

US



ESP-101



Instruction manual

1 USER RESPONSIBILITY	4
2 SAFETY PRECAUTIONS - English	4
3 PRECAUCION DE SEGURIDAD - Spanish	8
4 MESURES DE SECURITE - French	12
5 INTRODUCTION	17
5.1 General	17
5.2 Scope	17
5.3 ESP 101 Arc cutting system:	17
5.4 Package ordering information:	18
5.5 PT-37 Torch data	19
5.6 System and optional accessories	20
6 INSTALLATION	21
6.1 General	21
6.2 Equipment required	21
6.3 Placement and location	21
6.4 Inspection	21
6.5 Primary input connections	22
6.5.1 TUA2 Autotransformer primary input connections	24
6.5.2 Input air connection	26
6.6 CNC interface connection	27
6.7 Voltage divider adjustment	28
6.7.1 Output voltage sample	28
6.8 Secondary output connections for mechanized cutting	29
6.9 PT-37 torch installation	30
6.10 Remote junction box installation	31
6.11 ESP-101 modifications	31
6.12 Mounting the remote junction box (RJB)	33
6.13 Connecting to the ESP-101	35
7 OPERATION	36
7.1 ESP-101 controls	36
7.2 Cutting with the ESP-101	39
7.3 Electrode wear	40
7.4 Standoff and cut quality	40
7.5 Dross formation	41
7.6 Common cutting issues	42
8 MAINTENANCE	44
8.1 General	44
8.2 Inspection and cleaning	44
8.3 IGBT handling & replacement	44
8.4 Module replacement	45
9 TROUBLESHOOTING	45
9.1 General	46
9.2 List of help codes	46
9.3 Troubleshooting guide	47
9.4 Troubleshooting remote junction box installation	49
9.5 Reference voltage checks	50
9.6 Sequence of operation	51

10 REPLACEMENT PARTS	52
10.1 General	52
10.2 Ordering	52
10.3 Torque recommendations	52
10.4 Selecting air pressure units of measure	53
10.5 Display board assembly	54
11 REVISION HISTORY	54
SCHEMATIC DIAGRAM	56
REPLACEMENT PARTS	59

Be sure this information reaches the operator.
You can get extra copies through your supplier.

 **CAUTION**


These INSTRUCTIONS are for experienced operators. If you are not fully familiar with the principles of operation and safe practices for arc welding equipment, we urge you to read our booklet, "Precautions and Safe Practices for Arc, Cutting and Gouging," Form 52-529. Do NOT permit untrained persons to install, operate, or maintain this equipment. Do NOT attempt to install or operate this equipment until you have read and fully understand these instructions. If you do not fully understand these instructions, contact your supplier for further information. Be sure to read the Safety Precautions before installing or operating this equipment.

1 USER RESPONSIBILITY

This equipment will perform in conformity with the description thereof contained in this manual and accompanying labels and/or insert when installed, operated, maintained and repaired in accordance with the instruction provided. This equipment must be checked periodically. Malfunctioning or poorly maintained equipment should not be used. Parts that are broken, missing, worn, distorted or contaminated should be replaced immediately. Should such repair or replacement become necessary, the manufacturer recommends that a telephone or written request for service advice be made to the Authorized Distributor from whom it was purchased.

This equipment or any of its parts should not be altered without the prior written approval of the manufacturer. The user of this equipment shall have the sole responsibility for any malfunction which results from improper use, faulty maintenance, damage improper repair or alteration by anyone other than the manufacturer or a service facility designated by the manufacturer.

2 SAFETY PRECAUTIONS - English

 **WARNING:** These Safety Precautions are for your protection. They summarize precautionary information from the references listed in Additional Safety Information section. Before performing any installation or operating procedures, be sure to read and follow the safety precautions listed below as well as all other manuals, material safety data sheets, labels, etc. Failure to observe Safety Precautions can result in injury or death.



PROTECT YOURSELF AND OTHERS
Some welding, cutting and gouging processes are noisy and require ear protection. The arc, like the sun, emits ultraviolet (UV) and other radiation and can injure skin and eyes. Hot metal can cause burns. Training in the proper use of the processes and equipment is essential to prevent accidents. Therefore:

1. Always wear safety glasses with side shields in any work area, even if welding helmets face shields and goggles are also required.
2. Use a face shield fitted with the correct filter and cover plates to protect your eyes, face, neck and ears from sparks and rays of the arc when operating or observing operations. Warn bystanders not to watch the arc and not to expose themselves to the rays of the electric-arc or hot metal.
3. Wear flameproof gauntlet type gloves, heavy long-sleeve shirt, cuffless trousers, high-topped shoes and a welding helmet or cap for protection, to protect against arc rays and hot sparks or hot metal. A flameproof apron may also be desirable as protection against radiated heat and sparks.

4. Hot sparks or metal can lodge in rolled up sleeves, trouser cuffs, or pockets. Sleeves and collars should be kept buttoned and open pockets eliminated from the front of clothing.
5. Protect other personnel from arc rays and hot sparks with a suitable nonflammable partition or curtains.
6. Use goggles over safety glasses when chipping slag or grinding. Chipped slag may be hot and can fly far. Bystanders should also wear goggles over safety glasses.



FIRES AND EXPLOSIONS

Heat from flames and arcs can start fires. Hot slag or sparks can also cause fires and explosions. Therefore:

1. Remove all combustible materials well away from the work area or cover the materials with a protective nonflammable covering. Combustible materials include wood, cloth, sawdust, liquid and gas fuels, solvents, paints and coatings paper, etc.
2. Hot sparks or hot metal can fall through cracks or crevices in floors or wall openings and cause a hidden smoldering fire or fires on the floor below. Make certain that such openings are protected from hot sparks and metal.
3. Do not weld, cut or perform other hot work until the workpiece has been completely cleaned so that there are no substances on the workpiece which might produce flammable or toxic vapors. Do not do hot work on closed containers. They may explode.
4. Have fire extinguishing equipment handy for instant use, such as a garden hose, water pail, sand bucket, or portable fire extinguisher. Be sure you are trained in its use.
5. Do not use equipment beyond its ratings. For example, overloaded welding cable can overheat and create a fire hazard.
6. After completing operations, inspect the work area to make certain there are no hot sparks or hot metal which could cause a later fire. Use fire watchers when necessary.
7. For additional information refer to NFPA Standard 51B, "Fire Prevention in Use of Cutting and Welding Processes", available from the National Fire Protection Association, Batterymarch Park, Quincy, MA 02269.



ELECTRICAL SHOCK

Contact with live electrical parts and ground can cause severe injury or death. DO NOT use AC welding current in damp areas, if movement is confined, or if there is danger of falling. Therefore:

1. Be sure the power source frame (chassis) is connected to the ground system of the input power.
2. Connect the workpiece to a good electrical ground.
3. Connect the work cable to the workpiece. A poor or missing connection can expose you or others to a fatal shock.
4. Use well-maintained equipment. Replace worn or damaged cables.
5. Keep everything dry, including clothing, work area, cables, torch/electrode holder and power source.
6. Make sure that all parts of your body are insulated from work and from ground.
7. Do not stand directly on metal or the earth while working in tight quarters or a damp area; stand on dry boards or an insulating platform and wear rubber-soled shoes.
8. Put on dry, hole-free gloves before turning on the power.
9. Turn off the power before removing your gloves.
10. Refer to ANSI/ASC Standard Z49.1 (listed on next page) for specific grounding recommendations. Do not mistake the work lead for a ground cable.



ELECTRIC AND MAGNETIC FIELDS

May be dangerous. Electric current flowing through any conductor causes localized Electric and Magnetic Fields (EMF). Welding and cutting current creates EMF around welding cables and welding machines.

Therefore:

1. Welders having pacemakers should consult their physician before welding. EMF may interfere with some pacemakers.
2. Exposure to EMF may have other health effects which are unknown.
3. Welders should use the following procedures to minimize exposure to EMF:
 - a. Route the electrode and work cables together. Secure them with tape when possible.
 - b. Never coil the torch or work cable around your body.
 - c. Do not place your body between the torch and work cables. Route cables on the same side of your body.
 - d. Connect the work cable to the workpiece as close as possible to the area being welded.
 - e. Keep welding power source and cables as far away from your body as possible.



FUMES AND GASES

Fumes and gases, can cause discomfort or harm, particularly in confined spaces. Do not breathe fumes and gases. Shielding gases can cause asphyxiation.

Therefore:

1. Always provide adequate ventilation in the work area by natural or mechanical means. Do not weld, cut or gouge on materials such as galvanized steel, stainless steel, copper, zinc, lead beryllium or cadmium unless positive mechanical ventilation is provided. Do not breathe fumes from these materials.
2. Do not operate near degreasing and spraying operations. The heat or arc can react with chlorinated hydrocarbon vapors to form phosgene, a highly toxic gas and other irritant gases.
3. If you develop momentary eye, nose or throat irritation while operating, this is an indication that ventilation is not adequate. Stop work and take necessary steps to improve ventilation in the work area. Do not continue to operate if physical discomfort persists.
4. Refer to ANSI/ASC Standard Z49.1 (see listing below) for specific ventilation recommendations.
5. **WARNING:** 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 §25249.5 et seq.)



CYLINDER HANDLING

Cylinders, if mishandled, can rupture and violently release gas. Sudden rupture of cylinder valve or relief device can injure or kill.

Therefore:

1. Use the proper gas for the process and use the proper pressure reducing regulator designed to operate from the compressed gas cylinder. Do not use adaptors. Maintain hoses and fittings in good condition. Follow manufacturer's operating instructions for mounting regulator to a compressed gas cylinder.
2. Always secure cylinders in an upright position by chain or strap to suitable hand trucks, undercarriages, benches, wall, post or racks. Never secure cylinders to work tables or fixtures where they may become part of an electrical circuit.
3. When not in use, keep cylinder valves closed. Have valve protection cap in place if regulator is not connected. Secure and move cylinders by using suitable hand trucks.
4. Locate cylinders away from heat, sparks and flames. Never strike an arc on a cylinder.
5. For additional information, refer to CGA Standard P-1, "Precautions for Safe Handling of Compressed Gases in Cylinders", which is available from Compressed Gas Association, 1235 Jefferson Davis Highway, Arlington, VA 22202.



EQUIPMENT MAINTENANCE

Faulty or improperly maintained equipment can cause injury or death. Therefore:

1. Always have qualified personnel perform the installaion, troubleshooting and maintenance work. Do not perform any electrical work unless you are qualified to perform such work.
2. Before performing any maintenance work inside a power source, disconnect the power source from the incoming electrical power.
3. Maintain cables, grounding wire, connections, power cord and power supply in safe working order. Do not operate any equipment in faulty condition.
4. Do not abuse any equipment or accessories. Keep equipment away from heat sources such as furnaces, wet conditions such as water puddles, oil or grease, corrosive atmospheres and inclement weather.
5. Keep all safety devices and cabinet covers in position and in good repair.
6. Use equipment only for its intended purpose. Do not modify it in any manner.



ADDITIONAL SAFETY INFORMATION

For more information on safe practices for electric arc welding and cutting equipment, ask your supplier for a copy of “Precautions and Safe Practices for Arc Welding, Cutting and Gouging”, Form 52-529.

The following publications, which are available from the American Welding Society, 550 N.W. LeJuene Road, Miami, FL 33126, are recommended to you:

1. ANSI/ASC Z49.1 - “Safety in Welding and Cutting”
2. AWS C5.1 . “Recommended Practices for Plasma Arc Welding”
3. AWS C5.2 - “Recommended Practices for Plasma Arc Cutting“
4. AWS C5.3 - “Recommended Practices for Air Carbon, Arc Gouging and Cutting”
5. AWS C5.5 - “Recommended Practices for Gas Tungsten Arc Welding”
6. AWS C5.6 - “Recommended Practices for Gas Metal Arc welding”
7. AWS SP - “Safe practices” - Reprint, Welding Handbook
8. ANSI/AWS F4.1 - “Recommended Safe Practices for Welding and Cutting of Containers That Have Held Hazardous Substances”



MEANING OF SYMBOLS

As used throughout this manual: Means Attention! Be Alert!



DANGER

Means immediate hazards which, if not avoided, will result in immediate, serious personal injury or loss of life.



WARNING

Means potential hazards which could result in personal injury or loss of life.



CAUTION

Means hazards which could result in minor personal injury.

3 PRECAUCION DE SEGURIDAD - Spanish



ADVERTENCIA: Estas Precauciones de Seguridad son para su protección. Ellas hacen resumen de información proveniente de las referencias listadas en la sección "Información Adicional Sobre La Seguridad". Antes de hacer cualquier instalación o procedimiento de operación, asegúrese de leer y seguir las precauciones de seguridad listadas a continuación así como también todo manual, hoja de datos de seguridad del material, calcomanías, etc. El no observar las Precauciones de Seguridad puede resultar en daño a la persona o muerte.



PROTEJASE USTED Y A LOS DEMAS

Algunos procesos de soldadura, corte y ranurado son ruidosos y requieren protección para los oídos. El arco, como el sol, emite rayos ultravioleta (UV) y otras radiaciones que pueden dañar la piel y los ojos. El metal caliente causa quemaduras. EL entrenamiento en el uso propio de los equipos y sus procesos es esencial para prevenir accidentes.

Por lo tanto:

1. Utilice gafas de seguridad con protección a los lados siempre que esté en el área de trabajo, aún cuando esté usando careta de soldar, protector para su cara u otro tipo de protección.
2. Use una careta que tenga el filtro correcto y lente para proteger sus ojos, cara, cuello, y oídos de las chispas y rayos del arco cuando se esté operando y observando las operaciones. Alerta a todas las personas cercanas de no mirar el arco y no exponerse a los rayos del arco eléctrico o el metal fundido.
3. Use guantes de cuero a prueba de fuego, camisa pesada de mangas largas, pantalón de ruedo liso, zapato alto al tobillo, y careta de soldar con capucha para el pelo, para proteger el cuerpo de los rayos y chispas calientes provenientes del metal fundido. En ocasiones un delantal a prueba de fuego es necesario para protegerse del calor radiado y las chispas.
4. Chispas y partículas de metal caliente puede alojarse en las mangas enrolladas de la camisa, el ruedo del pantalón o los bolsillos. Mangas y cuellos deberán mantenerse abotonados, bolsillos al frente de la camisa deberán ser cerrados o eliminados.
5. Proteja a otras personas de los rayos del arco y chispas calientes con una cortina adecuada no-flamable como división.
6. Use careta protectora además de sus gafas de seguridad cuando esté removiendo escoria o puliendo. La escoria puede estar caliente y desprenderse con velocidad. Personas cercanas deberán usar gafas de seguridad y careta protectora.



FUEGO Y EXPLOSIONES

El calor de las flamas y el arco pueden ocasionar fuegos. Escoria caliente y las chispas pueden causar fuegos y explosiones.

Por lo tanto:

1. Remueva todo material combustible lejos del área de trabajo o cubra los materiales con una cobija a prueba de fuego. Materiales combustibles incluyen madera, ropa, líquidos y gases inflamables, solventes, pinturas, papel, etc.
2. Chispas y partículas de metal pueden introducirse en las grietas y agujeros de pisos y paredes causando fuegos escondidos en otros niveles o espacios. Asegúrese de que toda grieta y agujero esté cubierto para proteger lugares adyacentes contra fuegos.
3. No corte, suelde o haga cualquier otro trabajo relacionado hasta que la pieza de trabajo esté totalmente limpia y libre de substancias que puedan producir gases inflamables o vapores tóxicos. No trabaje dentro o fuera de contenedores o tanques cerrados. Estos pueden explotar si contienen vapores inflamables.
4. Tenga siempre a la mano equipo extintor de fuego para uso instantáneo, como por ejemplo una manguera con agua, cubeta con agua, cubeta con arena, o extintor portátil. Asegúrese que usted esta entrenado para su uso.
5. No use el equipo fuera de su rango de operación. Por ejemplo, el calor causado por cable sobrecarga en los cables de soldar pueden ocasionar un fuego.
6. Después de terminar la operación del equipo, inspeccione el área de trabajo para cerciorarse de que las chispas o metal caliente ocasionen un fuego más tarde. Tenga personal asignado para vigilar si es necesario.

7. Para información adicional , haga referencia a la publicación NFPA Standard 51B, "Fire Prevention in Use of Cutting and Welding Processes", available from the National Fire Protection Association, Batterymarch Park, Quincy, MA 02269.



CHOQUE ELECTRICO

El contacto con las partes eléctricas energizadas y tierra puede causar daño severo o muerte. NO use soldadura de corriente alterna (AC) en áreas húmedas, de movimiento confinado en lugares estrechos o si hay posibilidad de caer al suelo.

Por lo tanto:

1. Asegúrese de que el chasis de la fuente de poder esté conectado a tierra a través del sistema de electricidad primario.
2. Conecte la pieza de trabajo a un buen sistema de tierra física.
3. Conecte el cable de retorno a la pieza de trabajo. Cables y conductores expuestos o con malas conexiones pueden exponer al operador u otras personas a un choque eléctrico fatal.
4. Use el equipo solamente si está en buenas condiciones. Reemplace cables rotos, dañados o con conductores expuestos.
5. Mantenga todo seco, incluyendo su ropa, el área de trabajo, los cables, antorchas, pinza del electrodo, y la fuente de poder.
6. Asegúrese que todas las partes de su cuerpo están insuladas de ambos, la pieza de trabajo y tierra.
7. No se pare directamente sobre metal o tierra mientras trabaja en lugares estrechos o áreas húmedas; trabaje sobre un pedazo de madera seco o una plataforma insulada y use zapatos con suela de goma.
8. Use guantes secos y sin agujeros antes de energizar el equipo.
9. Apague el equipo antes de quitarse sus guantes.
10. Use como referencia la publicación ANSI/ASC Standard Z49.1 (listado en la próxima página) para recomendaciones específicas de como conectar el equipo a tierra. No confunda el cable de soldar a la pieza de trabajo con el cable a tierra.



CAMPOS ELECTRICOS Y MAGNETICOS

Son peligrosos. La corriente eléctrica fluye a través de cualquier conductor causando a nivel local Campos Eléctricos y Magnéticos (EMF). Las corrientes en el área de corte y soldadura, crean EMF alrededor de los cables de soldar y las maquinas.

Por lo tanto:

1. Soldadores u Operadores que use marca-pasos para el corazón deberán consultar a su médico antes de soldar. El Campo Electromagnético (EMF) puede interferir con algunos marcapasos.
2. Exponerse a campos electromagnéticos (EMF) puede causar otros efectos de salud aún desconocidos.
3. Los soldadores deberán usar los siguientes procedimientos para minimizar exponerse al EMF:
 - a. Mantenga el electrodo y el cable a la pieza de trabajo juntos, hasta llegar a la pieza que usted quiere soldar. Asegúrelos uno junto al otro con cinta adhesiva cuando sea posible.
 - b. Nunca envuelva los cables de soldar alrededor de su cuerpo.
 - c. Nunca ubique su cuerpo entre la antorcha y el cable, a la pieza de trabajo. Mantenga los cables a un sólo lado de su cuerpo.
 - d. Conecte el cable de trabajo a la pieza de trabajo lo más cercano posible al área de la soldadura.
 - e. Mantenga la fuente de poder y los cables de soldar lo más lejos posible de su cuerpo.



HUMO Y GASES

El humo y los gases, pueden causar malestar o daño, particularmente en espacios sin ventilación. No inhale el humo o gases. El gas de protección puede causar falta de oxígeno.

Por lo tanto:

1. Siempre provea ventilación adecuada en el área de trabajo por medio natural o mecánico. No solde, corte, o trabajo por medio natural o mecánico. No solde, corte, o ranure materiales con hierro galvanizado, acero inoxidable, cobre, zinc, plomo, berilio, o cadmio a menos que provea ventilación mecánica positiva. No respire los gases producidos por estos materiales.
2. No opere cerca de lugares donde se aplique sustancias químicas en aerosol. El calor de los rayos del arco pueden reaccionar con los vapores de hidrocarburo clorinado para formar un fosfógeno, o gas tóxico, y otros irritantes.
3. Si momentáneamente desarrolla irritación de ojos, nariz o garganta mientras está operando, es indicación de que la ventilación no es apropiada. Pare de trabajar y tome las medidas necesarias para mejorar la ventilación en el área de trabajo. No continúe operando si el malestar físico persiste.
4. Haga referencia a la publicación ANSI/ASC Standard Z49.1 (Vea la lista a continuación) para recomendaciones específicas en la ventilación.
5. **ADVERTENCIA**-Este producto cuando se utiliza para soldaduras o cortes, produce humos o gases, los cuales contienen químicos conocidos por el Estado de California de causar defectos en el nacimiento, o en algunos casos, Cáncer. (California Health & Safety Code §25249.5 et seq.)



MANEJO DE CILINDROS

Los cilindros, si no son manejados correctamente, pueden romperse y liberar violentamente gases. Rotura repentina del cilindro, válvula, o válvula de escape puede causar daño o muerte.

Por lo tanto:

1. Utilice el gas apropiado para el proceso y utilice un regulador diseñado para operar y reducir la presión del cilindro de gas. No utilice adaptadores. Mantenga las mangueras y las conexiones en buenas condiciones. Observe las instrucciones de operación del fabricante para montar el regulador en el cilindro de gas comprimido.
2. Asegure siempre los cilindros en posición vertical y amárrelos con una correa o cadena adecuada para asegurar el cilindro al carro, transportes, tablleros, paredes, postes, o armazón. Nunca asegure los cilindros a la mesa de trabajo o las piezas que son parte del circuito de soldadura. Este puede ser parte del circuito eléctrico.
3. Cuando el cilindro no está en uso, mantenga la válvula del cilindro cerrada. Ponga el capote de protección sobre la válvula si el regulador no está conectado. Asegure y mueva los cilindros utilizando un carro o transporte adecuado. Evite el manejo brusco de los
4. Localice los cilindros lejos del calor, chispas, y flamas. Nunca establezca un arco en el cilindro.
5. Para información adicional, haga referencia a la publicación CGA Standard P-1, "Precautions for Safe Handling of Compressed Gases in Cylinders", disponible a través del Compressed Gas Association, 1235 Jefferson Davis Highway, Arlington, VA 22202.



MANTENIMIENTO DEL EQUIPO

Equipo defectuoso o mal mantenido puede causar daño o muerte.

Por lo tanto:

1. Siempre tenga personal cualificado para efectuar la instalación, diagnóstico, y mantenimiento del equipo. No ejecute ningún trabajo eléctrico a menos que usted esté cualificado para hacer el trabajo.
2. Antes de dar mantenimiento en el interior de la fuente de poder, desconecte la fuente de poder del suministro de electricidad primaria.
3. Mantenga los cables, cable a tierra, conexiones, cable primario, y cualquier otra fuente de poder en buen estado operacional. No opere ningún equipo en malas condiciones.
4. No abuse del equipo y sus accesorios. Mantenga el equipo lejos de cosas que generen calor como hornos, también lugares húmedos como charcos de agua, aceite o grasa, atmósferas corrosivas y las inclemencias del tiempo.
5. Mantenga todos los artículos de seguridad y coberturas del equipo en su posición y en buenas condiciones.



6. Use el equipo sólo para el propósito que fue diseñado. No modifique el equipo en ninguna manera.



INFORMACION ADICIONAL DE SEGURIDAD

Para más información sobre las prácticas de seguridad de los equipos de arco eléctrico para soldar y cortar, pregunte a su suplidor por una copia de "Precautions and Safe Practices for Arc Welding, Cutting and Gouging", Form 52-529.

Las siguientes publicaciones, disponibles através de la American Welding Society, 550 N.W. LeJuene Road, Miami, FL 33126, son recomendadas para usted:

1. ANSI/ASC Z49.1 - "Safety in Welding and Cutting"
2. AWS C5.1 - "Recommended Practices for Plasma Arc Welding"
3. AWS C5.2 - "Recommended Practices for Plasma Arc Cutting"
4. AWS C5.3 - "Recommended Practices for Air Carbon, Arc Gouging and Cutting"
5. AWS C5.5 - "Recommended Practices for Gas Tungsten Arc Welding"
6. AWS C5.6 - "Recommended Practices for Gas Metal Arc welding"
7. AWS SP - "Safe practices" - Reprint, Welding Handbook
8. ANSI/AWS F4.1 - "Recommended Safe Practices for Welding and Cutting of Containers That Have Held Hazardous Substances"



SIGNIFICADO DE LOS SIMBOLOS

Según usted avanza en la lectura de este folleto: Los Símbolos Significan ¡Atención! ¡Esté Alerta! Se trata de su seguridad.



PELIGRO

Significa riesgo inmediato que, de no ser evadido, puede resultar inmediatamente en serio daño personal o la muerte.



ADVERTENCIA

Significa el riesgo de un peligro potencial que puede resultar en serio daño personal o la muerte.



CUIDADO

Significa el posible riesgo que puede resultar en menores daños a la persona.

4 MESURES DE SECURITE - French



ATTENTION : ces règles de sécurité ont pour objet d'assurer votre protection. Elles constituent une synthèse des mesures de sécurité contenues dans les ouvrages de référence repris au chapitre Informations complémentaires relatives à la Sécurité. Avant toute installation ou utilisation du matériel, veuillez à lire et à respecter les règles de sécurité énoncées ci-dessous ainsi que dans les divers manuels, fiches de sécurité du matériel, étiquettes, etc. Le non-respect de ces précautions risque d'entraîner des blessures graves ou mortelles.



PROTECTION INDIVIDUELLE ET DE L'ENTOURAGE

Certains procédés de soudage, découpage et gougeage sont bruyants et requièrent le port de protections auditives. L'arc, tout comme le soleil, émet des ultraviolets (UV) et d'autres rayonnements susceptibles de provoquer des lésions oculaires et dermatologiques. Le métal chaud peut être à l'origine de brûlures. Une formation à l'utilisation correcte des procédés et équipements est essentielle pour prévenir les accidents. En conséquence :

1. Porter impérativement des lunettes avec écrans latéraux dans les zones de travail, même lorsque le port du casque de soudage, de l'écran facial et des lunettes de protection est obligatoire
2. Tant pour exécuter les travaux que pour y assister, porter un écran facial muni de plaques protectrices et de verres filtrants appropriés pour protéger les yeux, le visage, le cou et les oreilles des étincelles et du rayonnement de l'arc. Avertir les personnes se trouvant à proximité qu'elles ne doivent pas regarder l'arc, ni s'exposer à son rayonnement ou à celui du métal incandescent.
3. Porter des gants ignifuges à crispins, une tunique épaisse à longues manches, des pantalons sans rebord, des chaussures à embout d'acier et un casque de soudage ou une casquette pour se protéger du rayonnement de l'arc, des étincelles et du métal incandescent. Le port d'un tablier ininflammable est également recommandé afin de se protéger des étincelles et du rayonnement thermique.
4. Les étincelles ou projections de métal en fusion risquent de se loger dans les manches retroussées, les bords relevés de pantalons ou dans les poches. Il convient donc de boutonner complètement les manches et le col, et de porter des vêtements sans poches à l'avant.
5. Protéger du rayonnement de l'arc et des étincelles les personnes se trouvant à proximité à l'aide d'un écran ou d'un rideau ininflammable approprié.
6. Porter des oculaires et des lunettes de protection pendant le meulage du laitier. Les particules meulées, souvent brûlantes, peuvent être projetées à des distances importantes, de sorte que les personnes se trouvant à proximité doivent également porter des lunettes de protection.



INCENDIES ET EXPLOSIONS

La chaleur dégagée par les flammes et les arcs peuvent être à l'origine d'incendies. Le laitier incandescent et les étincelles peuvent également provoquer incendies et explosions. En conséquence :

1. Éloigner suffisamment tous les matériaux combustibles de la zone de travail ou les recouvrir complètement d'une bâche ignifuge. Ce type de matériaux comprend le bois, les vêtements, la sciure, les carburants sous forme liquide et gazeuse, les peintures, les enduits, le papier, etc.
2. Les étincelles ou projections de métal en fusion peuvent tomber dans les fissures du sol ou des murs et déclencher une combustion lente dans les planchers ou à l'étage inférieur. Veiller à protéger ces ouvertures pour que les étincelles et projections n'y pénètrent pas.
3. Ne pas procéder à des travaux de soudage, de découpage et autres travaux à chaud tant que la surface n'est pas complètement nettoyée et débarrassée des substances susceptibles de produire des vapeurs inflammables ou toxiques. Ne pas effectuer de travaux à chaud sur des conteneurs fermés pour éviter tout risque d'explosion.
4. Conserver à portée de main un équipement d'extinction – tuyau d'arrosage, seau d'eau ou de sable, extincteur portatif, etc. et s'assurer d'en connaître l'utilisation.
5. Ne pas utiliser l'équipement au-delà de ses spécifications. Par exemple, un câble de soudage surchargé est susceptible de surchauffer et d'être à l'origine d'un incendie.

6. Une fois le travail terminé, inspecter la zone de travail pour s'assurer qu'aucune étincelle ou projection de métal ne risque de déclencher un incendie. Le cas échéant, utiliser des systèmes de détection d'incendie.
7. Pour toute information supplémentaire, voir la norme NFPA 51B relative à la prévention des incendies lors de travaux de découpage et de soudage, disponible auprès de la National Fire Protection Association, Batterymarch Park, Quincy, MA 02269 – USA.



CHOC ELECTRIQUE

Tout contact avec des éléments sous tension et la masse peut provoquer des blessures graves ou mortelles. NE PAS utiliser de courant de soudage CA dans des zones humides, des lieux exigus ou lorsqu'il existe un risque de chute. En conséquence :

1. Vérifier que le châssis du générateur est bien relié au dispositif de mise à la masse de l'alimentation.
2. Assurer une mise à la masse correcte de la pièce à souder.
3. Connecter le câble de soudage à la pièce à souder. Un raccordement médiocre ou inexistant constitue un risque mortel pour l'utilisateur et son entourage.
4. Utiliser du matériel correctement entretenu. Remplacer les câbles usés ou endommagés.
5. Empêcher l'apparition de toute humidité, notamment sur les vêtements, dans la zone de travail, sur les câbles, la torche de soudage, le porte-électrode et le générateur.
6. S'assurer que le corps est totalement isolé de la pièce à souder et de la masse.
7. Éviter tout contact direct avec du métal ou la masse lors de travaux dans des endroits exigus et en zone humide ; se tenir sur des panneaux ou sur une plate-forme isolante et porter des chaussures à semelles en caoutchouc.
8. Enfiler des gants secs et sans trous avant de mettre l'équipement sous tension.
9. Mettre l'équipement hors tension avant de retirer les gants.
10. Voir la norme ANSI/ASC Z49.1 (voir page suivante) pour les recommandations de mise à la masse. Ne pas confondre le câble de soudage et le câble de masse.



CHAMPS ELECTRIQUES ET MAGNETIQUES

Danger. Le courant électrique parcourant les conducteurs génère localement des champs électriques et magnétiques (EMF). Le courant de soudage et de découpe crée des EMF autour des câbles de soudage et des postes à souder.

En conséquence :

1. Les porteurs de stimulateurs cardiaques consulteront leur médecin avant d'effectuer des travaux de soudage. Les EMF peuvent en effet provoquer des interférences.
2. L'exposition aux EMF peut également avoir des effets méconnus sur la santé.
3. Les soudeurs respecteront les procédures suivantes pour réduire l'exposition aux EMF :
 - a. Rassembler en faisceau les câbles de soudage et d'électrode. Si possible, les attacher avec du ruban adhésif.
 - b. Ne jamais enrouler le câble de la torche ou le câble de soudage autour du corps.
 - c. L'utilisateur ne doit jamais se trouver entre le câble de la torche et le câble de soudage. Faire passer tous les câbles du même côté du corps.
 - d. Connecter le câble de soudage à la pièce à souder, au plus près de l'endroit du soudage.
 - e. S'éloigner au maximum du générateur et des câbles.



FUMÉES ET GAZ

L'inhalation des fumées et gaz peut provoquer des malaises et des dommages corporels, surtout lors de travaux dans les espaces confinés. Ne pas les respirer. Les gaz inertes peuvent causer l'asphyxie.

En conséquence :

1. Assurer une aération adéquate de la zone de travail par une ventilation naturelle ou mécanique. Ne pas effectuer de travaux de soudage, découpage ou gougeage sur des matériaux tels que l'acier galvanisé, le cuivre, le zinc, le plomb, le béryllium et le cadmium en l'absence d'une ventilation mécanique adéquate. Ne pas inhaler les fumées dégagées par ces matériaux.
2. Ne pas travailler à proximité d'opérations de dégraissage et de pulvérisation étant donné que la chaleur dégagée et l'arc peut réagir avec les hydrocarbures chlorés pour former du phosgène – un gaz particulièrement toxique – et d'autres gaz irritants.
3. Une irritation momentanée des yeux, du nez ou de la gorge provoquée par les travaux est le signe d'une ventilation inappropriée. Dans ce cas, il convient d'arrêter le travail et de prendre les mesures nécessaires pour améliorer l'aération. Ne pas poursuivre le travail si le malaise persiste.
4. Voir la norme ANSI/ASC Z49.1 (voir ci-dessous) pour les recommandations de ventilation.
5. ATTENTION : utilisé dans des opérations de soudage et de découpage, ce produit dégage des fumées et gaz qui contiennent des substances chimiques reconnues par l'État de Californie comme pouvant être à l'origine de malformations congénitales et de cancers (California Health & Safety Code §25249.5 et seq.).



MANIPULATION DES BOUTEILLES DE GAZ

Une erreur de manutention des bouteilles de gaz peut les endommager et entraîner une libération violente du gaz. La rupture soudaine de la soupape ou du détendeur peut provoquer des blessures graves ou mortelles.

En conséquence :

1. Utiliser le gaz approprié à la pression adéquate, celle-ci étant réglée par un détendeur adapté au type de bouteille utilisée. Ne pas utiliser d'adaptateurs. Garder les tuyaux et accessoires en bon état. Pour le montage du détendeur sur une bouteille de gaz comprimé, suivre les instructions du fabricant.
2. Fixer les bouteilles verticalement – au moyen d'une chaîne ou d'une sangle – à un chariot à bras, un châssis de roulement, un banc, un mur, un piquet ou un rack. Ne jamais attacher les bouteilles aux établis et éléments susceptibles de les intégrer à un circuit électrique.
3. Conserver les bouteilles fermées lorsqu'elles ne sont pas utilisées. Les fermer par un bouchon lorsqu'elles ne sont pas raccordées. Attacher et déplacer les bouteilles à l'aide de chariots adéquats.
4. Éloigner les bouteilles des sources de chaleur, d'étincelles et de flammes nues. Ne jamais déclencher d'arc sur une bouteille de gaz.
5. Pour plus d'informations sur les précautions d'utilisation des bouteilles de gaz comprimé, voir la norme CGA P-1, disponible auprès de la Compressed Gas Association, 1235 Jefferson Davis Highway, Arlington, VA 22202 – USA.



ENTRETIEN DE L'EQUIPEMENT

Un équipement mal entretenu peut provoquer des blessures graves ou mortelles. En conséquence :

1. Confier l'installation, les dépannages et l'entretien à du personnel qualifié. Ne pas effectuer de travaux électriques si vous ne possédez pas les compétences requises.
2. Mettre l'équipement hors tension avant toute intervention d'entretien sur le générateur.
3. Maintenir en bon état de fonctionnement les câbles, câbles de masse, connexions, cordons d'alimentation et générateurs. Ne jamais utiliser d'équipements défectueux.
4. Ne jamais surcharger les équipements et accessoires. Conserver les équipements à l'écart des sources de chaleur – notamment des fours –, des flaques d'eau, des traces d'huile ou de graisse, des atmosphères corrosives et des intempéries.
5. Laisser en place tous les dispositifs de sécurité et tous les panneaux du tableau de commande en veillant à les garder en bon état.
6. Utiliser l'équipement conformément à l'usage prévu ; n'y apporter aucune modification quelconque.

 **INFORMATIONS COMPLEMENTAIRES RELATIVES A LA SECURITE** Pour plus d'informations relatives aux règles de sécurité pour les travaux de gougeage, de découpage et de soudage à l'arc électrique, demander au fournisseur une copie du formulaire 52/529.

L'American Welding Society, 550 N.W. LeJuene Road, Miami, FL 33126 – USA, publie les documents suivants dont la lecture est également recommandée :

1. ANSI/ASC Z49.1 - "Safety in Welding and Cutting"
2. AWS C5.1 . "Recommended Practices for Plasma Arc Welding"
3. AWS C5.2 - "Recommended Practices for Plasma Arc Cutting"
4. AWS C5.3 - "Recommended Practices for Air Carbon, Arc Gouging and Cutting"
5. AWS C5.5 - "Recommended Practices for Gas Tungsten Arc Welding"
6. AWS C5.6 - "Recommended Practices for Gas Metal Arc welding"
7. AWS SP - "Safe practices" - Réédition, Manuel de soudage
8. ANSi/AWS F4.1 - "Recommended Safe Practices for Welding and Cutting of Containers That Have Held Hazardous Substances"

 **SYMBOLES**
Signification des symboles utilisés dans ce manuel : = Attention ! Rester prudent !

 **DANGER** = danger immédiat ; risque de blessures graves ou mortelles.

 **ADVERTISSEMENT** = danger potentiel ; risque de blessures graves ou mortelles.

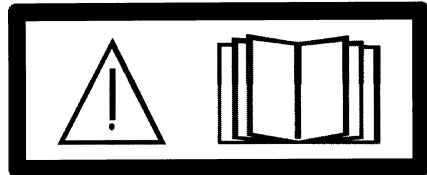
 **ATTENTION** = danger ; risque de blessures légères.

! CAUTION

This product is solely intended for plasma cutting. Any other use may result in personal injury and / or equipment damage.

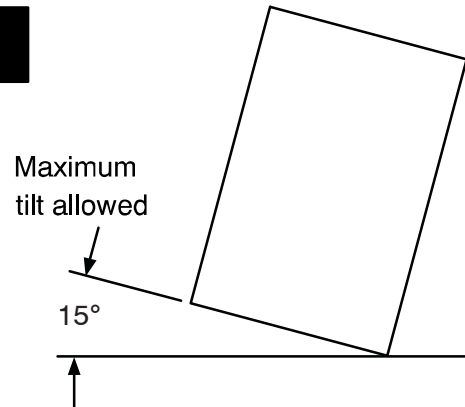
! CAUTION

Read and understand the instruction manual before installing or operating.



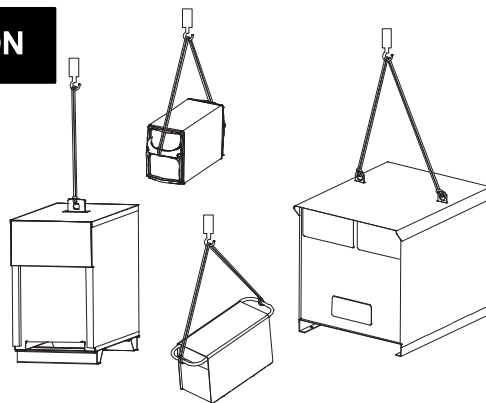
! CAUTION

If equipment is placed on a surface that slopes more than 15°, toppling over may occur. Personal injury and / or significant damage to equipment is possible.



! CAUTION

To avoid personal injury and / or equipment damage, lift using method and attachment points shown here



5 INTRODUCTION

**WARNING**

USE THE ESAB PT-37 PLASMARC TORCH WITH MECHANIZED CONSOLES. USE OF TORCHES NOT DESIGNED FOR USE WITH THIS CONSOLE COULD CREATE AN ELECTRIC SHOCK HAZARD.

5.1 General

As shipped, the ESP-101 is fully assembled and ready to cut after being connected to input power, a source of compressed air, and a PT-37 torch. The ESP-101 system uses the heavy-duty PT-37 (Mechanized Plasma) torch to deliver cutting power for cutting materials up to 1-1/4 inch (32 mm) thick. Refer to the following pages for descriptions of the ESP-101 packages available as well as performance specifications.

5.2 Scope

The purpose of this manual is to provide the operator with all the information required to install and operate the ESP-101 Plasma Arc Cutting System. Technical reference material is also provided to assist in troubleshooting the cutting system.



5.3 ESP 101 Arc cutting system:

The ESP-101 plasma cutting system combines the newly redesigned ESP-101 console and PT-37 torch. The PT-37 plasma cutting torch is designed to provide increased performance and longer consumable life resulting in higher production rates at lower costs.



Specifications: ESP-101

Pierces 3/4 inch (19.1 mm); Cuts 1-1/4 inch (32 mm) for Carbon & Stainless Steel

Pierces 3/4 inch (19.1 mm); Cuts 1 inch (25 mm) for Aluminum

Input	460 vac, 3 phase 60 Hz, 25 A 380/400 vac, 3 phase 50/60 Hz, 30/29 A
Output	100 amps @ 160v - 100% duty cycle
Voltage requirements	Idle 380-400, 460V, +/- 10% Cutting 380-400, 460V, +/- 15%
Air Supply Requirements	500 cfm @ 90 psig (236 l/min @ 6.2 bars)
Efficiency	89%
Power Factor	92%
CE 380-400 vac	*Ssc min 4 MVA *Zmax 0.039 Ω
Weight:	125 lb (56.7 kg)

Duty cycle

The duty cycle refers to the time as a percentage of a ten-minute period that you can weld at a certain load without overloading. The duty cycle is valid for 104°F.

Mains supply, $S_{sc \min}$

Minimum short circuit power on the network in accordance with IEC 61000-3-12

Mains supply, Z_{\max}

Maximum permissible line on the network impedance in accordance with IEC 61000-3-11.

5.4 Package ordering information:

Mechanized package ordering information:

The components that are included in the ESP-101 mechanized packages may be purchased separately by using the appropriate P/N when placing orders. Individual part numbers are listed below:

Available Packages:

ESP-101:

460 V CNC PT-37 with rack 25 ft (7.6 m)	0558009450
460 V CNC PT-37 with rack 50 ft (15.2 m)	0558009451
460 V CNC PT-37 w/o rack 25 ft (7.6 m)	0558009452
460 V CNC PT-37 w/o rack 50 ft (15.2 m)	0558009453
380-400 V CE CNC PT-37 with rack 25 ft (7.6 m)	0558009458
380-400 V CE CNC PT-37 with rack 50 ft (15.2 m)	0558009459
380-400 V CE CNC PT-37 w/o rack 17 ft (5.2 m)	0558009460
380-400 V CE CNC PT-37 w/o rack 25 ft (7.6 m)	0558009461
380-400 V CE CNC PT-37 w/o rack 50 ft (15.2 m)	0558009462



ESP-101 Multi-Voltage:

The ESP-101 multi-voltage console ships as a ESP-101 460 V console and a separate TUA 2 Auto-Transformer.

208-575 V CNC PT-37 with rack 25 ft (7.6 m)	0558009454
208-575 V CNC PT-37 with rack 50 ft (15.2 m)	0558009455
208-575 V CNC PT-37 w/o rack 25 ft (7.6 m)	0558009456
208-575 V CNC PT-37 w/o rack 50 ft (15.2 m)	0558009457

ESP-101 Consoles

460 V Console	0558004880
380-400 V CE Console	0558005215

Multi-Voltage Consoles:

The ESP-101 multi-voltage console ships as a ESP-101 460 V console and a separate TUA 2 Auto-Transformer.

208, 230, 400, 460, 475, 500, 575 V	0558004881
-------------------------------------	------------

	WARNING	DO NOT USE OXYGEN WITH THIS TORCH! A HAZARDOUS FIRE MAY RESULT.
--	----------------	---

5.5 PT-37 Torch data

ESP-101 mechanized console uses the PT-37 torch. For cut data information, breakdown of parts, dimensions and maintenance refer to torch manual.

PT-37 Torches:

PT-37 Torch with rack 4.5' (1.4m)	0558004860
PT-37 Torch with rack 17' (5.2m)	0558004861
PT-37 Torch with rack 25' (7.6m)	0558004862
PT-37 Torch with rack 50' (15.2m)	0558004863
PT-37 Torch w/o rack 4.5' (1.4m)	0558004894
PT-37 Torch w/o rack 17' (5.2m)	0558004895
PT-37 Torch w/o rack 25' (7.6m)	0558004896
PT-37 Torch w/o rack 50' (15.2m)	0558004897



5.6 System and optional accessories

<p>TUA 2 Auto-transformer .0459145880</p> <p>Converts an input voltage of 208, 230, 400, 475, 500, or 575 V to 460 V for use with an ESP-101 460 V console.</p>	
<p>Remote junction box 0558004887</p> <p>The Remote Junction Box provides a means to extend the total length of the PT-37 Torch. When used in combination with 50 ft., 75 ft., or 100 ft. extension cables, and any standard length of PT- 37 Plasma Torch from 4.5 ft. to 50 ft., a maximum torch length of 150 feet can be achieved.</p>	
<p>Torch holder assembly 0558005926</p>	
<p>Plate rider 0560936972</p> <p>Used to maintain a constant standoff while cutting thin materials or using machines without automatic height control.</p>	
<p>CNC cable 25 ft. (7.6 m) 0558008833 CNC cable 50 ft. (15.2 m) 0558008834</p> <p>Connects between the CNC interface receptacle on the rear panel and the CNC.</p>	
<p>Remote hand switch with 25 ft. (7.6 m) lead 0558005548 Remote hand switch with 50 ft. (15.2 m) lead 0558005549</p> <p>Enables non-automated mechanized cutting using the PT-37 or PT-38 torch. Connects to the CNC interface receptacle on the rear panel.</p>	
<p>Gas flow measuring Kit 19765 ("CE" 0558000739)</p> <p>Valuable troubleshooting tool allows measurement of the actual air flow through the torch</p>	

6 INSTALLATION



WARNING

INSTALLING OR PLACING ANY TYPE OF FILTERING DEVICE WILL RESTRICT THE VOLUME OF INTAKE AIR, THEREBY SUBJECTING THE POWER SOURCE INTERNAL COMPONENTS TO OVERHEATING. THE WARRANTY IS VOID IF ANY TYPE OF FILTER DEVICE IS USED.

6.1 General

Proper installation is important for satisfactory and trouble-free operation of the ESP-101 cutting package. It is suggested that each step in this section be studied carefully and followed closely.

6.2 Equipment required

A source of clean, dry, oil-free air that supplies 500 cfh (236 l/m) at 90 psig (6.2 bars) is required for the cutting operation. The air supply should not exceed 150 psig (10.3 bars) (the maximum inlet pressure rating of the air filter-regulator supplied with the package).



CAUTION

POSITION THE POWER SOURCE AT LEAST 10 FEET (3 METERS) FROM THE CUTTING AREA. SPARKS AND HOT SLAG FROM THE CUTTING OPERATION CAN DAMAGE THE UNIT.

6.3 Placement and location

After selecting an installation site, place the ESP-101 in the desired location. The unit may be lifted by either an overhead crane or forklift truck. If using forklift truck, be sure that the lift forks are long enough to extend completely under the base. If using straps, use two separate straps as shown in the illustration.

Adequate ventilation is necessary to provide proper cooling of the ESP-101. The amount of dirt, dust, and excessive heat to which the equipment is exposed, should be minimized. There should be at least one foot of clearance between the ESP-101 power source and wall or any other obstruction to allow freedom of air movement through the power source.




6.4 Inspection

1. Remove the shipping container and all packing material and inspect for evidence of concealed damage which may not have been apparent upon receipt of the ESP-101.

Notify the carrier of any defects or damage at once.

2. Check container for any loose parts prior to disposing of shipping materials.
3. Check air louvers and any other openings to ensure that any obstruction is removed.

	WARNING	<p>ELECTRIC SHOCK CAN KILL! PRECAUTIONARY MEASURES SHOULD BE TAKEN TO PROVIDE MAXIMUM PROTECTION AGAINST ELECTRICAL SHOCK. BE SURE THAT ALL POWER IS OFF BY OPENING THE LINE (WALL) DISCONNECT SWITCH AND BY UNPLUGGING THE POWER CORD TO THE UNIT WHEN CONNECTIONS ARE MADE INSIDE OF THE POWER SOURCE.</p>
---	----------------	---

6.5 Primary input connections

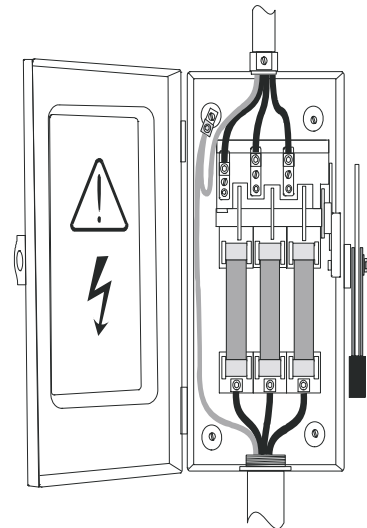
The ESP-101 consoles are equipped with approximately 15 ft. of 4-conductor input power cable for 3 phase connection.

See specification section or rating plate.

Standard units (NON-CE)		CE units (Europe)	
Phase	3	Phase	3
L1	Brown	L1	Brown
L2	Black	L2	Black
L3	Gray	L3	Gray
GND	Green / Yellow	GND	Green / Yellow





Primary input power cable




Customer fused line disconnect switch (See Table 3-1)

Figure 3-1. Input connection

 **WARNING** ELECTRIC SHOCK CAN KILL! BEFORE MAKING ELECTRICAL INPUT CONNECTIONS TO THE POWER SOURCE “MACHINERY LOCKOUT PROCEDURES” SHOULD BE EMPLOYED. IF THE CONNECTIONS ARE TO BE MADE FROM A LINE DISCONNECT SWITCH, PLACE THE SWITCH IN THE OFF POSITION AND PADLOCK IT TO PREVENT INADVERTENT TRIPPING. IF THE CONNECTION IS MADE FROM A FUSEBOX, REMOVE THE CORRESPONDING FUSES AND PADLOCK THE BOX COVER. IF IT IS NOT POSSIBLE TO USE PADLOCKS, ATTACH A RED TAG TO THE LINE DISCONNECT SWITCH (OR FUSE BOX) WARNING OTHERS THAT THE CIRCUIT IS BEING WORKED ON.

 **WARNING** THE CHASSIS MUST BE CONNECTED TO AN APPROVED ELECTRICAL GROUND. FAILURE TO DO SO MAY RESULT IN ELECTRICAL SHOCK, SEVERE BURNS OR DEATH.

 **WARNING** BEFORE MAKING ANY CONNECTIONS TO THE POWER SOURCE OUTPUT TERMINALS, MAKE SURE THAT ALL PRIMARY INPUT POWER TO THE POWER SOURCE IS DE-ENERGIZED (OFF) AT THE MAIN DISCONNECT SWITCH AND THAT THE INPUT POWER CABLE IS UNPLUGGED.

Before connecting to input power, make sure there is a line (wall) disconnect switch with fuses or circuit breakers at the main power panel. You may either use the factory-installed input power cable 4/c, type SO (90 °C), 15 ft (4.6 m) length or provide your own input power leads.

If you choose to provide your own, make sure they are insulated copper conductors. You must have three (3 phase) power leads and one ground wire. The wires may be heavy rubber covered cable or may be run in a solid or flexible conduit. Ensure the ground lead is sufficiently long inside the machine. In an event where the power cord is pulled from the machine, the ground lead **must not** break from the ground connection before the power leads have broken from their connection. Refer to Table 3-1 for recommended input conductors and line fuse sizes.

ESP-101					ESP-101 (with optional auto-transformer)				
Input requirem.			Input & Gnd	Fuse	Input requirem.			Input & Gnd	Fuse
V	~	A	Conductor CU / AWG	Size Amps	V	~	A	Conductor CU / AWG	Size Amps
380 CE	3	30	6 mm ²	40	208	3	53	6	70
400 CE	3	29	6 mm ²	40	230	3	50	6	70
460	3	25	8	35	400	3	29	6 mm ²	40
					460	3	25	8	35
					475	3	24	8	35
					500	3	22	10	30
					575	3	18	10	25

Table 3-1. Redommended sizes for conductors and line fuses.

6.5.1 TUA2 Autotransformer primary input connections

Connecting a multi-voltage version

The ESP-101 460V version is equipped with an input power cable which may be used to connect to the output of the TUA2 Auto-Transformer. You may either use the factory-installed input power cable (4/c, type SO (90 °C) or provide your own input power leads. If you choose to provide your own, make sure they are insulated copper conductors. You must have three (3 phase) power leads and one ground wire. Refer to Table 3-1 for recommended input conductors.

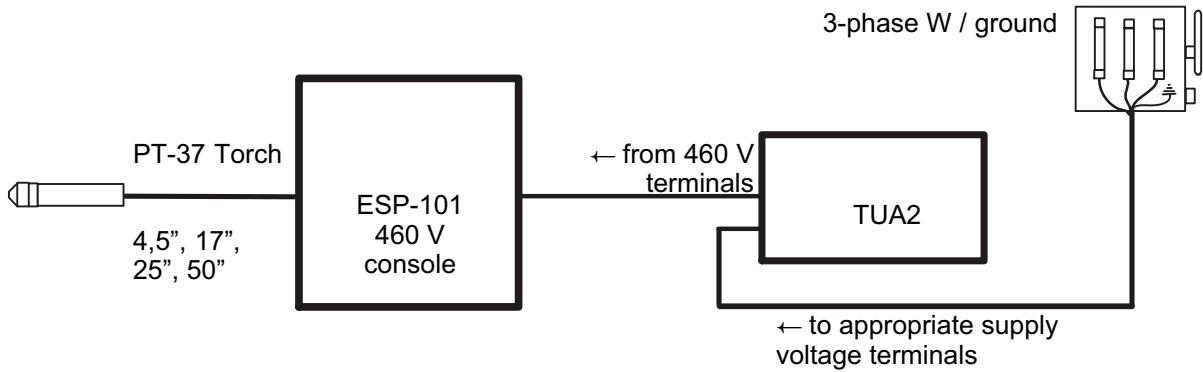


Fig 3-2a. Connection diagram for TUA2 autotransformer

Primary power cable from ESP-101 to TUA2 autotransformer

1. Begin by preparing the power cable, then positioning in the TUA2 as shown.
 Note: L1, L2 & L3 strip wires 3/8" (9.5 mm). GND wire strip 1" (25.4 mm) or 5/16" ring terminal.

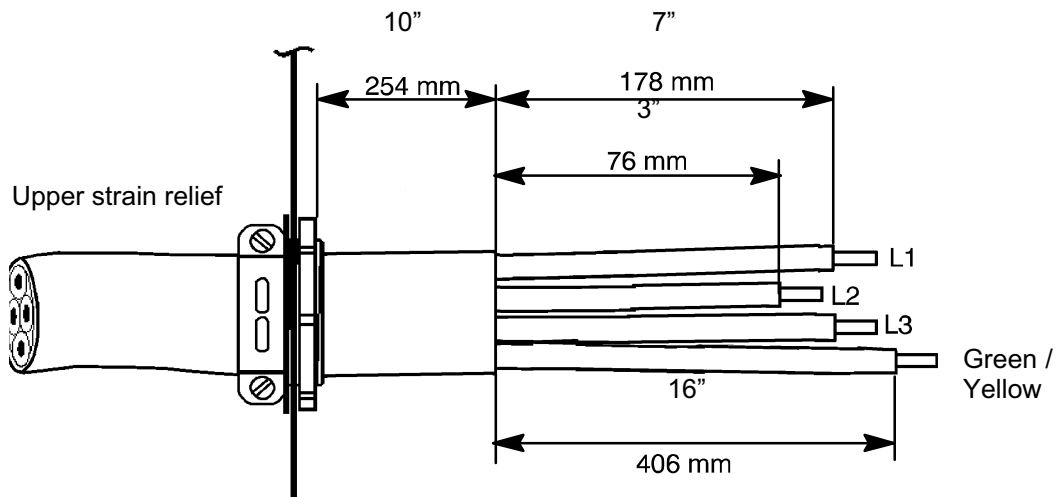


Fig 3-2b.. Primary power cable from ESP-101 to TUA2 autotransformer

- Route the power cable through the upper strain relief of the TUA2 autotransformer as shown below. Connect L1, L2, L3 leads to the 460 V terminals. Connect the ground lead to the forward ground stud. Ensure all connections are secure. Do not overtighten the strain relief.

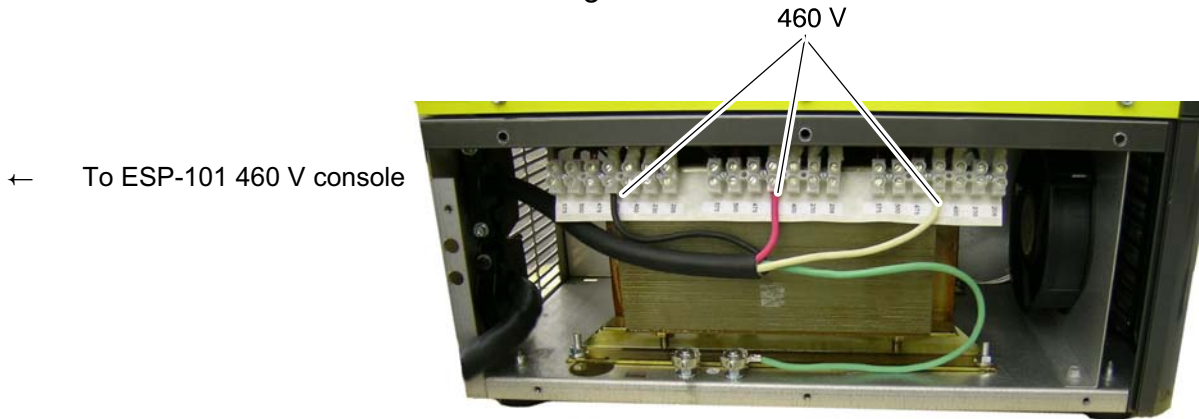



Fig 3-2c. Primary power cable from ESP-101 to TUA2 autotransformer 460 V terminals.

	CAUTION	Ensure three input power jumper cables are connected properly to the autotransformer for your input power.
---	----------------	--

The TUA2 Auto-Transformer is not equipped with an input power cable. A 4/c, type SO (90 °C) cable or equivalent is recommended. Ensure they are insulated copper conductors. You must have three (3 phase) power leads and one ground wire. Select an input power cable size corresponding to the input supply voltage listed in Table 3.1.

Primary power cable from fused line disconnect switch to TUA2 autotransformer.

- Begin by preparing the power cable, then positioning in the TUA2 as shown:

Note: L1, L2 & L3 strip wires 3/8" (9.5 mm) . GND wire strip 1" (25.4 mm) or 5/16" ring terminal.

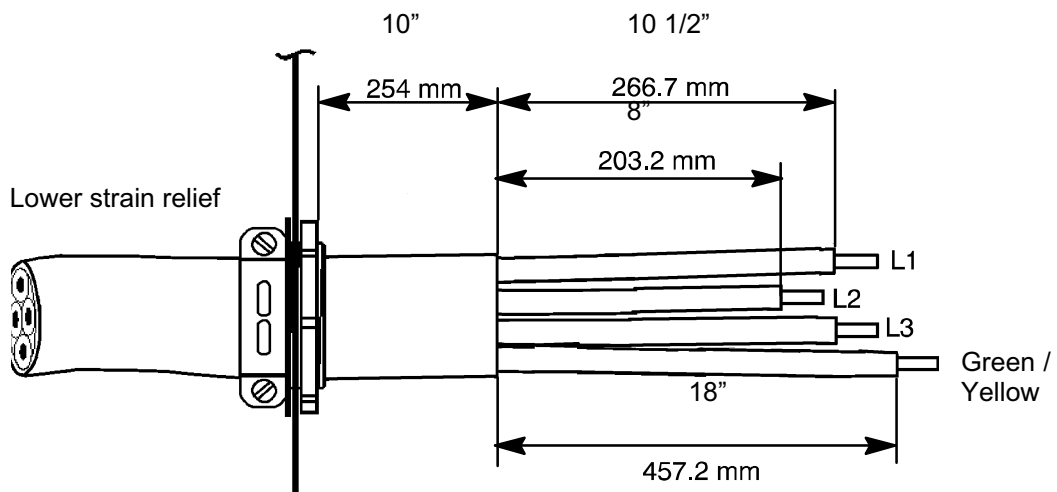


Fig 3-3a. Primary power cable from fused line disconnect switch to TUA2 autotransformer.

2. Route the power cable through the lower strain relief of the TUA2 autotransformer as shown below. Connect L1, L2, L3 leads to the voltage terminals that match your input power supply voltage. Connect the ground lead to the rear ground stud. Ensure all connections are secure. Do not overtighten the strain relief.

- ← To ESP-101 460 V console
- ← To fused line disconnect switch

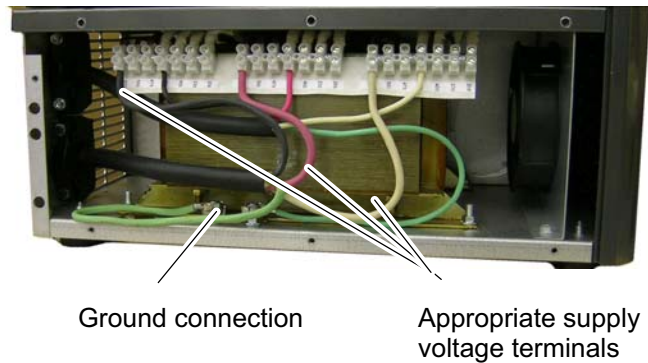


Fig 3-3b. Primary power cable from fused line disconnect switch to TUA2 autotransformer appropriate supply voltage terminals (575 V pictured)

6.5.2 Input air connection

Connect your air supply to the inlet connection of the filter/regulator.

Pre-filtered DRY AIR SUPPLY (Customer Supplied)
(90 - 150 psi / 6.2 - 10.3 bars)



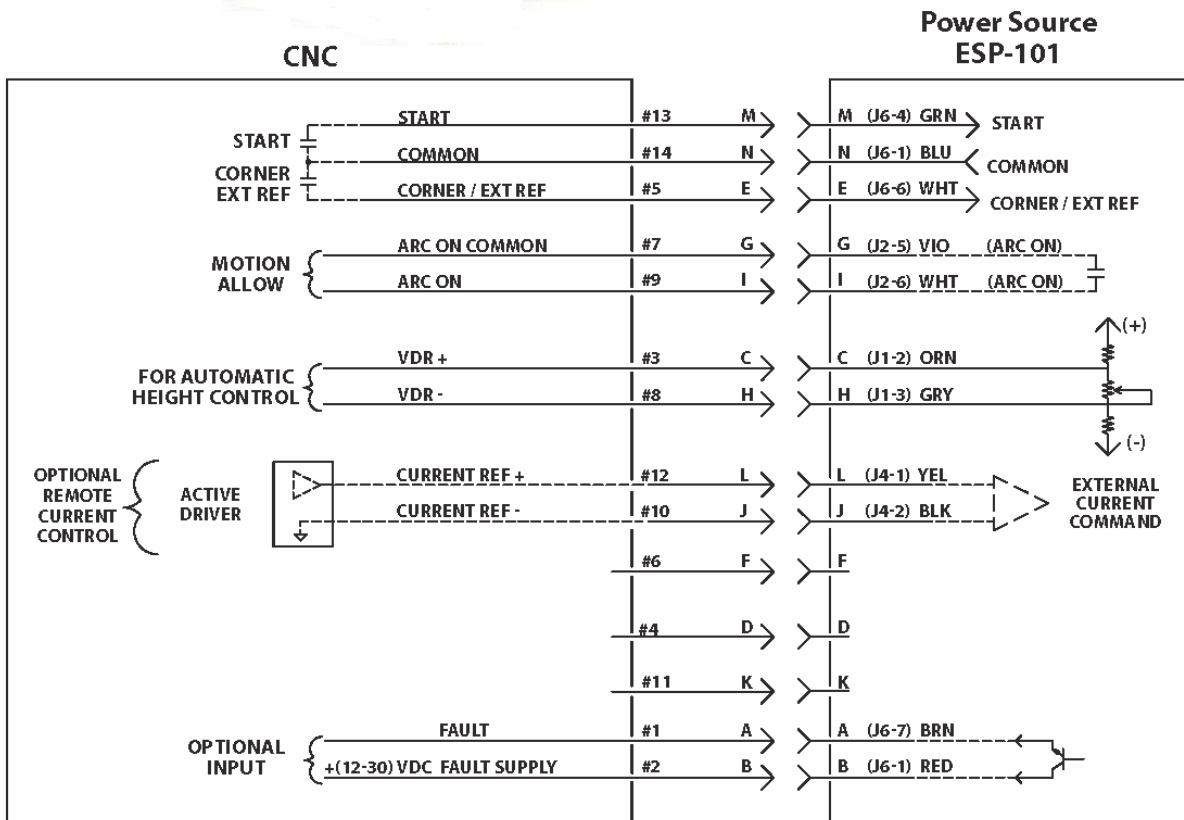
	WARNING	MAKE SURE THE POWER SOURCE IS SWITCHED OFF BEFORE REMOVING FUSE.
--	----------------	---



Replace fuse with Slo-Blo, 2 Amp, 600 V only.

Fig 3-4. Input connections / fuse replacement

6.6 CNC interface connection



Note:

If replacing the ESP-100 with an ESP-101, reversing wires 1 and 2 on the CNC cable may be necessary for proper polarity.

Fig 3-5. Mechanical cutting interface diagram CNC interface connection



WARNING

MAKE SURE POWER SWITCH ON CONSOLE IS IN OFF POSITION AND PRIMARY INPUT POWER IS DE-ENERGIZED.

6.7 Voltage divider adjustment

It may be necessary to adjust the voltage divider or VDR to match the particular height control system. There are two default settings for the ESP-101 models as shipped from the factory:

- STANDARD UNITS (non-CE) 750 ohms (21:1)
- CE UNITS (Europe): • 625 ohms (25:1)

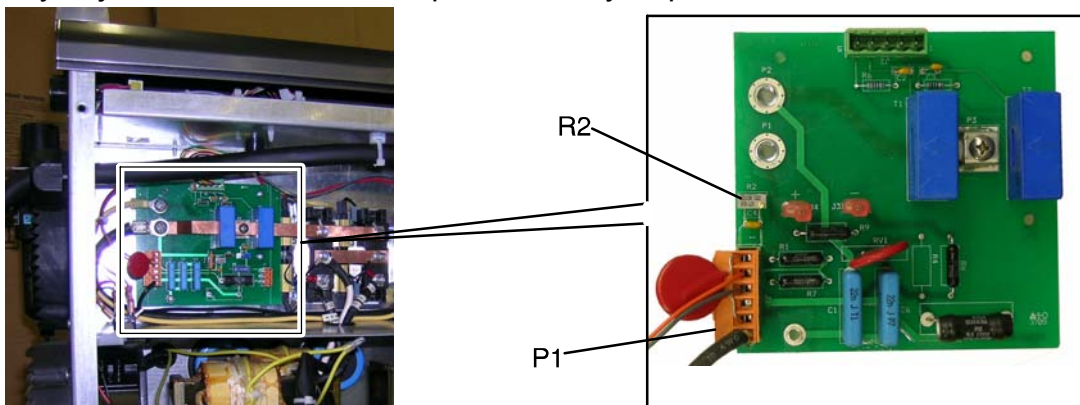
If the height control system does not match the factory default setting, matching can be accomplished by adjusting the VDR potentiometer on the Current Sensor PCB4 located behind the left side panel.

1. Place ohm meter leads between P1-2 (orn) & P1-3 (gry). Adjust potentiometer R2 to achieve the desired divide ratio for the 1. particular height control system used. For example:
 - 16:1 ratio 1000 ohms
 - 18:1 ratio 882 ohms
 - 21:1 ratio 750 ohms
 - 25:1 ratio 625 ohms

Note:

Ohm meter readings can also be taken at the CNC receptacle on the rear panel of the machine, between pins C and H.

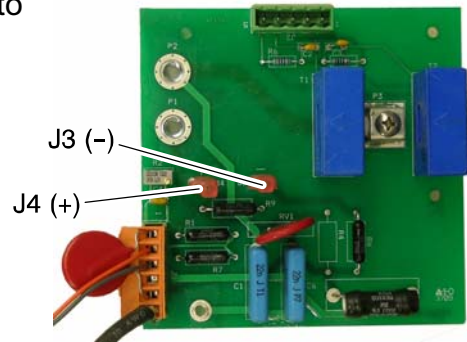
2. If desired, additional minor adjustments of the VDR potentiometer may be made. Any adjustments should be 2. performed by a qualified technician.



6.7.1 Output voltage sample

Output Voltage Sample - Some Cutting Machines sample the full output voltage of the plasma system to control the torch height and to determine when to start moving. The full output voltage is available within the machine on a pair of male spade terminals (J3 and J4).

1. Remove insulated terminals to provide access to the male spade terminals. (If needed, the insulated terminals may then be used to terminate the voltage pickup wires.)



! WARNING CLAMP THE WORK CABLE TO THE WORK PIECE. BE SURE THE WORK PIECE IS CONNECTED TO AN APPROVED EARTH GROUND WITH A PROPERLY SIZED GROUND CABLE.

6.8 Secondary output connections for mechanized cutting

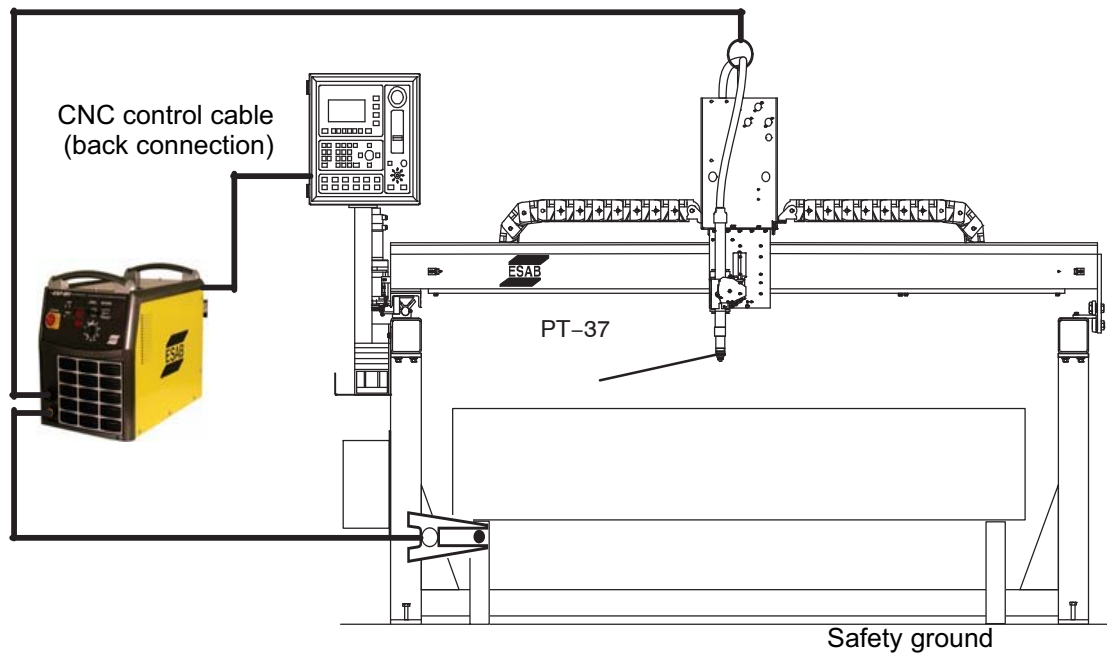
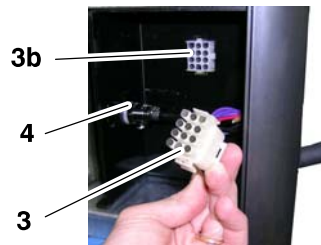
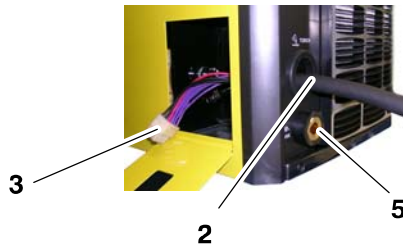


Figure. 3-6. ESP-101 Interconnection diagram

! WARNING BEFORE MAKING ANY CONNECTIONS TO THE POWER SOURCE OUTPUT TERMINAL, MAKE SURE THAT ALL PRIMARY INPUT POWER TO THE POWER SOURCE IS DE-ENERGIZED (OFF) AT THE MAIN DISCONNECT SWITCH.

6.9 PT-37 torch installation

1. Open lead access door on the left side of the ESP-101.
2. Route the torch cable through the access opening on the front of the console.
3. Connect the torch cable receptacle to the panel receptacle. Check orientation of the sockets to ensure a correct fit.
4. Connect the air hose to the quick-connect fitting.
5. Insert work cable plug into work cable socket
6. Close the Torch Lead access door.



- | | | |
|-------------------------------|-------------------------------|-----------------------------|
| 1 Torch lead access door | 2 Torch cable male receptacle | 3 Torch lead access opening |
| 4 Work Cable Socket | 5 Panel receptacle | 6 Air hose |
| 7 Torch cable male receptacle | | |

WARNING MAKE SURE POWER SWITCH ON CONSOLE IS IN OFF POSITION AND PRIMARY INPUT POWER IS DE-ENERGIZED.

6.10 Remote junction box installation

The Remote Junction Box (RJB) provides a means to extend the total length of the PT-37 Torch. A Remote Junction Box is used in combination with 50', 75' or 100' extension cable and any standard length of PT-37 Plasma Torch from 4.5' to 50', to create a combined maximum torch length of 150 feet.

Installation of a Remote Junction Box requires minor modifications to the ESP-101 power supply, mounting of the box itself, and connection of the extension cable. Use the diagram and steps below for installation.

Note:

See section 5.6 "System and optional accessories" for remote junction box and extension cable ordering information

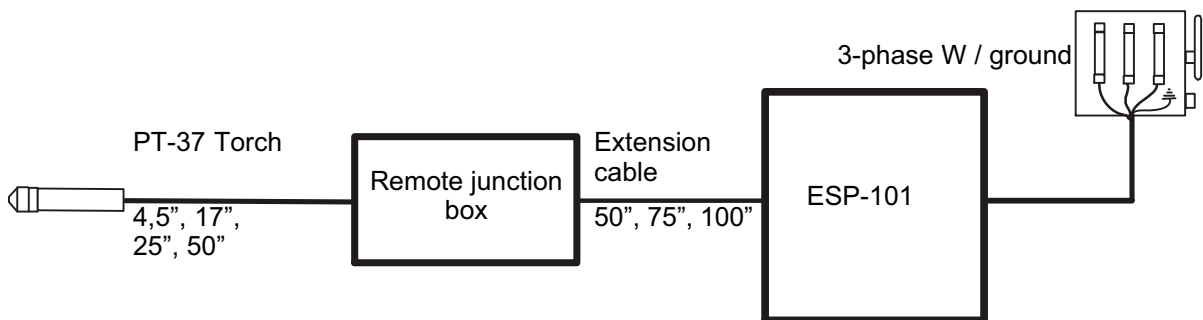


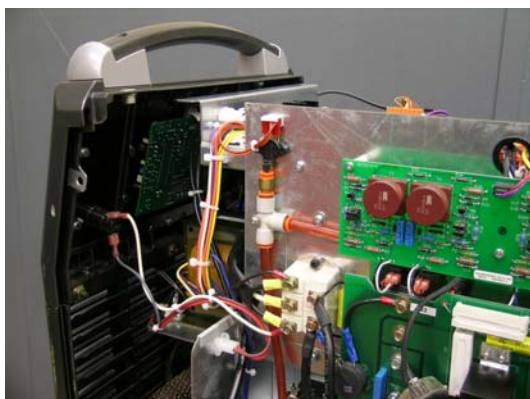
Figure 3-7. Connection diagram for remote junction box

Description of ESP-101 modification: The wiring modification (interconnect plug reversal) redirects the control signal from the ESP-101 internal solenoid, to the pins within the torch connection panel receptacle. The control signal is then diverted to the solenoid within the remote junction box

The hose modification (solenoid air bypass) directs the system air supply to the solenoid within the remote junction box. This ensures air at a sufficient pressure is immediately available to the PT-37 torch.

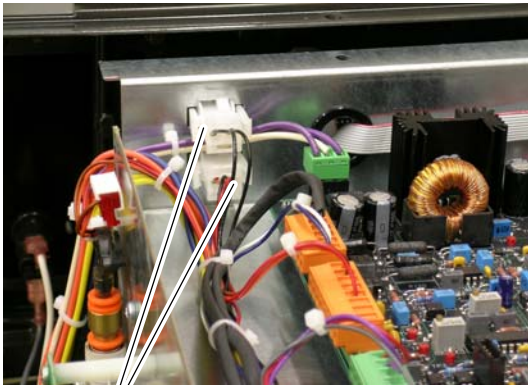
6.11 ESP-101 modifications

Remove the top and right side panel of the power supply.

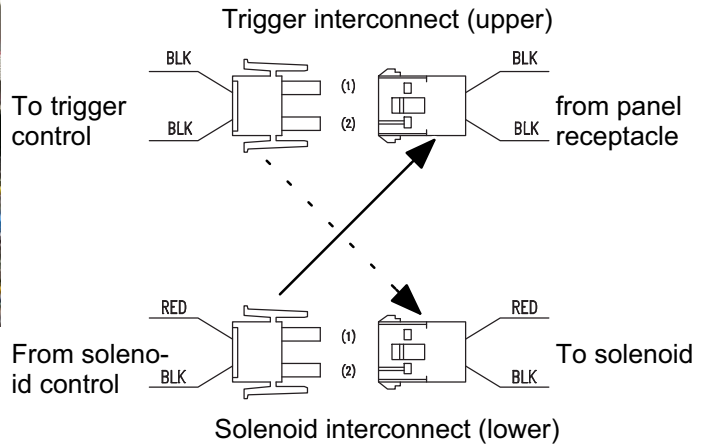


1. Redirection of solenoid control wiring:

- a. Locate, disconnect and reverse the trigger and solenoid interconnect plugs as shown.

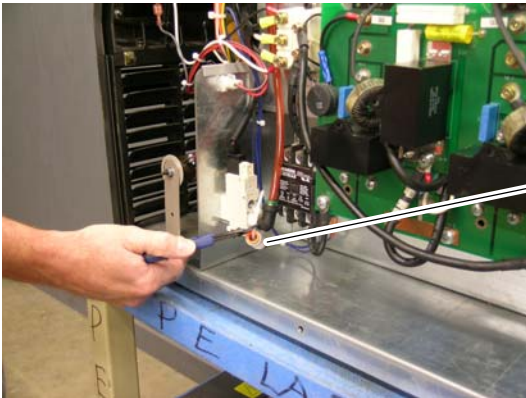


1



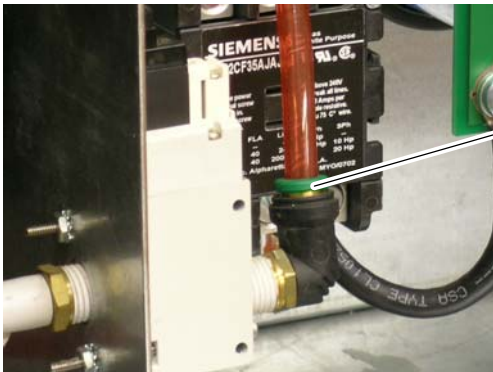
2. Air flow by-pass of internal solenoid:

- a. Locate and remove the included supplied air coupling.

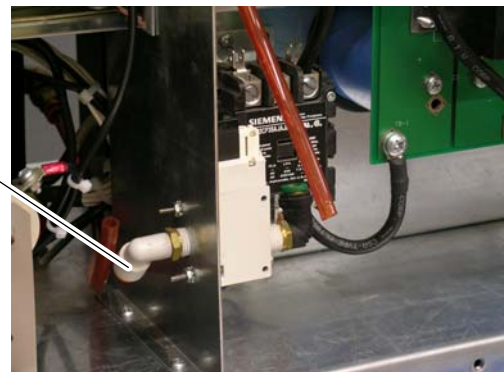


2a

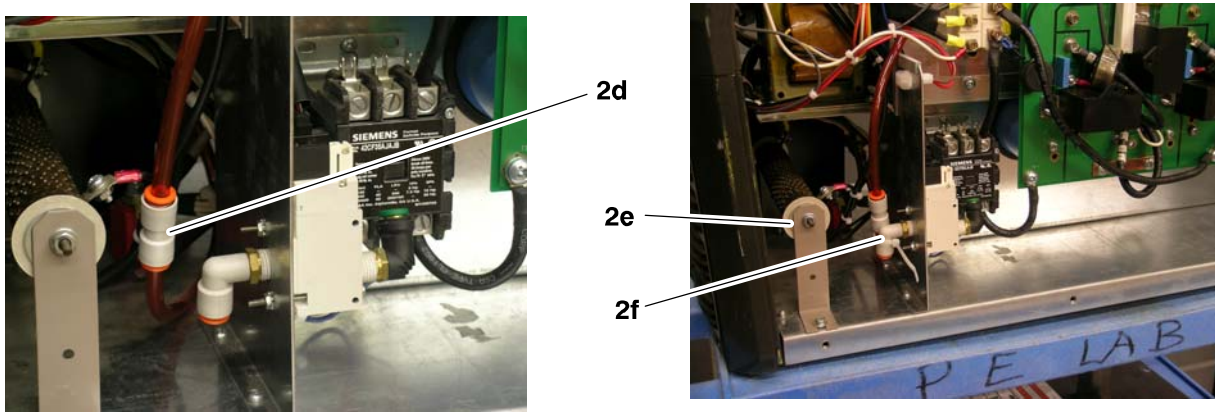
- b. Disconnect both air hoses from the input and output of the solenoid, by pushing ring inward and pulling hose.



2b



- c. Re-route the Input air hose over to the output side.
 d. Couple the free ends of the gas tubes together using the provided union.



Important Note:

Ensure tubing is securely fastened at least 1 inch away from pilot arc resistor.

- e. Secure the tubing to prevent contact with pilot arc resistor.
- f. Replace the top and right side panel of the power supply.

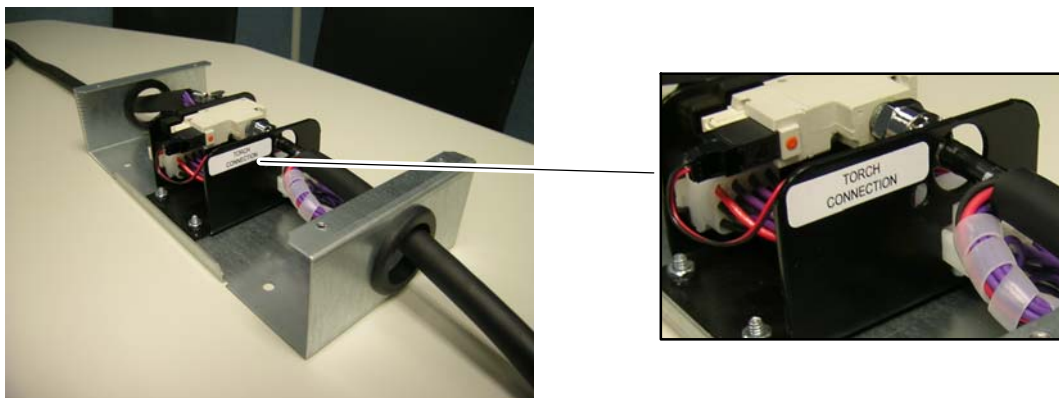
6.12 Mounting the remote junction box (RJB)

1. With the cover removed from the remote junction box, mount the base to a rigid location on the cutting machine, robot, or other suitable object, using at least 2 of the provided mounting holes. Orient the box such that the extension cable will enter the end of the RJB **not marked** for torch connection.

Remote junction box

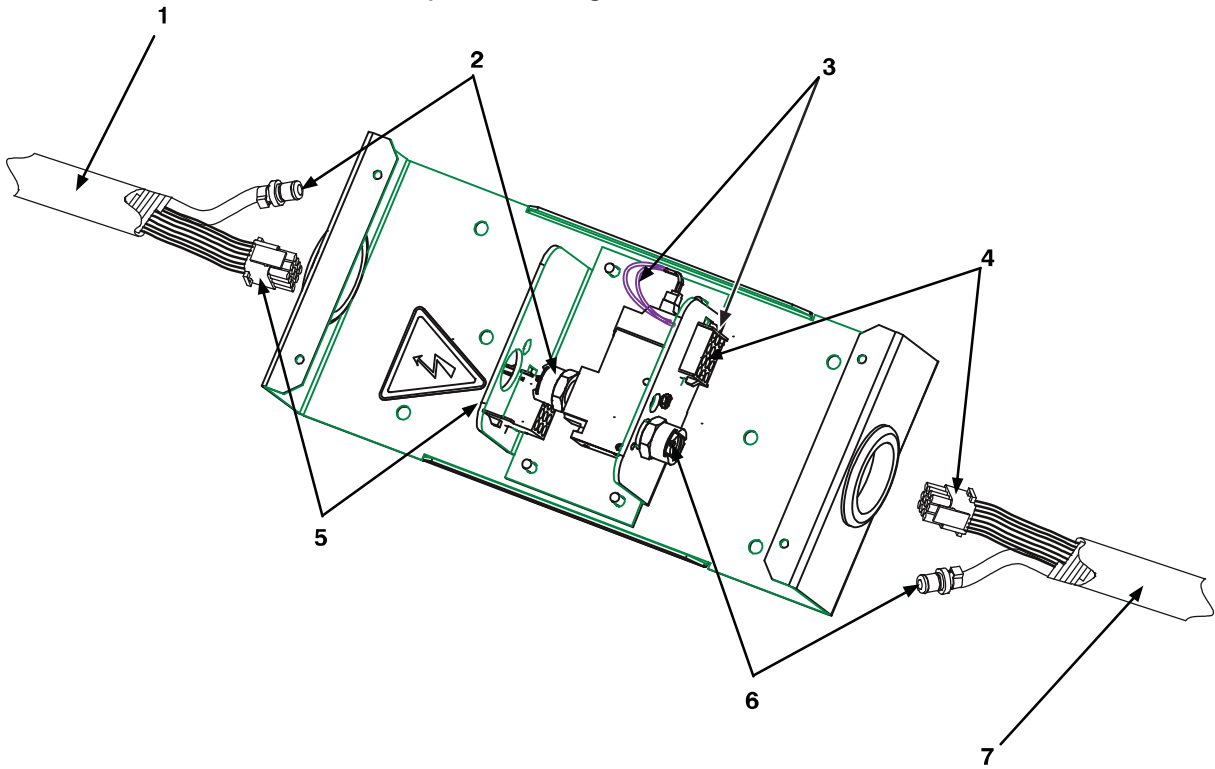


Torch and extension cable openings (typical at each end of remote junction box)



2. Insert the free end of the extension cable through the grommet on the end of the RJB and make the power and gas connections as shown.

3. Insert the free end of the PT-37 Torch through the grommet on the other end of the RJB and make the 3. power and gas connections as shown.



- | | | |
|------------------------------------|--------------------------------|---|
| 1 To PT-37 torch | 2 Torch cable air connection | 3 Note: Extension cable connections from the ESP-101 must be connected on the solenoid wiring side of the remote junction box. (Torch connection side is labeled.) |
| 4 Extension cable power Connection | 5 Torch cable power connection | |
| 6 Extension cable air connection | 7 Extension cable from ESP-101 | |

Figure 3-9. Remote junction box connections

4. Replace all covers and hardware



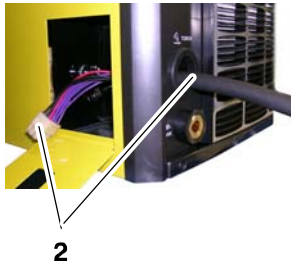
6.13 Connecting to the ESP-101

The extension cable is connected to the ESP-101 in the same manner as the PT-37 torch.

1. Open extension cable lead access door on the left side of the ESP-101.



2. Insert the extension cable and air hose through the extension cable access opening on the front of the console.



3. Connect the extension cable male receptacle (from remote junction box) to the female receptacle. Check orientation of the sockets so as to ensure a correct fit.





4. Connect the air hose (from remote junction box) to the quick-connect fitting.



5. Close the extension cable lead access door.

7 OPERATION

	DANGER	<p>ELECTRIC SHOCK CAN KILL!</p> <ul style="list-style-type: none"> - DO NOT OPERATE THE UNIT WITH THE COVER REMOVED - DO NOT APPLY POWER TO THE UNIT WHILE HOLDING OR CARRYING THE UNIT - DO NOT TOUCH ANY TORCH PARTS FORWARD OF THE TORCH HANDLE (NOZZLE, HEAT SHIELD, ELECTRODE, ETC.) WITH POWER SWITCH ON.
---	--------	---

	WARNING	<p>ARC RAYS CAN BURN EYES AND SKIN; NOISE CAN DAMAGE HEARING.</p> <ul style="list-style-type: none"> - WEAR WELDING HELMET WITH NO. 6 OR 7 LENS SHADE - WEAR EYE, EAR, AND BODY PROTECTION.
---	---------	--

	CAUTION	<p>POSITION THE ESP-101 AT LEAST 10 FEET (3 METERS) FROM THE CUTTING AREA. SPARKS AND HOT SLAG FROM THE CUTTING OPERATION CAN DAMAGE THE UNIT.</p>
---	---------	---

7.1 ESP-101 controls

1. **Power switch (ON-OFF)/(I-O).** Turn knob clockwise to "ON" ("I") position for normal operation. Turn knob counterclockwise to switch "OFF" ("O").

Note that with the switch in the "ON" ("I") position, power is provided to the main transformer and the low voltage control circuitry. In the "OFF" ("O") position, the unit is shut down; however, power is still present in the unit. To remove power from the power source, power must be disconnected at the line disconnect switch or the fuse box.

2. **Pressure regulator.** Regulates cut gas pressure. Rotate clockwise to increase and counterclockwise to decrease. Pressure reading is indicated on the lower display screen. Pressure unit of measure is indicated on the upper display screen.

Note:

With or without junction box installed: When using 4.5' (1.4 m) or 17' (5.2 m) torch assemblies, plasma gas settings should be reduced 5 - 10 psi (.35 - .69 bar) for optimum performance.

Note:

The unit is shipped from the factory with the regulator adjusted to deliver 80 psig (5.5 bar) to the torch from a 95 psig (6.5 bar) supply. If supply pressure to the machine is greater than 95 psig (6.5 bar) up to the maximum recommended 150 psig (10.3 bar), rotate pressure regulator knob counterclockwise to reduce the pressure delivered to the torch back to 80 psig (5.5 bar). Follow GAS TEST instructions, see D.2.

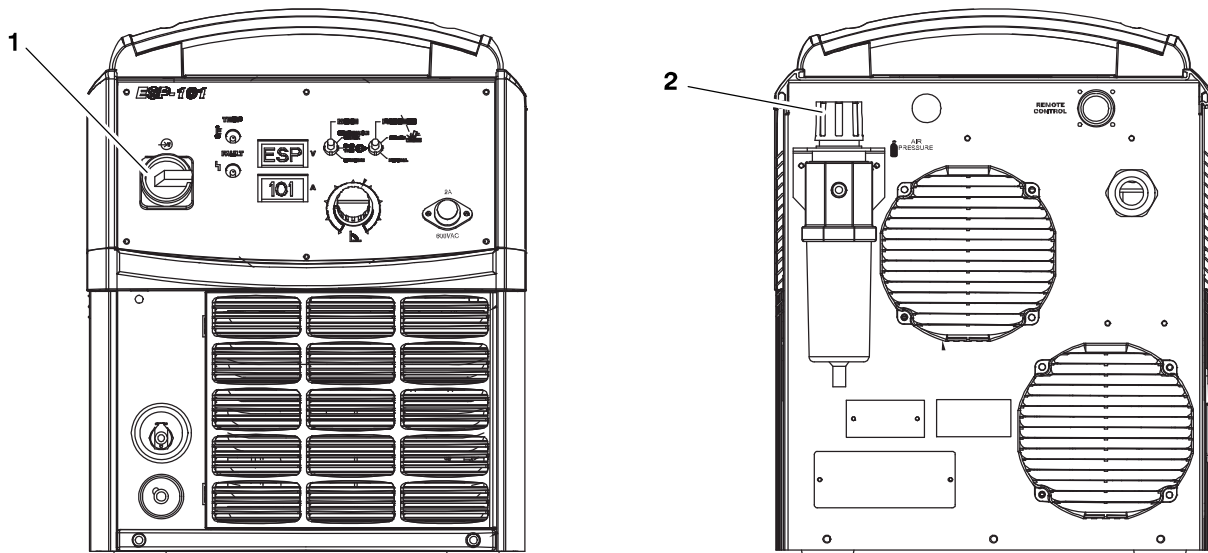


Figure.4-1 ESP-101 Controls

3. **Output current control.** Adjustable from 20 to 100 amperes. Calibration marks are to provide a guide in setting current. For settings refer to cut data charts in the torch manual.
4. **Mode selector switch.**
 - a. **Consumable check** (up position) - When placed in this position, the proper installation and operation of the consumables are verified by sending a series of gas pulses through the torch. PIP (Parts In Place) is indicated on the upper display screen.

An error message will be displayed if improper operation is detected. Err (error) is indicated on the upper display screen. The Error code is indicated on the lower display screen. Refer to Section 9.2 List of Help Codes.

Be sure to place switch in OPERATE position before starting cutting operation.
 - b. **Gas tests** (center position) - The display screen will indicate flowing air pressure. Pressure reading is indicated on the lower display screen. Pressure unit of measure is indicated on the upper display screen (psi or bar). See section 10.4 for selecting air pressure units of measure.

The air regulator should be adjusted to recommended pressure before cutting operations. Allow air to flow for a few minutes. This should remove any condensation that may have accumulated during shutdown period.

Be sure to place switch in OPERATE position before starting cutting operation.
 - c. **Operate** (down position) - Place switch in this position for cutting and gouging operations.
5. **Process selector switch.** The process switch allows for selection of the output characteristics of the power source depending on the cutting process being used.
 - a. **Normal.** Setting for all standard plate cutting operations. (The pilot arc will not re-strike automatically. Requires a new start signal.)
 - b. **Gouge.** Optimizes power source for gouging operations. Gouging requires higher arc voltages. In this mode the power source allows higher operating arc voltage limiting the output current to 85 amps.

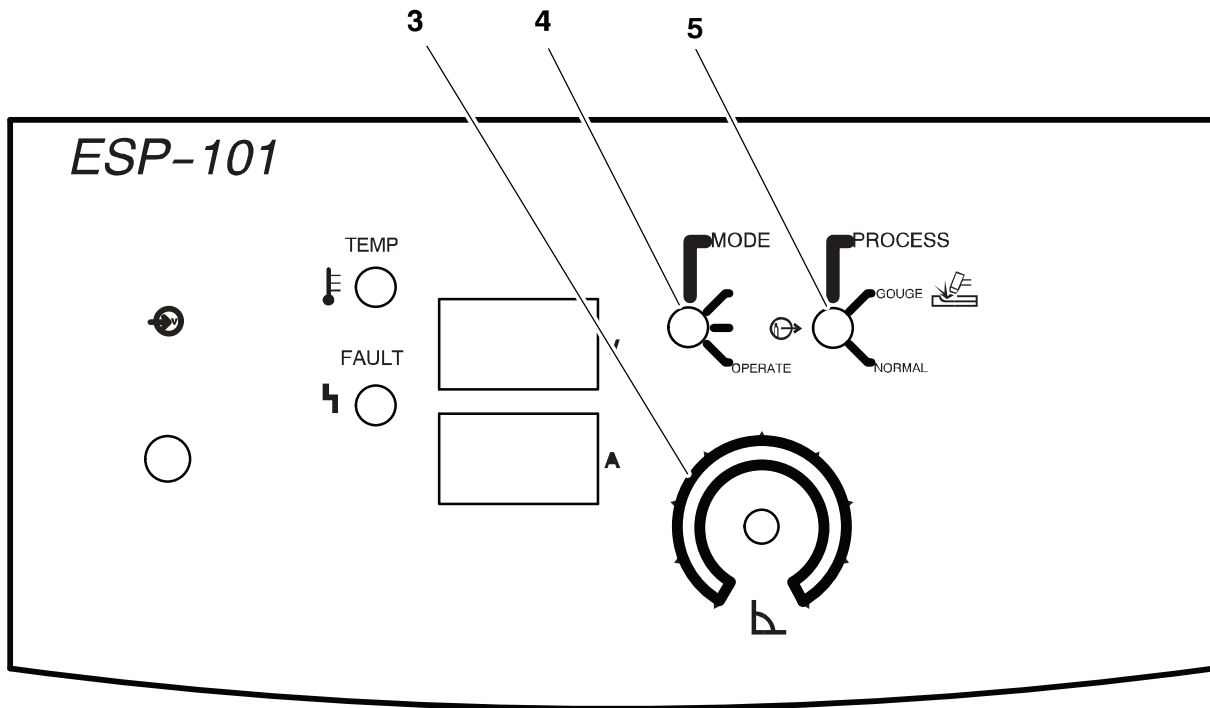


Figure. 4-2a ESP-101 controls

6. **Temp indicator lamp.** The amber lamp will illuminate to indicate an internal overheating condition has occurred, one of the thermal switches has opened. User control of the power source will be interrupted and the unit will shut down to protect critical components. Leave the power on to allow the fan time to cool off the unit. Once cooled to a safe temperature, the thermal switch will automatically reset and output control will be restored.
7. **Fault indicator lamp.** The red lamp will illuminate to indicate an error has occurred, operator attention is required. See item F. Display Screens and refer to Section 9.2 List of Help Codes.

Note:

Most fault signals will remain on for a minimum of 10 seconds.
Unit will reset automatically after faults are cleared except for over-current protection.

Error Indication: An error message will be displayed if improper operation is detected. Err (Error) is indicated on the upper display screen. The Error code is indicated on the lower display screen. Refer to Section 9.2 List of Help Codes.

8. **Display screens.**

Voltmeter (upper) - Displays DC output voltage.

Ammeter (lower) - Displays output current setting.

The voltmeter and ammeter screens alternately display model, Test and the Software version along with help code information (see Section 9.2 List of Help Codes).

When unit is initially switched on the model, PIP (Parts in Place) and software version will be briefly displayed. Lower display will then show current setting.

Important Note:

If after the initial sequence the display does not show the current setting but reverts back to displaying the model "ESP-101", the machine has detected a premature torch trigger condition. Disengage the torch trigger and restart the machine. (As a safety precaution, the ESP-101 will not power up with the torch trigger engaged.)

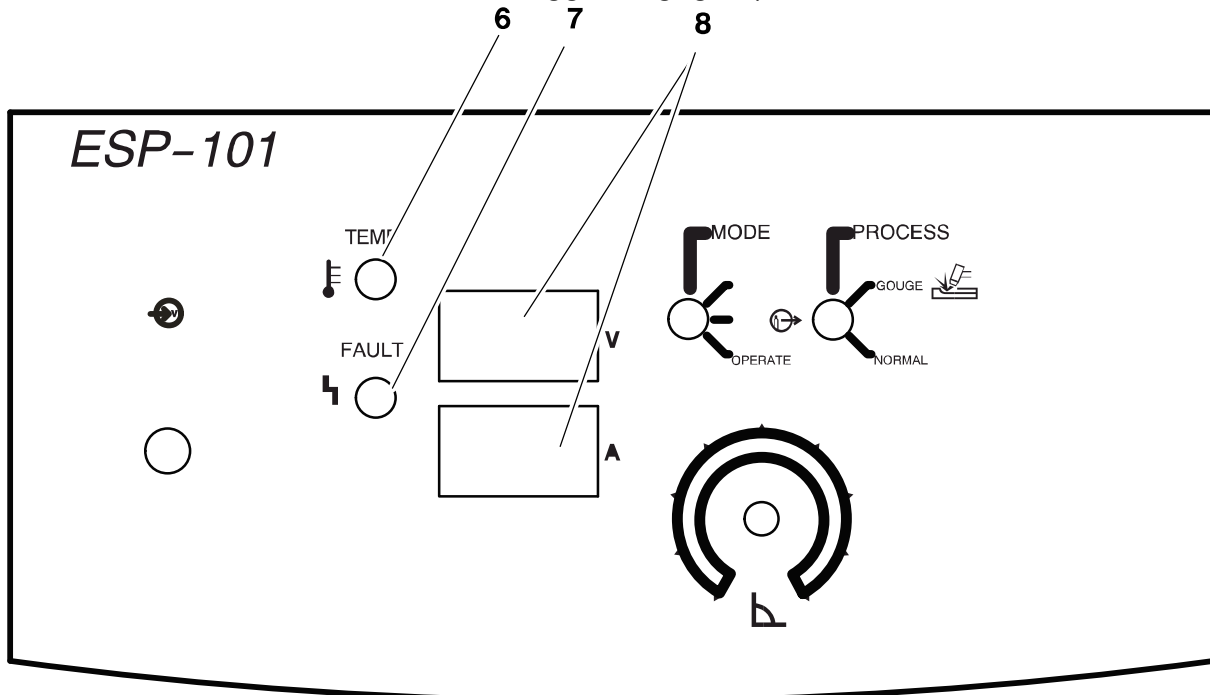


Figure. 4-2b ESP-101 controls

WARNING MAKE SURE POWER SWITCH ON UNIT IS IN OFF POSITION BEFORE WORKING ON THE TORCH.

WARNING THE PT-37 TORCH HEAD ACTS IN CONJUNCTION WITH THE CIRCUITRY WITHIN THE POWER SOURCE TO PREVENT THE TORCH FROM BEING ENERGIZED WITH HIGH VOLTAGE IF THE TORCH SWITCH IS ACCIDENTALLY CLOSED WHEN THE SHIELD IS REMOVED. ALWAYS REPLACE TORCH WITH THE PROPER TORCH MANUFACTURED BY ESAB SINCE IT ALONE CONTAINS ESAB'S SAFETY INTERLOCK.

7.2 Cutting with the ESP-101

1. Make sure that the wall disconnect switch is on and air is supplied to machine.
2. Turn on the front panel power switch.
3. Place MODE selector switch to "GAS TEST". Set pressure regulator to 80 psig (5.5 bar).
4. Place MODE selector switch to "OPERATE".
5. Place process selector switch to either "Normal" or "Gouging".
6. For in depth instructions refer to torch manual for complete operation and maintenance.
7. Periodically check torch head assembly. Replace if worn or damaged.
8. Torch cable should be inspected periodically. If there are any cuts through the protective sheath or wire insulation, replace the cable.

**CAUTION**

Replace electrode before wear becomes deeper than 1.5 mm.

7.3 Electrode wear

If the electrode has a pit which is more than .06" (1.5mm) deep at its center, it must be replaced. This is done by unscrewing the electrode in a counter-clockwise direction from the piston. If the electrode is used beyond this recommended wear limit, damage to the torch and power source may occur. Nozzle life is also greatly reduced when using the electrode below the recommended limit.



Figure 4-3 Electrode wear limit

7.4 Standoff and cut quality

Standoff (Arc Voltage) has a direct influence on cut quality and squareness. It is recommended that prior to cutting, that all cutting parameters are set to the manufacturer's suggested conditions. Refer to the "process tables" for recommendations. A sample cut should be made using actual part material followed by close examination of the part.

If the cut face of the part has excessive bevel or rounded top edge, it may be that the standoff is set too high. When standoff is controlled by an arc voltage height control, reducing the arc voltage setting will reduce the standoff.

Lower the standoff until the excessive bevel or rounded top edge disappears. The characteristics of plasma cutting hinder production of a perfectly square cut. On material thicknesses of 1/4 inch (6.4 mm) or greater, a standoff too close may result in a negative cut angle.

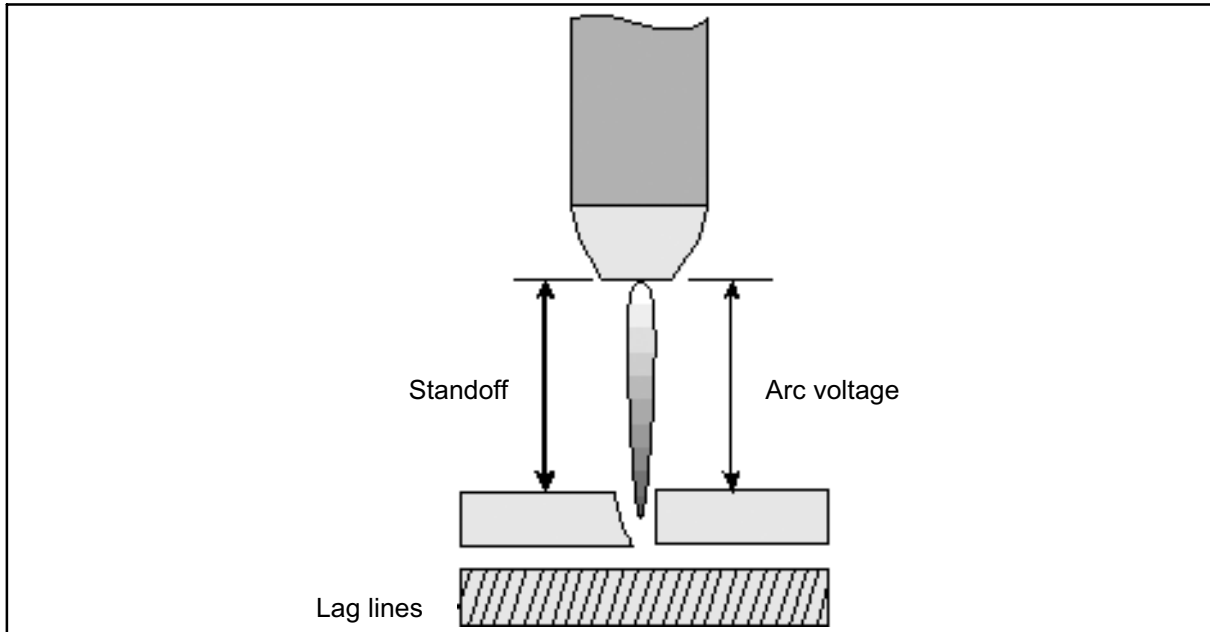


Figure 4-4. Cut quality

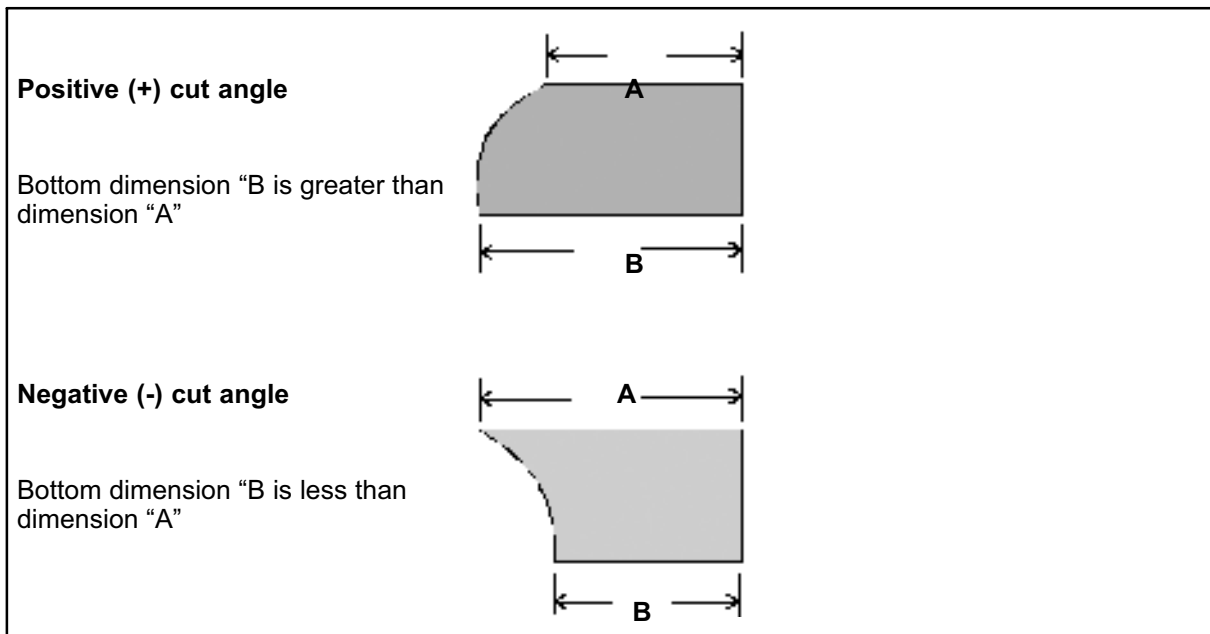


Figure 4-5. Cut angle

7.5 Dross formation

Cutting speed, gas selection and variations in metal composition contribute to dross formation. The correct cutting standoff also has an influence on dross formation. If the arc voltage is set too high, the cut angle becomes positive. In addition, dross forms on the bottom edge of the part. This dross can be very tenacious and require chipping and grinding for removal. Setting the cutting voltage too low results in undercutting the parts or negative cut angle. Dross formation occurs but in most cases it is easily removed.

Top dross

Top dross usually appears as splatter near the top edge of the kerf. This is a result of torch standoff (arc voltage) set too high or cutting speed set too fast. Most operators use the parameter charts for recommended speed. The most common problem is torch standoff or arc voltage control. Simply lower the voltage settings in increments of 5 volts until the top dross disappears. If an arc voltage control is not used, the torch can be lowered manually until the dross disappears.

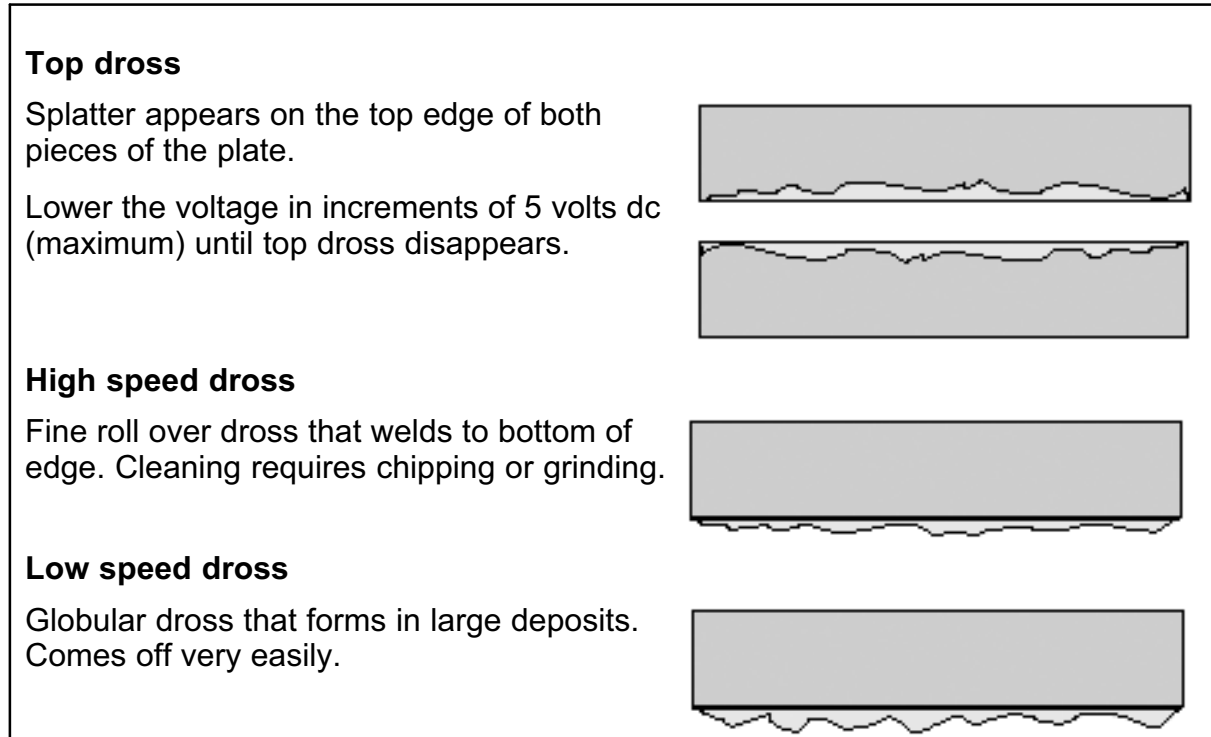


Figure 4-5. Cut angle

Summary

Arc voltage is a dependent variable. It is dependent upon cutting amperage, nozzle size, torch standoff, cut gas flow rate and cutting speed. An increase in arc voltage can result from a decrease in cutting speed, an increase in cutting amperage, a decrease in nozzle size, an increase in gas flow and an increase in torch standoff. Assuming that all of the variables are set as recommended, torch standoff becomes the most influential variable to the process. Good and accurate height control is a necessity in producing excellent cut quality.

7.6 Common cutting issues

Listed below are common cutting problems followed by the probable cause of each. If problems are determined to be caused by the ESP-101, refer to the maintenance and troubleshooting sections of this manual. If the problem is not corrected after referring to the maintenance and troubleshooting sections, contact your ESAB distributor.

A. Insufficient penetration.

1. Current too low.
2. Cutting speed too fast.



3. Damaged cutting nozzle.
4. Improper air pressure.
5. Low air flow rate.
6. Standoff too high - Nozzle to plate distance.

B. Main arc extinguishes.

1. Cutting speed too slow.
2. Worn electrode.
3. Standoff too high - Nozzle to plate distance.

C. Dross formation. (In some materials and thicknesses, it may be impossible to get dross-free cuts.)

1. Current too low.
2. Cutting speed too fast or too slow.
3. Improper air pressure.
4. Faulty nozzle or electrode.
5. Low air flow rate.

D. Double arcing. (damaged nozzle orifice.)

1. Low air pressure.
2. Damaged cutting nozzle.
3. Loose cutting nozzle.
4. Heavy spatter accumulation on nozzle.
5. Nozzle contact with workpiece during starting or cutting operation.

E. Uneven arc.

1. Damaged cutting nozzle or worn electrode.
2. Heavy spatter accumulation on nozzle or torch heat shield.

F. Unstable cutting conditions.

1. Incorrect cutting speed.
2. Loose cable or hose connections.
3. Electrode and/or cutting nozzle in poor condition.

G. Main arc does not strike.

1. Worn electrode.
2. Loose connections.
3. Work cable not attached

H. Poor consumable life.

1. Improper air pressure.
2. Contaminated air supply.
3. Low air flow rate.
4. Incorrect current setting for consumable set installed in torch.

8 MAINTENANCE



WARNING

BE SURE THAT THE WALL DISCONNECT SWITCH OR WALL CIRCUIT BREAKER IS OPEN BEFORE ATTEMPTING ANY INSPECTION OR WORK INSIDE OF THE UNIT.

8.1 General

If this equipment does not operate properly, stop work immediately and investigate the cause of the malfunction. Maintenance work must be performed by an experienced person, and electrical work by a trained electrician. Do not permit untrained persons to inspect, clean, or repair this equipment. Use only recommended replacement parts.

8.2 Inspection and cleaning

Frequent inspection and cleaning of the ESP-101 cutting machine is recommended. Some suggestions for inspecting and cleaning are as follows:

1. Check work cable to work piece connection.
2. Check safety earth ground at workpiece and at power source chassis.
3. Check heat shield on torch. It should be replaced if damaged.
4. Check the torch electrode and cutting tip for wear on a daily basis. Remove spatter, replace if necessary.
5. Make sure cable and hoses are not damaged or kinked.
6. Make sure all plugs, fittings, and ground connection are tight.
7. With all input power disconnected, and wearing proper eye and face protection, blow out the inside of the cutting power supply using low-pressure dry compressed air.



WARNING

WATER OR OIL ACCASIONALLY ACCUMULATES IN COMPRESSED AIR LINES. BE SURE TO DIRECT THE FIRST BLAST OF AIR AWAY FROM THE EQUIPMENT TO AVOID DAMAGE TO THE UNIT.

8. Occasionally bleed water from the filter beneath the air regulators.

8.3 IGBT handling & replacement

Since IGBT gates are insulated from any other conducting region, care should be taken to prevent static build up, which could possibly damage gate oxides. All IGBT modules are shipped from the factory with conductive foam contacting the gate and emitter sense pins.

Always ground parts touching gate pins during installation. In general, standard ESD precautions application to FETs should be followed.

Other handling precautions that should also be observed are as follows:

- Use grounded work station with grounded floors and grounded wrist straps when handling devices.

- Use a 100Ω resistor in series with the gate when performing curve tracer tests.
- Never install devices into systems with power connected to the system.

8.4 Module replacement

When mounting modules on a heatsink, certain precautions should be taken to prevent any damage against a sudden torque. If a sudden torque (“one-sided tightening”) is applied at only one mounting terminal the ceramic insulation plate or silicon chip inside the module may get damaged.

The mounting screws are to be fastened in the order shown below. Also, care must be taken to achieve maximum contact (i.e. minimum contact thermal resistance) for the best heat dissipation.

A torque wrench should be used. Tighten mounting and terminal screws per “Torque requirements shown in subsection” 7.3. If device is over-torqued, the device can be damaged like the above “one-sided tightening”.

Application of a thermal compound or thermal pad on the contact surface is required to properly remove heat from the device. It is recommended that a unit manufactured with thermal compound use thermal compound for replacement, even if replacement module was shipped with a thermal pad. Thermal compound may always be used as a replacement for a pad. Never use both compound and a pad.

Thoroughly remove any residual material from the mating surfaces. Use dow-340 heat sink compound or equivalent. Apply a thin layer (.005” nominal) between mating surfaces. If a thermal pad is used, ensure there are no folds or creases.

Two-point mounting type

Initial tightening 1 → 2

Final tightening 2 → 1

Four-point mounting type

Initial tightening 1 → 2 → 3 → 4

Final tightening 4 → 3 → 2 → 1

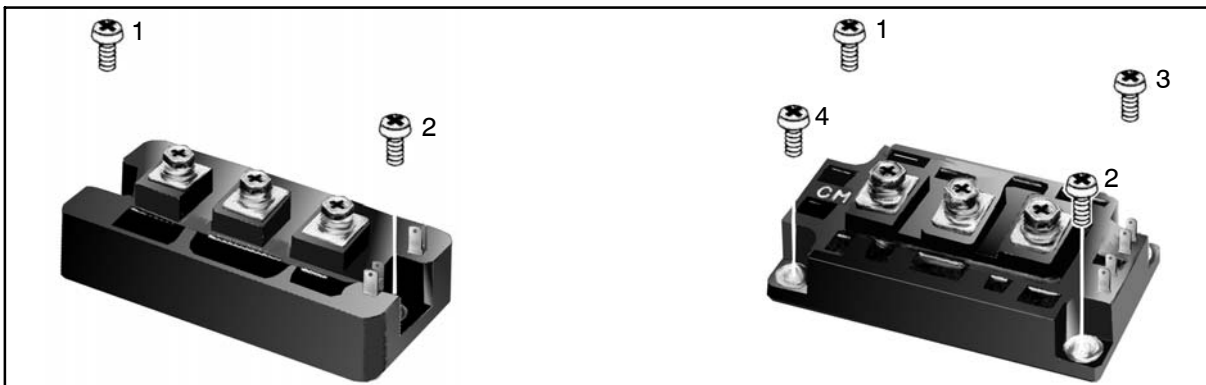




Figure 5-5. Screw fastening order

9 TROUBLESHOOTING

	<p>DANGER</p>	<p>ELECTRIC SHOCK CAN KILL! BE SURE THAT ALL PRIMARY POWER TO THE MACHINE HAS BEEN EXTERNALLY DISCONNECTED. OPEN THE LINE (WALL) DISCONNECT SWITCH OR CIRCUIT BREAKER BEFORE ATTEMPTING INSPECTION OR WORK INSIDE OF THE POWER SOURCE.</p>
---	----------------------	---

	DANGER	VOLTAGES IN PLASMA CUTTING EQUIPMENT ARE HIGH ENOUGH TO CAUSE SERIOUS INJURY OR POSSIBLY DEATH. BE PARTICULARLY CAREFUL AROUND EQUIPMENT WHEN THE COVERS ARE REMOVED.
---	---------------	--

9.1 General

Check the problem against the symptoms in the following troubleshooting guide. The remedy may be quite simple. If the cause cannot be quickly located, shut off the input power, open up the unit, and perform a simple visual inspection of all the components and wiring. Check for components, bulged or leaking capacitors, or any other sign of damage or discoloration.

The cause of control malfunctions can also be found by referring to the sequence of operations and electrical schematic diagram (Fig. 3) and check out the various components. A volt-ohmmeter will be necessary for some of these checks.

9.2 List of help codes

Code	Error	Cause	Solution
1	Line voltage, idle +/- 15 %	Supply line voltage either dropped or exceeded nominal input setting.	Check voltage supply.
2	Line voltage, cutting +/- 20 %	Supply line voltage either dropped or exceeded nominal input setting during a cut.	Check voltage supply.
3	Control bias, +/- 15 V bias split	Control transformer not supplying the proper voltage to the control circuit	Check transformer and control board.
4	Thermal switch	Switch open - unit overheated.	Allow unit to cool down, check for adequate ventilation.
5	Pressure	Air pressure is outside of proper range.	Check air supply and pressure setting.
6	Fail to fire	Arc did not transfer.	Check ground cable.
7	Pilot Arc timeout (~ 5 seconds)	Pilot arc exceeded 5 second limit .	Start within 5 second limit.
8	Torch error	Electrode in contact with nozzle (failed to separate	Check/replace consumables.
10	Feedback improper	Primarily seen if Hall sensor is unplugged. Check torch - possible nozzle to work short. Remove debris from front end of torch.	Check cable and connection between current sensor board and control board.
11	Primary over-current	Converter failure.	Send unit to an Authorized Repair Station for repair.
12	Single phase operation, shutdown	Lost (dropped) phase on the primary supply.	Check line wall disconnect fuses.
13	OCV (open circuit voltage) failure	Voltage or current not detected when test (parts in place, PIP) is performed.	Send unit to an Authorized Repair Station for repair.

Code	Error	Cause	Solution
14	Cabinet temperature	Too high, outside of operating limits.	Check ventilation around unit. Check air louvers and any other openings to ensure that any obstruction is removed
15	Bus charger failure	Primary bus not up to voltage.	Check bus charger.
20	PIP (Parts in place) no retract	Piston did not retract when air applied.	Check/clean consumables. Check air supply.
21	PIP (Parts in place) no continuity	Piston did not drop back in place when air was removed.	Check/clean consumables

9.3 Troubleshooting guide

A. Power (LED display) does not come on.

1. Visually inspect the machine for any damage.
2. Check if the cooling fan is running. If not, then check the following :
 - a. Check if the machine power cord is plugged to the input power receptacle.
 - b. Measure the input power at the receptacle. If not present, then check the wall disconnect switch and it's fuses.
 - c. Check fuse (F1). If fuse is ok, then check the input switch (S1) for proper operation. Replace if defective.
3. If above items check OK, the problem is internal. **Send unit to an authorized repair station for repair.**
 - a. a. If the cooling fan is running, then measure voltage between the following:
 - between P1-1 and P3-1 for 28 vac (if no voltage replace T1)
 - between TP-1 and TP-2 for 24 vdc
 - between P2-1 and P2-10 for 24 vdc
 - between P2-3 and P2-10 for 24 vdc
 - between TB1-1 (black) and TB1-2 (red) for 24 vdc.
 - b. If the voltage is present, then the pilot light may be burnt out.

B. Fault light remains on at power-up.

1. Verify start signal is not present. If so, clear start signal, fault should reset.
2. Switch power to OFF, verify consumables are installed correctly.

C. No air flow

1. Check air inlet supply. Unit requires 500 cfh (14.2 cmh) at 70 to 80 psig (4.8 to 5.5 bars) with 100 amp consumable set.
2. Check air hose and connections. Tighten if leaking.
3. Does air flow when "air test" switch is in test position?
 - a. If not, check torch consumables, replace if necessary.
 - b. If above items check OK , the problem is internal.

Send unit to an authorized repair station for repair.



D. The power is on, display does not show current setting but shows "ESP-101".

The machine has detected a premature torch trigger condition. Disengage the torch trigger and restart the machine. (As a safety precaution, the ESP-101 will not power up with the torch trigger engaged.)

E. The power is on, but nothing happens when torch switch is operated.

1. Ensure that torch is securely connected to the power source.
2. Torch should be checked for switch function.
3. If torch switch is functional, machine will need servicing.

F. Air is on, but nothing happens when torch switch is operated.

1. Error 21 will appear if the pilot arc path is not completed.
 - a. Check consumables, replace them if necessary.
 - b. Check torch for good connection to power source.
 - c. If it still gives this error, the machine may need to be serviced
2. Error 20 will appear if the torch piston does not retract.
 - a. Check and clean torch consumables.
 - b. Check that source pressure is greater than 80 psi (5.5 bar).
 - c. Check that air flows out of the torch.
 - d. If it still gives this error, the machine may need to be serviced.
3. Error 13 will appear if the machine does not provide OCV.

Send unit to an authorized repair station for repair.

G. Pilot arc is on but main arc does not transfer.

1. Make sure work clamp is connected to work table.
 - a. Measure continuity between work terminal and the work piece or table.
 - b. Make work clamp connection to clean bare metal of work piece or table.
 - c. If clamping to a work table, ensure good contact between work piece and the table.
2. Check the torch. Replace consumables if necessary.

H. Poor cutting performance.

1. Check air supply regulator . It should be adjusted to 70 - 80 psig (4.8 - 5.5 bars).
2. The air supplied to the torch should be free of oil and water.
3. Make sure the consumables in the torch are acceptable.
4. Check the output. Use a calibrated current probe capable of measuring 200 amps.



I. Air does not shut off.

1. Check air test, the gas solenoid valve is energized when the switch is in the “on” position.
 - a. Check voltage to solenoid coil, if present when CNC cable is unplugged, replace PCB2.
 - b. Turn off primary power to the power source. If gas continues to flow, replace the gas solenoid.
 - 1 Turn on primary power and check the status of the Fault light. If the Fault light is on continuously and gas is on continuously, turn off primary power and inspect the torch for proper assembly of the electrode and nozzle. Press firmly on the electrode and verify that it retracts when pressed, and returns forward when released.
 - 2 Reassemble the electrode and nozzle and turn on primary power. After approximately two seconds the gas should come on briefly then go off. If the Fault light comes on continuously and gas remains off, check for defective torch trigger or shorted torch trigger leads.

J. Main arc is difficult to start.

1. The most common reason is worn or missing consumables. Check and replace if necessary.
2. Input air must be clean and dry.
3. Input air pressure must be between 70 - 80 psig (4.8 - 5.5 bars).
4. Torch connections must be tight.
5. Work cable and clamp must be in good condition and must make a good electrical connection to the material to be cut.
6. If above items check OK , the problem may be internal.

Send unit to an authorized repair station for repair.

K. No pilot arc or main arc established if you depress torch switch or send start signal.

1. Check help code display.

9.4 Troubleshooting remote junction box installation

Issue	Resolution
Continuous flow of gas from remote junction box.	<ul style="list-style-type: none"> • Extension cable and torch cable are connected to wrong sides of RJB. Disconnect air supply and cables and reverse RJB mounting.
No gas flow from torch in gas test or operate mode and low air pressure code is not present on power supply.	<ul style="list-style-type: none"> • Place power supply in gas test mode, verify 24VDC is supplied at gas solenoid in RJB. • If 24VDC (polarity not required) is present, verify pins are properly installed in 12-pin plug, verify plug is mated completely until tabs are engaged and/or replace solenoid. • If 24VDC is not present, verify wiring connections made in Installation step A.2.

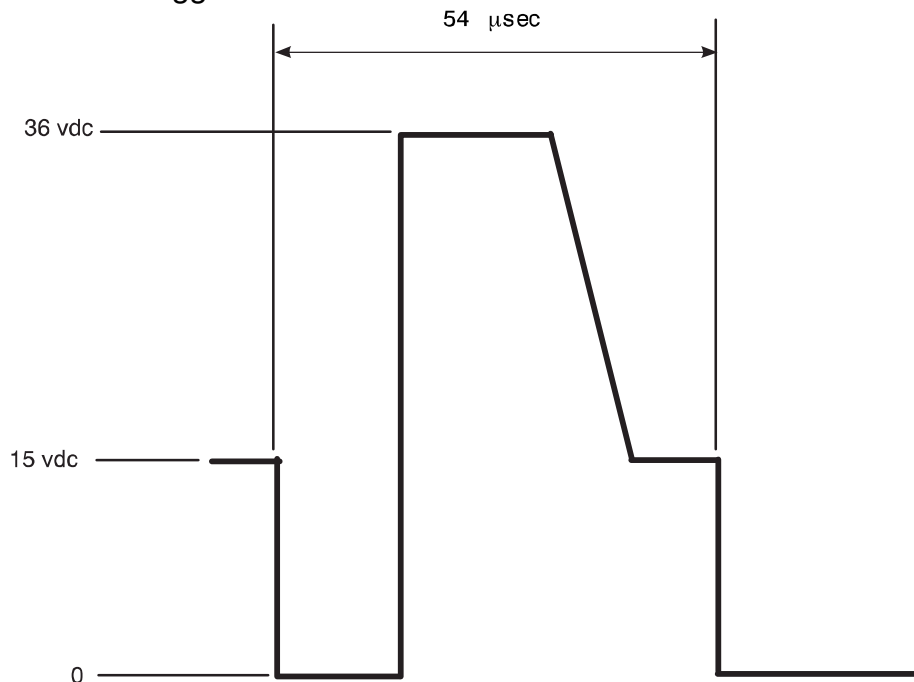
9.5 Reference voltage checks

A. Control board assembly (PCB1)

1. Voltage test points - Tests are made with power on - no arc.
 - TP-15 - ground
 - TP-12 - +15 vdc
 - TP-13 - +5 vdc
 - TP-14 - -15 vdc

B. Interface board (PCB2)

1. Voltage test points
 - TP-1 - +24 vdc
 - TP-2 - +24 vdc com
2. LED's
 - D18 - torch trigger



For 208/230 VAC input, the IGBT off time is 3μsec.

For 400/460 VAC input, the IGBT off time is 3μsec.

Figure 6.1. IGBT gating signal

9.6 Sequence of operation

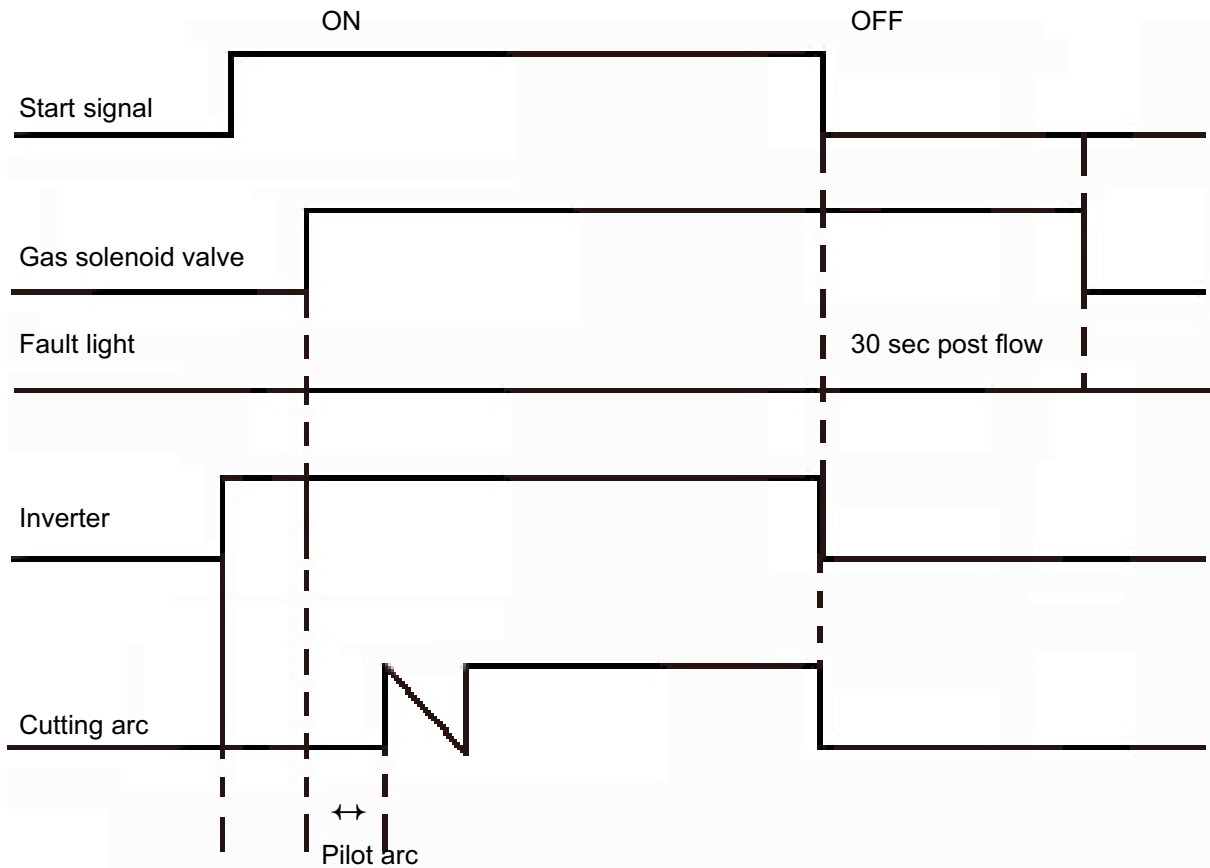


Fig 6.2. Sequence of operation

NOTES:

1. When the start signal is turned "on" during post flow period, the machine will start the process without a preflow period.
2. If the amber fault light comes on, cutting operation will be terminated. The post flow time starts from the moment the start signal is removed.

10 REPLACEMENT PARTS

10.1 General

Always provide the serial number of the unit on which the parts will be used. The serial number is stamped on the unit nameplate.

10.2 Ordering

To ensure proper operation, it is recommended that only genuine ESAB parts and products be used with this equipment. The use of non-ESAB parts may void your warranty.

Replacement parts may be ordered from your ESAB distributor.

Be sure to indicate any special shipping instructions when ordering replacement parts.

Refer to the communications guide located on the back page of this manual for a list of customer service phone numbers.

Note

Bill of material items that have blank part numbers are provided for customer information only. Hardware items should be available through local sources

	Model # P/N	Description	Schematic diagram	Wiringdiagram
1	0558 004 880	ESP-101 460v	0558 006 578	0558 004 831
2	0558 005 215	ESP-101 380-400c CE	0558 006 606	0558 006 607

10.3 Torque recommendations

RECOMMENDED TORQUES (IN/LBS±10%)

SYMBOL / DESCRIPTION	MOUNT	TERMINAL
RECOMMENDED TORQUES (IN/LBS±10%)		
SYMBOL / DESCRIPTION	MOUNT	TERMINAL
BR101	36	36
Q2,3	32	32
D4,5	28	22
C5,6	-	25
C11, 12, 13, 14	-	18
R1, 2, 3, 4,, 5, 6, 7	6	-
R14	Hand	-
SW1	22	35
K1	18	40
K2	18	18
F1, TB1	14	-
TS1, J1, TEE	12	-

SYMBOL / DESCRIPTION	MOUNT	TERMINAL
SOL1	10	-
HEATSINK	28	-
M1,2	18	-
JP1	36	36
WORK, GND1	44	44
GND2	12	-
PCB1,2	10	
PCB1 - J12	-	12
PCB3 . POTENTIOMETERS	14	-
PCB4	14	-
PCB4 - P1,2	-	44
PCB4 - P3	-	25
PCB5 - TB1, 2, 3, 4, 9, 10	-	44
PCB5 - TB6,8	-	25
PCB6	10	-
PCB7	18	14
P7,8	-	25
P1, 2, 3, 4, 6, 7, 9, 13, 16	-	4,5
STANDOFFS	7	-
HANDLES	44	-
SHEETMETAL #8	18	-
SHEETMETAL #10	28	-
SHEETMETAL 1/4"	Impact	-

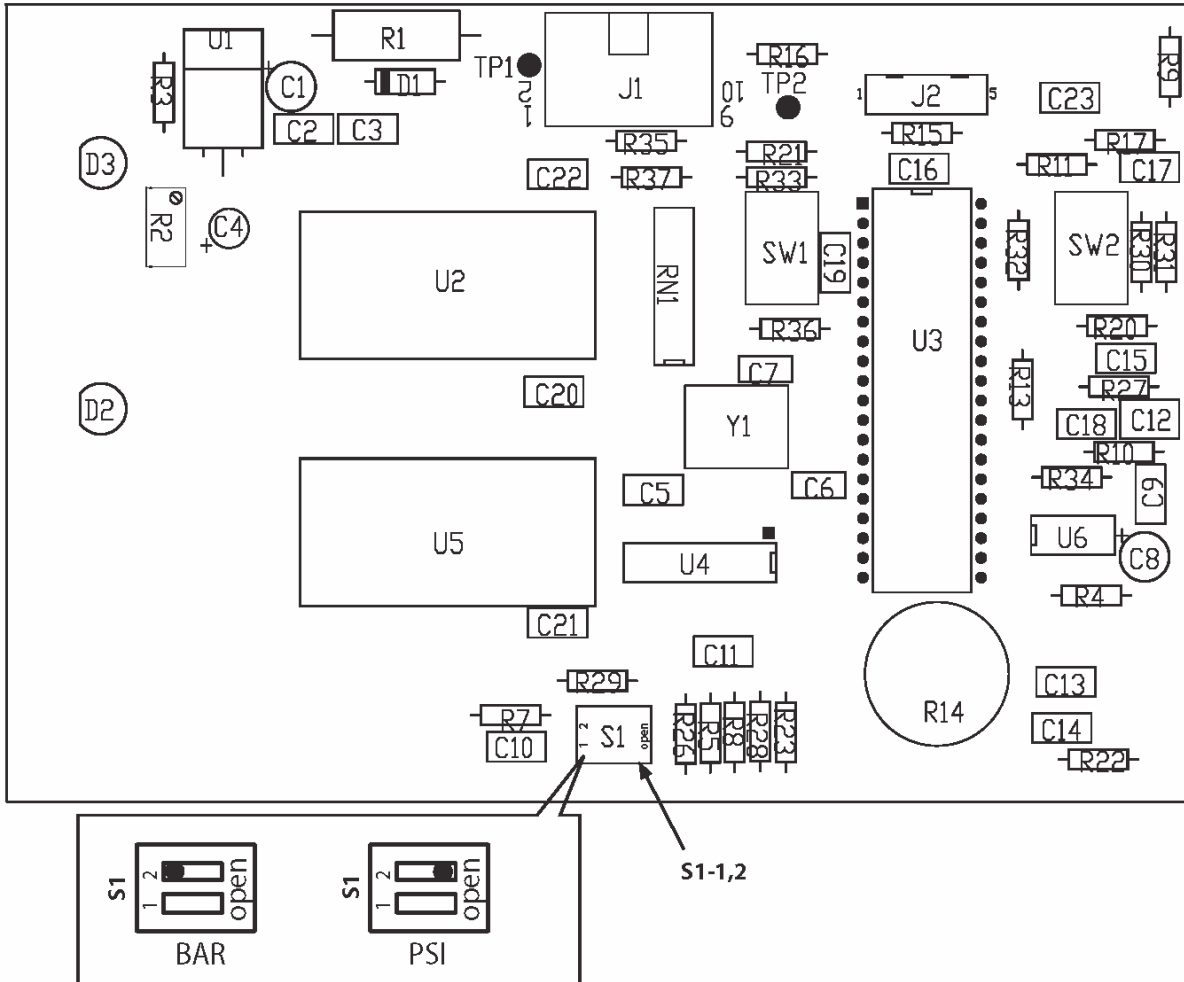
10.4 Selecting air pressure units of measure

1. Set S1-2 dip switch for desired air pressure units of measure.
 - PSI - "OPEN"
 - BAR - Not Open
2. S1-1 is not used.

10.5 Display board assembly

Display board assembly

P/N 0558038297



11 REVISION HISTORY

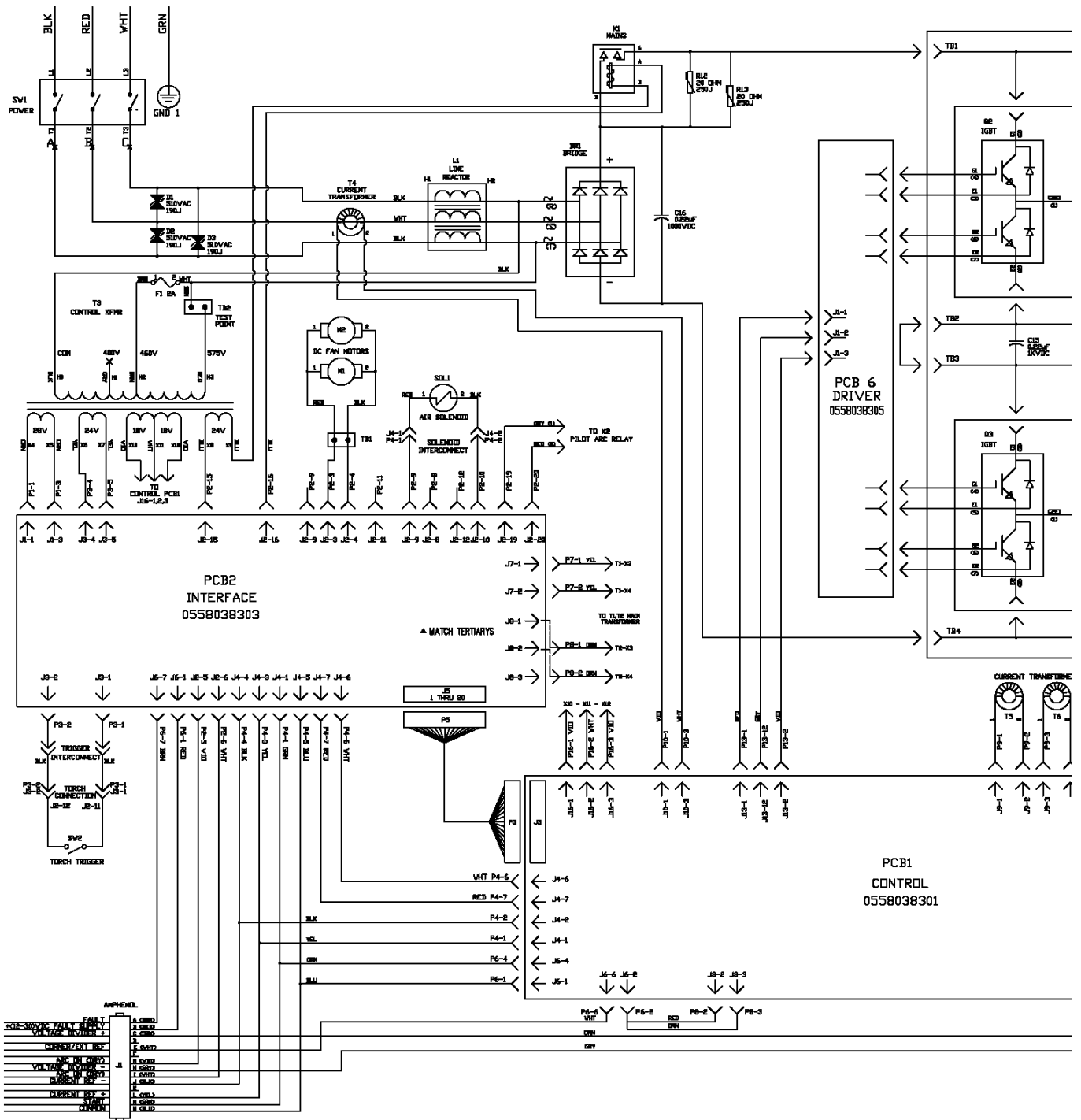
1. Original release for BETA use only: 04/2007
2. Preliminary release - 08/2007
3. Official release - 01/2008
4. Added info and made changes per CN-083154 - 09/2008
5. Revision 10/09 - completely re-work manual
6. 06 / 2010
Changed serial number.
Separated the replacement parts list from instruction manual.
7. 07 / 2010
Included the replacement parts list.

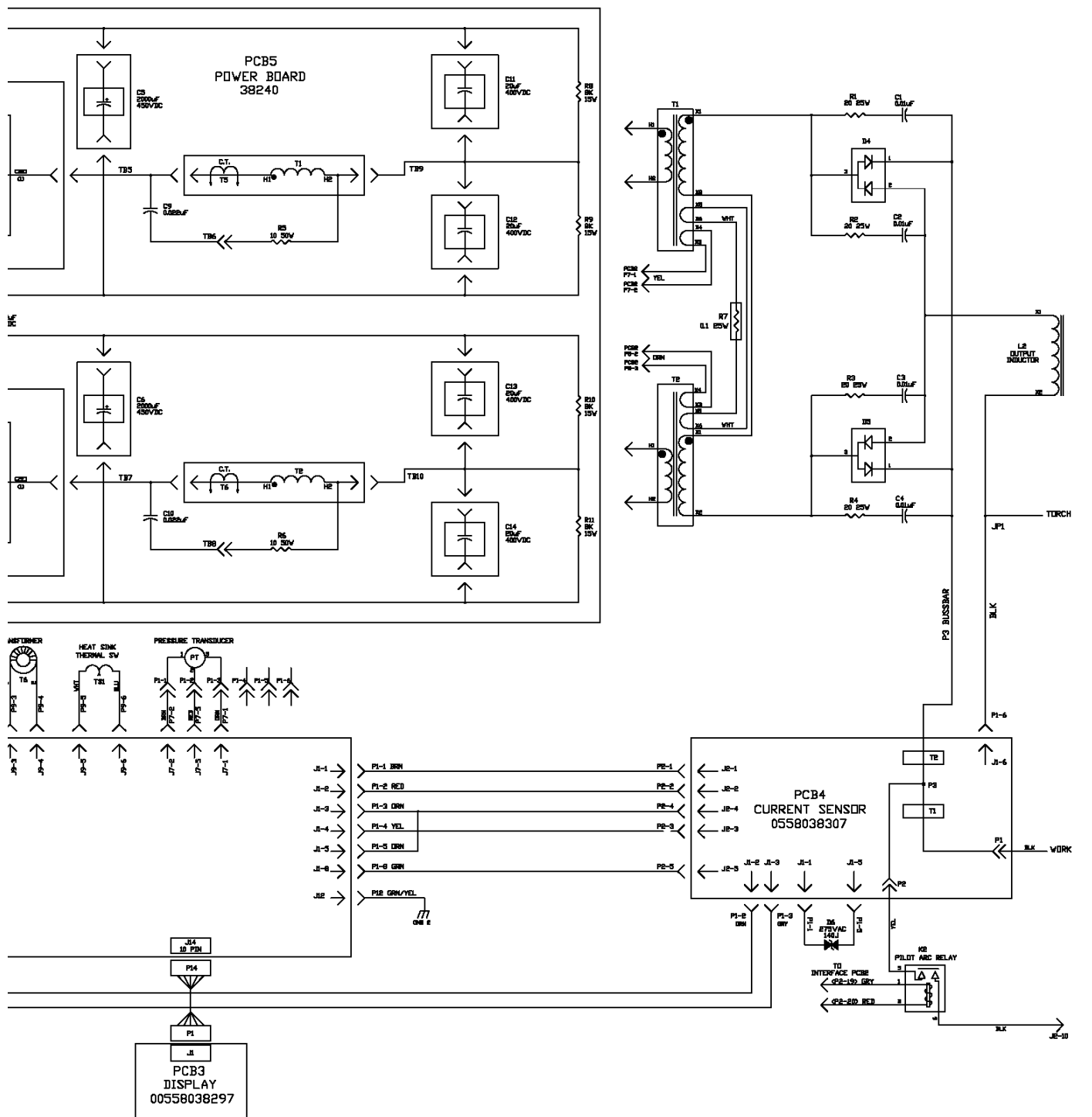
NOTES

Dotted lines for writing notes.

Schematic diagram

D-0558006578





CONTROL/DISPLAY BOARD ASSEMBLY

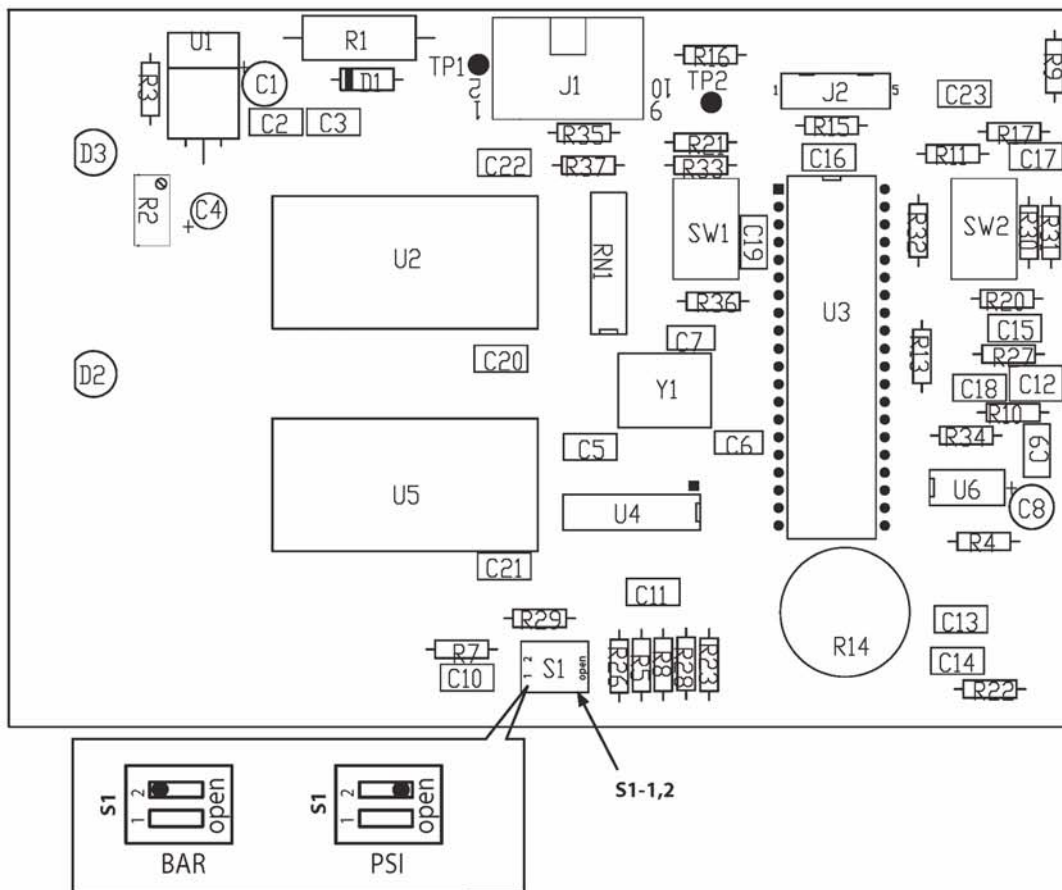
P/N 0558038297

Before installation:

1. Disconnect input power to machine.
2. Verify position of dip switch.

Settings:

1. Set S1-2 dip switch for desired air pressure units of measure.
 - PSI - "OPEN"
 - BAR - Not Open
2. S1-1 is not used.



0558007609

10/2009



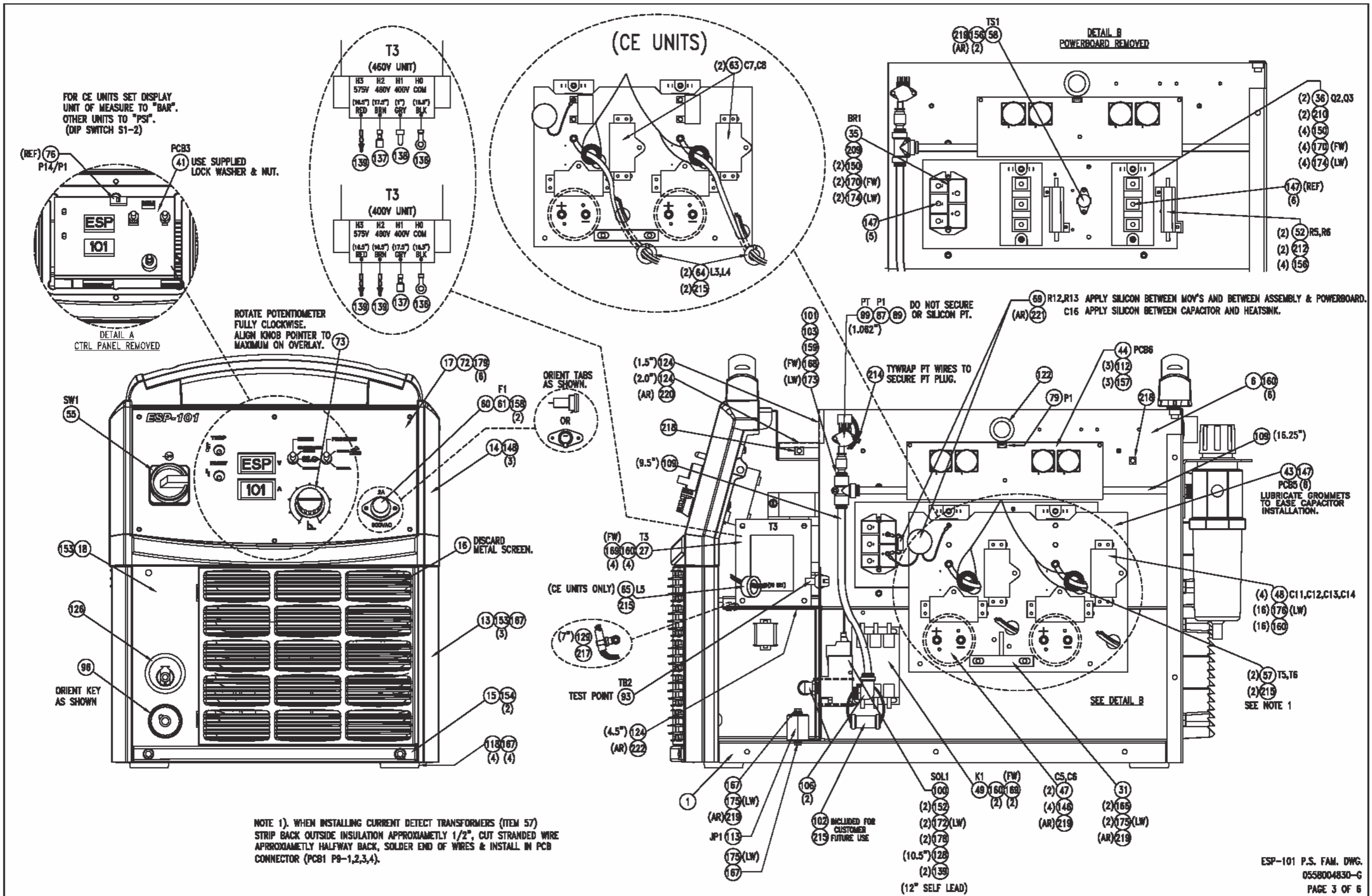
ESAB Welding & Cutting Products
PO Box 100545, Florence SC 29501-0545

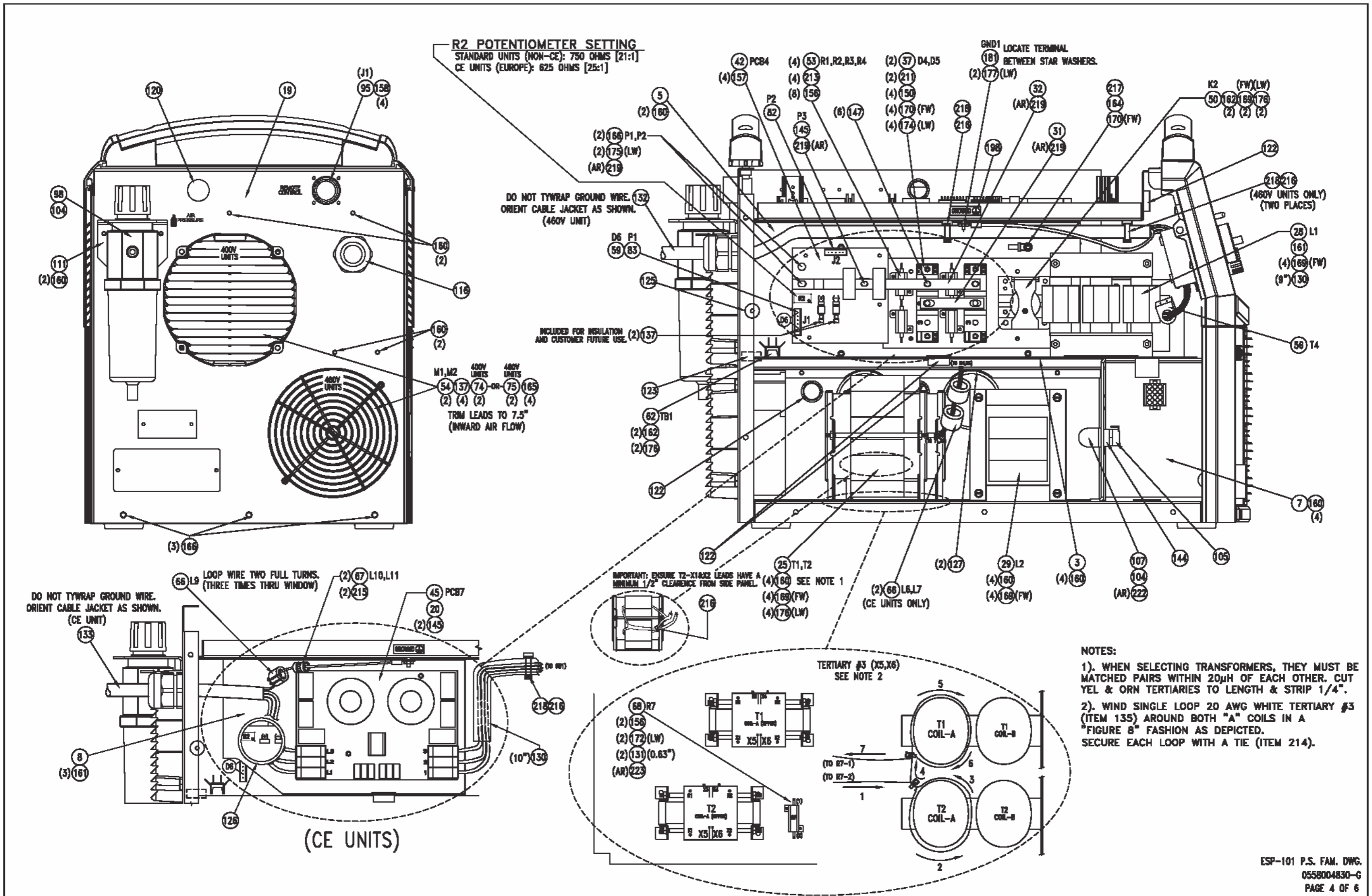
Replacement parts

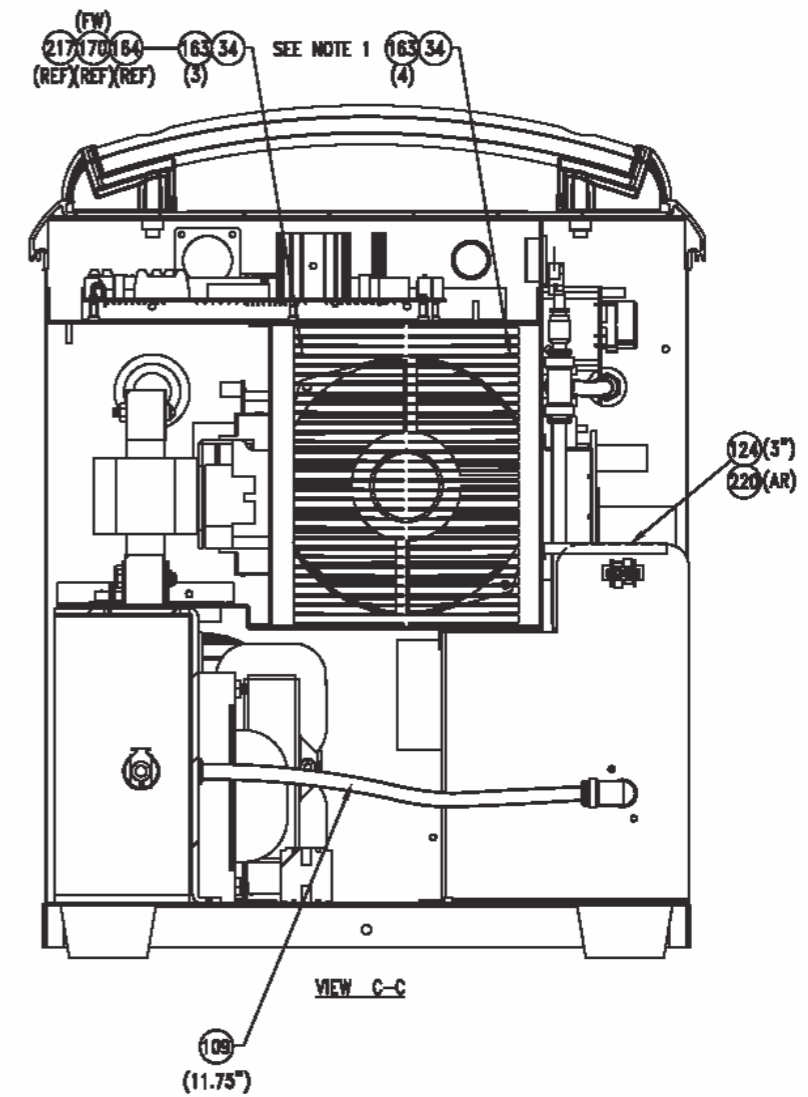
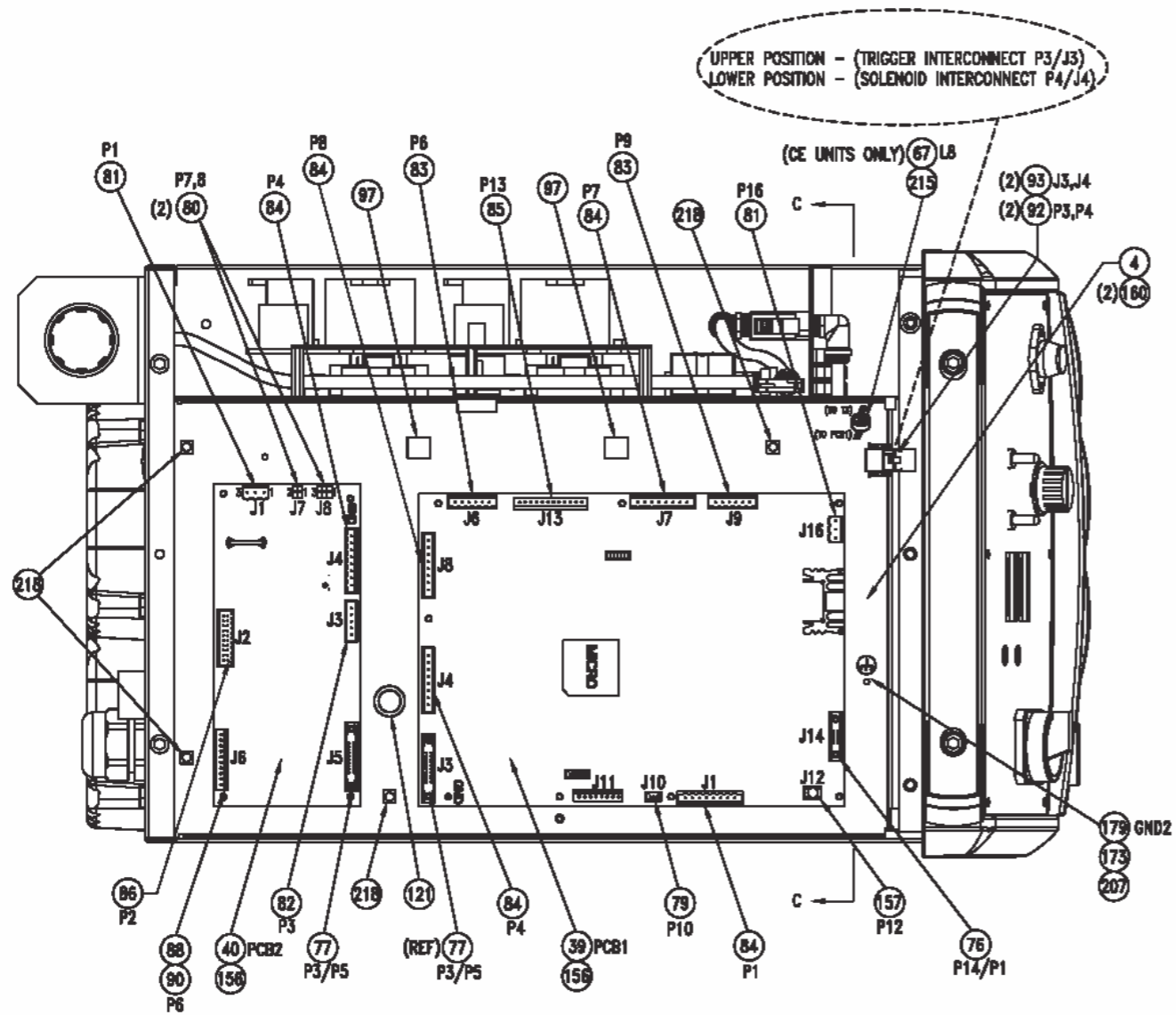
0558005215 380-400v CE	0558004880 460v	ITEM NO	PART NO	SYMBOL	DESCRIPTION	0558005215 380-400v CE	0558004880 460v	ITEM NO	PART NO	SYMBOL	DESCRIPTION
1	1	1	0558004148		BASE	1	1	58	951085	TS1	SWITCH THERMAL N/C 176°F
1	1	2	0458390005		PANEL TOP	1	1	59	0558006715	D6	VARISTOR METAL OXIDE 275VAC 140J
1	1	3	0558005876		SHELF LOWER	1	1	60	952136		HOLDER FUSE
1	1	4	0558004149		SHELF UPPER (PCB)	1	1	61	0558001379	F1	FUSE MIDGET SLO-BLO 2A 600V
1	1	5	0558005875		BRACKET HEATSINK LEFT	1	1	62	950487	TB1	TERMINAL BLOCK 2 POS x 4 FASTON
1	1	6	0558005874		BRACKET HEATSINK RIGHT	2	-	63	951940	C7,8	CAPACITOR MET-POLY 1uF 600VDC
1	1	7	0558005880		COMPARTMENT TORCH CONNECTIONS	2	-	64	0558009404	L3,4	FERRITE CORE 0.5"LG 1.42"OD
1	-	8	0558009434		BRACKET EMC FILTER	1	-	65	952002	L5	TOROIDAL CORE
		9				2 / Ref	-	66	0558009403	L6,7 / L9	FERRITE CORE 1.0"LG 1.25"OD
1	1	10	0558004150Y		PANEL SIDE LEFT	1 / Ref	-	67	0558009257	L8 / L10,11	METGLASS CORE
1	1	11	0558004151Y		PANEL SIDE RIGHT	1	1	68	17712001	R7	RESISTOR 0.1 OHM 25W 5%
1	1	12	0558006442Y		DOOR ACCESS TORCH	1	1	69	0558009435	R12,13 / C16	KIT THERMISTOR / CAP INRUSH
1	1	13	0458390002		PROFILE FRAME FRONT LOWER	1	1	70	0558009436	C1,2,3,4	KIT CAPACITORS
1	1	14	0558006409		PROFILE FRAME FRONT UPPER	1	1	71	0558009437	D1,2,3	KIT MOV 510VAC 190J
1	1	15	0458509001		BEAM LOWER FRONT	1	1	72	0558954063		OVERLAY
1	1	16	0458383001		GRILL FRONT	1	1	73	0558001818		KNOB 1-3/8" DIA
1	1	17	0558004155B		PANEL CONTROL	2	-	74	0558005659		GUARD FAN 6" LOUVERED PLASTIC
1	1	18	0558004156M		PANEL CONNECTION SILKSCREENED	-	2	75	0558002994		GUARD FAN 6" GRILLED STEEL
1	1	19	0558004152		PANEL REAR	1	1	76	0558004966	P14/P1	ASSY RIBBON CABLE 10 PIN 12"
		20	0558009269		INSULATOR DUAL STAGE EMC FILTER PCB Kydex	1	1	77	0558006867	P3/P5	ASSY RIBBON CABLE 20 PIN 4.5"
		21						78			
		22						79	950096	P1,10	HOUSING RECEPTACLE 3 POS - Blk
-	1	23	0558006405	T1	XFMR MAIN T1 460V	2	2	80	0558007184	P7,8	CONNECTOR MINI-COMBICON 2 PIN
1	-	24	0558007174	T1	XFMR MAIN T1 400V	2	2	81	951005	P1,16	CONNECTOR COMBICON 3 PIN
-	1	25	0558006465	T2	XFMR MAIN T2 460V	2	2	82	951007	P2,3	CONNECTOR COMBICON 5 PIN
1	-	26	0558007175	T2	XFMR MAIN T2 400V	3	3	83	951009	P1,6,9	CONNECTOR COMBICON 6 PIN
1	1	27	0558006393	T3	XFMR CONTROL	5	5	84	0560986173	P1,4,4,7,8	CONNECTOR COMBICON 8 PIN
1	1	28	0558006392	L1	REACTOR LINE CE 3 PHASE 25A	1	1	85	951339	P13	CONNECTOR COMBICON 12 PIN
1	1	29	0558006390	L2	INDUCTOR OUTPUT	1	1	86	0558006415	P2	CONNECTOR 20 POS w/ SPRING
		30				1	1	87	0558003430	P1	CONNECTOR IDC 6 PIN 22awg - Red
2	2	31	0558003558		BUSSBAR DIODE	1	1	88	952081	P6	CONNECTOR IDC 10 PIN 20awg - Yel
1	1	32	0558006410		BUSSBAR DIODE / CURRENT DETECT	1	1	89	0558003429		COVER IDC CONNECTOR 6 PIN
		33				1	1	90	13731781		COVER IDC CONNECTOR 10 PIN
2	2	34	0558006153		HEATSINK			91			
1	1	35	0558006395	BR1	BRIDGE RECTIFIER 80A 1600V	2	2	92	0558001012	P3,4	HOUSING UNIV PLUG 2 POS - Wht
-	2	36	0558006871	Q2,3	IGBT DUAL 200A 600V	3	3	93	0558001013	TB2, J3,4	HOUSING UNIV CAP 2 POS - Wht
2	-		0558008052	Q2,3	IGBT DUAL 200A 600V	1	1	94	951109	J2	HOUSING UNIV CAP 12 POS - Wht
2	2	37	0558006387	D4,5	DIODE OUTPUT 150A 600V	1	1	95	952210	J1	RECEPTACLE PANEL 14 SOCKET
		38				1	1	96	13733935	WORK	SOCKET PANEL MOUNT (1/0-3/0) 600A
1	1	39	0558038301	PCB1	PC BOARD - CONTROL			97			
1	1	40	0558038303	PCB2	PC BOARD - INTERFACE	1	1	98	950923		REGULATOR PRESSURE w/ FILTER 0-125 PSI
1	1	41	0558038297	PCB3	PC BOARD - DISPLAY	1	1	99	0558009438	PT	KIT TRANSDUCER PRESSURE 2-100 PSI w/ HOSE
1	1	42	0558038307	PCB4	PC BOARD - CURRENT SENSOR	1	1	100	0558006396	SOL1	VALVE SOLENOID 3-WAY 100 PSI 24VDC
1	1	43	38240	PCB5	PC BOARD - POWER	1	1	101	0558006351		TEE 5/16 OD TUBE
1	1	44	0558038305	PCB6	PC BOARD - DRIVER	1	1	102	0558007783		UNION 5/16 OD TUBE
1	-	45	0558038378	PCB7	PC BOARD - EMC FILTER DUAL STAGE	1	1	103	0558006341		REDUCER 5/16 OD TUBE 1/4 OD TUBE
		46				2	2	104	0558004182		ADAPTOR 5/16 OD TUBE 1/4NPTM
2	2	47	0558003106	C5,6	CAPACITOR ALUM 2000uF 450VDC	1	1	105	0558005635		COUPLING QDF 1/4-3/8 ORIF 1/4NPTM
4	4	48	951161	C11,12,13,14	CAPACITOR METPOLY 20uF 400VDC	2	2	106	0558004184		ELBOW 90° 5/16 OD TUBE 1/4NPTM
1	1	49	950247	K1	CONTACTOR 3P 40A 24VAC	1	1	107	44251100		ELBOW PIPE 90° 1/4NPT
1	1	50	0558006394	K2	RELAY SPST 24VAC 20A(125VDC) w/ MAG BLOWOUT			108			
		51				1	1	109	0558009439		KIT HOSE POLYURETHANE 3/16 ID 5/16 OD Red (3 per)
2	2	52	17750051	R5,6	RESISTOR 10 OHM 50W 3%			110			
4	4	53	17721020	R1,2,3,4	RESISTOR 20 OHM 25W 1%	1	1	111	0558005967		BRACKET MOUNTING REGULATOR
2	2	54	0558006389	M1,2	FAN 6" 24VDC	3	3	112	951567		STANDOFF NYLON FEMALE #6-32 HEX 1.25" LG
1	1	55	0558006388	SW1	SWITCH POWER 3P 40A 600V	1	1	113	672225	JP1	STANDOFF GLASTIC FEMALE 1/4-20 HEX 1.25" LG
1	1	56	0558009291	T4	KIT CURRENT TRANSFORMER	2	2	114	0459307881		HANDLE KIT
1	1	57	0558006391	T5,6	ASSY CURRENT DETECT TRANSFORMER PAIR	1	1	115	0558007069		LATCH SLIDING

Part 1

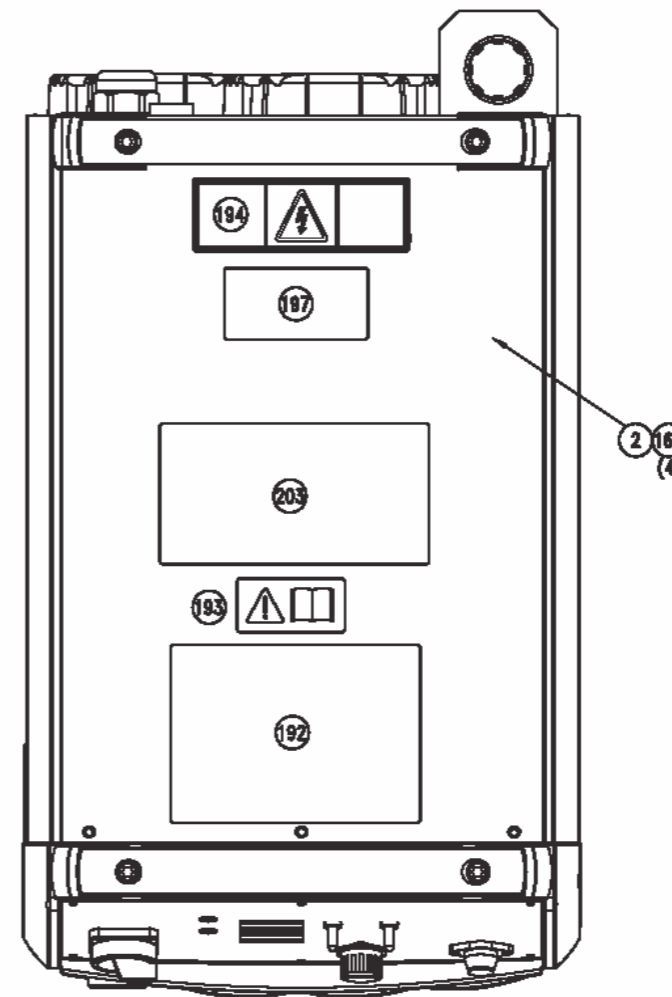
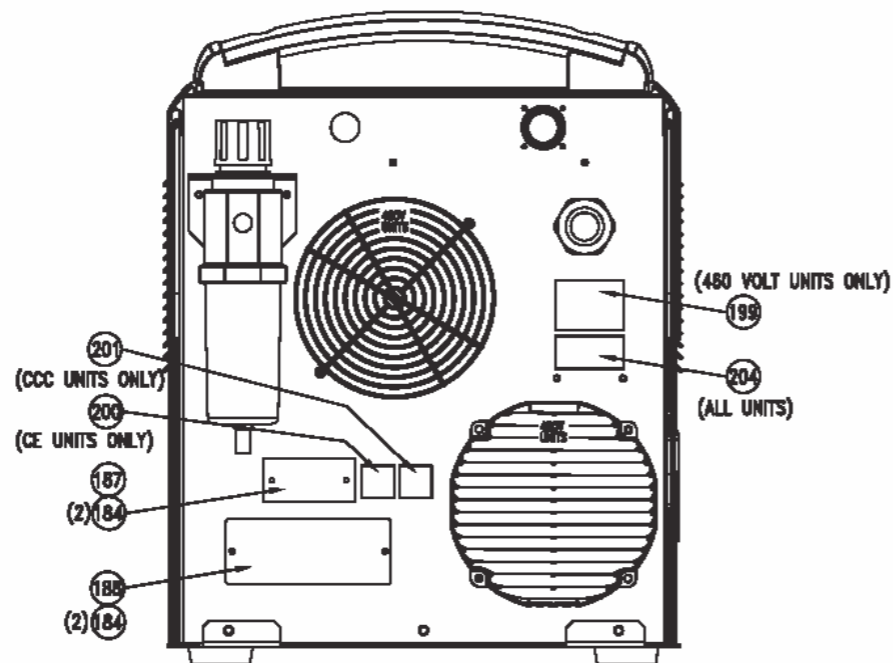
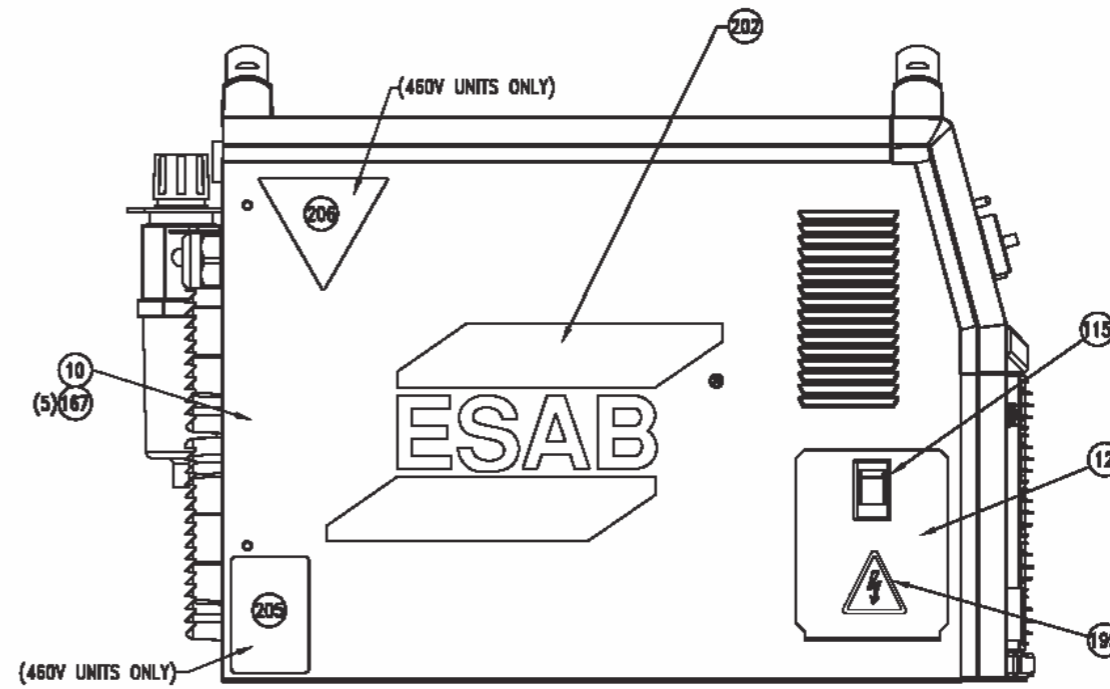
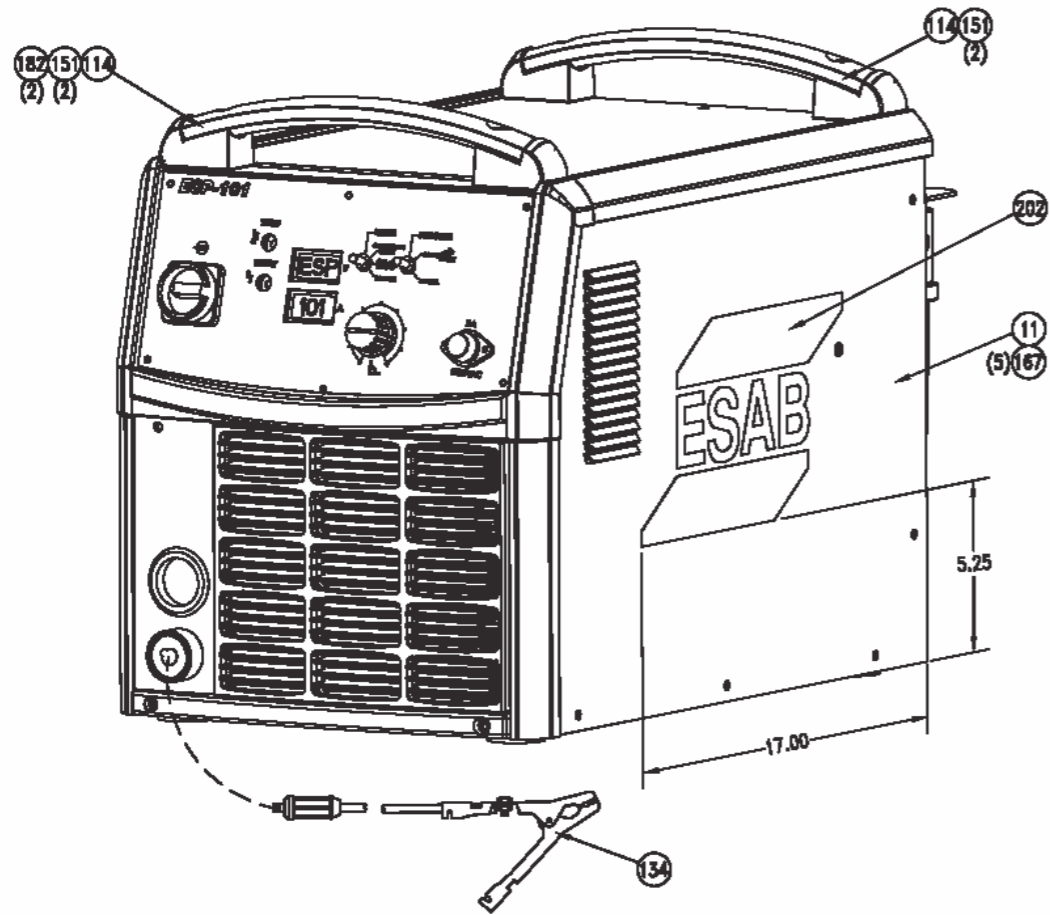
0558005215 380-400v CE	0558004880 460v	ITEM NO	PART NO	SYMBOL	DESCRIPTION	0558005215 380-400v CE	0558004880 460v	ITEM NO	PART NO	SYMBOL	DESCRIPTION
1	1	116	0558002581		STRAIN RELIEF 1" 1.312MH	AR	AR	173	*		WASHER LOCK #6
1	1	117	950435		LOCKNUT CONDUIT 1"	AR	AR	174	*		WASHER LOCK #10
4	4	118	0458683001		FOOT RUBBER	AR	AR	175	*		WASHER LOCK 1/4
		119						176			
1	1	120	23610197		PLUG HOLE .875 DIA	AR	AR	177	*		WASHER LOCK EXT 1/4
1	1	121	950823		BUSHING SNAP .56ID .69MH	AR	AR	178	*		NUT #4-40
5	5	122	594876		BUSHING SNAP .75ID 1.00MH	AR	AR	179	*		NUT #6-32
1	1	123	0558007782		EDGE GUARD WIRE GUIDE			180			
0.92'	0.92'	124	*		GROMMET STRIP RUBBER 0.63ID .188W	AR	AR	181	*		NUT 1/4-20
1	1	125	0558007073		GROMMET RUBBER (0.12-0.31)ID 0.50GD .06W	AR	AR	182	*		NUT LOCK NYLON 5/16-18
2	2	126	993426		GROMMET RUBBER 1.50ID 1.75GD .06W			183			
2	2	127	0558007070		GROMMET RUBBER 2.50ID 2.75GD .06W	AR	AR	184	*		RIVET 1/8 (.032-.125)
0.88'	0.88'	128	*		TUBING PVC, 300V, #8 BLACK			185			
0.59'	0.59'	129	*		TUBING PVC, 600V, 3/8" BLACK			186			
1.59'	1.59'	130	*		TUBING PVC, 600V, 5/8" BLACK	1	1	187	NA		LABEL NAMEPLATE Stock / Serial No
0.11'	0.11'	131	*		HEATSHRINK 1/8" BLACK	-	1	188	NA		LABEL RATING 460V
-	1	132	0558007789		POWER CORD 8awg 4 Conductor			189			
1	-	133	0558006872		POWER CORD CE 6mm (9awg) 4 Conductor	1	-	190	NA		LABEL RATING 380-400V
1	1	134	0558007603		CABLE WORK 25'						
AR	AR	135	*		WIRE, 600V 105C, 20 AWG, WHT	1	1	192	2091514		LABEL WARNING GENERAL ARC WELD & CUT
1	1	136	*		TERM, RING #10, 22-16 AWG - PIDG - Red	1	1	193	955269		LABEL SYMBOL CAUTION READ MANUAL
7	7	137	*		TERM, FAST 1/4" FEMALE INS, 22-18 AWG - Pink	1	1	194	954994		LABEL DANGER HIGH VOLTAGE Bilingual
-	1	138	*		TERM, WIRE JOINT INS, 18-16 AWG	1	1	195	954509		LABEL SYMBOL CAUTION HIGH VOLTAGE
4	3	139	*		CONTACT, PIN, 20-14 AWG - Round			196			
		140				1	1	197	954707		LABEL WARNING OEM SAFETY INTERLOCK
		141				1	1	198	2091558		LABEL PE GROUND
		142				-	1	199	NA		LABEL CSA LR-30071 NRTL /C
		143				1	-	200	NA		LABEL CE - Plain
1	1	144	0558006577		WASHER FLAT NYLON .817 x .544	0	-	201	NA		LABEL CCC
AR	AR	145	61387910		SCREW SQ PAN TRI #10-32 x .38 w/ LW	2	2	202	13734588		LABEL ESAB DIE CUT 9.0 x 5.1 Blk
AR	AR	146	0558006557		SCREW PHL HEX #10-32 x .50 w/ FLW Blk	1	1	203	0558954041		LABEL CONSUMABLE BREAKDOWN PT-37 (100A)
17	17	147	0558002087		SCREW PHL HEX w/ FLW M5 x 12	1	1	204	NA		LABEL PATENT POWER SUPPLIES Bilingual
3	3	148	0469381001		NUT CLIP-ON M6	-	1	205	0558954034		LABEL CUSTOMER ASSISTANCE
		149				-	1	206	NA		LABEL ISO 9001
AR	AR	150	*		SCREW SKT HEX #10-32 x .63	1	1	207	0558008436		LABEL CHASSIS GROUND
4	4	151	*		SCREW SKT HEX 5/16-18 x 2.00			208			
2	2	152	*		SCREW SLT RND #4-40 x 2.00	1	1	209	0558006463		PAD THERMAL BRIDGE RECTIFIER
3	3	153	*		SCREW SKT HEX BUTTON M6 x 20 Blk	2	2	210	951191		PAD THERMAL IGBT DUAL MODULE
2	2	154	*		SCREW SKT HEX 1/4-20 x 0.75 Blk	2	2	211	951518		PAD THERMAL DIODE MODULE
		155				2	2	212	951194		PAD THERMAL RESISTOR 50W
AR	AR	156	61325826		SCREW SQ PAN TRI #4-40 x .38	4	4	213	951193		PAD THERMAL RESISTOR 25W
AR	AR	157	61325851		SCREW SQ PAN TRI #6-32 x .38	AR	AR	214	*		TYWRAP SM 4"
AR	AR	158	61325853		SCREW SQ PAN TRI #6-32 x .63	AR	AR	215	*		TYWRAP MED 5.5"
AR	AR	159	61325861		SCREW SQ PAN TRI #6-32 x 1.00	AR	AR	216	*		TYWRAP LG 7.25"
AR	AR	160	61325878		SCREW SQ PAN TRI #8-32 x .38	AR	AR	217	182W58		TYWRAP SCREW MOUNT LG 7.25"
AR	AR	161	61325880		SCREW SQ PAN TRI #8-32 x .50	AR	AR	218	99511578		BASE TYWRAP SNAP-IN .218MH
AR	AR	162	61325882		SCREW SQ PAN TRI #8-32 x .75	AR	AR	219	*		COMPOUND ELECTRICAL JOINT ALCOA #2
AR	AR	163	61325900		SCREW SQ PAN TRI #10-24 x .38	AR	AR	220	*		ADHESIVE QUICK-SET LOCTITE 495
AR	AR	164	61325902		SCREW SQ PAN TRI #10-24 x .50	AR	AR	221	*		ADHESIVE SILICON RUBBER DOW 732 - Clear
AR	AR	165	61325903		SCREW SQ PAN TRI #10-24 x .63	AR	AR	222	*		ADHESIVE THREADLOCKER LOCTITE 242 - Blue
AR	AR	166	61325087		SCREW SQ PAN TRI 1/4-20 x .50	AR	AR	223	*		SOLDER .031 DIA
AR	AR	167	61949087		SCREW HEX WSH TRI 1/4-20 x .50 Serrated	1	1	224	NA		WIRE KIT MAIN
AR	AR	168	*		WASHER FLAT #6	1	-	225	NA		WIRE KIT CE
AR	AR	169	*		WASHER FLAT #8	1	1	226	NA		CABLE KIT
AR	AR	170	*		WASHER FLAT #10			227			
		171						228			
AR	AR	172	*		WASHER LOCK #4			229			



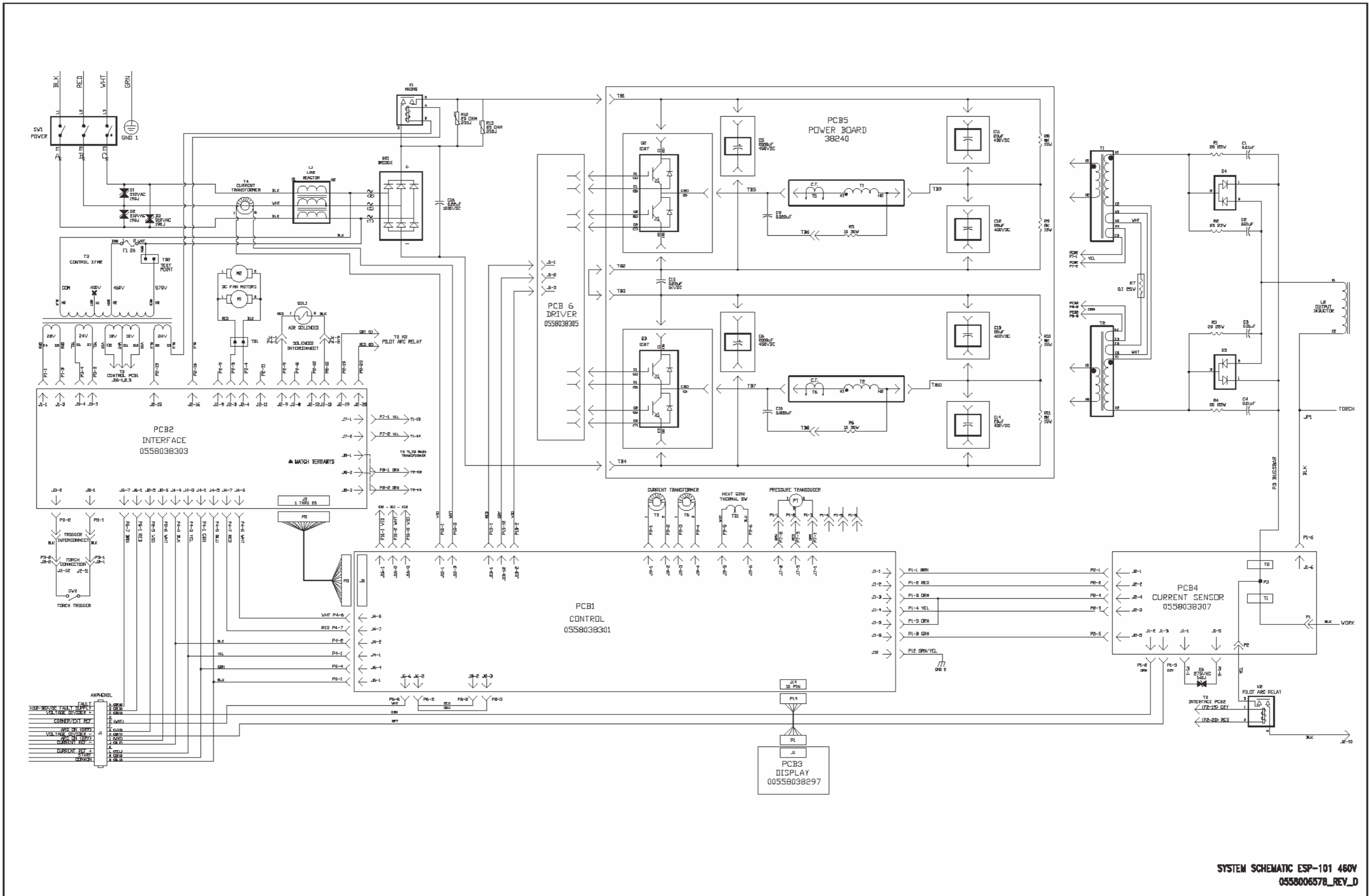




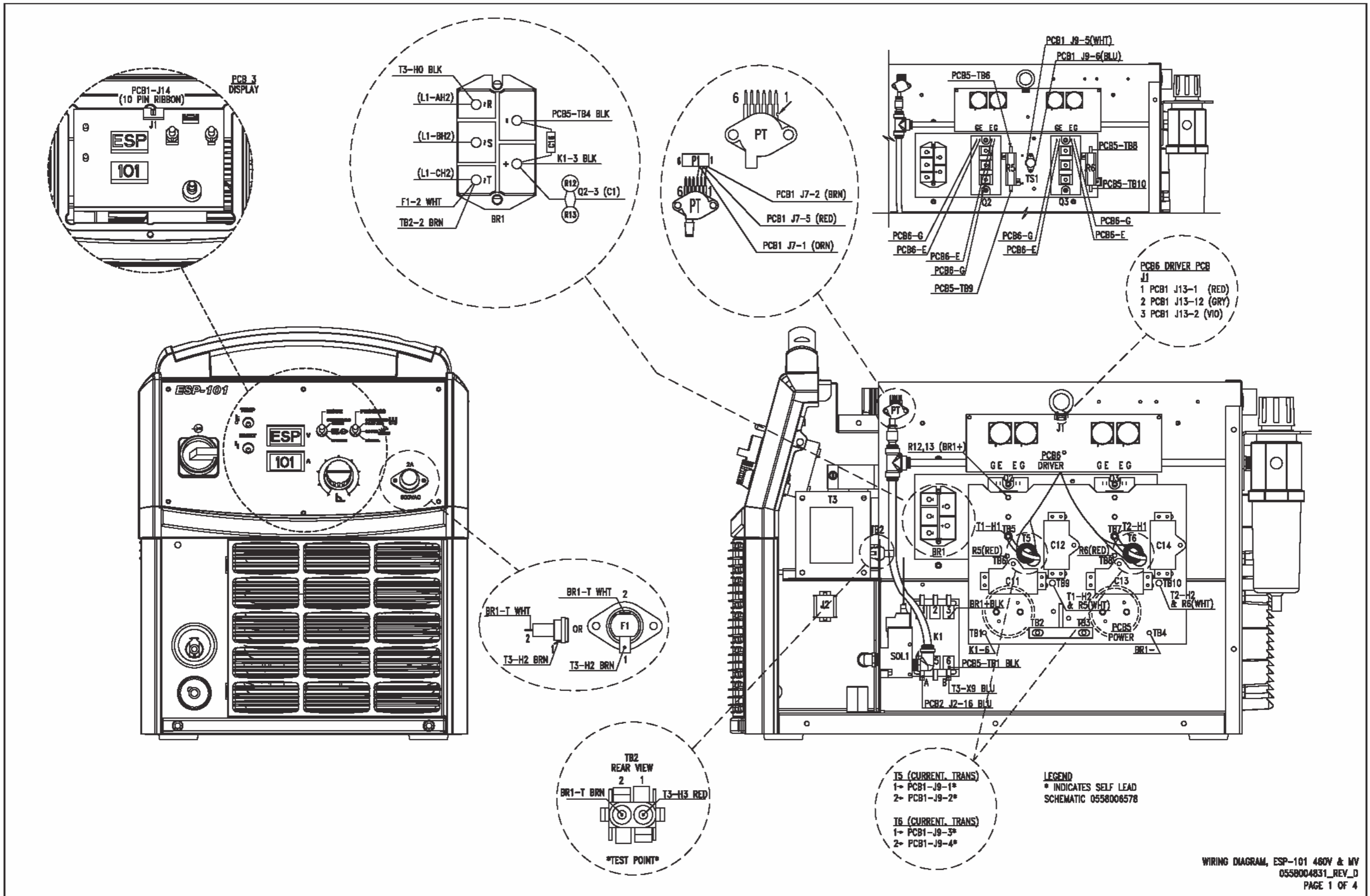
NOTE 1). TO AID WITH BUILDING HEATSINK ASSEMBLIES (ITEM 34)
 USE HEATSINK TEMPLATES P/N: 0558006154 & 0558006155:
 WHEN ASSEMBLING DIODE HEATSINK USE 0558006154.
 WHEN ASSEMBLING IGBT HEATSINK USE 0558006155.



ESP-101 P.S. FAM. DWG.
0558004830-G
PAGE 6 OF 6



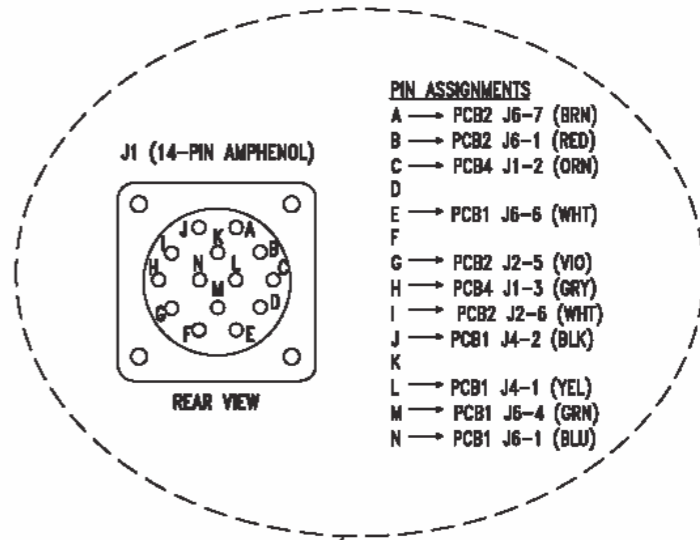
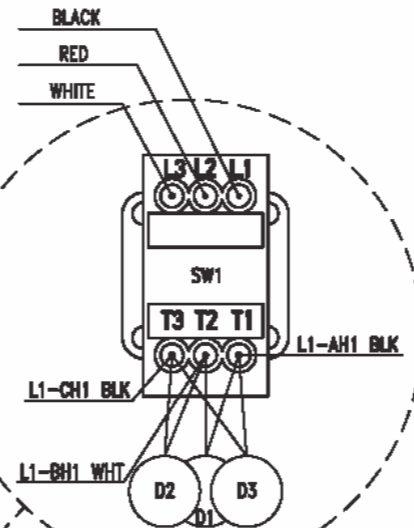
SYSTEM SCHEMATIC ESP-101 460V
0558006578_REV_D



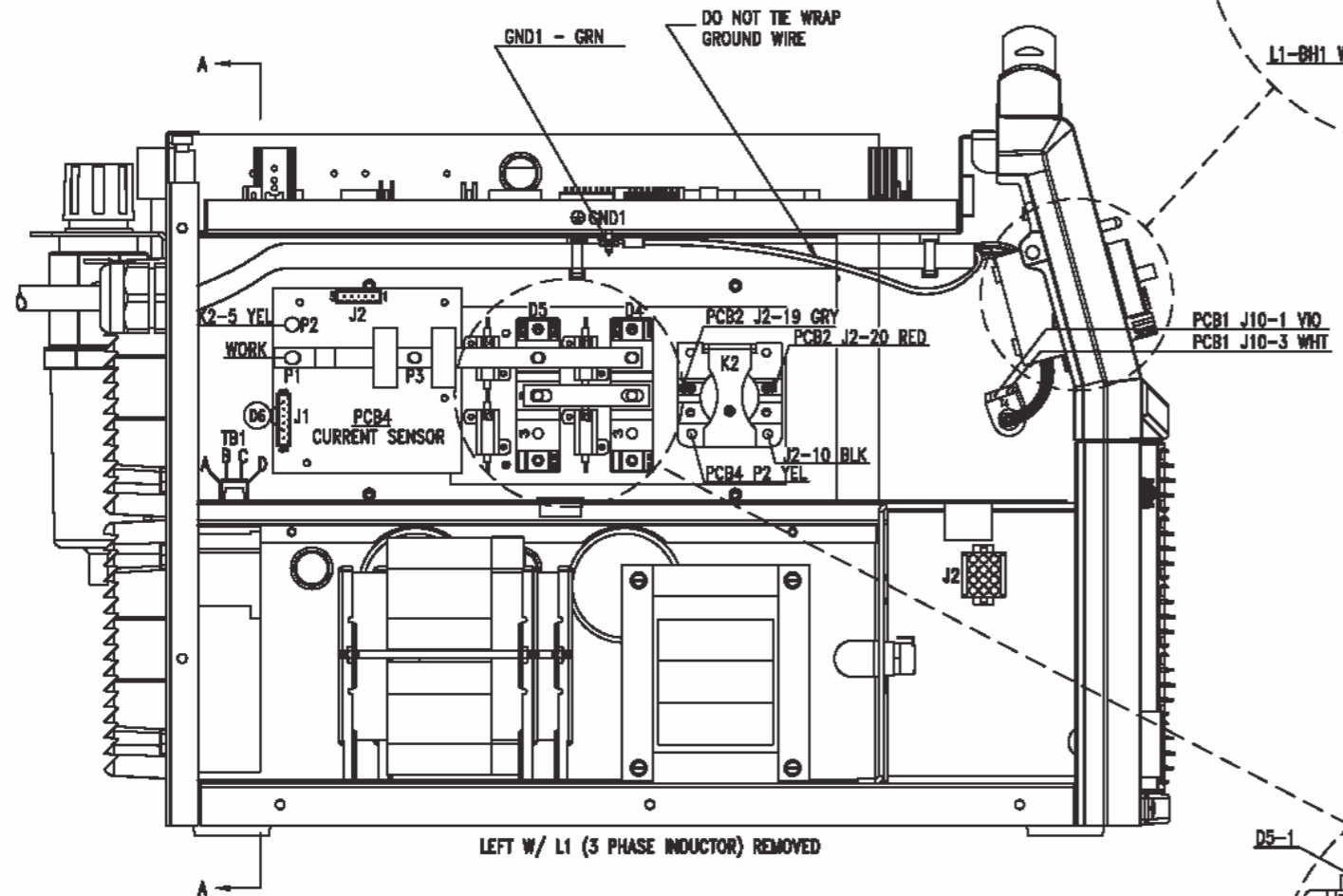
WIRING DIAGRAM, ESP-101 460V & MV
0558004831_REV_D
PAGE 1 OF 4

PCB4 CURRENT SENSOR

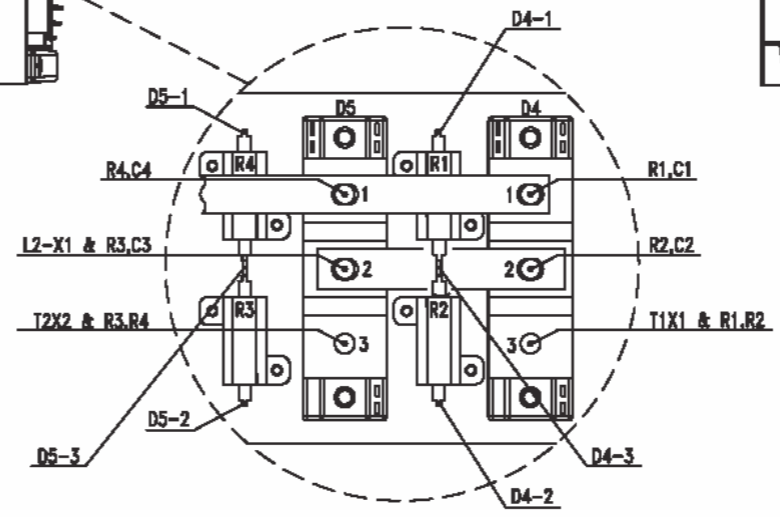
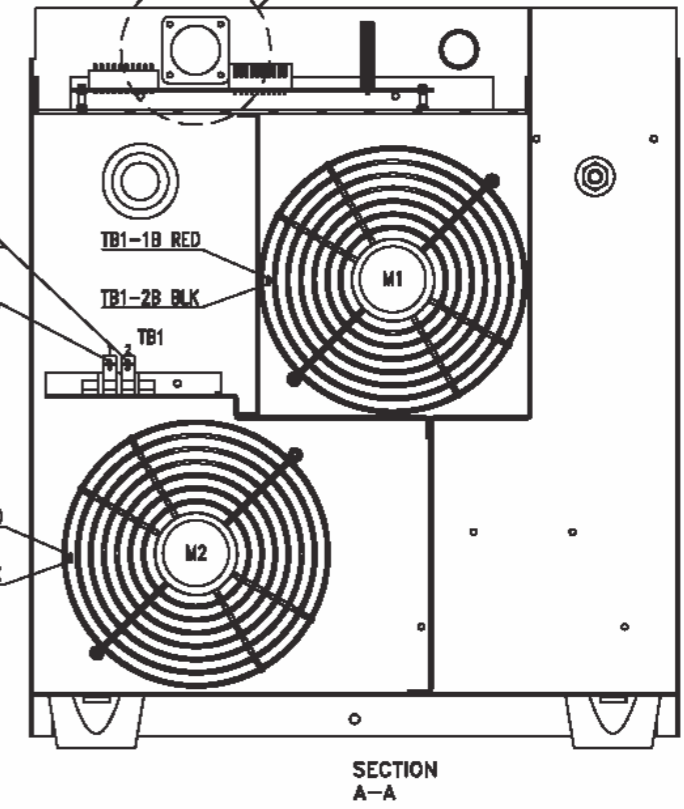
- J1**
 1→ D6-1
 2→ J1-C ORG
 3→ J1-H GRY
 4
 5→ D6-2
 6→ JP1 (JUNCTION POINT)
- J2**
 1→ PCB1 J1-1 BRN
 2→ PCB1 J1-2 RED
 3→ PCB1 J1-4 YEL
 4→ PCB1 J1-3 ORN
 5→ PCB1 J1-8 GRN

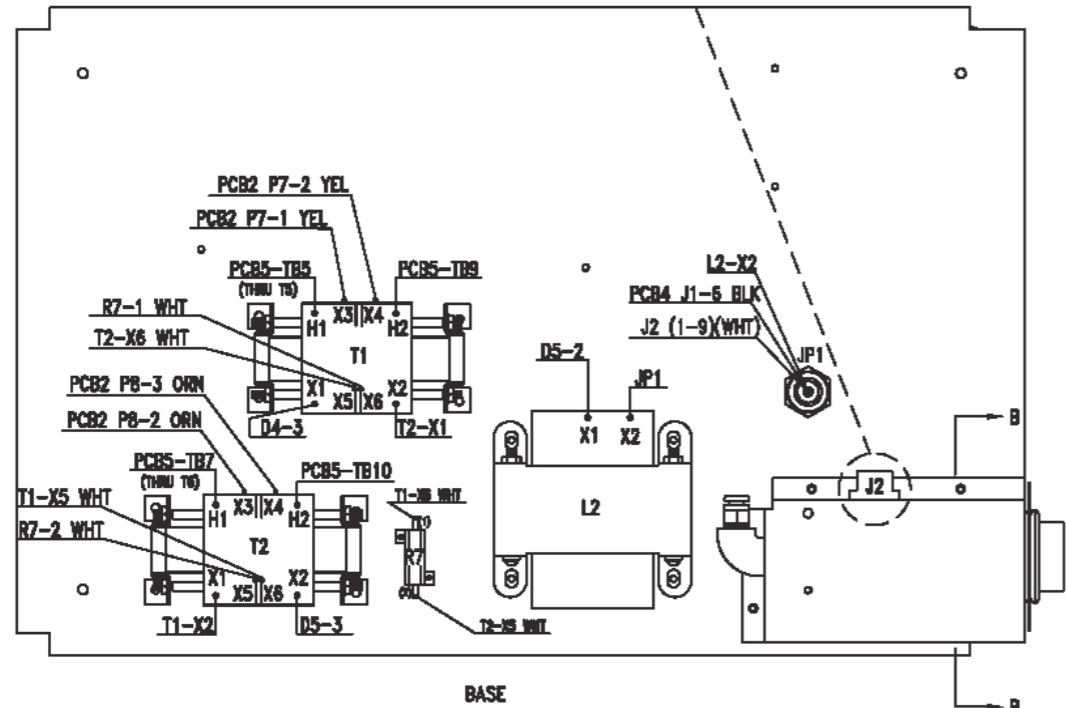
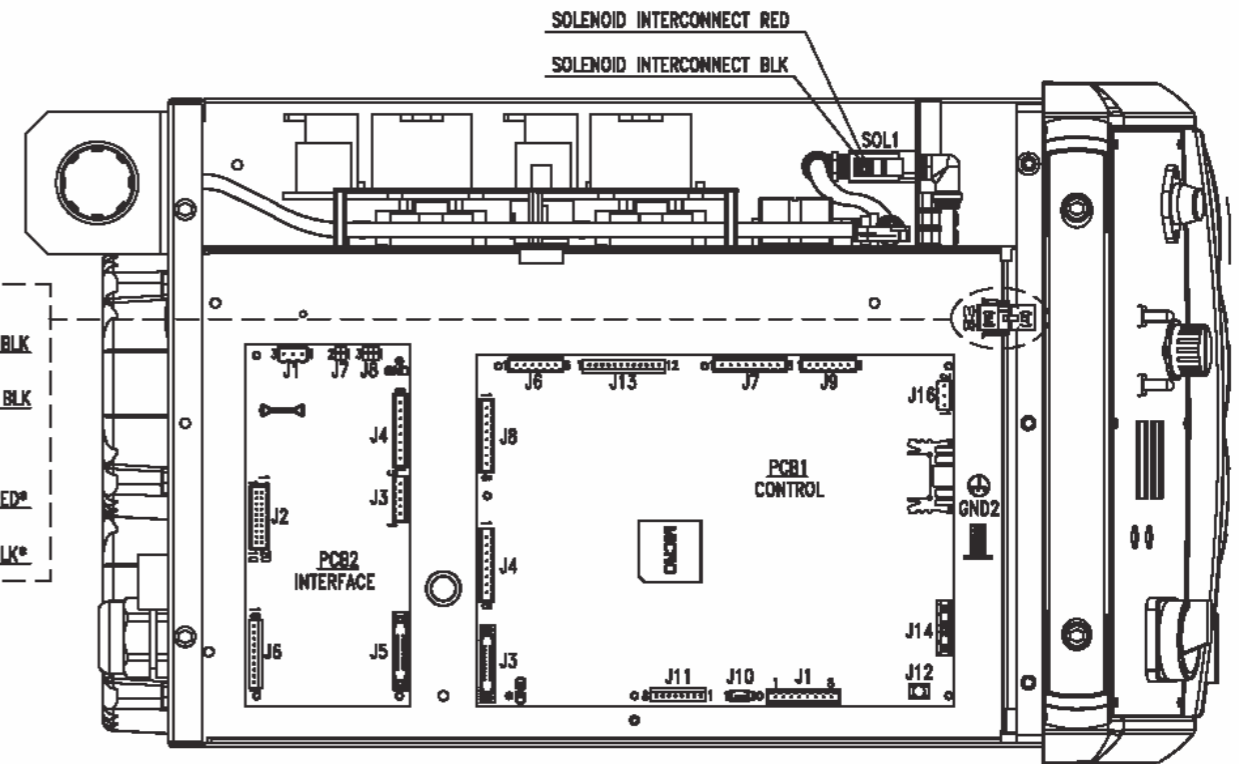
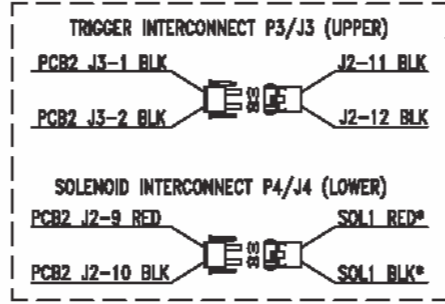
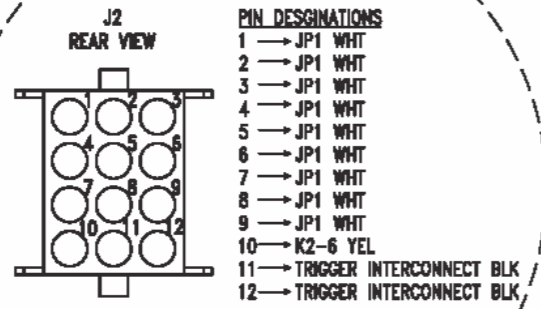
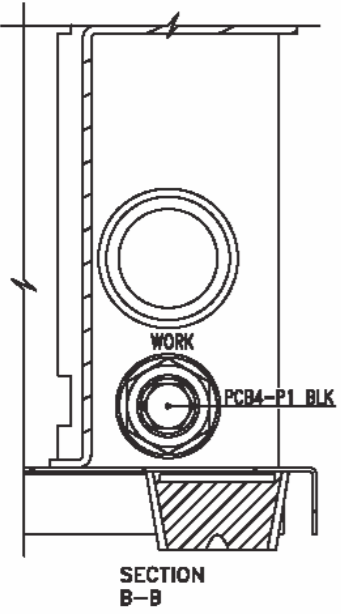


- PIN ASSIGNMENTS**
- A → PCB2 J6-7 (BRN)
 - B → PCB2 J6-1 (RED)
 - C → PCB4 J1-2 (ORN)
 - D
 - E → PCB1 J6-6 (WHT)
 - F
 - G → PCB2 J2-5 (VIO)
 - H → PCB4 J1-3 (GRY)
 - I → PCB2 J2-6 (WHT)
 - J → PCB1 J4-2 (BLK)
 - K
 - L → PCB1 J4-1 (YEL)
 - M → PCB1 J6-4 (GRN)
 - N → PCB1 J6-1 (BLU)



- (2A) M1 BLK
- (2B) M2 BLK
- (2C) PCB2 J2-4 BLK
- (1A) PCB2 J2-3 RED
- (1B) M2 RED
- (1C) M1 RED





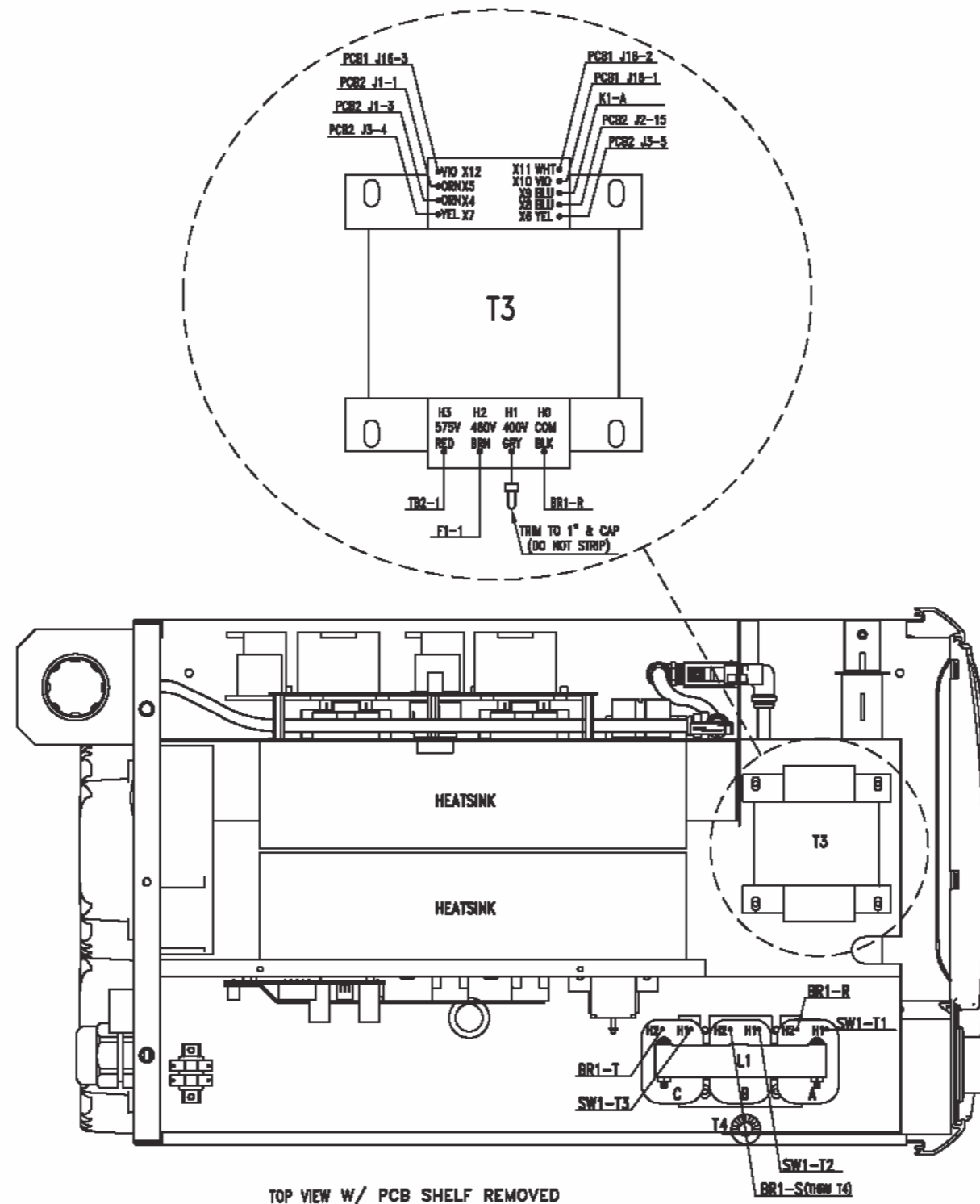
PCB1 CONTROL

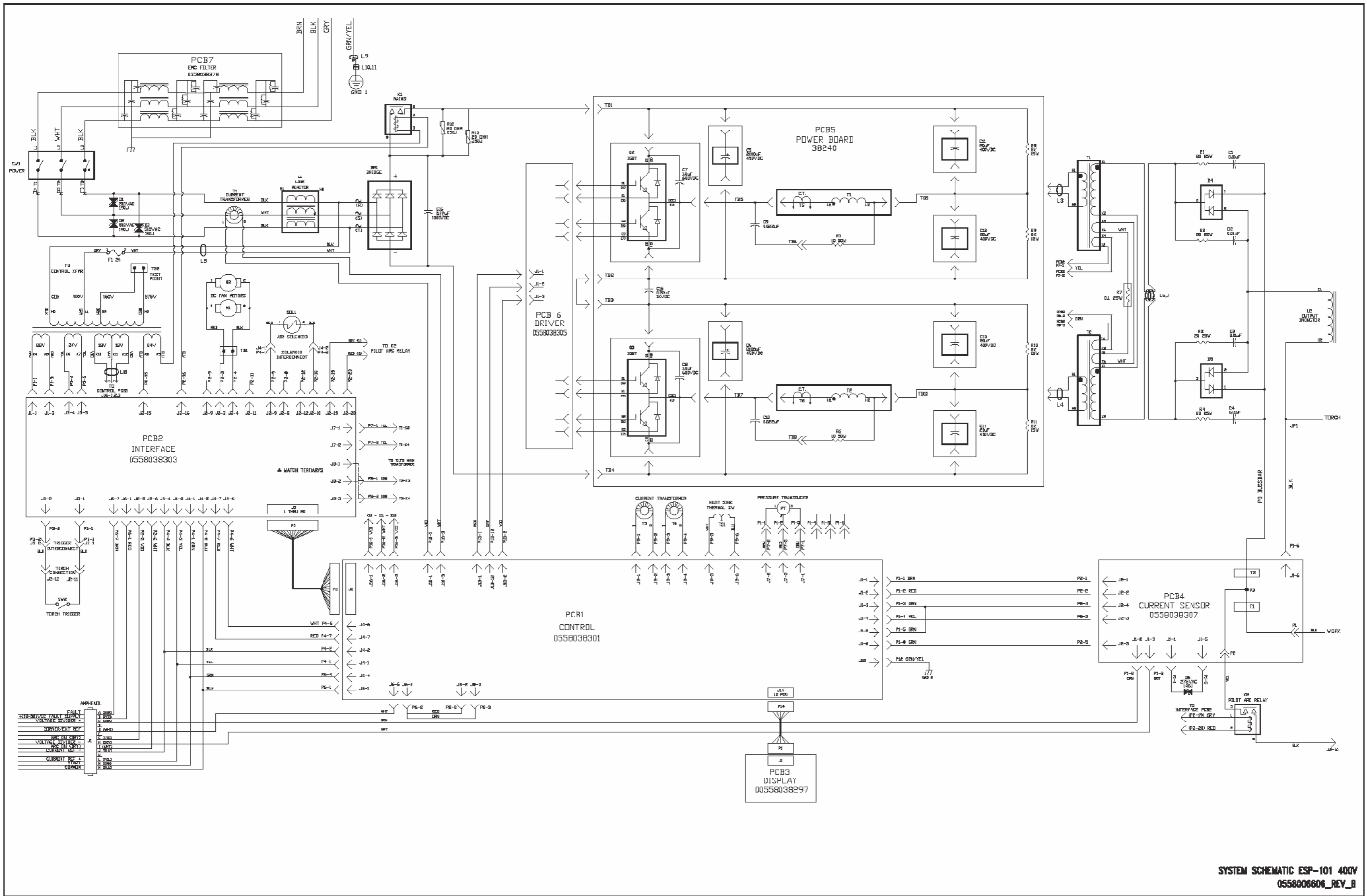
J1	J7	J10
1→ PCB4 J2-1 BRN	1→ PT-3 ORN	1→ T4-1 VIO
2→ PCB4 J2-2 RED	2→ PT-1 BRN	2→ T4-2 WHT
3→ PCB4 J2-4 OR	3	3→ T4-2 WHT
4→ PCB4 J2-3 YEL	4	
5→ PCB1 J1-3 (JUMPER)	5→ PT-2 RED	J12
6	6	→ GND2 GRN\YEL
7	7	
8→ PCB4 J2-5 GRN	8	J13
J3	J9	1→ PCB6 J1-1 RED
(1-20)→ PCB2 J5 1-20	1→ T5-1	2→ PCB6 J1-3 VIO
(RIBBON CABLE)	2→ T5-2	3
J4	3→ T6-1	4
1→ J1-L & PCB2 J4-3 YEL	4→ T6-2	5
2→ J1-J & PCB2 J4-4 BLK	5→ TS1-1 WHT	6
3	6→ TS1-2 BLU	7
4	J8	8
5	1	9
6→ PCB2 J4-6 WHT	2→ J6-2 RED	10
7→ PCB2 J4-7 RED	3→ J6-2 ORN	11
8	4	12→ PCB6 J1-2 GRY
J8	5	
1→ J1-N & PCB2 J4-5 BLU	6	J14
2→ PCB1 J8-2 RED & J8-3 ORN (JUMPERS)	7	(1-10)→ PCB3 J1(1-10)
3	8	(RIBBON CABLE)
4 J1-M & PCB2 J4-1 GRN		J16
5		1→ T3-X10 VIO
6→ J1-E WHT		2→ T3-X11 WHT
		3→ T3-X12 VIO

PCB2 INTERFACE

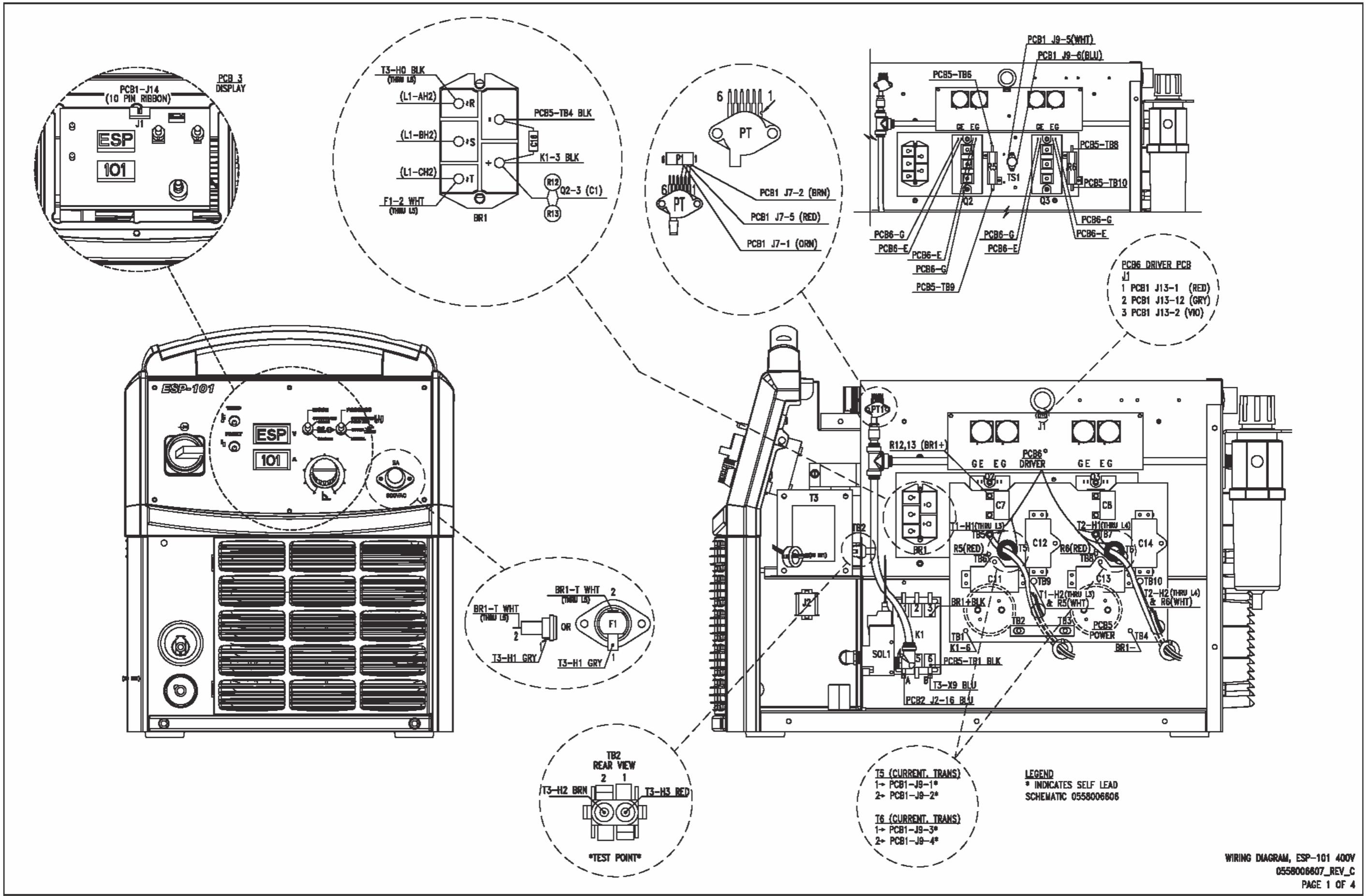
J1	J3	J6
1→ T3-X5 ORN	1→ TRIGGER INTERCONNECT BLK	1→ J1-B RED
2	2→ TRIGGER INTERCONNECT BLK	2
3→ T3-X4 ORN	3	3
J2	4→ T3-X7 YELLOW	4
1	5→ T3-X6 YELLOW	5
2		6
3→ TB1-1C RED	J4	7→ J1-A BRN
4→ TB1-2C BLK	1→ PCB1 J6-4 GRN	8
5→ J1-G VIO	2	9
6→ J1-1 WHT	3→ PCB1 J4-1 YEL	10
7	4→ PCB1 J4-2 BLK	J7
8	5→ PCB1 J6-1 BLU	1→ T1X3 YEL
9→ SOLENOID INTERCONNECTOR RED	6→ PCB1 J4-6 WHT	2→ T1X4 YEL
10→ SOLENOID INTERCONNECTOR BLK	7→ PCB1 J4-7 RED	J8
	8	1→
J5		2→ T2X3 ORN
(1-20)→ PCB1 J3 (1-20)		3→ T2X4 ORN
(RIBBON CABLE)		

▲ NOTE: INSTALL PLUG INTO POSITION 2 & 3. IF NECESSARY MOVE TO POSITIONS 1 & 2 TO MATCH TERMINALS (HELP CODE 13).





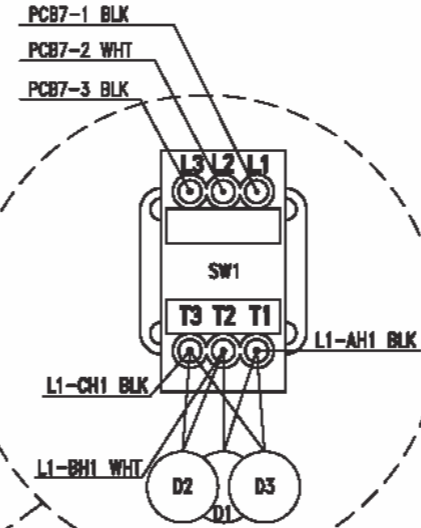
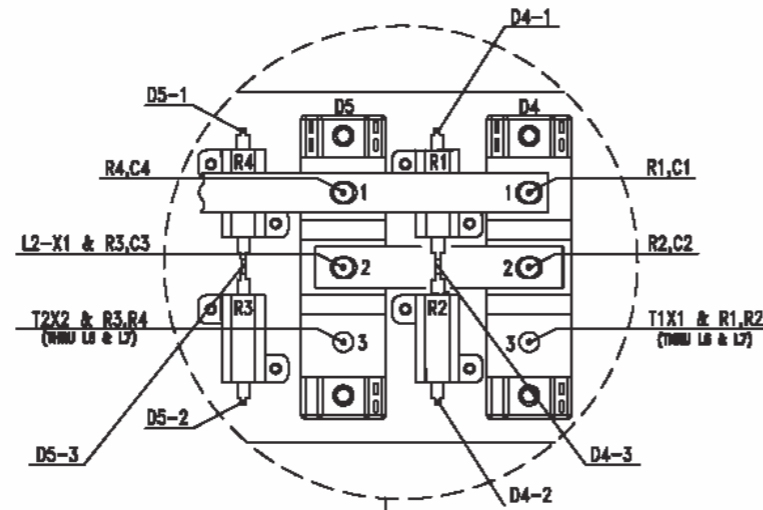
SYSTEM SCHEMATIC ESP-101 400V
0558006806_REV_B



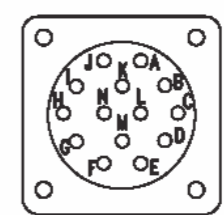
PCB4 CURRENT SENSOR

- J1**
 1→ D6-1
 2→ J1-C ORG
 3→ J1-H GRY
 4
 5→ D6-2
 6→ JP1 (JUNCTION POINT)

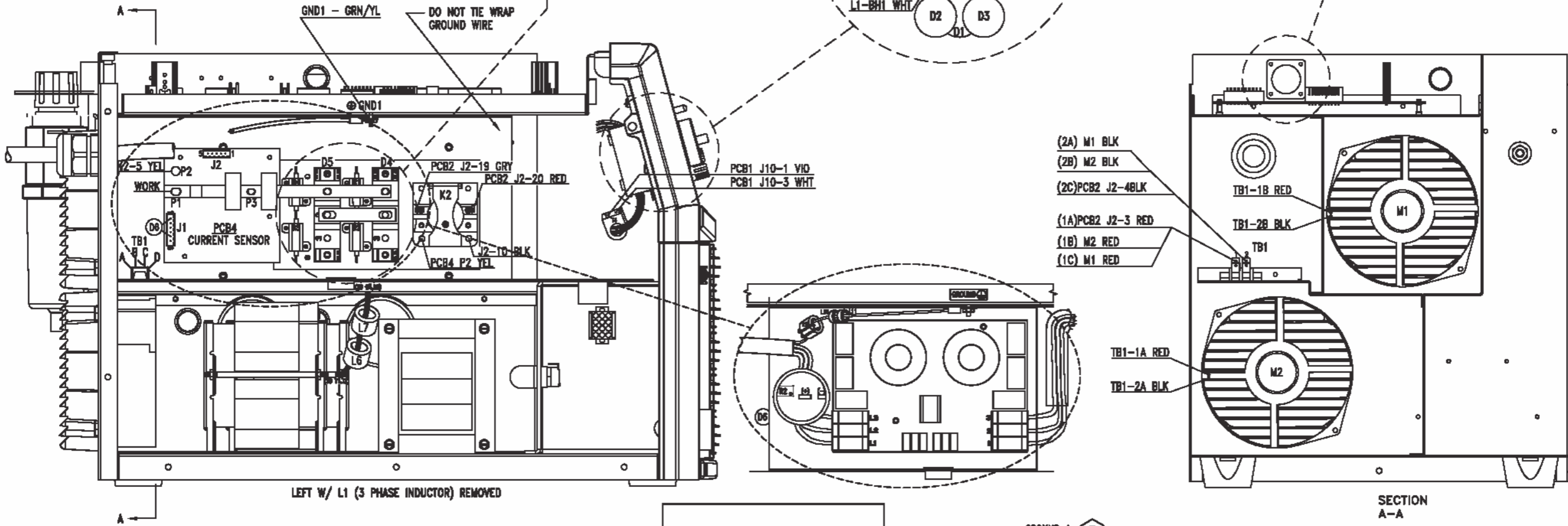
- J2**
 1→ PCB1 J1-1 BRN
 2→ PCB1 J1-2 RED
 3→ PCB1 J1-4 YEL
 4→ PCB1 J1-3 ORN
 5→ PCB1 J1-8 GRN



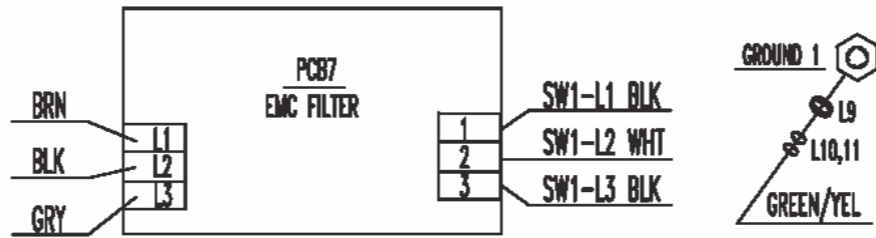
J1 (14-PIN AMPHENOL)

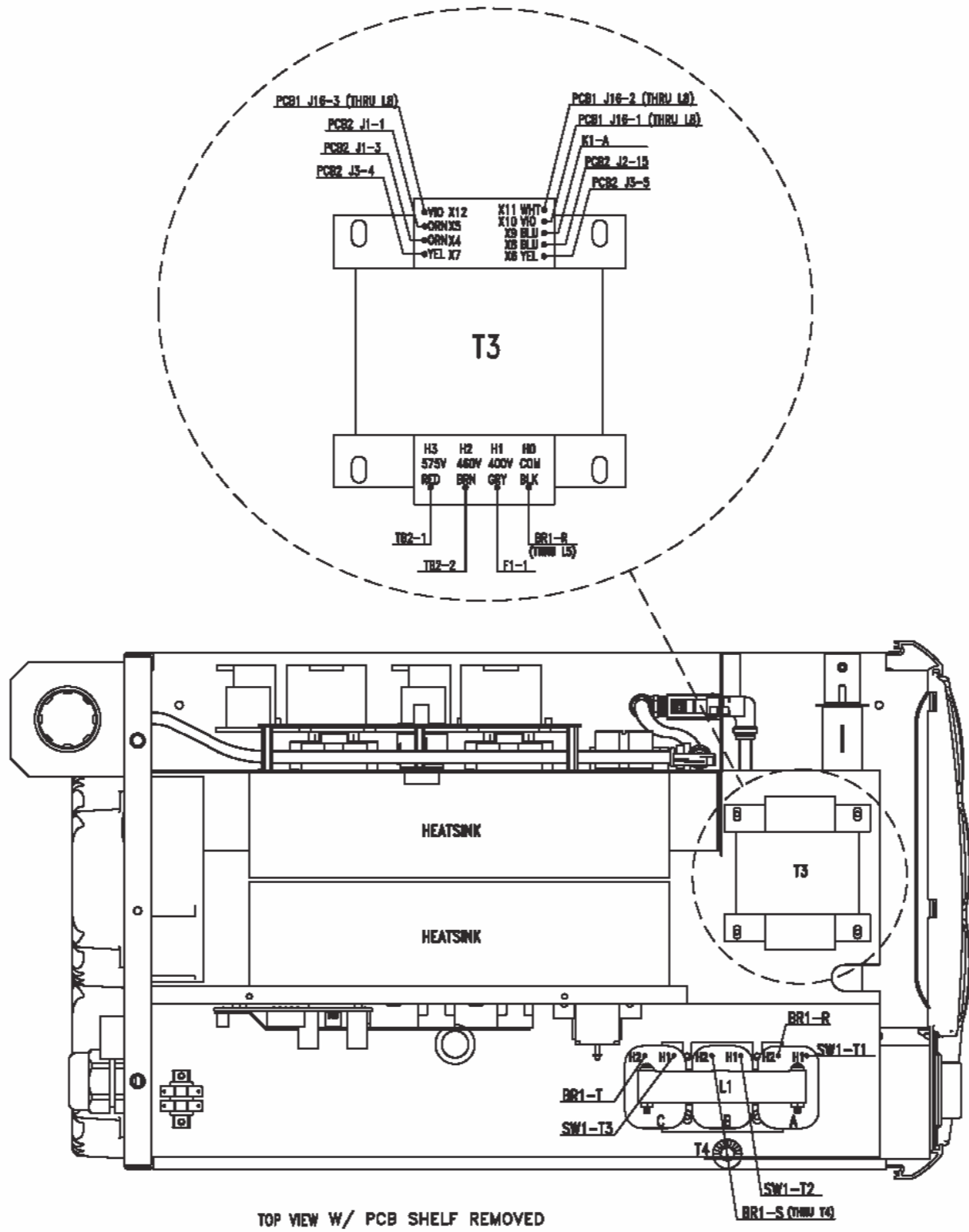


- PIN ASSIGNMENTS**
 A → PCB2 J6-7 (BRN)
 B → PCB2 J6-1 (RED)
 C → PCB4 J1-2 (ORN)
 D
 E → PCB1 J6-6 (WHT)
 F
 G → PCB2 J2-5 (VIO)
 H → PCB4 J1-3 (GRY)
 I → PCB2 J2-6 (WHT)
 J → PCB1 J4-2 (BLK)
 K
 L → PCB1 J4-1 (YEL)
 M → PCB1 J6-4 (GRN)
 N → PCB1 J6-1 (BLU)



- (2A) M1 BLK
 (2B) M2 BLK
 (2C) PCB2 J2-4BLK
 (1A) PCB2 J2-3 RED
 (1B) M2 RED
 (1C) M1 RED





**ESAB Welding & Cutting Products, Florence, SC Welding Equipment
COMMUNICATION GUIDE - CUSTOMER SERVICES**

- | | | |
|---|---|--------------------------------------|
| A | CUSTOMER SERVICE QUESTIONS:
Telephone: (800) 362-7080 / Fax: (800) 634-7548
Order Entry Product Availability Pricing Order Information Returns | Hours: 8.00 AM to 7:00 PM EST |
| B | ENGINEERING SERVICE:
Telephone: (834) 664-4416 / Fax: (800) 446-5693
Warranty Returns Authorized Repair Stations Welding Equipment Troubleshooting | Hours: 7.30 AM to 5:00 PM EST |
| C | TECHNICAL SERVICE:
Telephone: (800) ESAB-123 / Fax: (843) 664-4452
Part Numbers Technical Applications Specifications Equipment Recommendations | Hours: 8.00 AM to 5:00 PM EST |
| D | LITERATURE REQUESTS:
Telephone: (843) 664-5562 / Fax: (843) 664-5548 | Hours: 7.30 AM to 4:00 PM EST |
| E | WELDING EQUIPMENT REPAIRS:
Telephone: (843) 664-4487 / Fax: (843) 664-5557
Repair Estimates Repair Status | Hours: 7.30 AM to 3:30 PM EST |
| F | WELDING EQUIPMENT TRAINING:
Telephone: (843) 664-4428 / Fax: (843) 679-5864
Training School Information and Registrations | Hours: 7.30 AM to 4:00 PM EST |
| G | WELDING PROCESS ASSISTANCE:
Telephone: (800) ESAB-123 | Hours: 7.30 AM to 4:00 PM EST |
| H | TECHNICAL ASST. CONSUMABLES:
Telephone: (800) 933-7070 | Hours: 7.30 AM to 5:00 PM EST |

IF YOU DO NOT KNOW WHOM TO CALL

Telephone: (800) ESAB-123
Fax: (843) 664-4452
Hours: 7:30 AM to 5:00 PM EST

or

visit us on the web at <http://www.esabna.com>

The ESAB web site offers:
Comprehensive Product Information
Material Safety Data Sheets
Warranty Registration
Instruction Literature Download Library
Distributor Locator
Global Company Information
Press Releases
Customer Feedback & Support

100701



ESAB Welding & Cutting Products
PO BOX 100545, Florence SC 29501-0545