

MAINTENANCE INSTRUCTION

D18 ALTERNATOR

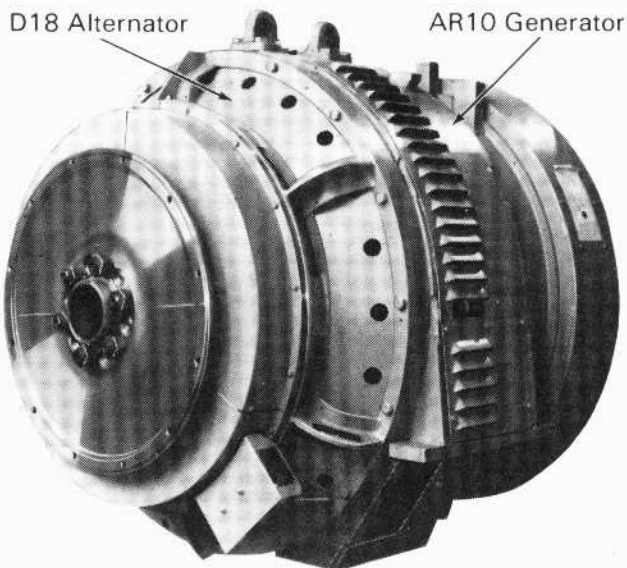
DESCRIPTION

The D18 alternator is physically connected to but electrically independent of the main generator, Fig. 1. The D18 rotor (field) is excited by low voltage current which is received from the auxiliary generator through a pair of slip rings adjacent to the slip rings for the main generator.

200 KVA at 0.8 power factor. Nominal output of the D18 alternator is 215 volts at 120 Hz when the diesel engine is rotating at a speed of 900 RPM. The D18 alternator and main generator rotating assembly is directly coupled to the crankshaft of the diesel engine.

The D18 alternator provides power for auxiliaries such as the inertial filter blower motor and radiator blower motor, and also provides power for excitation of the main generator and for various control circuits.

The D18 alternator, Fig. 2, can be used with either an AC or DC generator. The most apparent differences in the application of the D18 alternator

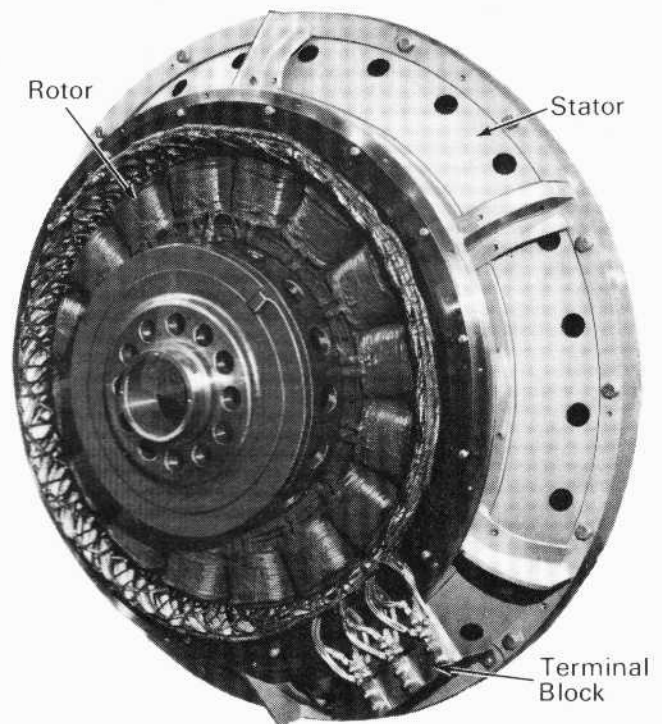


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Fig.1 - AR10-D18 Generator/Alternator Assembly

There are no controls in the D18 excitation circuit, thus the alternator will be excited and developing power whenever the diesel engine is running. Output voltage will vary with speed of rotation, alternator temperature, and load.

The D18 alternator is a variable frequency, variable voltage, rotating field, stationary armature, three phase, wye connected AC generator with a rating of



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Fig.2 - D18 Alternator

to an AC or DC generator are in the collector ring assemblies. Collector ring size and number differ, Fig. 3 and 4.

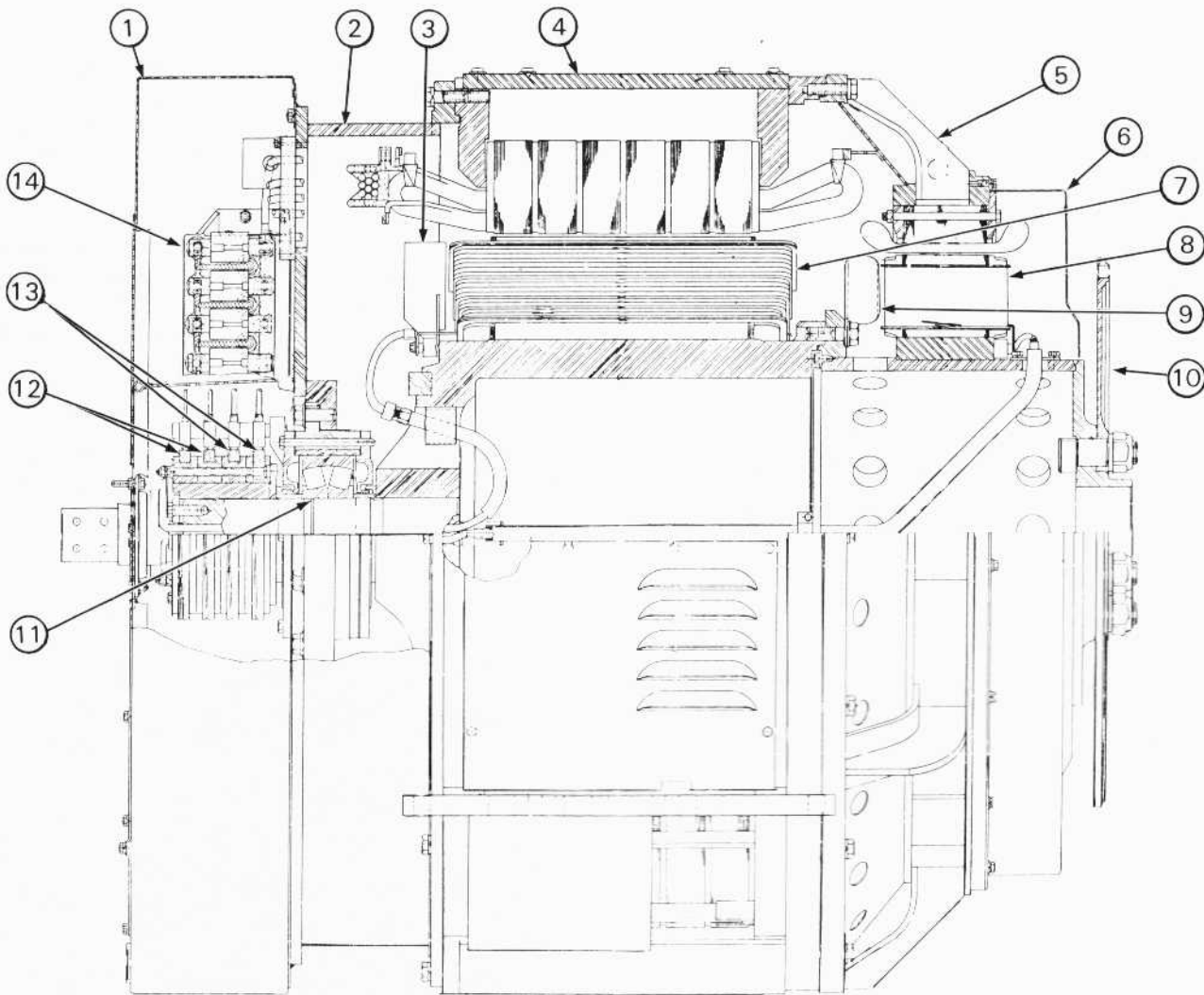
Four 279.4 mm (11") collector rings sharing a common assembly are used on the AC generator application. Main generator excitation is accomplished through the two inboard rings, and alternator excitation through the two outboard rings.

The DC main generator application has only two collector rings and associated equipment to provide

excitation to the alternator. The collector rings are approximately 236.54 mm (9-5/16"). Excitation to the DC generator is provided through the commutator and commutator brush assembly.

OPERATION

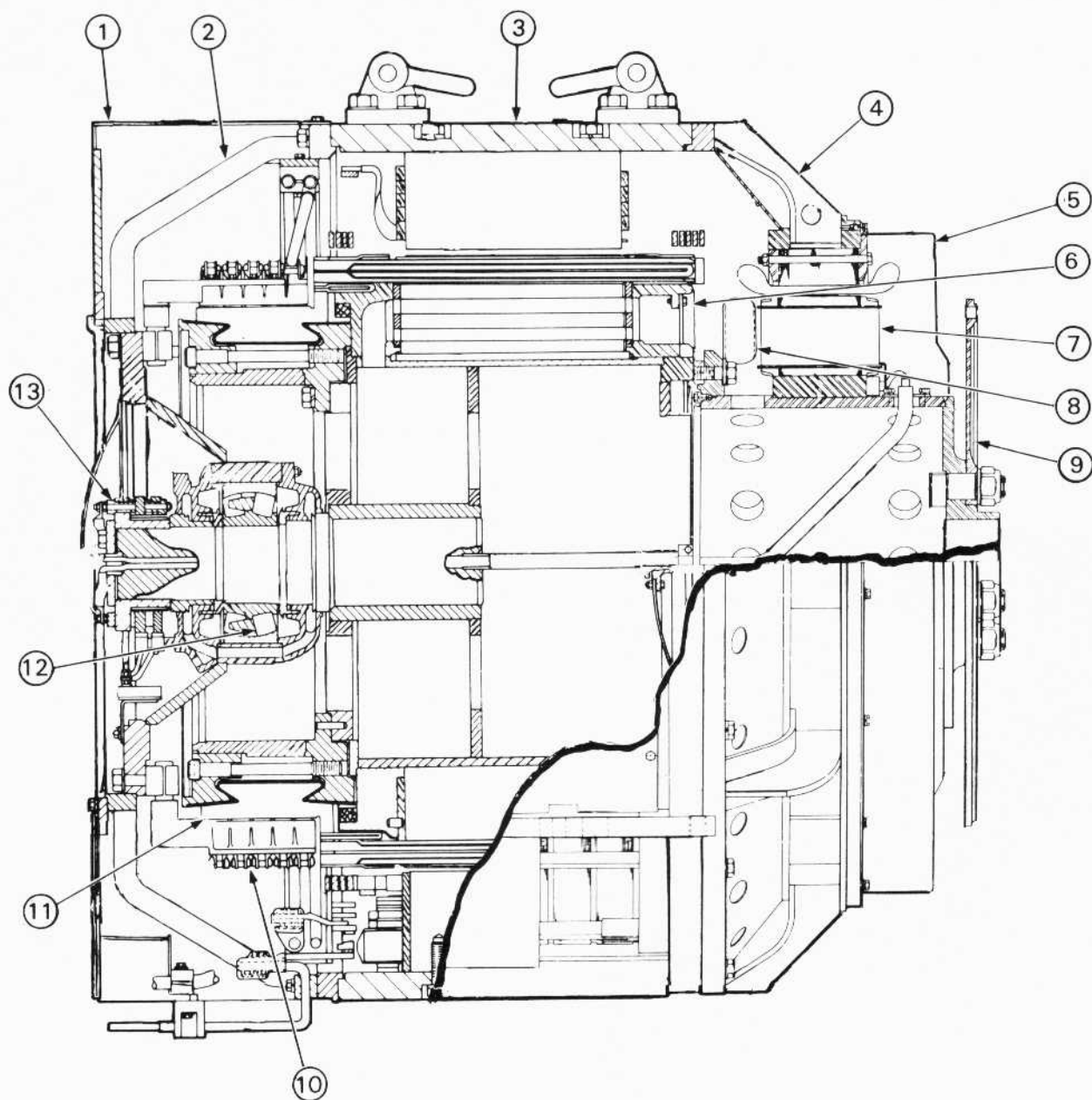
The alternator stator assembly is bolted directly to the main generator frame. The rotor or rotating field assembly is bolted at one end to the main generator field assembly, and to the engine at the other end by means of a disc type coupling.



- | | |
|----------------------|--------------------------------|
| 1. Air Box | 8. Alternator Rotor |
| 2. End Housing | 9. Fan Assembly |
| 3. Fan Assembly | 10. Coupling Disc |
| 4. Generator Stator | 11. Bearing Assembly |
| 5. Alternator Stator | 12. Alternator Collector Rings |
| 6. Closure Assembly | 13. Generator Collector Rings |
| 7. Generator Rotor | 14. Rectifier Bank |

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Fig.3 - Typical AC Generator (With Rectifier Assembly)/D18
Alternator Assembly, Cross-Section



- | | |
|-----------------------|--------------------------------|
| 1. Air Box | 8. Fan Assembly |
| 2. End Housing | 9. Coupling Disc |
| 3. Generator Stator | 10. Commutator Brush Holders |
| 4. Alternator Stator | 11. Commutator Assembly |
| 5. Enclosure Assembly | 12. Bearing Assembly |
| 6. Generator Armature | 13. Alternator Collector Rings |
| 7. Alternator Rotor | |

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Fig.4 - Typical DC Generator/D18 Alternator Assembly, Cross-Section

The separately excited field consists of 16 main pole coils. The coils are connected in two series groups of 8 coils each, with the coils connected alternately inner and outer on adjacent poles. This is possible because the coils are wound alternately crossed and open, permitting opposite polarity at adjacent poles. The two series groups of 8 coils each are connected in parallel.

MAINTENANCE

The alternator should be inspected and cleaned at intervals specified in the applicable Scheduled Maintenance Program. The extent of maintenance required is determined by the operation and service to which the generator is subjected.

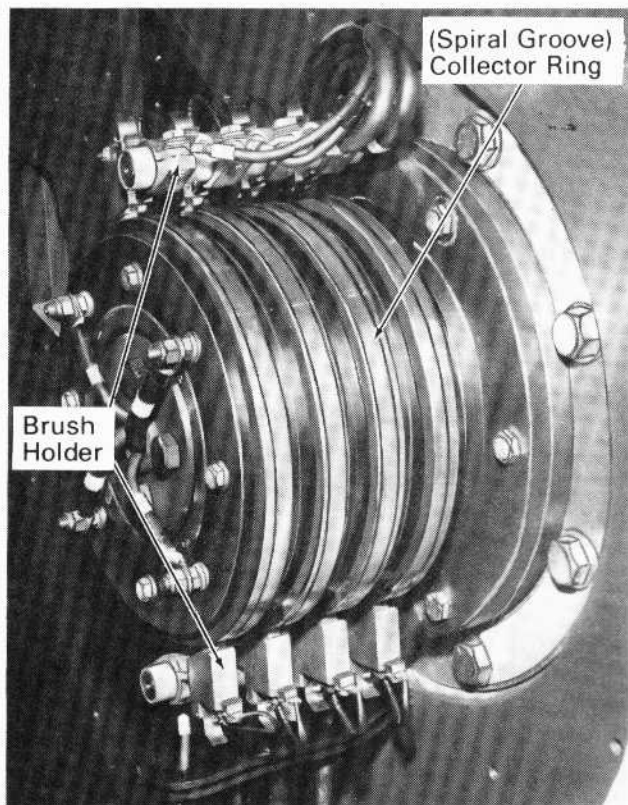
INSPECTION

CABLES AND TERMINAL BOARD

Ensure tightness of all mechanical and electrical connections. Cable connections to the terminal board and brush holders should be intact. Using dry cloths, wipe away any accumulation of dirt.

COLLECTOR RINGS, BRUSHES, AND BRUSH HOLDERS

The collector rings, Figs. 5 and 6, should be checked frequently while generator is in operation. Eliminate sparking conditions immediately. Normally, the negative ring will experience wear more rapidly than the positive ring. To minimize the unequal wear, reverse the ring polarity at six-month intervals.

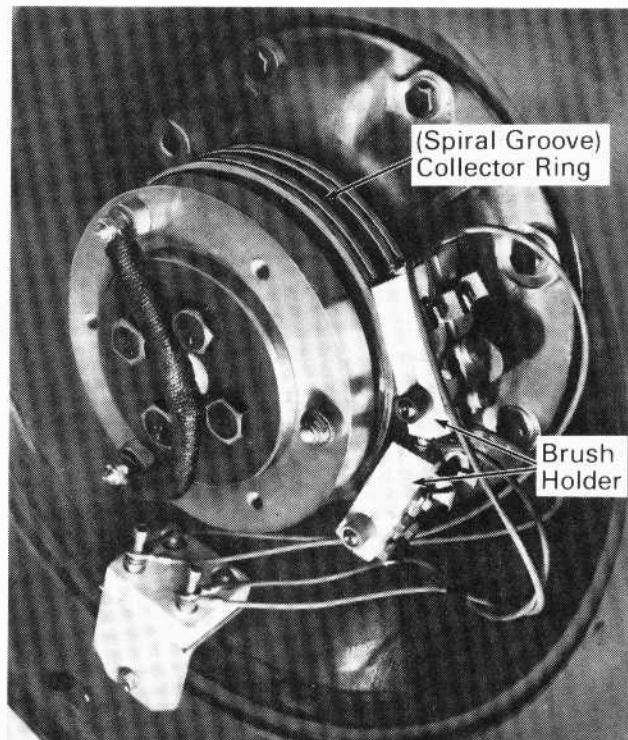


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Fig.5 – Typical AC Generator/D18 Brush Holder And Collector Ring Cable Connection Application

The following conditions may result in sparking on collector rings:

1. Collector rings not running concentric with shaft.
2. Collector ring surface rough or pitted.
3. Brushes tight in brush holder.



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Fig.6 – Typical DC Generator/D18 Brush Holder And Collector Ring Cable Connection Application

4. Oil on surface of collector ring.
5. Vibration of brush holder studs.

If collector ring surfaces are oily, wipe off the surface of the rings and brushes with a clean, dry, bound edge cloth.

A rough or pitted collector ring surface is usually due to prolonged sparking. Usually this condition can be corrected by grinding.

On the AC generator/alternator installation, collector ring concentricity should be within 0.15 mm (.006") total indicator reading (rings installed on generator), and lateral runout within 0.8 mm (1/32"). If these tolerances are exceeded, the rings will have to be machined. The diameter of a new ring is 279.40 mm (11.000"), Fig. 7. The minimum acceptable diameter on the collector rings is 260.35 mm (10-1/4"). If rough rings cannot be cleaned up without going below the minimum diameter, they should be replaced.

WARNING

Misapplication of generator and alternator collector ring leads can result in continuous excitation of the main generator from the alternator field leads. This condition could result in a serious accident when the diesel

engine is running and placed on the line. If power contactors are picked up, the locomotive can inadvertently move when the isolation switch is placed in "run" position.

Qualified personnel should check continuity to ensure proper connection of collector ring terminals in the appropriate outboard and inboard collector rings. Two different cable sizes are used to connect the collector ring leads: Cable size 37/24 (smaller) and 125/24 (larger). Connect the smaller alternator cables to the outboard collector rings "1" and "2", and the larger generator cables to the inboard collector rings "3" and "4", Fig. 7.

To minimize the possibility of misapplied collector ring cables, alternator leads are marked "1" and "2" and generator leads "3" and "4". Collector rings are stamped correspondingly on the outboard faces adjacent to the insulation.

The DC generator/alternator installation collector rings are smaller, approximately 241 mm (9.5"). Collector ring concentricity should be within 0.15 mm (.006") total indicator reading (rings installed on generator), and lateral runout within 0.8 mm (1/32"). If these tolerances are exceeded, the rings will have to be machined or stoned. The diameter of a new ring is 236.52 mm (9.312"), Fig. 8. The minimum acceptable diameter on the collector rings is 225.42 mm (8.875"). If rough rings cannot be cleaned up without going below the minimum diameter, they should be replaced.

Before grinding, remove brush holder assembly, and install the grinder and adapter to the applicable tapped holes or studs provided.

Position the grinder so there will be 3 mm (1/8") clearance between it and the rings to be ground. Install grinding stones in position on the grinder, making certain there will be enough travel to grind the rings.

Make the necessary preparation to start the engine, and run at approximately 600 RPM.

CAUTION

Be sure the grinding stones do not contact the collector rings until the generator begins rotating. Then gradually bring the stones in contact with the rings.

When the stones are in contact with the rings, proceed to grind until the ring surface is smooth. After grinding, check the surface with a dial indicator. Concentricity should not exceed 0.15 mm (.006") total indicator reading.

When the grind operation is complete, remove the grinding equipment. Blow out all grinding dust and reassemble the brush holder assembly in its proper position. Renew brushes if necessary, and follow instructions given under "Sanding-In" New Brushes.

CAUTION

Because of the continued abrasive action, do not use emery cloth for polishing collector rings.

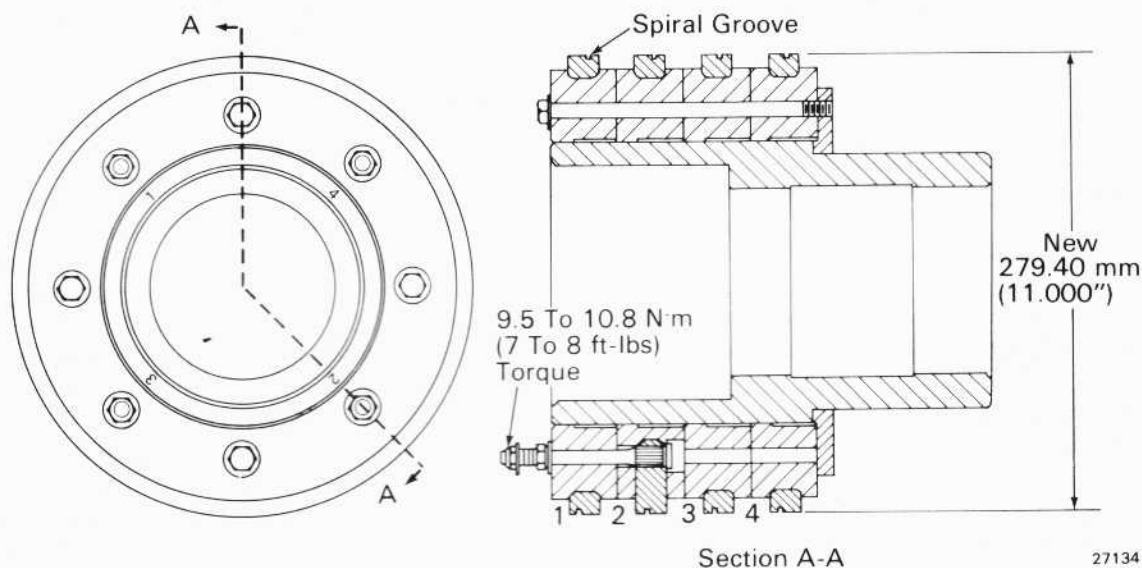


Fig.7 - AC Generator Collector Ring Assembly, Cross-Section

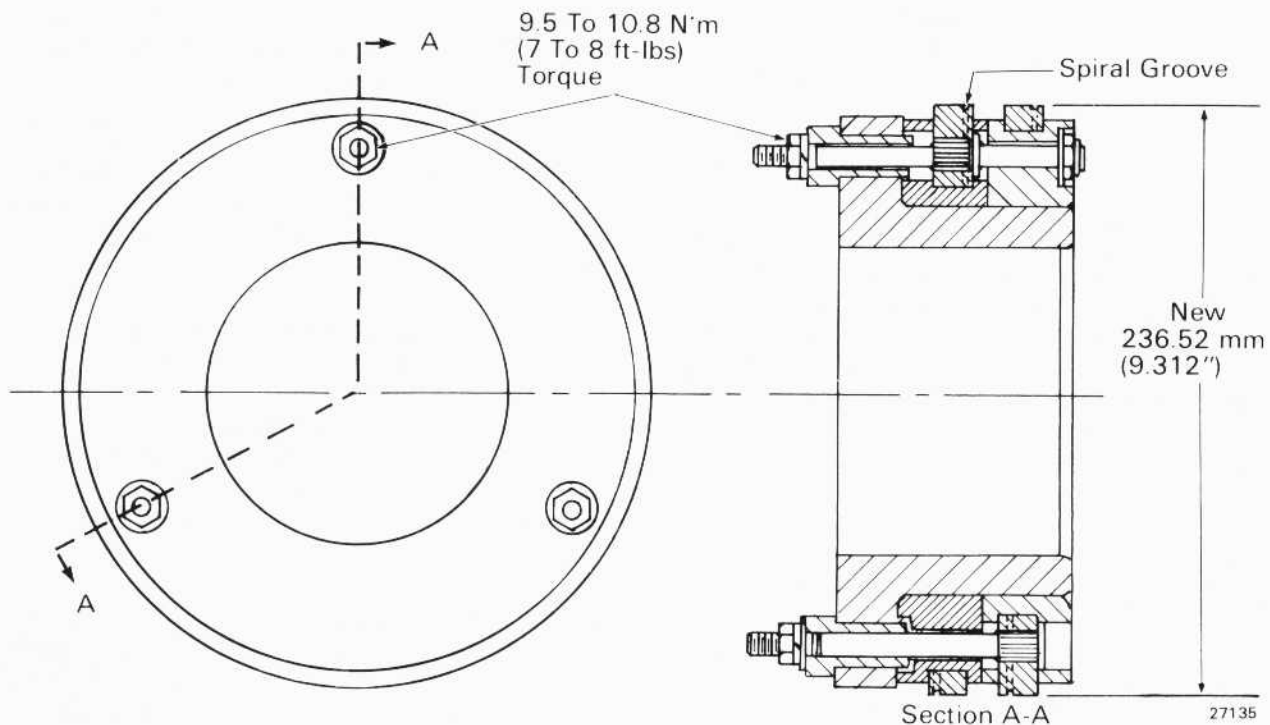


Fig.8 – DC Generator Collector Ring Assembly,
Cross-Section

The spring pressure of the brush holders is preset and remain constant throughout the brush life regardless of wear.

Main generator brush spring pressure is 1.5 kg (3.3 lbs). D18 alternator brush spring pressure is 0.68 kg (1.5 lbs).

AC generators are equipped with eight constant pressure brush holders, Fig. 5, four mounted at the top of the collector ring assembly and four at the bottom. The brushes riding on the two inside collector rings are for the main generator and the two riding on the two outside collector rings are for the D18 alternator.

DC generators are equipped with four constant pressure brush holders, Fig. 6, two mounted at the top of the collector ring assembly and two at the bottom. The brushes riding on the collector rings are for the D18 alternator. The main generator excitation is provided through the commutator and commutator brushes.

Ensure brush holder support bolts are tight to eliminate possible vibration.

CLEANING

GENERAL

If alternator is not disassembled, do not clean with a liquid cleaner. Dry compressed air at low pressure 207-345 kPa (30-50) psi may be used to blow out dirt from the stator and rotor assembly.

CAUTION

Do not use high air pressure since there is danger of loosening the insulation binding and blowing particles which may damage the insulation.

Where the use of low air pressure and dry cloths proves ineffective in removing imbedded deposits of dirt, a stiff brush, soft wood, or fiber scrapers may be used. In severe cases (to prevent surface creepage), dampen a cloth in solvent such as Stoddards Solvent to loosen and remove the dirt from rotating field terminals and connectors.

CAUTION

Ensure there is adequate ventilation and safety precautions are observed when handling inflammable fluids such as Stoddards Solvent, which has a flash point of 46° C (115° F).

After cleaning, paint connectors and field coil connections with red air drying enamel. When enamel has dried, apply black air drying varnish. Refer to Service Data for red air drying enamel and black air drying varnish part number.

"SANDING-IN" NEW BRUSHES

When new brushes are installed, they should be "sanded-in" by placing a piece of No. 00 grade sandpaper under the brush with the sand side contacting the brush and moving the sandpaper in the direction of rotation, Fig. 9. Lift the brush when moving the paper back, and keep the paper close to the rings to avoid rounding the edges of the brush.

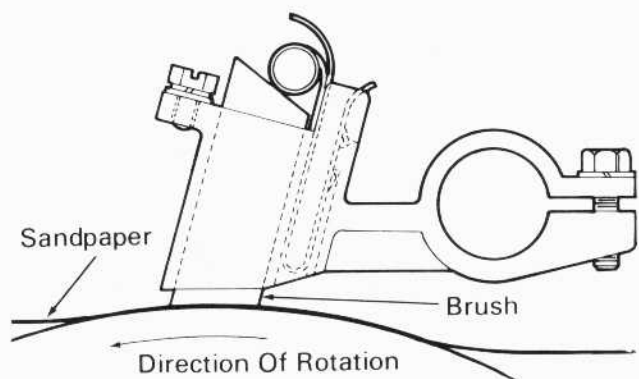


Fig.9 - "Sanding-In" New Brushes

CAUTION

Do not use carborundum, emery cloth, or emery paper for "sanding-in" brushes.

INSULATION RESISTANCE MEASUREMENTS

Using a megger, make an insulation resistance test on the rotor and stator. This should be done prior to making the high potential test. Readings of one megohm or better are satisfactory.

ROTOR

Field coil terminals and connectors should be thoroughly cleaned on both sides prior to making an insulation test. A low reading is likely to result if this is not done.

To test the rotor insulation, isolate the winding by lifting all the brushes off the collector rings. Connect the megohmmeter ground lead to the generator rotor or engine flywheel rather than to the frame of the machine. The other lead is connected to the collector ring.

STATOR

The stator insulation is checked by connecting the megger ground lead to the alternator frame and the other lead to the stator winding being tested. Be sure insulation resistance of the line cables is not included.

DISASSEMBLY AND OVERHAUL

GENERAL INFORMATION

The alternator assembly should be removed from the generator and overhauled at intervals specified in the Scheduled Maintenance Program.

Overhaul consists of disassembly, major component inspection and cleaning, and replacement of worn or defective parts. Special processing to ensure adequate dielectric strength of components is ensured by the specified varnish treatment.

NOTE

Insulation naturally deteriorates from the adverse affects of age, dirt, heat, and moisture. Deterioration can be slowed by proper service and care.

Equipment tested and approved after overhaul should perform satisfactorily between scheduled overhaul periods.

REMOVING ALTERNATOR STATOR

To remove the alternator stator from the generator frame, proceed as follows. Refer to Figs. 3 or 4 as applicable.

1. Remove generator coupling disc and alternator stator closure assembly.
2. Support alternator stator with a crane and a steel cable through a clevis pinned in the hole in the top center rib of the alternator stator frame.
3. Remove bolts holding alternator stator frame to generator (stator) frame.
4. Install three 1/2"-13 jacking bolts in the tapped holes provided in the alternator stator frame. Rotate jacking bolts evenly, taking care to avoid binding.
5. Remove alternator stator over alternator rotor poles. Ensure against damage to laminations or windings.

REMOVING ALTERNATOR ROTOR

Perform the following procedure to remove the alternator rotor from main generator after the alternator stator has been removed. Refer to Figs. 3 or 4 as applicable.

1. Disconnect the leads at the collector ring terminal posts.
2. Remove the shaft flange and conduit bushing at the collector ring end of the shaft.
3. Support the alternator rotor using an alternator rotor lifting sling, as shown in Fig. 10, and a crane. Refer to Service Data for File Drawing number of sling.

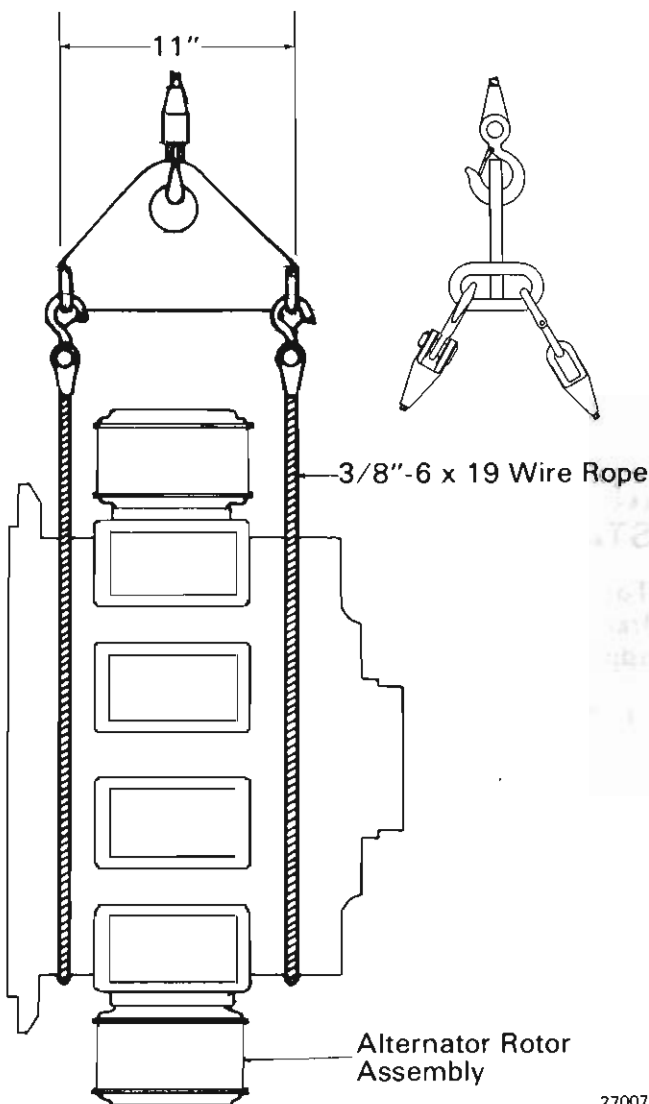


Fig.10 - Alternator Rotor Support

4. Remove bolts connecting alternator rotor to the generator rotor.

5. Place jacking screws in the holes provided and remove alternator rotor.

ROTOR OVERHAUL

Perform the following procedures as applicable, to repair or overhaul the alternator rotor.

ROTOR CLEANING PRIOR TO VARNISH TREATMENT

After separating the alternator rotor from the generator rotor, perform either of the following cleaning procedures in preparation for varnish treatment. Position the rotor to allow access to all areas during the cleaning process.

WET METHOD

The rotor may be cleaned with a steam cleaner such as Dober Chemical Corporation Cleaner 6006 or Turco Chemical Company Steamfas.

Use an 85 g per 3.79 liter (3 oz/gal) mixture of cleaner and water and maintain a tank temperature of approximately 60° C to 71° C (140° F to 160° F).

WARNING

Protect skin and clothing while steam cleaning. Operator should wear rubber apron, boots, gloves, and a plastic face shield.

Steam clean the stator assembly as follows.

NOTE

The solution tank should be approximately 0.9 m x 1.2 m x 0.9 m (3' x 4' x 3'). Two steam guns are required such as Hurriclean Steam Guns, Model 551.

1. Regulate a No. 1 steam gun to obtain a good soapy solution.
2. Steam clean stator holding No. 1 steam gun nozzle at an angle to the stator about 100 mm to 150 mm (4" to 6") away.
3. Rinse the stator thoroughly using a No. 2 steam gun with a combination of clean water and steam to remove all traces of cleaner.
4. Blow off stator using high volume, low pressure, clean, dry, compressed air.
5. Thoroughly dry rotor by placing in an oven at a regulator temperature of 150° C (302° F) for 8 hours.

DRY METHOD

An alternate, satisfactory cleaning method employs the use of granulated corn cob material applied with a controlled air blast. This method produces a clean, oil free surface ready for immediate varnish treatment.

When using this method, care should be exercised as it is possible to remove varnish and cut into the layers of insulation by prolonged application of the blast material. Pressure used should be between 300 to 400 kPa (45 to 60 psi).

The corn cob material trapped in the pockets or crevices of the rotor should be removed by a straight air blast at reduced air pressure.

ROTOR POLE INSPECTION AND TEST

LOOSE POLE CHECK

1. Inspect pole connectors for fatigue cracks, faulty connections, or burned insulation. A broken coil connecting strap will be evident by an open alternator field circuit and most likely indicates a loose pole.
2. Closely examine the area between pole piece and spider. A rust-like substance indicates a fretting condition.
3. Perform a pole tap test by tapping pole piece with a copper bar or lead mallet, while at the same time, holding a finger at the point between the pole and the spider. Looseness is indicated by movement at this point. Do not tap coil or insulation. Refer to Repair Recommendations section of this Maintenance Instruction if loose pole pieces are found.

ROTOR INSULATION RESISTANCE AND HIGH POTENTIAL TEST

Perform an insulation resistance test to field winding circuit with a megger. Megger indication of 15 megohms is satisfactory for hi-pot test.

If megger indication is less than 15 megohms, bake the rotor in an oven at $130^{\circ}\text{C} \pm 10^{\circ}$ ($266^{\circ}\text{F} \pm 18^{\circ}$) to remove any moisture which may be causing low indication. Repeat megger test when the rotor is at room temperature. If megger indication is 15 megohms or better, proceed with hi-pot test. If indication is below 15 megohms, disconnect connector straps and use megger to locate defective coil(s). Replace any defective coil with a serviceable coil.

Perform hi-pot test to ground at 1700 volts for 10 seconds.

NOTE

The connector blocks have unusual insulation resistance characteristics; this must be considered when interpreting megger readings. If a megger indication is less than 15 megohms on a clean rotor, the coil terminal should be disconnected from the block and the individual coils meggered to ground. Individual coil readings should be 250 megohms or more. If so reconnect the coils to the blocks, and perform the hi-pot test. Refer to Hi-Pot General Information prior to performing test.

ROTOR REPAIR RECOMMENDATIONS

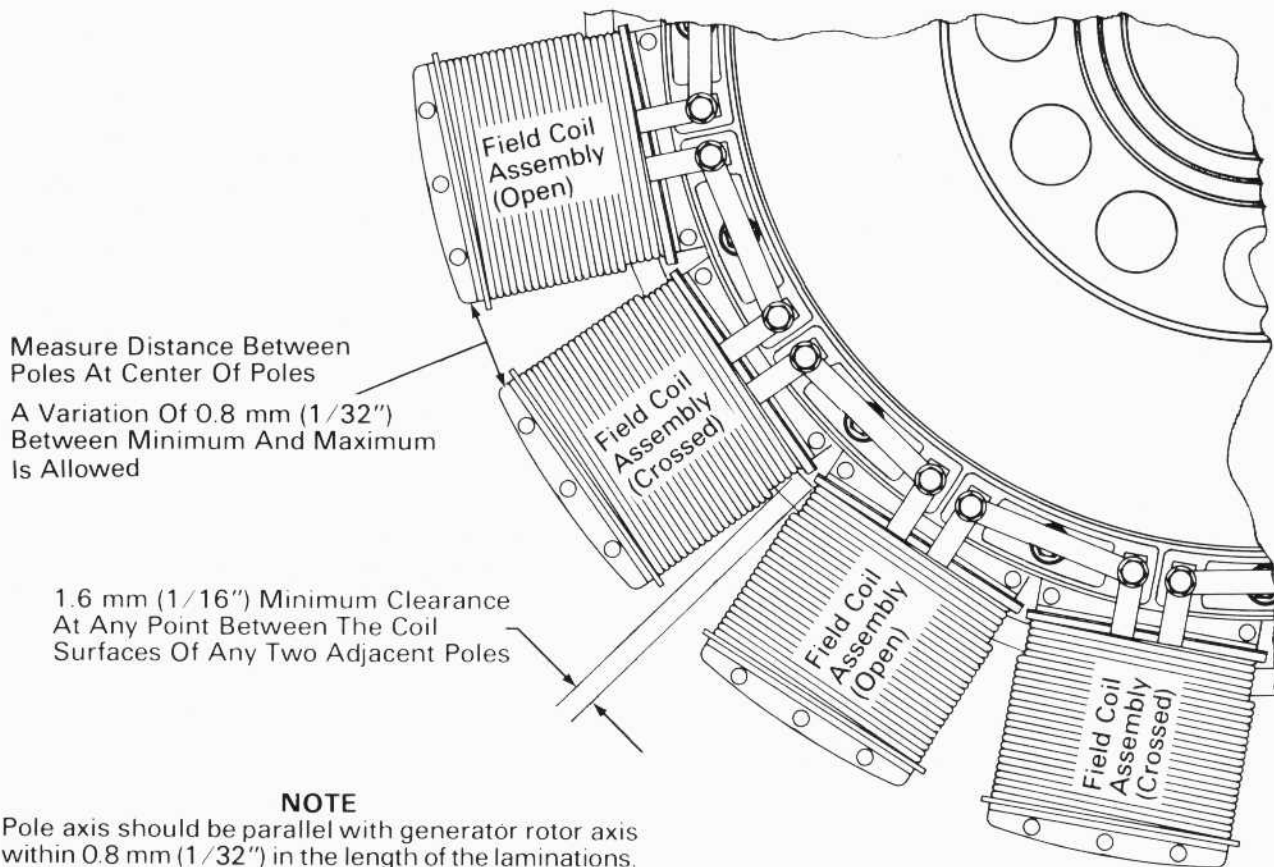
1. If there are any broken rotor pole studs, or if the studs should break during the tightening process, renew all pole studs for that particular pole.
2. To tighten rotor pole assembly, torque each pole stud nut to a minimum of 170 N·m (125 ft-lbs). Rap the pole piece head sharply with a lead or copper mallet, and again torque each pole stud nut to 170 N·m (125 ft-lbs).

To replace a pole piece assembly, proceed as follows:

1. Remove the defective pole assembly.
2. Install proper new pole assembly with new studs. There are eight open and eight crossed alternator field coil assemblies, Fig. 11. These field coil assemblies should be installed so no two like assemblies are adjacent.

Apply thread lubricant, such as Texaco Threadtex No. 2303, to pole studs at time of installation. Refer to Service Data for thread lubricant part number.

3. Perform a polarity test of the rotor poles as follows:
 - a. Apply 15 volts to rotor field coil circuit.
 - b. Hold compass at center of a rotor coil. Compass should indicate a north or south pole indication. Move compass from pole to pole. Each coil should indicate a definite change in polarity. If compass does not indicate a polarity change, either two poles of the same polarity are positioned next to



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Fig.11 – Alternator Rotor Pole Position On Rotor

each other or there is a wrong connection at the connector blocks. Replace wrong coil with proper coil or repair defective connection.

NOTE

When installing a new pole assembly, it is advisable to match the weight of the pole being replaced as closely as possible to simplify balancing.

4. Check poles for spacing and parallelism. Measure the distance between poles, on the sides of the laminations, half way between the brass end pieces. A variation of 0.8 mm (1/32") between maximum and minimum readings is allowed on this dimension. Pole axis should be parallel with the main rotor axis within 0.8 mm (1/32") in the length of the laminations. Maintain a 1.6 mm (1/16") clearance between the coil surfaces of any two adjacent poles. Refer to Fig. 11.
5. Torque each pole stud to $251 \text{ N}\cdot\text{m} \pm 14$ (185 ft-lbs ± 10).

6. It is recommended that the cables to field coils be replaced whenever the rotor is being overhauled.
7. Whenever a pole assembly has been removed, or one or more new poles have been replaced, the rotor assembly should be dynamically balanced within $0.056 \text{ N}\cdot\text{m}$ (8 in.-oz).
8. High potential test the entire field coil circuit to ground at 1700 VAC for 10 seconds.

WARNING

Insulate the end of the two cables to prevent injury to personnel.

9. Resistance test entire field coil circuit using at least 8 amperes through the field coils. Resistance at 75°C (167°F) should be $1.47 \text{ ohms} \pm 3.7\%$.
10. Paint cable connections, bolts, nuts, inside of spider, plate, and conduit with red air drying enamel.

Take care to keep enamel off all finished surfaces.

STATOR OVERHAUL

The alternator stator is wired as shown in Fig. 12.

The stator assembly consists of 24 stator coil assemblies (each consisting of four individual coils) or 96 individual coils. The stator is a three-phase winding connected in a "Y" fashion, with eight parallel paths per phase, four coils in series per parallel path, three turns per coil, for a total of 12 turns per parallel path. All parallel paths are connected to one "neutral" or "Y" connection.

REWired STATOR ELECTRICAL WINDING CONNECTION CHECK

If stator has been rewired, test the stator windings for proper connection with a suitable surge comparison tester. For this test connect all phase 1 terminal lugs together, connect all phase 2 terminal lugs together, and connect all phase 3 terminal lugs together. Testing voltage should be 1700 volts.

An alternate test to check stator windings for proper connection is to measure line-to-line inductance between each pair of the three possible pairs of stator line terminals. The inductance value of a correctly wired stator is 13 microhenries \pm 2.

STATOR INSULATION RESISTANCE AND HIGH POTENTIAL TEST

Perform an insulation and resistance test to the stator windings using a megger. If megger indicates less than 2 megohms, bake stator in an oven at 125° C (257° F) for 4 hours, to remove any moisture. If minimum of 2 megohms is obtained, proceed with high potential test.

Perform high potential test to ground at 1700 volts for 10 seconds.

PHASE-TO-PHASE RESISTANCE TEST

Perform a phase-to-phase resistance test between stator terminals 1 and 2, terminals 2 and 3, and terminals 1 and 3. All three values should be 0.0050 ohms \pm 0.0002 ohms at 75° C (167° F).

STATOR CLEANING PRIOR TO VARNISH TREATMENT

Clean stator with granulated corn cob material applied with a controlled air blast. This method produces a clean, oil free surface ready for immediate varnish treatment.

Care should be exercised, as it is possible to remove varnish and cut into layers of insulation material.

Pressure used should be between 300 to 400 kPa (45 to 60 psi).

The corn cob material trapped in the pockets or crevices of the stator should be removed by a straight air blast at reduced air pressure.

Cover terminal lugs with friction tape to prevent varnish from getting on terminal lugs.

ROTOR AND STATOR ASSEMBLY VARNISH TREATMENT

Rotor and stator assemblies which pass the inspection and electrical test after all repairs have been complete, should be given a varnish treatment as follows.

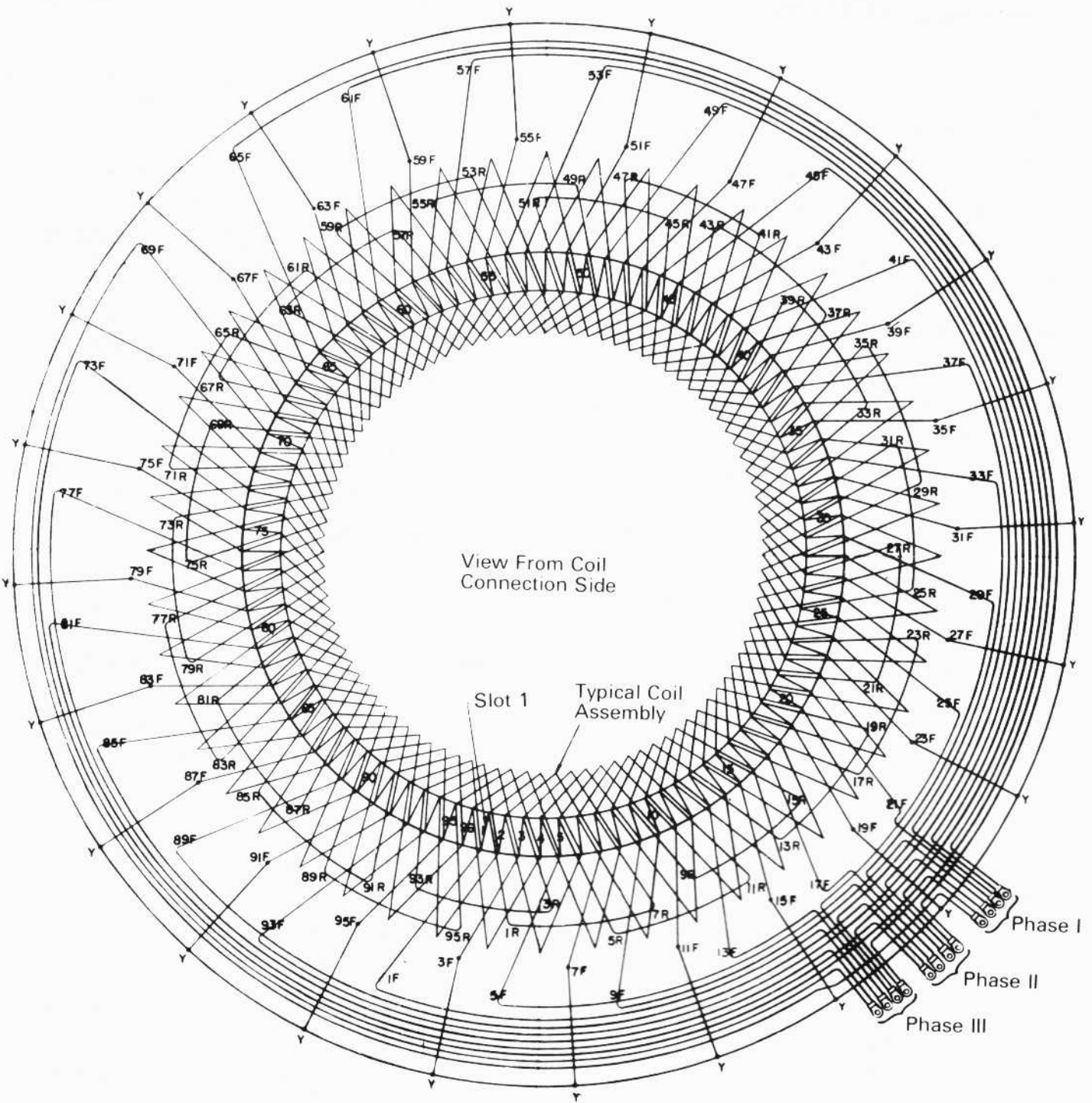
Varnish should be thinned to maintain Ford Cup No. 4 orifice viscosity at 250-325 seconds at 21.1° C (70° F) and a minimum specific gravity of 0.900.

ROTOR ASSEMBLY

1. Heat rotor in a convection oven to 130° C \pm 10° (266° F \pm 18°) for a minimum of 2 hours.
2. Remove rotor from oven and megger test immediately. If megger indication is less than 2 megohms, refer to Rotor Repair section which follows. If megger indication is 2 megohms or more, continue with procedure. Do not allow rotor to cool below 100° C (212° F) prior to dip operation.
3. Dip rotor in varnish tank and allow to soak for 5 minutes.
4. Remove rotor from varnish tank and allow to drain for 5 minutes.
5. Clean varnish from mounting surfaces using a cloth saturated with solvent.
6. Bake rotor for 5 hours in an oven set not to exceed 160° C (320° F).
7. When rotor has been allowed to cool to room temperature, check with megger. Rotor must measure a minimum of 15 megohms.

ROTOR REPAIR PROCEDURE

1. If rotor does not meet electrical minimum requirement, disconnect coil leads and check with a megger to determine defective coil(s). Individual coil resistance to ground should be 250 megohm minimum.



Phase I (Core Slot 69F, 81F, 93F, 9F, 21F, 33F, 45F, 57F)

Phase II (Core Slot 77F, 89F, 5F, 17F, 29F, 41F, 53F, 65F)

Phase III (Core Slot 73F, 85F, 1F, 13F, 25F, 37F, 49F, 61F)

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Fig.12 - D18 Alternator Stator Wiring Diagram

2. If old coils are used as replacement coils, varnish treatment will have to be repeated even if varnish treatment had been previously completed. When new coils are used, varnish treatment will not have to be repeated.

STATOR ASSEMBLY

1. Heat stator in a convection oven to $130^{\circ}\text{C} \pm 10^{\circ}$ ($266^{\circ}\text{F} \pm 18^{\circ}$) for a minimum of 2 hours.
2. Remove stator from oven and immerse in varnish tank for 10 minutes. Do not allow stator to cool below 100°C (212°F) prior to dip operation.
3. Remove stator from varnish tank and allow to drain for 10 minutes.
4. Heat stator for 2 hours at 160°C (320°F) maximum oven temperature.
5. While stator is 100° to 120°C (212° to 248°F), dip stator in varnish tank for 2 minutes.
6. Remove stator from varnish tank and allow to drain for 5 minutes.
7. Heat stator for 3 hours at 160°C (320°F) maximum oven temperature.
8. While stator is 100° to 120°C (212° to 248°F), dip stator in varnish for 2 minutes.
9. Remove stator from varnish tank and allow to drain for 5 minutes.
10. Heat stator for 5 hours at 160°C (320°F) maximum oven temperature.
11. Clean varnish from all machined surfaces, tapped holes, and mounting pads immediately after oven-bake while stator remains hot and varnish is soft.

HI-POT GENERAL INFORMATION

It is extremely important that the high potential test equipment be reliable to ensure adequate testing without unnecessarily overstressing the insulation.

In regard to the features which should be incorporated in the tester the following points are pertinent: Wave form, surges, and voltage regulation.

WAVE FORM

Voltages specified in high potential testing are, unless otherwise specified, root-mean-square (RMS) voltages. The wave form should have a limit of 5% third harmonic. This limitation fixes the peak voltage for any RMS voltage.

Wave form may be influenced by the capacity of the testing apparatus used relative to the size of the piece of equipment being tested. A serious peak on the voltage wave may result if the test box being used is too small for the piece of equipment tested. Also, it is possible that the leakage and charging current may be sufficient to trip the relay when testing a piece of equipment with a test box which is too small.

SURGES

Harmful surges may occur if special attention is not paid to the method of changing voltages on the primary when testing.

REGULATION

Specifications for regulation of high potential equipment state that the secondary voltage drop should not exceed 20% under actual test conditions.

SAFETY PRECAUTIONS

WARNING

ELECTRICAL RATINGS of the test equipment are values that should be considered **EXTREMELY DANGEROUS** to personnel.

The following safety considerations should be carefully observed when performing hi-pot tests:

1. Except for the person performing the hi-pot test, all personnel should maintain a safe distance from equipment being tested before applying voltage.
2. Do not make or break the high voltage circuit with the electrodes. Dangerous over-voltage surges may result.

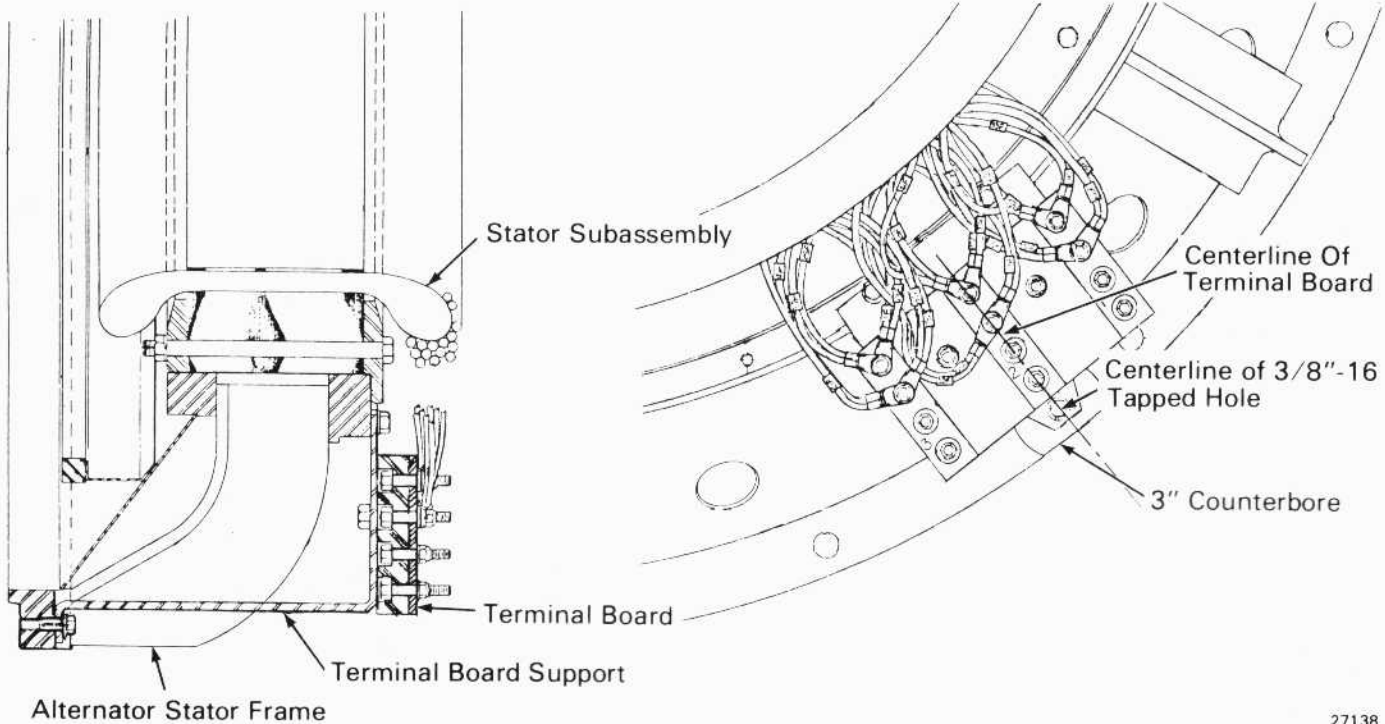
ALTERNATOR TO GENERATOR ASSEMBLY

ALTERNATOR ROTOR TO GENERATOR ROTOR

Bolt the alternator rotor to the generator rotor using the 7/8"-9 bolts removed during disassembly. Ensure the alternator rotor leads are threaded through the generator rotor shaft. Torque the bolts to 508-542 N·m (375-400 ft-lbs).

ALTERNATOR STATOR TO GENERATOR STATOR

Bolt the alternator stator to the generator stator using the 3/4"-10 bolts removed during disassembly. Ensure correct holes in the alternator stator ring line up with mating holes in the generator stator frame. The centerline of the 3/8"-16 NC tapped hole, which is centered in a 76 mm (3") counterbore in the outer flange of the alternator stator, must line up with the centerline of the terminal board on the generator frame, Fig. 13. Torque bolts to 271 N·m (200 ft-lbs).



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Fig.13 – Alternator Stator Terminal Assembly

SERVICE DATA

SPECIFICATIONS

Brushes (Alternator Only)

Spring pressure, non-adjustable type	0.68 kg ± 0.068 kg (1.5 lbs ± .15 lbs)
Number of brushes	4
Number of brush holders	4
Size of brush	9.53 mm x 19.05 mm x 55.56 mm (3/8" x 3/4" x 2-3/16")
Brush wear limit	19 mm (3/4") on long side

Resistance at 75° C (167° F)

Use the following formula to convert resistance measured at any temperature to resistance at 75° C (167° F):

$$\text{Resistance at } 75^{\circ} \text{ C} = \frac{\text{measured resistance} \times 309.5}{234.5 + \text{temperature of item being tested in } ^{\circ} \text{C}}$$

Stator, phase-to-phase	0.0050 ohms ± 0.0002
Rotor, slip-ring to slip-ring	2.20 ohms ± 3.7%
Maximum variation in resistance allowable between any two phases at 75° C (167° F)	0.00005 ohms
Air Gap (nominal)	3.97 mm (.156")
Weights (Approx.)	
Rotor	680 kg (1500 lbs)
Stator	422 kg (930 lbs)

MATERIAL

Enamel, Red Air Drying	
Approx. 1 liter (1 qt)	8061130
Approx. 19 liters (5 gal)	8084876
Varnish, Black Air Drying	
Approx. 4 liters (1 gal)	8122347
Approx. 208 liters (55 gal)	8116521
Megger, Insulation Resistance Test Set	8174880
Leads, 3.7 m (12 ft)	8174878
Carrying Case	8174879
Thread Lubricant, Texaco Threadtex No. 2303	
Approx. 19 liters (5 gal)	8307731
*Varnish, Electrical Insulating, Modified Polyester	
Approx. 208 liters (55 gal)	8489774

NOTE

Varnish mixture to have viscosity at 250-325 seconds using Ford Cup No. 4 at 21.1° C (70° F).

Thinner Solvents For Above Varnish

- *Chevron No. 1300
- *Thompson-Hayward Chemical Co. No. 2026
- **Xylol Thinner

NOTE

Butyl acetate or butyl cellosolve is used with the following two thinner solvents because the varnish sets up in the tank when mineral spirits thinner is used alone.

Alternate thinner	9083470
*Mineral Spirits (Rule 66 Type Thinner) 80%	
*Butyl Acetate, Technical Grade 20%	
Alternate Thinner	9544540
*Mineral Spirits (Rule 66 Type Thinner) 70%	
*Butyl Cellosolve 30%	

TOOLS

Collector Ring Grinder Assembly	8260844
Collector Ring Grinder Kit (used with grinder assembly)	8279712
Flexible Driver 1/4" Square Drive	
Flexible Extension 1/4" Square Drive	
Grinding Stone, Coarse	8280602
Grinding Stone, Medium	8085259
Grinding Stone, Finish	8260843
Alternator Rotor Support (lifting tool)	† File No. 924

*To be used where compliance with pollution control regulations is required.

**Xylol may be used as a substitute thinner, however, Xylol DOES NOT comply with pollution control regulations.

† File number represents facility drawings that are available (at no charge) from EMD Service Department. These drawings include construction details of tooling that can be manufactured.