INSTALLATION, OPERATION AND MAINTENANCE MANUAL

GEI-93862A

SUPERSEDES GEI-93862

LOW VOLTAGE PLB POWER PROTECTORS

Manually Operated

800, 1200, 1600, 2000, 2500, 3000 and 4000 Amperes

240 and 600 Volts

SWITCHGEAR DEPARTMENT

GENERAL ELECTRIC

PHILADELPHIA, PA.

INSTALLATION, OPERATION AND MAINTENANCE OF TYPE PLB POWER PROTECTOR

INTRODUCTION

The PLB power protector is a fully coordinated fused switch with NEMA Class L fuses serving as switch blades and having high pressure bolted contacts. It is designed for service entrance protection and main or feeder applications on high current capacity circuits. It is available for use on 240 and 600 volts 60 cps. circuits with continuous current ratings ranging from 800 to 4000 amperes, and may be applied to circuits with short circuit currents up to 200,000 symmetrical amperes when equipped with General Electric CLF* fuses. The 240 volt switch is not equipped with arc quenchers and must not be used on circuits above 240 volts. The 600 volt switch is equipped with arc quenchers (see Fig. 1) and may be used on circuits up to 600 volts.

RECEIVING, HANDLING AND STORAGE

Before installing, or operating these power protectors, a careful reading should be made of the sections of these instructions which are pertinent to the work anticipated.

Immediately upon receipt of a power protector and fuses, an examination should be made for any damage or loss sustained in shipment. If injury, loss or rough handling is evident, a damage claim should be filed at once with the transportation company and the nearest General Electric Sales Office should be promptly notified.

The power protector and fuses should be unpacked as soon as possible after they have been received. Care must be exercised in the unpacking to avoid damage to the power protector parts. Be sure that no loose parts are missing or left in the packaging material. Remove any dirt or loose particles of packaging material remaining on or in the protector.

If the power protector is not to be placed in service at once, it must be stored in a clean, dry location in an upright position and supported to prevent bending of the studs or damage to any of the protector parts. It is also advisable not to cover the protector with any packing or other material which absorbs moisture, that may cause corrosion of protector parts. A covering of kraft or other non-absorbent paper will prevent dust from settling on the protector.

INSTALLATION

Location

In choosing a location for the installation of a PLB Power Protector, ther are two factors to be considered. The first of these is the effect of the location on the protector itself. Much better performance and longer life may be expected if the area is clean, dry, dust-free, and well ventilated, than if the opposites to these conditions exist. The second consideration is convenience for operation and maintenance. The protector should be easily accessible to the operator, and there should be sufficient space allowed for maintenance work to be done if this becomes necessary.

MOUNTING

The PLB Power Protectors are available for stationary switchboard mounting as well as in a general purpose enclosure. To facilitate mounting, the protector's front frame may be separated from the back frame as follows:

1. The protector will be shipped in the closed position.

NOTE:
On 2500, 3000 and 4000 amp protectors, the operating handle (3) is extendable to reduce the operating torque. To extend handle loosen knurled collar (2) and pull down on the silver colored handle grip (1). With handle in extended position tighten knurled collar and proceed as outlined below.

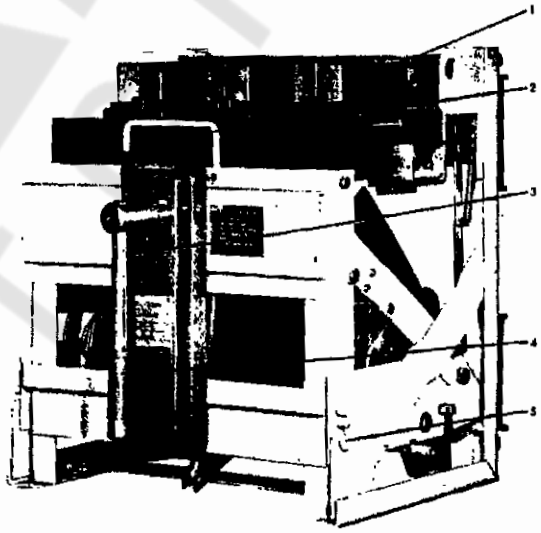
To open, pull the red colored button (3) (see Fig. 1) and turn operating handle (4) clockwise to the vertical position (see Fig. 1).

2. With the protector in the open position, (see Fig. 1), grasp the white handle (2) located above the front escutcheon and tilt the front frame assembly forward approximately 90°.

3. Lift the front frame assembly off the pivots (5) completely separating the two frames. The back frame is now ready for mounting.

STATIONARY MOUNTED PROTECTORS

These protectors are designed for mounting in a switchboard or enclosing case of the customer's design and construction. Minimum cutout dimensions, as



1. Arc Quencher
2. White Handle
3. Red Knob
4. Operating Handle
5. Front Frame Pivot

Fig. 1 (8034172) PLB Power Protector, 3 Pole, 600 Volt Shown in Open Position

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 General Electric Company.

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given by the appropriate outline drawing (see below) must be maintained to provide adequate electrical clearance. If installed in a switchboard or enclosure, adequate ventilation must be provided. See Table I for recommended minimum enclosure openings.

TABLE I

PLB MINIMUM ENCLOSURE OPENINGS

PROTECTOR SIZE IN AMPS	OPENINGS	
	TOP & BOTTOM OF ENCLOSURE	TOP & BOTTOM BOTH SIDES
800 - 2000	54 Sq. In.	--
2500 - 3000	168 Sq. In.	76 Sq. In.
4000	210 Sq. In.	76 Sq. In.

The front door of the switchboard or enclosing case of the customer's design should be hinged from the left side and should have an opening to accommodate the protectors front escutcheon. Outline drawings listed below furnish required dimensions for escutcheon opening as well as the other dimensions required for mounting the protector.

Protector		Outline
PLB-1	800 to 1200 Amps	0102C3644 Pt-1
PLB-1	1600 to 2000 Amps	0102C3644 Pt-2
PLB-2	800 to 1200 Amps	0108C9643 Pt-1
PLB-2	1600 to 2000 Amps	0108C9643 Pt-2
PLB-2	2500 & 3000 Amps	0102C3693
PLB-2	4000 Amps	0102C3694

Mounting in this instance consists of bolting the protector's back frame to the supporting structure within the switchboard or enclosure, installing the appropriate fuses, connecting the power buses or cables, and remounting the front frame on the backframe.

The mounting surface of the switchboard or enclosure must be true and flat in order to avoid any internal distortion of the protector unit and it must be sufficiently rigid to avoid any possibility of the protector pads supporting the weight of the protector. After completing the mounting of the protector's back frame in a switchboard or enclosure it should be checked for squareness. If out of true, it may be necessary to loosen the two mounting bolts on each side of the lower horizontal brace in the back frame, square up the right or left hand frame sides as required and then retighten the mounting bolts.

With the back frame assembly securely bolted to the supporting structure mount the power buses or cables to the upper and lower switch terminals. Depending on specific mounting arrangements, convenience and economy, power may be fed to either the upper or lower switch terminals. Care should be taken to be sure that all terminal connections are of good conductivity and that neither the connections nor the weight of the cable or bus apply a straining action to the protector terminals. Mating surfaces must be parallel, clean, have a smooth surface and be firmly bolted together. The bus or cable must have adequate current-carrying capacity to prevent excessive heating.

The appropriate Class L fuses should now be installed in the front frame assembly as follows:

NOTE:
Fuses with ratings lower than shown on the PLB nameplate must employ the correct adapter kit for down fusing.

1. Pull the red colored knob (3) (see Fig. 1) and rotate the operating handle (4) counter clockwise approximately 135° to the closed position.

2. Check the fuse tangs for accuracy and straighten by bending in vice if necessary. CAUTION: DO NOT HAMMER!!!! They must be within 1/32 inch of a true plane. Apply a thin layer of GE D50H47 grease to the surfaces of the fuse tangs and movable contacts (5), (see Fig. 3). A one ounce tube of this grease is supplied with each protector, attached to the horizontal channel of the front frame.

3a. On the 800 to 2000 amp protectors loosen the two slotted hexagon headed screws (2) (see Fig. 5) until the upper fuse holder (4) can be rotated sufficiently to allow the fuse to be inserted in the bottom fuse holder (1). Insert fuses.

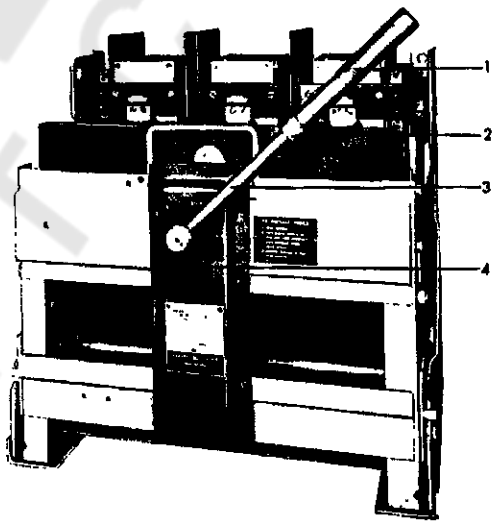
b. On 2500, 3000 and 4000 amp protectors it is also necessary to loosen the slotted hexagon headed screw (11) (see Fig. 4) and rotate the connecting link (8) (see Fig. 4) before rotating the upper fuse holder upward sufficiently to allow the fuse to be inserted.

NOTE:
On the 2500, 3000, and 4000 Amp protectors, it may be necessary to tap the upper fuse holder with a mallet when rotating the fuse holder to and from the closed position.

c. On the 4000 amp protectors remove the heat sinks (2) (see Fig. 4) from the compound bars by loosening four screws (3) (see Fig. 4). Discard the compound bars. Assemble the 4000 amp fuses to the heat sinks (2) by tightening the screws (4) securely. An Allen Wrench for screws (4) is supplied with each 4000 amp protector, attached to the horizontal channel on the front frame. The heat sinks are stamped to indicate their correct assembly locations.

4a. On the 800 to 2000 amp protectors rotate the upper fuse holder to the original position and tighten the two slotted hexagon headed screws (2) (see Fig. 5).

b. On 2500, 3000 and 4000 amp protectors rotate the connecting link into position and tighten the two slotted hexagon headed screws (1) (see Fig. 4). Then tighten the remaining screw (11) (see Fig. 4) securing the connecting link (8) (see Fig. 4).



1. Silver Handle Grip
2. Knurled Collar
3. Operating Handle
4. Red Knob

Fig. 2 (8036743) PLB Power Protector, 3000 Amp, 3 Pole 240V Shown In Closed Position With Handle Extended.

5. Repeat steps 3 and 4 for each phase.

6. Pull the red knob and turn the handle approximately 135 degrees clockwise to the open position.

To complete the installation of the protector, lift the front frame assembly with fuses installed and place the pivots (5) (see Fig. 1) in the pivot slots of the back frame. Grasp the white handle (2) and push, rotating the front frame into positive engagement with the back frame (see Fig. 1).

Closing

The closing operation consists of pulling the red colored button and rotating the operating handle counter clockwise from the vertical position thru approximately 135°. During the first part of the closing stroke, the movable contacts move from the open to the closed position. The last part of the closing stroke applies high pressure to the upper and lower fuse tangs.

Provision is incorporated in the design of the high pressure contact mechanism located directly above and below each fuse tang, to automatically insure uniform high pressure on all fuse tangs within the allowable range of thickness. This mechanism is set at the factory before shipment and should require no maintenance or adjustment.

Opening

The protector may be opened by reversing the sequence of the closing operations, first pulling the red button and then rotating the handle clockwise to the vertical position.

In both closing and opening operations, it is recommended that the operating handle be moved with a fast snapping action in order to prevent unnecessary heating of the protector contacts.

Non Reversing Mechanism

The movable contact structure as shown in Fig. 3 is equipped with a non-reversing mechanism in the form of spring biased pivoting links located directly inside the front frame. These links engage the movable contact end brackets in such a way as to prevent reversal of the closing operation during the closing stroke. This "controlled" manual closing operation eliminates "kick back" on the handle due to high repulsive forces in the event that the contacts might be closed on a current of high magnitude.

NOTE:
BEFORE INSPECTION OR ANY MAINTENANCE WORK WITH THE EXCEPTION OF CHANGING FUSES, BE SURE THAT ALL ELECTRICAL POWER IS DISCONNECTED.

The sequence of operations for changing fuses is shown on the nameplate located on the front frame of the protector and is also described in detail in the Installation Instructions.

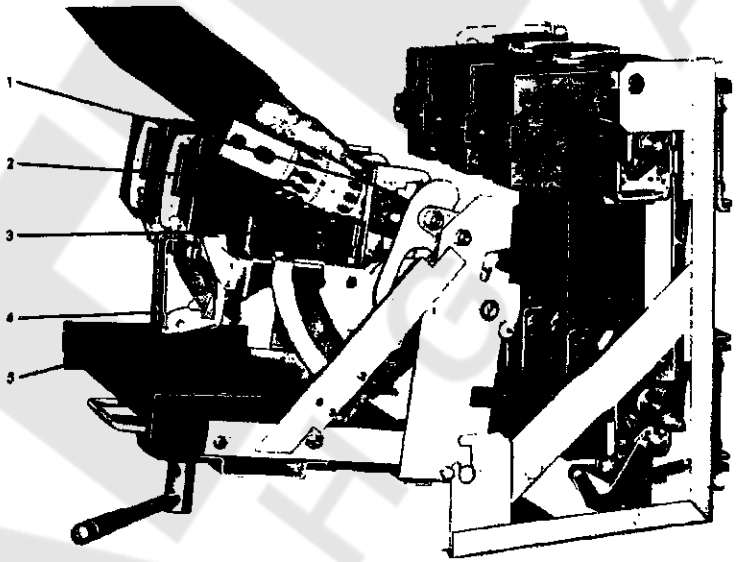
GENERAL PURPOSE ENCLOSURE

A factory built general purpose enclosure is available for mounting the PLB protector. These enclosures are provided with suitable means for mounting on walls or supporting framework. The enclosure has removable cover plates on top, bottom and sides which may be drilled or machined to accommodate the entrance of bus ducts, conduits, cables or buses to the top and bottom terminals of the protector.

After the enclosure has been securely mounted on supporting framework or wall, the same mounting procedure as outlined for switchboard mounted protectors should be followed.

Protector	Outline
PLB-1 800 to 1200 Amps	0108C9802 Pt-1
PLB-1 1600 to 2000 Amps	0108C9802 Pt-2
PLB-1 2500 & 3000 Amps	0108C9803
PLB-1 4000 Amps	0108C9804

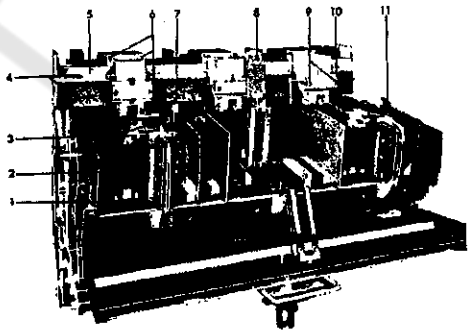
OPERATION



1. Lower Fuse Holder
2. 1200 Amp CLF* Fuse
3. Upper Fuse Stop
4. Upper Fuse Holder
5. Movable Arcing Contact

Fig. 3 (8034167) Inserting Fuse In Lower Fuse Holder

MAINTENANCE



1. Screw
2. Heat Sink
3. Screws
4. Screws
5. Horizontal Brace Assembly
6. Screws
7. Screws
8. Connecting Link
9. Screws
10. Retaining Bar
11. Screw

Fig. 4 (8036749) PLB Power Protector 4000 Amp, 600V Shown In Open Position With Center Fuse And Heat Sink Assembly Removed.

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Inspection

Periodic inspection of the protector is recommended at least once a year. More frequent inspections are recommended if severe load conditions, dust, moisture or other unfavorable conditions exist. A complete inspection of the protector, including contacts and arc quenchers, should always be made after the protector has interrupted a short-circuit.

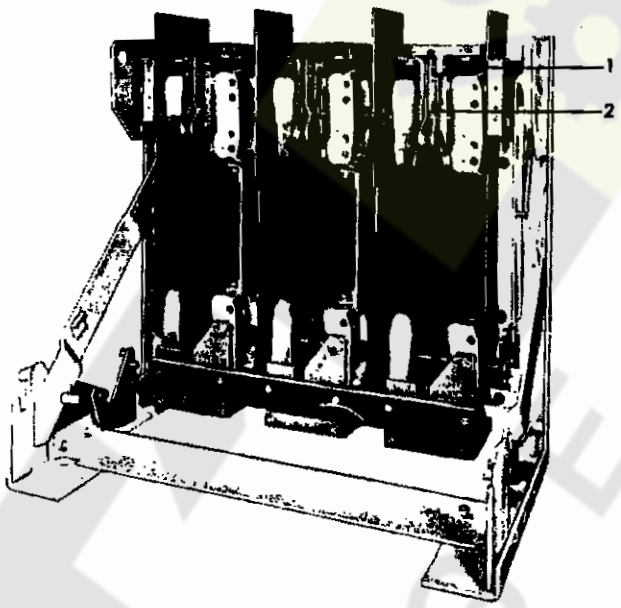
At regular inspection periods the protector should be operated manually to observe the contact alignment and to make sure all mechanism parts move freely without binding or excessive friction.

If overheating, not caused by overcurrent is observed, a complete inspection of the protector should be made including connections and contacts.

At all times it is important not to permit pencil lines, paint, oil or other foreign materials to remain on the insulating surfaces of the protector as they may cause low resistance between points of different potential and result in eventual electrical breakdown.

Lubrication

In general, the protector is adequately lubricated before shipment to withstand normal service requirements. However, in extremely dirty atmospheres or where greater than normal operations are encountered the following lubrication procedure is recommended:



1. Screw
2. Stationary Arcing Contacts

Fig. 6 (8036750) 3000 Amp Back Frame Assembly With Horizontal Brace Assembly Removed.

a. Hardened grease and dirt should be removed from bearing surfaces by using kerosene.

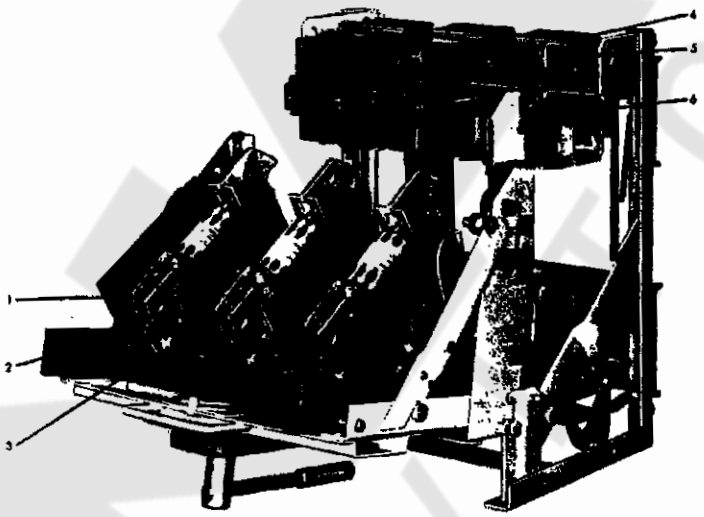
b. All bearing points and sliding surfaces should be lubricated at the regular inspection periods with a thin film of GE lubricant D50H15 with the following exceptions:

1. The Non-reversing mechanism should not be lubricated as it is designed to work dry.

2. The high pressure contact mechanisms should not be lubricated or readjusted in any way as they are permanently set before shipment.

3. The upper and lower fuse tangs and movable contacts should be coated with a thin film of GE D50H47 grease.

c. All excess lubricant should be removed with a clean cloth to avoid any accumulation of dust or dirt.



1. Movable Arcing Contact and Upper Fuse Holder
2. Screw
3. Pivot Pin
4. Terminal Pad Assembly
5. Screw
6. Stationary Arcing Contact

Fig. 5 (8034170) 600 Volt PLB Shown With Front Frame in Tilted Out Position

Arc Quencher Replacement

The arc quenchers should be inspected at regular inspection periods. If the molded sides are cracked or the steel plates eroded excessively, they should be replaced as follows:

1. Remove the channel shaped retaining bar by removing the two long screws and lockwashers.

2. Lift the arc quenchers clear of the supporting bracket.

3. Replace arc quencher in reverse order. NOTE: During replacement do not overtighten the screws which secure the channel shaped retaining bar thus preventing overstressing and possibly damage to the arc quencher sides.

Arcing Contact Replacement (Fig. 5)

The stationary arcing contacts (6) and the movable arcing contacts (1) should be inspected at regular inspection periods. If excessive erosion has occurred on the arcing surfaces, it is recommended that they be replaced as follows:

Stationary Arcing Contact

1. Remove arc quenchers. (See arc quencher Replacement).

2. On the 2500, 3000 and 4000 amp protectors, remove the horizontal brace assembly (5) (see Fig. 4) by removing screws (4, 6 & 7) (see Fig. 4).

3. Remove the hexagon headed screw (5) and lower the stationary arcing contact (6) free from the terminal assembly (4).

4. Replace stationary arcing contact in reverse order.

Movable Arcing Contact

With the protector's front frame in tilted out position proceed as follows:

1. Unscrew the two slotted hexagon headed screws (2) until the movable arcing contact (1) is free to pivot. (See Fig. 2) On the 2500, 3000 and 4000 amp protectors also unscrew the slotted hexagon headed screw (11) (see Fig. 4).

2. Remove cotter pin from the pivot pin (3) (see Fig. 3) allowing the pivot pin to be pulled free from the movable arcing contact.

3. Remove movable arcing contact.

4. Replace movable arcing contact in reverse order.