POWER-BREAK™ DRAWOUT ASSEMBLY

R-407

(600-2500 AMPERES)

DESCRIPTION OF UNIT

The drawout assembly is a self-contained, integral unit for use in POWERBREAK switchboards providing the convenience and safety inherent in drawout type construction. It permits activation of a new feeder, rapid replacement of a circuit breaker, and facilitates inspection and maintenance of POWERBREAK insulated case circuit breakers without making it necessary to de-energize the entire switchboard.

The drawout assembly consists of a stationary frame and a movable carriage which supports the circuit breaker. Current is carried through primary disconnects which are connected to bus bars or terminal lugs for use with cable.

The movable carriage is supported by rollers riding on two sets of telescoping rails attached to the stationary frame. A crank operated screw mechanism provides the mechanical force for engaging and disengaging the primary contacts.

ELECTRICAL DISCONNECTS

The spring loaded fingers of the primary disconnects are mounted on the movable carriage and breaker assembly, permitting maintenance of the fingers without complete de-energization of the bus system. Accessory control circuits are made by means of secondary disconnects mounted within the stationary frame, with a matching set on the movable carriage.

MOVABLE CARRIAGE/CIRCUIT BREAKER POSITIONS

The design features four position operation of the movable carriage relative to the stationary frame—ENGAGED, TEST DISENGAGED and FULLY WITHDRAWN—with the first three positions being referenced by an indicator mounted on the left side of the unit.

In the ENGAGED position primary and secondary contacts are completely engaged. In the TEST position primary disconnects are disengaged, but secondary disconnects are still engaged permitting checkout of control circuits.

In the DISENGAGED position, both primary and secondary disconnects are disengaged. The breaker is electrically disconnected from control circuits and system.

In FULLY WITHDRAWN position, the movable carriage is against the stop at the end of the rails. From this position the breaker and carriage can be removed from the stationary frame or tilted out for inspection.

MECHANICAL INTERLOCKS

a. *Cam Gate.* Interlocking means is provided to prevent movement of the carriage from DISENGAGED to TEST position, or vice versa, with the resultant making or breaking of the secondary contacts without first manually opening the cam gates.

b. *Breaker Trip.* Positive trip action is automatically initiated if the carriage is inadvertently cranked into or from the ENGAGED position without first opening the breaker—thus insuring that the primary contacts cannot be connected or disconnected with the breaker closed.

c. *Rail Latch.* Spring actuated latches are provided to lock the rail assemblies in both the extended and retracted positions if the carriage is not in place. This prevents push-in of the rails until the carriage is fully installed, or roll-out of unused rails in the enclosure.

SECONDARY CONTACTS

Secondary contacts are required when the circuit breakers are electrically operated, or are equipped with auxiliary switches, VersaTrip™ neutral sensors or other control devices.

PADLOCKING

Provision is made for padlocking the carriage in the TEST or DISENGAGED position by pushing and holding a slide cover down to deny access to the mechanism screw, and to prevent movement of the carriage in either direction.

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OPERATION

A. To Disengage and Remove Breaker

1. With door open, use crank handle and ¾" socket to turn mechanism screw counterclockwise as far as it will go. Indicator window will show "TEST." See Figs. 31 & 32.
2. Pull out red cam gate levers at left and right sides until they are latched. Grasp breaker, as shown in Fig. 38, and pull out to disengaged position. Cam gates will close automatically.

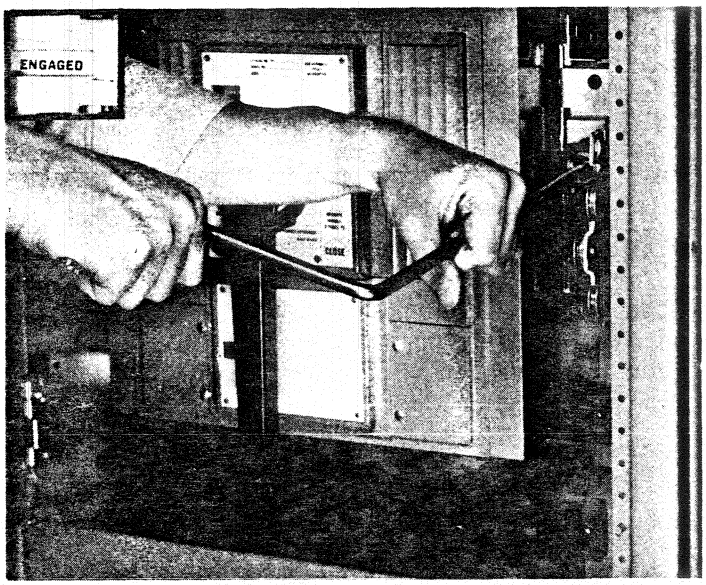

FIGURE 31.

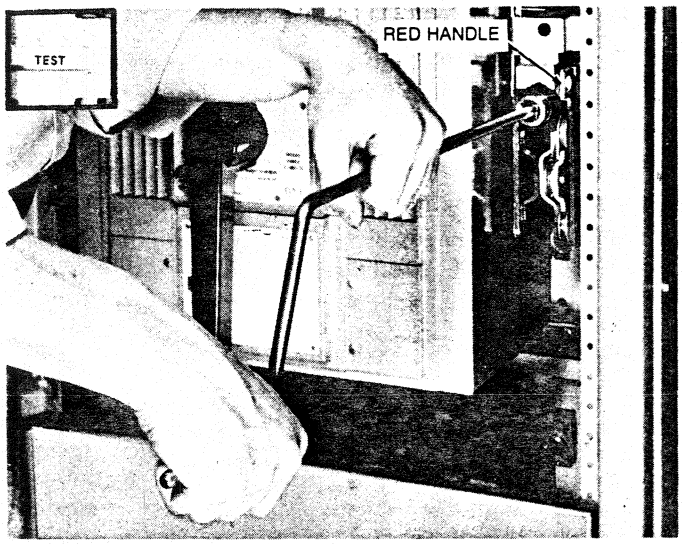

FIGURE 32.

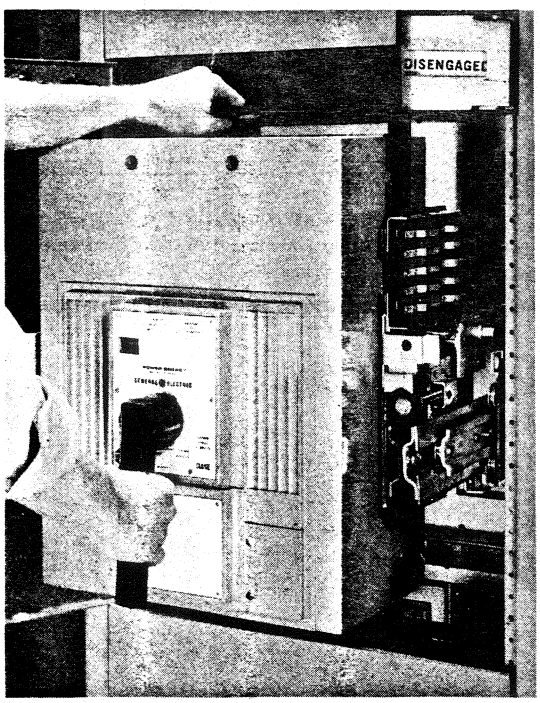

FIGURE 33.

POWER-BREAK™ DRAWOUT ASSEMBLY

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OPERATION (cont.)

A. To Disengage and Remove Breaker (cont.)

3. To inspect rear of breaker, pull it out to end of rail and rotate forward to inverted rest position. See Figs. 34 & 35.
4. If breaker is to be removed, it must be at end of rail travel in upright position where it can be raised above the rails using a portable device with a lifting sling or platform, and lowered to the floor, bench or truck.

B. To Install and Engage Breaker

1. Mechanism screw must be in full counterclockwise position, and side rails must be fully extended and latched to prevent premature pushback before positioning carriage in the rail assembly. See Fig. 36.
2. Roll breaker into DISENGAGED position against stops (See Indicator).
3. Pull out red cam gate levers at left and right sides until they are latched and push breaker into TEST position.
4. With crank and socket turn screw clockwise to ENGAGED position.

FIGURE 34. TILTING THE BREAKER

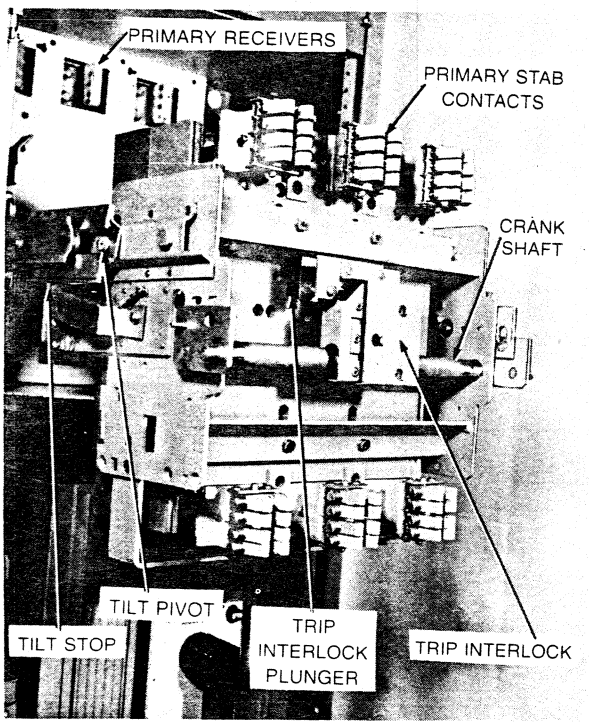

FIGURE 35. CARRIAGE IN TILT-OUT POSITION

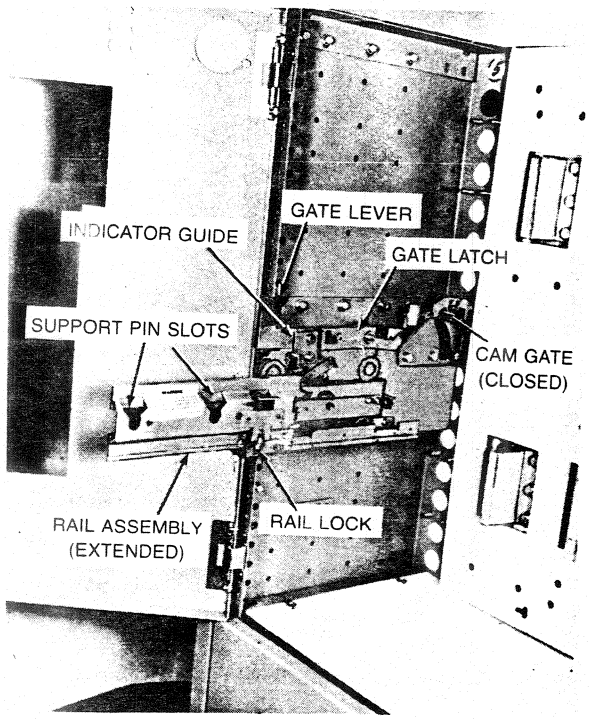

FIGURE 36. RAIL AND CAM ASSEMBLY—LEFT SIDE

POWER-BREAK™ DRAWOUT ASSEMBLY

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MECHANICAL DETAILS

Additional design features of the drawout mechanism are as follows:

Figures 37 and 38 show the right and left sides of the carriage with the crank pins located at the rear, midway between the upper and lower primary contacts. These pins, through the action of the mechanism screw and slide, rotate downward in a 90° arc and, cooperating with curved slots in the rail and cam assemblies, pull the carriage into the engaged position. Reverse action pushes the carriage back to the test position.

Figures 39 and 36 show the rail and cam assemblies at the right and left sides of the switchboard enclosure. The cams are at the rear of the assemblies. Also shown are the cam gates, (one open and one closed), which control movement into and out of the cam slots when actuated by the gate levers and latches. These latches hold the gates open when the levers are pulled out and are automatically released as the carriage passes between the DISENGAGED and TEST position in either direction.

CAUTION:

If the cam gates are operated out of sequence, the latch trigger is used to restore the cam gates to proper position. See Fig. 40.

If the cam gates are left open, the breaker will bypass DISENGAGED position energizing the secondary contacts unintentionally.

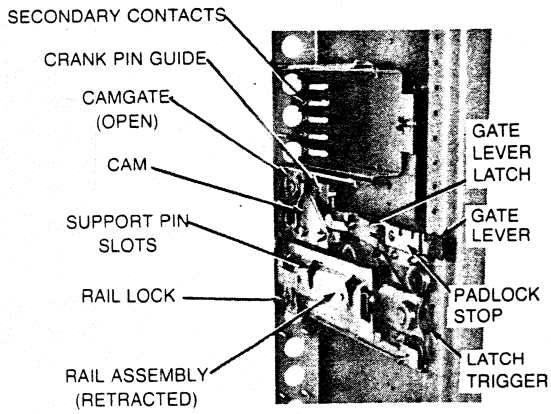

FIGURE 39. RAIL AND CAM ASSEMBLY—RIGHT SIDE

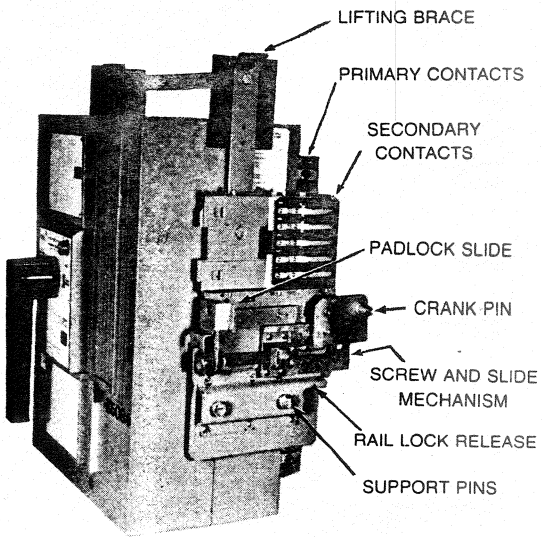

FIGURE 37. CARRIAGE ASSEMBLY—RIGHT SIDE

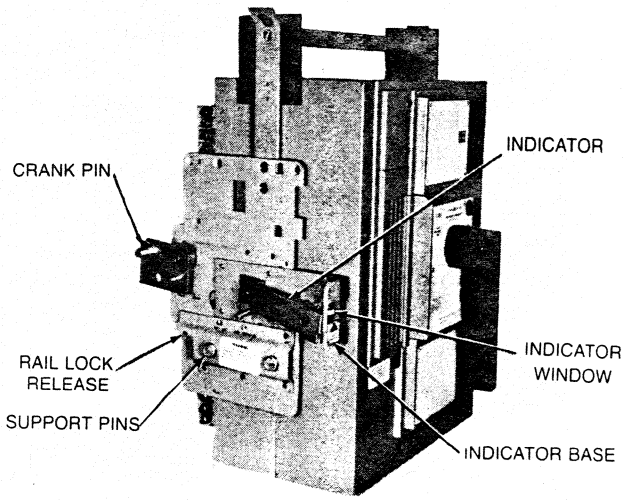

FIGURE 38. CARRIAGE ASSEMBLY—LEFT SIDE

POWER-BREAK™ DRAWOUT ASSEMBLY

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MECHANICAL DETAILS (cont.)

Fig. 41 also shows the carriage padlocked in the DISENGAGED position. A tab on the slide rests in slots in the gate lever and padlock stop (see Fig. 39) to prevent movement of the carriage or lever, while another tab covers the mechanism screw to prevent access to the screw.

Fig. 42 shows the action of the rail latch when the carriage is tilted out for inspection. As the rear portion of the carriage pin support tips up, the latch is released and pulls up into its locked position against the rail stop. The rails cannot be pushed in during the rotation, or while subsequent repair or adjustment is being performed on the breaker.

The secondary contacts shown in Fig. 39 are mounted in self-aligning steel enclosures to insure proper pick-up and continuous engagement with the mating contacts on the carriage. (Fig. 37). Contact between pairs of fingers is initiated as the carriage moves from the DISENGAGED to the TEST position and continues as the carriage is cranked in to full engagement. When the carriage is cranked out the fingers maintain contact to the TEST position so that control circuits can be checked, but become disconnected as the carriage is pulled to the DISENGAGED position.

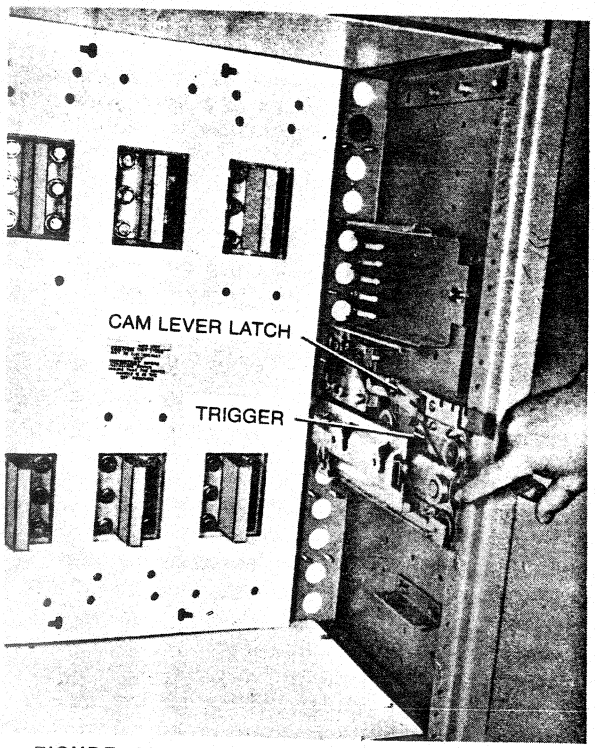

FIGURE 40. OPERATING THE CAM GATE TRIGGER

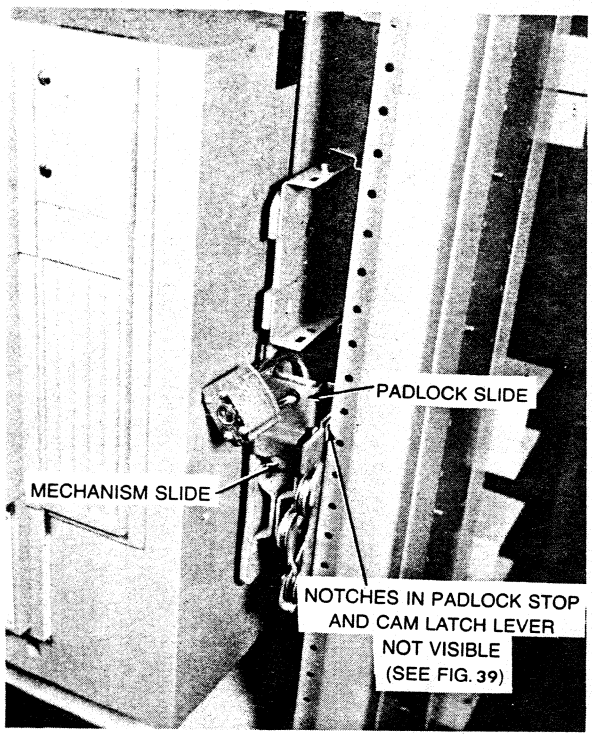

FIGURE 41.

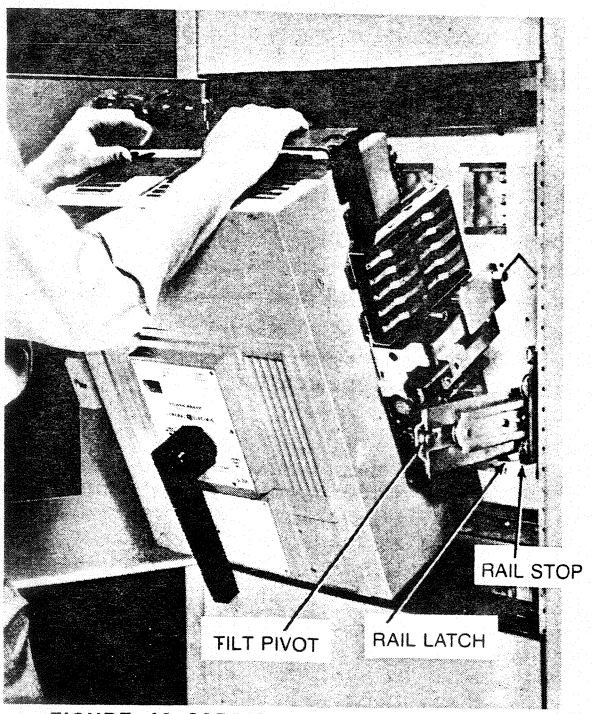

FIGURE 42. CARRIAGE AT START OF TILT OUT

PERIODIC MAINTENANCE PROCEDURES

CAUTION! ***De-energize equipment before performing any work.***

POWER-BREAK DRAWOUT ASSEMBLY

CAUTION: ***Before attempting any work on drawout devices, make sure that all sources of power—primary and secondary—have been de-energized.***

Drawout structure and connections should be given the following overall maintenance at least annually. The frequency of maintenance period will depend upon severity of service and atmospheric conditions around units. Equipment subject to highly repetitive operation may require more frequent maintenance.

None of the following operations should be undertaken until it is certain that equipment is completely de-energized by withdrawing breaker to disconnect or in fully withdrawn position.

Thoroughly clean by removing all dust and other accumulations from the equipment. Wipe or vacuum clean buses and supports. Avoid use of compressed air for blowing out equipment. Check indicating devices, mechanical and key interlocks for proper functioning. Lubricate all moving and rubbing parts with suitable lubricant.

Check primary and secondary disconnecting device surfaces for signs of abnormal wear or overheating. Clean contacts with suitable solvent, and apply a thin coat of the contact lubricant as described on pages 18-19. Discoloration of silvered surface is not ordinarily harmful unless atmospheric conditions cause deposits such as sulphides on the contacts.

Operate each breaker while in the TEST position to be sure it functions properly. This is particulary important for breakers that normally remain in either the opened or closed positions for long periods of time.

When the equipment is subject to unusual conditions, such as contaminating fumes, excessive moisture, etc., maintenance should be scheduled at more frequent intervals. In this case, the procedure listed above may not be sufficient for proper maintenance and additional precautions may be necessary to protect the equipment from the unusual conditions encountered.

Normal maintenance should include a visual inspection of all latches, interlocks and mechanisms with the manipulation of each one to check satisfactory performance. All screws used in the assembly should be checked for tightness.

Where needed, lubrication should be applied to all pivoting and sliding parts, with special attention being given to the mechanism screw, crank pins and cam slots which provide the force needed to insert the unit into the ENGAGED position.

While some of the above can be done with the carriage in the tilt-out position, a complete check can be made only after removing the carriage and breaker from the rails.

TRIP INTERLOCK CHECKOUT

The following procedure will permit checkout of the trip interlock mechanism without energizing the breaker:

1. Bring carriage to extended position at end of rails. (May also be done on bench.)
2. Put breaker in closed position and use crank, turning clockwise as if to bring mechanism to its engaged position.
3. Breaker should trip after not more than 16 turns of the crank, and after completion of remaining turns, it should be possible to close breaker again.
4. Turning the crank counterclockwise should trip the breaker after no more than 16 turns, and when in the test position, breaker can be closed again.

NOTE: ***Screw must be in full counterclockwise position before pushing carriage to disengaged position again.***

INDICATOR ADJUSTMENT

Means have been provided for adjusting the position of the indicator target should misalignment occur.

1. Roll carriage out to fully extended position and tilt out to rest position if desired.
2. Make sure the two indicator guide screws (Fig. 43) are tight, then back off both screws ¼ turn.
3. Bring carriage to upright position, then push in to disengaged position and—after pulling cam gate levers—to the test position.
4. a. If target is too low, insert screwdriver blade in lift tab slot, pry against roll in front of tab and raise target to proper position.
   b. If too high, hold screwdriver vertically with blade on top edge of tab and tap with hammer until target drops into position.
5. Bring carriage out to extended position and tighten screws—upper one first, then lower.

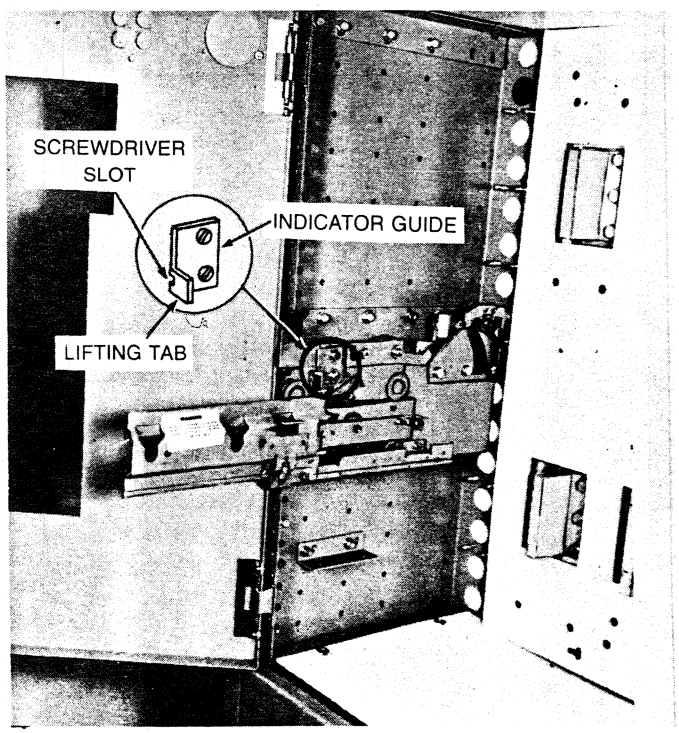

FIGURE 43. RAIL AND CAM ASSEMBLY—LEFT SIDE

PERIODIC MAINTENANCE PROCEDURES

CAUTION! ***De-energize equipment before performing any work.***

POWER-BREAK DRAWOUT ASSEMBLY (600-2500 AMPERES) (cont.)

LUBRICATION

All the areas subjected to mechanical friction have been liberally coated at the factory with a molybdenum disulfide paste for long lasting, wear resistance lubrication.

The primary contact sliding areas have been covered with a special high temperature grease especially formulated to decrease sliding friction and prevent corrosion of the silver surfaces at the high temperatures sometimes encountered at this type of joint.

The secondary contacts have been treated with a corrosion inhibiting grease to reduce the friction encountered as the carriage travels from TEST to ENGAGED position and assures continuity of circuitry at all times.

Figs. 44, 45, 46, 47 and 48 show the areas requiring lubrication and indicate the type as follows:

(L1) A high temperature grease, GE material D50HD24, designed for use on current carrying joints of circuit breakers. It is white in color and is formulated to improve contact and decrease friction of sliding joints where high pressures and temperatures are to be expected.

(L2) A pigmented lubricating grease, GE material D50H47, widely used for electrical contacts, and brownish in color, is used on the secondary contact fingers and on the sliding pins and channels of the secondary contact housings.

(L3) A heavy duty molydenum disulfide lubricant in paste form—GE material D6Y14A1 or equal should be used for the screw and slide mechanism, crank pins and cam slots where the greatest forces are encountered. For application such as sliding levers, rotating latches and rolls where a paste type lubricant would not penetrate to the friction areas, a molybdenum disulfide solid film lubricant in an aerosol can with plastic extension nozzle should be used to apply the lubricant where desired with a minimum of overspray.

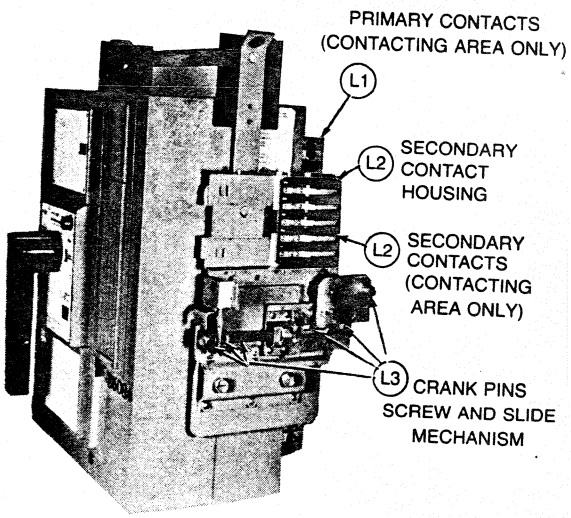

FIGURE 44. CARRIAGE ASSEMBLY—RIGHT SIDE

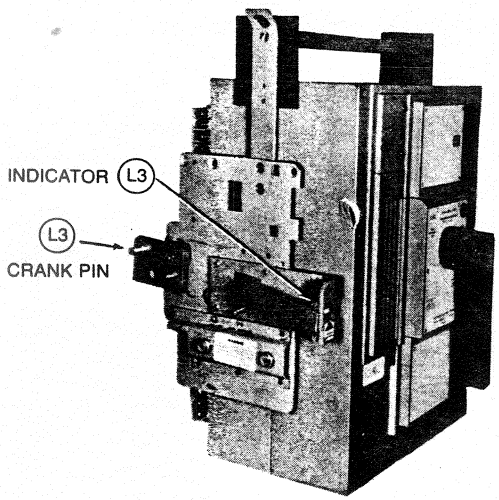

FIGURE 45. CARRIAGE ASSEMBLY—LEFT SIDE

PERIODIC MAINTENANCE PROCEDURES

CAUTION! ***De-energize equipment before performing any work.***

LUBRICATION (cont.)

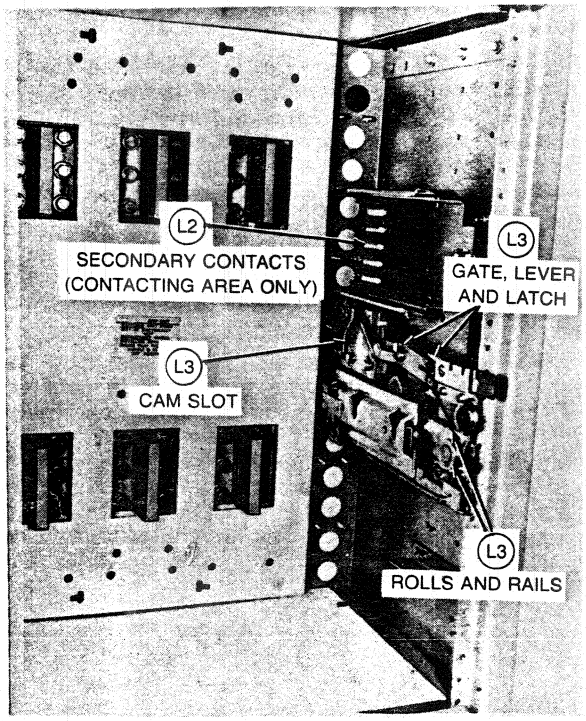

FIGURE 46. RAIL AND CAM ASSEMBLY—RIGHT SIDE

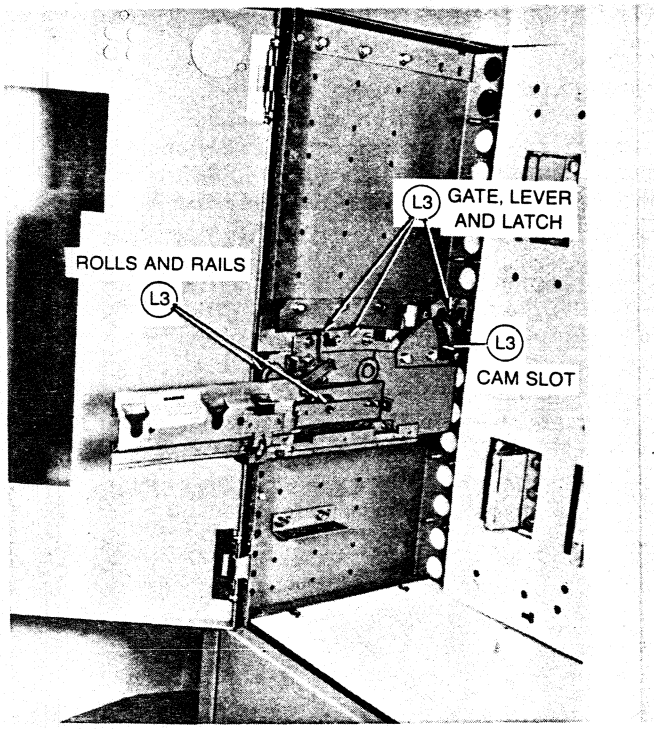

FIGURE 47. RAIL AND CAM ASSEMBLY—LEFT SIDE

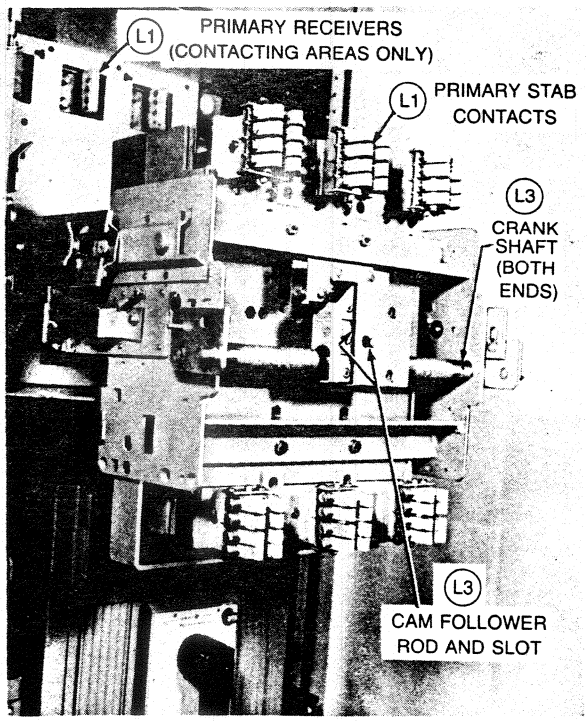

FIGURE 48. CARRIAGE IN TILT-OUT POSITION