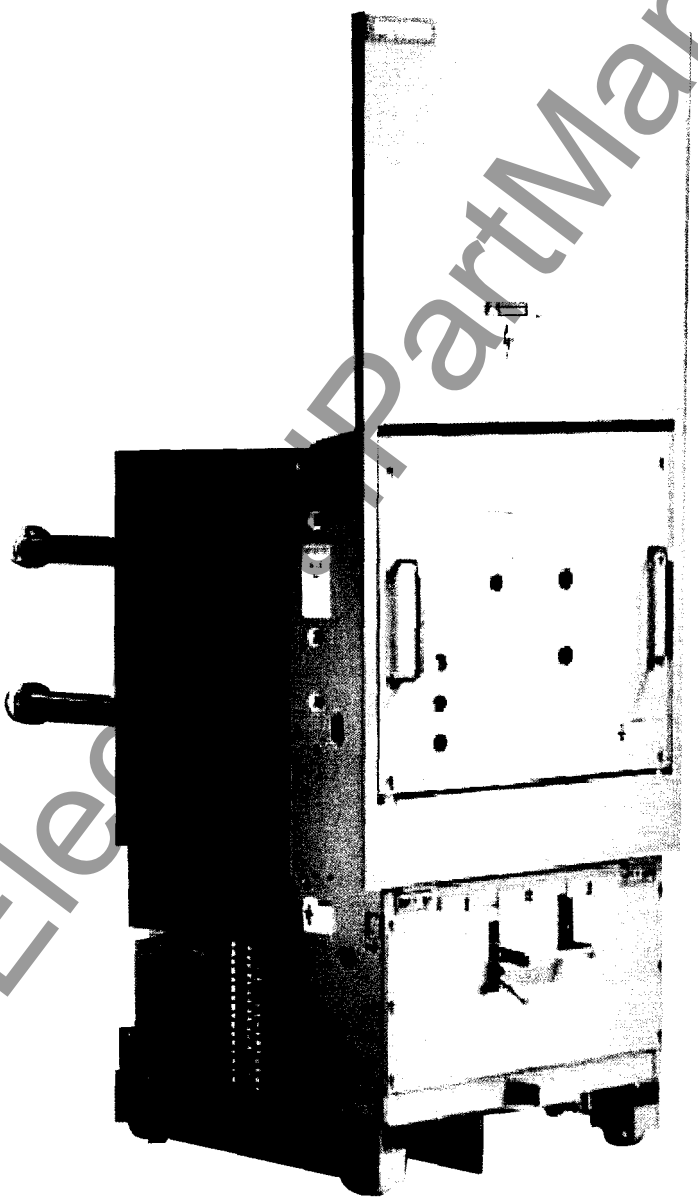
SIEMENS

Vacuum Circuit Breakers (Vehicle)

Type FSV 5kV to 15kV

Instructions
Installation
Operation
Maintenance
SGIM-9968A



⚠ DANGER

Hazardous voltages and high-speed moving parts.

Will cause death, serious injury or equipment damage.

De-energize and ground the equipment before maintenance. Maintenance should be performed only by qualified personnel.

The use of unauthorized parts should not be used in the repair of the equipment.

Follow all safety instructions contained herein.

IMPORTANT

The information contained herein is general in nature and not intended for specific application purposes. It does not relieve the user of responsibility to use sound practices in application, installation, operation, and maintenance of the equipment purchased. Siemens reserves the right to make changes in the specifications shown herein or to make improvements at any time without notice or obligations. Should a conflict arise between the general information contained in this publication and the contents of drawings or supplementary material or both, the latter shall take precedence.

QUALIFIED PERSON

For the purpose of this manual a qualified person is one who is familiar with the installation, construction or operation of the equipment and the hazards involved. In addition, this person has the following qualifications:

(a) **is trained and authorized** to de-energize, clear, ground, and tag circuits and equipment in accordance with established safety practices.

(b) **is trained** in the proper care and use of protective equipment such as rubber gloves, hard hat, safety glasses or face shields, flash clothing, etc., in accordance with established safety practices.

(c) **is trained** in rendering first aid.

SUMMARY

These instructions do not purport to cover all details or variations in equipment, nor to provide for every possible contingency to be met in connection with installation, operation, or maintenance. Should further information be desired or should particular problems arise which are not covered sufficiently for the purchaser's purposes, the matter should be referred to the local sales office.

The contents of this instruction manual shall not become part of or modify any prior or existing agreement, commitment or relationship. The sales contract contains the entire obligation of Siemens Energy, Inc. The warranty contained in the contract between the parties is the sole warranty of Siemens Energy, Inc. Any statements contained herein do not create new warranties or modify the existing warranty.

Vacuum Circuit Breakers (Vehicle)

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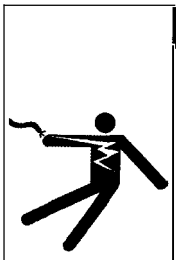
Introduction and Safety

Introduction
The FSV family of vacuum circuit breakers is designed to meet all the applicable ANSI, NEMA and IEEE standards. Successful application and operation of this equipment depends as much upon proper installation and maintenance by the user as it does upon the careful design and fabrication by Siemens.

The purpose of this Instruction Manual is to assist the user in developing safe and efficient procedures for the installation, maintenance and use of the equipment.

Contact the nearest Siemens representative if any additional information is desired.



⚠ DANGER

Hazardous voltages and high-speed moving parts.

Will cause death, serious injury or property damage.

Only qualified persons thoroughly familiar with the equipment, instruction manuals and drawings should install, operate and/or maintain this equipment.

Qualified Person
For the purpose of this manual a Qualified Person is one who is familiar with the installation, construction or operation of the equipment and the hazards involved. In addition, this person has the following qualifications:

- Training and authorization to energize, de-energize, clear, ground and tag circuits and equipment in accordance with established safety practices.
- Training in the proper care and use of protective equipment such as rubber gloves, hard hat, safety glasses, face shields, flash clothing, etc., in accordance with established safety procedures.
- Training in rendering first aid.

Signal Words
The signal words "Danger," "Warning" and "Caution" used in this manual indicate the degree of hazard that may be encountered by the user. These words are defined as:

Danger - Indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury.

Warning - Indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.

Caution - indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury.

Dangerous Procedures
In addition to other procedures described in this manual as dangerous, user personnel must adhere to the following:

1. Always work on de-energized equipment. Always de-energize a circuit breaker, and remove it from the switchgear before performing any tests, maintenance or repair.
2. Always perform maintenance on the circuit breaker after the spring-charged mechanisms are discharged.
3. Always let an interlock device or safety mechanism perform its function without forcing or defeating the device.

Field Service Operation
Siemens can provide competent, well-trained Field Service Representatives to provide technical guidance and advisory assistance for the installation, overhaul, repair and maintenance of Siemens equipment, processes and systems. Contact regional service centers, sales offices or the factory for details, or telephone Siemens Field Service at 1-800-241-4453.

Receiving, Handling and Storage

Introduction
This manual covers the Receiving, Handling and Storage instructions for vacuum circuit breakers shipped separately from the switchgear. This section of the manual is intended to help the user identify, inspect and protect the circuit breaker prior to its installation.

Receiving Procedure
Make a physical inspection of the shipping container before removing or unpacking the circuit breaker. Check for shipment damage or indications of rough handling by the carrier. Check each item against the manifest to identify any shortages.

Accessories such as the manual charging crank, the racking crank and the split plug jumper are shipped separately.

Shipping Damage Claims (when applicable) - Follow normal shipment damage procedures, which should include:

1. Check for visible damage upon arrival.

2. Visible damage must be noted on delivery receipt, and acknowledged with driver's signature. Notation, "Possible internal damage, subject to inspection" must be on delivery receipt.

3. Notify the Siemens Sales office immediately of any shipment damage.

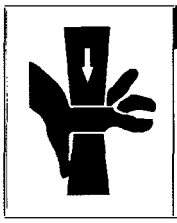
4. Arrange for carrier's inspection. Do not move the unit from its unloading point.

Handling Procedure

1. Carefully remove the shipping carton from the circuit breaker. Keep the shipping pallet for later use if the breaker is to be stored prior to its installation.

2. Inspect for concealed damage. Notification to carrier must take place within 15 days to assure prompt resolution of claims.

3. Each circuit breaker should be appropriately lifted, using lifting sling rated for at least 2,000 lbs. The circuit breaker shall be lifted by Upper "B" phase post insulator.



⚠WARNING

Heavy weight. Can cause death, serious injury, or property damage.

Use of a qualified rigger to hoist the circuit breaker.

4. The palleted circuit breaker can also be moved using a properly rated fork-lift vehicle. The pallets are designed for movement by a standard fork-lift vehicle.

Storage Procedure

1. When the circuit breaker will be placed on its pallet for storage, be sure the unit is securely bolted to the pallet and covered with polyethylene film at least 10 mils thick.

Indoor Storage - Whenever possible, store the circuit breaker indoors. The storage environment must be clean, dry and free of such items as construction dust, corrosive atmosphere, mechanical abuse and rapid temperature variations.

Outdoor Storage - Outdoor storage is not recommended. When no other option is available, the circuit breaker must be completely covered and protected from rain, snow, dirt and all other contaminants.

Space Heating - Space heating must be used for **both indoor and outdoor** storage to prevent condensation and corrosion. When stored outdoors, 250 watts per circuit breaker of space heating is recommended.

Vehicle Function and Operational Interlocks
Type FSV vacuum circuit breakers are comprised of the interrupter/operator module fitted to a vehicle. This interrupter/operator module is an integral arrangement of operating mechanism, dielectric system, vacuum interrupters, and means of connecting the primary circuit. The vehicle supports the interrupter/operator module, providing mobility and fully coordinated application in Siemens type "F" switchgear.

This manual should be used jointly with the Circuit Breaker Operator manual, SGIM-9918.

Alignment
All aspects of the circuit breaker structure which impact alignment and interchangeability are checked at the factory. Field adjustment will not normally be required, but variations in existing switchgear may require field adjustment.

⚠DANGER

Hazardous voltages and high-speed moving parts. Will cause death, serious injury, and property damage.

De-energize before working on this equipment.

Do not bypass interlocks or otherwise make interlocks inoperative.

Elements of the vehicle structure, which are assembled under fixture control and then are secured and pinned in place, include the following (no adjustments are required):

- Side channels which provide support to the interrupter/operator sub-assembly are fixtured square (90) to the wheel axle holes in the vehicles base.
- The primary circuit conductors are fixtured to appropriate elevation, phase spacing and alignment to the inside surface of the guide bar. The guide bar, is set in the fixture firmly secured and then pinned in place.
- Secondary disconnects are fixtured and pinned in place.
- Shutter cam which raises and lowers protective primary bushing barriers, is fixtured firmly secured and pinned.
- Circuit breaker grounding contacts, are aligned and securely bolted in place.
- Closing spring discharge roller is located and secured.
- The hinged protective barrier is aligned, adjusted vertically and then pinned in place.

Thus, all those features which must align with elements of the switchgear "draw out" enclosure, are precisely set, firmly secured and pinned while the complete circuit breaker is located in a rigid fixture.

Recommended Tools

- Racking Crank: Original circuit breaker racking crank may be used.

Interlocks

⚠DANGER

Inoperative or bypassed interlocks will cause death, serious personal injury and property damage.

Mechanical and electrical interlocks are provided as integral components of this equipment to ensure safe use. Interlocks must be in operation at all times. Read this instruction manual. Know and understand correct interlock function. Check interlock function prior to inserting circuit breaker into switchgear cubicle.

Circuit Breaker Racking Interlock (Lever Type)

Reference: **Figure 1**

The racking interlock functions to block movement of the circuit breaker from the connected or test positions whenever the circuit breaker is closed, and to maintain the circuit breakers mechanism in a "trip free" state whenever the circuit breaker is "released."

- The circuit breaker is **closed** whenever the primary circuit is completed through the vacuum interrupter contacts. This closed condition is caused by rotation of the circuit breaker shaft, to the position shown in **Figure 1**.
- The circuit breaker is released (free to rack) when the plunger shown in **Figure 1** is elevated sufficiently to clear the slot in the cubicle rail.

Function of the closed circuit breaker racking release is initiated by elevating the racking release handle. This action causes the interlock bell crank (1) to attempt CCW rotation. If the circuit breaker were closed, the bell crank will rotate incrementally causing the "push rod" (2) to rise through the action of the bell crank (1) and the link (3). This action will be immediately blocked, because the push rod (2) is blocked by the circuit breaker shaft mounted interlock lever (4). With motion blocked after this short movement, it is not possible to raise the plunger above the cubicle rail. **Thus, The Circuit Breaker Can Not Be Released For Racking When The Primary Contacts Are Closed.**

If the circuit breakers primary contacts were open, the circuit breaker shaft interlock lever will have rotated allowing the push rod (2) to rise freely.

As the push rod rises, its "mushroom" headed appendage, within the circuit breakers mechanism enclosure, causes the "interlock" levers to rotate, elevating the "trip free push rod and cam." This cam encounters the "trip latch lever," and after typically 8 to 12mm (0.3 to 0.5 inches) of motion forces the mechanism, through the "trip latch lever," to the "trip free" state shown in **Figure 2.**

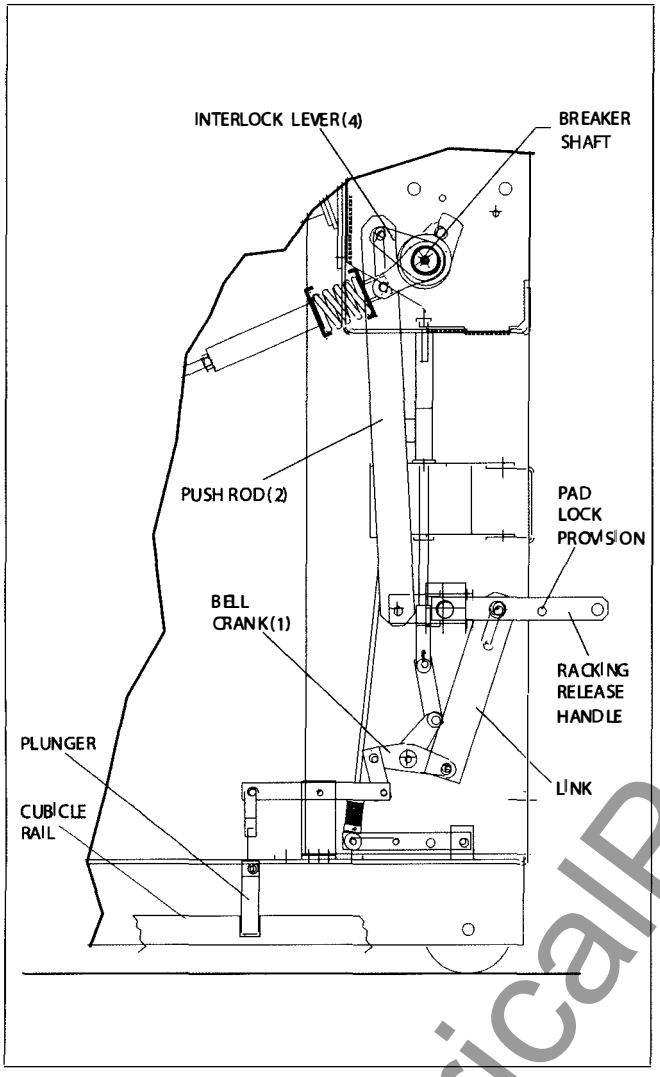


Figure 1.
Details of Closed Circuit Breaker Racking Interlock

Continued full CCW rotation of the interlock bell crank causes the plunger to clear the cubicle rail allowing the "open trip free circuit breaker" to be moved from the connected position.

The lower interlock bell crank is returned to the plunger engaged position, fully clockwise, by the action of double torsion springs at each end of the bell crank. It is stopped and maintained in the position which ensures full plunger engagement by a spring pin of sufficient length at the top of the plunger which straddles the guide bar and guiding channel.

The circuit breaker may be pad locked in an "open trip-free" state. Provision have been made for looping a padlock through the "racking release handle" and a stationary cover mounted angle. The position of the racking release handle at the point of padlock hole alignment ensures that the circuit breaker is trip-free yet the plunger engages the rail, preventing circuit breaker movement.

Circuit Breaker Racking Interlock (Screw Type)

Reference: **Figure 1**

The racking interlock functions to maintain the circuit breaker mechanism in a "trip free" state whenever the circuit breaker is "released."

- The circuit breaker is closed whenever the primary circuit is completed through the vacuum interrupter contacts. This closed condition is caused by rotation of the circuit breaker shaft, to the position shown in **Figure 1**.
- The circuit breaker is released (free to rack) when the plunger shown in **Figure 1** is elevated sufficiently to clear the slot in the cubicle rail.

Function of the closed circuit breaker racking release is initiated by elevating the racking release handle. This action causes the interlock bell crank (1) to rotate CCW. The bell crank will rotate causing the "push rod" (2) to rise through the action of the bell crank (1) and the link (3).

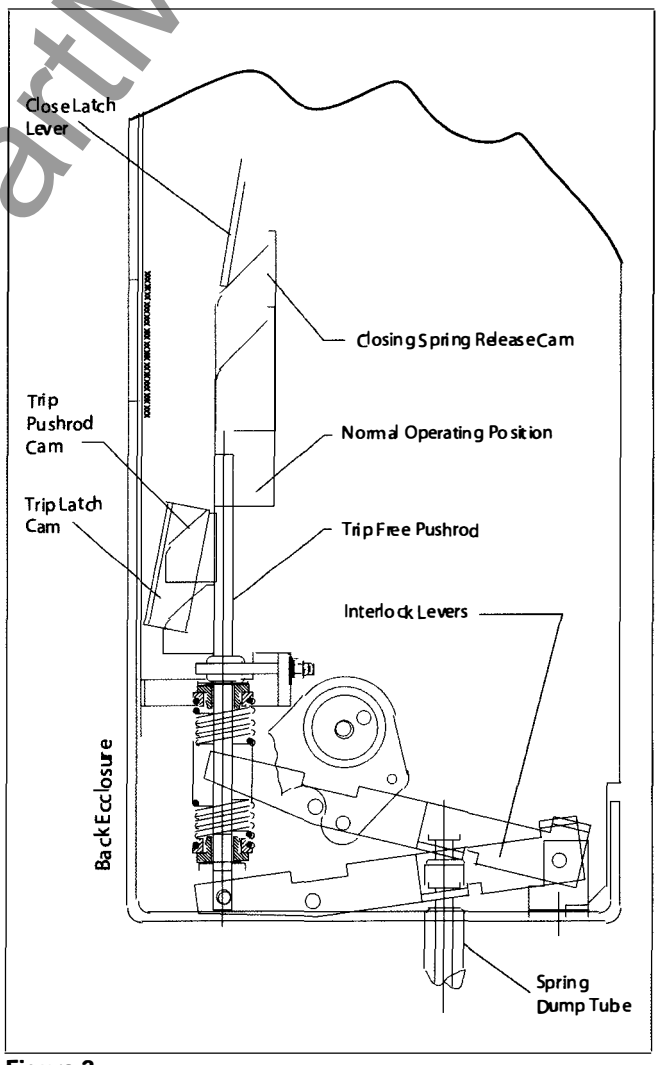


Figure 2.
Details of Closed Circuit Breaker Racking Interlock Internal to Mechanism Enclosure

As the push rod rises, its "mushroom" headed appendage, within the circuit breaker mechanism enclosure, causes the "interlock" levers to rotate, elevating the "trip free push rod and cam." This cam encounters the "trip latch lever," and after typically 8 to 12mm (0.3 to 0.5 inches) of motion forces the mechanism, through the "trip latch lever," and coupled "trip latch" to an opened and "trip free" condition shown in **Figure 2**.

Continued full CCW rotation of the interlock bell crank causes the plunger to clear the cubicle rail allowing the "open trip free breaker" to be moved from the connected position.

The lower interlock bell crank is returned to the plunger engaged position, fully clockwise, by the action of double torsion springs at each end of the bell crank. It is stopped and maintained in the position which ensures full plunger engagement by a spring pin of sufficient length at the top of the plunger which straddles the guide bar and guiding channel.

The circuit breaker may be pad locked in an "open trip-free" state. Provision has been made for looping a padlock through the "racking release handle" and a stationary cover mounted angle. The position of the racking release handle at the point of padlock hole alignment ensures the circuit breaker is trip-free yet the plunger engages the rail preventing breaker movement.

Plunger Position Mechanical Interlock

In order to prevent the motor charging circuit from "making and breaking" as the circuit breaker and cubicle secondaries make or break physical contact, an electrical switch is provided. This switch is mounted within the connection box, and is operated by a lever attached to a member on the interlock bell crank. The switch is adjusted to ensure the circuit breaker charging circuit is made up before the racking plunger achieves full engagement. Typically, the plunger will be 51mm (2 inches) off the floor when this switch makes the circuit.

Automatic Closing Spring Release

Reference: **Figures 2 & 3**

The automatic closing spring release feature is provided to ensure all spring energy has been discharged in the mechanism prior to the circuit breaker removal from the cubicle. The opening springs are discharged prior to the circuit breaker release for racking, and since automatic closing spring discharge occurs while the circuit breaker is trip free and its charging circuit is opened, we can be assured all spring energy has been released as the circuit breaker exits the cubicle.

Reference to **Figure 3** reveals the essential elements of this system. As the circuit breaker exits the cubicle, the roller encounters an actuating angle in the floor of the cubicle. As the roller strikes the angle it must rise, and this change in elevation is amplified through a lever and fulcrum arrangement located above the roller. Movement of the roller from a typical free height of 65mm (2.56 inches) to 74mm (2.91 inches) must produce approximately 20mm (0.75 inches) of vertical motion at the "spring dump tube."

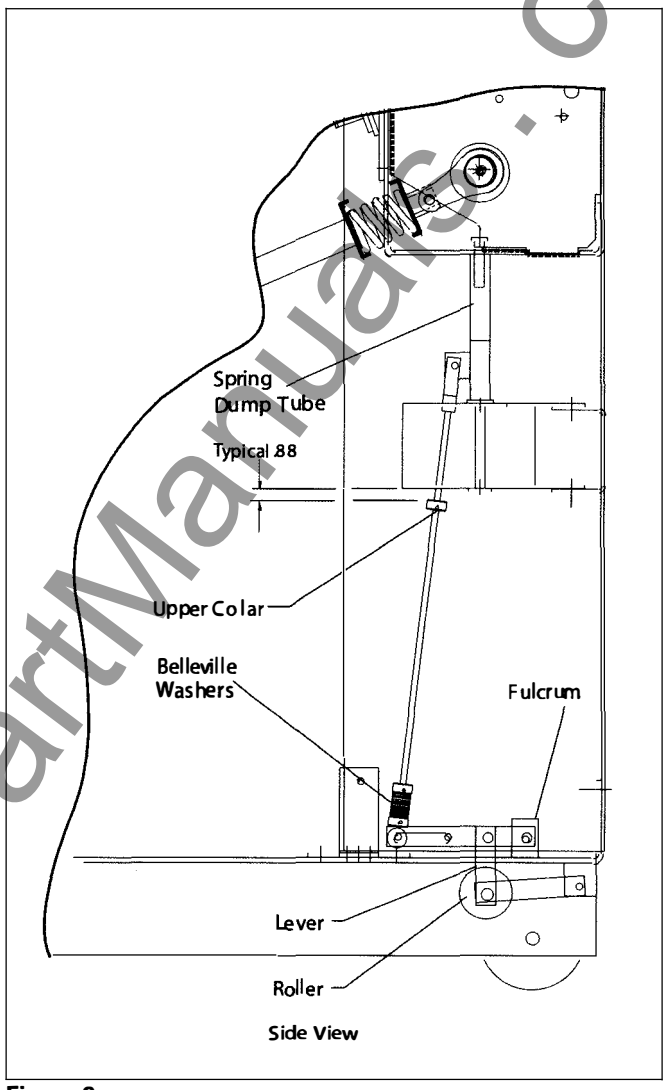


Figure 3.
Details of Automatic Closing Spring Discharge System

Reference to **Figure 2** shows the spring dump tube telescoping the trip free push rod, and thus the spring dump tube is able to move against the mechanism interlock levers independently of the trip free function. As the dump roller approaches the actuating angle the trip free rod will be elevated, holding the mechanism trip free. When the roller strikes the actuating angle, it overtakes the trip free push rod and moves beyond the trip free position. This action is allowed because the "mushroom" tip at the top of the trip push rod is not attached to this push rod, but simply "floats" above it, captured by the mechanisms interlocking levers.

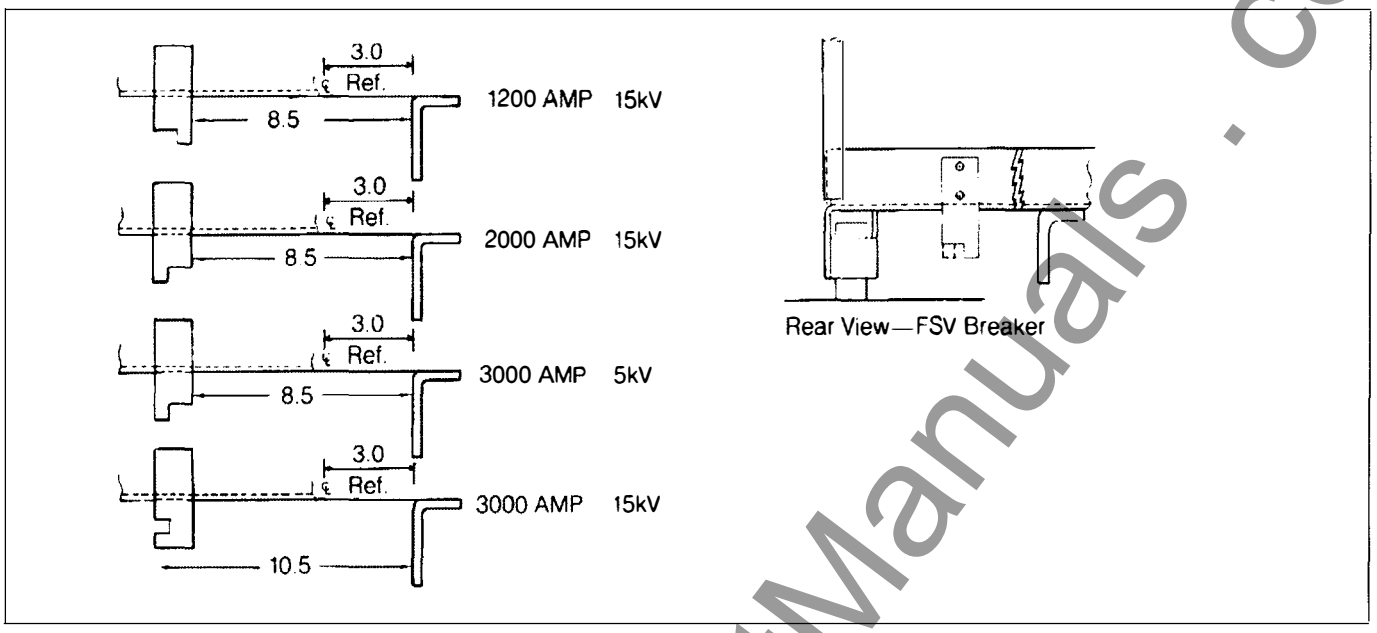


Figure 4. 1200, 2000, and 3000 Amp Continuous Current Interlock Orientation

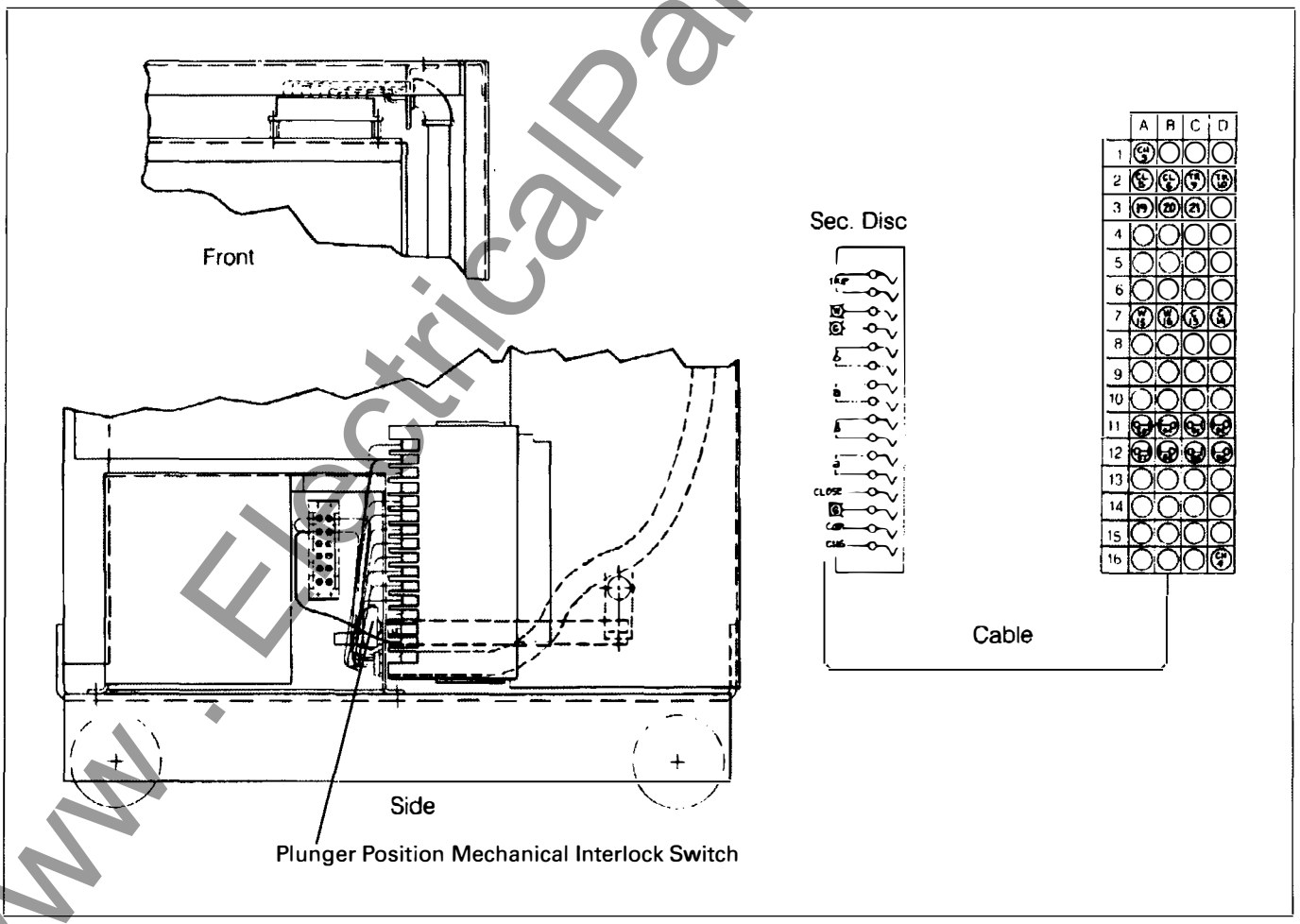


Figure 5. Control Cable Connection Detail

The spring dump tube now more fully elevates the mechanisms trip push rod cam and closing spring release cam (each attached to the same push rod). The spring release cam contacts and displaces the close latch lever causing release of the closing springs into a trip free mechanism. Thus all spring energy is discharged as the circuit breaker leaves the cubicle.

The spring dump roller must now overtravel the structural actuating angle and not be allowed any further elevation. The spring dump push rod accommodates this overtravel by employing a number of collars and bellville washers.The upper most collar is fixed and provides a definite stop after approximately (0.88 inches) displacement. The additional motion of rollers and levers required to complete overtravel is allowed by compression of the bellville washers. The collar immediately above the belleville washers is fixed, and the one below free to slide.

Continuous Current Interlock

Reference **Figure 4**

The continuous current interlock functions to ensure breakers and cubicles of like continuous rating are applied, and that circuit breakers with dissimilar continuous current ratings are excluded from cubicles of unlike current ratings.

Figure 4 provides detail necessary to determine continuous current ratings and appropriate interlock orientation.

Control Cable and Connection Box

The FSV type circuit breakers employ a plug-in-cable which completes all standard circuit breaker electrical connections between the mechanism housing and the vehicles secondary disconnects. **Figure 5** provides the detail of the cables wiring and a typical schematic diagram.

The wiring from this cable is terminated at a connection box which provides a convenient and versatile means of accommodating various control options and modes of common sourcing while maintaining a common circuit breaker enclosure wiring diagram.

Devices which will be mounted in the connection box include:

- Plunger Position Mechanical Interlock Switch
- Terminal Blocks
- CapacitorTrip (Optional)

Insulating Barriers

Insulating barriers are required for use on type FSV circuit breakers.

Interphase and exterior barriers are removed or inserted by sliding them in the vertical channels.

Type FSV circuit breakers require a full compliment of two exterior and two interphase barriers.

Front Hinged Panel, Type FSV

Reference **Figure 6.**

The FSV circuit breaker employs a hinged front panel which is spring loaded to seek a vertical position. Helical extension springs maintain tension in aramid fiber cords which are trained over guides to apply a horizontal pull on the front panel towards the rear of the circuit breaker.

If the front panel fails to move easily and freely against the spring tension. DO NOT FORCE. STOP! Examine aramid cord to ensure it is aligned over each of two guides.Tensioned cords are applied symmetrically to each side of the front panel. Helical springs may be accessed by removing the front lower panel of the circuit breaker.

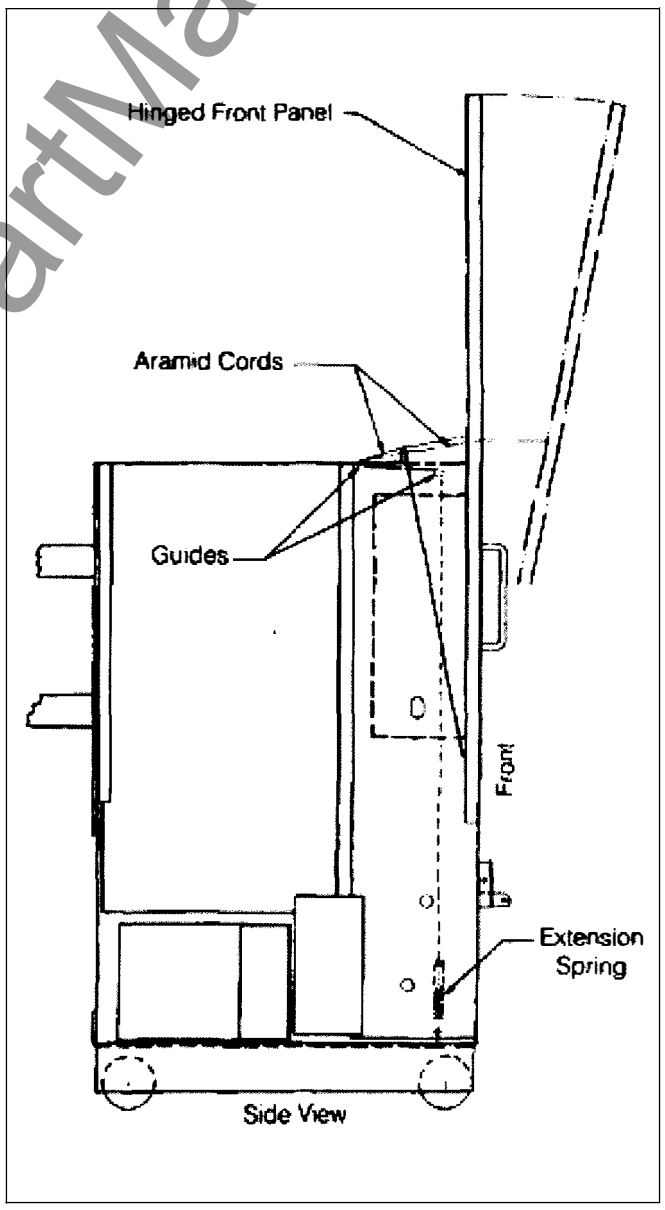


Figure 6. Hinged Front Panel

Introduction and Maintenance Intervals
Periodic inspections and maintenance are essential to obtain safe and reliable operation of the circuit breaker as well as the switchgear.

⚠ DANGER

Hazardous voltages and high-speed moving parts.

Will cause death, personal injury, and property damage.

De-energize before working on this equipment.

Read instruction manuals, observe safety instructions, and limit use to qualified personnel.

When circuit breakers and/or the switchgear are operated under "Usual Service Conditions," maintenance and lubrication is recommended at ten year intervals or at the number of operations indicated in **Table 2**. "Usual" and "Unusual" service conditions for Medium Voltage Metal-Clad Switchgear are defined in ANSI C37.20.2, section 8.1. Generally, "usual service conditions" are defined as an environment in which the equipment is not exposed to excessive dust, acid fumes, damaging chemicals, salt air, rapid or frequent changes in temperature, vibration, high humidity, and extremes of temperature.

The definition of "usual service conditions" is subject to a variety of interpretations. Because of this, you are best served by adjusting maintenance and lubrication intervals based on your experience with the equipment in the actual service environment.

Regardless of the length of the maintenance and lubrication interval, **Siemens recommends that circuit breakers and switchgear should be inspected and exercised annually.**

Recommended Maintenance and Lubrication
Periodic maintenance and lubrication should include all the tasks shown in **Table 1**. Recommended procedures for each of the listed tasks are provided in this section of the manual.

⚠ WARNING

Failure to properly maintain the equipment could result in death, serious injury or product failure, and can prevent successful functioning of connected apparatus.

Instructions should be carefully reviewed, understood, and followed.

The maintenance tasks in **Table 1** must be performed regularly.

Table 1: Maintenance Tasks

- Checks of the primary power path
- Cleanliness check
- Primary disconnect contact cleanliness and lubrication
- Fastener check
- Wiring and terminals check
- Secondary disconnect check
- Automatic spring charging interlock system check
- Electrical close and trip check
- High potential test
- Insulation test
- Inspection and cleaning of insulation
- Functional tests
- Racking mechanism cleanliness and lubrication
- MOC Actuator System inspection and lubrication
- Electrical control checks
- Circuit Breaker Operator tasks as detailed in manual SGIM-9918.

The list of tasks in **Table 1** does not represent an exhaustive survey of maintenance steps necessary to ensure safe operation of the equipment. Particular applications may require further procedures. Should further information be desired or should particular problems arise which are not covered sufficiently for the Purchaser's purposes, the matter should be referred to the local Siemens sales office.

⚠ DANGER

The use of unauthorized parts in the repair of the equipment, or tampering by unqualified personnel will result in dangerous conditions which will cause death, serious injury or equipment damage.

Follow all safety instructions contained herein.

Removal from Switchgear
Prior to performing any inspection or maintenance checks or tests, the circuit breaker must be removed from the switchgear. The Installation and Initial Functional Tests section describes the removal procedure in detail. Principal steps are repeated here for information and guidance, but without the details of the preceding section.

1. The first step is to de-energize the circuit breaker. Pressing the black Trip pushbutton opens the circuit breaker prior to removal from the switchgear (Refer to Circuit Breaker Operator / Manual SGIM-9918.

2. The second step in the removal procedure is to de-energize control power to the circuit breaker. Open the control power disconnect device.

3. Rack the breaker to the "DISCONNECT" position.

4. Perform the spring discharge check. This is done by first pressing the red Trip pushbutton. Second, press the black Close pushbutton. Third, press the red Trip pushbutton again, and observe the spring condition indicator. It should read Discharge (Refer to Circuit Breaker Operator / Manual SGIM-9918.

5. Remove the circuit breaker from the switchgear.

Checks of the Primary Power Path
The primary power path consists of the three vacuum interrupters, the three upper and the three lower primary disconnects. These components are checked for cleanliness and condition **(Figure 7)**. The vacuum interrupters are discussed in the Circuit Breaker Operator Manual SGIM-9918.

Note: Maximum Contact Resistance is read from primary bus stab to primary bus stab with primary disconnects removed. A value of 13 micro-ohms should be added to the maximum contact resistance specified in Circuit Breaker Operator Manual SGIM-9918.

Cleanliness Check
Figure 7 is a side view of the Circuit Breaker with the insulating barriers removed to show the vacuum interrupter, and the upper and lower primary disconnects.

All of these components must be clean and free of dirt or foreign objects. Use a dry lint-free cloth. For stubborn dirt, use a clean cloth saturated with denatured alcohol (except for the vacuum interrupters). For stubborn dirt on a vacuum interrupter use a damp cloth and then thoroughly dry using a dry lint-free cloth.

The phase barriers are plates of glass polyester insulating material and attached to the circuit breaker to provide suitable electrical insulation between the vacuum interrupter primary circuits and the switchgear.

Always re-install the phase barriers carefully to the original location prior to inserting the circuit breaker into the switchgear.

Primary Disconnects

Reference **Figure 7.**
When the contacts are mated with the switchgear's primary stud assembly, there is forceful contact distributed over a wide area. This maintains low current flow per individual contact finger.

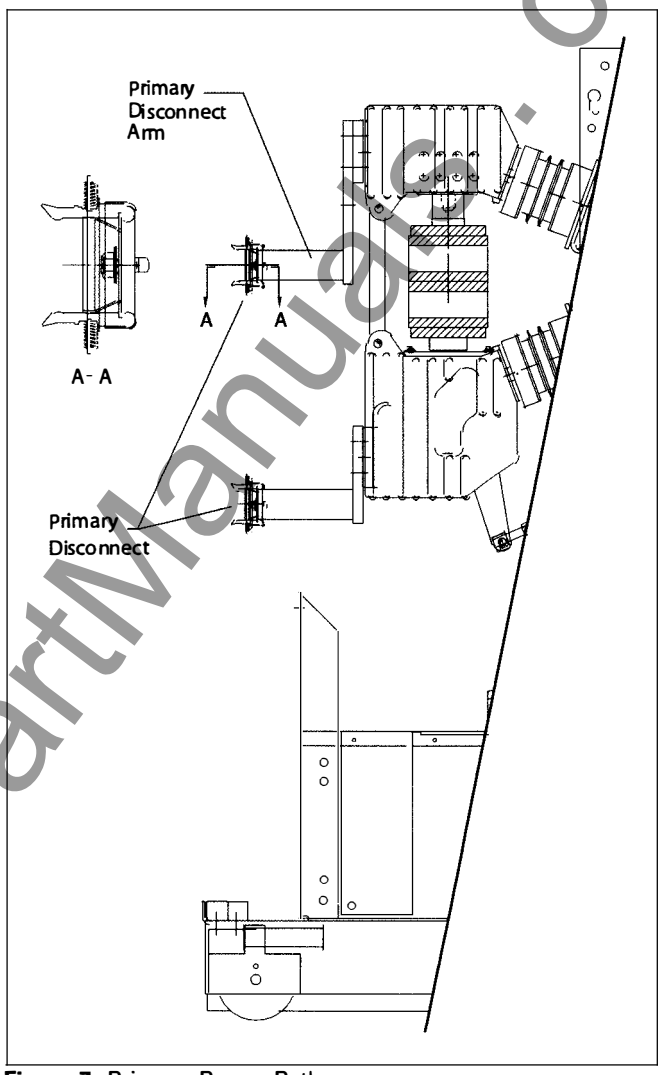


Figure 7. Primary Power Path

Inspect the contact fingers for any evidence of burning or pitting that would indicate weakness of the contact finger springs.

Inspect the primary disconnect arms for physical integrity and absence of mechanical damage.

Inspect the flexible connectors that connect the bottom movable contacts of the vacuum interrupters to the lower primary disconnect arms for tightness and absence of mechanical damage, burning, or pitting.

Using a clean cloth saturated with denatured alcohol, clean old lubricant from primary disconnects, and apply Siemens contact lubricant (reference 15-172-791-214) in a very thin layer.

Fastener Check
Inspect all fasteners for tightness. Both lock-nuts and retaining rings are used. Replace any fasteners that appear to have been frequently removed and replaced.

Racking Mechanism
Racking mechanism is to be wiped clean, and lubricant applied on sliding, rotating, and articulating surfaces.

MOC Actuator System
Reference **Figure 8.**
MOC Actuator System should be inspected — refer to **Table 2**, "Periodical Maintenance and Lubrication Tasks."

Maintenance of the circuit breaker MOC actuator system DOES NOT mitigate the requirement to maintain cubicle mounted MOC system components. These shall be maintained in accordance with the original equipment manufacturer's recommendations.

Electrical Control Checks

Check of the Wiring and Terminals

1. Physically check all of the switchgear wiring for evidence of abrasion, cuts, burning or mechanical damage.
2. Check all terminals to be certain they are solidly attached to their respective device.

Electrical Close and Trip Check (Control Power Required)
A check of the circuit breaker control circuits shall be performed. This check is made with the circuit breaker energized by control power either from the switchgear or an external control power source.

1. Once the circuit breaker springs are charged, move the switchgear Close/Trip switch to the Close position. There should be both the sound of the circuit breaker closing and indication that the circuit breaker contacts are closed by the main contact status indicator.
2. As soon as the circuit breaker has closed, the automatic spring charging process is repeated.
3. After a satisfactory close operation is verified, move the switchgear Close/Trip switch to the Trip position. Verify by both sound and contact position that the contacts are open.
4. After a satisfactory open operation is verified, hold the circuit breaker manual Trip button and apply and maintain an electrical close signal. The circuit breaker should close, immediately trip, the close spring should charge, and the circuit breaker should not attempt to close.

Completion of these checks demonstrates satisfactory operation of auxiliary switches, internal relays and solenoids.

Table 2. Periodic Maintenance and Lubrication Tasks

Sub-Assembly	Item	Inspect For	Lubrication Interval
Primary Power Path	Primary Disconnects	1. Burnt or damaged fingers 2. Lubrication of contact surfaces.	10 years 100 racking operations
		3. Tightness of nuts (torque 1/2" Grade 5 bus hardware to 50 ft.-lbs.) and other locking devices.	10 years or 10,000 operations
Electrical Controls	Wiring	1. Mechanical damage or abrasion	
	Terminals and Connectors	1. Tightness and absence of mechanical damage	
	Close and Trip Solenoids, Anti-Pump Relay, Auxiliary Switches, Secondary Disconnect	1. Automatic charging 2. Close and trip with control power	
High Potential Test	Primary Circuit to Ground and between Primary Disconnects	1. 60 second withstand, refer to Circuit Breaker Operator Manual SGIM-9918 for ratings.	
	Control Circuit to Ground	1. 60 second withstand, refer to Circuit Breaker Operator Manual SGIM-9918.	
Insulation	Barriers and all Insulating Components	1. Cleanliness 2. Cracking, crazing, tracking, or other sign of deterioration	
Interrupter Operator Mechanism	Refer to Circuit Breaker Operator Manual.		
Racking Mechanism and Interlocking System		1. Cleanliness 2. Lubrication of sliding, rotating, and articulating surfaces. Apply Klueber Isoflex Topas L32 (part number 3AX11333H), Anderol 732 aerosol synthetic fluid grease (part number 15-172-816-058) or Beacon #325 (part number 15-337-131-001).	10 years or 100 racking operations
MOC Actuator System (Refer Figure 8)	1. Excessive wear and/or mechanical damage on components or any mechanical joints. 2. Loose hardware.		10 years or 2,000 operations

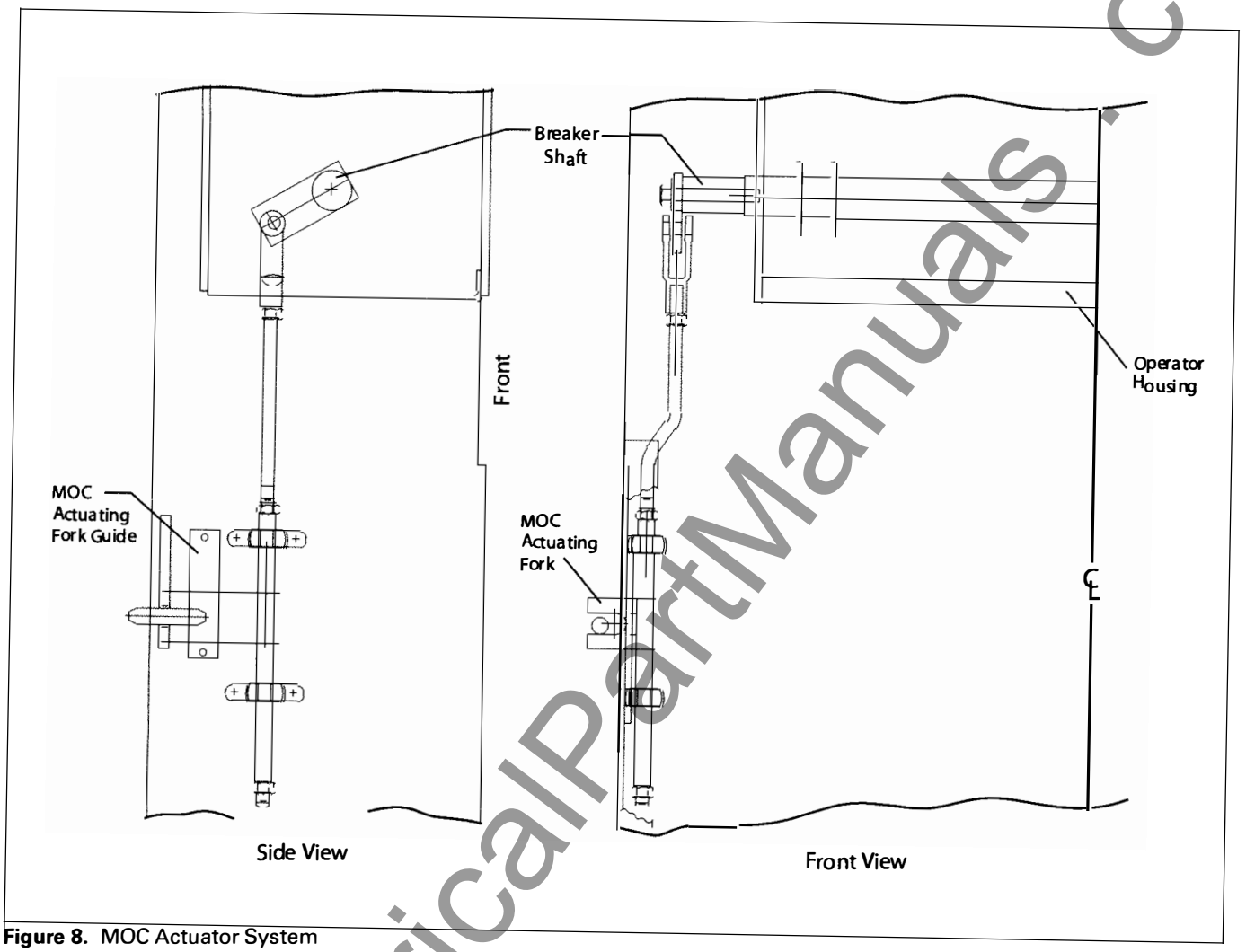


Figure 8. MOC Actuator System

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SGIM-9968A (2-2009) Printed in U.S.A. ♻