MAGNUM

by Lincoln Electric

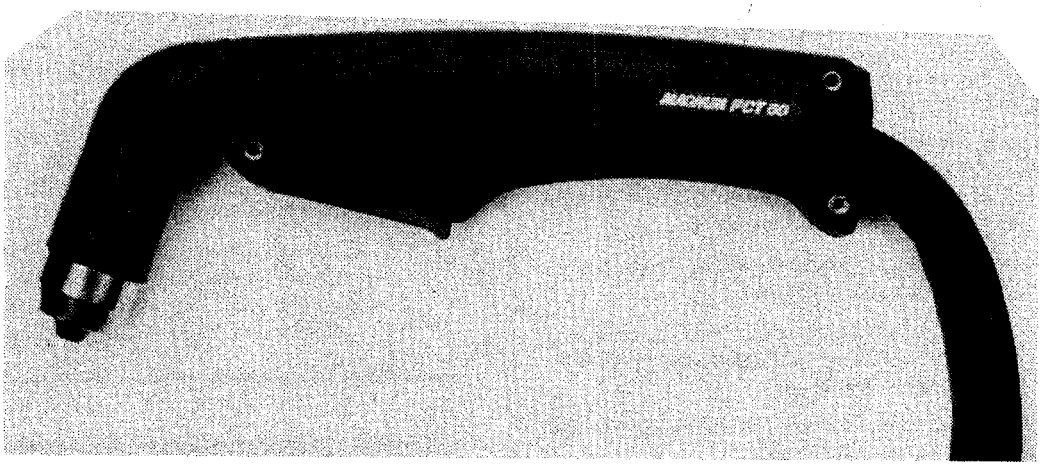
OPERATING MANUAL

IM-432

IM432
August, 1990
Magnum
PCT 60
Plasma
Cutting
Torch

MAGNUM™ PCT 60 PLASMA CUTTING TORCH

This manual covers equipment which is obsolete and no longer in production by The Lincoln Electric Co. Specifications and availability of optional features may have changed.



DAMAGE CLAIMS

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.

SAFETY DEPENDS ON YOU

Lincoln arc welding equipment is designed and built with safety in mind. However, your overall safety can be increased by proper installation . . . and thoughtful operation on your part. DO NOT INSTALL, OPERATE OR REPAIR THIS EQUIPMENT WITHOUT READING THIS OPERATING MANUAL AND THE ARC WELDING SAFETY PRECAUTIONS ON PAGES 2 AND 3. And, most importantly, think before you act and be careful.

LINCOLN ELECTRIC

THE LINCOLN ELECTRIC COMPANY

World's Largest Manufacturer of Arc Welding Products • Manufacturer of Industrial Motors

Sales and Service Worldwide

Cleveland, Ohio 44117-1199 U.S.A.

PLASMA CUTTING SAFETY PRECAUTIONS

WARNING: PROTECT YOURSELF AND OTHERS FROM POSSIBLE SERIOUS INJURY OR DEATH.

ELECTRIC SHOCK can kill.

1. a. The electrode and work (or ground) circuits are electrically "hot" when the power source is on. Do not touch these "hot" parts with your bare skin or wet clothing. Wear dry, hole-free gloves to insulate hands.

   b. When the power source is operating voltages in excess of 250 volts are produced. This creates the potential for serious electrical shock — potentially even fatal.

   c. Insulate yourself from work and ground using dry insulation. When cutting or gouging in damp locations, on metal framework such as floors, gratings or scaffolds, and when in positions such as sitting or lying, make certain the insulation is large enough to cover your full area of physical contact with work and ground.

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

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

   f. Maintain the torch, torch cable, work clamp, and plasma cutter in good, safe operating condition. Replace damaged insulation.

   g. Never dip the torch in water for cooling or plasma cut or gouge in or under water.

   h. When working above floor level, protect yourself from a fall should you get a shock.

   i. Operate the pilot arc with caution. The pilot arc is capable of burning the operator, others, or even piercing safety clothing.

   j. Also see Items 4c and 6.

ARC RAYS can burn.

2. a. Use safety glasses and a shield with the proper filter and cover plates to protect your eyes from sparks and the rays of the arc when performing or observing plasma arc cutting or gouging. Glasses, headshield and filter lens should conform to ANSI Z87.1 standards.

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

   c. Protect other nearby personnel with suitable nonflammable 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.

3. a. Plasma cutting or gouging may produce fumes and gases hazardous to health. Avoid breathing these fumes and gases. When cutting or gouging, 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 cutting or gougingon galvanized, lead or cadmium plated steel and other metals which produce toxic fumes due to paint contaminants, even greater care must be taken.

   b. Do not use plasma arc cutting or gouging 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.

   c. Gases used for plasma cutting and gouging can displace air and cause injury or death. Always use enough ventilation, especially in confined areas, to insure breathing air is safe.

   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.

CUTTING SPARKS can cause fire or explosion.

4. a. Remove fire hazards from the plasma cutting or gouging area. If this is not possible, cover them to prevent the cutting or gouging sparks from starting a fire. Remember that sparks and hot materials from plasma cutting or gouging can go through small cracks and openings to adjacent areas. Have a fire extinguisher readily available.

   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.

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

   d. Do not cut or gouge 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 the container has 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 F4.1-88 from the American Welding Society (see address below).

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

f. Sparks and spatter are thrown from the plasma arc. Wear safety glasses, ear protection and oil free protective garments such as leather gloves, heavy shirt, cuffless trousers, high shoes and a cap over your hair. Always wear safety glasses with side shields when in a cutting or gouging area.

g. Connect the work cable to the work as close to the cutting or gouging area as practical. Work cables connected to the building framework or other locations away from the cutting or gouging area increase the possibility of the 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.

CYLINDER may explode if damaged.

5. a. Use only compressed gas cylinders containing the correct 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.

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

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

d. Never allow any part of the electrode, torch or any other electrically "hot" parts to touch a cylinder.

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

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

g. Read and follow the instructions on compressed gas cylinders, associated equipment, and CGA publication P-1, "Precautions for Safe Handling of Compressed Gases in Cylinders," available from the Compressed Gas Association, 1235 Jefferson Davis Highway, Arlington, VA 22202.

FOR ELECTRICALLY powered equipment.

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

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

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

PLASMA ARC can injure.

7. a. Keep your body away from nozzle and plasma arc.

b. Operate the pilot arc with caution. The pilot arc is capable of burning the operator, others, or even piercing safety clothing.

HAVE ALL INSTALLATION, OPERATION, MAINTENANCE AND REPAIR WORK performed by qualified people.

For more detailed 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.

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GENERAL DESCRIPTION

The MAGNUM PCT 60 PLASMA TORCH is a 60 amp plasma cutting torch for use with Lincoln plasma power sources. The torch has a patented safety mechanism to ensure that the consumables are in place before cutting or gouging. This is extremely important due to the high voltages involved.

The torch comes standard with a 20 ft. (6.1 m) torch cable, but a 50 ft. (15.2 m) cable is also available. The torch is capable of cutting or gouging with nitrogen or air. Nitrogen is used to cut aluminum and other nonferrous metals.

SPECIFICATION SUMMARY:	
Type	K871-1, 20 ft (6.1 m) Cable K871-2, 50 ft. (15.2 m) Cable
Output Rating	60 Amps, 60% Duty Cycle 45 Amps, 100% Duty Cycle
Pilot Duty Cycle	20 Seconds out of 80 Seconds
Net Weight	7 lb. (3.2 kg) 20 ft. (6.1 m) Cable 16 lb. (7.3 kg) 50 ft. (15.2 m) Cable

STANDARD FEATURES

- Patent pending safety sensor to monitor if torch parts are in place.
- Ergonomically designed handle and trigger switch.
- Works with pure nitrogen for cutting or gouging nonferrous materials.
- Operation from any PRO-CUT power source.

USER RESPONSIBILITY

Because design, fabrication, erection and cutting variables affect the results obtained in applying this type of information, the serviceability of a product or structure is the responsibility of the user. Variation such as plate chemistry, plate surface condition (oil, scale), plate thickness, preheat, quench, gas type, gas flow rate, and equipment may produce results different than those expected. Some adjustments to procedures may be necessary to compensate for unique individual conditions. Test all procedures duplicating actual field conditions.

WARNING: ELECTRIC SHOCK CAN KILL

- Do not touch electrically live parts or electrode with skin or wet clothing.
- Insulate yourself from work and ground.

INSTALLATION

Read all of sections A through D before starting installation.

A. Safety Precautions:

WARNING: TURN THE POWER "OFF" TO THE PRO-CUT USING THE DISCONNECT SWITCH TO THE FUSE BOX BEFORE ATTEMPTING TO CONNECT THE POWER LEADS TO THE TORCH.

- Only qualified personnel should perform this installation.
- Turn the power switch on the PRO-CUT "OFF" before connecting or disconnecting the input leads.
- Connect the PRO-CUT 60 grounding terminal located on the side of the input connection box to a good electrical earth ground.

B. Location:

A source of clean, dry air or nitrogen MUST be supplied to the PRO-CUT 60. Oil in the air is a severe problem and must be avoided. Failure to observe these precautions could result in excessive operating temperatures or damage to the torch. The supply pressure must be between 70 and 150 psi (483 and 1034 kPa). The flow rate is approximately 4.7 cfm (133 l/min).

C. Torch Connections:

Pictures of the torch with required replacement parts are shown in Figures 1 and 2 (pages 7 and 8). The ends of the cable to be connected to the power source are unique. Follow the applicable instructions as given in Figure 3 (page 9).

D. Air Input Connections:

For information regarding air input connections, refer to power source operating manual.

WARNING:

CYLINDER may explode if damaged

- Keep cylinder upright and chained to a fixed support.
- Keep cylinder away from areas where it may be damaged.
- Never lift equipment with cylinder attached.
- Never allow the cutting torch to touch cylinder.
- Keep cylinder away from live electrical circuits.
- Maximum inlet pressure 150 psig.

ITEM	DESCRIPTION	PART NO.
1	Cable Assembly	L7747
2	Torch Head (only)	M15616
3	Plasma Torch Assembly	L7757

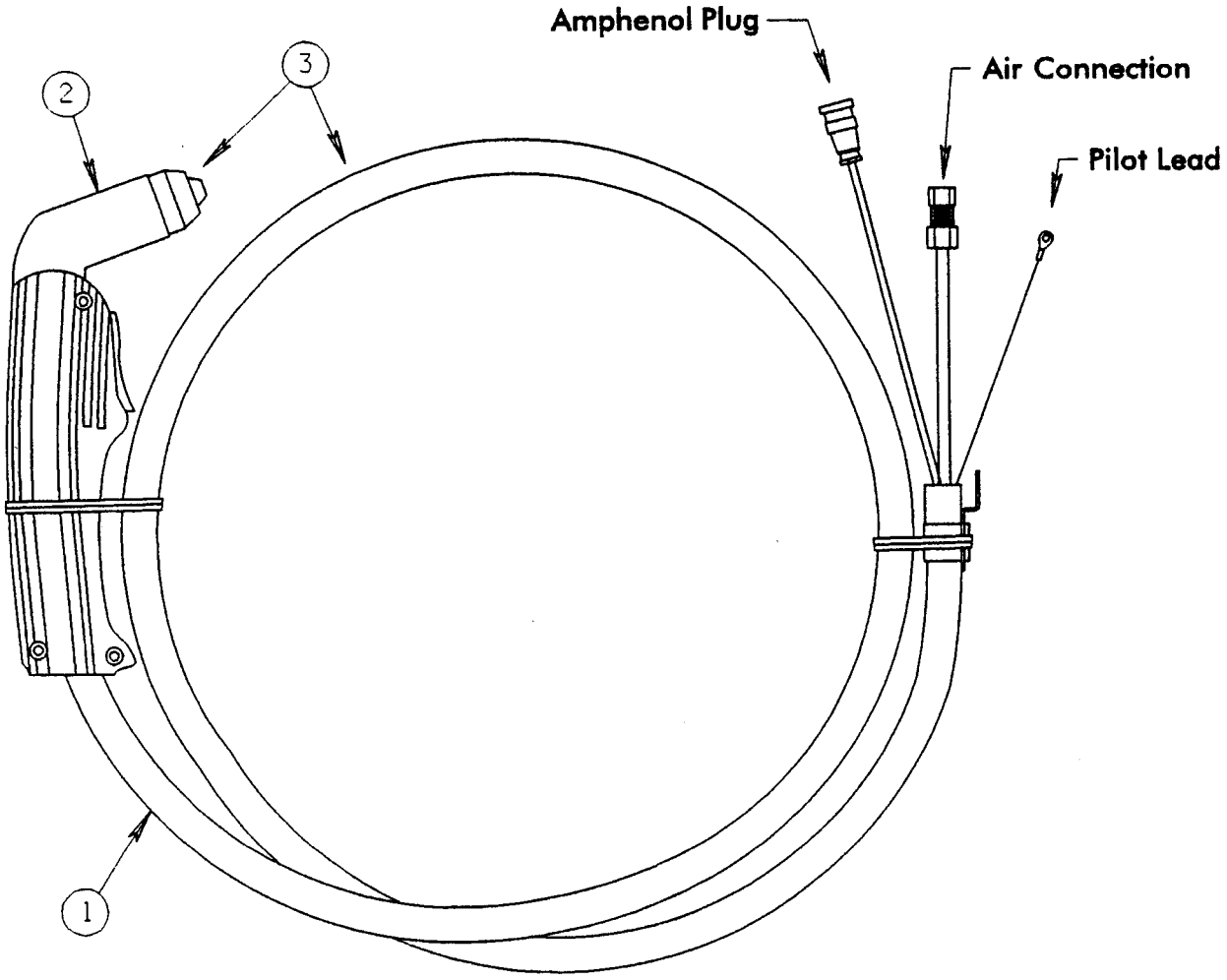


Figure 1

WARNING:
Electric shock can kill

- Turn off machine at the disconnect switch on the front of the machine BEFORE tightening, cleaning or replacing consumables.

ITEM	PART NO.	DESCRIPTION	REQ.
1	S18817	Shield Cup Assembly	1
2	S18497	Nozzle	1
3	S18752	Electrode	1
4	M15616	Molded Torch Head	1
5	G1975	Handle Set	1
6	S18932	Trigger Assembly	1
7	S19425	Drag Cup Assembly	1

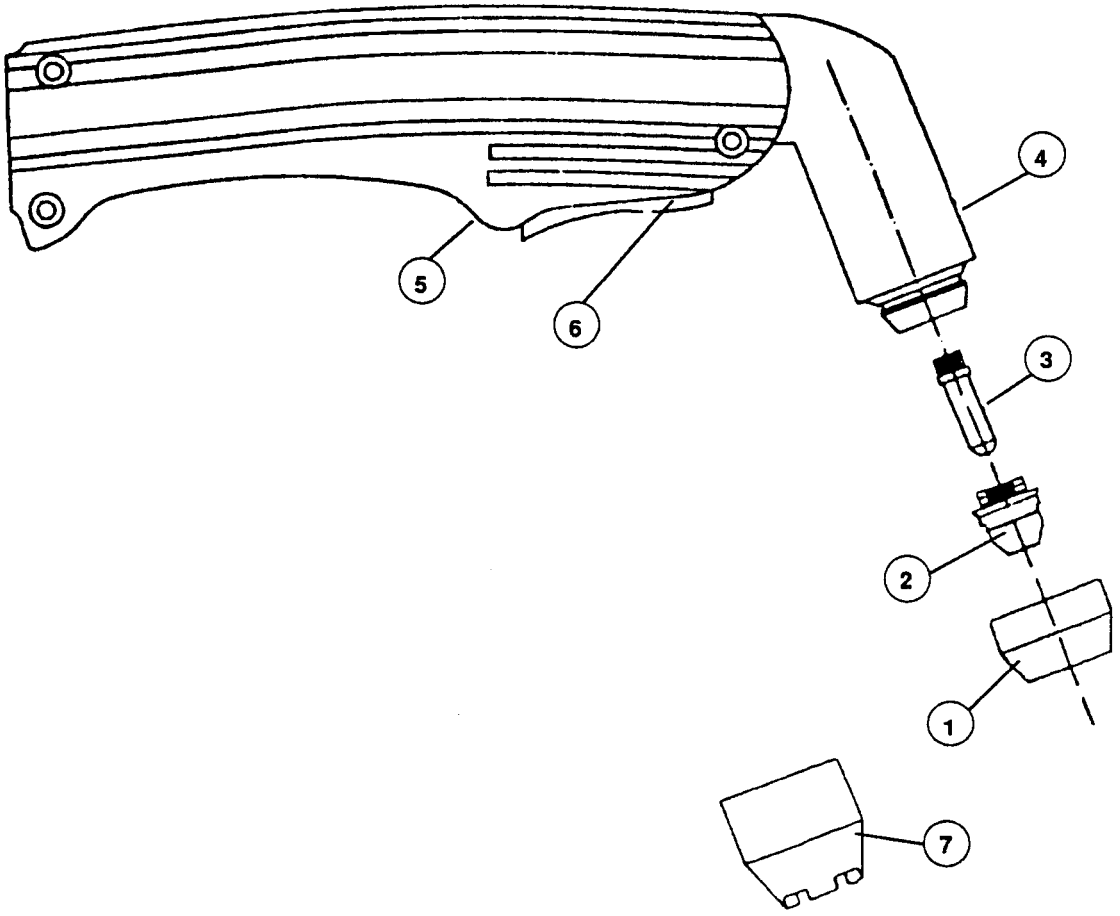
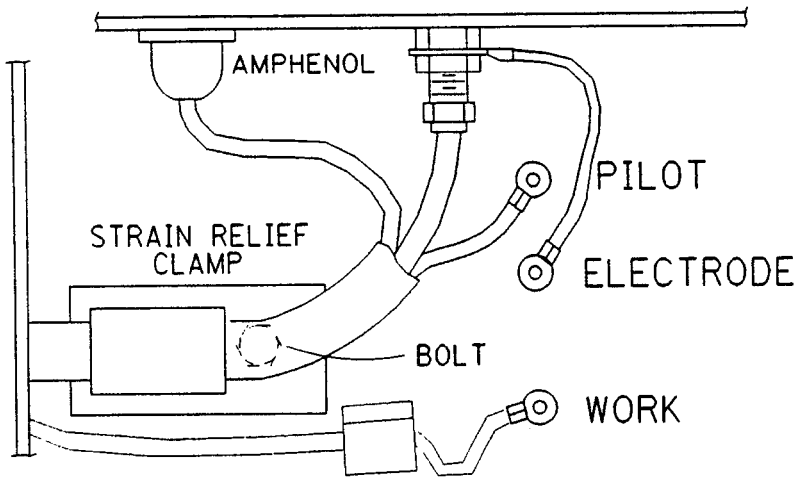


Figure 2

WARNING:
High voltage can kill

- Do not operate with covers removed.
- Disconnect input power before servicing.
- Do not touch electrically live parts.
- Only qualified persons should install, use or service this equipment.

CUTTING TORCH CONNECTION DIAGRAM
FOR MAGNUM™ PCT 60 PLASMA TORCH



PRO-CUT 60 POWER SOURCE

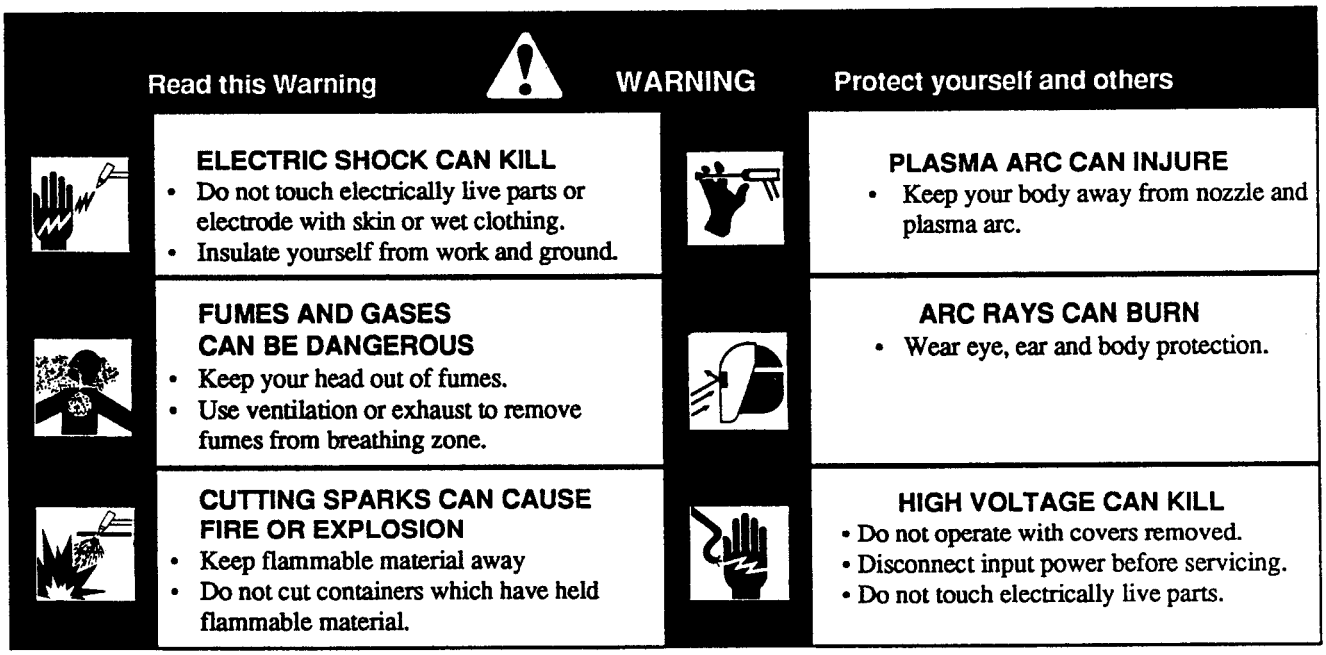
1. Disconnect input power and turn machine power switch off.
2. Thread cable and strain relief clamp through outside boot. Turn and lock strain relief clamp onto bolt.
3. Place bulkhead fitting over air line, insert air line into bulkhead union and screw tight.
4. Attach Amphenol connector.
5. Connect Pilot lead.

Figure 3

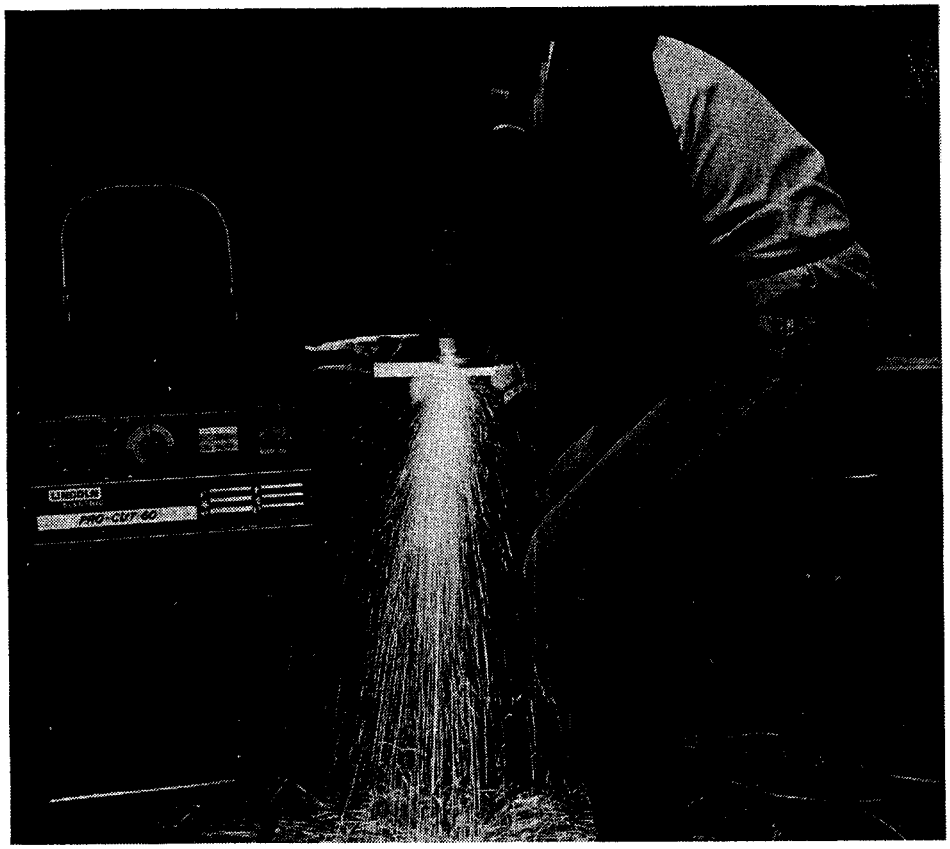
TORCH OPERATION

Follow step-by-step instructions below for proper and safe procedures in operating the Magnum PCT 60 plasma cutting torch.

1. Turn on the line power.
2. Connect the air supply to the PRO-CUT.
3. Turn the power switch on.
   a. The green "POWER On" LED should begin to glow.
   b. The fan should start.
   c. If the "Safety" LED is glowing, push the "Safety Reset" button. If there is no problem, the LED will go off. If there is a problem refer to Step 8 and the Troubleshooting Guide.
4. Set the Purge/Run switch to Purge.
   a. The air should start.
   b. The "Air Pressure" LED should be lit.
   c. Adjust the air regulator for 60 psi (414 kPa).
5. Set the Purge/Run switch to Run.
   The air will continue to run for 20 seconds of postflow. If the trigger is activated within this time period, the pilot arc will immediately start.



6. When ready to cut, place the work lead on the piece to be cut, place the torch near the work, make certain all safety precautions have been taken and pull the trigger.
   a. The air will flow for a preflow time of 2 seconds and the pilot arc will start. (This is true unless the machine is in postflow, then the preflow time is skipped and the pilot arc will start immediately.)
   b. The "Output On" LED will light.
   c. The pilot arc will run for 2.5 seconds and shut off unless the plasma is brought in contact with the work and the arc is transferred.
   d. When the arc is transferred, cutting begins. For best cutting results the sparks should exit the bottom of the workpiece at a 10 to 15° angle from vertical. If speed is too slow, a buildup of slag will appear. Finish the cut to be made and release the trigger.



"Qualified personnel demonstrating proper procedure in operating Lincoln Electric's plasma cutting equipment."

7. When the trigger is released, the arc will stop.
   The air will continue to run for 20 seconds of postflow. If the trigger is activated within this time period, the pilot arc will immediately restart.

WARNING: ELECTRIC SHOCK CAN KILL

- Turn off machine at the disconnect switch on the front of the machine before tightening, cleaning or replacing consumables.

8. If the "Safety" LED lights at any time, check the following.
   a. Check the assembly of the torch consumables. If they are not properly in place the machine will not start.
   b. Check the condition of the nozzle interior. If debris has collected, scrape it out with a piece of sturdy wire or a suitable drill bit. See the section entitled "Suggestions for Extra Utility from the PRO-CUT System" (page 14 and 15).
   c. After the problem is found, or if there is nothing apparently wrong, reset the machine by pressing the "Safety Reset" button. (It is possible for electrical noise to trip the safety circuit on rare occasions. This should not be a regular occurrence.)
   d. If the machine does not reset or continues to trip, consult the Troubleshooting Section.

PROCEDURE RECOMMENDATIONS

Plasma arc cutting or gouging is a very economical process if used properly. Improper use will result in a very high operating cost. Follow the general guidelines below in order to achieve the best possible results in operation of the Magnum PCT 60 plasma cutting torch. Specific recommendations are also listed for assistance when using this torch on any of the following:

Thin gauge sheet metal
Thick sections of metal
Expanded metal
Gouging

A. **Preheat temperature for plasma cutting** - Preheat temperature control is recommended for optimum mechanical properties, crack resistance and hardness control. This is particularly important on high alloy steels and heat treated aluminum. Job conditions, prevailing codes, alloy level, and other considerations may also require preheat temperature control. The following minimum preheat temperature is recommended as a starting point. Higher temperatures may be used as required by the job conditions and/or prevailing codes. If cracking or excessive hardness occurs on the cut face, higher preheat temperature may be required. The recommended minimum preheat temperature for plate thickness up to 1/2" (12.7 mm) is 70° F (21°C).

B. **General**
   1. Follow safety precautions as printed inside the operating manual and on the machine.
   2. The Drag Cup Assembly (S19425) should be used wherever the output control is set in the red range to protect the torch from dross and improper arcing conditions.
   3. Use proper cutting or gouging procedures referred to in procedure guideline.

C. **Thin gauge sheet metal:** Output set below mid-range.
   1. The torch should be dragged on the metal surface, touching the metal nozzle lightly to the surface. Output control should be set in the yellow range only.
   2. The Drag Cup Assembly (S19425) should not be used at very low outputs. It will cause erratic arc action. Use the Shield Cup Assembly (S18817).

3. The .035" (0.9 mm) nozzle may be used for a fine cut. Larger nozzles will work and provide longer life at the expense of a larger cut.
4. Do not allow torch cable or body to contact hot surface.
5. The best quality is obtained by reducing the current to a level that is barely adequate for the maximum travel speed at the given thickness being cut.
6. Aluminum, copper and other nonferrous metals require more current for proper cutting than the same thickness of steel. Treat these as a thicker section of steel if good results are not obtained.

D. Thick sections of metal: Output set above mid-range.

1. The best quality and consumable life will be obtained by holding the torch off the surface about 1/8" (3.2 mm). This can be accomplished with the Drag Cup Assembly (S19425). Output control should be set in the red range only. Do not touch the nozzle to the work or carry a long arc.
2. Use the Drag Cup (S19425) to protect the torch. The only reason not to use the Drag Cup when the output control is in the blue or red regions is in special tight corners. Always hold at least a 1/8" (3.2 mm) standoff in those situations.
3. Set the current to the minimum necessary to make the cut.
4. Use the .052 or .042" (1.3 or 1.1 mm) nozzle size. DO NOT use the .035" (0.9 mm) nozzle.
5. Pierce the plate by slowly lowering the torch onto it with the pilot arc on at an angle of about 30° to blow the dross away from the torch tip. When the main arc is established, slowly rotate the torch to a vertical position as the arc becomes deeper.
6. Where possible, start the cut from the edge of the workpiece.
7. Keep moving! A steady speed is necessary. Do not pause.
8. Do not allow torch cable or body to contact hot surface.

E. Expanded metal: Output set near mid-range.

1. Cut it as you would light gauge sheet metal.
2. Expanded metal is pilot arc intensive. After about 30 seconds of cutting, the pilot arc will change from a bright continuous arc to a discontinuous one which will sputter slightly. It will stay in this mode as long as metal has been cut in the previous 5 seconds. If metal is not cut in the previous 5 seconds, the arc will shut off and the machine will go into postflow. Output control should be set in the blue range only.
3. Placing a thin piece of scrap sheet metal above the area to be cut and cutting through both can make the job easier.
4. Do not allow torch cable or body to contact hot surface.
5. In extremely thick applications, a keyhole pierce may be required. While rotating the torch to the vertical position, slowly move the torch in the direction of the cut to keep the arc length short and in contact with the metal.
6. If the trigger is continuously pressed and released to obtain the bright pilot arc for long periods of time, the machine will go into pilot arc duty cycle limit. This is a 20 second out of 80 second pilot duty cycle. The pilot arc is disabled in the limit period. Pilot arc duty cycle limit is indicated by alternately flashing "OUTPUT ON" and "FAULT" LED's.

F. **Gouging:** Output set to maximum.
   1. Use a gouging nozzle (S18497-4).
   2. Use the S19425 Drag Cup.
   3. Bring the torch slowly towards the work at about a 30° angle as if piercing the plate. Blow the molten metal away from the torch.
   4. Do not touch the nozzle to the work.
   5. The air pressure may be raised to about 75 psi (517 kPa) to aid in metal removal. Lowering the pressure below 60 psi (414 kPa) will yield a broader arc for wide, shallow passes.
   6. This process will blow a lot of molten metal and dross. Be careful! Blow the dross away from the torch, away from the operator, and away from flammable objects.
   7. Do not allow torch cable or body to contact hot surface.
   8. Performance is similar to air carbon arc gouging with a 1/8" (3.2 mm) carbon electrode.

In all cases:

Do not pause when cutting or gouging the metal. This is not necessary and causes operational difficulty. Pausing at the edge of the workpiece causes poor consumable life and erratic operation.

Always position the torch in the best way to keep dross and hot air from burning back into it.

Do not carry a long arc. This may trip the safety or fault circuits and wears consumable rapidly.

Do not drag the nozzle above the mid-range setting. Always hold a standoff above mid-range.

Use a drag cup where possible but only when the current is in the blue or red ranges. Drag the nozzle in the yellow range. The use of the drag cup at low currents (in the yellow range) may cause problems. Proper use of the drag cup is the best way to get maximum nozzle and consumable life.

Use the proper machine setting. Setting the machine at maximum output will not produce the best cutting performance in most situations.

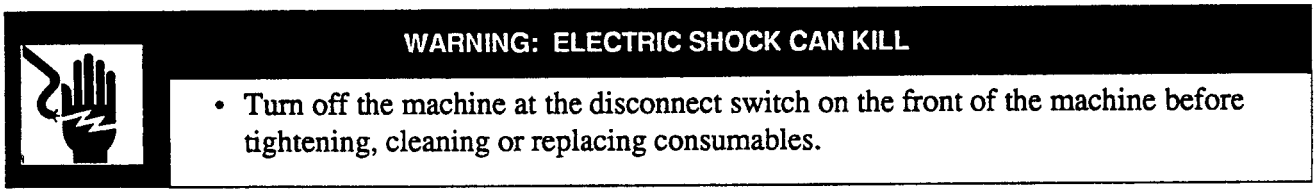
Use proper cutting or gouging procedures referred to in procedure guideline.

Use the nozzle with the largest orifice size that gives an acceptable cut. This will improve parts life. Never use the .035" (0.9 mm) nozzle at outputs above the yellow range.

Suggestions for Extra Utility from the PRO-CUT System:

If it becomes absolutely necessary to "hack" through a very thick section, the air flow at the regulator on the back of the machine may be **lowered** to get a better result. If it is set too low [below 35 psi (241 kPa)], the power source will trip off until the pressure is raised back to about 60 psi (414 kPa). It is not wise to operate in this manner for long periods of time because the consumable life is severely shortened.

In some cases where moderate or thin sections are being cut, higher air pressure may give better consumable life. At pressures about 80 psi (552 kPa) the pilot arc may sputter. This may be an annoyance but it will not damage the torch or power source. 60 psi (414 kPa) is the recommended pressure because it is the minimum necessary to provide proper cooling in all situations. Feel free to experiment with higher pressures. [Not to exceed 150 psi (1034 kPa) at the regulator input.]

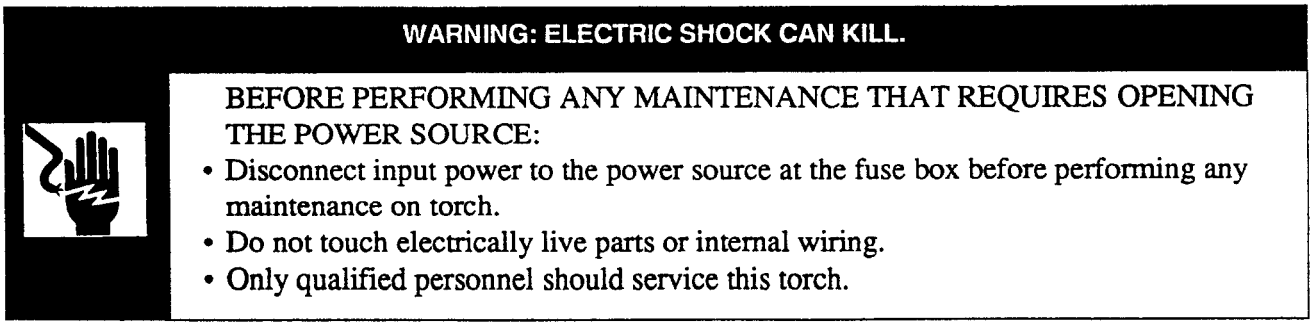


The PRO-CUT cutting system will cut with consumables that are worn considerably. Many competitive systems require replacement consumables long before a PRO-CUT system does. This is because of the solid state current regulation that the PRO-CUT has. Also, the safety reset circuit provides a means of extending nozzle life. Sometimes a small piece of material "spits" from the electrode and bridges the gap between the nozzle and the electrode. In a competitive unit, this would often result in the destruction of the electrode and nozzle due to the overheating. This will result in the tripping of the PRO-CUT safety circuit. When this happens, turn the power off, remove the nozzle and scrape any debris from its inside cavity with a piece of sturdy wire or a suitable drill bit. Replace the nozzle, turn on the power and continue cutting.

Gouging nozzles may be made from worn cutting nozzles by drilling the orifice out to .078 inches (5/64 or #47 drill bit). Take care to center the hole and be careful because the copper nozzle may seize to the drill bit.

Use of the nozzle with the largest orifice size that produces acceptable cutting results will maximize consumable life. Procedures given are all based on a .042 orifice size. Smaller orifice sizes constrict the arc more, raising the energy density and therefore the temperature. Larger orifice sizes have an opposite effect. Small orifice nozzles run hotter and wear faster than large orifice nozzles but produce a finer cut with less kerf width. There is a certain current where each orifice size becomes unstable because it runs too hot. Never use the smallest .035 orifice size at outputs above the yellow range because it will be quickly destroyed.

ROUTINE MAINTENANCE:



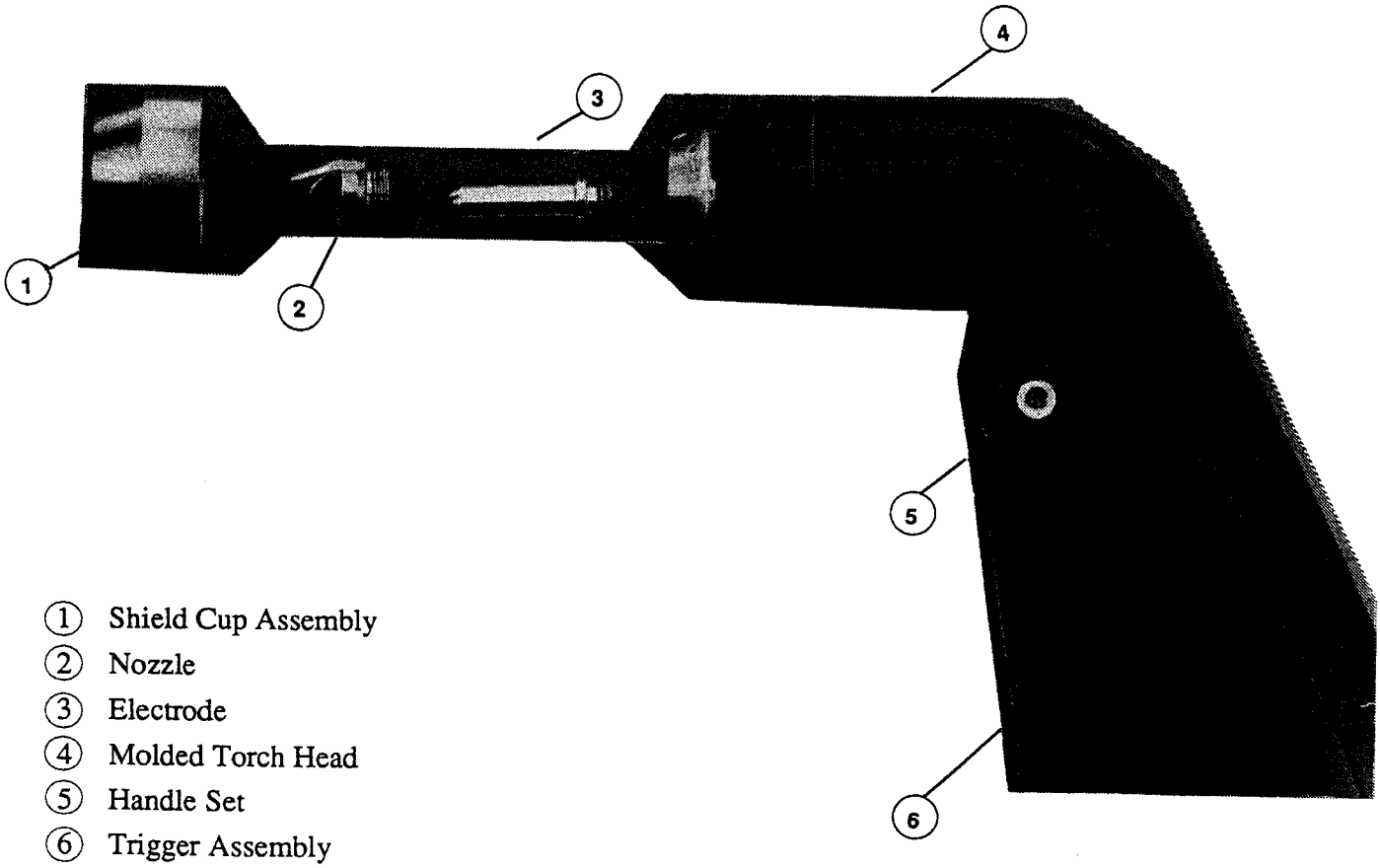
Keep the cutting or gouging area and the area around the machine clean and free of combustible materials. No debris should be allowed to collect which could obstruct air flow to the machine.

Inspect the cable periodically for any slits or puncture marks in the cable jacket. Replace if necessary. Check to make sure that nothing is crushing the cable and blocking the flow of air through the air tube inside. Also, check for kinks in the cable periodically and relieve any so as not to restrict the flow of air to the torch.

WARNING: ELECTRIC SHOCK CAN KILL

- Turn off machine at the disconnect switch on the front of the machine before tightening, cleaning or replacing consumables.

Change the consumables in the torch head as required.



① Shield Cup Assembly
② Nozzle
③ Electrode
④ Molded Torch Head
⑤ Handle Set
⑥ Trigger Assembly

TROUBLESHOOTING GUIDE:

WARNING: ELECTRIC SHOCK CAN KILL

BEFORE PERFORMING ANY MAINTENANCE THAT REQUIRES OPENING THE CASE OF THE POWER SOURCE:

- Disconnect input power to the power source at the fuse box.
- Do not touch electrically live parts or internal wiring.
- Only qualified personnel should service the torch.

How To Use This Guide: Carefully read through the "General Troubleshooting" and the "PRO-CUT 60 Status Lights Operating Modes" sections. Remember that most problems are caused by improper setup, such as switch settings, control settings, etc.

If you believe the setup is correct and the trouble still exists, first check for the obvious: input power, blown fuses, loose PC board connectors, broken wires, and the like. The following sections are intended to help you find the less obvious sources of trouble.

GENERAL TROUBLESHOOTING

Note: LED lights specified in the following Troubleshooting Guide refer to the Lincoln PRO-CUT 60 power source.

WARNING: ELECTRIC SHOCK CAN KILL

- Turn off machine at the disconnect switch on the front of the machine before tightening, cleaning or replacing consumables.

SYMPTOM	CHECK
The air begins to flow, the "OUTPUT ON" LED lights for a brief period, but no arc is established.	1. Check the torch consumables to be sure they are in tight, not dirty or greasy, and in good shape. Replace if necessary. 2. Check for high frequency at the spark gap. 3. Check Power Source Troubleshooting Guide.
The arc starts but sputters badly.	1. Check the torch consumables to be sure they are in tight, not dirty or greasy, and in good shape. 2. Check air supply for oil or a great deal of water. If there is oil or a great deal of water, the air must be filtered or the machine switched to nitrogen or bottled air.
The "MACHINE ON" LED is lit, but there is no response when the trigger is pulled.	1. Check the torch cable to see if it is cut or punctured. 2. Check Power Source Troubleshooting Guide.
The "FAULT" LED is lit.	1. The Fault circuit monitors the torch to see if it is shorted as well as internal machine failures. 2. Check the torch consumables to see if they are melted together or are simply touching each other. Tighten, clean or replace. See "Suggestions for Extra Utility from the PRO-CUT System" (page 14 and 15). 3. Turn off the machine and turn it back on. If the "FAULT" LED will not stay off and there is no problem with the torch, then something has failed in the machine and the machine should not be left on. 4. Check the Power Source Troubleshooting Guide.
The "SAFETY" LED is lit.	1. The machine will not operate. The machine senses that the nozzle is not in place, or the operator could be exposed to dangerous voltages if the machine were allowed to operate. 2. Check the nozzle to be sure it is tightly in place.

SYMPTOM	CHECK
The "SAFETY" LED is lit. (cont'd)	3. Check the torch consumables to see if they are melted together or are simply touching each other. Tighten, clean or replace. See "Suggestions for Extra Utility from the PRO-CUT System" (pages 14 and 15). 4. Check to see that the torch is hooked to the machine properly. 5. Push the "SAFETY RESET" button, the LED should go out. 6. If LED does not go out, refer to the Power Source Troubleshooting Guide.
The "OUTPUT ON" and the "FAULT" LED's blink in alternating order.	1. The pilot arc duty cycle has been exceeded. The machine will cool down and the lights will quit blinking in about 20 seconds. The pilot arc is limited to 20 out of 80 seconds except in special circumstances such as cutting expanded metal. (See the section on expanded metal in "Procedure Recommendations" section, page 13).

PRO-CUT 60 STATUS LIGHTS OPERATING MODES

STATUS LIGHTS	CONDITION	SUGGESTIONS
MACHINE ON	Should always be on when machine is on.	Normal
OUTPUT ON	On when there is voltage potential at the torch (cutting or pilot). If OUTPUT ON is blinking alternately with FAULT, the pilot arc duty cycle is exceeded.	Normal Wait for machine lights to stop blinking.
AIR PRESSURE	On whenever the air pressure is above 40 psi (276 kPa), there is an error condition mentioned above where air will turn on. The air will turn on for a brief time when power is first applied to machine.	Normal conditions are purge, preflow, postflow, and cutting.
THERMAL	Should normally be off.	If on, wait for machine to cool down.

STATUS LIGHTS	CONDITION	SUGGESTIONS
FAULT	Light on. At end of preflow, machine checks to see if the torch is shorted and if it can fire the SCR's.	Check consumables, replace as needed. Check torch cable to see if it is punctured or cut.
	Light blinking. If cutting tried with air pressure less than 40 psi (276 kPa) then machine will wait for air pressure to become greater than 40 psi (276 kPa).	No air connected to machine, air pressure set too low, or air leak in system.
	Light blinking alternately with OUTPUT ON.	Pilot arc duty cycle has been exceeded. Wait for machine lights to stop blinking.
	Light started blinking during cutting or gouging. There is an overcurrent condition caused by a surge of current the machine was not designed to handle.	If cutting or gouging with standoff more than 1/8" (3.2 mm) at high range of machine and nozzle is accidentally touched to work, turn output down, shorten standoff or use drag cup. Check consumables to see if electrode melted to nozzle.
	Light blinking with THERMAL light on.	Wait for machine to cool.
SAFETY	It is possible that this light could turn on when power is first applied to the machine.	If machine can be reset, it is OK to continue operation.
	The nozzle is not in place.	Securely fasten nozzle in place.
	While cutting or gouging if the voltage between the nozzle and the work is too high, it will put the machine into SAFETY.	By pressing reset the machine will be functional. This occurs most often when the consumables are wearing out. By removing the hafnium that builds up on the inside of the nozzle, it is possible to extend the life of the consumables.

			
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 oidos 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**	• 皮肤或湿衣物切勿接触带電部件及銲條。 • 使你自己與地面和工件絶緣。	• 把一切易燃物品移離工作場所。	• 保護眼、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 INSTRUCT ION FOR THIS EQUIPMENT AND THE CONSUMABLES TO BE USED AND FOLLOW YOUR EMPLOYER'S SAFETY PRACTICES.	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.
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.	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 Schweißrauch! • 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 resto 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 painels 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 لصاحبم العمل.

LIMITED WARRANTY

STATEMENT OF WARRANTY:

The Lincoln Electric Company (Lincoln) warrants to the original purchaser (end-user) of new equipment that it will be free of defects in workmanship and material.

This warranty is void if Lincoln finds that the equipment has been subjected to improper care or abnormal operation.

WARRANTY PERIOD:

All warranty periods date from the date of shipment to the original purchaser and are as follows:

Three Years:
Transformer Welders
Motor-generator Welders
Semiautomatic Wire feeders
Plasma-cutting power source
Engine Driven Welders (except engine and engine accessories) with operating speed under 2,000 RPM

Two Years:
Engine Driven Welders (except engine and engine accessories) with operating speed over 2,000 RPM

All engine and engine accessories are warranted by the engine or engine accessory manufacturer and are not covered by this warranty.

Equipment not listed above such as gun and cable assemblies, automatic wire feeders and field-installed optional equipment is warranted for one year.

TO OBTAIN WARRANTY COVERAGE:

You are required to notify Lincoln Electric, your Lincoln Distributor, Lincoln Service Center or Field Service Shop of any defect within the warranty period. Written notification is recommended.

WARRANTY REPAIR:

If Lincoln's inspection of the equipment confirms the existence of a defect covered by this warranty, the defect will be corrected by repair or replacement at Lincoln's option.

WARRANTY COSTS:

You must bear the cost of shipping the equipment to a Lincoln Service Center or Field Service Shop as well as return shipment to you from that location.

IMPORTANT WARRANTY LIMITATIONS:

- Lincoln will not accept responsibility for repairs made without its authorization.
- Lincoln shall not be liable for consequential damages (such as loss of business, etc.) caused by the defect or reasonable delay in correcting the defect.
- Lincoln's liability under this warranty shall not exceed the cost of correcting the defect.
- This written warranty is the **only** express warranty provided by Lincoln with respect to its products. Warranties implied by law such as the Warranty of Merchantability are limited to the duration of this limited warranty for the equipment involved.

WARRANTY SUPERSEDED
SEE IMWS 1

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THE LINCOLN ELECTRIC COMPANY

World's Largest Manufacturer of Arc Welding Products • Manufacturer of Industrial Motors
Sales and Service Worldwide Cleveland, Ohio 44117-1199 U.S.A.
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