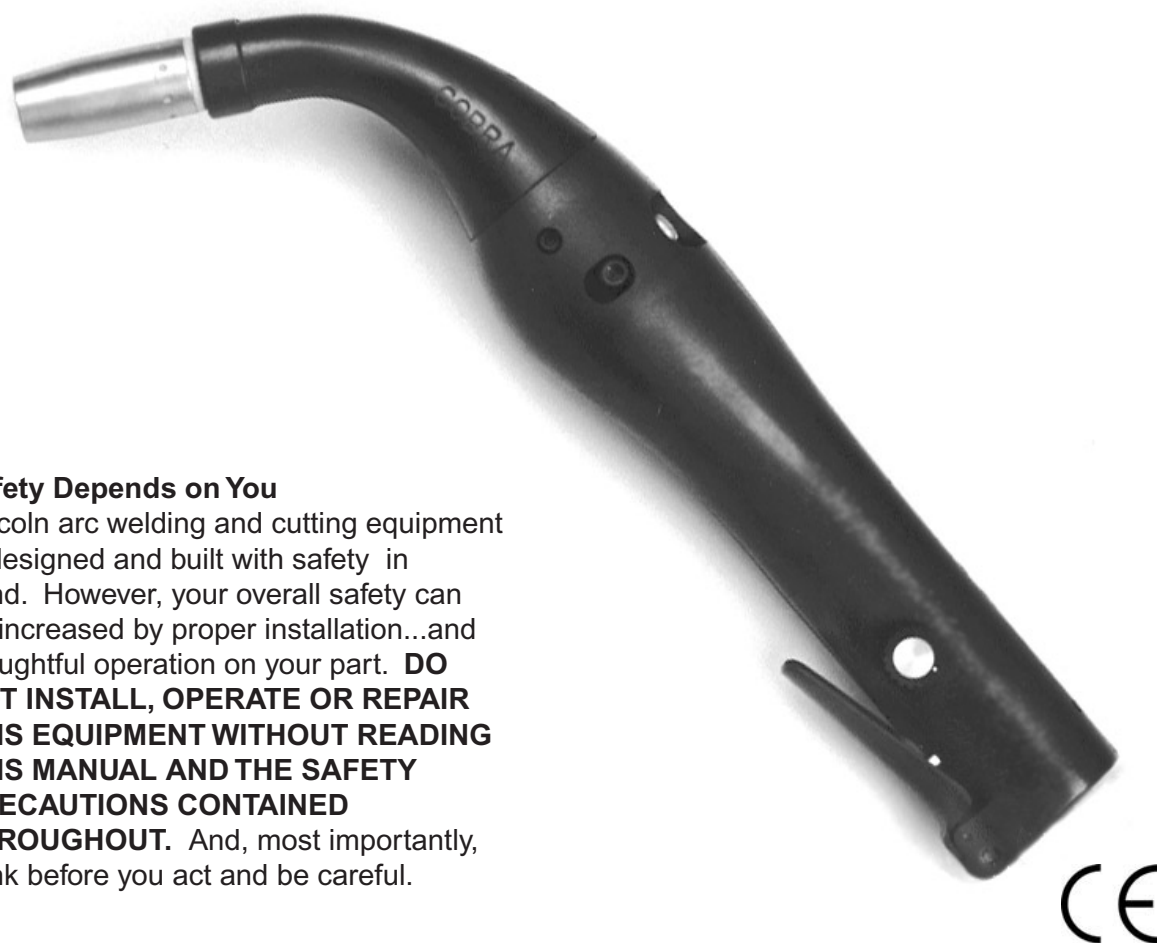
GMAW Push-Pull Gun

IM598
MK 091-0415
November 2001
Rev G

OPERATOR'S MANUAL

Cobra® Gold

For use with Cabinets K1587-1



Safety Depends on You
Lincoln arc welding and cutting equipment is designed and built with safety in mind. However, your overall safety can be increased by proper installation...and thoughtful operation on your part. **DO NOT INSTALL, OPERATE OR REPAIR THIS EQUIPMENT WITHOUT READING THIS MANUAL AND THE SAFETY PRECAUTIONS CONTAINED THROUGHOUT.** And, most importantly, think before you act and be careful.

CE

OPERATOR'S MANUAL

LINCOLN® ELECTRIC

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

⚠ WARNING

⚠ CALIFORNIA PROPOSITION 65 WARNINGS ⚠

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

The Above For Diesel Engines

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

The Above For Gasoline Engines

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

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

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

FOR ENGINE powered equipment.

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

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

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

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

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

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

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

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

ELECTRIC AND MAGNETIC FIELDS may be dangerous

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

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

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

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

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

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

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

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

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

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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.

Mar. '93

Thank You —— for selecting a **QUALITY** product by MK / Lincoln Electric. We want you to take pride in operating this MK Products Inc. / 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 and Sales SpecNumber (K-xxx) _____

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. There are some important topics covered in the manual about how this system works and how it is different than wire feeders you may be use to. 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**.

This Gun is fully warranted by MK Products and Lincoln Electric and can be serviced at MK Products Service locations listed inside the back cover of this manual.

Spare parts may be purchased from either company if so indicated by a part number in the respective company part number column in the parts listings.

Printed in the U.S.A.

Table of Contents

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Section A

Installation

Technical Specifications

Wire Capacity

.023inch - .045inch (0.8mm - 1.2mm) solid and hard wire

.030inch - 1/16inch (0.8mm - 1.6mm) aluminum and cored wire

Wire Speed

800 IPM (20mpm) Max. at rated feeder Input Voltage (120VAC / 42VAC)

Duty Cycle

Air Cooled Torches
(K1589 series) ..... 200 amps @50%

Water Cooled Torches
(K1590 series) ..... 250 amps @50%

Water Cooled Torches
with Optional Heavy Duty Finned Gas Cup ..... 300 amps @50%

All ratings are at 25 volts max. using Argon Gas

Shipping Weight (approximate)

Air Cooled

15ft. (4.5m)	13 lbs.	(5.9 Kg)
25ft. (7.6m)	18 lbs.	(8.2 Kg)
50ft. (15.2m)	33 lbs.	(14.96 Kg)

Water Cooled

15ft. (4.5m)	14 lbs.	(6.35 Kg)
25ft. (7.6m)	20 lbs.	(9.07 Kg)
50ft. (15.2m)	35 lbs.	(15.88 Kg)

Support Equipment Required

- PowerWave or Invertec Power Source with 42VAC Connector output.
- Regulated gas supply and hoses.
- Properly sized power leads from power source to wire feeder and ground.
- Water source and hose capable of providing a minimum of **1 quart (.95 liter) / min. at 35 p.s.i.** when using water cooled torches.

Coolant Recommendations

Use a name-brand additive, which does not contain reactive sulphur or chlorine and does not react with copper, brass or aluminum.

Use 3 Quarts (2.85 Liters) Distilled water.

Use 1 Quart (.95 Liters) ethylene glycol.

Use 1 tsp (5 ml) liquid glycerin

The Coolant rate should be 1 quart (.95 liter) / minute at 35 p.s.i.

Section A (Cont.)

Torch Lead Connections

Power Cable

IMPORTANT - PLEASE NOTE

Water cooled torches use a #4 AWG power cable inside a flexible hose. Because of the size of cable used, these torches MUST be WATER COOLED.

The torch fitting is screwed into the back of the torch block using a conductive sealant. Air cooled torches, on the other hand, use a #2 AWG power cable, which is secured to the torch in the same manner. The power cable fitting on the other end connects to the power block inside the Cobramatic feeder.

Conduit

The Cobra Gooseneck comes standard with a Teflon-lined conduit. The torch end is secured with a setscrew accessible through a hole in the handle. The other end is connected to the wire feeder. ***Spiral steel conduits are available when using hard and cored wires.***

Gas Hose

The gas hose is pushed on to the inlet tube of the front body, and then secured with a plastic cable tie. The gas inlet tube is located in the middle of the torch block, when viewed from the rear.

Water Hose

The water hose is pushed on to the inlet tube of the front body. The other end goes to the return side of the water recirculator. The Water tube is located in the upper right of the torch block, when viewed from the rear. Air cooled torches do not have a Water Hose.

Electric Cable

A seven conductor control cable is used on the Gooseneck Torch. The torch end of the control cable is secured to the back of the torch with a cable clamp and the wires are joined to the motor, pot, and micro switch through two connectors. The cabinet end has a 7 pin “W” clocked Amphenol connector. See the schematic in the appendix for wiring information.

Section B

Operation

General

The patented Cobra Gooseneck Torch 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 (3)-turn potentiometer in the torch handle.

Section B (Cont.)

Controls and Settings

Potentiometer

The potentiometer is located on the left hand side of the torch and provides three (3) turns of adjustment. A special pot nut and O-Ring provides drag on the knob and also secures the pot to the handle.

Trigger, Gas Valve and Micro Switch

The torch trigger is designed so that when it is partially depressed, gas flow starts via the valve located in the torch body, prior to ignition of the arc. When the trigger is partially released after welding (extinguishing the arc), gas flow continues until the trigger is fully released; built-in pre and post gas flow.

The micro switch is wired “Normally Open” and secured to the torch block with two (2) screws. An insulator between the torch block and micro switch prevents accidental shorting of the switch leads. The trigger pin reaches through the handle and activates the micro switch just before the trigger bottoms out on the handle.

Drive Roll and Idler Rolls

General

The Gooseneck torch comes standard with knurled drive rolls, which will handle wire diameters from .023 through 1/16 inch. Optional insulated V-groove drive rolls are also available for improved feeding of aluminum wire (see Optional Kits).

Drive roll tension is accomplished by means of a pressure-adjusting screw located on the left hand side of the torch. Proper tension is achieved when wire does not slip if a small amount of pressure is added to the wire as it exits the tip.

---------- IMPORTANT ----------

NOTE: *Over-tightening of the drive rolls will cause excessive knurling and/or deformation of the wire. When the complete system is setup properly, feeding wire out of the end of the torch and letting fall on the ground should form a large uniform circle. If it forms a spiral or spring then there is too much tension in the system, please refer to the Cabinet Owners Manual for adjustment to the tension setting.*

INCORRECT DRIVE ROLL TENSION IS THE NUMBER ONE CAUSE OF POOR WIRE FEED PERFORMANCE

Section B (Cont.)

Drive Roll Installation/Removal

Note
Neither of the handles needs to be removed to access the Drive or Idler Rolls.

1. Using a 5/32" hex wrench, loosen the Idler Roll tension screw. This will relieve the pressure against the drive roll.
2. Align the Drive Roll Removal Tool (P/N 931-0100) over the flats of the drive roll. 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.

Figure 1

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

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.

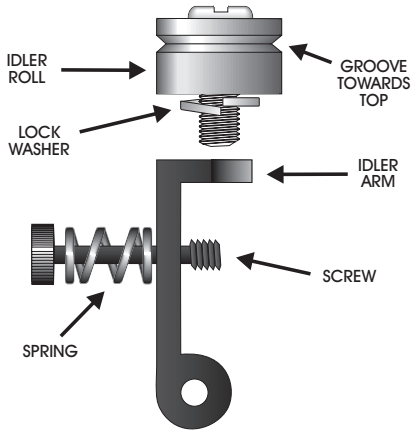


Figure 2

3. Tighten.
4. Using a 5/32" hex wrench, turn the Idler Roll tension screw into the gearbox housing to adjust the pressure against the drive roll.

NOTE: Lock washer must be under idler roll or it will not turn freely.

Use genuine MK parts

Consumables

Contact Tips

Spray Arc
Short Arc

Contact Tip Selector Guide					
Wire Size	**Tip I.D. ****	**Arc**	**Tip Length**	**LE P/N**	**MK P/N**
.023" (0.6mm)	.030" (0.8mm)	Spray	1-1/2" (38mm)	--	621-0057
	.030" (0.8mm)	Short	1-3/4" (44mm)	---	621-0328
.030" (0.8mm)	.036" (0.9mm)	Spray	1-1/2" (38mm)	--	621-0325
	.036" (0.9mm)	Short	1-3/4" (44mm)	--	621-0326
.030" (0.8mm) or .035" (0.9mm)	.040" (1.0mm)	Spray	1-1/2" (38mm)	S23978-29	621-0076
	.040" (1.0mm)	Short	1-3/4" (44mm)	--	621-0077
.035" (0.9mm)	.044" (1.1mm)	Spray	1-1/2" (38mm)	S23978-1	621-0001
	.044" (1.1mm)	Short	1-3/4" (44mm)	--	621-0002
.045" (1.2mm)	.053" (1.3mm)	Spray	1-1/2" (38mm)	--	621-0327
.045" (1.2mm) or .052" (1.3mm)	.060" (1.5mm)	Spray	1-1/2" (38mm)	S23978-2*	621-0003
	.060" (1.5mm)	Short	1-3/4" (44mm)	--	621-0286
1/16" (1.6mm)	.075" (1.9mm)	Spray	1-1/2" (38mm)	S23978-3	621-0075
1/16" (1.6mm)	.085" (2.1mm)	Spray	1-1/2" (38mm)	--	621-0153
	.085" (2.1mm)	Short	1-3/4" (44mm)	--	621-0154

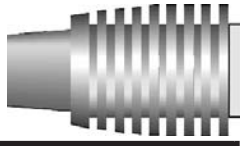
* Standard - Furnished with torch. ** All tips stamped with tip I.D.

NOTE: As a rule of thumb, use the smaller I.D. tip for steel, stainless steel and the 5000 series aluminum. Softer alloys such as the 1000 and 4000 series aluminum require more clearance and, therefore, use a larger I.D. tip.

Gas Cups

Standard Cup

Heavy Duty Finned Cup



Standard Gas Cups				Heavy-Duty Gas Cups			
Size	**I.D.**	**L.E. P/N**	**MK P/N**	**Size**	**I.D.**	**L.E. P/N**	**MK P/N**
5	1/4" (6.4mm)	--	621-0079				
6	3/8" (9.5mm)	--	001-0137				
***8**	1/2" (12.7mm)	S23978-4	001-0138	**8**	1/2" (12.7mm)	S23978-20	621-0366
10	5/8" (15.8mm)		001-0139	**10**	5/8" (15.8mm)		621-0367

*Standard - Furnished with torch

Section C (Cont.)

Torch Liners

Gooseneck Torch Liners			
Part No.	**Liner Material**	**Length**	**Wire Type**
615-0055*	Green Teflon	Standard	Aluminum
615-0284	Spiral Steel	Standard	Steel / Cored
615-0058	Green Teflon	Used with 621-0017 Tip Extender	Aluminum
615-0057	Spiral Steel	Used with 621-0017 Tip Extender	Steel / Cored
615-0054	Teflon - Standard	Bulk - by the foot	Aluminum
615-0331	Green Teflon	Used with 431-1630 Heavy Duty Cup Adapter and Finned Copper Cup	All wire types, .030 - .063" (0.8 - 2.6mm)

*Standard - Furnished with torch

Optional Kits

Insulated Drive Roll Kits

Insulated Groove Drive Roll Kits are used to prevent preheating of the aluminum 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.

Insulated Groove Drive Roll Kit for .030" (0.8mm) dia. wire 005-0640
Includes insulated drive roll P/N 511-0150
and idler roll assembly P/N 003-1870.

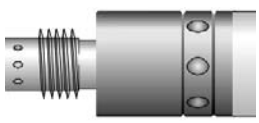
Insulated Groove Drive Roll Kit for .035" (0.9mm) dia. wire 005-0641
Includes insulated drive roll P/N 511-0151
and idler roll assembly P/N 003-1870.

Insulated Groove Drive Roll Kit for .040" (1.0mm) dia. wire 005-0642
Includes insulated drive roll P/N 511-0152
and idler roll assembly P/N 003-1870.

Insulated Groove Drive Roll Kit for .045" (1.2mm) dia. wire 005-0643
Includes insulated drive roll P/N 511-0153
and idler roll assembly P/N 003-1870.

Insulated Groove Drive Roll Kit for .062" (1.6mm) dia. wire 005-0644
Includes insulated drive roll P/N 511-0154
and idler roll assembly P/N 003-1870.

Tip Extender



Tip Extender.....**Lincoln P/N S23978-27**
.....621-0017
A tip extender is used if the torch cup or tip threads have been damaged or to prevent damage. Longer liners are required when using a tip extender.

Long Teflon Liner 615-0058
Long Spiral Steel Liner 615-0057

Note:
If more than one tip extender is used, the liner must be purchased in bulk and cut to size.

Section C (Cont.)

Accessories

Conduits

Flat Spiral Steel Conduit for steel & cored wire.		Standard Conduit with additional protective cover.	
615-0208	15 ft./4.5m	**001-0774**	15 ft./4.5m
615-0216	25 ft./7.6m	**001-0775**	25 ft./7.6m
615-0218	50 ft./15.2m	**001-0777**	50 ft./15.2m

NOTE: *The protective cover is used to help protect the conduit from burns.*

Snake Skins

Leather Snake Skin protective covers are now standard on all torches. 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 be means of a Velcro® closure.

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

Heavy Duty Contact Tip -3/8 ” Diameter

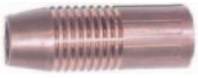
One Heavy Duty Contact Tip, one Heavy Duty Gas Cup Adapter, one Finned Copper gas cup and one 615-0331 Torch Liner must be ordered and used together as an assembly.

Part #	Wire Size	Tip ID	Arc	Tip Length
621-0390	.030”(0.8mm)	.040”(1.0mm)	Spray	1-5/8”(41.3mm)
621-0396	.030”(0.8mm)	.040”(1.0mm)	Short	1-7/8”(47.6mm)
621-0391	.035”(0.9mm)	.044”(1.1mm)	Spray	1-5/8”(41.3mm)
621-0397	.035”(0.9mm)	.044”(1.1mm)	Short	1-7/8”(47.6mm)
621-0392	.045”(1.2mm)	.053”(1.35mm)	Spray	1-5/8”(41.3mm)
621-0398	.045”(1.2mm)	.053”(1.35mm)	Short	1-7/8”(47.6mm)
621-0393	.052”(1.4mm)	.060”(1.5mm)	Spray	1-5/8”(41.3mm)
621-0399	.052”(1.4mm)	.060”(1.5mm)	Short	1-7/8”(47.6mm)
621-0394	1/16”(1.6mm)	.075”(1.9mm)	Spray	1-5/8”(41.3mm)
621-0400	1/16”(1.6mm)	.075”(1.9mm)	Short	1-7/8”(47.6mm)
621-0395	1/16”(1.6mm)	.085”(2.16mm)	Spray	1-5/8”(41.3mm)

Heavy Duty Gas Cup Adapter

Part #	Description
431-1630	Heavy Duty Cup Adapter

Finned Copper Gas Cups



Part #	Description
621-0249	#8, 1/2” ID (12.7mm) Gas Cup, Air Cooled
621-0250	#10, 5/8” ID (15.8mm) Gas Cup, Air Cooled
621-0251	#10, 5/8” ID (15.8mm) Heavy Duty Gas Cup, Air Cooled
621-0252	#12, 3/4” ID (19.05mm) Heavy Duty Gas Cup, Air Cooled

Section D

Maintenance

Periodic Maintenance

Maintenance of the torch will normally consist of a general cleaning of the wire guide system, including tubes, drive rolls, and conduits at regular intervals.

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

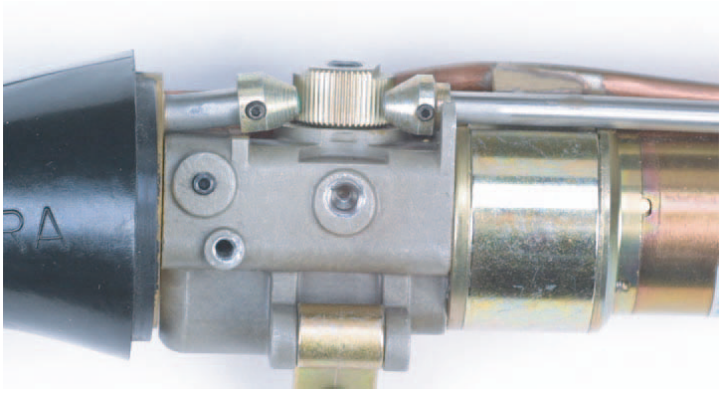
The only parts on the Cobramatic system that are subject to normal wear are the conduit, contact tips, gas cups, front body liners, wire guides, drive and idler rolls. A supply of these parts should be maintained on hand.

If repairs do become necessary, any part can easily be replaced by qualified shop maintenance personnel.

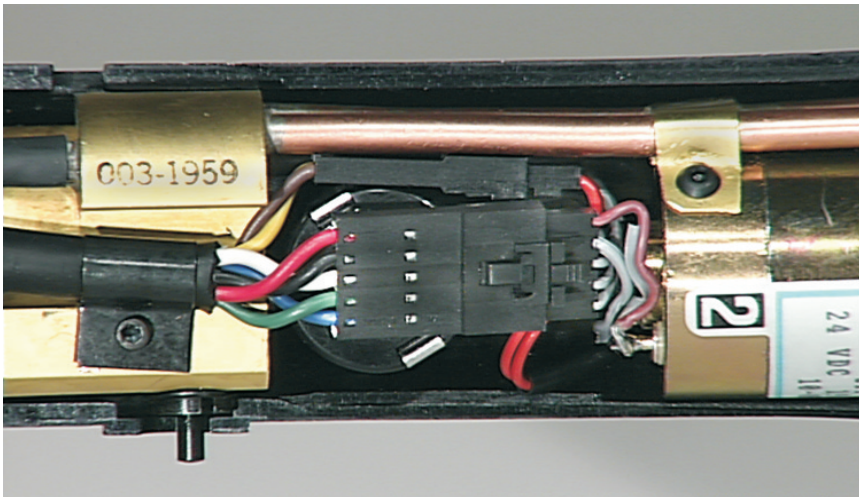
Your Cobramatic System is designed to provide years of reliable service. Normal wear and component failure may require occasional service.

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.

The front tube alignment is set at the factory for proper operation. If you feel you that your torch is not performing properly use the photo below to check alignment.



When replacing the Electrical Cable on a Cobra Gold make sure to properly place the connectors back into the handle opening above the potentiometer assemby. Use the picture below as a guide for proper placement.



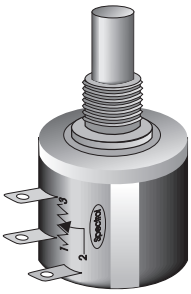
Recommended Spare Parts List

Part Number	Description	Part Number	Description
615-0007	Conduit 15 ft	449-0542	Nut, Pot
615-0008	Conduit 25 ft	005-0255	Handle Kit
615-0068	Conduit 50 ft	511-0101	Drive Roll
117-0520	Potentiometer	511-0001	Idler Roll
161-0002	Micro Switch	333-0082	Lock Washer, Idler Roll
401-0521	Knob, Pot	931-0100	Drive Roll Removal Tool
303-0540	'O' Ring, Pot	931-0584	Gas Valve Tool

KNOB
401-0521

'O' RING
303-0540

NUT
449-0542



POT
117-0520

POTENTIOMETER
ASSEMBLY

DRIVE ROLL REMOVAL TOOL
931-0100

DRIVE ROLL
511-0101

IDLER ROLL
511-0001

MICRO SWITCH
161-0002

Section E Troubleshooting

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

Section E (Cont.)

Troubleshooting Guide

Regardless of which torch or feeder used, all M.K. 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 24 V 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 Torch

See "W" clocked torch wiring diagram for information about pin-outs and locations.

Motor Check
Remove the torch connector from the cabinet.

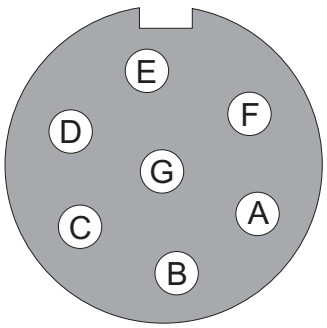
Using the torch Amphenol connector, check the resistance across pins **"A"** and **"B"** (motor leads). The resistance across the motor should be between **5-10 ohms**.

If an open circuit or short exists, 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.



"W" Clocked
Amphenol Connector
Viewed from front of connector

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Section F

Appendices

Diagrams / Parts List

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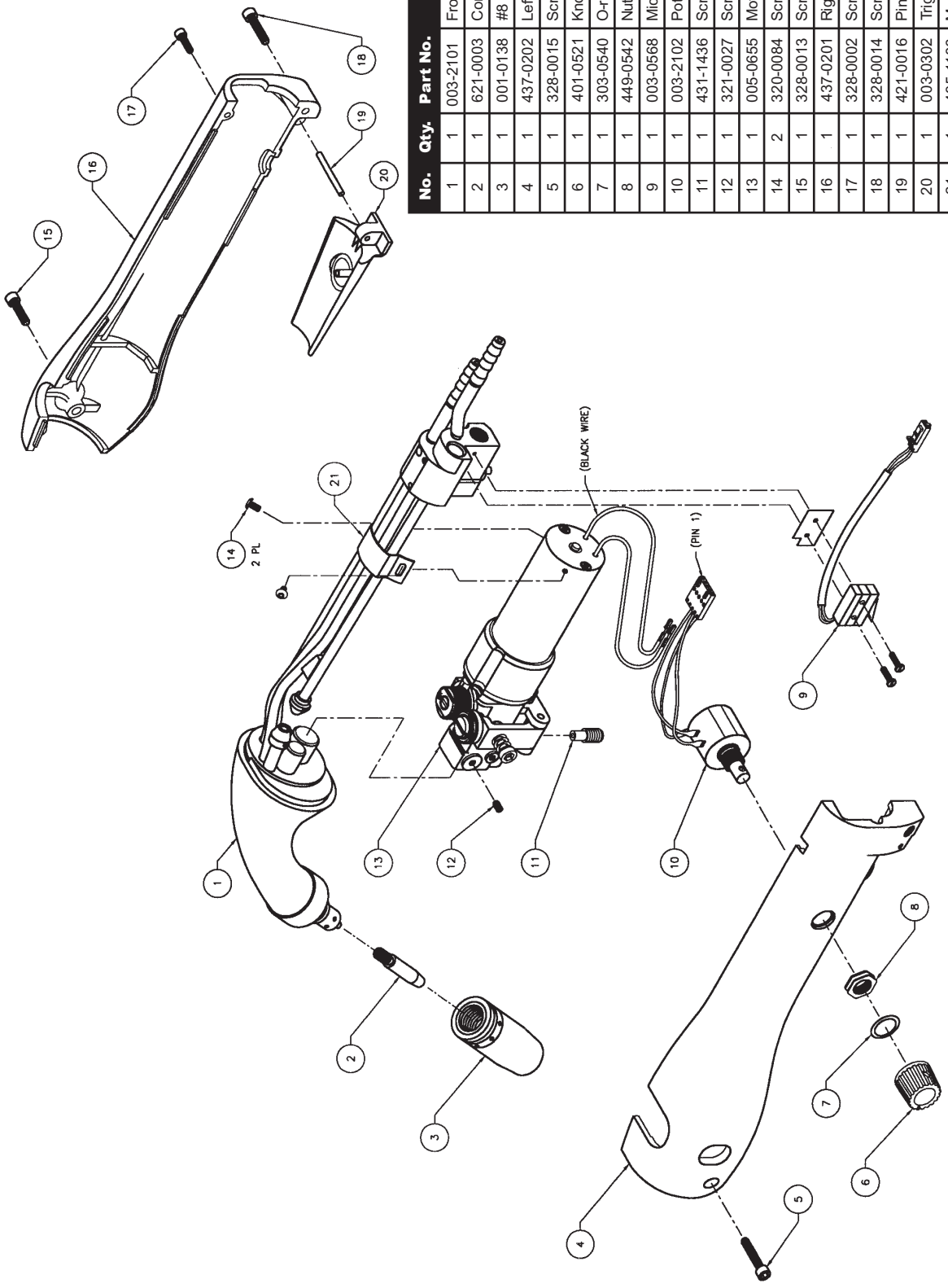
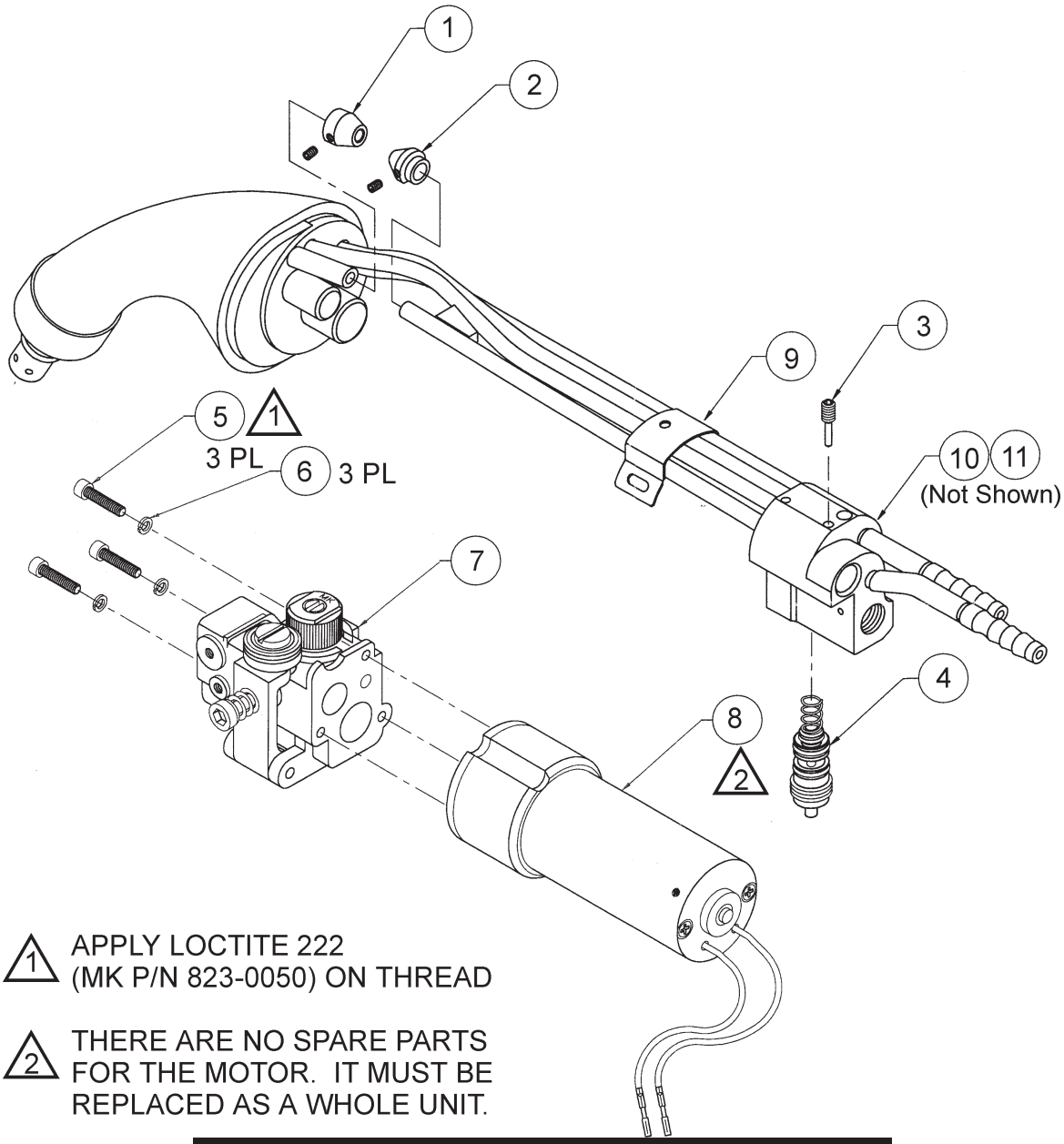
Cobra Gold Exploded View
P/N 003-1285



No.	Qty.	Part No.	Description
1	1	003-2101	Front Body Assy.
2	1	621-0003	Contact Tip, 0945 Wire, .060 ID
3	1	001-0138	#8 Gas Cup
4	1	437-0202	Left Side, Molded Handle
5	1	328-0015	Screw, Sch, Cap, 6-32 x3 /4
6	1	401-0521	Knob, 1/4 shaft
7	1	303-0540	O-ring, .426 ID .070Thk
8	1	449-0542	Nut, Pot Inj Mold Handle
9	1	003-0568	Microswitch Assy.
10	1	003-2102	Potentiometer Assy.
11	1	431-1436	Screw, Set Mod. 1/4-20 x 5/8
12	1	321-0027	Screw, Cps, 6-32 x 3/16
13	1	005-0655	Motor & Gear Hsg Assy.
14	2	320-0084	Screw, Bttn, Skt, Cap 4-40 x 3/16
15	1	328-0013	Screw, Sch, Cap 6-32 x 1/2
16	1	437-0201	Right Side, Molded Handle
17	1	328-0002	Screw, Sch, Cap, 4-40 x 3/8
18	1	328-0014	Screw, Sch, Cap, 6-32 x 5/8
19	1	421-0016	Pin, Dowel, 3/32 x 1.0 Long
20	1	003-0302	Trigger/Sleeve Assy.
21	1	435-1186	Motor Strap

Cobra Gold Front Body Assembly with Motor & Gear Housing
P/N 003-2101 and P/N 005-0655

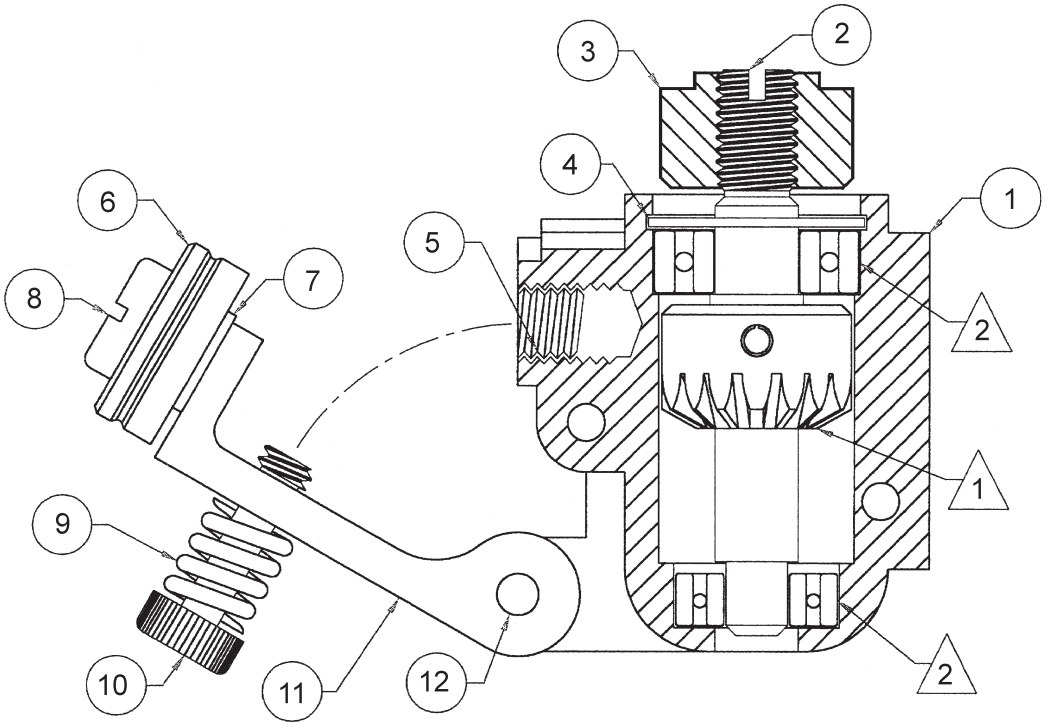


1 APPLY LOCTITE 222
(MK P/N 823-0050) ON THREAD

2 THERE ARE NO SPARE PARTS
FOR THE MOTOR. IT MUST BE
REPLACED AS A WHOLE UNIT.

No.	Qty.	Part No.	Description
1	1	431-1433	Guide, Wire, Front
2	1	431-1434	Guide, Wire, Rear
3	1	321-1074	Screw, Set, 6-32 x 1/2
4	1	001-0562	Valve, Gas
5	1	328-0003	Screw, Sch, Cap, 4-40 x 1/2
6	1	333-0084	Washer, Spr Lock, #4
7	1	003-1957	Assy, Gear Housing
8	1	005-0654	Motor Mod 19.5:1 W/Term
9	1	435-1186	Strap
10	1	411-0159	Strain Relief
11	1	328-0216	Screw, Sch, 3-48 x 3/16

Cobra Gold Gearbox Assembly
P/N 003-1957



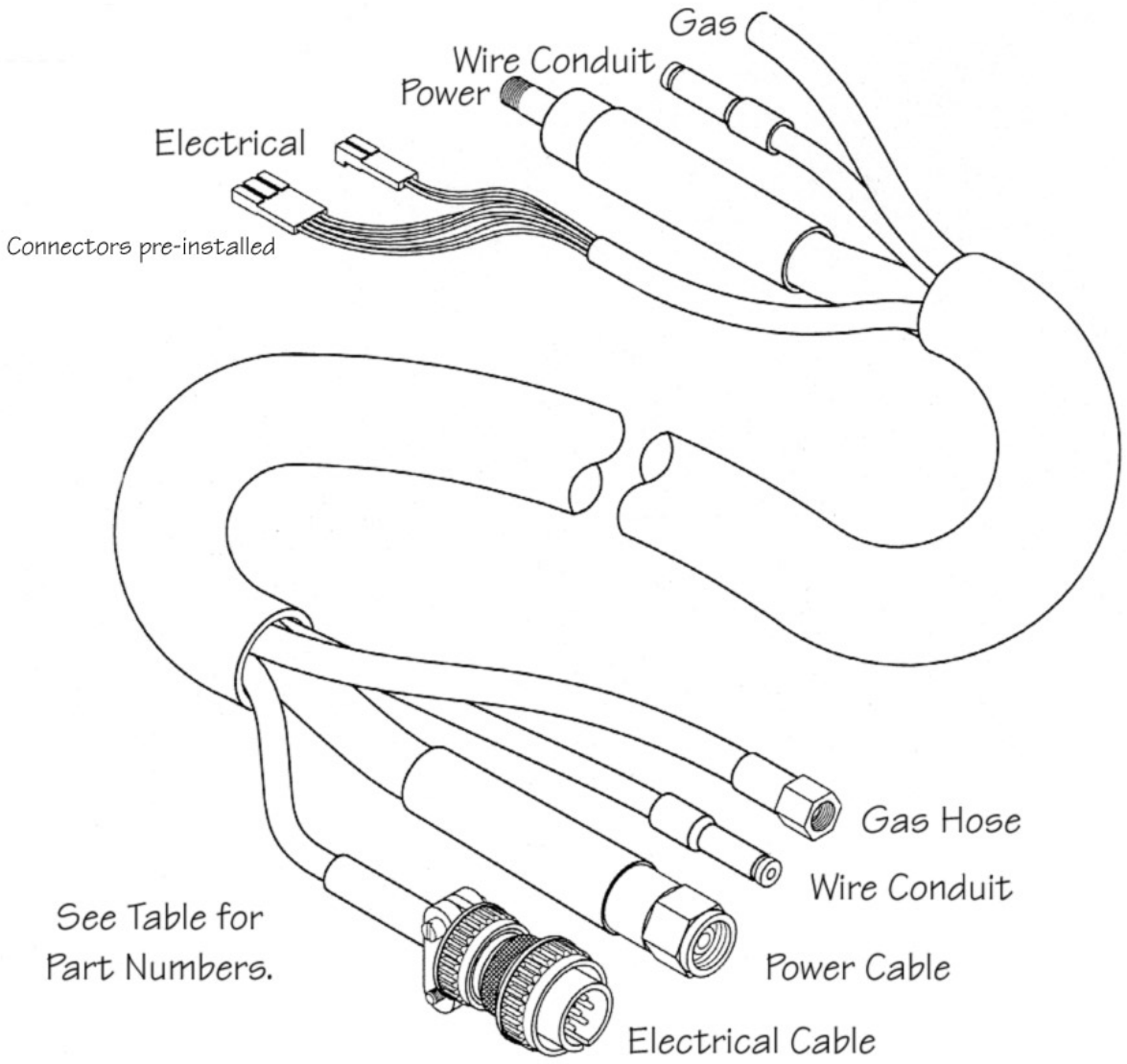
2 APPLY LOCTITE #620 (MK P/N 823-0038) TO OUTSIDE BEARING ONLY.

1 LUBE WITH 0.25 OZ OF 1:14 MIX MARVEL MYSTERY OIL & MOBILUX #2 GREASE MK #835-0001.

NOTES: UNLESS OTHERWISE SPECIFIED.

No.	Qty.	Part No.	Description
1	1	431-1435	90° Angle Head, Gear Housing
2	1	003-0787	Output Shaft Assy.
3	1	511-0101	Drive Roll, Cobra Gold
4	1	313-0198	Ring Retainer, Internal
5	1	351-0741	Helicoil, 10-24 x 0.190
6	1	511-0001	Idler Roll Assy
7	1	333-0082	Washer, Lock, #10
8	1	325-0206	Screw, PH, 10-24 x 3/8
9	1	419-0020	Spring, Compress
10	1	431-0015	Screw, Idler Arm, Adjust
11	1	413-0049	Idler Arm, Machine
12	1	421-3106	Pin, Dowel, 1/8 x 3/4

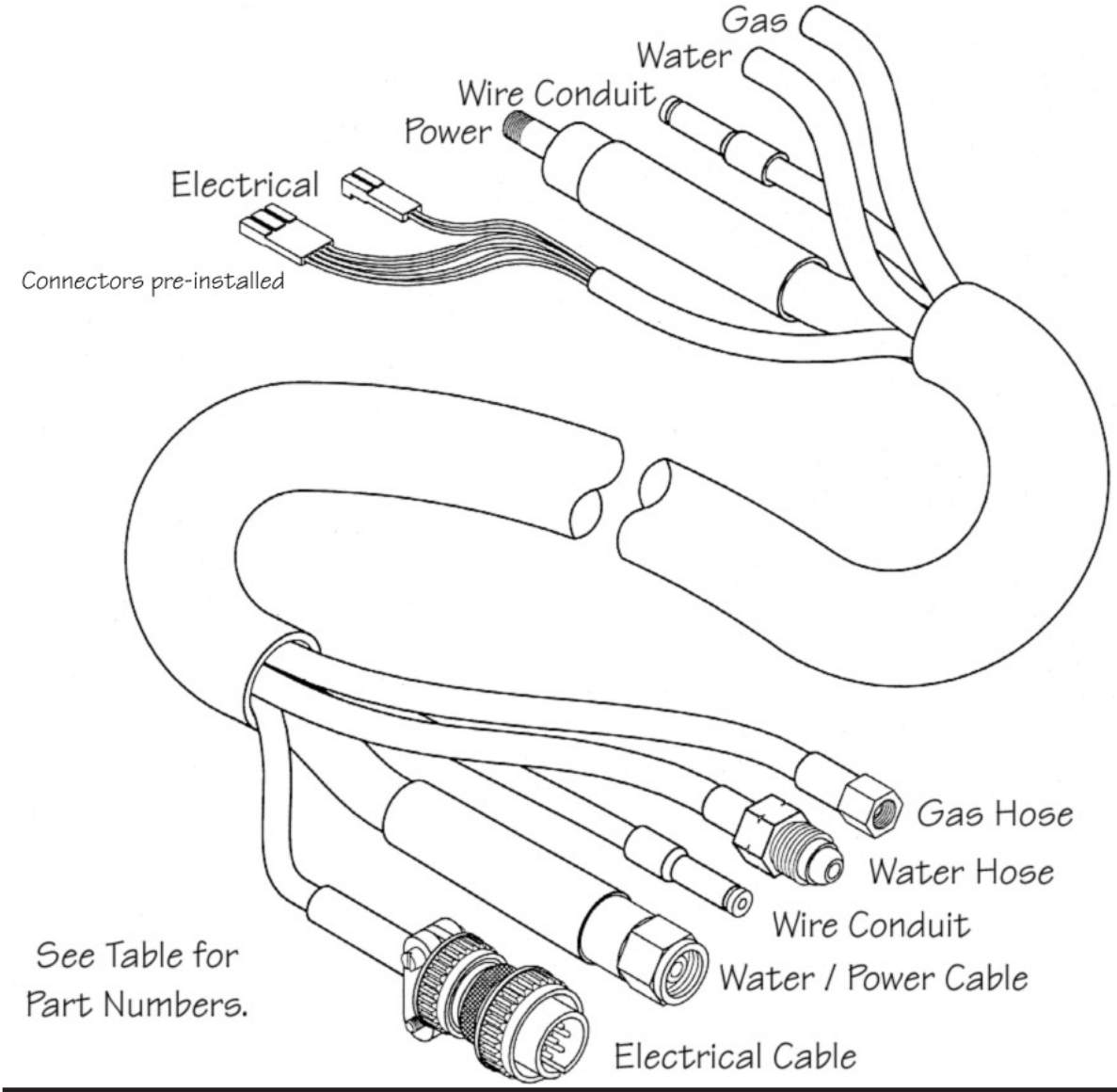
K1589 Series Ultra-Flex Air Cooled Lead Assy



211 Series Ultra-Flex Cable Assemblies						
Length	**Complete Cable Assy***	**LE P/N Conduit (MK P/N)**	**Power Cable***	**Electrical Cable ***	**Gas Hose***	**Snake Skin***
15'/ 4.5m	005-0276	S23978-8 (615-0007)	001-2527	005-0268	001-0537	931-0110
25'/ 7.6m	005-277	S23978-6 (615-0008)	001-2528	005-0269	001-0538	931-0122
50'/ 15.2m	005-280	S23978-7 (615-0068)	001-1042	005-0272	001-0665	931-0123
*MK Part Numbers						

Cable Fittings for Ultra-Flex (211 series)		
Power Cable	**Torch End Fitting**	**Cabinet End Lug Assy**
Part No.→	431-1128	003-1328
Gas Hose	**Nut & Insert**	**Ferrule**
Part No.→	753-0464	469-0161

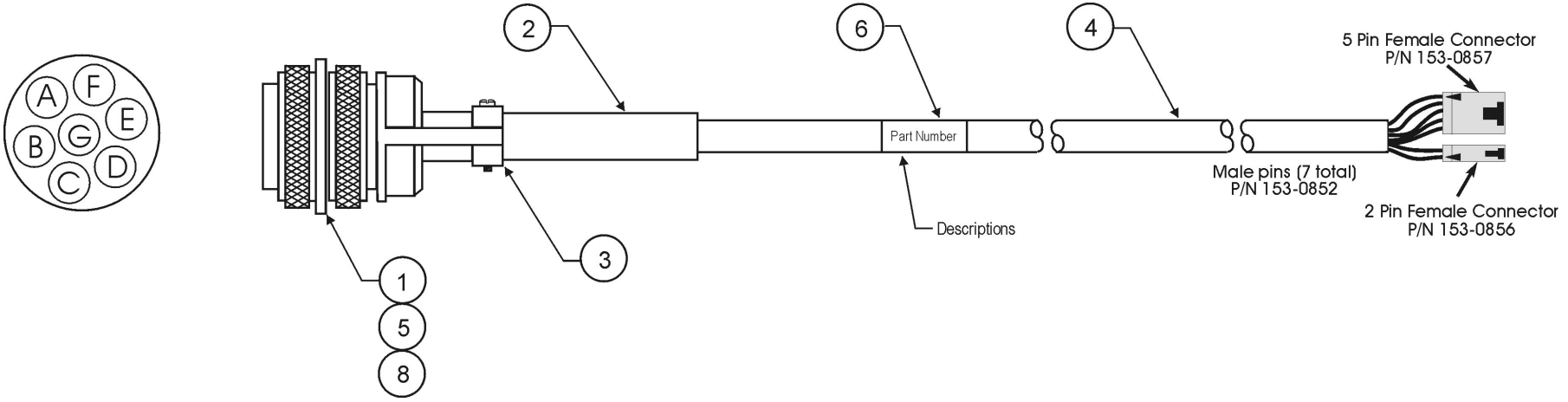
K1590 Series Water Cooled Lead Assy.



210 Series Water Cooled Cable Assemblies							
Length	**Complete Cable Assy***	**LE P/N Conduit (MK P/N)**	**#4 Water/ Power Cable***	**Electrical Cable ***	**Gas Hose***	**Water Hose***	**Snake Skin***
15'/4.5m	615-0007	S23978-8 (615-0007)	001-2521	005-0268	001-0537	001-0529	931-0110
25'/7.6m	615-0008	S23978-6 (615-0008)	001-2524	005-0269	001-0538	001-0530	931-0122
50'/15.2m	615-0068	S23978-7 (615-0068)	843-0338	005-0272	001-0665	001-0667	931-0123

*MK Part Numbers

Cable Fittings for Water-Cooled Torches (210 series)			
Water / Power Cable	**Torch End Fitting**	**Cabinet End Lug Assy**	**Ferrule #650 1ea**
Part No.→	003-0590	003-1327	469-0002
Gas Hose	**Nut & Insert**	**Ferrule**	
Part No.→	753-0464	469-0161	
Water Hose	**Nipple**	**Nut**	**Ferrule**
Part No. →	753-0656	753-3379	469-0161



Wire List		
Pin	**Wire Color**	**Signal Description**
A	Red	Torch Motor
B	Black	Torch Motor
C	Blue	Pot
D	Green	Pot Wiper
E	Brown	Trigger
F	Orange	Trigger
G	White	Pot

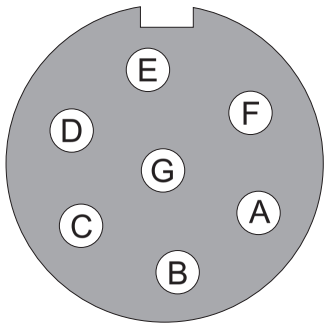
Control Cable "W" Torches

Part Numbers 001-3787, 001-3788, 001-3789 , 001-3790

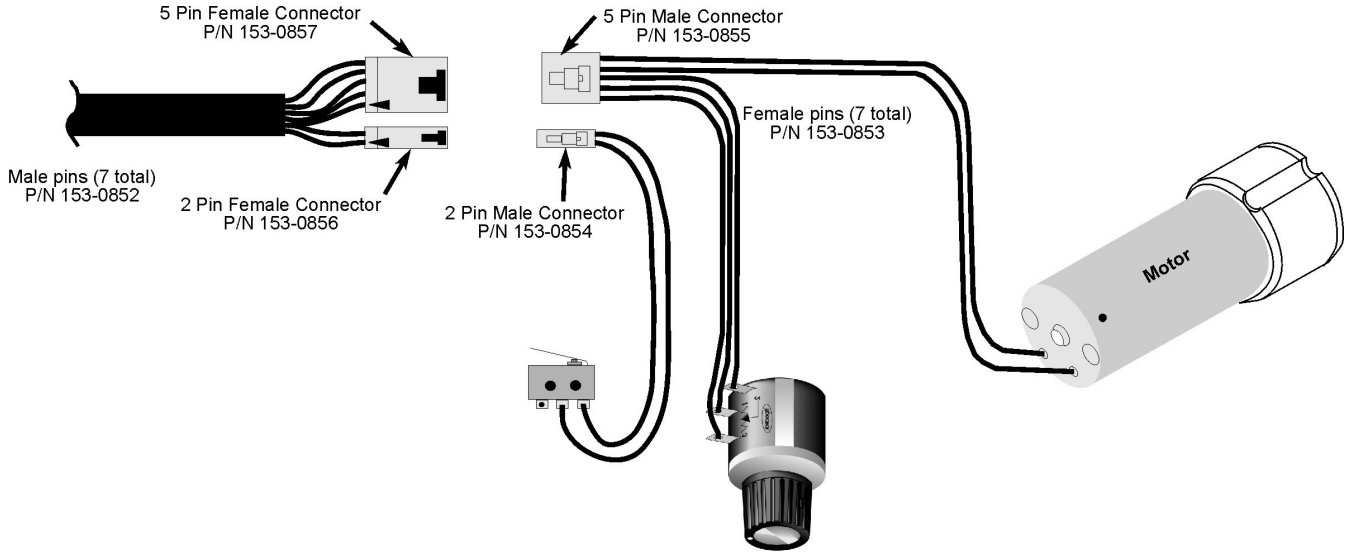
No.	Qty.	Part No.	Description
1	1	153-0322	Connector, 7 Pin, "W"
2	1	301-0004	Boot
3	1	411-0025	Clamp
4	Table **Q4**	844-0070	Cable, 7 Cond, 22 Ga.
5	0.30ft	739-0004	Tubing, Shrink, Ø1/8
6	1	405-0762	Label, Self Laminate
7	1	411-0159	Clamp, Retaining
8	1	331-0087	Washer, Flat, Neoprene
9	1	411-0243	Tie Wire #4 Screw 3/4 Dia N

Table Q4:
Quantity Required for Item #4

Part No.	Description	844-0070 Qty.
001-3787	15' Control Cable	15.50 Ft
001-3788	25' Control Cable	25.50 Ft
001-3789	30' Control Cable	30.50 Ft
001-3790	50' Control Cable	50.50 Ft



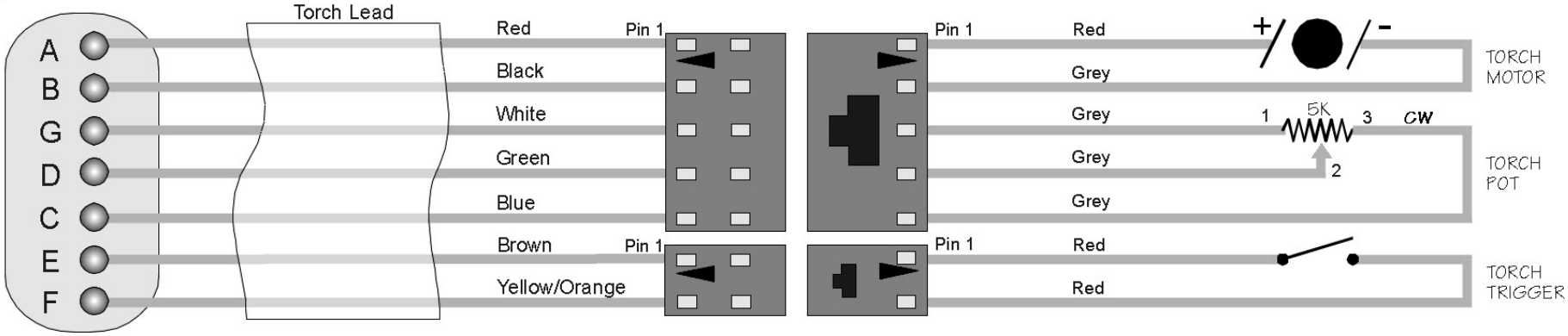
"W" Clocked
Amphenol Connector
Viewed from front of connector



Cabinet End
Amphenol Connector

Torch Connectors
Inside Handles

Torch Functions



MK Warranty Repair Centers as of 11/13/2001
Check www.mkprod.com for a current, accurate listing.

ALABAMA

AIRGAS – SOUTH, INC.
Birmingham, AL
205/251-6835

INDUSTRIAL WELDING SERVICES
Quinton, AL
205/674-3258

WELDING ENGINEERING SUPPLY CO.
Prichard, AL
334/457-8681

WELDING MACHINE HOSPITAL
Montgomery, AL
334/832-9353

ARIZONA

PRAXAIR DISTRIBUTION, INC.
Phoenix, AZ
602/269-2151

ALLSTATE ELECTRIC MOTOR CO.
Phoenix, AZ
602/233-0500

ARKANSAS

APPLIED SERVICES, INC.
Benton, AR
501/860-6464

ARKANSAS WELDING IND'L SUPPLY
Hot Springs, AR
501/321-9922

EL DORADO WELDING & IND'L SUPPLY
El Dorado, AR
870/863-4088

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
559/486-2251

CAL-WELD SUPPLY
Fresno, CA
209/445-0131

DELTA-TECH
Sun Valley, CA
818/767-4234

EMCO EAST
Concord, CA
925/798-4411

FRESNO OXYGEN
Fresno, CA
559/233-6684

INDUSTRIAL WELDER REPAIR
LaPuente, CA
626/961-7643

PRAXAIR DISTRIBUTION, INC.
Long Beach, CA
562/427-0099

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

SOUTHWEST WELDER REPAIR
Fontana, CA
909/357-1661

MK Warranty Repair Stations as of 11/13/2001 (Continued)

SWEINHART ELECTRIC CO., INC.
Long Beach, CA
714/521-9100

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

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

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.
Orlando, 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

TRI-TECH
Sarasota, FL
941/758-3825

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

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

ILLINOIS
INDUSTRIAL WELDER REBUILDERS
Alsip, IL
708/371-5688

RELIABLE EQUIPMENT REPAIR
Hamel, IL
618/633-5000

SCHERER INDUSTRIAL GROUP, INC.
Galesburg, IL
309/342-4125 or 888/964-3526

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

MK Warranty Repair Stations as of 11/13/2001 (Continued)

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

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

COX EQUIPMENT COMPANY
Indianapolis, IN
317/241-8881

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

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

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

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

KANSAS

KANOX
Hutchinson, KS
316/665-5551

KENTUCKY

GENERAL WELDING PRODUCTS
Louisville, KY
502/635-5218

RED-D-ARC
Lexington, KY
800/245-3660

WELDING EQUIPMENT
Louisville, KY
502/636-0545

LOUISIANA

RED BALL OXYGEN CO.
Shreveport, LA
318/425-3211

Maryland

CCM Mech/Elec Repair Service, Inc.
Owings, MD
301/855-7508

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

SAGINAW WELDING SUPPLY CO.
Saginaw, MI
517/793-9696

SOUTHPARK WELDING
Marysville, MI
810/364-6521

WELDING METALS, INC.
Madison Heights, MI
248/585-0480

WESAR COMPANY
Three Rivers, MI
616/483-9125

MK Warranty Repair Stations as of 11/13/2001 (Continued)

MINNESOTA
MINNEAPOLIS OXYGEN CO.
Minneapolis, MN
612/588-8855

OXYGEN SERVICE CO.
St. Paul, MN
612/644-7273

MISSOURI
CEE-KAY SUPPLY, INC.
St. Louis, MO
324/644-3500

P.G. WALKER
Springfield, MO
417/862-1745

MISSISSIPPI
NORDAN SMITH WELDING SUPPLY
Hattiesburg, MS
601/545-1800

3D SUPPLIES, INC.
Jackson, MS
601/353-3330

NEVADA
SIERRA WELDING SUPPLY CO.
Sparks, NV
775/359-0542

NEW JERSEY
INDUSTRIAL ELECTRIC SERVICE CO.
Hawthorne, NJ
973/423-1212

NEW YORK
DELO WELDING SUPPLY
Syracuse, NY
315/478-2188

HAUN WELDING SUPPLY
Syracuse, NY
315/463-5241

NORTH CAROLINA
HOLOX LTD.
Colfax, NC
336/996-1974

M & L WELDER REPAIR
Asheville, NC
828/250-9353

MACHINE & WELDING SUPPLY CO.
Dunn, NC
910/892-4016

MACHINE AND WELDING SUPPLY CO.
Greenville, NC
252/752-3089

MACHINE AND WELDING SUPPLY CO.
Raleigh, NC
919/772-9500

MACHINE AND WELDING SUPPLY CO.
Winston-Salem, NC
336/723-9651

NATIONAL WELDERS SUPPLY CO.
High Point, NC
910/882-1110

NATIONAL WELDERS SUPPLY CO.
Charlotte, NC
704/392-7317

OHIO
AGA GASES, INC.
Lima, OH
419/228-2828

ALBRIGHT WELDING SUPPLY
Wooster, OH
330/264-2021

ARC EQUIPMENT COMPANY
Struthers, OH
333/750-9353

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

MK Warranty Repair Stations as of 11/13/2001 (Continued)

OHIO AIR PRODUCTS
Canton, OH
330/821-2771

RICK'S WELDER REPAIR SERVICE
Eastlake, OH
440/269-1204

VALLEY NATIONAL GASES
Hilliard, OH
614/771-1311

VALLEY NATIONAL GASES
Lima, OH
419/228-1008

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

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

INDUSTRIAL SOURCE
Eugene, OR
541/344-1438

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

GEOVIC WELDING SUPPLY
Milton, PA
717/742-9377

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

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

VALLEY NATIONAL GASES
Pittsburgh, PA
412/281-1835

SOUTH CAROLINA
CAROLINA WELDER SERVICE
Lake City, SC
843/687-0413

TENNESSEE
NEXAIR
Memphis, TN
901/523-6821

TRAMCO
Bristol, TN
423/968-4499

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

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

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

DENISON OXYGEN
Denison, TX
903/465-3369

MK Warranty Repair Stations as of 11/13/2001 (Continued)

FT. WORTH WELDERS SUPPLY, INC.
Fort Worth, TX
817/332-8696

GPC SERVICES, INC.
San Angelo, TX
915/655-4545

RITE-WELD SUPPLY, INC
Fort Worth, TX
817/626-8237

UTAH
C.W. SILVER INDUSTRIAL SERVICE
Salt Lake City, UT
801/531-8888

VIRGINIA
AIR PRODUCTS & CHEMICALS, INC.
Bristol, VA
540/669-3161

ARC WELDERS, INC.
Ashland, VA
804/798-1818

NORFOLK WELDERS SUPPLY
Norfolk, VA
804/622-6571

WASHINGTON
AIRGAS - NORPAC, INC.
Tacoma, WA
253/473-2282

A-L WELDING PRODUCTS
Tukwila, WA
425/228-2218

AMERICAN EQUIPMENT SERVICES
Kent, WA
253/395-9947

HARRIS ELECTRIC, INC.
Seattle, WA
206/782-6668

OXARC, INC.
Spokane, WA
509/535-7794

PACIFIC WELDING SUPPLIES
Tacoma, WA
253/572-5302

PRECISION WELDER & ENGINE REPAIR
Seattle, WA
206/382-6227

WEST VIRGINIA
CARDINAL SALES & SERVICE, INC.
Clarksburg, WV
304/622-7590

WISCONSIN
INTERSTATE WELDING SALES CORP.
Appleton, WI
920/734-7173

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

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

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

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

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

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

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

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

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

INDUSTRIAL ELECTRONIC SERVICES
Calgary, Alberta
403/279-3432

MK Warranty Repair Stations as of 11/13/2001 (Continued)

LADEL LTD.
Quebec
819/376-6577

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

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

PEEL ENGINES
Mississauga, Ontario
905/670-1535

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

WELDERS SUPPLY
Winnipeg, Manitoba
204/772-9476

WELDING WIDE SERVICES, INC.
Brampton, Ontario
905/874-9992

WELDTEC
B.C.
604/545-3886

CHINA
PHT Group Company
Beijing, China
86-10-6858 8395

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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焊材料，並請遵守貴方的有関勞動保護規定。

이 제품에 동봉된 작업지침서를 숙지하시고 귀사의 작업자 안전수칙을 준수하시기 바랍니다.

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

LIMITED WARRANTY

Effective March 1, 2001

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 defect 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 torch 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.

In the case of MK Products' breach of warranty or any other duty with respect to the quality of any goods, the exclusive remedies therefore shall be at MK Products' option:

(1) repair
(2) replacement
(3) where authorized in writing by MK Products, the reasonable cost of repair or replacement at our Irvine, California plant; or
(4) payment of or credit for the purchase price (less reasonable depreciation based upon actual use) upon return of the goods at customer's risk and expense. Upon receipt of notice of apparent defect or failure, MK Products shall instruct the claimant on the warranty claim procedures to be followed.

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. **Torches, Weldheads and Water Recirculators.....1 year**
2. **All Other Equipment.....3 years**
3. **Repairs .....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 (both ways) 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 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.

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

DATE : March 1, 2001

LINCOLN ELECTRIC

World's Leader in Welding and Cutting Products
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