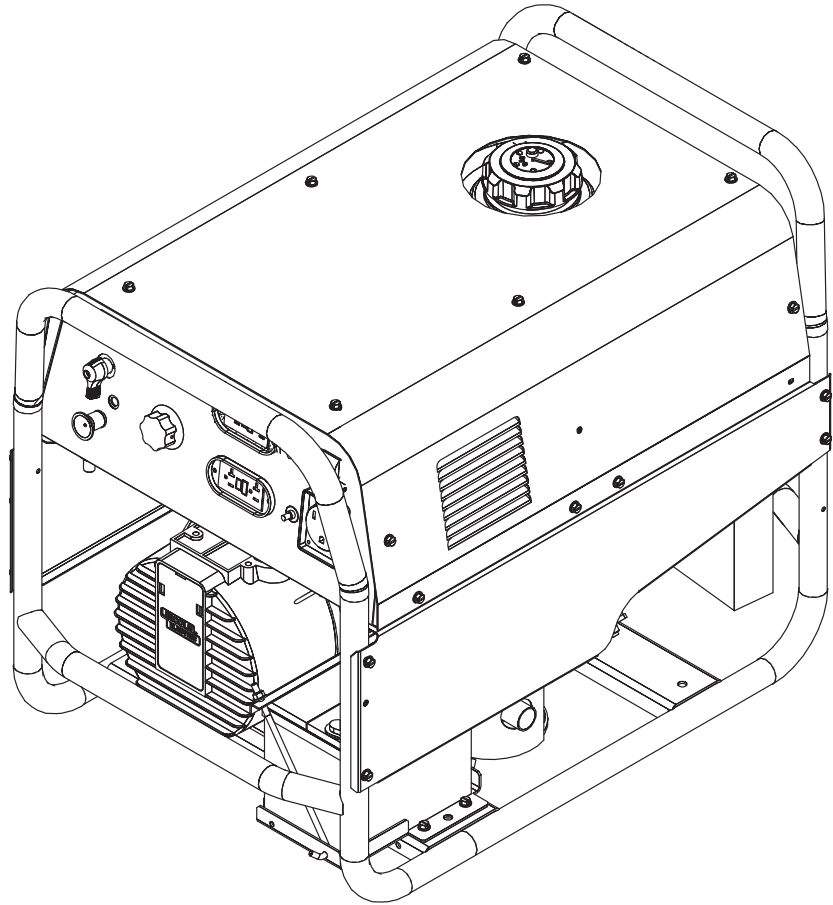


# OUTBACK<sup>®</sup> 185

For use with machine code number: **11516**

## 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.



## SERVICE MANUAL

**LINCOLN<sup>®</sup>**  
**ELECTRIC**

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• Sales and Service through Subsidiaries and Distributors Worldwide •

Cleveland, Ohio 44117-1199 U.S.A. TEL: 1.888.935.3877 FAX: 216.486.1751 WEB SITE: [www.lincolnelectric.com](http://www.lincolnelectric.com)

Download from [www.Somanuals.com](http://www.Somanuals.com). All Manuals Search And Download.

## ⚠ WARNING

### ⚠ CALIFORNIA PROPOSITION 65 WARNINGS ⚠

Diesel engine exhaust and some of its constituents are known to the State of California to cause cancer, birth defects, and other reproductive harm.

The Above For Diesel Engines

The engine exhaust from this product contains chemicals known to the State of California to cause cancer, birth defects, or other reproductive harm.

The Above For Gasoline Engines

**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 W117.2-1974. 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.

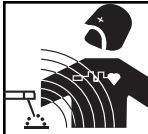


1.f. Do not put your hands near the engine fan. Do not attempt to override the governor or idler by pushing on the throttle control rods while the engine is running.

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.



### 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.

**OUTBACK® 185**





### 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 Z87.1 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 with electrodes which require special ventilation such as stainless or hard facing (see instructions on container or MSDS) 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. In confined spaces or in some circumstances, outdoors, a respirator may be required. Additional precautions are also required when welding on galvanized steel.**

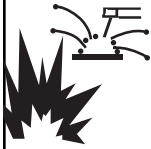
5.b. The operation of welding fume control equipment is affected by various factors including proper use and positioning of the equipment, maintenance of the equipment and the specific welding procedure and application involved. Worker exposure level should be checked upon installation and periodically 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 material safety data sheet (MSDS) and follow your employer's safety practices. MSDS 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-1, "Precautions for Safe Handling of Compressed Gases in Cylinders," available from the Compressed Gas Association 1235 Jefferson Davis Highway, Arlington, VA 22202.



## 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.

## PRÉCAUTIONS DE SÛRETÉ

Pour votre propre protection lire et observer toutes les instructions et les précautions de sûreté spécifiques qui paraissent dans ce manuel aussi bien que les précautions de sûreté générales suivantes:

### Sûreté Pour Soudage A L'Arc

1. Protégez-vous contre la secousse électrique:
  - a. Les circuits à l'électrode et à la pièce sont sous tension quand la machine à souder est en marche. Eviter toujours tout contact entre les parties sous tension et la peau nue ou les vêtements mouillés. Porter des gants secs et sans trous pour isoler les mains.
  - b. Faire très attention de bien s'isoler de la masse quand on soude dans des endroits humides, ou sur un plancher métallique ou des grilles métalliques, principalement dans les positions assis ou couché pour lesquelles une grande partie du corps peut être en contact avec la masse.
  - c. Maintenir le porte-électrode, la pince de masse, le câble de soudage et la machine à souder en bon et sûr état de fonctionnement.
  - d. Ne jamais plonger le porte-électrode dans l'eau pour le refroidir.
  - e. Ne jamais toucher simultanément les parties sous tension des porte-électrodes connectés à deux machines à souder parce que la tension entre les deux pinces peut être le total de la tension à vide des deux machines.
  - f. Si on utilise la machine à souder comme une source de courant pour soudage semi-automatique, ces précautions pour le porte-électrode s'appliquent aussi au pistolet de soudage.
2. Dans le cas de travail au dessus du niveau du sol, se protéger contre les chutes dans le cas où on reçoit un choc. Ne jamais enrouler le câble-électrode autour de n'importe quelle partie du corps.
3. Un coup d'arc peut être plus sévère qu'un coup de soliel, donc:
  - a. Utiliser un bon masque avec un verre filtrant approprié ainsi qu'un verre blanc afin de se protéger les yeux du rayonnement de l'arc et des projections quand on soude ou quand on regarde l'arc.
  - b. Porter des vêtements convenables afin de protéger la peau de soudeur et des aides contre le rayonnement de l'arc.
  - c. Protéger l'autre personnel travaillant à proximité au soudage à l'aide d'écrans appropriés et non-inflammables.
4. Des gouttes de laitier en fusion sont émises de l'arc de soudage. Se protéger avec des vêtements de protection libres de l'huile, tels que les gants en cuir, chemise épaisse, pantalons sans revers, et chaussures montantes.
5. Toujours porter des lunettes de sécurité dans la zone de soudage. Utiliser des lunettes avec écrans latéraux dans les zones où l'on pique le laitier.

6. Eloigner les matériaux inflammables ou les recouvrir afin de prévenir tout risque d'incendie dû aux étincelles.
7. Quand on ne soude pas, poser la pince à un endroit isolé de la masse. Un court-circuit accidentel peut provoquer un échauffement et un risque d'incendie.
8. S'assurer que la masse est connectée le plus près possible de la zone de travail qu'il est pratique de le faire. Si on place la masse sur la charpente de la construction ou d'autres endroits éloignés de la zone de travail, on augmente le risque de voir passer le courant de soudage par les chaînes de levage, câbles de grue, ou autres circuits. Cela peut provoquer des risques d'incendie ou d'échauffement des chaînes et des câbles jusqu'à ce qu'ils se rompent.
9. Assurer une ventilation suffisante dans la zone de soudage. Ceci est particulièrement important pour le soudage de tôles galvanisées plombées, ou cadmiées ou tout autre métal qui produit des fumées toxiques.
10. Ne pas souder en présence de vapeurs de chlore provenant d'opérations de dégraissage, nettoyage ou pistolage. La chaleur ou les rayons de l'arc peuvent réagir avec les vapeurs du solvant pour produire du phosgène (gas fortement toxique) ou autres produits irritants.
11. Pour obtenir de plus amples renseignements sur la sûreté, voir le code "Code for safety in welding and cutting" CSA Standard W 117.2-1974.

## PRÉCAUTIONS DE SÛRETÉ POUR LES MACHINES À SOUDER À TRANSFORMATEUR ET À REDRESSEUR

1. Relier à la terre le châssis du poste conformément au code de l'électricité et aux recommandations du fabricant. Le dispositif de montage ou la pièce à souder doit être branché à une bonne mise à la terre.
2. Autant que possible, l'installation et l'entretien du poste seront effectués par un électricien qualifié.
3. Avant de faire des travaux à l'intérieur de poste, la débrancher à l'interrupteur à la boîte de fusibles.
4. Garder tous les couvercles et dispositifs de sûreté à leur place.

## Electromagnetic Compatibility (EMC)

### Conformance

Products displaying the CE mark are in conformity with European Community Council Directive of 15 Dec 2004 on the approximation of the laws of the Member States relating to electromagnetic compatibility, 2004/108/EC. It was manufactured in conformity with a national standard that implements a harmonized standard: EN 60974-10 Electromagnetic Compatibility (EMC) Product Standard for Arc Welding Equipment. It is for use with other Lincoln Electric equipment. It is designed for industrial and professional use.

### Introduction

All electrical equipment generates small amounts of electromagnetic emission. Electrical emission may be transmitted through power lines or radiated through space, similar to a radio transmitter. When emissions are received by other equipment, electrical interference may result. Electrical emissions may affect many kinds of electrical equipment; other nearby welding equipment, radio and TV reception, numerical controlled machines, telephone systems, computers, etc. Be aware that interference may result and extra precautions may be required when a welding power source is used in a domestic establishment.

### Installation and Use

The user is responsible for installing and using the welding equipment according to the manufacturer's instructions. If electromagnetic disturbances are detected then it shall be the responsibility of the user of the welding equipment to resolve the situation with the technical assistance of the manufacturer. In some cases this remedial action may be as simple as earthing (grounding) the welding circuit, see Note. In other cases it could involve construction of an electromagnetic screen enclosing the power source and the work complete with associated input filters. In all cases electromagnetic disturbances must be reduced to the point where they are no longer troublesome.

Note: The welding circuit may or may not be earthed for safety reasons according to national codes. Changing the earthing arrangements should only be authorized by a person who is competent to access whether the changes will increase the risk of injury, e.g., by allowing parallel welding current return paths which may damage the earth circuits of other equipment.

### Assessment of Area

Before installing welding equipment the user shall make an assessment of potential electromagnetic problems in the surrounding area. The following shall be taken into account:

- a) other supply cables, control cables, signaling and telephone cables; above, below and adjacent to the welding equipment;
- b) radio and television transmitters and receivers;
- c) computer and other control equipment;
- d) safety critical equipment, e.g., guarding of industrial equipment;
- e) the health of the people around, e.g., the use of pacemakers and hearing aids;
- f) equipment used for calibration or measurement
- g) the immunity of other equipment in the environment. The user shall ensure that other equipment being used in the environment is compatible. This may require additional protection measures;
- h) the time of day that welding or other activities are to be carried out.

## Electromagnetic Compatibility (EMC)

The size of the surrounding area to be considered will depend on the structure of the building and other activities that are taking place. The surrounding area may extend beyond the boundaries of the premises.

### Methods of Reducing Emissions

#### Mains Supply

Welding equipment should be connected to the mains supply according to the manufacturer's recommendations. If interference occurs, it may be necessary to take additional precautions such as filtering of the mains supply. Consideration should be given to shielding the supply cable of permanently installed welding equipment, in metallic conduit or equivalent. Shielding should be electrically continuous throughout its length. The shielding should be connected to the welding power source so that good electrical contact is maintained between the conduit and the welding power source enclosure.

#### Maintenance of the Welding Equipment

The welding equipment should be routinely maintained according to the manufacturer's recommendations. All access and service doors and covers should be closed and properly fastened when the welding equipment is in operation. The welding equipment should not be modified in any way except for those changes and adjustments covered in the manufacturer's instructions. In particular, the spark gaps of arc striking and stabilizing devices should be adjusted and maintained according to the manufacturer's recommendations.

#### Welding Cables

The welding cables should be kept as short as possible and should be positioned close together, running at or close to floor level.

#### Equipotential Bonding

Bonding of all metallic components in the welding installation and adjacent to it should be considered. However, metallic components bonded to the work piece will increase the risk that the operator could receive a shock by touching these metallic components and the electrode at the same time. The operator should be insulated from all such bonded metallic components.

#### Earthing of the Workpiece

Where the workpiece is not bonded to earth for electrical safety, not connected to earth because of its size and position, e.g., ships hull or building steelwork, a connection bonding the workpiece to earth may reduce emissions in some, but not all instances. Care should be taken to prevent the earthing of the workpiece increasing the risk of injury to users, or damage to other electrical equipment. Where necessary, the connection of the workpiece to earth should be made by a direct connection to the workpiece, but in some countries where direct connection is not permitted, the bonding should be achieved by suitable capacitance, selected according to national regulations.

#### Screening and Shielding

Selective screening and shielding of other cables and equipment in the surrounding area may alleviate problems of interference. Screening of the entire welding installation may be considered for special applications.<sup>1</sup>

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<sup>1</sup> Portions of the preceding text are contained in EN 60974-10: "Electromagnetic Compatibility (EMC) product standard for arc welding equipment."

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## TECHNICAL SPECIFICATIONS - OUTBACK® 185 (K2706-1)

INPUT - GASOLINE ENGINE					
Make/Model	Description	Speed (RPM)	Displacement	Ignition System	Capacities
KOHLE CS 12.75	1 cylinder 4 cycle air-cooled OHV gasoline 12.75 HP @ 3600 RPM Aluminum Block w/ Cast Iron Sleeve	3750RPM High Idle 1825RPM Low Idle 3400RPM Full Load	21.96 cu. in (360 cc)	Electric & Recoil Start;  Manual Choke	Fuel: 6.86 gal. (24.9L)  Oil: 1.2 Qts. (1.1L)
			<b>Bore x Stroke</b>  3.35" x 2.48" (85 mm x 63mm)		
RATED OUTPUT - WELDER					
AMPS @ DC CONSTANT CURRENT		DUTY CYCLE		VOLTS @ RATED AMPERES	
100		100%		25	
130		60%		25	
150		20%		25	
185		MAX OUTPUT		---	
OUTPUT -WELDER AND GENERATOR					
Welding Ranges		Welding Open Circuit Voltage		AC Auxiliary Power	
50 - 185 Amps DC		80 VDC Max.		4600 Watts 115V 1PH 100% Duty Cycle 5700 Peak Watts 5200 Continuous Watts 120 / 230 V 1PH	
PHYSICAL DIMENSIONS					
HEIGHT	WIDTH	DEPTH		WEIGHT	
25.47 in.	21.12 in.	31.48 in.		310.0 lbs.	
646.94 mm	536.45 mm	799.59 mm		140.6 kg	
OPERATING TEMPERATURE RANGE			STORAGE TEMPERATURE RANGE		
0° F TO 104° F (-18° C TO 40° C)			-40° F TO 131° F (-40° C TO 55° C)		

OUTBACK® 185



## SAFETY PRECAUTIONS

Read this entire installation section before you start installation.

### ⚠ WARNING

Do not attempt to use this equipment until you have thoroughly read all operating and maintenance manuals supplied with your machine. They include important safety precautions, detailed engine starting, operating and maintenance instructions, and parts lists.

### Hazards of Electric Shock, Engine Exhaust & Moving Parts

### ⚠ WARNING

**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.
- Do not stack anything on or near the engine.



**MOVING PARTS can injure.**

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

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

## LOCATION AND VENTILATION

Whenever you use the OUTBACK® 185, be sure that clean cooling air can flow around the machine's gasoline engine and the generator. Avoid dusty, dirty areas. Also, keep the machine away from heat sources. Do not place the back end of the generator anywhere near hot engine exhaust from another machine. And of course, make sure that engine exhaust is ventilated to an open, outside area.

The OUTBACK® 185 must be used outdoors. Do not set the machine in puddles or otherwise submerge it in water. Such practices pose safety hazards and cause improper operation and corrosion of parts.

Always operate the OUTBACK® 185 with the case roof on and all machine components completely assembled. This will help to protect you from the dangers of moving parts, hot metal surfaces, and live electrical devices.

## STORING

1. Store the machine in a cool, dry place when it is not in use. Protect it from dust and dirt. Keep it where it can not be accidentally damaged from construction activities, moving vehicles and other hazards.
2. If you will be storing the machine for over 30 days, you should drain the fuel to protect fuel system and carburetor parts from gum deposits. Empty all fuel from the tank and run the engine until it stops from lack of fuel.
3. You can store the machine for up to 24 months if you use a stabilizing Additive in the fuel system. Mix the additive with the fuel in the tank and run the engine for a short time to circulate the additive through the carburetor.
4. While the engine is still warm, drain the oil and refill with fresh 10W30 oil.
5. Remove the spark plug and pour approximately 1/2 ounce (15ml) of engine oil into the cylinder. Replace the spark plug and crank the engine slowly to distribute the oil.
6. Clean any dirt and debris from the cylinder and cylinder head fins and housing, rotating screen, and muffler areas.
7. Store in a clean, dry area.

OUTBACK® 185



## STACKING

OUTBACK® 185 machines CANNOT be stacked.

## TILTING

Place the machine on a secure, level surface whenever you use it or store it. Any surfaces you place it on other than the ground must be firm, non-skid, and structurally sound.

The gasoline engine is designed to run in a level position for best performance. It can operate at an angle, but this should never be more than 15 degrees in any direction. If you do operate it at a slight angle, be sure to check the oil regularly and keep the oil level full. Also, fuel capacity will be a little less at an angle.

## LIFTING

The OUTBACK® 185 should be lifted by two people. (See **Technical Specification** page for weight). The LowLift™ grab bars on both ends make lifting easier.

## PRE-OPERATION ENGINE SERVICE

Read and understand the engine operating and maintenance instructions supplied with this machine before you operate the OUTBACK® 185.

### ⚠ WARNING

- Keep hands away from muffler or HOT engine parts.
- Stop the engine when fueling.
- Do not smoke when fueling.
- Remove fuel cap slowly to release pressure.
- Do not overfill tank.
- Wipe up spilled fuel and allow fumes to clear before starting engine.
- Keep sparks and flame away from tank.

## OIL

The OUTBACK® 185 is shipped with the engine filled with SAE 10W30 oil. **CHECK THE OIL LEVEL BEFORE YOU START THE ENGINE.** This is an added precaution. Do not screw in dipstick when checking oil level. **DO NOT OVERFILL.** Be sure the fill plug is tight after servicing.

## FUEL

Fill the fuel tank with clean, fresh, regular grade (minimum 87 octane lead free gasoline. DO NOT MIX OIL WITH GAS. The OUTBACK® 185 capacity is approximately 6.8 gallons (25.74 Liter). **DO NOT OVERFILL,** allow room in the fuel tank for fuel expansion.

## SPARK ARRESTER

Some federal, state or local laws may require gasoline engines to 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 machine does not qualify as a spark arrester. For areas requiring spark arrestors, use K2793-1.

### ⚠ CAUTION

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

⚠ WARNING		GASOLINE FUEL ONLY	
	<ul style="list-style-type: none"> <li>• Stop engine when fueling.</li> <li>• Do not smoke when fueling.</li> <li>• Keep sparks and flame away from tank.</li> <li>• Do not leave unattended while fueling.</li> <li>• Wipe up spilled fuel and allow fumes to clear before starting engine.</li> <li>• Do not overfill tank, fuel expansion may cause overflow.</li> <li>• Close fuel shut off valve when transporting or not operating machine.</li> </ul>		<ul style="list-style-type: none"> <li>• Use in open, well ventilated area or vent exhaust outside.</li> </ul>
GASOLINE can cause fire or explosion	ENGINE EXHAUST can kill		<ul style="list-style-type: none"> <li>• Keep away from moving parts.</li> <li>• Do not operate with panels open or guards off.</li> </ul>
		MOVING PARTS can injure	521098 1/04

OUTBACK® 185

LINCOLN  
ELECTRIC

## OUTBACK® 185 OUTPUT CONNECTIONS

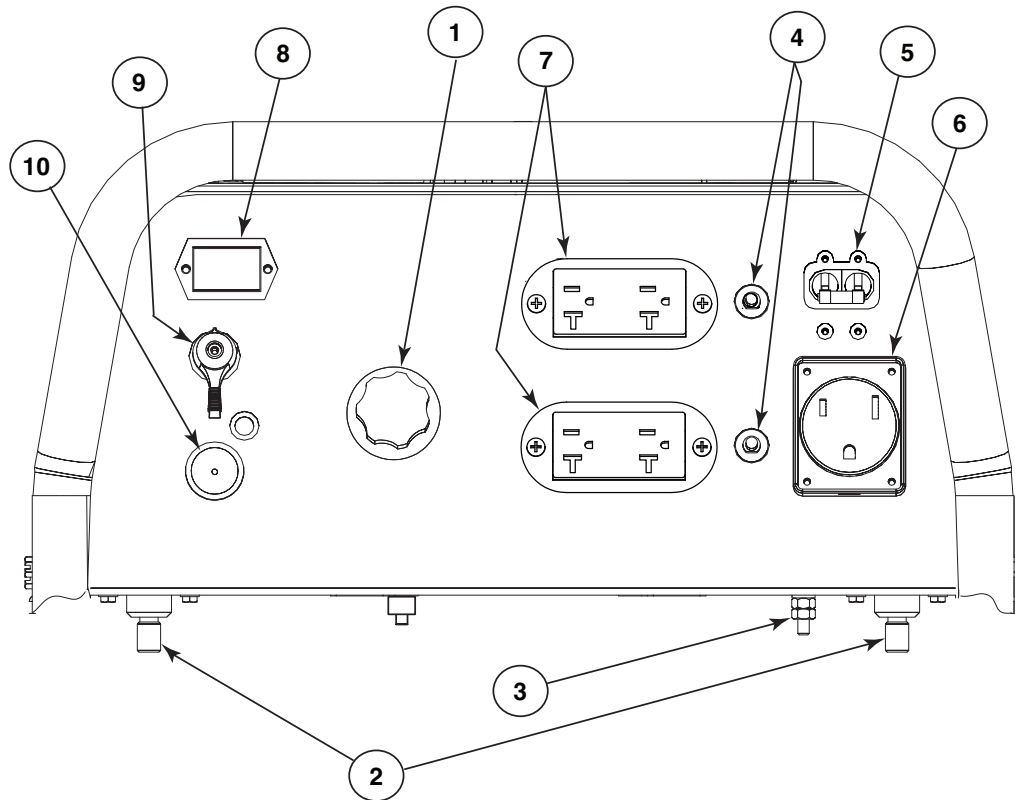


FIGURE A.1

- |                                  |  |
|----------------------------------|--|
| 1. CURRENT CONTROL DIAL          | 7. DUPLEX RECEPTACLE (2)- 120 VOLT, 20 AMP |
| 2. WELD OUTPUT TERMINALS (2)     | 8. HOURMETER                               |
| 3. GROUND STUD                   | 9. ENGINE SWITCH                           |
| 4. CIRCUIT BREAKERS (2) - 20 AMP | 10. CHOKE                                  |
| 5. CIRCUIT BREAKER 30 Amp        |  |
| 6. RECEPTACLE - 240 VOLT, 50 AMP |  |

## ELECTRICAL OUTPUT CONNECTIONS

See Figure A.1 for the location of the current control dial, weld output terminals, ground stud, circuit breakers, 240 and 120 volt receptacles.

## WELDING CABLE CONNECTIONS

### Cable Size and Length

Be sure to use welding cables that are large enough. The correct size and length becomes especially important when you are welding at a distance from the welder.

Table A.1 lists recommended cable sizes and lengths for rated current and duty cycle. Length refers to the distance from the welder to the work and back to the welder. Cable diameters are increased for long cable lengths to reduce voltage drops.

TABLE A.1  
RECOMMENDED WELDING CABLE  
SIZE AND LENGTH

TOTAL COMBINED LENGTH OF ELECTRODE AND WORK CABLES	
Cable Length	125 Amps 30% Duty Cycle
0-50 ft (0-15m)	6 AWG
50-100 ft (15-30 m)	5 AWG
100-150 ft (30-46 m)	3 AWG
150-200 ft (46-61 m)	2 AWG
200-250 ft (61-76m)	1 AWG

OUTBACK® 185



### Cable Installation

Install the welding cables to your OUTBACK® 185 as follows. See **Figure A.1** for the location of parts.

1. The gasoline engine must be OFF to install welding cables.
2. Remove the 1/2-13 flanged nuts from the output terminals.
3. Connect the electrode holder and work cables to the weld output terminals. Normally, the electrode cable is connected to the positive (+) output stud.
4. Tighten the flanged nuts securely.
5. Be certain that the metal piece you are welding (the “work”) is securely connected to the work clamp and cable.
6. Check and tighten the connections periodically.

### ⚠ CAUTION

- Loose connections will cause the output studs to overheat and the studs may eventually melt.
- Do not cross welding cables at output stud connection. Keep isolated and separate from one another.

Lincoln Electric offers a welding accessory kit with #6 welding cables. See the **ACCESSORIES** section of this manual for more information.


For more information on welding , see **WELDING OPERATION** in the **OPERATION** section of this manual.


### MACHINE GROUNDING

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

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

- a) be grounded to the frame of the welder using a grounded type plug  
or
- b) be double insulated

When this welder is mounted on a truck or trailer, the machine grounding  stud must be securely connected to the metal frame of the vehicle.

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 U.S. 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.

### ⚠ WARNING

**DO NOT GROUND MACHINE TO A PIPE WHICH CARRIES EXPLOSIVE OR COMBUSTIBLE MATERIAL.**

## PLUGS AND HAND HELD EQUIPMENT

For further protection against electric shock, any electrical equipment connected to the generator receptacles must use a three-blade, grounded type plug or an Underwriter's Laboratories (UL) approved double insulated tool with a two blade plug.

### WARNING

**Never operate this machine with damaged or defective cords. All electrical equipment must be in safe operating condition.**

## AUXILIARY POWER RECEPTACLES

The control panel of the OUTBACK® 185 features three auxiliary power receptacles:

- Two 20 amp, 120 volt duplex (double outlet) receptacle.
- A 50 amp, 240 volt single outlet receptacle.

See *Figure A.1*

Through these receptacles the machine can supply up to 5700 watts surge or 5200 watts continuous of single-phase 60 Hertz AC power. The machine output voltages meet UL standards and fall within  $\pm 10\%$  of the rated voltage.

## PREMISES WIRING

The OUTBACK® 185 is not recommended for premises wiring. The OUTBACK® 185 does not have a combined 120/240 volt receptacle and cannot be connected to a premises as described in other Lincoln literature.

The OUTBACK® 185 is intended only for backup, intermittent use power. Certain electrical devices cannot be powered by the OUTBACK® 185. Refer to *Table A.2* for these devices.

## CIRCUIT BREAKERS



Auxiliary power is protected by circuit breakers. When the machine is operated in high temperature environments, the breakers may tend to trip at lower loads than normally.

### CAUTION

**NEVER BYPASS THE CIRCUIT BREAKERS. WITHOUT OVERLOAD PROTECTION, THE UNIT COULD OVERHEAT AND/OR CAUSE DAMAGE TO THE EQUIPMENT BEING USED.**

## ⚠ CAUTION

Certain Electrical devices cannot be powered by the OUTBACK® 185. See Table A.2

**TABLE A.2  
ELECTRICAL DEVICE USE WITH THE OUTBACK® 185**

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 capacitive elements to fail. Surge protection, transient protection, and additional loading is recommended for 100% fail-safe operation. <b>DO NOT RUN THESE DEVICES WITHOUT ADDITIONAL RESISTIVE TYPE LOADS.</b>
Inductive	Single-phase induction motors, drills, well pumps, grinders, small refrigerators, weed and hedge trimmers.	These devices require large current inrush for starting. (See <b>Table B.3</b> , AUXILIARY POWER APPLICATIONS, in the OPERATION section of this manual for required starting wattages.) Some synchronous motors may be frequency sensitive to attain maximum output torque, but they <b>SHOULD BE SAFE</b> 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. <b>DO NOT USE THESE DEVICES WITH A OUTBACK® 185.</b>

The Lincoln Electric Company is not responsible for any damage to electrical components improperly connected to a OUTBACK® 185.

**OUTBACK® 185**





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## SAFETY INSTRUCTIONS

**⚠ WARNING**

**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.



**FUMES AND GASES**  
can be dangerous.

- Keep your head out of fumes.
- Use ventilation or exhaust to remove fumes from breathing zone.



**WELDING SPARKS**  
can cause fire or explosion

- Keep flammable material away.
- Do not weld on containers that have held combustibles.



**ARC RAYS**  
can burn.

- Wear eye, ear and body protection.

**⚠ WARNING**

**ENGINE EXHAUST** can kill.

- Use in open, well ventilated areas or vent exhaust outside.
- Do not stack anything on or near the engine.



**MOVING PARTS** can injure.

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

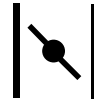
Only qualified personnel should install, use, or service this equipment.

Observe additional Safety Guidelines detailed throughout this manual.

GRAPHIC SYMBOLS USED ON THIS EQUIPMENT OR IN THIS MANUAL



WARNING / CAUTION



CHOKE



OIL



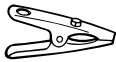
AIR CLEANER



FUEL



CIRCUIT BREAKER



WORK CLAMP



GROUND (AUXILIARY POWER)



FAST



ELECTRODE WELDING ARC



SLOW



ENGINE OFF



AUTO IDLE



ENGINE START

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Return to Master TOC

Return to Section TOC

Return to Master TOC

Return to Section TOC

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Return to Section TOC

Return to Master TOC

## GENERAL DESCRIPTION

The OUTBACK® 185 is designed for commercial use welder/generator applications. As a welder it provides 185 amps of DC constant current for welding with DC stick electrodes. A single dial lets you select a full range of welding output from 50 to 185 amps.

As a generator it can supply up to surge watts or continuous watts of 120 / 240 volt, single-phase AC power. The machine is portable.

A Kohler CS 12.75 HP air cooled, OHV gasoline engine powers the welder / generator. It has an engine warranty of 3 years.

## RECOMMENDED APPLICATIONS

### Welder

The OUTBACK® 185 provides excellent constant current DC welding output for stick (SMAW) welding.

### Generator

The OUTBACK® 185 gives smooth AC generator output for continuous auxiliary power usage within the engine manufacturer's required maintenance recommendations.

## OPERATIONAL FEATURES AND CONTROLS

The OUTBACK® 185 was designed for simplicity. Therefore, it has very few operating controls. A single dial on the control panel lets you select either welder or generator use. For welding, the same dial selects continuous current output over the machine's 50 to 185 amp range.

The gasoline engine controls include a recoil starter, choke and stop switch. See **ENGINE OPERATION** in the **OPERATION** section of this manual for details about starting, running, stopping, and breaking in the gasoline engine.

## DESIGN FEATURES AND ADVANTAGES

- 185 amp DC constant current welding for stick electrodes.
- Lightweight / portable.
- Full range, continuous welding output control with a single knob.
- Automatic shutdown under low oil level condition.
- Hour Meter Standard.
- Surge watts or Watts of continuous 120 / 240 volt single phase AC auxiliary power.
- Kohler CS 12.75 HP overhead cam air-cooled gasoline engine. Smooth running, long life.

## WELDING CAPABILITY

The OUTBACK® 185 rated 185 amps, 20 VDC at 10% duty cycle on a ten-minute basis. This means that you can load the welder to 185 amps for one minute out of every ten-minute period. The machine is capable of higher duty cycles at lower output currents. For example, you can load the welder to 120 amps for ten minutes out of ten for a 100% duty cycle.

The current is continuously variable from 50 to 185 amps DC. The OUTBACK® 185 can, therefore, weld with all 3/32", 1/8" and most 5/32" diameter Lincoln DC electrodes.

## LIMITATIONS

- The OUTBACK® 185 is not recommended for any processes besides those that are normally performed using stick welding (SMAW) procedures.
- The OUTBACK® 185 is not recommended for pipe thawing.
- During welding, generator power is limited to 100 watts, and output voltages can drop from 120 to 80 volts and 240 to 160 volts. Therefore, DO NOT OPERATE ANY SENSITIVE ELECTRICAL EQUIPMENT WHILE YOU ARE WELDING.

OUTBACK® 185



**CONTROLS AND SETTINGS** All welder/generator controls are located on the Output Control Panel. Gasoline engine controls are mounted on the engine. See Figure B.1 and the figures in engine operation section.

### OUTPUT PANEL CONTROLS

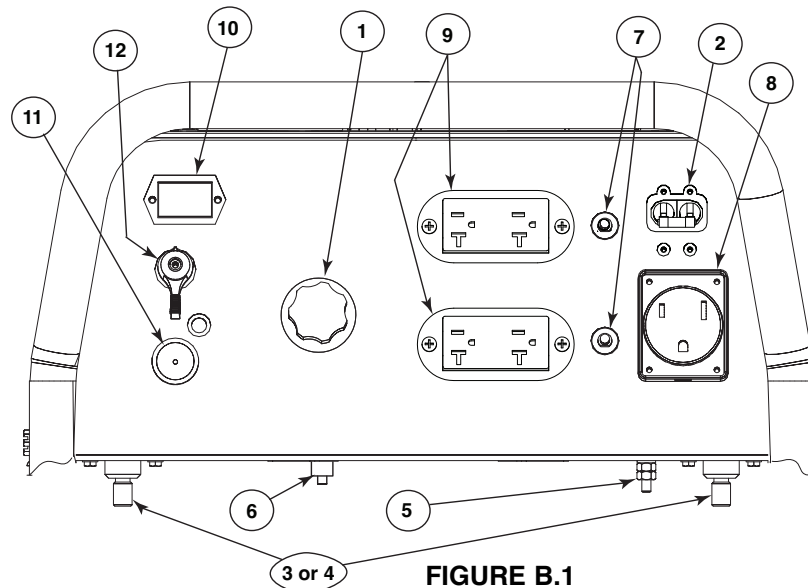



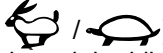


FIGURE B.1

### WELDER/GENERATOR CONTROLS

See Figure B.1 for the location of the following features:

1. **CURRENT CONTROL DIAL:** Adjusts continuous current output. The amperages on the dial correspond to the approximate amperages needed for specific Lincoln welding electrodes.
2. **30 AMP CIRCUIT BREAKER:** Provide separate overload current protection for the 120 Volt and 240 Volt Receptacles
3. **WELD POSITIVE OUTPUT TERMINAL:** Provides the connection point for either the electrode holder or the work cable. (Because the OUTBACK® 185 is a DC output machine, either output terminal can be used for either cable.)
4. **WELD NEGATIVE OUTPUT TERMINAL:** Provides the connection point for either the electrode holder or the work cable. (Because the OUTBACK®185 is a DC output machine, either output terminal can be used for either cable.)
5. **GROUND STUD:** Provides a connection point for connecting the machine case to earth ground for the safest grounding procedure.
6. **CIRCUIT BREAKER:** Provides overload protection for weld output terminals.
7. **CIRCUIT BREAKERS (2):** Provide separate overload current protection for the 120 volt and 240 volt receptacles
8. **240 VOLT RECEPTACLE:** Connection point for supplying 250 volt power to operate one electrical device.
9. **120 VOLT DUPLEX RECEPTACLES (2):** Connection point for supplying 120 volt power to operate devices needed for maintenance purposes.
10. **HOUR METER:** Records the time that the engine has run for maintenance purposes.
11. **ENGINE CHOKE:** Engine starting aid.
12. **ENGINE SWITCH:**  
Used to start the engine, Select High Idle or Auto Idle while the engine is running and stops 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:

#### • 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.

#### • Auxiliary Power

With the engine running at low idle and auxiliary power for lights or tools is drawn (approximately 0-150 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.

OUTBACK® 185






## ENGINE OPERATION

### Starting/Shutdown Instructions

Be sure all Pre-Operation Engine Service has been performed. Also, Read owners manual before starting for the first time. (See **INSTALLATION** section)


Remove all loads connected to the AC power receptacles. Before starting, first open the fuel shutoff valve.

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

Turn the engine switch to the “Start”  position and crank the engine until it 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 engine is running because this will cause damage to the ring gear and/or starter motor.

### Stopping the Engine

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

Stop the engine by placing the engine switch in the “Off” (  ) position.

### WARNING

**Close the fuel valve when the machine is transported to prevent fuel leakage from the carburetor.**

### Break-in Period

It is normal for any engine to use larger quantities of oil until break-in is accomplished. Check the oil level twice a day during the break-in period (about 50 running hours). Change the oil after the first 5 hours of operation. See the Engine Instruction Manual for further details.

### CAUTION

**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 SEVERAL MINUTES AT LOW IDLE BEFORE SHUTDOWN.**

### Low Oil Sensing

This engine has a built in sensor which responds to low oil level (not pressure). When activated, the system will shut the engine down. The engine will not restart until sufficient oil is added. Check oil level frequently and add oil as required to the full mark on the dipstick. DO NOT OVERFILL.

### Typical Fuel Consumption

	KOHLER CS 12.75 HP
NO LOAD. 2250 R.P.M	.20 GALLONS/HOUR .75 ( LITERS/HOUR)
NO LOAD 3750 R.P.M.	.40 GALLONS/HOUR 1.51 ( LITERS/HOUR)
DC CC WELD OUTPUT 100 AMPS, 25 VOLTS	.73 GALLONS/HOUR 2.77 ( LITERS/HOUR)
AUXILIARY POWER 5200 KVA	.99 GALLONS/HOUR 3.74 ( LITERS/HOUR)

## WELDING OPERATION

### ⚠ WARNING

**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.
- Do not stack anything on or near the engine.

**MOVING PARTS can injure.**



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

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

The OUTBACK® 185 can deliver from 50 to 185 amps of welding output current . Output can be adjusted by setting the current control dial on the output control panel.

You can get maximum welding output by setting the dial to 185 AMPS. At high current settings like this, some output may decrease as the machine is used. If you are welding for a long time, you may need to turn the dial slightly upward to maintain the same results.

The numbers on the dial correspond to the approximate amps needed to weld using specific Lincoln welding rods. **Table B.2**, WELDING APPLICATIONS, give you the recommended dial settings based on the thickness of the work and the size and type of rod you're using.

### TO USE THE OUTBACK® 185 FOR WELDING:

1. Remove the flange nuts from the weld output terminals and place the work and electrode welding cables over the terminals. **See Figure B.1** and B.1a. Replace and tighten the flange nuts securely. Be sure the connections are tight.
2. Select the appropriate electrode. **See Table B.2**
3. Attach the work clamp securely to the work you are welding.

4. Insert the electrode into the electrode holder.
5. Set the current control dial to the desired output current .
6. Start the gasoline engine.  
See **ENGINE OPERATION** in this section of the manual.
7. Strike an arc and begin welding.

### AFTER YOU FINISH THE WELD:

1. Stop the gasoline engine. See **ENGINE OPERATION** in this section of the manual.
2. Allow the electrode and work to cool completely.
3. Remove the work clamp from the work.
4. Remove any remaining piece of electrode from the electrode holder.
5. If you are finished using the OUTBACK® 185 for welding, disconnect the welding cables from the weld output terminals. Reattach the flange nuts and leave them on the terminals.

For DC+ welding, the electrode cable is to be connected to the "+" output stud and work cable to the "-" output stud. (For DC- welding, reverse these connections.)

### Semi-automatic Wire Welding with a Lincoln Wire Feeder/Welder

The OUTBACK® 185 generator power can be used to supply up to 5,200 watts continuous input power to a Lincoln Wire Feeder/Welder. The Wire Feeder/ Welder is equipped with all the supplies needed for Flux-Cored Arc Welding (FCAW). Also some Wire Feeder/Welders come equipped with the essentials needed for Gas Metal Arc Welding (GMAW) or MIG processes, while others require the purchase of a conversion kit. These products are available where Lincoln products are sold. Contact your local authorized Lincoln representative for more details.

### Plasma Cutting with Lincoln Pro-Cut 25.

The OUTBACK® 185 generator power can be used to supply up to 5,200 watts continuous input power to a Pro-Cut 25. The Pro-Cut will work satisfactorily under the following conditions:

1. Set the Current Control on the OUTBACK® 185 to the 185 amp position. (Higher Settings may result in a shutdown of the Pro-Cut 25.)
2. Leave the "ON/OFF" switch on the Pro-Cut "OFF" until the OUTBACK® 185 has been started and is at full operating speed.

OUTBACK® 185



**120V Receptacle Operation:**

- Set the Output Control on the Pro-Cut 25 no higher than the 15 amp position.( Higher settings may cause circuit breaker on the OUTBACK® 185 to trip.)
- Maximum material thickness that can be cut is 1/4".

**240V Receptacle Operation:**

- The Pro-Cut 25 may be used for its full range of control.
- Maximum material thickness that can be cut is 3/8".

Electrical loads in watts are calculated by multiplying the voltage rating of the load by the number of amps it draws. (This information is given on the load device nameplate.) For example, a device rated 120 volts, 2 amps will need 240 watts of power (120 x 2 = 240).

You can use **Table B.3**, AUXILIARY POWER APPLICATIONS, to determine the wattage requirements of the most common types of loads you can power with the OUTBACK® 185 Be sure to read the notes at the bottom of the table.

**TO USE THE OUTBACK® 185 AS AN AUXILIARY POWER SUPPLY:**

1. Start the gasoline engine. See **ENGINE OPERATION** in this section of the manual.
2. Set the current control dial on the output control panel to "MAX." **See Figure B.1.**
3. Plug the load(s) into the appropriate 120 volt or 240 volt power receptacle.

**NOTE:** During welding, the maximum generator output for auxiliary loads is 100 watts.

**NOTE:** You can supply multiple loads as long as the total load does not exceed 5700 Peak watts or 5200 continuous watts. Be sure to start the largest loads first.

**AUXILIARY POWER OPERATION**

**⚠ WARNING**

Be sure that any electrical equipment plugged into the generator AC power receptacles can withstand a ±10% voltage and a ±5% frequency variation. Some electronic devices cannot be powered by the OUTBACK® 185 Refer to **Table A.2**, ELECTRICAL DEVICE USE WITH THE OUTBACK® 185, in the **INSTALLATION** section of this manual.

**GENERAL INFORMATION**

The OUTBACK® 185 is rated at 5700 Peak watts or 5200 continuous watts. It provides both 120 volt and 240 volt power. You can draw up to 20 amps from either side of the 120 volt duplex receptacle, but not more than 35.4 amps from both sides at once. Up to 17.7 amps can be drawn from the single 240 volt receptacle.

**TABLE B.2  
ELECTRODE SELECTION GUIDE**

AWS CLASSIFICATION	ELECTRODE TYPE	ELECTRODE POLARITY	CURRENT RANGE (AMPS)		
			3/32 SIZE	1/8 SIZE	5/32 SIZE
E6010	FLEETWELD® 5P	DC+	50-75	75-135	90-175
E6011	FLEETWELD® 35	DC+	50-75	70-110	80-145
E6011	FLEETWELD® 180	DC+	50-80	55-110	105-135
E6013	FLEETWELD® 37	DC±	70-95	100-135	145-180
E7018	EXCALIBUR® 7018	DC+	70-100	90-125	125-185
E7018	JETWELD® LH-73	DC+	65-85	90-125	130-185
E708-17 & E308L-17	BLUE MAX® 308/308L AC-DC	DC+	50-80	75-110	95-150
ENi-CI	SOFTWELD® 99Ni	DC+	50-80	80-110	100-140
-	WEARSHIELD® ABR	DC+	-	50-150	50-185
SHEET THICKNESS			1/8 AND THINNER	1/8 AND THICKER	

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TABLE B.3  
AUXILIARY POWER APPLICATIONS

Suggested Power Applications	Running Watts (Continuous)	*Start-up Watts (Peak)
*Air Compressor - 1 HP	2,000	4,000 - 8,000
*Air Compressor - 3/4 HP	1,250	3,100 - 5,000
*Airless Sprayer - 1/3 HP	600	1,500 - 2,400
Chain Saw	1,200	
Circular Saw	1,200	
Coffee Maker	1,000	
*Deep Freezer	500	750 - 2,000
*Electric Motor - 1 HP	1,000	2,500 - 4,000
Electric Range (1 element)	1,500	
Electric Skillet	1,250	
*Furnace Fan - 1/3 HP	1,200	3,000 - 4,800
Portable Grinder (4 1/2")	600	
Portable Grinder (7")	2,000	
Halogen Work Light	500	
Hand Drill - 1/4"	500	
Hand Drill - 3/8"	700	
1500 Watt Heater	1,750	
Hedge Trimmer	450	
Light Bulb	100	
Reciprocating Saw	900	
Radial Arm Saw	2,600	
Radio	50	
*Refrigerator/Freezer (small)	600	1,500 - 2,400
Slow Cooker	200	
*Submersible Pump - 1 HP	1,000	2,500 - 4,000
*Sump Pump	600	1,500 - 2,400
Toaster	1,100	
Weed Trimmer	500	
Lincoln Wire Feeder/Welder	4,000	

**NOTES:**

Wattages listed are approximate. Check your equipment for actual wattage.

Equipment with unusually high \*START-UP WATTS are listed. For start-up of other equipment that uses a motor, listed in the table, multiply RUNNING WATTS by 2.

Multiple loads can be used as long as the total load does not exceed 5,700 Peak watts. Be sure to start the largest loads first.

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**OUTBACK® 185**



## OPTIONS/ACCESSORIES

The following options/accessories are available for your OUTBACK®185 from your local Lincoln Distributor:

**Accessory Kit (K875)** – Includes the following:

- Twenty feet (6.1 meters) of #6 AWG electrode cable with lug.
- Fifteen feet (4.6 meters) of #6 work cable with lugs.
- Work Clamp
- Headshield with No. 10 filter
- Insulated electrode holder and sample electrodes 150 amp capacity.

**Undercarriage (K2722-1)** - A two-wheeled, hand movable undercarriage is available for field installation.

**Rotor Removal Kit (S20925)** - A service kit with thru bolt and impact bolt's for removing the generator rotor from tapered engine crank shaft.

**Spark Arrestor Kit (K2793-1)** - Attaches to muffler exhaust tube. Virtually eliminates spark emissions.

**Canvas Covers (K2804-1)** - To protect the Outback® 185 when not in use. Made from attractive red canvas which is flame retardant, mildew resistant and water repellent.

**Maintenance** .....D-1

    Service Instructions .....D-2

    Safety Precautions .....D-3

    Routine and Periodic Maintenance .....D-3

    Engine Adjustments .....D-4

    Slip Rings .....D-4

    Engine Maintenance Parts .....D-4

    Operational Clearance .....D-4

    Major Component Locationss .....D-5

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Return to Master TOC

## Service Instructions

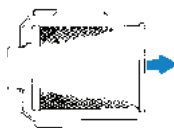
### Single- and Two-Stage Engine Air Cleaners

#### 1 Remove the Filter



Rotate the filter while pulling straight out.

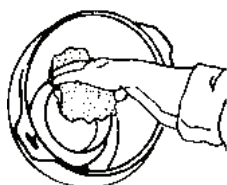
Unfasten or unlatch the service cover. Because the filter fits tightly over the outlet tube to create the critical seal, there will be some initial resistance, similar to breaking the seal on a jar. Gently move the end of the filter back and forth to break the seal then rotate while pulling straight out. Avoid knocking the filter against the housing.



If your air cleaner has a safety filter, replace it every third primary filter change. Remove the safety filter as you would the primary filter. Make sure you cover the air cleaner outlet tube to avoid any unfiltered contaminant dropping into the engine.

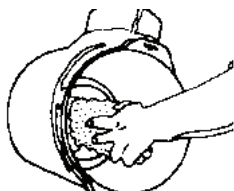
#### 2 Clean Both Surfaces of the Outlet Tube and Check the Vacuator™ Valve

Use a clean cloth to wipe the filter sealing surface and the inside of the outlet tube. Contaminant on the sealing surface could hinder an effective seal and cause leakage. Make sure that all contaminant is removed before the new filter is inserted. Dirt accidentally transferred to the inside of the outlet tube will reach the engine and cause wear. Engine manufacturers say that it takes only a few grams of dirt to "dust" an engine! Be careful not to damage the sealing area on the tube.



Outer edge of the outlet tube

Wipe both sides of the outlet tube clean.



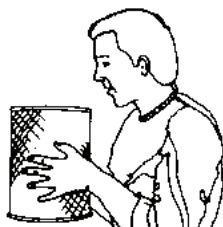
Inner edge of the outlet tube

**If your air cleaner is equipped with a Vacuator Valve**  
Visually check and physically squeeze to make sure the valve is flexible and not inverted, damaged or plugged.



#### 3 Inspect the Old Filter for Leak Clues

Visually inspect the old filter for any signs of leaks. A streak of dust on the clean side of the filter is a telltale sign. Remove any cause of leaks before installing new filter.



#### 4 Inspect the New Filter for Damage

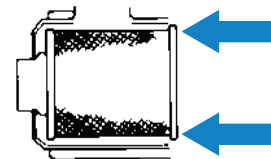
Inspect the new filter carefully, paying attention to the inside of the open end, which is the sealing area. NEVER install a damaged filter. A new Donaldson radial seal filter may have a dry lubricant on the seal to aid installation.



#### 5 Insert the New Radial Seal Filter Properly

If you're servicing the safety filter, this should be seated into position before installing the primary filter.

Insert the new filter carefully. Seat the filter by hand, making certain it is completely into the air cleaner housing before securing the cover in place.



The critical sealing area will stretch slightly, adjust itself and distribute the sealing pressure evenly. To complete a tight seal, apply pressure by hand at the outer rim of the filter, not the flexible center. (Avoid pushing on the center of the urethane end cap.) No cover pressure is required to hold the seal. NEVER use the service cover to push the filter into place! Using the cover to push the filter in could cause damage to the housing, cover fasteners and will void the warranty.

If the service cover hits the filter before it is fully in place, remove the cover and push the filter (by hand) further into the air cleaner and try again. The cover should go on with no extra force.

Once the filter is in place, secure the service cover.



#### Caution

**NEVER use the service cover to push the filter into place! Using the cover to push the filter in could cause damage to the housing, cover fasteners and will void the warranty.**



#### 6 Check Connectors for Tight Fit

Make sure that all mounting bands, clamps, bolts, and connections in the entire air cleaner system are tight. Check for holes in piping and repair if needed. Any leaks in your intake piping will send dust directly to the engine!

**SAFETY PRECAUTIONS**

**⚠ WARNING**

- Have qualified personnel do all maintenance and troubleshooting work.
- Turn the engine off before working inside the machine.
- 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, get replacements from a Lincoln Distributor. See the EXPLODED VIEW AND PARTS LIST at the back of this manual.

Read the Safety Precautions in the front of this manual and in the Kohler **Operating and Maintenance Instructions** manual before working on the OUTBACK®185. Keep all equipment safety guards, covers, and devices in position and in good repair. Keep your hands, hair, clothing, and tools away from the recoil housing, fans, and all other moving parts when starting, operating, or repairing this machine.

**ROUTINE AND PERIODIC MAINTENANCE**

**ENGINE MAINTENANCE**

**⚠ CAUTION**

To prevent the engine from accidentally starting, disconnect the spark plug lead before servicing the engine.

See the Kohler Owner's manual for a summary of maintenance intervals for the engine. Follow either the hourly or the calendar intervals, whichever come first. More frequent service may be required, depending on your specific application and operating conditions. The Kohler Owner's manual shows engine maintenance replacement parts and numbers.

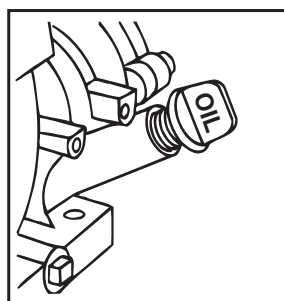


**OIL:** Check the oil level after every 5 hours of operation or daily. **BE SURE TO MAINTAIN THE OIL LEVEL.**

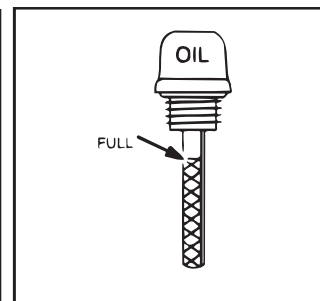
Change the oil the first time after 20 hours of operation. Then, under normal operating conditions, change the oil after every 100 hours or once a year, whichever occurs first. If the engine is operated under heavy load or in high ambient temperatures, change the oil every 50 hours.

Drain the oil from the drain plug located on either side of the engine bottom, as shown in **Figure D.1**. Refill through the oil fill plug until the oil reaches the full mark on the dip stick. See Engine Owner's manual for specific oil recommendations.

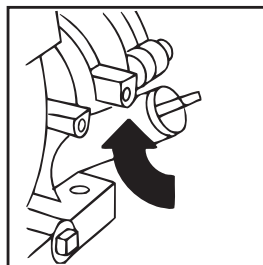
**FIGURE D.1 - OIL DRAIN AND REFILL LOCATION**



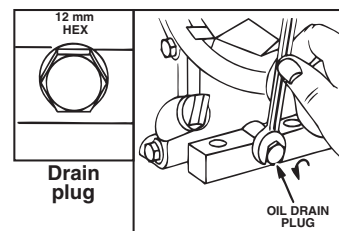
**Do not screw in dipstick to check oil**



**FILL to FULL mark on dipstick - recheck**



**Tighten dipstick firmly before starting**



**Oil drain**



**FUEL:** At the end of each day's use, refill the fuel tank to minimize moisture condensation and dirt contamination in the fuel line.



**AIR CLEANER:** With normal operating conditions, the maintenance schedule for cleaning and re-oiling the foam pre-filter is every 50 hours and replacement of the air cleaner filter element every 100 hours. More frequent servicing is required with dusty operating conditions. Refer to the maintenance section of the Engine Owner's Manual for more information.

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**To service the pre-cleaner:**

Remove the cover. Carefully remove the foam pre-cleaner from the filter element.

1. Wash in liquid detergent and water.
2. Squeeze dry in a clean cloth.
3. Saturate in clean engine oil.
4. Squeeze in a clean, absorbent cloth to remove all excess oil.

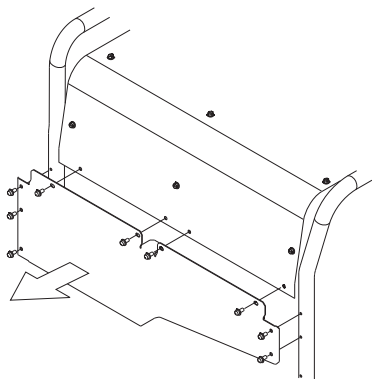
Carefully place the pre-cleaner back over the filter element and reinstall the air cleaner cover and wing nuts.

**CLEAN ENGINE:** Remove dirt and debris with a cloth or a brush. Do not clean with a forceful spray of water. Water might contaminate the fuel system. Use low pressure air to blow out the machine periodically. In particularly dirty locations this may be required once a week.

**SPARK PLUG SERVICE**

To service spark plug, remove the 9 screws securing the side panel. Remove side panel and place provided fiber spacer between the muffler and bottom of control panel. See Figure D.2.

FIGURE D.2

**ENGINE ADJUSTMENTS****⚠ WARNING**

**OVERSPEED IS HAZARDOUS** - The maximum allowable high idle speed for this machine is 3750 RPM, no load. Do NOT tamper with the 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 authorize Field Service Shop.

**SLIP RINGS****⚠ CAUTION**

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.

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

**HARDWARE**

Both English and Metric fasteners are used in this welder.

**ENGINE MAINTENANCE PARTS****Kohler CS 12.75**

Air Filter Element	63 083 19-S
Air Filter Pre-Cleaner	63 083 17-S
Spark Plug	Champion RC 12YC
(Resistor Type)	(Gap .030" [.76mm])

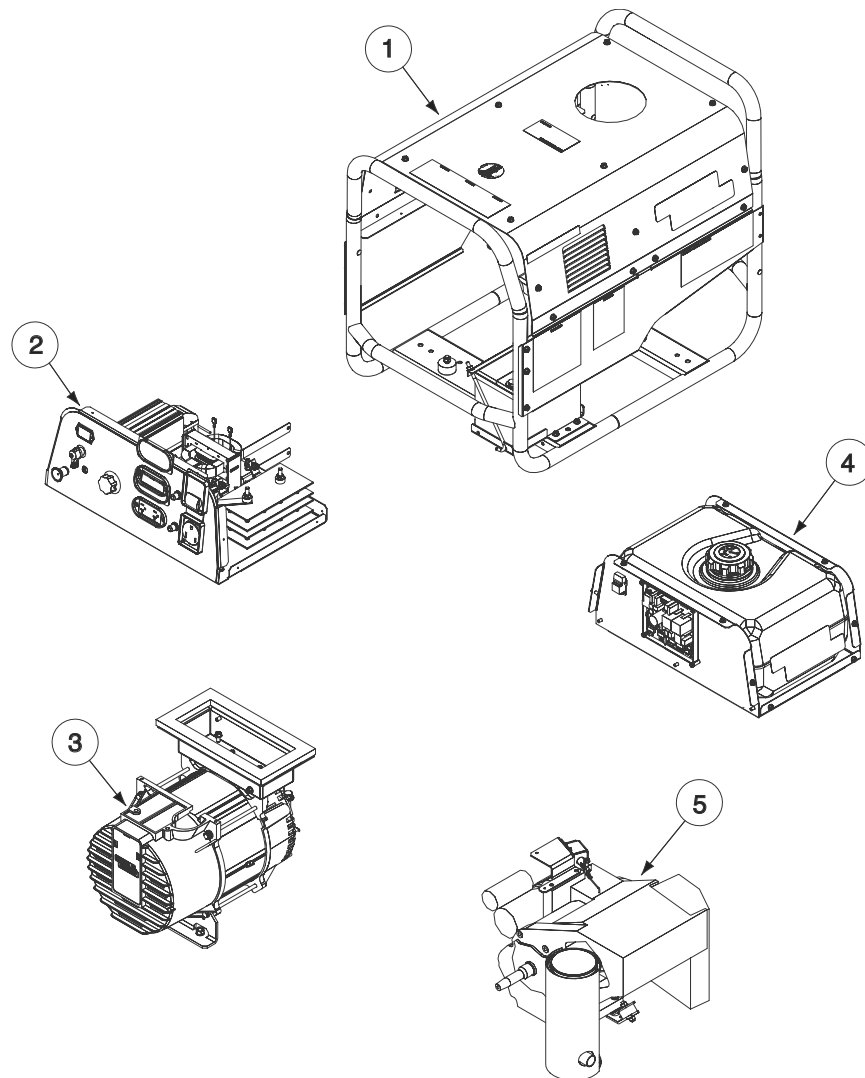
**OPERATIONAL CLEARANCE****⚠ CAUTION**

Approximately 12-18" of clearance should be around this unit during operation for air flow. Reducing this clearance will reduce air flow to the machine causing operational temperatures to increase. Possible damage to the machine can result if too much air flow is restricted.



1. CRADLE ASBLY, BATTERY & ROOF
2. CONTROL PANEL ASSEMBLY
3. STATOR & ROTOR ASSEMBLY
4. REAR CONTROL PANEL & FUEL TANK ASSEMBLY
5. ENGINE ASSEMBLY

## MAJOR COMPONENT LOCATION



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**OUTBACK® 185**



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Return to Master TOC

Return to Master TOC

Return to Master TOC

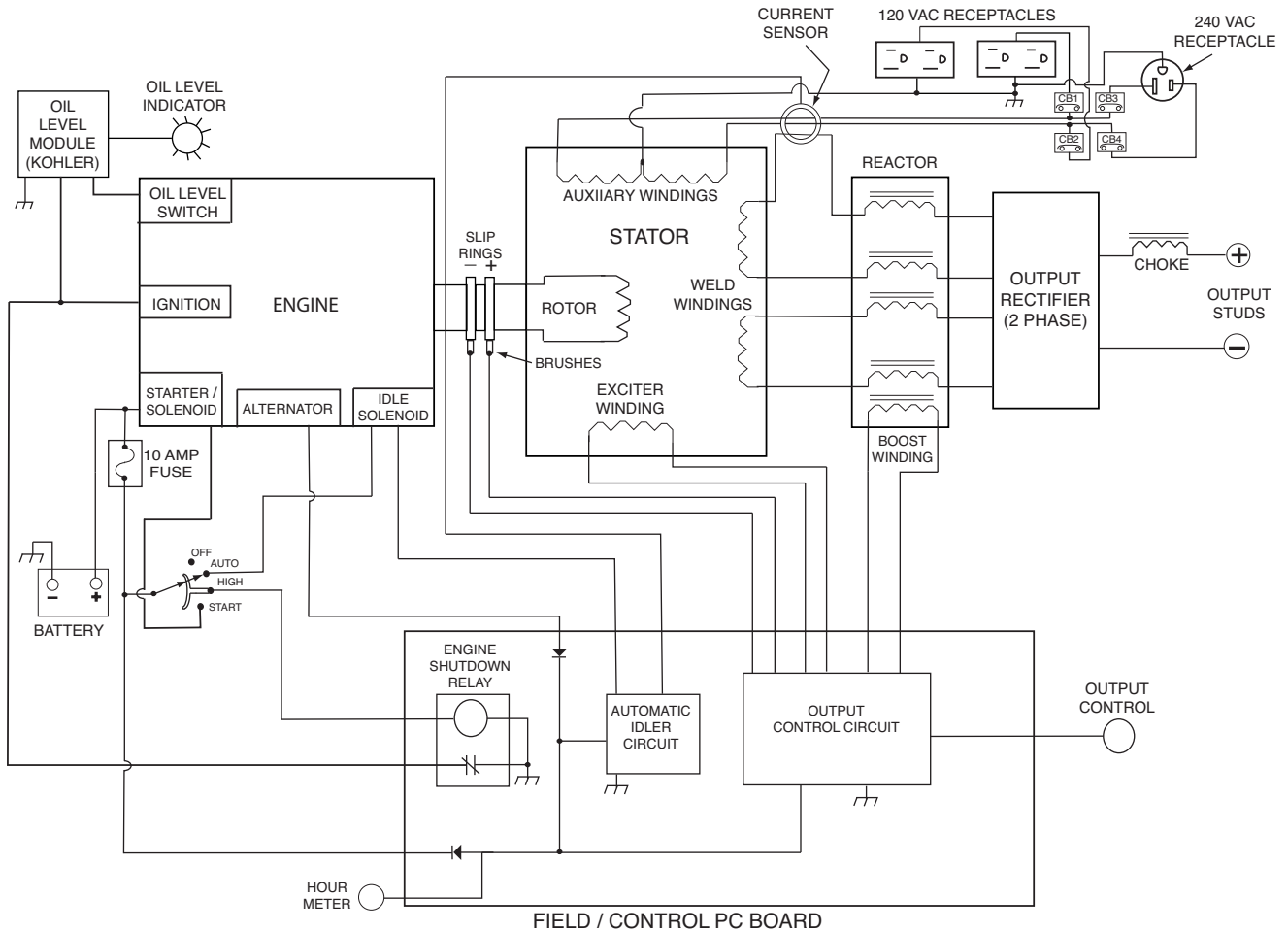
**Theory of Operation** .....E-1

Engine Starting, Protection and Battery Charging .....E-2, E-3

Automatic Idle System .....E-4

Generating Power .....E-5, E-6

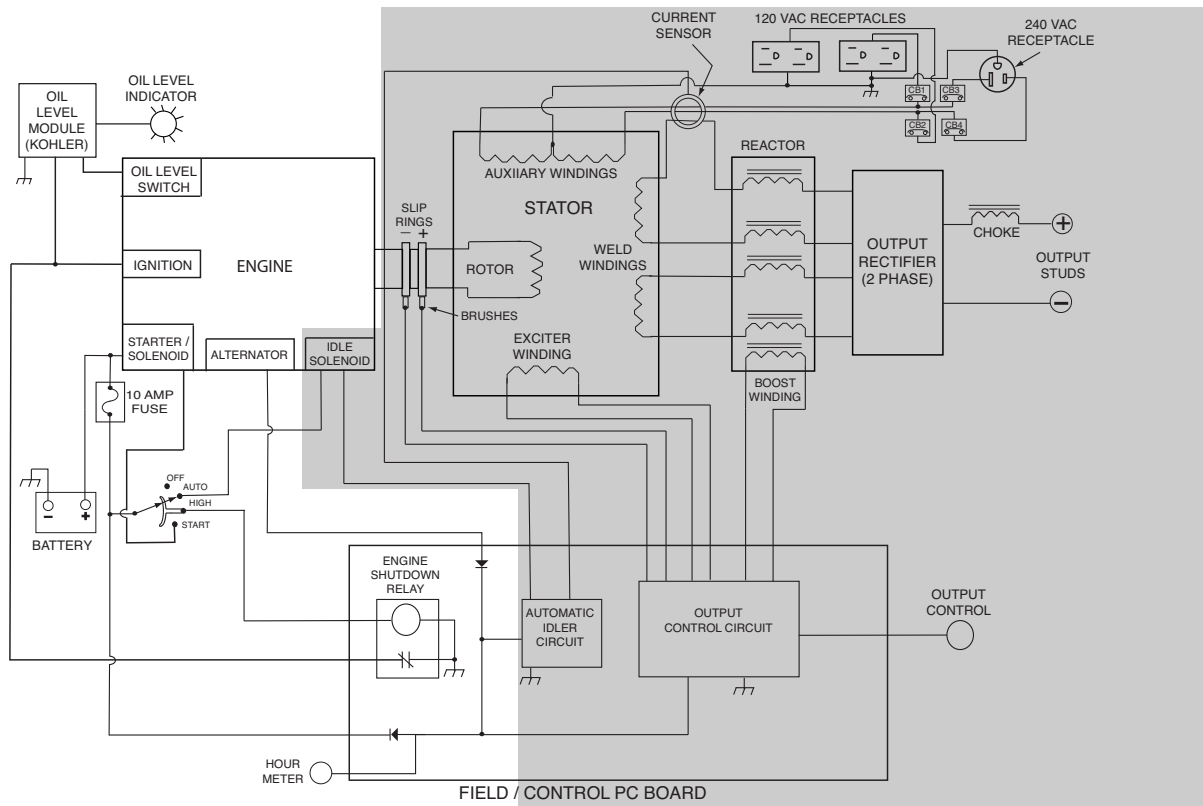
**FIGURE E.1 BLOCK LOGIC DIAGRAM**



**OUTBACK® 185**



FIGURE E.2 - ENGINE STARTING, PROTECTION AND BATTERY CHARGING



## ENGINE STARTING, PROTECTION AND BATTERY CHARGING

### ENGINE STARTING

A 12 Volt battery supplies power to the rotary run/stop/idle switch through a fuse that is located inside the control box. There is also a lead running from the fuse to the PC board. This is for battery charging only.

When the switch is placed in the “Low Idle” or “High Idle” position, a relay on the PC board is activated. This relay activates the engine ignition system by opening a ground lead from the engine magneto.

When the switch is held in the “Start” position, the starter motor solenoid is activated, cranking the engine. After the engine starts, the switch is released and returns to the “high idle” position.

If the battery is too low to properly power the starter motor, the built-in recoil starter can be used to crank the engine. (As long as the battery can produce 6 volts or more, the engine ignition system will remain enabled.)

**NOTE:** This machine will only start if there is at least 6 volts available to activate the engine ignition system. If the battery is removed or completely dead, the engine will not start.

### ENGINE PROTECTION

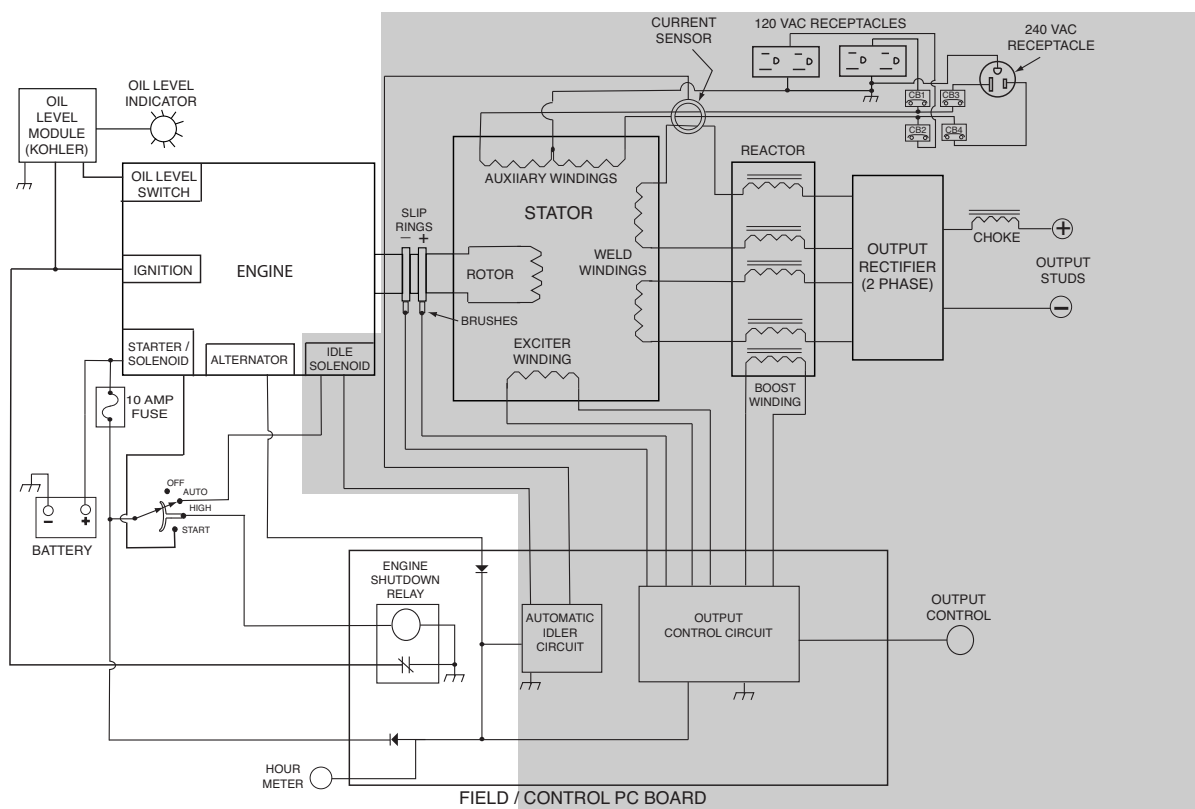
The Kohler engine has a built-in oil level sensor that is connected to an oil level module. If the oil level is low, the ignition magneto is disabled. This will prevent the engine from starting, or shut it down. Low oil level will also cause a warning light on the Outback®’s control panel to flicker for a few seconds when cranking the engine.

NOTE: Unshaded areas of Block Logic Diagram are the subject of discussion

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FIGURE E.3 - ENGINE STARTING, PROTECTION AND BATTERY CHARGING



## ENGINE STARTING, PROTECTION AND BATTERY CHARGING (continued)

### BATTERY CHARGING

The Kohler engine has a built-in battery charging system. Output from the charging system is applied to the PC board where it is stabilized by the battery and then used to power the board electronics, the generator flashing system, and the hour meter. The remaining output exits the PC board, is routed through a fuse located inside the control box, and applied to the battery.

**NOTE:** The engine charging system must be functional for the Outback® 185 to produce weld or auxiliary output.

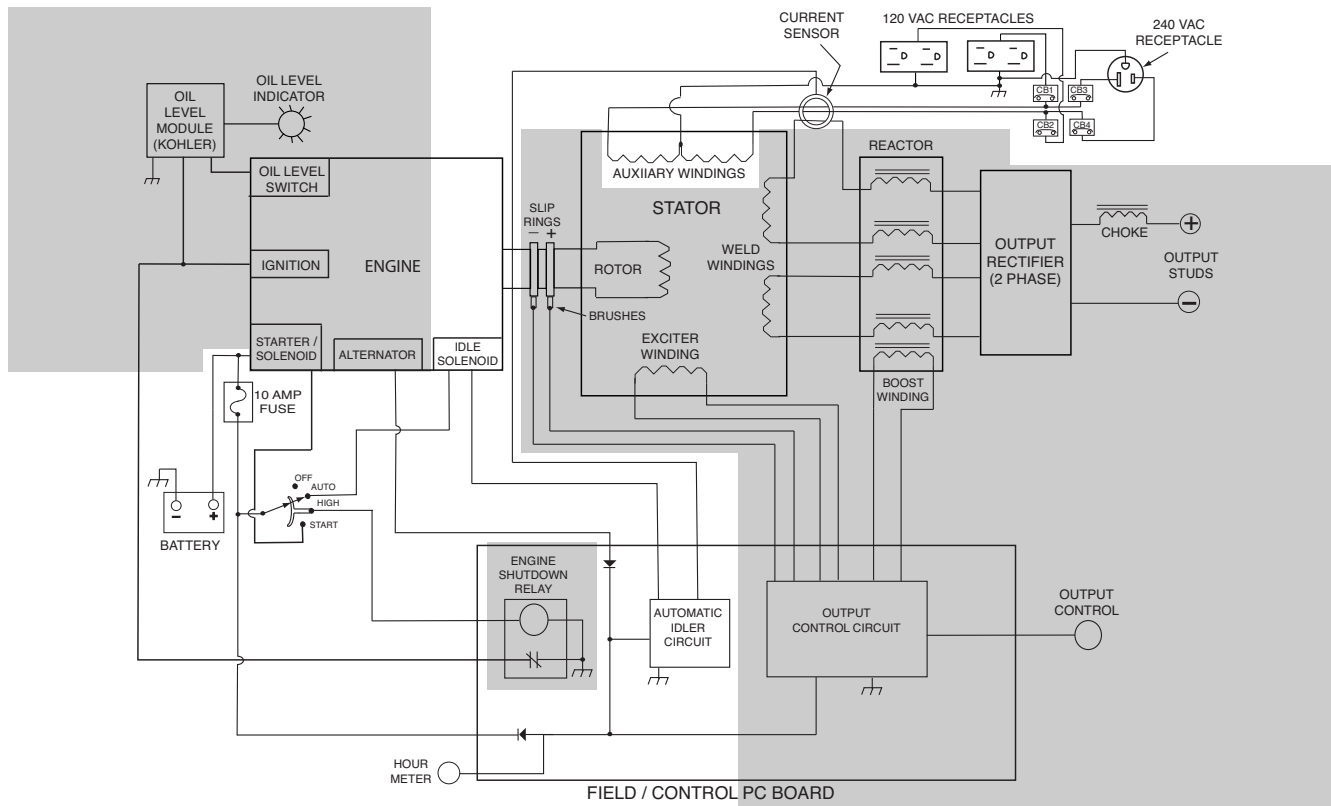
**NOTE:** The battery must remain connected at all times. If the battery is disconnected while the machine is running, unstable voltage from the charging system will likely cause the PC board electronics to malfunction and may cause permanent damage to the PC board.

NOTE: Unshaded areas of Block Logic Diagram are the subject of discussion

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FIGURE E.4 - AUTOMATIC IDLE SYSTEM



## AUTOMATIC IDLE SYSTEM

The Outback® 185 is equipped with an automatic engine idle system. A solenoid is used to pull the engine throttle to a preset low speed position when 12 volts DC is applied. When no voltage is applied, the solenoid is released allowing the engine governor to control the RPM.

The “high” and “auto” positions on the rotary run/stop/idle switch control the supply of positive (+) battery voltage to the idle solenoid. When the switch is in the “high” position, the solenoid is shut off and the engine will remain in high idle. When the switch is in the “auto” position, positive (+) battery voltage is applied to the solenoid and the negative (-) connection is controlled by the PC board as described below.

The following explanation assumes that the rotary switch is in the “auto” position and the engine is operating at low RPM.

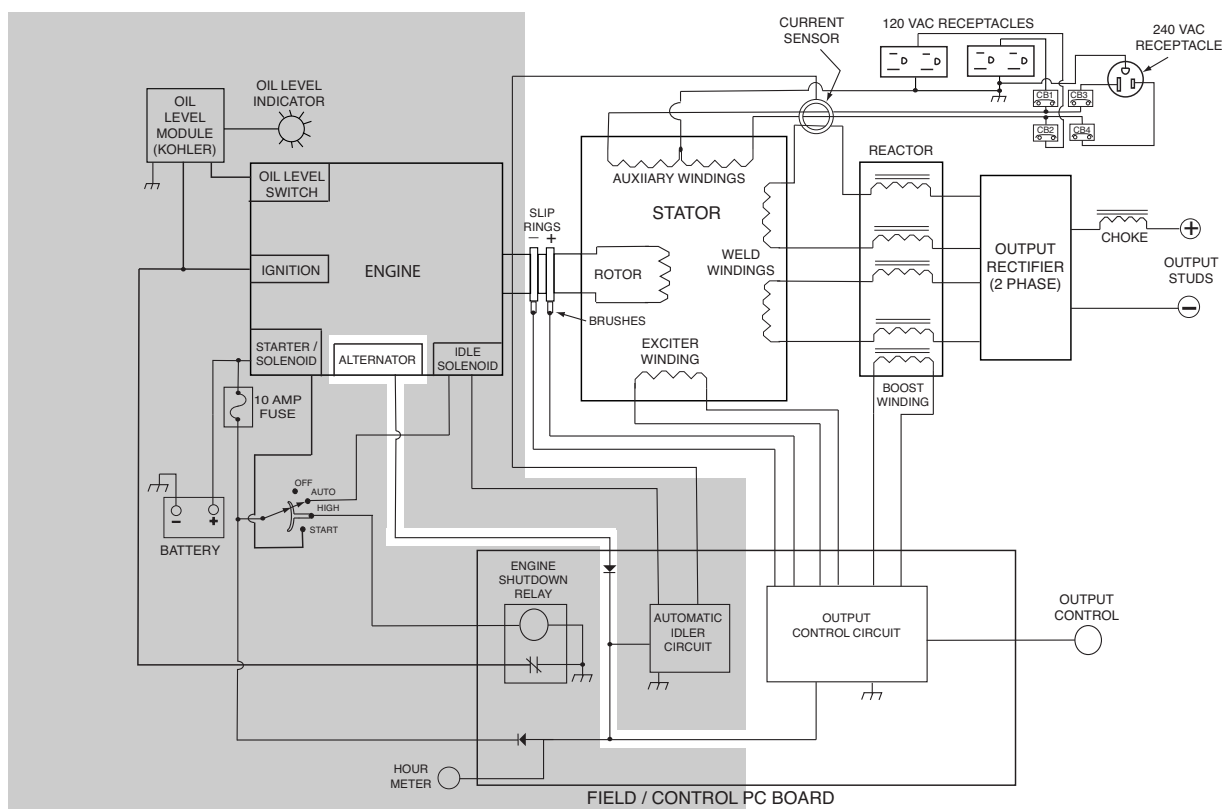
Weld and auxiliary current are detected by a toroidal current sensor that is connected to the PC board. When sufficient current flows through the sensor; the PC board detects this and immediately interrupts the negative (-) connection to the solenoid. The solenoid is released and the engine RPM increases to the high setting. When the current flow stops, the PC board will begin a time delay of about 12 seconds. If the current flow begins again during this time delay, the solenoid remains inactive and the engine continues to operate at high RPM. If no current flow is detected at the end of the 12 second delay, the negative (-) connection to the solenoid is restored and the engine will drop to low idle RPM.

NOTE: Unshaded areas of Block Logic Diagram are the subject of discussion

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FIGURE E.5 - GENERATING POWER



## GENERATING POWER

### Flashing

When the engine is running, power from the engine charging system is stabilized, and then applied to the rotor brushes through a series of PC board mounted current limiting resistors and a “flashing” diode.

### Building Output

The flashing current produces a weak magnetic field in the rotor, which is coupled to the now running engine. This rotating magnetic field begins to generate AC output from all of the stator windings. Output from the exciter winding is rectified by a diode bridge, filtered by a capacitor, controlled by circuitry on the PC board, and fed back into the rotating field winding, making the magnetic field stronger. This stronger magnetic field then produces higher voltage from the stator windings, which feeds back to the rotor, making its magnetic field even stronger.

This process of strengthening the magnetic field through feedback from the exciter winding continues to increase the output of the main generator. If the output control is set to maximum and the idle switch is in the

“high” position, all of the windings should be putting out maximum voltage almost immediately. The rotor field voltage is now considerably higher than the flashing voltage that was used to start the generating process. The “flashing” diode on the control PC board blocks that higher field voltage from intruding into the 12VDC battery system.

### AC Output

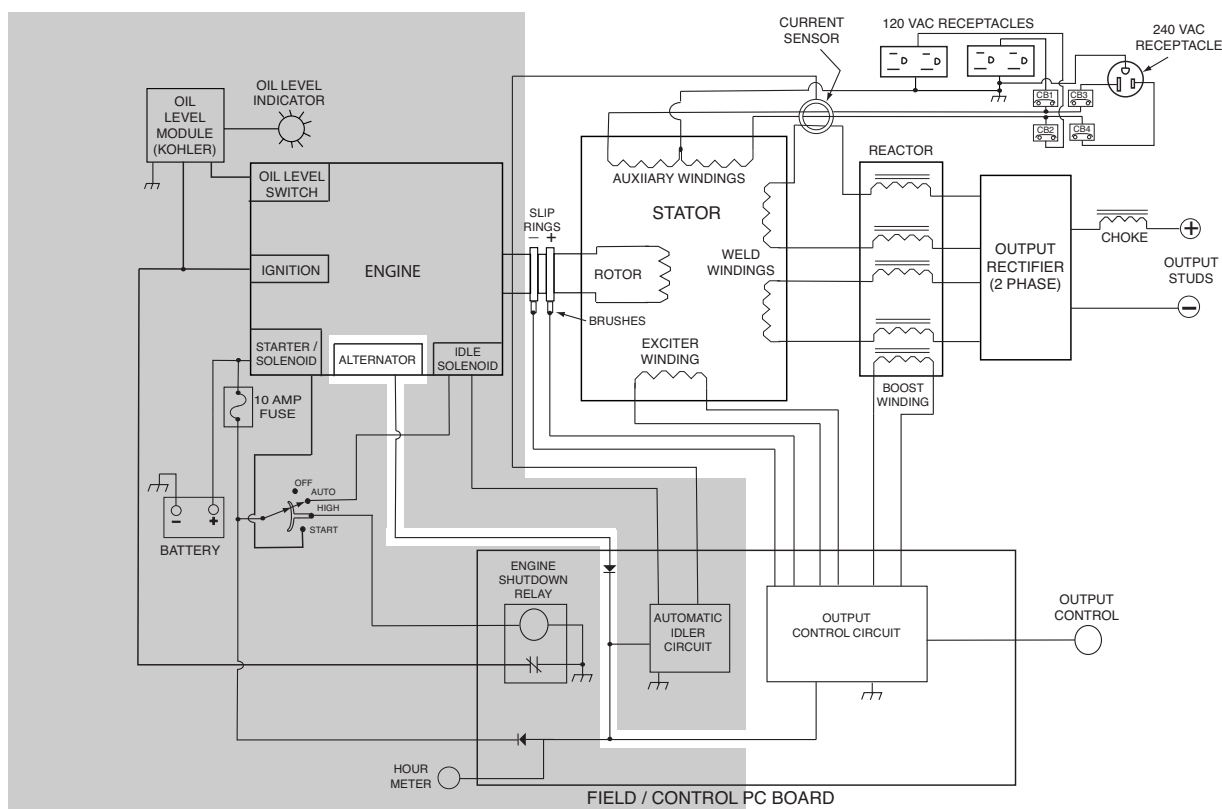
The generator is now producing normal AC power from all four of the windings. These windings consist of two 64 VAC weld windings, a 120/240 VAC auxiliary power winding, and an 82 VAC excitation winding.

NOTE: Unshaded areas of Block Logic Diagram are the subject of discussion

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FIGURE E.6 - GENERATING POWER



## GENERATING POWER (continued)

### DC Weld Output

AC output from the two phase-shifted weld windings pass through a reactor then to a two-phase bridge rectifier. DC output from the rectifier is then stabilized by a choke and terminates at two weld output terminals.

### Weld Output Control

Weld output is controlled by varying the current in the rotating field winding. This is done through circuitry on the PC board that detects the position of the output control potentiometer and then limits the rotor current accordingly.

**NOTE:** Because the strength of the rotating field affects the output of all the windings, auxiliary output will also drop when the weld output control setting is decreased.

### Weld Boost:

The Outback® 185 is equipped with a weld boost circuit that improves weld performance. The reactor contains a weld boost winding that produces output relative to the weld current. In high welding load situations, the exciter winding will tend to drop off in output while the boost winding's output tends to increase. The output from this boost winding is routed through a circuit breaker. It is then rectified and added to the exciter circuit, resulting in a significant improvement in weld performance.

NOTE: Unshaded areas of Block Logic Diagram are the subject of discussion

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    PC Board Troubleshooting Procedures .....F-3

    Troubleshooting Guide .....F-4

    Test Procedures .....F-13

        Engine RPM Adjustment Procedure .....F-13

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        Stator Short Circuit and Ground .....F-33

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## 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. Symptoms are grouped into the following categories: output problems.

**Step 2. PERFORM EXTERNAL TESTS.**

The second column labeled "POSSIBLE AREAS OF MISADJUSTMENT(S)" lists the obvious external possibilities that may contribute to the machine symptom. Perform these tests/checks in the order listed. In general, these tests can be conducted without removing the case wrap-around cover.

**Step 3. RECOMMENDED COURSE OF ACTION**

The last column labeled "Recommended Course of Action" lists the most likely components that may have failed in your machine. It also specifies the appropriate test procedure to verify that the subject component is either good or bad. If there are a number of possible components, check the components in the order listed to eliminate one possibility at a time until you locate the cause of your problem.

All of the referenced test procedures referred to in the Troubleshooting Guide are described in detail at the end of this chapter. Refer to the Troubleshooting and Repair Table of Contents to locate each specific Test Procedure. All of the specified test points, components, terminal strips, etc. can be found on the referenced electrical wiring diagrams and schematics. Refer to the **Electrical Diagrams Section Table of Contents** to locate the appropriate diagram.

**⚠ 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 problems 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.**

- 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-shielding 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 proper 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.

Observe Safety Guidelines detailed in the beginning of this manual.

PROBLEMS (SYMPTOMS)	POSSIBLE AREAS OF MISADJUSTMENT(S)	RECOMMENDED COURSE OF ACTION
<b>OUTPUT PROBLEMS</b>		
Major physical or electrical damage.	Contact the Lincoln Electric Service Department at 1-888-935-3877.	
The engine will not crank while using the electric start function.	<ol style="list-style-type: none"> <li>1. Be certain that the battery is properly connected and adequately charged.</li> <li>2. Try cranking the engine using the recoil starter. If the engine will still not turn, or the recoil starter is hard to pull, remove the spark plug and check for water or oil in the cylinder. Also check for high oil level.</li> <li>3. If the engine cranks normally while using the recoil starter, remove the top cover from the machine and check the fuse. The fuse is located under the white cover of the back of the control box.</li> </ol>	<ol style="list-style-type: none"> <li>1. Test the fuse located under the white cover at the back of the control box.</li> <li>2. Test for battery voltage at lead 210B where it connects to the starter solenoid, while holding the switch in the "start" position. If voltage is present, the starter/solenoid assembly is defective; contact the engine manufacturer for parts and service.</li> <li>3. If battery voltage is not present, check the engine switch, and all connectors and wires connecting the fuse, switch and starter solenoid. See the wiring diagram.</li> </ol>
Engine will not start. The starter motor will crank the engine normally.	<ol style="list-style-type: none"> <li>1. If using the recoil starter, be sure the engine switch is in the "high" or "auto" position.</li> <li>2. Check that the fuel valve is open, and that there is sufficient, fresh gasoline in the tank.</li> <li>3. Be certain that the battery is properly connected and adequately charged, even if using the recoil starter.</li> <li>4. Check the engine oil level.</li> <li>5. Check or replace the fuel filter.</li> <li>6. Check or replace air filter.</li> <li>7. Check the spark plug. Clean or replace if necessary.</li> </ol>	<ol style="list-style-type: none"> <li>1. Check for battery voltage at the PC board pin J3-10. (lead #211) If voltage is not present, the engine switch or wire #211 may be defective.</li> <li>2. Check PC board ground at pin J1-2. (lead GND-G)</li> <li>3. Place the engine switch in the "stop" position, unplug engine to welder harness connector (P4/J4) located inside the control box at the bottom left. <b>CAUTION: Disconnecting this plug disables the normal engine shut down function of the engine switch.</b></li> </ol>

### ⚠ 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.

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Observe Safety Guidelines detailed in the beginning of this manual.

PROBLEMS (SYMPTOMS)	POSSIBLE AREAS OF MISADJUSTMENT(S)	RECOMMENDED COURSE OF ACTION
<b>OUTPUT PROBLEMS</b>		
<p><i>(Continued)</i></p>	<p>8. Observe the oil level indicator light while cranking the engine. If the light is blinking while cranking the engine, the oil level may be low, or the oil level system may be faulty. Contact the engine manufacturer.</p>	<p>Reconnect P4/J4 to shut the engine down.</p> <p>Attempt to start the engine using the recoil starter; if the engine starts, check lead #212 for faulty insulation. If lead #212 is good, replace the PC board.</p> <p>If the engine fails to start, have the engine and oil level system checked by a qualified engine service technician.</p>
<p>The engine will not shut down.</p>		<ol style="list-style-type: none"> <li>1. Place the engine switch in the "stop" position and check for battery voltage at the PC board pin J3-10. (lead #211) If voltage is present, the switch is defective.</li> <li>2. Locate and ground the brown/white lead from the engine ignition magneto. If the engine still will not shut down, the engine ignition magneto may be defective. Contact a qualified engine technician.</li> <li>3. If the engine shuts down when the brown/white lead is grounded, check wiring and connections at leads #212, GND-I, GND-J, and the brown leads between connector J4/P4 and the engine ignition magneto. If these leads and connections are good, replace the PC board.</li> </ol>

**⚠ 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.

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Observe Safety Guidelines detailed in the beginning of this manual.

PROBLEMS (SYMPTOMS)	POSSIBLE AREAS OF MISADJUSTMENT(S)	RECOMMENDED COURSE OF ACTION
<b>OUTPUT PROBLEMS</b>		
<p>The engine runs erratically or stops running.</p>	<ol style="list-style-type: none"> <li>1. Check that the fuel valve is fully open, and that there is sufficient, fresh gasoline in the tank.</li> <li>2. The choke may be engaged. Be sure the choke handle is pushed in completely after the engine has begun to warm up.</li> <li>3. Be certain that the battery is properly connected and adequately charged, even if using the recoil starter.</li> <li>4. Check the engine oil level.</li> <li>5. Check or replace the fuel filter.</li> <li>6. Check or replace air filter.</li> <li>7. Check spark plug; clean or replace if necessary.</li> <li>8. Observe the oil level indicator light while cranking the engine. If the light is blinking while cranking the engine, the oil level may be low, or the oil level system may be faulty. Contact the engine manufacturer.</li> <li>9. Perform any additional maintenance suggested in the engine operator's manual.</li> </ol>	<ol style="list-style-type: none"> <li>1. Check the idle solenoid and engine carburetor linkage for damage, excessive dirt, or binding. If possible, perform the <b>engine RPM adjustment procedure</b>.</li> <li>2. Place the engine switch in the "stop" position, unplug engine to welder harness connector (P4/J4) located inside the control box at the bottom left. CAUTION: Disconnecting this plug disables the normal engine shut down function of the engine switch. Reconnect P4/J4 to shut the engine down.</li> <li>3. Attempt to start the engine using the recoil starter.</li> <li>4. If the problem persists check for faulty insulation at the brown and brown/white wires connecting P4/J4 to the engine magneto. If the insulation is good, contact a qualified engine repair technician.</li> <li>5. If the engine runs normally with P4/J4 disconnected, check for battery voltage between J3-10 (+) and J1-2 (-). If the voltage is low or erratic, check conductors and connections at GND-G, lead #211, lead 209A, and lead 230. Check the fuse, fuse holder, and the engine switch. Replace or repair any defective leads or components.</li> <li>6. If the voltage between J3-10 (+) and J1-2 (-) is normal, check for defective insulation on lead 212. If insulation is good, replace PC board.</li> </ol>

### ⚠ 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.

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Observe Safety Guidelines detailed in the beginning of this manual.

PROBLEMS (SYMPTOMS)	POSSIBLE AREAS OF MISADJUSTMENT(S)	RECOMMENDED COURSE OF ACTION
<b>OUTPUT PROBLEMS</b>		
Engine will not idle down. Weld and auxiliary outputs are normal.	<ol style="list-style-type: none"> <li>1. Check that the engine switch is in the "Auto" position.</li> <li>2. Check that the engine choke is fully open.</li> <li>3. There may be a load on the weld or auxiliary output. Disconnect all cables and cords.</li> </ol>	<ol style="list-style-type: none"> <li>1. The idle solenoid may be improperly adjusted. Perform the <b>Engine RPM adjustment procedure</b>.</li> <li>2. With the engine running, place the engine switch in the "Auto" position. Check for battery voltage at the idle solenoid, lead 213B. If battery voltage is not present, check engine switch, connector P4/J4, and leads 213A and 213B.</li> <li>3. If battery voltage was detected in step #2 above, check connector P4/J4, leads 215 and 215A.</li> <li>4. Check for AC voltage at leads 260 (J2-3) and 261 (J2-4). With no load on either the weld or auxiliary output, the meter should read about 26 mV. If the voltage is significantly higher than this, the toroidal current transformer may be faulty, or improperly wired. This may also indicate a load on machine input or faulty internal components drawing current.</li> <li>5. If the above readings are normal, replace the PC board.</li> </ol>
Engine idles own but will not stay at low idle.		Low idle ROM may be set too low. Perform the <b>engine RPM adjustment procedure</b> .

### ⚠ 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.

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Observe Safety Guidelines detailed in the beginning of this manual.

PROBLEMS (SYMPTOMS)	POSSIBLE AREAS OF MISADJUSTMENT(S)	RECOMMENDED COURSE OF ACTION
<b>OUTPUT PROBLEMS</b>		
<p>The engine will not go to high idle when a welding or auxiliary load is applied. Engine idles up normally and outputs are normal when the engine switch is placed in the "high" position.</p>	<ol style="list-style-type: none"> <li>Poor connection in weld circuit; check cables, connectors, work clamp and electrode holder. Check that work clamp is making a good connection to the work piece.</li> <li>Load too low to activate the idle circuit. Plug in a device that applies a load of 100 watts or more.</li> </ol> <p>NOTE: Some tools and devices check for "good" power before fully turning on. These devices will require the machine to be placed in the "high" position before they will function.</p>	<ol style="list-style-type: none"> <li>Unplug P4/J4 connector and measure the idle solenoid resistance between leads 213B and 215A. it should measure about 15 ohms. Measure the resistance from lead 213B or lead 215A to chassis ground. Resistance should be very high; 500,000 (500K) ohms or higher. Replace the solenoid if the resistance is significantly different.</li> <li>Reconnect P4/J4 and start the machine placing the engine switch in the high" position. Plug in a 100-watt light bulb. Check for AC voltage at leads 260 (J2-3) and 261 (J2-4). The meter should read about 1.2 volts. If voltage is significantly lower, replace the toroidal current transformer.</li> <li>If the above readings are normal, replace the PC board.</li> </ol>
<p>No weld or auxiliary output – Engine runs normally.</p>	<ol style="list-style-type: none"> <li>Make sure there is no load on the machine. Disconnect all cables and cords from the weld output terminals and the auxiliary receptacles. Check for DC open circuit voltage (OCV) (About 70 to 80 volts) at the weld output terminals and check for AC auxiliary voltage at the 120 and 240 VAC receptacles.</li> <li>Check that circuit breakers are not tripped.</li> </ol>	<ol style="list-style-type: none"> <li>The brushes and slip rings may be worn or faulty. Perform the brush and slip ring service procedure.</li> <li>With the engine running, check for battery voltage at the PC board, J3-9 (lead #208A). If voltage is not present, check conductors and connection at leads 208A, 208, and the engine wiring leading to the engine charging system. If the connections are good, the battery charging system may be faulty. Contact a qualified engine repair technician.</li> </ol>

**⚠ 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.

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Observe Safety Guidelines detailed in the beginning of this manual.

PROBLEMS (SYMPTOMS)	POSSIBLE AREAS OF MISADJUSTMENT(S)	RECOMMENDED COURSE OF ACTION
<b>OUTPUT PROBLEMS</b>		
<p>(Continued)</p>		<ol style="list-style-type: none"> <li>3. If voltage is present at J3-9, check for battery voltage at J3-8 (lead #224A). If voltage is not present, replace the PC board.</li> <li>4. If voltage is present at J3-8, check for battery voltage at J1-9 (lead #224). If voltage is not present, check leads 224 and 224A. Check the positive terminal connections at the hour meter.</li> <li>5. Check that the PC board is properly grounded, pin J1-2 (lead GND-G).</li> <li>6. Perform the <b>rotor flashing, voltage, and resistance tests</b>.</li> <li>7. Perform the <b>stator resistance and voltage tests</b>.</li> </ol>
<p>There is no weld output, or weld voltage drops dramatically when trying to strike an arc. The 115/230 VAC auxiliary output is normal; engine operates normally.</p>	<ol style="list-style-type: none"> <li>1. Check weld cables, connections, work clamps, and electrode holder.</li> <li>2. With engine running at high idle, and output control set to maximum, check the DC voltage at the weld output terminals. It should measure 70 to 80 Volts RMS.</li> </ol>	<ol style="list-style-type: none"> <li>1. Check for loose or damaged connections between the output terminals, the choke, the rectifier, the reactor, and the stator. See wiring diagram.</li> <li>2. With engine running at high idle, and output control set to maximum, check for about 63 VAC from each of the two stator weld windings (W1 to W2) and (W3 to W4). See wiring diagram. If voltage is not present for either test, the stator is probably defective.</li> <li>3. With the engine still running, check for about 63 VAC at W1A to W2 and from W3A to W4. If voltage is not present for either test, the reactor may be defective.</li> </ol>

**⚠ 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.

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PROBLEMS (SYMPTOMS)	POSSIBLE AREAS OF MISADJUSTMENT(S)	RECOMMENDED COURSE OF ACTION
<b>OUTPUT PROBLEMS</b>		
<p>(Continued)</p>		<ol style="list-style-type: none"> <li>4. With the engine still running, check for about 70 to 80 VDC at the output rectifier positive and negative terminal. If voltage is not present, the rectifier is probably faulty.</li> <li>5. If the is voltage at the rectifier output, but not at the weld terminals, the choke may be open.</li> </ol>
<p>No 115/230 VAC auxiliary output – Weld output is normal and engine operates normally.</p>	<ol style="list-style-type: none"> <li>1. Check for faulty extension cords, tools, lights, etc. Plug in a known working device.</li> <li>2. Check for tripped circuit breakers.</li> <li>3. If the Outback® has optional GFCI receptacles, try resetting them.</li> </ol> <p>NOTE: Engine must be running at high idle RPM or the GFCI receptacles will not reset.</p>	<ol style="list-style-type: none"> <li>1. Check for AC voltage at the back of the receptacles. If voltage is present at the back of the receptacles but the receptacles still will not function, replace the receptacle.</li> <li>2. Check for 120 VAC from lead #5 to leads #3 and #6 at the circuit breakers. See wiring diagram. If 120 VAC is present, one or more circuit breakers may be defective.</li> <li>3. If AC voltage is not detected in step 2 above, check leads between the test points and the stator winding. If the leads are good, the stator is likely defective.</li> </ol>
<p>Low weld and auxiliary output, the engine operates normally.</p>	<ol style="list-style-type: none"> <li>1. The output control may be set too low.</li> <li>2. Engine RPM may be low.</li> <li>3. The battery may be faulty.</li> </ol>	<ol style="list-style-type: none"> <li>1. Perform the <b>Engine RPM adjustment procedure</b>.</li> <li>2. The brushes and slip rings may be worn or faulty. Perform the <b>brush and slip ring service procedure</b>.</li> <li>3. Perform the <b>battery and charging system tests</b>.</li> <li>4. Perform the <b>rotor and stator voltage tests</b>.</li> </ol>

**⚠ 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.

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PROBLEMS (SYMPTOMS)	POSSIBLE AREAS OF MISADJUSTMENT(S)	RECOMMENDED COURSE OF ACTION
<b>OUTPUT PROBLEMS</b>		
<p>The welding arc is “cold” or weld performance is poor. Engine operates normally and auxiliary output is normal.</p>	<ol style="list-style-type: none"> <li>1. The weld boost circuit breaker may have tripped. This circuit breaker is a small button on the bottom of the control box, not far from the positive weld output terminal.</li> <li>2. Check the weld cables, electrode holder, and work clamp. Try welding with a known good set of short, adequately sized cables.</li> <li>3. The battery may be low or defective.</li> <li>4. The welding electrode may be wet or contaminated. Try using a fresh dry welding electrode.</li> </ol>	<ol style="list-style-type: none"> <li>1. Perform the <b>Engine RPM adjustment procedure</b>.</li> <li>2. The brushes and slip rings may be worn or faulty. Perform the <b>brush and slip ring service procedure</b>,</li> <li>3. Perform the <b>battery and charging system tests</b>.</li> <li>4. Perform the <b>weld boost circuit tests</b>.</li> </ol>

**⚠ 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.

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# TROUBLESHOOTING AND REPAIR

## ENGINE RPM ADJUSTMENT PROCEDURE

### WARNING

Service and repair should be performed only by Lincoln Electric factory trained personnel. Unauthorized repairs performed on this equipment may result in danger to the technician or 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.

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

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### TEST DESCRIPTION

Test will determine whether the engine is operating at the correct speed (RPM) during both HIGH and LOW idle conditions.

### MATERIALS NEEDED

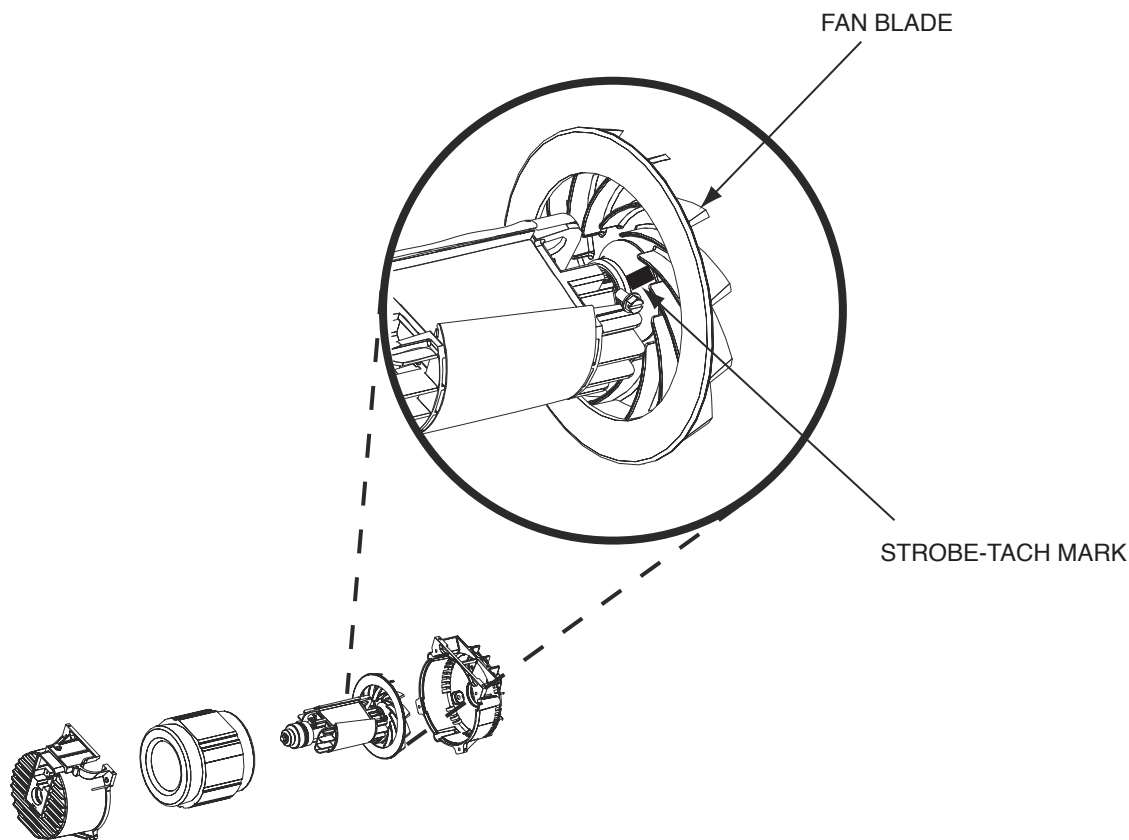
- Miscellaneous hand tools and metric wrench set
- High visibility marker
- Strobe-tach, frequency counter, or vibratach

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## ENGINE RPM ADJUSTMENT PROCEDURE (continued)

FIGURE F.1 – STROBE-TACH METHOD



## PROCEDURE

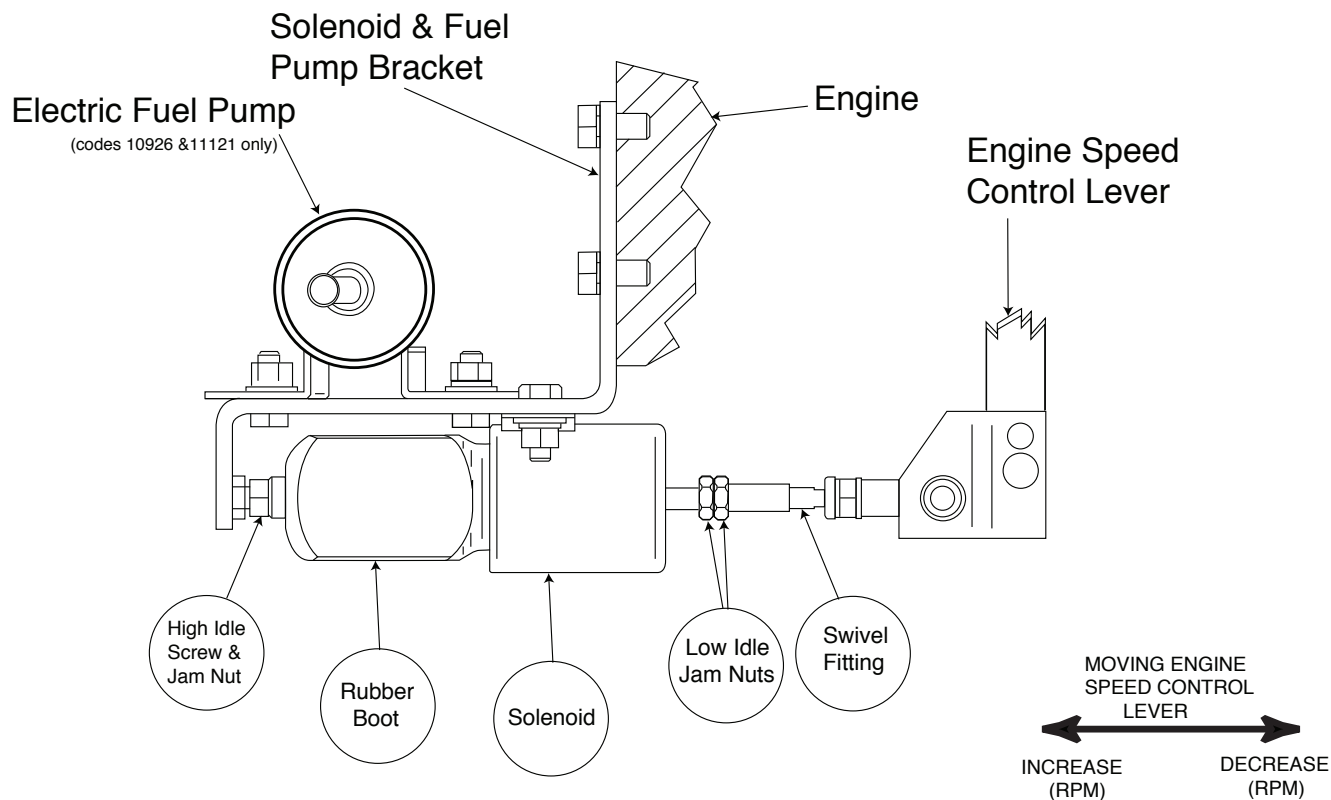
## Strobe-Tach Method

1. Turn the engine off.
2. Place a highly visible mark on a component that rotates while the engine is running. The rotor-cooling fan is a good place for this mark. See Figure F.1.
3. Connect the strobe-tach according to the manufacturer's instructions.
4. Start the engine and place the idle switch in the "HIGH IDLE" position. Make sure that there is no load on the machine.
5. Direct the strobe-tach light at the mark and synchronize the strobe-tach.
6. The tach should read between 3700 and 3800 RPM.
7. Move the idle switch to the "AUTO IDLE" position and wait for the idle solenoid to energize. The engine RPM should drop and stabilize at the low idle RPM.
8. Synchronize the strobe-tach to read the low idle RPM.
9. The tach should read between 2250 and 2500 RPM.
10. If either of the readings is incorrect, proceed to the **Throttle Adjustment Procedure** in this section.

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## ENGINE RPM ADJUSTMENT PROCEDURE (continued)

FIGURE F.2 – FREQUENCY COUNTER METHOD



## Frequency Counter Method

**NOTE:** A dedicated frequency counter can be used for this test, but many high quality digital multimeters also have this function, and can be easily utilized. See the manufacturer's instructions for your frequency counter or multimeter.

1. Set your frequency counter per the meter manufacturer's instructions and plug it into one of the 120VAC auxiliary receptacles.
2. Start the engine and place the idle switch in the "HIGH IDLE" position. Make sure that there is no load on this machine.
3. The frequency should read between 61.6 and 63.3 Hz.

4. Move the idle switch to the "AUTO IDLE" position and wait for the idle solenoid to energize. The engine RPM should drop and stabilize at the low idle RPM.
5. The frequency should read between 47.5 and 41.6 Hz.
6. If either of the readings is incorrect, proceed to the **Throttle Adjustment Procedure** later in this section.

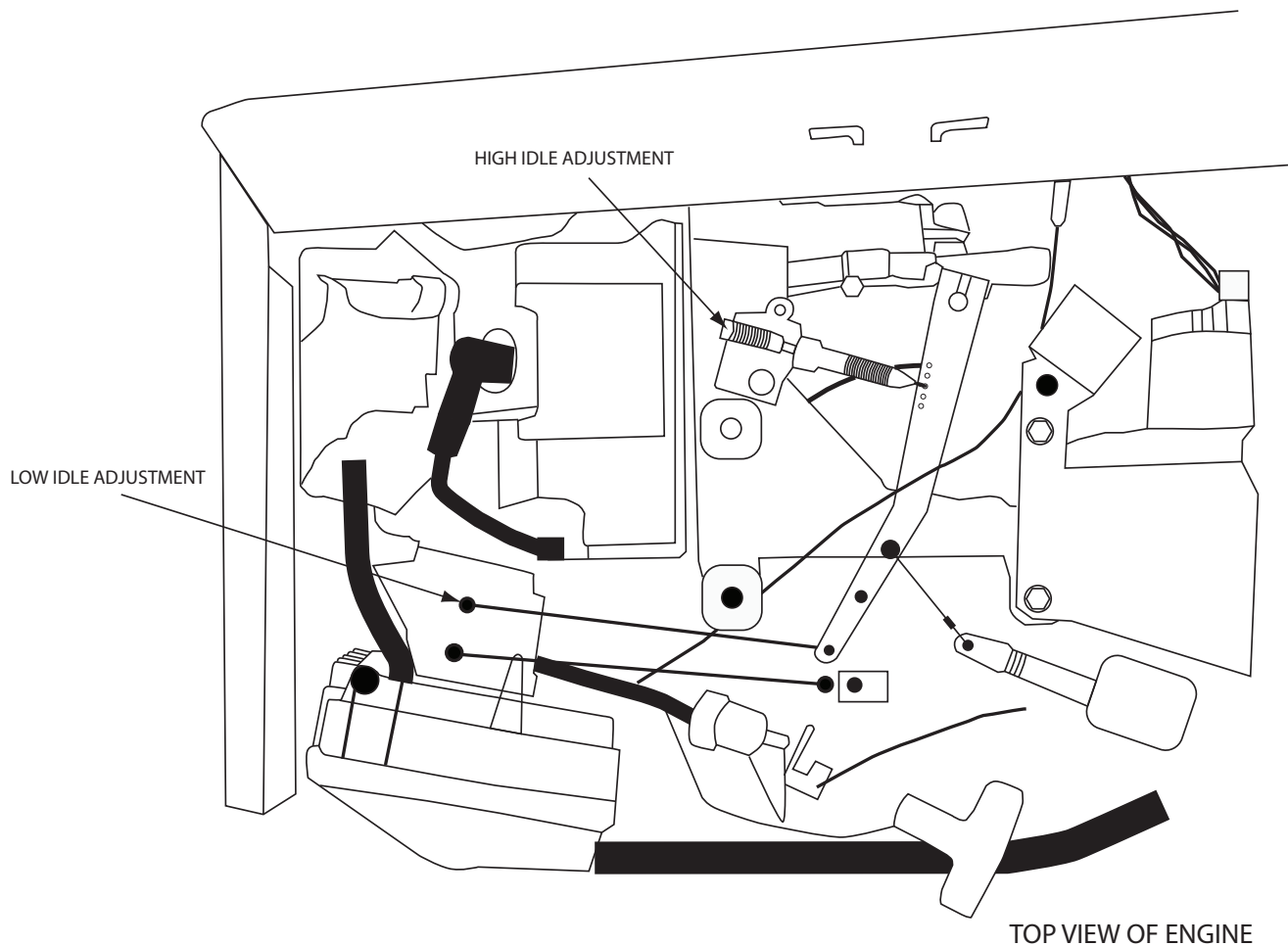
**NOTE:** For the Outback® 185, and any other Lincoln Electric 3600 RPM (2 Pole) machine, engine RPM can be determined by multiplying the frequency, in Hz. by 60. (Example: 60 Hz. x 60 = 3600 RPM).

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## ENGINE RPM ADJUSTMENT PROCEDURE (continued)

FIGURE F.3 – VIBRATACH METHOD

**Vibratach Method**

A Vibratach is used to measure the vibrations caused by the running engine. It can be positioned anywhere where the engine vibration is reasonably strong.

1. Read and understand the manufacturer's instructions for the Vibratach.
2. Start the engine and place the idle switch in the "HIGH IDLE" position. Make sure there is no load on the machine.
3. Position and adjust the Vibratach; it should read between 3700 and 3800 RPM.
4. Move the idle switch to the "AUTO IDLE" position and wait for the idle solenoid to energize, and the engine RPM to drop and stabilize at the low idle RPM.
5. Position and adjust the Vibratach; it should read between 2250 and 2500 RPM.
6. If either of the readings is incorrect, proceed to the **Throttle Adjustment Procedure** later in this section.



# TROUBLESHOOTING AND REPAIR

## THROTTLE ADJUSTMENT PROCEDURE

### WARNING

Service and repair should be performed only by Lincoln Electric factory trained personnel. Unauthorized repairs performed on this equipment may result in danger to the technician or 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.

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

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### TEST DESCRIPTION

This procedure will aid the technician in the adjustment of the throttle.

### MATERIALS NEEDED

Flathead Screw

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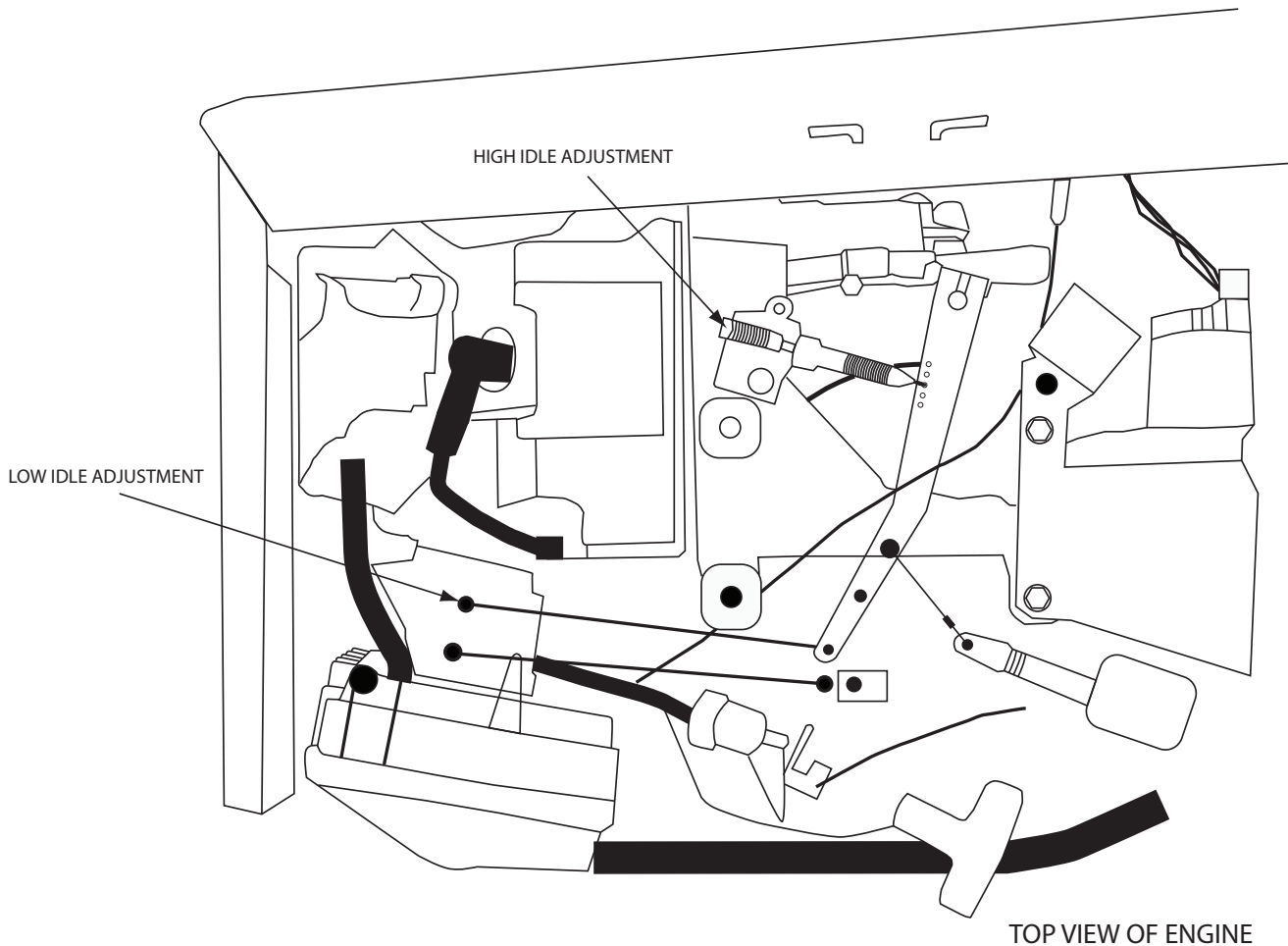
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## THROTTLE ADJUSTMENT PROCEDURE (continued)

FIGURE F.4 – HIGH AND LOW IDLE ADJUSTMENT



TOP VIEW OF ENGINE

## PROCEDURE

## High Idle Adjustment

Check that the linkage attaching the solenoid to the engine speed control lever is in good condition and moves freely.

1. Start the engine and place the engine switch in the "HIGH IDLE" position. The solenoid should be de-energized. Be certain that there is no load on the machine.
2. If the high idle RPM requires adjustment, using flathead screw turn the high idle adjustment screw. See Figure F.4. Turning the screw clockwise will increase RPM and turning it counterclockwise will decrease the RPM. Engine high idle RPM should be between 3700 and 3800 RPM.

## Low Idle Adjustment

1. With engine running and no load applied to the machine, place the engine switch in the "AUTO IDLE" position. Wait for the idle solenoid to energize and the engine speed to drop and stabilize at low idle RPM.
2. If the low idle RPM requires adjustment, turn the low idle adjustment screw. See Figure F.4. The low idle RPM should be between 2250 and 2500 RPM.

# TROUBLESHOOTING AND REPAIR

## BRUSH AND SLIP RING SERVICE PROCEDURE

### WARNING

Service and repair should be performed only by Lincoln Electric factory trained personnel. Unauthorized repairs performed on this equipment may result in danger to the technician or 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.

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

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### PROCEDURE DESCRIPTION

This procedure provides guidance in testing and maintaining the brush and slip ring system.

### MATERIALS NEEDED

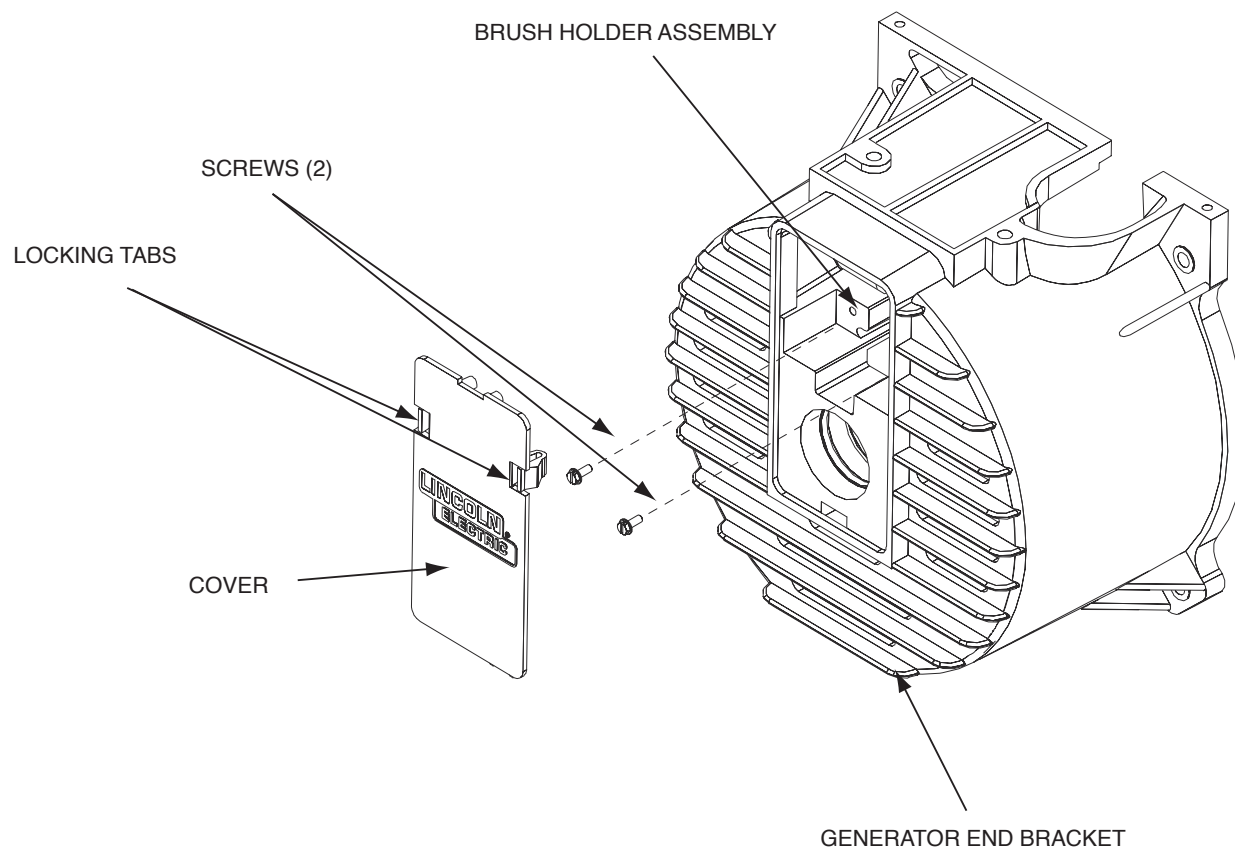
- 500 or 600 grit emery cloth
- 220 or 320 grit commutator stone (Optional)
- Needlenose Pliers
- 1/4" Nut Driver

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## BRUSH AND SLIP RING SERVICE PROCEDURE (continued)

FIGURE F.5 – BRUSH HOLDER ASSEMBLY LOCATION



## PROCEDURE

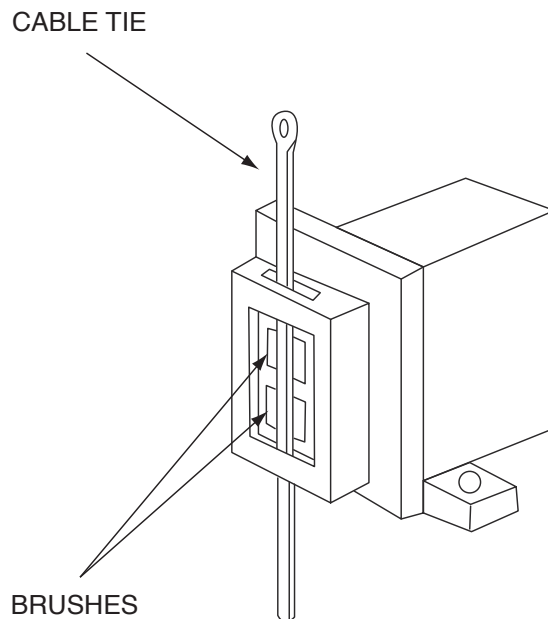
1. Remove the brush cover from the end of the generator.
2. Pry outward at the top of the plastic brush cover while depressing the two locking tabs at the sides of the cover. See Figure F.5.
3. Remove the brush and brush holder assembly.
4. Use needle-nose pliers to remove the leads from the brush terminals, and then use the 1/4" nut driver to remove the two screws holding the brush holder in place. The brush holder assembly can now be pulled straight out from the end of the generator toward the front of the machine.
5. Examine brushes and slip rings. The slip rings, brush holder, and brushes should be clean and free from oil or grease. The brushes should be making good, continuous contact with the slip rings.
6. The brushes should be of sufficient length and have adequate spring tension. Generally, the brushes should be replaced if either brush has less than 1/4" remaining before it reaches the end of its travel. Spring tension should be sufficient to hold the brushes firmly against the slip rings.
7. The brushes should be removed from the brush holder and be examined. The terminals should be clean. The shunt, (braided lead connecting the carbon brush to the terminal) should be in good condition and firmly connected to the carbon brush and to the connection terminal.
8. If the slip rings are discolored, display evidence of excessive sparking, or the brushes have worn prematurely; these may be signs of a grounded or shorted rotor. **Perform The Rotor Resistance Test.**

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## BRUSH AND SLIP RING SERVICE PROCEDURE (continued)

FIGURE F.6 – BRUSH REMOVAL AND REPLACEMENT



9. Check for evidence of sticking brushes. Sticking brushes will normally result in the slip rings being pitted and discolored from excessive arcing. Another sign of sticking brushes is instability or loss of both weld and auxiliary output, but the machine may also begin to work properly for a short time after being jarred or moved.
10. If there is any evidence that the brushes may have been sticking in the brush holders, a new brush holder and brush assembly should be installed.
2. Use low-pressure compressed air to thoroughly blow the carbon, commutator stone and sandpaper dust from the machine before operating.
3. To install the brush holder assembly, push the brushes into the brush holder assembly and place a plastic cable tie through the holes provided. See Figure F.6.
4. Slide the brush holder assembly back into the generator and secure with the two screws removed earlier. Reattach the leads and remove the cable tie. Replace the plastic generator cover.

**Cleaning Slip Rings**

1. In the event that the slip rings have become dirty, discolored or mildly pitted, it will become necessary to clean them using very fine 500 or 600 grit emery cloth or a 220 or 320 grit commutator stone.

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# TROUBLESHOOTING AND REPAIR

## ROTOR FLASHING AND VOLTAGE TEST

### WARNING

Service and repair should be performed only by Lincoln Electric factory trained personnel. Unauthorized repairs performed on this equipment may result in danger to the technician or 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.

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

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### TEST DESCRIPTION

This test will determine if correct voltage is being applied to the rotor slip rings.

### MATERIALS NEEDED

Misc. hand tools  
Multimeter

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Return to Master TOC

Return to Master TOC

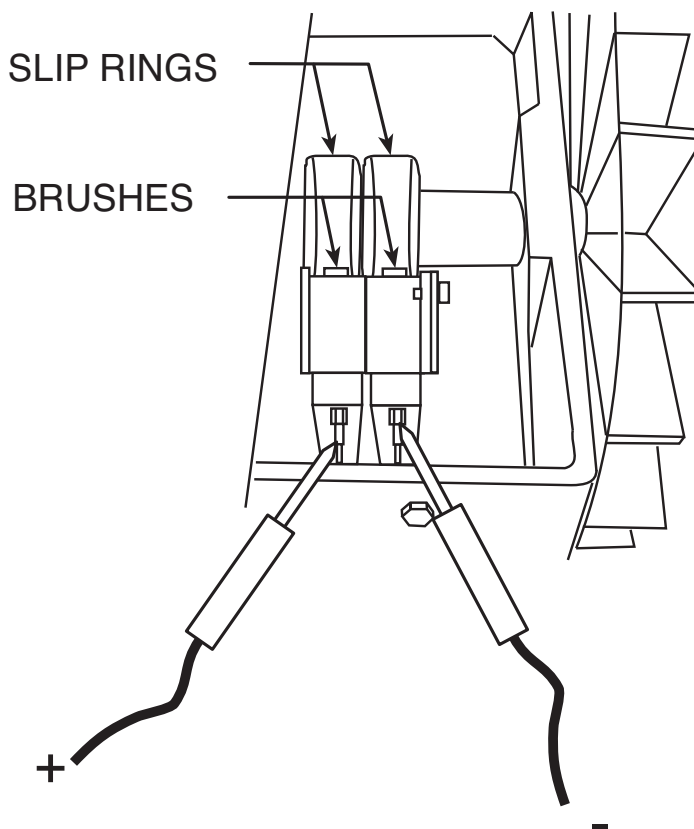
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## ROTOR FLASHING AND VOLTAGE TEST (continued)

FIGURE F.7 – BRUSH AND SLIP RING LOCATIONS



### PROCEDURE

1. Be certain the battery is fully charged and the battery charging system is functioning normally.
2. Ensure that there is no load on either the weld or auxiliary outputs.
3. Set the output control to maximum.
4. Remove the plastic brush cover from the end of the generator. **See *Brush and Slip Ring Service Procedure*.**
5. Attach voltmeter leads to the brush terminals. (The positive terminal is closest to the generator winding)
6. Start the engine and place the engine switch in the "HIGH" position.
7. The voltmeter should read about 50 VDC.
8. If the voltage reading is zero or near zero, perform the ***Rotor Resistance Test***.
9. Check for battery voltage at lead 224 (J1-9). Check that the PC board is properly grounded at lead GND-G (J1-2). If the board is getting battery voltage and is properly grounded, replace the board.
10. If the voltage reading is about 3 to 5 volts DC, check for AC voltage between Lead #7 (Terminal B2) and Lead #9 (Terminal B1). If the voltage is about the same or higher than the voltage reading of the brush leads, replace the board.
11. If the AC voltage between leads #7 and #9 is significantly lower than the DC voltage on the brush leads, perform the ***Stator Short Circuit and Ground Test and Stator Voltage Test***.

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**BATTERY CHARGING SYSTEM TEST****⚠ WARNING**

Service and repair should be performed only by Lincoln Electric factory trained personnel. Unauthorized repairs performed on this equipment may result in danger to the technician or 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.

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

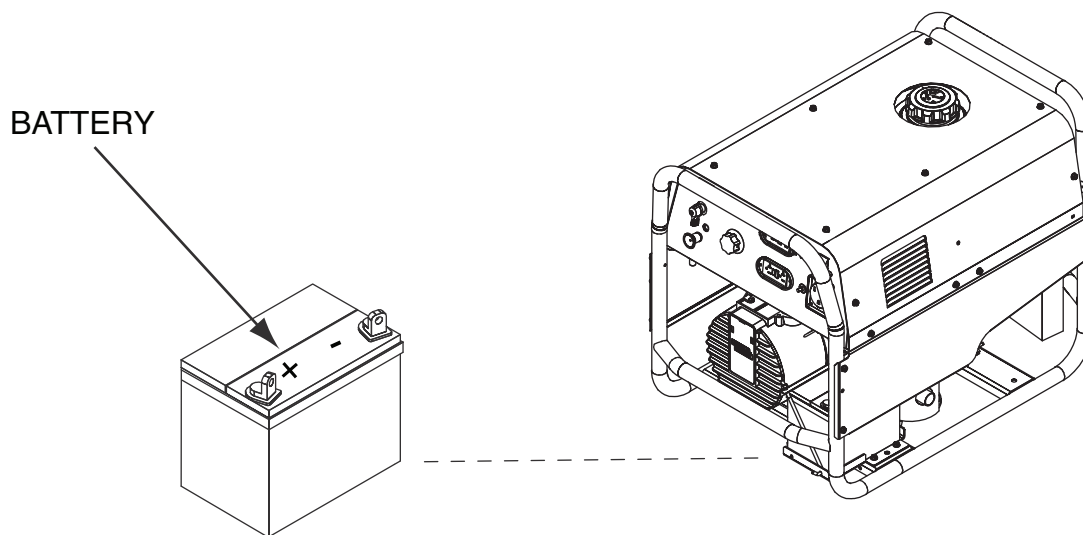
**TEST DESCRIPTION**

This test will determine if the battery charging system is functioning properly.

**MATERIALS NEEDED**

- Misc. hand tools
- Multimeter
- Jumper lead with a 10-amp inline fuse or circuit breaker

### FIGURE F.8 – CHARGING SYSTEM



## PROCEDURE

### ⚠ WARNING



DO NOT REMOVE BATTERY CABLE WHILE MACHINE IS RUNNING, OR ATTEMPT TO OPERATE THE ENGINE WITHOUT A BATTERY CONNECTED. Serious damage to the PC board may result.

1. Be sure the battery is fully charged, in good condition and is securely connected.
2. Start the engine and test the voltage at the battery terminals. The meter should read between 13.5 and 14.5 volts DC.
3. If the voltage is low, shut off the engine.
4. Disconnect lead #208 from the engine alternator and place a fused jumper lead between the alternator and the positive battery terminal. See Figure F.8. See wiring diagram.
5. Start the engine and check voltage at the battery. If the DC voltage is now 13.5 to 14.5, check leads 208, 208A, and lead 209. If these leads and connections are good, replace the board.
6. If the voltage is still low, or if the inline fuse blows, the engine charging system is most likely faulty. Contact a qualified engine repair technician.

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**STATOR VOLTAGE TEST****⚠ WARNING**

Service and repair should be performed only by Lincoln Electric factory trained personnel. Unauthorized repairs performed on this equipment may result in danger to the technician or 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.

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

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**TEST DESCRIPTION**

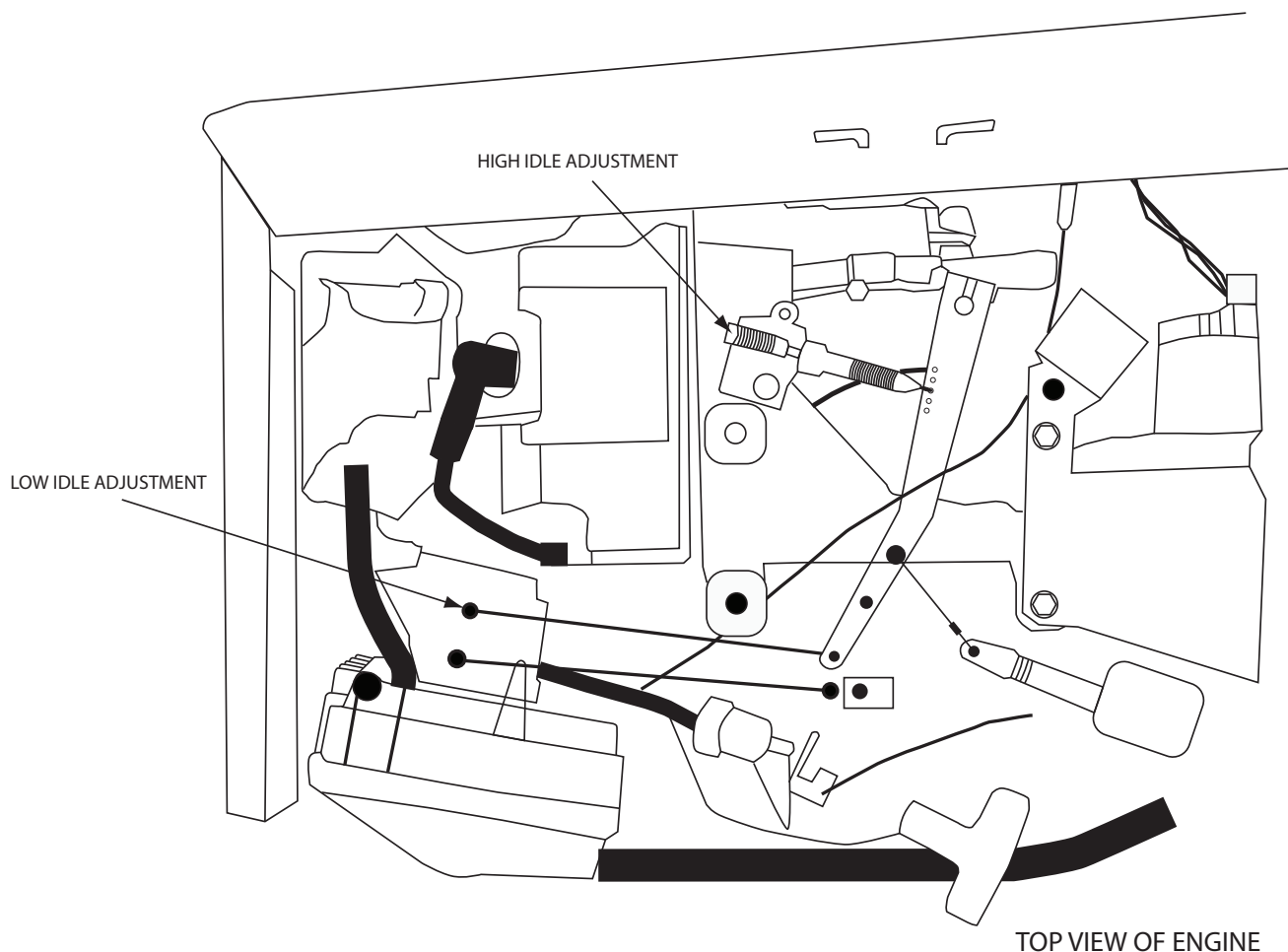
This test determines if the stator is producing the correct voltage from each of the windings. This test should be performed if rotor voltage is normal but one or more of the output voltage readings are incorrect.

**MATERIALS NEEDED**

- Miscellaneous hand tools
- Wiring diagram
- Multimeter

## STATOR VOLTAGE TEST (continued)

FIGURE F.9 – HIGH AND LOW IDLE ADJUSTMENT



TOP VIEW OF ENGINE

## PROCEDURE

1. Verify that the engine RPM is normal. See the **Engine RPM Adjustment Procedure**.
2. Start the machine and place the idle switch in the high position. See Figure F.9.
3. Check for AC voltage between the neutral stud on the control panel bottom and the #3 lead connection at the CB1 circuit breaker. Also check the voltage between the neutral stud and the #6 lead connection at the CB1 circuit breaker. Voltage should read between 115 and 130\* volts. See wiring diagram.
4. Check for AC voltage between leads W1 and W2. See Wiring Diagram. Voltage reading should be about 64\*VAC. Also check for AC voltage between leads W3 and W4. Voltage reading should be about 62\*VAC. See wiring diagram.
5. If the voltage is not present or is significantly different from expected readings, check the wiring between test points and the stator winding. See wiring diagram. If the wiring is in good condition, the stator is defective.

\*Voltage shown is for a stator that is at normal full load temperature. Readings will likely be slightly higher if machine is cold.

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**ROTOR RESISTANCE AND GROUND TEST (STATIC)****⚠ WARNING**

Service and repair should be performed only by Lincoln Electric factory trained personnel. Unauthorized repairs performed on this equipment may result in danger to the technician or 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.

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

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**TEST DESCRIPTION**

This test will determine if the rotor winding is open, shorted or grounded.

**MATERIALS NEEDED**

Miscellaneous hand tools  
Ohmmeter (analog type meter required for dynamic resistance test)  
Wiring Diagram

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Return to Master TOC

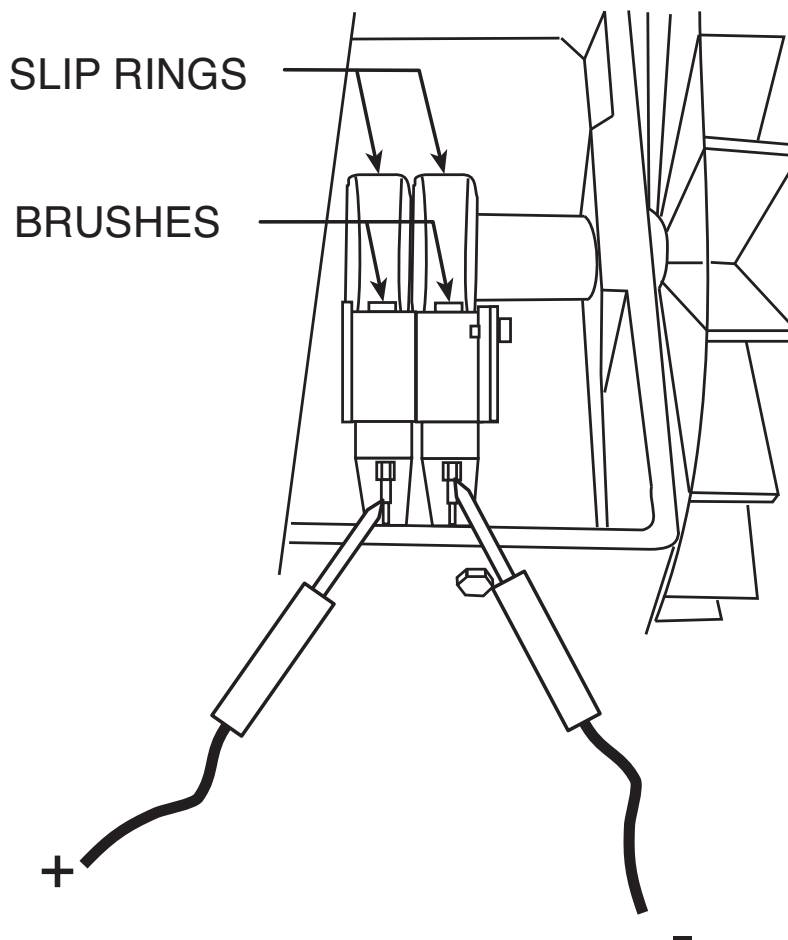
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## ROTOR RESISTANCE AND GROUND TEST (STATIC) (continued)

FIGURE F.10 – ROTOR RESISTANCE



### PROCEDURE

1. Turn the engine off.
2. Remove the plastic cover from the end of the generator. See **Brush and Slip Ring Service Procedure**.
3. Using needle-nose pliers, remove the leads from the brush terminals. This will electrically isolate the rotor windings.
4. Remove the brush and brush holder assembly. See **Brush and Slip Ring Service Procedure**.
5. Using the ohmmeter, check the rotor winding resistance across the slip rings. Normal resistance is approximately 9\* ohms, at 77°F. (25°C.)
6. Measure the resistance to ground. Place one meter probe on either of the slip rings. Place the other probe on any good, unpainted chassis ground. The resistance should be very high, at least 500,000 (500k) ohms.
7. If the test does not meet the resistance specifications, then the rotor may be faulty and should be replaced.
8. If this test meets resistance specifications, continue testing using the **Dynamic Rotor Resistance and Ground Test**.

\*Voltage shown is for a stator that is at normal full load temperature. Readings will likely be slightly higher if machine is cold.

**ROTOR RESISTANCE AND GROUND TEST (DYNAMIC)****⚠ WARNING**

Service and repair should be performed only by Lincoln Electric factory trained personnel. Unauthorized repairs performed on this equipment may result in danger to the technician or 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.

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

**TEST DESCRIPTION**

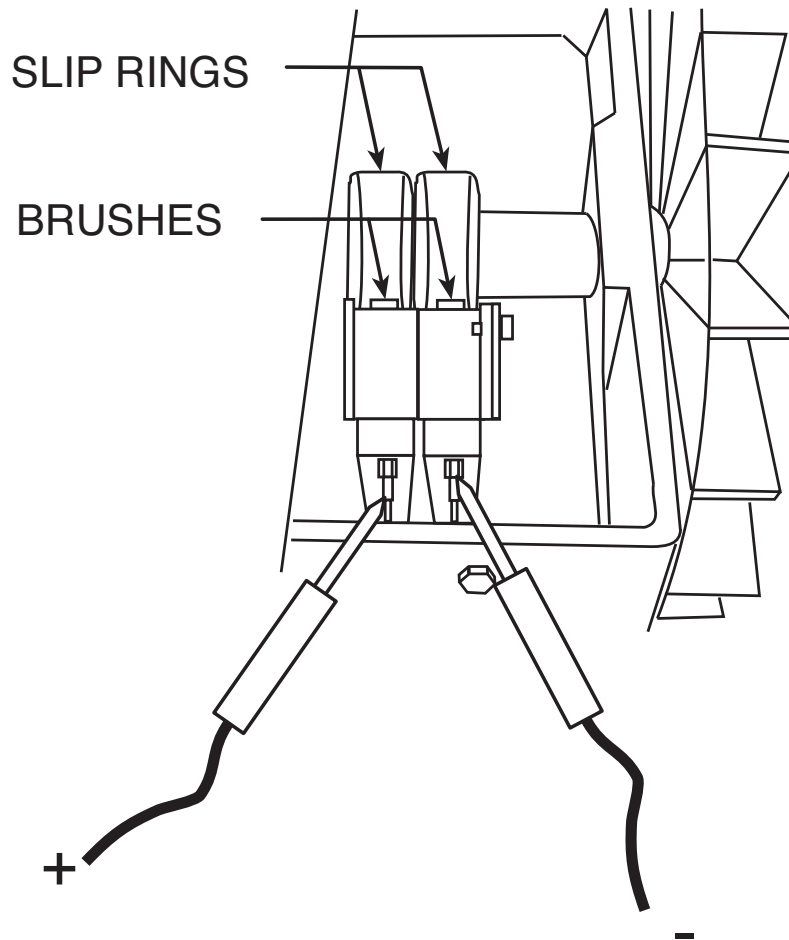
This test will aid the technician in checking for faults in the rotor winding.

**MATERIALS NEEDED**

Analog Ohmmeter

## ROTOR RESISTANCE AND GROUND TEST (DYNAMIC) (continued)

FIGURE F.11 – BRUSH AND SLIP RING LOCATIONS



### PROCEDURE

**NOTE:** This test is performed using a good quality analog type ohmmeter. Many digital meters will not provide stable or accurate resistance readings while the rotor is spinning.

1. This test requires that the brushes and slip rings are clean, in good condition, and are properly seated.
2. **Perform the Brush and Slip Ring Service Procedure.** Then reinstall the brush holder and brush assembly.
3. Insulate the lead wires that had been disconnected from the brushes during the static rotor resistance test.
4. Securely attach the ohmmeter leads to the brush terminals. Use clips or terminals to attach the leads BEFORE starting the engine. See Figure F.11.
5. Start the engine and run it at high idle speed. The resistance should read approximately 9\* ohms at 77°F. (25°C.)
6. Shut off engine, and move one of the ohmmeter leads to a good clean chassis ground connection.
7. Restart the engine and run it at high idle speed. The resistance should be very high, at least 500,000 (500k) ohms.
8. If the resistance readings differ significantly from the values indicated, re-check the brushes and the brush spring tension. If the brushes and slip rings are good, replace the rotor.
9. Re-attach the brush leads and install the brush cover.

**\*NOTE:** The resistance of the copper windings will change the temperature. Higher temperatures will produce higher resistance, and lower temperatures will produce lower resistance.

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# TROUBLESHOOTING AND REPAIR

## STATOR SHORT CIRCUIT AND GROUND TEST

### **WARNING**

Service and repair should be performed only by Lincoln Electric factory trained personnel. Unauthorized repairs performed on this equipment may result in danger to the technician or 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.

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

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### **TEST DESCRIPTION**

This test will determine if there are undesirable electrical connections between the stator windings and chassis ground, or between individual windings within the stator. This test should be performed if flashing voltage is present at the rotor slip rings, but the voltage output on leads #7 and #9 is too low.

### **MATERIALS NEEDED**

- Miscellaneous hand tools
- Ohmmeter

## STATOR SHORT CIRCUIT AND GROUND TEST (continued)

### PROCEDURE

1. Perform **Case Cover Removal Procedure**.
2. Disconnect anything that may be connected to the auxiliary receptacles or the weld output terminals.
3. Disconnect and isolate GND-C lead from the ground stud on the control panel front. See wiring diagram.
4. Disconnect and isolate lead #5 from the neutral stud on the control panel bottom. See wiring diagram.
5. Disconnect the #7 and #9 leads from the PC board.
6. Using an ohmmeter, check the resistance between chassis ground and each of the following points; resistance should read very high: 500,000 (500k) ohms minimum.
  - a) The #5 lead that had been disconnected from the neutral stud. (This tests for a grounded auxiliary winding.)
  - b) The #7 or #9 lead. (This tests for a grounded exciter winding.)
  - c) W1 or W2 lead. (This tests for a grounded weld winding.)
  - d) W3 or W4 lead. (This tests for a grounded weld winding.)

If any of these readings are less than 500,000 (500k) ohms, check for grounded components or wiring that remain connected to the stator, such as circuit breakers, receptacles, output rectifier, reactor, etc. See Wiring Diagram. If necessary, disconnect and isolate the stator leads as close to the stator winding as possible. If the low resistance to ground is determined to be in the stator windings, the stator is defective and should be replaced.

7. If the stator is not grounded, check for short circuit connections between the windings that should be isolated from each other.
8. Using an ohmmeter; check the resistance between the following points. Resistance should read very high, 500,000 (500k) ohms minimum.
  - a) The #5 lead that had been disconnected from the neutral stud, and either lead #7 or lead #9. (This checks for a connection between the auxiliary power winding and the excited winding.)
  - b) The #5 lead that had been disconnected from the neutral stud, and lead W1 or W2. (This checks for a connection between the wire auxiliary power winding and one of the weld windings.)
  - c) The #5 lead that has been disconnected from the neutral stud, and lead W3 or W4. (This checks for a connection between the auxiliary power winding and the other weld winding.)
  - d) Lead #7 and lead W1 or W2. (This checks for a connection between the exciter winding and one of the weld windings.)
  - e) Lead #7 and lead W3 or W4. (This checks for a connection between the exciter winding and the other weld winding.)

If any of the above readings is less than 500,000 (500k) ohms, check for damaged, contaminated, or shorted wiring, or defective components connected to the stator windings. If necessary, disconnect and isolate leads as close to the stator winding as possible. See Wiring Diagram. If the low resistance is determined to be between the windings within the stator, the stator is defective and should be replaced.

**WELD BOOST SYSTEM TEST****⚠ WARNING**

Service and repair should be performed only by Lincoln Electric factory trained personnel. Unauthorized repairs performed on this equipment may result in danger to the technician or 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.

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

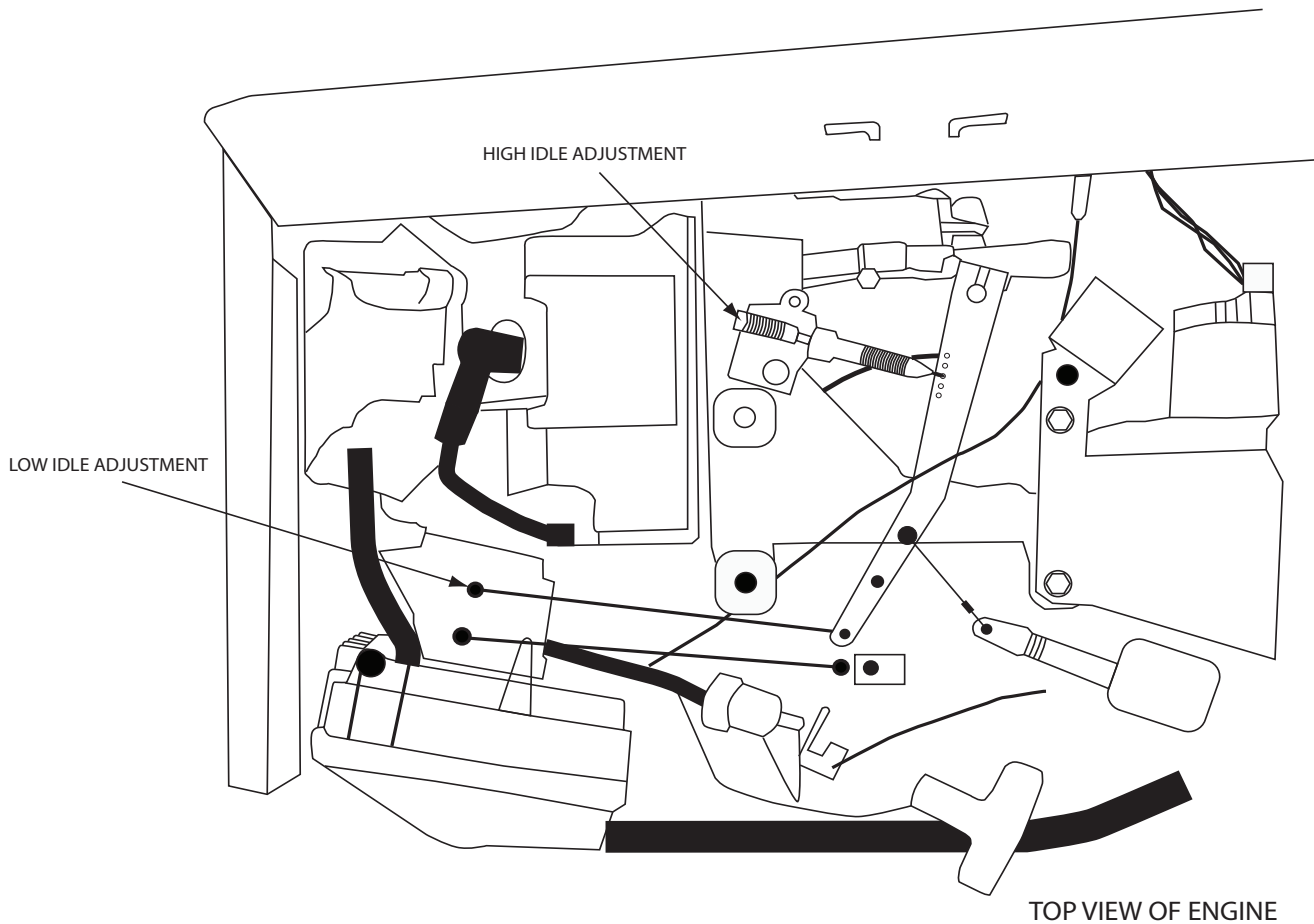
**TEST DESCRIPTION**

This test checks the functionality of the weld boost system. This test should be done if the weld terminal open circuit voltage and engine RPM are normal, but the machine weld output is low.

**MATERIALS NEEDED**

Resistive load bank  
Misc. hand tools  
Multimeter

FIGURE F.12 – HIGH AND LOW IDLE ADJUSTMENT



### PROCEDURE

1. Check that the CB4 circuit breaker is not tripped.
2. Check that the battery is fully charged and in good condition.
3. Set the output dial to the Maximum position.
4. Start the engine and place the engine switch in the High idle position.
5. Verify that the engine RPM is correct. See the **Engine RPM adjustment procedure**.
6. Turn on the load bank and adjust to get a 165 to 190 Amp load.
7. Check engine RPM, it should not fall below 3300 RPM.
8. Read the DC voltage at the output terminals. If the voltage is between 21 and 27, the boost system is functioning normally.
9. If the weld terminal voltage is low. Shut off the engine and perform the **Case Cover Removal Procedure**.
10. Start the engine and apply a load of about 80 to 100 Amps.
11. Check for AC voltage between leads 13 and 14 at the PC board. See wiring diagram.
12. If voltage is present, rotate the output control knob and observe the voltage between leads 13 and 14. The voltage should rise and fall as the output control is moved.
13. If the voltage at leads 13 and 14 is responding as described above, the PC board is probably defective.
14. If no significant voltage is detected at leads 13 and 14, and if the voltage does not respond to changes to the output control knob setting, check for a defective CB4 circuit breaker. Check for poor connections or damaged wires at leads 13, 13A and 14. If the breaker and wires are good, the reactor is likely defective.

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**CASE COVER REMOVAL AND REPLACEMENT PROCEDURE****⚠ WARNING**

Service and repair should be performed only by Lincoln Electric factory trained personnel. Unauthorized repairs performed on this equipment may result in danger to the technician or 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.

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

**TEST DESCRIPTION**

This procedure will aid the technician in the removal and replacement of the case sheet metal covers.

**MATERIALS NEEDED**

3/8" Wrench

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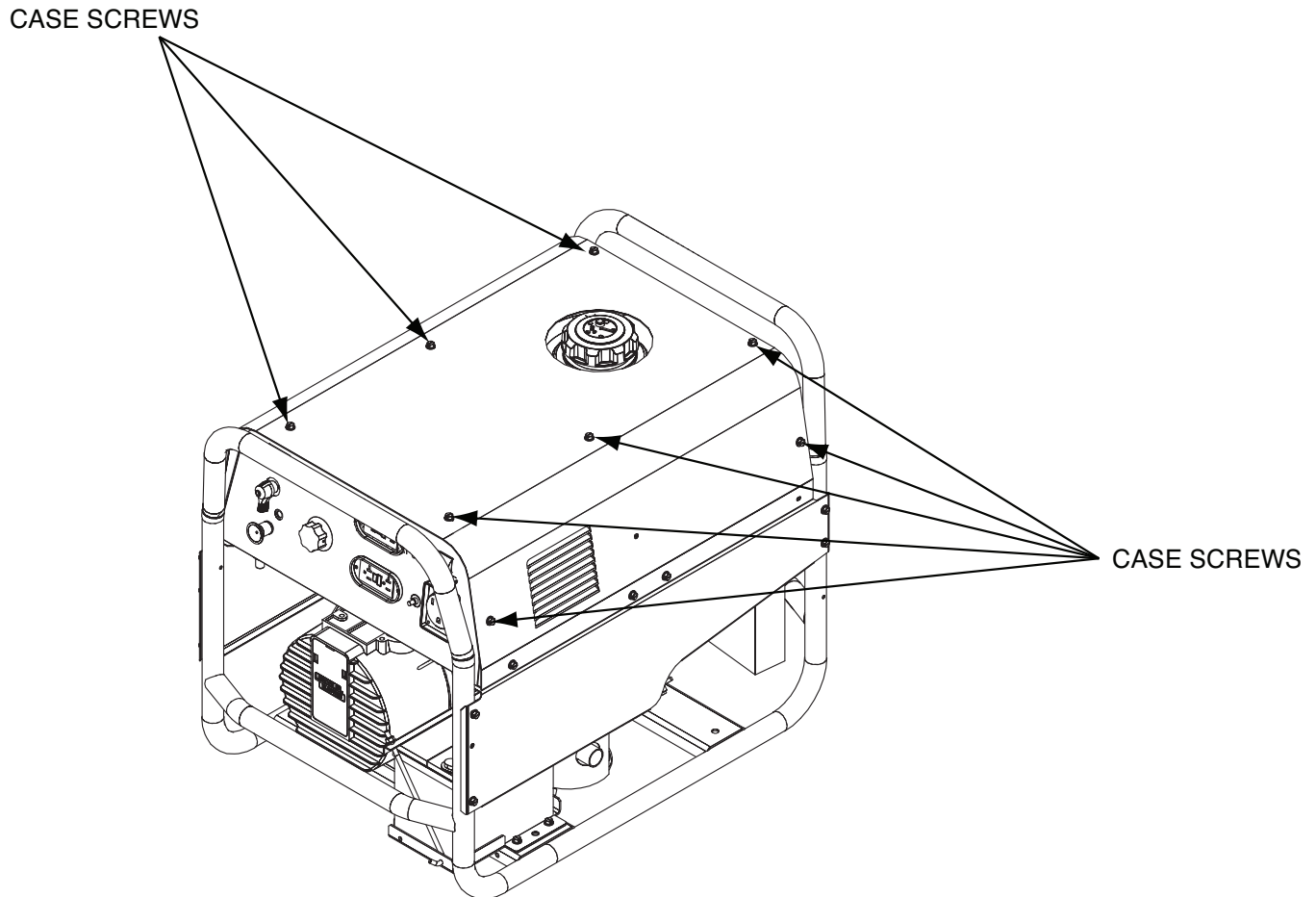
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**CASE COVER REMOVAL AND REPLACEMENT PROCEDURE (continued)****FIGURE F.13 – CASE COVER REMOVAL****PROCEDURE**

1. Using a 3/8" wrench, remove all screws from the top of the red sheet metal cover.
2. Lift the top cover off of the machine
3. To replace the cover, reverse the above procedure.

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## FUEL TANK AND ENCLOSURE REMOVAL AND REPLACEMENT PROCEDURE

### WARNING

Service and repair should be performed only by Lincoln Electric factory trained personnel. Unauthorized repairs performed on this equipment may result in danger to the technician or 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.

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

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### TEST DESCRIPTION

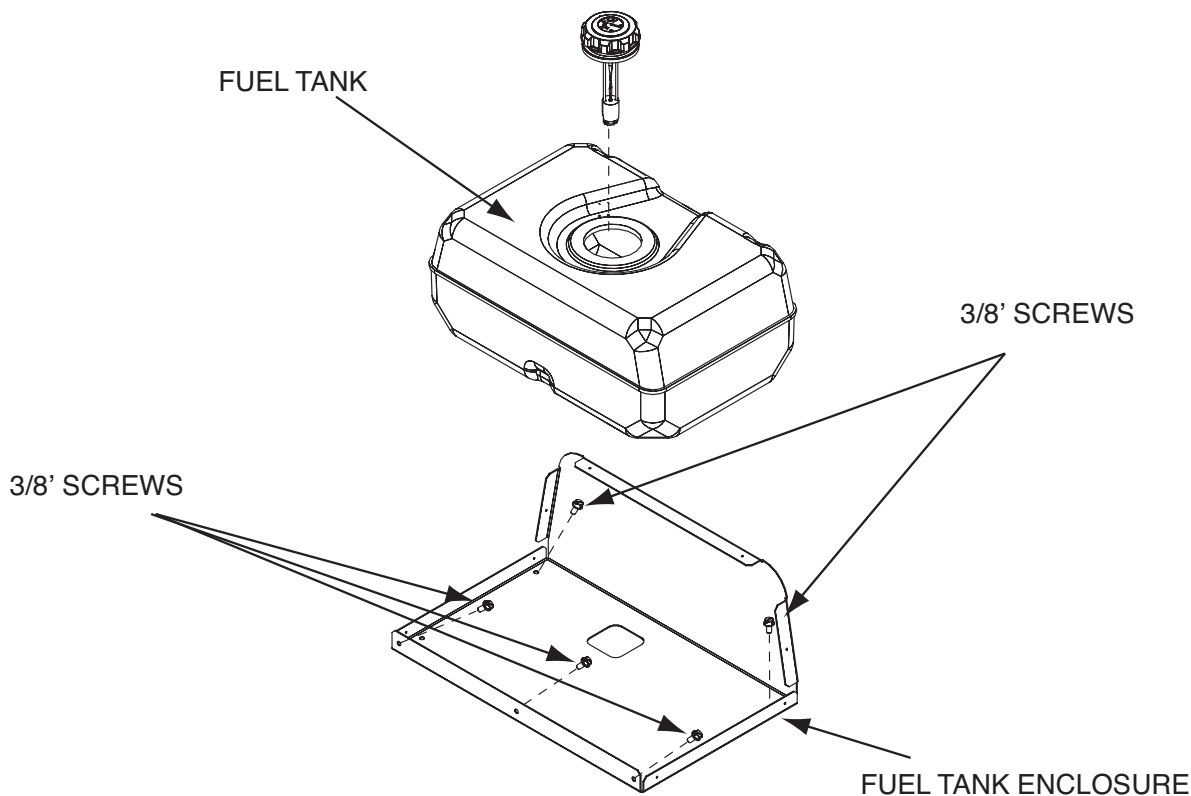
This procedure will aid the technician in the removal and replacement of the fuel tank enclosure.

### MATERIALS NEEDED

- Approved gasoline container and pump
- 7/16" Wrench
- Rags
- Pliers
- 3/8" Wrench

## FUEL TANK AND ENCLOSURE REMOVAL AND REPLACEMENT PROCEDURE (continued)

FIGURE F.14 – FUEL TANK REMOVAL



### PROCEDURE

#### **⚠ WARNING**



Because gasoline is highly flammable, the following procedures should be done in a well-ventilated area; far away from flame, sparks, or any other sources of ignition.

1. Perform the **Case Cover Removal Procedure**.
2. Close gasoline valve. "Red Lever" located on bottom of gas tank.
3. Using a 7/16" wrench, disconnect the negative battery cable. See **Figure F.15**. Note washer placement; label and disconnect for reassembly.
4. Pump gasoline into an approved gasoline container.
5. Using pliers, remove fuel line clamp located on gasoline valve.
6. Carefully remove the fuel line from the gasoline valve.
7. Flex the end of the sheet steel fuel tank enclosure out slightly and lift the tank out of the machine.
8. If access to the top of the engine is required, using the 3/8" wrench, remove the five screws holding the bottom of the fuel tank enclosure and lift it out of the machine.

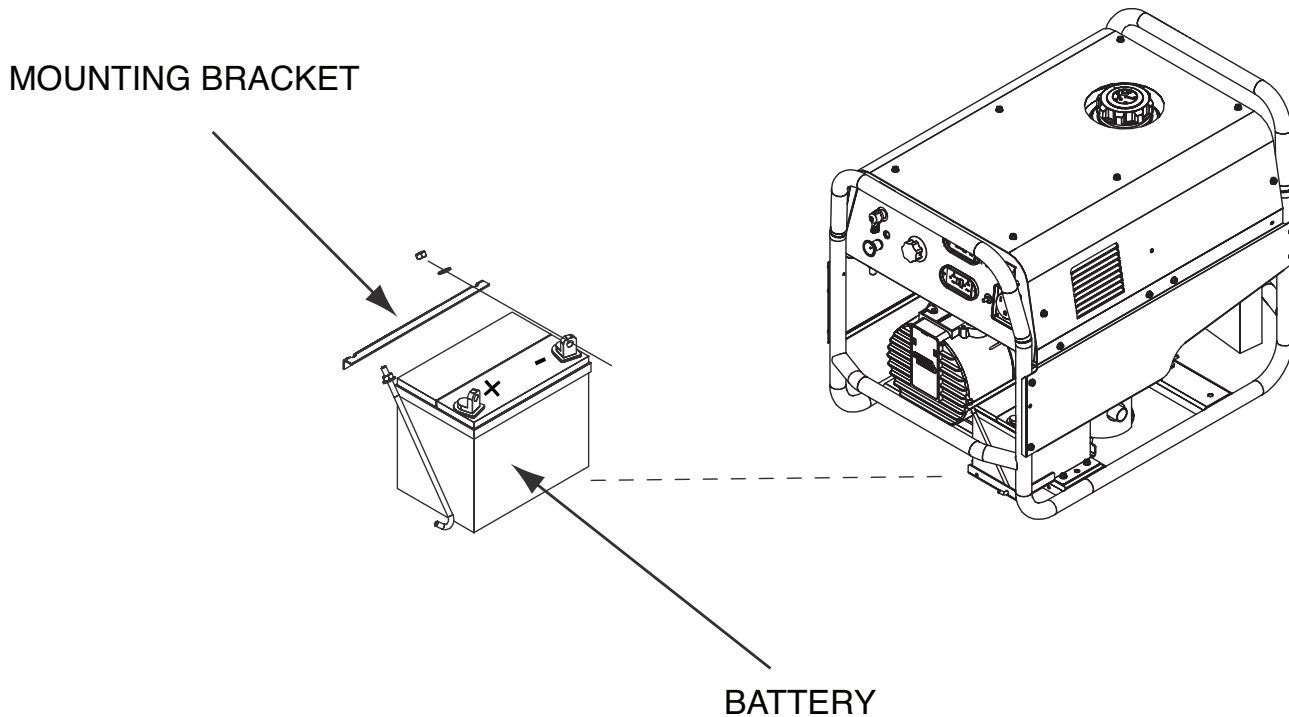
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## FUEL TANK AND ENCLOSURE REMOVAL AND REPLACEMENT PROCEDURE (continued)

FIGURE F.15 – BATTERY LOCATION



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Return to Section TOC

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Return to Master TOC      Return to Master TOC      Return to Master TOC

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**CONTROL BOX REMOVAL AND REPLACEMENT PROCEDURE****⚠ WARNING**

Service and repair should be performed only by Lincoln Electric factory trained personnel. Unauthorized repairs performed on this equipment may result in danger to the technician or 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.

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

**TEST DESCRIPTION**

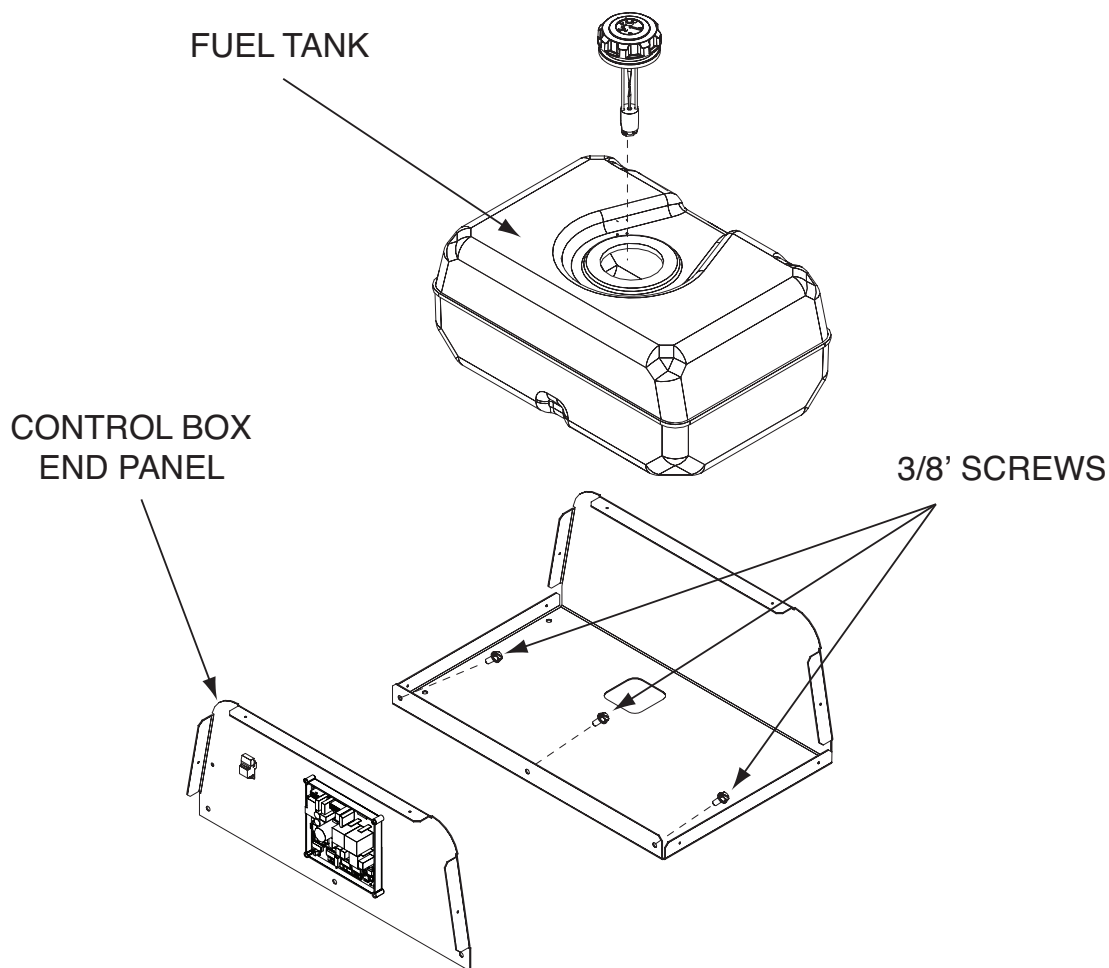
This procedure will aid the technician in the removal and replacement of the control box.

**MATERIALS NEEDED**

- Cable Ties
- Wire Marking Supplies
- Wiring Diagram
- Phillips Screwdriver
- 3/8" Wrench
- 7/16" Wrench
- Needle Nose Pliers

## CONTROL BOX REMOVAL AND REPLACEMENT PROCEDURE (continued)

FIGURE F.16 – CONTROL BOX REMOVAL

**PROCEDURE**

1. Perform the **Case Cover Removal Procedure**.
2. Using the 7/16" wrench, loosen battery mounting bracket. See Figure F.16.
3. Remove the battery.
4. Perform the **Fuel Tank and Enclosure Removal Procedure**.
5. Disconnect the spark plug wire to prevent accidental starting of the engine.
6. Replace three of the screws that had been removed when the fuel tank enclosure bottom was removed. These screws are used to temporarily secure the end panel on the control box.
7. Using Phillips screwdriver, remove choke cable mounting.
8. Using pliers, remove choke cable from engine.
9. Using the wiring diagram, identify all of the wires, wire splices, and plugs that connect control box components to the engine and generator. If any wire or connector is not clearly marked, mark them so they can be properly reconnected. It is also helpful to make notes as needed.
10. Cut cable ties as needed and disconnect these wires.
11. Remove any remaining 3/8" screws from left side of the control box and gently lift the control box off the generator assembly.
12. Reverse the above procedure to reassemble.
13. Replace any cable ties removed during disassembly.

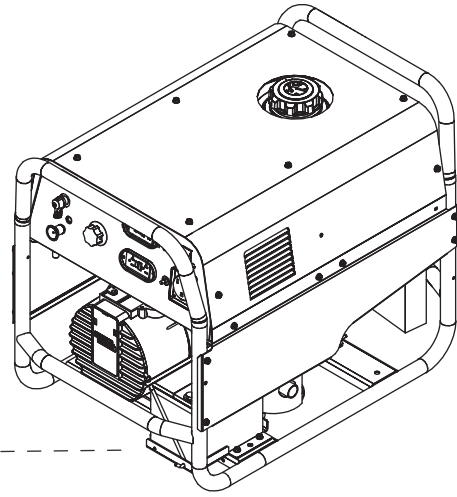
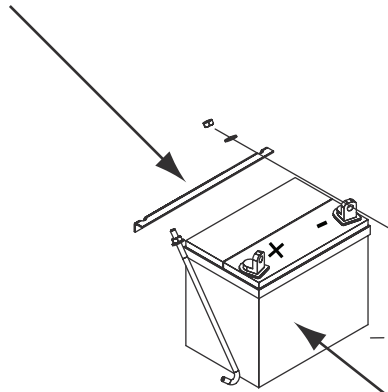
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## CONTROL BOX REMOVAL AND REPLACEMENT PROCEDURE (continued)

FIGURE F.17 – BATTERY LOCATION

MOUNTING BRACKET



BATTERY

Return to Section TOC  
Return to Section TOC  
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Return to Section TOC  
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Return to Master TOC

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**STATOR REMOVAL AND REPLACEMENT PROCEDURE****⚠ WARNING**

Service and repair should be performed only by Lincoln Electric factory trained personnel. Unauthorized repairs performed on this equipment may result in danger to the technician or 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.

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

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**DESCRIPTION**

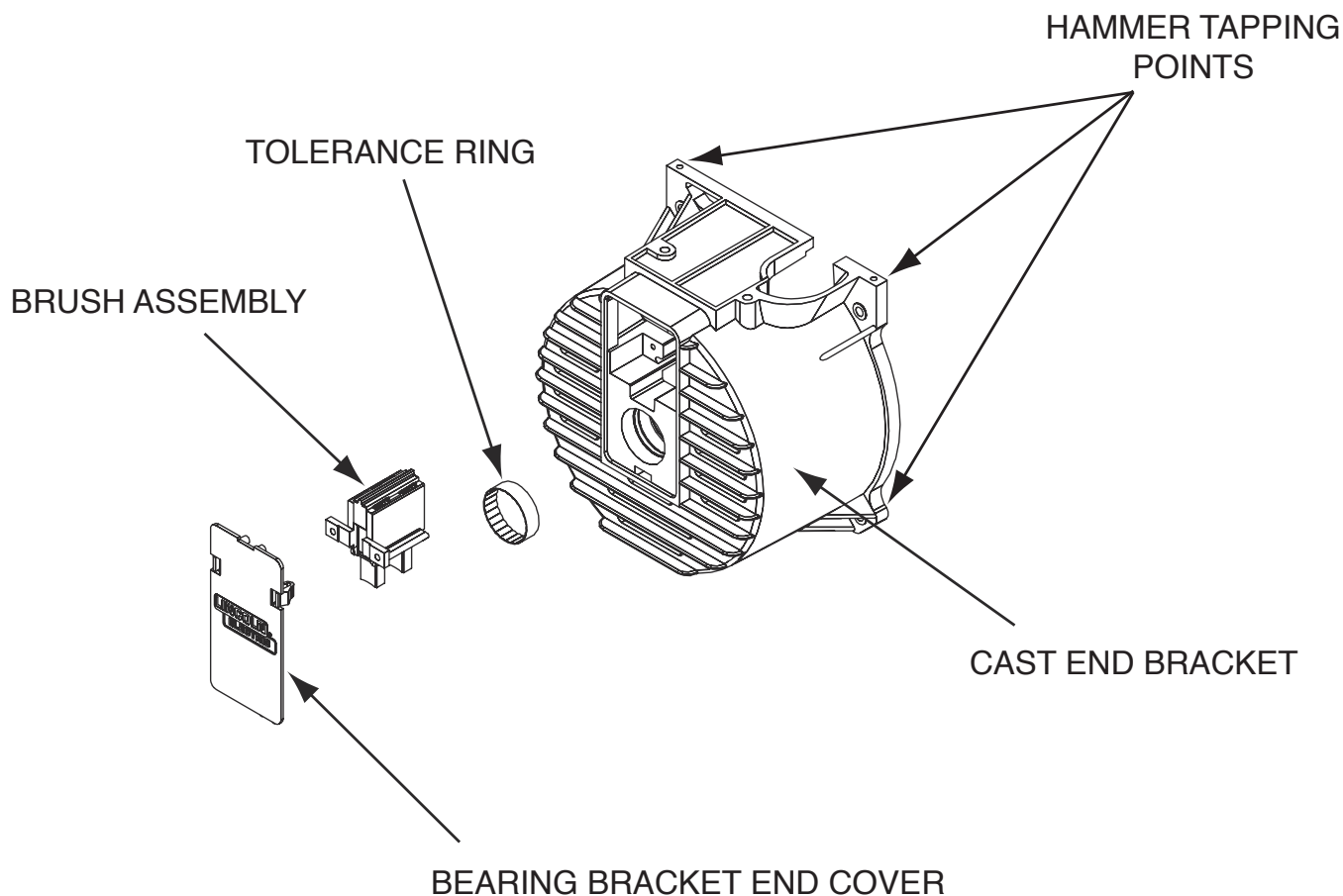
This procedure will aid the technician in the removal and replacement of the stator.

**MATERIALS NEEDED**

1/2" Wrench  
7/16" Wrench  
Hoist

## STATOR REMOVAL AND REPLACEMENT PROCEDURE (continued)

FIGURE F.18 – STATOR REMOVAL



## PROCEDURE

1. Perform the **Control Box Removal Procedure**.
2. Remove the brushes. See the **Brush and Slip Ring Service Procedure**.
3. Label and disconnect any wiring connecting the engine/generator assembly to the tubular frame. Remove cable ties and flexible plastic conduit as needed. See wiring diagram.
4. Using the 1/2" wrench, remove the nuts securing the generator and engine to the rubber mounts. Note ground lead and washer placement for reassembly. **See Figure F.19.**
5. Use a hoist or get a helper and lift the engine and generator assembly out of the tubular steel frame. Place the engine and generator assembly on a strong, solid work surface.
6. Using a 7/16" wrench, remove the four bolts connecting the cast stator brackets. Note the precise position of all hardware components and washers. Using a plastic hammer, gently and evenly tap outward on the end cast bracket. See Figure F.18.

The stator frame assembly can now be carefully removed.

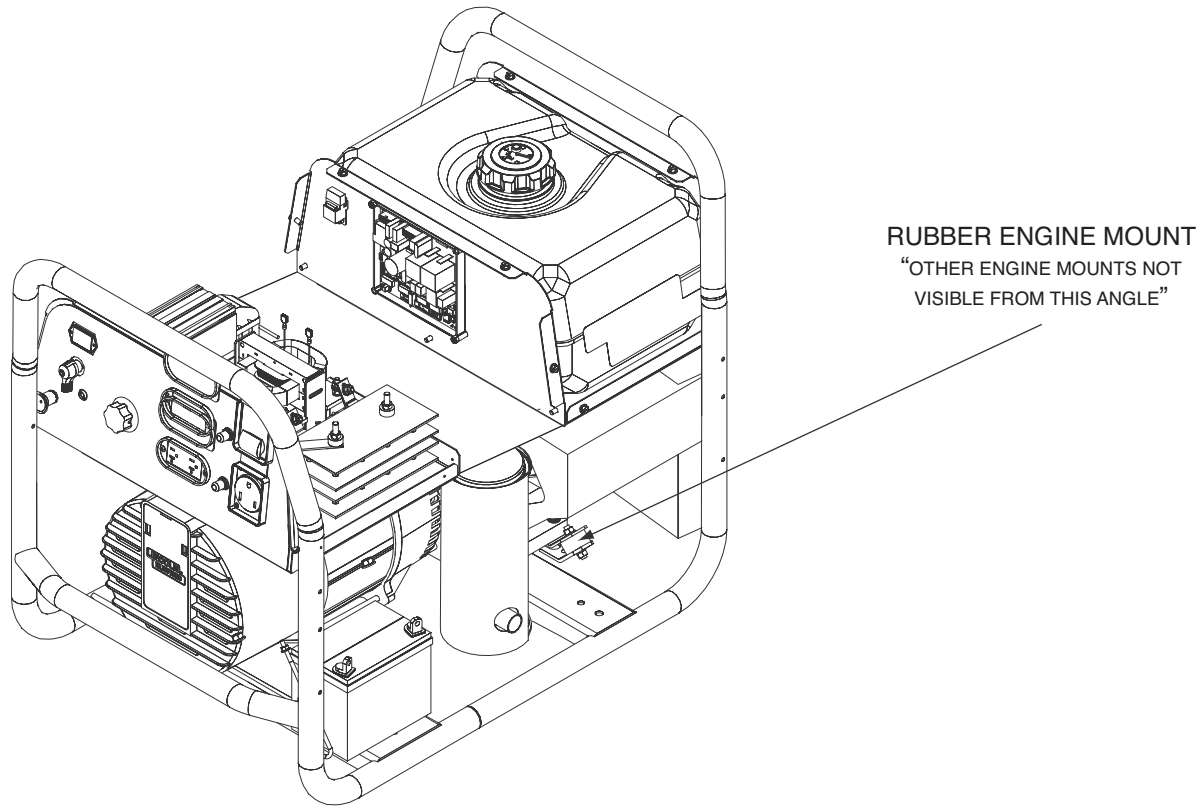
**IMPORTANT:** Handle and store the stator carefully to avoid damage to the windings.

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## STATOR REMOVAL AND REPLACEMENT PROCEDURE (continued)

FIGURE F.19 – NUTS & RUBBER ENGINE MOUNTS



### Installing the stator assembly:

1. If the rotor has been removed, it must be replaced before installation of the stator assembly. **See the Rotor Removal Procedure.**
2. Examine the cast end brackets and the stator assembly. Be sure the locating points are free of varnish and any debris.
3. Place the stator in the cast end bracket.
4. Clean the bearing recess in the brush end bracket and install a new tolerance ring.
5. Place the brush end bracket over the stator. Use a plastic or rubber hammer to tap the bracket in place.
6. Adjust the stator and brackets as needed and install the stator through bolts, placing the hardware components the same as they were before removal.
7. Place the engine and generator assembly into the tubular frame of the machine and loosely install the rubber mount fasteners.
8. Make final adjustments to the position of the brackets and stator. The stator lead bundle should exit the end bracket at the center of the hole provided. Evenly tighten the stator through bolts to a torque of 4.5 to 5.5 ft-lbs.
9. Tighten the mounting fasteners.

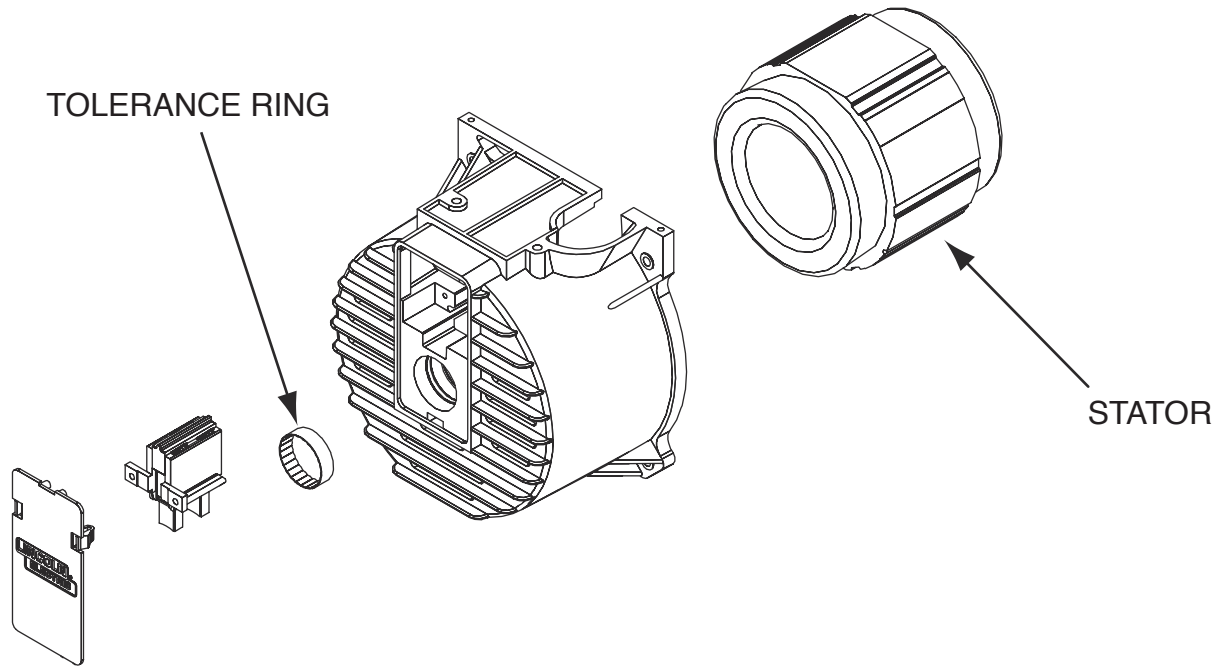
Use a plastic or rubber hammer to tap the bracket in place.

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## STATOR REMOVAL AND REPLACEMENT PROCEDURE (continued)

FIGURE F.20 – STATOR LOCATION



10. Check the air gap between the rotor and the stator. Feeler gages are inserted between the rotor and stator through the brush access opening. A .010 gage should be able to pass completely through the air gap and a .030 gage should not penetrate the air gap any farther than any tapered portion on the end of the gage.
11. Reinstall the control box and fuel tank previously removed.
12. Replace the case wraparound cover.

**ROTOR REMOVAL AND REPLACEMENT PROCEDURE****⚠ WARNING**

Service and repair should be performed only by Lincoln Electric factory trained personnel. Unauthorized repairs performed on this equipment may result in danger to the technician or 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.

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

**DESCRIPTION**

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

**MATERIALS NEEDED**

Rotor Puller Tool (See parts pages for the tool part number)  
Impact Wrench

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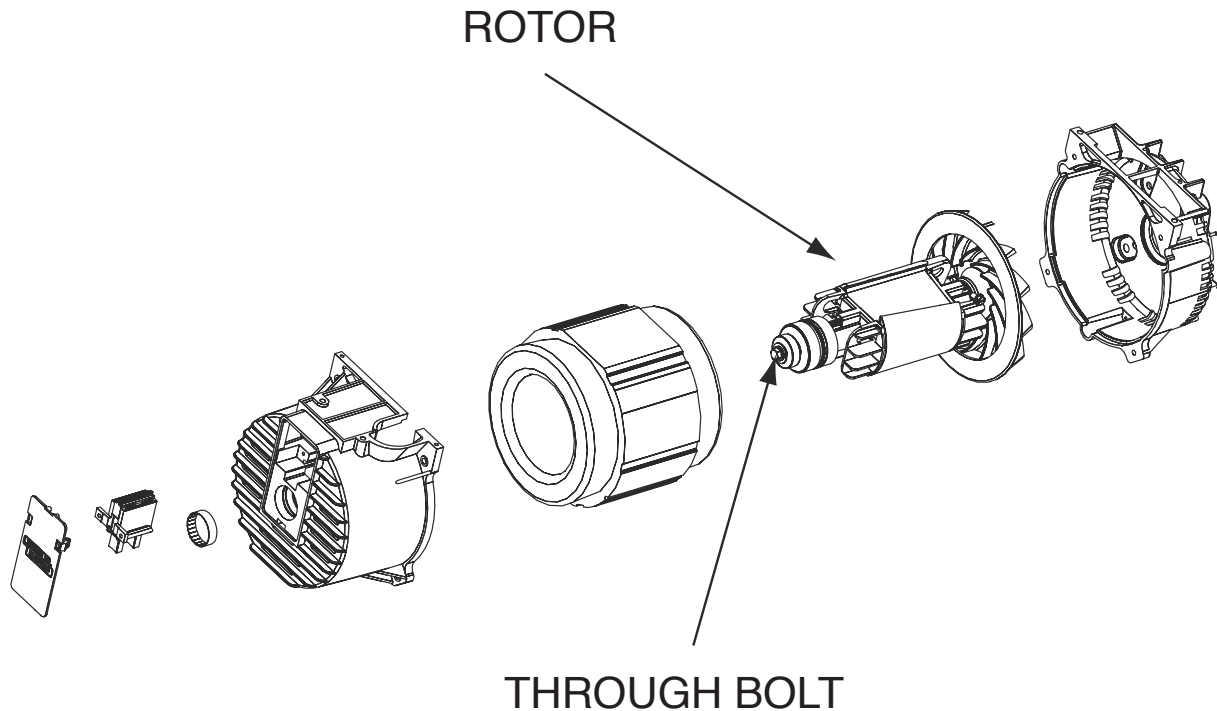
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## ROTOR REMOVAL AND REPLACEMENT PROCEDURE (continued)

FIGURE F.21 – ROTOR LOCATION



### PROCEDURE

1. Perform the *Stator Removal Procedure*.
2. Remove the long through-bolt from the bearing end of the rotor. (An impact wrench works best for removing this through-bolt). See Figure F.21.
3. Remove the rotor from the engine crankshaft using the Lincoln rotor-pulling tool. See instructions supplied with the tool.

### ⚠ IMPORTANT

Handle and store the rotor very carefully to avoid damage to the windings.

If necessary, the cast end bracket can now be removed from the engine.

### Replacing the Rotor

1. If the cast end bracket had been removed from the engine, clean the mating surfaces and reinstall it on the engine at this time. Bolts should be tightened to a torque of 22 to 24 ft-lbs.

### ⚠ IMPORTANT

It is highly recommended that a new bearing be installed before the rotor is secured to the engine crankshaft.

2. Thoroughly clean the engine crankshaft and the rotor shaft where it mates to the engine crankshaft. Place the rotor on the crankshaft.
3. When installing rotor thru-bolt, apply thread-locking compound, (Loctite 2760 or equivalent) torque the rotor thru-bolt to 22 to 24 ft-lbs.
4. After the rotor is secured to the engine crankshaft, check the run-out at the bearing outer race. Run out should not exceed .015" F.I.M.
5. See the stator removal and installation procedures for further assembly instructions.

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## RETEST AFTER REPAIR

### PROCEDURE

#### No-load test values

High idle (No load) RPM: 3700-3800 RPM (61.7 – 63.3 Hz)

Low idle RPM: 2250-2500 RPM (37.5 – 41.7 Hz)

Weld terminal open Circuit Voltage (OCV):

Weld control at maximum: 70 – 80 VDC

Weld control at minimum: 45 – 60 VDC

#### Full load test values:

Weld output control set to maximum.

Output amps: 165 – 190, Volts: 21 – 27, RPM: 3300 – 3650

Weld output set to minimum:

Output amps: 40 – 55, Volts: 20 – 28

Auxiliary receptacles with weld output control set to maximum:

#### 230 Volt receptacles:

Load amps: 22. – 25, Volts: 216 – 250 VAC

#### 120 Volt receptacles:

Load amps: 20.2 – 24, Volts: 108 – 130 VAC

**NOTE:** Values shown above are for a machine that is at normal full load temperature. Readings will likely be slightly higher if machine is cold.

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**Electrical Diagrams** ..... **G-1**

    Wiring Diagram - Complete Machine Code 11516 (L13878) ..... G-2

    Schematic – Complete Machine Code 11516 (G6205) ..... G-3

    Schematic – Field Control / Idle PC Board (G4793-1) ..... G-4

**\* NOTE:** Many PC Board Assemblies are now totally encapsulated, surface mounted and or multi-layered and are therefore considered to be unserviceable. Assembly drawings of these boards are no longer provided.

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WIRING DIAGRAM - COMPLETE MACHINE CODE 11516 (L13878)

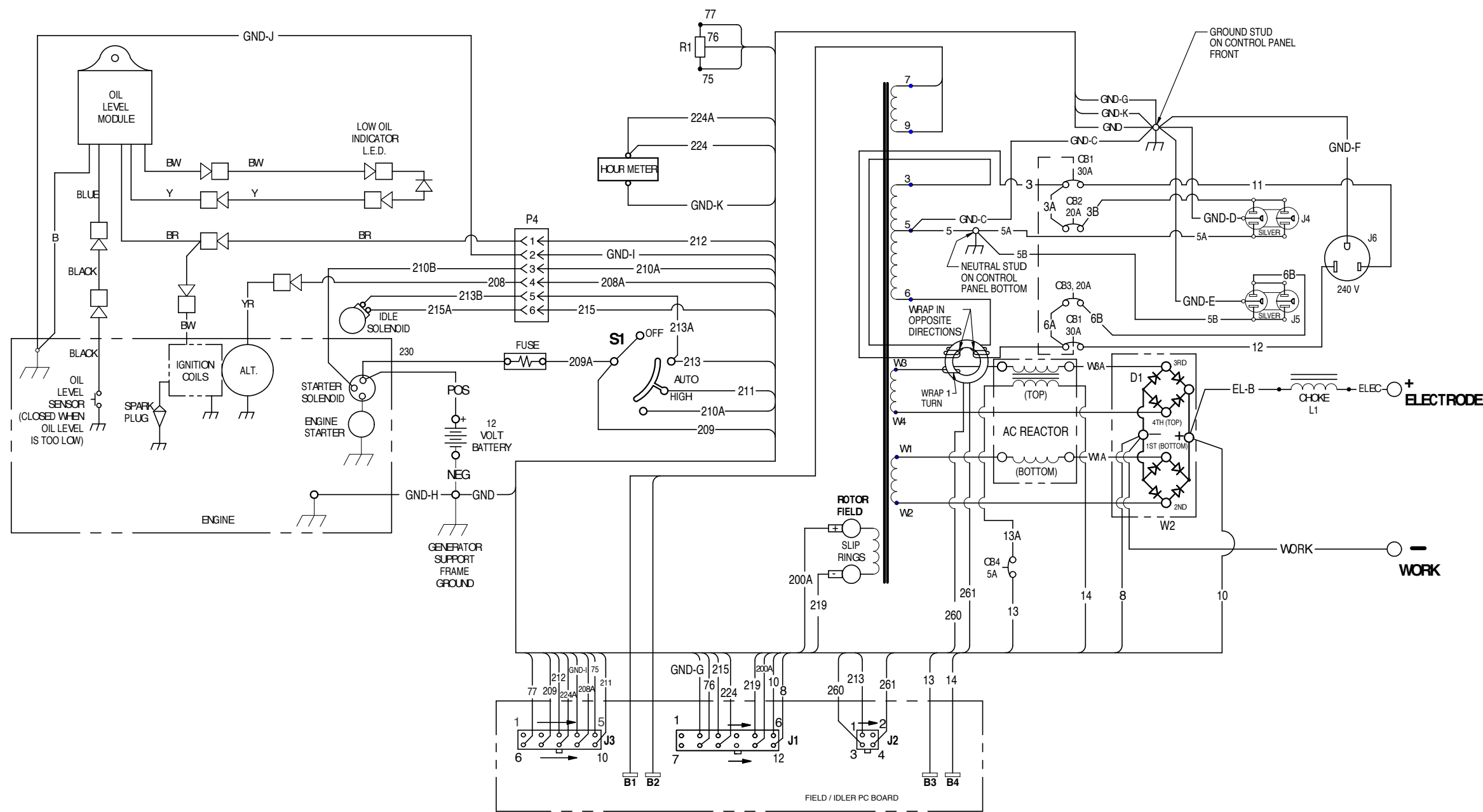
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# WIRING DIAGRAM - OUTBACK 185



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L13878PRINT

**NOTE:** This diagram is for reference only. It may not be accurate for all machines covered by this manual. The wiring diagram specific to your code is pasted inside one of the enclosure panels of your machine.



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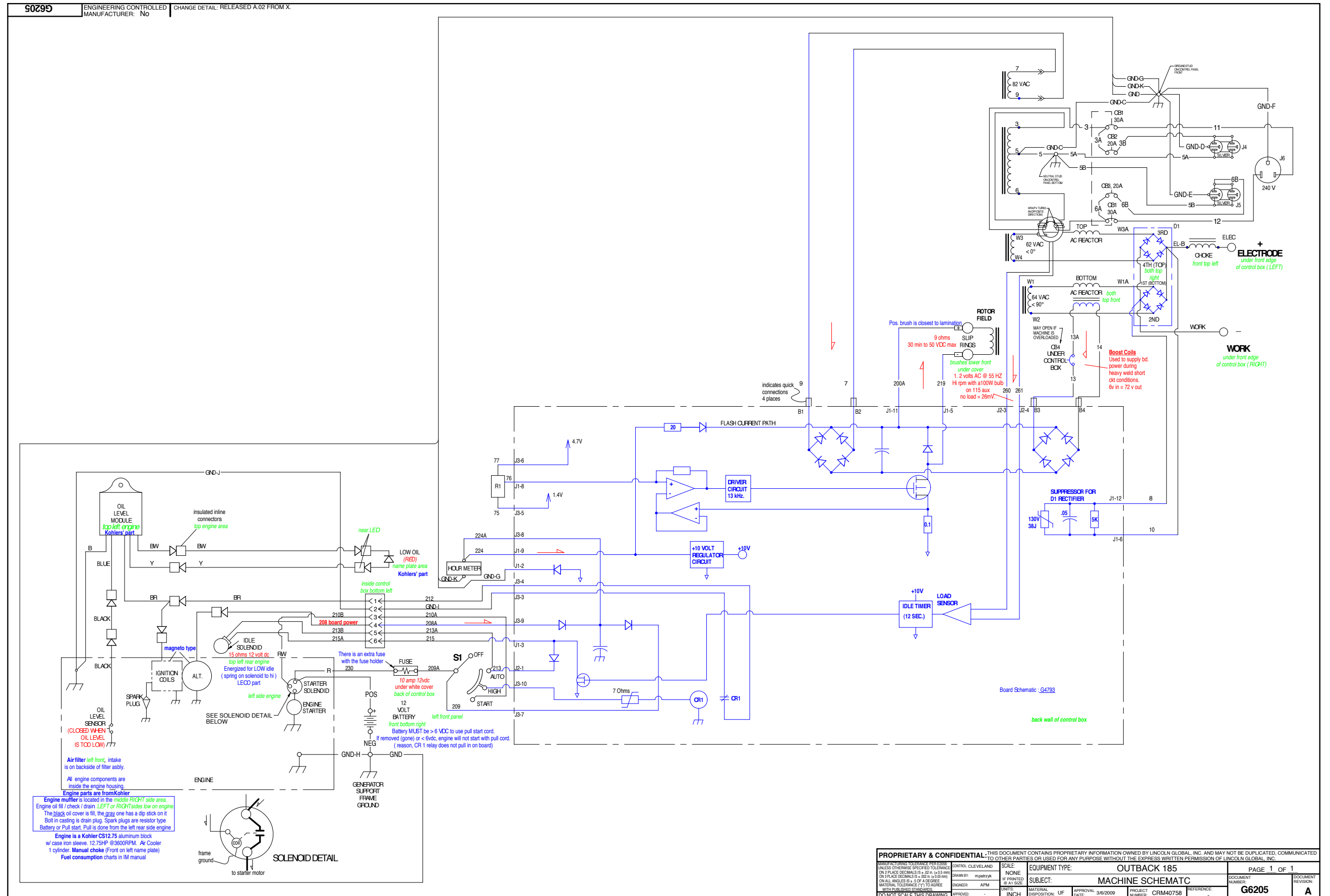
SCHEMATIC - COMPLETE MACHINE CODE 11516 (G6205)

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<p>MANUFACTURING TOLERANCE PER ISO9001 UNLESS OTHERWISE SPECIFIED TOLERANCES ON PLACE DECIMALS IS ± .02 IN (± 0.51 MM) ON PLACE DECIMALS IS ± .002 IN (± 0.051 MM) ON ALL ANGLES IS ± 30 OF A DEGREE MATERIAL TOLERANCE (*) TO AGREE WITH UNLESS OTHERWISE SPECIFIED</p>	<p>CENTRAL CLEVELAND, OH        DRAWN BY: mp/br/ryk        ENGINEER: APM        DATE: 3/8/2009</p>
<p>EQUIPMENT TYPE: <b>OUTBACK 185</b>        SUBJECT: <b>MACHINE SCHEMATIC</b></p>	<p>PAGE 1 OF 1        DOCUMENT NUMBER: <b>G6205</b>        DOCUMENT REVISION: <b>A</b></p>
<p>SCALE: NONE        IF PRINTED @ 1:1 SCALE</p>	<p>PROJECT NUMBER: CRM40758        REFERENCE: -</p>

SCHEMATIC - FIELD CONTROL / IDLE PC BOARD (G4793-1)

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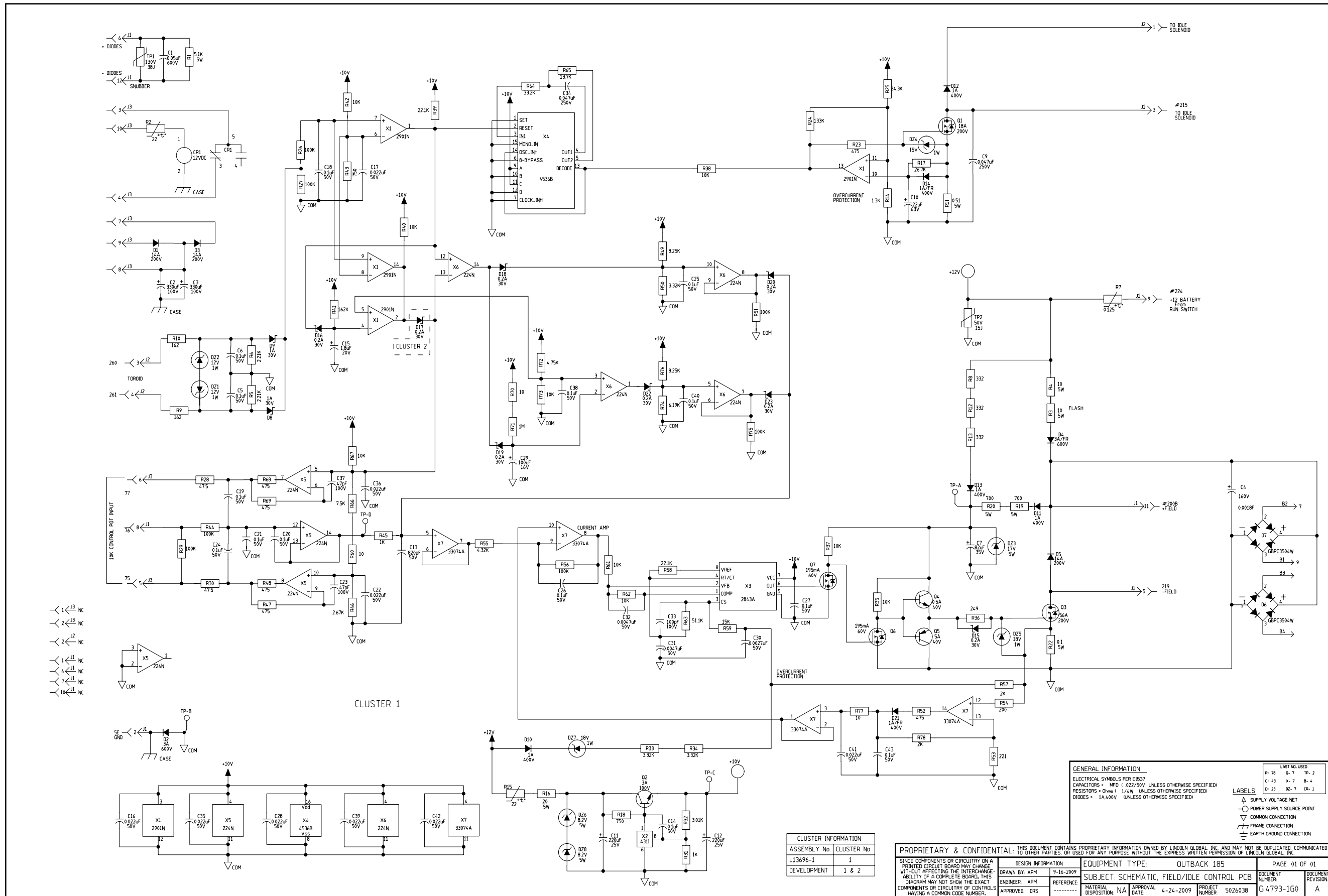
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CLUSTER INFORMATION	
ASSEMBLY No	CLUSTER No
L13696-1	1
DEVELOPMENT	1 & 2

DESIGN INFORMATION		EQUIPMENT TYPE		PAGE	
DRAWN BY	APM	DATE	9-16-2009	EQUIPMENT TYPE	OUTBACK 185
ENGINEER	APM	REFERENCE		DOCUMENT NUMBER	G 4793-1G0
APPROVED	DRS	MATERIAL DISPOSITION	NA	APPROVAL DATE	4-24-2009
		PROJECT NUMBER	5026038	REVISION	A

**GENERAL INFORMATION**

ELECTRICAL SYMBOLS PER E1537  
 CAPACITORS = MFD 1/22V/50V UNLESS OTHERWISE SPECIFIED  
 RESISTORS = Ohms 1/4W UNLESS OTHERWISE SPECIFIED  
 DIODES = 1A/400V UNLESS OTHERWISE SPECIFIED

**LEGEND**

- △ SUPPLY VOLTAGE NET
- POWER SUPPLY SOURCE POINT
- COMMON CONNECTION
- ▭ FRAME CONNECTION
- ⊕ EARTH GROUND CONNECTION

NOTE: This diagram is for reference only. It may not be accurate for all machines covered by this manual.



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