

Type DR7

69 THRU 362 kV
3000A
40-120 KA Momentary



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Center-Break Outdoor Air Disconnect Switch

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Suggested Tools

- 15/16" Open-End Wrench
- 15/16" Socket
- 3/4" Open-End Wrench (2)
- 3/4" Socket
- 1 1/2" Open-End Wrench or Adjustable
- Lineman Pliers
- Tape Measure
- Angle Finder
- Metal Cutting Saw
- Level

IMPORTANT: Read manual before installing or maintaining equipment! Make absolutely sure that equipment is de-energized and properly grounded.

This manual should be used in conjunction with the factory drawings. The drawings contain critical information, which if not followed could affect the operation of the switch.

Instructions can not cover all possible variations in equipment nor provide for every possible contingency to be met in connection with installation, operation or maintenance. Should further information be required or should particular problems arise which are not covered sufficiently for the purchaser's purposes, the concern should be referred to the factory.

For Technical Assistance Call 276-688-3328

RECEIVING INSPECTION

Check the shipment for completeness against the bill of material and installation drawings. If damage is found, file a claim immediately with the transportation company and notify your Pascor Atlantic representative.

HANDLING

Handling of disconnect switches should be done with care. Porcelain is fragile and may be damaged due to improper handling.

Factory drawings should be followed during installation. It is recommended that switches be fully assembled and adjusted at ground level before being placed into position. This should minimize final adjustments.

Lifting of switches by insulators, contacts, or live parts should be avoided, because of possible damage to these parts. Attachments for hoisting should be made to the switch bases unless otherwise instructed.

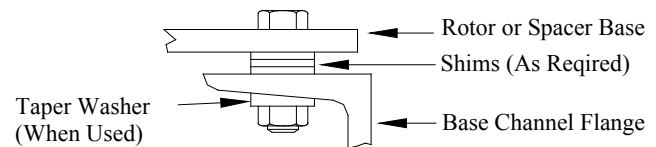
CAUTION: When uncrating switches having blade counterbalances open the switch blade to relieve the pressure of the counter balance before removing the live parts from the base.

INSTALLATION AND ADJUSTMENT

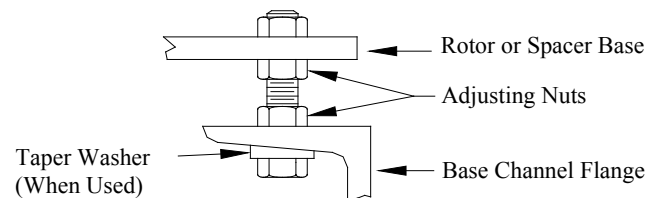
If the switches have already been assembled with insulators at the factory, proceed to step 5. However, it is recommended that each switch pole be checked for alignment and proper adjustment after being mounted on the structure.

Step 1—Check Bases

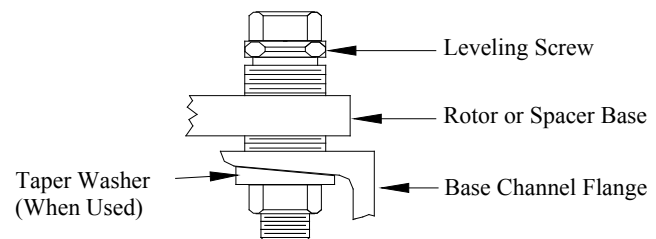
Check bases to make sure that the spacers and rotor bearing tops are square and level. The tops of the two supports on the hinge end must be exactly the same height. If necessary, make adjustments or shim. Shims, leveling screws, and adjusting nuts are shown in Fig. 1 and are explained in step 3.



Shims Used for Leveling Switches



Leveling Bolts



Leveling Screws

Fig. 1 Types of Leveling Devices

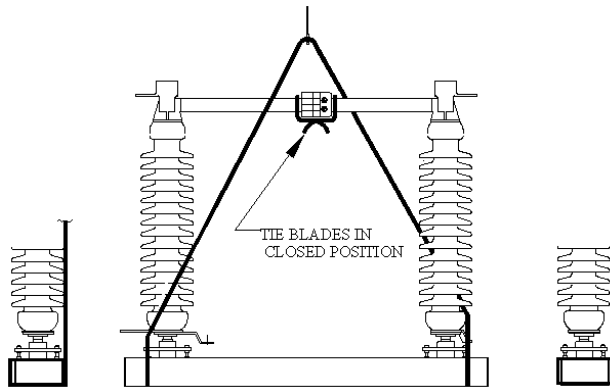


Fig. 2 Proper Rigging for Center Break

Step 2—Assemble Insulators

In some cases, involving higher voltage switches, the installer may choose to mount the switch bases on the structure before assembling the insulators. In such cases the switch bases should be mounted on the supporting structure in the positions shown on the installation drawing. Verify that the base for the drive phase is in the correct location and operating cranks are at their proper angles. Working on one end of the switch base at a time remove the bolts holding the switch cranks to the head of the rotor bearing. Using these same bolts mount the insulators on the top of the cranks, being careful not to change the angular position of these cranks. These cranks were mounted in the proper position at the factory and should not be changed.

(Fig 3) shows a typical switch base with the crank orientation for the switch in the closed position. The base on the driven phase will usually contain an additional crank.

Step 3—Insulator Stack Alignment

Lower voltage switches 8.25 thru 72.5kV

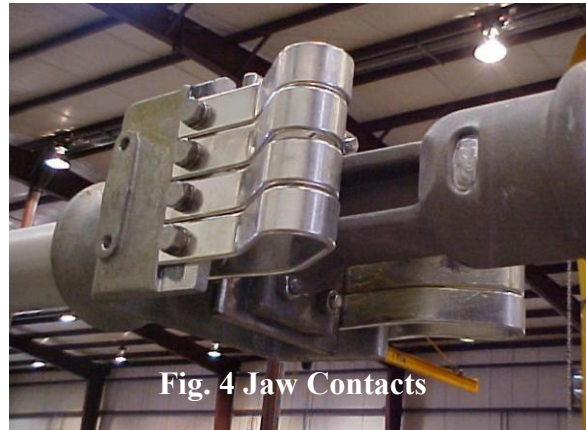


Fig. 4 Jaw Contacts

generally do not require insulator stack alignment. Where required, the insulator stacks of switches thru 242kV can be aligned using open-end shims or leveling screws and/or adjusting nuts (Fig. 1) if supplied (optional).

- If using shims, place the shims under the insulator supports (rotor bearing or spacer mounting flange) where the bolts secure the rotor bearing or spacer mounting flange to the switch bases.
- If optional leveling screws and/or adjusting nuts have been supplied, as shown in Fig. 1, adjust the leveling screw and/or adjusting nut to align the insulator stacks. Loosen all hardware before jacking to prevent binding.

Step 4—Mount Current Carrying Parts

Refer to fig 3 and with cranks in the switch closed position, assemble the current-carrying parts on the insulator stacks with the bolts provided. Normally, the blade end of the switch is mounted at the end of the switch, where the interphase rods are installed. However, the switch may be operated from the jaw end

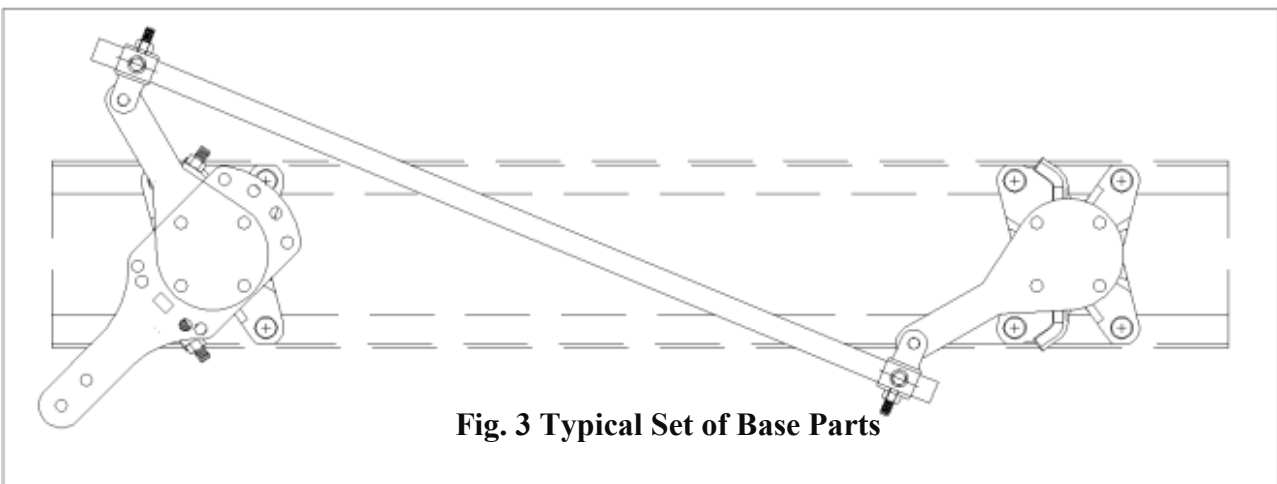


Fig. 3 Typical Set of Base Parts

without any noticeable difference. Refer to installation drawing for intended of preferred positioning of jaw and blade end.

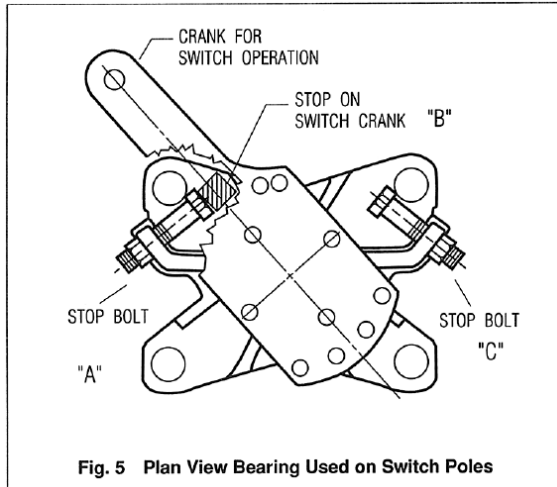


Fig. 5 Plan View Bearing Used on Switch Poles

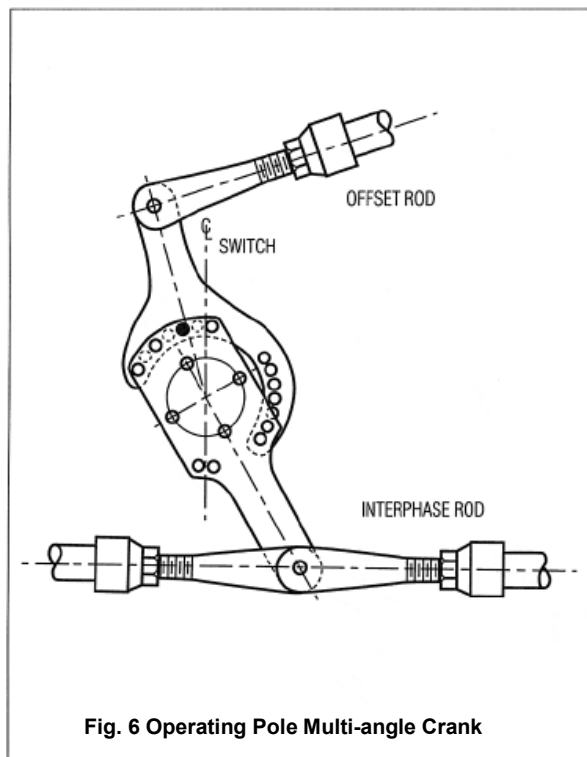


Fig. 6 Operating Pole Multi-angle Crank

Note: The counterbalances are assembled at the factory for the mounting positions as required for each installation. If it is necessary to change the mounting position of the switch in the field, the counterbalance must be changed as well.

Step 5—Switch Blade Adjustment

In the switch closed position, the moving contact of the blade should come to rest nearly midway on the contact portion of the jaw contacts, Fig. 4. Use the shims or leveling screws (which ever are furnished) between the base of the rotor bearings and the switch base, to achieve the proper blade penetration into the jaw. After this adjustment the insulator stacks may be slightly out of plumb when the switches open but well within the tolerances with the switch closed.

With the switch contacts closed as described above, the connecting rod should be adjusted so that there is neither tension nor compression in the rod. Adjustment may be made by removing the pin at the attachment point of crack and clevis, loosening the locknut, screwing the clevis in or out to adjust the length until the proper length is obtained. The locknut is then tightened and final assembly of the pin is made to attach clevis and crank.

After this has been accomplished, the closed position stop bolt (A) Fig. 5 is set so that it engages the mating projection (B) on the crank. Then, move the switch to the fully open position and adjust the one position stop bolt (C) in the same manner.

This procedure applies to each single pole.

Step 6—Mount Switches

Assemble the switches on the supporting structure in accordance with the positions shown on the installation drawing. The switches should be mounted level and parallel with each other. In case of a warped structure, shimming under the switch bases may be required.

Step 7—Mount Offset Bearing

For those installations requiring an offset bearing, mount the offset bearing and its supporting base on the structure in the position shown on the installation drawing. Check operating crank for proper length radius and

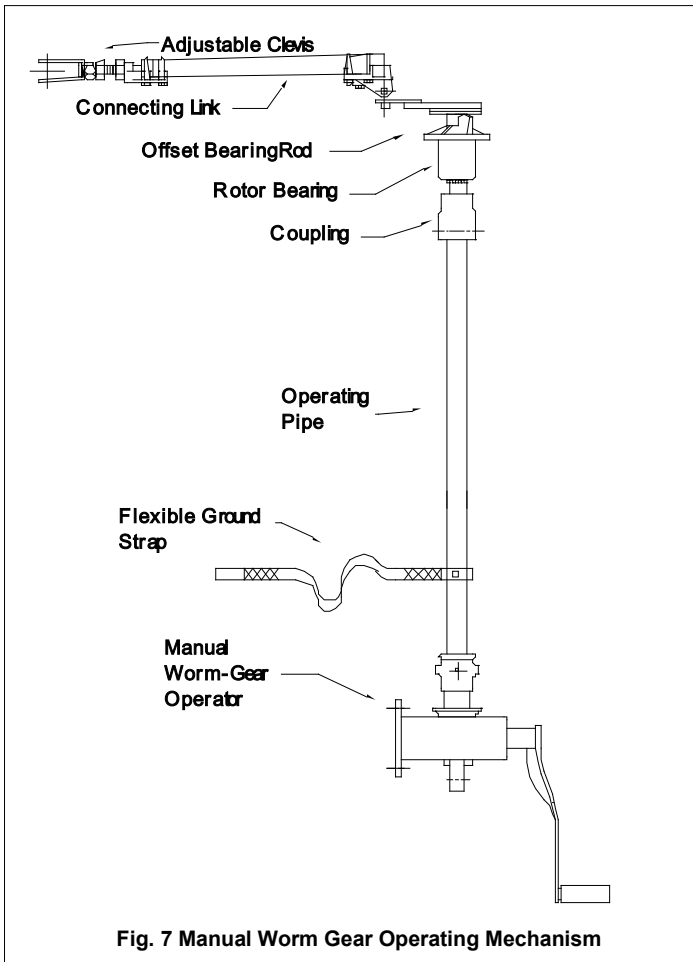


Fig. 7 Manual Worm Gear Operating Mechanism

angle, and stop crank for correct position. If the offset bearing has an adjustable crank, it is sometime necessary to add $\frac{1}{4}$ " to $\frac{1}{2}$ " to the trial radius given on the control drawing to get required travel to switch blades. This additional length allows for lost motion and clearances in pin holes and will also provide a definite audible sound accompanied by a reasonable amount of deflection in the structural members when the crank crosses the dead center position. This serves as a signal to the operator that the switch is either fully open or closed.

Step 8—Adjust the Multi-Angle Crank

The crank is identified in Fig. 6. This crank is supplied in the operation pole unit connected to the offset bearing. It permits 330° angular adjustments with crank location every 10° which allows adjustments to within 5° of desired position. In some adjustments, the adjustable crank may be in such a position to interfere with the stop projection on the switch crank. If this is

the case, remove this projection. The other two poles will regulate the blade travel on this unit. The multi-angle crank should be set so that it forms an angle of approximately 45 degrees with an offset link in either switch position, closed or open. On 5" base circle switches the multi-angle crank is installed on the top of the switch crank, on 3" base circle switches it is installed on the bottom.

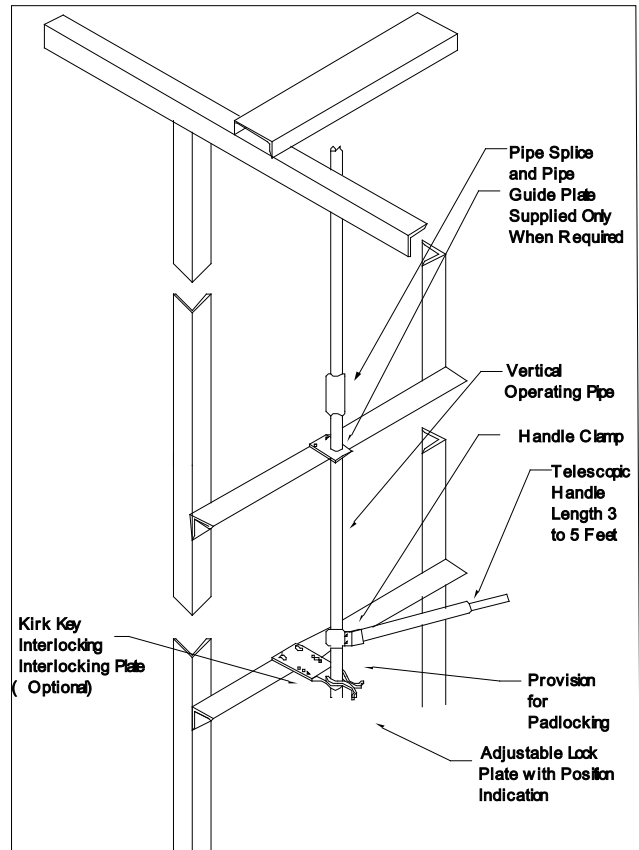


Fig. 8 Standard Offset-Torsional Mechanism on Standard Support Structure

Step 9—Install Interphase Rods

With all blades in the closed position, install the interphase rods and offset crank rod as follows:

- a. Lengthen the interphase rods that are in compression during opening, as much as possible, yet allowing for the pins to be inserted.
- b. On the rods that are in tension during opening, shorten them as much as possible, yet allowing for the pins to be inserted.
- c. The offset crank rod between the outboard bearing and the driven switch should be handled the same way
- d. For lubrication of pins and bearing areas, see Table 2.

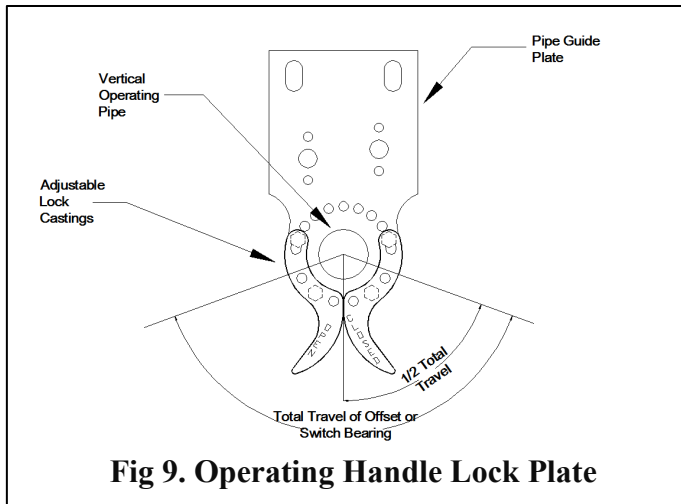


Fig 9. Operating Handle Lock Plate

Step 10—Install Vertical Operating Pipe

For directly connected switch operating mechanism, attach vertical operating pipe to switch rotor bearing shaft. Or, In the case of offset-torsional operating mechanism, attach vertical operating pipe to offset rotor bearing shaft, with coupling and pins supplied. For reference, see Figs. 7 and 8. At this point, check drawings for accessory equipment (auxiliary switches, mechanical interlocks, position indicators, ground straps, etc.) which mounts on vertical operating pipe and install before continuing installation. The vertical pipe is predrilled at one end for a 5/8" diameter pin, two of which are shipped, together with a coupling in a bag, for connection to the offset bearing shaft (or on the pole unit rotor bearing in the case of direct connection switches)

Step 11—Install Pipe Splice and Guide Plate

When the length of the vertical operating pipe exceeds 23 feet, a pipe splice and a guide plate are furnished and should be installed as shown in Fig. 8. The pipe splice and both pieces of pipe are pre-drilled to receive the 5/8" diameter pins. The guide plate should not be solidly mounted until after the vertical pipe has been completely installed; then bolts holding the guide plate on the structure should be tightened in order that the holes in the guide plate line up with the normal position of pipe. This assures that there is no binding.

Step 12—Install Operating Mechanism

Two types of manual operating mechanisms

- Swing-handle operator
- Worm gear mechanism



Fig. 10 Geared Mechanism



Fig. 11 MO-10 Motor Operator

Swing Handle Operator

To install the swing handle operator:

1. With ground strap in place on vertical operating pipe, slide handle and handle lock plate over the end of the vertical operating pipe
2. Fasten the lock plate at the proper location. Recommended height for the lock plate is 3 ft. 6 in. above ground.

Note: The lower end of the vertical operating pipe should extend through the lock plate at least 3 inches. It may extend as much as 3 feet or more, just so it doesn't touch the ground or column footing.

3. The lock plate assembly (Fig. 9) consists of two castings, mounted on the pipe guide plate, which can be easily adjusted in an arc to provide the required rotation. These act as locks for the manual operating handle when it is dropped from the operating position. The handle must be raised to a horizontal position for operation.
4. With the switch in the fully closed position, set the handle clamp so its set screws are 4 inches above the lock plate and its vertical centerline is at or near as possible to the closed position, see Fig. 8.
5. Temporarily fasten the handle to the pipe with the set screws.

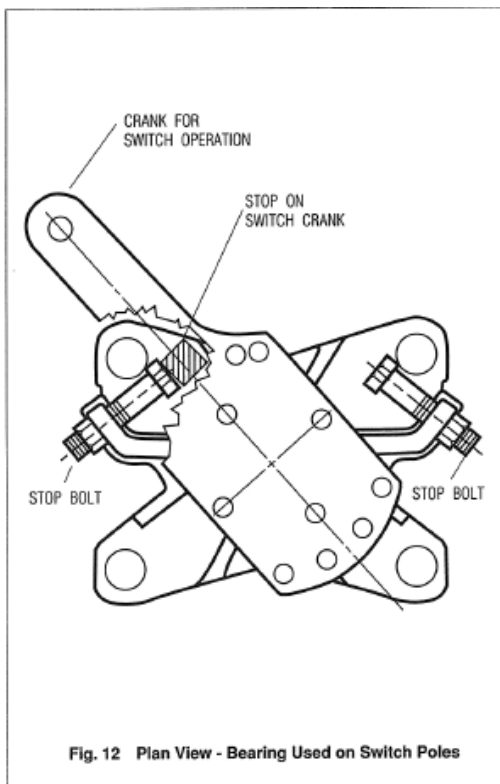


Fig. 12 Plan View - Bearing Used on Switch Poles

Worm Gear Mechanism

1. With ground strap in place on vertical operating pipe, slide worm gear mechanism over the vertical operating pipe and attach it to the structure.
2. Remove the small position indicators, which are attached to the worm gear coupling with allen set screws.
3. Tighten hex head set screws in the coupling until the vertical operating pipe is pierced.
4. If all stops at switch elevation have been set, including the offset bearing, then it is safe to reinstall the position indicators on the worm gear mechanism. These indicators should not quite touch the raised boss on the worm gear housing in either the open or closed position. There is a possibility of damage to the indicators or the coupling if this is not observed

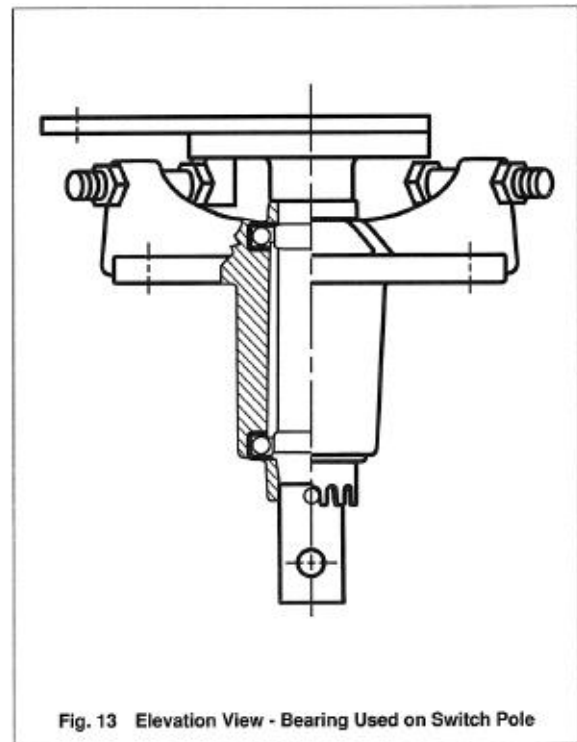


Fig. 13 Elevation View - Bearing Used on Switch Pole

Motor Operator

For remote operation, a motor operator is supplied and it should be installed per the instructions supplied with it.

Step 13—Arcing Horn Installation

Arcing horns are furnished only when horn gap switches are ordered. When arcing horns are used, they should be installed and

adjusted after the switches are mounted and adjusted.

Refer to arcing horn assembly drawing supplied with the order for detailed information.

Step 14—Installation of Corona Rings and Balls

If corona rings and balls have been supplied, install these components as shown on the single pole drawings.

Important: Prepare areas where ring supports contact switch parts as per instructions for aluminum-to-aluminum connections on this page.

Step 15—Final Checks

The completed 3-pole installation should be checked for the following:

1. In the open position, the blades should be between 90° to 93°.
2. In closing, blades should make central entry into their jaws at approximately the same time.
3. In the closed position, all blades must be in full contact with jaws.
4. All bolts are tight and all cotter pins are bent adequately.
5. The single poles are held against or nearly against their individual rotor bearing stops in both the open and closed positions and also the stops on the offset bearing.
6. Operating effort required to operate the switch is not excessive.

Terminal Connections

The aluminum surface of the terminal connection provides for easy current transfer.

Notice: In cases where a copper conductor is used, bolt a tinned terminal clamp (if available) to the aluminum switch terminal pad.

If a non-tinned terminal clamp is used, apply a liberal amount of electrical joint grease at the joint and all over the pad of the fitting.

To connect aluminum – to – aluminum terminals:

1. Clean all contact surfaces of conductors and fittings using a stiff wire brush to remove heavy oxide coatings until the aluminum finish is visible and restored.

2. Coat these now clean contact areas with a liberal amount of corrosion inhibitor such as NO-OX-ID™ A Special™ or No. 2 EJC.
3. Abrade the contact surface through the corrosion inhibitor again using the stiff wire brush.

Notice: Do not remove the compound.

4. Connect the terminals and tighten bolts

To connect copper-to-aluminum terminals:

1. Except for plated surfaces, clean all contact surfaces of conductors and fittings using a stiff wire brush to remove heavy oxide coatings until the aluminum finish is visible and restored.
2. Prepare any bare copper surfaces in the usual manner.
3. Coat these now clean contact areas with a liberal amount of corrosion inhibitor such as NO-OX-ID™ A Special™ or no. 2 EJC.
4. Abrade the contact surface through the corrosion inhibitor using a stiff wire brush.

Notice: Do not remove the electrical joint grease.

5. Connect the terminals and torque the bolts as per Table 1.

BOLT SIZE	condition of Threads	Recommended torque in Ft. Lbs.			
		Silicon Bronze	Aluminum 2024-t4 anodized	Stainless Steel Type 304	Bright Zinc, Black & Galv. Steel
3/8" -16	Dry	20	15	16	12
	Lubricated	15	12	13	10
1/2" -13	Dry	40	35	40	30
	Lubricated	30	20	30	20
5/8" -11	Dry	70	60	70	50
	Lubricated	50	40	50	40
3/4" -10	Dry	100	95	100	90
	Lubricated	85	60	80	70
7/8" -9	Dry	150	130	140	130
	Lubricated	120	75	110	100
1" -8	Dry	200	160	170	170
	Lubricated	160	95	140	130

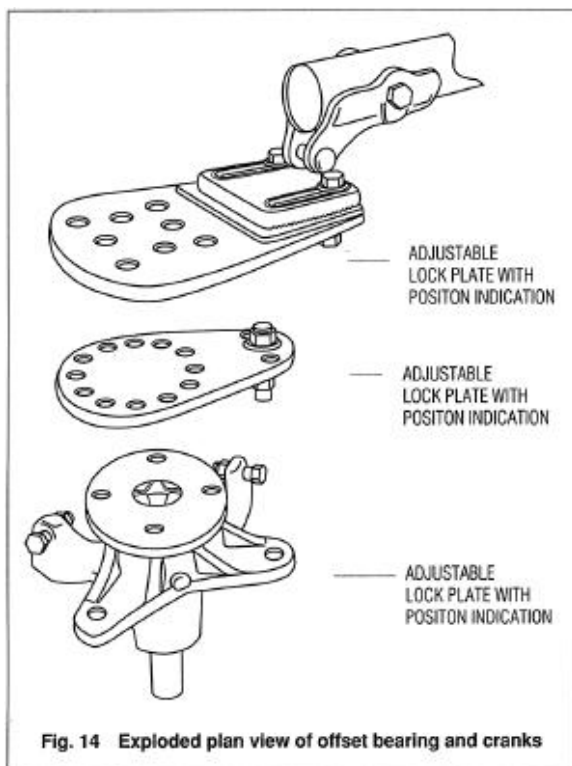
MAINTENANCE

WARNING

Before servicing the switch, be sure it is disconnected from all electric power sources and properly grounded.

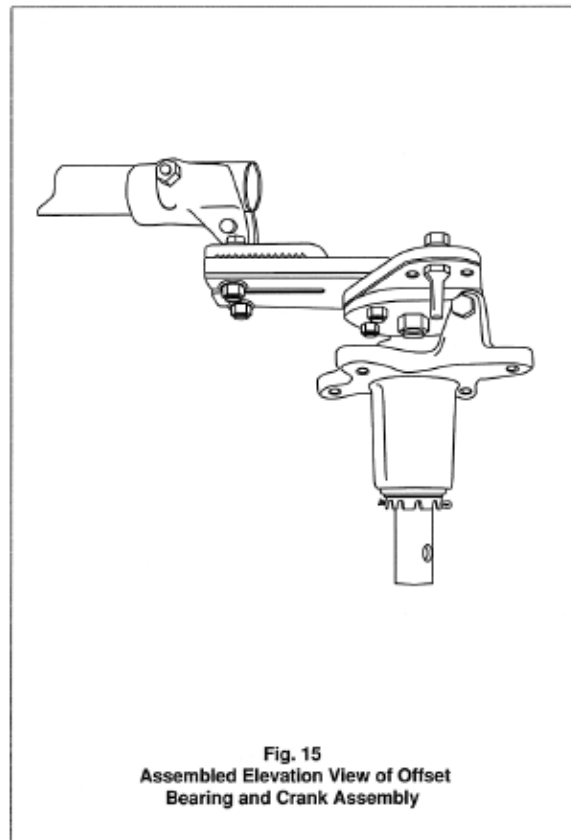
A certain amount of care and inspection is recommended. The frequency of inspection depends upon atmospheric conditions and frequency of operation. The service interval is largely determined by the user. Recommended maintenance is similar to that listed in the latest industry standards.¹ First, it is important that the insulators are always clean. It is also important that the contacts be examined to see that they are aligned, clean, and have a firm uniform pressure. If the contacts are pitted, or burned to some extent, they should be removed and replaced. Under normal service conditions, the jaw contacts should be examined and maintained at least once a year, depending upon the type of atmosphere to which they are exposed.

Periodic maintenance should consist of cleaning the contact surfaces thoroughly by carefully scraping off any contamination or deposit and sanding the surface entirely clean, a coating of lubricant should be applied. Suggested lubricants are MOBIL 28 grease or NO-OX-ID "A Special". MOBIL 28 is an Exxon Mobil Company product. NO-OX-ID is made by SANDCHEM INC.



¹ ANSI C37.35 (American National Standard Guide for the Application, Installation, Operation and Maintenance of High-Voltage Air Disconnecting and Interrupter Switches)

In general, operating linkages require virtually no maintenance. However, in contaminated atmospheres of where operation under sleet conditions is common some lubrication at pivot points may be desirable. The grease used should be durable even when exposed to the elements, and should retain its viscosity over a wide temperature range.



BEARINGS

The bearing of each switch and offset bearing is a grease-less type. Figs. 12 and 13 show the location of stop bolts and switch cranks on all switch bearings. Figs. 14 and 15 show the required location of stop bolts and stop cranks with a typical location of the adjustable radius crank on the offset bearing.

Field Lubrication of Outdoor Switches

*None required at installation unless switches were exposed to abnormal conditions during storage for a considerable length of time. During regular cleaning, give them a light coat of grease.

RENEWAL PARTS

Refer to the switch nameplate when ordering renewal parts. The nameplate is attached to the base assembly of each switch pole. The same data is shown on the record engineering drawings. The master file at the factory is linked to the serial number on the nameplate.

Renewal Parts Ordering Information

- Serial Number
- Switch Type
- Part Name
- Quantity Required
- Max. kV
- B.I.L. kV
- Cont. Amps
- Mom. Amps

Refer your requests for renewal parts to the Factory.

Table 2 Lubrication Guide for Outdoor Switch Components			
Part Name	Type Lubricants Recommended	Amount Applied	Qty. Req'd. for (6) Three-pole Switches
Jaw Fingers	NO-OX-ID Grade "A" Special or Mobil 28 Grease	Medium Coat	
Blade Ends	NO-OX-ID Grade "A" Special or Mobil 28 Grease	Medium Coat	(1) Quart
Pins On current carrying parts	Mobil 28 Grease or DC-4	*	
Pins On control parts	Mobil 28 Grease or DC-4	Light Coat	(1) Quart
Bearing Areas On control parts	Mobil 28 Grease or DC-4	Medium Coat	
Terminal Connections	NO-OX-ID Grade "A" Special or NO 2 EJC	Heavy Coat	(1) Quart

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