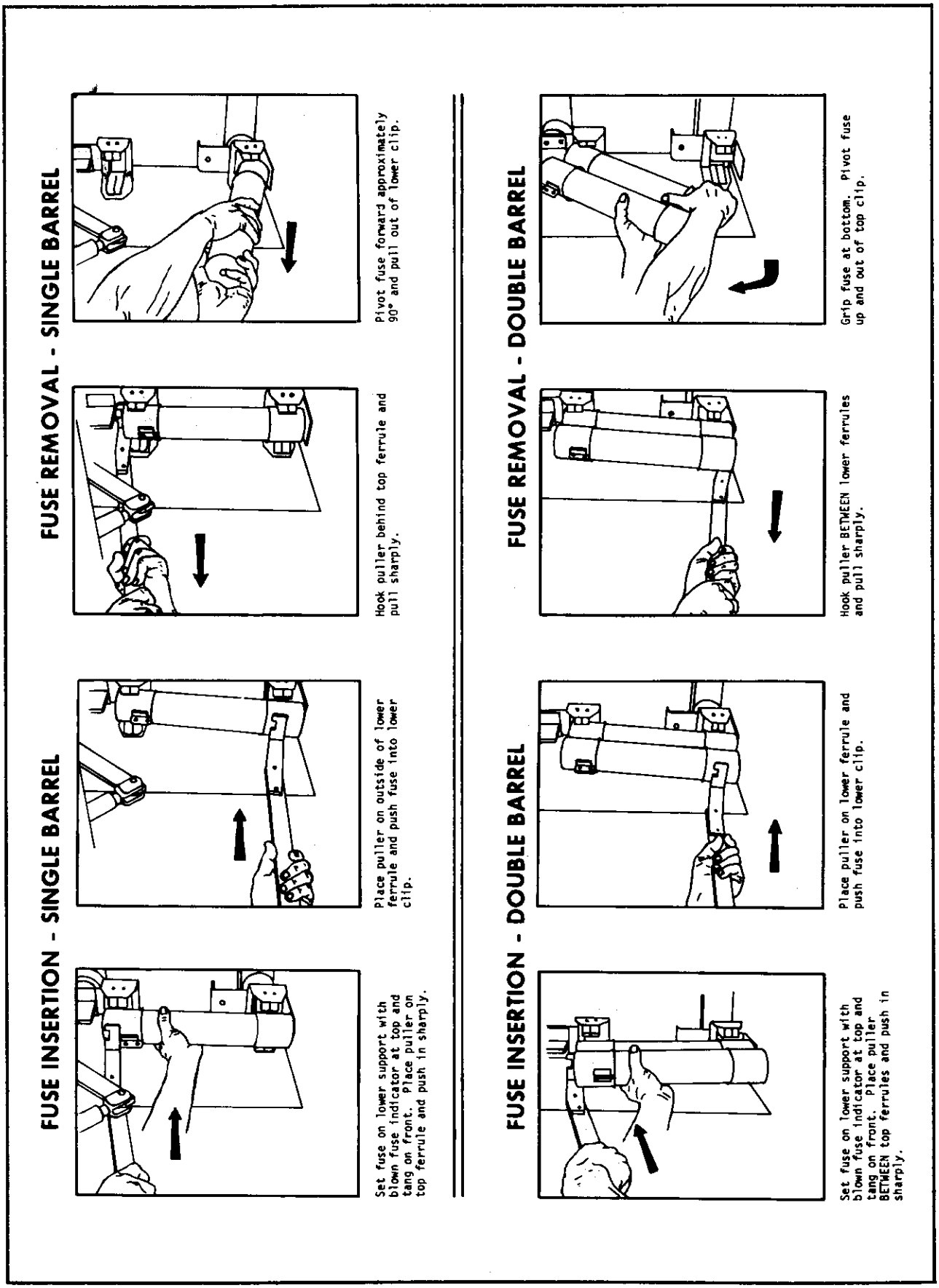
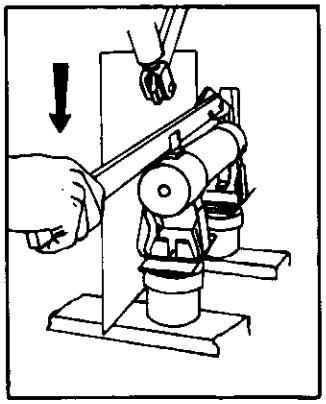
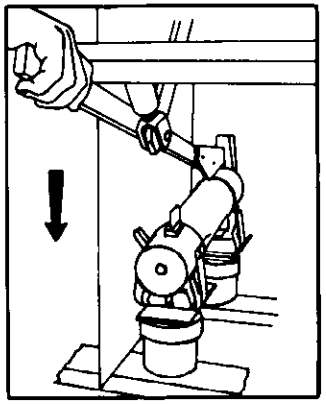


Fig. 11 Vertical Fuse Puller Operation (Dwg. 6391D56 Side 1)

FUSE INSERTION - SINGLE BARREL

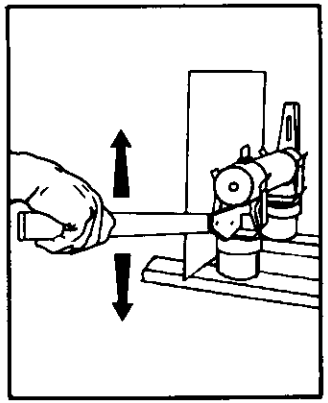


Position fuse on clips with blown fuse indicator at front and tang on top. Place tip of puller in slot at rear. Push down on puller handle until fuse snaps into front clip.

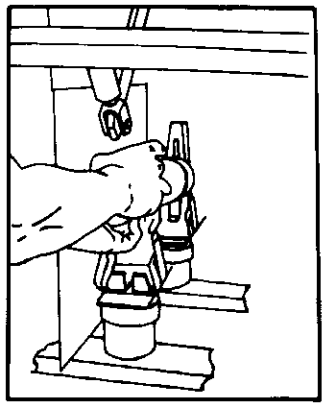


Remove puller from slot and ROTATE 180°. Again place tip in slot. Cam fuse into rear clip using a jacking motion while pushing in on puller.

FUSE REMOVAL - SINGLE BARREL

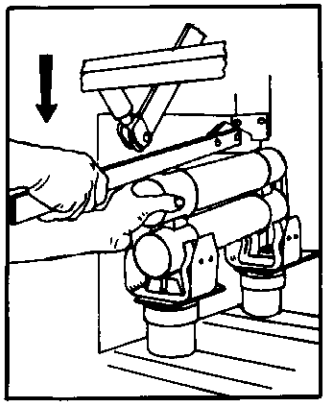


Place tip of puller in slot under front ferrule. Cam fuse out of front clip using a jacking motion while pushing in on puller.

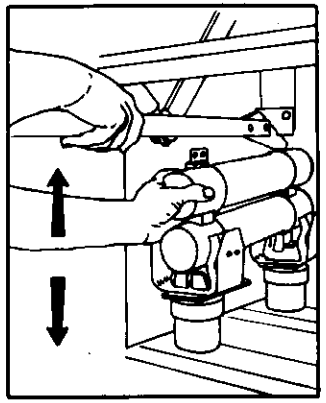


Lift up on front ferrule until fuse hits main blade. Lower fuse approximately horizontal and pull outward to free from rear clip.

FUSE INSERTION - DOUBLE BARREL

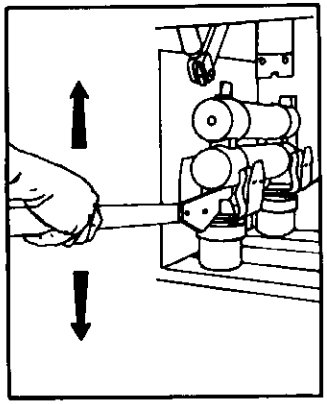


Position fuse on clips with blown fuse indicator at front and tang on top. Place tip of puller in slot above top rear ferrule. Push down on puller handle until fuse snaps into front clip.

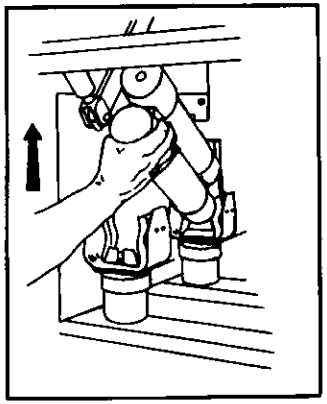


Cam fuse into rear clip using a jacking motion while pushing in on puller.

FUSE REMOVAL - DOUBLE BARREL



Place tip of puller in slot under front ferrule. Cam fuse out of front clip using a jacking motion while pushing in on puller.



Lift up on front ferrule and push to either side to clear drive link. Fuse will cam itself out of rear clip.

Fig. 12 Horizontal Fuse Puller Operation (Dwg. 6391D56 Side 2)

MECHANICAL INTERLOCKS

1. Check the door interlock latch mechanism to see that it is free of friction and automatically latches the handle mechanism when the enclosure door is opened.

2. Check to see that the interlock loop is in place on the inside of the enclosure door and is adjusted so as to engage the hook on the operating shaft when the switch is closed.

ELECTRICAL INTERLOCKS

It is very important to be sure the interlock plungers do not reach their solid stops before the switch is fully closed. The interlock adjustment is properly set when the plungers can be depressed slightly beyond the position they take when the switch is closed. This adjustment is made by means of the .190-32 hex head pushrod bolts.

FUSES

When required, the Type ADM switch may be supplied with Type CLS motor starting fuses or Type CLE feeder circuit fuses. These fuses may be mounted vertically as shown in Fig. 11 or horizontally as shown in Fig. 12.

Fuse puller style 6391D55G01 is supplied when the vertical fuse assembly is used and fuse puller style 6391D55G02 is supplied when the horizontal fuse assembly is used. Instructions for using these fuse pullers are given in figures 11 and 12 and are also mounted on the inside of the switch enclosure door.

CAUTION: Following any inspection procedure, or after any maintenance work – *BE SURE TO REPLACE the arc chutes and four large phase barriers used with each switch and fuse assembly, and check all the mechanical interlocks to be sure they are operating properly.*

Never energize the switch at line potential without having arc chutes and phase barriers in place.

Name of Part	Identification		Required for One Three Pole Switch
	600 Ampere	1200 Ampere	
Main Stationary Contact	3497C79G01	3497C79H03	3
Main Switch Blade (left)	6386D30G02	6386D30G02	3
Main Switch Blade (right)	6386D30G01	6386D30G01	3
Hinge Support	3497C90H01	3497C90H02	3
Spring Washers	2067A06H01	2067A06H01	12
.343" Long Spacer	755B907H03	755B907H03	3
Inner Spacer (.870" long)	755B907H02	755B907H02	6
Graphite Grease	2067A15G01	2067A15G01	1
Flicker Blade Moving Contact	3497C91G01	3497C91G01	3
Flicker Blade Stationary Contact	3497C70G01	3497C70G01	6
Flicker Blade Contact Spring	2067A05H02	2067A05H02	6
Flicker Blade Kickout Spring	755B917H01	755B917H01	3
Arc Chute Sides (left & right)	255D002G02	6386D32G01	3
Operating Spring	2067A05H01	2067A05H01	1
Mechanism Latch Spring	3497C86H02	3497C86H02	1

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Fig. 13 Renewal Parts

Westinghouse Electric Corporation
General Control Division
Buffalo, New York 14240

Printed in U.S.A. 6/75