



High Voltage Center Break Switch Operation Inspection

Standard
Operating
Procedure

Table of Contents

TABLE OF CONTENTS	1
1.0 PURPOSE	2
2.0 ROLES AND PREREQUISITES	2
3.0 TOOLS AND EQUIPMENT	2
4.0 PROCEDURE	2
5.0 COMPONENTS	15
6.0 ACRONYMS, DEFINITIONS AND SYMBOLS	16
7.0 POLICIES AND REGULATORY REQUIREMENTS	16
8.0 REFERENCES	16



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Operating
Procedure

1.0 Purpose

This SOP provides:

- A standard to follow when inspecting the installation of a high voltage center break switch.

2.0 Roles and Prerequisites

Role(s)	Quantity Required	Prerequisites
Powerline Technician/ Contractor Inspector	1 or more	1. SaskPower Standard Protection Code Training 2. Qualified Electrical Worker

3.0 Tools and Equipment

Minimum Tools and Equipment Required:

- Binoculars or spotting scope
- PPE
- Line Commissioning Form
- Camera

4.0 Procedure

The Procedure

NOTE: The following requirements shall be met prior to the start of the procedure:

- Complete Hazard/Aspect and Risk Assessment
- Applicable Personal Protective Equipment (PPE) is available and in good condition
- Obtain SaskPower Standard Protection Code and other related permits
- Reviewed work practices: limits of approach, testing for absence of potential and proper grounding procedures

NOTE: This procedure applies to all makes of center break high voltage switches with or without ground switches attached.

Refer to SOP "High Voltage Ground Switch and Interlock Inspection".

This SOP is based on Southern State switches. Some brands of switches may operate and look different than what is illustrated in this SOP. However, the required end result is the same. For other makes of switches refer to the supplied setup manual for exact tolerances and requirements.

1.0 Inspecting Operation of a Center Break Switch

1.1 Inspection Operation of a Center Break Switch

1.1.1 The Powerline Technician/Contractor Inspector, for center break switches shall ensure the following:

- *For center break switches confirm that the blades open to the correct direction.*
- *The grounding mat(s) are in the correct location and are level as per engineering design*
- *Control handles are in the correct location as per the engineering design*
- *Confirm that the switch contacts have been thoroughly cleaned and lubricated with bar graphite.*
- **Note:** *The switch may not close properly if not lubricated*



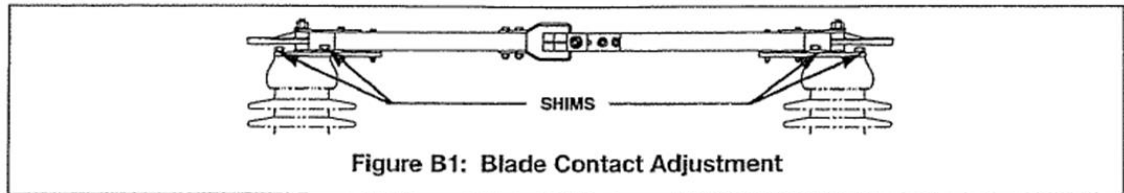
Stock Coded Graphite Bar

1.1.2 The Powerline Technician/Contractor Inspector shall ensure the following conditions are met

- *Confirm that when the switch is closing the contacts hit in the center of the male blade, and the male contact does not bind on the female contact going closed.*

Check with a level to confirm both Blades are in a horizontal plan, and their centerlines are aligned. A slight variance is acceptable provided the Male Blade Assembly is centered approximately vertical in the Female Blade Contacts.

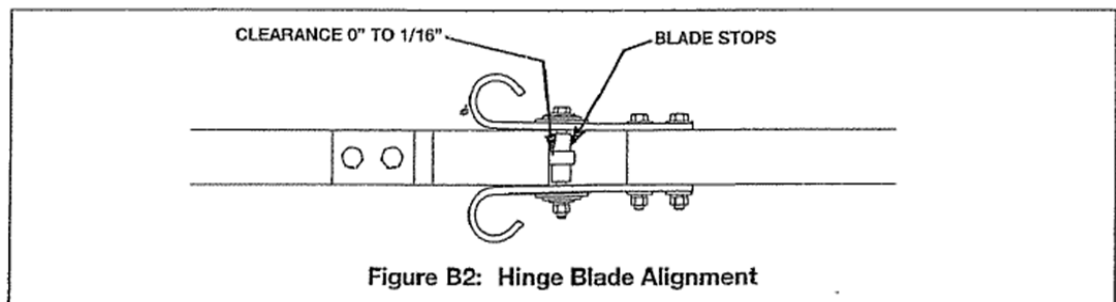
if necessary, use stainless steel shims (provided) at locations indicated in **Figure B1** for Blade Contact Adjustment.



Southern States Set Up Manual for Blade Contact Adjustment

- Confirm that the blade penetration is correct

Confirm initial Blade setting. Male Blade Assembly should either touch or rest within 1/16-Inch of at least one of the Blade Stops – **Figure B2**.



Southern States Set Up Manual for Hinge Blade Alignment

- Confirm that the fully closed position is correct

Closed Position:

- Switch is in the fully closed position when the centerline of the Male Blade Assembly is aligned with the centerline of the Female Blade Assembly – **Figure C3**.
- Blade toggle over center by approximately 1/2-inch is acceptable.

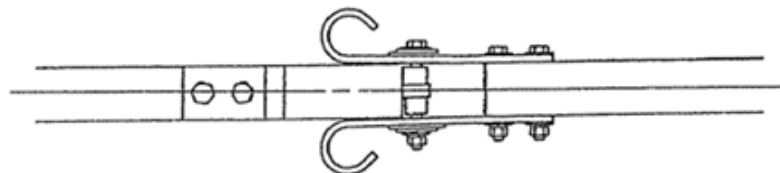


Figure C3: Switch Fully Closed

Southern States Set Up Manual for Blade Alignment



View From Under the Switch Blade Using the I-beam to Confirm Blade Alignment



View of Contacts Making Proper Penetration in Fully Closed Position

- *Confirm that the fully open position is correct. Refer to specific switch assembly manual for open and closed tolerances.*

Open Position:

- Switch is in the fully open position when both Blades are approximately 90-Degrees to the mounting base – Figure C4 and Chart 1.

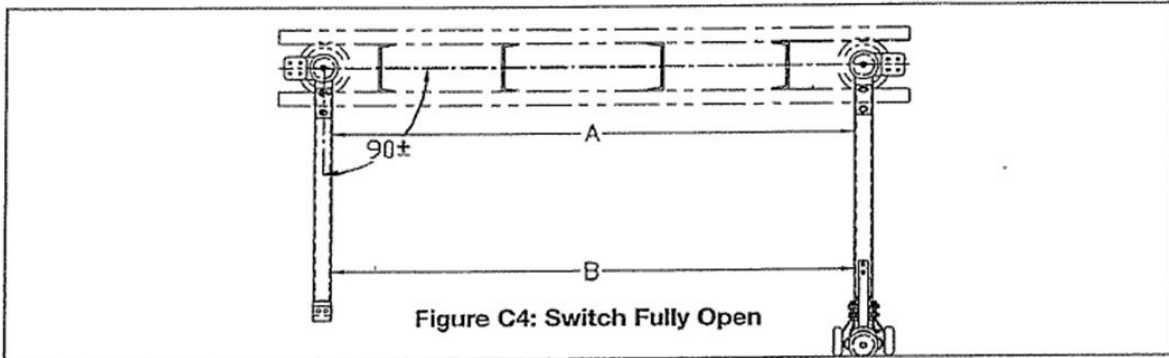


CHART - 1

Switch Rating	Recommended Maximum Variance Dimensions "A" & "B"
72.5 kV - 121 kV	$\pm 3/4"$
145 kV - 169 kV	$\pm 1"$
242 kV (900 kV BIL)	$\pm 1 1/4"$
242 kV (1050 kV BIL)	$\pm 1 1/2"$

Southern States Set Up Manual Instructions for Confirming Fully Open Position

NOTE: All of these conditions must be rechecked after conductor attachments to both ends of the switch pole have been made.

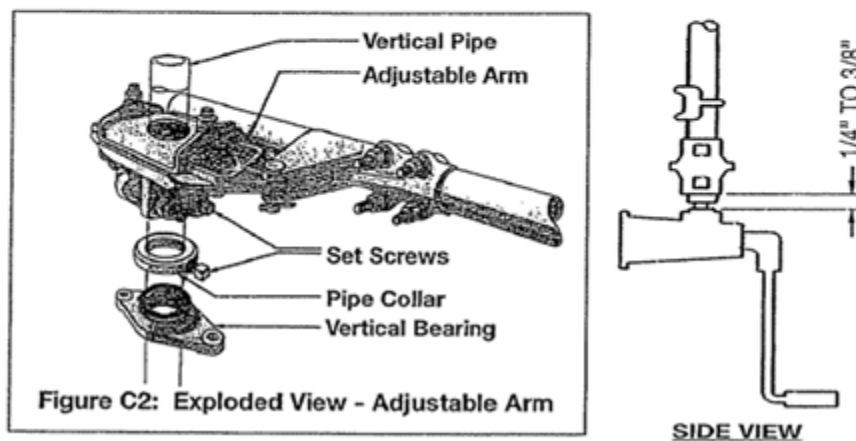
- *If the switch is equipped with arcing horns confirm the horns make and break contact before and after the current carrying contacts do.*



View of Arching Horns Making Initial Contact

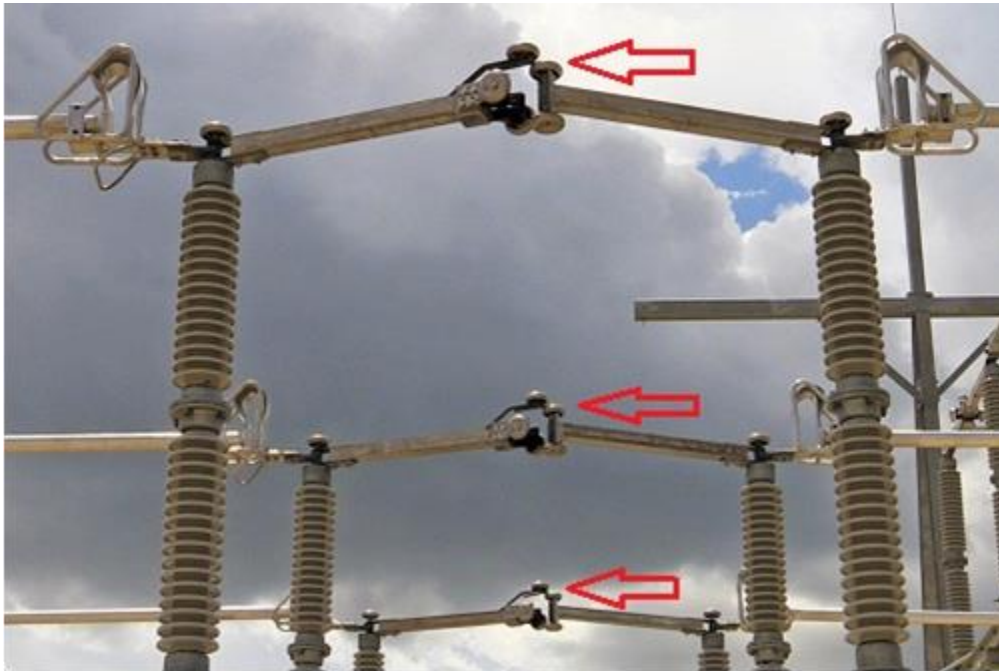
- Confirm that the pipe collar supports the entire weight of the vertical pipe.

CAUTION: The Pipe Collar above the Vertical Bearing must support the entire weight of the Vertical Operating Pipe. **Do not allow the manual or electrical operator housing to bear any weight.**



Southern States Exploded View of the Vertical Pipe Setup

- *Confirm that all poles of the fully adjusted switch operate together. A slight variance between poles is acceptable. The primary objective is for the poles to fully open and fully close.*



View of All Three Phases Touching at the Same Time

- *Confirm that there is positive toggle in the control handle in the fully closed position.*



View of The Outboard (Fifth) Bearing Where Toggle Will be Present

Note: Refer to the Component "SOP Center Break Switch - Bearing Toggle Video"

- *Confirm all adjustment bolts and interphase pipe turnbuckles are tight.*



View of Turnbuckle Jam Nuts

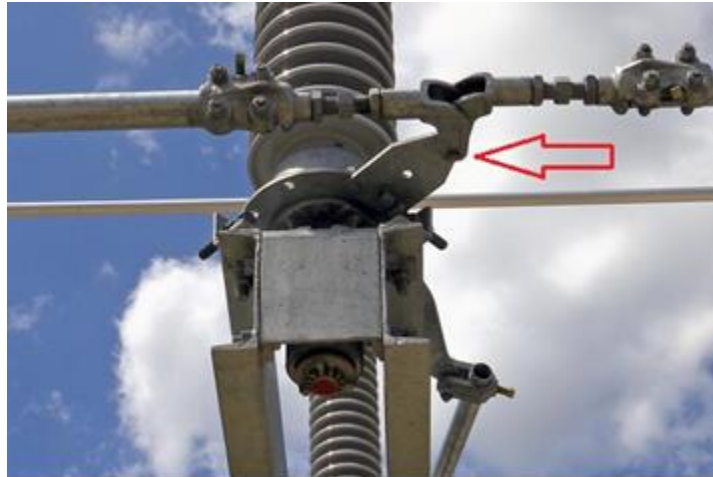
- *Confirm all setscrews are pierced through the pipe walls. These piercing screws are located at several locations.*



High Voltage Center Break Switch Operation Inspection

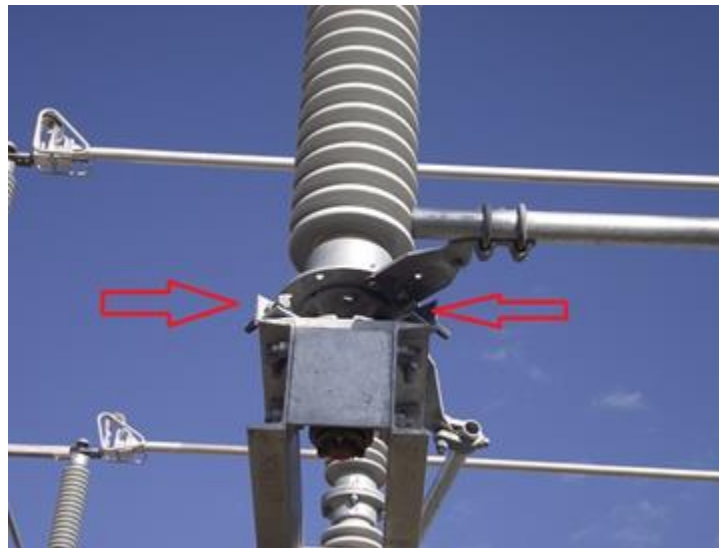
View of some of the Piercing Screws

- *Confirm all cotter keys are installed and bent 15 & 20 degrees. These cotter keys are located at several locations.*



View of Cotter Key location

- *Confirm all bearing stops are lightly touching or have a small gap (1/8") in both open and closed positions.*



View of Switch Open/Close Stops

- *Confirm that the open & closed indicator signs are installed correctly.*



View of Closed Indicator Sign, Open is on Opposite Side of Pipe

- *Confirm the ground mat and switch are grounded properly according to the **SaskPower specs**, and that the grounding mat is level and at the correct height.*



View of Ground Mat



View of Main Drive Pipe Ground

- *Confirm the switch designation signs are correct and mounted in the correct location.*



View of Switch Designation Sign

High Voltage Center Break Switch Operation Inspection

- *The Powerline Technician/Contractor Inspector shall complete the switch commissioning form and document the switch name plate data*
- *Refer to the " Line Switch Commissioning Form"*



View of the Switch Name Plates



High Voltage Center Break Switch Operation Inspection

Standard
Operating
Procedure



Line Switch Commissioning Form

Switch Designation:	Commissioned By:	Date:
Switch Manufacturer:	Serial Number(s)	Manufacturer Ref or Style #
Year of Manufacture	Voltage Rating (kV)	Basic Insulation Level (BIL) (kV)
Continuous Current Rating (A)	Momentary Current Rating (A)	Vacuum Interrupter Rating (if equipped)

Items	Checked	Comments
Grounding – Measured Resistance less than 100. Provide measured resistance.		
Switch is installed as per job specification with no visible damage. Insulators have been cleaned.		
Correct operation of main contacts, arcing horns, whips and vac-rupters (if equipped)		
Contacts have been cleaned and properly lubricated with graphite bar.		
Alignment and timing as per manufacturer's instructions.		
All phases lean back at 91° in open position. All phases are synchronized and touch the open stop at the same time.		
All phases are synchronized and touch the closed stop at the same time in the closed position.		
All hardware double checked for proper torque. All pins installed head up with cotter pin installed. All piercing bolts installed.		
Switch Designation Placard and all other required signage installed.		
Switch Name plate data tag(s) installed near operating handle.		
Damage to coating has been repaired. Uncoated steel (ie screw pile caps) have been coated.		
Photographs of installation have been sent of AM&FS.		
One copy of the manufacturer supplied drawings & manual have been sent to AM&FS.		

Switch is installed as per the job specification and manufacturer's installation manual.
The switch operates correctly and is ready for service: Yes No

Comments:

General Construction / Maintenance Specifications – PLC14#1 – Rev 0 2014 February 10 Page 89

View of the Line Switch Commissioning Form

NOTE: Refer to the "Line Switch Commissioning Form" found in this SOP Bundle

- Take pictures of the Apparatus in the fully open and fully close positions, and all three phase current carrying contacts in the fully closed position.
- Send the pictures, along with the Line Switch Commissioning Form electronically to the Construction Department for input into SAP.



- *Apparatus in the fully open and fully close positions, and all three phase current carrying contacts in the fully closed position*

5.0 Components

The following is a list of components for this SOP which can be accessed through the SOP System :

Component Name	Component Type	Component Description	Location of Component
SOP Center Break Switch - Bearing Toggle Video	Video	A video job aid required for this procedure	SOP Online - SOP Bundle: High Voltage Center Break Switch Operation Inspection
Line Switch Commissioning Form	Form	A form that is required to be completed for this procedure	SOP Online - SOP Bundle: High Voltage Center Break Switch Operation Inspection



High Voltage Center Break Switch Operation Inspection

Standard
Operating
Procedure

6.0 Acronyms, Definitions and Symbols

Acronyms and Abbreviations

N/A

Definitions

N/A

Symbols

N/A

7.0 Policies and Regulatory Requirements

This SOP is a result of the following regulations, policies, industry standards, and corporate directives and standards:

Regulatory Requirement(s)

- N/A

Policies

- Job Hazard Assessment Policy
- Personal Protective Equipment Policy

Standards

- N/A

Other

- SaskPower Standard Protection Code
- SaskPower Safety and Environment Rulebook

8.0 References

References

N/A