WIRE FEEDER

IM712

MK 091-0499
October 2000

OPERATOR'S MANUAL

Cobramatic®

For use with Push-Pull Torches model K1589, K1590, K1591, K1592
For use with code 10841

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 thoughtfull 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.

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

OPERATOR'S MANUAL

World's Leader in Welding and Cutting Prodcuts

LINCOLN ELECTRIC

Premier Manufacturer of Industrial Motors

Sales and Service through Subsidiaries and Distributors Worldwide
Cleveland, Ohio 44117-1199 U.S.A. TEL: 216.481.8100 FAX: 216.486.1751 WEB SITE: www.lincolnelectric.com

⚠ WARNING

⚠ CALIFORNIA PROPOSITION 65 WARNINGS ⚠

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

The Above For Diesel Engines

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

The Above For Gasoline Engines

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

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

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

FOR ENGINE powered equipment.

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

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

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

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

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

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

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

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

ELECTRIC AND MAGNETIC FIELDS may be dangerous

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

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

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

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

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

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

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

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

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

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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.

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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**.

The Wire Feeder - Gun section of the welding package is a push-pull system, which means that there is a motor in the wire feeder as well as the welding gun. These must both be set-up properly to achieve maximum benefit from the welding package.

The Wire Feeder – Gun section of the welding package is fully warranted by MK Products and Lincoln Electric and can be serviced at the 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.

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Section A

Installation

Technical Specifications

Wire Diameter Capacity ..... .030 - 1/16” ALL Types

Wire Capacity ..... 12” Standard

(Insulated or Non-Insulated)

Power Input ..... 42 VAC 50/60 Hz,

..... 150 Watts Peak (3 amps)

Weight ..... 41 pounds

Shipping Weight ..... 46 pounds

For Use with these Lincoln Torches K1589, K1590, K1591,
..... K1592

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.

Coolant Recommendations

Water Source and Hose Capable of Providing a Minimum of **1 qt/min. at 45 p.s.i**. when using water cooled torches.

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

Check coolant periodically to remain within limits of the following:

A. **Coolant Flow rate - 1 quart/minute at 45 p.s.i.**
B. **Resistivity - 10K ohms/centimeter**
C. **Ph Range - 5.5-8.5**
D. **Particle Size - .005”**

MK Recommended Coolant Solution:

1 part etylene glycol
3 parts distilled water
1 teaspoon liquid glycerin

Machine Grounding

The Cobramatic® and GMAW wire feeders are ground to the power source through the input cable. The power source grounding terminal must be properly connected to electrical ground per the power source operating manual.

Mounting Location

The cabinet should be placed in a location where it can be protected from damage. Lead lengths and accessibility must also be considered when installing the cabinet.

Input Power Connections

Your Wire Feeder comes factory ready with a harness to plug directly into all 14 pin Lincoln Power Sources equipped with 42 VAC auxiliary.

The **42 VAC** is connected to the PC Board on terminal strip **J5 #1** (neutral) and **#2** (hot) and Ground to the Cabinet chassis. See diagram in the appendix.

Wire Threading Procedure

Wire Spool Installation

Release latches, and open right side door of cabinet.

Remove spool retainer from spindle hub.

Raise wire retainer bar to latched postion.

Install wire spool onto spindle hub so that wire feeds from bottom of spool towards slave motor. Make sure that the hole in the spool aligns with pin on spindle hub. The white dot on the end of the spindle hub will aid in this alignment.

Replace the spool retainer nut.

Lower the wire retainer bar onto the spool.

Threading Procedure

Place wire size selector switch on front panel to the correct position for the wire being used.

Loosen end of wire from spool and cut off any kinked or bent portions.

Unreel and straighten out first 6” to 8” of wire.

Raise wire type lever to center position.

Route wire into inlet guide, along drive roll groove, and into wire conduit.

Flip wire type lever to show type of wire being used.

Tighten the torch pressure adjusting knob so the wire will be picked up and fed through the contact tip. 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.

Wire Retainer Bar

The design of the patented Cobramatic® Wire Retainer Bar performs two very important and very basic functions of the wire feeder: a) spool drag tension, and b) wire maintenance on the spool.

The spool drag tension is set by lowering the wire retainer bar onto the wire inside of the spool. The spring tension of the wire retainer bar applies enough pressure on the spool so that when the torch trigger is released, engaging the brake pall, the spool does not overrun kicking wire off the spool.

Wire maintenance on the spool is performed by the applied pressure of the wire retainer bar spread across the coiled wire on the spool. The replaceable pad (P/N 437-0255) of the wire retainer bar is designed to hold the wire on the spool, maintaining the smooth layering of the wire and keeping it from jumping off, and possibly, electrically shorting to the cabinet chassis.

Welding Torch Connections

Work Cable

Connect a work lead of sufficient size and length (see table below) between the proper output stud on the power source and the work. Be sure the connection to the work makes tight metal to metal electrical contact. Poor work lead connections can result in poor arc initiation, poor weld results and activation of the ground lead protector.

	Work Lead Lengths	
Current 60% Duty Cycle	Up to 50ft. (15.2m)	10-100ft. (15.2-30.4m)
300A	0 (53mm)	0 (67mm)
400A	00 (67mm)	00 (85mm)
500A	00 (67mm)	00 (85mm)
600A	000 (85mm)	000 (107mm)

Control Cable
The 7-Pin “W” Clocked connector screws onto the mating receptacle on the front panel of the wire feeder. This provides all electrical signals (motor voltage, potentiometer control & trigger) to and from the feeder to the torch.

Wire Conduit Inlet
Front panel access to attach conduit to front of slave motor assembly.

Power Cable Inlet
Front panel access to attach power cable (air or water) to top of power block.

Gas Inlet
Front panel access to attach gas hose to bottom fitting of power block.

Water Inlet (For Water Cooled Torches)
Front panel access to connect the water hose to the middle fitting on the power block.

Section B Operation

General
The AC 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 spool drag tension is produced by the patented Wire Retainer Bar mechanism to keep the wire slightly taut. The 24 VDC torch pull motor is controlled by a solid state speed control and a potentiometer located in the torch.

Recommended Processes and Equipment
The Cobramatic® is recommended for use in the GMAW and FCAW welding applications. It is recommended for use with constant voltage power sources. The Cobramatic® is capable of feeding wires (diameter capacity) ranging from .023” through .045” solid/cored and .030” through 1/16” aluminum.

Controls and Settings
On/Off Switch
Placing the switch in the “ON” position energizes the feeder circuitry and the power indicator light.

Wire Size Selector Switch
The wire size selector switch changes the torque of the slave motor for the wire you are using. When in the **.030-.035** aluminum only position, the slave motor produces approximately **1 1/2 lbs**. inches and approximately **4 1/2 lbs**. inches when in the all other wires position.

NOTE:
Operating the cabinet with the switch in the wrong position will cause wire feed difficulties.

Posa Start Controls
The Posa Start Run-in Speed Control, located on the front panel, provides adjustment for slow wire run-in. Once the arc has been established, the wire feed speed is automatically changed from the slow run-in speed to the welding speed set on the torch potentiometer.

Posa Start Operating Procedure
General
The Posa Start Run-in Speed Control, located on the front panel, provides

adjustment for slow wire run-in. Once the arc has been established, the wire feed speed is automatically changed from the slow run-in speed to the welding speed set on the torch potentiometer.

The Posa Start feature allows the Cobramatic® to be used in combination with constant current DC welding power sources of open circuit voltage in excess of 55 volts - also, any constant voltage welding power source capable of a minimum of 50 amps.

Note:
Reverse polarity MUST be used.

Posa Start Connections

Attach the #14 single black lead which extends from the back of the cabinet to the negative terminal of the power supply or work ground, unless already attached through a 14 pin amphenol supplies with the cabinet. The Posa Start lead is internally connected to the P.C. board on terminal strip J6, terminal 2.

CV Posa Start Operations

Attach Cobramatic® to CV power source according to the installation instructions.

Turn the Cobramatic® to the **"ON"** position and the Posa Start to the **"OFF"** position.

Adjust power source to desired voltage for your weld condition.

Depress gun trigger and adjust wire feed speed at gun to match voltage setting. If approximate wire feed is not known, it is better to start with excess wire feed rather than too little, in order to prevent a "burn-back".

Turn the Posa Start switch to the **"ON"** position. Press torch trigger and, using Run-in Speed Control, adjust wire feed rate to approximately 10% of welding wire speed set at torch.

Strike an arc, and adjust wire feed rate at gun until correct condition is achieved.

CC Posa Start Operation

Attach the Cobramatic® to a CC power source according to the installation instructions.

Insure power supply high frequency switch is in the **"OFF"** position, and power supply is set to DC reverse polarity.

The power supply contactor should be set to **"Remote"** or **"Tig"** and the amperage control set to **"Panel"** or **"Standard"** depending on power supply.

Turn the Cobramatic® power switch to the **"ON"** position and the Posa Start switch to the **"OFF"** position.

Adjust power source to desired amperage for your weld condition.

Press gun trigger and adjust wire feed speed at gun to match current setting. If approximate wire feed speed is not known, it is better to start with excess wire feed rather than too little, in order to prevent possible damage to the contact tip.

Turn Posa Start switch to the **"ON"** position. Press torch trigger and, using Run-in Speed Control, adjust wire feed speed to approximately 10% of welding wire speed set at torch.

Strike an arc; if the wire stubs out, reduce wire feed rate at gun, or increase amperage setting on power source.

CAUTION:
Do Not operate this wire feeder on a power source having a high-frequency starting circuit before making sure that the high frequency portion of the power source is turned off.
Failure to take this precaution will cause permanent damage to the Posa Start circuitry.

NOTE:
Because the Posa Start Run-in Speed always remains a percentage of the actual welding wire feed rate, the Posa Start run-in speed will always slow down or speed up proportional to any adjustment you now make at the gun. Therefore, if you slow down the welding wire feed speed, you will have to increase the Run-in Speed setting.

Section C OPTIONAL KITS

The following is a list of Optional Kits available for the Cobra® V Wire Feeder.

A detailed description of each kit is given later in this section.

P/N	Description
005-0674	Gas Purge/Trigger Latch Kit
005-0675	Water Pressure Kit

005-0674 Gas Purge/Trigger Latch Kit

The Gas Purge/Trigger Latch Kit is a dual function kit, built into one. The kit includes an easy to install interface control PC board, a 24VAC solenoid for pre and post purge control, a modified valve stem for the welding torch and, a front panel switch for activating the Trigger Latch mechanism.

The gas control times have been preset to 0.5 seconds pre-purge and 1.0 seconds post-purge. This offers an optimum amount of inert gas shielding prior to striking the arc and after the arc has been extinguished.

The Trigger Latch mechanism gives the operator the flexibility of normal trigger operation (pull trigger to weld - release trigger to stop). This also offers the comfort of latched trigger operation (pull trigger once to latch and weld - pull trigger again to unlatch and stop).

005-0675 Water Pressure Kit

By monitoring the pressure from the water recirculator, the switch uses the pressure as the key safety element in protecting the torch from overheating while welding. If there is a loss of water pressure, the switch will keep the arc from igniting so no welding takes place without water cooling the torch. The benefit of the water pressure switch far exceeds the minimal cost of its purchase and installation.

This kit, when installed into the wire feeder, is physically adaptable to all makes ands models of water recirculators using standard fittings (left-hand threaded).

Section D Maintenance

Routine 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 a qualified shop maintenance man.

Your Cobramatic® 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.

Testing the Feeder

Relay K2 Operation

When the torch trigger is pressed, 24VAC is sent to the coil of relay K2. When K2 is energized, AC is sent to the slave motor, spool brake, and the AC contactor. Relay K2 is also responsible for sending 24VAC to the speed control circuit and shorting the torch motor leads together when the trigger is released for the dynamic braking system. K2 also provides the closing contactor signal.

Testing the Input Power Circuits

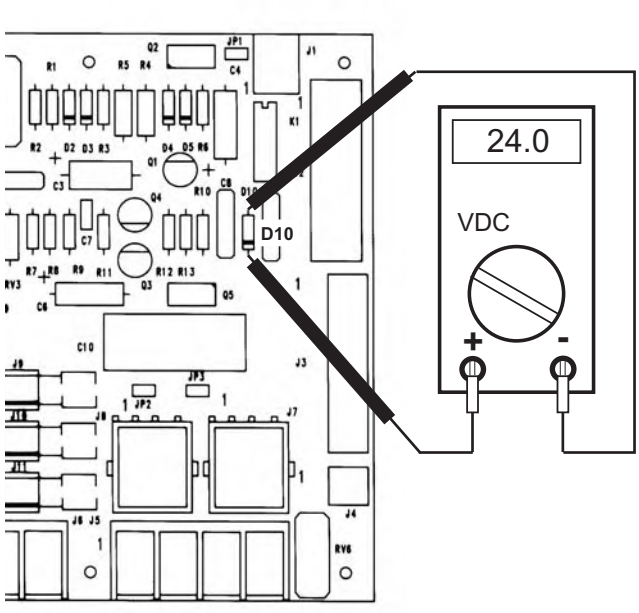
The AC circuits are protected by fuses F2 and F3. If F2 and F3 continually blow, remove J4 (Brake Solenoid), J7 (slave motor) and J5-3,4 (AC Contactor) from the P.C. Board. Replace fuse, and retrigger system. If fuse does not blow; isolate the problem by plugging in J4, J7, and J5-3,4 one at a time until the fuse blows.

Testing the Speed Control

NOTE:

The torch should be tested first and the amphenol must be connected to the Cobramatic® to perform this test.

Place a voltmeter across diode **D10** and press torch trigger. A reading of **0 - 24VDC** should be observed, as the torch potentiometer varied.



Testing the Torch

Motor Check

Remove the amphenol connector from the cabinet.

Using the torch amphenol, 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 exist, check the motor leads and motor independently.

Testing the Potentiometer - "W" Clocked

Using the torch amphenol, check the resistance across pin **"D"** (wiper) and pin **"C"**. The resistance should vary from **0 - 5K ohms.**

Check the resistance across pin **"D"** (wiper) and pin **"G"**. The resistance should vary from **5K - 0 ohms**.

Testing the Micro Switch

Using the torch amphenol, check for continuity across pins **"E"** and **"F"** when the trigger is pressed.

Section E Troubleshooting

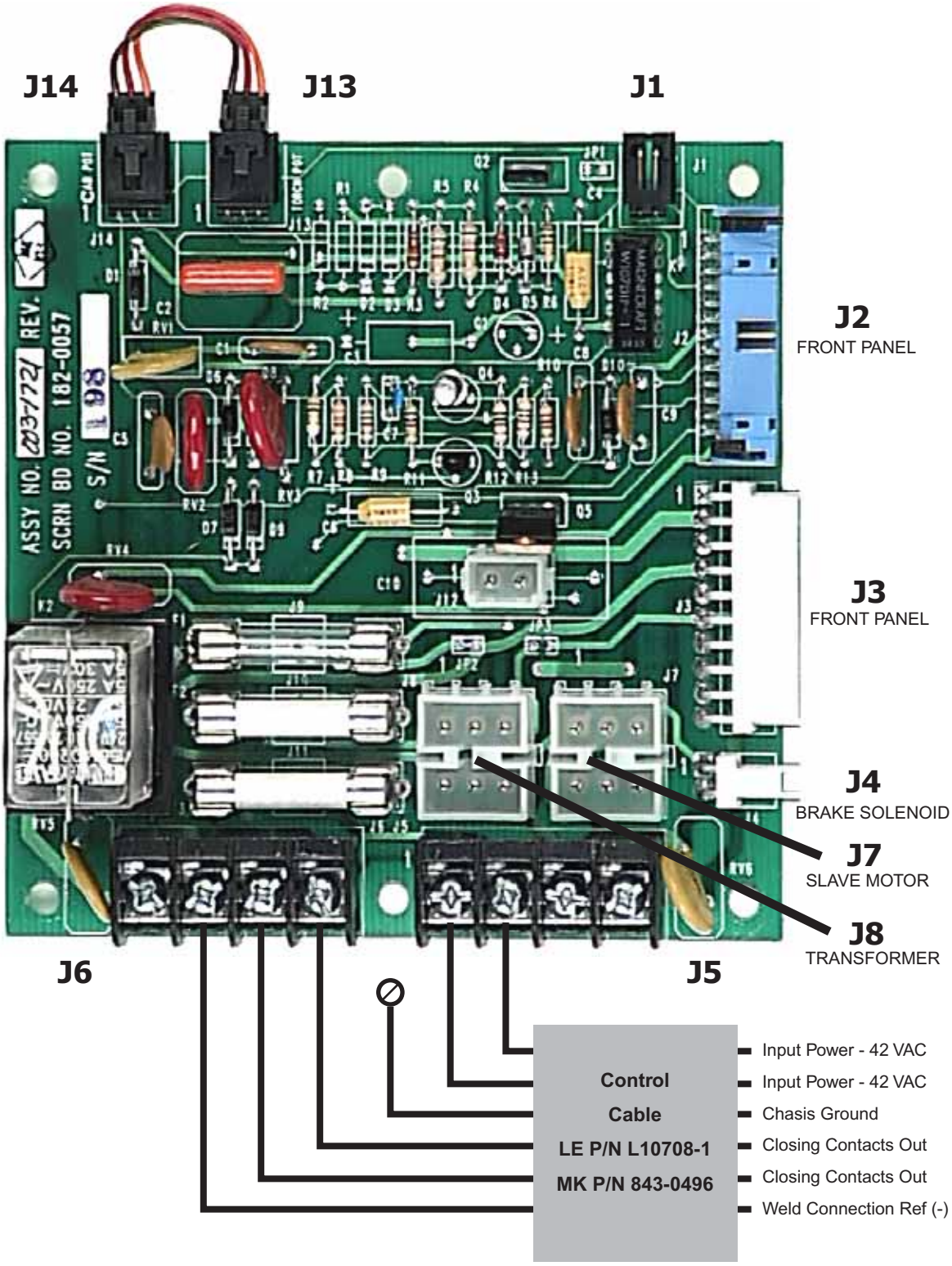
TROUBLESHOOTING		
SYMPTOM	**CAUSE**	**REMEDY**
No wire feed at torch, feeder not operating, i.e., no slave motor or brake solenoid.	F2 & F3 (MDA7 7A Slow Blow) fuse in feeder blown.	Check AC circuit. Replace fuse.
	F1 (4 amp) fuse in feeder blown.	Check motor leads for shorts, then replace fuse.
	Micro-switch defective/not being activated. Broken electrical cable.	Replace switch. Check switch for operation. Check micro switch wires for continuity.
	Relay K2 inoperative.	Check/Replace relay K2.
	Loose J2, J3, P.C. board connector	Check J2, J3 connectors.
Brake solenoid inoperative.	Solenoid defective.	Replace solenoid.
	Relay K2 inoperative.	Check for 42VAC across J4-1 and J4-2
No wire feed at torch, feeder operating properly.	Bad potentiometer.	Check potentiometer with meter.
	Bad torch motor.	Check/Replace motor.
	Broken electrical cable.	Check motor and potentiometer wires for continuity.
	Bad speed control/PCB.	Check/Replace P.C. Board.
Wire feeds, but welding wire is not energized.	Loose or no cable connections.	Check all power connections.
	Relay K2 not sending contactor signal.	Check/Replace relay K2.
	Contactor control cable loose or in wrong position.	Check power supply owners manual for location and type of contactor signal required, i.e. closing contacts or AC.
	Welding power source not working right.	Check power supply for proper operation.
Wire feeds erratically.	Dirty or worn conduit.	Blow out or replace conduit.
	Incorrect pressure on drive rolls.	Adjust pressure at torch.
	Idler roll stuck in torch.	Check for lock washer under idler roll, or replace if damaged or worn.
	Wrong size contact tip.	See contact tip table.
Wire feeds one speed only	Bad potentiometer.	Check with meter.
	Broken electrical cable in lead assy.	Check potentiometer wires for continuity or shorts.
	Bad speed control.	Check/Replace P.C. Board.
Wire walks out of drive rolls	Idler roll upside-down.	Place groove in idler roll towards top.
	Rear wire guide missing.	Replace wire guide.

Section F

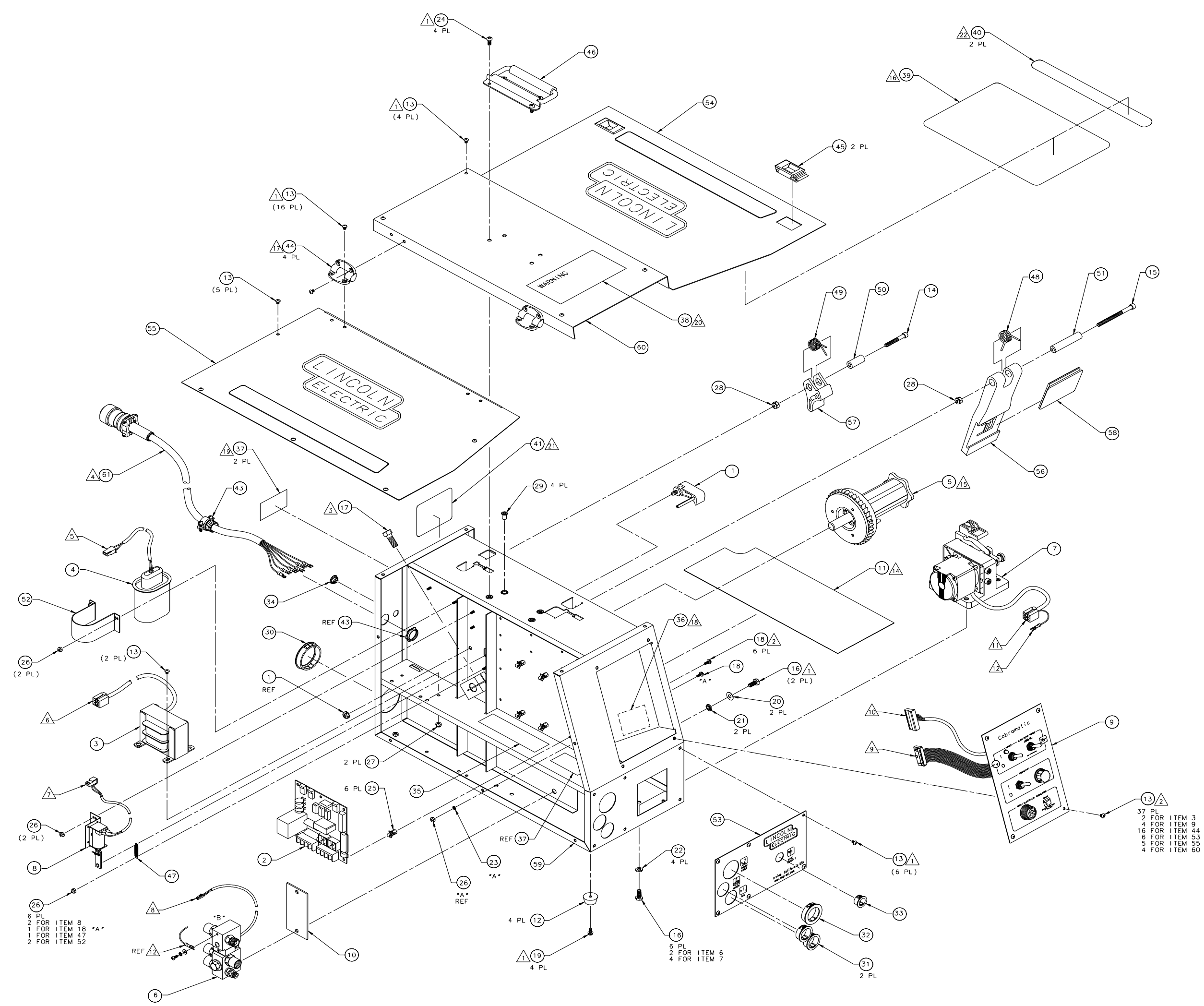
Appendices

Diagrams/Parts List

Main P.C. Board Connections



001-4012 Cobramatic Assembly



NOTES: UNLESS OTHERWISE SPECIFIED

1. APPLY LOCTITE 222 TO THREADS.
2. APPLY LOCTITE 242 TO THREADS.
3. APPLY LOCTITE 262 TO THREADS.
4. (GREEN) TO ITEM CHASSIS "A"; (WHITE) TO ITEM #2, J5 "1"; (BLACK) TO ITEM #2, J5 "2"; (BLUE) TO ITEM #2, J6 "2"; (RED) TO ITEM #2, J6 "3"; (ORANGE) TO ITEM #2, J6 "4".
5. TO ITEM #2, J12 "2".
6. TO ITEM #2, J8.
7. TO ITEM #2, J4.
8. TO ITEM #2, J1.
9. TO ITEM #2, J2.
10. TO ITEM #2, J3.
11. TO ITEM #2, J7.
12. TO ITEM #7, "B".
13. ITEM #42 NOT SHOWN FOR CLARITY.
14. ASSEMBLE ITEM #11 TO ITEM #59 WITH 3M 90 HIGH STRENGTH ADHESIVE.
15. USE SPACER PLATE 051-1981 TO LOCATE SPINDLE ASSY (ITEM 5).
16. PLACE INSTRUCTIONS UPSIDE DOWN ON INSIDE OF DOOR.
17. DO NOT USE HINGE COVERS ON ITEM #44.
18. LOCATE DECAL PER TEMPLATE #051-1987 ON FARSIDE THIS PANEL.
19. LOCATE DECAL PER TEMPLATE #051-1986.
20. LOCATE DECAL PER TEMPLATE #051-1985.
21. LOCATE SERIAL NUMBER PLATE PER TEMPLATE #051-1988.
22. PLACE DECAL UPSIDE DOWN NEAR BOTTOM INSIDE EACH DOOR.
23. AFTER ASSEMBLY USE TEST PROCEDURE ITEM #67.

Note	NO.	QTY	PART NO.	DESCRIPTION
23	66	REF	031-0067	TEST PROCEDURE
1	65	A/R	823-0050	LOCTITE 222 SMALL SCREW
3	64	A/R	823-0049	LOCTITE 262 MEDIUM SCREW
14	63	A/R	823-0045	3M ADHESIVE (97-3M)
2	62	A/R	823-0043	LOCTITE 242 REMOVABLE
	61	1	843-0496	CBL CNTL 42V CB LE
	60	1	438-0068	PAINT TOP CB LE
	59	1	438-0067	PAINT WRAP CB LE
	58	1	437-0255	PAD RESTRAINER WIRE
	57	1	437-0243	CATCH MOLD RESTRAINER CB
	56	1	437-0242	RESTRAINER WIRE MOLD CB
	55	1	436-0156	SS DOOR PWR CB LE
	54	1	436-0155	SS DOOR SPL CB LE
	53	1	436-0154	SS PWR PNL CB LE
	52	1	435-3121	HOLDER CAP CB
	51	1	431-1609	MANDREL RESTRAINER WIRE CB
	50	1	431-1608	MANDREL CATCH CB
	49	1	419-0090	TORSION SPRING CATCH
	48	1	419-0089	TORSION SPRING RESTRAINER CB
	47	1	419-0080	SPRG EXT .219OD X .94LG
	46	1	415-0243	HANDLE CARRY BLACK
	45	2	415-0222	LATCH SLIDE
	44	4	415-0075	HINGE CB
	43	1	411-0157	CLAMP CBL STR REF
13	42	2	411-0020	TIE WRAP
	41	1	405-0946	DECAL SERIAL PLT 42V CB LE
	40	2	405-0944	DECAL DOOR CAUTION
	39	1	405-0943	DECAL INSTRUCTIONS DOOR SPOOL
	38	1	405-0888	DECAL WARNING T16196
	37	2	405-0887	DECAL WARNING T13470
	36	1	405-0886	DECAL WARNING T13297
	35	1	405-0738	DECAL ELECTRONIC CONN 42V
	34	1	351-0835	SNAP BTN Ø1/2 HOLE BLK
	33	1	351-0758	BUSH SNAP 9/16ID Ø3/4 HOLE
	32	1	351-0752	BUSH SNAP 1 1/8ID Ø1 1/2 HOLE
	31	2	351-0745	BUSH SNAP 15/16ID Ø1 1/8 MTG
	30	1	351-0100	BUSH SNAP 1 5/8ID Ø2 HOLE
	29	4	351-0089	INSERT THREAD 10-32
	28	2	345-0015	NUT HEX LOCK 1/4-20 ST
	27	2	345-0009	NUT HEX LOCK 8-32 ST
	26	6	345-0008	NUT HEX LOCK 6-32
	25	6	342-0410	SPACER STACKING 6-32 X 0.53
	24	4	336-0228	SCR PNH PH 10-32 X 1/2 STL BLK
	23	1	333-0252	WSHR LK STAR-IN #6 ST
	22	4	333-0009	WSHR SPR LK 1/4
	21	2	332-0009	WSHR SHLDR .265IDX.365ODX.50D
	20	2	331-0049	WSHR FLT .26ID X .625 OD ST
	19	4	329-1019	SCR HEX WSHR SLT 8-32 X 3/8 ST
	18	7	329-1007	SCR HEX WSHR SLT 6-32 X 3/8 ST
	17	1	329-0208	SCR HEX 3/8-16 X 1.0
	16	6	329-0002	SCREW HEX 1/4-20 X 5/8
	15	1	328-0258	SCR SCH 1/4-20 X 3 1/2 STL
	14	1	328-0063	SCR SCH 1/4-20 X 1-3/4 BLK
	13	37	320-0095	SCR BUTTON 8-32 X 1/4 BLK
	12	4	301-0107	FOOT RBR W/WSHR #8 ID
	11	1	261-0634	INSULATOR SPOOL
	10	1	261-0105	INSULATOR POWER BLOCK
	9	1	003-2112	ASSY PNL FR 42V CB LE
	8	1	003-2095	ASSY SOL BRK 42V TOP
	7	1	003-2068	ASSY SLAVE MOTOR 42V CB LE
	6	1	003-2063	ASSY POWER BLOCK
	5	1	003-2061	ASSY SPINDLE CB
	4	1	003-1798	ASSY CAP EXT 42V
	3	1	003-1723	ASSY XFMR 42V
	2	1	003-1721	ASSY PCB MAIN 42V
	1	1	003-0784	ASSY PAWL CB

PARTS LIST

MATERIAL:	SEE PARTS LIST
FINISH:	N/A
HEAT TREATMENT:	N/A
DRAWN	J. SLACK — DATE 08/00
ENGINEER	J. SLACK — DATE 08/00
CHECKED	T. NGUYEN — DATE 08/00
APPROVED	
	M.K. PRODUCTS, INC. IRVINE, CALIFORNIA
TITLE	ASSEMBLY COBRAMATIC 42V LINCOLN
SIZE	E
DWG. NO.	001-4012
SHEET	1 OF 1

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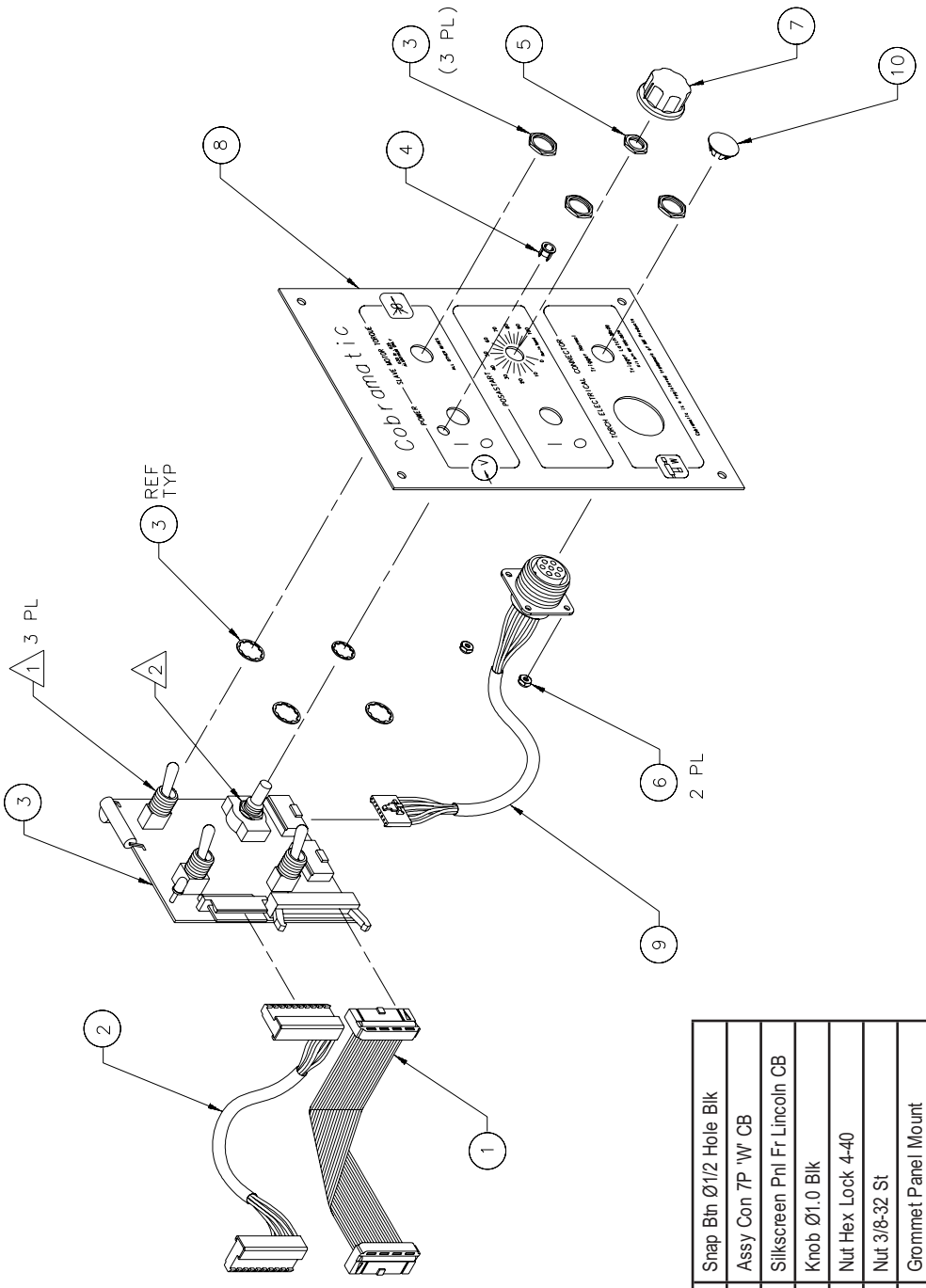
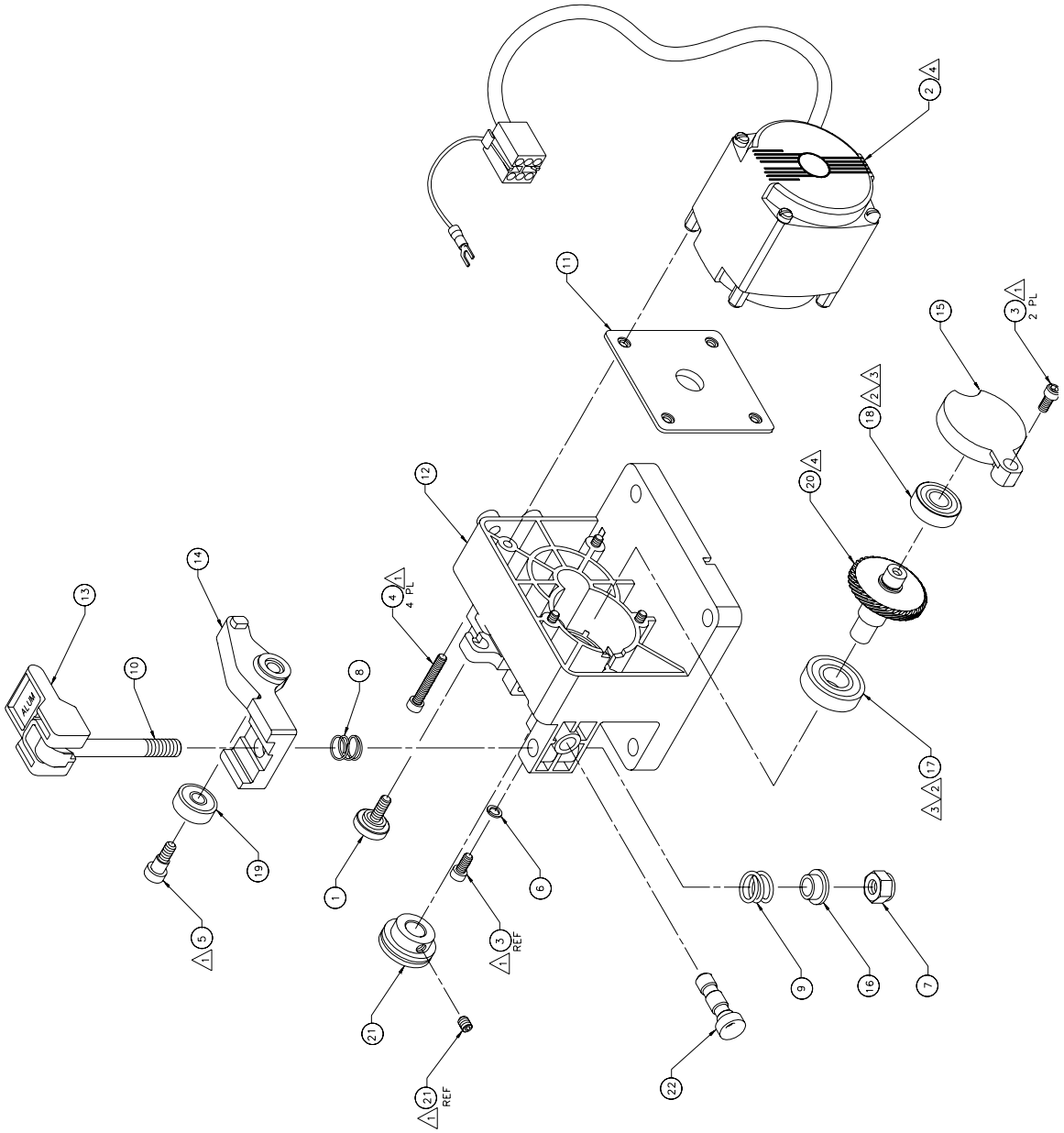
003-2112 Cobramatic Front Panel Assembly



No.	Qty.	Part No.	Description
10	1	351-0835	Snap Btn Ø1/2 Hole Blk
9	1	003-1642	Assy Con 7P 'W' CB
8	1	436-0153	Silkscreen Pnl Fr Lincoln CB
7	1	401-0012	Knob Ø1.0 Blk
6	2	345-0004	Nut Hex Lock 4-40
5	1	341-0050	Nut 3/8-32 St
4	1	301-0023	Grommet Panel Mount
3	1	003-2001	PCB Front Panel 42V CB
2	1	003-1631	Cable Power Assy
1	1	003-1332	Assy Cable Ribbon 26C

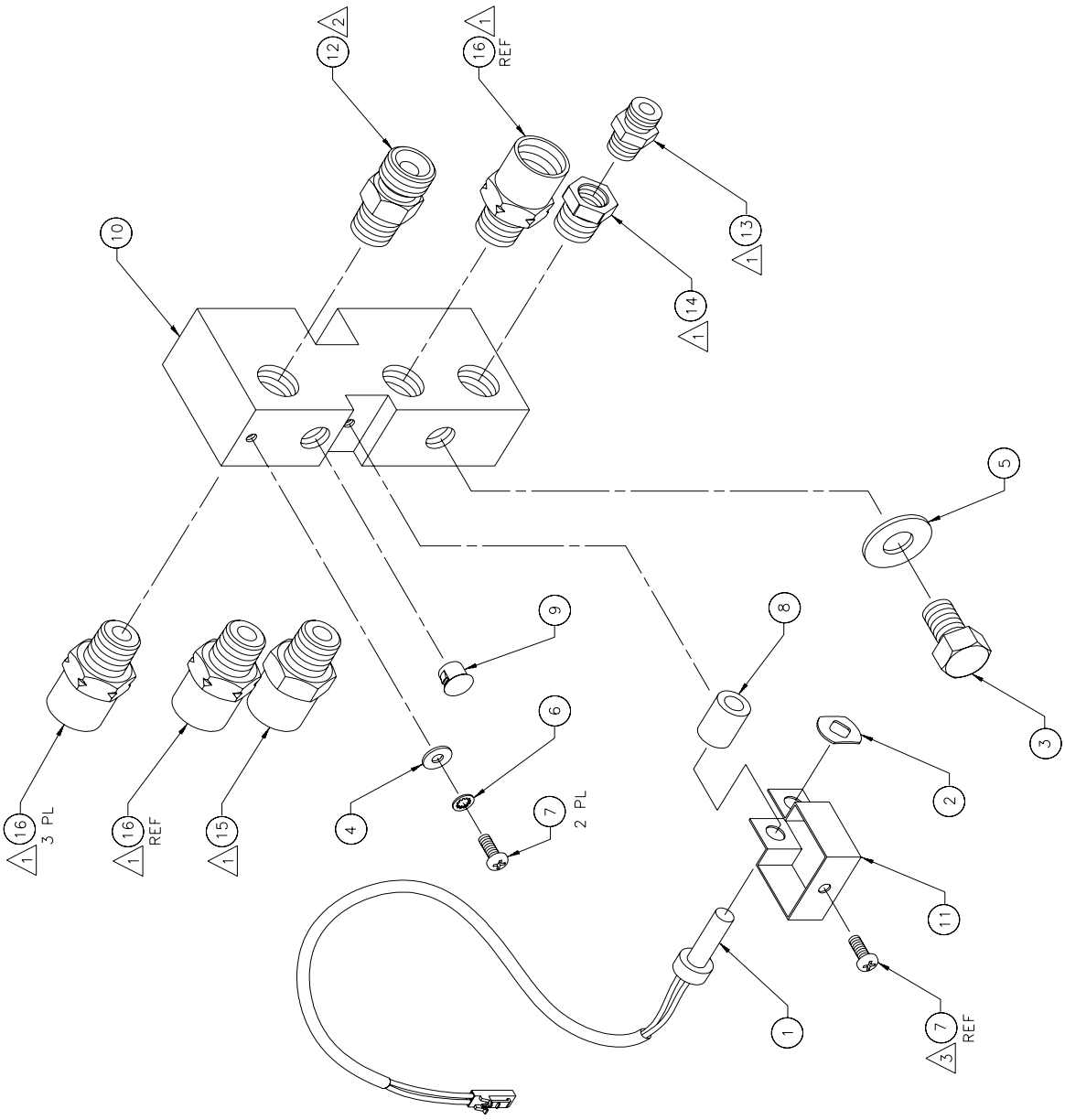
003-2068 Cobramatic Slave Motor Assembly

No.	Qty.	Part No.	Description
25	REF	031-0167	Test Procedure
25	A/R	823-0051	Loctite Retaining Compound
24	A/R	835-0001	Grease Mobilux 2
23	A/R	823-0043	Loctite Threadlocking
22	1	753-0062	Guide Wire Inlet Nylon
21	1	511-0206	Drive Roll
20	1	507-0130	Shaft Gear
19	1	501-0207	Bearing Idler Roll
18	1	501-0156	Bearing .875 x .38 x .28
17	1	501-0118	Bearing 1.125 x .50 x. .31
16	1	437-0254	Sleeve Spring
15	1	437-0245	Cap Bearing Mold
14	1	437-0232	Arm Idler Mold Slave Motor
13	1	437-0231	Handle Mold Slave Motor
12	1	437-0230	Housing Slave Motor Mold
11	1	435-1582	Plate Locate Slave Motor
10	1	431-1576	Bolt Swing Mod
9	1	419-0211	Spring Comp OD 5/8 x 1/16
8	1	419-0085	Spring Comp 1/32 x DD .40
7	1	345-0018	Nut Lock 5-16-18
6	1	333-0006	Washer Spring Lock #8
5	1	330-0258	Scr Shldr 1/4 x 1/4 x 10-24
4	4	328-0259	Scr Shc B-32 x 1-1/B Stl
3	2	328--0024	Scr Shc B-32 x 3/B Stl
2	1	003-2113	Assy Torque Motor 42V
1	1	003-0176	Assy Knob Conduit



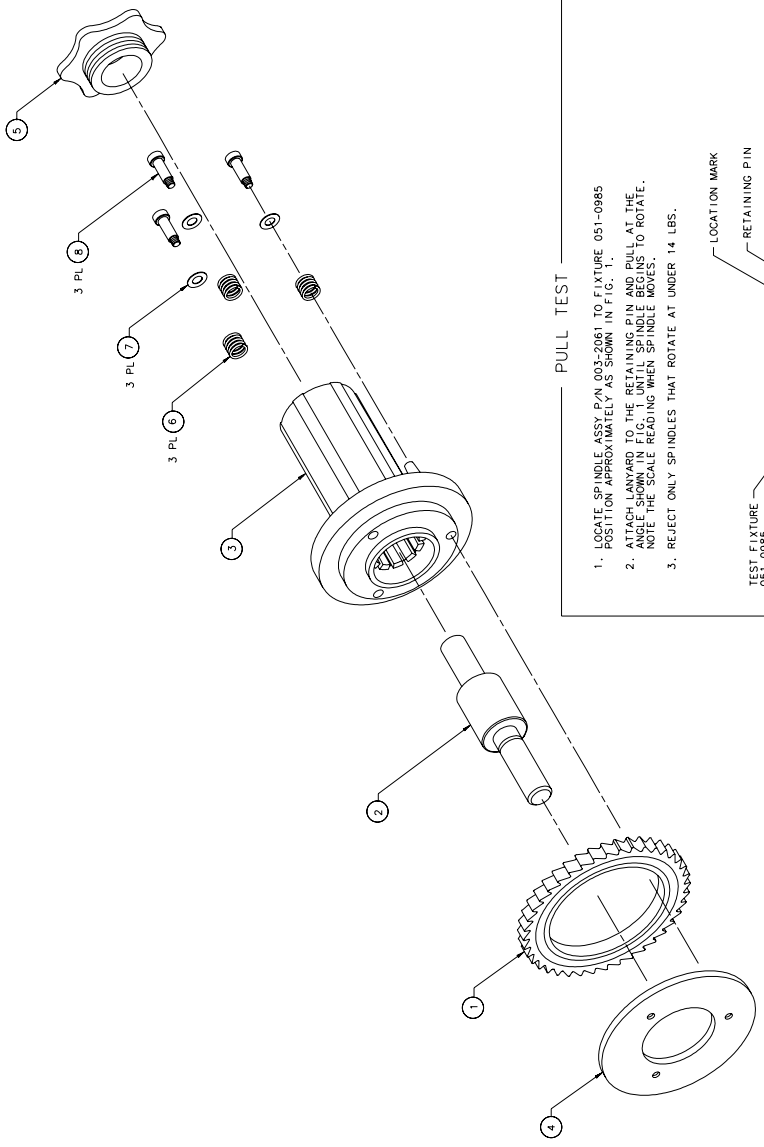
003-2063 Cobramatic Power Block Assembly

No.	Qty.	Part No.	Description
19	A/R	823-0044	Loctite Pipe Thread Sealant
18	A/R	823-0043	Loctite 242 Threadlock
17	A/R	823-0029	Noalox Pipe Thread Sealant
16	3	753-0475	Aptr 1/4npt M to 5/8-18 Fem LH
15	1	753-0466	Aptr 1/4npt Male to 5/8-18 Fem
14	1	753-0115	Bush 1/4npt Male to 1/8mpt Fem
13	1	753-0114	Aptr 1/8npt x 1/8nps
12	1	753-0112	Ftg 1/4npt Male to 5/8-18 Male
11	1	435-3038	Bracket Current Sensor
10	1	431-1612	Block Power CB2K
9	1	351-0066	Plug Hole Ø5/16
8	1	342-0395	Spacer Current Sensor
7	2	336-0005	Scr Pn Ph 6-32 x .375 Stl
6	1	333-0252	Wshr Lk Star-in #6 St.
5	1	331-0777	Washer Flat 0.391 ID x 0.875OD
4	1	331-0002	Washer Flat #6 Stl
3	1	329-0054	Scr Hex 3/8-16 x 5/8
2	1	313-0021	Stud Receiver Push-on
1	1	003-1243	Assy Sensor Posa-Start



003-2061 Cobramatic Spindle Brake Assembly

No.	Qty.	Part No.	Description
8	3	330-3063	Scr Shdr Mod .25 x .63 10-24
7	3	331-0063	Whsr Flt .255ID x .505OD
6	3	419-0059	Spr Comp .468 x .437 x .056
5	1	431-0169	Retainer Spool
4	1	431-1266	Ring Backup Plate
3	1	437-0645	Spindle Cobra Plus
2	1	501-0060	Bearing 5/8 Shaft Cobra Plus
1	1	723-0059	Ratchet Disk Brake



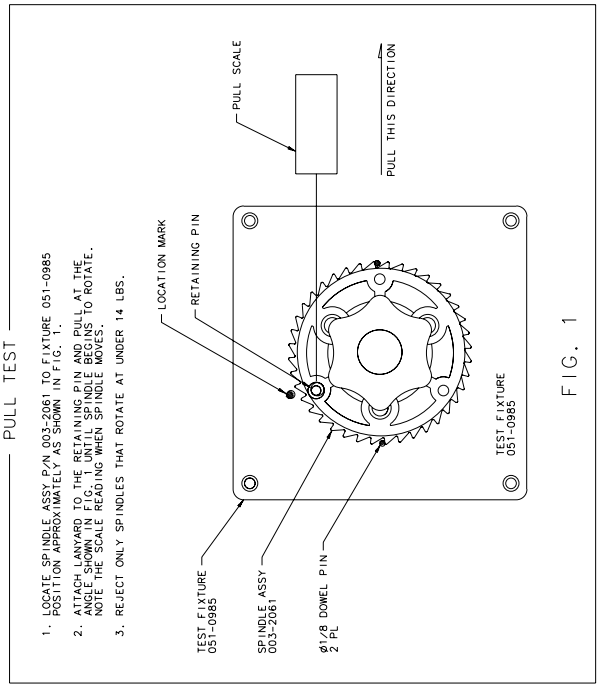
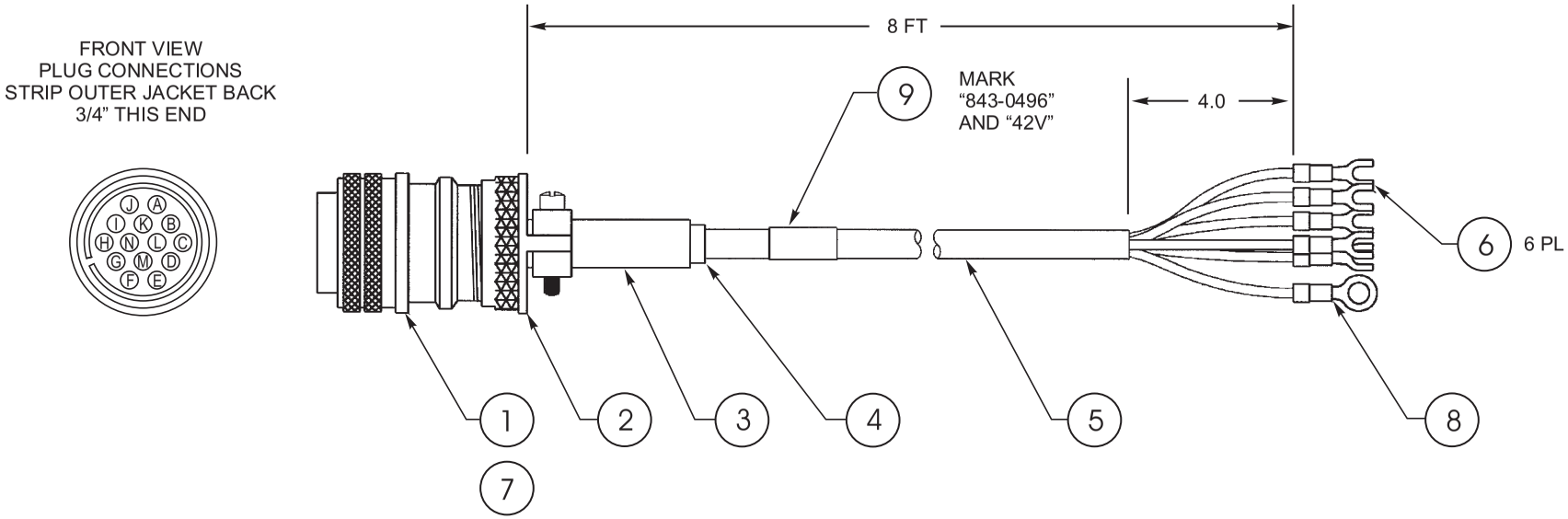


FIG. 1

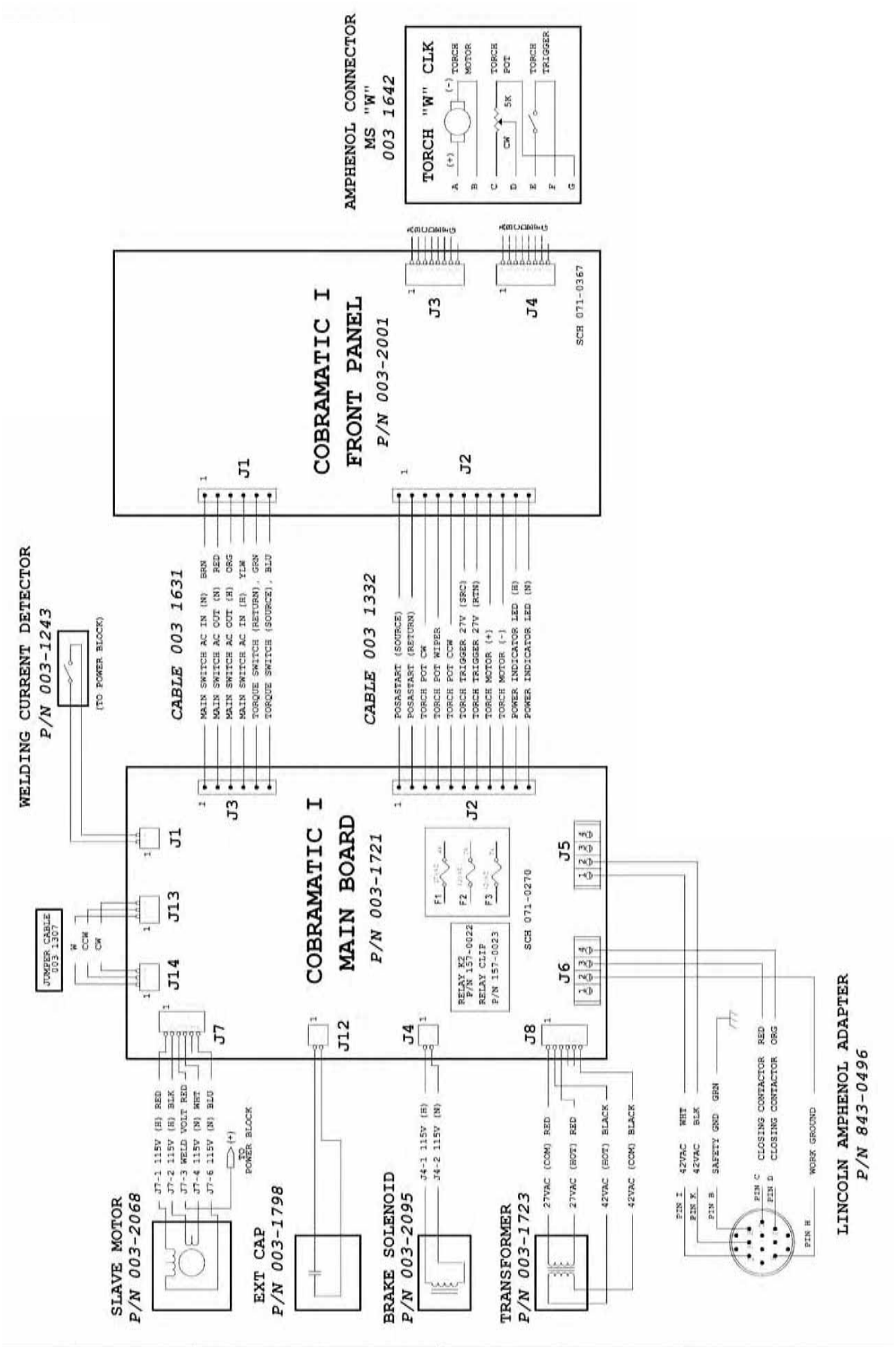
843-0496 Cobramatic Control Cable



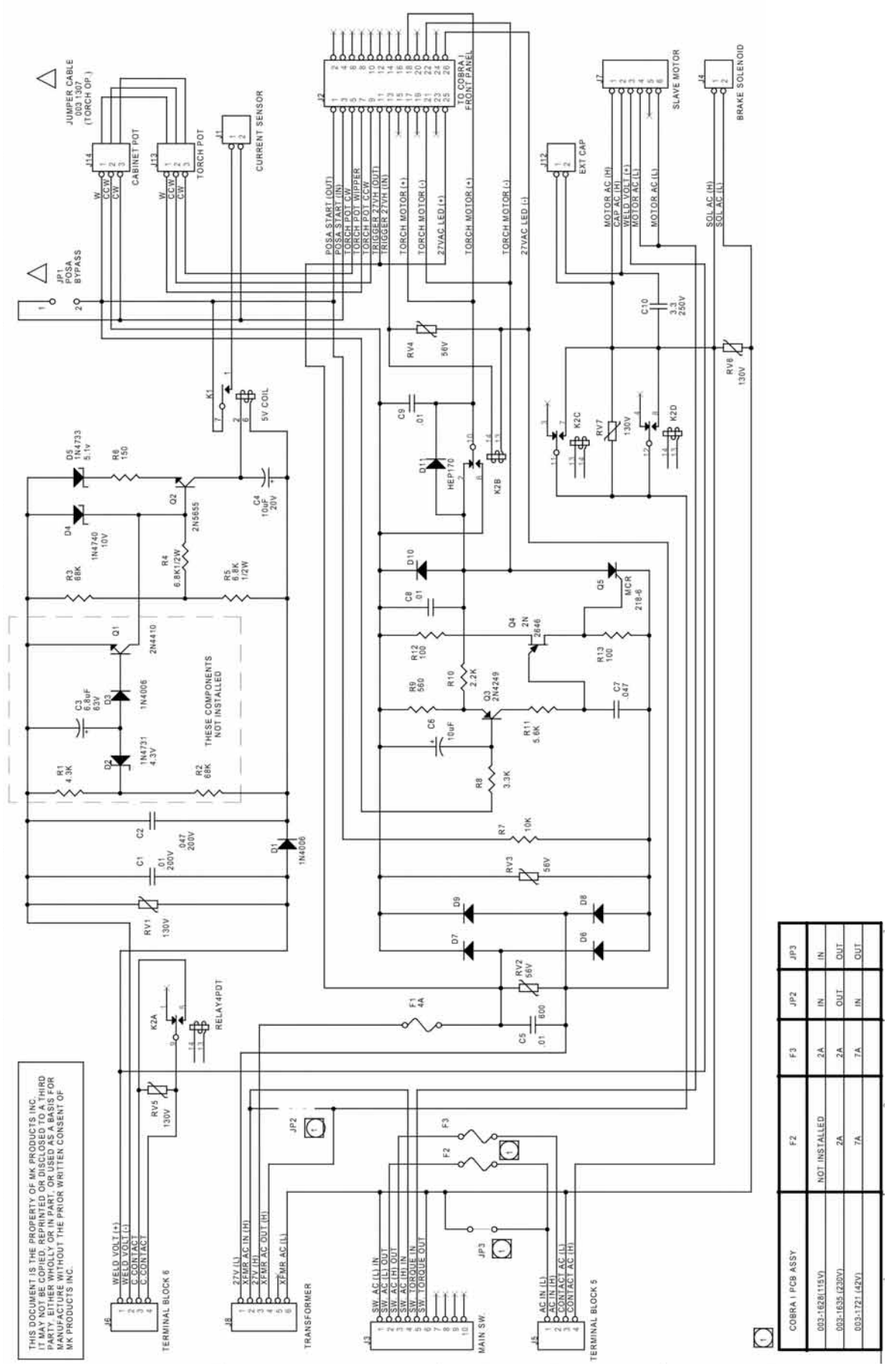
Wire List		
Pin	Wire Color	Terminal
A	Not used	
B	Green	Chassis
C	Red	J6-3
D	Orange	J6-6
E	Not used	
F	Not used	
G	Not used	
H	Blue	J6-2
I	White	J5-1
J	Not used	
K	Black	J5-2
L	Not used	
M	Not used	
N	Not used	

42 V Lincoln Cobramatic Control Cable 843-0496c			
No.	Qty.	Part No.	Description
1	1	153-1161	Conn, 14P, X Clocked
2	1	411-0035	Clamp, Cable
3	1	301-0026	Boot, Cable, #12
4	1	301-0021	Boot, Cable, #10
5	8 ft	844-0025	Cable, 7 Conductor, 10 Ga
6	5	185-0003	Lug, Spade, Insul, 18 Ga
7	0.12 ft	739-0004	Tube, HT Shrink, Ø 1/8
8	1	185-0514	Lug, Ring, Insul, #6-18 Ga
9	1	405-0762	Label Self Laminate

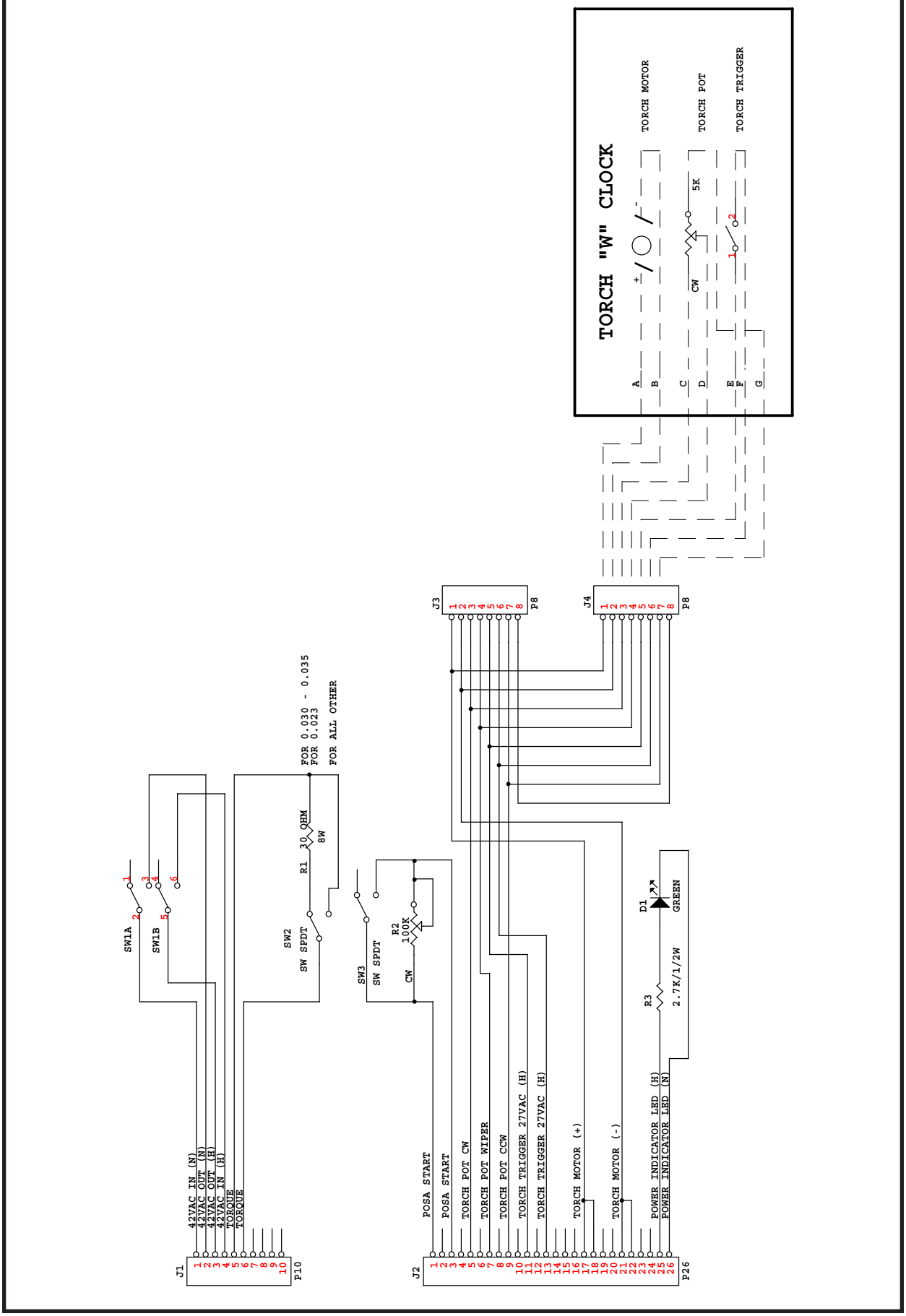
071-0386 Cobramatic Block Diagram



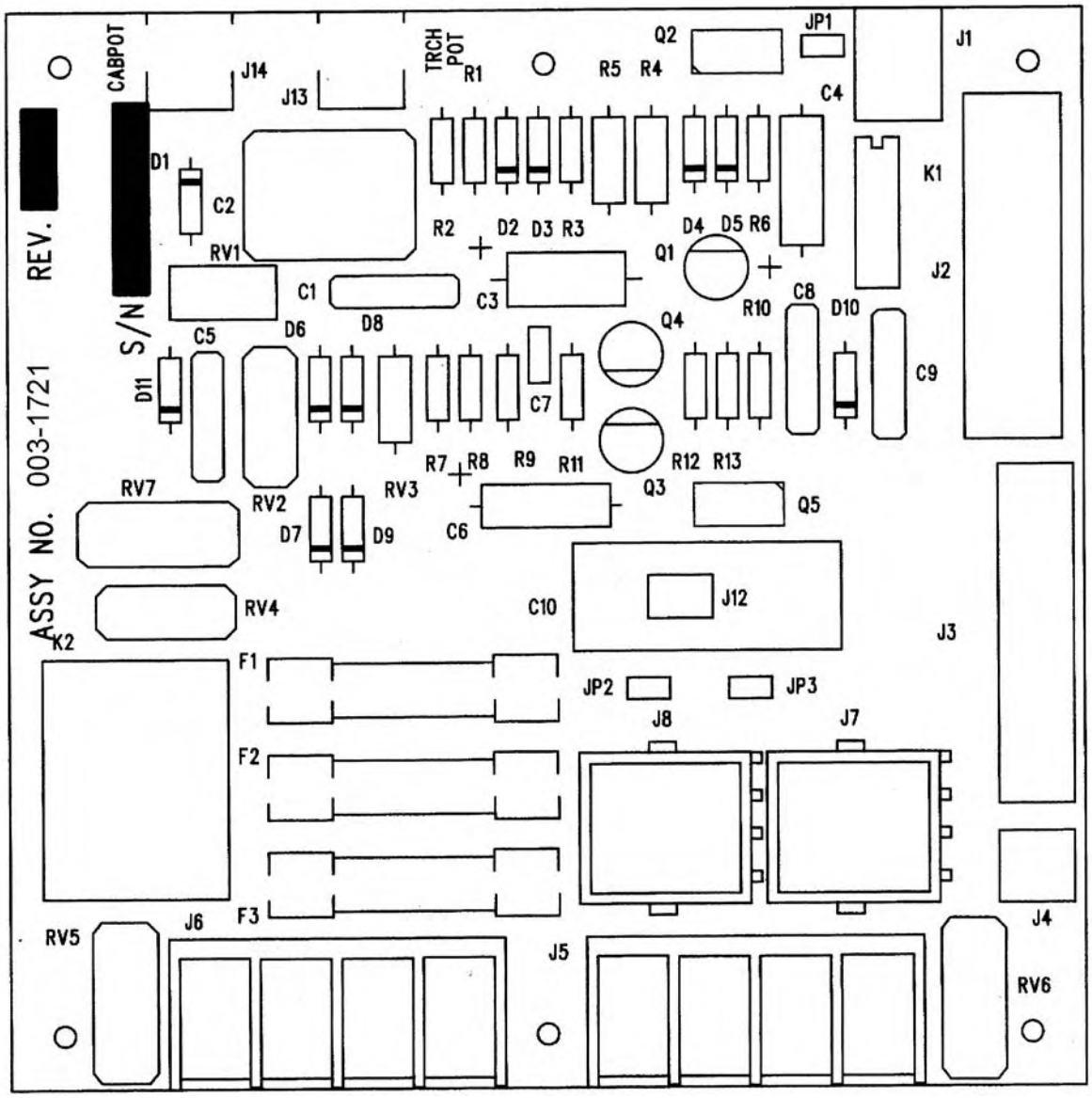
071-0270 Cobramatic Main PC Board



071-0367 Cobramatic Torch Connections



003-1721 Main P.C. Board Parts Placement



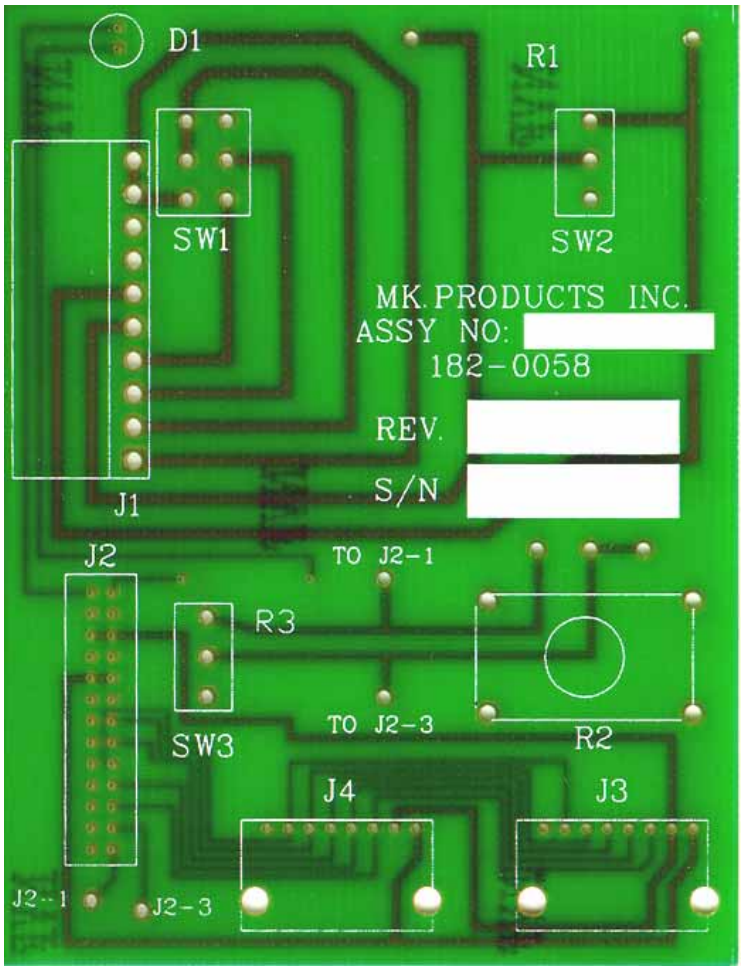
COMPONENTS TO BE REPLACED BY QUALIFIED SERVICE PERSONNEL ONLY.

003-1721 Main P.C. Board Parts List

COMPONENT #	MK P/N	DESCRIPTION
K1	157-0144	RELAY, 5V 500 Ohm 200MA
R3	115-0154	RESISTOR, carbon .25 watt 6.8K ohm
R4, R5	115-0042	RESISTOR, carbon .50 watt 6.8K ohm
R12, R13	115-0120	RESISTOR, carbon .25 watt 100 ohm
R6	115-0122	RESISTOR, carbon .25 watt 150 ohm
R7	115-0144	RESISTOR, carbon .25 watt 10K ohm
R8	115-0138	RESISTOR, carbon .25 watt 3.3K ohm
R9	115-0129	RESISTOR, carbon .25 watt 560 ohm
R10	115-0136	RESISTOR, carbon .25 watt 2.2K ohm
R11	115-0141	RESISTOR, carbon .25 watt 5.6K ohm
D1	124-0002	DIODE, 1 amp 800 volts (IN4006)
D6-D11	124-0003	DIODE, 2.5 amps 1KV (HEP170)
D4	124-0011	DIODE, zener 1 watt 10 volts (IN4740)
D5	124-0093	DIODE, zener 1 watt 5.1 volts (IN4733A)
Q2	122-0011	TRANSISTOR, NPN 500MA 250 volts (2N5655)
Q3	122-0004	TRANSISTOR, PNP 1 amp 50 volts (2N4249)
Q4	122-0013	TRANSISTOR, unijunction 30 volts (2N2646)
Q5	125-0028	THYRISTOR, 8 amps 400 volts (MCR218-6)
C1, C5, C8, C9	101-0016	CAPACITOR, ceramic .01uf 600VDC
C2	101-0013	CAPACITOR, Poly .047uf 200VDC
C4, C6	104-0002	CAPACITOR, tantalum 10uf 20VDC
C7	101-0021	CAPACITOR, ceramic .047uf 50VDC
RV1, RV5, RV6, RV7	124-0026	VARISTOR, 130 volts 10 amps
RV2, RV3, RV4	124-0028	VARISTOR, 56 volts 8 amps
J1	153-0866	CONNECTOR, R/A header 2 pin
J2	153-0923	TERMINAL, header 26 pin
J3	153-0842	TERMINAL, header 10 pin
J4	153-0844	TERMINAL, header 2 pin
J5, J6	186-0057	TERMINAL, strip 4 pin
J7, J8	153-0850	CONNECTOR, 6 pin
J13, J14	153-0867	CONNECTOR, R/A header 3 pin
Fuse Holder	152-0008	FUSE HOLDER, PC mount
F1	151-0043	FUSE, 3AG 4A 250V
F2, F3	151-0021	FUSE, MDA7 7A Slow Blow
K2	157-0022	RELAY, 24VAC 4PDT
K2 Socket	173-0026	SOCKET, relay 15 pin
Jumper	003-1307	JUMPER CABLE
Clip	157-0023	Relay Clip
C10	153-0851	CONNECTOR, SHDR, 2 Pin External Capacitor

003-2001 Front Panel Circuit Board

COMPONENT #	MK P/N	DESCRIPTION
R1	113-0062	RESISTOR, wire wound 30 ohm, 8 watt
R2	119-0020	POTENTIOMETER, 100K ohm
R3	115-0037	RESISTOR, carbon 2.7K ohm, 1/2 watt
D1	124-0045	LED, green
SW1	159-3587	SWITCH, DPDT, p.c. mount
SW2	159-3586	SWITCH, SPDT, p.c. mount
SW3	159-3586	SWITCH, SPDT p.c. mount
J1	153-0842	HEADER, 10pin, 90 degree
J2	153-0924	HEADER, 26pin, 90 degree
J3	153-0860	HEADER, 8pin, 90 degree
J4	153-0860	HEADER, 8pin, 90 degree



MK Warranty Repair Stations

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

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

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

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

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

EMCO EAST
Concord, CA
925/798-4411

FRESNO OXYGEN
Fresno, CA
559/233-6684

INDUSTRIAL WELDER REPAIR
LaPuente, CA
626/961-7643

PRAXAIR DISTRIBUTION (ArcRent Div)
Long Beach, CA
562/427-0099

PRAXAIR DISTRIBUTION, INC.
Bakersfield, CA
661/327-5336

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

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
Orlando, FL
407/872-0011

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

ROPER ELECTRIC MOTOR SERVICE
Panama City, FL 32405
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

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

PCI ENERGY SERVICES
Lake Bluff, IL
847/680-8100

RELIABLE EQUIPMENT REPAIR
Hamel, IL
618/633-5000

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

INDIANA
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 ENGINEERING & 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

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.
(FLINT WELDING SUPPLY CO.-Parent Co.)
Saginaw, MI
517/793-9696

SOUTH PARK WELDING
Marysville, MI
810/364-6521

WESAR COMPANY
Three Rivers, MI
616/483-9125

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
HAUN WELDING SUPPLY
Syracuse, NY
315/463-5241

NORTH CAROLINA
HOLOX
Colfax, NC
336/996-1974

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

MACHINE AND 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

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 44706
330/478-8811

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

WELDINGHOUSE, INC.
Cleveland, OH
216/524-1955

VOLLMER ELECTRIC CO.
Columbus, OH
614/476-8800

OKLAHOMA

AIRGAS MID-SOUTH
Tulsa, OK
918/582-0885

BILL'S WELDER REPAIR
Oklahoma City, OK
405/232-4799

OKLAHOMA WELDERS SUPPLY
Madill, OK
580/795-5561

PENNSYLVANIA

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

TENNESSEE

NEXAIR
Memphis, TN
901/523-6821

TRAMCO
Bristol, TN
423/968-4499

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

TEXAS

AIRGAS SOUTHWEST
Houston, TX
713/462-8027

ARC CONTROL
Houston, TX
713/941-4701

DENISON OXYGEN
Denison, TX
903/465-3369

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

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

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

VIRGINIA
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 AND ENGINE REPAIR
Seattle, WA
206/382-6227

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

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

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

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

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

LADEL Ltd.
Quebec, Canada
819/376-6577

OZARK ELECTRICAL MARINE LTD.
St. John's Newfoundland
709/726-4554

PEEL ENGINES
Mississauga, Ontario
905/670-1535

PROMOTECH électrique, Inc.
Fleurimont, Québec
819/822-2111

WELDERS SUPPLY
Winnipeg, Manitoba
204/772-9476

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

WELDTEC
B.C., Canada
604/545-3886

INDUSTRIAL ELECTRONIC SERVICES
Calgary, Alberta
403/279-3432

CHINA
PHT GROUP COMPANY

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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。	●機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說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 January 1, 2000

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 and Weldheads**	**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
sales@mkprod.com

FORM : LW-9MK
DATE : January 1, 2000