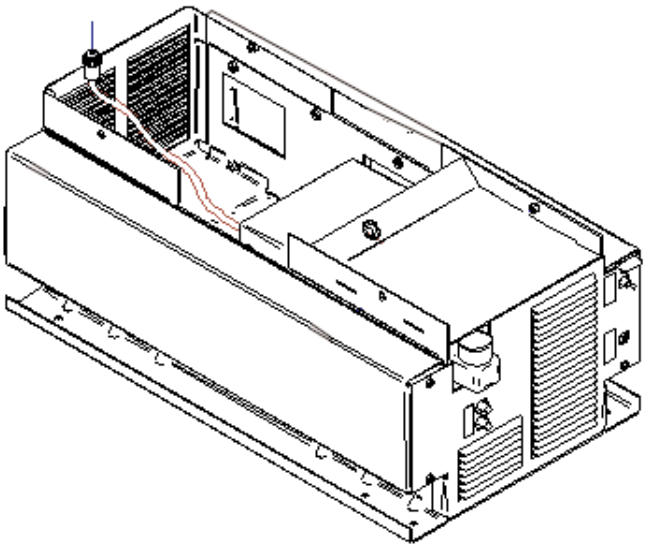
Power Wave Water Cooler

IM680-A

November, 2002

For use with machines having Code Numbers: **10730**, **10844**

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



Date of Purchase:_____
Serial Number:_____
Code Number:_____
Model:_____
Where Purchased:_____

INSTALLATION INSTRUCTIONS

LINCOLN® ELECTRIC

• World's Leader in Welding and Cutting Products •
• Sales and Service through Subsidiaries and Distributors Worldwide •
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⚠ 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.

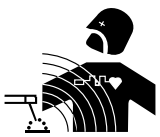
1.d. Keep all equipment safety guards, covers and devices in position and in good repair.Keep hands, hair, clothing and tools away from V-belts, gears, fans and all other moving parts when starting, operating or repairing equipment.

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.

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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.

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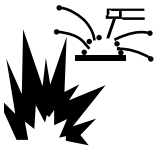


WELDING SPARKS can cause fire or explosion.

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.

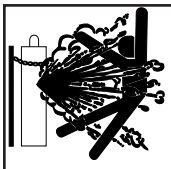
6.d. Do not heat, cut or weld tanks, drums or containers until the proper steps have been taken to insure that such procedures will not cause flammable or toxic vapors from substances inside. They can cause an explosion even though they have been “cleaned”. For information, purchase “Recommended Safe 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.

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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.

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**.

EXPLANATION OF SYMBOLS THAT APPEAR ON THIS EQUIPMENT

O **OFF**

I **ON**

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TECHNICAL SPECIFICATIONS – Power Wave Water Cooler (K1767-1)		
Model / Make		Power Wave Water Cooler K1767-1
Input		230V 50/60 Hz 1 Phase
Rated Current Draw		2.8 Amps
Operating Pressure		75 psig (516 kPa) (5.2 bar)
Flow Range		0.1 to 0.8 gal/min (0.4 to 3.0 liters/min)
Use on Machines		K1761, Power Wave 455/R K1519, Power Wave 655/R
Typical Operating Flow	MIG	0.5 gal./min (2.0 liter/min)
	Open Flow	1.1 gal/min (4.3 liter/min)
Reservoir Size		1.6 gal (6.1 liter)
Coolant Requirement		See Recommended Coolants Section D-3.
Shipping Weight	Reservoir Full	135 lbs. (61.2 kg)
Dimensions	L	35 in. (889mm)
	W	19 in. (483mm)
	H	14 in. (356mm)

SAFETY PRECAUTIONS:

⚠ WARNING

ELECTRIC SHOCK Can Kill

- **Only qualified persons should perform this installation.**

HOT COOLANT CAN BURN SKIN

- **Always be sure coolant is not hot before doing any work on cooler parts.**

ROTATING FAN BLADES ARE HAZARDOUS

- **Do not put your hands near an operating fan.**

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

ATTACHING THE WATER COOLER TO THE POWER SOURCE:

1. Preparation:

⚠ WARNING

- **Always turn off the power to the water cooler and to the power source before servicing the machine.**
- **Always disconnect the Power Wave machine from its service input power before servicing the machine.**

2. Detach all shipping material from the water cooler.

3. Make sure the wiring bundle with two leads in it is routed toward the front of the water cooler through the 1" diameter opening in the sheet metal (see Figure 1).

4. The Power Wave 455 weights 300 pounds. Use a suitable overhead crane or equivalent lifting device to safely raise the Power Wave 455 by its lift bale. Place temporary supports (4 x 4 in Lumber) across the cooler at points shown to support the power source. Lower the Power Wave 455 onto temporary supports. Do not remove overhead crane.

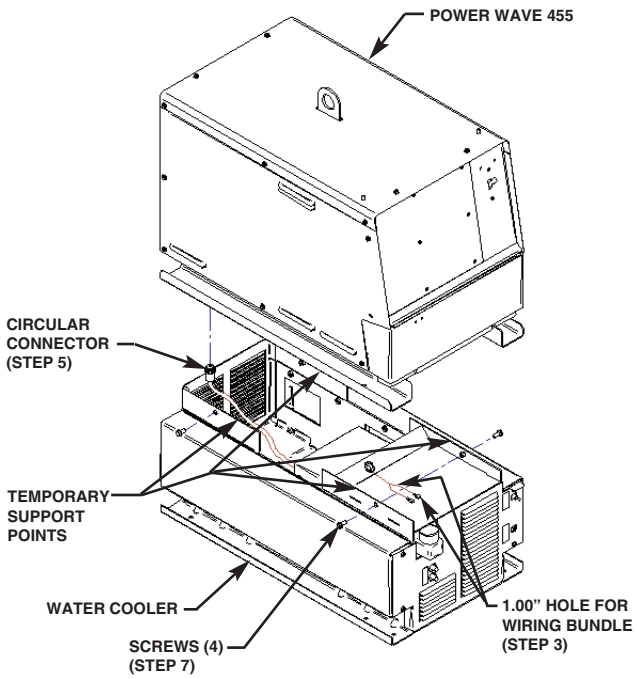
5. Connect the circular connector at the rear of the water cooler to the connector at the rear of the power source.

6. Remove temporary supports and carefully finish lowering the power source onto the water cooler and line up the mounting holes in the channels at the base of the power source.

7. Using the four 3/8 screws provided, fasten the water cooler to the power source.

8. Connect the two front leads from step 3 to the terminal strip at the front of the power source.

FIGURE 1



SAFETY PRECAUTIONS

⚠ WARNING

ELECTRIC SHOCK can kill.

- **Disconnect input power by removing plug from receptacle before working inside Cooler.**
- **Do not operate with covers removed.**
- **Use only grounded receptacle.**
- **Do not remove the power cord ground prong.**
- **Do not touch electrically "hot" parts inside Cooler.**
- **Have qualified personnel do the installation, maintenance and troubleshooting work.**

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

GENERAL DESCRIPTION:

The Power Wave Cooler is specifically designed to work with select Power Wave's type power sources for MIG and TIG guns and torches. It mounts directly underneath the power source to conserve floor space. Integral to the cooler is a flow switch to protect welding guns when water flow is interrupted. Electrical power for the cooler is supplied by the power source.

The following should always be observed when operating any Power Wave Water Cooler:

⚠ WARNING

- **Never operate the G3503-[ ] cooler outside of its case, or without access door in place.**
- **Immersion in water around electrical lines can cause electrical shock.**
- **Never place fingers into openings of Cooler. Moving parts can injure.**
- **Turn off power to the Power Wave or the disconnect switch before filling the reservoir.**
- **Never operate the Cooler with the reservoir fill cap off. (See Figure 1.A)**

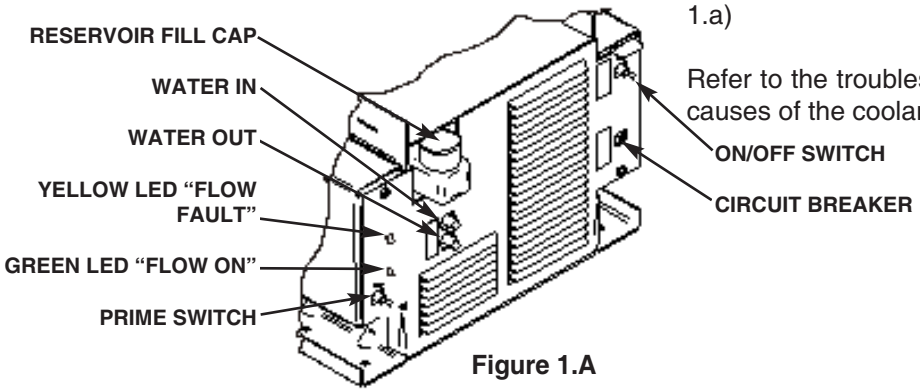


Figure 1.A

OPERATING PRECAUTIONS

The following should always be observed when operating any Power Wave Water Cooler:

- Check the reservoir daily. (See Figure 3)
- Keep the reservoir full especially after changing any water lines.
- The power to the Cooler should be turned off when welding is not taking place for a long period of time.
- Be certain that the Cooler is on (power switch in the "**I**" position) before beginning to weld.
- Never operate the Cooler with the reservoir fill cap removed.
- Avoid placing the Cooler near areas of extreme heat.
- Avoid placing the Cooler near a flux hopper or an area where dust build-up is extreme.
- Avoid kinking or putting sharp bends in any water lines.
- Keep all water lines clean.

TURNING THE SYSTEM ON

After filling the reservoir and connecting the coolant hoses to the Power Wave Water Cooler per the Installation Section, turn the Water Cooler on.
You will be able to hear the unit running and feel air flow out of the front of the K1767-1 when the Cooler is operating. The Cooler will run continuously when the Power Wave is turned on.
When first starting the unit, check all of the water lines to insure that no coolant leaks are present. Leakage causes poor welding performance, poor cooling performance, low welding component life and potential electrical safety hazards.
Turn the primer switch on and hold for ten seconds. coolant will start to flow through the system and the green LED "Flow on" will light, when the primer switch is released the pump will remain on and continue to circulate coolant.
If the flow sensor detects low flow, the pump will stop operating and the YELLOW LED "Flow Fault" will light. A signal will be sent to the Power Wave to stop welding to protect the welding gun or torch. (See Figure 1.a)

Refer to the troubleshooting guide to find the potential causes of the coolant flow fault.

SAFETY PRECAUTIONS

⚠ WARNING

ELECTRIC SHOCK can kill.

- **Disconnect input power by removing plug from receptacle before working inside Cooler.**
- **Do not operate with covers removed.**
- **Use only grounded receptacle.**
- **Do not remove the power cord ground prong.**
- **Do not touch electrically "hot" parts inside Cooler.**
- **Have qualified personnel do the installation, maintenance and troubleshooting work.**

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

REMOVING THE G3503-[ ] WATER COOLER FROM THE BASE FOR SERVICE:

⚠ WARNING

- **Always turn off the power to the water cooler and to the power source before servicing the machine.**
- **Always disconnect the Power Wave machine from its service input power before servicing the machine.**
- **Do not remove the pump relief valves 3/4" hex nut or attempt to adjust the relief valve setting.**

1. Remove the front panel by removing the four screws holding it in place. Save the screws.
2. Remove both fasteners from the base which hold the cooler in place. Carefully pull the water cooler forward until the cooler's Molex connectors are visible.
3. Disconnect both the water cooler's Molex connectors.
4. Pull the water cooler completely out of the machine.
5. Perform service or periodic maintenance on the cooler.
6. Reinstall the water cooler by reversing steps 1 through 4.
7. If necessary, fill the water cooler with recommended coolant (Page D-3) to level shown (Figure 2,Page D-2).
8. Prime the cooler:
   a. Keep accessories' hose lengths horizontal, either coiled or straight, and no higher than 4 feet of the specified coolant level (Fig. 2).
   b. Switch on the Power Wave machine.
   c. Turn on and hold the PRIME switch for approximately 10 seconds until the green LED "flow on" lights.
9. Check coolant level. Add more if required.

WATER COOLER PERIODIC MAINTENANCE

1. Preparation:

⚠ WARNING

- **Always switch off the Power Wave machine power.**
- **Always disconnect the Power Wave machine from service input power.**
- **Do not remove the pump relief valves 3/4 in. acorn hex nut or attempt to adjust the relief valve setting.**

2. Remove the cooler G3503-[ ] from the Power Wave machine.

3. Clean the pumps inlet strainer:
   - Drain the reservoir of coolant and dispose of it in an environmentally responsible manner (see Recommended Coolants).
   - Place absorbent towels underneath pump head.
   - Hold pump head to apply counter torque when loosening strainers 7/8 acorn nut. Do not confuse with 3/4 acorn nut. Remove nut and slide inlet strainer down and out from pump head.
   - Gently rinse strainer under running water to thoroughly clean it.
   - Use the mirror to inspect inside of pump for contamination. Carefully remove hardened debris with dental pick if necessary, without scratching inside of the pump.
   - Reinstall strainer and acorn nut, tightening with 75±15 in.-lbs. of torque. Wipe dry all areas wetted by coolant. Dispose of towels in an environmentally responsible manner (see Recommended Coolants).

4. Remove fan shroud and inspect hoses and electrical harnesses for kinking or damage (cut, abrasion, swelling, etc.). Replace if necessary.

5. Remove accumulated dust from cooler, especially from the motor and heat exchanger, by blowing it off with shop air or vacuuming it out.
   - The heat exchanger fins are sharp but can be easily bent. Treat them with care to avoid personal injury and damaging them.
   - Remove the cooler from the machine for a more thorough cleaning job.

6. Motor lubrication is recommended once a year:
   - Remove plug over lube port at top of motor near fan end.
   - Add 20 drops of electric motor or SAE 10 oil then reinstall plug.

7. Flush coolant from the system and replace with fresh, recommended coolant at least once a year. More frequent flushing may be necessary, depending upon a user's particular system or its usage.

NOTE: Never run the pump dry. Always use a recommended coolant, otherwise pump damage may result.

8. Reinstall the cooler into the Power Wave machine.

9. Prime the cooler:
   a. Keep accessories' hose lengths horizontal, either coiled or straight, and no higher than 4 feet of the specified coolant level (Fig. 2).
   b. Switch on the Power Wave machine.
   c. Turn on and hold the PRIME switch for approximately 10 seconds until the green LED "flow on" lights .

10. Check coolant level. Add more if required.

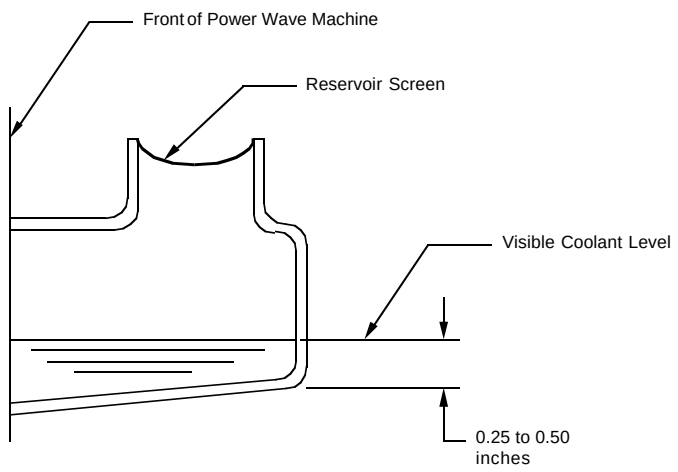


Figure 2. Specified coolant level.

TABLE 1
COOLER ELECTRICAL HARNESS PIN-OUTS

Molex Connector	Molex Pin No.	Description
large	1	Ground
large	2	Motor Common
large	3	Unused
large	4	Unused
large	5	Motor 230 VAC Functions on (PW 450 ONLY)
large	6	Motor 230 VAC Functions on (PW 455 / PW 655)
small	1	Unused
small	2	Unused
small	3	Relay coil
small	4	Relay coil
small	5	Pressure Switch - NO contact
small	6	Pressure Switch - common contact

RECOMMENDED COOLANTS

1. The following coolants have been determined to be compatible with the wetted materials used in the cooler assembly:
   - Distilled or deionized water
   - Potable tap water
   - Sediment-free mixtures containing a maximum of 50% ethylene glycol or automotive-grade antifreeze and the balance of distilled or deionized water.

2. Ethylene glycol mixtures should be selected if the cooler may be exposed to a temperature below the freezing point of water.

3. Consult gun, torch, and wire feeder manuals for coolant recommendations and select one from the above list.

4. Pure solutions and mixtures of, or materials (i.e. towels) wetted with ethylene glycol are toxic to humans and animals. They must not be haphazardly discarded, especially by pouring liquids down the drain. Contact the local EPA office for responsible disposal methods or for recycling information.

5. The cooler's reservoir has a nominal liquid capacity of 1.6 gallons.(6.1 Liters)

FILLING THE RESERVOIR

The cooler is shipped from the factory with a 50 / 50 mixture of ethylene glycol and water as coolant.

- Be certain to replace the reservoir fill cap when the reservoir is full. Operation of the Power Wave Water Cooler without the fill cap in place can cause evaporation loss of coolant or low product life.

WATER LINE CONNECTION

Each Water Cooler model contains two female quick disconnect fittings to mate with water hoses typically used in the welding market.

Take the accessory INLET hose (colored or tagged blue on most hoses) and insert it into the cooler's "Coolant Out" fitting. Then take the accessory OUTLET hose (colored or tagged red on most hoses) and insert it into the cooler's "Coolant In" fitting. Make sure the connectors are fully inserted. BE CERTAIN THAT NO LEAKS EXIST WHEN COOLER IS TURNED ON. A LEAK WILL DEPLETE RESERVOIR VOLUME, CAUSE POOR COOLING PERFORMANCE AND REDUCE GUN OR TORCH LIFE.

HOW TO USE TROUBLESHOOTING GUIDE

⚠ WARNING

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

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

Step 1. LOCATE PROBLEM (SYMPTOM).
Look under the column labeled “PROBLEM (SYMPTOMS)”. This column describes possible symptoms that the machine may exhibit. Find the listing that best describes the symptom that the machine is exhibiting.

Step 2. POSSIBLE CAUSE.
The second column labeled “POSSIBLE CAUSE” lists the obvious external possibilities that may contribute to the machine symptom.

Step 3. RECOMMENDED COURSE OF ACTION
This column provides a course of action for the Possible Cause, generally it states to contact your local Lincoln Authorized Field Service Facility.

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

⚠ 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.

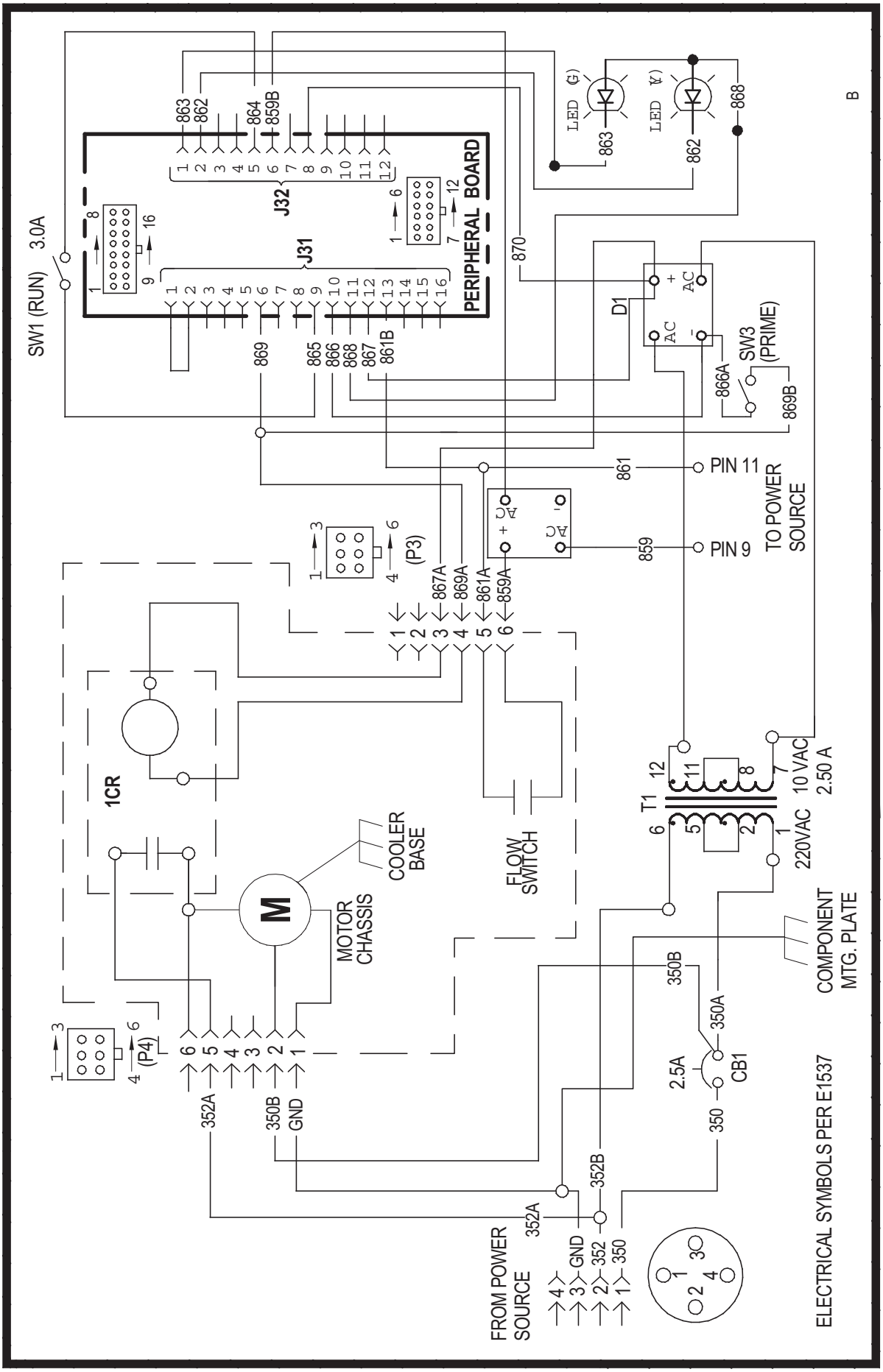
Observe all Safety Guidelines detailed throughout this manual

PROBLEMS (SYMPTOMS)	POSSIBLE AREAS OF MISADJUSTMENTS(S)	RECOMMENDED COURSE OF ACTION
Cooler does not operate with power switch on. (Switch pushed to "1" position.) No " LED" Turn on.	1. Power cord unplugged to power-wave not plugged in. 2. Power switch faulty. 3. Power harness damaged.	If all recommended possible areas of misadjustment have been checked and the problem persists, **Contact your local Lincoln Authorized Field Service Facility.**
Cooler does not operate with power switch on, YELLOW LED "Flow Fault" is on.	1. Water lines blocked or crimped. 2. Leak in gun or water hoses. 3. Reservoir empty. 4. Female quick-connect fittings are not connected to male fittings. 5. The system needs to be primed.	
Internal water leak.	1. Hose clamp loose on internal hose. 2. Internal hose punctured. 3. Heat exchanger leaking.	
Torch or gun runs hot.	1. Unit placed by area of extreme heat. 2. Low coolant flow. 3. No coolant flow. 4. Fan not operating. 5. Heat exchanger clogged.(Air or coolant side) 6. Torch or Gun exceeds cooler rating. 7. Welding output not disabled with low or no coolant flow.	
Fan operates but there is low coolant flow. (Cooler will not continuously operate)	1. Leak in torch/gun or hoses. 2. Torch/gun or hoses partially obstructed. 3. Pressure low (pump failing).	
Fan operates but there is no coolant flow. (Cooler will not continuously operate)	1. Pump motor failure. 2. Reservoir empty.	
Cooler trips outlet circuit breaker.	1. Circuit overloaded.	
The Cooler is on, but the Power Wave still indicates that there is a water fault.	1. Verify that there is actually coolant flow (ie no blocked connections, proper coolant level) 2. Check that all connections in the Power Wave's green I/O connector are tight and that any insulation is not pinched	

⚠ 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.

K1767-1 WATER COOLER WIRING DIAGRAM



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		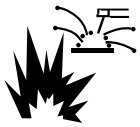	
WARNING	● Do not touch electrically live parts or electrode with skin or wet clothing. ● Insulate yourself from work and ground.	● Keep flammable materials away.	● Wear eye, ear and body protection.
Spanish **AVISO DE PRECAUCION**	● No toque las partes o los electrodos bajo carga con la piel o ropa mojada. ● 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.

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