

**THERMAL DYNAMICS**  


**SL60  
SL100**

**1Torch**<sup>TM</sup>

*with SURELOK<sup>®</sup> Technology*

## **PLASMA CUTTING TORCH**

*Model SL60, SL100 Hand  
Torch*

*Model SL100 Machine Torch*

# **Instruction Manual**

Rev. AA.02

Date: July 23, 2007

Manual # 0-2962

Operating Features:

<b>60 AMP</b>	<b>100 AMP</b>	<b>DC</b>	<b>100% Duty Cycle</b>	<b>H/F LV Start</b>	<b>Max Flow 400 scfh</b>	<b>Op Pres 60-75 PSI</b>	<b>Max Input 125PSI</b>	<b>PIP</b>
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## **WE APPRECIATE YOUR BUSINESS!**

Congratulations on your new Thermal Dynamics product. We are proud to have you as our customer and will strive to provide you with the best service and reliability in the industry. This product is backed by our extensive warranty and world-wide service network. To locate your nearest distributor or service agency call 1-800-426-1888, or visit us on the web at **[www.thermal-dynamics.com](http://www.thermal-dynamics.com)**.

This Operating Manual has been designed to instruct you on the correct use and operation of your Thermal Dynamics product. Your satisfaction with this product and its safe operation is our ultimate concern. Therefore please take the time to read the entire manual, especially the Safety Precautions. They will help you to avoid potential hazards that may exist when working with this product.

## **YOU ARE IN GOOD COMPANY!**

### **The Brand of Choice for Contractors and Fabricators Worldwide.**

Thermal Dynamics is a Global Brand of manual and automation Plasma Cutting Products for Thermadyne Industries Inc.

We distinguish ourselves from our competition through market-leading, dependable products that have stood the test of time. We pride ourselves on technical innovation, competitive prices, excellent delivery, superior customer service and technical support, together with excellence in sales and marketing expertise.

Above all, we are committed to developing technologically advanced products to achieve a safer working environment within the welding industry.



## WARNINGS

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*Read and understand this entire Manual and your employer's safety practices before installing, operating, or servicing the equipment.*

*While the information contained in this Manual represents the Manufacturer's best judgment, the Manufacturer assumes no liability for its use.*

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Plasma Cutting Torch  
Model SL60 and SL100 Hand Torch  
Model SL100 Machine Torch  
Instruction Manual Number 0-2962

Protected under U.S. Patent Number 6,163,008. Other patents may apply.

Published by:  
Thermal Dynamics Corporation  
82 Benning Street  
West Lebanon, New Hampshire, USA 03784  
(603) 298-5711

[www.thermal-dynamics.com](http://www.thermal-dynamics.com)

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Printed in the United States of America

Publication Date: September 29, 2005

**Record the following information for Warranty purposes:**

Where Purchased: \_\_\_\_\_

Purchase Date: \_\_\_\_\_

Power Supply Serial #: \_\_\_\_\_

Torch Serial #: \_\_\_\_\_



# SECTION 1: GENERAL INFORMATION

## 1.01 Notes, Cautions and Warnings

Throughout this manual, notes, cautions, and warnings are used to highlight important information. These highlights are categorized as follows:

### NOTE

*An operation, procedure, or background information which requires additional emphasis or is helpful in efficient operation of the system.*

### CAUTION

*A procedure which, if not properly followed, may cause damage to the equipment.*



### WARNING

*A procedure which, if not properly followed, may cause injury to the operator or others in the operating area.*

## 1.02 Important Safety Precautions



### WARNINGS

**OPERATION AND MAINTENANCE OF PLASMA ARC EQUIPMENT CAN BE DANGEROUS AND HAZARDOUS TO YOUR HEALTH.**

*Plasma arc cutting produces intense electric and magnetic emissions that may interfere with the proper function of cardiac pacemakers, hearing aids, or other electronic health equipment. Persons who work near plasma arc cutting applications should consult their medical health professional and the manufacturer of the health equipment to determine whether a hazard exists.*

*To prevent possible injury, read, understand and follow all warnings, safety precautions and instructions before using the equipment. Call 1-603-298-5711 or your local distributor if you have any questions.*



### GASES AND FUMES

Gases and fumes produced during the plasma cutting process can be dangerous and hazardous to your health.

- Keep all fumes and gases from the breathing area. Keep your head out of the welding fume plume.
- Use an air-supplied respirator if ventilation is not adequate to remove all fumes and gases.
- The kinds of fumes and gases from the plasma arc depend on the kind of metal being used, coatings on the metal, and the different processes. You must be very careful when cutting or welding any metals which may contain one or more of the following:

Antimony	Chromium	Mercury
Arsenic	Cobalt	Nickel
Barium	Copper	Selenium
Beryllium	Lead	Silver
Cadmium	Manganese	Vanadium

- Always read the Material Safety Data Sheets (MSDS) that should be supplied with the material you are using. These MSDSs will give you the information regarding the kind and amount of fumes and gases that may be dangerous to your health.
- For information on how to test for fumes and gases in your workplace, refer to item 1 in Subsection 1.03, Publications in this manual.
- Use special equipment, such as water or down draft cutting tables, to capture fumes and gases.
- Do not use the plasma torch in an area where combustible or explosive gases or materials are located.
- Phosgene, a toxic gas, is generated from the vapors of chlorinated solvents and cleansers. Remove all sources of these vapors.
- This product, when used for welding or cutting, produces fumes or gases which contain chemicals known to the State of California to cause birth defects and, in some cases, cancer. (California Health & Safety Code Sec. 25249.5 et seq.)



### ELECTRIC SHOCK

Electric Shock can injure or kill. The plasma arc process uses and produces high voltage electrical energy. This electric energy can cause severe or fatal shock to the operator or others in the workplace.

- Never touch any parts that are electrically "live" or "hot."

- Wear dry gloves and clothing. Insulate yourself from the work piece or other parts of the welding circuit.
- Repair or replace all worn or damaged parts.
- Extra care must be taken when the workplace is moist or damp.
- Install and maintain equipment according to NEC code, refer to item 9 in Subsection 1.03, Publications.
- Disconnect power source before performing any service or repairs.
- Read and follow all the instructions in the Operating Manual.



### FIRE AND EXPLOSION

Fire and explosion can be caused by hot slag, sparks, or the plasma arc.

- Be sure there is no combustible or flammable material in the workplace. Any material that cannot be removed must be protected.
- Ventilate all flammable or explosive vapors from the workplace.
- Do not cut or weld on containers that may have held combustibles.
- Provide a fire watch when working in an area where fire hazards may exist.
- Hydrogen gas may be formed and trapped under aluminum workpieces when they are cut underwater or while using a water table. **DO NOT** cut aluminum alloys underwater or on a water table unless the hydrogen gas can be eliminated or dissipated. Trapped hydrogen gas that is ignited will cause an explosion.



### NOISE

Noise can cause permanent hearing loss. Plasma arc processes can cause noise levels to exceed safe limits. You must protect your ears from loud noise to prevent permanent loss of hearing.

- To protect your hearing from loud noise, wear protective ear plugs and/or ear muffs. Protect others in the workplace.
- Noise levels should be measured to be sure the decibels (sound) do not exceed safe levels.
- For information on how to test for noise, see item 1 in Subsection 1.03, Publications, in this manual.



### PLASMA ARC RAYS

Plasma Arc Rays can injure your eyes and burn your skin. The plasma arc process produces very bright ultra violet and infra red light. These arc rays will damage your eyes and burn your skin if you are not properly protected.

- To protect your eyes, always wear a welding helmet or shield. Also always wear safety glasses with side shields, goggles or other protective eye wear.
- Wear welding gloves and suitable clothing to protect your skin from the arc rays and sparks.
- Keep helmet and safety glasses in good condition. Replace lenses when cracked, chipped or dirty.
- Protect others in the work area from the arc rays. Use protective booths, screens or shields.
- Use the shade of lens as suggested in the following per ANSI/ASC Z49.1:

Arc Current	Minimum Protective Shade No.	Suggested Shade No.
Less Than 300*	8	9
300 - 400*	9	12
400 - 800*	10	14

\* These values apply where the actual arc is clearly seen. Experience has shown that lighter filters may be used when the arc is hidden by the workpiece.

## 1.03 Publications

Refer to the following standards or their latest revisions for more information:

1. OSHA, SAFETY AND HEALTH STANDARDS, 29CFR 1910, obtainable from the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402
2. ANSI Standard Z49.1, SAFETY IN WELDING AND CUTTING, obtainable from the American Welding Society, 550 N.W. LeJeune Rd, Miami, FL 33126
3. NIOSH, SAFETY AND HEALTH IN ARC WELDING AND GAS WELDING AND CUTTING, obtainable from the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402
4. ANSI Standard Z87.1, SAFE PRACTICES FOR OCCUPATION AND EDUCATIONAL EYE AND FACE PROTECTION, obtainable from American National Standards Institute, 1430 Broadway, New York, NY 10018
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6. ANSI Standard Z49.2, FIRE PREVENTION IN THE USE OF CUTTING AND WELDING PROCESSES, obtainable from American National Standards Institute, 1430 Broadway, New York, NY 10018
7. AWS Standard A6.0, WELDING AND CUTTING CONTAINERS WHICH HAVE HELD COMBUSTIBLES, obtainable from American Welding Society, 550 N.W. LeJeune Rd, Miami, FL 33126
8. NFPA Standard 51, OXYGEN-FUEL GAS SYSTEMS FOR WELDING, CUTTING AND ALLIED PROCESSES, obtainable from the National Fire Protection Association, Batterymarch Park, Quincy, MA 02269
9. NFPA Standard 70, NATIONAL ELECTRICAL CODE, obtainable from the National Fire Protection Association, Batterymarch Park, Quincy, MA 02269
10. NFPA Standard 51B, CUTTING AND WELDING PROCESSES, obtainable from the National Fire Protection Association, Batterymarch Park, Quincy, MA 02269
11. CGA Pamphlet P-1, SAFE HANDLING OF COMPRESSED GASES IN CYLINDERS, obtainable from the Compressed Gas Association, 1235 Jefferson Davis Highway, Suite 501, Arlington, VA 22202
12. CSA Standard W117.2, CODE FOR SAFETY IN WELDING AND CUTTING, obtainable from the Canadian Standards Association, Standards Sales, 178 Rexdale Boulevard, Rexdale, Ontario, Canada M9W 1R3
13. NWSA booklet, WELDING SAFETY BIBLIOGRAPHY obtainable from the National Welding Supply Association, 1900 Arch Street, Philadelphia, PA 19103
14. American Welding Society Standard AWSF4.1, RECOMMENDED SAFE PRACTICES FOR THE PREPARATION FOR WELDING AND CUTTING OF CONTAINERS AND PIPING THAT HAVE HELD HAZARDOUS SUBSTANCES, obtainable from the American Welding Society, 550 N.W. LeJeune Rd, Miami, FL 33126
15. ANSI Standard Z88.2, PRACTICE FOR RESPIRATORY PROTECTION, obtainable from American National Standards Institute, 1430 Broadway, New York, NY 10018

## 1.04 Declaration of Conformity

Manufacturer: Thermal Dynamics Corporation  
Address: 82 Benning Street  
West Lebanon, New Hampshire 03784  
USA

The equipment described in this manual conforms to all applicable aspects and regulations of the 'Low Voltage Directive' (European Council Directive 73/23/EEC as amended by Council Directive 93/68/EEC) and to the National legislation for the enforcement of this Directive.

Serial numbers are unique with each individual piece of equipment and details description, parts used to manufacture a unit and date of manufacture.

### National Standard and Technical Specifications

The product is designed and manufactured to a number of standards and technical requirements. Among them are:

- \* CSA (Canadian Standards Association) standard C22.2 number 60 for Arc welding equipment.
- \* UL (Underwriters Laboratory) rating 94VO flammability testing for all printed-circuit boards used.
- \* ISO/IEC 60974-1 (BS 638-PT10) (EN 60 974-1) (EN50192) (EN50078) applicable to plasma cutting equipment and associated accessories.
- \* Extensive product design verification is conducted at the manufacturing facility as part of the routine design and manufacturing process. This is to ensure the product is safe, when used according to instructions in this manual and related industry standards, and performs as specified. Rigorous testing is incorporated into the manufacturing process to ensure the manufactured product meets or exceeds all design specifications.

Thermal Dynamics has been manufacturing products for more than 30 years, and will continue to achieve excellence in our area of manufacture.

Manufacturers responsible representative: Steve Ward  
Operations Director  
Thermadyne Europe  
Europa Building  
Chorley N Industrial Park  
Chorley, Lancashire,  
England PR6 7BX

## 1.05 Statement of Warranty

**LIMITED WARRANTY:** Thermal Dynamics® Corporation (hereinafter “Thermal”) warrants that its products will be free of defects in workmanship or material. Should any failure to conform to this warranty appear within the time period applicable to the Thermal products as stated below, Thermal shall, upon notification thereof and substantiation that the product has been stored, installed, operated, and maintained in accordance with Thermal’s specifications, instructions, recommendations and recognized standard industry practice, and not subject to misuse, repair, neglect, alteration, or accident, correct such defects by suitable repair or replacement, at Thermal’s sole option, of any components or parts of the product determined by Thermal to be defective.

**THIS WARRANTY IS EXCLUSIVE AND IS IN LIEU OF ANY WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE.**

**LIMITATION OF LIABILITY:** Thermal shall not under any circumstances be liable for special or consequential damages, such as, but not limited to, damage or loss of purchased or replacement goods, or claims of customers of distributor (hereinafter “Purchaser”) for service interruption. The remedies of the Purchaser set forth herein are exclusive and the liability of Thermal with respect to any contract, or anything done in connection therewith such as the performance or breach thereof, or from the manufacture, sale, delivery, resale, or use of any goods covered by or furnished by Thermal whether arising out of contract, negligence, strict tort, or under any warranty, or otherwise, shall not, except as expressly provided herein, exceed the price of the goods upon which such liability is based.

**THIS WARRANTY BECOMES INVALID IF REPLACEMENT PARTS OR ACCESSORIES ARE USED WHICH MAY IMPAIR THE SAFETY OR PERFORMANCE OF ANY THERMAL PRODUCT.**

**THIS WARRANTY IS INVALID IF THE PRODUCT IS SOLD BY NON-AUTHORIZED PERSONS.**

The limited warranty periods for Thermal products shall be as follows (with the exception of XL Plus Series, CutMaster Series, Cougar and DRAG-GUN): A maximum of three (3) years from date of sale to an authorized distributor and a maximum of two (2) years from date of sale by such distributor to the Purchaser, and with the further limitations on such two (2) year period (see chart below).

The limited warranty period for XL Plus Series and CutMaster Series shall be as follows: A maximum of four (4) years from date of sale to an authorized distributor and a maximum of three (3) years from date of sale by such distributor to the Purchaser, and with the further limitations on such three (3) year period (see chart below).

The limited warranty period for Cougar and DRAG-GUN shall be as follows: A maximum of two (2) years from date of sale to an authorized distributor and a maximum of one (1) year from date of sale by such distributor to the Purchaser, and with the further limitations on such two (2) year period (see chart below).

	Parts			
	XL Plus & CutMaster Series	Parts Cougar/Drag-Gun	Parts All Others	Labor
<b><u>PAK Units, Power Supplies</u></b>				
Main Power Magnetics	3 Years	1 Year	2 Years	1 Year
Original Main Power Rectifier	3 Years	1 Year	2 Years	1 Year
Control PC Board	3 Years	1 Year	2 Years	1 Year
All Other Circuits And Components Including, But Not Limited To, Starting Circuit, Contactors, Relays, Solenoids, Pumps, Power Switching Semi-Conductors	1 Year	1 Year	1 Year	1 Year
<b><u>Consoles, Control Equipment, Heat Exchanges, And Accessory Equipment</u></b>	1 Year		1 Year	1 Year
<b><u>Torch And Leads</u></b>				
Maximizer 300 Torch			1 Year	1 Year
SureLok Torches	1 Year		1 Year	1 Year
All Other Torches	180 Days	180 Days	180 Days	180 Days
<b><u>Repair/Replacement Parts</u></b>	90 Days	90 Days	90 Days	None

Warranty repairs or replacement claims under this limited warranty must be submitted by an authorized Thermal Dynamics® repair facility within thirty (30) days of the repair. No transportation costs of any kind will be paid under this warranty. Transportation charges to send products to an authorized warranty repair facility shall be the responsibility of the customer. All returned goods shall be at the customer’s risk and expense. This warranty supersedes all previous Thermal warranties.

Effective August 6, 2001



# SECTION 1: GENERAL INFORMATION

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Thermal Dynamics has been manufacturing products for more than 30 years, and will continue to achieve excellence in our area of manufacture.

Manufacturers responsible representative: Steve Ward  
Operations Director  
Thermadyne Europe  
Europa Building  
Chorley N Industrial Park  
Chorley, Lancashire,  
England PR6 7BX

## 1.05 Statement of Warranty

**LIMITED WARRANTY:** Thermal Dynamics® Corporation (hereinafter “Thermal”) warrants that its products will be free of defects in workmanship or material. Should any failure to conform to this warranty appear within the time period applicable to the Thermal products as stated below, Thermal shall, upon notification thereof and substantiation that the product has been stored, installed, operated, and maintained in accordance with Thermal’s specifications, instructions, recommendations and recognized standard industry practice, and not subject to misuse, repair, neglect, alteration, or accident, correct such defects by suitable repair or replacement, at Thermal’s sole option, of any components or parts of the product determined by Thermal to be defective.

**THIS WARRANTY IS EXCLUSIVE AND IS IN LIEU OF ANY WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE.**

**LIMITATION OF LIABILITY:** Thermal shall not under any circumstances be liable for special or consequential damages, such as, but not limited to, damage or loss of purchased or replacement goods, or claims of customers of distributor (hereinafter “Purchaser”) for service interruption. The remedies of the Purchaser set forth herein are exclusive and the liability of Thermal with respect to any contract, or anything done in connection therewith such as the performance or breach thereof, or from the manufacture, sale, delivery, resale, or use of any goods covered by or furnished by Thermal whether arising out of contract, negligence, strict tort, or under any warranty, or otherwise, shall not, except as expressly provided herein, exceed the price of the goods upon which such liability is based.

**THIS WARRANTY BECOMES INVALID IF REPLACEMENT PARTS OR ACCESSORIES ARE USED WHICH MAY IMPAIR THE SAFETY OR PERFORMANCE OF ANY THERMAL PRODUCT.**

**THIS WARRANTY IS INVALID IF THE PRODUCT IS SOLD BY NON-AUTHORIZED PERSONS.**

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	Parts			
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Original Main Power Rectifier	3 Years	1 Year	2 Years	1 Year
Control PC Board	3 Years	1 Year	2 Years	1 Year
All Other Circuits And Components Including, But Not Limited To, Starting Circuit, Contactors, Relays, Solenoids, Pumps, Power Switching Semi-Conductors	1 Year	1 Year	1 Year	1 Year
<b><u>Consoles, Control Equipment, Heat Exchanges, And Accessory Equipment</u></b>	1 Year		1 Year	1 Year
<b><u>Torch And Leads</u></b>				
Maximizer 300 Torch			1 Year	1 Year
SureLok Torches	1 Year		1 Year	1 Year
All Other Torches	180 Days	180 Days	180 Days	180 Days
<b><u>Repair/Replacement Parts</u></b>	90 Days	90 Days	90 Days	None

Warranty repairs or replacement claims under this limited warranty must be submitted by an authorized Thermal Dynamics® repair facility within thirty (30) days of the repair. No transportation costs of any kind will be paid under this warranty. Transportation charges to send products to an authorized warranty repair facility shall be the responsibility of the customer. All returned goods shall be at the customer’s risk and expense. This warranty supersedes all previous Thermal warranties.

Effective August 6, 2001



## SECTION 2: INTRODUCTION

### 2.01 Scope of Manual

This manual contains descriptions, operating instructions and maintenance procedures for the 1Torch Models SL60 and SL100 Plasma Cutting Torches. Service of this equipment is restricted to properly trained personnel; unqualified personnel are strictly cautioned against attempting repairs or adjustments not covered in this manual, at the risk of voiding the Warranty.

Read this manual thoroughly. A complete understanding of the characteristics and capabilities of this equipment will assure the dependable operation for which it was designed.

### 2.02 General Description

Plasma torches are similar in design to the automotive spark plug. They consist of negative and positive sections separated by a center insulator. Inside the torch, the pilot arc starts in the gap between the negatively charged electrode and the positively charged tip. Once the pilot arc has ionized the plasma gas, the superheated column of gas flows through the small orifice in the torch tip, which is focused on the metal to be cut.

A single torch lead provides gas from a single source to be used as both the plasma and secondary gas. The air flow is divided inside the torch head. Single - gas operation provides a smaller sized torch and inexpensive operation.

#### NOTE

Refer to Section 2.05, *Introduction To Plasma*, for a more detailed description of plasma torch operation.

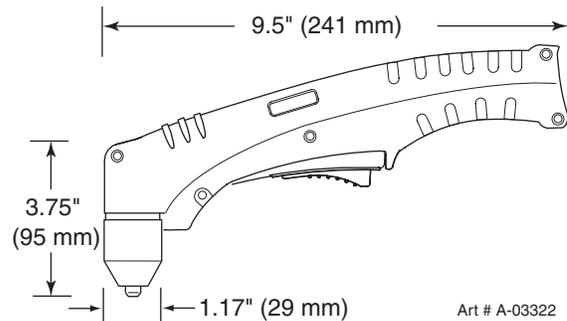
Refer to the Appendix Pages for additional specifications as related to the Power Supply used.

## 2.03 Specifications

### A. Torch Configurations

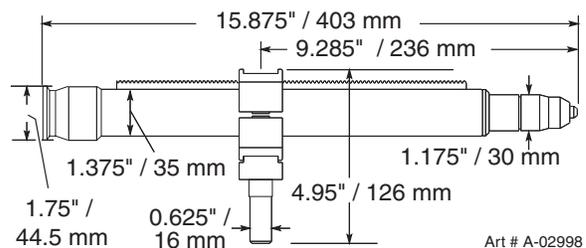
#### 1. Hand Torch, Models SL60 and SL100

The hand torch head is at 75° to the torch handle. The hand torches include a torch handle and torch trigger assembly.



#### 2. Machine Torch, Model SL100

The standard machine torch has a positioning tube with rack & pinch block assembly.



### B. Torch Leads Lengths

**Hand Torches** are available as follows:

- 20 ft / 6.1 m, with O2B or ATC connectors
- 50 ft / 15.2 m, with O2B or ATC connectors

**Machine Torches** are available as follows:

- 5 foot / 1.5 m, with ATC connectors
- 10 foot / 3.05 m, with ATC connectors
- 25 foot / 7.6 m, with O2B or ATC connectors
- 50 foot / 15.2 m, with O2B or ATC connectors

### C. Torch Parts

Starter Cartridge, Electrode, Tip, Shield Cup

### D. Parts - In - Place (PIP)

Torch Head has built - in switch

12 vdc circuit rating

## E. Type Cooling

Combination of ambient air and gas stream through torch.

## F. Torch Ratings

SL60 Torch Ratings	
Ambient Temperature	104° F 40° C
Duty Cycle	100% @ 60 Amps @ 400 scfh
Maximum Current	60 Amps
Voltage (V <sub>peak</sub> )	500V
Arc Striking Voltage	7kV

SL100 Torch Ratings	
Ambient Temperature	104° F 40° C
Duty Cycle	100% @ 100 Amps @ 400 scfh
Maximum Current	100 Amps
Voltage (V <sub>peak</sub> )	500V
Arc Striking Voltage	7kV

## G. Current Ratings

Current Ratings	
SL60 Torch & Leads	Up to 60 Amps, DC, Straight Polarity
SL100 Torch & Leads	Up to 100 Amps, DC, Straight Polarity



**WARNING**

Maximum current is 60 Amps for SL60 Torches, or 100 Amps for SL100 Torches. Operation of this torch at higher outputs may damage the torch, the leads, the components, or the Power Supply. DO NOT operate the SL60 torch at more than 60 Amps, or the SL100 at more than 100 Amps.

**NOTE**

Power Supply characteristics will determine material thickness range.

## H. Gas Requirements

SL60 and SL100 Torch Gas Specifications	
Gas (Plasma and Secondary)	Compressed Air
Operating Pressure <i>Refer to NOTE</i>	60 - 75 psi 4.1 - 5.2 bar
Maximum Input Pressure	125 psi / 8.6 bar
Gas Flow (Cutting and Gouging)	300 - 500 scfh 142 - 235 lpm



**WARNING**

*This torch is not to be used with oxygen (O<sub>2</sub>).*

**NOTE**

*Operating pressure varies with torch model, operating amperage, and torch leads length. Refer to gas pressure settings charts for each model.*

## I. Direct Contact Hazard

For exposed tip the recommended standoff is 3/16 inches / 4.7 mm.

## J. Plasma Power Supply Used With

- CutMaster 50
- CutMaster 51
- CutMaster 75
- CutMaster 81
- CutMaster 100
- CutMaster 101
- CutMaster 151
- PakMaster 50XL Plus
- PakMaster 75XL Plus
- PakMaster 100XL Plus

**NOTE**

*Refer to the Appendix Pages for additional specifications as related to the Power Supply used.*

## 2.04 Options And Accessories

These items can adapt a standard system to a particular application or further enhance performance (refer to Section 6 for ordering information).

- Spare Parts Kits - Various kits containing replacement consumable torch parts.
- Deluxe Cutting Guide Kit - Easy add - on attachments for precise straight line, circle cutting, and beveling. Includes carrying case.
- Trigger Guard Kits (for hand torches) - These offer additional protection from accidental activation of the torch switch.
- 1 - 3/8" Mounting Tube (for machine torches)
- Pinion Assembly (for machine torches)
- Computer Control (CNC) Cable 25 Ft / 7.6 m or 50 Ft / 15.2 m (for machine torches)
- Remote Pendant Control Assembly - for machine torch applications. Hand Pendant Control has 20 ft. (6.1 m) cable which provides ON & OFF signals to the Power Supply.
- Extension Cable for Hand Pendant Control - 25 ft / 7.6 m cable which can be added to the Hand Pendant Control cable to provide a total control cable length of 50 ft / 15.2 m.
- Leads Extensions for torches with ATC connectors
- Leather Leads Covers

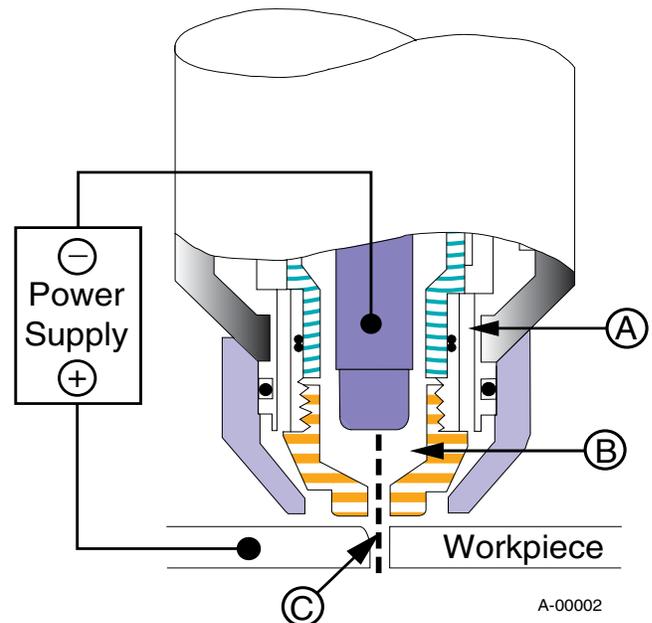
## 2.05 Introduction to Plasma

### A. Plasma Gas Flow

Plasma is a gas which has been heated to an extremely high temperature and ionized so that it becomes electrically conductive. The plasma arc cutting and gouging processes use this plasma to transfer an electrical arc to the workpiece. The metal to be cut or removed is melted by the heat of the arc and then blown away.

While the goal of plasma arc cutting is separation of the material, plasma arc gouging is used to remove metals to a controlled depth and width.

In a Plasma Cutting Torch a cool gas enters Zone B, where a pilot arc between the electrode and the torch tip heats and ionizes the gas. The main cutting arc then transfers to the workpiece through the column of plasma gas in Zone C.



Typical Torch Head Detail

By forcing the plasma gas and electric arc through a small orifice, the torch delivers a high concentration of heat to a small area. The stiff, constricted plasma arc is shown in Zone C. Direct current (DC) straight polarity is used for plasma cutting, as shown in the illustration.

Zone A channels a secondary gas that cools the torch. This gas also assists the high velocity plasma gas in blowing the molten metal out of the cut allowing for a fast, slag - free cut.

## B. Gas Distribution

The single gas used is internally split into plasma and secondary gases.

The plasma gas flows into the torch through the negative lead, through the starter cartridge, around the electrode, and out through the tip orifice.

The secondary gas flows down around the outside of the torch starter cartridge, and out between the tip and shield cup around the plasma arc.

## C. Pilot Arc

When the torch is started a pilot arc is established between the electrode and cutting tip. This pilot arc creates a path for the main arc to transfer to the work.

## D. Capacitive Discharge

Because direct current (DC) alone is not sufficient to strike and maintain the pilot arc, capacitive discharge is also used. The high voltage jumps between the tip and electrode with the DC following.

### NOTE

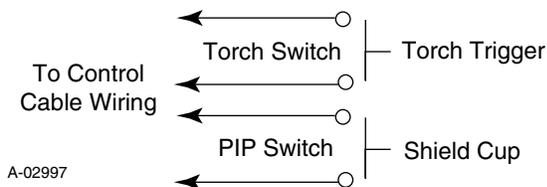
*Not all power supplies have this feature.*

## E. Main Cutting Arc

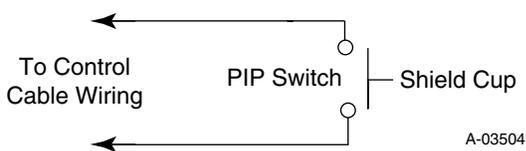
DC power is also used for the main cutting arc. The negative output is connected to the torch electrode through the torch lead. The positive output is connected to the workpiece via the work cable and to the torch through a pilot wire.

## F. Parts - In - Place (PIP)

The torch includes a 'Parts - In - Place' (PIP) circuit. When the shield cup is properly installed, it closes a switch. The torch will not operate if this switch is open.



Parts - In - Place Circuit Diagram for Hand Torch



Parts - In - Place Circuit Diagram for Machine Torch

## SECTION 3: INSTALLATION

### 3.01 Introduction

This section describes installation of the Torch. These instructions apply to the Torch and Leads Assemblies only; installation procedures for the Power Supply, Options and Accessories are given in Manuals specifically provided for those parts.

The complete installation consists of:

- Site Selection
- Unpacking
- Setting Up Torch
- Connecting Torch
- Gas Connection

### 3.02 Site Location

Select a clean, dry location with good ventilation and adequate working space around all components.

Review the safety precautions in the front of this manual to be sure that the location meets all safety requirements.

### 3.03 Unpacking

Each component of the system is packaged and protected with a carton and packing material to prevent damage during shipping.

1. Unpack each item and remove all packing material.
2. Locate the packing list and use the list to identify and account for each item.
3. Inspect each item for possible shipping damage. If damage is evident, contact your distributor and / or shipping company before proceeding with system installation.

### 3.04 Setting Up Hand Torch

The hand torch requires no special set up. The proper torch parts (shield cup, tip, starter cartridge, and electrode) must be installed for the type of operation. Refer to Section 4.04, Torch Parts Selection for details.

### 3.05 Setting Up Machine Torch

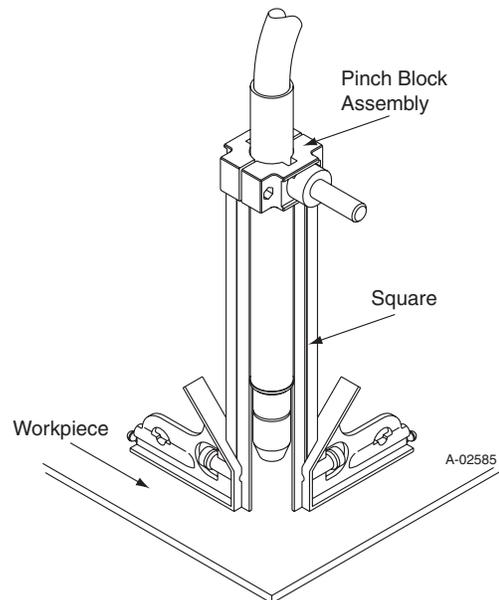


**WARNING**

*Disconnect primary power at the source before disassembling the torch or torch leads.*

The machine torch includes a positioning tube with rack and pinch block assembly.

1. Mount the torch assembly on the cutting table.
2. To obtain a clean vertical cut, use a square to align the torch perpendicular to the surface of the workpiece.



Machine Torch Set - Up

3. The proper torch parts (shield cup, tip, starter cartridge, and electrode) must be installed for the type of operation. Refer to Section 4.04, Torch Parts Selection for details.

### 3.06 Connecting Torch

The Torch Leads must be properly connected to the Power Supply for proper operation. If the torch leads or ATC Adapter were not factory - installed, make all torch connections as required.

The instructions for connecting the Torch Leads to the Power Supply vary depending on the type of leads connections. This sub - section covers connecting the Torch for the following applications:

- A. Hand Systems
- B. Mechanized Machine Torch Systems with ATC Connectors
- C. Mechanized Machine Torch Systems with O2B Connectors
- D. Remote Pendant Control (Optional)
- E. Automated Machine Torch Systems with ATC Connectors
- F. Automated Machine Torch Systems with O2B Connectors

#### A. Hand Systems

Torches with ATC connectors connect either to an ATC Adapter which connects to the power supply bulkhead, or to an ATC Receptacle which mounts to the power supply front panel.

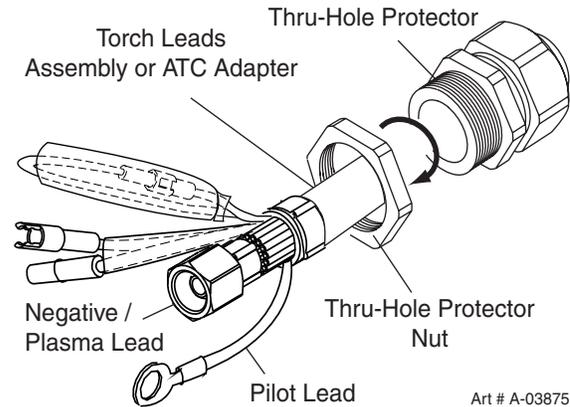
Torches with O2B fittings connect directly to the power supply bulkhead. The connections to the bulkhead are the same in both applications.

Follow Steps 1-8 to install either an ATC Adapter or a torch with O2B fittings. Follow Step 9 to connect a torch with an ATC connector to the ATC Adapter or to the panel-mounted ATC receptacle.



*Disconnect primary power at the source before disassembling the torch or torch leads.*

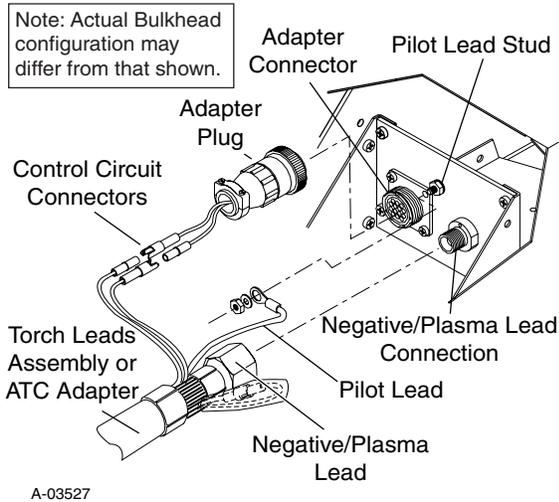
1. Remove the retaining nut from the Through - Hole protector.



#### Through - Hole Protector Nut Removal

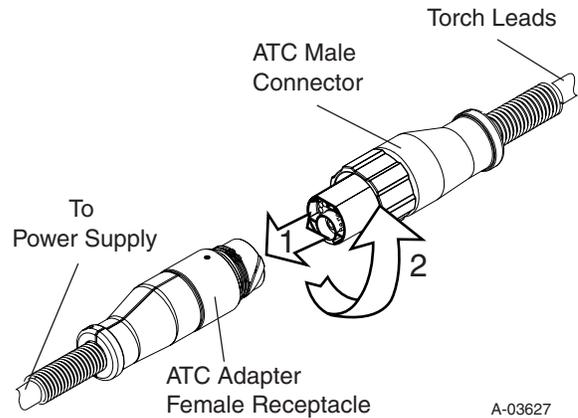
2. Fit the torch leads or ATC Adapter end and the Through - Hole protector into the hole in the unit.

- Secure the Through - Hole protector with the retaining nut removed earlier.
- Connect the torch leads or ATC Adapter Negative / Plasma Lead to the bulkhead connection inside the Power Supply as shown.

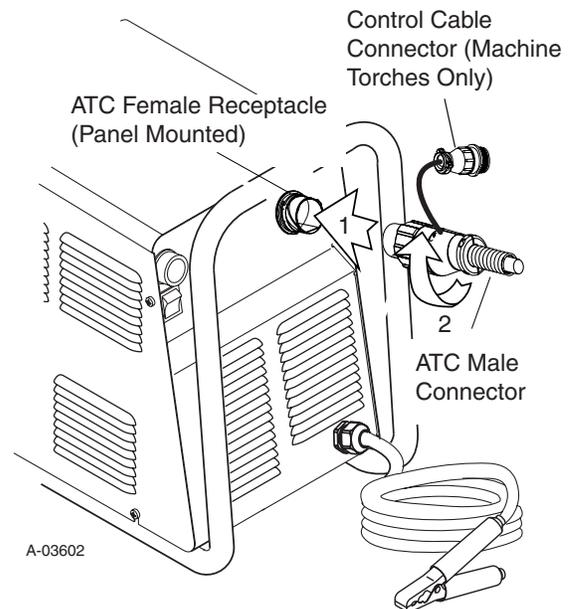


#### Bulkhead Connections - ATC Adapter or Hand Torch Leads with O2B Fittings

- The Leads or ATC Adapter Assembly includes two wires joined with mating connectors and covered with an insulating sleeve. These wires must remain joined and insulated. Connect the remaining torch leads connectors to the mating connectors on the Power Supply Adapter.
- Remove the top nut and washer from the Pilot Stud.
- Connect the pilot lead terminal to the stud and secure with the nut and washer removed in the above Step.
- Tighten the Through - Hole protector onto the Torch Leads or ATC Adapter Leads Assembly.
- For torches with the ATC Connector**, align the torch leads male connector with the ATC female receptacle. Push the male connector into the female receptacle. The connectors should push together with a very small amount of pressure. Secure the connection by turning the locking nut clockwise until it stops. **DO NOT** use the locking nut to pull the connection together. Do not use tools to secure the connection.



Torch Connection - Torch Leads with ATC Male Connector, Power Supply with ATC Adapter



Torch Connection - Torch Leads with ATC Male Connector, Power Supply with Panel-Mounted ATC Receptacle

- Check the torch for proper consumable parts.

#### CAUTION

The torch parts must correspond with the type of operation. Refer to Section 4.04, Torch Parts Selection.

## B. Mechanized Machine Torch Systems - Torches with ATC Connectors

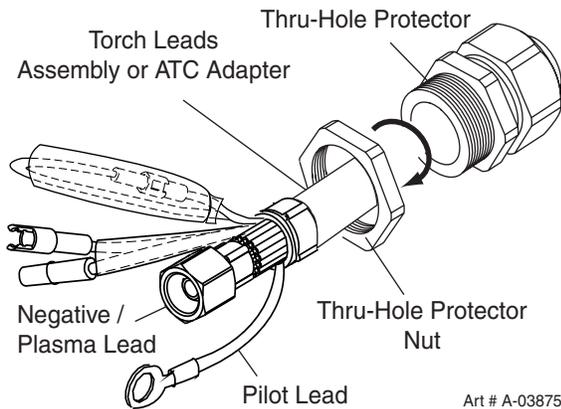
Torches with ATC connectors connect either to an ATC Adapter which connects to the power supply bulkhead, or to a panel-mounted ATC Receptacle. Mechanized torch leads with ATC connectors include a control cable connector to accept a remote pendant.



### WARNING

*Disconnect primary power at the source before disassembling the torch or torch leads.*

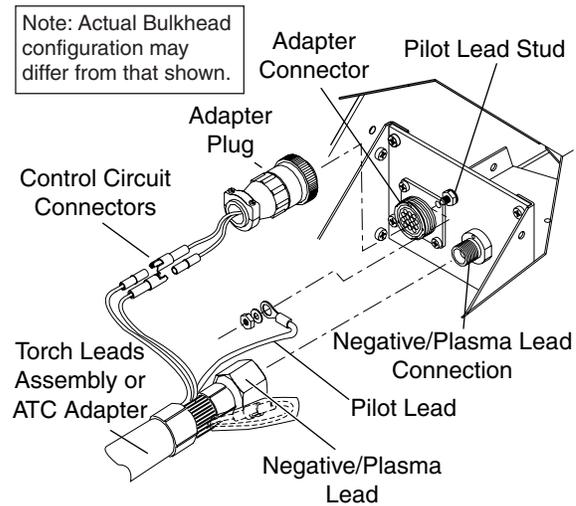
1. Remove the Through - Hole protector Nut from the Through - Hole protector.



### Through - Hole Protector Nut Removal

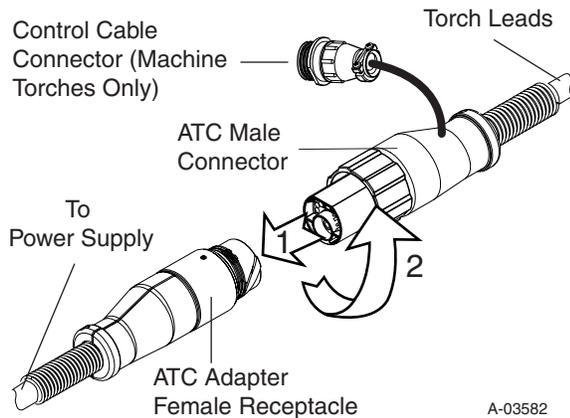
2. The ATC Adapter Assembly includes two wires joined with mating connectors and covered with an insulating sleeve. These wires must remain joined and insulated.
3. Connect the ATC Adapter as follows:
  - a. Feed the end of the adapter lead and the Through - Hole protector into the hole in the unit
  - b. Tighten the Through - Hole protector Nut to secure the Through - Hole protector to the Power Supply.
4. Connect the Adapter Negative / Plasma Lead to the bulkhead connection inside the Power Supply.

5. Connect the Control Circuit Connectors on the ATC Adapter to the mating connectors on the Power Supply Adapter.

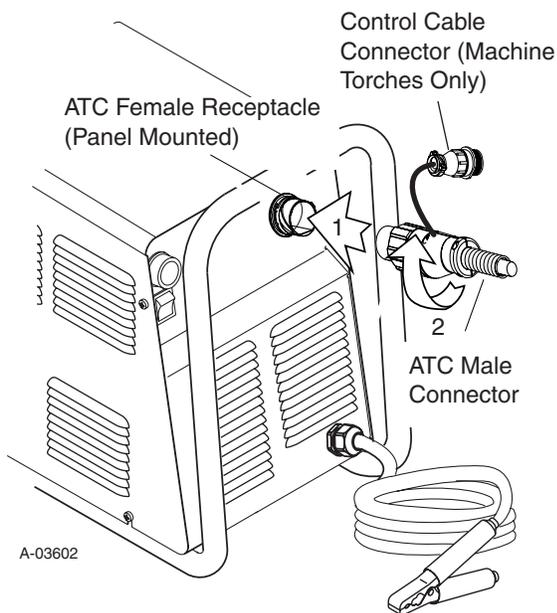


6. Remove the top nut and washer from the Pilot Stud on the power supply bulkhead.
7. Place the ATC Adapter Pilot lead terminal on onto the stud and secure with the nut and washer removed in the above Step.
8. Tighten the Through - Hole protector onto the ATC Adapter leads.
9. Connect the torch leads male connector to the ATC female receptacle. The connectors should push together with a very small amount of pressure. Secure the connection by turning the locking nut clockwise until it stops. **DO NOT** use the locking nut to pull the connection together. Do not use tools to secure the connections.

- Connect the remote pendant adapter to the Remote Control Cable Connector.



Torch Connection - Torch Leads with ATC Male Connector, Power Supply with ATC Adapter



Torch Connection - Torch Leads with ATC Male Connector, Power Supply with Panel-Mounted ATC Receptacle

- Check the torch for proper consumable parts.

**CAUTION**

The torch parts must correspond with the type of operation. Refer to Section 4.04, Torch Parts Selection.

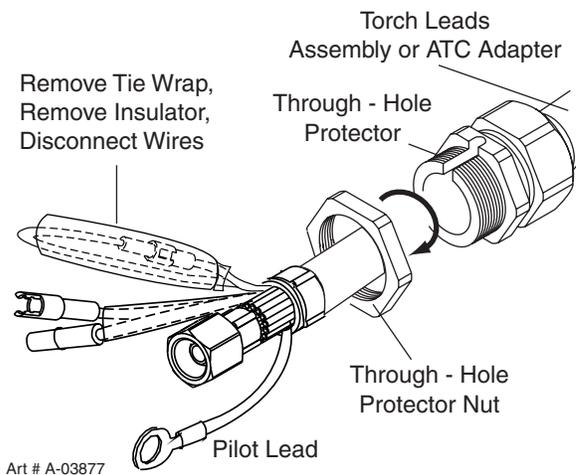
## C. Mechanized Machine Torch Systems - Torches with O2B Connectors

Torches with O2B connectors connect directly to the power supply bulkhead. Mechanized torch leads with O2B connectors require a remote pendant adapter to accept a remote pendant.



Disconnect primary power at the source before disassembling the torch or torch leads.

- Remove the Through - Hole protector Nut from the Through - Hole protector.



### Through - Hole Protector Nut Removal

- The leads Assembly includes two wires joined with mating connectors and covered with an insulating sleeve. Remove the tie wrap and insulating sleeve. Disconnect the two joined wires.
- Feed the end of the torch leads and the Through - Hole protector into the hole in the unit.
- Route the wire harness on the Remote Pendant Adapter through the Through - Hole protector and Through - Hole protector Nut. Tighten the Through - Hole protector Nut to secure the Through - Hole protector to the Power Supply.
- Connect the Negative / Plasma lead to the bulkhead connection inside the power supply.

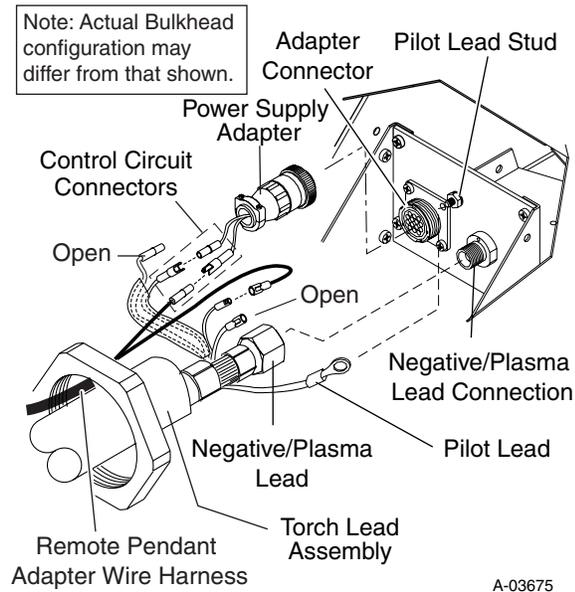
- Connect the control circuit connectors on the Torch Leads to the mating connectors on the Remote Pendant Adapter and Power Supply Adapter (see Warning).



**WARNING**

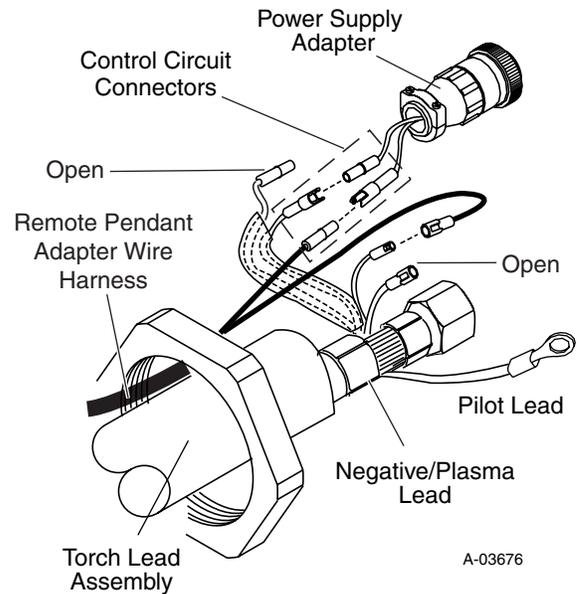
*There are two additional connectors that are not used and must be taped out of the way to prevent contacting the Negative / Plasma or Pilot Leads.*

- Remove the top nut and washer from the Pilot Stud on the power supply bulkhead.
- Place the Torch Leads Pilot lead terminal on onto the stud and secure with the nut and washer removed in the above Step.



Bulkhead Connection - Unshielded Machine Torch with O2B Fittings and Remote Pendant Adapter

- Connect the Torch Leads connectors and the remote pendant adapter connector to the power supply adapter as shown.



Bulkhead Connection Detail - Unshielded Machine Torch with O2B Fittings and Remote Pendant Adapter

- Tighten the Through - Hole protector onto the Torch Leads or ATC Adapter Leads Assembly.
- Connect the remote pendant to the remote pendant adapter.
- Check the torch for proper consumable parts.

**CAUTION**

*The torch parts must correspond with the type of operation. Refer to Section 4.04, Torch Parts Selection.*

**D. Remote Pendant Control (Optional)**

In mechanized applications an Adapter connects the remote pendant control to the Power Supply.

Connect the remote pendant control cable to the torch leads by aligning the control cable connector with the adapter on the torch leads. Press the connector into the adapter. Turn the locking ring to secure the connection.

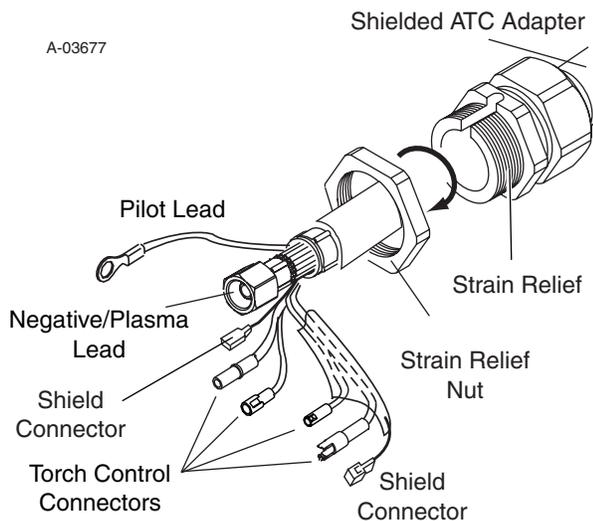
## E. Automated Machine Torch Systems with ATC Connectors

Torches with shielded leads and ATC connectors connect to a shielded ATC Adapter which connects to the power supply bulkhead.



### WARNING

*Disconnect primary power at the source before disassembling the torch or torch leads.*



### Through - Hole protector Nut Removal

1. Remove the Through - Hole protector Nut from the Through - Hole protector. Inside the Power Supply Bulkhead area, route the connectors on the free end of the Adapter through the Through - Hole protector Nut.
2. Fit the ATC Adapter end and the Through - Hole protector into the hole in the unit.
3. Secure the Through - Hole protector with the retaining nut removed earlier.
4. Connect the ATC Adapter Negative / Plasma Lead to the bulkhead connection inside the Power Supply.
5. Remove the top nut and washer from the Pilot Stud.
6. Connect the pilot lead terminal to the stud and secure with the nut and washer removed previously.

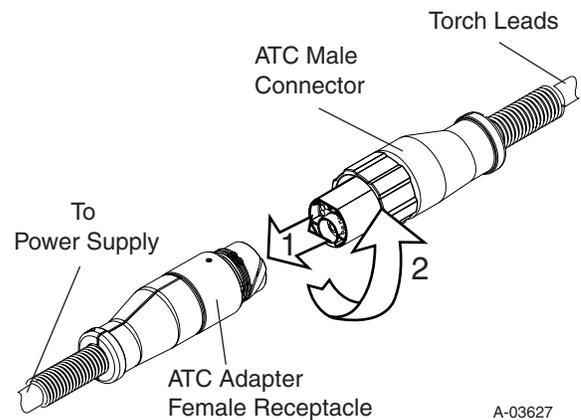
7. Connect the ATC Adapter connectors to the power supply adapter.



### WARNING

*The Shielded ATC Adapter includes two connectors that are not used and must be taped out of the way to prevent contacting the Negative / Plasma or Pilot Leads.*

8. Tighten the Through - Hole protector onto the ATC Adapter leads.
9. Connect the torch leads male connector to the ATC female receptacle. The connectors should push together with a very small amount of pressure. Secure the connection by turning the locking nut clockwise until it stops. **DO NOT** use the locking nut to pull the connection together. Do not use tools to secure the connections.



### Torch Connection - Torch Leads with ATC Male Connector, Power Supply with ATC Adapter

10. Check the torch for proper consumable parts.

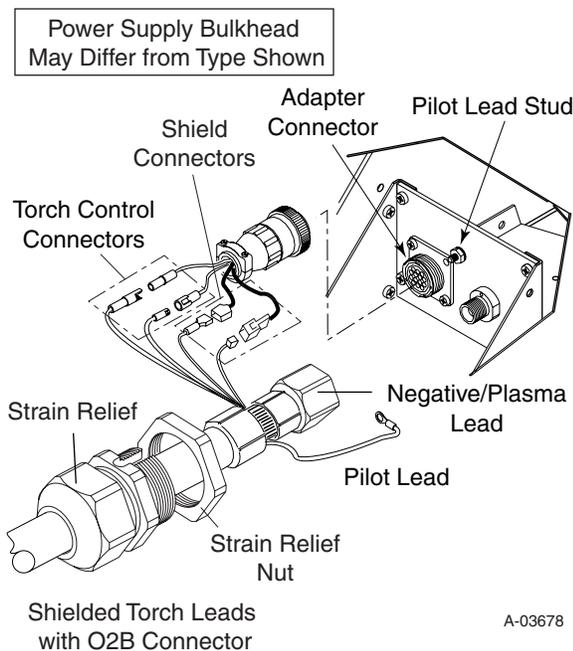
### CAUTION

*The torch parts must correspond with the type of operation. Refer to Section 4.04, Torch Parts Selection.*

## F. Automated Machine Torch Systems with O2B Connectors

Torches with shielded leads and O2B connectors connect directly to the power supply bulkhead.

1. Remove the Through - Hole protector Nut from the Through - Hole protector. Inside the Power Supply Bulkhead area, route the connectors on the free end of the torch leads through the Through - Hole protector Nut.
2. Fit the leads ends and the Through - Hole protector into the hole in the unit.
3. Secure the Through - Hole protector with the retaining nut removed earlier.
4. Connect the Negative / Plasma Lead to the bulkhead connection inside the Power Supply.
5. Remove the top nut and washer from the Pilot Stud.
6. Connect the pilot lead terminal to the stud and secure with the nut and washer removed previously.
7. Connect the connectors to the power supply adapter as shown.



Bulkhead Connections - Shielded Machine Torch Leads with O2B Connectors

8. Tighten the Through - Hole protector onto the ATC Adapter leads.
9. Check the torch for proper consumable parts.

### CAUTION

*The torch parts must correspond with the type of operation. Refer to Section 4.04, Torch Parts Selection.*

## 3.07 Gas Connection

### A. Connection

Connect the gas, compressed air only, to the Power Supply as described in the Power Supply Manual.

### CAUTION

*Air supply must be free of oil, moisture, and other contaminants. Excessive oil and moisture may cause double - arcing, rapid tip wear, or even complete torch failure. Contaminants may cause poor cutting performance and rapid electrode wear.*

### B. Checking Air Quality

To test the quality of air, place a welding filter lens in front of the torch and turn on the gas. Any oil or moisture in the air will be visible on the lens. Do not initiate an arc!

### C. Filtering

An in - line pneumatic dryer & evaporator type air filter, capable of filtering to at least 5 microns, is required when using air from a compressor. This type filter will insure that moisture, oil, dirt, chips, rust particles, and other contaminants from the supply hose do not enter the torch. For highly automated applications, a refrigerated drier may be used.

# SECTION 4: OPERATION

---

## 4.01 Introduction

This section provides a description of the SL60 and SL100 Torch Assemblies followed by operating procedures.

## 4.02 Functional Overview

The Torch is designed to operate with various Power Supplies to provide a plasma cutting system which can cut most metals. With gouging torch parts the torch can be used for plasma arc gouging.

---

### NOTE

*Refer to Appendix Pages for additional information as related to the Power Supply used.*

## 4.03 Getting Started

Follow this procedure at the beginning of each shift:



### WARNING

---

*Disconnect primary power at the source before assembling or disassembling power supply, torch parts, or torch and leads assemblies.*

---

### A. Torch Parts

Check the torch for proper assembly. Install proper torch parts for the desired application (refer to Section 4.04, Torch Parts Selection).

### B. Input Power

Check the power source for proper input voltage. Close main disconnect switch or plug unit in to supply primary power to the system.

### C. Work Cable

Check for a solid cable connection to the workpiece.

### D. Gas Supply

Select desired single gas supply. Make sure gas sources meet requirements (see Note). Check connections and turn gas supply on.

---

### NOTE

*Refer to Appendix Pages for additional information as related to the Power Supply used.*

### E. Power On

Place the ON - OFF Switch on the Power Supply to the ON position. If the RUN - SET - LATCH, RUN - SET or RUN - RAPID AUTO RESTART - SET Switch is in SET position, gas will flow. If the switch is in RUN position there will be no gas flow.

### F. RUN - SET - LATCH , RUN - SET or RUN - RAPID AUTO RESTART Switch

If the RUN - SET - LATCH, RUN - SET or RUN - RAPID AUTO RESTART - SET switch is in SET position, gas will flow. If the switch is in RUN position there will be no gas flow.

### G. Current Output Level

At the Power Supply, set the desired current output level. For drag cutting set the control at 40 amps or less only.



### WARNING

---

*Maximum current is 60 Amps for SL60 Torches, or 100 Amps for SL100 Torches. Operation of this torch at higher outputs may damage the torch, the leads, the components, or the Power Supply. DO NOT operate the SL60 torch at more than 60 Amps, or the SL100 torch at more than 100 Amps.*

---

### H. Pressure Settings

Place the RUN - SET - LATCH, RUN - SET or RUN - RAPID AUTO RESTART - SET switch to the SET position. Adjust the gas pressure control on the Power Supply for the proper gas pressure. Refer to Appendix Pages for gas pressure and other specifics.

### I. Ready for Operation

Return the RUN - SET - LATCH, RUN - SET or RUN - RAPID AUTO RESTART - SET switch to RUN position.

---

### NOTES

*For general cutting, use the RUN position which provides normal torch operation where the torch switch must be held throughout the main arc transfer.*

*For specific applications, use the LATCH position where the torch switch can be released after the main arc transfer. The torch remains activated until the main arc breaks from the workpiece.*

*Refer to Appendix 1 for a typical detailed block diagram of Sequence of Operation.*

The system is now ready for operation.

## 4.04 Torch Parts Selection

Depending on the type of operation to be done determines the torch parts to be used.

### Type of operation:

Drag cutting, standoff cutting or gouging

### Torch parts:

Shield Cup, Cutting Tip, Electrode and Starter Cartridge

#### NOTE

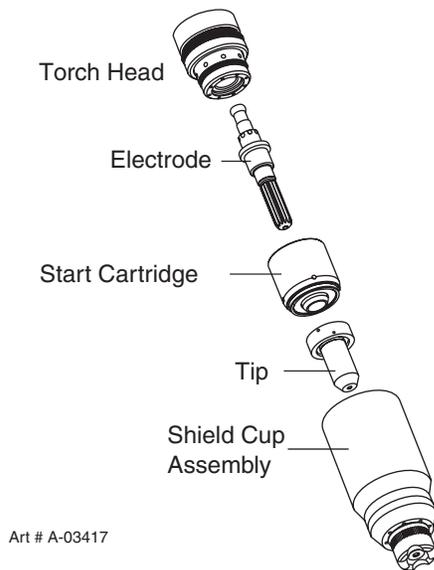
Refer to Section 6 and the Appendix Pages for additional information on torch parts.

Change the torch parts for a different operation as follows:

#### NOTE

The shield cup holds the tip and starter cartridge in place. Position the torch with the shield cup facing upward to keep these parts from falling out when the cup is removed.

1. Unscrew and remove the shield cup assembly from the torch head.
2. Remove the Electrode by pulling it straight out of the Torch Head.



Torch Parts (Drag Shield Cap & Shield Cup Body Shown)

3. Install the replacement Electrode by pushing it straight into the torch head until it clicks.
4. Install the starter cartridge and desired tip for the operation into the torch head.
5. Hand tighten the shield cup assembly until it is seated on the torch head. If resistance is felt when installing the cup, check the threads before proceeding.

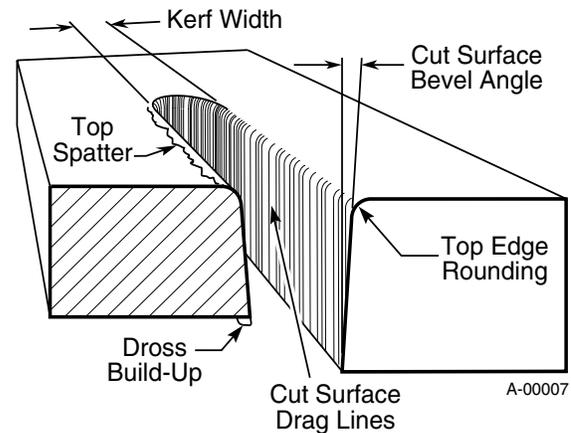
## 4.05 Cut Quality

#### NOTES

Cut quality depends heavily on setup and parameters such as torch standoff, alignment with the workpiece, cutting speed, gas pressures, and operator ability.

Refer to Appendix Pages for additional information as related to the Power Supply used.

Cut quality requirements differ depending on application. For instance, nitride build - up and bevel angle may be major factors when the surface will be welded after cutting. Dross - free cutting is important when finish cut quality is desired to avoid a secondary cleaning operation. The following cut quality characteristics are illustrated in the following figure:



Cut Quality Characteristics

### A. Cut Surface

The desired or specified condition (smooth or rough) of the face of the cut.

### B. Nitride Build - Up

Nitride deposits can be left on the surface of the cut when nitrogen is present in the plasma gas stream. These buildups may create difficulties if the material is to be welded after the cutting process.

### C. Bevel Angle

The angle between the surface of the cut edge and a plane perpendicular to the surface of the plate. A perfectly perpendicular cut would result in a 0° bevel angle.

### D. Top - Edge Rounding

Rounding on the top edge of a cut due to wearing from the initial contact of the plasma arc on the workpiece.

### E. Bottom Dross Buildup

Molten material which is not blown out of the cut area and resolidifies on the plate. Excessive dross may require secondary cleanup operations after cutting.

### F. Kerf Width

The width of the cut (or the width of material removed during the cut).

### G. Top Spatter (Dross)

Top spatter or dross on the top of the cut caused by slow travel speed, excess cutting height, or cutting tip whose orifice has become elongated.

## 4.06 General Cutting Information



### WARNINGS

Disconnect primary power at the source before disassembling the power supply, torch, or torch leads.

Frequently review the Important Safety Precautions at the front of this manual. Be sure the operator is equipped with proper gloves, clothing, eye and ear protection. Make sure no part of the operator's body comes into contact with the workpiece while the torch is activated.

### CAUTION

Sparks from the cutting process can cause damage to coated, painted, and other surfaces such as glass, plastic and metal.

### NOTE

Handle torch leads with care and protect them from damage.

### A. Piloting

Piloting is harder on parts life than actual cutting because the pilot arc is directed from the electrode to the tip rather than to a workpiece. Whenever possible, avoid excessive pilot arc time to improve parts life.

### B. Torch Standoff

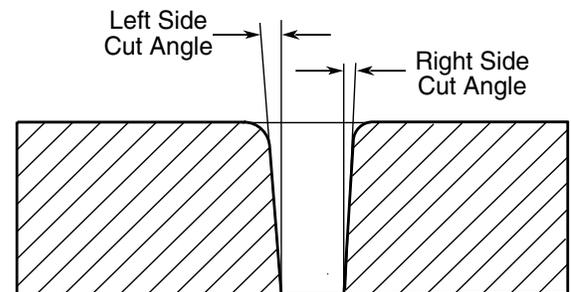
Improper standoff (the distance between the torch tip and workpiece) can adversely affect tip life as well as shield cup life. Standoff may also significantly affect the bevel angle. Reducing standoff will generally result in a more square cut.

### C. Edge Starting

For edge starts, hold the torch perpendicular to the workpiece with the front of the tip near (not touching) the edge of the workpiece at the point where the cut is to start. When starting at the edge of the plate, do not pause at the edge and force the arc to "reach" for the edge of the metal. Establish the cutting arc as quickly as possible.

### D. Direction of Cut

In the torches, the plasma gas stream swirls as it leaves the torch to maintain a smooth column of gas. This swirl effect results in one side of a cut being more square than the other. Viewed along the direction of travel, the right side of the cut is more square than the left.



Side Characteristics Of Cut

To make a square-edged cut along an inside diameter of a circle, the torch should move counterclockwise around the circle. To keep the square edge along an outside diameter cut, the torch should travel in a clockwise direction.

## E. Dross

When dross is present on carbon steel, it is commonly referred to as either "high speed, slow speed, or top dross". Dross present on top of the plate is normally caused by too great a torch to plate distance. "Top dross" is normally very easy to remove and can often be wiped off with a welding glove. "Slow speed dross" is normally present on the bottom edge of the plate. It can vary from a light to heavy bead, but does not adhere tightly to the cut edge, and can be easily scraped off. "High speed dross" usually forms a narrow bead along the bottom of the cut edge and is very difficult to remove. When cutting a troublesome steel, it is sometimes useful to reduce the cutting speed to produce "slow speed dross". Any resultant cleanup can be accomplished by scraping, not grinding.

## 4.07 Hand Torch Operation

### A. Standoff Cutting With Hand Torch

#### NOTE

*For best performance and parts life, always use the correct parts for the type of operation.*

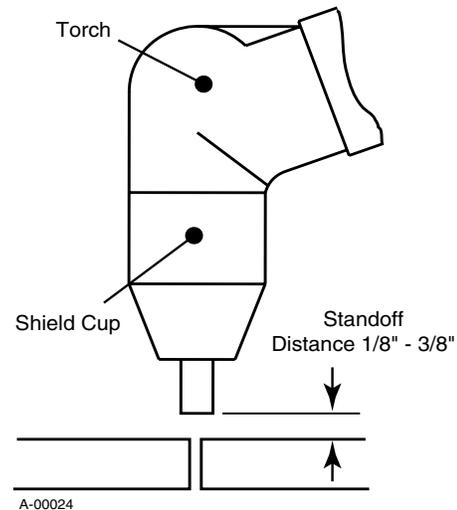
1. The torch can be comfortably held in one hand or steadied with two hands. Position the hand to press the Trigger on the torch handle. With the hand torch, the hand may be positioned close to the torch head for maximum control or near the back end for maximum heat protection. Choose the holding technique that feels most comfortable and allows good control and movement.

#### NOTE

*The tip should never come in contact with the workpiece except during drag cutting operations.*

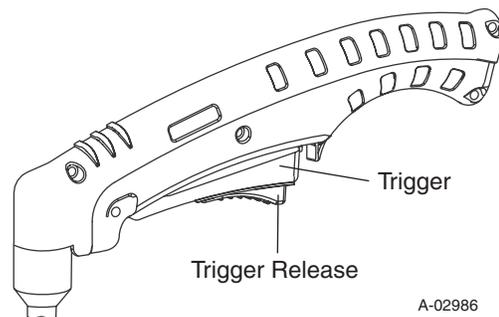
2. Depending on the cutting operation, do one of the following:

- a. For **edge starts**, hold the torch perpendicular to the workpiece with the front of the tip on the edge of the workpiece at the point where the cut is to start.
- b. For **standoff cutting**, hold the torch  $1/8$  -  $3/8$  in (3-9 mm) from the workpiece as shown below.



Standoff Distance

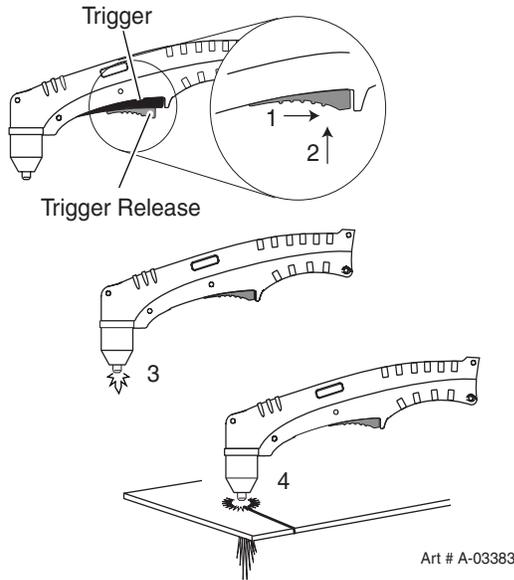
3. Hold the torch away from your body.
4. Slide the trigger release toward the back of the torch handle while simultaneously squeezing the trigger. The pilot arc will start.



5. Bring the torch within transfer distance to the work. The main arc will transfer to the work, and the pilot arc will shut off.

#### NOTE

*The gas preflow and postflow are a characteristic of the power supply and not a function of the torch.*

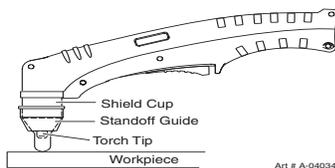


6. Cut as usual. Simply release the trigger assembly to stop cutting.
7. Follow normal recommended cutting practices as provided in the power supply operator's manual.

#### **NOTE**

When the shield cup is properly installed, there is a slight gap between the shield cup and the torch handle. Gas vents through this gap as part of normal operation. Do not attempt to force the shield cup to close this gap. Forcing the shield cup against the torch head or torch handle can damage components.

8. For a consistent standoff height from the workpiece, install the standoff guide by sliding it onto the torch shield cup. Install the guide with the legs at the sides of the shield cup body to maintain good visibility of the cutting arc. During operation, position the legs of the standoff guide against the workpiece.



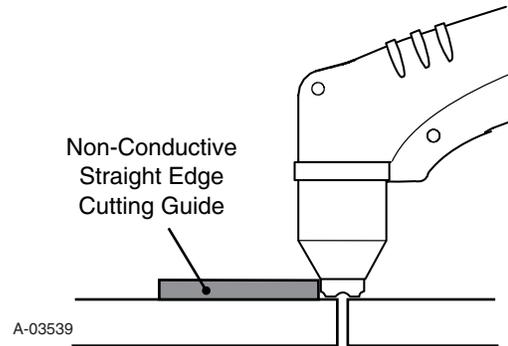
## B. Shield Cup With Straight Edge

The drag shield cup can be used with a nonconductive straight edge to make straight cuts by hand.



**WARNING**

*The straight edge **must be non-conductive.***



### Using Drag Shield Cup With Straight Edge

The crown shield cup functions best when cutting 3/16 inch (4.7 mm) solid metal with relatively smooth surface.

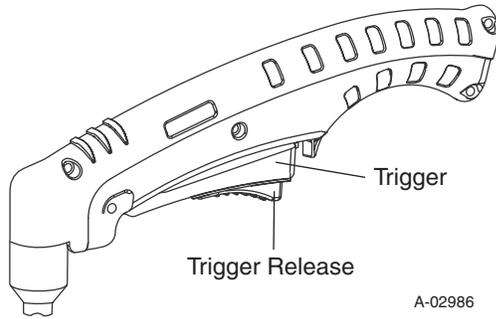
## C. Drag Cutting With a Hand Torch

Drag cutting works best on metal 3/16" (4.7 mm) thick or less.

#### **NOTE**

*For best parts performance and life, always use the correct parts for the type of operation.*

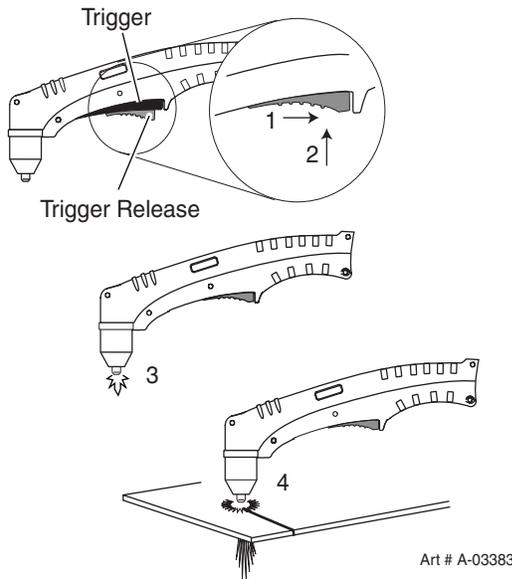
1. Install the drag cutting tip and set the output current to 35 amps or less.
2. The torch can be comfortably held in one hand or steadied with two hands. Position the hand to press the Trigger on the torch handle. With the hand torch, the hand may be positioned close to the torch head for maximum control or near the back end for maximum heat protection. Choose the holding technique that feels most comfortable and allows good control and movement.
4. Keep the torch in contact with the workpiece during the cutting cycle.
5. Hold the torch away from your body.
6. Slide the trigger release toward the back of the torch handle while simultaneously squeezing the trigger. The pilot arc will start.



- Bring the torch within transfer distance to the work. The main arc will transfer to the work, and the pilot arc will shut off.

**NOTE**

*The gas preflow and postflow are a characteristic of the power supply and not a function of the torch.*



- Cut as usual. Simply release the trigger assembly to stop cutting.
- Follow normal recommended cutting practices as provided in the power supply operator's manual.

**NOTE**

*When the shield cup is properly installed, there is a slight gap between the shield cup and the torch handle. Gas vents through this gap as part of normal operation. Do not attempt to force the shield cup to close this gap. Forcing the shield cup against the torch head or torch handle can damage components.*

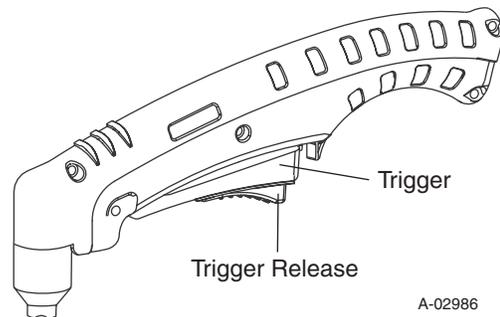
**D. Piercing With Hand Torch**

- The torch can be comfortably held in one hand or steadied with two hands. Position the hand to press the Trigger on the torch handle. With the hand torch, the hand may be positioned close to the torch head for maximum control or near the back end for maximum heat protection. Choose the technique that feels most comfortable and allows good control and movement.

**NOTE**

*The tip should never come in contact with the work-piece except during drag cutting operations.*

- Angle the torch slightly to direct blowback particles away from the torch tip (and operator) rather than directly back into it until the pierce is complete.
- In a portion of the unwanted metal start the pierce off the cutting line and then continue the cut onto the line. Hold the torch perpendicular to the work-piece after the pierce is complete.
- Hold the torch away from your body.
- Slide the trigger release toward the back of the torch handle while simultaneously squeezing the trigger. The pilot arc will start.



- Bring the torch within transfer distance to the work. The main arc will transfer to the work, and the pilot arc will shut off.

**NOTES**

*The gas preflow and postflow are a characteristic of the power supply and not a function of the torch.*

*When the shield cup is properly installed, there is a slight gap between the shield cup and the torch handle. Gas vents through this gap as part of normal operation. Do not attempt to force the shield cup to close this gap. Forcing the shield cup against the torch head or torch handle can damage components.*

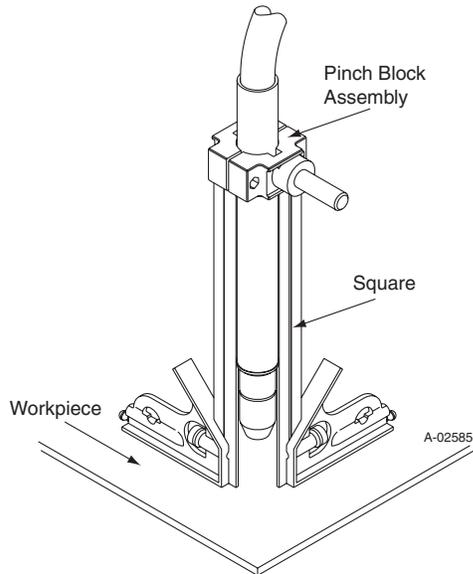
- Clean spatter and scale from the shield cup and the tip as soon as possible. Spraying the shield cup in anti-spatter compound will minimize the amount of scale which adheres to it.

## 4.08 Machine Torch Operation

### A. Cutting With Machine Torch

The machine torch can be activated by remote control pendant or by a remote interface device such as CNC.

1. Use a square to check that the torch is perpendicular to the workpiece to obtain a clean, vertical cut.



Checking Alignment

2. To start a cut at the plate edge, position the center of the torch along the edge of the plate.

### B. Travel Speed

Proper travel speed is indicated by the trail of the arc which is seen below the plate. The arc can be one of the following:

#### 1. Straight Arc

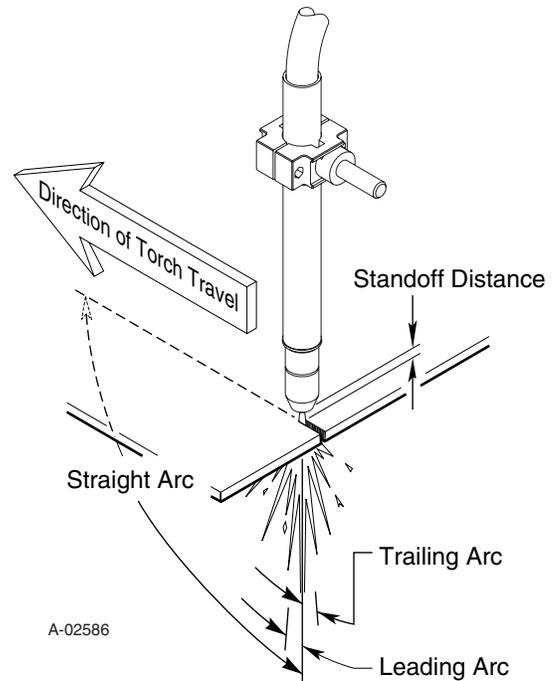
A straight arc is perpendicular to the workpiece surface. This arc is generally recommended for the best cut using air plasma on stainless or aluminum.

#### 2. Leading Arc

The leading arc is directed in the same direction as torch travel. A five degree leading arc is generally recommended for air plasma on mild steel.

#### 3. Trailing Arc

The trailing arc is directed in the opposite direction as torch travel.



Machine Torch Operation

For optimum smooth surface quality, the travel speed should be adjusted so that only the leading edge of the arc column produces the cut. If the travel speed is too slow, a rough cut will be produced as the arc moves from side to side in search of metal for transfer.

Travel speed also affects the bevel angle of a cut. When cutting in a circle or around a corner, slowing down the travel speed will result in a squarer cut. The power source output should be reduced also. Refer to the appropriate Control Module Operating Manual for any Corner Slowdown adjustments that may be required.

## C. Piercing With Machine Torch

To pierce with a machine torch, the arc should be started with the torch positioned as high as possible above the plate while allowing the arc to transfer and pierce. This standoff helps avoid having molten metal blow back onto the front end of the torch.

When operating with a cutting machine, a pierce or dwell time is required. Torch travel should not be enabled until the arc penetrates the bottom of the plate. As motion begins, torch standoff should be reduced to the recommended 1/8- 1/4 inch (3-6 mm) distance for optimum speed and cut quality. Clean spatter and scale from the shield cup and the tip as soon as possible. Spraying or dipping the shield cup in anti - spatter compound will minimize the amount of scale which adheres to it.

## 4.09 Recommended Cutting Speeds

Cutting speed depends on material, thickness, and the operator's ability to accurately follow the desired cut line. The following factors may have an impact on system performance:

- Torch parts wear
- Air quality
- Line voltage fluctuations
- Torch standoff height
- Proper work cable connection

### NOTES

*This information represents realistic expectations using recommended practices and well - maintained systems. Actual speeds may vary up to 50% from those shown.*

*Refer to Appendix Pages for cutting speed chart information as related to the Power Supply used.*

## 4.10 Gouging



### WARNINGS

*Be sure the operator is equipped with proper gloves, clothing, eye and ear protection and that all safety precautions at the front of this manual have been followed. Make sure no part of the operator's body comes in contact with the workpiece when the torch is activated.*

*Disconnect primary power to the system before disassembling the torch, leads, or power supply.*

### CAUTIONS

*Sparks from plasma gouging can cause damage to coated, painted or other surfaces such as glass, plastic, and metal.*

*Check torch parts. The torch parts must correspond with the type of operation. Refer to Section 4.04, Torch Parts Selection.*

## A. Gouging Parameters

Gouging performance depends on parameters such as torch travel speed, current level, lead angle (the angle between the torch and workpiece), and the distance between the torch tip and workpiece (stand-off).

## B. Torch Travel Speed

### NOTE

*Refer to Appendix Pages for additional information as related to the Power Supply used.*

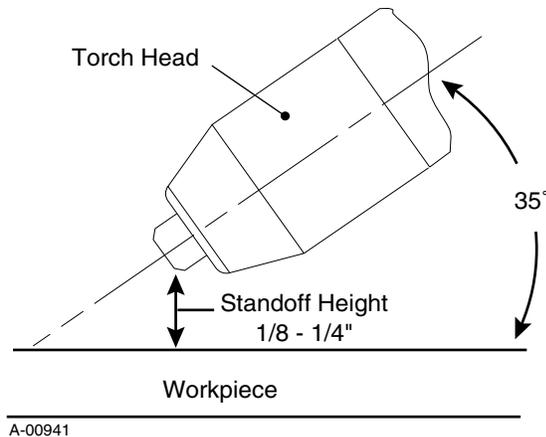
Optimum torch travel speed is dependent on current setting, lead angle, and mode of operation (hand or machine torch).

## C. Current Setting

Current settings depend on torch travel speed, mode of operation (hand or machine torch), and the amount of material to be removed.

## D. Lead Angle

The angle between the torch and workpiece depends on the output current setting and torch travel speed. At 80 amps, the recommended lead angle is 35°. At a lead angle greater than 45° the molten metal will not be blown out of the gouge and may be blown back onto the torch. If the lead angle is too small (less than 35°), less material may be removed, requiring more passes. In some applications, such as removing welds or working with light metal, this may be desirable.



Gouging Angle and Standoff Distance

## E. Standoff Distance

The tip to work distance affects gouge quality and depth. Standoff distance of 1/8 - 1/4 inch (3 - 6 mm) allows for smooth, consistent metal removal. Smaller standoff distances may result in a severance cut rather than a gouge. Standoff distances greater than 1/4 inch (6 mm) may result in minimal metal removal or loss of transferred main arc.

## F. Slag Buildup

Slag generated by gouging on materials such as carbon and stainless steels, nickels, and alloyed steels, can be removed easily in most cases. Slag does not obstruct the gouging process if it accumulates to the side of the gouge path. However, slag build - up can cause inconsistencies and irregular metal removal if large amounts of material build up in front of the arc. The build - up is most often a result of improper travel speed, lead angle, or standoff height.



# SECTION 5: SERVICE

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## 5.01 Introduction

This section describes basic maintenance procedures performable by operating personnel. No other adjustments or repairs are to be attempted by other than properly trained personnel.



### WARNINGS

---

*Disconnect primary power at the source before disassembling the torch or torch leads.*

*Frequently review the Important Safety Precautions at the front of this Manual. Be sure the operator is equipped with proper gloves, clothing, eye and ear protection. Make sure no part of the operator's body comes into contact with the workpiece while the torch is activated.*

---

### CAUTION

---

*Sparks from the cutting process can cause damage to coated, painted, and other surfaces such as glass, plastic and metal.*

### NOTE

---

*Handle torch leads with care and protect them from damage.*

## 5.02 General Torch Maintenance

### A. Cleaning Torch

Even if precautions are taken to use only clean air with a torch, eventually the inside of the torch becomes coated with residue. This buildup can affect the pilot arc initiation and the overall cut quality of the torch.



### WARNINGS

---

*Disconnect primary power to the system before disassembling the torch or torch leads.*

*DO NOT touch any internal torch parts while the AC indicator light of the Power Supply is ON.*

---

The inside of the torch should be cleaned with electrical contact cleaner using a cotton swab or soft wet rag. In severe cases, the torch can be removed from the leads and cleaned more thoroughly by pouring electrical contact cleaner into the torch and blowing it through with compressed air.

### CAUTION

---

*Dry the torch thoroughly before reinstalling.*

## B. O-Ring Lubrication

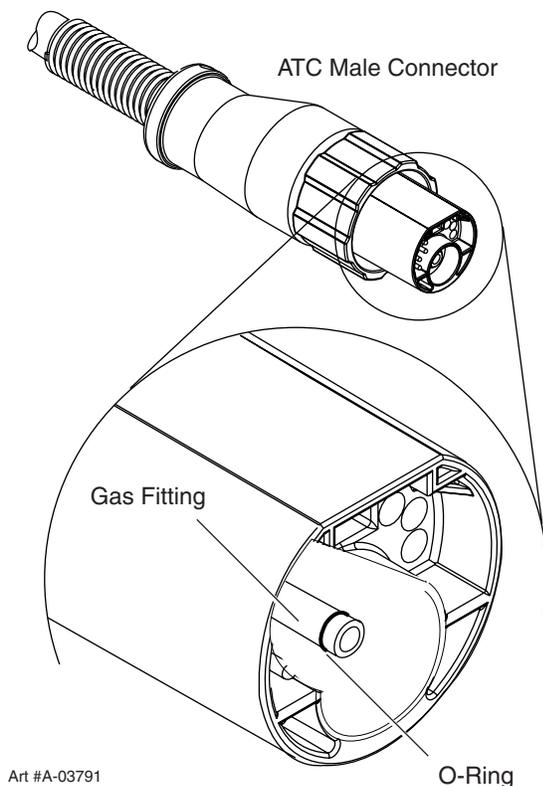
This section applies only to torches with ATC connectors.

An o-ring on the Torch ATC Male Connector requires lubrication on a regular basis, depending on how frequently the torch is disconnected and re-connected. This will allow the o-ring to remain pliable and provide a proper seal. The o-ring will dry out, becoming hard and cracked, if the o-ring lubricant is not used on a regular basis. This can lead to potential performance problems.

It is recommended to apply a very light film of o-ring lubricant (Catalog # 8-4025) to the o-ring on a weekly basis.

### NOTE

*DO NOT use other lubricants or grease, they may not be designed to operate within high temperatures or may contain "unknown elements" that may react with the atmosphere. This reaction can leave contaminants inside the torch. Either of these conditions can lead to inconsistent performance or poor parts life.*



## 5.03 Common Operating Faults

The following lists the more common cutting faults and possible causes:

### 1. Insufficient Penetration

- Cutting speed too fast
- Torch tilted too much
- Metal too thick
- Worn torch parts
- Cutting current too low
- Non - Genuine Thermal Dynamics Parts

### 2. Main Arc Extinguishes

- Cutting speed too slow
- Torch standoff too high from workpiece
- Cutting current too high
- Work cable disconnected
- Worn torch parts
- Non - Genuine Thermal Dynamics Parts

### 3. Excessive Dross Formation

- Cutting speed too slow
- Torch standoff too high from workpiece
- Worn torch parts
- Improper cutting current
- Non - Genuine Thermal Dynamics Parts

### 4. Short Torch Parts Life

- Oil or moisture in air source
- Exceeding system capability (material too thick)
- Excessive pilot arc time
- Air flow too low (incorrect pressure)
- Improperly assembled torch
- Non - Genuine Thermal Dynamics Parts

## 5.04 Inspection and Replacement of Consumable Torch Parts



### WARNINGS

Disconnect primary power to the system before disassembling the torch or torch leads.

DO NOT touch any internal torch parts while the AC indicator light of the Power Supply is ON.

Remove the consumable torch parts as follows:

#### NOTE

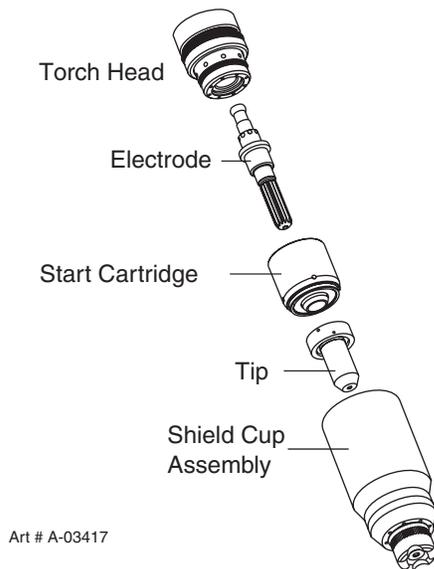
The shield cup holds the tip and starter cartridge shield cup in place. Position the torch with the shield cup facing upward to prevent these parts from falling out when the cup is removed.

1. Unscrew and remove the shield cup from the torch.

#### NOTE

Slag built up on the shield cup that cannot be removed may effect the performance of the system.

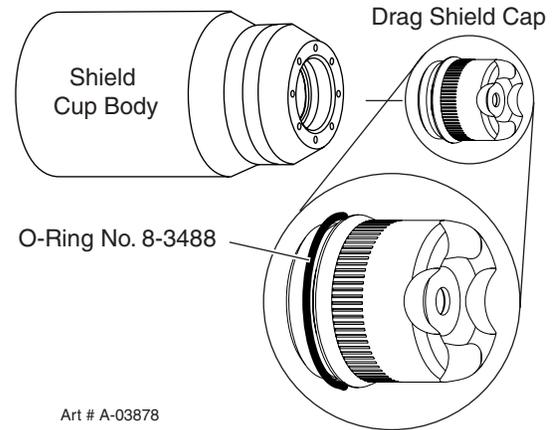
2. Inspect the cup for damage. Wipe it clean or replace if damaged.



Art # A-03417

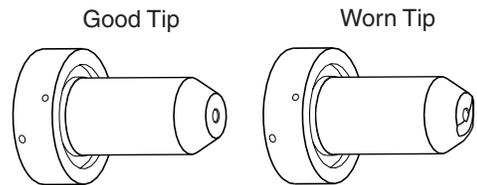
Consumable Parts

3. On torches with a shield cup body and a shield cap or deflector, ensure that the cap or deflector is threaded snugly against the shield cup body. In shielded drag cutting operations (only), there may be an O-ring between the shield cup body and drag shield cap. Do not lubricate the O-ring.



Art # A-03878

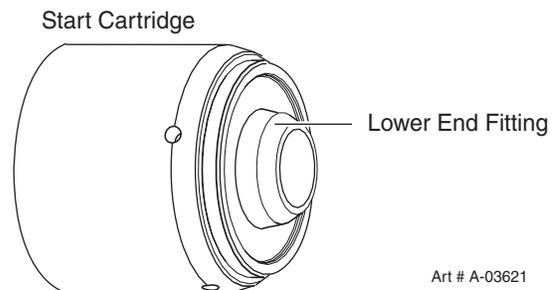
4. Remove the tip. Check for excessive wear (indicated by an elongated or oversized orifice). Clean or replace the tip if necessary.



A-03406

Tip Wear

5. Remove the starter cartridge. Check for excessive wear, plugged gas holes, or discoloration. Check the lower end fitting for free motion. Replace if necessary.

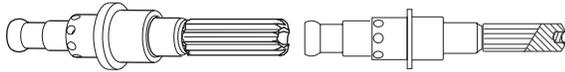


Art # A-03621

6. Pull the Electrode straight out of the Torch Head. Check the face of the electrode for excessive wear. Refer to the following figure.



New Electrode



Worn Electrode

Art # A-03284

Electrode Wear

7. Reinstall the Electrode by pushing it straight into the torch head until it clicks.
8. Reinstall the desired starter cartridge and tip into the torch head.
9. Hand tighten the shield cup until it is seated on the torch head. If resistance is felt when installing the cup, check the threads before proceeding.

## 5.05 Troubleshooting Guide

This subsection covers troubleshooting that requires disassembly and electronic measurements. It is helpful for solving many of the common problems that can arise with this torch assembly.

### How to Use This Guide

The following information is a guide to help the Customer / Operator determine the most likely causes for various symptoms.

This guide is set up as follows:

#### X. Symptom (Bold Type)

Any Special Instructions (Text Type)

1. Cause (Italic Type)

- a. Check / Remedy (Text Type)

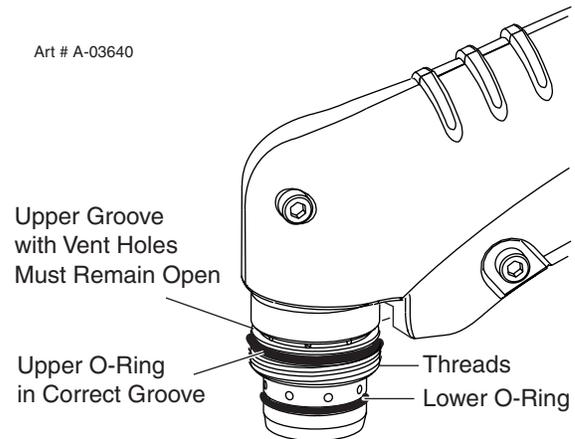
Locate your **symptom**, check the *causes* (easiest listed first) then remedies. Repair as needed being sure to verify that unit is fully operational after any repairs.

## Troubleshooting

### A. Torch will not pilot when torch switch is activated

1. Power Supply RUN / SET switch in SET position
  - a. Place RUN / SET switch to RUN position.
2. Parts - In - Place (PIP) not satisfied.
  - a. Check that shield cup is properly installed.
3. Upper O-ring on torch head is in wrong position.
  - a. Remove shield cup from torch; check position of upper O-ring. Correct if necessary.

Art # A-03640



4. Faulty Torch Switch or PIP Switch
  - a. Check PIP switch for continuity.
5. Faulty torch parts
  - a. Inspect torch parts and replace if necessary. Refer to Section 5.04, Inspection and Replacement Consumable Torch Parts
6. Gas pressure too low
  - a. Set proper operating gas pressure.
7. Faulty components in torch and leads assembly
  - a. Inspect torch assemblies and replace if necessary.
8. Faulty components in power supply
  - a. Return for repair or have qualified technician repair per Service Manual.

## **B. No cutting output**

1. *Torch not properly connected to power supply*
  - a. Check that torch leads are properly attached to power supply
2. *Shield cup not properly installed on torch*
  - a. Check that shield cup is fully seated against torch head (do not overtighten)
3. *Parts - In - Place (PIP) not satisfied.*
  - a. Check that shield cup is properly installed.
  - b. Check switch - in hand torch handle or in machine torch head - for continuity.
4. *Faulty components in torch and leads assembly*
  - a. Inspect torch assemblies and replace if necessary.
5. *Faulty components in power supply*
  - a. Return for repair or have qualified technician repair per Service Manual.

## **C. Limited output with no control**

1. *Poor input or output connections to power supply*
  - a. Check all input and output connections.
2. *Faulty components in torch and leads assembly*
  - a. Inspect torch assemblies and replace if necessary.
3. *Faulty components in power supply*
  - a. Return for repair or have qualified technician repair per Service Manual.

## **D. Erratic or improper cutting output**

1. *Poor input or output connections to power supply*
  - a. Check all input and output connections.
2. *Current set too low at power supply*
  - a. Increase current setting.
3. *Torch is being moved too fast across workpiece*
  - a. Reduce cutting speed (refer to Appendix Page for the Power Supply being used).

4. *Excessive oil or moisture in torch*
  - a. Hold torch 1/8 inch (3.2 mm) from clean surface while purging and observe oil or moisture buildup (do not activate torch).
5. *Torch tip dragged across workpiece*
  - a. When the tip is dragged across the workpiece, the amperage automatically cuts back to 35 amps (see Note).

---

### **NOTE**

*All power supplies may not have this feature.*

## **E. No gas flow**

1. *Gas not connected or pressure too low*
  - a. Check source for proper operating gas pressure (refer to Appendix Page for Power Supply used).
2. *Faulty components in torch and leads assembly*
  - a. Inspect torch assemblies and replace if necessary.
3. *Faulty components in power supply*
  - a. Return for repair or have qualified technician repair per Service Manual.

## **F. Torch cuts but not adequately**

1. *Current set too low at power supply*
  - a. Increase current setting
2. *Torch is being moved too fast across workpiece*
  - a. Reduce cutting speed (refer to Appendix Page for the Power Supply being used).
3. *Excessive oil or moisture in torch*
  - a. Hold torch 1/8 inch (3.2 mm) from clean surface while purging and observe oil or moisture buildup (do not activate torch).



# SECTION 6: PARTS LISTS

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## 6.01 Introduction

### A. Parts List Breakdown

The parts list provides a breakdown of all replaceable components. Torch Assemblies are field serviceable, so a complete breakdown of parts is provided. The parts lists are arranged as follows:

- Section 6.03: Hand Torch Replacement Parts
- Section 6.04: Machine Torch Replacement Parts
- Section 6.05: Replacement Shielded Leads Assemblies
- Section 6.06: Hand Torch Consumable Parts
- Section 6.07: Hand Torch Spare Parts Kits
- Section 6.08: Machine Torch Consumable Parts
- Section 6.09: Machine Torch Spare Parts Kits
- Section 6.10: Automated Torch Consumable Parts
- Section 6.11: Automated Torch Spare Parts Kits
- Section 6.12: Complete Assembly Replacements
- Section 6.13: Options & Accessories

#### **NOTE**

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*Parts listed without item numbers are not shown, but may be ordered by the catalog number shown.*

### B. Returns

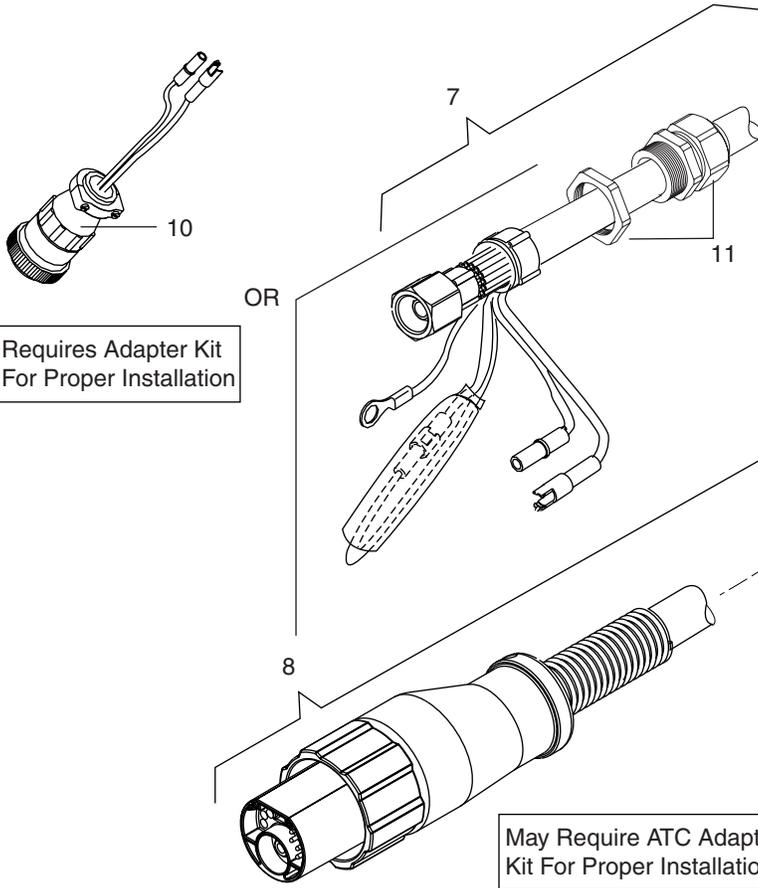
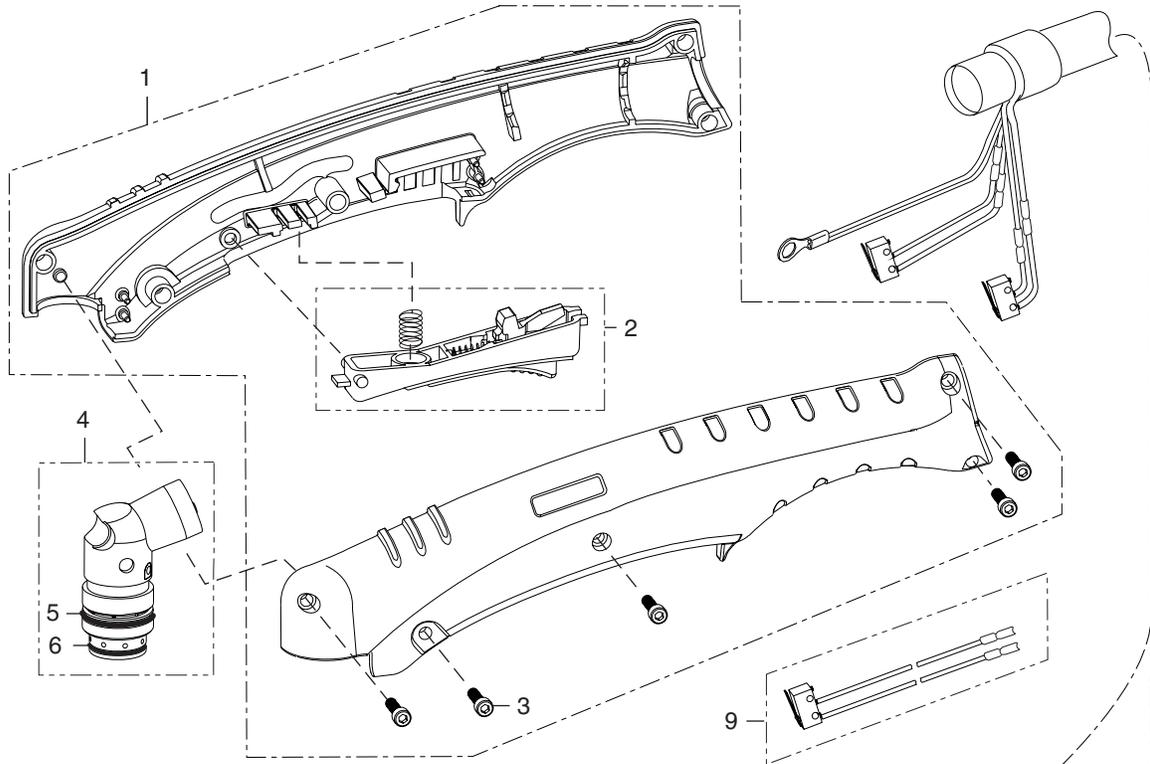
If a product must be returned for service, contact your authorized distributor. Materials returned without proper authorization will not be accepted.

## 6.02 Ordering Information

Order replacement parts by catalog number and complete description of the part or assembly, as listed in the parts list for each type item. Also include the model and serial number of the torch. Address all inquiries to your authorized distributor.

## 6.03 Replacement Parts for Hand Torch

Item #	Qty	Description	Catalog #
1	1	Torch Handle Replacement Kit (includes items No. 2 & 3)	9-7030
2	1	Trigger Assembly Replacement Kit	9-7034
3	1	Handle Screw Kit (5 each, 6-32 x 1/2" cap screw, and wrench)	9-8062
4	1	Torch Head Assembly Replacement Kit (includes items No. 5 & 6)	9-8219
5	1	Large O - Ring	8-3487
6	1	Small O - Ring	8-3486
7		<b>Leads Assemblies with O2B connectors</b> (includes switch assemblies)	
	1	SL60 / 60 Amp, 20 - foot Leads Assembly with O2B connectors	4-7830
	1	SL60 / 60 Amp, 50 - foot Leads Assembly with O2B connectors	4-7831
	1	SL100 / 100 Amp, 20 - foot Leads Assembly with O2B connectors	4-7832
	1	SL100 / 100 Amp, 50 - foot Leads Assembly with O2B connectors	4-7833
8		<b>Leads Assemblies with ATC connectors</b> (includes switch assemblies)	
	1	SL60 / 60 Amp, 20 - foot Leads Assembly with ATC connector	4-7834
	1	SL60 / 60 Amp, 50 - foot Leads Assembly with ATC connector	4-7835
	1	SL100 / 100 Amp, 20 - foot Leads Assembly with ATC connector	4-7836
	1	SL100 / 100 Amp, 50 - foot Leads Assembly with ATC connector	4-7837
9	1	Switch Kit	9-7031
10	1	Torch Control Cable Adapter (includes item # 11)	7-3447
11	1	Through - Hole Protector	9-8103



Requires Adapter Kit  
For Proper Installation

May Require ATC Adapter  
Kit For Proper Installation

A-03664

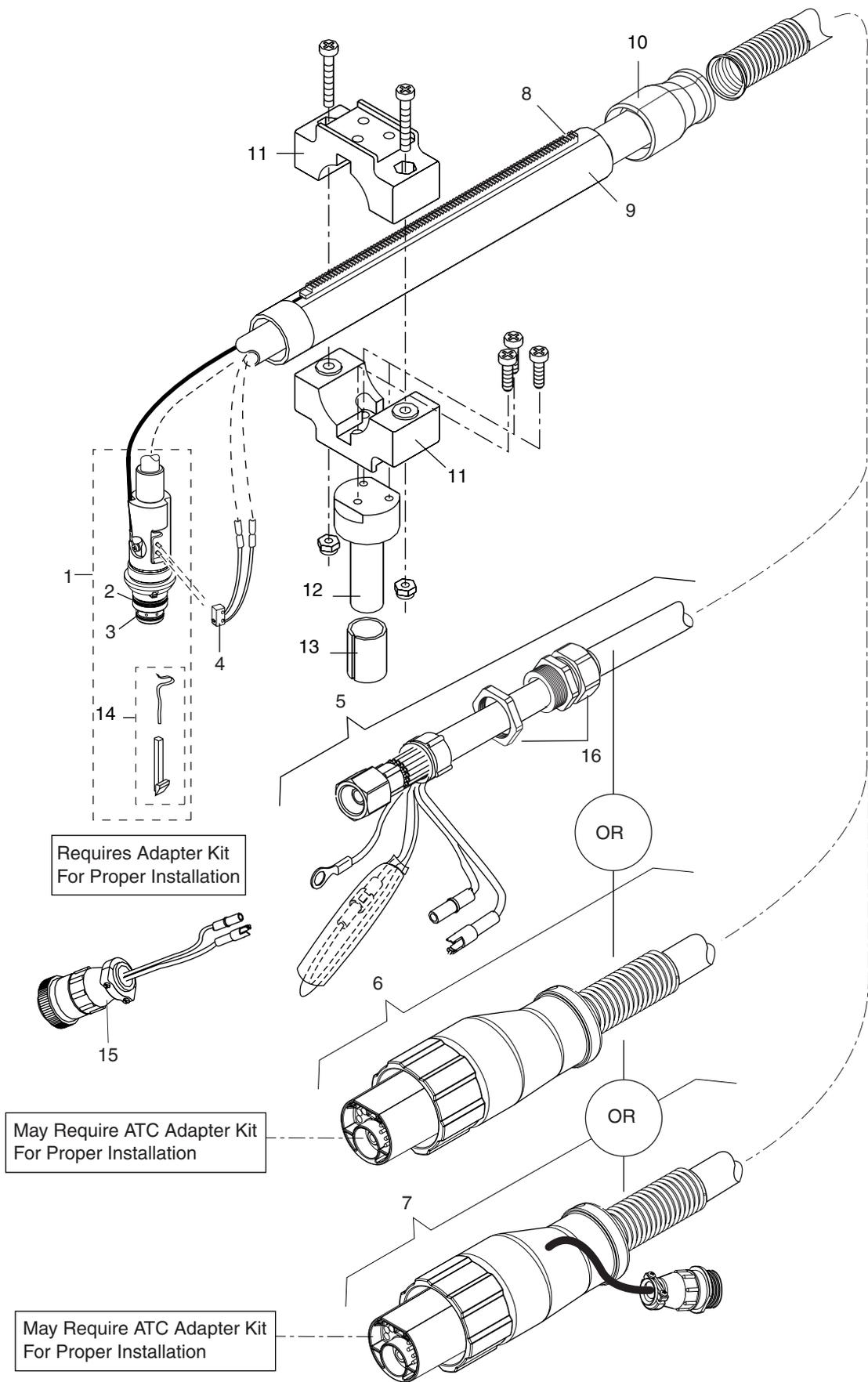
## 6.04 Replacement Parts - for Machine Torches with Unshielded Leads

Item No.	Qty	Description	Catalog No.
1	1	Torch Head Assembly without leads (includes items 2, 3, and 14)	9-8220
2	1	Large O - Ring	8-3487
3	1	Small O - Ring	8-3486
4	1	PIP Switch Kit	9-7036
5		<b>Unshielded Mechanized Leads Assemblies with O2B connectors</b>	
	1	25 - foot / 7.6 m Leads Assembly with O2B connectors	4-7838*
	1	50 - foot / 15.2 m Leads Assembly with O2B connectors	4-7839*
6		<b>Unshielded Automated Leads Assemblies with ATC connectors</b>	
	1	5 - foot / 1.5 m Leads Assembly with ATC connector	4-7850
	1	10 - foot / 3.05 m Leads Assembly with ATC connector	4-7851
	1	25 - foot / 7.6 m Leads Assembly with ATC connector	4-7852
	1	50 - foot / 15.2 m Leads Assembly with ATC connector	4-7853
7		<b>Unshielded Mechanized Leads Assemblies with ATC connectors</b>	
	1	5 - foot / 1.5 m Leads Assembly with ATC connector	4-7842
	1	10 - foot / 3.05 m Leads Assembly with ATC connector	4-7843
	1	25 - foot / 7.6 m Leads Assembly with ATC connector	4-7844
	1	50 - foot / 15.2 m Leads Assembly with ATC connector	4-7845
8	1	11" / 279 mm Rack	9-7041
9	1	11" / 279 mm Mounting Tube	9-7043
10	1	End Cap Assembly	9-7044
11	2	Body, Mounting, Pinch Block	9-4513
12	1	Pin, Mounting, Pinch Block	9-4521
13	1	Torch Holder Sleeve	7-2896
14	1	PIP Plunger and Return Spring Kit	9-7045
15	1	Torch Control Cable Adapter for Unshielded Leads (includes item # 16)	7-3447
16	1	Through - Hole Protector	9-8103
	1	Pinion Assembly (Not shown)	7-2827
	1	5" / 126 mm Positioning Tube (Not shown)	9-7042

### NOTE

\* Does not include Control Cable Adapter or Through - Hole Protector.

Refer to Section 6.05 for Replacement Shielded Leads Assemblies.



Requires Adapter Kit  
For Proper Installation

May Require ATC Adapter Kit  
For Proper Installation

May Require ATC Adapter Kit  
For Proper Installation

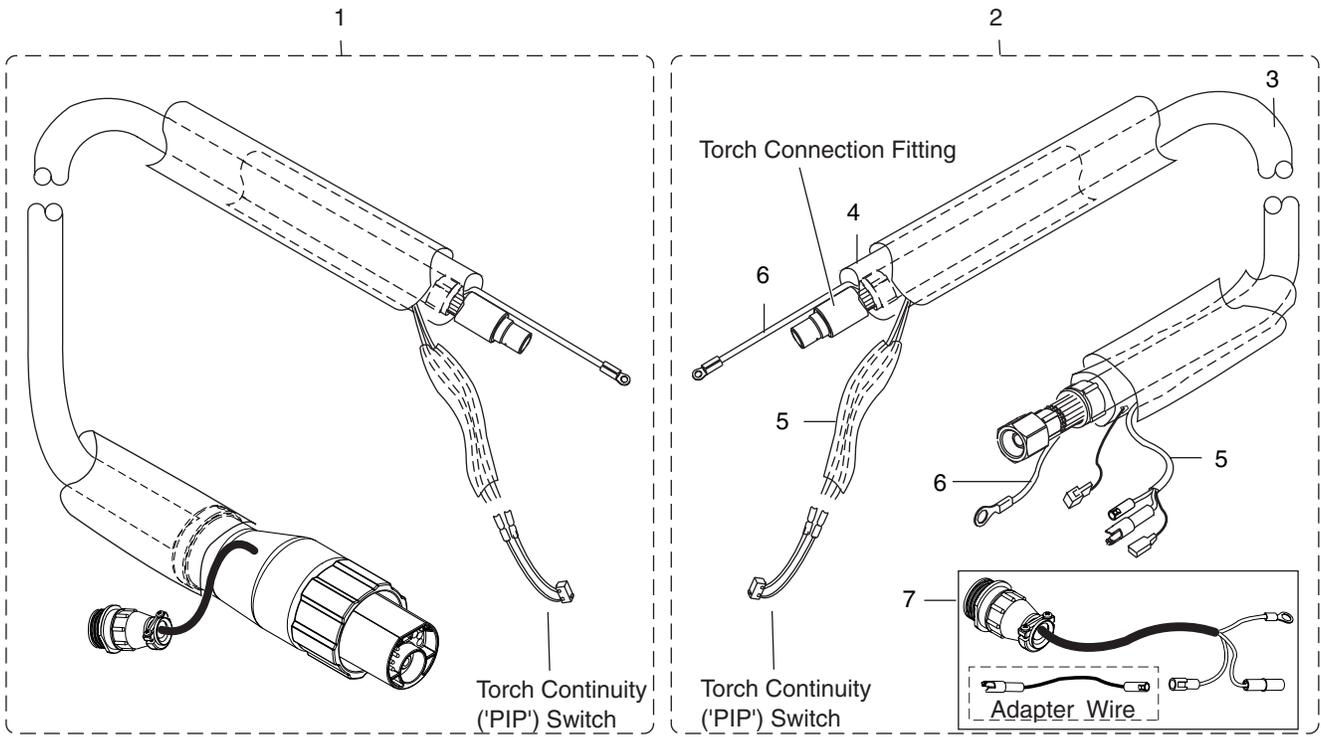
A-03665

## 6.05 Replacement Shielded Machine Torch Leads Assemblies

Item No.	Qty	Description	Catalog No.
1		<b>Mechanized Shielded Leads Assemblies with ATC Connectors</b>	
	1	5 - foot / 1.5 m Leads Assembly with ATC Connector	4-7846
	1	10 - foot / 3.05 m Leads Assembly with ATC Connector	4-7847
	1	25 - foot / 7.6 m Leads Assembly with ATC Connector	4-7848
	1	50 - foot / 15.2 m Leads Assembly with ATC Connector	4-7849
2		<b>Shielded Leads Assemblies with O2B Connectors</b>	
	1	25 - foot / 7.6 m Leads Assembly with O2B Connector	4-7840
	1	50 - foot / 15.2 m Leads Assembly with O2B Connector	4-7841
3		Negative / Plasma Lead	
	1	25 - foot / 7.6 m Length	9-7969
	1	50 - foot / 15.2 m Length	9-7974
4		Shield Lead	
	1	25 - foot / 7.6 m Length	9-7979
	1	50 - foot / 15.2 m Length	9-7980
5		PIP Lead	
	1	25 - foot / 7.6 m Length	9-7977 *
	1	50 - foot / 15.2 m Length	9-7978 *
6		Pilot Lead, 25 - foot / 7.6 m Length	
	1	25 - foot / 7.6 m Length	9-7975
	1	50 - foot / 15.2 m Length	9-7976
7	1	Power Supply Adapter for Shielded Leads (not shown)	7-3479

### **NOTE**

*\*Does not include Torch continuity (PIP) Switch.*



Art #A-03616

## 6.06 Hand Torch Consumables

The illustration shows all consumable parts for the SL60 and SL100 hand torches. Refer to the Appendix pages covering the power supply being used to ensure proper selection for the application.

Various front - end torch parts are available for different applications.

Use the single - piece shield cup for general purpose cutting operations with the torch tip in contact with the work (up to 40 amps). This is the preferred method of cutting sheet metal up to 3/16" or 4.8 mm thick.

Also use the single - piece Shield Cup for 'standoff' cutting (with the torch tip 1/8" to 1/4" from the workpiece). This is the preferred method for cutting metal thicker than 3/16" / 4.8 mm and at current levels above 40 amps. This provides maximum visibility and accessibility.

The Standoff Guide fits Shield Cup No. 9-8218 and enables the user to maintain a consistent standoff height for most applications.

Use the Shield Cup Body with the Deflector Shield Cap for extended parts life and improved resistance to reflected heat. This combination provides cutting results similar to the single-piece Shield Cup, as well as easy change-over to gouging or drag shield cutting.

Use the Shield Cup Body with the Drag Shield Cap for a consistent standoff distance with the drag shield in contact with the workpiece. This is a simple and operator-friendly method of cutting between 50 and 100 amps.

Use the Shield Cup Body with the Gouging Shield Cap for excellent gouging performance and enhanced torch parts life.

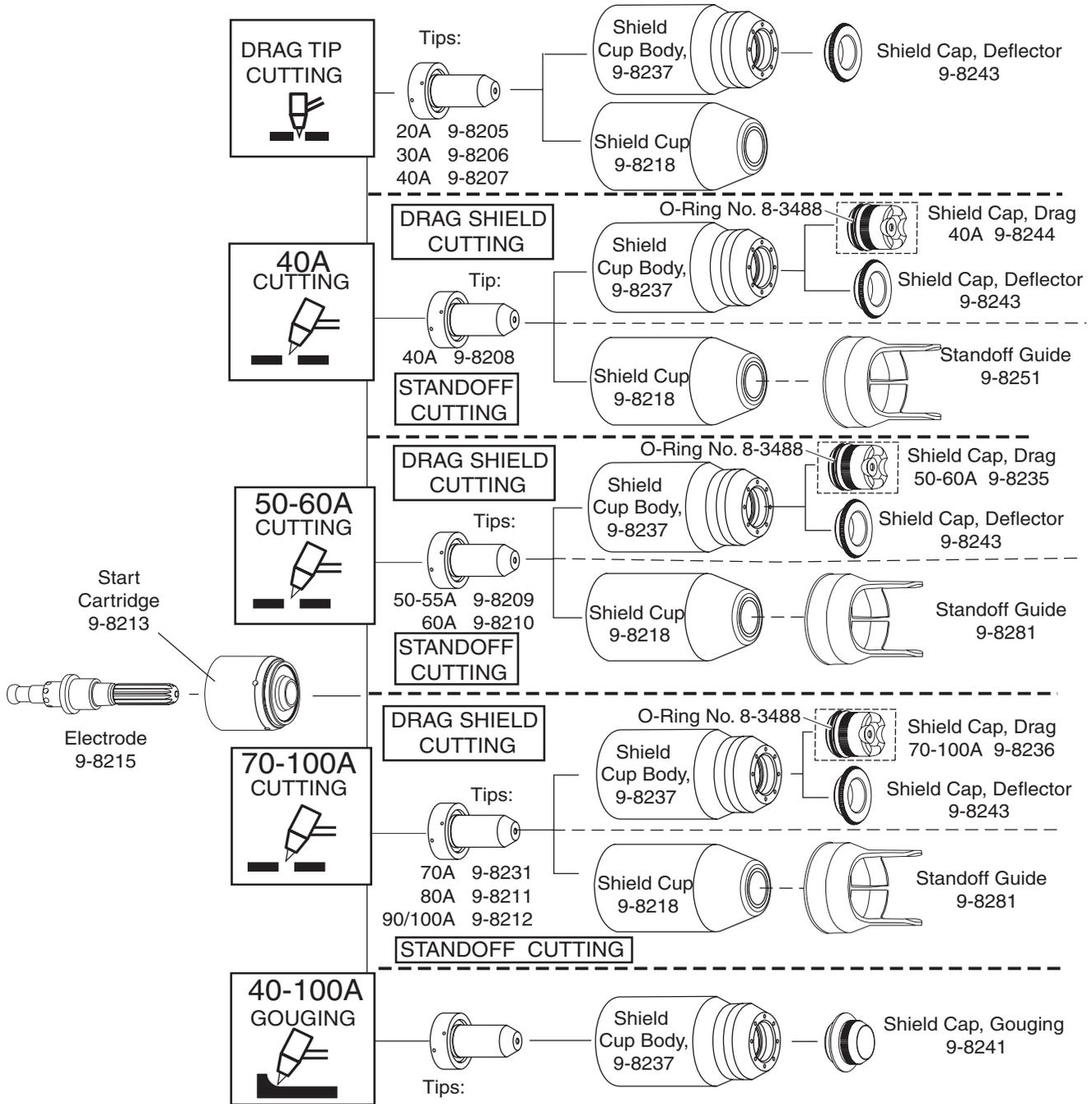
The electrode and starter cartridge are the same for all operations.

## 6.07 Hand Torch Spare Parts Kits

**Hand Torch Spare Parts Kit Contents**

Item	Catalog No.	40-Amp Kit, Cat No. <b>5-0050</b>	60-Amp Kit, Cat No. <b>5-0075</b>	80-Amp Kit, Cat No. <b>5-0110</b>	100-Amp Kit, Cat No. <b>5-0170</b>
Electrode	9-8215	3	3	3	3
40A Drag Tip	9-8207	5	2	2	2
40A Standoff Tip	9-8208	2			
60A Standoff Tip	9-8210		5		
80A Standoff Tip	9-8211			5	
100A Standoff Tip	9-8212				5
Shield Cup Body	9-8237		1	1	1
Drag Shield Cap, 50-60A	9-8235		1		
Drag Shield Cap, 70-100A	9-8236			1	1
Large O-Ring	8-3487	1	1	1	1
Small O-Ring	8-3486	1	1	1	1
Standoff Guide	9-8251	1			
Standoff Guide	9-8281		1	1	1

# Hand Torch Consumables Selection



Tip A 9-8225 (40 Amps Max.)

Tip B 9-8226 (40 - 100 Amps)

Tip C 9-8227 (40 - 100 Amps)

Tip D 9-8228 (40 - 100 Amps)

Art # A-03662

Gouging Profiles			
	Output Range	Depth	Width
Tip A	40 Amps Max.	Shallow	Narrow
Tip B	40-100 Amps	Deep	Narrow
Tip C	40-100 Amps	Moderate	Moderate
Tip D	40-100 Amps	Shallow	Wide

## 6.08 Machine Torch Consumables

The illustration shows all consumable parts for the SL100 machine torches. Refer to the Appendix pages covering the power supply being used to ensure proper selection for the application.

Various front - end torch parts are available for different applications.

Use the single - piece Shield Cup for 'standoff' cutting (with the torch tip 1/8" to 1/4" from the workpiece). This is the preferred method for cutting metal thicker than 3/16" / 4.8 mm and at current levels above 40 amps. This provides maximum visibility and accessibility.

Use the Shield Cup Body with the Deflector Shield Cap for extended parts life and improved resistance to reflected heat. This combination provides cutting results similar to the single-piece Shield Cup, as well as easy change-over to gouging or drag shield cutting.

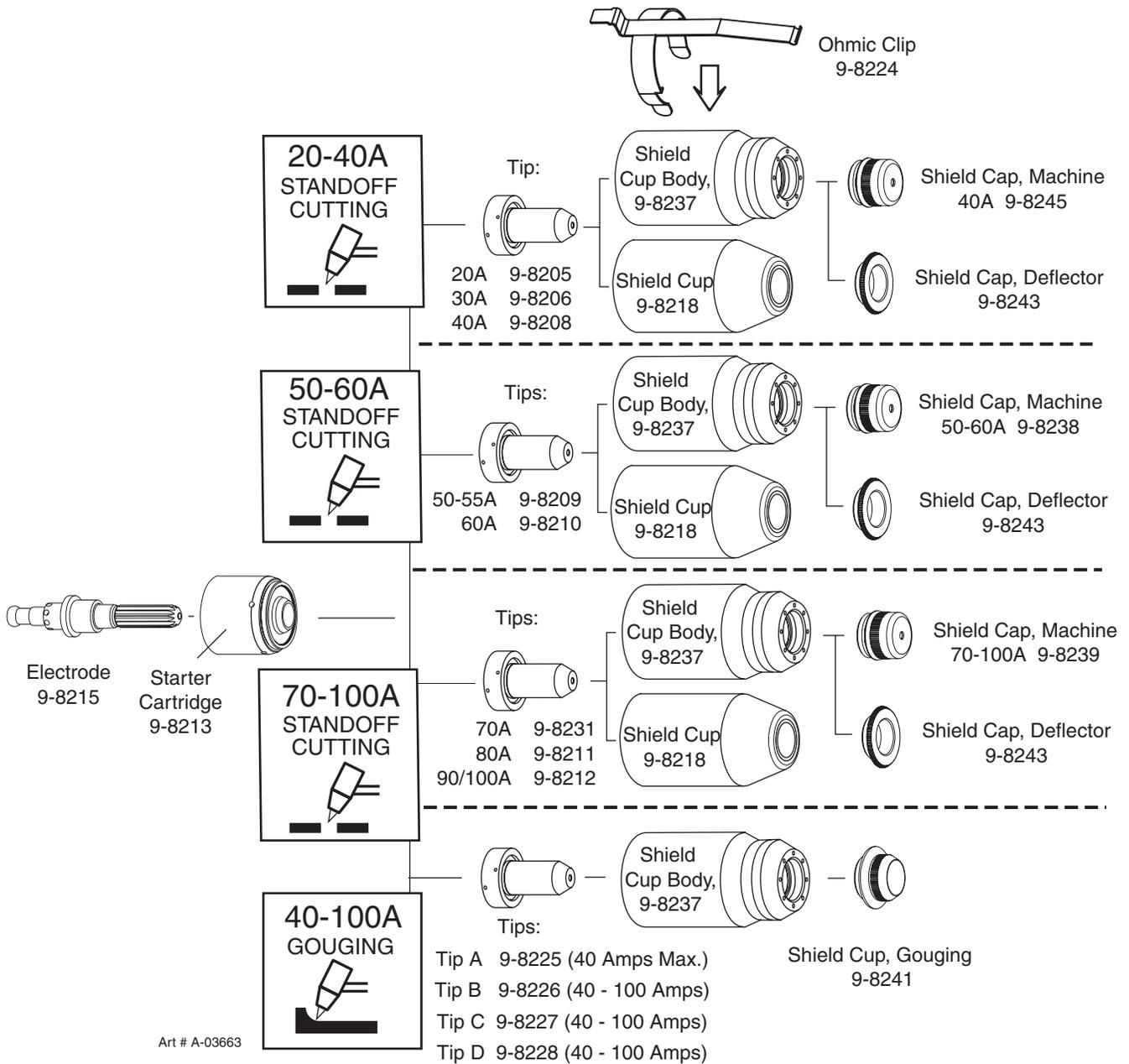
Use the Shield Cup Body with the Gouging Shield Cap for excellent gouging performance and enhanced torch parts life.

The electrode and starter cartridge are the same for all operations.

## 6.09 Machine Torch Spare Parts Kits

**Machine Torch Spare Parts Kit Contents**

Item	Catalog No.	40-Amp Kit, Cat No. 5-0052	60-Amp Kit, Cat No. 5-0077	80-Amp Kit, Cat No. 5-0120	100-Amp Kit, Cat No. 5-0171
Electrode	9-8215	3	3	3	3
40A Standoff Tip	9-8208	5	5	5	5
60A Standoff Tip	9-8210		5		
80A Standoff Tip	9-8211			5	
100A Standoff Tip	9-8212				5
Shield Cup	9-8218	1	1	1	1
Large O-Ring	8-3487	1	1	1	1
Small O-Ring	8-3486	1	1	1	1
Start Cartridge	9-8213	1	1	1	1



Gouging Profiles			
	Output Range	Depth	Width
Tip A	40 Amps Max.	Shallow	Narrow
Tip B	40-100 Amps	Deep	Narrow
Tip C	40-100 Amps	Moderate	Moderate
Tip D	40-100 Amps	Shallow	Wide

## 6.10 Automated Torch Consumables

The illustration shows all consumable parts for the SL100 automated torch. Refer to the Appendix pages covering the power supply being used to ensure proper selection for the application.

Various front - end torch parts are available for different applications.

The Shield Cup Body with the Deflector Shield Cap provides extended parts life and improved resistance to reflected heat. This combination provides easy change-over to gouging or drag shield cutting.

Use the Shield Cup Body with the Gouging Shield Cap for excellent gouging performance and enhanced torch parts life.

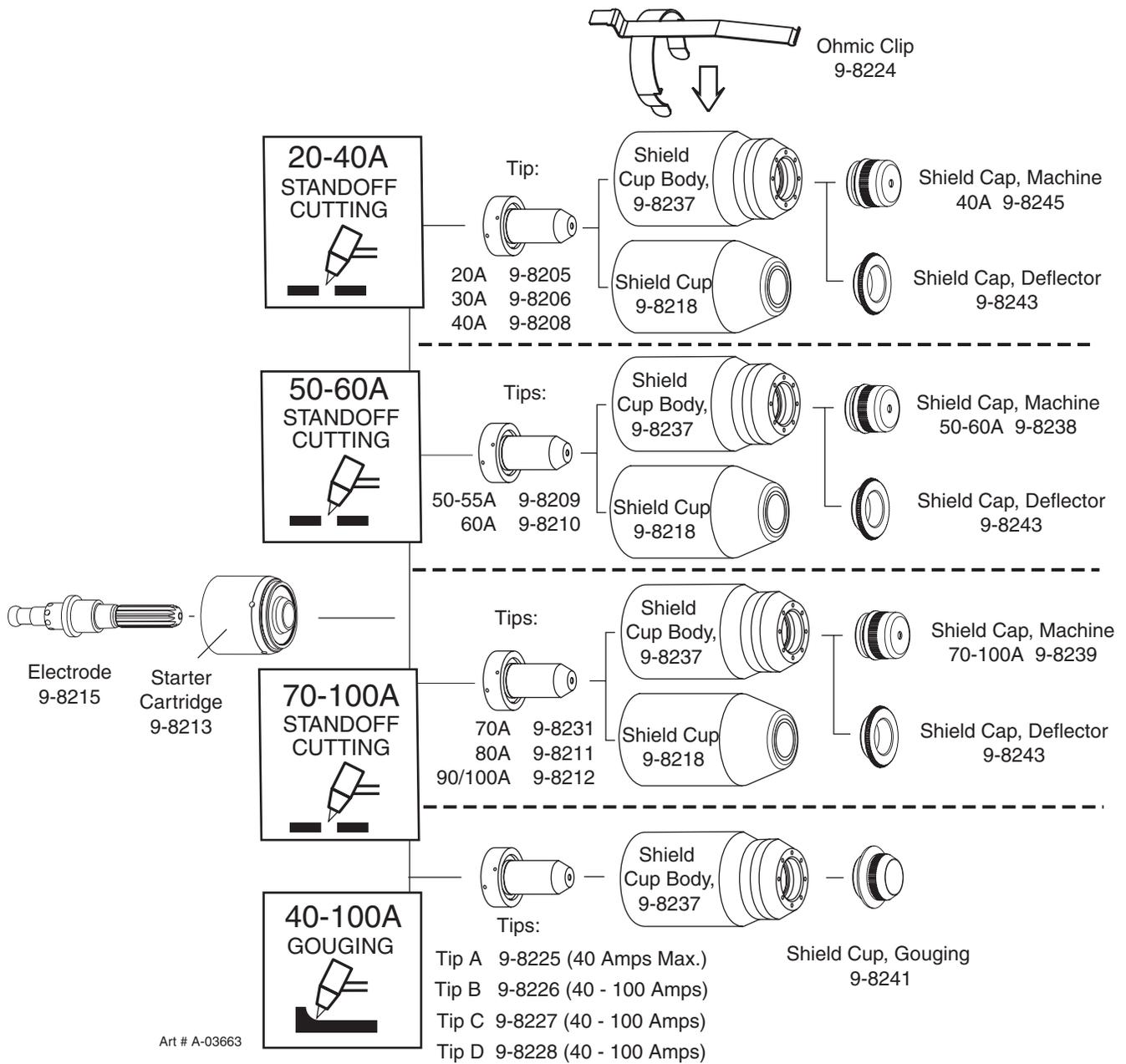
The electrode and starter cartridge are the same for all operations.

## 6.11 Automated Torch Spare Parts Kits

**Automation Torch Spare Parts Kit Contents**

Item	Catalog No.	40-Amp Kit, Cat No. <b>5-0054</b>	60-Amp Kit, Cat No. <b>5-0079</b>	80-Amp Kit, Cat No. <b>5-0122</b>	100-Amp Kit, Cat No. <b>5-0174</b>
Electrode	9-8215	3	3	3	3
30A Standoff Tip	9-8206	5	5	5	5
40A Standoff Tip	9-8208	5	5	5	5
60A Standoff Tip	9-8210		5	5	5
80A Standoff Tip	9-8211			5	5
100A Standoff Tip	9-8212				5
Shield Cup Body	9-8237	1	1	1	1
Shield Cap, Deflector	9-8243	1	1	1	1
Shield Cap, Machine, 40A	9-8245	1	1	1	1
Shield Cap, Machine, 60A	9-8238		1	1	1
Shield Cap, Machine, 70-100A	9-8239			1	1
Large O-Ring	8-3487	1	1	1	1
Small O-Ring	8-3486	1	1	1	1
Start Cartridge	9-8213	1	1	1	1
Ohmic Clip Kit	9-8224	1	1	1	1

# Automated Torch Consumables Selection



Art # A-03663

Gouging Profiles			
	Output Range	Depth	Width
Tip A	40 Amps Max.	Shallow	Narrow
Tip B	40-100 Amps	Deep	Narrow
Tip C	40-100 Amps	Moderate	Moderate
Tip D	40-100 Amps	Shallow	Wide

## 6.12 Complete Assembly Replacement

### NOTE

*The Complete Torch & Leads Assembly Replacement does not include the Torch Control Cable Adapter.*

Description	Catalog #
<b>60 - Amp Hand Torch and Leads Assemblies:</b>	
SL60 Hand Torch and 20 foot / 6.1 m Leads, with O2B Connector	7-5200
SL60 Hand Torch and 50 foot / 15.2 m Leads, with O2B Connector	7-5201
SL60 Hand Torch and 20 foot / 6.1 m Leads, with ATC Connector	7-5204
SL60 Hand Torch and 50 foot / 15.2 m Leads, with ATC Connector	7-5205
<b>100 - Amp Hand Torch and Leads Assemblies:</b>	
SL100 Hand Torch and 20 foot / 6.1 m Leads, with O2B Connector	7-5202
SL100 Hand Torch and 50 foot / 15.2 m Leads, with O2B Connector	7-5203
SL100 Hand Torch and 20 foot / 6.1 m Leads, with ATC Connector	7-5206
SL100 Hand Torch and 50 foot / 15.2 m Leads, with ATC Connector	7-5208
<b>100 - Amp Machine Torch and Leads Assemblies, Unshielded Leads:</b>	
SL100 Machine Torch and 25 foot / 7.6 m Leads, with O2B Connector	7-5209
SL100 Machine Torch and 50 foot / 15.2 m Leads, with O2B Connector	7-5210
SL100 Machine Torch and 5 foot / 1.5 m Leads, with ATC Connector	7-5213
SL100 Machine Torch and 10 foot / 3.05 m Leads, with ATC Connector	7-5214
SL100 Machine Torch and 25 foot / 7.6 m Leads, with ATC Connector	7-5215
SL100 Machine Torch and 50 foot / 15.2 m Leads, with ATC Connector	7-5216
<b>100 - Amp Machine Torch and Leads Assemblies, Shielded Leads</b>	
SL100 Machine Torch and 25 foot / 7.6 m Leads, with O2B Connector	7-5211
SL100 Machine Torch and 50 foot / 15.2 m Leads, with O2B Connector	7-5212
SL100 Machine Torch and 5 foot / 1.5 m Leads, with ATC Connector	7-5219
SL100 Machine Torch and 10 foot / 3 m Leads, with ATC Connector	7-5220
SL100 Machine Torch and 25 foot / 7.6 m Leads, with ATC Connector	7-5221
SL100 Machine Torch and 50 foot / 15.2 m Leads, with ATC Connector	7-5222

## 6.13 Options & Accessories

Qty	Description	Catalog #
1	ATC Adapter Kit, Unshielded	7-5207
1	ATC Adapter Kit, Shielded	7-3472
1 7-7544	Unshielded Leads extensions with ATC connectors, 15 - foot / 4.6 m length	
1 7-7545	Unshielded Leads extensions with ATC connectors, 25 - foot / 7.6 m length	
1	Unshielded Leads extensions with ATC connectors, 50 - foot / 15.2 m length	7-7552
1 4-7854	Shielded Leads extensions with ATC connectors, 25 - foot / 7.6 m length	
1 4-7855	Shielded Leads extensions with ATC connectors, 50 - foot / 15.2 m length	
1	Deluxe Cutting Guide Kit	7-8910
1	Radius / Roller Cutting Guide Kit	7-7501
1	Circle Cutting Guide Kit	7-3291
1	Remote Hand Pendant Control with 20 ft. Cable	7-3460
1	Hand Pendant Extension - 25 ft	7-7744
1	Computer Control (CNC) Cable	
	25 Foot / 7.6 m length	8-5557
	50 Foot / 15.2 m length	8-5558
1	Leather Leads Cover, 20 foot / 6.1 m	9-1260
1	Leather Leads Cover, 25 foot / 7.6 m	9-1270
1	Leather Leads Cover, 50 foot / 15.2 m	9-1280
1	OhmicClip Kit (for Automated Applications only)	9-8224

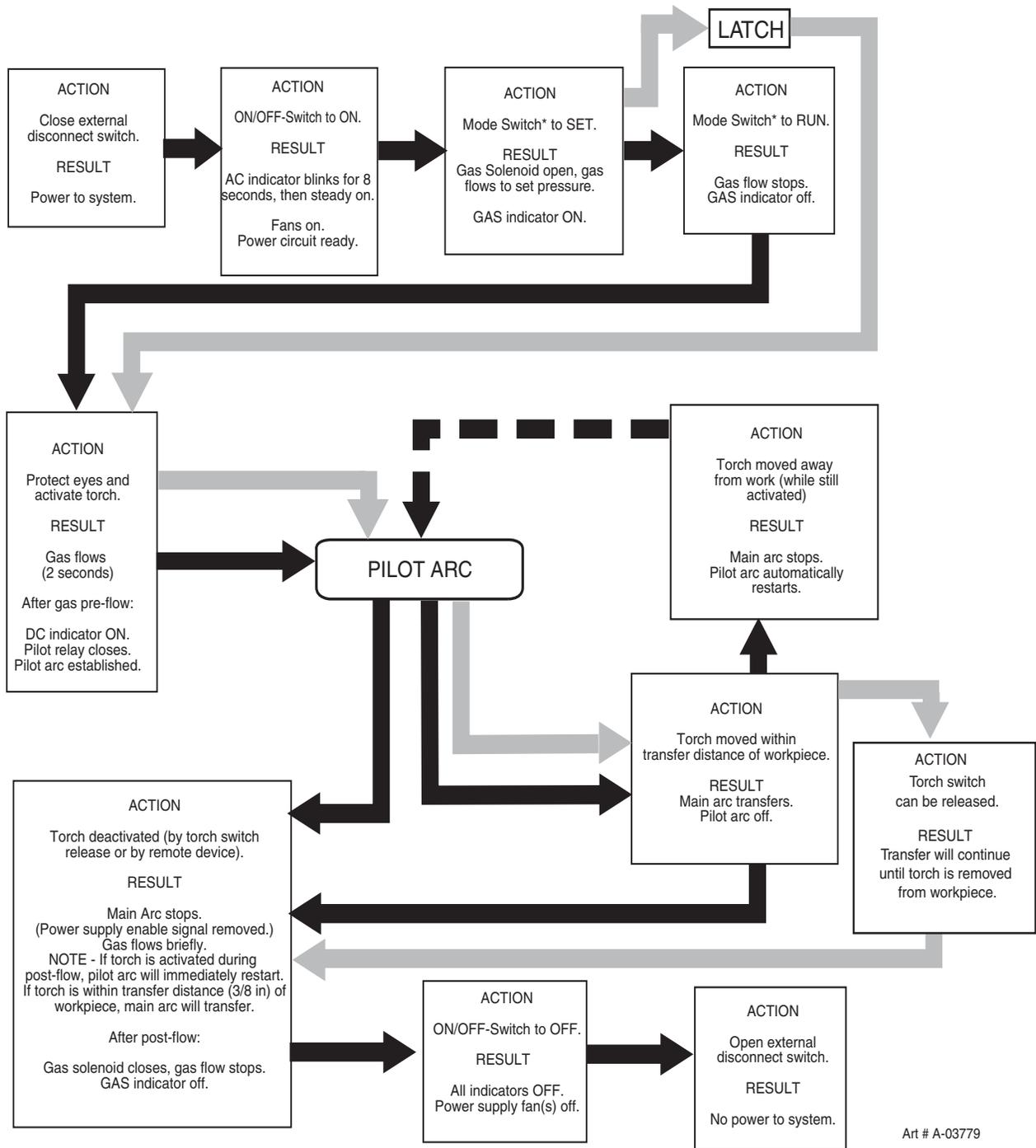
# PATENT INFORMATION

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The following parts are licensed under U.S. Patent No(s). 5120930 and 5132512

<b>Catalog Number</b>	<b>Description</b>
9-8235	Shield Cap, Drag 50-60A
9-8236	Shield Cap, Drag 70-100A
9-8237	Shield Cup, Body
9-8238	Shield Cap, Machine 50-60A
9-8239	Shield Cap, Machine 70-100A
9-8244	Shield Cap, Drag 40A
9-8245	Shield Cap, Machine 40A

# APPENDIX 1: TYPICAL SYSTEM SEQUENCE OF OPERATION BLOCK DIAGRAM



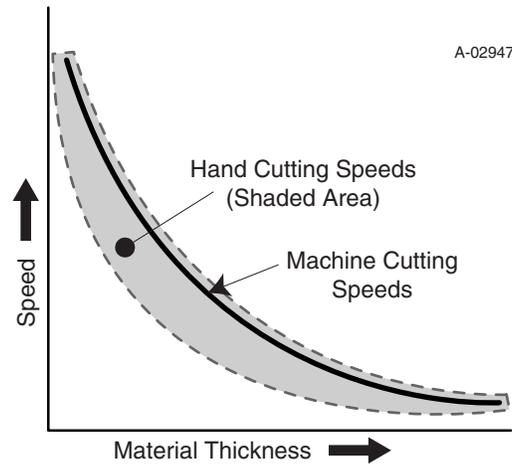
Art # A-03779

- \* Mode switch settings in PakMaster Series are RUN / SET / LATCH.
- \* Mode switch settings in CutMaster 50, CutMaster 75 and CutMaster 100 are RUN / SET.
- \* Mode switch settings in CutMaster 51, CutMaster 81 and CutMaster 101 are RUN / RAPID AUTO RESTART / SET.

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## APPENDIX 2: GENERAL APPLICATION NOTES

### A. Hand Cutting Versus Machine (Mechanized) Cutting Speeds



Hand cutting speeds can be much less than those obtained from Machine (Mechanized) Type applications. Hand cutting application speeds mostly depend on operator experience. The cut quality obtained at slower speeds for a Hand application is just as good as those obtained from a Machine application. As the cut speeds increase or decrease from the Machine applications the following may occur:

- If cut speed is too fast the cut may exhibit one or more of the following: Insufficient Penetration, High Speed Dross, Poor Consumable Life, Excessive Bevel Angle.
- If cut speed is too slow the cut may exhibit one or more of the following: Main Arc Extinguishes, Slow Speed Dross, Wandering (Unstable) Arc, Poor Consumable Life.

# APPENDIX 3A: CUTMASTER 50 & CUTMASTER 51 SYSTEM DATA (HAND TORCH)

Torch Specifications For CutMaster 50 & CutMaster 51 Power Supplies	
<b>Cutting Range</b>	
Material	Mild Steel
Genuine Cut:	
Up to	1/2 inch - 12.7 mm
Speed	12-14 ipm / 0.3 - 0.36 mpm
<b>Pierce Rating</b>	
Material	Mild Steel
Thickness:	
Hand Cutting	1/2 inch - 12.7 mm
Machine Cutting	1/4 inch - 6.4 mm
<b>Transfer Distance</b>	
	3/8 inch - 9.5 mm
<b>Gouging</b>	
Width	3/16 inch - 4.8 mm
Depth	1/8 inch - 3.2 mm
Number Passes	Single
Speed	20 ipm / 0.5 mpm
<b>Bevel Cut Capability</b>	
Degrees	0° to 45°
Material Thickness	3/8 inch - 9.5 mm
<b>Gas Requirement</b>	
Type Gas	Air
Operating Pressure	75 psi / 5.2 bar
Max Input Pressure	125 psi / 8.6 bar
Total Flow Rate:	
Cutting	350 scfh / 165 lpm
Gouging	230 scfh / 109 lpm

## Cut Quality on Various Materials and Thicknesses

The following table defines the cut quality on various materials and thicknesses:

Cut Quality on Various Materials			
Material Thickness	Type of Material	Type of Gas	Cut Characteristics
Gage to 1/2 inch (12.7 mm)	Carbon Steel	Air	Good - Excellent
	Stainless	Air	Good
	Aluminum	Air	Good

## Description of Cut Characteristics:

**Excellent** - Minimum bevel (0 - 4°), minimum kerf (2 x tip orifice diameter), little or no dross, smooth cut surface.

**Good** - Slight bevel (0 - 10°), slightly wider kerf (2-1/2 x tip orifice diameter), some dross (easily removed), medium - smooth cut surface, slight top edge rounding.

Gouging Profiles			
	Output Range	Depth	Width
Tip A	40 Amps Max.	Shallow	Narrow
Tip B	40-100 Amps	Deep	Narrow
Tip C	40-100 Amps	Moderate	Moderate
Tip D	40-100 Amps	Shallow	Wide

SL60 - SL100 Hand Torch Consumables for 40-Amp Power Supply						
Application	Electrode	Starter Cartridge	Tip	Shield Cup Body	Shield Cap or Deflector	Shield Cup
Drag Cutting	9-8215	9-8213	9-8207 (40A)	None	None	9-8218
Standoff Cutting	9-8215	9-8213	9-8208 (40A)	None	None	9-8218
	9-8215	9-8213	9-8208 (40A)	9-8237	9-8244 or 9-8243	None
Gouging	9-8215	9-8213	Tip A: 9-8225 (40A Max) Tip B: 9-8226 (40-100A) Tip C: 9-8227 (40-100A) Tip D: 9-8228 (40-100A)	9-8237	9-8241	None

## Cutting Speed Charts

Air Plasma Cutting Speed Data Chart For CutMaster 50 & CutMaster 51															
Type Torch: SL60 - Drag								Type Material: Aluminum							
Type Plasma Gas: Air								Type Secondary Gas: Single Gas Torch							
Thickness		Tip	Output Volts	Amperage	Speed (Per Minute)		Standoff		Plasma Gas Press		Flow (SCFH)		Pierce	Pierce Height	
Inches	mm	(Cat. No.)	(VDC)	(Amps)	Inches	Meters	Inches	mm	psi*	bar	Plasma	Total**	Delay (Sec)	Inches	mm
20 ga	0.9	9-8207	80	40	300	7.62	N/A	N/A	75	5.2	50	350	0	0.00	0.0
16 ga	1.5	9-8207	80	40	275	6.99	N/A	N/A	75	5.2	50	350	0	0.19	4.8
10 ga	3.4	9-8207	80	40	75	1.91	N/A	N/A	75	5.2	50	350	0	0.19	4.8
7 ga	4.6	9-8207	85	40	55	1.40	N/A	N/A	75	5.2	50	350	0.5	0.19	4.8
1/4	6.4	9-8207	90	40	40	1.02	N/A	N/A	75	5.2	50	350	0.5	0.19	4.8
3/8	9.5	9-8207	100	40	18	0.46	N/A	N/A	75	5.2	50	350	1	0.25	6.4
1/2	12.7	9-8207	100	40	10	0.25	N/A	N/A	75	5.2	50	350	1.5	0.25	6.4

Air Plasma Cutting Speed Data Chart For CutMaster 50 & CutMaster 51															
Type Torch: SL60 - Drag								Type Material: Mild Steel							
Type Plasma Gas: Air								Type Secondary Gas: Single Gas Torch							
Thickness		Tip	Output Volts	Amperage	Speed (Per Minute)		Standoff		Plasma Gas Press		Flow (SCFH)		Pierce	Pierce Height	
Inches	mm	(Cat. No.)	(VDC)	(Amps)	Inches	Meters	Inches	mm	psi*	bar	Plasma	Total**	Delay (Sec)	Inches	mm
20 ga	0.9	9-8207	80	40	300	7.62	N/A	N/A	75	5.2	50	350	0	0.00	0.0
16 ga	1.5	9-8207	80	40	275	6.99	N/A	N/A	75	5.2	50	350	0	0.19	4.8
10 ga	3.4	9-8207	80	40	105	2.67	N/A	N/A	75	5.2	50	350	0	0.19	4.8
7 ga	4.6	9-8207	85	40	70	1.78	N/A	N/A	75	5.2	50	350	0.5	0.19	4.8
1/4	6.4	9-8207	90	40	39	0.99	N/A	N/A	75	5.2	50	350	0.5	0.19	4.8
3/8	9.5	9-8207	100	40	20	0.51	N/A	N/A	75	5.2	50	350	1	0.25	6.4
1/2	12.7	9-8207	100	40	10	0.25	N/A	N/A	75	5.2	50	350	1.5	0.25	6.4

Air Plasma Cutting Speed Data Chart For CutMaster 50 & CutMaster 51															
Type Torch: SL60 - Drag								Type Material: Stainless Steel							
Type Plasma Gas: Air								Type Secondary Gas: Single Gas Torch							
Thickness		Tip	Output Volts	Amperage	Speed (Per Minute)		Standoff		Plasma Gas Press		Flow (SCFH)		Pierce	Pierce Height	
Inches	mm	(Cat. No.)	(VDC)	(Amps)	Inches	Meters	Inches	mm	psi*	bar	Plasma	Total**	Delay (Sec)	Inches	mm
20 ga	0.9	9-8207	80	40	300	7.62	N/A	N/A	75	5.2	50	350	0	0.00	0.0
16 ga	1.5	9-8207	80	40	275	6.99	N/A	N/A	75	5.2	50	350	0	0.19	4.8
10 ga	3.4	9-8207	80	40	75	1.91	N/A	N/A	75	5.2	50	350	0	0.19	4.8
7 ga	4.6	9-8207	85	40	55	1.40	N/A	N/A	75	5.2	50	350	0.5	0.19	4.8
1/4	6.4	9-8207	90	40	40	1.02	N/A	N/A	75	5.2	50	350	0.5	0.19	4.8
3/8	9.5	9-8207	100	40	18	0.46	N/A	N/A	75	5.2	50	350	1	0.25	6.4
1/2	12.7	9-8207	100	40	10	0.25	N/A	N/A	75	5.2	50	350	1.5	0.25	6.4

### NOTES

\* Gas pressure shown is for torches with leads up to 25' / 7.6 m long. For 50' / 15.2 m leads, set gas pressure to 85 psi / 5.9 bar.

\*\* Total flow rate includes plasma and secondary gas flow.

## APPENDIX 3B: CUTMASTER 50 & CUTMASTER 51 SYSTEM DATA (MACHINE TORCH)

Torch Specifications For CutMaster 50 & CutMaster 51 Power Supplies	
<b>Cutting Range</b>	
Material	Mild Steel
Genuine Cut:	
Up to Speed	1/2 inch - 12.7 mm 12-14 ipm / 0.3 - 0.36 mpm
<b>Pierce Rating</b>	
Material	Mild Steel
Thickness:	
Hand Cutting	1/2 inch - 12.7 mm
Machine Cutting	1/4 inch - 6.4 mm
<b>Transfer Distance</b>	
3/8 inch - 9.5 mm	
<b>Gouging</b>	
Width	3/16 inch - 4.8 mm
Depth	1/8 inch - 3.2 mm
Number Passes	Single
Speed	20 ipm / 0.5 mpm
<b>Bevel Cut Capability</b>	
Degrees	0° to 45°
Material Thickness	3/8 inch - 9.5 mm
<b>Gas Requirement</b>	
Type Gas	Air
Operating Pressure	65 psi / 4.5 bar
Max Input Pressure	125 psi / 8.6 bar
Total Flow Rate:	
Cutting	350 scfh / 165 lpm
Gouging	230 scfh / 109 lpm

### Cut Quality on Various Materials and Thicknesses

The following table defines the cut quality on various materials and thicknesses:

Cut Quality on Various Materials			
Material Thickness	Type of Material	Type of Gas	Cut Characteristics
Gage to 1/2 inch (12.7 mm)	Carbon Steel	Air	Good - Excellent
	Stainless	Air	Good
	Aluminum	Air	Good

### Description of Cut Characteristics:

**Excellent** - Minimum bevel (0 - 4°), minimum kerf (2 x tip orifice diameter), little or no dross, smooth cut surface.

**Good** - Slight bevel (0 - 10°), slightly wider kerf (2-1/2 x tip orifice diameter), some dross (easily removed), medium - smooth cut surface, slight top edge rounding.

Gouging Profiles			
	Output Range	Depth	Width
Tip A	40 Amps Max.	Shallow	Narrow
Tip B	40-100 Amps	Deep	Narrow
Tip C	40-100 Amps	Moderate	Moderate
Tip D	40-100 Amps	Shallow	Wide

SL100 Machine Torch Consumables for 40-Amp Power Supply						
Application	Electrode	Starter Cartridge	Tip	Shield Cup Body	Shield Cap or Deflector	Shield Cup
Standoff Cutting	9-8215	9-8213	9-8208 (40A)	None	None	9-8218
	9-8215	9-8213	9-8208 (40A)	9-8237	9-8245 or 9-8243	None
Gouging	9-8215	9-8213	Tip A: 9-8225 (40 A Max) Tip B: 9-8226 (40-100 A) Tip C: 9-8227 (40-100 A) Tip D: 9-8228 (40-100 A)	9-8237	9-8241	None

## Cutting Speed Charts

Air Plasma Cutting Speed Data Chart For CutMaster 50 & CutMaster 51															
Type Torch: SL100								Type Material: Aluminum							
Type Plasma Gas: Air								Type Secondary Gas: Single Gas Torch							
Thickness		Tip	Output Volts	Amperage	Speed (Per Minute)		Standoff		Plasma Gas Press		Flow (SCFH)		Pierce	Pierce Height	
Inches	mm	(Cat. No.)	(VDC)	(Amps)	Inches	Meters	Inches	mm	psi*	bar	Plasma	Total**	Delay (Sec)	Inches	mm
20 ga	0.8	9-8208	90	40	350	8.89	0.19	4.8	65	4.5	50	350	0	0.19	4.8
16 ga	1.3	9-8208	94	40	275	6.99	0.19	4.8	65	4.5	50	350	0	0.19	4.8
10 ga	2.6	9-8208	105	40	100	2.54	0.19	4.8	65	4.5	50	350	0	0.19	4.8
7 ga	3.7	9-8208	100	40	70	1.78	0.19	4.8	65	4.5	50	350	0	0.19	4.8
1/4	6.4	9-8208	107	40	40	1.02	0.19	4.8	65	4.5	50	350	0.5	0.19	4.8
3/8	9.5	9-8208	114	40	18	0.46	0.19	4.8	65	4.5	50	350	0.5	0.19	4.8
1/2	12.7	9-8208	121	40	10	0.25	0.19	4.8	65	4.5	50	350	1	0.19	4.8

Air Plasma Cutting Speed Data Chart For CutMaster 50 & CutMaster 51															
Type Torch: SL100								Type Material: Mild Steel							
Type Plasma Gas: Air								Type Secondary Gas: Single Gas Torch							
Thickness		Tip	Output Volts	Amperage	Speed (Per Minute)		Standoff		Plasma Gas Press		Flow (SCFH)		Pierce	Pierce Height	
Inches	mm	(Cat. No.)	(VDC)	(Amps)	Inches	Meters	Inches	mm	psi*	bar	Plasma	Total**	Delay (Sec)	Inches	mm
20 ga	0.9	9-8208	90	40	300	7.62	0.13	3.2	65	4.5	50	350	0	0.19	4.8
16 ga	1.5	9-8208	90	40	275	6.99	0.13	3.2	65	4.5	50	350	0	0.19	4.8
10 ga	3.4	9-8208	90	40	115	2.92	0.13	3.2	65	4.5	50	350	0	0.19	4.8
7 ga	4.6	9-8208	95	40	75	1.91	0.13	3.2	65	4.5	50	350	0.5	0.19	4.8
1/4	6.4	9-8208	110	40	45	1.14	0.19	4.8	65	4.5	50	350	0.5	0.19	4.8
3/8	9.5	9-8208	119	40	20	0.51	0.19	4.8	65	4.5	50	350	1	0.25	6.4
1/2	12.7	9-8208	121	40	14	0.36	0.19	4.8	65	4.5	50	350	1.5	0.25	6.4

Air Plasma Cutting Speed Data Chart For CutMaster 50 & CutMaster 51															
Type Torch: SL100								Type Material: Stainless Steel							
Type Plasma Gas: Air								Type Secondary Gas: Single Gas Torch							
Thickness		Tip	Output Volts	Amperage	Speed (Per Minute)		Standoff		Plasma Gas Press		Flow (SCFH)		Pierce	Pierce Height	
Inches	mm	(Cat. No.)	(VDC)	(Amps)	Inches	Meters	Inches	mm	psi*	bar	Plasma	Total**	Delay (Sec)	Inches	mm
20 ga	0.9	9-8208	95	40	300	7.62	0.19	4.8	65	4.5	50	350	0	0.19	4.8
16 ga	1.5	9-8208	95	40	275	6.99	0.19	4.8	65	4.5	50	350	0	0.19	4.8
10 ga	3.5	9-8208	100	40	75	1.91	0.19	4.8	65	4.5	50	350	0	0.19	4.8
7 ga	4.6	9-8208	105	40	55	1.40	0.19	4.8	65	4.5	50	350	0	0.19	4.8
1/4	6.4	9-8208	105	40	40	1.02	0.19	4.8	65	4.5	50	350	0.5	0.19	4.8
3/8	9.5	9-8208	110	40	18	0.46	0.19	4.8	65	4.5	50	350	1	0.19	4.8
1/2	12.7	9-8208	119	40	10	0.25	0.19	4.8	65	4.5	50	350	1.5	0.19	4.8

### NOTES

\* Gas pressure shown is for torches with leads up to 25' / 7.6 m long. For 50' / 15.2 m leads, set gas pressure to 70 psi / 4.8 bar.

\*\* Total flow rate includes plasma and secondary gas flow.

# APPENDIX 4A: CUTMASTER 75 & CUTMASTER 81 SYSTEM DATA (HAND TORCH)

Torch Specifications For CutMaster 75 & CutMaster 81 Power Supplies	
<b>Cutting Range</b>	
Material	Most Metals
Up to	3/4 inch - 19 mm
Speed	11 ipm / 0.28 mpm
<b>Pierce Rating</b>	
Material	Carbon Steel
Thickness	3/8 inch - 9.5 mm
<b>Transfer Distance</b> 3/8 inch - 9.5 mm	
<b>Gouging</b>	
Width	1/4 inch - 6.3 mm
Depth	1/8 inch - 3.2 mm
Number Passes	Single
Speed	20 ipm / 0.5 mpm
<b>Bevel Cut Capability</b>	
Degrees	0° to 45°
Material Thickness	1/4 inch - 6.3 mm
<b>Gas Requirement</b>	
Type Gas	Air
Operating Pressure	70 psi / 4.8 bar
Max Input Pressure	125 psi / 8.6 bar
Cutting & Gouging Total Flow	350 scfh / 165 lpm

## Cut Quality on Various Materials and Thicknesses

The following table defines the cut quality on various materials and thicknesses:

Cut Quality on Various Materials			
Material Thickness	Type of Material	Type of Gas	Cut Characteristics
Gage to 3/4 inch (19 mm)	Carbon Steel	Air	Good - Excellent
	Stainless	Air	Good
	Aluminum	Air	Good

### Description of Cut Characteristics:

**Excellent** - Minimum bevel (0 - 4°), minimum kerf (2 x tip orifice diameter), little or no dross, smooth cut surface.

**Good** - Slight bevel (0 - 10°), slightly wider kerf (2-1/2 x tip orifice diameter), some dross (easily removed), medium - smooth cut surface, slight top edge rounding.

Gouging Profiles			
	Output Range	Depth	Width
Tip A	40 Amps Max.	Shallow	Narrow
Tip B	40-100 Amps	Deep	Narrow
Tip C	40-100 Amps	Moderate	Moderate
Tip D	40-100 Amps	Shallow	Wide

SL60 - SL100 Hand Torch Consumables for 60-Amp Power Supply						
Application	Electrode	Starter Cartridge	Tip	Shield Cup Body	Shield Cap or Deflector	Shield Cup
Drag Cutting	9-8215	9-8213	9-8207 (40A)	None	None	9-8218
Standoff Cutting	9-8215	9-8213	9-8210 (60A)	None	None	9-8218
	9-8215	9-8213	9-8210 (60A)	9-8237	9-8235 or 9-8243	None
Gouging	9-8215	9-8213	Tip A: 9-8225 (40A Max) Tip B: 9-8226 (40-100A) Tip C: 9-8227 (40-100A) Tip D: 9-8228 (40-100A)	9-8237	9-8241	None

## Cutting Speed Charts

Air Plasma Cutting Speed Data Chart For CutMaster 75 & CutMaster 81															
Type Torch: SL60								Type Material: Aluminum							
Type Plasma Gas: Air								Type Secondary Gas: Single Gas Torch							
Thickness		Tip	Output Volts	Amperage	Speed (Per Minute)		Standoff		Plasma Gas Press		Flow (SCFH)		Pierce	Pierce Height	
Inches	mm	(Cat. No.)	(VDC)	(Amps)	Inches	Meters	Inches	mm	psi*	bar	Plasma	Total**	Delay (Sec)	Inches	mm
0.06	1.6	9-8210	95	60	350	8.89	0.19	4.8	70	4.8	80	400	0	0.19	4.8
0.125	3.2	9-8210	98	60	175	4.45	0.19	4.8	70	4.8	80	400	0	0.19	4.8
1/4	6.4	9-8210	102	60	80	2.03	0.19	4.8	70	4.8	80	400	0	0.19	4.8
3/8	9.5	9-8210	109	60	44	1.12	0.19	4.8	70	4.8	80	400	0	0.19	4.8
1/2	12.7	9-8210	115	60	23	0.58	0.19	4.8	70	4.8	80	400	0	0.19	4.8
3/4	19.1	9-8210	117	60	11	0.28	0.19	4.8	70	4.8	80	400	NR	0.19	4.8

Air Plasma Cutting Speed Data Chart For CutMaster 75 & CutMaster 81															
Type Torch: SL60								Type Material: Mild Steel							
Type Plasma Gas: Air								Type Secondary Gas: Single Gas Torch							
Thickness		Tip	Output Volts	Amperage	Speed (Per Minute)		Standoff		Plasma Gas Press		Flow (SCFH)		Pierce	Pierce Height	
Inches	mm	(Cat. No.)	(VDC)	(Amps)	Inches	Meters	Inches	mm	psi*	bar	Plasma	Total**	Delay (Sec)	Inches	mm
0.06	1.6	9-8210	95	60	350	8.89	0.19	4.8	70	4.8	80	400	0	0.19	4.8
1/8	3.2	9-8210	98	60	175	4.45	0.19	4.8	70	4.8	80	400	0	0.19	4.8
1/4	6.4	9-8210	102	60	80	2.03	0.19	4.8	70	4.8	80	400	0	0.19	4.8
3/8	9.5	9-8210	109	60	44	1.12	0.19	4.8	70	4.8	80	400	0	0.19	4.8
1/2	12.7	9-8210	115	60	23	0.58	0.19	4.8	70	4.8	80	400	0	0.19	4.8
3/4	19.1	9-8210	117	60	11	0.28	0.19	4.8	70	4.8	80	400	NR	0.19	4.8

Air Plasma Cutting Speed Data Chart For CutMaster 75 & CutMaster 81															
Type Torch: SL60								Type Material: Stainless Steel							
Type Plasma Gas: Air								Type Secondary Gas: Single Gas Torch							
Thickness		Tip	Output Volts	Amperage	Speed (Per Minute)		Standoff		Plasma Gas Press		Flow (SCFH)		Pierce	Pierce Height	
Inches	mm	(Cat. No.)	(VDC)	(Amps)	Inches	Meters	Inches	mm	psi*	bar	Plasma	Total**	Delay (Sec)	Inches	mm
0.06	1.6	9-8210	95	60	350	8.89	0.19	4.8	70	4.8	80	400	0	0.19	4.8
1/8	3.2	9-8210	98	60	150	3.81	0.19	4.8	70	4.8	80	400	0	0.19	4.8
1/4	6.4	9-8210	102	60	70	1.78	0.19	4.8	70	4.8	80	400	0	0.19	4.8
3/8	9.5	9-8210	109	60	35	0.89	0.19	4.8	70	4.8	80	400	0	0.19	4.8
1/2	12.7	9-8210	115	60	20	0.51	0.19	4.8	70	4.8	80	400	0	0.19	4.8
3/4	19.1	9-8210	117	60	10	0.25	0.19	4.8	70	4.8	80	400	NR	0.19	4.8

### NOTES

\* Gas pressure shown is for torches with leads up to 25' / 7.6 m long. For 50' / 15.2 m leads, set gas pressure to 80 psi / 5.5 bar.

\*\* Total flow rate includes plasma and secondary gas flow.

# APPENDIX 4B: CUTMASTER 75 & CUTMASTER 81 SYSTEM DATA (MACHINE TORCH)

Torch Specifications For CutMaster 75 & CutMaster 81 Power Supplies	
<b>Cutting Range</b>	
Material	Most Metals
Up to	3/4 inch - 19 mm
Speed	11 ipm / 0.28 mpm
<b>Pierce Rating</b>	
Material	Carbon Steel
Thickness	3/8 inch - 9.5 mm
<b>Transfer Distance</b> 3/8 inch - 9.5 mm	
<b>Gouging</b>	
Width	1/4 inch - 6.3 mm
Depth	1/8 inch - 3.2 mm
Number Passes	Single
Speed	20 ipm / 0.5 mpm
<b>Bevel Cut Capability</b>	
Degrees	0° to 45°
Material Thickness	1/4 inch - 6.3 mm
<b>Gas Requirement</b>	
Type Gas	Air
Operating Pressure	65 psi / 4.5 bar
Max Input Pressure	125 psi / 8.6 bar
Cutting & Gouging Total Flow	350 scfh / 165 lpm

## Cut Quality on Various Materials and Thicknesses

The following table defines the cut quality on various materials and thicknesses:

Cut Quality on Various Materials			
Material Thickness	Type of Material	Type of Gas	Cut Characteristics
Gage to 3/4 inch (19 mm)	Carbon Steel	Air	Good - Excellent
	Stainless	Air	Good
	Aluminum	Air	Good

### Description of Cut Characteristics:

**Excellent** - Minimum bevel (0 - 4°), minimum kerf (2 x tip orifice diameter), little or no dross, smooth cut surface.

**Good** - Slight bevel (0 - 10°), slightly wider kerf (2-1/2 x tip orifice diameter), some dross (easily removed), medium - smooth cut surface, slight top edge rounding.

Gouging Profiles			
	Output Range	Depth	Width
Tip A	40 Amps Max.	Shallow	Narrow
Tip B	40-100 Amps	Deep	Narrow
Tip C	40-100 Amps	Moderate	Moderate
Tip D	40-100 Amps	Shallow	Wide

SL100 Machine Torch Consumables for 60-Amp Power Supply						
Application	Electrode	Starter Cartridge	Tip	Shield Cup Body	Shield Cap or Deflector	Shield Cup
Standoff Cutting	9-8215	9-8213	9-8210 (60A)	None	None	9-8218
	9-8215	9-8213	9-8210 (60A)	9-8237	9-8238 or 9-8243	None
Gouging	9-8215	9-8213	Tip A: 9-8225 (40 A Max) Tip B: 9-8226 (40-100 A) Tip C: 9-8227 (40-100 A) Tip D: 9-8228 (40-100 A)	9-8237	9-8241	None

## Cutting Speed Charts

Air Plasma Cutting Speed Data Chart For CutMaster 75 & CutMaster 81															
Type Torch: SL100								Type Material: Aluminum							
Type Plasma Gas: Air								Type Secondary Gas: Single Gas Torch							
Thickness		Tip	Output Volts	Amperage	Speed (Per Minute)		Standoff		Plasma Gas Press		Flow (SCFH)		Pierce	Pierce Height	
Inches	mm	(Cat. No.)	(VDC)	(Amps)	Inches	Meters	Inches	mm	psi*	bar	Plasma	Total**	Delay (Sec)	Inches	mm
0.06	1.6	9-8210	95	60	350	8.89	0.19	4.8	65	4.5	80	400	0	0.19	4.8
1/8	3.2	9-8210	98	60	175	4.45	0.19	4.8	65	4.5	80	400	0	0.19	4.8
1/4	6.4	9-8210	102	60	80	2.03	0.19	4.8	65	4.5	80	400	0	0.19	4.8
3/8	9.5	9-8210	109	60	44	1.12	0.19	4.8	65	4.5	80	400	0	0.19	4.8
1/2	12.7	9-8210	115	60	23	0.58	0.19	4.8	65	4.5	80	400	0	0.19	4.8
3/4	19.1	9-8210	117	60	11	0.28	0.19	4.8	65	4.5	80	400	NR	0.19	4.8

Air Plasma Cutting Speed Data Chart For CutMaster 75 & CutMaster 81															
Type Torch: SL100								Type Material: Mild Steel							
Type Plasma Gas: Air								Type Secondary Gas: Single Gas Torch							
Thickness		Tip	Output Volts	Amperage	Speed (Per Minute)		Standoff		Plasma Gas Press		Flow (SCFH)		Pierce	Pierce Height	
Inches	mm	(Cat. No.)	(VDC)	(Amps)	Inches	Meters	Inches	mm	psi*	bar	Plasma	Total**	Delay (Sec)	Inches	mm
0.06	1.6	9-8210	95	60	350	8.89	0.19	4.8	65	4.5	80	400	0	0.19	4.8
1/8	3.2	9-8210	98	60	175	4.45	0.19	65	65	4.5	80	400	0	0.19	4.8
1/4	6.4	9-8210	102	60	80	2.03	0.19	65	65	4.5	80	400	0	0.19	4.8
3/8	9.5	9-8210	109	60	44	1.12	0.19	65	65	4.5	80	400	0	0.19	4.8
1/2	12.7	9-8210	115	60	23	0.58	0.19	65	65	4.5	80	400	0	0.19	4.8
3/4	19.1	9-8210	117	60	11	0.28	0.19	65	65	4.5	80	400	NR	0.19	4.8

Air Plasma Cutting Speed Data Chart For CutMaster 75 & CutMaster 81															
Type Torch: SL100								Type Material: Stainless Steel							
Type Plasma Gas: Air								Type Secondary Gas: Single Gas Torch							
Thickness		Tip	Output Volts	Amperage	Speed (Per Minute)		Standoff		Plasma Gas Press		Flow (SCFH)		Pierce	Pierce Height	
Inches	mm	(Cat. No.)	(VDC)	(Amps)	Inches	Meters	Inches	mm	psi*	bar	Plasma	Total**	Delay (Sec)	Inches	mm
0.06	1.6	9-8210	95	60	350	8.89	0.19	4.8	65	4.5	80	400	0	0.19	4.8
0.125	3.2	9-8210	98	60	150	3.81	0.19	4.8	65	4.5	80	400	0	0.19	4.8
1/4	6.4	9-8210	102	60	70	1.78	0.19	4.8	65	4.5	80	400	0	0.19	4.8
3/8	9.5	9-8210	109	60	35	0.89	0.19	4.8	65	4.5	80	400	0	0.19	4.8
1/2	12.7	9-8210	115	60	20	0.51	0.19	4.8	65	4.5	80	400	0	0.19	4.8
3/4	19.1	9-8210	117	60	10	0.25	0.19	4.8	65	4.5	80	400	NR	0.19	4.8

### NOTES

\* Gas pressure shown is for torches with leads up to 25' / 7.6 m long. For 50' / 15.2 m leads, set gas pressure to 70 psi / 4.8 bar.

\*\* Total flow rate includes plasma and secondary gas flow.

# APPENDIX 5: CUTMASTER 100 & 101 SYSTEM DATA (HAND and MACHINE TORCH)

Torch Specifications For CutMaster 100 & CutMaster 101 Power Supplies	
<b>Cutting Range</b>	
Material	Most Metals
Up to	1 inch / 25.4 mm
Speed	10 ipm / 0.25 mpm
<b>Pierce Rating</b>	
Material	Carbon Steel
Thickness	3/8 inch / 9.5 mm
<b>Transfer Distance</b>	
3/8 inch / 9.5 mm	
<b>Gouging</b>	
Width	1/4 inch - 6.3 mm
Depth	3/16 inch - 4.8 mm
Number Passes	Single
Speed	20 ipm / 0.5 mpm
<b>Bevel Cut Capability</b>	
Degrees	0° to 45°
Material Thickness	1/2 inch - 13 mm
<b>Gas Requirement</b>	
Type Gas	Air
Operating Pressure	70 psi / 4.8 bar
Max Input Pressure	125 psi / 8.6 bar
Cutting & Gouging	490 scfh / 231 lpm
Total Flow	

### Cut Quality on Various Materials and Thicknesses

The following table defines the cut quality on various materials and thicknesses:

Cut Quality on Various Materials			
Material Thickness	Type of Material	Type of Gas	Cut Characteristics
Gage to 1 inch (25.4 mm)	Carbon Steel	Air	Good - Excellent
	Stainless	Air	Good
	Aluminum	Air	Good

### Description of Cut Characteristics:

**Excellent** - Minimum bevel (0 - 4°), minimum kerf (2 x tip orifice diameter), little or no dross, smooth cut surface.

**Good** - Slight bevel (0 - 10°), slightly wider kerf (2-1/2 x tip orifice diameter), some dross (easily removed), medium - smooth cut surface, slight top edge rounding.

Gouging Profiles			
	Output Range	Depth	Width
Tip A	40 Amps Max.	Shallow	Narrow
Tip B	40-100 Amps	Deep	Narrow
Tip C	40-100 Amps	Moderate	Moderate
Tip D	40-100 Amps	Shallow	Wide

SL100 Machine Torch Consumables for 80-Amp Power Supply						
Application	Electrode	Starter Cartridge	Tip	Shield Cup Body	Shield Cap or Deflector	Shield Cup
Standoff Cutting	9-8215	9-8213	9-8211 (80A)	None	None	9-8218
	9-8215	9-8213	9-8211 (80A)	9-8237	9-8239 or 9-8243	None
Gouging	9-8215	9-8213	Tip A: 9-8225 (40A Max) Tip B: 9-8226 (40-100A) Tip C: 9-8227 (40-100A) Tip D: 9-8228 (40-100A)	9-8237	9-8241	None

## Cutting Speed Charts

Air Plasma Cutting Speed Data Chart For CutMaster 100 & CutMaster 101															
Type Torch: SL100								Type Material: Aluminum							
Type Plasma Gas: Air								Type Secondary Gas: Single Gas Torch							
Thickness		Tip	Output Volts	Amperage	Speed (Per Minute)		Standoff		Plasma Gas Press		Flow (SCFH)		Pierce	Pierce Height	
Inches	mm	(Cat. No.)	(VDC)	(Amps)	Inches	Meters	Inches	mm	psi*	bar	Plasma	Total**	Delay (Sec)	Inches	mm
0.05	1.3	9-8211	100	80	350	8.89	0.19	4.8	70	4.8	90	490	0	0.19	4.8
0.125	3.2	9-8211	103	80	230	5.84	0.19	4.8	70	4.8	90	490	0	0.19	4.8
1/4	6.4	9-8211	106	80	112	2.84	0.19	4.8	70	4.8	90	490	0	0.19	4.8
3/8	9.5	9-8211	111	80	55	1.40	0.19	4.8	70	4.8	90	490	0	0.19	4.8
1/2	12.7	9-8211	112	80	38	0.97	0.19	4.8	70	4.8	90	490	0	0.19	4.8
3/4	19.1	9-8211	117	80	18	0.46	0.19	4.8	70	4.8	90	490	NR	0.19	4.8
1	25.4	9-8211	120	80	10	0.25	0.19	4.8	70	4.8	90	490	NR	0.19	4.8

Air Plasma Cutting Speed Data Chart For CutMaster 100 & CutMaster 101															
Type Torch: SL100								Type Material: Mild Steel							
Type Plasma Gas: Air								Type Secondary Gas: Single Gas Torch							
Thickness		Tip	Output Volts	Amperage	Speed (Per Minute)		Standoff		Plasma Gas Press		Flow (SCFH)		Pierce	Pierce Height	
Inches	mm	(Cat. No.)	(VDC)	(Amps)	Inches	Meters	Inches	mm	psi*	bar	Plasma	Total**	Delay (Sec)	Inches	mm
0.05	1.3	9-8211	100	80	350	8.89	0.19	4.8	70	4.8	90	490	0	0.19	4.8
0.125	3.2	9-8211	103	80	230	5.84	0.19	4.8	70	4.8	90	490	0	0.19	4.8
1/4	6.4	9-8211	106	80	112	2.84	0.19	4.8	70	4.8	90	490	0	0.19	4.8
3/8	9.5	9-8211	111	80	55	1.40	0.19	4.8	70	4.8	90	490	0	0.19	4.8
1/2	12.7	9-8211	112	80	38	0.97	0.19	4.8	70	4.8	90	490	0	0.19	4.8
3/4	19.1	9-8211	117	80	18	0.46	0.19	4.8	70	4.8	90	490	NR	0.19	4.8
1	25.4	9-8211	120	80	10	0.25	0.19	4.8	70	4.8	90	490	NR	0.19	4.8

Air Plasma Cutting Speed Data Chart For CutMaster 100 & CutMaster 101															
Type Torch: SL100								Type Material: Stainless Steel							
Type Plasma Gas: Air								Type Secondary Gas: Single Gas Torch							
Thickness		Tip	Output Volts	Amperage	Speed (Per Minute)		Standoff		Plasma Gas Press		Flow (SCFH)		Pierce	Pierce Height	
Inches	mm	(Cat. No.)	(VDC)	(Amps)	Inches	Meters	Inches	mm	psi*	bar	Plasma	Total**	Delay (Sec)	Inches	mm
0.05	1.3	9-8211	100	80	350	8.89	0.19	4.8	70	4.8	90	490	0	0.19	4.8
0.125	3.2	9-8211	103	80	200	5.08	0.19	4.8	70	4.8	90	490	0	0.19	4.8
1/4	6.4	9-8211	106	80	112	2.84	0.19	4.8	70	4.8	90	490	0.25	0.19	4.8
3/8	9.5	9-8211	111	80	55	1.40	0.19	4.8	70	4.8	90	490	0.25	0.19	4.8
1/2	12.7	9-8211	112	80	38	0.97	0.19	4.8	70	4.8	90	490	0.25	0.19	4.8
3/4	19.1	9-8211	117	80	18	0.46	0.19	4.8	70	4.8	90	490	NR	0.19	4.8
1	25.4	9-8211	120	80	10	0.25	0.19	4.8	70	4.8	90	490	NR	0.19	4.8

### NOTES

\* Gas pressure shown is for torches with leads up to 25' / 7.6 m long. For 50' / 15.2 m leads, set gas pressure to 80 psi / 5.5 bar.

\*\* Total flow rate includes plasma and secondary gas flow.

## APPENDIX 6: CUTMASTER 151 SYSTEM DATA (HAND and MACHINE TORCH)

Torch Specifications For CutMaster 151 Power Supply	
<b>Cutting Range</b>	
Material	Most Metals
Up to	1-1/2 inch / 38 mm
Speed	11 ipm / 0.28 mpm
<b>Pierce Rating</b>	
Material	Carbon Steel
Thickness	1/2 inch / 12.2 mm
<b>Transfer Distance</b>	
3/8 inch / 9.5 mm	
<b>Gouging</b>	
Width	1/4 inch - 6.3 mm (min)
Depth	3/16 inch - 4.8 mm (min)
Number Passes	Single
Speed	20 ipm / 0.5 mpm
<b>Bevel Cut Capability</b>	
Degrees	0° to 45°
Material Thickness	3/4 inch - 19 mm
<b>Gas Requirement</b>	
Type Gas	Air
Operating Pressure	70 psi / 4.8 bar
Max Input Pressure	125 psi / 8.6 bar
Cutting & Gouging	490 scfh / 231 lpm
Total Flow	

### Cut Quality on Various Materials and Thicknesses

The following table defines the cut quality on various materials and thicknesses:

Cut Quality on Various Materials			
Material Thickness	Type of Material	Type of Gas	Cut Characteristics
Gage to 1.5 inch (38 mm)	Carbon Steel	Air	Good - Excellent
	Stainless	Air	Good
	Aluminum	Air	Good

#### Description of Cut Characteristics:

**Excellent** - Minimum bevel (0-4°), minimum kerf (2x tip orifice diameter), little or no dross, smooth cut surface.

**Good** - Slight bevel (0-10°), slightly wider kerf (2-1/2x tip orifice diameter), some dross (easily removed), medium - smooth cut surface, slight top edge rounding.

Gouging Profiles			
	Output Range	Depth	Width
Tip A	40 Amps Max.	Shallow	Narrow
Tip B	40-100 Amps	Deep	Narrow
Tip C	40-100 Amps	Moderate	Moderate
Tip D	40-100 Amps	Shallow	Wide

SL100 Machine Torch Consumables for 100-Amp Power Supply						
Application	Electrode	Start Cartridge	Tip	Shield Cup Body	Shield Cap or Deflector	Shield Cup
Standoff Cutting	9-8215	9-8213	9-8212 (100A)	None	None	9-8218
	9-8215	9-8213	9-8212 (100A)	9-8237	9-8239 or 9-8243	None
Gouging	9-8215	9-8213	Tip A: 9-8225 (40A Max) Tip B: 9-8226 (40-100A) Tip C: 9-8227 (40-100A) Tip D: 9-8228 (40-100A)	9-8237	9-8241	None

## Cutting Speed Charts

Air Plasma Cutting Speed Data Chart For CutMaster 151															
Type Torch: SL100								Type Material: Aluminum							
Type Plasma Gas: Air								Type Secondary Gas: Single Gas Torch							
Thickness		Tip	Output Volts	Amperage	Speed (Per Minute)		Standoff		Plasma Gas Press		Flow (SCFH)		Pierce	Pierce Height	
Inches	mm	(Cat. No.)	(VDC)	(Amps)	Inches	Meters	Inches	mm	psi*	bar	Plasma	Total**	Delay (Sec)	Inches	mm
1/4	6.4	9-8212	104	100	148	3.76	0.19	4.8	70	4.8	90	490	0	0.19	4.8
3/8	9.5	9-8212	110	100	118	3.00	0.19	4.8	70	4.8	90	490	0	0.19	4.8
1/2	12.7	9-8212	113	100	79	2.01	0.19	4.8	70	4.8	90	490	0	0.19	4.8
3/4	19.1	9-8212	118	100	31	0.79	0.19	4.8	70	4.8	90	490	0	0.19	4.8
1	25.4	9-8212	121	100	18	0.46	0.19	4.8	70	4.8	90	490	NR	0.19	4.8
1-1/4	31.8	9-8212	128	100	14	0.36	0.19	4.8	70	4.8	90	490	NR	0.19	4.8
1-1/2	38.1	9-8212	133	100	11	0.28	0.19	4.8	70	4.8	90	490	NR	0.19	4.8

Air Plasma Cutting Speed Data Chart For CutMaster 151															
Type Torch: SL100								Type Material: Mild Steel							
Type Plasma Gas: Air								Type Secondary Gas: Single Gas Torch							
Thickness		Tip	Output Volts	Amperage	Speed (Per Minute)		Standoff		Plasma Gas Press		Flow (SCFH)		Pierce	Pierce Height	
Inches	mm	(Cat. No.)	(VDC)	(Amps)	Inches	Meters	Inches	mm	psi*	bar	Plasma	Total**	Delay (Sec)	Inches	mm
1/4	6.4	9-8212	104	100	129	3.28	0.19	4.8	70	4.8	90	490	0	0.19	4.8
3/8	9.5	9-8212	110	100	65	1.65	0.19	4.8	70	4.8	90	490	0	0.19	4.8
1/2	12.7	9-8212	113	100	49	1.24	0.19	4.8	70	4.8	90	490	0	0.19	4.8
3/4	19.1	9-8212	118	100	24	0.61	0.19	4.8	70	4.8	90	490	0	0.19	4.8
1	25.4	9-8212	121	100	16	0.41	0.19	4.8	70	4.8	90	490	NR	0.19	4.8
1-1/4	31.8	9-8212	128	100	10	0.25	0.19	4.8	70	4.8	90	490	NR	0.19	4.8
1-1/2	38.1	9-8212	133	100	8	0.20	0.19	4.8	70	4.8	90	490	NR	0.19	4.8

Air Plasma Cutting Speed Data Chart For CutMaster 151															
Type Torch: SL100								Type Material: Stainless Steel							
Type Plasma Gas: Air								Type Secondary Gas: Single Gas Torch							
Thickness		Tip	Output Volts	Amperage	Speed (Per Minute)		Standoff		Plasma Gas Press		Flow (SCFH)		Pierce	Pierce Height	
Inches	mm	(Cat. No.)	(VDC)	(Amps)	Inches	Meters	Inches	mm	psi*	bar	Plasma	Total**	Delay (Sec)	Inches	mm
1/4	6.4	9-8212	104	100	134	3.40	0.19	4.8	70	4.8	90	490	0	0.19	4.8
3/8	9.5	9-8212	110	100	67	1.70	0.19	4.8	70	4.8	90	490	0	0.19	4.8
1/2	12.7	9-8212	113	100	40	1.02	0.19	4.8	70	4.8	90	490	0	0.19	4.8
3/4	19.1	9-8212	118	100	22	0.56	0.19	4.8	70	4.8	90	490	0	0.19	4.8
1	25.4	9-8212	123	100	12	0.30	0.19	4.8	70	4.8	90	490	NR	0.19	4.8
1-1/4	31.8	9-8212	129	100	9	0.23	0.19	4.8	70	4.8	90	490	NR	0.19	4.8
1-1/2	38.1	9-8212	135	100	6	0.15	0.19	4.8	70	4.8	90	490	NR	0.19	4.8

### NOTES

\* Gas pressure shown is for torches with leads up to 25' / 7.6 m long. For 50' / 15.2 m leads, set gas pressure to 75 psi / 5.2 bar.

\*\* Total flow rate includes plasma and secondary gas flow.

# APPENDIX 7A: PAKMASTER 50XL PLUS SYSTEM DATA (HAND TORCH)

<b>Torch Specifications For PakMaster 50XL Plus Power Supply</b>	
<b>Cutting Range</b>	
Material	Mild Steel
Production Cut:	
Up to	1/4 inch - 6.3 mm
Speed	45 ipm / 1.14 mpm
Genuine Cut:	
Up to	1/2 inch - 12.7 mm
Speed	12-14 ipm / 0.3 - 0.36 mpm
Severance Cut:	
Up to	3/4 inch - 19 mm
Speed	5-7 ipm 0.13 - 0.18 mpm
<b>Pierce Rating</b>	
Material	Mild Steel
Thickness:	
Hand Cutting	1/2 inch - 12.7 mm
Machine Cutting	1/4 inch - 6.4 mm
<b>Transfer Distance</b>	3/8 inch - 9.5 mm
<b>Gouging</b>	
Width	3/16 inch - 4.8 mm
Depth	1/8 inch - 3.2 mm
Number Passes	Single
Speed	20 ipm / 0.5 mpm
<b>Bevel Cut Capability</b>	
Degrees	0° to 45°
Material Thickness	3/8 inch - 9.5 mm
<b>Gas Requirement</b>	
Type Gas	Air
Operating Pressure	65 psi / 4.5 bar
Max Input Pressure	125 psi / 8.6 bar
Total Flow Rate:	
Cutting	350 scfh / 165 lpm
Gouging	230 scfh / 108.5 lpm

## Cut Quality on Various Materials and Thicknesses

The following table defines the cut quality on various materials and thicknesses:

<b>Cut Quality on Various Materials</b>			
<b>Material Thickness</b>	<b>Type of Material</b>	<b>Type of Gas</b>	<b>Cut Characteristics</b>
Gage to 1/2 inch (12.7 mm)	Carbon Steel	Air	Good - Excellent
	Stainless	Air	Good
	Aluminum	Air	Good

## Description of Cut Characteristics:

**Excellent** - Minimum bevel (0 - 4°), minimum kerf (2 x tip orifice diameter), little or no dross, smooth cut surface.

**Good** - Slight bevel (0 - 10°), slightly wider kerf (2-1/2 x tip orifice diameter), some dross (easily removed), medium - smooth cut surface, slight top edge rounding.

<b>Gouging Profiles</b>			
	<b>Output Range</b>	<b>Depth</b>	<b>Width</b>
Tip A	40 Amps Max.	Shallow	Narrow
Tip B	40-100 Amps	Deep	Narrow
Tip C	40-100 Amps	Moderate	Moderate
Tip D	40-100 Amps	Shallow	Wide

<b>SL60 - SL100 Hand Torch Consumables for 40-Amp Power Supply</b>						
<b>Application</b>	<b>Electrode</b>	<b>Starter Cartridge</b>	<b>Tip</b>	<b>Shield Cup Body</b>	<b>Shield Cap or Deflector</b>	<b>Shield Cup</b>
Drag Cutting	9-8215	9-8213	9-8207 (40A)	None	None	9-8218
Standoff Cutting	9-8215	9-8213	9-8208 (40A)	None	None	9-8218
	9-8215	9-8213	9-8208 (40A)	9-8237	9-8244 or 9-8243	None
Gouging	9-8215	9-8213	Tip A: 9-8225 (40A Max) Tip B: 9-8226 (40-100A) Tip C: 9-8227 (40-100A) Tip D: 9-8228 (40-100A)	9-8237	9-8241	None

## Cutting Speed Charts

Air Plasma Cutting Speed Data Chart For PakMaster 50XL Plus															
Type Torch: SL60 - Drag								Type Material: Aluminum							
Type Plasma Gas: Air								Type Secondary Gas: Single Gas Torch							
Thickness		Tip	Output Volts	Amperage	Speed (Per Minute)		Standoff		Plasma Gas Press		Flow (SCFH)		Pierce	Pierce Height	
Inches	mm	(Cat. No.)	(VDC)	(Amps)	Inches	Meters	Inches	mm	psi*	bar	Plasma	Total**	Delay (Sec)	Inches	mm
20 ga	0.9	9-8207	80	40	300	7.62	N/A	N/A	65	4.5	50	350	0	0.00	0.0
16 ga	1.5	9-8207	80	40	275	6.99	N/A	N/A	65	4.5	50	350	0	0.19	4.8
10 ga	3.4	9-8207	80	40	75	1.91	N/A	N/A	65	4.5	50	350	0	0.19	4.8
7 ga	4.6	9-8207	85	40	55	1.40	N/A	N/A	65	4.5	50	350	0.5	0.19	4.8
1/4	6.4	9-8207	90	40	40	1.02	N/A	N/A	65	4.5	50	350	0.5	0.19	4.8
3/8	9.5	9-8207	100	40	18	0.46	N/A	N/A	65	4.5	50	350	1	0.25	6.4
1/2	12.7	9-8207	100	40	10	0.25	N/A	N/A	65	4.5	50	350	1.5	0.25	6.4

Air Plasma Cutting Speed Data Chart For PakMaster 50XL Plus															
Type Torch: SL60 - Drag								Type Material: Mild Steel							
Type Plasma Gas: Air								Type Secondary Gas: Single Gas Torch							
Thickness		Tip	Output Volts	Amperage	Speed (Per Minute)		Standoff		Plasma Gas Press		Flow (SCFH)		Pierce	Pierce Height	
Inches	mm	(Cat. No.)	(VDC)	(Amps)	Inches	Meters	Inches	mm	psi*	bar	Plasma	Total**	Delay (Sec)	Inches	mm
20 ga	0.9	9-8207	80	40	300	7.6	N/A	N/A	65	4.5	50	350	0	0.00	0.0
16 ga	1.5	9-8207	80	40	275	7.0	N/A	N/A	65	4.5	50	350	0	0.19	4.8
10 ga	3.4	9-8207	80	40	105	2.7	N/A	N/A	65	4.5	50	350	0	0.19	4.8
7 ga	4.6	9-8207	85	40	70	1.8	N/A	N/A	65	4.5	50	350	0.5	0.19	4.8
1/4	6.4	9-8207	90	40	39	1.0	N/A	N/A	65	4.5	50	350	0.5	0.19	4.8
3/8	9.5	9-8207	100	40	20	0.5	N/A	N/A	65	4.5	50	350	1	0.25	6.4
1/2	12.7	9-8207	100	40	10	0.3	N/A	N/A	65	4.5	50	350	1.5	0.25	6.4

Air Plasma Cutting Speed Data Chart For PakMaster 50XL Plus															
Type Torch: SL60 - Drag								Type Material: Stainless Steel							
Type Plasma Gas: Air								Type Secondary Gas: Single Gas Torch							
Thickness		Tip	Output Volts	Amperage	Speed (Per Minute)		Standoff		Plasma Gas Press		Flow (SCFH)		Pierce	Pierce Height	
Inches	mm	(Cat. No.)	(VDC)	(Amps)	Inches	Meters	Inches	mm	psi*	bar	Plasma	Total**	Delay (Sec)	Inches	mm
20 ga	0.9	9-8207	80	40	300	7.6	N/A	N/A	65	4.5	50	350	0	0.00	0.0
16 ga	1.5	9-8207	80	40	275	7.0	N/A	N/A	65	4.5	50	350	0	0.19	4.8
10 ga	3.4	9-8207	80	40	75	1.9	N/A	N/A	65	4.5	50	350	0	0.19	4.8
7 ga	4.6	9-8207	85	40	55	1.4	N/A	N/A	65	4.5	50	350	0.5	0.19	4.8
1/4	6.4	9-8207	90	40	40	1.0	N/A	N/A	65	4.5	50	350	0.5	0.19	4.8
3/8	9.5	9-8207	100	40	18	0.5	N/A	N/A	65	4.5	50	350	1	0.25	6.4
1/2	12.7	9-8207	100	40	10	0.3	N/A	N/A	65	4.5	50	350	1.5	0.25	6.4

### NOTES

\* Gas pressure shown is for torches with leads up to 25' / 7.6 m long. For 50' / 15.2 m leads, set gas pressure to 75 psi / 5.2 bar.

\*\* Total flow rate includes plasma and secondary gas flow.

# APPENDIX 7B: PAKMASTER 50XL PLUS SYSTEM DATA (MACHINE TORCH)

<b>Torch Specifications For PakMaster 50XL Plus Power Supply</b>	
<b>Cutting Range</b>	
Material	Mild Steel
Production Cut:	
Up to	1/4 inch - 6.3 mm
Speed	45 ipm / 1.14 mpm
Genuine Cut:	
Up to	1/2 inch - 12.7 mm
Speed	12-14 ipm / 0.3 - 0.36 mpm
Severance Cut:	
Up to	3/4 inch - 19 mm
Speed	5-7 ipm 0.13 - 0.18 mpm
<b>Pierce Rating</b>	
Material	Mild Steel
Thickness:	
Hand Cutting	1/2 inch - 12.7 mm
Machine Cutting	1/4 inch - 6.4 mm
<b>Transfer Distance</b>	
	3/8 inch - 9.5 mm
<b>Gouging</b>	
Width	3/16 inch - 4.8 mm
Depth	1/8 inch - 3.2 mm
Number Passes	Single
Speed	20 ipm / 0.5 mpm
<b>Bevel Cut Capability</b>	
Degrees	0° to 45°
Material Thickness	3/8 inch - 9.5 mm
<b>Gas Requirement</b>	
Type Gas	Air
Operating Pressure	60 psi / 4.1 bar
Max Input Pressure	125 psi / 8.6 bar
Total Flow Rate:	
Cutting	350 scfh / 165 lpm
Gouging	230 scfh / 108.5 lpm

## Cut Quality on Various Materials and Thicknesses

The following table defines the cut quality on various materials and thicknesses:

<b>Cut Quality on Various Materials</b>			
Material Thickness	Type of Material	Type of Gas	Cut Characteristics
Gage to 1/2 inch (12.7 mm)	Carbon Steel	Air	Good - Excellent
	Stainless	Air	Good
	Aluminum	Air	Good

### Description of Cut Characteristics:

**Excellent** - Minimum bevel (0 - 4°), minimum kerf (2 x tip orifice diameter), little or no dross, smooth cut surface.

**Good** - Slight bevel (0 - 10°), slightly wider kerf (2 - 1/2 x tip orifice diameter), some dross (easily removed), medium - smooth cut surface, slight top edge rounding.

<b>Gouging Profiles</b>			
	Output Range	Depth	Width
Tip A	40 Amps Max.	Shallow	Narrow
Tip B	40-100 Amps	Deep	Narrow
Tip C	40-100 Amps	Moderate	Moderate
Tip D	40-100 Amps	Shallow	Wide

<b>SL100 Machine Torch Consumables for 40-Amp Power Supply</b>						
Application	Electrode	Starter Cartridge	Tip	Shield Cup Body	Shield Cap or Deflector	Shield Cup
Standoff Cutting	9-8215	9-8213	9-8208 (40A)	None	None	9-8218
	9-8215	9-8213	9-8208 (40A)	9-8237	9-8245 or 9-8243	None
Gouging	9-8215	9-8213	Tip A: 9-8225 (40 A Max) Tip B: 9-8226 (40-100 A) Tip C: 9-8227 (40-100 A) Tip D: 9-8228 (40-100 A)	9-8237	9-8241	None

## Cutting Speed Charts

Air Plasma Cutting Speed Data Chart For PakMaster 50XL Plus															
Type Torch: SL100								Type Material: Aluminum							
Type Plasma Gas: Air								Type Secondary Gas: Single Gas Torch							
Thickness		Tip	Output Volts	Amperage	Speed (Per Minute)		Standoff		Plasma Gas Press		Flow (SCFH)		Pierce	Pierce Height	
Inches	mm	(Cat. No.)	(VDC)	(Amps)	Inches	Meters	Inches	mm	psi*	bar	Plasma	Total**	Delay (Sec)	Inches	mm
20 ga	0.8	9-8208	90	40	350	8.89	0.19	4.8	60	4.1	50	350	0	0.19	4.8
16 ga	1.3	9-8208	94	40	275	6.99	0.19	4.8	60	4.1	50	350	0	0.19	4.8
10 ga	2.6	9-8208	105	40	100	2.54	0.19	4.8	60	4.1	50	350	0	0.19	4.8
7 ga	3.7	9-8208	100	40	70	1.78	0.19	4.8	60	4.1	50	350	0	0.19	4.8
1/4	6.4	9-8208	107	40	40	1.02	0.19	4.8	60	4.1	50	350	0.5	0.19	4.8
3/8	9.5	9-8208	114	40	18	0.46	0.19	4.8	60	4.1	50	350	0.5	0.19	4.8
1/2	12.7	9-8208	121	40	10	0.25	0.19	4.8	60	4.1	50	350	1	0.19	4.8

Air Plasma Cutting Speed Data Chart For PakMaster 50XL Plus															
Type Torch: SL100								Type Material: Mild Steel							
Type Plasma Gas: Air								Type Secondary Gas: Single Gas Torch							
Thickness		Tip	Output Volts	Amperage	Speed (Per Minute)		Standoff		Plasma Gas Press		Flow (SCFH)		Pierce	Pierce Height	
Inches	mm	(Cat. No.)	(VDC)	(Amps)	Inches	Meters	Inches	mm	psi*	bar	Plasma	Total**	Delay (Sec)	Inches	mm
20 ga	0.9	9-8208	90	40	350	8.89	0.13	3.2	60	4.1	50	350	0	0.19	4.8
16 ga	1.5	9-8208	90	40	275	6.99	0.13	3.2	60	4.1	50	350	0	0.19	4.8
10 ga	3.4	9-8208	90	40	115	2.92	0.13	3.2	60	4.1	50	350	0	0.19	4.8
7 ga	4.6	9-8208	95	40	75	1.91	0.13	3.2	60	4.1	50	350	0.5	0.19	4.8
1/4	6.4	9-8208	110	40	45	1.14	0.19	4.8	60	4.1	50	350	0.5	0.19	4.8
3/8	9.5	9-8208	119	40	20	0.51	0.19	4.8	60	4.1	50	350	1	0.25	6.4
1/2	12.7	9-8208	121	40	14	0.36	0.19	4.8	60	4.1	50	350	1.5	0.25	6.4

Air Plasma Cutting Speed Data Chart For PakMaster 50XL Plus															
Type Torch: SL100								Type Material: Stainless Steel							
Type Plasma Gas: Air								Type Secondary Gas: Single Gas Torch							
Thickness		Tip	Output Volts	Amperage	Speed (Per Minute)		Standoff		Plasma Gas Press		Flow (SCFH)		Pierce	Pierce Height	
Inches	mm	(Cat. No.)	(VDC)	(Amps)	Inches	Meters	Inches	mm	psi*	bar	Plasma	Total**	Delay (Sec)	Inches	mm
20 ga	0.9	9-8208	95	40	300	7.62	0.19	4.8	60	4.1	50	350	0	0.19	4.8
16 ga	1.5	9-8208	95	40	275	6.99	0.19	4.8	60	4.1	50	350	0	0.19	4.8
10 ga	3.5	9-8208	100	40	75	1.91	0.19	4.8	60	4.1	50	350	0	0.19	4.8
7 ga	4.6	9-8208	105	40	55	1.40	0.19	4.8	60	4.1	50	350	0	0.19	4.8
1/4	6.4	9-8208	105	40	40	1.02	0.19	4.8	60	4.1	50	350	0.5	0.19	4.8
3/8	9.5	9-8208	110	40	18	0.46	0.19	4.8	60	4.1	50	350	1	0.19	4.8
1/2	12.7	9-8208	119	40	10	0.25	0.19	4.8	60	4.1	50	350	1.5	0.19	4.8

### NOTES

\* Gas pressure shown is for torches with leads up to 25' / 7.6 m long. For 50' / 15.2 m leads, set gas pressure to 65 psi / 4.5 bar.

\*\* Total flow rate includes plasma and secondary gas flow.

# APPENDIX 8A: PAKMASTER 75XL PLUS SYSTEM DATA (HAND TORCH)

Torch Specifications For Pak Master 75XL Plus Power Supply	
<b>Cutting Range</b>	
Material	Most Metals
Up to Speed	3/4 inch - 19 mm 11 ipm / 0.28 mpm
<b>Pierce Rating</b>	
Material	Carbon Steel
Thickness	3/8 inch - 9.5 mm
<b>Transfer Distance</b>	
3/8 inch - 9.5 mm	
<b>Gouging</b>	
Width	1/4 inch - 6.3 mm
Depth	1/8 inch - 3.2 mm
Number Passes	Single
Speed	20 ipm / 0.5 mpm
<b>Bevel Cut Capability</b>	
Degrees	0° to 45°
Material Thickness	1/4 inch - 6.3 mm
<b>Gas Requirement</b>	
Type Gas	Air
Operating Pressure	65 psi / 4.5 bar
Max Input Pressure	125 psi / 8.6 bar
Cutting & Gouging Total Flow	350 scfh / 165 lpm

## Cut Quality on Various Materials and Thicknesses

The following table defines the cut quality on various materials and thicknesses:

Cut Quality on Various Materials			
Material Thickness	Type of Material	Type of Gas	Cut Characteristics
Gage to 3/4 inch (19 mm)	Carbon Steel	Air	Good - Excellent
	Stainless	Air	Good
	Aluminum	Air	Good

### Description of Cut Characteristics:

**Excellent** - Minimum bevel (0 - 4°), minimum kerf (2 x tip orifice diameter), little or no dross, smooth cut surface.

**Good** - Slight bevel (0 - 10°), slightly wider kerf (2 - 1/2 x tip orifice diameter), some dross (easily removed), medium - smooth cut surface, slight top edge rounding.

Gouging Profiles			
	Output Range	Depth	Width
Tip A	40 Amps Max.	Shallow	Narrow
Tip B	40-100 Amps	Deep	Narrow
Tip C	40-100 Amps	Moderate	Moderate
Tip D	40-100 Amps	Shallow	Wide

SL60 - SL100 Hand Torch Consumables for 60-Amp Power Supply						
Application	Electrode	Starter Cartridge	Tip	Shield Cup Body	Shield Cap or Deflector	Shield Cup
Drag Cutting	9-8215	9-8213	9-8207 (40A)	None	None	9-8218
Standoff Cutting	9-8215	9-8213	9-8210 (60A)	None	None	9-8218
	9-8215	9-8213	9-8210 (60A)	9-8237	9-8235 or 9-8243	None
Gouging	9-8215	9-8213	Tip A: 9-8225 (40A Max) Tip B: 9-8226 (40-100A) Tip C: 9-8227 (40-100A) Tip D: 9-8228 (40-100A)	9-8237	9-8241	None

## Cutting Speed Charts

Air Plasma Cutting Speed Data Chart For PakMaster 75XL Plus															
Type Torch: SL60								Type Material: Aluminum							
Type Plasma Gas: Air								Type Secondary Gas: Single Gas Torch							
Thickness		Tip	Output Volts	Amperage	Speed (Per Minute)		Standoff		Plasma Gas Press		Flow (SCFH)		Pierce	Pierce Height	
Inches	mm	(Cat. No.)	(VDC)	(Amps)	Inches	Meters	Inches	mm	psi*	bar	Plasma	Total**	Delay (Sec)	Inches	mm
1/16	1.6	9-8210	95	60	350	8.89	0.19	4.8	65	4.5	80	350	0.1	0.25	6.4
1/8	3.2	9-8210	95	60	175	4.45	0.19	4.8	65	4.5	80	350	0.25	0.25	6.4
1/4	6.4	9-8210	105	60	80	2.03	0.19	4.8	65	4.5	80	350	0.25	0.25	6.4
3/8	9.5	9-8210	105	60	45	1.14	0.19	4.8	65	4.5	80	350	0.25	0.25	6.4
1/2	12.7	9-8210	105	60	22	0.56	0.19	4.8	65	4.5	80	350	0.5	0.25	6.4
3/4	19.1	9-8210	115	60	12	0.30	0.19	4.8	65	4.5	80	350	NA	NA	NA

Air Plasma Cutting Speed Data Chart For PakMaster 75XL Plus															
Type Torch: SL60								Type Material: Mild Steel							
Type Plasma Gas: Air								Type Secondary Gas: Single Gas Torch							
Thickness		Tip	Output Volts	Amperage	Speed (Per Minute)		Standoff		Plasma Gas Press		Flow (SCFH)		Pierce	Pierce Height	
Inches	mm	(Cat. No.)	(VDC)	(Amps)	Inches	Meters	Inches	mm	psi*	bar	Plasma	Total**	Delay (Sec)	Inches	mm
1/16	1.6	9-8210	90	60	350	8.89	0.19	4.8	65	4.5	80	350	0.1	0.25	6.4
1/8	3.2	9-8210	95	60	175	4.45	0.19	4.8	65	4.5	80	350	0.25	0.25	6.4
1/4	6.4	9-8210	105	60	80	2.03	0.19	4.8	65	4.5	80	350	0.25	0.25	6.4
3/8	9.5	9-8210	105	60	45	1.14	0.19	4.8	65	4.5	80	350	0.25	0.25	6.4
1/2	12.7	9-8210	105	60	22	0.56	0.19	4.8	65	4.5	80	350	0.5	0.25	6.4
3/4	19.1	9-8210	115	60	11	0.28	0.19	4.8	65	4.5	80	350	NA	NA	NA
1	25.4	9-8210	115	60	8	0.20	0.19	4.8	65	4.5	80	350	NA	NA	NA

Air Plasma Cutting Speed Data Chart For PakMaster 75XL Plus															
Type Torch: SL60								Type Material: Stainless Steel							
Type Plasma Gas: Air								Type Secondary Gas: Single Gas Torch							
Thickness		Tip	Output Volts	Amperage	Speed (Per Minute)		Standoff		Plasma Gas Press		Flow (SCFH)		Pierce	Pierce Height	
Inches	mm	(Cat. No.)	(VDC)	(Amps)	Inches	Meters	Inches	mm	psi*	bar	Plasma	Total**	Delay (Sec)	Inches	mm
1/16	1.6	9-8210	95	60	350	8.89	0.19	4.8	65	4.5	80	350	0.1	0.25	6.4
1/8	3.2	9-8210	95	60	150	3.81	0.19	4.8	65	4.5	80	350	0.25	0.25	6.4
1/4	6.4	9-8210	105	60	70	1.78	0.19	4.8	65	4.5	80	350	0.25	0.25	6.4
3/8	9.5	9-8210	105	60	35	0.89	0.19	4.8	65	4.5	80	350	0.25	0.25	6.4
1/2	12.7	9-8210	105	60	20	0.51	0.19	4.8	65	4.5	80	350	0.5	0.25	6.4
3/4	19.1	9-8210	115	60	10	0.25	0.19	4.8	65	4.5	80	350	NA	NA	NA

### NOTES

\* Gas pressure shown is for torches with leads up to 25' / 7.6 m long. For 50' / 15.2 m leads, set gas pressure to 75 psi / 5.2 bar.

\*\* Total flow rate includes plasma and secondary gas flow.

# APPENDIX 8B: PAKMASTER 75XL PLUS SYSTEM DATA (MACHINE TORCH)

Torch Specifications For Pak Master 75XL Plus Power Supply	
<b>Cutting Range</b>	
Material	Most Metals
Up to Speed	3/4 inch - 19 mm 11 ipm / 0.28 mpm
<b>Pierce Rating</b>	
Material	Carbon Steel
Thickness	3/8 inch - 9.5 mm
<b>Transfer Distance</b>	
	3/8 inch - 9.5 mm
<b>Gouging</b>	
Width	1/4 inch - 6.3 mm
Depth	1/8 inch - 3.2 mm
Number Passes	Single
Speed	20 ipm / 0.5 mpm
<b>Bevel Cut Capability</b>	
Degrees	0° to 45°
Material Thickness	1/4 inch - 6.3 mm
<b>Gas Requirement</b>	
Type Gas	Air
Operating Pressure	60 psi / 4.1 bar
Max Input Pressure	125 psi / 8.6 bar
Cutting & Gouging Total Flow	350 scfh / 165 lpm

## Cut Quality on Various Materials and Thicknesses

The following table defines the cut quality on various materials and thicknesses:

Cut Quality on Various Materials			
Material Thickness	Type of Material	Type of Gas	Cut Characteristics
Gage to 3/4 inch (19 mm)	Carbon Steel	Air	Good - Excellent
	Stainless	Air	Good
	Aluminum	Air	Good

### Description of Cut Characteristics:

**Excellent** - Minimum bevel (0 - 4°), minimum kerf (2 x tip orifice diameter), little or no dross, smooth cut surface.

**Good** - Slight bevel (0 - 10°), slightly wider kerf (2 - 1/2 x tip orifice diameter), some dross (easily removed), medium - smooth cut surface, slight top edge rounding.

Gouging Profiles			
	Output Range	Depth	Width
Tip A	40 Amps Max.	Shallow	Narrow
Tip B	40-100 Amps	Deep	Narrow
Tip C	40-100 Amps	Moderate	Moderate
Tip D	40-100 Amps	Shallow	Wide

SL100 Machine Torch Consumables for 60-Amp Power Supply						
Application	Electrode	Starter Cartridge	Tip	Shield Cup Body	Shield Cap or Deflector	Shield Cup
Standoff Cutting	9-8215	9-8213	9-8210 (60A)	None	None	9-8218
	9-8215	9-8213	9-8210 (60A)	9-8237	9-8238 or 9-8243	None
Gouging	9-8215	9-8213	Tip A: 9-8225 (40 A Max) Tip B: 9-8226 (40-100 A) Tip C: 9-8227 (40-100 A) Tip D: 9-8228 (40-100 A)	9-8237	9-8241	None

## Cutting Speed Charts

Air Plasma Cutting Speed Data Chart For PakMaster 75XL Plus															
Type Torch: SL100								Type Material: Aluminum							
Type Plasma Gas: Air								Type Secondary Gas: Single Gas Torch							
Thickness		Tip	Output Volts	Amperage	Speed (Per Minute)		Standoff		Plasma Gas Press		Flow (SCFH)		Pierce	Pierce Height	
Inches	mm	(Cat. No.)	(VDC)	(Amps)	Inches	Meters	Inches	mm	psi*	bar	Plasma	Total**	Delay (Sec)	Inches	mm
1/16	1.6	9-8210	95	60	350	8.89	0.19	4.8	60	4.1	80	350	0.1	0.25	6.4
1/8	3.2	9-8210	95	60	175	4.45	0.19	4.8	60	4.1	80	350	0.25	0.25	6.4
1/4	6.4	9-8210	105	60	80	2.03	0.19	4.8	60	4.1	80	350	0.25	0.25	6.4
3/8	9.5	9-8210	105	60	45	1.14	0.19	4.8	60	4.1	80	350	0.25	0.25	6.4
1/2	12.7	9-8210	105	60	22	0.56	0.19	4.8	60	4.1	80	350	0.5	0.25	6.4
3/4	19.1	9-8210	115	60	12	0.30	0.19	4.8	60	4.1	80	350	NA	NA	NA

Air Plasma Cutting Speed Data Chart For PakMaster 75XL Plus															
Type Torch: SL100								Type Material: Mild Steel							
Type Plasma Gas: Air								Type Secondary Gas: Single Gas Torch							
Thickness		Tip	Output Volts	Amperage	Speed (Per Minute)		Standoff		Plasma Gas Press		Flow (SCFH)		Pierce	Pierce Height	
Inches	mm	(Cat. No.)	(VDC)	(Amps)	Inches	Meters	Inches	mm	psi*	bar	Plasma	Total**	Delay (Sec)	Inches	mm
1/16	1.6	9-8210	90	60	350	8.89	0.19	4.8	60	4.1	80	350	0.1	0.25	6.4
1/8	3.2	9-8210	95	60	175	4.45	0.19	4.8	60	4.1	80	350	0.25	0.25	6.4
1/4	6.4	9-8210	105	60	80	2.03	0.19	4.8	60	4.1	80	350	0.25	0.25	6.4
3/8	9.5	9-8210	105	60	45	1.14	0.19	4.8	60	4.1	80	350	0.25	0.25	6.4
1/2	12.7	9-8210	105	60	22	0.56	0.19	4.8	60	4.1	80	350	0.5	0.25	6.4
3/4	19.1	9-8210	115	60	11	0.28	0.19	4.8	60	4.1	80	350	NA	NA	NA
1	25.4	9-8210	115	60	8	0.20	0.19	4.8	60	4.1	80	350	NA	NA	NA

Air Plasma Cutting Speed Data Chart For PakMaster 75XL Plus															
Type Torch: SL100								Type Material: Stainless Steel							
Type Plasma Gas: Air								Type Secondary Gas: Single Gas Torch							
Thickness		Tip	Output Volts	Amperage	Speed (Per Minute)		Standoff		Plasma Gas Press		Flow (SCFH)		Pierce	Pierce Height	
Inches	mm	(Cat. No.)	(VDC)	(Amps)	Inches	Meters	Inches	mm	psi*	bar	Plasma	Total**	Delay (Sec)	Inches	mm
1/16	1.6	9-8210	95	60	350	8.89	0.19	4.8	60	4.1	80	350	0.1	0.25	6.4
1/8	3.2	9-8210	95	60	150	3.81	0.19	4.8	60	4.1	80	350	0.25	0.25	6.4
1/4	6.4	9-8210	105	60	70	1.78	0.19	4.8	60	4.1	80	350	0.25	0.25	6.4
3/8	9.5	9-8210	105	60	35	0.89	0.19	4.8	60	4.1	80	350	0.25	0.25	6.4
1/2	12.7	9-8210	105	60	20	0.51	0.19	4.8	60	4.1	80	350	0.5	0.25	6.4
3/4	19.1	9-8210	115	60	10	0.25	0.19	4.8	60	4.1	80	350	NA	NA	NA

### NOTES

\* Gas pressure shown is for torches with leads up to 25' / 7.6 m long. For 50' / 15.2 m leads, set gas pressure to 65 psi / 4.5 bar.

\*\* Total flow rate includes plasma and secondary gas flow.

# APPENDIX 9: PAKMASTER 100XL PLUS SYSTEM DATA (MACHINE TORCH)

Torch Specifications For Pak Master 100XL Plus Power Supply	
<b>Cutting Range</b>	
Material	Most Metals
Up to	1 inch / 25.4 mm
Speed	10 ipm / 0.25 mpm
<b>Pierce Rating</b>	
Material	Carbon Steel
Thickness	3/8 inch - 9.5 mm
<b>Transfer Distance</b>	
3/8 inch - 9.5 mm	
<b>Gouging</b>	
Width	1/4 inch - 6.3 mm
Depth	3/16 inch - 4.8 mm
Number Passes	Single
Speed	20 ipm - 0.5 mpm
<b>Bevel Cut Capability</b>	
Degrees	0° to 45°
Material Thickness	1/2 inch - 13 mm
<b>Gas Requirement</b>	
Type Gas	Air
Operating Pressure	60 psi / 4.1 bar
Max Input Pressure	125 psi / 8.6 bar
Cutting & Gouging	490 scfh / 231 lpm
Total Flow	

## Cut Quality on Various Materials and Thicknesses

The following table defines the cut quality on various materials and thicknesses:

Cut Quality on Various Materials			
Material Thickness	Type of Material	Type of Gas	Cut Characteristics
Gage to 1 inch (25.4 mm)	Carbon Steel	Air	Good - Excellent
	Stainless	Air	Good
	Aluminum	Air	Good

### Description of Cut Characteristics:

**Excellent** - Minimum bevel (0 - 4°), minimum kerf (2 x tip orifice diameter), little or no dross, smooth cut surface.

**Good** - Slight bevel (0 - 10°), slightly wider kerf (2 - 1/2 x tip orifice diameter), some dross (easily removed), medium - smooth cut surface, slight top edge rounding.

Gouging Profiles			
	Output Range	Depth	Width
Tip A	40 Amps Max.	Shallow	Narrow
Tip B	40-100 Amps	Deep	Narrow
Tip C	40-100 Amps	Moderate	Moderate
Tip D	40-100 Amps	Shallow	Wide

SL100 Machine Torch Consumables for 80-Amp Power Supply						
Application	Electrode	Starter Cartridge	Tip	Shield Cup Body	Shield Cap or Deflector	Shield Cup
Standoff Cutting	9-8215	9-8213	9-8211 (80A)	None	None	9-8218
	9-8215	9-8213	9-8211 (80A)	9-8237	9-8239 or 9-8243	None
Gouging	9-8215	9-8213	Tip A: 9-8225 (40A Max) Tip B: 9-8226 (40-100A) Tip C: 9-8227 (40-100A) Tip D: 9-8228 (40-100A)	9-8237	9-8241	None

## Cutting Speed Charts

Air Plasma Cutting Speed Data Chart For PakMaster 100XL Plus															
Type Torch: SL100								Type Material: Aluminum							
Type Plasma Gas: Air								Type Secondary Gas: Single Gas Torch							
Thickness		Tip	Output Volts	Amperage	Speed (Per Minute)		Standoff		Plasma Gas Press		Flow (SCFH)		Pierce	Pierce Height	
Inches	mm	(Cat. No.)	(VDC)	(Amps)	Inches	Meters	Inches	mm	psi*	bar	Plasma	Total**	Delay (Sec)	Inches	mm
0.05	1.3	9-8211	100	80	350	8.89	0.19	4.8	60	4.1	90	490	0	0.19	4.8
0.125	3.2	9-8211	103	80	225	5.72	0.19	4.8	60	4.1	90	490	0	0.19	4.8
1/4	6.4	9-8211	106	80	112	2.84	0.19	4.8	60	4.1	90	490	0	0.19	4.8
3/8	9.5	9-8211	111	80	55	1.40	0.19	4.8	60	4.1	90	490	0	0.19	4.8
1/2	12.7	9-8211	115	80	30	0.76	0.19	4.8	60	4.1	90	490	0	0.19	4.8
3/4	19.1	9-8211	117	80	10	0.25	0.19	4.8	60	4.1	90	490	NR	0.19	4.8
1	25.4	9-8211	120	80	8	0.20	0.19	4.8	60	4.1	90	490	NR	0.19	4.8

Air Plasma Cutting Speed Data Chart For PakMaster 100XL Plus															
Type Torch: SL100								Type Material: Mild Steel							
Type Plasma Gas: Air								Type Secondary Gas: Single Gas Torch							
Thickness		Tip	Output Volts	Amperage	Speed (Per Minute)		Standoff		Plasma Gas Press		Flow (SCFH)		Pierce	Pierce Height	
Inches	mm	(Cat. No.)	(VDC)	(Amps)	Inches	Meters	Inches	mm	psi*	bar	Plasma	Total**	Delay (Sec)	Inches	mm
1/16	1.6	9-8211	100	80	350	8.89	0.19	4.8	60	4.1	90	490	0	0.20	5.1
1/8	3.2	9-8211	103	80	230	5.84	0.19	4.8	60	4.1	90	490	0.1	0.20	5.1
1/4	6.4	9-8211	106	80	112	2.84	0.19	4.8	60	4.1	90	490	0.1	0.20	5.1
3/8	9.5	9-8211	111	80	55	1.40	0.19	4.8	60	4.1	90	490	0.1	0.20	5.1
1/2	12.7	9-8211	112	80	38	0.97	0.19	4.8	60	4.1	90	490	0.1	0.20	5.1
3/4	19.1	9-8211	117	80	18	0.46	0.19	4.8	60	4.1	90	490	NA	NA	NA
1	25.4	9-8211	120	80	10	0.25	0.19	4.8	60	4.1	90	490	NA	NA	NA

Air Plasma Cutting Speed Data Chart For PakMaster 100XL Plus															
Type Torch: SL100								Type Material: Stainless Steel							
Type Plasma Gas: Air								Type Secondary Gas: Single Gas Torch							
Thickness		Tip	Output Volts	Amperage	Speed (Per Minute)		Standoff		Plasma Gas Press		Flow (SCFH)		Pierce	Pierce Height	
Inches	mm	(Cat. No.)	(VDC)	(Amps)	Inches	Meters	Inches	mm	psi*	bar	Plasma	Total**	Delay (Sec)	Inches	mm
0.05	1.3	9-8211	100	80	350	8.89	0.19	4.8	60	4.1	90	490	0	0.19	4.8
0.125	3.2	9-8211	103	80	200	5.08	0.19	4.8	60	4.1	90	490	0	0.19	4.8
1/4	6.4	9-8211	106	80	112	2.84	0.19	4.8	60	4.1	90	490	0.25	0.19	4.8
3/8	9.5	9-8211	111	80	55	1.40	0.19	4.8	60	4.1	90	490	0.25	0.19	4.8
1/2	12.7	9-8211	112	80	38	0.97	0.19	4.8	60	4.1	90	490	0.25	0.19	4.8
3/4	19.1	9-8211	117	80	18	0.46	0.19	4.8	60	4.1	90	490	NR	0.19	4.8
1	25.4	9-8211	120	80	10	0.25	0.19	4.8	60	4.1	90	490	NR	0.19	4.8

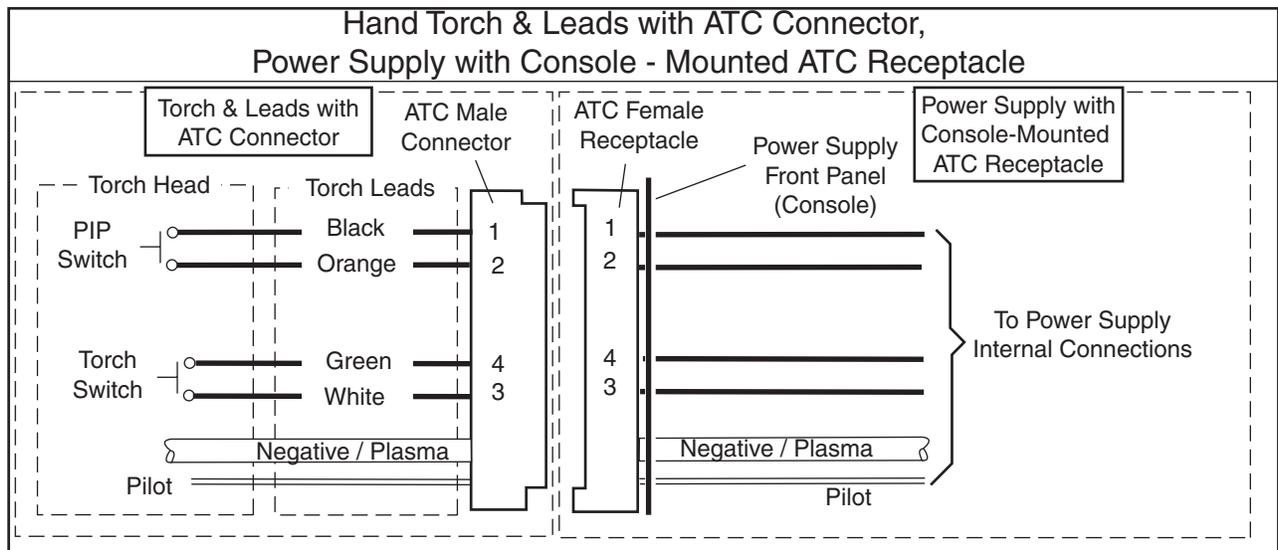
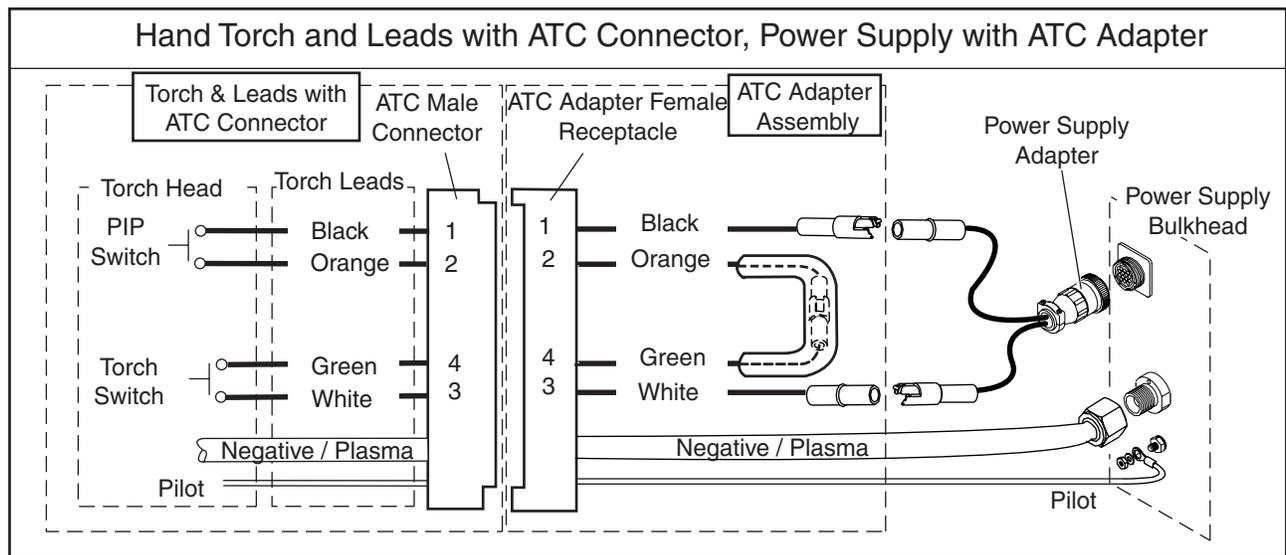
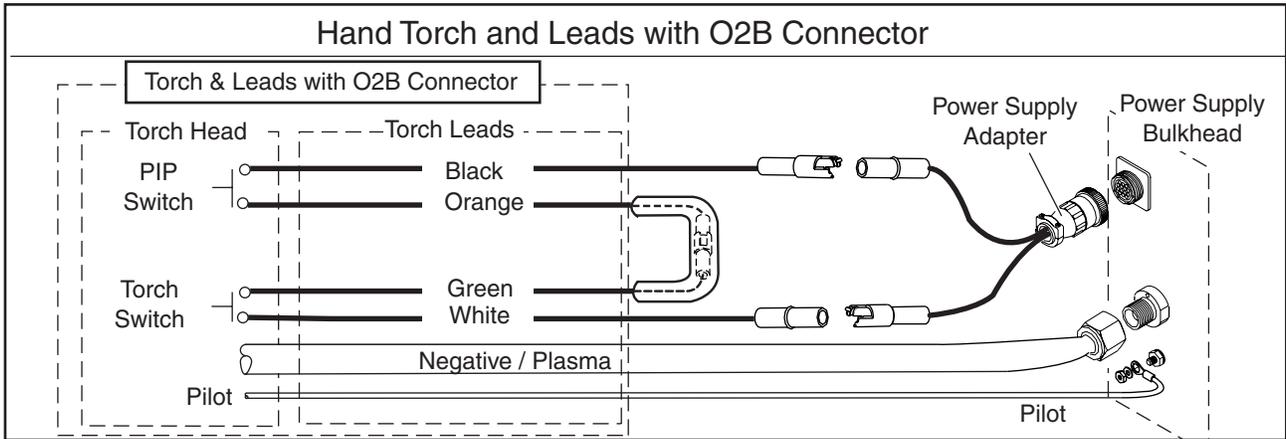
### NOTES

\* Gas pressure shown is for torches with leads up to 25' / 7.6 m long. For 50' / 15.2 m leads, set gas pressure to 65 psi / 4.5 bar.

\*\* Total flow rate includes plasma and secondary gas flow.

# APPENDIX 10: HAND TORCH WIRING DIAGRAMS

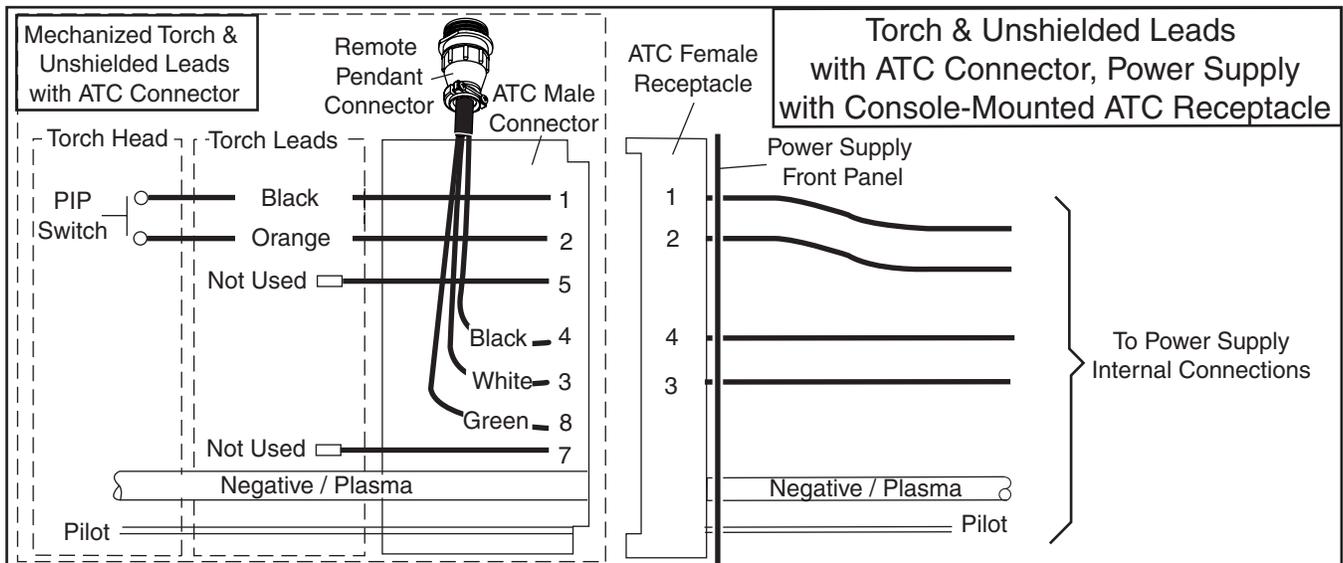
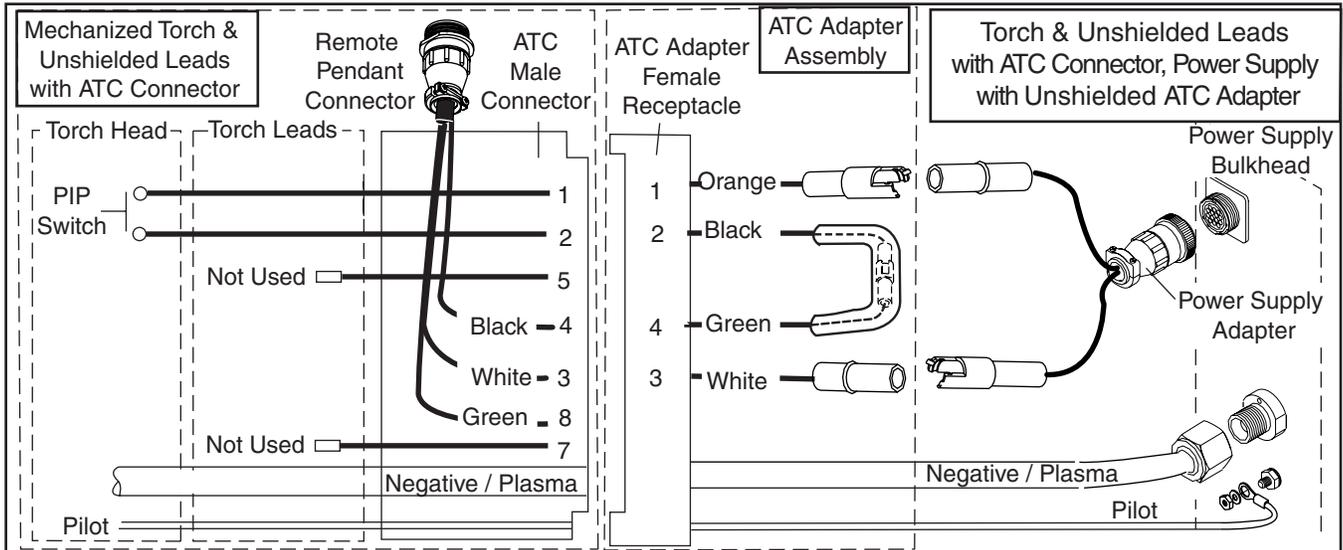
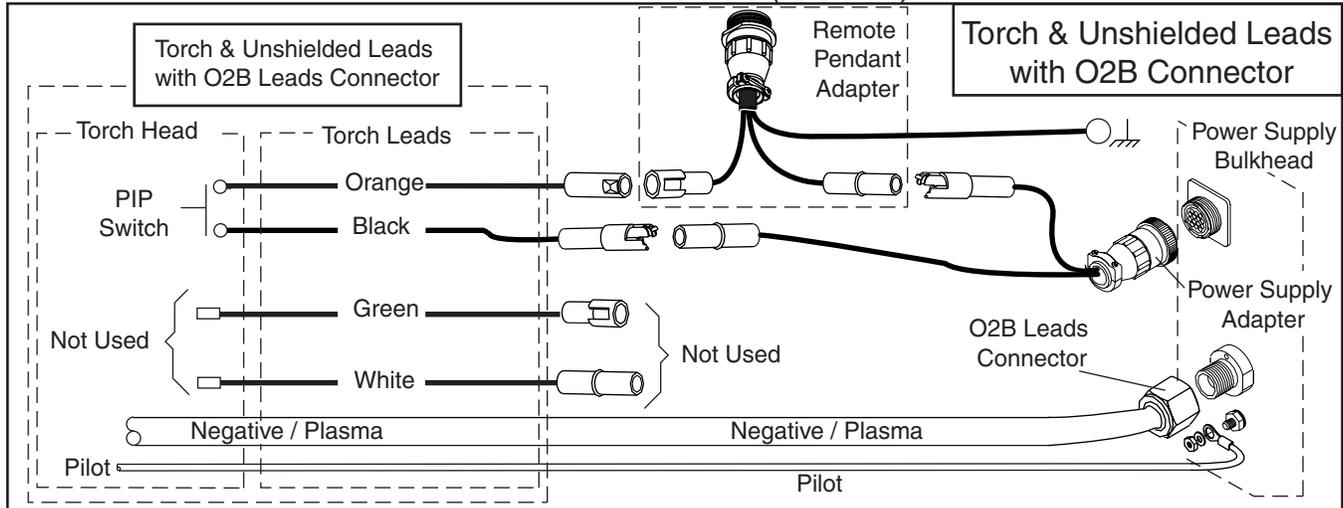
## SL60 - SL100 Hand Torch



Art # A-03679

# APPENDIX 11: MECHANIZED TORCH WIRING DIAGRAMS

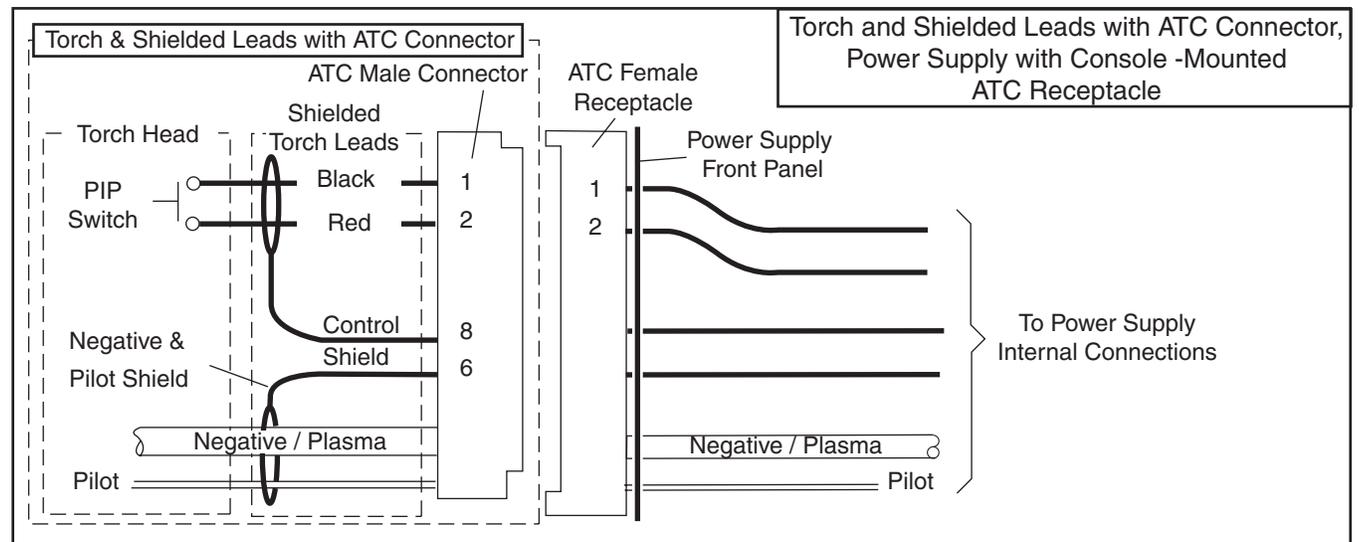
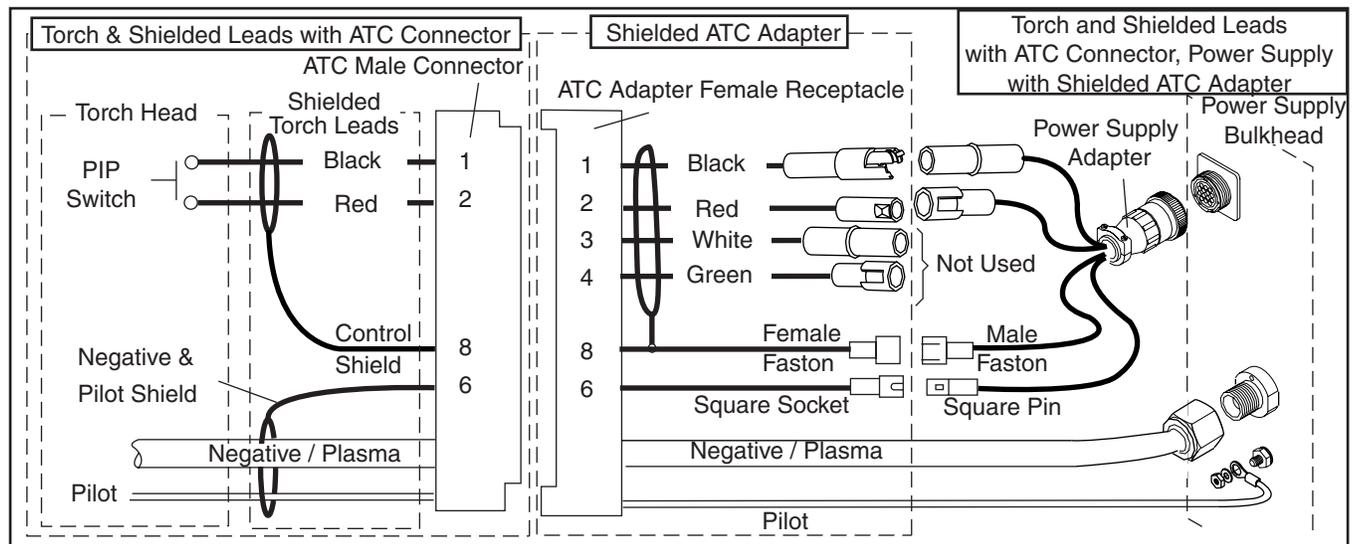
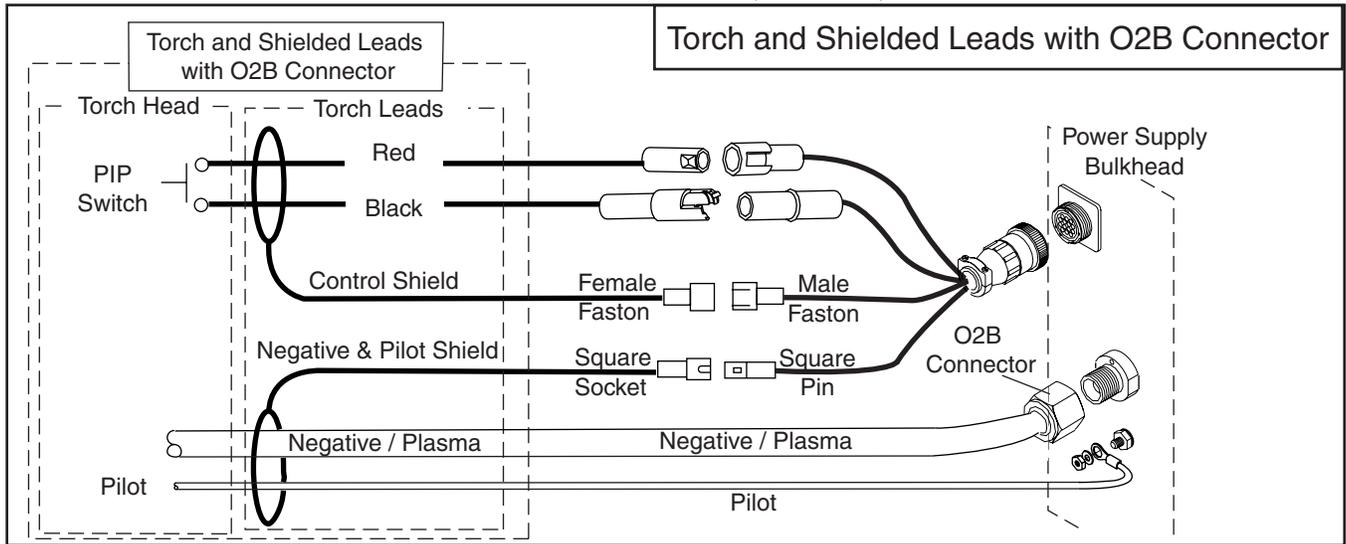
## Unshielded SL100 Mechanized (Machine) Torch



Art # A-03680

# APPENDIX 12: AUTOMATED TORCH WIRING DIAGRAMS

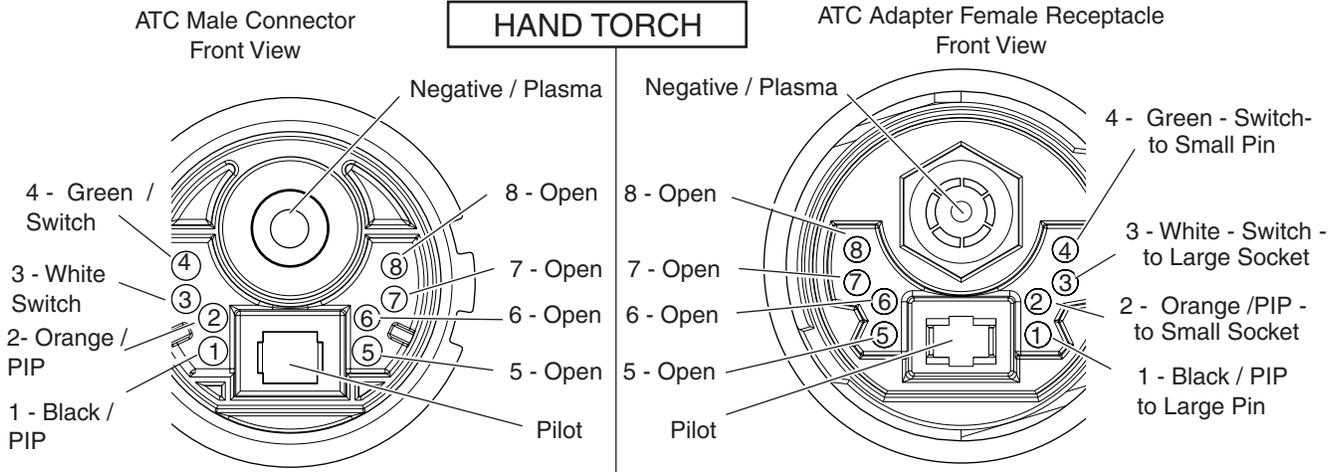
## Shielded SL100 Automated (Machine) Torch



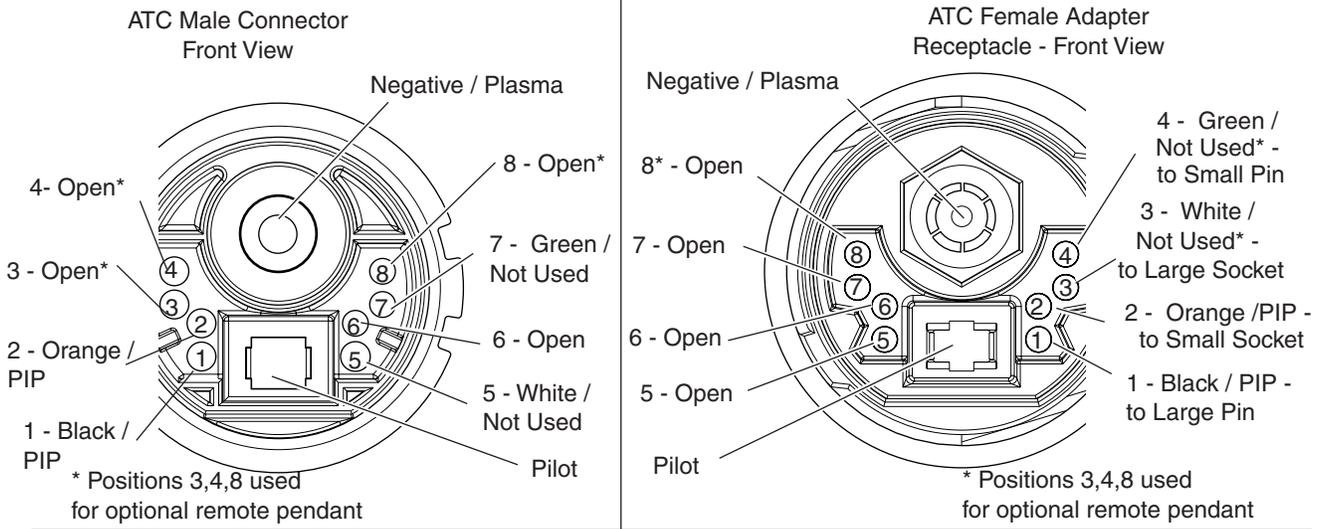
Art # A-03681

# APPENDIX 13: ATC ADAPTER PINOUT DIAGRAM

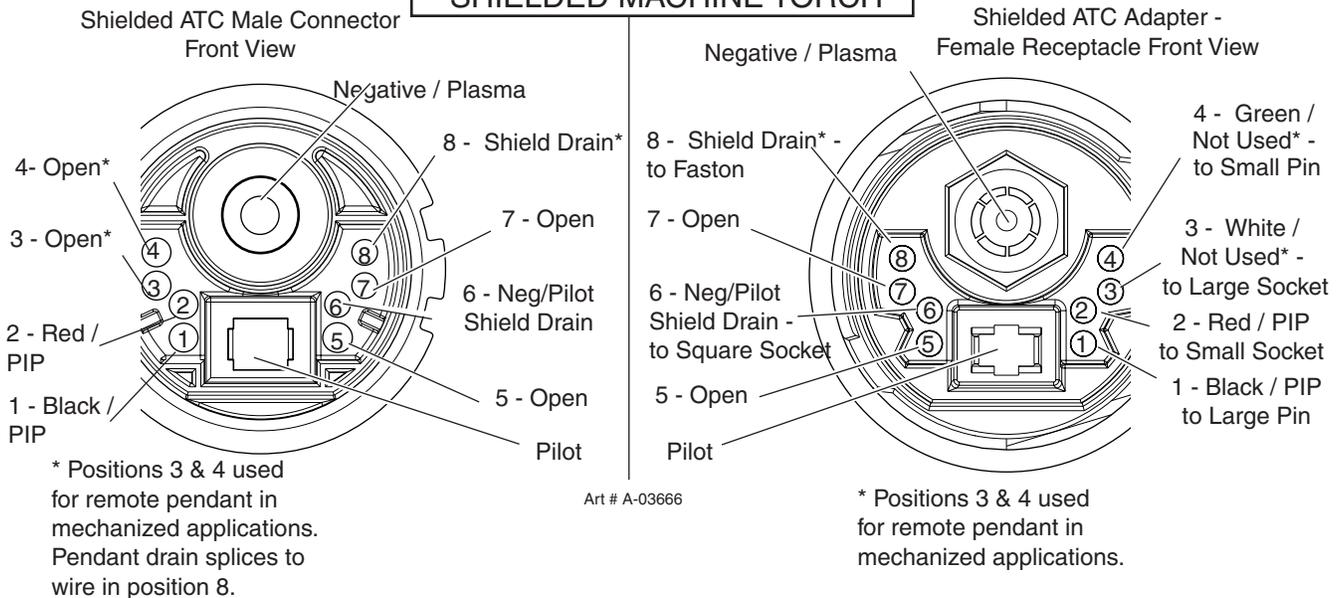
## HAND TORCH



## UNSHIELDED MACHINE TORCH



## SHIELDED MACHINE TORCH



Art # A-03666





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