

INSTRUCTIONS

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INTRODUCTION

CAUTION

The equipment covered by this publication must be inspected by qualified persons who are thoroughly trained and who understand any hazards that may be involved. This publication is written only for such qualified persons and is not intended to be a substitute for adequate training and experience in safety procedures for this type of equipment.

To assure Circuit-Switcher's continued proper performance, it should be inspected in accordance with the recommended schedule and procedures contained in the tables of this publication. Table I indicates the

frequency with which each major Circuit-Switcher component should be inspected and Table II lists a summary of inspection procedures appropriate for each component.

These inspection recommendations are applicable to Mark II and Mark IV Circuit-Switcher models having 4 or 6 interrupting gaps per pole-unit. These inspection recommendations are not applicable to comparable Type G Circuit-Switchers because those devices have significantly different and less robust construction features than subsequent models. Type G Circuit-Switchers need the benefit of an annual exercising and inspection to optimize performance.



RECOMMENDED INSPECTION SCHEDULE

A mechanical-operations test value is indicated in Table I for those Circuit-Switcher components affected by the number of mechanical operations performed. It is offered as a guideline to the number of open-close operations which might reasonably be expected for the component before replacement is required.

Electrical-operations limits are also listed for the interrupter and disconnect live parts, since these components are affected by the number of electrical operations performed. These limits are dependent upon the Circuit-Switcher application and magnitude of current switched. For the interrupter and disconnect live parts, the electrical-operations limit may thus provide an overriding guideline to the number of open-close operations which might be expected before replacement is required.

The actual number of open-close operations which may be obtained for a component in service will depend upon the nature of the application, the installation environment (e.g., whether subject to temperature or

humidity extremes, or highly corrosive or dusty atmospheres), and the observance of the recommended inspection schedule.

An inspection frequency is shown for each component listed. To maximize the operating life of the component, it is recommended that the user perform the inspection procedures described in Table II, at the frequency indicated by a "●"—either in number of open-close operations or years, whichever occurs more often. If the inspection results so indicate—or if dictated by the mechanical-operations test value or electrical-operations limit guideline—the component should be replaced.

Each user's own experience will determine whether more frequent inspections are required. Note that for most transformer-protection applications, the Circuit-Switcher inspection frequency is approximately five years—consistent with many utilities' transformer-inspection practices.

TABLE I—RECOMMENDED INSPECTION SCHEDULE FOR S&C CIRCUIT-SWITCHER COMPONENTS

Component	Mechanical-Operations Test Value, ^① Number of Open-Close Operations	Electrical-Operations Limit			Inspection Frequency ^②									
		Application	Maximum Current, Amperes	Number of Open-Close Operations	Number of Open-Close Operations						Number of Years			
					1 or 2	125	250	500	1,000	2,500	1	5		
Switch Operator, Power Train, Brain, and Shunt-Trip Device	5,000	—	—	—							●		●	
Interrupter	5,000	Capacitor, Reactor, or Load Switching	250	5,000							●◆			
			550	2,000				●◆						
			1,000	1,000				●◆						
		Load Switching	1,200	750			●◆							●◆
			1,600	500			●◆							
			2,000	250	●◆									
		Fault Interrupting	Secondary-fault interrupting rating of Circuit-Switcher	25	Not applicable									
			Primary-fault interrupting rating of Circuit-Switcher	10										

TABLE CONTINUED →



RECOMMENDED INSPECTION SCHEDULE — Continued

TABLE I—RECOMMENDED INSPECTION SCHEDULE FOR S&C CIRCUIT-SWITCHER COMPONENTS—
Continued

Component	Mechanical-Operations Test Value, ^① Number of Open-Close Operations	Electrical-Operations Limit			Inspection Frequency ^②								
		Application	Maximum Current, Amperes	Number of Open-Close Operations	Number of Open-Close Operations					Number of Years			
					1 or 2	125	250	500	1,000	2,500	1	5	
Disconnect Live Parts	5,000	Capacitor, Reactor, or Load Switching	250	5,000						●			
			550	2,000				●					
			1,000	1,000				●				●	
		Load Switching	1,200	750			●						
			1,600	500			●						
			2,000	250		●							
Fault Closing	Fault-closing rating of Circuit-Switcher	2	●								Not applicable		
Pre-insertion Inductor	—	—	—						●		●		
Pre-insertion Resistor	—	—	—			●				●			
Grounding Switch	—	—	—	Not applicable								●	

① Based on mechanical-operations tests performed by S&C utilizing new Circuit-Switchers, with no intervening maintenance performed.

② Frequently operated Circuit-Switchers (typically 200 or more open-close operations a year) should be inspected after the first 250 operations; thereafter, they should be inspected at the frequency indicated.

Frequently operated Circuit-Switchers also require annual lubrication of the disconnect live parts. See Table II

◆ Interrupters should be checked for low gas pressure (red targets) during the user's normal day-to-day operating procedures.



RECOMMENDED INSPECTION PROCEDURES

The Circuit-Switcher inspection procedures to be followed are summarized in Table II. The applicable S&C instruction sheets for the Circuit-Switcher, switch

operator, pre-insertion inductor or resistor, grounding switch, etc., should be referenced for further details.

TABLE II—RECOMMENDED INSPECTION PROCEDURES FOR S&C CIRCUIT-SWITCHER COMPONENTS

Component	Inspection Procedures
Switch Operator	<ol style="list-style-type: none"> 1. Check for evidence of water ingress, damage, excessive corrosion, or wear. 2. Check ease of operation during slow, manual cranking using the switch operator manual operating handle. Listen for simultaneity of tripping of the interrupters. From the point at which one interrupter trips, no more than 75° of rotation should be required before the other interrupters trip. If excessive rotation is required, contact the nearest S&C Sales Office. 3. Check electrical operation, coupled and decoupled 4. Check for loose wiring inside enclosure and proper functioning of position-indicating lamps, operation counter, convenience lamp, etc.
Power Train	<ol style="list-style-type: none"> 1. Check for evidence of damage, excessive corrosion, or wear. 2. Check tightness of fasteners 3. Observe operation during slow, manual cranking using the switch operator manual operating handle. Check for complete stroking of the various drive levers against their stops and for attainment of overtoggle positions, as required. 4. Check condition of seals
Brain	<ol style="list-style-type: none"> 1. Remove brain cover and check for evidence of water ingress, damage, excessive corrosion, or wear. 2. Check tightness of shunt-cable fasteners and for evidence of excessive fraying of the shunt cable. 3. Check condition of seals. 4. Replace brain cover. Observe operation during slow, manual cranking using the switch operator manual operating handle. Listen for the tripping action of the interrupter on opening and observe operation of the interrupter targets. 5. Check for proper clearances at the brain adjustment-holding device and at the blade crank-arm stop
Shunt-Trip Device	<ol style="list-style-type: none"> 1. Remove shunt-trip solenoid-housing cover and check for evidence of water ingress, damage, excessive corrosion, or wear. 2. Check condition of seals. 3. Replace shunt-trip solenoid-housing cover. Simulate a fault by activating the protective-relay circuit. Verify that all three shunt-trip solenoids function and that the switch operator motor follows through to open the disconnect.
Interrupter	<ol style="list-style-type: none"> 1. Check for low gas pressure (red indicator) 2. Check tightness of fasteners on current-carrying parts.

TABLE CONTINUED →



RECOMMENDED INSPECTION PROCEDURES — Continued

TABLE II—RECOMMENDED INSPECTION PROCEDURES FOR S&C CIRCUIT-SWITCHER COMPONENTS—
Continued

Component	Inspection Procedures
Disconnect Live Parts	<ol style="list-style-type: none"> 1 Check for evidence of damage, excessive corrosion, or wear—especially at the fault-closing contacts and current-carrying contacts. Replace current-carrying jaw contacts if the silver-alloy inserts on two or more contact fingers are worn to the extent that the blade tongue contact engages the full width of the contact finger. 2 Check tightness of fasteners on current-carrying parts. 3 Observe operation during slow, manual cranking using the switch operator manual operating handle. Check for proper contact alignment. 4 Lubricate the contact surfaces with an appropriate lubricant, such as Shell Darina EP2.
Pre-insertion Inductor	<ol style="list-style-type: none"> 1 Touch up exterior finish of inductor windings with an appropriate silicone-alkyd paint, such as ALMA AP-9753. 2 Check arcing-arm assemblies for proper setting and for evidence of damage and excessive corrosion or wear.
Pre-insertion Resistor	<ol style="list-style-type: none"> 1 Check resistance of assembly. If it measures more than $\pm 20\%$ of original value, contact the nearest S&C Sales Office. 2 Check that pressure-relief plug is present and aligned with opening in resistor mounting bracket or mounting adapter. If pressure-relief plug is not present or is not aligned with opening, contact the nearest S&C Sales Office. 3 Check arcing-arm assemblies for proper setting and for evidence of damage and excessive corrosion or wear.
Grounding Switch	<ol style="list-style-type: none"> 1 Check for evidence of damage, excessive corrosion, or wear—especially at the jaw-contact members. 2 Check tightness of fasteners on current-carrying parts. 3 Observe operation using manual operating handle. Check for proper contact alignment. 4 Lubricate the contact surfaces with an appropriate lubricant, such as Shell Darina EP2.