IM660

January,2000

Ranger 200

For use with machines having Code Numbers: **10646**

This manual covers equipment which is no longer in production by The Lincoln Electric Co. Specifications and availability of optional features may have changed.

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

ISO 9002
Accredited by the Dutch Council for Certification
REGISTRAR ACCREDITATION BOARD
Manufactured Under a Quality Program Certified by ABS Quality Evaluations, Inc. to ISO 9002 Requirements.
CERTIFICATE NUMBER: 30273

LINCOLN® ELECTRIC

• World's Leader in Welding and Cutting Products •
• Sales and Service through Subsidiaries and Distributors Worldwide •
Cleveland, Ohio 44117-1199 U.S.A. TEL: 216.481.8100 FAX: 216.486.1751 WEB SITE: www.lincolnelectric.com

⚠ WARNING

⚠ CALIFORNIA PROPOSITION 65 WARNINGS ⚠

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

The Above For Diesel Engines

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

The Above For Gasoline Engines

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

Read and understand the following safety highlights. For additional safety information, it is strongly recommended that you purchase a copy of "Safety in Welding & Cutting - ANSI Standard Z49.1" from the American Welding Society, P.O. Box 351040, Miami, Florida 33135 or CSA Standard W117.2-1974. A Free copy of "Arc Welding Safety" booklet E205 is available from the Lincoln Electric Company, 22801 St. Clair Avenue, Cleveland, Ohio 44117-1199.

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

FOR ENGINE powered equipment.

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

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

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

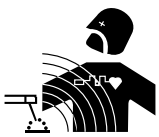
1.d. Keep all equipment safety guards, covers and devices in position and in good repair.Keep hands, hair, clothing and tools away from V-belts, gears, fans and all other moving parts when starting, operating or repairing equipment.

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

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

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

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



ELECTRIC AND MAGNETIC FIELDS may be dangerous

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

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

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

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

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

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

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

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

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

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 insulate hands.

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

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

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

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

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

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

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

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

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

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

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

ARC RAYS can burn.

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

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

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

FUMES AND GASES can be dangerous.

5.a. Welding may produce fumes and gases hazardous to health. Avoid breathing these fumes and gases.When welding, keep your head out of the fume. Use enough ventilation and/or exhaust at the arc to keep fumes and gases away from the breathing zone. **When welding 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.**

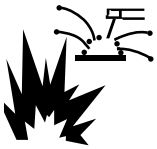
5.b. Do not weld in locations near chlorinated hydrocarbon vapors coming from degreasing, cleaning or spraying operations. The heat and rays of the arc can react with solvent vapors to form phosgene, a highly toxic gas, and other irritating products.

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



WELDING SPARKS can cause fire or explosion.

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

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

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

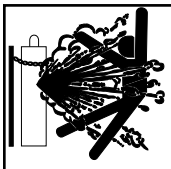
6.d. Do not heat, cut or weld tanks, drums or containers until the proper steps have been taken to insure that such procedures will not cause flammable or toxic vapors from substances inside. They can cause an explosion even though they have been “cleaned”. For information, purchase “Recommended Safe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

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

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

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

6.h. Also see item 1.c.



CYLINDER may explode if damaged.

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

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

7.c. Cylinders should be located:

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

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

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

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

7.g. Read and follow the instructions on compressed gas cylinders, associated equipment, and CGA publication P-l, “Precautions for Safe Handling of Compressed Gases in Cylinders,” available from the Compressed Gas Association 1235 Jefferson Davis Highway, Arlington, VA 22202.

FOR ELECTRICALLY powered equipment.

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

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

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

Mar ‘95

PRÉCAUTIONS DE SÛRETÉ

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

Sûreté Pour Soudage A L'Arc

1. Protegez-vous contre la secousse électrique:

   a. Les circuits à l'électrode et à la piéce 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 vétements mouillés. Porter des gants secs et sans trous pour isoler les mains.
   b. Faire trés attention de bien s'isoler de la masse quand on soude dans des endroits humides, ou sur un plancher metallique ou des grilles metalliques, 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 defonctionnement.
   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 precautions pour le porte-électrode s'applicuent 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 recoit un choc. Ne jamais enrouler le câble-électrode autour de n'importe quelle partie du corps.

3. Un coup d'arc peut être plus sévère qu'un coup de soliel, donc:

   a. Utiliser un bon masque avec un verre filtrant approprié ainsi qu'un verre blanc afin de se protéger les yeux du rayonnement de l'arc et des projections quand on soude ou quand on regarde l'arc.
   b. Porter des vêtements convenables afin de protéger la peau de soudeur et des aides contre le rayonnement de l'arc.
   c. Protéger l'autre personnel travaillant à proximité au soudage à l'aide d'écrans appropriés et non-inflammables.

4. Des gouttes de laitier en fusion sont émises de l'arc de soudage. Se protéger avec des vêtements de protection libres de l'huile, tels que les gants en cuir, chemise épaisse, pantalons sans revers, et chaussures montantes.

5. Toujours porter des lunettes de sécurité dans la zone de soudage. Utiliser des lunettes avec écrans lateraux 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 accidental peut provoquer un échauffement et un risque d'incendie.

8. S'assurer que la masse est connectée le plus prés 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'echauffement des chaines et des câbles jusqu'à ce qu'ils se rompent.

9. Assurer une ventilation suffisante dans la zone de soudage. Ceci est particuliérement important pour le soudage de tôles galvanisées plombées, ou cadmiées ou tout autre métal qui produit des fumeés toxiques.

10. Ne pas souder en présence de vapeurs de chlore provenant d'opérations de dégraissage, nettoyage ou pistolage. La chaleur ou les rayons de l'arc peuvent réagir avec les vapeurs du solvant pour produire du phosgéne (gas fortement toxique) ou autres produits irritants.

11. Pour obtenir de plus amples renseignements sur la sûreté, voir le code "Code for safety in welding and cutting" CSA Standard W 117.2-1974.

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

1. Relier à la terre le chassis du poste conformement 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 faires des travaux à l'interieur de poste, la debrancher à l'interrupteur à la boite de fusibles.

4. Garder tous les couvercles et dispositifs de sûreté à leur place.

Mar. '93

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**.

Page

TABLE OF CONTENTS

TECHNICAL SPECIFICATIONS - Ranger 200 (K1724-1)

INPUT - GASOLINE ENGINE

Make/Model	Description	Speed (RPM)	Displacement	Starting System	Capacities
Kohler Command CH15 OHV	1 cylinder (Cast Iron Liner) 15 HP @ 3600 RPM	Low Idle 2500 High Idle 3700 Full Load 3500	26 cu. in (426 cc) **Bore x Stroke** 2.55" x 2.64" (90 mm x 67mm)	12VDC Battery & Starter (Group 58; 435 cold crank amps) Battery Charger 15 A. regulated (Push Button Start)	Fuel: 12 gal. 45.4 L Oil: 2.0 Qts. 1.9 L Cooling System: Air-Cooled

RATED OUTPUT - WELDER

Welding Output	Volts at Rated Amps	Duty Cycle	Max. OCV @ 3700 RPM
CC DC Constant Current 210 amps CC Output Range 40 to 210 amps	25 volts	100%	80 volts RMS

OUTPUT - GENERATOR

Auxiliary Power [1]
6,000 Watts, 60 Hz 120/240 Volts 100 % Duty Cycle

PHYSICAL DIMENSIONS

HEIGHT	WIDTH	DEPTH	WEIGHT
30.00 in. 762.0 mm	21.50 in. 546.0 mm	42.25 in. 1073.0 mm	409 lbs. 186 kg.

ENGINE COMPONENTS

LUBRICATION	VALVE LIFTERS	FUEL SYSTEM	GOVERNOR
Full Pressure with Full Filter	Hydraulic	Mechanical Fuel Pump	Mechanical Governor 5% Regulation

AIR CLEANER	ENGINE IDLER	MUFFLER	ENGINE PROTECTION
Duel Element	Automatic Idler	Low noise Muffler: Top outlet can be rotated. Made from long life, aluminized steel.	Shutdown on low oil pressure.

ENGINE WARRANTY: 2 year unlimited hours (See engine manufacturer warranty for details.)

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.

INSTALLATION INSTRUCTIONS

⚠ 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.

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

LOCATION AND VENTILATION

Whenever you use the RANGER 200, be sure that clean cooling air can flow through the machine's air inlets and to avoid restricting the air outlets. Avoid dusty, dirty areas. Also, keep the machine away from heat sources. Do not place the engine end of the machine anywhere near hot engine exhaust from another machine or closer than two feet from a wall. And of course, make sure that engine exhaust is ventilated to an open, outside area.

The RANGER 200 may be used outdoors. Do not set the machine in puddles or otherwise submerge it in water. Such practices pose safety hazards and cause improper operation and corrosion of parts.

Always operate the RANGER 200 with the case roof on and all machine components completely assembled. This will protect you from the dangers of moving parts, hot metal surfaces, and live electrical devices.

STORING

1. Store the machine in a cool, dry place when it is not in use. Protect it from dust and dirt. Keep it where it can't be accidentally damaged from construction activities, moving vehicles, and other hazards.

2. Drain the engine oil and refill with fresh 10W30 oil. Run the engine for about five minutes to circulate oil to all the parts. See the MAINTENANCE section of this manual for details on changing oil.

3. Remove the battery, recharge it, and adjust the electrolyte level. Store the battery in a dry, dark place.

STACKING

RANGER 200 machines **CANNOT** be stacked.

TILTING

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

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

HIGH ALTITUDE OPERATION

It may be necessary to de-rate the welder output at higher altitudes. De-rate the welder output 3.5% for every 1000 ft. (305m) above 5000 ft. (150 m). Some engine adjustment may be required above 5,000 ft. (1,525 m).

HIGH TEMPERATURE OPERATION

At temperatures above 30°C, output de-rating is necessary. For maximum output current ratings, de-rate the welder output 5% for every 10°C above 30°C.

LIFTING

The RANGER 200 weighs approximately 490lbs / 222 kg. A lift bail is mounted to the machine frame and should always be used when lifting the machine.

⚠ WARNING

ADDITIONAL SAFETY PRECAUTIONS

FALLING EQUIPMENT can cause injury.

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

The recommended trailer for use with this equipment for in-plant and yard towing by a vehicle(1) is Lincoln's K957-1. If the user adapts a non-Lincoln undercarriage, he must assume responsibility that the method of attachment and usage does not result in a safety hazard nor damage the welding equipment. Some of the factors to be considered are as follows:

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

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

PRE-OPERATION ENGINE SERVICE

READ and UNDERSTAND the engine operating and

⚠ CAUTION

maintenance instructions supplied with this machine.

- Keep hands way from the engine muffler or HOT

⚠ WARNING

engine parts.

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

OIL

The RANGER 200 is shipped with the engine filled with SAE 10W-30 oil. CHECK THE OIL LEVEL BEFORE YOU START THE ENGINE. Check the oil level every four hours of running time during the first 25 running hours. Refer to the engine Operator's Manual for specific oil recommendations and break-in information. The oil change interval is dependent on the quality of the oil and the operating environment.

For more information on oil viscosity and service conditions, see the MAINTENANCE section of this manual and the engine Operator's Manual.

FUEL

USE GASOLINE FUEL ONLY
Fill the fuel tank with clean fresh fuel only. Do not fill to the top of the filler neck to allow room for expansion.

The RANGER 200 has a 12 gallon (45.4 liter) fuel tank with a top fill and fuel gauge mounted on the control panel. See the OPERATION and MAINTENANCE sections of this manual for more details about fuel.
NOTE: The fuel tank is mounted below the engine so a fuel shutoff valve is not required.

ENGINE COOLING SYSTEM

Air to cool the engine is drawn in a lower set of louvers on the case back. It is important that the intake air is not restricted. Allow a minimum clearance of 2 feet (0.6m) from the case back to a vertical surface.

⚠ WARNING

BATTERY CONNECTIONS

GASES FROM BATTERY can explode.

- Keep sparks, flame and cigarettes away from battery.

To prevent **EXPLOSION** when:

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

BATTERY ACID can burn eyes and skin.

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

- Follow instructions printed on battery.

IMPORTANT: To prevent ELECTRICAL DAMAGE WHEN:

a) Installing new batteries.

b) Using a booster.

Use correct polarity — **Negative Ground**.

The RANGER 200 is shipped with the negative battery cable disconnected. Make certain that the RUN-STOP switch is in the STOP position. Remove the two screws from the rear battery tray using a screwdriver or a 3/8” socket. Attach the negative battery cable to the negative battery terminal and tighten using 1/2” socket wrench.

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

MUFFLER OUTLET PIPE

⚠ CAUTION

Shut off the machine and allow the muffler to cool before touching the muffler.

The RANGER 200 is shipped with a muffler outlet pipe. Using the clamp provided secure the outlet pipe to the outlet tube with the pipe positioned such that it will direct the exhaust in the desired direction. Tighten using a 9/16” socket or wrench.

SPARK ARRESTER

Gasoline engine mufflers may emit sparks when the engine is running. Some federal, state, or local laws require spark arresters in locations where unarrested sparks could present a fire hazard.

Standard muffler (like the ones included with the RANGER 200 do not act as spark arresters. When local laws require it, a spark arrester must be installed on the machine and properly maintained. An optional spark arrester kit (S24647) is available for your RANGER 200. See the ACCESSORIES section of this manual for more information.

⚠ CAUTION

An incorrect spark arrester may lead to damage to the engine or reduce performance.

ELECTRICAL CONNECTIONS

MACHINE GROUNDING

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

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

a) Be grounded to the frame of the welder using a grounded type plug.

b) Be double insulated.

⚠ WARNING

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

When this welder is mounted on a truck or trailer, its frame must be securely connected to the metal frame of the vehicle. When this engine driven welder is connected to premises wiring such as that in a home or shop, its 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.

WELDING OUTPUT CABLES

With the engine off connect the electrode and work cables to the output studs. The welding process dictates the polarity of the electrode cable. These connections should be checked periodically and tightened with a 3/4" wrench.

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

TOTAL COMBINED LENGTH OF ELECTRODE AND WORK CABLES	
Cable Length	**Cable Size for 210 Amps 100% Duty Cycle**
0-100Ft. (0-30meters)	**2 AWG**
100-200 Ft. (30-46m meters)	**1 AWG**
200-250 Ft. (30-46 meters)	**1/0 AWG**

Table A.1

CABLE INSTALLATION

Install the welding cables to your RANGER 200 as follows. See Figure B.1 for location of parts.

1. The gasoline engine must be OFF to install welding cables.

2. Remove the flanged nuts from the output terminals.

3. Connect the electrode holder and work cables to the weld output terminals. The terminals are identified on the case front.

4. Tighten the flanged nuts securely.

5. Be certain that the metal piece you are welding (the “work”) is properly connected to the work clamp and cable.

6. Check and tighten the connections periodically.

• Loose connections will cause the output terminals to overheat. The terminals may eventually melt.

⚠ CAUTION

• Do not cross the welding cables at the output terminal connection. Keep the cables isolated and separate from one another.

AUXILIARY POWER RECEPTACLES & PLUGS

The auxiliary power of the RANGER 200 consists of two 20 Amp-120 VAC (5-20R) duplex receptacles and one 50 Amp 120/240 VAC (14-50R) receptacle. The 240 VAC receptacle can be split for single phase 120 VAC operation.

The auxiliary power capacity is 6,000 watts of 60 Hz, single phase power. The auxiliary power capacity rating in watts is equivalent to volt-amperes at unity power factor. The max permissible current of the 240 VAC output is 25 Amps. The 240 VAC output can be split to provide two separate 120 VAC outputs with a max permissible current of 25 Amps per output to two separate 120 VAC branch circuits (these circuits cannot be paralleled). Output voltage is within ± 10% at all loads up to rated capacity.

The 120 V 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 capacity of the associated receptacle.

STANDBY POWER CONNECTIONS

The RANGER 200 is suitable for temporary, standby or emergency power using the engine manufacturer's recommended maintenance schedule.

The RANGER 200 can be permanently installed as a standby power unit for 240 VAC, 3 wire, single phase, 25 amp service. Connections must be made by a licensed electrician who can determine how the 120/240 VAC power can be adapted to the particular installation and comply with all applicable electrical codes.

PREMISES WIRING

⚠ WARNING

Only a licensed, certified, trained electrician should install the machine to a premises or residential electrical system. Be certain that:

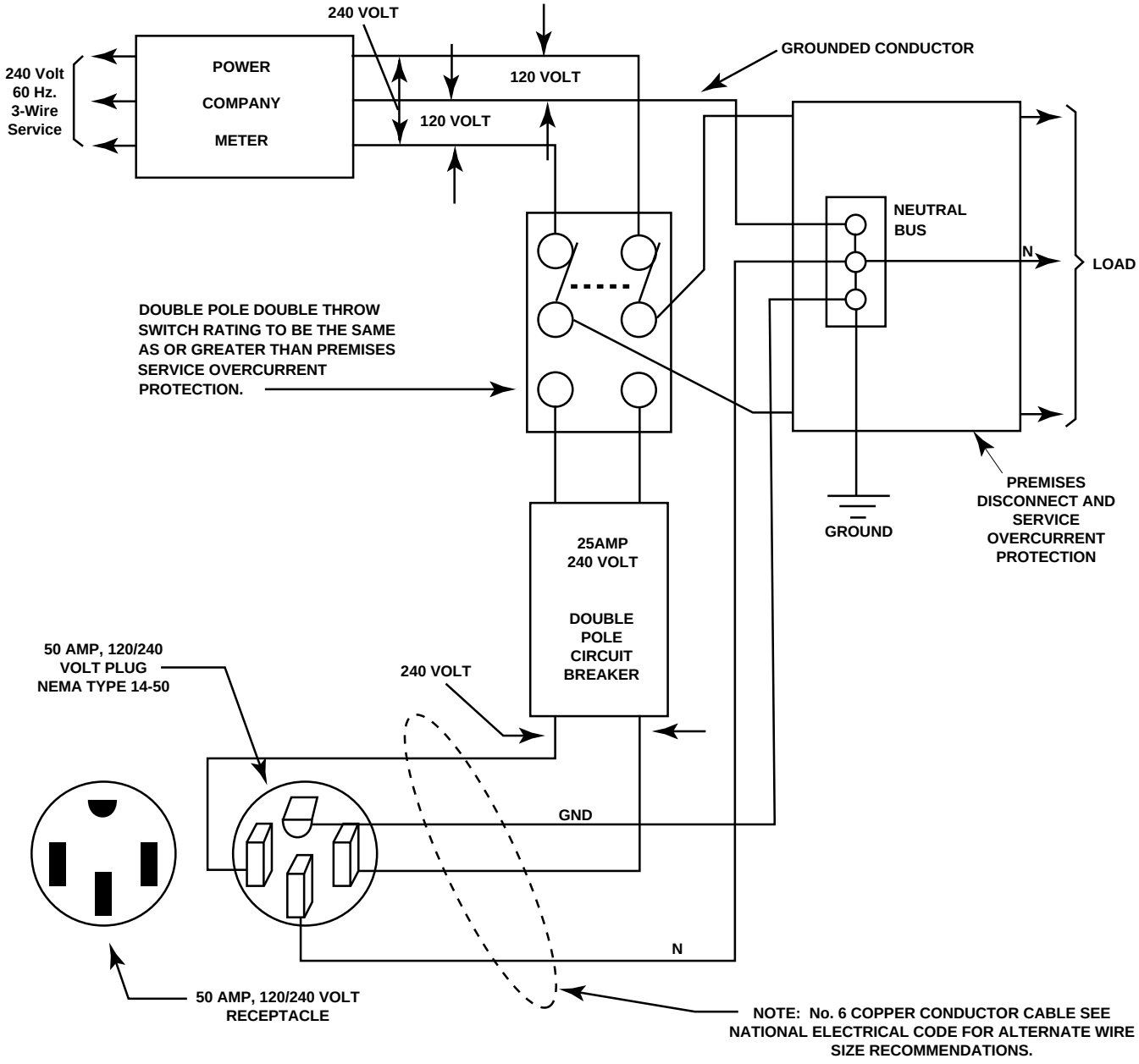
- The installation complies with the National Electrical Code and all other applicable electrical codes.
- The premises is isolated and no feedbacking into the utility system can occur. Certain state and local laws require the premises to be isolated before the generator is linked to the premises. Check your state and local requirements.
- A double pole, double throw transfer switch in conjunction with the properly rated double throw circuit breaker is connected between the generator power and the utility meter.

The following information and the connection diagram, Figure A.1, can be used as a guide by the electrician for most applications to premises wiring.

1. Install a double pole, double throw switch between the power company meter and the premises disconnect. The switch rating must be the same as or greater than the premises disconnect and service overcurrent protection.
2. Take necessary steps to assure that the load is limited to the capacity of the RANGER 200 by installing a 25 amp, 240 VAC double pole circuit breaker. Maximum rated load for each leg of the 240 VAC auxiliary is 25 amperes. Loading above the rated output will reduce output voltage below the allowable - 10% of rated voltage which may damage appliances or other motor-driven equipment and may result in overheating of the RANGER 200 engine and/or alternator windings.
3. Install a 50 amp 120/240 volt plug (NEMA type 14-50) to the double pole circuit breaker using No. 6 or larger, 4 conductor cable of the desired length. (The 50 amp 120/240 volt plug is available in the optional K802R power plug kit.
4. Plug this cable in to the 50 amp 120/240 volt receptacle on the RANGER 200 case front.

Figure A.1

CONNECTION OF RANGER 200 TO PREMISES WIRING



⚠ WARNING

Connection of Ranger 200 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 200 is a gasoline engine powered DC stick welding power source and 120/240 volt AC power generator. The engine drives a generator that supplies three phase power for the DC welding circuit and single phase power for the AC auxiliary outlets. The DC welding control system uses state of the art **Chopper Technology** (CT tm) for superior welding peformance.

DESIGN FEATURES

FOR AUXILIARY POWER:

Start the engine and set the IDLER control switch to the desired operating mode. Full power is available regardless of the welding control settings providing no welding current is being drawn.

The auxiliary power of the RANGER 200 consists of two 20 Amp-120 VAC (5-20R) duplex receptacles and one 50 Amp 120/240 VAC (14-50R) receptacle. The 240 VAC receptacle can be split for single phase 120 VAC operation.

RECOMMENDED APPLICATIONS

PROCESSES:

Excellent DC stick welding (GMAW). The Ranger 200 can handle up to 3/16 dia. 6010 and 7018 electrodes. Can also be used for limited scratch start TIG welding.

EQUIPMENT:

K710 Accessory Kit which includes:
Electrode holder and cable
Ground clamp and cable
Headshield

ADDITIONAL SAFETY PRECAUTIONS

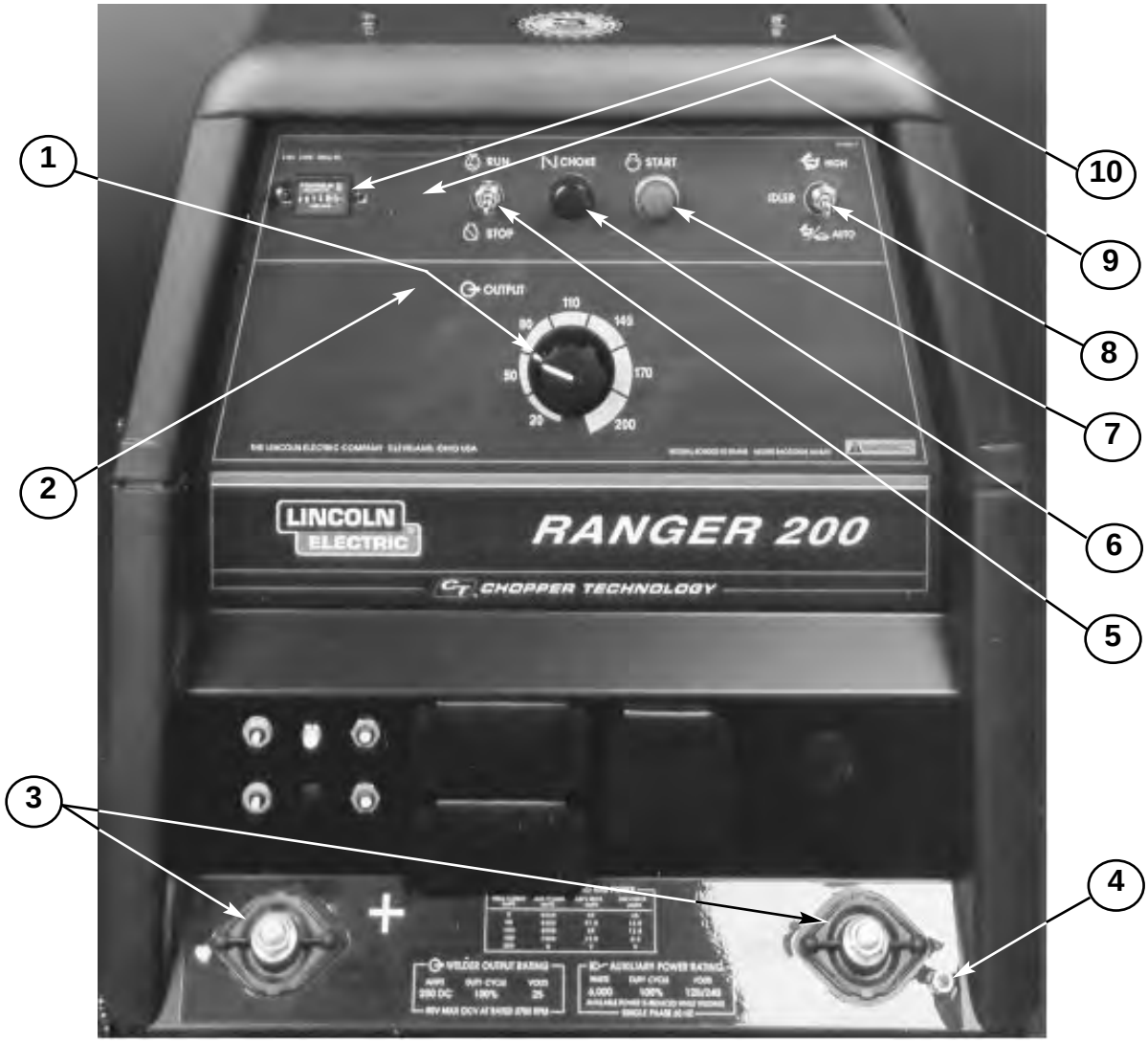
Always operate the welder with the hinged door closed and the side panels in place.

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.

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

CONTROLS AND SETTINGS

All generator/welder controls are located on the Output Control Panel of the machine case front. See figure on page B-2 and the explanations that follow.



WELDING CONTROLS

1. OUTPUT CONTROL: The **OUTPUT** dial provides continuous control of the welding current.

2. THERMAL SHUTDOWN INDICATOR LIGHT: Indicates that the welding output is shut off because of blocked airflow or the welding current exceeded the rating of the machine.

3. WELD OUTPUT TERMINALS WITH FLANGE NUT: Provides a connection point for the electrode and work cables.

4. GROUND STUD: Provides a connection point for connecting the machine case to earth ground for the safest grounding procedure.

ENGINE CONTROLS

5. RUN/STOP SWITCH: RUN position energizes the engine prior to starting. **STOP** position stops the engine. The oil pressure interlock switch prevents battery drain if the switch is left in the **RUN** position and the engine is not operating.

6. CHOKE: When pulled out, it closes the choke valve on the engine carburetor for quick starting.

7. START: PUSH BUTTON - Energizes the starter motor to crank the engine.

8. IDLER: SWITCH- Has two positions as follows:

1) In the **HIGH** position, the engine runs at the high idle speed controlled by the engine governor.

2) In the **AUTO** position, the idler operates as follows:

A. When switched from **HIGH** to **AUTO** or after starting the engine, the engine will operate at full speed for approximately 12 seconds and then go to low idle speed.

ENGINE CONTROLS (CONTINUED)

B. When the electrode touches the work or power is drawn for lights or tools (approximately 100 Watts minimum) the engine accelerates and operates at full speed.

C. When welding ceases or the AC power load is turned off, a fixed time delay of approximately 12 seconds starts. If the welding or AC power load is not restarted before the end of the time delay, the idler reduces the engine speed to low idle speed.

D. The engine will automatically return to high idle speed when there is welding load or AC power load reapplied.

9. ENGINE ALTERNATOR TROUBLE LIGHT: The yellow engine alternator light is off when batterycharging system is functioning normally. If light turns on, the alternator or the voltage regulator may not be operating correctly. The light may also come on due to the battery not holding a charge. It is normal for the light to come on while starting the engine.

10. ENGINE HOUR METER: Displays the total time that the engine has been running. This meter is useful for scheduling prescribed maintenance.

ENGINE OPERATION

BEFORE STARTING THE ENGINE:

1. Be sure the machine is on a level surface.

2. Open top engine door and remove the engine oil dipstick and wipe it with a clean cloth. Reinsert the dipstick and check the level on the dipstick.

3. Add oil (if necessary) to bring the level up to the full mark. Do not overfill. Close engine door.

4. See Engine Owner's Manual for specific oil recommendations.

Check and fill the engine fuel tank:

⚠ WARNING

GASOLINE fuel can cause fire or explosion.

- Stop engine when fueling.
- Do not smoke when fueling.
- Do not overfill tank.
- Keep sparks and flame away from tank.

1. Remove the fuel tank cap.

2. Fill the tank approximately 4 inches (100 mm) from the top of the filler neck to allow for fuel expansion (observe the fuel gauge.) DO NOT FILL THE TANK TO THE POINT OF OVERFLOW.

3. Replace the fuel tank cap and tighten securely.

4. See Engine Owner's Manual for specific fuel recommendations.

STARTING THE ENGINE

1. Remove all plugs connected to the AC power receptacles.

2. Set **IDLER** switch to **AUTO**.

3. Set the **RUN/STOP** switch to **RUN.**

4. Pull the choke to the full out position.

5. Press and hold the engine **START** button until the engine starts.

6. Release the engine **START** button when the engine starts.

7. Push the choke back in.

8. The engine will run at high idle speed for approximately 12 seconds and then go to low idle speed. Allow the engine to warm up at low idle for several minutes before applying a load and/or switching to high idle. Allow a longer warm up time in cold weather.

⚠ CAUTION

Operating the starter motor for more than 5 seconds can damage the motor. If the engine fails to start, release the switch and wait 10 seconds before operation the starter again. Do **NOT** push the **START** button while the engine is running because this can damage the ring gear and/or the starter motor.

NOTE: When starting a Ranger 200 for the first time, or after and extended period of time of not operating, it will take longer than normal because the fuel pump has to fill the fuel line and carburetor.

STOPPING THE ENGINE

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

2. Stop the engine by placing the **RUN/STOP** in the **STOP** position.

NOTE: A fuel shut off valve is not required on the Ranger 200 because the fuel tank is mounted below the engine.

TABLE B.1
TYPICAL RANGER 200 FUEL CONSUMPTION

KOHLER CH 15	15 HP@3600 RPM GAL./HR (LITERS/HR.)	RUNNING TIME 12 GAL. (HOURS)
Low Idle - No Load 2500 RPM	.25 gallons/hour (.95 liters/hour)	48
High Idle - No Load 3700 RPM	.52 gallons/hour (2.0 liters/hour)	23
DC CC Weld Output 210 Amps @ 25 Volts	1.1 gallons/hour (4.1 liters/hour)	11
Auxiliary Power, 6,000 VA	1.0 gallons/hour (3.9 liters/hour)	12

WELDING OPERATION

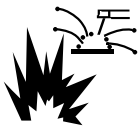
⚠ WARNING

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.**

FUMES AND GASES can be dangerous.
- **Keep your head out of fumes.**
- **Use ventilation or exhaust to remove fumes from breathing zone.**

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



WELDING SPARKS can cause fire or explosion.
- **Keep flammable material away.**

ARC RAYS can burn.
- **Wear eye, ear and body protection.**

See additional warning information throughout this operator's manual.

Stick Welding

The RANGER 200 can be used with a broad range of DC stick electrodes.

TIG Welding

The RANGER 200 can be used for limited DC Tungsten Inert Gas (TIG) welding applications using the scratch start procedure. Start the arc while the engine is running at low idle. TIG welding is normally done with electrode negitive.

ARC GOUGING

Set the CONTROL knob to adjust output current to the desired level for the gouging electrode being used according to the ratings in the following table.

Electrode Diameter	Current Range (DC, electrode positive)
1/8"	30-60 Amps
5/32"	90-150 Amps
3/16"	150-200 Amps

AUXILIARY POWER

Start the engine and set the IDLER control switch to the desired operating mode. Full power is available regardless of the welding control settings providing no welding current is being drawn.

The auxiliary power of the RANGER 200 consists of two 20 Amp-120 VAC (5-20R) duplex receptacles and one 50 Amp 120/240 VAC (14-50R) receptacle. The 240 VAC receptacle can be split for single phase 120 VAC operation.

The auxiliary power capacity is 6,000 watts of 60 Hz, single phase power. The auxiliary power capacity rating in watts is equivalent to volt-amperes at unity power factor. The max permissible current of the 240 VAC output is 25 Amps. The 240 VAC output can be split to provide two separate 120 VAC outputs with a max permissible current of 25 Amps per output to two separate 120 VAC branch circuits (these circuits cannot be paralleled). Output voltage is within ± 10% at all loads up to rated capacity.

The 120 V 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 capacity of the associated receptacle.

NOTE: The 240 V receptacle has two circuits, each of which measure 120 V toneutral but are of opposite polarities and cannot be paralleled.

Simultaneous Welding and Auxiliary Power Loads

The previous auxiliary power ratings are with no welding load. Simultaneous welding and power loads are specified in the following table. The permissible currents shown assume that current is being drawn from either the 120 VAC or 240 VAC supply (not both at the same time).

Ranger 200 Simultaneous Welding and Power Loads

Welding Output Range Setting	Permissibl Power Watts (Unity Power Factor)	Permissible Auxiliary Current in Amps	
		@120 VAC *	@ 240 VAC
0	6000	40*	25
50	4500	38*	18.8
100	3000	25	12.5
150	1500	12.5	6.3
210	0	0	0

* Each duplex receptacle is limited to 20 amps.
** Not to exceed 25 A per 120 VAC branch circuit when splitting the 240 VAC output.

Ranger 200 Extension Cord Length Recommendations
(Use the shortest length extension cord possible sized per the following table.)

Current (Amps)	Voltag eVolts	Load (Watts)	Maximum Allowable Cord Length in ft. (m) for Conductor Size											
			14 AWG		12 AWG		10 AWG		8 AWG		6 AWG		4 AWG	
15	120	1800	30	(9)	40	(12)	75	(23)	125	(38)	175	(53)	300	(91)
20	120	2400			30	(9)	50	(15)	88	(27)	138	(42)	225	(69)
15	240	3600	60	(18)	75	(23)	150	(46)	225	(69)	350	(107)	600	(183)
20	240	4800			60	(18)	100	(30)	175	(53)	275	(84)	450	(137)
25	240	6000					90	(27)	150	(46)	225	(69)	250	(76)
Conductor size is based on manimum 2.0% voltage drop.														

GENERAL OPTIONS / ACCESSORIES

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.).

K1737-1 FOUR WHEEL ALL-TERRAIN UNDERCARRIAGE (For moving by hand)

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).

K1739-1 CABLE CARRIER KIT
For use on K1737-1 and K1770-1 Undercarriages.

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.

K886-2 CANVAS COVER
Protects Machine when not in use.

S24647 SPARK ARRESTER
Mounts inside exhaust pipe.

K1690-1 GFCI RECEPTACLE KIT
Includes one UL approved 120V ground fault circuit interrupter duplex type receptacle with cover and installation instructions. Replaces the factory installed 120V duplex receptacle. Each receptacle of the GFCI Duplex is rated at 20 Amps, the maximum total current from the GFCI Duplex is limited to the 20 Amps. Two kits are required.

K710 ACCESSORY KIT
Accessory set includes 30 f t. (9.1 meters) 3 AWG electrode cable, 25 ft. (7.6 meters) 3 AWG work cable, headshield with No. 12 filter, GC300 work clamp and Cooltong 300 electrode holder. Cables are rated at 225 amps, 40% duty cycle.

K802-N POWER PLUG KIT
Provides four 120 volt plugs rated at 20 amps each and one dual voltage, full KVA plug rated at 120/240 volts, 50 amps.

K802-R POWER PLUG KIT
Provides four 120 volt plugs rated at 15 amps each and one dual voltage, full KVA plug rated at 120/240 volts, 50 amps.

T12153-9 50 AMP, 120/240 V POWER PLUG

SAFETY PRECAUTIONS

⚠ WARNING

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

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

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

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.

KOHLER ENGINE MAINTENANCE COMPONENTS

TABLE D.2

ITEM	MAKE AND PART NUMBER
Oil Filter	Kohler 5205002
Air Filter Element	Kohler 4708301, Fram CA6605
Air Filter Pre-Cleaner	Kohler 5208301
Fuel Filter	Kohler 2505002, Fram G1
Spark Plug	Champion RC12YC (.040" Gap)
Battery	BCI Group 58 (435)

KOHLER ENGINE MAINTENANCE SCHEDULE

TABLE D.1

FREQUENCY	MAINTENANCE REQUIRED
Daily or Before Starting Engine	• Fill fuel tank. • Check oil level. • Check air cleaner for dirty, loose, or damaged parts. • Check air intake and cooling areas, clean as necessary.
Every 25 Hours	• Service air pre-cleaner..
Every 100 Hours	• Change engine oil. (1)
Every 100 Hours	• Replace fuel filter element.
Every 100 Hours	• Clean or replace air filter element. (1)
Every 100 Hours	• Spark Plug Arrester (Optional)
Every 200 Hours	• Replace oil filter. (1)
Every 200 Hours	• Check spark plug and gap
Every 2 Years	• Check fuel lines and clamps.

(1) Service more frequently when used in dusty areas and/or at high ambient temperatures.

Rerfer to your Operators Manual for periodic maintenance.

Engine Oil Change

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

1. Remove the oil filler cap and dipstick. Remove the yellow cap from the oil drain valve and attach the flexible drain tube supplied with the machine. Push in and twist the drain valve counterclockwise. Pull the valve out and drain the oil into a suitable container.

2. Close the drain valve by pushing in and twisting clockwise. Replace the yellow cap.

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

ROUTINE AND PERIODIC ENGINE MAINTENANCE

⚠ WARNING

To prevent the engine from accidentally starting, disconnect the negative battery cable before servicing the engine.

See Table D.1 for a summary of maintenance intervals for the items listed below. More frequent service may be required, depending on your specific application and operating conditions. See the Kubota Engine Operator's Manual for further information

OIL

Check the oil level before starting engine or daily. **BE SURE TO MAINTAIN THE OIL LEVEL**. Change the oil for the first time after 50 hours of operation. Then, under normal operating conditions, change the oil as specified in the maintenance schedule.

CHANGING THE OIL

Ambient Temperature	Viscosity Grades
-5F° to 104F° (C-20 to 40 C)	**SAE 10W-30**

Engine Oil Refill Capacities: (Kohler)

Without oil filter replacement: 1.70 US qt. (1.41 Imp qt., 1.60 liter)
With oil filter replacement: 2.0 US qt. (1.66 Imp qt., 1.90 liter)

Use 4-stroke motor oil that meets or exceeds the requirements for API service classification SG or SH. Always check the API SERVICE label on the oil container to be sure it includes the letters SG or SH.

Wash your hands with soap and water after handling used oil.

Please dispose of used motor oil in a manner that is compatible with the environment. We suggest you take it in a sealed container to your local service station or recycling center for reclamation. Do not throw it in the trash, pour it on the ground or down a drain.

OIL FILTER

Change the oil, while the engine is still warm, as follows:

1. Drain the engine oil.
2. Remove the oil filter, and drain the oil into a suitable container. Discard the used oil filter.
3. Clean the filter mounting base, and coat the gasket of the new oil filter with clean engine oil.
4. Screw on the new oil filter by hand, until the gasket contacts the filter mounting base, then use an oil filter socket tool to tighten the filter an additional 1/2 to 7/8 turn. (Torque 10 ft. lbs., (13.6 N m)
5. Refill the crankcase with the specified amount of the recommended oil. Reinstall the oil filler cap.
6. Start the engine and check for oil filter leaks.
7. Stop the engine, and check the oil level. If necessary, add oil to the upper limit mark on the dipstick.

Air Cleaner Service

A dirty air cleaner will restrict air flow to the carburetor. To prevent carburetor malfunction, service the air cleaner regularly. Service more frequently when operating the engine in extremely dusty areas.

⚠ WARNING

Never use gasoline or low flash point solvents for cleaning the air cleaner element. A fire or explosion could result.

⚠ CAUTION

Never run the engine without the air cleaner. Rapid engine wear will result from contaminants, such as dust and dirt being drawn into the engine.

Kohler Engine

Air Pre-cleaner Service

1. Loosen the cover retaining knob and remove the cover.
2. Remove the pre-cleaner from the paper element.
3. Wash the pre-cleaner in warm water with detergent. Rinse the pre-cleaner thoroughly until all traces of detergent are eliminated. Squeeze out excess water (do not wring). Allow the pre-cleaner to air dry.
4. Saturate the pre-cleaner with new engine oil. Squeeze out all excess oil.
5. Reinstall the pre-cleaner over the paper element.
6. Reinstall the air cleaner cover. Secure cover with the cover retaining knob.

AIR FILTER PAPER ELEMENT

1. Loosen the cover retaining knob and remove the cover.

2. Remove the pre-cleaner from the paper element.

3. Remove the element cover nut, element cover, and paper element.

4. Do not wash the paper element or use pressurized air, as this will damage the element. Replace a dirty, bent, or damaged element with a new element. Handle new elements carefully; do not use if the sealing surfaces are bent or damaged.

5. When servicing the air cleaner, check the air cleaner base. Make sure it is secured and not bent or damaged. Also check the element cover for damaged or improper fit. Replace all damaged air cleaner components.

NOTE: Before air cleaner is reassembled make sure rubber seal is in position around stud. Inspect, making sure it is not damaged and seals with the element cover.

6. Reinstall the paper element, pre-cleaner, element cover, element cover nut, and air cleaner cover. Secure cover with the cover retaining knob.

SPARK PLUG

To ensure proper engine operation, the spark plug must be properly gapped and free of deposits.

⚠ WARNING

NOTE: Before removing spark plug, the muffler becomes very hot during operation and remains hot for a while after stopping the engine. Be careful not to touch the muffler while it is hot.

1. Remove the spark plug cap.

2. Clean any dirt from around the spark plug base.

3. Use a plug wrench to remove the spark plug.

4. Visually inspect the spark plug. Discard them if the insulator is cracked or chipped. Clean the spark plug with a wire brush if it is to be reused.

5. Measure the plug gap with a feeler gauge. Correct as necessary by bending the side electrode.
   -Spark Plug Gap (.040 in.) (1.0 mm)

6. Check that the spark plug washer is in good condition and thread the spark plug in by hand to prevent cross-threading.

7. After the spark plug is seated, tighten with a spark plug wrench to compress the washer.
   - If installing a new spark plug, tighten 1/2 turn after the spark plug seats to compress the washer.
   - If reinstalling a used spark plug, tighten 1/8 - 1/4 turn after the spark plug seats to compress the washer.
   - Spark Plug Torque: 20 ft. Lb. (27 N-m)

⚠ CAUTION

The spark plug must be securely tightened. An improperly tightened spark plug can become very hot and may cause engine damage.

Use only the recommended spark plug or equivalent. A spark plug which has an improper heat range may cause engine damage.

FUEL FILTER

1. Check the fuel filter for water accumulation or sediment.

2. Replace the fuel filter if it is found with excessive water accumulation or sediment.

ENGINE ADJUSTMENT

⚠ WARNING

OVERSPEED IS HAZARDOUS

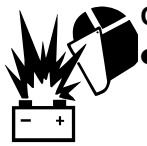
The maximum allowable high idle speed for this machine is 3750 RPM, no load. Do NOT tamper with governor components or setting or make any other adjustments to increase the maximum speed. Severe personal injury and damage to the machine can result if operated at speeds above maximum.

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

BATTERY MAINTENANCE

To access the battery, Remove the 3 screws from the rear battery tray using a screwdriver or a 3/8" socket. Slide the battery tray out only far enough to access the battery terminals.

⚠ WARNING



GASES FROM BATTERY can explode.

- Keep sparks, flame and cigarettes away from battery.

To prevent **EXPLOSION** when:

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

BATTERY ACID can burn eyes and skin.

- Wear gloves and eye protection and be careful when working near battery.
- Follow instructions printed on battery.

CLEANING THE BATTERY

Keep the battery clean by wiping it with a damp cloth when dirty. If the terminals appear corroded, disconnect the battery cables and wash the terminals with an ammonia solution or a solution of 1/4 pound (0.1113 kg) of baking soda and 1 quart (0.9461) of water. Be sure the battery vent plugs (if equipped) are tight so that none of the solution enters the cells.
After cleaning, flush the outside of the battery, the battery compartment, and surrounding areas with clear water. Coat the battery terminals lightly with petroleum jelly or a non-conductive grease to retard corrosion.

Keep the battery clean and dry. Moisture accumulation on the battery can lead to more rapid discharge and early battery failure.

CHECKING THE ELECTROLYTE LEVEL

If battery cells are low, fill them to the neck of the filler hole with distilled water and recharge. If one cell is low, check for leaks.

CHARGING THE BATTERY

When you charge, jump, replace, or otherwise connect battery cables to the battery, be sure the polarity is correct. Improper polarity can damage the charging circuit. The RANGER 200 positive (+) battery terminal has a red terminal cover.

If you need to charge the battery with an external charger, disconnect the negative cable first, then the positive cable before you attach the charger leads. After the battery is charged, reconnect the positive battery cable first and the negative cable last. Failure to do so can result in damage to the internal charger components.

Follow the instructions of the battery charger manufacturer for proper charger settings and charging time.

OPTION SPARK ARRESTER

⚠ WARNING

MUFFLER MAY BE HOT

ALLOW ENGINE TO COOL BEFORE INSTALLING THE SPARK ARRESTER!

DO NOT OPERATE ENGINE WHILE INSTALLING THE SPARK ARRESTER!

Clean every 100 hours.

Welder/Generator Maintenance

STORAGE: Store the RANGER 200 in clean, dry protected areas.

CLEANING: Blow out the generator and controls periodically with low pressure air. Do this at least once a week in particularly dirty areas.

BRUSH REMOVAL AND REPLACEMENT: It's normal for the brushes and slip rings to wear and darken slightly. Inspect the brushes when a generator overhaul is necessary.

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

⚠ 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.

HOW TO USE TROUBLESHOOTING GUIDE

⚠ WARNING

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

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

Step 1. LOCATE PROBLEM (SYMPTOM).
Look under the column labeled "PROBLEMS (SYMPTOMS)". This column describes possible symptoms that the machine may exhibit. Find the listing that best describes the symptom that the machine is exhibiting.
Symptoms are grouped into the following categories: engine problems, function problems and output problems.

Step 2. PERFORM EXTERNAL TESTS
The second column labeled "POSSIBLE AREAS OF MISADJUSTMENT(S)" lists the obvious external possibilities that may contribute to the machine symptom. Perform these tests/checks in the order listed. In general, these tests can be conducted without removing the case wrap-around cover.

Step 3. RECOMMENDED COURSE OF ACTION
This column provides a course of action for the Possible Cause.If you do not understand or are unable to perform the Recommended Course of Action safely, contact you local Lincoln Authorized Field Service Facility.

⚠ WARNING

ELECTRIC SHOCK can kill.
- **Do not touch electrically live parts such as output terminals or internal wiring.**

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.**

- **Remove guards only when necessary and replace when work requiring removal is complete.**
- **Only qualified personnel should install, use or service this equipment.**

⚠ 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

E-2

Observe all Safety Guidelines detailed throughout this manual

PROBLEMS (SYMPTOMS)	POSSIBLE AREAS OF MISADJUSTMENT(S)	RECOMMENDED COURSE OF ACTION
Major Physical or Electrical Damage is Evident.		1.If all recommended possible areas of misadjustment have been checked and the problem persists, **Contact your local Lincoln Authorized Field Service Facility.**
Engine will not "crank".	1. Battery is low. 2. Loose battery cable connections. 3. Faulty engine starter motor. 4. “Battery Circuit” circuit breaker is tripped.	1.Charge Battery. 2. Inspect, clean and tighten. 3. Contact authorized engine Service Shop. 4. Re-set. If it continues to trip, con tact your local Lincoln AUTHO-RIZED FIELD SERVICE FACILI-TY.
Engine will "crank" but not start.	1. Out of fuel. 2. Faulty fuel solenoid or faulty PC board or ignition system.	1. Fill tank and bleed fuel system. See MAINTENANCE section 2. Contact your Local Lincoln Authorized Field Service Facility for technical troubleshooting assistance.
Engine shuts down shortly after starting.	1. Low oil level. 2. Faulty oil pressure switch or other engine component. 3. Open rotor circuit.	1. Change oil and oil filter and fill to prop-er level. Start engine and look for leaks. 2. Contact your Local Lincoln Authorized Field Service Facility or authorized engine service shop. 3. Contact your Local Lincoln Authorized Field Service Facility or authorized engine service shop.
Battery does not stay charged.	1. Faulty battery. 2. Loose connections at battery or alternator. 3. Faulty engine alternator or charg-er modual.	1. Replace 2. Clean and tighten connections. 3. Consult authorized Engine Service Shop.

⚠ 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

E-3

Observe all Safety Guidelines detailed throughout this manual

PROBLEMS (SYMPTOMS)	POSSIBLE AREAS OF MISADJUSTMENT(S)	RECOMMENDED COURSE OF ACTION
Engine will not idle down to low speed.	1. Idler switch in High idle position. 2. External load on welder or auxiliary power. 3. Faulty PC board or idler solenoid.	1. Set switch to Auto. 2. Remove all external loads. 3. Contact your Local Lincoln Authorized Field Service Facility for technical troubleshooting assistance.
Engine will not go to high idle when attempting to weld.	1. Poor work lead connection to work. 2. Faulty PC board. Low idle speed set to low.	1. Make sure work clamp is tightly connected to clean base metal. 2. Contact your Local Lincoln Authorized Field Service Facility for technical troubleshooting assistance.
Engine will not go to high idle when using auxiliary power.	1. Auxiliary power load is less than 100 watts. 2. Faulty PC board.	1. Idler may not respond with less than a 100 watt load. Set idler to "High". 2. Contact your Local Lincoln Authorized Field Service Facility for technical troubleshooting assistance.
Engine does not develop full power.	1. Fuel filter clogged. 2. Air filter clogged. 3. Fouled spark plugs. 4. Valves out of adjustment.	1. Replace. 2. Clean or replace. 3. Clean or replace. 4. Contact authorized Engine Service Shop.

⚠ 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

E-4

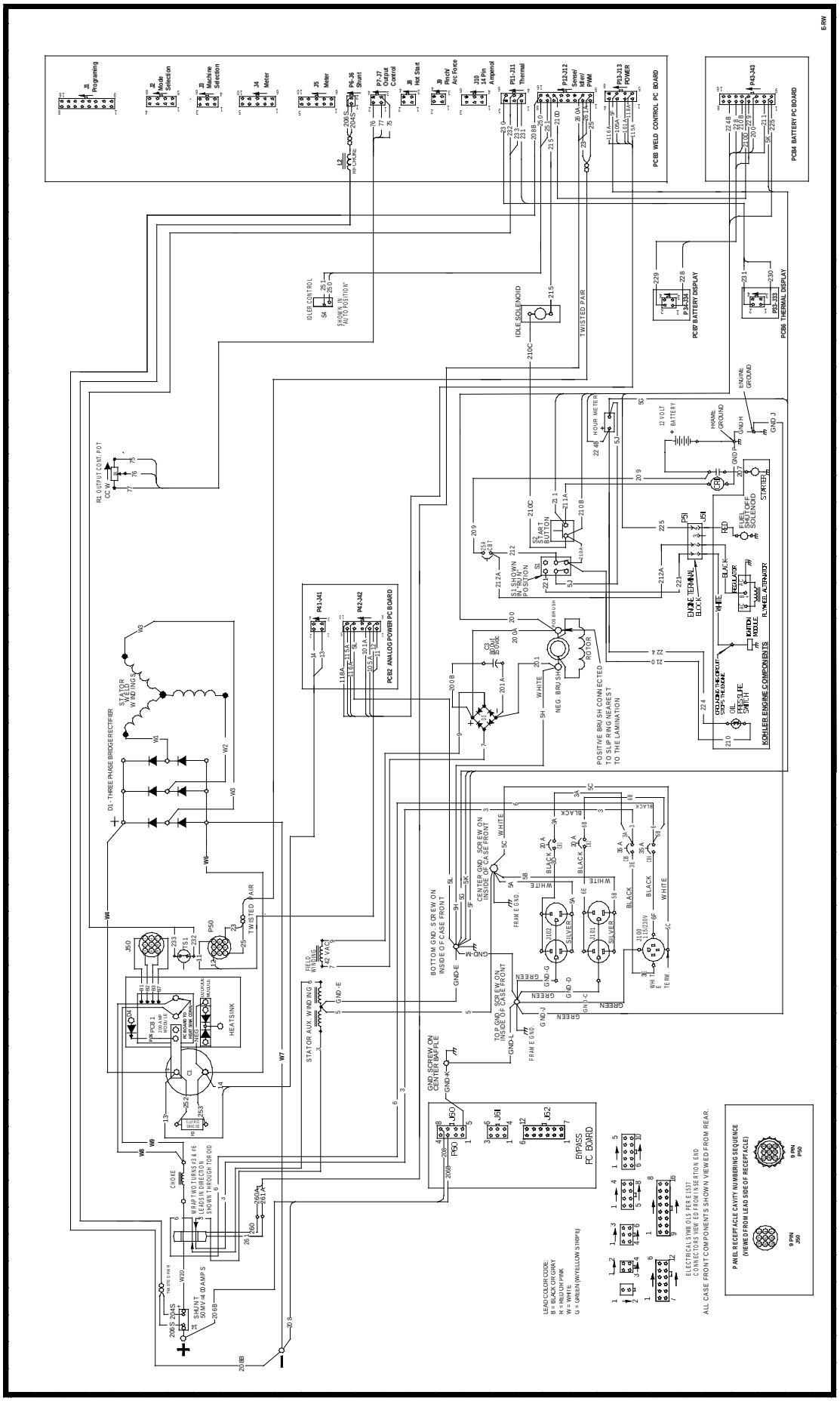
Observe all Safety Guidelines detailed throughout this manual

PROBLEMS (SYMPTOMS)	POSSIBLE AREAS OF MISADJUSTMENT(S)	RECOMMENDED COURSE OF ACTION
No welding power output. Thermal shutdown light is on.	1. Airflow is blocked or restricted. 2. Welding current exceeding machine rating.	1. Remove restriction and allow machine to run until light goes off. 2. Use smaller electrode size or slower wire feed speed. Allow machine to run until light goes off.
No welding power output. Thermal shutdown light is NOT on.	1. Remove restriction and allow machine to run until light goes off. 2. Use smaller electrode size or slower wire feed speed. Allow machine to run until light goes off. 3. Faulty PC board or welder alternator.	1. Make sure work clamp is tightly connected to clean base metal. 2. Place switch in "Weld Terminals On" position when welding without control cable. 3. Contact your Local Lincoln AUTHORIZED FIELD SERVICE FACILITY for technical troubleshooting assistance.
Welder has output but no control.	1. Faulty control potentiometer or PC board.	1. Contact your Local Lincoln AUTHORIZED FIELD SERVICE FACILITY for technical troubleshooting assistance.
No auxiliary power.	1. Open circuit breakers. 2. Faulty connections to auxiliary receptacles. 3. GFCI tripped (if installed). 4. Faulty PC board or welder alternator.	1. Reset breakers. If breakers keep tripping, reduce power draw. 2. Check connections. 3. Clear any ground fault and reset GFCI circuit by pressing "Reset" button on the 120 V receptacle. 4. Contact your Local Lincoln AUTHORIZED FIELD SERVICE FACILITY for technical troubleshooting assistance.

⚠ 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.

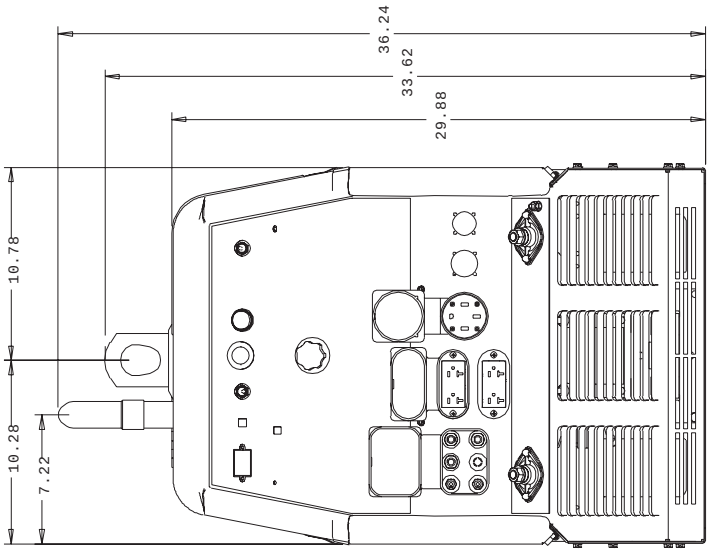
RANGER 200 - WIRING DIAGRAM

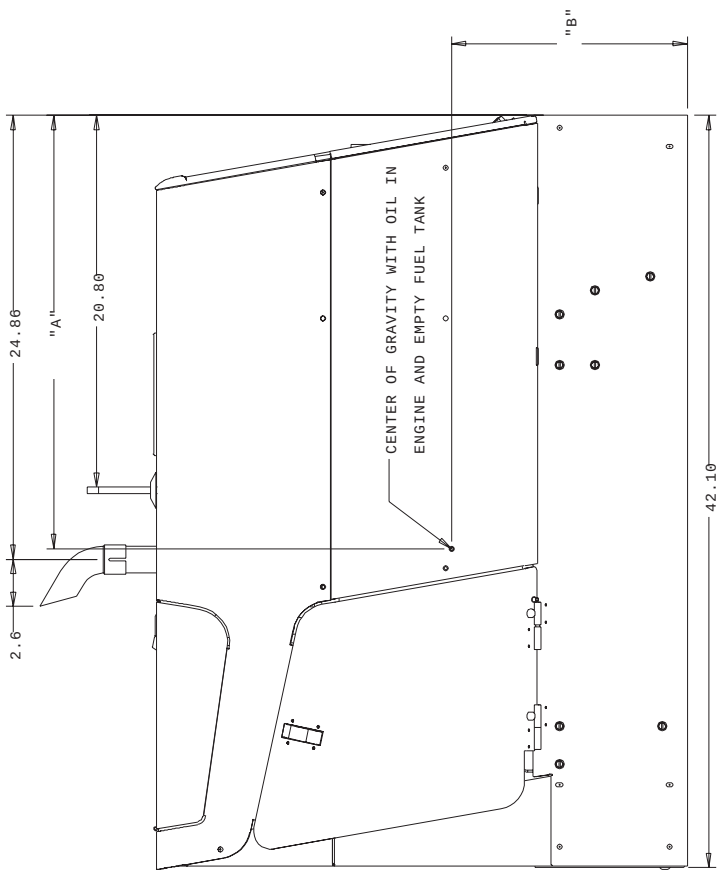


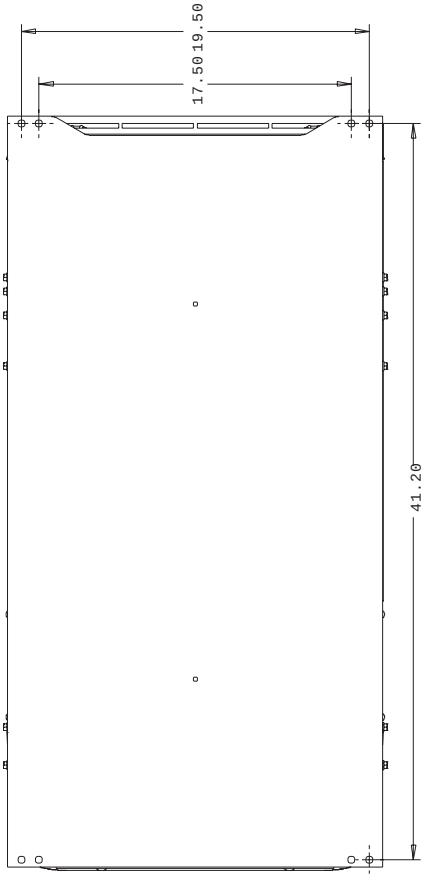
NOTE: This diagram is for reference only. It may not be accurate for all machines covered by this manual. The specific diagram for a particular code is pasted inside the machine on one of the enclosure panels. If the diagram is illegible, write to the Service Department for a replacement. Give the equipment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

DIMENSION PRINT RANGER 200

M19410







NOTES

NOTES

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:
____ Please Invoice (only if order is over $50.00)
____ Check or Money Order Enclosed, U.S. Funds only
____ Credit Card - VISA MasterCard

Account No. |_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|_| Exp Date |_|_| Month |_|_| Year

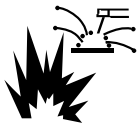
Name: _____
Address: _____
_____
Telephone: _____
Signature as it appears on Charge Card: _____

USE THIS FORM TO ORDER:
BOOKS OR FREE INFORMATIVE CATALOGS

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 **(ED-80)** _____
Seminar Information **(ED-45)** _____
Educational Video Information **(ED-93)** _____
James F. Lincoln Arc Welding Foundation Book Information **(JFLF-515)** _____

Titles:	Price	Code	Quantity	Cost
New Lessons in Arc Welding	$5.00	L		
Procedure Handbook "Twelfth Edition"	$15.00	PH		
How to Read Shop Drawings	$4.50	H		
Incentive Management	$5.00	IM		
A New Approach to Industrial Economics	$5.00	NA		
The American Century of John C. Lincoln	$5.00	AC		
Welding Preheat Calculator	$3.00	WC-8		
Pipe Welding Charts	$4.50	ED-89		
			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 **AVISO DE PRECAUCION**	● No toque las partes o los electrodos bajo carga con la piel o ropa mojada. ● Aislese del trabajo y de la tierra.	● Mantenga el material combustible fuera del área de trabajo.	● Protéjase los ojos, los oídos y el cuerpo.
French **ATTENTION**	● Ne laissez ni la peau ni des vêtements mouillés entrer en contact avec des pièces sous tension. ● Isolez-vous du travail et de la terre.	● Gardez à l'écart de tout matériel inflammable.	● Protégez vos yeux, vos oreilles et votre corps.
German **WARNUNG**	● Berühren Sie keine stromführenden Teile oder Elektroden mit Ihrem Körper oder feuchter Kleidung! ● Isolieren Sie sich von den Elektroden und dem Erdboden!	● Entfernen Sie brennbarres Material!	● Tragen Sie Augen-, Ohren- und Körperschutz!
Portuguese **ATENÇÃO**	● Não toque partes elétricas e electrodos com a pele ou roupa molhada. ● Isole-se da peça e terra.	● Mantenha inflamáveis bem guardados.	● Use proteção para a vista, ouvido e corpo.
Japanese **注意事項**	● 通電中の電気部品、又は溶材にヒフやぬれた布で触れないこと。 ● 施工物やアースから身体が絶縁されている様にして下さい。	● 燃えやすいものの側での溶接作業は絶対にしてはなりません。	● 目、耳及び身体に保護具をして下さい。
Chinese **警 告**	● 皮肤或濕衣物切勿接觸帶電部件及銲條。 ● 使你自己與地面和工件絕緣。	● 把一切易燃物品移離工作場所。	● 佩戴眼、耳及身體勞動保護用具。
Korean **위 험**	● 전도체나 용접봉을 젖은 헝겁 또는 피부로 절대 접촉치 마십시요. ● 모재와 접지를 접촉치 마십시요.	● 인화성 물질을 접근 시키지 마시요.	● 눈, 귀와 몸에 보호장구를 착용하십시요.
Arabic **تحذير**	● لا تلمس الاجزاء التي يسري فيها التيار الكهربائي أو الالكترود بجلد الجسم أو بالملابس المبللة بالماء. ● ضع عازلا على جسمك خلال العمل.	● ضع المواد القابلة للاشتعال في مكان بعيد.	● ضع أدوات وملابس واقية على عينيك وأذنيك وجسمك.

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

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

LISEZ ET COMPRENEZ LES INSTRUCTIONS DU FABRICANT EN CE QUI REGARDE CET EQUIPMENT ET LES PRODUITS A ETRE EMPLOYES ET SUIVEZ LES PROCEDURES DE SECURITE DE VOTRE EMPLOYEUR.

LESEN SIE UND BEFOLGEN SIE DIE BETRIEBSANLEITUNG DER ANLAGE UND DEN ELEKTRODENEINSATZ DES HERSTELLERS. DIE UNFALLVERHÜTUNGSVORSCHRIFTEN DES ARBEITGEBERS SIND EBENFALLS ZU BEACHTEN.

			
● Keep your head out of fumes. ● Use ventilation or exhaust to remove fumes from breathing zone.	● Turn power off before servicing.	● Do not operate with panel open or guards off.	**WARNING**
● Los humos fuera de la zona de respiración. ● Mantenga la cabeza fuera de los humos. Utilice ventilación o aspiración para gases.	● Desconectar el cable de alimentación de poder de la máquina antes de iniciar cualquier servicio.	● No operar con panel abierto o guardas quitadas.	Spanish **AVISO DE PRECAUCION**
● Gardez la tête à l'écart des fumées. ● Utilisez un ventilateur ou un aspirateur pour ôter les fumées des zones de travail.	● Débranchez le courant avant l'entretien.	● N'opérez pas avec les panneaux ouverts ou avec les dispositifs de protection enlevés.	French **ATTENTION**
● Vermeiden Sie das Einatmen von Schweibrauch! ● Sorgen Sie für gute Be- und Entlüftung des Arbeitsplatzes!	● Strom vor Wartungsarbeiten abschalten! (Netzstrom völlig öffnen; Maschine anhalten!)	● Anlage nie ohne Schutzgehäuse oder Innenschutzverkleidung in Betrieb setzen!	German **WARNUNG**
● Mantenha seu rosto da fumaça. ● Use ventilação e exhaustão para remover fumo da zona respiratória.	● Não opere com as tampas removidas. ● Desligue a corrente antes de fazer serviço. ● Não toque as partes elétricas nuas.	● Mantenha-se afastado das partes moventes. ● Não opere com os paineis abertos ou guardas removidas.	Portuguese **ATENÇÃO**
● ヒュームから頭を離すようにして下さい。 ● 換気や排煙に十分留意して下さい。	● メンテナンス・サービスに取りかかる際には、まず電源スイッチを必ず切って下さい。	● パネルやカバーを取り外したままで機械操作をしないで下さい。	Japanese **注意事項**
●頭部遠離煙霧。 ●在呼吸區使用通風或排風器除煙。	●維修前切斷電源。	●儀表板打開或沒有安全罩時不準作業。	Chinese **警 告**
● 얼굴로부터 용접가스를 멀리하십시요. ● 호흡지역으로부터 용접가스를 제거하기 위해 가스제거기나 통풍기를 사용하십시요.	● 보수전에 전원을 차단하십시요.	● 판넬이 열린 상태로 작동치 마십시요.	Korean **위 험**
● ابعد رأسك بعيداً عن الدخان. ● استعمل التهوية أو جهاز ضغط الدخان للخارج لكي تبعد الدخان عن المنطقة التي تتنفس فيها.	● اقطع التيار الكهربائي قبل القيام بأية صيانة.	● لا تشغل هذا الجهاز اذا كانت الاغطية الحديدية الواقية ليست عليه.	Arabic **تحذير**

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

使う機械や溶材のメーカーの指示書をよく読み、まず理解して下さい。そして貴社の安全規定に従って下さい。

請詳細閱讀並理解製造廠提供的説明以及應該使用的銀捍材料，並請遵守貴方的有関勞動保護規定。

이 제폼에 동봉된 작업지침서를 숙지하시고 귀사의 작업자 안전수칙을 준수하시기 바랍니다.

اقرأ بتمعن وافهم تعليمات المصنع المنتج لهذه المعدات والمواد قبل استعمالها واتبع تعليمات الوقاية لصاحب العمل.

LINCOLN® ELECTRIC

• World's Leader in Welding and Cutting Products •

• Sales and Service through Subsidiaries and Distributors Worldwide •

Cleveland, Ohio 44117-1199 U.S.A. TEL: 216.481.8100 FAX: 216.486.1751 WEB SITE: www.lincolnelectric.com