



# MAINTENANCE INSTRUCTION

## AR10 – D14 TRACTION GENERATOR

### DESCRIPTION

The AR10–D14 traction generator, Fig. 1, is composed of two, three-phase alternating current synchronous generators of the single bearing type.

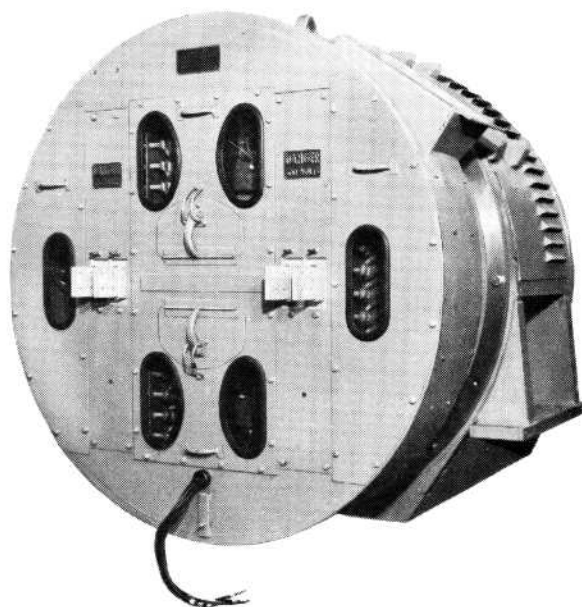
The rotors of the two machines are mounted on a single shaft which is, in turn, directly connected to the engine crankshaft through a flexible flywheel coupling. The shaft is supported at the outboard end by a single, sealed lubricated, self-aligning bearing, assembled in an end housing which is, in turn, bolted to the main frame or stator of the AR10. The D14 stator is bolted to the opposite or coupling end of the AR10 stator.

The rotating fields consist of series connected field coils wound on laminated poles which are bolted to a drum type spider. This spider is connected to the previously mentioned shaft.

The AR10 field coils are insulated with class "F" insulation and are electrically connected to the two inboard collector rings mounted in the air box at the bearing end of the generator. The D14 field coils are electrically connected to the two outboard collector rings. The collector rings and associated brush holders provide the means of exciting the fields of the two machines.

Current production models are equipped with a new design air box cover which includes diode viewing windows and two access doors, Fig. 1. These doors provide easy access to the collector rings or brushes for inspection or replacement of brushes. An additional feature on current models is the collector ring cover, Fig. 2, to prevent snow from entering the collector ring area.

The AR10 stator frame and core assembly, utilizing welded construction, provides a rigid structure which houses the stator windings and supports the end housing and D14 stator assemblies. The class "H" insulated



16377

Fig. 1 – AR10 – D14 Generator

AR10 stator coils are internally connected at the bearing end of the stator into two sets of three-phase "Y" connected windings.

Two rectifier assemblies mounted on the front of the AR10 generator, provide means of converting the three-phase AC power to DC power. Each assembly consists of high-current high-voltage silicon diodes connected in a three-phase full wave, rectifier circuit and mounted on heat sinks capable of providing adequate cooling.

This instruction covers only the synchronous generator on the AR10 generator. For information on the AR10 rectifier assemblies see Section 2, M.I. 3317, for the D14 alternator see M.I. 3306.

## MAINTENANCE

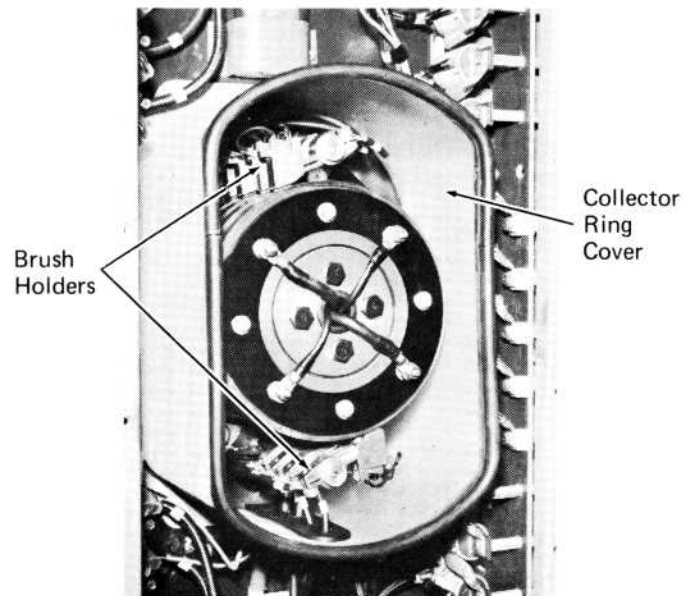
This generator is designed and manufactured to provide long life and satisfying performance with a minimum of maintenance. Like any machine, however, certain maintenance is required, the extent of which is largely determined by the operation and service to which the generator is subjected. Inspections and maintenance should be performed on the systematic basis outlined in the Scheduled Maintenance Program.

## CLEANING

Both the interior and exterior of the generator should be kept clean and free of dust, dirt, oil, and water which are likely to have a detrimental effect on insulation and performance.

As frequent as conditions warrant, the generator should be blown out with low pressure air. Avoid excessive air pressure which could cause damage to insulation.

Clean, bound edge, lintless wiping cloths should be used as necessary to remove oil, grease, and accumulations of dirt.



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Fig. 2 – Brush Holder Installation

## COLLECTOR RING AND BRUSHES

Collector rings should be checked frequently while generator is in operation. Any sparking should be corrected immediately. It is normal for the negative ring to experience electrical wear more rapidly than the positive ring. The unequal wear can be minimized by reversing polarity of the rings every 6 months.

Sparking on collector rings may be due to the various causes listed below:

1. Collector rings not running concentric with shaft.
2. Collector ring surface rough or pitted.
3. Brushes tight in brush holders.
4. Oil on surface of collector ring.
5. Vibration of brush holder studs.

If the collector ring concentricity exceeds .004" total indicator reading and slip ring lateral run out exceeds 1/32", rings will have to be machined or stoned to bring them into tolerance. (Readings taken with collector rings installed on generator.)

A rough or pitted collector ring surface is normally due to prolonged sparking. Usually this condition can be corrected by grinding. The minimum acceptable diameter on the collector rings is 10-1/4". If rough rings cannot be cleaned up without going below the minimum diameter, they should be replaced.

The brush holder assembly should be removed and the collector ring grinder and adapter assembled to the tapped holes provided in the end housing just to the left of the brush holder mounting location.

Position the grinder so there will be 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 300 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. Runout should not exceed .004" total indicator reading.

When the grinding operation is complete, remove the grinding equipment. Blow out all grinding dust and reassemble the brush holder assembly in its proper position. Replace brushes if necessary.

**CAUTION:** Never use emery cloth for polishing collector rings due to its continued abrasive action.

Current model generators are equipped with eight constant pressure brush holders, four mounted at the top of the slip ring assembly and four at the bottom. Earlier model generators had four double arm brush holders mounted at the top of the collector ring assembly. The brushes riding on the two inside collector rings are for the AR10 generator and the brushes riding on the two outside collector rings are for the D14 generator. The spring pressure is pre-set and cannot be adjusted. The pressure will remain constant throughout the brush life regardless of brush wear.

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

If a brush holder is vibrating, tighten brush holder support bolt and see that brush holder is fastened securely to support.

When installing new brushes, they should be sanded to fit the curvature of the collector ring. This can be done by putting a piece of sandpaper on the surface of the ring with the rough side against the brush. Then with the brush held down with pressure arm of the brush holder, move sandpaper in direction of rotation of the rings. Repeat motion until brush fits curvature of the rings.

Make sure the coil spring rests on top of the brush and not on the holder when applying the spring clip.

**BEARING**

A sealed grease lubricated, double row, spherical, self-aligning bearing is used and is assembled into an insulated bearing housing to prevent damage to the bearing due to electrical arcing. No additional lubrication is required. Occasionally checking the bearing temperature during operation, by applying a pyrometer to the outside surface of the bearing cover, will give an indication of the bearing condition. The bearing temperature should not exceed a 25° C. rise. High bearing temperature may be caused by:

1. Contamination of grease.
2. Excessive thrust due to misalignment.
3. Pounding caused by bearing being loose on shaft or worn rollers.
4. Actual bearing failure caused by bearing fatigue or wear.

Shell Cyprina RA grease should be applied to the bearing at intervals recommended in the applicable Scheduled Maintenance Program. The bearing cover should be removed and a one ounce sample of the darkened part of the grease removed. The grease sample should be subjected to a laboratory analysis as follows:

<u>Determination</u>	<u>Acceptable Limits</u>
PH	10 or higher
1/4 scale worked micropenetration	190 to 250
% ash	2.0 or less
% iron	2.0 or less
% copper	2.0 or less
Acidity, as % oleic acid	0.50 or less

NOTE: All tests to be per latest ASTM standards.

Should the grease fail to pass only the PH test, clean out and repack the bearing cover as outlined later under Generator Assembly. While the cover is removed, visually inspect the exposed portion of the bearing for signs of distress such as overheating, abnormal wear and brass flakes.

If the visual inspection shows any defects or if the grease does not pass any of the remaining tests, the bearing will have to be removed and replaced with a new bearing or have the used bearing cleaned of the contaminated grease. If bearing and grease are satisfactory, repair grease contour in a cover with a clean putty knife or spatula, where it was deformed by the test sample removal. When grease contour has been restored, replace cover using a new gasket.

CAUTION: Take extreme care to ensure that no foreign material gets into the grease or bearing while the cover is removed.

Whenever it becomes necessary to remove the bearing, the generator will have to be removed from the unit.

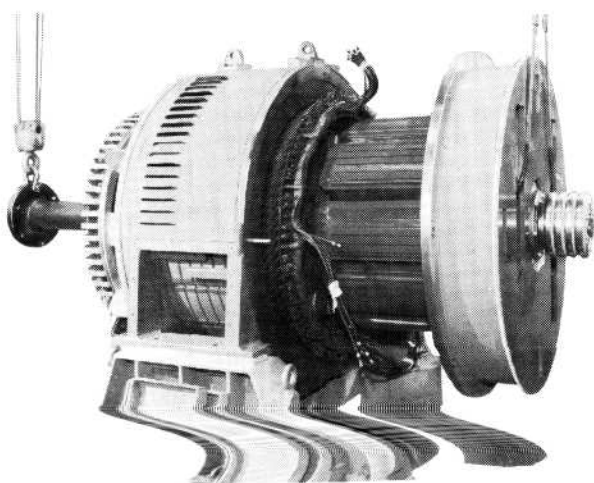
NOTE: If means for dismantling and reassembling are not available, generator should be returned to the Electro-Motive Division for repair either on a rebuild and return or unit exchange basis.

## GENERATOR DISASSEMBLY

Before the generator is removed from its location, place strips of fish paper  $1/16'' \times 3'' \times 36''$  in the bottom air gap between the rotor assembly and stator coils. When removing the generator be sure to tag shims used under mounting pads so they may be replaced in their original position.

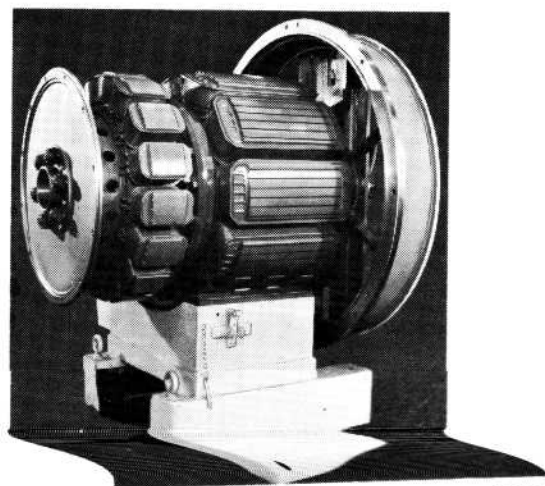
The following steps should be used in disassembling the generator.

1. Mount the generator on a sturdy stand at a suitable height from the floor.
2. Remove all covers from the generator assembly.
3. Disconnect leads to brush holder and filter assemblies.
4. Remove bolts holding air box to end housing and remove air box carefully.
5. Remove brush holders and bracket assembly.
6. Remove rectifier bank assemblies from end housing assembly.
7. Remove cleat assemblies securing stator leads to end housing.
8. Remove bolts securing end housing to stator being sure to support end housing with a wire cable and a crane.
9. Insert three  $3/4''$ –10 jack bolts equally spaced around the end housing in the bolt holes from which the end housing to stator bolts were removed. Remove end housing.
10. Apply arbor fixture to spider bore of rotor, and attach a wire cable to arbor fixture.
11. With the aid of a crane, raise the arbor fixture until the air gap is equal around the circumference of the rotor. With the aid of a second crane, raise the front end until the cable is taut.
12. Carefully remove the rotor assembly from the stator, Fig. 3, moving it towards the front end of the assembly until it clears the stator assembly and can be rested on a stand, Fig. 4.
13. If necessary the coupling disc and D14 rotor can be removed from the AR10 rotor.
14. Disconnect leads from collector ring.
15. Remove the four bolts securing the retainer plate to the end of the shaft and remove the retainer plate.



15194

*Fig. 3 – Removing Rotor From Stator*



13234

*Fig. 4 – Rotor Assembly Removed From Stator*

16. Remove the four 3/8"–16 bolts securing the collector rings to the collector ring housing, which are located in the slip ring face between the lead connection terminals.
  17. Install four 3/8"–16 puller studs in the bolt holes and secure in collector ring housing.
  18. Install puller plate and remove collector ring assembly.
  19. Disconnect all remaining leads from generator assembly.
  20. Attach puller studs and puller to outer bearing seal and remove seal.
  21. Remove bearing cover bolts and remove cover.
  22. Remove bearing housing from end housing.
- CAUTION: Do not wash bearing housing in caustic solution or cob blast the housing bore.
23. Apply puller studs and puller to inner bearing cap and remove cap and bearing. Some rotor shafts have been drilled for float off bearing removal.
  24. Remove D14 stator closure assembly if necessary.
  25. Remove bolts securing the D14 stator assembly to the AR10 stator assembly being sure to support the D14 stator properly. Install 3/4"–10 jack screws and remove the D14 stator assembly.

#### ELECTRICAL INSULATION TEST

Before the generator is assembled it is advisable to electrically qualify the stator, Fig. 5, and rotor. The following qualifications should be met before any attempt to give the stator or rotor a high potential test. This applies to any stator or rotor that has had an occasion for windings to accumulate moisture or dirt.

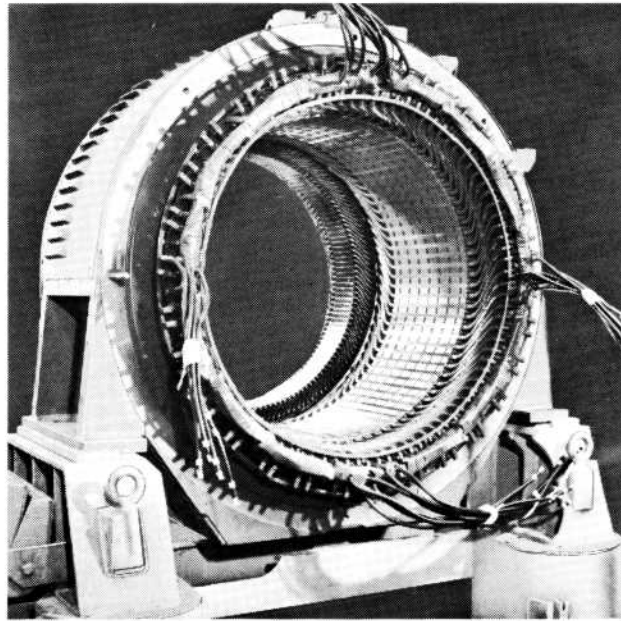


Fig. 5 – AR10 Stator

1. Stator and rotor must be clean.
2. Stator and rotor must show a steady insulation resistance reading for at least three hours at any given temperature from 75° C. to 90° C.

3. The ratio of insulation resistance taken 5 minutes after starting the megger check should not be less than 1-1/2 times the reading taken 10 seconds after starting the check. The check should be taken with a stator temperature reading of 50° C.
4. The insulation resistance of the rotor must be not less than one megohm at any temperature up to 75° C.

Any stator or rotor which, although clean, shows low or erratic insulation resistance readings should be dried at 90° C. until a stabilized insulation resistance reading is obtained for a period of twenty-four hours. Before applying high potential test, all the other qualifications outlined must be met.

NOTE: Generators which have been stored for a considerable period of time should be given an insulation resistance check before being put into service.

### HIGH POTENTIAL TEST

If the stator and rotor meet the listed qualifications, test should be taken at 50° plus or minus 5° C. in the following manner:

1. For stators, short all positive and negative bus bars. DO NOT PERFORM HIGH POTENTIAL TESTS BEFORE CONSULTING M.I. 3317, Section 2.
2. Apply 1050 volts RMS for one minute.
3. For rotor, apply 300 volts for one minute.

If the stator or rotor fails to qualify either the resistance check or the high potential test, we recommend, due to the special tooling and facilities needed to make corrections that the generator be returned to the Electro-Motive Division.

### BEARING INSPECTION

The roller bearing should be thoroughly inspected for possible evidence of impending failure. If there is any evidence that the bearing shows signs of distress, it should be replaced with a new bearing. The following procedure may be helpful in inspecting bearings.

### CLEANING

Before attempting to make any inspection, a bearing must be thoroughly cleaned. A mixture of 50% carbon tetrachloride and 50% benzine has been found suitable for this purpose. After inspection, bearings should be dipped in hot oil to prevent corrosion unless they are to be used immediately. A good grade of bearing oil should be used, or grease that is used for its lubrication in service.

### WEAR

A properly lubricated bearing not subjected to misalignment, dirt or distortion will show no evidence of wear. The internal radial clearance of the bearing may be checked by passing a feeler gauge between the rollers and race on the unloaded side. Do not roll a feeler through a bearing. For limits see Maintenance Data.

### FATIGUE FAILURE

Sign of bearing fatigue will most usually appear on the bearing surface. Fatigue failure is usually evidenced as ragged craters, and may be of any size. Any bearing showing signs of cracks or craters of any size, regardless of how small they may be, should be replaced.

This type of failure is more likely to occur on either the rollers or inner race.

## DENTS

Dents are caused by hard particles of foreign matter being rolled between the races and rollers, causing slight depressions where the bearing surfaces have been permanently deformed. They are distinguished from fatigue failures by their smooth surface with a slightly raised edge around the dent.

Small dents in themselves cause little damage and are usually evident on the bearings which have been run. However, should the bearing show signs of more than normal distress, and should there be any question as to whether they are dents or fatigue failures, or should there be any doubt as to their effect on the life of the bearing, the bearing should be replaced.

## SCRATCHES

In general, scratches due to mishandling are not serious provided they are small. Scratches on the bearing surface, parallel to the length of the bearing are more serious than those at an angle. Sometimes, scratches are difficult to differentiate from cracks, and for this reason, if there is any doubt as to their character, they should be treated as cracks due to fatigue failure.

## HEAT

Any bearing showing evidence of having been overheated should be replaced.

## CAGES

Bearing cages which shown excessive wear should be replaced.

## GENERATOR ASSEMBLY

After the generator stator and rotor have been cleaned and checked, the inside of the stator and the outside of the rotor should be painted with red air drying enamel.

When all the component parts have been cleaned, checked, inspected, and painted, the generator is ready for assembly.

Before shrinking bearing to rotor shaft, it is very important that the bearing be tried in its housing. Place bearing housing on floor and try bearing through bore of housing. Care must be taken to see that the bearing enters the housing bore squarely and is not cocked. See Maintenance Data for bearing dimensions and tolerances.

## BEARING AND END HOUSING ASSEMBLY

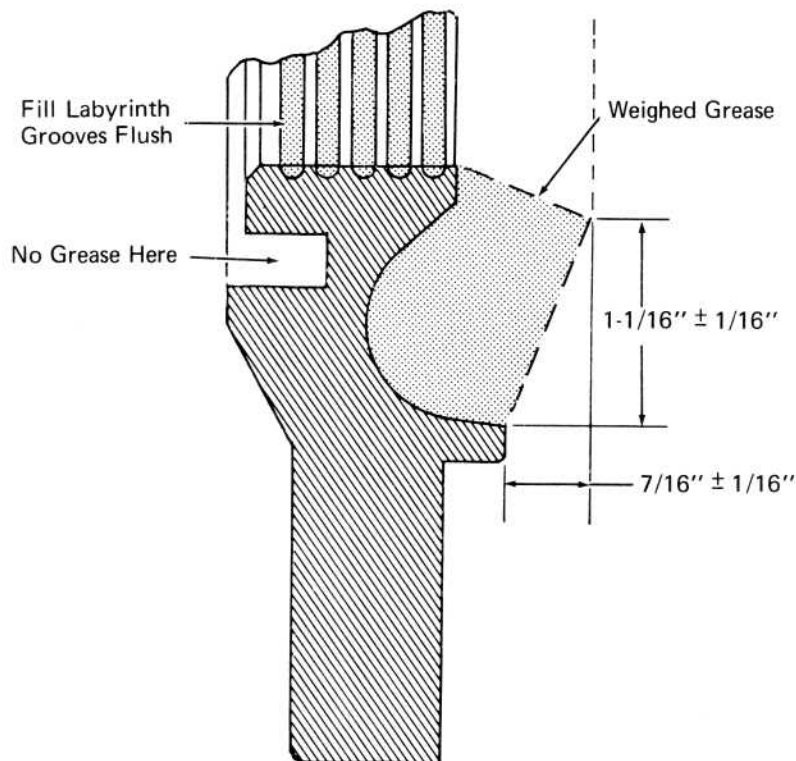
1. Apply grease as specified in the Maintenance Data to clean bearing cap and cover. See Fig. 6.
2. Clean armature shaft and remove burrs or gall marks.
3. Heat the inner seal in an oil bath or electric oven for half an hour at 248°F. or 120°C. If an induction heater is used, only heat up to 248°F. or 120°C. If an oil bath is used for heating, remove the oil from the seal with clean bound edge cloths prior to shrinking to the shaft. When using an induction heater, pyrometer readings (with current off) should be taken periodically. After heating, shrink the seal to the shaft and let it cool to room temperature.

NOTE: Care should be used when heating bearing assembly parts. Overheating may result in warping or metallurgical upsetting of the parts.

4. Install bearing cap over inner seal.

5. Pack the bearing rollers and the space between the two rows of rollers completely with the quantity and type of grease specified in the Maintenance Data.
6. Heat roller bearing with an induction heater to 248°F. or 120°C. Take pyrometer readings (with current off) at outside face of inner race only. Also, see note in Step 3. Shrink bearing to shaft with the bearing part number toward the outside. Do not cock the bearing when placing it on shaft. Use a brass pipe to push bearing on shaft up to and against inner seal. Let bearing cool to room temperature.
7. Bolt the bearing housing to the end housing with the 3/4"–10 bolts removed during disassembly and torque to 200 ft-lbs.

NOTE: The two top bolts are also used to mount the brush holder bracket to the bearing housing and may be left out until the brush holder bracket is installed.



15196

Fig. 6 — Application Of Grease To Bearing Cap And Cover

8. Insert two studs, Fig. 7, 180° apart in the 1/2"–13 UNC-2B threaded holes in the bearing cap. Purpose of the studs is to guide the bearing housing to the bearing cap. An aligning collar, shown in Fig. 7, may also be used to aid in installing the end housing. Before installing the housing be sure to apply a new gasket to the bearing cap. Gasket must be lined up to clear bolt holes and may be held in place by a spot of grease on the gasket.
9. Lift the end housing and bearing housing assembly with a wire cable and crane and align the bearing housing with the aligning studs, Fig. 7. Push the end housing onto the shaft until the bearing housing is snug against the bearing cap.
10. Mount the bearing cover to the bearing housing and install the 1/2"–13 bolts hand tight. Do not remove the two guide studs until all the other bolts have been started. Then the guide studs can be removed and the two bolts put in their place and torqued to 50–55 ft-lbs.
11. Heat the outer seal in an oil bath or electric oven for half an hour at 248°F. or 120°C. If an induction heater is used, heat up to 248°F. or 120°C. Then proceed as per Step 3.

12. Place collector ring on induction heater and heat to 248° F. or 120° C, taking pyrometer readings on slip rings. Shrink collector ring assembly in place on shaft.
13. Place retainer plate on the end of rotor shaft and tighten 5/8"–11 bolts to 110–120 ft-lbs.

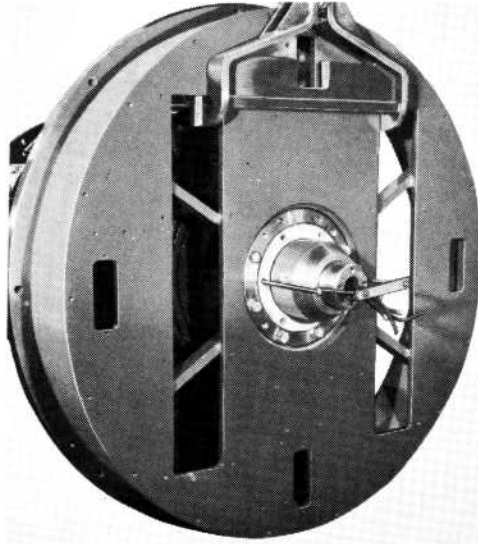


Fig. 7 – Applying End Housing To Rotor Assembly 15274

#### ROTOR TO STATOR ASSEMBLY

1. If the D14 rotor assembly was removed from the AR10 rotor, bolt these two assemblies together using the 7/8"–9 bolts removed during disassembly. Be sure the D14 cable leads are threaded through the AR10 rotor shaft as shown in Fig. 9. Tighten bolts to 375–400 ft-lbs.
2. Bolt D14 stator assembly to AR10 stator frame. Torque to 200 ft-lbs.
3. Place stator assembly and rotor assembly on their stands close enough to each other so that, when the arbor fixture is placed in the flange bore or the D14 rotor, the end of the arbor fixture protrudes through the stator assembly, as shown in Fig. 8.

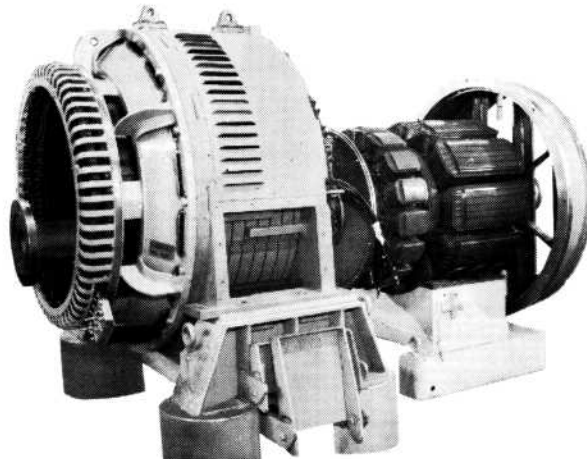
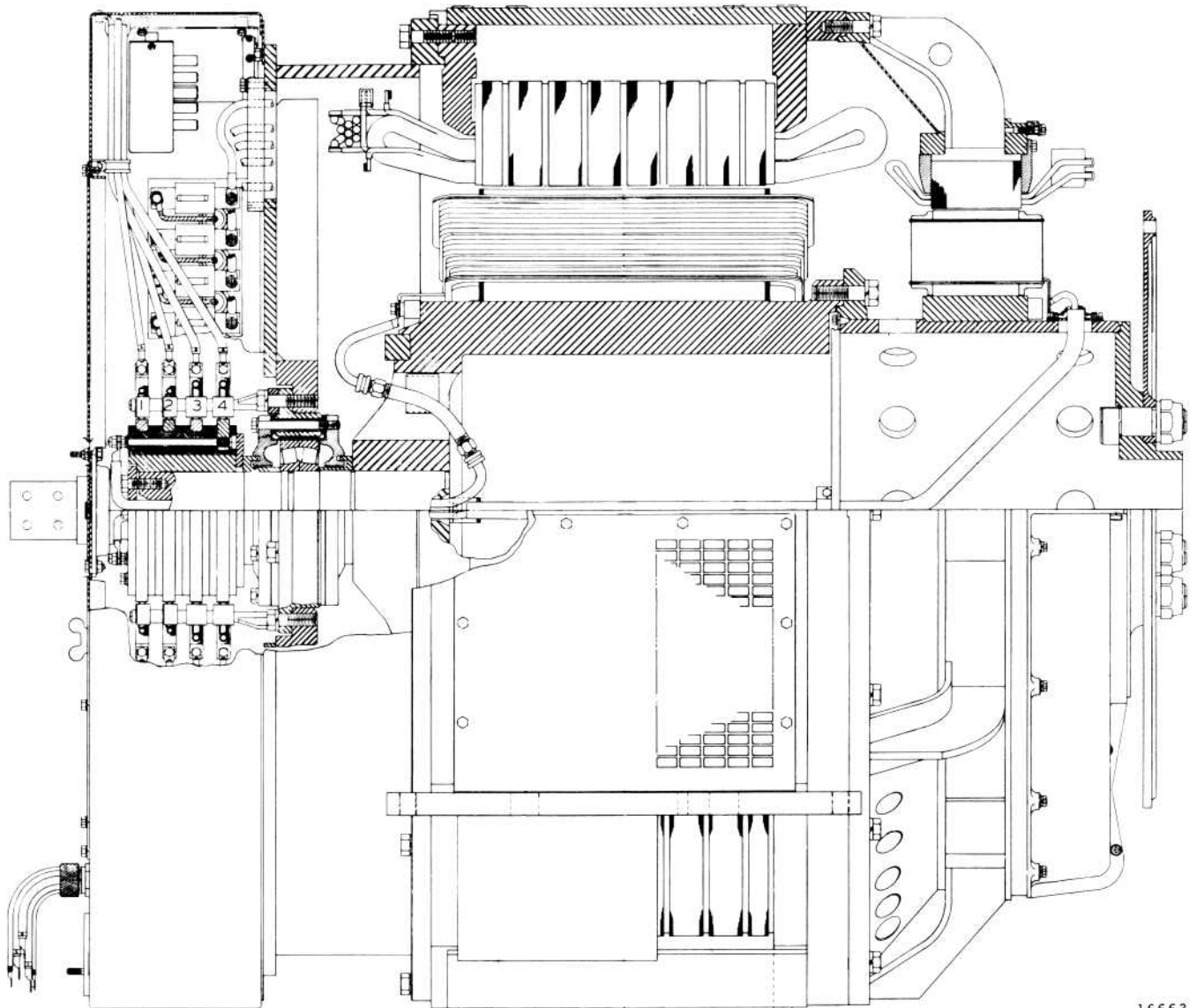


Fig. 8 – Installing Rotor In Stator 15195

4. Using two wire cable loops, place one loop through the end housing and the other loop around the arbor fixture. With the aid of two cranes, lift and guide the rotor assembly into the stator assembly slowly and carefully so the insulation will not be damaged. When the end housing is flush against the stator frame, install the 3/4"–10 bolts to hold the end housing to the stator frame and torque to 200 ft-lbs.

5. Place fish paper strips  $1/16'' \times 3'' \times 36''$  in air gap between rotor assembly and coils of AR10 alternator only. Remove wire cable loops and arbor fixture after fish paper has been applied.
6. Apply coupling disc to D14 rotor hub, Fig. 9, using the bolts removed at disassembly. Torque to value specified in Maintenance Data.



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Fig. 9 – AR10 Generator Cross-Section

7. Mount brush holder bracket to bearing housing and tighten the  $3/4''$ –10 bolts to 200 ft-lbs.
8. Install the stator lead cleat assemblies, rectifier bank assemblies and collector ring cover to the front face of the end housing.
9. Connect the leads to the collector ring assembly, and through collector ring cover and cable cleats to the rectifier bank assemblies.
10. Mount the air box assembly to the end housing using  $1/2''$ –13 bolts.
11. Connect brush holder leads and any remaining leads that have not been connected.

- 12. Install all covers that were removed during disassembly.
- 13. After assembly, check to ensure that the total end movement of the bearing outer race in the bearing housing is within  $3/8'' \pm 1/64''$ . If the original parts are reused, this figure may be the same as the original figure which was steel stamped on the face of the end housing. If the figure is not the same, blot out the original figure and stamp the new figure adjacent to it.

NOTE: A few of the earlier generators had a total end movement less than the  $3/8'' \pm 1/64''$ , which can be verified by the figure stamped on the end housing.

Position the rotor so that all the end movement is taken up in the direction of the coupling disc. Then measure the distance from the machined face of the bearing housing to the outer face surface of the collector ring assembly. Stamp this measurement (approximately  $8-27/32''$ ) to the nearest  $1/64''$  on the end housing next to the end movement figure.

**HIGH POTENTIAL TEST**

Before high potential tests are made it is highly desirable to check first with megohmmeter. A megohmmeter reading of 1 megohm, when tested with a 1000 V megger, is satisfactory for hy-pot test. An accumulation of dirt and moisture sometimes is sufficient to cause leakage, and if high potential is applied it will cause an actual breakdown on the insulation. The condition may be aggravated by sudden temperature changes. If the equipment has been standing outside during cold weather before being brought inside a warm building, the equipment will tend to sweat and the condensed moisture will aid the leakage effect.

The normal voltage of EMD main generators is 600 volts. Therefore, the minimum test voltage should be:

Generator . . . . .	950 volts
High voltage wiring and high voltage equipment . . . . .	1050 volts

In making high potential tests, the following precautions should be taken:

- 1. All high potential tests must be made by placing electrodes on the circuit under test before closing switch, and opening switch before removing electrodes. Dangerous over-voltage surges may result from making or breaking the high voltage circuit with the electrodes.
- 2. It is of the utmost importance that a reliable high potential tester be used, to ensure that an adequate test is made and also unnecessary overstressing of insulation does not take place. In regard to the features which should be incorporated in a high potential tester, the following points are pertinent:
  - a. Wave form
  - b. Surges
  - c. Voltage regulation
- 3. In making high potential tests, extreme care should be taken to see that every person is in the clear before applying the voltages.

**INSTALLATION OF MAIN GENERATOR INTO LOCOMOTIVE UNIT**

The installation of main generator and alternator is similar to removal, with exception that it requires more time, care and skill.

Before a main generator is installed, check and clean the mounting plates. Be sure these plates are smooth, free of burrs and high spots.

Before lifting the generator into the unit, check and clean the mounting pads on the locomotive bed frame. Be sure these pads are clean and free of burrs.

Check the surface on the engine and generator coupling discs, both must be smooth and clean. Add a little oil or white lead to the fitting surfaces. Check that bolt holes in couplings are clean and smooth.

Apply a 2-3/8" socket wrench to the engine to generator coupling bolt nuts to make sure they are tightened to the proper torque as specified in the Maintenance Data.

Inspect and clean shims. Shims must be smooth, free from burrs and kinks. Shims should have been tagged after removal of generator so they may be installed in their original position at this time.

Lift generator and guide slowly and carefully into engine room. Set generator on mounting pads as close to engine coupling disc as possible.

Line up hole patterns in the engine and generator coupling discs by barring or jacking engine over. Push generator toward engine until its coupling fits into the beveled groove in the engine coupling disc.

Check all coupling bolts to see that they are smooth and clean. Place a little oil with white lead on 3/4" coupling bolts and install all bolts through generator coupling disc and engine coupling disc from the engine side. Check to be sure the generator disc is not cocked and is properly mated to the engine coupling disc.

Once the generator is attached to the engine, do not bar or jack engine over until all fish paper or fibre strips are removed from between the rotor assembly and the stator coils.

Line up dowel holes and install base bolts. Do not insert dowels or base bolts until generator is aligned with engine. See M.I. 1753 for alignment of generator to engine.

**MAINTENANCE DATA**

**SPECIFICATIONS**

**Weights**

Generator (complete)	16,110 lbs.
AR10 Stator	7000 lbs.
AR10 — D14 Rotor Assembly	6775 lbs.
End Housing	900 lbs.

**Brushes**

Number of brushes	4
Grade	255
Brush Number	
Used with single brush holder 8413189	8413191
Used with double brush holder 8283003	8329691
Brush Size	
8413191	2-1/8" x 1-1/4" x 1/2"
8329691	2" x 1-1/4" x 1/2"
Wear Limit	3/4"
Brush Holder	
Number	4                      2
Spring Pressure	3.3±.33 lbs.              3.29±.25 lbs.

(For D14 brushes and brush holders see M.I. 3306)

**Collector Rings**

Maximum ring eccentricity	.004"
Maximum lateral ring runout	1/32"
Condemning limit on ring outside diameter	10-1/4"

AR10A, AR10B,  
AR10E and AR10F

**Roller Bearing**

Outer diameter	8.4646 <sup>+0.0000"</sup> <sub>-.0012"</sub>
Bearing Bore	4.7244 <sup>+0.0000"</sup> <sub>-.0008"</sub>
Width	2.2835 <sup>+0.000"</sup> <sub>-.005"</sub>
Internal Clearance (before assembly)	.0045" to .0061"
Internal Clearance (after assembly)	.003" min.

Bearing Housing Bore Inside Diameter	8.4705 <sup>+0.0010"</sup> <sub>-.0000"</sub>
Early Housing Bore	8.4681 <sup>+0.0010"</sup> <sub>-.0000"</sub>

**Lubricant Capacity**

Bearing Cap	6 ozs.
Bearing	4 ozs.
Outer bearing cover	6 ozs.
	<b>TOTAL 16 ozs.</b>

Recommended Lubricant . . . . . Shell Cyprina RA Grade 3

Cold resistances @ 75°C.

AR10 Rotor, slip-ring to slip-ring	Nom.	+ 4%	- 4%
	1.255	1.305	1.205
AR10 Stator, line to neutral, per 5 phase group	Nom.	+ 2%	- 2%
	.00315	.00321	.00309
Line to line per phase group	.00580	.00592	.00568
AR10 Stator line to neutral per paralleled 10 phase group	Nom.	+ 8%	- 8%
	.00180	.00194	.00166
Line to line per paralleled 10 phase group	Nom.	+ 5%	- 5%
	.00319	.00335	.00303

Coupling Disc Torque  
(Lubricated with Molykote 8168822)

Six bolt application	1400-1500 ft-lbs.
Twelve bolt application	750-850 ft-lbs.

**EQUIPMENT LIST**

Pyrometer	8027937
Induction Heater	8041446
Coating, Molykote	8168822
Stone (1 x 1-1/2 x 5) - 2 required	8204167
Collector Ring Grinder	8219264
Adapter	8364940
Megohm Tester	8219774