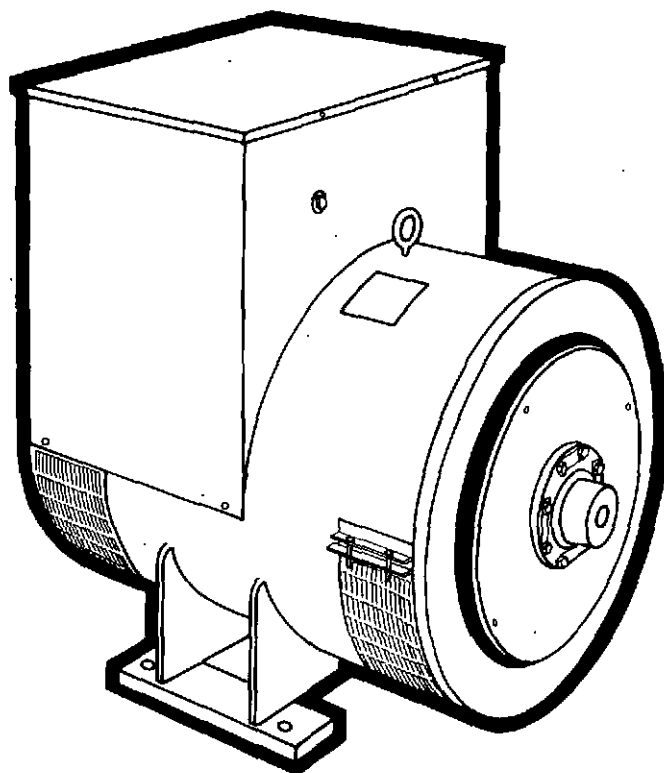




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INSTALLATION, OPERATION AND MAINTENANCE MANUAL

TYPE MAC Brushless AC Synchronous, Internally Regulated Alternator Frame 360, 440, 580, 680



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Making Energy Work For You

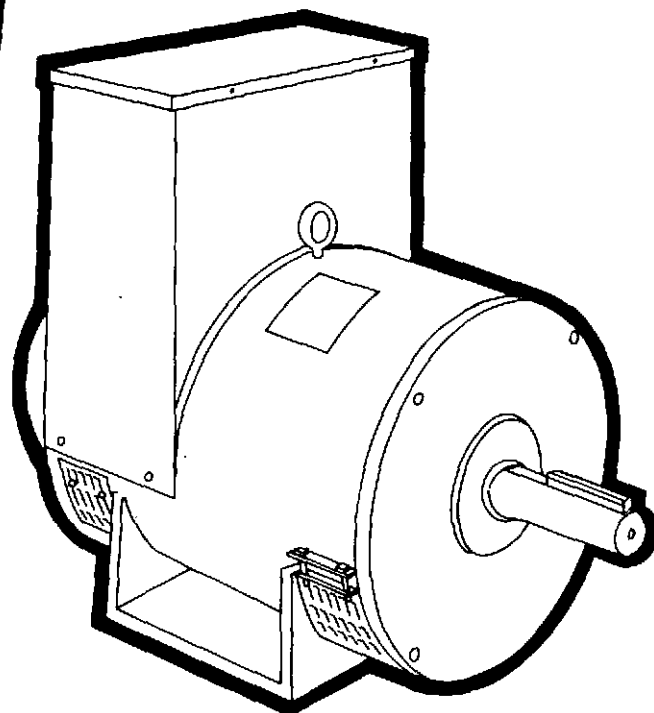


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PRINCIPLE OF OPERATION

The MAC generator is a self-regulated, rotating field synchronous unit with the rotor having a salient pole construction with amortisseur windings. The generator stator and exciter stator are combined in a common housing. The generator field, exciter rotor and rotating rectifier assembly are mounted on a common shaft. The output of the exciter rotor is applied to the generator field winding through a rotating, full wave bridge, silicon rectifier unit.

The exciter pole pieces contain residual magnetism, setting up lines of force across the air gap to the exciter armature. When the exciter armature begins to rotate a voltage is induced and current flow is initiated in the exciter armature AC windings. This voltage is fed to the rotating rectifier assembly, rectified and fed to the alternator field coils. This DC voltage is sufficient to magnetize the laminated alternator field which will set up lines of force across the air gap to the alternator stator. As the generator rotor rotates a voltage will be induced and current will flow in the alternator stator windings and to the output circuit.

All connections between the exciter stator windings and the generator stator windings are internally connected within the stator housing. Only the output power leads of the generator unit are brought out to the generator terminal box.

CIRCUIT DIAGRAM

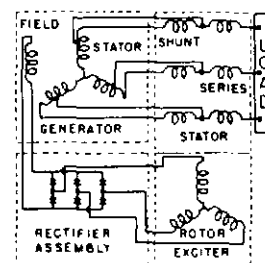
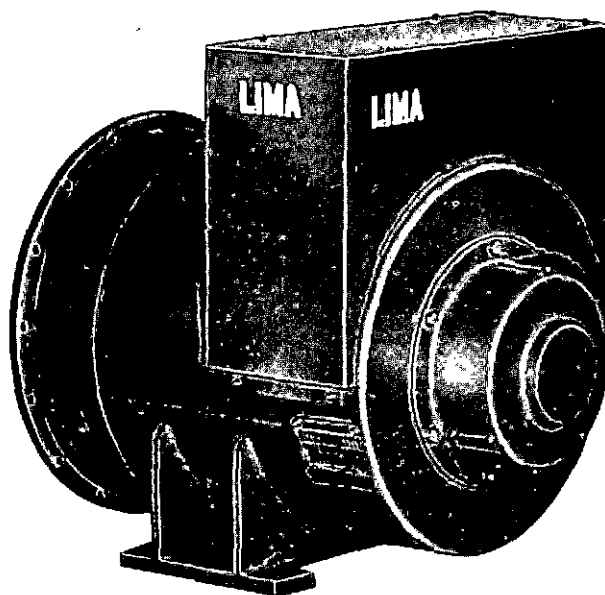
Figure 2 shows the internal schematic diagram of the generator, exciter and rectifier unit. The generator is a three phase unit and the exciter stator and exciter rotor also have three phase windings. A portion of the exciter stator windings is connected across a tap on the generator stator winding. This exciter shunt winding provides the generator field excitation power required for the generator no load voltage. Another portion of the exciter stator windings is connected in series with the output of the generator and provides a compounding excitation characteristic.

The rotor is, in effect, the secondary of a rotating current transformer induction frequency converter. The exciter rotor output voltage is applied to the generator field windings by a three phase full wave rotating silicon rectifier unit. The response time of the excitation system is very fast since the exciter stator carries an alternating current corresponding to the load current which appears immediately on the exciter primary. An increase in load current will cause an immediate increase in the exciter secondary output voltage which is rectified and applied to the generator field windings. The inherent compounding characteristics of the excitation system provide excellent voltage regulation even under heavy overload conditions.

PERFORMANCE DATA

The excitation characteristics of fast exciter response with maximum exciter output makes this generator ideal for motor starting loads that require a very high current at low power factor during the motor starting and acceleration periods. At the same time it offers the rugged, reliable, maintenance-free operation inherent in the brushless type generator. No external controls are needed with a Lima MAC generator.

The performance of a 10 KW Lima MAC synchronous generator is indicated in Figure 3.



CIRCUIT DIAGRAM

Figure 2

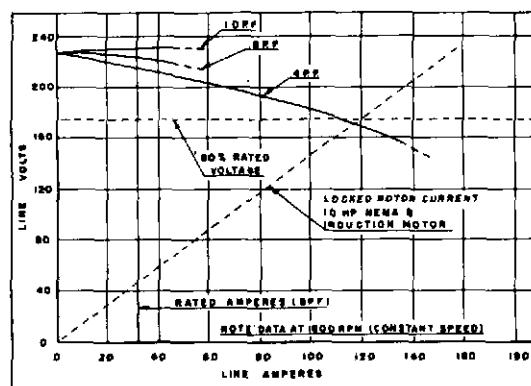


Figure 3

SECTION I

INSTALLATION AND OPERATION

UNPACKING:

When unpacking check for damage in shipping. Report any damage at once to delivering carrier. Read instruction tags shipped with generator.

INSTALLATION:

The generator must be properly aligned and located in a well-ventilated place where the air temperature will not exceed 40°C or 104°F, and should be accessible for cleaning. An open type generator should not be located where there are abrasive or conductive dusts, corrosive gases or fumes, or where excessive moisture may be encountered. A totally enclosed fan-cooled generator should be used where these conditions exist. Air openings of the generator should be cleaned frequently to remove accumulated dust and dirt, which may cause overheating and burn out.

WIRING CONNECTIONS:

Electrical characteristics are shown on the nameplate. Refer to connection diagrams on pages 10 and 11 for proper electrical connections.

OPERATION:

After the generator has been properly connected to the driving unit and the load lines connected to the generator's leads according to the wiring diagram, the unit is ready for operation. To connect the coupling discs of a single bearing generator to the driving engine's flywheel it may be necessary to slide the rotor forward a few inches out of the stator, taking care not to slide it so far as to cause the rotor to come out of the bearing entirely and down upon the stator windings, causing damage to the windings. Ordinarily, a chain hoist is needed to jockey the generator rotor into position.

STANDBY UNITS:

Generators used as an auxiliary power source in case of commercial power failure must be isolated from the commercial line before being placed in operation.

CAUTION: MAKE SURE UNIT IS COMPLETELY SHUT DOWN AND FREE OF ANY POWER SOURCE BEFORE ATTEMPTING ANY REPAIR OR MAINTENANCE ON THE UNIT.

PARALLEL OPERATION:

For parallel operation, both units must be of the same voltage, frequency, and phase. Phase voltages of paralleled units must be synchronized. This generator set utilizes the "dark lamp" method of paralleling.

ROTATION:

The generator can be operated in either direction of rotation.

OVERLOAD:

The load on the generator should be checked with an A-C ammeter to see that the ampere rating stamped on the nameplate is not exceeded. Prolonged overload on the generator may cause it to overheat and possibly burn out.

LUBRICATION:

Ball bearings on Lima generators are pre-lubricated and require no further lubrication for the life of the bearing.

SECTION II

SERVICE AND MAINTENANCE

PREVENTATIVE MAINTENANCE AND OPERATING PRECAUTIONS:

Costly repairs and down time can usually be prevented by operating electrical equipment under conditions which are compatible with those at which the equipment was designed to operate. Follow the instructions as outlined to insure maximum efficient utilization of the electrical equipment.

COOLING:

Keep all cooling parts clean and make certain sufficient room is left on all sides for a plentiful supply of fresh coolant air flow. **DO NOT EXCEED AIR TEMPERATURE RISE AS SHOWN FOR 50°C ABOVE A 40°C AMBIENT.** This insures that the insulation NEMA Class "F" will not be damaged. **DO NOT EXCEED RATED LOAD**, except as specified for the equipment. **OPERATE AT RATED SPEED.** Failure to operate generators at rated load or speed will cause overheating and possibly damage to windings due to over voltage or current.

BEARING REPLACEMENT:

Factory lubricated shielded bearings will normally provide several years of trouble free service when operated under normal conditions. Excessive bearing load and adverse environment conditions will greatly shorten bearing life. Should bearing failure occur, bearings can be replaced. **ALWAYS REPLACE WITH THE SAME TYPE BEARING AS INSTALLED AT THE FACTORY. CHECK PARTS LIST FOR PART NUMBER.** Include generator serial number when ordering bearings.

ROTATING DIODE BRIDGE:

The rotating diode bridge can be removed and replaced. Excessive overcurrent, overvoltage, overspeed, or reverse currents can cause damage to the assembly or any of the component parts.

ROTOR DAMAGE:

The damper bars of the generator prevent excessive hunting when AC generators are operated in parallel. Damper bars, because they must have a low electrical resistance and are subjected to extreme centrifugal forces, must be mechanically secure and permanent. Consequently, they are welded to end plates completely covering the field.

All rotors are static and dynamically balanced to a high degree on precision machines to assure minimum vibration. They will, therefore, remain dynamically stable at speed well beyond the synchronous speed of the generator. The rotors on generators are, however, subjected to extreme centrifugal forces which can increase beyond safe operating limits at excessive overspeed. Therefore, the prime mover should be adequately governed to prevent overspeed.

Damage to the rotor can also occur due to overheating which can be caused by the air flow being restricted from dust or other foreign objects collecting in the air passage.

If a rotor becomes defective, it should be returned to the factory with full nameplate data, because the rotor coils are enclosed in welded squirrel case winding. To repair a rotor the special tooling and technique of the factory is necessary and essential. THE LIMA ELECTRIC COMPANY, INCORPORATED, facilities can perform a complete rebuild, or rewind job with greater skill and craftsmanship than can be found in the average motor rewind shop. Should a failure occur, the factory should be notified immediately and steps will be taken to get the generator back into service with the least expense; and more important, to determine the cause of the failure and take steps to prevent a recurrence.

PRECAUTIONS:

GENERATOR WINDINGS (DRYING):

Generators that have been in transit or storage for long periods may be subjected to extreme temperature and moisture changes. This can cause excessive condensation, and the generator windings should be thoroughly dried out before bringing the generator up to full nameplate voltage. If this precaution is not taken, serious damage to the generator can result. The following steps should be taken to effectively dry the generator windings:

- A. (1) Place generator in drying oven or hot room.
(2) Dry with warm air blower directed through windings.
- B. (1) If the generator has been operated and then put into storage for any period of time, a P. D. George #11127 type air-dry fungus resistant varnish should be reapplied.

Experience has shown that it is necessary to take these precautions in locations such as seaboard installations and other highly humid areas. Some installations will be in atmospheres that are much more corrosive than others. A little precaution along the lines outlined here could eliminate an unnecessary repair job.

Each generator was subjected to a standard NEMA insulation test, which means 1000 volts plus twice the highest voltage for which the generator is rated was impressed between the winding and frame. All machines are insulated with a high safety factor for the class of insulation used. The latest and newest in insulation and baking techniques are used.

The finest insulation job can be very quickly broken down by carelessly applying high voltage to windings in a moisture saturated condition. Mishandling in this respect can easily cause a breakdown, making it necessary to return the generator to the factory for repair, and consequent expense and loss of time.

WARNING: HIGH VOLTAGE (DIELECTRIC) TESTING MUST NOT BE PERFORMED TO THE MACHINE WITHOUT FIRST OBSERVING NEMA RULES. THE INSULATION OF THIS GENERATOR WINDING MAY BE SAFELY CHECKED BY USING A MEGGER. A HIGH MEGGER READING INDICATES LOW INSULATION LEAKAGE.

RESTORING RESIDUAL MAGNETISM:

The current necessary to magnetize the alternator field is obtained from the exciter. Initially, upon starting the generator, current flow and voltage are induced into the exciter armature by the magnetic lines of force set up by the residual magnetism of the exciter field poles.

Residual magnetism of the exciter field poles may be lost or weakened by a strong neutralizing magnetic field from any source, or if the generator is not operated for a long period of time.

Should the generator fail to build up voltage after being disassembled for any reason, a momentary short-circuit of any two generator leads should be sufficient to correct this condition. If not, an alternate method may be used. Apply either an alternating current or a direct current voltage of approximately 20 volts to any two generator leads. Do not make a positive connection but rather touch the leads together until the generator voltage begins to rise and then remove. It is suggested that a 30 ampere fuse be inserted in the circuit to prevent any damage in case the build-up voltage is not removed quickly enough.

Start generator and observe generator build-up. Reflash field if generator output voltage does not build up.

FIELD TESTING STUD TYPE DIODES

Refer to Figure 1 below for reference to diode polarity and part identification.

- A. Stud type diodes may be tested in the field without unsoldering and removing the load lead from the diode terminal. Remove the diode load lead terminal lug from its terminal post and insure that it is not making contact with any adjacent metallic part. An ohmmeter or a battery-light continuity tester may be used to find a short or open condition in the diode. Connect the positive test lead to the anode and the negative lead to the cathode, take a reading, and then reverse the leads and take a reading. These checks should indicate one of three conditions:
 - (1) Good diode: Will have a much greater reverse resistance (positive lead on cathode) than forward resistance (negative lead on anode). Typical reverse resistance will be 30,000 - 300,000 ohms or greater, while typical forward resistance will be less than 10 ohms. The continuity tester will have the light "on" in one direction, and "off" in the other.
 - (2) Shorted condition: Ohmmeter reading will be zero, or very low in both directions. Continuity tester light will be "on" in both directions.
 - (3) Open condition: Ohmmeter will have a maximum (infinity) reading in both directions. Continuity tester light will be dark (off) in both directions.

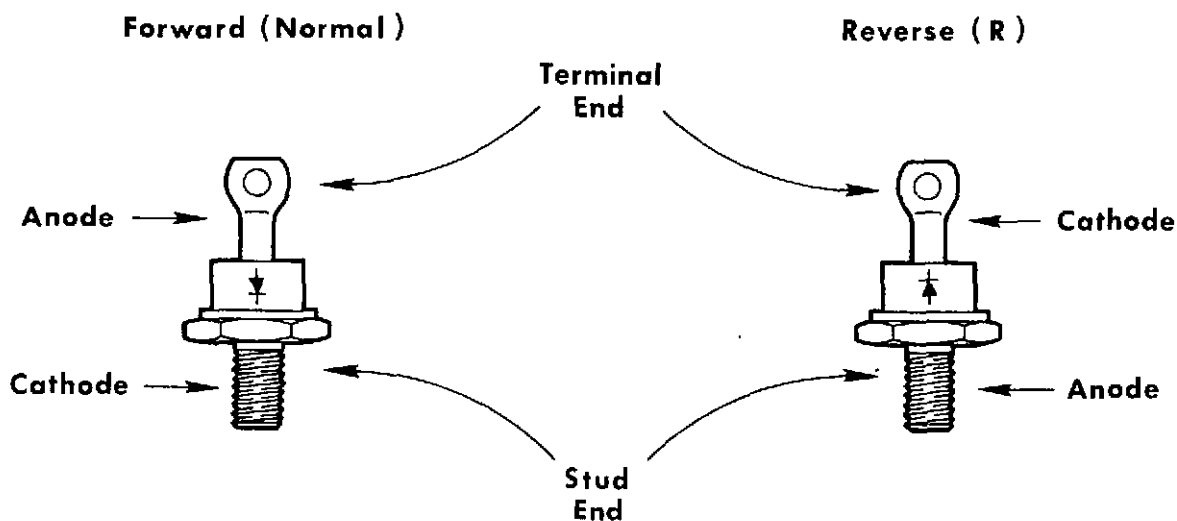


FIGURE 1

ROTATING RECTIFIER ASSEMBLY MAINTENANCE AND TEST PROCEDURE.

- A. Individual rectifiers, or complete heat sink assemblies with both diodes still installed can be removed and replaced through the access port located on the top of the endbell opposite the drive end of the

unit (See Fig. 2). Remove the 4 inspection port cover plate retaining cap screws and the cover plate. The assembly is now available for inspection, test, and/or service. See Figure 3 for the rotating rectifier assembly parts identification and location. The individual diodes are "stud type", retained by 1/4 - 28 hex head nuts and star washers. To test the individual diodes, disconnect the diode's lead wire terminal lug from the main rotor terminal post. Since each diode stud is secured to a heat sink; use the heat sink and the diode terminal or output lead terminal lug as the two testing points, and proceed with testing as in paragraph 2 above. If the diode tests good, reinstall the load lead terminal lug on the main rotor post. If the diode tests bad, replace the device following the procedures given in sub paragraph B below.

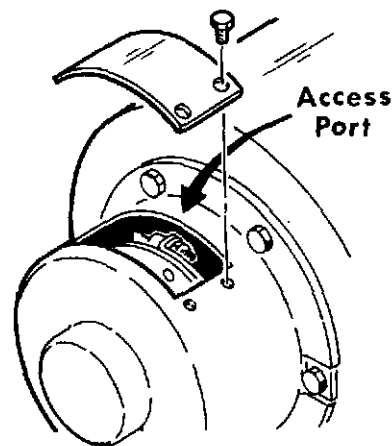


FIGURE 2

- B. Prior to installing a replacement diode on the heat sink, run a bead of thermal-electrical contact compound such as the Brundy Company's Penetrox "A" around the base of the diode (do not coat the threads). When installing a diode on the heat sink, care should be taken not to over-torque the retaining nut which could cause damage to the device. Torque to 28 to 30 pounds-inches. If not damaged, the existing diode load lead may be unsoldered from the failed diode and resoldered on the replacement.

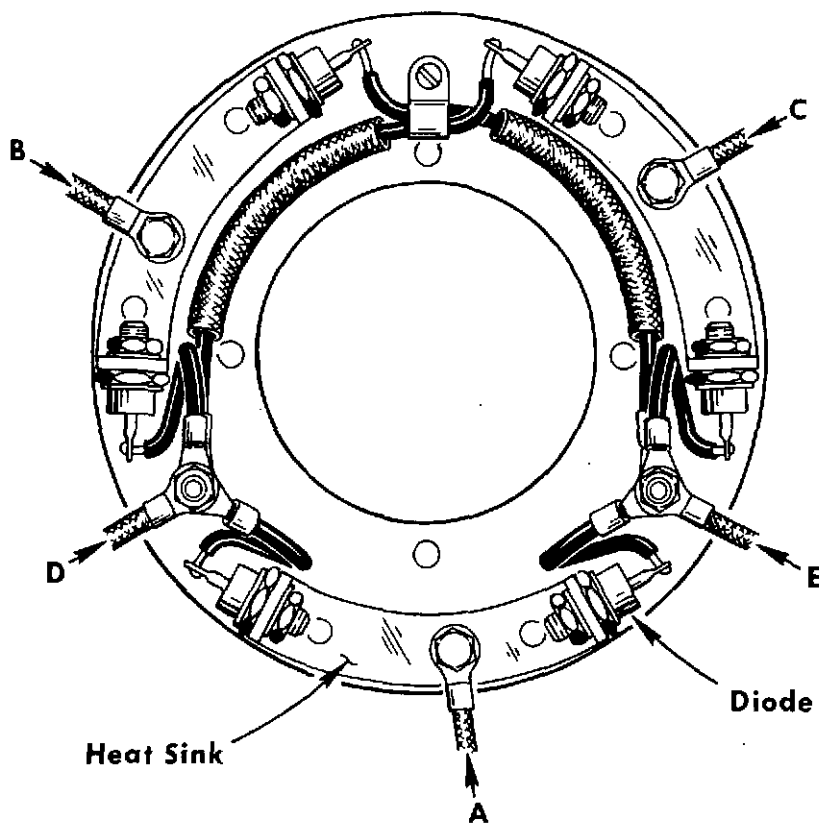


FIGURE 3

- C. Should it be necessary to remove one or more heat sink assemblies, it will first be necessary to remove the two diode lead terminals from their respective main rotor posts. Next remove the exciter rotor lead, and the plastic lead wire clamp if it is retaining either of the two diode leads involved. Now remove the two 1/4 - 20 hex head cap screws which secure the heat sink to the insulating plate, and carefully pull the assembly out the inspection port. Reverse this procedure when reinstalling the heat sink assembly.
- D. If the alternator is close coupled to an engine, it may well be necessary to "bar-over" the engine in order to position any specific area of the rectifier assembly directly under the access port. NEVER use the alternator fan as a fulcrum to accomplish this. Use the engine manufacturer's recommended practice to manually turn over the engine. To prevent possible injury to personnel and damage to the equipment - insure that the engine cannot start during this procedure, especially if the engine's starter is used to "bump-over" the engine.

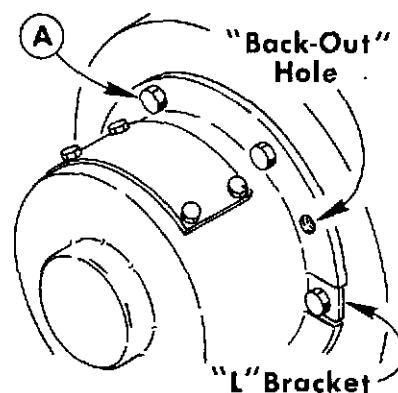
BEARING AND EXCITER ROTOR REMOVAL AND REPLACEMENT PROCEDURE.

Prior to commencing this operation, rotate the alternator shaft until two of the main rotor poles are in a "vertical" position. Once the bearing bracket is backed out the rotor will drop down on the main stator core. Having the main rotor in this position will limit the amount of rotor drop to that of the air gap.

- A. **Rear Bearing Bracket Removal Procedure.** Loosen but do not remove the two 1/2 - 13 exciter stator "L" bracket retaining cap screws (Fig. 4). Remove the four 12 - 13 rear bearing bracket hex head cap screws (Item A, Fig. 4) to release the bracket. Rethread two of these cap screws in the threaded "back-out" holes in the flange of the bracket. Tighten these two screws evenly to back the bracket off of the bearing. Once the bracket is free of the bearing, pull it straight back until it is clear of the exciter stator and rotating rectifier assembly. As soon as the internal aligning register of the bracket is free of the rear plate of the frame, the rotor will drop until one pole is resting in the main stator core.

NOTE:

On 360, 361, 440, and 441 frames there is an "O" ring installed in the bearing bore of the rear bearing bracket. Inspect this "O" ring for wear or damage, and replace if necessary.

**FIGURE 4**

- B. **Front Bearing Bracket Removal (2-bearing units only).** Remove the drive arrangement from the alternator shaft extension.

NOTE:

The shaft extension must be supported before proceeding further. A hoist and sling, jack, or some other means of support with a capacity of TWO TONS should be used.

Remove the six hexhead cap screws holding the bearing bracket to the frame. Rethread two of these screws in the threaded "back-out" holes provided and proceed as described above for the rear bearing bracket.

- C. **Bearing Removal Procedure.** Using a bearing puller remove the bearing. Be sure that the puller is against the Inner Race of the bearing to prevent damage to the bearing. Prior to removal visually inspect the bearing for obvious wear and damage.
- D. **Rotating rectifier assembly removal procedure.** Remove the three exciter rotor leads, and the two main rotor leads (Fig. 3 Items a, b, c, and d) from the rectifier assembly. Remove the four cap screws holding the rectifier assembly to the rectifier hub.
- E. **Exciter rotor removal procedure.** Using a bearing puller, remove the rectifier mounting hub. This hub is heat shrunk onto the shaft and may require the use of heat during the removal operation. When reassembling, this hub must be heated prior to being installed on the shaft. Pull the two main rotor load leads out of the holes in the exciter rotor. These two holes may be used to remove the exciter rotor with a hub puller.
- F. **Bearing replacement.** **ALWAYS** install the same type bearing that was supplied as original equipment. Order by part number from the parts list, and include the alternator model and serial numbers from the unit's nameplate. Install the bearing with a conventional bearing tool. When replacing **avoid damage to the bearing outer race and bearing shields. Apply pressing force to the inner race only.**
- G. **Reassembly.** For reassembly, reverse the above procedures being careful that all electrical connections are clean and tight. When reinstalling either bearing bracket, it may well be necessary to provide a lifting device such as a sling and hoist or a jack to raise the bracket so that the aligning register will fit into the alternator frame. Insure that the bearing bracket register is properly seated in the frame prior to torquing the retaining cap screws. Failure to do this may result in damage to the bearing bracket. Torque the four retaining cap screws to 59 to 61 lb./in. of torque. After the bracket is secure, torque the two exciter stator "L" bracket cap screws to the same values as for the bearing bracket screws.

RETURNED GOODS

Contact **THE LIMA ELECTRIC COMPANY** by letter, telex or telephone for a "RETURNED MATERIAL AUTHORIZATION" before returning either parts or a complete unit. We will take steps to return your unit to service quickly, and at the least expense possible. At the same time, we will analyze the cause of failure and recommend steps to prevent a recurrence of the failure.

CAUTION: SINGLE BEARING ALTERNATORS MUST HAVE THE ROTOR ASSEMBLY PROPERLY SECURED TO PREVENT DAMAGE DURING TRANSIT TO THE FACTORY OR AUTHORIZED SERVICE STATION.

TROUBLE SHOOTING PROCEDURES AC BRUSHLESS GENERATOR

As with any machine, trouble may develop in electrical generators. It may be due to long service or neglect of regular maintenance, servicing, and checking. Should trouble develop, the following instructions will be helpful in tracing the cause and making repairs.

SPEED DEVIATIONS:

The generator speed should be maintained at rated nameplate speed. The frequency and voltage of the generator output depends on speed. If the generator runs slower than rated speed, the voltage will drop off.

NO VOLTAGE:

CAUSE

- Loss of residual magnetism in exciter field poles.
- Open in stator windings.
- * Open or short in rotating rectifiers.
- Short circuited.
- * Open in alternator field.
- * Shorted exciter armature.
- * Shorted leads between exciter armature and generator field.

CHECK AND REMEDY

- Flash field, see page 6 "Restoring Residual Magnetism."
- Check for continuity in windings. Return to factory for repair if open.
- Check rectifiers per previous instructions, replace if faulty.
- Clear lead to restore voltage build-up.
- Check for continuity and return rotor to factory for repair if field coils are open.
- Check for short and replace if faulty. Use a "Kelvin" type bridge to measure this resistance.
- Test and repair.

NOTE: *Designate rotating parts. Generator must be open to test.

LOW VOLTAGE:

CAUSE

- Excessive Load.
- Low speed.
- Line loss.
- High resistance connections — connections will be warm or hot.
- Shorted field.
- Low power factor.

CHECK AND REMEDY

- Reduce load. With 3 phase generators, the load on each leg should be as evenly balanced as possible and should not exceed the rated current on any leg.
- Check engine for malfunction or system for overload.
- Increase size of line lead wire.
- Make better connection electrically and mechanically.
- Test field coils for possible short by checking resistance with an ohmmeter or resistance bridge. Return rotor assembly to factory for repair if alternator field coils are shorted.
- Reduce inductive (motor) load. Some AC motors draw approximately the same current regardless of load. Do not use motors of larger horsepower rating than is necessary to carry the mechanical load.

FLUCTUATING VOLTAGE:

(May be indicated by flickering lights)

CAUSE	CHECK AND REMEDY
Irregular speed of engine.	Check engine for malfunction or load for fluctuation.
Fluctuating speed.	Stabilize load. The addition of a lamp load (resistance load) may compensate partially for load changes caused by intermittent motor operation. Do not overload.
Loose terminal or load connections.	Make better connection mechanically and electrically.
Defective bearing causing uneven air gap.	Replace worn bearing.

HIGH VOLTAGE:

CAUSE	CHECK AND REMEDY
Excessive speed.	Check engine for malfunction.

OVERHEATING:

CAUSE	CHECK AND REMEDY
Generator overloaded.	Reduce load. (Check with ammeter and compare with nameplate rating.)
Clogged ventilating screens.	Clean air passages.
High room temperature.	Improve ventilation.
Insufficient circulation.	Provide cross-ventilation.
Low power factor.	Reduce inductive loads or install power factor improvement capacitors.
Unbalanced load.	The load on each leg should be as evenly balanced as possible and should not exceed the rated current on any leg.
Dry bearing.	Replace bearing.

MECHANICAL NOISE:

CAUSE	CHECK AND REMEDY
Defective Bearing.	Replace bearing.
Rotor scrubbing on stator.	Bad bearing, replace. Bent shaft, return to factory. Loose endbell, tighten; loose drive discs. tighten.
Loose Laminations.	Return to factory for repair.
Loose or misaligned coupling.	Tighten or align.

GENERATOR FRAME PRODUCES SHOCK WHEN TOUCHED:

CAUSE	CHECK AND REMEDY
Static charge.	Ground generator frame.
Grounded armature or field coil.	Return to factory for repair.

ELECTRICAL WIRING PROCEDURES — WIRING DIAGRAMS

CAUTION

Wiring of the alternator should be done in accordance with good electrical practices. Follow government, association and industry standards. In some wiring arrangements, groups of terminals are connected together with no further termination. These terminals must be properly insulated to avoid a hazard to personnel and potential equipment damage.

LIMA alternators are supplied in 4-lead, 10-lead, or 12-lead configurations. From the nameplate information and system voltage requirements, select the appropriate wiring diagram from the information that follows.

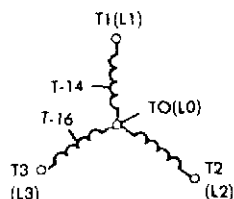
WIRING REFERENCE CHART

	CONFIGURATION	MAC TYPE SPECIFIC VOLTAGE (60 HZ)	REF. DIAG
3 PHASE	4-Lead Unit, Wye Connected	480 V	A
	4-Lead Unit, Wye Connected	600 V	A
	4-Lead Unit, 480 Volt Delta Connected	480 V	B
	12-Lead Unit, 4-Wire 240 Volt Delta Connected	240 V	C
	12-Lead Unit, High Voltage Wye Connected	416 V	D
	12-Lead Unit, Low Voltage Wye Connected	208 V	E
	10-Lead Unit, High Voltage Wye Connected	480 V	F
	10-Lead Unit, Low Voltage Wye Connected	240 V	G
1 PHASE	12-Lead Unit, Low Voltage Delta	120 V	H
	12-Lead Unit, 240 Volt, Zig Zag	240 V	I
	12-Lead Unit, 480 Volt, Zig Zag	416 V	J

DIAGRAM A

4-Lead Unit, 480 or 600 Volt, Wye Connected, 3 Phase

OUTPUTS:	480 V	600 V
L1 to L2	480 V, 3Ø	600 V, 3Ø
L2 to L3	480 V, 3Ø	600 V, 3Ø
L1 to L3	480 V, 3Ø	600 V, 3Ø
L1 to L0	277 V, 1Ø	346 V, 1Ø
L2 to L0	277 V, 1Ø	346 V, 1Ø
L3 to L0	277 V, 1Ø	346 V, 1Ø

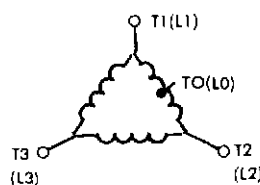


CAUTION: Properly insulate all unused terminations

DIAGRAM B

4-Lead Unit, 480 Volt, Delta Connected, 3 Phase

OUTPUTS:	240 V, 1Ø	480 V, 3Ø
L1 to L0		L1 to L2
L2 to L0		L2 to L3
		L1 to L3



CAUTION: Properly insulate all unused terminations

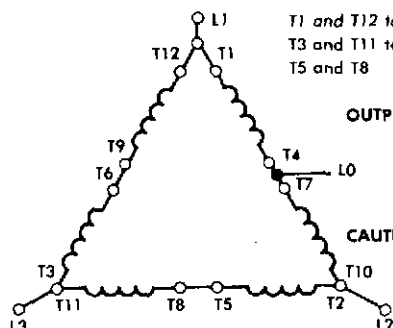
DIAGRAM C

12-Lead Unit, 240 Volt, Delta Connected, 3 Phase

Connect the following sets of terminations:

T1 and T12 to form L1 T2 and T10 to form L2
T3 and T11 to form L3 T4 and T7 to form L0
T5 and T8 T6 and T9

OUTPUTS:	120 V, 1Ø	240 V, 3Ø
L1 to L0		L1 to L2
L2 to L0		L2 to L3
		L1 to L3



CAUTION: Properly insulate all unused terminations

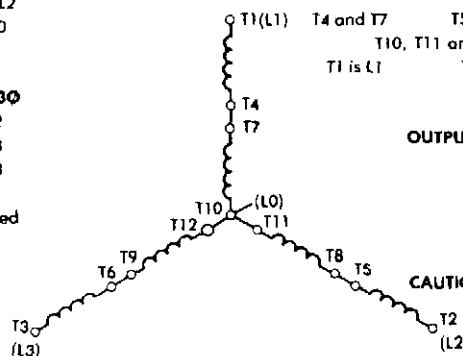
DIAGRAM D

12-Lead Unit, High Voltage, Wye Connected, 3 Phase

Connect the following sets of terminations:

T4 and T7 T5 and T8 T6 and T9
T10, T11 and T12 to form L0
T1 is L1 T2 is L2 T3 is L3

OUTPUTS:	240 V, 1Ø	416 V, 3Ø
L1 to L0		L1 to L2
L2 to L0		L2 to L3
L3 to L0		L1 to L3



CAUTION: Properly insulate all unused terminations

DIAGRAM E

12-Lead Unit, Low Voltage, Wye Connected, 3 Phase

Connect the following sets of terminations:

T1 and T7 to form L1 T2 and T8 to form L2
T3 and T9 to form L3
T4, T5, T6, T10, T11 and T12 to form L0

OUTPUTS: 120 V, 1 ϕ 208 V, 3 ϕ
L1 to L0 L1 to L2
L2 to L0 L2 to L3
L3 to L0 L1 to L3

CAUTION: Properly insulate all unused terminations

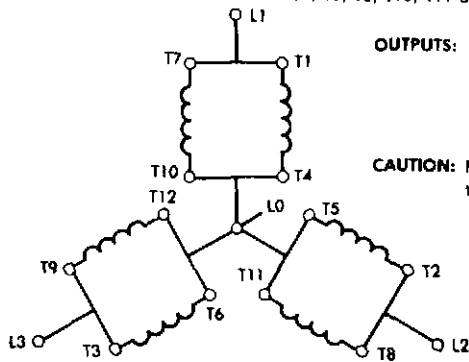


DIAGRAM F

10-Lead Unit, High Voltage, Wye Connected, 3 Phase

Connect the following sets of terminations:

T4 and T7 T5 and T8 T6 and T9
T1 is L1 T2 is L2 T3 is L3

OUTPUTS: 277 V, 1 ϕ 480 V, 3 ϕ
L1 to L0 L1 to L2
L2 to L0 L2 to L3
L3 to L0 L1 to L3

CAUTION: Properly insulate all unused terminations

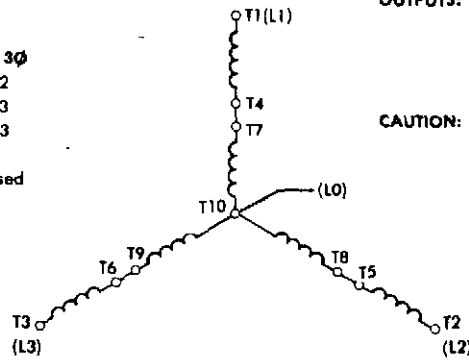


DIAGRAM H

12-Lead Unit, Low Voltage, Delta Connected, 1 Phase

Connect the following sets of terminations:

T2, T8, T6, T12 and Insulate
T1, T5, T7, T11 to form L1
T3, T4, T9, T10 to form L2

OUTPUTS: 120 V, 1 ϕ
L1 to L2

CAUTION: Properly insulate all unused terminations

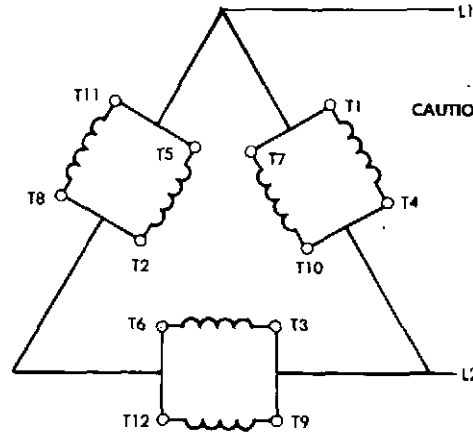


DIAGRAM G

10-Lead Unit, Low Voltage, Wye Connected, 3 Phase

Connect the following sets of terminations:

T1 and T7 to form L1 T2 and T8 to form L2
T3 and T9 to form L3
T4, T5, T6 and T10 to form L0

OUTPUTS: 139 V, 1 ϕ 240 V, 3 ϕ
L1 to L0 L1 to L2
L2 to L0 L2 to L3
L3 to L0 L1 to L3

CAUTION: Properly insulate all unused terminations

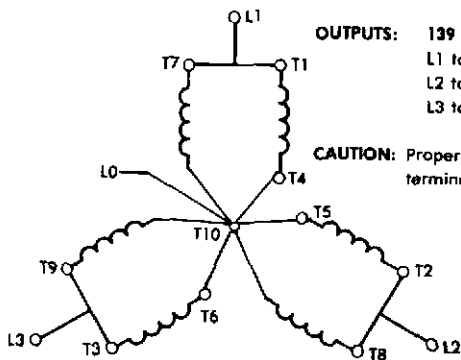


DIAGRAM I

12-Lead Unit, 240 Volt, Zig Zag, 1 Phase

Connect the following sets of terminations:

T2, T8, T6, T12 and Insulate
T1, T7, to form L1
T3, T9, to form L2
T4, T10, T5, T11 to form L0

OUTPUTS: 120 V, 1 ϕ 240 V, 1 ϕ
L1 to L0 L1 to L2
L2 to L0

CAUTION: Properly insulate all unused terminations

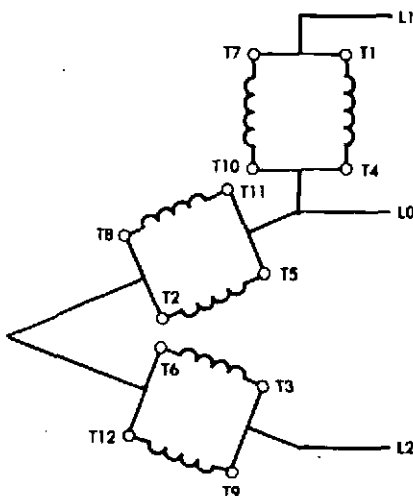


DIAGRAM J

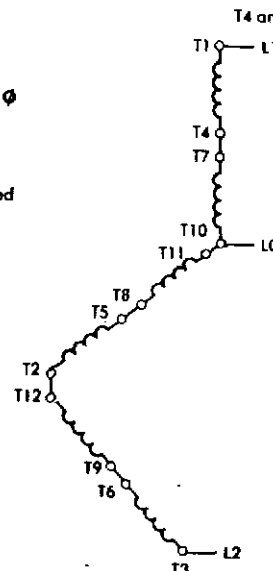
12-Lead Unit, 480 Volt, Zig Zag, 1 Phase

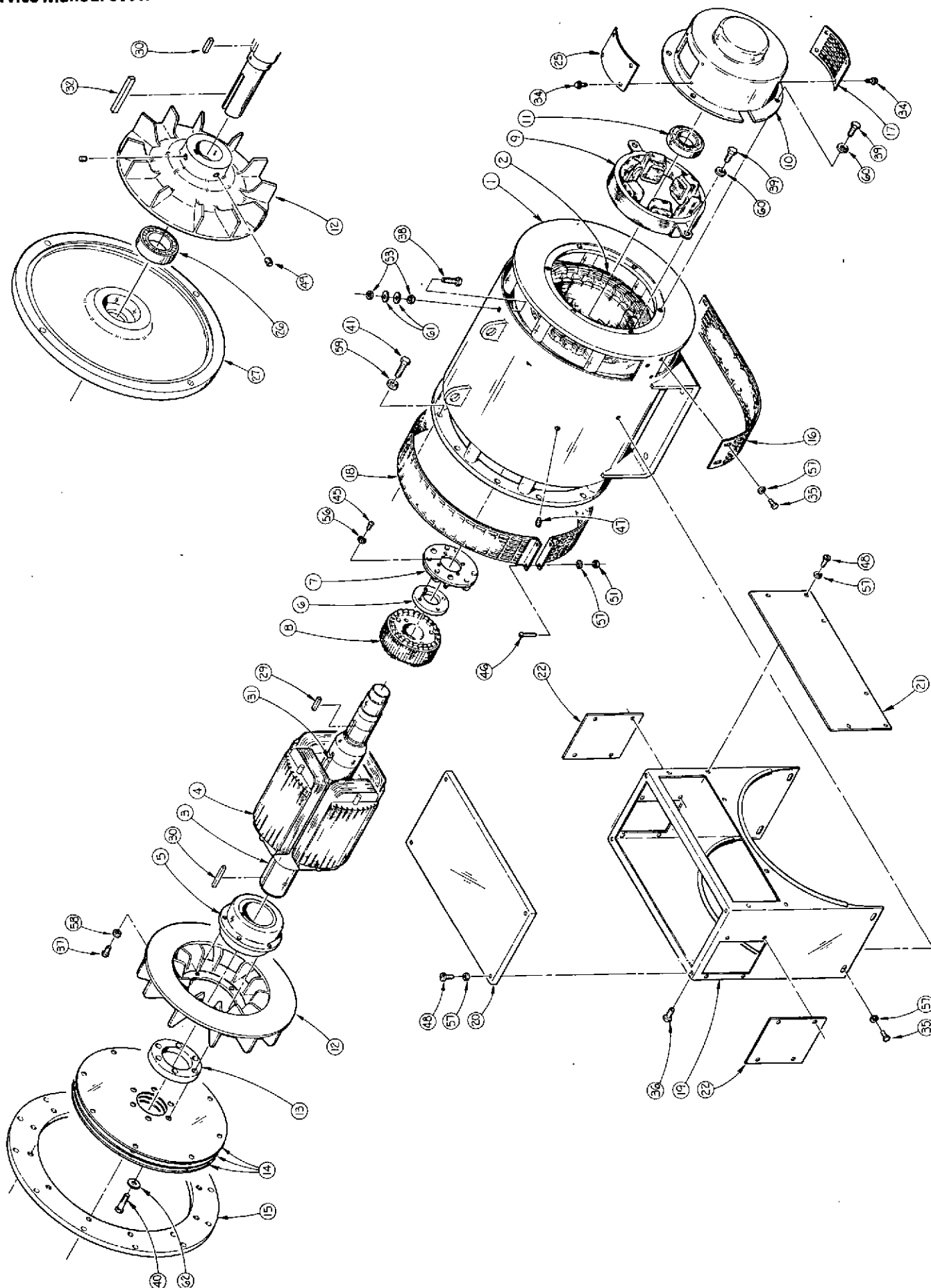
Connect the following sets of terminations:

T4 and T7 T2 and T12 T6 and T9 T5 and T8
T1 is L1 T10, T11 to form L0 T3 is L2

OUTPUTS: 240 V, 1 ϕ 480 V, 1 ϕ
L1 to L0 L1 to L2
L2 to L0

CAUTION: Properly insulate all unused terminations





**DRIPPROOF GENERATOR
PARTS LIST
FRAME 360, 440, 580, 680
SINGLE BEARING**

Part No.	Part Name	Part No.	Part Name
1	Frame	45	Screw - Rd. Hd.
2	Main Stator	46	Screw - Rd. Hd.
3	Shaft	47	Screw - Socket Set
4	Main Rotor	48	Screw - Pan Hd.
5	Drive Hub	49	Screw - Socket Set
6	Rectifier Hub	51	Nut
7	Rectifier Ass'y.	53	Nut
8	Exciter Rotor	56	Washer - Shakeproof
9	Exciter Stator	57	Washer - Split Lock
10	Endbell	58	Washer - Split Lock
11	Bearing	59	Washer - Split Lock
12	Fan	60	Washer - Split Lock
13	Hub Spacer	61	Washer - Flat
14	Disc Coupling	62	Washer - Flat
15	Adaptor Ring		
16	Intake Screen		
17	Endbell Screen		
18	Screen & Cover Band		
19	Connection Box		
20	Cover		
21	Front Panel		
22	Side Panel		
25	Cover Plate		
26	Bearing		
27	Endbell		
29	Key		
30	Key		
31	Key		
32	Key		
34	Capscrew		
35	Capscrew		
36	Capscrew		
37	Capscrew		
38	Capscrew		
39	Capscrew		
40	Capscrew		
41	Capscrew		



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