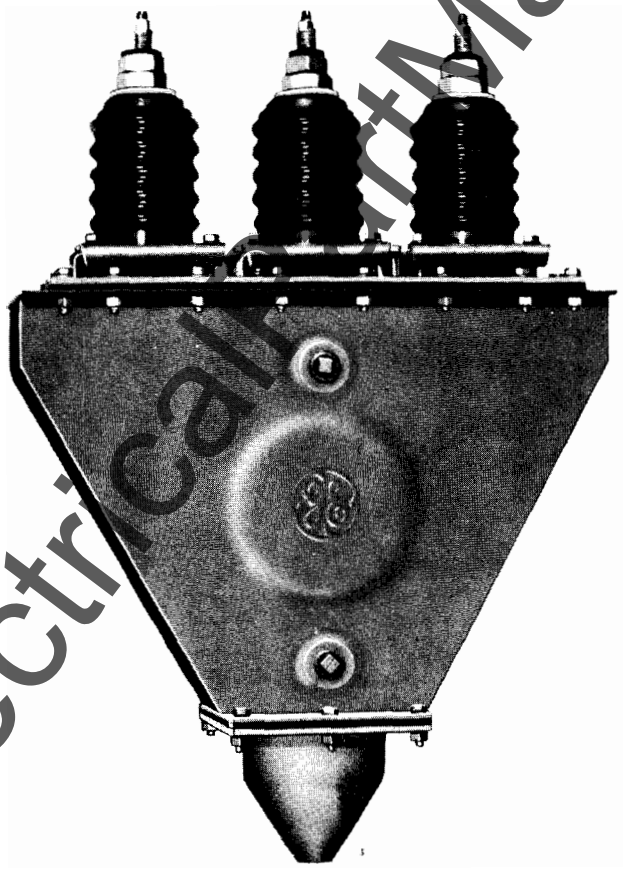
INSTRUCTIONS AND RECOMMENDED PARTS FOR MAINTENANCE

GEI-28838I
Supersedes GEI-28838H

INSTALLATION OF PRIMARY CABLES IN METAL-ENCLOSED SWITCHGEAR



SWITCHGEAR PRODUCTS DEPARTMENT

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(c) Remove the pothead from the unit, disassemble the wiping sleeve and slip it and its gasket over the cable as shown in Fig. 4.

(d) Remove the lead sheath from the cable to the point marked in operation "b" as shown in Figs. 5 and 6 proceeding as follows:

First, make a cut around the cable half through the sheath at the reference point. Second, split the sheath lengthwise between the cut and the cable, holding the cutting tool at an angle to the cable radius to avoid damaging the insulation. Third, remove the sheath by catching the split edge with pliers and pulling directly away from the cable axis.

Clean and tin the outside of the lead sheath for about 3 inches and bell out the end of the lead sheath.

(e) Remove the belt and interphase insulation down to within 1-1/2 inches of the lead sheath as shown in Fig. 7. The last few layers should be torn off to avoid damaging the individual conductor insulation. To reinforce and protect the conductor insulation, wrap two layers of half lapped varnished cambric or irrathene tape over the factory insulation.

(f) Disassemble insulator support plate from pothead body. The insulators should not be removed from the support plate because they are factory assembled for proper compression of their gaskets. Place pothead body over cable and then fan out the conductors into approximately the final position, as shown in Figs. 8 and 9. The middle conductor should be bowed slightly for final adjustment of length. Avoid sharp bends and damage to the insulation, particularly at the crotch.

(g) For system voltage above 7500 volts it is recommended that stress relief cones be built up when single-conductor or three-conductor shielded cable is used. Construct stress relief cones in accordance with the recommendations of the cable manufacturer. See Fig. 1 for one recommended method. On lower voltage cables, belling out the end of the lead sheath ordinarily provides sufficient stress relief. (Stress cone material will not be furnished with pothead).

(h) Bolt pothead body to metal-clad adapter plate. Shape conductors into final position, then cut off each conductor to fit its terminal.

(i) Remove pothead terminals from insulators. Remove two inches of insulation from the end of each conductor and assemble pothead terminals to cables.

(j) Assemble gaskets where shown in Fig. 1 and bolt insulator support plate and wiping sleeve to pothead body. Compress gaskets by a partial turn on each bolt successively until the gasket is uniformly compressed to dimensions shown in Fig. 1. Check to be sure the terminal studs are seated properly on their gaskets, then screw contact nut in place after assembling top gaskets and washers. See Figs. 9, 10 and 11.

Fig. 4

Fig. 5

Fig. 4 (857623)
Fig. 5 (857622)

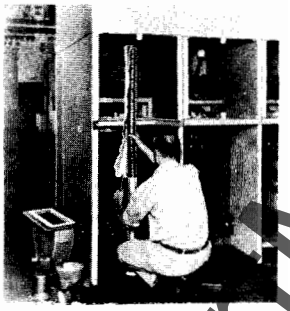


Fig. 6

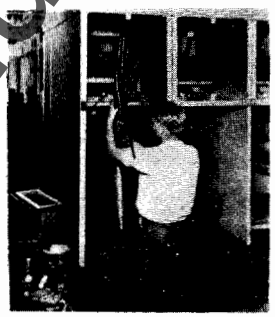


Fig. 7

Fig. 6 (857621)
Fig. 7 (857618)

Fig. 8

Fig. 9

Fig. 8 (857611)
Fig. 9 (857606)

Fig. 10

Fig. 11

Fig. 10 (857619)
Fig. 11 (857610)

(k) Make a plumber's wiped joint between the wiping sleeve and the lead sheath of the cable, as shown in Figs. 12 and 13.

(l) Remove the 3/4" filling plug in the pothead body, the pipe plugs in the top of the studs and in the insulator support plate. Insert a stand pipe and funnel in the filling hole of sufficient height to extend above the top of the studs as shown in Fig. 14.

Fig. 12 (857609)
Fig. 13 (857608)

Heat compound to the pouring temperature, 165 C. for #227 or 135-160 C for novoid "X". Do not overheat compound as higher temperatures may injure cable insulation and also result in excessive shrinkage of the compound while cooling. Before and while filling, warm pothead body and stand pipe to prevent sudden chilling of compound which may result in the formation of air voids. The pothead may be warmed by playing a blowtorch over the body, taking care that no direct heat reaches the porcelains or gaskets.

Pour until the compound appears at the insulator support plate plug holes. Insert plugs and continue filling until it appears at holes at the top of terminal studs. Insert plugs and continue pouring while the pothead and compound cools to fill air voids which might form.

Fig. 14 (857607)
Fig. 15 (857606)

When the pothead has cooled, remove filling pipe and insert plug. Clean off compound which might have overflowed on the outside of the porcelains.

(m) Assemble pothead connection bars (see Fig. 15), and insulate connections as follows:

(1) Fill all cavities around bolts and nuts with Duxseal compound to form smooth surface for taping, thus preventing air voids. This compound is not an insulating medium and should not be used for that purpose.

(2) Wrap with insulating tape, as shown in Fig. 19, the number of layers depending on the voltage rating of the equipment and the type of tape used. Where there are sharp angles, apply additional layers to obtain the equivalent of the insulation of the flat surfaces.

(3) Over the insulating tape, apply one layer of white cotton tape, half lap, as a binder.

(4) Over the white cotton tape, brush a good coat of varnish (U-310 for 15 KV and U-311 for 5 KV). Varnish may be thinned if necessary, with Xylene, D5B9.

Single-Conductor Potheads

The procedure for installation of single-conductor potheads is in general the same as described for three-conductor potheads. Refer to Fig. 20.

Fig. 12

Fig. 13

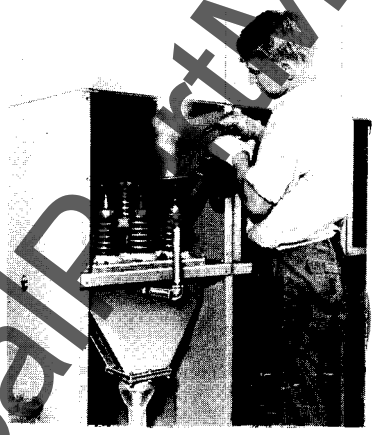


Fig. 14

Fig. 15

Cable Entrances Other Than Wiping Sleeve

Stuffing box cable entrance fittings are used for cables other than lead sheathed. These fittings may be provided with or without armor clamps as necessary.

The fitting consists of a cast and machined base, one or more rubber or neoprene washers, and a packing nut which compresses the washers around the cable. These parts should be assembled on the cable in the above order, with the base nearest to the pothead. The packing nut should be tightened after the cable is located in the pothead and before any compound is poured.

Where an armor clamp is required, it is usually made an integral part of the packing nut. This requires that the packing nut and the armor clamp be tightened on the cable before the assembly of the pothead is completed.

Cable Sheath or Conduit Grounding

Where three-conductor conducting sheath or shielded cables are used, or where non-conducting sheath cable is carried in metallic ducts or conduits, it is usually desirable that both ends of the cable sheath or conduit be grounded directly to the switchgear ground bus or structure or other apparatus. In some cases this may be accomplished by the mounting of potheads or terminating fittings on a grounded support. When such mounting cannot be arranged, a separate ground wire should be connected between the cable sheath or conduit and the switchgear ground bus.

Where single conductor conducting sheath cables are used, the same procedure

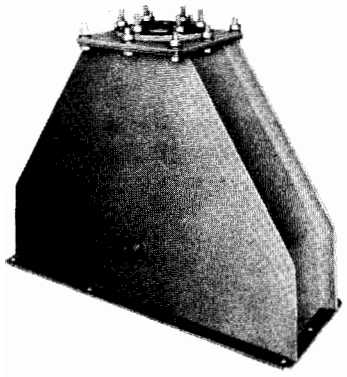
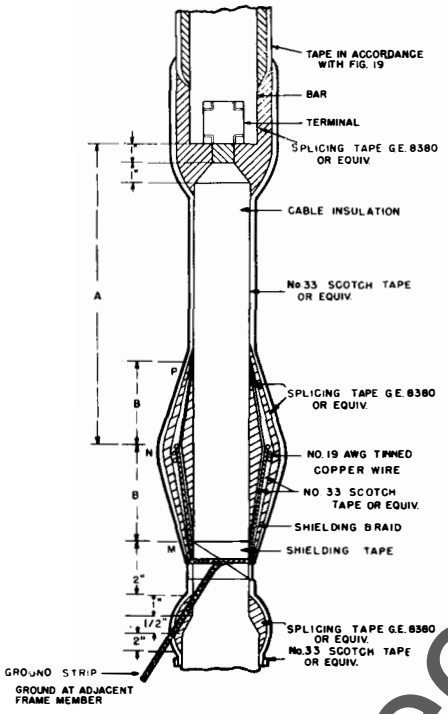


Fig. 16 Stuffing Box (with or without Clamping Ring)



Rated kv Phase to Phase	Dimensions in Inches A * Indoors Dry Locations	B
2 to 5	5	2
6 to 10	9	3
11 to 15	13	4

* For ungrounded neutral use 1.33 times the dimensions in selecting distance A.

Fig. 17 Termination Non-Leaded Cable Single-Conductor

should be observed, except that only one end of the sheath should be grounded. This also applies to single conductor non-conducting sheath cables in separate metallic conduits. Where three phases are carried by single conductors in a common metallic conduit, grounding procedure should be the same as that described for three conductor cables.

TERMINATION NONLEADED CABLE SINGLE-CONDUCTOR

1. Cut cable to proper length.

2. Remove jacket and cable tape for distance of A plus B plus 3 inches, plus length to be inserted into terminal lug.

3. Unwrap shielding tape to point M, cut and solder it in place avoiding excessive heat on insulation. Remove outer semi-conducting tape for same distance. Thoroughly clean surface from which the semi-conducting tape was removed.

4. Remove insulation and inner semi-conducting tape to expose conductor for distance of one inch plus length to be inserted into terminal lug.

5. Attach terminal lug to conductor.

6. Taper insulation for one inch as shown.

7. Apply end seal. Clean surface over which splicing tape is to be applied and coat with G-E No. A50P68 adhesive cement or equivalent. When solvent evaporates, build up with splicing tape GE8380 or equivalent, as shown.

8. Build stress cone. Clean cable surface and coat with G-E No. A50P68 adhesive cement or equivalent. When solvent evaporates, build up cone with splicing tape GE8380 or equivalent, for length B plus B. Between points M and P, tape is applied so that wrapped thickness at N is equal to 75% of the original insulation thickness - and so that the cone tapers to zero thickness at points M and P. Apply one layer No. 33 Scotch tape or equivalent, half lapped. Obtain a smooth wrapping but do not stretch tape more than necessary.

9. Pass a turn of tightly drawn braid around exposed portion of shielding tape at point M and solder in place. Then apply shielding braid in tightly drawn 1/16 inch lap wrappings to point N and spot solder. Terminate the braid by cutting 1/2 inch beyond soldering point. Turn down and solder loose ends to preceding turns. Wrap four to six turns of No. 19 AWG tinned copper wire around shielding braid and solder. Solder all turns of braid together along three lengthwise lines equally spaced around braided surface.

10. Solder - attach ground strip to shielding tape near cable covering. Cover stress cone with one layer No. 33 Scotch tape, half lapped. Obtain a smooth wrapping but do not stretch tape more than necessary. Add two layers of splicing tape.

11. Pencil jacket for 1/2 inch as shown. Clean surface. Tke particular care in cleaning outside jacket surface in order to entirely remove black wax finish. Coat with G-E No. A50P68 adhesive cement or equivalent. When solvent evaporates, apply splicing tape GE8380 or equivalent and

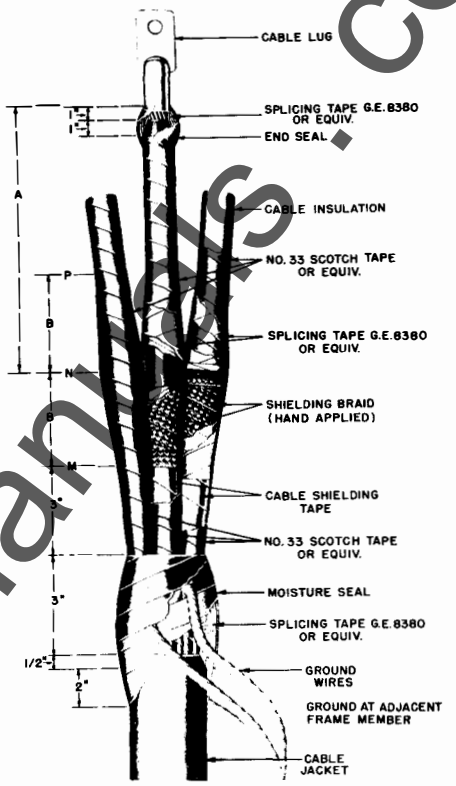


Fig. 18 Termination Non-Leaded Cable Multi-Conductor

make sheath seal as shown on drawing. Apply one layer No. 33 Scotch tape or equivalent, half lapped. Obtain a smooth wrapping but do not stretch tape more than necessary.

12. Over entire termination, apply two layers of No. 33 Scotch tape or equivalent, half lapped, in manner to shed water. Obtain a smooth wrapping but do not stretch tape more than necessary.

TERMINATION NONLEADED CABLE MULTI-CONDUCTOR

Make termination as indicated for single-conductor except - substitute the following for paragraphs 10, 11 and 12.

Pencil Geoprene jacket 1/2 inch. Clean surface over which sheath moisture seal is to be applied. Take particular care in cleaning outside jacket surface in order to entirely remove black wax finish. Coat with G-E No. A50P68 adhesive cement or equivalent. Allow to dry. Apply splicing tape GE8380 or equivalent to make moisture seal as shown. This is done by starting wrapping tape near end of jacket and wrapping over ground wires for 1-1/2 inches. Bend ground wires out and back over taping just applied and continue applying lap-

Fig. 16 (8004733)
Fig. 17 (B-230046-C)
Fig. 18 (B-232004-C)

ped layers of tape to completion of moisture seal including a complete tape seal in crotch formed between the three conductors. Bond and ground the ground wires.

For a multi-conductor cable not having ground wires, the individual terminations should have grounding strips applied as for a single-conductor termination. These grounding strips are to be joined together to a common ground. This common ground must then be grounded.

PRIMARY TERMINATIONS

Field Assembled

The primary termination (cable or bar) connections in both indoor and outdoor switchgear are reached by removing the rear bolted covers or doors when furnished. All field assembled primary joints and terminations must be insulated for the operating voltage.

Before any primary cable connections are made, the cables should be identified to indicate their phase relationship with the switchgear connections. This is necessary to insure that motors will rotate in the proper direction and that the phase rotation is the same when interconnecting two different sources of power.

No insulation materials are furnished for cable terminations and/or bar connections furnished by the customer. In all cases carefully follow the cable manufacturer's recommendations for installation of the type of cable being used.

Insulating Primary Cable Terminations

All field assembled joints for primary cable terminations should be prepared as outlined under "CONNECTIONS" in GEH-1802, items 1, 2, 3 and 4 for METAL CLAD SWITCHGEAR. Upon completion of the cable termination, care must be exercised when taping the exposed termination.

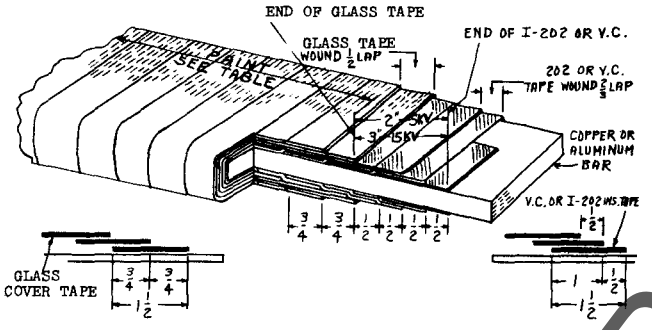
If the cable is aluminum, the conductor surface must be carefully abraided and the cable covered liberally with a joint compound recommended by the manufacturer.

(1) Check to see that a sufficient area of insulating tape extends beyond the painted glass tape furnished by the factory. (2" for 5KV, 3" for 15KV). It may be necessary to remove the current transformer primary conductor insulating support to obtain proper insulation joint overlap. Replace support upon completion of joint. Refer to Figure 19.

(2) All terminations should be insulated as outlined in table figure 19 for correct layers of insulating and glass tape.

(3) The instructions for application of the tape insulation is the same as outlined for "Taped Joints" items 1, 2, 4, 6 and 7. (GEH-1802)

Fig. 19 (K6500514)



INSULATION LEVEL	INSULATION LAYERS (NOTE 1) I-202 NOTE 2	GLASS NOTE 3	V.C. NOTE 4	PAINT APPLY ONE COAT LIBERALLY
5000V	2	1	4	STERLING U-311 BLACK
15,000V	4	1	7	STERLING U-310 BROWN

NOTE 1:
I-202 & V.C. - One layer, wound 2/3 lap requires 3 turns around bar in one width of tape. One layer thickness is 3 times tape thickness.
GLASS - One layer, wound 1/2 lap requires 2 turns around bar in one width of tape. One layer thickness is 2 times tape thickness.

NOTE 2:
Irrathene #202, width 1 1/2" thickness 0.010". Keep tension on tape at all times while applying.

NOTE 3:
Glass A2L12B width 1 1/2" thickness 0.004".

NOTE 4:
Varnished cambric A22A11A (#992) width 1 1/2", thickness 0.012".

Fig. 26 (K6500514) Insulation of Connection Bars

Fig. 19 Insulation of Connection Bars

Fig. 20 (414A757)

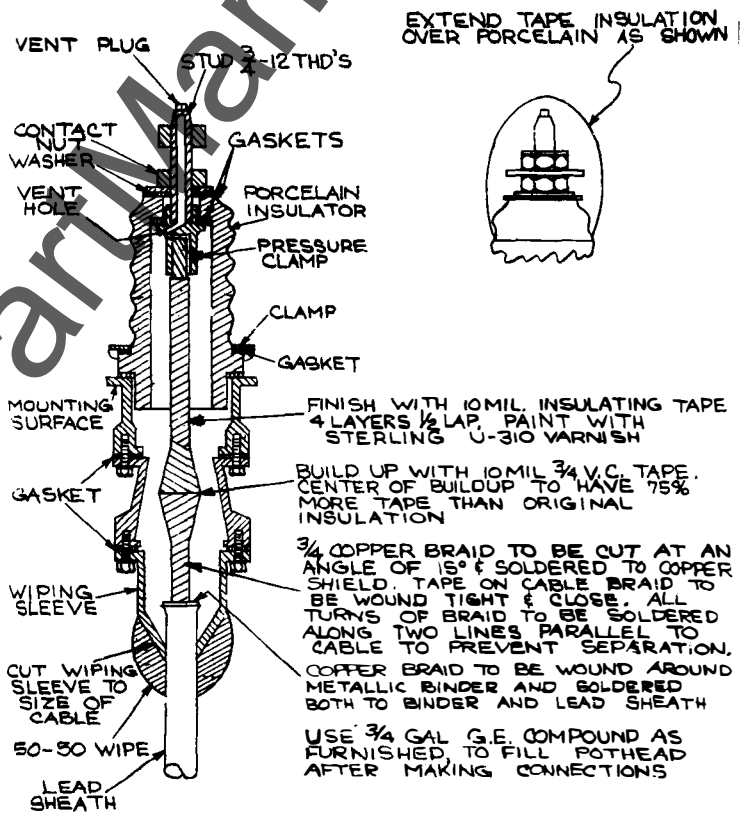


Figure 20 Single-Conductor Pothead Assembly

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