



DESCRIPTION • INSTALLATION • MAINTENANCE

# INSTRUCTIONS

## INERTEEN® AND OIL INSULATED FEEDER SWITCHES

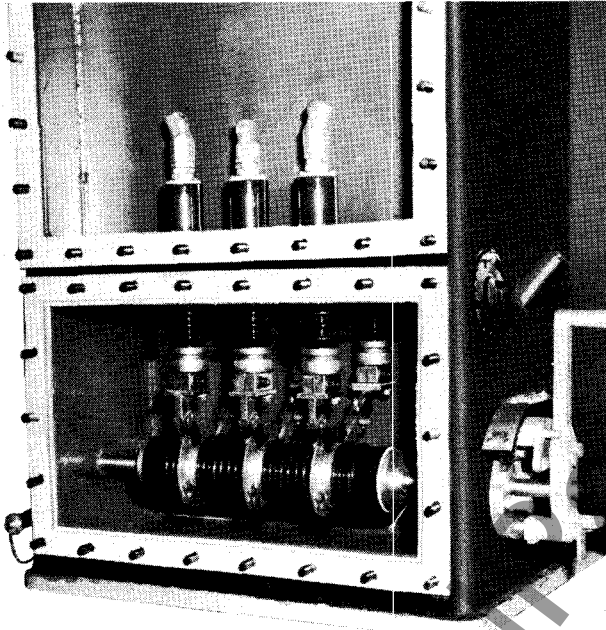


FIG. 1. Rotary Switch in Transformer Position.

**THE INERTEEN AND OIL INSULATED FEEDER SWITCH** provides complete switching facilities in a minimum space. The switch, immersed in oil or Inerteen, is mounted on and becomes an integral part of the transformer. It will not interrupt load current but may be adapted to interrupt the transformer exciting current.

In the "ground" position the switch will withstand a short circuit current of 15,000 amperes for five seconds without any appreciable movement of the contacts. The switch is adaptable to many types of feeder distribution systems and uses such as: the radial feeder system in which a two-position switch is required (open and transformer); the double radial feeder where it is desired to select

one of two feeders; a three-position switch (open-transformer-ground) to ground the feeder for repair.

### DESCRIPTION

The switch is the rotary type and consists of a porcelain insulating tube keyed at both ends to a stainless steel operating shaft. A disc segment with button-type contacts is babitted on the porcelain tube.

The disk segment slides in a button-type contact mounted on the outlet or line bushing and makes contact through the entire range of travel of the drum. See Fig. 1.

The button-type contact mounted on the rotating drum makes contact with the transformer bushing and the ground bushing which are arranged on the arc of a circle.

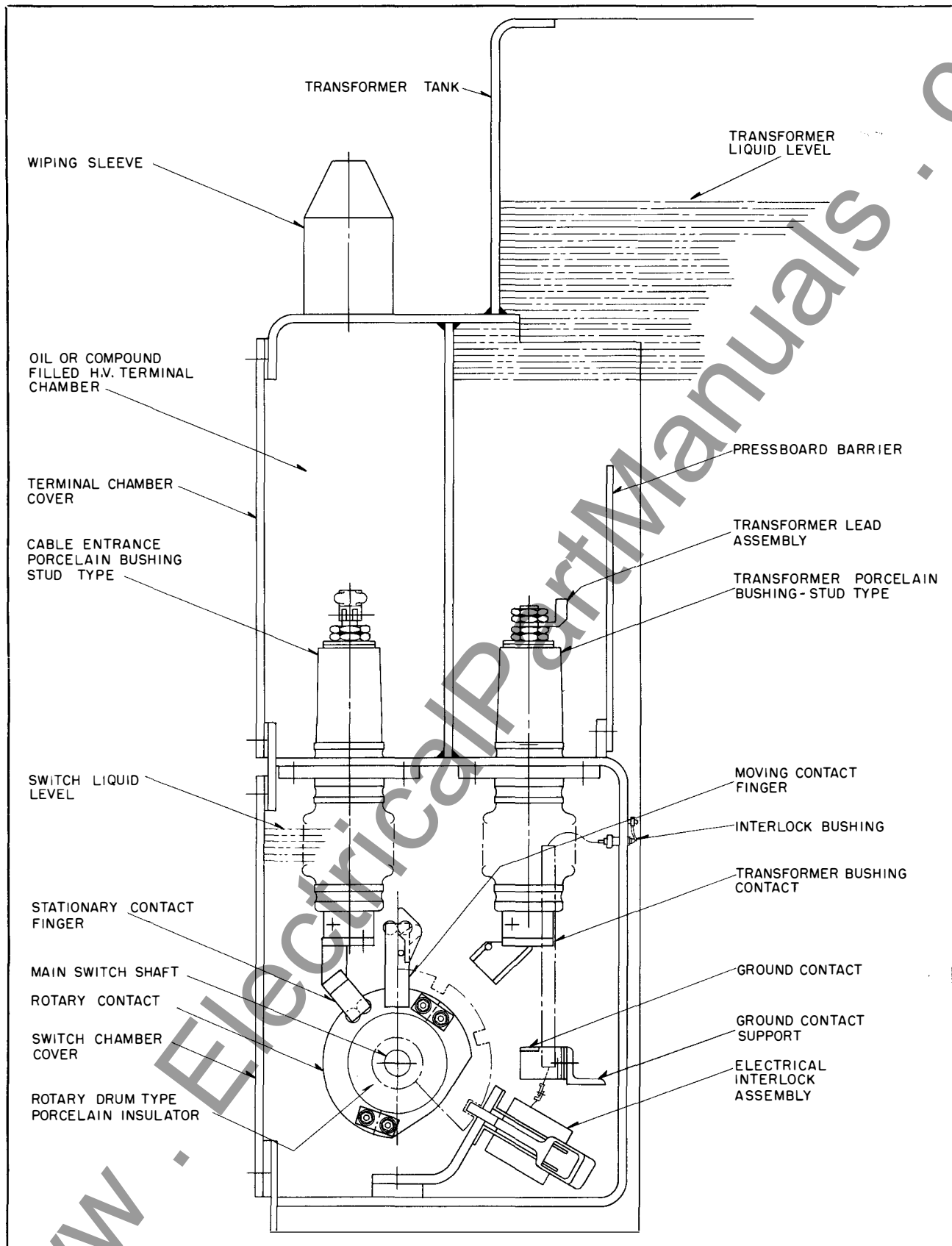
The three-position disconnect and grounding switch is designed to have the following sequence: "open", "transformer", "ground". The operating mechanism compels a pause in the "transformer" position to allow the electrical interlock to "pick-up", or lock the switch in the "transformer" position in case the feeder is energized. This action prevents grounding a live feeder.

The three-position two-feeder switch has the sequence of "Feeder #1", "open" and "Feeder #2". The operating mechanism enforces a pause in the "open" position.

Two-position switches are also manufactured and may have the "open" and "transformer" positions, or have "transformer" and "ground" positions.

The operating mechanism on both two- and three-position switches includes a latching device which holds the switch in any normal operating position

**FEEDER SWITCHES**



**FIG. 2. Assembly Drawing of a 3-Position Disconnect and Grounding Switch Welded to Transformer Tank.**

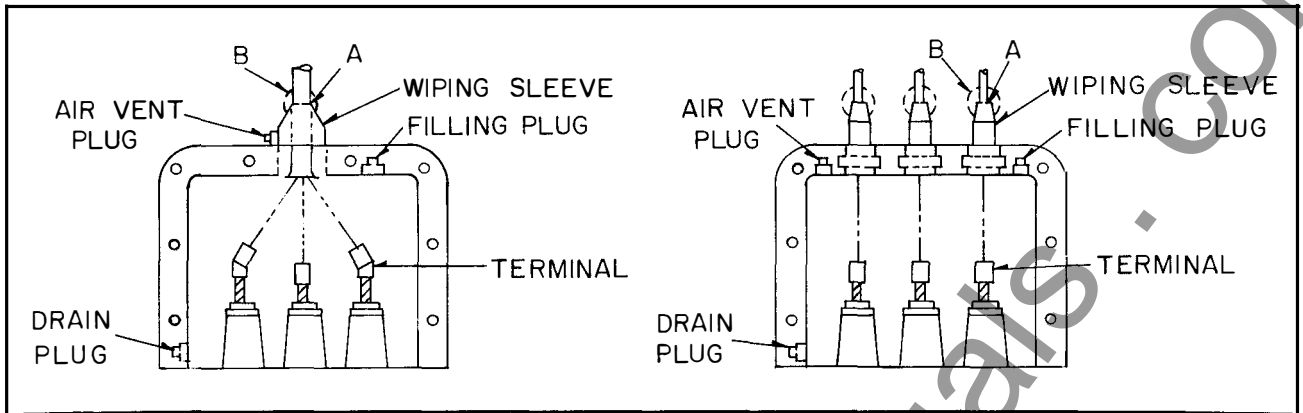


FIG. 3. Terminal Chamber Connections.

unless released by the operator and also provides a means by which the customer may padlock it to prevent unauthorized operation.

The switch is assembled in the switch chamber which is either bolted or welded to the transformer tank. The incoming cables are brought into a terminal chamber welded to the switch chamber.

### INSTALLATION

Before the transformer is installed, carefully examine the switch chamber for leaks. All switch chambers are tested at the factory at 8 pounds per square inch pressure. It is advisable to make a test at installation to make sure that no joints have opened during shipment.

Operate the switch a few times to make sure that all parts move freely. The switch chamber is shipped filled with liquid unless otherwise requested and the cover is sealed in place. It is not necessary to open the switch chamber since all cables are terminated in the terminal chamber.

**Terminal Chamber.** The terminal chamber cover gasket and wiping sleeve gasket are cemented to the chamber. Cement is not used on the other side of these gaskets to facilitate removal of the cover and wiping sleeve.

The terminal chamber is shipped dry and must be filled with insulating compound after making cable connections and replacing cover. Refer to Fig. 3, selecting the arrangement that applies.

**Cable Installation.** The following instructions for cable installation apply to paper-covered or varnished cambric lead covered cable used without stress cones.

Follow cable manufacturer's instructions for stress cones and other types of cables.

1. Remove the wiping nipple and cut off end at A until inside diameter is slightly larger than the diameter of the lead cable. Slip flange and wiping nipple back over lead cable.

2. Remove the lead covering from cable for a distance of approximately 8 inches and bell end away from conductor approximately  $\frac{1}{2}$  inch. This forming of the lead sheath is important and care should be taken that all sharp edges are removed.

3. Remove insulation from conductor for a distance of approximately 1 inch. Slip the cable into the terminal and tighten terminal bolts securely.

4. Replace the wiping nipple after inspecting gasket, and tighten the bushing flange. Wipe lead cable to nipple at point B. Warm the metal parts of terminal chamber to drive off all moisture and wipe the porcelain bushings dry before replacing cover.

5. Replace the filling plug with standpipe and remove air vent plug. Fill terminal chamber with compound \*M1845-1 (35 lb. pail is S\*1512 978-A) until compound comes out at air vent plug. Insulating compound \*M1845-1 should be heated to a temperature of 105° to 115° C for a period of one hour and then poured into terminal chamber while hot.

6. Disconnect standpipe, replace plugs.

### SPECIAL ACCESSORIES

Switches when so ordered may be equipped with auxiliary devices, such as quick-break mechanism, phasing-out contacts, and switch-to-tap changer interlocks.

## FEEDER SWITCHES

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**Liquid Dielectric Tests.** For information regarding sampling and testing either oil or Inerteen, refer to the accompanying instructions.

**Insulation Test.** Place switch in "open" position and test to ground for one minute at the following voltages based on the voltage rating of the transformer:

Rated Voltage of Transformer	Test Voltage
2500 to 15000	47,000 volts D.C. for 5 min.
15001 to 25000	65,000 volts D.C. for 5 min.
25001 to 34500	82,500 volts D.C. for 5 min.

**Renewal Parts.** Order renewal parts from the nearest Westinghouse Sales Office, giving description of parts wanted, as well as all data on the nameplate of the transformer.



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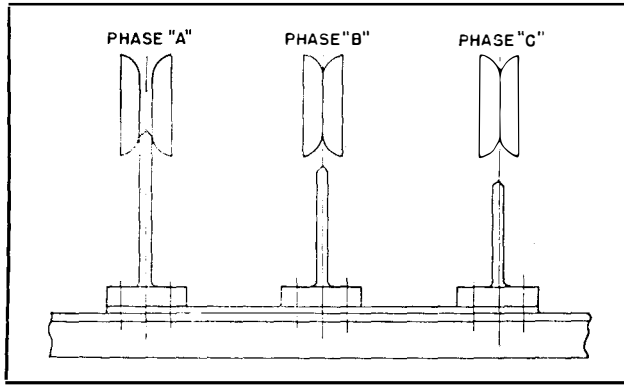


FIG. 4. Standard Phasing Sequence A-B-C, Left to Right, Facing Switch

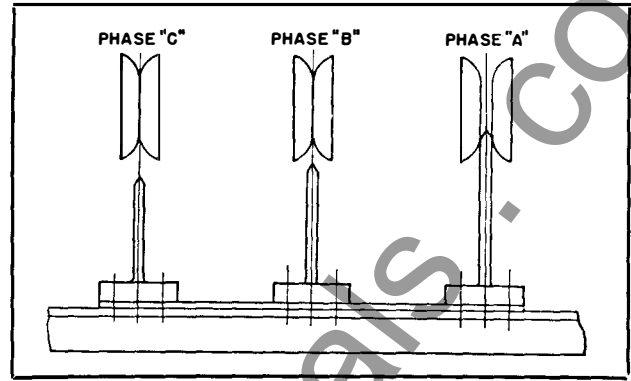


FIG. 5. Special Phasing Sequence A-B-C, Right to Left, Facing Switch

**Electrical Interlock Circuits.** For arrangement of the electrical interlock circuits and locking cams refer to the diagram instruction plate on the transformer, and to the interlock instruction leaflet.

**Important:** Care must be exercised when installing a unit with quick-break mechanism. Some load interlocks are arranged to lock when energized while others are locked when de-energized. The load switch must be arranged for the proper connection.

**Tap Changer Mechanical Interlock.** This manually operated interlock is designed to prevent operation of the tap changer unless the switch is in "open" or "ground" position. It also prevents operation of the switch from "open" or "ground" position unless the tap changer is on one of its various positions. The interlock will normally be in position to lock the tap changer. To operate the tap changer, move the switch to "open" or "ground" position and then the interlock arm can be moved, which will free the tap changer operating mechanism. The arm of the interlock must be moved back, locking the tap changer, before the switch can be closed.

**Phasing-Out Contacts.** On the three-position disconnect and grounding switch, phasing-out contacts may be provided, if specified on the order, so that one phase of the cable can be grounded at a time. Buttons are provided on the operating handle for this operation. Sequence of grounding may be either left to right, per Fig. 4, or right to left, per Fig. 5.

**Phasing-Out High Voltage Cables.** Move the switch handle from "transformer" toward

"ground" with the latch pins on the switch control set for phasing out cable.

**Caution:** High voltage cable must be de-energized.

1. When pin marked A on the handle (See Fig. 6) stops the movement, the contacts are engaged for phase A as shown in Figs. 4 and 5, Phases B and C are open-circuited. Check for circuit through phase A with test voltage, then tag.

2. Release pin A on the handle and move the switch handle until pin marked AB stops movement. The contacts are then engaged for phases A and B. Phase C is open-circuited. Check for a circuit through phase B with test voltage, then tag.

3. With the switch in "ground" position, all three contacts are fully engaged.

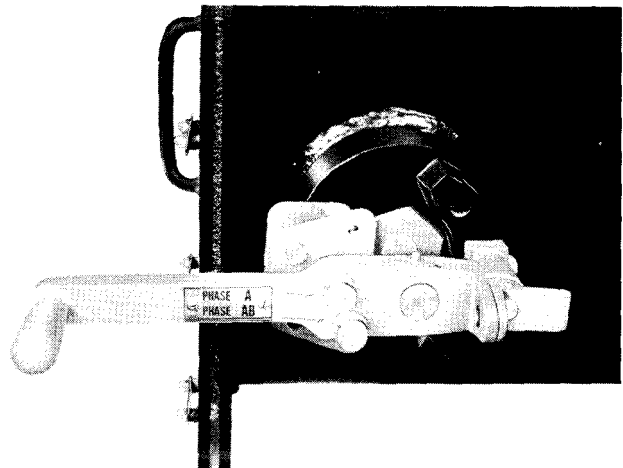


FIG. 6. Side View of Switch in Transformer Position

**MAINTENANCE**

Make a periodic examination at least every six months to keep the switch in good condition and to insure trouble-free operation. All cover bolts should be tightened with a wrench for one-half inch bolts. Oil the pushbuttons on the operating mechanism with a fine grade of light machine oil.

**Gaskets.** All gaskets used on network switches are made of Cortite, a gasket material consisting of cork and synthetic rubber; and for satisfactory results replacement gaskets should be of the same material. Before replacing a gasket, carefully and thoroughly clean the steel surfaces between which the gaskets are compressed to remove rust, oil, grease, paint and other foreign material. The cleaning may be done by scraping or wire-brushing and then wiping the gasket surface with de-natured alcohol. Use gasket cement M-7386 (S# 1150419) when applying gaskets.

For switch covers and bushings, thoroughly brush the cement on all sides and surfaces of the gaskets. Place gasket and cover in place and immediately bolt together under uniform pressure. After unit has been in service for a period of six months, re-tighten all the bolts.

**Quick-Break Mechanism.** The quick-break mechanism furnished on some switches, by special order, normally will not require maintenance. The mechanism uses an auxiliary contact arm which maintains the circuit as the switch is moved from "transformer" toward the "open" position. When sufficient clearance between main blade and its contact has been obtained, the auxiliary contact arm opens the circuit by quick-break action, regardless of the speed at which the operating handle is moved.

If a bushing or the quick-break arm is replaced, it should be adjusted so that all arms break or snap at the same time. This may be done by filing the end of the arm as much as is necessary.

**Replacing Bushings.** The bushings between the switch chamber and the transformer tank, as well as those between the switch chamber and the terminal chamber, are designed with permanent rolled flange seals between the stud and bushing, and between bushing and bushing flange. The seal between bushing flange and switch chamber is by means of a recessed gasket which may be replaced. In the case of a leak at the permanent rolled flange seals the bushing must be replaced with a new one.

To replace a bushing, remove locking nuts from mounting bolts and pull bushing directly down to break gasket seal. Carefully remove any gasket material remaining on mounting surface. When installing new bushings draw down on all of the flange bolts until flange is flush with mounting surface. After all bushings are in place, close up the chamber, using a new cover gasket, and pressure test at 7 pounds per square inch. Check carefully for any leaks. If leaks are discovered, the gasket must be replaced as above and the test repeated.

**Electrical Interlock.** The electrical interlock is of the spring loaded type. The moving latch is equipped with an adjustable tension spring to adjust the pick-up and drop-out voltages of the interlock. This assembly is adjusted at the factory according to the following table:

**INTERLOCK ADJUSTMENT**

INTERLOCK COIL RATING	ADJUSTMENT	
	MAXIMUM PICK-UP VOLTS	MINIMUM DROP-OUT VOLTS
125V-60 cycle	80V	25V
266V-60 cycle	190V	35V
460V-60 cycle	240V	45V
125V-D-C	65V	5V
250V-D-C	125V	5V

Do not disturb this adjustment unless the interlock is dismantled. The interlock is located in the main switch chamber, to the rear and below the rotary bushing. The adjustment of the tension spring is varied by a screw attached to the spring and locked with two brass nuts.

**Mechanical Interlock.** The mechanical interlock may be connected with flexible metal tubing enclosing a solid rod or by a linkage mechanism. Since the mechanism is exposed, it is possible that it may become inoperative due to corrosion of the parts. To prevent this, it is advisable to clean the mechanism once a year. Working parts should have a light coating of vaseline applied to them. The interlock rod should be removed from the housing tube and have a light coating of graphite applied to its entire length. In assembling this type of mechanism, the ends of the housing must be clamped firmly to prevent any motion at these points.