

# **ArcWriter®**

## ***Plasma Arc Marking System***

***Instruction Manual  
802520 – Revision 7***



EN50199  
EN60974-1

**Hypertherm®**  
*The world leader in  
plasma cutting technology*

<b>Page of Change</b>	<b>Description of Rev 6 Changes</b>	11/8/2002
6.8	Removed color descriptions from part numbers .	

<b>Page of Change</b>	<b>Description of Rev 5 Changes</b>	7/15/2002
2.3, 3.6, 4.2, 6.3	Logo shown on front panel of system updated to new format.	
6.4	Part number for item # 16 (contactor) changed from 003175 to 003212.	
6.5	Art updated to show new contactor.	
Section 7	Removed control board schematic (041516). No other manuals have schematics at this level.	

<b>Page of Change</b>	<b>Description of Rev 4 Changes</b>	11/9/2001
1.1-1a.6	Safety section updated. Put the "a" after setion 1. The file called both safety sections section1	
5.9	Correction: PCB A4 changed to A1	
6.8	Removed P/Ns 001595, 005191 & 008858. Moved S3 designator to P/N 005193	
7.2 & 7.3	Symbol description pages added	
wiring diagrams	All uprev'd except 041516 sheets 1 & 2. Section title changed from Diagrams to Wiring diagrams	

# **ArcWriter**

## **Instruction Manual (P/N 802520)**

**Revision 7 – October, 2013**

**Hypertherm, Inc.  
Hanover, NH USA**

**[www.hypertherm.com](http://www.hypertherm.com)**

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## EMC INTRODUCTION

Hypertherm's CE-marked equipment is built in compliance with standard EN50199. The equipment should be installed and used in accordance with the information below to achieve electromagnetic compatibility.

The limits required by EN50199 may not be adequate to completely eliminate interference when the affected equipment is in close proximity or has a high degree of sensitivity. In such cases it may be necessary to use other measures to further reduce interference.

This plasma equipment is designed for use only in an industrial environment.

## INSTALLATION AND USE

The user is responsible for installing and using the plasma equipment according to the manufacturer's instructions. If electromagnetic disturbances are detected then it shall be the responsibility of the user to resolve the situation with the technical assistance of the manufacturer. In some cases this remedial action may be as simple as earthing the cutting circuit, see *Earthing of Workpiece*. In other cases it could involve constructing an electromagnetic screen enclosing the power source and the work complete with associated input filters. In all cases electromagnetic disturbances must be reduced to the point where they are no longer troublesome.

## ASSESSMENT OF AREA

Before installing the equipment the user shall make an assessment of potential electromagnetic problems in the surrounding area. The following shall be taken into account:

- a. Other supply cables, control cables, signalling and telephone cables; above, below and adjacent to the cutting equipment.
- b. Radio and television transmitters and receivers.
- c. Computer and other control equipment.
- d. Safety critical equipment, for example guarding of industrial equipment.
- e. Health of the people around, for example the use of pacemakers and hearing aids.
- f. Equipment used for calibration or measurement.
- g. Immunity of other equipment in the environment. User shall ensure that other equipment being used in the environment is compatible. This may require additional protection measures.
- h. Time of day that cutting or other activities are to be carried out.

The size of the surrounding area to be considered will depend on the structure of the building and other activities that are taking place. The surrounding area may extend beyond the boundaries of the premises.

## METHODS OF REDUCING EMISSIONS

### Mains Supply

Cutting equipment must be connected to the mains supply according to the manufacturer's recommendations. If interference occurs, it may be necessary to take additional precautions such as filtering of the mains supply. Consideration should be given to shielding the supply cable of permanently installed cutting equipment, in metallic conduit or equivalent. Shielding should be electrically continuous throughout its length. The shielding should be connected to the cutting mains supply so that good electrical contact is maintained between the conduit and the cutting power source enclosure

### Maintenance of Cutting Equipment

The cutting equipment must be routinely maintained according to the manufacturer's recommendations. All access and service doors and covers should be closed and properly fastened when the cutting equipment is in operation. The cutting equipment should not be modified in any way except for those changes and adjustments covered in the manufacturer's instructions. In particular, the spark gaps of arc striking and stabilizing devices should be adjusted and maintained according to the manufacturer's recommendations.

### Cutting Cables

The cutting cables should be kept as short as possible and should be positioned close together, running at or close to the floor level.

### Equipotential Bonding

Bonding of all metallic components in the cutting installation and adjacent to it should be considered. However, metallic components bonded to the workpiece will increase the risk that the operator could receive a shock by touching these metallic components and the electrode at the same time. The operator should be insulated from all such bonded metallic components.

### Earthing of Workpiece

Where the workpiece is not bonded to earth for electrical safety, nor connected to earth because of its size and position, for example, ship's hull or building steelwork, a connection bonding the workpiece to earth may reduce emissions in some, but not all instances. Care should be taken to prevent the earthing of the workpiece increasing the risk of injury to users, or damage to other electrical equipment. Where necessary, the connection of the workpiece to earth should be made by a direct connection to the workpiece, but in some countries where direct connection is not permitted, the bonding should be achieved by suitable capacitances selected according to national regulations.

Note. The cutting circuit may or may not be earthed for safety reasons. Changing the earthing arrangements should only be authorized by a person who is competent to assess whether the changes will increase the risk of injury, for example, by allowing parallel cutting current return paths which may damage the earth circuits of other equipment. Further guidance is given in IEC TC26 (sec)94 and IEC TC26/108A/CD Arc Welding Equipment Installation and Use.

### Screening and Shielding

Selective screening and shielding of other cables and equipment in the surrounding area may alleviate problems of interference. Screening of the entire plasma cutting installation may be considered for special applications

## **WARRANTY**

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### **WARNING**

Genuine Hypertherm parts are the factory-recommended replacement parts for your Hypertherm system. Any damage caused by the use of other than genuine Hypertherm parts may not be covered by the Hypertherm warranty.

### **WARNING**

You are responsible for the safe use of the Product. Hypertherm does not and cannot make any guarantee or warranty regarding the safe use of the Product in your environment.

### **GENERAL**

Hypertherm, Inc. warrants that its Products shall be free from defects in materials and workmanship, if Hypertherm is notified of a defect (i) with respect to the power supply within a period of two (2) years from the date of its delivery to you, with the exception of G3 Series power supplies, which shall be within a period of three (3) years from the date of delivery to you, and (ii) with respect to the torch and leads within a period of one (1) year from its date of delivery to you. This warranty shall not apply to any Product which has been incorrectly installed, modified, or otherwise damaged. Hypertherm, at its sole option, shall repair, replace, or adjust, free of charge, any defective Products covered by this warranty which shall be returned with Hypertherm's prior authorization (which shall not be unreasonably withheld), properly packed, to Hypertherm's place of business in Hanover, New Hampshire, or to an authorized Hypertherm repair facility, all costs, insurance and freight prepaid. Hypertherm shall not be liable for any repairs, replacement, or adjustments of Products covered by this warranty, except those made pursuant to this paragraph or with Hypertherm's prior written consent. **The warranty above is exclusive and is in lieu of all other warranties, express, implied, statutory, or otherwise with respect to the Products or as to the results which may be obtained therefrom, and all implied warranties or conditions of quality or of merchantability or fitness for a particular purpose or against infringement. The foregoing shall constitute the sole and exclusive remedy for any breach by Hypertherm of its warranty.** Distributors/OEMs may offer different or additional warranties, but Distributors/OEMs are not authorized to give any additional warranty protection to you or make any representation to you purporting to be binding upon Hypertherm.

### **PATENT INDEMNITY**

Except only in cases of products not manufactured by Hypertherm or manufactured by a person other than Hypertherm not in strict conformity with Hypertherm's specifications and in cases of designs, processes, formulae, or combinations not developed or purported to be developed by Hypertherm, Hypertherm will defend or settle, at its own expense, any suit or proceeding brought against you alleging that the use of the Hypertherm product, alone and not in combination with any other product not supplied by

Hypertherm, infringes any patent of any third party. You shall notify Hypertherm promptly upon learning of any action or threatened action in connection with any such alleged infringement, and Hypertherm's obligation to indemnify shall be conditioned upon Hypertherm's sole control of, and the indemnified party's cooperation and assistance in, the defense of the claim.

### **LIMITATION OF LIABILITY**

**In no event shall Hypertherm be liable to any person or entity for any incidental, consequential, indirect, or punitive damages (including but not limited to lost profits) regardless of whether such liability is based on breach of contract, tort, strict liability, breach of warranties, failure of essential purpose or otherwise and even if advised of the possibility of such damages.**

### **LIABILITY CAP**

**In no event shall Hypertherm's liability, whether such liability is based on breach of contract, tort, strict liability, breach of warranties, failure of essential purpose or otherwise, for any claim action suit or proceeding arising out of or relating to the use of the Products exceed in the aggregate the amount paid for the Products that gave rise to such claim.**

### **INSURANCE**

At all times you will have and maintain insurance in such quantities and types, and with coverage sufficient and appropriate to defend and to hold Hypertherm harmless in the event of any cause of action arising from the use of the Products.

### **NATIONAL AND LOCAL CODES**

National and Local codes governing plumbing and electrical installation shall take precedent over any instructions contained in this manual. **In no event** shall Hypertherm be liable for injury to persons or property damage by reason of any code violation or poor work practices.

### **TRANSFER OF RIGHTS**

You may transfer any remaining rights you may have hereunder only in connection with the sale of all or substantially all of your assets or capital stock to a successor in interest who agrees to be bound by all of the terms and conditions of this Warranty.

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## **Section 1**

### **SAFETY**

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### RECOGNIZE SAFETY INFORMATION

The symbols shown in this section are used to identify potential hazards. When you see a safety symbol in this manual or on your machine, understand the potential for personal injury, and follow the related instructions to avoid the hazard.



### FOLLOW SAFETY INSTRUCTIONS

Read carefully all safety messages in this manual and safety labels on your machine.

- Keep the safety labels on your machine in good condition. Replace missing or damaged labels immediately.
- Learn how to operate the machine and how to use the controls properly. Do not let anyone operate it without instruction.

- Keep your machine in proper working condition. Unauthorized modifications to the machine may affect safety and machine service life.

### DANGER    WARNING    CAUTION

A signal word DANGER or WARNING is used with a safety symbol. DANGER identifies the most serious hazards.

- DANGER and WARNING safety labels are located on your machine near specific hazards.
- WARNING safety messages precede related instructions in this manual that may result in injury or death if not followed correctly.
- CAUTION safety messages precede related instructions in this manual that may result in damage to equipment if not followed correctly.



### CUTTING CAN CAUSE FIRE OR EXPLOSION

#### Fire Prevention

- Be sure the area is safe before doing any cutting. Keep a fire extinguisher nearby.
- Remove all flammables within 35 feet (10 m) of the cutting area.
- Quench hot metal or allow it to cool before handling or before letting it touch combustible materials.
- Never cut containers with potentially flammable materials inside – they must be emptied and properly cleaned first.
- Ventilate potentially flammable atmospheres before cutting.
- When cutting with oxygen as the plasma gas, an exhaust ventilation system is required.

#### Explosion Prevention

- Do not use the plasma system if explosive dust or vapors may be present.
- Do not cut pressurized cylinders, pipes, or any closed container.
- Do not cut containers that have held combustible materials.



#### WARNING

Explosion Hazard  
Argon-Hydrogen and Methane

Hydrogen and methane are flammable gases that present an explosion hazard. Keep flames away from cylinders and hoses that contain methane or hydrogen mixtures. Keep flames and sparks away from the torch when using methane or argon-hydrogen plasma.



#### WARNING

Hydrogen Detonation with Aluminum Cutting

- When cutting aluminum underwater, or with the water touching the underside of the aluminum, free hydrogen gas may collect under the workpiece and detonate during plasma cutting operations.
- Install an aeration manifold on the floor of the water table to eliminate the possibility of hydrogen detonation. Refer to the Appendix section of this manual for aeration manifold details.



## ELECTRIC SHOCK CAN KILL

Touching live electrical parts can cause a fatal shock or severe burn.

- Operating the plasma system completes an electrical circuit between the torch and the workpiece. The workpiece and anything touching the workpiece are part of the electrical circuit.
- Never touch the torch body, workpiece or the water in a water table when the plasma system is operating.

### Electric Shock Prevention

**All Hypertherm plasma systems use high voltage in the cutting process (200 to 400 VDC are common). Take the following precautions when operating this system:**

- Wear insulated gloves and boots, and keep your body and clothing dry.
- Do not stand, sit or lie on – or touch – any wet surface when using the plasma system.
- Insulate yourself from work and ground using dry insulating mats or covers big enough to prevent any physical contact with the work or ground. If you must work in or near a damp area, use extreme caution.
- Provide a disconnect switch close to the power supply with properly sized fuses. This switch allows the operator to turn off the power supply quickly in an emergency situation.
- When using a water table, be sure that it is correctly connected to earth ground.

- Install and ground this equipment according to the instruction manual and in accordance with national and local codes.
- Inspect the input power cord frequently for damage or cracking of the cover. Replace a damaged power cord immediately. **Bare wiring can kill.**
- Inspect and replace any worn or damaged torch leads.
- Do not pick up the workpiece, including the waste cutoff, while you cut. Leave the workpiece in place or on the workbench with the work cable attached during the cutting process.
- Before checking, cleaning or changing torch parts, disconnect the main power or unplug the power supply.
- Never bypass or shortcut the safety interlocks.
- Before removing any power supply or system enclosure cover, disconnect electrical input power. Wait 5 minutes after disconnecting the main power to allow capacitors to discharge.
- Never operate the plasma system unless the power supply covers are in place. Exposed power supply connections present a severe electrical hazard.
- When making input connections, attach proper grounding conductor first.
- Each Hypertherm plasma system is designed to be used only with specific Hypertherm torches. Do not substitute other torches which could overheat and present a safety hazard.



## CUTTING CAN PRODUCE TOXIC FUMES

Cutting can produce toxic fumes and gases that deplete oxygen and cause injury or death.

- Keep the cutting area well ventilated or use an approved air-supplied respirator.
- Do not cut in locations near degreasing, cleaning or spraying operations. The vapors from certain chlorinated solvents decompose to form phosgene gas when exposed to ultraviolet radiation.
- Do not cut metal coated or containing toxic materials, such as zinc (galvanized), lead, cadmium or

beryllium, unless the area is well ventilated and the operator wears an air-supplied respirator. The coatings and any metals containing these elements can produce toxic fumes when cut.

- Never cut containers with potentially toxic materials inside – they must be emptied and properly cleaned first.
- 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.



### A PLASMA ARC CAN CAUSE INJURY AND BURNS

#### Instant-On Torches

Plasma arc comes on immediately when the torch switch is activated.

The plasma arc will cut quickly through gloves and skin.

- Keep away from the torch tip.
- Do not hold metal near the cutting path.
- Never point the torch toward yourself or others.



### ARC RAYS CAN BURN EYES AND SKIN

**Eye Protection** Plasma arc rays produce intense visible and invisible (ultraviolet and infrared) rays that can burn eyes and skin.

- Use eye protection in accordance with applicable national or local codes.
- Wear eye protection (safety glasses or goggles with side shields, and a welding helmet) with appropriate lens shading to protect your eyes from the arc's ultraviolet and infrared rays.

**Arc Current**  
Up to 100 A  
100-200 A  
200-400 A  
Over 400 A



Lens Shade	
AWS (USA)	ISO 4850
No. 8	No. 11
No. 10	No. 11-12
No. 12	No. 13
No. 14	No. 14

**Skin Protection** Wear protective clothing to protect against burns caused by ultraviolet light, sparks and hot metal.

- Gauntlet gloves, safety shoes and hat.
- Flame-retardant clothing to cover all exposed areas.
- Cuffless trousers to prevent entry of sparks and slag.
- Remove any combustibles, such as a butane lighter or matches, from your pockets before cutting.

**Cutting Area** Prepare the cutting area to reduce reflection and transmission of ultraviolet light:

- Paint walls and other surfaces with dark colors to reduce reflection.
- Use protective screens or barriers to protect others from flash and glare.
- Warn others not to watch the arc. Use placards or signs.



### GROUNDING SAFETY

**Work Cable** Attach the work cable securely to the workpiece or the work table with good metal-to-metal contact. Do not connect it to the piece that will fall away when the cut is complete.

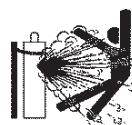
**Work Table** Connect the work table to an earth ground, in accordance with appropriate national or local electrical codes.

#### Input Power

- Be sure to connect the power cord ground wire to the ground in the disconnect box.
- If installation of the plasma system involves connecting the power cord to the power supply, be sure to connect the power cord ground wire properly.
- Place the power cord's ground wire on the stud first, then place any other ground wires on top of the power cord ground. Fasten the retaining nut tightly.
- Tighten all electrical connections to avoid excessive heating.

## COMPRESSED GAS EQUIPMENT SAFETY

- Never lubricate cylinder valves or regulators with oil or grease.
- Use only correct gas cylinders, regulators, hoses and fittings designed for the specific application.
- Maintain all compressed gas equipment and associated parts in good condition.
- Label and color-code all gas hoses to identify the type of gas in each hose. Consult applicable national or local codes.



### GAS CYLINDERS CAN EXPLODE IF DAMAGED

Gas cylinders contain gas under high pressure. If damaged, a cylinder can explode.

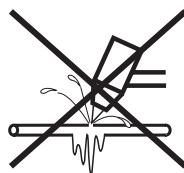
- Handle and use compressed gas cylinders in accordance with applicable national or local codes.
- Never use a cylinder that is not upright and secured in place.
- Keep the protective cap in place over valve except when the cylinder is in use or connected for use.
- Never allow electrical contact between the plasma arc and a cylinder.
- Never expose cylinders to excessive heat, sparks, slag or open flame.
- Never use a hammer, wrench or other tool to open a stuck cylinder valve.



### NOISE CAN DAMAGE HEARING

Prolonged exposure to noise from cutting or gouging can damage hearing.

- Use approved ear protection when using plasma system.
- Warn others nearby about the noise hazard.



### A PLASMA ARC CAN DAMAGE FROZEN PIPES

Frozen pipes may be damaged or can burst if you attempt to thaw them with a plasma torch.



### PACEMAKER AND HEARING AID OPERATION

Pacemaker and hearing aid operation can be affected by magnetic fields from high currents.

Pacemaker and hearing aid wearers should consult a doctor before going near any plasma arc cutting and gouging operations.

To reduce magnetic field hazards:

- Keep both the work cable and the torch lead to one side, away from your body.
- Route the torch leads as close as possible to the work cable.
- Do not wrap or drape the torch lead or work cable around your body.
- Keep as far away from the power supply as possible.

## ADDITIONAL SAFETY INFORMATION

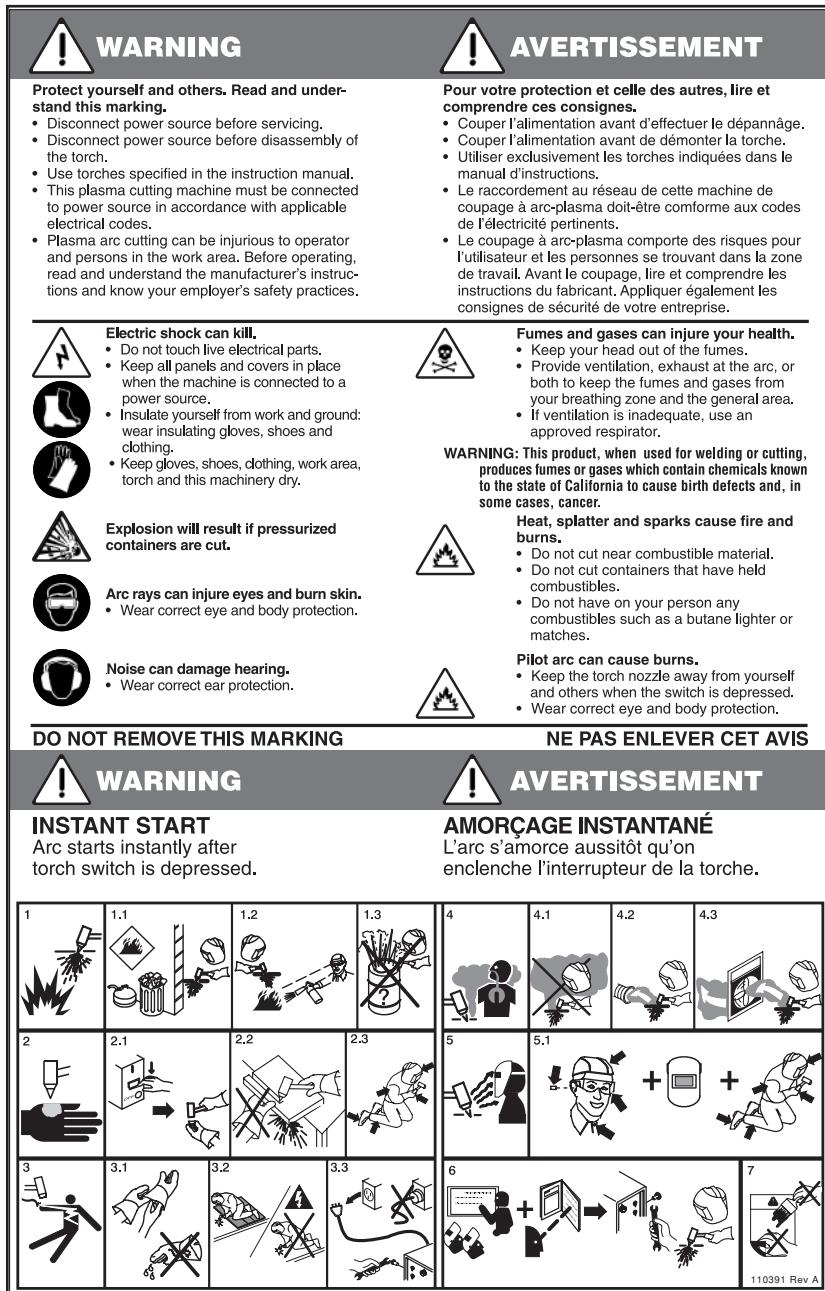
1. ANSI Standard Z49.1, *Safety in Welding and Cutting*, American Welding Society, 550 LeJeune Road P.O. Box 351020, Miami, FL 33135
2. ANSI Standard Z49.2, *Fire Prevention in the Use of Cutting and Welding Processes*, American National Standards Institute 1430 Broadway, New York, NY 10018
3. ANSI Standard Z87.1, *Safe Practices for Occupation and Educational Eye and Face Protection*, American National Standards Institute, 1430 Broadway, New York, NY 10018
4. AWS F4.1, *Recommended Safe Practices for the Preparation for Welding and Cutting of Containers and Piping That Have Held Hazardous Substances*, American Welding Society 550 LeJeune Road, P.O. Box 351040, Miami, FL 33135

5. AWS F5.2, *Recommended Safe Practices for Plasma Arc Cutting*, American Welding Society  
550 LeJeune Road, P.O. Box 351040, Miami, FL 33135
6. CGA Pamphlet P-1, *Safe Handling of Compressed Gases in Cylinders*, Compressed Gas Association  
1235 Jefferson Davis Highway, Arlington, VA 22202
7. CSA Standard W117.2, *Code for Safety in Welding and Cutting*, Canadian Standards Association Standard Sales  
178 Rexdale Boulevard, Rexdale, Ontario M9W 1R3, Canada
8. NFPA Standard 51B, *Cutting and Welding Processes*, National Fire Protection Association  
470 Atlantic Avenue, Boston, MA 02210
9. NFPA Standard 70-1978, *National Electrical Code*, National Fire Protection Association, 470 Atlantic Avenue, Boston, MA 02210
10. OSHA, *Safety and Health Standards*, 29FR 1910  
U.S. Government Printing Office, Washington, D.C. 20402

# SAFETY

## WARNING LABEL

This warning label is affixed to some power supplies. It is important that the operator and maintenance technician understand the intent of these warning symbols as described. The numbered text corresponds to the numbered boxes on the label.



1. Cutting sparks can cause explosion or fire.
- 1.1 Keep flammables away from cutting.
- 1.2 Keep a fire extinguisher nearby, and have a watchperson ready to use it.
- 1.3 Do not cut on any closed containers.
2. The plasma arc can cause injury and burns.
- 2.1 Turn off power before disassembling torch.
- 2.2 Do not hold the material near cutting path.
- 2.3 Wear complete body protection.
3. Electric shock from torch or wiring can kill. Protect yourself from electric shock.
- 3.1 Wear insulating gloves. Do not wear wet or damaged gloves.
- 3.2 Insulate yourself from work and ground.
- 3.3 Disconnect input plug or power before working on machine.
4. Breathing cutting fumes can be hazardous to your health.
- 4.1 Keep your head out of the fumes.
- 4.2 Use forced ventilation or local exhaust to remove the fumes.
- 4.3 Use ventilating fan to remove the fumes.
5. Arc rays can burn eyes and injure skin.
- 5.1 Wear hat and safety glasses. Use ear protection and button shirt collar. Use welding helmet with correct shade of filter. Wear complete body protection.
6. Become trained and read the instructions before working on the machine or cutting.
7. Do not remove or paint over (cover) warning labels.

## **Section 1a**

### **SÉCURITÉ**

---

*Dans cette section :*

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## SÉCURITÉ



### IDENTIFIER LES CONSIGNES DE SÉCURITÉ

Les symboles indiqués dans cette section sont utilisés pour identifier les risques éventuels. Si vous trouvez un symbole de sécurité, que ce soit dans ce manuel ou sur l'équipement, soyez conscient des risques de blessures et suivez les instructions correspondantes afin d'éviter ces risques.



### SUIVRE LES INSTRUCTIONS DE SÉCURITÉ

Lire attentivement toutes les consignes de sécurité dans le présent manuel et sur les étiquettes de sécurité se trouvant sur la machine.

- Les étiquettes de sécurité doivent rester lisibles. Remplacer immédiatement les étiquettes manquantes ou abîmées.
- Apprendre à faire fonctionner la machine et à utiliser correctement les commandes. Ne laisser personne utiliser la machine sans connaître son fonctionnement.

- Garder la machine en bon état. Des modifications non autorisées sur la machine peuvent engendrer des problèmes de sécurité et raccourcir la durée d'utilisation de l'équipement.

### DANGER AVERTISSEMENT PRÉCAUTION

Les signaux DANGER ou AVERTISSEMENT sont utilisés avec un symbole de sécurité, DANGER correspondant aux risques les plus sérieux.

- Les étiquettes de sécurité DANGER et AVERTISSEMENT sont situées sur la machine pour signaler certains dangers spécifiques.
- Les messages d'AVERTISSEMENT précèdent les instructions d'utilisation expliquées dans ce manuel et signalent les risques de blessures ou de mort au cas où ces instructions ne seraient pas suivies correctement.
- Les messages de PRÉCAUTION précèdent les instructions d'utilisation contenues dans ce manuel et signalent que le matériel risque d'être endommagé si les instructions ne sont pas suivies correctement.



### LE COUPAGE PEUT PROVOQUER UN INCENDIE OU UNE EXPLOSION

#### Prévention des incendies

- Avant de commencer, s'assurer que la zone de coupage ne présente aucun danger. Conserver un extincteur à proximité.
- Éloigner toute matière inflammable à une distance d'au moins 10 m du poste de coupage.
- Tremper le métal chaud ou le laisser refroidir avant de le manipuler ou avant de le mettre en contact avec des matériaux combustibles.
- Ne jamais couper des récipients pouvant contenir des matières inflammables avant de les avoir vidés et nettoyés correctement.
- Aérer toute atmosphère potentiellement inflammable avant d'utiliser un système plasma.
- Lors de l'utilisation d'oxygène comme gaz plasma, un système de ventilation par aspiration est nécessaire.

#### Prévention des explosions

- Ne pas couper en présence de poussière ou de vapeurs.
- Ne pas couper de bouteilles, de tuyaux ou autres récipients fermés et pressurisés.
- Ne pas couper de récipients contenant des matières combustibles.



#### AVERTISSEMENT

Risque d'explosion  
argon-hydrogène et méthane

L'hydrogène et le méthane sont des gaz inflammables et potentiellement explosifs. Conserver à l'écart de toute flamme les bouteilles et tuyaux contenant des mélanges à base d'hydrogène ou de méthane. Maintenir toute flamme et étincelle à l'écart de la torche lors de l'utilisation d'un plasma d'argon-hydrogène ou de méthane.



#### AVERTISSEMENT

Détonation de l'hydrogène lors du coupage de l'aluminium

- Lors du coupage de l'aluminium sous l'eau, ou si l'eau touche la partie inférieure de la pièce d'aluminium, de l'hydrogène libre peut s'accumuler sous la pièce à couper et détonner lors du coupage plasma.
- Installer un collecteur d'aération au fond de la table à eau afin d'éliminer les risques de détonation de l'hydrogène. Se référer à l'annexe du manuel pour plus de renseignements sur les collecteurs d'aération.



## LES CHOCS ÉLECTRIQUES PEUVENT ÊTRE FATALS

Toucher une pièce électrique sous tension peut provoquer un choc électrique fatal ou des brûlures graves.

- La mise en fonctionnement du système plasma ferme un circuit électrique entre la torche et la pièce à couper. La pièce à couper et tout autre élément en contact avec cette pièce font partie du circuit électrique.
- Ne jamais toucher le corps de la torche, la pièce à couper ou l'eau de la table à eau pendant le fonctionnement du système plasma.

### Prévention des chocs électriques

Tous les systèmes plasma Hypertherm utilisent des hautes tensions pour le coupage (souvent de 200 à 400 V). On doit prendre les précautions suivantes quand on utilise le système plasma :

- Porter des bottes et des gants isolants et garder le corps et les vêtements au sec.
- Ne pas se tenir, s'asseoir ou se coucher sur une surface mouillée, ni la toucher quand on utilise le système plasma.
- S'isoler de la surface de travail et du sol en utilisant des tapis isolants secs ou des couvertures assez grandes pour éviter tout contact physique avec le travail ou le sol. S'il s'avère nécessaire de travailler dans ou près d'un endroit humide, procéder avec une extrême prudence.
- Installer un sectionneur avec fusibles appropriés, à proximité de la source de courant. Ce dispositif permet à l'opérateur d'arrêter rapidement la source de courant en cas d'urgence.
- En cas d'utilisation d'une table à eau, s'assurer que cette dernière est correctement mise à la terre.

- Installer et mettre à la terre l'équipement selon les instructions du présent manuel et conformément aux codes électriques locaux et nationaux.
- Inspecter fréquemment le cordon d'alimentation primaire pour s'assurer qu'il n'est ni endommagé, ni fendu. Remplacer immédiatement un cordon endommagé. **Un câble dénudé peut tuer.**
- Inspecter et remplacer les câbles de la torche qui sont usés ou endommagés.
- Ne pas saisir la pièce à couper ni les chutes lors du coupage. Laisser la pièce à couper en place ou sur la table de travail, le câble de retour connecté lors du coupage.
- Avant de vérifier, de nettoyer ou de remplacer les pièces de la torche, couper l'alimentation ou débrancher la prise de courant.
- Ne jamais contourner ou court-circuiter les verrouillages de sécurité.
- Avant d'enlever le capot du système ou de la source de courant, couper l'alimentation électrique. Attendre ensuite 5 minutes pour que les condensateurs se déchargent.
- Ne jamais faire fonctionner le système plasma sans que les capots de la source de courant ne soient en place. Les raccords exposés de la source de courant sont extrêmement dangereux.
- Lors de l'installation des connexions, attacher tout d'abord la prise de terre appropriée.
- Chaque système plasma Hypertherm est conçu pour être utilisé uniquement avec des torches Hypertherm spécifiques. Ne pas utiliser des torches inappropriées qui pourraient surchauffer et présenter des risques pour la sécurité.



## LE COUPAGE PEUT PRODUIRE DES VAPEURS TOXIQUES

Le coupage peut produire des vapeurs et des gaz toxiques qui réduisent le niveau d'oxygène dans l'air et peuvent provoquer des blessures, voire la mort.

- Conserver le poste de coupage bien aéré ou utiliser un masque respiratoire homologué.
- Ne pas procéder au coupage près d'endroits où s'effectuent le dégraissage, le nettoyage ou la vaporisation. Certains solvants chlorés se décomposent sous l'effet des rayons ultraviolets et forment du phosgène.
- Ne pas couper des métaux peints ou contenant des matières toxiques comme le zinc (galvanisé), le plomb, le cadmium ou le beryllium, à moins que la zone de travail

soit très bien ventilée et que l'opérateur porte un masque respiratoire. Les revêtements et métaux contenant ces matières peuvent produire des vapeurs toxiques lors du coupage.

- Ne jamais couper de récipients pouvant contenir des matières inflammables avant de les avoir vidés et nettoyés correctement.
- Quand on utilise ce produit pour le soudage ou le coupage, il dégage des fumées et des gaz qui contiennent des produits chimiques qui, selon l'État de Californie, provoquent des anomalies congénitales et, dans certains cas, le cancer.

## SÉCURITÉ



### L'ARC PLASMA PEUT PROVOQUER DES BLESSURES OU DES BRÛLURES

#### Torches à allumage instantané

L'arc plasma s'allume immédiatement après que la torche soit mise en marche.

L'arc plasma coupe facilement les gants et la peau.

- Rester éloigné de l'extrémité de la torche.
- Ne pas tenir de métal près de la trajectoire de coupe.
- Ne jamais pointer la torche vers soi ou d'autres personnes.



### LES RAYONS DE L'ARC PEUVENT BRÛLER LES YEUX ET LA PEAU

**Protection des yeux** Les rayons de l'arc plasma produisent de puissants rayons visibles ou invisibles (ultraviolets et infrarouges) qui peuvent brûler les yeux et la peau.

- Utiliser des lunettes de sécurité conformément aux codes locaux ou nationaux en vigueur.
- Porter des lunettes de protection (lunettes ou masque muni d'écrans latéraux et encore masque de soudure) avec des verres teintés appropriés pour protéger les yeux des rayons ultraviolets et infrarouges de l'arc.

#### Puissance des verres teintés

##### Courant de l'arc



Jusqu'à 100 A

100-200 A

200-400 A

Plus de 400 A

##### AWS (É.-U.)

Nº 8

Nº 10

Nº 12

Nº 14

##### ISO 4850

Nº 11

Nº 11-12

Nº 13

Nº 14

**Protection de la peau** Porter des vêtements de sécurité pour se protéger contre les brûlures que peuvent causer les rayons ultraviolets, les étincelles et le métal brûlant :

- Gants à crissipin, chaussures et casque de sécurité.
- Vêtements ignifugés couvrant toutes les parties exposées du corps.
- Pantalon sans revers pour éviter que des étincelles ou des scories puissent s'y loger.
- Avant le coupage, retirer de ses poches tout objet combustible comme les briquets au butane ou les allumettes.

**Zone de coupage** Préparer la zone de coupage afin de réduire la réverbération et la transmission de la lumière ultraviolette :

- Peindre les murs et autres surfaces de couleur sombre pour réduire la réflexion de la lumière.
- Utiliser des écrans et autres dispositifs de protection afin de protéger les autres personnes de la lumière et de la réverbération.
- Prévenir les autres personnes de ne pas regarder l'arc. Utiliser des affiches ou des panneaux.



### MISE À LA MASSE ET À LA TERRE

**Câble de retour** Bien fixer le câble de retour (ou de masse) à la pièce à couper ou à la table de travail de façon à assurer un bon contact métal-métal. Ne pas fixer le câble de retour à la partie de la pièce qui doit se détacher.

**Table de travail** Raccorder la table de travail à la terre, conformément aux codes de sécurité locaux ou nationaux appropriés.

#### Alimentation

- S'assurer que le fil de terre du cordon d'alimentation est connecté à la terre dans le coffret du sectionneur.
- S'il est nécessaire de brancher le cordon d'alimentation à la source de courant lors de l'installation du système, s'assurer que le fil de terre est correctement branché.
- Placer tout d'abord le fil de terre du cordon d'alimentation sur le plot de mise à la terre puis placer les autres fils de terre par-dessus. Bien serrer l'écrou de retenue.
- S'assurer que toutes les connexions sont bien serrées pour éviter la surchauffe.

## SÉCURITÉ DES BOUTEILLES DE GAZ COMPRIMÉ

- Ne jamais lubrifier les robinets des bouteilles ou les régulateurs avec de l'huile ou de la graisse.
- Utiliser uniquement les bouteilles, régulateurs, tuyaux et accessoires appropriés et conçus pour chaque application spécifique.
- Entretenir l'équipement et les pièces d'équipement à gaz comprimé afin de les garder en bon état.
- Étiqueter et coder avec des couleurs tous les tuyaux de gaz afin d'identifier le type de gaz contenu dans chaque tuyau. Se référer aux codes locaux ou nationaux en vigueur.



## LES BOUTEILLES DE GAZ COMPRIMÉ PEUVENT EXPLOSER EN CAS DE DOMMAGES

Les bouteilles de gaz contiennent du gaz à haute pression. Si une bouteille est endommagée, elle peut exploser.

- Manipuler et utiliser les bouteilles de gaz comprimé conformément aux codes locaux ou nationaux.
- Ne jamais utiliser une bouteille qui n'est pas placée à la verticale et bien assujettie.
- Le capuchon de protection doit être placé sur le robinet sauf si la bouteille est en cours d'utilisation ou connectée pour utilisation.
- Éviter à tout prix le contact électrique entre l'arc plasma et une bouteille.
- Ne jamais exposer des bouteilles à une chaleur excessive, aux étincelles, aux scories ou aux flammes nues.
- Ne jamais utiliser des marteaux, des clés ou d'autres outils pour débloquer le robinet des bouteilles.



## LE BRUIT PEUT PROVOQUER DES PROBLÈMES AUDITIFS

Une exposition prolongée au bruit du coupage ou du gougeage peut provoquer des problèmes auditifs.

- Utiliser un casque de protection homologué lors de l'utilisation du système plasma.
- Prévenir les personnes aux alentours des risques encourus en cas d'exposition au bruit.

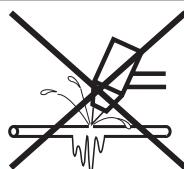


## PACEMAKERS ET PROTHÈSES AUDITIVES

Les champs magnétiques produits par les courants à haute tension peuvent affecter le fonctionnement des prothèses auditives et des pacemakers. Les personnes portant ce type d'appareil doivent consulter un médecin avant de s'approcher d'un lieu où s'effectue le coupage ou le gougeage plasma.

Pour réduire les risques associés aux champs magnétiques :

- Garder loin de soi et du même côté du corps le câble de retour et le faisceau de la torche.
- Faire passer le faisceau de la torche le plus près possible du câble de retour.
- Ne pas s'enrouler le faisceau de la torche ou le câble de retour autour du corps.
- Se tenir le plus loin possible de la source de courant.



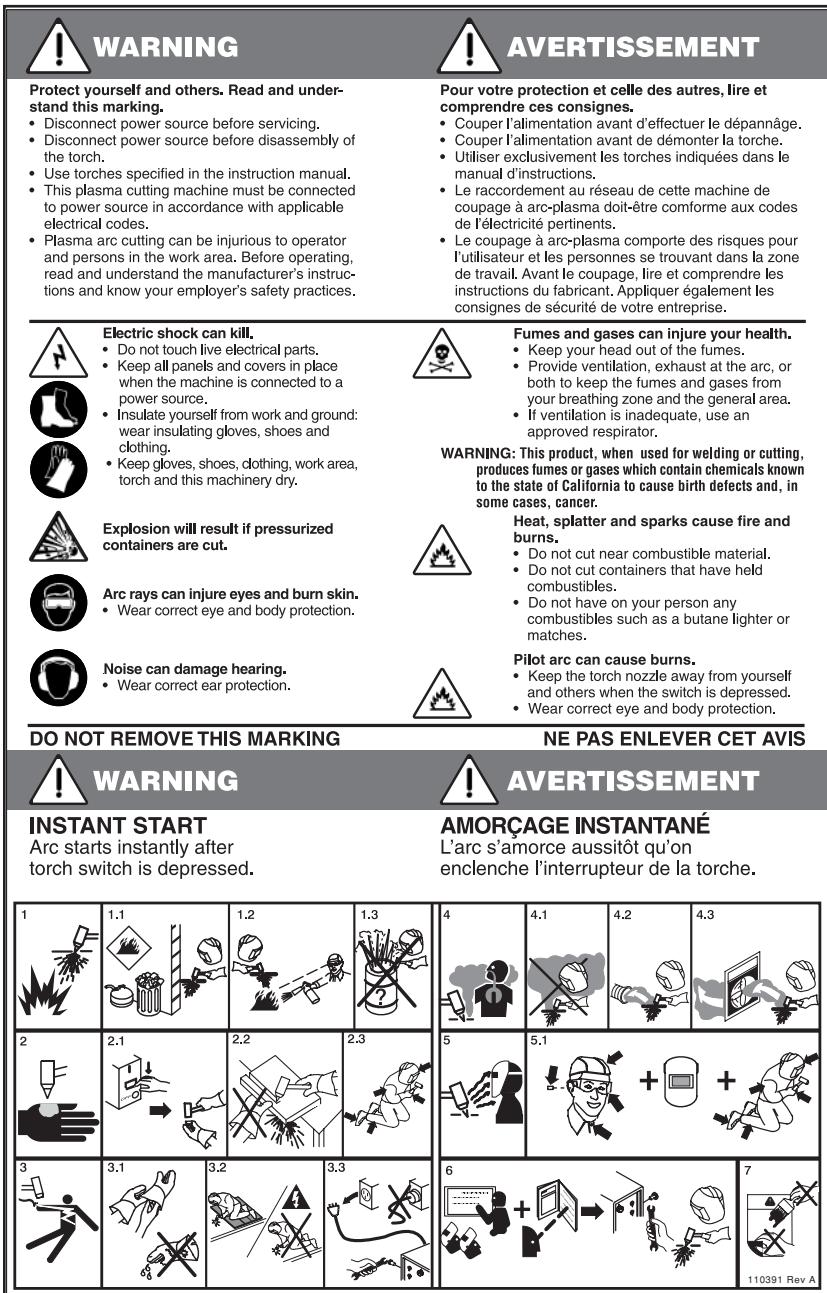
## UN ARC PLASMA PEUT ENDOMMAGER LES TUYAUX GELÉS

Les tuyaux gelés peuvent être endommagés ou éclater si l'on essaie de les dégeler avec une torche plasma.

# SÉCURITÉ

## Étiquette de sécurité

Cette étiquette est affichée sur la source de courant. Il est important que l'utilisateur et le technicien de maintenance comprennent la signification des symboles de sécurité. Les numéros de la liste correspondent aux numéros des images.



- Les étincelles produites par le coupage peuvent provoquer une explosion ou un incendie.
  - Pendant le coupage, éloigner toute matière inflammable.
  - Conserver un extincteur à proximité et s'assurer qu'une personne soit prête à l'utiliser.
  - Ne jamais couper de récipients fermés.
  - L'arc plasma peut provoquer des blessures et des brûlures.
    - Couper l'alimentation avant de démonter la torche.
    - Ne pas tenir la surface à couper près de la trajectoire de coupe.
    - Porter des vêtements de protection couvrant tout le corps.
    - Un choc électrique causé par la torche ou les câbles peut être fatal. Se protéger contre les risques de chocs électriques.
      - Porter des gants isolants. Ne pas porter de gants mouillés ou abîmés.
      - S'isoler de la surface de travail et du sol.
      - Débrancher la prise ou la source de courant avant de manipuler l'équipement.
      - L'inhalation des vapeurs produites par le coupage peut être dangereuse pour la santé.
        - Garder le visage à l'écart des vapeurs.
        - Utiliser un système de ventilation par aspiration ou d'échappement localisé pour dissiper les vapeurs.
        - Utiliser un ventilateur pour dissiper les vapeurs.
        - Les rayons de l'arc peuvent brûler les yeux et provoquer des lésions de la peau.
          - Porter un casque et des lunettes de sécurité. Se protéger les oreilles et porter une chemise dont le col peut être déboutonné. Porter un casque de soudure dont la protection filtrante est suffisante. Porter des vêtements protecteurs couvrant la totalité du corps.
          - Se former à la technique du coupage et lire les instructions avant de manipuler l'équipement ou de procéder au coupage.
          - Ne pas retirer ou peindre (recouvrir) les étiquettes de sécurité.

**Section 2****SPECIFICATIONS**

*In this section:*

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### General

Hypertherm's ArcWriter is a dual gas plasma system using a marking, scoring and dimpling system designed to leave temporary or permanent identification marks on metal surfaces. The ArcWriter system includes the following:

- A **constant current chopper power supply** capable of providing a variable current output from 4 to 19 amps in 1-amp increments. This unit inputs the plasma and shield gases through two pressure regulators located at the rear of the power supply. These regulators ensure that the gases are provided at the right pressure for all marking applications. The power supply can be configured to control current in two ways (Fig. 2-1):

**Full CNC Control** – This configuration requires the use of the **17-wire interface cable** (Fig. 2-6).

**Control Panel Subassembly** – This configuration requires the use of the control panel SA (mounted on the front panel of the power supply) and the **8-wire interface cable** (Fig. 2-8). The control panel SA provides current selection for users with a limited number of CNC inputs (Fig. 2-7).

- An **isolation/voltage divider board** is available to provide an arc voltage signal for customer supplied THC units.
- A **torch and lead assembly** which consists of a lead set that interconnects the power supply and torch, plasma gas valve SA, torch sleeve, torch main body and consumables. The torch is a dual-gas mechanized marking torch which uses air or H5 (5% hydrogen and 95% argon premixed) as the plasma gas and air as the shield gas. The lead set consists of the plasma, shield and cap-on-sensor gas hoses, pilot arc lead (+) and electrode lead (-). Physically mounted to the torch sleeve, the plasma gas valve interfaces the plasma gas hose between the power supply and the torch. The plasma gas valve also receives power through the lead set from the power supply.

A ground screw is provided on the plasma gas valve for attaching a protective earth ground wire (by the customer) from the water table, gantry, etc. (Figs. 2-2, 2-3, 2-4 and 2-5).

The plasma gas valve allows the plasma gas hose back to the power supply to remain at pressure once pressurized. In turn, the plasma gas hose between the plasma gas valve and torch will reach operating pressure quickly, ensure that the torch contact start mechanism operates normally and provide proper system performance when extra long lead sets are required .

- A **work lead** which connects from the power supply to the work table (Fig. 2-9).

## Specifications

### Power Supply

#### Electrical

Rated OCV ( $U_0$ ) ..... 235 VDC at rated input voltage

Output current ( $I_2$ ) ..... 4-19 amps, adjustable in 1-amp increments

Output voltage ( $U_2$ ) ..... 120 VDC

Duty cycle (X) at 40° C ..... 100% (19-amps, 120 VDC)

Input Power ( $U_1$  line voltage,  $I_1$  input current):

084000, 084008, 084013, 084017 ..... 200 VAC, 3 Ph, 50/60 Hz, 8.3 amps

084025, 084027, 084029, 084031 ..... 208 VAC, 3 Ph, 60 Hz, 8.2 amps

084026, 084028, 084030, 084032 ..... 240 VAC, 3 Ph, 60 Hz, 7.9 amps

084004, 084009, 084014, 084018 ..... 400 VAC, 3 Ph, 50 Hz, 4.5 amps

084021, 084022, 084023, 084024 ..... 440 VAC, 3 Ph, 60 Hz, 4.2 amps

084005, 084010, 084015, 084019 ..... 480 VAC, 3 Ph, 60 Hz, 4.0 amps

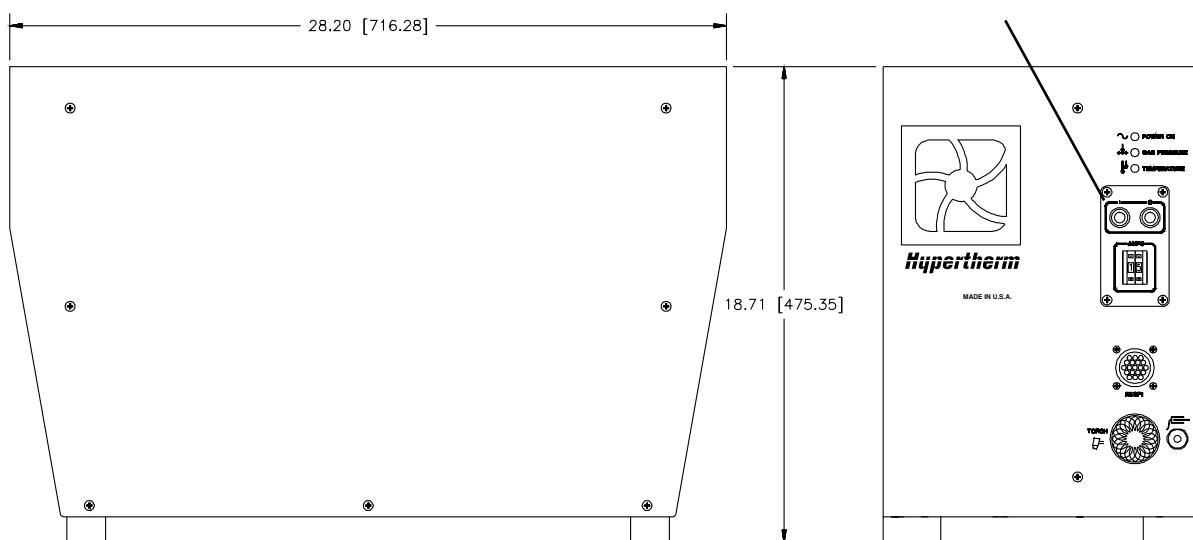
084011, 084012, 084016, 084020 ..... 600 VAC, 3 Ph, 60 Hz, 3.3 amps

#### Dimensions and Weight

Width ..... 12.6 -inches (321 mm)

Height ..... 18.7 -inches (475 mm)

Shown with control panel SA  
installed. A cover is installed  
when full CNC control is used.



**Figure 2-1 Power Supply Dimensions**

## SPECIFICATIONS

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Depth ..... 28.2 -inches (716 mm)  
Weight ..... 100 pounds (55 kg)

### Gas Requirements

#### Type

Plasma gases ..... Air or H5 (5% hydrogen and 95% argon premixed)

Shield gas ..... Air

#### Quality

Air ..... Clean, dry and oil-free

H5 ..... Industrial grade (5% hydrogen and 95% argon premixed)

### Flowrates and Pressures

Plasma gases ..... 60 scfh (28 l/min) @ 100 psi (6.9 bar) supplied to power supply pressure regulator

Shield gas ..... 300 scfh (142 l/min) @ 100 psi (6.9 bar) supplied to power supply pressure regulator

Plasma pressure regulator setting (Air or H5) ..... 70 psig (4.8 bar) dynamic (flowing)

Shield pressure regulator setting (Air) ..... 60 psig (4.1 bar) dynamic (flowing)

## Torch and Lead Assembly

Assembly includes: torch assembly, lead set and plasma gas valve SA

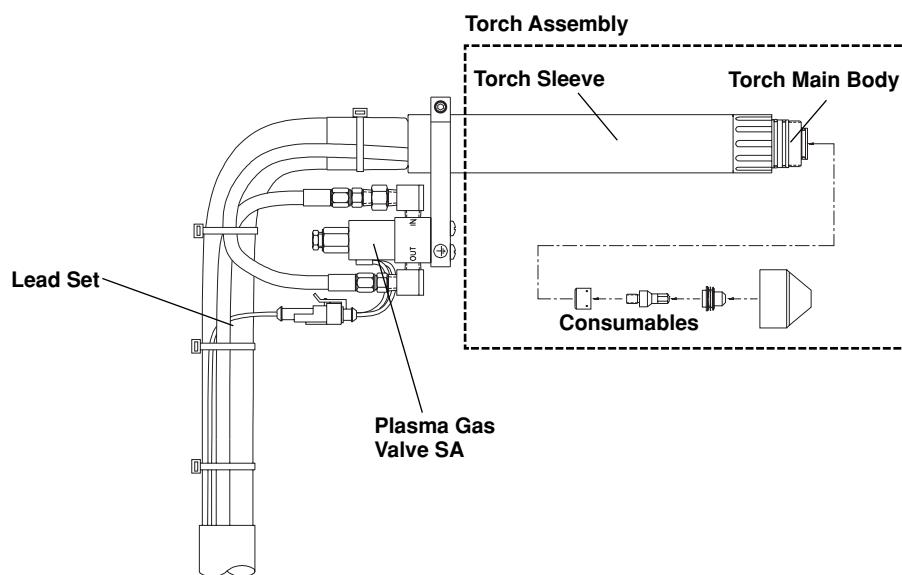


Figure 2-2 Torch and Lead Assembly

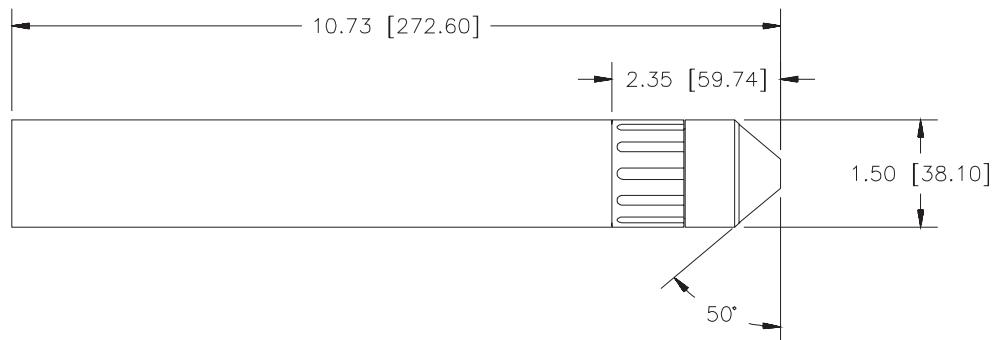
## Torch and Lead Assembly (Continued)

### Torch Assembly (128115)

Type ..... Dual gas, mechanized  
Gas ..... Plasma and shield  
Starting ..... Contact start  
Cap sensor ..... Pneumatic

#### Dimensions and Weight

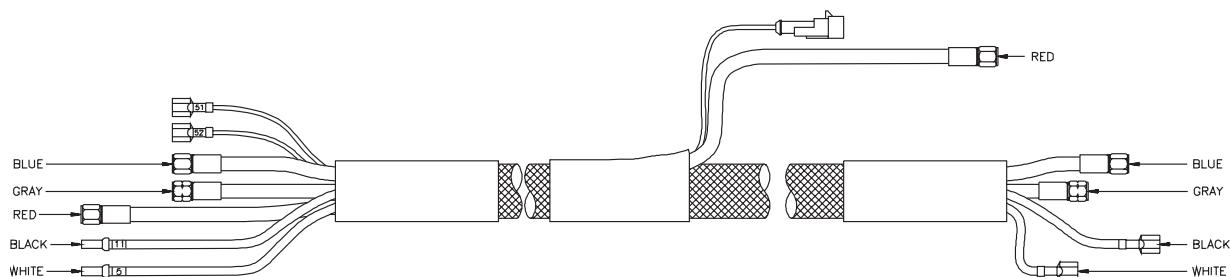
Diameter ..... 1.5-inches (38 mm)  
Length ..... 10.73-inches (272 mm)  
Weight ..... 1.5 pounds (0.8kg)



**Figure 2-3 Torch Dimensions**

### Lead Set

Refer to Section 6, Parts List for available lengths.



**Figure 2-4 Lead Set**

### Torch and Lead Assembly (Continued)

#### Plasma Gas Valve Subassembly (129101)

Electrical ..... 120 VAC (input from power supply to operate solenoid valve)

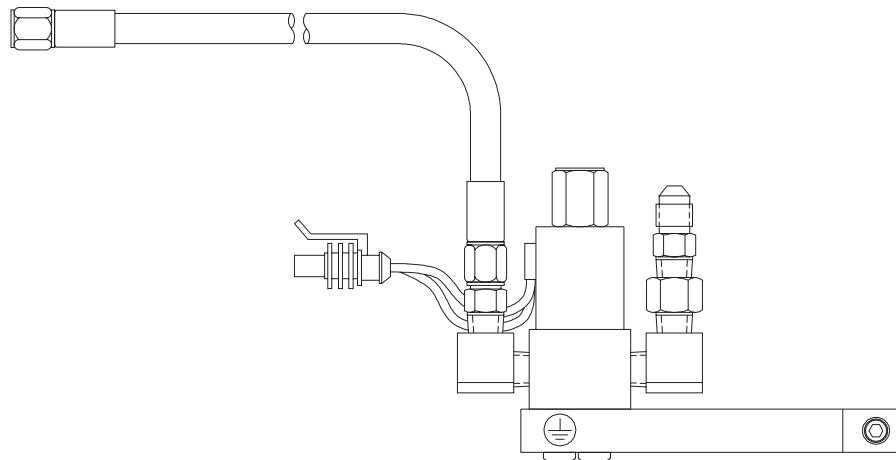


Figure 2-5 Plasma Gas Valve Subassembly

#### Interface Cable (for use with CNC Control)

Refer to Section 6, Parts List for available lengths.

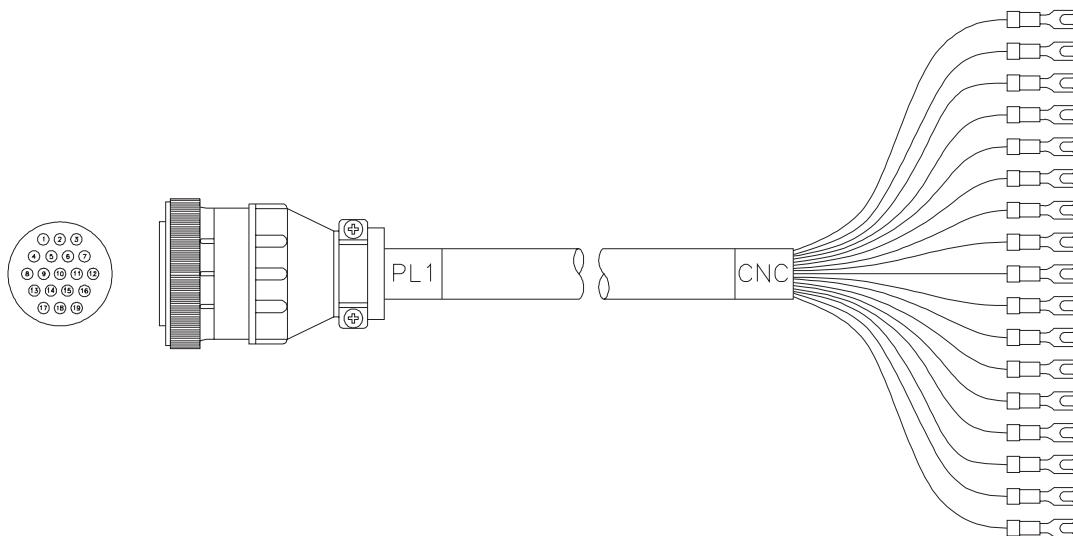


Figure 2-6 Interface Cable (for use with full CNC Control)

## Control Panel Subassembly (129096)

### Electrical

Remote current set points ..... BCD switch settings (4-19 amps at 1-amp increments).  
Settings 0-4 provide 4 amps.

### Dimensions and Weight

Width ..... 2.7-inches (68.6 mm)  
Height ..... 4.7-inches (120.5 mm)

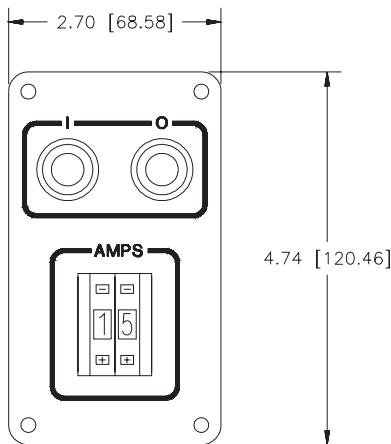


Figure 2-7 Control Panel SA Dimensions

## Interface Cable (for use with Control Panel SA)

Refer to Section 6, Parts List for available lengths.

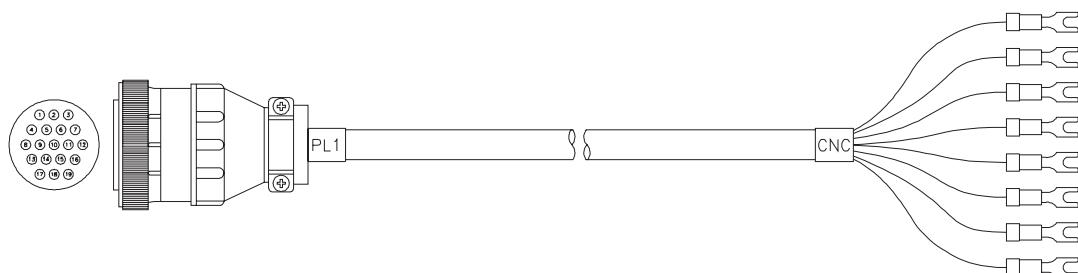


Figure 2-8 Interface Cable (for use with Control Panel SA)

## Work Lead

Refer to Section 6, Parts List for available lengths.

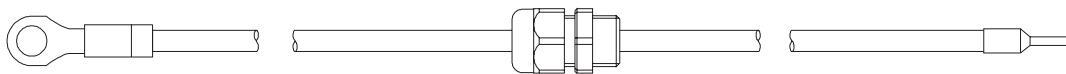


Figure 2-9 Work Lead

## SPECIFICATIONS

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### Performance Characteristics

#### Metals

The ArcWriter will mark mild steel, stainless steel and aluminum. The width and depth of the marks may be varied by adjusting the current, gas type and speed.

#### Marking (Light and Heavy Scoring) and Dimpling

**Light Scoring** – fine, clean dross free lines

Width .....	0.020 - 0.040 inches (0.5 - 1.0 mm)
Depth.....	Less than 0.001 inch (0.03 mm)
Travel speed.....	100 -300 ipm (3-7 m/minute)

**Heavy Scoring** – heavier lines; some dross may form

Width .....	0.020 - 0.040 inches (0.5 - 1.0 mm)
Depth.....	0.003 - 0.010 inches (0.08 - 0.25 mm)
Travel speed.....	100 -300 ipm (3-7 m/minute)

**Dimples** – round marks; some dross may form with deeper dimples

Diameter.....	0.040 - 0.060 inches (1.0 - 1.5 mm)
Depth.....	0.020 - 0.040 inches (0.5 - 1.0 mm)
Dimpling time .....	Less than 1 second (time to produce a desired dimple)

**Section 3****SETUP***In this section:*

Upon Receipt .....	3-2
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Unit Placement .....	3-2
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Line Disconnect Switch .....	3-2
Power Cord Connections .....	3-3
Grounding .....	3-4
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Cylinder or Shop Compressed Air Supply.....	3-4
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Connect Interface Cable Between Power Supply and CNC (for use with Control Panel SA) .....	3-10
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### Upon Receipt

The carton is reusable and provides an impact-resistant box for transporting or storing the unit. The carton should include:

- Power Supply (with or without Control Panel SA)
- Torch and Lead Assembly
  - Torch Assembly (with consumables)
- Torch Main Body
  - Torch Sleeve
  - Torch Lead
  - Solenoid Valve
- Interface Cable (for use with full CNC control) or
  - Interface Cable (for use with Control Panel SA for current control)
- Work Lead
- Consumables Parts Kit
- ArcWriter Instruction Manual

### Claims

**Claims for damage during shipment** – If your unit was damaged during shipment, file a claim with the carrier. Hypertherm will furnish a copy of the bill of lading upon request, call Hypertherm Customer Service at 1-800-643-0030.

**Claims for defective or missing merchandise** – All units shipped from Hypertherm are inspected for defects. If any of the merchandise is defective or missing, call Hypertherm Customer Service at 1-800-643-0030.

### Unit Placement

Position the units, prior to installing the line disconnect switch, gas and air supplies, and making interconnections as described below. Refer to Section 2, *Description & Specifications* for unit dimensions.

### Power Cord Plug Installation

The power supply is shipped without a plug connected to the power cord. The user must obtain a suitable plug that is certified by national and local electrical codes. The plug should be connected to the power cord by a licensed electrician. Refer to Fig. 3-1 for power cord connections.

### Power Requirements

#### Line Disconnect Switch

Use a primary line disconnect switch for each power supply. This switch allows the operator to turn the power supply off quickly in an emergency situation. The switch should be located on a wall near the power supply, and should be easily accessible to the operator. The interrupt level of the switch must be equal to or exceed the continuous rating of the SLO-BLO fuses. The recommended SLO-BLO fuses (class K5) fuse sizes are listed on the next page.

<u>Input Voltage</u>	<u>Phase</u>	<u>Input Current Range @ 2.6 kw Output</u>	<u>Recommended SLO-BLO Fuse Size</u>
200 VAC	3	8.3 amps	15 amps
208 VAC	3	8.2 amps	15 amps
240 VAC	3	7.9 amps	15 amps
400 VAC	3	4.5 amps	10 amps
440 VAC	3	4.2 amps	10 amps
480 VAC	3	4.0 amps	10 amps
600 VAC	3	3.3 amps	10 amps

## Power Cord Connections

The installed power cord is a 4-conductor (12 AWG), 15 ft. (4.5 m) long power cord. Refer to Fig. 3-1 for power cord connections. Refer to appropriate electrical schematic in Section 7, *Diagrams*.

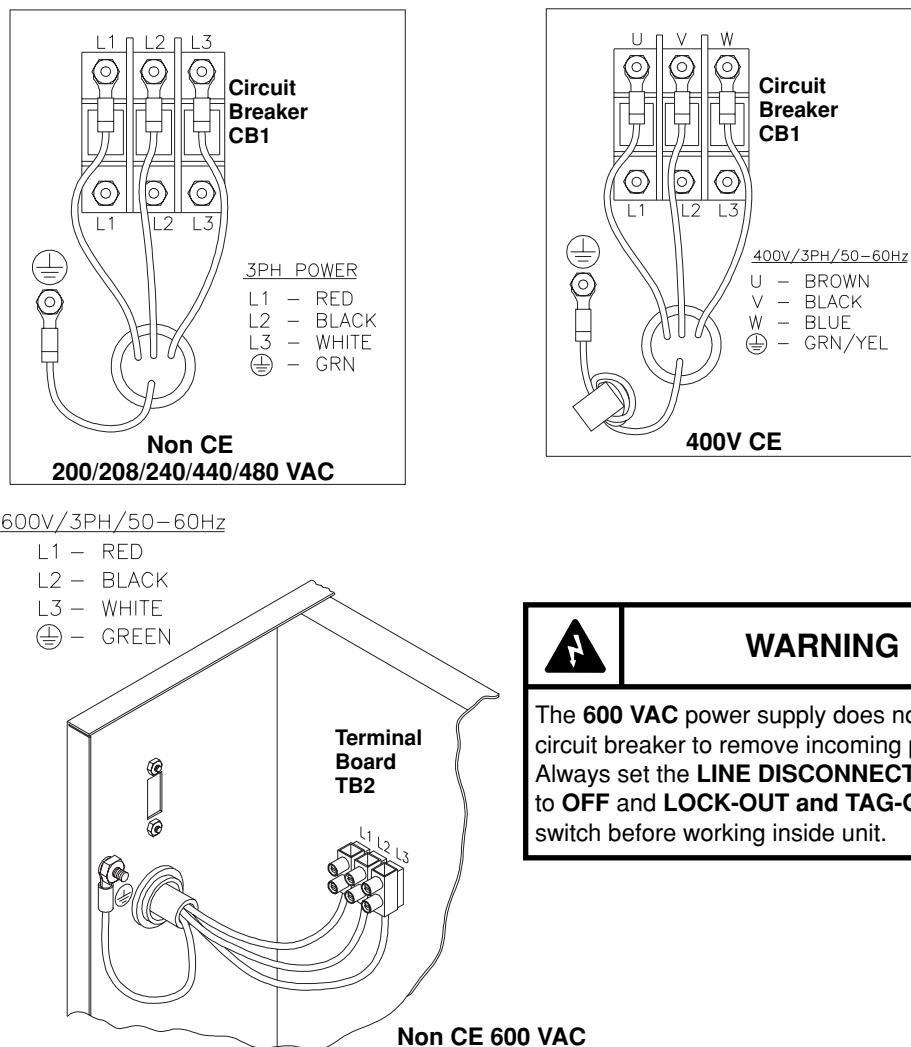


Figure 3-1 Power Cord Connections

### Grounding

To ensure personal safety, proper operation and to reduce electromagnetic interference (EMI), the ArcWriter must be properly grounded. The power supply must be properly grounded through the power cord according to national and local electrical codes. The power supply chassis is electrically conductive and can present a shock hazard if it is not properly grounded through the line disconnect switch. Three-phase service must be of the 4-wire type with a green/yellow wire for protective earth ground. Refer to *Grounding* in the *Safety* section.

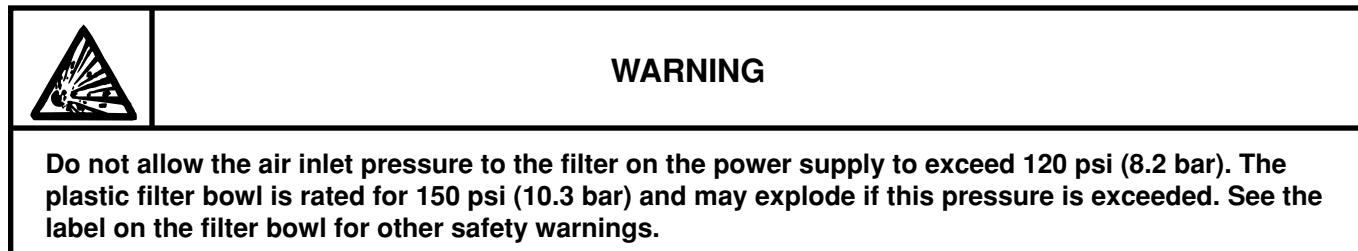
### Work Lead

Attach the work lead to the work table and ensure that it makes good metal-to-metal contact.

### Gas Supply Requirements

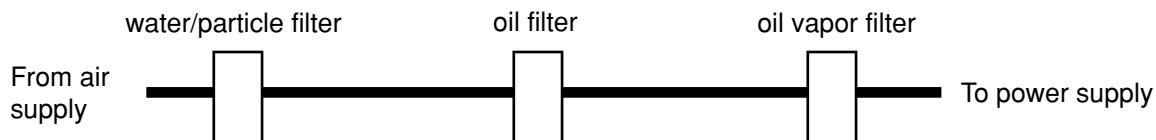
The gases required for marking are air and/or argon-hydrogen (H5). Either air or H5 (5% hydrogen and 95% argon) can be used as the plasma gas. Air is used as the shield gas. Air can be supplied as shop compressed air or cylinder compressed air. The argon-hydrogen mixture H5 should be supplied from premixed compressed gas cylinders and can be obtained from local welding suppliers. High-pressure regulators on the air and H5 gas supplies must be used and be capable of delivering the following flowrates and pressures:

- Air - **360 scfh (170 l/min)** at **100 psi (6.9 bar)** to the pressure regulator/filter on the power supply.  
Air for plasma gas **60 scfh (28 l/min)**  
Air for shield gas **300 scfh (142 l/min)**
- H5 - **60 scfh (28 l/min)** at **100 psi (6.9 bar)** to the pressure regulator on the power supply.



### Cylinder or Shop Compressed Air Supply

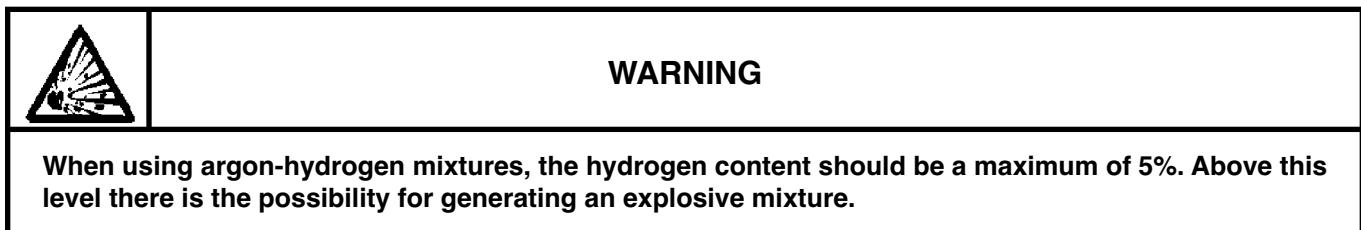
The cylinder or shop compressed air supply must be clean, dry and oil-free. If air supply quality is poor, marking, scoring and dimpling quality deteriorates and consumable parts life shortens. Use a three-stage coalescing filtration system as shown in Fig. 3-2 when site conditions introduce moisture, oil, or other contaminants into the air line.



**Figure 3-2 Recommended Three-Stage Air Filtration System**

## Argon-Hydrogen (H5)

Argon-hydrogen (H5) may be used as a plasma gas. The H5 mixture consists of premixed 5% hydrogen and 95% argon. It is available from local welding suppliers. If the purity level of the H5 is poor, marking, scoring and dimpling quality deteriorates and consumable parts life shortens. (Note: These conditions also occur if there are leaks in the gas supply hoses or connections.)



## Plasma and Shield Gas Supply Connections

Use a 3/8-inch ID inert gas hoses to connect to the gas supplies (air and air or air and H5) to the pressure regulators at the rear of the power supply. To connect the hoses, install 1/8" NPT nipples to each of the regulators as shown in Fig. 3-3. Apply a light coat of liquid pipe sealant to the threads to ensure a leak-free installation. The 1/8" NPT nipples are located in the Consumable Parts Kit.

**Caution:** Never use PTFE tape when installing nipples on adapters. Bits of tape can break off and enter the gas line and harm the pressure regulator, pressure switches and valves.

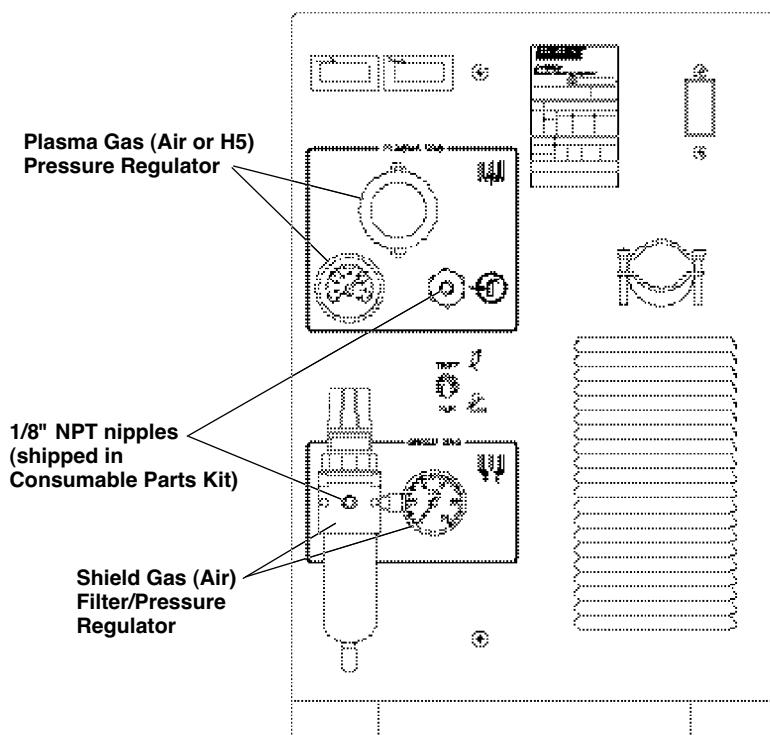


Figure 3-3 Plasma and Shield Gas Connections to Pressure Regulators

## System Interconnections

Refer to Figure 3-4 and the following procedures and figures on the following pages for detailed connection information:

- ① Connect lead set with plasma gas valve subassembly to power supply (Fig. 3-5).
- ② Connect work lead to power supply (Figs. 3-5).
- ③ Connect lead set with plasma gas valve subassembly to torch (Fig. 3-6).
- ④ Connect ground wire (customer supplied) between plasma valve SA and work table (Fig. 3-4).
- ⑤ Connect work lead to work table (Fig. 3-7).

If the control panel subassembly is **not** installed on the power supply, go to ⑥. If it is installed, go to ⑦.

- ⑥ Connect interface cable (for use with full CNC control) between power supply and CNC (Fig. 3-8).
- ⑦ Connect interface cable (for use with control panel subassembly) between power supply and CNC (Fig. 3-9).

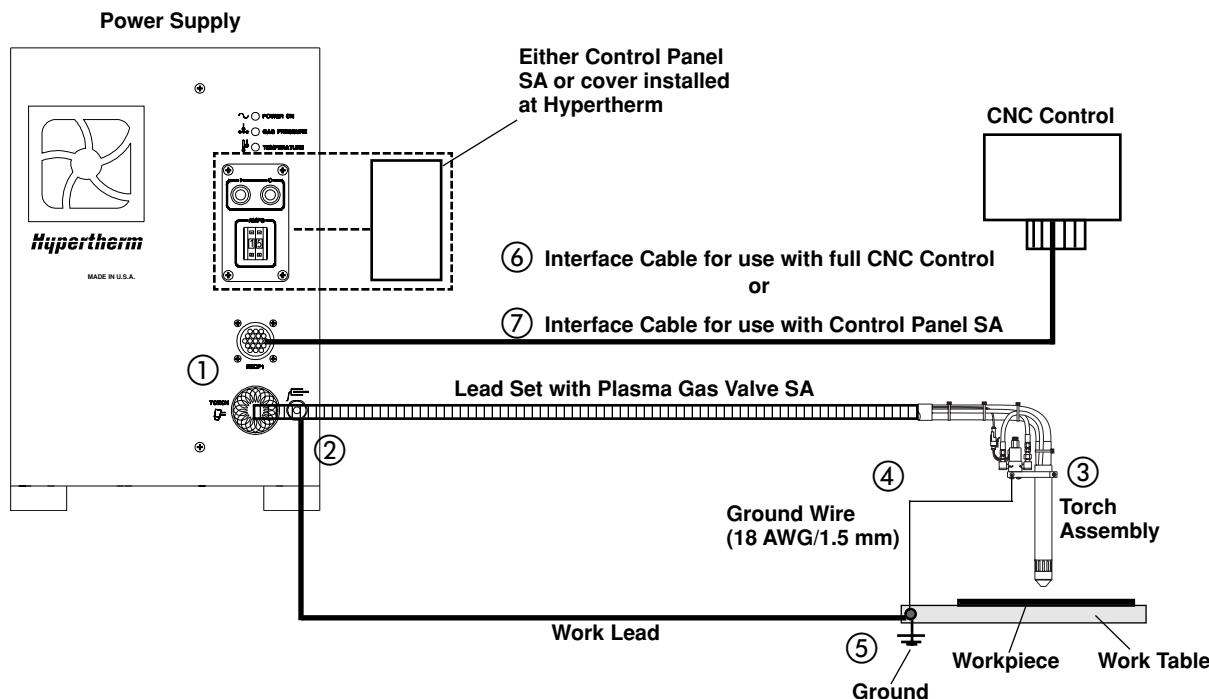


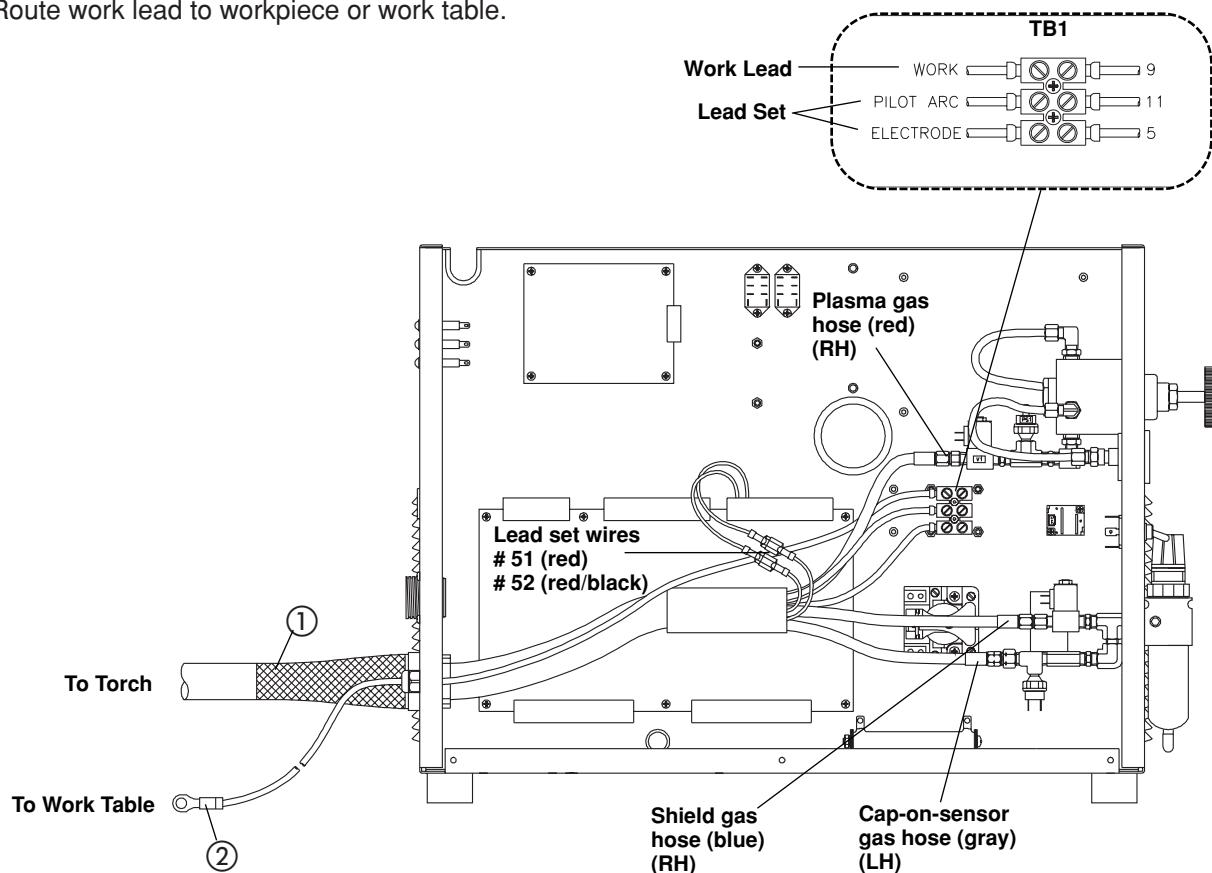
Figure 3-4 ArcWriter Plasma Marking System Interconnection Diagram

## Connect Lead Set with Plasma Gas Valve SA to Power Supply ①

1. Remove power supply cover.
2. Route lead set through strain relief on front panel to make the following connections (Fig. 3-5).
  - Connect plasma gas hose (red) to solenoid valve V1 (right handed/RH).
  - Connect shield gas hose (blue) to solenoid valve V2 (right handed/RH).
  - Connect cap on sensor gas hose (gray) to fitting on output of shield gas pressure regulator (left handed/LH).
  - Connect # 11 wire to TB1 (Pilot Arc).
  - Connect # 5 wire to TB1 (Electrode).
  - Connect # 51 wire (red) from control PCB A1 to #51 wire in lead set.
  - Connect # 52 wire (red/black) from control PCB A1 to #52 wire in lead set.
3. Route lead set to torch.

## Connect Work Lead to Power Supply ②

1. Remove nut at rear of strain relief. Route work lead with strain relief through front panel. Reinstall nut by sliding it back down work lead to secure strain relief. Connect work lead (# 9) to TB1 (Work) (Fig. 3-5).
2. Route work lead to workpiece or work table.



**Figure 3-5 Lead Set Connections at Power Supply**

### Connect Lead Set to Torch ③

1. Route torch lead set to torch and make the following connections (Fig. 3-6):

- Connect black wire to (Pilot Arc +) terminal.
- Connect white wire to white Electrode wire.
- Connect shield gas hose (blue) to medium length copper tubing (right handed/RH).
- Connect plasma gas hose (red) to shortest copper tubing (right handed/RH).
- Connect cap on sensor gas hose (gray) to longest copper tubing (left handed/LH).

2. Mount torch. Refer to *Torch Alignment* at end of this section.

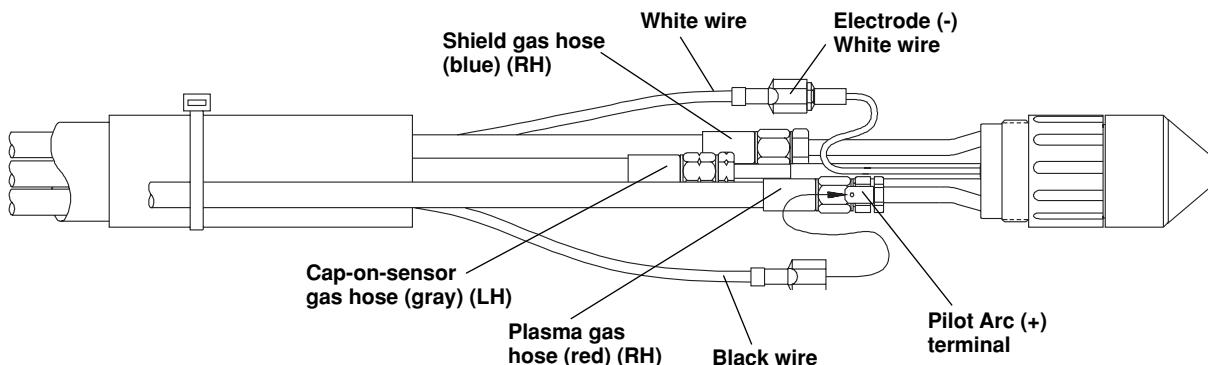


Figure 3-6 Lead Set Connections at Torch

### Connect Ground Wire Between Plasma Gas Valve SA and Work Table ④

1. Attach 18 AWG (1.5 mm) ground wire (customer supplied) to ground screw on plasma valve SA (Fig. 3-4).
2. Attach other end to work table. Make good metal-to-metal contact.

### Connect Work Lead to Work Table ⑤

1. Route work lead to work table (Fig. 3-7).
2. Attach work lead to work table. Make good metal-to-metal contact.

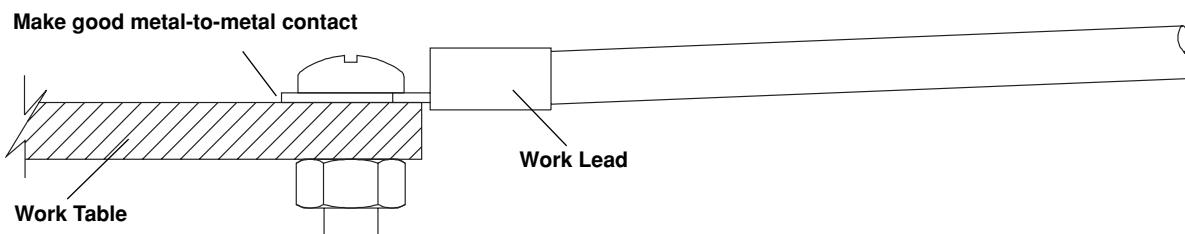
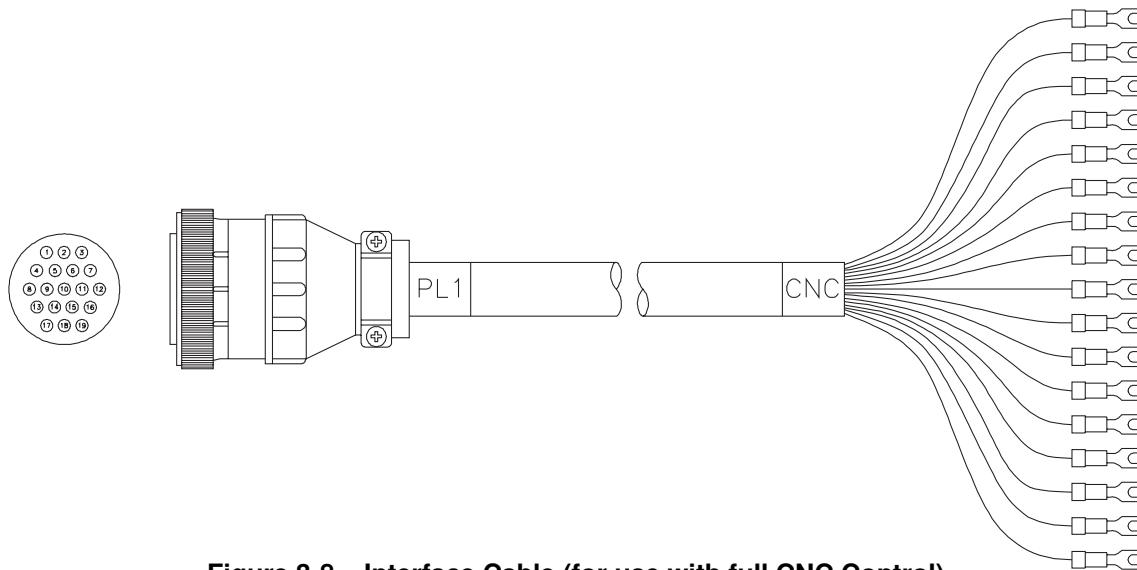


Figure 3-7 Work Lead Connection to Work Table

## Connect Interface Cable Between Power Supply and CNC (for use with full CNC Control) ⑥

Connect the interface cable between the power supply and CNC (Fig. 3-8).

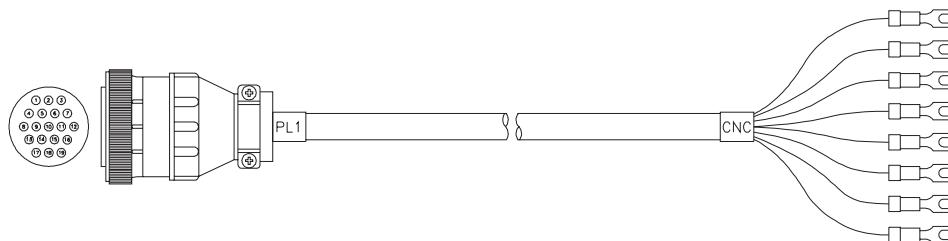


**Figure 3-8 Interface Cable (for use with full CNC Control)**

Signal List				
Signal	PL1	Wire Color	CNC	Description
Common	1	Orange	I COM	BCD switch settings (5-19 amps at 1-amp increments)
1 Amp BCD	2	Orange/Black	I1	
2 Amp BCD	3	Black	I2	
4 Amp BCD	4	Blue	I4	
8 Amp BCD	5	Blue/Black	I8	
10 Amp BCD	6	Blue/White	I10	
Shield	7	Bare	Cut	Shield
Arc 1/100 (+)	8	White/Black	Arc+	Unfiltered, isolated and divided 1/100 arc volts. Signal available only if isolation/voltage divider PCB is installed.
Arc 1/100 (-)	9	Black/White	Arc-	
Not Used	10	N/A	10	Not Used
Machine Motion	11	Red/Black	Mach	Starts machine motion. Current sensor on ground lead;
Machine Motion	12	Red/White	Mach	output signal (dry contact) to CNC.
Emergency Stop	13	Black/Red	E-Stop	Contact normally closed. When open plasma system
Emergency Stop	17	White/Red	E-Stop	shuts down. Output from CNC.
AC Power Off	14	Green/Black	Off	Output 24 VAC to CNC; requires dry contact momentary
AC Power On	15	Green/White	On	closure for On/Off at CNC.
AC Power Com	16	Green	Com	
Plasma Start	18	White	Start	Starts plasma. Output 24 VAC to CNC; requires dry
Plasma Start	19	Red	Start	contact closure at CNC.

**Connect Interface Cable Between Power Supply and CNC (for use with Control Panel SA for current control) ⑦**

Connect the interface cable between the power supply and CNC (Fig. 3-9).

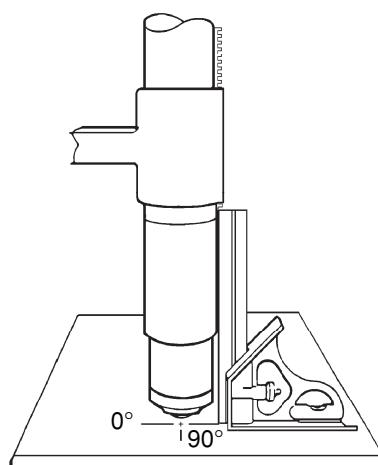


**Figure 3-9 Interface Cable (for use with Control Panel SA for current control)**

Signal List				
Signal	PL1	Wire Color	CNC	Description
Shield	7	Bare	Cut	Shield
Arc 1/100 (+) Arc 1/100 (-)	8 9	Black Red	Arc+ Arc-	Unfiltered, isolated and divided 1/100 arc volts. Signal available only if optional THC/isolation/divider PCB is installed
Machine Motion Machine Motion	11 12	Yellow Brown	Mach Mach	Starts machine motion. Current sensor on ground lead; output signal (dry contact) to CNC.
Emergency Stop Emergency Stop	13 17	Blue Orange	E-Stop E-Stop	Contact normally closed. When open plasma system shuts down. Output from CNC.
Plasma Start Plasma Start	18 19	White Green	Start Start	Starts plasma. Output 24 VAC to CNC; requires dry contact closure at CNC.

**Torch Alignment**

Before marking with the marker torch, ensure that the torch is mounted at right angles to the workpiece. Use a square to align the torch at 0° and 90° as shown in Fig. 3-10.



**Figure 3-10 Aligning Torch with Square (Typical)**

**Section 4****OPERATION**

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*In this section:*

Power Supply Controls and Indicators.....	4-2
Front Panel .....	4-2
Rear Panel .....	4-3
Control Panel SA Controls .....	4-4
Operating Instructions.....	4-4
Low Gas Pressure .....	4-5
Cap-On-Sensor Safety Interlock.....	4-5
Claims and Technical Questions.....	4-6
Operating Tips .....	4-7
Changing Consumable Parts .....	4-7
Marking Process Guidelines .....	4-8
Operating Data Charts.....	4-10

### Power Supply Controls and Indicators

#### Front Panel

- **Green POWER ON LED**

Indicates that all control circuits are activated and the system is ready for operation.

- **Green GAS PRESSURE LED**

Indicates that the pressures are within operating limits and the cap-on-sensor safety interlock circuit is satisfied.

- **Yellow TEMPERATURE LED**

Indicates that the power supply temperature has exceeded operating limits.

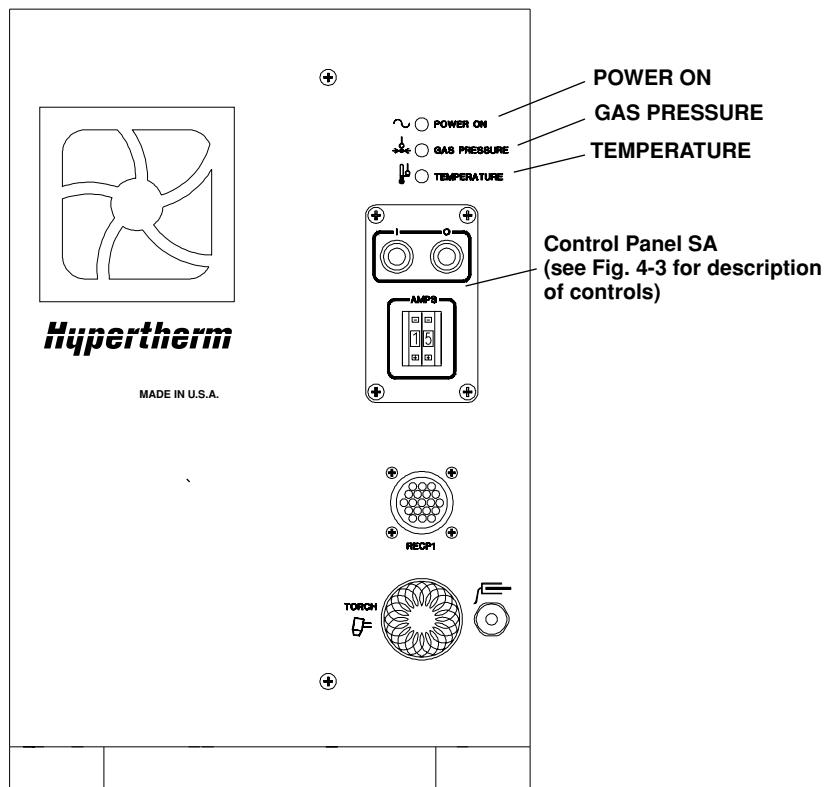


Figure 4-1 Front Panel Controls and Indicators

## Rear Panel

- **Counter**

Indicates the cumulative number of arc starts.

- **Hours**

Indicates the cumulative amount of time that the arc is on (in hours).

- **Circuit Breaker**

Applies input power to the power supply and its control circuits. (Not used on 600 VAC units.)

- **Gas TEST/RUN Switch**

Allows operator to adjust plasma and shield gas input pressure settings in TEST mode.

- **PLASMA GAS Pressure Regulator**

Regulates input plasma air or argon-hydrogen (H5) gas pressure to power supply.

- **SHIELD GAS Pressure Regulator with Filter**

Regulates input shield air pressure to power supply.

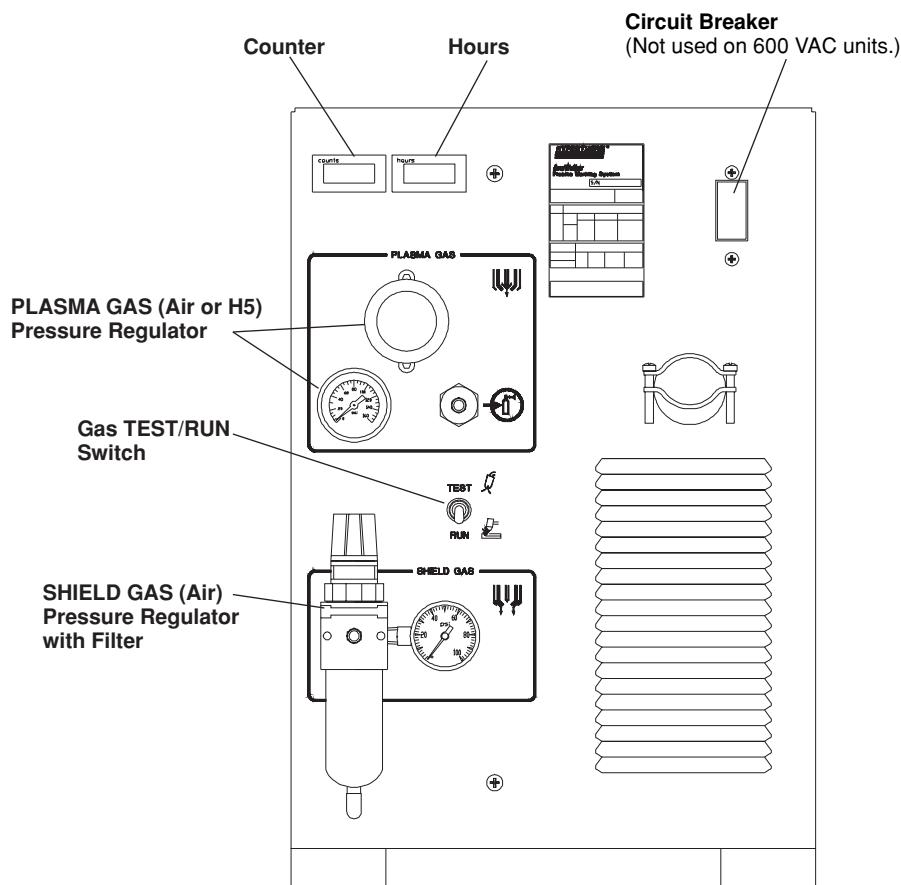


Figure 4-2 Rear Panel Controls and Indicators

### Control Panel SA Controls

- **Power I/O (On/Off) pushbutton switches**

Applies input power to the power supply and its control circuits. **Note that in order for the system to work with the control panel installed, both the circuit breaker and control panel power I pusbutton switch must be On.**

- **AMPS-thumbwheel BCD switch (2-decade)**

Sets the arc current for marking applications.

(Current selection range is 4-19 amps) Note that settings 0-4 provide 4 amps.

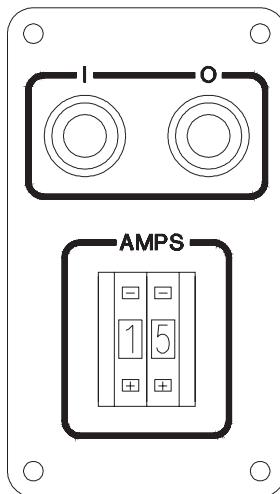


Figure 4-3 Control Panel Controls

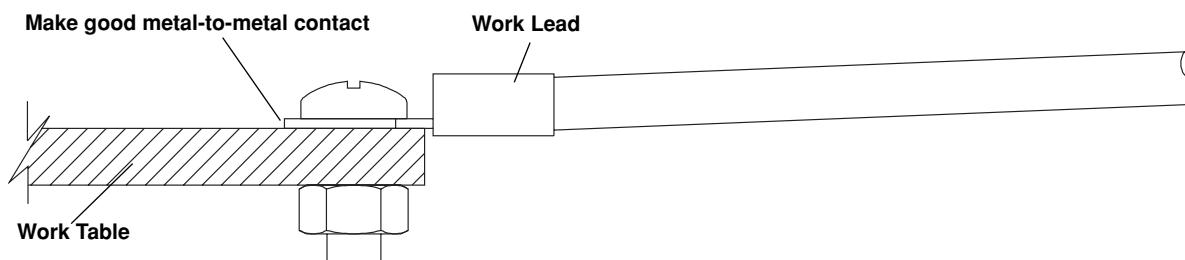
### Operating Instructions

1. Ensure that the work environment and your clothing meet the safety requirements outlined in Section 1, *Safety*.
2. Follow the instructions in Section 3, *Setup*.
3. At the rear of the power supply, set the circuit breaker to the On position. Activate unit AC power at CNC or control panel SA. If all safety interlocks are satisfied, then the POWER ON and GAS PRESSURE LEDs should illuminate. The TEMPERATURE LED should remain extinguished.
4. Adjust the pressure regulators for the following readings:
  - At the plasma gas pressure regulator, loosen locking behind adjustment knob to adjust pressure.
  - At the shield gas pressure regulator, pull the adjustment knob up to adjust pressure.

- Set the Gas TEST/RUN switch to TEST. This allows the gas to flow through the torch while the pressures are being set (dynamic pressure settings). Adjust the pressure regulators for the following pressures: plasma gas 70 psi (4.8 bar) and shield gas 60 psi (4.1 bar).
  - Set the Gas TEST switch to RUN and lock both adjustment knobs.
5. Attach the work lead securely to the work table (Fig. 4-4).
6. Refer to the *Operating Data Charts* at the end of this section to set parameters at CNC or marking current at control panel SA and other parameters at the CNC.



7. The plasma arc marking system is now ready to operate.



**Figure 4-4 Work Lead Connection to Work Table**

## Low Gas Pressure

The gas supplies, both plasma and shield, must be supplied at 100 psi (6.9 bar) to the pressure regulators on the ArcWriter. If either gas pressure drops below 40 psi (2.7 bar), either pressure switch PS1 or PS2 will cause the power supply to shut down and the torch will go out.

## Cap-On-Sensor Safety Interlock

The Cap-On-Sensor safety circuit senses if the torch retaining cap is loose. When pressure switch PS2 senses that the cap-on-sensor pressure is below 40 psi (2.7 bar), the unit will shut down. The torch will not fire until the retaining cap is tightened, satisfying the Cap-On-Sensor safety interlock, and the unit AC power is activated at the CNC or control panel.

### **Claims and Technical Questions**

**Claims for defective merchandise** – All units shipped from Hypertherm undergo quality control testing. However, if your unit does not function correctly:

1. Read the *Maintenance* section of this manual. You may find the problem is quite easy to fix, such as a loose connection.
2. If you are unable to solve the problem, call your distributor. He will be able to help you, or refer you to an authorized Hypertherm repair facility.
3. If you need assistance, call Customer Service at 1-800-643-0030 or Technical Service at 1-800-643-9878.

## Operating Tips

### Changing Consumable Parts



#### WARNING

Always unplug the power supply before inspecting or changing the torch parts.

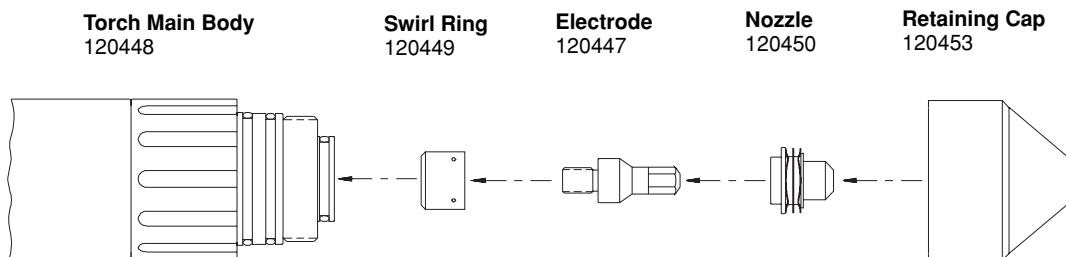
**Do not use the Cap-On-Sensor safety interlock circuit to remove power from the power supply when the retaining cap is removed in order to change consumable parts.**

**Do not rely on the Cap-On-Sensor safety interlock circuit to remove power. It is provided strictly for safety backup.**

Unscrew the retaining cap to remove consumables. Use the 7/32-inch hex wrench in the consumable parts kit to remove the electrode. Inspect the nozzle for damage or wear. If the hole in the nozzle is worn or oval-shaped, it is time to change it. Inspect the electrode. If the center of the electrode has a pit more than 0.040 inch (1 mm) deep, replace it. Inspect the swirl ring for clogged holes, etc.

Replace the parts as illustrated in Figure 4-5. Each part fits in only one direction, so you cannot put the parts in backwards. Also, the torch will not fire if the parts are improperly assembled. Very lightly lubricate all O-rings and wipe the excess away.

When the swirl ring, electrode (**tighten only until snug**) and nozzle are properly in place, install the retaining cap. Apply power to power supply line disconnect switch. At the rear of the power supply, set the power circuit breaker to the ON position.



**Figure 4-5 Consumables**

## Marking Process Guidelines

Refer to the guidelines below to reduce marking problems.

### Beginning of mark is too large

- A time delay exists between when the CNC receives the machine motion signal from the ArcWriter and when the machine motion actually occurs. The delay is dependent on the electronics of the CNC equipment and should be determined. For the length of the delay, the torch will stay at a fixed position. Therefore, if the delay is significant, piercing may occur. Hypertherm recommends reducing the delay to 50 msec if possible.
- Check the table parameters, especially the acceleration parameter. It may need to be increased.
- If the current level is reduced, the size of the dimple at the beginning of the mark will also be reduced. Note that the marking speed may also need to be adjusted to account for the lower current level.
- Check torch standoff, a good fast transfer may not be occurring.

### End of mark is too large

- Check the table parameters, you may need to shorten the length before the end of the mark where deceleration occurs.

### Mark becomes too deep and wide during cornering

- **Avoid 90° corners** because the torch comes to a complete stop. If a 90° corner is necessary and the resulting mark is unacceptable, then it may be done as a **two-step operation**. The **best method** is to smooth out the corner, so that the torch does not come to a complete stop in the corner (Fig. 4-6).
- Reduce the current when approaching the corner. The ArcWriter current can be reduced to a minimum of four amps. The amount of current reduction required is dependent on the acceleration and deceleration characteristics of the cutting table.
- Reduce both current and marking speed for the entire marking operation.

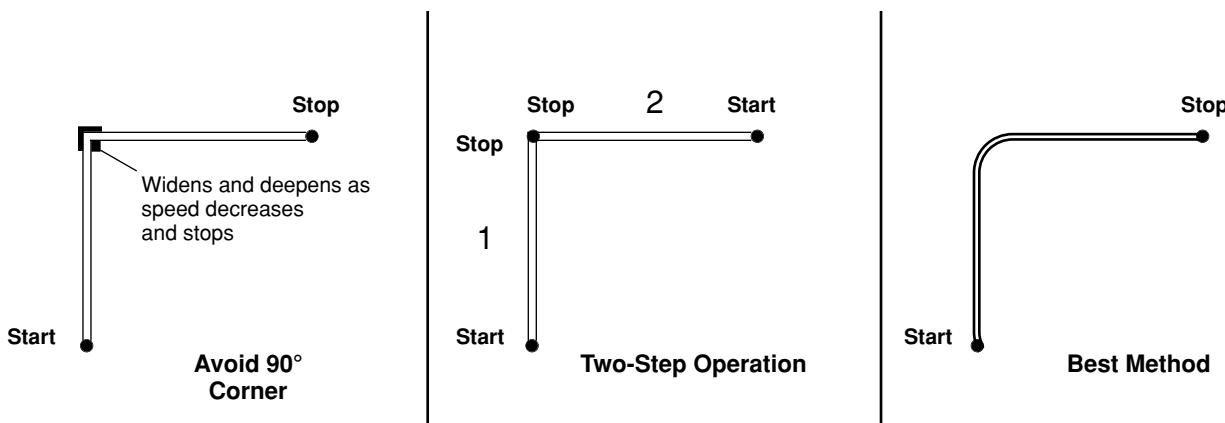


Figure 4-6 Cornering

## **Marking Process Guidelines (Continued)**

### **Arc goes out during marking**

- Check standoff, it may be too high.
- Plasma gas pressure may be too low.
- Change worn or damaged consumables.

### **Mark is too wide or deep**

- Reduce operating current.
- Increase marking speed.
- Check nozzle orifice bore, if damaged change nozzle. Inspect other consumables.

### **Mark is too narrow or shallow**

- Check gas pressures.
- Change worn or damaged consumables.
- Increase operating current.
- Decrease marking speed.

### **Dimpling/Punching**

- For a larger diameter dimple increase current.
- For a smaller diameter dimple decrease current.
- For deeper a dimple increase plasma on time.
- For a shallower dimple decrease plasma on time.

## Operating Data Charts

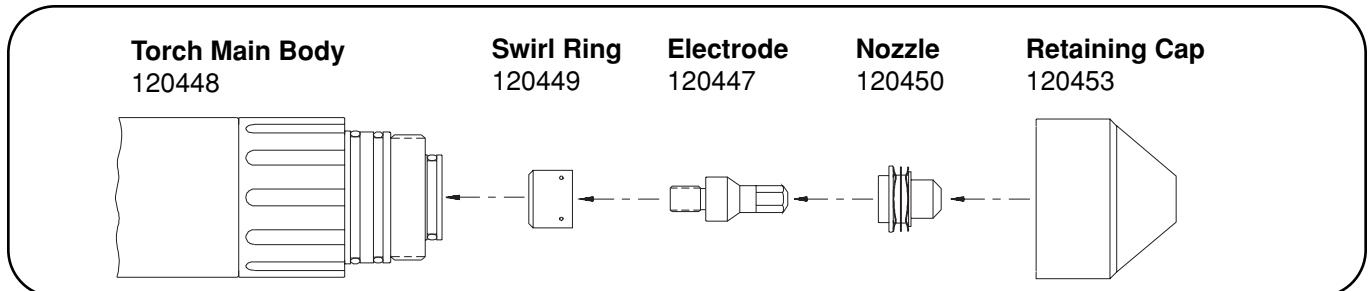
The *Operating Data Charts* on the following pages are optimized to provide the best mark appearances, least dross and best surface finish. Keep in mind that these charts provide a good starting point and that optimum marking, scoring or dimpling must be tuned to the application and materials on site. Increasing speed, lowering the torch standoff, higher current, for example, all present certain tradeoffs. Depending on the marking application, it is up to the operator to determine if the tradeoffs are acceptable.

The charts also provides part numbers and illustrations of the consumables required to mark.

**Operating Data Chart Index**

Metal	Plasma Gas	Shield Gas	Page
Mild Steel	Air H5	Air Air	4-11 4-12
Stainless Steel	Air H5	Air Air	4-13 4-14
Aluminum	Air H5	Air Air	4-15 4-16

**Mild Steel**  
**Air Plasma/Air Shield**



Arc Current (A)	Arc Voltage (V)	Plasma Pressure (psi) (bar)	Shield Pressure (psi) (bar)	Torch-to-Work Distance (in) (mm)	Travel Speed (ipm) (m/min)	Width (in) (mm)	Depth (in) (mm)	Time (msec)	Diameter (in) (mm)
<b>Light Scoring</b>									
5	149	70 4.8	60 4.1	0.08 2	150 3.81	0.03 0.8	$\leq 0.001$	$\leq 0.03$	N/A N/A
6	140	70 4.8	60 4.1	0.08 2	250 6.35	0.03 0.8	$\leq 0.001$	$\leq 0.03$	N/A N/A
<b>Heavy Scoring</b>									
9	123	70 4.8	60 4.1	0.08 2	150 3.81	0.05 1.3	0.005 0.13	N/A	N/A N/A
10	118	70 4.8	60 4.1	0.08 2	250 6.35	0.05 1.3	0.005 0.13	N/A	N/A N/A
<b>Dimpling</b>									
7	N/A	70 4.8	60 4.1	0.08 2	N/A N/A	N/A N/A	0.02 0.5	300	0.06 1.5

**Pros:**

Excellent all around process

Air inexpensive process gas

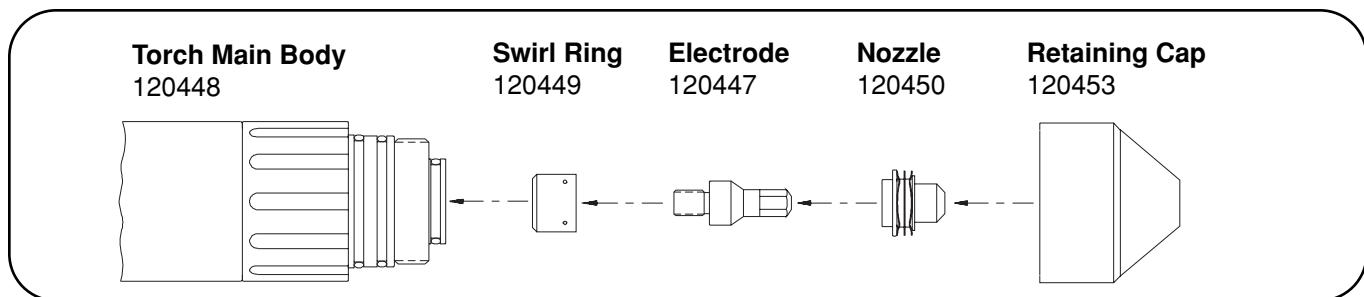
No top side dross

**Cons:**

Low contrast between mark and plate

## OPERATION

### Mild Steel Argon Hydrogen (H5) / Air Shield



Arc Current (A)	Arc Voltage (V)	Plasma Pressure (psi) (bar)	Shield Pressure (psi) (bar)	Torch-to-Work Distance (in) (mm)	Travel Speed (ipm) (m/min)	Width (in) (mm)	Depth (in) (mm)	Time (msec)	Diameter (in) (mm)
<b>Light Scoring</b>									
8	69	70 4.8	60 4.1	0.08 2	150 3.81	0.04 1	$\leq 0.001$ $\leq 0.03$	N/A	N/A N/A
10	69	70 4.8	60 4.1	0.08 2	250 6.35	0.04 1	$\leq 0.001$ $\leq 0.03$	N/A	N/A N/A
<b>Heavy Scoring</b>									
13	67	70 4.8	60 4.1	0.08 2	150 3.81	0.06 1.5	0.003 0.08	N/A	N/A N/A
15	66	70 4.8	60 4.1	0.08 2	250 6.35	0.06 1.5	0.003 0.08	N/A	N/A N/A
<b>Dimpling</b>									
10	N/A	70 4.8	60 4.1	0.08 2	N/A N/A	N/A N/A	0.02 0.5	300	0.05 1.27

Pros:

Excellent high contrast for light scoring

Cons:

Heavy scoring and dimpling leave top side dross

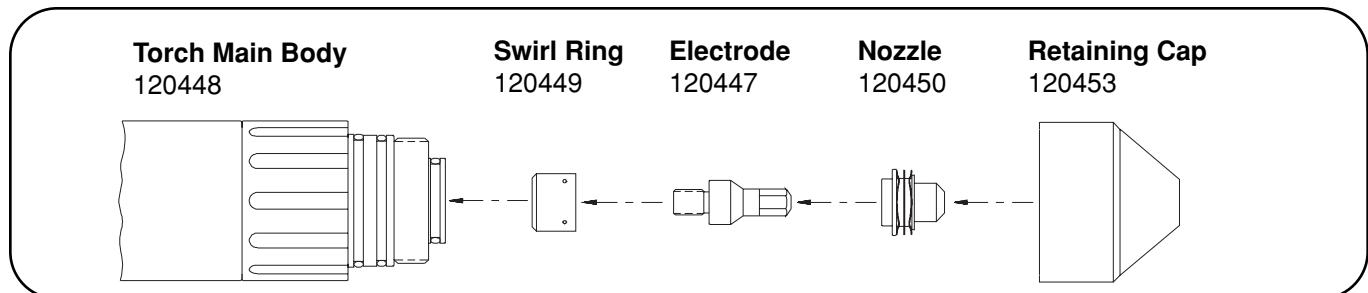
Argon-hydrogen (H5) expensive



#### WARNING

When using argon-hydrogen mixtures, the hydrogen content should be a maximum of 5%. Above this level there is the possibility for generating an explosive mixture.

**Stainless Steel**  
**Air Plasma / Air Shield**



Arc Current (A)	Arc Voltage (V)	Plasma Pressure (psi) (bar)	Shield Pressure (psi) (bar)	Torch-to-Work Distance (in) (mm)	Travel Speed (ipm) (m/min)	Width (in) (mm)	Depth (in) (mm)	Time (msec)	Diameter (in) (mm)
<b>Light Scoring</b>									
5	149	70 4.8	60 4.1	0.08 2	150 3.81	0.04 1	$\leq 0.001$	$\leq 0.03$	N/A N/A
6	140	70 4.8	60 4.1	0.08 2	250 6.35	0.04 1	$\leq 0.001$	$\leq 0.03$	N/A N/A
<b>Heavy Scoring</b>									
8	127	70 4.8	60 4.1	0.08 2	150 3.81	0.05 1.3	0.005 0.13	N/A	N/A N/A
9	123	70 4.8	60 4.1	0.08 2	250 6.35	0.05 1.3	0.005 0.13	N/A	N/A N/A
<b>Dimpling</b>									
7	N/A	70 4.8	60 4.1	0.08 2	N/A N/A	N/A N/A	0.02 0.5	300	0.05 1.3

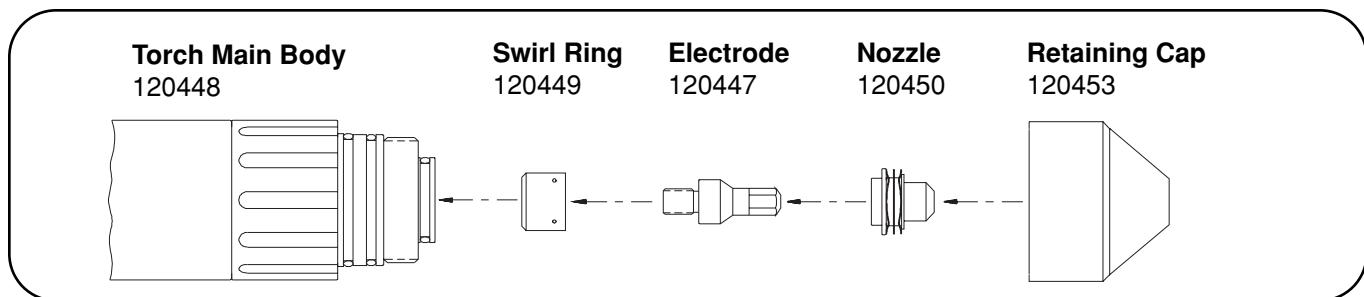
**Pros:**

Air inexpensive process gas  
 Excellent high contrast for light scoring

**Cons:**

High heat input, especially on thin plate material; deformation may occur  
 Heavy scoring and dimpling leave top side dross

### Stainless Steel Argon-Hydrogen (H5) / Air Shield



Arc Current (A)	Arc Voltage (V)	Plasma Pressure (psi) (bar)	Shield Pressure (psi) (bar)	Torch-to-Work Distance (in) (mm)	Travel Speed (ipm) (m/min)	Width (in) (mm)	Depth (in) (mm)	Time (msec)	Diameter (in) (mm)
<b>Light Scoring</b>									
6	72	70 4.8	60 4.1	0.08 2	150 3.81	0.03 0.76	$\leq 0.001$ $\leq 0.03$	N/A	N/A N/A
8	69	70 4.8	60 4.1	0.08 2	250 6.35	0.03 0.76	$\leq 0.001$ $\leq 0.03$	N/A	N/A N/A
<b>Heavy Scoring</b>									
9	69	70 4.8	60 4.1	0.08 2	150 3.81	0.04 1	0.005 0.13	N/A	N/A N/A
11	68	70 4.8	60 4.1	0.08 2	250 6.35	0.04 1	0.005 0.13	N/A	N/A N/A
<b>Dimpling</b>									
8	N/A	70 4.8	60 4.1	0.08 2	N/A N/A	N/A N/A	0.02 0.5	300	0.05 1.3

Pros:

Lower heat input to plate than Air/Air

Lower heat input lessens chance of material deformation

Cons:

Argon-hydrogen (H5) expensive

Heavy scoring leaves top side dross

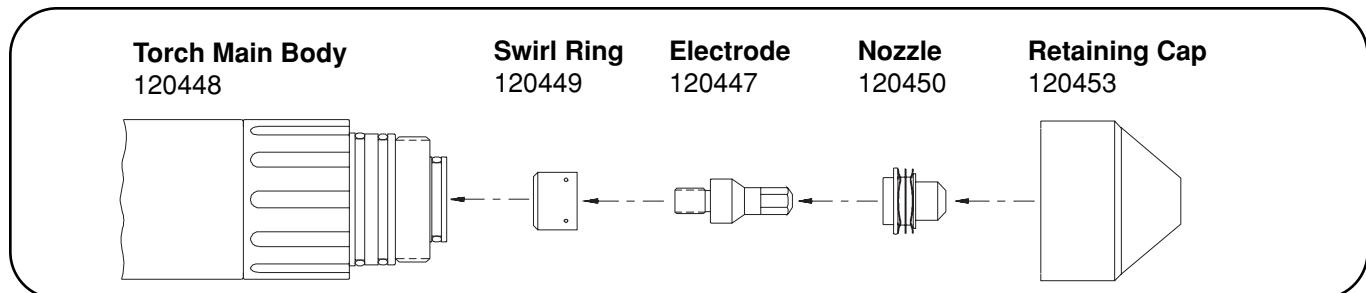


#### WARNING

When using argon-hydrogen mixtures, the hydrogen content should be a maximum of 5%. Above this level there is the possibility for generating an explosive mixture.

## Aluminum

### Air Plasma / Air Shield



Arc Current (A)	Arc Voltage (V)	Plasma Pressure (psi) (bar)	Shield Pressure (psi) (bar)	Torch-to-Work Distance (in) (mm)	Travel Speed (ipm) (m/min)	Width (in) (mm)	Depth (in) (mm)	Time (msec)	Diameter (in) (mm)
<b>Scoring</b>									
7	134	70 4.8	60 4.1	0.08 2	150 3.81	0.04 1	0.002 0.05	N/A	N/A N/A

Pros:

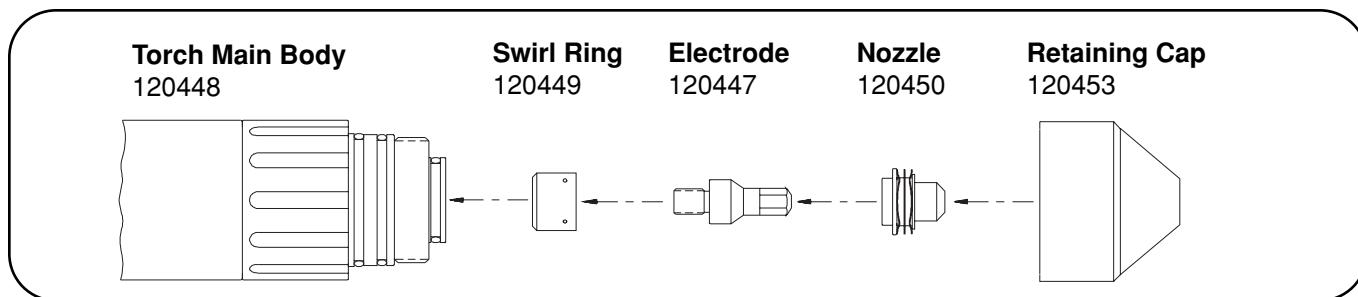
Air inexpensive as process gas

Cons:

Mark edges not well defined; edges have more of a jagged look

**Important:** The above conditions are optimized for 1/8-inch plate. For thicker material the arc current must be increased.

**Aluminum**  
**Argon-Hydrogen (H5) / Air Shield**



Arc Current (A)	Arc Voltage (V)	Plasma Pressure (psi) (bar)	Shield Pressure (psi) (bar)	Torch-to-Work Distance (in) (mm)	Travel Speed (ipm) (m/min)	Width (in) (mm)	Depth (in) (mm)	Time (msec)	Diameter (in) (mm)
Scoring									
10	69	70 4.8	60 4.1	0.08 2	150 3.81	0.03 0.8	0.002 0.05	N/A	N/A N/A

Pros:

Mark edges well defined

Cons:

Argon-hydrogen (H5) expensive

**Important: The above conditions are optimized for 1/8-inch plate. For thicker material the arc current must be increased.**

	<b>WARNING</b>
When using argon-hydrogen mixtures, the hydrogen content should be a maximum of 5%. Above this level there is the possibility for generating an explosive mixture.	

**Section 5****MAINTENANCE**

*In this section:*

Problems and Solutions .....	5-2
Normal Startup of ArcWriter with CNC Control.....	5-3
Normal Startup of ArcWriter with Control Panel SA .....	5-4
Green POWER LED Extinguished .....	5-5
Green GAS PRESSURE LED Extinguished .....	5-6
Yellow TEMPERATURE LED Illuminated. Unit Fails to Turn On.....	5-7
Unit Operates but Plasma Will Not Fire .....	5-8
ArcWriter Control PCB A1 Assembly LED Locations .....	5-10
Routine Maintenance .....	5-11
Air Filter Cleaning .....	5-11
Pressure Regulator Cleaning and Filter Replacement .....	5-11

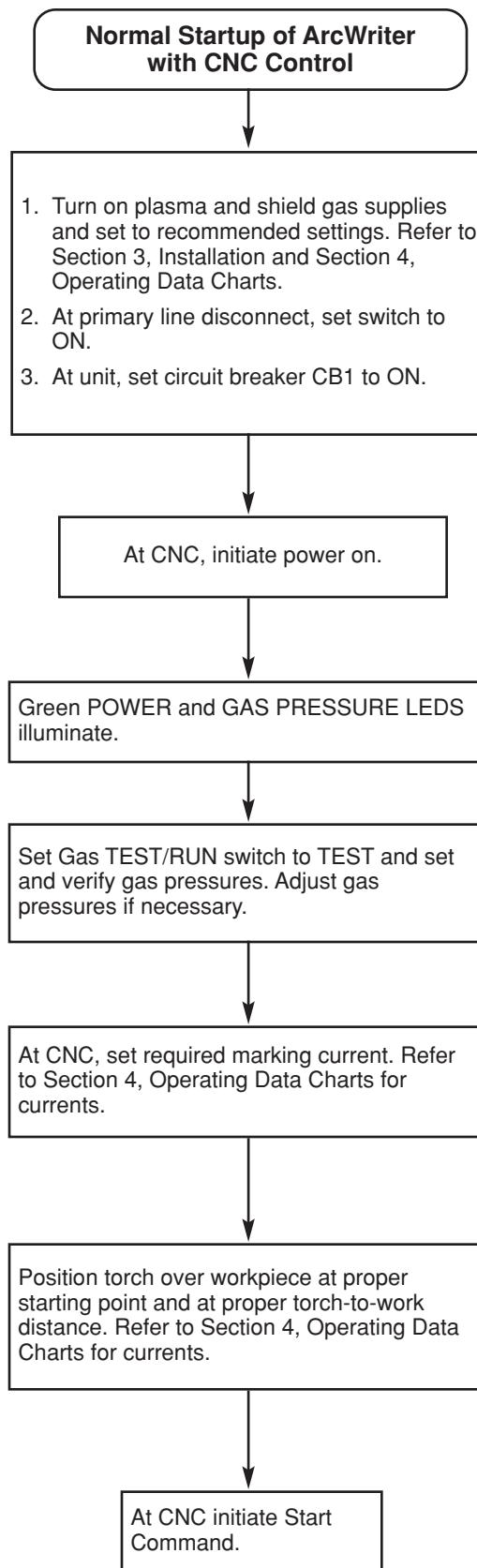
### Problems and Solutions

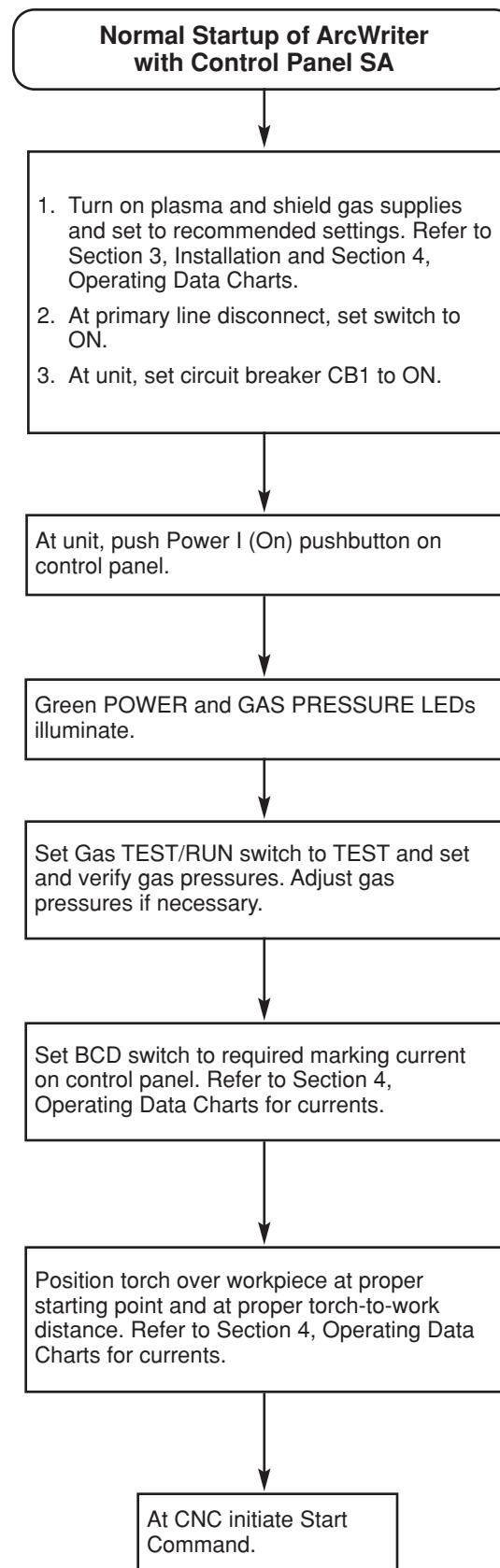
The following problems and solutions provide basic troubleshooting for the operator. Normal startup procedures are given to provide a starting point in troubleshooting. Also, refer to Section 7, *Diagrams* for the power supply electrical schematics.

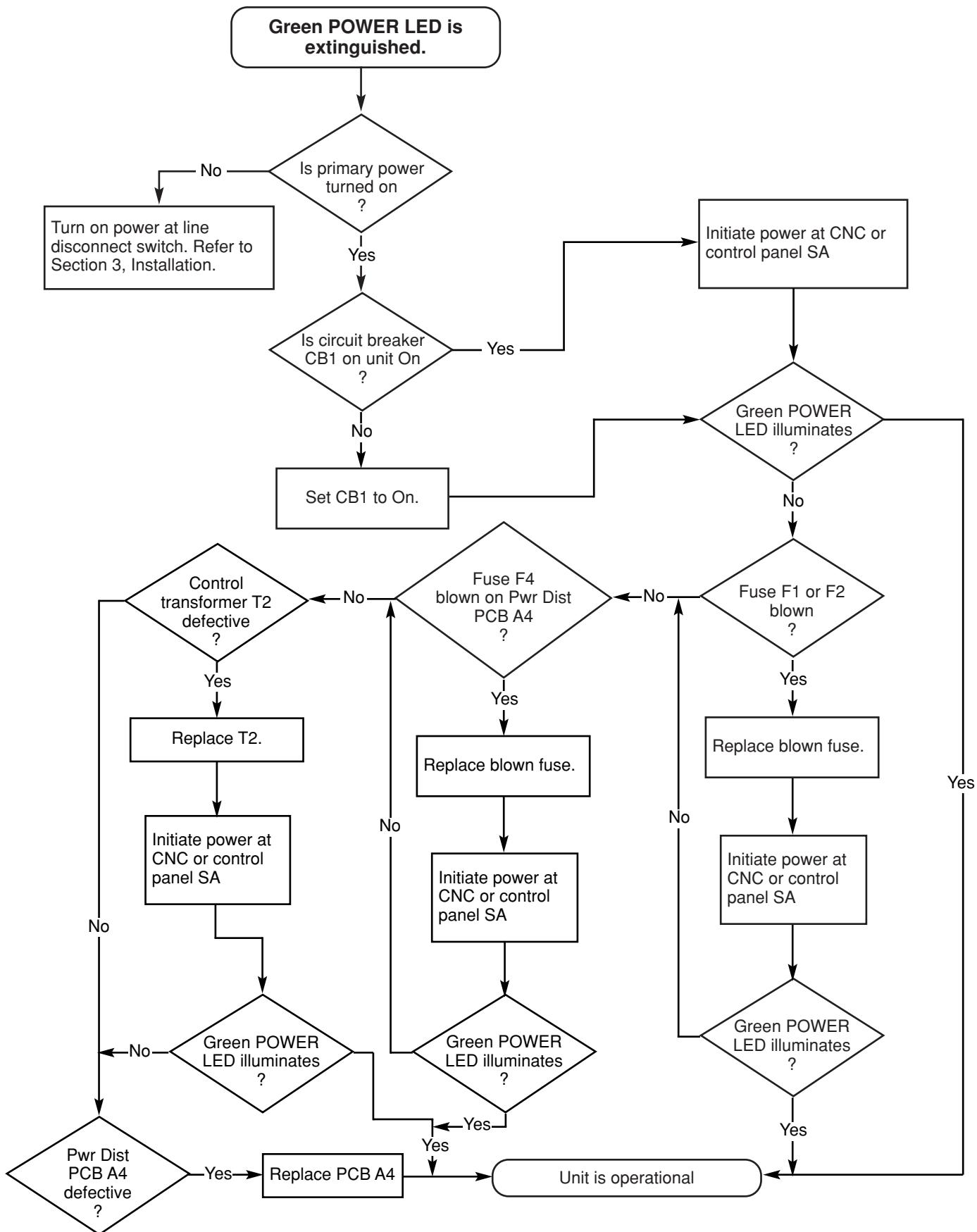
A technician with a working knowledge of chopper power supply theory is required, if the power supply requires more in depth troubleshooting. If required, remove the power supply cover as follows:

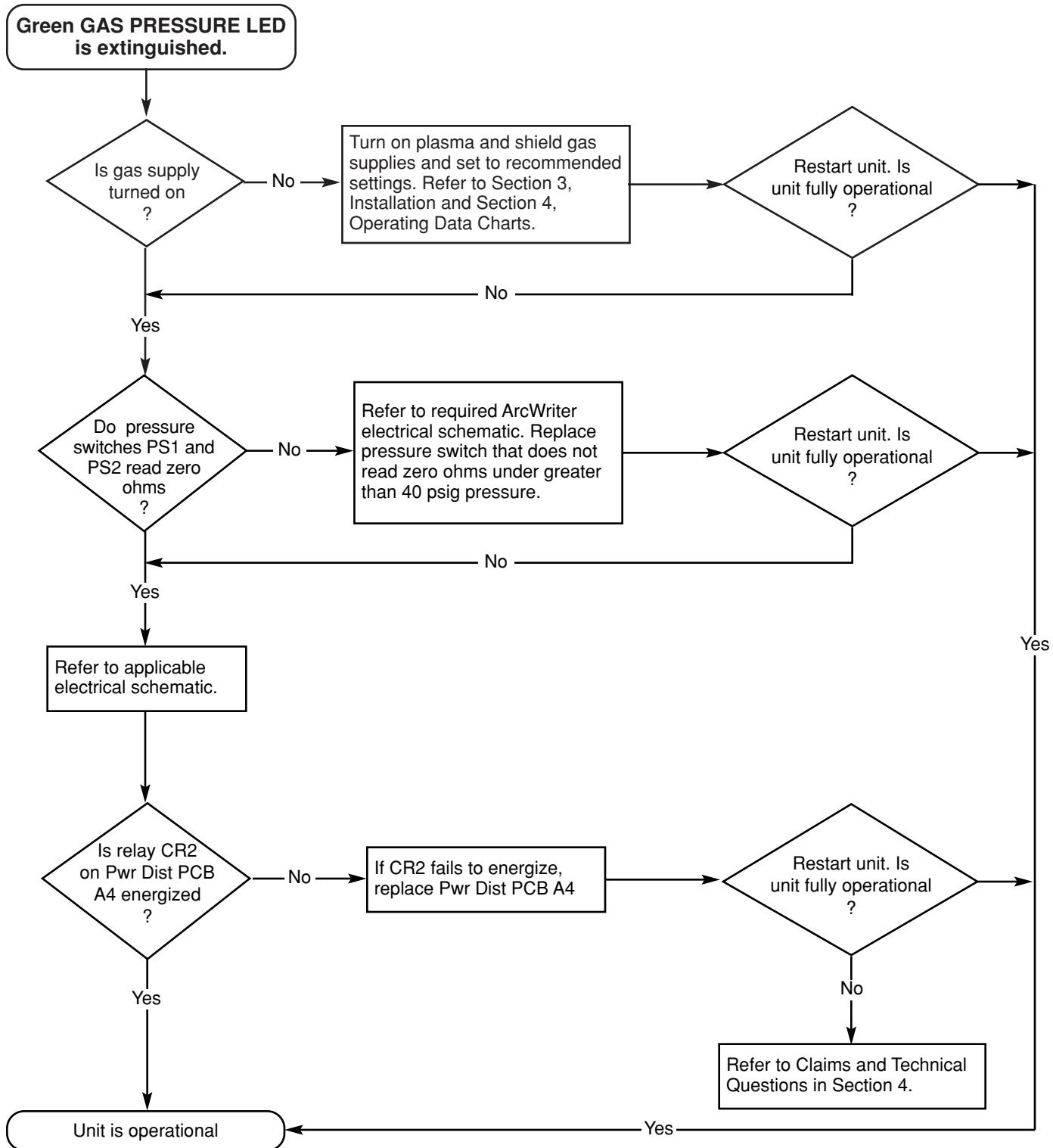
1. **READ AND UNDERSTAND WARNINGS BELOW.**
2. Set the ArcWriter power circuit breaker CB1 to OFF and set Line Disconnect Switch to OFF. Lock-Out and Tag -Out switch.
3. Remove cover.

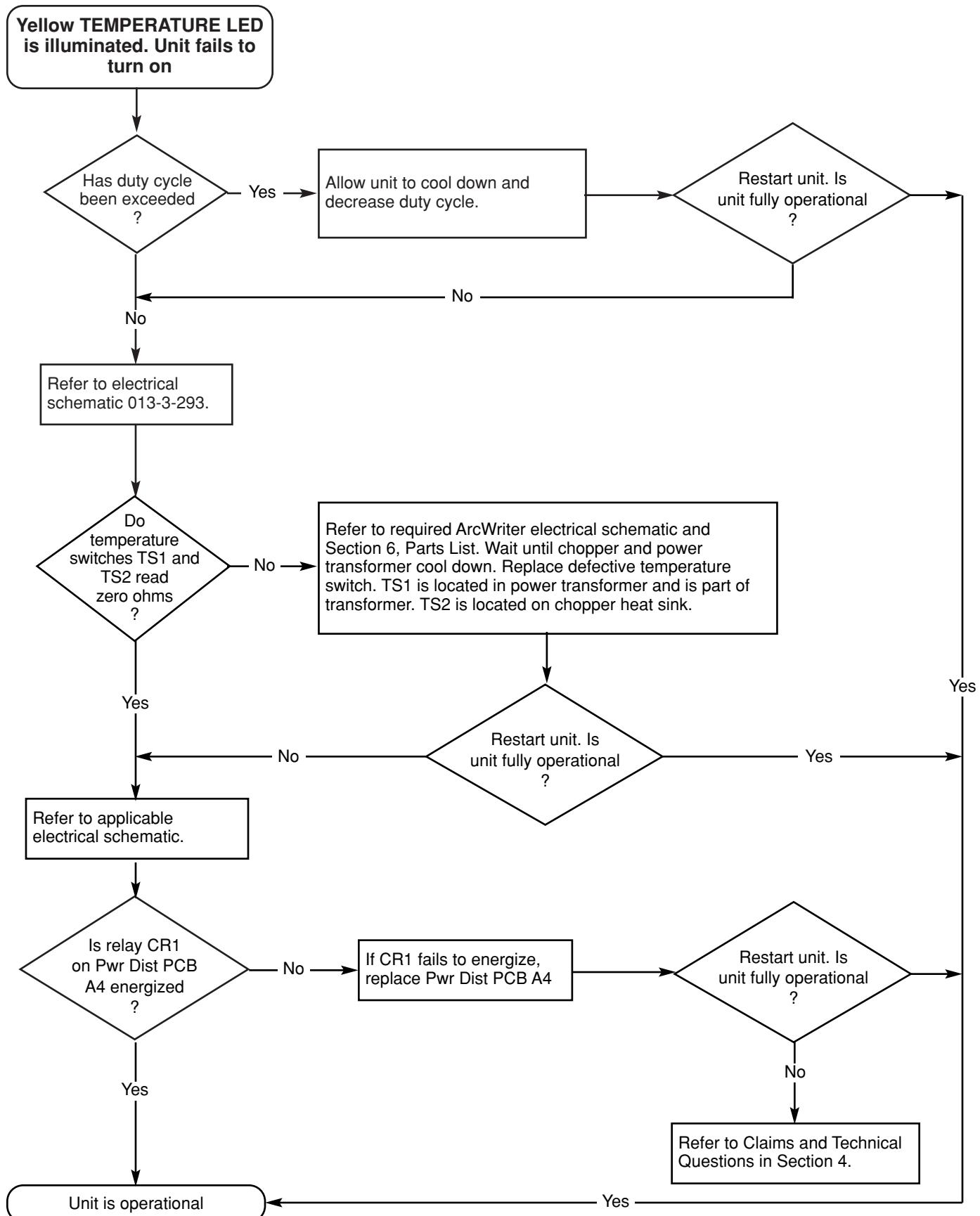
	<b>WARNING</b>
<p><b>SHOCK HAZARD:</b> Always turn off power to ArcWriter before removing cover for servicing. Always set ArcWriter circuit breaker to OFF (except for 600 VAC power supply, see below) and set LINE DISCONNECT SWITCH to OFF and LOCK-OUT and TAG-OUT switch. Note that if power is required for servicing, dangerous voltages exist within the power supply which could cause serious injury or death.</p> <p><b>SHOCK HAZARD:</b> The 600 VAC power supply does not have a circuit breaker to remove incoming power. Always turn off power to ArcWriter before removing cover for servicing. Always set the LINE DISCONNECT SWITCH to OFF and LOCK-OUT and TAG-OUT switch. Note that if power is required for servicing, dangerous voltages exist within the power supply which could cause serious injury or death.</p> <p><b>SHOCK HAZARD:</b> The large, blue electrolytic capacitor stores a large amount of energy in the form of electrical voltage. Even if the power is off, dangerous voltage exists at the capacitor terminals. Never discharge the capacitor with a screwdriver or other implement, personal injury could result. Wait at least two minutes after turning the power supply off before removing cover.</p> <p>If questions or problems arise during servicing, call Hypertherm Technical Services at 1-800-643-9878.</p>	

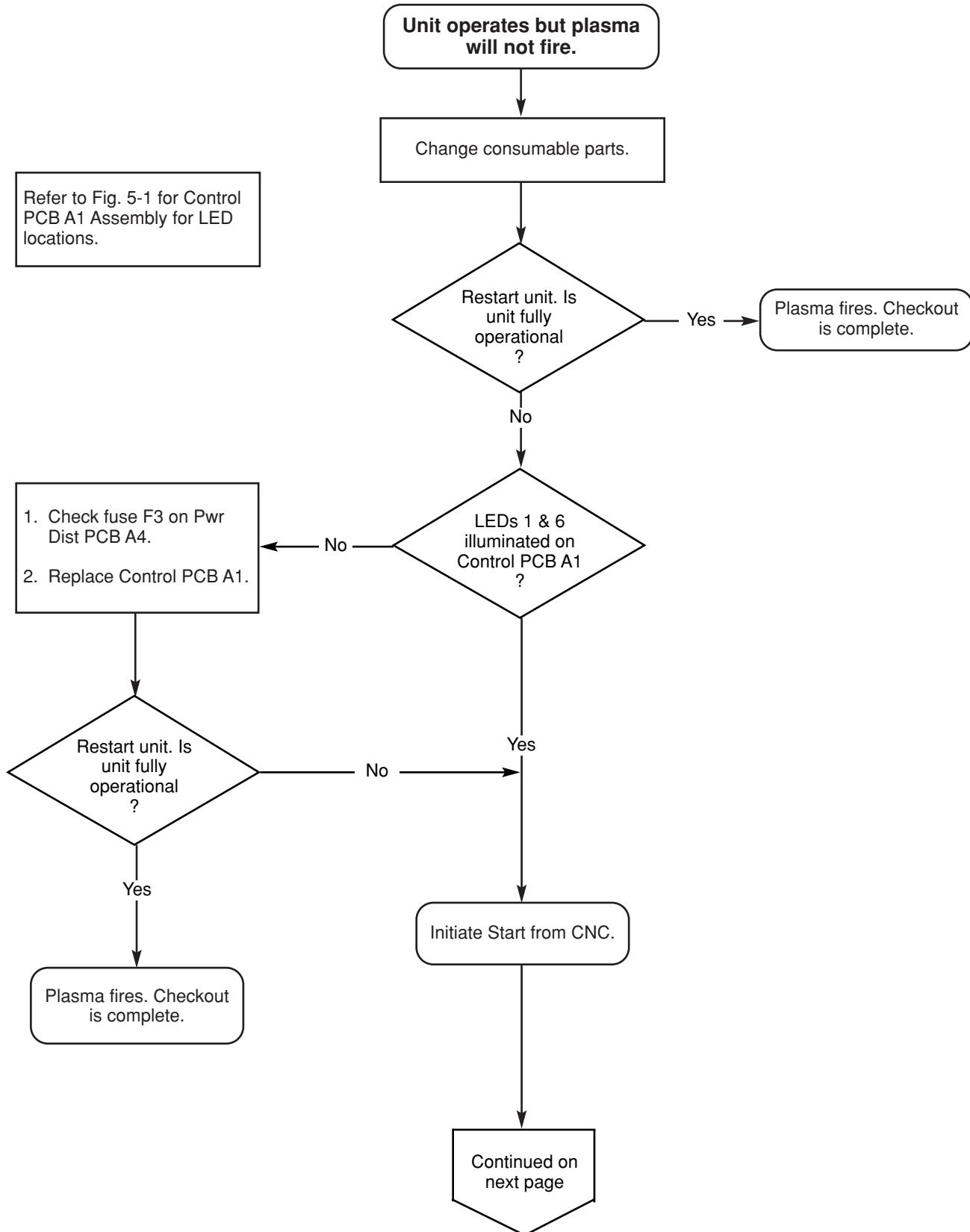


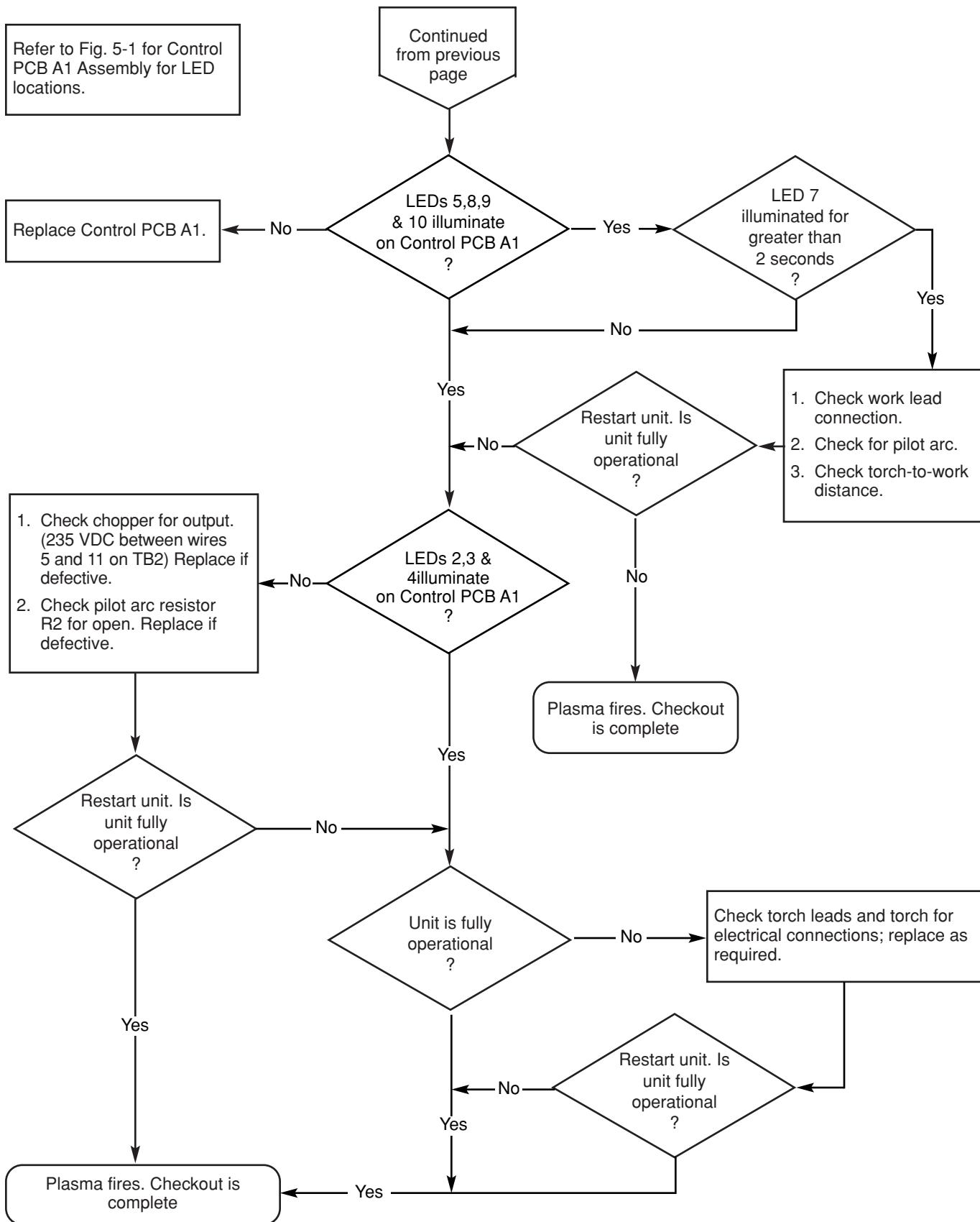












### ArcWriter Control PCB A1 Assembly LED Locations

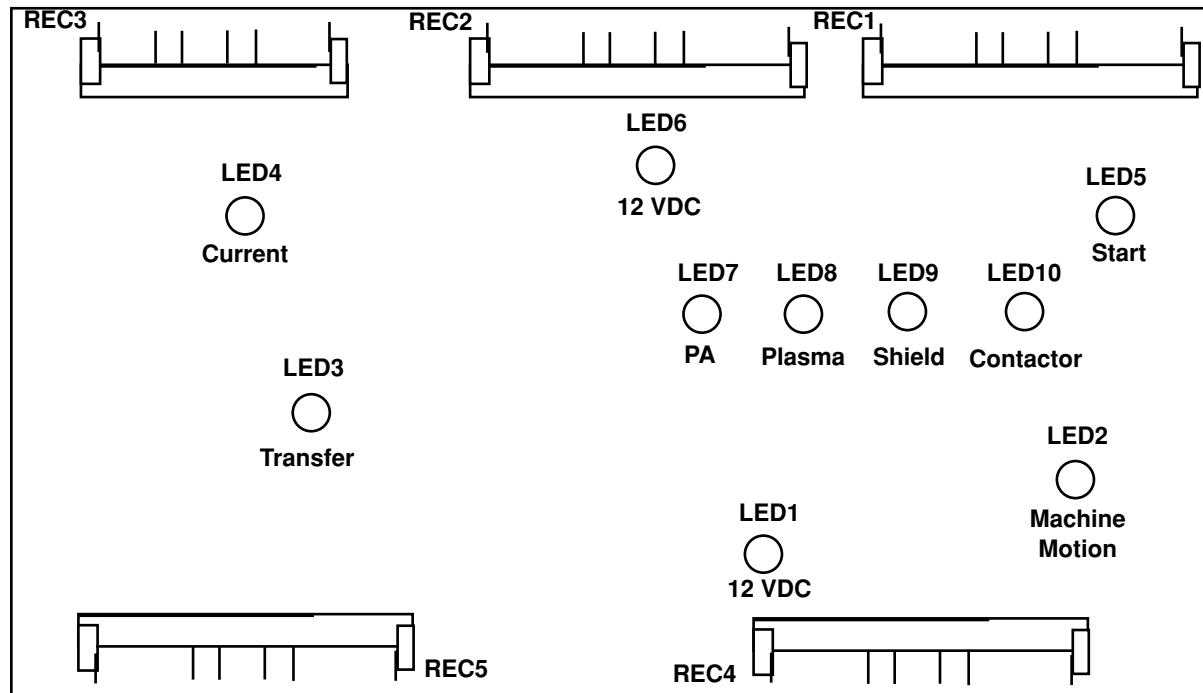


Figure 5-1 ArcWriter Control PCB A1 Assembly LED Locations

## Routine Maintenance

### Air Filter Cleaning

1. Turn the ArcWriter circuit breaker to OFF (0).
2. Unsnap the filter from the front panel.
3. Blow out dirt from filter using compressed air.
4. Reinstall filter.

### Pressure Regulator Cleaning and Filter Replacement

1. Always disconnect the gas supply hose from the pressure regulator before draining filter bowl.
2. Drain the bowl at the bottom by removing the red plastic cap and opening the knurled drain valve in a clockwise direction.
3. If the bowl or filter element appear dirty and require cleaning, proceed as follows.
4. Unscrew the filter bowl and clean.
5. If the filter element needs to be cleaned or replaced, remove the element by unscrewing the element retainer. Refer to Section 6, *Parts List* to order filter element # 011054.
6. Reinstall the filter element and filter bowl.
7. Reconnect the gas supply hose to the hose connection on the filter block.

**Section 6****PARTS LIST**

*In this section:*

Power Supplies .....	6-2
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Consumable Parts Kit .....	6-11
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Interface Cable (for use with full CNC Control) .....	6-11
Interface Cable (for use with Control Panel SA) .....	6-12
Work Lead .....	6-12

## PARTS LIST

---

### Power Supplies

#### with full CNC control

084008	200V, 50-60 Hz, 3Ø
084027	208V, 60 Hz, 3Ø
084028	240V, 60 Hz, 3Ø
084009	400V, 50 Hz, 3Ø
084021	440V, 60 Hz, 3Ø
084010	480V, 60 Hz, 3Ø
084011	600V, 60 Hz, 3Ø

#### with Control Panel SA for current control

084000	200V, 50-60 Hz, 3Ø
084025	208V, 60 Hz, 3Ø
084026	240V, 60 Hz, 3Ø
084004	400V, 50 Hz, 3Ø
084022	440V, 60 Hz, 3Ø
084005	480V, 60 Hz, 3Ø
084012	600V, 60 Hz, 3Ø

#### with full CNC control & Voltage Divider Board

084013	200V, 50-60 Hz, 3Ø
084029	208V, 60 Hz, 3Ø
084030	240V, 60 Hz, 3Ø
084014	400V, 50 Hz, 3Ø
084023	440V, 60 Hz, 3Ø
084015	480V, 60 Hz, 3Ø
084016	600V, 60 Hz, 3Ø

#### with Control Panel SA for current control & Voltage Divider Board

084017	200V, 50-60 Hz, 3Ø
084031	208V, 60 Hz, 3Ø
084032	240V, 60 Hz, 3Ø
084018	400V, 50 Hz, 3Ø
084024	440V, 60 Hz, 3Ø
084019	480V, 60 Hz, 3Ø
084020	600V, 60 Hz, 3Ø

### Cover, Front and Rear

Index No.	Ref. Desig.	Part No.	Description	Quantity
1		001582	Cover, ArcWriter Power Unit	1
2		001446	Foot, MAX70 Power Unit	4
3		001580	Base, ArcWriter Power Unit	1
4A	M1	031116	Fan, 100-115 scfm 120 VAC/50-60	1
4B		027494	Filter, used with fan 031116 (4A)	1
5 L	LT1, LT3	009382	Light, Pilot, Green LED 24 VAC 187 QDisc	2
6	LT2	009375	Light, Pilot, Yellow LED 24 VAC 187 QDisc	1
7A		129096	Control Panel Subassembly (see Fig. 6-4)	1
7B		001594	Panel, Cover (used in place of control panel assy)	1
8		008310	Receptacle, CPC 23-19 Reverse Sex	1
9		008279	Strain Relief	1
10		008482	Strain Relief, 1-1/4 NPS Basket	1
11	CT1	027274	Counter, Self Powered LCD	1
12	CT2	027275	Meter, Self Powered Elapsed Time	1
13A*	CB1	003187	Circuit Breaker, 3 Pole, 15A	1
13B**		001636	Cover, circuit breaker (600V units only)	1
14		008228	Cord Grip, 1-1/4 NPT .850 -1.320 2SC	1
		129071	Gas SA, Shield/Cap Sensor	1
15		011039	Filter/Regulator, 0-120 PSI 1/8 NPT Gas	1
16		011054	Filter Element	1
17		015152	Nipple, Quick Connect, Steel, 1/8 NPT (mount on regulator, part of consumable parts kit)	1
18		022019	Gauge, Pressure 0-100 PSI 1-1/2"	1
19	S1	005044	Switch, Toggle SPDT Maint ON/NONE/ON	1
		129072	Gas SA, Plasma	1
20		022027	Gauge, Pressure 160 PSI 1-1/2"	1
21		011080	Regulator, 0-120 PSIG 1/4 FPT w/Knob	1
22		015152	Nipple, Quick Connect, Steel, 1/8 FPT (mount on regulator, part of consumable parts kit)	1

\* Not used on 600V power supplies.

\*\* Used on 600V power supplies only.

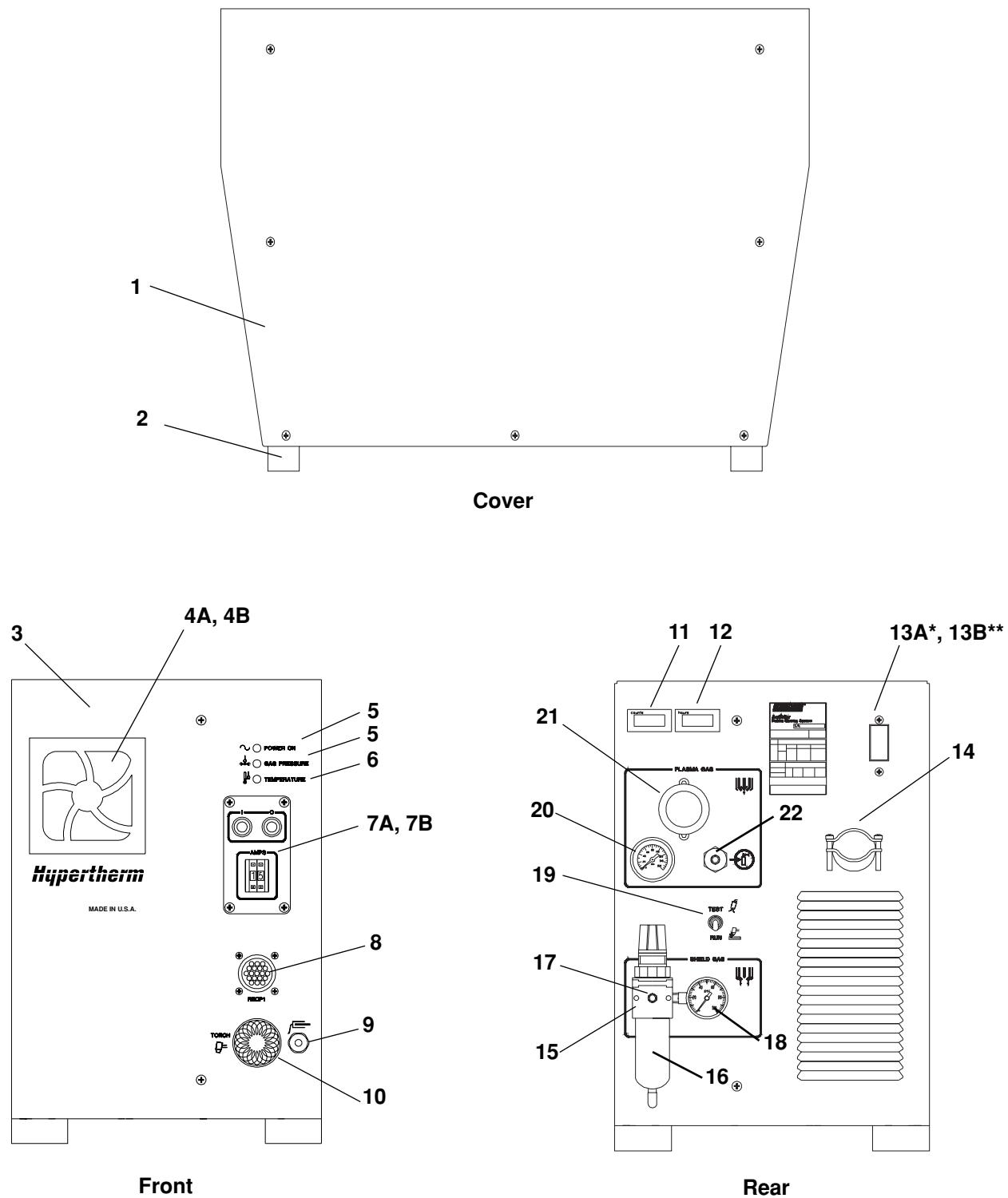


Figure 6-1 Power Supply – Cover, Front and Rear

## PARTS LIST

---

### Power Supplies (continued)

#### Left Side

Index No.	Ref. Desig.	Part No.	Description	Quantity
1	A3	129147	Chopper SA, ArcWriter	1
2	T3	014162	Transformer, 24 VCT, 0.25A, 120 VAC Power	1
3A	M1	031116	Fan, 100-115 scfm 120 VAC/50-60	1
3B		027494	Filter, used with fan 031116 (4A)	1
4		008482	Strain Relief, 1-1/4 NPS Basket	1
5		009295	Capacitor, 2500 $\mu$ f 25WV-10-+50% CMPTRGR	1
6	L1	014202	Inductor, 15 MH	1
7	T1	129131	Transformer SA, 200V Unit	1
		129220	Transformer SA, 208V Unit	1
		129130	Transformer SA, 240V Unit	1
		129129	Transformer SA, 400V CE Unit	1
		129219	Transformer SA, 440V Unit	1
		129128	Transformer SA, 480V Unit	1
		129218	Transformer SA, 600V Unit	1
		129071	Gas SA, Shield/Cap Sensor	1
8		011039	Filter/Regulator, 0-120 PSI 1/8 NPT Gas	1
9		011054	Filter Element	1
10		022019	Gauge, Pressure 0-100 PSI 1-1/2"	1
11		123107	Cord, Power 15 feet, All Units Except 400V CE	1
		123154	Cord, Power 15 feet, 400V CE Units	1
		129072	Gas SA, Plasma	1
12		011080	Regulator, 0-120 PSIG 1/4 FPT w/Knob	1
13A*	CB1	003194	Circuit Breaker, 3 Pole, 15A	1
13B**		001636	Cover, circuit breaker (600V units only)	1
14***		041542	PC BD Assy, CE Filter (400V units only)	1
15**	TB2	008933	Board, 3-Terminal (600V units only)	1
16	CON1	003212	Contactor: 3 Phase with AC Coil	1
17	F1, F2	108017	Fuse, 1/2A 600V 13/32 X 1-1/2 TD, 200V, 208V and 240V Units	2
		108005****	Fuse, 1/4A 600V 13/32 X 1-1/2 TD, 400V, 440V, 480V and 600V Units	2
18	T2	129126	Transformer, Control SA 200V Unit	1
		129217	Transformer, Control SA 208V Unit	1
		129127	Transformer, Control SA 240V Unit	1
		129124	Transformer, Control SA 400V CE Unit	1
		129216	Transformer, Control SA 440V Unit	1
		129125	Transformer, Control SA 480V Unit	1
		129215	Transformer, Control SA 600V Unit	1

\* Not used on 600V power supplies.

\*\* Used on 600V power supplies only.

\*\*\* Used on 400V CE power supplies only.

\*\*\*\* On 400V CE units, only order listed fuses or European equivalent fuses as replacements.

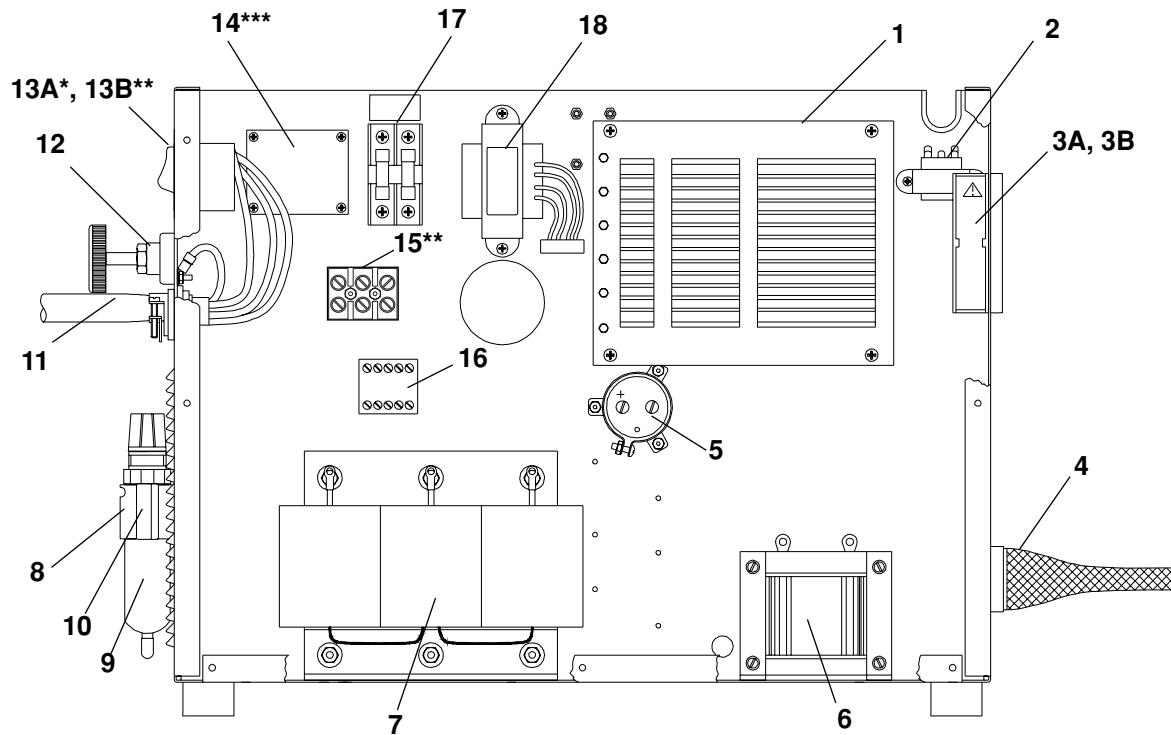


Figure 6-2 Power Supply – Left Side

**Power Supplies (continued)****Right Side**

Index No.	Ref. Desig.	Part No.	Description	Quantity
1	SV1	129072 006095	Gas SA, Plasma Valve, Solenoid, 1/8 FPT 120V 2WNC	1 1
2	PS1	005112	Switch, Pressure 39 PSI .013 Orifice	1
3		011080	Regulator, 0-120 PSIG 1/4 FPT w/Knob	1
4		022027	Gauge, Pressure 160 PSI 1-1/2"	1
5	CS1	009373 129071	Sensor, Current 40-200A/HD Gas SA, Shield/Cap Sensor	1 1
6		011039	Filter/Regulator, 0-120 PSI 1/8 NPT Gas	1
7		011054	Filter Element	1
8	SV2	006095	Valve, Solenoid, 1/8 FPT 120V 2WNC	1
9	PS2	005112	Switch, Pressure 39 PSI .013 Orifice	1
10		007035	Shunt, 20A 100MV	1
11		009438	Resistor, 5-Ohm 50W 5% wire wound	1
12		003021	Relay, 120VAC SPST NO	1
13	A1	041516	PC BD Assy, Control	1
14		008482	Strain Relief, 1-1/4 NPS Basket	1
15		008310	Receptacle, CPC 23-19 Reverse Sex	1
16	LT2	009375	Light, Pilot, Yellow LED 24 VAC 187 QDisc	1
17	LT1, LT2	009382	Light, Pilot, Green LED 24 VAC 187 QDisc	2
18	A4	041513	PC BD Assy, Power Distribution	1
19	F3, F4	008818*	Fuse, MDL 3/4 amp	2
20		003096	Relay, 24 VAC DPDTBifurcated Cont	2
21	TB1	008933	Board, Terminal 3-Terminal Fu-HDS w/Prot	1
22	A2	041377	PC BD Assy, Voltage Divider (can be purchased for customer supplied THC units)	1

\* On 400V CE units, only order listed fuses or European equivalent fuses as replacements.

\*\* Used on 400V CE units only.

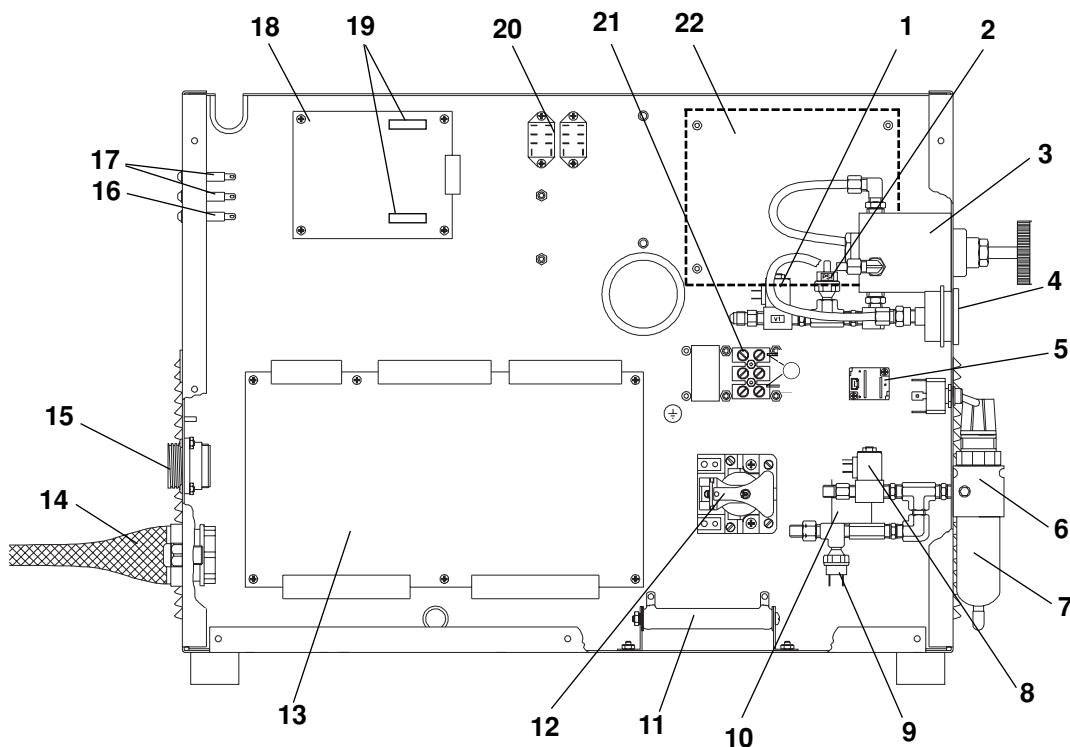


Figure 6-3 Power Supply Right Side

## PARTS LIST

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### Control Panel Subassembly (129096)

Index No.	Ref. Desig.	Part No.	Description	Quantity
1	PB1	005201	Switch, pushbutton, momentary NO	1
2	PB2	005203	Switch, pushbutton, momentary NO	1
3	S3	005193	Switch, Thumbwheel Assembly	1

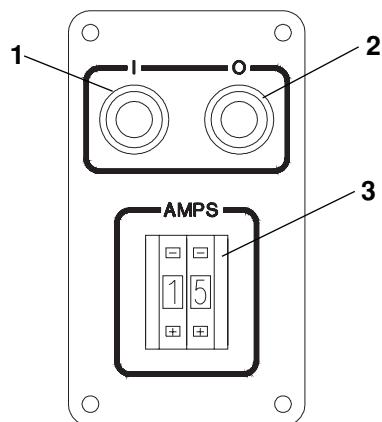


Figure 6-4 Control Panel Subassembly

## Torch and Lead Assembly

### Torch Assembly (128115)

Index No.	Ref. Design.	Part No.	Description	Quantity
1		120337	Sleeve, Torch Mounting	1
2		120448	Torch Main Body	1
3		026024	O-Ring, Silicon 1.114 X 0.070	2
4		026017	O-Ring, Silicon 0.676 X 0.070	1
5		120449	Ring, Swirl, Blow Forward	1
6		120447	Electrode, Air Blow Forward	1
7		120450	Nozzle, Blow Forward	1
8		120453	Cap, Retaining Blow Forward	1

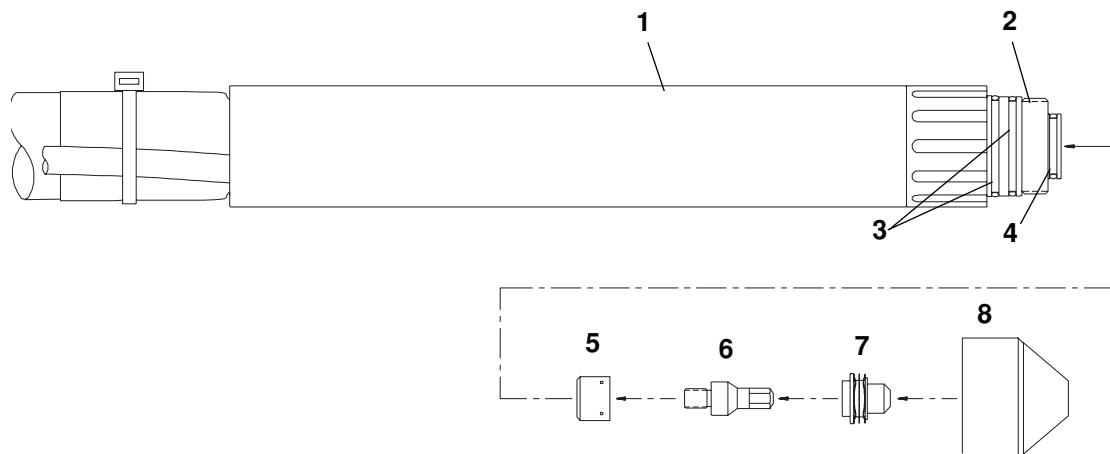


Figure 6-5 Torch Assembly

### Lead Set

Part No.	Description	Quantity
128119	Lead Set, 25 Ft. (7.6 m)	1
128057	Lead Set, 50 Ft. (15.2 m)	
128120	Lead Set, 75 Ft. (22.8 m)	
128121	Lead Set, 100 Ft. (30.5 m)	

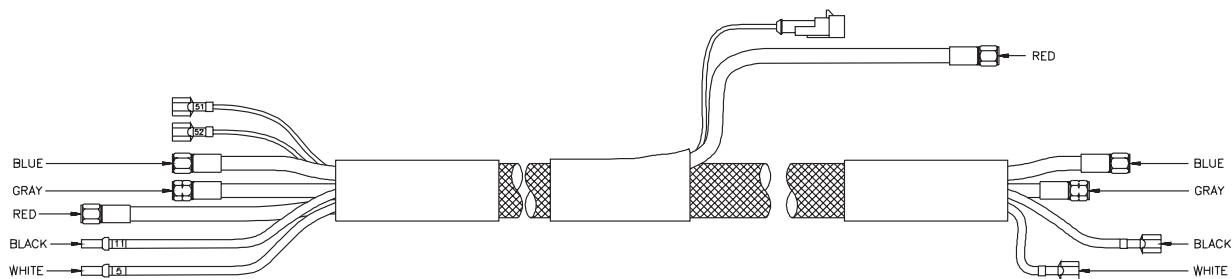


Figure 6-6 Lead Set

## PARTS LIST

### Torch and Lead Assembly (continued)

#### Plasma Gas Valve Subassembly (129101)

Index No.	Ref. Desig.	Part No.	Description	Quantity
1	SV3	006097	Valve, Solenoid 1/8 FPT 120V 3 WNC	1
2		024473	Assembly, Hose 3/16 Red RH 'A' 15 inch	1
3		004725	Bracket, Solenoid/Sleeve Mounting	1

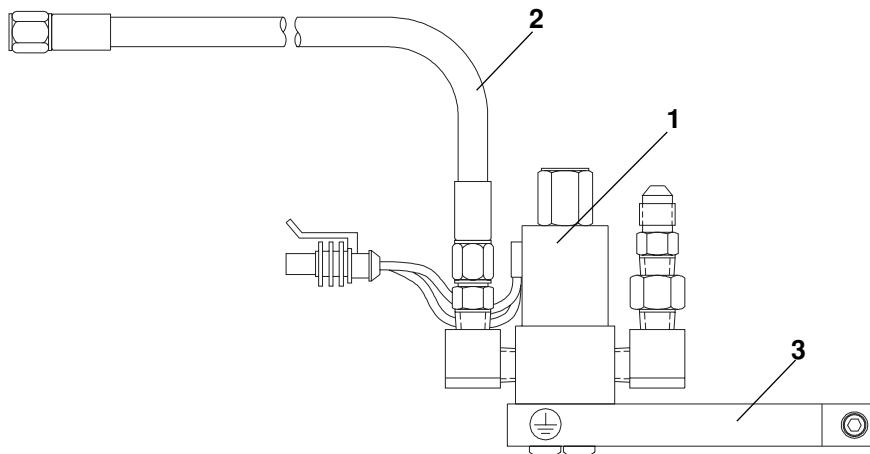


Figure 6-7 Plasma Gas Valve Subassembly

### Consumable Parts

Index No.	Ref. Desig.	Part No.	Description	Quantity
1	—	120449	Ring, Swirl Blow Forward	1
2	—	120447	Electrode, Air BlowForward	1
3	—	120450	Nozzle, Blow Forward	1
4	—	120453	Cap, Retaining Blow Forward	1

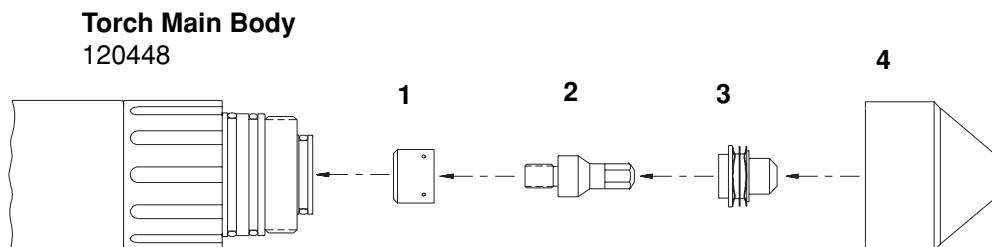


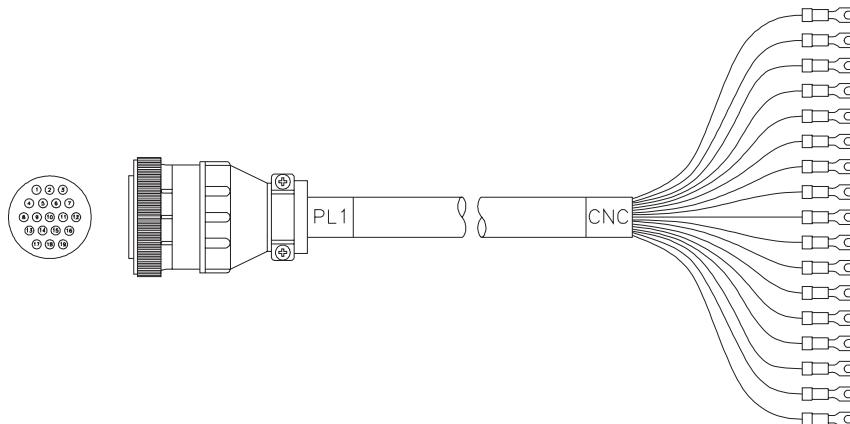
Figure 6-8 Consumable Parts

**Consumable Parts Kit (128059)**

Part No.	Description	Quantity
001285	Box, Consumable Parts	1
026024	O-Ring, Silicon 1.114 X 0.070	6
026017	O-Ring, Silicon 0.676 X 0.070	3
120449	Ring, Swirl Blow Forward	1
120447	Electrode, Air Blow Foward	5
120450	Nozzle, Blow Forward	5
120453	Cap, Retaining Blow Forward	1
027493	Wrench, Electrode 7/32 Hex	1
027055	Lubricant, Silicone 1/4 Oz Tube	1
015152	Nipple, Quick Connect, Steel, 1/8 FPT	2

**Interface Cables and Work Lead****Interface Cable (use for full CNC control)**

Part No.	Description	Quantity
123072	Interface Cable, 15 Ft. (4.5 m)	1
123112	Interface Cable, 25 Ft. (7.6 m)	
123113	Interface Cable, 50 Ft. (15.2 m)	
123114	Interface Cable, 75 Ft. (22.8 m)	
123115	Interface Cable, 100 Ft. (30.5 m)	

**Figure 6-9 Interface Cable (for use with full CNC control)**

## PARTS LIST

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### Interface Cables and Work Lead (continued)

#### Interface Cable (use with Control Panel SA for current control)

Part No.	Description	Quantity
123059	Interface Cable, 15 Ft. (4.5 m)	1
123116	Interface Cable, 25 Ft. (7.6 m)	
123117	Interface Cable, 50 Ft. (15.2 m)	
123118	Interface Cable, 75 Ft. (22.8 m)	
123119	Interface Cable, 100 Ft. (30.5 m)	

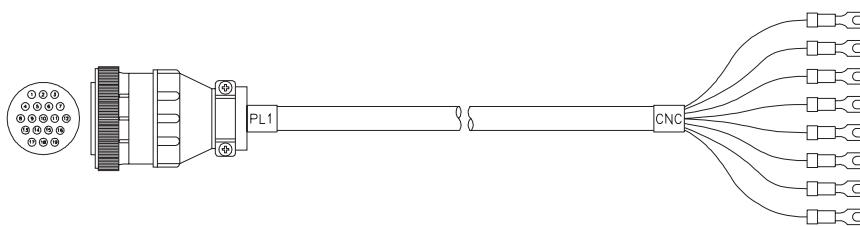


Figure 6-10 Interface Cable (for use with Control Panel SA)

#### Work Lead

Part No.	Description	Quantity
123120	Work Lead, 15 Ft. (4.5 m)	1
123121	Work Lead, 25 Ft. (7.6 m)	
123051	Work Lead, 50 Ft. (15.2 m)	
123122	Work Lead, 75 Ft. (22.8 m)	
123123	Work Lead, 100 Ft. (30.5 m)	

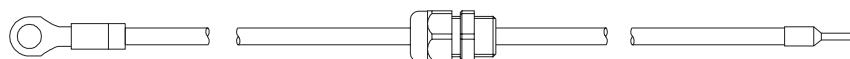


Figure 6-11 Work Lead

**Section 7****WIRING DIAGRAMS***In this section:*

ArcWriter Electrical Schematic, 200V (013293).....	1 Sheet
ArcWriter Electrical Schematic, 208V (013308).....	1 Sheet
ArcWriter Electrical Schematic, 240V (013309).....	1 Sheet
ArcWriter Electrical Schematic, 400V CE (013306).....	1 Sheet
ArcWriter Electrical Schematic, 440V (013310).....	1 Sheet
ArcWriter Electrical Schematic, 480V (013307).....	1 Sheet
ArcWriter Electrical Schematic, 600V (013311).....	1 Sheet

	<b>Battery</b>		<b>Fuse</b>		<b>Push Button, Normally Open</b>
	<b>Cap, polarized</b>		<b>Ground Clamp</b>		<b>Receptacle</b>
	<b>Cap, non-polarized</b>		<b>Ground, Chassis</b>		<b>Relay, Coil</b>
	<b>Cap, feed-thru</b>		<b>Ground, Earth</b>		<b>Relay, Normally Closed</b>
	<b>Circuit breaker</b>		<b>IGBT</b>		<b>Relay, Normally Open</b>
	<b>Coax shield</b>		<b>Inductor</b>		<b>Relay, Solid State, AC</b>
	<b>Current Sensor</b>		<b>LED</b>		<b>Relay, Solid State, DC</b>
	<b>Current sensor</b>		<b>Light</b>		<b>Relay, Solid State, Dry</b>
	<b>DC supply</b>		<b>MOV</b>		<b>Resistor</b>
	<b>Diode</b>		<b>Pin</b>		<b>SCR</b>
	<b>Door interlock</b>		<b>Plug</b>		<b>Shield</b>
	<b>Fan</b>		<b>PNP Transistor</b>		<b>Shunt</b>
	<b>Feedthru LC</b>		<b>Potentiometer</b>		<b>Spark Gap</b>
	<b>Filter, AC</b>		<b>Push Button, Normally Closed</b>		<b>Switch, Flow</b>

	Switch, Level, Normally Closed
	Switch, Pressure, Normally Closed
	Switch, Pressure, Normally Open
	Switch, 1 Pole, 1 Throw
	Switch, 1 Pole, 2 Throw
	Switch, 1 Pole, 1 Throw, Center Off
	Switch, Temperature, Normally Closed
	Switch, Temperature, Normally Open
	Terminal Block
	Time Delay Closed, NC/Off
	Time Delay Open, NO/Off
	Time Delay Open, NC/On
	Time Delay Closed, NO/Off
	Transformer
	Transformer, Air Core
	Transformer Coil
	Triac
	VAC Source
	Valve, Solenoid
	Voltage Source
	Zener Diode

### Torch Symbols

