



HEAVY MAINTENANCE INSTRUCTIONS MAIN TRANSFORMER

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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.

Verify numbers for parts, tools, or material by using the Renewal Parts or Tool Catalogs, or contact your General Electric representative for assistance. Do not order from this publication.

INTRODUCTION

SCOPE

This section contains instructions necessary to maintain, disassemble, repair and reassemble the main transformer for the commuter car. These instructions are to be used with reference material located in Red Tab 13 of this manual. This reference material is appropriately identified throughout the following instructions.

The maintenance and repair of the main transformer should be accomplished by qualified personnel only.

DESCRIPTION

The transformer covered by this instruction is of the forced liquid-cooled type (see Figs. 16-1, 16-2, and 16-3). The cooling medium (Pyranol*) is circulated through the transformer windings and through the heat exchanger by a pump. The heat exchanger is bolted to angles on the side of the transformer tank. An air blast to cool the Pyranol is drawn across the external surface of the heat exchanger tubes by two fans. The Pyranol circulating pump and the fans must be in operation whenever the transformer is energized under load.

WARNING: *The Pyranol used in this transformer contains polychlorinated biphenyls which are considered an environmental contaminant. Extreme care should be taken to prevent any entry into the environment through spills, leakage, use, disposal, vaporization, or otherwise. For further information refer to the nearest sales office of the General Electric Company.*

The high-voltage lead (H1) is connected to the transformer through a plug-in cable terminator (1, Fig. 16-4) in a pocket (I. 1, Fig. 16-2 and 28, Fig. 16-4) on the nameplate side of the transformer tank.

The high voltage winding is equipped with a wedge-type tap changer (27, Fig. 16-4) for **de-energized** operation which provides a means of making changes in the transformer ratio. See nameplate, figure 16-5. DO **NOT** operate the tap changer without first removing load and excitation from the transformer.

The grounded end of the high-voltage winding of the transformer is brought outside the transformer tank through a rod bushing (7, Fig. 16-2 and 2, Fig. 16-4) located on the same side of the transformer as the high-voltage connector (H1). A permanent ground connection is made from this rod bushing to a low resistance ground for operation on testing of the transformer. The ground block (22, Fig. 16-4) must also be connected to ground before operation of the transformer.

The low-voltage windings of the transformer are brought out through bushings (6, Fig. 16-1 and 3, Fig. 16-4) on the side of the transformer tank opposite the high-voltage side. See figure 16-9 for bushing detail.

Care should be exercised to protect the high-voltage and low-voltage terminals from mechanical injury during handling of the transformer.

Connection

Do not change connections with either load or excitation on the transformer or make any connections other than those authorized by the nameplate, see figure 16-5.

Gaskets

All gaskets supplied on this Pyranol transformer are made of silicone rubber and **viton**. The gaskets should be prepared and applied as explained in Instructions **GEI-28009**.

Storage

Before storing a transformer, check to see that the Pyranol is at the proper level as described in the section FILLING TRANSFORMER in this section. The storage room should be clean and dry, without extreme temperature changes. Before a transformer is placed in service after having been in storage, instructions on PERIODIC INSPECTION in Instructions **GEI-28006** should be read carefully, particularly with regard to moisture.

Relief Devices

A pressure relief device (4, Fig. 16-1 and 10, Fig. 16-4) mounted over the air expansion box, is an instantaneous over-pressure protector, set to operate at 12 ± 1.0 psi. See figure 16-6 for detail. It is designed to relieve an instantaneous pressure build-up. The normal tank operating pressure is 5.0 psi.

A safety valve (14, Fig. 16-2 and 17, Fig. 16-4), mounted on the side of the air expansion box, is set to operate at 10 ± 0.5 psi. It is designed to relieve a gradual pressure build-up. See figure 16-7 for valve detail.

*Product Of GENERAL ELECTRIC CO.

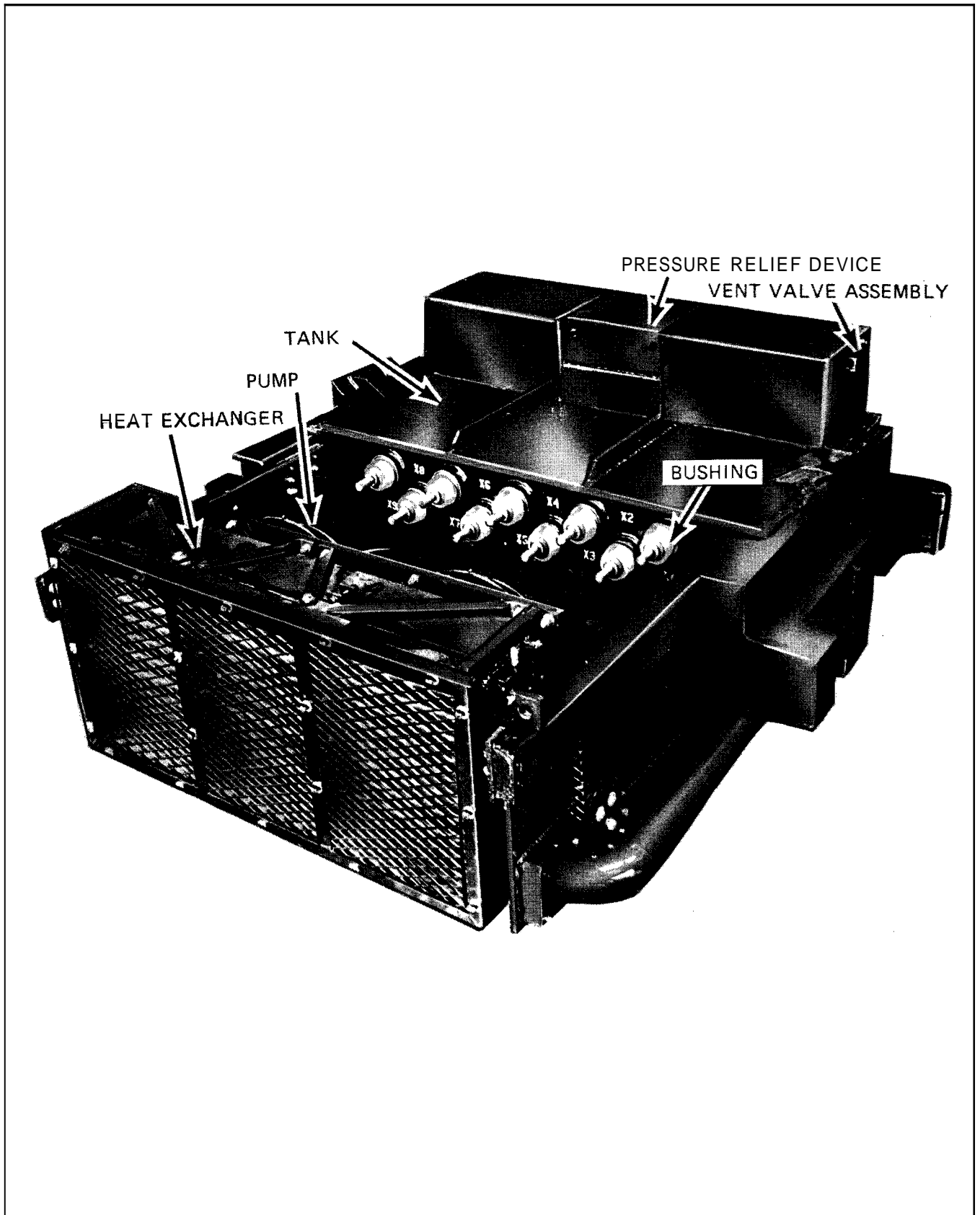


FIG. 16-1. LOW VOLTAGE SIDE. E-18801

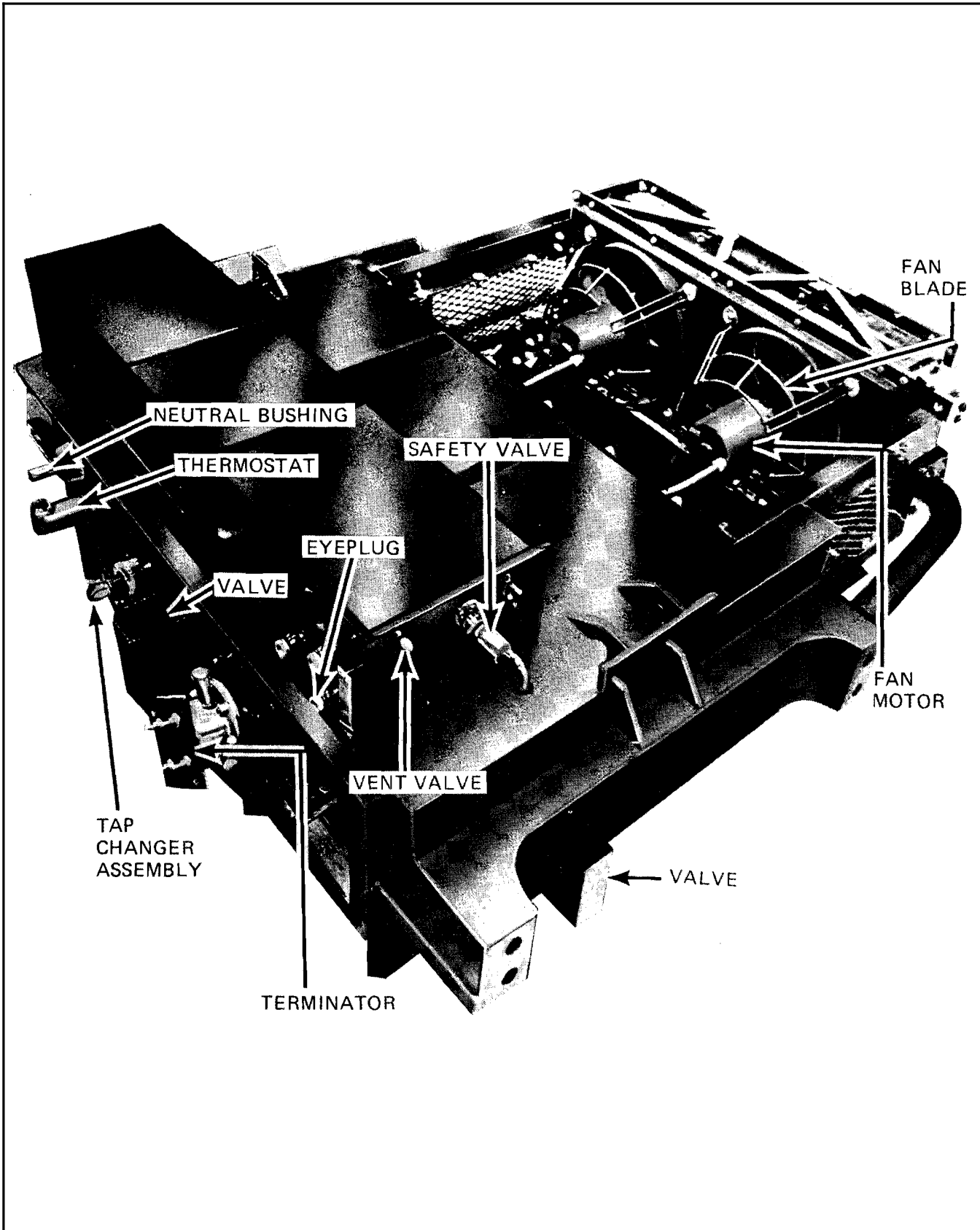


FIG. 16-2. HIGH VOLTAGE SIDE. E-18802

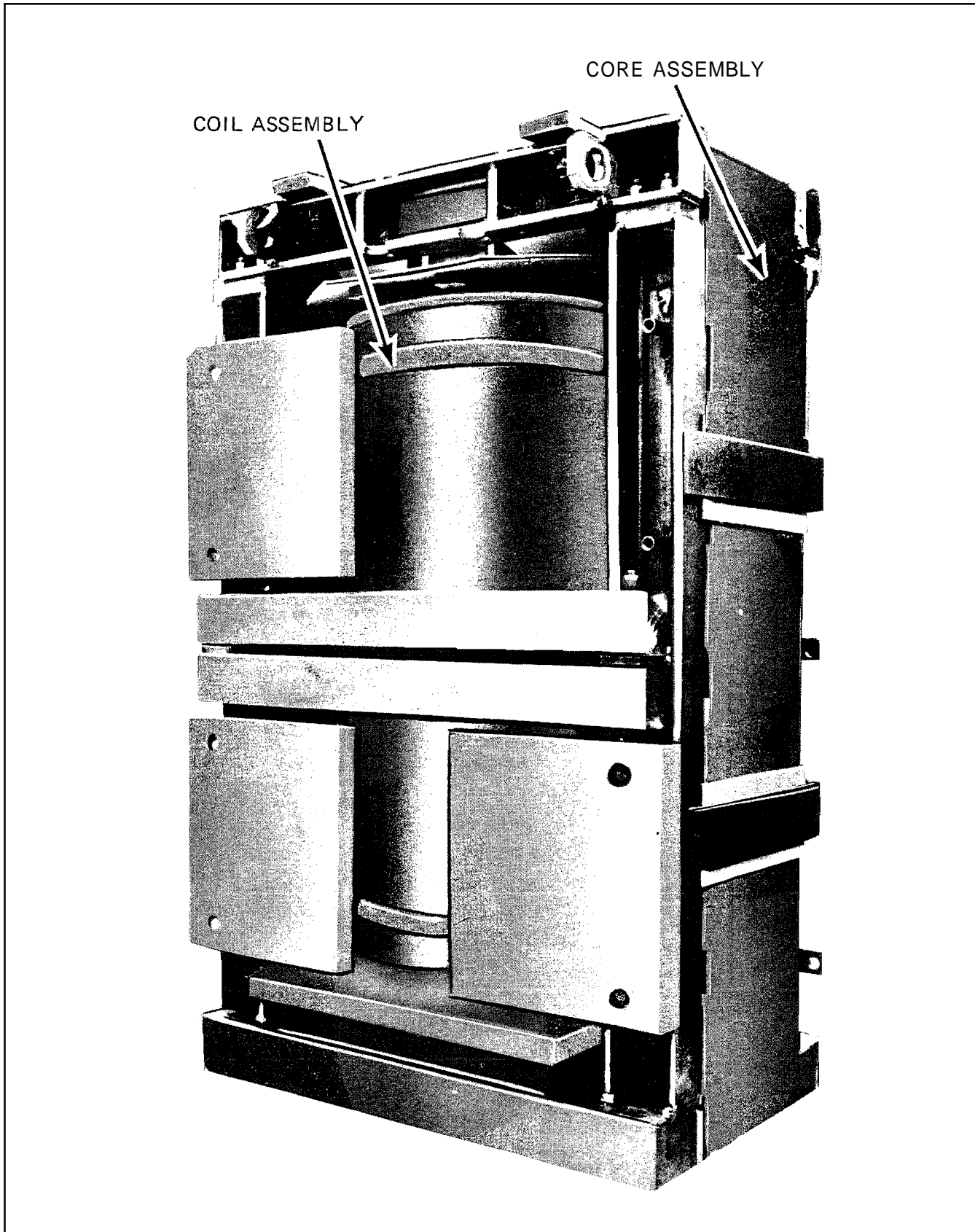
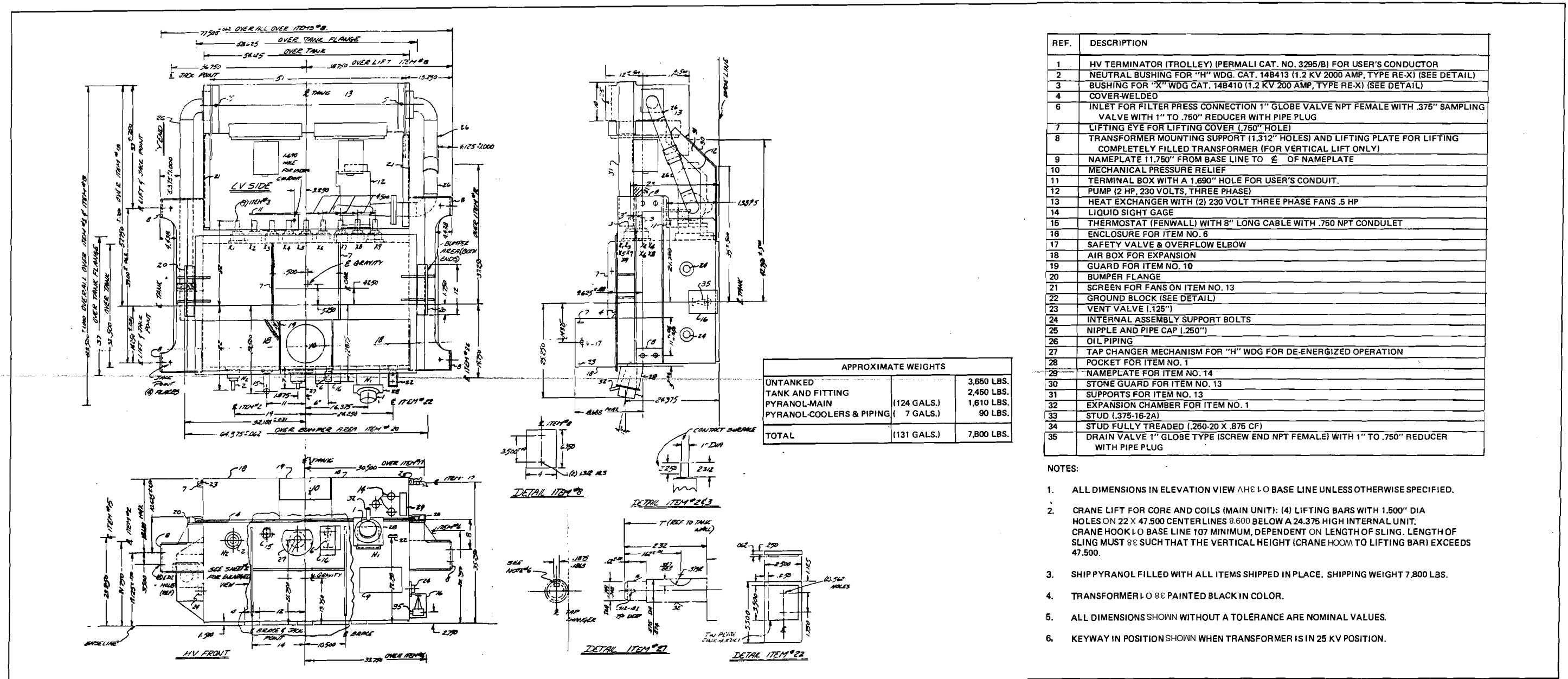


FIG. 16-3. COIL AND CORE ASSEMBLY. E-18803



REF.	DESCRIPTION
1	HV TERMINATOR (TROLLEY) (PERMALI CAT. NO. 3295/BI FOR USER'S CONDUCTOR
2	NEUTRAL BUSHING FOR "H" WDG. CAT. 148413 (1.2 KV 2000 AMP, TYPE RE-X) (SEE DETAIL)
3	BUSHING FOR "X" WDG CAT. 148410 (1.2 KV 200 AMP, TYPE RE-X) (SEE DETAIL)
4	COVER-WELDED
6	INLET FOR FILTER PRESS CONNECTION 1" GLOBE VALVE NPT FEMALE WITH .375" SAMPLING VALVE WITH 1" TO .750" REDUCER WITH PIPE PLUG
7	LIFTING EYE FOR LIFTING COVER (.750" HOLE)
8	TRANSFORMER MOUNTING SUPPORT (1.312" HOLES) AND LIFTING PLATE FOR LIFTING COMPLETELY FILLED TRANSFORMER (FOR VERTICAL LIFT ONLY)
9	NAMEPLATE 11.750" FROM BASE LINE TO \bar{c} OF NAMEPLATE
10	MECHANICAL PRESSURE RELIEF
11	TERMINAL BOX WITH A 1.690" HOLE FOR USER'S CONDUIT.
12	PUMP (2 HP, 230 VOLTS, THREE PHASE)
13	HEAT EXCHANGER WITH (2) 230 VOLT THREE PHASE FANS .5 HP
14	LIQUID SIGHT GAGE
15	THERMOSTAT (FENWALL) WITH 8" LONG CABLE WITH .750 NPT CONDULET
16	ENCLOSURE FOR ITEM NO. 6
17	SAFETY VALVE & OVERFLOW ELBOW
18	AIR BOX FOR EXPANSION
19	GUARD FOR ITEM NO. 10
20	BUMPER FLANGE
21	SCREEN FOR FANS ON ITEM NO. 13
22	GROUND BLOCK (SEE DETAIL)
23	VENT VALVE (.125")
24	INTERNAL ASSEMBLY SUPPORT BOLTS
25	NIPPLE AND PIPE CAP (.250")
26	OIL PIPING
27	TAP CHANGER MECHANISM FOR "H" WDG FOR DE-ENERGIZED OPERATION
28	POCKET FOR ITEM NO. 1
29	NAMEPLATE FOR ITEM NO. 14
30	STONE GUARD FOR ITEM NO. 13
31	SUPPORTS FOR ITEM NO. 13
32	EXPANSION CHAMBER FOR ITEM NO. 1
33	STUD (.375-16-2A)
34	STUD FULLY TREADED (.250-20 X .875 CF)
35	DRAIN VALVE 1" GLOBE TYPE (SCREW END NPT FEMALE) WITH 1" TO .750" REDUCER WITH PIPE PLUG

- NOTES:
- ALL DIMENSIONS IN ELEVATION VIEW ARE TO BASE LINE UNLESS OTHERWISE SPECIFIED.
 - CRANE LIFT FOR CORE AND COILS (MAIN UNIT): (4) LIFTING BARS WITH 1.500" DIA HOLES ON 22 X 47.500 CENTER LINES 8.600 BELOW A 24.375 HIGH INTERNAL UNIT. CRANE HOOK TO BASE LINE 107 MINIMUM, DEPENDENT ON LENGTH OF SLING. LENGTH OF SLING MUST BE SUCH THAT THE VERTICAL HEIGHT (CRANE HOOK TO LIFTING BAR) EXCEEDS 47.500.
 - SHIP PYRANOL FILLED WITH ALL ITEMS SHIPPED IN PLACE. SHIPPING WEIGHT 7,800 LBS.
 - TRANSFORMER TO BE PAINTED BLACK IN COLOR.
 - ALL DIMENSIONS SHOWN WITHOUT A TOLERANCE ARE NOMINAL VALUES.
 - KEYWAY IN POSITION SHOWN WHEN TRANSFORMER IS IN 25 KV POSITION.

FIG. 16-4. TRANSFORMER OUTLINE. E-18804

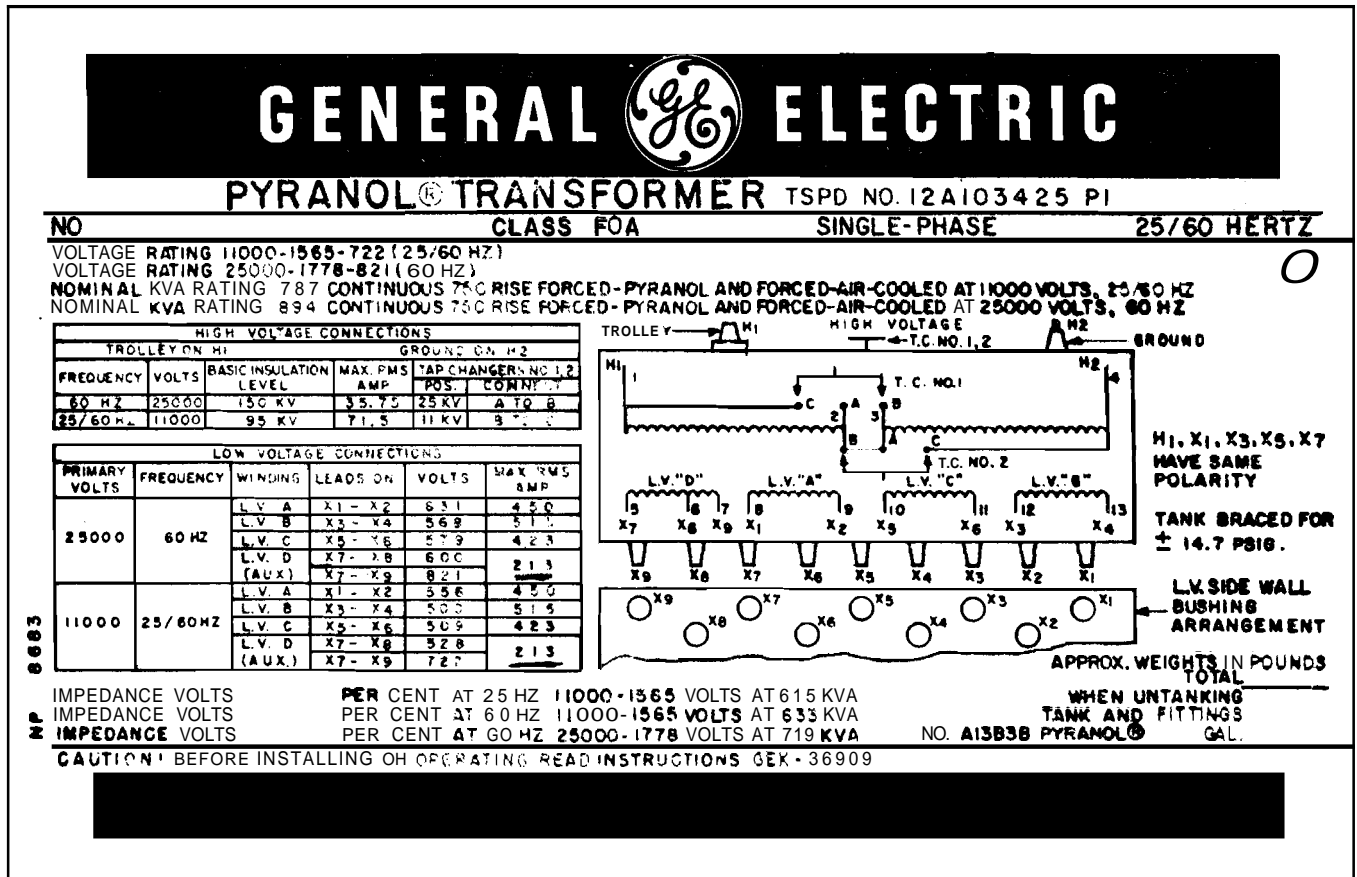


FIG. 16-5. TRANSFORMER NAMEPLATE. E-18805

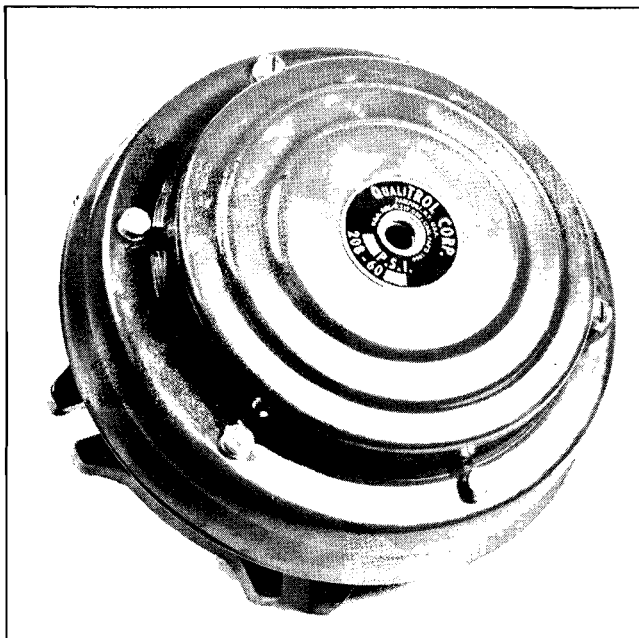


FIG. 16-6. PRESSURE RELIEF DEVICE. E-17283

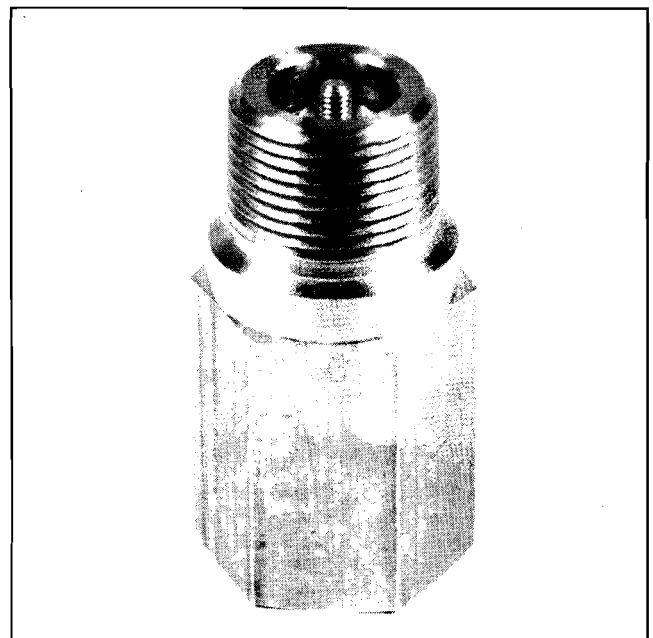


FIG. 16-7. SAFETY VALVE. E-17284

Thermostat

A thermostatic control device (8, Fig. 16-2 and 15, Fig. 16-4) is installed in a well located in the side tank wall with the well extending into the Pyranol. The thermostatic switch has been adjusted at the factory to close its contacts at 95°C on increasing temperature and this setting must not be changed. The switch contact ratings are 1 ampere in a 75-volt d-c circuit or 2 amperes in a 37.5-volt d-c circuit. The thermostatic switch is provided with normally open contacts which will close at the temperature for which it has been set. The closed contacts complete a circuit which energizes the TRF relay. This relay removes power from the propulsion contactors resulting in a car without propulsion power.

If the thermostatic switch is replaced or removed, silicone grease (m/s 985) must be inserted between the bulb of the device and the thermostatic well.

Heat Exchanger

The heat exchanger, (3, Fig. 16-1) consists of a number of aluminum cooling tubes with helical fins which are formed as an integral part of each tube. The ends of each tube are rolled into aluminum header plates at both ends and placed in a casing. A steel cover plate is located below and an aluminum plate above the heat exchanger tubes. The unit is mounted on supports on the side of the tank.

Pump

The pump and motor assembly (2, Fig. 16-1 and 12, Fig. 16-4) are sealed in a housing which has a liquid-tight terminal outlet for power connections to the motor.

The motor-operated pump, mounted on the end of the transformer tank circulates the Pyranol insulating liquid through the transformer and heat exchanger.

The pump motor is rated 1750 revolutions per minute 230-volts three-phase, 60 Hz.

Pump rotation can be determined by means of a sight glass with a removable protective cover located at the terminal end of the motor.

For inspection purposes only, the motor and complete rotating assembly can be removed from the pump without disturbing the suction or discharge connections. However, if repairs are necessary, replace the complete unit.

Terminator Installation

Refer to drawings T-F-4251 and 16-F-4251 for installation of the high-voltage terminator (item 1, Outline drawing 3915D693). The tools and equipment listed on the top of the drawing T-F-4251 are necessary for installation of the terminator. Refer to Red Tab 13.

MAINTENANCE AND REPAIR

MAINTENANCE

Cleaning the Tubes

Cleaning the outside surfaces of the tubes may be found necessary at times as determined by observation. A stream of water or steam under pressure may be used for this operation.

NOTE: *Direct steam or water away from the fans and electrical connections. DO NOT use caustic soda solutions.*

Fan Maintenance

The fans (12 & 13, Fig. 16-2) and associated equipment require little maintenance. Test the operations of the fans monthly, and clean the blades of any accumulation of dirt.

The ball-bearing fan motors should be lubricated every two years or 6000 operating hours, whichever occurs first. Use G.E. ball-bearing grease, G.E. Cat. No. D6A2C13. To prevent damage to the motor, remove the four grease relief plugs and replace two adjacent grease relief plugs with 1/4-27 NPT grease fittings. Add the grease slowly until it starts to come out of the opening.

Note that the fan motor bearings are of a double shield construction. The shields permit passage of the oil in the grease to lubricate the bearing balls.

Correct rotation of the fans is counterclockwise, when facing the shaft end of the fan motor. Fan motor and pump wiring are depicted in figure 16-8.

Filling Transformer

The transformer is shipped with Pyranol. If it becomes necessary to drain and refill the transformer, the transformer must be refilled under vacuum. Refer to Instruction Book GEI-28083 and the following procedure when vacuum filling the transformer.

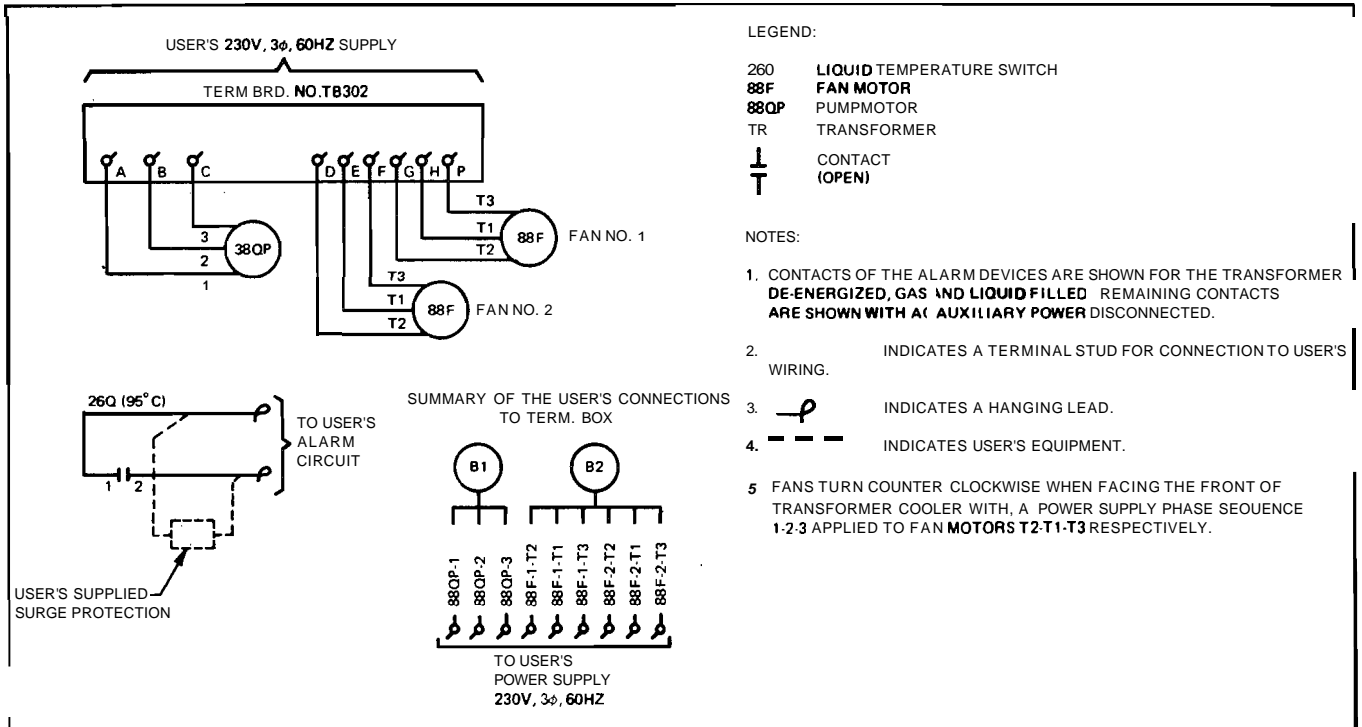


FIG. 16-8. FAN MOTOR AND PUMP MOTOR WIRING. E-18806

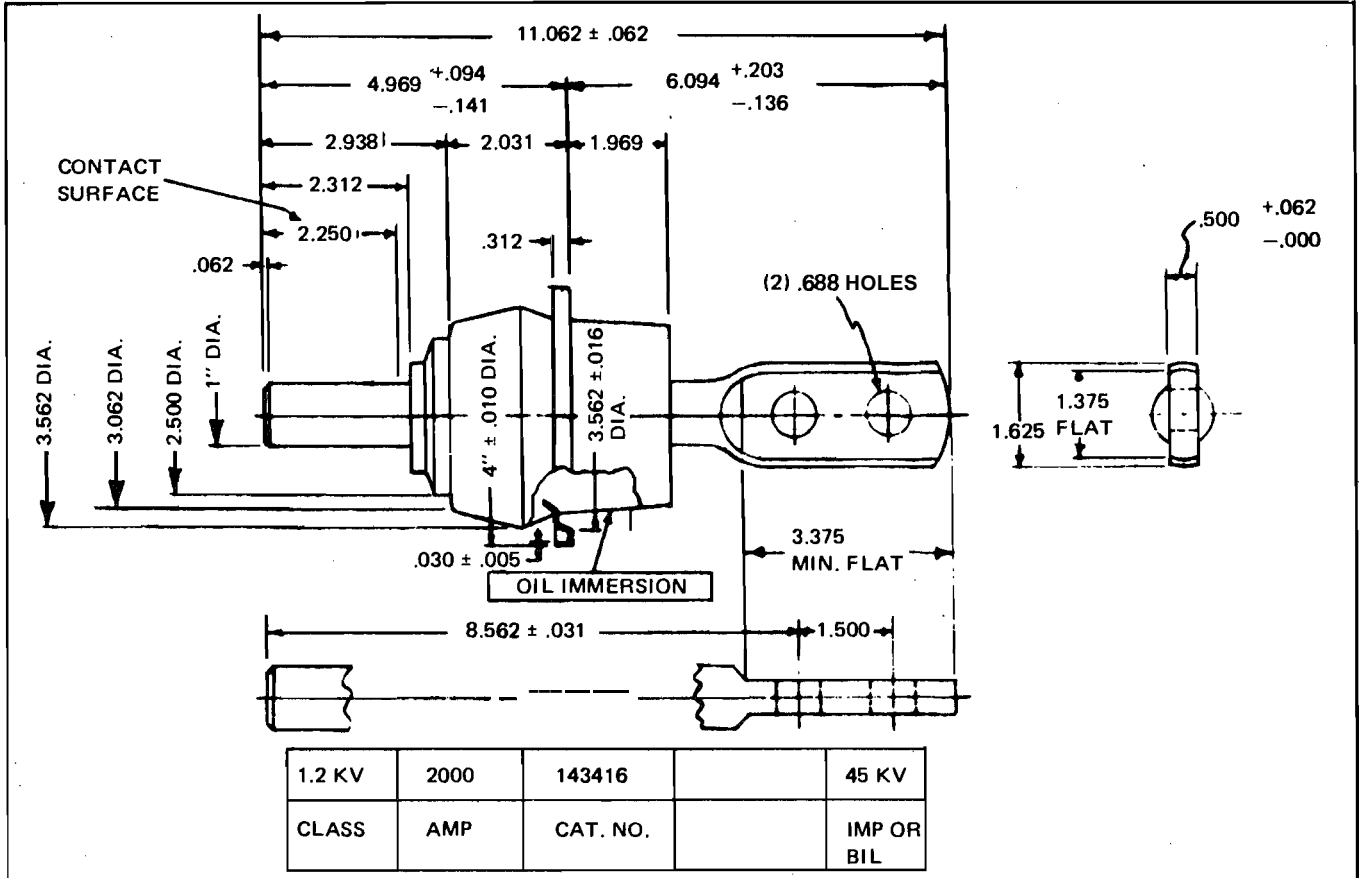


FIG. 16-9. LOW VOLTAGE BUSHINGS. E-17286

Before filling the transformer, make sure all joints are tight. In order to prevent aeration of the Pyranol, **fill** the transformer through the drain valves (10, Fig. 16-2 and 35 and 6, Fig. 16-4) with a filter press. Continue the filling until the level of the Pyranol reaches the **25°C** mark on the liquid sight gauge, (15, Fig. 16-2, 14, Fig. 16-4). The liquid level at **25°C** is located at a point 3.25 inches above the main tank in the air expansion box. If filling is done with Pyranol at temperature other than **25°C**, adjust the Pyranol level to the liquid temperature by adding or removing Pyranol. The liquid level in the main tank varies 0.123 inch for each **10°C** difference in temperature and in the expansion tank varies 0.3 inch.

The transformer is so constructed that, at certain sections, air might be entrapped temporarily when filling. To make certain that the entrapped air is removed from the insulation structure, operate the Pyranol circulating pump for a period of four hours after filling has been completed. Open then close the air vent valves (5, Fig. 16-1 and 16-20, and 23, Fig. 16-4).

After filling, the Pyranol level should be checked carefully. Also check the level of the Pyranol before placing the transformer in service. One week after filling the transformer, the Pyranol should be again checked for proper level. If the level of the Pyranol is low, **fill** the correct level before applying voltage.

All traces of Pyranol should be removed from the outside of the transformer tank by cleaning the surface with denatured alcohol, Naptha or Benzine. See WARNING statement in step 8 under DISASSEMBLY.

Filtering and Drying Pyranol Transformers

Instructions GEH-1031 explain the use of a Pyranol Purifier.

If it is ever necessary to dry a Pyranol transformer the short-circuit method of drying can be used. This method of drying is described in detail in instructions **GEI-28007**.

The Pyranol-filled transformer should be treated the same as an oil-filled transformer from the standpoint of maintenance, operation, over-voltage protection, and overcurrent protection. Specific instructions on items peculiar to Pyranol, such as handling, periodic inspection, sampling, and testing are contained in Instructions **GEI-28006**.

Painting

The transformer tank and cooler are painted with black non-conductive paint to Sherwin-Williams transportation

specification **F44BN413**. If additional paint is applied to the transformer, caution should be exercised to see that the bushings, (6, Fig. 16-1 and 7, 16-2) and particularly the contact surface between the semiconductor of the bushing well and the high-voltage connector, are adequately masked from the paint.

Handling Transformer

Four lifting holes (8, Fig. 16-4) are provided (two on each end of the tank) near the mounting points of the transformer tank. These are to be used for vertical lifting of the transformer. Before lifting the transformer tank, position the lifting cables to prevent damage to any of the transformer accessories. Do not place jacks or tackle under drain valves, heat exchanger connections, or from the transformer mounts, but jack the transformer only under the four corners. When rollers are used, skids should be provided to distribute the stress over the base. The transformer must always be handled in an upright position.

Removing Heat Exchanger

The heat exchanger (cooler) is designed to be removed while mounted on the car, but it is recommended to first remove the transformer from the car before attempting removal of the cooler.

WARNING: *If the heat exchanger is removed while the transformer is mounted on the railroad car, the cooler should be properly supported to prevent injury to personnel.*

The following procedure is recommended for removal of the heat exchanger:

1. De-energize the transformer.
2. Drain the Pyranol insulating liquid from the transformer by opening the bottom valve and an air vent above the top level of the Pyranol.
3. Remove the fan screen (21, Fig. 16-4).
4. Remove the heat exchanger guard (30, Fig. 16-4).
5. Disconnect all electrical connections to the fans.
6. Disconnect the cooler piping.
7. Unbolt the nuts holding the cooler to the cooler support channels. Note the position of all shims, washers, and bolt assemblies so they can be located correctly when re-assembling, see figure 16-1.

8. Lifting eyes are located at each end of the cooler as shown in figure 16-1.

NOTE: *Avoid any strain on the heat exchanger tubes.*

NOTE: *The transformer to cooler piping is aligned with the transformer and the pump at the factory for accurate positioning of the cooler. In the event that a replacement pipe must be installed, bending may be necessary. The pipe is of low carbon furnace seam-welded steel type and may be heated to a dull red for bending.*

Special tools and equipment are necessary to properly repair the heat exchanger tubes. Should a leak develop in the tubes contact the nearest General Electric Sales Office.

DISASSEMBLY

NOTE: *See Table I and figure 16-11 for specific detailed instructions on what components to remove for each assembly to be removed from the car.*

Removal of Transformer From Car

1. Remove the bottom cover from the area between the transformer and the cooler. Remove the 8 bolts and loosen 10 bolts to loosen the cover.

2. Remove all 9 power connections to the transformer secondary taps. Loosen the clamp that fastens onto the transformer bushing.

3. Disconnect the 3 power connections for the blower fans and the Pyranol pump from the terminal box (10 screws in box cover).

4. Loosen the conduit from the terminal box top.

5. Bundle all the wires together and fasten to the car conduit systems. This will insure that the wires are not damaged when the transformer is removed from the car.

6. Remove the power leads from the high voltage (primary) side of the transformer.

- a. Loosen the clamps on the Ground lead that connects to the transformer bushing.
- b. Untape the high voltage lead.

- c. Loosen the cable retainer.
- d. Unplug the cable from the connector.

7. Disconnect the thermostat leads.

- a. Open up the conduit junction box.
- b. Disconnect the wires.
- c. Remove the conduit where it attaches to the transformer.
- d. Move the conduit out of the way. Fasten it so that it won't get damaged when the transformer is removed from the car.

8. Remove the ground wire from the transformer case ground pad.

9. Bundle all the wires together and tie them out of the way so that they will not be damaged when the transformer is removed from the car.

10. Place a lifting cradle on the drop table so that the transformer can be removed easily from the drop table.

11. Remove the two 1-1/4 inch mounting bolts from the transformer support assembly. These are the two lower bolts that fasten, to the mounting feet on the transformer, same the **shims**.

NOTE: *It may be necessary to move (up or down) the transformer with the drop table in order to remove these bolts.*

12. Check that the transformer isn't binding while the drop table is being lowered.

13. Check that all the wires, pipes, etc. are completely free before the transformer is completely removed from underneath the car.

Mounting Disassembly

1. Remove the 4 Lateral Support Assembly. There are two assemblies on each side of the transformer.

- a. Remove the 3/4 inch nuts at the center of the transformer.
- b. Remove the 3/4 inch mounting bolts at the transformer mount assembly.
- c. Remove the Lateral Support Assemblies.

2. Remove the 4 shock absorbers from the transformer.
 - a. Remove the 3/4 inch mounting bolts on both ends of the shock absorbers.
 - b. Remove the shock absorbers.
3. Remove the 4 transformer support mount assembly.
 - a. Remove the four 1-1/2 inch shouldered bolts (one from each support assembly).
 - b. Remove the eight 5/8 inch mounting bolts from each support assembly. These bolts fasten the assembly to the cross member on the car structure.
4. To disassemble the mount assembly:
 - a. Remove the three 5/8 inch bolts that fasten the shock pads together.

Transformer Disassembly

1. Drain the **Pyranol** from the tank by opening the bottom valve, (10, Fig. 16-2) and an air vent (5, Fig. 16-1, Fig. 16-2) above the top level of the Pyranol.
2. Remove the pressure-relief assembly, (4, Fig. 16-1) the liquid-sight gauge (15, Fig. 16-2), the thermostat and well (8, Fig. 16-2).
3. Remove the cover. Refer to instructions GEI-28008.
4. Remove all bushings (6, Fig. 16-1 and 7, 16-2) so that the leads will be free when the core and coils are being lifted from the tank, see figure 16-10. Refer to GET-3535 for the method of removing the bushings.
5. Burn or chip off the welds on the internal support bolts (27, Fig. 16-4), and remove the bolts.
6. Remove the core and coils (Fig. 16-10) from the tank for inspection, being careful to pull the leads from the bushing openings as the core and coils are being removed. Refer to the following procedure and figure 16-4 to remove the core and coils.

A crane with a hook capable of being raised to at least 107 inches above the base of the transformer is required. A minimum vertical distance of 47.5 inches from the crane hook to the core and coil lifting eyes are required to minimize vertical stress. These distances will permit a clearance of 6 inches between the core and coils and the transformer tank. To achieve a vertical lift, the length of the lifting cables must be approximately 2 inches longer to the "Y" end lifting eyes. (See Fig. 16-4.)

7. Order repair material without unnecessary disassembly.
8. Replace core and coils in tank and either replace the **bushings** or use plates over the openings, then cover with Pyranol.
9. When repair material is at hand, remove Pyranol and then the core and coils.
10. Flush out tank with Pyranol or naphtha. Also flush core and coils with Pyranol to remove any sludge or deposits.

WARNING: *Naptha may be used in an emergency, but presents fire and explosion hazard. Precautions must be taken against this hazard if this liquid is used. Remove all final traces of naptha with a blast of dry air.*

11. Disassemble lamination and clean with 'naptha.

INSPECTION AND REPAIR

Clean laminations with naptha. See WARNING statement in step 10.

Before installation, inspect the transformer carefully for any damage which might have occurred in transit. Tighten the pump, cooler, fans, and all nuts and leads which might have worked loose during shipment.

The transformer must be inspected and repaired per the instructions in GEK-38312.

The shock absorbers must be inspected and repaired per the instructions in GEK-38312.

The lateral support assembly bonded mount must be checked for physical damage.

1. Replace the bonded mount if the cracks are larger than superficial surface cracks.
2. Replace the bonded mount if any of the mount is torn away.

The transformer bonded sandwich mount must be checked for physical damage.

1. Replace the bonded sandwich mount if the cracks are larger than superficial surface cracks.
2. Replace the bonded sandwich mount if any of the rubber is torn away.
3. Replace the bonded sandwich mount if the **rubber** to metal bond is bad (rubber loosening from the metal).

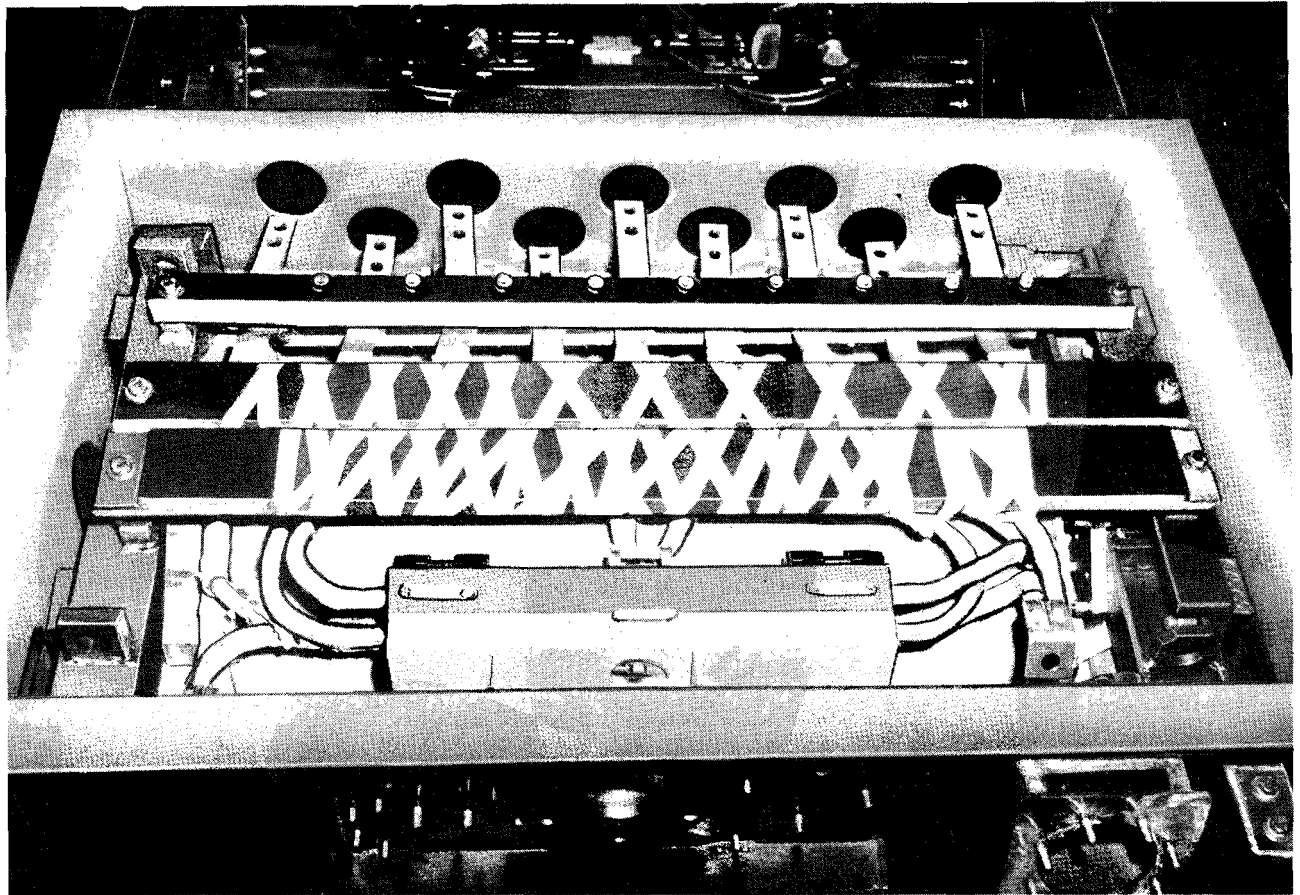


FIG. 16-10. CORE READY FOR REMOVAL. E-18807

REASSEMBLY

Transformer Reassembly

1. Remove ~~the~~ core and coils from the ~~tank~~ and drain the Pyranol.
2. Assemble repair material and reassemble the core.
3. Assemble core and coils in the tank. Reconnect all leads and obstructions which had been disconnected.
4. Weld cover in place using the asbestos gasket between cover and tank flange when welding cover to tank. Refer to instructions GEI-28008.
5. Vacuum **fill** with Pyranol, see **GEI-28083B**.
6. Dry the transformer by the **short-circuit** method. Seal the tank and circulate the Pyranol with the purifier.

The above operations should be performed by one who is thoroughly familiar with the factory procedure in handling Pyranol transformers.

7. Prepare all cables and wires that mate to the transformer.
 - a. The highvoltage lead from the pantograph should have the connector installed per instructions in GEK-38312(13).
 - b. The connectors that fasten the ground and secondary terminals to the car wiring should be checked for corrosion, burn marks, and mechanical damage. Repair or replace the connectors as required. Torque the bolts that fasten the connectors to the car wiring to 65-75 inch-pounds.
 - c. Check all the control wiring terminals for physical damage, corrosion, and burn marks. Repair or replace as required.
 - d. Check all the conduit that fastens to the transformer. Insure that the threads on the conduit are good. Retread as required.
 - e. Check all conduit and wiring troughs, where the wires to the transformer, exit. Insure that **all** sharp edges are removed and covered with material which will eliminate the chafing of the wire insulation.

Mounting Reassembly

1. Reassemble the four transformer support mount assemblies, see figure 16-11.
 - a. Position the bonded sandwich mounting (17) on either side of the transformer support mount (33).
 - b. Install the three $5/8$ inch bolts (18, 19, 20).
 - c. Torque these bolts to 110-120 ft-lbs.
2. Assemble the four transformer support mount assemblies to the cross member on the car body.
 - a. Install the four $5/8$ inch bolts, (7) into the assembly and finger tighten the nuts (8, 9).
 - b. Install the $1\ 1/2$ inch shouldered bolt (10, 11, 12) and torque this bolt to 1570-1740 ft-lbs.
 - c. Torque the four $5/8$ inch bolts (7) to 110-120 ft-lbs.
3. Install the four shock absorbers (27) between the car body cross member and the transformer support mount assemblies with the two $3/4$ inch bolts (28, 29, 30, 31). Finger tighten the eight nuts.
4. Install the four lateral support assemblies two on each side of the transformer.
 - a. Lubricate the rubber mount and socket lightly with rubber lubricant (DC 36 mix*) or equivalent.
 - b. Per sketch "A", figure 16-11, insert mount (3) squarely in the hole and press (tighten nuts) until the large diameter is firmly seated against the side plate of the mounting assembly.
 - c. Remove the threaded rod or bolt and insert the rod assy. lateral support (21) with its associated hardware (1, 2). Tighten until the washer bottoms on the sleeve that is bonded within the rubber mount (3).
 - d. Install the rod end (24) on the lateral support rod assy. (21). Adjust the rod end to line up with the hole in the transformer support plate (33). Tighten the mounting hardware (25, 26).

*Product of Shields Rubber Co.

Installation of Transformer on Car

1. Position the transformer onto a drop table (10,000 lb. capacity) and position the transformer under the car.
2. Lift the transformer into place, shim and align the mounting pads. Insert the two **1-1/4** inch mounting bolts (34, 35, 36) in each mounting pad and finger tighten the eight nuts.
3. Check that the transformer is positioned properly and that there isn't any binding. The drop table may have to be moved up, down or to the side to properly position the transformer.
4. Torque **all** bolts.
 - a. The eight **3/4** inch lateral support assembly bolts to **185-210 ft-lbs.**
 - b. The eight **3/4** inch shock absorber bolts to **185-210 ft-lbs.**
 - c. The eight **1-1/4** inch transformer mounting bolts to **900-1000 ft-lbs.**
5. Remove the drop table from underneath the car.
6. Attach nine wires to the terminals from the **secondaries** on the transformer. Torque all the connector bolts to 65-75 inch-pounds.
7. Attach the conduit to the top of the terminal box. Remove the ten screws from the box cover.
8. Attach the three control wires to the terminal board. Torque these bolts to 25-30 inch-pounds.
9. Install the cover on the terminal box. Torque the ten screws to 25-30 inch-pounds.
10. Attach the cover to the bottom of the transformer. Slip one end over the ten bolts on the transformer tank and fasten the other end to the cooler unit with eight bolts. Torque **all** eighteen bolts to 65-75 inch-pounds.
11. Attach the ground wire to the transformer ground pad on the tank. Torque the bolts to 65-75 inch-pounds.
12. Attach the conduit to the thermostat and open the conduit.
13. Connect the wires to the thermostat leads and insulate.

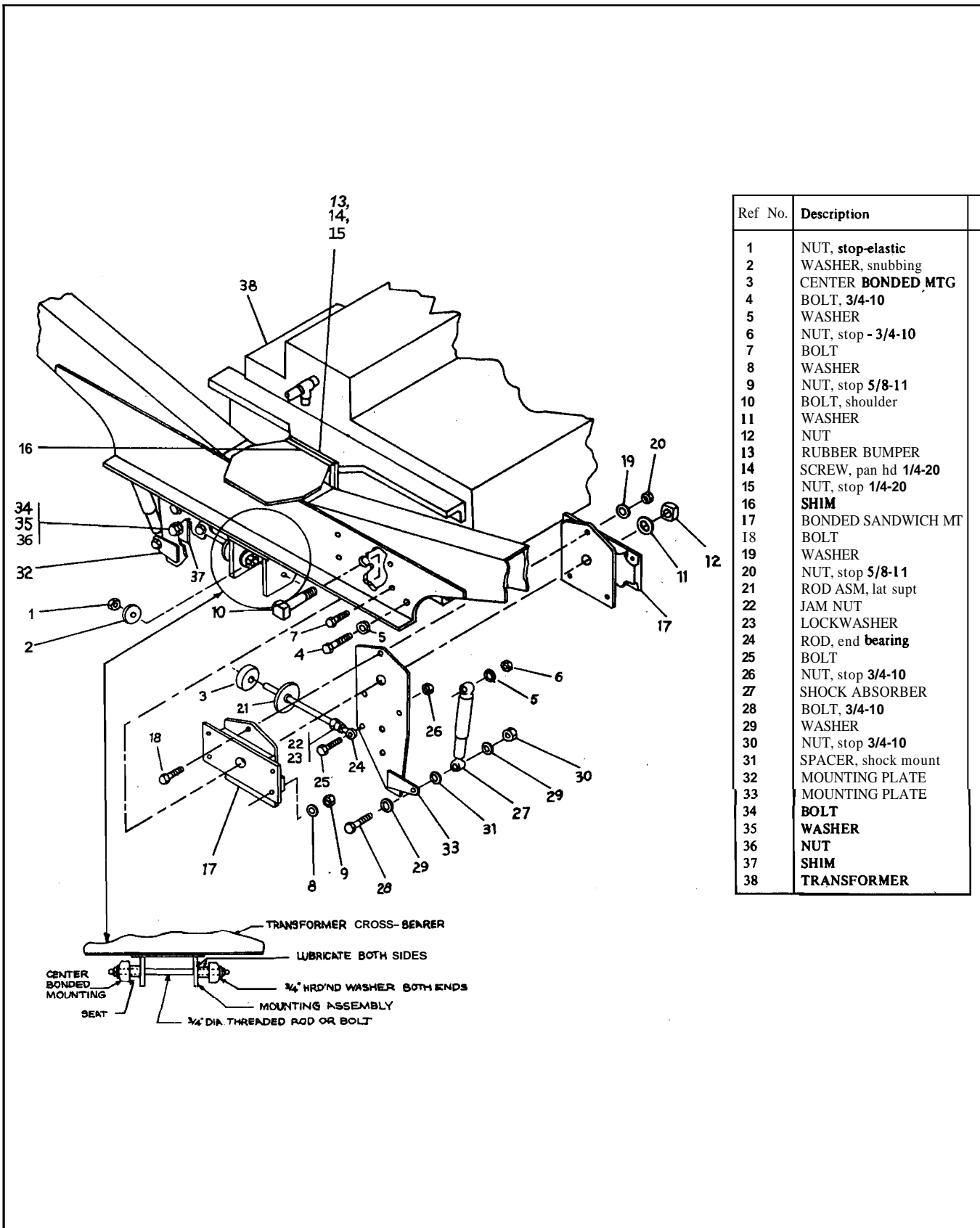
14. Fasten the cover on the conduit.
15. Attach the ground wire to the transformer ground stud. Torque the bolts in the connector to 65-75 inch-pounds.
16. Assemble the hi-voltage lead into the connector and tighten into place. Wrap with insulating material.

REPAIRS AND REPLACEMENTS

Refer all questions concerning repair and replacement of the transformer and accessory parts to the General Electric Company, Transit Systems Products Department, Erie, Pennsylvania 16501.

TABLE I

To remove the	Perform the following procedures
Shock Absorber (27)	<ol style="list-style-type: none"> 1. Remove the top mounting hardware 4, 5, 6. 2. Remove the bottom mounting hardware 28, 29, 30, 31.
Lateral Support (21)	<ol style="list-style-type: none"> 1. Remove the hardware 25, 26 from the mounting plate 33. 2. Remove the hardware 1,2 from the car body mounting pads. 3. Remove the center bonded mounting 3.
Bonded Sandwich (17)	<ol style="list-style-type: none"> 1. Remove the bottom shock mount 28, 29, 30, 31. 2. Remove the Lateral Support Rod Assembly 24, 25, 26. 3. Remove the hardware 18, 19, 20 from the mounting plate 33. 4. Remove the hardware 10, 11, 12 from the car body mounting pads. 5. Remove the hardware 7, 8, 9 from the car body mounting pads.
Transformer (38)	<ol style="list-style-type: none"> 1. Remove the hardware 34, 35, 36 from the mounting plate 33 and remove the transformer from underneath the car. Note: Mark the location and amount of shims. At reassembly replace as required per assembly instructions.



Ref No.	Description
1	NUT, stop-elastic
2	WASHER, snubbing
3	CENTER BONDED MTG
4	BOLT, 3/4-10
5	WASHER
6	NUT, stop - 3/4-10
7	BOLT
8	WASHER
9	NUT, stop 5/8-11
10	BOLT, shoulder
11	WASHER
12	NUT
13	RUBBER BUMPER
14	SCREW, pan hd 1/4-20
15	NUT, stop 1/4-20
16	SHIM
17	BONDED SANDWICH MT
18	BOLT
19	WASHER
20	NUT, stop 5/8-11
21	ROD ASM, lat supt
22	JAM NUT
23	LOCKWASHER
24	ROD, end bearing
25	BOLT
26	NUT, stop 3/4-10
27	SHOCK ABSORBER
28	BOLT, 3/4-10
29	WASHER
30	NUT, stop 3/4-10
31	SPACER, shock mount
32	MOUNTING PLATE
33	MOUNTING PLATE
34	BOLT
35	WASHER
36	NUT
37	SHIM
38	TRANSFORMER

FIG. 16-11. MAIN TRANSFORMER INSTALLATION. E-18732