Instructions for
Type WFS Load Interrupter Switch
5.0 kV, 15.0 kV, 25.8 kV, and 38.0 kV

I.L. 31-931

Read and understand these instructions before attempting any Installation, Operation or Maintenance of this switch.

Westinghouse Electric Corporation
Distribution and Control Business Unit
Sumter, SC 29150

Effective October, 1986

PURPOSE

THIS INSTRUCTION BOOK IS INTENDED TO COVER THE INSTALLATION, OPERATION AND MAINTENANCE OF TYPE WFS LOAD INTERRUPTER SWITCHES. IT DOES NOT PURPORT TO COVER ALL POSSIBLE CONTINGENCIES, VARIATIONS, AND DETAILS THAT MAY ARISE DURING INSTALLATION, OPERATION OR MAINTENANCE OF THIS EQUIPMENT.

IF FURTHER INFORMATION IS DESIRED BY PURCHASER REGARDING TYPE WFS SWITCHES, CONTACT THE LOCAL WESTINGHOUSE SALES OFFICE. FOR APPLICATION INFORMATION, CONSULT YOUR NEAREST WESTINGHOUSE SALES OFFICE, SEE WESTINGHOUSE PRICE LIST 31-931, AND READ THE APPROPRIATE INDUSTRY STANDARDS.

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SECTION 1 – INTRODUCTION

1.0 BASIC DESCRIPTION AND APPLICATION

Type WFS load interrupter switch consists of an air insulated, three-pole, gang-operated, quick-make, quick-break, load interrupter switch. The switch must be installed in a suitable enclosure before operation. It can be applied in combination with power fuses or other protective devices to provide safe, low-cost, infrequent switching and circuit protection.

WARNING

Failure to install a WFS switch in a suitable enclosure may result in property damage, severe injury or death.

A WFS switch must be installed in a suitable enclosure before being used to switch and control high voltage power circuits.

1.1 SWITCH IDENTIFICATION

A nameplate is located on the switch cover plate of all WFS switches (See Fig. 1). Contained on this nameplate are the Westinghouse order number and the switch style number. This information should be given to the Westinghouse sales office if a question should arise concerning the switch or if renewal parts are required. These numbers allow the factory to completely identify the switch.

Also located on the nameplate are the voltage ratings and current ratings of the switch.

DANGER

Exceeding the nameplate ratings of WFS switch may cause property damage, severe injury, or death.

Do not apply the WFS switch beyond its nameplate ratings.

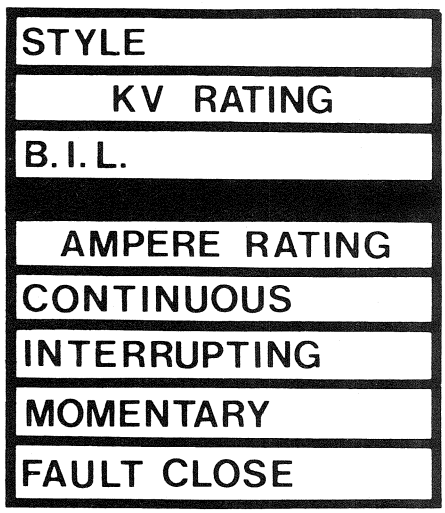

Fig. 1 *Typical Nameplate*

1.2 SAFETY FEATURES

Type WFS Load Interrupter Switches are manufactured with several built-in interlocks and safety features to reduce hazards and provide proper operating sequences.

1. A door interlock provision in conjunction with a suitable door design may be used to prevent opening the front enclosure door when the switch is in the closed position.

2. A switch interlock provision blocks inadvertent closing of the switch when the front enclosure door is open.

3. Facility for padlocking the switch in the open or closed positions is provided.

4. Positive mechanical indicators show when the switch is open or closed.

5. Key interlock provisions are included for enclosure manufacturer or customer addition of key interlocks to force a sequence of operation.

WARNING

Operating a WFS switch with a key interlock bolt extended will result in equipment damage and may also expose a person to bodily injury or death.

The key must be inserted into the interlock and rotated to retract the locking bolt before operating a WFS switch.

1.3 SAFE PRACTICES

Only qualified electrical workers with training and experience on high voltage circuits should be permitted to work on this equipment. They should be familiar with the work to be performed, the safety equipment required, and hazards involved.

1. Read and understand these instructions before attempting any assembly, operation, or maintenance of the switch.

2. Type WFS load interrupter switches are designed to operate within the current and voltage ratings on the switch nameplate. Do not apply these switches to systems with currents and/or voltages exceeding these ratings.

3. Disconnect all power sources before making any adjustments or performing maintenance.

4. After opening the WFS switch and before opening the enclosure door, look through the enclosure viewing win-

dow to insure that all switch main and auxiliary blades are open. If necessary, use a suitable light source to verify all contacts are open.

5. There are several interlocks on the switches. They are for personnel and/or equipment protection. Under no circumstances should they be made inoperative when switch is in service. To do so could cause property damage, bodily injury or death.

6. Never energize the switch without the arc chutes and barriers properly installed.

7. Always be sure that all switch hardware is in place and tight before putting a WFS switch into operation.

SECTION 2 – RECEIVING, HANDLING, AND STORAGE

2.0 RECEIVING

A visual inspection should be performed immediately upon receipt of a WFS switch and before removing it from the truck. Shipping papers should be checked to be sure all boxes or other accompanying pieces have been received. If any damage or shortages are evident, a claim should be filed at once with the carrier and the nearest Westinghouse sales office notified.

The order data nameplate for each switch assembly is located on the switch cover plate. The order number and drawing number are located on this nameplate and should be given to the Westinghouse representative whenever identification of the assembly is required.

2.1 HANDLING

This apparatus is insulated for high voltages and it must be protected at all times against damaging handling. Switch and/or fuse mountings will be packed separately in an individual carton or crate. These packages must be handled with care to avoid damage to the equipment inside.

2.2 STORAGE

If it is necessary to store the equipment before installation, keep it in a clean, dry location with ample air circulation and heat to prevent condensation. Like all electrical apparatus, these units contain insulation which must be protected against dirt and moisture.

SECTION 3 – INSTALLATION

NOTE

See also Sections 6 and 7 for special mounting requirements for Electromechanical Stored Energy Release and Motor Operated switches.

3.0 SWITCH MOUNTING

Standard WFS switch mounting dimensions and details may be found in Westinghouse Technical Certification Sheets (TCS) 31-970. Match the WFS switch nameplate ratings to the appropriate table on the TCS page being referenced to allow proper design and fabrication of enclosure. When mounting a Motor Operated or Electromechanical Stored Energy Release operated switch the front of the switch must be supported using the front mounting holes designated "A".

CAUTION

The switch must be installed and fully supported before operation to avoid damage to the switch.

3.1 FUSE MOUNTINGS (OPTIONAL)

WFS fuse mounting and live parts dimensions and details may be found in the Westinghouse TCS 31-970. These fuse mountings are designed solely for use with the WFS switch and use the load side terminal pad for support. The fuse mountings are usually packaged separately.

3.2 ENCLOSURE REQUIREMENTS

The enclosure manufacturer must incorporate the following items on the door to provide for standard safety features.

1. Viewing window
2. Door locking bracket
3. Switch lock assembly bracket

Key interlocks may be added. The necessary construction details of these features are included in TCS 31-970.

3.3 POWER CONNECTIONS

Bus pads are supplied for power connections. Refer to TCS 31-970 for details.

3.4 SWITCH INSPECTION BEFORE STARTUP

Each switch is properly adjusted at the factory before shipment. Vibration and mechanical stresses imposed by transit and installation may adversely affect switch adjustment. A final inspection is essential before energizing. If this inspection reveals any defects in adjustment, they should be corrected according to alignment procedures in Section 5.3.

Inspection procedures require closing and opening the switch with the main door open. This requires override of the switch safety latch as described in Section 5.3.1 and must be accomplished BEFORE energization.

INSPECTION PROCEDURE

A. With the switch in the open position (See Fig. 2), the distance between the edge of the main blade and the closest point of the break jaw should be:

6-5/8" plus or minus 1/8" for 5 and 15 kV switches
11-1/2" plus or minus 1/8" for 25 and 35 kV switches

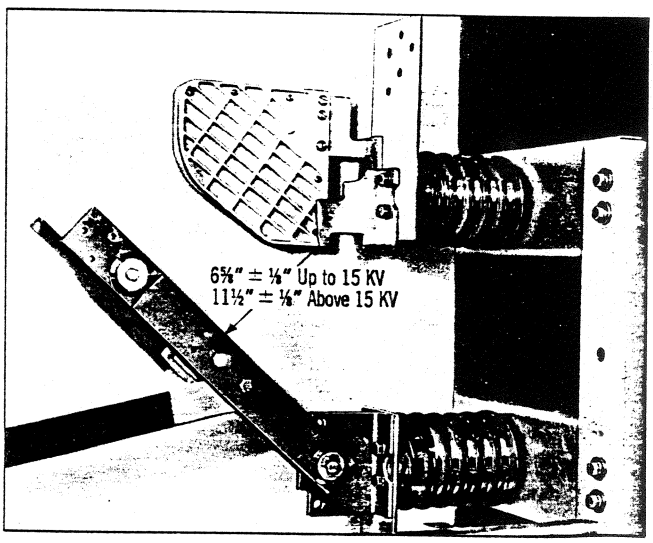

Fig. 2 *Main Blade Adjustment*

B. Main and flicker blades must be in proper alignment with break jaws and arc chute openings respectively. This can be checked by closing the switch and then partially opening it using the maintenance hub as described in Section 5.1.3.

C. In the closed position the drive rod links and shaft ears must be 1/16" to 1/8" over toggle when checked with a straight edge. (See Fig. 3).

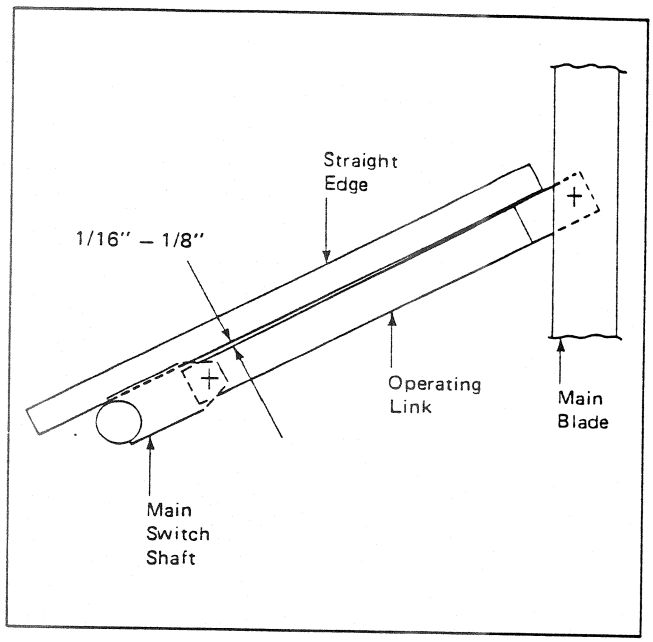

Fig. 3 *Drive Rod Links and Shaft Ears Alignment*

D. With the switch closed, the upper spacers of the main blades should rest 3/16" plus or minus 1/16" above the bottom of the depression of the stationary break jaw (See Fig. 4).

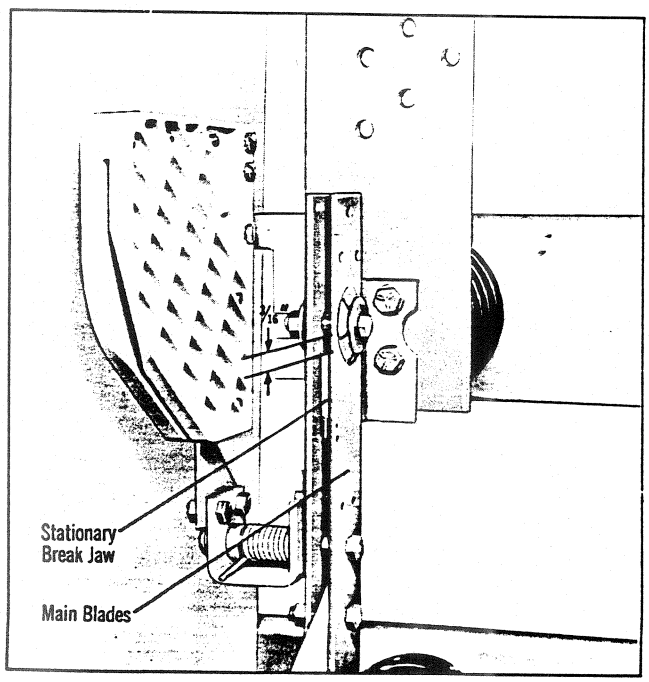

Fig. 4 *Main Blade Spacer Adjustment*

E. Check bolted bus connections for proper tightness, referring to Appendix A for torque values.

F. If fuse mountings are supplied by Westinghouse from PL 31-931 check to be sure the fuse mounting is securely fastened and fuses are securely clamped in place.

G. For units fitted with Westinghouse expulsion type boric acid fuses, check the discharge filters on the lower end of the fuses for tightness. They must be securely hand tightened.

H. Wipe away any dust or dirt that may have accumulated paying particular attention to insulators and insulating material.

K. A final thorough inspection should be made to insure that no tools or other objects are left inside the enclosure.

SECTION 4 – OPERATION

WARNING

Failure to install a WFS switch in a suitable enclosure may result in property damage, severe injury or death.

A WFS switch must be installed in a suitable enclosure before being used to switch and control high voltage power circuits.

4.0 MECHANICAL SAFETY INTERLOCKS

The WFS switch is equipped with provisions for switch and door interlocks as well as provisions for padlocking the switch in either the open or closed position.

WARNING

Defeating or disengaging safety interlocks on a WFS switch that is properly installed in an appropriate enclosure and connected to a power source may result in property damage, bodily injury or death.

Do not defeat or disengage any safety interlocks.

4.0.1 Switch Interlock

This interlock prevents inadvertent closure of the switch if the enclosure door is open. When the door is closed, the pointed latch lug fastened to the inside of the door causes the safety latch to move out of the blocking position (See Fig. 5).

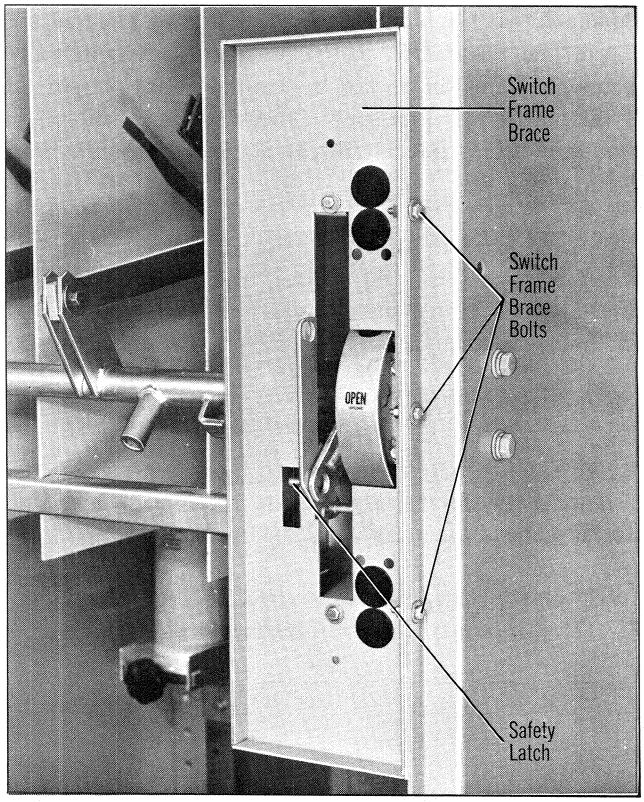

Fig. 5 *Safety Latch Location*

4.0.2 Door Interlock

This interlock prevents the door of the enclosure from being opened when the switch is closed. When the switch is closed, a hook lug fastened to the operating shaft engages the door interlocking bracket fastened to the inside of the switch door, preventing the door from being opened (See Fig. 6).

4.0.3 Key Interlocking

Key interlock provisions are standard on the WFS switch. Key interlocks can be mounted per the Technical Certification Sheets 31-970 to provide for various schemes.

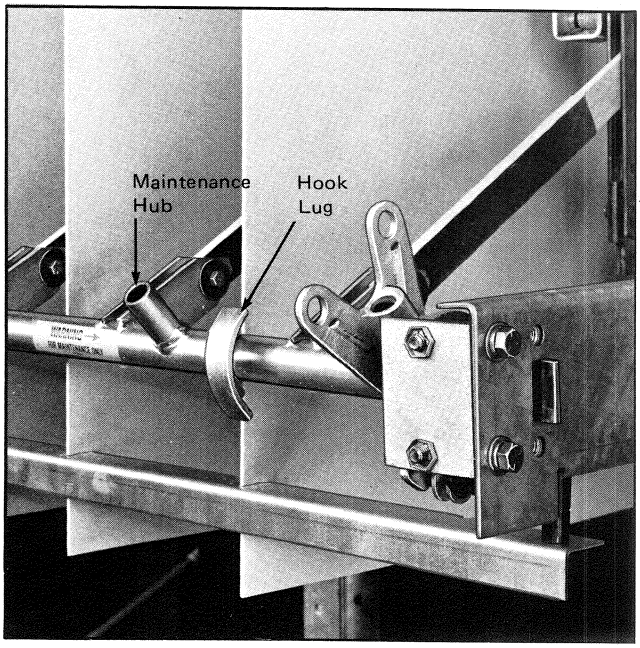

Fig. 6 *Maintenance Hub Location*

WARNING

Operating a WFS switch with a key interlock bolt extended will result in equipment damage and may also expose a person to bodily injury or death.

The key must be inserted into the interlock and rotated to retract the locking bolt before operating a WFS switch.

4.1 SWITCH OPERATION

To manually close or open the WFS switch the operating handle is inserted into the handle casting and rotated through an angle of 120 degrees. This charges the compression spring, and as the spring lever goes over toggle, the stored energy of the spring is transferred to the shaft which snaps the switch open or closed. The blades thus move at a predetermined speed which is independent of the operator.

The quick-make mechanism provides power to overcome blowout forces which occur when the switch is closed into a short circuit. These forces are not transmitted to the operating handle since it is not rigidly connected to the blades. Therefore, the switch may be closed under short circuit conditions within its fault-closing rating.

Load interruption is accomplished by a flicker blade and engaging contact fingers located inside a De-Ion arc chute. On opening the switch, the main blades open first and all current is shunted through the spring loaded flicker blades. Further travel of the main blades causes the flicker blades to snap out of their contact fingers where associated arcing takes place within the arc chutes. (See Fig. 7 for Sequence of Operation).

4.2 FUSE REPLACEMENT

WARNING

When addressing fuses, failure to assure that the fuses are deenergized may result in equipment damage, bodily injury, or death.

Make sure that all power sources are deenergized before attempting to access the fuses. Follow the enclosure manufacturer's instructions for replacement of fuses.

SECTION 5 – MAINTENANCE

WARNING

The switch must be completely disconnected from all power sources before any maintenance or alignment is attempted.

Failure to completely disconnect the switch from all power sources may result in severe injury or death.

5.0 INSPECTION SCHEDULE

The WFS switch should be inspected once a year or after 50 rated current interruptions whichever occurs first. After the switch has been closed against a fault current, it should be inspected at first opportunity. If the switch has been moved or otherwise subjected to mechanical strain, inspection procedures described in Section 3.4 should also be performed.

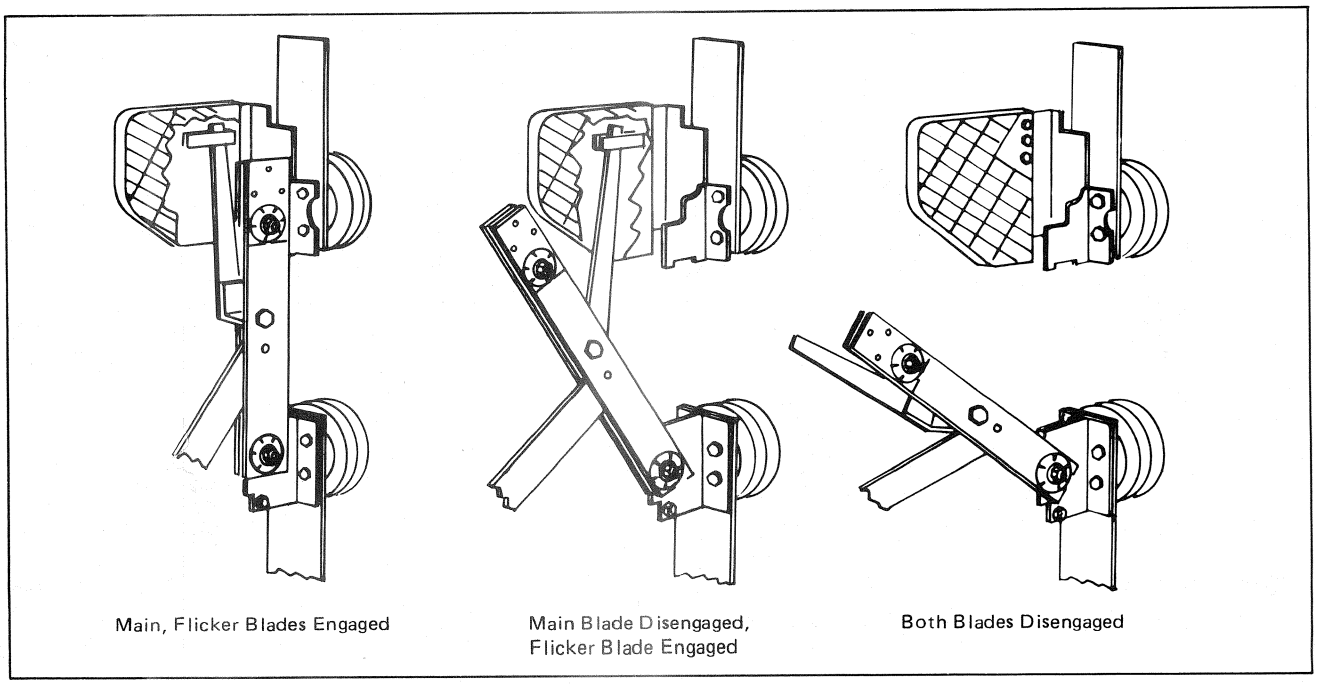

Fig. 7 *Flicker Blade Operation*

5.1 INSPECTION PROCEDURE

WARNING

Failure to completely disconnect the switch from all power sources prior to inspection may result in severe injury or death.

The switch must be completely disconnected from all power sources before performing inspection.

5.1.1 Before checking main blades and flicker blades for arc erosion note that WFS switches with 20 kA fault close rating have copper break jaws and the leading edges of main blades are copper. All other ratings will have tungsten tips on break jaws and arcing buttons on leading edges of main blades.

Check main blade leading edges or arc buttons and leading edges of flicker blades for arc erosion. Severely damaged blade assemblies should be replaced as described in Section 5.4.1. If less than half of the arcing contact surfaces are damaged, they may be cleaned with a few light strokes of a fine file. No attempt should be made to file out pit marks. Do not use abrasive material for cleaning as small bits of abrasive material may cause the contact to overheat or even weld during faults. The main current carrying contacts on the main blades should not be filed as opening and closing of the switch will keep them clean.

5.1.2 Inspect arc chute sides for cracks or erosion and replace if damaged. Use a flashlight to examine the flicker blade contacts inside the arc chute. If contacts are found to be burned or pitted over half their surfaces, or if the contacts are out of alignment, the arc chute should be replaced.

5.1.3 Check the engagement of the flicker blades by first closing the switch. To slow open and close the switch against the spring follow this procedure.

CAUTION

Slow closing or slow opening the switch against the spring may result in bodily injury if a person is not careful to hold the operating handle firmly.

Be sure to hold the handle firmly while performing slow closing or slow opening operations.

Insert the removable handle in the pipe-like maintenance hub welded to the switch shaft (See Fig. 6) and slowly open the switch. The flicker blades should remain engaged in their contact fingers while the main blades open. When the main blades clear the break jaws, they will hit a stop on the flicker blade brackets which releases the flicker blades, which in turn snap open from the energy stored in their torsional springs.

5.1.4 Check interphase barriers for carbon or metallic deposits. Replace if deposits are present.

5.1.5 Wipe any dust or dirt that may have accumulated inside the cubicle, paying close attention to insulators and insulating material.

5.1.6 Close and open the de-energized switch at least three times to check the performance of the operating mechanism.

5.2 ALIGNMENT PROCEDURES

NOTE: When adjusting an inverted switch keep in mind that the perspective is reversed from that of standard WFS switches.

> **WARNING**
>
> **Failure to de-energize switch from all sources before attempting any alignment procedures could result in severe injury or death.**
>
> The switch must be completely de-energized from all sources before any attempt to align switch.

5.2.1 Override of Switch Interlock Safety Latch

To operate the switch with the door open, the safety latch (Fig. 5) must be disengaged. To close the switch, insert the handle into the handle casting and push, while at the same time pushing the latch on the left side of the safety barrier downward until the butterfly on the handle casting clears the locking pin. Reverse this procedure to open the switch.

5.2.2 Closed-Open-Stop Adjustment

A. Remove the switch cover plate assembly (Fig. 5) by removing the four 1/4-20 bolts in the side sheet flange. When viewing the switch mechanism from the top in Fig. 8, the bottom stop bolt and nut adjusts the closed position. In the closed position, the shaft rod ends should be slightly over toggle. This can be easily checked by laying a straight edge on top of the drive rod so that its end extends over the shaft (See Fig. 3). If a 1/16" to 1/8" gap appears between the straight edge and the drive rod, adjustment is correct.

B. Check to see that the blades are closing fully. To do this, measure the distance from the upper switch terminal pad to the outer edge of the main blade. This dimension should be 3-5/16" to 3-7/16" up to 15 kV, and 3-5/16" to 3-1/2" above 15 kV. Should adjustment be required, loosen the bolt holding the drive rod to the shaft and adjust the blade travel. Re-tighten the bolt to 35 foot pounds.

C. In the open position, clearance between the edge of the main blade and the break jaw should be 6-5/8" ± 1/8" for up to 15 kV, 11-1/2" ± 1/8" above 15 kV (See Fig. 2). The top stop bolt adjusts this dimension (See Fig. 8).

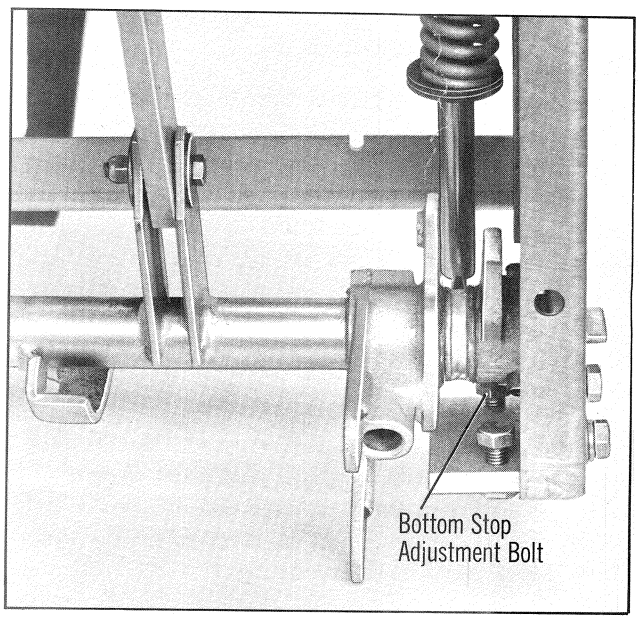

Fig. 8 *Closed-Open-Stop Adjustment*

D. If the switch is equipped with key interlocking, care must be taken when replacing the switch cover plate assembly to insure that it is properly positioned. Elongated holes in the WFS side sheet allow for vertical adjustment. The key interlock bolt must clear the aluminum handle casting when retracted, yet engage the slot (s) in the casting when extended.

> **WARNING**
>
> **Operating a WFS switch with a key interlock bolt extended will result in equipment damage and may also expose a person to bodily injury or death.**
>
> The key must be inserted into the interlock and rotated to retract the locking bolt before operating a WFS switch.

5.2.3 Main Blade Alignment (Fig. 9)

Loosen the four hinge bolts (bottom drawing) and the two break jaw bolts (top drawing). Insert the removable handle in the maintenance hub on the shaft and close the switch. For safety purposes, the switch will not fully close, reverting to the open position if pressure on the handle is released. Hold the switch in the closed position with the handle and tighten the bolts on both the hinge and the break jaw per Appendix A.

5.2.4 Arc Chute Alignment (Fig. 9)

Loosen the two arc chute mounting bolts (top drawing). Adjust the arc chute so that its opening is parallel to the main blade. Lightly tighten the mounting bolts. Using the blade alignment hub, slowly close the switch and check that the flicker blade is in line with the arc chute opening. If necessary, move the arc chute left or right until it lines up with the flicker blade. Tighten the arc chute mounting bolts and re-check the alignment.

5.2.5 Vertical Position of Break Jaw

Close the switch. Check that the upper spacers of the main blades are 3/16" ± 1/16" above the tops of the break jaws. (See Fig. 4). If they are not, loosen the bolts holding the break jaw support insulator to the back pan. Adjust as necessary. When setting is correct, tighten bolts to proper torque value. Recheck upper spacer measurement to break jaw.

5.2.6 Break Jaw Contact Bolt

The break jaw contact bolt holds the upper spacer of the main blades for proper contact with the break jaw when the switch is closed (See Fig. 10). The locking nut should be tightened to a value of 10 ft. lbs. with the switch closed. Standard ohmic readings between blade and break jaw should not exceed 60 micro-ohms.

5.3 REPLACEMENT PROCEDURES

WARNING

Failure to completely disconnect the switch from all power sources before any replacement procedure is attempted could result in severe injury or death.

The switch must be completely disconnected from all power sources before any replacement procedure is attempted.

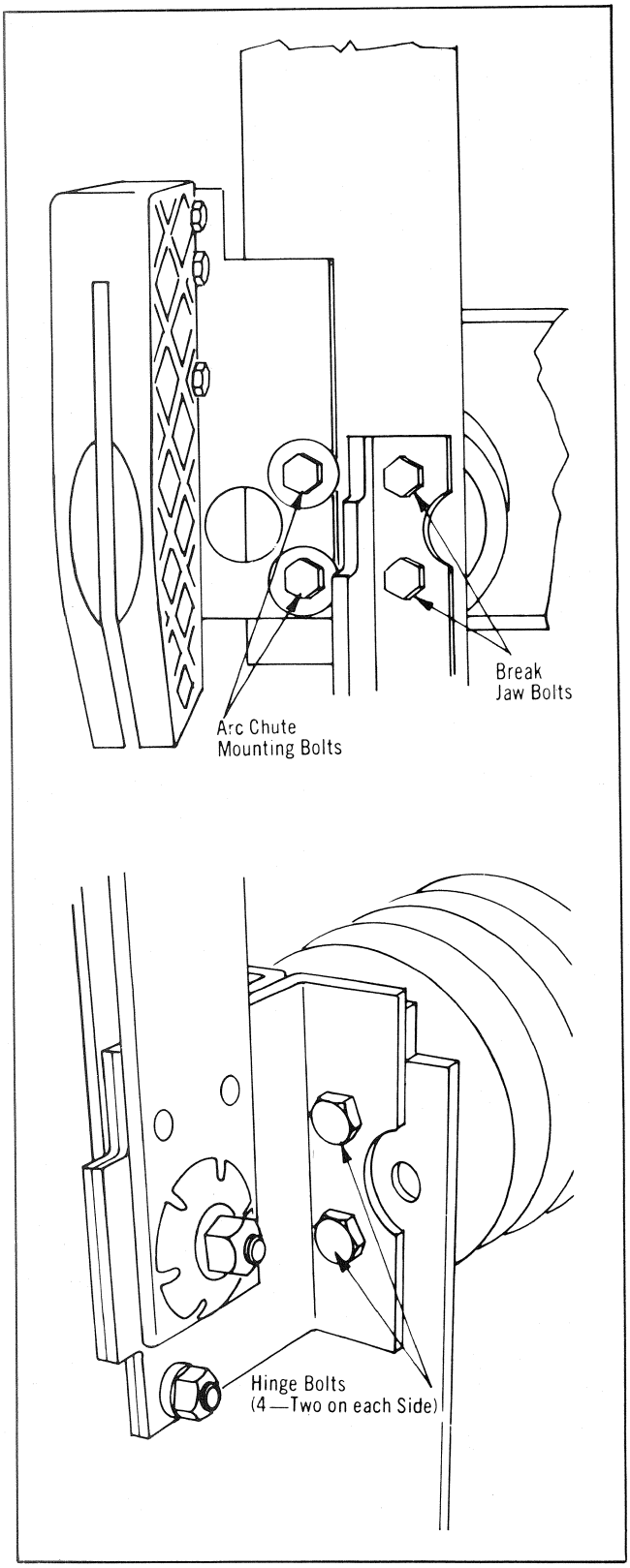

Fig. 9 *Main Blade and Arc Chute Alignment*

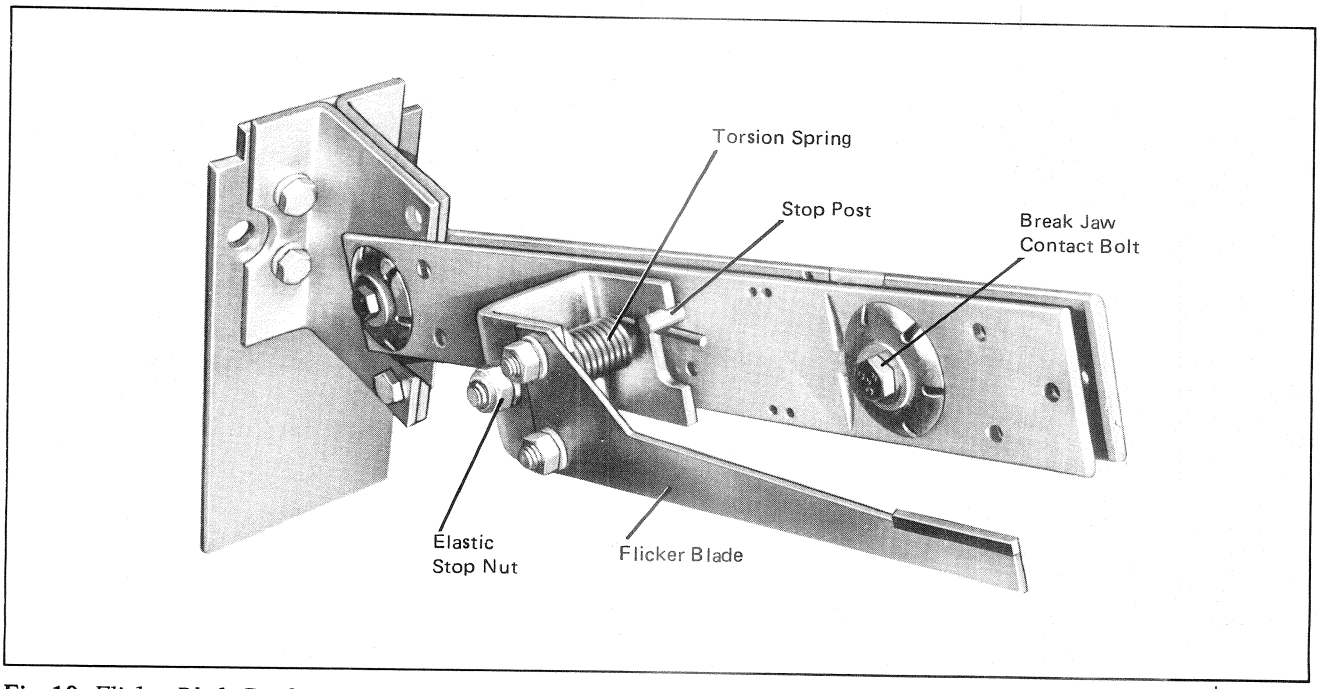

Fig. 10 *Flicker Blade Replacement*

5.3.1 Main Blade, Jaw and Hinge Replacement

Disconnect the drive rod from the main blade assembly by unbolting. Remove the four bolts holding the hinge assembly to the lower terminal pad. The hinge, main blade and flicker blade are now free from the switch. Remove the two bolts holding the jaw to the upper terminal. The jaw is now free. Replace the jaw and finger tighten the two mounting bolts. Mount the hinge on top of the lower terminal pad and install the four bolts finger tight. Tighten the lock nut on the spring washer on the jaw end of the blade. Set the main blade to an open position of approximately 45 degrees. The weight of the blade should let the blade fall SLOWLY open at a constant speed. If the blade fails to fall open, loosen the lock nut on the hinge spring washer until the blade SLOWLY falls open. If the blade falls too fast, tighten the lock nut. Now align the blade per Paragraph 5.3.3. Tighten the jaw and hinge mounting bolts. Align flicker blade and arc chute per Paragraph 5.1.3. Re-check alignments. If satisfactory, connect the drive rod to main blade. Check the switch for adjustments per Paragraphs 5.3.2 and 5.3.5. Perform the pre-operation check (See Section 3.4).

CAUTION

A spring can store considerable energy that may cause injury if it escapes suddenly.

Be sure to follow spring removal procedure to avoid injury.

5.3.2 Spring Replacement

The main spring is a large compression spring along the inside of the switch frame on the handle side. (See Fig. 11). For higher ratings, (15 kV 61KA fault close) there is an auxiliary spring connected to the other end of the main shaft. To disengage the main spring, remove the switch frame brace (See Fig. 5). Take a 5/16-18 threaded rod 4" long and screw it approx. 1/2" into the rear end of the spring rod. Make a spacer 1-1/2" long from a pipe or tube with a 1" I.D. Put this over the 5/16" rod. Take a washer with an O.D. larger than the spacer and place it on the rod. Run a 5/16-18 nut down the rod and center the spacer. Tighten the nut until tension on the pin at the front of the spring rod is released. Remove the retaining rings holding the pin in and remove the pin. The spring assembly is now free from the shaft. To reinstall the assembly, or to re-engage the spring rod, reverse this procedure.

To remove the auxiliary spring, put switch in closed position and remove the retaining rings and pin holding the spring retaining rod to the small arm of the main shaft while the compression spring is in its longest condition. Pull the spring retaining rod away from its rear support. The spring is now free of the rod. To re-install, reverse this procedure.

5.3.3 Shaft or Bearing Replacement

To replace the shaft bearings, disengage the springs as instructed in Paragraph 5.4.2. Remove the drive rods from the switch main shaft ears by unbolting the connection. Remove the four bolts which hold the bearing support plates on the end of the shaft opposite the operating mechanism. Raise the shaft end opposite the mechanism up until the support plates and bearing can be removed. Slide the shaft out of the mechanism side bearing. Remove the shaft and then the shaft bearing. Reverse the procedure for re-assembly.

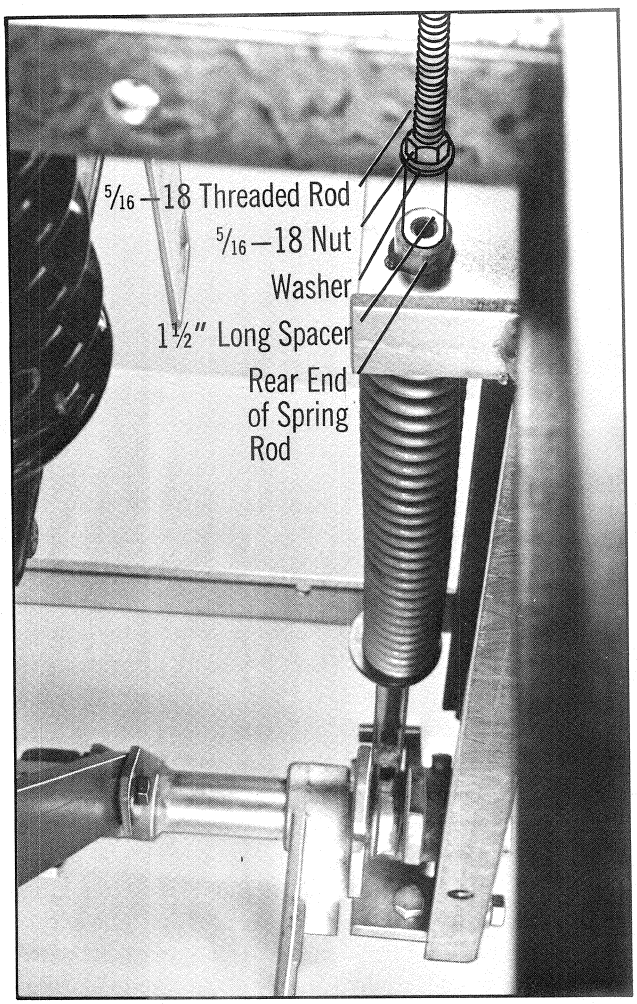

Fig. 11 *Stored Energy Spring Replacement or Adjustment*

5.3.4 Pre-Service Check

After completing any maintenance, the alignment should be checked. (See Section 5.3). After completing any alignment, the switch should be operated at least three "close-open" operations to assure proper performance.

5.4 LUBRICATION

This should be done during switch maintenance (See Section 5.0). In general, the switch requires only moderate lubrication. All excess must be removed with a clean cloth to prevent any accumulation of dust or dirt. Avoid any lubricant on insulation.

Only conductive graphite grease should be applied sparingly to contact surfaces on break jaw and between blade and hinge.

Dow Corning, Molykote BR2-S grease, a mixture of molybdenum disulfide in grease, should be applied to spring rods at the end pivots. Care must be taken to prevent any molybdenum lubricant reaching any current carrying contact surface.

SECTION 6 - MOTOR OPERATOR

6.0 DESCRIPTION

The motor operated WFS switch is essentially a standard manually operated switch whose operating mechanism is coupled to a motor driven linear actuator. Because all basic switch parts are identical to those of the standard manually operated switch, sections of this instruction book pertaining to installation, inspection before startup, maintenance, and parts replacement also apply to the motor operated switch.

Standard Ratings:

Operating Voltage: 120 Vac, Single phase
Full Load Current: Approx. 5 Amps
Spring Charging Time: Approx. 8 Seconds

6.1 ELECTRICAL OPERATION

The linear actuator opens the switch in the extended position and closes it in the retracted position. Since the linear actuator drives the spring over toggle mechanism, the switch blades move at a speed independent of the speed of the linear actuator.

6.2 WIRING

The switch is wired as shown in Technical Certification Sheet 31-970 page 8. The solid lines denote factory wiring and the dotted lines one possible scheme which the customer could wire.

6.3 SAFETY INTERLOCKING

The motor operated WFS switch comes equipped with a micro-switch mounted on the switch cover plate that prevents the operation of the linear actuator when the enclosure door is opened. Technical Certification Sheet 31-970, page 8, shows how this micro-switch is wired into the motor circuit.

6.4 MAINTENANCE

The linear actuator itself is completely weathersealed. The actuator and its associated bearings are lubricated for their normal life. No maintenance is required on the linear actuator.

SECTION 7 – ELECTROMECHANICAL STORED ENERGY RELEASE (SHUNT TRIP)

7.0 DESCRIPTION

The electromechanical stored energy release feature of the WFS load interrupter switch allows the operator to manually compress the main operating spring until it snaps over toggle. At this point, the stored energy lever system reacts to restrain further motion, and holds the spring in its compressed state until a signal is given to discharge. The open or close operation can then be initiated manually by upward pressure on the trigger latch, or electrically by energizing the trigger coil (See Fig. 12 for operating characteristics of trigger coils). When the restraining mechanism is released, the stored energy in the main operating spring is released to rapidly rotate the main shaft to close or open the switch. (See Fig. 13).

7.1 OPERATION

7.1.1 Charging the Spring

To store energy for operation, the handle is inserted into the handle casting, and is rotated against spring pressure through an angle of 120 degrees. The handle casting presses against the spring lever (See Fig. 14) which then rotates

WLI Switch – Stored Energy Trip Coil Operating Data

Coil Rating	Applied Voltage	Inrush Current	Steady Steam Current
677C903G04 24 VDC	24 VDC RMS 30 VDC RMS 14 VDC RMS	– – – – – – – – –	14.1 A RMS 17.7 A RMS 8.2 A RMS
677C903G05 115 VAC	115 VAC RMS 125 VAC RMS 95 VAC RMS	17.9 A RMS 18.7 A RMS 15.1 A RMS	9.6 A RMS 11.2 A RMS 7.6 A RMS
677C903G06 220 VAC	220 VAC RMS 250 VAC RMS 190 VAC RMS	12.0 A RMS 13.4 A RMS 9.6 A RMS	6.0 A RMS 7.4 A RMS 4.6 A RMS
677C903G01 48 VDC	48 VDC 60 VDC 25 VDC	– – – – – – – – –	5.3 A DC 7.4 A DC 1.7 A DC
677C903G02 125 VDC	125 VDC 140 VDC 70 VDC	– – – – – – – – –	4.2 A DC 4.8 A DC 2.3 A DC
677C903G03 250 VDC	250 VDC 280 VDC 140 VDC	– – – – – – – – –	1.6 A DC 1.3 A DC .89 A DC

Fig. 12 *WLI Switch – Stored Energy Trip Coil Operating Data*

with the handle casting. The spring rod is thus forced to compress the spring until the spring rod is snapped slightly over toggle. At this point the spring is now charged and the handle must be removed and returned to its storage location.

WARNING

Failure to remove operating handle after charging the spring may cause severe injury or death.

Be sure to remove the handle after a spring charging operation.

The spring rod stops with a clicking sound as the rear teeter bar roller seats against the lip of the trip link. It is held locked in this position by the resulting force vectors for the trip link assembly (See Fig. 15). At the same time, the front roller of the teeter bar presses down on the trigger latch with sufficient pressure to resist trip forces. Consequently, the charged spring is held compressed by the mutually reacting forces of the spring restraint linkage, teeter bar, and trigger latch. The final result as shown in Figs. 15 and 17 is a charged spring restrained slightly over toggle by the spring restraint linkage. (Fig. 16).

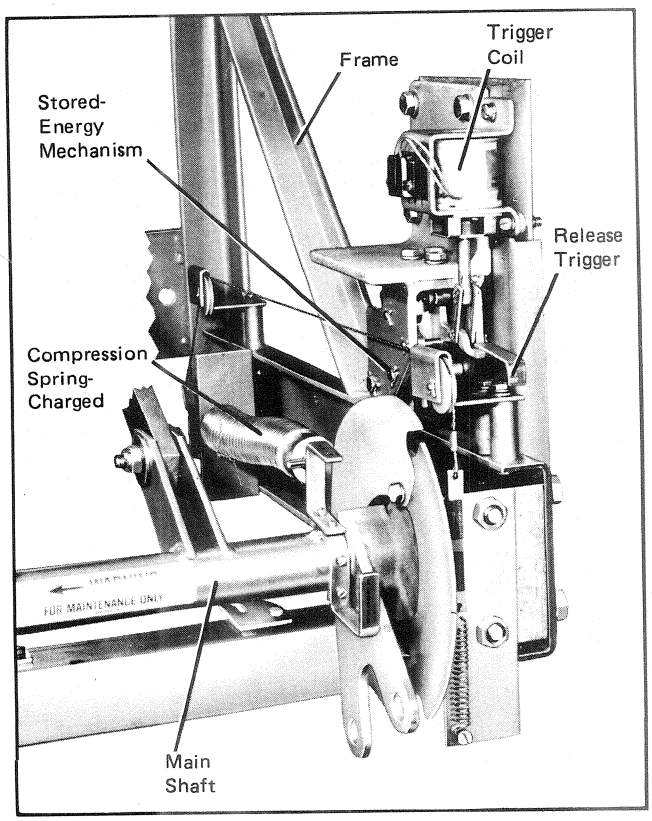

Fig. 13 *Stored Energy Mechanism*

7.1.2 Closing or Opening the Switch

When the trigger latch is forced upward, either manually or by the action of the trigger coil, the front roller of the teeter bar drops over and down the lip of the trigger latch. The rear roller moves up and over the lip of the trip link. This releases the restraining linkages to the spring rod and allows the switch to rapidly close or open. After operation the spring is discharged and must be recharged before any subsequent operation.

7.2 DOOR INTERLOCK-SHAFT BLOCKING CAM

WARNING

Defeating the door interlock blocking cam may cause severe injury or death.

Do not defeat this interlock.

When the enclosure door is opened, a spring biased cam assembly located at the left hand end of the operating shaft moves into position preparatory to blocking inadvertent shaft rotation and consequent switch closing.

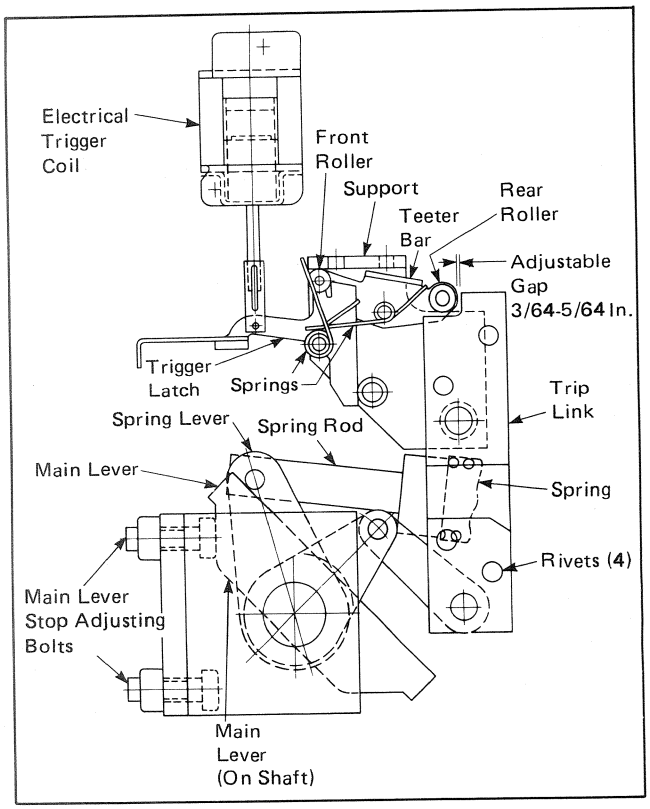

Fig. 14 *Switch Open, Spring Not Charged*

The shaft rotation is inhibited by the blocking action between the blocking cam welded to the shaft, and the ramping cam of the spring biased assembly. If the door is open and a trip-to-close action is initiated, a jamming action takes place between the blocking cam and the ramping cam to stop shaft rotation; thus, the switch cannot close (See Fig. 18).

The blocking action must be released by inserting the operating handle into the maintenance hub and slightly rotating to reset the charged main spring again over toggle.

7.3 INSPECTION AND MAINTENANCE

WARNING

Failure to completely disconnect the switch from all power sources may result in severe injury or death.

The switch must be completely disconnected from all power sources before any inspection or maintenance procedures are attempted.

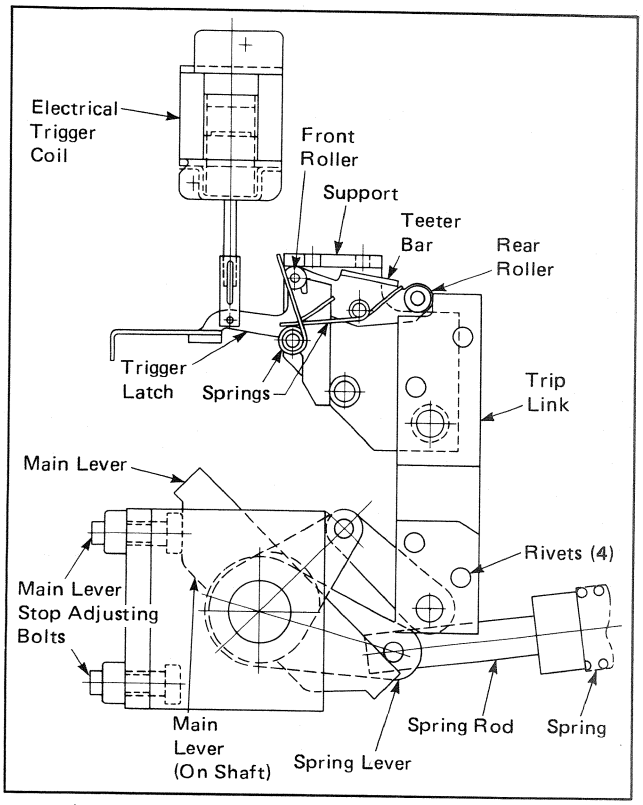

Fig. 15 *Switch Open, Spring Charged*

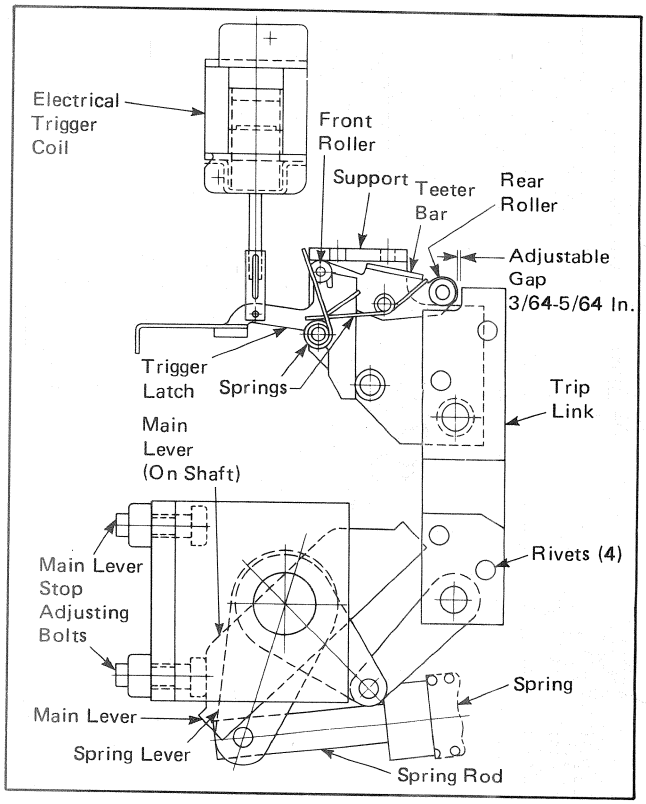

Fig. 16 *Switch Closed, Spring Not Charged*

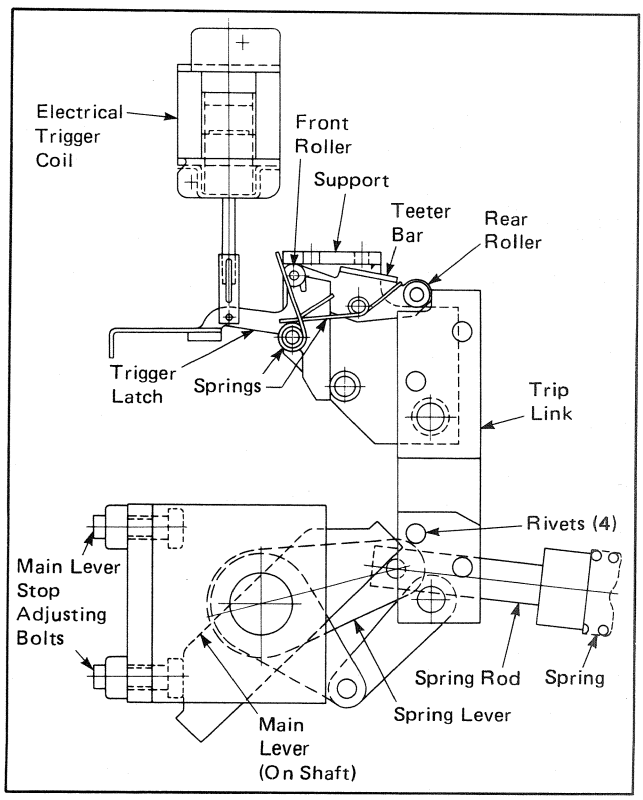

Fig. 17 *Switch Closed, Spring Charged*

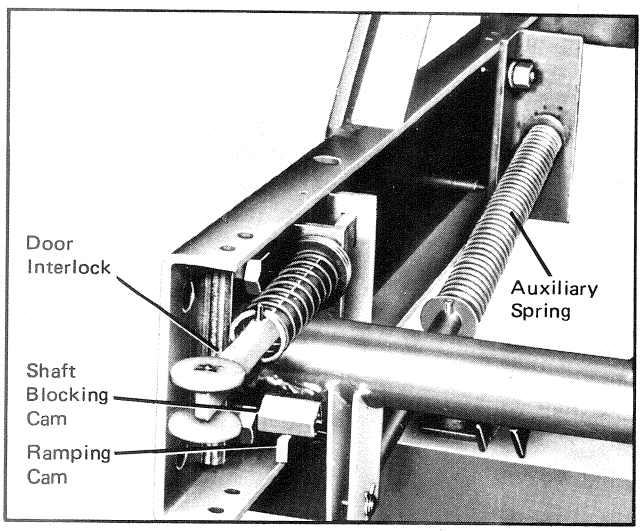

Fig. 18 *Operating Mechanism Showing Door Interlock, Auxiliary Spring, Shaft Blocking Cam and Ramping Cam*

7.3.1 Blade and arc chute alignment procedures are the same as for the standard WFS switch described in Section 5. However, before the maintenance hub may be used, the following steps must be taken:

A. Remove the door interlock shaft blocking cam assembly by removing its two 3/8" bolts.

B. Close the switch and leave spring in its discharged position. The maintenance hub may now be used for alignment procedures by raising the trigger latch during initial rotation of the operating shaft. Failure to release the trigger latch will damage components in the linkage assembly.

WARNING

Failure to replace shaft blocking cam assembly before energization may cause severe injury or death.

Replace shaft blocking assembly before energizing switch.

7.3.2 Over-toggle Adjustment

There are two 1/2" diameter adjusting bolts on the front of the L-shaped bearing support bracket. This bracket is enclosed by the switch cover plate which must be removed before proceeding.

The bottom bolt adjustment affects the distance between the rear teeter bar roller and the lip of the trip link (See Fig. 14). Proper operation of the restraining linkage requires 3/64" to 5/64" clearance between the rear teeter bar roller and the lip of the trip link. This adjustment is made with the switch closed and the spring discharged. Proper adjustment sequence is: main blade alignment, over-toggle alignment, and trip linkage alignment. Each adjustment may affect the others and all should be checked at completion of any adjustment.

7.3.3 Open Gap Adjustment

The upper bolt adjustment affects the distance between the rear teeter bar roller and the lip of the trip link as shown in Fig. 16. This distance should be 3/16" to 5/64" for proper operation of the restraining linkage. This adjustment is made with the switch open and spring uncharged. Proper adjustment requires attention to the main blade alignment, over toggle alignment, and trip linkage alignment.

Improper adjustment of the upper or lower bolts can result in the following:

A. The spring operating rod cannot be forced over toggle.

B. The restraining linkage can become inoperative resulting in the switch immediately closing or opening the charged spring snaps over toggle.

SECTION 8 – RENEWAL PARTS

The following is a list of renewal parts that are recommended for stock. When ordering parts, specify the part name, switch style number and order number found on the nameplate located on the switch cover plate. Parts differ slightly according to specific switch rating and date of manufacture; hence, all above information is necessary.

Item	Part Description	No. per Switch
1	Main and Flicker Blade Assembly	3
2	Break Jaw	3
3	Arc Chute	3
4	Insulator	6
5	Removable Handle	1
6	Drive Rod Link	3
7	Operating Spring	1
8	Polyester Barrier	4

APPENDIX A

WFS SWITCHES BOLT TORQUE VALUES FOR SWITCH CONNECTIONS

Use the following torque values for tightening switch connections. Use the widest standard flat washers that are consistent with bolt spacing.

TORQUE IN FOOT POUNDS FOR BOLT DIAMETER

Diameter	1/4	5/16	3/8	1/2	5/8
Minimum Torque	3.75	8	16.5	41.25	56.25
Nominal Torque	5	12	22	55	75
Maximum Torque	6.25	15	27.5	68.75	93.75