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.

Date of Purchase:____________
Serial Number:____________
Code Number:____________
Model:____________
Where Purchased:__________

**OPERATOR’S MANUAL**
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 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 not yet 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.

Mar '95
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 isolate 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 when 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 below Threshold Limit Values (TLV) 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. 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.c. 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.d. 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.e. Also see item 1.b.

Mar ‘95
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.

Mar ’95
**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 À 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 soudier 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 soudier 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 soudier 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 soudier comme une source de courant pour soudage semi-automatique, ces precautions 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 ou on recuit 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 chaines 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 chasis 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.
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!

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.

Model Name & Number _____________________________________

Code & Serial Number _____________________________________

Date of Purchase _________________________________________

Whenever you request replacement parts for or information on this equipment always supply the information you have recorded above.

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 OF CONTENTS

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Installation</td>
<td>Section A</td>
</tr>
<tr>
<td>Technical Specifications</td>
<td>A-1, A-2</td>
</tr>
<tr>
<td>Installation Instructions</td>
<td>A-3</td>
</tr>
<tr>
<td>Safety Precautions</td>
<td>A-3</td>
</tr>
<tr>
<td>Machine Grounding</td>
<td>A-3</td>
</tr>
<tr>
<td>Spark Arrester</td>
<td>A-3</td>
</tr>
<tr>
<td>Trailers</td>
<td>A-3</td>
</tr>
<tr>
<td>Pre-Operation Engine Service</td>
<td>A-4</td>
</tr>
<tr>
<td>Oil</td>
<td>A-4</td>
</tr>
<tr>
<td>Fuel</td>
<td>A-4</td>
</tr>
<tr>
<td>Battery Connections</td>
<td>A-4</td>
</tr>
<tr>
<td>Welding Cable Connections</td>
<td>A-4</td>
</tr>
<tr>
<td>Angle of Operation</td>
<td>A-5</td>
</tr>
<tr>
<td>High Altitude Operation</td>
<td>A-5</td>
</tr>
<tr>
<td>Location and Ventilation</td>
<td>A-5</td>
</tr>
<tr>
<td>Welding Cable Connections</td>
<td>A-5</td>
</tr>
<tr>
<td>Connection of Wire Feeders</td>
<td>A-5</td>
</tr>
<tr>
<td>Connection of Tig Module</td>
<td>A-6</td>
</tr>
<tr>
<td>Additional Safety Precautions</td>
<td>A-6</td>
</tr>
<tr>
<td>Auxiliary Power Receptacles, and Plugs</td>
<td>A-6, A-7</td>
</tr>
<tr>
<td>Motor Starting</td>
<td>A-7</td>
</tr>
<tr>
<td>Electrical Device Used with the Ranger 8</td>
<td>A-8</td>
</tr>
<tr>
<td>Auxiliary Power While Welding</td>
<td>A-9</td>
</tr>
<tr>
<td>Premises Wiring</td>
<td>A-10</td>
</tr>
<tr>
<td>Premises Wiring</td>
<td>Section A</td>
</tr>
<tr>
<td>Electrical Device Used with the Ranger 8</td>
<td>A-8</td>
</tr>
<tr>
<td>Auxiliary Power While Welding</td>
<td>A-9</td>
</tr>
<tr>
<td>Summary of Welding Processes</td>
<td>B-5</td>
</tr>
<tr>
<td>DC Wire Feed Welding Processes(CV)</td>
<td>B-4</td>
</tr>
<tr>
<td>TIG (Constant Current) Welding</td>
<td>B-4</td>
</tr>
<tr>
<td>Stick (Constant Current) Welding</td>
<td>B-4</td>
</tr>
<tr>
<td>Break-In Period</td>
<td>B-3</td>
</tr>
<tr>
<td>Starting the Engine</td>
<td>B-3</td>
</tr>
<tr>
<td>Safety Precautions</td>
<td>B-3</td>
</tr>
<tr>
<td>Stopping the Engine</td>
<td>B-3</td>
</tr>
<tr>
<td>Welder / Generator Controls</td>
<td>B-2, B-3</td>
</tr>
<tr>
<td>Welding Process</td>
<td>B-4</td>
</tr>
<tr>
<td>Engine Operation</td>
<td>B-3</td>
</tr>
<tr>
<td>Other Features</td>
<td>B-1</td>
</tr>
<tr>
<td>Design Features</td>
<td>B-1</td>
</tr>
<tr>
<td>Engine Options</td>
<td>B-1</td>
</tr>
<tr>
<td>Fuel Consumption</td>
<td>B-2</td>
</tr>
<tr>
<td>Controls and Settings</td>
<td>B-2</td>
</tr>
<tr>
<td>Controls and Settings</td>
<td>B-2</td>
</tr>
<tr>
<td>Controls and Settings</td>
<td>B-2</td>
</tr>
<tr>
<td>Welder / Generator Controls</td>
<td>B-2, B-3</td>
</tr>
<tr>
<td>Welding Process</td>
<td>B-4</td>
</tr>
<tr>
<td>Engine Operation</td>
<td>B-3</td>
</tr>
<tr>
<td>Starting the Engine</td>
<td>B-3</td>
</tr>
<tr>
<td>Safety Precautions</td>
<td>B-3</td>
</tr>
<tr>
<td>Stopping the Engine</td>
<td>B-3</td>
</tr>
<tr>
<td>Break-In Period</td>
<td>B-3</td>
</tr>
<tr>
<td>Welding Process</td>
<td>B-4</td>
</tr>
<tr>
<td>Stick (Constant Current) Welding</td>
<td>B-4</td>
</tr>
<tr>
<td>TIG (Constant Current) Welding</td>
<td>B-4</td>
</tr>
<tr>
<td>DC Wire Feed Welding Processes(CV)</td>
<td>B-4</td>
</tr>
<tr>
<td>Summary of Welding Processes</td>
<td>B-5</td>
</tr>
<tr>
<td>Accessories</td>
<td>Section C</td>
</tr>
<tr>
<td>General Options / Accessories</td>
<td>C-1</td>
</tr>
<tr>
<td>Recommended Equipment/ Accessories</td>
<td>C-2</td>
</tr>
<tr>
<td>Maintenance</td>
<td>Section D</td>
</tr>
<tr>
<td>Safety Precautions</td>
<td>D-1</td>
</tr>
<tr>
<td>Routine Engine Maintenance</td>
<td>D-1</td>
</tr>
<tr>
<td>Engine Adjustments</td>
<td>D-2</td>
</tr>
<tr>
<td>Slip Rings</td>
<td>D-2</td>
</tr>
<tr>
<td>Battery Maintenance</td>
<td>D-2</td>
</tr>
<tr>
<td>Engine Maintenance Parts</td>
<td>D-2</td>
</tr>
<tr>
<td>Troubleshooting</td>
<td>Section E</td>
</tr>
<tr>
<td>Safety Precautions</td>
<td>E-1</td>
</tr>
<tr>
<td>How to Use Troubleshooting Guide</td>
<td>E-1</td>
</tr>
<tr>
<td>Troubleshooting Guide</td>
<td>E-2, E-3</td>
</tr>
<tr>
<td>Wiring Diagrams &amp; Dimension Print</td>
<td>Section F</td>
</tr>
<tr>
<td>Parts List</td>
<td>P229</td>
</tr>
</tbody>
</table>
### TECHNICAL SPECIFICATIONS - Ranger 8 (K1418-1) (K1418-2 CSA MEETS CANADIAN STD.)
(K1419-1) (K1419-2 CSA MEETS CANADIAN STD.)
(K2160-1 CSA MEETS CANADIAN STD.)

## INSTALLATION

- **Make/Model**: Onan P216 (K1418-1) (K1418-2)
  - **Description**: 2 cylinder 4 Cycle Air-Cooled Gasoline Engine.
  - **Horsepower**: 16 HP @ 3600 RPM (Onan)
  - **Speed (RPM)**: High Idle 3700
  - **Displacement cu. in. (cu. cm.)**: 43(710)-Onan
  - **Weights**: Fuel: 9 Gal (34 L) Lubricating Oil: 1.8 Qts (1.7 L)

- **Make/Model**: Kohler CH20 (K1419-1) (K1419-2)
  - **Description**: 2 cylinder 4 Cycle Air-Cooled Gasoline Engine. Aluminum Alloy with Cast Iron Liners, Electrical Ignition
  - **Horsepower**: 20 HP @ 3600 RPM (Kohler)
  - **Speed (RPM)**: Full Load 3500
  - **Displacement cu. in. (cu. cm.)**: 38(624)-Kohler
  - **Weights**: Fuel: 9 Gal (34 L) Lubricating Oil: 2.0 Qts (1.9 L)

- **Make/Model**: Honda GX620 (K2160-1)
  - **Description**: 2 cylinder 4 Cycle Air-Cooled Gasoline Engine.
  - **Horsepower**: 20 HP @ 3600 RPM (Honda)
  - **Speed (RPM)**: Low Idle 2200
  - **Displacement cu. in. (cu. cm.)**: 37.5(614)-Honda
  - **Weights**: Fuel: 9 Gal (34 L) Lubricating Oil: 1.9 Qts (1.8 L)

## INPUT - GASOLINE ENGINE

<table>
<thead>
<tr>
<th>Make/Model</th>
<th>Description</th>
<th>Horsepower</th>
<th>Speed (RPM)</th>
<th>Displacement cu. in. (cu. cm.)</th>
<th>Capacities</th>
</tr>
</thead>
<tbody>
<tr>
<td>Onan P216</td>
<td>2 cylinder 4 Cycle Air-Cooled Gasoline Engine</td>
<td>16 HP @ 3600 RPM (Onan)</td>
<td>High Idle 3700</td>
<td>43(710)-Onan</td>
<td>Fuel: 9 Gal (34 L) Lubricating Oil: 1.8 Qts (1.7 L)</td>
</tr>
<tr>
<td>Kohler CH20</td>
<td>2 cylinder 4 Cycle Air-Cooled Gasoline Engine</td>
<td>20 HP @ 3600 RPM (Kohler)</td>
<td>Full Load 3500</td>
<td>38(624)-Kohler</td>
<td>Fuel: 9 Gal (34 L) Lubricating Oil: 2.0 Qts (1.9 L)</td>
</tr>
<tr>
<td>Honda GX620</td>
<td>2 cylinder 4 Cycle Air-Cooled Gasoline Engine</td>
<td>20 HP @ 3600 RPM (Honda)</td>
<td>Low Idle 2200</td>
<td>37.5(614)-Honda</td>
<td>Fuel: 9 Gal (34 L) Lubricating Oil: 1.9 Qts (1.8 L)</td>
</tr>
</tbody>
</table>

## RATED OUTPUT - WELDER

<table>
<thead>
<tr>
<th>Welding Output *</th>
<th>AC Constant Current</th>
<th>DC Constant Current</th>
<th>DC Constant Voltage</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>225A / 25V / 100%</strong></td>
<td>210A / 25V / 100%</td>
<td>200A / 20V / 100%</td>
<td></td>
</tr>
</tbody>
</table>

## OUTPUT - GENERATOR

<table>
<thead>
<tr>
<th>Auxiliary Power</th>
<th>8,000 Watts, 60 Hz AC</th>
</tr>
</thead>
<tbody>
<tr>
<td>70 Amps @ 115V</td>
<td>35 Amps @ 230V</td>
</tr>
</tbody>
</table>

## PHYSICAL DIMENSIONS

<table>
<thead>
<tr>
<th>HEIGHT</th>
<th>WIDTH</th>
<th>DEPTH</th>
<th>WEIGHT</th>
</tr>
</thead>
<tbody>
<tr>
<td>30.3 in.</td>
<td>19.2 in.</td>
<td>42.3 in.</td>
<td>529 lbs. (240kg.) K1418-1,-2</td>
</tr>
<tr>
<td>770 mm</td>
<td>488 mm</td>
<td>1074 mm</td>
<td>511 lbs. (232kg.) K1419-1,-2 &amp; K2160-1</td>
</tr>
</tbody>
</table>

* Based on a 10 min. period.
INSTALLATION INSTRUCTIONS

Safety Precautions

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

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

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

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

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

Machine Grounding

Because this portable engine driven welder or generator creates 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:

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

When this welder is mounted on a truck or trailer, it’s frame must be securely connected to the metal frame of the vehicle.

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

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.

Spark Arrester

Some federal, state, or local laws may require that gasoline engines be equipped with exhaust spark arresters when they are operated in certain locations where unarrested sparks may present a fire hazard. The standard muffler included with this welder does not qualify as a spark arrester. When required by local regulations, the K894-1 spark arrester must be installed and properly maintained.

**CAUTION**

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

Trailers

The recommended trailer for use with this equipment for in plant and yard towing by a vehicle is Lincoln’s K768-2. Consult applicable federal, state, and local laws regarding specific requirements for use on public highways.

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.

Pre-Operation Service

**CAUTION**

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

**WARNING**

GASOLINE fuel can cause fire or explosion.

- Stop engine while fueling.
- Do not smoke when fueling.
- Do not overfill tank.
- Keep sparks and flame away from tank.
- Wipe up spilled fuel and allow fumes to clear before starting engine.

Oil

The Ranger 8 is shipped with the engine crankcase filled with SAE 10W-30 oil. Check the oil level before starting the engine. If it is not up to the full mark on the dip stick, add oil as required. Make certain that the oil filler cap is tightened securely. Refer to the engine Owner’s Manual for specific oil recommendations.

**LUBRICATION SYSTEM CAPACITY**

(INCLUDING FILTER)

Onan P218 - 1.8 Quarts (1.7 Liters)
Kohler CH20S - 2.0 Quarts (1.9 Liters)
Honda GX620-1.9 Quarts (1.6 Liters)

Battery Connections

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

Welding Output Cables

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

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

<table>
<thead>
<tr>
<th>TOTAL COMBINED LENGTH OF ELECTRODE AND WORK CABLES</th>
<th>225 Amps 40% Duty Cycle</th>
<th>225 Amps 100% Duty Cycle</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-50 Ft.</td>
<td>3 AWG</td>
<td>1 AWG</td>
</tr>
<tr>
<td>50-100 Ft.</td>
<td>3 AWG</td>
<td>1 AWG</td>
</tr>
<tr>
<td>100-150 Ft.</td>
<td>2 AWG</td>
<td>1 AWG</td>
</tr>
<tr>
<td>150-200 Ft.</td>
<td>1 AWG</td>
<td>1 AWG</td>
</tr>
<tr>
<td>200-250 Ft.</td>
<td>1/0 AWG</td>
<td>1/0 AWG</td>
</tr>
</tbody>
</table>

Fuel

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

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

When operating at an angle, the effective fuel capacity will be slightly less than the specified 10 gallons.

High Altitude Operation

If the Ranger 8 will be consistently operated at altitudes above 5000 ft, a carburetor jet designed for high altitudes should be installed. This will result in better fuel economy, cleaner exhaust, and longer spark plug life. It will not give increased power which is decreased at higher altitudes. Engine horsepower is reduced by 3.5% per 1000 feet for altitudes above 377 feet.

Contact your local Onan, Kohler or Honda Authorized Dealer for high altitude jet kits that are available from the engine manufacturer.

Location / Ventilation

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

WARNING

• Damage to the fuel tank may cause fire or explosion. Do not drill holes in the Ranger 8 base or weld to the Ranger 8 base.

Connection of Lincoln Electric Wire Feeders

Shut off welder before making any electrical connections.

Wire Feed (Constant voltage)

Connection of the LN-25 to the Ranger 8

1. Shut the welder off.
2. Connect the electrode cable from the LN-25 to the “ELECTRODE” terminal of the welder. Connect the work cable to the “TO WORK” terminal of the welder.
3. Position the welder “Polarity” switch to the desired polarity, either DC (-) or DC (+).
4. Position the “RANGE” switch to the “WIRE FEED” position.
5. Attach the single lead from the LN-25 control box to the work using the spring clip on the end of the lead - it carries no welding current.
6. Place the idler switch in the “AUTO” position.
7. Adjust wire feed speed at the LN-25 and adjust the welding voltage with the output “CONTROL” at the welder.

NOTE: The welding electrode is energized at all times, unless an LN-25 with built-in contactor is used. If the output “CONTROL” is set below “3”, the LN-25 contactor may not pull in.

Muffler Relocation Shut off welder and allow muffler to cool before touching muffler.

The Ranger 8 is shipped with the exhaust coming out on the left side. The exhaust can be changed to the opposite side by removing the two screws that hold the exhaust port cover in place and installing the cover on the opposite side. (Operating the Ranger 8 without the cover in place will result in a higher noise level and no increase in machine output.)
Connection of the LN-7 to the Ranger 8

- Shut the welder off.
- Connect the LN-7 and the K240 contactor kit per instructions on the connection diagram S17742 (can be found in the back of this manual).
- Place the “RANGE” switch to the “WIRE FEED” position and the “POLARITY” switch to the desired polarity.
- Place the “IDLER” switch in the “HIGH” idle position. The engine idling device may not function when welding in the “WIRE FEED” mode.
- Adjust wire feed speed at the LN-7 and adjust the welding voltage with the output “CONTROL” at the welder.

**NOTE:** If the output “CONTROL” is set below “3” the K240 contactor may not pull in.

Connection of K930-[ ] TIG Module to the Ranger 8.

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

**Note:** The TIG Module does not require the use of a high frequency bypass capacitor. However, if the Ranger 8 is used with any other high frequency equipment, the bypass capacitor must be installed - order kit T12246.

**INSTRUCTIONS**

**Additional Safety Precautions**

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

Read and understand all Safety Precautions before operating this machine. Always follow these and any other safety procedures included in this manual and in the Engine Owner’s Manual.

**Welder Operation**

**Welder Output**

- Maximum Open Circuit Voltage at 3700 RPM is 80 Volts RMS.
- Duty Cycle: 100% for both welding and auxiliary power.

<table>
<thead>
<tr>
<th>Ranger 8</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Constant Current</strong></td>
</tr>
<tr>
<td>225 Amps AC @ 25 Volts</td>
</tr>
<tr>
<td>210 Amps DC @ 25 Volts</td>
</tr>
<tr>
<td><strong>Constant Voltage</strong></td>
</tr>
<tr>
<td>200 Amps DC @ 20 Volts</td>
</tr>
</tbody>
</table>

**Auxiliary Power**

The Ranger 8 can provide up to 8,000 watts of 115/230 volts AC, single phase 60Hz power for continuous use. The front of the machine includes three receptacles for connecting the AC power plugs; one 50 amp 115/230 volt NEMA 14-50R receptacle and two 20 amp 115 volt NEMA 5-20R receptacles. The CSA machine has one 50 amp 115/230 volt NEMA 14-50R receptacle and two 15 amp 115 volt NEMA 5-15R receptacles.

**CAUTION**

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

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

**115/230 Volt Dual Voltage Receptacle**

The 115/230 volt receptacle can supply up to 35 amps of 230 volt power to a two wire circuit, up to 35 amps of 115 volts power from each side of a three wire circuit (up to 70 amps total). Do not connect the 115 volt circuits in parallel. Current sensing for the automatic idle feature is only in one leg of the three wire circuit as shown in the following column.
115 V Duplex Receptacles

The 115V auxiliary power receptacles should only be used with three wire grounded type plugs or approved double insulated tools with two wire plugs.

The current rating of any plug used with the system must be at least equal to the current load through the associated receptacle (Refer to Tables I and II). Do not attempt to connect power receptacles in parallel.

**Motor Starting**

Most 1.5 hp AC single phase motors can be started if there is no load on the motor or other load connected to the machine, since the full load current rating of a 1.5 hp motor is approximately 20 amperes (10 amperes for 230 volt motors). The motor may be run at full load when plugged into only one side of the duplex receptacle. Larger motors through 2 hp can be run provided the receptacle rating as previously stated is not exceeded. This may necessitate 230V operation only.

<table>
<thead>
<tr>
<th>Load From 115V/230V</th>
<th>K1418-1 and K1419-1</th>
<th>K1418-2, K1419-2 and K2160-1 CSA Machines</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>20*</td>
<td>15</td>
</tr>
<tr>
<td>1.1 kW</td>
<td>20*</td>
<td>15</td>
</tr>
<tr>
<td>3.4 kW</td>
<td>20*</td>
<td>15</td>
</tr>
<tr>
<td>5.7 kW</td>
<td>20*</td>
<td>15</td>
</tr>
<tr>
<td>8.0 KW</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

**NEMA 5-20P Plug required for 20Amp Draw**

**TABLE II Maximum Current Draw from 115V GFCI Duplex Receptacles - No Welding**

<table>
<thead>
<tr>
<th>Load From 115V/230V</th>
<th>K1418-1 and K1419-1</th>
<th>K1418-2, K1419-2 and K2160-1 CSA Machines</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>15</td>
<td>15</td>
</tr>
<tr>
<td>1.1 kW</td>
<td>15</td>
<td>15</td>
</tr>
<tr>
<td>3.4 kW</td>
<td>15</td>
<td>15</td>
</tr>
<tr>
<td>5.7 kW</td>
<td>15</td>
<td>15</td>
</tr>
<tr>
<td>8.0 KW</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

*Maximum current draw from each 115V GFCI Duplex is 20 amps
*Maximum current draw from each 115V GFCI Duplex is 15 amps
### TABLE III

**ELECTRICAL DEVICE USE WITH THE RANGER 8.**

<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 capacitive elements to fail. Some devices may require surge protection, transient protection, and additional loading is recommended for 100% fail-safe operation. <strong>DO NOT RUN THESE DEVICES WITHOUT ADDITIONAL RESISTIVE TYPE LOADS.</strong></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. <strong>DO NOT USE THESE DEVICES WITH A RANGER 8</strong></td>
</tr>
</tbody>
</table>

The Lincoln Electric Company is not responsible for any damage to electrical components improperly connected to the RANGER 8.
Standby Power Connections

The Ranger 8 is suitable for temporary, standby, or emergency power using the engine manufacturer's recommended maintenance schedule.

The Ranger 8 can be permanently installed as a standby power unit for 230V-3 wire, single phase 35 ampere service. (Connections must be made by a licensed electrician who can determine how the 115/230V power can be adapted to the particular installation and comply with all applicable electrical codes.) The following information can be used as a guide by the electrician for most applications (refer also to the connection diagram shown in Figure 1.)

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

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

2. Take necessary steps to assure load is limited to the capacity of the Ranger 8 by installing a 35 amp 230V double pole circuit breaker. Maximum rated load for the 230V auxiliary is 35 amperes. Loading above 35 amperes will reduce output voltage below the allowable -10% of rated voltage which may damage appliances or other motor-driven equipment.

3. Install a 50 amp 115/230V plug (NEMA type 14-50) to the Double Pole Circuit Breaker using No. 8, 4 conductor cable of the desired length. (The 50 amp 115/230V plug is available in the optional plug kit.)

4. Plug this cable into the 50 amp 115/230V receptacle on the Ranger 8 case front.

### TABLE III

<table>
<thead>
<tr>
<th>Output Selector Setting</th>
<th>Permissible Power Watts (Unity Power Factor)</th>
<th>Permissible Auxiliary Current in Amperes @ 115V -or- @ 230V</th>
</tr>
</thead>
<tbody>
<tr>
<td>Max. Stick or Wire Feed Setting</td>
<td>None</td>
<td>0 - 0</td>
</tr>
<tr>
<td>175 Stick Setting</td>
<td>2100</td>
<td>18 - 9</td>
</tr>
<tr>
<td>125 Stick Setting</td>
<td>3800</td>
<td>32 - 16</td>
</tr>
<tr>
<td>90 Stick Setting</td>
<td>5000</td>
<td>42 - 21</td>
</tr>
<tr>
<td>70 Stick Setting</td>
<td>5600</td>
<td>48 - 24</td>
</tr>
<tr>
<td>50 Stick Setting</td>
<td>6300</td>
<td>54 - 27</td>
</tr>
<tr>
<td>NO WELDING</td>
<td>8000</td>
<td>70 - 35</td>
</tr>
</tbody>
</table>

Auxilliary Power While Welding

It must be noted that the above auxiliary power ratings are with no welding load. Simultaneous welding and power loads are permitted by following Table III. The permissible currents shown assume that current is being drawn from either the 115V or 230V supply (not both at the same time). Also, the “Output Control” is set at “10” for maximum auxiliary power.

WARNING

**Auxilliary Power While Welding**

It must be noted that the above auxiliary power ratings are with no welding load. Simultaneous welding and power loads are permitted by following Table III. The permissible currents shown assume that current is being drawn from either the 115V or 230V supply (not both at the same time). Also, the “Output Control” is set at “10” for maximum auxiliary power.
Connection of Ranger 8 to premises wiring must be done by a licensed electrician and must comply with the National Electrical Code and all other applicable electrical codes.
GENERAL DESCRIPTION
The Ranger™ 8 is a twin-cylinder, gasoline driven, multiprocess arc welder and AC power generator. It is built in a heavy gauge steel case for durability on the job site.

DESIGN FEATURES

AC/DC STICK WELDING (Constant Current)
- AC 40 - 225 Amps
- DC 40 - 210 Amps
- 100% Duty Cycle on All Settings
- Output Selector with 6 Ranges
- Output Control for Fine Current Adjustment
- Use with a broad range of AC & DC Electrodes including Fleetweld® 5P

DC SEMIAUTOMATIC WIRE FEED WELDING (Constant Voltage)
- CV Tap Setting for 60-200 Amps.
- 100% Duty Cycle.
- Excellent Performance with .068" (1.7mm) NR®-211-MP Innershield® Electrode.
- Limited MIG Welding with L-50 & L-56 using blended Argon Shielding Gas.
- The Recommended Wire Feeder is the LN-25, but can also be used with the LN-7 Wire Feeder. (LN-7 and LN-25 without Contactor Requires the K240 Contactor Kit).

AC/DC TIG WELDING (Constant Current)
- AC & DC TIG Welding can be done at all constant current output range settings.

AUXILIARY POWER
- 8000 Watt AC 115/230 Volt 60 Hz. Generator.
- Operates AC Power Tools.
- Powers Battery Chargers.
- Powers a 1.5 HP Motor (If Started Under No Load).
- Lights Eighty 100 Watt Incandescent Bulbs.
- Can be used for Standby Power.

OTHER FEATURES
- Bottom Mounted 9 Gallon Fuel Tank with a Convenient Top Fill and Fuel Gauge.
- Polarity Switch for Selecting DC+, DC-, or AC Welding Output.
- K930-1 TIG Module Available.
- Remote Control Receptacle Kit Available.
- Electronic Engine Idler. Engine automatically goes to low idle in 10 to 14 seconds after welding or use of auxiliary power. Includes high idle switch.
- Electric Starting.
- Battery Charging Ammeter.
- Full 8 KVA Auxiliary Output Receptacle.
- Factory Installed Engine Hour Meter.
- Engine Protection Shuts Engine Down in the Event of Low Oil Pressure.
- Built-in Feet for Easy Mounting to Truck Bed or Trailer.
- All Copper Alternator Windings and High Quality Insulation for Long-Life and Dependability.
- Powder Painted Case and Base for Outstanding Corrosion Protection.
- Quiet muffler with reversible exhaust feature; either right or left side of machine.

ENGINE OPTIONS
Three engines are available for the Ranger 8 Welders; the Onan P216 Performer®, the Kohler 20 HP Command® and the Honda GX620. All three engines have the following features:
- Air Cooled, Twin-Cylinder.
- Cast Aluminum Alloy Crankcase with Integral Cast Iron Cylinder Liners.
- Electric Start with Solid State Battery Charging Module.
- Solid State Breakerless Ignition.
- Spin on Oil Filter.
- Low Oil Pressure Shutdown Protection.

In addition to the above, the Kohler Command Engine has overhead valves and hydraulic valve lifters.

* These trademarks are the property of their respective manufacturers.
Ranger 8 Approximate Fuel Consumption

<table>
<thead>
<tr>
<th></th>
<th>ONAN P216 16 H.P. PERFORMER</th>
<th>KOLHER 20 H.P. COMMAND</th>
<th>HONDA 20 H.P. G620</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low Idle - No Load 2200 RPM</td>
<td>0.4 Gallons/Hour (1.5 Liters/Hour)</td>
<td>0.4 Gallons/Hour (1.5 Liters/Hour)</td>
<td>0.3 Gallons/Hour (1.3 Liters/Hour)</td>
</tr>
<tr>
<td>High Idle - No Load 3700 RPM</td>
<td>0.9 Gallons/Hour (3.5 Liters/Hour)</td>
<td>0.9 Gallons/Hour (3.5 Liters/Hour)</td>
<td>0.7 Gallons/Hour (2.7 Liters/Hour)</td>
</tr>
<tr>
<td>AC CC Weld Output 225 Amps @ 25 Volts</td>
<td>1.5 Gallons/Hour (5.8 Liters/Hour)</td>
<td>1.3 Gallons/Hour (5.0 Liters/Hour)</td>
<td>1.6 Gallons/Hour (6.0 Liters/Hour)</td>
</tr>
<tr>
<td>DC CC Weld Output 210 Amps @ 25 Volts</td>
<td>1.7 Gallons/Hour (6.5 Liters/Hour)</td>
<td>1.4 Gallons/Hour (5.3 Liters/Hour)</td>
<td>1.7 Gallons/Hour (6.3 Liters/Hour)</td>
</tr>
<tr>
<td>DC CV Weld Output 200 Amps @ 20 Volts</td>
<td>1.4 Gallons/Hour (5.3 Liters/Hour)</td>
<td>1.2 Gallons/Hour (4.5 Liters/Hour)</td>
<td>1.2 Gallons/Hour (4.6 Liters/Hour)</td>
</tr>
<tr>
<td>Auxiliary Power 8000 Watts</td>
<td>1.7 Gallons/Hour (6.5 Liters/Hour)</td>
<td>1.4 Gallons/Hour (5.3 Liters/Hour)</td>
<td>1.5 Gallons/Hour (5.7 Liters/Hour)</td>
</tr>
</tbody>
</table>

Welder Controls - Function and Operation

**ENGINE “ON-OFF” Switch**

When placed in the “ON” position, this switch energizes the engine ignition circuit. When placed in the “OFF” position, the ignition circuit is de-energized to shut down the engine.

**ENGINE “START” Push-Button Switch**

Energizes engine starter motor.

**“Polarity” Switch**

Never change the “Polarity” switch setting while welding. This will damage the switch.

**“Range” Switch**

<table>
<thead>
<tr>
<th>Process</th>
<th>Maximum Current on Each Setting</th>
</tr>
</thead>
<tbody>
<tr>
<td>STICK/TIG - CC</td>
<td>50, 70, 90</td>
</tr>
<tr>
<td>6 Range Settings</td>
<td></td>
</tr>
<tr>
<td>125, 175, 210 DC/225 AC</td>
<td></td>
</tr>
<tr>
<td>WIRE FEED - CV</td>
<td>200</td>
</tr>
<tr>
<td>1 Range Setting</td>
<td></td>
</tr>
</tbody>
</table>


“Control” Switch

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

**“IDLER” Switch**

The idler switch has two positions, “HIGH” and “AUTO”.

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

When in “AUTO” ( / ) idle position, 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 100-150 watts or greater) from the receptacles, the engine will accelerate to high speed. If no power is being drawn from the receptacles (and not welding) for 10-14 seconds, the idler reduces the engine speed to low idle.
Starting/Shutdown Instructions
Starting the Engine

**WARNING**

- Do not touch electrically live parts of electrode with skin or wet clothing.
- Keep flammable material away.
- Insulate yourself from work and ground. Wear eye, ear, and body protection.
- Keep your head out of the fumes.
- Use ventilation or exhaust to remove fumes from breathing zone.

Be sure all Pre-Operation Maintenance has been performed. Also, read the Engine Owner’s Manual.

Remove all loads connected to the AC power receptacles. To start the engine, set the “Idler Control” switch in the Automatic ( / ) position.

Use the choke control as follows:

**Onan Engine** - If the engine is cold, pull the choke control out. Do not use the choke if the engine is warm or hot.

**Kohler Engine** - **Always** pull the choke control out when starting the engine; cold, warm or hot. Place the “Engine” switch in the “ON” position.

**Honda Engine** - **Always** pull the choke control out when starting the engine; cold. Place the “Engine” switch in the “ON” position.

Push the “START” button and crank the engine until it starts. Release the button as soon as the engine starts. Do not push the “START” button while the engine is running because this will cause damage to the ring gear and/or starter motor. After the engine has started, slowly return the choke control to the full “in” position (choke open).

After running at high engine speed for 10-14 seconds, the engine will go to low idle.

Allow the engine to warm up by letting it run at low idle for a few minutes.

Stopping the Engine

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

Stop the engine by placing the “Engine” switch in the “OFF” position.

A fuel shut off valve is not required on the Ranger 8 because the fuel tank is mounted below the engine.

**Break-in Period**

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

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

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

<table>
<thead>
<tr>
<th>Engine Type</th>
<th>Running Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kohler CH20S</td>
<td>5 HRS</td>
</tr>
<tr>
<td>Onan P216</td>
<td>25 HRS</td>
</tr>
<tr>
<td>Honda GX620</td>
<td>First Month or 20 HRS</td>
</tr>
</tbody>
</table>

The oil filter is to be changed at the second oil change. Refer to the Engine Owner’s Manual for more information.

---

**WARNING**

- Do not touch electrically live parts of electrode with skin or wet clothing.
- Keep flammable material away.
- Insulate yourself from work and ground. Wear eye, ear, and body protection.
- Keep your head out of the fumes.
- Use ventilation or exhaust to remove fumes from breathing zone.
Welding Process
Stick (Constant Current) Welding

Connect welding cables to the "TO WORK" and "ELECTRODE" studs. Start the engine. Set the "Polarity" switch to the desired polarity. Set the "RANGE" switch to a setting that is equal to or slightly greater than the desired welding current. (The "RANGE" dial marking indicates the maximum current for that range). Fine adjustment of the welding current is made by adjusting the output "CONTROL" or remote control. For best arc stability, use settings 5 through 10.

The Ranger 8 can be used with a broad range of AC and DC stick electrodes. See "Welding Tips 1" included with the Ranger 8 for electrodes within the rating of this unit and recommended welding currents of each.

TIG (Constant Current) Welding

The K930-[ ] TIG Module installed on a Ranger 8 provides high frequency and shielding gas control for AC and DC GTAW (TIG) welding processes. The TIG Module allows full range output control. Afterflow time is adjustable from 0 to 55 seconds.

When using the Ranger 8 for AC TIG welding of aluminum, the following settings and electrodes are recommended:

<table>
<thead>
<tr>
<th>Diameter (in.)</th>
<th>Wire Speed</th>
<th>Approximate Current Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>.030</td>
<td>80 - 110</td>
<td>75A to 120A</td>
</tr>
<tr>
<td>.035</td>
<td>70 - 130</td>
<td>120A to 170A</td>
</tr>
<tr>
<td>.068</td>
<td>40 - 90</td>
<td>125A to 210A</td>
</tr>
</tbody>
</table>

Wire Feed Welding Processes
(Constant Voltage)

The only Innershield® electrode recommended for use with the Ranger 8 is NR®-211-MP. The electrode sizes and welding ranges that can be used with the Ranger 8 are shown in the following table:

<table>
<thead>
<tr>
<th>Diameter (in.)</th>
<th>Wire Speed</th>
<th>Approximate Current Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>.030</td>
<td>80 - 110</td>
<td>75A to 120A</td>
</tr>
<tr>
<td>.035</td>
<td>70 - 130</td>
<td>120A to 170A</td>
</tr>
</tbody>
</table>

The Ranger 8 is recommended for limited "MIG" welding (GMAW - gas metal arc welding). The recommended electrodes are .030" and .035" L-50 and L-56. They must be used with a blended shielding gas such as C25 (75% Argon - 25% CO₂). The welding ranges that can be used with the Ranger 8 are shown in the following table:

<table>
<thead>
<tr>
<th>Diameter (in.)</th>
<th>Wire Speed</th>
<th>Approximate Current Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>.030</td>
<td>80 - 110</td>
<td>75A to 120A</td>
</tr>
<tr>
<td>.035</td>
<td>70 - 130</td>
<td>120A to 170A</td>
</tr>
</tbody>
</table>

The K930-[ ] TIG Module should be used with the Ranger 8 on high idle to maintain satisfactory operation. It can be used in the AUTO position but the delay going to flow idle after welding is ceased will be increased if the AFTERFLOW CONTROL is set above 10 seconds.
## Summary of Welding Processes

<table>
<thead>
<tr>
<th>PROCESS</th>
<th>CONTROL CABLE USED</th>
<th>IDLE MODE</th>
<th>ELECTRODE WHEN NOT WELDING</th>
<th>TO START WELDING</th>
</tr>
</thead>
<tbody>
<tr>
<td>STICK</td>
<td>No</td>
<td>AUTO</td>
<td>Hot</td>
<td>Touch electrode to work. Welding starts immediately and engine goes to high idle.</td>
</tr>
<tr>
<td>TIG/K7930-1/K938-1, K936-( ) /K892-1 (WITH AMPTROL)</td>
<td>Yes</td>
<td>HIGH</td>
<td>Cold</td>
<td>Press Amptrol, contactor closes, welding starts immediately.</td>
</tr>
<tr>
<td>WIRE FEED, LN-25 WITH INTERNAL CONTACTOR</td>
<td>No</td>
<td>AUTO</td>
<td>Cold</td>
<td>Press gun trigger, LN-25 contactor closes. Welding starts immediately and engine goes to high idle. NOTE: Output Control must be set above “3”.</td>
</tr>
<tr>
<td>WIRE FEED, LN-7 WITH K240 CONTACTER KIT</td>
<td>Yes</td>
<td>HIGH</td>
<td>Cold</td>
<td>Press gun trigger, contactor closes. Welding starts immediately.</td>
</tr>
</tbody>
</table>
OPTIONAL EQUIPMENT (Field Installed)

K957-1 HEAVY DUTY, TWO WHEEL TRAILER FOR SMALL WELDERS - For road, off-road and in-plant and yard towing. (For highway use, consult applicable federal, state and local laws regarding requirements for brakes, lights, fenders, etc.). Order:

K957-1 Trailer
K958-1 Ball Hitch
K958-2 Lunette Eye Hitch
K959-2 Fender & Light Kit
K965-1 Cable Storage Rack

K889-2 & -3 Two-Wheel Undercarriage - For moving by hand. Overall Width 29 in (0.74m) Both have pneumatic tires. Puncture proof tires included with K889-3.

K1631-1 Puncture Proof Wheel Kit - For converting K889-2 to puncture proof pneumatic tires.

K893-1 Caster for Undercarriage - Mounts to the front of the K889-2 to allow easy movement on smooth surfaces. Includes 6" diameter hard rubber wheel and convenient toe-on, toe-off locking brake.

K933-1 Four Wheel Undercarriage - For Hand Moving. Rear pneumatic tires, front molded wheels.

K934-1 Cylinder Brackets - For use with K933-1. For transporting either one LPG fuel cylinder or one welding gas cylinder.

K1737-1 FOUR WHEEL ALL-TERRAIN UNDERCARRIAGE - For moving by hand at construction sites. Heavy duty puncture resistant pneumatic tires.

K1770-1 UNDERCARRIAGE (FACTORY) - For moving by hand on a smooth surface. One or two gas cylinders can be mounted on the rear of the undercarriage with the installation of K1745-1 Cylinder Holder(s). Heavy duty puncture resistant pneumatic tires and front caster.

K1745-1 SINGLE GAS CYLINDER HOLDER
For use on K1770-1 Undercarriage. One or two may be installed on an undercarriage.

K1788-1 ROLL CAGE - Gives added damage protection.

K886-1 Canvas Cover - To protect the Ranger 8 when not in use. Made from attractive red canvas material which is flame retardant, mildew resistant, and water repellent.

K802-R Power Plug Kit - Provides four 115V plugs rated at 15 amps each and one dual voltage, full KVA plug rated at 115/230V, 50 amps.

K802-N Power Plug Kit - Provides four 115V plugs rated at 20 amps each and one dual voltage, full KVA plug rated at 115/230V, 50 amps. (For K1418-2 or K1419-2 CSA machines and machines with GFCI recepcptacles, use K802-R).

K704 Accessory Kit - Includes 35 ft (10.7m) 2/0 AWG electrode cable, 30 ft. (9.1m) 2/0 AWG work cable, headshield with No. 12 filter, GC300 work clamp and Cooltong® 300 electrode holder. Cables are rated at 300 amps, 100% duty cycle.

K929-1 Remote Control Receptacle Kit - Includes a 6-pin MS-type (Amphenol) receptacle and a local-remote toggle switch that mounts in the case front. Required when using a K930-2 Tig Module with an optional Amptrol or when using a Remote Control.

K857 25 ft (7.5m) or K857-1 100 ft. (30.4m) REMOTE CONTROL - Portable control provides same dial range as the output control on the welder. Has a convenient 6 pin plug for easy connection to the welder.

K894-1 Spark Arrester Kit - Includes a heavy gauge steel, approved spark arrester and clamp for easy mounting to muffler exhaust pipe.

K896-1 GFCI Receptacle Kit - Includes two UL approved 115V ground fault circuit interrupter duplex type receptacles with covers and installation instructions. Replaces the two factory installed 115V duplex receptacles. Each receptacle of each GFCI duplex is rated at 15 amps, but the maximum total current from each GFCI duplex is limited to 20 amps.

K930-2 TIG Module - Provides high frequency and shielding gas control for AC and DC GTAW (TIG) welding applications. Its compact case is designed for easy carrying, complete with a handle. High frequency bypass is built in. The K938-1 Contactor Kit must be field installed in the TIG Module when used with a Ranger 8. 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.

K936-3 Remote Control Cable - Control cable for connecting the K930-2 TIG Module to a Ranger 8 equipped with a K892-1 Remote Kit. 9-Socket to a grounded 115 V plug and a 6 pin MS-connector. (Contains circuits 2, 4, 31, 32, 75, 76, 77 and ground)

K939-1 Docking Kit - For mounting the K930-2 TIG Module unit on top of the Ranger 8.

K1816-1 FULL KVA ADAPTER KIT - Plugs into the 120/240V NEMA 14-50R receptacle on the casefront (which accepts 4-prong plugs) and converts it to a NEMA 6-50R receptacle, (which accepts 3-prong plugs.)
RECOMMENDED EQUIPMENT

STICK

K704 Accessory Kit which includes:

- Electrode Holder & Cable
- Work Clamp & Cable
- Headshield

K892-1 Remote Control Receptacle Kit and K857 Remote Control Kit are optional for remote current control.

TIG

Magnum™ TIG Torch
Magnum Parts Kit and Argon Gas
K930-2 TIG Module (requires K938-1 Contactor Kit)
K939-3 Control Cable (see Optional Equipment)

Optional:

- K939-1 Docking Kit
- K963 Hand Amptrol®
- K870 Foot Amptrol
- K892-1 Remote Control Receptacle Kit
- K915-1 Adapter Cable

WIRE FEED

K449 LN-25 - Includes internal contactor for across the arc operation (no control cable). Provides “cold” electrode until gun trigger is pressed. Includes gas solenoid. K892-1 Remote control Receptacle Kit and K444-1 Remote voltage Control Kit are required for voltage control at the feeder.

LN7-K240 Contactor Kit is required.

Magnum Gun is required for gas-shielded welding. Innershield Gun is required for gasless welding.
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 throughout this operator’s manual and the Engine manual as well.

Read the Safety Precautions in the front of this manual and the engine instruction manual before working on this machine.

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

**Routine Maintenance**

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

**CAUTION**

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

- **OIL** - Maintenance schedule for changing the oil and oil filter after break-in:

<table>
<thead>
<tr>
<th></th>
<th>Kohler CH20S</th>
<th>Onan P216</th>
<th>Honda GX620</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oil</td>
<td>100 HRS</td>
<td>50 HRS</td>
<td>6 Months or 100 HRS</td>
</tr>
<tr>
<td>Oil Filter</td>
<td>200 HRS</td>
<td>100 HRS</td>
<td>1 Year or 200 HRS</td>
</tr>
</tbody>
</table>

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

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

- Air Cleaner - With normal operating conditions, the maintenance schedule for cleaning and re-oiling the foam pre-filter is every 25 hours and replacement of the air cleaner filter 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.

- Refer to the maintenance section of the Engine Owner’s Manual for the maintenance schedule, spark plug servicing, cooling system servicing, and fuel filter replacement.

- Blow out the machine with low pressure air periodically. In particularly dirty locations, this may be required once a week.

- Output Ranger Selector and Polarity Switches: Switch contacts should not be greased. To keep contacts clean, rotate the switch through its entire range frequently. Good practice is to turn the handle from maximum to minimum setting twice each morning before starting to weld.
Engine Adjustments

OVERSPEED IS HAZARDOUS

**WARNING**

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

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

**Slip Rings**

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

**CAUTION**

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

**Battery**

1. When replacing, jumping, or otherwise connecting the battery to the battery cables, the proper polarity must be observed. Failure to observe the proper polarity could result in damage to the charging circuit. The positive (+) battery cable has a red terminal cover.
2. If the battery requires charging from an external charger, disconnect the negative battery cable first and then the positive battery cable before attaching the charger leads. Failure to do so can result in damage to the internal charger components. When reconnecting the cables, connect the positive cable first and the negative cable last.

**Hardware**

Both English and Metric fasteners are used in this welder.

### Engine Maintenance Parts

<table>
<thead>
<tr>
<th></th>
<th>ONAN P216</th>
<th>KOHLER CH20S</th>
<th>HONDA GX620</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oil Filter</td>
<td>ONAN 122-0645</td>
<td>KOHLER 1205001</td>
<td>HONDA 15400-PR3-004</td>
</tr>
<tr>
<td></td>
<td>FRAM PH3614</td>
<td>FRAM PH3614*</td>
<td>(HONDA CODE 3179553)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>FRAM PH6811</td>
</tr>
<tr>
<td>Air Filter</td>
<td>ONAN 140-2628-01</td>
<td>KOHLER 4708303</td>
<td>HONDA 17211-ZJ1-000</td>
</tr>
<tr>
<td>Element</td>
<td>FRAM CA140PL</td>
<td>FRAM CA79</td>
<td>(HONDA CODE 4209672)</td>
</tr>
<tr>
<td>Air Filter</td>
<td>ONAN 140-1496</td>
<td>KOHLER 2408302</td>
<td>HONDA 17218-ZJ1-000</td>
</tr>
<tr>
<td>Pre-Cleaner</td>
<td></td>
<td></td>
<td>(HONDA CODE 4209706)</td>
</tr>
<tr>
<td>Fuel Filter</td>
<td>ONAN 149-2005</td>
<td>KOHLER 2505002</td>
<td>HONDA 16910-ZE8-005</td>
</tr>
<tr>
<td></td>
<td>FRAM G1</td>
<td>FRAM G1</td>
<td>(HONDA CODE 2106235)</td>
</tr>
<tr>
<td>Spark Plugs</td>
<td>ONAN 167-0263</td>
<td>CHAMPION RC12YC</td>
<td>NKG BPR6ES</td>
</tr>
<tr>
<td>(Resistor Type)</td>
<td>CHAMPION RS14YC</td>
<td>(.030” GAP)</td>
<td>W20EPR-U</td>
</tr>
<tr>
<td></td>
<td>(.025” GAP)</td>
<td></td>
<td>(.030 in., (76mm) gap)</td>
</tr>
</tbody>
</table>

* Oil capacity increases from 2.0 Qts. to 2.1 Qts. when using this filter.
**HOW TO USE TROUBLESHOOTING GUIDE**

<table>
<thead>
<tr>
<th>Step 1. LOCATE PROBLEM (SYMPTOM).</th>
</tr>
</thead>
<tbody>
<tr>
<td>Look under the column labeled “PROBLEM (SYMPTOM)”. This column describes possible symptoms that the machine may exhibit. Find the listing that best describes the symptom that the machine is exhibiting.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Step 2. POSSIBLE CAUSE.</th>
</tr>
</thead>
<tbody>
<tr>
<td>The second column labeled “POSSIBLE CAUSE” lists the obvious external possibilities that may contribute to the machine symptom.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Step 3. RECOMMENDED COURSE OF ACTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>This column provides a course of action for the Possible Cause, generally it states to contact your local Lincoln Authorized Field Service Facility. If you do not understand or are unable to perform the Recommended Course of Action safely, contact your local Lincoln Authorized Field Service Facility.</td>
</tr>
</tbody>
</table>

---

**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.

---

**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 AREAS OF MISADJUSTMENTS(S)</th>
<th>RECOMMENDED COURSE OF ACTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>No welder or output power.</td>
<td>1. Open in miscellaneous leads.</td>
<td>If all recommended possible areas of misadjustment have been checked and the problem persists, Contact your local Lincoln Authorized Field Service Facility.</td>
</tr>
<tr>
<td></td>
<td>2. Open lead in flashing or field circuit.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>3. Faulty rotor.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>4. Faulty Potentiometer (R1).</td>
<td></td>
</tr>
<tr>
<td></td>
<td>5. Faulty stator Field winding.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>6. Faulty Field rectifier (D2).</td>
<td></td>
</tr>
<tr>
<td></td>
<td>7. Faulty P.C. Board.</td>
<td></td>
</tr>
<tr>
<td>Engine will not idle down to low speed.</td>
<td>1. Idler switch on High Idle.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>2. Insufficient voltage present between terminals #213 and #5E. (Voltage should be 12V DC).</td>
<td></td>
</tr>
<tr>
<td></td>
<td>3. External load on welder or auxiliary power.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>4. Faulty wiring in solenoid circuit.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>5. Faulty idler solenoid.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>6. Faulty P.C. Board.</td>
<td></td>
</tr>
<tr>
<td>Engine will not go to high idle when attempting to weld.</td>
<td>1. Poor work lead connection to work.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>2. No voltage signal from the current sensor.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>3. No open circuit voltage on output studs.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>4. Faulty P.C. Board.</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.
<table>
<thead>
<tr>
<th>PROBLEMS (SYMPTOMS)</th>
<th>POSSIBLE AREAS OF MISADJUSTMENTS(S)</th>
<th>RECOMMENDED COURSE OF ACTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Engine will not go to high idle when using auxiliary power.</td>
<td>1. No voltage signal from the current sensor.</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>.</td>
</tr>
<tr>
<td></td>
<td>2. Auxiliary power load less than 100 to 150 watts.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>3. Faulty P.C. Board.</td>
<td></td>
</tr>
<tr>
<td>Engine will not crank or is hard to crank.</td>
<td>1. Battery will not hold a charge. Faulty Battery.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>2. No or insufficient charging current.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>3. Loose battery cable connection(s).</td>
<td></td>
</tr>
<tr>
<td>Engine shuts down.</td>
<td>1. Out of fuel.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>2. Low oil level.</td>
<td></td>
</tr>
<tr>
<td>Engine does not develop full power.</td>
<td>1. Fuel filter clogged.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>2. Air filter clogged.</td>
<td></td>
</tr>
<tr>
<td>Engine is hard to start.</td>
<td>1. Spark plugs do not have specified gap.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>2. Spark plugs are fouled.</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.
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.
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.
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.
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.
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.

RA (CSA) - WIRING DIAGRAM
K2160-1 Code 10886 RANGER 8 HONDA

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.

RA (CSA) - WIRING DIAGRAM
K2160-1 Code 10886 RANGER 8 HONDA

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.

RA (CSA) - WIRING DIAGRAM
K2160-1 Code 10886 RANGER 8 HONDA
**RANGER 8 / LN-25 ACROSS THE ARC CONNECTION DIAGRAM**

**WARNING**
- Do not operate with panels open.
- Disconnect NEGATIVE (-) BATTERY LEAD before servicing.
- Do not touch electrically live parts.
- Keep guards in place.
- Keep away from moving parts.
- Only qualified personnel should install, use or service this equipment.

**CONNECTION OF RANGER 8 TO LN-7 & K240 CONTACTOR KIT**

**CONNECTION OF LN-7 & K240 CONTACTOR KIT WITH 115 VOLT AC AUXILIARY POWER AND CV OUTPUT**

- **N.A.** WELDING CABLE MUST BE SIZED FOR CURRENT AND DUTY CYCLE OF APPLICATION.
- **N.B.** USE POLARITY SWITCH TO SET FOR DESIRED ELECTRODE POLARITY. POSITION THE OUTPUT SELECTOR SWITCH TO THE WIRE FEED (CV) POSITION.
- **N.C.** IF OPTIONAL REMOTE OUTPUT CONTROL IS USED, PLACE OUTPUT CONTROL SWITCH IN "OUTPUT CONTROL REMOTE" POSITION.
- **N.D.** Leads #21 and GND do not appear on LN-7's with codes below 7026.
- **N.E.** Welding cables must be of proper capacity for the current and duty cycle of immediate and future applications.
- **N.F.** If LN-7 is equipped with a meter kit, extend lead #21 using #14 or larger insulated wire physically suitable for the installation. An S16586-"length" remote voltage sensing work lead may be ordered for this purpose. Connect it directly to the work piece independent of the welding work cable. For convenience, this extended #21 lead should be taped to the welding work lead.
- **N.G.** Tape up bolted connection where lead #21 is extended.
- **N.H.** Idler switch on power source must be in high idle position.
- **N.J.** If an optional remote output control is used, connect it to this terminal strip or 6 pin Amphenol receptacle. NOTE: Terminal strip or 6 pin Amphenol receptacle not available on all power sources.
- **CAUTION:** Any speed up of the engine RPM by changing the governor setting or over-riding the throttle linkage will cause an increase in the AC auxiliary voltage. If this voltage goes above 140 volts, the LN-7 control circuit will be damaged. The engine governor setting is pre-set at the factory – do not adjust above RPM specifications listed in engine welder operating manual.
CENTER OF GRAVITY WITH OIL IN ENGINE AND FULL FUEL TANK.

UNDERCARRIAGE MOUNTING HOLES

CENTER OF GRAVITY WITH OIL IN ENGINE AND FULL FUEL TANK.

FOR OIL FILTER REMOVAL

M17215-2
1-30-98E

RANGER 8
CENTER OF GRAVITY WITH OIL IN ENGINE AND FULL FUEL TANK.

UNDERCARRIAGE MOUNTING HOLES

OF SHAFT

FOR OIL FILTER REMOVAL

CENTER OF GRAVITY WITH OIL IN ENGINE AND FULL FUEL TANK.
Now Available...12th Edition
The Procedure Handbook of Arc Welding

With over 500,000 copies of previous editions published since 1933, the Procedure Handbook is considered by many to be the “Bible” of the arc welding industry.

This printing will go fast so don’t delay. Place your order now using the coupon below.

The hardbound book contains over 750 pages of welding information, techniques and procedures. Much of this material has never been included in any other book.

A must for all welders, supervisors, engineers and designers. Many welding instructors will want to use the book as a reference for all students by taking advantage of the low quantity discount prices which include shipping by 4th class parcel post.

$15.00 postage paid U.S.A. Mainland

How To Read Shop Drawings

The book contains the latest information and application data on the American Welding Society Standard Welding Symbols. Detailed discussion tells how engineers and draftsmen use the “short-cut” language of symbols to pass on assembly and welding information to shop personnel.

Practical exercises and examples develop the reader’s ability to visualize mechanically drawn objects as they will appear in their assembled form.

187 pages with more than 100 illustrations. Size 8-1/2” x 11” Durable, cloth-covered board binding.

$4.50 postage paid U.S.A. Mainland

New Lessons in Arc Welding

Lessons, simply written, cover manipulatory techniques; machine and electrode characteristics; related subjects, such as distortion; and supplemental information on arc welding applications, speeds and costs. Practice materials, exercises, questions and answers are suggested for each lesson.

528 pages, well illustrated, 6” x 9” size, bound in simulated, gold embossed leather.

$5.00 postage paid U.S.A. Mainland

Need Welding Training?

The Lincoln Electric Company operates the oldest and most respected Arc Welding School in the United States at its corporate headquarters in Cleveland, Ohio. Over 100,000 students have graduated. Tuition is low and the training is “hands on”

For details write: Lincoln Welding School
22801 St. Clair Ave.
Cleveland, Ohio 44117-1199.

and ask for bulletin ED-80 or call 216-383-2259 and ask for the Welding School Registrar.

Lincoln Welding School
BASIC COURSE

$700.00

5 weeks of fundamentals

THERE IS A 10% discount on all orders of $50.00 or more for shipment at one time to one location.

Orders of $50 or less before discount or orders outside of North America must be prepaid with charge, check or money order in U.S. Funds Only. Prices include shipment by 4th Class Book Rate for U.S.A. Mainland Only. Please allow up to 4 weeks for delivery.

UPS Shipping for North America Only. All prepaid orders that request UPS shipment please add:

$5.00 For order value up to $49.99
$10.00 For order value between $50.00 & $99.99
$15.00 For order value between $100.00 & $149.00

For North America invoiced orders over $50.00 & credit card orders, if UPS is requested, it will be invoiced or charged to you at cost.

Outside U.S.A. Mainland order must be prepaid in U.S. Funds. Please add $2.00 per book for surface mail or $15.00 per book for air parcel post shipment.

METHOD OF PAYMENT: (Sorry, No C.O.D. Orders)

CHECK ONE:

Name: _______________________________________________
Address: _______________________________________________

Check or Money Order Enclosed, U.S. Funds only _______________________________________________

Credit Card - ________________________

Account No. | | | | | | | | | | | | | | | | | | | | | Exp Date | | | |

Signature as it appears on Charge Card: ________________________

USE THIS FORM TO ORDER: Order from: BOOK DIVISION, The Lincoln Electric Company, 22801 St. Clair Avenue, Cleveland, Ohio 44117-1199

Telephone: 216-383-2211 or, for fastest service, FAX this completed form to: 216-361-5901.

Lincoln Welding School

Seminar Information Procedure Handbook

ED-45 "Twelfth Edition"

Incentive Management

ED-93

A New Approach to Industrial Economics

James F. Lincoln Arc Welding

Welding Preheat Calculator

Foundation Book Information

Pipe Welding Charts

(JFLF-915)

(JFL-515)

SUB TOTAL

Additional Shipping Costs if any

TOTAL COST
**WARNING**  
- Do not touch electrically live parts or electrode with skin or wet clothing.  
- Insulate yourself from work and ground.  
- Keep flammable materials away.  
- Wear eye, ear and body protection.

**Spanish**  
**AVISOS 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.

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

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

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

**Japanese**  
**注意事項**  
- 過電中の電気部品、又は溶着にヒグゆれた者で触れないこと。  
- 施工物やアースから身体が絶縁されている様にして下さい。  
- 燃えやすいものの侧での溶接作業は絶対にしてはなりません。  
- 目、耳及び身体に保護具をして下さい。

**Chinese**  
**警告**  
- 皮肤或浸衣物切勿接触带电部件及物件。  
- 使你自己与地面和工作绝缘。  
- 把一切易燃品移离工作場所。  
- 佩戴眼、耳及身体勞動保護用具。

**Korean**  
**위험**  
- 전도체나 움직이는 곳은 헝겊 또는 피부로 접촉하지 마십시오.  
- 모체와 접촉을 점측치 마십시오.  
- 염화성 물질을 접근 시키지 마십시오.  
- 눈, 귀와 몸에 보호장구를 착용하십시오.

**Arabic**  
**تحذير**  
- لا تمس الأجزاء التي يعرف بها التيار الكهربائي أو الألتيرو Jetzt الجسم أو بالملابس المبللة بالماء.  
- ضع عازلا على جسمك خلف العمل.  
- ضع أدوات وملابس واقي على جبينك وأذنك.

---

**READ AND UNDERSTAND THE MANUFACTURER’S INSTRUCTION FOR THIS EQUIPMENT AND THE CONSUMABLES TO BE USED AND FOLLOW YOUR EMPLOYER’S SAFETY PRACTICES.**

**SE RECOMIENDA LEER Y ENTENDER LAS INSTRUCCIONES DEL FABRICANTE PARA EL USO DE ESTE EQUIPO Y LOS CONSUMIBLES QUE VA A UTILIZAR, SIGA LAS MEDIDAS DE SEGURIDAD DE SU SUPERVISOR.**

**LISEZ ET COMPRENZE LES INSTRUCTIONS DU FABRICANT EN CE QUI REGARDE CET EQUIPEMENT ET LES PRODUITS À ETRE EMPLOYES ET SUIVEZ LES PROCEDURES DE SECURITE DE VOTRE EMPLOYEUR.**

**LESEN SIE UND BEFOLGEN SIE DIE BETRIEBSANLEITUNG DER ANLAGE UND DEN ELEKTRODENEINSATZ DES HERSTELLERS. DIE UNFALLVERHÜTUNGSVORSCHRIFTEN DES ARBEITGEBERS SIND Ebensfalls ZU BEACHTEN.**
<table>
<thead>
<tr>
<th>Action</th>
<th>Spanish</th>
<th>French</th>
<th>German</th>
<th>Portuguese</th>
<th>Japanese</th>
<th>Chinese</th>
<th>Korean</th>
<th>Arabic</th>
</tr>
</thead>
<tbody>
<tr>
<td>Keep your head out of fumes.</td>
<td>Los humos fuera de la zona de respiración.</td>
<td>Mantenga la cabeza fuera de los humos. Utilice ventilación o aspiración para gases.</td>
<td>Vermeiden Sie das Einatmen von Schweibrauch!</td>
<td>Mantenha seu rosto da fumaça.</td>
<td>Use ventilation or exhaust to remove fumes from breathing zone.</td>
<td>Use ventilation or exhaust to remove fumes from breathing zone.</td>
<td>Turn power off before servicing.</td>
<td>Débranchez le courant avant l'entretien.</td>
</tr>
<tr>
<td>Do not operate with panel open or guards off.</td>
<td>No operar con panel abierto o guanras quitadas.</td>
<td>Sorgen Sie für gute Be- und Entlüftung des Arbeitsplatzes!</td>
<td>Mantenha-se afastado das partes moventes.</td>
<td>N’opérez pas avec les panneaux ouverts ou avec les dispositifs de protection enlevés.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Turn power off before servicing.</td>
<td>N’opérez pas avec les panneaux ouverts ou avec les dispositifs de protection enlevés.</td>
<td>N’opérez pas avec les panneaux ouverts ou avec les dispositifs de protection enlevés.</td>
<td>N’opérez pas avec les panneaux ouverts ou avec les dispositifs de protection enlevés.</td>
<td>N’opérez pas avec les panneaux ouverts ou avec les dispositifs de protection enlevés.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Do not operate with panel open or guards off.</td>
<td>Do not operate with panel open or guards off.</td>
<td>Do not operate with panel open or guards off.</td>
<td>Do not operate with panel open or guards off.</td>
<td>Do not operate with panel open or guards off.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Keep your head out of fumes.</td>
<td>Use ventilation or exhaust to remove fumes from breathing zone.</td>
<td>Use ventilation or exhaust to remove fumes from breathing zone.</td>
<td>Use ventilation or exhaust to remove fumes from breathing zone.</td>
<td>Use ventilation or exhaust to remove fumes from breathing zone.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

---

**LEIA E COMPREENDA AS INSTRUÇÕES DO FABRICANTE PARA ESTE EQUIPAMENTO E AS PARTES DE USO, E SIGA AS PRÁTICAS DE SEGURANÇA DO EMPREGADOR.**

**警告**

**주의**

**警告**

**포함**

**تحذير**