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.
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.

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.

ELECTRIC AND MAGNETIC FIELDS may be dangerous

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

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

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

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

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

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

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

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

2.d.5. Do not work next to welding power source.
**ELECTRIC SHOCK can kill.**

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

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

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

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

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

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

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

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

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

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

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

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

**ARC RAYS can burn.**

4.a. Use a shield with the proper filter and cover plates to protect your eyes from sparks and the rays of the arc when welding or observing open arc welding. Headshield and filter lens should conform to ANSI Z87.1 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.
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](http://www.lincolnelectric.com/safety) for additional safety information.
SAFETY

PRÉCAUTIONS DE SÛRETÉ

Pour votre propre protection lire et observer toutes les instructions et les précautions de sûreté spécifiques qui parraissent 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.


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 une 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 chains de levage, câbles de grue, ou autres circuits. Cela peut provoquer des risques d’incendie ou d’échauffement des chaines 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 pistoletage. 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.


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

1. Relier à la terre le chassis du poste conformément au code de l’électricité et aux recommendations du fabricant. Le dispositif de montage ou la piece 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.
Thank You—

for selecting a QUALITY product by Lincoln Electric. We want you to take pride in operating this Lincoln Electric Company product as much pride as we have in bringing this product to you!

CUSTOMER ASSISTANCE POLICY

The business of The Lincoln Electric Company is manufacturing and selling high quality welding equipment, consumables, and cutting equipment. Our challenge is to meet the needs of our customers and to exceed their expectations. On occasion, purchasers may ask Lincoln Electric for advice or information about their use of our products. We respond to our customers based on the best information in our possession at that time. Lincoln Electric is not in a position to warrant or guarantee such advice, and assumes no liability, with respect to such information or advice. We expressly disclaim any warranty of any kind, including any warranty of fitness for any customer’s particular purpose, with respect to such information or advice. As a matter of practical consideration, we also cannot assume any responsibility for updating or correcting any such information or advice once it has been given, nor does the provision of information or advice create, expand or alter any warranty with respect to the sale of our products.

Lincoln Electric is a responsive manufacturer, but the selection and use of specific products sold by Lincoln Electric is solely within the control of, and remains the sole responsibility of the customer. Many variables beyond the control of Lincoln Electric affect the results obtained in applying these types of fabrication methods and service requirements.

Subject to Change – This information is accurate to the best of our knowledge at the time of printing. Please refer to www.lincolnelectric.com for any updated information.

Please Examine Carton and Equipment For Damage Immediately

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

Please record your equipment identification information below for future reference. This information can be found on your machine nameplate.

Product ___________________________________  
Model Number ________________________________  
Code Number or Date Code _______________________  
Serial Number _________________________________  
Date Purchased _______________________________  
Where Purchased ______________________________

Whenever you request replacement parts or information on this equipment, always supply the information you have recorded above. The code number is especially important when identifying the correct replacement parts.

On-Line Product Registration

- Register your machine with Lincoln Electric either via fax or over the Internet.
  • For faxing: Complete the form on the back of the warranty statement included in the literature packet accompanying this machine and fax the form per the instructions printed on it.
  • For On-Line Registration: Go to our WEB SITE at www.lincolnelectric.com. Choose “Support” and then “Register Your Product”. Please complete the form and submit your registration.

Read this Operators Manual completely before attempting to use this equipment. Save this manual and keep it handy for quick reference. Pay particular attention to the safety instructions we have provided for your protection. The level of seriousness to be applied to each is explained below:

⚠️ WARNING

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

⚠️ CAUTION

This statement appears where the information must be followed to avoid minor personal injury or damage to this equipment.
<table>
<thead>
<tr>
<th>TABLE OF CONTENTS</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Installation</strong></td>
</tr>
<tr>
<td>Technical Specifications</td>
</tr>
<tr>
<td>General Description</td>
</tr>
<tr>
<td>Design Features</td>
</tr>
<tr>
<td>Pre-Operation Installation</td>
</tr>
<tr>
<td>Safety Precautions</td>
</tr>
<tr>
<td>Exhaust Spark Arrester</td>
</tr>
<tr>
<td>Location/Ventilation</td>
</tr>
<tr>
<td>Machine Grounding</td>
</tr>
<tr>
<td>Lift Bail</td>
</tr>
<tr>
<td>Trailers</td>
</tr>
<tr>
<td>Vehicle Mounting</td>
</tr>
<tr>
<td>Polarity Control and Cable Sizes</td>
</tr>
<tr>
<td>Pre-Operation Service</td>
</tr>
<tr>
<td>Oil</td>
</tr>
<tr>
<td>Fuel</td>
</tr>
<tr>
<td>Cooling System</td>
</tr>
<tr>
<td>Battery Charging</td>
</tr>
<tr>
<td>Electrical Devices use with this Product</td>
</tr>
<tr>
<td><strong>Operation</strong></td>
</tr>
<tr>
<td>Engine Operation</td>
</tr>
<tr>
<td>Starting The Perkins Engine</td>
</tr>
<tr>
<td>High Altitude Operation</td>
</tr>
<tr>
<td>Stopping the engine, Engine Break-In</td>
</tr>
<tr>
<td>Welder Operation</td>
</tr>
<tr>
<td>Duty Cycle</td>
</tr>
<tr>
<td>Current Control</td>
</tr>
<tr>
<td>Idler Operation</td>
</tr>
<tr>
<td>Auxiliary Power, Fuel Consumption Data</td>
</tr>
<tr>
<td><strong>Accessories</strong></td>
</tr>
<tr>
<td>Optional Features (Field Installed)</td>
</tr>
<tr>
<td><strong>Maintenance</strong></td>
</tr>
<tr>
<td>Safety Precautions</td>
</tr>
<tr>
<td>General Instructions</td>
</tr>
<tr>
<td>Cooling System</td>
</tr>
<tr>
<td>Bearings</td>
</tr>
<tr>
<td>Commutator and Brushes</td>
</tr>
<tr>
<td>Idler Maintenance</td>
</tr>
<tr>
<td>Nameplates</td>
</tr>
<tr>
<td>Purging Air from Fuel System</td>
</tr>
<tr>
<td>Engine Service Chart</td>
</tr>
<tr>
<td>GFCI Testing and Resetting Procedure</td>
</tr>
<tr>
<td><strong>Troubleshooting</strong></td>
</tr>
<tr>
<td>Safety Precautions</td>
</tr>
<tr>
<td>Welder Troubleshooting</td>
</tr>
<tr>
<td>Electronic Idler Troubleshooting Guide</td>
</tr>
<tr>
<td>Engine Troubleshooting Guide</td>
</tr>
<tr>
<td><strong>Diagrams</strong></td>
</tr>
<tr>
<td>Wiring Diagrams</td>
</tr>
<tr>
<td>Dimension Print</td>
</tr>
<tr>
<td><strong>Parts List</strong></td>
</tr>
</tbody>
</table>
## TECHNICAL SPECIFICATIONS - SAE-300®

### INPUT - DIESEL ENGINE

<table>
<thead>
<tr>
<th>Make/Model</th>
<th>Description</th>
<th>Speed (RPM)</th>
<th>Displacement</th>
<th>Starting System</th>
<th>Dry Capacities</th>
</tr>
</thead>
<tbody>
<tr>
<td>Perkins 404D-22 EPA Tier 4 interim Compliant</td>
<td>4 Cylinder 4 Cycle Naturally Aspirated Water-Cooled Diesel Engine Cast Iron Cylinder, Block/Crankcase</td>
<td>High Idle 1800 Low Idle 1400 Full Load 1725</td>
<td>135 cu. in (2.2 ltrs)</td>
<td>12VDC battery (Group 24, 650 cold crank amps) 2.0 KW Starter</td>
<td>Fuel: 16 gal. 60.6 L. Oil: 11.2 Qts. 10.6 L. Coolant: 9.5 Qts. 9.0 L.</td>
</tr>
<tr>
<td></td>
<td>Bore x Stroke</td>
<td>3.3” x 3.9” (84mm x 100mm) 32.7HP @1800 RPM</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### RATED OUTPUT @ 104°F(40°C) - WELDER

<table>
<thead>
<tr>
<th>DESCRIPTION</th>
<th>RATED DC OUTPUT * VOLTS @ RATED AMPS</th>
<th>Duty CYCLE</th>
</tr>
</thead>
<tbody>
<tr>
<td>300 Amp DC Welder All Copper Windings Pure DC Power Generator</td>
<td>30V @ 250A 32V @ 300A 98V DC Max. OCV @ 1800RPM</td>
<td>100% 60%</td>
</tr>
</tbody>
</table>

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

**Auxiliary Power**

- 3,000 Watts Continuous, 60 Hz AC
- 26 Amps @ 115V
- 13 Amps @ 230V

### PHYSICAL DIMENSIONS

<table>
<thead>
<tr>
<th>MODEL</th>
<th>HEIGHT</th>
<th>WIDTH</th>
<th>DEPTH</th>
<th>WEIGHT</th>
</tr>
</thead>
<tbody>
<tr>
<td>(K3003-1, K3003-2, K3003-3) CSA Without Wire Feed Module</td>
<td>45.5 in. (1156 mm)</td>
<td>24.00 in. (610 mm)</td>
<td>65.0 in. (1651 mm)</td>
<td>1453 lbs. (659 kg.)</td>
</tr>
</tbody>
</table>

* Based on a 10 min. period.

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

(2) Height to top of exhaust elbow.
GENERAL DESCRIPTION

The SAE-300® is a heavy duty, engine driven, DC arc welding power source, capable of providing constant current output for stick welding or DC TIG welding. This welder is wound with all copper coils, rated at 300 amps/32 Volts, and provides other Classic® features such as improved door latches and stainless hinges. With the addition of the optional K623-1 Wire Feed Module™, the SAE-300® will provide constant voltage output for running the LN-7, LN-23P, or LN-25 wire feeders. (The Wire Feed Module is factory installed on the K1643-8). The optional K924-5 Remote Control Kit, provides a remote control rheostat for remote fine current and open circuit voltage adjustment. See Section C for description.

The SAE-300® has an Electronic Engine Protection System. In the event of sudden low oil pressure or high coolant temperature, the engine immediately shuts down. The SAE-300® has a current range of 40-350 DC amps with output ratings as follows: These units are also capable of providing 3 KVA of 115/230 volts of 60 cycle AC auxiliary power.

The SAE-300® uses the Perkins 404D-22 industrial water-cooled diesel engine.

<table>
<thead>
<tr>
<th>RATED OUTPUT</th>
<th>DUTY CYCLE</th>
</tr>
</thead>
<tbody>
<tr>
<td>250A @ 30V</td>
<td>100%</td>
</tr>
<tr>
<td>300A @ 32V</td>
<td>60%</td>
</tr>
</tbody>
</table>

DESIGN FEATURES

Control Panel

The welder controls consist of a Reactor and a “Fine Current Adjustment” rheostat located on the upper control panel at the exciter end of the machine. The lower control panel welder is equipped with a “Start” button, an “Ignition” switch, an “Idler” control switch, and a “Glow Plug” button for easier cold weather starting.

The lower control panel also contains an engine temperature gauge, a battery charging ammeter, an oil pressure gauge, for auxiliary power consists of one 20 amp, 120VAC (5-20R) duplex receptacle with GFCI protection and one 15 amp, 250VAC (6-15R) receptacle, protected by 2 pole, 15 Amp breaker.

All Copper Windings - For long life and dependable operation.

Engine Idler - The SAE-300® is equipped with an electronic automatic engine idler. It automatically increases and decreases engine speed when starting and stopping welding or using auxiliary power.

A built-in time delay permits changing electrodes before the engine slows to its low idle speed. The “Idler” control switch on the panel locks the idler in high idle position when desired.

Auxiliary Power - 3.0 KVA of nominal 115/230V, 60Hz, AC. Output voltage is maintained within ± 10% at all loads up to rated capacity. (See Optional Features Section C for Power Plug Kit.)

GFCI - Protects the 20 amp, 120V duplex receptacle. See the Maintenance Section for detailed information on testing and resetting of the GFCI.

120 V DUPLEX RECEPTACLE AND GFCI

A GFCI protects the 120V auxiliary power receptacle.

A GFCI (Ground Fault Circuit Interrupter) is a device to protect against electric shock should a piece of defective equipment connected to it develop a ground fault. If this situation should occur, the GFCI will trip, removing voltage from the output of the receptacle. If a GFCI is tripped see the MAINTENANCE section for detailed information on testing and resetting it. A GFCI should be properly tested at least once every month.

The 120 V auxiliary power receptacle should only be used with three wire grounded type plugs or approved double insulated tools with two wire plugs. The current rating of any plug used with the system must be at least equal to the current capacity of the associated receptacle.

Welder Enclosure - The complete welder is rubber mounted on a rugged steel “C” channel base.

The output terminals are placed at the side of the machine so that they are protected by the door. The output terminals are labeled (+) and (-).

Cranking System - A 12 volt electric starter is standard.

Air Cleaner - Heavy duty two stage dry type.

Muffler - A muffler and stainless steel exhaust outlet elbow are standard.

Engine Hour Meter - A meter to record hours of operation.

Engine Protection - The system shuts the engine down in the event of sudden low oil pressure or high coolant temperature. A warning light on the control panel will indicate such a fault. To reset the engine for restarting, turn the ignition switch off then on.

Oil Drain Valve - A ball valve, hose and clamp are standard.

Remote Control - The Remote / Local Switch and Receptacle are standard.
PRE-OPERATION INSTALLATION

**WARNING**

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

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

- **ENGINE EXHAUST** can kill.
  - Use in open, well ventilated areas or vent exhaust outside.

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

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

**EXHAUST SPARK ARRESTER**

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

**CAUTION**

Use of an incorrect arrester may lead to engine damage or performance loss. Contact the engine manufacturer for specific recommendations.

**LOCATION / VENTILATION**

Always operate the welder with the doors closed. Leaving the doors open changes the designed air flow and may cause overheating.

The welder should be located to provide an unrestricted flow of clean, cool air. Also, locate the welder so that engine exhaust fumes are properly vented to an outside area.

**MACHINE GROUNDING**

According to the United States National Electrical Code, the frame of this portable generator is not required to be grounded and is permitted to serve as the grounding means for cord connected equipment plugged into its receptacle.

Some state, local, or other codes or unusual operating circumstances may require the machine frame to be grounded. It is recommended that you determine the extent to which such requirements may apply to your particular situation and follow them explicitly. A machine grounding stud marked with the symbol is provided on the welding generator frame foot. 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 Code lists a number of alternate means of grounding electrical equipment.

**LIFT BAIL**

A lift bail is provided for lifting with a hoist.

**WARNING**

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

**CAUTION**

- Do not lift machine if lift bail is damaged.
- Do not operate machine while suspended from lift bail.

**TRAILER** (SEE OPTIONAL FEATURES)

If the user adapts a non-Lincoln trailer, he must assume responsibility that the method of attachment and usage does not result in a safety hazard nor damage the welding equipment. Some of the factors to be considered are as follows:

1. Design capacity of trailer vs. weight of Lincoln equipment and likely additional attachments.
2. Proper support of, and attachment to, the base of the welding equipment so there will be no undue stress to the framework.

3. Proper placement of the equipment on the trailer to ensure stability side to side and front to back when being moved and when standing by itself while being operated or serviced.

4. Typical conditions of use, i.e., travel speed, roughness of surface on which the trailer will be operated; environmental conditions, likely maintenance.

5. Conformance with federal, state and local laws. (1) Consult your federal, state and local laws regarding specific requirements for use on public highways.

**VEHICLE MOUNTING**

**WARNING**

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

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

**POLARITY CONTROL AND CABLE SIZES**

With the engine off, route the electrode and work cables through the strain relief bracket on the base and connect to the studs located below the fuel tank mounting rail. (See size recommendations below.) For positive polarity, connect the electrode cable to the terminal marked “+”. For negative polarity, connect the electrode cable to the “-” stud. These connections should be checked periodically and tightened if necessary.

When welding at a considerable distance from the welder, be sure you use ample sized welding cables.

**RECOMMENDED COPPER CABLE SIZES**

<table>
<thead>
<tr>
<th>Amps</th>
<th>Duty Cycle</th>
<th>Cables Sizes for Combined Length of Electrode Plus Work Cable</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Cables Sizes for Combined Length of Electrode Plus Work Cable</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Up to 200ft.(61m) 200 to 250ft. 61 to 76m</td>
</tr>
<tr>
<td>250</td>
<td>100%</td>
<td>1 1/0</td>
</tr>
<tr>
<td>300</td>
<td>60%</td>
<td>1/0 2/0</td>
</tr>
</tbody>
</table>

**OIL**

This unit is supplied from the factory with the engine crankcase filled with a high quality SAE 10W/30 oil. This oil should be acceptable for most typical ambient temperatures. Consult the engine operation manual for specific engine manufacturer’s recommendations. Upon receipt of the welder, check the engine dipstick to be sure the oil is at the “full” mark. DO NOT overfill.

**FUEL**

Fill the fuel tank with the grade of fuel recommended in the Engine Operator’s manual. Make sure the fuel valve on the water separator is in the open position.

**COOLING SYSTEM**

The radiator has been filled at the factory with a 50-50 mixture of ethylene glycol antifreeze and water. Check the radiator level and add a 50-50 solution as needed (see engine manual or antifreeze container for alternate antifreeze recommendations).
BATTERY CHARGING

**WARNING**

GASES FROM BATTERY can explode.
- Keep sparks, flame and cigarettes away.

BATTERY ACID can burn eyes and skin.
- Wear gloves and eye protection and be careful when boosting, charging or working near battery.

To prevent EXPLOSION when:

a) Installing a new battery - disconnect thenegative cable from the old battery first and connect the negative cable to the new battery last.

b) Connecting a battery charger - remove the battery from the welder by disconnecting the negative cable first, then the positive cable and battery clamp. When reinstalling, connect the negative cable last.

c) Using a booster - connect the positive lead to the battery first, then connect the negative lead to the ground lead on the base.

To prevent ELECTRICAL DAMAGE when:

a) Installing a new battery.

b) Using a booster.

Use correct polarity - Negative Ground.

To prevent BATTERY DISCHARGE, if you have an ignition switch, turn it off when engine is not running.

- To prevent BATTERY BUCKLING, tighten nuts on battery clamp until snug.

The SAE-300® is equipped with a wet charged battery. The charging current is automatically regulated when the battery is low (after starting the engine) to a trickle current when the battery is fully charged.

When replacing, jumping or otherwise connecting the battery to the battery cables, the proper polarity must be observed. This system is **NEGATIVE GROUND**.
CAUTION

Certain Electrical devices cannot be powered to this Product. See Table A.1

**TABLE A.1**

**ELECTRICAL DEVICE USE WITH THIS PRODUCT**

<table>
<thead>
<tr>
<th>Type</th>
<th>Common Electrical Devices</th>
<th>Possible Concerns</th>
</tr>
</thead>
<tbody>
<tr>
<td>Resistive</td>
<td>Heaters, toasters, incandescent light bulbs, electric range, hot pan, skillet, coffee maker.</td>
<td>NONE</td>
</tr>
<tr>
<td>Capacitive</td>
<td>TV sets, radios, microwaves, appliances with electrical control.</td>
<td>Voltage spikes or high voltage regulation can cause the capacitative elements to fail. Surge protection, transient protection, and additional loading is recommended for 100% fail-safe operation. DO NOT RUN THESE DEVICES WITHOUT ADDITIONAL RESISTIVE TYPE LOADS.</td>
</tr>
<tr>
<td>Inductive</td>
<td>Single-phase induction motors, drills, well pumps, grinders, small refrigerators, weed and hedge trimmers.</td>
<td>These devices require large current inrush for starting. Some synchronous motors may be frequency sensitive to attain maximum output torque, but they SHOULD BE SAFE from any frequency induced failures.</td>
</tr>
<tr>
<td>Capacitive / Inductive</td>
<td>Computers, high resolution TV sets, complicated electrical equipment.</td>
<td>An inductive type line conditioner along with transient and surge protection is required, and liabilities still exist. DO NOT USE THESE DEVICES WITH THIS PRODUCT.</td>
</tr>
</tbody>
</table>

The Lincoln Electric Company is not responsible for any damage to electrical components improperly connected to this product.
OPERATION

ENGINE OPERATION

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

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

- **ENGINE EXHAUST** can kill.
  - Use in open, well ventilated areas or vent exhaust outside.

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

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

Operate the welder with the doors closed. Leaving the doors open changes the designed air flow and can cause overheating.

**STARTING THE SAE-300® 404D-22 DIESEL ENGINE**

1. Turn the “IDLER” switch to “HIGH”.
2. Turn the “IGNITION” switch to “ON”.
3. Press the Glow Plug button for 20 to 30 seconds. (maximum 60 seconds).
4. Press the Start button. When the engine starts running, release both buttons. If the engine fails to start in 20 seconds, wait 30 seconds and repeat the above procedure.
5. Observe the oil pressure. If no pressure shows within 30 seconds, stop the engine and consult the engine operating manual. To stop the engine, turn the “IGNITION” switch to “OFF”.
6. If the engine protection warning light comes on during cranking or after start up, the “IGNITION” switch must be turned “OFF” to reset the engine protection system.

7. Allow the engine to run at high idle speed for several minutes to warm the engine. Stop the engine and recheck the oil level, after allowing sufficient time for the oil to drain into the pan. If the level is down, fill it to the full mark again. The engine controls were properly set at the factory and should require no adjusting when received.

**COLD WEATHER STARTING:**

With a fully charged battery and the proper weight oil, the engine should start satisfactorily even down to about -15°F (-26°C), it may be desirable to install cold-starting aides.

Note: Extreme cold weather starting may require longer glow plug operation.

**WARNING**

Under **NO conditions** should ether or other starting fluids be used!

**HIGH ALTITUDE OPERATION:**

The engine will run correctly up to an altitude of 600m (2000ft.). If the engine is to be operated permanently at an altitude above this, the fuel consumption and exhaust emissions may be excessive.

Contact the Perkins Application Department for any engine adjustments that may be required.

**STOPPING THE ENGINE**

1. Turn the “IGNITION” switch to “OFF”.

At the end of each day’s welding, check the crankcase oil level, drain accumulated dirt and water from the water separator located on the fuel rail. Refill the fuel tank to minimize moisture condensation in the tank. Also, running out of fuel tends to draw dirt into the fuel system.

When hauling the welder between job sites, close the fuel feed valve on the separator located on the fuel rail.

If the fuel supply is cut off or runs out while the fuel pump is operating, air may be entrapped in the fuel distribution system. If this happens, bleeding of the fuel system may be necessary. Use qualified personnel to do this per the instructions in the MAINTENANCE section of this manual.
ENGINE BREAK-IN

Lincoln Electric selects high quality, heavy-duty industrial engines for the portable welding machines we offer. While it is normal to see a small amount of crankcase oil consumption during initial operation, excessive oil use, wet stacking (oil or tar like substance at the exhaust port), or excessive smoke is not normal.

Larger machines with a capacity of 350 amperes and higher, which are operated at low or no-load conditions for extended periods of time are especially susceptible to the conditions described above. To accomplish successful engine break-in, most diesel-powered equipment needs only to be run at a reasonably heavy load within the rating of the welder for some period of time during the engine’s early life. However, if the welder is subjected to extensive light loading, occasional moderate to heavy loading of the engine may sometimes be necessary. Caution must be observed in correctly loading a diesel/generator unit.

1. Connect the welder output studs to a suitable resistive load bank. Note that any attempt to short the output studs by connecting the welding leads together, direct shorting of the output studs, or connecting the output leads to a length of steel will result in catastrophic damage to the generator and voids the warranty.
2. Set the welder controls for an output current and voltage within the welder rating and duty cycle. Note that any attempt to exceed the welder rating or duty cycle for any period of time will result in catastrophic damage to the generator and voids the warranty.
3. Periodically shut off the engine and check the crankcase oil level.

WELDER OPERATION

DUTY CYCLE

The NEMA output rating of the SAE-300 is 300 amperes at 32 arc volts on a 60% duty cycle (consult Specifications in this manual for alternate ratings). Duty cycle is based on a ten minute period; thus, the welder can be loaded at rated output for six minutes out of every ten minute period.

CURRENT CONTROL

Do not adjust the “Current Control” while welding because this can damage the control.

The “Coarse Current Control” is the main Current Adjuster. The “Fine Current Control” adjusts the current from minimum to maximum. Open circuit voltage is also controlled by the “Fine Current Control” permitting control of the arc characteristics.

A high open circuit voltage setting provides the soft “buttering” arc with best resistance to pop-outs preferred for most welding. To get this characteristic, set the “Coarse Current Control” to the lowest setting that still provides the current you need and set the “Fine Current Control” near maximum.

When a forceful “digging” arc is required, usually for vertical and overhead welding, use a higher “Coarse Current Control” setting and lower open circuit voltage.

Some arc instability may be experienced with EXX10 electrodes when trying to operate with long arc techniques at settings at the lower end of the open circuit voltage range.

STICK / TIG WELDING

Start by setting the right-side Fine Current and OCV control dial to 60, then set the left-side Coarse Current control dial to the desired current using the dial markings as an approximate guideline. Arc characteristics and small changes in output can then be adjusted using the Fine Current and OCV control dial. A K924-4 Remote Control unit can also be used as the Fine Control and OCV control dial.

SELF-SHIELDED FLUX-CORED WELDING (WITH A K623-1 WIRE FEED MODULE INSTALLED)

Start by setting the Wire (CV) / Stick (CC) toggle switch to the Wire (CV) position. Then set the left-side Coarse Current control dial to 270. Now move the Voltage Adjustment dial to the desired voltage. Move the Coarse Current control to the left for a softer arc and to the right for a crisper arc.
1. In the “High” position, the idler solenoid deactivates, and the engine goes to high idle speed. The speed is controlled by the governor.

2. In the “Auto” position, the idler operates as follows:
   a. When welding or drawing power for lights or tools (approximately 100 watts minimum) from the receptacles, the idler solenoid deactivates and the engine operates at high idle speed.
   b. When welding ceases or the power load is turned off, a preset time delay of about 15 seconds starts. This time delay cannot be adjusted.
   c. If the welding or power load is not re-started before the end of the time delay, the idler solenoid activates and reduces the engine to low idle speed.

AUXILIARY POWER

If GFCI is tripped, See the MAINTENANCE section for detailed information on testing and resetting the GFCI.

The AC auxiliary power, supplied as a standard, has a rating of 3.0 KVA of 115/230 VAC (60 hertz). Set fine current adjustment at 100 for maximum auxiliary power.

With the 3.0 KVA, 115/230 VAC auxiliary power, one 120V duplex protected by GFCI and one 230V duplex, grounding type receptacle with 2 pole, 15 amp circuit breaker.

The rating of 3.0 KVA permits a maximum continuous current of 13 amps to be drawn from the 230 volt duplex receptacle. 20 amps can be drawn from the 120 volt duplex receptacle. The total combined load of all receptacles is not to exceed 3.0 KVA.

An optional power plug kit is available. When this kit is specified, the customer is supplied with a plug for each receptacle.

<table>
<thead>
<tr>
<th>SAE-300® WITH PERKINS 404D-22 DIESEL ENGINE</th>
</tr>
</thead>
<tbody>
<tr>
<td>TYPICAL FUEL CONSUMPTION DATA</td>
</tr>
<tr>
<td>Low Idle (1375 RPM)-No Load @ 45 Volts</td>
</tr>
<tr>
<td>High Idle (1800 RPM)-No Load @ 96.6 Volts</td>
</tr>
<tr>
<td>3000 Watts</td>
</tr>
<tr>
<td>250 Amps @ 30 Volts</td>
</tr>
<tr>
<td>300 Amps @ 32 Volts</td>
</tr>
</tbody>
</table>
OPTIONAL FEATURES

GENERAL OPTIONS

WARNING

Pipe Thawing with an arc welder can cause fire, explosion, damage to electric wiring or to the arc welder if done improperly. The use of an arc welder for pipe thawing is not approved by the CSA, nor is it recommended or supported by Lincoln Electric.

Power Plug Kit K802D
A power plug kit for the auxiliary power receptacles is available. (Provides a plug for each receptacle.)

Spark Arrestor Kit K903-1
Includes a heavy gage steel, approved spark arrestor, clamp and adapter for mounting to the muffler exhaust pipe.

TRAILER K2636-1
For heavy-duty road, off-road, plant and yard use. Includes pivoting jack stand, safety chains, and 13 in. (330.2 mm) wheels. Stiff .120 in. (3.0 mm) welded rectangular steel tube frame construction is phosphate etched and powder coat painted for superior rust and corrosion resistance. Low sway suspension gives outstanding stability with manageable tongue weight. Wheel bearings are packed with high viscosity, high pressure, low washout Lubriplate® grease. Includes a Duo-Hitch™ – a 2 in. (50.8 mm) Ball/Lunette Eye combination hitch. Overall width: 60 in. (1.5 m)

K2639-1 Fender & Light Kit
K2640-1 Cable Rack

Stainless Steel Sheet Metal Kit K2423-1
Stainless steel roof and doors. Also includes decals (mounted), door latches, door hooks, bumpers and all-required mounting hardware. Fits K6090-9 and -10 Pipeliner® 200D and K1643-1 thru -10 Classic® 300D

STICK OPTIONS

ACCESSORY SET K704
Includes 35 feet (10 m) of electrode cable and 30 feet (9 m) of work cable, headshield, work clamp and electrode holder. Cable is rated at 500 amps, 60% duty cycle.

Remote Control Kit K924-4
Contains remote control rheostat and 100 ft. (30.5 m) cable for adjusting the OCV at the welding site.

TIG OPTIONS

TIG Module K930-2
Provides high frequency and shielding gas control for AC and DC GTAW (TIG) welding applications. Its compact case is designed for easy carrying, complete with a handle. High frequency bypass is built in. Additionally, the K936-3 control cable is required if remote control is used. If remote control is not used the K936-4 control cable is required.

PTA-26V TIG Torch K1783-9
Air cooled 200 amp torch equipped with valve for gas flow control. 25Ft. length.

Magnum Parts Kit For PTA-26V TIG Torch KP509

Control Cable K936-4 (required for TIG Module)
Control cable for connecting the K930-2 TIG Module.

Arc Start Switch K814 (required for TIG Module)
Comes with a 25ft. (7.6m) cable. Attaches to the TIG torch for convenient finger control.

Contactor Kit K938-1 (required for TIG Module)
Provide “Cold” tungsten Tip when welding with the TIG Module.

Control Cable Extension K937-45
Allows the TIG Module to be operated at distances up to 200 ft. from the power source. Available in 45 ft. (13.7m).
WIRE FEEDER OPTIONS

Wire Feed Module K623-1
Provides constant voltage (CV) output with improved arc stability for Innershield welding. Excellent for MIG welding. Recommended wire feeders are the LN-7, LN-23P and LN-25.

Remote Control Kit K2464-1
(Stick & Wire)
For machines that have the wire feed module. Contains a rheostat for stick output, a potentiometer for wire output and 100 ft. (30 m) of control cable.

LN-25 PRO Wire Feeder K2613-1
Portable CC/CV unit for flux-cored and MIG welding with MAXTRAC® wire drive system. Includes Gas Solenoid & Internal Contactor. Requires Wire Feed Module.

Magnum® 350 Innershield Gun for LN-25 K126-12
For self-shielded wire with 15 ft. (4.5m) cable. For .072" (1.9mm) (5/64" (2.0mm) wire.

Magnum® PRO 350 Ready-Pak® K2652-2-10-45
15 ft., .035-5/64 in. Magnum® PRO MIG/flux-cored welding guns are rated 100% duty cycle. The guns are designed for high amperage, high duty cycle applications in extreme environments where heat-resistance and fast service-ability are key.

Drive Roll and Guide Tube Kit (for LN-25 PRO)
KP1697-068 for .068-.072 in. (1.8 mm)
KP1697-5/64 for 5/64 in. (2.0 mm)
For cored or solid steel wire.

Magnum® 300 MIG Gun and Cable Package LN-25 PRO K1802-1 (includes K466-1 Connector Kit)
For .035-.045 in. (0.9-1.2 mm) gas-shielded wire with 15 ft. (4.5 m) cable.

Drive Roll and Guide Tube Kit (for LN-25 PRO)
KP1696-1
For .035 in. and .045 in. (0.9 mm and 1.1 mm) solid steel wire.
SAFETY PRECAUTIONS

**WARNING**

Have qualified personnel do the maintenance work. Turn the engine off before working inside the machine. 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.

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

---

**ELECTRIC SHOCK can kill.**

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

---

**ENGINE EXHAUST can kill.**

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

---

**MOVING PARTS can injure.**

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

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

---

GENERAL INSTRUCTIONS

1. Blow out the welder and controls with an air hose at least once every two months. In particularly dirty locations, this cleaning may be necessary once a week. Use low pressure air to avoid driving dirt into the insulation.

2. Follow the engine service schedule in this manual and the detailed maintenance and troubleshooting in the engine manufacturer’s manual.

---

**COOLING SYSTEM**

The SAE-300® is equipped with a pressure radiator. Keep the radiator cap tight to prevent loss of coolant. Clean and flush the cooling system periodically to prevent clogging the passage and overheating the engine. When antifreeze is needed, always use the permanent type.

**BEARINGS**

This welder is equipped with a double synthetic sealed ball bearing having sufficient grease to last indefinitely under normal service.

**COMMITATOR AND BRUSHES**

---

**WARNING**

Uncovered rotating equipment can be dangerous. Use care so your hands, hair, clothing or tools do not catch in the rotating parts. Protect yourself from particles that may be thrown out by the rotating armature when stoning the commutator.

Shifting of the commutator brushes may result in:
- Change in machine output
- Commutator damage
- Excessive brush wear

Periodically inspect the commutator, slip rings, and brushes by removing the covers. DO NOT remove or replace these covers while the machine is running. Commutators and slip rings require little attention. However, if they are black or appear uneven, have them cleaned by an experienced maintenance man using fine sandpaper or a commutator stone. Never use emery cloth or paper for this purpose.
Replace brushes when they wear within 1/4” of the pigtail. A complete set of replacement brushes should be kept on hand. Lincoln brushes have a curved face to fit the commutator. Have an experienced maintenance man seat these brushes by lightly stoning the commutator as the armature rotates at full speed until contact is made across the full face of the brushes. After stoning, blow out the dust with low pressure air.

To seat slip ring brushes, position the brushes in place. Then slide one end of a piece of fine sandpaper between slip rings and brushes with the coarse side against the brushes. With slight additional finger pressure on top of the brushes, pull the sandpaper around the circumference of the rings - in direction of rotation only - until brushes seat properly. In addition, stone slip ring with a fine stone. Brushes must be seated 100%.

Arcing or excessive exciter brush wear indicates a possible misaligned shaft. Have an authorized Field Service Shop check and realign the shaft.

**IDLER MAINTENANCE**

**CAUTION**

Before doing electrical work on the idler printed circuit board, disconnect the battery.

When installing a new battery or using a jumper battery to start the engine, be sure the battery polarity is connected properly. The correct polarity is **negative** ground. Damage to the engine alternator and the printed circuit board can result from incorrect connection.

1. Proper operation of the idler requires good grounding of the printed circuit board, reed switch, and battery.

2. Idler solenoid is activated for low idle.

3. If desired, the welder can be used without automatic idling by setting the “Idler” switch to the “High” position.

**NAMEPLATES**

Whenever routine maintenance is performed on this machine - or at least yearly - inspect all nameplates and labels for legibility. Replace those which are no longer clear. Refer to the parts list for the replacement item number.

---

**PURGING AIR FROM FUEL SYSTEM**

**(PERKINS 404D-22 ENGINE)**

**WARNING**

Keep fuel clear of open flames or arcs, allow engine to cool before working on the fuel system. Wipe up any spilled fuel and do not start engine until fumes clear.

If the engine is running rough and you suspect air has been trapped in the fuel system, (e.g. the engine was allowed to run out of fuel) perform the following steps using qualified personnel:

1. Loosen by two or three turns, the vent screw (Figure D.1) on the fuel inlet connection.

2. Operate the electric fuel pump by turning the “Ignition” switch “ON” until fuel, free of air, flows from the vent point. Tighten the vent screw.

3. Contact your Perkins Engine repair facility if problems persist.

---

**FIGURE D.1**
### ENGINE SERVICE

<table>
<thead>
<tr>
<th>MAINTENANCE ITEM</th>
<th>TYPE OR QUANTITY</th>
</tr>
</thead>
<tbody>
<tr>
<td>Coolant level</td>
<td>50/50 Water/Ethylene Glycol</td>
</tr>
<tr>
<td>Concentration of antifreeze</td>
<td>9.5qt., 9.0L</td>
</tr>
<tr>
<td>Engine oil level (NOTE 1)</td>
<td>8.45qt., 8L (refill amount)</td>
</tr>
<tr>
<td>Engine oil level (NOTE 1 &amp; 3)</td>
<td>Perkins #140517050</td>
</tr>
<tr>
<td>Drain water separator &amp; fuel strainer</td>
<td>Lincoln #M20840-A</td>
</tr>
<tr>
<td>Water separator element</td>
<td>Perkins #130366120</td>
</tr>
<tr>
<td>Fuel filter canister</td>
<td>Perkins #080109107</td>
</tr>
<tr>
<td>Tension of alternator drive belt</td>
<td>Donaldson #P821575</td>
</tr>
<tr>
<td>Alternator drive belt wear</td>
<td></td>
</tr>
<tr>
<td>Air filter (earlier check may be req’d)</td>
<td></td>
</tr>
<tr>
<td>Renew the engine breather</td>
<td></td>
</tr>
<tr>
<td>Tighten cylinder head</td>
<td></td>
</tr>
<tr>
<td>Valve clearances</td>
<td>Intake .008&quot;, exhaust .008&quot;</td>
</tr>
<tr>
<td>Electrical systems</td>
<td></td>
</tr>
<tr>
<td>All nuts and bolts for tightness</td>
<td></td>
</tr>
<tr>
<td>Injector performance</td>
<td>Contact Perkins</td>
</tr>
<tr>
<td>Leaks or engine damage</td>
<td></td>
</tr>
<tr>
<td>Battery</td>
<td></td>
</tr>
</tbody>
</table>

**Notes:**

3. Fill slowly! Ensure correct quantity is used.

Above operations to be carried out by trained personnel with reference to the workshop manual where necessary.

These preventative maintenance periods apply to average conditions of operation. If necessary use shorter periods.
GFCI TESTING AND resetting
PROCEDURE

The GFCI should be properly tested at least once every month or whenever it is tripped. To properly test and reset the GFCI:

- If the GFCI has tripped, first carefully remove any load and check it for damage.
- If the equipment has been shut down, it must be restarted.
- The equipment needs to be operating at high idle speed and any necessary adjustments made on the control panel so that the equipment is providing at least 80 volts to the receptacle input terminals.
- The circuit breaker for this receptacle must not be tripped. Reset if necessary.
- Push the "Reset" button located on the GFCI. This will assure normal GFCI operation.
- Plug a night-light (with an "ON/OFF" switch) or other product (such as a lamp) into the Duplex receptacle and turn the product "ON".
- Push the "Test" button located on the GFCI. The night-light or other product should go "OFF".
- Push the "Reset" button, again. The light or other product should go "ON" again.

If the light or other product remains "ON" when the "Test" button is pushed, the GFCI is not working properly or has been incorrectly installed (miswired). If your GFCI is not working properly, contact a qualified, certified electrician who can assess the situation, rewire the GFCI if necessary or replace the device.
If for any reason you do not understand the test procedures or are unable to perform the tests/repairs safely, contact your Local Lincoln Authorized Field Service Facility for technical troubleshooting assistance before you proceed.
<table>
<thead>
<tr>
<th>PROBLEMS (SYMPTOMS)</th>
<th>POSSIBLE CAUSE</th>
<th>RECOMMENDED COURSE OF ACTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Machine fails to hold the output (heat) consistently.</td>
<td>1. Rough or dirty commutator. &lt;br&gt;2. Brushes may be worn down to limit. &lt;br&gt;3. Field circuit may have variable resistance connection or intermittent open circuit due to loose connection or broken wire. &lt;br&gt;4. Electrode lead or work lead connection may be poor. &lt;br&gt;5. Wrong grade of brushes may have been installed on generator. &lt;br&gt;6. Field rheostat may be making poor contact and overheating.</td>
<td>If all recommended possible areas of misadjustment have been checked and the problem persists, <strong>Contact your local Lincoln Authorized Field Service Facility.</strong> &lt;br&gt;7. “Current Control” may not be operating properly. &lt;br&gt;8. “Current Control” brush holder contact springs may be worn out or missing. Contact surface may be dirty, rough and pitted. &lt;br&gt;9. “Current Control” brush holder support stud and mating contact surfaces may be dirty or pitted and burned.</td>
</tr>
</tbody>
</table>
## TROUBLESHOOTING

Observe all Safety Guidelines detailed throughout this manual

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

<table>
<thead>
<tr>
<th>PROBLEMS (SYMPTOMS)</th>
<th>POSSIBLE AREAS OF MISADJUSTMENTS(S)</th>
<th>RECOMMENDED COURSE OF ACTION</th>
</tr>
</thead>
</table>
| Welder starts but fails to generate current. | 1. Generator or exciter brushes may be loose or missing.  
2. Exciter may not be operating.  
3. Field circuit of generator or exciter may be open.  
4. Exciter may have lost excitation.  
5. Series field and armature circuit may be open-circuited. | If all recommended possible areas of misadjustment have been checked and the problem persists, Contact your local Lincoln Authorized Field Service Facility. |
| Welding arc is loud and spatters excessively. | 1. Current setting may be too high.  
2. Polarity may be wrong. | |
| Welding current too great or too small compared to indication on the dial. | 1. Exciter output low causing low output compared to dial indication.  
2. Operating speed too low or too high.  
3. “Current Control” shaft and handle may have turned slightly in the insulated bushing of the current control brush holder, caused by turning handle too hard against one of the stops.  
3. With current control against the minimum stop, set pointer to within 1/8” of the last scale division. | |

⚠️ CAUTION ⚠️

If for any reason you do not understand the test procedures or are unable to perform the tests/repairs safely, contact your Local Lincoln Authorized Field Service Facility for technical troubleshooting assistance before you proceed.
With Idler Control Switch in the Auto Position, Engine Will Not Return to Low Idle in Approximately 15 Seconds After Welding and Auxiliary Loads are Removed

Set Idler Control Switch to the Auto Position

Check for Continuity through Idler Control Switch

Open
Measure DC Voltage on Idler Solenoid Coil
0 VDC
Check Continuity of Reed Switch in Weld Circuit
Open
1. Check Wiring in Idler Solenoid Circuit
2. Replace Idler P.C. Board
Closed
12 VDC
Check for Jamming of the Idler Solenoid Mechanism
Closed
Replace Reed Switch

CAUTION
If for any reason you do not understand the test procedures or are unable to perform the tests/repairs safely, contact your Local Lincoln Authorized Field Service Facility for technical troubleshooting assistance before you proceed.
With Idler Control Switch in the AUTO Position, Engine Will Not Pick Up Speed When:

The Arc is Struck
Reed Switch in Weld Circuit Defective -- Will Not Close
To Check: Short the Red Lead on P.C. Board to Welder Frame.

The Auxiliary Power Load is Turned ON
Power Load Too Small
Try Load Above 150 Watts

Engine Does Not Pick Up Speed
1. Check for Jamming of the Idler Solenoid Mechanism, or broken return spring.
2. Check for Continuity of Current Transformer (Toroid). Replace as Required.
3. Check Idler Circuit Wiring and Repair as Required.
4. Replace Idler P.C. Board.

Engine Picks Up Speed
1. Check for Break in Red Lead and Repair
2. Replace Reed Switch in Weld Circuit.

Engine Does Not Pick Up Speed
1. Check for Jamming of the Idler Solenoid Mechanism, or broken return spring.
2. Check Idler Circuit Wiring and Repair as Required.
3. Replace Idler P.C. Board.

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

Observe all Safety Guidelines detailed throughout this manual.

<table>
<thead>
<tr>
<th>PROBLEMS (SYMPTOMS)</th>
<th>POSSIBLE CAUSE</th>
<th>RECOMMENDED COURSE OF ACTION</th>
</tr>
</thead>
</table>
| Engine does not start. | 1. Lack of fuel.  
2. Air mixed in the fuel system.  
3. Clogged fuel filter.  
4. Irregular and faulty fuel supply (Injector pump trouble).  
5. Glow plug not heated.  
6. Clogged air cleaner.  
7. No compression.  
8. Engine protection light is ON. | If all recommended possible areas of misadjustment have been checked and the problem persists, Contact your local Lincoln Authorized Field Service Facility. |
| Engine does not turn over. | 1. Faulty Ignition switch and or Injector pump solenoid.  
2. Insufficient charging or complete discharge of the battery.  
3. Improper viscosity of the lubricating oil. | |
| Irregular running of the engine. | 1. Air mixed in the fuel system.  
2. Uneven fuel injection (Faulty fuel injector pump).  
3. Clogged fuel filter.  
4. Defective governor.  
5. Engine itself defective. | |
| Engine stops during operation and the Engine Protection light **does not** turn on. | 1. Lack of fuel in the fuel tank.  
2. Clogged fuel filter.  
3. Air mixed in the fuel system.  
4. Faulty function of the engine. | |

### CAUTION

If for any reason you do not understand the test procedures or are unable to perform the tests/repairs safely, contact your Local Lincoln Authorized Field Service Facility for technical troubleshooting assistance before you proceed.
<table>
<thead>
<tr>
<th>PROBLEMS (SYMPTOMS)</th>
<th>POSSIBLE CAUSE</th>
<th>RECOMMENDED COURSE OF ACTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Engine stops during operation and the Engine Protection light <strong>does</strong> turn on.</td>
<td>1. Overheat of the Engine.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Lack of Coolant Supply coolant. Inspect leakage and correct.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Loose or slipping fan belt Remove oil, dust, etc. and tighten.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Damaged fan belt. Replace.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Clogged radiator Flush the radiator.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Clogged radiator fin. Clean.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Dust or scale clogged in the cooling water passage. Flush the system.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Faulty function of the thermostat. Inspect or replace thermostat.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Lack of lubricating oil. Add oil.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Overloading Decrease the load.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Faulty Idler/Engine Protection Printed Circuit Board. Replace.</td>
<td></td>
</tr>
<tr>
<td>2. Loss of Engine Oil Pressure.</td>
<td>Lack of engine oil Supply oil up to the specified level.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Fault in the Oil Pressure Switch Replace the switch.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Oil leakage from the lubricating system Inspect and retighten.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Clogged oil filter Replace with new one.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Oil too light Drain and refill with proper grade.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Faulty Idler/Engine Protection P.C. Board. Replace.</td>
<td></td>
</tr>
</tbody>
</table>

**CAUTION**

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

**PROBLEMS (SYMPTOMS)** | **POSSIBLE CAUSE** | **RECOMMENDED COURSE OF ACTION**
--- | --- | ---
White or Blue Smoke. | 1. Excess engine oil.  
2. Too low viscosity of the engine oil.  
3. Faulty injection timing. | If all recommended possible areas of misadjustment have been checked and the problem persists, **Contact your local Lincoln Authorized Field Service Facility.**

| Dark Grey Smoke. | 1. Unsuitable fuel.  
2. Excess injection.  
3. Faulty function of the engine.  
4. Overloading.  
5. Clogged air cleaner. |  |

| Faulty Charging. | 1. Loose fan belt.  
2. Faulty wiring.  
3. Faulty battery.  
4. Worn out alternator brush. |  |

| Starter Motor does not run. | 1. Loose or damaged wiring.  
2. Drained voltage from battery.  
3. Damaged starter motor (including solenoid). |  |

| Engine Protection Light not coming on. | 1. Broken Light Bulb.  
2. Faulty light wiring.  
3. Faulty Engine Control Unit. |  |

| No Auxiliary Power | 1. Open circuit breakers.  
Reset breakers.  
2. GFCI may have tripped.  
Follow “GFCI Testing and Resetting Procedure” in the Maintenance Section of this Manual.  
3. Faulty connections to auxiliary receptacles.  
Check connections |  |
NOTE: This diagram is for reference only. It may not be accurate for all machines covered by this manual. The specific diagram for a particular code is pasted inside the machine on one of the enclosure panels. If the diagram is illegible, write to the Service Department for a replacement. Give the equipment code number.
NOTES:
N.A. CENTER OF GRAVITY WITH OIL AND WATER IN ENGINE, BUT NO FUEL.
N.B. Ø.56 TRAILER MOUNTING HOLES.
**WARNING**  
- Do not touch electrically live parts or electrode with skin or wet clothing.  
- Insulate yourself from work and ground.  
- Keep flammable materials away.  
- Wear eye, ear and body protection.

**AVISO DE PRECAUCION**  
- No toque las partes o los electrodos bajo carga con la piel o ropa mojada.  
- Aíslese del trabajo y de la tierra.  
- Mantenga el material combustible fuera del área de trabajo.  
- Protejase los ojos, los oídos y el cuerpo.

**ATTENTION**  
- Ne laissez ni la peau ni des vêtements mouillés entrer en contact avec des pièces sous tension.  
- Isolez-vous du travail et de la terre.  
- Gardez à l’écart de tout matériel inflammable.  
- Protégez vos yeux, vos oreilles et votre corps.

**WARNUNG**  
- Berühren Sie keine stromführenden Teile oder Elektroden mit Ihrem Körper oder feuchter Kleidung!  
- Isolieren Sie sich von den Elektroden und dem Erdboden!  
- Entfernen Sie brennbares Material!  
- Tragen Sie Augen-, Ohren- und Körperschutz!

**ATENÇÃO**  
- Não toque partes elétricas e electrodes com a pele ou roupa molhada.  
- Isole-se da peça e terra.  
- Mantenha inflamáveis bem guardados.  
- Use proteção para a vista, ouvido e corpo.

**注意事項**  
- 通電中の電気部品、又は溶材に手や身体を触れることを絶対にしないこと。  
- 施工作業やアースから身体が絶縁されているようにしてください。  
- 燃えやすいものの側での溶接作業は絶対にしてはなりません。  
- 目、耳及び身体に保護具をして下さい。

**警告**  
- 皮肤或湿衣物切勿接触带电部件及调节。  
- 使你自己与地面和工件绝缘。  
- 把一切易燃物品移离工作场。  
- 佩戴眼、耳及身体劳动保护用具。

**주의**  
- 전도체나 용접부에 접촉된 점착 또는 피부로 접지 점착치 마십시오.  
- 보호와 점착치 점착치 마십시오.  
- 스무디 점착치 접촉 마십시오.  
- 눈, 귀와 몸에 보호장구를 착용하십시오.

**주의**  
- كنيسة  
- قم بمنع أدوات وملايس واقفة على عينك وذويك.  
- جمسك.  
- قم بإزالة أي المواد القابلة للاشتعال في مكان بعيد.
<table>
<thead>
<tr>
<th>WARNING</th>
</tr>
</thead>
<tbody>
<tr>
<td>● Keep your head out of fumes.</td>
</tr>
<tr>
<td>● Turn power off before servicing.</td>
</tr>
<tr>
<td>● Do not operate with panel open or guards off.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>AVISO DE PRECAUCION</th>
</tr>
</thead>
<tbody>
<tr>
<td>● Los humos fuera de la zona de respiración.</td>
</tr>
<tr>
<td>● Mantenga la cabeza fuera de los humos. Utilice ventilación o aspiración para gases.</td>
</tr>
<tr>
<td>● No operar con panel abierto o guardas quitadas.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>ATTENTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>● Gardez la tête à l’écart des fumées.</td>
</tr>
<tr>
<td>● Utilisez un ventilateur ou un aspirateur pour ôter les fumées des zones de travail.</td>
</tr>
<tr>
<td>● N’opérez pas avec les panneaux ouverts ou avec les dispositifs de protection enlevés.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>WARNUNG</th>
</tr>
</thead>
<tbody>
<tr>
<td>● Vermeiden Sie das Einatmen von Schweibrauch!</td>
</tr>
<tr>
<td>● Sorgen Sie für gute Be- und Entlüftung des Arbeitsplatzes!</td>
</tr>
<tr>
<td>● Strom vor Wartungsarbeiten abschalten! (Netzstrom völlig öffnen; Maschine anhalten!)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>ATENÇÃO</th>
</tr>
</thead>
<tbody>
<tr>
<td>● Mantenha seu rosto da fumaça.</td>
</tr>
<tr>
<td>● Use ventilação e exhaustão para remover fumo da zona respiratória.</td>
</tr>
<tr>
<td>● Não opere com as tampas removidas.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>注意事項</th>
</tr>
</thead>
<tbody>
<tr>
<td>● ヒュームから頭を離すようにして下さい。</td>
</tr>
<tr>
<td>● 難気や絞燃に十分留意して下さい。</td>
</tr>
<tr>
<td>● メンテナンス・サービスに取りかかる際には、まず電源スイッチを必ず切って下さい。</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>WARMUNG</th>
</tr>
</thead>
<tbody>
<tr>
<td>● 頭部逃離燃焼。</td>
</tr>
<tr>
<td>● 在呼吸區使用通風戒排風器除燃。</td>
</tr>
<tr>
<td>● 抽放前切断電源。</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>日本語</th>
</tr>
</thead>
<tbody>
<tr>
<td>● 難気から頭を離して下さい。</td>
</tr>
<tr>
<td>● 難気や絞燃に十分留意して下さい。</td>
</tr>
<tr>
<td>● メンテナンス・サービスに取りかかる際には、まず電源スイッチを必ず切って下さい。</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>在韓語</th>
</tr>
</thead>
<tbody>
<tr>
<td>● 엽고로부터 화기가올리라하시오。</td>
</tr>
<tr>
<td>● 호흡치역으로부터 화기가올리라 제거하기위하여 가스제거기나 통풍기를 사용하십시오。</td>
</tr>
<tr>
<td>● 안전히 열린 상태로 작동하게 마십시오。</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>警告</th>
</tr>
</thead>
<tbody>
<tr>
<td>● 保持機械或溶材的メーカーの指示書をよく読み、まず理解して下さい。そして貴社の安全規定に従って下さい。</td>
</tr>
<tr>
<td>● 請詳細閱讀並理解製造商提供的說明以及應該使用的防護材料，並請遵守貴方的有關勞動保護規定。</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>위험</th>
</tr>
</thead>
<tbody>
<tr>
<td>● 이 제품에 동봉된 작업지침서를 숙지하시고 귀사의 작업자 안전수칙을 준수하시기 바랍니다。</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>تحذير</th>
</tr>
</thead>
<tbody>
<tr>
<td>● اقرأ وفهم تعليمات المصنع المنتج لهذه المواد والمواد قبل استخدامها واتباع تعليمات الوقاية لصاحب العمل。</td>
</tr>
</tbody>
</table>
Need Help?

Lincoln Electric “Rapid Response” Service!

Call 1.888.935.3877 to talk to a Service Representative

Hours of Operation: 8:00A.M. to 6:00P.M. (ET) Mon. thru Fri.

After hours? Use “Ask the Experts” at lincolnelectric.com

A Lincoln Service Representative will contact you by the next business day.

• For Non-U.S. Service: Email globalservice@lincolnelectric.com