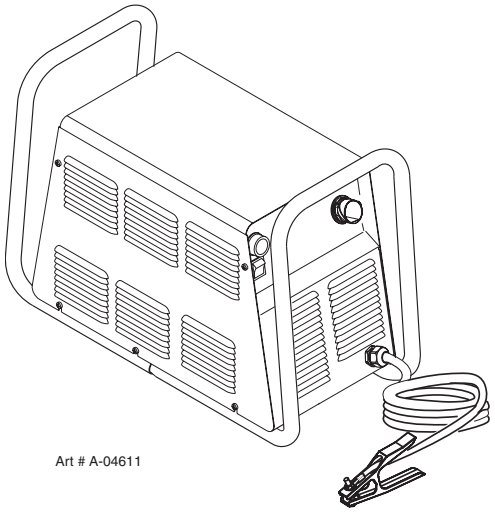
THERMAL DYNAMICS®

101 CUTMASTER™

AUTOMATED PLASMA CUTTING SYSTEM

SL100SV

PLASMA CUTTING MACHINE TORCH



Art # A-04611

Operating Manual

Rev. AD.01 **Date:** April 2, 2007 **Manual #** 0-4642

Operating Features:

80 AMP	DC	1 PHASE	3 PHASE	208-230 V	400 V	400 V (CE)	460 V	600V

WE APPRECIATE YOUR BUSINESS!

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

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

YOU ARE IN GOOD COMPANY!

The Brand of Choice for Contractors and Fabricators Worldwide.

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

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

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

WARNINGS

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.

Automated Plasma Cutting System
Automated CutMaster™ 101 Power Supply
SL100 / SL100SV Machine Torch
Operating Manual Number 0-4642

Covered under U.S. Patents

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

www.thermal-dynamics.com

Printed in the United States of America

Publication Date: April 2, 2007

Record the following information for Warranty purposes:

Where Purchased:_____

Purchase Date:_____

Power Supply Serial #:_____

Torch Serial #:_____

TABLE OF CONTENTS

TABLE OF CONTENTS (continued)

TABLE OF CONTENTS (continued)

TABLE OF CONTENTS (continued)

SECTION 1: GENERAL INFORMATION

1.01 Notes, Cautions and Warnings

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

NOTE

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

CAUTION

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

WARNING

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

1.02 Important Safety Precautions

WARNINGS

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

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

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

GASES AND FUMES

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

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

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

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

ELECTRIC SHOCK

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

- Never touch any parts that are electrically "live" or "hot."
- Wear dry gloves and clothing. Insulate yourself from the work piece or other parts of the welding circuit.
- Repair or replace all worn or damaged parts.
- Extra care must be taken when the workplace is moist or damp.
- Install and maintain equipment according to NEC code, refer to item 9 in Subsection 1.03, Publications.
- Disconnect power source before performing any service or repairs.
- Read and follow all the instructions in the Operating Manual.

FIRE AND EXPLOSION

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

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

NOISE

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

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

PLASMA ARC RAYS

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

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

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

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

1.03 Publications

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

1. OSHA, SAFETY AND HEALTH STANDARDS, 29CFR 1910, obtainable from the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402
2. ANSI Standard Z49.1, SAFETY IN WELDING AND CUTTING, obtainable from the American Welding Society, 550 N.W. LeJeune Rd, Miami, FL 33126
3. NIOSH, SAFETY AND HEALTH IN ARC WELDING AND GAS WELDING AND CUTTING, obtainable from the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402
4. ANSI Standard Z87.1, SAFE PRACTICES FOR OCCUPATION AND EDUCATIONAL EYE AND FACE PROTECTION, obtainable from American National Standards Institute, 1430 Broadway, New York, NY 10018
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 electronique. Ceux qui travail près d'une application à l'arc au jet de plasma devrait consulter leur membre professionel 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. Eliminez toute source de telle fumée.
- Ce produit, dans le procéder de soudage et de coupe, produit de la fumée ou des gaz pouvant contenir des éléments reconnu 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-violets 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 suggèrée dans le recommendation qui suivent ANSI/ASC Z49.1:

Courant Arc	Nuance Minimum Protective Numéro	Nuance Suggerée 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'experience a démontrer que les filtres moins foncés peuvent être utilisés quand l'arc est caché par moiceau 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 dúez 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 GCAP-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: 82 Benning Street
West Lebanon, New Hampshire 03784
USA

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

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.

* For environments with increased hazard of electrical shock, Power Supplies bearing the S mark conform to EN50192 when used in conjunction with hand torches with exposed cutting tips, if equipped with properly installed standoff guides.

* Extensive product design verification is conducted at the manufacturing facility as part of the routine design and manufacturing process. This is to ensure the product is safe, when used according to instructions in this manual and related industry standards, and performs as specified. Rigorous testing is incorporated into the manufacturing process to ensure the manufactured product meets or exceeds all design specifications.

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

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

CE

1.08 Statement of Warranty

LIMITED WARRANTY: Subject to the terms and conditions established below, Thermal Dynamics® Corporation warrants to the original retail purchaser that new Thermal Dynamics CUTMASTER™ 1Series plasma cutting systems sold after the effective date of this warranty are free of defects in material and workmanship. Should any failure to conform to this warranty appear within the applicable period stated below, Thermal Dynamics Corporation shall, upon notification thereof and substantiation that the product has been stored operated and maintained in accordance with Thermal Dynamics' specifications, instructions, recommendations and recognized industry practice, correct such defects by suitable repair or replacement.

This warranty is exclusive and in lieu of any warranty of merchantability or fitness for a particular purpose.

Thermal Dynamics will repair or replace, at its discretion, any warranted parts or components that fail due to defects in material or workmanship within the time periods set out below. Thermal Dynamics Corporation must be notified within 30 days of any failure, at which time Thermal Dynamics Corporation will provide instructions on the warranty procedures to be implemented.

Thermal Dynamics Corporation will honor warranty claims submitted within the warranty periods listed below. All warranty periods begin on the date of sale of the product to the original retail customer or 1 year after sale to an authorized Thermal Dynamics Distributor.

LIMITED WARRANTY PERIOD

Product	Power Supply Components (Parts and Labor)	Torch and Leads (Parts and Labor)
CUTMASTER™ 51	3 Years	1 Year
CUTMASTER™ 81	3 Years	1 Year
CUTMASTER™ 101	3 Years	1 Year

This warranty does not apply to:

1. Consumable Parts, such as tips, electrodes, shield cups, o - rings, starter cartridges, gas distributors, fuses, filters.
2. Equipment that has been modified by an unauthorized party, improperly installed, improperly operated or misused based upon industry standards.

In the event of a claim under this warranty, the remedies shall be, at the discretion of Thermal Dynamics Corporation:

1. Repair of the defective product.
2. Replacement of the defective product.
3. Reimbursement of reasonable costs of repair when authorized in advance by Thermal Dynamics.
4. Payment of credit up to the purchase price less reasonable depreciation based on actual use.

These remedies may be authorized by Thermal Dynamics and are FOB West Lebanon, NH or an authorized Thermadyne service station. Product returned for service is at the owner's expense and no reimbursement of travel or transportation is authorized.

LIMITATION OF LIABILITY: Thermal Dynamics Corporation 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 customer of distributors (hereinafter "Purchaser") for service interruption. The remedies of the Purchaser set forth herein are exclusive and the liability of Thermal Dynamics 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 the goods covered by or furnished by Thermal Dynamics 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 liability is based.

This warranty becomes invalid if replacement parts or accessories are used which may impair the safety or performance of any Thermal Dynamics product.

This warranty is invalid if the Thermal Dynamics product is sold by non - authorized persons.

Effective January 15, 2004

SECTION 2: SPECIFICATIONS

2.01 Scope of Manual

This manual contains descriptions, operating instructions and basic maintenance procedures for the Thermal Dynamics Automated CutMaster 101 Plasma Cutting System. Servicing of this equipment is restricted to properly trained personnel; unqualified personnel are strictly cautioned against attempting repairs or adjustments not covered in this manual, at the risk of voiding the Warranty.

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

2.02 Power Supply Specifications

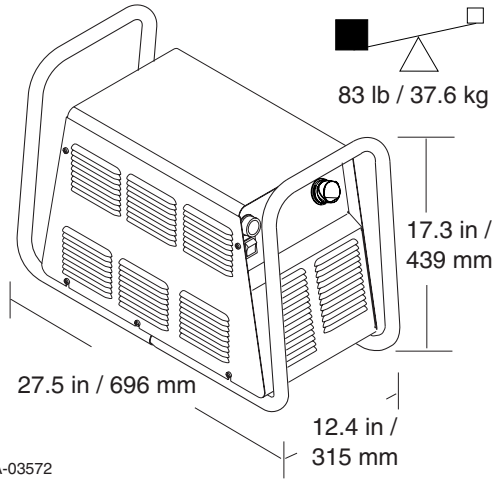
Automated CutMaster 101 Power Supply Specifications							
Input Power	208 / 230 VAC (187 - 253 VAC), Single Phase, 50/60 Hz						
	400 VAC (360 - 440 VAC), Three Phase, 50/60 Hz						
	400 VAC (360 - 440 VAC), Three Phase, 50 Hz, CE						
	415 VAC (370 - 460 VAC), Three Phase, 50 Hz, CE						
	460 VAC (414 - 506 VAC), Single Phase, 60 Hz						
	460 VAC (414 - 506 VAC), Three Phase, 60 Hz						
	600 VAC (517 - 632 VAC), Three Phase, 60 hz						
Input Power Cable	Cable for 208/230 VAC unit includes plug.						
Output Current	20 - 80 Amps, Continuously Adjustable						
Power Supply Gas Filtering Ability	Particulates to 20 Microns						
CutMaster 101 Power Supply Duty Cycle *							
Ambient Temperature	40° C (104° F)						
		IEC Rating	TDC Rating	IEC Rating	TDC Rating	IEC Rating	TDC Rating
208/230V, and 460V Units	Duty Cycle	**40%**		**60%**		**100%**	
	Current	80A	78A	68A	68A	45A	45A
	DC Voltage	112V	120V	107V	111V	98V	98V
400V / 415V Units	Duty Cycle	**35%**		**60%**		**100%**	
	Current	80A	78A	68A	68A	45A	45A
	DC Voltage	112V	120V	107V	111V	98V	98V
600V Units	Duty Cycle	**35%**		**60%**		**100%**	
	Current	80A	78A	68A	68A	43A	43A
	DC Voltage	112V	120V	107V	111V	97V	97V
* NOTE: The duty cycle will be reduced if the primary input power (AC) is low or the output voltage (DC) is higher than shown in this chart.							

NOTE:

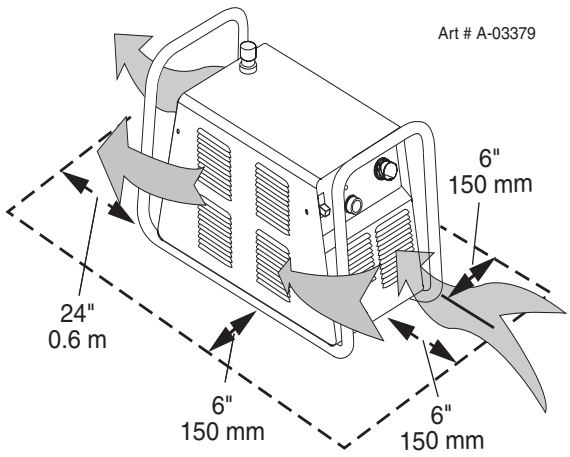
IEC Rating is determined as specified by the International Electro-Technical Commission. These specifications include calculating an output voltage based upon power supply rated current. To facilitate comparison between power supplies, all manufacturers use this output voltage to determine duty cycle.

TDC Rating is determined using an output voltage representative of actual output voltage during cutting with a TDC torch. This voltage may be more or less than IEC voltage, depending upon choice of torch, consumables, and actual cutting operation.

Power Supply Dimensions & Weight



Ventilation Clearance Requirements



2.03 Input Wiring Specifications

CutMaster 101 Input Wiring Specifications											
Input		Power Input		Current Input		Suggested Sizes (See Notes)					
Voltage	Freq.	1-Ph	3-Ph	1-Ph	3-Ph	Fuse (Amps)		Wire (AWG)		Wire (Canada)	
(Volts)	(Hz)	(kVA)	(kVA)	(Amps)	(Amps)	1-Ph	3-Ph	1-Ph	3-Ph	1-Ph	3-Ph
208	50	14.4		69		90		6		6	
208	60	15.6		75		90		6		6	
230	50	15		65		80		6		6	
230	60	15.5		67		80		6		6	
400	50/60		13.9		20		30		10		10
460	60	18		39		50		10		10	
460	60		16		20		30		12		12
600	60		13.5		13		20		12		12
Line Voltages with Suggested Circuit Protection and Wire Sizes Based on National Electric Code and Canadian Electrical Code											

CE CutMaster 101 Input Wiring Specifications					
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 / 415	50	13.9	20	25	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.

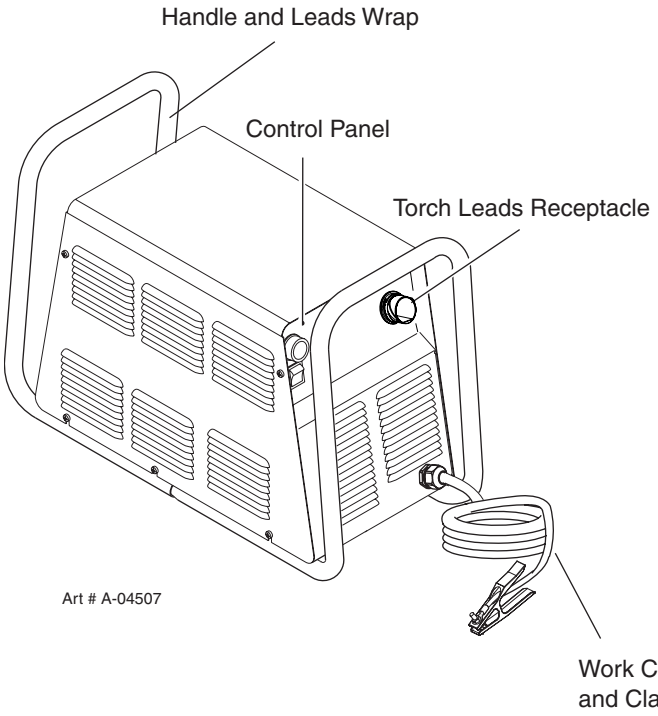
The suggested sizes are based on flexible power cable with power plug installations. For hard-wired installations refer to local or national codes.

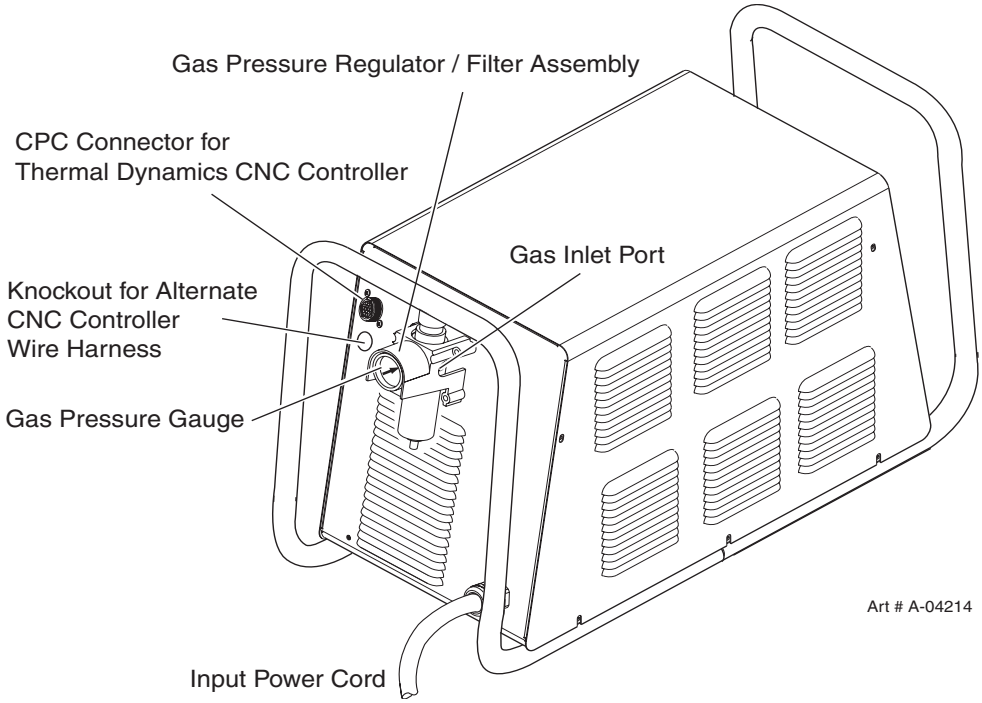
Cable conductor temperature used is 167° F (75° C).

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.*

2.04 Power Supply Features





2.05 Power Supply Options and Accessories

Section 6, Parts Lists, provides catalog numbers and ordering information.

A. Single-Stage Air Filter Kit

For use with compressed air shop systems. Filters moisture and particulate matter from the air stream to at least 0.85 microns. This filter increases performance and improves consumables parts life.

B. Two Stage Air Filter Kit

For use on compressed air shop systems. Filters moisture and contaminants from the air stream to at least 5.0 microns. This filter is pre-assembled at the factory and needs only to be installed on the power supply.

C. High Pressure Regulators

High pressure regulators are available. The regulators are used to set the proper compressed air pressure.

2

NOTE

Regulators should not be installed with In-Line Air Filters.

D. Extended Work Cable with Clamp

As an alternative to the standard 20 ft / 6.1 m work cable & clamp on the power supply, a 50 ft / 15.2 m work cable with clamp is available.

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.

F. Wheel Kit

A kit with easy-rolling wheels, for maximum portability for the power supply.

G. Nylon Dust Cover

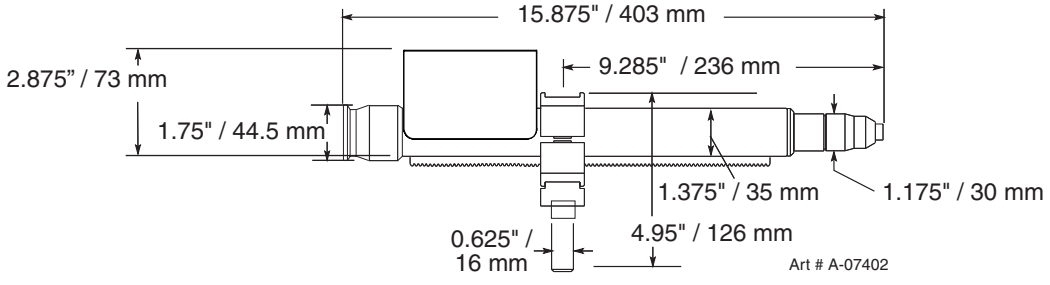
Nylon canvas power supply dust cover with water resistant finish, large outer pocket for storing manuals or spare consumables, and adjustable draw cord for tight fit.

2.06 Torch Specifications

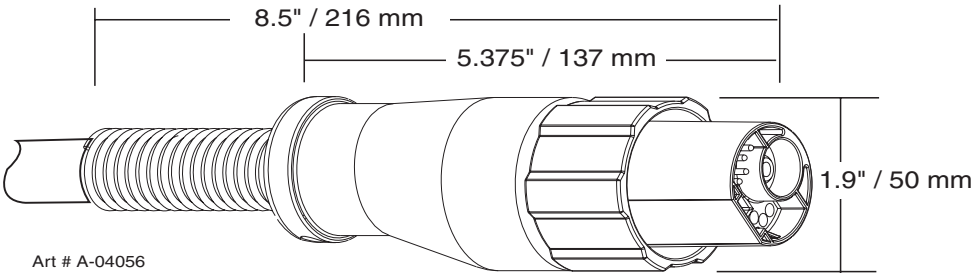
SL100SV Machine Torch Specifications	
Torch Ratings	
Ambient Temperature	104° F / 40° C
Duty Cycle *(Refer to NOTE)*	100% @ 100 Amps @ 400 scfh
Maximum Current	100 Amps
Voltage (V_{peak})	500V
Arc Striking Voltage	7kV
Type of Cooling	Combination of Ambient Air and Gas Flow Through Torch
Current Rating	Up to 100 Amps, DC, Straight Polarity
Gas Requirements	
Gas (Plasma and Secondary)	Compressed Air (**ONLY**)
Operating Pressure (Varies According to Power Supply and Torch Leads Length)	60 - 75 psi 4.1 - 5.2 bar
Maximum Input Pressure	125 psi / 8.6 bar
Gas Flow	300 - 500 scfh / 142 - 235 lpm
NOTE: Operating pressure varies with operating amperage and torch leads length.	
Torch Leads Lengths	
25' / 7.6 m, with ATC Connector	
35' / 10.6 m, with ATC Connector	
50' / 15.2 m, with ATC Connector	
Plasma Power Supply Used With:	
Thermal Dynamics CutMaster 51, CutMaster 81, CutMaster 101, CutMaster 151	
NOTE Torch duty cycle is greater than power supply duty cycle.	

A. Torch Configuration

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



B. Torch Connector Dimensions



C. Torch Parts

Start Cartridge, Electrode, Tip, Shield Cup Body, Shield Cap

2

D. Parts - In - Place (PIP)

Torch Head has built - in switch

12 vdc circuit rating

E. Direct Contact Hazard

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

2.07 Torch Options and Accessories

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

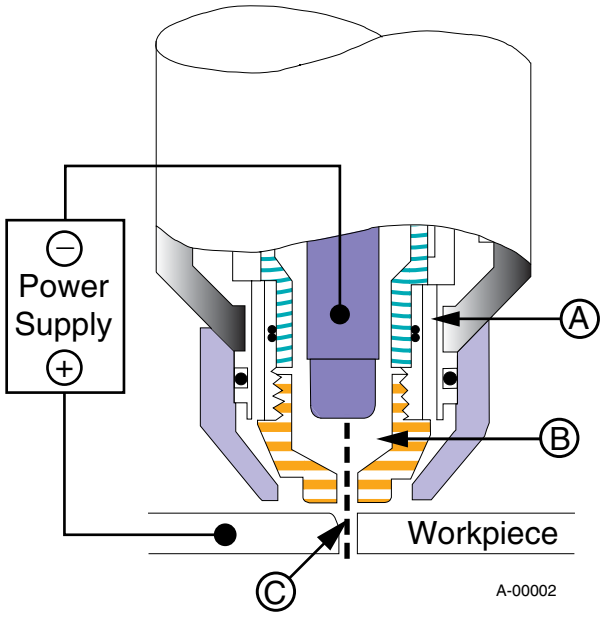
- Spare Parts Kits - Various kits containing replacement consumable torch parts.
- Pinion Assembly (for machine torches)
- Leather Leads Covers

2.08 Introduction to Plasma

A. Plasma Gas Flow

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

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



Typical Torch Head Detail

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

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

B. Gas Distribution

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

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

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

C. Pilot Arc

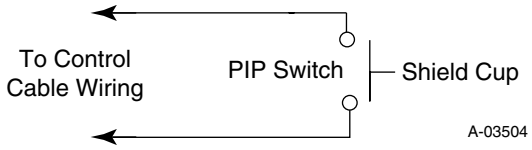
When the torch is started a pilot arc is established between the electrode and cutting tip. This pilot arc creates a path for the main arc to transfer to the work.

D. Main Cutting Arc

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

E. Parts - In - Place (PIP)

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



Parts - In - Place Circuit Diagram

SECTION 3: INSTALLATION

3.01 Unpacking

1. Use the packing lists to identify and account for each item.
2. Inspect each item for possible shipping damage. If damage is evident, contact your distributor and / or shipping company before proceeding with the installation.
3. Record Power Supply and Torch model and serial numbers, purchase date and vendor name, in the information block at the front of this manual.

3.02 Lifting Options

The Power Supply includes a handle for **hand lifting only**. Be sure unit is lifted and transported safely and securely.

WARNINGS

Do not touch live electrical parts.

Disconnect input power cord before moving unit.

***FALLING EQUIPMENT** can cause serious personal injury and can damage equipment.*

***HANDLE** is not for mechanical lifting.*

- Only persons of adequate physical strength should lift the unit.
- Lift unit by the handle, using two hands. Do not use straps for lifting.
- Use optional wheel kit, cart or similar device of adequate capacity to move unit.
- Place unit on a proper skid and secure in place before transporting with a fork lift or other vehicle.

3.03 Primary Input Power Connections

CAUTION

Check your power source for correct voltage before plugging in or connecting the unit. The primary power source, fuse, and any extension cords used must conform to local electrical code and the recommended circuit protection and wiring requirements as specified in Section 2.03.

A. Connections to 208 / 230-Volt Power

The 208 / 230-Volt power supply includes a factory-installed input power cable and plug.

1. Check your power source for correct voltage before plugging in the unit.
2. Connect the input power cable (or close the main disconnect switch) to supply power to the system.

CAUTION

The primary power source and power cable must conform to local electrical code and the recommended circuit protection and wiring requirements (refer to table in Section 2.03).

B. Connections to 400-Volt, 415-Volt, 460-Volt, or 600-Volt Three-Phase Power

These Power Supplies are equipped with a four-conductor input power cable for three-phase input power. The 460-Volt Power Supply will accept 460-VAC, Single-Phase input power with a change of input power cable.

1. Check your power source for correct voltage before plugging in the unit.
2. The input cable's outer covering is stripped back at the factory to expose the individual wires at the free end of the cable.
3. Connect the ends of the individual wires to a customer supplied plug or main disconnect as follows:

CAUTION

The primary power source and power cable must conform to local electrical code and the recommended circuit protection and wiring requirements (refer to table in Section 2). All the input cable wires must be connected for three-phase operation.

- Green / Yellow wire to Ground.
- Remaining wires to L1, L2, L3 input.

4. Connect the input power cable (or close the main disconnect switch) to supply power to the system.

C. Connections to 460-Volt Single - Phase Power

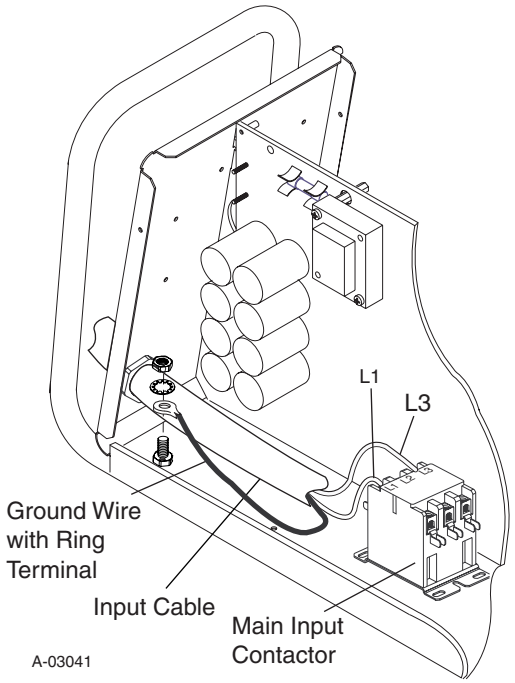
The 460-Volt Power Supply will accept 460-VAC, Single-Phase input power with a change of input power cable.

1. Remove the Power Supply cover per section 5.09-A.
2. Disconnect the original input power cable from the main input contactor and the chassis ground connection.
3. Loosen the through-hole protector on the back panel of the power supply. Pull the original power cable out of the power supply.
4. Pass a customer-supplied, three-conductor input power cable through the access opening in the back panel of the power supply. Refer to Section 2 for power cable specifications.

CAUTION

The primary power source and power cable must conform to local electrical code and the recommended circuit protection and wiring requirements (refer to table in Section 2.03).

5. Strip back the insulation on the individual wires.
6. Connect to main input contactor as follows:
   - Line 1 wire to terminal L1.
   - Line 3 wire to terminal L3.
7. Connect the ground wire to Ground (Earth). The Ground wire connection requires a ring terminal.
8. Tighten the through-hole protector to secure the power cable.



Input Power Connections, 460 VAC, Single-Phase

9. Replace the Power Supply cover.
10. Connect the input power cable (or close the main disconnect switch) to supply power to the system.

3.04 Gas Connections

A. Connecting Gas Supply to Unit

Use **only** compressed air with this power supply.

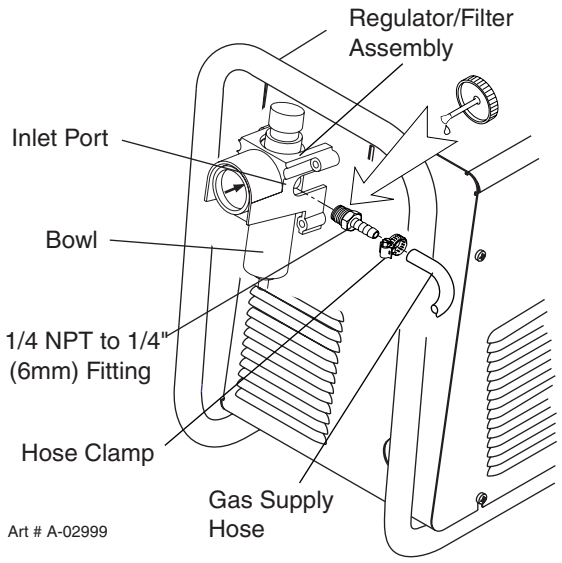
An in-line pneumatic dryer & evaporator type air filter, capable of filtering to at least 5 microns, is required when using air from a compressor. This type filter will insure that moisture, oil, dirt, chips, rust particles, and other contaminants from the supply hose do not enter the torch. For highly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

The connection is the same for compressed air from a compressor from high pressure cylinders. Refer to subsection 3.4-B or 3.4-C if an additional air line filter is to be installed.

1. Connect the air line to the inlet port. The illustration shows typical fittings as an example. Other fittings can be used.

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 air passages in the torch.



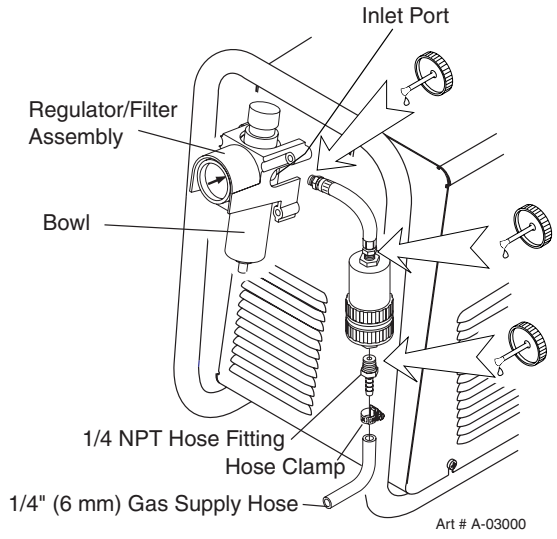
Air Connection to Inlet Port

B. Optional Air Filters

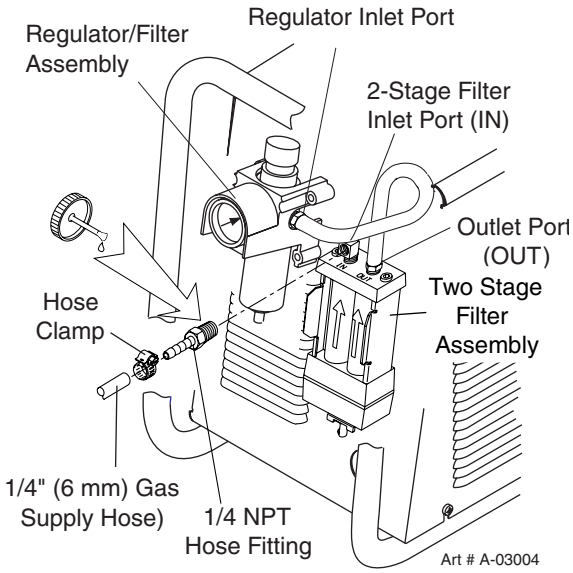
1. Connect the Filter as illustrated. Use only Synflex or equivalent grade hose. The illustrations show typical fittings as an example.

NOTE

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



Optional Single-Stage Filter Installation



Optional Two-Stage Filter Installation

D. Using High Pressure Air Cylinders

When using high pressure air cylinders as the air supply:

1. Refer to the manufacturer's specifications for installation and maintenance procedures for high pressure regulators.
2. Examine the cylinder valves to be sure they are clean and free of oil, grease or any foreign material. Briefly open each cylinder valve to blow out any dust which may be present.
3. The cylinder must be equipped with an adjustable high-pressure regulator capable of outlet pressures up to 100 psi (6.9 bar) maximum and flows of at least 500 scfh (236 lpm).
4. Connect supply hose to the cylinder.

NOTE

Pressure should be set at 100 psi (6.9 bar) at the high pressure cylinder regulator.

Supply hose must be at least 1/4 inch (6 mm) I.D.

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 air passages in the torch.

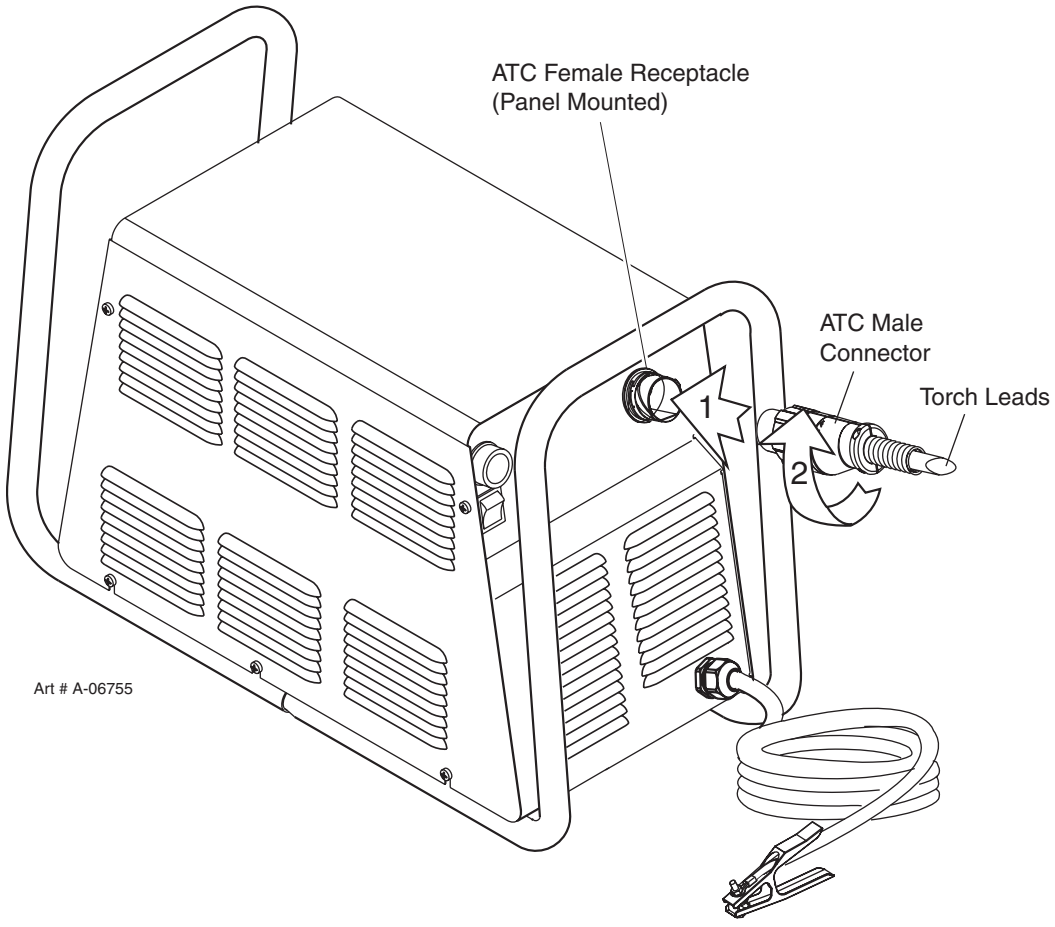
3.05 Torch Connections

If necessary, connect the torch to the Power Supply. Connect only the Thermal Dynamics model SL100 Torch (with ATC connector) to this power supply. Maximum torch leads length is 50 feet / 15.2 m.

WARNING

Disconnect primary power at the source before connecting the torch.

1. Align the ATC male connector (on the torch lead) with the female receptacle. Push the male connector into the female receptacle. The connectors should push together with a small amount of pressure.
2. Secure the connection by turning the locking nut clockwise until it clicks. DO NOT use the locking nut to pull the connection together. Do not use tools to secure the connection.
3. The system is ready for operation.

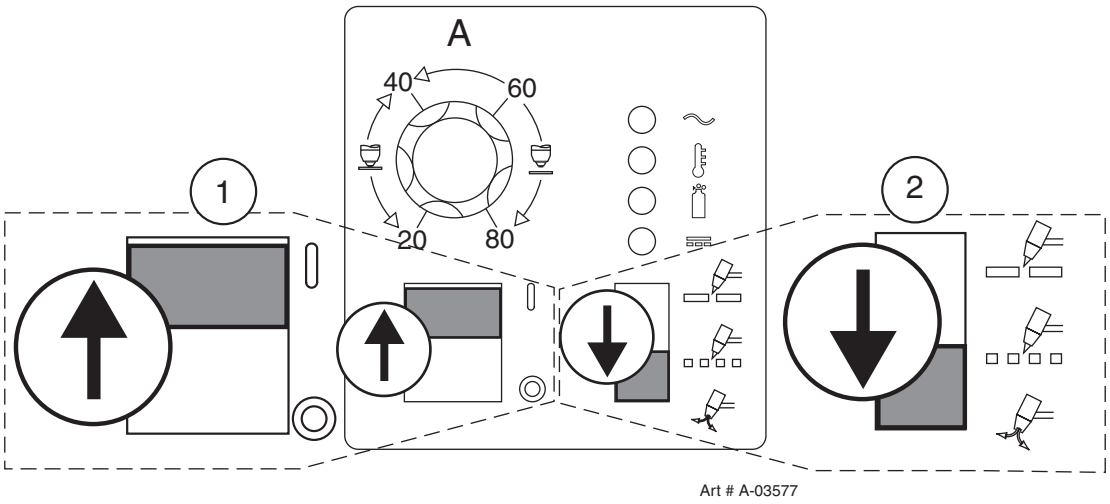


Connecting the Torch to the Power Supply

B. Check Air Quality

To test the quality of air:

1. Put the ON / OFF switch in the ON (up) position.
2. Put the RUN / RAPID AUTO RESTART / SET switch in the SET (down) position.
3. Place a welding filter lens in front of the torch and turn on the air. Any oil or moisture in the air will be visible on the lens. **Do not start an arc!**



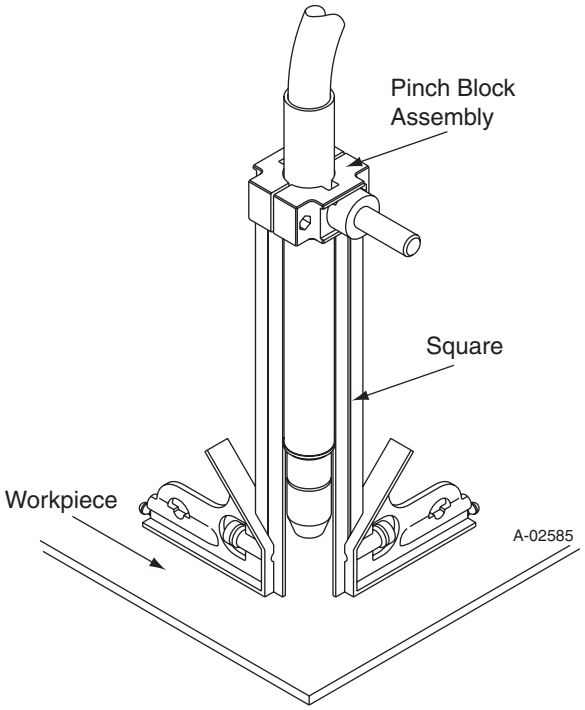
3.06 Torch Installation

WARNING

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

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

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

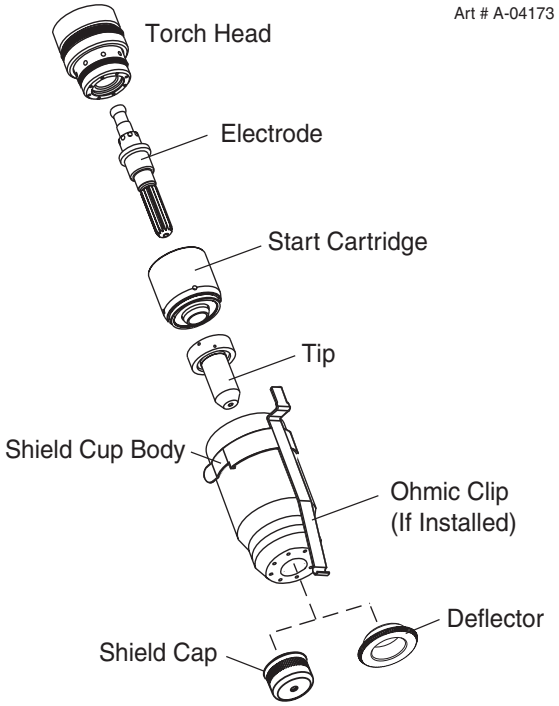


Machine Torch Set-Up

3. The proper torch parts (shield cup body, shield cap, tip, start cartridge, and electrode) must be installed for the type of operation. Refer to Section 3.07, Torch Parts Selection for details.

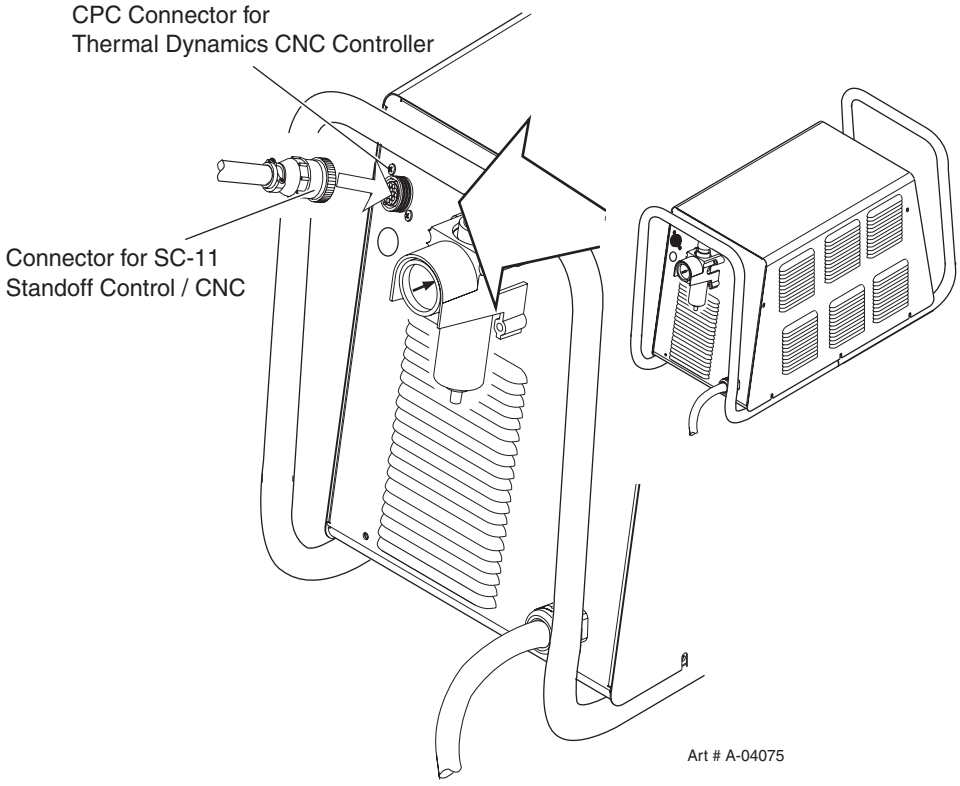
3.07 Torch Parts Selection

1. Check the torch for proper consumable parts. The parts supplied in the torch may not be correct for the operator's chosen amperage level. The torch parts must correspond with the type of operation.



3.08 Power Supply Connection to SC-11 Standoff Control

The power supply includes an Automation Interface PC Board connected to a CPC connector on the power supply rear panel. For connection to the Thermal Dynamics SC-11 Standoff Control, align and connect the cable from the Standoff Control to the CPC connector. Check for a secure connection.

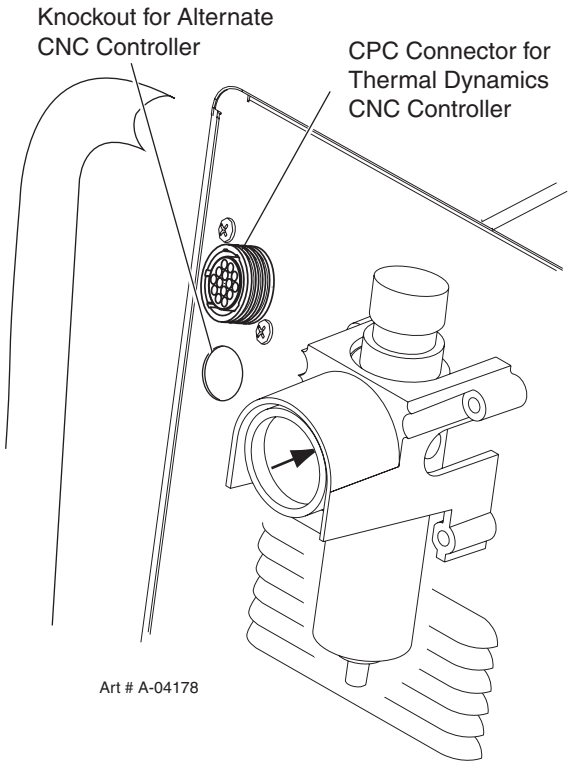


3.09 Power Supply Connection to Alternate Standoff Control

The Power Supply rear panel includes a knockout to accept wiring between the Automation Interface PC Board and alternate CNC controls. The Automation Interface PC board includes a terminal strip for connection to alternate CNC controls.

To connect an alternate CNC Control to the Power Supply:

1. Remove the Power Supply Cover.
2. Carefully open the lower knockout (below the factory-installed CNC connector) on the Power Supply rear panel.

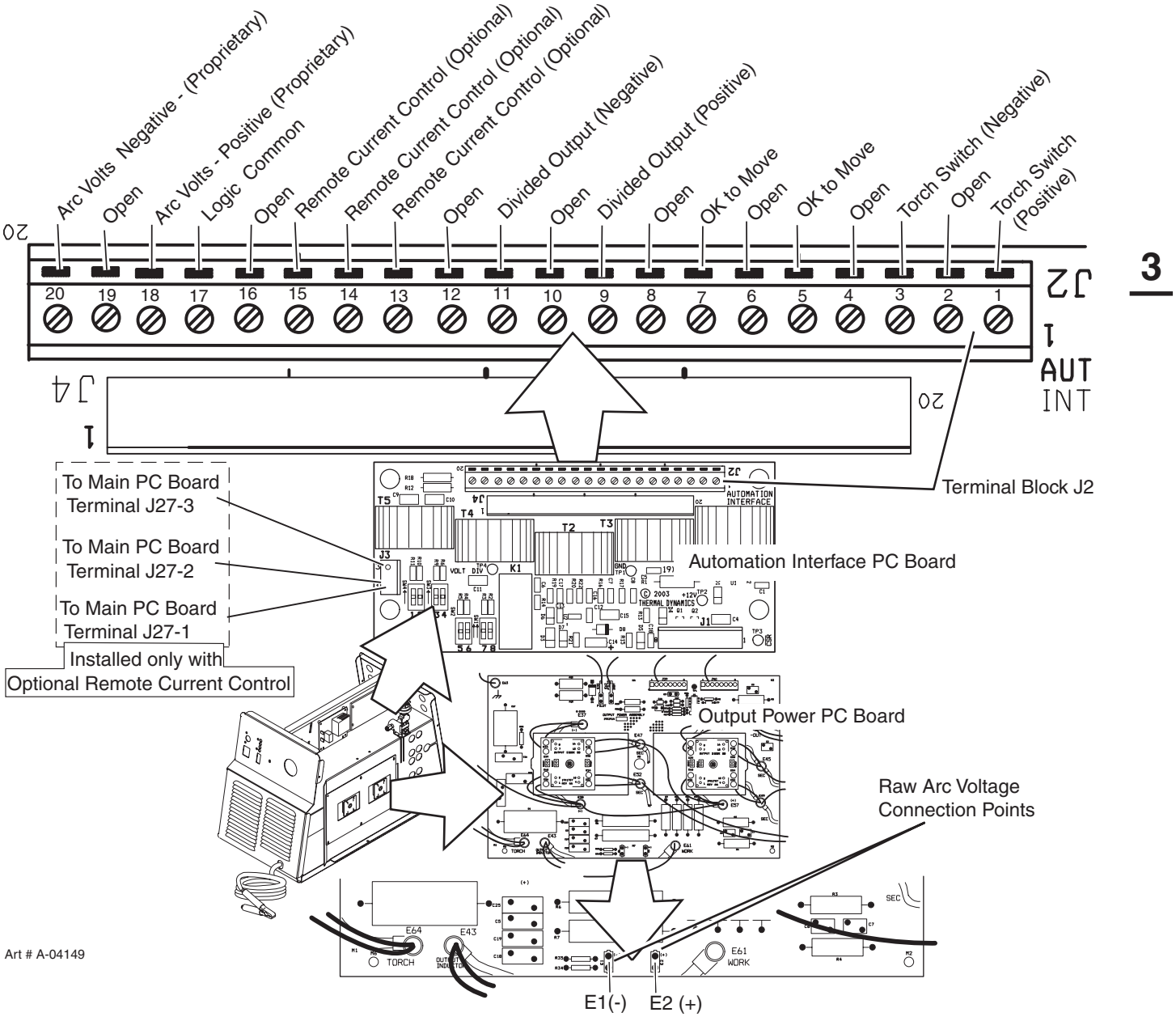


3. Install a customer-supplied through-hole protector ('Strain Relief') in the lower knockout hole.
4. Route the wire harness from the alternate CNC Control through the through-hole protector.

5. Connect the wire harness from the alternate CNC Control to the 20-position terminal strip (labeled 'J2') on the Automation Interface PC Board. Refer to the illustration.
   a. For divided voltage output, connect to terminals J2-11 (negative) and J2-9 (positive) on the Interface PC Board..
   b. For raw arc voltage, connect to terminals E2 (positive) and E1 (negative) on the Output Power PC Board.

NOTE

There is no need to disconnect the factory-installed wire harness from the J4 terminal strip.



Alternate CNC Controller Connections to Automation Interface Board

6. Tighten the through-hole protector ('strain relief') to secure the CNC cable to the power supply.

3.10 Automation Interface PC Board Set-up

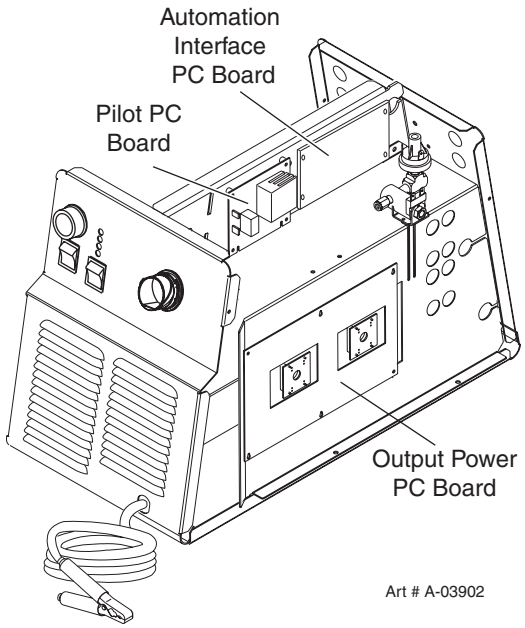
The Automation Interface PC board includes switches that must be set to adapt the Interface Board to the automation system being used.

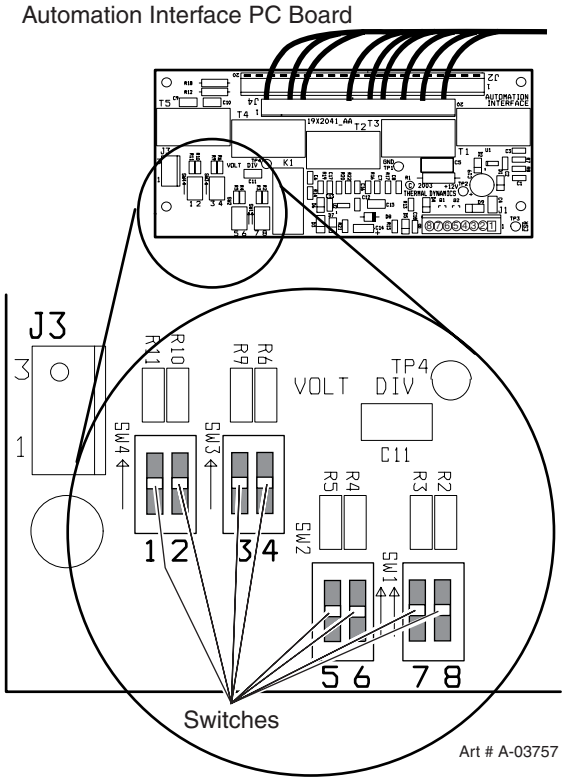
NOTE

The switches are factory-set for the Thermal Dynamics SC-11 Standoff Control.

For operation with any other CNC equipment, refer to the CNC system documents to determine the division factor the CNC system requires. Proceed as follows:

1. Set the interface control board switches as indicated in the appropriate chart in the Appendix pages. The division factors are listed in the right-hand column of each chart.

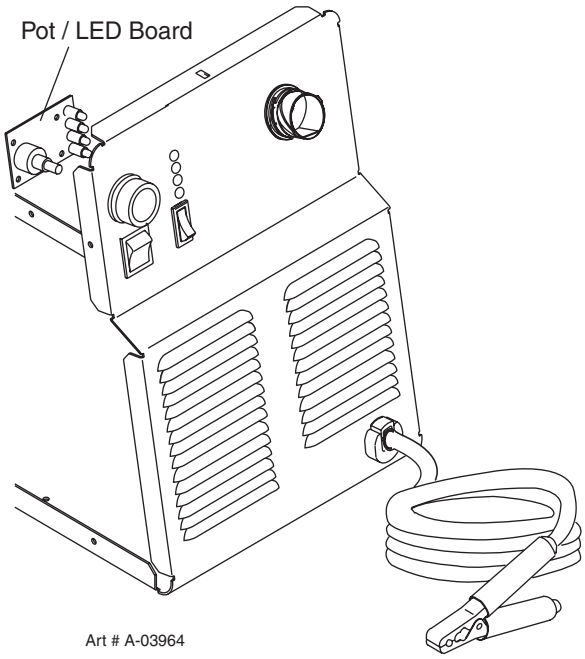




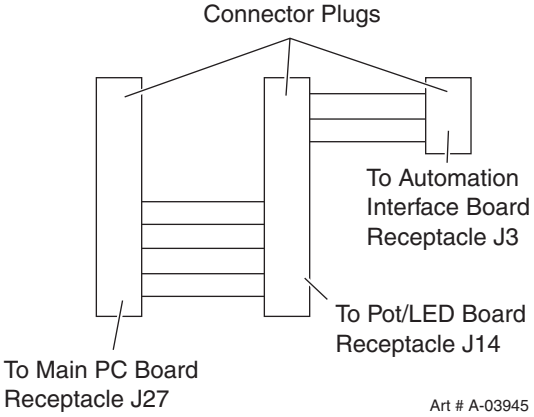
2. Re-install the Power Supply cover.

3.11 Optional Remote Current Control Harness Installation

1. Locate the power supply Pot/LED Board just inside the power supply front panel.



2. Disconnect and remove the wire harness between the Pot/LED Board and receptacle J22 on the Main PC Board. Keep the harness for possible future use.
3. The kit includes a wire harness with 3 connectors. Install the harness as follows:



4. Ensure that the wire harness will not interfere with the fit of the power supply cover against the top edge of the power supply center chassis. Use wire ties as needed to secure the wire harness.

NOTE

Installation of this harness disables the output current control **(A)** *on the front panel of the power supply. Use the CNC controller to control the output current of the power supply.*

5. Re-install the Power Supply cover.

This Page Left Blank

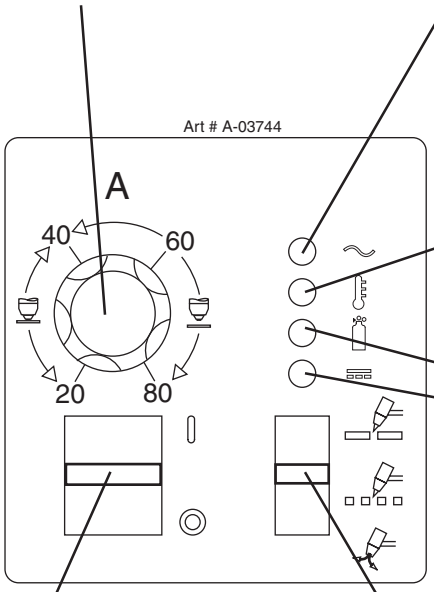
SECTION 4: OPERATION

4.01 Product Features

A. Power Supply Front Panel Controls and Indicators

(A) Output Current Control

Sets the desired output current. At output settings over 40 Amps, the power supply automatically reduces output current to 40 Amps if the torch tip touches the workpiece.



AC Indicator

Steady light indicates power supply is ready for operation. Blinking light indicates unit is in protective interlock mode. Shut unit off, shut off or disconnect input power, correct the fault, and restart the unit. Refer to Section 5 for details.

TEMP Indicator

Indicator is normally OFF. Indicator is ON when internal temperature exceeds normal limits. Shut unit OFF; let the unit cool before continuing operation.

GAS Indicator

Indicator is ON when minimum input gas pressure for power supply operation is present. Minimum pressure for power supply operation is not sufficient for torch operation.

DC Indicator

Indicator is ON when DC output circuit is active.

ON / OFF Switch

Controls input power to the power supply.

▯ is ON, ◎ is OFF.

RUN / RAPID AUTO RESTART / SET Switch

RUN (up) position is for general torch operation.

RAPID AUTO RESTART (middle) position is for an uninterrupted restart, when cutting expanded metal or in trimming operations.

SET (down) position is for setting gas pressure and purging lines.

4

4.02 Preparations For Operating

Perform the following steps at the start of each operating session:

WARNING

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

A. Torch Parts Selection

Check the torch for proper assembly and appropriate torch parts. The torch parts must correspond with the type of operation, and with the amperage output of this Power Supply (80 amps maximum).

B. Torch Connection

Check that the torch is properly connected. Only Thermal Dynamics model SL100 Torches may be connected to this Power Supply.

C. Check Primary Input Power Source

1. Check the power source for proper input voltage. Make sure the input power source meets the power requirements for the unit per Section 2, Specifications.
2. Connect the input power cable (or close the main disconnect switch) to supply power to the system.

D. Gas Selection

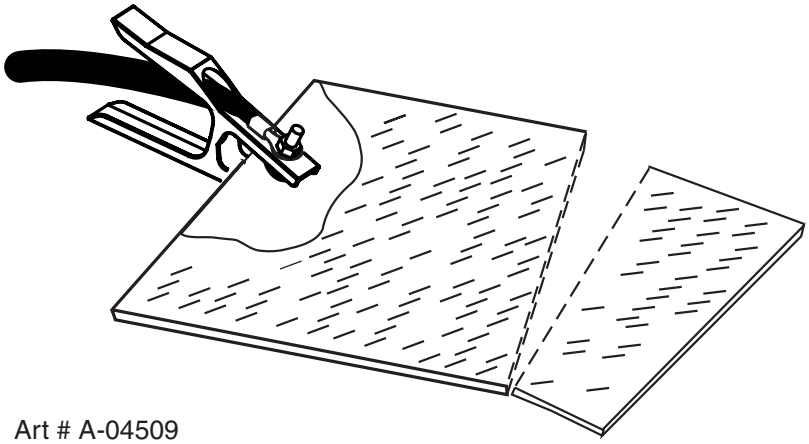
Ensure compressed air source meets requirements (refer to Section 3.4). Check connections and turn gas supply on.

4

Place the ON - OFF Switch on the Power Supply to the ON position. If the Run - Rapid Auto Restart - Set switch is in SET position, gas will flow. If the switch is in RUN or Rapid Auto Restart position there will be no gas flow.

E. Connect Work Cable

Clamp the work cable to the workpiece or cutting table. The area must be free from oil, paint and rust. Connect only to the main part of the workpiece; do not connect to the part to be cut off.



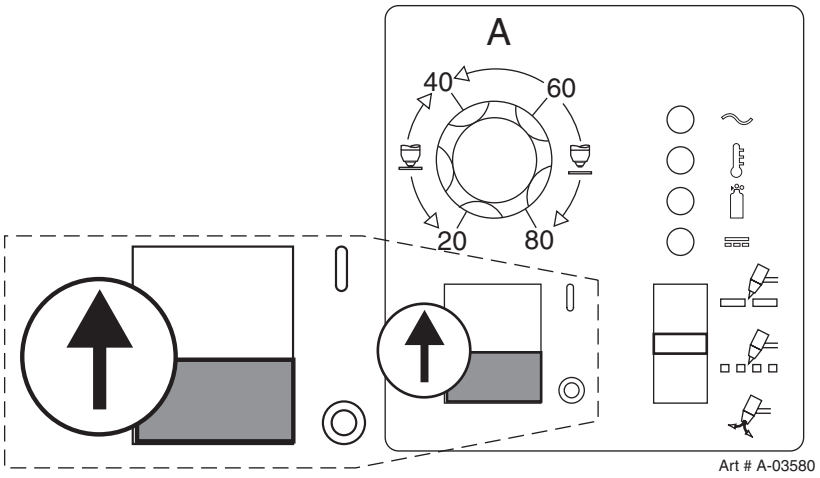
Art # A-04509

F. Power On

Place the Power Supply ON / OFF switch to the ON (up) position. AC indicator ~ turns on. Gas indicator turns on if there is sufficient gas pressure for power supply operation.

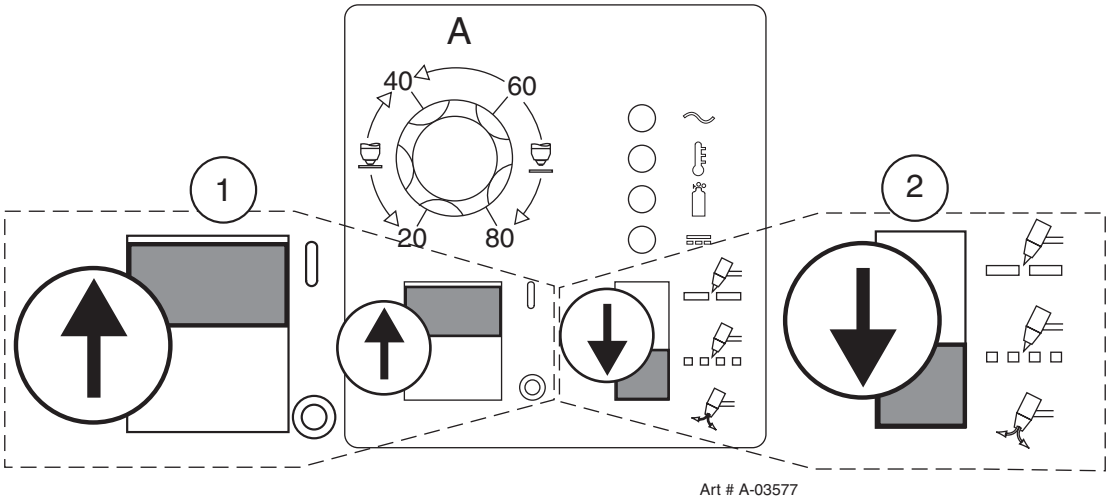
NOTE

Minimum pressure for power supply operation is lower than minimum for torch operation.



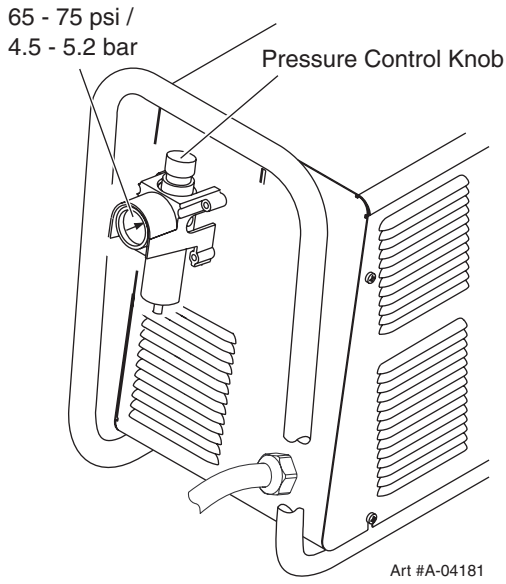
G. Set Operating Pressure

1. Place the Power Supply RUN / Rapid Auto Restart / SET switch to the SET (down) position. Gas will flow.



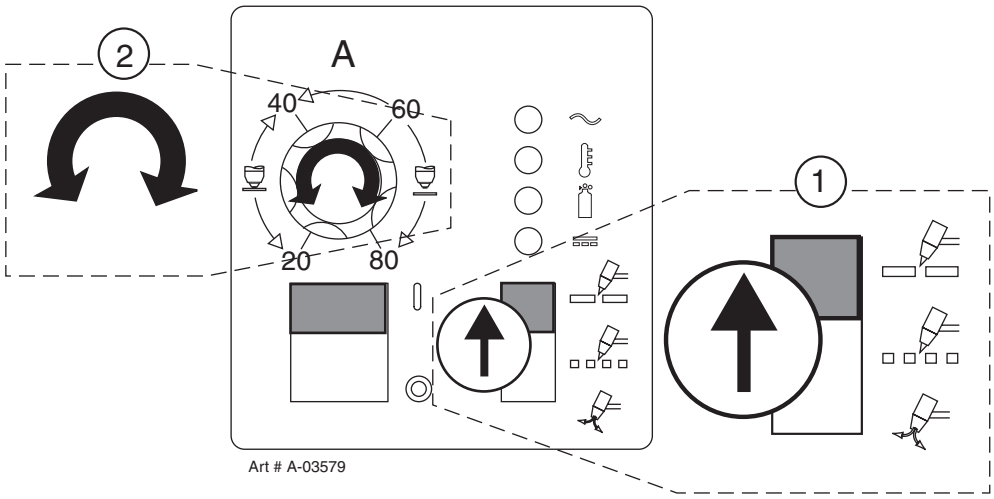
2. Adjust gas pressure per the settings chart.

CutMaster 101 Gas Pressure Settings		
Leads Length	Up to 25' (7.6 m)	Over 25' (7.6 m)
40A Cutting	65 psi 4.5 bar	70 psi 4.8 bar
60A Cutting	70 psi 4.8 bar	75 psi 5.2 bar
80A Cutting	65 psi 4.5 bar	70 psi 4.8 bar



H. Select Current Output Level

1. Place RUN / Rapid Auto Restart / SET to RUN (up) or Rapid Auto Restart (center) position. Gas flow stops.
2. Set the current output level, up to 80 amps for standoff cutting. At output settings higher than 40 amps, the power supply automatically reduces output current to 40 amps if the torch tip contacts the workpiece.



Art # A-03579

I. Cutting Operation

When the torch leaves the workpiece during cutting operations with the RUN / Rapid Auto Restart / SET switch in the RUN (up) position, there is a brief delay in restarting the pilot arc. With the switch in the 'Rapid Auto Restart' (middle) position, when the torch leaves the workpiece the pilot arc restarts instantly, and the cutting arc restarts instantly when the pilot arc contacts the workpiece. Use the 'Rapid Auto Restart' position when cutting expanded metal or gratings, or in trimming operations when an uninterrupted restart is desired.

J. Typical Cutting Speeds

Cutting speeds vary according to torch output amperage, the type of material being cut, and operator skill.

Output current setting or cutting speeds may be reduced to allow slower cutting while still producing cuts of excellent quality.

K. Postflow

De-activate the start signal (provided by the CNC Control) to stop the cutting arc. Gas continues to flow for approximately 6 seconds. During post - flow, if the user activates start signal, the pilot arc starts. The main arc transfers to the workpiece if the torch tip is within transfer distance to the workpiece.

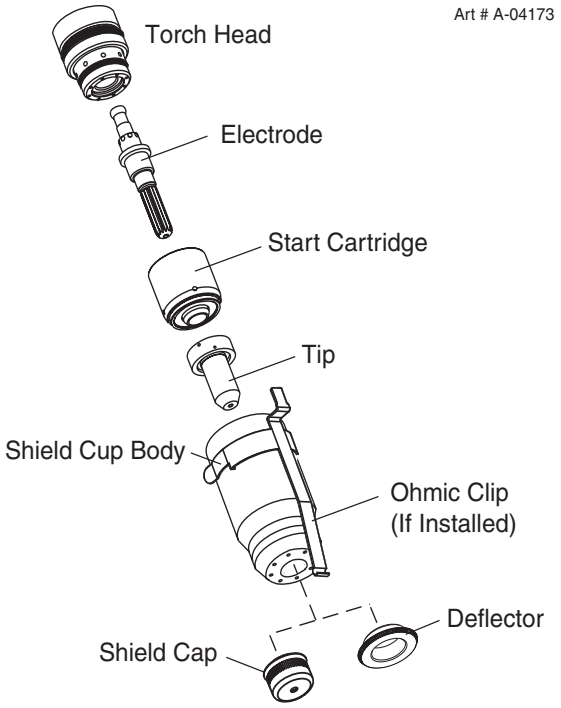
4.03 Selection, Inspection and Replacement of Consumable Torch Parts

The type of operation to be done determines the torch parts to be used. Change the torch parts for a different operation as follows:

WARNINGS

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

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



Consumable Parts

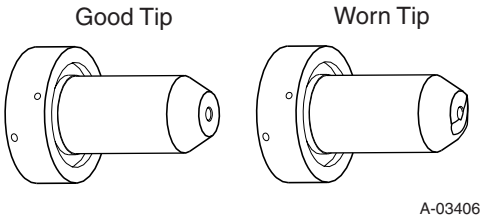
1. Unscrew and remove the shield cup assembly from the torch head. Inspect the cup for damage. Wipe it clean or replace if damaged.

NOTES

The shield cup holds the tip and start cartridge in place.

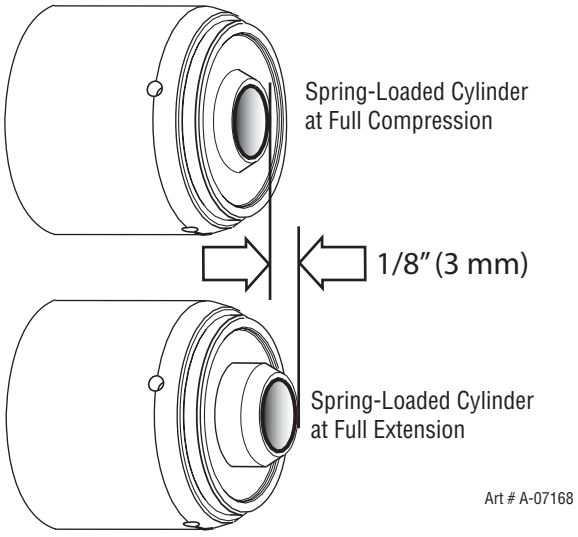
Slag built up on the shield cup that cannot be removed may affect the performance of the system.

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

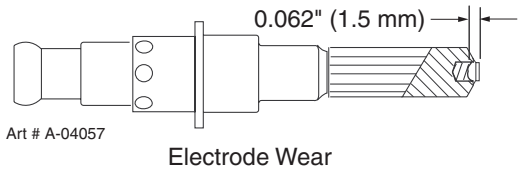


Tip Wear

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



4. Pull the Electrode straight out of the Torch Head. Check the end of the electrode for excessive wear. Replace the electrode if wear is greater than 0.062" / 1.5 mm or if the wear is excessively off-center. Refer to the following figure.



Electrode Wear

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

NOTE

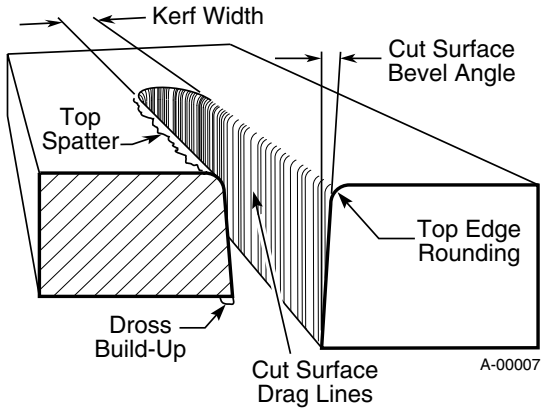
When the shield cup is properly installed, there is a slight gap between the shield cup and the torch head. Gas vents through this gap as part of normal operation. Do not attempt to force the shield cup to close this gap. Forcing the shield cup against the torch head can damage components.

4.04 Cut Quality

NOTES

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

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



Cut Quality Characteristics

A. Cut Surface

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

B. Nitride Build - Up

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

C. Bevel Angle

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

D. Top - Edge Rounding

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

E. Bottom Dross Buildup

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

F. Kerf Width

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

G. Top Spatter (Dross)

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

4.05 General Cutting Information

WARNINGS

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

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

CAUTION

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

NOTE

Handle torch leads with care and protect them from damage.

A. Piloting

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

B. Torch Standoff

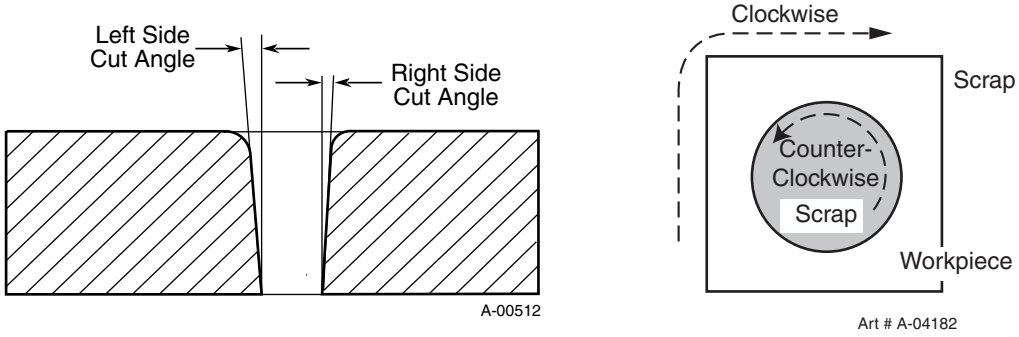
Improper standoff (the distance between the torch tip and workpiece) can adversely affect tip life as well as shield cup life. Standoff may also significantly affect the bevel angle. Reducing standoff will generally result in a more square cut.

C. Edge Starting

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

D. Direction of Cut

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



Side Characteristics Of Cut

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

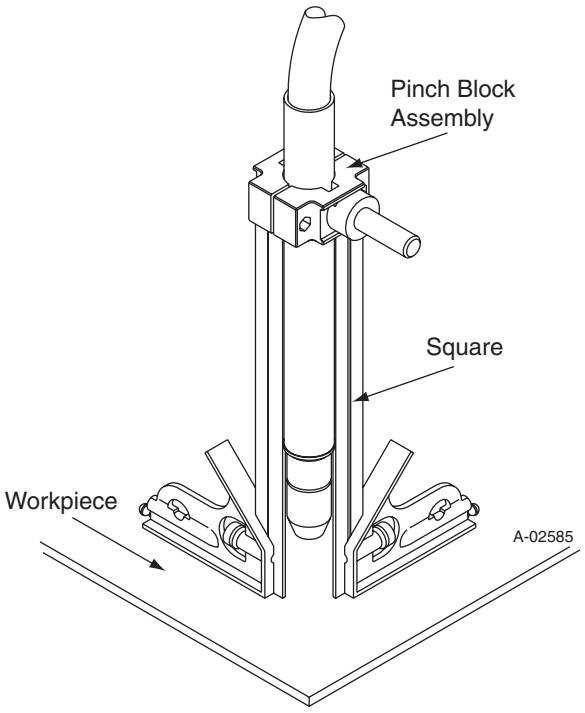
E. Dross

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

4.06 Torch Operation

A. Cutting

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



Checking Alignment

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

B. Travel Speed

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

1. **Straight Arc**

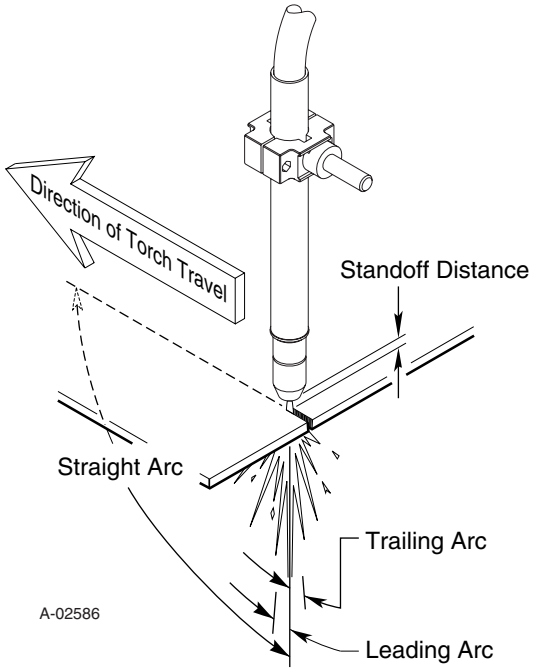
   A straight arc is perpendicular to the workpiece surface. This arc is generally recommended for the best cut using air plasma on stainless or aluminum.

2. **Leading Arc**

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

3. **Trailing Arc**

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



Machine Torch Operation

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

Travel speed also affects the bevel angle of a cut. When cutting in a circle or around a corner, slowing down the travel speed will result in a squarer cut.

C. Piercing With Machine Torch

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

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

4.07 Cutting Parameters

Cutting speed depends on material, thickness, and other factors. These may have an impact on system performance:

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

4.08 Cutting Specifications

Torch Specifications For CutMaster 101 Power Supplies	
Cutting Range	
Material	Most Metals
Up to	1 inch / 25.4 mm
Speed	10 ipm / 0.25 mpm
Pierce Rating	
Material	Carbon Steel
Thickness	3/8 inch / 9.5 mm
Transfer Distance	3/8 inch / 9.5 mm
Bevel Cut Capability	
Degrees	0° to 45°
Material Thickness	1/2 inch - 13 mm
Gas Requirement	
Type Gas	Air
Operating Pressure	65 - 75psi / 4.5 - 5.2 bar
Max Input Pressure	125 psi / 8.6 bar
Total Flow	490 scfh / 231 lpm

Cut Quality on Various Materials and Thicknesses

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

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

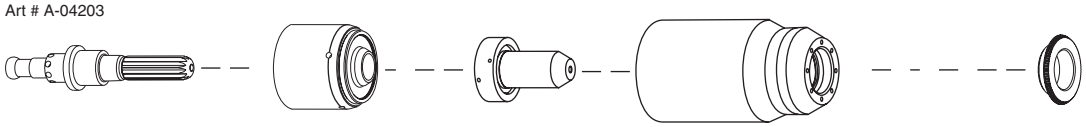
Description of Cut Characteristics:

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

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

4.09 Cutting Speed Chart: Mild Steel, SL100 Torch with Exposed Tip

Art # A-04203



Electrode 9-8215 | Start Cartridge 9-8213 | Tip | Shield Cup Body 9-8237 | Shield Cap, Deflector 9-8243

Material: Mild Steel

Torch: SL100 with Exposed Tip and Deflector **Table: Dry**
Power Supply: CutMaster 101 Automated **Gas: Compressed Air**

Material thickness			Tip	Current	Plasma Press.*	Pierce Height		Pierce Time	Arc voltage	Stand-off Height		Recommended Travel Speed	
In	GA	mm	Cat. #	Amps	PSI	In	mm	SEC	Volts	in	mm	IPM	mm/min
0.036	20	0.91	8-8208	40	65	0.188	4.8	0.00	96	0.19	4.80	341	8661.4
0.051		1.30	8-8208	40	65	0.188	4.8	0.00	97	0.19	4.80	300	7620
0.060	16	1.52	8-8208	40	65	0.188	4.8	0.10	98	0.19	4.80	265	6731
0.075	14	1.91	8-8208	40	65	0.188	4.8	0.30	100	0.19	4.80	190	4826
0.135	10	3.43	8-8208	40	65	0.188	4.8	0.40	101	0.19	4.80	120	3048
0.141		3.58	8-8208	40	65	0.188	4.8	0.50	102	0.19	4.80	112	2844.8
0.188		4.78	8-8208	40	65	0.188	4.8	0.60	107	0.19	4.80	60	1524
0.250		6.35	8-8208	40	65	0.188	4.8	1.00	111	0.19	4.80	40	1016
0.375		9.53	8-8208	40	65	NR	NR	NR	119	0.19	4.80	19.7	500.38
0.500		12.70	8-8208	40	65	NR	NR	NR	123	0.19	4.80	11.1	281.94
0.625		15.88	8-8208	40	65	NR	NR	NR	127	0.19	4.80	6	152.4
0.060	16	1.57	9-8210	60	70	0.188	4.8	0.00	110	0.19	4.80	293	7442.2
0.075	14	1.91	9-8210	60	70	0.188	4.8	0.10	110	0.19	4.80	288	7315.2
0.120	11	3.05	9-8210	60	70	0.188	4.8	0.10	111	0.19	4.80	273	6934.2
0.135	10	3.43	9-8210	60	70	0.188	4.8	0.10	111	0.19	4.80	215	5461
0.141		3.58	9-8210	60	70	0.188	4.8	0.15	112	0.19	4.80	177.6	4511.04
0.188		4.78	9-8210	60	70	0.188	4.8	0.20	114	0.19	4.80	137	3479.8
0.250		6.35	9-8210	60	70	0.188	4.8	0.30	116	0.19	4.80	82.4	2092.96
0.375		9.53	9-8210	60	70	0.188	4.8	0.50	118	0.19	4.80	42.4	1076.96
0.500		12.70	9-8210	60	70	0.188	4.8	0.75	119	0.19	4.80	26.3	668.02
0.625		15.88	9-8210	60	70	NR	NR	NR	127	0.19	4.80	17.4	441.96
0.750		19.05	9-8210	60	70	NR	NR	NR	126	0.19	4.80	16	406.4
1.000		25.40	9-8210	60	70	NR	NR	NR	128	0.19	4.80	12	304.8
0.047	18	1.19	9-8211	80	65	0.188	4.8	0.05	98	0.19	4.80	289	7340.6
0.120	11	3.05	9-8211	80	65	0.188	4.8	0.05	100	0.19	4.80	216	5486.4
0.135	10	3.43	9-8211	80	65	0.188	4.8	0.10	101	0.19	4.80	180	4572
0.188		4.78	9-8211	80	65	0.188	4.8	0.20	102	0.19	4.80	143	3632.2
0.250		6.35	9-8211	80	65	0.188	4.8	0.30	107	0.19	4.80	102.4	2600.96
0.375		9.53	9-8211	80	65	0.188	4.8	0.40	111	0.19	4.80	48	1219.2
0.500		12.70	9-8211	80	65	0.188	4.8	0.60	113	0.19	4.80	32.6	828.04
0.625		15.88	9-8211	80	65	0.188	4.8	0.75	116	0.19	4.80	24	609.6
0.750		19.05	9-8211	80	65	NR	NR	NR	121	0.19	4.80	18	457.2
0.875		22.23	9-8211	80	65	NR	NR	NR	126	0.19	4.80	14	355.6
1.000		25.40	9-8211	80	65	NR	NR	NR	132	0.19	4.80	10	254
1.250		31.75	9-8211	80		NR	NR	NR	136	0.19	4.80	2	50.8

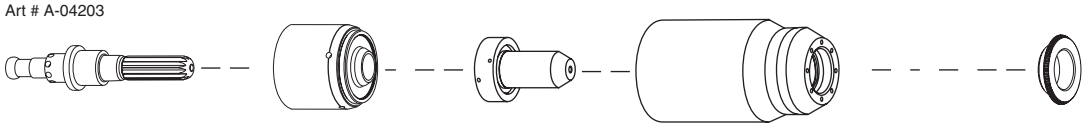
NOTES

** Gas pressure shown is for torches with leads up to 25' / 7.6 m long. For 50' / 15.2 m leads, increase pressure by 5 psi / 0.34 bar.*

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

4.10 Cutting Speed Charts: Stainless Steel, SL100 Torch with Exposed Tip

Art # A-04203



Electrode 9-8215 | Start Cartridge 9-8213 | Tip | Shield Cup Body 9-8237 | Shield Cap, Deflector 9-8243

Material: Stainless Steel

Torch: SL100 with Exposed Tip and Deflector **Table: Dry**

Power Supply: CutMaster 101 Automated **Gas: Compressed Air**

Material thickness			Tip	Current	Plasma Press.*	Pierce Height		Pierce Time	Arc voltage	Stand-off Height		Recommended Travel Speed	
In	GA	mm	Cat. #	Amps	PSI	In	mm	SEC	Volts	in	mm	IPM	mm/min
0.038	20	0.95	8-8208	40	65	0.188	4.8	0.00	103	0.19	4.80	357	9067.8
0.050	18	1.27	8-8208	40	65	0.188	4.8	0.00	104	0.19	4.80	287	7289.8
0.063	16	1.60	8-8208	40	65	0.188	4.8	0.10	104	0.19	4.80	244	6197.6
0.078	14	1.98	8-8208	40	65	0.188	4.8	0.30	105	0.19	4.80	125	3175
0.135		3.43	8-8208	40	65	0.188	4.8	0.40	105	0.19	4.80	106	2692.4
0.141	10	3.58	8-8208	40	65	0.188	4.8	0.50	106	0.19	4.80	104	2641.6
0.188		4.78	8-8208	40	65	0.188	4.8	0.60	106	0.19	4.80	75	1905
0.250		6.35	8-8208	40	65	0.188	4.8	1.00	109	0.19	4.80	46.6	1183.64
0.375		9.53	8-8208	40	65	NR	NR	NR	109	0.19	4.80	31.5	800.1
0.500		12.70	8-8208	40	65	NR	NR	NR	112	0.19	4.80	17.4	441.96
0.625		15.88	8-8208	40	65	NR	NR	NR	114	0.19	4.80	10	254
0.063	16	1.57	9-8210	60	70	0.188	4.8	0.00	107	0.19	4.80	177	4495.8
0.078	14	1.98	9-8210	60	70	0.188	4.8	0.10	108	0.19	4.80	169	4292.6
0.125	11	3.18	9-8210	60	70	0.188	4.8	0.10	109	0.19	4.80	140	3556
0.135		3.43	9-8210	60	70	0.188	4.8	0.10	110	0.19	4.80	117	2971.8
0.141	10	3.58	9-8210	60	70	0.188	4.8	0.15	111	0.19	4.80	103	2616.2
0.188		4.78	9-8210	60	70	0.188	4.8	0.20	112	0.19	4.80	90	2286
0.250		6.35	9-8210	60	70	0.188	4.8	0.30	113	0.19	4.80	68.8	1747.52
0.375		9.53	9-8210	60	70	0.188	4.8	0.50	115	0.19	4.80	35	889
0.500		12.70	9-8210	60	70	0.188	4.8	0.75	121	0.19	4.80	21.3	541.02
0.625		15.88	9-8210	60	70	NR	NR	NR	127	0.19	4.80	15.9	403.86
0.750		19.05	9-8210	60	70	NR	NR	NR	131	0.19	4.80	12.5	317.5
1.000		25.40	9-8210	60	70	NR	NR	NR	135	0.19	4.80	6	152.4
0.048	18	1.22	9-8211	80	65	0.188	4.8	0.05	102	0.19	4.80	411	10439.4
0.125	11	3.18	9-8211	80	65	0.188	4.8	0.05	104	0.19	4.80	291	7391.4
0.135		3.43	9-8211	80	65	0.188	4.8	0.10	105	0.19	4.80	270	6858
0.188		4.78	9-8211	80	65	0.188	4.8	0.20	106	0.19	4.80	171	4343.4
0.250		6.35	9-8211	80	65	0.188	4.8	0.30	107	0.19	4.80	88	2235.2
0.375		9.53	9-8211	80	65	0.188	4.8	0.40	111	0.19	4.80	47	1193.8
0.500		12.70	9-8211	80	65	0.188	4.8	0.60	113	0.19	4.80	28.8	731.52
0.625		15.88	9-8211	80	65	0.188	4.8	0.75	117	0.19	4.80	19.5	495.3
0.750		19.05	9-8211	80	65	NR	NR	NR	120	0.19	4.80	15.6	396.24
0.875		22.23	9-8211	80	65	NR	NR	NR	123	0.19	4.80	12	304.8
1.000		25.40	9-8211	80	65	NR	NR	NR	126	0.19	4.80	10	254
1.250		31.75	9-8211	80	65	NR	NR	NR	130	0.19	4.80	6	152.4

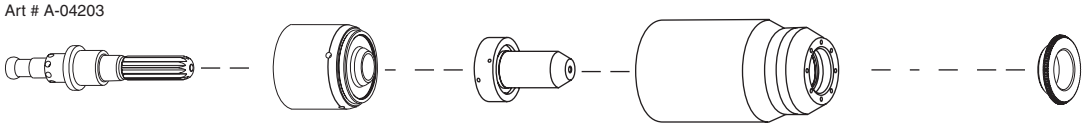
NOTES

**Gas pressure shown is for torches with leads up to 25' / 7.6 m long. For 50' / 15.2 m leads, increase pressure by 5 psi / 0.34 bar.*

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

4.11 Cutting Speed Charts: Aluminum, SL100 Torch with Exposed Tip

Art # A-04203



Electrode 9-8215 | Start Cartridge 9-8213 | Tip | Shield Cup Body 9-8237 | Shield Cap, Deflector 9-8243

Material: Aluminum

Torch: SL100 with Exposed Tip **Table: Dry**

Power Supply: CutMaster 101 Automated **Gas: Compressed Air**

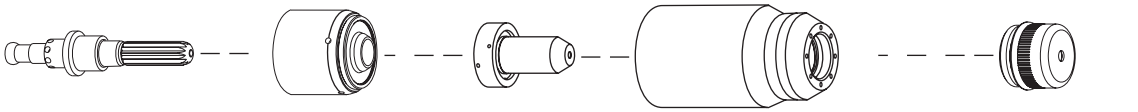
Material thickness			Tip	Current	Plasma Press.*	Pierce Height		Pierce Time	Arc voltage	Stand-off Height		Recommended Travel Speed	
In	GA	mm	Cat. #	Amps	PSI	In	mm	SEC	Volts	in	mm	IPM	mm/min
0.040	20	1.02	8-8208	40	65	0.188	4.8	0.00	94	0.19	4.80	440	11176
0.052	18	1.32	8-8208	40	65	0.188	4.8	0.00	96	0.19	4.80	440	11176
0.064	16	1.63	8-8208	40	65	0.188	4.8	0.10	98	0.19	4.80	440	11176
0.079	14	2.01	8-8208	40	65	0.188	4.8	0.30	102	0.19	4.80	297	7543.8
0.125		3.18	8-8208	40	65	0.188	4.8	0.35	106	0.19	4.80	145.6	3698.24
0.135		3.43	8-8208	40	65	0.188	4.8	0.40	108	0.19	4.80	135	3429
0.187		4.75	8-8208	40	65	0.188	4.8	0.60	112	0.19	4.80	98	2489.2
0.250		6.35	8-8208	40	65	0.188	4.8	1.00	115	0.19	4.80	50.4	1280.16
0.375		9.53	8-8208	40	65	NR	NR	NR	122	0.19	4.80	22	558.8
0.500		12.70	8-8208	40	65	NR	NR	NR	126	0.19	4.80	13.5	342.9
0.625		15.88	8-8208	40	65	NR	NR	NR	130	0.19	4.80	8	203.2
0.034	22	1.57	9-8210	60	70	0.2	5.1	0.00	95	0.19	4.80	440	11176
0.079	14	2.01	9-8210	60	70	0.2	5.1	0.10	98	0.19	4.80	440	11176
0.125		3.18	9-8210	60	70	0.2	5.1	0.10	103	0.19	4.80	440	11176
0.135		3.43	9-8210	60	70	0.2	5.1	0.10	108	0.19	4.80	340	8636
0.141		3.58	9-8210	60	70	0.2	5.1	0.15	111	0.19	4.80	275	6985
0.188		4.78	9-8210	60	70	0.2	5.1	0.20	115	0.19	4.80	170	4318
0.250		6.35	9-8210	60	70	0.2	5.1	0.30	119	0.19	4.80	94.4	2397.76
0.375		9.53	9-8210	60	70	0.2	5.1	0.50	122	0.19	4.80	57.4	1457.96
0.500		12.70	9-8210	60	70	0.2	5.1	0.75	128	0.19	4.80	34.4	873.76
0.625		15.88	9-8210	60	70	NR	NR	NR	131	0.19	4.80	23	584.2
0.750		19.05	9-8210	60	70	NR	NR	NR	134	0.19	4.80	17.6	447.04
1.000		25.40	9-8210	60	70	NR	NR	NR	140	0.19	4.80	8	203.2
0.047	19	1.19	9-8211	80	65	0.2	5.1	0.00	101	0.19	4.80	419	10642.6
0.125		3.18	9-8211	80	65	0.2	5.1	0.05	101	0.19	4.80	301	7645.4
0.135		3.43	9-8211	80	65	0.2	5.1	0.10	101	0.19	4.80	280	7112
0.188		4.78	9-8211	80	65	0.2	5.1	0.20	101	0.19	4.80	182	4622.8
0.250		6.35	9-8211	80	65	0.2	5.1	0.30	108	0.19	4.80	124	3149.6
0.375		9.53	9-8211	80	65	0.2	5.1	0.40	115	0.19	4.80	65.6	1666.24
0.500		12.70	9-8211	80	65	0.2	5.1	0.60	118	0.19	4.80	44.8	1137.92
0.625		15.88	9-8211	80	65	0.2	5.1	0.75	120	0.19	4.80	35	889
0.750		19.05	9-8211	80	65	NR	NR	NR	127	0.19	4.80	20	508
0.875		22.23	9-8211	80	65	NR	NR	NR	140	0.19	4.80	10	254
1.000		25.40	9-8211	80	65	NR	NR	NR	154	0.19	4.80	5	127
1.250		31.75	9-8211	80	65	NR	NR	NR	160	0.19	4.80	2	50.8

NOTES

** Gas pressure shown is for torches with leads up to 25' / 7.6 m long. For 50' / 15.2 m leads, increase pressure by 5 psi / 0.34 bar.*

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

4.12 Cutting Speed Charts: Mild Steel, SL100 Torch with Shielded Tip



Electrode 9-8215 | Start Cartridge 9-8213 | Tip | Shield Cup Body 9-8237 | Shield Cap, Machine

Art # A-04204

Material: Mild Steel

Torch: SL100 with Shielded Tip **Table: Dry**

Power Supply: CutMaster 101 Automated **Gas: Compressed Air**

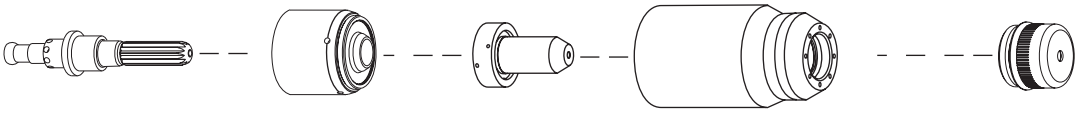
Material thickness			Torch Tip	Shield Cap	Current	Plasma Press.*	Pierce Height		Pierce Time	Arc voltage	Stand-off Height		Recommended Travel speed	
In	GA	mm	Cat. #	Cat. #	Amps	PSI	In	mm	SEC	Volts	in	mm	IPM	mm/min
0.036	20	0.9144	8-8208	9-8245	40	65	1.88	4.8	0.00	102	0.19	4.80	170	4318
0.051		1.30	8-8208	9-8245	40	65	1.88	4.8	0.00	103	0.19	4.80	148	3759.2
0.060	16	1.52	8-8208	9-8245	40	65	1.88	4.8	0.10	104	0.19	4.80	133	3378.2
0.075	14	1.91	8-8208	9-8245	40	65	1.88	4.8	0.30	106	0.19	4.80	95	2413
0.135	10	3.43	8-8208	9-8245	40	65	1.88	4.8	0.40	110	0.19	4.80	65	1651
0.188		4.78	8-8208	9-8245	40	65	1.88	4.8	0.60	113	0.19	4.80	30	762
0.250		6.35	8-8208	9-8245	40	65	1.88	4.8	1.00	117	0.19	4.80	23	584.2
0.375		9.53	8-8208	9-8245	40	65	NR	NR	NR	126	0.19	4.80	10	254
0.500		12.70	8-8208	9-8245	40	65	NR	NR	NR	122	0.19	4.80	7	177.8
0.625		15.88	8-8208	9-8245	40	65	NR	NR	NR	135	0.19	4.80	3	76.2
0.060	16	1.57	9-8210	9-8238	60	70	1.88	4.8	0.00	117	0.19	4.80	235	5969
0.075	14	1.91	9-8210	9-8238	60	70	1.88	4.8	0.10	118	0.19	4.80	190	4826
0.120	11	3.05	9-8210	9-8238	60	70	1.88	4.8	0.10	118	0.19	4.80	218	5537.2
0.135	10	3.43	9-8210	9-8238	60	70	1.88	4.8	0.10	119	0.19	4.80	142	3606.8
0.188		4.78	9-8210	9-8238	60	70	1.88	4.8	0.20	120	0.19	4.80	117	2971.8
0.250		6.35	9-8210	9-8238	60	70	1.88	4.8	0.30	123	0.19	4.80	66	1676.4
0.375		9.53	9-8210	9-8238	60	70	1.88	4.8	0.50	119	0.19	4.80	34	863.6
0.500		12.70	9-8210	9-8238	60	70	1.88	4.8	0.75	121	0.19	4.80	23.4	594.36
0.625		15.88	9-8210	9-8238	60	70	NR	NR	NR	135	0.19	4.80	14	355.6
0.750		19.05	9-8210	9-8238	60	70	NR	NR	NR	130	0.19	4.80	13.6	345.44
1.000		25.40	9-8210	9-8238	60	70	NR	NR	NR	135	0.19	4.80	12.8	325.12
0.047	18	0.05	9-8211	9-8239	80	65	1.88	4.8	0.00	104	0.19	4.80	231	5867.4
0.120	11	0.13	9-8211	9-8239	80	65	1.88	4.8	0.10	106	0.19	4.80	173	4394.2
0.135		3.43	9-8211	9-8239	80	65	1.88	4.8	0.10	106	0.19	4.80	165	4191
0.188	7	4.78	9-8211	9-8239	80	65	1.88	4.8	0.20	103	0.19	4.80	125	3175
0.250		6.35	9-8211	9-8239	80	65	1.88	4.8	0.30	113	0.19	4.80	82	2082.8
0.375		9.53	9-8211	9-8239	80	65	1.88	4.8	0.40	118	0.19	4.80	38	965.2
0.500		12.70	9-8211	9-8239	80	65	1.88	4.8	0.60	115	0.19	4.80	29.6	751.84
0.625		15.88	9-8211	9-8239	80	65	1.88	4.8	0.75	123	0.19	4.80	19	482.6
0.750		19.05	9-8211	9-8239	80	65	NR	NR	NR	128	0.19	4.80	14	355.6
0.875		22.23	9-8211	9-8239	80	65	NR	NR	NR	134	0.19	4.80	11	279.4
1.000		25.40	9-8211	9-8239	80	65	NR	NR	NR	129	0.19	4.80	9.2	233.68
1.250		31.75	9-8211	9-8239	80	65	NR	NR	NR	134	0.19	4.80	5	127

NOTES

** Gas pressure shown is for torches with leads up to 25' / 7.6 m long. For 50' / 15.2 m leads, increase pressure by 5 psi / 0.34 bar.*

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

4.13 Cutting Speed Charts: Stainless Steel, SL100 Torch with Shielded Tip



Electrode 9-8215 | Start Cartridge 9-8213 | Tip | Shield Cup Body 9-8237 | Shield Cap, Machine

Art # A-04204

Material: Stainless Steel

Torch: SL100 with Shielded Tip **Table: Dry**

Power Supply: CutMaster 101 Automated **Gas: Compressed Air**

Material thickness			Torch Tip	Shield Cap	Current	Plasma Press.*	Pierce Height		Pierce Time	Arc voltage	Stand-off Height		Recommended Travel Speed	
In	GA	mm	Cat. #	Cat. #	Amps	PSI	In	mm	SEC	Volts	in	mm	IPM	mm/min
0.038	20		8-8208	9-8245	40	65	0.188	4.8	0.00	109	0.19	4.8	179	4546.6
0.050	18	1.27	8-8208	9-8245	40	65	0.188	4.8	0.00	109	0.19	4.8	150	3810
0.063	16	1.60	8-8208	9-8245	40	65	0.188	4.8	0.10	110	0.19	4.8	122	3098.8
0.078	14	1.98	8-8208	9-8245	40	65	0.188	4.8	0.30	111	0.19	4.8	66	1676.4
0.135		3.43	8-8208	9-8245	40	65	0.188	4.8	0.40	111	0.19	4.8	66	1676.4
0.141	10	3.58	8-8208	9-8245	40	65	0.188	4.8	0.50	112	0.19	4.8	65	1651
0.187		4.75	8-8208	9-8245	40	65	0.188	4.8	0.60	112	0.19	4.8	38	965.2
0.250		6.35	8-8208	9-8245	40	65	0.188	4.8	1.00	116	0.19	4.8	23	584.2
0.375		9.53	8-8208	9-8245	40	65	NR	NR	NR	116	0.19	4.8	16	406.4
0.500		12.70	8-8208	9-8245	40	65	NR	NR	NR	119	0.19	4.8	9	228.6
0.625		15.88	8-8208	9-8245	40	65	NR	NR	NR	121	0.19	4.8	5	127
0.063	16	1.57	9-8210	9-8238	60	70	0.188	4.8	0.00	113	0.19	4.8	142	3606.8
0.078	14	1.98	9-8210	9-8238	60	70	0.188	4.8	0.10	115	0.19	4.8	134	3403.6
0.125	11	3.18	9-8210	9-8238	60	70	0.188	4.8	0.10	116	0.19	4.8	112	2844.8
0.135		3.43	9-8210	9-8238	60	70	0.188	4.8	0.10	118	0.19	4.8	82	2082.8
0.141	10	3.58	9-8210	9-8238	60	70	0.188	4.8	0.15	118	0.19	4.8	82	2082.8
0.187		4.75	9-8210	9-8238	60	70	0.188	4.8	0.20	119	0.19	4.8	75	1905
0.250		6.35	9-8210	9-8238	60	70	0.188	4.8	0.30	120	0.19	4.8	55	1397
0.375		9.53	9-8210	9-8238	60	70	0.188	4.8	0.50	122	0.19	4.8	28	711.2
0.500		12.70	9-8210	9-8238	60	70	0.188	4.8	0.75	128	0.19	4.8	17	431.8
0.625		15.88	9-8210	9-8238	60	70	NR	NR	NR	135	0.19	4.8	13	330.2
0.750		19.05	9-8210	9-8238	60	70	NR	NR	NR	139	0.19	4.8	10	254
1.000		25.40	9-8210	9-8238	60	70	NR	NR	NR	142	0.19	4.8	4	101.6
0.052	18	0.05	9-8211	9-8239	80	65	0.188	4.8	0.00	108	0.19	4.8	329	8356.6
0.125	11		9-8211	9-8239	80	65	0.188	4.8	0.00	110	0.19	4.8	233	5918.2
0.135		3.43	9-8211	9-8239	80	65	0.188	4.8	0.10	111	0.19	4.8	220	5588
0.172		4.37	9-8211	9-8239	80	65	0.188	4.8	0.20	112	0.19	4.8	137	3479.8
0.250		6.35	9-8211	9-8239	80	65	0.188	4.8	0.30	113	0.19	4.8	71	1803.4
0.375		9.53	9-8211	9-8239	80	65	0.188	4.8	0.40	118	0.19	4.8	38	965.2
0.500		12.70	9-8211	9-8239	80	65	0.188	4.8	0.60	120	0.19	4.8	23	584.2
0.625		15.88	9-8211	9-8239	80	65	0.188	4.8	0.75	124	0.19	4.8	16	406.4
0.750		19.05	9-8211	9-8239	80	65	NR	NR	NR	127	0.19	4.8	12	304.8
0.875		22.23	9-8211	9-8239	80	65	NR	NR	NR	130	0.19	4.8	10	254
1.000		25.40	9-8211	9-8239	80	65	NR	NR	NR	134	0.19	4.8	8	203.2

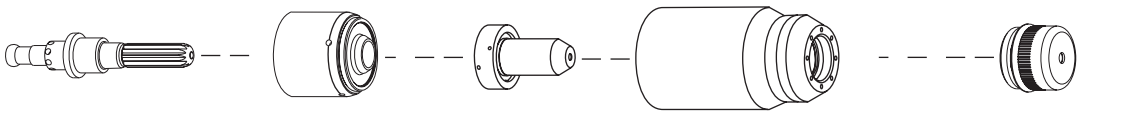
4

NOTES

** Gas pressure shown is for torches with leads up to 25' / 7.6 m long. For 50' / 15.2 m leads, increase pressure by 5 psi / 0.34 bar.*

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

4.14 Cutting Speed Charts: Aluminum, SL100 Torch with Shielded Tip



Electrode 9-8215 | Start Cartridge 9-8213 | Tip | Shield Cup Body 9-8237 | Shield Cap, Machine

Art # A-04204

Material: Aluminum

Torch: SL100 with Shielded Tip **Table: Dry**

Power Supply: CutMaster 101 Automated **Gas: Compressed Air**

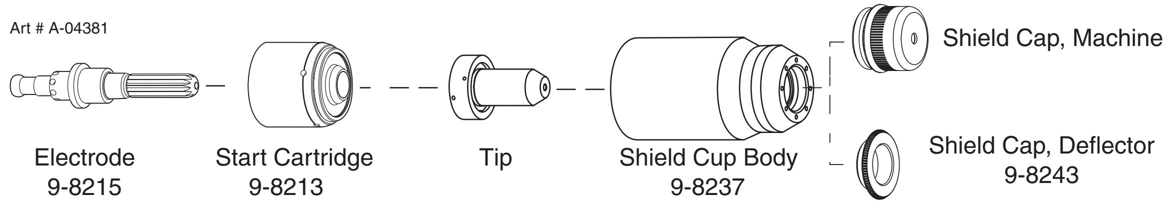
Material thickness			Torch Tip	Shield Cap	Current	Plasma Press.*	Pierce Height		Pierce Time	Arc voltage	Stand-off Height		Recommended Travel Speed	
In	GA	mm	Cat. #	Cat. #	Amps	PSI	In	mm	SEC	Volts	in	mm	IPM	mm/min
0.04	20	1.02	8-8208	9-8245	40	65	0.188	4.8	0.00	100	0.19	4.8	220	5588
0.051		1.30	8-8208	9-8245	40	65	0.188	4.8	0.00	102	0.19	4.8	220	5588
0.064	16	1.63	8-8208	9-8245	40	65	0.188	4.8	0.10	104	0.19	4.8	220	5588
0.079	14	2.01	8-8208	9-8245	40	65	0.188	4.8	0.30	108	0.19	4.8	149	3784.6
0.125		3.18	8-8208	9-8245	40	65	0.188	4.8	0.35	112	0.19	4.8	73	1854.2
0.135		3.43	8-8208	9-8245	40	65	0.188	4.8	0.40	115	0.19	4.8	69	1752.6
0.187		4.75	8-8208	9-8245	40	65	0.188	4.8	0.60	118	0.19	4.8	50	1270
0.250		6.35	8-8208	9-8245	40	65	0.188	4.8	1.00	122	0.19	4.8	25	635
0.375		9.53	8-8208	9-8245	40	65	NR	NR	NR	129	0.19	4.8	11	279.4
0.500		12.70	8-8208	9-8245	40	65	NR	NR	NR	134	0.19	4.8	7	177.8
0.625		15.88	8-8208	9-8245	40	65	NR	NR	NR	138	0.19	4.8	4	101.6
0.034	22	1.57	9-8210	9-8238	60	70	0.188	4.8	0.00	101	0.19	4.8	352	8940.8
0.064	16	1.63	9-8210	9-8238	60	70	0.188	4.8	0.10	105	0.19	4.8	352	8940.8
0.125		3.18	9-8210	9-8238	60	70	0.188	4.8	0.10	109	0.19	4.8	352	8940.8
0.135		3.43	9-8210	9-8238	60	70	0.188	4.8	0.10	112	0.19	4.8	272	6908.8
0.141		3.58	9-8210	9-8238	60	70	0.188	4.8	0.15	118	0.19	4.8	220	5588
0.187		4.75	9-8210	9-8238	60	70	0.188	4.8	0.20	122	0.19	4.8	136	3454.4
0.250		6.35	9-8210	9-8238	60	70	0.188	4.8	0.30	126	0.19	4.8	76	1930.4
0.375		9.53	9-8210	9-8238	60	70	0.188	4.8	0.50	129	0.19	4.8	46	1168.4
0.500		12.70	9-8210	9-8238	60	70	0.188	4.8	0.75	136	0.19	4.8	28	711.2
0.625		15.88	9-8210	9-8238	60	70	NR	NR	NR	139	0.19	4.8	19	482.6
0.750		19.05	9-8210	9-8238	60	70	NR	NR	NR	142	0.19	4.8	14	355.6
1.000		25.40	9-8210	9-8238	60	70	NR	NR	NR	150	0.19	4.8	4	101.6
0.047	18	0.05	9-8211	9-8239	80	65	0.188	4.8	0.00	107	0.19	4.8	335	8509
0.125		0.13	9-8211	9-8239	80	65	0.188	4.8	0.10	107	0.19	4.8	241	6121.4
0.135		3.43	9-8211	9-8239	80	65	0.188	4.8	0.10	107.0	0.19	4.8	225	5715
0.187		4.75	9-8211	9-8239	80	65	0.188	4.8	0.20	107	0.19	4.8	146	3708.4
0.250		6.35	9-8211	9-8239	80	65	0.188	4.8	0.30	114	0.19	4.8	99	2514.6
0.375		9.53	9-8211	9-8239	80	65	0.188	4.8	0.40	122	0.19	4.8	52	1320.8
0.500		12.70	9-8211	9-8239	80	65	0.188	4.8	0.60	125	0.19	4.8	36	914.4
0.625		15.88	9-8211	9-8239	80	65	0.188	4.8	0.75	130	0.19	4.8	26	660.4
0.750		19.05	9-8211	9-8239	80	65	NR	NR	NR	135	0.19	4.8	16	406.4
0.875		22.23	9-8211	9-8239	80	65	NR	NR	NR	148	0.19	4.8	8	203.2
1.000		25.40	9-8211	9-8239	80	65	NR	NR	NR	164	0.19	4.8	4	101.6
1.250		31.75	9-8211	9-8239	80	65	NR	NR	NR	170	0.19	4.8	2	50.8

NOTES

** Gas pressure shown is for torches with leads up to 25' / 7.6 m long. For 50' / 15.2 m leads, increase pressure by 5 psi / 0.34 bar.*

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

4.15 Operator's Custom Cutting Speed Charts

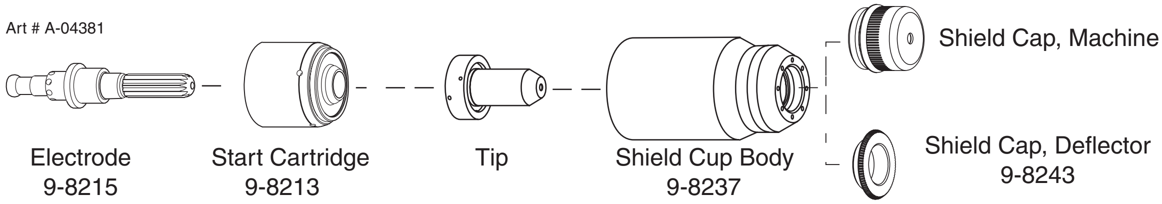


Material:

Torch: SL100 with Shielded Tip **Table: Dry**

Power Supply: CutMaster 101 Automated **Gas: Compressed Air**

Material thickness			Torch Tip	Shield Cap	Current	Plasma Press.*	Pierce Height		Pierce Time	Arc voltage	Stand-off Height		Recommended Travel Speed	
In	GA	mm	Cat. #	Cat. #	Amps	PSI	In	mm	SEC	Volts	in	mm	IPM	mm/min

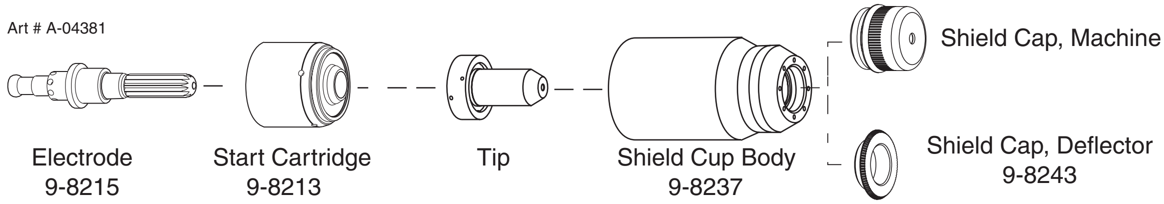


Material:

Torch: SL100 with Shielded Tip **Table: Dry**

Power Supply: CutMaster 101 Automated **Gas: Compressed Air**

Material thickness			Torch Tip	Shield Cap	Current	Plasma Press.*	Pierce Height		Pierce Time	Arc voltage	Stand-off Height		Recommended Travel Speed	
In	GA	mm	Cat. #	Cat. #	Amps	PSI	In	mm	SEC	Volts	in	mm	IPM	mm/min

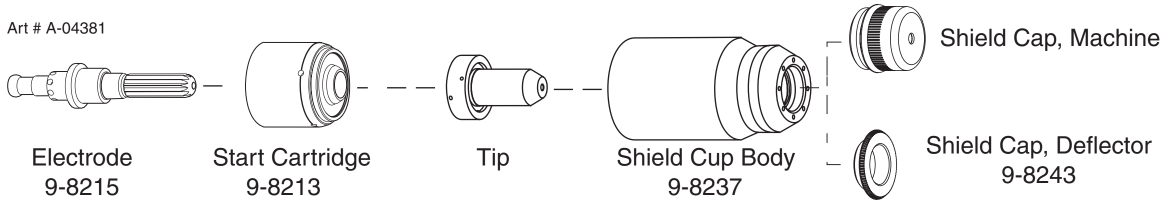


Material:

Torch: SL100 with Shielded Tip | **Table: Dry**

Power Supply: CutMaster 101 Automated | **Gas: Compressed Air**

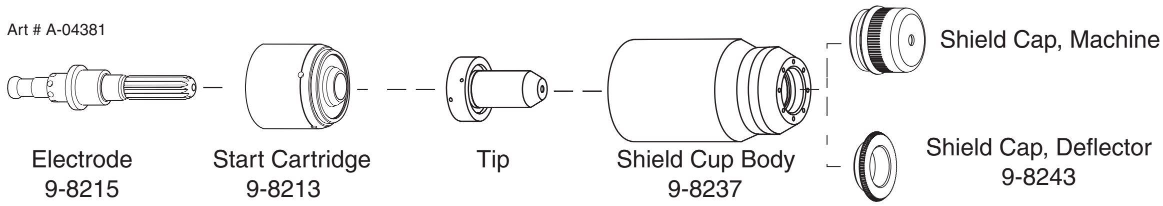
Material thickness			Torch Tip	Shield Cap	Current	Plasma Press.*	Pierce Height		Pierce Time	Arc voltage	Stand-off Height		Recommended Travel Speed	
In	GA	mm	Cat. #	Cat. #	Amps	PSI	In	mm	SEC	Volts	in	mm	IPM	mm/min



Material:

Torch: SL100 with Shielded Tip **Table: Dry**
Power Supply: CutMaster 101 Automated **Gas: Compressed Air**

Material thickness			Torch Tip	Shield Cap	Current	Plasma Press.*	Pierce Height		Pierce Time	Arc voltage	Stand-off Height		Recommended Travel Speed	
In	GA	mm	Cat. #	Cat. #	Amps	PSI	In	mm	SEC	Volts	in	mm	IPM	mm/min



Material:

Torch: SL100 with Shielded Tip **Table: Dry**

Power Supply: CutMaster 101 Automated **Gas: Compressed Air**

Material thickness			Torch Tip	Shield Cap	Current	Plasma Press.*	Pierce Height		Pierce Time	Arc voltage	Stand-off Height		Recommended Travel Speed	
In	GA	mm	Cat. #	Cat. #	Amps	PSI	In	mm	SEC	Volts	in	mm	IPM	mm/min

4

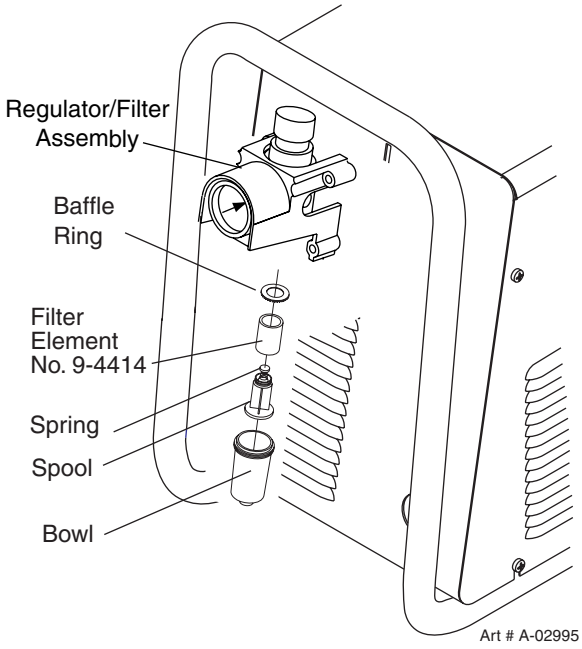
SECTION 5:
SERVICE

5.01 General Maintenance

A. 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 (Appendix 3), and either cleaned or replaced.

1. Remove power from the power supply; turn off the gas supply and bleed down the system. Turn the regulator adjustment knob to the 'zero' setting.
2. Unscrew the bowl on the bottom of the Regulator/Filter Assembly. The filter element will be visible and still attached to the main body of the Regulator/Filter.
3. Grasp the filter element and unscrew it from the Regulator/Filter 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.



Regulator/Filter Element Replacement

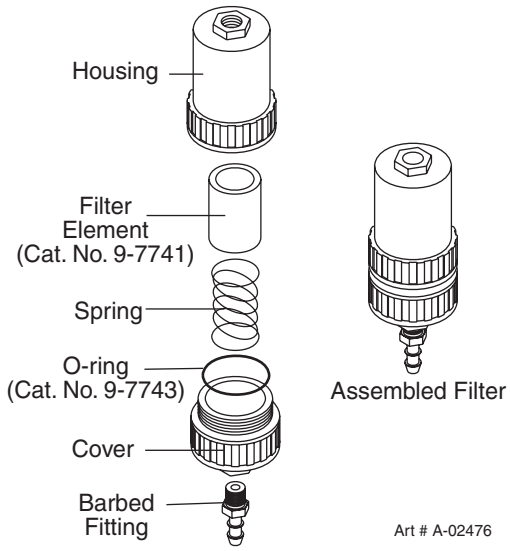
6. Reinstall the bowl.
7. Turn on the air supply.

B. Single-Stage Filter Element Replacement

These instructions apply to power supplies where the 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.

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.
4. Turn the Cover counter-clockwise and remove it from the Filter Housing. The Filter Element is located inside the Housing.



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.
7. Replace Housing on Cover.
8. Reattach gas supply.

NOTE

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

C. Optional Two-Stage Filter Element Replacement

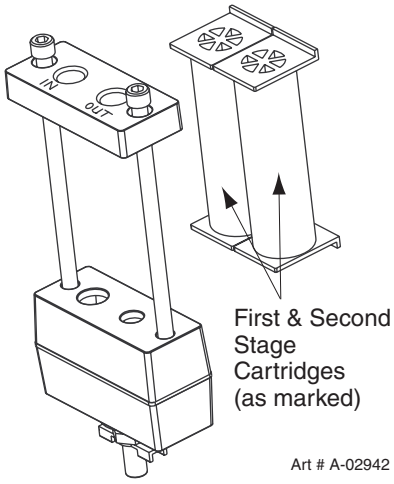
The Two-Stage Air Filter has two Filter Elements. When the Filter Elements become dirty the Power Supply will continue to operate but cut quality may become unacceptable. Refer to Section 6, Parts List, for replacement filter element catalog number.

1. Shut off primary input power.
2. Shut off air supply and bleed down system.

WARNING

Always turn off the air supply and bleed down 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.
4. Note the location and orientation of the old Filter Elements.
5. Slide out the old Filter Elements.



Optional Two-Stage Filter Replacement

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). Improper torque may damage the gasket.
8. Slowly apply air pressure to the assembly, checking for leaks.

NOTE

A small amount of air leakage from the bottom fitting is normal.

D. Cleaning Torch

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

WARNINGS

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

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

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

CAUTION

Dry the torch thoroughly before reinstalling.

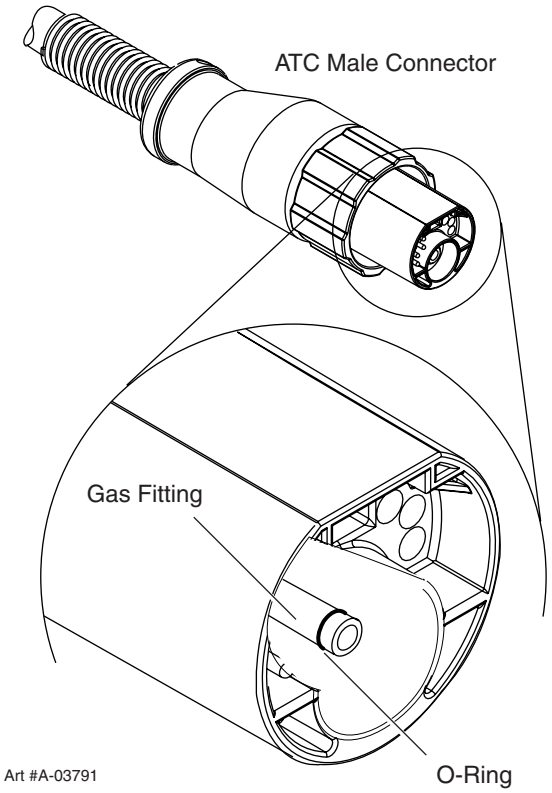
E. O-Ring Lubrication

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

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

NOTE

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



5.02 Common 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

g. Incorrect gas pressure

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

f. Incorrect gas pressure

4. Short Torch Parts Life

a. Oil or moisture in air source

b. Exceeding system capability (material too thick)

c. Excessive pilot arc time

d. Gas pressure too low

e. Improperly assembled torch

f. Non - Genuine Thermal Dynamics parts used

5. Difficult Piloting

a. Worn torch parts

b. Non - Genuine Thermal Dynamics parts used

c. Incorrect gas pressure

5.03 Basic Troubleshooting

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. Basic Troubleshooting: Overview

This guide covers basic troubleshooting. It is helpful for solving many of the common problems that can arise with this system.

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

B. How to Use This Guide

The following information will help the Operator determine the most likely causes for various symptoms. Follow all instructions as listed and complete each section in the order presented.

This guide is set up in the following manner:

X. Symptom (Bold Type)

Any Special Instructions

1. *Cause*
    a. Check / Remedy

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

C. Common Symptoms

A. AC indicator ~ OFF

1. *Switch at main power panel in OFF (open) position.*
    a. Close main power switch.
2. *Power Supply ON / OFF switch in OFF (down) position.*
    a. Turn switch to ON (up).
3. *Torch is not connected properly to Power Supply*
    a. Turn power supply ON / OFF switch to OFF (down). Check torch connection to Power Supply. Tighten or adjust as required. Do not use tools. Turn power supply ON / OFF switch to ON (up).
4. *Shield cup not fully tightened on torch head*
    a. Check shield cup for proper installation. Do not overtighten. Do not use tools to tighten.

CAUTION

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

5. *Main power line fuse(s) or circuit breaker(s) blown*
    a. Check main power panel fuse(s). Replace as required.

6. *Unit internal fuse blown or loose*

   a. If blown, double-check input voltage and replace fuse per Section 5.09-C.

7. *Actual input voltage does not correspond to voltage of unit*

   a. Verify that the input line voltage is correct. Refer to Section 2, Input Wiring Requirements.

B. Gas flows continuously when power is turned on, AC indicator ~ flashes

1. *Torch switch is activated (closed) before user turns power on.*

   a. Release torch switch.

2. *Faulty torch switch in CNC Control.*

   a. Check torch switch for continuity. Replace if necessary.

C. Gas flows continuously; Torch will not pilot when torch switch is activated; AC indicator ~ ON

1. *System is in SET mode*

   a. Change RUN / Rapid Auto Restart / SET switch to RUN (up).

D. No gas flow; RUN / Rapid Auto Restart / SET switch in SET position; Fans operate; AC indicator ~ ON; GAS indicator OFF

1. *Gas not connected*

   a. Check gas connections.

2. *Gas pressure too low for power supply operation*

   a. Adjust pressure to 70-75 psi / 4.8 - 5.2 bar.

E. Torch will not pilot; gas flows; AC indicator ~ ON, GAS, TEMP, and DC ⎓ indicators OFF

1. *Gas pressure is below power supply minimum requirement.*

   a. Adjust pressure to 70-75 psi / 4.8 - 5.2 bar.

NOTE

Minimum pressure for power supply operation is lower than minimum for torch operation.

F. Torch will not pilot; gas flows; AC ~ and Gas indicators ON; DC ⎓ and TEMP indicators OFF

1. *Gas pressure is below torch minimum requirement (Minimum pressure for power supply operation is lower than minimum required for torch operation.)*

   a. Adjust pressure to 70-75 psi / 4.8 - 5.2 bar.

2. *Positive and negative wire connections to automation interface PC Board terminals J2-1 and J2-3 are reversed.*

   a. Check wire connections, correct if necessary.

NOTE

This condition applies to CNC Controllers (other than the SC-11) with semiconductor switches.

G Torch will not pilot; no gas flow; AC indicator ~ ON, GAS indicator ON, DC indicator ⎓ ON

1. *Start cartridge missing from torch*

   a. Shut off power supply. Remove shield cup, install start cartridge. Reinstall torch tip and shield cup. Turn power supply ON / OFF switch to ON (up).

2. *Shield cup is loose on torch*

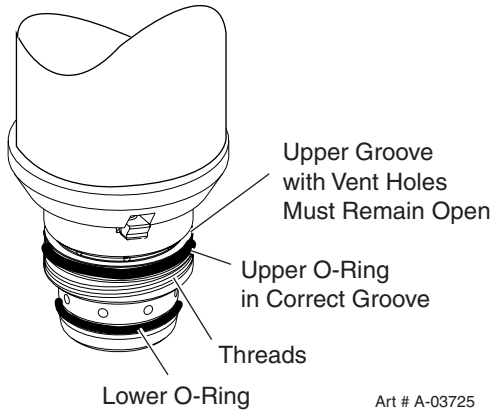
   a. Check shield cup; tighten if necessary.

NOTE

When operating the torch in a normal condition, a small amount of gas vents through the gap between the shield cup and torch head. Do not attempt to over tighten the shield cup as irreparable damage to internal components may result.

3. *Upper O-ring on torch head is in wrong position.*

   a. Remove shield cup from torch; check position of upper O-ring. Correct if necessary.



H Torch will not pilot; AC ~, GAS, and TEMP indicators ON, DC ⎓ indicator OFF

1. *Air flow blocked*

   a. Check for blocked air flow around the unit and correct condition.

2. *Unit is overheated*

   a. Let unit cool down for at least 5 minutes. Make sure the unit has not been operated beyond Duty Cycle limit. Refer to duty cycle data in Section 2.

3. *Input line voltage is low*

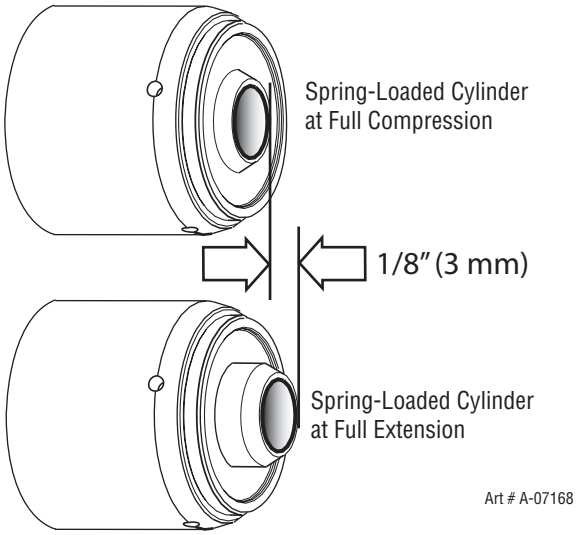
   a. Check and connect to proper input power line.

I. Torch cannot be activated; AC indicator ~ flashing; Gas indicator ON; Temp indicator OFF; DC indicator ⎓ OFF

1. *System is in protective interlock mode. (Torch switch in CNC Controller in ON position while turning on power supply ON / OFF switch.)*
   a. Release torch switch.
2. *System is in protective interlock mode. (Torch parts are missing, defective, or loose.)*
   a. Release torch switch, and set power supply ON / OFF switch to OFF (down). Open main disconnect switch. Check torch parts. Replace parts as needed. Reinstall shield cup; hand - tighten it securely against the torch head. Do not overtighten. Do not use tools. Close main disconnect switch. Set ON / OFF switch to ON (up) position.

J. Gas cycles on and off without torch switch being activated; AC indicator ~ Flashing; Gas indicator ON; DC indicator ⎓ OFF

1. *Torch tip or electrode missing*
   a. Shut off power supply. Remove shield cup, install missing part(s). Turn power supply ON / OFF switch to ON (up).
   2. Start cartridge stuck or worn.
   a. Remove the start cartridge. Check for excessive wear, plugged gas holes, or discoloration. Check the lower end fitting for free motion. Replace if necessary.



K. No cutting output; Torch pilots; Gas flows; Fans operate; AC ~ , Gas , and DC ⎓ indicator ON; TEMP indicator OFF

1. *Work cable not connected to work piece, or connection is poor*
   a. Make sure that work cable has a proper connection to a clean, dry area of the workpiece or the cutting table.
2. *Faulty Torch*
   a. Return for repair or have qualified technician repair.

L. Torch cuts but not adequately

1. Incorrect setting of output current *(A)* control
   a. Check and adjust to proper setting.
2. *Torch consumables worn*
   a. Check torch consumables; replace as needed.
3. *Work cable connection is poor*
   a. Make sure that work cable has a proper connection to a clean, dry area of the workpiece or cutting table.
4. *Torch is being moved too fast across workpiece*
   a. Reduce cutting speed.
5. *Excessive oil or moisture in torch*
   a. Put RUN / RAPID AUTO RESTART / SET switch in SET (down) position. Hold torch 1/8 inch (3 mm) from clean surface while purging and observe oil or moisture buildup (do not activate torch). If there are contaminants in the gas, additional filtering may be needed.
6. *Fluctuations in input power*
   a. Have electrician check input line voltage.

M Arc shuts off during operation; arc will not restart when torch switch is activated.

1. *Power Supply is overheated (TEMP indicator ON)*
   a. Let unit cool down for at least 5 minutes. Make sure the unit has not been operated beyond Duty Cycle limit. Refer to Section 2 for duty cycle specifications.
2. *Fan blades blocked (TEMP indicator ON)*
   a. Check and clear blades.
3. *Air flow obstructed (TEMP indicator ON)*
   a. Check for obstructed air flow around the unit and correct condition.
4. *Gas pressure too low (GAS indicator OFF when torch switch is activated)*
   a. Check source for at least 60 psi / 4.1 bar; adjust as needed. (Minimum pressure for power supply operation is lower than minimum required for torch operation.)
5. *Torch consumables worn*
   a. Check torch consumables; replace as needed.

N. AC indicator ~ remains ON when shield cup is removed

1. *Faulty PIP switch in torch*
   a. Check PIP switch for continuity; replace if necessary

5.04 Advanced 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 Section covers advanced troubleshooting, which requires power supply disassembly and live measurements. Advanced troubleshooting and repair of this unit is a process which should be undertaken only by those familiar with high voltage high power electronic equipment.

If major complex subassemblies are faulty, the faulty subassembly must be returned for repair. Refer to Repairs & Replacement Procedures, for parts replacement instructions. Replacement instructions for some parts are included in this manual. Replacement instructions for parts not covered in this manual are included with the replacement part.

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

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

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 5.06, 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.

C. Main Input and Internal Power Tests

1. Connect main AC power to the unit.
2. Set the Power Supply ON/OFF switch to ON (up) and note the following:
   - AC indicator ~ steady ON
   - Gas solenoid energizes (clicks)
   - Main PCB Relay energizes, pulling in main input contactor (W1)
   - TEMP Indicator  OFF
   - GAS Indicator  ON if input pressure is sufficient for power supply operation. Minimum pressure for power supply operation is lower than minimum for torch operation.
   - Gas flows
   - Fans operate
   - DC indicator ⎓ is OFF
3. Set the Power Supply RUN / RAPID AUTO RESTART / SET switch to the RUN (up) position and note the following:
   - Gas flow stops

This completes the Main Input and Internal Power Tests. If the above are all correct then proceed to paragraph 'D'. If not, note the symptom and proceed to Subsection 5.05, Main Input and Internal Power Problems.

D. Pilot Arc Test

1. Activate the torch to establish a pilot arc and note the following:
   - Gas flows
   - Preflow delay (two seconds) then DC indicator turns ON
   - Pilot arc is established

This completes the Pilot Arc Test. If the above are all correct then proceed to paragraph 'E'. If the unit does not function properly, then note the symptom and proceed to Subsection 5.06, Pilot Arc Problems.

E. Main Arc Test

Make sure the work cable is firmly connected to the workpiece. Activate the torch to establish a pilot arc.

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

- Main cutting arc starts

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 5.07, Main Arc Problems.

5.05 Main Input and Internal Power Problems

A. Opening Power Supply Enclosure

The cover of the Power Supply must be removed for access to input power connections and test points.

WARNING

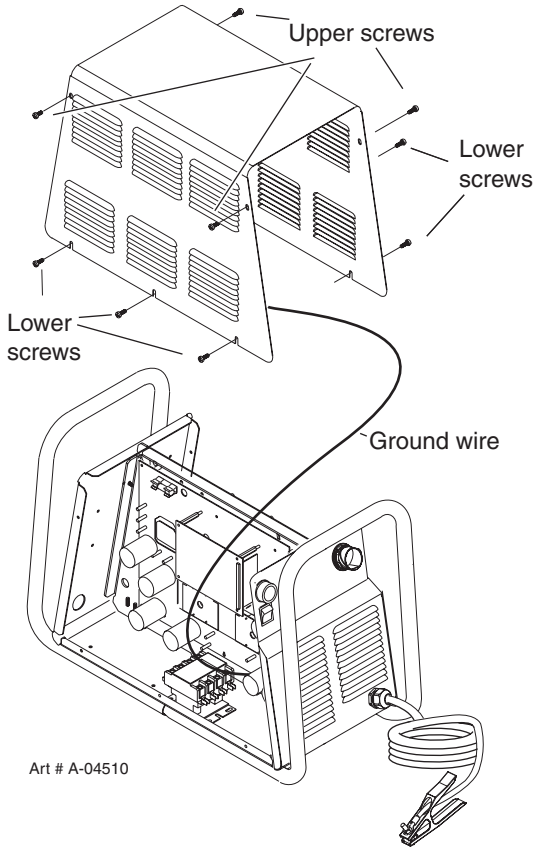
Disconnect primary power at the source before assembling or disassembling the Power Supply, torch parts, or torch and leads assemblies.

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 remove the nut securing the ground wire to the side panel.
4. Re-install the cover by reversing the above steps.



Cover Removal

Locate your symptom below:

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

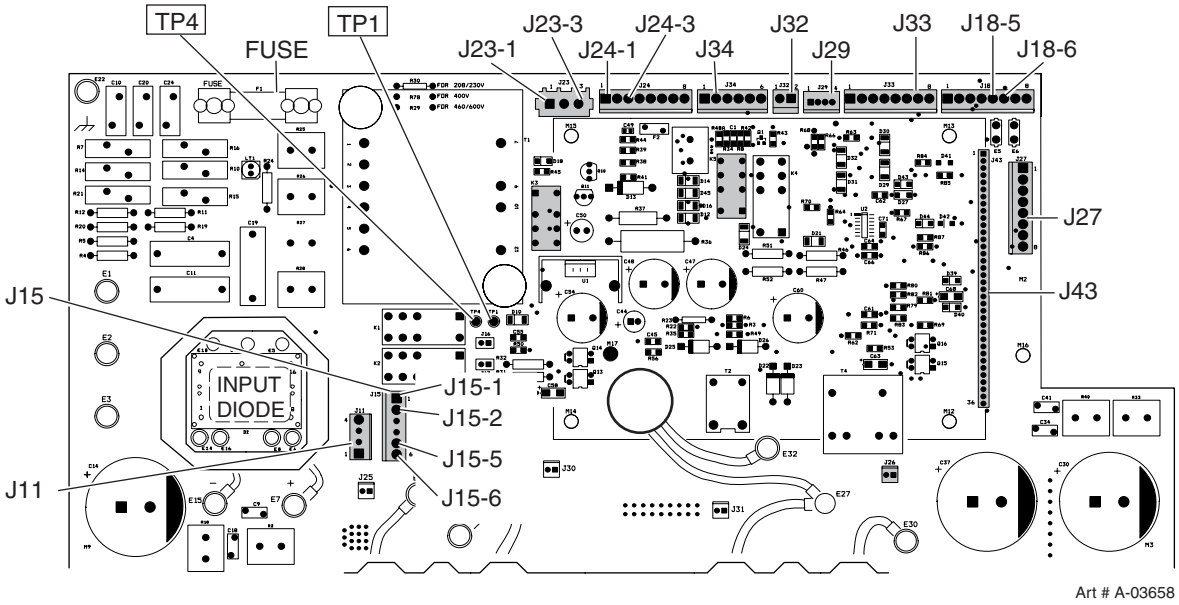
1. *Input power cable installed incorrectly or defective power cord.*
   a. Refer to Subsection 5.07 and check that the input power cable is not defective or installed incorrectly.
2. *Main input contactor (W1) stuck.*
   a. Check contactor. Replace if stuck.

B. Main power line fuses blow immediately after the ON/OFF Switch is turned on.

1. *Faulty Input Diode*
   a. Test Input Diode per Subsection 5.08-C; repair as necessary.

C. Fans do not operate; AC indicator ~ OFF

1. *Front Panel ON/OFF switch in OFF position*
   a. Place switch to ON (up) position.
2. *Main power disconnect open*
   a. Close main power disconnect.
3. *Torch is not properly connected to Power Supply.*
   a. Check torch connections to Power Supply. Tighten or adjust as needed.
4. *Shield cup not fully tightened on torch head.*
   a. Check shield cup for proper installation. Do not overtighten.
5. *Main power line fuses blown*
   a. Replace main power line fuses.



Main Printed Circuit Board Layout (logic board not shown)

6. *Improper input power cable connections inside Power Supply*

   a. Refer to System Schematic and correct if needed.

7. *Defective input power cable*

   a. Replace input power cable. Refer to subsection 5.09-L.

8. *Fuse blown inside Power Supply*

   a. Replace internal Fuse per Subsection 5.09-C.

9. *Line voltage above 10% tolerance (over voltage protection)*

   a. Reduce line supply.

10. *Faulty Auxiliary Transformer (refer to Appendix pages, 28 VAC Circuit Diagram)*

    Measure for 28 VAC on Main PC Board from J23-1 to J23-3.

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

11. *Faulty ON/OFF switch*

    Measure for 28 VAC on the Main PC Board between J18-5 to J18-6.

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

12. *Faulty Main PC Board*

    Measure for 12 vdc on Main PC Board from TP4 to TP1.

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

D. AC ~ and TEMP indicators ON, fans do not run

1. *Air flow through unit is restricted*

   a. Provide adequate air flow

2. *Exceeded Duty Cycle of Power Supply*

   a. Deactivate torch and wait for fan to cool unit. Refer to Specifications Section for proper duty Cycle for this unit.

3. *Faulty Fan(s)*

   Measure for 230 VAC (±) on the Main PC Board from J15-1 to J15-2, and from J15-5 to J15-6.

   - If voltage at J15-1 to J15-2 is correct, replace lower Fan (M1).
   - If voltage at J15-5 to J15-6 is correct, replace upper Fan (M2).

4. *Faulty Temperature Sensor / Switch*

   a. Check IGBT Heatsink Temp Sensor (TS1). Disconnect wire connector P29 from terminal J29 on Main PC Board. Check connector pins 1 and 2 for 10K ohm (±25%) (at ambient temperature). If resistance is not 10K ohm (±25%), replace TS1.

   b. Check Inductor Temp Switch (TS2). Disconnect wire connector P32 from terminal J32 on Main PC Board. Check connector pins 1 and 2 for at least 12K ohms. If resistance is less than 12K ohms, replace output inductor (L1). If temp switch is open, replace Main PC Board.

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

1. *RUN/RAPID AUTO RESTART/SET switch in RUN position*
   a. Change 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/RAPID AUTO RESTART/SET switch*
   a. Check continuity.
5. *Faulty Gas Solenoid circuit*
   a. Test Gas Solenoid circuit per Subsection 5.08-E; repair as necessary.
6. *Faulty Logic Board*
   a. Replace logic board.

F. Gas flows; AC indicator ~ ON; GAS and DC ⎓ indicator OFF

1. *Gas pressure too low*
   a. Set operating pressure per pressure setting label on power supply.

NOTE

Minimum pressure for power supply operation is lower than minimum required for torch operation.

2. *Faulty Pressure Switch*

   Measure for 12 vdc from wire #10 to wire #11 at the Gas Pressure Switch, located on the right side of the unit. Refer to System Schematic in the Appendix pages.

   a. If 12 vdc is present and pressure is above 50 psi (3.4 bar), replace Gas Pressure Switch/Solenoid Assembly. Refer to Section 5.08-A.

   b. If pressure is above 50 psi (3.4 bar) and 12 vdc is not present, replace the Logic PC Board.

3. *Faulty Wiring or Faulty Logic PC Board*

   Check for 12 vdc at Main PC Board pin J24-3 to J24-4 from the Logic PC Board. Refer to Appendix Pages, Main PC Board Layout.

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

G Gas continues to flow with RUN/RAPID AUTO RESTART/SET switch in RUN position.

1. *Damaged gas solenoid.*

   a. Turn the front panel ON/OFF switch to OFF.

   • If gas continues to flow, debris from the air line is preventing the solenoid from closing. Clean or replace the solenoid.

2. *Faulty RUN/RAPID AUTO RESTART/SET switch.*

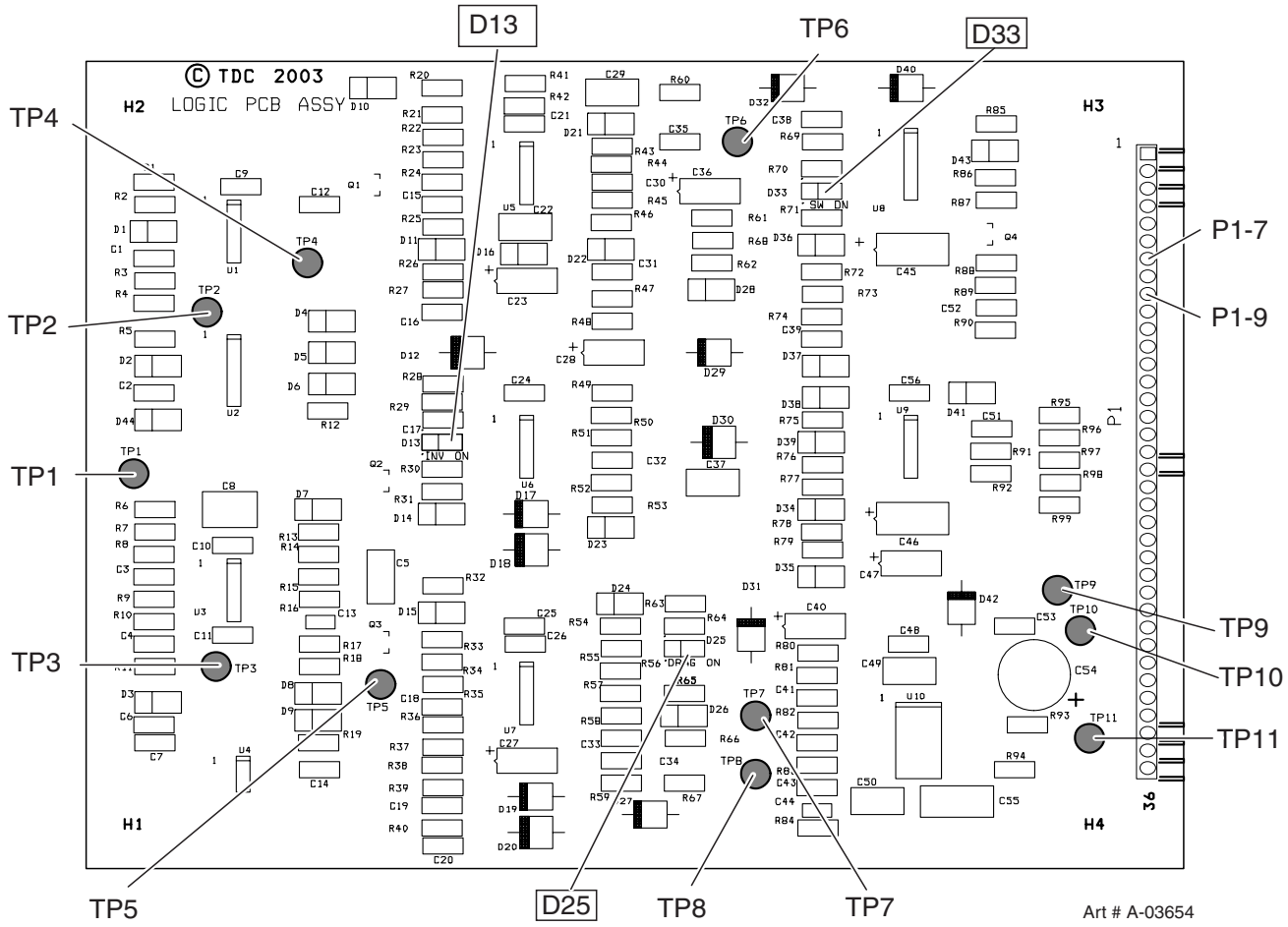
   a. Remove one wire from the pressure switch. Check for ± 0 vdc at Main PC Board pin J24-3 to J24-4 from the Logic PC Board. Refer to Main PC Board Layout.

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

3. *Faulty Logic PCB.*

   a. Measure for approximately 12 vdc between P1-7 and TP-1 on the Logic PCB.

   - If 12 vdc is present, replace Logic PCB.
   - If less than 2 vdc, replace Main PCB.



Logic Board Layout

5

H. Gas flows continuously when power is turned on; AC indicator ~ flashes

1. *Torch switch is activated (closed) before user turns power on*

   a. Release torch switch.

2. *Faulty torch switch*

   a. Check torch switch for continuity.

I. Gas cycles on and off when power is turned on; AC indicator ~ flashes

1. *Shield cup is loose.*

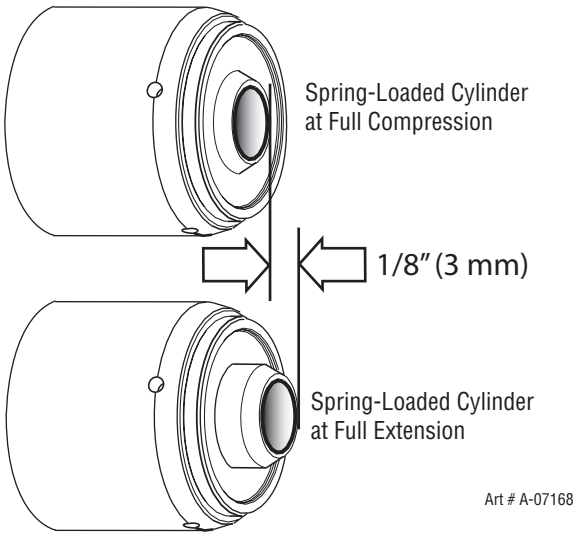
   a. Tighten shield cup by hand. Do not overtighten.

2. *Torch tip, electrode, or start cartridge missing*

   a. Turn off power supply. Remove shield cup, install missing parts.

3. *Start cartridge is stuck*

   a. Turn off power supply. Remove shield cup, tip, and start cartridge. Check lower end fitting on start cartridge for free movement. Replace cartridge if lower end fitting does not move freely.



5

5.06 Pilot Arc Problems

WARNING

The following tests must be performed with the power supply connected to primary input power. There are extremely dangerous voltage and power levels present inside this unit. Do not attempt to diagnose or repair without proper training in power electronics measurement and troubleshooting techniques.

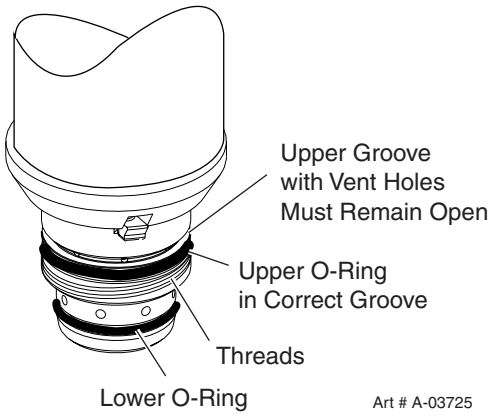
Locate your symptom below:

A. Torch will not pilot; gas flows; AC indicator ~ ON, GAS , TEMP , and DC ⎓ indicators OFF

1. *Gas pressure is below power supply minimum requirement. (Minimum pressure for power supply operation is lower than minimum required for torch operation.)*
   a. Adjust gas pressure per pressure setting label on power supply.

B. Torch will not pilot; gas flows; AC ~ and Gas indicators ON; TEMP and DC indicators ⎓ OFF

1. *Gas pressure is below torch minimum requirement (Minimum pressure for power supply operation is lower than minimum required for torch operation.)*
   a. Adjust gas pressure per pressure setting label on power supply.
2. *Power Supply RUN / SET switch in SET position*
   a. Place RUN / SET switch to RUN position.
3. *Upper O-ring on torch head is in wrong position.*
   a. Remove shield cup from torch; check position of upper O-ring. Correct if necessary.



5

C. Torch will not pilot; AC ~, GAS, and TEMP indicators ON

1. *Air flow blocked*

   a. Check for blocked air flow around the unit and correct condition.

2. *Unit is overheated*

   a. Let unit cool down for at least 5 minutes. Make sure the unit has not been operated beyond Duty Cycle limit. Refer to duty cycle data in Specifications Section.

3. *Input line voltage is low*

   a. Check and connect to proper input power line.

4. *Faulty Temperature Sensor / Switch*

   a. Refer to Appendix 15, Main PC Board Layout. Check IGBT Heatsink Temp Sensor (TS1). Disconnect wire connector P29 from terminal J29 on Main PC Board. Check connector pins 1 and 2 for 10K ohm (±25%) (at ambient temperature). If resistance is not 10K ohm (±25%), replace TS1.

   b. Check Inductor Temp Switch (TS2). Disconnect wire connector P32 from terminal J32 on Main PC Board. Check connector pins 1 and 2 for at least 12K ohms. If resistance is less than 12K ohms, replace output inductor (L1). If temp switch is open, replace Main PC Board.

5. *Faulty Logic PC Board*

   a. Check for (±) 12vdc on Main PC Board between J43-9 and TP1. If (±) 12vdc is present, replace Logic PC Board.

6. *Faulty Main PC Board*

   a. Check for (±) 0 vdc on Main PC Board between J43-9 and TP1. If (±) 0 vdc is present, replace Main PC Board.

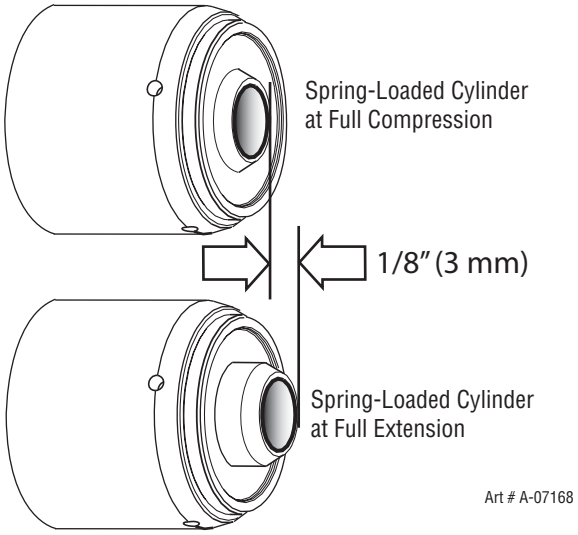
7. *Faulty Fan(s)*

   Measure for (±) 230 VAC on the Main PC Board from J15-1 to J15-5, and from J15-2 to J15-6.

   - If voltage at J15-1 to J15-5 is correct, replace upper Fan (M1).
   - If voltage at J15-2 to J15-6 is correct, replace lower Fan (M2).

D. Torch will not pilot when torch switch is activated; AC ~ and GAS indicators ON; Temp and DC ⎓ indicators OFF

1. *Gas pressure too high or too low*
   a. Adjust gas pressure per pressure setting label on power supply.
2. *Torch tip, start cartridge, or electrode missing.*
   a. Turn off power supply. Remove shield cup, install missing parts.
3. *Start cartridge is stuck*
   a. Turn off power supply. Remove shield cup, tip, and start cartridge. Check lower end fitting on start cartridge for free movement. Replace cartridge if lower end fitting does not move freely.



4. *Worn or faulty torch parts*
   a. Inspect torch consumable parts. Replace if necessary.

E. Gas flows; AC indicator ~ and GAS indicators ON; TEMP indicator off; ON; DC ⎓ indicator off or blinks on/off once.

1. *Faulty IGBT or Output Diode Module Assembly(s)*
   a. Check per Subsection 5.08-C; repair as needed.
2. *Faulty Main PCB*
   a. Test; repair as needed.

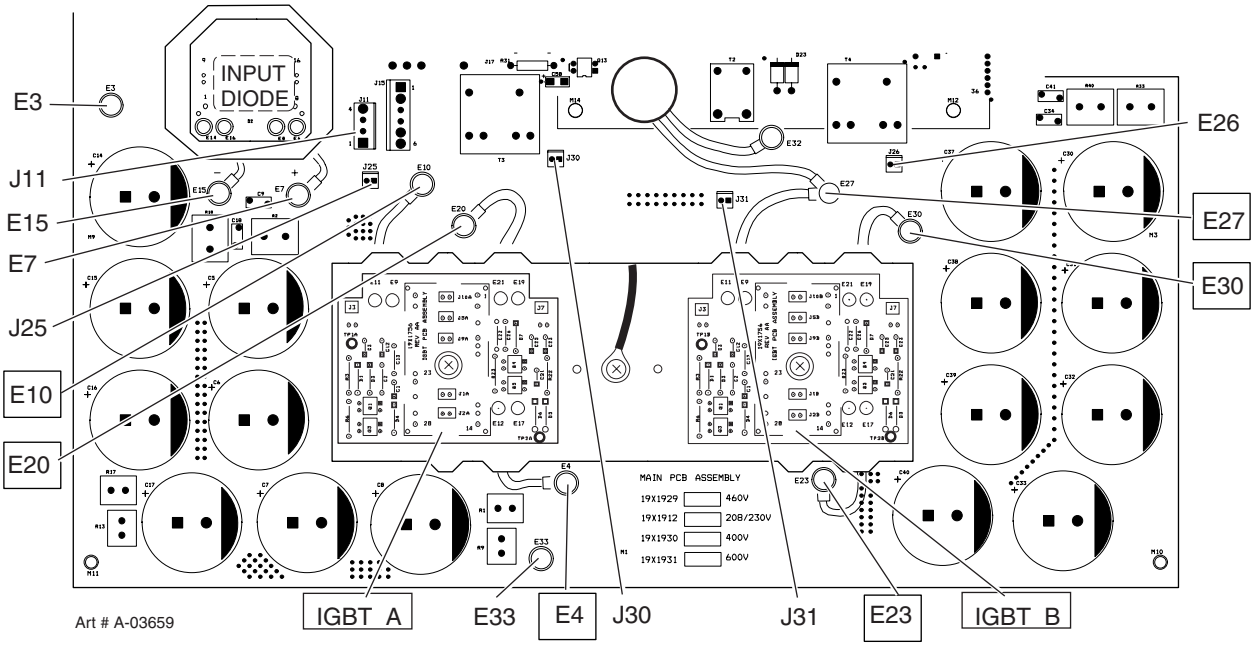
F. Gas flows; No arc in torch; AC ~, GAS, and DC ⎓ indicators ON; TEMP indicator off

1. Faulty IGBT(s)

a. Measure between the following points on the IGBTs:

- IGBT A: E4 to E10
  E10 to E20
- IGBT B: E23 to E27
  E27 to E30

Voltage should be approximately 20 vdc before the start signal is active. If voltage measures greater than 100 vdc when the start signal is active, replace the respective IGBT(s).



Main PC Board Layout (IGBT Test Points)

G. No arc or intermittent arc in torch; Gas flows; AC ~, GAS  , and DC ⎓ indicators ON; TEMP indicator  off

1. *Gas pressure set incorrectly (too high)*
   a. Reset gas pressure per pressure setting label on power supply.
2. *Oil/moisture in air lines*
   a. Purge system. If problem corrected, add filters in line with air source.
3. *Incorrect torch parts*
   a. Inspect the torch parts; replace as needed.
4. *Faulty leads*
   a. Check torch leads continuity.
5. *Faulty torch*
   a. Check torch.
6. *Faulty connection of wire #58 or 62 to Pilot Board*
   a. Check wiring connection. Refer to the System Schematic in the Appendix. Connections should be:
      - Wire #58 to Pilot Board terminal E58
      - Wire #62 to Pilot Board terminal E62

      If wires 58 and 62 are not connected to the proper terminals, replace the Pilot Board.
7. *Faulty Main PC Board*
   a. Check for approximately 12 vdc at TP4 to TP1. If less than 2 vdc, replace the Main PC Board.
8. *Faulty Logic Board or Faulty Pilot Board*
   a. Install a jumper between wires 58 and 62 on Pilot Board and retry piloting. If torch pilots with jumper installed, replace Pilot Board. If torch does not pilot, replace Logic Board.

5.07 Main Arc Problems

Locate your symptom below:

A. Main cutting arc will not start

1. *Work cable not connected.*
   a. Connect work cable.

B. No cutting output

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

C. Limited output with no control

1. *Poor input or output connections to power supply*
   a. Check all input and output connections.
2. *Faulty components in torch and leads assembly*
   a. Inspect torch assemblies and replace if necessary.

D. Erratic or improper cutting output

1. *Poor input or output connections to power supply*
   a. Check all input and output connections.
2. *Current set too low at power supply*
   a. Increase current setting.
3. *Torch is being moved too fast across workpiece*
   a. Reduce cutting speed.
4. *Holding too high of a standoff.*
   a. Refer to recommended standoff heights provided in speed charts in Section 3. Adjust as needed.
5. *Workpiece is painted or rusty.*
   a. Clean workpiece.

6. *Faulty Main PC Board or Logic Board.*

   a. Measure for ±0 vdc at TP2 to TP1 on the Logic Board when attempting to transfer. Refer to Logic Board Layout.

   - If TP2 goes to 0 vdc replace Output Board.
   - If not, replace Main PC Board.

7. *Faulty Main Input Contactor.*

   a. Check per Subsection 5.14-D.

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

1. *Torch tip contacts workpiece*

   Raise the torch tip off the work. At output settings over 40 amps, circuitry in the power supply automatically reduces output current to 40 amps if the torch tip contacts the workpiece.

2. Faulty Pilot Board

   a. With power off and wires E58 and E62 disconnected from the pilot board, measure for continuity between terminals #E58 and #E62. If continuity is found, replace Pilot Board.

5.08 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 two 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.

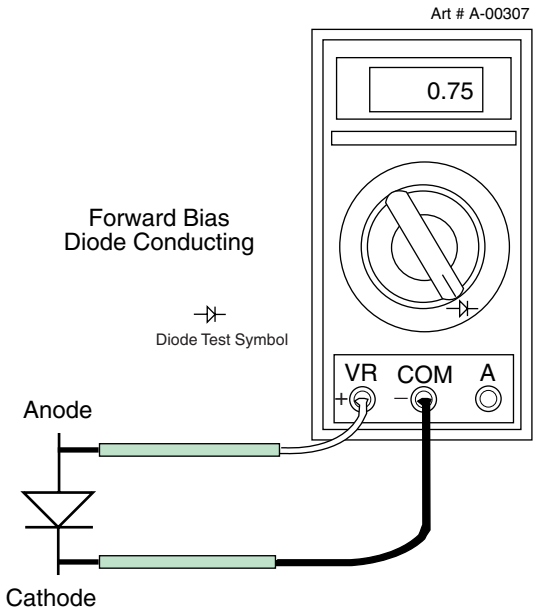
B. Diode Testing Basics

WARNING

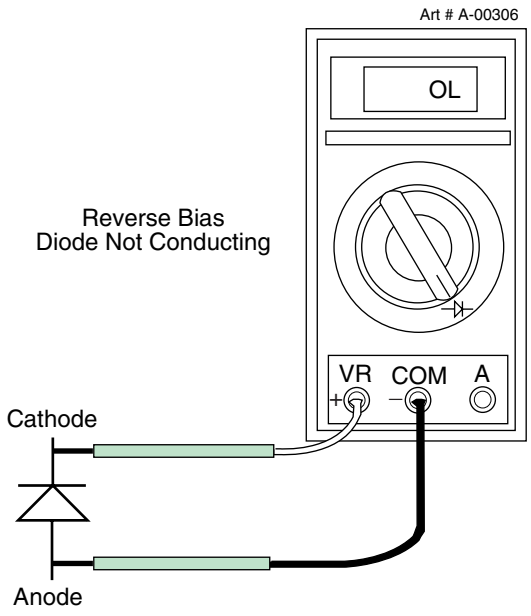
Disconnect primary power at the source before disassembling the power supply, torch, or torch leads.

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. Remove cables from mounting studs on diodes to isolate the module.
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



Testing Diode Reverse 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".
7. If a diode checks bad, replace the diode module.
8. Reconnect all cables.

C. Diode Module Board Tests

WARNING

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

1. Input Diode Test

a. Disconnect input AC power.

b. Check Input Diode for shorted input diode. With an ohmmeter set on the diode range make the following checks from Main PC Board to Input Diode:

For 400-Volt, 415-Volt, 460-Volt, and 600-Volt Power Supplies:

400V, 415V, 460V, and 600V Input Diode Indications		
Meter +	Meter -	Indication
E15	E1	Diode Drop
E1	E15	Open
E15	E2	Diode Drop
E2	E15	Open
E15	E3	Diode Drop
E3	E15	Open
E7	E1	Open
E1	E7	Diode Drop
E7	E2	Open
E2	E7	Diode Drop
E7	E3	Open
E3	E7	Diode Drop
E7	E15	Open
E15	E7	Diode Drop*
* Indication can be twice other indications.		

For 208/230-Volt Power Supplies:

208/230V Input Diode Indications		
Meter +	Meter -	Indication
E7	E1	Open
E1	E7	Diode Drop
E15	E1	Diode Drop
E1	E15	Open
E15	E7	Diode Drop*
E7	E15	Open
* Indication can be twice other indications.		

5

c. The meter should indicate a diode drop in one direction and an open in the other direction for each check. Replace the Input Diode Module Board if the readings do not match the chart.

d. If Input Diode Module Board is shorted, make the following checks with an ohmmeter at the Main Contactor (W1):

Meter (+)	Meter (-)	Indication
L1	T1	Open
L2	T2	Open
L3	T3	Open

If any test has resistance, then replace the Main Contactor.

2. Output Diode Module Board Circuit Test

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

Output Diode A		Output Diode B		Indication
Meter +	Meter -	Meter +	Meter -	
E37	E58	E36	E57	Diode Drop *
E58	E37	E57	E36	Open
E37	E47	E36	E49	Diode Drop
E47	E37	E49	E36	Open
E58	E47	E57	E49	Open
E47	E58	E49	E57	Diode Drop
* Indication can be twice other indications.				

b. The meter should indicate a diode drop in one direction and an open in the other direction for each check. Replace the Output Diode Module Board(s) if the readings do not match the chart.

3. IGBT Module Board Circuit Test

a. Use an ohmmeter set on the diode function and make the following measurements on the IGBT Module Board(s) to the Main PC Board.

IGBT PCB A		IGBT PCB B		Indication
Meter +	Meter -	Meter +	Meter -	
E10	E4	E27	E23	Diode Drop
E4	E10	E23	E27	Open
E10	E20	E27	E30	Open
E20	E10	E30	E27	Diode Drop
E4	E20	E23	E30	Open
E20	E4	E30	E23	Diode Drop *
* Indication can be twice other indications.				

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(s) if readings are not the same as the chart.

D. Main Input Power Test

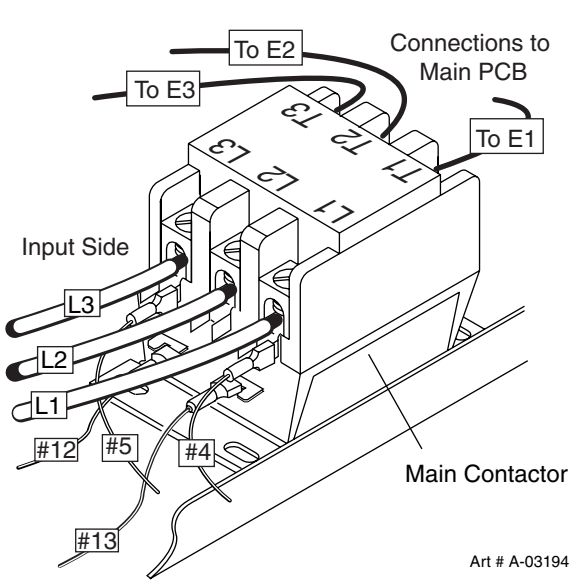
WARNING

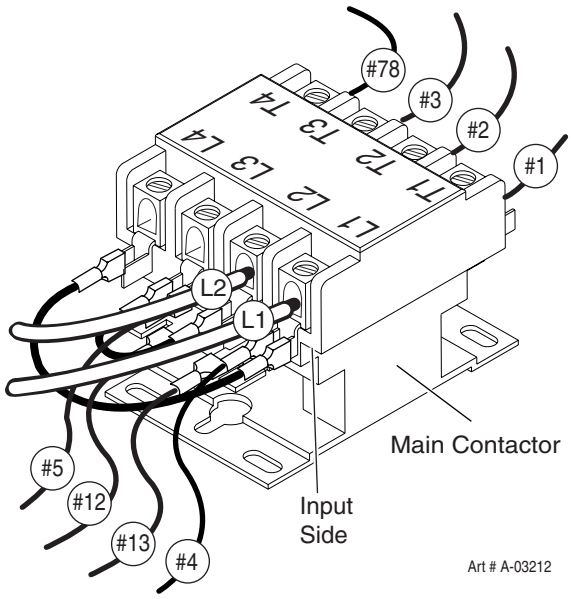
The following tests must be performed with the power supply connected to primary input power. There are extremely dangerous voltage and power levels present inside this unit. Do not attempt to diagnose or repair without proper training in power electronics measurement and troubleshooting techniques.

Reconnect power and observe proper start-up procedure. AC 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 indicator on Front Panel is OFF, check for proper AC input voltage between input cables on the Main Contactor. Input voltage should be as shown in the following chart. If not, check for proper voltage at the main power source.

Contactor Voltage Readings		
Nominal Input Voltage	Contactor Points	Voltage Range
208/230VAC	L1, L2	187-253VAC
400VAC	L1, L3	360-440VAC
415VAC	L1, L3	370-460VAC
460VAC	L1, L3	414-506VAC
600VAC	L1, L3	517-632 VAC





Main Input Contactor (460-Volt Three-Phase Input Power Shown) 208/230-Volt Main Input Contactor

2. Check for 28 VAC at J23-1 to J23-3 on the Main PC Board.
   a. If greater than 30 VAC, input line power is too high.
   b. If there is no AC power, check the fuse. If the fuse is okay, the auxiliary transformer is faulty. Replace the Main PC Board.

E. Gas Solenoid Circuit Test

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

1. Place the RUN / RAPID AUTO RESTART / SET Switch to the SET position.
2. Measure for 28 VAC across Solenoid wires #8 and #9. Refer to System Schematic in Appendix Section.
   - If 28 VAC is present, replace Solenoid/Pressure Switch Assembly.
   - If 28 VAC is not present, check for 65 psi (4.5 bar) at the pressure regulator.
3. Check for less than 2 vdc at P1-7 to TP1 on Logic Board.
   - If less than 2 vdc, replace Main PC Board.
   - If more than 2 vdc, replace Logic PC Board.

F. Output Power Tests

1. No DC Output

a. Activate the torch.

- If INV ON indicator D13 on Logic PC Board does not turn ON, then replace the Logic PCB.
- If the INV ON indicator D13 blinks ON then OFF immediately, perform the following test:

WARNING

The following tests must be performed with the power supply connected to primary input power. There are extremely dangerous voltage and power levels present inside this unit. Do not attempt to diagnose or repair without proper training in power electronics measurement and troubleshooting techniques.

The next step will defeat the safety interlock feature. Proceed with caution.

b. Remove the tip and electrode from the torch. Attach the work lead to the pilot return (E35 or E62) on the Output Power Board. Activate the torch switch. Gas should flow, then stop after 2 seconds. Front panel DC indicator ⎓ should turn on.

c. Measure open circuit voltage between E61(+) to E43 (-) at the Output Power PC Board. Voltage should be greater than 200 V. If voltage is less than 10 V, refer to the diode test measurements in Section 5.10-C.

5

2. Gate Drive & Sensing

a. After checking all previous steps, jumper TP1 to TP7 on the Logic PCB. Refer to Logic Board layout.

b. When the unit is turned on, the DC light should remain ON.

c. Activate the torch. After two seconds INV ON Indicator (D13) 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 remains on, then check for at least 2 vdc between TP-1 to TP-11 and between TP-1 to TP-10 on the Logic PCB. Refer to Logic Board Layout.
  - If no voltage, replace Logic PC Board.
  - If voltage is correct, measure for at least 2 vdc between points as in the following chart:

IGBT A		IGBT B	
E11	J2A	E11	J2B
E19	J10A	E19	J10B

  - If voltage is 0, replace Main PCB.

5.09 Power Supply Major External Parts Replacement

WARNING

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

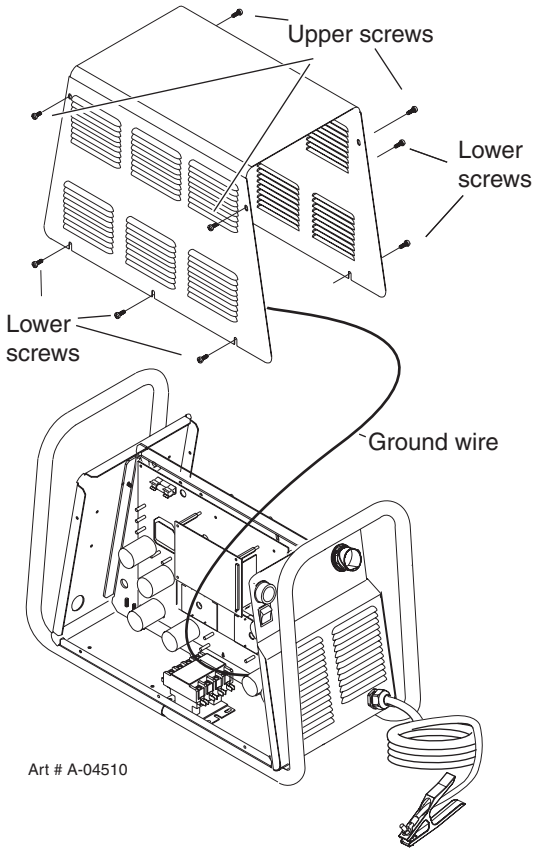
For replacement of parts not covered in this section, instructions are provided with the replacement part.

A. Cover Removal

1. Remove the upper screws which secure the cover to the main assembly.

NOTE

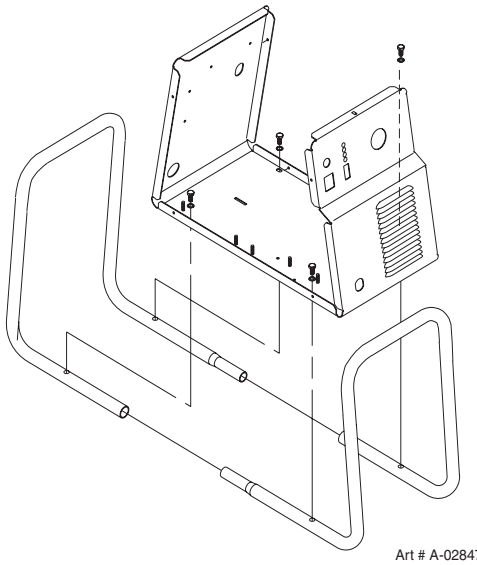
There is a ground wire connection to the inside of the unit. There is no need to disconnect the ground wire, unless there is a need for more room to work.



2. Loosen, but do not remove, the lower screws, then carefully pull the Cover up and away from the unit.

B. Tube Handle Replacement

1. Remove the power supply cover per Section 5.09-A.
2. Remove the four bolts and star washers securing the tube handles 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 the above steps.
6. Reinstall the power supply cover.



Art # A-02847

C Cover Installation

1. Reconnect the ground wire, if necessary.
2. Place the cover onto the power supply so that slots in the bottom edges of the cover engage the lower screws.
3. Tighten lower screws.
4. Reinstall and tighten the upper screws.

5

5.10 Front Panel Parts Replacement

WARNING

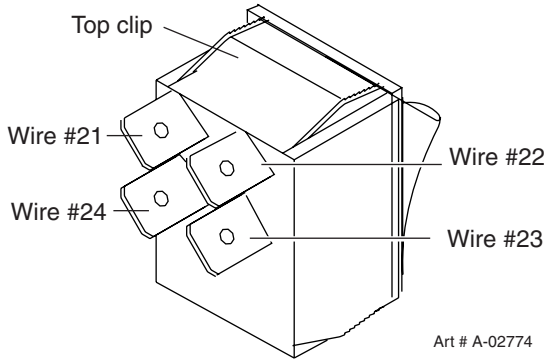
Disconnect input power at the source and bleed down the system before attempting these procedures.

A. Current (A) Control Knob Replacement

1. Turn the control knob fully clockwise and note the location of the pointer on the knob.
2. Loosen the screw securing the Knob to the potentiometer shaft and remove the Knob.
3. Place the replacement 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 (SW1) Replacement

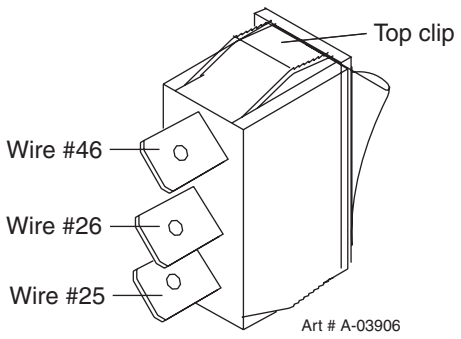
1. Remove the power supply cover per Section 5.09-A.
2. Disconnect the wires on the rear of the ON/OFF Switch. Note the location of each wire, as shown below:



3. Squeeze together the clips on the top and bottom of the Switch. Remove the Switch through the Front Panel.
4. Install the replacement Switch by reversing the above steps.
5. Reinstall the power supply cover.

C. RUN / RAPID AUTO RESTART / SET Switch (SW2) Replacement

1. Remove the power supply cover per Section 5.09-A.
2. Disconnect the wires on the rear of the Switch. Note the location of each wire, as shown:



3. Squeeze together the clips on the top and bottom of the Switch, then remove the switch through the Front Panel.
4. Install the replacement Switch by reversing the above steps.
5. Reinstall the power supply cover.

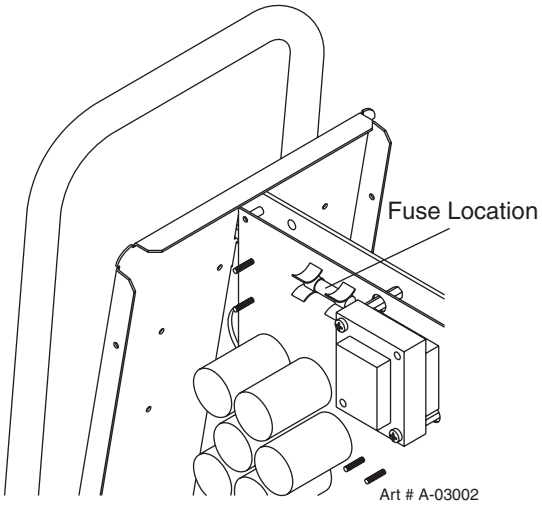
D. POT/LED PC Board Replacement

1. Remove the power supply cover per Section 5.09-A.
2. Remove Current Knob .
3. Disconnect wire harness 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.
6. Reinstall the power supply cover.

5.11 Left Side Internal Parts Replacement

A. Fuse (F1) Replacement

1. Remove the power supply cover per Section 5.09-A.
2. Locate the internal fuse on the left side of the center chassis.
3. Replace the fuse. A replacement fuse is located inside the power supply. Refer to Section 6, Parts Lists, for replacement fuse catalog number.
4. Reinstall the power supply cover.



Internal Fuse Location

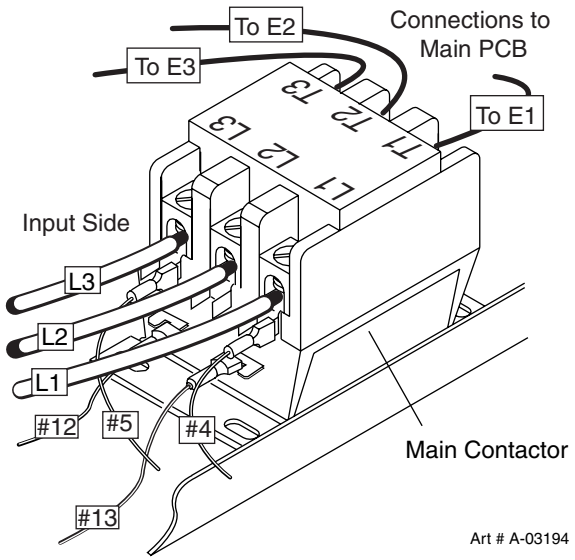
B. Main Input Contactor (W1) Replacement

1. Remove the power supply cover per Section 5.09-A.
2. Label all wires connected to the Input Contactor.
3. Disconnect wires to the Input Contactor from the input cable.
4. Disconnect all other wires connected to the Input Contactor.
5. Remove the two nuts and washers securing the Input Contactor to the base of the power supply.
6. Position the replacement Input Contactor with the row of connectors labeled L toward the rear of the Power Supply. Fasten in place with the hardware removed previously.
7. Complete the wiring connections as shown.

NOTE

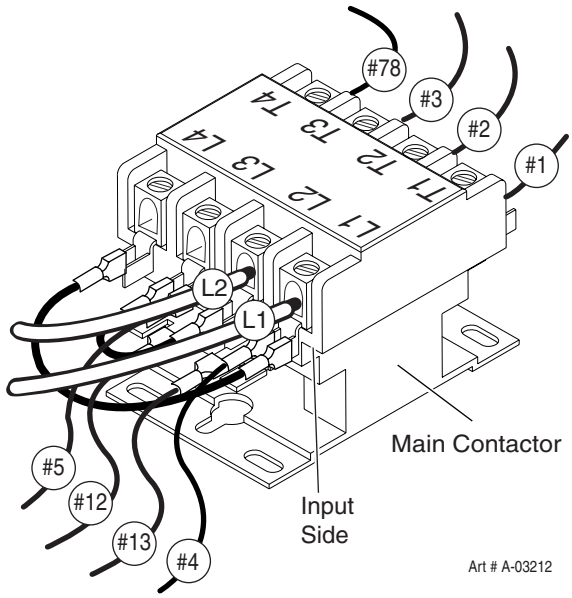
It is important that wires are installed correctly, as shown, to prevent damage to the unit.

8. Reinstall the power supply cover.



400-Volt, 415-Volt, 460-Volt, and 600-Volt Input Contactor

(3-phase input power connections shown)



208 / 230-Volt Input Contactor

5

C. Logic PC Board Replacement

Follow the antistatic instructions provided with the replacement part. The Logic PC Board connects to the Main PC Board through an extender board perpendicular to both boards.

1. Remove the power supply cover per Section 5.09-A.
2. Remove the bolts in each corner of the Logic PC Board.
3. Detach the Logic PC Board and the extender board from the Main Power PC Board. Detach the extender board from the Logic Board.
4. Install the replacement Logic PC Board by reversing the above steps. The pins on the right edge of the Logic PC Board must fully engage the sockets on the edge of the extender board. The extender board must fully engage sockets on the Main Power PC Board.

D. IGBT Circuit Board or Input Diode Board Replacement

Follow the antistatic instructions provided with the replacement part. The Power Supply includes two IGBT Circuit PC Boards.

NOTE

Follow the electrostatic discharge instructions provided with the replacement component to prevent damage to the component.

Thermal pads, heatsinks, and the large flat surface on the back of diodes and IGBTs must be kept clean. Diodes and IGBTs must not be bent or allowed to pick up any foreign material. A very clean installation between the module and the heatsink or chassis is essential for proper operation.

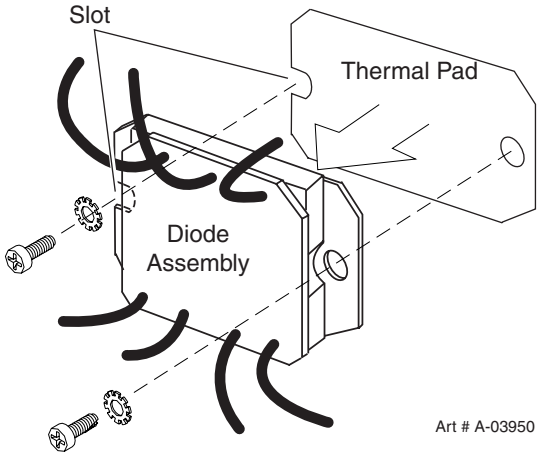
1. Remove the power supply cover per Section 5.09-A.
2. Turn the Power Supply onto its side.
3. Locate the IGBT Circuit PC Boards or Input Diode mounted within the Main Power PC Board. Refer to Appendix pages for location and position.
4. For IGBTs, remove the small jumpers between the IGBT and the Main PC Board. Transfer these jumpers to the replacement IGBT. Label, then remove all other wire connections to the Board(s) being replaced. Note the routing of wires. Ensure that the wires are put back in the same place when installing the replacement module.
5. Remove screw(s) securing PC Board(s) to the heatsink and remove board(s) from the Power Supply.
6. Use isopropyl alcohol and a clean rag to clean the heatsink or chassis area behind the component being replaced. Clean the large flat surface on the back of the replacement component. Do not scratch or abrade the surface.
7. The thermal pad(s), provided with the replacement part, is a thin metal pad. Remove any loose protective paper coverings from the pad(s).

NOTE

Protective coverings must be removed from the thermal pads. Installing thermal pads with protective coverings in place will cause equipment damage or failure.

8. Install replacement components as follows:

For Input Diodes:



Input Diode Replacement

a. Apply the thermal pad to the flat surface of the diode. Align the pad with the rectangular flat surface on the back of the device.

b. Align the diode horizontally, with its longer edges perpendicular to the power supply base.

c. Secure the device and rectangular pad to the chassis with the replacement screws and washers.

9. Torque screw(s) to 35 in-lb. (3.95 Nm).

NOTE

Failure to torque properly will cause component damage.

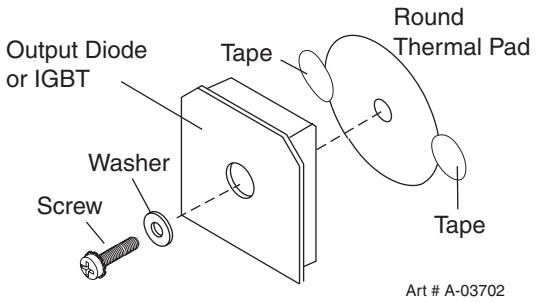
10. Connect wires per the chart.

CutMaster 101
Input Diode Connections

208/230V Units		400V, 415V, 460V, 600V Units	
Input Diode	To Main PCB	Input Diode	To Main PCB
E5	E1	E5	E1
E13	E2	E13	E2
E18	E2	E18	E3
E6, E8	E7	E6, E8	E7
E14, E16	E15	E14, E16	E15

For IGBTs:

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



b. Secure replacement board(s) with the screw removed previously. Ensure that the washer is under the head of the screw.

9. Torque screw(s) to 17 in-lb. (1.9 Nm).

NOTE

Failure to torque properly will cause component damage.

10. Connect wires per the chart.

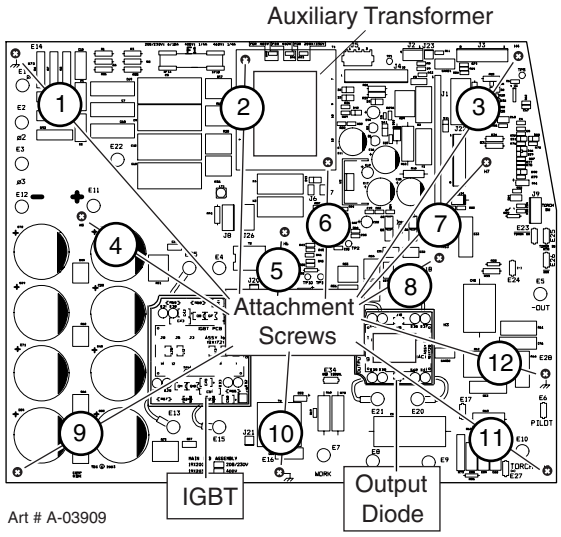
CutMaster 101 IGBT Connections			
IGBT A		IGBT B	
IGBT A Connector	To Main PCB Connector	IGBT B Connector	To Main PCB Connector
J3	J25	J3	J31
J7	J30	J7	J26
E9, E11	E10	E9, E11	E27
E19, E21	E20	E19, E21	E30
E12, E17	E4	E12, E17	E23

11. Stand the unit upright; reinstall the cover.

E. Main PC Board Replacement

Follow the antistatic procedures provided with the replacement part.

1. Remove the power supply cover per Section 5.09-A.
2. Remove the Logic PC Board.
3. Remove the POT/LED PC Board.
4. Disconnect all wire and cable connections to the Main PC Board, including the connections from the three smaller PC Boards. Refer to the Main PC Board Wiring Diagrams in the Appendix pages if necessary.
5. Remove the two long Transformer screws securing the Auxiliary Transformer to the Center Chassis.
6. Remove the other screws securing the PC Board to the Center Chassis.
7. Carefully remove the original PC Board.
8. 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. Torque the screws to 17 inch-pounds (1.9 Nm).

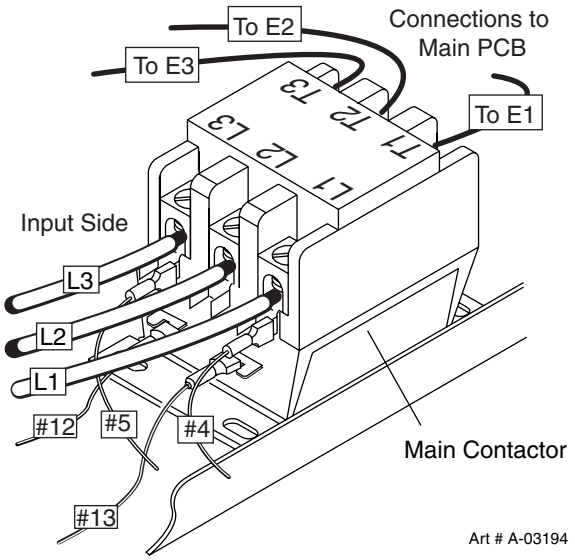


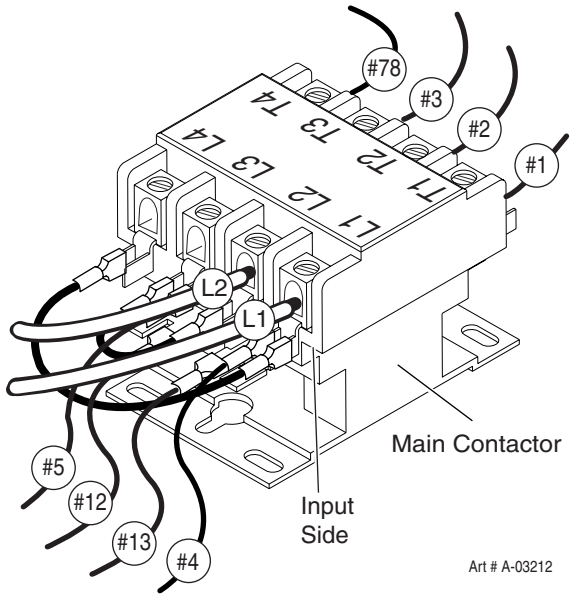
5

9. Reconnect all wiring. Refer to the Appendix pages in this manual for wiring details.

F. Input Power Cable Replacement

1. Remove the power supply cover per Section 5.09-A.
2. Locate and label the input power cable connections and disconnect the cable.





Main Input Contactor (400-Volt, 415-Volt, 460-Volt, 600-Volt) Main Input Contactor (208/230Volt)

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. Install the replacement Input Power Cable by reversing the above steps. The Input Power Cable ground wire requires a ring terminal.

G. EMI Filter Replacement (CE Units Only)

1. Remove the power supply cover per Section 5.09-A.
2. Label the input power cable connections and the cable connections to the main input contactor.
3. Disconnect all wire and cable connections to the EMI Filter.
4. Remove the hardware securing the EMI Filter. This hardware passes upward through the base of the power supply.
5. Put the replacement EMI Filter in position and secure it with the hardware removed in Step 4.
6. Connect the input power cables and the cable connections to the main input contactor.
7. Test the Power Supply for proper operation.

5.12 Right Side Internal Parts Replacement

A. Fan Replacement (M1, M2)

1. Remove the power supply cover per Section 5.09-A.
2. Label, then carefully remove the wiring connectors from the terminals on the Fans.
3. Disconnect the Work Cable from terminal E61 on the Power Output Board.
4. Remove one bolt from the Front Panel of the Power Supply, near the Control Panel. Pull the Front Panel slightly away from the Power Supply.
5. Remove one nut from a stud at the bottom of the Fan Assembly Panel.
6. Lift the Fan Assembly Panel and pull it out of the Power Supply.
7. Remove two bolts per Fan. Set the Fan(s) aside.
8. Install the replacement Fan Assembly as follows:
   a. Fasten Fan(s) in position with the wiring connectors at the bottom of the Fan(s).

NOTE

Only two screws are needed to attach the Fan to the Fan Panel. 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.

   b. Place the Fan Assembly Panel in position in the Power Supply.
      1. The inner edge of the Panel has tabs that engage slots in the center chassis. Ensure that these tabs fully engage in the chassis.
      2. Press the Panel downward. Press the bottom flange fully against the bottom panel of the Power Supply.
      3. Ensure that the hole in the bottom flange of the Fan Assembly Panel engages the mounting stud.
   c. Replace nut on the bottom mounting stud.
   d. Ensure that the Fan Panel's top flange is fully against the top forward edge of the Heatsink Shroud.
   e. Press the front panel of the Power Supply against the Fan Panel, and fasten in place with the bolt removed in Step 2.
   f. Secure the nut on the stud at the bottom of the Fan Panel.
9. Re-connect the wires to the Fan Assemblies.
10. Pass the Work Cable through the hole in the bottom of the Fan Panel. Ensure that the grommet is in place in the hole.
11. Connect the Work Cable to terminal E61 on the Power Output PC Board. Secure the Work Cable Strain Relief.
12. Re-install the Power Supply Cover.

B. Work Cable Replacement

1. Remove the cover per Section 5.09-A.
2. Disconnect the Work Cable from the E61 (WORK) terminal on the Power Output PC Board, located on the right side of the unit.
3. Squeeze the top and bottom of the Work Cable Strain Relief and remove from the Front Panel.
4. Remove Work Cable from the unit.
5. Install the replacement Work Cable.
    a. Ensure that the replacement Work Cable passes through the grommet in the Fan Assembly Panel.
    b. Secure the Cable to the Work terminal on the Power Output PC Board and securing the strain relief.

C. Pilot PC Board Replacement

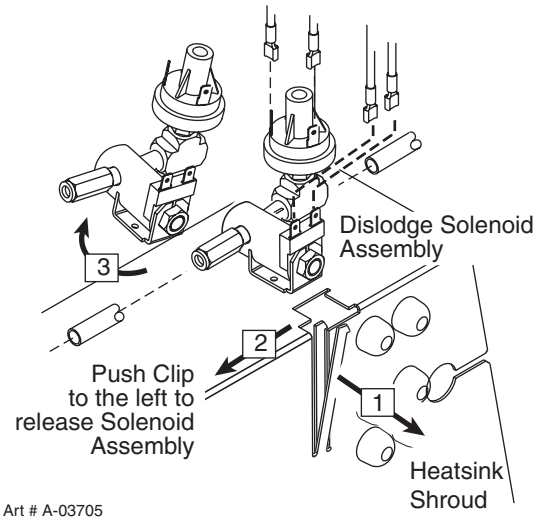
The Pilot PC Board mounts to the Power Supply center chassis. Refer to Pilot Board Layout in the Appendix.

1. Remove the power supply cover per Section 5.09-A.
2. Label and disconnect wires from Pilot PC Board terminals E58 and E62. Disconnect the wire harness from receptacle J28.
3. Remove the hardware securing the Pilot PC Board to the power supply center chassis. Remove the Pilot PC Board.
4. Position the replacement Pilot PC Board against the standoffs fastened to the center chassis. Note that the Pilot PC Board mounts with its printed text upside down. Fasten the Pilot Board to the standoffs with the hardware removed previously. Torque the hardware to 18 in-lbs (2.04 Nm).
5. Reconnect the wires to the Pilot PC Board. Wire #58 connects to terminal E58; wire #62 connects to terminal E62. Ensure that the wire harness connector is fully seated in receptacle J28.
6. Reinstall the power supply cover.

D. 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 power supply cover per Section 5.09-A.
2. Disconnect the following wires:
   a. Wires #10 and #11 from the Pressure Switch Assembly.
   b. Wires #8 and #9 from the Solenoid Assembly.
3. Push the clip on the front of the Heatsink Shroud to the left to release the Solenoid Assembly. Dislodge the Assembly from underneath the clip on the top of the Heatsink Shroud.



4. Release the hose from the Adapter Fitting on the input side of the Solenoid Assembly. 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 Solenoid Assembly.
6. Install the replacement Pressure Switch/Solenoid Assembly by reversing steps 2-5. Once installed, the Solenoid Assembly should fit securely on the Heatsink Shroud. It should not be moveable.
7. Re-install the power supply cover.

E. Heatsink Shroud Assembly Removal

The Heatsink Shroud Assembly must be disengaged for access to either the Main Transformer or the Output Inductor. Follow these steps for access to either component.

1. Remove the power supply cover per Section 5.09-A.
2. Release the tab on the vertical face of the Heatsink Shroud securing the Solenoid/Pressure Switch Assembly in position.
3. Remove the gas hose from the Regulator Fitting on the back panel of the Power Supply by pressing on the locking ring on the elbow fitting, while pulling on the hose.
4. Remove the Power Supply Back Panel per subsection 5.07-D.

   Remove the grommets from the two holes on the right (rear) edge of the Heatsink Shroud.
5. Remove the Fan Assembly per subsection 5.08C.
6. Label and disconnect the wires connected to the Pilot PC Board.
7. Remove the hardware securing the Pilot PC Board in place. Pull the PC Board off the center chassis.
8. Label and disconnect wires No. 45, 47, 49, and 52 from the Power Output PC Board.
9. Disconnect the wires from the Output Inductor to terminal E43 on the Power Output PC Board.

   Disconnect the torch receptacle ground wire connected to the center chassis.
10. Remove nuts on two studs at the top corners of the Heatsink Shroud, and nuts on two studs on the bottom flange of the Heatsink Shroud.
12. Remove the Heatsink Shroud as follows:
    a. Use the open left end of the Heatsink Shroud and the Pressure Switch/Solenoid opening as handles.
    b. Pull the Heatsink Shroud away from the center chassis, and then up. It may be necessary to pry the top and bottom flanges of the Heatsink Shroud slightly to release them from their mounting studs. Movement will be limited by the wiring harness.

F. Main Transformer Removal and Replacement

1. Disengage the Heatsink Shroud per Paragraph E.
2. Disconnect wires #27 and 32, connected to terminals E27 and E32 on the Main Power PC Board. Pull these wires through the hole in the center chassis.
3. Remove the transformer.
   a. Lift the Main Transformer slightly. Swing its left edge away from the center chassis. Pull its right edge away from the center chassis.
   b. Lift it out of the Power Supply through the opening at the rear of the Power Supply.
4. Position the replacement Main Transformer behind the Heatsink Shroud Assembly. Position its wires at the right edge (as you face it) of the transformer.
5. Install the replacement transformer as follows:
   a. Pass the tabs on the right edge of the base of the transformer into slots in the center chassis of the Power Supply.
   b. Swing the transformer against the chassis, and pass the tabs on the left edge of the base into slots in the chassis. Press the transformer downward to lock it into position.
   c. Check for proper installation; the transformer should remain securely in place.
6. Pass wires #27 and 32 through the hole in the center of the main chassis. Connect wire #27 to terminal E27 and wire #32 to terminal E32 on the Main Power PC Board.
7. Reinstall the Heatsink Shroud Assembly per sub-section H.

G. Output Inductor Assembly Removal and Replacement

1. Disengage the Heatsink Shroud per paragraph E.
2. Disconnect the wires to the thermal switch on the Output Inductor.
3. Remove hex nuts at the left forward and right rear corners of the Inductor base.
4. Remove the Inductor as follows:
   a. Note the position of the wires leading from the Inductor.
   b. Lift out the Inductor through the opening at the rear of the Power Supply. It may be necessary to lift the Main Transformer slightly to create room for the Inductor to pass through the rear opening.
5. Install the replacement Inductor.
   a. Put the replacement Inductor in place, with the wires oriented the same way as the original Inductor.
   b. Secure the Inductor in place with hex nuts at opposite corners of the Inductor base.
6. Reconnect the wires to the thermal switch on the Output Inductor.
7. Replace the Heatsink Shroud per paragraph I.

H. Heatsink Shroud Assembly Replacement

1. Pass transformer wires #45 and 49 through the upper hole in the right (rear) edge of the Heatsink Shroud. Pass transformer wires #47 and 52 through the lower hole.
2. Route wires as follows:
   a. Pass the red wires from the output inductor through the upper hole in the right (rear) edge of the Heatsink Shroud.
   b. Pass the black wires from the output inductor through the lower hole in the right (rear) edge of the Heatsink Shroud. Refer to Appendix 11, Power Output Board Layout.
   c. Pass the wires from the temperature switch on the Output Inductor through the upper hole in the Shroud.
3. Re-install the Heatsink Shroud as follows:
   a. Lift the Heatsink Shroud (Assembly) into position. Studs on the Power Supply base pass through holes in the bottom flange of the Shroud.
   b. Swing the top edge of the Shroud Assembly into place. Studs on the Center Chassis of the Power Supply pass through holes in the top flanges of the Shroud.
   c. Ensure that the rubber feet on the Main Transformer engage holes in the Shroud.
   d. Put hex nuts on the studs. Tighten the nuts on the right (rear) top and bottom studs. Leave the nuts on the left (forward) studs loose temporarily.
4. Put the Fan Assembly in place per subsection 5.12-A. Reconnect the work cable to terminal E61 on the Power Output PC Board.
5. Tighten the nuts securing the left edge of the Heatsink Shroud Assembly. The stud and nut on the bottom left edge fasten a wire stay to the Power Supply.
6. Replace the grommets around the wire harnesses passing through the right (rearward) edge of the Heatsink Shroud.
7. Reinstall the Pilot Board. Reconnect the wires to the Pilot Board.

   Reconnect the torch receptacle ground wire to the center chassis.
9. Replace the Pressure Switch/Solenoid Assembly. This assembly fits into a slot in the top horizontal surface of the Heatsink Shroud. A notched pin holds the assembly in place.
10. Connect the gas hose between the Regulator/Filter Assembly and the Gas Pressure Switch/Solenoid Assembly.
11. Connect wiring to the Output Power PC Board. Refer to the Appendix pages for wiring layout.
12. Replace the Power Supply rear panel per subsection 5.07-D.

This concludes the replacement procedures.

This Page Left Blank

SECTION 6:
PARTS LISTS

6.01 Introduction

A. Parts List Breakdown

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

Section 6.03 Complete Power Supply Replacements
Section 6.04 Power Supply Basic Replacement Parts
Section 6.05 Power Supply Options and Accessories
Section 6.06 Power Supply Major External Replacement Parts
Section 6.07: Power Supply Front Panel Replacement Parts
Section 6.08: Power Supply Left Side Replacement Parts
Section 6.09: Power Supply Rear Panel Replacement Parts
Section 6.10: Power Supply Right Side Replacement Parts
Section 6.11: Torch Replacement Parts (SL100 Torch - no Solenoid on Mounting Tube)
Section 6.12: Torch Replacement Parts (SL100SV Torch - with Solenoid on Mounting Tube)
Section 6.13: Torch Consumable Parts
Section 6.14: Torch Spare Parts Kits
Section 6.15: Complete Torch Replacements
Section 6.16: Torch 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 power supply. Address all inquiries to your authorized distributor.

6.03 Complete Power Supply Replacement

The following items are included with the replacement power supply: work cable & clamp, input power cable, gas pressure regulator / filter, and operating manual.

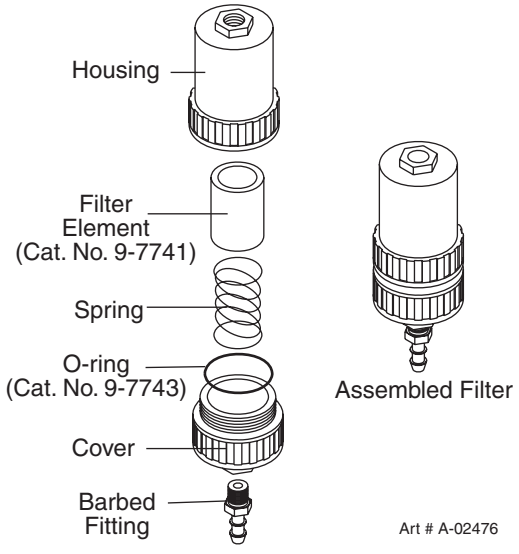
Qty	Description	Catalog #
	CutMaster 101 Automation Power Supply	
1	208 / 230VAC, Single-Phase, 50 / 60Hz, with input power cable and plug	3-1321-1
1	400VAC, Three - Phase, 50 /60Hz, with input power cable	3-1321-3
1	415VAC, Three - Phase, 50 Hz, with input power cable, CE	3-1321-6
1	400VAC, Three - Phase, 50 Hz, with input power cable, CE	3-1321-4
1	460VAC, Three - Phase, 60 Hz, with input power cable	3-1321-2
1	600VAC, Three - Phase, 60 Hz, with input power cable	3-1321-5

6.04 Power Supply Basic Replacement Parts

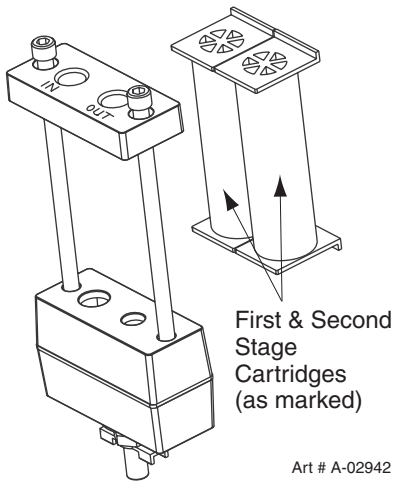
Qty	Description	Catalog #
	Fuse	
1	for 208 / 230VAC Power Supply	9-8588
1	for 400 / 415 VAC Power Supply	9-8602
1	for 460 VAC Power Supply	9-8583
1	for 600 VAC Power Supply	9-8638
1	Regulator / Filter Assembly Replacement Element	9-4414

6.05 Power Supply Options and Accessories

Qty	Description	Catalog #
1	Two-Stage 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	First Stage Cartridge	9-1021
1	Second Stage Cartridge	9-1022
1	Single-Stage Filter Kit (includes Filter & Hose)	7-7507
1	Replacement Filter Body	9-7740
1	Replacement Filter Hose (not shown)	9-7742
2	Replacement Filter Element	9-7741
1	Extended Work Cable (50 ft / 15.2 m) with Clamp	9-8529
1	Multi-Purpose Cart	7-8888
1	25' / 7.6 m CNC Interface Cable	9-8312
1	50' / 15.2 m CNC Interface Cable	9-8313
1	75' / 22.8 m CNC Interface Cable	9-8315
1	100' / 30.4 m CNC Interface Cable	9-8316
1	125' / 38.0 m CNC Interface Cable	9-8317
1	Vinyl Cover	9-7072



Single-Stage Filter Kit

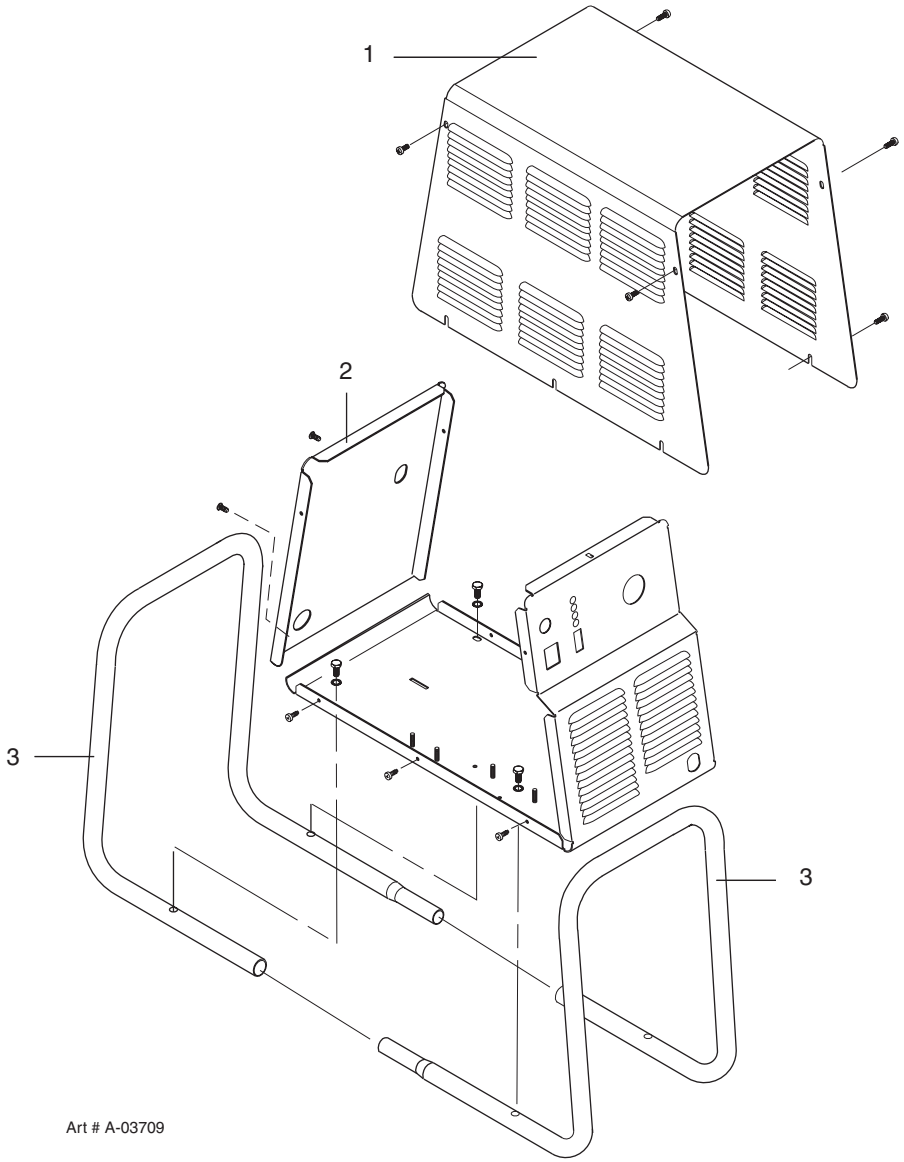


Optional Two-Stage Filter Kit

6

6.06 Power Supply Major External Replacement Parts

Item #	Qty	Description	Catalog #
1	1	Cover with labels	9-7997
2		Rear Panel (provide data tag information when ordering)	
	1	For 208/230-Volt Power Supplies	9-8323
	1	For 400-Volt, 415-Volt, 460-Volt, and 600-Volt Power Supplies	9-8322
2	1	Tube, roll handle	9-7998



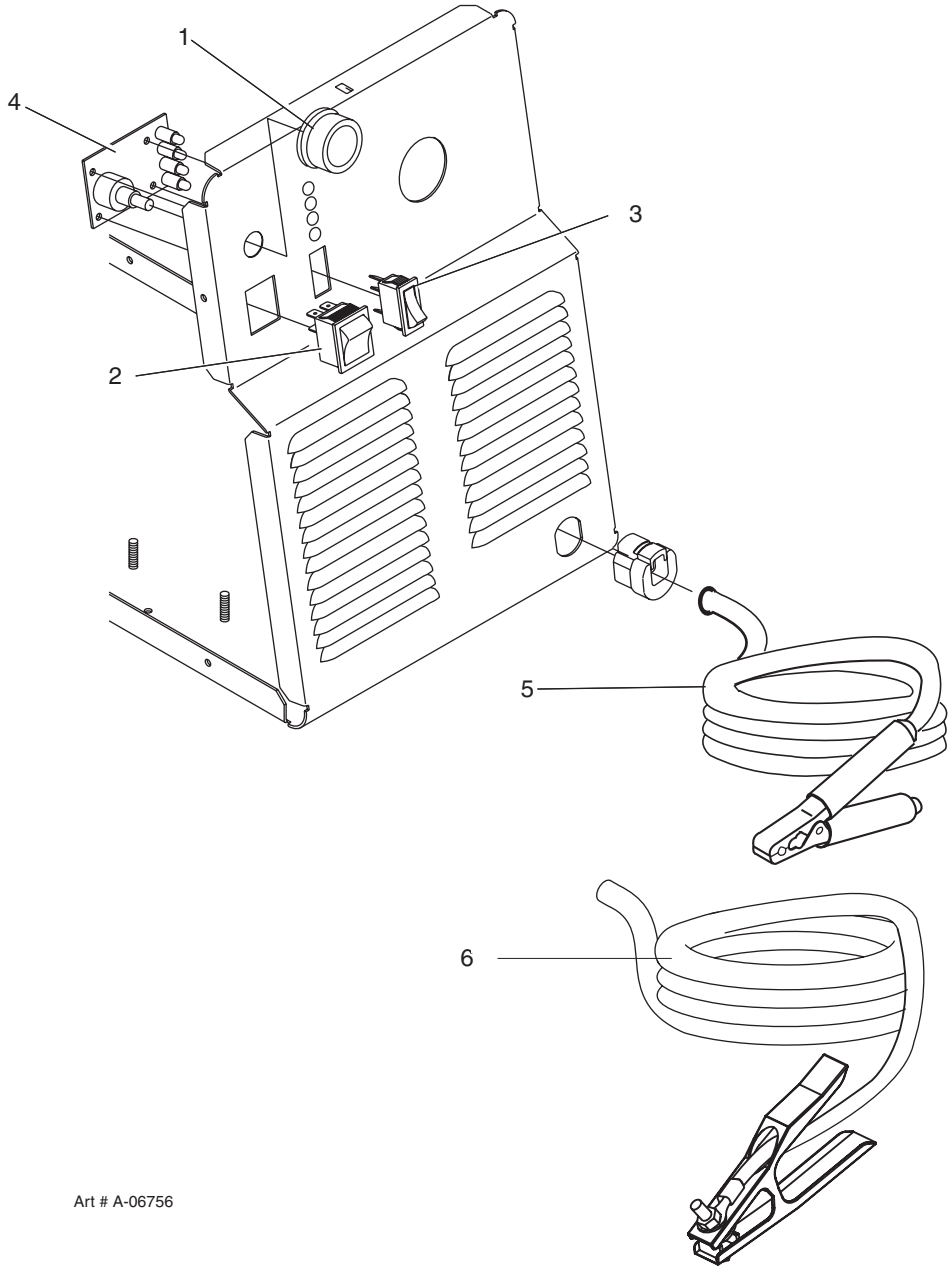
NOTE: Illustration may vary slightly from unit.

6.07 Power Supply 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	SW1	8-3258
3	1	Run / Rapid Auto Restart / Set Switch	SW2	9-1042
4	1	Assembly, Pot / LED PC Board		9-8004
5	1	Work Cable, #6 AWG, with Clamp, 20 Ft. (6.1 m)		See Note
6	1	Work Cable, #6 AWG, with Clamp, 20 Ft. (6.1 m)		9-8528

Note:

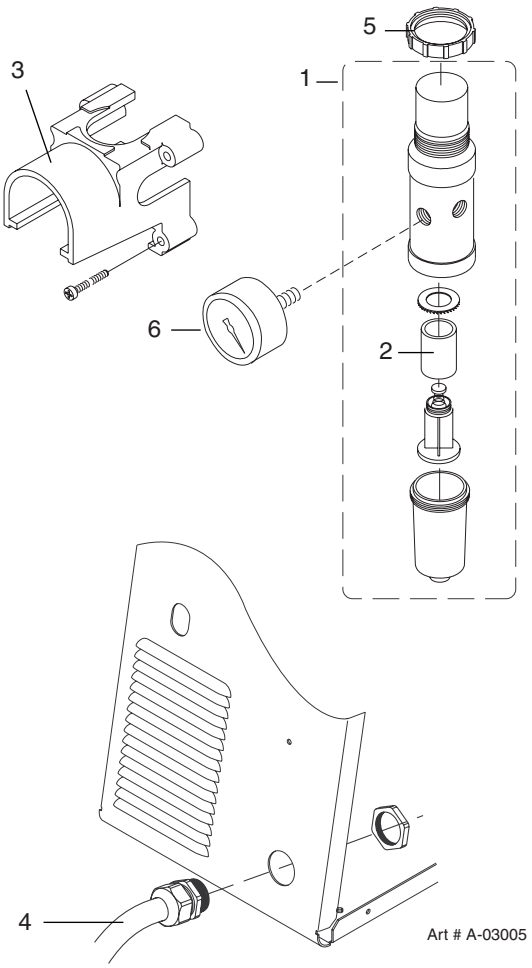
Item # 6 replaces Item #5.



NOTE: Illustration may vary slightly from unit.

6.08 Rear Panel Replacement Parts

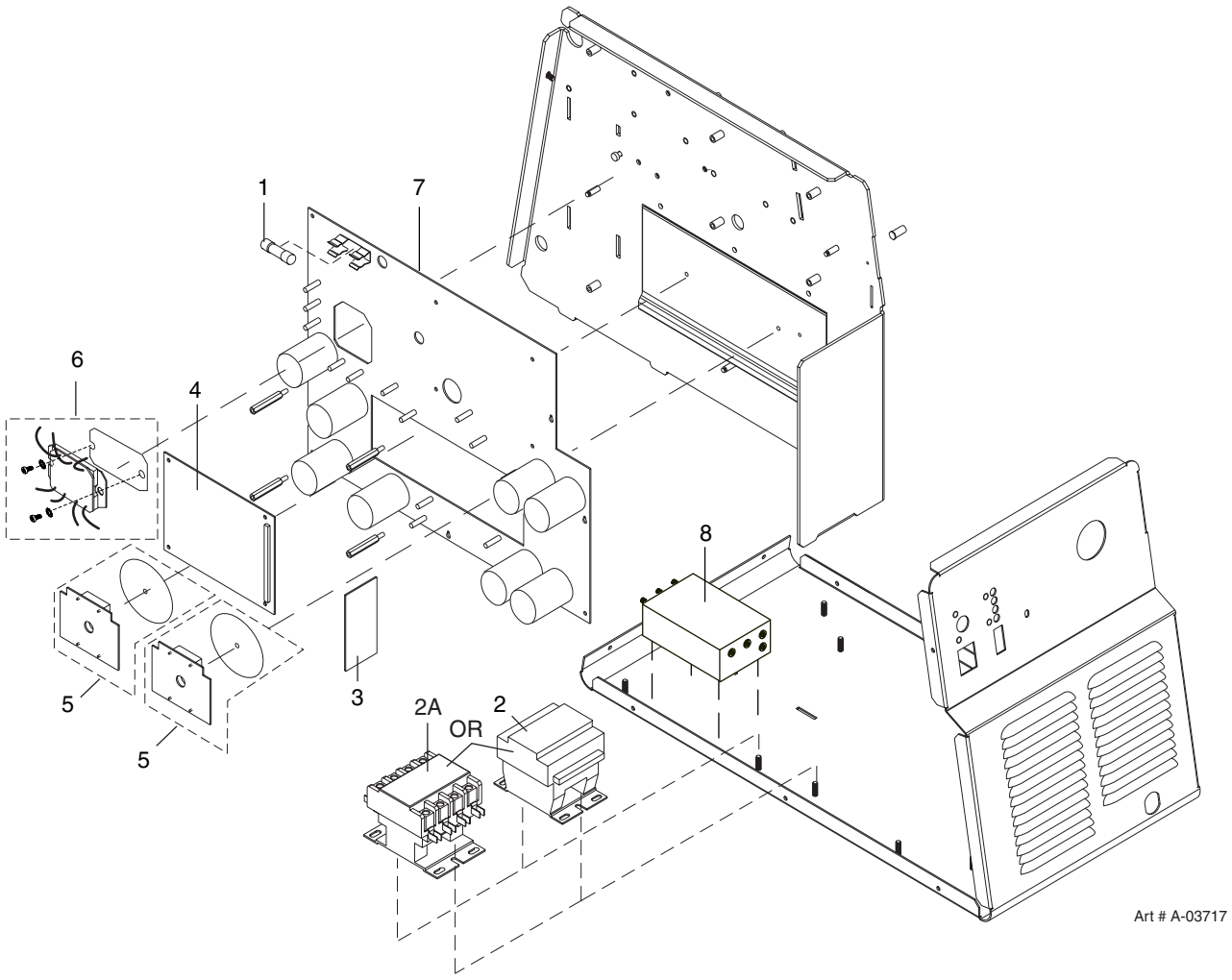
Item #	Qty	Description	Ref.	Catalog #
1	1	Assembly, Filter/Regulator		9-7514
2	1	Regulator/Filter Replacement Element		9-4414
3	1	Regulator Mounting Bracket		9-7589
4		Input Power Cable		
	1	for 208/230-Volt Units		9-8596
	1	for 400-Volt Three-Phase units		9-8562
	1	for 400-Volt / 415-Volt CE units		9-8553
	1	for 460-Volt Three-Phase units and 600-Volt Three-Phase units		9-8593
5	1	Mounting Nut		9-5804
6	1	Pressure Gauge		9-1045



NOTE: Illustration may vary slightly from unit.

6.09 Power Supply Left Side Internal Replacement Parts

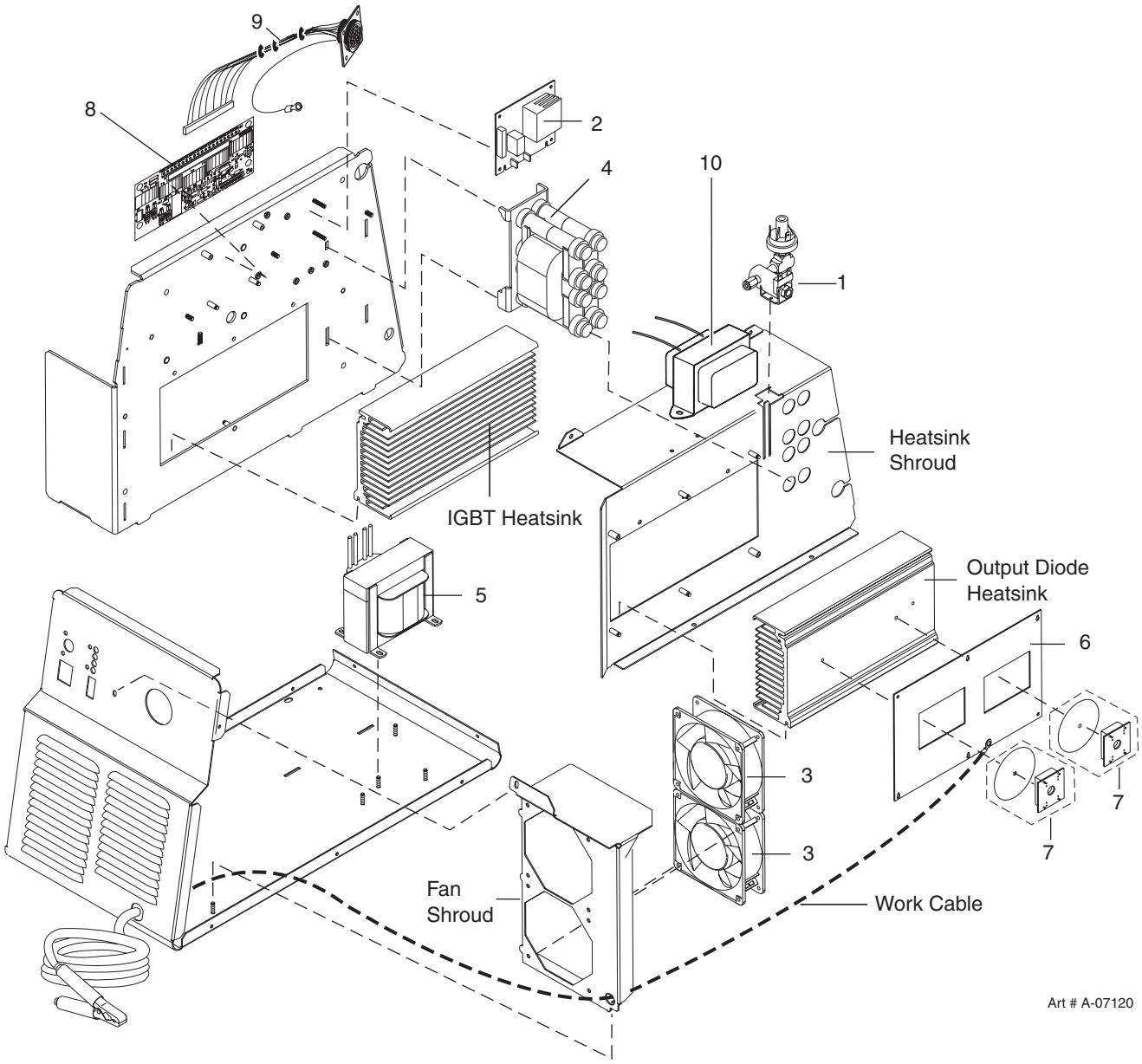
Item #	Qty	Description	Ref #	Catalog #
1	1	Fuse	F1	
		for 208/230-Volt Power Supplies		9-8588
		for 400 / 415-Volt Power Supplies		9-8602
		for 460-Volt Power Supplies		9-8583
		for 600-Volt Power Supplies		9-8638
		Main Input Contactor	W1	
2A		for 208/230-Volt Power Supplies		9-8587
2		for 400-Volt, 415-Volt, 460-Volt and 600-Volt Power Supplies		9-8554
3	1	Connector PC Board		9-8576
4	1	PC Board Assembly, Logic		9-7987
5	1	PC Board Assembly Kit, IGBT Circuit		
		for 208/230-Volt, 400-Volt, 415-Volt, and 460-Volt Power Supplies		9-8578
		IGBT PC Board		
		Round Thermal Pad		
		for 600-Volt Power Supplies		9-8646
		IGBT PC Board		
		Round Thermal Pad		
6	1	PC Board Assembly Kit, Input Diode		9-7088
		Input Diode PC Board		
		Rectangular Thermal Pad		
7	1	PC Board Assembly, Main Power		
		for 208/230-Volt Power Supplies		9-7986
		for 400-Volt Power Supplies		9-7990
		for 415-Volt Power Supplies		9-8669
		for 460-Volt Power Supplies		9-7989
		for 600-Volt Power Supplies		9-7991
8	1	EMI Filter (for CE Power Supplies only)		9-7667



NOTE: Illustration may vary slightly from unit.

6.10 Right Side Internal Replacement Parts

Item #	Qty	Description	Ref #.	Catalog #
1	1	Assembly, Pressure Switch/Solenoid	Sol1, Ps1	9-8329
2	1	Assembly, Pilot Board		9-7985
3	1	Fan, 220V, 115 CFM	M1, M2	9-7687
4	1	Assembly, Main Transformer	T5	
		for 208/230-Volt units		9-8589
		for 400-Volt / 415-Volt units		9-8603
		for 460-Volt units		9-8584
		for 600-Volt units		9-8635
5	1	Assembly, Output Inductor	L1	9-8591
6	1	Assembly, Output Power PC Board		9-7988
7	1	Assembly, Output Diode PC Board		9-8580
	1	Round Thermal Pad		
8	1	Automation Interface PC Board		9-4894
9	1	Automation Interface Wire Harness		9-4895
10	1	Transformer (only in power supplies connected to SL100SV Torch (with solenoid on mounting tube)		9-9449



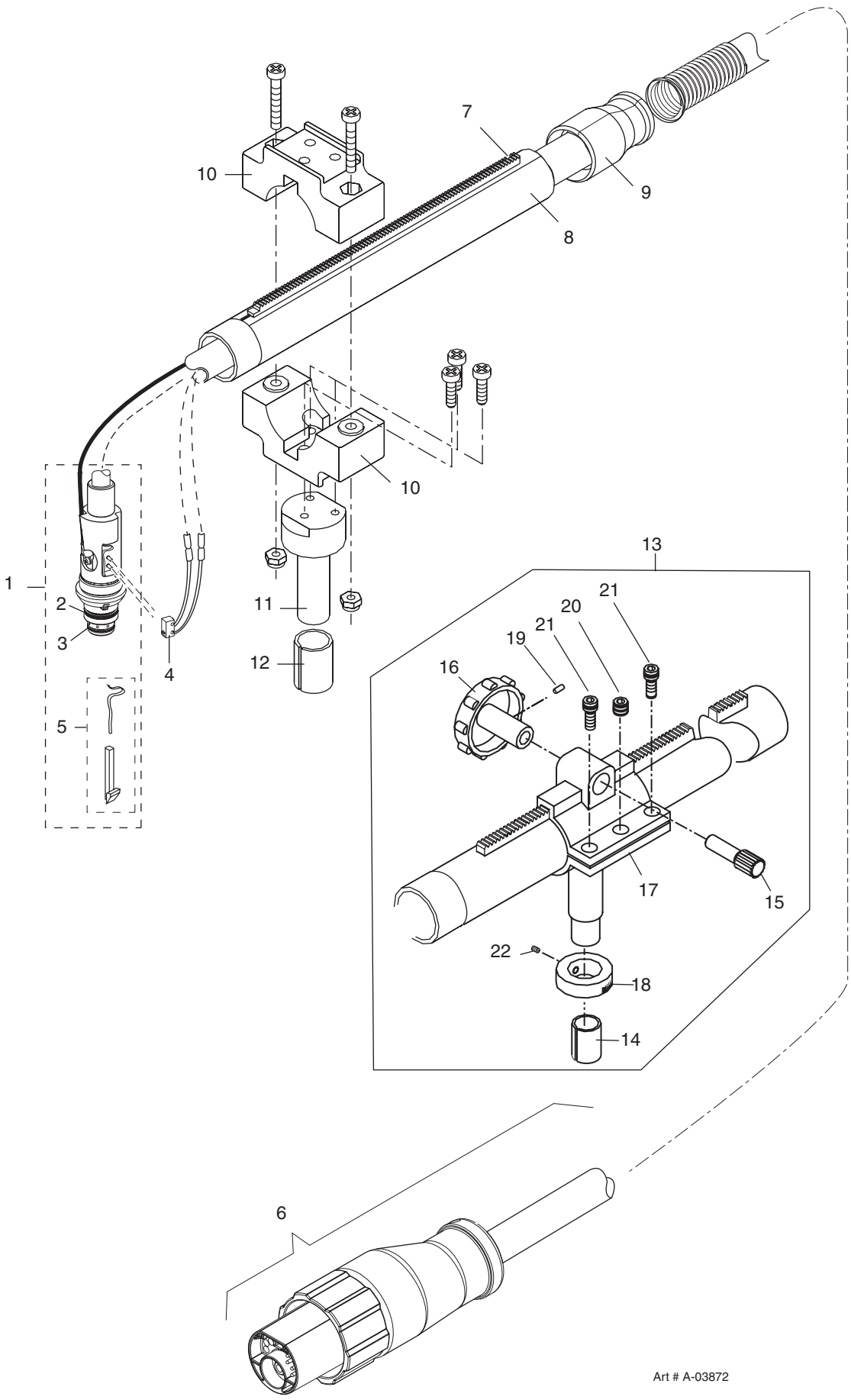
NOTE: Illustration may vary slightly from unit.

6.11 Torch Replacement Parts

SL100 Torch

Item No.	Qty	Description	Catalog No.
1	1	Torch Head Assembly without leads (includes items 2, 3, and 14)	9-8220
2	1	Large O - Ring	8-3487
3	1	Small O - Ring	8-3486
4	1	PIP Switch Kit	9-7036
5	1	PIP Plunger and Return Spring Kit	9-7045
6		**Automated Leads Assemblies with ATC connectors**	
	1	5 - foot / 1.5 m Leads Assembly with ATC connector	4-7850
	1	10 - foot / 3.05 m Leads Assembly with ATC connector	4-7851
	1	25 - foot / 7.6 m Leads Assembly with ATC connector	4-7852
	1	50 - foot / 15.2 m Leads Assembly with ATC connector	4-7853
7	1	11" / 279 mm Rack	9-7041
8	1	11" / 279 mm Mounting Tube	9-7043
9	1	End Cap Assembly	9-7044
10	2	Body, Mounting, Pinch Block	9-4513
11	1	Pin, Mounting, Pinch Block	9-4521
12	1	Torch Holder Sleeve	7-2896
13	1	Pinion Assembly (does not include positioning tube)	7-2827
14	1	Torch Holder Sleeve	7-2896
15	1	Pinion Gear-Short	8-6074
16	1	Handwheel (Torch Holder)	9-4514
17	1	Low Profile Torch Holder (1 3/8 Dia) w/o Hardware	9-4515
18	1	Calibrated Torch Holder Bushing	9-4366
19	1	5/32 Dia x 5/8 Lg Slotted Spring Pin	See Note 1
20	1	3/8-24 x 3/8 Soc Hd Set Screw, Cup Point	See Note 1
21	2	1/4-20 x 5/8 Hex Socket Head Screw	See Note 1
22	1	#10-24 x 3/8 Hex Socket Set Screw, Cup Point	See Note 1
	1	5" / 126 mm Positioning Tube (Not shown)	9-7042

Note 1: Item can be bought locally.


1
2
3
4
5
6
7
8
9
10
10
11
12
13
14
15
16
17
18
19
20
21
21
22
Art # A-03872

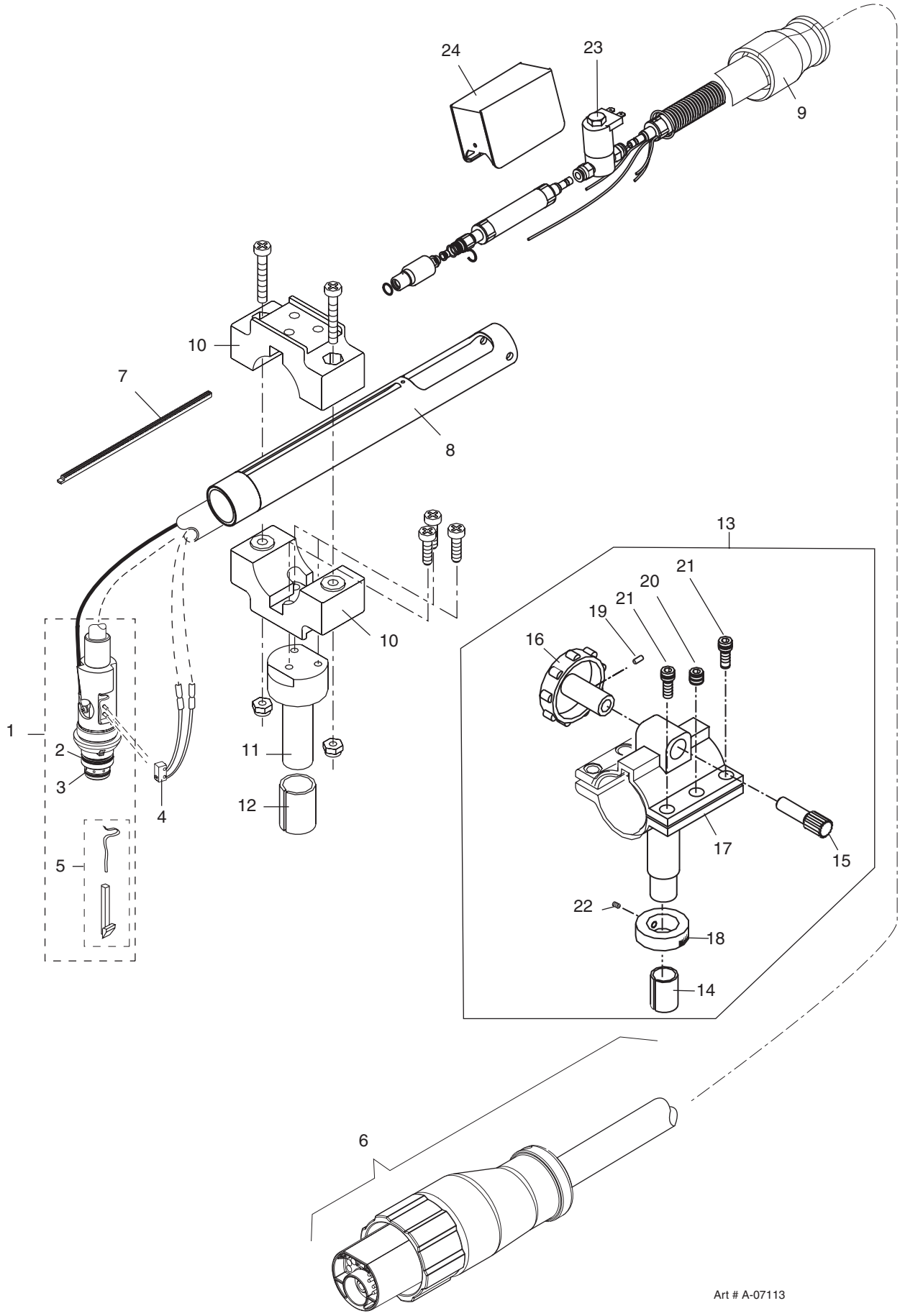
6.12 Torch Replacement Parts

SL100SV Torch (with Solenoid on Mounting Tube)

Item No.	Qty	Description	Catalog No.
1	1	Torch Head Assembly without leads (includes items 2, 3, and 14)	9-8220
2	1	Large O - Ring	8-3487
3	1	Small O - Ring	8-3486
4	1	PIP Switch Kit	9-7036
5	1	PIP Plunger and Return Spring Kit	9-7045
6		**Automated Leads Assemblies with ATC connectors**	
	1	25 - foot / 7.6 m Leads Assembly with ATC connector	4-3058
	1	35 - foot / 10.6 m Leads Assembly with ATC connector	4-3059
	1	50 - foot / 15.2 m Leads Assembly with ATC connector	4-3060
7	1	Rack	9-9448
8	1	Mounting Tube	9-9445
9	1	End Cap Assembly	9-7044
10	2	Body, Mounting, Pinch Block	9-4513
11	1	Pin, Mounting, Pinch Block	9-4521
12	1	Torch Holder Sleeve	7-2896
13	1	Pinion Assembly (does not include positioning tube)	7-2827
14	1	Torch Holder Sleeve	7-2896
15	1	Pinion Gear-Short	8-6074
16	1	Handwheel (Torch Holder)	9-4514
17	1	Low Profile Torch Holder (1 3/8 Dia) w/o Hardware	9-4515
18	1	Calibrated Torch Holder Bushing	9-4366
19	1	5/32 Dia x 5/8 Lg Slotted Spring Pin	See Note 1
20	1	3/8-24 x 3/8 Soc Hd Set Screw, Cup Point	See Note 1
21	2	1/4-20 x 5/8 Hex Socket Head Screw	See Note 1
22	1	#10-24 x 3/8 Hex Socket Set Screw, Cup Point	See Note 1
23	1	Solenoid Assembly	9-9447
24	1	Solenoid Cover	9-9446

NOTE 1:

Purchase these parts locally.


24
23
9
10
7
8
10
13
21
20
21
19
16
1
2
3
4
11
12
5
17
15
22
18
14
6
Art # A-07113

6.13 Torch Consumables

The illustration shows all SL100 torch consumable parts for use with the CutMaster 101 Automated Power Supply.

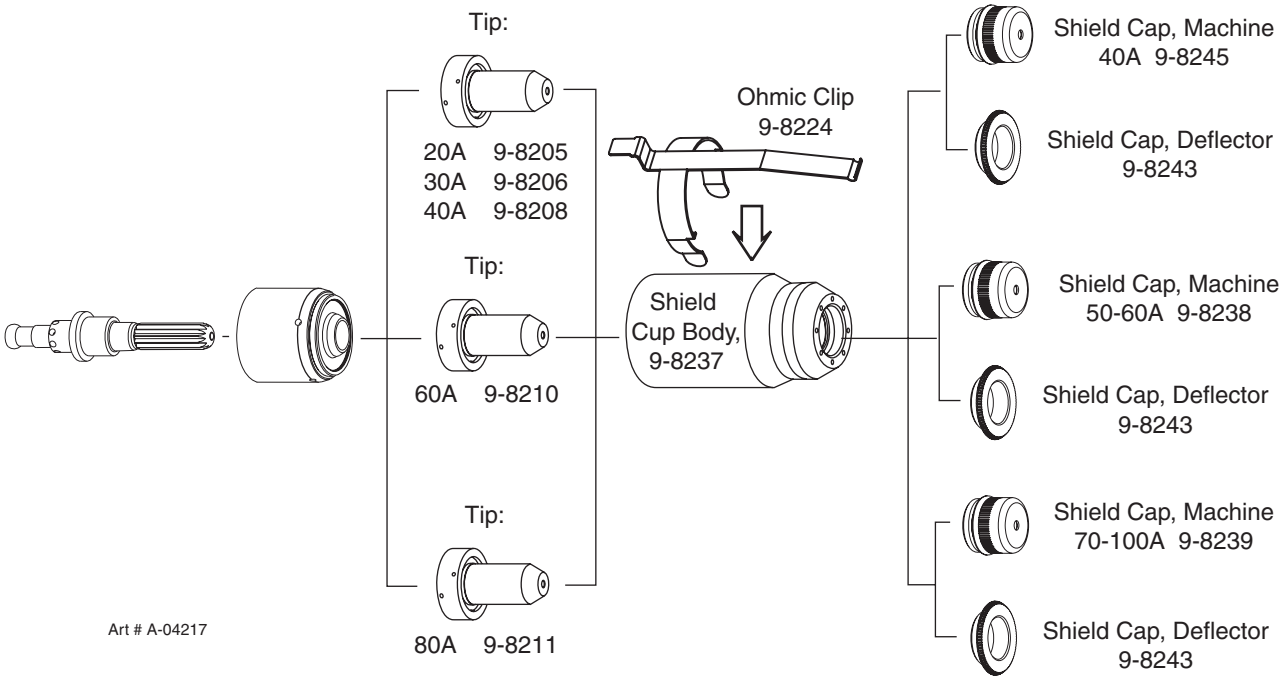
Various front-end torch parts are available for different applications.

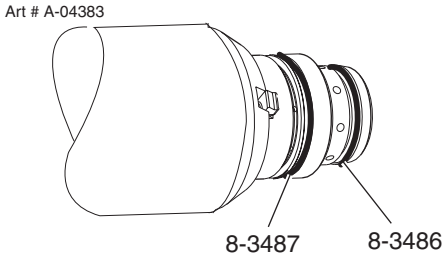
The Shield Cup Body with the Deflector Shield Cap provides extended parts life and improved resistance to reflected heat.

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

6.14 Torch Spare Parts Kits

Qty	Description	Catalog #
	40-Amp Automated Machine Torch Spare Parts Kit, includes:	5-0054
3	Electrode	9-8215
5	30 Amp Tip	9-8206
5	40 Amp Standoff Tip	9-8208
1	Start Cartridge	9-8213
1	Shield Cup Body	9-8237
1	Shield Cap, Machine, 40 Amp	9-8245
1	Shield Cap, Deflector	9-8243
1	Ohmic Clip Kit	9-8224
1	Large O - Ring	8-3487
1	Small O - Ring	8-3486
	60-Amp Automated Machine Torch Spare Parts Kit, includes:	5-0079
1	Start Cartridge	9-8213
3	Electrode	9-8215
5	30 Amp Tip	9-8206
5	40 Amp Standoff Tip	9-8208
5	60 Amp Standoff Tip	9-8210
1	Shield Cup Body	9-8237
1	Shield Cap, Machine, 40 Amp	9-8245
1	Shield Cap, Machine, 50-60 Amp	9-8238
1	Shield Cap, Deflector	9-8243
1	Ohmic Clip Kit	9-8224
1	Large O - Ring	8-3487
1	Small O - Ring	8-3486
	80-Amp Automated Machine Torch Spare Parts Kit, includes:	5-0122
1	Start Cartridge	9-8213
3	Electrode	9-8215
5	30 Amp Tip	9-8206
5	40 Amp Standoff Tip	9-8208
5	60 Amp Standoff Tip	9-8210
5	80 Amp Standoff Tip	9-8211
1	Shield Cup Body	9-8237
1	Shield Cap, Machine, 40 Amp	9-8245
1	Shield Cap, Machine, 50-60 Amp	9-8238
1	Shield Cap, Machine, 70-100 Amp	9-8239
1	Shield Cap, Deflector	9-8243
1	Ohmic Clip Kit	9-8224
1	Large O - Ring	8-3487
1	Small O - Ring	8-3486


Tip:
20A 9-8205
30A 9-8206
40A 9-8208
Tip:
60A 9-8210
Tip:
80A 9-8211
Ohmic Clip
9-8224
Shield
Cup Body,
9-8237
Shield Cap, Machine
40A 9-8245
Shield Cap, Deflector
9-8243
Shield Cap, Machine
50-60A 9-8238
Shield Cap, Deflector
9-8243
Shield Cap, Machine
70-100A 9-8239
Shield Cap, Deflector
9-8243
Art # A-04217


Art # A-04383
8-3487
8-3486

6

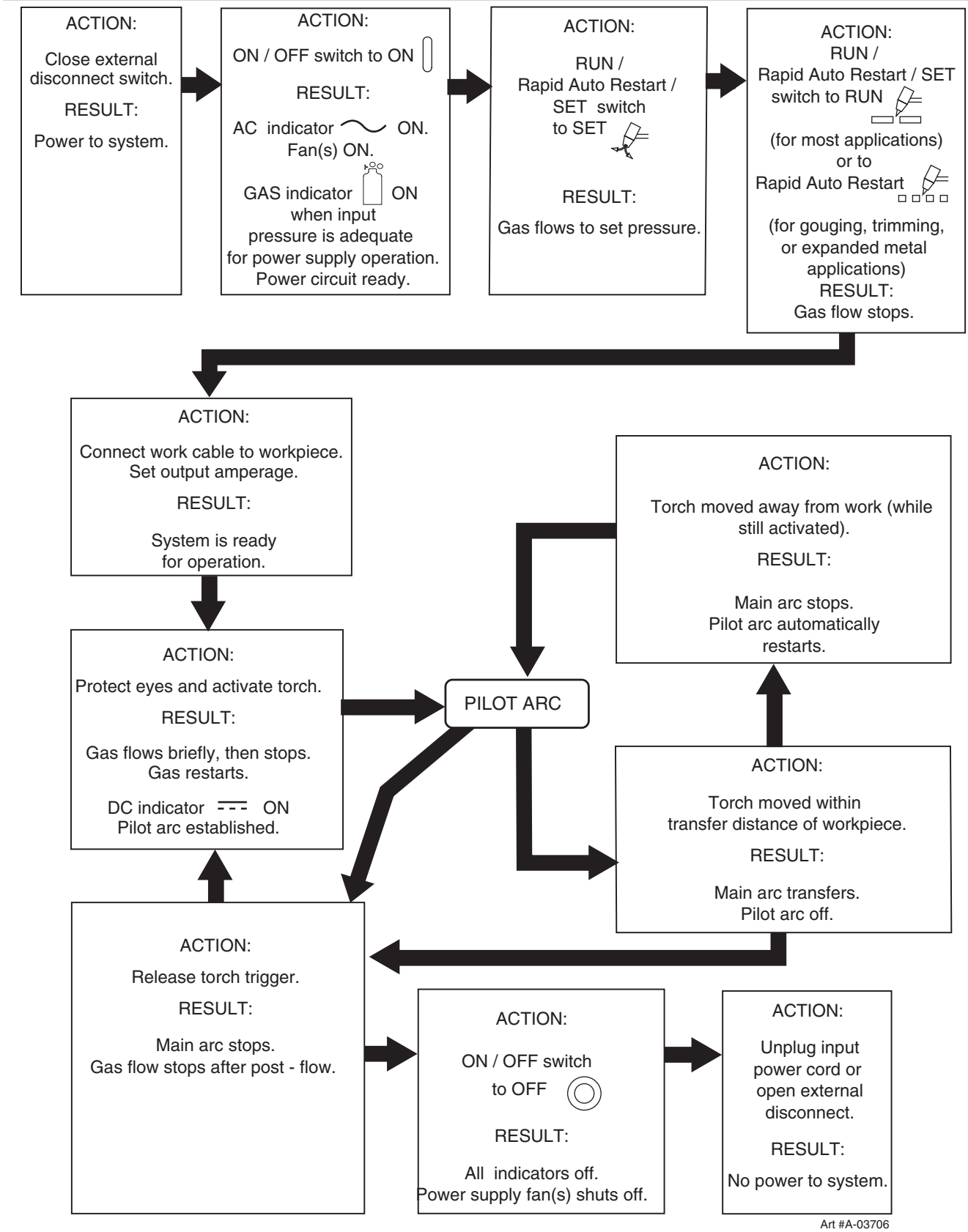
6.15 Complete Torch Assembly Replacement

Qty	Description	Catalog #
	100 - Amp Machine Torch and Leads Assemblies, Unshielded Leads:	
1	SL100 Machine Torch and 5 foot / 1.5 m Leads, with ATC Connector	7-5213
1	SL100 Machine Torch and 10 foot / 3.05 m Leads, with ATC Connector	7-5214
1	SL100 Machine Torch and 25 foot / 7.6 m Leads, with ATC Connector	7-5215
1	SL100 Machine Torch and 35 foot / 10.6 m Leads, with ATC Connector	7-5232
1	SL100 Machine Torch and 50 foot / 15.2 m Leads, with ATC Connector	7-5216
	100 - Amp Machine Torch and Leads Assemblies, Unshielded Leads, with Solenoid:	
1	SL100SV Machine Torch and 25 foot / 7.6 m Leads, with ATC Connector	7-4001
1	SL100SV Machine Torch and 35 foot / 10.6 m Leads, with ATC Connector	7-4002
1	SL100SV Machine Torch and 50 foot / 15.2 m Leads, with ATC Connector	7-4003

6.16 Torch Options & Accessories

Qty	Description	Catalog #
1	Computer Control (CNC) Cable	
	25 Foot / 7.6 m length	8-5557
	50 Foot / 15.2 m length	8-5558
1	Leather Leads Cover, 25 foot / 7.6 m length	9-1270
1	Leather Leads Cover, 50 foot / 15.2 m length	9-1280
1	Torch O-Ring Lubricant	8 - 4025

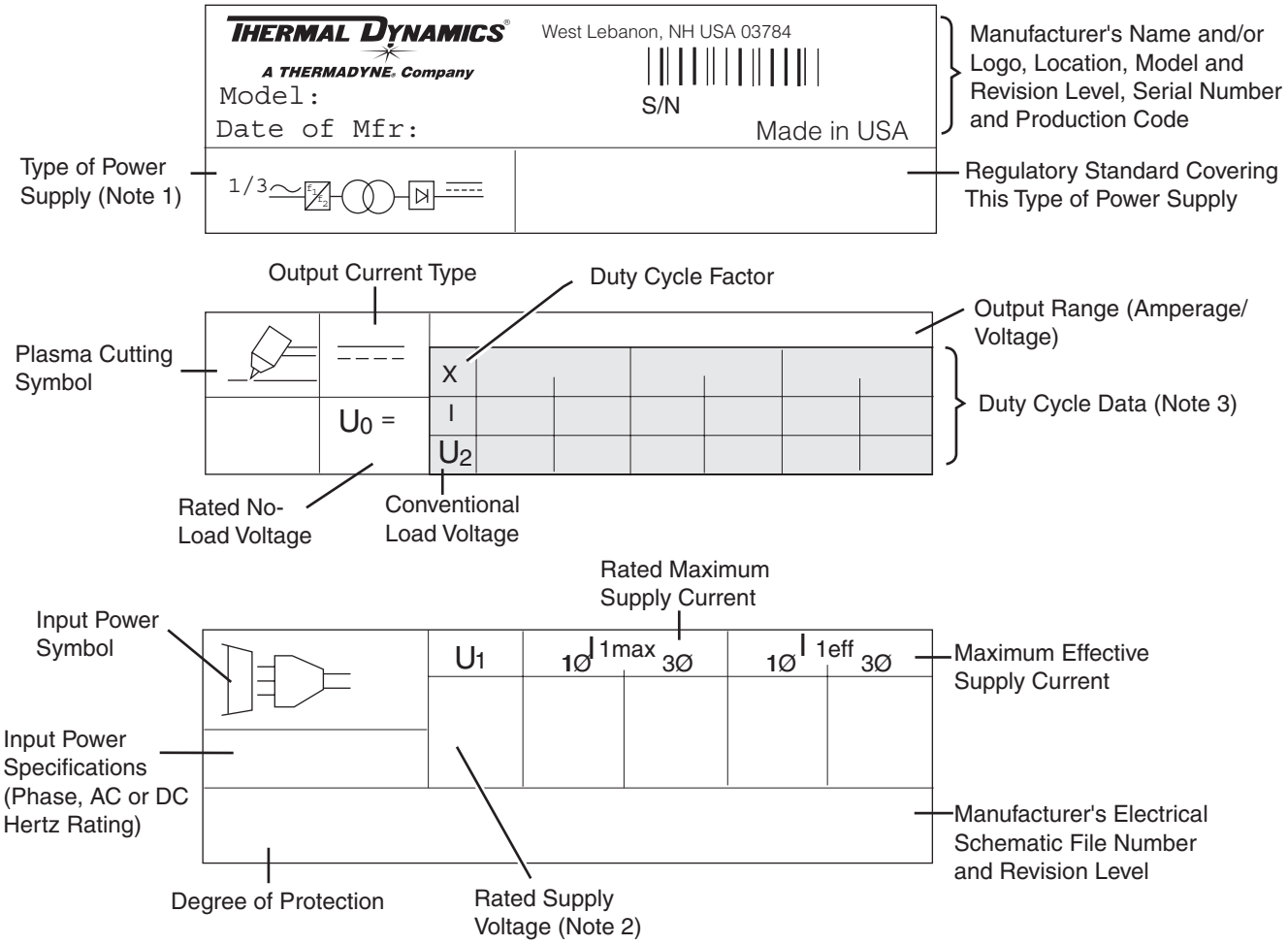
APPENDIX 1: SEQUENCE OF OPERATION (BLOCK DIAGRAM)



Art #A-03706

A

APPENDIX 2: DATA TAG INFORMATION



NOTES:

1. Symbol shown indicates single- or three-phase AC input, static frequency converter-transformer-rectifier, DC output.
2. Indicates input voltages for this power supply. Most power supplies carry a label at the input power cord showing input voltage requirements for the power supply as built.
3. Top row: Duty cycle values.
   IEC duty cycle value is calculated as specified by the International ElectroTechnical Commission.
   TDC duty cycle value is determined under the power supply manufacturer's test procedures.
   Second row: Rated cutting current values.
   Third row: Conventional load voltage values.
4. Sections of the Data Tag may be applied to separate areas of the power supply.

Standard Symbols

~	AC
⎓	DC
Ø	Phase

Art # A-03288

A

APPENDIX 3: 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

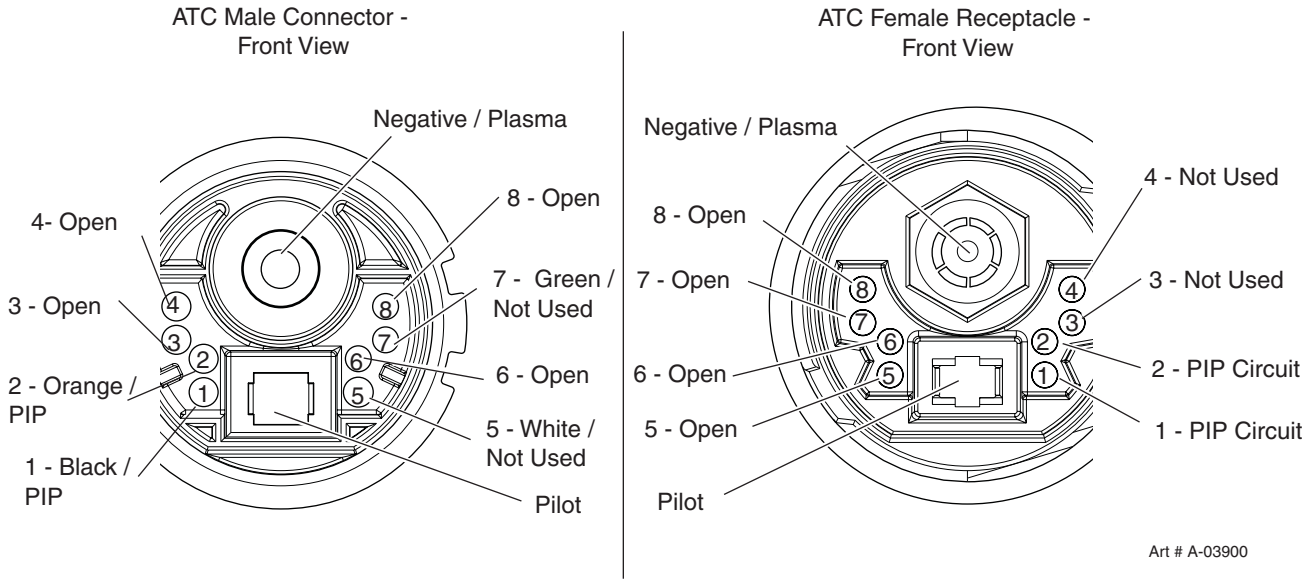
Do not blow air into the power supply during cleaning. Blowing air into the unit can cause metal particles to interfere with sensitive electrical components and cause damage to the unit.

Six Months or Every 720 Cutting Hours:

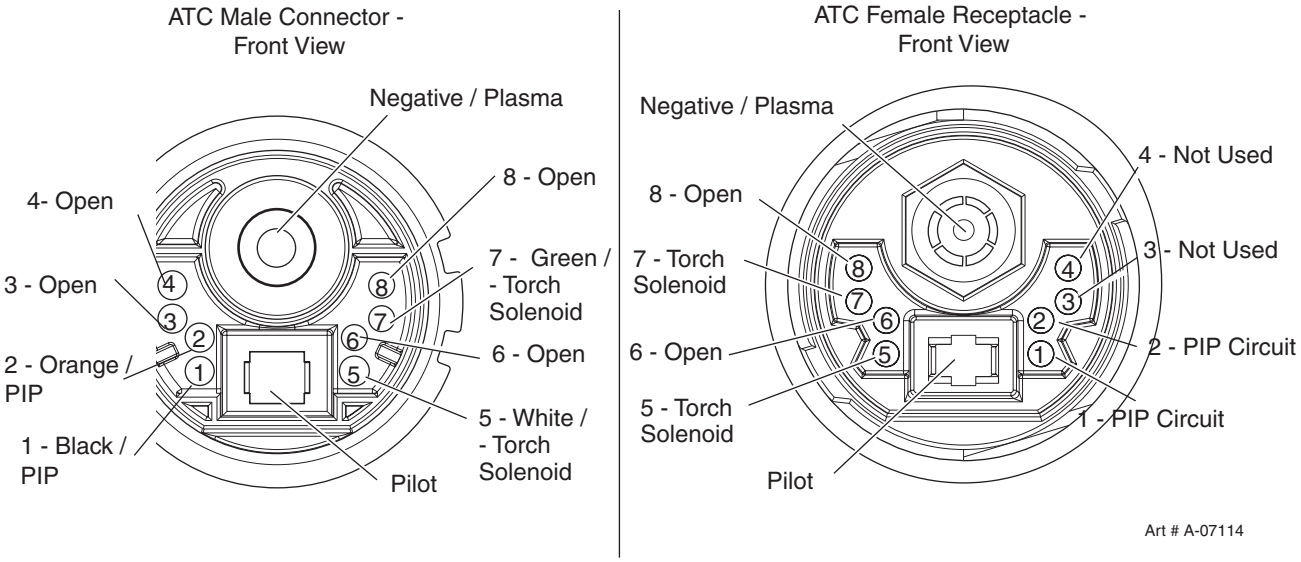
1. Check the in-line air filter(s), clean or replace as required
2. Check cables and hoses for leaks or cracks, replace if necessary.
3. Check all contactor points for severe arcing or pits, replace if necessary.

APPENDIX 4: TORCH PIN - OUT DIAGRAMS

A. Power Supply and SL100 Torch (without Solenoid)



B. Power Supply and SL100SV Torch (with Solenoid)

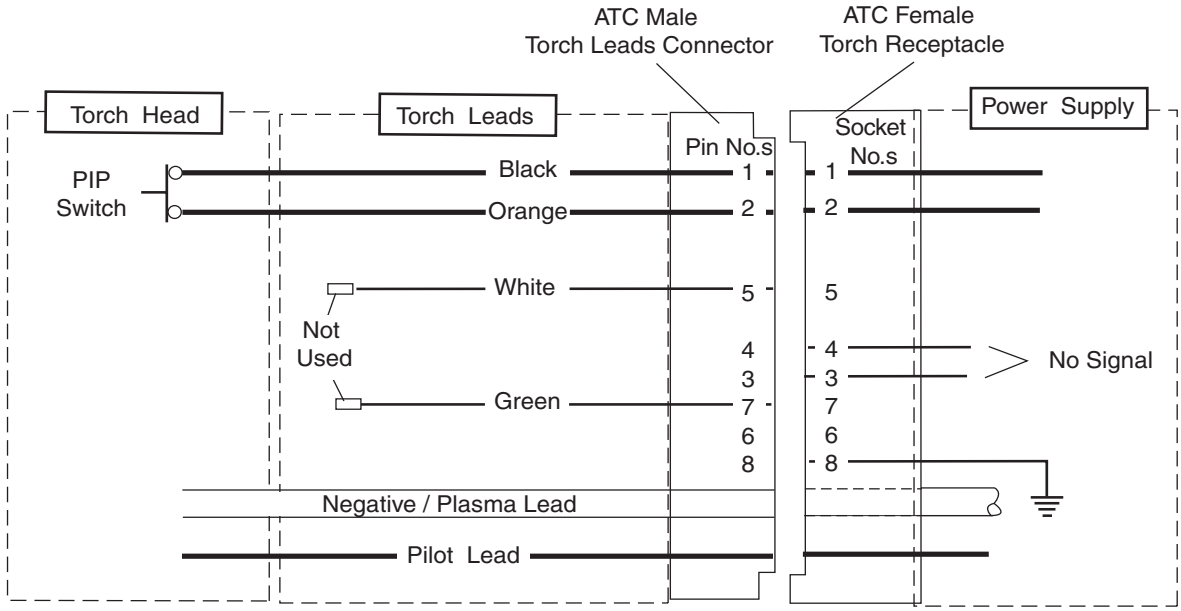


A

APPENDIX 5: TORCH CONNECTION DIAGRAMS

A. Power Supply and SL100 Torch (without Solenoid)

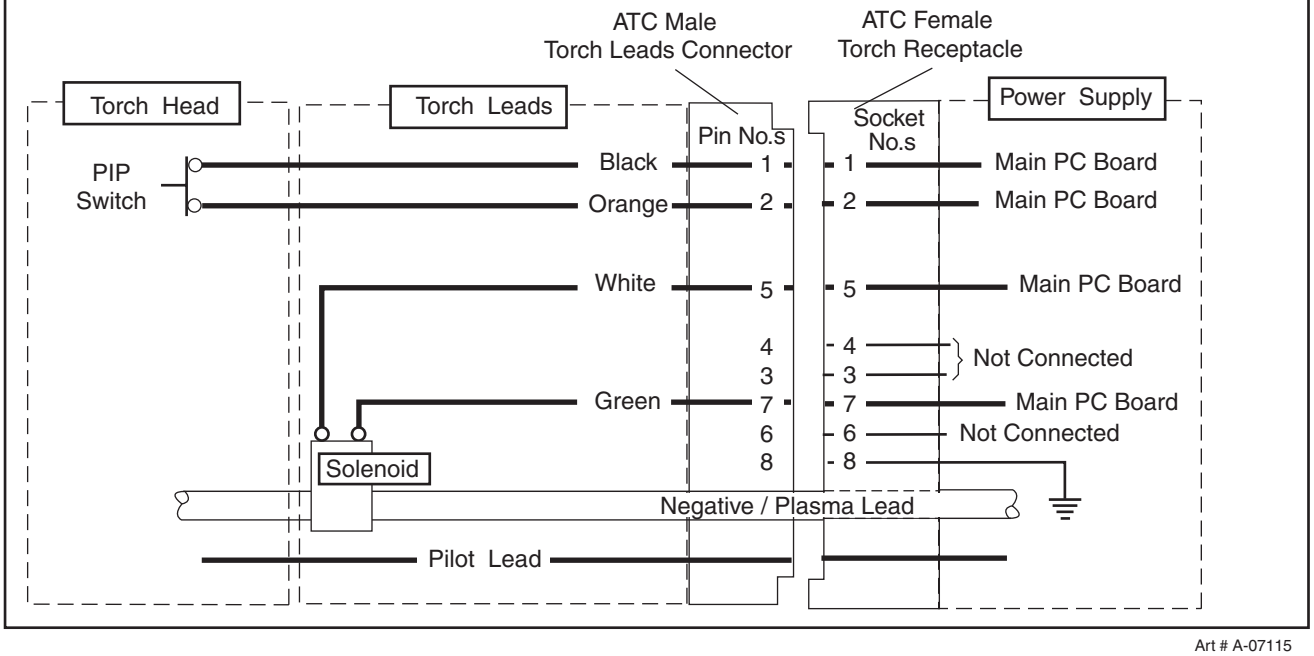
Automated CutMaster Power Supply with ATC Torch Receptacle,
Automated SL100 Torch with ATC Connector,



Art # A-03901

B. Power Supply and SL100SV Torch (with Solenoid)

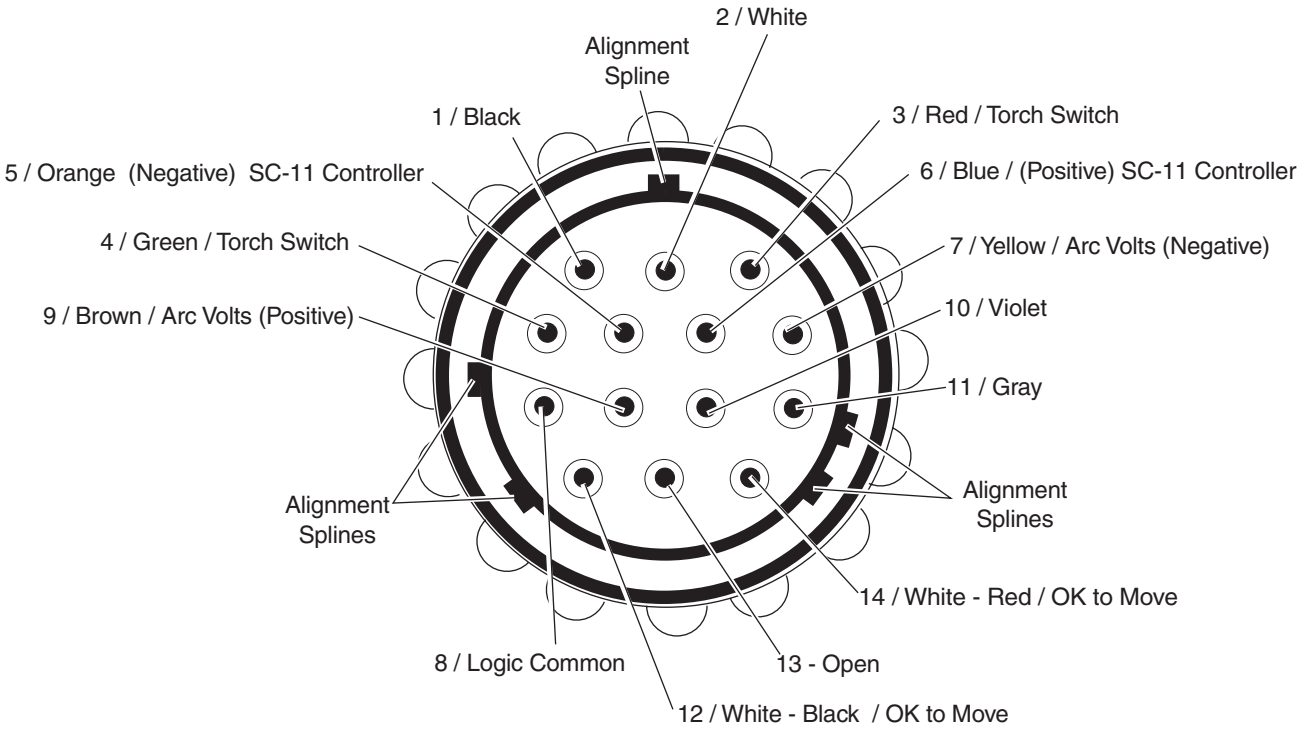
Automated CutMaster Power Supply with ATC Torch Receptacle,
Automated SL100SV Torch (w/ Solenoid on Positioning Tube), Torch Lead with ATC Connector



Art # A-07115

A

APPENDIX 6: CONTROL CABLE PIN - OUT DIAGRAM



Art # A-03993

A

APPENDIX 7: INTERFACE PCB SWITCH SETTINGS (MOST COMMON SETTINGS)

Automation Interface Switch Setting Chart - *Common Voltage Divider Output Settings*										
SW 4		**SW3**		**SW2**		**SW1**		**Volts Out for 100vdc In**	**Volts Out for 200vdc In**	***Division Factor***
1	**2**	**3**	**4**	**5**	**6**	**7**	**8**			
0 = DOWN = OFF, 1 = UP = ON										
Factory Default Settings Suitable for Thermal Dynamics SC-11 Standoff Control:										
0	0	0	0	0	0	0	0	6.00	12.00	16.3:1
Other Common Settings:										
0	0	0	1	0	1	1	0	5.00	10.00	20:1
0	1	0	1	0	0	0	1	3.3	6.6	30:1
1	1	0	0	0	0	0	0	2.5	5.0	40:1
1	1	1	1	1	1	1	1	2.0	4.0	50:1
0 = DOWN = OFF, 1 = UP = ON										

APPENDIX 8: INTERFACE PCB SWITCH SETTINGS (Division Factors 16-24)

Automation Interface Switch Setting Chart - *Division Factors 16 - 24*								
Switch 1	**Switch 2**	**Switch 3**	**Switch 4**	**Switch 5**	**Switch 6**	**Switch 7**	**Switch 8**	***Divide Factor***
0 = DOWN = OFF, 1 = UP = ON								
0	0	0	0	0	0	0	0	16.56
0	0	0	0	0	0	0	1	16.70
0	0	0	0	0	0	1	0	16.84
0	0	0	0	0	0	1	1	16.98
0	0	0	0	0	1	0	0	17.14
0	0	0	0	0	1	0	1	17.28
0	0	0	0	0	1	1	0	17.42
0	0	0	0	0	1	1	1	17.56
0	0	0	0	1	0	0	0	17.74
0	0	0	0	1	0	0	1	17.89
0	0	0	0	1	0	1	0	18.03
0	0	0	0	1	0	1	1	18.17
0	0	0	0	1	1	0	0	18.32
0	0	0	0	1	1	0	1	18.46
0	0	0	0	1	1	1	0	18.60
0	0	0	0	1	1	1	1	18.75
0	0	0	1	0	0	0	0	19.11
0	0	0	1	0	0	0	1	19.25
0	0	0	1	0	0	1	0	19.39
0	0	0	1	0	0	1	1	19.53
0	0	0	1	0	1	0	0	19.69
0	0	0	1	0	1	0	1	19.83
0	0	0	1	0	1	1	0	19.97
0	0	0	1	0	1	1	1	20.11
0	0	0	1	1	0	0	0	20.29
0	0	0	1	1	0	0	1	20.44
0	0	0	1	1	0	1	0	20.58
0	0	0	1	1	0	1	1	20.72
0	0	0	1	1	1	0	0	20.87
0	0	0	1	1	1	0	1	21.01
0	0	0	1	1	1	1	0	21.15
0	0	0	1	1	1	1	1	21.30
0	0	1	0	0	0	0	0	21.67
0	0	1	0	0	0	0	1	21.81
0	0	1	0	0	0	1	0	21.95
0	0	1	0	0	0	1	1	22.09
0	0	1	0	0	1	0	0	22.25
0	0	1	0	0	1	0	1	22.39
0	0	1	0	0	1	1	0	22.53
0	0	1	0	0	1	1	1	22.67
0	0	1	0	1	0	0	0	22.85
0	0	1	0	1	0	0	1	23.00
0	0	1	0	1	0	1	0	23.14
0	0	1	0	1	0	1	1	23.28
0	0	1	0	1	1	0	0	23.43
0	0	1	0	1	1	0	1	23.57
0	0	1	0	1	1	1	0	23.71
0	0	1	0	1	1	1	1	23.86
0 = DOWN = OFF, 1 = UP = ON								

A

APPENDIX 9: INTERFACE PCB SWITCH SETTINGS (Division Factors 24-30)

Automation Interface Switch Setting Chart, *Division Factors 24-30*								
Switch 1	**Switch 2**	**Switch 3**	**Switch 4**	**Switch 5**	**Switch 6**	**Switch 7**	**Switch 8**	***Divide Factor***
0 = DOWN = OFF, 1 = UP = ON								
0	0	1	1	0	0	0	0	24.22
0	0	1	1	0	0	0	1	24.36
0	0	1	1	0	0	1	0	24.50
0	0	1	1	0	0	1	1	24.64
0	0	1	1	0	1	0	0	24.80
0	0	1	1	0	1	0	1	24.94
0	0	1	1	0	1	1	0	25.08
0	0	1	1	0	1	1	1	25.22
0	0	1	1	1	0	0	0	25.40
0	0	1	1	1	0	0	1	25.55
0	0	1	1	1	0	1	0	25.69
0	0	1	1	1	0	1	1	25.83
0	0	1	1	1	1	0	0	25.98
0	0	1	1	1	1	0	1	26.12
0	0	1	1	1	1	1	0	26.26
0	0	1	1	1	1	1	1	26.41
0	1	0	0	0	0	0	0	27.32
0	1	0	0	0	0	0	1	27.46
0	1	0	0	0	0	1	0	27.60
0	1	0	0	0	0	1	1	27.74
0	1	0	0	0	1	0	0	27.89
0	1	0	0	0	1	0	1	28.04
0	1	0	0	0	1	1	0	28.18
0	1	0	0	0	1	1	1	28.32
0	1	0	0	1	0	0	0	28.50
0	1	0	0	1	0	0	1	28.65
0	1	0	0	1	0	1	0	28.78
0	1	0	0	1	0	1	1	28.93
0	1	0	0	1	1	0	0	29.08
0	1	0	0	1	1	0	1	29.22
1	0	0	0	0	0	0	0	29.31
0	1	0	0	1	1	1	0	29.36
1	0	0	0	0	0	0	1	29.45
0	1	0	0	1	1	1	1	29.50
1	0	0	0	0	0	1	0	29.59
1	0	0	0	0	0	1	1	29.73
0	1	0	1	0	0	0	0	29.87
1	0	0	0	0	1	0	0	29.89
0 = DOWN = OFF, 1 = UP = ON								

APPENDIX 10: INTERFACE PCB SWITCH SETTINGS (Division Factors 30-33)

Automation Interface Switch Setting Chart, *Division Factors 30-33*								
Switch 1	**Switch 2**	**Switch 3**	**Switch 4**	**Switch 5**	**Switch 6**	**Switch 7**	**Switch 8**	***Divide Factor***
0 = DOWN = OFF, 1 = UP = ON								
0	1	0	1	0	0	0	1	30.01
1	0	0	0	0	1	0	1	30.03
0	1	0	1	0	0	1	0	30.15
1	0	0	0	0	1	1	0	30.17
0	1	0	1	0	0	1	1	30.29
1	0	0	0	0	1	1	1	30.31
0	1	0	1	0	1	0	0	30.44
1	0	0	0	1	0	0	0	30.49
0	1	0	1	0	1	0	1	30.59
1	0	0	0	1	0	0	1	30.64
0	1	0	1	0	1	1	0	30.73
1	0	0	0	1	0	1	0	30.78
0	1	0	1	0	1	1	1	30.87
1	0	0	0	1	0	1	1	30.92
0	1	0	1	1	0	0	0	31.05
1	0	0	0	1	1	0	0	31.07
0	1	0	1	1	0	0	1	31.20
1	0	0	0	1	1	0	1	31.21
0	1	0	1	1	0	1	0	31.33
1	0	0	0	1	1	1	0	31.35
0	1	0	1	1	0	1	1	31.48
1	0	0	0	1	1	1	1	31.50
0	1	0	1	1	1	0	0	31.63
0	1	0	1	1	1	0	1	31.77
1	0	0	1	0	0	0	0	31.86
0	1	0	1	1	1	1	0	31.91
1	0	0	1	0	0	0	1	32.00
0	1	0	1	1	1	1	1	32.05
1	0	0	1	0	0	1	0	32.14
1	0	0	1	0	0	1	1	32.28
0	1	1	0	0	0	0	0	32.43
1	0	0	1	0	1	0	0	32.44
0	1	1	0	0	0	0	1	32.57
1	0	0	1	0	1	0	1	32.58
0	1	1	0	0	0	1	0	32.71
1	0	0	1	0	1	1	0	32.72
0	1	1	0	0	0	1	1	32.85
1	0	0	1	0	1	1	1	32.86
0 = DOWN = OFF, 1 = UP = ON								

A

APPENDIX 11: INTERFACE PCB SWITCH SETTINGS (Division Factors 33-36)

Automation Interface Switch Setting Chart, *Division Factors 33 - 36*								
Switch 1	**Switch 2**	**Switch 3**	**Switch 4**	**Switch 5**	**Switch 6**	**Switch 7**	**Switch 8**	***Divide Factor***
0 = DOWN = OFF, 1 = UP = ON								
0	1	1	0	0	1	0	0	33.01
1	0	0	1	1	0	0	0	33.04
0	1	1	0	0	1	0	1	33.15
1	0	0	1	1	0	0	1	33.19
0	1	1	0	0	1	1	0	33.29
1	0	0	1	1	0	1	0	33.33
0	1	1	0	0	1	1	1	33.43
1	0	0	1	1	0	1	1	33.47
0	1	1	0	1	0	0	0	33.61
1	0	0	1	1	1	0	0	33.62
0	1	1	0	1	0	0	1	33.76
1	0	0	1	1	1	0	1	33.76
0	1	1	0	1	0	1	0	33.89
1	0	0	1	1	1	1	0	33.90
0	1	1	0	1	0	1	1	34.04
1	0	0	1	1	1	1	1	34.05
0	1	1	0	1	1	0	0	34.19
0	1	1	0	1	1	0	1	34.33
1	0	1	0	0	0	0	0	34.42
0	1	1	0	1	1	1	0	34.47
1	0	1	0	0	0	0	1	34.56
0	1	1	0	1	1	1	1	34.61
1	0	1	0	0	0	1	0	34.70
1	0	1	0	0	0	1	1	34.84
0	1	1	1	0	0	0	0	34.98
1	0	1	0	0	1	0	0	35.00
0	1	1	1	0	0	0	1	35.12
1	0	1	0	0	1	0	1	35.14
0	1	1	1	0	0	1	0	35.26
1	0	1	0	0	1	1	0	35.28
0	1	1	1	0	0	1	1	35.40
1	0	1	0	0	1	1	1	35.42
0	1	1	1	0	1	0	0	35.56
1	0	1	0	1	0	0	0	35.60
0	1	1	1	0	1	0	1	35.70
1	0	1	0	1	0	0	1	35.75
0	1	1	1	0	1	1	0	35.84
1	0	1	0	1	0	1	0	35.89
0	1	1	1	0	1	1	1	35.98
0 = DOWN = OFF, 1 = UP = ON								

APPENDIX 12: INTERFACE PCB SWITCH SETTINGS (Division Factors 36-43)

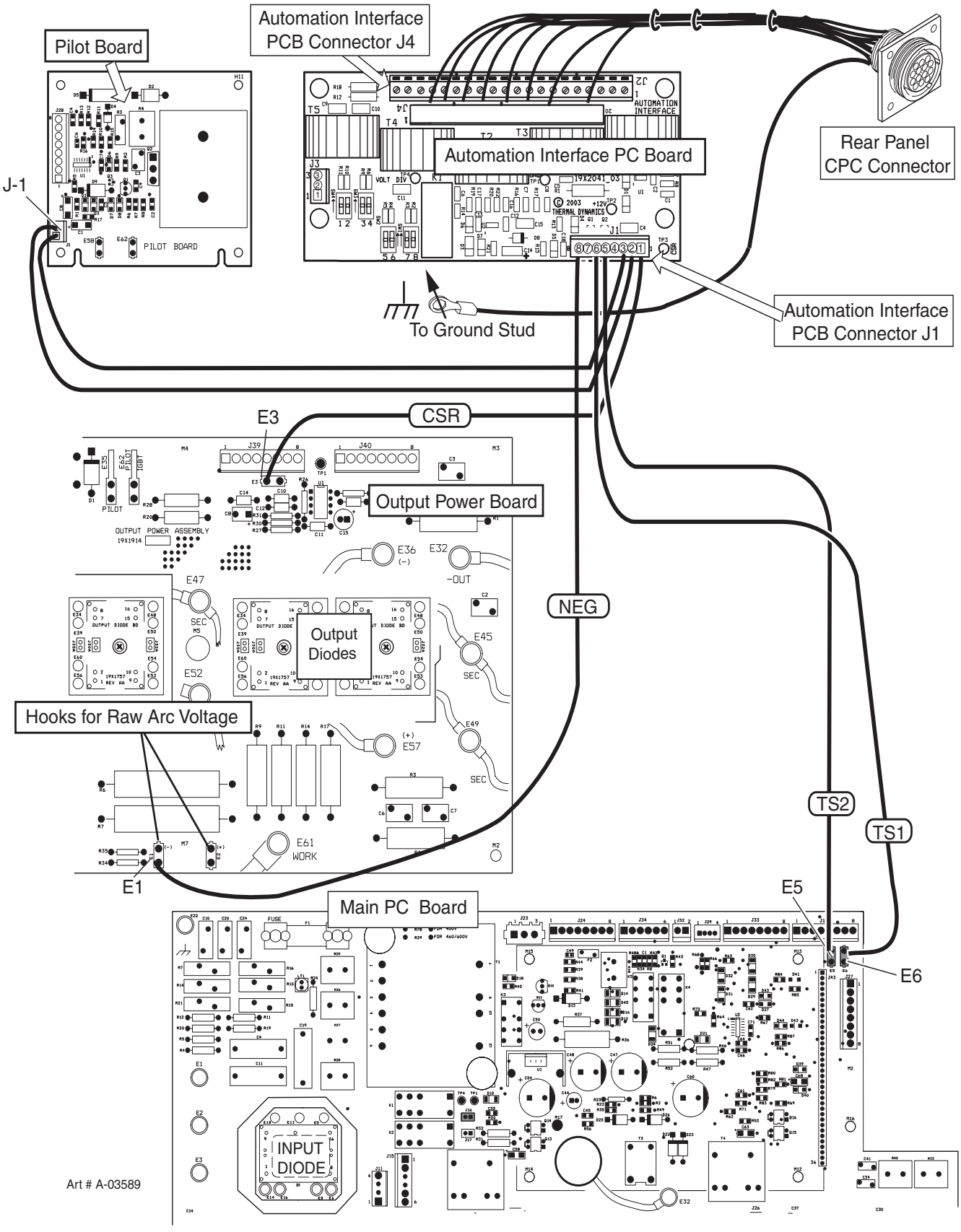
Automation Interface Switch Setting Chart, *Division Factors 36-43*								
Switch 1	**Switch 2**	**Switch 3**	**Switch 4**	**Switch 5**	**Switch 6**	**Switch 7**	**Switch 8**	***Divide Factor***
0 = DOWN = OFF, 1 = UP = ON								
1	0	1	0	1	0	1	1	36.03
0	1	1	1	1	0	0	0	36.16
1	0	1	0	1	1	0	0	36.18
0	1	1	1	1	0	0	1	36.31
1	0	1	0	1	1	0	1	36.32
0	1	1	1	1	0	1	0	36.44
1	0	1	0	1	1	1	0	36.46
0	1	1	1	1	0	1	1	36.59
1	0	1	0	1	1	1	1	36.61
0	1	1	1	1	1	0	0	36.74
0	1	1	1	1	1	0	1	36.88
1	0	1	1	0	0	0	0	36.97
0	1	1	1	1	1	1	0	37.02
1	0	1	1	0	0	0	1	37.11
0	1	1	1	1	1	1	1	37.16
1	0	1	1	0	0	1	0	37.25
1	0	1	1	0	0	1	1	37.39
1	0	1	1	0	1	0	0	37.55
1	0	1	1	0	1	0	1	37.69
1	0	1	1	0	1	1	0	37.83
1	0	1	1	0	1	1	1	37.97
1	0	1	1	1	0	0	0	38.15
1	0	1	1	1	0	0	1	38.30
1	0	1	1	1	0	1	0	38.44
1	0	1	1	1	0	1	1	38.58
1	0	1	1	1	1	0	0	38.73
1	0	1	1	1	1	0	1	38.87
1	0	1	1	1	1	1	0	39.01
1	0	1	1	1	1	1	1	39.16
1	1	0	0	0	0	0	0	40.07
1	1	0	0	0	0	0	1	40.21
1	1	0	0	0	0	1	0	40.35
1	1	0	0	0	0	1	1	40.49
1	1	0	0	0	1	0	0	40.64
1	1	0	0	0	1	0	1	40.79
1	1	0	0	0	1	1	0	40.93
1	1	0	0	0	1	1	1	41.07
1	1	0	0	1	0	0	0	41.25
1	1	0	0	1	0	0	1	41.40
1	1	0	0	1	0	1	0	41.53
1	1	0	0	1	0	1	1	41.68
1	1	0	0	1	1	0	0	41.83
1	1	0	0	1	1	0	1	41.97
1	1	0	0	1	1	1	0	42.11
1	1	0	0	1	1	1	1	42.25
1	1	0	1	0	0	0	0	42.62
1	1	0	1	0	0	0	1	42.76
1	1	0	1	0	0	1	0	42.90
0 = DOWN = OFF, 1 = UP = ON								

A

APPENDIX 13: INTERFACE PCB SWITCH SETTINGS (Division Factors 43-50)

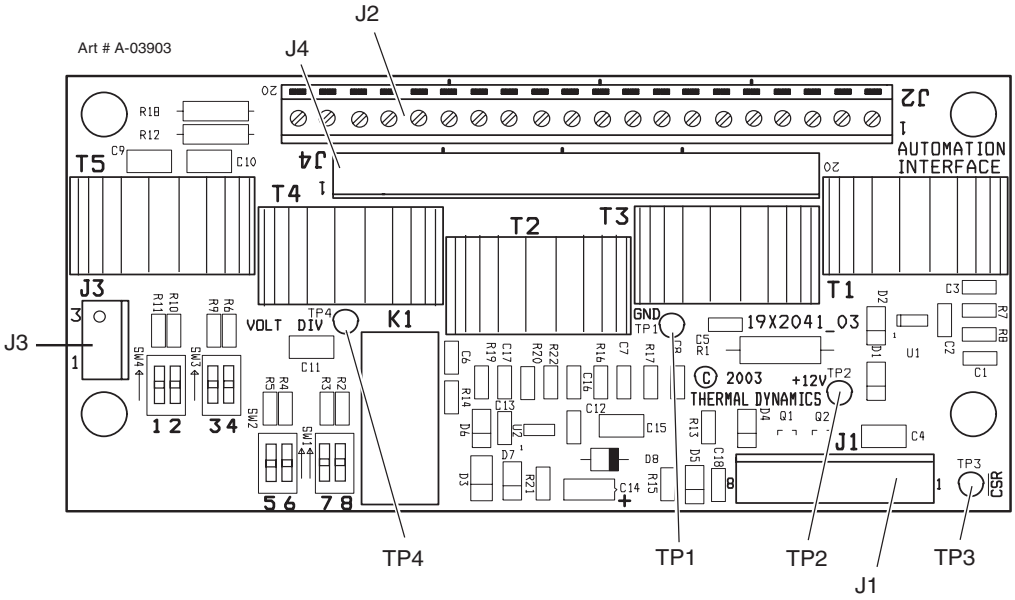
Automation Interface Switch Setting Chart, *Division Factors 43 - 50*								
Switch 1	**Switch 2**	**Switch 3**	**Switch 4**	**Switch 5**	**Switch 6**	**Switch 7**	**Switch 8**	***Divide Factor***
0 = DOWN = OFF, 1 = UP = ON								
1	1	0	1	0	0	1	1	43.04
1	1	0	1	0	1	0	0	43.19
1	1	0	1	0	1	0	1	43.34
1	1	0	1	0	1	1	0	43.48
1	1	0	1	0	1	1	1	43.62
1	1	0	1	1	0	0	0	43.80
1	1	0	1	1	0	0	1	43.95
1	1	0	1	1	0	1	0	44.08
1	1	0	1	1	0	1	1	44.23
1	1	0	1	1	1	0	0	44.38
1	1	0	1	1	1	0	1	44.52
1	1	0	1	1	1	1	0	44.66
1	1	0	1	1	1	1	1	44.80
1	1	1	0	0	0	0	0	45.18
1	1	1	0	0	0	0	1	45.32
1	1	1	0	0	0	1	0	45.46
1	1	1	0	0	0	1	1	45.60
1	1	1	0	0	1	0	0	45.76
1	1	1	0	0	1	0	1	45.90
1	1	1	0	0	1	1	0	46.04
1	1	1	0	0	1	1	1	46.18
1	1	1	0	1	0	0	0	46.36
1	1	1	0	1	0	0	1	46.51
1	1	1	0	1	0	1	0	46.64
1	1	1	0	1	0	1	1	46.79
1	1	1	0	1	1	0	0	46.94
1	1	1	0	1	1	0	1	47.08
1	1	1	0	1	1	1	0	47.22
1	1	1	0	1	1	1	1	47.36
1	1	1	1	0	0	0	0	47.73
1	1	1	1	0	0	0	1	47.87
1	1	1	1	0	0	1	0	48.01
1	1	1	1	0	0	1	1	48.15
1	1	1	1	0	1	0	0	48.31
1	1	1	1	0	1	0	1	48.45
1	1	1	1	0	1	1	0	48.59
1	1	1	1	0	1	1	1	48.73
1	1	1	1	1	0	0	0	48.91
1	1	1	1	1	0	0	1	49.06
1	1	1	1	1	0	1	0	49.19
1	1	1	1	1	0	1	1	49.34
1	1	1	1	1	1	0	0	49.49
1	1	1	1	1	1	0	1	49.63
1	1	1	1	1	1	1	0	49.77
1	1	1	1	1	1	1	1	49.91
0 = DOWN = OFF, 1 = UP = ON								

APPENDIX 14: AUTOMATION INTERFACE PC BOARD WIRING LAYOUT



A

APPENDIX 15: AUTOMATION INTERFACE PC BOARD LAYOUT and TEST POINTS



Signals

Connector J2 *(To wiring harness for alternate CNC Controller)*

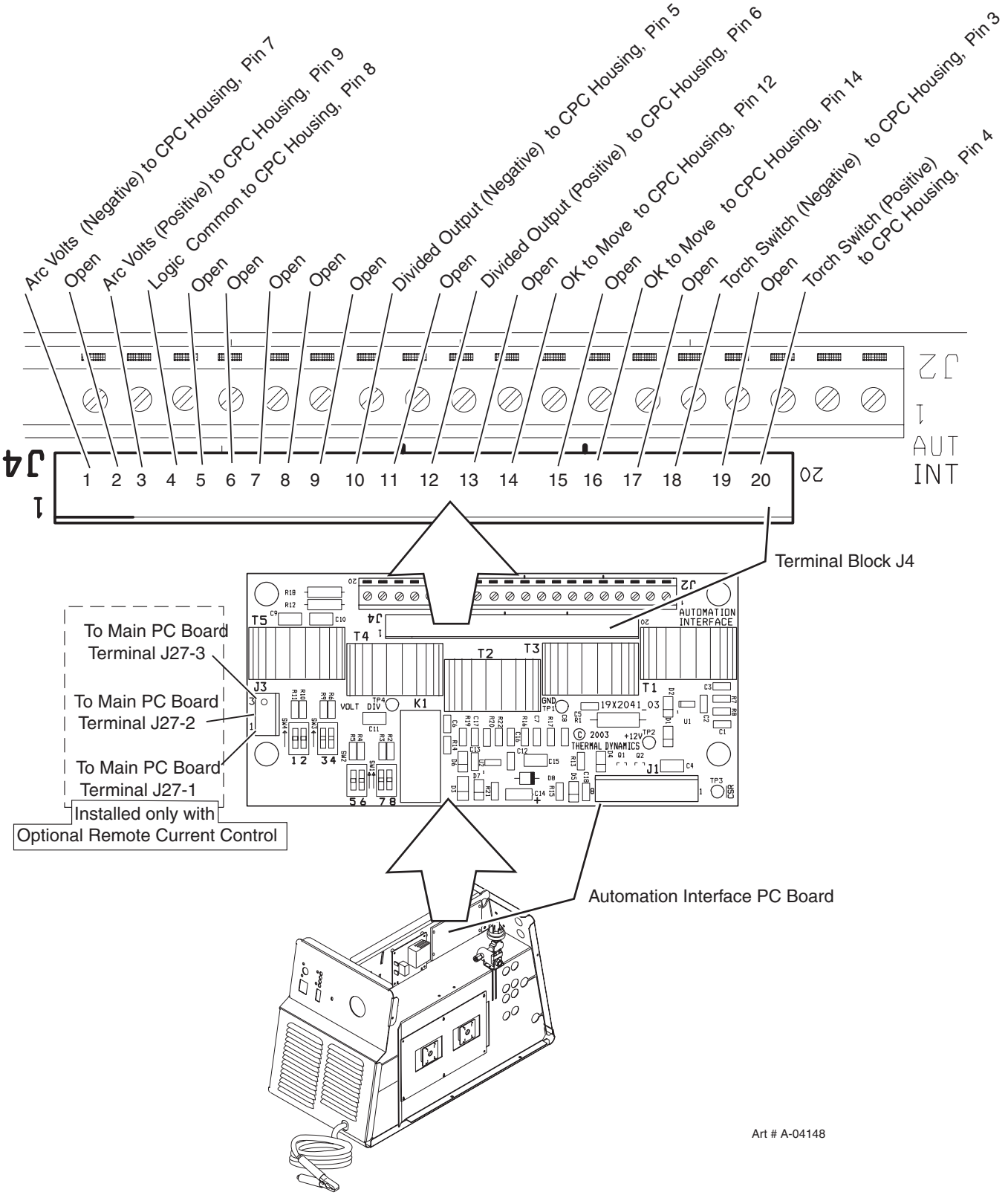
J2-1 Torch Switch (Positive)
J2-2 Open
J2-3 Torch Switch (Negative)
J2-4 Open
J2-5 OK to Move
J2-6 Open
J2-7 OK to Move
J2-8 Open
J2-9 Divided Output (Positive)
J2-10 Open
J2-11 Divided Output (Negative)
J2-12 Open
J2-13 Remote Current Control
J2-14 Remote Current Control
J2-15 Remote Current Control
J2-16 Open
J2-17 DC Common
J2-18 Arc Volts (+)
J2-19 Open
J2-20 Arc Volts (-)

Connector J4 *(to CPC Connector on Power Supply Rear Panel)*

J4-1 Arc Volts (-) (Through 100K ohm resistor)
J4-2 Open
J4-3 Arc Volts (+) (Through 100K ohm resistor)
J4-4 Logic Common
J4-5 Open
J4-6 Open
J4-7 Open
J4-8 Open
J4-9 Open
J4-10 SC-11 (-)
J4-11 Open
J4-12 SC-11 (+)
J4-13 Open
J4-14 OK to Move
J4-15 Open
J4-16 OK to Move
J4-17 Open
J4-18 Torch Switch (-)
J4-19 Open
J4-20 Torch Switch (+)

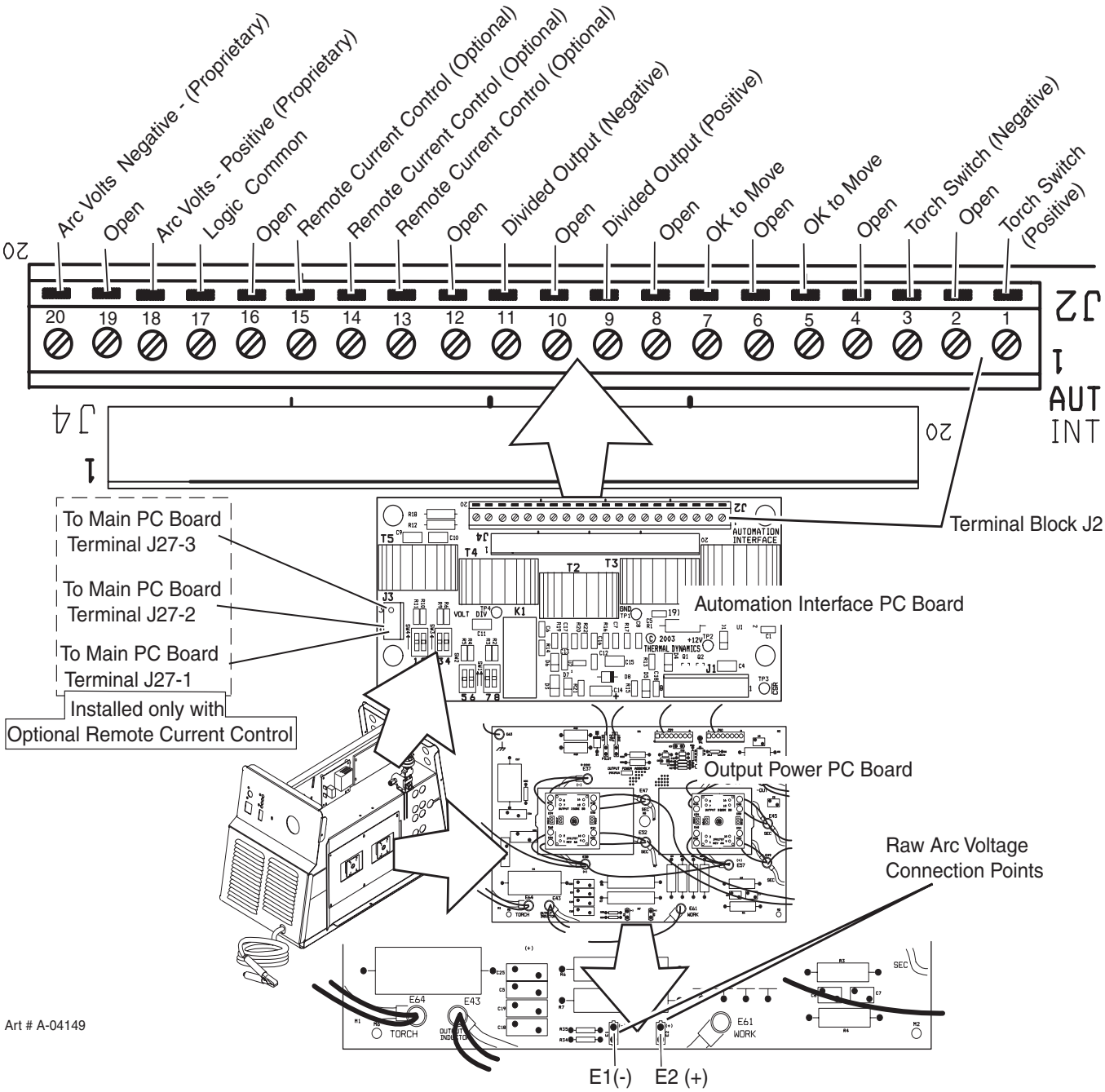
A

APPENDIX 16: AUTOMATION INTERFACE PC BOARD WIRING CONNECTIONS TO OEM CNC HARNESS



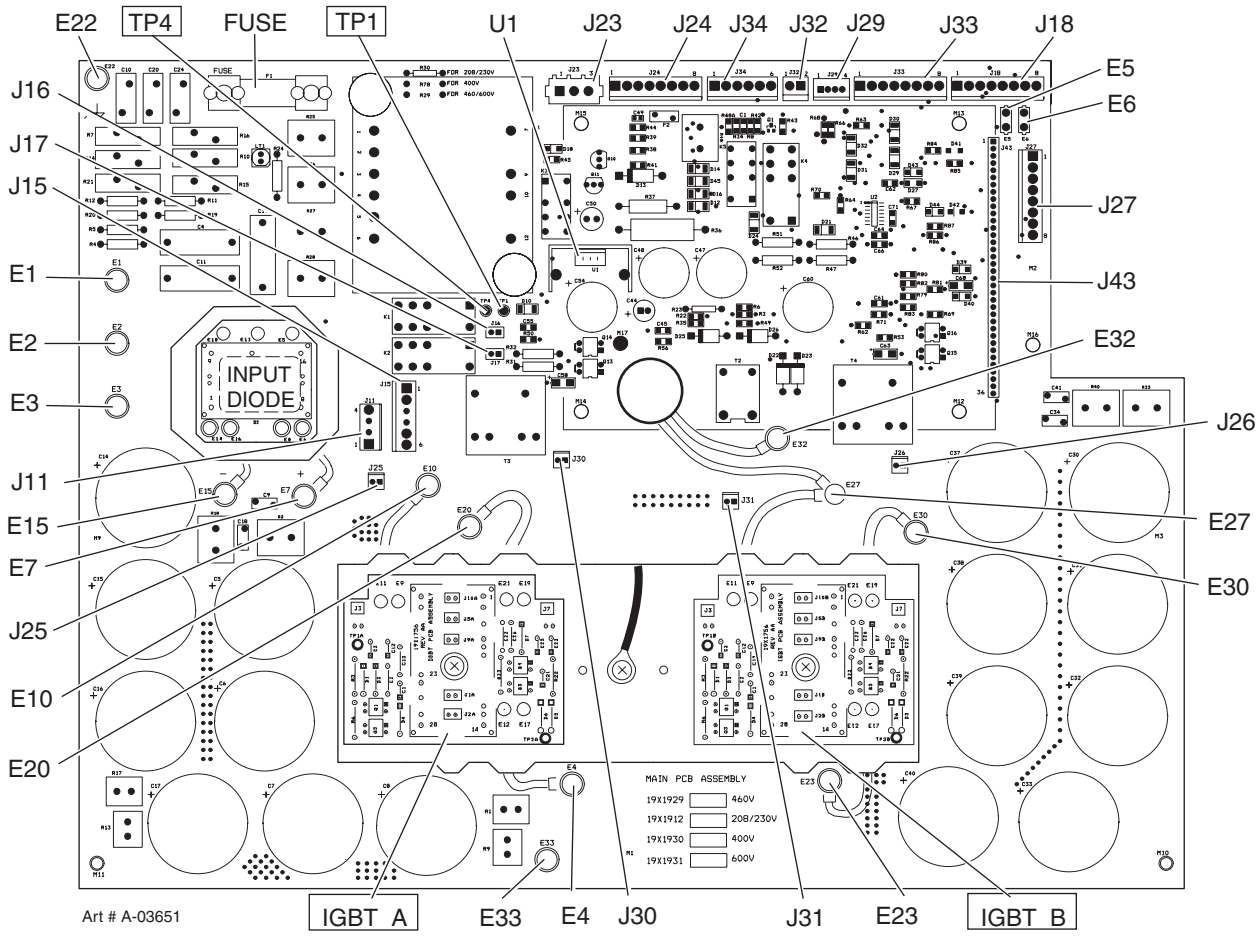
A

APPENDIX 17: AUTOMATION INTERFACE PC BOARD WIRING CONNECTIONS TO ALTERNATE CNC HARNESS



A

APPENDIX 18: MAIN PC BOARD LAYOUT



Main Power PC Board Signals

J11-1 L1 Input
J11-4 L3 Input

J15-1 Fan (M1)
J15-2 Fan (M1)
J15-3 Not used
J15-4 Not used
J15-5 Fan (M2)
J15-6 Fan (M2)

J16-1 Not used
J16-2 Not used

J17-1 Not used
J17-2 Not used

J18-1 Not used
J18-2 Not used
J18-3 28 VAC B
J18-4 28 VAC A
J18-5 On-Off Switch
J18-6 On-Off Switch
J18-7 Run-Set Switch
J18-8 Run-Set Switch

J23-1 Not used
J23-2 Not used
J23-3 Not used

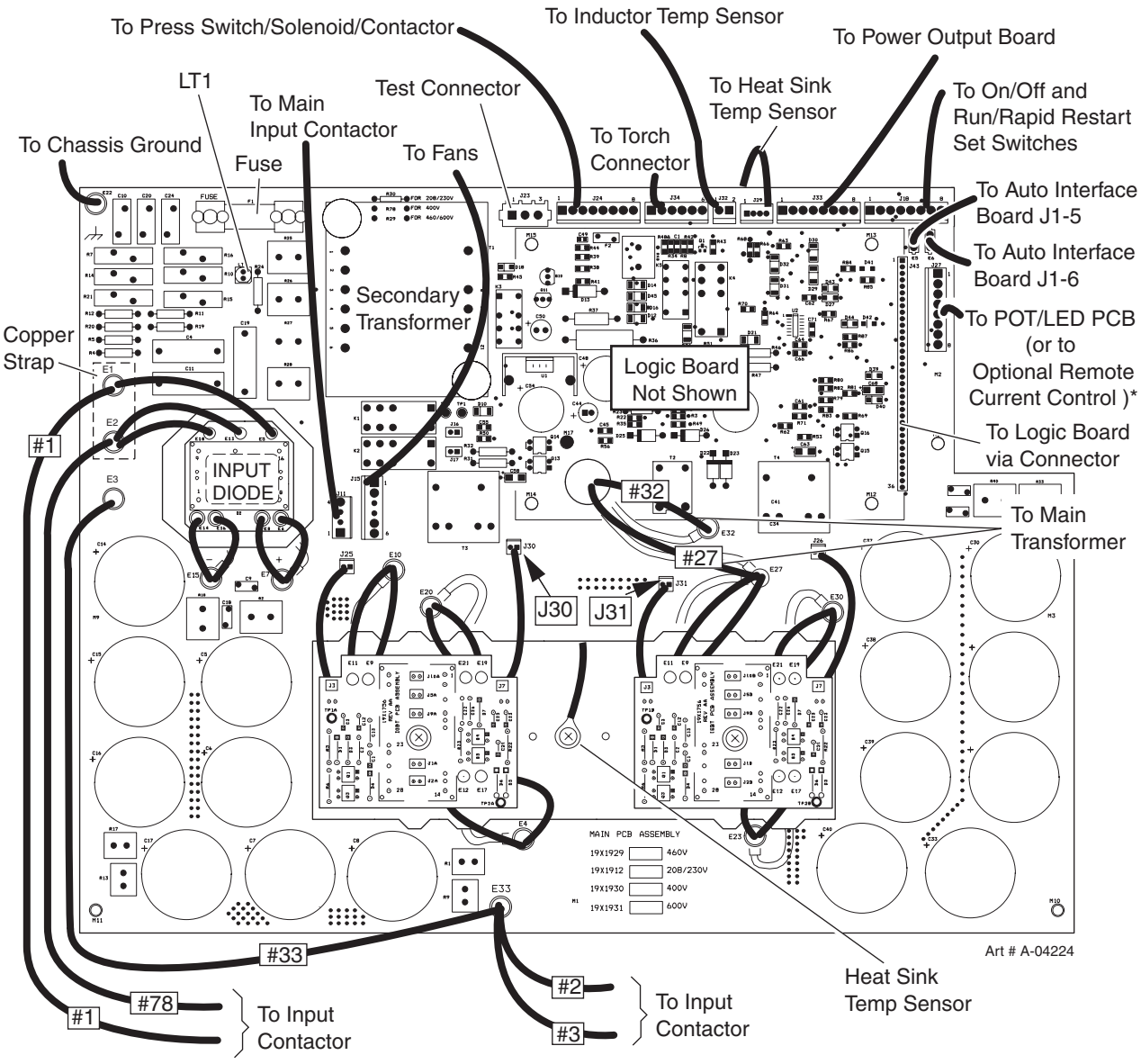
J24-1 Gas Solenoid (SOL1)
J24-2 Gas Solenoid (SOL1)
J24-3 Pressure Switch (PS1)
J24-4 Pressure Switch (PS1)
J24-5 Main Contactor (W1)
J24-6 Main Contactor (W1)
J24-7 Not used
J24-8 Not used

A

J25-1	Gate Drive
J25-2	Gate Drive
J26-1	Gate Drive
J26-2	Gate Drive
J27-1	Pot High
J27-2	Pot Wiper
J27-3	Pot Low
J27-4	+12V
J27-5	AC
J27-6	Gas
J27-7	Overtemp
J27-8	DC
J29-1	IGBT Heatsink Temp
J29-2	IGBT Heatsink Temp
J29-3	Jumper
J29-4	Jumper
J30-1	Gate Drive
J30-2	Gate Drive
J31-1	Gate Drive
J31-2	Gate Drive
J32-1	Inductor Temp Switch
J32-2	Inductor Temp Switch
J33-1	- Out Sense
J33-2	DC Com
J33-3	Tip Sense
J33-4	+ 12 vdc
J33-5	CSR
J33-6	I Sense
J33-7	Not used
J33-8	Tip volts
J34-1	PIP Return
J34-2	PIP
J34-3	Not used
J34-4	Not used
J34-5	Torch Switch Return
J34-6	Torch Switch

J43-1	+ 12 vdc to Logic PCB
J43-2	+ 12 vdc to Logic PCB
J43-3	DC Com
J43-4	DC Com
J43-5	MC1 On
J43-6	Tip Sense
J43-7	Run / Set
J43-8	Pressure Good
J43-9	Overtemp
J43-10	CSR
J43-11	Gas on
J43-12	DC OK
J43-13	OVTEMP
J43-14	AC OK
J43-15	Torch Switch
J43-16	Torch Switch Return
J43-17	+ 12 vdc
J43-18	POT High
J43-19	POT Wiper
J43-20	POT Low
J43-21	Gate Drive B Return
J43-22	Gate Drive B
J43-23	Gate Drive A Return
J43-24	Gate Drive A
J43-25	- Out Sense
J43-26	Current Sense
J43-27	Current Sense
J43-28	Current Sense Return
J43-29	Current Sense Return
J43-30	DC Com
J43-31	DC Com
J43-32	Not Used
J43-33	I Sense
J43-34	Not Used
J43-35	Not Used
J43-36	Tip Volts
TP1	Ground
TP4	+12 vdc

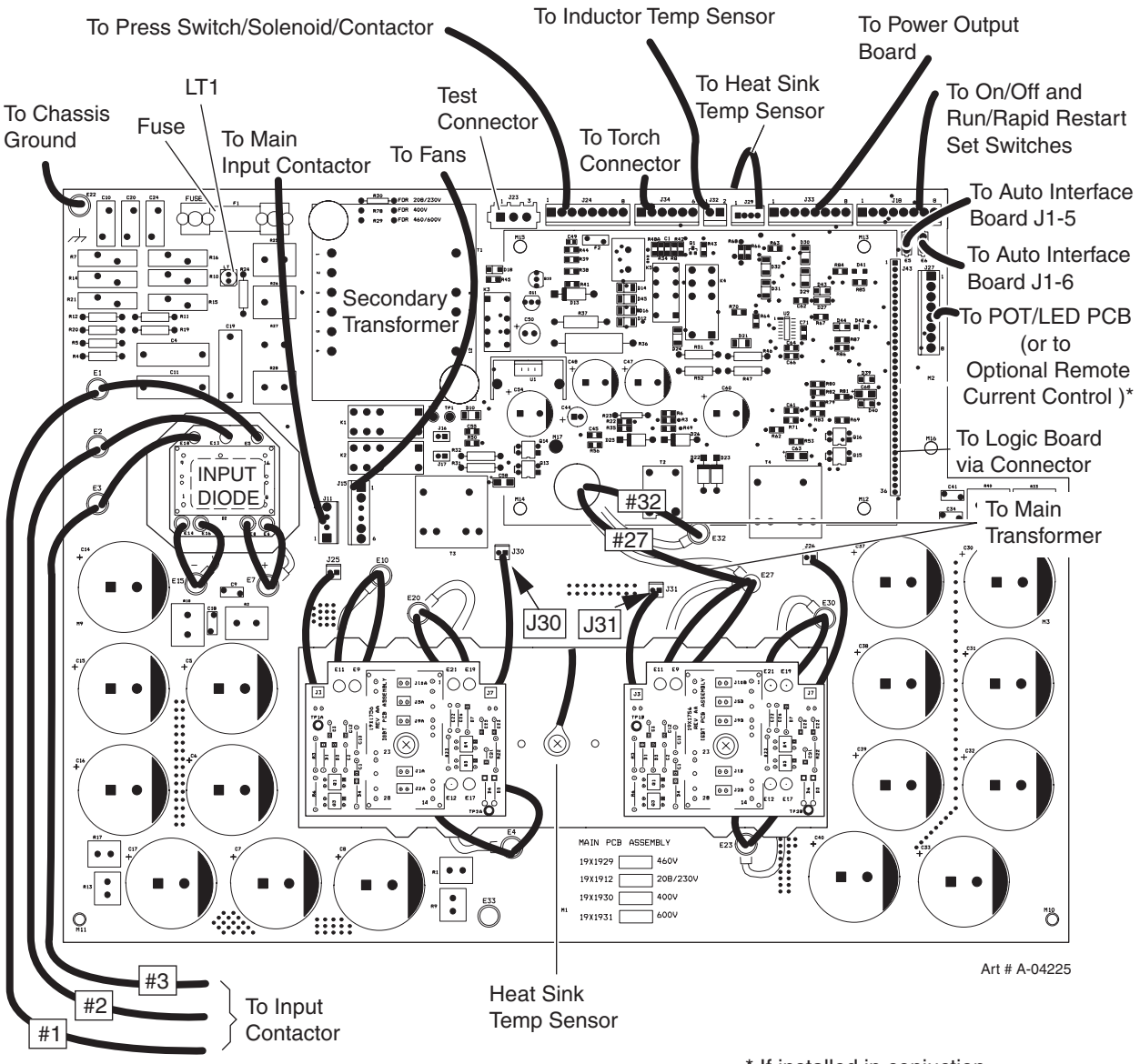
APPENDIX 19: MAIN PC BOARD WIRING LAYOUT (208 /230-Volt POWER SUPPLIES)



* If installed in conjuction with Automation Interface PC Board

A

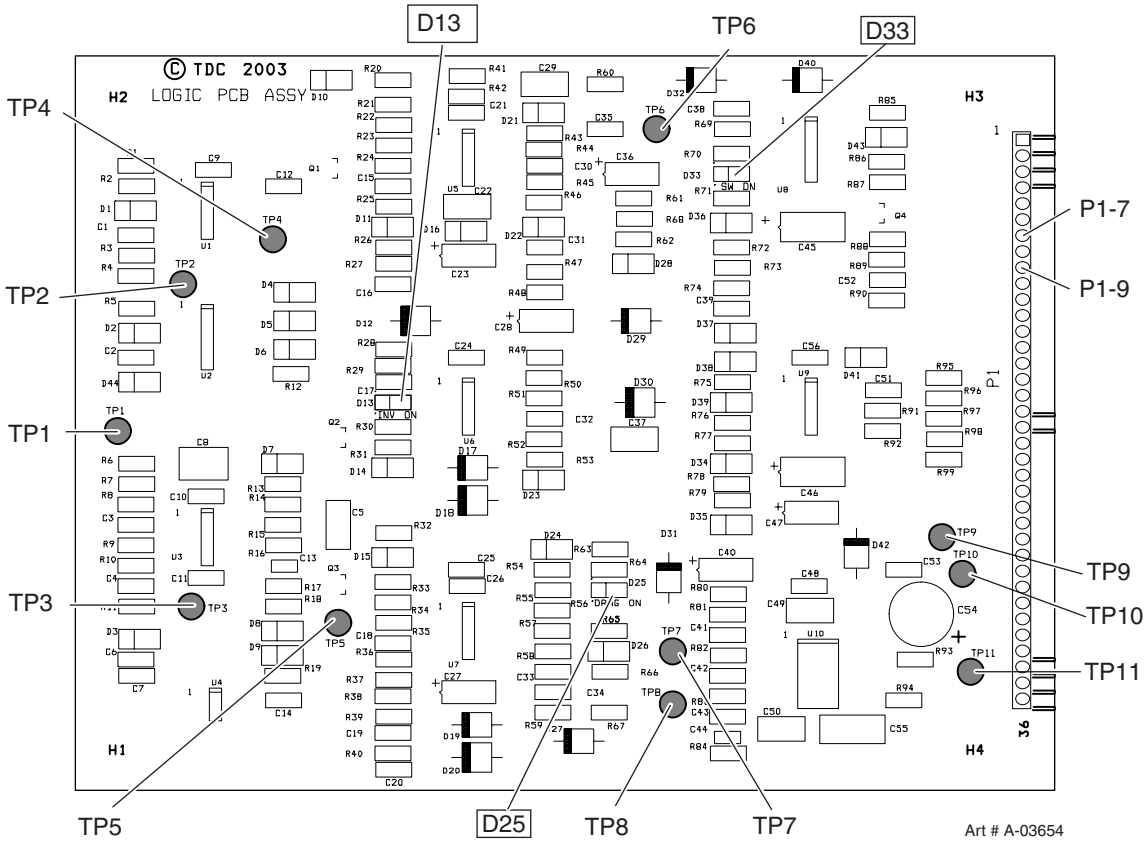
APPENDIX 20: MAIN PC BOARD WIRING LAYOUT (400-Volt, 415-Volt, 460-Volt, 600-Volt POWER SUPPLIES)



* If installed in conjuction with Automation Interface PC Board

A

APPENDIX 21: LOGIC BOARD LAYOUT



Logic Board Signals

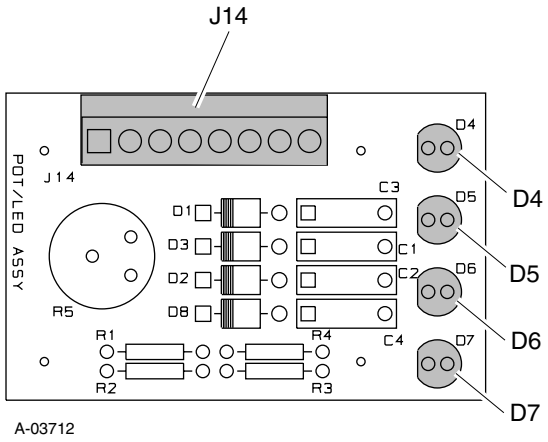
P1-1 +12vdcfrom Main Power PCB
P1-2 +12vdcfrom Main PCB
P1-3 DC Com
P1-4 DC Com
P1-5 MC1 ON signal
P1-6 Tip Sense
P1-7 RUN/SET Signal Logic Low for SET
P1-8 Logic Low = PS1 Pressure Switch closed = Pressure OK
P1-9 Logic Low = TS1 Closed = OVERTEMP
P1-10 Logic Low = CSR
P1-11 Logic Low = Gas ON
P1-12 Logic Low = DC OK
P1-13 Logic Low = OVTEMP
P1-14 Logic Low = AC OK
P1-15 Logic Low = Torch Switch
P1-16 Logic Low = Torch Switch Return
P1-17 Logic Low = +12vdc
P1-18 Logic Low = Pot High
P1-19 Logic Low = Pot High
P1-20 Pot Low
P1-21 Gate Drive B Return
P1-22 Gate Drive B
P1-23 Gate Drive A Return
P1-24 Gate Drive A
P1-25 - Out Sense
P1-26 Current Sense
P1-27 Current Sense
P1-28 Current Sense Return
P1-29 Current Sense Return
P1-30 DC Com
P1-31 DC Com
P1-32 Not Used
P1-33 I Sense
P1-34 Not Used
P1-35 Not Used
P1-36 Tip Volts

INDICATORS:
D13 INV ON
D25 DRAG ON
D33 SWITCH ON

TEST POINTS:
TP-1 Common
TP-2 Current Demand Signal
TP-3 Converter Enable
TP-4 CSR (Logic Low)
TP-5 Not used
TP-6 Fault (Logic Low)
TP-7 DC OK (Logic Low)
TP-8 Tip Sense
TP-9 Current Sense
TP-10 Gate Drive A
TP-11 Gate Drive B

A

APPENDIX 22: POT / LED BOARD LAYOUT

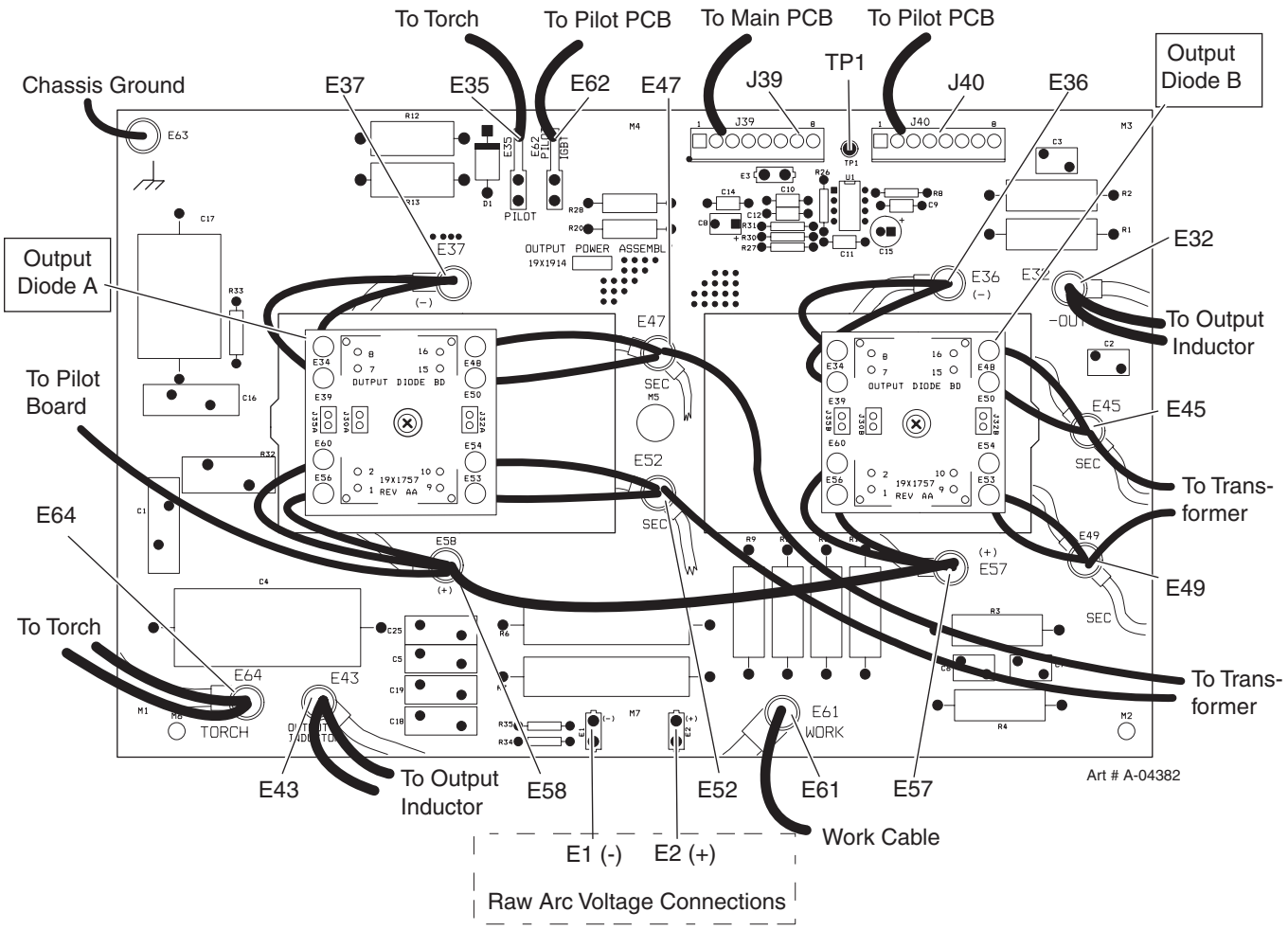


Pot/LED PC Board Signals

J14-1 from Main PC Board (J27-1) Pot High
J14-2 Main PC Board (J27-2) Pot Wiper
J14-3 from Main PC Board (J27-3) Pot Low
J14-4 12vdc (J27-4)
J14-5 Logic Low Signal for AC OK Indicator from Logic PC Board (J27-5)
J14-6 Logic Low Signal for GAS Indicator from Logic PC Board (J27-6)
J14-7 Logic Low Signal for TEMP Indicator from Logic PC Board (J27-7)
J14-8 Logic Low Signal for DC Indicator from Logic PC Board (J27-8)

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

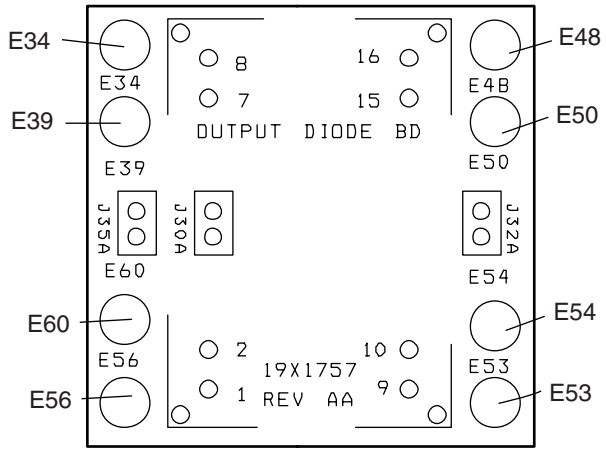
APPENDIX 23: OUTPUT BOARD WIRING DIAGRAM



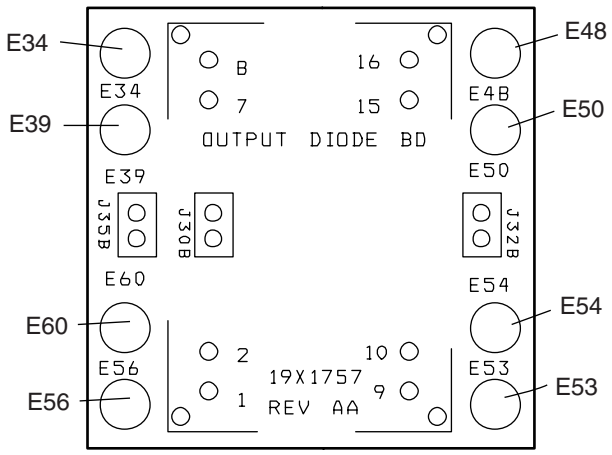
A

APPENDIX 24: OUTPUT DIODE BOARD LAYOUT

Output Diode A



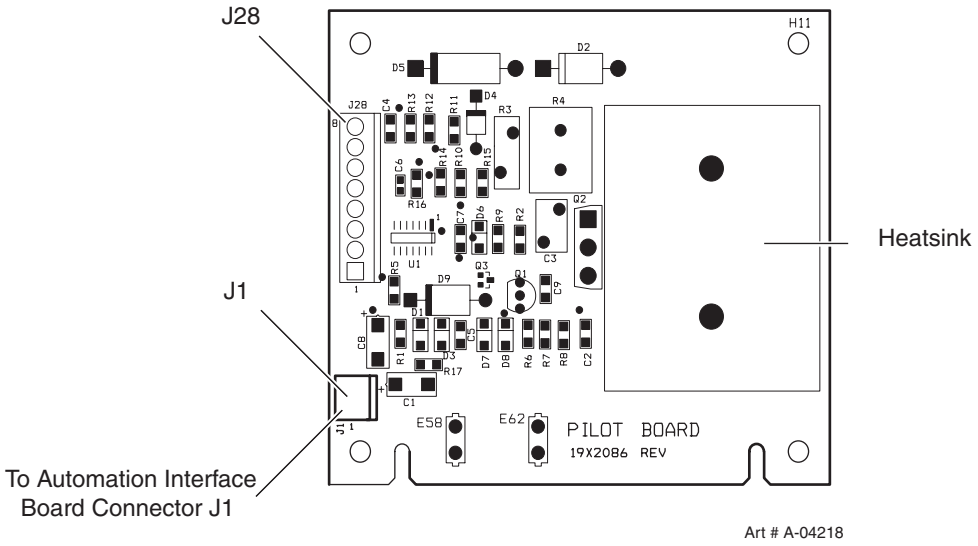
Output Diode B



A-03152

A

APPENDIX 25: PILOT BOARD LAYOUT



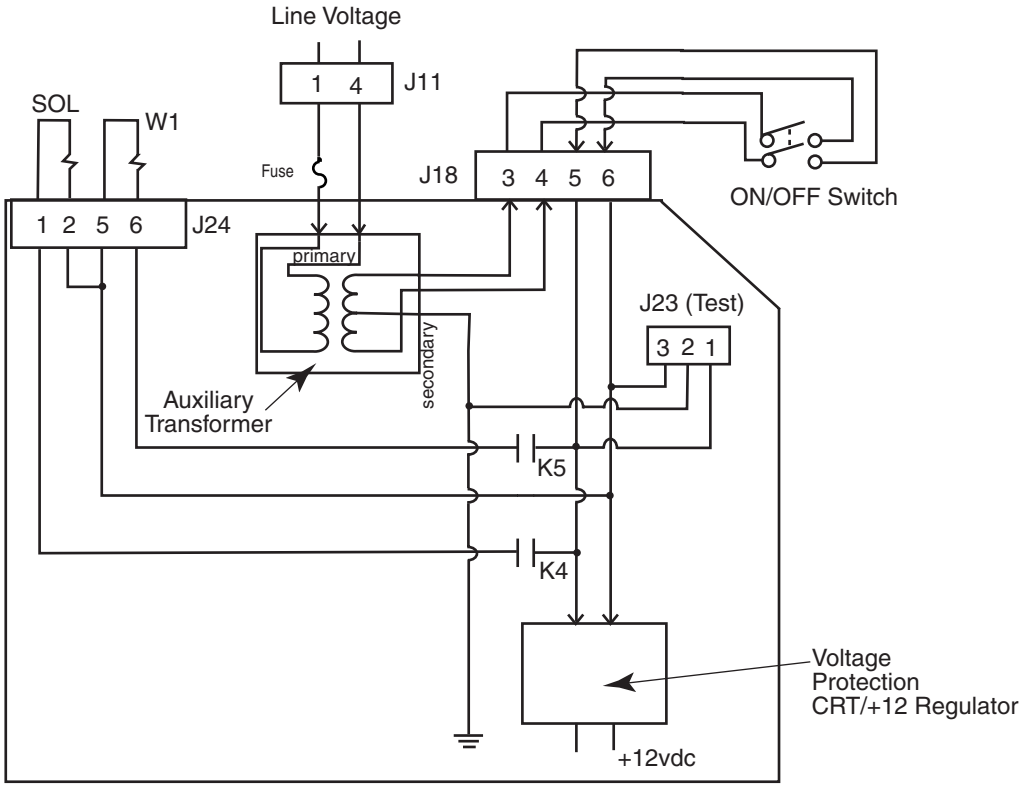
Pilot Board Signals

J1-1 +12 vdc to Automation Interface PC Board J1-3
J1-2 DC Common to Automation Interface PC Board J1-2

J28-1 +12 vdc
J28-2 DC Com
J28-3 Not Used
J28-4 Not Used
J28-5 Logic Low CSR
J28-6 Not Used
J28-7 Not Used
J28-8 Not Used

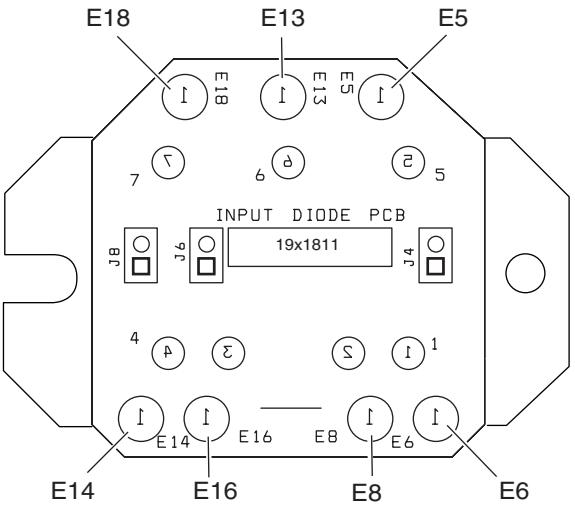
E58 To Power Output PC Board Terminal E58
E62 To Power Output PC Board Terminal E62

APPENDIX 26: 28VAC CIRCUIT DIAGRAM



A

APPENDIX 27: INPUT DIODE LAYOUT

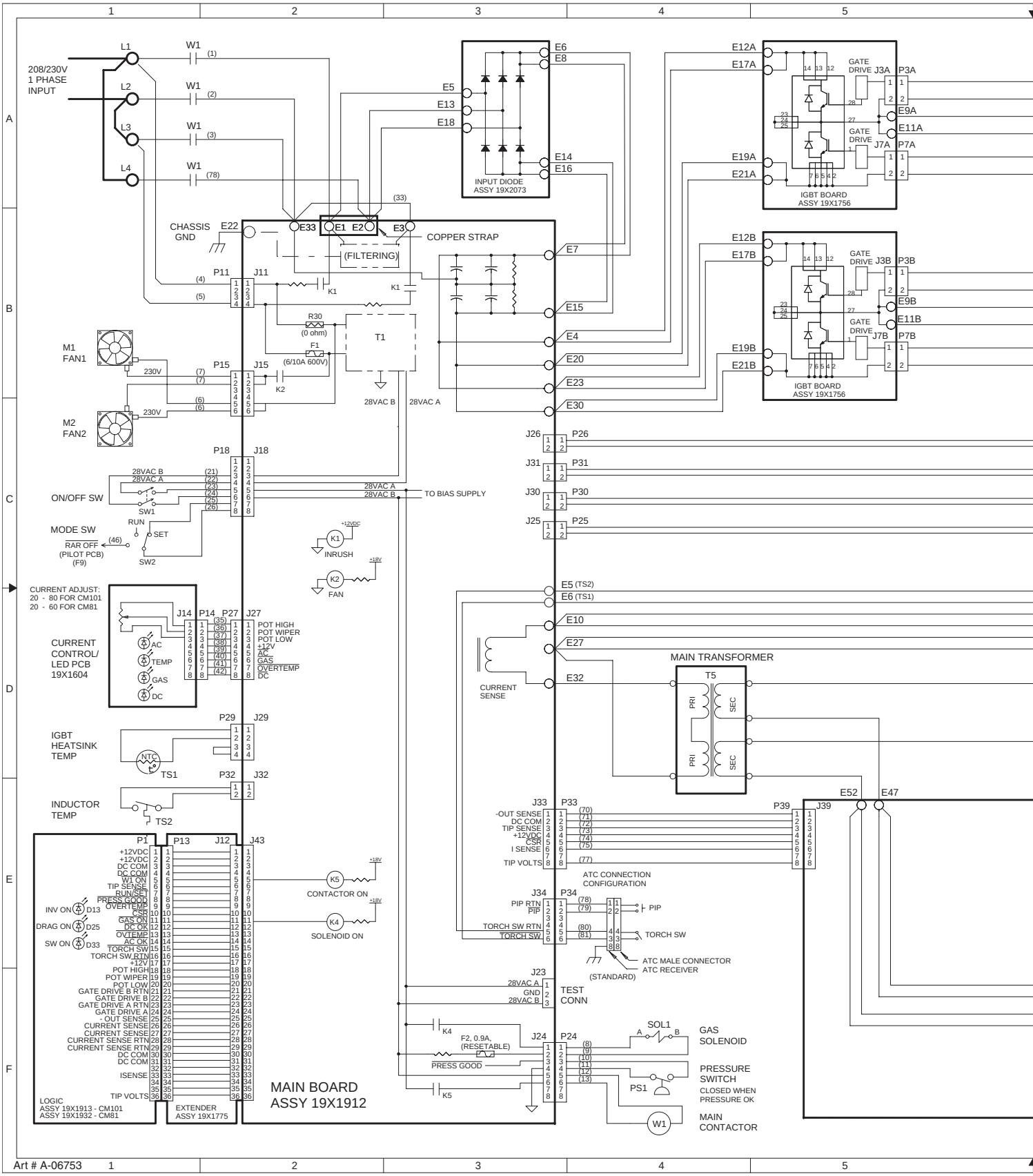


Art # A-03703

This Page Left Blank

APPENDIX 28: 208/230V SYSTEM SCHEMATIC

For Power Supplies and SL100 Torches (without solenoid on mounting tube)

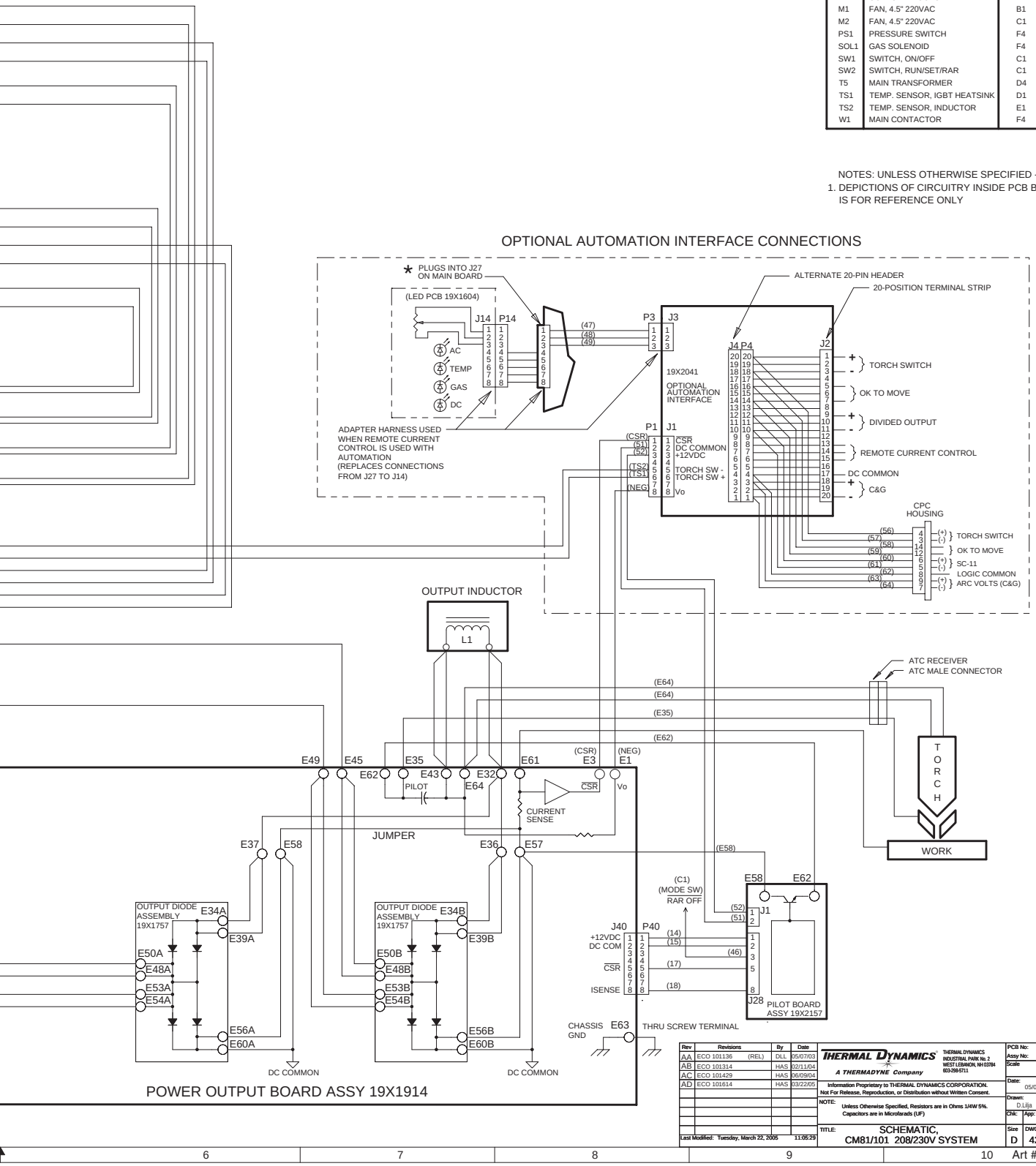


A

COMP	DESCRIPTION	LOCATION
F1	FUSE, 6/10A 600V KTK	B2
F2	FUSE, 0.9A, RESETABLE	F3
L1	OUTPUT INDUCTOR	D7
M1	FAN, 4.5" 220VAC	B1
M2	FAN, 4.5" 220VAC	C1
PS1	PRESSURE SWITCH	F4
SOL1	GAS SOLENOID	F4
SW1	SWITCH, ON/OFF	C1
SW2	SWITCH, RUN/SET/RAR	C1
T5	MAIN TRANSFORMER	D4
TS1	TEMP. SENSOR, IGBT HEATSINK	D1
TS2	TEMP. SENSOR, INDUCTOR	E1
W1	MAIN CONTACTOR	F4

NOTES: UNLESS OTHERWISE SPECIFIED -
1. DEPICTIONS OF CIRCUITRY INSIDE PCB BLOCKS IS FOR REFERENCE ONLY

OPTIONAL AUTOMATION INTERFACE CONNECTIONS



POWER OUTPUT BOARD ASSY 19X1914

Rev	Revisions		By	Date
AA	ECO 101136	(REL)	DLL	05/07/03
AB	ECO 101314		HAS	02/11/04
AC	ECO 101429		HAS	06/09/04
AD	ECO 101614		HAS	03/22/05

Last Modified: Tuesday, March 22, 2005 11:05:29

THERMAL DYNAMICS
A THERMADYNE Company
THERMAL DYNAMICS INDUSTRIAL PARK No. 2 WEST LEBANON, NH 03784 603-298-5711

Information Proprietary to THERMAL DYNAMICS CORPORATION. Not For Release, Reproduction, or Distribution without Written Consent.

NOTE: Unless Otherwise Specified, Resistors are in Ohms 1/4W 5%. Capacitors are in Microfarads (UF)

TITLE: SCHEMATIC, CM81/101 208/230V SYSTEM

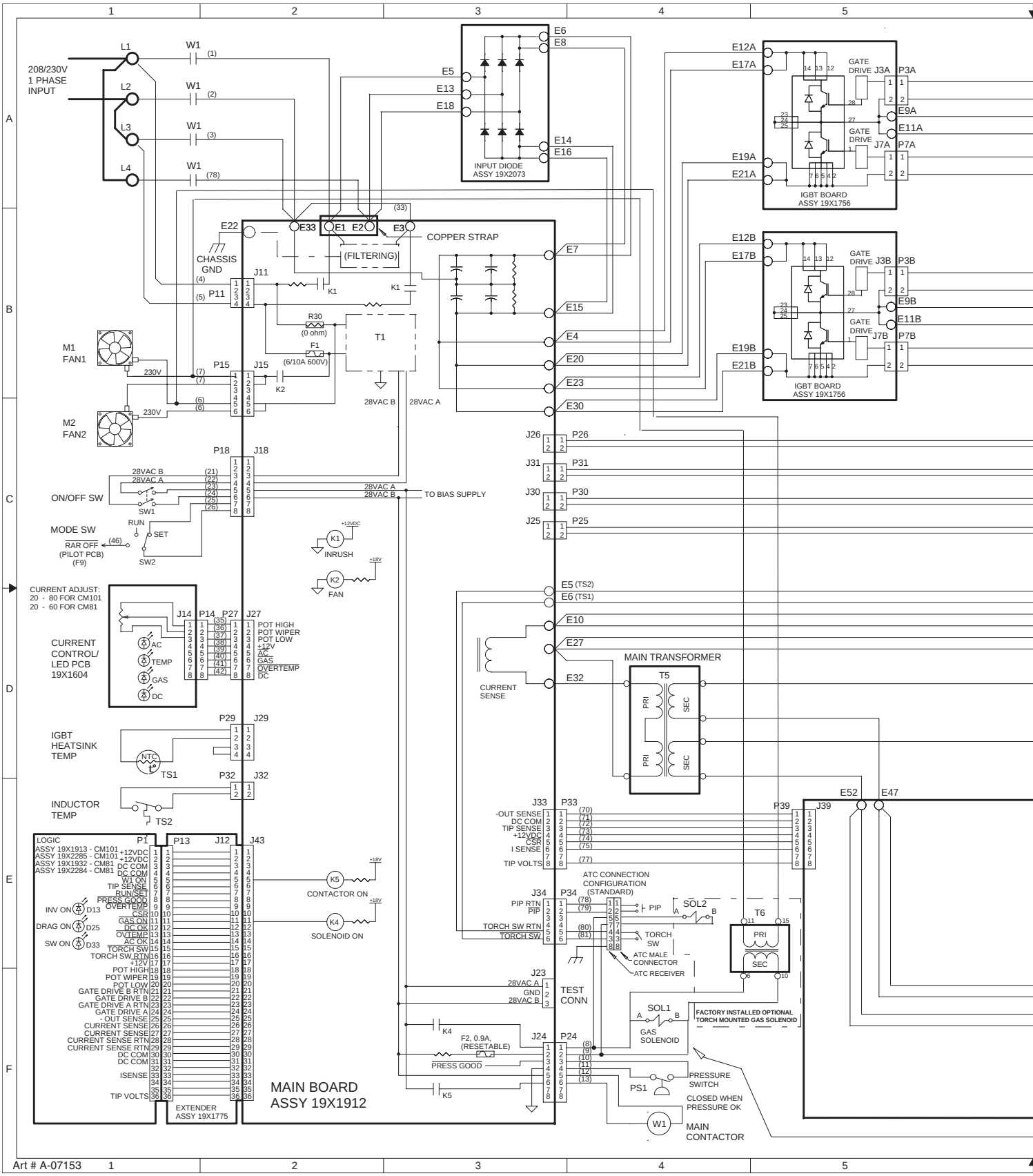
PCB No:
Assy No:
Scale: Supersedes
Date: 05/07/03
Drawn: D.Lilja References
Chk: App: Sheet 1 of 1
Size: D DWG No: 42X1136

Art # A-06753

A

APPENDIX 29: 208/230V SYSTEM SCHEMATIC

For Power Supplies and SL100SV Torches (with solenoid on mounting tube)

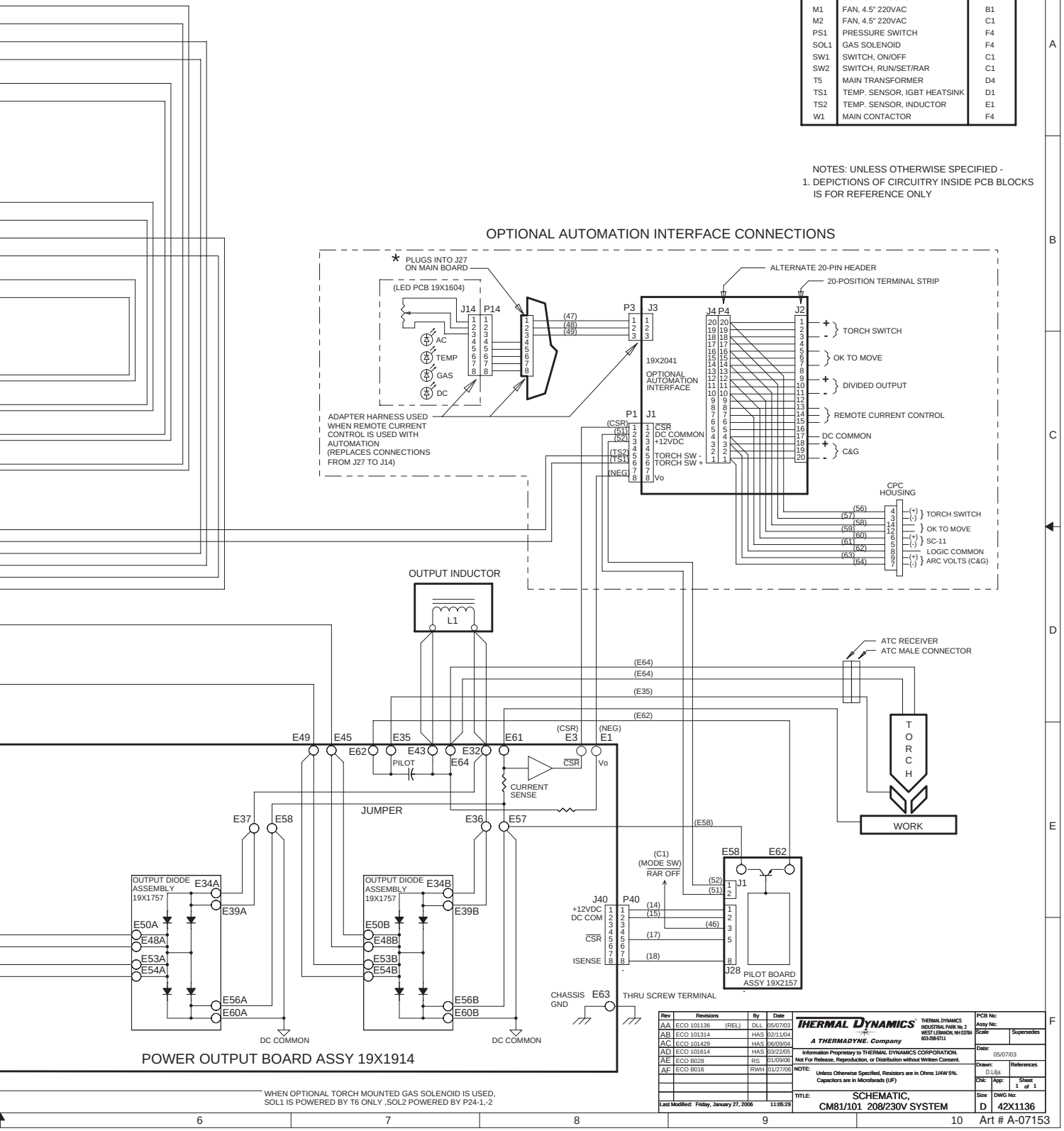


A

COMP	DESCRIPTION	LOCATION
F1	FUSE, 6/10A 600V KTK	B2
F2	FUSE, 0.9A, RESETABLE	F3
L1	OUTPUT INDUCTOR	D7
M1	FAN, 4.5" 220VAC	B1
M2	FAN, 4.5" 220VAC	C1
PS1	PRESSURE SWITCH	F4
SOL1	GAS SOLENOID	F4
SW1	SWITCH, ON/OFF	C1
SW2	SWITCH, RUN/SET/RAR	C1
T5	MAIN TRANSFORMER	D4
TS1	TEMP. SENSOR, IGBT HEATSINK	D1
TS2	TEMP. SENSOR, INDUCTOR	E1
W1	MAIN CONTACTOR	F4

NOTES: UNLESS OTHERWISE SPECIFIED -
1. DEPICTIONS OF CIRCUITRY INSIDE PCB BLOCKS IS FOR REFERENCE ONLY

OPTIONAL AUTOMATION INTERFACE CONNECTIONS



POWER OUTPUT BOARD ASSY 19X1914

WHEN OPTIONAL TORCH MOUNTED GAS SOLENOID IS USED, SOL1 IS POWERED BY T6 ONLY ,SOL2 POWERED BY P24-1,-2

Rev	Revisions		By	Date
AA	ECO 101136	(REL)	DLL	05/07/03
AB	ECO 101314		HAS	02/11/04
AC	ECO 101429		HAS	06/09/04
AD	ECO 101614		HAS	03/22/05
AE	ECO B028		RS	01/09/06
AF	ECO B016		RWH	01/27/06

Last Modified: Friday, January 27, 2006 11:05:29

THERMAL DYNAMICS
A THERMADYNE Company
THERMAL DYNAMICS INDUSTRIAL PARK No. 2 WEST LEBANON, NH 03784 603-298-5711

Information Proprietary to THERMAL DYNAMICS CORPORATION. Not For Release, Reproduction, or Distribution without Written Consent.

NOTE: Unless Otherwise Specified, Resistors are in Ohms 1/4W 5%. Capacitors are in Microfarads (UF)

TITLE: SCHEMATIC, CM81/101 208/230V SYSTEM

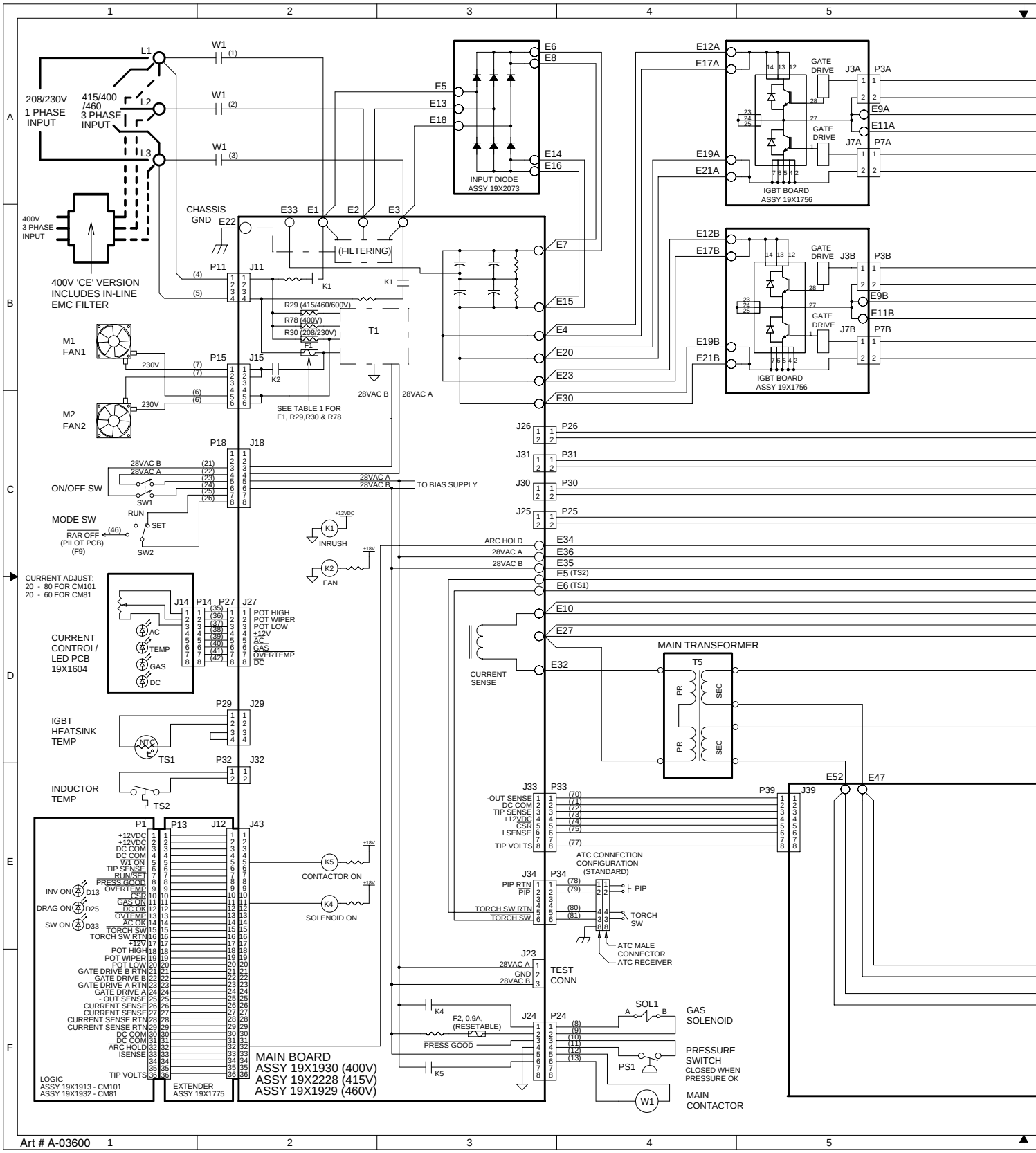
PCB No:
Assy No:
Scale: Supersedes
Date: 05/07/03
Drawn: D.Lilja
References
Chk: App:
Sheet 1 of 1
Size: D
DWG No: 42X1136

Art # A-07153

A

APPENDIX 30: 400 / 415V / 460V SYSTEM SCHEMATIC

For Power Supplies and SL100 Torches (without solenoid on mounting tube)



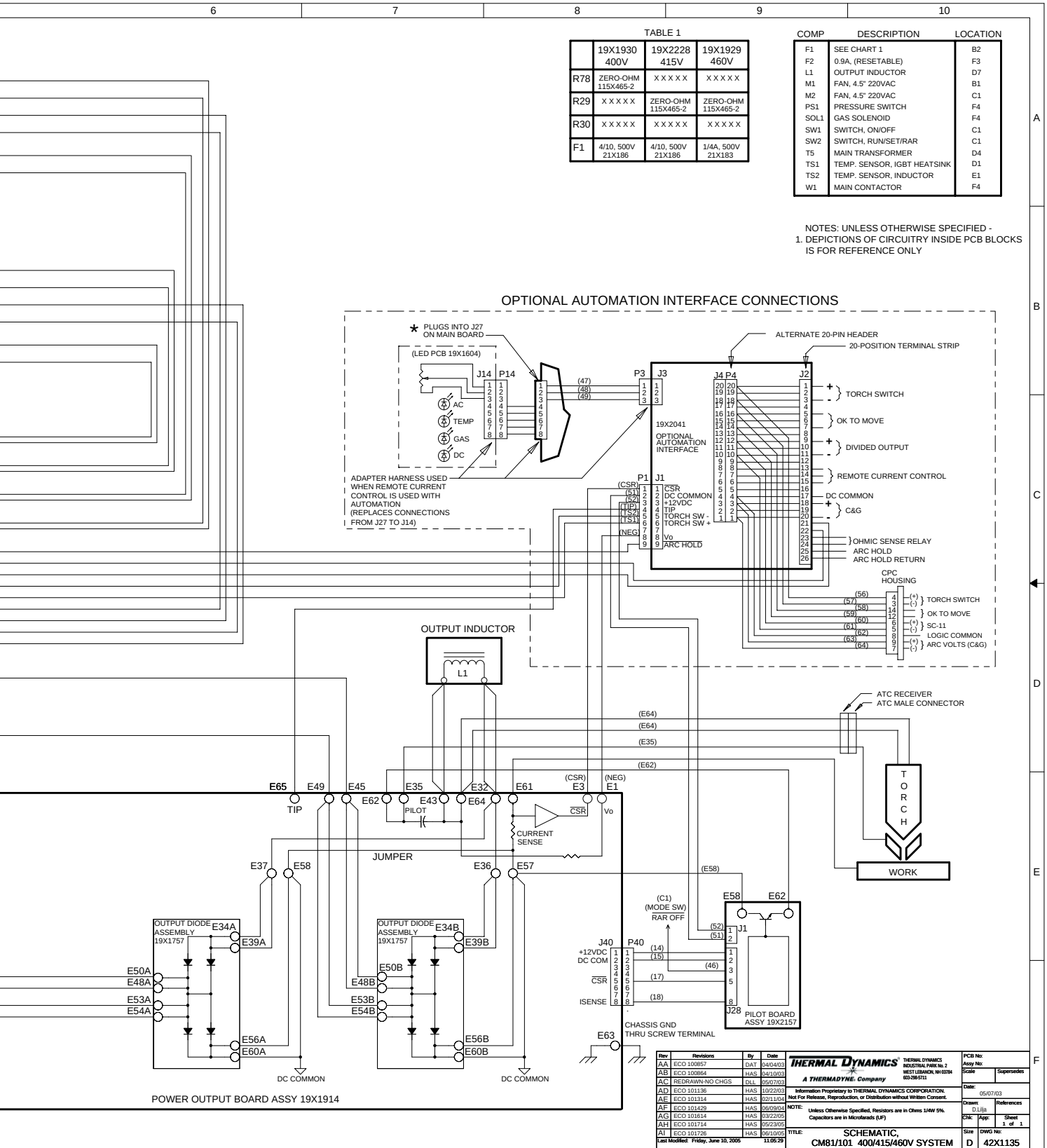
A

TABLE 1

	19X1930 400V	19X2228 415V	19X1929 460V
R78	ZERO-OHM 115X465-2	X X X X X	X X X X X
R29	X X X X X	ZERO-OHM 115X465-2	ZERO-OHM 115X465-2
R30	X X X X X	X X X X X	X X X X X
F1	4/10, 500V 21X186	4/10, 500V 21X186	1/4A, 500V 21X183

COMP	DESCRIPTION	LOCATION
F1	SEE CHART 1	B2
F2	0.9A, (RESETABLE)	F3
L1	OUTPUT INDUCTOR	D7
M1	FAN, 4.5" 220VAC	B1
M2	FAN, 4.5" 220VAC	C1
PS1	PRESSURE SWITCH	F4
SOL1	GAS SOLENOID	F4
SW1	SWITCH, ON/OFF	C1
SW2	SWITCH, RUN/SET/RAR	C1
T5	MAIN TRANSFORMER	D4
TS1	TEMP. SENSOR, IGBT HEATSINK	D1
TS2	TEMP. SENSOR, INDUCTOR	E1
W1	MAIN CONTACTOR	F4

NOTES: UNLESS OTHERWISE SPECIFIED -
1. DEPICTIONS OF CIRCUITRY INSIDE PCB BLOCKS IS FOR REFERENCE ONLY



Rev	Revisions	By	Date
AA	ECO 100857	DAT	04/04/03
AB	ECO 100864	HAS	04/10/03
AC	REDRAWN-NO CHGS	DLL	05/07/03
AD	ECO 101136	HAS	10/22/03
AE	ECO 101314	HAS	02/11/04
AF	ECO 101429	HAS	06/09/04
AG	ECO 101614	HAS	03/22/05
AH	ECO 101714	HAS	05/23/05
AI	ECO 101726	HAS	06/10/05

Last Modified: Friday, June 10, 2005 11:05:29

THERMAL DYNAMICS® A THERMADYNE® Company
THERMAL DYNAMICS INDUSTRIAL PARK No. 2 WEST LEBANON, NH 03784 603-298-5711

Information Proprietary to THERMAL DYNAMICS CORPORATION. Not For Release, Reproduction, or Distribution without Written Consent.

NOTE: Unless Otherwise Specified, Resistors are in Ohms 1/4W 5%. Capacitors are in Microfarads (UF)

TITLE: SCHEMATIC, CM81/101 400/415/460V SYSTEM

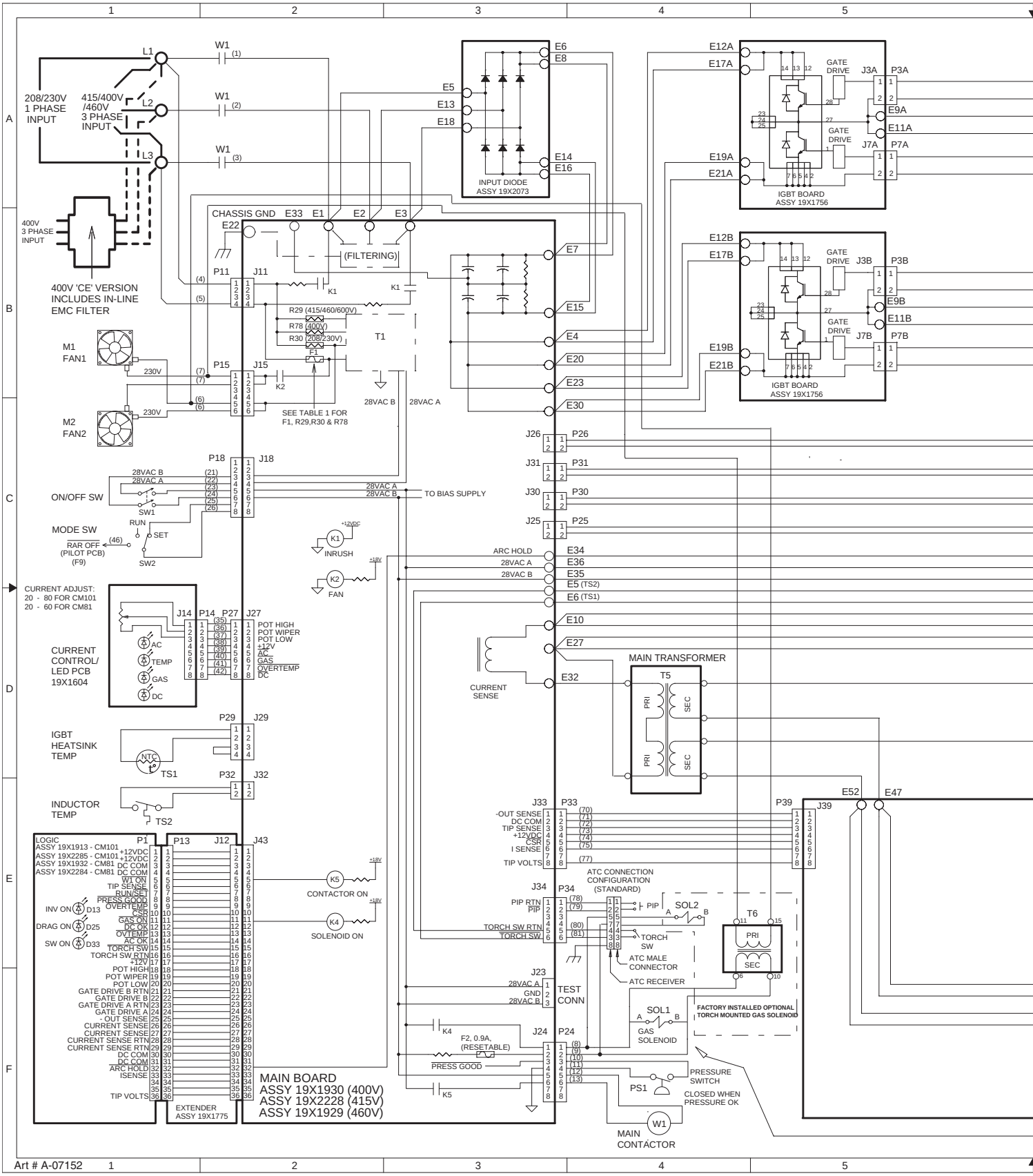
PCB No:
Assy No:
Scale
Supersedes
Date: 05/07/03
Drawn: D.Lija
References
Chk:
Appr:
Sheet 1 of 1
Size D
DWG No: 42X1135

Art # A-03600

A

APPENDIX 31: 400 / 415V / 460V SYSTEM SCHEMATIC

For Power Supplies and SL100SV Torches (with solenoid on mounting tube)



Art # A-07152

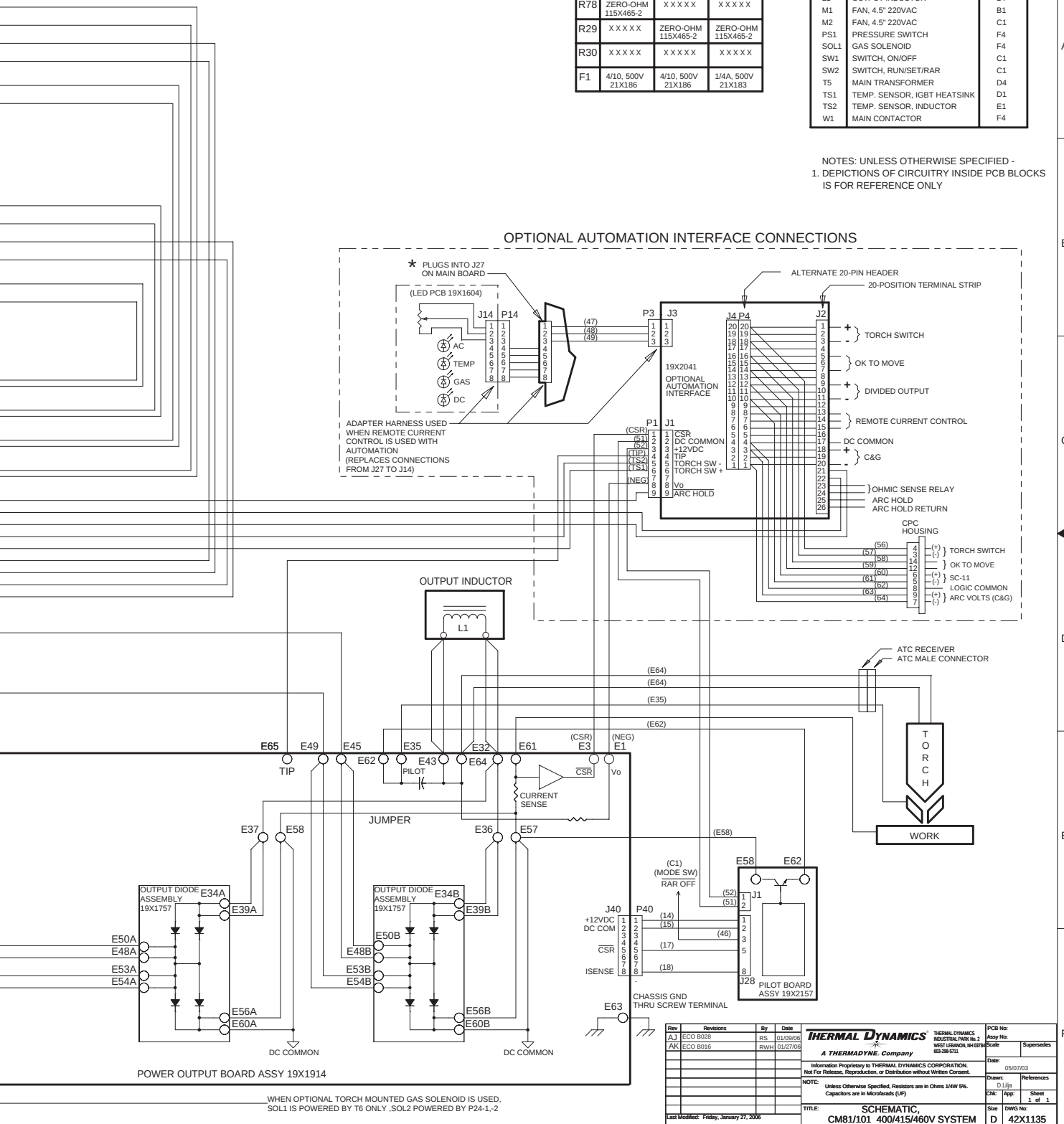
TABLE 1

	19X1930 400V	19X2228 415V	19X1929 460V
R78	ZERO-OHM 115X465-2	XXXXX	XXXXX
R29	XXXXX	ZERO-OHM 115X465-2	ZERO-OHM 115X465-2
R30	XXXXX	XXXXX	XXXXX
F1	4/10, 500V 21X186	4/10, 500V 21X186	1/4A, 500V 21X183

COMP	DESCRIPTION	LOCATION
F1	SEE CHART 1	B2
F2	0.9A, (RESETABLE)	F3
L1	OUTPUT INDUCTOR	D7
M1	FAN, 4.5" 220VAC	B1
M2	FAN, 4.5" 220VAC	C1
PS1	PRESSURE SWITCH	F4
SOL1	GAS SOLENOID	F4
SW1	SWITCH, ON/OFF	C1
SW2	SWITCH, RUN/SET/RAR	C1
T5	MAIN TRANSFORMER	D4
TS1	TEMP. SENSOR, IGBT HEATSINK	D1
TS2	TEMP. SENSOR, INDUCTOR	E1
W1	MAIN CONTACTOR	F4

NOTES: UNLESS OTHERWISE SPECIFIED -
1. DEPICTIONS OF CIRCUITRY INSIDE PCB BLOCKS IS FOR REFERENCE ONLY

OPTIONAL AUTOMATION INTERFACE CONNECTIONS



Rev	Revisions	By	Date
AJ	ECO B028	RS	01/09/06
AK	ECO B016	RWH	01/27/06

Last Modified: Friday, January 27, 2006

THERMAL DYNAMICS
A THERMADYNE Company
THERMAL DYNAMICS INDUSTRIAL PARK No. 2 WEST LEBANON, NH 03784 603-298-5711

Information Proprietary to THERMAL DYNAMICS CORPORATION. Not For Release, Reproduction, or Distribution without Written Consent.

NOTE: Unless Otherwise Specified, Resistors are in Ohms 1/4W 5%. Capacitors are in Microfarads (UF)

TITLE: SCHEMATIC, CM81/101 400/415/460V SYSTEM

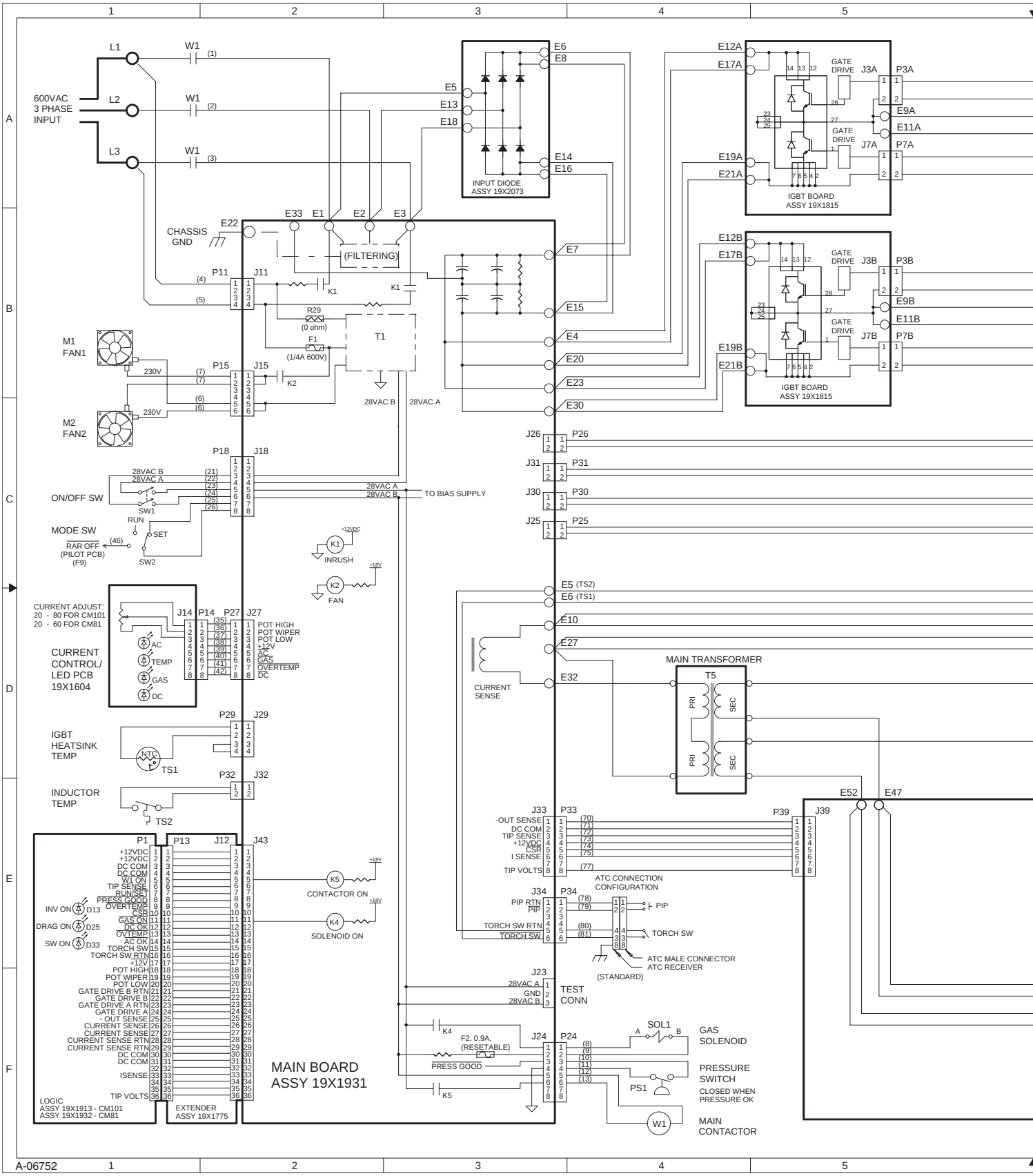
PCB No:
Assy No:
Scale
Supersedes
Date: 05/07/03
Drawn: D.Lilja
References
Chk:
App:
Sheet 1 of 1
Size D
DWG No: 42X1135

Art # A-07152

A

APPENDIX 32: 600V SYSTEM SCHEMATIC

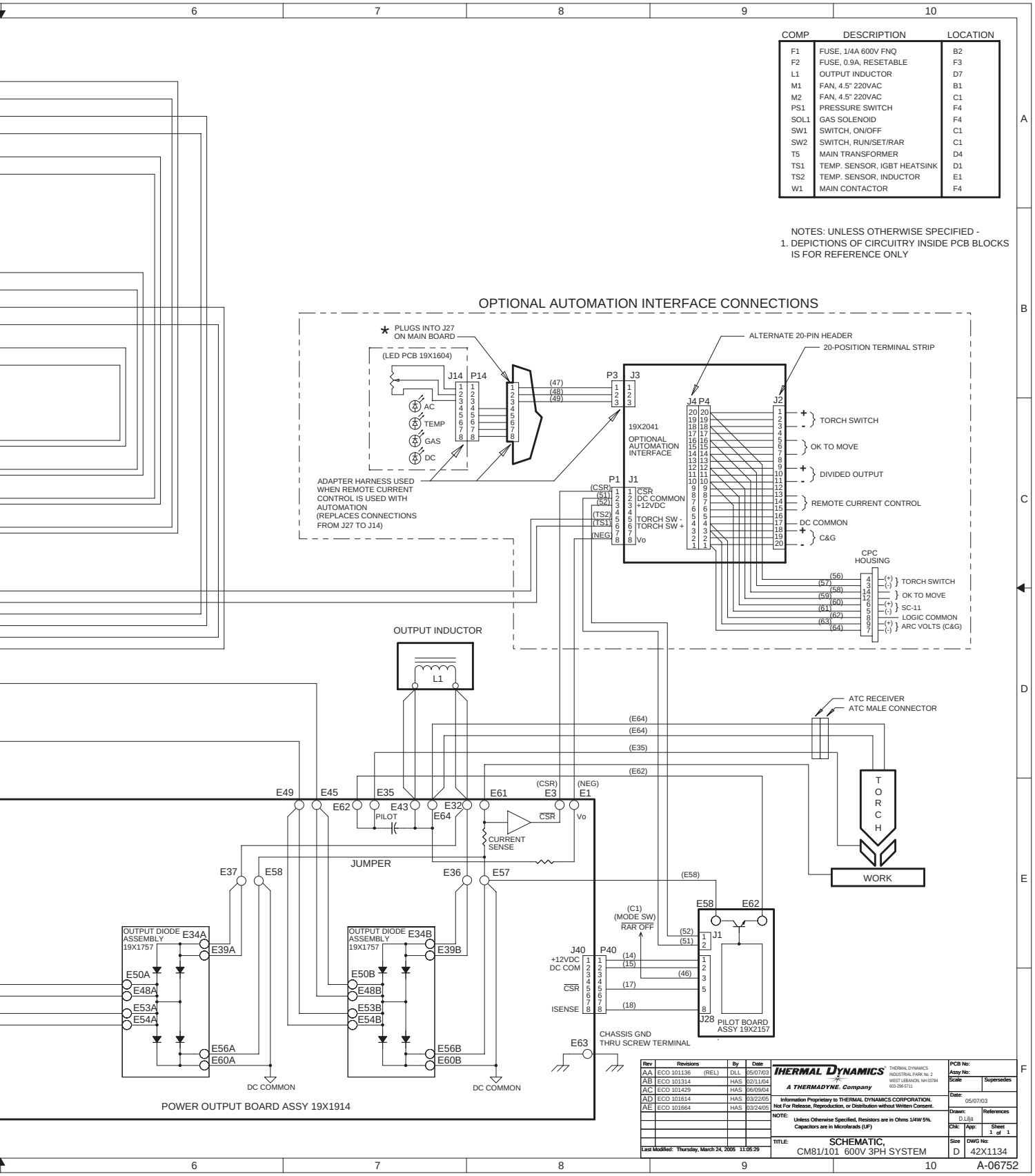
For Power Supplies and SL100 Torches (without solenoid on mounting tube)



A

COMP	DESCRIPTION	LOCATION
F1	FUSE, 1/4A 600V FNQ	B2
F2	FUSE, 0.9A, RESETABLE	F3
L1	OUTPUT INDUCTOR	D7
M1	FAN, 4.5" 220VAC	B1
M2	FAN, 4.5" 220VAC	C1
PS1	PRESSURE SWITCH	F4
SOL1	GAS SOLENOID	F4
SW1	SWITCH, ON/OFF	C1
SW2	SWITCH, RUN/SET/RAR	C1
T5	MAIN TRANSFORMER	D4
TS1	TEMP. SENSOR, IGBT HEATSINK	D1
TS2	TEMP. SENSOR, INDUCTOR	E1
W1	MAIN CONTACTOR	F4

NOTES: UNLESS OTHERWISE SPECIFIED -
1. DEPICTIONS OF CIRCUITRY INSIDE PCB BLOCKS IS FOR REFERENCE ONLY



Rev	Revisions	By	Date
AA	ECO 101136 (REL)	DLL	05/07/03
AB	ECO 101314	HAS	02/11/04
AC	ECO 101429	HAS	06/09/04
AD	ECO 101614	HAS	03/22/05
AE	ECO 101664	HAS	03/24/05

Last Modified: Thursday, March 24, 2005 11:05:29

THERMAL DYNAMICS® A THERMADYNE Company
THERMAL DYNAMICS INDUSTRIAL PARK No. 2 WEST LEBANON, NH 03784 603-298-5711

Information Proprietary to THERMAL DYNAMICS CORPORATION. Not For Release, Reproduction, or Distribution without Written Consent.

NOTE: Unless Otherwise Specified, Resistors are in Ohms 1/4W 5%. Capacitors are in Microfarads (UF)

TITLE: SCHEMATIC, CM81/101 600V 3PH SYSTEM

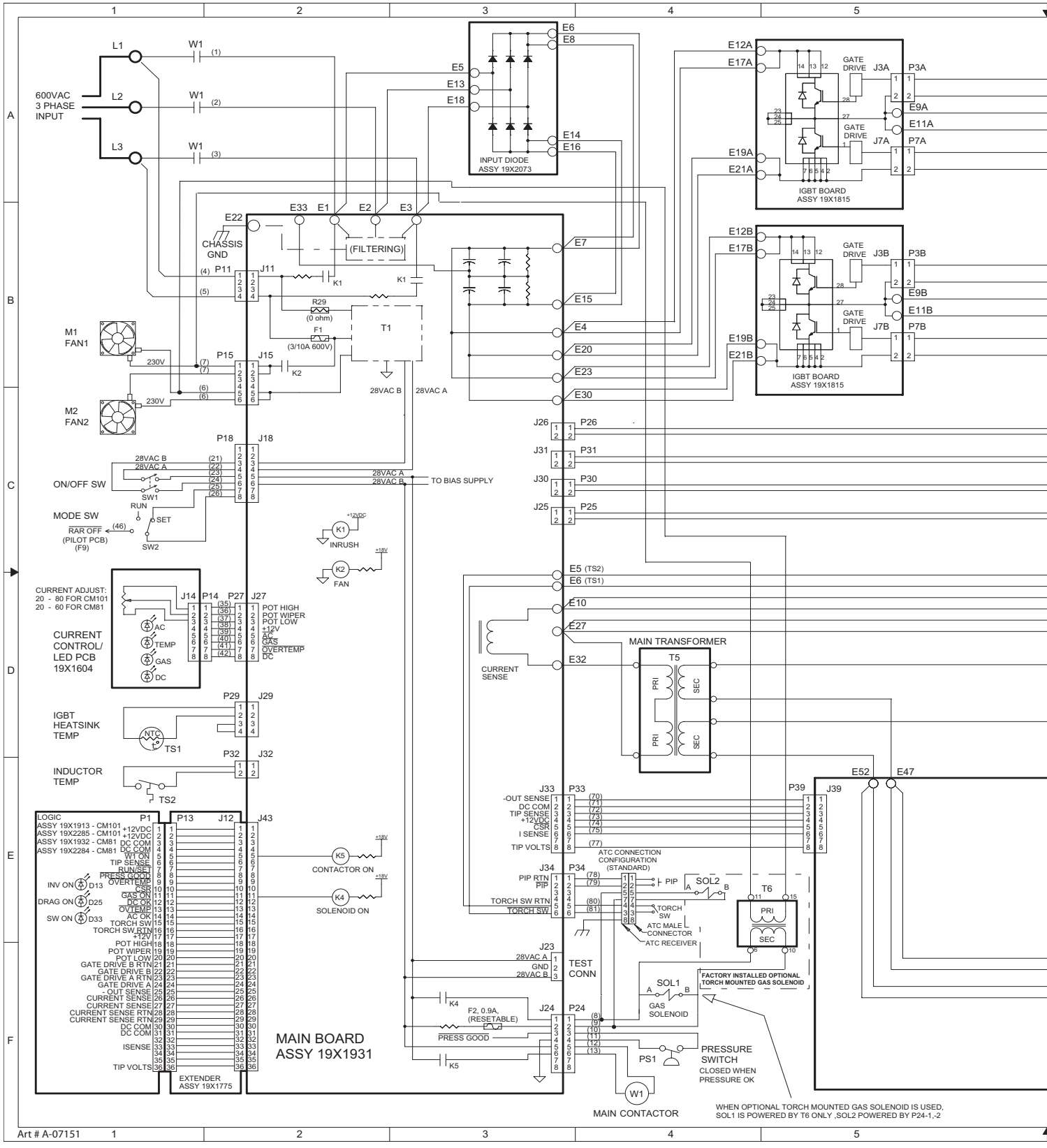
PCB No:
Assy No:
Scale
Supersedes
Date: 05/07/03
Drawn: D.Lilja
References
Chk:
App:
Sheet 1 of 1
Size D
DWG No: 42X1134

A-06752

A

APPENDIX 33: 600V SYSTEM SCHEMATIC

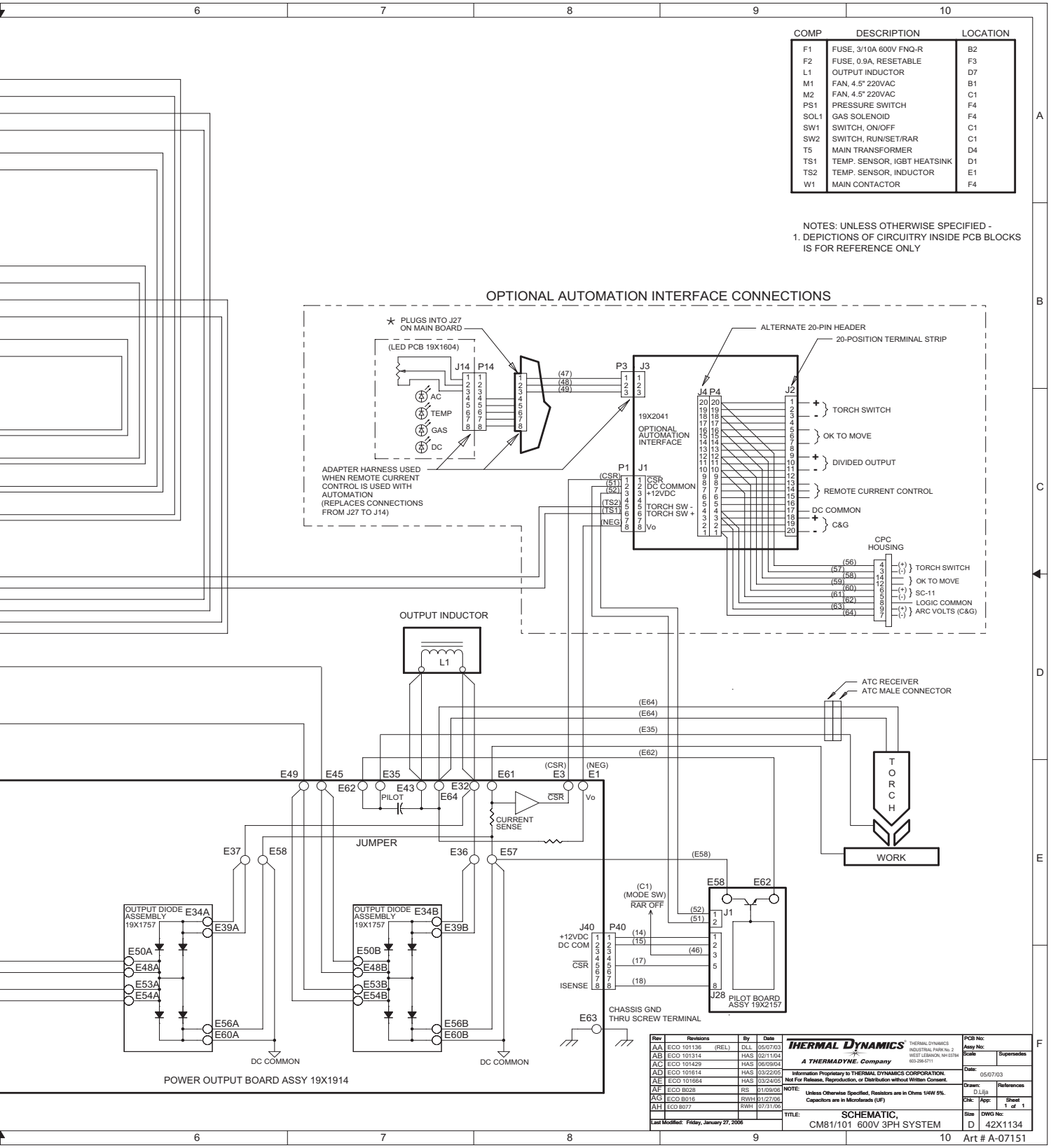
For Power Supplies and SL100SV Torches (with solenoid on mounting tube)



A

COMP	DESCRIPTION	LOCATION
F1	FUSE, 3/10A 600V FNQ-R	B2
F2	FUSE, 0.9A, RESETABLE	F3
L1	OUTPUT INDUCTOR	D7
M1	FAN, 4.5" 220VAC	B1
M2	FAN, 4.5" 220VAC	C1
PS1	PRESSURE SWITCH	F4
SOL1	GAS SOLENOID	F4
SW1	SWITCH, ON/OFF	C1
SW2	SWITCH, RUN/SET/RAR	C1
T5	MAIN TRANSFORMER	D4
TS1	TEMP. SENSOR, IGBT HEATSINK	D1
TS2	TEMP. SENSOR, INDUCTOR	E1
W1	MAIN CONTACTOR	F4

NOTES: UNLESS OTHERWISE SPECIFIED -
1. DEPICTIONS OF CIRCUITRY INSIDE PCB BLOCKS IS FOR REFERENCE ONLY



Rev	Revisions	By	Date
AA	ECO 101136 (REL)	DLL	05/07/03
AB	ECO 101314	HAS	02/11/04
AC	ECO 101429	HAS	06/09/04
AD	ECO 101614	HAS	03/22/05
AE	ECO 101664	HAS	03/24/05
AF	ECO B028	RS	01/09/06
AG	ECO B016	RWH	01/27/06
AH	ECO B077	RWH	07/31/06

Last Modified: Friday, January 27, 2006

THERMAL DYNAMICS — A THERMADYNE Company
THERMAL DYNAMICS INDUSTRIAL PARK No. 2 WEST LEBANON, NH 03784 603-298-5711

Information Proprietary to THERMAL DYNAMICS CORPORATION. Not For Release, Reproduction, or Distribution without Written Consent.

NOTE: Unless Otherwise Specified, Resistors are in Ohms 1/4W 5%. Capacitors are in Microfarads (UF)

TITLE: SCHEMATIC, CM81/101 600V 3PH SYSTEM

PCB No:
Assy No:
Scale: Supersedes
Date: 05/07/03
Drawn: D.Lilja References
Chk: App: Sheet 1 of 1
Size: D DWG No: 42X1134

Art # A-07151

A

APPENDIX 34: Publication History

Release	Rev.	Changes
1/3/05	-	Released to production.
2/14/05	-	Updated per ECO 101610, adding parts to Spare parts kits.
6/17/05	-	Added 415V CE units, ECO 101726.
9/15/05	-	Updated 208/230V and 600V schematics, updated work cable clamp.
Feb. 1, 2006	-	Added system schematics for system w/ SL100SV Torches (w/ solenoid on mounting tube). Added torch connection diagram and torch pinout diagrams for torch w/ solenoid. Added transformer for power supplies supporting torch w/ solenoid. Added catalog numbers for torches & leads w/ solenoid & for replacement leads for torches w/ solenoid. Added publication history to manual.
Mar. 29, 2006	AA	Dropped references to leads extensions. Started using new cover style.
April 17, 2006	AB	Updated torque spec for input diode to 35 in-lb / 3.95 Nm.
Oct. 5, 2006	AB.01	Added patent information and newer revision control to include two numbers.
Mar. 14, 2007	AC.01	Updated 600 volt schematic to show new fuse.
April 2, 2007	AD.01	Revised Art - Appendix 4, Torch Pin - Out Diagrams: A. Power Supply and SL100SV (without Solenoid) Art A-03900 B. Power Supply and SL100SV Torch (with Solenoid) Art A-07114 added text to Callout #'s: 3 & 4: Not Used, updated inside & rear cover.

GLOBAL CUSTOMER SERVICE CONTACT INFORMATION

Thermadyne USA
2800 Airport Road
Denton, Tx 76207 USA
Telephone: (940) 566-2000
800-426-1888
Fax: 800-535-0557
Email: sales@thermalarc.com

Thermadyne Canada
2070 Wyecroft Road
Oakville, Ontario
Canada, L6L5V6
Telephone: (905)-827-1111
Fax: 905-827-3648

Thermadyne Europe
Europe Building
Chorley North Industrial Park
Chorley, Lancashire
England, PR6 7Bx
Telephone: 44-1257-261755
Fax: 44-1257-224800

Thermadyne, China
RM 102A
685 Ding Xi Rd
Chang Ning District
Shanghai, PR, 200052
Telephone: 86-21-69171135
Fax: 86-21-69171139

Thermadyne Asia Sdn Bhd
Lot 151, Jalan Industri 3/5A
Rawang Integrated Industrial Park - Jln Batu Arang
48000 Rawang Selangor Darul Ehsan
West Malaysia
Telephone: 603+ 6092 2988
Fax : 603+ 6092 1085

Cigweld, Australia
71 Gower Street
Preston, Victoria
Australia, 3072
Telephone: 61-3-9474-7400
Fax: 61-3-9474-7510

Thermadyne Italy
OCIM, S.r.L.
Via Benaco, 3
20098 S. Giuliano
Milan, Italy
Tel: (39) 02-98 80320
Fax: (39) 02-98 281773

Thermadyne International
2070 Wyecroft Road
Oakville, Ontario
Canada, L6L5V6
Telephone: (905)-827-9777
Fax: 905-827-9797

Corporate Headquarters
16052 Swingley Ridge Road
Suite 300
St. Louis, MO 63017
Telephone: 636-728-3000
Email: TDCSales@Thermadyne.com
www.thermadyne.com

THERMAL DYNAMICS®
By THERMADYNE®