



ESP-150

Plasma Cutting System



Instruction manual

This manual provides installation and operation instructions for the following components beginning with Serial Number 015:

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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, 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.



ESP-150 Plasmarc™ System

This versatile, all encompassed heavy duty water cooled plasma cutting and gouging system is ideal for manual and mechanized applications.

- Greater productivity - high speed cutting of most metals from gauge thickness to 2- in. thick plate
- Versatility - 230/460/575 volt three-phase input
- Greater variation - adjustable output - 25 to 150 amps
- Built-In Water Cooler - simplifies maintenance, less hookup, no wiring issues, no extra hoses. Water flow is controlled with power supply
- Water cooled Torch PT-26
- Leather sheath wrapped torch - protects torch leads from abrasion and molten metal
- Cuts with air, nitrogen, argon-hydrogen mixtures or nitrogenhydrogen mixtures
- Built-In CNC interface provides easy connection of automation applications
- Torch design provides perfect electrode centering - provides longer tip life by minimizing the possibility of double-arcing
- Torch spare parts kit supplied with each outfit - ample supply of spare parts to minimize downtime at no additional cost
- Thermal overload switches - prevents damage if unit overheats due to insufficient air flow
- Line voltage compensation
- Automatic intermittent cutting - additional capability, permits continuous cutting of grates, expanded metal, heavy screen material, etc.
- Wheels and cylinder rack - all provided standard for portability and greater utilization at no additional cost
- Ideal for plasma gouging
- Three year warranty on console
- One Year warranty on torch



Specifications ESP-150

Input Current and Input Voltage at Rated Load	112/56/45 amps, 230/460/575 Vac, 60 Hz, 3 Ph
Output rating	
90% duty cycle	150 amps @ 120 V
100% duty cycle	140 amps @ 120 V
Open circuit voltage	370 vdc
Operating temperature	-10 to +40° C
Transportation temperature	-20 to +55° C
Dimensions	
	w = 21.75 in. (552 mm)
	h = 31.5 in. (800 mm)
	d = 40 in. (1016 mm)
Weight	766 lbs. (348 kg)

Torch: PT-26 - 70°, 90° or In-Line

*Instruction Literature 230/460/575 V
Sales Literature*

*F15-687
PAC-21062*

5 INTRODUCTION

The plasma power source **ESP-150** and plasma cutting torch **PT-26** are a complete and safe plasma cutting system for cutting and gouging for manual and mechanized applications.

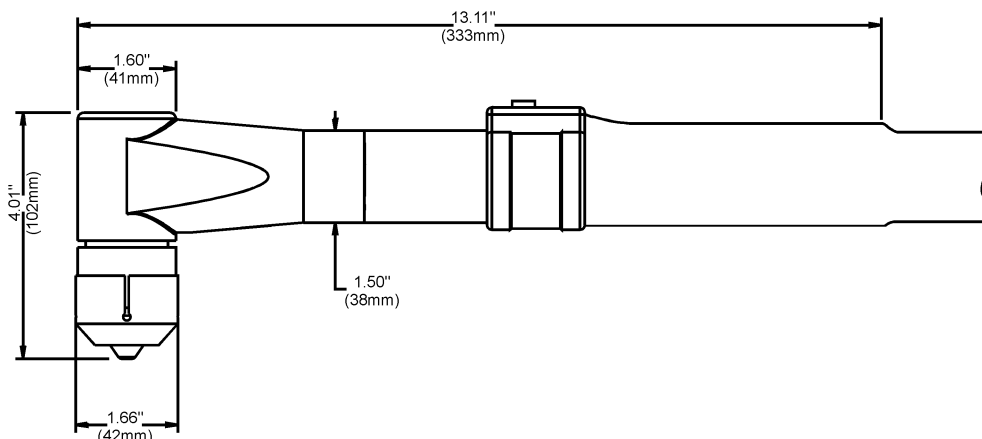
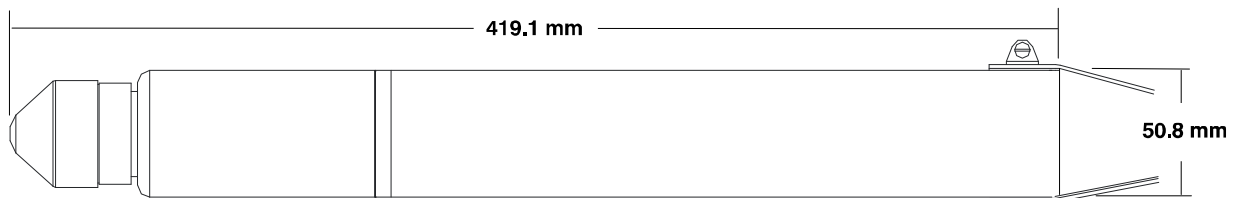
5.1 PT-26

Plasma Gas	
Type of gas	N2, Air, AR-H2, N2-H2
Pressure	100 psig (6.9 bar)
Flow	240 cfh (6.8 M3/h)
Purity required	O2 - 99.5% min., N2-99.995% min., Air - clean and dry
Recommended liquid cylinder service regulators	Inert Gas R-76-150-580LC 19977
Recommended cylinder 2-stage regulators	Argon-Hydrogen R-77-75-350 998341 Nitrogen R-77-75-580 998343 Industrial Air R-77-150-590 998348
Recommended Heavy-Duty Hi-Flow station or pipeline regulators	Nitrogen R-76-75-034 19155

Starting Gas/Cutting Gas	
Type of gas	N2, Air (for Ar-H2 Cut Gas Use N2 or Ar-H2)
Pressure	100 psig (6.9 bar)
Flow	200 cfh (5.66M3/h) at 60 psig (4.1 bar)
Purity required	N2 - 99% min., Air - clean and dry

Shield Gas	
Type of gas	N2 or Air
Pressure	100 psig (6.9 bar) maximum
Flow	200 cfh (5.66 M3/h) at 85 psig (5.86 bar)
Purity required	Nitrogen - 99% minimum, Air - clean and dry

Assembly instructions PT-26, see on page 53.



The ESP-150 system is available as pre-engineered basic packages or can be ordered as individual parts and pieces for a custom system. The basic pre-engineered systems contain the ESP-150 console, plasma torch, appropriate regulators for the gases indicated, and torch coolant. For torch information, refer to the PT-26 manual F-15-345.

ESP-150 MANUAL PLASMA CUTTING PACKAGES

AIR PACKAGES

0558002909 - ESP-150 / PT-26 25' 70° / Air		
P/N	QTY	DESCRIPTION
0558002677	1	ESP-150 Console
0558002208	1	PT-26,70°,25' Plasma torch
0558002864	1	PT-26 Spare Parts Kit, 150A
0558003242	1	Air Reg. Assembly
678724	1	Work Cable, 50'
156F05	4	Coolant (4 gallons)
680794	1	Truck & Cylinder Rack

0558002910 - ESP-150 / PT-26 50' 70° / Air		
P/N	QTY	DESCRIPTION
0558002677	1	ESP-150 Console
0558002209	1	PT-26,70°,50' Plasma torch
0558002864	1	PT-26 Spare Parts Kit, 150A
0558003242	3	Air Reg. Assembly
678724	1	Work Cable, 50'
74S76	3	Adaptors
19416	3	Gas Hose
36933GY	1	Reg.Mont
156F05	4	Coolant (4 gallons)
680794	1	Truck & Cylinder Rack

0558002911 - ESP-150 / PT-26 25' 90° / Air		
P/N	QTY	DESCRIPTION
0558002677	1	ESP-150 Console
35458	1	PT-26,90°,25' Plasma torch
0558002864	1	PT-26 Spare Parts Kit, 150A
0558003242	3	Air Reg. Assembly
678723	1	Work Cable, 25'
156F05	4	Coolant (4 gallons)
680794	1	Truck & Cylinder Rack

0558002912 - ESP-150 / PT-26 50' 90° / Air		
P/N	QTY	DESCRIPTION
0558002677	1	ESP-150 Console
35459	1	PT-26,90°,50' Plasma torch
0558002864	1	PT-26 Spare Parts Kit, 150A
0558003242	3	Air Reg. Assembly
678724	1	Work Cable, 50'
156F05	4	Coolant (4 gallons)
680794	1	Truck & Cylinder Rack

Ar/H₂ PACKAGES

0558002915 - ESP-150 / PT-26 25' 70° / Ar+H₂ Mix		
P/N	QTY	DESCRIPTION
0558002677	1	ESP-150 Console
0558002208	1	PT-26, 70°, 25' Plasma torch
0558002864	1	PT-26 Spare Parts Kit, 150A
998341	2	Argon/Hydrogen Mix Regulator
998343	1	Nitrogen Regulator
33122	3	Hoses
678723	1	Work Cable, 25'
19X54	2	Adaptors
156F05	4	Coolant (4 gallons)
680794	1	Truck & Cylinder Rack

0558002916 - ESP-150 / PT-26 50' 70° / Ar+H₂ Mix		
P/N	QTY	DESCRIPTION
0558002677	1	ESP-150 Console
0558002209	1	PT-26, 70°, 50' Plasma torch
0558002864	1	PT-26 Spare Parts Kit, 150A
998341	2	Argon/Hydrogen Mix Regulator
998343	1	Nitrogen Regulator
33122	3	Hoses
678724	1	Work Cable, 50'
19X54	2	Adaptors
156F05	4	Coolant (4 gallons)
680794	1	Truck & Cylinder Rack

0558002917 - ESP-150 / PT-26 25' 90° / Ar+H₂ Mix		
P/N	QTY	DESCRIPTION
0558002677	1	ESP-150 Console
36558	1	PT-26, 90°, 25' Plasma torch
0558002864	1	PT-26 Spare Parts Kit, 150A
998341	2	Argon/Hydrogen Mix Regulator
998343	1	Nitrogen Regulator
33122	3	Hoses
678724	1	Work Cable, 25'
74S76	2	Adaptors
156F05	4	Coolant (4 gallons)
680794	1	Truck & Cylinder Rack

ESP-150 MANUAL PLASMA CUTTING PACKAGES

Ar/H₂ PACKAGES

0558002918 - ESP-150 / PT-26 50' 90° / Ar+H₂ Mix		
P/N	QTY	DESCRIPTION
0558002677	1	ESP-150 Console
36559	1	PT-26, 90°, 50' Plasma torch
0558002864	1	PT-26 Spare Parts Kit, 150A
998341	2	Argon/Hydrogen Mix Regulator
998343	1	Nitrogen Regulator
33122	3	Hoses
678724	1	Work Cable, 50'
19X54	2	Adaptors
156F05	4	Coolant (4 gallons)
680794	1	Truck & Cylinder Rack

ESP-150 MECHANIZED PLASMA CUTTING PACKAGES

AIR PACKAGES

0558002913 - ESP-150 / PT-26 25' Inline / Air		
P/N	QTY	DESCRIPTION
0558002677	1	ESP-150 Console
0558002320	1	PT-26, 25' Inline Plasma torch
0558002864	1	PT-26 Spare Parts Kit, 150A
0558003242	3	Air Reg. Assembly
678723	1	Work Cable, 25'
33053	1	Strain Relief
951188	1	Locknut
156F05	4	Coolant (4 gallons)
680794	1	Truck & Cylinder Rack

0558002914 - ESP-150 / PT-26 50' Inline / Air		
P/N	QTY	DESCRIPTION
0558002677	1	ESP-150 Console
0558002321	1	PT-26, 50' Inline Plasma torch
0558002864	1	PT-26 Spare Parts Kit, 150A
0558003242	3	Air Reg. Assembly
678724	1	Work Cable, 50'
33053	1	Strain Relief
951188	1	Locknut
156F05	4	Coolant (4 gallons)
680794	1	Truck & Cylinder Rack

Ar/H₂ PACKAGES

0558002919 - ESP-150 / PT-26 25' Inline / Air		
P/N	QTY	DESCRIPTION
0558002677	1	ESP-150 Console
0558002320	1	PT-26, 25' Inline Plasma torch
0558002864	1	PT-26 Spare Parts Kit, 150A
998341	2	Argon/Hydrogen Mix Regulator
998343	1	Nitrogen Regulator
33122	3	Hoses
678724	1	Work Cable, 25'
33053	1	Strain Relief
951188	1	Locknut
19X54	2	Adaptors
156F05	4	Coolant (4 gallons)
680794	1	Truck & Cylinder Rack

0558002920 - ESP-150 / PT-26 50' Inline / Air		
P/N	QTY	DESCRIPTION
0558002677	1	ESP-150 Console
0558002321	1	PT-26, 50' Inline Plasma torch
0558002864	1	PT-26 Spare Parts Kit, 150A
998341	2	Argon/Hydrogen Mix Regulator
998343	1	Nitrogen Regulator
33122	3	Hoses
678724	1	Work Cable, 50'
33053	1	Strain Relief
951188	1	Locknut
19X54	2	Adaptors
156F05	4	Coolant (4 gallons)
680794	1	Truck & Cylinder Rack

6 INSTALLATION

The installation must be done by a professional.

6.1 General



WARNING

PRECAUTIONARY MEASURES SHOULD BE TAKEN TO PROVIDE MAXIMUM PROTECTION AGAINST ELECTRIC SHOCK. BE SURE THAT ALL POWER IS OFF BY OPENING THE LINE (WALL) DISCONNECT SWITCH AND UNPLUG THE POWER CORD TO THE UNIT WHEN PRIMARY ELECTRICAL CONNECTIONS ARE MADE INSIDE OF THE POWER SUPPLY.

Proper installation can contribute materially to satisfactory and trouble-free operation of the cutting outfit. Each step in this section should be studied carefully and followed as closely as possible.



CAUTION

This product is intended for industrial use. In a domestic environment this product may cause radio interference. It is the user's responsibility to take adequate precautions.

6.2 Inspection and placement



WARNING

ELECTRIC SHOCK CAN KILL!
PRECAUTIONARY MEASURES SHOULD BE TAKEN TO PROVIDE MAXIMUM PROTECTION AGAINST ELECTRIC 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.



WARNING

PRECAUTIONARY MEASURES SHOULD BE TAKEN TO PROVIDE MAXIMUM PROTECTION AGAINST ELECTRIC SHOCK. BE SURE THAT ALL POWER IS OFF BY OPENING THE LINE (WALL) DISCONNECT SWITCH AND UNPLUG THE POWER CORD TO THE UNIT USE LOCK OUT SAFETY PROCEDURES WHEN MAKING PRIMARY ELECTRICAL CONNECTIONS TO THE POWER SUPPLY.

1. Having removed the shipping container, and before removing the skid, inspect for evidence of concealed damage which may not have been apparent upon receipt of the unit. Notify the carrier of any defects or damage at once.

2. Check the container for any loose parts. Check air passages on rear panel of cabinet for any packing materials that may obstruct air flow through the power supply.

The ESP-150 Power Source is equipped with one lifting eye that enables hoisting the unit. Be sure the lifting device has adequate capacity to lift the unit safely. Refer to the SPECIFICATIONS for the unit weight.

3. Mount the components of the TR-21 truck kit to the unit as covered by Form F-14-413 packed with the truck kit.
4. The machine components are maintained at proper operating temperatures by forced air which is drawn through the front panel louvers and holes in the base and out the rear panel by a heavy-duty fan. Locate this machine in an open area where air can circulate freely through the openings. Leave at least two feet of clearance between the unit and wall or other obstruction. The area around the unit should be relatively free of dust, fumes and excessive heat.

(Installing or placing any type of filtering device will restrict the volume of intake air, thereby subjecting the power source internal components to overheating. Use of any type of filter device voids the warranty.)

5. A source of clean, dry air that supplies a minimum of 250cfh (7.08 M3H at 110psig) is required for the cutting operation. The air supply should not exceed 150psig (10.3 bars) - maximum inlet pressure rating of the filter regulator supplied with the package.

6.3 Primary input electrical connections



WARNING

IT IS OF THE UTMOST IMPORTANCE THAT THE CHASSIS BE CONNECTED TO AN APPROVED ELECTRICAL GROUND TO PREVENT ACCIDENTAL SHOCKING. TAKE CARE NOT TO CONNECT THE GROUND WIRE TO ANY OF THE PRIMARY LEADS.

1. A line (wall) disconnect switch, with fuse or circuit breakers, should be provided at the main power panel. See Fig. 3. The primary power leads should be insulated copper conductors, and include three power leads and one ground wire. The wires may be heavy rubber covered cable, or may be run in a solid or flexible conduit. Refer to Table 1 for recommended input conductors and line fuse sizes.

US

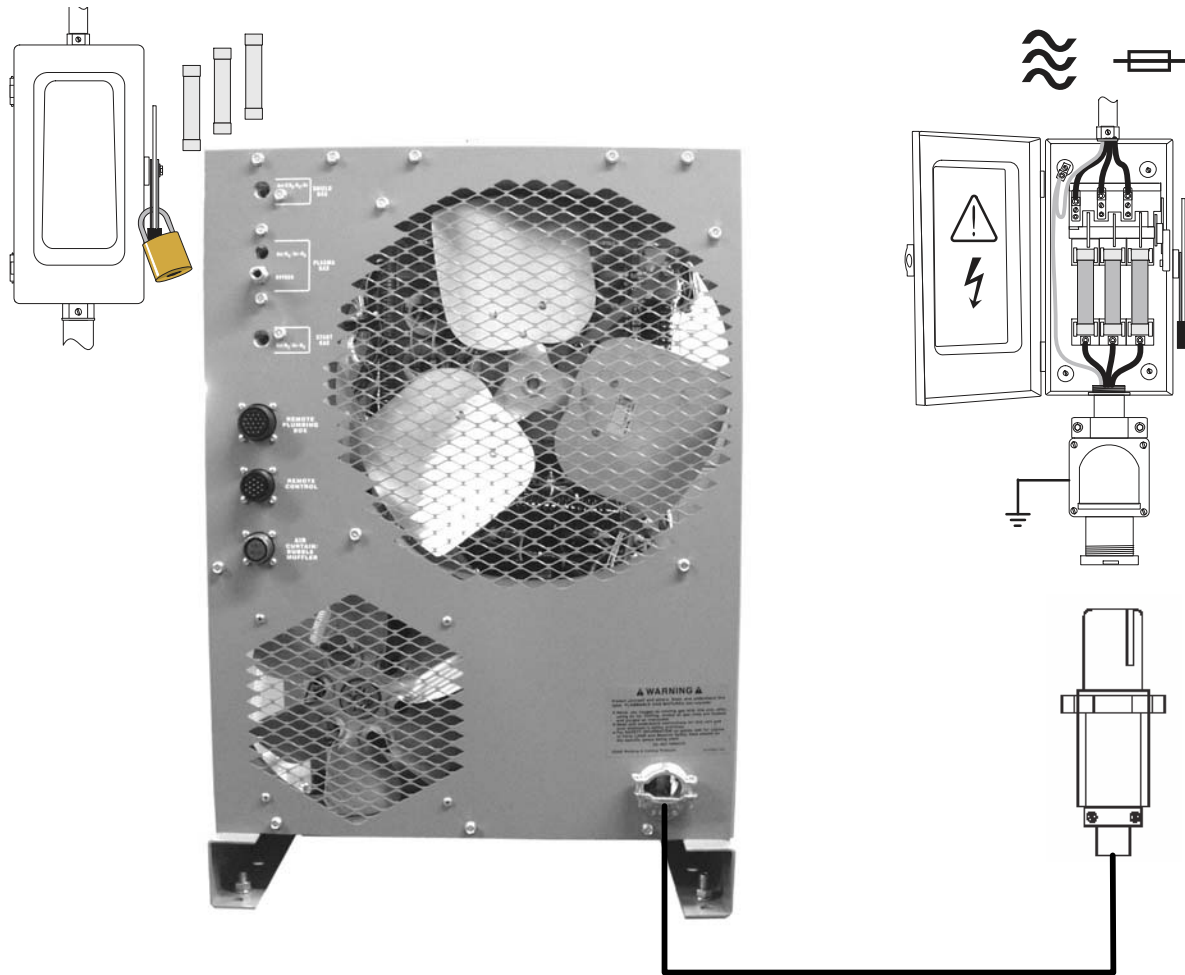



Fig 3 Typical installation - User supplied 3 Phase fused power disconnect box with receptacle and plug.

Recommended fuse sizes and minimum cable area

Input requirements			Input & gnd. conductor CU/AWG	Fuse ratings / Phase, Apms
Volts	Phase	Amps		
220	3	121	No. 1	150
230	3	116	No. 1	150
380	3	70	No. 4	100
415	3	64	No. 6	90
460	3	58	No. 6	80
575	3	45	No. 6	70

Table 1. Sizes per “National Electrical Code” for 75° rated conductors at 30° C ambient. Not more than three conductors in raceway or cable. Local codes should be followed if they specify sizes other than those listed above.



WARNING

ELECTRIC SHOCK CAN KILL!
PRECAUTIONARY MEASURES SHOULD BE TAKEN TO PROVIDE MAXIMUM PROTECTION AGAINST ELECTRIC 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.

2. **60 Hz Models** - As shipped from the factory, the ESP-150 is configured for the highest connectable voltage. If using other input voltages, the links on the terminal board (TB) inside the unit must be repositioned for the appropriate input voltage. See figures 4a, 4b and 4c for input voltage configurations. To gain access to the terminal board, open the access panel on the left side.

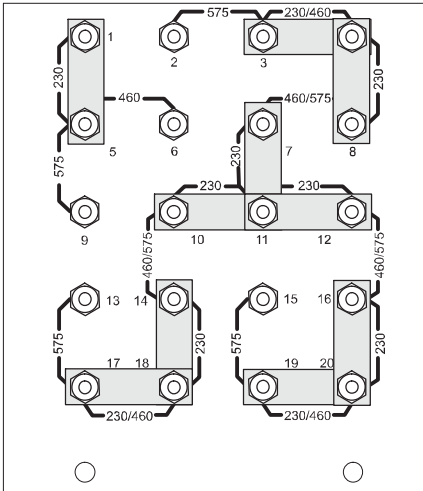


Fig 4a
Input Terminal Board
230/460/575 Vac Models.
230 Vac configuration

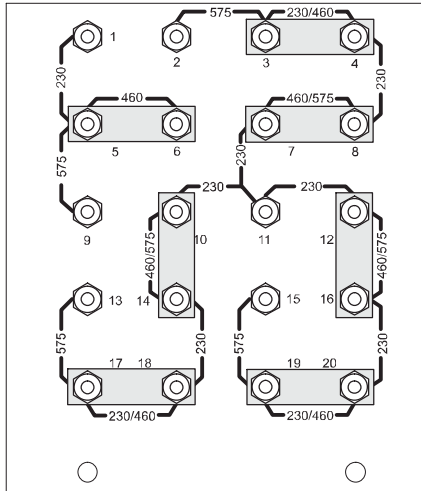


Fig 4b
Input Terminal Board
230/460/575 Vac Models.
460 Vac configuration

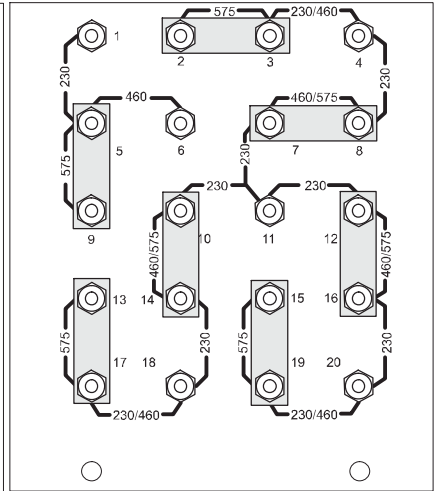


Fig 4c
Input Terminal Board
230/460/575 Vac Models
575 Vac configuration (factory
supplied)



WARNING

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



WARNING

A POOR CONNECTION OR FAILURE TO CONNECT WORK CABLE TO WORKPIECE CAN RESULT IN FATAL SHOCK. FAILURE TO CONNECT THE WORKPIECE TO EARTH GROUND WILL RESULT IN THE OPENING OF FUSE F3 AND CIRCUIT BREAKER CB1, DISABLING THE CONSOLE.

- Safety codes specify that the Power Cable GROUND wire be the last to break connection should the cable be pulled out of the unit. Be sure to cut and strip wire as shown in Figure 6.

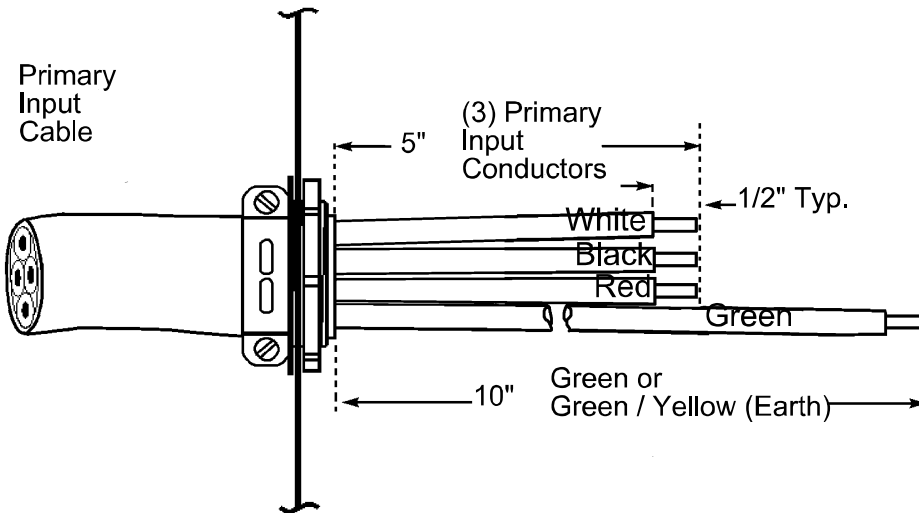


Fig 6 Primary power cable configuration

- Thread the input conductor cable from the wall disconnect switch through the strainrelief in the rear panel of the main contactor (MC). Connect the primary power leads to the main contactor terminals (see Figure 7) using UL listed pressure wire connectors. Also connect the ground wire to the stud provided on the chassis base inside the left-rear of the cabinet. Secure the input cable by tightening the strain relief coupling.

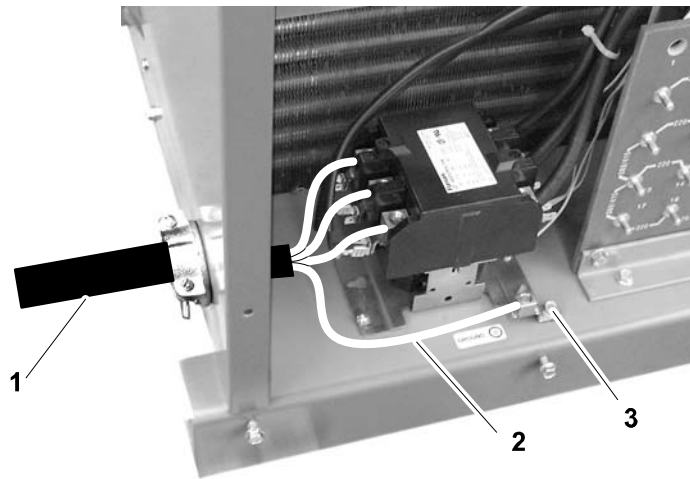


Fig 7 Input Power Cable - Detail View, left side

- | | | | | | |
|---|---|---|----------------|---|-------------|
| 1 | 4-conductor inputcable
(customer supplied) | 2 | Green / Yellow | 3 | Ground Stud |
|---|---|---|----------------|---|-------------|

- Recheck all connections to make sure that they are tight, well insulated, and the proper connection has been made. Then close access panel and reinstall fasteners.

6. **Control mode selection for operation with remote plumbing box**

The ESP-150 is supplied from the factory with plug P45 connected to the J4 (MAN) receptacle (torch gases and torch connected directly to the ESP-150 power source). If the unit is to be used with a remote plumbing box, move P45 to the J5 (MECH) receptacle.

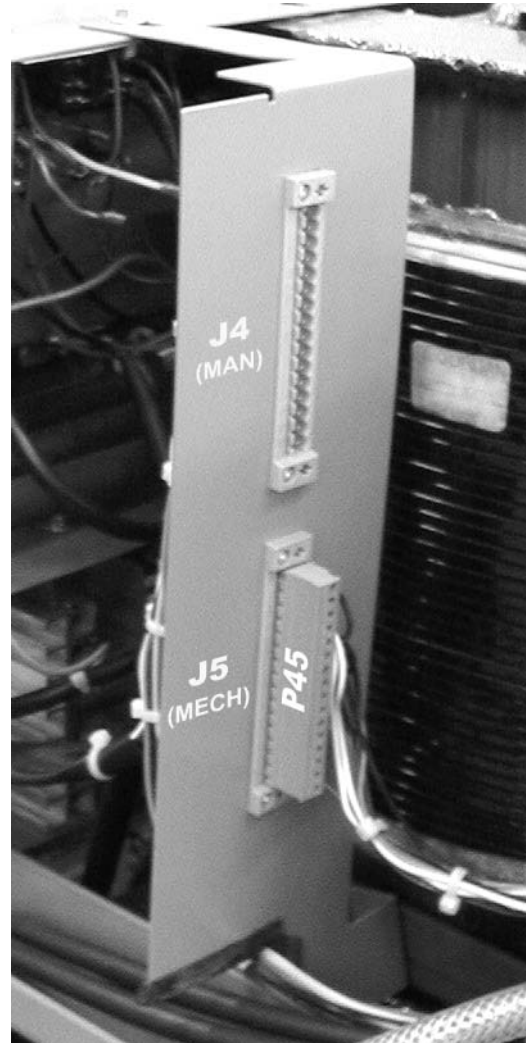
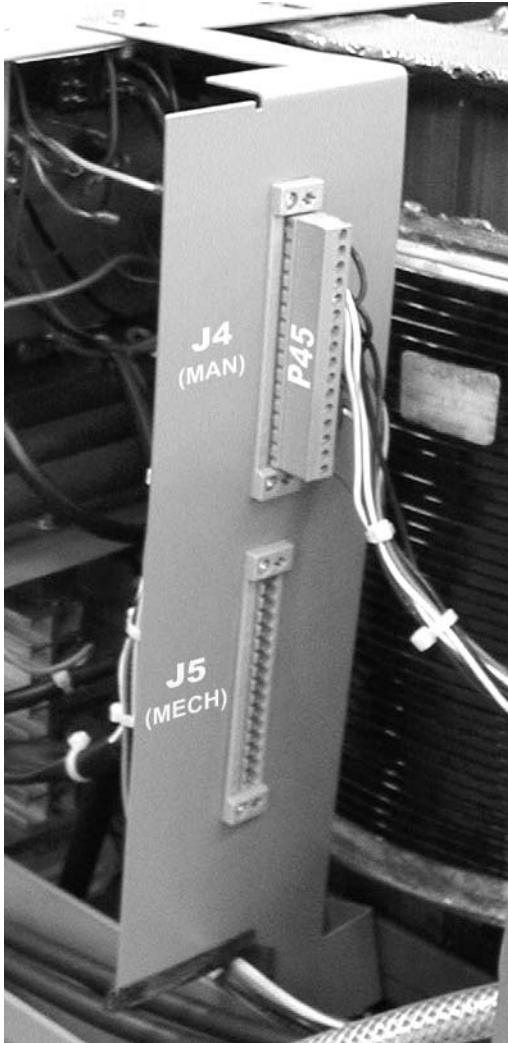
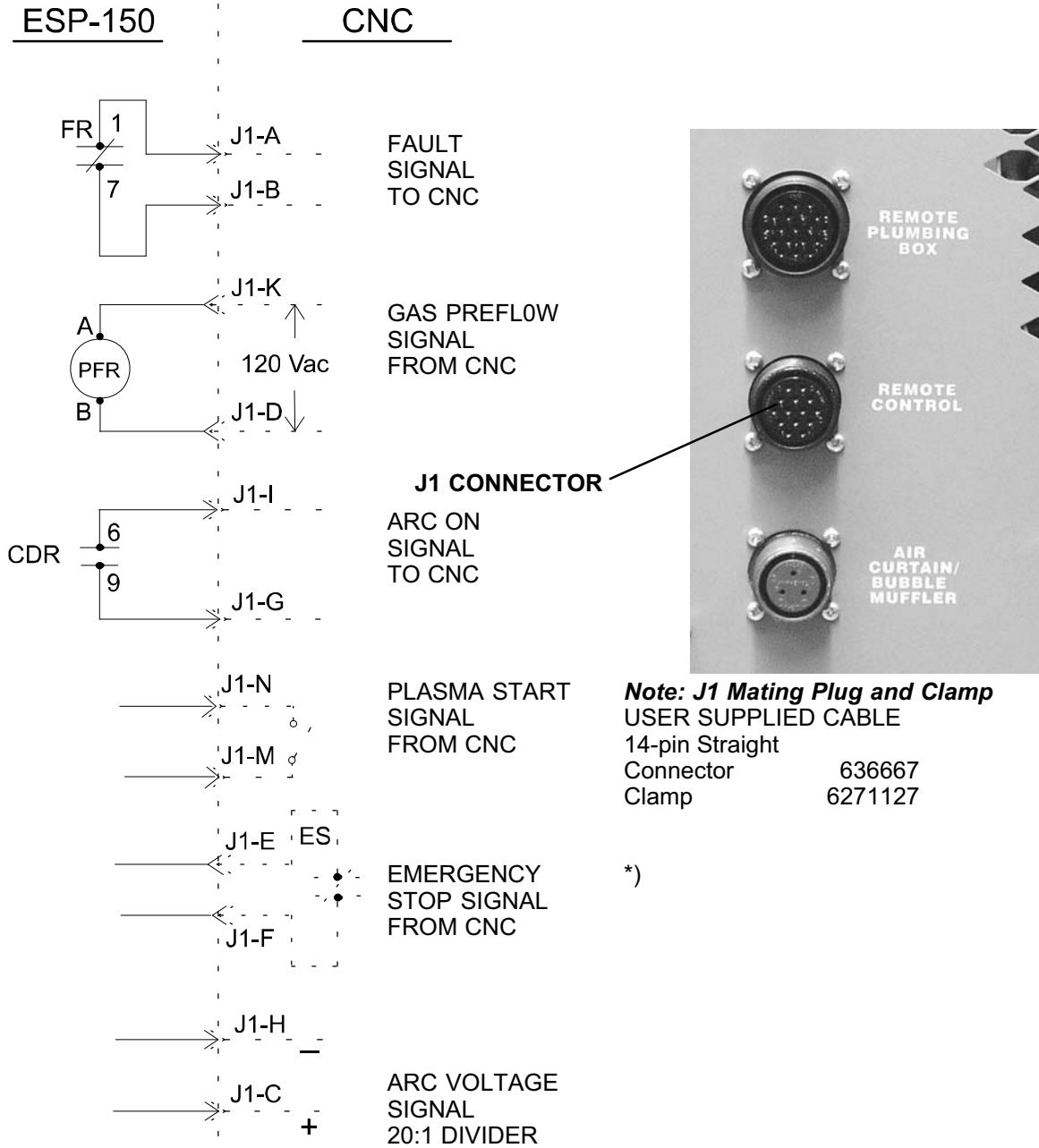


Fig 8 Manual vs. Mechanized Operation

Factory supplied for standard operation - P45 to J4 (MAN)

P45 moved to the J5 (MECH) position to allow use of remote plumbing box



* NOTE: If CNC does not have a normally closed emergency stop switch, a jumper must be installed between TB1-16 and TB1-20.

Fig 9 J1 remote control receptacle pin configuration for CNC connection

6.4 Torch connections

1. Open top front cover to gain access to the torch connections. (Fig. 10)
2. Thread the five service lines (gas, power, and switch lead) of the PT-26 torch through bushing at upper left corner of the front panel and connect them to the matching fittings on output terminal. Hose connections should be wrench tight. Make sure plug of the switch lead is firmly locked in place. Then close and reinstall the hinged cover.
 - a. only an arc start signal is required, connect the optional Remote Hand Switch, ESAB part number 2075600, to the Torch Switch Receptacle on the hook-up panel in the front of the ESP-150 console. Fig. 11.
 - b. If a PT-26 In-line Torch is being used in a mechanized installation with a CNC device, see Fig. 9 for Remote Control Receptacle I/O signal pin configuration and Fig. 8 for Control Mode Selection instructions.

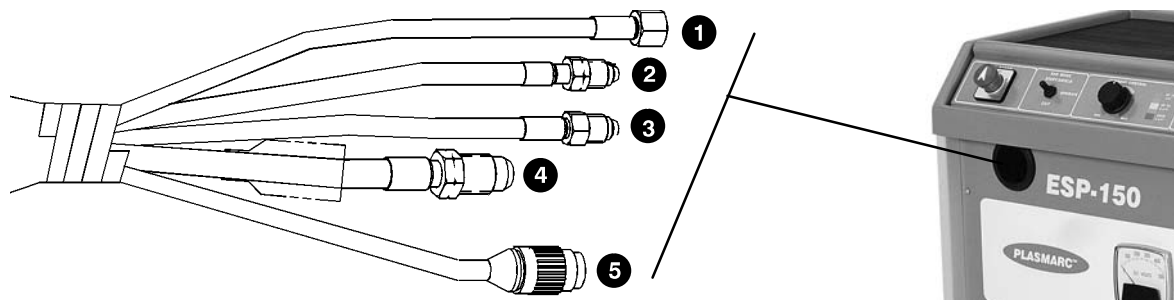


Fig 10 For manual torch applications, pass the service connections through the rubber grommet in the front of ESP-150 and make connections as shown.

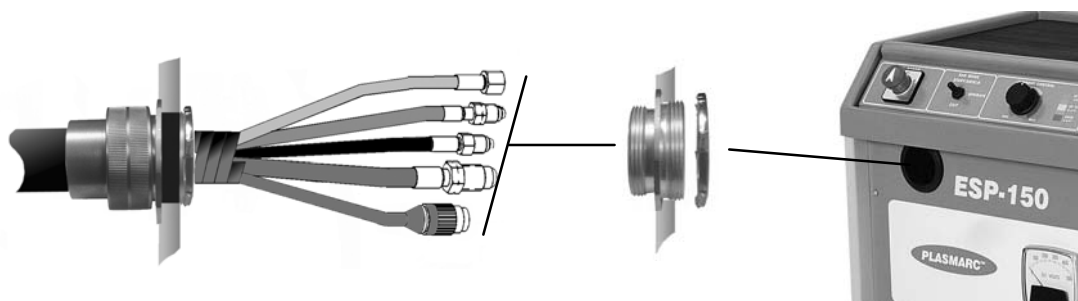


Fig 11 For mechanized applications using a shielded in-line torch, remove the rubber grommet slide body through sheet metal front of ESP-150 and tighten with



Fig 12 Interconnection diagram - front of ESP-150

- | | |
|---|---|
| <p>1 Shield gas</p> <p>2 Water IN (+) (pilot arc)</p> <p>3 Plasma / start gas</p> | <p>4 Water OUT (-) (torch)</p> <p>5 Torch switch receptacle</p> |
|---|---|

6.5 Gas supply connections

1. Connect the gas supplies. The cylinders may be placed and secured on the cylinder rack of the truck. Before connecting the regulators, be sure to read, understand, and follow all instructions packed with each regulator.
2. Connect the gas hoses to the regulators and to the proper fittings (Adaptors: 74S76, Air; 19X54, Ar/H2) on the rear panel of the ESP-150. Connections should be wrench tight including those that are plugged. (Fig. 14)

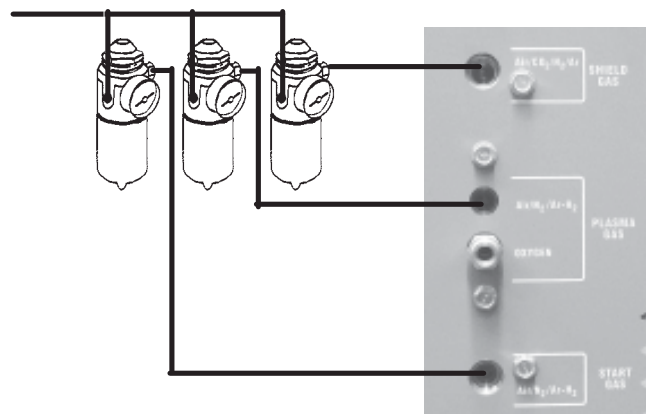
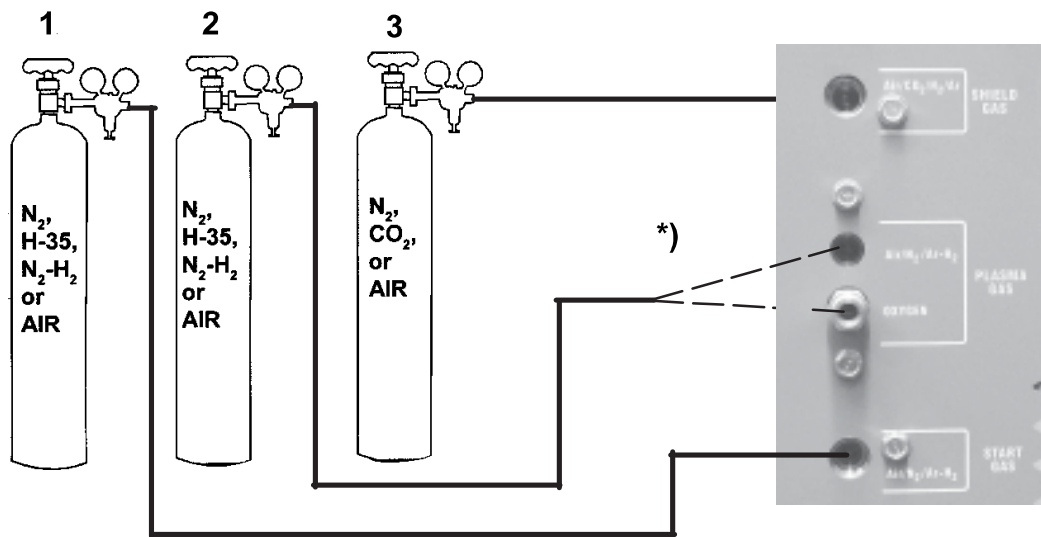


Fig 13 Air filter regulator connections



*) Select ONLY ONE (1) inlet connection, NEVER BOTH, when selecting plasma as

- 1 Start gas
- 2 Cut gas
- 3 Shield gas

Fig 14 Gas connections

6.6 Work and earth connections

1. Connect terminal lug end of the work cable assembly to stud on lower left corner of front panel. Nut should be wrench tight. (Fig. 15). Electrically connect work cable to work piece. The connection must be made to a clean, exposed metal surface free of paint, rust, mill scale, etc. (Fig. 15)
2. Make sure workpiece is connected to an approved earth ground. Use copper ground cable equal to or larger than the power supply chassis ground listed in Table 1.

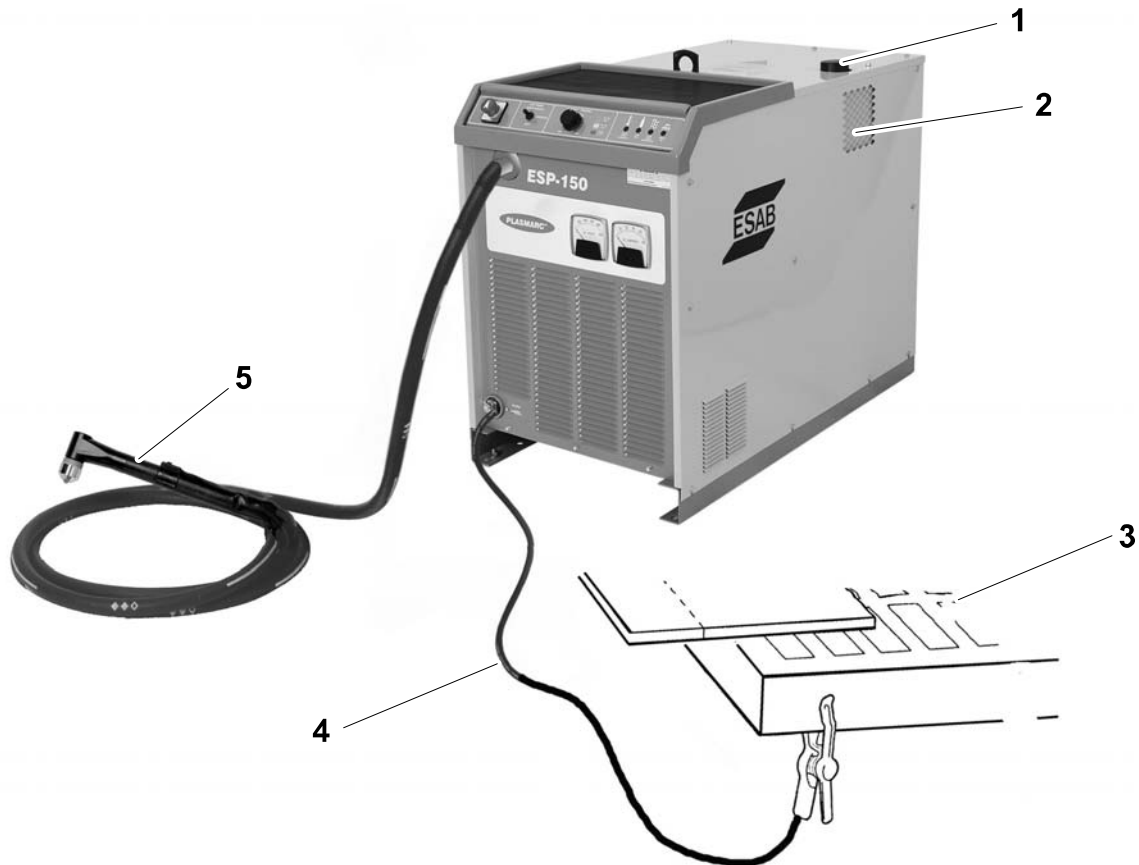


Fig 15 Access for filling Torch Coolant Tank

- | | | | |
|---|---------------------------|---|---|
| 1 | Torch coolant fill access | 4 | Work cable
25 ft. - 23120589, 50ft. - 23120590 |
| 2 | Level indicator | 5 | Torch PT-26 |
| 3 | Grounded work table | | |



WARNING

OPERATING THE UNIT WITHOUT COOLANT WILL CAUSE PERMANENT DAMAGE TO COOLANT PUMP.

6.7 Torch coolant preparation



WARNING

DO NOT USE COMMERCIAL ANTIFREEZE OR TAP WATER.
EQUIPMENT WILL MALFUNCTION AND DAMAGE WILL OCCUR.



CAUTION

The coolant must be handled as chemical waste.

1. Remove the cap from the coolant filter tank. Fill coolant tank with 2 gallons (7.5 liters) of plasma system coolant (P/N 156F05) - supplied with the package. The coolant also provides antifreeze protection down to -34°F (1.1°C).
Due to high electrical conductivity, use of tap water or commercial antifreeze is NOT recommended for torch cooling. Use of tap water can result in algae growth in the water cooler and torch. Automotive type antifreeze will adversely affect starting and will form deposits in the torch that will cause damage.
2. With installation completed, check all gas and coolant fittings for leaks using a standard solution.

7 OPERATION

General safety regulations for the handling of the equipment can be found on page 3. Read through before you start using the equipment!

This section provides descriptions of the power source controls and general operating procedures plus, some tips on cut quality.

7.1 Controls and indicators

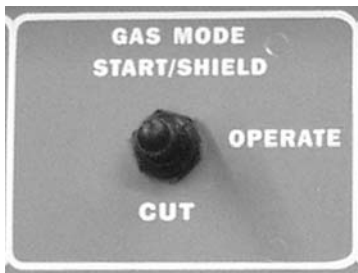
The status lights located on the front of the top lid of the ESP-150 console provide the conditions of the circuitry during a normal plasma arc cutting operation. By knowing the proper sequencing of events and by observing the status lights one can troubleshoot the console in a short time to minimize downtime.

None of these lights will function unless proper input voltage is applied with the links on the input terminal board (TB) properly connected for the input voltage; the ON-OFF power switch is ON; and the top lid of the console is closed firmly.

The following are the functions of each control:



POWER (ROS) — Energizes power to the Fan, Water Cooler and Control Circuitry. This readies the unit for operation.



GAS MODE (OSS) — CUT - Allows for setup of cut gas pressure and flow; START/ SHIELD - allows setup of start and shield gas pressure and flow; and OPERATE - position to use for cutting operations.



CURRENT CONTROL — Controls desired cutting current for optimizing speed and cut thickness. See Application Data on pages 27 through 28.



OVER TEMP — Will light if any (one or more) thermal switch in the console is open due to overheating. (This light may be dim when the gas flow is in the postflow mode.) If light comes on, stop cutting operations and allow unit to cool down (with fan running) until light goes out. If the light is on and

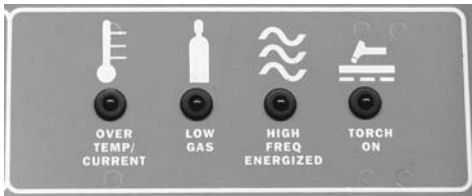
you suspect the unit is cool, then check for defective thermal switch(es) or loose connections.



READY/LOW GAS — This light serves as a READY light, torch switch and operate/set switch check as well as low gas flow or pressure indicator. It will light when the unit is at rest or READY (power ON-OFF switch is ON. It will continue to be lit when operate/set switch (OSS)

is placed in the SET position even when proper gas flow or pressure is set properly. The light will not go out when the OSS switch is placed in the OPERATE position (gas solenoid valves will shut off).

In the operate mode, this light will then function as a LOW GAS light. After depressing the torch switch button and the LOW GAS lights up during a cutting operation, gas pressure or flow is insufficient.



HIGH FREQ ENERGIZED — This will light when the unit is in the OPERATE mode and the torch switch button is depressed. It should remain lit until the main cutting arc is established. It indicates that proper voltage (approx. 115 VAC) is applied to the primary of the high frequency

transformer (HFTR). The voltage is applied to the HFTR through proper operation of the pilot arc contactor (PAC).

TORCH ON — This will light when the power supply is delivering the voltage to generate an arc (whether or not the main arc has been established). It is indicating there is greater than 50 volts between NEG output and WORK terminals.

***Note!** Never touch the front end parts or make any adjustments to the torch if the TORCH ON light is on, even when the power ON-OFF is OFF.*

7.2 ESP-150 Adjustments



WARNING

BEFORE MAKING ANY ADJUSTMENTS OR PERFORMING ANY MAINTENANCE ON THE TORCH, MAKE SURE THE POWER TO THE TORCH IS SHUT OFF.



CAUTION

Never, under any circumstances, operate the power supply with the cover removed. In addition to the safety hazard, improper cooling may cause damage to internal components. Keep side panels closed when unit is energized. Also make sure you are adequately protected before you start cutting — protective helmet and gloves should always be worn. Refer to page 2 for additional operating precautions.



CAUTION

Voltage is available at the POWER On- Off switch on the hinged top cover when voltage is applied to the input terminal board even when the POWER switch is OFF.



1. Slowly open each gas cylinder valve.
2. Place the ESP-150 GAS MODE and POWER switches in the OPERATE and OFF positions.
3. Place the primary (wall) switch in the ON position.
4. Place POWER to READY position. POWER light should light up. Fan should be running.
5. With GAS MODE switch in START/SHIELD position gas solenoid valves should be open. Adjust the START gas and SHIELD regulators to deliver the pressures specified in Table 2.
Place switch in CUT position and adjust CUT Gas regulator to deliver pressures specified in Table 2.
6. Allow the gases to flow for a few minutes. This should remove any condensation that may have accumulated during shut down.
7. Place the GAS MODE switch in the OPERATE position. This will shut off the gas flows.
8. Adjust CURRENT CONTROL knob to approximate cutting current desired.

7.3 Operation



WARNING

ARC RAYS CAN BURN EYES AND SKIN, NOISE CAN DAMAGE HEARING! WEAR EYE, EAR, AND BODY PROTECTION. WEAR THE USUAL PROTECTIVE GLOVES, CLOTHING, AND HELMET.

HELMET WITH FILTER LENS SHADE NO. 6 OR 7 SHOULD PROVIDE ADEQUATE PROTECTION FOR YOUR EYES.

NEVER TOUCH ANY PARTS FORWARD OF THE TORCH HANDLE (TIP, HEAT SHIELD, ELECTRODE, ETC.) UNLESS THE POWER SWITCH IS IN THE OFF POSITION.

1. Position the torch on the workpiece by resting the heatshield on the edge of the workpiece where you intend to start the cut.
2. Lower your protective helmet and then lift the torch about 1/8-in. above the workpiece.
3. Push down on the torch switch button mounted on the torch handle. Pilot arc contactor and high frequency will energize, and gas will start flowing. Two seconds later, the main contactor will come on. The pilot arc should then transfer to the cutting arc.
NOTE: If cutting arc does not start within 6 seconds, the pilot arc will shut off. Release torch switch. Check to be sure gas pressures are adequate, work cable is firmly connected to workpiece, torch was about 1/8 to 1/4- in. above workpiece, etc. Then start from step 1 again.
4. For manual and mechanized cutting, maintain a standoff (torch-to-work distance) of about 3/8-in. (stand off guide, P/N 36648, provides that distance). Keep the torch head vertical, and move it at a rate that produces the desired cut quality. The cutting should produce a straight fine spray of molten metal emitting from beneath the workpiece as illustrated in Fig. 16. For mechanized cutting, see Table 2 or 3 for recommended cutting speed range.
5. If cutting arc is lost during a cut, the pilot arc will immediately reignite as long as the torch switch is depressed. You then have about 6 seconds to move the torch close enough to work to re-establish the cutting arc.



WARNING

**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 WITH POWER SWITCH ON.**

6. The cutting arc will extinguish at the end of the cut; however, the torch switch should be released to keep the pilot arc from reigniting.
7. When cutting operation is completed, wait a few minutes before placing the POWER switch to the OFF position so that the cooling fan has time to remove the heat from the unit. Then shut off the primary power at the main disconnect switch.



CAUTION

**Position the ESP-150 at least 10 feet (3 meters) from the cutting area.
Sparks and hot slag from the cutting operation can damage the unit.**

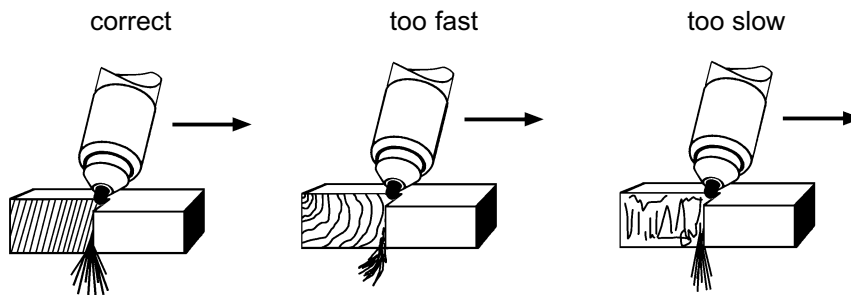


Fig. 16 - Effect of cutting speed

With a positive cut angle, the top dimension is slightly less than the bottom dimension. With a negative cut angle, the top dimension is slightly greater than the bottom dimension. The cut angle is controlled by the standoff (arc voltage), cutting speed and cutting current. If the cutting speed and the cutting current are correct and the part has an excessive positive angle, then the standoff is too high. Begin lowering the arc voltage in increments of 5 volts, observing cut squareness. There will always be slight top edge rounding of the part when using Nitrogen.

The optimum torch height is a point just before the part begins to develop a negative cut angle. To expand upon the other two variables; with the correct torch standoff, excessive cutting speed will result in a positive cut angle; insufficient cutting speed will produce a negative cut angle. If the cutting current is too high or low a positive cut angle will be produced.

Arc Voltage/Standoff - Interactive parameters that are proportional. The higher the torch above the plate (standoff), the higher the operating voltage required and vice versa.

Lag Lines - These lines appear on the cut surface. They are of assistance in determining if your process parameters are correct.

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 or greater, a standoff too close may result in a negative cut angle.

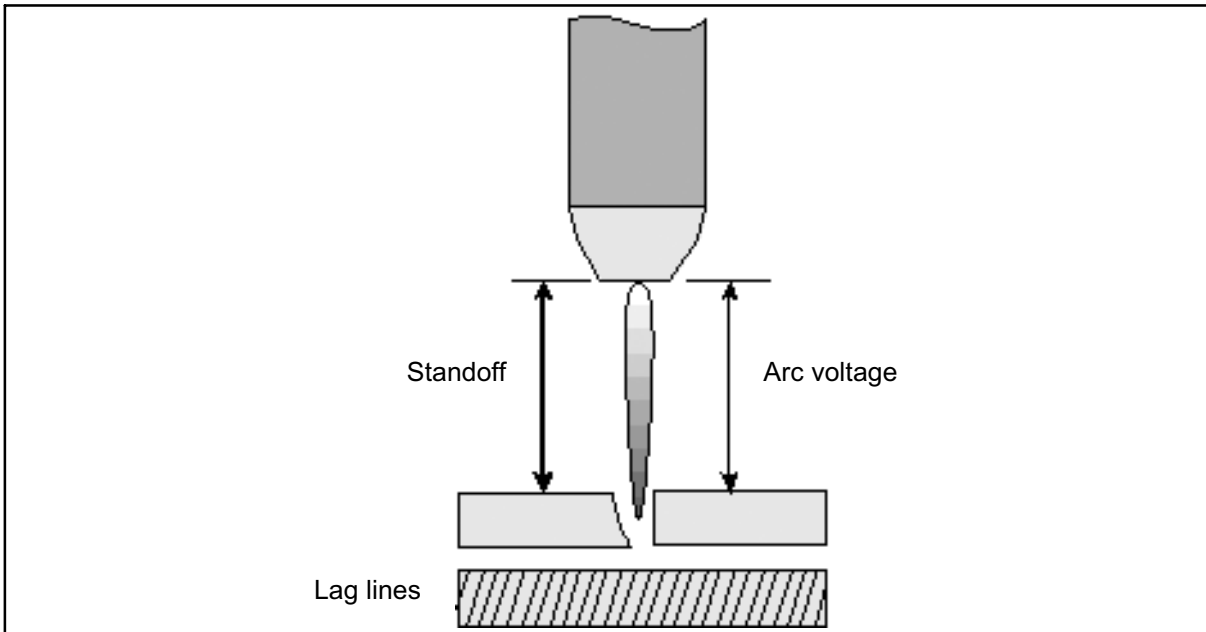


Fig 17. Cut Quality

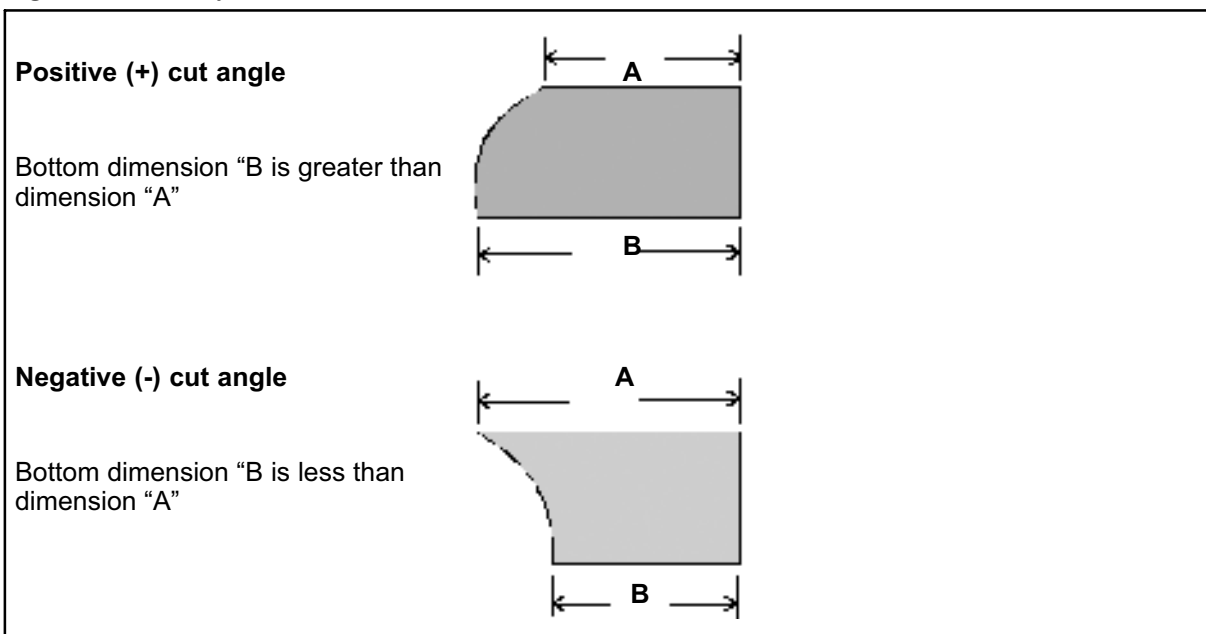


Fig 18. Cut angle

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 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.

Top dross

Splatter appears on the top edge of both pieces of the plate.

Lower the voltage in increments of 5 volts dc (maximum) until top dross disappears.

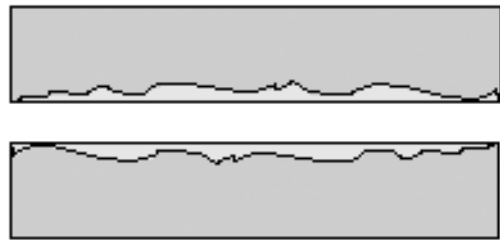


Fig 19. Top Dross Formation

High speed dross

Fine roll over dross that welds to bottom of edge. Cleaning requires chipping or grinding.



Fig 20. High Speed Dross

Low speed dross

Globular dross that forms in large deposits. Comes off very easily.



Fig 21. Low Speed Dross Formation

7.6 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.

7.7 Common cutting problems



WARNING

TRIPPED CIRCUIT BREAKER (LOCATED UNDER THE TOP HINGED COVER) MAY INDICATE DANGEROUS HIGH VOLTAGE EXISTED BETWEEN THE WORK CABLE AND EARTH GROUND. THIS IS USUALLY CAUSED BY A MISSING OR POOR CONNECTION OF THE WORK CABLE TO THE WORK PIECE. THE WORK CABLE MUST BE ELECTRICALLY CONNECTED TO THE WORK PIECE TO PREVENT DANGEROUS SHOCK CONDITIONS.

The following is a listing of common cutting problems and the probable cause. If problems are determined to be caused by the ESP-150, refer to the maintenance section of this manual. If the problem is not corrected after referring to the maintenance section, contact your ESAB representative.

A. Insufficient penetration:

1. Cutting speed too fast
2. Damaged cutting nozzle
3. Improper gas settings
4. Inadequate delay for pierce

B. Main arc extinguishes:

1. Cutting speed too slow

C. Dross formation:

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

D. Double arcing:

1. Low air pressure
2. Damaged cutting nozzle
3. Loose cutting nozzle
4. Heavy spatter
5. Nozzle touches work while cutting
6. Pierce height too low
7. Current too low

E. Uneven arc:

1. Damaged cutting nozzle or worn electrode



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. Loose connections
2. Work clamp not connected
3. Gas pressures not correct
4. Insufficient coolant to operate flow switch

H. Poor consumable life:

1. Improper gas pressure
2. Contaminated air supply
3. Improper gas/electrode combination
4. Torch hitting work piece or turned up parts
5. Parts damaged by double arcing (see D above)
6. Use of non-genuine parts
7. Water leaks in torch
8. Torch not purged after changing consumables or idle period
9. Using wrong consumables for selected gases

7.8 Cutting speed conditions

The cutting speeds and conditions in the following tables were selected to give the best quality with a particular gas combination at a specific current.

Consumables - Refer to PT-26 Torch manual for recommended parts for these conditions. Use of parts in combinations and applications other than as described herein can result in damage to the torch or poor performance.

Gas and current selection - Refer to the following tables to choose the most appropriate conditions for your application.

7.9 Recommended gas and current

The following provide the recommended gas and current selection for common metals to obtain the best cutting results.

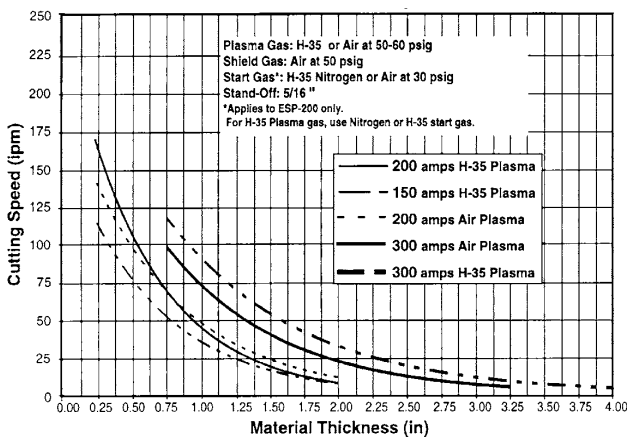
Material type: CARBON STEEL		Material type: STAINLESS STEEL	
Thickness	Gas and Current Selection	Thickness	Gas and Current Selection
1/8" (3.2mm) and thinner	50 / 65 Amps, Air Plasma/Air Shield.	1/4" - 3/8" (3.2-9.9mm) and thinner	50 - 65 Amps, N ₂ Plasma/N ₂ Shield produces best surface but light dross on 1/8" material.
3/16 - 1/2 (4.8-12.7mm)	100 Amps, Plasma/Air Shield. 100 Amps, Air Plasma/Air Shield is also good but there will be bottom dross on 1/2" (12.7mm) material		50 - 65 Amps, Air Plasma/Air Shield can produce dross free cuts but the surface is rough.
1/2" - 2" (12.7mm - 50mm)	150 Amps, Plasma/Air		



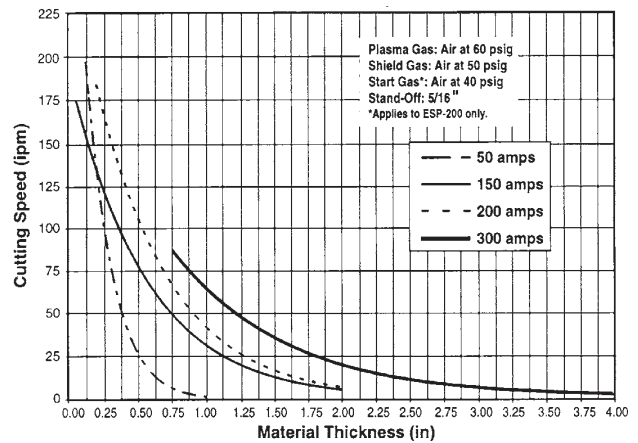
Material type: ALUMINUM	
Thickness	Gas and Current Selection
1/4" (6.4mm) and thinner	50/65 Amps, N ₂ Plasma/N ₂ Shield usually produces fairly smooth, dross free cuts.
	50/65 Amps, Air Plasma/Air Shield produces much rougher cut surfaces.
1/4" (6.4mm) and thinner	150 Amps, Plasma/N ₂ H-35

7.10 Cutting Parameters for the PT-26 and ESP-150

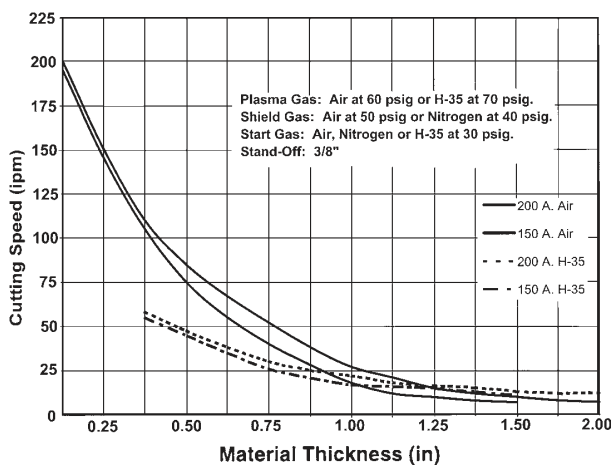
PT-26 Aluminum Cutting Data



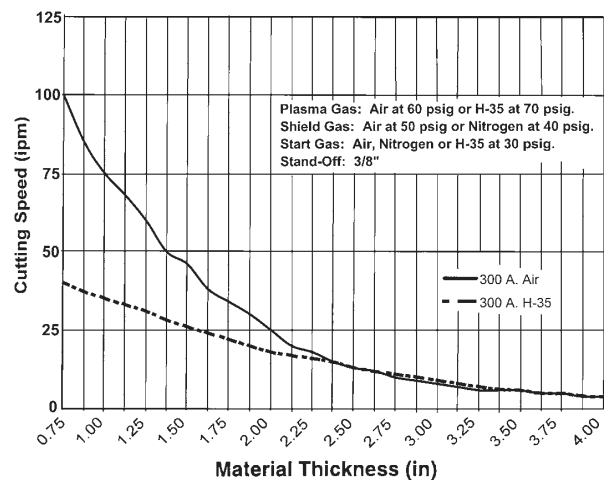
PT-26 Steel Cutting Data



PT-26 Stainless Steel Cutting Data



PT-26 Stainledd Steel 300 Amp Cutting Data





Cutting Parameters for the PT-26 and ESP-150

Material Type-Thickness in.(mm)	Current (Amps)	Travel Speed ipm(M/m)	Cutting Height in.(mm)	Start Gas Type/ Pressure psi(bar)	Plasma Gas Type/ Pressure psi(bar)	Shield Gas Type/ Pressure psi(bar)
CS-1/8 (3.2)	50	195 (4.95)	5/16 (8)	Air - 30 (2.1)	Air - 60 (4.14)	Air - 50 (3.45)
CS-3/16 (4.7)		150 (3.8)				
CS-1/4 (6.35)		100 (2.58)				
CS-5/16 (8)		75 (1.9)				
CS-3/8 (9.5)		50 (1.27)				
CS-1/2 (12.7)		25 (.63)				
CS-5/8 (15.9)		12 (.3)				
CS-3/4 (19)		6 (.15)				
CS-1 (25.4)		2 (.05)				

Table 4.1. PT-26 Carbon Steel Cutting Data

Material Type-Thickness in.(mm)	Current (Amps)	Travel Speed ipm(M/m)	Cutting Height in.(mm)	Start Gas Type/ Pressure psi(bar)	Plasma Gas Type/ Pressure psi(bar)	Shield Gas Type/ Pressure psi(bar)
CS-1/16 (1.6)	150	175 (4.45)	5/16 (8)	Air - 30 (2.1)	Air - 60 (4.14)	Air - 50 (3.45)
CS-1/8 (3.2)		155 (3.94)				
CS-1/4 (6.3)		137 (3.48)				
CS-5/16 (8)		125 (3.17)				
CS-3/8 (9.5)		87 (2.2)				
CS-1/2 (12.7)		76 (1.93)				
CS-5/8 (15.9)		62 (1.57)				
CS-3/4 (19)		50 (1.27)				
CS-1 (25.4)		30 (.76)				
CS-1-1/8 (28.6)		25 (.63)				
CS-1-1/4 (31.7)		20 (.5)				
CS-1-3/8 (34.9)		15 (.38)				
CS-1-1/2 (38)		13 (.33)				
CS-1-3/4 (44.5)		6 (.15)				
CS-2 (50.8)		4 (.10)				

Table 4.1. PT-26 Carbon Steel Cutting Data



Material Type- Thickness in.(mm)	Cur- rent (Amps)	Travel Speed ipm(M/m)	Cutting Height in.(mm)	Start Gas Type/Pres- sure psi(bar)	Plasma Gas Type/Pres- sure psi(bar)	Shield Gas Type/Pres- sure psi(bar)
AL-1/4 (6.35)	150	112 (2.84)	5/16 (8)	H-35 or N2 30 (2.1)	H-35 - 50 (3.45)	Air - 50 (3.45)
AL-5/16 (8)		100 (2.54)				
AL-3/8 (9.6)		93 (2.36)				
AL-1/2 (12.7)		78 (1.98)				
AL-5/8 (15.9)		63 (1.6)				
AL-3/4 (19)		52 (1.32)				
AL-1 (25.4)		37 (.94)				
AL-1-1/8 (28.6)		30 (.76)				
AL-1-1/4 (31.7)		25 (.63)				
AL-1-3/8 (34.9)		20 (.5)				
AL-1-1/2 (38)		18 (.46)				
AL-1-3/4 (44.5)		12 (.3)				
AL-2 (50.8)		10 (.25)				

Table 4-2. PT-26 Aluminium Cutting Data

8 MAINTENANCE

**WARNING**

BE SURE THAT ALL PRIMARY POWER TO THE MACHINE HAS BEEN EXTERNALLY DISCONNECTED. OPEN WALL DISCONNECT SWITCH OR CIRCUIT BREAKER BEFORE ATTEMPTING INSPECTION OR WORK INSIDE OF THE POWER SUPPLY.

**WARNING**

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

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.

8.1 Inspection and cleaning

Frequent inspection and cleaning of the ESP-150 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.
CAUTION: Water occasionally accumulates in compressed air lines. Be sure to direct the first blast of air away from the equipment to avoid damage.
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.
8. Occasionally bleed water from the filter beneath the air regulators.

8.2 Flow testing



WARNING

BE SURE THAT ALL PRIMARY POWER TO THE MACHINE HAS BEEN EXTERNALLY DISCONNECTED. OPEN WALL DISCONNECT SWITCH OR CIRCUIT BREAKER BEFORE ATTEMPTING INSPECTION OR WORK INSIDE OF THE POWER SUPPLY.



WARNING

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

Improper flows can cause short life on the consumables, poor starting, bad cuts, or overheated torches. The flows given below are “cold” flow (no arc). To avoid fatal shock, follow the steps below to assure safe flow measurement.

1. Shut off input power at the main disconnect switch.
2. Lift the top lid of the ESP-150 and unplug the torch switch cord.
3. Close the lid.
4. Turn on the power at the main disconnect switch.
5. Place gas mode selector switch (OSS) in START/SHIELD position.
6. Place power ON-OFF switch (ROS) to ON.
7. Check flow measurements with P/N 19765 flow measuring kit.
8. Place mode selector switch (OSS) in CUT position and check CUT flow with P/N 19765 flow measuring kit.
9. Place ROS switch to OFF.
10. Turn off power at main disconnect switch.
11. Reconnect torch switch plug inside console.

PT-26 Plasma Gas Flow (No Arc):

Nitrogen or Air @ 60 psig: 110 cfh; H-35 @ 90 psig: 130 cfh

PT-26 Start Gas Flow:

Nitrogen or Air @ 40 psig: 75 cfh

PT-26 Shield Gas Flow:

Air or Nitrogen @ 85 psig: 200 cfh minimum.

8.3 Spark gap adjustment



WARNING

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

The spark gap, which is part of the high frequency generator, is factory set at 0.025-in. (+/- 0.002). After extended operation or if erratic operation is noted, it may be necessary to readjust or replace the electrodes (634098). Use a feeler gauge when readjusting the gap. (See form 11-831, "Recommended Installation and Test Procedures for High-Frequency Stabilized Arc Welding Machines", packed with the unit.) Cleaning or dressing of the spark gap electrodes is not recommended. When replacement is necessary, both electrodes should be replaced.

8.4 Testing and replacing bridge assembly components



WARNING

BE SURE THAT ALL PRIMARY POWER TO THE MACHINE HAS BEEN EXTERNALLY DISCONNECTED. OPEN WALL DISCONNECT SWITCH OR CIRCUIT BREAKER BEFORE ATTEMPTING INSPECTION OR WORK INSIDE OF THE POWER SUPPLY.



WARNING

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

1. Testing Diodes

- a. Locate the main rectifier assembly containing the silicon diodes and SCR's.
- b. Electrically isolate main bridge rectifier assembly by disconnecting the main transformer secondary fuse links F1 and F2.
- c. With ohmmeter on RX1 scale, place negative lead on the diode heat sink and touch positive lead to each pigtail terminal. Meter should read a low resistance of approximately 3 to 15 ohms on each diode.
- d. Reverse leads and check each diode. All readings should show high resistance of 2 K (2000) ohms or higher. With most ohmmeters on the RX1 scale, 2K ohms is the highest possible reading available.
- e. Since diode resistance is non-linear with voltage (using any scale), diodes are good when they show low resistance in one direction and high resistance in the opposite direction. They are bad when they show no or very low resistance in both directions (shorted), or if they show very high assistance in both directions (open).

2. Testing SCR's

- a. a. Follow steps a. and b. under Testing Diodes. Disconnect the SCR pigtail.
- b. With ohmmeter on RX1 scale place the negative lead on the anode (end of SCR with screw threads) and positive lead on the cathode (pigtail end). Meter should read a high resistance of 2 K (2000) ohms or higher.
- c. Reverse leads and check each SCR. All readings again should show high resistance. The SCR's are bad if they show low resistance in either direction.
- d. Now check the gate circuit on the SCR's by placing the negative lead to the gate (wht wire off SCR) and the positive lead to the cathode. Meter should read approximately 20 ohms and should vary only slightly (5 ohms) when leads are reversed. If the meter reads zero or infinity in either direction the gate circuit is faulty and the SCR should be replaced.

IMPORTANT:

When replacing Diodes or SCR's make sure mounting surfaces are clean. Coat mounting surfaces with Alcoa No. 2 EJC Electrical Joint Compound (no substitutes) available in 8 oz. bottles under P/N 73585980. Use a torque wrench to tighten diodes and SCR's. Recommended torques are 20-30 in.-lbs. for diodes; 125-150 in.- lbs. for SCR's.

9 TROUBLESHOOTING

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.

NOTE: Before checking voltages in the circuit, disconnect the power from the high frequency generator to avoid damaging your voltmeter.

Be sure unit is set up properly for voltage being used and that the gas supplies are adequate.

9.1 Troubleshooting guide

1. **Unit Inoperative; fan does not run.**
 - a. Check primary disconnect switch to make sure input power is being supplied.
 - b. Check links on the input terminal board TB to make sure all are connected to the proper input voltage being used. (See Form 14-376.)
 - c. Check for defective power switch (ROS).
2. **No gas flow when torch switch is closed.**
 - a. Unplug torch switch plug and check for proper operation with an ohmmeter connected to pins 1 and 2 of torch switch plug.
 - b. Defective interlock switch (ISW).
 - c. Check for defective solenoid valves.
 - d. Plug (P1) may be loose at control board (674935).
 - e. Defective logic board (675369).
3. **No pilot arc-high frequency sparks noted at spark gap but not at the torch.**
 - a. Check spark gap and readjust electrodes if necessary. Replace spark gap electrodes if worn beyond serviceability.
 - b. Check with an ohmmeter for continuity between torch nozzle and POS output where torch attaches to console.
4. **No pilot arc-high frequency sparks noted at spark gap and at torch during preflow, but main contactor does not activate or chatters at end of 2 second preflow time.**
 - a. Check start gas pressure. It must be at least 30 psig.
 - b. Check cooling gas pressure (PT-26). It must be at least 50 psig.
 - c. If using PT-26 torch, check jumper plug between J1-5 and J1-4 on the torch switchplug.
 - d. Thermal switch in bridge, inductor, or main transformer may be open. Allow unit to cool down.
 - e. Defective logic board (675369).
5. **No pilot arc - No spark noted in the spark gap.**
 - a. Check to see that pilot arc contactor (PAC) closes. If it does not, and gas flows when torch switch is closed, replace logic board (675369).
 - b. If PAC closes, check for proper spark gap setting (0.025-in.).
 - c. Check the 120V input to the high voltage transformer (HFTR).
 - d. Check for arcing or carbon tracking around the spark gap.
 - e. If all of the above check good, HFTR is most likely defective.
6. **Erratic pilot arc - pilot arc contactor (PAC) chatters.**
 - a. Defective logic board (675369).
 - b. Power supply may be single phasing. Check main disconnect switch and fuses.

7. No pilot arc -pilot arc contactor (PAC) drops out when main contactor (MC) activates at end of 2-second preflow.

- a. a. Check for low open circuit voltage. It should be around 370 V at nominal line voltage.
- b. Check voltage between each side of resistor R29 and the WORK output connection when MC is activated. Place negative meter lead on side of resistor being checked and positive meter lead on the WORK output connection. The voltage on one side should be the open circuit voltage (370 V). The voltage on other side should be above 175 V. If lower voltage is under 175 V, PAC will drop out.
- c. Check the resistance of R29. It should be 133 K ohm.
- d. Disconnect R-29 resistor and measure the resistance from P1-1 to shunt (common). Resistance should be 200 K to 250 K ohms.
- e. Check for continuity between R29 and electrode (-) torch connections.
- f. With power off, mechanically pull in PAC. The resistance between POS and WORK connections should be 8 ohms.

8. Main arc fails to transfer to work.

- a. Make sure that work clamp is securely fastened to the work piece.
- b. Check for proper function of pilot arc (PT-26) and high frequency unit.
- c. Check main disconnect switch and fuses.
- d. Check main contactor (MC) by disconnecting primary power and check each contact for closure using an ohmmeter while physically pulling contactor.
- e. Check each capacitor (1900 uf, 450 V) with an ohmmeter. Resistance should be 900-1000 ohms with capacitor connected in the circuit. If shorted, replace capacitor. Then check R18 resistor. The resistance of R18 should be 5 ohms. The resistance between "DRB POS" and "CAP (+)" should be 25 ohms. If the stud mounted rectifier on D/R board is shorted, the 25 ohm will be less than 5 ohms even when meter probes are reversed. A shorted rectifier on D/R board can cause C25 capacitor to fail.
- f. Check open circuit voltage. It should be about 370 volts.
- g. Check F1 and F2 fuses. The open circuit can still be 370 volts with one blown fuse.
- h. Current control board (674935) may be defective.

9. Short tip life.

- a. Check for correct gas pressure.
- b. Check gas flow rate using flowmeter P/N 19765
- c. Check to see if pilot arc contactor (PAC) remains activated after main arc transfers. This can be done by observing the spark in the spark gap of the high freq. unit. The high freq. spark should shut off as soon as main arc starts. If spark continues after main arc is established, either main contactor (MC) or logic board (675369) is defective.
- d. Arc current is set too high.
- e. Wrong cutting tip size. Use larger tip.
- f. Defective current control board (675468 or 674940).

10. Pilot arc cycles on and off when torch switch is not depressed.

- a. Unplug torch switch plug. If cycling stops, then torch switch wires or plug or torch switch itself are shorted.
- b. Defective logic board (675369).

11. No or limited control of output current.

- a. Defective current control potentiometer (CCP). Check by placing negative meter lead on WORK output connection and positive meter lead on current control board P1-2. (P1 is the larger of the two plugs.) With the fan running (machine at idle), adjust CCP from min. to max. They read zero at min. (1.1 volts on ESP-150); 10 Volts DC at max. The meter should move smoothly from zero to 10 V as CCP is rotated from min. to max.
- b. Defective logic board (675369).

12. Gas does not shut off after 10 seconds of preflow.

- a. Turn off ready-off switch (ROS). If gas continues to flow, solenoid valve is defective.
- b. Defective logic board (675369).

9.2 Sequence of operation (see fig 22)

1. Close primary disconnect switch.

- a. Power supplied to unit.

2. Place Power Switch (ROS) to “Ready” position.

- a. Fan motor (FM) and Pump motor on.
- b. Low Gas LED on.
- c. Control circuit energizes.

3. Place Gas Mode Switch (OSS) to “CUT” position.

- a. Gas solenoid valves (CGSV) energize. Gases flow to permit setting of pressures and to purge system.

4. Place OSS to “Operate” position.

- a. Gas valves (PGSV and CGSV) deenergize to stop gas flows.

5. Depress torch switch.

- a. SHSV and SGSV (shield and start) gas solenoid valves open to allow gases to flow to torch.
- b. Pilot Arc Contactor (PAC) closes.
- c. High Frequency (HF) energizes.
- d. Pressure Switches (PGPS & CGPS) close (provided gas pressures are set above 19 psig on PGPS and 22 psig on CGPS).
- e. Two seconds later, Main Contactor (MC) closes to establish pilot arc.
- f. Pilot arc will transfer to cutting arc within 6 seconds as long as torch is close enough (1/8 —1/4-in.) to work.

- g. HF and PAC deenergizes immediately when cutting arc is established, or after 6 seconds of continuous pilot arc. If cutting arc is not established after six seconds, MC will open but the HF will remain energized. MC and pilot arc will then cycle on and off every 3 seconds, MC will open but the HF will remain energized. MC and pilot arc will then cycle on and off every 3 seconds until torch switch is released. **WARNING:** Dangerous high voltage (over 300 volts) exists at the torch front end whenever MC is closed; therefore, release torch switch when cutting is not established and repeat step 5.

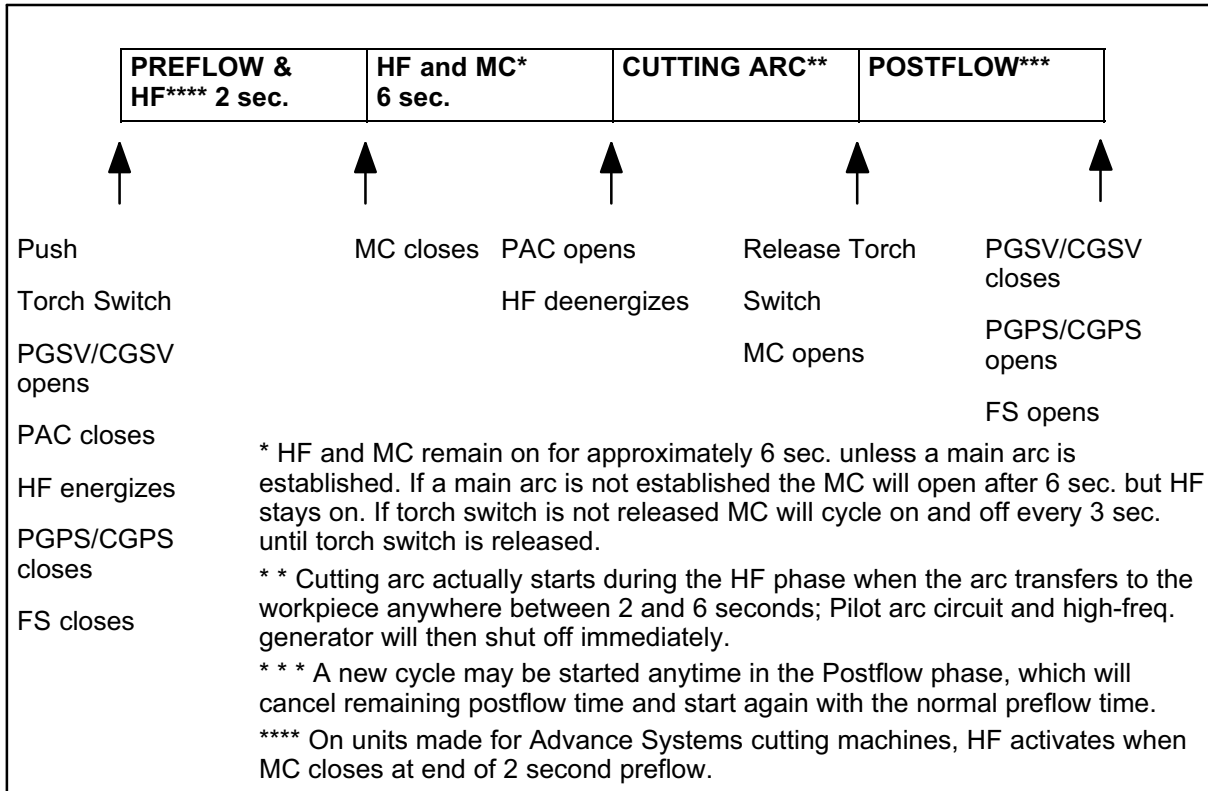


Fig 22. Torch operation sequence diagram

6. **Release torch switch.**

- a. MC opens and the cutting arc shuts off.
- b. Gases continue to flow (postflow) for approximately another 10 seconds at which time the PGSV and CGSV will close, opening PCPS and CGPS.

NOTE: A new cutting cycle can be started anytime during the postflow. As soon as the torch switch is depressed, the remaining postflow time will cancel and the normal preflow time will start.

7. **Control circuit will not energize or can deenergize during a cutting cycle when:**

- a. PGPS or CGPS is open due to insufficient gas pressure (at least 15 psi required).
- b. Thermal Switches (TS) are open due to overheating of unit. TS should open at 180° C (356° F).

8. **Place ROS to “OFF” position.**

- a. Control circuit deenergizes.
- b. Fan motor (FM) deenergizes.
- c. Low Gas light on status board will go out.

9. **Open primary disconnect switch.**

- a. Input power unit shut off.

9.3 Status light troubleshooting chart

Proper Input Power Applied		
↓		
ROS ON		
↓		
Is OVER TEMP Light On?	YES →	1. Machine may be overheated. 2. Check connections to thermal switches (TS).
NO ↓		
Is READY/LOW GAS Light On	NO →	1. Close top lid. 2. Check ISW switch 3. Check CB1.
YES ↓		
Set Gas(es) at proper pressure with OSS switch in CUT/ START-SHIELD- mode.		
↓		
Place OSS switch in OPERATE		
↓	← "A"	
Depress Torch Switch		
↓		
Is HIGH FREQ Light On?	NO →	1. Check OSS switch. 2. Check Torch Switch. 3. Check PAC contactor to insure 24 VAC is applied to coil. 4. Check PC Board 675369. 5. Check HFTR Transformer
YES ↓		
Does LOW GAS Light GO Off?	NO →	1. Check input gas pressure. 2. Check gas flow of PT-26. Check to be sure consumables are good and properly in place. 3. Check torch switch for intermittent connection. 4. If using PT-26, check jumper between pin 4 and 5.
YES ↓		
2 second delay		

Does TORCH ON Light turn on?	NO →	1. Check open circuit voltage. Should be about 370 VDC.(Disconnect HF to avoid damaging meter.) 2. Check input power. 3. Check MC contactor. 4. Check diodes and SCR's. 5. Check PC board 675468.
YES ↓		
Is Pilot Arc established	NO →	1. Check consumables in torch. 2. Check torch connections using ohmmeter. 3. Check open circuit voltage (325 VDC). (Disconnect HF to avoid damaging meter.) 4. Check HF at spark gaps. (ISW switch must be closed when performing check.) May have to reset spark gap. 5. Check PAC contactor. 6. Check R20 and R21 resistors.
YES ↓		
Touch pilot arc to work piece within 6 sec. after pilot arc is established, or pilot arc will turn off and begin cycling on and off about every 3 sec..		
↓		
Is Main Arc established?	NO →	1. Check work lead connection. 2. Check consumables in torch. 3. Check for proper nozzle and current. At low currents, the arc length has to be closer to work. 4. Check all input voltages between lines. 5. Check open circuit voltage. 6. Check diodes and SCR's. 7. Check PC board 675468.
YES ↓		
HIGH FREQ light goes out		
↓		
Adjust cutting speed		
↓		
Release torch switch		
↓		
LOW GAS light turns on		
↓		
Unit in Post Flow mode and ready to cut again.		
↓		
"A"		



10 ORDERING AND REPLACEMENT PARTS

10.1 Replacement parts

When ordering replacement parts, order by part number and part name, as illustrated on the figure. Always provide the series or serial number on the unit on which the parts will be used. The serial number is stamped on the rating plate.

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.

Refer to the Communications Guide located on the back side of this manual for a lists of customer service phone numbers.

10.2 Ordering numbers

The ESP-150 package includes console, PT-26 torch with leather sheath, torch spare parts kit, 25 ft. or 50 ft. work cable, TR-21 truck with dual cylinder rack, regulators and gas hoses and torch coolant

Ordering information

ESP-150 Packages

230/460/575 V, 60 Hz, 3 Phase

ESP-150, 25' PT-26 70° Air.....	0558002909
ESP-150, 50' PT-26 70° Air.....	0558002910
ESP-150, 25' PT-26 90° Air.....	0558002911
ESP-150, 50' PT-26 90° Air.....	0558002912
ESP-150, 25' PT-26 Inline/Air.....	0558002913
ESP-150, 50' PT-26 Inline/Air.....	0558002914
ESP-150, 25' PT-26 70° Ar+H2 Mix.....	0558002915
ESP-150, 50' PT-26 70° Ar+H2 Mix.....	0558002916
ESP-150, 25' PT-26 90° Ar+H2 Mix.....	0558002917
ESP-150, 50' PT-26 90° Ar+H2 Mix.....	0558002918
ESP-150, 25' PT-26 Inline/Ar+H2 Mix.....	0558002919
ESP-150, 50' PT-26 Inline/Ar+H2 Mix.....	0558002920

ESP-150 Console Only

230/460(575V, 60 Hz, 3 Phase.....0558002677

NOTE: Contact your ESAB Representative to substitute console.

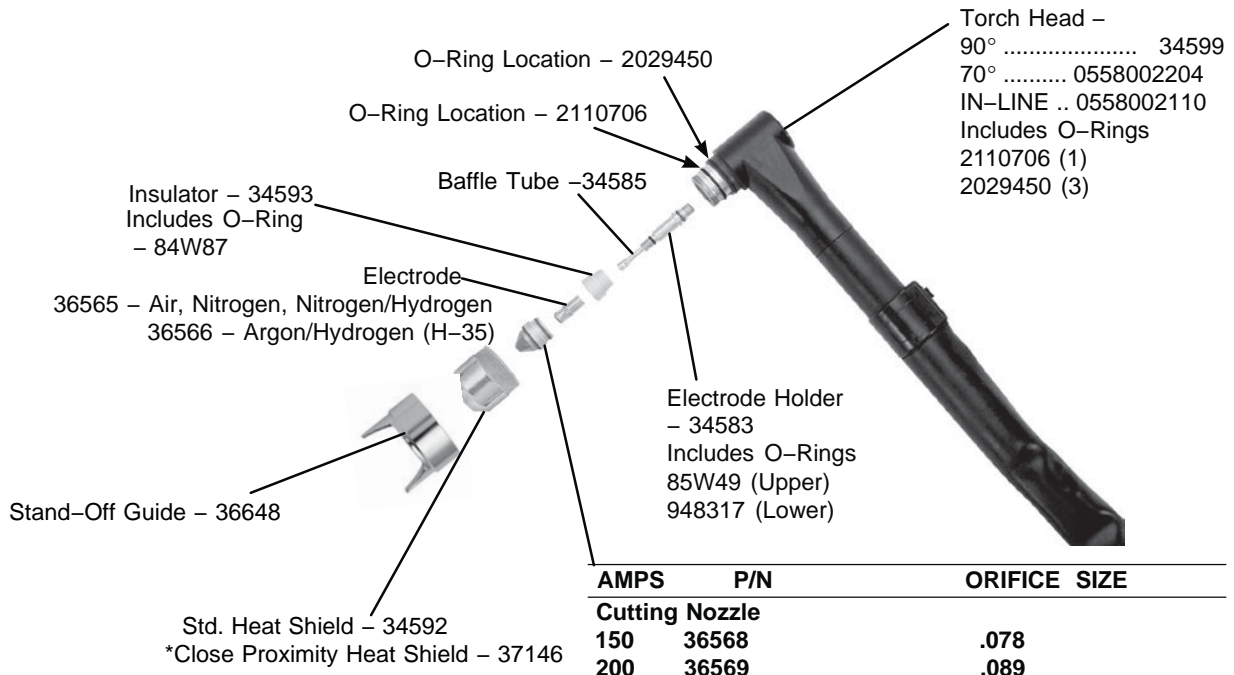
Optional Accessories

150 amp Spare Parts Kit	0558002864
Remote Hand Switch	
Permits remote starting and stopping of cutting process; used primarily for mechanized cutting.....	2075600
25 ft. Leather Sheath*	
Protects torch leads from abrasion and molten metal; particularly recommended for plasma gouging.....	0558002921
50 ft. Leather Sheath*	0558002922
Plasma Flow Measuring Kit	
This valuable troubleshooting tool allows measurement of the actual plasma gas flow through the torch.....	19765
Plasma Torch Head Protector	
For gouging	20806
Trigger Latch Kit	
(Factory Installed Only)	588000939

* Standard on manual torches.

11 ASSEMBLY INSTRUCTIONS

PT-26 Front End Parts



AMPS	P/N	ORIFICE SIZE
Cutting Nozzle		
150	36568	.078
200	36569	.089
300	36570	.104
Gouging Nozzle		
200	36571	.125
300	36572	.144

* For use when cutting or gouging in close proximity of workpiece.
Standard on In-line version.

**All include O-Rings 2110578 (Upper)
994092 (Lower)**

12 REVISION HISTORY

1

Revision "C" - 07/2004 - Revised with updated schematic diagrams. Made various editorial changes also.

2.

Revision "C" - 08/2006 - Replacement parts section, front view, changed item 11 from: p/n 950812 to: 636702

3

Revision "D" - 02/2007 - updated Replacement Parts section.

4

Revision "E" - 06/2008 - updated P45 / J5 location functions in Section 3.

06/2010

Changed serial number.

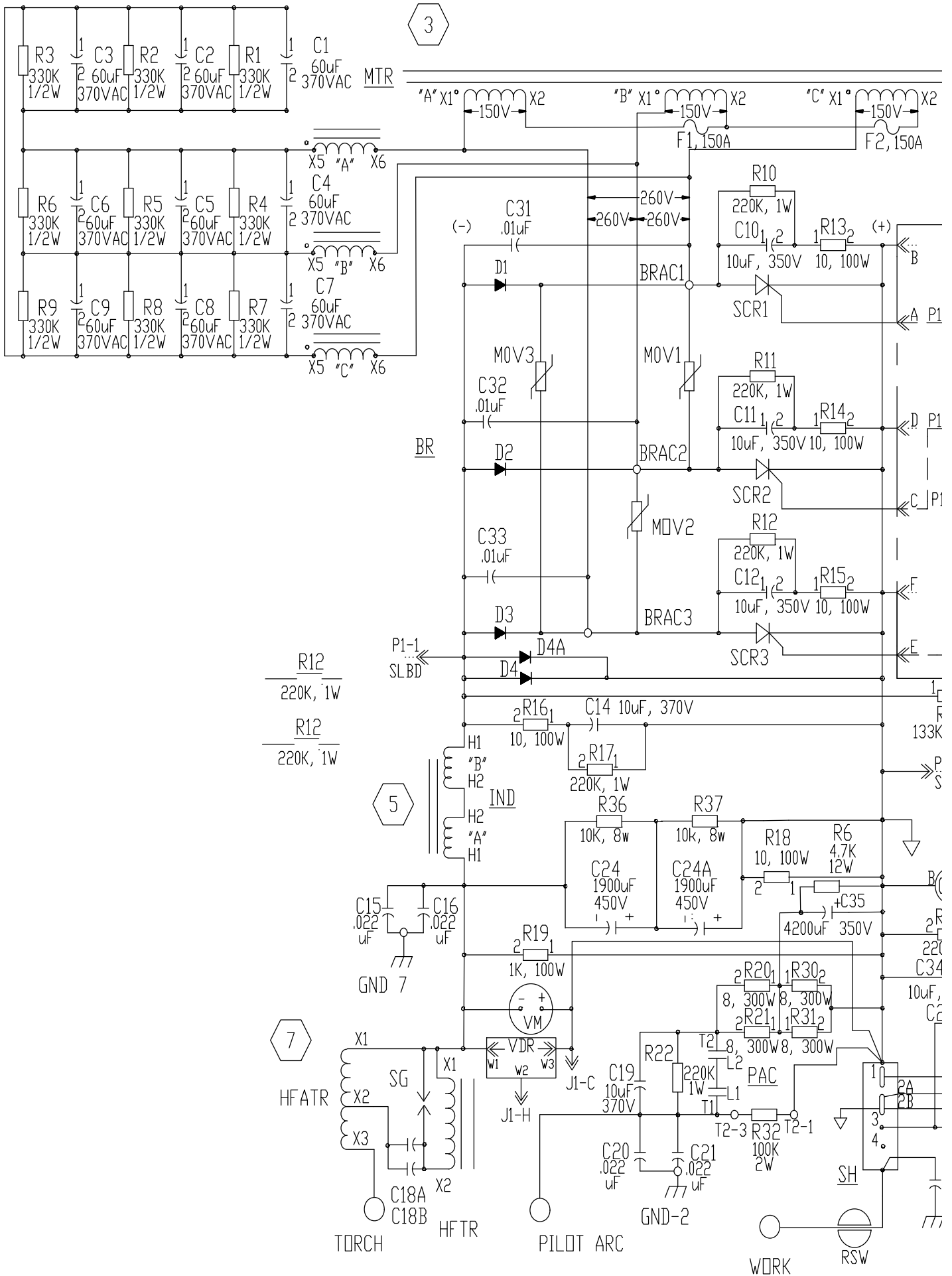
Separated the replacement parts list from instruction manual

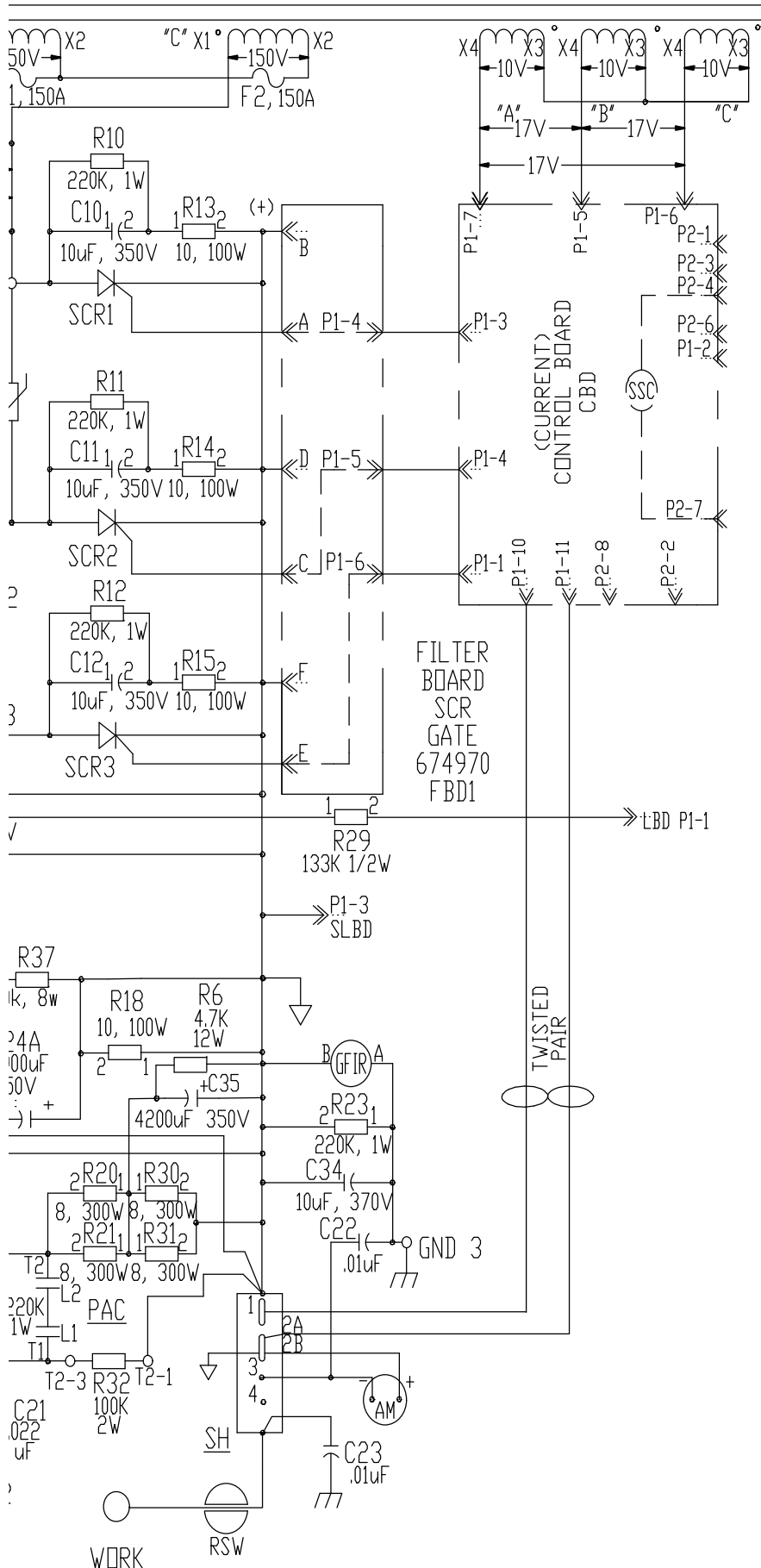
Changed ordering number for the instruction manual from F15-687-E to 0558 003 774

07/2010

Included the replacement parts list

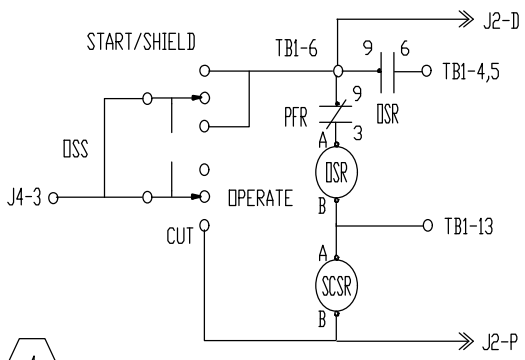
Schematic diagram



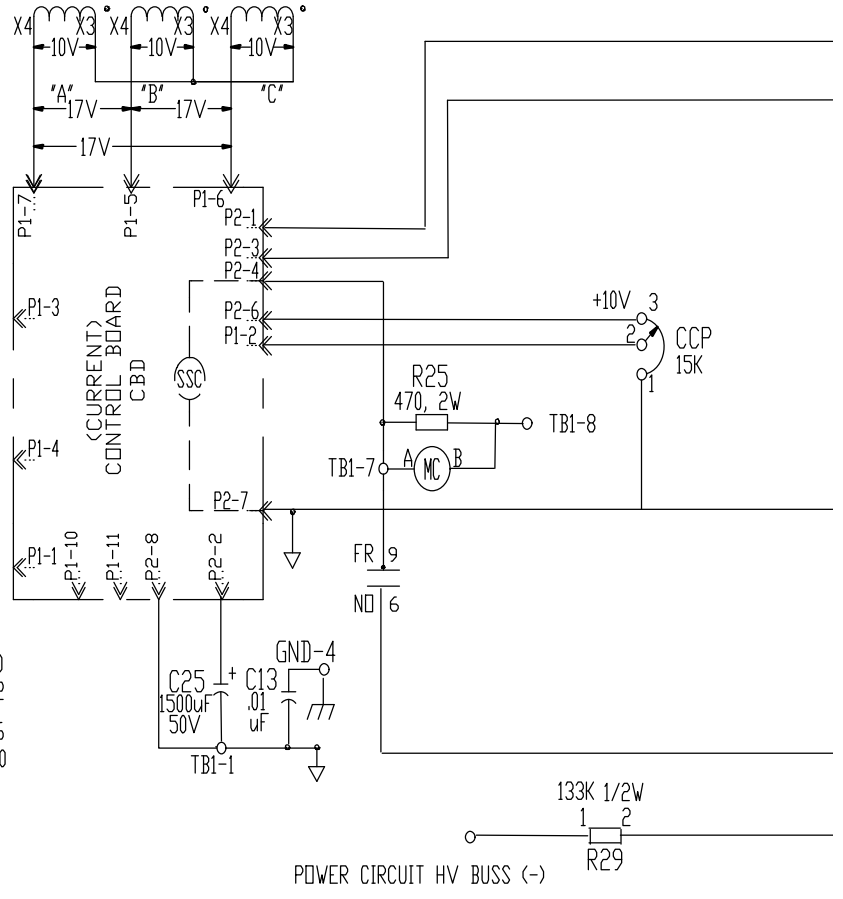
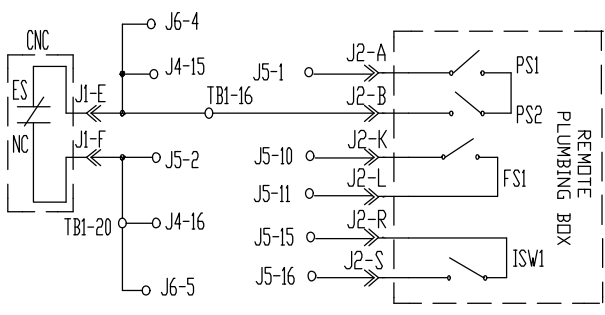
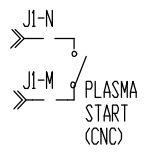
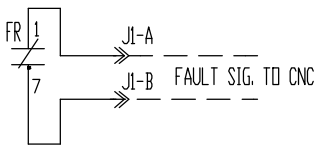
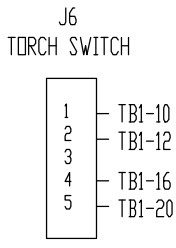
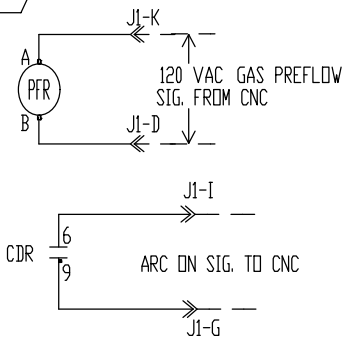


- ① MC - MAIN CONTACTOR
- ② TB - TERMINAL BOARD
- ③ MTR - MAIN TRANSFORMER
F1 - FUSE 150 AMP
F2 - FUSE 150 AMP
- ④ PFR - PREFLOW RELAY
BR - BRIDGE
FBD1 - FILTER BOARD #1
CBD - CONTROL BOARD
- ⑤ IND - INDUCTOR
- ⑥ D/R - DIODE/RESISTOR BOARD
- ⑦ CDR - CURRENT DETECTOR RELAY
PAC - PILOT ARC CONTACTOR
AM - AMMETER
SH - SHUNT
- ⑧ RDS - READY/OFF SWITCH
FM - FAN MOTOR
- ⑨ CTR1 - CONTROL TRANSFORMER
FS - FLOW SWITCH
ACR - AUX. CONTROL RELAY
CB - CIRCUIT BREAKER 5 AMP
ISW - INTERLOCK SWITCH
- ⑩ F3 - FUSE 1 AMP
F4 - FUSE 3.2 AMP
SLBD - STATUS LIGHT BOARD
SVR - SOLENOID VALVE RELAY
GFIR - GROUND FAULT INTERRUPTER RELAY
CCP - CURRENT CONTROL PDT
FR - FAULT RELAY
- ⑫ ES - EMERGENCY STOP RELAY
- ⑬ LBD - LOGIC BOARD
SSC - SOLID STATE CONTACTOR
OSS - OPERATE/SET SWITCH
FBD2 - FILTER BOARD #2
BRTS1 - BRIDGE THERMAL SWITCH #1
INDTS1 - INDUCTOR THERMAL SWITCH #1
MTRTS1 - MAIN TRANS THERMAL SWITCH #1
MTRTS2 - MAIN TRANS THERMAL SWITCH #2
MTRTS3 - MAIN TRANS THERMAL SWITCH #3
OSIR1 - OPERATE SWITCH INTERRUPT RELAY
OSIR2 - OPERATE SWITCH INTERRUPT RELAY
RSW - REED SWITCH
- ⑪ TDR - TIME DELAY RELAY
ACR - AIR CURTAIN RELAY

MTR 3



4



P45

1	TB1-18
2	P45-10
3	TB1-9
4	CDR-4
5	
6	P45-1
7	TB1-4,5
8	CDR-1
9	P45-6
10	P45-2
11	P45-15
12	TDR-6
13	TDR-4
14	
15	P45-11
16	FR-A

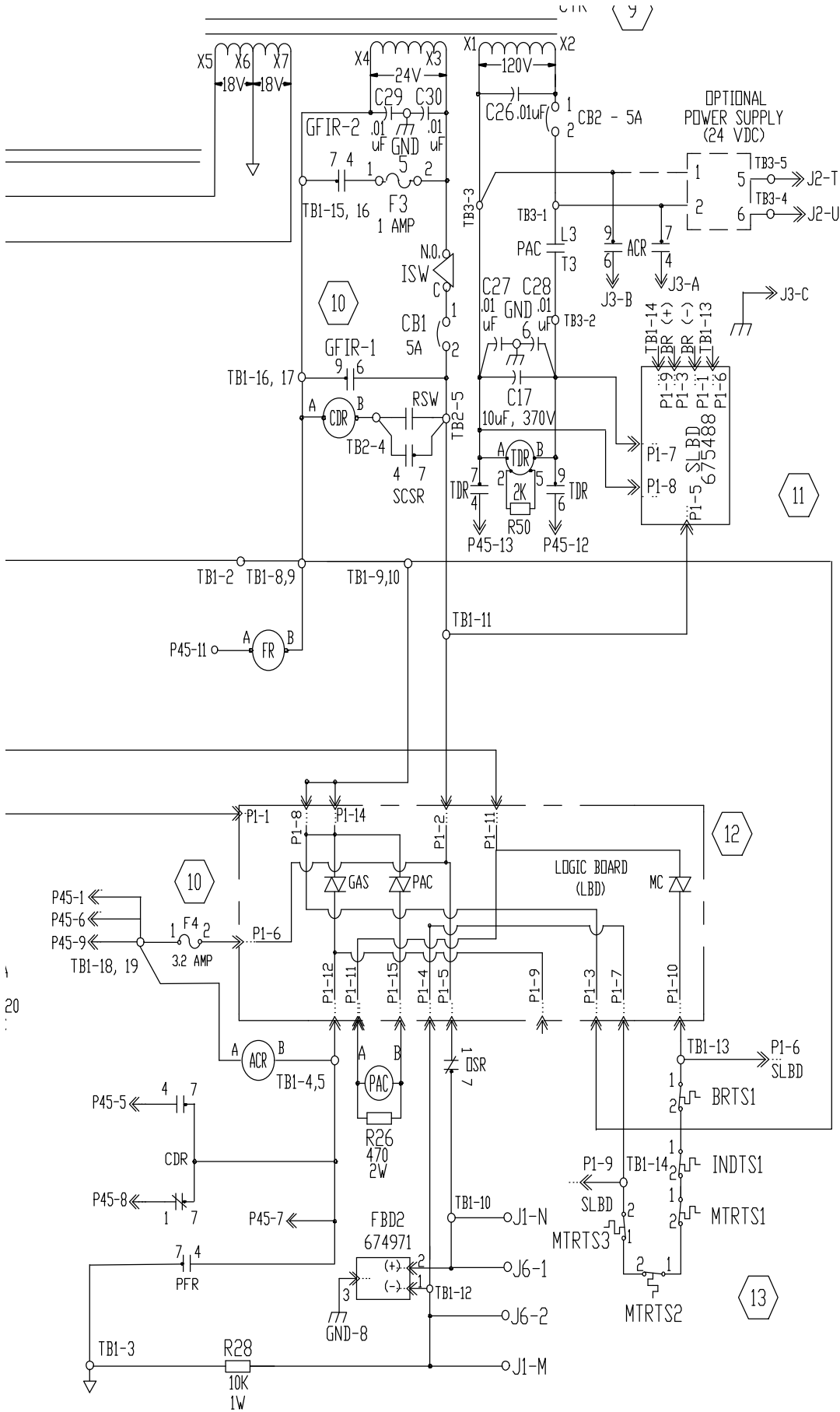
J4 (MAN)



J5 (MECH)

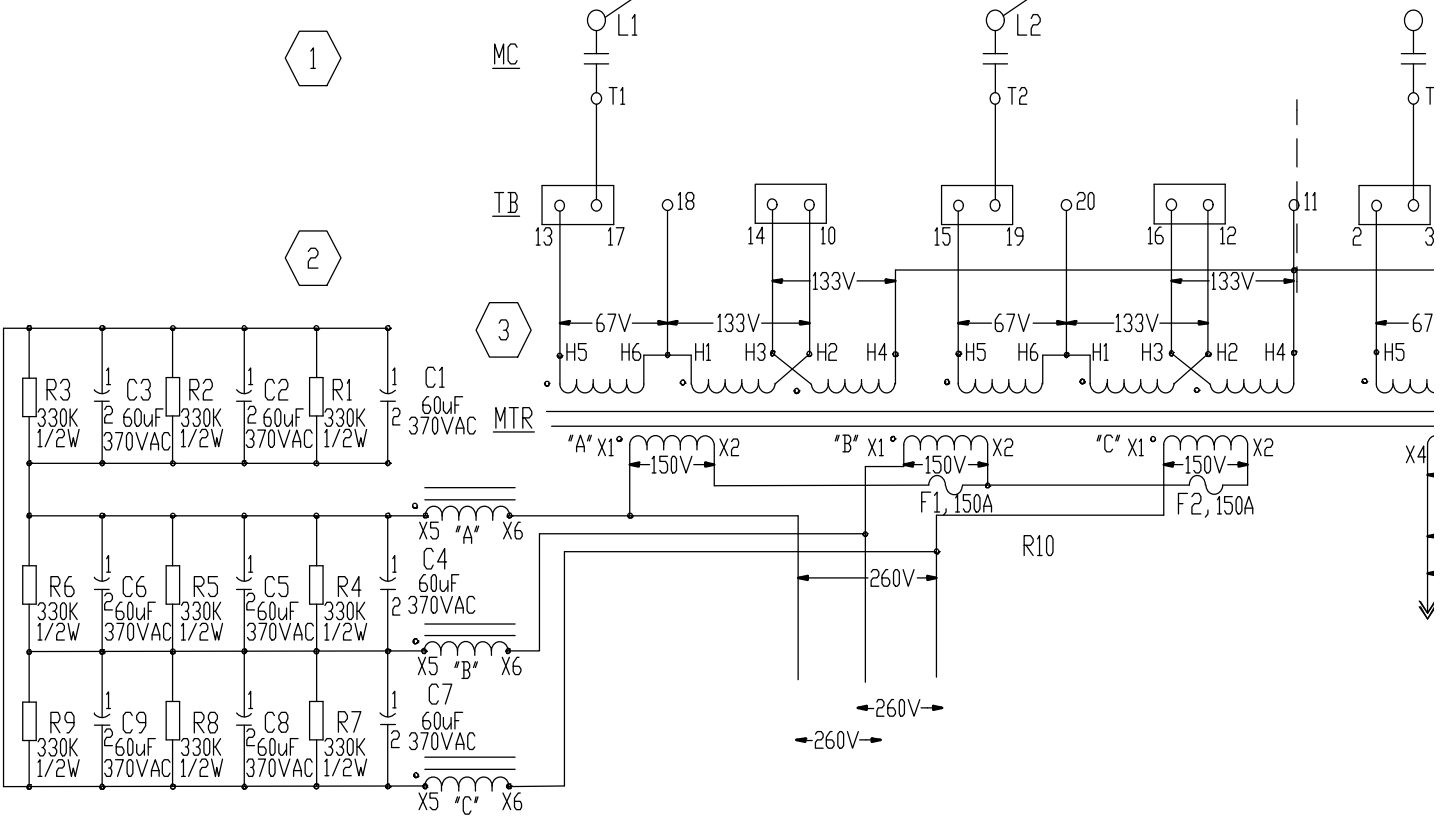
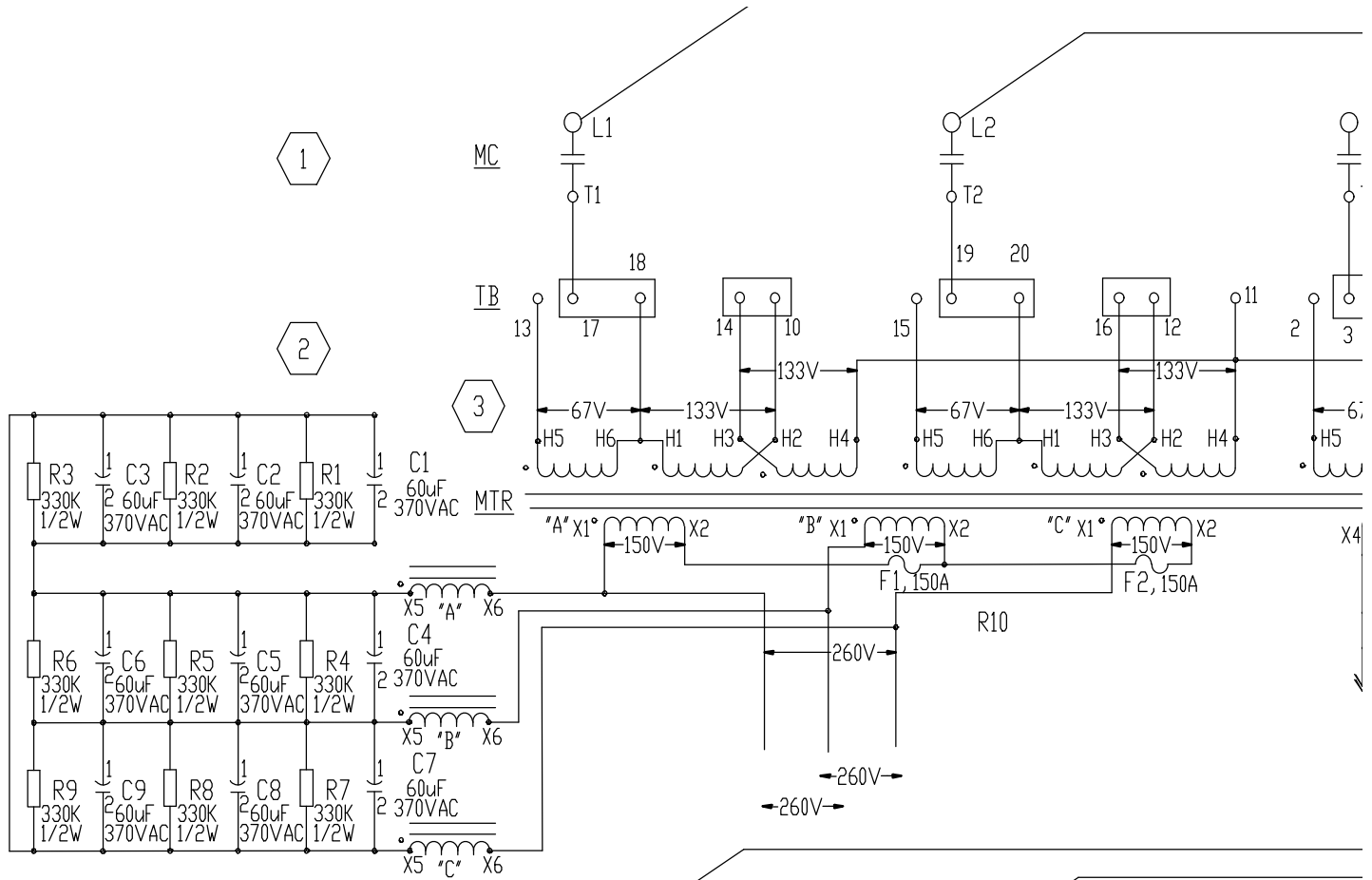
1	J2-A
2	TB1-20
3	J2-C
4	J2-G
5	J2-J
6	J2-H
7	J2-E
8	J2-F
9	
10	J2-K
11	J2-L
12	J2-M
13	J2-N
14	
15	J2-R
16	J2-S

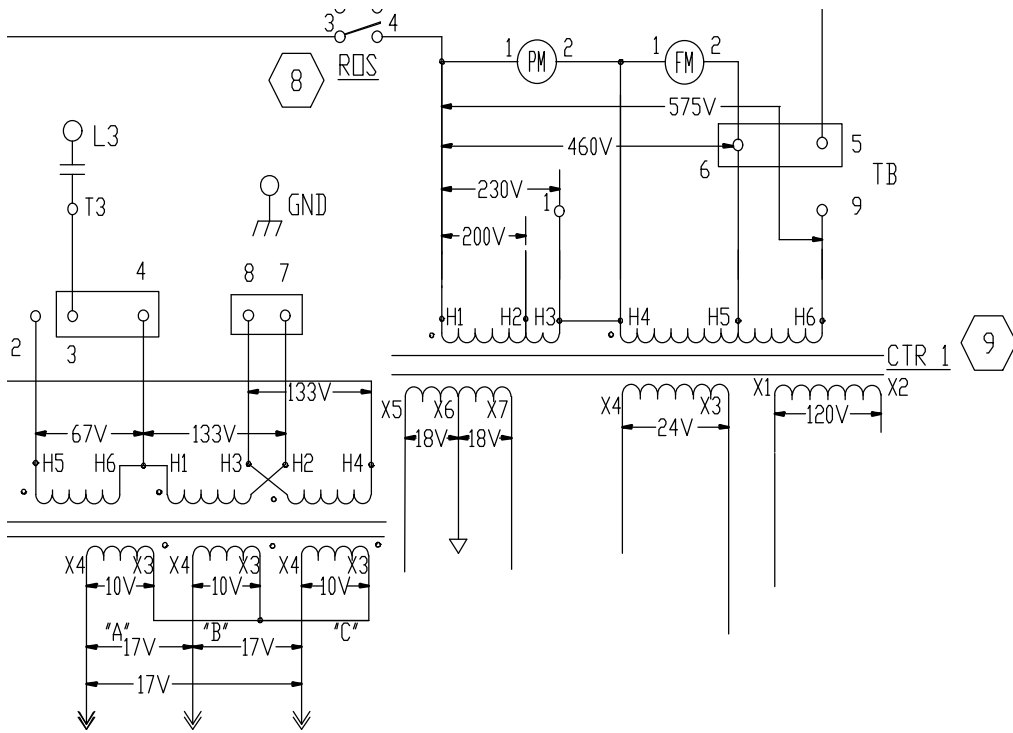
P4:
P4:
P4:



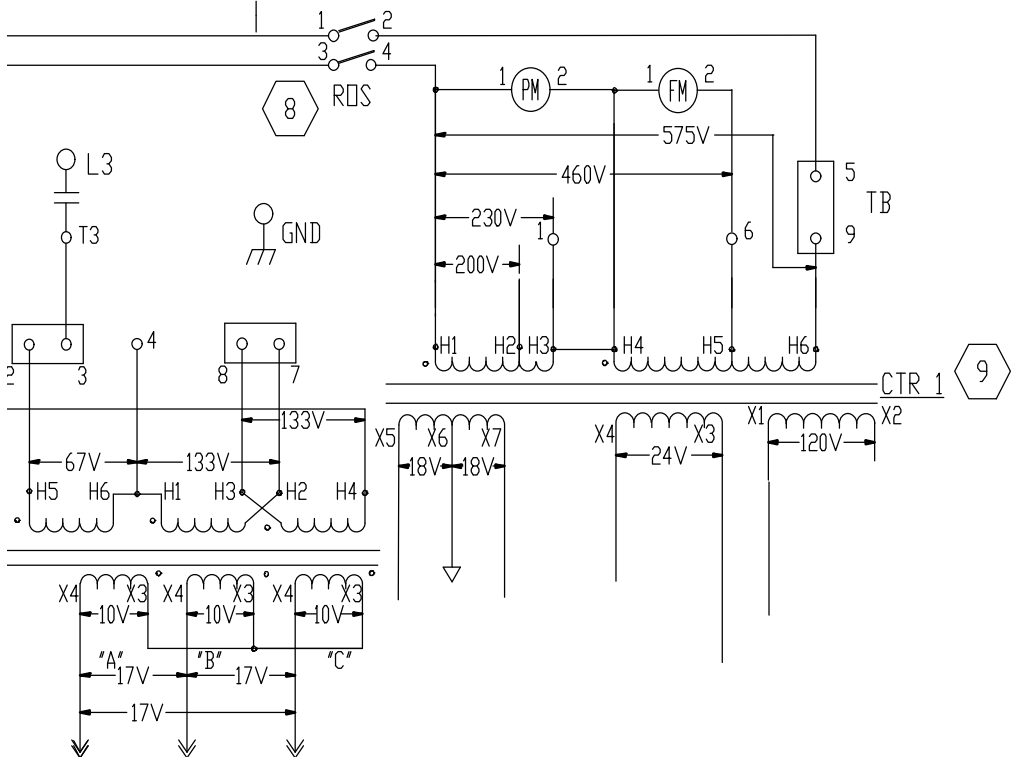
- ① MC - MAIN CONTACTOR
- ② TB - TERMINAL BOARD
- ③ MTR - MAIN TRANSFORMER
F1 - FUSE 150 AMP
F2 - FUSE 150 AMP
- ④ PFR - PREFLOW RELAY
BR - BRIDGE
FBD1 - FILTER BOARD #1
CBD - CONTROL BOARD
- ⑤ IND - INDUCTOR
- ⑥ D/R - DIODE/RESISTOR BOARD
- ⑦ CDR - CURRENT DETECTOR RELAY
PAC - PILOT ARC CONTACTOR
AM - AMMETER
SH - SHUNT
- ⑧ RDS - READY/OFF SWITCH
FM - FAN MOTOR
- ⑨ CTR1 - CONTROL TRANSFORMER
FS - FLOW SWITCH
ACR - AUX. CONTROL RELAY
CB - CIRCUIT BREAKER 5 AMP
ISW - INTERLOCK SWITCH
- ⑩ F3 - FUSE 1 AMP
F4 - FUSE 3.2 AMP
SLBD - STATUS LIGHT BOARD
SVR - SOLENOID VALVE RELAY
GFIR - GROUND FAULT INTERRUPTER RELAY
CCP - CURRENT CONTROL PDT
FR - FAULT RELAY
- ⑫ ES - EMERGENCY STOP RELAY
- ⑬ LBD - LOGIC BOARD
SSC - SOLID STATE CONTACTOR
OSS - OPERATE/SET SWITCH
FBD2 - FILTER BOARD #2
BRTS1 - BRIDGE THERMAL SWITCH #1
INDTS1 - INDUCTOR THERMAL SWITCH #1
MTRTS1 - MAIN TRANS THERMAL SWITCH #1
MTRTS2 - MAIN TRANS THERMAL SWITCH #2
MTRTS3 - MAIN TRANS THERMAL SWITCH #3
OSR - OPERATE SWITCH RELAY
SCSR - START/CUT GAS SELECT RELAY
RSW - REED SWITCH
- ⑭ TDR - TIME DELAY RELAY
ACR - AIR CURTAIN RELAY

REFERENCE:
 WIRING DIAGRAM: D-0558002925
 HARNESS: A-0558002801 & A-0558002805





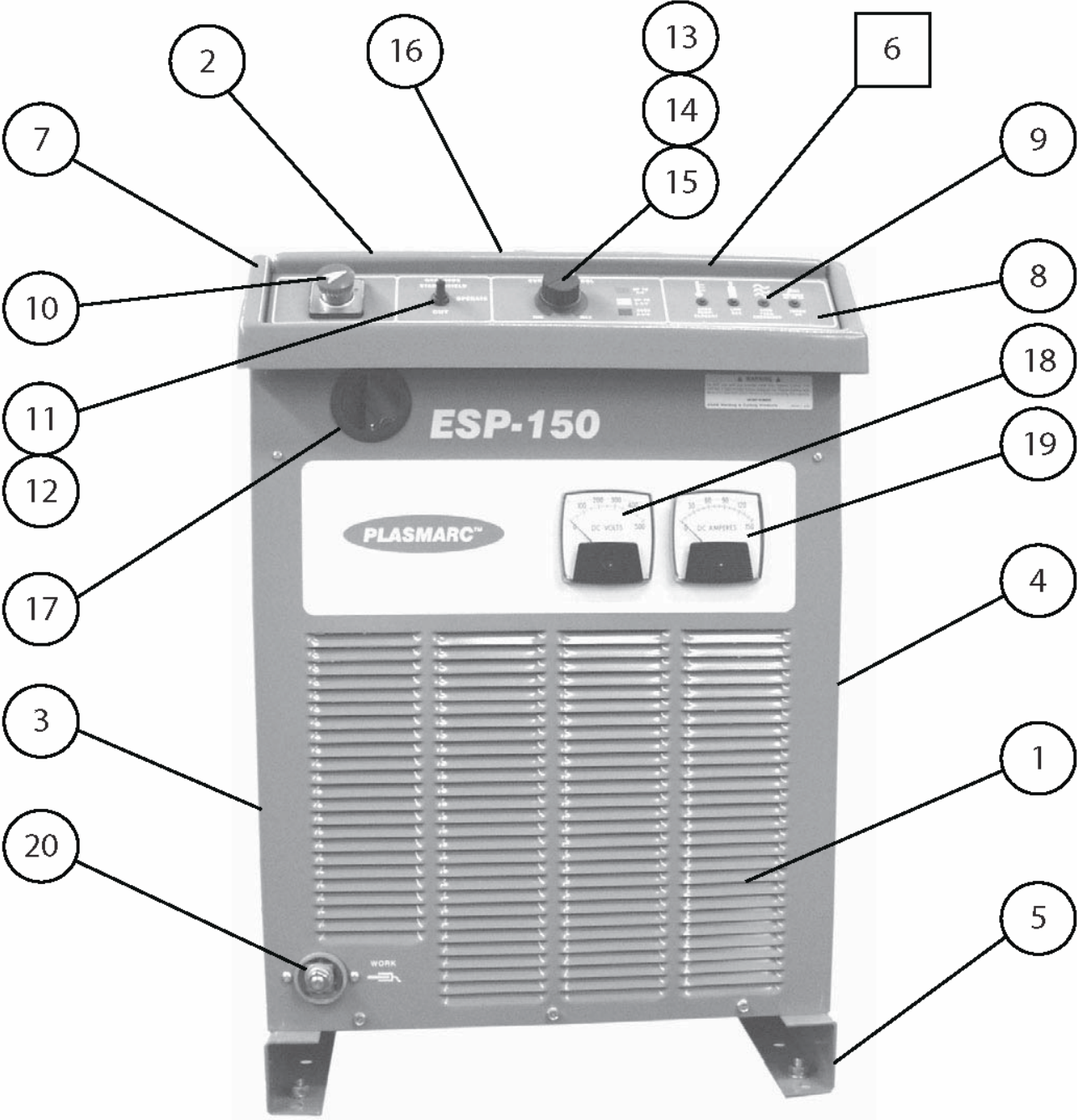
575 VAC 3 PH 60HZ W/EQUIP. GND.



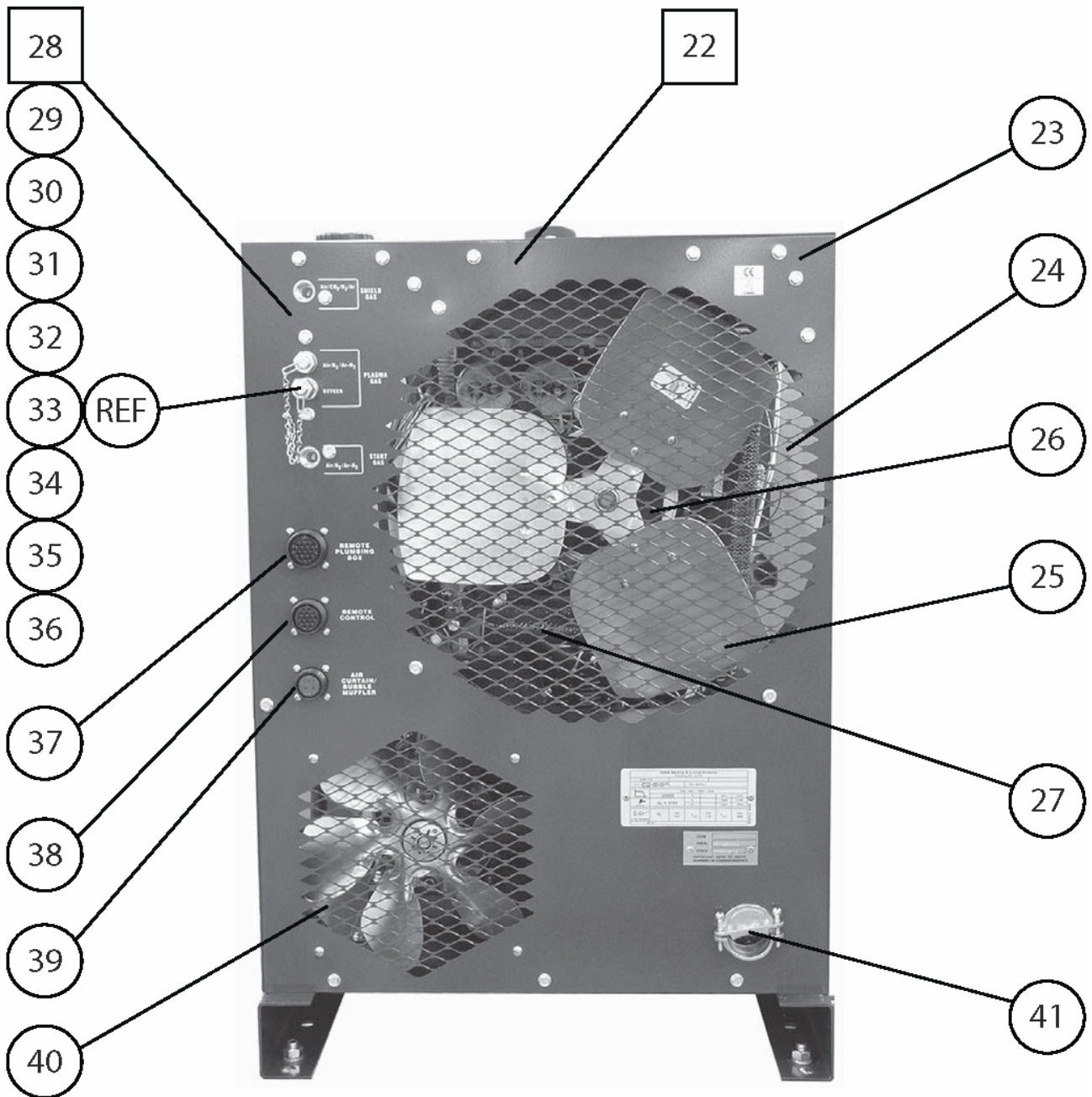
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- ② TB - TERMINAL BOARD
- ③ MTR - MAIN TRANSFORMER
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FR - FAULT RELAY
- ⑫ ES - EMERGENCY STOP RELAY
- ⑬ LBD - LOGIC BOARD
SSC - SOLID STATE CONTACTOR
OSS - OPERATE/SET SWITCH
FBD2 - FILTER BOARD #2
BRTS1 - BRIDGE THERMAL SWITCH #1
INDTS1 - INDUCTOR THERMAL SWITCH #1
MTRTS1 - MAIN TRANS THERMAL SWITCH #1
MTRTS2 - MAIN TRANS THERMAL SWITCH #2
MTRTS3 - MAIN TRANS THERMAL SWITCH #3
DSIR1 - TBD
DSIR2 - TBD
RSW - REED SWITCH
⑪ TDR - TIME DELAY RELAY

REFERENCE:
WIRING DIAGRAM: D-0558002925
HARNESS: A-0558002801 & A-0558002805

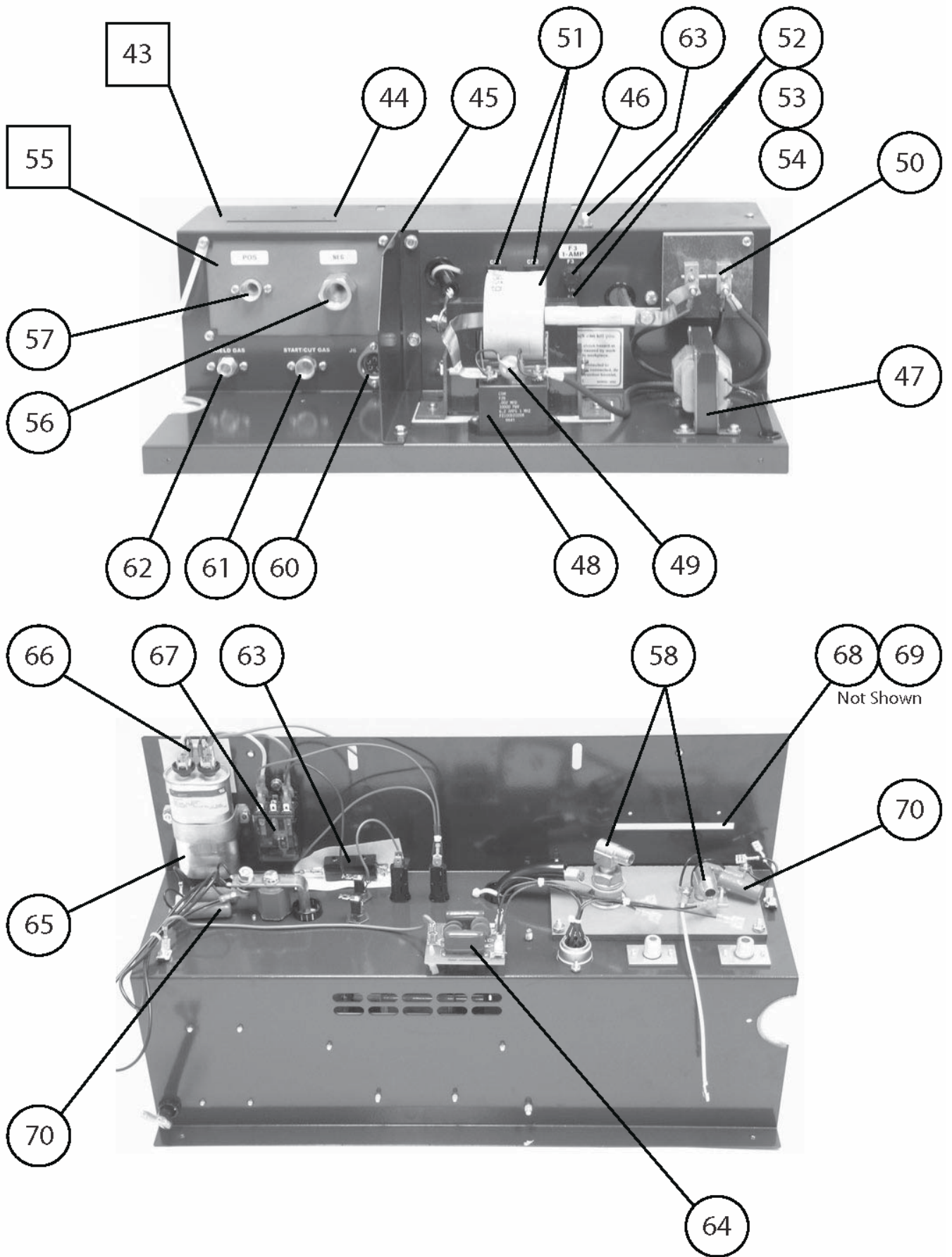
Replacement parts



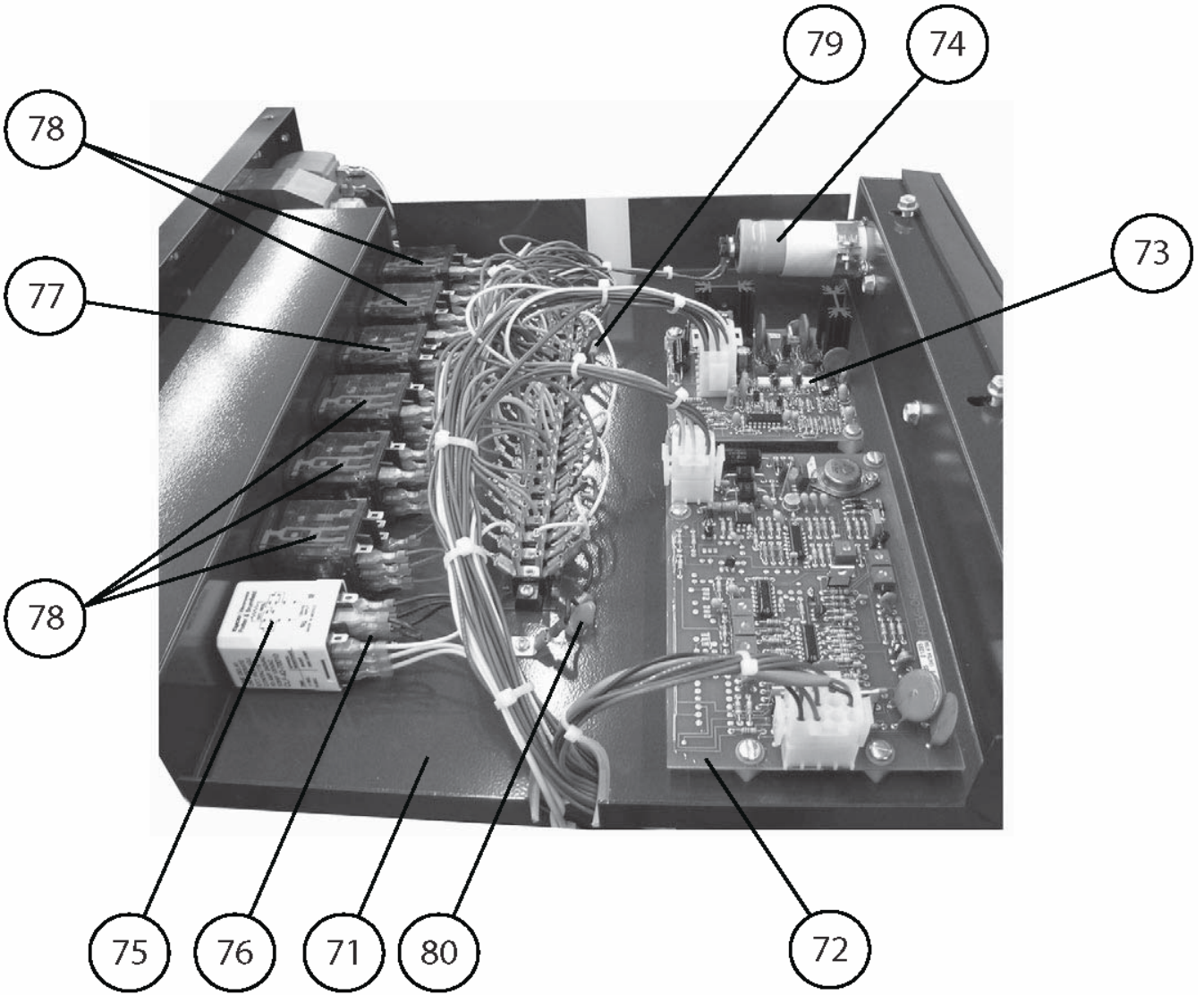
ITEM	QTY	PART NO	DESCRIPTION	SYMBOL
1	1	0558002680M	PANEL FRONT	
2	1	0558002683Y	PANEL TOP	
3	1	0558002681Y	PANEL SIDE LEFT	
4	1	0558002682Y	PANEL SIDE RIGHT	
5	1	0558002678M	PANEL BASE	
6	1	0558002806	CONTROL PANEL TOP ASSY (Includes Items 7 thru 10)	
7	1	680718	CONTROL PANEL TOP SHELL	
8	1	0558003773	PANEL CONTROL SILKSCREENED	
9	1	0558003775	PC BOARD - STATUS LIGHTS	SLBD
10	1	0558003780	SWITCH ROTOR DPST 600V 25A	ROS
11	1	0558004052	SWITCH TOGGLE 3 POS DPDT 15A 125V	OSS
12	1	951474	SEAL SWITCH BLACK	
13	1	0558003776	POTENTIOMETER 15K 2W	CCP
14	1	673999	POTENTIOMETER SHAFT LOCK	
15	1	0558003777	KNOB	
16	1	0558003778	MAT RUBBER	
17	1	0558004053	GROMMET RUBBER	
18	1	0558003772	VOLTMETER DC (0-500 VOLTS)	VM
19	1	0558003769	AMMETER DC (0-150 AMPS)	AM
20	1	0558004054	TERMINAL OUTPUT ASSY	WORK



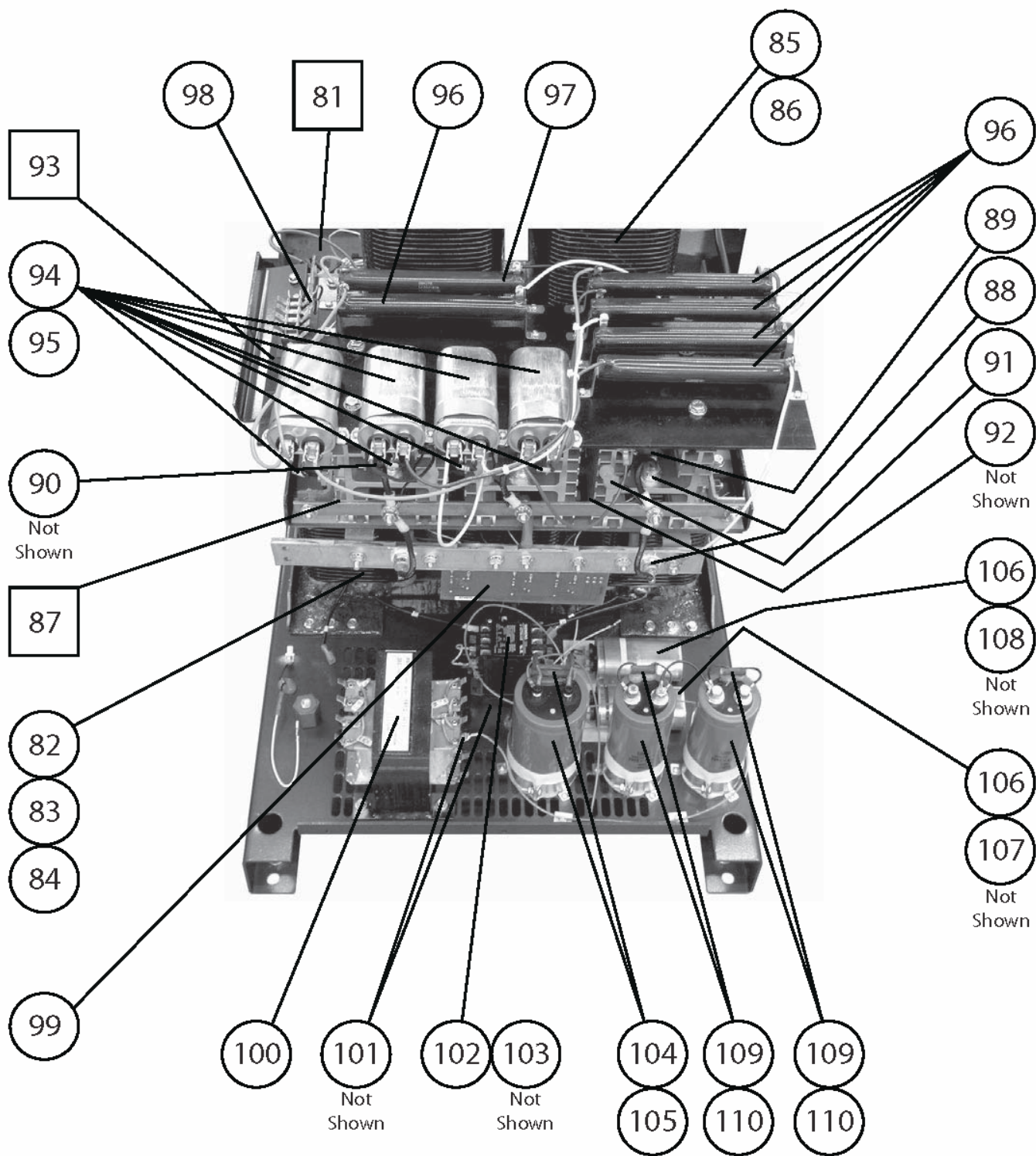
ITEM	QTY	PART NO	DESCRIPTION	SYMBOL
22	1	0558002800M	PANEL REAR ASSY (Includes Items 23 thru 41)	
23	1	0558002679M	PANEL REAR	
24	1	0558004077	SHROUD MACHINE FAN 16"	
25	1	0558004055	BLADE MACHINE FAN 16"	
26	1	0558000749	MOTOR MACHINE FAN 1/3 HP	FM
27	4	17300008	RESISTOR 8 OHM 300W	R20,R21,R30,R31
28	1	0558002810	MANIFOLD GAS CONTROL ASSY (Includes Items 29 thru 36)	
29	3	0558006864	VALVE SOLENOID 165 PSI 24VAC	SV-1,2,3
30	1	0558002345	SWITCH PRESSURE 17 PSI	PS1
31	1	0558006291	ELBOW STREET 90 DEGREE 1/8NPT	
32	1	0558002346	SWITCH PRESSURE 22 PSI	PS2
33	1	0558004058	CONNECTION RH OXYGEN B SIZE	
34	2	0558006292	ELBOW STREET 90 DEGREE 1/4NPT	
35	1	0558004057	ADAPTOR RH B/I-G*F 1/4NPTM	
36	1	10Z30	ADAPTOR RH B/A-W*M 1/4NPTM	
37	1	0558004059	RECEPTACLE PANEL 19 SOCKET	J1
38	1	0558004060	RECEPTACLE PANEL 14 SOCKET	J2
39	1	0558004061	RECEPTACLE PANEL 3 SOCKET	J3
40	1	0558002820M	SHROUD COOLANT PUMP FAN 10.5"	
41	1	0558004079	STRAIN RELIEF 2"	
Ref	Ref	0558004056	CONNECTION LH FUEL GAS B SIZE	



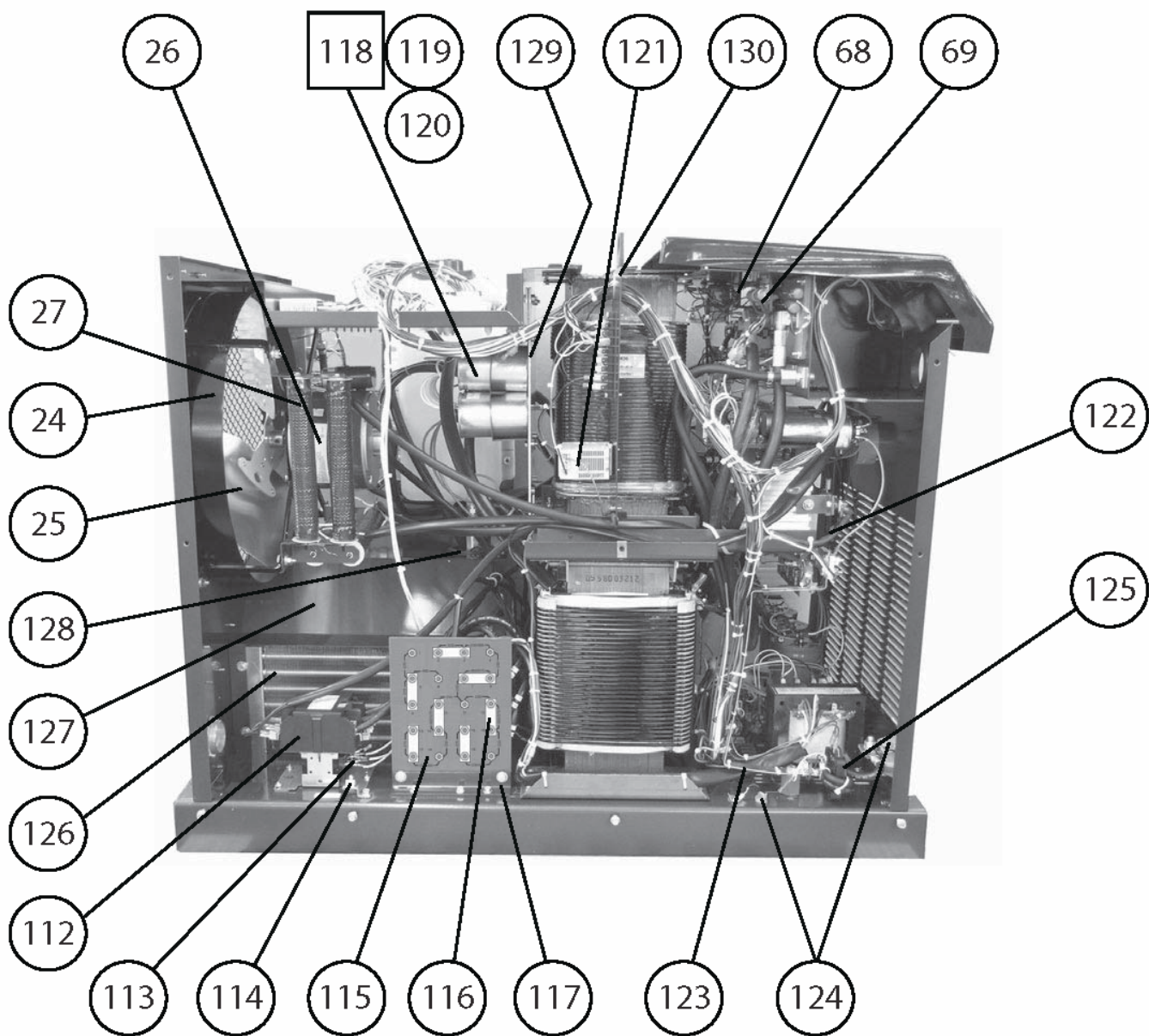
ITEM	QTY	PART NO	DESCRIPTION	SYMBOL
43	1	0558002803	HIGH FREQUENCY ASSY (Includes Items 44 thru 70)	
44	1	0558002804M	PANEL HIGH FREQUENCY ASSY	
45	1	30845M	PANEL DIVIDER	
46	1	30859	AUTOTRANSFORMER HIGH FREQUENCY	HFATR
47	1	0558007469	TRANSFORMER HIGH FREQUENCY	HFTR
48	1	0558007163	CAPACITOR .002uF 10KWV	C18A
49	1	0558007470	CAPACITOR 2500pF 15KV	C18B
50	1	7677905	SPARK GAP ASSY	SG
51	2	2062161	CIRCUIT BREAKER 5A	CB1,2
52	2	182W15	FUSE HOLDER	
53	1	82W43	FUSE 1A 250V	F3
54	1	96W22	FUSE SLO-BLO 3.2A 250V	F4
55	1	30813	TORCH CONNECTION PANEL ASSY (Includes Items 56 thru 58)	
56	1	634090	ADAPTOR SPECIAL	
57	1	58V75	ADAPTOR BULKHEAD LH B/A-W*F 1/4NPTM	
58	2	0558006292	ELBOW STREET 90 DEGREE 1/4NPT	
59			Not Used	
60	1	997830	RECEPTACLE 5 POLE	J6
61	1	58V58	ADAPTOR BULKHEAD B/I-G*F 1/4NPTM	
62	1	33033	ADAPTOR BULKHEAD B/A-W*M 1/4NPTM	
63	1	674592	SWITCH SNAP ACTION SPDT 15A 125V	ISW
64	1	674971	PC BOARD - HF FILTER	FBD2
65	1	0558004069	CAPACITOR 10uF 370VDC	C34
66	1	0558004071	RESISTOR 220K OHM 1W	R23
67	1	0558004088	RELAY 3PDT 240VAC 28VDC 10A	GFIR
68	1	17711153	RESISTOR PRECISION 15K OHM 50W	R33
69	1	17712751	RESISTOR PRECISION 750 OHM 25W	R34
70	4	950972	CAPACITOR .022uF 1600VDC	C15,C16,C20,C21



ITEM	QTY	PART NO	DESCRIPTION	SYMBOL
71	1	0558002689M	BOX PC BOARD	
72	1	0558004085	PC BOARD - CONTROL	CBD
73	1	0558004086	PC BOARD - LOGIC	LBD
74	1	0558004087	CAPACITOR 1500uF 50VDC	C25
75	1	0558004090	RELAY TIME DELAY DPDT 120VAC 10A	TDR
76	1	17111220	RESISTOR 2K OHM 0.25W	R50
77	1	0558004088	RELAY 3PDT 240VAC 28VDC 10A	PFR
78	5	0558004089	RELAY DPDT 24VAC 10A	SCSR,OSR,CDR,ACR,FR
79	1	17140310	RESISTOR 10K OHM 2W	R28
80	1	0558004068	CAPACITOR .01uF 250VAC	C13



ITEM	QTY	PART NO	DESCRIPTION	SYMBOL
81	1	0558006906	TRANSFORMER / BRIDGE ASSY (Includes Items 82 thru 99)	
82	1	0558004076	TRANSFORMER MAIN (Includes Items 83 and 84)	MTR
83	2	0558004084	FUSE LINK 150A 250V	F1,2
84	3	0558004075	SWITCH THERMAL 180C	MTRTS1,2,3
85	1	0558004074	INDUCTOR (Includes Item 86)	IND
86	1	0558004075	SWITCH THERMAL 180C	INDTS1
87	1	680379	BRIDGE ASSY (Includes Items 88 thru 92)	BR
88	5	950703	DIODE FORWARD 1200V 85A	D1,D2,D3,D4,D4A
89	3	680452	RECTIFIER SILICON CONTROLLED 1200V	SCR1,2,3
90	1	950711	SWITCH THERMAL 194F	BRTS1
91	3	0558004068	CAPACITOR .01uF 250VAC	C31,32,33
92	3	950065	VARISTOR METAL OXIDE 420VAC 160J	MOV1,2,3
93	1	0558004073	FILTER NETWORK ASSY (Includes Items 94 thru 98)	
94	4	0558004069	CAPACITOR 10uF 370VDC	C10,C11,C12,C14
95	4	0558004071	RESISTOR 220K OHM 1W	R10,R11,R12,R17
96	5	17280010	RESISTOR 10 OHM 100W	R13,R14,R15,R16,R18
97	1	17280210	RESISTOR 1K OHM 100W	R19
98	1	17145410	RESISTOR 100K OHM 2W	R32
99	1	674970	PC BOARD - SCR GATE FILTER	FBD1
100	1	680381	TRANSFORMER CONTROL	CTR
101	3	0558004068	CAPACITOR .01uF 250VAC	C26,C29,C30
102	1	0558000759	CONTACTOR PILOT ARC 40A 24VAC	PAC
103	1	0558004070	RESISTOR 470 OHM 2W	R26
104	1	950627	CAPACITOR 4200uF 350VDC	C35
105	1	17315247	RESISTOR 4.7K OHM 12W	R6
106	2	0558004069	CAPACITOR 10uF 370VDC	C17,C19
107	2	0558004068	CAPACITOR .01uF 250VAC	C27,28
108	1	17145422	RESISTOR 220K OHM 2W	R22
109	2	0558000447	CAPACITOR 1900uF 450VDC	C24,24A
110	2	17225310	RESISTOR 10 OHM 8W	R36,37



ITEM	QTY	PART NO	DESCRIPTION	SYMBOL
112	1	0558004080	CONTACTOR MAIN 90A 24VAC	MC
113	1	0558004070	RESISTOR 470 OHM 2W	R25
114	1	0558004081	LUG GROUNDING	GND1
115	1	9680911	TERMINAL BOARD ASSY 230/460/575V (Includes Item 116)	TB
116	10	672065	TERMINAL STRAP	
117	1	672227M	BRACKET MOUNTING TERMINAL BOARD	
118	1	30941	CAPACITOR BANK ASSY (Includes Items 119 and 120)	
119	9	0558004066	CAPACITOR 60uF 370VDC	C1-C9
120	9	0558004067	RESISTOR 330K OHM 0.5W	R1-R9
121	1	0558003760	MODULE POWER SUPPLY 24V	
122	1	17175413	RESISTOR 133K OHM 2W (In-line / Violet Wire)	R29
123	1	0558004072	SHUNT ASSY	SH
124	1	0558004068	CAPACITOR .01uF 250VAC	C22,23
125	1	0458918880	REED SWITCH	RSW
126	1	0558000292	HEAT EXCHANGER	
127	1	0558002686M	PANEL TOP AIR EXIT CHAMBER	
128	1	186W91	GROMMET RUBBER 2-5/8" I.D.	
129	1	0558002688	PLATE MOUNTING CAPACITOR BANK ASSY	
130	1	0558002808M	BAFFLE LEFT	

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