GMAW

Push-Pull Gun

OPERATOR'S MANUAL

Python® -Plus

Model number K2447-1, K2447-2, K2447-3

Safety Depends on You
Lincoln arc welding 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.
SAFETY

WARNINGS

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 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 Diesel Engines 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 not now 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 workplace 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 Z87.1 standards.

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

4.c. Protect other nearby personnel with suitable, non-flammable screening and/or warn them not to watch the arc or 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, cuffsless trousers, high shoes and a cap over your hair. Wear ear plugs when welding out of position or in confined spaces. 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-1, “Precautions for Safe Handling of Compressed Gases in Cylinders,” available from the Compressed Gas Association 1235 Jefferson Davis Highway, Arlington, VA 22202.

FOR ELECTRICALLY powered equipment.

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

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

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

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PRÉCAUTIONS DE SÛRETÉ

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

Sûreté pour Soudage à L’Arc
1. Protégez-vous contre la secousse électrique :
   a. Les circuits à l’électrode et à la pièce sont sous tension quand la machine à soudier est en marche. Eviter toujours tout contact entre les parties sous tension et la peau nue ou les vêtements mouillés. Porter des gants secs et sans trous pour isoler les mains.
   b. Faire très attention de bien s’isoler de la masse quand on soude dans des endroits humides, ou sur un plancher métallique ou des grilles métalliques, principalement dans les positions assis ou couché pour lesquelles une grande partie du corps peut être en contact avec la masse.
   c. Maintenir le porte-électrode, la pince de masse, le câble de soudage et la machine à souder en bon et sûr état de fonctionnement.
   d. Ne jamais plonger le porte-électrode dans l’eau pour le refroidir.
   e. Ne jamais toucher simultanément les parties sous tension des porte-électrodes connectés à deux machines à souder parce que la tension entre les deux pinces peut être le total de la tension à vide des deux machines.
   f. Si on utilise la machine à souder comme une source de courant pour soudage semi-automatique, ces précautions pour le porte-électrode s’appliquent aussi au pistolet de soudage.

2. Dans le cas de travail au dessus du niveau du sol, se protéger contre les chutes dans le cas ou on reçoit un choc. Ne jamais enrouler le câble-électrode autour de n’importe quelle partie du corps.

3. Un coup d’arc peut être plus sévère qu’un coup de soleil, 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 laiter 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 épaissie, pantalon sans revers, et chaussures montantes.

5. Toujours porter des lunettes de sécurité dans la zone de soudage. Utiliser des lunettes avec écrans latéraux dans les zones où l’on pique le laitier.

6. Eloigner les matériaux inflammables ou les recouvrir afin de prévenir tout risque d’incendie dû aux étincelles.

7. Quand on ne soude pas, poser la pince à une endroit isolé de la masse. Un court-circuit accidentel peut provoquer un échauffement et un risque d’incendie.

8. S’assurer que la masse est connectée le plus près possible de la zone de travail qu’il est pratique de la faire. Si on place la masse sur la charpente de la construction ou d’autres endroits éloignés de la zone de travail, on augmente le risque de voir passer le courant de soudage par les chaînes de levage, câbles de grue, ou autres circuits. Cela peut provoquer des risques d’incendie ou d’échauffement des chaines et des câbles jusqu’à ce qu’ils se rompent.

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

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


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

1. Relier à la terre le châssis du poste conformément au code de l’électricité et aux recommandations du fabricant. Le dispositif de montage ou la pièce à souder doit être branché à une bonne mise à la terre.

2. Autant que possible, l’installation et l’entretien du poste seront effectués par un électricien qualifié.

3. Avant de faire des travaux à l’intérieur du poste, la débrancher à l’interrupteur à la boîte de fusibles.

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

INSTRUCTIONS FOR ELECTROMAGNETIC COMPATIBILITY

Conformance
Products displaying the C-Tick mark are in conformity with Australian/New Zealand requirements for Electromagnetic Compatibility (EMC) according to standard (emission) AS/NZS 3652 "Electromagnetic Compatibility – Arc Welding Equipment".

Products displaying the CE mark are in conformity with European Community Directive 89/336/EEC requirements for EMC by implementing ENS0199 "Electromagnetic Compatibility (EMC) – Product standard for arc welding equipment".

Products are:
• For use with other Lincoln Electric/LiquidArc equipment.
• Designed for industrial and professional use.

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

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

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

Assessment of Area
Before installing welding equipment the purchaser/user shall make an assessment of potential problems in the surrounding area.

The following shall be taken into account:
• Other supply cables, control cables, signaling and telephone cables above, below and adjacent to the welding equipment;
• Radio and television transmitters and receivers;
• Computer and other control equipment;
• Safety critical safety equipment, eg. guarding of industrial equipment;
• The health of people around, eg. the use of pacemakers and hearing aids;
• Equipment used for calibration or measurement;
• The immunity of other equipment in the environment. The purchaser/user shall ensure that other equipment being used in the environment is compatible. This may require additional protection measures;
• The time of the day that welding or other activities are to be carried out.

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

Methods of Reducing Emissions

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

Maintenance of the Welding Equipment
The welding equipment should be routinely maintained according to the manufacturer's recommendations. All access and service doors and covers should be closed and properly fastened when the welding equipment is in operation. The welding equipment should not be repositioned in any way except for those changes and adjustment covered in the manufacturer’s instructions. In particular, the spark gaps of arc stabilization and shielding devices should be adjusted and maintained according to the manufacturer's recommendations.

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

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

Earthing of the workpiece
Where the workpiece is not bonded to earth for electrical safety, nor connected to earth because of its size and position, eg. ship’s hull or building steelwork, a connection bonding the workpiece to earth may reduce emissions in some, but not all instances. Care should be taken to prevent the earthing of work pieces increasing the risk of injury to users, or damage to other electrical equipment. Where necessary, the connection of the workpiece to earth should be made by direct connection to the workpiece, but in some countries where direct connection is not permitted, the bonding should be achieved by suitable capacitance, selected according to national regulations.

Screening and Shielding
Selective shielding and shielding of other cables and equipment in the surrounding area may alleviate problems of interference. Screening of the entire welding installation may be considered for special applications.

Portions of the preceding text are extracted from:
• Australian/New Zealand standard AS/NZS 3652. Permission to reproduce has been granted by Standards Australia and Standards New Zealand. For further explanation, readers should be referred to the standard itself.
• British Standards Institution standard BS EN 50199:1995. Reproduced with permission of BSI under license number 20005K0631. Complete standards can be obtained from BSI Customer Services, 389 Chiswick High Road, London W4 4AL, United Kingdom. (Tel +44 (0) 20 8990 9001).

Copyright of above text is property of Standards Australia, Standards New Zealand and British Standards Institution. Permission to reproduce the text must be obtained.
Thank You

For selecting a quality product. We want you to take pride in operating this product...as much pride as we have in bringing the 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 replacements parts for, or information on this equipment always supply the information you have recorded above.

Read this Owner’s 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.
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Section A

Installation

Technical Specifications

Wire Capacity
- .030" - .045" (0.6mm - 1.2mm) solid and hard wire
- .030" - 1/16" (0.8mm - 1.6mm) aluminum and cored wire

Wire Speed
800 IPM (20.3 mpm) Max. at rated feeder Input Voltage (120VAC / 42VAC)

Duty Cycle - 100% (All ratings are using Argon Gas)
200 Amps/25 Volts Air cooled standard

Shipping Weight (approximate) - Air Cooled
- 15ft. (4.5m) ........................................ 13.09 lbs. (5.94 Kg)
- 25ft. (7.6m) ........................................ 19.29 lbs. (8.29 Kg)
- 50ft. (15.2m) ........................................ 29.9 lbs. (13.19 Kg)

Torch weight (less leads)
- Air/Water cooled - 2.5 lbs. (1.13 kilogram)

Support Equipment Required
- C.V. or C.C. Power Source of sufficient capacity for your needs.
- Regulated gas supply and hoses.
- Properly sized power leads from power source to wire feeder and ground.

Gun Lead Connections

Power Cable
A #2 AWG power cable is used on the Python-Plus. The gun end of the cable has a fitting crimped to the copper cable strands. This fitting is then threaded into the gun body. The cabinet end of the power cable is incorporated into the Power/Gas Adaptor.

Conduit
The Python-Plus comes standard with a poly-lined conduit, for feeding aluminum wire. The longer fitting with a shallow groove is used on the gun end. A set screw located on top of the gun handle secures the conduit in place. The cabinet end of the conduit is incorporated into the Power/Gas Adaptor.

Gas Hose
The gas hose is pushed over a barbed fitting on the gun body and secured with a plastic tie wrap. The cabinet end of the gas hose is incorporated into the Power/Gas Adaptor.

Electric Cable
A multi-conductor control cable is used on the Python-Plus. The gun end of the cable is secured with a cable clamp and the wires are connected to the potentiometer, the micro switch, the motor and the gun body mechanically. Slack is left in the electric cable as it exits the back of the gun to prevent cable and/or wire breakage. The cabinet end of the control cable uses a 7-Pin, Amphenol connector.
Section B

Operation

General
The Python gun maintains a constant, steady, uniform wire feed speed, regardless of curved or looped wire conduit. The constant push exerted by the slave motor in the cabinet, combined with the pull of the torch motor, causes the wire to literally float friction-free through the wire conduit. The 24VDC torch motor is controlled by a three and three-quarter (3 3/4) turn potentiometer in the torch handle.

Controls and Settings

Potentiometer
The laterally-positioned potentiometer is located in the lower end of the handle, providing up to 800 ipm with 3 3/4 turns.

Micro Switch
The micro switch assembly consists of the micro switch, and leads.

Trigger Sensitivity
The amount of trigger level travel can be shortened for a "quicker" or "more responsive" action.

A more sensitive trigger lever is produced by reducing the gap between the trigger lever and the micro-switch lever.

By turning-in the Trigger Sensitivity Adjustment Screw, it closed the gap between the trigger lever and the micro-switch lever.

This well enable the operator to increase the sensitivity of the trigger lever.

Sensitivity Adjustment
With the wire feeder turned on (with or without welding wire loaded), turn the screw in until the micro-switch is activated. Once activated, the gun and wire feeder motors will begin feeding wire. Retract the screw accordingly until the system is deactivated and adjusted to the operators' liking.

Drive Roll and Idler Rolls

General
The Python gun comes standard with a knurled drive roll and a grooved idler roll, which will handle both steel and aluminum wire with diameters from .030-1/16 inch. Optional insulated V-groove drive rolls are also available for aluminum wire if desired (see Optional Kits).

Drive roll tension is accomplished with a unique spring-loaded pressure screw. The Python comes from the factory with the pressure adjustment screw preset. NO ADJUSTMENT IS REQUIRED FOR ALL SIZES AND TYPES OF WIRES.
Drive Roll Installation/Removal

*NOTE: Neither of the handles needs to be removed to access the Drive or Idler Rolls.*

1. Pull the Cam Lever away from the idler roll. This will relieve the pressure against the drive roll (as shown in Figure 1).

2. Align the Drive Roll Removal Tool (P/N 931-0100) over the flats of the drive roll (as shown in Figure 2). Hold the torch with one hand or on a table top, with the other hand give the Removal Tool a quick snap-turn in the **CLOCKWISE DIRECTION**.

3. Once the drive roll is loose, continue to spin drive roll in the clockwise direction to remove the drive roll from the torch.

4. Install a new drive roll on the left-hand threaded shaft. The drive roll will self-tighten when it is feeding wire.

**Idler Roll Installation and Removal**
(Reference Figure 3)

1. Using a slot type screwdriver, loosen idler screw, taking care not to lose lock washer under idler roll.

2. Insert new idler roll and lock washer onto screw, insuring that idler groove is toward top and lock washer is beneath.

3. Tighten.

*NOTE: Lock washer must be under idler roll or it will not turn freely.*
### Accessories/Options

<table>
<thead>
<tr>
<th>Description</th>
<th>LE P/N</th>
<th>MK P/N</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Insulated Drive Roll Kits</strong> are used to prevent preheating of the wire which may soften it and clog the liner. This picking up of current at the drive rolls rather than at the contact tip is usually not a problem unless using too large of a contact tip or excessively oxidized aluminum wire.</td>
<td></td>
<td></td>
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<tr>
<td><strong>Insulated Groove Drive Roll Kit</strong>……………………..KP1594-030 ….. 005-0640</td>
<td></td>
<td></td>
</tr>
<tr>
<td>For .030&quot; (0.8mm) dia. aluminum wire. Includes insulated groove drive roll and insulated idler roll assy.</td>
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<tr>
<td><strong>Insulated Groove Drive Roll Kit</strong>……………………..KP1594-035 ….. 005-0641</td>
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<td></td>
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<tr>
<td>For .035&quot; (0.9mm) dia. aluminum wire. Includes insulated groove drive roll and insulated idler roll assy.</td>
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<td><strong>Insulated Groove Drive Roll Kit</strong>…………………….. n/a ….. 005-0642</td>
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<td>For .040&quot; (1.0mm) dia. aluminum wire. Includes insulated groove drive roll and insulated idler roll assy.</td>
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<td><strong>Insulated Groove Drive Roll Kit</strong>……………………..KP1594-3/64 ….. 005-0643</td>
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<td></td>
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<tr>
<td>For .045&quot; (1.2mm) dia. aluminum wire. Includes insulated groove drive roll and insulated idler roll assy.</td>
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<tr>
<td><strong>Insulated Groove Drive Roll Kit</strong>……………………..KP1594-1/16 ….. 005-0644</td>
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</tr>
<tr>
<td>For .062&quot; (1.6mm) dia. aluminum wire. Includes insulated groove drive roll and insulated idler roll assy.</td>
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<td><strong>Handle Kit</strong>…………………………………………………………005-0699</td>
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<tr>
<td>Includes left and right handles, screws and drive roll door.</td>
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<tr>
<td><strong>Trigger Kit</strong>…………………………………………………………005-0694</td>
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<td></td>
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<tr>
<td>Trigger adjustment kit includes a spring and sensitivity adjustment screw replacement for all Python-Plus guns.</td>
<td></td>
<td></td>
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<tr>
<td><strong>Micro Switch Kit</strong>…………………………………………………005-0701</td>
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<td></td>
</tr>
<tr>
<td>Replacement micro switch assembly for all Python guns.</td>
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</tr>
<tr>
<td><strong>Potentiometer Kit</strong>………………………………………………005-0695</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Replacement potentiometer assembly for all Python guns.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Snake Skins®

Snake Skins® protective covers are now standard on all guns. You may order spare replacement covers to protect the lead assy of the torch when the factory one becomes damaged or worn. It can easily be replaced in the field by means of Velcro®.

Snake Skin Cover 13ft (for 15ft leads) ........................................931-0110
Snake Skin Cover 23ft (for 25ft leads) ........................................931-0122
Snake Skin Cover 48ft (for 50ft leads) ........................................931-0123
### Contact Tips

<table>
<thead>
<tr>
<th>Contact Tip - 3/8” Diameter</th>
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<tbody>
<tr>
<td>LE P/N</td>
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<tr>
<td>------</td>
</tr>
<tr>
<td>KP2217-1B1</td>
</tr>
<tr>
<td>--</td>
</tr>
<tr>
<td>KP2217-2B1</td>
</tr>
<tr>
<td>--</td>
</tr>
<tr>
<td>--</td>
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<tr>
<td>--</td>
</tr>
<tr>
<td>KP2217-4B1</td>
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<tr>
<td>--</td>
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<tr>
<td>KP2217-5B1</td>
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<tr>
<td>--</td>
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<td>--</td>
</tr>
</tbody>
</table>

*Standard - furnished with torch.

To Remove contact tip when using full water cooled gas cup (P/N 621-0065), contact tip removal tool (P/N 931-0002) must be used.

### Finned Copper Cups

<table>
<thead>
<tr>
<th>Cup Size</th>
<th>Cup I.D.</th>
<th>MK P/N</th>
<th>LE P/N</th>
</tr>
</thead>
<tbody>
<tr>
<td>No. 6</td>
<td>3/8” (9.25mm)</td>
<td>621-0248</td>
<td>KP2213-1</td>
</tr>
<tr>
<td>No. 8</td>
<td>1/2” (12.7mm)</td>
<td>621-0249</td>
<td>KP2214-1</td>
</tr>
<tr>
<td>No. 10*</td>
<td>5/8” (15.8mm)</td>
<td>621-0250</td>
<td>KP2215-1</td>
</tr>
</tbody>
</table>

*Standard - furnished with torch

### Heavy Duty Finned Copper Gas Cups

<table>
<thead>
<tr>
<th>Cup Size</th>
<th>Cup I.D.</th>
<th>MK P/N</th>
<th>LE P/N</th>
</tr>
</thead>
<tbody>
<tr>
<td>No. 10</td>
<td>5/8” (15.8mm)</td>
<td>621-0251</td>
<td>KP2216-1</td>
</tr>
<tr>
<td>No. 12</td>
<td>3/4” (19.0mm)</td>
<td>621-0252</td>
<td>--</td>
</tr>
</tbody>
</table>

*Standard - furnished with torch

### Torch Barrel Liners

<table>
<thead>
<tr>
<th>Part Number</th>
<th>Description</th>
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<tbody>
<tr>
<td>LE KP2244-1 MK 621-0424</td>
<td>Tip Extender (Air/Water cooled barrel only)</td>
</tr>
<tr>
<td>615-0178</td>
<td>Bulk Teflon Liner</td>
</tr>
<tr>
<td>LE KP2226-1 MK 931-0137</td>
<td>Liner Package, 5 pieces</td>
</tr>
</tbody>
</table>
Barrel Assemblies
All barrels are rated at 100% duty cycle

Barrels
Air Cooled
The Python-Plus guns come standard with a 60˚ curved barrel. The barrel assembly locks to the Python® body using the patented EZ Lock™ system.

Barrel Removal and Installation
To remove the barrel assembly, loosen the patented EZ Lock™ Taper lock nut until it is clear of the threads. Pull barrel out of the gun body.

To replace a barrel assembly, open the drive and idler roll door and seat the barrel assembly until the inlet guide is almost touching the drive and idler roll and the rear face of the barrel is flush with the aluminum body block. Take care not to damage the “O” rings when inserting into the body. Tighten taper lock nut assembly firmly so that barrel cannot rotate.

Barrel Rotation
To rotate a barrel assembly, loosen the patented EZ Lock™ Taper lock nut assembly no more than 1 turn. Rotate barrel to the position of your choice and retighten taper lock nut assembly firmly so that the barrel cannot rotate.

WARNING: Do not attempt to weld without the barrel being tightly secured in the torch body, or damage to the barrel or body may result.

Maintenance
Periodic Maintenance
Your Cobramatic® System is designed to provide years of reliable service. Maintenance of the torch will normally consist of a general cleaning of the wire guide system, including barrels, drive rolls, and conduits at regular intervals.

Remove spatter build-up from inside of nozzles with a hardwood stick.

The only parts on the Cobramatic® system that are subject to normal wear are the conduit, contact tips, gas cups, front body liners, wire guides, drive and idler rolls. A supply of these parts should be maintained on hand.

The number of units in operation and the importance of minimal “down time” will determine to what extent spare parts should be stocked on hand. See the “Recommended Spare Parts List” for the most commonly replaced parts.

If repairs do become necessary, qualified shop maintenance personnel can easily replace any part.

<table>
<thead>
<tr>
<th>Maintenance Tools</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tool</td>
</tr>
<tr>
<td>Drive Roll Removal Tool</td>
</tr>
</tbody>
</table>
### Recommended Spare Parts List

<table>
<thead>
<tr>
<th>Qty.</th>
<th>Part No.</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>LE KP2463-1</td>
<td>Conduit - 15 ft</td>
</tr>
<tr>
<td></td>
<td>MK 615-0603-15</td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>LE KP2463-2</td>
<td>Conduit - 25 ft</td>
</tr>
<tr>
<td></td>
<td>MK 615-0603-25</td>
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</tr>
<tr>
<td>1</td>
<td>LE KP2463-3</td>
<td>Conduit - 50 ft</td>
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<tr>
<td></td>
<td>MK 615-0603-50</td>
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<tr>
<td>1</td>
<td>437-0253</td>
<td>Drive Roll Door</td>
</tr>
<tr>
<td>2</td>
<td>005-0694</td>
<td>Trigger Assy. Kit</td>
</tr>
<tr>
<td>2</td>
<td>005-0695</td>
<td>Potentiometer Assy. Kit</td>
</tr>
<tr>
<td>1</td>
<td>005-0699</td>
<td>Handle Kit</td>
</tr>
<tr>
<td>2</td>
<td>005-0701</td>
<td>Micro-Switch Assy. Kit</td>
</tr>
<tr>
<td>10</td>
<td>LE KP2219-1</td>
<td>Drive Roll</td>
</tr>
<tr>
<td></td>
<td>MK 511-0101</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>LE KP2220-1</td>
<td>Idler Roll Kit</td>
</tr>
<tr>
<td></td>
<td>MK 005-0686</td>
<td></td>
</tr>
</tbody>
</table>

---

![Drive Roll Removal Tool](image)

**Drive Roll Removal Tool**

931-0100

---

![Knurled Drive Roll](image)

**Knurled Drive Roll**

LE P/N KP2219-1

MK P/N 511-0101

---

![Idler Roll Kit](image)

**Idler Roll Kit**

LE P/N KP2220-1

MK P/N 005-0686

---

![Micro Switch Assembly](image)

**Micro Switch Assembly**

005-0701
## Troubleshooting

<table>
<thead>
<tr>
<th>Trouble</th>
<th>Cause</th>
<th>Remedy</th>
</tr>
</thead>
<tbody>
<tr>
<td>No wire feed at torch, feeder not operating, i.e. no slave motor or brake solenoid.</td>
<td>115/42 VAC Control fuse in feeder/Control box blown.</td>
<td>Replace fuse.</td>
</tr>
<tr>
<td></td>
<td>Micro-switch defective/not being activated.</td>
<td>Replace switch. Check switch for operation.</td>
</tr>
<tr>
<td></td>
<td>Broken electrical cable.</td>
<td>Check micro-switch wires for continuity.</td>
</tr>
<tr>
<td>No wire feed at torch, feeder operating properly.</td>
<td>24 VAC Control fuse in feeder/Control box blown.</td>
<td>Check motor leads for shorts; then replace fuse.</td>
</tr>
<tr>
<td></td>
<td>Bad potentiometer.</td>
<td>Check potentiometer with meter.</td>
</tr>
<tr>
<td></td>
<td>Broken Electrical Cable.</td>
<td>Check motor and potentiometer wires for continuity.</td>
</tr>
<tr>
<td></td>
<td>Bad Speed control/PCB</td>
<td>See specific cabinet/ control box owners manual for speed control operation.</td>
</tr>
<tr>
<td>Wire feeds, but welding wire is not energized.</td>
<td>Loose or no cable connections.</td>
<td>Check all power connections.</td>
</tr>
<tr>
<td></td>
<td>Contactor control cable loose or in wrong position.</td>
<td>Check power supply owners manual for location and type of contactor signal required.</td>
</tr>
<tr>
<td></td>
<td>Welding power source.</td>
<td>Check power source.</td>
</tr>
<tr>
<td>Wire feeds erratically.</td>
<td>Dirty or worn conduit.</td>
<td>Blow out or replace conduit.</td>
</tr>
<tr>
<td></td>
<td>Wrong size contact tip.</td>
<td>See Contact tip table.</td>
</tr>
<tr>
<td></td>
<td>Idler roll stuck.</td>
<td>Check for lock washer under idler roll, or replace if damaged.</td>
</tr>
<tr>
<td>Wire feeds one speed only.</td>
<td>Bad potentiometer.</td>
<td>Check with meter.</td>
</tr>
<tr>
<td></td>
<td>Broken electrical cable.</td>
<td>Check potentiometer wires for continuity or short.</td>
</tr>
<tr>
<td></td>
<td>Bad speed control.</td>
<td>See specific cabinet/ control owners manual for speed control operation.</td>
</tr>
<tr>
<td>Wire walks out of drive rolls.</td>
<td>Idler roll upside-down.</td>
<td>Place groove in idler roll toward top.</td>
</tr>
<tr>
<td></td>
<td>Rear wire guide missing.</td>
<td>Replace wire guide.</td>
</tr>
</tbody>
</table>
Troubleshooting Guide

Regardless of which torch or feeder used, all MK Products’ push-pull guns operate on the same principle. The slave motor in the feeder runs at a fast, constant speed, but has very low torque. It is always trying to feed more wire than the torch motor wants, and when the motor gets all it wants, it slows the slave motor, preventing a bird’s nest. Because of the low torque produced by the slave motor, a brake system is used to prevent wire overrun rather than tension. The drag adjustment in the feeder is used simply to keep the wire slightly taut, so it will not pull off the spool while feeding wire.

The high torque 24VDC torch motor is controlled by a solid state speed control located in the feeder, and a pot located in the torch. The torch motor, potentiometer, and micro switch are connected to the cabinet/control box via a control cable and Amphenol connector. If this cable becomes damaged, a variety of symptoms can occur, depending on which wire(s) break. To test, check each wire for continuity and shorts.

Remember, the micro switch in the torch activates both the slave motor and torch motor circuits in the cabinet. Therefore, if the slave motor and brake solenoid operate, but the torch does not, look more toward the torch motor’s 24V circuits, speed control, control cable, or the torch motor. If nothing operates, look more toward the slave motor’s input, micro switch leads, or micro switch.

Testing The Gun

Reference the "W" clocked torch wiring diagram on the Python® Electrical Diagram for information about pin-outs and locations.

Motor Check

Remove the torch connector from the cabinet.

Using the torch Amphenol connector, check the resistance across pins “A” and “B” (motor leads). The resistance across the motor should be between 5 - 10 ohms as the potentiometer is turned.

If an open circuit or short exist, check the motor leads and motor independently.

Testing the Potentiometer - “W” Clocked

Using the torch Amphenol connector, check the resistance across pin “D” (wiper) and pin “C”. The resistance should vary from 0 - 5K ohms as the potentiometer is turned.

Check the resistance across pin “D” (wiper) and pin “G”. The resistance should vary from 5K - 0 ohms as the potentiometer is turned.

Testing the Micro Switch

Using the torch Amphenol connector, check for continuity across pins “E” and “F” when the trigger is pressed.
## Section F

### Appendices

#### Diagrams / Parts List

<table>
<thead>
<tr>
<th>Description</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Python-Plus Exploded View</td>
<td>12</td>
</tr>
<tr>
<td>Python-Plus Bill of Material</td>
<td>13</td>
</tr>
<tr>
<td>Python Front Body Assembly</td>
<td>14</td>
</tr>
<tr>
<td>A/W Barrel Assembly</td>
<td>15</td>
</tr>
<tr>
<td>Python-Plus Electrical</td>
<td>16</td>
</tr>
<tr>
<td>No.</td>
<td>Qty</td>
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<tr>
<td>24</td>
<td>9</td>
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</table>
### Python Front Body Assembly

**P/N 003-2108**

**NOTE:** Items #3, 4 and 9 can be ordered together in Kit P/N LE KP2220-1, MK 005-0686

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<thead>
<tr>
<th>No.</th>
<th>Qty</th>
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<th>Description</th>
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<td>003-2083</td>
<td>Output Shaft Assembly</td>
<td>6</td>
<td>1</td>
<td>421-0525</td>
<td>1/8 x 7/8 SST Dowel Pin</td>
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<td>2</td>
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<td>003-2106</td>
<td>Body Assembly</td>
<td>7</td>
<td>1</td>
<td>431-1663</td>
<td>Idler Adjusting Screw</td>
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<td>3</td>
<td>1</td>
<td>325-0206</td>
<td>10-24 x 3/8 PH Screw</td>
<td>8</td>
<td>1</td>
<td>431-1598</td>
<td>Idler Arm</td>
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<tr>
<td>4</td>
<td>1</td>
<td>333-0082</td>
<td># 10 Lock Washer</td>
<td>9</td>
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<td>LE KP2220-1 MK 005-0686</td>
<td>Idler Wire Feed Assembly</td>
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<tr>
<td>5</td>
<td>1</td>
<td>419-0092</td>
<td>Compression Spring</td>
<td>10</td>
<td>1</td>
<td>LE KP2219-1 MK 511-0101</td>
<td>Drive Roll</td>
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A/W Barrel Assembly
P/N LE KP2225-1, MK 003-2147

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<tr>
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<td>1</td>
<td>003-2213</td>
<td>Assy Taper Lock</td>
</tr>
<tr>
<td>3</td>
<td>4</td>
<td>303-0010</td>
<td>O-Ring 0.489 I.D. x 0.070 Width</td>
</tr>
<tr>
<td>4</td>
<td>2</td>
<td>303-0094</td>
<td>O-Ring 0.301 I.D. x 0.070 Width</td>
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<tr>
<td>5</td>
<td>1</td>
<td>LE KP2228-1 MK 931-0137</td>
<td>Liner Package, 5 pieces</td>
</tr>
<tr>
<td>6</td>
<td>1</td>
<td>621-0250</td>
<td>Assy Cup CPR Finned #10</td>
</tr>
<tr>
<td>7</td>
<td>1</td>
<td>LE KP2217-4B1 MK 621-0393</td>
<td>Tip HD Spray 0.060</td>
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<td>-</td>
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<td>-</td>
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<tr>
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<td>005-0696</td>
<td>Insulator Replacement Kit</td>
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<td>431-1774</td>
<td>Cup Insulator</td>
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<tr>
<td>12</td>
<td>1</td>
<td>313-0091</td>
<td>Retaining Ring 5/8 Shaft</td>
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</tbody>
</table>
MK WARRANTY REPAIR STATIONS
for MK Products as of 9/14/05
for most up-to-date list, please visit www.mkproducts.com

ALABAMA
AIRGAS - SOUTH, INC.
Birmingham, AL
205/251-6835
DIXIE WELDING SUPPLY
Attalla, AL
256/538-6157
INDUSTRIAL WELDING SERVICES
Quinton, AL
205/674-3258
KIBRO, INC.
Theodore, AL
334/653-4672
WELDING ENGINEERING SUPPLY CO.
Prichard, AL
334/457-8681
WELDING MACHINE HOSPITAL
Montgomery, AL
334/832-9353

ALASKA
FAIRBANKS AERO SERVICES
Fairbanks, AK
907/479-6666
RNR, INC. dba
Rubey Engine & Electric
Anchorage, AK
907/336-5152

ARIZONA
ALLSTATE ELECTRIC MOTOR CO.
Phoenix, AZ
602/233-0500
ARC DYNAMICS
Yuma, AZ
928/539-0003
PRAXAIR DISTRIBUTION, INC.
Phoenix, AZ
602/269-2151
VERN LEWIS WLDG. SUPPLY
Phoenix, AZ
602/252-0341

ARKANSAS
APPLIED SERVICES, INC.
Benton, AR
501/860-6464
ARKANSAS WELDING IND’L SUPPLY
Hot Springs, AR
501/321-9922
EL DORADO WELDING & INDUSTRIAL SUPPLY
El Dorado, AR
870/863-4088
WELSCO
Little Rock, AR
501/372-2252

CALIFORNIA
ADVANCED WELDER REPAIR
Commerce, CA
323/263-7383
AIRGAS - WEST, INC.
Gardena, CA
310/523-9355
ALL PHASE WELDER REPAIR & CONSULTING
Sacramento, CA
916/331-0595
ARC PRODUCTS
San Diego, CA
619/628-1022
ARCO WELDER REPAIR
Santa Fe Springs, CA
562/921-5240
ARK WELDER REPAIR
Fresno, CA
559/292-4714
CAL-WELD SUPPLY
Fresno, CA
209/445-0131
DELTA-TECH
Sun Valley, CA
818/767-4234
EMCO-EAST WELD’R REPAIR
Concord, CA
925/798-4411
FRESNO OXYGEN
Fresno, CA
559/233-6684
INDUSTRIAL ELECTRICAL CO
Modesto, CA
209/527-2800
INDUSTRIAL WELDER REPAIR
LaPuente, CA
626/961-7643
MK WARRANTY REPAIR STATIONS
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NESCO WELDING SUPPLY
Fontana, CA
909/427-9670

PRAXAIR DISTRIBUTION
(ARC RENTS)
Signal Hill, CA
562/989-3212

PRAXAIR DISTRIBUTION, INC.
Bakersfield, CA
661/321-9922

R. J. KATES
San Diego, CA
619/565-6960

RED-D-ARC, INC.
Carson, CA
310/233-3327

SIMS-ORANGE WELDING SUPPLY
Santa Ana, CA
714/549-9393

SOUTHWEST WELDER REPAIR
Fontana, CA
909/357-1661

VERNON ELECTRIC
Covina, CA
626/858-4750

WESTEC WELDING EQUIPMENT REPAIR
Sacramento, CA
916/924-5370

COLORADO

AIRGAS - INTERMOUNTAIN, INC.
Colorado Springs, CO
719/473-1947

WELDERS & EQUIP. SVC. & TESTING
Littleton, CO
303/932-8755

WESTERN SLOPE WELDER REPAIR
Grand Junction, CO
970/243-9616

CONNETICUT

ABCO WELDING & INDUSTRIAL SUPPLY CO.
Waterford, CT
800/962-0285

TECH AIR
Milford, CT
203/783-1834

WELDER REPAIR AND RENTAL SERVICE
Durham, CT
860-349-0864

DELAWARE

KEEN COMPRESSED GAS
New Castle, DE
302/594-4555

WARREN ELECTRIC CO., INC.
Seaford, DE
302/629-9134

FLORIDA

A & T SPECIALTIES
Lehigh Acres, FL
941/368-7435

AAA GENERATOR & PUMP
Ft. Myers, FL
941/332-1136

ACTION WELDING SUPPLY
Jacksonville, FL
904/786-2254

AMVEL CORPORATION
Miami, FL
305/592-5678

ELECTRICAL WELDERS SERVICE
Orlando, FL
407/999-5214

HAUN SYSTEMS REPAIR, INC.
Winter Park, FL
407/681-6064

HOLOX
Ocala, FL
352/351-4417

J.K. CIRCUIT TECHNOLOGY
Boynton Beach, FL
561/733-7859

ROPER ELECTRIC MOTOR SERVICE
Panama City, FL
850/769-6643

SMITTY’S WELDER SERVICE
West Palm Beach, FL
561/845-1224

TRI-GAS
Miami, FL
305/592-3180

TRI-STATE SALES & LEASING
Lake City, FL
904/397-3340
MK WARRANTY REPAIR STATIONS
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TRI-TECH
Sarasota, FL
941/758-3825

V.A. ELECTRICAL MOTORS CENTER, INC.
Hialeah, FL
305/825-3327

WELD DIRECT CORPORATION
Jacksonville, FL
904/387-5664

INDIANA
AGA GAS, INC.
Hammond, IN
219/989-9030

AIRGAS - MID AMERICA, INC.
Evansville, IN
800/424-8905

B & H ELECTRIC
Seymour, IN
812/522-5607

BRETT DIEHM HOAGLAND ELECTRIC, INC.
Fort Wayne, IN
260-489-5990

COX EQUIPMENT COMPANY
Indianapolis, IN
317/241-8881

EVANSVILLE ARMATURE, INC.
Evansville, IN
812/428-9034

HARRISON ELECTRIC, INC.
Michigan City, IN
219/879-0444

MODERN SUPPLY CO., INC.
Evansville, IN
812/425-9353

PRAXAIR DISTRIBUTION, INC.
Speedway, IN
317/481-4550

SUTTON-GARTEN COMPANY
Indianapolis, IN
317/264-3236

IOWA
ARC SOURCE MIDWEST
Grimes, IA
515/986-4610

AIRGAS NORTH CENTRAL
Des Moines, IA
515/266-1111

CEDAR RAPIDS WELDING SUPPLY
Cedar Rapids, IA
319/365-1466

ELECTRICAL ENGRG. & EQUIPMENT
Des Moines, IA
515/266-8890

SUPERIOR WELDING SUPPLY
Waterloo, IA
319/236-9660

GEORGIA
B&W INDUSTRIAL SERVICES
Augusta, GA
706/738-8722

Mc CULLOUGH ELEC. MOTOR SVC.
Atlanta, GA
404/688-5251

HAWAII
DC ELECTRIC, INC.
Aiea, HI
808/483-8900

IDAHO
NORCO
Boise, ID
208/336-1643

ROSSITER ELECTRIC
Idaho Falls, ID
208/529-3665

ILLINOIS
CMS ELECTROMECHANICAL SERVICES, INC.
Galesburg, IL
309/342-4125 – 888/964-3526

FRED ARMS ELECTRIC MOTOR REPAIR
Stone Park, IL
708/343-6262

INDUSTRIAL WELDER REBUILDERS
Alsip, IL
708/371-5688

RELIABLE EQUIPMENT REPAIR
Hamel, IL
618/633-5000

ROCKFORD INDUSTRIAL WELDING SUPPLY
Rockford, IL
815/226-1900

IOWA
ARC SOURCE MIDWEST
Grimes, IA
515/986-4610

AIRGAS NORTH CENTRAL
Des Moines, IA
515/266-1111

CEDAR RAPIDS WELDING SUPPLY
Cedar Rapids, IA
319/365-1466

ELECTRICAL ENGRG. & EQUIPMENT
Des Moines, IA
515/266-8890

SUPERIOR WELDING SUPPLY
Waterloo, IA
319/236-9660
MK WARRANTY REPAIR STATIONS
for MK Products as of 9/14/05
for most up-to-date list, please visit www.mkproducts.com

WRIGHT WELDING SUPPLY
Ft. Dodge, IA
515/576-0640

KANSAS
AEROFORM CORPORATION
Coffeyville, KS
620/251-1430
KANOX
Hutchinson, KS
316/665-5551

KENTUCKY
DUPONT DYNAMICS
Bellevue, KY
859-655-9353
GENERAL WELDING PRODUCTS
Louisville, KY
502/635-5218
RED-D-ARC
Lexington, KY
800/245-3660
WELDING EQUIPMENT
Louisville, KY
502/636-0545

LOUISIANA
GT SVCS OF MORGAN CITY
Morgan City, LA
985/385-4135
RED BALL OXYGEN CO.
Shreveport, LA
318/425-3211
SHAW OXYGEN CO., INC.
Monroe, LA
318/387-4115
WELDERS EQUIPMENT CO.
Broussard, LA
337/837-5701
WELDERS SUPPLY & EQUIP.
Port Allen, LA
225/346-4712

MAINE
ADVANTAGE GASES & TOOLS
Bangor, ME
207/942-6393
ADVANTAGE GASES & TOOLS
Portland, ME
207/797-2733

ADVANTAGE GASES & TOOLS
Lewiston, ME
207/784-4588
MAINE OXY-ACETYLENE SUPPLY COMPANY
Auburn, ME
207/784-5788

MARYLAND
CCM MECH/ELEC REPAIR SERVICE
Owings, MD
301/855-7508

MASSACHUSETTS
AIMTEK WELDING SUPPLY
Auburn, MA
508/832-5035

MICHIGAN
ANN ARBOR WELDING SUPPLY CO.
Ypsilanti, MI
734/572-0444
APEX WELDING GASES & SUPPLY
Muskegon Heights, MI
616/722-3185
AUTOMATIC WELD
Midland, MI
517/496-9245
GREAT LAKES EQUIPMENT
Clare, MI
517/386-4630
HAMILTON ELECTRIC CO.
Saginaw, MI
517/799-6291
PLYMOUTH WAYNE, INC.
Wixom, MI
248/735-7700
PURITY CYLINDER GASES, INC.
Grand Rapids, MI
616/532-2375
SAGINAW WELDING SUPPLY CO.
Saginaw, MI
517/793-9696
SIMPKINS ELECTRICAL SVC.
Michigan Center, MI
517/764-7766
SOUTHPARK WELDING
Marysville, MI
810/364-6521
### MK WARRANTY REPAIR STATIONS for MK Products as of 9/14/05
for most up-to-date list, please visit www.mkproducts.com

<table>
<thead>
<tr>
<th>State</th>
<th>Business Name</th>
<th>Address</th>
<th>Phone</th>
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<tbody>
<tr>
<td>Wisconsin</td>
<td>WELDING METALS, INC.</td>
<td>Madison Heights, WI</td>
<td>248/585-0480</td>
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<td>Wisconsin</td>
<td>WESAR COMPANY</td>
<td>Three Rivers, WI</td>
<td>616/483-9125</td>
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<td>WILSON WELDING &amp; MEDICAL GASES</td>
<td>Warren, MI</td>
<td>586/751-7400</td>
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<td>Minnesota</td>
<td>MINNESOTA AIRGAS – NORTH CENTRAL</td>
<td>Albert Lea, MN</td>
<td>507/373-2411</td>
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<td>Minnesota</td>
<td>CAPITOL CITY WELDING SUPPLY</td>
<td>St. Paul, MN</td>
<td>651/224-4843</td>
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<tr>
<td>Minnesota</td>
<td>CENTRAL McGOWAN</td>
<td>St. Cloud, MN</td>
<td>320/252-5292</td>
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<td>Minnesota</td>
<td>MINNEAPOLIS OXYGEN CO.</td>
<td>Minneapolis, MN</td>
<td>612/588-8855</td>
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<td>Minnesota</td>
<td>OXYGEN SERVICE CO.</td>
<td>St. Paul, MN</td>
<td>612/644-7273</td>
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<td>Minnesota</td>
<td>PRAXAIR DISTRIBUTION, INC.</td>
<td>St. Paul, MN</td>
<td>651/603-1996</td>
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<td>Missouri</td>
<td>MISSOURI CEE-KAY SUPPLY, INC.</td>
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<td>P.G. WALKER</td>
<td>Springfield, MO</td>
<td>417/862-1745</td>
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<td>ROD’S SERVICE, INC.</td>
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<td>MISSISSIPPI 3D SUPPLIES, INC.</td>
<td>Jackson, MS</td>
<td>601/353-3330</td>
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<td>Mississippi</td>
<td>KOMP INDL’ &amp; WELD’G SUPPLY</td>
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<td>601/649-5889</td>
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<td>Mississippi</td>
<td>MID-SOUTH WELDING SUPPLY</td>
<td>Meridian, MS</td>
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<td>NORDAN SMITH WELDING SUPPLY</td>
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<td>Montana</td>
<td>MONTANA VALLEY WELDERS SUPPLY</td>
<td>Billings, MT</td>
<td>406/256-3330</td>
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<td>Nevada</td>
<td>NEVADA SIERRA WELDING SUPPLY CO.</td>
<td>Sparks, NV</td>
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<td>New Hampshire</td>
<td>NEW HAMPSHIRE WELDING SYSTEMS SVC.</td>
<td>Raymond, NH</td>
<td>603/895-4700</td>
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<td>New Jersey</td>
<td>NEW JERSEY INDUSTRIAL ELECTRIC SERVICE CO.</td>
<td>Hawthorne, NJ</td>
<td>973/423-1212</td>
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<td>NEW YORK DELO WELDING SUPPLY</td>
<td>Syracuse, NY</td>
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<td>New York</td>
<td>DYNAMIC WELD’G &amp; REPAIR</td>
<td>Bayshore, NY</td>
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<td>New York</td>
<td>HAUN WELDING SUPPLY</td>
<td>Syracuse, NY</td>
<td>315/463-5241</td>
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<td>New York</td>
<td>JACKSON WELDING SUPPLY</td>
<td>Rochester, NY</td>
<td>585/235-2920</td>
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<td>North Carolina</td>
<td>NORTH CAROLINA ADAMS WELDER REPAIR &amp; ELECTRICAL SERVICE, INC.</td>
<td>Nashville, NC</td>
<td>252/459-1960</td>
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<td>North Carolina</td>
<td>HOLOX LTD.</td>
<td>Colfax, NC</td>
<td>336/996-1974</td>
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<td>North Carolina</td>
<td>M &amp; L WELDER REPAIR</td>
<td>Asheville, NC</td>
<td>828/250-9353</td>
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</table>
MK WARRANTY REPAIR STATIONS
for MK Products as of 9/14/05
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<table>
<thead>
<tr>
<th>Machine &amp; Welding Supply Co.</th>
<th>Dunn, NC</th>
<th>910/892-4016</th>
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<td>Greenville, NC</td>
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<td>National Welders Supply Co.</td>
<td>High Point, NC</td>
<td>910/882-1110</td>
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<tr>
<td>National Welders Supply Co.</td>
<td>Charlotte, NC</td>
<td>704/392-7317</td>
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**North Dakota**
Praxair Distribution, Inc.
Fargo, ND
701/237-5233

**Ohio**
AGA Gases, Inc.
Lima, OH
419/228-2828

Albright Welding Supply
Wooster, OH
330/264-2021

All About Service
Wickliffe, OH
440/516-0303

Arc Equipment Company
Struthers, OH
33/750-9353

Arc Services, Inc.
Toledo, OH
419/478-6204

Belair Products, Inc.
Akron, OH
330/253-3116

Big River Electric
Gallipolis, OH
740/446-4360

CnD Machine, Inc.
Canton, OH
330/478-8811

Electric Welder Repair
Cuyahoga Heights, OH
216/271-5600

Maintenance Unlimited & Tool Repair
Cincinnati, OH
513/554-1313

O.E. Meyer Co.
Sandusky, OH
419/621-4201

Ohio Air Products
Canton, OH
330/821-2771

Rick's Welder Repair Service
Eastlake, OH
440/269-1204

S.D. Nold, Inc.
Lisbon, OH
330/424-3134

Southern Ohio Welder Repair
Groveport, OH
614/836-2069

Valley National Gases
Cincinnati, OH
513/241-5840

Valley National Gases
Lima, OH
419/228-1008

Valley National Gases
Hilliard, OH
614/771-1311

Valley National Gases
Toledo, OH
419/241-9114

Vollmer Electric Co.
Columbus, OH
614/476-8800

Weiler Welding Co., Inc.
Dayton, OH
937/222-8312

Weldinghouse, Inc.
Cleveland, OH
216/524-1955

**Oklahoma**
Airgas Mid-South
Tulsa, OK
918/582-0885
MK WARRANTY REPAIR STATIONS
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**BILL’S WELDER REPAIR**
Oklahoma City, OK
405/232-4799

**MUNN SUPPLY**
Enid, OK
580/234-4120

**OKLAHOMA WELDERS SUPPLY**
Madill, OK
580/795-5561

**OREGON**

**ARC SYSTEMS SERVICES**
Central Point, OR
541/665-2676

**E C COMPANY**
dba ELECTRICAL CONSTRUCTION COMPANY
Portland, OR
800/452-1511

**INDUSTRIAL SOURCE**
Eugene, OR
541/344-1438

**IRONTECH WELDING & INDUSTRIAL SUPPLY, INC.**
Portland, OR
503/774-5145

**WELDER SERVICE & REPAIR**
Redmond, OR
541/548-8711

**PENNSYLVANIA**

**ALLWELD EQUIPMENT REPAIR**
Pittsburgh, PA
412/821-8460

**BY DESIGN**
Columbia, PA
717/681-9494

**GEOVIC WELDING SUPPLY**
Milton, PA
717/742-9377

**J.A. CUNNINGHAM EQUIPMENT, INC.**
Philadelphia, PA
215/426-6650

**JOSEPH PINTO, JR. EQUIPMENT CO.**
E. Lansdowne, PA
610/259-4100

**POWER SOURCE REPAIR CO., INC.**
Collingdale, PA
610/532-6460

**VALLEY NATIONAL GASES**
Pittsburgh, PA
412/281-1835

**SOUTH CAROLINA**

**CAROLINA WELDER SVC.**
Lake City, SC
843/687-0413

**TENNESSEE**

**ARC-ONE WELDER REPAIR, INC.**
East Ridge, TN
423/894-9353

**INDUSTRIAL MACHINE REPAIRS**
Rogersville, TN
423/272-8199

**NATIONAL RENTAL & REPAIR**
Knoxville, TN
423/584-6390

**NEXAIR**
Memphis, TN
901/523-6821

**QUALITY WELD’G EQUIPMENT**
Nashville, TN
615/726-5282

**TRAMCO**
Bristol, TN
423/968-4499

**TEXAS**

**AIRGAS - SOUTHWEST, INC.**
Arlington, TX
817/281-2967

**AIRGAS-SOUTHWEST, INC.**
Austin, TX
512/835-0202

**AIRGAS-SOUTHWEST, INC.**
Corpus Christi, TX
361/882-2531

**AIRGAS-SOUTHWEST, INC.**
Houston, TX
713/462-8027

**AIRGAS-SOUTHWEST, INC.**
San Antonio, TX
210/337-7255

**AIRGAS-SOUTHWEST, INC.**
Waco, TX
254/753-6443
### MK WARRANTY REPAIR STATIONS
for MK Products as of 9/14/05
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<table>
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<th>State</th>
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<td>TX</td>
<td>DENISON OXYGEN</td>
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<td>GPC SERVICES, INC.</td>
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<td>LEKTROTECH, INC.</td>
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<td>TexAir WELDING SUPPLY</td>
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<td>VA</td>
<td>VERMONT W.J. WELDING EQUIPMENT REPAIR, INC.</td>
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<td>WI</td>
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<td>WASHINGTON AIRGAS - NORPAC, INC.</td>
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<td>AMERICAN EQUIPMENT SERVICES</td>
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<td>253/395-9947</td>
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<td>HARRIS ELECTRIC, INC.</td>
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<td>K &amp; M ENTERPRISES</td>
<td>Enumclaw, WA</td>
<td>253/335-7817</td>
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<td></td>
<td>OXARC, INC.</td>
<td>Spokane, WA</td>
<td>509/535-7794</td>
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<td>PACIFIC WELDING SUPPLIES</td>
<td>Tacoma, WA</td>
<td>253/572-5302</td>
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<td>PRECISION WELDER &amp; ENGINE REPAIR</td>
<td>Seattle, WA</td>
<td>206/382-6227</td>
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<tr>
<td>WV</td>
<td>CARDINAL SALES &amp; SERVICE, INC.</td>
<td>Clarksburg, WV</td>
<td>304/622-7590</td>
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<td></td>
<td>WILLARD C. STARCHER</td>
<td>Spencer, WV</td>
<td>304/927-2520</td>
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<td>WI</td>
<td>INTERSTATE WELDING SALES CORP.</td>
<td>Appleton, WI</td>
<td>920/734-7173</td>
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MK WARRANTY REPAIR STATIONS
for MK Products as of 9/14/05
for most up-to-date list, please visit www.mkproducts.com

MKINNE MACHINE & ELECTRIC
Mosinee, WI
715/693-0858

INDUSTRIAL ELECTRONIC SERVICES
Calgary, Alberta
403/279-3432

PRAXAIR DISTRIBUTION, INC.
Brookfield, WI
414/938-6365

KRISTIAN ELECTRIC
Calgary, Alberta T2C 2CB
403/292-9111

RED-D-ARC APPLETON
Kaukauna, WI 54130
920/759-4700

LADEL LTD.
Quebec
819/376-6577

VALLEY NATIONAL GASES
Milwaukee, WI
414/281-9540

LeBLANC ELECTRO-TECH, INC.
Boucherville, Quebec
450/449-5244

WELDER REPAIR & SERVICE
Fredonia, WI
262/692-3068

LINCOLN ELECTRIC COMPANY OF CANADA
(MSG)
Mississauga, Ontario
905/565-5600

CANADA
A&A WELDER SERVICES LTD.
Saskatoon, Saskatchewan
306/934-1601

MACTECH Distributors LTD
Porterslake, Nova Scotia
902/827-3926

ARC & GENERATOR REPAIR
Garson, Ontario
705/525-2141

M.R.T. REPAIR CENTER, INC.
Montreal, Quebec
514/648-0800

B. HARRIS WELDING SVCS.
Dartmouth, Nova Scotia
902/468-6255

OZARK ELECTRICAL MARINE LTD.
St. Johns, Newfoundland
709/726-4554

BARRY HAMEL EQUIPMENT LTD.
Coquitlam, B.C.
604/945-9313

PEEL ENGINES
Mississauga, Ontario
905/670-1535

BEAUCS TECHNOLOGIES, INC.
St. Prosper, Quebec
418/594-8852

T.F. DAB WELDER SERVICES
Ajax, Ontario
905/424-8754

CHIPPINDALE ELECTRIC COMPANY
Cambridge, Ontario
519/841-9535

PROMOTECH ÉLECTRIQUE, INC.
Fleurimont, Quebec
819/822-2111

D-TECH WELD SERVICES
Regina, Saskatchewan
306/586-9353

WELDERS SUPPLY
Winnipeg, Manitoba
204/772-9476

ELECTRO-MÉCANIK, INC.
Sainte-Foy, Quebec
418/683-1724

WELDERTECH
Calgary, Alberta
403/279-3432

GPR INDUSTRIES 1994 LTD.
Grande Prairie, Alberta
780/532-5900

WELDTEC
B.C.
604/545-3886

HYPERDYNAMICS TECHNOLOGIES LTD.
Pickering, Ontario
905/683-9938

CHINA
PHT GROUP COMPANY
Beijing, China
86-10-6858 8395
MK WARRANTY REPAIR STATIONS
for MK Products as of 9/14/05
for most up-to-date list, please visit www.mkproducts.com

**INDIA**
JSK SYSTEMS
Andheri (W), Mumbai
011-91-39-574-384
### Safety Warnings

<table>
<thead>
<tr>
<th>Language</th>
<th>Warning Message</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>WARNING</strong></td>
<td>1. Do not touch electrically live parts or electrode with skin or wet clothing. 2. Insulate yourself from work and ground. 3. Keep flammable materials away. 4. Wear eye, ear and body protection.</td>
</tr>
<tr>
<td>Spanish</td>
<td>AVISO DE PRECAUCION</td>
</tr>
<tr>
<td>French</td>
<td>ATTENTION</td>
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<td>Portuguese</td>
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<td>Arabic</td>
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**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 À ETRE EMPLOYES ET SUIVEZ LES PROCÉDURES 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.**
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商提供的說明以及應該使用的焊接材料，並請遵守貴方的有關勞動保護規定。

이 제품에 동봉된 작업지침서를 숙지하시고 귀사의 작업자 안전수칙을 준수하시기 바랍니다。

قاراً يشترط على أفراد يعتمدون على المنتج لهذه المعدات والمواد قبل استعمالها تابع تعليمات الوقاية الصادرة من العمل.
LIMITED WARRANTY

Effective May 1, 2005

This warranty supersedes all previous MK Products warranties and is exclusive, with no other guarantees or warranties expressed or implied.

LIMITED WARRANTY - MK Products, Inc., Irvine, California warrants that all new and unused equipment furnished by MK Products is free from defects in workmanship and material as of the time and place of delivery by MK Products. No warranty is made by MK Products with respect to trade accessories or other items manufactured by others. Such trade accessories and other items are sold subject to the warranties of their respective manufacturers, if any.

MK Products' warranty does not apply to components having normal useful life of less than one (1) year, such as relay points, wire conduit, tungsten, and welding gun parts that come in contact with the welding wire, including gas cups, gas cup insulators, and contact tips where failure does not result from defect in workmanship or material.

MK Products shall, exclusively remedy the limited warranty or any duties with respect to the quality of goods, based on the following options:

(1) repair
(2) replacement
(3) where authorized in writing by MK Products, the reasonable cost of repair or replacement at our Irvine, California plant.

As a matter of general policy only, MK Products may honor an original user's warranty claims on warranted equipment in the event of failure resulting from a defect within the following periods from the date of delivery of equipment to the original user:

1. Power Supplies and Wire Feed Cabinets........ 3 years
2. Weldheads, Positioners, Prince XL and Prince XL Spool Guns, Python, CobraMAX, Cobra SX ........1 year
3. Sidewinder® Spool Gun, Prince SG Spool Guns, Modules ...................................................... 180 days
4. Repairs/Exchanges/Parts ................................. 90 days

Classification of any item into the foregoing categories shall be at the sole discretion of MK Products. Notification of any failure must be made in writing within 30 days of such failure.

A copy of the invoice showing the date of sale must accompany products returned for warranty repair or replacement.

All equipment returned to MK Products for service must be properly packaged to guard against damage from shipping. MK Products will not be responsible for any damages resulting from shipping.

Normal surface transportation charges (one way) for products returned for warranty repair or replacement will be borne by MK Products, except for products sold to foreign markets.

ANY EXPRESS WARRANTY NOT PROVIDED HEREIN AND ANY IMPLIED WARRANTY, GUARANTY, OR REPRESENTATION AS TO PERFORMANCE, AND ANY REMEDY FOR BREACH OF CONTRACT WHICH, BUT FOR THIS PROVISION, MIGHT ARISE BY IMPLICATION, OPERATION OF LAW, CUSTOM OF TRADE, OR COURSE OF DEALING, INCLUDING ANY IMPLIED WARRANTY OF MERCHANTABILITY OR OF FITNESS FOR PARTICULAR PURPOSE, WITH RESPECT TO ANY AND ALL EQUIPMENT FURNISHED BY MK PRODUCTS, IS EXCLUDED AND DISCLAIMED BY MK PRODUCTS.

EXCEPT AS EXPRESSLY PROVIDED BY MK PRODUCTS IN WRITING, MK'S PRODUCTS ARE INTENDED FOR ULTIMATE PURCHASE BY COMMERCIAL/INDUSTRIAL USERS AND FOR OPERATION BY PERSONS TRAINED AND EXPERIENCED IN THE USE AND MAINTENANCE OF WELDING EQUIPMENT AND NOT FOR CONSUMERS OR CONSUMER USE. MK PRODUCTS' WARRANTIES DO NOT EXTEND TO, AND NO RE-SELLER IS AUTHORIZED TO EXTEND MK PRODUCTS' WARRANTIES TO ANY CONSUMER.

USE OF OTHER THAN GENUINE MK PRODUCTS' CONSUMABLES, PARTS, AND ACCESSORIES MAY INVALIDATE YOUR PRODUCT WARRANTY.

MK Products, Inc.
16882 Armstrong Ave.
Irvine, CA 92606
Tel (949)863-1234
Fax (949)474-1428

DATE: May 1, 2005