

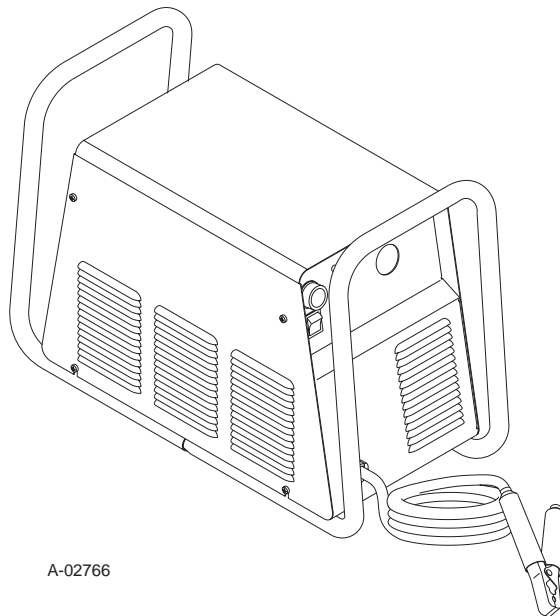
THERMAL DYNAMICS[®]



A THERMADYNE[®] Company

Plasma Cutting Power Supply

CE CutMaster[™] 50



A-02766

Service Manual

April 21, 2003

Manual No. 0-2845



WARNINGS

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

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

Plasma Cutting Power Supply
CE CutMaster™ 50
Service Manual Number 0-2845

Published by:
Thermal Dynamics Corporation
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Publication Date: April 21, 2003

Record the following information for Warranty purposes:

Where Purchased: _____

Purchase Date: _____

Power Supply Serial #: _____

Torch Serial #: _____

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SECTION 1: GENERAL INFORMATION

1.01 Notes, Cautions and Warnings

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

NOTE

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

CAUTION

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



WARNING

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

1.02 Important Safety Precautions



WARNINGS

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

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

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



GASES AND FUMES

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

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

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

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



ELECTRIC SHOCK

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

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

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



FIRE AND EXPLOSION

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

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



NOISE

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

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



PLASMA ARC RAYS

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

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

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

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

1.03 Publications

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

1. OSHA, SAFETY AND HEALTH STANDARDS, 29CFR 1910, obtainable from the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402
2. ANSI Standard Z49.1, SAFETY IN WELDING AND CUTTING, obtainable from the American Welding Society, 550 N.W. LeJeune Rd, Miami, FL 33126
3. NIOSH, SAFETY AND HEALTH IN ARC WELDING AND GAS WELDING AND CUTTING, obtainable from the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402
4. ANSI Standard Z87.1, SAFE PRACTICES FOR OCCUPATION AND EDUCATIONAL EYE AND FACE PROTECTION, obtainable from American National Standards Institute, 1430 Broadway, New York, NY 10018
5. ANSI Standard Z41.1, STANDARD FOR MEN'S SAFETY-TOE FOOTWEAR, obtainable from the American National Standards Institute, 1430 Broadway, New York, NY 10018

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

1.04 Note, Attention et Avertissement

Dans ce manuel, les mots “note,” “attention,” et “avertissement” sont utilisés pour mettre en relief des informations à caractère important. Ces mises en relief sont classifiées comme suit :

NOTE

Toute opération, procédure ou renseignement général sur lequel il importe d'insister davantage ou qui contribue à l'efficacité de fonctionnement du système.

ATTENTION

Toute procédure pouvant résulter l'endommagement du matériel en cas de non-respect de la procédure en question.



AVERTISSEMENT

Toute procédure pouvant provoquer des blessures de l'opérateur ou des autres personnes se trouvant dans la zone de travail en cas de non-respect de la procédure en question.

1.05 Precautions De Securite Importantes



AVERTISSEMENTS

L'OPÉRATION ET LA MAINTENANCE DU MATÉRIEL DE SOUDAGE À L'ARC AU JET DE PLASMA PEUVENT PRÉSENTER DES RISQUES ET DES DANGERS DE SANTÉ.

Coupant à l'arc au jet de plasma produit de l'énergie électrique haute tension et des émissions magnétique qui peuvent interférer la fonction propre d'un "pacemaker" cardiaque, les appareils auditif, ou autre matériel de santé électronique. Ceux qui travail près d'une application à l'arc au jet de plasma devrait consulter leur membre professionnel de médication et le manufacturier de matériel de santé pour déterminer s'il existe des risques de santé.

Il faut communiquer aux opérateurs et au personnel TOUS les dangers possibles. Afin d'éviter les blessures possibles, lisez, comprenez et suivez tous les avertissements, toutes les précautions de sécurité et toutes les consignes avant d'utiliser le matériel. Composez le + 603-298-5711 ou votre distributeur local si vous avez des questions.



FUMÉE et GAZ

La fumée et les gaz produits par le procédé de jet de plasma peuvent présenter des risques et des dangers de santé.

- Eloignez toute fumée et gaz de votre zone de respiration. Gardez votre tête hors de la plume de fumée provenant du chalumeau.
- Utilisez un appareil respiratoire à alimentation en air si l'aération fournie ne permet pas d'éliminer la fumée et les gaz.
- Les sortes de gaz et de fumée provenant de l'arc de plasma dépendent du genre de métal utilisé, des revêtements se trouvant sur le métal et des différents procédés. Vous devez prendre soin lorsque vous coupez ou soudez tout métal pouvant contenir un ou plusieurs des éléments suivants:

antimoine	cadmium	mercure
argent	chrome	nickel
arsenic	cobalt	plomb
baryum	cuivre	sélénium
béryllium	manganèse	vanadium

- Lisez toujours les fiches de données sur la sécurité des matières (sigle américain "MSDS"); celles-ci devraient être fournies avec le matériel que vous utilisez. Les MSDS contiennent des renseignements quant à la quantité et la nature de la fumée et des gaz pouvant poser des dangers de santé.
- Pour des informations sur la manière de tester la fumée et les gaz de votre lieu de travail, consultez l'article 1 et les documents cités à la page 5.
- Utilisez un équipement spécial tel que des tables de coupe à débit d'eau ou à courant descendant pour capter la fumée et les gaz.
- N'utilisez pas le chalumeau au jet de plasma dans une zone où se trouvent des matières ou des gaz combustibles ou explosifs.
- Le phosgène, un gaz toxique, est généré par la fumée provenant des solvants et des produits de nettoyage chlorés. Éliminez toute source de telle fumée.
- Ce produit, dans le procédé de soudage et de coupe, produit de la fumée ou des gaz pouvant contenir des éléments reconnus dans L'état de la Californie, qui peuvent causer des défauts de naissance et le cancer. (La sécurité de santé en Californie et la code sécurité Sec. 25249.5 et seq.)



CHOC ELECTRIQUE

Les chocs électriques peuvent blesser ou même tuer. Le procédé au jet de plasma requiert et produit de l'énergie électrique haute tension. Cette énergie électrique peut produire des chocs graves, voire mortels, pour l'opérateur et les autres personnes sur le lieu de travail.

- Ne touchez jamais une pièce "sous tension" ou "vive"; portez des gants et des vêtements secs. Isolez-vous de la pièce de travail ou des autres parties du circuit de soudage.
- Réparez ou remplacez toute pièce usée ou endommagée.
- Prenez des soins particuliers lorsque la zone de travail est humide ou moite.
- Montez et maintenez le matériel conformément au Code électrique national des Etats-Unis. (Voir la page 5, article 9.)
- Débranchez l'alimentation électrique avant tout travail d'entretien ou de réparation.
- Lisez et respectez toutes les consignes du Manuel de consignes.



INCENDIE ET EXPLOSION

Les incendies et les explosions peuvent résulter des scories chaudes, des étincelles ou de l'arc de plasma. Le procédé à l'arc de plasma produit du métal, des étincelles, des scories chaudes pouvant mettre le feu aux matières combustibles ou provoquer l'explosion de fumées inflammables.

- Soyez certain qu'aucune matière combustible ou inflammable ne se trouve sur le lieu de travail. Protégez toute telle matière qu'il est impossible de retirer de la zone de travail.
- Procurez une bonne aération de toutes les fumées inflammables ou explosives.
- Ne coupez pas et ne soudez pas les conteneurs ayant pu renfermer des matières combustibles.
- Prévoyez une veille d'incendie lors de tout travail dans une zone présentant des dangers d'incendie.
- Le gas hydrogène peut se former ou s'accumuler sous les pièces de travail en aluminium lorsqu'elles sont coupées sous l'eau ou sur une table d'eau. NE PAS couper les alliages en aluminium sous l'eau ou sur une table d'eau à moins que le gas hydrogène peut s'échapper ou se dissiper. Le gas hydrogène accumulé explosera si enflammé.



RAYONS D'ARC DE PLASMA

Les rayons provenant de l'arc de plasma peuvent blesser vos yeux et brûler votre peau. Le procédé à l'arc de plasma produit une lumière infra-rouge et des rayons

ultra-violet très forts. Ces rayons d'arc nuiront à vos yeux et brûleront votre peau si vous ne vous protégez pas correctement.

- Pour protéger vos yeux, portez toujours un casque ou un écran de soudeur. Portez toujours des lunettes de sécurité munies de parois latérales ou des lunettes de protection ou une autre sorte de protection oculaire.
- Portez des gants de soudeur et un vêtement protecteur approprié pour protéger votre peau contre les étincelles et les rayons de l'arc.
- Maintenez votre casque et vos lunettes de protection en bon état. Remplacez toute lentille sale ou comportant fissure ou rognure.
- Protégez les autres personnes se trouvant sur la zone de travail contre les rayons de l'arc en fournissant des cabines ou des écrans de protection.
- Utilisez la nuance de lentille qui est suggérée dans la recommandation qui suivent ANSI/ASC Z49.1:

Courant Arc	Nuance Minimum Protective Numéro	Nuance Suggestée Numéro
Moins de 300*	8	9
300 - 400*	9	12
400 - 800*	10	14

** Ces valeurs s'appliquent ou l'arc actuel est observé clairement. L'expérience a démontré que les filtres moins foncés peuvent être utilisés quand l'arc est caché par moicseau de travail.*



BRUIT

Le bruit peut provoquer une perte permanente de l'ouïe. Les procédés de soudage à l'arc de plasma peuvent provoquer des niveaux sonores supérieurs aux limites normalement acceptables. Vous devez vous protéger les oreilles contre les bruits forts afin d'éviter une perte permanente de l'ouïe.

- Pour protéger votre ouïe contre les bruits forts, portez des tampons protecteurs et/ou des protections auriculaires. Protégez également les autres personnes se trouvant sur le lieu de travail.
- Il faut mesurer les niveaux sonores afin d'assurer que les décibels (le bruit) ne dépassent pas les niveaux sûrs.
- Pour des renseignements sur la manière de tester le bruit, consultez l'article 1, page 5.

1.06 Documents De Reference

Consultez les normes suivantes ou les révisions les plus récentes ayant été faites à celles-ci pour de plus amples renseignements :

1. OSHA, NORMES DE SÉCURITÉ DU TRAVAIL ET DE PROTECTION DE LA SANTÉ, 29CFR 1910, disponible auprès du Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402
2. Norme ANSI Z49.1, LA SÉCURITÉ DES OPÉRATIONS DE COUPE ET DE SOUDAGE, disponible auprès de la Société Américaine de Soudage (American Welding Society), 550 N.W. LeJeune Rd., Miami, FL 33126
3. NIOSH, LA SÉCURITÉ ET LA SANTÉ LORS DES OPÉRATIONS DE COUPE ET DE SOUDAGE À L'ARC ET AU GAZ, disponible auprès du Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402
4. Norme ANSI Z87.1, PRATIQUES SURES POUR LA PROTECTION DES YEUX ET DU VISAGE AU TRAVAIL ET DANS LES ECOLES, disponible de l'Institut Américain des Normes Nationales (American National Standards Institute), 1430 Broadway, New York, NY 10018
5. Norme ANSI Z41.1, NORMES POUR LES CHAUSSURES PROTECTRICES, disponible auprès de l'American National Standards Institute, 1430 Broadway, New York, NY 10018
6. Norme ANSI Z49.2, PRÉVENTION DES INCENDIES LORS DE L'EMPLOI DE PROCÉDÉS DE COUPE ET DE SOUDAGE, disponible auprès de l'American National Standards Institute, 1430 Broadway, New York, NY 10018
7. Norme A6.0 de l'Association Américaine du Soudage (AWS), LE SOUDAGE ET LA COUPE DE CONTENEURS AYANT RENFERMÉ DES PRODUITS COMBUSTIBLES, disponible auprès de la American Welding Society, 550 N.W. LeJeune Rd., Miami, FL 33126
8. Norme 51 de l'Association Américaine pour la Protection contre les Incendies (NFPA), LES SYSTEMES À GAZ AVEC ALIMENTATION EN OXYGENE POUR LE SOUDAGE, LA COUPE ET LES PROCÉDÉS ASSOCIÉS, disponible auprès de la National Fire Protection Association, Batterymarch Park, Quincy, MA 02269

9. Norme 70 de la NFPA, CODE ELECTRIQUE NATIONAL, disponible auprès de la National Fire Protection Association, Batterymarch Park, Quincy, MA 02269
10. Norme 51B de la NFPA, LES PROCÉDÉS DE COUPE ET DE SOUDAGE, disponible auprès de la National Fire Protection Association, Batterymarch Park, Quincy, MA 02269
11. Brochure GCA P-1, LA MANIPULATION SANS RISQUE DES GAZ COMPRIMÉS EN CYLINDRES, disponible auprès de l'Association des Gaz Comprimés (Compressed Gas Association), 1235 Jefferson Davis Highway, Suite 501, Arlington, VA 22202
12. Norme CSA W117.2, CODE DE SÉCURITÉ POUR LE SOUDAGE ET LA COUPE, disponible auprès de l'Association des Normes Canadiennes, Standards Sales, 178 Rexdale Boulevard, Rexdale, Ontario, Canada, M9W 1R3
13. Livret NWSA, BIBLIOGRAPHIE SUR LA SÉCURITÉ DU SOUDAGE, disponible auprès de l'Association Nationale de Fournitures de Soudage (National Welding Supply Association), 1900 Arch Street, Philadelphia, PA 19103
14. Norme AWSF4.1 de l'Association Américaine de Soudage, RECOMMANDATIONS DE PRATIQUES SURES POUR LA PRÉPARATION À LA COUPE ET AU SOUDAGE DE CONTENEURS ET TUYAUX AYANT RENFERMÉ DES PRODUITS DANGEREUX, disponible auprès de la American Welding Society, 550 N.W. LeJeune Rd., Miami, FL 33126
15. Norme ANSI Z88.2, PRATIQUES DE PROTECTION RESPIRATOIRE, disponible auprès de l'American National Standards Institute, 1430 Broadway, New York, NY 10018

1.07 Declaration of Conformity

Manufacturer: Thermal Dynamics Corporation
Address: Industrial Park #2
West Lebanon, New Hampshire 03784
USA

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

The equipment described in this manual conforms to all applicable aspects and regulations of the "EMC Directive" (European Council Directive 89/336/EEC) and to the National legislation for the enforcement of this Directive.

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

National Standard and Technical Specifications

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

- * CSA (Canadian Standards Association) standard C22.2 number 60 for Arc welding equipment.
 - * UL (Underwriters Laboratory) rating 94VO flammability testing for all printed-circuit boards used.
 - * CENELEC EN50199 EMC Product Standard for Arc Welding Equipment.
 - * ISO/IEC 60974-1 (BS 638-PT10) (EN 60 974-1) (EN50192) (EN50078) applicable to plasma cutting equipment and associated accessories.
- * Extensive product design verification is conducted at the manufacturing facility as part of the routine design and manufacturing process. This is to ensure the product is safe, when used according to instructions in this manual and related industry standards, and performs as specified. Rigorous testing is incorporated into the manufacturing process to ensure the manufactured product meets or exceeds all design specifications.

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

Manufacturers responsible representative: Giorgio Bassi
Managing Director
Thermal Dynamics Europe
Via rio Fabbiani 8A
40067 Rastignano (BO)
Italy



1.08 Statement of Warranty

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

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

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

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

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

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

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

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

	Parts				
	<u>XL Plus & CutMaster Series</u>	<u>Parts Cougar/ Drag-Gun</u>	<u>Parts All Others</u>	<u>Labor</u>	
<u>PAK Units, Power Supplies</u>					
Main Power Magnetics	3 Years	1 Year	2 Years	1 Year	
Original Main Power Rectifier	3 Years	1 Year	2 Years	1 Year	
Control PC Board	3 Years	1 Year	2 Years	1 Year	
All Other Circuits And Components Including, But Not Limited To, Starting Circuit, Contactors, Relays, Solenoids, Pumps, Power Switching Semi-Conductors	1 Year	1 Year	1 Year	1 Year	
<u>Consoles, Control Equipment, Heat Exchanges, And Accessory Equipment</u>	1 Year		1 Year	1 Year	
<u>Torch And Leads</u>					
Maximizer 300 Torch			1 Year	1 Year	
PCH/M-62 & PCH/M-102 Torches	1 Year			1 Year	
All Other Torches	180 Days	180 Days	180 Days	180 Days	
<u>Repair/Replacement Parts</u>	90 Days	90 Days	90 Days	None	

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

Effective May 1, 2000

SECTION 2: INTRODUCTION

2.01 Scope Of Manual

This manual provides service instructions for the Thermal Dynamics CE CutMaster 50 Plasma Cutting Power Supply. Information in this manual is particularly applicable to the troubleshooting and repair of this power supply, and is intended for use by properly-trained service technicians familiar with this equipment.

For setup of this equipment, individual operating procedures, and basic troubleshooting, refer to Operating Manual Number 0-2844.

Read both the operating manual and the service manual thoroughly. A complete understanding of the capabilities and functions of this equipment will assure obtaining the performance for which it was designed.

2.02 General Service Philosophy

Several key points are essential to properly support the application and operation of this equipment.

A. Application

The equipment should satisfy the customer's requirements as supplied and as described in Section 3 of this manual. Be sure to confirm that the equipment is capable of the application desired.

B. Modifications

No physical or electrical modifications other than selection of standard options and Accessories are to be made to this equipment.

C. Customer/Operator Responsibilities

It is the customer/operator's responsibility to maintain the equipment and peripheral accessories provided by Thermal Dynamics in good operating order in accordance with the procedures outlined in the operating manual, and to protect the equipment from accidental or malicious damage.

D. Repair Restrictions

The electronics consists of Printed Circuit Board (PCB) Assemblies which must be carefully handled and must be replaced as units. No replacement of printed circuit solder-mounted components is allowed except as noted in this manual.

Printed Circuit Board Assemblies to be returned must be properly packaged in protective material and returned intact per normal procedures.

2.03 Service Responsibilities

The service technician should be familiar with the equipment and its capabilities and should be prepared to recommend arrangements of components which will provide the most efficient layout, utilizing the equipment to its best possible advantage.

Maintenance work should be accomplished in a timely manner. If problems are encountered, or the equipment does not function as specified, contact the Technical Services Department at West Lebanon, NH for assistance (1-603-298-5711).

SECTION 3: DESCRIPTION

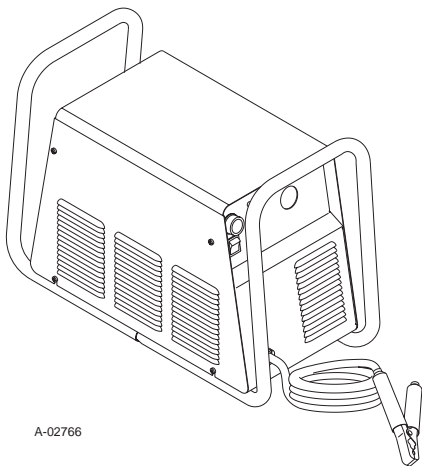
3.01 Scope

The purpose of this section is:

- To familiarize the service technician with the capabilities and limitations of the equipment,
- To provide an overall understanding which will allow the technician, in turn, to properly train customer operating personnel.

3.02 General Description

The power supply provides 40 amp maximum output and includes all control circuitry, electrical and gas inputs and outputs, pilot circuitry, torch & leads, work cable with clamp, and input power cable.



CE CutMaster 50 Power Supply

3.03 Specifications/Design Features

A. Power Supply Technical Specifications

The following specifications apply to the Power Supply only:

1. Front Panel Controls

- Main Power ON/OFF Switch
- RUN/SET Switch
- Torch Leads
- Work Lead
- Output Current Control

2. Front Panel LED Indicators

- AC
- TEMP
- GAS
- DC

3. Rear Panel Features

- Primary Input Power Cable
- Gas Pressure Regulator/Filter Assembly
- Gas Supply Connection

4. Input Power

400 VAC ($\pm 10\%$), Three-Phase, 50/60 Hz

*refer to Appendix 1 for input wiring requirements

5. Output Power

Continuously variable from 20 to 40 amps maximum

6. Duty Cycle (see NOTE)

NOTE

The duty cycle will be reduced if the primary input voltage (AC) is low or the DC voltage is higher than shown in the chart.

400V Power Supply Duty Cycle			
Ambient Temperature	104° F (40° C)	104° F (40° C)	104° F (40° C)
Duty Cycle	40%	60%	100%
Current	40 Amps	33 Amps	n/a Amps
DC Voltage	96 vdc	93 vdc	n/a vdc

7. Pilot Circuitry

Capacitive Discharge (CD), Ignition DC Pilot

8. Weight

Power Supply w/Input Cable & Work Lead, Torch & Leads - 54 lbs. (24.5 kg).

9. Overall Dimensions (w/handles)

Length 22-1/2" (571 mm)
 Width 10-3/4" (273 mm)
 Height 16-3/8" (416 mm)

B. Gas Regulator/Filter Assembly Specifications

The following specifications apply to the Gas Regulator/Filter Assembly only:

1. Operating Pressure

65 psi (4.5 bar)

2. Maximum input gas supply pressure

125 psi (8.6 bar)

3. Filter

Particulate Type Filter (to 20 microns)

3.04 Power Supply Options and Accessories

The following accessories are available for this power supply. Refer to Section 6, Parts Lists, for catalog numbers and ordering information.

A. Single Stage Air Line Filter Kit

A Single Stage In-Line Air Filter for use with compressed air shop systems. Filters moisture and particulate matter from the air stream to at least 0.85 microns.

B. Two Stage Air Line Filter

A Two Stage In-Line Air Filter for use on compressed air shop systems. Filters moisture and particulate matter from the air stream to at least 5.0 microns.

C. Extended Work Cable with Clamp

As an alternative to the standard 20 ft (6.1 m) work cable & clamp factory installed on the power supply, an optional 50 ft (15.2 m) work cable with clamp is available.

D. Hand Pendant Control (for machine applications only)

A hand pendant control with 25 ft (7.6m) cable which provides ON/OFF signals to the power supply.

E. Hand Pendant Control Extension

Also offered is a 25 ft (7.6 m) extension cable which when added to the Hand Pendant Control, provides a total cable length of 50 ft (15.2 m).

F. Wheel Kit

A steel cart on easy-rolling wheels, for maximum mobility of the power supply.

E. Multi-Purpose Cart

Rugged steel cart on easy-rolling rear wheels and front-mounted swivel casters. Provides maximum mobility for the power supply and can also serve as a display cart. Top shelf is 12" (305 mm) x 20" (508 mm). Steel handle is 30" (762 mm) high.

SECTION 4: SERVICE AND TROUBLESHOOTING DIAGNOSTICS

4.01 Introduction

This section provides service diagnostics for the CE Cut-Master 50 Power Supply, allowing the Technician to isolate any faulty subassemblies. Refer to Section 5, Repairs & Replacement Procedures, for parts replacement instructions.

Under no circumstances are field repairs to be attempted on Printed Circuit Boards or other subassemblies of this unit. Evidence of unauthorized repairs will void the factory warranty.

NOTE

The troubleshooting contained in this manual is for the Power Supply only. Troubleshooting other parts of the system is covered in the separate manuals for those products.

4.02 Periodic Inspection & Cleaning Procedures

This subsection describes inspection procedures which should be performed at periodic intervals as required.

A. Physical Inspection

Check that all cable connections are secure.

B. Cleaning

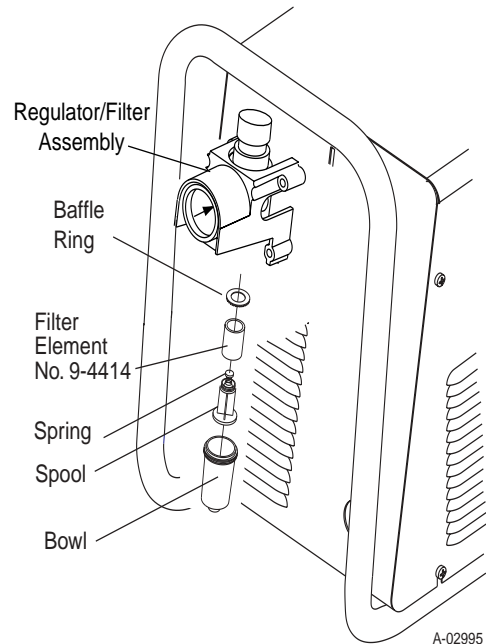
Clean and maintain the Power Supply per Appendix 12, Maintenance Schedule.

C. Regulator/Filter Element Replacement

The Regulator/Filter Assembly is on the rear panel. For better system performance, the Regulator/Filter Assembly filter element should be checked per the Maintenance Schedule, and either cleaned or replaced. See Section 6 for replacement element catalog number.

1. Remove power from the power supply; turn off the gas supply.
2. Unscrew the bowl on the bottom of the Filter Regulator Assembly. The filter element will be visible and still attached to the main body of the Filter Regulator.

3. Grasp the filter element and unscrew it from the Filter Regulator body. The filter element will come off with a spool and some additional pieces.
4. Note the correct assembly of the filter/spool then remove the filter from the spool and either clean it or replace it.
5. The filter element and spool, with the baffle ring in place (teeth facing downward) can be screwed back into the Regulator body by compressing the spring on the spool. Tighten firmly by hand.



Filter Regulator Element Replacement

6. Reinstall the bowl.
7. Turn on the air supply.

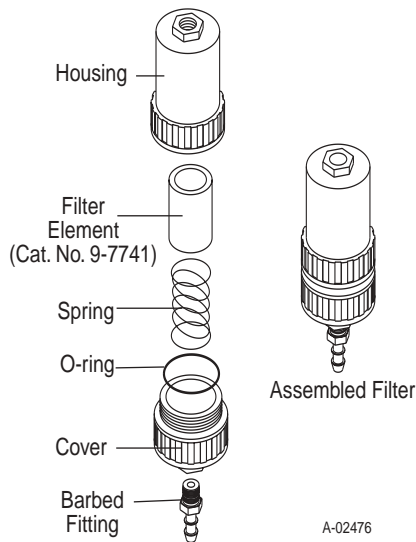
D. Optional Single-Stage Filter Element Replacement

NOTES

These instructions apply to power supplies where the optional Single-Stage Filter has been installed.

The Power Supply shuts down automatically when the Filter Element becomes completely saturated. The Filter Element can be removed from its housing, dried, and reused. Allow 24 hours for Element to dry. See Section 6 for replacement element catalog number.

1. Remove power from power supply.
2. Shut off air supply and bleed down system before disassembling Filter to change Filter Element.
3. Disconnect gas supply hose from barbed fitting.
4. Turn the Cover counter-clockwise and remove it from the Filter Housing. The Filter Element is located inside the Housing.



Optional Single-Stage Filter Element Replacement

5. Remove the Filter Element from the Housing and set Element aside to dry.
6. Wipe inside of housing clean, then insert the replacement Filter Element open side first, as shown in Figure 5-2.
7. Replace Housing on Cover.
8. Reattach gas supply hose to barbed fitting.

NOTE

If unit leaks between housing and cover, inspect the "O" Ring for cuts or other damage.

E. Optional Two-Stage Filter Element Replacement

NOTES

These instructions apply to any power supply where the optional Two-Stage Filter has been installed.

The Two-Stage Air Filter has two Filter Elements. When the Filter Elements become dirty the Power Supply will continue to operate but cut quality may become unacceptable. See Section 6 for replacement element catalog number.

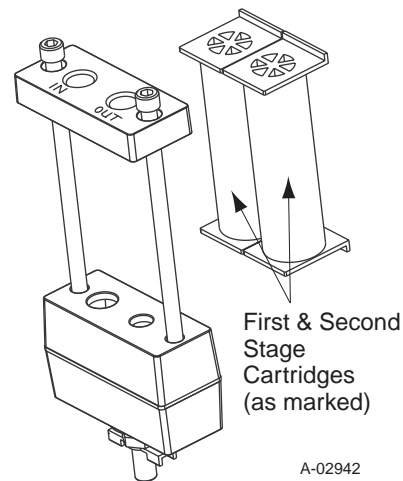
1. Remove power from power supply.
2. Shut off air supply and bleed down system before changing Filter Elements.



WARNING

Always turn off the air supply and bleed the system before disassembling the Filter Assembly as injury could result.

3. Loosen the two bolts on the top of the Filter Assembly enough to allow the Filter Elements to move freely.



Optional Two-Stage Filter Replacement

4. Note the location and orientation of the old Filter Elements.
5. Slide out the old Filter Elements.
6. Slide the replacement Filter Elements into the Filter Assembly, with the same orientation as noted in Step 4 above.
7. Hand tighten the two bolts evenly, then torque each bolt to 20 - 30 in-lbs (2.3 - 3.4 Nm).
8. Slowly apply air pressure to the assembly, checking for leaks.

4.03 System Theory

The CE CutMaster 50 System is designed for hand operation and mechanized operation using the torch bulkhead panel within the power supply as the interface.

A. Logic PC Board Functions

The Logic PC Board controls the timing and sequencing of the system. It monitors gas pressure and power supply temperature, and controls the gas flow in Run and Set modes by turning on the plasma solenoids.

After the ON/OFF switch is closed on the front panel, the AC Indicator blinks for approximately 8 seconds then it becomes steady and the Main Contactor closes.

When the unit is at 'idle' the AC indicator on the Front Panel should be ON. When the torch switch is pressed, the gas begins to flow. When preflow is over, the INV ON signal is given, and the DC indicator on the Front Panel turns ON.

An open circuit voltage of approximately 230 to 300 vdc (depending on input power) is produced when the switching of the IGBTs in the IGBT Module Assembly are turned ON by an INV ON signal from the Logic PC Board. A circuit on the Logic PC Board monitors the output voltage. When the output voltage drops below 60 vdc, indicating a problem exists, the Logic PC Board sends a signal which turns OFF the INV ON Enable signal. This happens in less than 50 milliseconds.

When the torch switch is pressed, gas will flow for approximately 2 seconds before DC is established (indicated on the front panel). During this time CD Enable indicator on the Logic Board will come on and sends a logic signal to the CD Board which initiates the pilot arc. The CD Enable Indicator should go out immediately if the pilot starts immediately.

When the torch is close to the workpiece, the cutting arc "transfers" to the work. The resulting current is sensed by the Main Power PC Board, resulting in the demand level changing from pilot current to whatever the main current control is set at, and then the main cutting arc is initiated. If the torch is removed from the workpiece while the torch switch is still pressed, the main arc extinguishes and the pilot arc automatically restarts.

A circuit on the Logic Board monitors the output voltage. When the output voltage drops below 60vdc, indicating a problem exists, the Logic Board turns off the INV ON signal.

CE CutMaster 50 Logic PCB Indicators	
D13	INV ON
D16	CD Enable

B. CD (Capacitive Discharge) Board Functions

The CD Board functions are initiated by the CD Enable signal from the Logic PC Board. The CD arc starting circuit fires the spark gap producing the high voltage spark which starts the DC pilot arc. When the Logic Board senses a pilot arc, the signal shuts off the CD enable.

4.04 Common Operating Problems



WARNINGS

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

Frequently review the Important Safety Precautions in Section 1. Be sure the operator is equipped with proper gloves, clothing, and eye and ear protection. Make sure no part of the operator's body comes into contact with the workpiece while the torch is activated.

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

Handle torch leads with care and protect them from damage.

A. Piloting

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

B. Torch Standoff

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

C. Edge Starting

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

D. Direction of Cut

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

E. Dross

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

F. Common Cutting Faults

1. Insufficient Penetration

- a. *Cutting speed too fast*
- b. *Torch tilted too much*
- c. *Metal too thick*
- d. *Worn torch parts*
- e. *Cutting current too low*
- f. *Non-Genuine Thermal Dynamics parts used*

2. Main Arc Extinguishes

- a. *Cutting speed too slow*
- b. *Torch standoff too high from workpiece*
- c. *Cutting current too high*
- d. *Work cable disconnected*
- e. *Worn torch parts*
- f. *Non-Genuine Thermal Dynamics parts used*

3. Excessive Dross Formation

- a. *Cutting speed too slow*
- b. *Torch standoff too high from workpiece*

- c. *Worn torch parts*
- d. *Improper cutting current*
- e. *Non-Genuine Thermal Dynamics parts used*

4. Short Torch Parts Life

- a. *Moisture in air source*
- b. *Exceeding system capability (material too thick)*
- c. *Excessive pilot arc time*
- d. *Gas flow too low (incorrect pressure)*
- e. *Improperly assembled torch*
- f. *Incorrect torch parts for the operation*
- g. *Non-Genuine Thermal Dynamics parts used*

4.05 Troubleshooting Guide - General Information



WARNING

There are extremely dangerous voltage and power levels present inside this unit. Do not attempt to diagnose or repair unless you have had training in power electronics measurement and troubleshooting techniques.

A. General Information

This Service Manual covers advanced troubleshooting, which requires power supply disassembly and live measurements. Advanced troubleshooting and repair of this unit should be undertaken only by those familiar with high voltage high power electronic equipment.

If major complex subassemblies are faulty, the faulty sub-assembly must be returned for repair.

NOTE

Follow all instructions as listed and complete each in the order presented.

The troubleshooting guide has subsections as follows:

Section 4.06 - Circuit Fault Isolation

Section 4.07 - Main Input and Internal Power Problems

Section 4.08 - Pilot Arc Problems

Section 4.09 - Main Arc Problems

Section 4.10 - Test Procedures

Subsection 4.10 includes specific test procedures and LED status identification tables. The subsection is referenced by the troubleshooting guide for the specific test to be performed.

B. How to Use the Troubleshooting Guide

The following information is a guide to help the Service Technician determine the most likely causes for various symptoms. This guide is set up in the following manner:

1. Perform operational check(s) on the equipment to isolate problem to possible circuit(s) per subsection 4.06, Circuit Fault Isolation.
2. Determine symptom and isolate to defective assembly using the following format:

X. Symptom (Bold Type)

Any Special Instructions (Text Type)

1. Cause (Italic Type)

a. Check/Remedy (Text Type)

3. Locate your **symptom** in the appropriate Subsection.
4. Check the *causes* (easiest listed first) for the **symptom**.
5. Check the remedies listed for each cause.
6. Repair as needed being sure to verify that unit is fully operational after any repairs.

NOTES

Many signals are transferred between Printed Circuit Board Assemblies on Cables. If these cables become faulty they can then cause various problems. Do not forget about these cables when troubleshooting.

While troubleshooting visually inspect the internal components for signs of overheating, fractures and damage.

4.06 Circuit Fault Isolation

This section is to help isolate the defective circuit before troubleshooting, identify symptoms, and test the unit for proper operation. Follow the instructions as given to identify the possible symptom(s) and the defective circuit. After repairs are complete, run the following tests again to verify that the unit is fully operational.

A. Initial Setup Conditions

1. Connect gas supply to rear of Power Supply.
2. Turn on gas supply and adjust Power Supply Gas Regulator to 65 psi (4.5 bar).

3. Set the Power Supply controls as follows:

ON/OFF switch to OFF

RUN/SET switch to SET

CURRENT control knob to maximum

B. Main Input and Internal Power Tests

1. Connect main AC power to the unit.
2. Set the Power Supply ON/OFF switch to ON and note the following:
 - AC indicator blinks for approximately eight seconds, then steady ON
 - Relay K4 on Main PC Board energizes (clicks) while AC indicator is blinking
 - Relay K2 energizes, activating W1 after AC light stops blinking.
 - TEMP Indicator OFF
 - GAS Indicator ON
 - Gas flows
 - Fan will operate
 - DC Indicator is OFF
3. Set the Power Supply RUN/SET switch to the RUN position and note the following:
 - Gas indicator goes OFF
 - Gas flow stops

This completes the Main Input and Internal Power Tests. If the above are all correct then proceed to paragraph 'C'. If not, then note the symptom and proceed to subsection 4.07, Main Input and Internal Power Problems.

C. Pilot Arc Test

Activate the torch (press torch switch on the handle, send START signal from CNC Control, or press the torch switch on the Remote Pendant) to establish a pilot arc and note the following:

- Gas flows
- GAS indicator turns ON
- Preflow delay (2 seconds) then DC indicator turns ON
- Pilot arc established

This completes the Pilot Arc Test. If the above are all correct then proceed to paragraph 'D'. If the unit does not function as noted then note the symptom and proceed to subsection 4.08, Pilot Arc Problems.

D. Main Arc Test

Activate the torch (press torch switch on the handle, send START signal from CNC Control or press the torch switch on the Remote Pendant) to establish a pilot arc.

Bring the torch to within 1/8"-3/8" (3-10 mm) of the work-piece to establish the main cutting arc, and note the following:

- Main cutting arc starts
- Pilot Relay PCR opens

This completes the Main Arc Test. If the above are all correct then the equipment should be operating properly. If problems still persist then contact Technical Services.

If the torch does not function as noted then note the symptom and proceed to subsection 4.09, Main Arc Problems.

4.07 Main Input and Internal Power Problems

Locate your symptom below:

A. Main power line fuses blow as soon as main disconnect is closed

1. *Input power cable installed incorrectly or defective power cord.*
 - a. Refer to subsection 5.07-B, Input Power Cable Replacement procedures, and check that the input power cable is not defective or installed incorrectly.

B. Main power line fuses blow 3-6 seconds after the ON/OFF Switch is turned on.

1. *Faulty Input Diode*
 - a. Test Input Diode per subsection 4.10-D; repair as necessary.

C. Fan does not operate; AC indicator on front panel of power supply is OFF

1. *Front Panel ON/OFF switch in OFF position*
 - a. Place switch to ON position.
2. *Main power disconnect not closed*
 - a. Close main power disconnect.
3. *Main power line fuses blown*
 - a. Replace main power line Fuses.
4. *Improper input power cable connections inside Power Supply*
 - a. Refer to subsection 5.07-B and correct if needed.

5. Defective input power cable

- a. Replace input power cable. See Section 5.07-C.

6. Fuse blown inside Power Supply

- a. Replace internal Fuse per subsection 5.06-A.

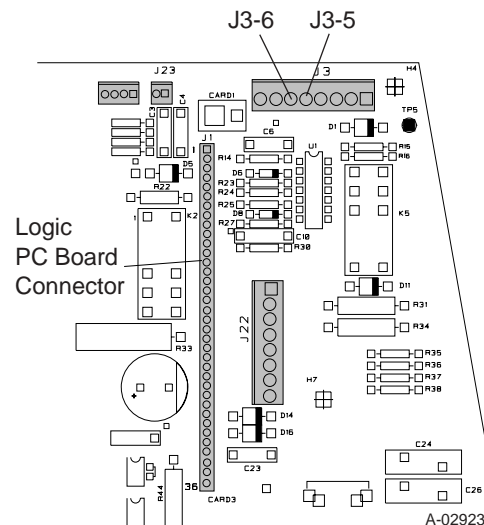
7. Line voltage above 10% tolerance (over voltage protection)

- a. Reduce line supply.

8. Faulty ON/OFF switch (refer to Appendix 11, 28 VAC Circuit Diagram).

Measure for 28VAC on the Main Power PC Board between J3-5 to J3-6.

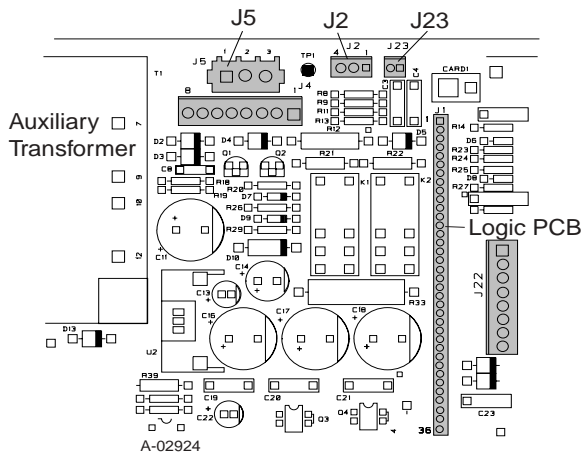
- a. If voltage is not present replace the ON/OFF Switch.



9. Faulty Auxiliary Transformer (refer to Appendix 11, 28 VAC Circuit Diagram)

Measure for 28 VAC on Main Power PC Board from J5-1 to J5-3.

- a. If voltage is not present, replace the Main Power PC Board.



10. Faulty Main Power PC Board (refer to Appendix 4, Main Power PC Board Layout).

Measure for 12 vdc on Main Power PC Board from TP5 to TP1.

- a. If voltage is not present, replace the Main Power Board.

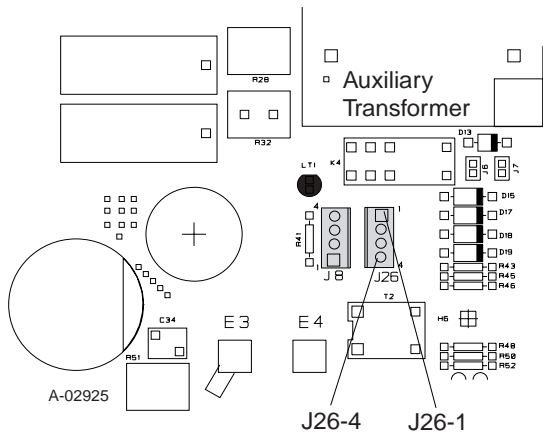
D. System will not pilot; AC indicator ON, TEMP indicator ON

1. *Air flow through unit is restricted*
 - a. Provide adequate air flow (Refer to Operating Manual, subsection 3.02, Site Selection).
2. *Exceeded Duty Cycle of Power Supply*
 - a. Release Torch Switch or de-activate torch with CNC Controller or Remote Pendant Control and wait for fan to cool unit. Refer to Operator's Manual for proper duty Cycle for this unit.

3. Faulty Fan

Measure for 230 VAC on the Main PC Board from J26-1 to J26-4.

- If voltage is correct, replace Fan Assembly.



E. No gas flow; AC indicator ON; TEMP indicator OFF; GAS and DC indicators OFF

1. *RUN/SET switch in RUN position*
 - a. Switch to SET position
2. *Gas supply not connected to unit*
 - a. Connect to gas supply.
3. *Gas supply not turned on*
 - a. Turn gas supply on.
4. *Faulty RUN/SET switch*
 - a. Check continuity.
5. *Faulty Gas Solenoid circuit*
 - a. Test Gas Solenoid circuit per subsection 4.10-F; repair as necessary.

F. Gas flows; AC indicator ON; GAS indicator OFF; DC indicator OFF

1. *Gas pressure too low*
 - a. See Torch Instruction Manual for operating pressures.
2. *Faulty Pressure Switch*

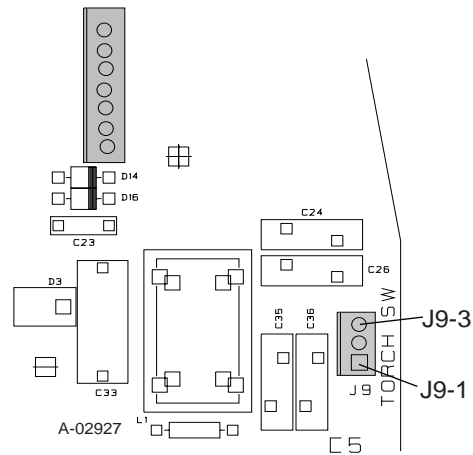
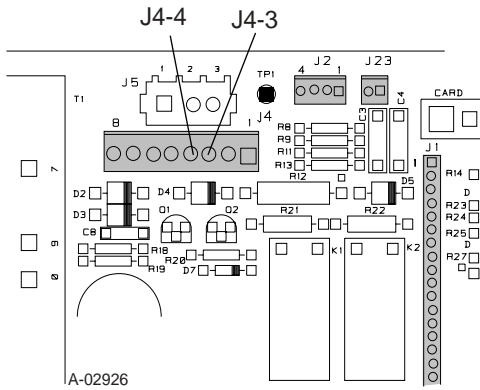
Measure for DC voltage from wire #9 to wire #10 at the Gas Pressure Switch, located on the right side of the unit. See Appendix 13, System Schematic.

- a. If 12 vdc is present and pressure is above 50 psi, replace Gas Pressure Switch/Solenoid Assembly.
- b. If 12 vdc is not present, replace the Logic PC Board.

3. Faulty Wiring or Faulty Logic PC Board

Check the Main Power PCB pin J4-3 to J4-4 for DC voltage from the Logic PC Board. See Appendix 4, Main Power PC Board Layout.

- If less than a volt, replace Logic PC Board.



G. Arc in torch without activating torch; Gas flows; AC indicator ON; GAS and DC indicators ON

1. *Faulty torch switch*
 - a. Refer to appropriate Torch Instruction Manual and check continuity.
2. *Faulty torch leads*
 - a. Refer to appropriate Torch Instruction Manual and check continuity.
3. *Faulty Main Power PC Board (See Appendix 4, Main Power PC Board Layout)*
 - a. Disconnect J9 Connector from the Main PC Board.
 - b. Unplug Logic PC Board.
 - c. Measure across pins J9-1 and J9-3 on Main Power PC Board.
 - If less than 2K ohms, replace Main Power Board.
 - If more than 2K ohms, replace Logic PC Board.
 - d. Check for damaged torch leads. If pilot wire arcs to torch switch PIP lead it can damage either PCB as well as the torch leads.

4.08 Pilot Arc Problems

Locate your symptom below:

- A. No gas flow; AC indicator ON; TEMP indicator off; GAS and DC indicators OFF (Torch Switch, CNC Control Switch or Pendant Control switch must be pressed)**
 1. *Faulty torch*
 - a. Refer to Torch Instruction Manual and check torch switch continuity.
 2. *Faulty RUN/SET Switch*
 - a. Check switch and replace as necessary.
 3. *Faulty Logic PC Board*
 - a. Measure the voltage between J1-22 to J1-20. Voltage should be less than 2 vdc. See Appendix 4, Main Power PC Board Layout.
 - If less than 2 vdc, replace logic PCB.
 - If greater than 2 vdc, replace Main PCB.
 - b. Check for damaged torch leads. If pilot wire arcs to torch switch PIP lead it can cause damage to either PC Board as well as the torch leads.
- B. Gas flows; small arc may be visible in torch; AC indicator ON; TEMP indicator off; GAS indicator ON; DC indicator blinks**
 1. *Faulty Main Power PC Board or Shorted Torch*
 - a. Test per subsection 4.10-G; repair as necessary.
 2. *Faulty IGBT or Output Diode Module Assembly*
 - a. Check per subsection 4.10-G; repair as necessary.

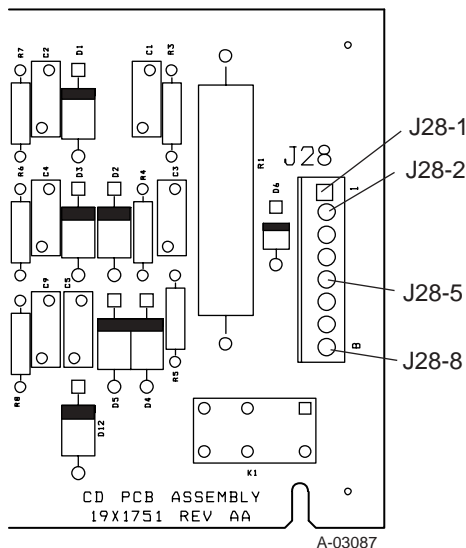
3. Faulty torch

- a. Check torch per appropriate Torch Instruction Manual.

C. Gas flows; No arc in torch; No arc at spark gap on CD PC Board; AC indicator ON; TEMP indicator off; GAS and DC indicators ON; CD enable indicator ON

1. Faulty CD PC Board. (See Appendix 5, CD Board Layout)

- a. If available, check with oscilloscope from J28-5 to J28-8 for approximately 500VAC peak-to-peak (18Khz switching frequency).
 - If there is no 500 VAC, replace main power transformer (T5). See Section 5.08D.
- b. Check for +12vdc between J28-1 on CD Board and TP-1 on Main Power PC Board.
 - Measure for less than 2vdc between J28-2 on CD Board and TP-1 on Main Power PC Board.
 - If voltages are present, replace CD Board.



D. No arc or intermittent arc in torch; Gas flows; Spark at gap on CD PC Board; AC indicator ON; TEMP indicator off; GAS and DC indicators ON; and CD enable indicator ON

1. Gas pressure(s) set incorrectly (too high)
 - a. Refer to appropriate Torch Instruction Manual.
2. Oil/moisture in air lines
 - a. Purge system. If problem corrected, add filters in line with air source.

3. Incorrect torch parts

- a. Refer to appropriate Torch Instruction Manual.

4. Faulty leads

- a. Check continuity per appropriate Torch Instruction Manual.

5. Faulty torch

- a. Check continuity per appropriate Torch Instruction Manual.

6. Faulty connection of wire #33 to Main Power PC Board

- a. Check wiring connection. See Appendix 13, System Schematic.

7. Faulty Main Power PC Board

Check for approximately 12 vdc at TP2 to TP1 on logic PC Board.

- If less than 2 vdc, replace the Main Power PC Board.

8. Faulty PCR Relay

Install a jumper between wires #33 and #43 on PCR Relay. Retry piloting.

- a. If torch pilots with jumper installed, replace PCR Relay.

4.09 Main Arc Problems

Locate your symptom below:

A. Main cutting arc will not initiate

1. Work cable not connected.
 - a. Connect work cable.
2. Holding too high of a standoff.
 - a. Refer to Operating Manual for recommended standoff heights.
3. Workpiece is painted or rusty.
 - a. Clean workpiece.
4. Faulty Main Power PC Board or Logic Board.
 - a. Measure for 0 vdc at TP2 to TP1 on the Logic Board when attempting to transfer. See Appendix 3.
 - If TP2 goes to 0 vdc replace Logic Board.
 - If not, replace Main Power PC Board.
5. Faulty Main Input Contactor.
 - a. Check per subsection 4.10E.

B. When operating the amperage drops off after the main cutting arc initiates.

1. *Faulty Pilot (PCR) Relay*
 - a. With power off, measure for continuity between wires #43 and #33. See Appendix 13, System Schematic. If continuity is found, replace PCR.

C. Arc shuts off during operation; Arc will not re-light when torch switch is activated.

1. *Unit is overheated (TEMP indicator ON)*
 - a. Let unit cool down for at least five minutes. Make sure the unit has not been operated beyond Duty Cycle limit. See Section 3 for duty cycle specifications.
2. *Fan blades blocked (TEMP indicator ON)*
 - a. Check and clear blades.
3. *Air flow blocked (TEMP indicator ON)*
 - a. Check for blocked air flow around the unit; correct as needed.
4. *Gas pressure too low (GAS indicator OFF when torch switch is activated)*
 - a. Check source for at least 65 psi (4.5 bar); adjust as needed.
5. *Faulty components in unit.*
 - a. Return for repair or have qualified technician repair per Service Manual.

4.10 Test Procedures

The test procedures in this subsection are referenced in the troubleshooting section.

A. Safety Precautions

1. Significant DC Voltage exists after removal of input power. Allow 2 minutes for discharge time. Voltage measured on input capacitors must be zero before performing service on the power supply.
2. Do Not touch electrical components with any part of the human body when power is applied.
3. Keep away from any moving parts.
4. Hot surfaces can cause severe burns. Allow equipment to cool before servicing.
5. Electrostatic discharge can damage printed circuit board assemblies. Transport printed circuit boards in proper antistatic shielded packages. Use proper grounding techniques with wrist strap before handling printed circuit boards.

6. Misaligned plugs can cause printed circuit board damage. Be sure plugs are properly aligned and completely seated.
7. Excessive pressure can damage printed circuit boards. Use only minimal pressure and gentle movement when disconnecting or connecting printed circuit board plugs.

B. Opening Power Supply Enclosure

The Power Supply cover must be removed for access to the internal components.



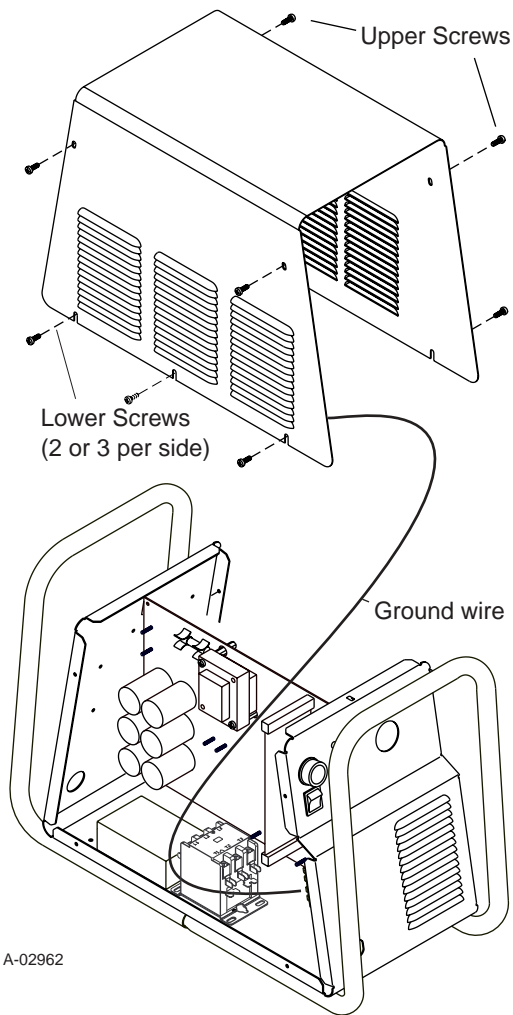
Disconnect primary power at the source before assembling or disassembling the Power Supply, torch parts, or torch and leads assemblies.

1. Remove the upper screws securing the cover to the main assembly.
2. Loosen, but do not remove, the lower screws.

NOTE

There is a ground wire attached from the cover to the main body of the unit.

3. Carefully lift the cover off the unit, and as you do so, remove the nut securing the ground wire to the side panel.
4. Replace the cover by reversing the above steps.



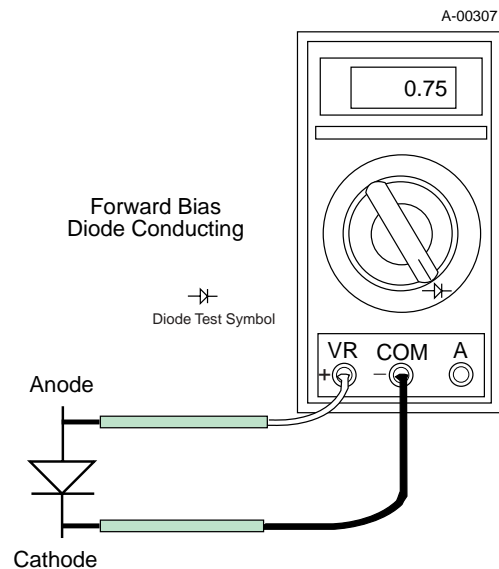
Cover Removal

C. Diode Testing Basics

Testing of diode modules requires a digital volt/ohmmeter that has a diode test scale. Remember that even if the diode module checks good, it may still be bad. If in doubt, replace the diode module.

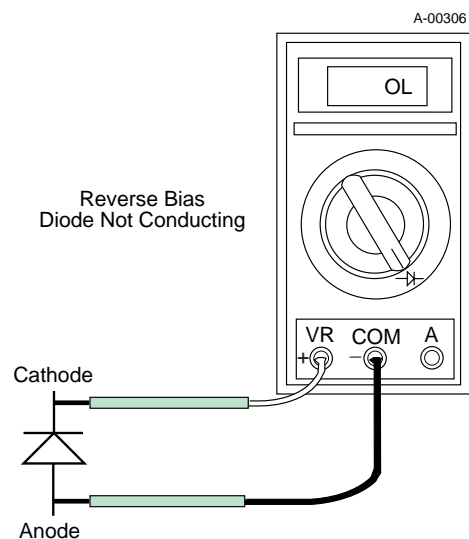
1. Locate the diode module to be tested.
2. Make a visual check of the Diode for damage.
3. Set digital volt/ohmmeter to diode test scale.
4. Using the Figures for each test, check each diode in the module. Each diode must be checked in forward bias (plus to negative) and reverse bias (negative to plus) direction.
5. Connect the volt/ohmmeter positive lead to the anode (+) of the diode and the negative lead to the cathode (-) of the diode for forward bias testing (refer to

following figure). A properly functioning diode will conduct in the forward bias direction and indicate between 0.3 to 0.9 volts.



Testing Diode Forward Bias

6. Reverse the meter leads across the diode for reverse bias testing (refer to following figure). A properly functioning diode will block in the reverse bias direction and depending on the meter function will indicate an open or "OL".



Testing Diode Reverse Bias

7. If a diode checks bad, replace the diode module.
8. Reconnect all cables.

D. Input Diode Test

Check Input Diode for shorted input diode.

Remove AC power and with an ohmmeter set on the diode range make the following checks on Main PC Board:

Meter (+)	Meter (-)	Indication
E1	E11	Diode Drop
E11	E1	Open
E2	E11	Diode Drop
E11	E2	Open
E3	E11	Diode Drop
E11	E3	Open
E12	E1	Diode Drop
E1	E12	Open
E12	E2	Diode Drop
E2	E12	Open
E12	E3	Diode Drop
E3	E12	Open

The meter should indicate a diode drop in one direction and an open in the other direction for each check.

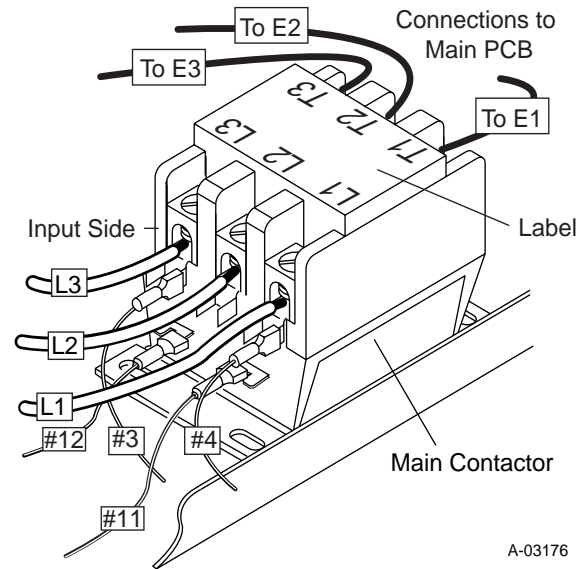
If Input Diode is shorted, make the following checks with an ohmmeter at the Main Contactor (W1): If any test has resistance, then replace the Main Contactor also.

Meter (+)	Meter (-)	Indication
L1	T1	Open
L2	T2	Open
L2	T1	Open

E. Main Input Contactor (W1) Test

Reconnect power and observe proper start-up procedure. AC LED Indicator on the Front Panel should be ON. If indicator is OFF there is no voltage to the Power Supply or an overvoltage condition exists.

1. If AC LED Indicator on Front Panel is OFF, check for proper AC input voltage between input cables L1 and L3 on the Main Contactor. Should be 342-440 VAC. If not, check for proper voltage at the main power source.



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2. Measure voltage on coil of Contactor between wires #11 and #12; should be approximately 28 VAC.

- If voltage is correct, replace Main Contactor.
- If voltage is incorrect, replace Main Power PC Board.

F. Gas Solenoid Circuit Test

Make the following voltage checks and replace the faulty part as required.

1. Place the RUN/SET Switch to the SET position.
2. Measure for 28 VAC across Solenoid wires #7 and #8. See Appendix 13, System Schematic.
 - If 28 VAC is present, replace Solenoid/Pressure Switch Assembly.
 - If 28 VAC is not present, go to the next step.
3. Check for less than 2 vdc at J1-14 to TP1 on Logic Board.
 - If less than 2 vdc replace Main Power PC Board.
 - If more than 2 vdc, replace Logic PC Board.

G. IGBT / Output Diode Circuit Test

1. No DC Output

Activate the torch (press torch switch on the handle, send START signal from CNC Control or press the torch switch on the Remote Pendant).

- If INV ON indicator on Logic PC Board does not turn ON, then replace the Logic PCB.
- If the INV ON indicator turns ON then OFF immediately, the following test should be performed:
 - a. Disconnect jumper J28 from the CD PC Board to disable the CD signal.



WARNINGS

Disconnect primary power at the source before taking any resistance checks.

Connector J28 on the CD PC Board must be disconnected to prevent electrical damage to measuring equipment when testing the open circuit voltage (OCV).

- b. Activate the torch (press torch switch on the handle, send START signal from CNC Control or press the torch switch on the Remote Pendant). Logic PC Board Inverter ON Indicator turns ON.
- c. Measure open circuit voltage between E7(+) to E10 (-) at the Main PC Board. Voltage should be greater than 200 Volts. If voltage is less than 10 V, each IGBT Module and Output Diode Module should be tested individually.

2. Output Diode Circuit Test

- a. Use an ohmmeter set the diode function and make the following measurements on the Output Diode Board to Main Power PC Board connections.

Meter (+)	Meter (-)	Indication
E18	E21	Diode Drop
E21	E18	Open
E18	E20	Diode Drop
E20	E18	Open
E20	E19	Diode Drop
E19	E20	Open
E21	E19	Diode Drop
E19	E21	Open
E18	E19	(2) Diode Drops
E19	E18	Open

- b. The meter should indicate a diode drop in one direction and an open in the other direction for each check. If any of these measurements read shorted or open replace the Output Diode Module Board.

3. IGBT Module Board Circuit Test

- a. Use an ohmmeter set the diode function and make the following measurements on the IGBT Module Board to the Main Power Board.

Meter (+)	Meter (-)	Indication
E35	E13	Diode Drop
E13	E35	Open
E15	E35	Diode Drop
E35	E15	Open
E15	E13	(2) Diode Drops
E13	E15	Open

- b. The meter should indicate a diode drop in one direction and an open in the other direction for each check. Replace IGBT Module Board if readings are not the same as the chart.
- c. Activate the torch (press torch switch on the handle, send START signal from CNC Control or press the torch switch on the Remote Pendant).
 - After 2 seconds the INV ON Indicator on the Logic PCB turns ON. If Indicator does not turn ON, replace Logic PCB.
- d. Measure open circuit voltage between E7(+) to E10 (-) at the Main Power PC Board. Voltage should be greater than 200 V. If voltage is less than 10 V, refer to the output diode test measurements or IGBT module test measurements or shorted torch measurements.

4. Gate Drive & DC Sensing

- a. After checking all previous steps in subsection 4.10-G, jumper TP1 to TP3 on the Logic PCB. See Appendix 3.
- b. Disconnect wires from E13, E35 and E15. When the unit is turned on, the DC light should remain ON.

- c. Activate the torch (press torch switch on the handle, send START signal from CNC Control or press the torch switch on the Remote Pendant) and after two seconds INV ON on the Logic PCB should come on and remain on.
 - If INV ON indicator does not remain on, replace Logic PCB.
 - If INV ON indicator does remain on, then check for approximately 6 vdc between J1-29 to J1-28 and between J1-27 to J1-26 on the Main Power PC Board. See Appendix 4.
 - If no voltage, replace Logic PC Board.
 - If voltage is okay, measure for approximately 6 vdc between E32 to TP-14 on the IGBT PCB and E31 to TP13 on IGBT PC Board.
 - If voltage is 0, replace Main PCB.
 - If voltage is okay, reconnect wires to E13, E35, and E15.
- d. With jumper between TP1 to TP3 still in place, activate the torch (press torch switch on the handle, send START signal from CNC Control, or press the torch switch on the Remote Pendant) and measure for 230 vdc to 300 vdc at Main PCB E18 to E19. See Appendix 4.
 - If voltage is 0 vdc, replace IGBT Module.
 - If voltage is okay, replace Logic PCB.

This completes the test procedures.

SECTION 5: REPAIRS & REPLACEMENT PROCEDURES

5.01 Introduction

This section describes parts replacement procedures and all repairs which may be performed on the CE CutMaster 50 Power Supply.

Under no circumstances are field repairs to be attempted on Printed Circuits or other subassemblies of this unit. Evidence of unauthorized repairs may void the factory warranty.

5.02 Anti-Static Handling Procedures

A. General

Caution: PC Boards can be irreparably damaged by improper handling due to electrostatic discharge (ESD).

Replacement PC Boards are shipped in a protective enclosure to prevent damage from electrostatic discharge (ESD) during shipping. Included with each replacement board is a ground strap to prevent static damage during installation.



WARNINGS

Read and understand these instructions and the instructions on the grounding wrist strap package before opening the equipment enclosure or removing the replacement PC board from its protective enclosure.

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

Where these instructions include specific torquing instructions, failure to torque properly will cause component damage.

Do not operate the equipment or test equipment under power while wearing the grounding wrist strap.

B. Procedure

1. Open the wrist strap and unwrap the first two folds of the band. Wrap the adhesive side firmly around your wrist.
2. Unroll the rest of the band and peel the liner from the copper foil at the opposite end.
3. Attach the copper foil to a convenient and exposed electrical ground.
4. Connect the equipment primary cable ground to the same electrical ground as the wrist strap.
5. Open the equipment enclosure and remove the failed PC board.
6. Carefully open the ESD protective bag and remove the replacement PC Board.
7. Install the replacement PC Board in the equipment and make all necessary connections.
8. Place the failed PC Board in the ESD protective bag and seal for return shipping.
9. Replace the power supply cover.
10. Remove the grounding wrist strap from your wrist and from the electrical ground connection before reconnecting primary power to the equipment.

5.03 Parts Replacement - General Information

The parts replacement procedures described in this manual, except for filter replacement, require that the Power Supply be disassembled. The part to be replaced will determine to what extent the Power Supply must be disassembled.

Before removing any connection mark each wire with the connection designation. When reassembling make sure the wires go to the proper terminals.

Note the routing of wires and make sure the wires are put back in the same place when re-assembling the unit.

Each subsection is referenced to Section 6 for parts lists and overall detailed drawings.



WARNING

Disconnect primary power from the source before opening or disassembling the power supply.

Before disassembling any part of the Power Supply first read the procedure for the part to be replaced, then proceed with the disassembly.

5.04 Major External Parts Replacement

Refer to Section 6.03 for Major External Replacement Parts and overall detailed drawing.

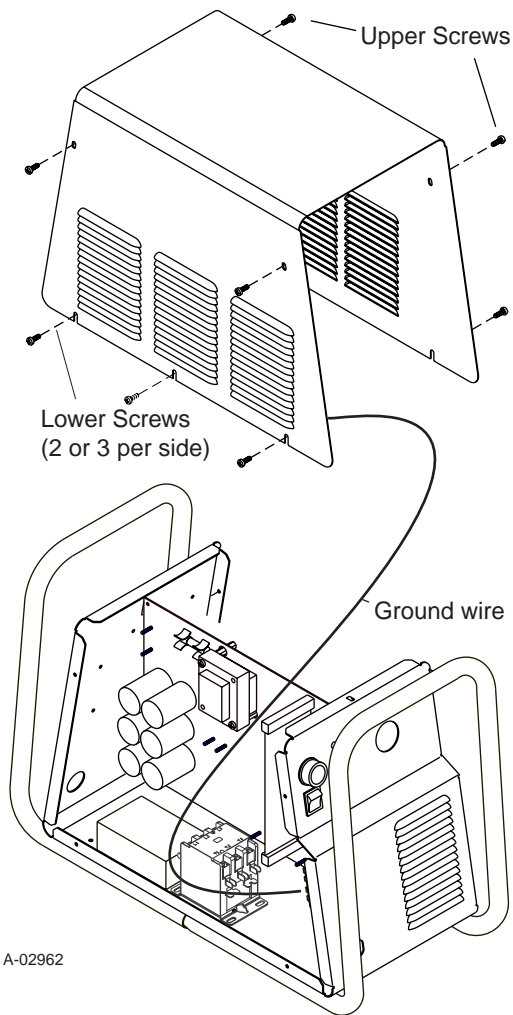


WARNING

Disconnect primary power from the source before opening or disassembling the power supply.

A. Cover Removal and Replacement

1. Remove the upper screws securing the cover to the unit then loosen the lower screws securing the cover to the base.

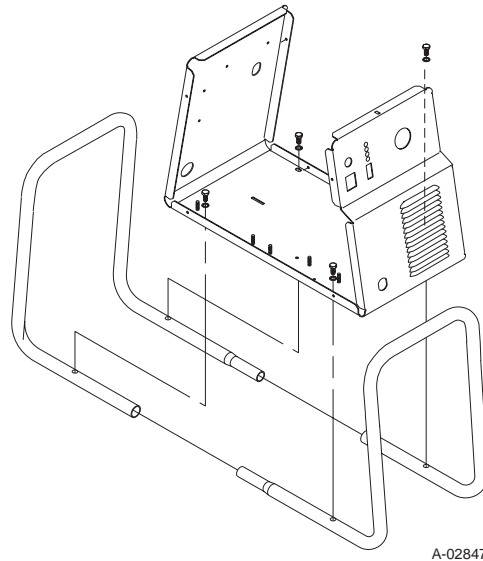


2. Carefully lift the cover up and away from the unit to gain access to the ground wire connection on the inside of the cover (left side near front).

3. Remove the nut and washer from the ground stud on the inside of the cover.
4. Install the replacement cover by reversing steps 1-3.

B. Tube Handle Replacement

1. Remove the cover per subsection 5.04-A.
2. Remove the four bolts and star washers securing the frame to the base of the unit.
3. Move the input power cable, torch leads and work cable inside the handle, then lift the base of the unit away from the Tube Handle.
4. With a rubber mallet, separate the two handle ends as shown below.
5. Install the replacement Tube Handle by reversing steps 1-4.
6. Replace the Power Supply cover.



5.05 Front Panel Parts Replacement

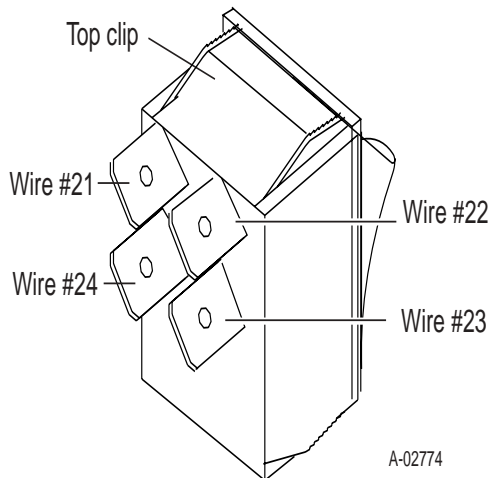
Disconnect primary power from the source before opening or disassembling the power supply. Refer to Section 6.04 for Front Panel Replacement Parts and overall detailed drawing.

A. CURRENT Knob Replacement

1. Turn the CURRENT adjustment fully clockwise and note the location of the pointer on the knob.
2. Loosen the screw securing the Current Knob to the potentiometer shaft and remove the Current Knob.
3. Place the replacement Current Knob on the potentiometer shaft with the location of the pointer the same as noted in step 1.
4. Tighten the screw to secure the knob to the potentiometer shaft.

B. ON/OFF Switch Replacement

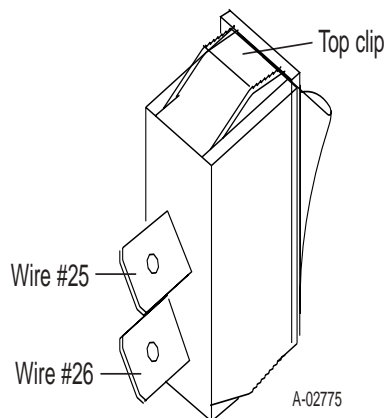
1. Remove the cover per subsection 5.04-A.
2. Disconnect the four wires on the rear of the ON/OFF Switch, noting the location and orientation of each wire, as shown below:



3. Squeeze together the clips on the rear of the ON/OFF Switch, then remove the Switch through the Front Panel.
4. Install the replacement ON/OFF Switch by reversing the above steps.

C. RUN/SET Switch Replacement

1. Remove the cover per subsection 5.04-A.
2. Disconnect the two wires on the rear of the RUN/SET Switch, noting the location and orientation of each wire, as shown:



3. Squeeze together the clips on the rear of the RUN/SET Switch, then remove the switch through the Front Panel.
4. Install the replacement RUN/SET Switch by reversing the above steps.

D. POT/LED PC Board Replacement

Follow the antistatic procedures provided in subsection 5.02.

1. Remove the cover per subsection 5.04-A.
2. Remove Current Knob per procedures in subsection 5.05-A.
3. Disconnect J Connector from POT/LED PC Board.
4. Remove PC Board from standoffs.
5. Install the replacement POT/LED PC Board by reversing the above steps.

E. Work Cable Replacement

1. Remove the cover per subsection 5.04-A.
2. Disconnect the Work Cable from the WORK terminal on the Main Power PC Board, located on the left side of the unit.
3. Squeeze the top and bottom sides of the Work Cable Strain Relief and remove from the Front Panel.
4. Remove Work Cable from the unit. Note that the cable passes through a cylindrical filter secured to the power supply base.
5. Install the replacement Work Cable by reversing the previous steps. Ensure that the replacement Work Cable passes through the cylindrical filter on the power supply base before securing the Cable to the Work terminal on the Main Power PC Board and securing the strain relief.

5.06 Left Side Internal Component Parts Replacement

Refer to subsection 6.05 Left Side Internal Component Replacement Parts and overall detailed drawing.

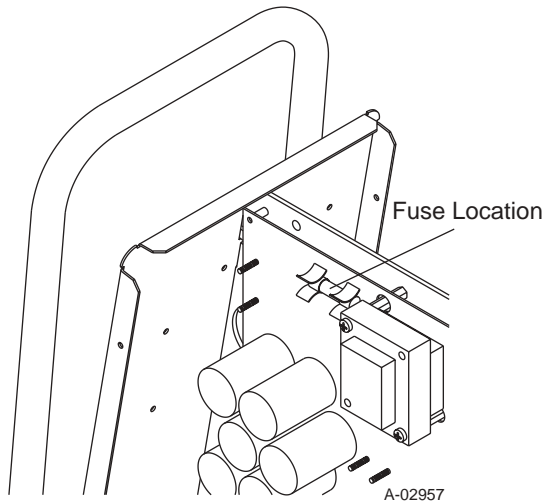


WARNING

Disconnect primary power from the source before opening or disassembling the power supply.

A. Fuse Replacement

1. Remove the cover per subsection 5.04-A.
2. Locate the Fuse near the top edge of the Main Power PC Board and remove the Fuse from the fuse holder.

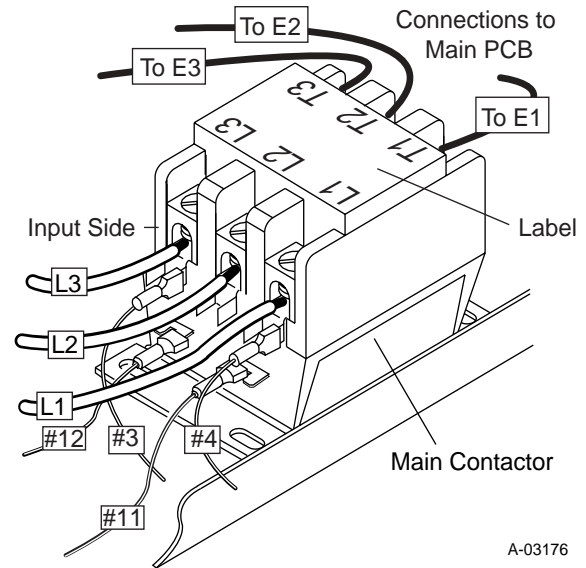


3. Install replacement fuse. See Section 6 for replacement fuse catalog number.
4. Reinstall the cover.

B. Main Input Contactor Replacement

1. Remove the cover per subsection 5.04-A.
2. Label, then disconnect the wires from the EMI filter to the Input Contactor.
3. Label, then disconnect the wires from the Input Contactor to the main PC Board.
4. Disconnect the four small wires on the input side of the Input Contactor.
5. Remove the hardware securing the Input Contactor to the base of the power supply.

6. Fasten the replacement Input Contactor in place, with the label facing outwards.
7. Complete the wiring connections as shown below.



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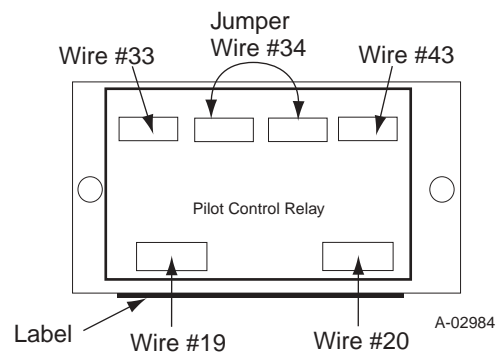
NOTE

It is important that wires are installed correctly, as shown, to prevent damage to the unit.

8. Reinstall the cover.

C. Pilot Relay Assembly (PCR) Replacement

1. Remove the cover per subsection 5.04-A.
2. Carefully remove all wire connections as shown:



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3. Remove the two nuts securing the Mounting Plate to the front panel of the power supply.
4. Remove Relay from Mounting Plate.
5. Install the replacement Relay Assembly by reversing the previous steps. The label on the Pilot Relay should face outwards.

D. Logic PC Board Replacement

Follow the antistatic procedures in subsection 5.02.

1. Remove the cover per subsection 5.04-A.
2. Refer to Section 6.05, Left Side Internal Replacement Parts.
3. Unlock the two tabs on the card guide. Push in the silver part of the tab until the black part pops out on the other side.
4. Gently pull the Logic PC Board from the Main Power PC Board.
5. Install the replacement Logic PC Board by reversing the above steps, keeping in mind the following:
 - The pins on the Logic Board must be fully seated in the J1 connector on the Main PC Board to ensure that the tabs on the card guides close properly.
 - The small pin inside the tab on the card guide must slide through the hole in the PC Board to ensure the PC Board is properly secured.

E. IGBT Circuit Board, Input Diode, or Output Diode Replacement

Follow the antistatic procedures in Subsection 5.02.

1. Remove cover per Subsection 5.04-A.
2. Carefully remove all wire connections to/from the Board being replaced, noting the location of each.
3. Remove hardware securing PCB in place and remove board and its hardware from the power supply.
4. Use isopropyl alcohol to remove any residue of the original thermal pad from the heatsink or center chassis. Do not scratch or abrade the surface.
5. The thermal pad, provided with the replacement part, is a thin metal pad. Remove any loose protective paper coverings from the pad.

For output diodes, cut away one side of the pad, about 1/4" (3 mm) at the widest, to accommodate the thermal switch on the heatsink.

For input diodes, cut away one side of the pad, about 1/4" (3 mm) at the widest, to accommodate the circuit board standoff on the chassis.

6. Apply the thermal pad to the heatsink with a small piece of light-duty tape. Tape must cover no more than 1/8" (3 mm) of the edge of the thermal pad. Use the screw hole in the heatsink or chassis as a guide to position the pad.

7. Clean the large flat surface on the back of the replacement diode with isopropyl alcohol.
8. Put the replacement module in position, and secure with the hardware removed previously. Torque the hardware to 17 inch-pounds (1.9 Nm). Failure to torque properly will cause component damage.
9. Reconnect the wiring per the applicable chart.

From IGBT	To Main PCB
E28 & E29	E13
E30 & E31	E35
E32 & E33	E15
J18	J20
J19	J21

From Output Diode PCB	To Main PCB
E39 & E38	E21
E42 & E43	E19
E36 & E37	E18
E40 & E41	E20

From Input Diode PCB	To Main PCB
E26 & E27	E12
E24 & E25	E11
E44	E1
E23	E2
E22	E3

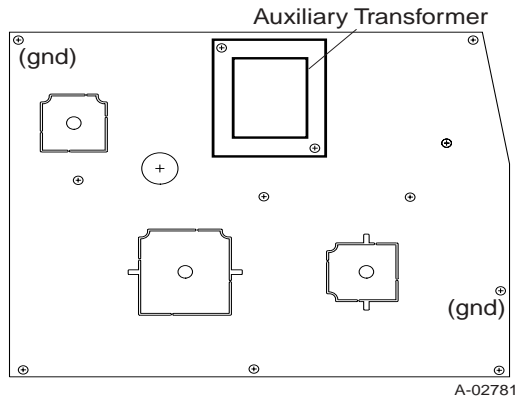
10. Re-connect primary input power, and test the unit per directions in Section 4.
11. When all tests are completed, replace the power supply cover.

F. Main Power PC Board Replacement

Follow the antistatic procedures in subsection 5.02.

1. Remove cover per subsection 5.04-A.
2. Remove the Logic PC Board per subsection 5.06-D.
3. Remove the POT/LED PC Board per subsection 5.05-D.
4. Disconnect all wire and cable connections to the Main PC Board, including the connections from the three smaller PC Boards. These smaller boards remain in place. Refer to the Main PC Board Wiring Diagram in the Appendices if necessary.
5. Remove the two long Transformer screws securing the Transformer to the Center Chassis.

- Remove the other screws securing the PC Board to the Center Chassis. If necessary for more room to maneuver the Main PC Board out of the Power Supply, squeeze the clips on the top and bottom of the ON/OFF panel and push the switch through the front panel.



- Carefully remove the original PC Board from the unit.
- Remove the card guides (for the Logic PC Board) from the original Main PC Board. Attach the card guides to the replacement Main PC Board.
- Install the replacement PC Board by reversing steps above. It may be easier to install the PC Board if the Power Supply is turned on its right side first. See Section 5.06-E for wiring connections to the three smaller boards which mount to the heatsink.

G. EMI Filter Replacement

- Label the input power cable connections and the cable connections to the main input contactor.
- Disconnect all wire and cable connections to the EMI Filter.
- Remove the hardware securing the EMI Filter. This hardware passes upward through the base of the power supply.
- Put the replacement EMI Filter in position and secure it with the hardware removed in Step 3.
- Connect the input power cables and the cable connections to the main input contactor.
- Test the Power Supply for proper operation.

5.07 Rear Panel Parts Replacement

Refer to subsection 6.02 for parts list and overall detailed drawing. Disconnect primary power from the source and bleed down the system before opening or disassembling the power supply.



WARNING

Disconnect the gas supply at the source and bleed down the system before attempting this procedure.

A. Air Regulator/Filter Bracket Replacement

- Disconnect the gas input hose from the input of the Air Regulator/Filter Assembly.
- Remove the nut securing the Air Regulator/Filter to the mounting bracket.
- Remove the four screws securing the Air Regulator/Filter Bracket to the Rear Panel.
- Pull the bracket from the unit.
- Install the replacement Air Regulator/Filter Bracket by reversing the above procedure.

B. Air Regulator/Filter Replacement

- Disconnect the gas input hose from the input of the Air Regulator/Filter Assembly.
- Remove the Cover Panel per Section 5.04-A.
- Disconnect the gas tube connected to the Solenoid Valve Assembly.
- Remove the Air Regulator/Filter Bracket per paragraph 'A' above.
- Pull the Air Regulator/Filter away from the Rear Panel far enough to disconnect the plumbing joint between the reducer and elbow fitting.
- Remove the elbow fitting from the old assembly.
- Install the replacement Air Regulator/Filter Assembly by reversing the above procedure.
 - Apply pipe thread sealant to the fitting before reassembling.

NOTE

For a secure seal, apply thread sealant to the fitting threads, according to manufacturer's instructions. Do Not use Teflon tape as a thread sealer as small particles of the tape may break off and block the small gas passages in the torch.

C. Input Power Cable Replacement

1. Remove the cover per subsection 5.04-A.
2. Locate the EMI filter. Label the filter and ground connections and disconnect the cables from the terminals.
3. Unthread the retaining nut on the Input Cable Strain Relief on the inside of the Rear Panel and remove the Input Power Cable from the unit.
4. Strip back the insulation on the wires.
5. Attach a ring terminal to the end of the ground wire on the replacement cable.
6. Pass the replacement cable through the access hole in the back of the power supply, and fasten with the retaining nut on the strain relief.
7. Attach the ground wire ring terminal to the ground stud on the EMI filter. Fasten with the hardware removed earlier.
8. Attach the remaining wires according to the labeling in step 2.
9. Replace the Power Supply cover.

5.08 Right Side Internal Parts Replacement

Refer to Section 6.07 Right Side Internal Component Parts List and overall detailed drawing.



WARNING

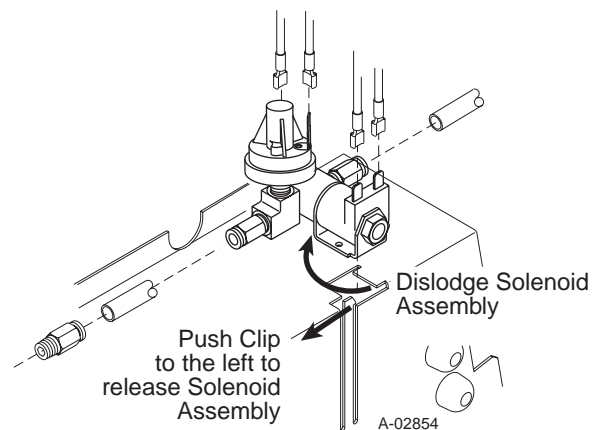
Disconnect primary power from the source before opening or disassembling the power supply.

A. Pressure Switch/Solenoid Assembly Replacement

The Pressure Switch and Solenoid Valve are one Assembly. Disconnect primary input power and bleed down the system.

1. Remove the cover per subsection 5.04-A.
2. Disconnect:
 - Wire #9 and wire #10 from the Pressure Switch Assembly.
 - Wire #7 and wire #8 from the Solenoid Assembly.

3. Use a tool (screwdriver, etc.) to push the clip on the front of the Fan Shroud to the left to release the Solenoid Assembly, then remove the Solenoid from underneath the clip on the top of the Fan Shroud.
4. Release the hose from the Adapter Fitting on the input side of the Solenoid Assembly. To do this, hold a wrench or similar tool against the locking ring on the Fitting, then pull on the hose to release it.
5. Release the hose from the Adapter Fitting on the output side of the Pressure Switch.



6. Install the replacement Pressure Switch/Solenoid Assembly by reversing steps 2-5. Once installed, the Solenoid Assembly should fit securely under the Fan Shroud and should not be moveable.
7. Replace the Power Supply cover.

B. CD PC Board Assembly Replacement

Follow the antistatic procedures in subsection 5.02.

1. Remove the cover per subsection 5.04-A.
2. Disconnect the following wiring connections to the CD PC Board Assembly, noting the location of each connection:
 - J28 Connector
 - Wire #E1
 - Wire #E2
3. Remove the screws securing the PC Board to the standoffs.
4. Install the replacement CD PC Board Assembly by reversing steps 2-3.
5. Replace the Power Supply cover.

C. Fan Replacement (M1)

1. Remove the cover per subsection 5.04-A.
2. Remove the two screws securing the Fan to the Fan Shroud and let the Fan drop down.
3. Turn the Fan slightly and slide the Fan out, left side first.
4. Carefully remove the two wiring connectors from the terminals on the Fan Assembly.
5. Install the replacement Fan Assembly as follows:
 - a. Position Fan with the label facing inward and the Fan terminals facing bottom right.
 - b. Connect the two wire connectors to the two Fan terminals (order unimportant).
 - c. Slide the right end of the Fan in through the Shroud first, then the left.

NOTE

Only two screws are needed to attach the Fan to the Shroud and they can be installed in any two holes provided they are opposite each other. For grounding purposes, one of those screws must be installed with a star washer.

- d. Line up the Fan holes with the screw holes in the Fan Shroud then attach the Fan by installing two screws in opposite corners.

D. Main Transformer Replacement (T5)

The Main Transformer is located behind the Fan Shroud. To provide access to the Main Transformer, the Bulkhead and Solenoid/Pressure Switch Assembly need to be disengaged and the Fan and Fan Shroud need to be removed.

1. Remove the cover per subsection 5.04-A.
2. Release the tab on the Fan Shroud that secures the Bulkhead in position. Pull the Bulkhead upwards so the Bulkhead tabs are released from the slots on the Center Chassis.
3. Release the tabs on the side and top of the Fan Shroud securing the Solenoid/Pressure Switch Assembly in position, enabling the Assembly to move freely.
4. Remove the gas hose from the Solenoid Fitting by pressing on the locking ring while pulling on the hose.
5. Remove Fan per instructions in subsection 5.08-C. The Fan Shroud cannot be tilted up until the Fan wires are disconnected from the Fan. Removing the Fan also provides better access to the Main Transformer for reinstallation.

6. Remove the nuts securing the Fan Shroud to the Center Chassis.
7. On the left side of the unit (when viewed from the front of unit), locate the two tabs below the Main PC Board securing the Fan Shroud to the Center Chassis. Use a screwdriver to push down on these tabs to release the Shroud.
8. Disconnect the following cables on the Main Power PCB. See Appendix 10.
 - Cable #3 to E35 Connector
 - Cable #4 to E4 Connector
 - Cable #8 to E8 Connector
 - Cable #9 to E9 Connector
9. Disconnect wires E1 & E2 from the CD PC Board. See Appendix 5.
10. Tilt the Fan Shroud up from the bottom to expose the Main Transformer and disconnect J1 Connector on the Coil Winding PC Board.
11. Remove the Transformer from the unit, carefully unthreading all the connected cables and wires as you do so.
12. Turn unit onto its left side.
13. Position the replacement Transformer with the PC Board facing out from the unit, the cables oriented to the right side, and the four Transformer Rubber Feet well seated in the four holes in the Center Chassis.
14. Thread the Transformer wires/cables as follows:
 - White Transformer Cable - thread through bottom hole in Center Chassis.
 - Black Transformer Cable - thread through hole in Top of Fan Shroud, then through hole in Center Chassis below CD Board.
 - Blue Fan Wires - thread through same hole in Fan Shroud as Black Cable, then through hole at right side of Center Chassis.
15. Secure the Main Transformer in position by locking the two tabs on the bottom of the Shroud into the Center Chassis. Start with the left side first, lock it in position, then repeat with the right side.
16. Install the two nuts and washers securing the Shroud to the Center Chassis.
17. Connect J1 Connector to the Coil Winding Assembly PCB on the Main Transformer.
18. Reinstall the Bulkhead.

19. Re-install the Pressure Switch/Solenoid Assembly.
20. Re-install the fan per Section 5.08-C and reconnect the wiring.
21. Reconnect the cables removed in step 8.
22. Reconnect wires E1 and E2 to the CD PC board.
23. Install the Power Supply Cover per subsection 5.04-A.

E. Output Inductor Assembly Replacement (L1)

1. Remove the cover per subsection 5.04-A.
2. Disconnect the two terminal wires connected to E5 and E10 located on the right side of the Main Power PC Board and pull through the bottom hole in the Center Chassis.
3. Disconnect the harness connected to J23 on the Main PC Board, removing tie wraps as necessary.
4. Remove the front mounting screw securing the Output Inductor Assembly to the unit base.
5. Pop grommet out in Fan Shroud to provide better access to the Output Inductor Assembly rear mounting screw.
6. Insert a magnetic socket with a long extension through the hole in the Fan Shroud directly above the Output Inductor Assembly rear screw, and remove nut. Use tape on the socket if the socket is not magnetic.
7. Install the replacement Output Inductor Assembly by reversing the above steps, keeping in mind the following:
 - The Output Inductor wires should be oriented towards the front of the unit.
 - If a magnetic socket is unavailable, use a piece of tape instead. This will help prevent the nut from falling out of the socket when reinstalling the nut.
8. Re-install the cover.

F. CD Transformer Replacement

1. Locate the CD PC Board Assembly and disconnect wires E1 and E2. See Appendix 5.
2. Disconnect the black CD Transformer wire from Connector E10 on the Main Power PC Board and disconnect red pilot return wire #32 from E6 on the Main PC Board. Reroute both back through the Center Chassis and Bulkhead. See Appendix 10.

3. Disconnect the gas tube from the Bulkhead Adapter Fitting by pressing against the ring of the fitting while gently pulling on the tube.
4. Remove the large brass jam nut securing the large terminal ring to the Bulkhead Adapter Fitting, then remove the terminal ring.
5. Remove the two long screws securing the CD Transformer Assembly to the Fan Shroud, and set the Assembly aside.



WARNING

The Ferrite U Cores are very brittle and can easily be damaged if not handled properly.

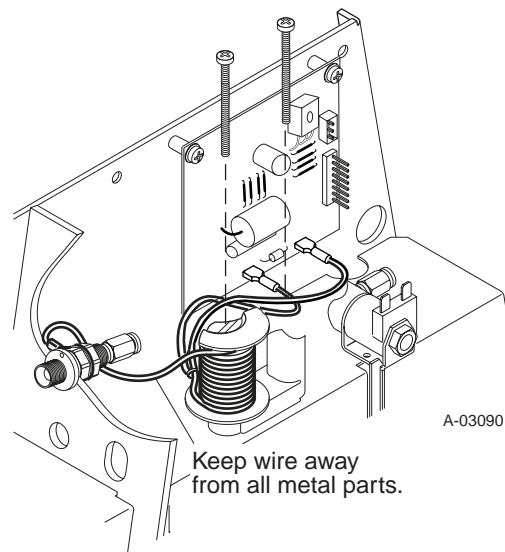
6. Install the replacement CD Transformer as follows:
 - Place the CD Transformer Assembly in the correct orientation and install it on the Fan Shroud using the two long screws.



WARNING

DO NOT allow the CD Transformer wires to touch anything metal.

- Attach the brass terminal ring to the Bulkhead Adapter Fitting with the brass jam nut, making sure the wires are not touching anything metal. Refer to the following illustration:



- Reinstall the short gas hose in the Adapter Fitting.
- Connect wires E1 & E2 to the CD PC Board.
- Twist the pilot return wire #32 and the black CD Transformer wire together 6-8 times then feed both through the Bulkhead and through the bottom hole in the center Chassis.
- Reconnect pilot return wire to E6 on the Main Power PC Board and black CD Transformer wire to E10 on the Main Power PC Board.

This concludes the replacement procedures.

SECTION 6: PARTS LISTS

6.01 Introduction

A. Parts List Breakdown

The parts lists provide a breakdown of all replaceable components. The parts lists are arranged as follows:

Section 6.03 Major External Replacement Parts

Section 6.04 Front Panel Replacement Parts

Section 6.05 Left Side Internal Replacement Parts

Section 6.06 Rear Panel Replacement Parts

Section 6.07 Right Side Internal Replacement Parts

Section 6.08 Options and Accessories

NOTE

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

B. Returns

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

6.02 Ordering Information

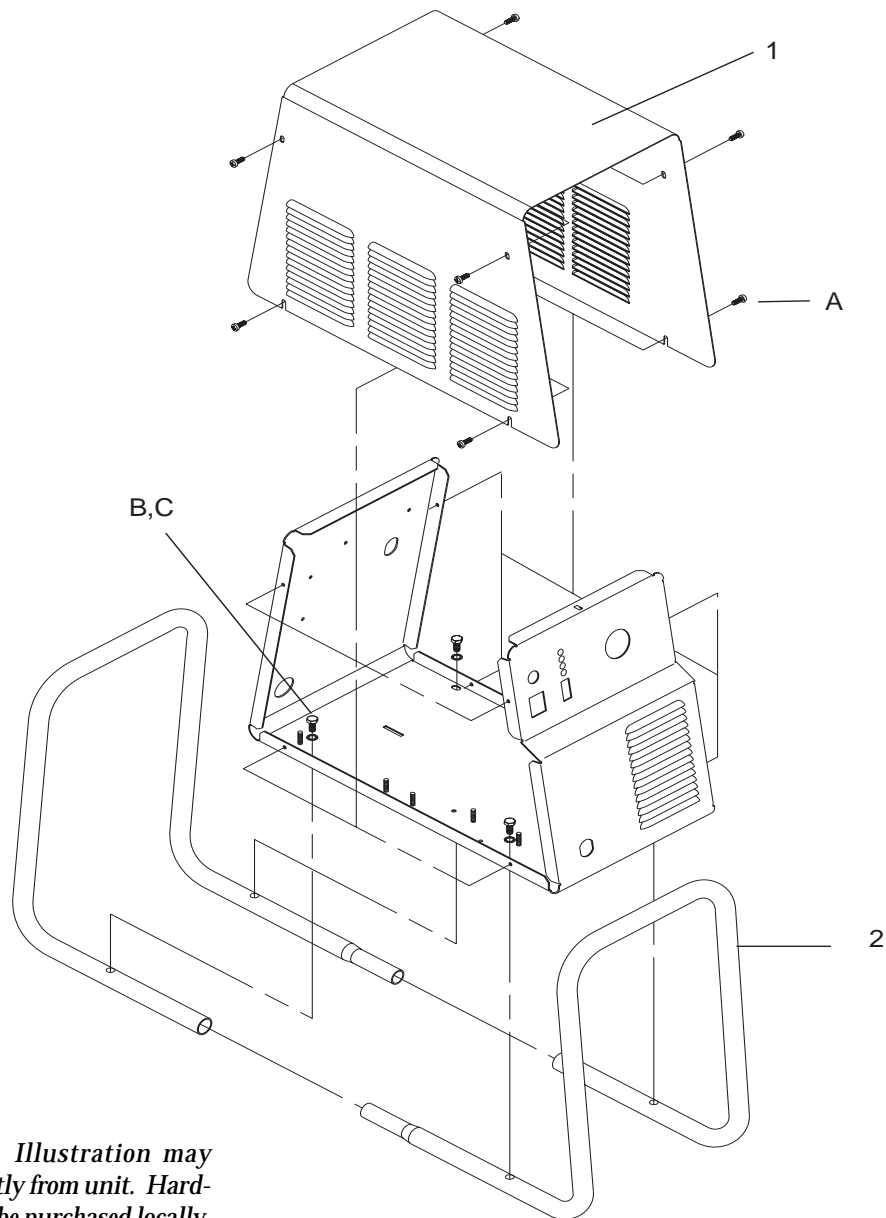
Order replacement parts by catalog number and complete description of the part or assembly, as listed in the parts list for each type item. Also include the model and serial number of the torch. Address all inquiries to your authorized distributor.

6.03 Major External Replacement Parts

Item #	Qty	Description	Catalog #
1	1	Cover with labels	9-8535
2	1	Tube, roll handle	9-8520

HARDWARE:

A	8	Screw, 10-32 x 1/2 PPH Swageform	See Note
C	4	Washer, 1/4 External Star	See Note
D	4	Screw, 1/4-20 x 5/8 Hex	See Note

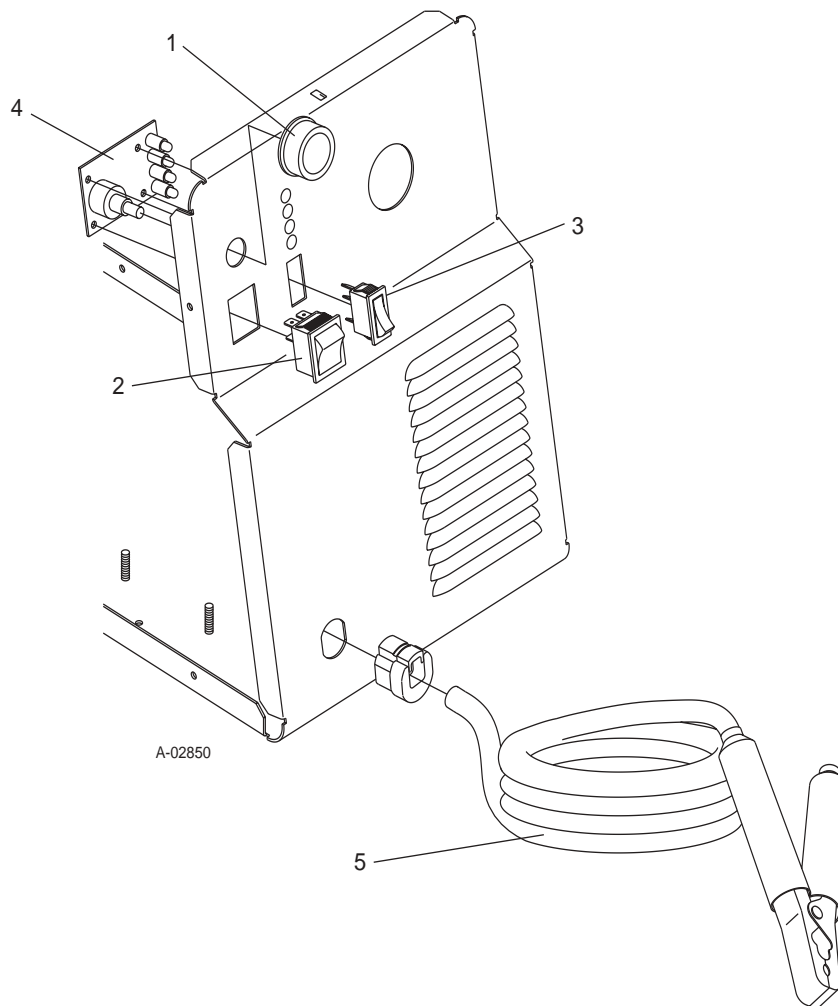


NOTES: *Illustration may vary slightly from unit. Hardware may be purchased locally.*

A-02819

6.04 Front Panel Replacement Parts

Item#	Qty	Description	Ref	Catalog #
1	1	Knob, Fluted, Skirted, 0,250 I.D.		9-8527
2	1	On/Off Rocker Switch, DPST	On/Off	8-3258
3	1	Run/Set Switch, Rocker, SPST, Center Off	Run/Set	9-1042
4	1	Assembly, Pot/LED PCB		9-8004
5	1	Cable, Work, #6 AWG with Clamp, 20 Ft (6.1 m)		9-8528



NOTE: Illustration may vary slightly from unit.

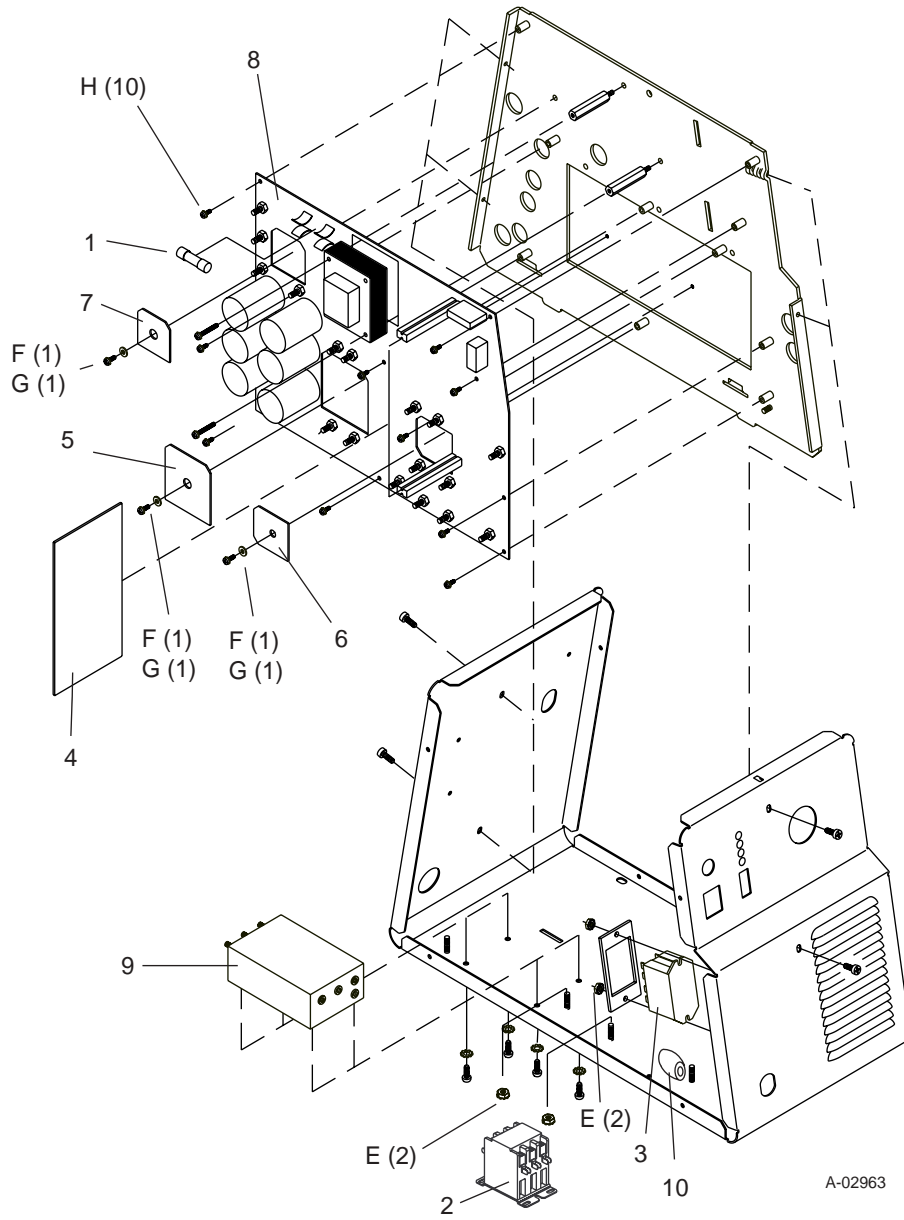
6.05 Left Side Internal Replacement Parts

Item #	Qty	Description	Ref	Catalog #
1	1	Fuse, 1/2A, 600V		9-8110
2	1	Main Input Contactor	W1	9-8554
3	1	PCR Pilot Relay	PCR	9-7508
4	1	PCB Assembly, Logic		9-8536
5	1	PCB Assembly, IGBT Circuit		9-8540
6	1	PCB Assembly, Output Diode		9-8539
7	1	PCB Assembly, Input Diode		9-8551
8	1	PCB Assembly, Main Power		9-8550
9	1	EMI Filter Assembly		9-8561
10	1	Toroid filter (shown for assembly purposes only)		

HARDWARE:

E	4	Hex nut	See Note
F	3	Screw, 8-32 x 3/4 PPH, with external-tooth star washer	See Note
G	3	Washer, .125 ID, zinc	See Note
H	10	Screw, 6-32 x 3/8 PPH	See Note

NOTE: Hardware may be purchased locally.

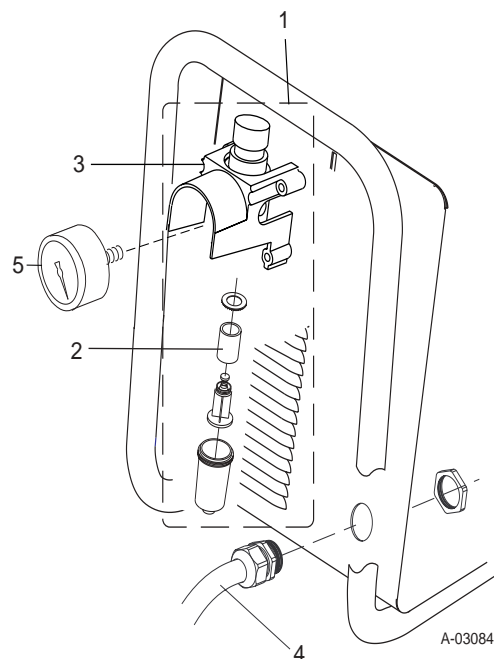


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NOTE: Illustration may vary slightly from unit.

6.06 Rear Panel Replacement Parts

Item #	Qty	Description	Ref	Catalog #
1	1	Assembly, Filter/Regulator		9-7514
2	1	Regulator/Filter Replacement Element		9-4414
3	1	Regulator Mounting Bracket		9-7589
4	1	Input Power Cable		9-8553
5	1	Pressure Gauge		9-1045



NOTE: Illustration may vary slightly from unit.

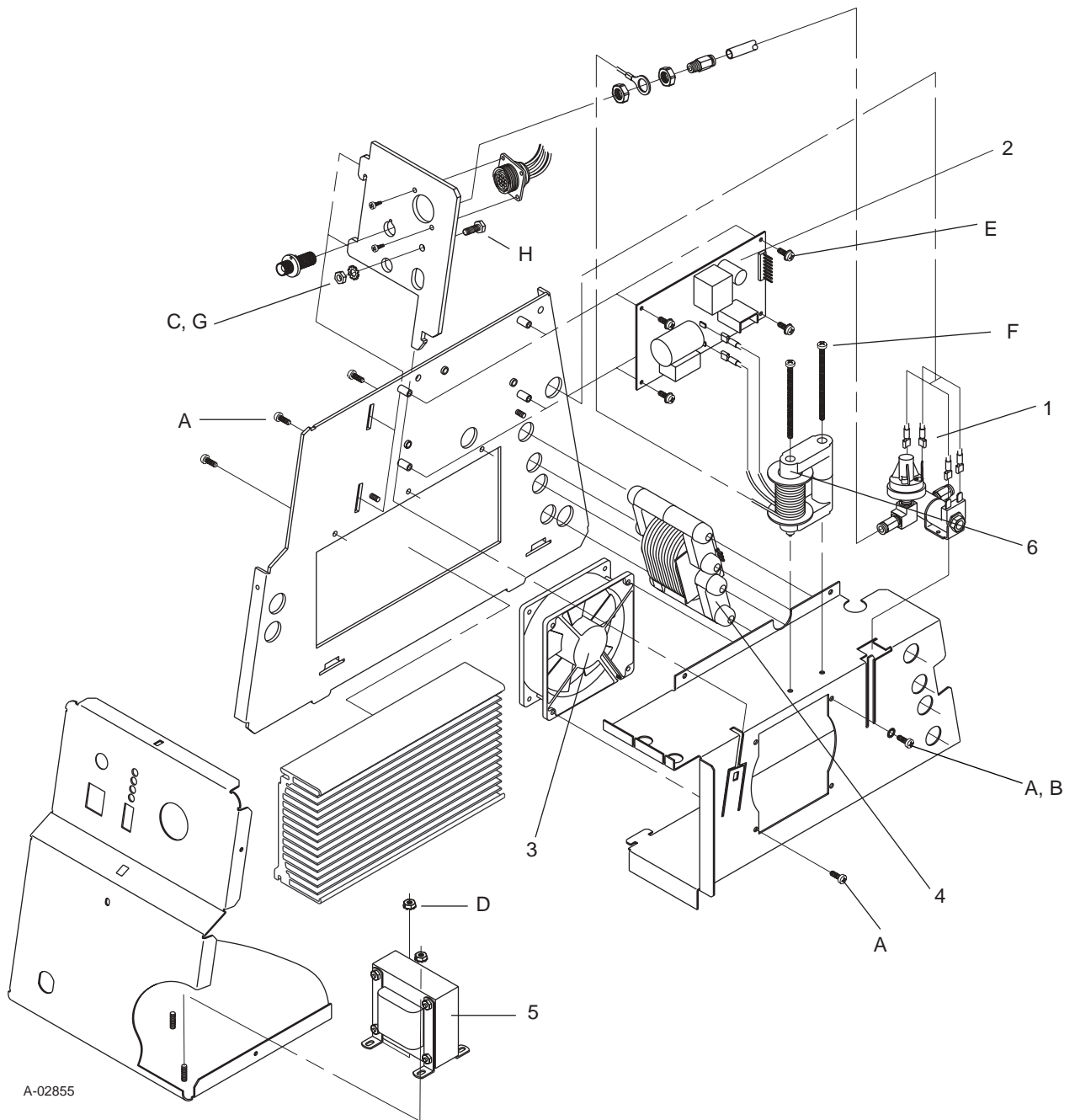
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6.07 Right Side Internal Replacement Parts

Item #	Qty	Description	Ref	Catalog #
1	1	Assembly, Pressure Switch/Solenoid	SOL1, PS1	9-8563
2	1	Assembly, CD PCB		9-8552
3	1	Fan, 220V, 115 CFM		9-7687
4	1	Assembly, Main Transformer	T5	9-8564
5	1	Assembly, Output Inductor	L1	9-8560
6	1	Coil, CD Transformer, Secondary	T1	9-8543

HARDWARE:

A	5	10-32 x 1/2 pph screw		See Note
B	1	#10 External star washer		See Note
C	1	1/4-20 nut, brass		See Note
E	3	10-32 Kepnut w/ star washer		See Note
H	4	6-32 x 3/8" pph screw		See Note
I	2	6/32 x 3-1/2" pph screw		See Note
J	1	1/4" External star washer		See Note
K	1	1/4-20 X 1" hex bolt, brass		See Note



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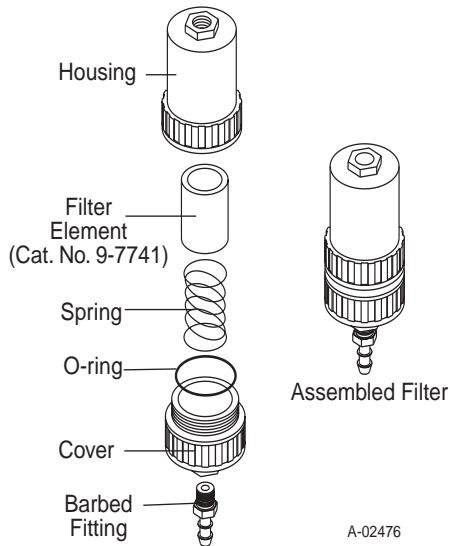
NOTES: *Illustration may vary slightly from unit. Hardware may be purchased locally.*

6.08 Options and Accessories

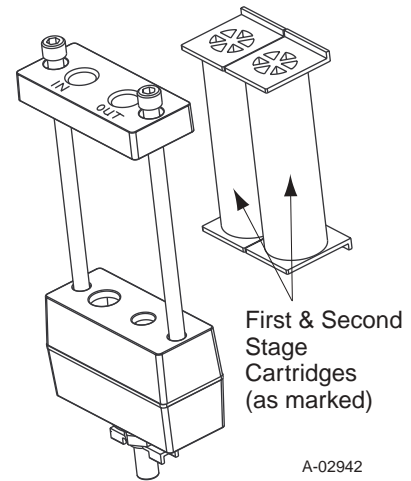
Qty	Description	Catalog #
1	Single-Stage Filter Kit (includes Filter and Hose)	7-7507
1	Replacement Filter Body	9-7740
1	Replacement Filter Element	9-7741
1	Replacement Filter Hose (Not Shown)	9-7742
1	Two Stage Air Line Filter Kit (Includes Hose & Mounting Screws)	7-7500
1	Bracket, Filter Mounting (Not Shown)	9-7535
1	Two Stage Air Filter Assembly	9-7527
1	Replacement First Stage Cartridge	9-1021
1	Replacement Second Stage Cartridge	9-1022
1	Wheel Kit	9-8510

Not Shown:

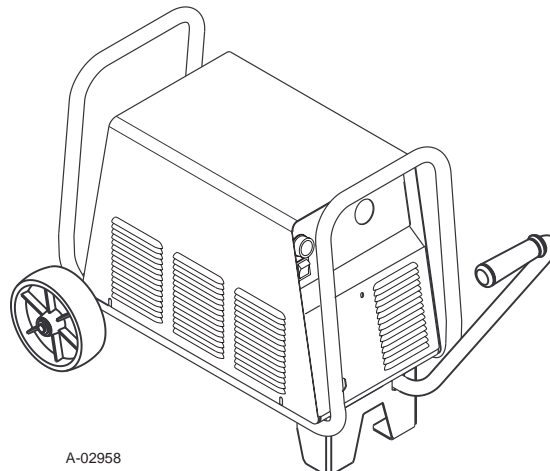
1	Extended Work Cable - 50 ft (15.2 m)	9-8529
1	Hand Pendant Control With 25 ft (7.6 m) Cable	7-3114
1	Hand Pendant Control Cable Extension - 25 ft (7.6 m)	7-7744
1	Multi-Purpose Cart	7-8888



Single-Stage Filter Kit



Two-Stage Air Filter Kit



Wheel Kit, Installed

APPENDIX 1: INPUT WIRING REQUIREMENTS

Input		Power Input	Current Input	Suggested Sizes (See Notes)	
Voltage	Frequency	3-Ph	3-Ph	Fuse (Amps)	Wire (mm ²)
(Volts)	(Hz)	(kVA)	(Amps)	3-Ph	3-Ph
400	50/60	7.9	11.5	15	4
Line Voltages with Suggested Circuit Protection and Wire Sizes Based on National Electric Code and Canadian Electric Code					

NOTES

Refer to Local and National Codes or local authority having jurisdiction for proper wiring requirements.

Cable size is de-rated based on the Duty Cycle of the equipment.

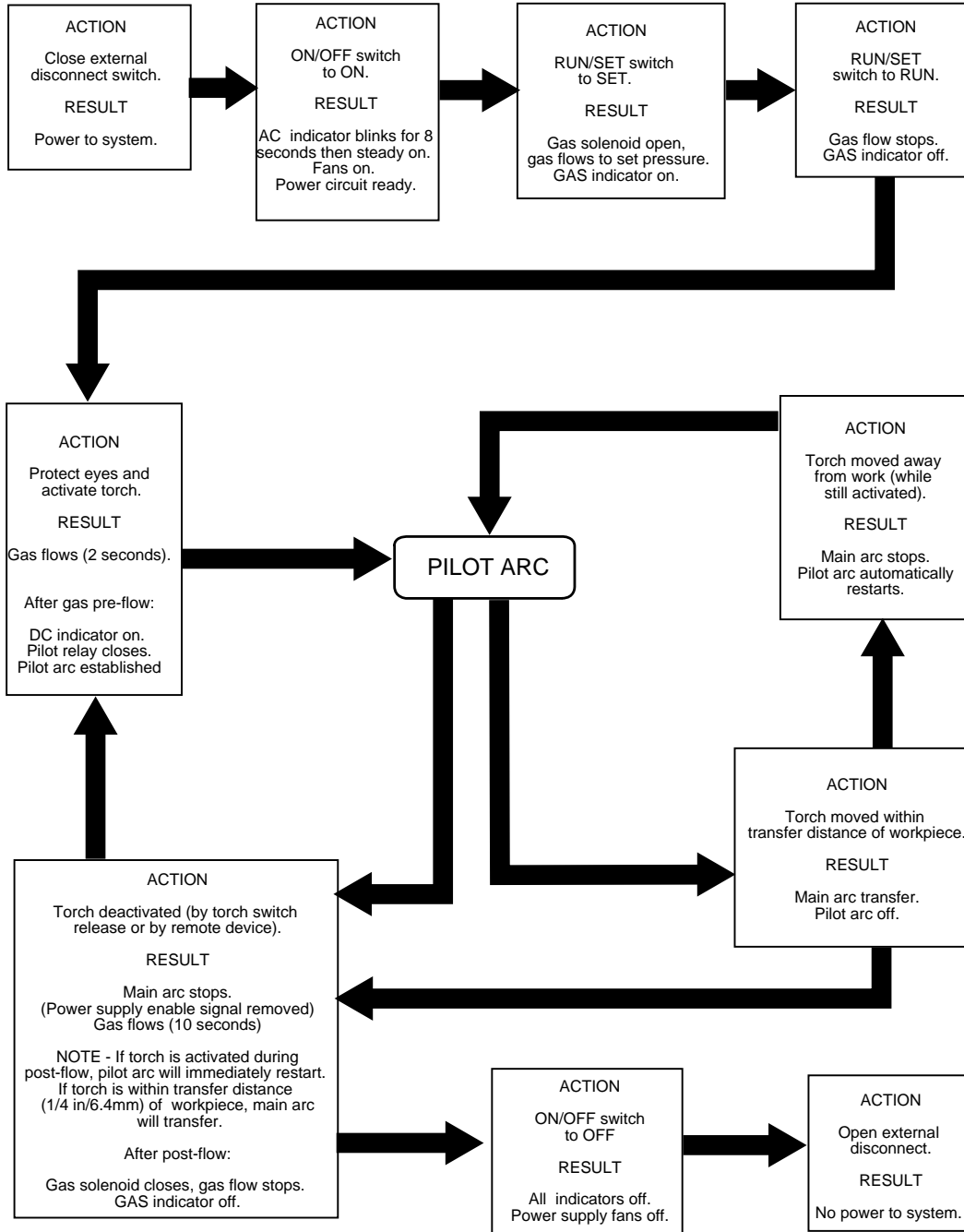
The suggested sizes are based on flexible power cable with power plug installations. For hard-wired installations refer to local or national codes.

Cable conductor temperature used is 167° F (75° C).

An energy limiting fuse UL Class RK-1 (examples: BUSS LPS/LPN-RK or Gould-Shawmut AZK-A6K) should be used to minimize damage to Plasma Cutting, Welding or power distribution equipment.

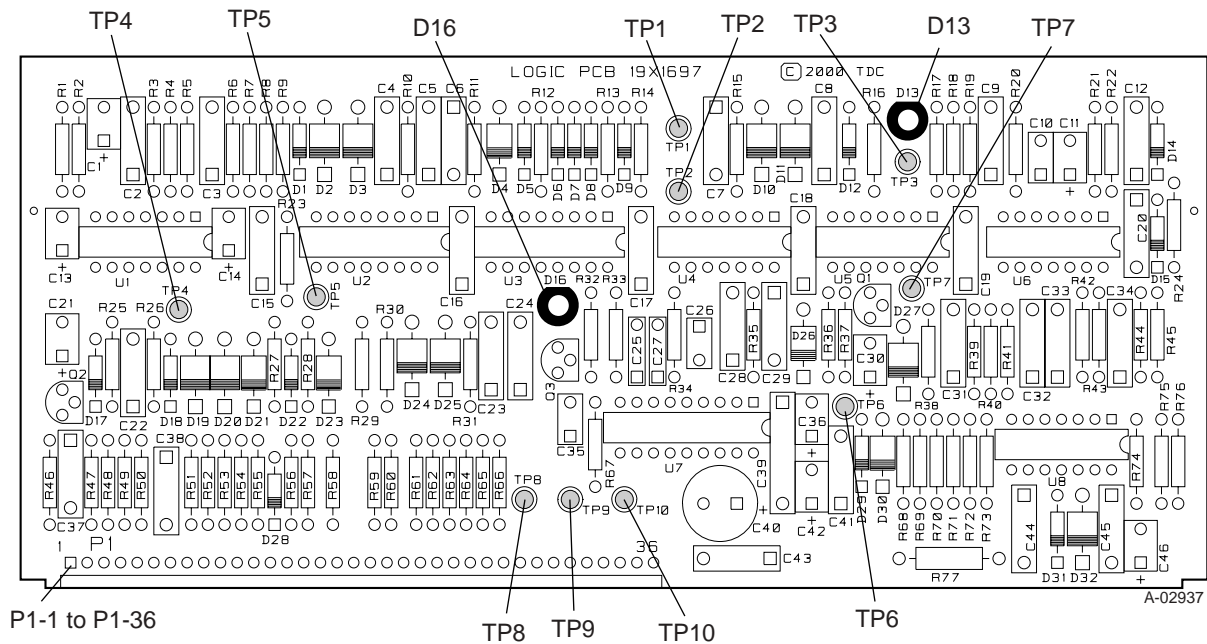
NEVER use replaceable element fuses like UL Class H, or "one-time" fuses like UL Class K5.

APPENDIX 2: SEQUENCE OF OPERATION (BLOCK DIAGRAM)



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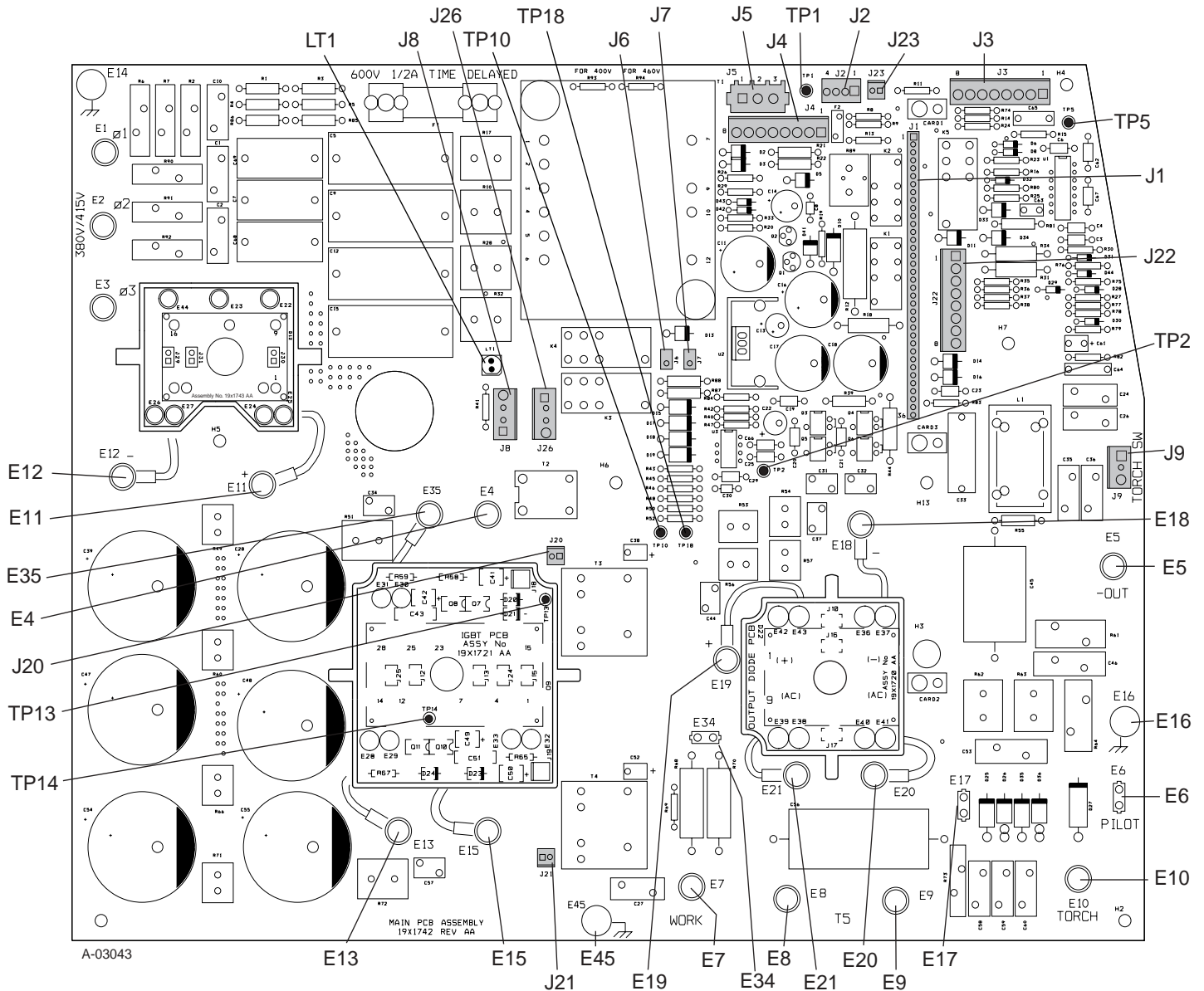
APPENDIX 3: LOGIC PC BOARD LAYOUT



Logic Board Signals

P1-1	+12vdc from Main Power PCB	P1-26	Gate Drive B Rtn
P1-2	+12vdc from Main PCB	P1-27	Gate Drive B Signal
P1-3	gnd	P1-28	Gate Drive A Rtn
P1-4	gnd	P1-29	Gate Drive A Signal
P1-5	Logic Low= W1 ON signal	P1-30	(-) Output Signal
P1-6	not used	P1-31	Current Sense Signal
P1-7	RUN/SET Signal Logic Low for SET	P1-32	Current Sense Signal
P1-8	Logic Low= PS1 Pressure Switch closed= Pressure OK	P1-33	Current Sense Return
P1-9	Logic Low= TS1 Closed=OVERTEMP	P1-34	Current Sense Return
P1-10	Logic Low= Inrush done signal	P1-35	Ground
P1-11	Logic Low= signal CD enable	P1-36	Ground
P1-12	Logic Low= signal CD enable	TP1	Logic GND
P1-13	Not Used	TP2	CSR Signal (Logic Low= CSR)
P1-14	Logic Low = Gas ON signal to Main PCB	TP3	DC OK Signal (jumper to TP1 to override)
P1-15	Logic Low= CSR signal from Main PCB	TP4	PWM Fault Shutdown (Logic Low=fault)
P1-16	Logic Low =Pilot ON signal to Main PCB	TP5	Fault Signal (from torch sw, overtemp, gas pressure)
P1-17	Logic Low= DC OK signal to Main PCB	TP6	Demand Signal
P1-18	Logic Low = OV TEMP signal from Main PCB	TP7	Gate Drive B Signal
P1-19	Logic Low= AC OK signal	TP8	Gate Drive Return
P1-20	Rtn for torch switch	TP9	Gate Drive A Signal
P1-21	Logic Low= torch switch signal	TP10	(-) Output Signal
P1-22	+12 vdc	D13	Inverter ON Indicator
P1-23	To Current Control Pot	D16	CD Enable ON Indicator
P1-24	Current Control		
P1-25	Current Control Return		

APPENDIX 4: MAIN POWER PC BOARD LAYOUT

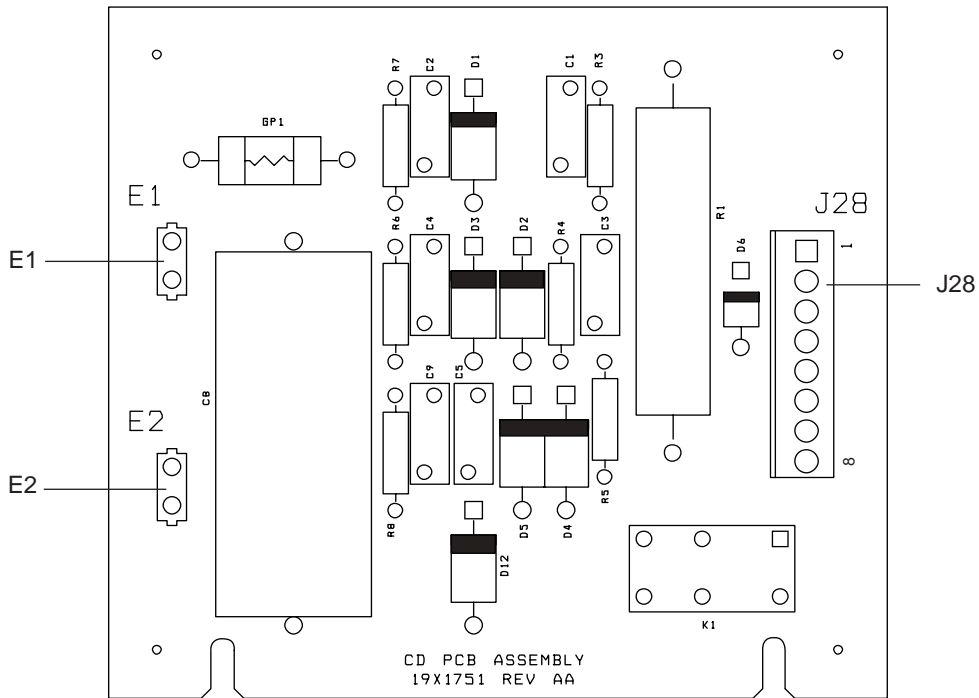


Main Power PC Board Signals

J1-1	+12vdc to Logic PCB	J1-16	Logic Low= Pilot on Signal from Logic PCB
J1-2	+12vdc to Logic PCB	J1-17	Logic Low= DC OK Signal from Logic PCB
J1-3	GND	J1-18	Logic Low= OV TEMP signal from Main Power PCB
J1-4	GND	J1-19	Logic Low= AC OK signal from Logic PCB
J1-5	Logic Low=- W1 on Signal	J1-20	Rtn for torch switch
J1-6	not used	J1-21	Logic Low= torch switch signal to Logic PCB
J1-7	RUN/SET Signal Logic Low for SET	J1-22	+12 vdc to Logic PCB
J1-8	Logic Low = PS1 Closed=Pressure OK to Logic PCB	J1-23	To Current Control Pot from Logic PCB
J1-9	Logic Low = TS1 (or TS2) Closed=Overtemp	J1-24	Current Control to Logic PCB
J1-10	Logic Low= Inrush done signal to Logic PCB	J1-25	Current Control Return from Logic PCB
J1-11	Logic Low =Signal CD enable to Logic PCB	J1-26	Gate Drive B Return from Logic PCB
J1-12	Logic Low= Signal CD enable to Logic PCB	J1-27	Gate Drive B Return from Logic PCB
J1-13	Not Used	J1-28	Gate Drive A Return from Logic PCB
J1-14	Logic Low= Gas on Signal from Logic PCB	J1-29	Gate Drive A Return from Logic PCB
J1-15	Logic Low =CSR Signal to Logic PCB	J1-30	Not used.

J1-30	Out Signal to Logic PCB.	TP1	Logic Gnd
J1-31	Current Sense Signal to Logic PCB	TP2	Not Used
J1-32	Current Sense Signal to Logic PCB	TP5	+12vdc
J1-33	Current Sense Return	TP10	Current Sense Signal Rtn
J1-34	Current Sense Return	TP18	Current Sense Signal
J1-35	GND		
J1-36	GND	LT1	Power ON Indicator (indicates power is present on the line side of the Input Contactor)
J2-1	Overtemp Signal from TS1 mounted on Heatsink		
J2-2	Overtemp Return		
J2-3	Overtemp signal if J2 unplugged		
J2-4	Ground		
J3-1	Pilot ON Signal Logic Low for Pilot ON		
J3-2	+18 vdc to PCR Pilot Relay		
J3-3	28VAC B from Auxilliary Transformer to On/OFF Switch		
J3-4	28VAC A from Auxilliary Transformer to ON/OFF Switch		
J3-5	28VAC A from ON/OFF Switch to Main PC Board		
J3-6	28VAC B from ON/OFF Switch to Main PC Board		
J3-7	RUN/SET Signal Logic Low Logic Low=SET Mode		
J3-8	RUN/SET Rtn		
J4-1	28VAC A to Gas Solenoid		
J4-2	28VAC B to Gas Solenoid		
J4-3	Pressure Sw Signal Logic Low		
J4-4	Pressure Sw Signal Rtn Low		
J4-5	28VAC Main Contactor W1		
J4-6	28VAC to Main Contactor W1		
J4-7	+12vdc to CD PC Board		
J4-8	Logic Low=CD Enable Signal Logic Low		
J5-1	28VAC A - for test and CD Board power		
J5-2	28VAC Rtn - for test and CD Board power		
J5-3	28VAC B for test and CD Board power		
J8-1	400VAC to Primary of Aux Transformer		
J8-4	400VAC to Primary of Aux Transformer		
J9-1	Torch Switch Return		
J9-3	Coming from Torch Switch Logic Low Signal		
J23-1	Overtemp Signal from TS2 mounted in Output Inductor		
J23-2	Overtemp Return		
J26-1	From Auxillary Transformer to Fan Power		
J26-4	From Auxillary Transformer to Fan Power		
J27-1	28VAC A from J5-1		
J27-2	28VAC Return from J5-2		
J27-3	28VAC B from J5-3		
J28-1	from E8 OCV		
J28-4	from E9		

APPENDIX 5: CD PC BOARD LAYOUT



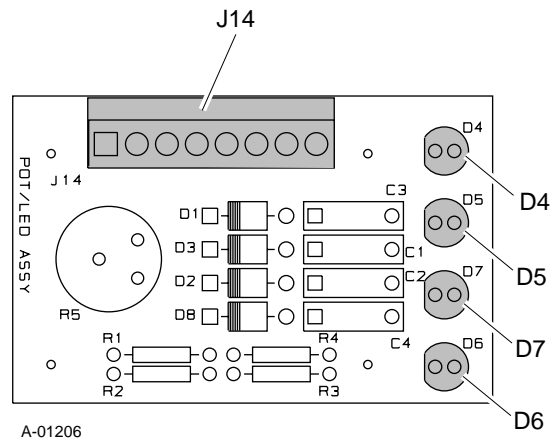
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CD PC Board Signals

- J28-1 +12 vdc from Main Power PC Board
- J28-2 CD Enable Logic Low from Logic PC Board
- J28-3 Not Used
- J28-4 Not Used
- J28-5 Approx 36VAC from Main Switching Transformer
- J28-6 Not Used
- J28-7 Not Used
- J28-8 Approx 36VAC from Main Switching Transformer

- E1 CD Output
- E2 CD Output

APPENDIX 6: LED/POT PC BOARD LAYOUT

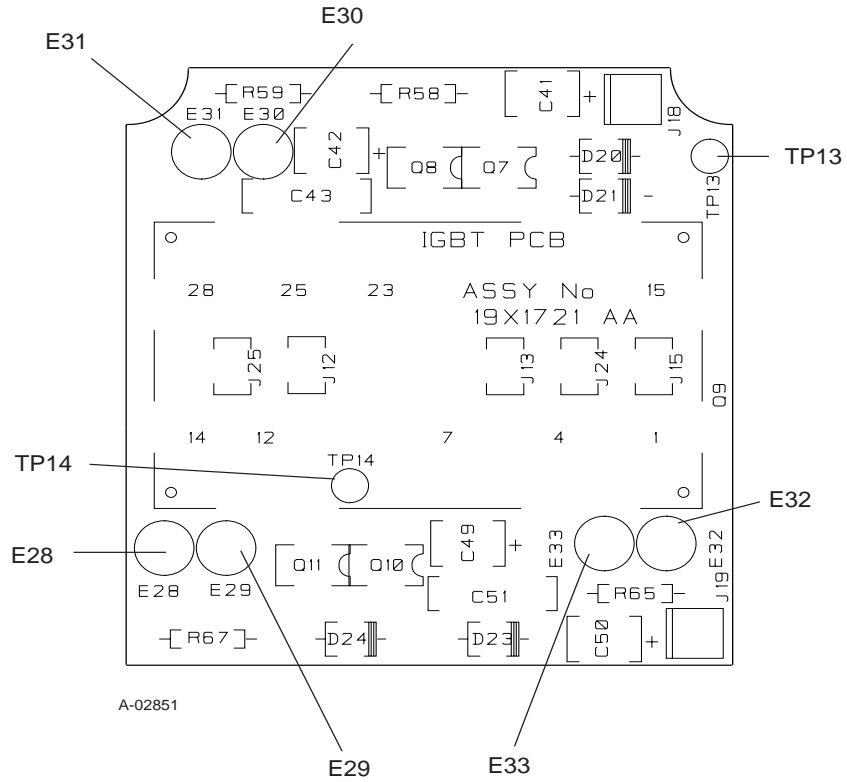


Pot/LED PC Board Signals

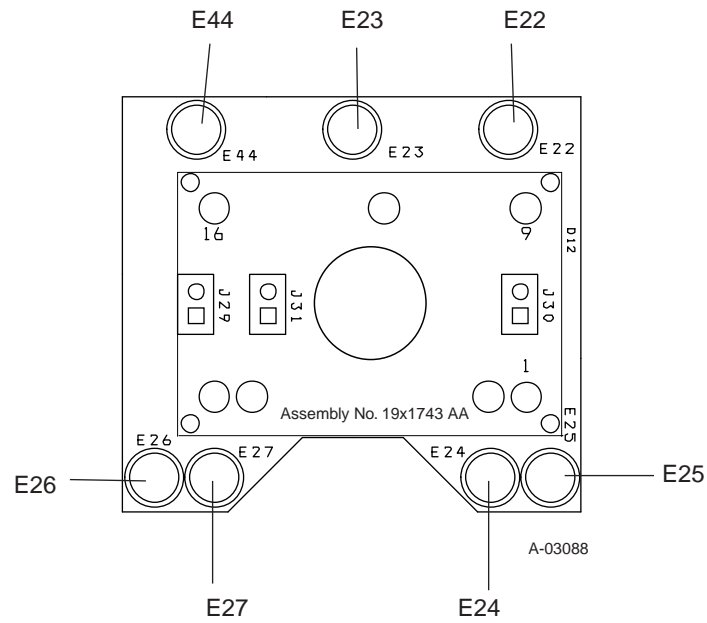
- J14-1 +4 vdc from Logic PC Board (J22-1) Pot High
- J14-2 Current Control to Logic PC Board (J22-2) Pot Wiper
- J14-3 Return for Current Control from Logic PC Board (J22-3) Pot Low
- J14-4 12vdc (J22-4)
- J14-5 Logic Low Signal for AC OK Indicator from Logic PC Board (J22-5)
- J14-6 Logic Low Signal for GAS Indicator from Logic PC Board (J22-6)
- J14-7 Logic Low Signal for TEMP Indicator from Logic PC Board (J22-7)
- J14-8 Logic Low Signal for DC Indicator from Logic PC Board (J22-8)

- D4 Front Panel AC Indicator
- D5 Front Panel TEMP Indicator
- D6 Front Panel DC Indicator
- D7 Front Panel GAS Indicator

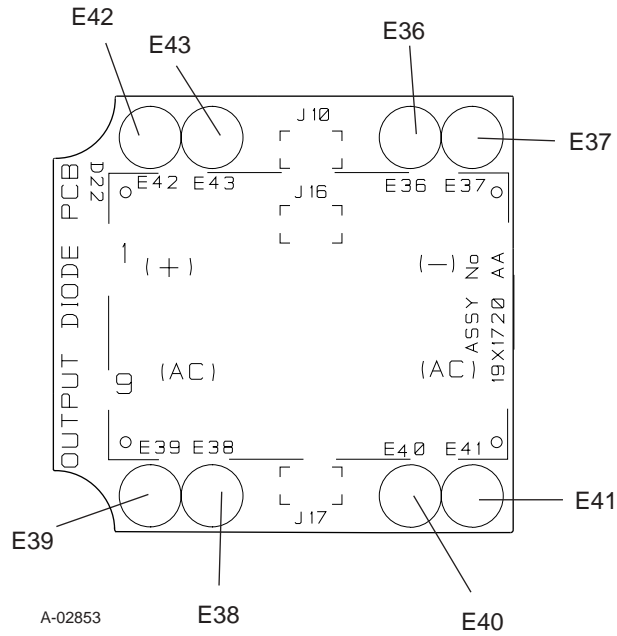
APPENDIX 7: IGBT CIRCUIT PC BOARD LAYOUT



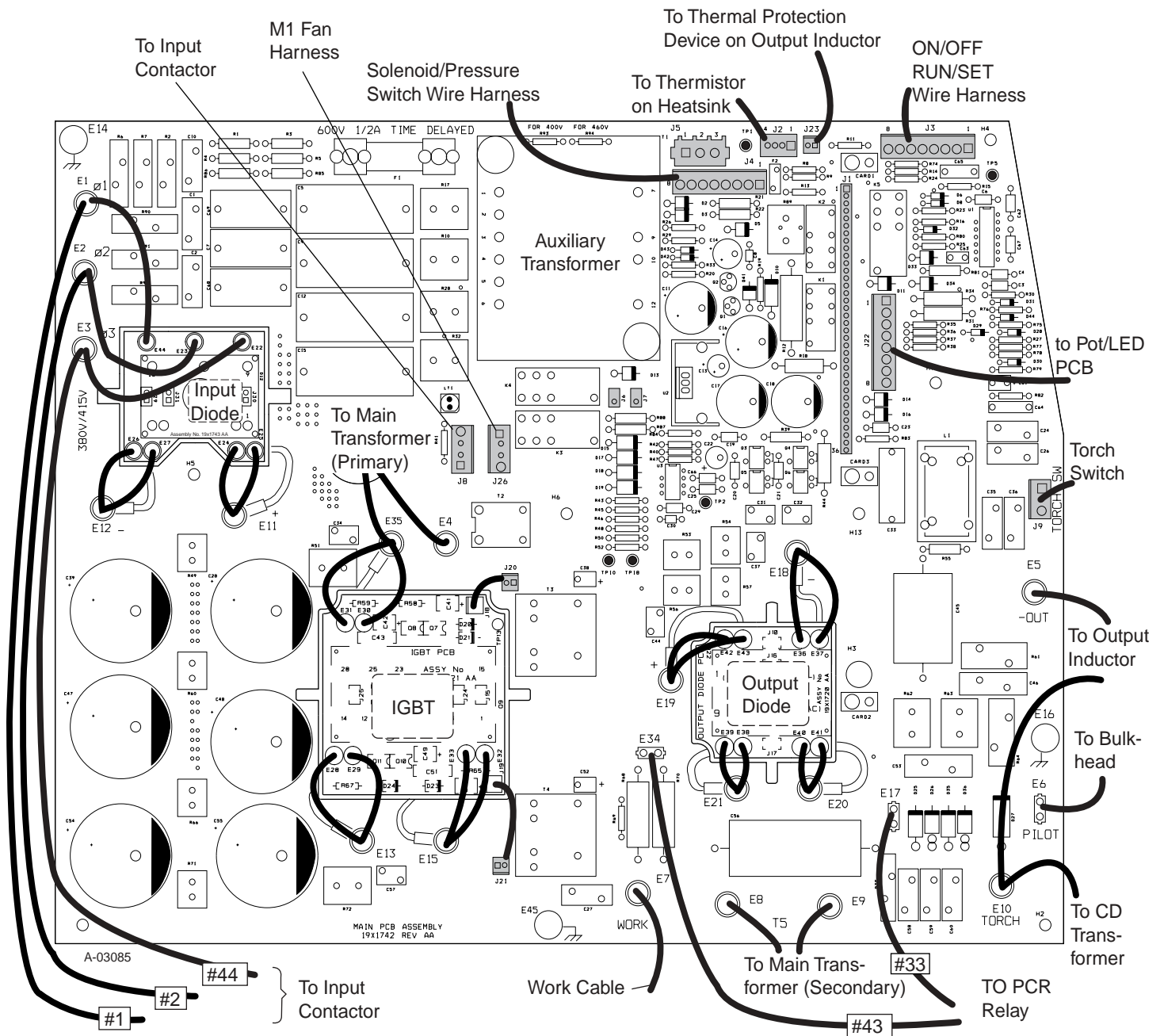
APPENDIX 8: INPUT DIODE PC BOARD LAYOUT



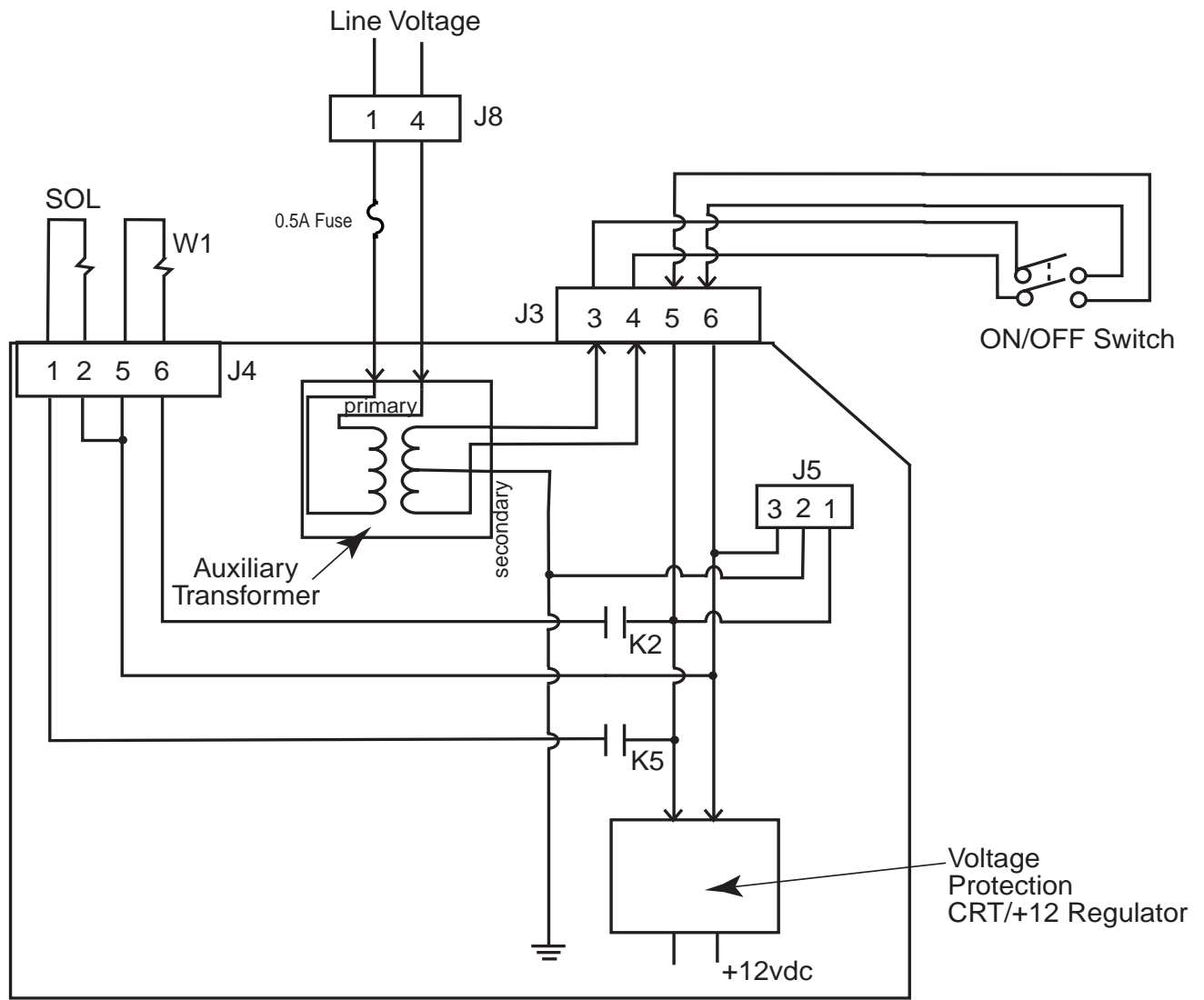
APPENDIX 9: OUTPUT DIODE PC BOARD LAYOUT



APPENDIX 10: MAIN PC BOARD WIRING



APPENDIX 11: 28VAC CIRCUIT DIAGRAM



A-02770

Main Power PC Board

APPENDIX 12: MAINTENANCE SCHEDULE

This schedule applies to all types of *non-liquid cooled* plasma cutting systems. Some systems will not have all the parts listed and those checks need not be performed.

NOTE

The actual frequency of maintenance may need to be adjusted according to the operating environment.

Daily Operational Checks or Every Six Cutting Hours:

1. Check torch consumable parts, replace if damaged or worn.
2. Inspect torch for any cracks or exposed wires, replace if necessary.
3. Check plasma and secondary supply and pressure/flow.
4. Purge plasma gas line to remove any moisture build-up.
5. Inspect input power cable for damage or exposed wires, replace if necessary.

Weekly or Every 30 Cutting Hours:

1. Check fan for proper operation and adequate air flow.
2. Blow or vacuum dust and dirt *out* of the entire machine.

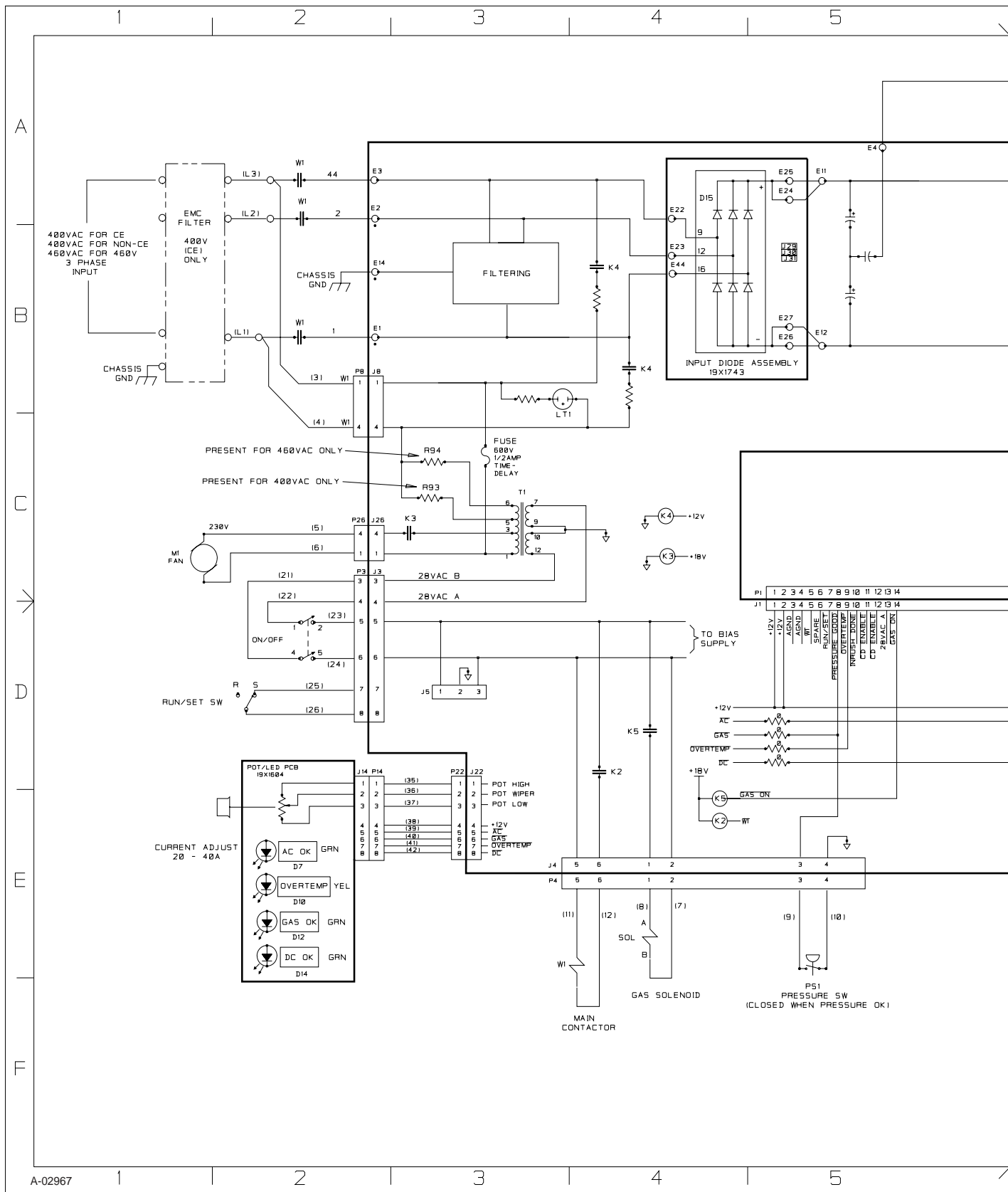
CAUTION

Do not blow air into the power supply during cleaning. Blowing air into the unit can cause metal particles to interfere with sensitive electrical components and cause damage to the unit.

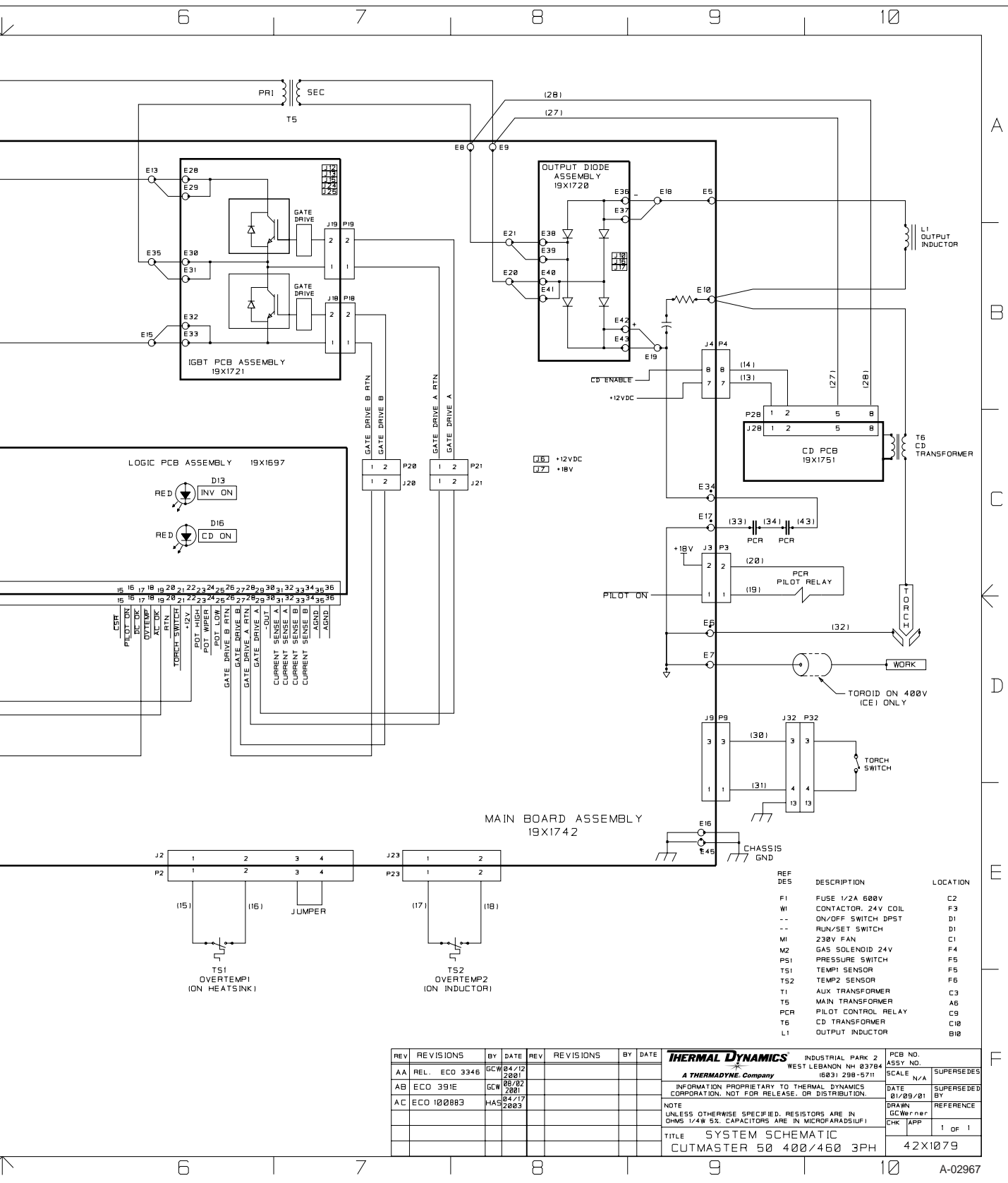
Six Months or Every 720 Cutting Hours:

1. Check the in-line air filter(s), clean or replace as required
2. Check cables and hoses for leaks or cracks, replace if necessary.
3. Check all contactor points for severe arcing or pits, replace if necessary.

APPENDIX 13: SYSTEM SCHEMATIC



A-02967



REF DES	DESCRIPTION	LOCATION
F1	FUSE 1/2A 600V	C2
W1	CONTACTOR, 24V COIL	F3
--	ON/OFF SWITCH-DPST	D1
--	RUN/SET SWITCH	D1
M1	230V FAN	C1
M2	GAS SOLENOID 24V	F4
PS1	PRESSURE SWITCH	F5
TS1	TEMP1 SENSOR	F5
TS2	TEMP2 SENSOR	F6
T1	AUX TRANSFORMER	C3
T5	MAIN TRANSFORMER	A6
PCR	PILOT CONTROL RELAY	C9
T6	CD TRANSFORMER	C10
L1	OUTPUT INDUCTOR	B10

REV	REVISIONS	BY	DATE	REV	REVISIONS	BY	DATE
AA	REL. ECO 3346	GCV	04/12/2001				
AB	ECO 391E	GCV	08/02/2001				
AC	ECO 100883	HAS	04/17/2003				

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