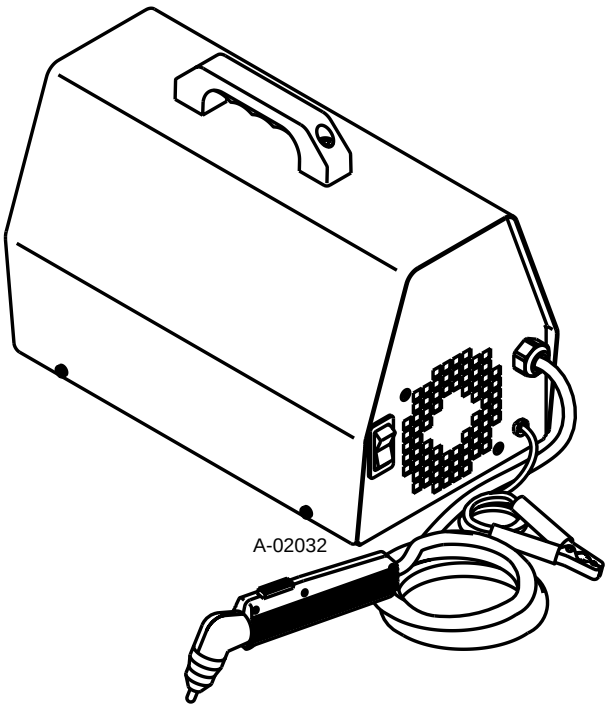
TurboTorch®

PRO-LINE™

TPC-18 PLASMA CUTTING SYSTEM



Service Manual

Includes:
- 12 Amp Power Supply
- PCH-10 Torch with Leads
- Work Cable with Clamp
- Input Power Cable

For Model:
- 120VAC 60Hz

April 26, 2000 **Manual No. 0-2694**

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

WARNING While the information contained in this manual represents our best judgement, Proline ™assumes no liability for its use.

TurboTorch TPC-18 Plasma Cutting System
Service Manual Number 0-2694

Published by:
Thermal Dynamics Corporation
Industrial Park No. 2
West Lebanon, New Hampshire, USA 03784
(603) 298-5711

Printed in the United States of America

April 2000

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1.0 GENERAL INFORMATION

1.1 Notes, Cautions, 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.

1.2 Important Safety Precautions

WARNING

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 1.3, 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.

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 1.3, 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 1.3, 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 recommended in Subsection 1.3, item 4.

1.3 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

1.4 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.

1.5 Precautions De Securite Importantes

AVERTISSEMENT

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 4.
- 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.

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 *4*, 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.
- Respectez le teint de lentille recommandé dans le article 4, page 4.

 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 dú4ez 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 4.

1.6 Documents De Reference

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

1. OSHA, NORMES DE SÉCURITÉ DU TRAVAIL ET DE PROTECTION DE LA SANTÉ, 29CFR 1910, disponible auprès du Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402
2. Norme ANSI Z49.1, LA SÉCURITÉ DES OPÉRATIONS DE COUPE ET DE SOUDAGE, disponible auprès de la Société Américaine de Soudage (American Welding Society), 550 N.W. LeJeune Rd., Miami, FL 33126
3. NIOSH, LA SÉCURITÉ ET LA SANTÉ LORS DES OPÉRATIONS DE COUPE ET DE SOUDAGE À L'ARC ET AU GAZ, disponible auprès du Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402
4. Norme ANSI Z87.1, PRATIQUES SURES POUR LA PROTECTION DES YEUX ET DU VISAGE AU TRAVAIL ET DANS LES ECOLES, disponible de l'Institut Américain des Normes Nationales (American National Standards Institute), 1430 Broadway, New York, NY 10018
5. Norme ANSI Z41.1, NORMES POUR LES CHAUSSURES PROTECTRICES, disponible auprès de l'American National Standards Institute, 1430 Broadway, New York, NY 10018
6. Norme ANSI Z49.2, PRÉVENTION DES INCENDIES LORS DE L'EMPLOI DE PROCÉDÉS DE COUPE ET DE SOUDAGE, disponible auprès de l'American National Standards Institute, 1430 Broadway, New York, NY 10018
7. Norme A6.0 de l'Association Américaine du Soudage (AWS), LE SOUDAGE ET LA COUPE DE CONTENEURS AYANT RENFERMÉ DES PRODUITS COMBUSTIBLES, disponible auprès de la American Welding Society, 550 N.W. LeJeune Rd., Miami, FL 33126
8. Norme 51 de l'Association Américaine pour la Protection contre les Incendies (NFPA), LES SYSTEMES À GAZ AVEC ALIMENTATION EN OXYGENE POUR LE SOUDAGE, LA COUPE ET LES PROCÉDÉS ASSOCIÉS, disponible auprès de la National Fire Protection Association, Batterymarch Park, Quincy, MA 02269
9. Norme 70 de la NFPA, CODE ELECTRIQUE NATIONAL, disponible auprès de la National Fire Protection Association, Batterymarch Park, Quincy, MA 02269
10. Norme 51B de la NFPA, LES PROCÉDÉS DE COUPE ET DE SOUDAGE, disponible auprès de la National Fire Protection Association, Batterymarch Park, Quincy, MA 02269
11. Brochure GCA P-1, LA MANIPULATION SANS RISQUE DES GAZ COMPRIMÉS EN CYLINDRES, disponible auprès de l'Association des Gaz Comprimés (Compressed Gas Association), 1235 Jefferson Davis Highway, Suite 501, Arlington, VA 22202
12. Norme CSA W117.2, CODE DE SÉCURITÉ POUR LE SOUDAGE ET LA COUPE, disponible auprès de l'Association des Normes Canadiennes, Standards Sales, 178 Rexdale Boulevard, Rexdale, Ontario, Canada, M9W 1R3
13. ivret 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

1.7 Declaration of Conformity

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

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

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

National Standard and Technical Specifications

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

* CSA (Canadian Standards Association) standard C22.2 number 60 for Arc welding equipment.

* UL (Underwriters Laboratory) rating 94VO flammability testing for all printed-circuit boards used.

* ISO/IEC 60974-1 (BS 638-PT10) (EN 60 974-1) applicable to welding equipment and associated accessories.

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

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

Manufacturers responsible representative: Steve Ward
Director of Operations
Thermadyne UK
Chorley England

1.8 Statement of Warranty

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

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

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

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

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

The limited warranty periods for TurboTorch TPC-18 shall be as follows: A maximum of two (2) years from date of sale to an authorized distributor and a maximum of one (1) year from date of sale by such distributor to the Purchaser, and with the following further limitations on such two (2) year period.

POWER SUPPLY	**PARTS**	**LABOR**
MAIN POWER MAGNETICS	1 YEAR	1 YEAR
ORIGINAL MAIN POWER RECTIFIER	1 YEAR	1 YEAR
CONTROL PC BOARD	1YEAR	1 YEAR
ALL OTHER CIRCUITS AND COMPONENTS INCLUDING, BUT NOT LIMITED TO, STARTING CIRCUIT, CONTACTORS, RELAYS, SOLENOIDS, PUMPS, POWER SWITCHING SEMI-CONDUCTORS	1 YEAR	1 YEAR
TORCH AND LEADS	180 DAYS	180 DAYS
REPAIR/REPLACEMENT PARTS	90 DAYS	NONE

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

Effective April 1998

2.0 INTRODUCTION

2.1 Scope Of Manual

This manual provides service instructions for the TurboTorch ® TPC-18 Plasma Cutter.

Information in this edition is particularly applicable to the Troubleshooting and Repair of the equipment, and is intended for use by properly trained Service Technicians familiar with this equipment.

Read this manual and the TurboTorch TPC-18 Plasma Cutter Operating Manual, 0-2693, thoroughly. A complete understanding of the capabilities and functions of the equipment will assure obtaining the performance for which it was designed.

2.2 General Service Philosophy

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

A. Application

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

B. Modifications

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

C. Customer/Operator Responsibilities

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

D. Repair Restrictions

The electronics consists of a Printed Circuit Board Assembly which must be carefully handled, and must be replaced as a unit. No replacement of printed circuit solder-mounted components is allowed except as noted in this manual. If PC Board is to be returned, the replaced Printed Circuit Board Assembly must be properly packaged in protective material and returned intact per normal procedures.

2.3 Service Responsibilities

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

Maintenance work should be accomplished in a timely manner. If problems are encountered, or the equipment does not function as specified, contact the Technical Services Department in West Lebanon for assistance.

2.4 Technical Specifications

A. System Specifications

System		Specifications
Input Power		120VAC ± 10%, 60 Hz, Single Phase
Output Power		12 Amps maximum @70 VDC
Duty Cycle		30% at 70 VDC, 12 amps output
Maximum OCV		280 VDC
Pilot Circuitry		Capacitive Discharge (CD), Constant DC
Weight with Leads		55 lbs
Power Supply Dimensions	L	16 in. (406 mm)
	W	9 in. (229 mm)
	H	10 in. (254 mm)
Work Cable		15 ft. (4.57 m)
Input Power Cable		6.6 ft. (2 m) minimum
Torch Style		PCH-10 70°
Torch Dimensions	L	7.98 in. (203 mm)
	W	2.95 in. (75 mm)
Cutting Rating		12 Amps Max. Straight Polarity
Cut Capacity		Most metals up to 1/8 in. (3.2mm)
Severance		Most metals up to 3/16 in. (4.76mm)
Pierce Rating		1/16 in. (1.59 mm)
Transfer Distance		Approx. 1/8 in. (3.2 mm)
Gas Requirements		Compressed Air (Built-in)
Leads Length		20 ft. (6.10 m)

B. Dimensions

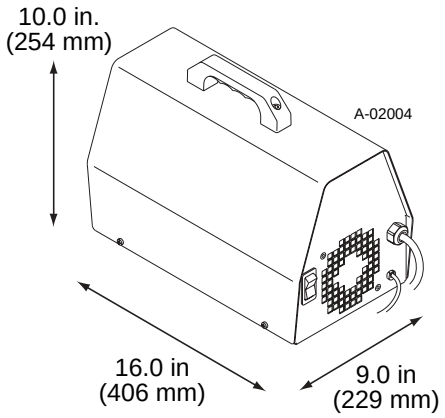


Figure 2-1 Power Supply Dimensions

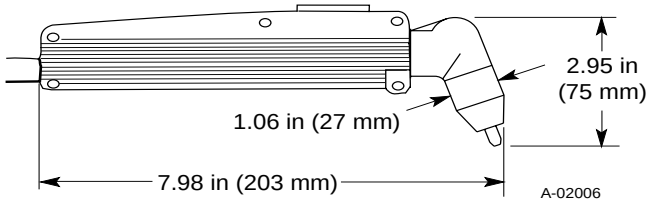


Figure 2-4 Torch Dimensions

3.0: SERVICE TROUBLESHOOTING

3.1 Introduction

This section provides service diagnostics for the TurboTorch TPC-18 Plasma Cutter with PCH-10 Torch, aiding the technician to isolate faulty subassemblies.

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.

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.

3.2 Periodic Inspection & Maintenance

The TurboTorch TPC-18 Operating Manual 0-2693, describes the inspection and maintenance procedures which should be performed at periodic intervals. Routine Maintenance ensures optimum performance of equipment and can prevent the user from encountering problems with this equipment. Refer to that manual for instructions on power supply and torch maintenance.

3.3 Common Cutting Faults

Poor or lackluster performance can often be improved by slight modifications to technique or equipment. For example:

A. Insufficient Penetration

1. *Cutting speed too fast*
2. *Torch tilted too much*
3. *Metal too thick*
4. *Worn torch parts*
5. *Standoff too high*
6. *Line voltage too low*
7. *Extension cord with inadequate rating*

B. Main Arc Extinguishes

1. *Cutting speed too slow*
2. *Torch standoff too high from workpiece*
3. *Work cable disconnected*
4. *Worn torch parts*

C. Excessive Dross Formation

1. *Cutting speed too slow*
2. *Torch standoff too high from workpiece*
3. *Worn torch parts*

D. Short Torch Parts Life

1. *Exceeding system capability (material too thick)*
2. *Excessive pilot arc time*
3. *Improperly assembled torch*
4. *Inadequate air supply (check filter on Compressor)*
5. *Faulty Air Compressor*
6. *Ground or work lead not connected*

3.4 Common Operating Problems

Getting used to the way the system sounds and feels while it is operating properly will help to determine the nature of problems if they arise.

A. Compressor Related

If the unit is cold, the Air Compressor may not start up or may run sluggishly. Most likely, when the torch switch is depressed, the unit will click once and nothing more will happen. Let the unit warm up to room temperature, approximately 50° F (10° C) and try again.

If the air filter on the compressor becomes clogged, the compressor may sound more labored, cut speed and quality will be reduced, and the arc may have a more green color. The air filter element can be cleaned - remove it, blow air through it, then reinstall it.

B. Power Source Related

This system draws about 20 amps rms from the 120 VAC service under normal operating conditions. If the 120V service available is saggy, pilot and cut performance will be degraded. In some cases, the service circuit breaker may open during use. Some things that will help:

- Use a service fused or circuit breaker for 20 amps.
- Use as short an extension cord as possible.
- Use heavy gauge extension cords (Refer to Operating Manual 0-2693 for sizes).
- Try different outlets on different branch circuits. Use the one that gives the strongest pilot.

C. Power Supply/Torch Related

In some instances when the torch switch is pressed there is no pilot. You may need to try several times before the torch fires.

If the torch does not fire (no pilot arc) soon after the torch switch is activated, try releasing the torch switch and letting the leads bleed down before trying again. This should help because the torch fires best at a lower voltage with lower air pressure at the torch.

D. Cutting Related

1. Piloting

One of the features of this plasma cutter is the constant DC pilot. This means the plasma arc is always "on"- either as a pilot arc, or a cutting arc, resulting in a very smooth, forgiving system. This also means that the torch tip will wear fairly rapidly if you pilot for an extended time or cut with too great a standoff (essentially switching from a transferred cutting arc back to the constant DC pilot arc).

The best way to prevent this is to pilot for no more than 5 seconds at a time (or start with the torch in contact with the material) and "drag cut", that is, hold the tip in direct contact with the material to be cut. For some materials, holding a slight standoff (1/16") may provide a better cut.

NOTE

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.

2. Torch Standoff

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

NOTE

Although the TPC-18 will cut using standoff, this unit is primarily a drag-cutting machine.

3.5 Troubleshooting Guide

A. General

The troubleshooting covered in this Service Manual requires power supply disassembly and live measurements. Troubleshooting and repairing this unit is a process which should be undertaken only by those familiar with high voltage high power electronic equipment.

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.

B. How To Use This Guide

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

X. Symptom (Bold Type)

1. Cause (Italic Type)

a. Check/Remedy (Test Type)

Locate your symptom, check causes (easiest is usually first; sometimes the order is important, if noted), then remedies. Repair as needed being sure to verify that the unit is fully operational after any repairs.

C. No Power, AC switch on, red indicator dark, no fan.

1. No power from wall unit.

a. Test electrical outlet with voltmeter or some other known good load (trouble light, hand drill, etc).

If AC line voltage is present, go to step #C2.

If AC line voltage is not present, replace fuse or reset circuit breaker.

2. Damaged power cord.

a. Confirm with voltmeter if ac line voltage is present at input to power switch.

If ac voltage is present, proceed to subsection C3.

If ac line voltage is not present, replace power cord.

3. *Power switch faulty.*

a. Confirm with voltmeter if AC line voltage is present at main capacitor terminals when power switch is on.

If ac line voltage is not present, replace power switch.

D. Power OK, service circuit breaker or fuse opens after the power switch is switched on.

NOTE

Proceed with troubleshooting for these components in order:

1. Faulty Fan.

a. Disconnect the Fan and insulate the two wires going to the Fan with tape (separately), then reapply power.

If the circuit breaker or fuse opens after the power switch is switched on, go to step #D2.

If the circuit breaker or fuse is okay, replace Fan.

2. Faulty Transformer Assembly or Capacitor.

a. With the Fan still disconnected, disconnect two leads from the transformer that are connected to the Capacitor , then apply power.

If the circuit breaker or fuse opens after power is applied, the Capacitor is shorted. Replace Capacitor.

If the circuit brreaker or fuse is okay, replace Transformer.

E. Power OK, fan runs, no compressor operation or pilot when torch switch pressed.

1. Shield cup loose, PIP not making contact.

a. Reseat the torch parts, tighten shield cup.

2. Unit overtemp.

a. Leave power on so fan can cool unit, test again after 10 min.

3. Shorted torch parts.

a. Replace torch consumables.

4. Torch switch may have broken or shorted wires.

a. Refer to subsection 3.6, Torch and Leads Troubleshooting.

5. Overheated or faulty Compressor.

a. Press the torch switch. If a clicking can be heard and / or the Relay is actuating (test button on side pulls in), the Compressor motor may have failed or overheated. If the Case of the Compressor motor feels very warm, allow it to cool and try again. The Compressor has its own overtemp cutout switch.

If the unit fails to operate once it has cooled down, replace the compressor.

6. Shorted Bridge Rectifier (BR2)

a. If the Rectifier (upper) is hot and the Transformer is buzzing or heating up, the rectifier is shorted. Replace Rectifier.

7. Faulty Control PCB or Relay

CAUTION

Be sure torch is directed away from people or hazards. A pilot arc may start!

a. Push the test button on the side of the Relay. If the Compressor starts and the torch operates, the PCB or Relay has most likely failed.

The PCB can be isolated by removing the push on connectors from the Relay coil and measuring the relay coil with an ohmmeter. If the coil measures between 50 - 100ohms, the Relay is good and the PCB should be replaced.

If the Compressor runs intermittently and arcing can be seen in the Relay case while the torch switch is held on, the relay contacts are worn and the Relay should be replaced.

F. Power OK, fan runs, compressor runs intermittently, Relay Case shows arcing when the torch switch is held on.

1. Faulty Relay.

a. If the Compressor runs intermittently and arcing can be seen in the Relay Case while the torch switch is held on, the relay contacts are worn and the Relay should be replaced.

G. Power OK, fan runs, compressor starts then shuts down as soon as the torch switch is pressed.

1. Shorted, damaged, or incorrect torch parts.

a. Check that all torch parts are in good condition and designed for use in the PCH-10 torch.

2. Faulty (open) Voltage Divider Resistor.

a. The voltage divider is the top Resistor. Disconnect the push-on connectors and measure the Resistor with an ohmmeter. It should read 1K ohms. If measurement is not 1K ohms, replace Resistor.

3. Shorted Bridge Rectifier (BR1).

a. Probable if a loud hum or buzz is heard from the main transformer after the Relay actuates.

If hum or buzzing noise exists, replace Bridge Rectifier. (replace lower Bridge Rectifier, closest to Chassis).

H. Power OK, fan runs, compressor runs, no pilot or cutting arc with the torch switch pressed.

1. Worn, contaminated, or incorrect torch parts.

a. Check that all torch parts are in good condition and designed for use in the PCH-10 torch. Replace worn parts as necessary.

2. Parts not assembled correctly.

a. Reassemble torch parts.

3. *Damaged torch or leads.*

a. Check per subsection 3.6, Torch and Leads Troubleshooting.

4. Faulty Control PCB.

a. Listen for a faint, sharp clicking noise, at about 3-4 clicks / second from the Ferrite Core Assembly. If nothing is heard, the PCB should be replaced.

5. Faulty (open) Pilot Resistor.

a. The Pilot Resistor is mounted closest to the chassis. Disconnect the the push on connectors and measure the resistor with an ohmmeter. It should read 0.5 ohms (essentially a short).

6. AC input too low.

a. If the AC line is below about 105vac, the torch may not always start. Try an outlet on a different branch circuit.

7. Faulty Ferrite/Transformer Assembly.

a. The Ferrite Transformer Assembly is used to generate a high voltage pulse to establish the pilot arc. Troubleshooting is limited to visual inspection. The two primary connections and two secondary connections should be checked for general integrity and snug fit onto the push on connectors. The Transformer Assembly itself should be free of large ferrite chips and cracks along the core.

I. Torch pilots but does not cut well.

1. AC input power too low.

a. Use shortest service from AC outlet to breaker panel as possible or larger gauge extension cord.

2. Work cable not attached.

a. Check work cable connection.

3. Restricted air flow.

a. Check lead for kinks or pinching restricting air flow.

4. *Loose shield cup.*

   a. Tighten shield cup.

5. *One or more gas distributor holes blocked.*

   a. Replace Gas Distributor.

6. *Excessive parts wear.*

   a. Inspect torch consumables and replace as necessary.

7. *Damaged torch insulator*

   a. Check insulator between anode and cathode for charring per subsection 3.6, Torch and Leads Troubleshooting.

3.6 Torch & Leads Troubleshooting

WARNINGS

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

DO NOT touch any internal torch parts while the AC indicator light on the front panel of the power supply is on.

Torch parts may get quite hot during normal operation. Always wear light cutting gloves when changing torch parts just after operating the TURBOTORCH system.

A. Checking the Center Insulator

The Center Insulator separates the negative and positive charged sections of the torch. If the center insulator does not provide adequate resistance, current which is intended for the pilot arc may be dissipated into the torch head, resulting in torch failure.

1. Remove the shield cup, tip, gas distributor, and electrode from the torch.

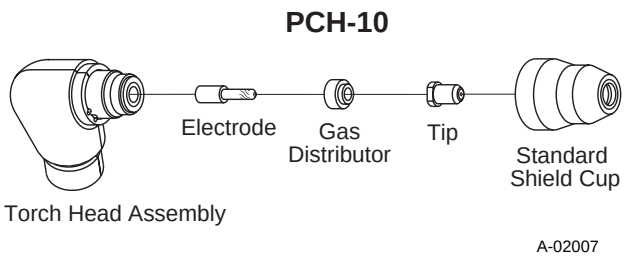


Figure 3-1 PCH-10 Torch Head Parts Removal

2. Disconnect the torch lead from the power supply to isolate the torch from power supply circuits. Refer to Appendix I for Leads connections.

3. Using an ohmmeter (set to 10K or higher), check for continuity between the electrode seat (negative) and the brass threads of the torch assembly. Infinite resistance (no continuity) should be found. If there is continuity between the two, remove the torch head from the lead and check the torch head separately.

B. Checking Torch Lead

If the torch head assembly is okay, check the torch lead by measuring the resistance between the positive pilot lead connector and the negative lead fitting. If continuity is found, the insulation between the torch leads is breaking down and the torch and leads assembly should be replaced.

NOTE

The lead cannot be replaced without replacing the torch assembly as well.

If no continuity is found, check the resistance between the negative plasma lead fitting and the electrode seat in torch head. If no continuity is found, replace the torch and leads assembly.

C. Checking Pilot and Switch Control Wires

Check the pilot and switch control wires for continuity from one end of the torch lead to the other. If no continuity exists, replace torch and lead assembly.

D. Reassembling Torch and Leads

Replace parts as required, then recheck the torch head, and lead connections to confirm proper measurements. If each component is okay, reassemble torch and leads.

4.0 REPAIRS & REPLACEMENT PROCEDURES

4.1 General Information

- Failures identified on the Transformer/Inductor/Chassis Assembly cannot be repaired - the entire power supply must be replaced. Refer to the Parts List for the catalog number for a replacement power supply.
- The torch head, torch switch, and torch & leads assembly are replaceable parts. The torch leads alone are not serviceable; problems encountered in the leads will require the torch & leads assembly to be replaced.

- For instructions on replacing the torch & leads, work cable & clamp, and input power cable, refer to Operating Manual 0-2693. (Refer to Appendix I, in this manual, for leads connection diagram.)
- Most replacement hardware can be purchased locally.
- One of two harnesses has been used in this unit. For units which are rev "C" or earlier, refer to the schematic in Appendix II. For units which are rev "D" or later, refer to the schematic in Appendix III. Check the data tag on your unit for the rev level of your unit and follow instructions in this section where aplicable, as they pertain to your unit.

WARNING

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

4.2 Removing Cover/Handle

1. Remove 2 screws in handle, 2 screws in end panels, and four screws near base to remove cover and handle from unit.

NOTE

When replacing cover, make sure all wires are carefully positioned so that the wires are not pinched when the cover and handle are secured.

4.3 Torch Head Assembly Replacement

WARNINGS

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

Torch parts may get quite hot during normal operation. Always wear light cutting gloves when changing torch parts just after operating the TPC-18 System.

To Remove Torch Head Assembly:

NOTE

Refer to Figure 4-1 for parts identification.

1. Remove consumable parts from front end of torch.
2. Remove six screws from torch handle assembly (A).
3. Remove both torch handle halves from the torch and leads assembly , then complete the following:
   a. Disconnect positive pilot lead connection at torch head by removing pilot lead screw (B).
   b. Cut tie wrap from torch hose (C).
   c. Using X-acto knife or other small cutting tool, cut torch lead 1" (2.54 cm) from the end of black sleeve (D) to reveal butt splice.
4. Pull torch head away from torch lead to expose 1/2"-3/4" of cable.
5. Clamp down with vise grips on black sleeve of lead so that cable cannot spring back into lead (E).
6. Cut cable at end of butt splice and remove torch head assembly (F).
7. Remove orange insulating sleeving from torch head gas input (G). Note: Sleeving is optional. Some torch assemblies may not have sleeving.
8. Remove torch O-ring from torch split holder (H).
9. Remove the two screws from the torch head split holder and separate the halves (I).
10. Remove the torch head from the holder. Do not disturb PIP connections.

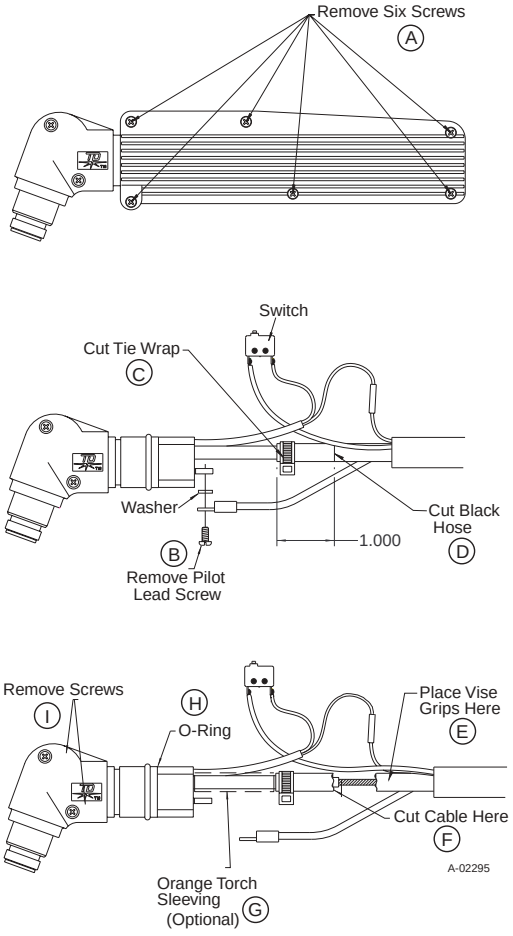


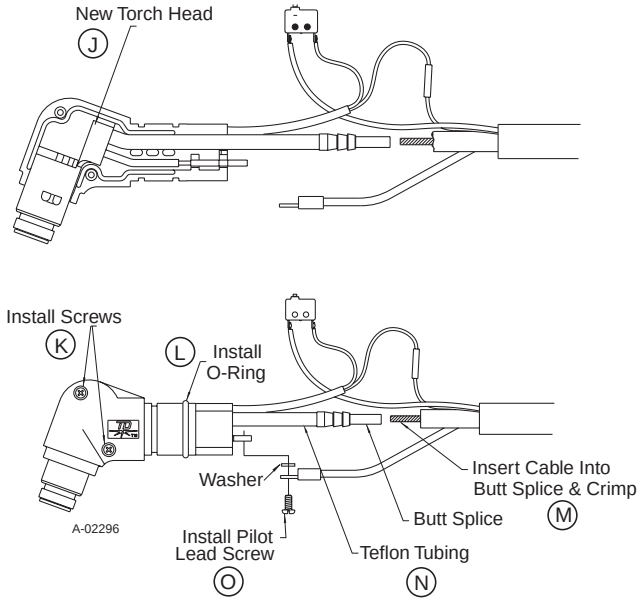
Figure 4-1 Removing Torch HeadAssembly

To Install Replacement Torch Head Assembly:

NOTE

Refer to Figure 4-2 for parts identification.

1. Place replacement torch head in torch head split holder halves and secure with 2 screws removed in step 9 above (K). Do not disturb PIP connections.
2. Install O-ring removed in step 8 above (L).
3. Optional: Install orange sleeving on replacement torch head gas input.
4. Place torch head in correct orientation, then insert lead cable into torch butt slice and crimp (M).
5. Remove vise grips.
6. Lubricate torch head glands lightly with silicone and push hose back onto barbs up to the point where the teflon tubing and brass fitting meet (N).
7. Install tie wrap onto hose in correct position (C), removing any excess.
8. Connect pilot lead to pilot lead terminal by placing washer between terminal and connector and installing screw (O).
9. Push pilot lead under cable jacket until there is no excess.



4-2 Installing Torch Head Assembly

4.4 Torch Switch Only Replacement

NOTE

This procedure requires the following tools (or equivalent): screwdriver, soldering iron, Nokorde Flux.

WARNING

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

1. Remove consumable parts from front end of torch.
2. Remove the six screws from the torch handle assembly and remove torch and leads assembly.
3. Using soldering iron, carefully remove solder where orange wire connects to switch terminal.

NOTE

Be careful not to overheat the torch switch while removing soldering from terminals.

4. Apply Nokorde Flux to orange wire and to switch post. Insert orange wire in switch post hole and solder, keeping solder at a minimum required for good joint.
5. Repeat steps 3 and 4, this time for the white wire.

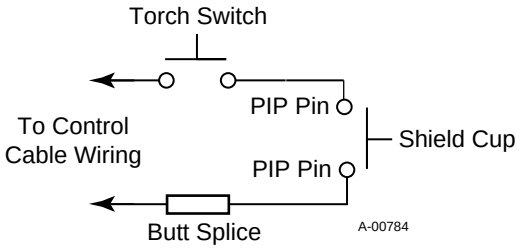


Figure 4-3 Torch Switch Schematic

6. Place the torch head in the torch handle bottom. Carefully return the torch switch and button w/ springs to their proper position. Replace cover on the handle assembly, and screw together with six screws.

NOTE

Make sure torch switch wires are seated in their guides so that the wires are not pinched when the handle is secured.

7. Install consumables parts in front end of torch.

4.5 Air Compressor Replacement

NOTES

Refer to subsection 4.1, General Information, for information about wire harnesses.

Refer to Appendix II for parts location and orientation.

1. Remove cover / handle from unit per subsection 4.2.
2. Locate the nylon nut on the 90° nylon fitting on side of Air Compressor. Loosen the nylon nut and slide the brass torch lead fitting / faston connector out.
3. Complete one of the following, as it pertains to your unit:
   - Rev C units or earlier - Disconnect black wire from Compressor to faston splice & wire #21. Disconnect red wire from Compressor to upper diode piggy back terminal.
   - Rev D units or later - Disconnect black wire from Compressor to faston splice & wire #29. Disconnect red wire from Compressor to upper diode piggy back terminal.
4. Slide Compressor out of bracket.
5. Note position and angle of 90° nylon nut connected to the Air Compressor. Remove fitting.
6. Clean old teflon thread sealant from nylon fitting, apply new thread sealant and install nylon fitting on replacement Air Compressor. Make sure fitting is in proper position.
7. Remove "feet" from Compressor and install on replacement Compressor.
8. Insert replacement Air Compressor into bracket, insuring "feet" have dropped into slots in bracket.
9. Apply a small amount of O-Ring lubricant to brass torch fitting and insert into 90° nylon fitting. Tighten nylon nut.

NOTE

Be careful not to remove the nylon nut completely as there are small parts inside that could fall out.

10. Connect the following as it pertains to your unit:
    - Rev C units (or earlier) - Connect black wire from Compressor to faston splice & wire #21. Connect red wire from Compressor to upper diode piggyback terminal.
    - Rev D (or earlier) - Connect black wire from Compressor to faston splice & wire #29. Connect red wire from Compressor to upper diode piggyback terminal.
11. Position wire connector L4 so that it runs along side the Transformer, NOT across the top of the Transformer.
12. Install cover / handle by reversing steps in subsection 4.2, keeping in mind the following:
    a. The Air Compressor is secured in position by one of the handle screws on the top side of the power supply. Make sure that no wires obstruct the cover when it is installed.

4.6 Capacitor Replacement

WARNING

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

NOTE

Refer to subsection 4.1, General Information, for information about wire harnesses.

1. Remove cover / handle from unit per subsection 4.2.
2. Make note of all wire connections and locations to Capacitor.
3. Remove all wire connections to Capacitor.
4. The Capacitor is held in place by a tab located on the Transformer frame. Using a screw driver or similar tool, pry the tab back slightly to allow the Capacitor to slide out of the bracket.
5. Install replacement Capacitor, by reversing steps 1-4, keeping in mind the following:
   a. Make sure the Capacitor is securely positioned behind tab. Tab may need to be bent.
   b. Position wire connector L4 so that it runs along side the Transformer, avoiding contact with metal parts.

4.7 Control PC Board Replacement

The TURBOTORCH Plasma Cutter has been manufactured using one of two styles of PC Board Assemblies. The Board will either have round mounting holes in the corners or key slotted mounting holes in the corners. Follow procedures as they apply to your unit.

NOTES

It may be easier to remove the PC Board if the Capacitor is removed first.

All replacement PC Boards have key slotted holes.

WARNING

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

A. To Remove PC Board:

1. Remove cover / handle from unit per subsection 4.2.
2. Remove Capacitor (optional) per subsection 4.6.
3. Note all wiring connections and locations to the PC Board.
4. Disconnect all wire connections to the PC Board, removing any tie wraps where necessary.
5. Remove PC Board from unit by completing the following, as it applies to your unit:

PC Board with round mounting holes:

a. Remove the two (2) metal "C" clips located on the top two standoffs that secure the PC Board to the unit.

b. Gently pry PC Board off the standoffs then remove the second set of metal "C" clips (2).

NOTE

In some cases, the PCB may be mounted on standoffs and secured with RTV over the ends. Remove the RTV and then remove the PCB from the unit.

PC Board with key slotted mounting holes:

a. Remove two (2) fastener plastic push ons from key slotted holes in corners of PC Board.

b. Slide PC Board up or down to disengage, then remove from unit.

B. To Install Replacement PC Board:

1. Install replacement key slotted PC Board by placing PC Board over standoffs and sliding Board down into position.
2. Push a white fastener plastic push on into each keyhole (just above standoffs) to secure the PC Board into position.
3. Reverse steps 1-4, keeping in mind the following:

a. Make sure J2 is not offset by one or more pins.

b. Install new tie wraps on wires connected to the PC Board, as necessary.

4.8 Power Relay Replacement

NOTES

The Control PC Board must be moved out of the way before the Power Relay can be replaced. (It may be easier to move the Contrl PC Board if the Capacitor is removed first.)

Refer to subsection 4.1, General Information, for information about wire harnesses.

WARNING

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

1. Remove cover / handle from unit per subsection 4.2.
2. Remove Capacitor (optional step) per instructions in 4.6.
3. Remove PCB from standoffs per subsection 4.7.B.
4. Slide PC Board away from Relay.
5. Note all wiring connections and locations to the Relay.
6. Remove wirings connected to Relay.
7. Slide Relay out from bracket, towards the center of the unit.
8. Install replacement Relay, by reversing the above steps, keeping in mind the following:

a. Position wire connector L4 so that it runs along side the Transformer, NOT across the top of the Transformer.

4.9 ON/OFF Power Switch Replacement

NOTE

When ordering a replacement ON/OFF Switch, order the same Type and Color as is in your unit.

Switch Type	Dimensions	Neon Color	Voltage	Catalog Number
5 prong	1"x2"	red	115	9-0015
4 prong	1"x1-1/4"	red	115	9-0021

WARNING

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

1. Remove cover / handle from unit per subsection 4.2.
2. Note all wiring connections and locations to the ON / OFF Switch.
3. Disconnect wires to ON / OFF Switch.
4. Push plastic clips down on top side of Switch and slide Switch out by pulling it through front panel.
5. Install replacement ON / OFF Switch, by reversing the above steps, keeping in mind the following:
   a. Position wire connector L4 so that it runs along side the Transformer, NOT across the top of the Transformer.

4.10 Fan Replacement

1. Remove cover / handle from unit per subsection 4.2.
2. Carefully slide the Air Compressor out of the Transformer bracket and out of the way of the Fan. Be careful not to strain wire connections. (If necessary, remove Compressor completely, following procedures described in subsection 4.5.)
3. For reference, mark wires with correct connection designation, then disconnect two wires to Fan.
4. Remove two (2) rivets* securing Fan to the front panel.

NOTE

**Some models may use screws instead of rivets.*

5. Install replacement Fan. Refer to Figure 5.1 for proper Fan orientation (or refer to the arrows marked on the Fan chassis).

NOTE

Proper fan orientation is essential to ensure proper cooling of power supply parts.

6. Install Compressor by reversing steps 1-3, keeping in mind the following:
   a. Position wire connector L4 so that it runs along side the Transformer, NOT across the top of the Transformer or touching any metal parts.
   b. The Compressor is secured in position by one of the handle screws.

4.11 Diode Bridge Rectifier Replacement

NOTE

Refer to subsection 4.1, General Information, for information about wire harnesses.

1. Remove cover / handle from unit per subsection 4.2.
2. Note all wire connections and locations to the Diode Bridge Rectifier.
3. Disconnect wires to the Diode(s), and remove Diode from unit.
4. Install replacement Diode, by reversing steps 1-3 above, noting the following:
   a. Diode should be oriented with plus sign (+) down and to the right.

4.12 Resistor Replacement

NOTE

The TURBOTORCH has two Resistors. The top Resistor is 1K ohm and the bottom Resistor is .5 ohm. These parts are not interchangeable. Be sure to order the correct replacement part. To replace the bottom Resistor, the top Resistor must be removed first.

The Air Compressor must be removed (or optionally, pulled out of its frame and moved out of the way) in order to remove the Resistor(s).

1. Remove cover / handle from unit per subsection 4.2.
2. Remove Air Compressor per subsection 4.5.
3. Note all wire connections and locations to the Resistor(s).
4. Disconnect all wiring connections to the Resistor(s).
5. Remove two nuts and washers securing Resistor to chassis.

6. Remove Resistor(s).

7. Install replacement Resistor(s) by reversing steps 1-5, noting the following:

   a. The top Resistor is 1K ohm and the bottom Resistor is .5 ohm.

   b. Tighten screws securely.

4.13 Transformer/Ferrite Core Assembly Replacement

WARNINGS

Disconnect primary power at source before assembling or disassembling the power supply.

1. Remove cover / handle from unit per subsection 4.2.

2. Wire connections are as follows:

Connector	Location
L1	E6 on PCB
L2	E1 on PCB
L3	E2 on PCB
L4	Brass Torch Lead Fitting

3. Disconnect wire connections. Pull L4 connector through loose tie wrap if available.

4. Remove two Ferrite Core Assembly screws which hold the Transformer / Ferrite Core Assembly in position. Remove Transformer / Ferrite Core Assembly from unit.

5. Install replacement Transformer / Ferrite Core Assembly by reversing steps 1-4, keeping in mind the following:

   a. Pull L4 through loose tie wrap if available.

   b. Position wire connector L4 so that it runs along side the Transformer, NOT across the top of the Transformer or near any metal parts.

5.0 PARTS LIST

Order replacement parts by catalog number and complete description of the part or assembly. Also include the model and serial number of the torch. Address all inquiries to your authorized distributor or call toll free 1-888-832-4250.

NOTE

Standard hardware has been used in this unit. Replacement hardware can be purchased locally.

5.1 Returns

If a product must be returned for service, contact your authorized distributor. Items return to the manufacturer without proper authorization will not be accepted.

5.2 Parts Replacement

NOTE: Refer to Power Supply data tag to identify model of your unit.

Description	Catalog #

A. Complete Systems

Includes Power Supply, PCH-10 70° Torch with Leads, Spare Consumable Parts, Input Power Cord, and Work Cable.

TURBOTORCH 120V 60Hz, PCH-10	1445-0900

B. Torch & Leads Only

Includes Torch & Leads, 90° Nylon Air Compressor Fitting. Torch Leads alone are not replaceable.

PCH-10 (70°) w / 20 ft. (6 m) Leads	2-1020

5.3 Power Supply Replacement Parts

Item #	Qty	Description	Catalog#
1	1	Transformer / Inductor (Incl. Chassis)	8-8302
2	1	Cover (incl. Labels)	8-8303
3	1	Control PCB Assembly	9-0003
4	1	Capacitor, AC 120UF, 180V	9-0004
5	1	Wire Harness (not shown)	9-0005
6	1	Relay, DPST, -NO, 25A @ 250V	9-7508
7	1	Fan, 120V 60Hz,Fan 115V 50 / 60Hz, 95 / 115CFM	8-3209
8	1	Compressor, Air, 12VDC, 0.5 CFM	9-0010
9	1	Resistor, 0.5ohm, 55 watt, 10%,3 / 16 Faston	9-0011
10	1	Resistor, 1Kohm, 55 watt, 5%,3 / 16 Faston	9-0012
11	1	Work Cable, 15 ft. (4.57 m) w / Red Handles	9-0013
12	1	Input Power Cable, 6.5 ft. min. (2 m), 16 / 3 w / molded plug	9-0014
13	1	ON / OFF Switch:	
		ON / OFF Switch , DPST, 125V 15A, RED NEON (5 Prongs)	9-0015
		ON / OFF Switch, DPST, 125V 22A, RED NEON (4 Prongs)	9-0021
14	1	CD Transformer / Ferrite Core Assembly	9-0018
15	2	Bridge Rectifier	7-3345
16	1	Handle, Molded	9-8115

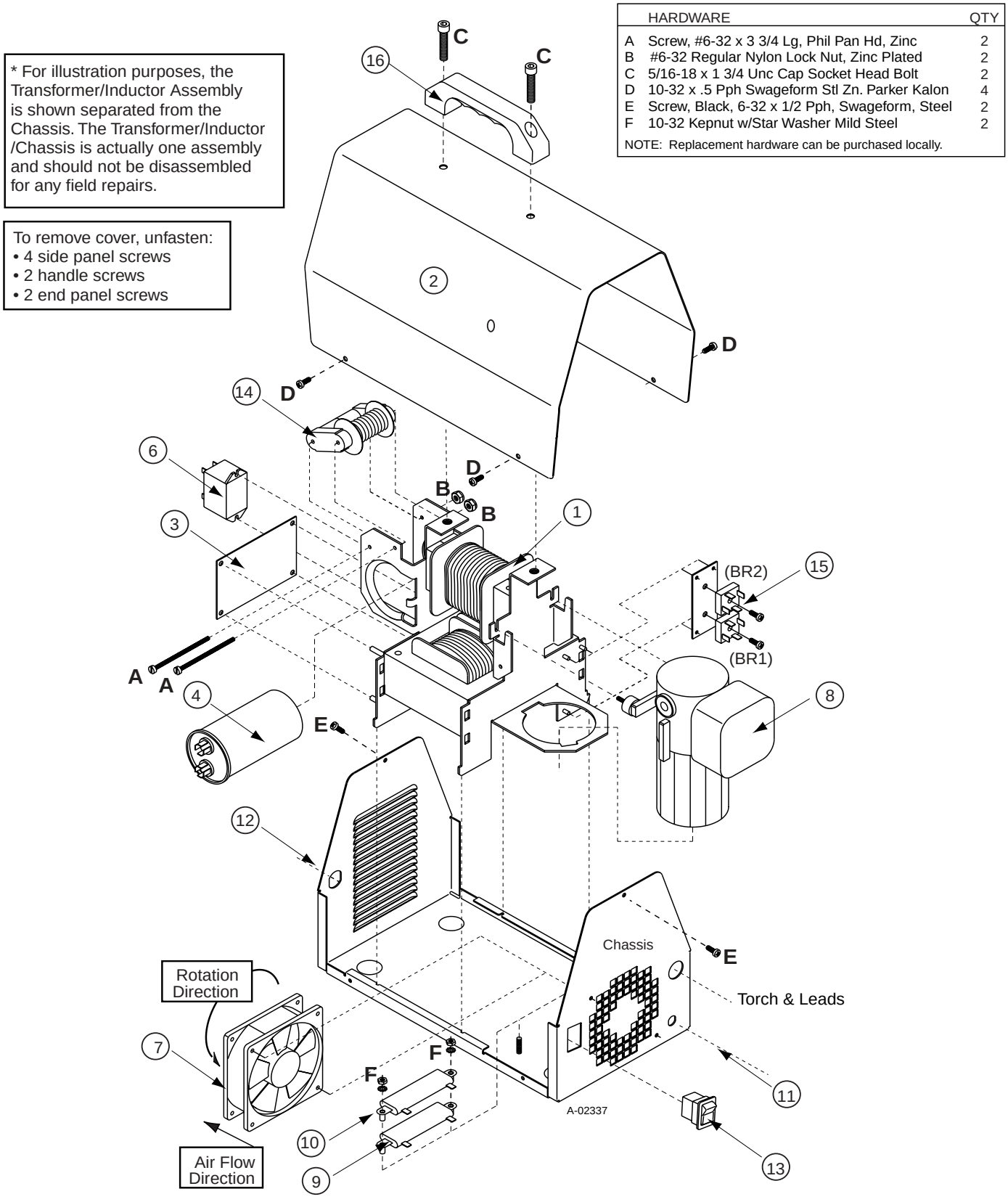
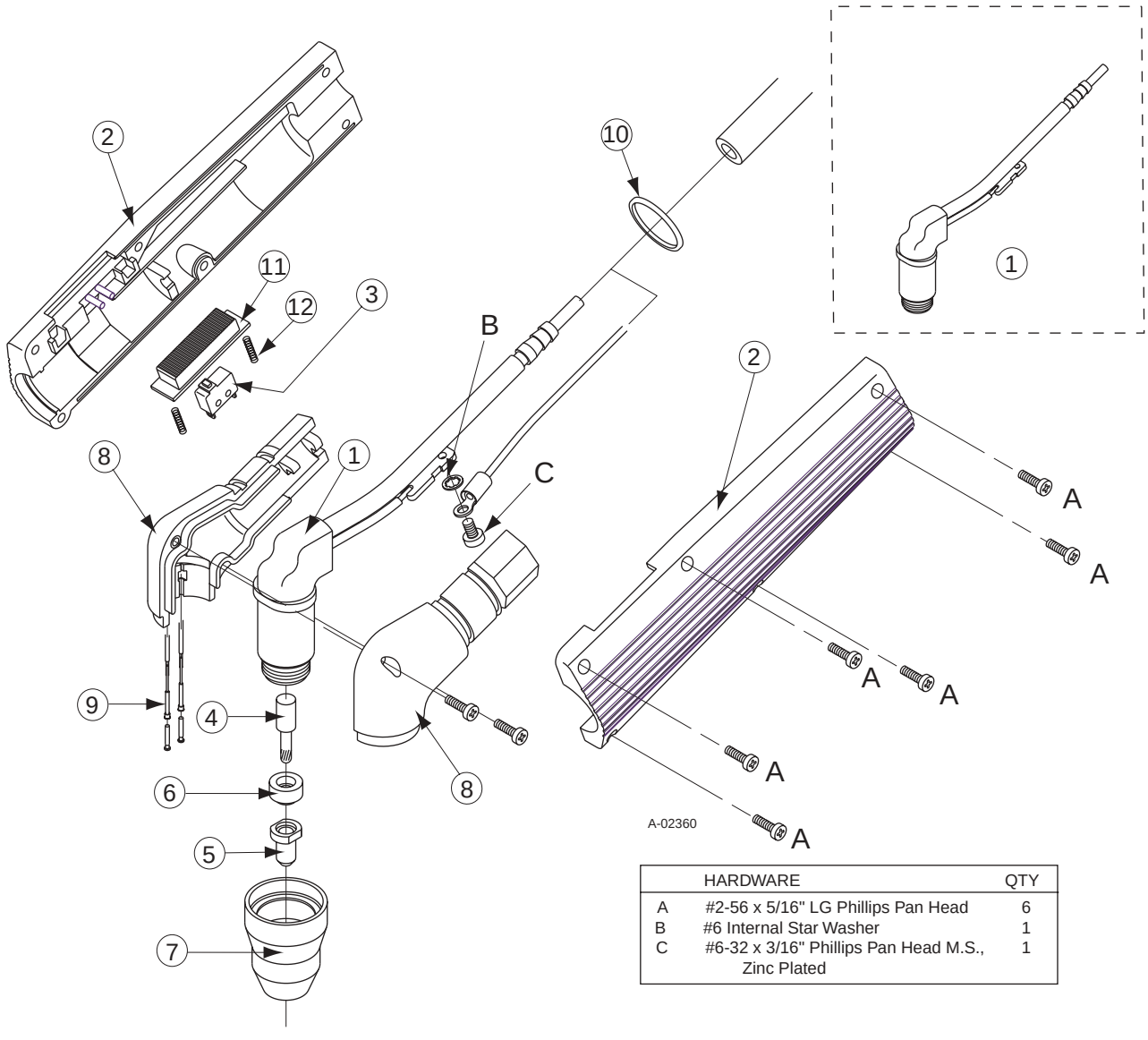


Figure 5-1 Exploded View of Power Supply

5.4 Torch Replacement Parts

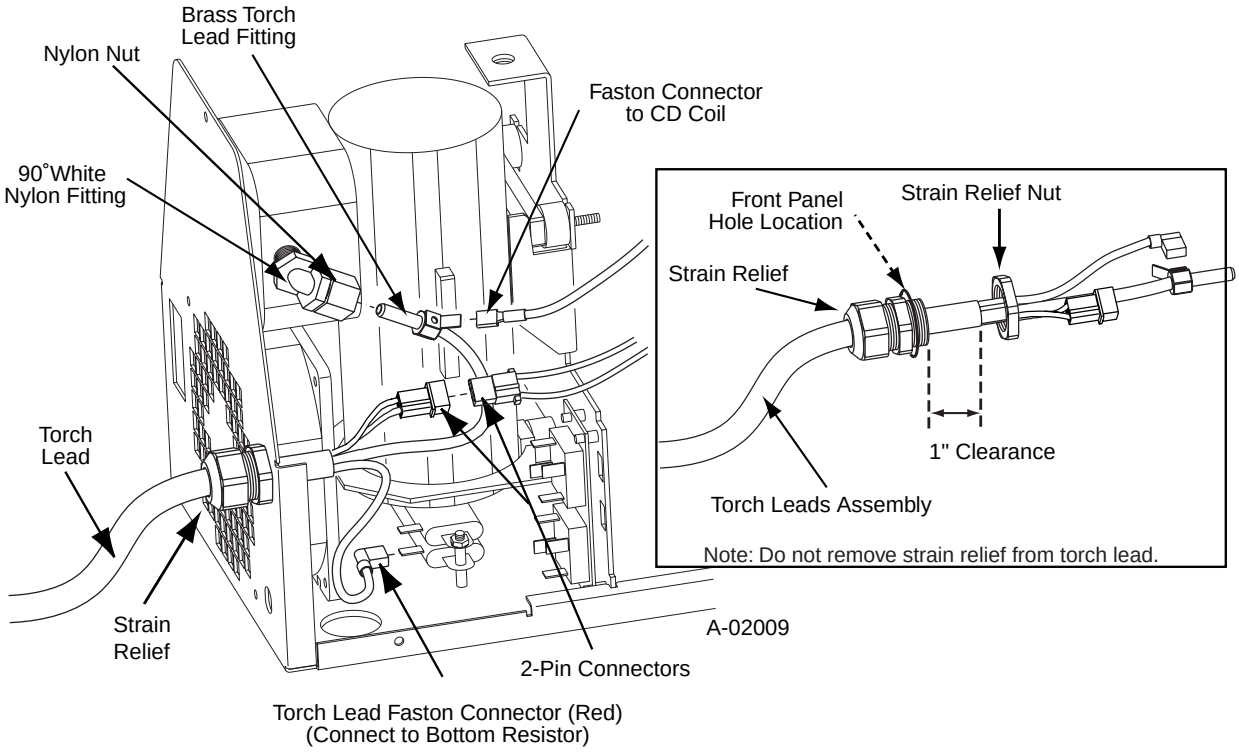
Item #	Qty	Description	Catalog#
1	1	PCH-10 (70°) Torch Head Assembly*	9-0016
2	1	Torch Handle Only	9-0019
3	1	Torch Switch	9-1058
4	1	Standard Electrode	1445-0904
5	1	PCH-10 Tip	1445-0909
6	1	Gas Distributor	1445-0905
7	1	Shield Cup	1445-0903
8	1	Torch Head Split Holders PCH-10 (70°)	9-6259
9	1	PIP (Parts-In-Place) Wire Assembly	9-6290
10	1	O-Ring	8-0533
11	1	Torch Switch Button	8-4256
12	2	Torch Switch Button Springs	9-6292

* To be replaced by Qualified Technician only.



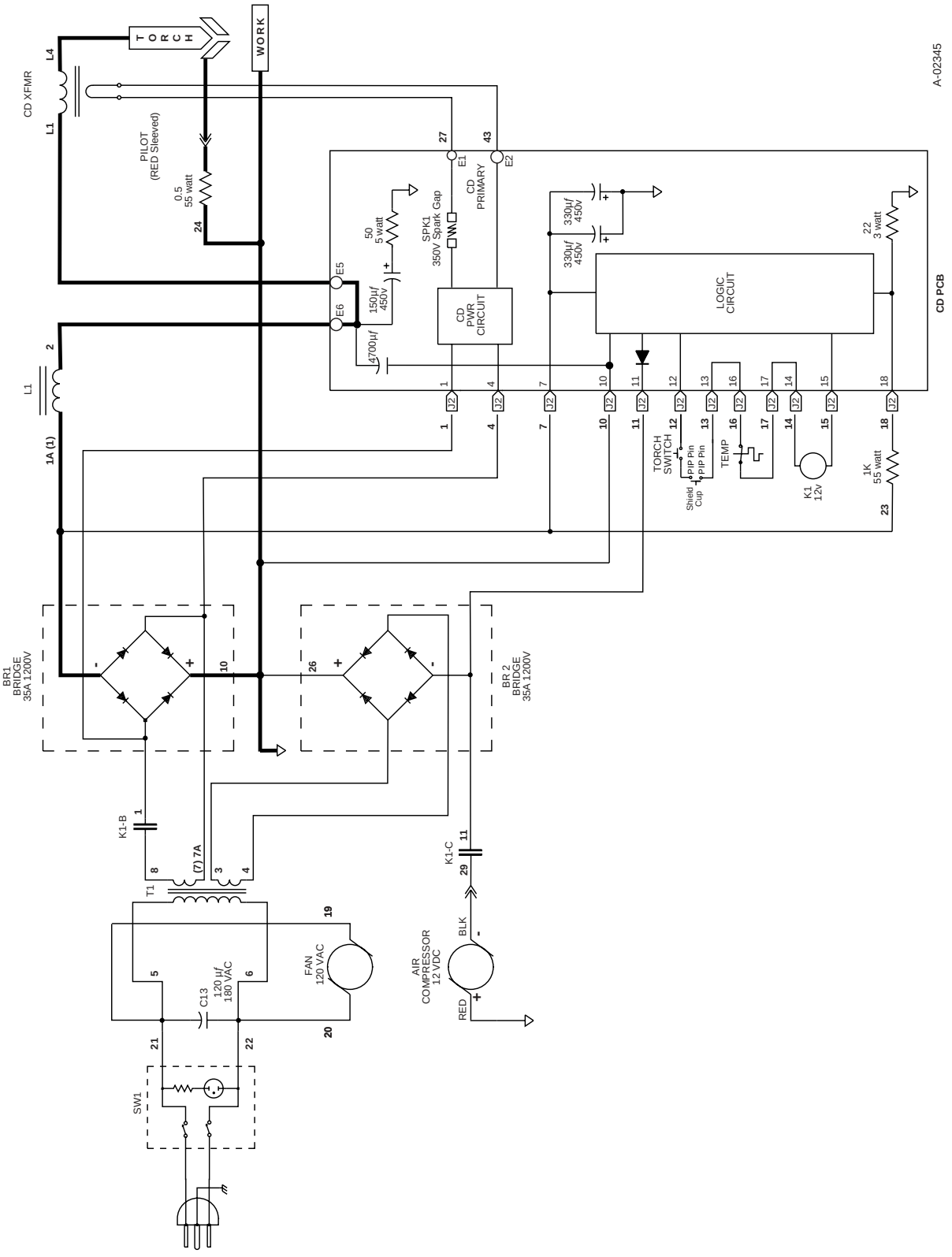
	HARDWARE	QTY
A	#2-56 x 5/16" LG Phillips Pan Head	6
B	#6 Internal Star Washer	1
C	#6-32 x 3/16" Phillips Pan Head M.S., Zinc Plated	1

APPENDIX I - LEADS CONNECTIONS

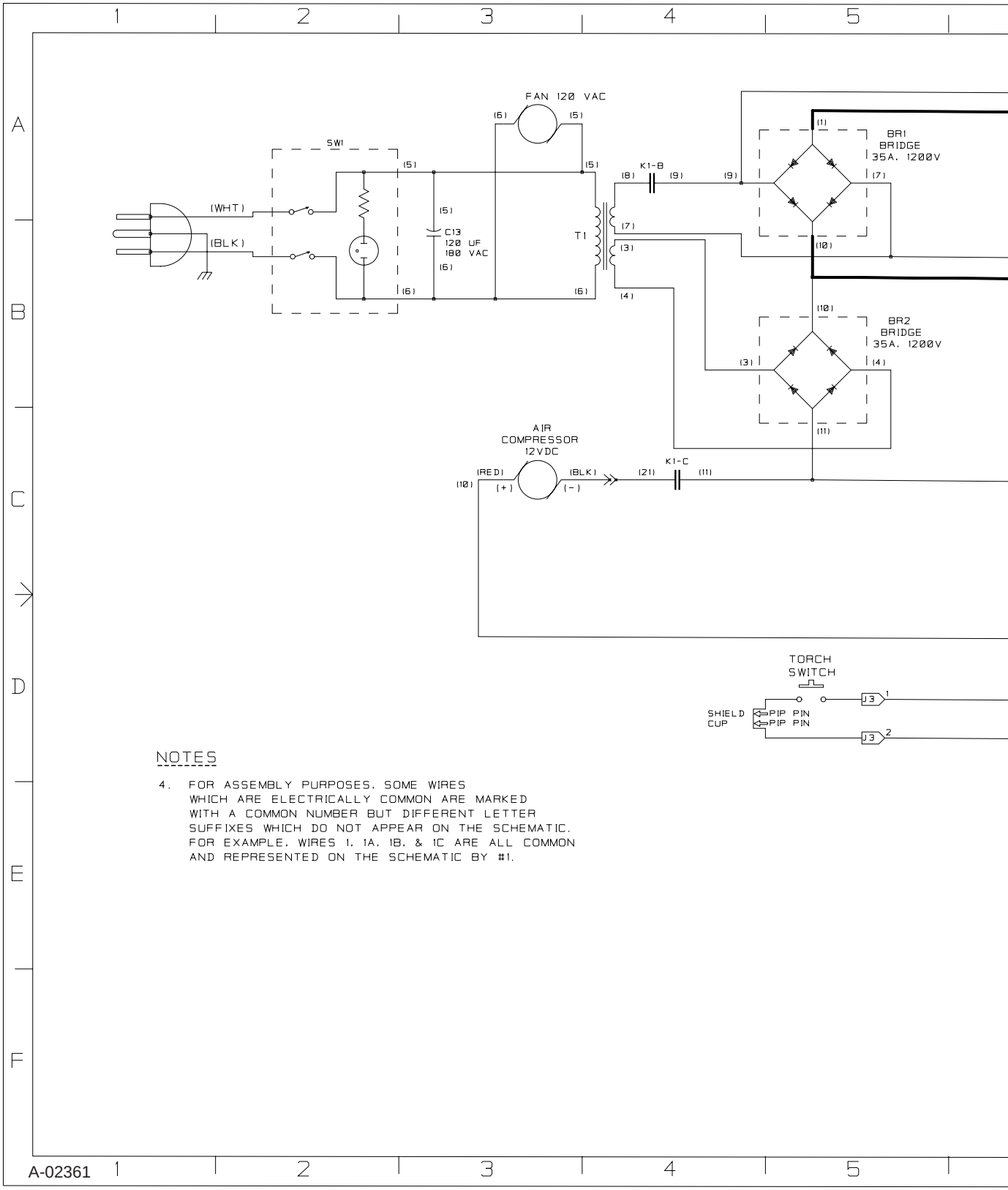


APPENDIX II - INTERCONNECTING DIAGRAM

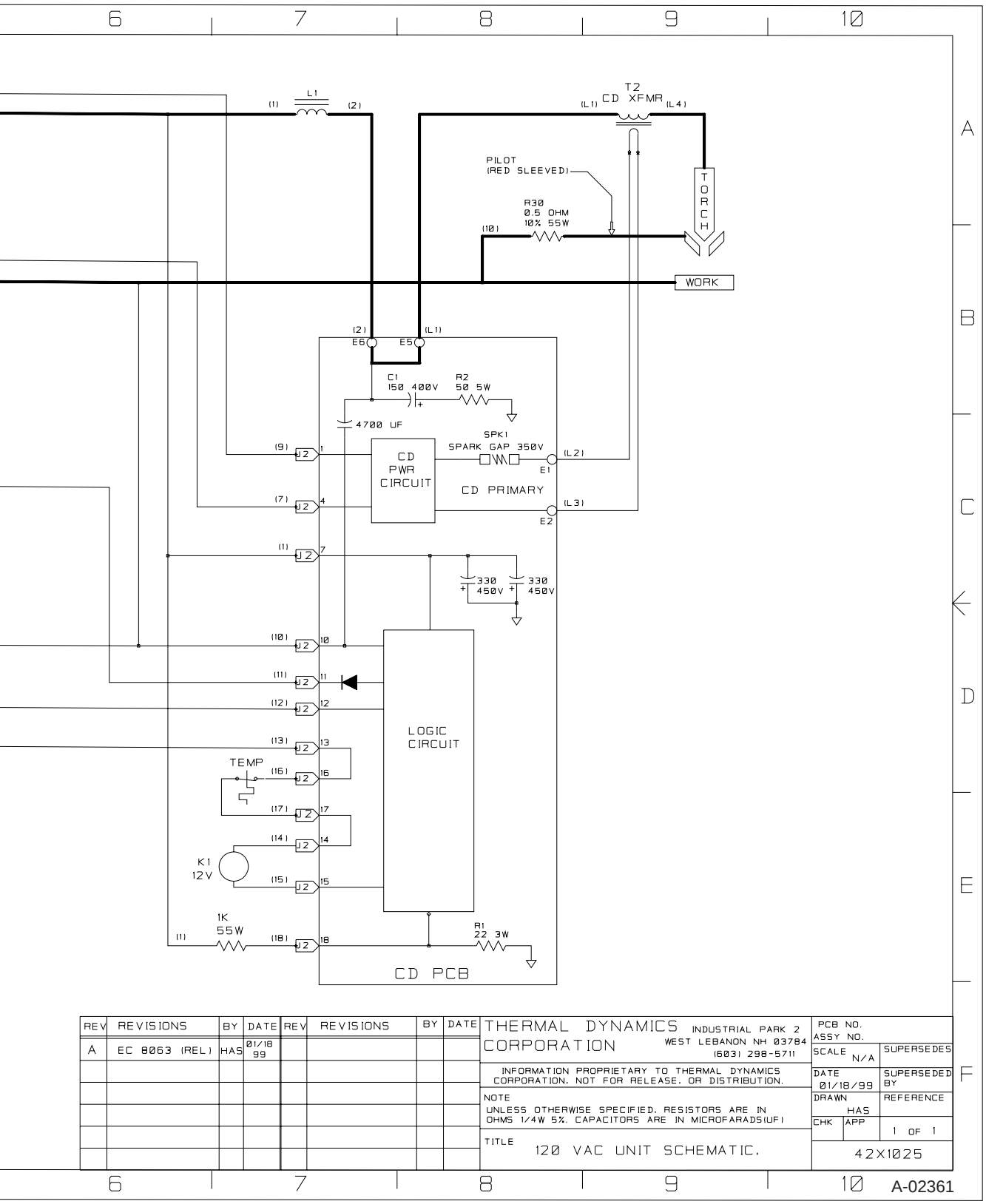
NOTE: Use this diagram for all rev C units (or earlier). Check the data tag on the unit for rev level.



APPENDIX III - INTERCONNECTING DIAGRAM



NOTE: Use this diagram for all rev D (or later) units. Check the data tag on the unit for rev level.



REV	REVISIONS	BY	DATE	REV	REVISIONS	BY	DATE
A	EC 8063 (REL)	HAS	01/18 99				

THERMAL DYNAMICS CORPORATION
INDUSTRIAL PARK 2
WEST LEBANON NH 03784
(603) 298-5711

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NOTE
UNLESS OTHERWISE SPECIFIED. RESISTORS ARE IN OHMS 1/4W 5%. CAPACITORS ARE IN MICROFARADS(UF)

TITLE
120 VAC UNIT SCHEMATIC.

PCB NO.	
ASSY NO.	
SCALE N/A	SUPERSEDES
DATE 01/18/99	SUPERSEDED BY
DRAWN HAS	REFERENCE
CHK / APP	1 OF 1
42X1025	

A-02361