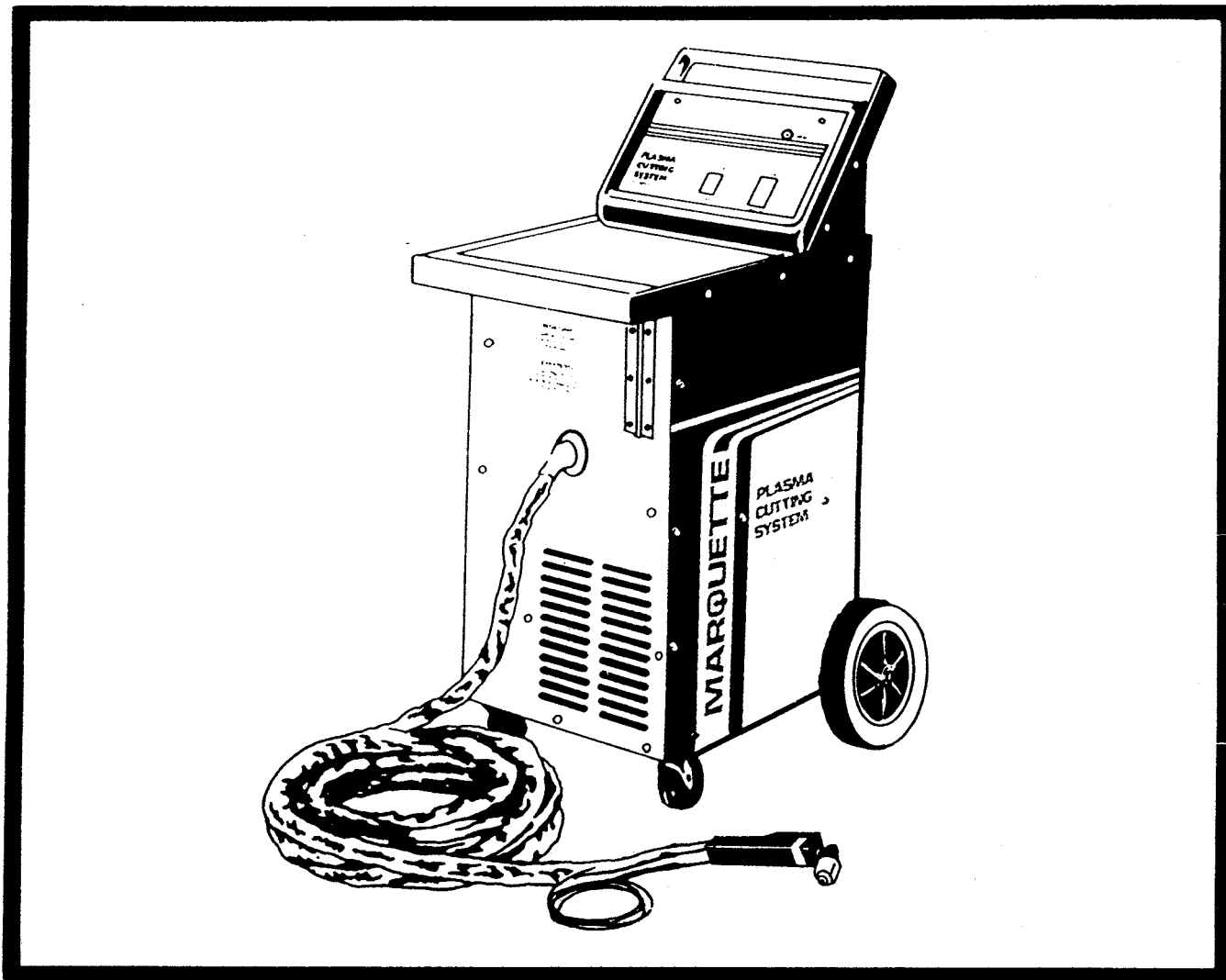


OPERATING INSTRUCTIONS

Plasma Cutting System



IMPORTANT SAFETY INSTRUCTIONS
SAVE THESE INSTRUCTIONS

MARQUETTE®



NAPA SERVICE EQUIPMENT COMPANY

TABLE OF CONTENTS

	Page
INTRODUCTION	1
PRECAUTIONS	2
SECTION 1 GENERAL INFORMATION	3
1.1 What is Plasma?	3
1.2 Theory of Operation	3
1.3 Power Requirements	4
SECTION 2 INITIAL SET-UP	4
2.1 Required Tools and Facilities	4
2.2 Equipment Installation	5
SECTION 3 OPERATION	5
3.1 Operating Controls	5
3.2 Pre-Operation Set-Up	6
3.3 Torch Operation	6
3.4 Piercing	8
3.5 Common Cutting Problems	8
3.6 Cutting Speeds	9
3.7 Changing Input Voltage	9
SECTION 4 SERVICE	9
4.1 Torch Maintenance	9
4.2 Power Cable and Torch Leads	10
4.3 Unit Maintenance and Adjustments	11
4.4 Troubleshooting Guide	11
SECTION 5 PARTS LIST	13

INTRODUCTION

Many service related problems are a result of neglected operating procedures. The coverage in this manual should serve as a guide to the proper operation of the Plasma Cutting System and a logical sequence to solving service problems that may be encountered.

This manual is divided into five sections and a brief description of each follows. The information contained in this manual represents our best judgment but the manufacturer assumes no liability, written or implied, for its use.

SECTION 1. Explains plasma cutting, the theory of operation, a general circuit diagram and a brief table of power requirements.

SECTION 2. Provides detailed instructions and tools required for the assembly and installation of new equipment in preparation for operation.

SECTION 3. Lists operating procedures, which include detailed instructions for safe usage of the equipment and efficient cutting.

SECTION 4. SERVICE - Contains complete service instructions for external parts of the system and some routine maintenance instructions for the internal components of the Plasma Cutting System.

SECTION 5. PARTS LIST - List of the common serviceable parts, external to the unit, that are critical to the everyday functions of the system.

M12-200, 83-330, 4015

NOTES, CAUTIONS & WARNINGS

Throughout this manual, notes, cautions and warnings are used to call attention to particular information that is important to emphasize. Please read these instructions carefully.

The method used to identify these highlights and the purpose for their use are as follows:

NOTES

Inserted after an operation, procedure, and/or command which adds background information, clarify meaning and aid the operator in efficient use of the machine or equipment. The note may also indicate additional emphasis to a previous statement.

CAUTION

Inserted before an operation or procedure, which if not properly followed, may cause damage to the equipment.



Inserted before an operation or procedure, which if not strictly followed, may cause injury to the operator or others in the operating area.

PRECAUTIONS

Operation and maintenance of any plasma arc cutting equipment involves potential hazards. Personnel should be alerted to the following hazard, and precautions should be taken to prevent possible injury. The following symbols, their meaning and what to do to counteract the effects of these hazards are as follows:



GASES and FUMES can be very dangerous and hazardous to your health.

- * Ventilation must be adequate to remove the smoke during cutting (threshold limit values and how to measure the amounts to assure adequate ventilation are found in publication "A" listed below). on page 3.)

- * Vapors of chlorinated solvents can form the toxic gas Phosgene when exposed to ultraviolet radiation from the electric arc. All solvents, degreasers and potential sources of these vapors must be removed from the cutting area.
- * Keep all fumes and gases from the breathing area.
- * Use a downdraft cutting table or water table to capture the fumes and gases.
- * Use an air-supplied respirator if ventilation is not adequate to remove all fumes and gases.



ARC RAYS can injure eyes and burn the skin.

- * Use welding shield with #4 or darker filter when drag cutting.
- * Wear proper protective clothing.
- * Make sure others are protected from arc rays.



ELECTRIC SHOCK can kill!

- * Install and maintain equipment according to USA Standard C1, National Electric Code.
- * Proper grounding procedures must be adhered to when using plasma cutting equipment. The work or metal must be grounded to a good electrical ground.
- * Do not come in contact with electrically live parts.
- * Insulate yourself from the work and ground.
- * Replace any cracked or damaged insulating parts, including the torch, sheath, leads, work and power cable.
- * Turn OFF primary power before working on or changing any torch parts, including the shield cup or tip.
- * When operating plasma cutting equipment in a damp area, extra care should be taken.



FIRE can be caused by hot sparks and slag.

- * Remove combustibles from the welding area or provide a fire watch.
- * Do not cut containers that have held combustibles. All flammable materials in the cutting area that might be ignited by cutting sparks should be removed.

COMPRESSED GAS CYLINDERS

Compressed gas cylinders are potentially dangerous - refer to supplier for proper handling procedures.

PUBLICATIONS

The following publications provide additional information on safety precautions:

- (A) Bulletin No. A6.3-69 "Recommended Safe Practices for Plasma Arc Cutting."
- (B) American National Standard ANSI Z49.1 "Safety in Welding and Cutting."

Both of the above are available from:

American Welding Society Inc.
2501 Northwest 7th Street
Miami, FL 33125
Telephone (305) 642-7090

OR

American National Standard
Institute (ANSI)
1430 Broadway
New York, NY 10018

(C) OSHA Safety and Health Standards,
29CFR 1910, available from the U. S.
DEPARTMENT of LABOR, Washington, D.C.
20210.

(D) In CANADA:

Canadian Standards Association
178 Rexdale Blvd.
Rexdale, Ontario M9W1R3

"Code for Safety in Welding and Cutting,"
(CSA Standard W117.2-1574).



WARNING



Read and understand this instruction manual and your employer's safety practices.

M12-200, 83-330, 4015

GENERAL INFORMATION

1.1 WHAT IS PLASMA?

Plasma is a gas that has been heated to an extremely high temperature and ionized so that the gas becomes electrically conductive. The plasma cutting process uses this plasma to transfer an electric arc to the workpiece. The metal to be cut is melted by the heat of the arc and then blown away.

In a plasma torch, compressed air is used as both the plasma and secondary gas. Incoming air is internally channeled (see Zone A, Figure 1-A) to the proper existing ports. A high frequency circuit is energized and initiates the heating and ionizing of the plasma gas between the electrode and the work (see Zone B). When the tip of the torch is brought close to or in contact with the work, this ionized gas produces a stiff, constricted cutting arc at Zone B that delivers a high concentration of heat to a very small area at Zone C.

This exclusive dual flow design of the plasma torch utilizes a secondary gas, shown by the small arrows in Figure 1-A. The secondary compressed air is channeled out around the tip where it cools the torch parts and protects the torch from spatter.

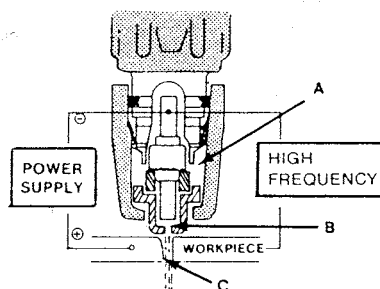


Figure 1-A Plasma Torch.

1.2 THEORY OF OPERATION

Plasma and Secondary Gases

To aid in understanding the Plasma Cutting System, it may be helpful to follow the control circuit diagram in Figure 1-B. The single source of compressed air for the plasma and secondary gas flows through the unit to the torch at the pressure set on the air supply regulator. A solenoid valve turns the air on and off. A gas flow interlock shuts the system down if the air flow is stopped either by no air connection or by the torch head valve closing.

GENERAL INFORMATION



WARNING



Keep all panels and covers in place and the front access door closed at all times and especially during operation. A safety hazard exists due to the high voltage and current inside the Plasma Cutting System which could cause severe electrical shock.

CAUTION

Do not adjust the air pressure above 60 psi (415 kPa). This will cause rapid consumable parts deterioration and poor cutting quality.

High Frequency

High frequency is used to initiate the cutting arc. When the cutting sequence is started by pressing the torch switch, there is a two second flow of air before the high frequency relay closes and the circuit is established between the electrode and the workpiece. This high frequency circuit creates a path for the cutting arc to follow. The high frequency shuts off immediately after the cutting arc has been established.

Cutting Arc

A bridge rectifier in the Plasma Cutting System converts the AC power to DC current for the cutting arc. The negative output connects to the torch electrode through the power cable and the positive output is connected to the workpiece through the work cable.

Interlocks

A flow switch acts as an interlock for the air supply. If the air flow is stopped, the flow switch will open and not allow the cutting arc to start or continue.

A pressure switch is located on the regulated air line. If 40 PSI is not available at the outlet of the regulator, the unit will not work.

NOTE:

The flow switch also acts as "parts-in-place" interlock. When the tip is loosened, it allows a ball check valve in the torch body to close and stops the gas (air) flow, thus causing the flow switch to open. This shuts down the control circuit and prevents operation of the unit until the problem has been corrected. The control circuit can be energized when the tip is properly installed and the gas flow in the line satisfies the flow switch.

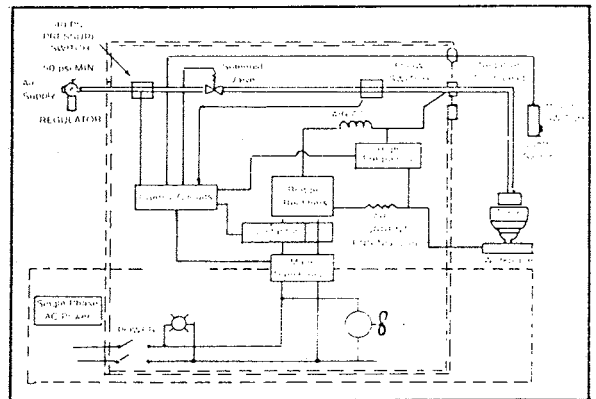


Figure 1-B Power Input, Air Supply and Control Circuit Diagram.

1.3 POWER REQUIREMENTS

A reference guide for power requirements, circuit protection, wire size, rated output and duty cycle is shown in Table 1. The circuit protection and recommended wire size is based on data found in Table 310-16, 1981 National Electric Code.

Input Voltage	Power Input (kVA)	Current (Amps)	Phase	Frequency (Hz)
208/220	5.2/5.6	41	1	60

Recommended		Rated Output	Duty Cycle
Fuse Size	Wire Size	40 Amps D.C. : HI	40%
30 Amps	10 AWG	15 Amps D.C. : LO	

Table 1. Power Requirements and Rated Output Chart.

INITIAL SET-UP

2.1 REQUIRED TOOLS & FACILITIES

The following list is provided as an aid in selecting tools in the preparation for assembly and operation of your Plasma Cutting System.

Only common hand tools are necessary for Assembly.

Necessary Facilities for Operational Check:

1. Power outlet with single phase 220-VAC 41 amp service

M12-200, 83-330, 4015

INITIAL SET-UP

2. A filtered compressed air supply (preferred)
3. Clean steel scrap metal for practice cutting
4. Helmet with #4 shaded lens and necessary welding safety gear.

2.2 EQUIPMENT INSTALLATION

The Plasma Cutting System is shipped with the torch, torch leads, work cable and power cable connected. A carton and padding material is used to prevent damage in shipment. The running gear, handles, air supply regulator, and spare parts kit are packed loose. Make sure all items on the packing list are accounted for and identified. Inspect Plasma Cutting System and components for possible damage.

One copy of the Plasma Cutting System operating and maintenance instruction manual is packed in each carton.

Review PRECAUTIONS on page 2 of this manual to be sure that the location selected meets all safety requirements. Then proceed to select a clean, dry location with adequate working space and good ventilation. Air flow under the base and out the rear of the unit must not be obstructed. A source of power (see Power Requirements table) and compressed air with a minimum pressure of 80 psi (552 kPa) and a maximum pressure of 150 psi (1035 kPa) is required.

The following steps are required to complete the assembly and prepare the Plasma Cutting System for operation:

1. Remove all packing material and the Plasma Cutting System from the carton.
2. Locate the handles, casters, wheels and all the attaching hardware.
3. Attach the wheels to the axle with the attaching hardware provided.
4. Assemble the casters to the unit with eight sheet metal screws.
5. Fasten the front and top handles to the cabinet.

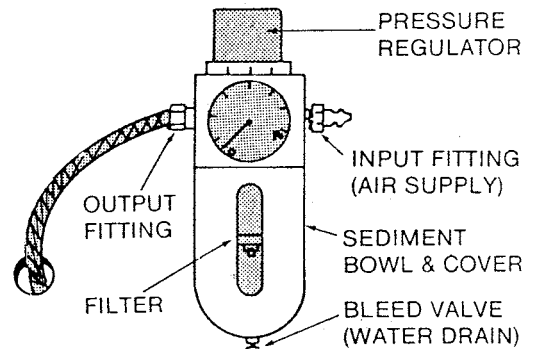
NOTE:

Place the front handle with the offset holes pointing down so it forms a ridge around the top of the cabinet and provides for clearance to open the front access door.

6. The air supply regulator, assembled to a mounting bracket, is installed on the rear panel of the cabinet. Connect the air supply hose from an air supply regulator to the input fitting on the air supply regulator (see Figure 2-A).

CAUTION

The quality of the air may require an air filter to be installed between the air supply and the regulator. Air containing moisture or Oil WILL CAUSE damage to the torch parts and poor cutting quality.



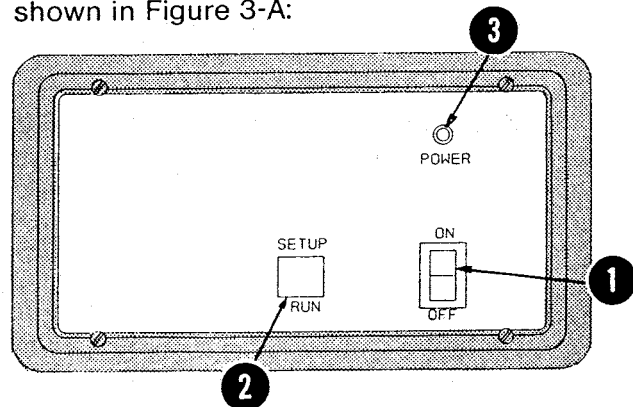
(View from rear of Plasma Cutting System)
Figure 2-A Air Supply Regulator Installation

7. Check the power source for the proper fuses (see Table 1).
8. Connect the work cable clamp to the workpiece.
9. Check the torch to see that it is properly assembled (refer to section 4.1). The Plasma Cutting System is now ready for the pre-operation set-up procedure described in Section 3.

OPERATION

3.1 OPERATING CONTROLS ON CONSOLE

The following is an explanation of the operating controls found on the console as shown in Figure 3-A:



M12-200, 83-330, 4015

1. POWER Switch

Function: Move the rocker type switch up to the ON position which activates the control circuits. Move down to the OFF position to deactivate the control circuits.

2. RUN/SET-UP Switch

Function: Move the rocker type switch up to the SET-UP position for purging gas lines and setting gas pressure with the external regulator. Move down to the RUN position for normal torch operation.

3. POWER Light (~)

Function: When the POWER switch is in the ON position, The RED light will glow when power is being supplied to the system.

3.2 PRE-OPERATION SET-UP

This procedure should be followed at the beginning of each shift:



Unplug the unit before disassembling the torch!

1. Check the torch head to be sure it has been assembled correctly (refer to Figure 4-A).
2. Plug the unit into the power supply.
3. Move the POWER switch to the ON position.
4. Move the RUN/SET-UP switch to the SET-UP position. Open the air supply valve at the source. Adjust the pressure regulator on the back of the unit until the pressure reads 50 psi (345 kPa).

CAUTION

Pressure above 60 psi (415 kPa) causes rapid parts deterioration and poor cutting performance.

5. Purge for approximately 1 minute by letting the air flow through the system. This should remove any condensation or moisture that may have accumulated

6. Return the RUN/SET-UP switch to the RUN position.
7. Check the sediment bowl for water and drain if necessary (see Section 4.3 if additional maintenance is required).



The operator must be equipped with the proper gloves, clothing, eye and ear protection. Read and follow the instructions and precautions found in this manual. No part of the operator's body should come in contact with the workpiece while the torch switch is depressed. Determine that the work cable clamp is connected to the work on a clean metal surface and always have the torch in its cutting position before depressing torch switch.

The system is now ready for operation. The torch is controlled by the torch switch mounted on the torch handle. Refer to Figure 3-B and study the sequence of operation that coincides with the following explanation of torch operation.

CAUTION

The sparks which are small molten metal particles from the cutting process can cause damage to coated material (painted auto finishes for example) and other surfaces such as glass, plastic and metal.

3.3 TORCH OPERATION

1. The torch hand control can be comfortably held in one hand or steadied with two for making long cuts. Choose the method that feels most comfortable and gives the required results. Use the thumb to activate the torch push button switches on the torch handle.
2. Position the torch head over the workpiece, resting the front edge of the tip on the edge of the workpiece at the point where the cut is to start. This will positively locate the line of cut.
3. Select the cutting range by pressing the green button for LO (15 Amps) or

PLASMA CUTTER OPERATION M12-200, 83-330, 4015

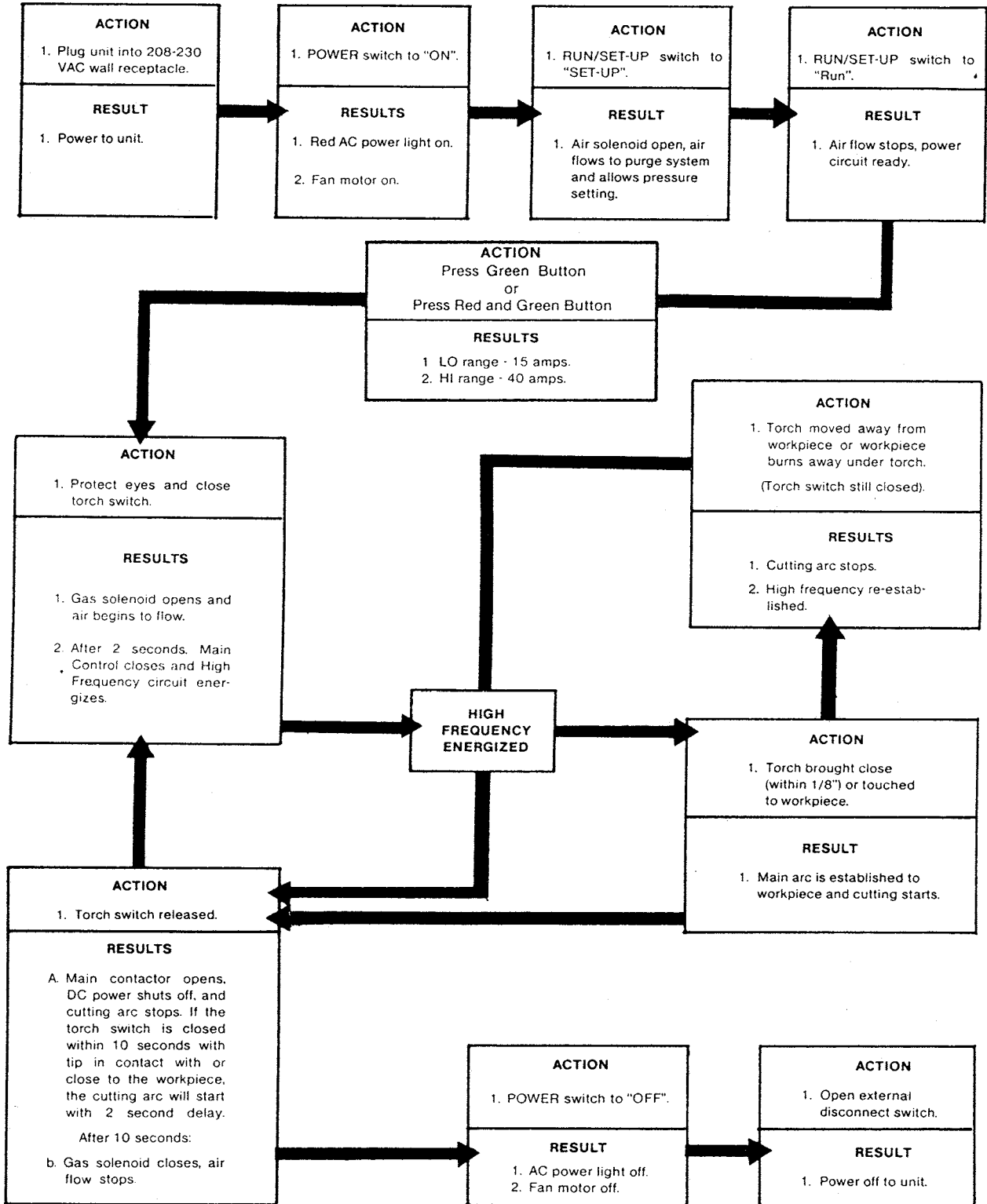


Figure 3-B. Sequence of Operation.

OPERATION

both the red & the green for HI, (40 Amps).

- Lower the helmet, press and hold the torch switch ON. After a two second gas purge, the high frequency circuit is energized.

NOTE:

With the high frequency energized, the main cutting arc is established immediately when the tip is touching the work or very close to it (less than 1/8" or 3mm) and then the high frequency shuts down. If the arc is interrupted and the torch switch is still depressed (ON), when cutting expanded metal e.g., the high frequency will automatically restart followed by the main cutting arc. Releasing the control switch shuts off the main arc and the high frequency circuit. After ten seconds, the air flow stops.

- Cut with the torch tip as described in the note above and keep the torch head tilted at a slight angle when the tip is in contact with the work.
- When the cutting operation is completed, release the torch switch to shut down the main arc.



WARNING



It is not enough to simply move the **POWER** switch to its **OFF** position when the Plasma Cutting System is not in use. Always unplug the power cord from the wall receptacle.

3.4 PIERCING

In some cutting operations, it may be desirable to start the cut within the plate area instead of the edge. Piercing the plate is not recommended if thickness is greater than 1/16" (1.5 mm) because blow back will shorten the life of torch parts. All piercing should be done quickly.

When performing the piercing operation, always tip the torch slightly to blow particles away from the tip rather than directly back into it (see Figure 3-C).

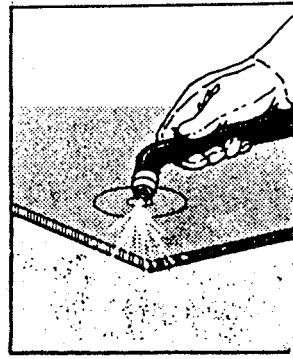


Figure 3-C

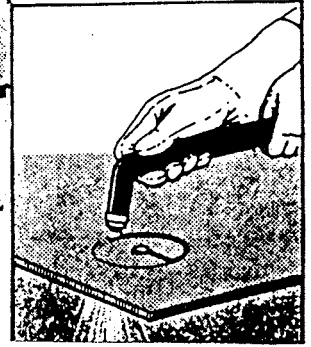


Figure 3-D

Pierce of the cutting line and then continue the cut as shown in Figure 3-D. Spatter and scale should be cleaned from the tip and shield cup as soon as possible. Spraying or dipping the shield cup into anti-spatter compound will minimize the amount of scale which adheres to it.

3.5 COMMON CUTTING PROBLEMS

Listed below are common cutting problems followed by the probable causes of each. If problems are caused by a malfunction of the unit, refer to the Troubleshooting Guide in Section 4.4.

- Insufficient Penetration
 - Cutting speed too fast (see Figure 3-E)
 - Torch tilted too much
 - Metal too thick
 - Torch parts worn or damaged
- Main Arc Extinguishes
 - Cutting speed too slow (see Figure 3-E)
- Dross Formation
 - Improper cutting speed
 - Worn or damaged parts
 - Gas pressure incorrect

M12-200, 83-330, 4015

OPERATION

3.6 CUTTING SPEEDS

The speed at which the torch is moved along the cutting line depends on the thickness and composition of the material being cut and how fast the operator can comfortably and accurately follow the line. Cutting speeds on some materials can be substantially reduced with only a slight reduction in cut quality; for example, cutting 1/16 inch aluminum at 60 ipm will still produce an acceptable cut. See Table 2 for a cutting speed guide.

FREQUENTLY REVIEW THE SAFETY PRECAUTIONS AT THE FRONT OF THIS MANUAL

3.7 CHANGING INPUT VOLTAGE

The Plasma Cutting System* is wired from the factory to operate on 230 VAC. If this power is not available, the unit may be changed to the lower power requirement of 208 VAC as follows:

1. Disconnect the unit from the power supply
2. Remove the front handle and the left side panel.
3. Locate terminal board #1 on the center shelf and interchange lead #63 with #70 at terminals 2 and 3.
4. Replace the side panel and handle.
5. The unit is now ready to operate on 208 VAC.

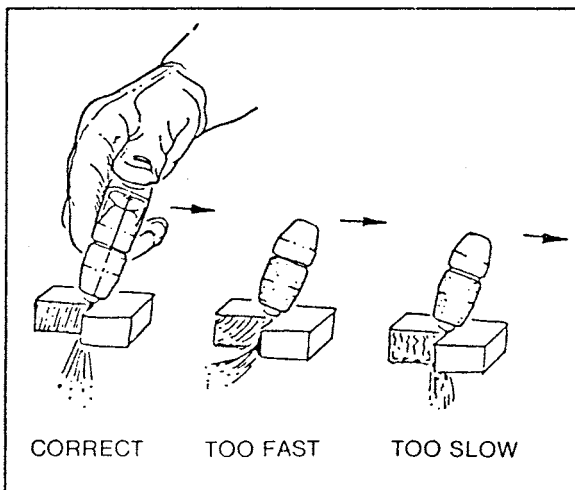


Figure 3-E. Effects of Cutting Speed

Material	Thickness (in.)	Speed Range for Best Quality Cut
Carbon	0.030	210-250 ipm
Steel (AISI 1020)	1/16	100-140
	1/8	40-60
	1/4	10-15
	5/16	8-10
Stainless	0.040	210-250 ipm
Steel (AISI 304)	1/16	100-140
	1/8	50-70
	1/4	10-15
	5/16	8-10
Aluminum (6061)	0.033	210-250 ipm
	1/16	100-140
	1/8	50-70
	1/4	10-15
	5/16	8-10

Table 2.
Cutting Speed Range (air at 50 psi - 345 kPa)

SERVICE

4.1 TORCH MAINTENANCE

Torch Disassembly and Inspection



WARNING



Unplug the unit before disassembling the torch!

The torch head includes the electrode, swirl baffle, tip and shield cup with o' ring. Routine inspection and replacement of any consumable parts may be accomplished as follows (see Figure 4-A):

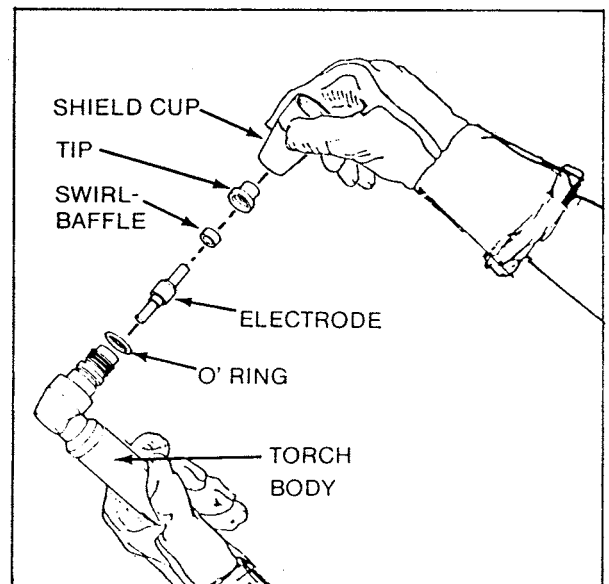


Figure 4-A Torch Head Components

M12-200, 83-330, 4015

SERVICE

1. Hold the torch with the shield cup up and remove it from the torch body.
2. Turn the torch over and prepare to catch the parts as they fall out of the torch body.
3. Inspect parts carefully; two parts require close attention:
 - a. Tip-check for wear indicated by an elongated hole, excessive erosion or pitting.
 - b. Electrode-check the length as shown in Figure 4-B using the torch body as a gauge.

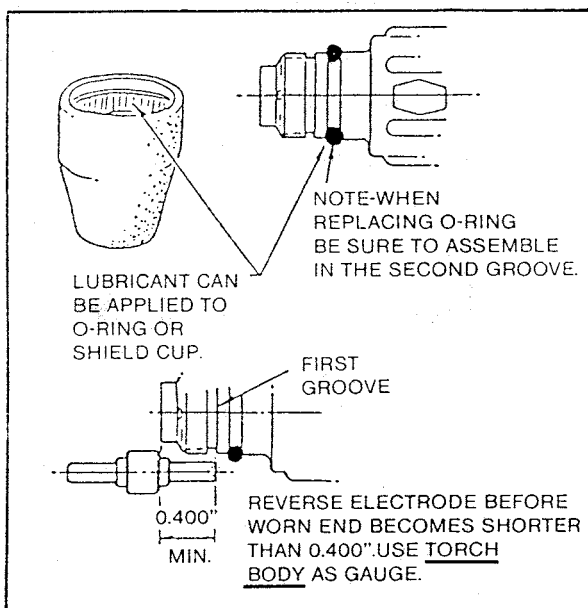


Figure 4-B Electrode and O' Ring Maintenance.

NOTE:

When one end of the electrode is worn, it can be reversed, but remember, the electrode opens the torch head check valve. This valve is part of the safety interlock system and it is permanently assembled in the torch body. The torch body must be replaced if this valve malfunctions. The light spring force used to close the ball check may be felt by pushing on the electrode when assembling the torch head to the torch body. DO NOT use one end of the electrode continually or it will erode to a length shorter than that shown in the illustration. If this happens, it will be too short to open the torch head valve when reversed and the torch will not operate.

Torch Repair and Assembly

1. Replace any damaged or worn parts.
2. Check the o-ring for wear or damage and assemble as shown in Figure 4-B.
3. Assemble the parts of the torch head into the torch body in the order as illustrated. Apply a small amount of the lubricant supplied in the spare parts kit to the O' ring or shield cup. Be careful not to overtighten the shield cup.

4.2 POWER CABLE AND TORCH LEADS

The torch power cable, work cable, leads and torch switch should be inspected periodically. The protective sheath should be checked daily as any damage done to it could lead to problems with internal components. Always handle the power and work cables carefully to protect them from damage.

To disassemble and check the power cable and components, proceed as follows (see Figure 4-C):

1. Unscrew the handle halves to expose the torch head connection switch leads. Be careful to save the torch head positioning pads.
2. Disconnect the torch head from the power cable. Inspect and/or replace all head components.
3. Disconnect HI/LO switch leads. Leads #96 and #97 are connected to the red button, leads #98 and #99 are connected to the green button. Inspect the switch contacts for wear and replace switch if necessary.
4. Inspect the power cable and leads. Also, check the work cable and clamp.
5. Replace any damaged components. If leads are replaced, use #16 AWG STRANDED COPPER, 600 VOLT, 903C INSULATED WIRE.
6. Assemble in reverse order.

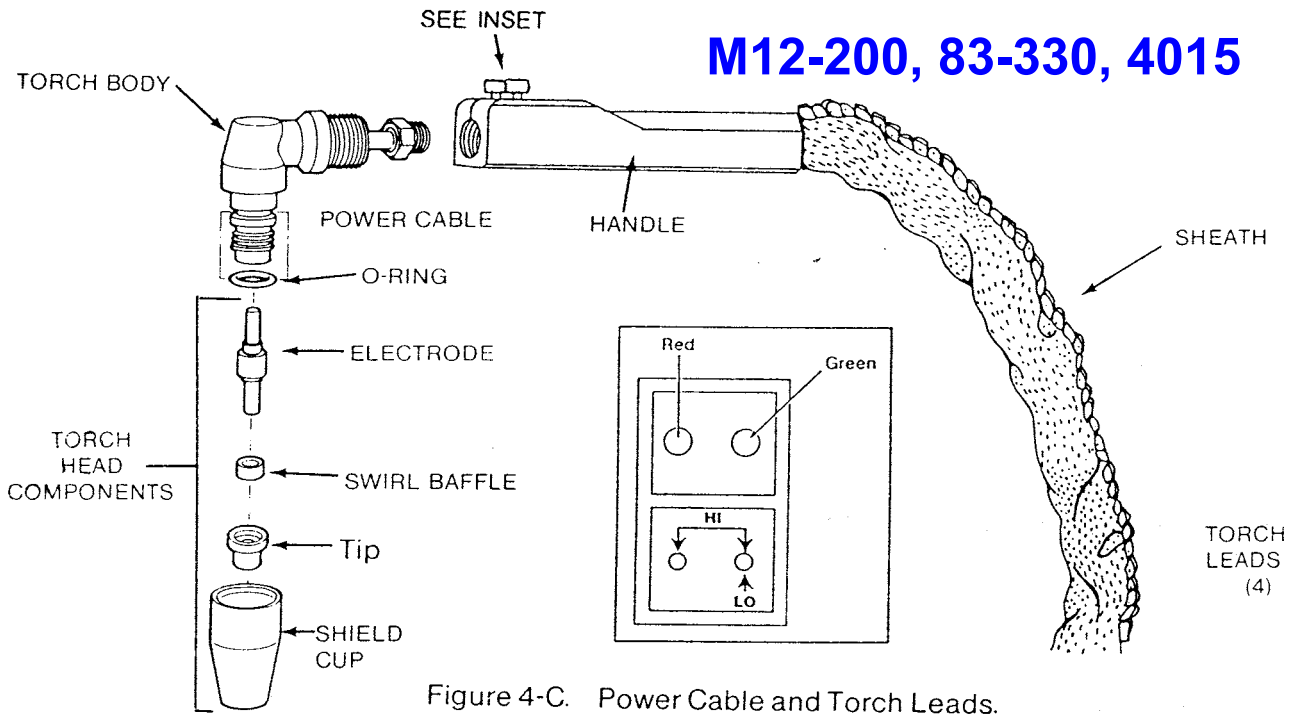


Figure 4-C. Power Cable and Torch Leads.

SERVICE

4.3 UNIT MAINTENANCE AND ADJUSTMENTS

The only routine maintenance required for the Plasma Cutting System is a thorough cleaning and inspection. The inspection and cleaning should be done on a regular basis, the frequency depending on the amount of usage and the environment in which the unit is operated.



WARNING



Power must be turned OFF and the unit DISCONNECTED from the wall receptacle before performing the following operations!

Clean the Unit

To clean the unit, remove the front handle, both side panels and blow out any accumulated dirt and dust with compressed air. If necessary, solvents that are suitable for cleaning electrical apparatus may be used.

Inspect Components

While the side panels are off, inspect the wiring in the unit, looking for any frayed wires or loose connections that should be repaired. When checking interior components, pay particular attention to the area around the high frequency spark gap points since accumulated dirt in this area can weaken the high frequency starting cycle and cause poor main arc starting.

Adjust Spark Gap

To adjust the spark gap setting, open the front access door and with an offset screwdriver, loosen the set screw on bottom of the brass block until the electrode can be moved. Adjust one electrode until the proper gap of 0.022 inch (0.56 mm) is obtained. Secure the electrode by tightening the set screw. Close the front access door and keep it closed at all times.

Service Air Supply Regulator

Check the sediment bowl in the air supply regulator for water accumulation. Water may be drained out by pressing in on the stem of the drain valve (see Figure 2-A). The filter inside the sediment bowl should be checked often and cleaned as required. If cleaning does not suffice, replace the filter.

4.4 TROUBLESHOOTING GUIDE

If the Plasma Cutting System malfunctions, the following table will be helpful in correcting the problem. Since the malfunction may be due to a faulty connection rather than a faulty component, be sure to check all connections to a component that appears to be inoperative. Also, check the fuses that are located directly inside the front access door to see if they are blown.

SERVICE

The troubleshooting guide is arranged in the normal operating sequence of the unit for easy reference. Each problem has listed next to it the possible cause(s) and the remedy..

NOTE: A product service representative may be contacted if a machine remains inoperative after performing these recommended service procedures. If additional assistance is required, call Service: 1-800-558-4558

With the Plasma Cutting System plugged into a proper power source, the POWER switch in the ON position, the red POWER light lit and a proper air supply available, all conditions are ready for operation. If at any time this DOES NOT HAPPEN and the unit fails to operate, check as follows:

WARNING

Be sure to disconnect the unit from the AC POWER SOURCE before checking or changing fuses.

PROBLEM	POSSIBLE CAUSE	REMEDY
A. POWER light not lit.	<ol style="list-style-type: none">1. Blown line fuse or open circuit breaker at disconnect panel.2. POWER switch faulty.3. Defective light.	<ol style="list-style-type: none">1. Replace line fuse or reset breaker.2. Replace SW1.3. Replace bulb.
B. Gas does not flow in SET-UP position.	<ol style="list-style-type: none">1. Air supply not turned on or empty cylinder.	<ol style="list-style-type: none">1. Turn air supply on or replace cyl.
C. Gas does not flow in RUN position.	<ol style="list-style-type: none">1. Loose torch tip.2. Gas pressure too low.	<ol style="list-style-type: none">1. Check torch components.2. Adjust.
D. Cannot set desired gas pressure.	<ol style="list-style-type: none">1. Faulty regulator or plugged filter.	<ol style="list-style-type: none">1. Repair or replace.
E. No gas flow or high frequency when torch switch is pressed.	<ol style="list-style-type: none">1. Torch switch not connected.2. Torch switch not closing.3. Transformer fuse behind front access door blown.	<ol style="list-style-type: none">1. Check lead wires, splice & receptacle.2. Check for continuity when pressed.3. Replace fuse.
F. No main arc during normal start cycle.	<ol style="list-style-type: none">1. Work cable not connected.2. Transformer fuse behind front access door blown.	<ol style="list-style-type: none">1. Connect work cable to work-piece.2. Replace fuse.
G. Unit shuts down during cutting operation.	<ol style="list-style-type: none">1. Unit components over-heated; duty cycle activated.	<ol style="list-style-type: none">1. Allow unit to cool down.

M12-200, 83-330, 4015

PROBLEM	POSSIBLE CAUSE	REMEDY
H. Poor torch operation.	<ol style="list-style-type: none"> 1. Check all torch head parts (Figure 4-A). 2. Sediment bowl full of water. 3. Dirty filter. 4. Loose shield cup. 5. High frequency points shorted. 	<ol style="list-style-type: none"> 1. Replace parts as required. 2. Drain. 3. Clean or replace. 4. Tighten. 5. Clean and dry area - adjust gap (Section 4.3).
I. Short torch parts life.	<ol style="list-style-type: none"> 1. Misuse of torch. 2. Incorrect gas pressures. 	<ol style="list-style-type: none"> 1. Use torch per ratings. 2. Check and correct.

NAPA PARTS LIST

Torch Spare Parts

The following parts kit is recommended for maintaining the Plasma Cutting System with a minimum downtime. The kit contains the spare parts as listed below in a convenient container which is supplied with each unit.

Description	Part Number	Quantity
Heat Shield	83-334	1
Tip	83-332	1
Electrode	83-333	1
O-Ring	83-336	1
Swirl Baffle	83-335	1
Parts Kit	83-337	1
	(Contains 3 tips and 1 each of the above parts).	
Torch Complete	83-339	1

M12-200, 83-330, 4015

LIMITED WARRANTY

Lincoln, a Division of McNeil (Ohio) Corp., a subsidiary of Pentair, Inc., warrants that jacks and related service equipment sold with the brand-names Lincoln, Blackhawk Automotive, Blackhawk Automotive Banner, Blackhawk Automotive Porto-Power, Hein-Werner Automotive, Hein-Werner Automotive Winner will be free from defects in material and workmanship during the one (1) year following the date of purchase. This warranty is extended to the original retail purchaser only. If a jack or related service equipment proves to be defective during this warranty period, it will be repaired or replaced without charge. To obtain repair or replacement, it must be shipped, transportation charges prepaid, with proof of date of purchase to a Lincoln authorized Warranty and Service Center, within one (1) year following the date of purchase. This warranty does not apply to parts damaged from accident, overload, or abuse, nor does it apply to any equipment which has been altered or used with special attachments other than those recommended by Lincoln. No other express warranty applies to jacks and related service equipment manufactured by Lincoln. ANY IMPLIED WARRANTIES applicable to jacks and related service equipment manufactured by Lincoln, INCLUDING THE WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE, WILL LAST ONLY FOR ONE (1) YEAR FROM THE DATE OF PURCHASE. SOME STATES DO NOT ALLOW LIMITATIONS ON HOW LONG AN IMPLIED WARRANTY LASTS, SO THE ABOVE LIMITATION MAY NOT APPLY TO YOU. In no event shall Lincoln be liable for incidental or consequential damages. The liability of Lincoln on any claim for loss or damage arising out of the sale, resale, or use of a jack or related service equipment shall in no event exceed the purchase price. SOME STATES DO NOT ALLOW THE EXCLUSION OR LIMITATION OF INCIDENTAL OR CONSEQUENTIAL DAMAGES, SO THE ABOVE LIMITATION OR EXCLUSION MAY NOT APPLY TO YOU. THIS WARRANTY GIVES YOU SPECIFIC LEGAL RIGHTS, AND YOU MAY ALSO HAVE OTHER RIGHTS WHICH VARY FROM STATE TO STATE.

Service beyond the warranty period is available through a nationwide system of Authorized Service Centers which are carefully selected by Blackhawk. A current list of Authorized Service Centers is available from the factory.

M12-200, 83-330, 4015

LINCOLN

© A PENTAIR COMPANY

One Lincoln Way
St. Louis, Missouri 63120-1578
Customer Service, (314) 679-4300