

SERVICE DEPARTMENT



# Maintenance Instruction

## AR6-D14 TRACTION GENERATOR

AR6-D14 traction generator maintenance and overhaul instructions are presented in six sections, each under separate cover. General maintenance instructions are included for the AR6-D14 combination. In addition, detailed instructions to completely disassemble, inspect, recondition, assemble, and test the AR6 traction generator are included. Performance of a specific procedure may require, as a prerequisite, the completion of a procedure contained in another section. In each case this procedure will be referenced.

<u>Section No.</u>	<u>Title</u>
1	Maintenance And Disassembly
2	Bearing Component Maintenance And Inspection
3	Stator Inspection, Reconditioning, And Test
▶ 4	Rotor Inspection, Reconditioning, And Test
5	Rectifier Bank Assemblies And Suppression Circuits
6	Assembly And Test

## SECTION 4

### ROTOR INSPECTION, RECONDITIONING, AND TEST

#### INTRODUCTION

During traction generator overhaul, the rotor should be cleaned and inspected to determine the electrical and mechanical quality and to ensure satisfactory performance during operation. Visual and electrical inspections are necessary to determine what type of repair, if any, is needed.

The inspections should be carefully made and all rework performed according to the outlined procedures.

#### CLEANING

Prior to making any inspections, the rotor should be thoroughly cleaned and dried. Cleaning should be performed as outlined below.

The rotor may be cleaned by blowing off all loose dirt and carbon dust, both from the outside and inside of the rotor with high volume, low pressure, dry air, and by using a fiber brush and Stoddards Solvent (ASTM-D474-40). This solvent

is non-toxic and has a flash point of 46° C (115° F). It also has a fairly fast rate of evaporation.

**WARNING:** The usual safety precautions that apply to inflammable fluids should be observed. Provide adequate ventilation when any type of solvent is being used.

After the rotor has been cleaned, blow off as much of the solvent as possible using high volume, low pressure, dry air. Let the rotor stand until all remaining solvent has evaporated before making any electrical checks.

Mechanical inspection can be made on the shaft and rotor during the period when the remaining solvent is evaporating.

#### SHAFT INSPECTION

Inspect the exposed shaft diameters for size as shown in Fig. 1. Inspect bearing seat surface for damage, fretting, corrosion, or roughness. This surface may be "cleaned up" by light rubbing with crocus cloth.

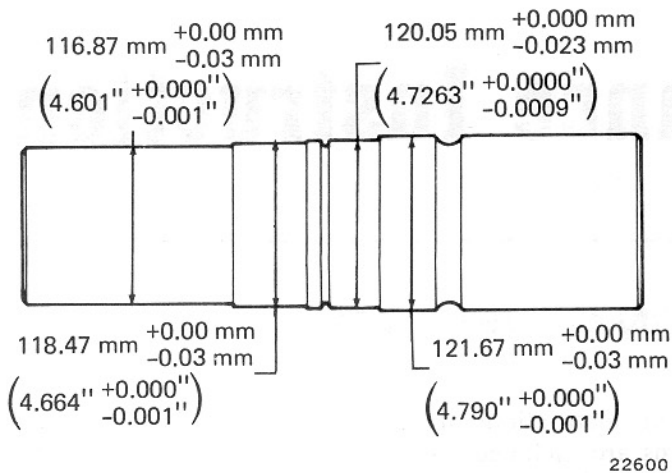


Fig. 1 - Shaft Dimensions

NOTE: When cleaning up the surface, do not rub or polish axially or work below the normal surface. If the surface is heavily damaged, the shaft should be replaced.

## COIL INSPECTION

1. Check rotor coils for loose or shifted windings. This will be evident by cracks in the epoxy on the long side of the coil assemblies. Replace any coils found in this condition.
2. Check connection between coils for loose bolts or damaged connectors, and repair or replace connectors as required.

## COIL REPLACEMENT

1. Remove coil mounting bolts and lift coil from spider assembly.
2. Mounting surface on the rotor spider and coil laminations must be free of rust, paint, or other foreign material. High spots or protrusions above the surface caused by handling are not permitted.
3. Remove any epoxy insulating compound which may have been baked on the coil assembly mounting surface.
4. Coil bolts must be discarded and new bolts used for replacement coil.
5. Washers must fit freely on bolt and lie tightly against the face of bolt head without interference with head radius.

6. Replacement coil must be same configuration as coil being replaced.

## ASSEMBLY

1. Place rotor spider in approved assembly fixture with open end up. Weigh each pole and select them for assembly so that crossed and open coils alternate and so that coils of approximately the same weight are opposite each other to facilitate balancing.
2. Lift coil to be installed, with an approved lifting fixture and with leads located at lower end. Be careful to prevent damage to coil winding or contact face.
3. Position coil against spider so that holes line up and split sleeve at each end of coil will enter counterbored holes in spider.
4. Apply Molykote lubricant to mounting bolt threads, washer contact surface of bolt heads, and both faces of hardened washers.
5. Place one bolt and washer in center mounting hole and start threads by hand. Tighten bolt until upper and lower split sleeves are in contact and weight of coil is supported, then remove lifting fixture.
6. Place bolt and washer in upper and lower mounting holes and start threads by hand. Tighten upper and lower bolts evenly until split sleeves are fully engaged and coil is seated.
7. Assemble remaining bolts and washers in mounting holes and tighten bolts until fully engaged. All bolts must turn freely by hand without use of a wrench until fully engaged.
8. Tightening sequence should be to tighten the two inboard bolts first, and then the outboard bolts.
9. Tighten the bolts to 1424 N·m (1050 ft-lbs) torque, using the preceding sequence, then loosen the bolt to below 678 N·m (500 ft-lbs) and retighten to 1424 N·m (1050 ft-lbs).
10. Remove all balance weights from rotor and dynamically balance complete AR6-D14 rotor assembly to 0.06 N·m (8 in.-ozs.).

## ELECTRICAL TESTS

### INSULATION RESISTANCE TEST

Perform insulation resistance test as follows:

1. Connect the positive lead of the megohmmeter to either lead of the rotor cable.
2. Connect the remaining lead to the frame of the rotor.
3. Make insulation resistance check with 500 volt DC constant potential. Megger must indicate 100 M $\Omega$  (megohms) minimum after one minute. (Individual coils must indicate 1000 M $\Omega$  after one minute.)

### HIGH POTENTIAL TESTING

The insulation used in these generators is designed to withstand somewhat higher voltages than those experienced during normal operation.

High potential tests are normally used when it is necessary to qualify new equipment installations or to determine the location of an insulation breakdown on older equipment. High potential tests can be destructive to equipment being tested and, therefore, are not recommended as a normal routine maintenance item.

In some cases, such as; national or local code requirements, company policy, or a suspected insulation breakdown, high potential tests are required. In these instances adhere to all cautions, listed below in the safety precautions section, while performing test.

### SAFETY PRECAUTIONS

- - Make certain that stator meets qualifications under "Insulation Resistance Test," before performing high potential tests.
- - Whenever possible, high potential tests should be performed by one man. All others should be kept away from the test area.

- - A thorough knowledge and understanding of equipment, and procedures involved is essential.
- - To prevent dangerous overvoltage surges, test electrodes must be firmly connected to item under test before voltage is applied. In addition the voltage should be removed before the electrodes are removed.
- - Discharge residual voltage to ground after removing tester.

### PROCEDURE

1. Jumper both rotor leads together and connect to red lead of tester.
2. Connect black tester lead to rotor spider.
3. Test unit at 1500 volts for one minute.
4. Discharge circuit under test to ground before removing tester leads. (Individual coils should be tested at 1600 volts for one minute, if required.)
5. Repeat insulation resistance test.

### TURN-TO-TURN TEST

Shorted turns in a rotor field coil can be detected by measuring the watts input across a coil as follows:

1. Test each coil individually. It is not necessary to open coil connections to perform this test.
2. Connect a wattmeter across the terminals of a field coil energized with a 110 volt 60 Hz source.
3. Wattmeter should indicate approximately 110 watts. If a coil has one turn shorted, the indication will be approximately 570 watts.

NOTE: Values between good coils may vary as much as 30%, and between a shorted coil and a good coil by as much as 300%.

4. Upon successful completion of all electrical tests and dynamic balancing, paint the entire rotor assembly with red air drying enamel.

# SERVICE DATA

## EQUIPMENT LIST

Megohmmeter Tester	.....	8306539
High-Potential Tester	.....	8212404, 8212405, 8212406, 8324253

## MATERIAL LIST

Red Air Drying Enamel 2 litre (1 qt)	.....	8061130
Molykote Lubricant 0.5 litre (16 ozs) Spray Can	.....	9316707

**PROCEEDURE**

1. Test stator and rotor windings to determine insulation resistance. The insulation resistance should be at least 100 megohms per kilovolt of rated voltage. If the insulation resistance is less than this value, the stator and rotor windings should be repaired or replaced.

2. Test the stator and rotor windings for short circuits to ground. The insulation resistance should be at least 100 megohms per kilovolt of rated voltage. If the insulation resistance is less than this value, the stator and rotor windings should be repaired or replaced.

3. Test the stator and rotor windings for open circuits. The insulation resistance should be at least 100 megohms per kilovolt of rated voltage. If the insulation resistance is less than this value, the stator and rotor windings should be repaired or replaced.

4. Upon successful completion of all electrical tests and dynamic balancing, paint the motor rotor assembly with red air drying enamel.

**SAFETY PRECAUTIONS**

- Make certain that stator meets qualifications under "Insulation Resistance Test," before performing high potential tests.
- Whenever possible, high potential tests should be performed by one man. All others should be kept away from the test area.