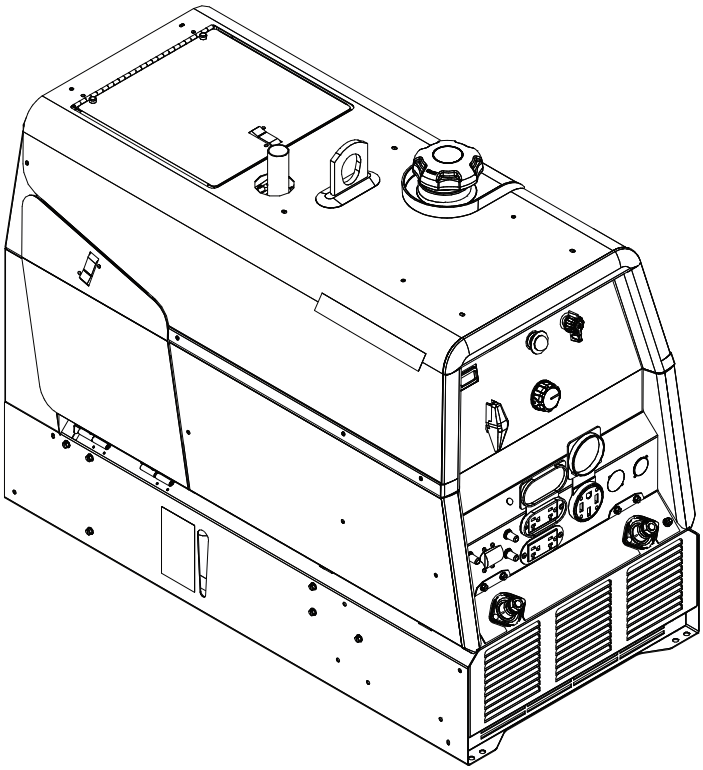
LINCOLN ELECTRIC

Service Manual

EAGLE™ 10,000 PLUS



For use with machines having Code Numbers:
13414

GENUINE LINCOLN PARTS™

Register your machine:
www.lincolnelectric.com/register

Authorized Service and Distributor Locator:
www.lincolnelectric.com/locator

Save for future reference

Date Purchased

Code: (ex: 10859)

Serial: (ex: U1060512345)

Need Help? Call 1.888.935.3877
to talk to a Service Representative

Hours of Operation:
8:00 AM to 6:00 PM (ET) Mon. thru Fri.

After hours?
Use "Ask the Experts" at lincolnelectric.com
A Lincoln Service Representative will contact you no later than the following business day.

For Service outside the USA:
Email: globalservice@lincolnelectric.com

SVM10645 | Issue Date Jul - 22

THE LINCOLN ELECTRIC COMPANY
22801 St. Clair Avenue • Cleveland, OH • 44117-1199 • U.S.A.
Phone: +1.216.481.8100 • www.lincolnelectric.com

THANK YOU FOR SELECTING A QUALITY PRODUCT BY LINCOLN ELECTRIC.

PLEASE EXAMINE CARTON AND EQUIPMENT FOR DAMAGE IMMEDIATELY

When this equipment is shipped, title passes to the purchaser upon receipt by the carrier. Consequently, claims for material damaged in shipment must be made by the purchaser against the transportation company at the time the shipment is received.

SAFETY DEPENDS ON YOU

Lincoln arc welding and cutting equipment is designed and built with safety in mind. However, your overall safety can be increased by proper installation ... and thoughtful operation on your part. **DO NOT INSTALL, OPERATE OR REPAIR THIS EQUIPMENT WITHOUT READING THIS MANUAL AND THE SAFETY PRECAUTIONS CONTAINED THROUGHOUT.** And, most importantly, think before you act and be careful.

⚠ WARNING

This statement appears where the information must be followed exactly to avoid serious personal injury or loss of life.

⚠ CAUTION

This statement appears where the information must be followed to avoid minor personal injury or damage to this equipment.

KEEP YOUR HEAD OUT OF THE FUMES.

DON'T get too close to the arc. Use corrective lenses if necessary to stay a reasonable distance away from the arc.

READ and obey the Safety Data Sheet (SDS) and the warning label that appears on all containers of welding materials.

USE ENOUGH VENTILATION or exhaust at the arc, or both, to keep the fumes and gases from your breathing zone and the general area.

IN A LARGE ROOM OR OUTDOORS, natural ventilation may be adequate if you keep your head out of the fumes (See below).

USE NATURAL DRAFTS or fans to keep the fumes away from your face.

If you develop unusual symptoms, see your supervisor. Perhaps the welding atmosphere and ventilation system should be checked.

WEAR CORRECT EYE, EAR & BODY PROTECTION

PROTECT your eyes and face with welding helmet properly fitted and with proper grade of filter plate (See ANSI Z49.1).

PROTECT your body from welding spatter and arc flash with protective clothing including woolen clothing, flame-proof apron and gloves, leather leggings, and high boots.

PROTECT others from splatter, flash, and glare with protective screens or barriers.

IN SOME AREAS, protection from noise may be appropriate.

BE SURE protective equipment is in good condition.

Also, wear safety glasses in work area **AT ALL TIMES.**

SPECIAL SITUATIONS

DO NOT WELD OR CUT containers or materials which previously had been in contact with hazardous substances unless they are properly cleaned. This is extremely dangerous.

DO NOT WELD OR CUT painted or plated parts unless special precautions with ventilation have been taken. They can release highly toxic fumes or gases.

Additional precautionary measures

PROTECT compressed gas cylinders from excessive heat, mechanical shocks, and arcs; fasten cylinders so they cannot fall.

BE SURE cylinders are never grounded or part of an electrical circuit.

REMOVE all potential fire hazards from welding area.

ALWAYS HAVE FIRE FIGHTING EQUIPMENT READY FOR IMMEDIATE USE AND KNOW HOW TO USE IT.

SECTION A: WARNINGS

CALIFORNIA PROPOSITION 65 WARNINGS

WARNING: Breathing diesel engine exhaust exposes you to chemicals known to the State of California to cause cancer and birth defects, or other reproductive harm.

- Always start and operate the engine in a well-ventilated area.
- If in an exposed area, vent the exhaust to the outside.
- Do not modify or tamper with the exhaust system.
- Do not idle the engine except as necessary.

For more information go to www.P65 warnings.ca.gov/diesel

WARNING: This product, when used for welding or cutting, produces fumes or gases which contain chemicals known to the State of California to cause birth defects and, in some cases, cancer. (California Health & Safety Code § 25249.5 *et seq.)*

WARNING: Cancer and Reproductive Harm www.P65warnings.ca.gov

ARC WELDING CAN BE HAZARDOUS. PROTECT YOURSELF AND OTHERS FROM POSSIBLE SERIOUS INJURY OR DEATH. KEEP CHILDREN AWAY. PACEMAKER WEARERS SHOULD CONSULT WITH THEIR DOCTOR BEFORE OPERATING.

Read and understand the following safety highlights. For additional safety information, it is strongly recommended that you purchase a copy of "Safety in Welding & Cutting - ANSI Standard Z49.1" from the American Welding Society, P.O. Box 351040, Miami, Florida 33135 or CSA Standard W117.2. A Free copy of "Arc Welding Safety" booklet E205 is available from the Lincoln Electric Company, 22801 St. Clair Avenue, Cleveland, Ohio 44117-1199.

BE SURE THAT ALL INSTALLATION, OPERATION, MAINTENANCE AND REPAIR PROCEDURES ARE PERFORMED ONLY BY QUALIFIED INDIVIDUALS.

FOR ENGINE POWERED EQUIPMENT.

1.a. Turn the engine off before troubleshooting and maintenance work unless the maintenance work requires it to be running.

1.b. Operate engines in open, well-ventilated areas or vent the engine exhaust fumes outdoors.

1.c. Do not add the fuel near an open flame welding arc or when the engine is running. Stop the engine and allow it to cool before refueling to prevent spilled fuel from vaporizing on contact with hot engine parts and igniting. Do not spill fuel when filling tank. If fuel is spilled, wipe it up and do not start engine until fumes have been eliminated.

1.d. Keep all equipment safety guards, covers and devices in position and in good repair. Keep hands, hair, clothing and tools away from V-belts, gears, fans and all other moving parts when starting, operating or repairing equipment.

1.e. In some cases it may be necessary to remove safety guards to perform required maintenance. Remove guards only when necessary and replace them when the maintenance requiring their removal is complete. Always use the greatest care when working near moving parts.

1.f. Do not put your hands near the engine fan. Do not attempt to override the governor or idler by pushing on the throttle control rods while the engine is running.

1.g. To prevent accidentally starting gasoline engines while turning the engine or welding generator during maintenance work, disconnect the spark plug wires, distributor cap or magneto wire as appropriate.

1.h. To avoid scalding, do not remove the radiator pressure cap when the engine is hot.

1.i. Using a generator indoors CAN KILL YOU IN MINUTES.

1.j. Generator exhaust contains carbon monoxide. This is a poison you cannot see or smell.

1.k. NEVER use inside a home or garage, EVEN IF doors and windows are open.

1.l. Only use OUTSIDE and far away from windows, doors and vents.

1.m. Avoid other generator hazards. READ MANUAL BEFORE USE.

ELECTRIC AND MAGNETIC FIELDS MAY BE DANGEROUS

2.a. Electric current flowing through any conductor causes localized Electric and Magnetic Fields (EMF). Welding current creates EMF fields around welding cables and welding machines

2.b. EMF fields may interfere with some pacemakers, and welders having a pacemaker should consult their physician before welding.

2.c. Exposure to EMF fields in welding may have other health effects which are now not known.

2.d. All welders should use the following procedures in order to minimize exposure to EMF fields from the welding circuit:

2.d.1. Route the electrode and work cables together - Secure them with tape when possible.

2.d.2. Never coil the electrode lead around your body.

2.d.3. Do not place your body between the electrode and work cables. If the electrode cable is on your right side, the work cable should also be on your right side.

2.d.4. Connect the work cable to the workpiece as close as possible to the area being welded.

2.d.5. Do not work next to welding power source.

ELECTRIC SHOCK CAN KILL.

3.a. The electrode and work (or ground) circuits are electrically “hot” when the welder is on. Do not touch these “hot” parts with your bare skin or wet clothing. Wear dry, hole-free gloves to insulate hands.

3.b. Insulate yourself from work and ground using dry insulation. Make certain the insulation is large enough to cover your full area of physical contact with work and ground.

In addition to the normal safety precautions, if welding must be performed under electrically hazardous conditions (in damp locations or while wearing wet clothing; on metal structures such as floors, gratings or scaffolds; when in cramped positions such as sitting, kneeling or lying, if there is a high risk of unavoidable or accidental contact with the workpiece or ground) use the following equipment:

- Semiautomatic DC Constant Voltage (Wire) Welder.
- DC Manual (Stick) Welder.
- AC Welder with Reduced Voltage Control.

3.c. In semiautomatic or automatic wire welding, the electrode, electrode reel, welding head, nozzle or semiautomatic welding gun are also electrically “hot”.

3.d. Always be sure the work cable makes a good electrical connection with the metal being welded. The connection should be as close as possible to the area being welded.

3.e. Ground the work or metal to be welded to a good electrical (earth) ground.

3.f. Maintain the electrode holder, work clamp, welding cable and welding machine in good, safe operating condition. Replace damaged insulation.

3.g. Never dip the electrode in water for cooling.

3.h. Never simultaneously touch electrically “hot” parts of electrode holders connected to two welders because voltage between the two can be the total of the open circuit voltage of both welders.

3.i. When working above floor level, use a safety belt to protect yourself from a fall should you get a shock.

3.j. Also see Items 6.c. and 8.

ARC RAYS CAN BURN.

4.a. Use a shield with the proper filter and cover plates to protect your eyes from sparks and the rays of the arc when welding or observing open arc welding. Headshield and filter lens should conform to ANSI Z87. I standards.

4.b. Use suitable clothing made from durable flame-resistant material to protect your skin and that of your helpers from the arc rays.

4.c. Protect other nearby personnel with suitable, non-flammable screening and/or warn them not to watch the arc nor expose themselves to the arc rays or to hot spatter or metal.

FUMES AND GASES CAN BE DANGEROUS.

5.a. Welding may produce fumes and gases hazardous to health. Avoid breathing these fumes and gases. When welding, keep your head out of the fume. Use enough ventilation and/or exhaust at the arc to keep fumes and gases away from the breathing zone. **When welding hardfacing (see instructions on container or SDS) or on lead or cadmium plated steel and other metals or coatings which produce highly toxic fumes, keep exposure as low as possible and within applicable OSHA PEL and ACGIH TLV limits using local exhaust or mechanical ventilation unless exposure assessments indicate otherwise. In confined spaces or in some circumstances, outdoors, a respirator may also be required. Additional precautions are also required when welding on galvanized steel.**

5. b. The operation of welding fume control equipment is affected by various factors including proper use and positioning of the equipment, maintenance of the equipment and the specific welding procedure and application involved. Worker exposure level should be checked upon installation and periodically thereafter to be certain it is within applicable OSHA PEL and ACGIH TLV limits.

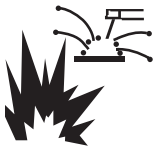
5.c. Do not weld in locations near chlorinated hydrocarbon vapors coming from degreasing, cleaning or spraying operations. The heat and rays of the arc can react with solvent vapors to form phosgene, a highly toxic gas, and other irritating products.

5.d. Shielding gases used for arc welding can displace air and cause injury or death. Always use enough ventilation, especially in confined areas, to insure breathing air is safe.

5.e. Read and understand the manufacturer’s instructions for this equipment and the consumables to be used, including the Safety Data Sheet (SDS) and follow your employer’s safety practices. SDS forms are available from your welding distributor or from the manufacturer.

5.f. Also see item 1.b.

WELDING AND CUTTING SPARKS CAN CAUSE FIRE OR EXPLOSION.



6.a. Remove fire hazards from the welding area. If this is not possible, cover them to prevent the welding sparks from starting a fire. Remember that welding sparks and hot materials from welding can easily go through small cracks and openings to adjacent areas. Avoid welding near hydraulic lines. Have a fire extinguisher readily available.

6.b. Where compressed gases are to be used at the job site, special precautions should be used to prevent hazardous situations. Refer to "Safety in Welding and Cutting" (ANSI Standard Z49.1) and the operating information for the equipment being used.

6.c. When not welding, make certain no part of the electrode circuit is touching the work or ground. Accidental contact can cause overheating and create a fire hazard.

6.d. Do not heat, cut or weld tanks, drums or containers until the proper steps have been taken to insure that such procedures will not cause flammable or toxic vapors from substances inside. They can cause an explosion even though they have been "cleaned". For information, purchase "Recommended Safe Practices for the Preparation for Welding and Cutting of Containers and Piping That Have Held Hazardous Substances", AWS F4.1 from the American Welding Society (see address above).

6.e. Vent hollow castings or containers before heating, cutting or welding. They may explode.

6.f. Sparks and spatter are thrown from the welding arc. Wear oil free protective garments such as leather gloves, heavy shirt, cuffless trousers, high shoes and a cap over your hair. Wear ear plugs when welding out of position or in confined places. Always wear safety glasses with side shields when in a welding area.

6.g. Connect the work cable to the work as close to the welding area as practical. Work cables connected to the building framework or other locations away from the welding area increase the possibility of the welding current passing through lifting chains, crane cables or other alternate circuits. This can create fire hazards or overheat lifting chains or cables until they fail.

6.h. Also see item 1.c.

6.I. Read and follow NFPA 51B "Standard for Fire Prevention During Welding, Cutting and Other Hot Work", available from NFPA, 1 Batterymarch Park, PO box 9101, Quincy, MA 022690-9101.

6.j. Do not use a welding power source for pipe thawing.

CYLINDER MAY EXPLODE IF DAMAGED.

7.a. Use only compressed gas cylinders containing the correct shielding gas for the process used and properly operating regulators designed for the gas and pressure used. All hoses, fittings, etc. should be suitable for the application and maintained in good condition.

7.b. Always keep cylinders in an upright position securely chained to an undercarriage or fixed support.

7.c. Cylinders should be located:

- Away from areas where they may be struck or subjected to physical damage.
- A safe distance from arc welding or cutting operations and any other source of heat, sparks, or flame.

7.d. Never allow the electrode, electrode holder or any other electrically "hot" parts to touch a cylinder.

7.e. Keep your head and face away from the cylinder valve outlet when opening the cylinder valve.

7.f. Valve protection caps should always be in place and hand tight except when the cylinder is in use or connected for use.

7.g. Read and follow the instructions on compressed gas cylinders, associated equipment, and CGA publication P-I, "Precautions for Safe Handling of Compressed Gases in Cylinders," available from the Compressed Gas Association, 14501 George Carter Way Chantilly, VA 20151.

FOR ELECTRICALLY POWERED EQUIPMENT.

8.a. Turn off input power using the disconnect switch at the fuse box before working on the equipment.

8.b. Install equipment in accordance with the U.S. National Electrical Code, all local codes and the manufacturer's recommendations.

8.c. Ground the equipment in accordance with the U.S. National Electrical Code and the manufacturer's recommendations.

Refer to http://www.lincolnelectric.com/safety for additional safety information.

EPA EMISSION CONTROL WARRANTY STATEMENT

New small off road engines (SOREs) must be designed, built, and equipped to meet the EPA's anti-smog standards. The Lincoln Electric Company must warrant the emission control system on your small off road engine for 2 years from the date of purchase to the ultimate purchaser, provided there has been no abuse, neglect, or improper maintenance of your small off road engine. The emission control system warranty is extended to the original owner and all subsequent owners.

Your emission control system may include parts such as:

(1) Fuel Metering System
   a. Carburetor and internal parts (and/or pressure regulator or fuel injection system).
   b. Air-fuel ratio feedback and control system.
   c. Cold start enrichment system.

(2) Air Induction System
   a. Controlled hot air intake system.
   b. Intake manifold.
   c. Air filter.

(3) Ignition System
   a. Spark plugs.
   b. Magneto or electronic ignition system.
   c. Spark advance/retard system.

(4) Exhaust Gas Recirculation (EGR) System
   a. EGR valve body, and carburetor spacer if applicable.
   b. EGR rate feedback and control system.

(5) Air Injection System
   a. Air pump or pulse valve.
   b. Valves affecting distribution of flow.
   c. Distribution manifold.

(6) Catalyst or Thermal Reactor System
   a. Catalytic converter.
   b. Thermal reactor.
   c. Exhaust manifold.

(7) Particulate Controls
   a. Traps, filters, precipitators, and any other device used to capture particulate emissions.

(8) Miscellaneous Items Used in Above Systems
   a. Vacuum, temperature, and time sensitive valves and switches
   b. Electronic controls.
   c. Hoses, belts, connectors, and assemblies.

MANUFACTURER'S WARRANTY COVERAGE:

The engine is warrantied for 2 years for certain emission-related parts (deÿned below). Defective parts will be repaired or replaced by one our Lincoln Electric Authorized Repair Facilities.

OWNER'S WARRANTY RESPONSIBILITIES:

- As the small off road engine owner, you are responsible for the performance of the required maintenance listed in section D within this manual. The Lincoln Electric Company recommends that you retain all receipts covering maintenance items listed in section D, however, The Lincoln Electric Company cannot deny warranty solely for the lack of receipts or failure to ensure the performance of all scheduled maintenance.

- As the small off road engine owner, you should be aware that The Lincoln Electric Company may deny you warranty coverage if your small off road engine or a part has failed due to abuse, neglect, improper maintenance, or unapproved modifications.
- You are responsible for presenting your small off road engine to a Lincoln Electric Authorized Service Facility as soon as a problem exists. For owners located more than 100 miles from an authorized service center, Lincoln Electric, at its sole choice and discretion, will either pay for shipping costs to and from an authorized service center, provide for a service technician to come to the owner to make the warranty repair, or pay for the repair to be made at a local nonauthorized service center. The provision only applies to owners located in the contiguous United States, excluding the states with high-altitude areas identiÿed in 40 CFR part 1068, Appendix III. The warranty repairs should be completed in a reasonable amount of time, not to exceed 30 days. Should you need assistance or have questions concerning The Lincoln Electric Company's Warranty Statement, you can contact our Customer Service Department at 1-888-935-3877 or online at www.lincolnelectric.com.

EPA EMISSIONS DEFECT WARRANTY EXPLANATION

WHAT DOES THIS WARRANTY COVER?

The Lincoln Electric Company warrants that your small off the road engine was designed and manufactured to conform with applicable EPA (exhaust) emissions standards and that your small off road engine will be free from defects in material and workmanship that would cause it to fail within the first 2 years of ownership.

HOW WILL A COVERED PART BE CORRECTED?

If there is a defect in a part covered by this warranty, a Lincoln Electric Authorized Service Facility will correct the defect free of charge.

WHAT PARTS ARE COVERED BY THE EPA EMISSIONS DEFECT WARRANTY?

- Any emission related part (deÿned below) not scheduled for "required maintenance" (See Section D MAINTENANCE) will be repaired or replaced within the warranty period.
- Any emission related part scheduled for replacement during "required maintenance" (See Section D, MAINTENANCE) is warrantied for the period of time prior to the first scheduled replacement for that part. Any such part repaired or replaced under warranty shall be warranted for the remainder of the period prior to the first scheduled replacement for that part.
- Any manufacturer-approved replacement part may be used in the performance of any warranty maintenance or repairs on emission related parts, and must be must be provided without charge if the part is still under warranty.
- Any replacement part that is equivalent in performance and durability may be used in non-warranty maintenance or repairs, and shall not reduce the warranty obligations of the manufacturer.
- The Owner is responsible for the performance of the required maintenance described in section D.

EMISSION RELATED WARRANTIED PARTS:

- Choke
- Carburetor
- Air Filter
- Electronic Ignition System
- Catalytic Converter/Muffler Assembly
- Spark Plug

WHAT IS NOT COVERED BY THE EPA ENGINE EMISSIONS DEFECT WARRANTY?

- Any failure caused by abuse, neglect, or improper maintenance
- Any failure caused by unapproved modification or use of unapproved accessories

CONTENT/DETAILS MAY BE CHANGED OR UPDATED WITHOUT NOTICE. FOR MOST CURRENT INSTRUCTION MANUALS, GO TO PARTS.LINCOLNELECTRIC.COM.

TECHNICAL SPECIFICATIONS - EAGLE 10,000 PLUS (K2343-4)

INPUT - GASOLINE ENGINE

Make/Model	Description	Horsepower	Operating Speed (RPM)	Displacement cu. in. (cu.cm.)	Starting System	Capacities
Lincoln GV750™	2 Cylinder 4 Cycle Air-Cooled Gasoline Engine. Aluminum Alloy with Cast Iron Liners Electronic Ignition	22 HP @ 3600 RPM	High Idle 3700 Full Load 3500 Low Idle 2400	45.8 (750)	12VDC Battery Electric Start Group 99 Battery (can use group 58 batteries for replacement) (410 Cold Cranking Amps)	Fuel: 12 Gal (45.4 L) Lubricating Oil: 1.5 Qts (1.5 L)

RATED OUTPUT @ 104°F (40°C)- WELDER

Welding Output
DC Constant Current 225A / 25V / 40% DC Constant Current 210A / 25V / 100%

RATED OUTPUT @ 104°F (40°C)- GENERATOR

Auxiliary Power[1]
9,000 Watts Continuous, 60 Hz AC 10,500 Watts Surge, 60 Hz AC 120/240 Volts

RECEPTACLES AND CIRCUIT BREAKERS

RECEPTACLES	AUXILIARY POWER CIRCUIT BREAKER	BATTERY CHARGING CIRCUIT BREAKER
(2) 120VAC Duplex (5-20R) (1) 120/240VAC Dual Voltage Full KVA (14-50R)	Two 20AMP for Two Duplex Receptacle (1) 40AMP for Dual Voltage (2-pole)	15AMP for Engine Battery Charging Circuit

PHYSICAL DIMENSIONS

HEIGHT	WIDTH	DEPTH	MODEL / WEIGHT
30.00** in. 762.0 mm	21.50 in 546.0 mm	42.25 in. 1073.0 mm	539 lbs. (244 kg.)

** Top of enclosure, add 6.00"(152mm) for exhaust.

ENGINE COMPONENTS

LUBRICATION	VALVE LIFTERS	FUEL SYSTEM	GOVERNOR
Full Pressure with Full Flow Filter	Mechanical	Vacuum Pulse Fuel Pump	Mechanical Governor
AIR CLEANER	**ENGINE IDLER**	**MUFFLER**	**ENGINE PROTECTION**
Low Restriction	Automatic Idler	Low noise Muffler: Top outlet can be rotated. Made from long life, aluminized steel.	Shutdown on low oil pressure.

[1] Output rating in watts is equivalent to volt - amperes at unity factor.Output voltage is within +/-10% at all loads up to rated capacity. When welding available auxiliary power will be reduced.

SAFETY PRECAUTIONS

Only qualified personnel should install, use, or service this equipment.

⚠ WARNING

Do not attempt to use this equipment until you have thoroughly read the engine manufacturer's manual supplied with your welder. It includes important safety precautions, detailed engine starting, operating and maintenance instructions, and parts lists.

ELECTRIC SHOCK can kill.

- **Do not touch electrically live parts or electrode with skin or wet clothing.**
- **Insulate yourself from work and ground**
- **Always wear dry insulating gloves.**

ENGINE EXHAUST can kill.

- **Use in open, well ventilated areas or vent exhaust outside.**

MOVING PARTS can injure.

- **Do not operate with doors open or guards off.**
- **Stop engine before servicing.**
- **Keep away from moving parts.**

See additional warning information at front of this operator's manual.

MACHINE GROUNDING

Because this portable engine driven welder or generator creates it's own power, it is not necessary to connect it's frame to an earth ground, unless the machine is connected to premises wiring (your home, shop, etc.).

⚠ WARNING

To prevent dangerous electric shock, other equipment to which this engine driven welder supplies power must:

- **be grounded to the frame of the welder using a grounded type plug, or be double insulated.**

Do not ground the machine to a pipe that carries explosive or combustible material.

When this welder is mounted on a truck or trailer, it's frame must be electrically bonded to the metal frame of the vehicle. Use a #8 or larger copper wire connected between the machine grounding stud and the frame of the vehicle.

Where this engine driven welder is connected to premises wiring such as that in your home or shop, it's frame must be connected to the system earth ground. See further connection instructions in the section entitled "Standby Power Connections", as well as the article on grounding in the latest National Electrical Code and the local guide.

In general, if the machine is to be grounded, it should be connected with a #8 or larger copper wire to a solid earth ground such as a metal water pipe going into the ground for at least ten feet and having no insulated joints, or to the metal framework of a building which has been effectively grounded. The National Electrical Code lists a number of alternate means of grounding electrical equipment. A machine grounding stud marked with the symbol ⏚ is provided on the front of the welder.

SPARK ARRESTER

Some federal, state, or local laws may require that gasoline engines be equipped with exhaust spark arresters when they are operated in certain locations where unarrested sparks may present a fire hazard. The standard muffler included with this welder does not qualify as a spark arrester. When required by local regulations, the K1898-1 spark arrester must be installed and properly maintained.

⚠ CAUTION

An incorrect arrester may lead to damage to the engine or adversely affect performance.

TOWING

The recommended trailer for use with this equipment for road, in-plant and yard towing by a vehicle(1) is Lincoln's K2635-1. If the user adapts a non-Lincoln trailer, he must assume responsibility that the method of attachment and usage does not result in a safety hazard nor damage the welding equipment. Some of the factors to be considered are as follows:

1. Design capacity of trailer vs. weight of Lincoln equipment and likely additional attachments.
2. Proper support of, and attachment to, the base of the welding equipment so there will be no undue stress to the framework.
3. Proper placement of the equipment on the trailer to insure stability side to side and front to back when being moved and when standing by itself while being operated or serviced.
4. Typical conditions of use, i.e., travel speed; roughness of surface on which the trailer will be operated; environmental conditions.
5. Conformance with federal, state and local laws(1)

(1) Consult applicable federal, state and local laws regarding specific requirements for use on public highways.

VEHICLE MOUNTING

⚠ WARNING

Improperly mounted concentrated loads may cause unstable vehicle handling and tires or other components to fail.

- **Only transport this Equipment on serviceable vehicles which are rated and designed for such loads.**
- **Distribute, balance and secure loads so vehicle is stable under conditions of use.**
- **Do not exceed maximum rated loads for components such as suspension, axles and tires.**
- **Mount equipment base to metal bed or frame of vehicle.**
- **Follow vehicle manufacturer's instructions.**

PRE-OPERATION SERVICE

⚠ CAUTION

READ the engine operating and maintenance instructions supplied with this machine.

⚠ WARNING

GASOLINE can cause fire or explosion.

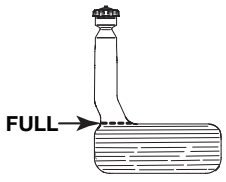
- **Stop engine while fueling.**
- **Do not smoke when fueling.**
- **Keep sparks and flame away from tank.**
- **Do not leave unattended while fueling.**
- **Wipe up spilled fuel and allow fumes to clear before starting engine.**
- **Do not overfill tank, fuel expansion may cause overflow.**

GASOLINE FUEL ONLY

FUEL

Fill the fuel tank with clean, fresh, lead-free gasoline. Observe fuel gauge while filling to prevent overfilling

Stop fueling once the fuel gauge reads full. Do not top off tank. Be sure to leave filler neck empty to allow room for expansion.



⚠ WARNING

- **Damage to the fuel tank may cause fire or explosion. DO NOT drill holes in the EAGLE™ 10,000 PLUS base or weld to the EAGLE™ 10,000 PLUS base.**

OIL

LUBRICATION SYSTEM CAPACITY (INCLUDING FILTER):
GV750™ - 1.6 Quarts (1.5 Liters)

The EAGLE™ 10,000 Plus is shipped with the engine crankcase filled with SAE 10W-30 oil. Check the oil level before starting the engine. If it is not up to the full mark on the dip stick, add oil as required. Make certain that the oil filler cap is tightened securely. Refer to this operator's manual for specific oil recommendations.

⚠ CAUTION

BATTERY CONNECTION

Use caution as the electrolyte is a strong acid that can burn skin and damage eyes.

This welder is shipped with the negative battery cable disconnected. Make sure that the Engine Switch is in the "STOP" position. Attach the disconnected cable securely to the negative battery terminal before attempting to operate the machine. If the battery is discharged and does not have enough power to start the engine, see the battery charging instructions in the Battery section.

NOTE: This machine is furnished with a wet charged battery; if unused for several months, the battery may require a booster charge. Be careful to charge the battery with the correct polarity.

WELDING OUTPUT CABLES

With the engine off, connect the electrode and work cables to the studs provided. These connections should be checked periodically and tightened if necessary Loose connections will result in overheating of the output studs.

When welding at a considerable distance from the welder, be sure you use ample size welding cables. Listed below are copper cable sizes recommended for the rated current and duty cycle. Lengths stipulated are the distance from the welder to work and back to the welder again. Cable sizes are increased for greater lengths primarily for the purpose of minimizing cable voltage drop.

TOTAL COMBINED LENGTH OF ELECTRODE AND WORK CABLES	
	225 Amps 100% Duty Cycle
0-100 Ft. (0-31m)	1 AWG
100-150 Ft. (31-46m)	1 AWG
150-200 Ft. (46-61m)	1/0 AWG

ANGLE OF OPERATION

Internal combustion engines are designed to run in a level condition which is where the optimum performance is achieved. The maximum angle of operation for the engine is 15 degrees from horizontal in any direction. If the engine is to be operated at an angle, provisions must be made for checking and maintaining the oil at the normal (FULL) oil capacity in the crankcase in a level condition.

When operating at an angle, the effective fuel capacity will be slightly less than the specified 12 Gal. (45 L).

LIFTING

The EAGLE™ 10,000 Plus weighs approximately 611 lbs. (277kg) with a full tank of gasoline. A lift bail is mounted to the machine and should always be used when lifting the machine.

⚠ WARNING

FALLING EQUIPMENT can cause injury

- **Lift only with equipment of adequate lifting capacity.**
- **Be sure machine is stable when lifting.**
- **Do not lift this machine using lift bail if it is equipped with a heavy accessory such as trailer or gas cylinder.**
- **Do not lift machine if lift bail is damaged.**
- **Do not operate machine while suspended from lift bail.**

HIGH ALTITUDE OPERATION

At higher altitudes, Welder output de-rating may be necessary. For maximum rating, de-rate the welder output 3.5% for every 1000 ft. (305m) above 3000 ft. (914m).

MUFFLER OUTLET PIPE

Using the clamp provided secure the outlet pipe to the outlet tube with the pipe positioned such that it will direct the exhaust in the desired direction. Tighten using a 9/16” socket or wrench.

LOCATION / VENTILATION

The welder should be located to provide an unrestricted flow of clean, cool air to the cooling air inlets and to avoid heated air coming out of the welder recirculating back to the cooling air inlet. Also, locate the welder so that engine exhaust fumes are properly vented to an outside area.

STACKING

EAGLE™ 10,000 Plus machines cannot be stacked.
clean, cool air to the cooling air inlets and to avoid heated air coming out of the welder recirculating back to the cooling air inlet. Also, locate the welder so that engine exhaust fumes are properly vented to an outside area.

CONNECTION OF K930-2 TIG MODULE TO THE EAGLE™ 10,000 PLUS.

The TIG Module is an accessory that provides high frequency and shielding gas control for DC GTAW (TIG) welding. See IM528 supplied with the TIG Module for installation instructions.

NOTE: The TIG Module does not require the use of a high frequency bypass capacitor. However, if the EAGLE™ 10,000 Plus is used with any other high frequency equipment, the bypass capacitor must be installed, order kit T12246.

ADDITIONAL INSTRUCTIONS / SAFETY PRECAUTIONS

Always operate the welder with the roof and case sides in place as this provides maximum protection from moving parts and assures proper cooling air flow.

Read and understand all Safety Precautions before operating this machine. Always follow these and any other safety procedures included in this manual.

WELDER OPERATION

WELDER OUTPUT

- Maximum Open Circuit Voltage at 3700 RPM is 80 Volts RMS.
- Duty Cycle is the percentage of time the load is being applied in a 10 minute period. For example, a 60% duty cycle represents 6 minutes of load and 4 minutes of no load in a 10 minute period. Duty Cycle for the EAGLE™ 10,000 Plus is 100%.

EAGLE™ 10,000 Plus	
Constant Current	210 Amps DC @ 25 Volts

AUXILIARY POWER

The EAGLE™ 10,000 Plus can provide up to 9,000 watts of 120/240 volts AC, single phase 60Hz power for continuous use, and up to 10,500 watts of 120/240 volts AC, single phase 60Hz power surge use. The front of the machine includes three receptacles for connecting the AC power plugs; one 50 amp 120/240 volt NEMA 14-50R receptacle and two 20 amp 120 volt NEMA 5-20R receptacles. Output voltage is within +/-10% at all loads up to rated capacity.

All auxiliary power is protected by circuit breakers. The 120V has 20 Amp circuit breakers for each duplex receptacle. The 120/240V Single Phase has a 40 Amp 2-pole Circuit Breaker that disconnects both hot leads simultaneously.

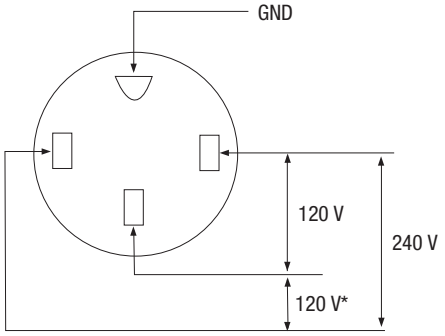
⚠ CAUTION

Do not connect any plugs that connect to the power receptacles in parallel.

Start the engine and set the “IDLER” control switch to the desired operating mode. Set the “CONTROL” to 10. Voltage is now correct at the receptacles for auxiliary power.

120/240 VOLT DUAL VOLTAGE RECEPTACLE

The 120/240 volt receptacle can supply up to 38 amps of 240 volt power to a two wire circuit, up to 38 amps of 120 volts power from each side of a three wire circuit (up to 76 amps total). Do not connect the 120 volt circuits in parallel. Current sensing for the automatic idle feature is only in one leg of the three wire circuit as shown in the following column.



*Current Sensing for Automatic Idle.
(Receptacle viewed from front of Machine)

120 V DUPLEX RECEPTACLES

The 120V auxiliary power receptacles should only be used with three wire grounded type plugs or approved double insulated tools with two wire plugs.

The current rating of any plug used with the system must be at least equal to the current load through the associated receptacle.

MOTOR STARTING

Most 1.5 hp AC single phase motors can be started if there is no load on the motor or other load connected to the machine, since the full load current rating of a 1.5 hp motor is approximately 20 amperes (10 amperes for 240 volt motors). The motor may be run at full load when plugged into only one side of the duplex receptacle. Larger motors through 2 hp can be run provided the receptacle rating as previously stated is not exceeded. This may necessitate 240V operation only.

EAGLE™ 10,000 Plus Extension Cord Length Recommendations
(Use the shortest length extension cord possible sized per the following table.)

Current (Amps)	Voltage Volts	Load (Watts)	Maximum Allowable Cord Length in ft. (m) for Conductor Size											
			14 AWG		12 AWG		10 AWG		8 AWG		6 AWG		4 AWG	
15	120	1800	30	(9)	40	(19)	75	(23)	125	(38)	175	(53)	300	(91)
20	120	2400			30	(9)	50	(15)	88	(27)	138	(42)	225	(69)
15	240	3600	60	(18)	75	(23)	150	(46)	225	(69)	350	(107)	600	(183)
20	240	4800			60	(18)	100	(30)	175	(53)	275	(84)	450	(137)
38	240	9000					50	(15)	90	(27)	150	(46)	225	(69)

Conductor size is based on maximum 2.0% voltage drop.

ELECTRICAL DEVICE USE WITH THE EAGLE™ 10,000 Plus.		
Type	**Common Electrical Devices**	**Possible Concerns**
Resistive	Heaters, toasters, incandescent light bulbs, electric range, hot pan, skillet, coffee maker.	NONE
Capacitive	TV sets, radios, microwaves, Appliances with electrical control.	Voltage spikes or high voltage regulation can cause the capacitative elements to fail. Surge protection, transient protection, and additional loading is recommended for 100% fail-safe operation. **DO NOT RUN THESE DEVICES WITHOUT ADDITIONAL RESISTIVE TYPE LOADS**.
Inductive	Single-phase induction motors, Drills, well pumps, grinders, small Refrigerators, weed and hedge Trimmers	These devices require large Current inrush for starting. Some synchronous motors may be frequency sensitive to attain maximum output torque, but they SHOULD BE SAFE from any frequency induced failures.
Capacitive/Inductive	Computers, high resolution TV sets, Complicated electrical equipment.	An inductive type line conditioner along with transient and surge protection is required, and liabilities still exist. **DO NOT USE THESE DEVICES WITH A EAGLE™ 10,000 Plus**
The Lincoln Electric Company is not responsible for any damage to electrical components improperly connected to the EAGLE™ 10,000 Plus.		

AUXILIARY POWER WHILE WELDING

Simultaneous welding and power loads are permitted by following Table I. The permissible currents shown assume that current is being drawn from either the 120V or 240V supply (not both at the same time). Also, the "Output Control" is set at "10" for maximum auxiliary power.

TABLE I
SIMULTANEOUS WELDING AND POWER

Output Selector Setting	Permissible Power Watts (Unity Power Factor)	Permissible Auxiliary Current in Amperes @ 120V *-or- @ 240V	
Max. Stick Setting	None	0	0
145 Stick Setting	3450	32**	16
90 Stick Setting	6000	50**	25
No Welding	9000	76**	38

* Each duplex receptacle is limited to 20 amps.

**Not to exceed 40A per 120VAC branch circuit when splitting the 240 VAC output.

STANDBY POWER CONNECTIONS

The EAGLE™ 10,000 Plus is suitable for temporary, standby, or emergency power using the engine manufacturer's recommended maintenance schedule.

The EAGLE™ 10,000 Plus can be permanently installed as a standby power unit for 240V-3 wire, single phase 38 ampere service.

⚠ WARNING

(Connections must be made by a licensed electrician who can determine how the 120/240V power can be adapted to the particular installation and comply with all applicable electrical codes.) The following information can be used as a guide by the electrician for most applications (refer also to the connection diagram shown in Figure 1.)

---

1. Install a double pole, double throw switch between the power company meter and the premises disconnect.

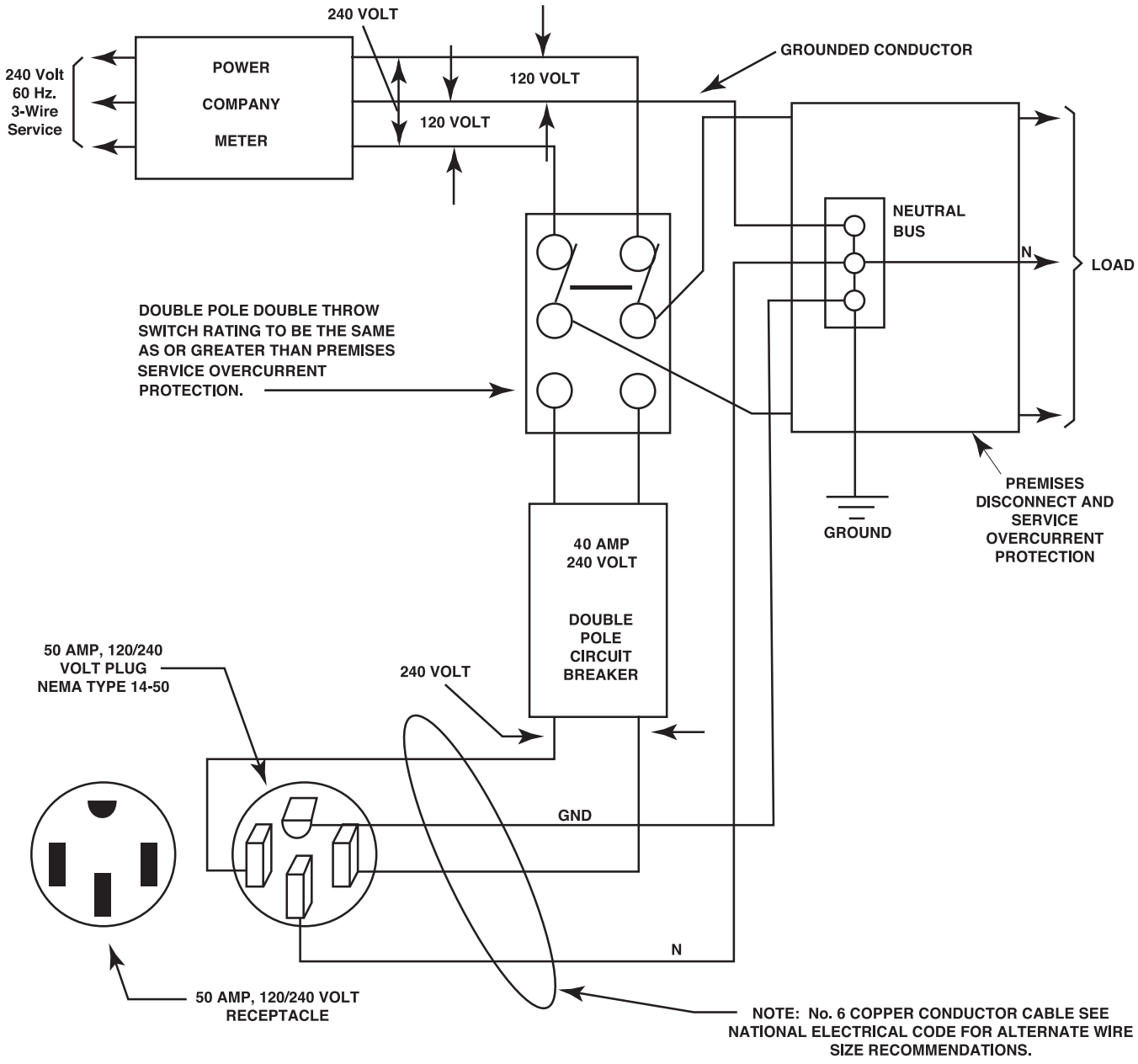
   Switch rating must be the same or greater than the customer's premises disconnect and service overcurrent protection.

2. Take necessary steps to assure load is limited to the capacity of the EAGLE™10,000 Plus by installing a 40 amp 240V double pole circuit breaker Maximum rated load for the 240V auxiliary is 38 amperes. Loading above 38 amperes will reduce output voltage below the allowable -10% of rated voltage which may damage appliances or other motor-driven equipment.

3. Install a 50 amp 120/240V plug (NEMA type 14-50) to the Double Pole Circuit Breaker using No. 8, 4 conductor cable of the desired length. (The 50 amp 120/240V plug is available in the optional plug kit.)

4. Plug this cable into the 50 amp 120/240V receptacle on the EAGLE™ 10,000 Plus case front.

FIGURE A.1
CONNECTION OF EAGLE™ 10,000 PLUS TO PREMISES WIRING



⚠ WARNING

Connection of EAGLE™ 10,000 Plus to premises wiring must be done by a licensed electrician and must comply with the National Electrical Code and all other applicable electrical codes.

OPERATION

SAFETY PRECAUTIONS

Read and understand this entire section before operating your Eagle™ 10,000 Plus.

⚠ WARNING

Do not attempt to use this equipment until you have thoroughly read the engine manufacturer's manual supplied with your welder. It includes important safety precautions, detailed engine starting, operating and maintenance instructions, and parts lists.

ELECTRIC SHOCK can kill.

- **Do not touch electrically live parts or electrode with skin or wet clothing.**
- **Insulate yourself from work and ground**
- **Always wear dry insulating gloves.**

- **Always operate the welder with the hinged door closed and the side panels in place.**
- **Always follow these and any other safety procedures included in this manual and in the Engine Instruction Manual.**

GENERAL DESCRIPTION

The EAGLE™ 10,000 Plus is a twin-cylinder, gasoline driven, multiprocess arc welder and AC power generator It is built in a heavy gauge steel case for durability on the job site.

WELDER CONTROLS - FUNCTION AND OPERATION

ENGINE SWITCH

The engine switch is used to Start the Engine, Select High Idle or Auto Idle while the engine is running, and stop the Engine.

When placed in the "OFF" position, the ignition circuit is de-energized to shut down the engine.

When held in the "START" position, the engine starter motor is energized.

When in "HIGH IDLE" ( ) position, the engine will run continuously at high idle.

When in "AUTO IDLE" (/) position, the engine will run continuously and the idler operates as follows:

1) Welding

When the electrode touches the work, the welding Arc is initiated and the engine accelerates to full Speed.

After welding ceases (and no auxiliary power is being drawn), the engine will return to low idle after approximately 10 to 14 seconds.

2) Auxiliary Power

With the engine running at low idle and auxiliary power for lights or tools are drawn (approximately 100-150 watts or greater) from the receptacles, the engine will accelerate to high speed. If no power is being drawn from the receptacles (and not welding) for 10-14 seconds, the idler reduces the engine speed to low idle.

"RANGE" SWITCH

The "Range" switch is used to select one of four amperage ranges with generous overlap for Stick/TIG welding.

Process	Range Setting	Current Range
STICK/TIG (Constant current) (3 range settings)	90 Max. 145 Max. 225 MAX.	40 to 90 Amps 70 to 145 Amps 120 to 225 Amps

⚠ CAUTION

Never change the "RANGE" Switch setting while welding. This will damage the switch.

"CONTROL" DIAL

Provides a fine welding current adjustment within the Range Switch settings in the STICK mode and welding voltage control with the Range switch set in the wire feed mode.

EAGLE™ 10,000 PLUS APPROXIMATE FUEL CONSUMPTION

GV750™		
CONDITION	GAL/HR	LITERS/HR
High Idle	0.83	3.13
Low Idle	0.47	1.79
210A @ 25V	1.52	5.77
9000 Watts	1.70	6.44

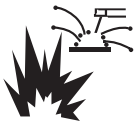
STARTING/SHUTDOWN INSTRUCTIONS

STARTING THE ENGINE

⚠ WARNING

Do not touch electrically live parts of electrode with skin or wet clothing.

Keep flammable material away.



Insulate yourself from work and ground. Wear eye, ear, and body protection.

Keep your head out of the fumes.

Use ventilation or exhaust to remove fumes from breathing zones.

Be sure all Pre-Operation Maintenance has been performed. Also, read the Engine Owner's Manual before starting for the first time.

Remove all loads connected to the AC power receptacles. Use the choke control as follows:

- ALWAYS pull the choke control out when starting the engine; cold, warm or hot.

1) Turn the engine switch to the "start" position and crank the engine until it starts. Release the switch as soon as the engine starts, slowly return the choke control to the full "in" position (choke open), and turn the switch to the Auto Idle ( ) position. Do not turn the switch to the "Start" position while the engineis running because this will cause damage to the ring gear and/or starter motor.
3) After running at high engine speed for 10-14 seconds, the engine will go to low idle.
4) Allow the engine to warm up by letting it run at low idle for a few minutes.

STOPPING THE ENGINE

Remove all welding and auxiliary power loads and allow engine to run at low idle speed for a few minutes to cool the engine.

Stop the engine by placing the Engine switch in the "OFF" position.

A fuel shut off valve is not required on the EAGLE™ 10,000 Plus because the fuel tank is mounted below the engine.

BREAK-IN PERIOD

It is normal for any engine to use a greater amount of oil until the break-in is accomplished. Check the oil level twice a day during the break-in period (approximately 50 running hours).

NOTE: IN ORDER TO ACCOMPLISH THIS BREAK-IN, THE UNIT SHOULD BE SUBJECTED TO MODERATE LOADS, WITHIN THE RATING OF THE MACHINE. AVOID LONG IDLE RUNNING PERIODS. REMOVE LOADS AND ALLOW ENGINE TO COOL BEFORE SHUTDOWN.

The engine manufacturer's recommendation for the running time until the first oil change is as follows:

LINCOLN GV750™
10 HRS

The oil filter is to be changed at the second oil change. Refer to the engine service information in this manual for more information.

WELDING PROCESS

For any electrodes the procedures should be kept within the rating of the machine. For electrode information see the appropriate Lincoln publication.

STICK (CONSTANT CURRENT) WELDING

Connect welding cables to the "TO WORK" and "ELECTRODE" studs. Start the engine. Set the "Polarity" switch to the desired polarity. The "RANGE" switch markings indicate the maximum current for that range as well as the typical electrode size for that range. The "OUTPUT" Control provides fine adjustment of the welding current within the select range. For maximum output within a selected range set the "OUTPUT" Control at 10. For minimum output within a selected range set the "OUTPUT" Control at 5. ("OUTPUT" Control settings below 5 may reduce arc stability) For best overall welding performance set the "RANGE" Switch to the lowest setting and the OUTPUT" Control near the maximum to achieve the desired welding current.

RANGE SETTING	TYPICAL ELECTRODE SIZE	CURRENT RANGE
90 MAX.	3/32	40 TO 90 AMPS
145 MAX.	1/8	70 TO 145 AMPS
225 MAX.	5/32	120 TO 225 AMPS

The EAGLE™ 10,000 Plus can be used with a broad range of DC stick electrodes. See "Welding Tips 1" included with the EAGLE™ 10,000 Plus for electrodes within the rating of this unit and recommended welding currents of each.

SCRATCH START TIG (CONSTANT CURRENT) WELDING

The EAGLE™ 10,000 Plus can be used for Scratch-Start of DC TIG welding applications. To initiate a weld, the course and fine output control knobs must be set for the desired current. The tungsten electrode is then scratch on the work which establishes the arc.

To stop the arc, simply lift the TIG torch away from the work piece. The tungsten may then be scratched on the work piece to restrike the arc.

If a high frequency start is desired, the K930-2 TIG Module can be be used with the EAGLE™ 10,000 Plus. The settings are referenced.

The EAGLE™ 10,000 Plus and any high frequency generating equipment must be properly grounded. See the K930-2 TIG Module operating manuals for complete instructions on installation, operation and maintenance.

When using the TIG Module, the OUTPUT control on the EAGLE™ 10,000 Plus is used to set the maximum range of the CURRENT CONTROL on the TIG Module or an Amptrol if connected to the TIG Module.

ARC GOUGING

The EAGLE™ 10,000 Plus can be used for limited arc gouging.

Set the Range switch to adjust output current to the desired level for the gouging electrode being used according to the ratings in the following table:

ELECTRODE SETTING	CURRENT RANGE (DC, electrode positive)
1/8	30 - 60 Amps
5/32	90 - 150 Amps
3/16	150 - 250 Amps

TYPICAL CURRENT RANGES (1) FOR TUNGSTEN ELECTRODES(2)

Tungsten Electrode Diameter in. (mm)		DDENE (-)	DAZE (+)	Approximate Argon Gas Flow Flow Rate C.F.H. (l /min.)				TIG TORCH Nozzle Size (4), (5)
		1%, 2% Thoriated Tungsten	1%, 2% Thoriated Tungsten	Aluminum		Stainless Steel		
.010	(.25)	2-15	(3)	3-8	(2-4)	3-8	(2-4)	#4, #5, #6
0.020	(.50)	5-20	(3)	5-10	(3-5)	5-10	(3-5)	
0.040	(1.0)	15-80	(3)	5-10	(3-5)	5-10	(3-5)	
1/16	(1.6)	70-150	10-20	5-10	(3-5)	9-13	(4-6)	#5, #6
3/32	(2.4)	150-250	15-30	13-17	(6-8)	11-15	(5-7)	#6, #7, #8
1/8	(3.2)	250-400	25-40	15-23	(7-11)	11-15	(5-7)	
5/32	(4.0)	400-500	40-55	21-25	(10-12)	13-17	(6-8)	#8, #10
3/16	(4.8)	500-750	55-80	23-27	(11-13)	18-22	(8-10)	
1/4	(6.4)	750-1000	80-125	28-32	(13-15)	23-27	(11-13)	

(1) When used with argon gas. The current ranges shown must be reduced when using argon/helium or pure helium shielding gases.
(2) Tungsten electrodes are classified as follows by the American Welding Society (AWS):

Pure	EWP
1% Thoriated	EWTh-1
2% Thoriated	EWTh-2

Though not yet recognized by the AWS, Ceriated Tungsten is now widely accepted as a substitute for 2% Thoriated Tungsten in AC and DC applications.
(3) DAZE is not commonly used in these sizes.
(4) TIG torch nozzle "sizes" are in multiples of 1/16ths of an inch:

# 4 = 1/4 in.	(6 mm)
# 5 = 5/16 in.	(8 mm)
# 6 = 3/8 in.	(10 mm)
# 7 = 7/16 in.	(11 mm)
# 8 = 1/2 in.	(12.5 mm)
#10 = 5/8 in.	(16 mm)

(5) TIG torch nozzles are typically made from alumina ceramic. Special applications may require lava nozzles, which are less prone to breakage, but cannot withstand high temperatures and high duty cycles.

SUMMARY OF WELDING PROCESSES

PROCESS	CONTROL CABLE USED	IDLE MODE	ELECTRODE WHEN NOT WELDING	TO START WELDING
STICK	NO	AUTO	HOT	TOUCH electrode to work. Welding starts immediately and engine goes to high idle.
TIG, TIG MODULE WITH CONTRACTOR KIT CONTROL CABLE, & AMPTROL	YES	HIGH	COLD	Press Amptrol, contractor closes, welding starts immediately.

ACCESSORIES

OPTIONAL ACCESSORIES

SMALL TWO-WHEEL ROAD TRAILER WITH DUO-HITCH

For heavy-duty road, off-road, plant and yard use.

Includes pivoting jack stand, safety chains, and 13" wheels. Overall width 60". Stiff .120" welded rectangular steel tube frame construction is phosphate etched and powder coat painted for superior rust and corrosion resistance.

Low sway suspension gives outstanding stability with manageable tongue weight. Wheels bearings are packed with high viscosity, high pressure, low washout luxuriates™ grease.

Features a Duo-Hitch™ - a 2" Ball/Lunette Eye combination hitch.

Order: K2635-1 Trailer
K2639-1 Fender and Light Kit
K2640-1 Cable Rack

FOUR WHEEL ALL-TERRAIN UNDERCARRIAGE

For moving by hand at construction sites. Heavy duty puncture resistant pneumatic tires.

Order: K1737-4

UNDERCARRIAGE (FACTORY)

For moving by hand on a smooth surface. One or two gas cylinders can be mounted on the rear of the undercarriage with the installation of K1745-1 Cylinder Holder(s). Heavy duty puncture resistant pneumatic tires and front caster.

Order: K1770-2

WELDING GAS CYLINDER LPG TANK HOLDER

Holds Welding Gas Cylinder for use on K1770-1 Undercarriage. One or two may be installed on an undercarriage.

Order: K1745-1

ROLL CAGE

Gives added damage protection. Attaches to K1737-1, K1770-2, and K957-1.

Order: K1788-1

Canvas Cover

To protect the EAGLE™ 10,000 Plus when not in use. Made from attractive red canvas material which is flame retardant, mildew resistant, and water repellent.

Order: K886-2

Power Plug Kit

Provides four 120V plugs rated at 15 amps each and one dual voltage, Full KVA plug rated at 120/240V, 50 amps.

Order: K802R

Power Plug Kit

Provides four 120V plugs rated at 20 amps each and one dual voltage, full KVA plug rated at 120/240V, 50 amps.

Order: K802N

Accessory Kit

Includes 35 ft (lm) 2/0 AWG electrode cable, 30 ft. (lm) 2/0 AWG work cable, headshield with No. 12 filter, GC300 work clamp and cooltong® 300 electrode holder. Cables are rated at 300 amps, 100% duty cycle.

Order: K704

Accessory Kit

For Stick welding. Includes ft.(.m)# electrode cable with lug. ft.(.m)# work cable with lugs, headshield, filter plate, work clamp, electrode holder and sample pack of mild steel electrode. 150 amp capacity.

Order: K875

Spark Arrester Kit

Attaches between muffler and exhaust elbow. Virtually eliminates spark emissions.

Order: K1898-1

GFCI RECEPTACLE KIT

Includes one UL appraised ground fault circuit interrupter duplex type receptacle with cover and installation instructions. Replaces the factory installed 120V duplex receptacle. Each receptacle of the GFCI Duplex is rated at 20 Amps, the maximum total current from the GFCI Duplex is limited to the 20 Amps. Two kits are required.

Order: K1690-1

FULL KVA ADAPTER KIT

Plugs into the 120/240V NEMA 14-50R receptacle on the case front (which accepts 4-prong plugs) and converts it to a NEMA 6-50R receptacle, (which accepts 3-prong plugs.)

Order: K1816-1

Full KVA Power Plug

One dual voltage plug rated at 120/240V, 50 amps.

Order: T12153-9

RECOMMENDED EQUIPMENT

STICK

Accessory Kit

Kit (400 AMP Capacity) which includes an electrode holder & cable, work clamp & cable, and headshield.

Order: K704

Accessory Kit

150 AMP capacity kit.

Order: K875

TIG

Magnum™ TIG Torch

Order: K1783-4

Magnum Parts Kit and Argon Gas

Order: KP509

TIG Module

Provides high frequency and shielding gas control. For AC and DC GTAW (TIG) welding applications Its compact case is designed for easy carrying, complete with a handle. High frequency bypass is built in. Requires K938-1 Contactor Kit, K936-4 Control Cable, and K814 Arc Start Switch.

Order: K930-2

Contactor Kit

For use with TIG Module, Provides a “cold” electrode until the triggering device (Arc Start Switch) is pressed.

Order: K938-1

Control Cable

Connects TIG Module to EAGLE™ 10,000 Plus.

Order: K936-4

Optional TIG Equipment:

Docking Kit

For Mounting the K930-2 TIG Module on top of the EAGLE™ 10,000 Plus.

Order: K939-1

Control Cable Extension

Allows TIG Module to be operated at distances up to 200ft. from the power source. Available in 45ft. (lm).

Order: K937-45

Arc Start Switch

Order: K886-2

MAINTENANCE

SAFETY PRECAUTIONS

⚠ WARNING

- **Have qualified personnel do all maintenance and troubleshooting work.**
- **Turn the engine off before working inside the machine or servicing the engine.**
- **Remove guards only when necessary to perform maintenance and replace them when the maintenance requiring their removal is complete. If guards are missing from the machine, obtain replacements from a Lincoln Distributor. (See Operating Manual Parts List.)**

ELECTRIC SHOCK can kill.

- **Do not touch electrically live parts or electrode with skin or wet clothing.**
- **Insulate yourself from work and ground**
- **Always wear dry insulating gloves.**

ENGINE EXHAUST can kill.

- **Use in open, well ventilated areas or vent exhaust outside.**

MOVING PARTS can injure.

- **Do not operate with doors open or guards off.**
- **Stop engine before servicing.**
- **Keep away from moving parts.**

Read the Safety Precautions in the front of this manual and in the Engine Owner's Manual before working on this machine.

Keep all equipment safety guards, covers, and devices in position and in good repair. Keep hands, hair, clothing, and tools away from the gears, fans, and all other moving parts when starting, operating, or repairing the equipment.

Do not put your hands near the engine cooling blower fan. If a problem cannot be corrected by following the instructions, take the machine to the nearest Lincoln Field Service Shop.

Routine Maintenance

At the end of each day's use, refill the fuel tank to minimize moisture condensation in the tank. Running out of fuel tends to draw dirt into the fuel system. Also, check the crankcase oil level and add oil if indicated.

⚠ CAUTION

- **Make certain that the oil filler cap is securely tightened after checking or adding oil. If the cap is not tight, oil consumption can increase significantly which may be evidenced by white smoke coming from the exhaust.**

TABLE D.1 OIL MAINTENANCE SCHEDULE FOR CHANGING THE OIL AND OIL FILTER AFTER BREAK-IN

	Lincoln GV750™
OIL	100 Hrs.
OIL FILTER	100 Hrs.

The above schedule is for normal operating conditions. More frequent oil changes are required with dusty, high temperature and other severe operating conditions. Refer to the maintenance section of the Engine Owner's Manual for more information.

NOTE: Engine life will be reduced if the oil and oil filter are not changed according to the manufacturer's recommendation.

ENGINE OIL CHANGE

Drain the oil while the engine is warm to assure rapid and complete draining.

- Refill to the upper limit mark on the dipstick with the recommended oil. Tighten the oil filler cap securely.

ENGINE OIL REFILL CAPACITIES

With oil filter replacement:

- 1.6 Qts. (1.5 L) - GV750™

Use 4-stroke motor oil that meets or exceeds the requirements for APIO service classification SJ or better.

SAE 10W-30 is recommended for general, all-temperature use, -5 F to 104 F (-20 C to 40 C).

See Engine Owner's Manual for more specific information on oil viscosity recommendations.

Please dispose of used motor oil in a manner that is compatible with the environment. We suggest you take it in a sealed container to your local service station or recycling center for reclamation.

Do not throw it in the trash, pour it on the ground or down a drain.

OIL FILTER CHANGE

1) Drain the engine oil.
2) Remove the oil filter, and drain the oil into a suitable container. Discard the used oil filter.
3) Clean the filter mounting base, and coat the gasket of the new oil filter with clean engine oil.
4) Screw on the new oil filter by hand, until the gasket contacts the filter mounting base, then use an oil filter socket tool to tighten the filter an additional 1/2 to 7/8 turn.
5) Refill the crankcase with the specified amount of the recommended oil. Reinstall the oil filler cap.
6) Start the engine and check for oil filter leaks.
7) Stop the engine, and check the oil level. If necessary, add oil to the upper limit mark on the dipstick.

AIR CLEANER AND OTHER MAINTENANCE

- Air Cleaner - With normal operating conditions, the maintenance schedule consists of replacing the air cleaner filter every 100 hours. More frequent servicing is required with dusty operating conditions.
- Refer to the maintenance section of this manual for the maintenance schedule, spark plug servicing, and fuel filter replacement.
- Blow out the machine with low pressure air periodically. In particularly dirty locations, this may be required once a week.
- Output Range Selector and Polarity Switches - Switch contacts should not be greased. To keep contacts clean, rotate the switch through its entire range frequently. Good practice is to turn the handle from maximum to minimum setting twice each morning before starting to weld.

ENGINE ADJUSTMENTS

⚠ WARNING

OVERSPEED IS HAZARDOUS

The maximum allowable high idle speed for this machine is 3750 RPM, no load. Do NOT tamper with governor components or setting or make any other adjustments to increase the maximum speed. Severe personal injury and damage to the machine can result if operated at speeds above maximum

Adjustments to the engine are to be made only by a Lincoln Service Center or an authorized Field Service Shop.

SLIP RINGS

A slight amount of darkening and wear of the slip rings and brushes is normal. Brushes should be inspected when a general overhaul is necessary.If brushes are to be replaced, clean slip rings with a fine emery paper.

⚠ CAUTION

Do not attempt to polish slip rings while engine is running.

BATTERY MAINTENANCE

⚠ WARNING

GASES FROM BATTERY can explode.

Keep sparks, flame and cigarettes away from battery.

To prevent EXPLOSION when:

- **INSTALLING A NEW BATTERY — disconnect negative cable from old battery first and connect to new battery last.**
- **CONNECTING A BATTERY CHARGER — remove battery from welder by disconnecting negative cable first, then positive cable and battery clamp. When reinstalling, connect Negative cable last. Keep well ventilated.**
- **USING A BOOSTER — connect positive lead to battery first then connect negative lead to negative battery lead at engine foot.**

BATTERY ACID can burn eyes and skin.

Wear gloves and eye protection and be careful when working near battery.

- **Follow instructions printed on battery.**

When replacing, jumping, or otherwise connecting the battery to the battery cables, the proper polarity must be observed. Failure to observe the proper polarity could result in damage to the charging circuit. The positive (+) battery cable has a red terminal cover.

If the battery requires charging from an external charger, disconnect the negative battery cable first and then the positive battery cable before attaching the charger leads. Failure to do so can result in damage to the internal charger components. When reconnecting the cables, connect the positive cable first and the negative cable last.

HARDWARE

Both English and Metric fasteners are used in this welder.

Engine Maintenance Parts

Purchase K5380-1. Kit includes:

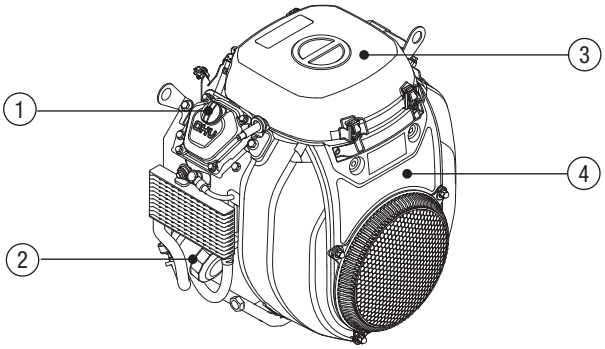
- Oil Filter
- 2 quarts 10W30 oil
- Air Fliter
- Fuel Filter
- Spark plugs (2)

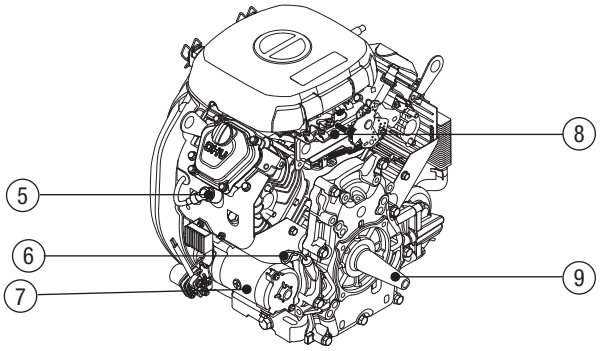
GV750™ GASOLINE ENGINE

⚠ WARNING

Read this section of the manual carefully before operation. This section includes important guidance to ensure safe operation of the engine.

FEATURES AND CONTROLS





1. **Oil Fill**
2. **Oil Filter**
3. **Air Filter**
4. **Air Guide Cover**
5. **Spark Plug**
6. **Dipstick**
7. **Starting Motor**
8. **Throttle Control Assembly**
9. **Crankshaft**

OPERATING CHECKLIST

A. Operating location

The engine must only be operated OUTDOORS and placed in a well ventilated area. Wind / air current conditions must be taken into consideration.

Place the engine on a level surface before any operation.

⚠ DANGER

Engine exhaust fumes contain carbon monoxide, an odorless, colorless, poison gas. Operating engines indoors CAN KILL YOU!

NEVER operate the engine indoors or in any type of enclosure. Opening doors and/or windows does NOT lessen the risks of poisoning or death.

NOTE: For **HIGH ALTITUDE** operation, the engine may require a high altitude carburetor kit. The kit ensures proper operation at high altitudes. Consult your local Lincoln dealer for high altitude kit information if you plan to operate your engine at altitudes above 5,000 feet (1,500 meters).

⚠ CAUTION

Engine horsepower will still decrease approximately 3.5% per 1,000 feet (300 meters) of increased altitude even with the presence of a modified carburetor. However, without a modified carburetor the effects of altitude on horsepower would be greater.

Operating the engine at altitudes below 5,000 feet (1,500 meters) with a modified carburetor may result in engine overheating, which could lead to serious engine damage.

B. Operating condition

Check for loose or damaged parts, signs of oil or fuel leaks, and any other condition that may affect proper operation. Repair or replace all damaged or defective parts immediately.

⚠ WARNING

Failure to repair or replace damaged or defective parts before operation of the engine could result in property damage, serious injury or DEATH.

Remove all excess dirt or debris, especially around the muffler.

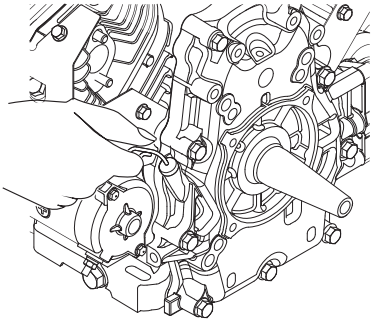
Do not exceed the maximum angle of operation when operating the engine (see specification table in this manual), as engine damage could result from the insufficient lubrication that could occur when engine is not on a level surface.

C. Checking the engine oil

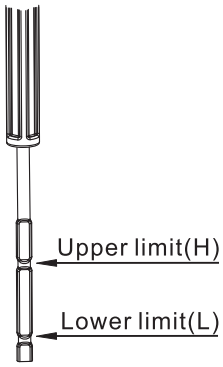
(1) Place the engine on a level surface with the engine stopped.

(2) Remove the dipstick and wipe clean.

(3) Insert the dipstick in the dipstick slot.



(4) Remove the dipstick and check oil level. Oil level should be within the Upper Limit (H) range (see illustration below).



Oil level gauge

(5) If oil level is low, fill oil to the Upper Limit (H) of the dipstick (using the recommended engine oil).

(6) Re-insert the dipstick into the dipstick slot. Refer to the Maintenance chapter of this Owner's Manual for further information.

NOTE: The engine's **RATED OIL CAPACITY** is 1.6 Qrt. / 1.5 L

⚠ WARNING

Oil is a major factor in engine performance and service life. Use only a 4-stroke automotive detergent oil recommended in the Maintenance section of this Owner's Manual.

⚠ CAUTION

The engine must only be operated on level surfaces.

This engine is equipped with a low oil sensor (when applicable) that will shutdown the engine when oil levels fall below the safe operating limit. To avoid unexpected shutdowns, check oil levels regularly and fill to the Upper Limit range when oil is below the high range.

D. Checking the engine fuel

Check the fuel level guage with the engine stopped. Refill the fuel tank if necessary.

⚠ CAUTION

Pressure can build up in the fuel tank. Allow engine to cool for at least two minutes before removing fuel cap. Loosen fuel cap slowly to relieve any pressure in the tank.

Use clean, fresh, regular unleaded gasoline.

DO NOT mix oil with gasoline.

DO NOT fill above the upper limit mark. Always allow room for fuel expansion.

⚠ DANGER

DO NOT fill the fuel tank above the upper limit. Over filling will result in engine damage and void the warranty.

NEVER use engine or carburetor cleaning products in the fuel tank. Permanent damage may occur.

It is important to prevent gum deposits from forming in essential fuel system parts, such as the carburetor, fuel filter, fuel hose or tank during storage. Also, alcohol-blended fuels (called gasohol, ethanol or methanol) can attract moisture, which leads to separation and formation of acids during storage.

Acidic fuel can damage the fuel system of an engine while in storage. Review the instructions in the "Storage" chapter for more information.

⚠ DANGER

FIRE OR EXPLOSION

Gasoline is highly flammable and extremely explosive.

Fire or explosion can cause severe burns or death.

Keep flammable items away while handling gasoline.

Fill fuel tank outdoors and in a well ventilated area with the engine stopped.

Always wipe off spilled fuel and wait until the fuel has dried before starting the engine.

DO NOT operate the engine with known leaks in the fuel system.

Use proper fuel storage and handling procedures. DO NOT store fuel or other flammable materials nearby.

Empty the fuel tank before storing or transporting this engine.

Keep fire extinguisher handy in the event of engine fuel fire.

NOTE: Approved **GASOLINE/ALCOHOL BLENDS** must not differ from 10% alcohol, 90% unleaded gasoline blend. Other gasoline/alcohol blends are not approved. Effects of old, stale or contaminated fuel are not covered by warranty.

⚠ CAUTION

To minimize gum deposits in the fuel system and ensure easy starting, DO NOT use gasoline left over from the previous season.

E. Equipment check

Check the equipment powered by this engine. Review the instructions provided by the equipment manufacturer for any precautions and procedures that should be followed before starting the engine.

⚠ WARNING

This engine is designed and manufactured for specific applications. Do not attempt to modify the equipment or use it for any application for which it was not designed. If you have questions about a specific application, ask your local dealer.

ELECTRIC STARTING

Turn the key to the START position until the engine starts. After the engine starts, release the key and return it to the ON position.

If the starter cannot drive the engine to rotate, turn off the starter immediately. Do not attempt to start the engine again before finding the causes of the fault.

⚠ WARNING

Do not continuously start the engine for more than 15 seconds at a time. If the engine fails to start, cool the starting motor for 1 minute before re-start. Otherwise, it may cause damage to the starting motor.

⚠ CAUTION

If engine cannot be started or shutdown after three attempts, check that the engine is placed on a flat surface and is filled with enough oil.

If the oil in the crankcase is below the minimum level, the engine will not start.

Conduct the oil routine inspection during run-in. For the recommended maintenance intervals, refer to the Maintenance section of this Owner's Manual.

If the engine speed is raised to the speed over the starter but does not keep running (fails to start), then the engine must completely stop before attempting to start again. If the flywheel starts to rotate automatically, the starter is still engaged. There may be interference or improper gear meshing between the flywheel external gear and the starter pinions, and this may cause damage to the starter.

SETTING THE ENGINE SPEED

The engine speed has been set at the factory. DO NOT attempt to adjust the engine speed with unauthorized means. This may cause damage to the engine or personal injury.

If you have any questions regarding the operation of the engine or other requirements, please return to the authorized dealer for guidance. Do not attempt engine calibration or repair without the proper tools and machine maintenance capabilities.

STOPPING THE ENGINE

To stop the engine running at high load, first release the load, allow the machine to go to idle speed, then turn off the engine.

If the gasoline engine has abnormal noise, severe vibrations, or serious hunting, immediately stop the engine.

MAINTENANCE

It is the owner's/operator's responsibility to complete all scheduled maintenance in a timely manner. Correct any issue before operating the engine. Always follow the inspection and maintenance recommendations and schedules in this manual.

⚠ DANGER

Accidental starts can cause severe injury or death. Remove and ground spark plug wire before performing any service.

Before servicing the engine, STOP THE ENGINE, disconnect all electric devices and battery, and allow the engine to cool down.

⚠ WARNING

Improper maintenance or failure to correct a problem before operation can cause a malfunction and result in property damage, serious injury or DEATH.

Improper maintenance will void the warranty.

A. Maintenance schedule

Follow the service intervals indicated in the chart below. Service your engine more frequently when operating in. adverse conditions.

Contact your local service dealer for your engine or engine maintenance needs.

		Each time before use	The first month or 10 hours[Note1]	Every three months or 50 hours[Note1]	Every 6 months or 100 hours[Note1]	Every year or 300 hours[Note1]
Engine oil	Inspection	√				
	Replacement		√		√	
Air filter	Inspection	√				
	Cleaning			√ Note2		
Spark plug	Inspection and adjustment				√	
	Replacement					√
Idle speed	Inspection and adjustment					√ Note3
Valve clearance	Inspection and adjustment					√ Note3

Note 1: Before each season and after then (whichever comes first).

Note 2: Service more frequently under severe, dusty, dirty conditions.

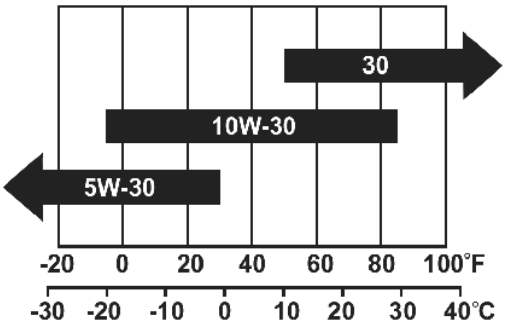
Note 3: To be performed by knowledgeable, experienced owners or the authorized dealer.

A. General maintenance

ENGINE OIL: SAE 10W-30 is recommended for general, all-temperature use. Other viscosities shown in the chart may be used when the average temperature in your area is within the indicated range.

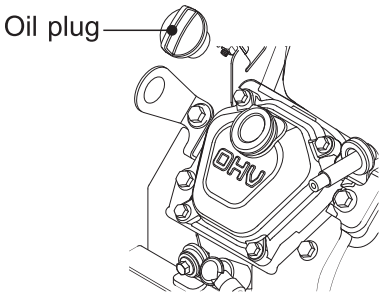
OIL CAPACITY (RATED); see engine specifications in this Owner's Manual.

TABLE D.2 - AMBIENT TEMPERATURE

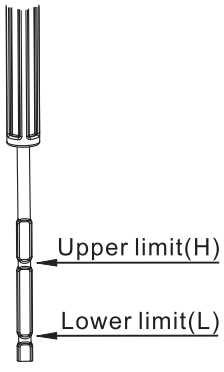


B. Adding oil

1) Place the engine on a level surface.
2) Remove the oil plug, and fill with the recommended oil type.



3) Remove the dipstick and check the oil filling volume, which should be at the upper limit of the scale (H point).



Oil level gauge

4) Completely insert the dipstick into the dipstick slot during inspection.
5) Dispose of used oil at an approved waste management facility.

B. Changing the oil

⚠ CAUTION

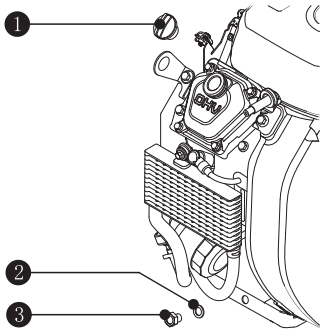
Change oil when the engine is warm from operation.

To change the engine oil, it is recommended to run the engine for five minutes (without load) and then stop the engine.This will ensure quick and complete drainage of the used oil.

1) Place the appropriate waste oil container beneath the oil outlet. Open the valve on the oil drain hose. Allow appropriate time to drain waste oil completely from oil tank.
2) When the oil is completely drained, close the valve.
3) Place the engine on level surface. Fill the recommended grade oil to the upper limit of the dipstick.
4) Re-tighten the oil plug.

If there is oil spillage, wipe off the spilled oil. Clean your hands with soap or detergent and rinse with water.

Please dispose the waste oil in a manner that is environmentally friendly. It is recommended to put the waste oil in a sealed container and deliver to the local recycling center for treatment. Do not directly dispose oil in a trash bin or pour it into the water supply.



❶ Oil plug
❷ Drain bolt gasket
❸ Drain bolt

C. Replacing the oil filter

Complete steps listed in "Changing the oil" section listed in this Owner's Manual above.

1) Remove the oil filter, then pour the oil into a suitable container. Put the used oil and filter in an appropriate place. In order to prevent deformation or damage to the oil filter, do not remove with a conventional wrench; please use a special oil filter wrench.
2) After cleaning the mounting base of the filter, clean the seal ring of the new filter with new oil.
3) Tighten the new oil filter by hand directly until the seal ring comes into contact with the mounting base, then tighten the filter (tightening torque for oil filter is 115 - 130 in-lb, 13 - 15 Nm).

4) Add oil to the engine and confirm the dipstick is in place.

5) Start the engine and check for oil leaks.

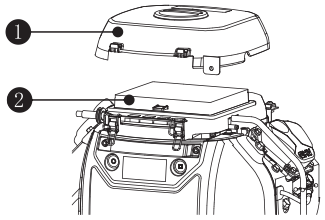
6) Stop the engine, then remove the dipstick and confirm the oil level is within the specified range. If the oil level is below the specified range, fill the oil to the appropriate level.

D. Air filter replacement

1) Clean area around the air filter.

2) Unhook retaining clips and remove cover.

3) Remove the paper filter element from the cover.



❶ Air cleaner cover
❷ Paper element

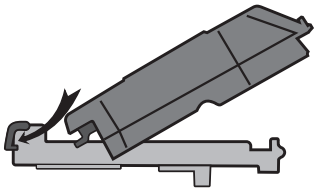
4) Check condition of rubber seal and replace if necessary.

5) Cleaning the paper element: gently tap the filter element several times. Do not clean the paper filter element with brushes or other hard cleaning tools.

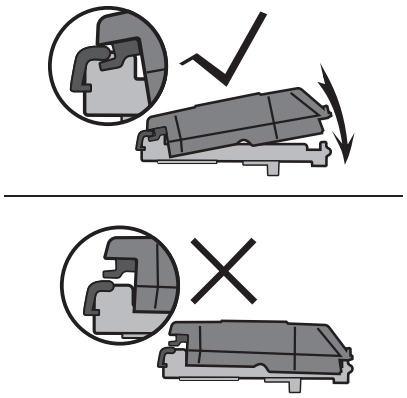
6) Install the paper filter element into the cover.

7) Reinstall air cleaner cover:

a) Lean the cover against the base. Push the cover forward to position the knobs into the slots.



b) Press the cover and secure the retaining clips.



⚠ CAUTION

The air filter is a critical emission component, and should not be altered or modified in any way.

Operating engine with loose or damaged air cleaner components could cause engine wear and failure, and void your warranty.

Paper element cannot be blown out with compressed air.

⚠ WARNING

Do not run engine when the air filter is not installed, as this may damage the engine.

⚠ DANGER

Do not use gasoline or cleaning agent with low ignition point to clean the air filter element, as this may result in fire or explosion.

E. Spark plug replacement

1) **Recommended spark plug**: F6RTC.

2) Non-recommended spark plugs may cause damage to the engine.

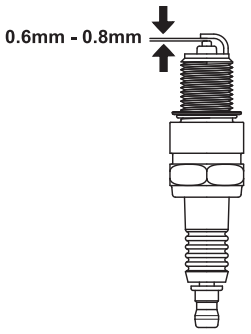
3) Remove the dirt from the spark plug cap and bottom.

4) Remove the spark plug cap.

5) Use a socket wrench to loose and remove the spark plug.

6) Inspect the spark plug and spark plug washer. If it is damaged or worn, replace with new one. Clean the spark plug with wire brush if reused.

7) Check spark plug gap. Carefully bend side electrode to adjust the gap if necessary. **SPARK PLUG GAP REQUIREMENTS**: 0.6mm - 0.8mm.



Check spark plug gap

8) Carefully thread the plug into the engine by hand.

9) After the spark plug is seated, use a wrench to tighten. **SPARK PLUG TIGHTENING TORQUE LEVEL**: 177 - 220 in-lb, 20-25 Nm.

10) Attach the spark plug wire to the plug.

⚠ WARNING

Only use recommended spark plug or equivalent. DO NOT use spark plugs that have improper heat range.

The spark plug must be tightened. If it is loosened, the combustion chamber will not be sealed tightly when the engine runs, the leaks will reduce the power of the engine, and may not allow the engine to start.

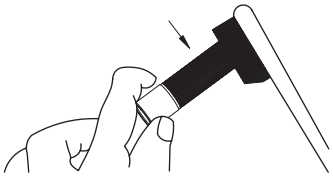
To ensure normal operation of the engine, the spark plug gap must be clean without deposits. Clean and adjust the spark plug according to the steps shown.

(i) Remove the spark plug.

(ii) Remove carbon deposits.

F. Spark arrester

1) Allow the engine to cool completely before servicing the spark arrester.
2) Remove the two screws holding the cover plate that holds the end of the spark arrester to the muffler.
3) Remove the spark arrester screen.
4) Carefully remove the carbon deposits from the spark arrester screen with a wire brush.



Clean carbon deposits

5) Replace the spark arrester if it is damaged.
6) Reinstall the spark arrester in the muffler and attach with the two screws.

G. Adjusting the valve clearance

Each engine is inspected in the factory. After many hours of use, you may need to adjust the engine with the adjustment method as follows:

1) Hold the valve clearance adjusting nut, and release the valve locking nut.

⚠ WARNING

Unauthorized modification may cause damage to the engine and void the warranty.

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2) Rotate the valve clearance, adjusting nut to a predetermined clearance.
3) Hold the valve clearance adjusting nut, and tighten the valve locking nut according to the predetermined torque.
4) Tighten the valve locking nut, then check the valve clearance again until the valve clearance is in line with the standard.

IDLE SPEED

The idle speed has been pre-set at the factory, and should rarely require readjustment. Consult your local authorized dealer for idle speed adjustment needs.

⚠ WARNING

Unapproved adjustment will damage your engine and/or your electrical devices, and void your warranty.

ADJUSTMENT

There has no other service and/or adjustment need for your engine.

Unapproved adjustments or tampering can damage your engine and your electrical devices, and will void your warranty. Contact your local dealer for such needs.

⚠ WARNING

Tampering with the factory set governor will damage your engine and void your warranty.

ENGINE TROUBLESHOOTING CHART

Symptom	Problems	Solutions
Engine Cannot be started	Engine switch is off.	Turn engine switch to the **ON** position.
	There is no fuel	Fill tank per instructions in this manual.
	Inadequate engine oil.	Check oil level. This engine is equipped with a low oil sensor. The engine cannot be started unless the oil level is above the prescribed lower limit.
	There is no ignition	Remove the spark plug cap. Clean any dirt around the plug base, then remove the spark plug. Install the spark plug in the plug cap. Turn the engine switch on. Ground the electrode to any engine ground, and verify a spark jumps across the gap. Reinstall the plug and start engine according to instructions in this manual. Consult Customer Service.

STORAGE AND TRANSPORTATION

A. Storage

DO NOT mix oil with gasoline. The engine should be started at least once every 2 weeks and allowed to run for at least 20 minutes. Follow the instructions below for longer term storage if the engine were out of service for 2 months or more.

⚠ DANGER

FIRE OR EXPLOSION

Gasoline is highly flammable and extremely explosive. Empty the fuel tank and shut off fuel valve before storing or transporting this engine.

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1) Change oil while engine is still warm from operation.
2) Allow the engine to cool completely.
3) Drain all fuel completely from the fuel tank, fuel hose and carburetor.
4) Remove spark plug and pour approximately 1 oz. of engine oil into cylinder. Reinstall spark plug. Crank engine slowly to distribute oil and lubricate cylinder.
5) Clean the engine according to the instructions in the Maintenance section.
6) Store the unit in a clean, dry area out of direct sunlight.

B. Transportation

To prevent fuel spillage when transporting or during temporary storage, the engine should be secured upright in its normal operating position, with the engine switch OFF.

⚠ WARNING

WHEN TRANSPORTING:

Do not over fill the tank. Avoid a place exposed to direct sunlight when putting the engine on a vehicle. If the engine is left in an enclosed vehicle for many hours, high temperature inside the vehicle could cause fuel to vaporize resulting in a possible explosion.

Do not drive on a rough road for an extended period with the engine on board. If you must transport the engine on a rough road, drain the fuel from the engine beforehand.

⚠ CAUTION

Take care not to drop or strike the engine when transporting. Do not place heavy objects on the engine.

Engine Specifications Table

Category	Item		GV750™
Main Engine Structure	Valve arrangement		Overhead valve
	Number of cylinders		2
	Cylinder diameter		3.228” / 82 mm
	Piston		2.795” / 71 mm
	Total displacement		48.8in^3 / 750 cc
	Compression ratio		8.8:1
	Rated hp/ power(kW)		22/16/3600
	Direction of rotation		Anticlockwise (From the PTO end direction)
	Ignition advance angle		25°±2°
	Valve clearance	Intake valve clearance	.004 - .006” / 0.10-0.15 mm
		Exhaust valve clearance	.006 - .008” / 0.15-0.20 mm
	Spark plug 82 gap		.024 - .031” / 0.6-0.8 mm
Oil	Oil		SAE 10W-30
	Oil capacity(L)		1.5

Notes: The gasoline engine with different specification and configurations may have different parameters and may change at any time without notice.

TABLE OF CONTENTS

FUNCTIONAL DESCRIPTION

The EAGLE™ 10,000 Plus is a twin-cylinder, gasoline driven, multi-process arc welder and AC power generator. It is built in a heavy gauge steel case for durability and reliability. It is capable of producing 225DC amps at 25VDC for welding. It also can produce 9000 Watts of continuous AC auxiliary power.

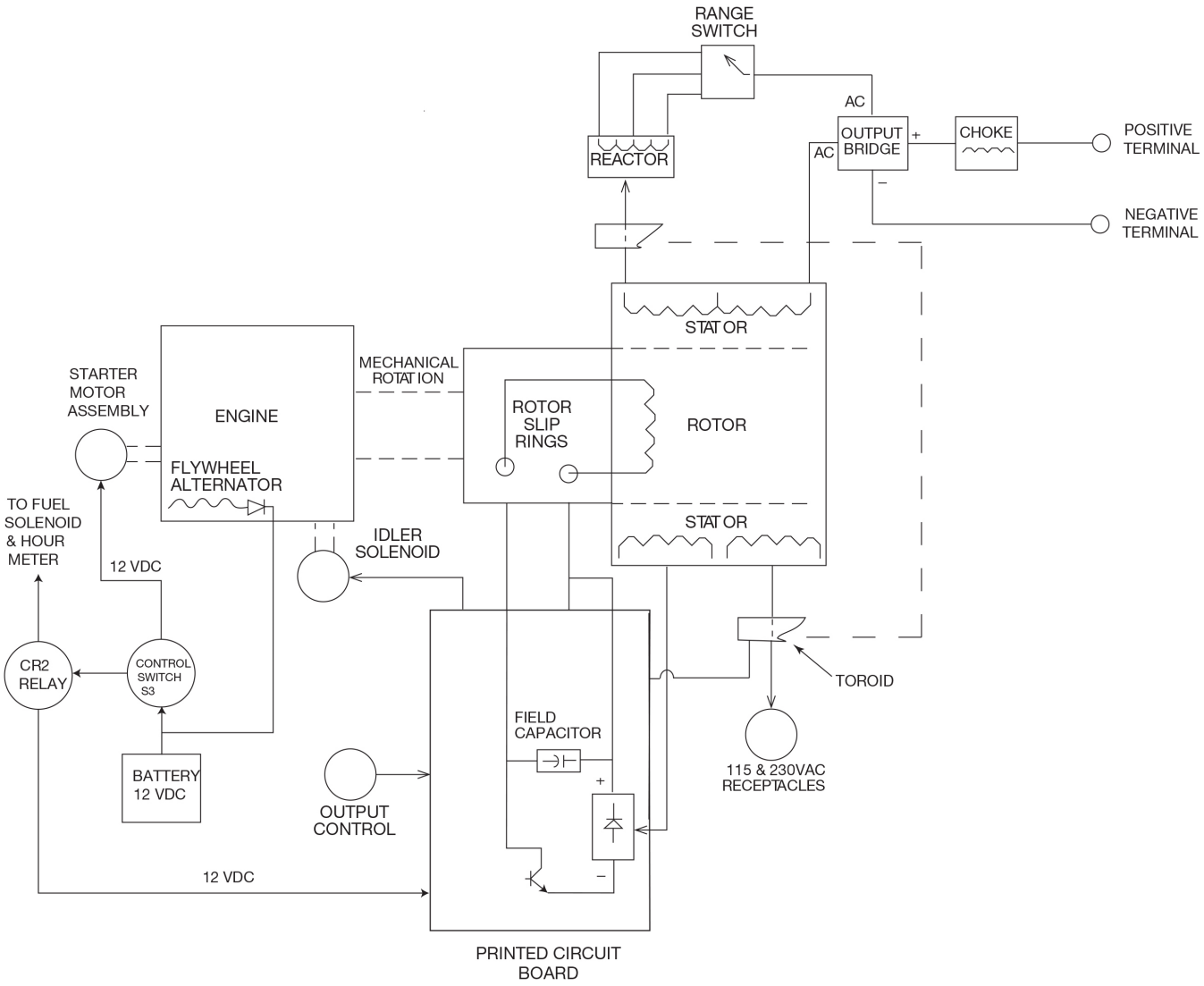


FIGURE E.1

POWER UP

BATTERY, S3 ENGINE CONTROL SWITCH, CR2 RELAY, STARTER MOTOR ASSEMBLY, FIELD AND IDLE CONTROL PC BOARD

When the Engine Control Switch is in the Auto, High, or Start position the 12VDC battery voltage is applied to the CR2 relay coil and also to its N.O. contacts. When the Engine Control Switch is rotated and held in the Start position the CR1 Engine Starter Assembly receives the 12VD battery voltage and the starter motor is energized. When the N.O. Oil Pressure switch closes the CR2 relay is energized and the N.O. contacts close the 12VDC battery voltage is applied to the Fuel Shut-Off Solenoid, the Hour Meter, and to the Field and Idle PC Control Board.

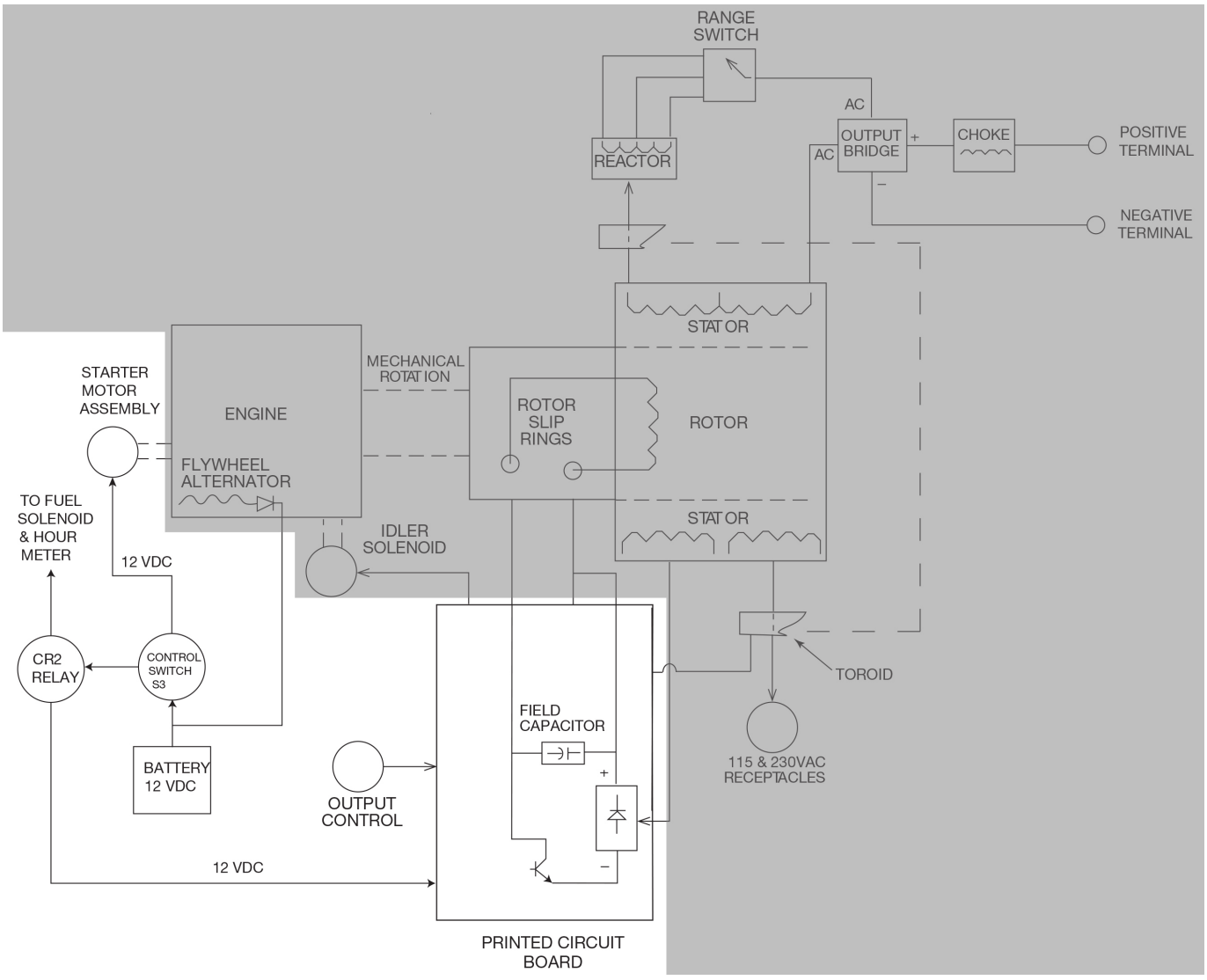


FIGURE E.2

ENGINE COMPONENTS

FLYWHEEL ALTERNATOR, AND IDLER SOLENOID

The flywheel alternator, located on the engine, supplies “charging” current for the battery circuit. The idler solenoid is mechanically connected to the engine throttle linkage and controlled by the Field and Idle Control. If no current is drawn from the EAGLE 10,000, the printed circuit board activates the idler solenoid, which then brings the engine to a low idle state. When either weld or auxiliary output current is sensed by the toroid the printed circuit board deactivates the idler solenoid, the engine then goes to high RPM (3700). After 12 to 15 seconds of no load, the solenoid is reactivated to reduce the engine speed to 2400 RPM.

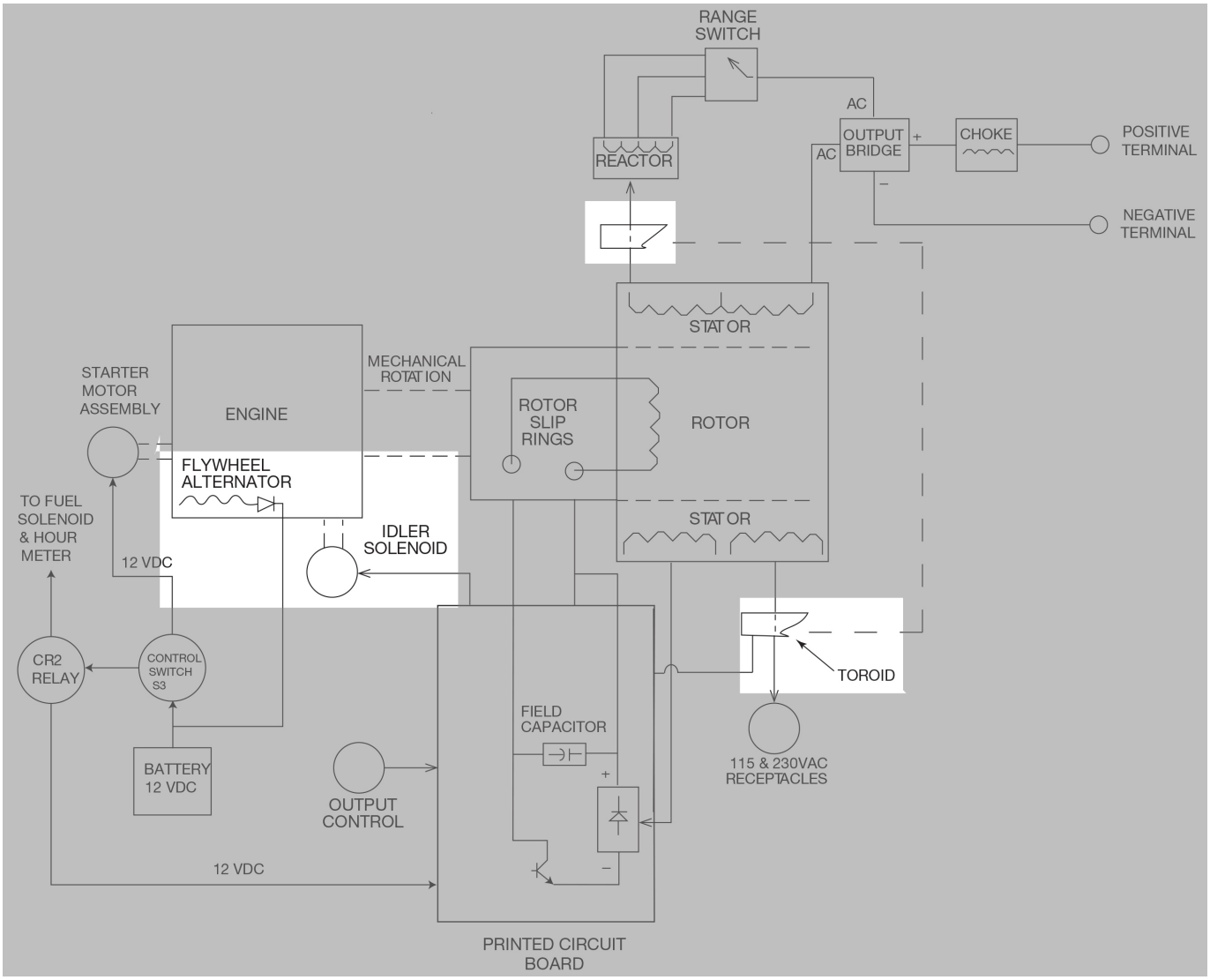


FIGURE E.3

WELDER COMPONENTS

ROTOR AND STATOR

When the engine is started and running, the battery circuit voltage is fed, through the printed circuit board, to the rotating field coil in the rotor via a brush and slip ring configuration. This excitation ("flashing") voltage magnetizes the rotor lamination. The rotor is mechanically coupled to the engine. This rotating magnet induces a voltage in the stationary windings of the main alternator (stator). Three separate and isolated windings are incorporated in the stator lamination assembly. Each winding set has a different number of turns producing different magnitudes of AC output voltages. The three windings are the weld winding, the auxiliary power windings and the field feedback exciter winding. The exciter winding provides rotor current during machine operation.

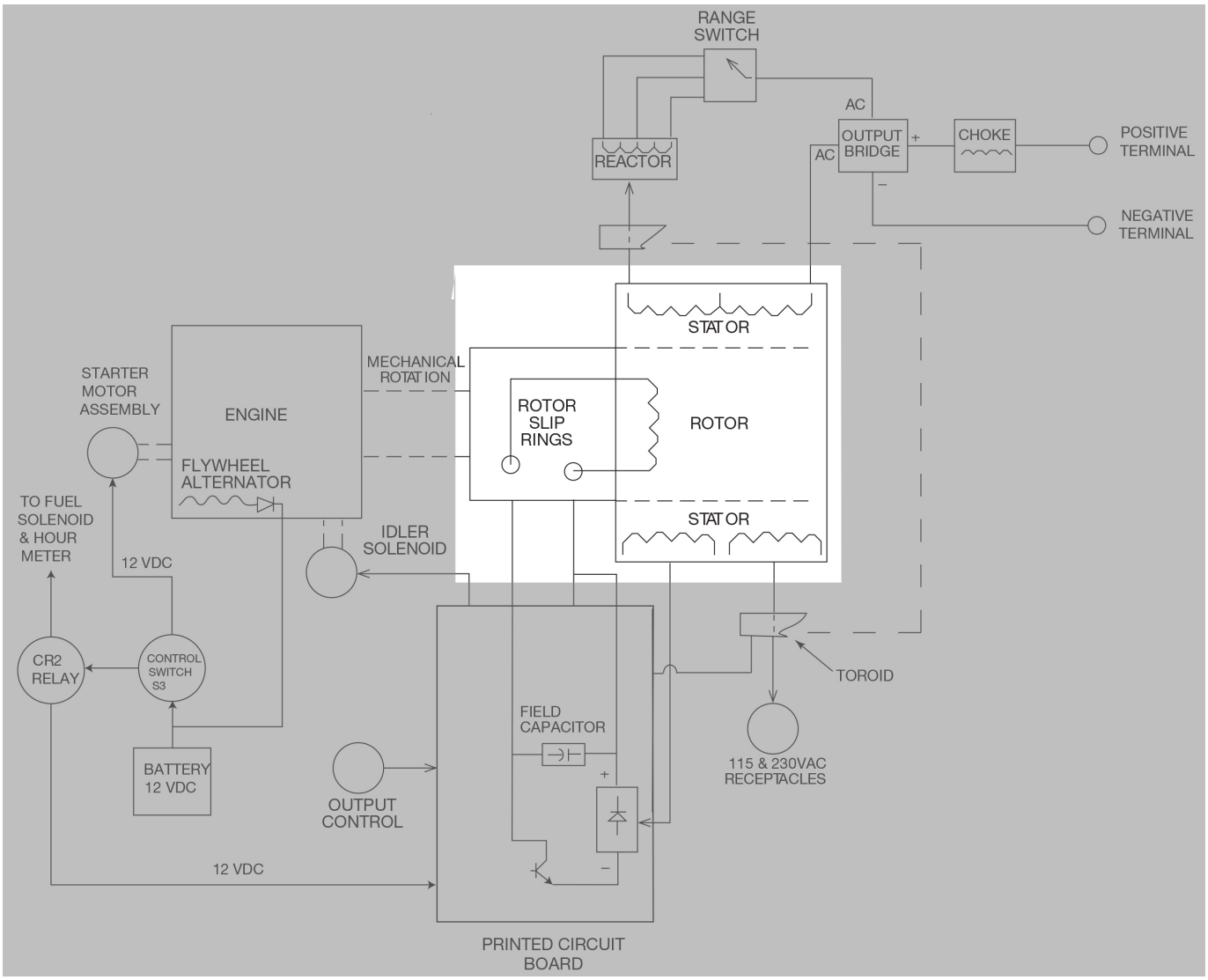


FIGURE E.4

OUTPUTS AND CONTROLS

ROTOR FIELD FEEDBACK AND FIELD AND IDLER CONTROL BOARD

The voltage output of the EAGLE 10,000 is dependent on two criteria: the engine RPM and the amount of current in the rotor winding. The AC voltage developed in the field winding is fed to the full wave field bridge that is part of the Field and Idler Control Board. The DC output of the bridge is filtered by the field capacitor and controlled by the printed circuit board according to the output control (R1) setting.

This filtered and controlled voltage is fed to the rotor winding via the brush and slip ring configuration.
As the feedback voltage is increased or decreased, the voltage outputs of the weld and auxiliary windings are increased or decreased.

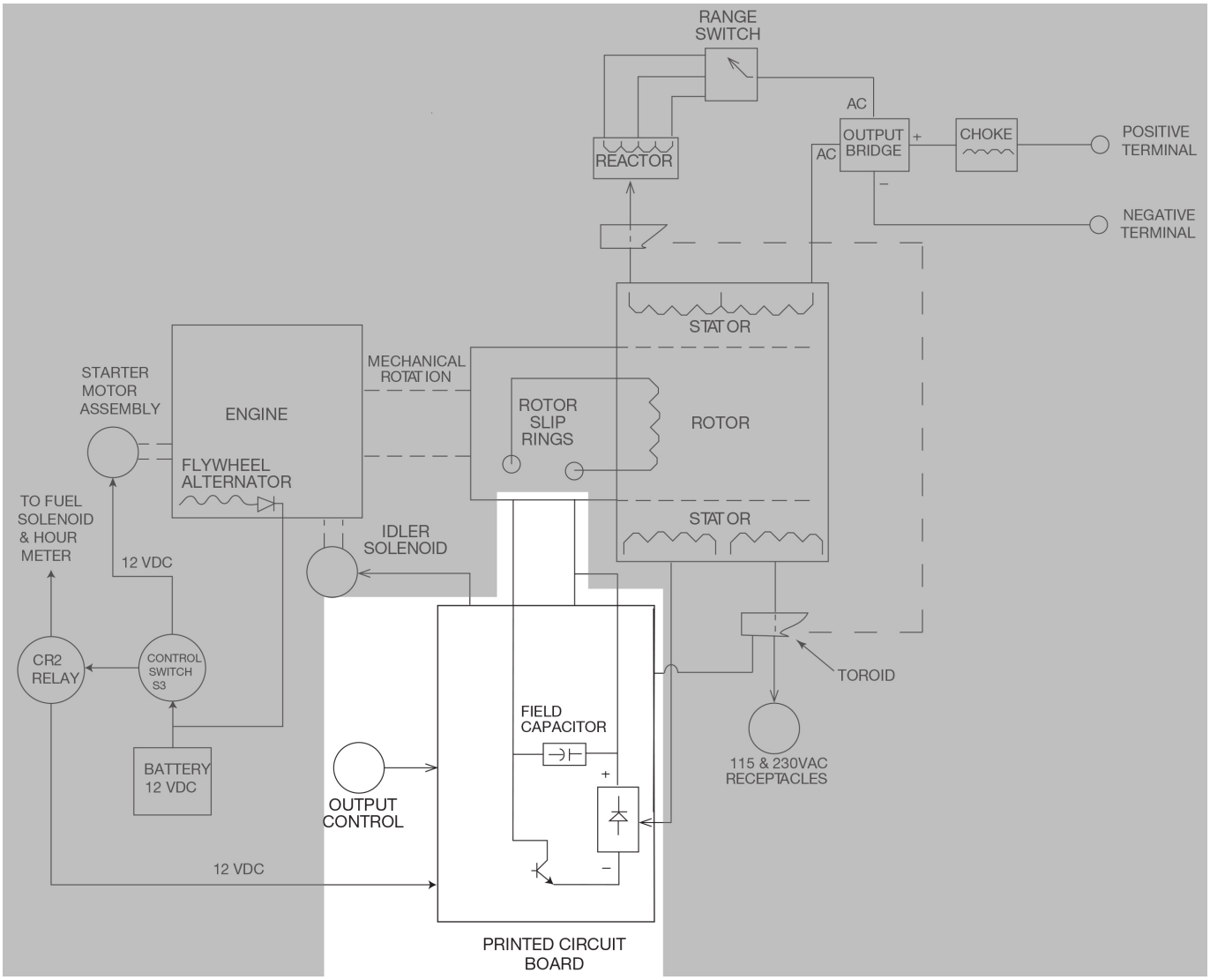


FIGURE E.5

WELD WINDING, REACTOR, AND RANGE SWITCH

The stator weld winding is connected to the reactor and range switch. The inductance in the reactor offers an impedance to current flow. The reactor coil is tapped at various points. As the range switch is rotated, different amounts of reactor coil are brought into the current welding path. As more turns of reactor are brought into the circuit, the more impedance there is to current flow. Simply stated, the more reactor in the circuit, the lower the welding current.

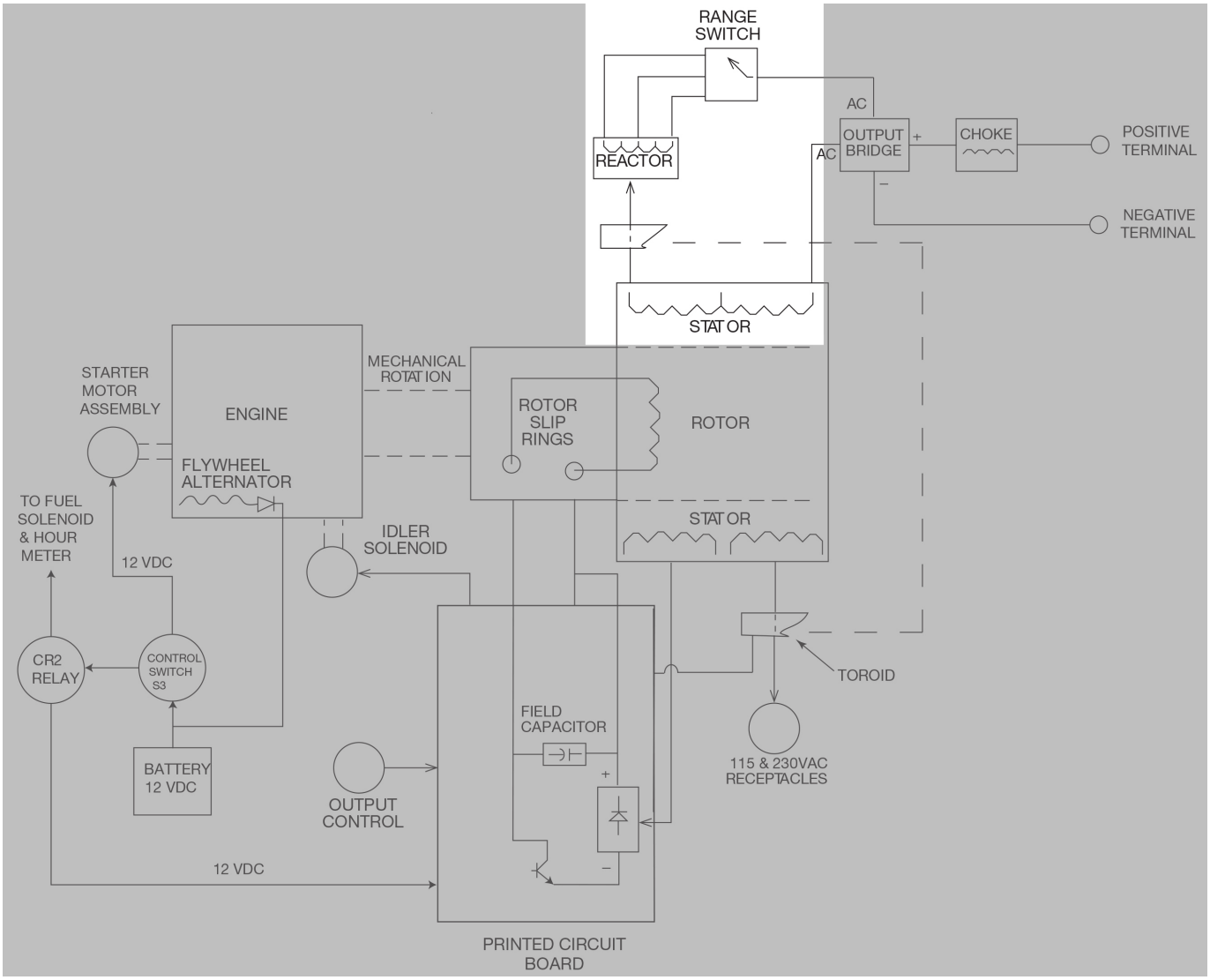


FIGURE E.6

OUTPUT BRIDGE, CHOKE, AND OUTPUT TERMINALS

The AC voltage developed in the stator weld winding is delivered, through the reactor and range switch, to the Output Rectifier Bridge. The DC output current path is from the Output Bridge, where the AC voltage is rectified to a DC voltage, and then through the Choke, where the DC current is filtered and on to the Output Terminals.

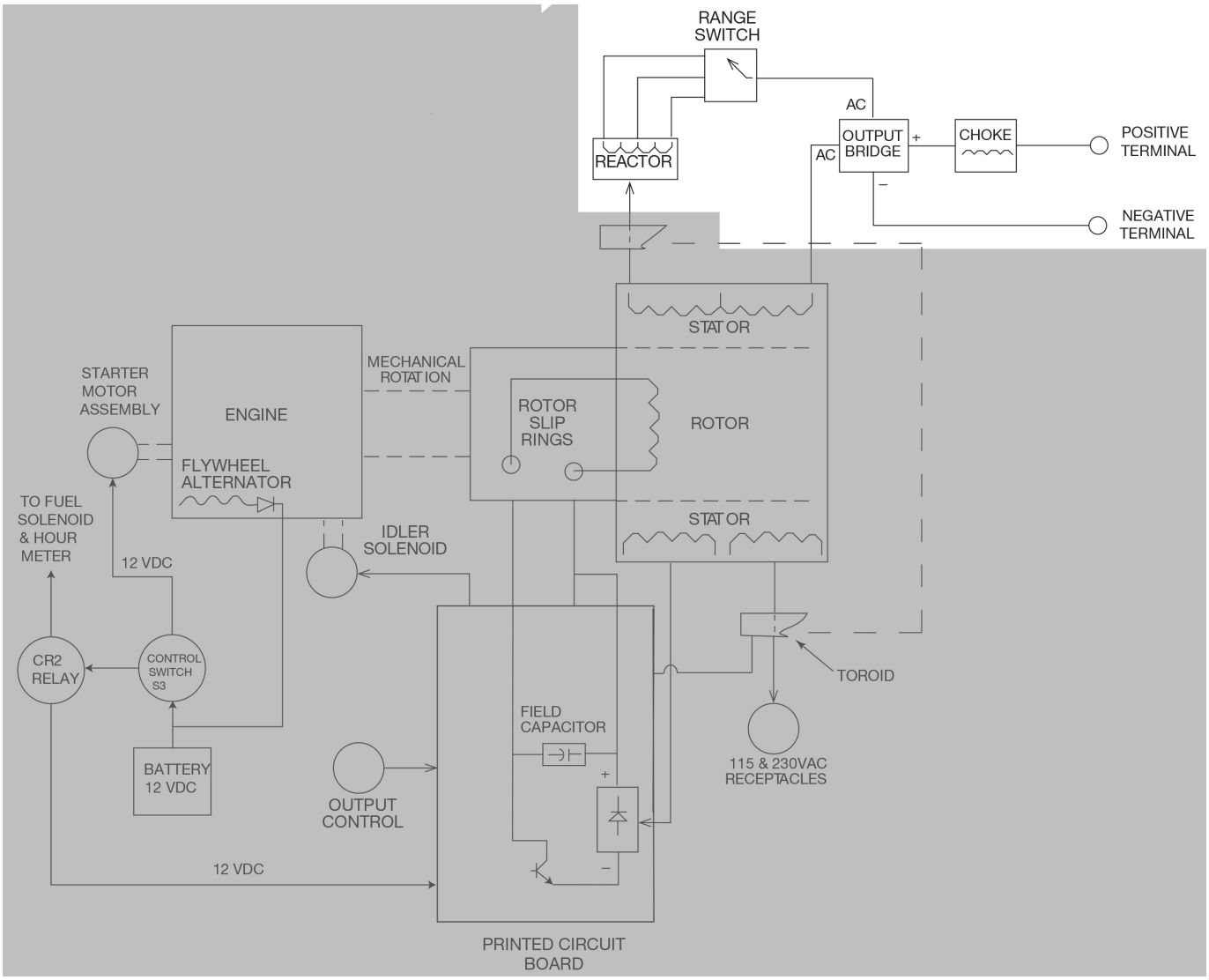


FIGURE E.7

AUXILIARY POWER

When full field voltage is applied to the rotor and the engine is running at high speed (3700 RPM), a 230 AC voltage is developed in the stator auxiliary winding. This winding is tapped to provide 115 VAC. The two voltages, (115 VAC and 230 VAC), are connected to the appropriate receptacles and offer 9,000 watts (total) of AC auxiliary power.

PROTECTIONS

The Engine is protected from a low oil pressure condition. If the oil pressure is below safe levels the oil pressure switch will "open" and the fuel solenoid will stop gas flow to the Engine and the Engine will shut off.

LINCOLN GV750 ENGINE

The Eagle 10,000 Plus (GV750) is powered by a two cylinder, four-stroke, naturally aspirated, internal combustion engine. The engine is fuel by gasoline that is ignited by spark plugs.

COMBUSTION: also known as burning, is the basic chemical process of releasing energy from a fuel and air mixture. In an internal combustion engine the ignition and combustion of the fuel occurs within the engine itself. The engine then partially converts the energy from the combustion to work. The engine consists of a fixed cylinder and a moving piston. The expanding combustion gases push the piston, which in turn rotates the crankshaft that is mechanically connected to the Rotor. Thus, the Rotor is rotated within the Stator housing. In four-stroke cycle engines four piston strokes are needed to complete a cycle. The cycle includes four distinct processes: intake of fuel, compression of fuel, combustion of fuel, power stroke, and exhaust.

There are several basic components to the GV750 engine. They are as follows:

- Block (1)
- Crankshaft (1)
- Pistons (2)
- Connecting Rods (2)
- Cylinders and Heads (2)
- Carburetor (1)
- Ignition Circuit (1)

BLOCK: The block houses the crankshaft, pistons, connecting rods, and lubricating oil.

CRANKSHAFT: The crankshaft is connected to pistons via connecting rods.

PISTONS: A piston is a disc or cylinder shaped object used in internal combustion engines to derive motion.

CONNECTING RODS: Devices used to attach the pistons to the crankshaft.

CYLINDERS AND HEADS: The cylinder is the enclosed container in which the piston moves up and down. The HEAD is the top of the cylinder where the ignition of the fuel takes place.

CARBURETOR: Is the engine component used to control the fuel and air mixture for the internal combustion engine.

IGNITION CIRCUIT: An electronic circuit that ignites the cylinder spark plug so that the fuel mixture "explodes" when the piston is at the correct position within the cylinder.

TABLE OF CONTENTS

TROUBLESHOOTING

How to Use Troubleshooting Guide

⚠ WARNING

Service and Repair should only be performed by Lincoln Electric Factory Trained Personnel. Unauthorized repairs performed on this equipment may result in danger to the technician and machine operator and will invalidate your factory warranty. For your safety and to avoid Electrical Shock, please observe all safety notes and precautions detailed throughout this manual.

This Troubleshooting Guide is provided to help you locate and repair possible machine malfunctions. Simply follow the three-step procedure listed below.

Step 1. LOCATE PROBLEM (SYMPTOM).

Look under the column labeled "PROBLEM (SYMPTOMS)". This column describes possible symptoms that the machine may exhibit. Find the listing that best describes the symptom that the machine is exhibiting.

Step 2. POSSIBLE CAUSE.

The second column labeled "POSSIBLE CAUSE" lists the obvious external possibilities that may contribute to the machine symptom.

Step 3. RECOMMENDED COURSE OF ACTION

This column provides a course of action for the Possible Cause, generally it states to contact your local Lincoln Authorized Field Service Facility.

If you do not understand or are unable to perform the Recommended Course of Action safely, contact your local Lincoln Authorized Field Service Facility.

Observe Safety Guidelines detailed in the beginning of this manual.

PROBLEMS (SYMPTOMS)	POSSIBLE AREAS OF MISADJUSTMENT(S)	RECOMMENDED COURSE OF ACTION
OUTPUT PROBLEMS		
Major Physical or Electrical Damage is Evident.	1. Contact your local Lincoln Authorized Field Service Facility.	1. Contact The Lincoln Electric Service Dept. 1-888-935-3877.
No weld output and no auxiliary power. Engine runs normally.	1. Check the brushes for wear and proper contact with the rotor slip rings.	1. Perform the ***ROTOR TEST.*** 2. Perform the ***PCB1 FIELD AND IDLER BOARD TEST.*** 3. Perform the ***STATOR TEST.***
No weld output, the auxiliary power (230-115VAC) is operating normally. Engine runs normally.	1. Check the open circuit voltage at the weld terminals. With the engine running at 3700 RPM the maximum open circuit voltage should be 67 to 72VDC. 2. Check the welding cables, clamps and electrode holder for loose or faulty connections.	1. Perform the ***D1 BRIDGE RECTIFIER TEST***. 2. Perform the ***S1 OUTPUT SELECTOR SWITCH TEST.*** 3. Perform the ***REACTOR TEST***. 4. Perform the ***CHOKE TEST***. 5. Perform the ***STATOR TEST***.
No auxiliary power, welding output is normal. Engine runs normally.	1. Check the auxiliary power circuit breakers. Reset if tripped. 2. Make sure the Output Control is set at the maximum position. 3. Check for loose or faulty plugs at the auxiliary power receptacles.	1. Check the internal wiring between the stator, the circuit breakers and the output receptacles. See the wiring diagram. 2. Perform the ***STATOR TEST***.
Machine has low welding output and low auxiliary output. The engine no load RPM is 3700RPM.	1. The brushes may be worn or faulty.	1. Perform the ***ROTOR TEST***. 2. Perform the ***PCB1 FIELD AND IDLER BOARD TEST***. 3. Perform the ***S1 OUTPUT SELECTOR SWITCH TEST***. 4. Perform the ***STATOR TEST***. 5. The engine may have lost horse power and be in need of repair.

⚠ CAUTION

If for any reason you do not understand the test procedures or are unable to perform the tests/repairs safely, contact the Lincoln Electric Service Department for technical troubleshooting assistance before you proceed. Call 1-888-935-3877.

Observe Safety Guidelines detailed in the beginning of this manual.

PROBLEMS (SYMPTOMS)	POSSIBLE AREAS OF MISADJUSTMENT(S)	RECOMMENDED COURSE OF ACTION
ENGINE PROBLEMS (CONTINUED)		
The Engine will not idle down to low speed (2400RPM) when there is no load applied to either the welding terminals or the auxiliary receptacles.	1. Make sure the S3 Engine Control Switch is in the "Auto" position. 2. Make sure there is NOT an external load on the weld terminals nor the auxiliary power receptacles.	1. Perform the ***PCB1 FIELD AND IDLER BOARD TEST***. 2. Perform the ***S3 ENGINE CONTROL SWITCH TEST***. 3. Perform the ***IDLER SOLENOID TEST***. 4. The Engine's Carburetor or linkage may be faulty.
The Engine will not go to high idle speed (3700RPM) when attempting to weld. The S3 Engine Control Switch is set to "Auto". Welding output and engine RPM is normal when the S3 switch is set to "HIGH". The automatic idle function works properly when the auxiliary receptacles are loaded.	1. Make sure the welding cables and connections are tight.	1. Check for broken or faulty connections in the sensing lead (#254). Make sure the connections are tight at the D1 Bridge Rectfier and the S1 Selector Switch See Wiring Diagram. 2. Make sure the lead (#254) is routed through the toroid. See the Wiring Diagram
The Engine will not go to high idle speed (3700RPM) when attempting to weld or when the auxiliary receptacles are loaded. The S3 Engine Control Switch is set to "Auto". Welding output and auxiliary output is normal when the S3 switch is set to "HIGH".	1. Make sure the welding cables and connections are tight. 2. Automatic idler may not function if the auxiliary power is loaded to less than 150 Watts.	1. Check the leads and connections between the stator windings and the toroid sensor. See the wiring diagram. 2. The Toroid may be faulty. 3. Perform the ***PCB1 FIELD AND IDLER BOARD TEST***. 4. Perform the ***IDLER SOLENOID TEST***.
The engine will not crank when the S3 Engine Control Switch is in the "Start" position.	1. Check the CB5 circuit breaker. Reset is tripped. 2. The battery may be faulty.	1. Perform the ***S3 ENGINE CONTROL SWITCH TEST.*** 2. Perform the ***STARTER TEST***. 3. If the battery is discharged perform the ***VOLTAGE REGULATOR TEST***. 4. The engine may be hard to crank due to a mechanical failure in the engine.

⚠ CAUTION

If for any reason you do not understand the test procedures or are unable to perform the tests/repairs safely, contact the Lincoln Electric Service Department for technical troubleshooting assistance before you proceed. Call 1-888-935-3877.

Observe Safety Guidelines detailed in the beginning of this manual.

PROBLEMS (SYMPTOMS)	POSSIBLE AREAS OF MISADJUSTMENT(S)	RECOMMENDED COURSE OF ACTION
ENGINE PROBLEMS (CONTINUED)		
The engine shuts off unexpectedly.	1. The Engine may be low on or out of fuel. 2. The Oil level may be low. 3. The fuel filter may be clogged.	1. Perform the ***OIL PRESSURE SWITCH TEST***. 2. Perform the ***CR2 RELAY TEST***. 3. The fuel shut off solenoid may be faulty. See the wiring diagram. 4. The engine carburetor may be faulty. 5. The engine ignition system may be faulty.
Engine does not develop full power.	1. The fuel filter may be clogged. Replace if necessary. 2. The air filter may be clogged. Replace if necessary. 3. The spark plug(s) may be faulty. Replace if necessary.	1. Check the engine valve clearance. See the Maintenance Section. 2. The engine carburetor may be faulty. 3. The engine may be in need of major repair.
The engine runs erratic and not smooth.	1. The spark plugs may be faulty. 2. The fuel may be contaminated with water. 3. The fuel filter may be clogged.	1. Check the engine valve clearance. See the Maintenance Section. 2. The engine carburetor may be faulty. 3. The engine ignition circuit may be faulty.

⚠ CAUTION

If for any reason you do not understand the test procedures or are unable to perform the tests/repairs safely, contact the Lincoln Electric Service Department for technical troubleshooting assistance before you proceed. Call 1-888-935-3877.

Observe Safety Guidelines detailed in the beginning of this manual.

PROBLEMS (SYMPTOMS)	POSSIBLE AREAS OF MISADJUSTMENT(S)	RECOMMENDED COURSE OF ACTION
WELDING PROBLEMS		
The welding arc is "cold." Engine runs normally (3700 RPM no load). Auxiliary power is functioning normally.	1. Check for loose or faulty connections at the weld output terminals and welding cable connections. 2. The welding cable may be too long or coiled, causing an excessive voltage drop.	1. Perform the ***D1 BRIDGE RECTIFIER TEST***. 2. Perform the ***S1 OUTPUT SELECTOR SWITCH TEST***. 3. Perform the ***REACTOR TEST***. 4. Perform the ***CHOKE TEST***. 5. Perform the ***STATOR TEST***.
The welding arc is erratic and unstable. The engine runs normally (3700RPM no load) Auxiliary power is normal.	1. Check for loose or faulty connections at the weld output terminals and welding cable connections.	1. Perform the ***D1 BRIDGE RECTIFIER TEST***. 2. Perform the ***S1 OUTPUT SELECTOR SWITCH TEST***. 3. Perform the ***REACTOR TEST***. 4. Perform the ***CHOKE TEST***.

⚠ CAUTION

If for any reason you do not understand the test procedures or are unable to perform the tests/repairs safely, contact the Lincoln Electric Service Department for technical troubleshooting assistance before you proceed. Call 1-888-935-3877.

PC BOARD TROUBLESHOOTING PROCEDURES

⚠ WARNING

ELECTRIC SHOCK can kill.

- Have an electrician install and service this equipment. Turn the input power OFF at the fuse box before working on equipment. Do not touch electrically hot parts.

⚠ CAUTION

Sometimes machine failures appear to be due to PC board failures. These problems can sometimes be traced to poor electrical connections. To avoid prob- lems when troubleshooting and replacing PC boards, please use the following procedure:

1. Determine to the best of your technical ability that the PC board is the most likely component causing the failure symptom.
2. Check for loose connections at the PC board to assure that the PC board is properly connected.
3. If the problem persists, replace the suspect PC board using standard practices to avoid static electrical damage and electrical shock. Read the warning inside the static resistant bag and perform the following procedures:

PC board can be damaged by static electricity.

ATTENTION Static-Sensitive Devices Handle only at Static-Safe Workstations

- Remove your body's static charge before opening the static-shielding bag. Wear an anti-static wrist strap. For safety, use a 1 Meg ohm resistive cord connected to a grounded part of the equipment frame.

- If you don't have a wrist strap, touch an un-painted, grounded, part of the equipment frame. Keep touching the frame to prevent static build-up. Be sure not to touch any electrically live parts at the same time.

- Tools which come in contact with the PC board must be either conductive, anti-static or static-dissipative.

- Remove the PC board from the static-shielding bag and place it directly into the equipment. Don't set the PC board on or near paper, plastic or cloth which could have a static charge. If the PC board can't be installed immediately, put it back in the static-shield- ing bag.

- If the PC board uses protective shorting jumpers, don't remove them until installation is complete.

- If you return a PC board to The Lincoln Electric Company for credit, it must be in the static-shielding bag. This will prevent further damage and allow prop- er failure analysis.

4. Test the machine to determine if the failure symptom has been corrected by the replacement PC board.

NOTE: It is desirable to have a spare (known good) PC board available for PC board troubleshooting.

NOTE: Allow the machine to heat up so that all electrical components can reach their operating temperature.

5. Remove the replacement PC board and substitute it with the original PC board to recreate the original problem.
   a. If the original problem does not reappear by substituting the original board, then the PC board was not the problem. Continue to look for bad connections in the control wiring harness, junction blocks, and terminal strips.
   b. If the original problem is recreated by the substitution of the original board, then the PC board was the problem. Reinstall the replacement PC board and test the machine.
6. Always indicate that this procedure was followed when warranty reports are to be submitted.

NOTE: Following this procedure and writing on the warranty report, "INSTALLED AND SWITCHED PC BOARDS TO VERIFY PROBLEM," will help avoid denial of legitimate PC board warranty claims.

TEST PROCEDURES

HOW TO USE THE TEST REFERENCE CHART

⚠ WARNING

Service and Repair should only be performed by Lincoln Electric Factory Trained Personnel. Unauthorized repairs performed on this equipment may result in danger to the technician and machine operator and will invalidate your factory warranty. For your safety and to avoid Electrical Shock, please observe all safety notes and precautions detailed throughout this manual.

The Test Reference Chart is a nonspecific, operations based troubleshooting aide intended to identify components involved in a particular machine function. The left side of the chart consists of a listing of all major components in the machine. Across the top of the chart the three main machine functions are listed. This chart is provided to help you quickly identify possible faulty components, simply identify the particular function and refer to its specified column for a list of its related components. Simply follow the steps below.

Step 1. IDENTIFY MACHINE FUNCTION

There will be three columns with a "MACHINE FUNCTION" listed at the top. You can choose from "POWER UP", "PRIMARY OUTPUT" or 'AUXILIARY OUTPUT". Choose the column that best describes the symptom that the machine is exhibiting a problem with. Examples are as follows:

- POWER UP - machine wont turn on, blows fuses, no display
- WELDING OUTPUT - no welding output, no wire feed, cannot control output, poor welding characteristics
- AUXILIARY OUTPUT - does not power feeder, no power from 120V receptacle,

Step 2. IDENTIFY RELATED COMPONENTS

If a component is used in a particular "MACHINE FUNCTION" it will be marked in the corresponding column. These components serve a purpose for the identified "MACHINE FUNCTION" and could be related to the symptom identified as a possible faulty component.

RELATED COMPONENT LIST	MACHINE FUNCTION EAGLE™ 10,000 PLUS		
	POWER UP	WELDING OUTPUT	AUXILIARY OUTPUT
Auxiliary Receptacles			X
CB1			X
CB3			X
CB4			X
CB5	X		
CHOKE		X	
CR1 STARTER RELAY	X		
CR2	X		
D1 BRIDGE RECTIFIER		X	
D2	X		
IDLE SOLENOID		X	X
OIL PRESSURE SENSOR	X		
FIELD AND IDLER PCB		X	
R1 OUTPUT CONTROL		X	X
REACTOR		X	
ROTOR		X	X
S1 OUTPUT SELECTOR		X	
S3 ENGINE CONTROL	X	X	X
STARTER	X		
STATOR		X	X
VOLTAGE REGULATOR	X		

If for any reason you do not understand the test procedures or are unable to perform the tests/repairs safely, contact your Lincoln Authorized Service Facility for technical troubleshooting assistance before you proceed.
WWW.LINCOLNELECTRIC.COM/LOCATOR

Refer to Safety pages for explanation of hazards:

CB1 TEST PROCEDURE

TEST DESCRIPTION:
This procedure will determine the proper function of CB1 using Static tests.

MATERIALS NEEDED:
3/8” wrench
Digital Multi-Meter
Wiring Diagram
Machine Schematic
Required P.P.E.

TEST PROCEDURE:
1. For location of CB1 refer to Figure F.1.

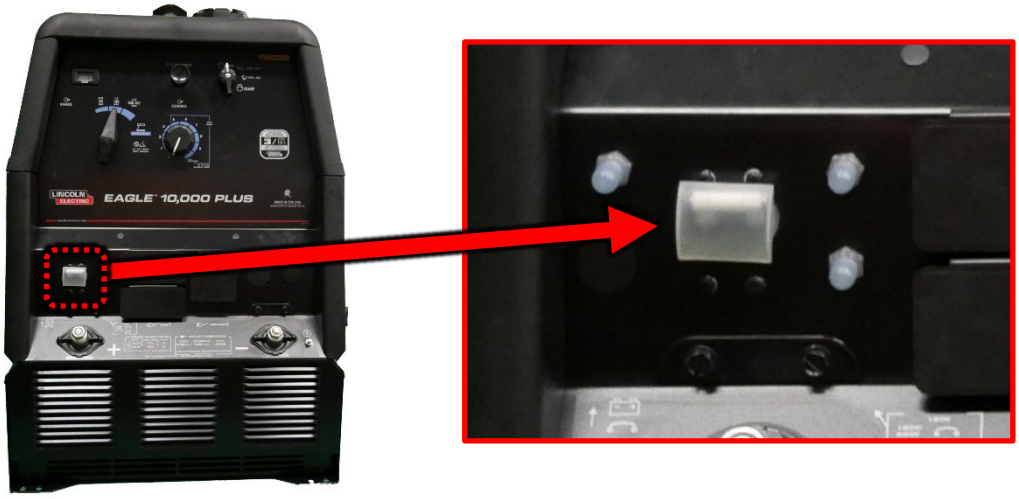


Figure F.1

2. Perform the “Case Cover Removal” to gain access for testing.

3. Perform the Static Testing.

A. STATIC TESTING

A.1. Ensure the engine is not running and the “Engine Control” switch is in the “Off” position.

A.2. Perform the static measurements in Test Table 1, refer to Figure F.2 for test point locations.

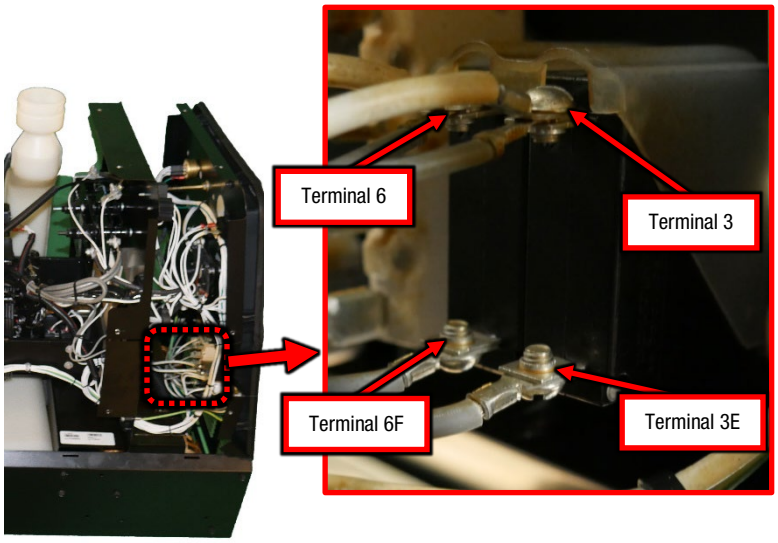


Figure F.2

CB1 Static Test				
Component/Circuit Tested	Condition(s)	+Meter Lead	-Meter Lead	Expected Value
CB1	Machine Off, CB1 closed	Terminal 3	Terminal 3E	<1Ω
		Terminal 6	Terminal 6F	<1Ω

Table 1

A.3. Any failed measurement indicates a defective component.

4. If problems with the machine persist, refer to the “Test Reference” chart for other possible faulty components. Reconnect anything disconnected in previous steps.

Refer to Safety pages for explanation of hazards:

CB3 TEST PROCEDURE

TEST DESCRIPTION:
This procedure will determine the proper function of CB3 using Static tests.

MATERIALS NEEDED:
3/8” wrench
Digital Multi-Meter
Wiring Diagram
Machine Schematic
Required P.P.E.

TEST PROCEDURE:
1. For location of CB3 refer to Figure F.1.

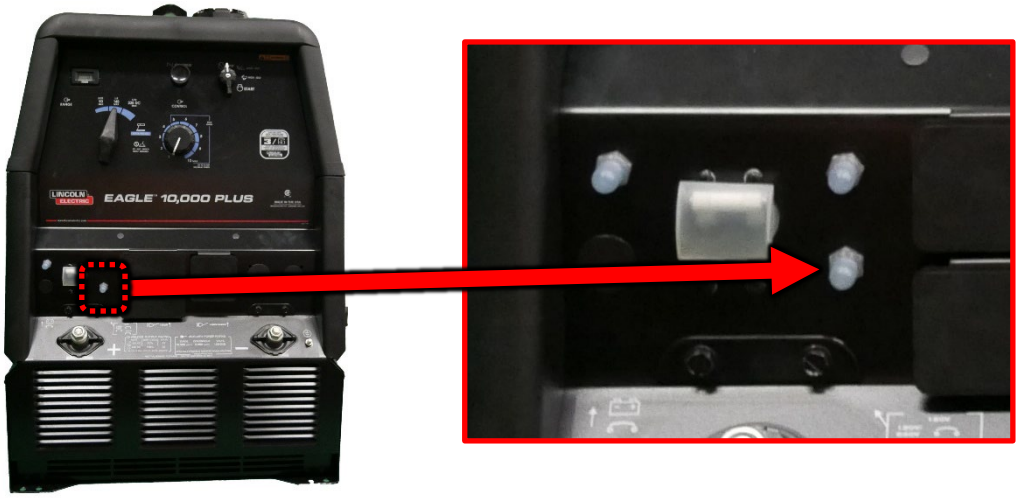


Figure F.1

2. Perform the “Case Cover Removal” to gain access for testing.

3. Perform the Static Testing.

A. STATIC TESTING

A.1. Ensure the engine is not running and the “Engine Control” switch is in the “Off” position.

A.2. Perform the static measurements in Test Table 1, refer to Figure F.2 for test point locations.

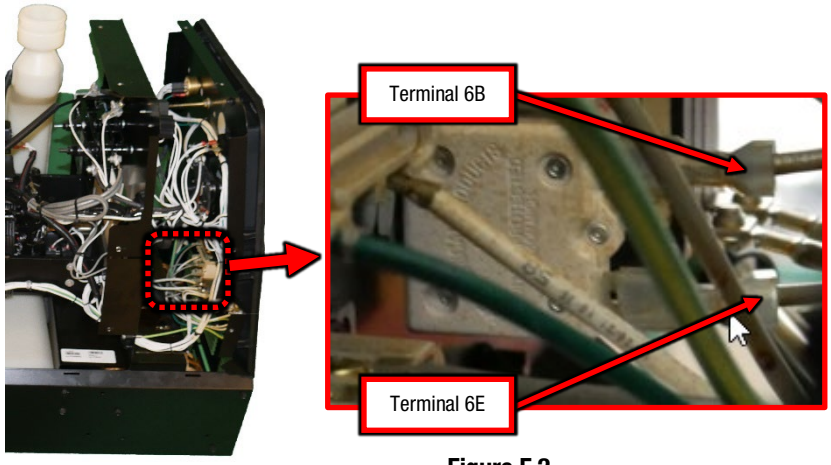


Figure F.2

CB3 Static Test				
Component/Circuit Tested	Condition(s)	+Meter Lead	-Meter Lead	Expected Value
CB3	Machine Off, CB3 closed	Terminal 6B	Terminal 6E	<1Ω

Table 1

A.3. Any failed measurement indicates a defective component.

4. If problems with the machine persist, refer to the “Test Reference” chart for other possible faulty components. Reconnect anything disconnected in previous steps.

Refer to Safety pages for explanation of hazards:

CB4 TEST PROCEDURE

TEST DESCRIPTION:
This procedure will determine the proper function of CB4 using Static tests.

MATERIALS NEEDED:
3/8” wrench
Digital Multi-Meter
Wiring Diagram
Machine Schematic
Required P.P.E.

TEST PROCEDURE:
1. For location of CB4 refer to Figure F.1.

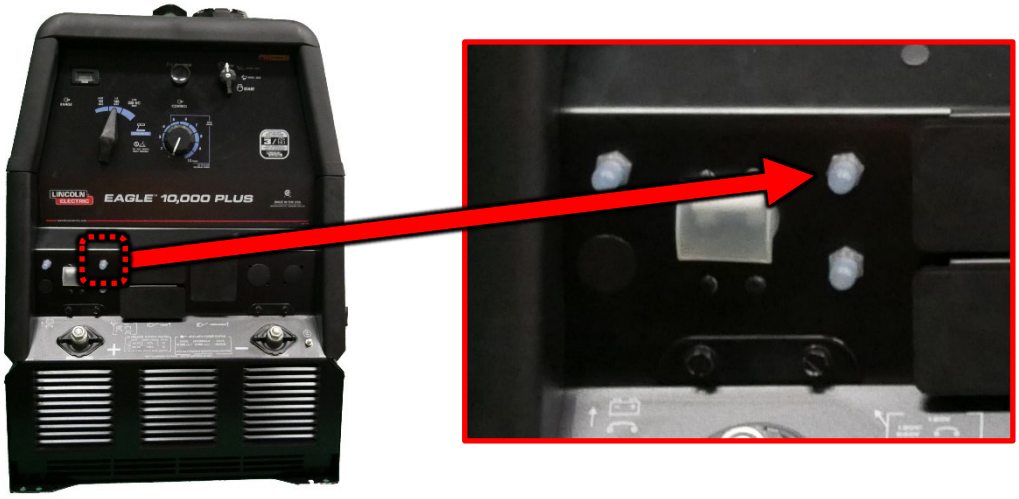


Figure F.1

2. Perform the “Case Cover Removal” to gain access for testing.

3. Perform the Static Testing.

A. STATIC TESTING

A.1. Ensure the engine is not running and the “Engine Control” switch is in the “Off” position.

A.2. Perform the static measurements in Test Table 1, refer to Figure F.2 for test point locations.

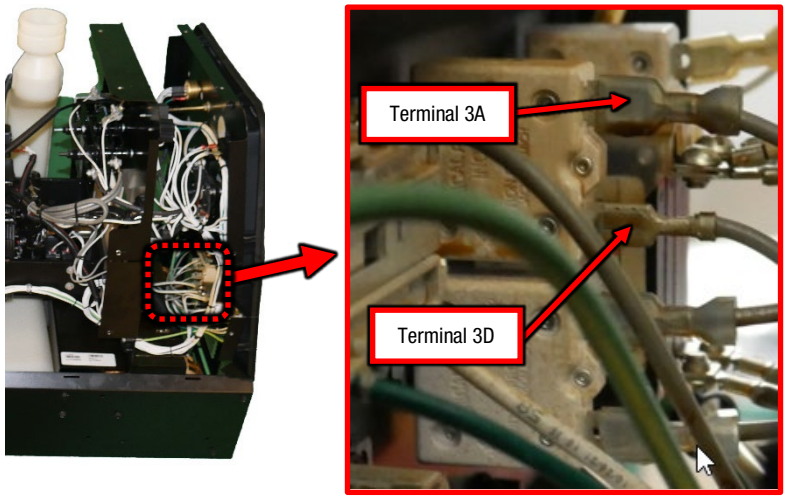


Figure F.2

CB4 Static Test				
Component/Circuit Tested	Condition(s)	+Meter Lead	-Meter Lead	Expected Value
CB4	Machine Off, CB4 closed	Terminal 3A	Terminal 3D	<1Ω

Table 1

A.3. Any failed measurement indicates a defective component.

4. If problems with the machine persist, refer to the “Test Reference” chart for other possible faulty components. Reconnect anything disconnected in previous steps.

Refer to Safety pages for explanation of hazards:

CB5 TEST PROCEDURE

TEST DESCRIPTION:
This procedure will determine the proper function of CB5 using Static tests.

MATERIALS NEEDED:
3/8” wrench
Digital Multi-Meter
Wiring Diagram
Machine Schematic
Required P.P.E.

TEST PROCEDURE:
1. For location of CB5 refer to Figure F.1.

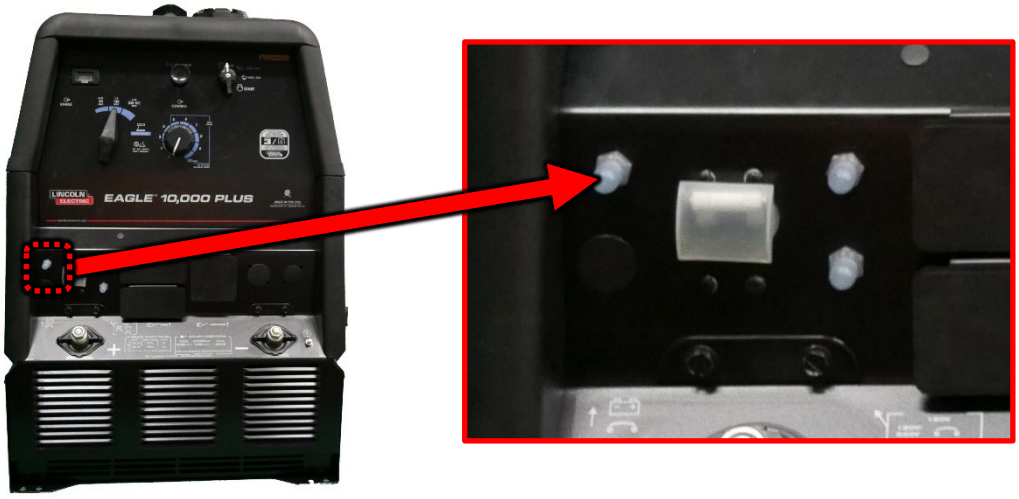


Figure F.1

2. Perform the “Case Cover Removal” to gain access for testing.

3. Perform the Static Testing.

A. STATIC TESTING

A.1. Ensure the engine is not running and the “Engine Control” switch is in the “Off” position.

A.2. Perform the static measurements in Test Table 1, refer to Figure F.2 for test point locations.

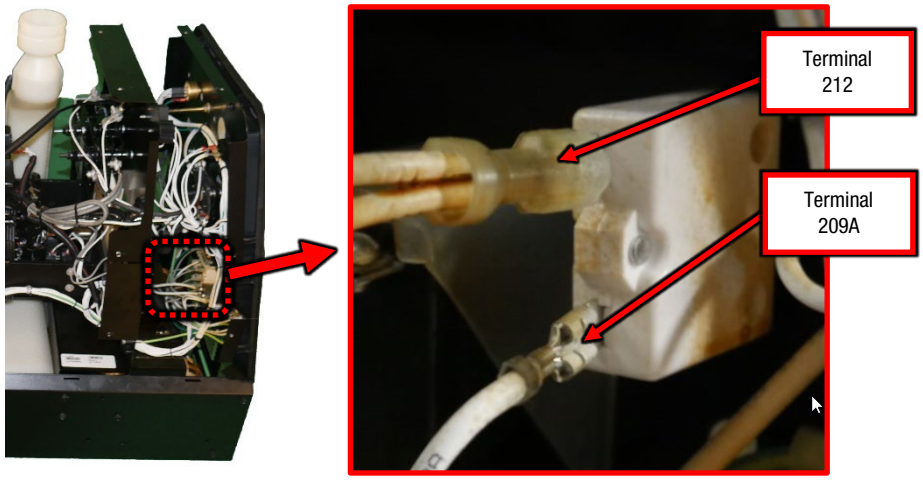


Figure F.2

CB5 Static Test				
Component/Circuit Tested	Condition(s)	+Meter Lead	-Meter Lead	Expected Value
CB5	Machine Off, CB4 closed	Terminal 212	Terminal 209A	<1Ω

Table 1

A.3. Any failed measurement indicates a defective component.

4. If problems with the machine persist, refer to the “Test Reference” chart for other possible faulty components. Reconnect anything disconnected in previous steps.

Refer to Safety pages for explanation of hazards:

CHOKE TEST PROCEDURE

TEST DESCRIPTION:
This procedure will determine the proper function of the Choke using Static tests.

MATERIALS NEEDED:
3/8” wrench
7/16” wrench
Digital Multi-Meter
Wiring Diagram
Machine Schematic
Required P.P.E.

TEST PROCEDURE:
1. For location of the Choke refer to Figure F.1.

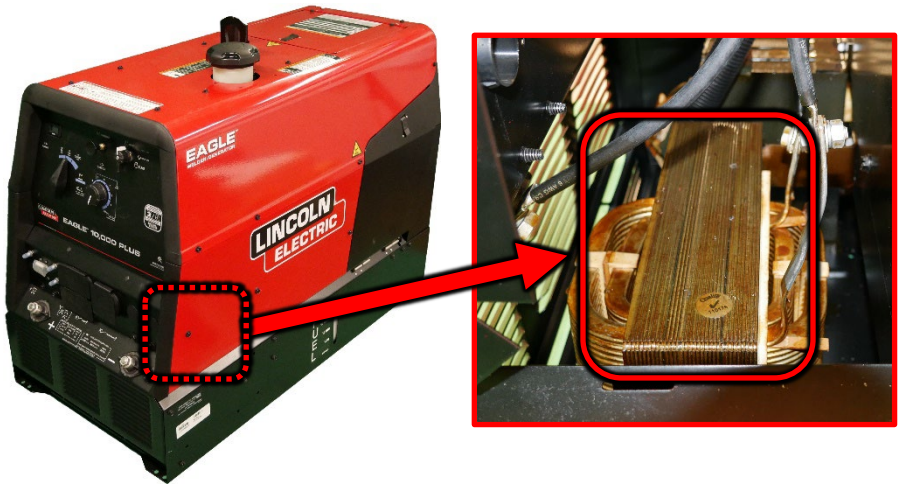


Figure F.1

2. Perform the “Case Cover Removal” to gain access for testing.

3. Perform the Static Testing.

A. STATIC TESTING

A.1. Ensure the engine is not running and the “Engine Control” switch is in the OFF position.

A.2. Label and disconnect the following connections, refer to Figure F.2.

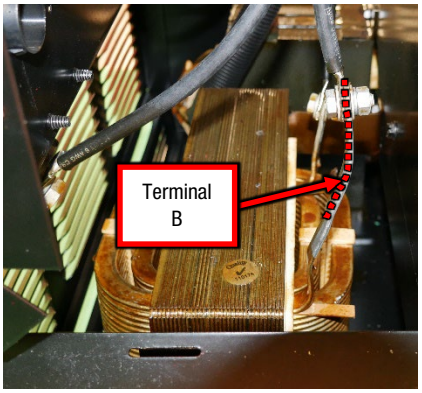


Figure F.2

A.3. Perform the static measurements in Test Table 1, refer to Figure F.3 for test point locations.

Figure F.3

Choke Static Test				
Component/Circuit Tested	Condition(s)	+Meter Lead	-Meter Lead	Expected Value
Choke	Machine Off	Terminal B	Positive Terminal	<1Ω
Short to Ground		Terminal B	Ground	>500KΩ

Table 1

A.4. Any failed measurement indicates a defective component.

4. If problems with the machine persist, refer to the “Test Reference” chart for other possible faulty components. Reconnect anything disconnected in previous steps.

Refer to Safety pages for explanation of hazards:

CR1 STARTER RELAY TEST PROCEDURE

TEST DESCRIPTION:
This procedure will determine the proper function of the CR1 Starter Relay using Static tests.

MATERIALS NEEDED:
3/8” wrench
Digital Multi-Meter
Wiring Diagram
Machine Schematic
Required P.P.E.

TEST PROCEDURE:
1. For location of the CR1 Starter Relay refer to Figure F.1.

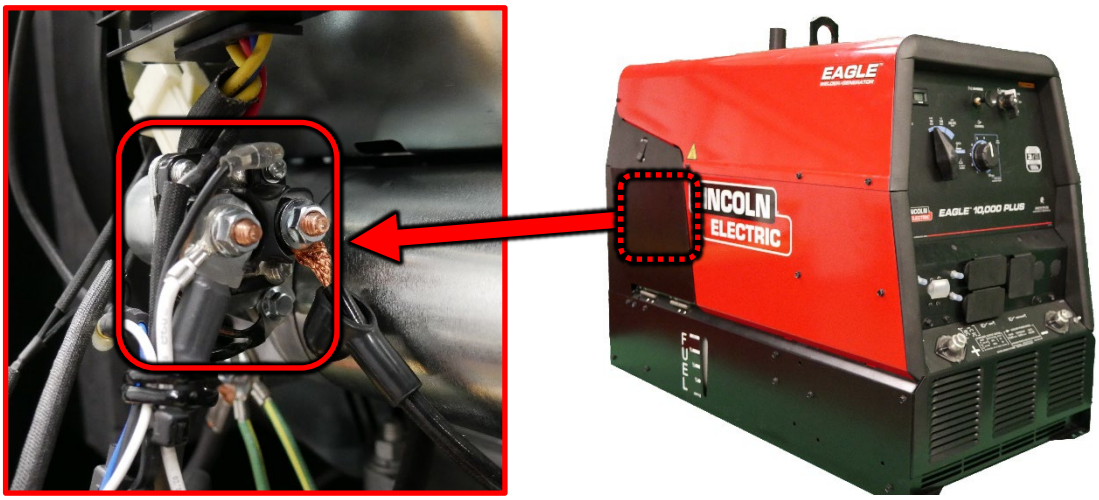


Figure F.1

2. Perform the “Case Cover Removal” to gain access for testing.

3. Perform the Static Testing.

A. STATIC TESTING

A.1. Ensure the engine is not running and the “Engine Control” switch is in the “Off” position.

A.2. Perform the static measurements in Test Table 1, refer to Figure F.2 for test point locations.

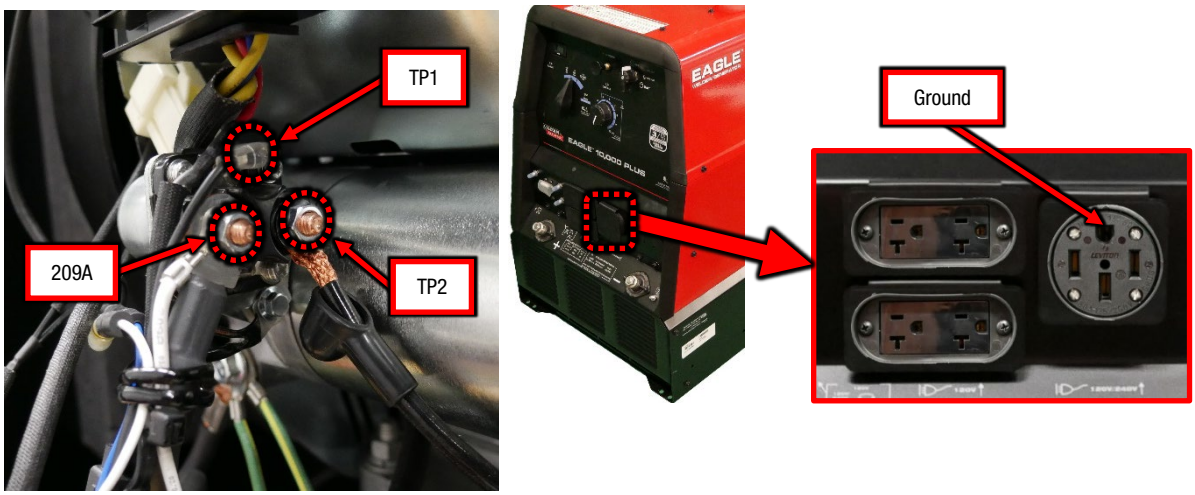


Figure F.2

CR1 Starter Relay Static Test				
Component/Circuit Tested	Condition(s)	+Meter Lead	-Meter Lead	Expected Value
Relay Coil	Machine Off	TP1	Ground	~2.9Ω
Relay Contacts		209A	TP2	>500KΩ

Table 1

A.3. Any failed measurement indicates a defective component.

4. If problems with the machine persist, refer to the “Test Reference” chart for other possible faulty components. Reconnect anything disconnected in previous steps.

Refer to Safety pages for explanation of hazards:

CR2 RELAY TEST PROCEDURE

TEST DESCRIPTION:
This procedure will determine the proper function of the CR2 Relay using Static tests.

MATERIALS NEEDED:
3/8” wrench
Digital Multi-Meter
Wiring Diagram
Machine Schematic
Required P.P.E.

TEST PROCEDURE:
1. For location of the CR2 Relay refer to Figure F.1.

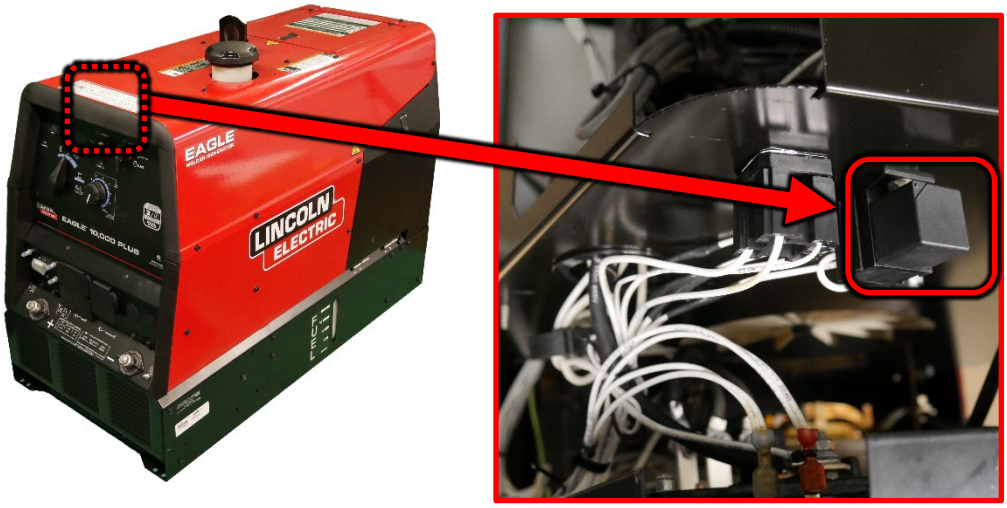


Figure F.1

2. Perform the “Case Cover Removal” to gain access for testing.

3. Perform the Static Testing.

A. STATIC TESTING

A.1. Ensure the engine is not running and the “Engine Control” switch is in the OFF position.

A.2. Label and disconnect CR2, refer to Figure F.2.

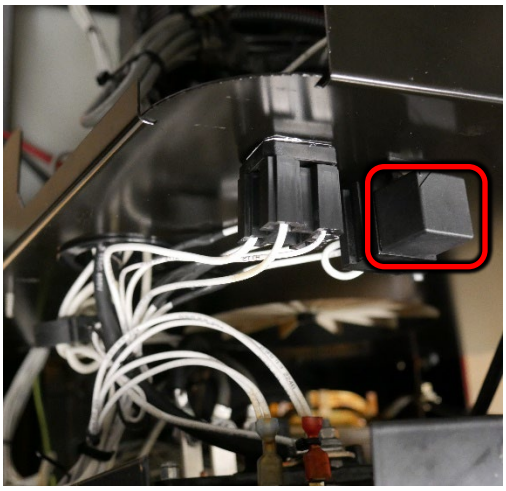


Figure F.2

A.3. Perform the static measurements on CR2 in Test Table 1, refer to Figure F.3 for test point locations.

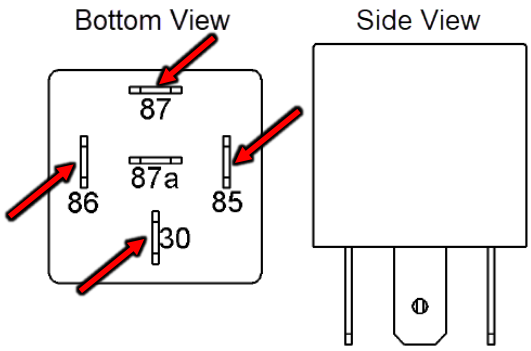


Figure F.3

CR2 Relay Static Test				
Component/Circuit Tested	Condition(s)	+Meter Lead	-Meter Lead	Expected Value
Relay Coil	Machine Off	Terminal 86	Terminal 85	~90Ω
Relay Contacts		Terminal 30	Terminal 87	>500KΩ

Table 1

A.4. Any failed measurement indicates a defective component.

4. If problems with the machine persist, refer to the “Test Reference” chart for other possible faulty components. Reconnect anything disconnected in previous steps.

Refer to Safety pages for explanation of hazards:

D1 BRIDGE RECTIFIER TEST PROCEDURE

TEST DESCRIPTION:
This procedure will determine the proper function of the D1 Bridge Rectifier using Static and Active tests.

MATERIALS NEEDED:
3/8” wrench
7/16” wrench
Digital Multi-Meter
Wiring Diagram
Machine Schematic
Required P.P.E.

TEST PROCEDURE:
1. For location of the D1 Bridge Rectifier refer to Figure F.1.

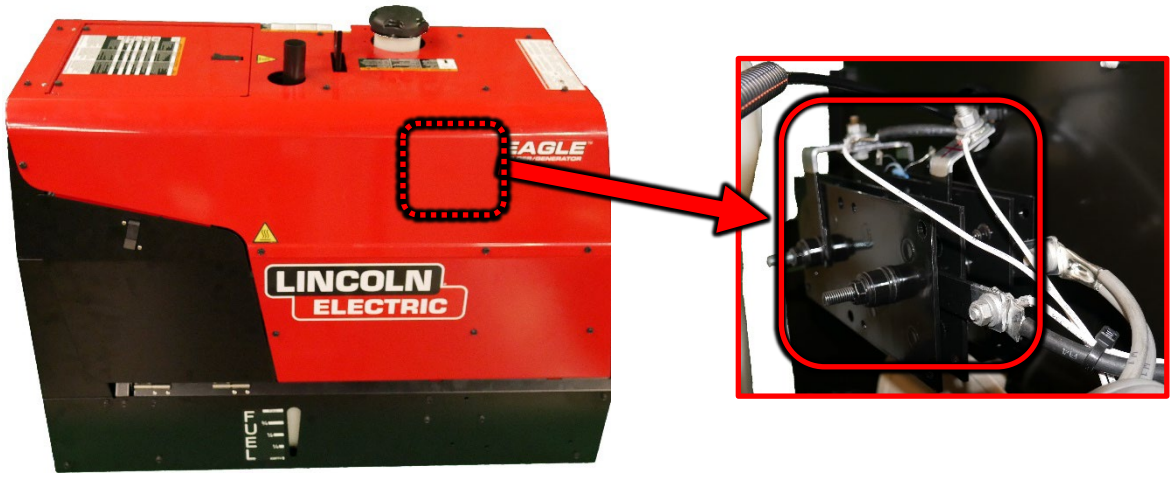


Figure F.1

2. Perform the “Case Cover Removal” to gain access for testing.

3. Perform the Static Testing.

A. STATIC TESTING

A.1. Ensure the engine is not running and the “Engine Control” switch is in the OFF position.

A.2. Label and disconnect the following connections, refer to Figure F.2.

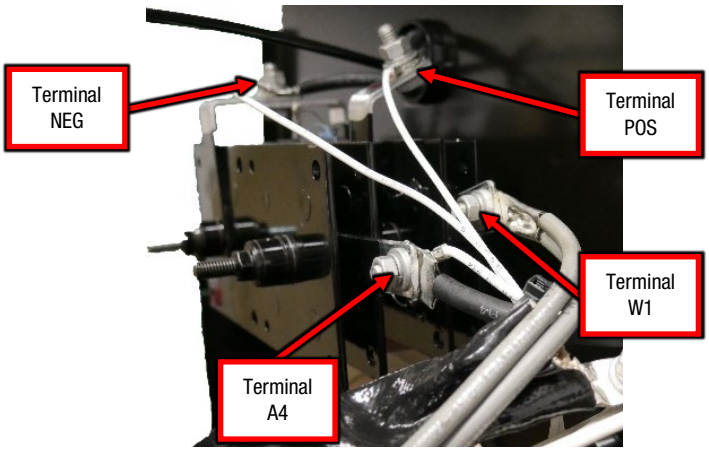


Figure F.2

A.3. Perform the static measurements in Test Table 1, refer to Figure F.2 for test point locations.

D1 Bridge Rectifier Static Test				
Component/Circuit Tested	Condition(s)	+Meter Lead	-Meter Lead	Expected Value
D1 Bridge Rectifier	Machine Off, meter in Diode Mode	Terminal NEG	Terminal A4	.3-.7VDC
		Terminal A4	Terminal POS	.3-.7VDC
		Terminal W1	Terminal POS	.3-.7VDC
		Terminal NEG	Terminal W1	.3-.7VDC

Table 1

A.4. If measurements are correct reconnect anything disconnected in previous steps and proceed to “B. ACTIVE TESTING”.

A.5. Any failed measurement indicates a defective component.

B. ACTIVE TESTING

B.1. Ensure the engine is running and “Engine Control” switch set to HIGH IDLE, “Output Control” set to Maximum.

B.2. Perform the measurements in Test Table 2 below, refer to Figure F.3 for test point locations.

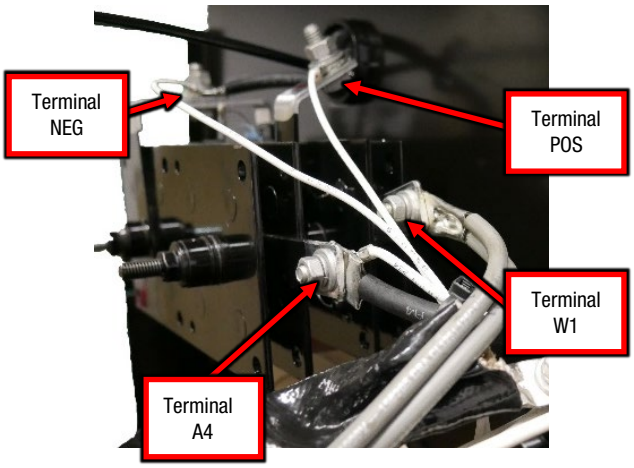


Figure F.3

D1 Bridge Rectifier Active Test				
Component/Circuit Tested	Condition(s)	+Meter Lead	-Meter Lead	Expected Value
Input from Weld Windings	Machine ON, Engine Control Switch set to HIGH, Output Control set to MAXIMUM	Terminal A4	Terminal W1	~74VAC
D1 Bridge Rectifier Output		Terminal POS	Terminal NEG	~68VDC

Table 2

B.3. If the input measurements are correct and the output measurements are not correct this component may be faulty.

4. If problems with the machine persist, refer to the “Test Reference” chart for other possible faulty components. Reconnect anything disconnected in previous steps.

Refer to Safety pages for explanation of hazards:

J6 (D2) RECTIFIER TEST PROCEDURE

TEST DESCRIPTION:
This procedure will determine the proper function of the J6 (D2) Rectifier using Static tests.

MATERIALS NEEDED:
3/8" wrench
Digital Multi-Meter
Wiring Diagram
Machine Schematic
Required P.P.E.

TEST PROCEDURE:
1. For location of the J6 (D2) Rectifier refer to Figure F.1.

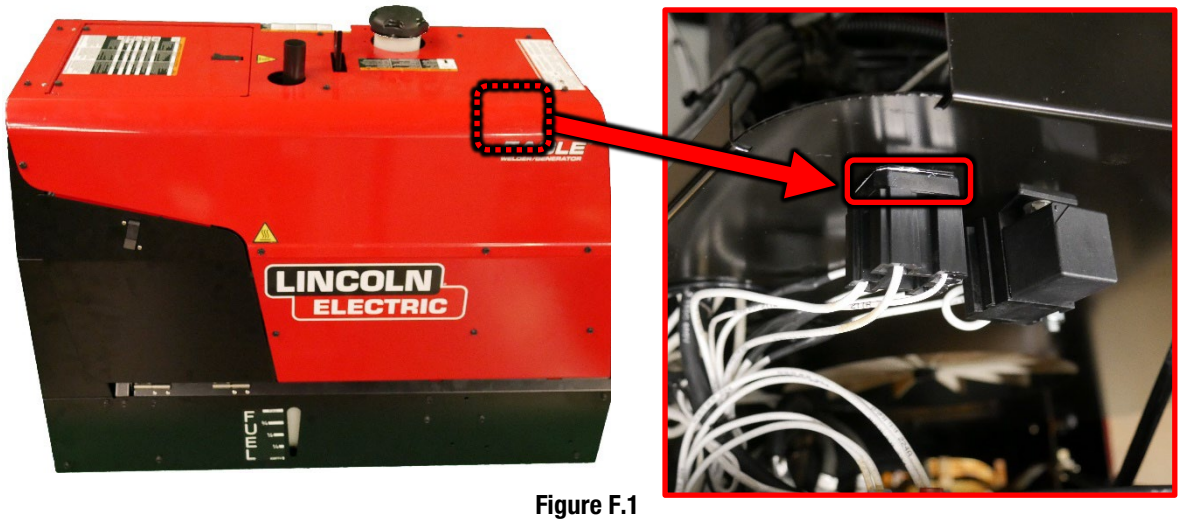


Figure F.1

2. Perform the "Case Cover Removal" to gain access for testing.

3. Perform the Static Testing.

A. STATIC TESTING

A.1. Ensure the engine is not running and the “Engine Control” switch is in the “Off” position.

A.2. Label and disconnect the following connections, refer to Figure F.2.

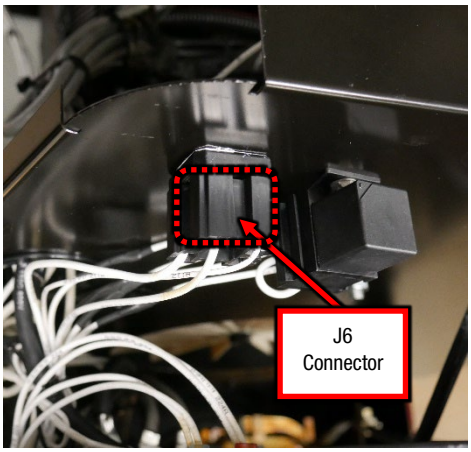


Figure F.2

A.3. Perform the static measurements in Test Table 1, refer to Figure F.3 for test point locations.

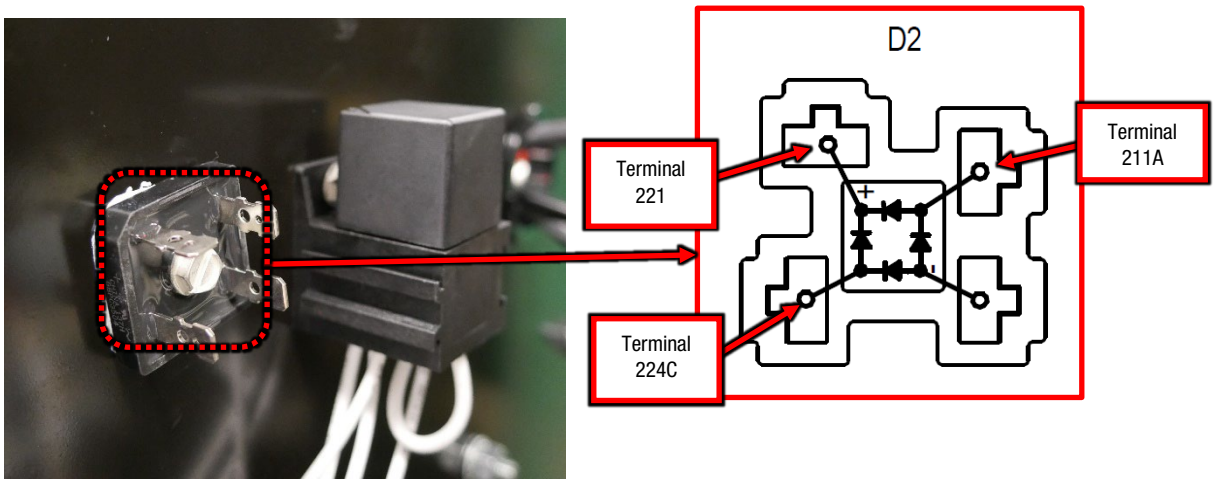


Figure F.3

J6 (D2) Rectifier Static Test				
Component/Circuit Tested	Condition(s)	+Meter Lead	-Meter Lead	Expected Value
J6 (D2) Rectifier	Machine Off, meter in Diode Mode	Terminal 224C	Terminal 221	.3-.7VDC
		Terminal 211A	Terminal 221	.3-.7VDC

Table 1

A.4. Any failed measurement indicates a defective component.

4. If problems with the machine persist, refer to the “Test Reference” chart for other possible faulty components. Reconnect anything disconnected in previous steps.

Refer to Safety pages for explanation of hazards:

IDLE SOLENOID TEST PROCEDURE

TEST DESCRIPTION:
This procedure will determine the proper function of the Idle Solenoid using Static and Active tests.

MATERIALS NEEDED:
3/8" wrench
Digital Multi-Meter
Wiring Diagram
Machine Schematic
Required P.P.E.

TEST PROCEDURE:
1. For location of the Idle Solenoid refer to Figure F.1.

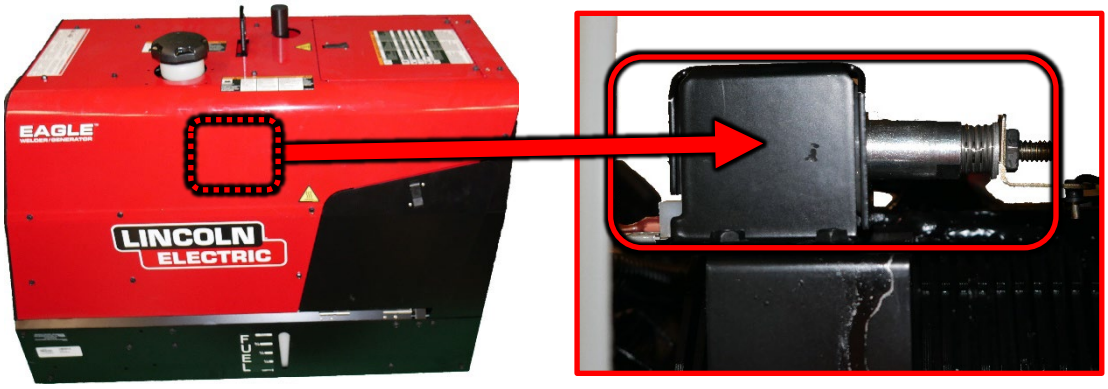


Figure F.1

2. Perform the "Case Cover Removal" to gain access for testing.

3. Perform the Static Testing.

A. STATIC TESTING

A.1. Ensure the engine is not running and the “Engine Control” switch is in the OFF position.

A.2. Label and disconnect the following connections, refer to Figure F.2.

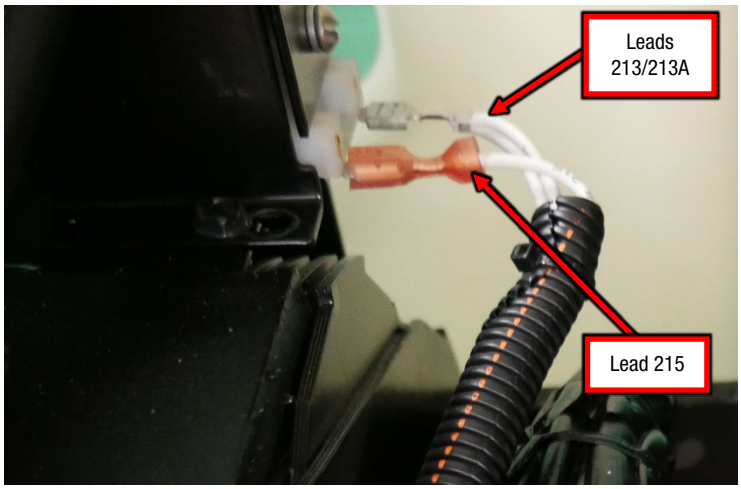


Figure F.2

A.3. Perform the static measurements in Test Table 1, refer to Figure F.3 for test point locations on the Idle Solenoid. **NOTE: LEADS 213/213A AND 215 ARE REMOVED FOR TESTING.**

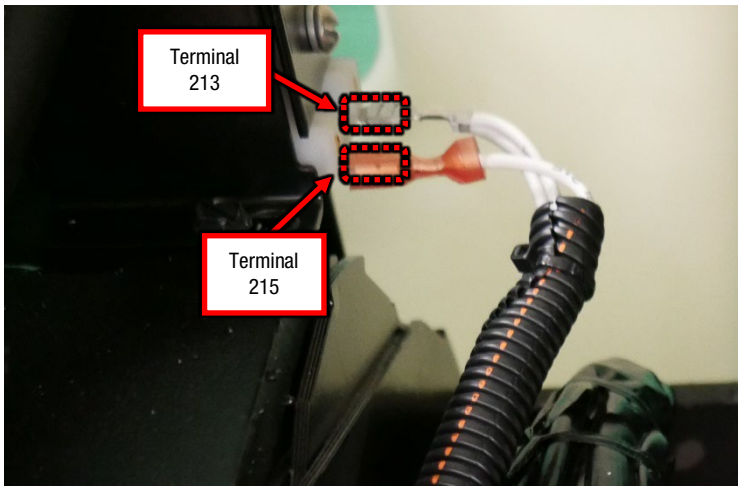


Figure F.3

Idle Solenoid Static Test				
Component/Circuit Tested	Condition(s)	+Meter Lead	-Meter Lead	Expected Value
Idle Solenoid	Machine Off	Terminal 213	Terminal 215	~15.2Ω

Table 1

A.4. If measurements are correct reconnect anything disconnected in previous steps and proceed to “B. ACTIVE TESTING”.

A.5. Any failed measurement indicates a defective component.

B. ACTIVE TESTING

B.1. Ensure the engine is **NOT** running and the "Engine Control" switch is in the AUTO position with Lead 270 grounded to the frame when directed.

B.2. Perform the measurements in Test Table 2 below, refer to Figure F.3 for test point locations.

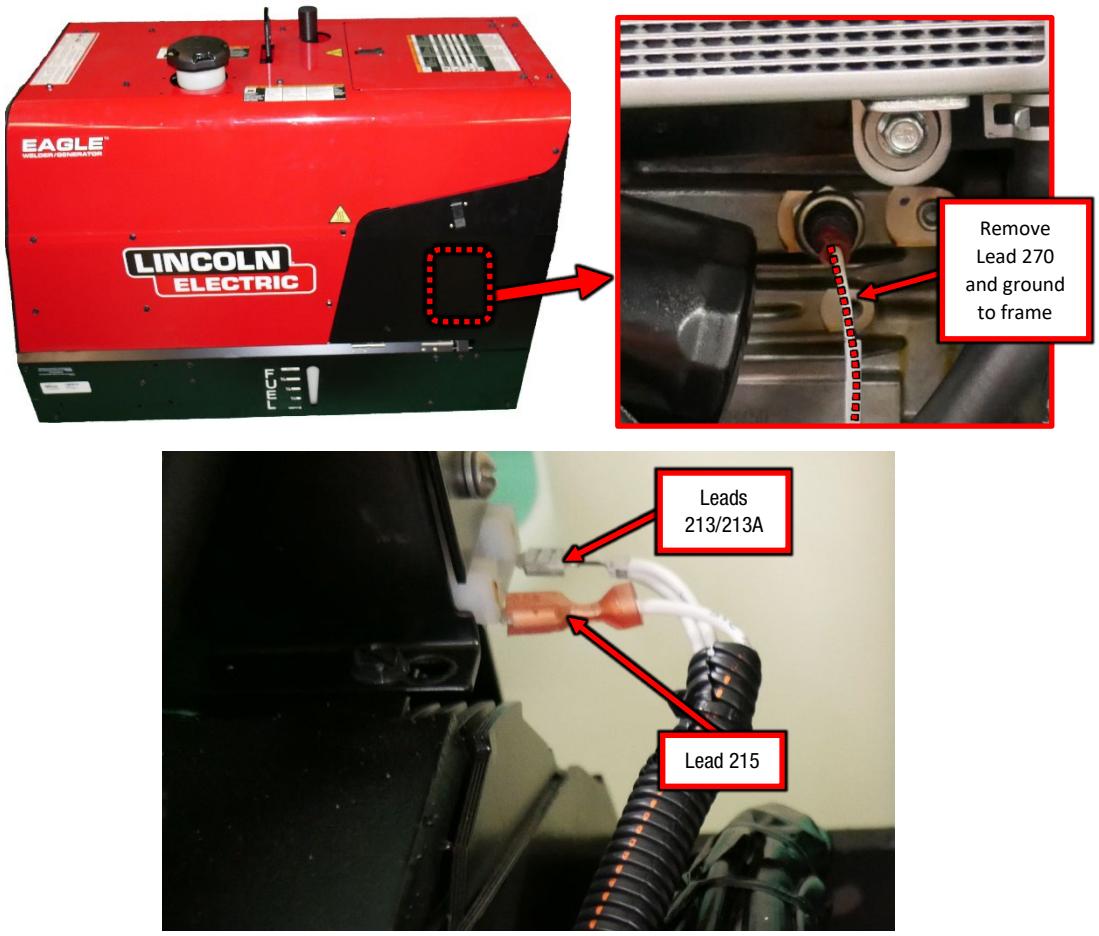


Figure F.3

Idle Solenoid Active Test				
Component/Circuit Tested	Condition(s)	+Meter Lead	-Meter Lead	Expected Value
Idle Solenoid Input	Machine OFF, Engine Control Switch set to AUTO, Lead 270 grounded	Leads 213/213A	Lead 215	~11.2VDC

Table 2

B.3. If the input measurements are correct and the output measurements are not correct this component may be faulty.

4. If problems with the machine persist, refer to the "Test Reference" chart for other possible faulty components. Reconnect anything disconnected in previous steps.

Refer to Safety pages for explanation of hazards:

OIL PRESSURE SENSOR TEST PROCEDURE

TEST DESCRIPTION:
This procedure will determine the proper function of the Oil Pressure Sensor using Static tests.

MATERIALS NEEDED:
3/8" wrench
Digital Multi-Meter
Wiring Diagram
Machine Schematic
Required P.P.E.

TEST PROCEDURE:
1. For location of the Oil Pressure Sensor refer to Figure F.1.

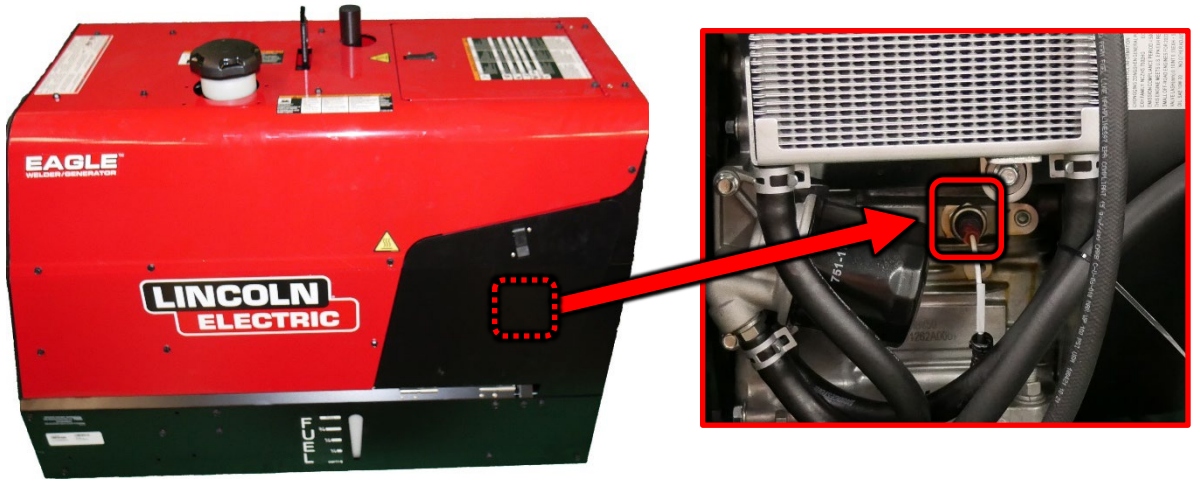


Figure F.1

2. Perform the "Case Cover Removal" to gain access for testing.

3. Perform the Static Testing.

A. STATIC TESTING

A.1. Ensure the engine is not running and the “Engine Control” switch is in the “Off” position.

A.2. Label and disconnect the following connections, refer to Figure F.2.

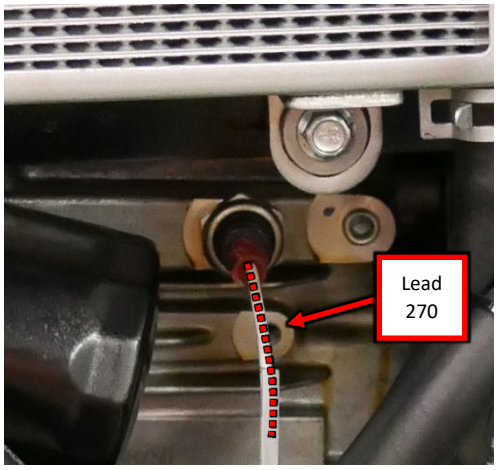


Figure F.2

A.3. Perform the static measurements in Test Table 1, refer to Figure F.3 for test point locations.

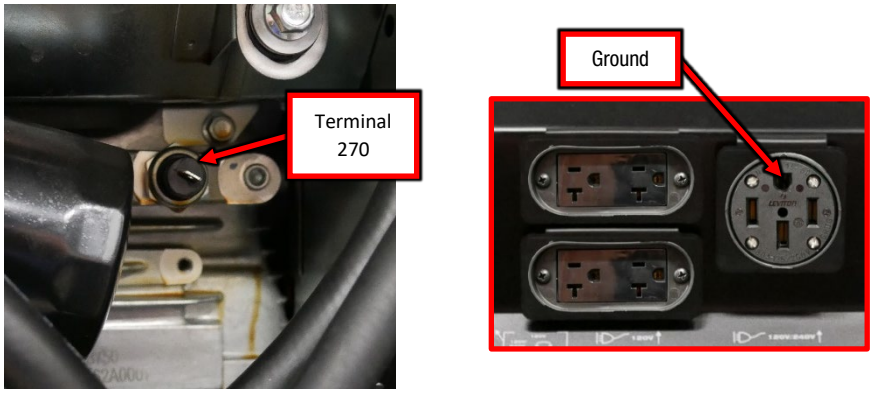


Figure F.3

Oil Pressure Sensor Static Test				
Component/Circuit Tested	Condition(s)	+Meter Lead	-Meter Lead	Expected Value
Oil Pressure Sensor	Machine Off	Terminal 270	Ground	>500KΩ

Table 1

A.4. Any failed measurement indicates a defective component.

4. If problems with the machine persist, refer to the “Test Reference” chart for other possible faulty components. Reconnect anything disconnected in previous steps.

Refer to Safety pages for explanation of hazards:

PCB1 FIELD AND IDLER BOARD TEST PROCEDURE

TEST DESCRIPTION:
This procedure will determine the proper function of the PCB1 Field and Idler board using Active tests.

MATERIALS NEEDED:
3/8” wrench
Digital Multi-Meter
Wiring Diagram
Machine Schematic
Required P.P.E.

TEST PROCEDURE:
1. For location of the PCB1 Field and Idler board refer to Figure F.1.

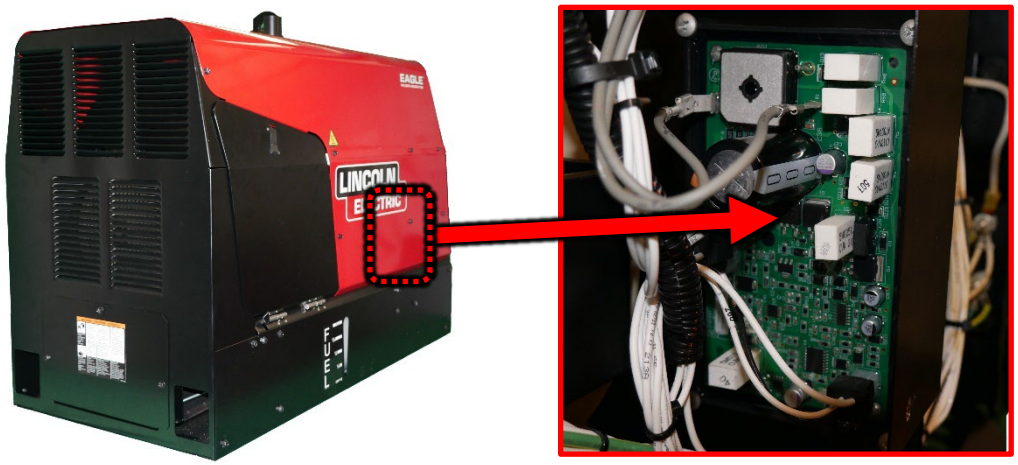


Figure F.1

2. Perform the “Case Cover Removal” to gain access for testing.

3. Perform the Active Testing.

A. ACTIVE TESTING

A.1. Ensure the engine is **NOT** running and the "Engine Control" switch is in the OFF position.

A.2. Label and disconnect the following connections, refer to Figure F.2.

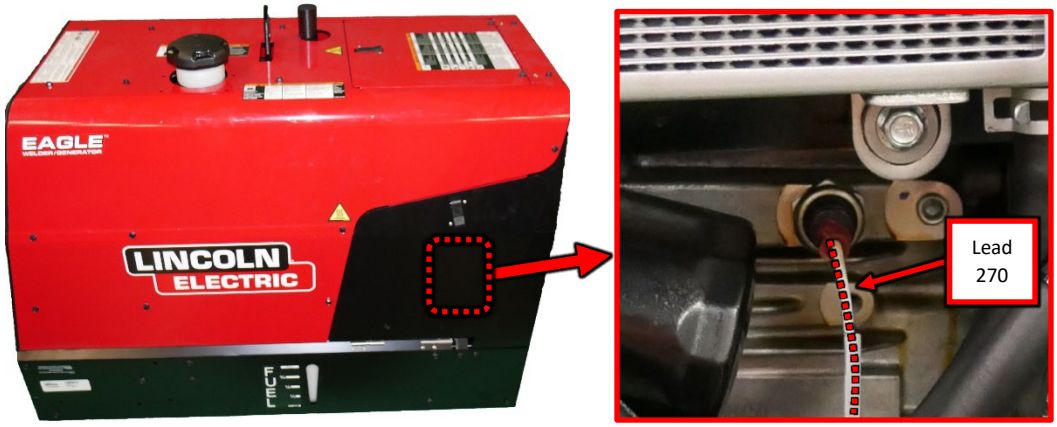


Figure F.2

A.3. Ensure the engine is **NOT** running and the "Engine Control" switch is in the HIGH position with Lead 270 grounded to the frame when directed.

A.4. Perform the measurements identified in Test Table 1 below, refer to Figure F.3 for test point locations.

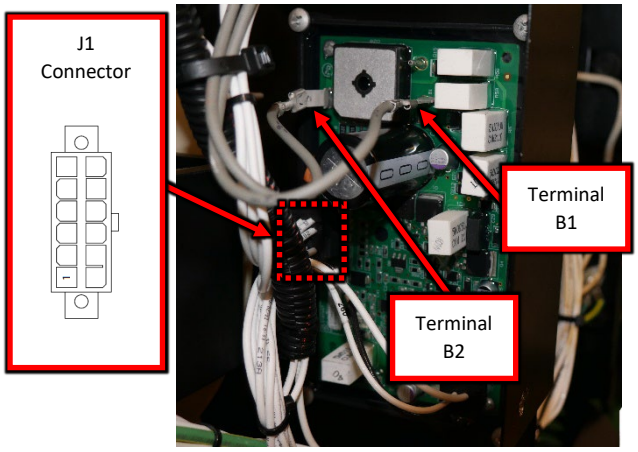


Figure F.3

PCB1 Field and Idler board Active Test				
Component/Circuit Tested	Condition(s)	+Meter Lead	-Meter Lead	Expected Value
Rotor Flashing Output	Machine OFF, Engine Control switch set to HIGH, Lead 270 grounded	J1 pin 11	J1 pin 5	~12VDC

Table 1

A.5. If measurements are correct reconnect anything disconnected in previous steps and proceed to step "A.7.".

A.6. Any failed measurement indicates a defective component.

A.7. Ensure the engine is running and "Engine Control" switch set to High idle, "Output Control" set from Minimum to Maximum as directed.

A.8. Perform the measurements identified in Test Table 2 below, refer to Figure F.3 for test point locations.

PCB1 Field and Idler board Active Test				
Component/Circuit Tested	Condition(s)	+Meter Lead	-Meter Lead	Expected Value
Rotor Voltage Output	Machine ON, Engine Control switch set to HIGH, Output control varied from MIN to MAX	J1 pin 11	J1 pin 5	37-46VDC
Field Voltage Input	Machine ON, Engine Control switch set to HIGH, Output control varied from MIN to MAX	Terminal B1	Terminal B2	41-45VAC

Table 2

A.9. If the input measurements are correct and the output measurements are not correct this component may be faulty.

4. If problems with the machine persist, refer to the “Test Reference” chart for other possible faulty components. Reconnect anything disconnected in previous steps.

Refer to Safety pages for explanation of hazards:

R1 LOCAL CONTROL POTENTIOMETER TEST PROCEDURE

TEST DESCRIPTION:
This procedure will determine the proper function of the R1 Local Control Potentiometer Switch using Static tests.

MATERIALS NEEDED:
3/8” wrench
Digital Multi-Meter
Wiring Diagram
Machine Schematic
Required P.P.E.

TEST PROCEDURE:
1. For location of the R1 Local Control Potentiometer refer to Figure F.1.

Figure F.1

2. Perform the “Case Cover Removal” to gain access for testing.

3. Perform the Static Testing.

A. STATIC TESTING

A.1. Ensure the engine is not running and the "Engine Control" switch is in the "OFF" position, "Output Control" set from Minimum to Maximum as directed.

A.2. Label and disconnect the following connections, refer to Figure F.2.

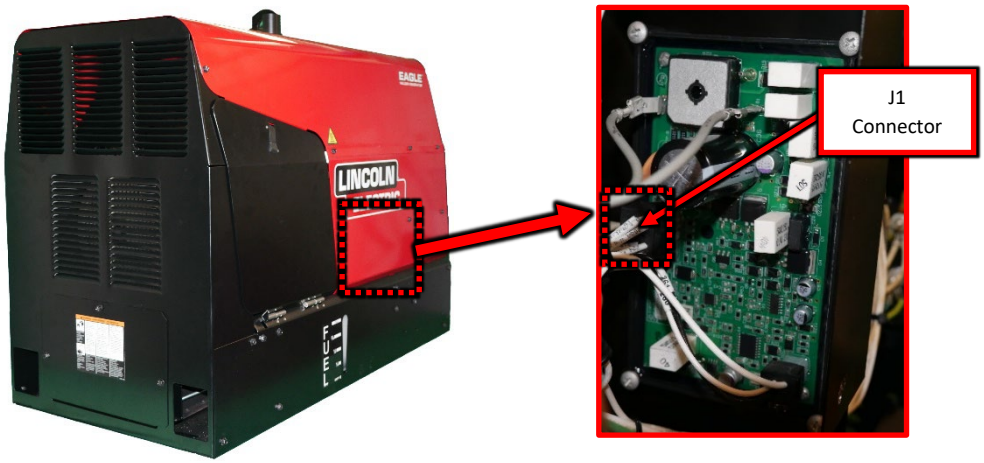


Figure F.2

A.3. Perform the static measurements in Test Table 1, refer to Figure F.3 for test point locations. **NOTE: J1 IS REMOVED FROM THE FIELD AND IDLE CONTROL BOARD, MEASUREMENTS ARE MADE ON J1 CONNECTOR HARNESS.**

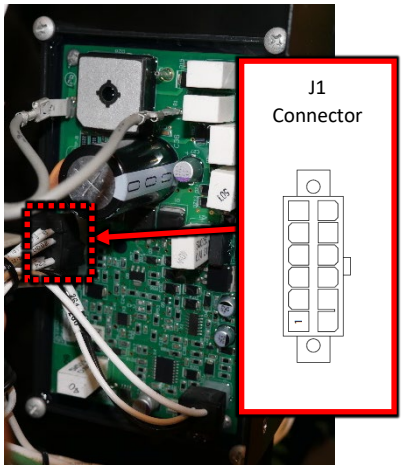


Figure F.3

R1 Local Control Potentiometer Static Test				
Component/Circuit Tested	Condition(s)	+Meter Lead	-Meter Lead	Expected Value
R1 Local Control Potentiometer	Machine OFF	J1 pin 1	J1 pin 7	~9.5KΩ
	Machine OFF, Rotate R1 from MIN to MAX	J1 pin 7	J1 pin 8	~1-9.5KΩ

Table 1

A.4. Any failed measurement indicates a defective component.

4. If problems with the machine persist, refer to the "Test Reference" chart for other possible faulty components. Reconnect anything disconnected in previous steps.

Refer to Safety pages for explanation of hazards:

REACTOR TEST PROCEDURE

TEST DESCRIPTION:
This procedure will determine the proper function of the Reactor using Static tests.

MATERIALS NEEDED:
3/8” wrench
7/16” wrench
Digital Multi-Meter
Wiring Diagram
Machine Schematic
Required P.P.E.

TEST PROCEDURE:
1. For location of the Reactor refer to Figure F.1.

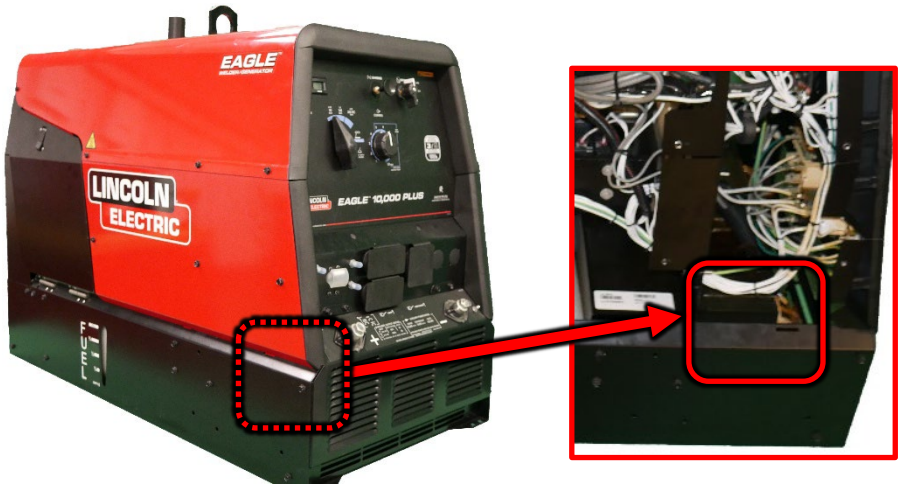


Figure F.1

2. Perform the “Case Cover Removal” to gain access for testing.

3. Perform the Static Testing.

A. STATIC TESTING

A.1. Ensure the engine is not running and the “Engine Control” switch is in the OFF position.

A.2. Label and disconnect the following connections, refer to Figure F.2.

Figure F.2

A.3. Perform the static measurements in Test Table 1, refer to Figure F.3 for test point locations.

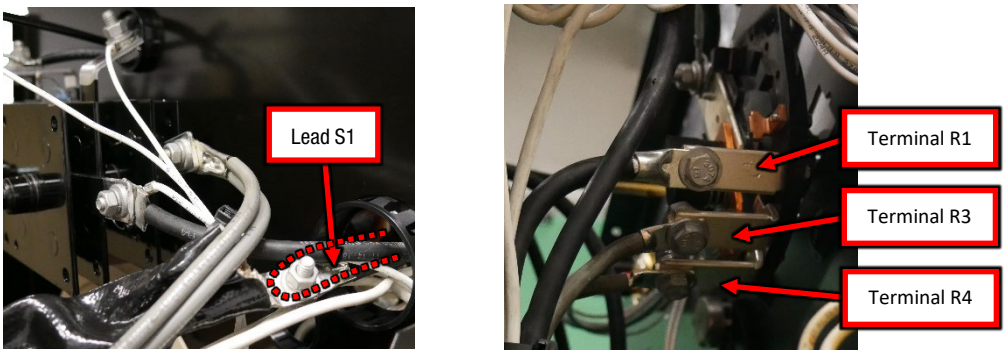


Figure F.3

Reactor Static Test				
Component/Circuit Tested	Condition(s)	+Meter Lead	-Meter Lead	Expected Value
Reactor	Machine Off	Lead S1	Terminal R4	<1Ω
		Lead S1	Terminal R3	<1Ω
		Lead S1	Terminal R1	<1Ω

Table 1

A.4. Any failed measurement indicates a defective component.

4. If problems with the machine persist, refer to the “Test Reference” chart for other possible faulty components. Reconnect anything disconnected in previous steps.

Refer to Safety pages for explanation of hazards:

ROTOR TEST PROCEDURE

TEST DESCRIPTION:
This procedure will determine the proper function of the Rotor using Static and Active tests.

MATERIALS NEEDED:
3/8” wrench
Digital Multi-Meter
Wiring Diagram
Machine Schematic
Required P.P.E.

TEST PROCEDURE:
1. For location of the Rotor refer to Figure F.1.

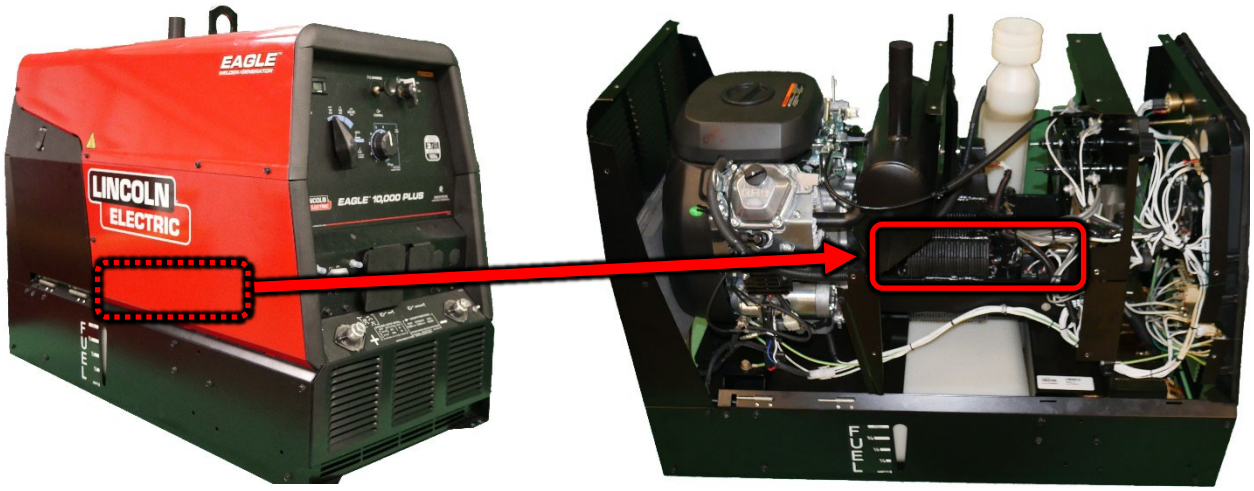


Figure F.1

2. Perform the “Case Cover Removal” to gain access for testing.

3. Perform the Static Testing.

A. STATIC TESTING

A.1. Ensure the engine is not running and the “Engine Control” switch is in the “Off” position.

A.2. Label and disconnect the following connections, refer to Figure F.2.

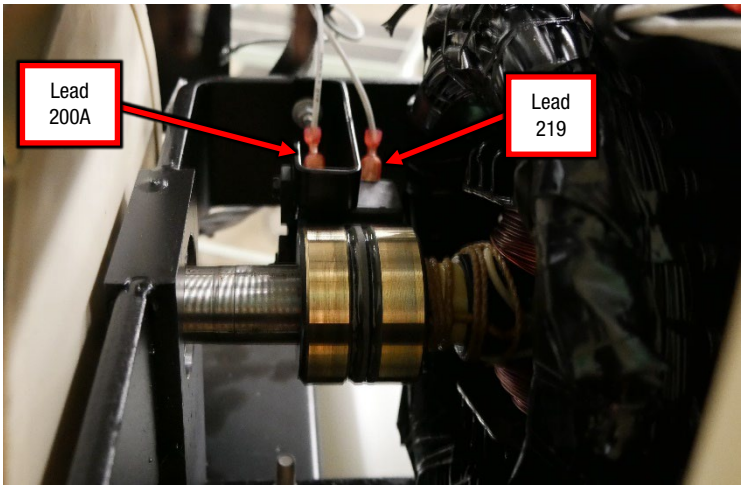


Figure F.2

A.3. Perform the static measurements in Test Table 1, refer to Figure F.3 for test point locations. **NOTE: ENSURE LEADS 200A AND 219 ARE DISCONNECTED.**

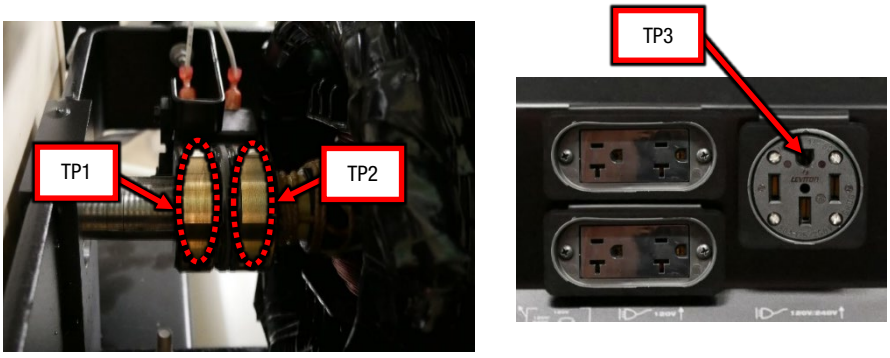


Figure F.3

Rotor Static Test				
Component/Circuit Tested	Condition(s)	+Meter Lead	-Meter Lead	Expected Value
Rotor	Machine Off	TP1	TP2	~5.5Ω
		TP1	TP3	>500K Ω

Table 1

A.4. If measurements are correct proceed to “B. ACTIVE TESTING”.

A.5. Any failed measurement indicates a defective component.

B. ACTIVE TESTING

B.1. Ensure the engine is running and "Engine Control" switch set to High idle. **NOTE: ENSURE LEADS 200A AND 219 ARE DISCONNECTED.**

B.2. Perform the measurements in Test Table 2 below, refer to Figure F.4 for test point locations.

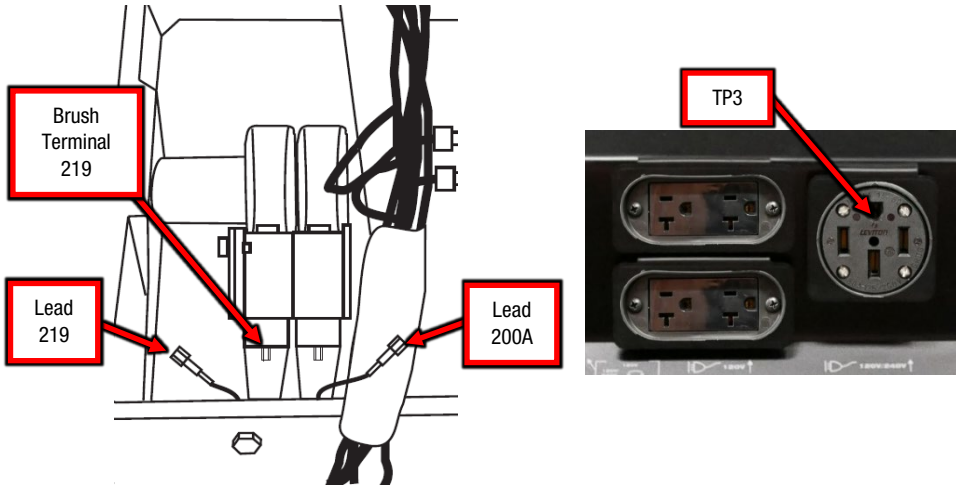


Figure F.4

Rotor Active Test				
Component/Circuit Tested	Condition(s)	+Meter Lead	-Meter Lead	Expected Value
Rotor Flying Short	Machine ON, High Idle	Terminal 219	TP3	>500KΩ

Table 2

B.3. If the input measurements are correct and the output measurements are not correct this component may be faulty.

4. If problems with the machine persist, refer to the "Test Reference" chart for other possible faulty components. Reconnect anything disconnected in previous steps.

Refer to Safety pages for explanation of hazards:

S1 OUTPUT SELECTOR SWITCH TEST PROCEDURE

TEST DESCRIPTION:
This procedure will determine the proper function of the S1 Output Selector Switch using Static tests.

MATERIALS NEEDED:
3/8” wrench
7/16” wrench
Digital Multi-Meter
Wiring Diagram
Machine Schematic
Required P.P.E.

TEST PROCEDURE:
1. For location of the S1 Output Selector Switch refer to Figure F.1.

2. Perform the “Case Cover Removal” to gain access for testing.

3. Perform the Static Testing.

A. STATIC TESTING

A.1. Ensure the engine is not running and the “Engine Control” switch is in the OFF position.

A.2. Label and disconnect the following connections, refer to Figure F.2.

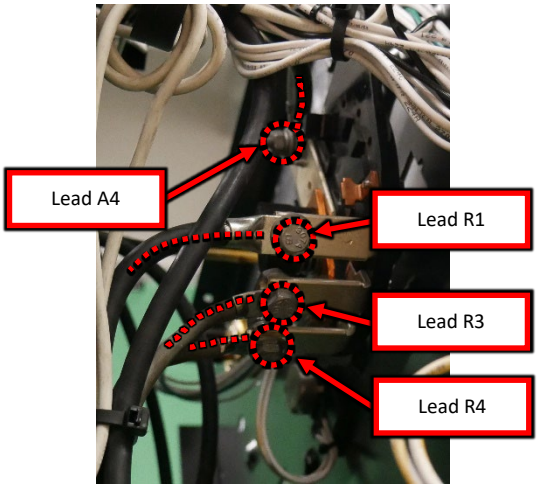


Figure F.2

A.3. Perform the static measurements in Test Table 1, refer to Figure F.3 for test point locations.

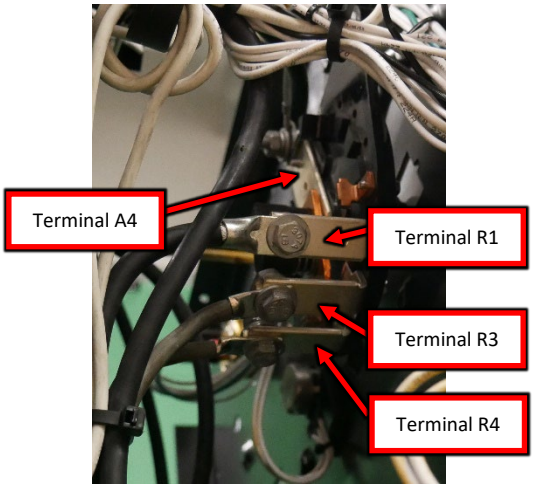


Figure F.3

S1 Output Selector Switch Static Test				
Component/Circuit Tested	Condition(s)	+Meter Lead	-Meter Lead	Expected Value
S1 Selector Switch	Machine Off	Terminal A4	Terminal R4	<1Ω
		Terminal A4	Terminal R3	<1Ω
		Terminal A4	Terminal R1	<1Ω

Table 1

A.4. Any failed measurement indicates a defective component.

4. If problems with the machine persist, refer to the “Test Reference” chart for other possible faulty components. Reconnect anything disconnected in previous steps.

Refer to Safety pages for explanation of hazards:

S3 ENGINE CONTROL SWITCH TEST PROCEDURE

TEST DESCRIPTION:
This procedure will determine the proper function of the S3 Engine Control Switch using Static tests.

MATERIALS NEEDED:
3/8” wrench
Digital Multi-Meter
Wiring Diagram
Machine Schematic
Required P.P.E.

TEST PROCEDURE:
1. For location of the S3 Engine Control Switch refer to Figure F.1.

Figure F.1

2. Perform the “Case Cover Removal” to gain access for testing.

3. Perform the Static Testing.

A. STATIC TESTING

A.1. Ensure the engine is not running and the "Engine Control" switch is in the OFF position.

A.2. Label and disconnect the following connections, refer to Figure F.2.

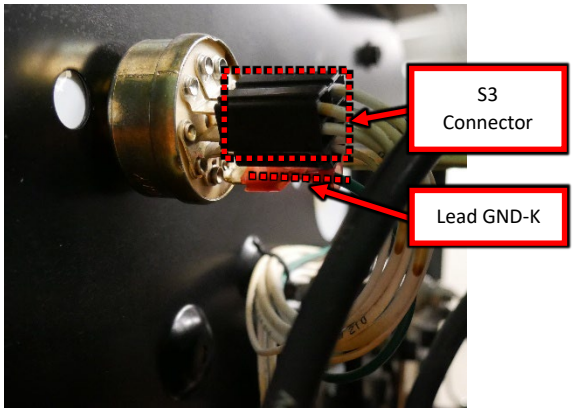


Figure F.2

A.3. Perform the static measurements in Test Table 1, refer to Figure F.3 for test point locations.

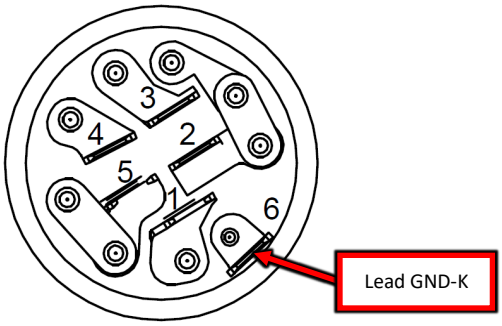


Figure F.3

S3 Engine Control Switch Static Test				
Component/Circuit Tested	Condition(s)	+Meter Lead	-Meter Lead	Expected Value
S3 Engine Control Switch	Machine Off, Switch set to OFF	Terminal 3	Terminal 4	<1Ω
		Terminal 3	Terminal 6	<1Ω
	Machine Off, Switch set to AUTO IDLE	Terminal 2	Terminal 4	<1Ω
		Terminal 2	Terminal 5	<1Ω
	Machine Off, Switch set to HIGH IDLE	Terminal 2	Terminal 5	<1Ω
	Machine Off, Switch set to START	Terminal 1	Terminal 2	<1Ω
		Terminal 1	Terminal 5	<1Ω

Table 1

A.4. Any failed measurement indicates a defective component.

4. If problems with the machine persist, refer to the "Test Reference" chart for other possible faulty components. Reconnect anything disconnected in previous steps.

Refer to Safety pages for explanation of hazards:

STARTER TEST PROCEDURE

TEST DESCRIPTION:
This procedure will determine the proper function of the Starter using Static tests.

MATERIALS NEEDED:
3/8” wrench
Digital Multi-Meter
Wiring Diagram
Machine Schematic
Required P.P.E.

TEST PROCEDURE:
1. For location of the Starter refer to Figure F.1.

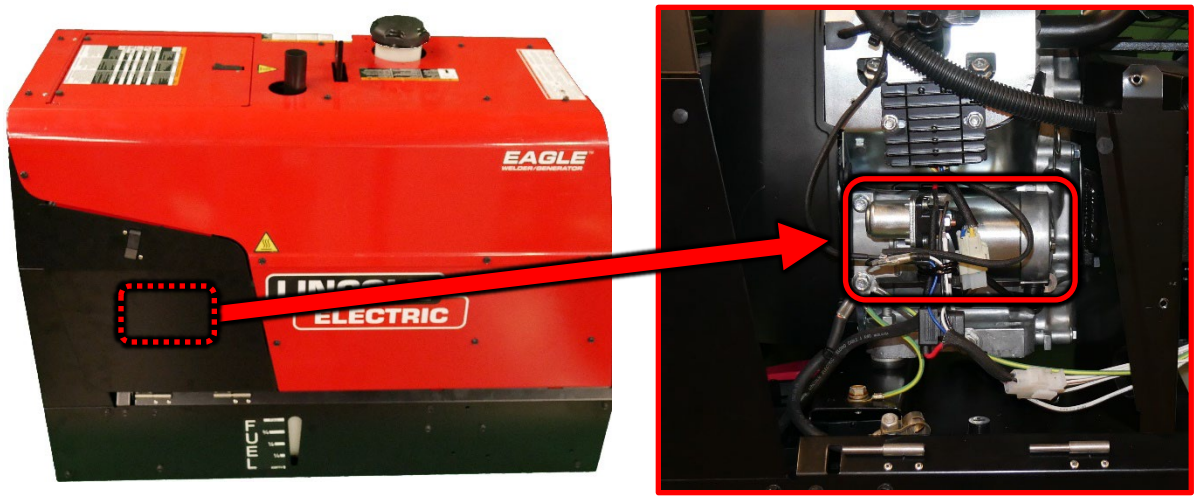


Figure F.1

2. Perform the “Case Cover Removal” to gain access for testing.

3. Perform the Static Testing.

A. STATIC TESTING

A.1. Ensure the engine is not running and the “Engine Control” switch is in the OFF position.

A.2. Perform the static measurements in Test Table 1, refer to Figure F.2 for test point locations.

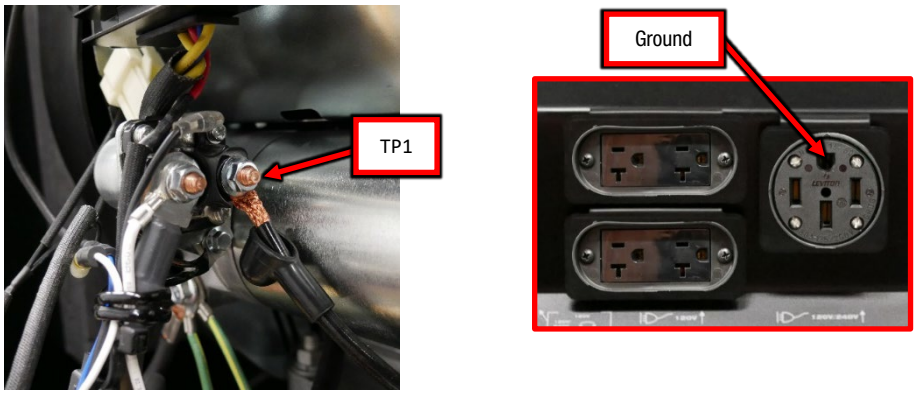


Figure F.2

Starter Static Test				
Component/Circuit Tested	Condition(s)	+Meter Lead	-Meter Lead	Expected Value
Starter	Machine Off	TP1	Ground	<1Ω

Table 1

A.3. Any failed measurement indicates a defective component.

4. If problems with the machine persist, refer to the “Test Reference” chart for other possible faulty components. Reconnect anything disconnected in previous steps.

Refer to Safety pages for explanation of hazards:

STATOR TEST PROCEDURE

TEST DESCRIPTION:
This procedure will determine the proper function of the Stator using Static and Active tests.

MATERIALS NEEDED:
3/8” wrench
7/16” wrench
Digital Multi-Meter
Wiring Diagram
Machine Schematic
Required P.P.E.

TEST PROCEDURE:
1. For location of the Stator refer to Figure F.1.

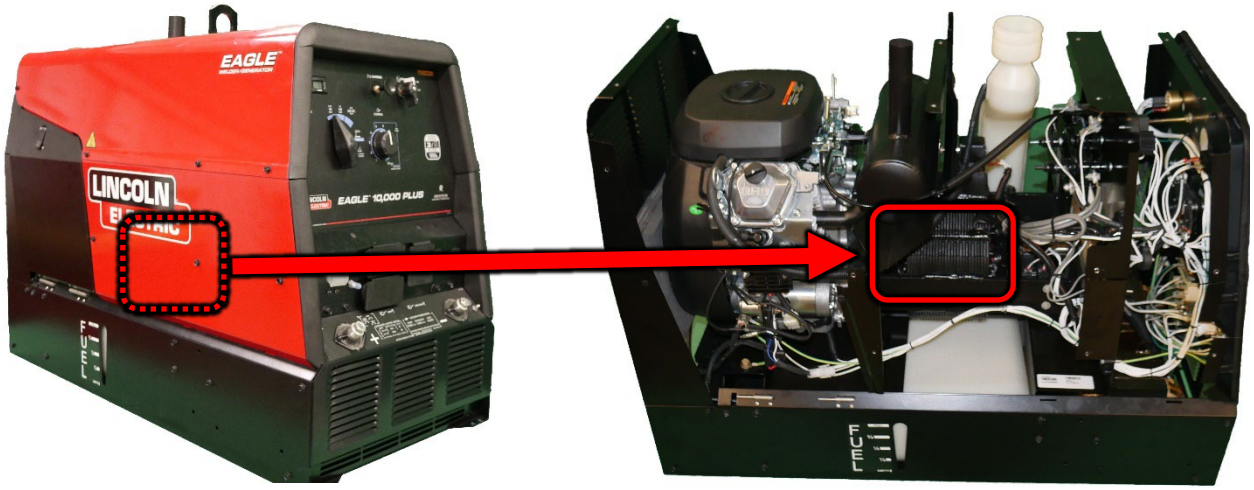


Figure F.1

2. Perform the “Case Cover Removal” to gain access for testing.

3. Perform the Static Testing.

A. STATIC TESTING

A.1. Ensure the engine is not running and the “Engine Control” switch is in the OFF position.

A.2. Label and disconnect the following connections, refer to Figure F.2.

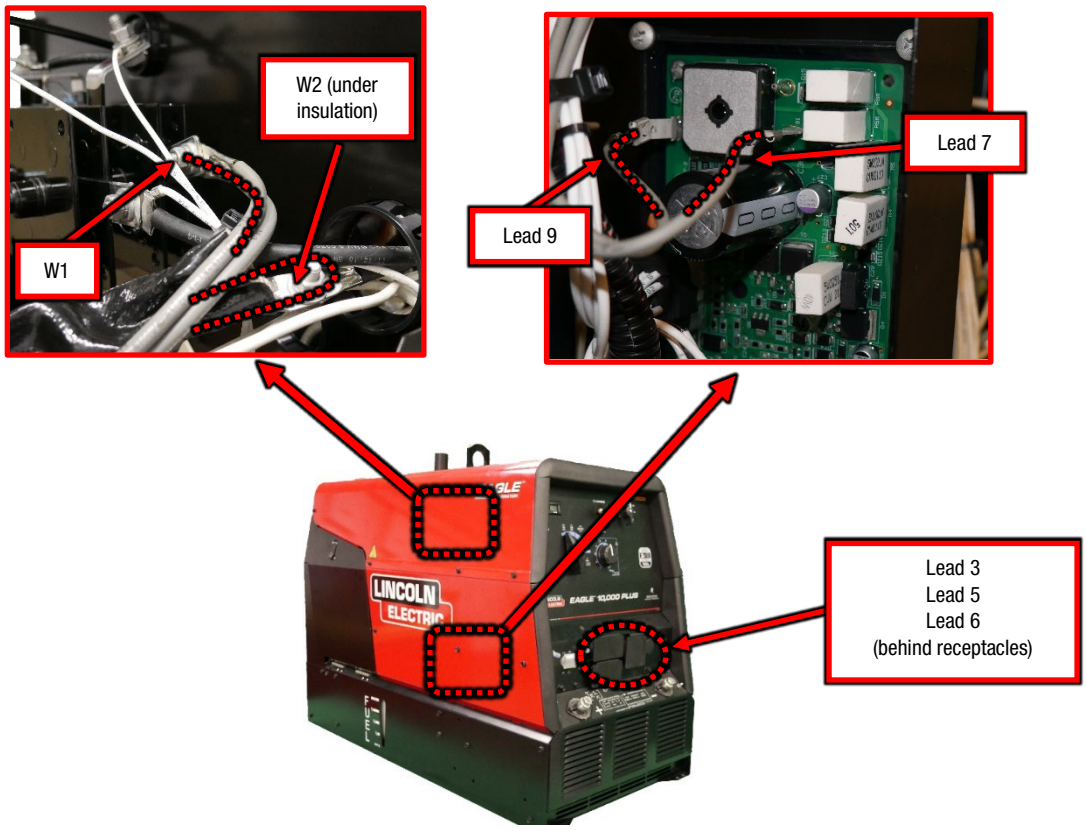


Figure F.2

A.3. Perform the static measurements in Test Table 1, refer to Figure F.2 for test point locations.

Stator Static Test				
Component/Circuit Tested	Condition(s)	+Meter Lead	-Meter Lead	Expected Value
Weld Winding	Machine Off	Lead W1	Lead W2	<1Ω
120VAC Winding		Lead 3	Lead 5	<1Ω
120VAC Winding		Lead 6	Lead 5	<1Ω
Field Winding		Lead 7	Lead 9	<1Ω

Table 1

A.4. If measurements are correct reconnect anything disconnected in previous steps and proceed to “B. ACTIVE TESTING”.

A.5. Any failed measurement indicates a defective component.

B. ACTIVE TESTING

B.1. Ensure the engine is running and “Engine Control” switch set to HIGH IDLE, “Output Control” set to Maximum.

B.2. Perform the measurements in Test Table 2 below, refer to Figure F.3 for test point locations.

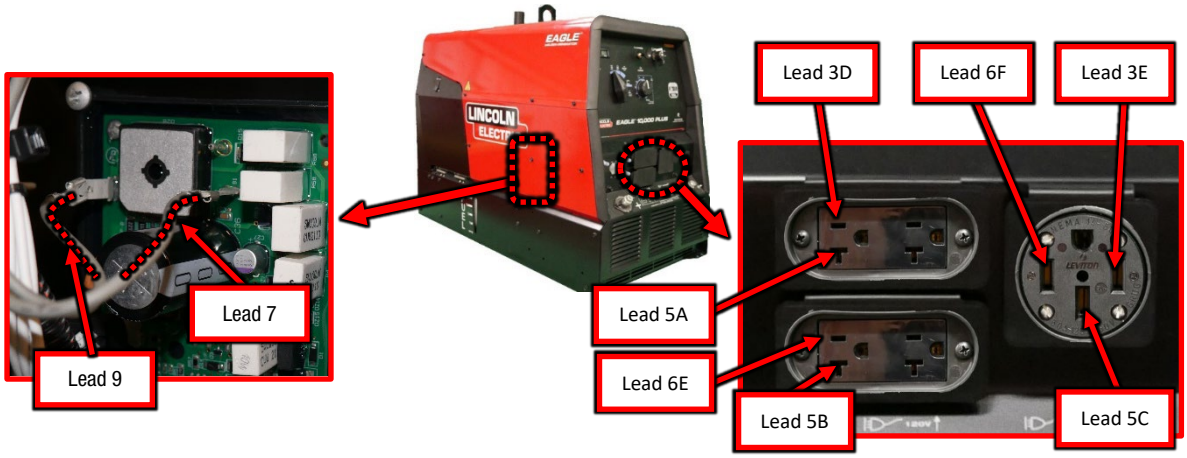


Figure F.3

Stator Active Test				
Component/Circuit Tested	Condition(s)	+Meter Lead	-Meter Lead	Expected Value
120/240VAC Output	Machine ON, Engine Control Switch set to HIGH, Output Control set to MAXIMUM	Lead 3E	Lead 6F	~240VAC
		Lead 3E	Lead 5C	~120VAC
		Lead 6F	Lead 5C	~120 VAC
120VAC Output		Lead 3D	Lead 5A	~120VAC
120VAC Output		Lead 6E	Lead 5B	~120VAC
Field Winding Output		Lead 7	Lead 9	36-43VAC

Table 2

B.3. If the input measurements are correct and the output measurements are not correct this component may be faulty.

4. If problems with the machine persist, refer to the “Test Reference” chart for other possible faulty components. Reconnect anything disconnected in previous steps.

Refer to Safety pages for explanation of hazards:

VOLTAGE REGULATOR TEST PROCEDURE

TEST DESCRIPTION:
This procedure will determine the proper function of the Voltage Regulator using Active tests.

MATERIALS NEEDED:
3/8” wrench
Digital Multi-Meter
Wiring Diagram
Machine Schematic
Required P.P.E.

TEST PROCEDURE:
1. For location of the Voltage Regulator refer to Figure F.1.

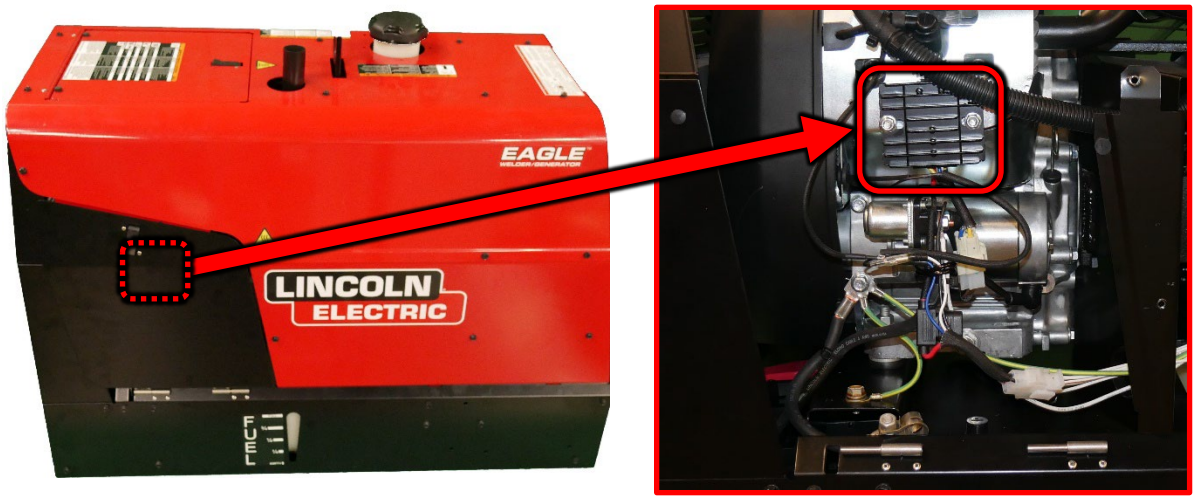


Figure F.1

2. Perform the “Case Cover Removal” to gain access for testing.

3. Perform the Active Testing.

A. ACTIVE TESTING

A.1. Ensure the engine is running and “Engine Control” switch set to HIGH IDLE.

A.2. Perform the measurements identified in Test Table 1 below, refer to Figure F.2 for test point locations.

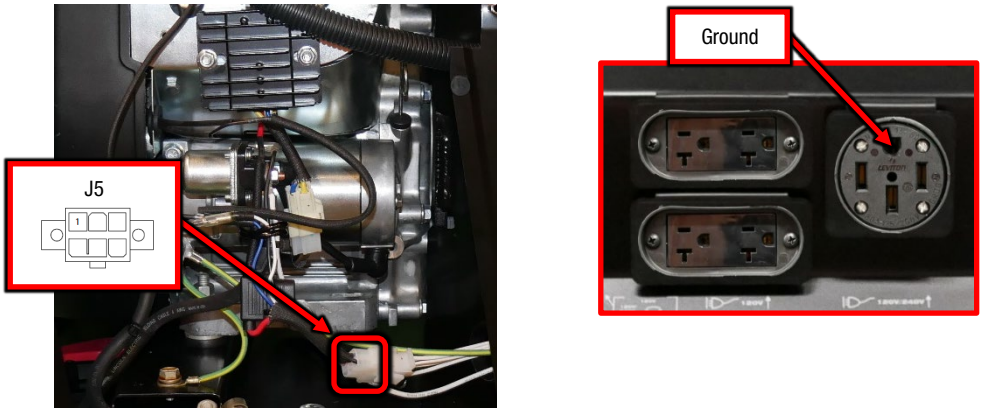


Figure F.2

Voltage Regulator Active Test				
Component/Circuit Tested	Condition(s)	+Meter Lead	-Meter Lead	Expected Value
Voltage Regulator Output	Machine ON, HIGH IDLE	J5 pin 6	Ground	~13-15VDC

Table 1

A.3. If the output measurements are not correct this component may be faulty.

4. If problems with the machine persist, refer to the “Test Reference” chart for other possible faulty components. Reconnect anything disconnected in previous steps.

Refer to Safety pages for explanation of hazards:

CASE COVER REMOVAL AND REPLACEMENT PROCEDURE

TEST DESCRIPTION

This procedure will aid the technician in the removal and replacement of the Case Covers.

MATERIALS NEEDED

Phillips Screwdriver
3/8" Nutdriver
Wiring Diagram

REMOVAL PROCEDURE

1. Ensure the machine is not running and carefully remove the spark plug wires from the engine.
2. Unlatch and remove both swing down engine cover panels from their hinges at the rear of the machine. See Figure F.1.
3. Remove the rubber gasket (cover seal) from the lift bail. See Figure F.1.
4. Remove the fuel cap and the rubber gasket for the fill tube. See Figure F.1.
5. Using a 3/8" nutdriver, remove the 16 screws securing the top cover panel and remove from the machine then **re-install the fuel cap**. See Figure F.1.
6. Using a 3/8" nutdriver, remove the 3 screws securing each side cover panel from both sides. See Figure F.1.
7. Perform any tests/replacement procedure.

REPLACEMENT PROCEDURE

1. Perform the removal procedure in reverse to replace the case coverings.

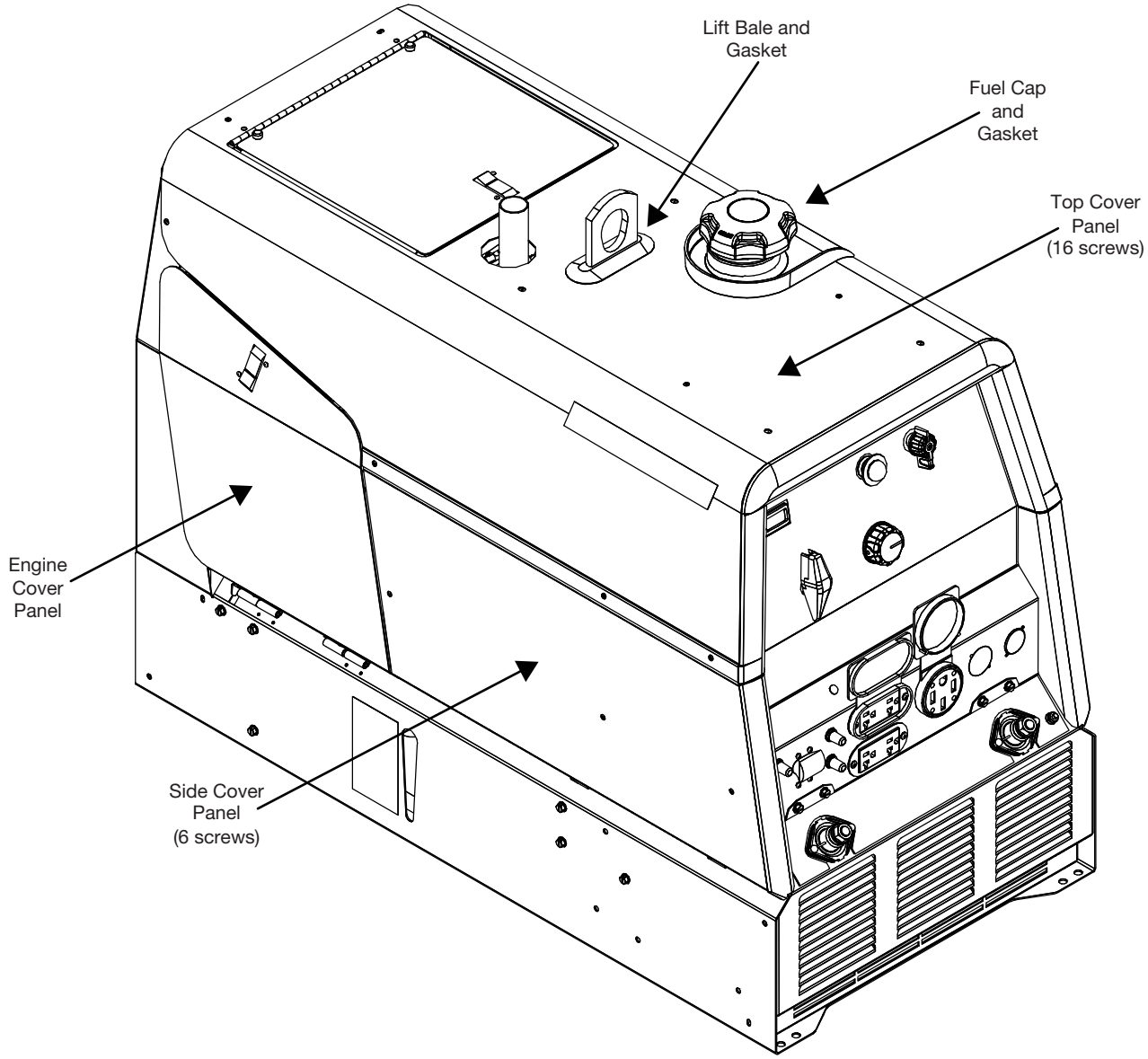


Figure F.1 – Case cover components

Refer to Safety pages for explanation of hazards:

FIELD & IDLE CONTROL PC BOARD REMOVAL AND REPLACEMENT PROCEDURE

TEST DESCRIPTION

This procedure will aid the technician in the removal and replacement of the Field & Idle Control PC Board.

MATERIALS NEEDED

Phillips Head Screwdriver
Miscellaneous Hand Tools
Wiring Diagram

REMOVAL PROCEDURE

1. Ensure the machine is not running and carefully remove the spark plug wires from the engine.
2. Perform the ***CASE COVER REMOVAL PROCEDURE***.
3. Label and remove both Molex Connectors. See Figure F.1.
4. Label and remove leads from two 1/4" Q.C. tabs. See Figure F.1.
5. With a Phillips Head Screwdriver, remove four self tapping screws holding the Field & Idle Control PC Board. See Figure F.1.
6. The Field & Idle Control PC Board can now be removed from the machine.

REPLACEMENT PROCEDURE

1. Perform the removal procedure in reverse to replace the Field & Idle Control PC Board.

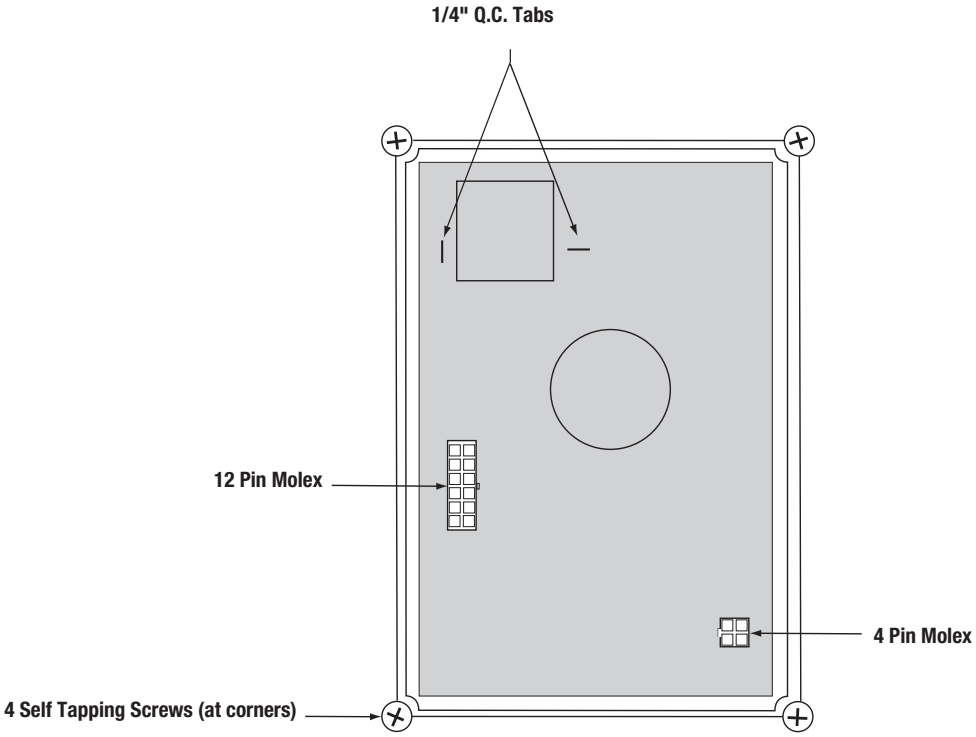


Figure F.1 – Field & Idle Control PC Board components

Refer to Safety pages for explanation of hazards:

BRUSH REMOVAL AND REPLACEMENT PROCEDURE

TEST DESCRIPTION

This procedure will aid the technician in the removal and replacement of the Brushes.

MATERIALS NEEDED

5/16" Wrench
7/16" Wrench
Miscellaneous Hand Tools
Wiring Diagram

REMOVAL AND REPLACEMENT PROCEDURE

1. Ensure the machine is not running and carefully remove the spark plug wires from the engine.
2. Perform the ***CASE COVER REMOVAL PROCEDURE***.
3. With needle nose pliers, label and remove leads 200 and 219A from the brushes.
4. With a 7/16” wrench, remove the brush holder assembly bracket from the stator frame.See Figure F.1.
5. With a 5/16” wrench, remove the two screws that secure the brush holder assembly to the bracket. Slide the brush holder assembly out of the bracket.
6. To change the brushes, use a slot head screw driver to pop off the plastic retainer on the back of the brush holder assembly.
7. Remove the old brushes and insert the new ones. One corner of the terminal clip is beveled so that the brush can go in only one way.
8. Snap the plastic retainer back onto the brush holder. The brushes may need some repositioning; wiggle them slightly to help them seat properly on the slip rings.
9. To reinstall the brushes, depress the springloaded brushes into the holder and slip a suitable non-metallic, fairly stiff retainer through the slots at the top and bottom of the holder. A cable tie works well; See Figure F.1. This will hold the brushes up so that you can easily install the holder.
10. Slide the brush holder assembly back into the bracket and, with the 5/16” open end wrench, install the two screws that hold it in place.
11. With the 7/16” wrench, install the brush holder assembly bracket to the stator frame.
12. Slowly remove the non-metallic retainer from the brush holder and let the brushes snap back against the slip rings.
13. With the needle nose pliers, connect leads 200 and 219A to the appropriate terminals on the brushes.
14. Check the wire connections for clearance and tightness.

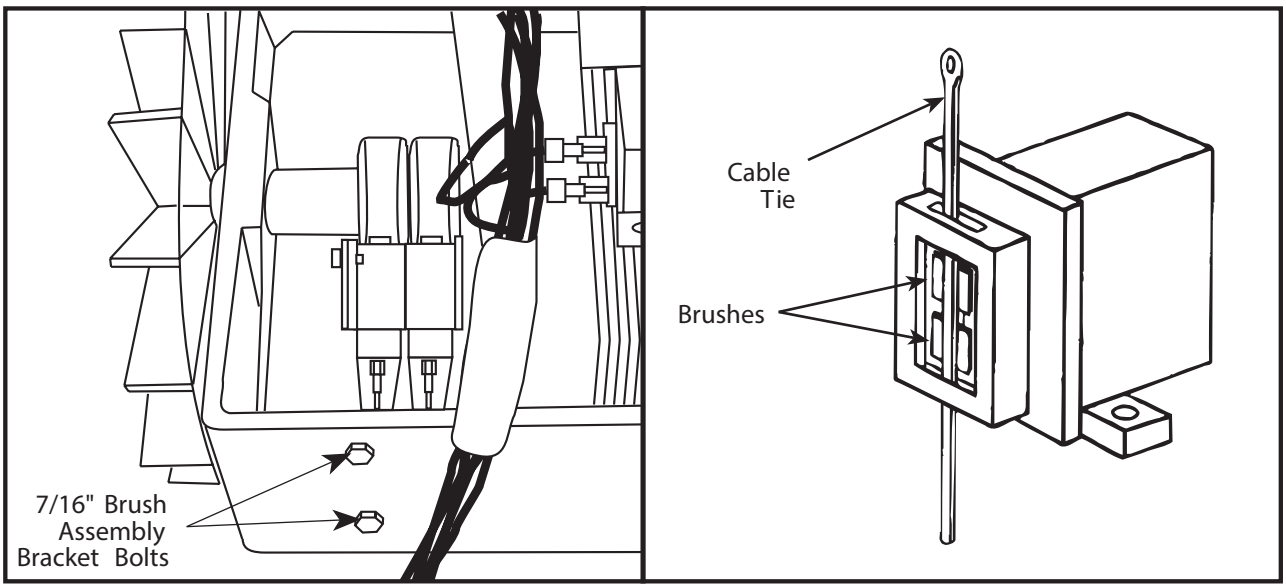


Figure F.1 – Brush components

EAGLE 10,000

RETEST AFTER REPAIR

Retest a machine:

- If it is rejected under test for any reason that requires you to remove any mechanical part which could affect the machine's electrical characteristics.

OR

- If you repair or replace any electrical components.

ENGINE OUTPUT

Mode	No Load RPM	Load RPM
Low Idle	2400 RPM	N/A
High Idle	3700 RPM	3500 RPM

WELDER OUTPUT

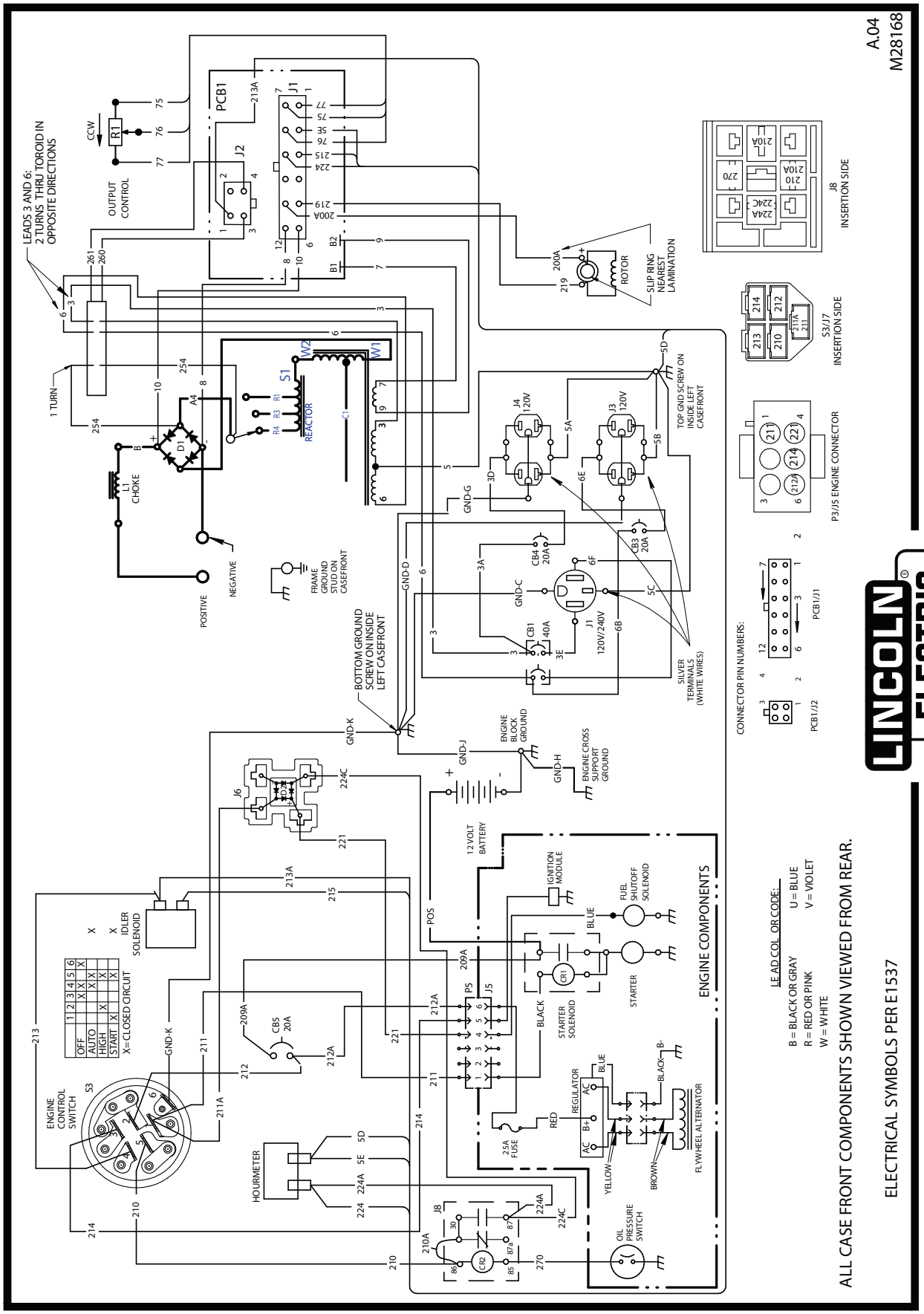
Output Control	Output Range Switch	Open Circuit Voltage	Load Volts	Load Amps
Maximum	Maximum	65-72VDC	25 VDC	225 Amps

AUXILIARY POWER RECEPTACLES OUTPUT

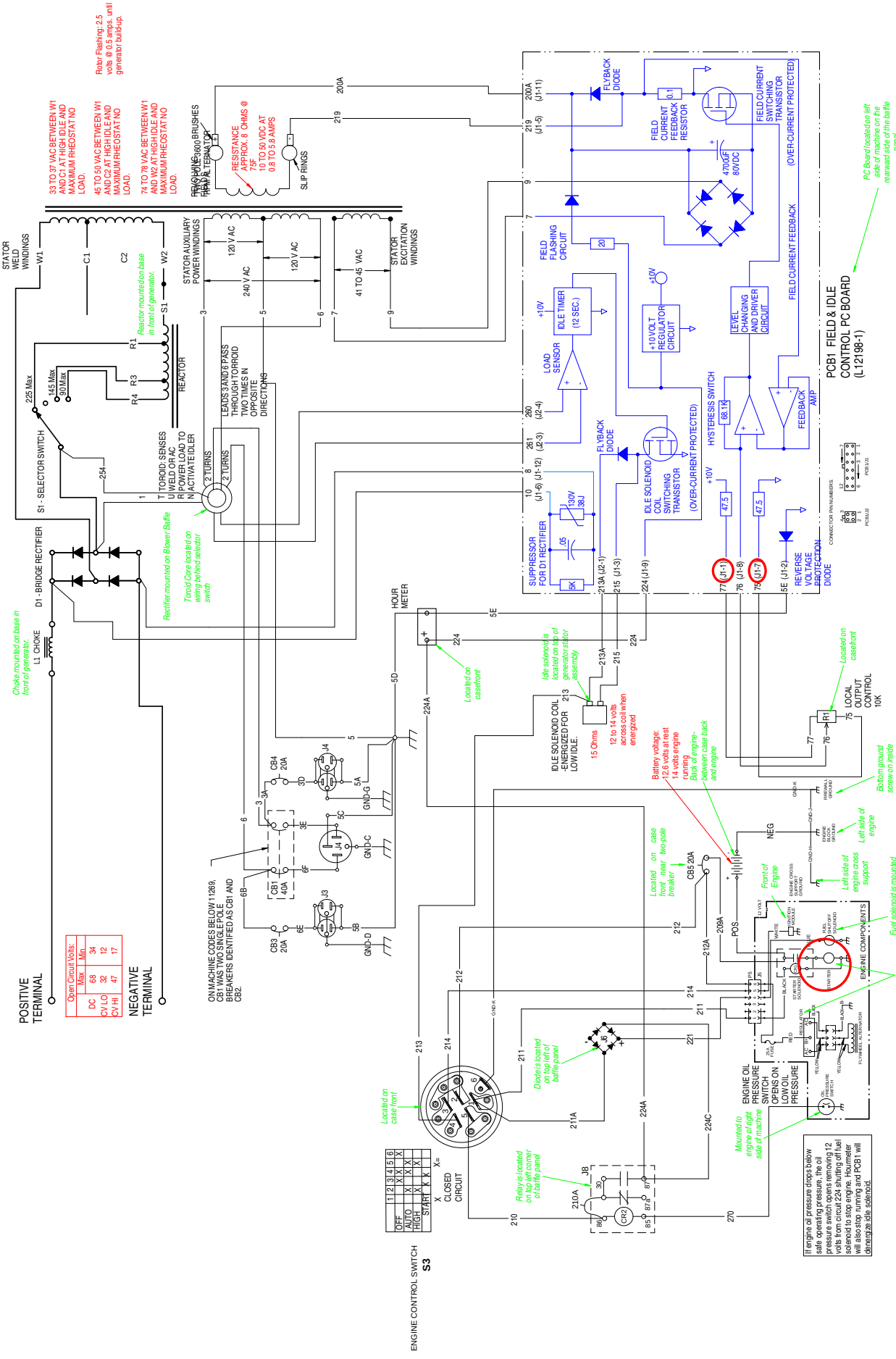
230VAC Receptacle			115VAC Receptacle		
Open Circuit Voltage	Load Voltage	Load Amps	Open Circuit Voltage	Load Voltage	Load Amps
246-264 VAC	216-250VAC	34-41.5 Amps	123-132 VAC	114-126 VAC	35-42 Amps

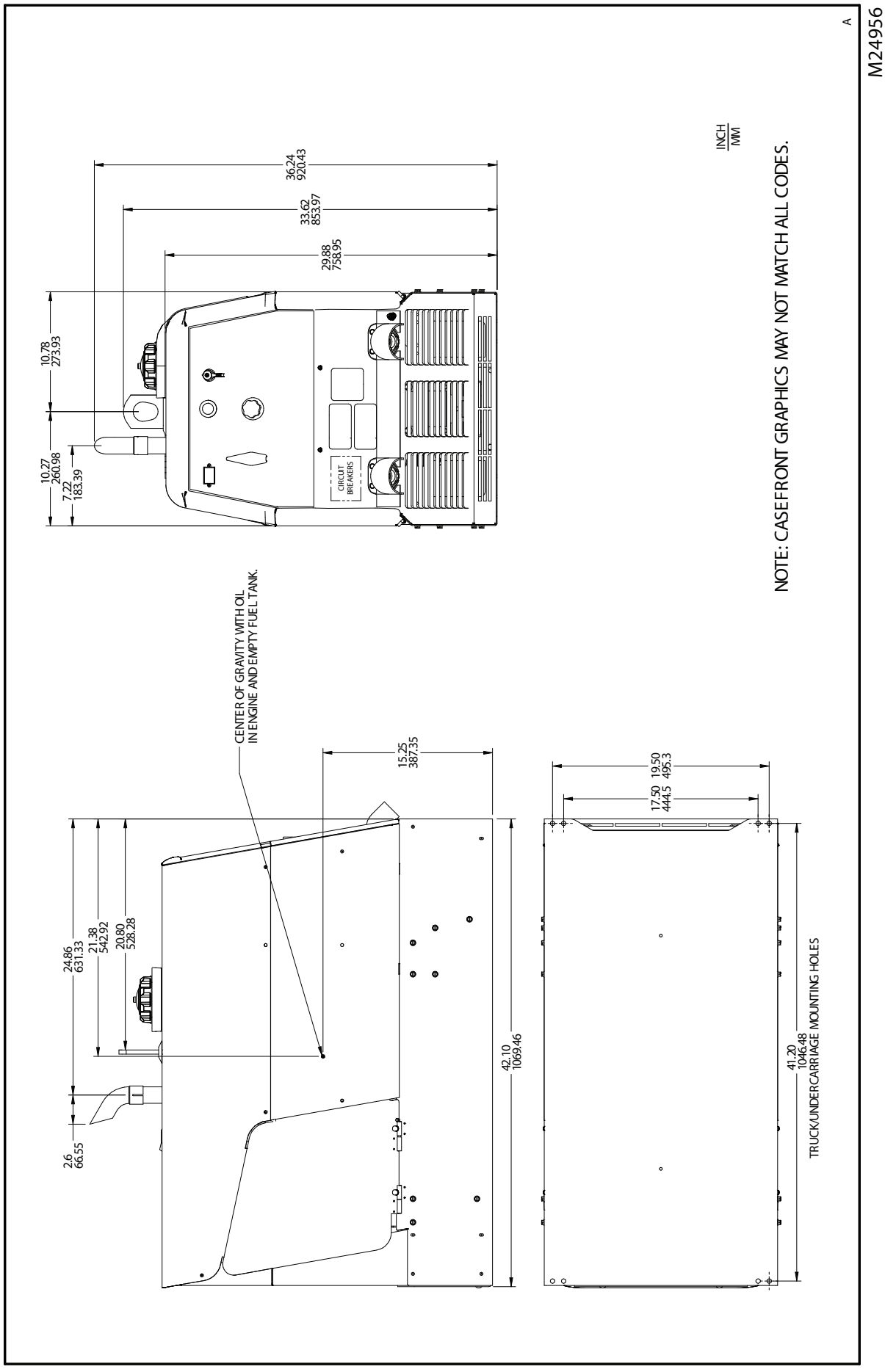
Output values of each receptacle can vary within the range shown but must be within 2 volts of each other

EAGLE 10,000 PLUS (GV750)



NOTE: This diagram is for reference only. It may not be accurate for all machines covered by this manual. The specific diagram for a particular code is included with the machine. If the diagram is illegible, write to the Service Department for a replacement. Give the equipment code number.


PCB1 FIELD & IDLE CONTROL PC BOARD (L12198-1)
STATOR WELD WINDINGS
STATOR AUXILIARY POWER WINDINGS
STATOR EXCITATION WINDINGS
REACTOR
S1 - SELECTOR SWITCH
D1 - BRIDGE RECTIFIER
L1 CHOKE
HOUR METER
FIELD FLASHING CIRCUIT
FLYBACK DIODE
FIELD CURRENT FEEDBACK RESISTOR
FIELD CURRENT SWITCHING TRANSISTOR
(OVER-CURRENT PROTECTED)
FIELD CURRENT FEEDBACK
IDLE TIMER (12 SEC.)
LOAD SENSOR
+10VOLT REGULATOR CIRCUIT
LEVEL CHASING AND DRIVER CIRCUIT
HYSTERESIS SWITCH
FEEDBACK AMP
IDLE SOLENOID COIL SWITCHING TRANSISTOR
SUPPRESSOR FOR D1 RECTIFIER
REVERSE VOLTAGE PROTECTION DIODE
LOCAL OUTPUT CONTROL 10K
ENGINE CONTROL SWITCH S3
ENGINE OIL PRESSURE SWITCH OPENS ON LOW OIL PRESSURE
POSITIVE TERMINAL
NEGATIVE TERMINAL
ENGINE COMPONENTS
Rotor Flashing: 2.5 volts @ 0.5 amps. until generator build-up.
Reactor mounted on base in front of generator.
Rectifier mounted on Blower Baffle
Toroid Core located on wiring behind selector switch
Choke mounted on base in front of generator.
Located on case front
Located on case front
Diode is located on top left of baffle panel
Relay is located on top left corner of baffle panel
Mounted to engine of right side of machine
Located on front near two pole breaker
Front of Engine
Left side of engine
Left side of engine cross support
Fuel solenoid is mounted on engine carburetor.
Mounted to engine on left side of machine
Bottom ground screw on inside left case/front
Battery voltage: 12.6 volts at rest 14 volts engine running Back of engine- between case back and engine
Idle solenoid is located on top of generator stator assembly
IDLE SOLENOID COIL -ENERGIZED FOR LOW IDLE:
15 Ohms
12 to 14 volts across coil when energized
If engine oil pressure drops below safe operating pressure, the oil pressure switch opens removing 12 volts from circuit 224 shutting off fuel solenoid to stop engine. Hourmeter will also stop running and PCB1 will denergize idle solenoid.
ON MACHINE CODES BELOW 11289, CB1 WAS TWO SINGLEPOLE BREAKERS IDENTIFIED AS CB1 AND CB2.
33 TO 37 VAC BETWEEN W1 AND C1 AT HIGH IDLE AND MAXIMUM RHEOSTAT NO LOAD.
45 TO 50 VAC BETWEEN W1 AND C2 AT HIGH IDLE AND MAXIMUM RHEOSTAT NO LOAD.
74 TO 78 VAC BETWEEN W1 AND W2 AT HIGH IDLE AND MAXIMUM RHEOSTAT NO LOAD.
RESISTANCE APPROX. 8 OHMS @ 75F
10 TO 50 VDC AT 0.8 TO 5.8 AMPS
SLIP RINGS
BRUSHES
Open Circuit Volts:
Max Min
DC 68 34
CV LO 32 12
CV HI 47 17
OFF
AUTO
HIGH
START
CLOSED CIRCUIT


DIMENSION DIAGRAM CODE
A
M24956
INCH
MM
NOTE: CASEFRONT GRAPHICS MAY NOT MATCH ALL CODES.
36.24
920.43
33.62
853.97
29.88
758.95
10.78
273.93
10.27
260.98
7.22
183.39
CIRCUIT BREAKERS
CENTER OF GRAVITY WITH OIL
IN ENGINE AND EMPTY FUEL TANK.
15.25
387.35
24.86
631.33
21.38
542.92
20.80
528.28
2.6
66.55
42.10
1069.46
19.50
495.3
17.50
444.5
41.20
1046.48
TRUCK/UNDERCARRIAGE MOUNTING HOLES

2 Step – When the gun trigger is pulled, the welding system cycles through the arc starting sequence and into the main welding parameters. The welding system will continue to weld as long as the gun trigger is activated. Once the trigger is released, the welding system cycles through the arc ending steps.

3 Phase voltage – Three AC voltage sources that are phase shifted 120° with respect to each other.

4 Step – The 4 step trigger adds to the welder's comfort when making long welds by allowing the trigger to be released after an initial trigger pull. When the gun trigger is pulled, the welding system cycles through the arc starting sequence and into the main welding parameters. Welding stops when the trigger is pulled a second time and then released and the welding system cycles through the arc ending steps.

A-lead – The single wire used to configure the machine reconnect for various input Voltages.

AC (Alternating Current) – Voltage or current that changes polarity or direction, respectively, over time.

Active Condition – The machine is energized either by connection to a power source or has some kind of mechanical motion within the unit.

Alternator – An electric generator that produces alternating current. The main function of this device is to change mechanical energy into electrical energy. The mechanical energy can be supplied by either a motor or engine.

Ampere (Amp) – The standard measurement unit of current flow. Symbol: A

Anode – The positively charged electrode of a device.

Arc Control (Pinch) – Adjusts how quickly the current will rise when the wire is shorted to the work resulting in a soft or crisp arc.

Arc Force – A temporary increase of the output current during SMAW welding when the arc is too short.

Arc Length – The physical gap between the end of the electrode and the weld puddle.

Across the Arc – The device is electrically connected to the welding terminals. This device is powered by the same voltage that is used for welding.

Arc-link cable – Used between the power source and wire feeder in a bench system and between the power source, control box and wire drive in a boom system. This 5 pin cable supplies voltage from the power source to power the feeder and also transmits digital signals between the two.

Armature – The part of an electric device that includes the main current-carrying winding and in which the electromotive force is induced.

Armature Reaction – A force set up by the current induced in the armature of a generator that results in altering as to both magnitude and direction the flux due to the field magnet.

Asynchronous Welder Generator – An alternator that utilizes an air-gap rotating magnetic-field between a stator and a rotor to interact with an induced current in a rotor winding. It is sometimes called an induction generator.

Auxiliary Windings – Stator winding used to power the auxiliary connections.

Battery – A combination of two or more cells electrically connected to work together to produce electric energy.

Block Diagram – visual representation of a machine that utilizes simplified blocks to represent the principal parts or functions of the machine.

Boost Converter – The boost converter increases applied voltage to a higher level. This circuitry only applies to DC voltage and is only active if the applied voltage is below a predetermined value.

Bridge Rectifier – A type of full wave rectifier which uses four or more diodes in a bridge circuit configuration to efficiently convert the Alternating Current (AC) into Direct Current (DC).

Brushes – An electrical contact which conducts current between stationary wires and moving parts, most commonly in a rotating shaft.

Buck Converter – The buck converter decreases applied voltage to a lower level. This circuitry only applies to DC voltage and is only active if the applied voltage is above a predetermined value.

Buck/Boost Converter – The combined buck/boost circuitry is utilized to increase or decrease an applied voltage to a predetermined value.

CAN communication – Controller Area Network (CAN bus) is a robust vehicle bus standard designed to allow microcontrollers and devices to communicate with each other's applications without a host computer. It broadcasts messages to the nodes presented in a network.

Cathode – The negatively charged electrode of a device.

Capacitance – The ability of a body to store an electrical charge.

Capacitor – A device used to store an electric charge, consisting of one or more pairs of conductors separated by an insulator. Capacitance is measured in Farad's (F) and some capacitors are polarity sensitive which is typically noted on the device as such.

Circuit Breaker – A device to prevent excessive current flow in a circuit that may be caused by a short circuit or heavy loads. The circuit breaker will stop the flow of current (open) if such a situation occurs.

Collector – The positively charged electrode of a transistor device.

Commutator – A cylindrical ring or disk assembly of conducting members, individually insulated in a supporting structure with an exposed surface for contact with current-collecting brushes and mounted on the armature shaft, for changing the frequency or direction of the current in the armature windings.

Conductor – A type of material that allows the flow of charge (**electrical** current) in one or more directions

Connectors – Various devices for connecting one object to another.

Constant Current – A process where the power source keeps the current as constant as possible even when the operator varies the arc length. The voltage varies, formerly known as "variable voltage". Mainly used for Stick and TIG welding.

Constant Voltage – A process where the power source keeps the voltage as constant as possible and allows amperage to vary considerably. Mainly used for MIG and Flux core welding using wire feeders.

Contactor – A mechanically or electrically operated switch used in high current applications.

Control cable – A multistrand cable used for transmission of power, command and feedback information.

Crosslinc – A welding system communication technology. When using a Crosslinc enabled power source and wire feeder, welding voltage can be controlled remotely, through the welding cable without the use of an additional control cable.

Current – The flow of electrons through a conductor.

Current Transducer – A device used to detect DC current flow.

Cycle – One complete wave of alternating current or voltage.

DC (Direct Current) – A voltage or current that never crosses zero and maintains current flow in one direction.

Diode – A device used in a circuit that allows current to flow in one direction only. Typically current flow will occur if the diode's anode is more positive than its cathode. Typical configurations used can be: blocking, flashing, free-wheeling, full wave bridge rectifier, half wave rectifier.

Display – An electronic device with a screen used for displaying information.

Duty Cycle – The percentage of a ten (10) minute period that a power source can operate its rated load before exceeding its thermal limit.

Efficiency – The ratio of the output power divided by the input power.

Electrical Interference (noise) – Unwanted noise or other effects from electromagnetic radiation.

Electricity – The flow of electrons through a conductor from the source to a ground.

Electrode Negative – When the electrode is connected to the negative output terminal.

Electrode Positive – When the electrode is connected to the positive output terminal.

Electromagnetism – Magnetism developed by a current of electricity.

Emitter – The negatively charged electrode of a transistor device.

Encoder – An electro-mechanical device that converts the angular position or motion of a shaft or axle to digital output signals.

Excitation – The process of generating a magnetic field by means of an electric current. The source of this can be from a magnet or an external voltage source.

Excitation Windings – Stator winding that powers the excitation process in an alternator or generator.

Farads – The standard measurement unit of capacitance. Symbol: f

Feedback – To provide actual output information to a control circuit so as to maintain a constant output.

Feeder Winding – Stator winding that powers the wire feeders.

Field Windings – The stationary windings of a generator.

Field Current – The current flow through the Field Windings

Light Emitting Diode (LED) – A semiconductor device that emits light when an electric current passes through it.

Flashing – A generic term referring to the initial excitation of an electrical magnetic field.

Forward Biased – When voltage is applied to a semiconductor device in the direction that allows current to flow.

Frequency – The number of occurrences of a repeating event (cycles) per unit of Time.

Full Wave – A rectifier that converts alternating current into continuous current and that utilizes both halves of each cycle of the alternating current.

Fuse – An electrical safety device that operates to provide overcurrent protection of an electrical circuit. Its essential component is a metal wire or strip that melts when too much current flows through it, thereby interrupting current flow.

Gate – Is the control terminal in a semiconductor device. Typically a small voltage is applied to the Gate to trigger or latch the device.

Generator – An electric generator that produces direct current. The main function of this device is to change mechanical energy into electrical energy. The mechanical energy can be supplied by either a motor or engine.

GFCI (Ground Fault Circuit Interrupter) – A device which interrupts current flow when it senses an imbalance between the outgoing and incoming current.

Ground Connection – A safety connection from a welding machine frame to an earth ground.

Half Wave - A rectifier that utilizes one half cycle of alternating current and suppresses the other.

Henry – The standard measurement unit of inductance. Symbol: H

Hertz – The standard measurement unit of electrical frequency. Symbol: Hz

High Frequency – A high frequency used for arc ignition and stabilization when TIG welding.

Hot Start – Increases the output amperage for a designated amount of time at the start of a weld.

Insulated Gate Bipolar Transistor (IGBT) – A high speed solid state switching device that can be turned on by applying a voltage signal to the gate. When the gate signal is removed the IGBT will turn off. An IGBT will operate on DC voltage only.

Inductance – The tendency of an electrical conductor to oppose a change in the electric current flowing through it.

Inductor – A passive component which stores the electrical energy in a magnetic field when the electric current passes through it.

Interpole Coils – Utilized in generators. They counteract the effects of armature reaction.

Inverter – circuitry that changes direct current (DC) to alternating current (AC).

Life Cycle – The length of time a product is introduced to consumers until it's removal from the shelves.

Motor – An electrical device that converts electrical energy into mechanical energy.

Magnetic Field – The area around a magnet or coil in which there is magnetic force.

Magnetic Flux – The measurement of the total magnetic field lines that pass through a given surface area.

Magnetism – The force that arises from the motion of electric charges.

MOLEX – Is the vernacular term for a two-piece pin and socket interconnection that was pioneered by Molex Connector Company.

Negative Temperature Co-efficient (NTC) – A type of thermistor in which the resistance decreases in relation to a rise in temperature.

OCV (Open Circuit Voltage) –The potential voltage in the welding circuit before the arc is initiated or a load applied; measured in volts.

Ohms – The standard measurement unit of electrical resistance. Symbol: Ω

Ohm's Law – current passing through a conductor is proportional to the voltage over the resistance. I = V / R.

Parallel Circuit – a circuit that has multiple current paths.

Peak Value – The maximum value attained by the current during one cycle. There is a positive and negative peak.

Peak to Peak Value – The maximum value attained by both peaks during one cycle.

Phase – A relative variation or change of state or a cycle.

Phaseback (foldback) – A current limiting feature (a type of overload protection).

Pilot Arc – The electrical pathway between the torch nozzle and electrode tip. This function aids in the transfer of current from the electrode tip to the work piece.

Polarity – The polarity of the electrode as compared to the polarity of the work piece.

Positive Temperature Co-efficient (PTC) – A type of thermistor in which the resistance increases in relation to a rise in temperature.

Potentiometer – It is a variable resistor with three terminals. The middle terminal is adjustable. The potential at the third terminal can be adjusted to give any fraction of the potential voltage across the two outer terminals.

Power – The rate, over time, in which electrical energy is transferred within an electrical circuit.

Power Factor – The ratio of the real power that is used to do work to the apparent power that is supplied to the circuit.

Printed Circuit Boards – A physical device that houses one or more electrical circuits.

Pulsating DC – A periodic current which changes in value but never changes direction.

Rated Load – The average amperage and voltage the power source is designed to produce for a given specific duty cycle time period. For example, 400 amps, 36 load volts, at 60 percent duty cycle.

RCBO (Residual Current Breaker with Over-current) – A combination of a RCD and Circuit Breaker.

RCD (Residual Current Device) – Detects imbalance in the currents of the supply and return conductors of a circuit. Does not protect against shorts.

Reactor – An electrical magnetic component used to maintain current at constant levels by resisting any changes in the current.

Reconnect Panel – Used to configure the machine's internal components for various input power voltages

Rectification – The process of converting alternating current to direct current.

Relay – An electrically operated switch used in low current applications.

Resistance – The opposition to the passage of an electric current through a conductor. Measured in Ohms (Ω) and is not polarity sensitive.

Resistor – Used to regulate voltage and current levels in a circuit.

Reverse Biased – When voltage is applied to a semiconductor device in the direction that does not allows current to flow.

Rheostat – A two terminal adjustable resistor that may have its resistance value changed without opening the circuit in which it is connected, thereby controlling the current through the circuit.

Ripple – The residual periodic variation of the DC voltage within a power supply which has been derived from an alternating current source.

RMS (Root Means Squared) – The same amount of heat dissipation across a resistor as Direct Current.

Rotor – A rotating component of an electromagnetic system in an electric motor, or alternator.

RPM (Revolutions per minute) – A unit of rotational speed or the frequency of rotation around a fixed axis.

Saturation – The state reached when an increase in applied external magnetic field cannot increase the magnetization of the material further.

Saw Tooth Wave Form – A non-sinusoidal waveform. It is so named based on its resemblance to the teeth of a plain-toothed saw.

Schematic Diagram – A representation of the electronic components of a machine utilizing graphic symbols rather than realistic pictures.

Schematic Symbols – A standardized pictogram used to represent various electrical and electronic devices or function.

Series Circuit – a circuit that has only one current path.

Series - Parallel Circuit – a circuit that has both a single current path and multiple current paths.

Silicon Controlled Rectifier (SCR) – Very similar to a Diode in which it allows current to flow when the anode is more positive than the cathode. However, current flow will occur only if a small signal is applied to its Gate and will stop flowing when the voltage drops to zero or goes negative.

Shunt – A type of low value resistance used to detect circuit current.

Sinusoidal Wave Form – A curve that describes a smooth repetitive oscillation of a waveform.

Slip Rings – An electromechanical device that allows the transmission of electrical power from a stationary to a rotating structure. Normally a copper or brass circular device attached to a rotating member.

Solenoid – An electromechanical device that when energized acts like a magnet so that a movable core is drawn into the coil when a current flows and that is used especially as a switch or control for a mechanical device (such as a valve).

Source – Provides the electrical potential that is required for electricity to flow.

Spark Gap Generator – Used to initiate and maintain the arc in a TIG machine.

Square Wave Form – A type of waveform where the signal has only two levels. The signal transitions between these levels at regular intervals and the switching time is very rapid.

Standard Units of Measurement – Is a quantifiable language that helps everyone understand the association of the object with the measurement.

Static Condition – The machine is not connection to a power source and has no mechanical motion.

Stator – The stationary part of a rotary system, found in electric alternators, generators and electric motors.

Switch – A mechanical device used to interrupt the flow of current in a circuit. Switches are essentially binary devices: they are either completely on (closed) or completely off (open).

Tachometer – A device or circuit used to measure the rotations of a mechanical device.

Thermistor – A type of resistor in which resistance changes due to temperature, two main types: Positive Temperature Co-efficient (PTC), Negative Temperature Co-efficient (NTC).

Thermostat – A mechanical device that interrupts or closes a circuit when a pre-determined temperature limit is reached.

Toroid – A device used to filter unwanted electrical noise.

Trigger Interlock – The gun trigger will stay closed (activated) as long as welding current is flowing and will open (deactivate) when welding current stops.

Transformer – A device with a group of mutually-inductive coils used to magnetically induce AC power from one coil to the other. Typical examples are as follows:

> ***Isolation Transformer*** – A transformer usually used for circuit protection.
>
> ***Step Down Transformer*** – A transformer where the secondary voltage is lower than the primary voltage.
>
> ***Step Up Transformer*** – A transformer where the secondary voltage is higher than the primary voltage.
>
> ***Current Transformer*** – A type of transformer used as a current monitoring device.
>
> ***Power Transformer*** – A transformer that contains multiple primary windings to accommodate a variety of input voltages.

Twisted Pair – A cable consisting of two wires of a single circuit twisted around each other for the purposes of improving electromagnetic compatibility.

Voltage – The pressure or difference in electrical potential between two points in a circuit that causes current to flow.

Volts – The standard unit of measurement for Voltage. Symbol: V

User Interface – A device where interactions between operators and machines occur.

Watts – The standard measurement unit of electrical power. Symbol: W

Watts Law – power of an electrical circuit is the product of its voltage and current. P = I x V.

Weld Winding – Stator winding that provides the power for the welding components.

Welding Electrode – A consumable component of the welding circuit through which current is conducted between the electrode holder and the arc that becomes part of the weldment.

Welding Gun – In semi-automatic or automatic welding, a device to transfer current and guide the electrode wire into the arc puddle.

Wire Harness – A system of insulated conducting wires bound together with insulating materials.

Wiring Diagram – a simple visual representation of the physical connections and physical layout of the electrical system of the machine.

WFS (Wire Feed Speed) – The speed at which the consumable wire is fed into the weld joint puddle.

			
WARNING	● Do not touch electrically live parts or electrode with skin or wet clothing. ● Insulate yourself from work and ground.	● Keep flammable materials away.	● Wear eye, ear and body protection.
Spanish **AVISO DE PRECAUCION**	● No toque las partes o los electrodos bajo carga con la piel o ropa mojada. ● Aislese del trabajo y de la tierra.	● Mantenga el material combustible fuera del área de trabajo.	● Protéjase los ojos, los oídos y el cuerpo.
French **ATTENTION**	● Ne laissez ni la peau ni des vêtements mouillés entrer en contact avec des pièces sous tension. ● Isolez-vous du travail et de la terre.	● Gardez à l'écart de tout matériel inflammable.	● Protégez vos yeux, vos oreilles et votre corps.
German **WARNUNG**	● Berühren Sie keine stromführenden Teile oder Elektroden mit Ihrem Körper oder feuchter Kleidung! ● Isolieren Sie sich von den Elektroden und dem Erdboden!	● Entfernen Sie brennbarres Material!	● Tragen Sie Augen-, Ohren- und Körperschutz!
Portuguese **ATENÇÃO**	● Não toque partes elétricas e electrodos com a pele ou roupa molhada. ● Isole-se da peça e terra.	● Mantenha inflamáveis bem guardados.	● Use proteção para a vista, ouvido e corpo.
Japanese **注意事項**	● 通電中の電気部品、又は溶材にヒフやぬれた布で触れないこと。 ● 施工物やアースから身体が絶縁されている様にして下さい。	● 燃えやすいものの側での溶接作業は絶対にしてはなりません。	● 目、耳及び身体に保護具をして下さい。
Chinese **警 告**	● 皮肤或濕衣物切勿接觸帶電部件及銲條。 ● 使你自己與地面和工件絕緣。	● 把一切易燃物品移離工作場所。	● 佩戴眼、耳及身體勞動保護用具。
Korean **위 험**	● 전도체나 용접봉을 젖은 헝겁 또는 피부로 절대 접촉치 마십시요. ● 모재와 접지를 접촉치 마십시요.	● 인화성 물질을 접근 시키지 마시요.	● 눈, 귀와 몸에 보호장구를 착용하십시요.
Arabic **تحذير**	● لا تلمس الاجزاء التي يسري فيها التيار الكهربائي أو الالكترود بجلد الجسم أو بالملابس المبللة بالماء. ● ضع عازلا على جسمك خلال العمل.	● ضع المواد القابلة للاشتعال في مكان بعيد.	● ضع أدوات وملابس واقية على عينيك وأذنيك وجسمك.

READ AND UNDERSTAND THE MANUFACTURER'S INSTRUCTION FOR THIS EQUIPMENT AND THE CONSUMABLES TO BE USED AND FOLLOW YOUR EMPLOYER'S SAFETY PRACTICES.

SE RECOMIENDA LEER Y ENTENDER LAS INSTRUCCIONES DEL FABRICANTE PARA EL USO DE ESTE EQUIPO Y LOS CONSUMIBLES QUE VA A UTILIZAR, SIGA LAS MEDIDAS DE SEGURIDAD DE SU SUPERVISOR.

LISEZ ET COMPRENEZ LES INSTRUCTIONS DU FABRICANT EN CE QUI REGARDE CET EQUIPMENT ET LES PRODUITS A ETRE EMPLOYES ET SUIVEZ LES PROCEDURES DE SECURITE DE VOTRE EMPLOYEUR.

LESEN SIE UND BEFOLGEN SIE DIE BETRIEBSANLEITUNG DER ANLAGE UND DEN ELEKTRODENEINSATZ DES HERSTELLERS. DIE UNFALLVERHÜTUNGSVORSCHRIFTEN DES ARBEITGEBERS SIND EBENFALLS ZU BEACHTEN.

			
● Keep your head out of fumes. ● Use ventilation or exhaust to remove fumes from breathing zone.	● Turn power off before servicing.	● Do not operate with panel open or guards off.	**WARNING**
● Los humos fuera de la zona de respiración. ● Mantenga la cabeza fuera de los humos. Utilice ventilación o aspiración para gases.	● Desconectar el cable de alimentación de poder de la máquina antes de iniciar cualquier servicio.	● No operar con panel abierto o guardas quitadas.	Spanish **AVISO DE PRECAUCION**
● Gardez la tête à l'écart des fumées. ● Utilisez un ventilateur ou un aspirateur pour ôter les fumées des zones de travail.	● Débranchez le courant avant l'entretien.	● N'opérez pas avec les panneaux ouverts ou avec les dispositifs de protection enlevés.	French **ATTENTION**
● Vermeiden Sie das Einatmen von Schweibrauch! ● Sorgen Sie für gute Be- und Entlüftung des Arbeitsplatzes!	● Strom vor Wartungsarbeiten abschalten! (Netzstrom völlig öffnen; Maschine anhalten!)	● Anlage nie ohne Schutzgehäuse oder Innenschutzverkleidung in Betrieb setzen!	German **WARNUNG**
● Mantenha seu rosto da fumaça. ● Use ventilação e exhaustão para remover fumo da zona respiratória.	● Não opere com as tampas removidas. ● Desligue a corrente antes de fazer serviço. ● Não toque as partes elétricas nuas.	● Mantenha-se afastado das partes moventes. ● Não opere com os paineis abertos ou guardas removidas.	Portuguese **ATENÇÃO**
● ヒュームから頭を離すようにして下さい。 ● 換気や排煙に十分留意して下さい。	● メンテナンス・サービスに取りかかる際には、まず電源スイッチを必ず切って下さい。	● パネルやカバーを取り外したままで機械操作をしないで下さい。	Japanese **注意事項**
●頭部遠離煙霧。 ●在呼吸區使用通風或排風器除煙。	●維修前切斷電源。	●儀表板打開或沒有安全罩時不準作業。	Chinese **警 告**
● 얼굴로부터 용접가스를 멀리하십시요. ● 호흡지역으로부터 용접가스를 제거하기 위해 가스제거기나 통풍기를 사용하십시요.	● 보수전에 전원을 차단하십시요.	● 판넬이 열린 상태로 작동치 마십시요.	Korean **위 험**
● ابعد رأسك بعيداً عن الدخان. ● استعمل التهوية أو جهاز ضغط الدخان للخارج لكي تبعد الدخان عن المنطقة التي تتنفس فيها.	● اقطع التيار الكهربائي قبل القيام بأية صيانة.	● لا تشغل هذا الجهاز اذا كانت الاغطية الحديدية الواقية ليست عليه.	Arabic **تحذير**

LEIA E COMPREENDA AS INSTRUÇÕES DO FABRICANTE PARA ESTE EQUIPAMENTO E AS PARTES DE USO, E SIGA AS PRÁTICAS DE SEGURANÇA DO EMPREGADOR.

使う機械や溶材のメーカーの指示書をよく読み、まず理解して下さい。そして貴社の安全規定に従って下さい。

請詳細閱讀並理解製造廠提供的説明以及應該使用的銀焊材料，並請遵守貴方的有関勞動保護規定。

이 제품에 동봉된 작업지침서를 숙지하시고 귀사의 작업자 안전수칙을 준수하시기 바랍니다.

اقرأ بتمعن وافهم تعليمات المصنع المنتج لهذه المعدات والمواد قبل استعمالها واتبع تعليمات الوقاية لصاحب العمل.

CUSTOMER ASSISTANCE POLICY

The business of Lincoln Electric is manufacturing and selling high quality welding equipment, automated welding systems, consumables, and cutting equipment. Our challenge is to meet the needs of our customers, who are experts in their fields, and to exceed their expectations. On occasion, purchasers may ask Lincoln Electric for information or technical information about their use of our products. Our employees respond to inquiries to the best of their ability based on information and specifications provided to them by the customers and the knowledge they may have concerning the application. Our employees, however, are not in a position to verify the information provided or to evaluate the engineering requirements for the particular weldment, or to provide engineering advice in relation to a specific situation or application. Accordingly, Lincoln Electric does not warrant or guarantee or assume any liability with respect to such information or communications. Moreover, the provision of such information or technical information does not create, expand, or alter any warranty on our products. Any express or implied warranty that might arise from the information or technical information, including any implied warranty of merchantability or any warranty of fitness for any customers' particular purpose or any other equivalent or similar warranty is specifically disclaimed.

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WELD FUME CONTROL EQUIPMENT

The operation of welding fume control equipment is affected by various factors including proper use and positioning of the equipment, maintenance of the equipment and the speciÿc welding procedure and application involved. Worker exposure level should be checked upon installation and periodically thereafter to be certain it is within applicable OSHA PEL and ACGIH TLV limits.

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