Instruction Manual

Installation
Operation
Maintenance

Traction Alternator
Brushless AC Rectified DC

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Nidec
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DANGER

ONLY QUALIFIED PERSONNEL FAMILIAR WITH THE CONSTRUCTION AND OPERATION OF THIS EQUIPMENT AND THE HAZARDS INVOLVED SHOULD INSTALL, ADJUST, OPERATE AND/OR SERVICE THIS UNIT. READ AND UNDERSTAND THIS MANUAL IN ITS ENTIRETY BEFORE PROCEEDING. FAILURE TO OBSERVE THIS PRECAUTION COULD RESULT IN SEVERE BODILY INJURY OR LOSS OF LIFE.

DANGER

THE USER IS RESPONSIBLE FOR CONFORMING TO THE NATIONAL ELECTRIC CODE AND ALL OTHER APPLICABLE LOCAL CODES. WIRING, GROUNDING, DISCONNECTS, AND OVERCURRENT PROTECTION ARE PARTICULARLY IMPORTANT. FAILURE TO OBSERVE THIS PRECAUTION COULD RESULT IN SEVERE BODILY INJURY OR LOSS OF LIFE.

DANGER

SUBSEQUENT STEPS REQUIRE ROTATING PARTS AND/OR ELECTRICAL CIRCUITS TO BE EXPOSED. STAY CLEAR IF UNIT MUST BE RUNNING OR DISCONNECT AND LOCKOUT AND TAG POWER SOURCE IF CONTACT MUST BE MADE. FAILURE TO OBSERV THESE PRECAUTIONS COULD RESULT IN SEVER BODILY INJURY OR LOSS OF LIFE.

WARNING

WHEN LIFTING THIS UNIT, DO NOT PULL AT AN ANGLE ON LIFTING EYES. THE LIFTING EYES ARE FOR THE UNIT ONLY AND NOT FOR THE COMPLETE SET. ALWAYS USE SPREADER BARS WHEN LIFTING THE UNIT. FAILURE TO OBSERVE THESE PRECAUTIONS COULD RESULT IN BODILY INJURY.

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SECTION 1
INTRODUCTION AND DESCRIPTION

INTRODUCTION

This manual contains instructions for installation, operation, maintenance, and assembly/disassembly of Kato AC Rectified DC Traction Alternator. (Generator).

Electrical connection drawings, dimensional drawings, and parts listings for specific model, type and serial number are contained as supplementary information in a separate excerpt of the alternator manual. *These drawings are the official source of information* for making electrical connections or ordering replacement parts.

GENERAL DESCRIPTION

The Kato Traction Alternator is a single bearing, eight pole, synchronous alternator with a brushless exciter.

The alternator is cooled by an external electrically driven blower supplied by others.

The multi-circuited alternator windings supply DC output through parallel rectifier assemblies (not by Kato).
The rectifier assembly is mounted in the terminal box on top of the alternator.

CONSTRUCTION

The basic alternator includes frame and stator, rotor, AC to DC rectifier assembly (not by Kato) and bearing.

Frame and Stator

The alternator stator core is built of laminated electrical grade steel. Laminations are secured under pressure and clamped to steel endrings. The alternator frame is fabricated from steel bars welded to the end rings. The feet are welded to the frame to simplify installation and alignment with the prime mover. Lifting eyes are welded to the frame to enable lifting of the entire alternator. Windings are inserted into the stator slots and the entire assembly is vacuum pressure impregnated with 100 percent epoxy resin (see Figure 1-1). The phase leads are brought out to standard connection lugs which are fastened to the main AC/DC rectifier assembly.

Figure 1-1
Wound Frame and stator

The alternator rotor consists of the shaft, spider, field poles and windings.

The shaft is machined from a high strength steel forging.

The spider is laminated with individual dovetails punched to anchor the field poles. The spider laminations are held under pressure and riveted.

The poles are individually punched laminations which are held together with bolts. The field windings use insulated copper wire which are layered wound on the poles. The wound poles are anchored to the spider with two tapered keys. “V” shaped blocks are placed between adjacent field windings and are bolted to the spider. The entire spider and pole winding assembly is vacuum pressure impregnated with 100% epoxy resin.

The rotor assembly is shrunk and keyed on the shaft. Two balancing rings are bolted to each end of the field pole coil support shelves.

Bearing

The bearing housing is packed with grease and requires no periodic lubrication. The bearing should be repacked or inspected during major overhauls. The bearing housing is insulated to prevent the flow of stray shaft currents.

Figure 1-3
Ball Bearing

SECTION 2
INSTALLATION

PREINSTALLATION

The Kato alternator is carefully packed and palletized for shipment and can withstand most shocks incurred during transit. Before accepting shipment for the transportation company, examine the pallet carefully to determine if any damage has occurred during shipment. If necessary, unpack the unit, determine the extent of the damage, and immediately notify the transportation company claims office and Kato Engineering. Be sure to give complete and accurate details when reporting damage.

Unpacking and Storage

If the alternator is received during cold weather, let the unit stabilize to room temperature before removing the protective packing material. This precaution will minimize the condensation of moisture on coil surfaces, eliminating the possibility of wet windings and insulating materials.

Unpack the alternator with care to avoid scratching painted surfaces or otherwise damaging the unit. Move the unit to the mounting location either by attaching an overhead hoist to the lifting eyes installed on the top of the alternator frame or by lifting the alternator from underneath the skid with a forklift. Care must be taken not to damage accessory equipment mounted in the vicinity of the lifting eyes.

WARNING
Apply lifting force to structural points specifically provided for that purpose. DO NOT USE enclosure lifting holes to lift the whole unit. Use lifting means adequate for the weight. Failure to observe these instructions can result in injuries to personnel and damage to the alternator.

Short-Term Storage (less than six months)

If the alternator is not to be installed in its operating location as soon as received, it should be stored in a clean, dry area, not subject to sudden changes in temperature or humidity. Although the equipment can safely withstand non-operating temperature ranging from -65 to +165 degrees fahrenheit, storage at room temperature is recommended.

Inspection

The alternator is carefully inspected and operationally tested before leaving the factory and is shipped assembled and serviced for operation. However, before installing the machine, it is good practice to thoroughly inspect the unit for signs of damage or potential malfunction.

Long-Term Storage

Alternators that must be stored for more than six months or are stored in adverse conditions should be prepared for storage by installing desiccant bags inside the outboard end bell and vacuum sealing the unit in a covering of plastic or other material designed for that purpose. The unit should be tagged to ensure that desiccant bags are removed before the unit is placed in operation.

Grease used in ball bearings is subject to deterioration. If the alternator is stored for one year or more, it is recommended that new ball bearings be installed and greased to the proper level before being put into operation. If inspection reveals the bearings to be in good condition (free of rust or corrosion), replacement is not necessary .

NOTE
Ball bearings should be inspected in place. Do not reuse a bearing that has been removed for inspection.

INSTALLATION

Installation of the alternator will require careful adjustment. Follow the prime mover manufacturers special instructions for alignment and mounting.

ELECTRICAL MEASUREMENTS

NOTE
Insulation Resistance test should be conducted before any power connections are made.

In the event the alternator was subjected to rapid change in temperature, or freezing or wet climate during storage, it is recommended that the insulation resistance of the windings be checked. A hand cranked megger of not over 500 volts is a convenient method. The minimum insulation resistance value at 104 degrees fahrenheit (40 degrees centigrade) should not be less than one megohm. For megger reading conversion to 40 degrees centigrade see Figure 2-1.

Exciter Field

a) Disconnect the exciter leads from the terminal strip.

b) Connect exciter leads to one clamp of 500 volt megger and connect the other clamp to alternator frame.

c) Apply 500 volts form the megger and measure the resistance reading after one minute. The minimum reading should be 1.0 megohm. If not, refer to drying method.

Generator Stator

If the exciter field insulation resistance shows unacceptable megohm reading proceed with the following test:

a) Disconnect all alternator leads from the rectifier assembly.

b) Connect one phase at a time (Al, A2, A3, A4) with phases isolated to one clamp of 500 volt megger and connect the other clamp to the alternator frame.

c) Apply 500 volts from the megger and measure the resistance reading after one minute. The minimum reading should be:

$$\text{Resistance in megohm} = \frac{\text{Rated voltage of machine}}{1000} + 1000$$

If not, refer to dry-out procedures.

Exciter Armature

a) Disconnect the exciter armature leads from therotating rectifiers.

Caution
Do not megger the rotating rectifier assembly.

b) Connect the exciter armature leads to one clamp of 500 volt megger and connect the other clamp to the exciter sleeve tubing.

c) Record the megohm reading after one minute of applying 500 volts. Minimum reading should be 1.0 megohm. If not, refer to dry-out procedures.

Generator Rotor Winding

a) Disconnect the alternator field leads from the rotating rectifier assembly.

b) Connect the alternator field leads to one clamp of 500 volt megger and connect the other clamp to the shaft.

c) Record the megohm reading after one minute of applying 500 volts. Minimum reading should be 1.0 megohm. If not, refer to dry-out procedures.

Drying Methods

If the insulation fails to meet the minimum value specified previously, the windings may be dried out by heat from a warm air oven, heat lamps, or strip heaters.

When oven drying, use a forced air circulating type, not a radiant type. The temperature of windings should not exceed 93 degrees centigrade (200 degrees fahrenheit).

The insulation resistance drops rapidly at first as the winding heats up, rises slowly as moisture is removed, and then levels off when winding is dry. Winding temperature should be raised gradually at a rate of 10 degrees centigrade per hour.

ELECTRICAL CONNECTIONS

To minimize the transmission of vibration it is essential that flexible conduits be used for all electrical connections to the alternator. Be sure that electrical service conforms to the ratings on the nameplate. Torque all connections to the following values:

Bolt Size	Torque
1/4"	65 in. lbs.
5/16"	130 in. lbs.
3/8"	372 in. lbs.
1/2"	600 in. lbs.

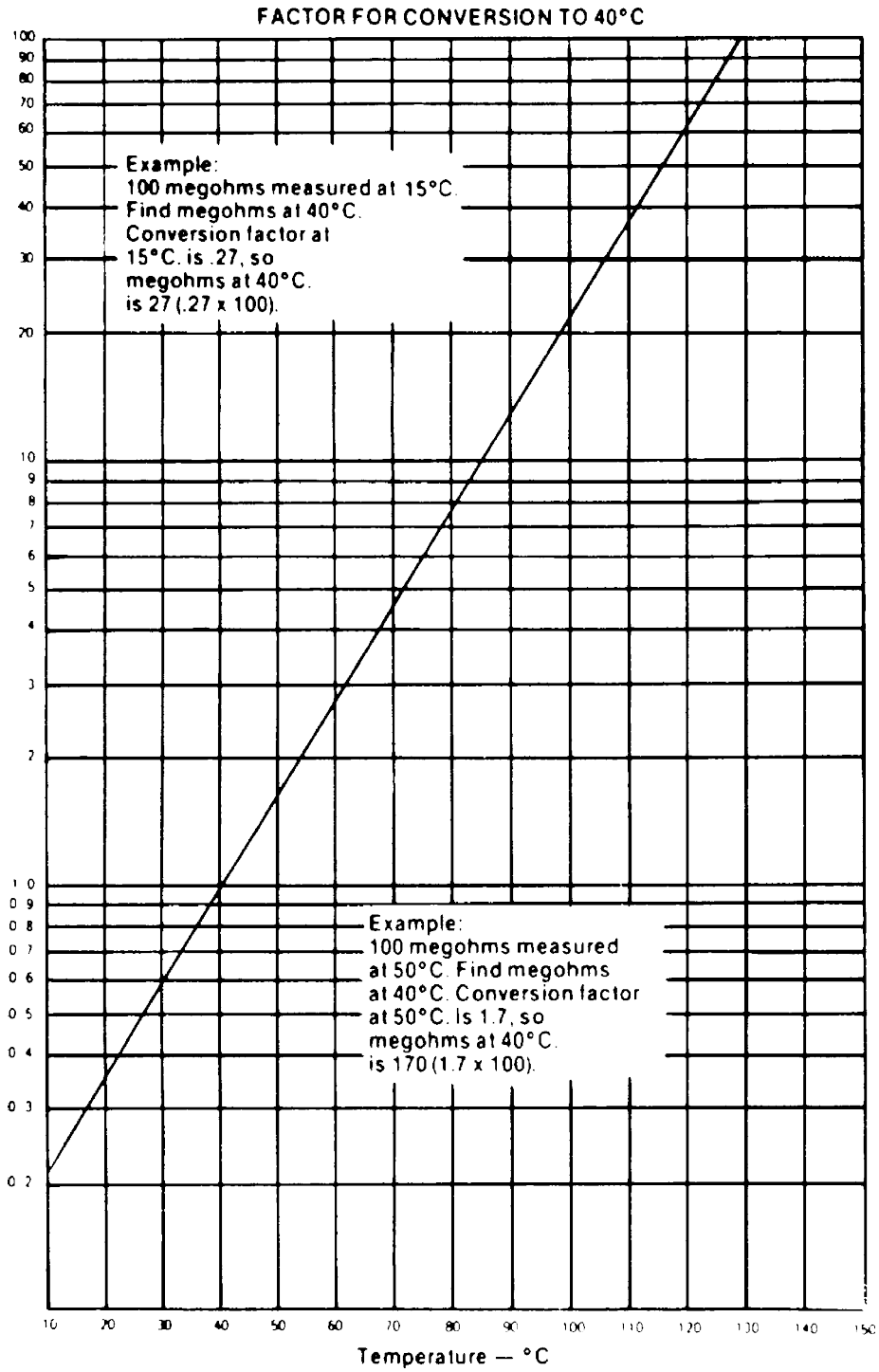


Figure 2-1
Chart for Converting Megger Readings
to 40 Degrees Centigrade

SECTION 3
OPERATION

PRE-OPERATION CHECKS

After the alternator is installed and wired, and before operating for the first time, perform the following checks:

a) Double-check all wiring against the connection diagrams. Inspect rectifier assembly, make sure all connections are tight and leads in place and in good condition with proper labels.

b) Check all mounting bolts for proper torque.

c) Make certain no restrictive material or objects are lodged in the alternator. Remove desiccant bags if unit has been in long-term storage. Place all covers and guards that have been removed and all safety devices are functional.

INITIAL START-UP

WARNING

BEFORE RUNNING MACHINE, MAKE SURE GUARDS, SHIELDS, AND SCREENS PROVIDED ARE PROPERLY INSTALLED. FAILURE TO OBSERVE THESE PRECAUTIONS COULD RESULT IN SEVERE BODILY INJURY OR LOSS OF LIFE.

The alternator has been test run at the factory. However, after rebuild or any type of servicing proceed cautiously, possibility of errors and omissions always exist.

Start the alternator slowly and check for proper direction of rotation.

Bring alternator to normal operating speed and during the first minutes check for excessive noise, vibration or bearing temperature. High vibration, noise or temperature calls for **immediate shut down.**

During the first 50 hours of operation check for vibration with and without load. A slight increase with load and temperature is normal. However, the vibration levels should stabilize after 2-3 hours.

Check for bearing temperatures. A properly operating ball or roller bearing should not operate above 200 degrees fahrenheit (93 degrees centigrade) as measured at the bearing housing. A common cause of high bearing temperature is over greasing or high ambient temperature. Make sure that hot air discharged from the alternator is not recirculating to the intake of the alternator.

Recheck all exposed bolts (including mounting bolts) and retorque.

PREVENTIVE MAINTENANCE

The following information is presented only as a guide and does not purport to cover every contingency which may occur under local operating conditions.

Preventive maintenance should include routine checks of: cleanliness, lubrication, bearing temperature, vibration. For more detail, see section 4.

Daily

a) Check for overheating (unusual radiant heat, discoloration and smoke).

b) Check for unusual noise or vibration.

Periodic

Every three months or 2000 hours of accrued operating time, whichever comes first. If the equipment is subjected to excessive moisture, heat or dust, the schedule for cleaning and inspection should be shortened. Check for clogged air intakes, loose cables and bolts, and excessive dirt build up.

Cleaning

Proper maintenance of electrical equipment requires periodic visual examination of the machine and windings and appropriate electrical and thermal checks. Insulation surfaces should be examined for cracks and accumulations of dirt and dust to determine required action. Lower than normal insulation resistance can be an indication that conductive contaminant is present. The contaminant may be carbon, salts, metal dusts, or virtually any dirt saturated with moisture. These contaminants develop a conductive path to produce shorts or grounds with subsequent failure. Cleaning is also advisable if heavy accumulations of dirt and dust can be seen, or are suspected to be restricting ventilation as manifested by excessive heating. With no visual, electrical, or thermal evidence that dirt is present, routine cleaning should not be initiated since more harm than good may result. If harmful dirt accumulations are present, a variety of cleaning techniques are available. The one selected will depend on:

(1) The extent of the cleaning operation to be undertaken.

(2) The type, rating, and insulation structure of the machine involved.

(3) The type of dirt to be removed.

Field Service Cleaning-Assembled Machines.

Where cleaning is required at the installation, and complete disassembly of the machine is unnecessary or not feasible, dry dirt, dust, or carbon should first be picked up by a vacuum cleaner to prevent the redistribution of the contaminant. A small nonconductive nozzle or tube connected to the vacuum cleaner may be required to reach dusty surfaces or to enter into narrow openings. After most of the dust has been removed, a small brush can be affixed to the vacuum nozzle to loosen and allow removal of dirt more firmly attached.
After the initial cleaning with vacuum, compressed air (not to exceed 30 lb/in^2) may be used to remove the remaining dust and dirt.
An exhaust must be provided so that dirt will be removed from the machine. Indiscriminate blowing may produce mechanical unbalance of an armature or rotating field by redistribution of dirt.
Compressed air used for cleaning should be clean and free of moisture or oil. Air pressure or velocity should be adequately controlled to prevent mechanical damage to the insulation. Disassembly of the machine and more effective cleaning by a qualified service shop may be required if the previously described field service cleaning procedures do not yield effective results.

Service Shop-Disassembled Machines.

An initial insulation-resistance reading should be taken on the machine to check electrical integrity. (See section 4.4) A zero reading may indicate an insulation breakdown requiring repair, not just cleaning.
The "steam-jenny" method of cleaning, which sprays a high-velocity jet of hot water and water containing a mild detergent, is normally effective in cleaning windings including those subjected to flooding or salt contamination. The detergent spray is followed by multiple sprays with clean water to remove or dilute the detergent. Water immersion with multiple rinses and changes of water may also be used to remove contamination. The machine should then be dried (low-temperature oven may be used) until normal insulation resistance values are obtained at room temperature.
Solvents are effective for removing oil or grease and may be required if water or detergent is not adequate. However, solvents may carry contamination, such as conductive dusts, metals, salts and carbon, into cracks and crevices. Removal of contamination from such inaccessible areas is virtually impossible. A solvent dampened cloth is the preferred cleaning method rather than the direct application of liquids. Extreme care should be taken when using solvents both with the respect to the equipment and the personnel. Environmental concerns, the disposal of waste products, the possibility of damage to the insulation, and the health and safety hazards for the worker should be considered when selecting a solvent. Adequate ventilation and protective gear, such as a dust mask, glasses and gloves, should be used during equipment cleaning. Of course, equipment should not be cleaned when energized.
Note: These cleaning instructions are taken from the **I.E.E.E. Guide for Insulation Maintenance, Standard Number 432-1992** which should be referenced for further information.

If cleaning requires complete disassembly of the unit, or is beyond the ability of the customer, Kato Engineering can clean and service the unit. Contact our parts and service department.

Lubrication

Bearings are sealed for life, but should beperiodically inspected.
Occasional checks of bearing temperature during operation will give indication of the bearing condition. Bearing housing temperature should not exceed 63 degrees fahrenheit (35 degrees centigrade) rise over the ambient air temperature. Bearings can operate at 200 degrees fahrenheit (95 degrees centigrade), but once overheating occurs, this limit may be exceeded rather quickly and the problem should be identified and remedied immediately.

The basic cause of bearing overheating is excessive friction caused by the following conditions.

1) Contamination of grease/wrong kind of grease.

2) Insufficient/too much grease.

3) Excessive thrust due to misalignment.

4) Pounding caused by worn balls or bearing being loose on the shaft.

5) Bearing failure caused by fatigue or wear.

A bearing replacement program is recommended to reduce the possibility of unexpected shutdown due to bearing failure. Under normal conditions and proper

lubrication this replacement should be during a major overhaul. If the alternator is removed from service, inspect the bearing for grease contamination, metal particles in the grease, excessive wear in the bearing housing, and fatigue damage on balls or balls path.

Vibration Check

Take vibration measurements on the bearing housing at start-up after the first 2000 hours of operation and once a year thereafter. Normal vibration readings should not exceed .006 inches (peak to peak) measured in any direction. Any significant change in vibration from previous readings should be investigated.

Insulation Resistance Check

Periodic checks of winding insulation should be made on a yearly basis. A record of insulation resistance should include temperature humidity and a brief description of the winding condition at the time of the check. If data shows any large changes from previous readings, a careful winding inspection should be made.

Winding Resistance Checks

The alternator winding resistance should not change during its life except for minor variations due to temperature. Use a suitable meter for the range of resistance of interest.

SECTION 4
MAINTENANCE

TRACTION ALTERNATOR REMOVAL

With power module removed from vehicle, remove alternator as follows:

NOTE: Alternator removal, with the power module installed in the vehicle, may be possible. Consult vehicle manufacturer's service manual for proper procedure.

CAUTION: Power leads must be disconnected.

WARNING
ENSURE LIFTING DEVICE HAS SUFFICIENT CAPACITY TO LIFT ALTERNATOR ASSEMBLY. ALTERNATOR ASSEMBLY WEIGHT IS 8600 POUNDS.

1. Remove screen cover from housing and remove twenty-four 5/8"-11 bolts securing alternator flex plates to engine flywheel.

2. Connect lifting device to lifting eyes on alternator frame.

3. With lifting device in place, take weight off of alternator engine mounting bracket so the eight 1" bracket bolts and sixteen 5/8" flywheel housing adapter bolts can be removed. Care must be taken taken to support the rotor to avoid damage to the drive plates.

4. Remove alternator from power module and remove shims from coupling adapter or mounting flange if installed.

5. Move alternator to disassembly area.

ASSEMBLY TO PRIME MOVER

See Figure 4-1 for typical method of coupling single bearing alternator to prime mover. The alternator and prime mover should be mounted on a rigid level base.

NOTE: Before assembling alternator to prime mover, remove blocking holding the drive discs to the adaptor.

Before mounting the alternator, check the run-out of the prime mover flywheel and flywheel housing (bell housing) with a dial indicator as shown in Figures 4-2 and 4-3.

TOTAL INDICATOR READING SHOULD NOT EXCEED .003 INCH PER EACH FOOT OF DIAMETER OF FLYWHEEL AND BELL HOUSING, SEE TABLE 4-1. If reading exceeds the allowable limit, excessive vibration could result. Contact the prime mover manufacturer for recommendations.

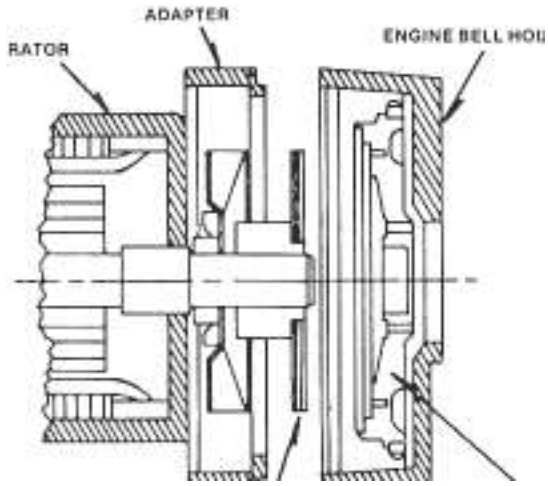


Figure 4-1
Typical Single Bearing Generator-Engine Coupling

FLYWHEEL DRIVE DISC RECESS		
Pilot Diameter	Nominal Clutch Dia.	Allowable Runout (Total Indicator Reading)
6½	8.500	.002
7½	9.500	.002
8	10.375	.002
10	12.375	.003
11½	13.375	.003
14	18.375	.004
16	20.375	.005
18	22.500	.005
21	26.500	.006
24	28.875	.007

FLYWHEEL HOUSING		
SAE Housing Number	Housing Inside Dia.	Allowable Runout (Total Indicator Reading)
6	10.500	.002
5	12.375	.003
4	14.250	.003
33	16.125	.004
2	17.625	.004
1	20.125	.005
½	23.000	.005
0	25.500	.006
00	31.000	.007

Table 4-2
Allowable Flywheel & Disc Recess Runout

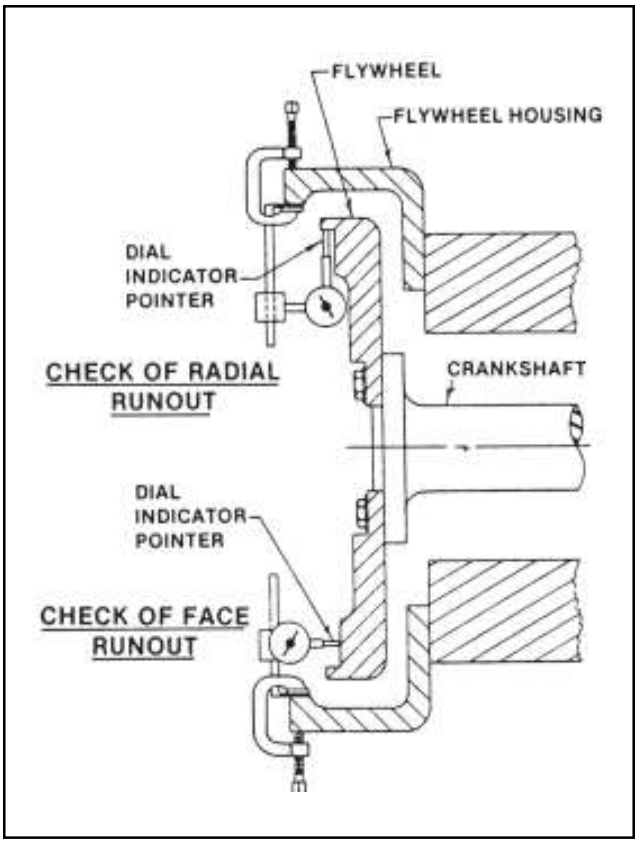


Figure 4-2
Checking Flywheel Run-out

Installation of alternator will require careful adjustment. Shims will be installed between alternator flexplates and coupling hub. This adjustment prevents the possibility of a pre-load on engine crankshaft and alternator bearing. Install the alternator assembly on the power module as follows:

WARNING
ENSURE LIFTING DEVICE HAS SUFFICIENT CAPACITY TO LIFT ALTERNATOR ASSEMBLY. ALTERNATOR ASSEMBLY WEIGHT IS 8600 POUNDS.

1. Attach a magnetic base dial indicator to alternator frame face and set pointer on coupling adapter machined surface, adjust dial indicator to zero. Move rotor in each direction as far as it will go and measure total travel.

CAUTION: If end play is other than .010 to .045, disassemble and correct.

2. Check distance between alternator frame face and alternator coupling face. In order to obtain an accurate dimension, use the following steps:

A. Push rotor towards engine end.Place a parallel steel bar across alternator frame face and with a depth gauge, measure distance between coupling face and alternator frame face. Obtain four readings 90° apart and note average reading. This total is the "alternator dimension".

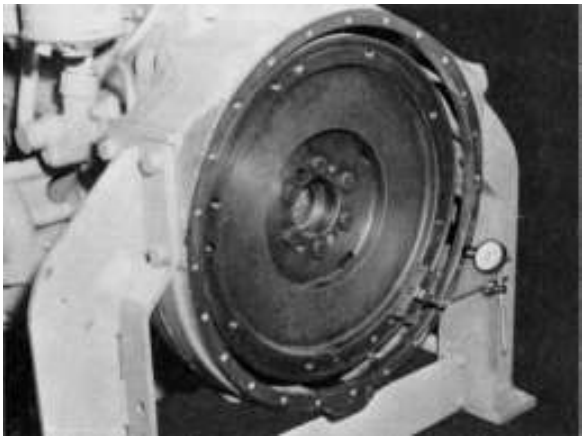


Figure 4-3
Checking Engine Flywheel Housing Runout

3. Check distance between engine flywheel and flywheel housing adapter. In order to obtain an accurate dimension, use the following steps:

A. Center the crankshaft end play, place a parallel steel bar across the flywheel housing adapter face and with a depth gauge, mea sure distance between engine flywheel flex plate and flywheel housing adapter face. Obtain four readings 90° apart and note average reading. This average reading is "engine dimension".

4. Shim Selection

A. If alternator dimension exceeds "engine dimension" shims must be removed between alternator drive plates and coupling hub. Shim thickness to be removed will be the difference between "alternator dimension" and "engine dimension" with an allowable toler ance of .005 inch.

B. If "engine dimension" exceeds "alternator dimension", flex plate coupling shims must be added between alternator flex plate and

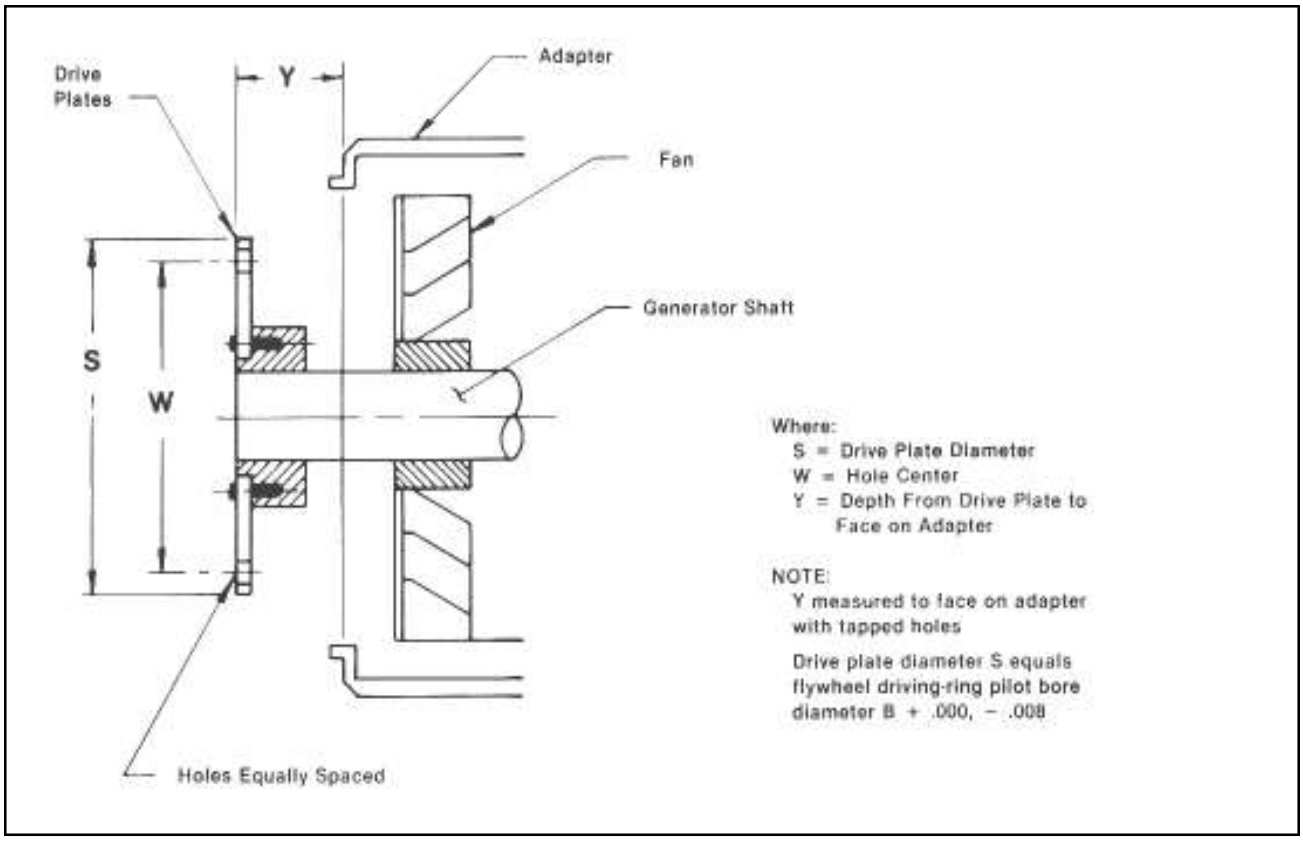


Figure 4-4
Single Bearing Generator Drive Plate and Adaptor

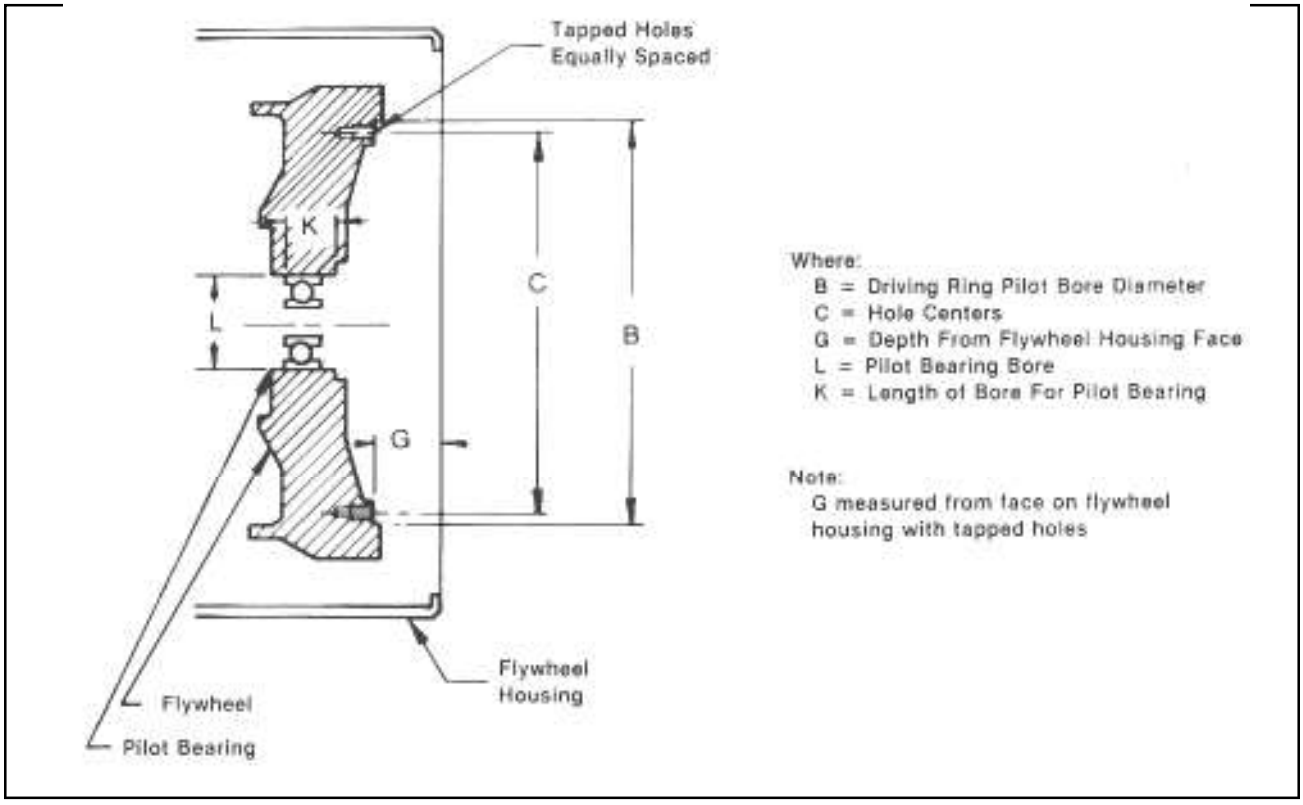


Figure 4-5
SAE Flywheel

Shank Diameter (in inches)	Recommended Torque (in foot pounds)	
	A.S.T.M. A449 S.A.E. 5 Steel	S.A.E. 8 Steel
1/4	9	13
5/16	18	28
3/8	31	46
7/16	50	75
1/2	75	115
9/16	110	165
5/8	150	225
3/4	250	370
7/8	378	591
1	583	893
1 1/8	782	1410
1 1/4	1097	1964
1 3/8	1461	2633
1 1/2	1748	3150

Table 4-2
Recommended Torque SAE 5 Steel and SAE Steel cap Screws

alternator coupling hub. Shim thickness will be the difference between "engine dimension" and "alternator dimension" with an allowable tolerance of .005 inch.

C. If "engine dimension" equals "alternator dimension", no change is required.

5. Connect lifting device to lifting eyes on alternator frame, lift and move alternator into alignment with engine.

6. Install sixteen 1/2-13 bolts, coated with anti-seize compound,securing alternator to engine flywheel housing adapter. Torque in a star pattern to 170 Lb.-ft.

7. Install twenty-four 5/8-11 bolts, coated with anti-seize compound, through access hole in flywheel housing, securing flywheel flex plate to alternator coupling adapter. Torque in a star pattern to 170 lb ft. Install access hole plug to engine flywheel housing.

8. Install eight 1"-8 bolts coated with anti-seize compound, securing alternator to power module. Torque to 480 lb ft.

9. Use lock-washers on all bolts used to secure the

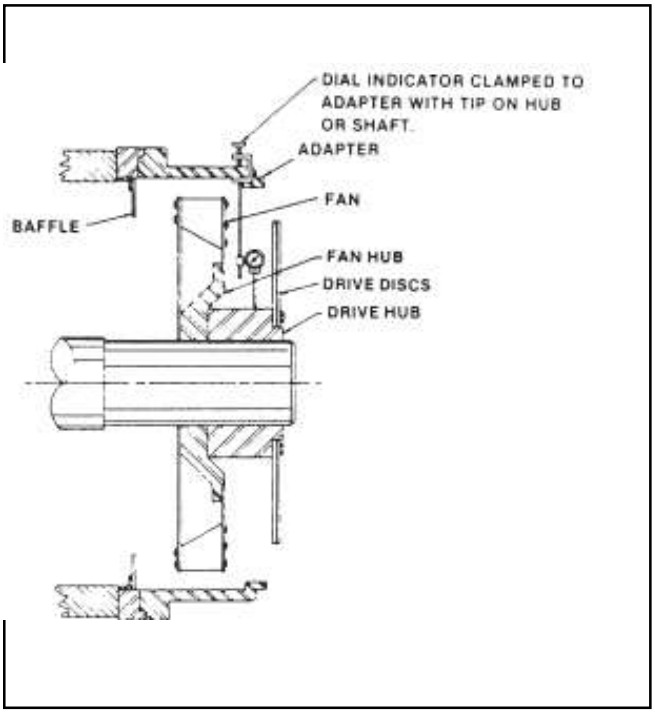


Figure 4-6
Checking Generator Shaft Run-out

alternator to engine and base. Use recommended torque values for each type of cap screws given in Table 4-2.

10. Before installing any covers, check runout of the alternator shaft. Check run-out by placing the base of the dial indicator on the alternator frame rib end positioning the indicator finger on the shaft as shown in Figure 4-6. Total shaft run-out should not exceed .003 inch. If this figure is exceeded, rotate shaft so that high readig is on top. Loosen bolts attaching drive plates to flywheel, allowing the high spot to "settle". Recheck runout. If the .003 figure is still exceeded, remove drive disc bolts and rotate alternator relative to the engine flywheel. Reinstall bolts and check runout again.

PRELIMINARY CHECKS

Before initial start-up, perform the following preliminary checks:

1. Check all mounting bolts for proper torque.

2. Check brush installation.

3. Check for proper installation of guards and safety devices at any hazardous location. Make sure all covers are in place.

4. Check cable labeling. Make sure all leads are in good condition.

CAUTION: After assembly of alternator or when placing in service, proceed cautiously, even though the best installation instructions and practices are followed. Possibilities of errors or omissions always exist.

WARNING
BEFORE RUNNING MACHINE, MAKE SURE GUARDS, SHIELDS, SCREENS PROVIDED ARE PROPERLY INSTALLED.

INITIAL START-UP

The traction alternator has been test run at the factory. However, after rebuild or initial start-up, perform the following recommended procedures:

1. Start traction alternator slowly and under as light a load as possible; bring traction alternator to normal operating speed During this time, constantly check for unusual sound or excessive vibration.

2. After 50 hours of operation, all exposed bolts (including mounting bolts) should be re-torqued.

DIODE REPLACEMENT

The diodes can be accessed through the cover plate on the bottom of the alternator. The rotor will have to be rotated to reach all of the dides.

PREVENTIVE MAINTENANCE

Please refer to the maitenance manual provided under seperate cover.

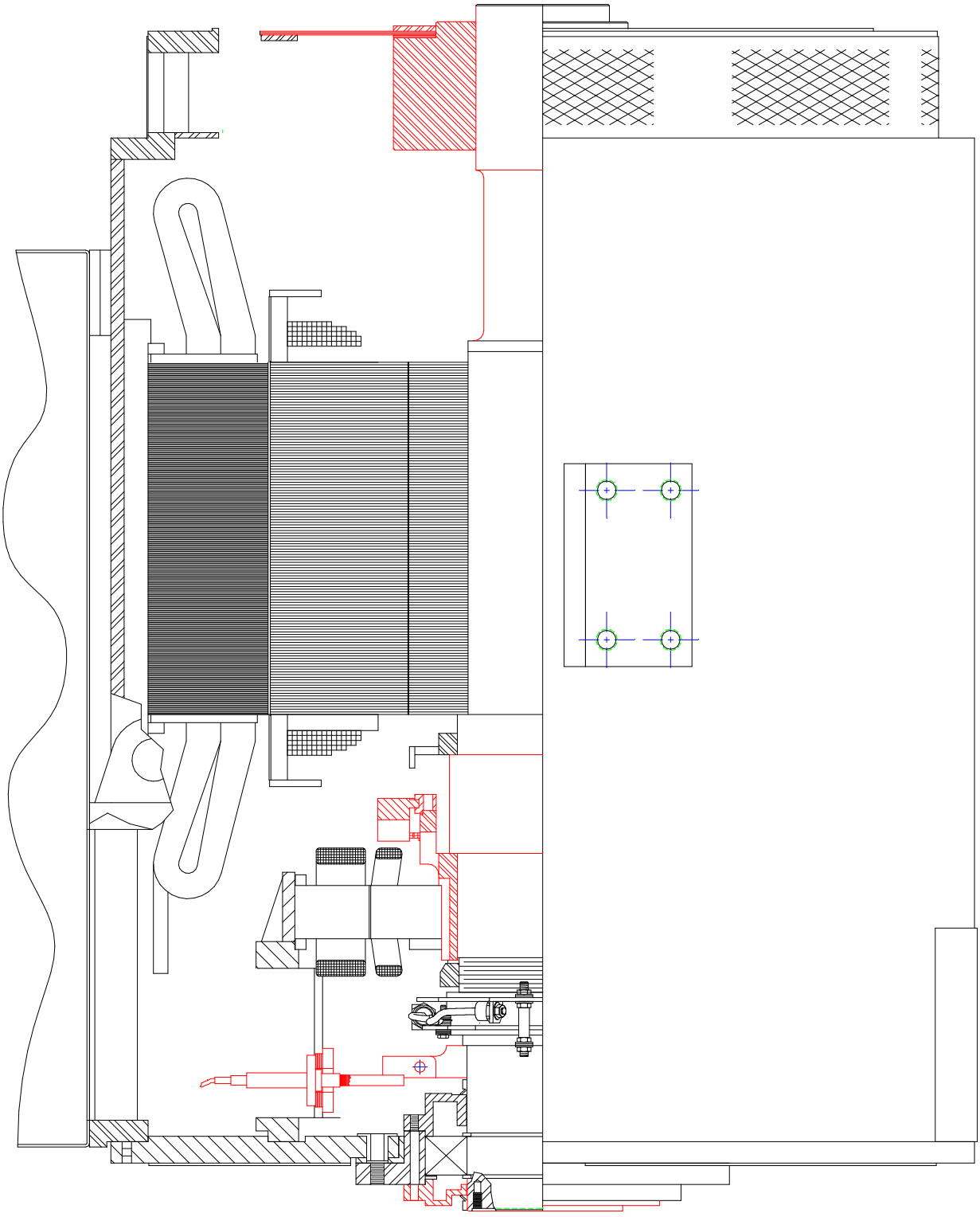


Figure 4-7 Cut Away View Of Traction Alternator

SECTION 5, DISASSEMBLY

TRACTION ALTERNATOR

Utilization of a clean work area around alternator will enable workers to keep parts clean and in proper order for reassembly. Keep in mind that many parts go back together in reverse order of disassembly. Use wooden blocks, pallets or skids for storing.

FIGURE 5-1

1. Rotating Field Assembly Removal

All interference objects boxes, pumps, leads, etc. must be removed prior to rotating field removal.

A. Rotating field assembly is removed with alternator in horizontal position from opposite drive plate end.

B. Remove covers (A), (B) (4) & (C) as shown in figure 5-4.

C. Disconnect auxillary leads in box (A). They leads tie wraps must be removed. Tie wraps on exciter frame can be accessed through access cover panels (B) and (C). Pull the bearing RTD wire (H) through the acess hole. See figures 5-1 & 5-4.

FIGURE 5-2

D. The speed sensor can be accessed through the bottom access cover as shown in figure 5-2. Remove the speed sensor and the tie wraps securing the speed sensor wire to the excitor frame. Place out of the way inside the stator.

E. Remove the eight bolts (D) holding the exciter frame to the endbell. Push the exciter back, it will rest on the exciter armature. See figure 5-3.

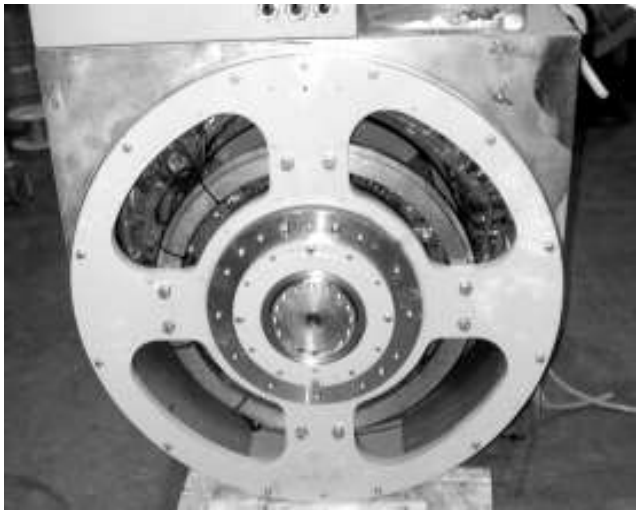


FIGURE 5-3

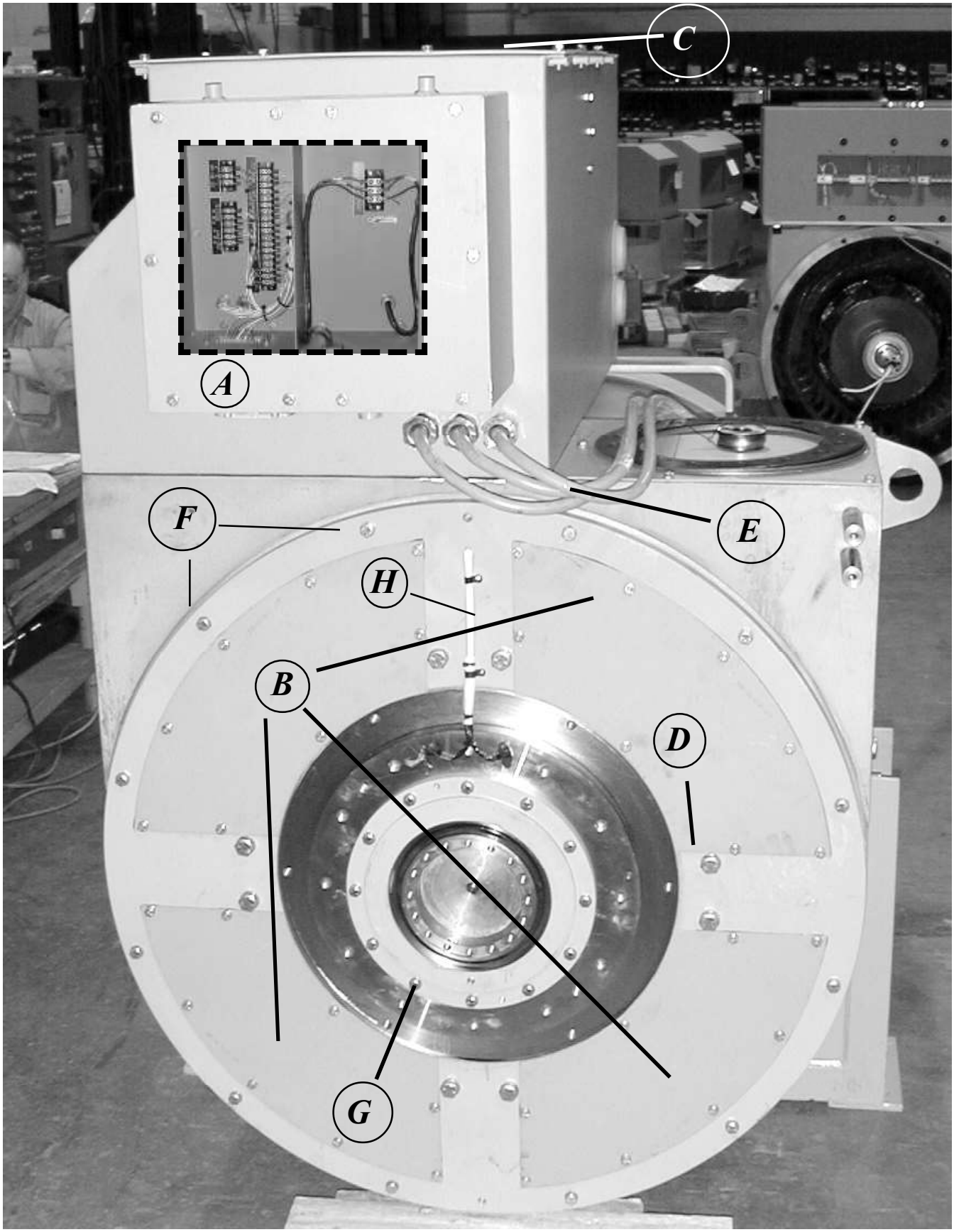


FIGURE 5-4

F. Remove the bolts holding the bearing cap (G) to the endbell. Remove the bearing cap, carefully remove the rubber seal, inspect and set it aside, Remove the wavy washers and set aside. See figure 5-6.

FIGURE 5-6

F. Support the endbell from the top with a strap and remove the 12 bolts holding the endbell to the alternator frame. Push the endbell off using 2 pusher bolts, 1 top and 1 bottom. Move endbell aside. See figure 5-7.

NOTE: At this point the bearing can be removed or the entire rotor floated out depending on your need.

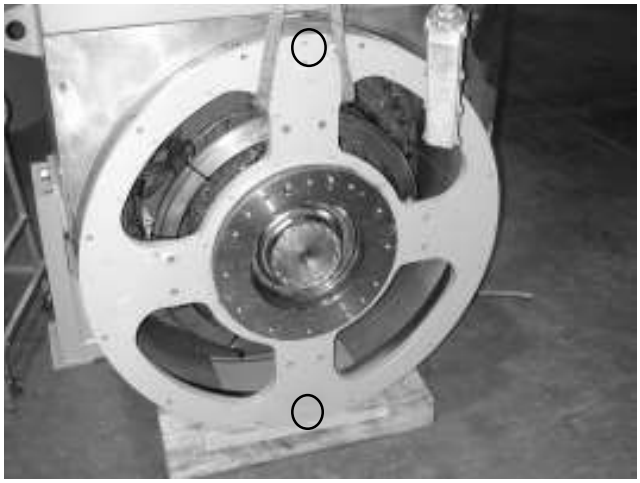


FIGURE 5-7

G. To remove the bearing, remove the bearing snap ring in front of the bearing. Slide rear bearing cap backwards to allow clearance to the bearing. Use a bearing puller to pull bearing.

WARNING: Follow manufacturer instructions when using a bearing puller. Failure to observe this precaution could result in severe bodily injury or loss of life.

H. Anytime a bearing is pulled, it must be replaced. To install a new bearing, heat it to 250^{o} F. Push it onto shaft flush against the rear bearing snap ring.

I. Fill the bearing with a good quality grease. Kato Engineering recommends Mobilith SHC 220. Peak grease in bearing caps as shown in figure 5-9.

FIGURE 5-8

J. To remove the rotor, 2 hoists will be needed. Place a nylon strap over the bearing end of the shaft. An adaptor will be needed to support the driveplate end of the shaft. It should be similar to the examples shown if figures 5-10. The dimensions for this adaptor can be

taken from the hub layout drawing in the drawings section of this manual. Attach a pipe to the adaptor tool and support it with a hoist. Carefully remove rotor as shown in figure 5-11.

FIGURE 5-9

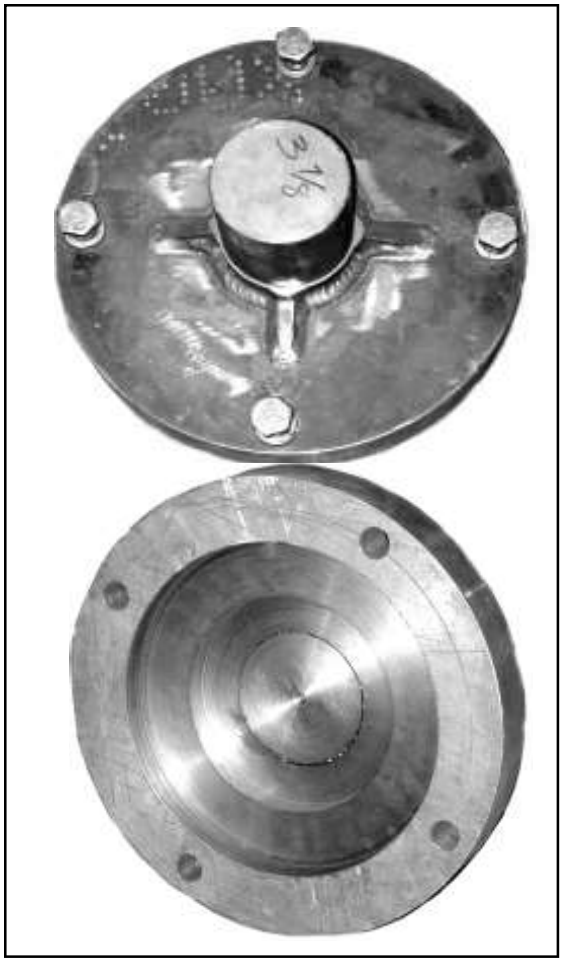


FIGURE 5-10

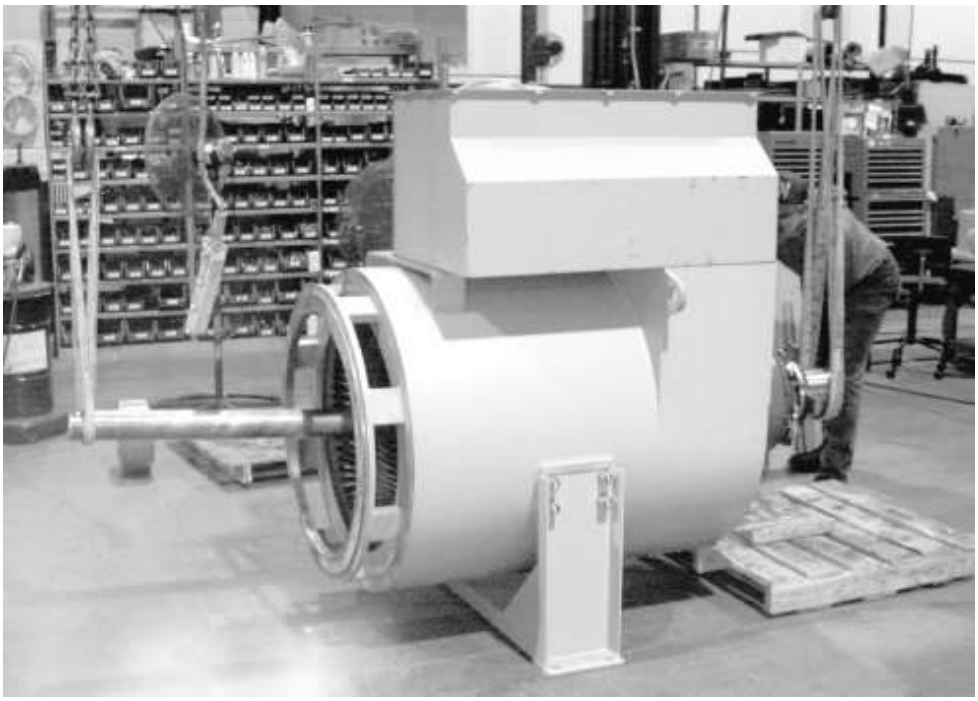
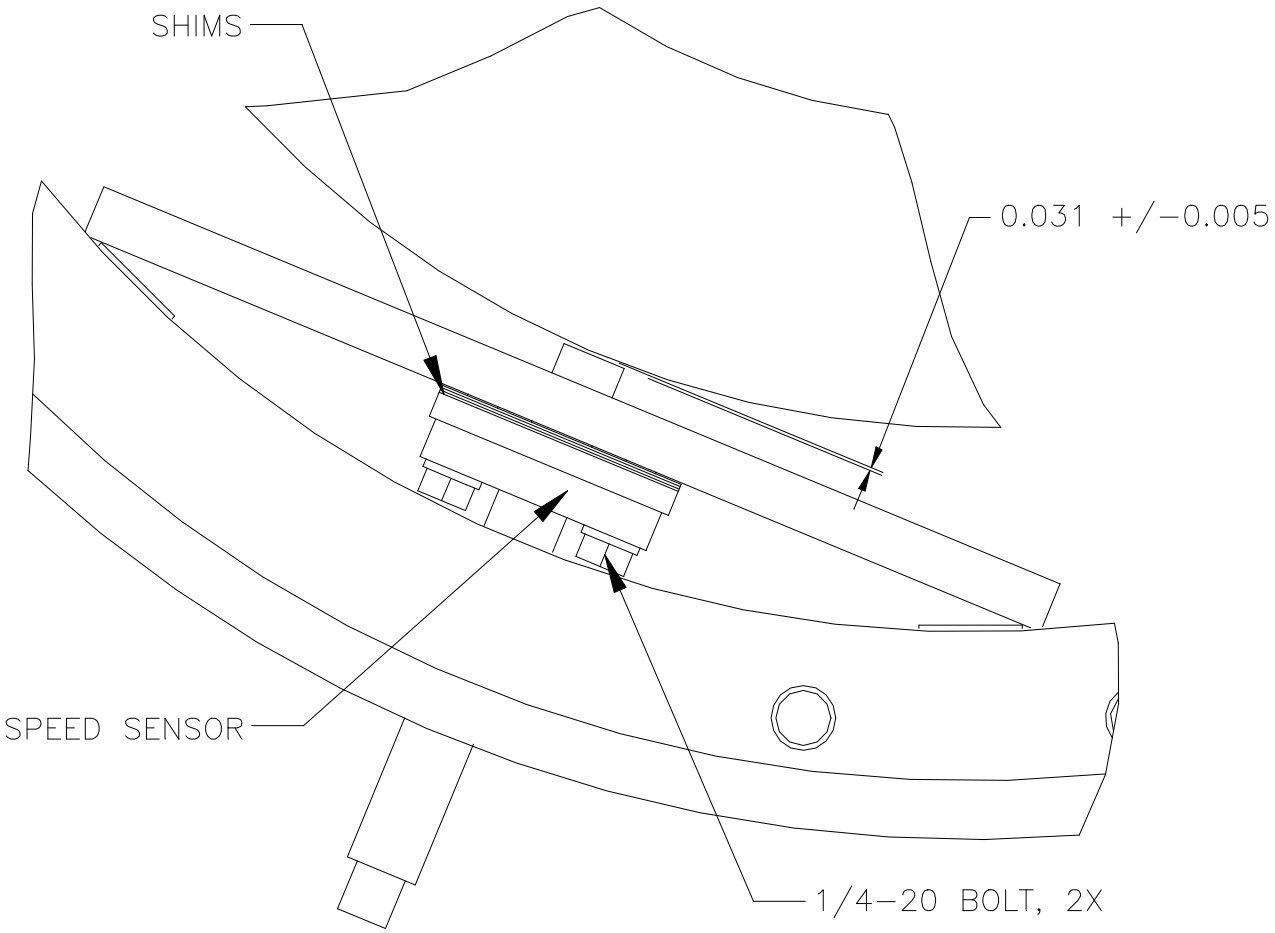


FIGURE 5-11

SECTION 6
Speed Sensor Installation

1. Install sensor, shims, and 5/16-UNC bolts and lockwashers (X2). NOTE: BOLTS MUST BE NO LONGER THAN 1.50 INCH.

2. Install shims to achieve a 0.031 +/- 0.005 inch clearance between sensor tip and gear teeth. (see below figure)



Section 7
Troubleshooting

Troubleshooting is the process of recognizing malfunctions of the system, intelligently analyzing the malfunction, and necessary corrections to place the unit back into operation. Be alert for any signs of alternator trouble. Common symptoms are listed in the following chart. Correct minor problems immediately. Minor defects left uncorrected can cause serious damage.

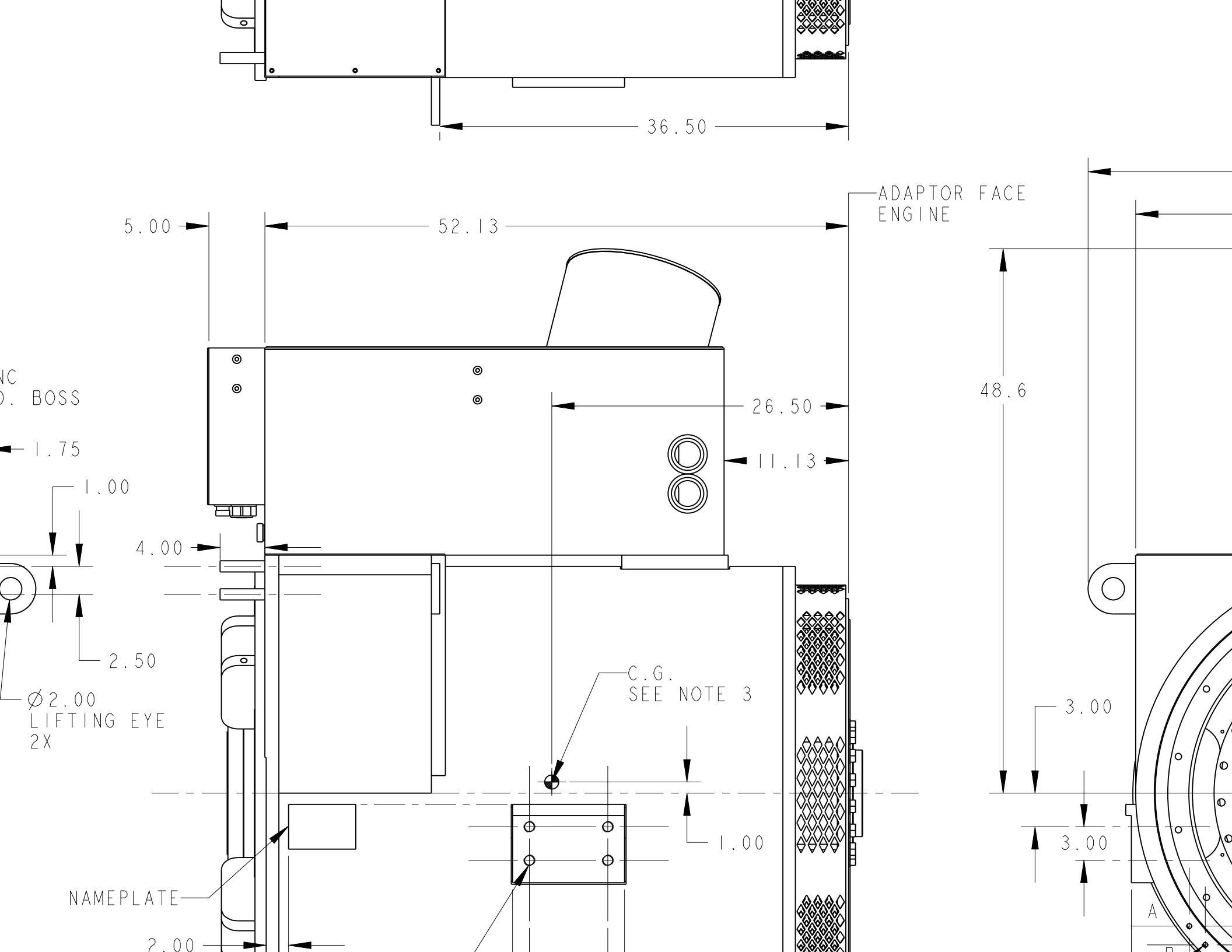
SYMPTOM	PROBABLE CAUSE	REMEDY
No voltage from generator.	Excitation lead open, shorted or grounded to frame.	Check for continuity. Check F1 and F2 for ground. Replace damaged lead if necessary.
	Short circuit on output.	Disconnect load leads from plus and minus terminals of the output rectifier assembly. If voltage is normal check for short or ground in the load. If no voltage, disconnect the generator leads of the rectifier assembly and check for short or ground in generator leads. If the generator windings are normal, check the generator winding field.
	Field coils shorted or open.	Check for short or open circuit in the generator field. See instructions to access the rotating rectifier assembly. Disconnect the generator field leads from the rotating rectifier assembly to check the generator field winding.
	No excitation to the generator.	Check the output of the regulator at F1 and F2. Refer to system manual for regulator operation.

SYMPTOM	PROBABLE CAUSE	REMEDY
Low voltage from generator.	Excessive load.	Reduce load.
	High resistance connections (connections will be warm or hot).	Check connections at the rectifiers. Tighten connections to the recommended torques.
	Weak field due to high temperature.	Improve ventilation.
Fluctuating voltage from generator with constant speed.	Excitation circuit not functioning properly.	Refer to system manual for regulator operation.
	Defective bearing causing uneven air gap.	Replace bearing
High voltage from generator.	Excitation circuit not functioning properly.	Refer to system manual for regulator operation.
	Overspeed.	Correct speed of prime mover.
Overheating	Generator over loaded.	Reduce load.
	Blocked ventilation passages.	Clear air passages.
	Dirty Windings.	Clean Windings.
	High Ambient temperature.	Improve circulation to lower heat build up.
Vibration	Improper mounting or misalignment of coupling.	Correct Alignment. Refer to Prime movers instructions.
	Defective bearing.	Replace bearing.
	Rotor out of balance after repair.	Re-balance with cooling fan in place.
	Vibration caused by other equipment.	Check other equipment.
	Rotor out of balance due to winding failure.	Check for overspeed condition. Repair or replace rotor, including re-balance if necessary.

Section 8
Replacement Parts

Replacement parts must be of the same physical construction and have the same operating characteristics as parts installed in the alternator at the factory. Do not attempt to substitute “similar” parts. Order parts by part name and part number. As additional information, **always include the order number**, the alternator serial number and the alternator and exciter type and model numbers. For fastest service direct parts order to:

KATO ENGINEERING,
Parts and Service Department,
P. O. Box 8447, Mankato, Minnesota 56001
or call (507) 625-4011
FAX. (507)-345-2798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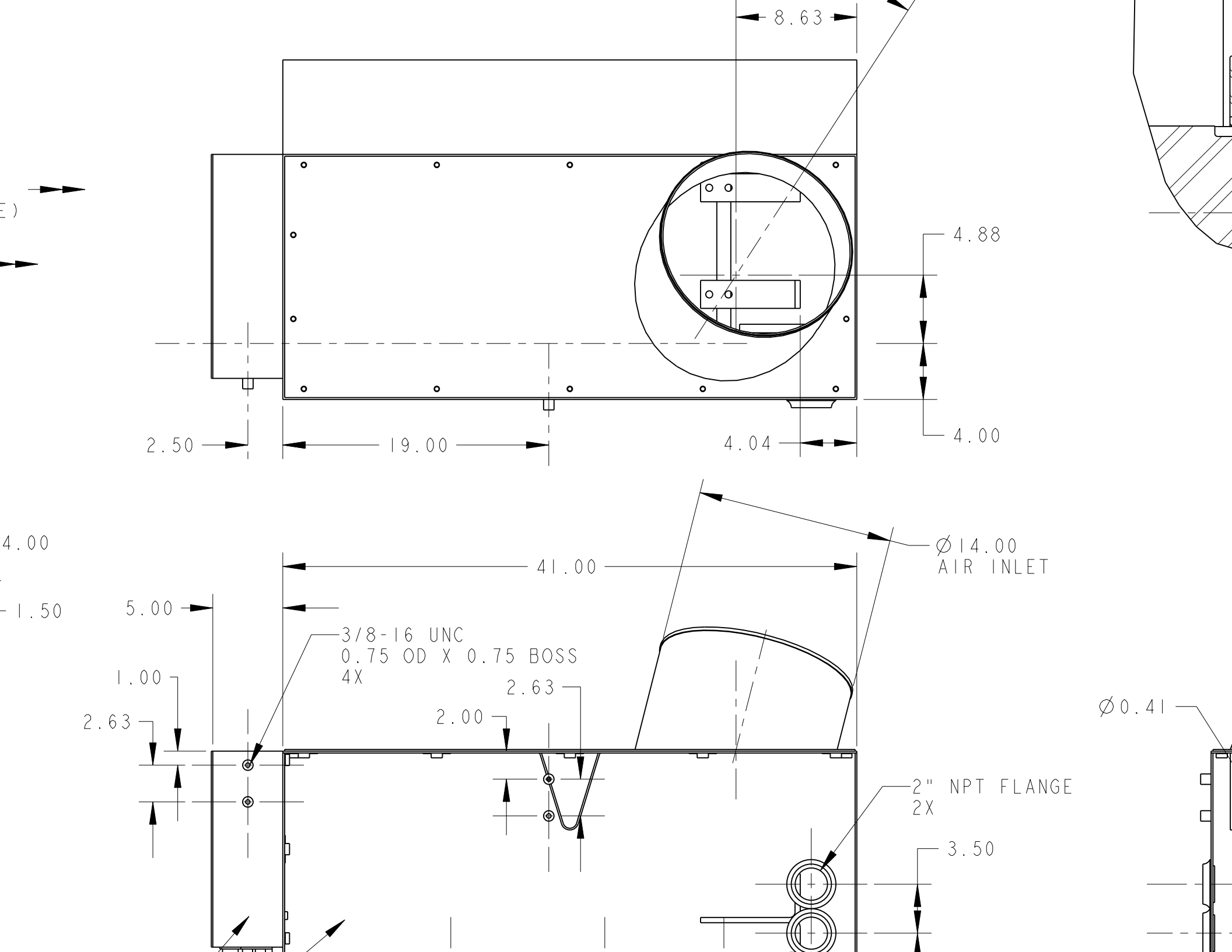
ENGINE
5.00
52.13
48.6
26.50
11.13
NC
D. BOSS
1.75
1.00
4.00
2.50
Ø2.00
LIFTING EYE
2X
C.G.
SEE NOTE 3
3.00
3.00
1.00
NAMEPLATE
2.00
A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4.00
2.50
19.00
4.04
41.00
Ø14.00
AIR INLET
5.00
3/8-16 UNC
0.75 OD X 0.75 BOSS
4X
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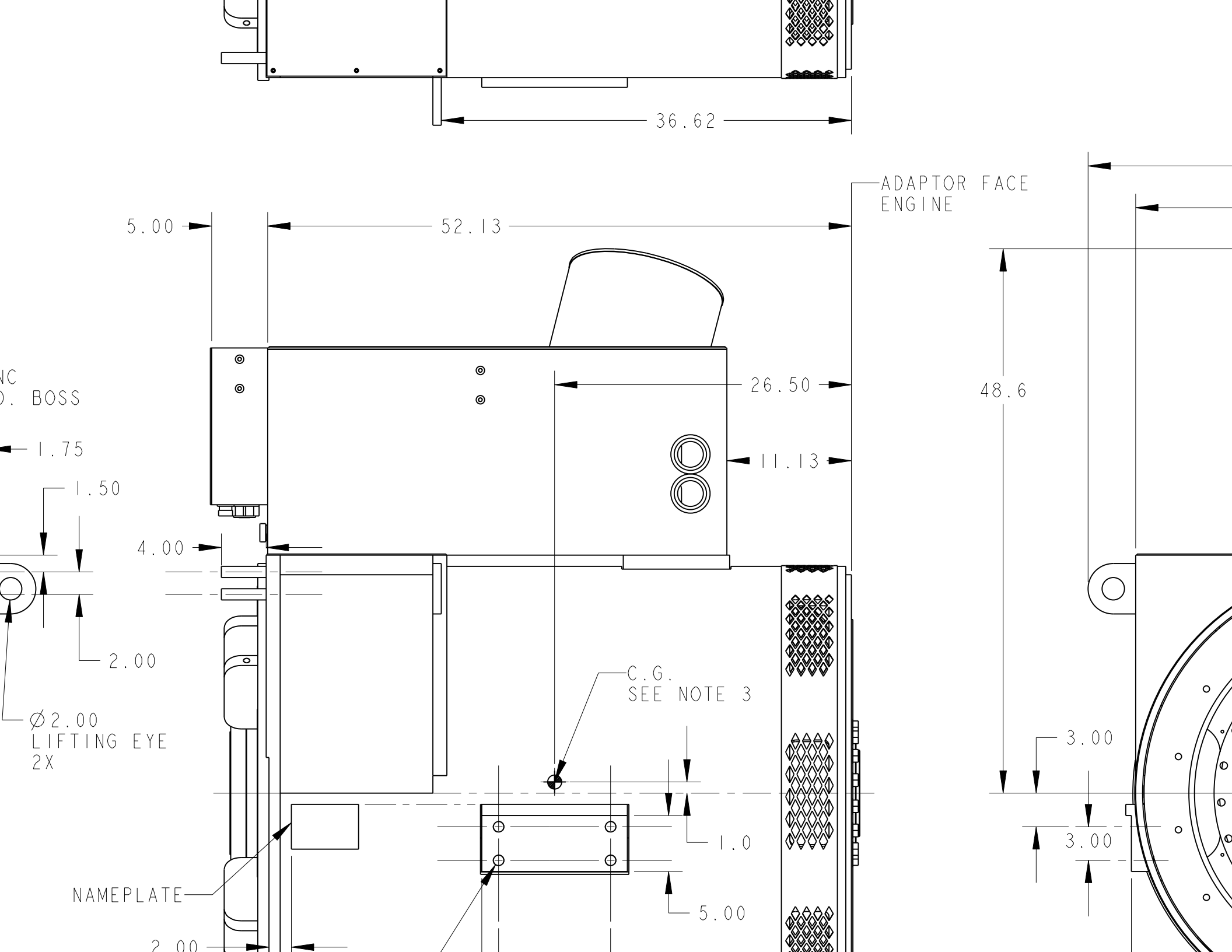
2.63
2.63
2.00
Ø0.41
2" NPT FLANGE
2X
3.50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4.00
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Ø2.00
LIFTING EYE
2X
C.G.
SEE NOTE 3
3.00
3.00
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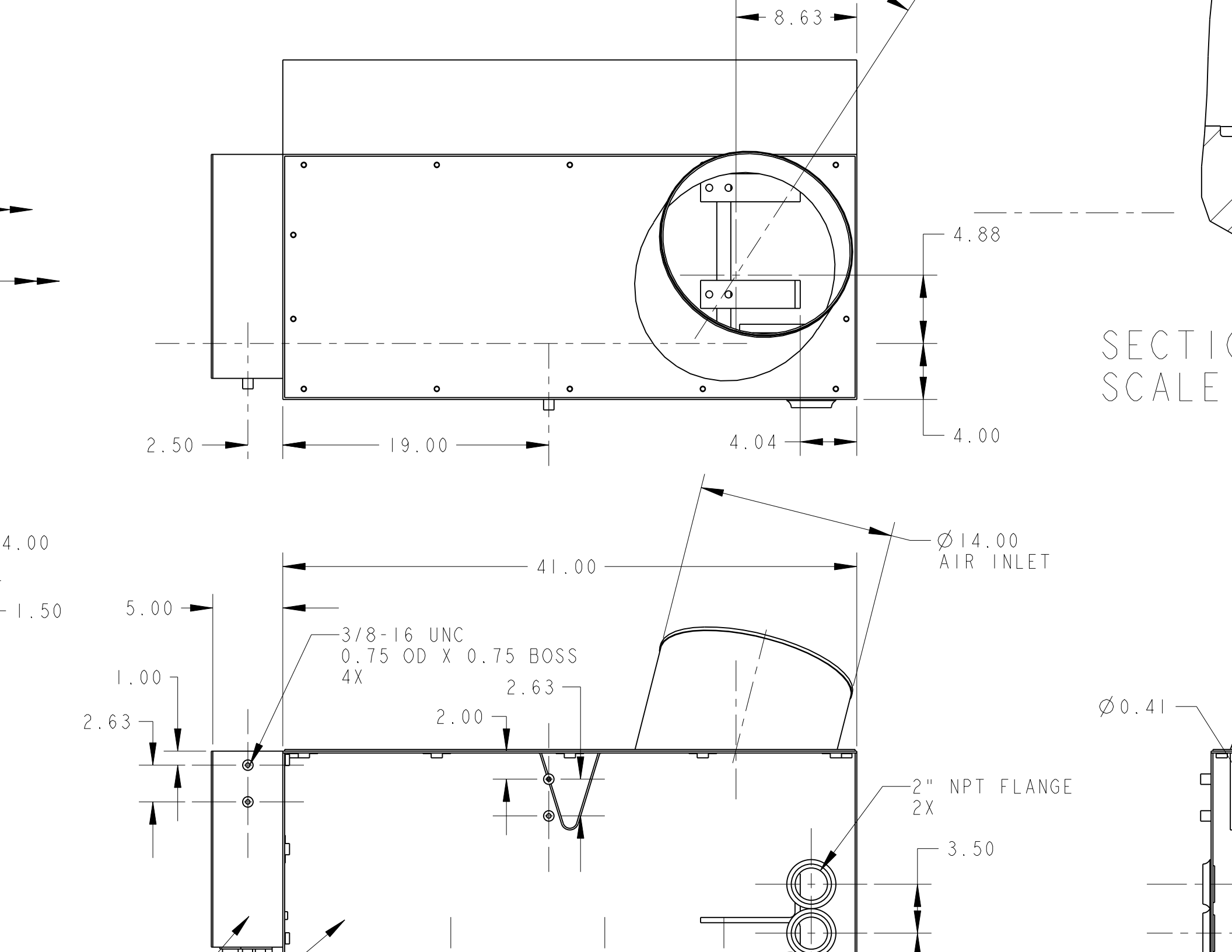
5.00
NAMEPLATE
2.00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0.75 OD X 0.75 BOSS
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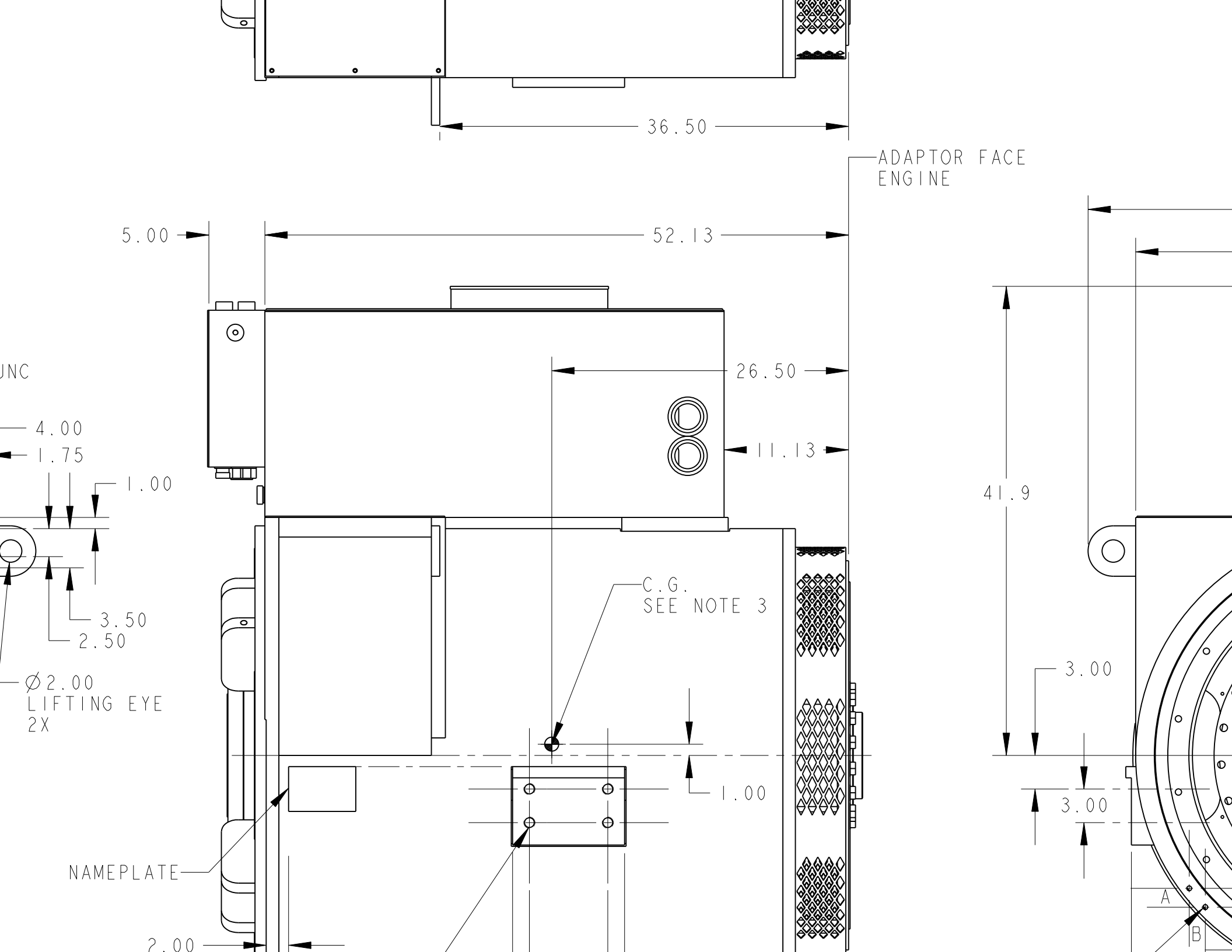
2.63
2.00
Ø14.00
AIR INLET
Ø0.41
2" NPT FLANGE
2X
3.50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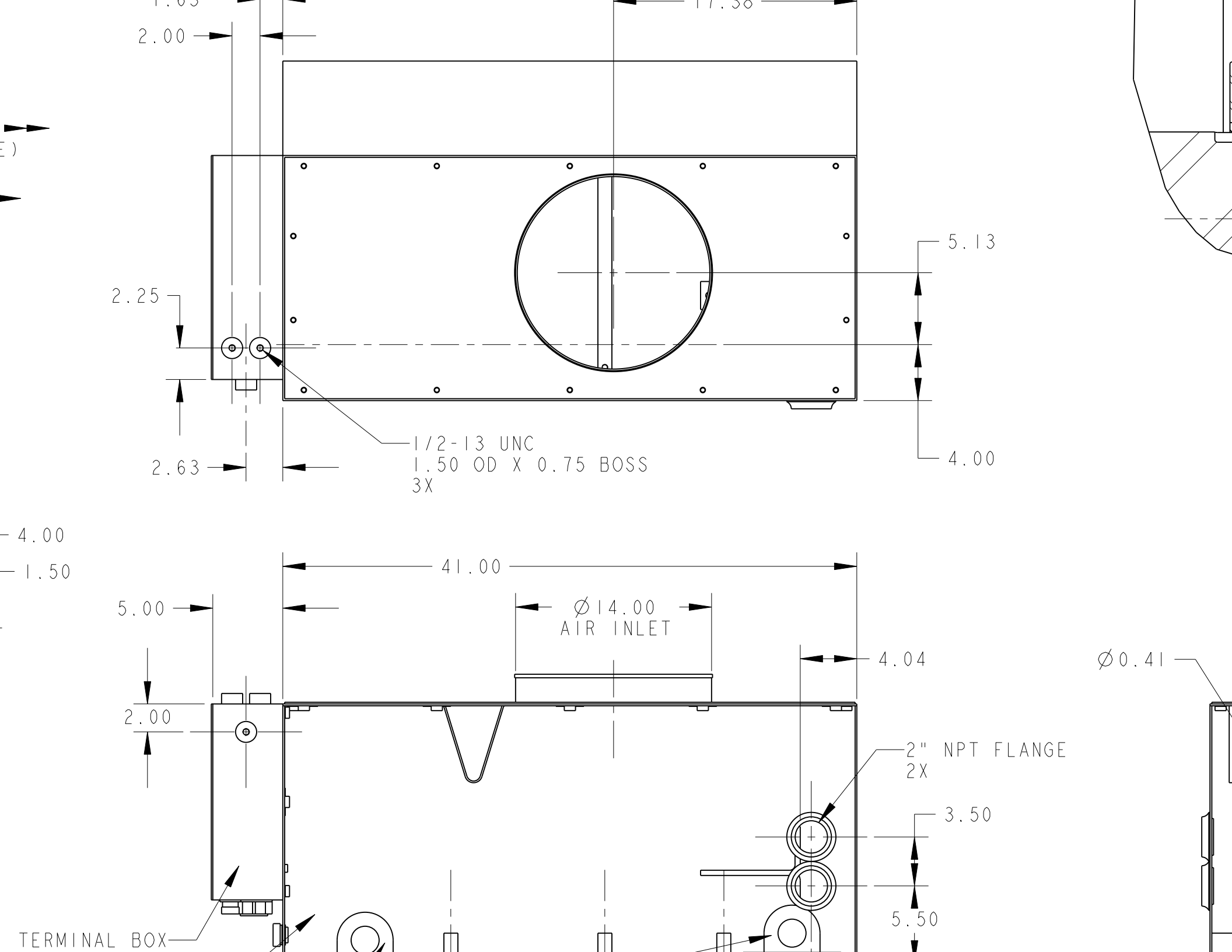
ADAPTOR FACE
ENGINE
5.00
52.13
26.50
11.13
41.9
UNC
4.00
1.75
1.00
3.50
2.50
Ø2.00
LIFTING EYE
2X
C.G.
SEE NOTE 3
1.00
3.00
3.00
NAMEPLATE
2.00
A
B


2.00
17.38
5.13
2.25
1/2-13 UNC
1.50 OD X 0.75 BOSS
3X
2.63
4.00
4.00
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41.00
5.00
Ø14.00
AIR INLET
4.04
Ø0.41
2.00
2" NPT FLANGE
2X
3.50
5.50
TERMINAL BOX

Kato Engineering Support

The brand you trust, the power you depend on. Include the serial number and model number for your machine in the email subject line.

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Manuals	KatoManuals@mail.nidec.com
Parts	KatoParts@mail.nidec.com
Remanufacturing	KatoRemanufacturing@mail.nidec.com
Warranty/Quality Assurance	KatoWarranty@mail.nidec.com

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