EPP-450

Instruction manual

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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, "Precations 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 precesses 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. Combusible materials include wood, clot, sawdust, liquid and gas fuels, solvents, pants and coatings papper, 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 bady 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.

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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.
Therfore:

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, cooper, 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 Californa 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, “Precations for Safe Handling of Comporessed Gases in Cylinders”, which is available from Compressed Gas Association, 1235 Jefferson Davis Highway, Arlington, VA 22202.

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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.**

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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, calcomanias, 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 requiren 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. Alerte 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 ocaciones 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 ocacionar 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 flamables, 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 termirar 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 através 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. Reemplaze 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. Apage el equipo antes de quitarse sus guantes.
10. RUse 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 através de cualquier conductor causando a nivel local Campos Eléctricos y Magnéticos (EMF). Las corrientes en el área de corte y soldadura, crean EMF alrrededor 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. Mantega 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, berílio, 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 substancias 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 irritant es.
3. Si momentáneamente desarrolla inrritación de ojos, nariz o garganta mientras est á 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, Cancer. (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. Utilize el gas apropiado para el proceso y utilize 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 manufacturero 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, tablilleros, 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 elélectrico.
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. Localize los cilindros lejos del calor, chispas, y flamas. Nunca establezca un arco en el cilindro.
5. Para información adicional, haga referncia a la publicación CGA Standard P-1, “Precations for Safe Handling of Comporessed Gases in Cylinders”, disponible através 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, conexciones, 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 coverturas 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, veillez 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.

FUMEES 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.

US

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.**

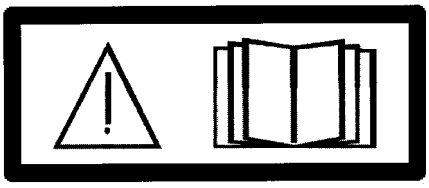
ADVERTISSEMENT **= danger potentiel ; risque de blessures graves ou mortelles.**

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

US

CAUTION

Read and understand the instruction manual before installing or operating.



CAUTION

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

5 INTRODUCTION

The EPP power source is designed for marking and high speed plasma mechanized cutting applications. It can be used with other ESAB products such as the PT-15, PT-19XLS, PT-600 and PT-36 torches along with the Smart Flow II, a computerized gas regulation and switching system.

5.1 Features

- 10 to 100 amperes for marking in low current range
- 50 to 450 amperes cutting in high current range
- 35 to 100 amperes cutting in low current range
- Forced air cooled
- Solid state DC power
- Input voltage protection
- Local or remote front panel control
- Thermal switch protection for main transformer and power semiconductor components
- Top lifting rings or base forklift clearance for transport
- Parallel supplemental power source capabilities to extend current output range.

US

6 TECHNICAL DATA

	EPP-450 380V 50/60HZ 380V TAPS	EPP-450 380V 50/60HZ 400V TAPS	EPP-450 400V 50/60HZ	EPP-450 460V 60HZ	EPP-450 575V 60HZ
Part Number	0558007730			0558007731	0558007732
Input Voltage (3 ~)	380VAC	380VAC	400VAC	460VAC	575VAC
Input Current (3 ~)	167A RMS	167A RMS	159A RMS	138A RMS	110A RMS
Input Frequency	50/60 Hz	50/60 Hz	50/60 Hz	60 Hz	60 Hz
Input KVA	109.9 KVA	109.9 KVA	110.2KVA	110 KVA	109.6 KVA
Input Power	98.9 KW	98.9 KW	99.1 KW	99.0 KW	98.6 KW
Input Power Factor	90%	90%	90%	90%	90%
Recommended Input Power Cable	*2/0 AWG	*2/0 AWG	*2/0 AWG	*1/0 AWG	*2/0 AWG
Input Fuse (Recommended)	200A	200A	200A	200A	150A
Output Open Circuit Voltage (High Range Cutting)	430VDC	406VDC	427VDC	431VDC	431VDC
Output Open Circuit Voltage (OCV) (Low Range Cutting)	414VDC	393VDC	413VDC	415VDC	415VDC
Output Open Circuit Voltage (OCV) (Marking)	360VDC	342VDC	369VDC	360VDC	360VDC
Output Cutting High Range (100% Duty)	50A @ 100V TO 450A @ 200V				
Output Cutting Low Range (100% Duty)	35A @ 94V TO 100A @ 120V				
Output Marking Low Range (100% Duty)	10A @ 84V TO 100A @ 120V				
Output Power (100% Duty)	90 KW				
Dimensions lxwxh	45” x 37.25” x 40.25” 114,3 x 94,6 x 102,2 mm				
Weight	1870 lbs. 850 kg				

** Fuse sizes per National Electrical Code for a 90° C (194˚ F) rated copper conductors @ 40° C (104˚ F) ambient. Not more than three conductors in raceway or cable. Local codes should be followed if they specify sizes other than those listed above.*

US

7 INSTALLATION

7.1 General

WARNING **FAILURE TO FOLLOW INSTRUCTIONS COULD LEAD TO DEATH, INJURY OR DAMAGED PROPERTY. FOLLOW THESE INSTRUCTIONS TO PREVENT INJURY OR PROPERTY DAMAGE. YOU MUST COMPLY WITH LOCAL, STATE AND NATIONAL ELECTRICAL AND SAFETY CODES.**

7.2 Unpacking

CAUTION **Using one lifting eye will damage sheet metal and frame. Use both lifting eyes when transporting with overhead method.**

- Inspect for transit damage immediately upon receipt.
- Remove all components from shipping container and check for loose parts in container.
- Inspect louvers for air obstructions.

7.3 Placement

NOTICE **Use both lifting eyes when transporting from overhead.**

- A minimum of 1 M (3 ft.) clearance on front and back for cooling air flow.
- Plan for top panel and side panels having to be removed for maintenance, cleaning and inspection.
- Locate the EPP-450 relatively close to a properly fused electrical power supply.
- Keep area beneath power source clear for cooling air flow.
- Environment should be relatively free of dust, fumes and excessive heat. These factors will affect cooling efficiency.

CAUTION **Conductive dust and dirt inside power source may cause arc flashover. Equipment damage may occur. Electrical shorting may occur if dust is allowed to build-up inside power source. See maintenance section.**

US

7.4 Input power connection

WARNING

ELECTRIC SHOCK CAN KILL!
PROVIDE MAXIMUM PROTECTION AGAINST ELECTRICAL SHOCK. BEFORE ANY CONNECTIONS ARE MADE INSIDE THE MACHINE, OPEN THE LINE WALL DISCONNECT SWITCH TO TURN POWER OFF.

7.4.1 Primary power

EPP-450 is a 3-phase unit. Input power must be provided from a line (wall) disconnect switch that contains fuses or circuit breakers in accordance to local regulations.

NOTICE

Please refer to table under "Technical Data" in Subsection 6 for recommended cable and input fuse sizes.

To estimate the input current for a wide range of output conditions, use the formula below.

$$\text{Input current} = \frac{(\text{V arc}) \times (\text{I arc}) \times 0.688}{(\text{V line})}$$

NOTICE

Dedicated power line may be necessary.
EPP-450 is equipped with line voltage compensation but to avoid impaired performance due to an overloaded circuit, a dedicated power line may be required.

7.4.2 Input conductors

- Customer supplied
- May consist either of heavy rubber covered copper conductors (three power and one ground) or run in solid or flexible conduit.
- Sized according to the table under "Technical data" see subsection 6.

NOTICE

Input conductors must be terminated with ring terminals sized for 12.7 mm (0.50") hardware before being attached to the EPP-450.

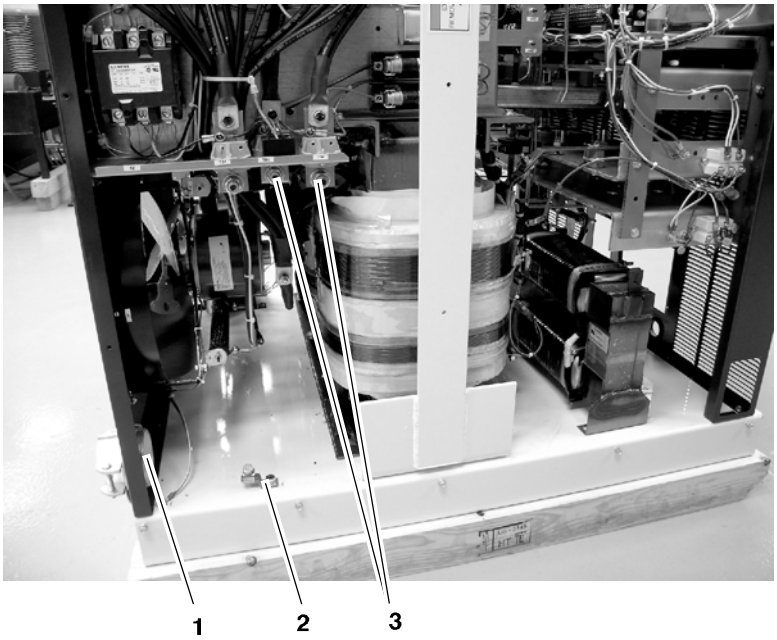
CAUTION

Inspect the clearance between the power lead ring terminals and the side panel. The barrels of some large terminals can come very close to our touch the side panel if the terminal is mounted incorrectly. The barrels of the terminals mounted on TB4 and TB6 should be rotated to face away from the side panel.

US

7.4.3 Input connection procedure

1. Remove left side panel of the EPP-450
2. Thread cables through the access opening in the rear panel.
3. Secure cables with a strain relief at the access opening.
4. Connect the ground lead to the stud on the chassis base.
5. Connect the power lead ring terminals to the primary terminals with supplied bolts, washers and nuts.
6. Connect the input conductors to the line (wall) disconnect.



1 Power input cable access opening (rear panel) *2 Chassis ground* *3 Primary terminals*

WARNING	**ELECTRIC SHOCK CAN KILL!** **RING TERMINALS MUST HAVE CLEARANCE BETWEEN SIDE PANEL AND MAIN TRANSFORMER. CLEARANCE MUST BE SUFFICIENT TO PREVENT POSSIBLE ARCING. MAKE SURE CABLES DO NOT INTERFERE WITH COOLING FAN ROTATION.**
WARNING	**IMPROPER GROUNDING CAN RESULT IN DEATH OR INJURY. CHASSIS MUST BE CONNECTED TO AN APPROVED ELECTRICAL GROUND. BE SURE GROUND LEAD IS NOT CONNECTED TO ANY PRIMARY TERMINAL.**

US

7.5 Output connections

WARNING

ELECTRIC SHOCK CAN KILL! DANGEROUS VOLTAGE AND CURRENT! ANY TIME WORKING AROUND A PLASMA POWER SOURCE WITH COVERS REMOVED:
- DISCONNECT POWER SOURCE AT THE LINE (WALL) DISCONNECT.
- HAVE A QUALIFIED PERSON CHECK THE OUTPUT BUS BARS (POSITIVE AND NEGATIVE) WITH A VOLTMETER.

7.5.1 Output cables (customer supplied)

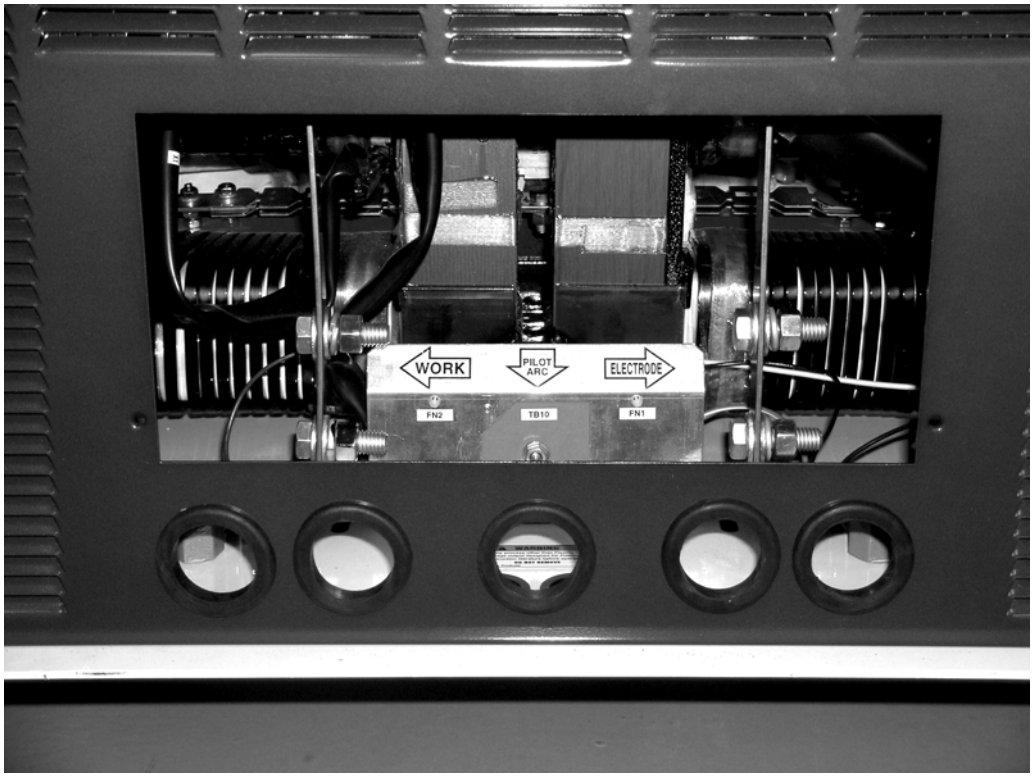
Choose plasma cutting output cables (customer supplied) on the basis of one 4/0 AWG, 600 volt insulated copper cable for each 400 amps of output current. For 450 amps, 100% duty cutting, two parallel 2/0 AWG, 600 volt cables should be used.

NOTICE

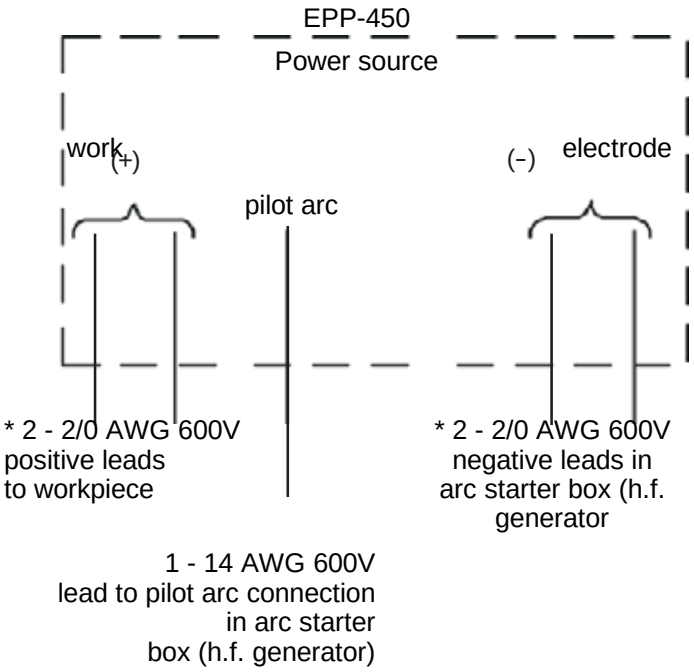
Do not use 100 volt insulated welding cable.

7.5.2 Output connection procedure - single power source

1. Remove access panel on the lower front of the power source.
2. Thread output cables through the openings at the bottom of the front panel or at the bottom of the power source immediately behind the front panel.
3. Connect cables to designated terminals mounted inside the power source using UL listed pressure wire connectors.
4. Replace panel removed during the first step.



Open acces panel



*Two parallel 2/0 AWG leads are recommended for 450A 100% duty operation. For operation at or below 400A 100% duty, one 4/0 lead may be used. Also, for 450A operation at or below 80% duty, one 4/0 lead may be used. 80% maximum duty means operation for no more than 8 minutes in any 10 minute time interval.

7.6 Parallel installation

Two EPP-450 power sources may be connected together in parallel to extend the output current range.

CAUTION

Use only one power source for cutting below 100A.
We recommend disconnecting the negative lead from the supplemental power source when changing to currents below 100A. This lead should be safely insulated to protect against electric shock.

7.6.1 Connections for two EPP-450's in parallel

NOTICE

Primary power source has the electrode (-) conductor jumpered. The supplemental power source has the work (+) jumpered.

1. Connect the negative (-) output cables to the arc starter box (high frequency generator).
2. Connect the positive (+) output cables to the workpiece.
3. Connect the positive (+) and negative (-) conductors between the power sources.
4. Connect the pilot arc cable to the pilot arc terminal in the primary power source. The pilot arc connection in the supplemental power source is not used. The pilot arc circuit is not run in parallel.
5. Set the Pilot Arc HIGH / LOW switch on the supplemental power source to "LOW".
6. Set the Pilot Arc HIGH / LOW switch on the primary power source to "HIGH".
7. If a remote 0.00 to +10.00 VDC current reference signal is used to set the output current, feed the same signal into both power sources. Connect J1-G (positive 0.00 to 10.00 VDC) of both power sources together and connect J1-P (negative) of both power sources together. With both power sources operating, the output current can be predicted using the following formula: [output current (amps)] = [reference voltage] x [100]

The EPP-450 does not have an ON/OFF switch. The main power is controlled through the line (wall) disconnect switch.

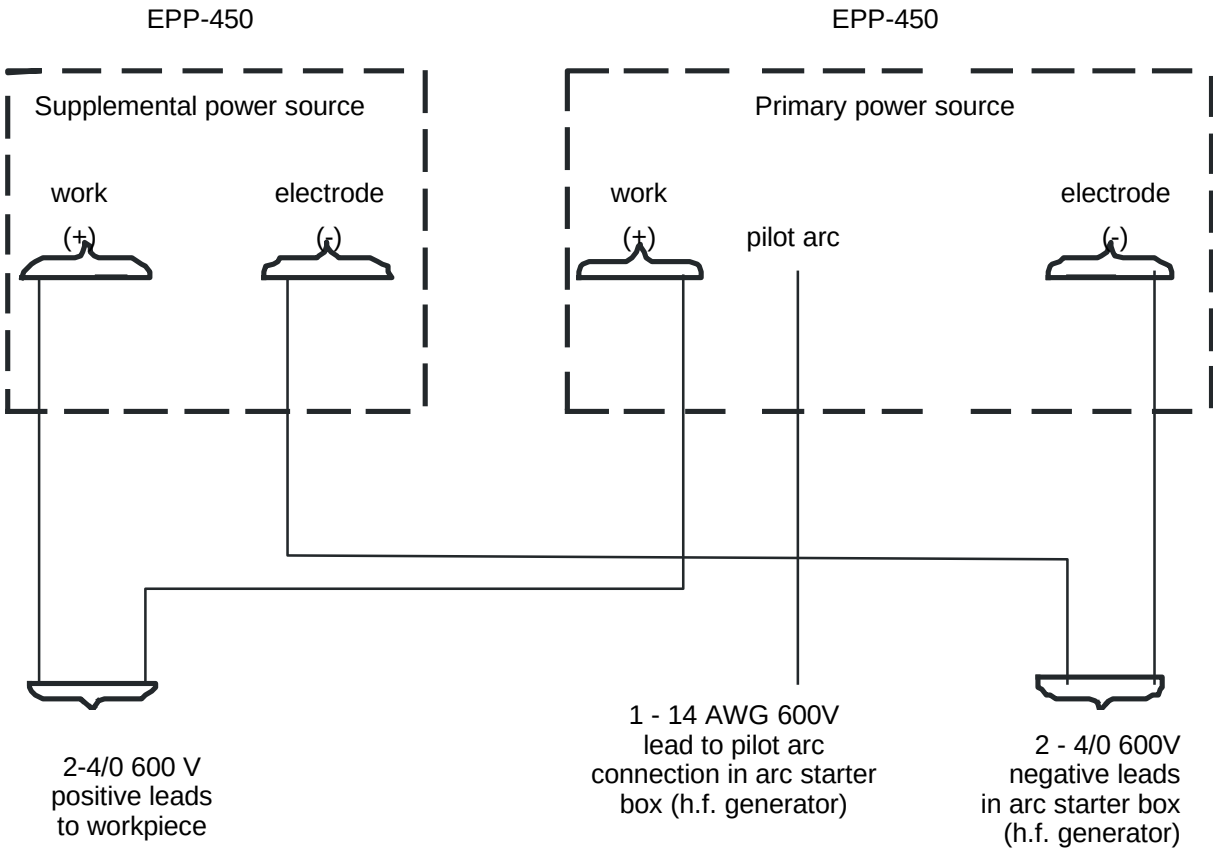
WARNING

DO NOT OPERATE THE EPP-450 WITH COVERS REMOVED. HIGH VOLTAGE COMPONENTS ARE EXPOSED INCREASING SHOCK HAZARD.
INTERNAL COMPONENT MAY BE DAMAGED BECAUSE COOLING FANS WILL LOSE EFFICIENCY.
ELECTRIC SHOCK CAN KILL!
EXPOSED ELECTRICAL CONDUCTORS CAN BE HAZARDOUS! DO NOT LEAVE ELECTRICALLY "HOT" CONDUCTORS EXPOSED. WHEN DISCONNECTING THE SUPPLEMENTAL POWER SOURCE FROM THE PRIMARY, VERIFY THAT THE CORRECT CABLES WERE DISCONNECTED. INSULATE THE DISCONNECTED ENDS.
WHEN USING ONLY ONE POWER SOURCE IN A PARALLEL CONFIGURATION, THE NEGATIVE ELECTRODE CONDUCTOR MUST BE DISCONNECTED FROM THE SUPPLEMENTAL POWER SOURCE AND THE PLUMBING BOX. FAILURE TO DO THIS WILL LEAVE THE SUPPLMENTAL ELECTRICALLY "HOT".

US

Connections for parallel installation of two EPP-450 power sources with both power sources in operation.

The connections below are suitable for parallel operation up to 800A at 100% duty or 900A at or below 80% duty. 80% duty means 8 minutes of arc “on” time in any 10 minute period.



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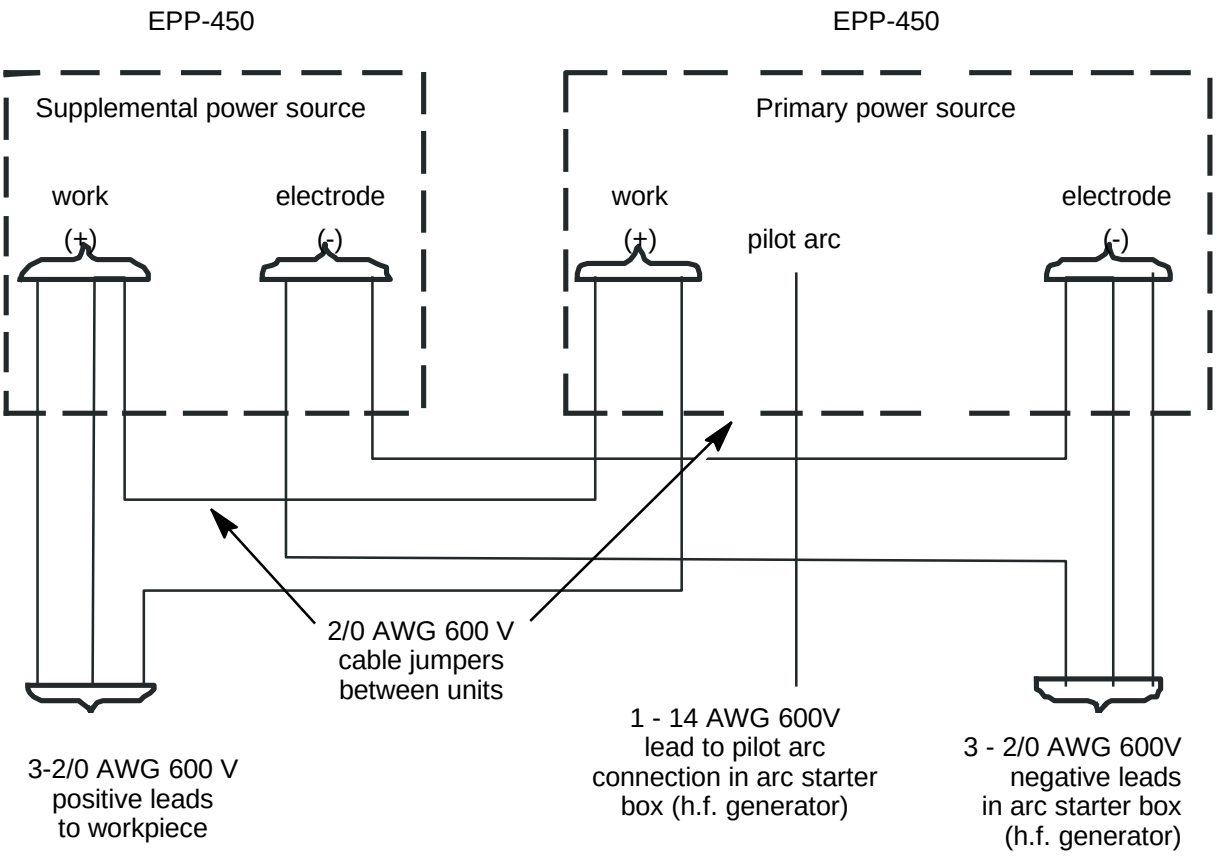
For 100% duty operation above 800A refer to the connection diagram below.



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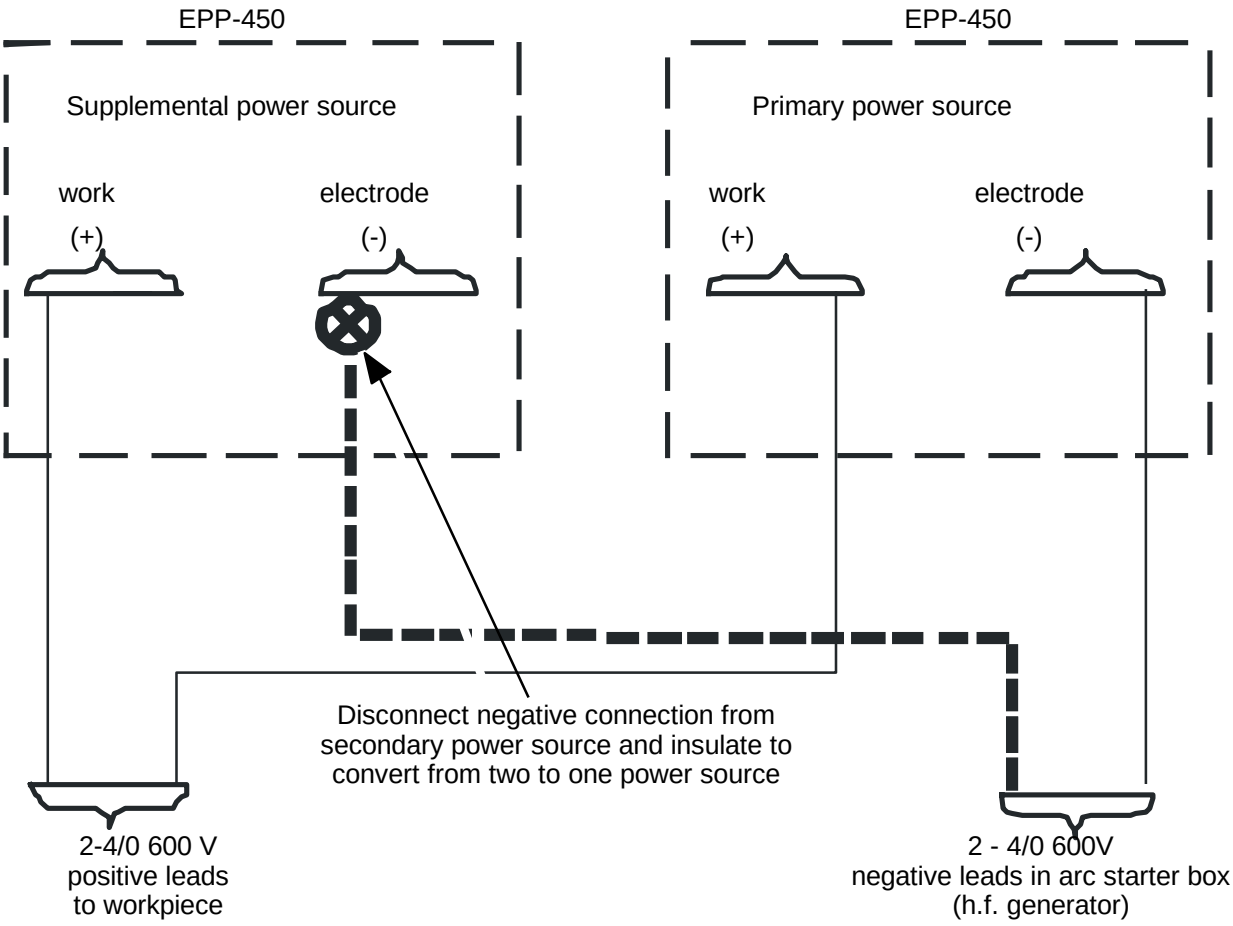
Connections for parallel installation of two EPP-450 power sources with only one power source in operation.

Connections for single power source operation up to 400A, 100% duty or 450A up to a maximum of 80% duty. Maximum 80% duty means operation for no more than 8 minutes in any 10 minute time interval.



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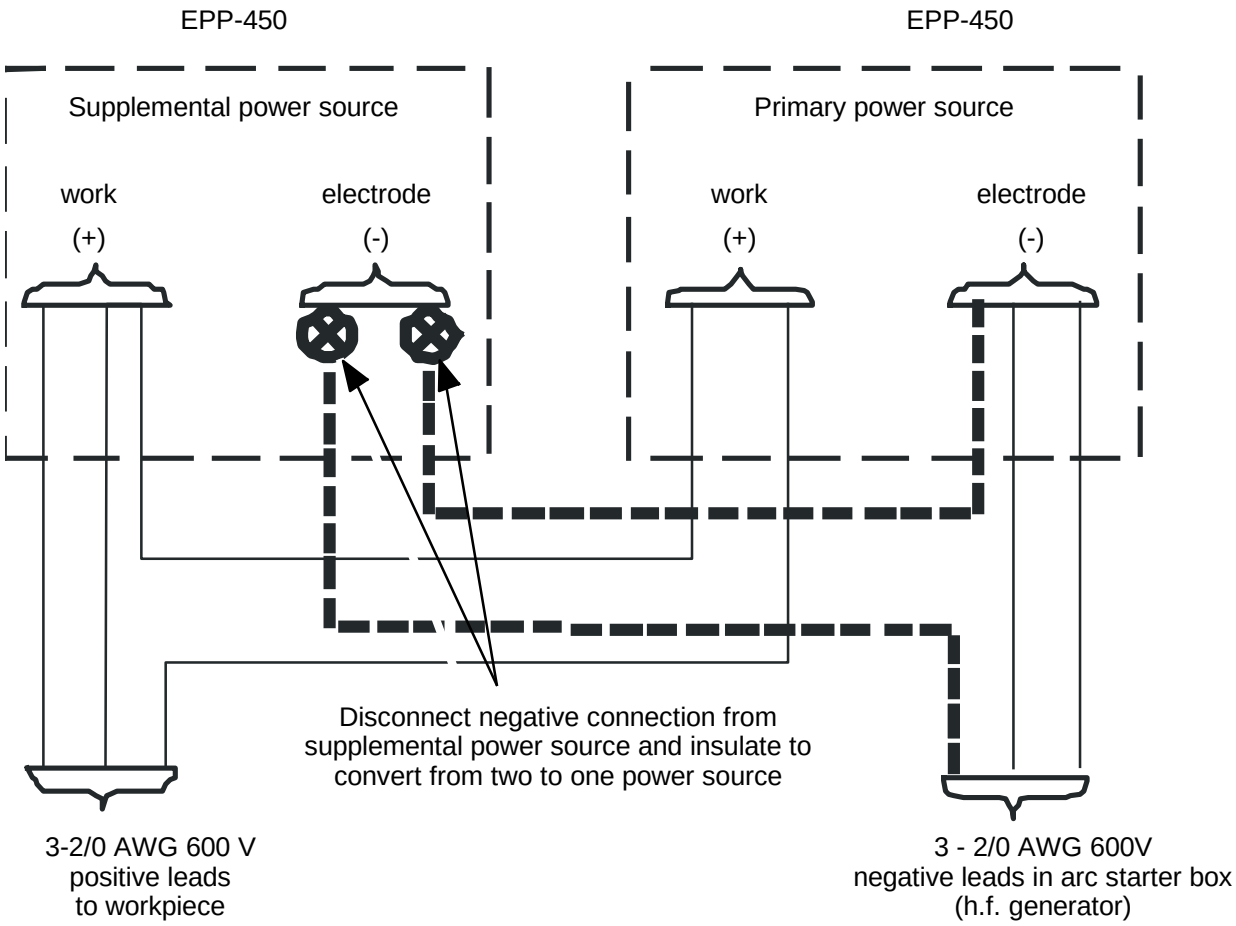
Connections for parallel installation of two EPP-450 power sources with only one power source in operation.

The connections below are suitable for single power supply operation up to 450A up to 100% duty.



7.6.2 Marking with two parallel EPP-450's

Two EPP-450's, connected in parallel, and can be used for marking down to 20A and cutting from 100A up to 900A. Two simple modifications can be made to the supplemental power source in order to permit marking down to 10A. The modifications are necessary only if marking below 20A is required.

Field modifications to permit marking down to 10 A:

1. Changes to the primary power source: None
2. Changes to the supplement power source:
   a. Unplug the WHT wire from the coil of K12
   b. Remove the jumper between TB7-7 and TB7-8. The jumper is a link built into the terminal strip.

! **NOTICE**	These modifications disable the current output of the secondary power supply only in the marking mode. The modifications have no effect on the output current of the secondary power supply while cutting in either HI or LOW current cutting modes.

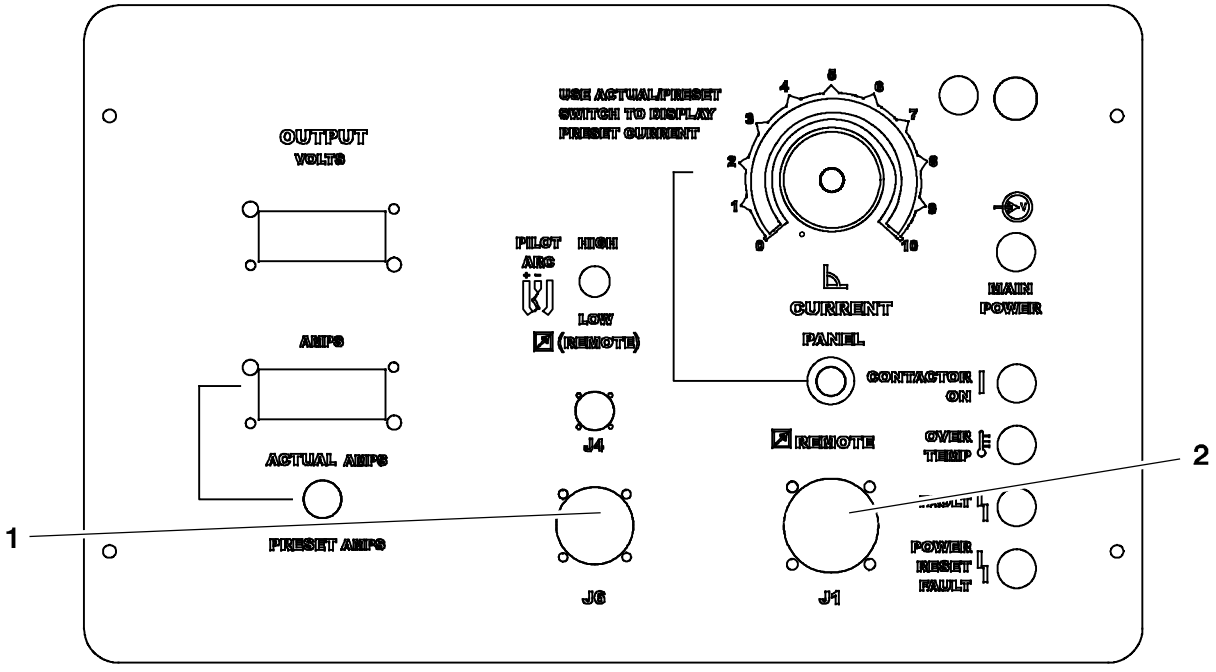
US

Operation of two parallel EPP-450's:

1. Provide Contactor On/Off, Cut/Mark, Current Range High/Low signals to both the Primary and Supplemental power sources. Feed the same V_{REF} signal into both power sources.
2. When marking with parallel power sources, and the Secondary power source is not modified, the output current transfer function is the sum of the transfer functions for each power source: $I_{OUT} = 20 \times V_{REF}$. Each power source will provide the same output current.

   When marking with parallel power sources, and the Secondary power source is modified, the current transfer function is that of the Primary power source: $I_{OUT} = 10 \times V_{REF}$. Both power sources will turn on when the Contactor signal is present, but the output current of a modified Secondary power source is disabled in the marking mode.
3. When cutting in the Low current mode, the current transfer function is the sum of the transfer functions for each power source: $I_{OUT} = 20 \times V_{REF}$. For cutting at currents below 100A, disconnect the negative cable(s) from the secondary power source, and insure their terminations are insulated to protect against electric shock. With the secondary power source disconnected, the current transfer function is that of the Primary power source: $I_{OUT} = 10 \times V_{REF}$.
4. When cutting in the High current mode, the current transfer function is the sum of the transfer functions for each power source: $I_{OUT} = 100 \times V_{REF}$. For cutting at currents below 100A, disconnect the negative cable(s) from the secondary power source, and insure their terminations are insulated to protect against electric shock. Use the Low current cutting mode.

7.7 Interface cables



1 Water Cooler Interface (8 Conductors) *2 CNC Interface (24 Conductors*

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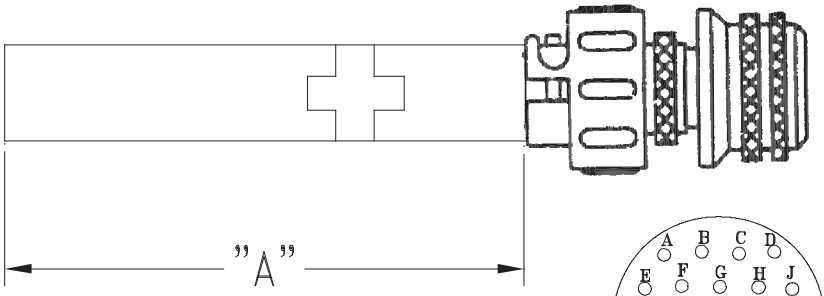
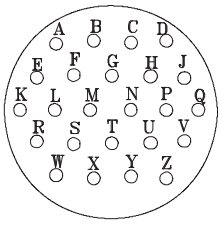
7.7.1 CNC interface cables with mating power source connector and unterminated CNC interface

Male connector





WIRING VIEW

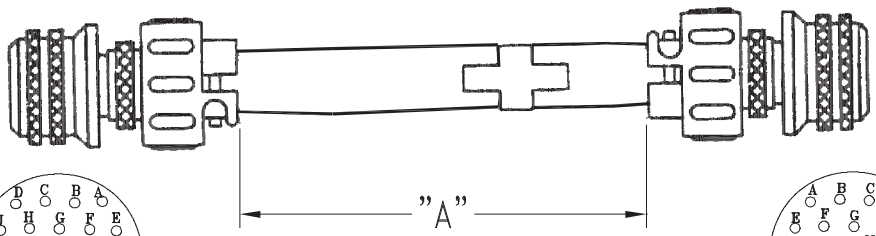
P/N	DESCRIPTION	"A" DIM
0558004849	CABLE CTRL 24C 5M	16'
0558004850	CABLE CTRL 24C 10M	33'
0558005237	CABLE CTRL 24C 15M	49'
0558004851	CABLE CTRL 24C 20M	66'
0558005238	CABLE CTRL 24C 30M	98'
0558004852	CABLE CTRL 24C 40M	131'
0558004853	CABLE CTRL 24C 50M	164'
0558004854	CABLE CTRL 24C 60M	196'

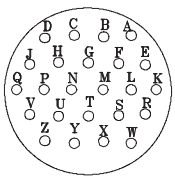
PIN	WIRE COLOR
A	RED #1
B	RED #2
C	RED #3
D	RED #4
E	RED #5
F	RED #6
G	RED #7
H	RED #8
J	RED #9
K	RED #10
L	RED #11
M	RED #12
N	RED #13
P	RED #14
Q	RED #15
R	RED #16
S	RED #17
T	RED #18
U	RED #19
V	RED #20
W	RED #21
X	RED #22
Y	RED #23
Z	GRN/YEL

7.7.2 CNC interface cables with mating power source connectors and mating CNC connector

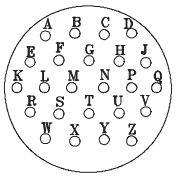
CNC connector

Male connector





WIRING VIEW



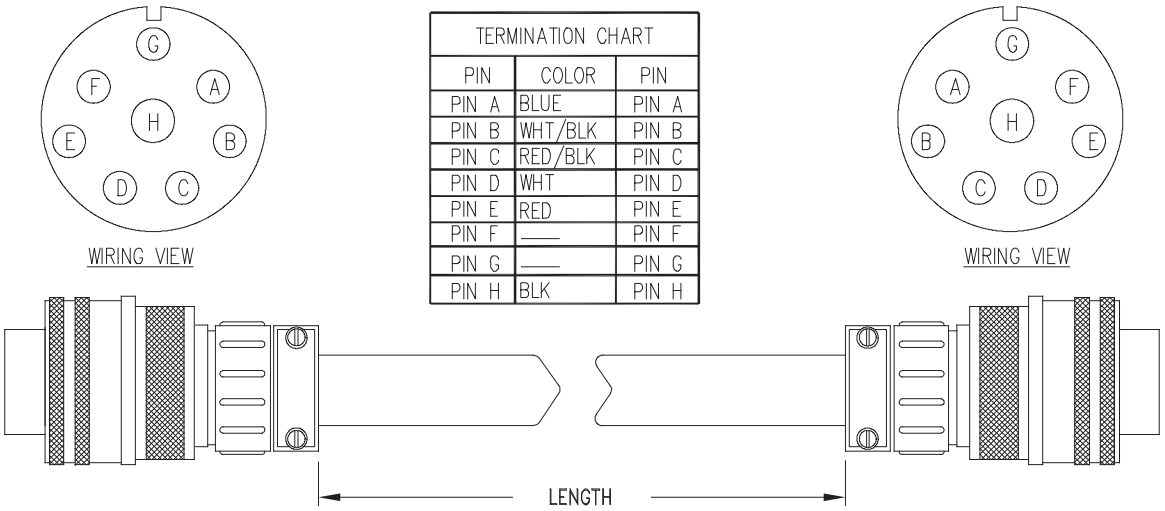
WIRING VIEW

P/N	DESCRIPTION	"A" DIM
0558004651	CABLE CTRL 24C 7.6M	25'
0558004652	CABLE CTRL 24C 15M	50'
0558004653	CABLE CTRL 24C 22.8M	75'
0558004654	CABLE CTRL 24C 30.5M	100'
0558003978	CABLE CTRL 24C 38.1M	125'
0558004655	CABLE CTRL 24C 45.7M	150'

PIN	WIRE COLOR
A	RED #1
B	RED #2
C	RED #3
D	RED #4
E	RED #5
F	RED #6
G	RED #7
H	RED #8
J	RED #9
K	RED #10
L	RED #11
M	RED #12
N	RED #13
P	RED #14
Q	RED #15
R	RED #16
S	RED #17
T	RED #18
U	RED #19
V	RED #20
W	RED #21
X	RED #22
Y	RED #23
Z	GRN/YEL

US

7.7.3 Water cooler interface cables with mating power source connectors at both ends



TERMINATION CHART		
PIN	COLOR	PIN
PIN A	BLUE	PIN A
PIN B	WHT/BLK	PIN B
PIN C	RED/BLK	PIN C
PIN D	WHT	PIN D
PIN E	RED	PIN E
PIN F	——	PIN F
PIN G	——	PIN G
PIN H	BLK	PIN H

P/N	DESCRIPTION	LENGTH
0558004837	CONTROL CABLE WC 5M	16’
0558004838	CONTROL CABLE WC 10M	33’
0558004839	CONTROL CABLE WC 20M	66’

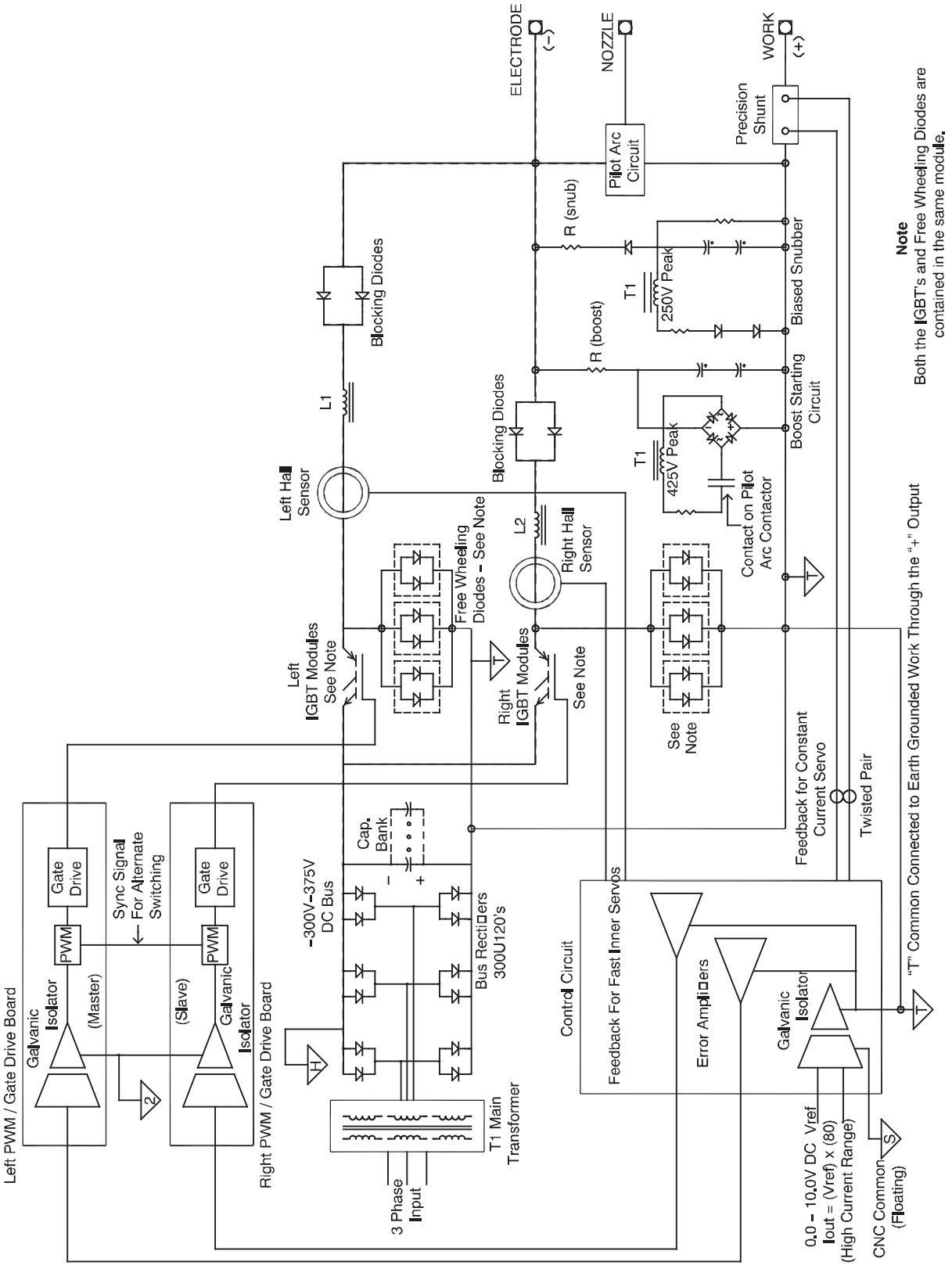
Female connector

Male connector

US

8 OPERATION

8.1 Block diagram circuit description

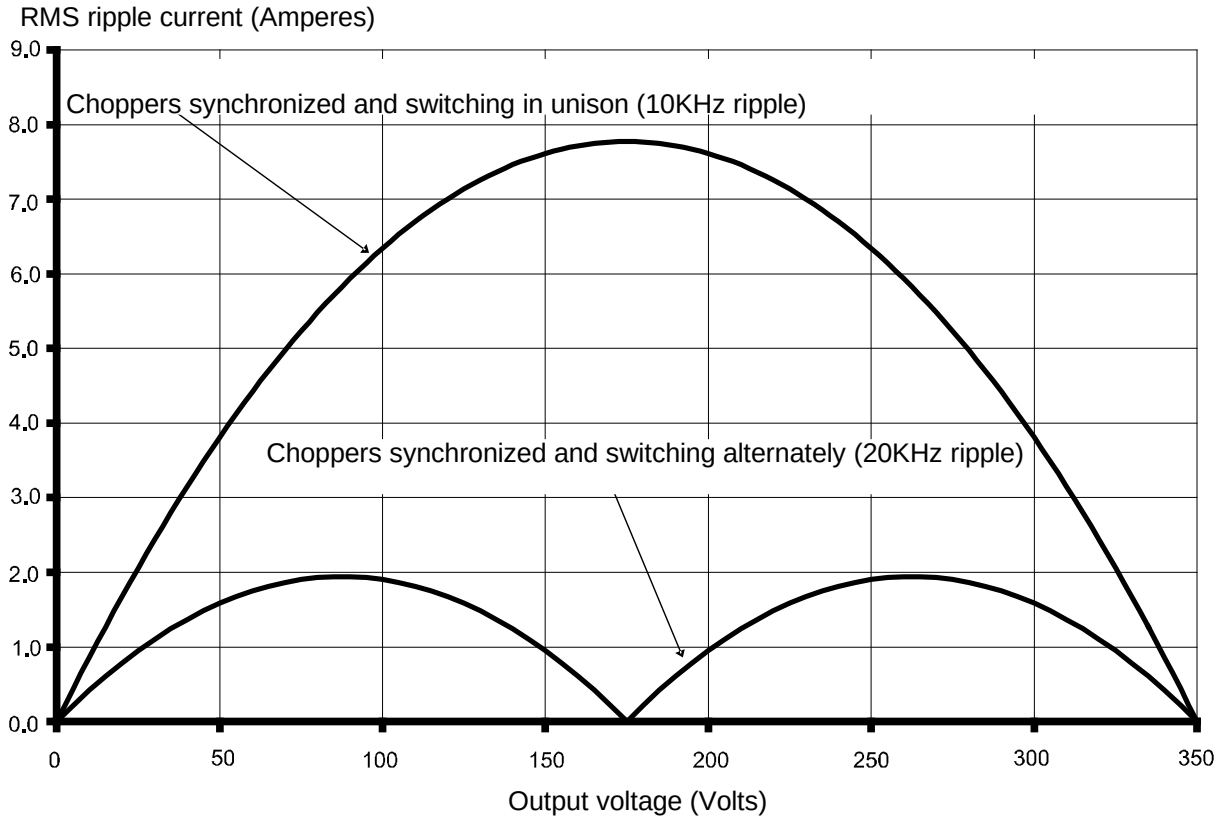


The power circuit utilized in the EPP-450 is commonly referred to as a buck converter or a chopper. High speed electronic switches turn on and off several thousand times per second providing pulses of power to the output. A filter circuit, consisting primarily of an inductor (sometimes called a choke), converts the pulses to a relatively constant DC (Direct Current) output.

Although the filter inductor removes most of the fluctuations from the “chopped” output of the electronic switches, some small fluctuations of output, called ripple, remain. The EPP-450 utilizes a patented power circuit combining the output of two choppers, each providing approximately half the total output, in a manner that reduces ripple. The choppers are synchronized so that when the ripple from the first chopper is increasing output, the second chopper is decreasing output. The result is the ripple from each chopper partially cancels the ripple from the other. The result is ultra low ripple with a very smooth and stable output. Low ripple is highly desirable because torch consumable life is often improved with low ripple.

The graph below shows the effect of ESAB’s patented ripple reduction using two choppers synchronized and switching alternately. Compared to two choppers switching in unison, the alternate switching typically reduces ripple a factor of 4 to 10.

EPP-450 10/20 KHz output RMS ripple current versus output voltage



The EPP-450 Block Diagram see on page **31** shows the main functional elements of the power source. T1, the main transformer, provides isolation from the primary power line as well as the proper voltage for the *375V DC bus. The bus rectifiers convert the three phase output of T1 to the *375V bus voltage. A capacitor bank provides filtering and energy storage that supplies power to the high speed electronic switches. The switches are IGBT’s (Insulated Gate Bipolar Transistors).

The *375V bus provides power for both the left (master) chopper and the right (slave) chopper.

Each chopper contains IGBT's, free wheeling diodes, a hall sensor, a filter inductor, and blocking diodes. The IGBT's are the electronic switches that, in the EPP-450, turn on and off 10,000 times per second (25,000 times per second in low current and marking mode). They provide the pulses of power filtered by the inductor. The free wheeling diodes provide the path for current to flow when the IGBT's are off. The hall sensors are current transducers that monitor the output currents and provide the feedback signals for the control circuit.

The blocking diodes provide two functions. First, they prevent the 431V DC from the boost starting circuit from feeding back to the IGBT's and the *375V bus. Second, they provide isolation of the two choppers from one another. This permits independent operation of each chopper without the other chopper functioning.

The control circuit contains regulating servos for both choppers. It also contains a third servo that monitors the total output current signal fed back from the precision shunt. This third servo adjusts the two chopper servos to maintain an accurately controlled output current commanded by the V_{REF} signal.

The V_{REF} circuitry is galvanically isolated from the rest of the power source. The isolation prevents problems that can arise from "ground" loops

Each chopper, the left master, and the right slave, contain their own PWM / gate drive PC Boards mounted next to the IGBT's. This circuitry provides the on / off PWM (Pulse Width Modulation) signals to drive the IGBT's. The left (master) PWM provides a synchronized clock signal to its own gate drive circuitry as well as to the right (Slave) gate drive circuitry. It is through this synchronized signal that the IGBT's from the two sides switch alternately reducing output ripple.

The EPP-450 contains a boost supply for providing approximately 430V DC for arc starting. After the cutting arc is established, the boost supply is turned off with contacts on the contactor (K10).

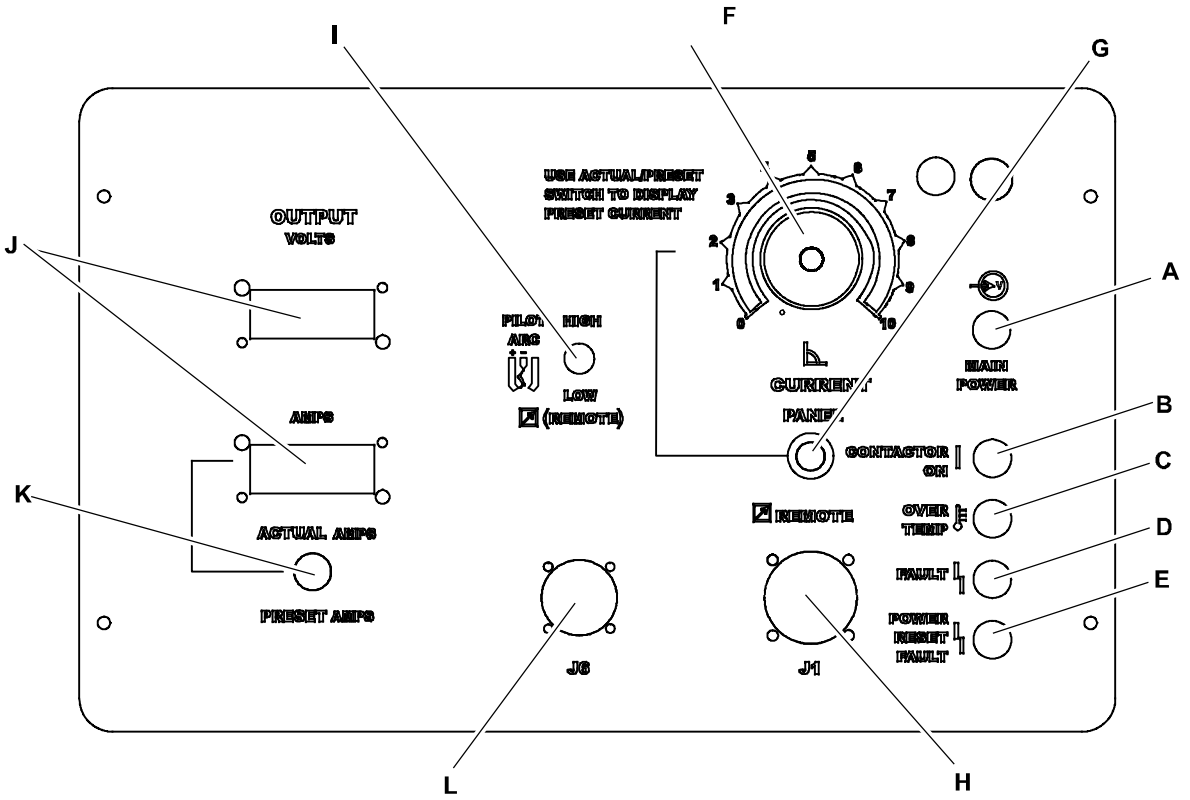
A biased snubber reduces the voltage transients created during cutting arc termination. It also reduces the transient voltages from a parallel power source thus preventing damage to the power source.

The pilot arc circuit consists of the necessary components for establishing a pilot arc. This circuit disengages when the cutting or marking arc is established.

* The bus voltage for the 380/400V, 50Hz model is approximately 360V DC when operating with 380V input.

US

8.2 Control panel



A - Main power

Indicator illuminates when input power is applied to the power source.

B - Contactor on

Indicator illuminates when the main contactor is energized.

C - Over Temp

Indicator illuminates when power source has overheated.

D - Fault

Indicator illuminates when there are abnormalities in the cutting process or when the input line voltage falls outside of the required nominal value by more than ±10%.

E - Power reset fault

Indicator illuminates when a serious fault is detected. Input power must be disconnected for at least 5 seconds and then reapplied.

F - Current dial (potentiometer)

EPP-450 dial shown. EPP-450 has a range of 10 to 100A in low current range and 50 to 400A in high current range. The potentiometer is used only in panel mode.

G - Panel remote switch

Controls the location of current control.

- Place in the PANEL position for control using the current potentiometer.
- Place in REMOTE position for control from an external signal (CNC).

H and L - Remote connections

- H - 24 pin plug for connecting the power source to CNC (remote control)
- L - 8 pin plug for connecting the power source to the coolant circulator

I - Pilot arc HIGH / LO W Switch

Used to select amount of pilot arc current desired. As a general rule, for 100 amperes and below, a setting of LOW is used. This can vary depending on gas, material and torch used. High/Low settings are specified in cutting data included in the torch manual. When the EPP-450 is set to marking mode, this switch must be in the low position.

NOTICE

The EPP-450 power supply is normally in "Low Current Range", 100A maximum. The external control must supply a connection (contact closure) between J1-R and J1-T to place the power supply in "High Current Range", 450A maximum. If the EPP-450 will be permanently connected in "High Current Range", move the red wire from TB8-1 to TB8-2. TB8 is located near the top of the power supply on the back of the sheet metal box containing the control PC board.

J - Meters

Displays voltage and amperage when cutting. The ammeter can be activated with the actual / preset switch when not cutting to view an estimation of the cutting current before cutting begins.

K - Actual/preset switch

The ACTUAL AMPS / PRESET AMPS spring return toggle switch, S4, defaults to the ACTUAL (UP) position. In the ACTUAL position, the OUTPUT AMMETER displays the output cutting current.

In the PRESET (DOWN) position, the OUTPUT AMMETER displays an estimate of the output cutting current by monitoring the 0.00 to 10.00 VDC cutting or marking current reference signal (Vref). The reference signal comes from the CURRENT POTENTIOMETER with the PANEL/REMOTE switch in the PANEL (UP) position and from a remote reference signal (J1-J / J1-L(+)) with the PANEL/ REMOTE switch in the REMOTE (DOWN) position. The value displayed on the OUTPUT AMMETER will be the value of estimated actual output current for both the Hi and Lo current modes.

The switch may be changed to and from the ACTUAL and PRESET positions at any time without affecting the cutting process.

US

WARNING

DANGEROUS VOLTAGES AND CURRENT! ELECTRIC SHOCK CAN KILL! BEFORE OPERATION, ENSURE INSTALLATION AND GROUNDING PROCEDURES HAVE BEEN FOLLOWED. DO NOT OPERATE THIS EQUIPMENT WITH COVERS REMOVED.

8.2.1 Modes of operation: cutting modes and marking mode

1. The EPP-450 operates in the Cutting Mode in two current ranges. The low current range is 35-100A corresponding to a V_{REF} signal of 3.50-10.00V. In the high current range, the current output is continuously adjustable from 50A through 450A using either the Current Potentiometer, on the front panel, or a remote current reference signal fed into connector, J1.

   When using a remote signal, 50A corresponds to a current reference signal of 1.00VDC, and 450A corresponds to a signal of 9.00VDC. For signals over 9.00V, the power source internally limits the output current to a typical value of 475A.

   The EPP-450 defaults to the cutting mode of operation unless the command signal from a remote control for marking mode is supplied.

2. The power source is placed in marking mode with an external isolated relay or switch contact connecting J1-R (115VAC) to J1-M. This contact closure must be made before (50mS or longer) issuing a start or contactor on command.

   In the marking mode, the output current is adjusted through a single continuously adjustable range from 10A through 100A using either the current potentiometer, on the front panel, or a remote current reference signal fed into connector, J1. The EPP-450 automatically switches to the low current range in marking mode.

   In the low current range, when using a remote signal, 10A corresponds to a current reference signal of 1.00VDC, and 100A corresponds to a signal of 10.00VDC. In the high current range, when using the remote current reference signal (V_{REF}), the output current of 50 to 450A corresponds to a reference signal of 1.00 to 9.00VDC. For reference signals over 9.00V the power source limits the output current to a typical value of 475A.

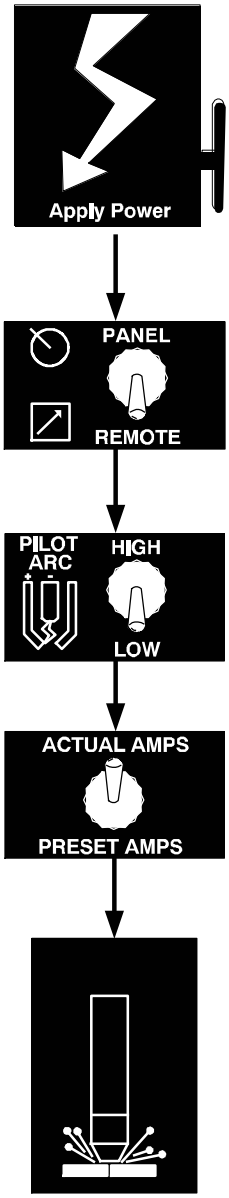
   In the marking mode, the boost supply, used for arc starting in the cutting mode, is de-activated. The resulting open circuit voltage is approximately 360V at nominal input line voltage*. Additionally, K12 closes connecting R60 through R67 into the output circuit. These resistors help stabilize the output for the low marking currents. The power source is capable of 10-100A at 100% duty output in the marking mode.

   10 Amp output is provided by resistors R60-R67. The factory set Minimum Starting Current (SW2) is 3 Amps. The default settings of Switch Two (SW2) on the Control PC Board mounted behind the access cover on the upper right of the front panel is positions 5, 6, 7 and 8 are off (down).

   * Approximately 345V for the 380/400V model operating on 380V.

US

8.3 Sequence of operation



1. Apply power by closing the line (wall) switch. (The EPP-450 does not have an on / off switch). The main power light will illuminate and the fault light will flash and then go out.
2. Select the Panel / Remote setting.
3. Set pilot arc High / Low switch. If pilot arc High / Low is selected from a remote control, the switch must be in the Low position. (Refer to cutting data in the torch manual.)
4. If using panel mode, view preset amps with the ACTUAL / PRESET AMPS switch. Adjust current until the approximate desired value is shown on the ammeter. If using the remote mode, placing the actual Amps / Preset Amps switch in the Preset Amps position provides the initial output current commanded by the remote control.
5. Begin plasma cutting operation. This may include manually setting up other options, depending on the total plasma package.
6. If using panel mode, after cutting has begun, adjust current to desired amount.
7. If cutting or marking fails to initiate, check for fault light. If a fault light illuminates, refer to troubleshooting section.

NOTICE

The fault light flashes when the contactor is first turned on signifying the DC Bus powered up normally.

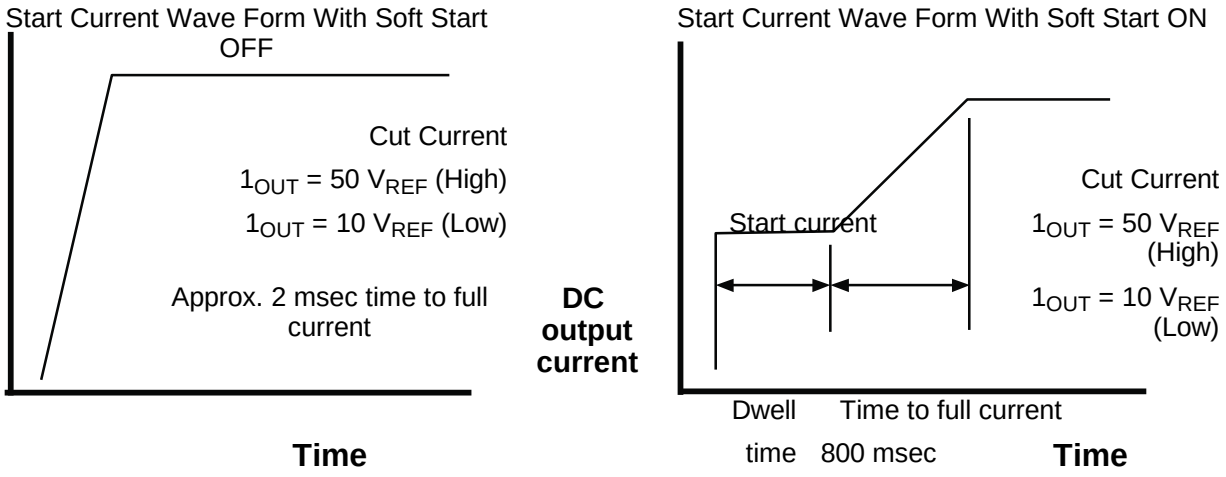
US

8.4 Arc initiation settings

The time to achieve full current can be adjusted for a soft start. This feature uses a reduced current to start and then gradually ramps up to full current. The EPP-450 is factory shipped with soft start enabled. The default settings are:

- Minimum Start Current 3A
- Start Current . . . . . 50% of cut current
- Timing to achieve full current . . . . . 800 msec
- Dwell Time . . . . . 2 msec

These timing functions can be disabled or adjusted to suit individual system requirements.

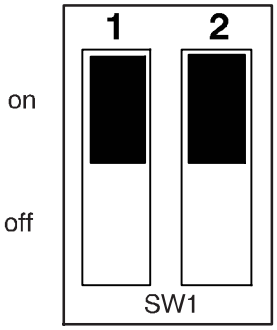


WARNING

ELECTRIC SHOCK CAN KILL!
SHUT OFF POWER AT THE LINE (WALL) DISCONNECT BEFORE REMOVING ANY COVERS OR MAKING ANY ADJUSTMENTS TO THE POWER SOURCE.

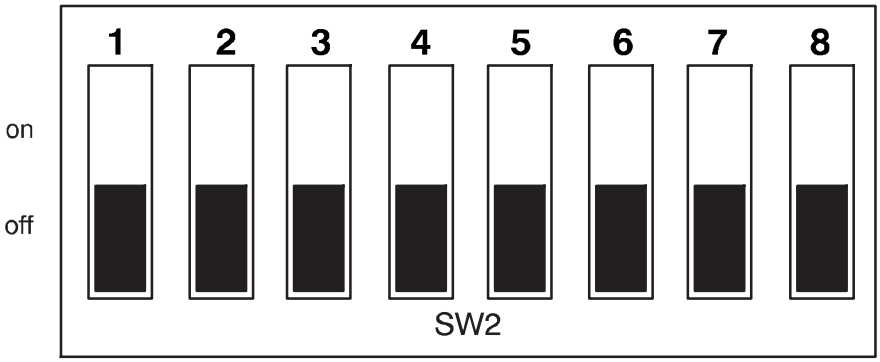
8.4.1 Enable/disable arc initiation conditions

Factory default setting shown.



1. Remove access panel on the upper-right corner of the front panel. Be sure to replace this panel after adjustments have been made.
2. Locate SW1 and PCB1 and push both rocker switches down to disable. To enable push both switches up. (If one switch is up and the other is down, arc initiation time is considered on.)

Factory default setting shown.



8.4.2 Adjusting arc initiation dwell timer

Dwell time is controlled by selections of positions 1 through 4 of SW2 on PCB1. When a switch is pushed on, its value is added to the minimum dwell time of 2 msec.

Switch #1 = 2 msec dwell time

Switch #2 = 4 msec dwell time

Switch #3 = 8 msec dwell time

Switch #4 = 16 msec dwell time

All switches off. 2 msec is the factory default dwell time.

8.4.3 Adjusting the minimum start current

Minimum Start Current is controlled by selection of positions 5 through 8 of SW2. When a switch is pushed on, its value is added to the factory set minimum value of 5A.

Switch #5 = 25A min. start current

Switch #6 = 12A min. start current

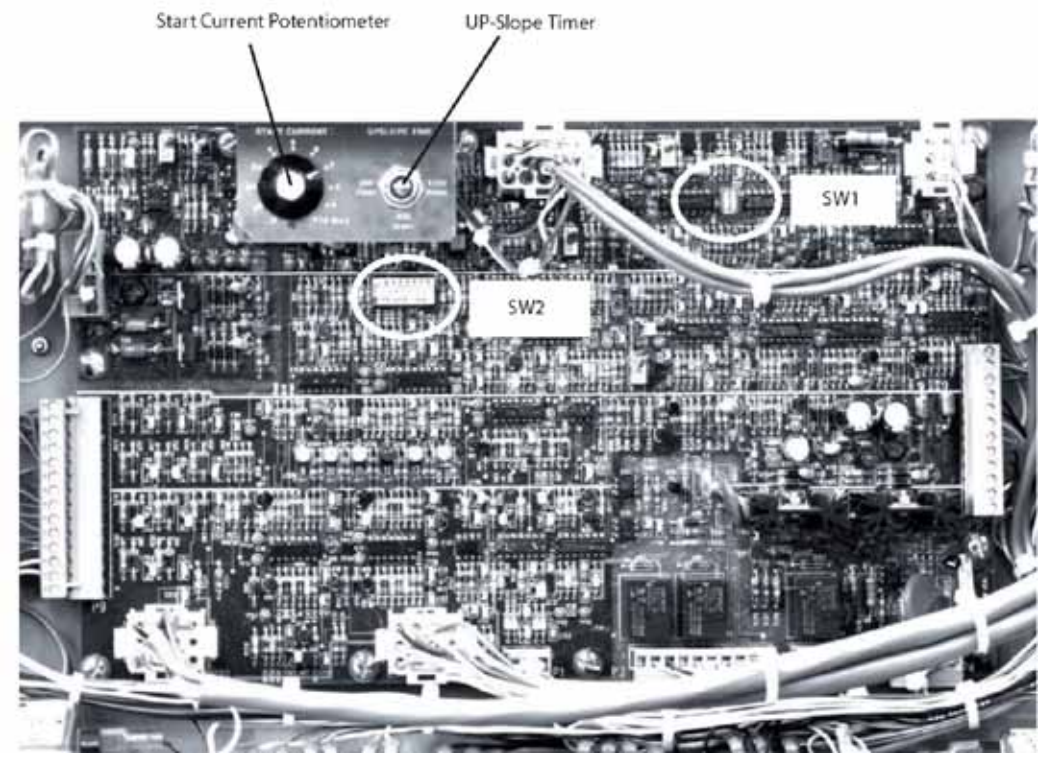
Switch #7 = 6A min. start current

Switch #8 = 3A min. start current

Default setting is with 5, 6, 7 and 8 off (down) 0A + 0A + 0A + 0A + 3A = 3A

US

8.4.4 Arc initiation controls



8.4.5 Start current and up-slope timer

Start Current

Set using potentiometer located above and to the left of center of PCB1. Factory default setting of 7 results in a starting current that is 50% of the cutting current.

Up-Slope Timer

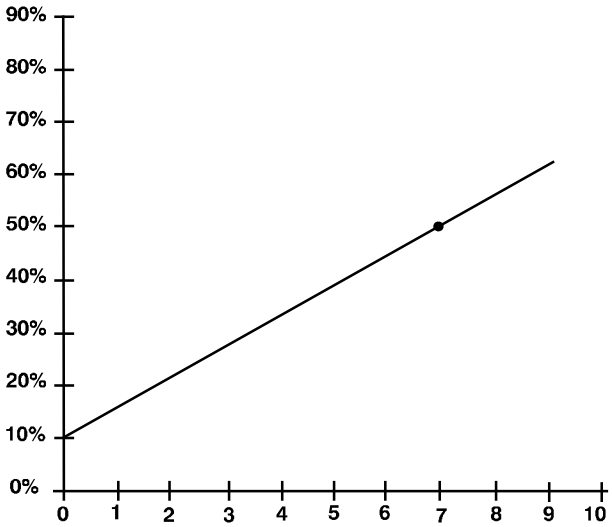
Three position switch located next to the start current potentiometer. Time is from start current (after dwell ends) to full current. Factory default = 800 msec.

Left position = 250 msec

Center position = 800 msec

Right Position = 1200 msec

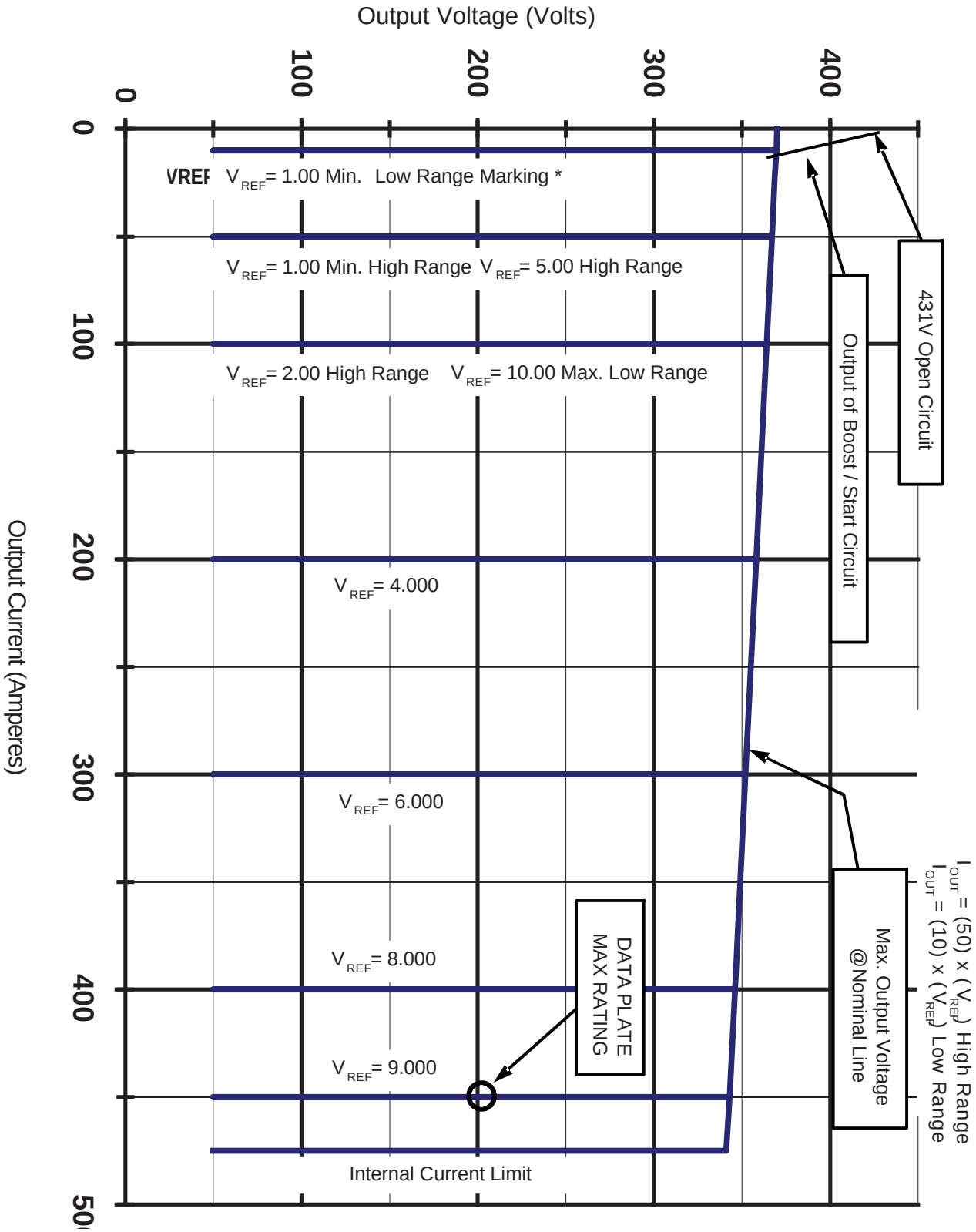
Starting current (%) and pot setting relationship



Start current pot setting

US

8.4.6 Approximate EPP-450 V-I curves for all models



US

9 MAINTENANCE

9.1 General

WARNING

ELECTRIC SHOCK CAN KILL!
SHUT OFF POWER AT THE LINE (WALL) DISCONNECT BEFORE ATTEMPTING ANY MAINTENANCE.

WARNING

EYE HAZARD WHEN USING COMPRESSED AIR TO CLEAN.

*** WEAR APPROVED EYE PROTECTION WITH SIDE SHIELDS WHEN CLEANING THE POWER SOURCE.**
*** USE ONLY LOW PRESSURE AIR.**

CAUTION

Maintenance on this equipment should only be performed by trained personnel.

9.2 Cleaning

Regularly scheduled cleaning of the power source is required to help keep the unit running trouble free. The frequency of cleaning depends on environment and use.

1. Turn power off at wall disconnect.
2. Remove side panels.
3. Use low pressure compressed dry air, remove dust from all air passages and components. Pay particular attention to heat sinks in the front of the unit. Dust insulates, reducing heat dissipation. Be sure to wear eye protection.

CAUTION

Air restrictions may cause EPP-450 to ver heat. Thermal switches may be activated causing interruption of function.
Do not use air filters on this unit.
Keep air passages clear of dust and other obstructions.

9.3 Lubrication

- Some units are equipped with oil tubes on the fans. These fans should be oiled after 1 year of service.
- All other EPP-450s have fan motors that are permanently lubricated and require no regular maintenance.

WARNING

ELECTRIC SHOCK HAZARD!
BE SURE TO REPLACE ANY COVERS REMOVED DURING CLEANING BEFORE TURNING POWER BACK ON.

US

10 TROUBLESHOOTING

10.1 General

WARNING

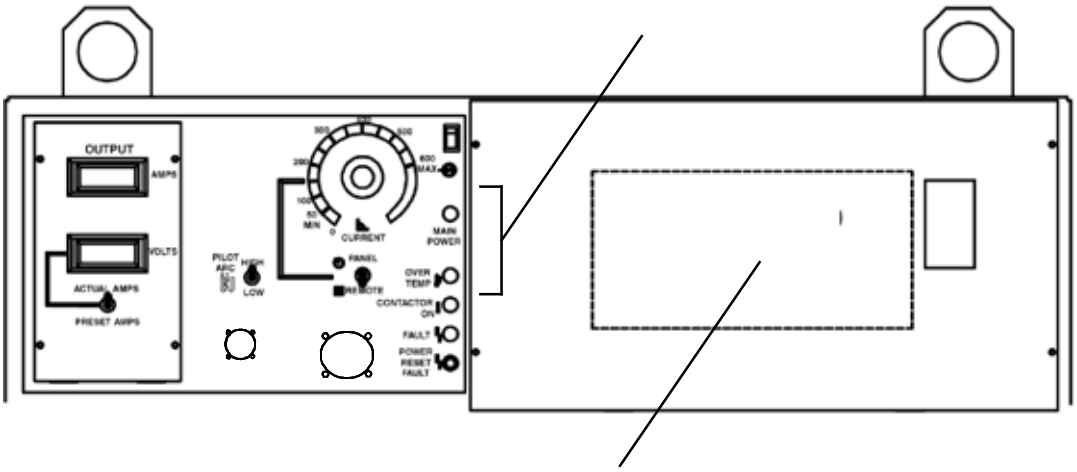
ELECTRIC SHOCK CAN KILL!
DO NOT PERMIT UNTRAINED PERSONS TO INSPECT OR REPAIR THIS EQUIPMENT. ELECTRICAL WORK MUST BE PERFORMED BY AN EXPERIENCED ELECTRICIAN.

CAUTION

Stop work immediately if power source does not work properly. Have only trained personnel investigate the cause. Use only recommended replacement parts.

10.2 Fault indicators

Front panel fault indicators



PCB1 located behind this panel

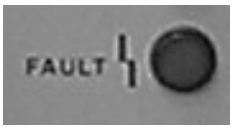
Fault indicators are found on the front panel. Used with the LEDs on PCB1 (located behind the cover with the EPP label) problems can be diagnosed.

NOTE:
It is normal for momentary lighting (flashing) of the fault indicator and LED 3 when a “contactor on” signal is applied at the beginning of each cut start.

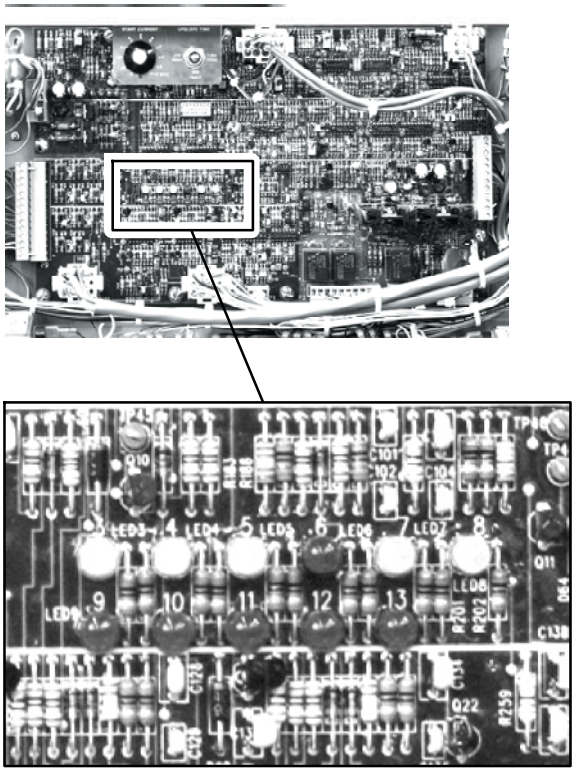
Fault Indicator used with:		Power Reset Fault Indicator used with:	
LED 3	Bus ripple	LED 6	Right overcurrent
LED 4	High bus	LED 9	Left overcurrent
LED 5	Low bus	LED 10	Left IGBT unsaturated
LED 7	Arc voltage saturation	LED 11	Right IGHT unsaturated
LED 8	Arc voltage cutoff	LED 12	Left - 12V bias supply
		LED 13	Right - 12V bias supply

US

Fault indicator (front panel)



Illuminates when there are abnormalities in the cutting process or when the input voltage falls ±10% outside the normal value. Momentary illumination is normal. If continuously lit, check LEDs 3, 4, 5, 7, and 8 on PCB1 for further diagnosis.



LED 3 – (yellow) Bus Ripple Fault - Momentarily illuminates at the beginning of each cut. Continuously lit during single-phasing or imbalanced line-to-line voltages of the three phase input line (Excessive Ripple). Power Source is shut down.

LED 4 – (yellow) High Bus Fault – Illuminates when input line voltage is too high for proper operation (approximately 20% above nominal line voltage rating). Power source is shut down.

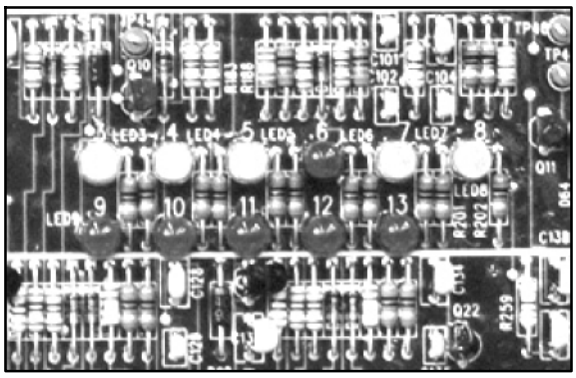
LED 5 – (yellow) Low Bus Fault – Illuminates when input line voltage is lower than 10% below nominal line voltage rating. Power Source is shut down.

LED 7 – (yellow) Arc Voltage Saturation Fault – Illuminates when the cutting arc voltage is too high and cutting current drops below preset level. LED will extinguish after voltage decreases and current rises.

LED 8 – (yellow) Arc Voltage Cutoff Fault – Illuminates when arc voltage increases over the preset value. PS is shut down.

Power reset fault indicator (on front panel)

Illuminates when a serious fault is detected. Input power must be disconnected for a least 5 seconds to clear this fault. Check PCB1 Red LEDs 6, 9, 10, 11, 12, and 13 if this fault is illuminated for further diagnosis.



LED 6 – (red) **Right overcurrent fault** – Illuminates when the current out of the right side chopper is too high (300 amps). This current is measured by the right-side hall sensor. The power source is shut down.

LED 9 – (red) **Left overcurrent fault** – Illuminates when the current from the left side chopper is too high (300 amps). Measured by the left hall sensor. Power source is shut down.

LED 10 _ (red) **Left IGBT unsaturated fault** – Illuminates when left IGBT is not fully conducting. PS (PS) is shut down.

LED 11 – (red) **Right IGBT unsaturated fault** – Illuminates when right IGBT is not fully conducting. Power Source (PS) is shut down.

LED 12 – (red) Left -(neg) **12V Bias supply fault** – Illuminates when negative 12 V bias supply to the left side IGBT gate drive circuit (located on PWM-drive board PCB2) is missing. PS is shut down.

LED 13 – (red) Right –(neg) **12V Bias supply fault** - Illuminates when negative 12 V bias supply to the right side IGBT gate drive circuit (located on PWM drive board PCB3) is missing. PS is shut down.

10.3 Fault isolation

Many of the most common problems are listed by symptom.

10.3.1 No output with contactor signal applied

10.3.2 Output limited to 100A

10.3.3 Fans not working

10.3.4 Power not on or low voltage

10.3.5 Fault light illumination

10.3.6 Torch won't fire

10.3.7 Fuses blown - F1 and F2

10.3.8 Intermittent, interrupted or partial operation

10.3.1 No output with contactor signal applied

Problem	Possible cause	Action
Contactor signal is applied, contactor lamp on front panel is illuminated, K2 and K3 contactors do not close and low bus fault light, LED 5 illuminates.	External emergency stop (E-stop) is open.	Connect isolated contact of E-stop switch to provide connection between J1-E and J1-F.
	Power reset lamp on front panel indicates a serious fault condition.	Refer to section under fault light illumination.

10.3.2 Output limited to 100A

Problem	Possible cause	Action
Power source will not go over 100A.	High current range signal missing.	External control should connect J1-R to J1-T. As an alternative, in the power source, move the white wire on TB8-1 to TB8-2.

10.3.3 Fans not working

Problem	Possible cause	Action
All 4 fans do not run	This is normal when not cutting. Fans run only when "Contactor On" signal is received.	None
1, 2 or 3 fans do not run.	Broken or disconnected wire in fan motor circuit	Repair wire.
	Faulty fan(s)	Replace fans

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10.3.4 Power not on or LOW voltage

Problem	Possible cause	Action
Power source inoperable: Main power lamp is off.	Missing 3-phase input voltage	Restore all 3 phases of input voltage to within ±10% of nominal line.
	Missing 1 of 3-phase input voltage	Restore all 3 phases of input voltage to within ±10% of nominal line.
Low open circuit voltage	Fuse F3 blown	Replace F3
	Pilot arc Contactor (K4) faulty	Replace K4
	Faulty Control PCB1	Replace Control PCB1 (P/N 0558038312

10.3.5 Fault light illumination

Problem	Possible cause	Action
Fault light illuminates at the end of cut but goes off at the start of the next.	Normal condition caused when terminating the arc by running the torch off the work or the arc being attached to a part that falls away.	Reprogram cutting process to ensure arc is terminated only by removing the “Contactor On” signal
LED 3 – (amber) Bus ripple	Imbalance of 3-phase input power	Maintain phase voltage imbalance of less than 5%.
	Momentary loss of one phase of input power	Restore and maintain input power within ±10% nominal
	Faulty control PCB1	Replace PCB1 P/N 0558038312
LED 4 – (amber) High bus	One or more phases of input voltage exceed nominal line voltage by more than 15%.	Restore and maintain line voltage within ±10%
	Faulty control PCB1	Replace PCB1 P/N 0558038312
	One or more shorted diode rectifiers (D25-D28) on the “Electrode Plate”	Replace shorted diode rectifiers
LED 5 – (amber) Low bus	One or more phases of input voltage are lower than nominal by more than 15%.	Restore and maintain within ±10% of nominal
	Blown F1 and F2 fuses	See F1 and F2 in Blown Fuses Section
	Over temp Light comes on.	See over temp in Fault Light Section
	Imbalanced 3-phase input power	Maintain phase voltage imbalance of less than 5%
	Momentary loss of one phase of input power	Restore and maintain within ±10% of nominal
	Faulty Main Contactor (K1)	Replace K1
	Faulty Control PCB1	Replace PCB1 P/N 0558038312

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Problem	Possible cause	Action
LED 6 – (red) Right over current Note: If operation at 275A or less is possible, then the LEFT side is not working.	Cutting at over 275A with a faulty left side (left side output = 0)	See faulty left or right side
	Right current transducer connector loose or unplugged. PCB loose	Secure connections
	Loose or unplugged connector at right PWM/Drive Printed circuit board.	Secure connections
	P2 at left of PWM / Drive PCB loose or unplugged.	Secure connections
	Check voltage between P7-6 and P7-7. A voltage in either polarity of greater than 0.01 V indicates a faulty right current transducer (TD2).	Replace right current transducer (TD2)
	Faulty PCB1	Replace PCB1 P/N 0558038312
	Faulty right PWM / Drive PCB	Replace right PWM / Drive PCB P/N 0558038324
LED 9 – (red) Left over current Note: If operation at 275A or less is possible, then the right side is not working.	Cutting at over 275A with a faulty right side (right side output = 0)	See faulty right side
	Left current transducer connector loose or unplugged. PCB loose.	Secure connections
	Loose or unplugged connector at left PWM / Drive Printed circuit board.	Secure connections
	P2 at right of PWM / Drive PCB loose or unplugged.	Secure connections
	Check voltage between P7-2 and P7-3. A voltage in either polarity of greater than 0.01 V indicates a faulty left current transducer (TD1).	Replace left current transducer (TD1)
	Faulty PCB1	Replace PCB1 P/N 0558038312
	Faulty left PWM / Drive PCB	Replace left PWM / Drive PCB P/N 0558038324

CAUTION

NEVER attempt to power-up or operate the power source with any gate/admitter IGBT plug disconnected from it´s PWM/gate drive board. Attempting to operate the power source with any open (unplugged) IGBT gate/emitter connector may damage the IGBT and the plasma cutting torch.

Problem	Possible cause	Action
Very high output current accompanied by either a left or right over current (LED 6)	Shorted IGBT	Replace the IGBTs
	Current pot set too high	Lower the current setting
	Faulty left PWM / Drive PCB	Replace left PWM / Drive PCB
	High remote current signal	Decrease remote current signal
	Faulty PCB1	Replace PCB1 P/N 0558038312
LED 10 - (red) Left IGBT unsaturated	Black wire connecting IGBT (Q2) collector to P3 of the left PWM / Drive PCB (PCB2) is disconnected	Secure connector
	Shorted Freewheeling Diode(s)	Replace freewheeling diode(s)
	Loose or unplugged P1 connector at the left PWM / Drive PCB	Secure P1
	Loose or unplugged P10 connector at PCB1	Secure P10
	Faulty PCB1	Replace PCB1 P/N 0558038312
	Faulty left PWM / Drive PCB	Replace PCB2 P/N 0558038324
LED 11 - (red) Right IGBT unsaturated	Black wire connecting IGBT (Q5) collector to P3 of the right PWM / Drive PCB (PCB3) is disconnected.	Secure connector
	Shorted Freewheeling Diode(s)	Replace freewheeling diode(s)
	Loose or unplugged P1 connector at the left PWM / Drive PCB	Secure P1
	Loose or unplugged P10 connector at PCB1	Secure P11
	Faulty PCB1	Replace PCB1 P/N 0558038312
	Faulty right PWM / Drive PCB	Replace PCB3 P/N 0558038324
LED 12 – (red) Left –12V missing	Loose or unplugged P1 connector at the left PWM / Drive PCB	Secure P1 connector
	Loose or unplugged P10 connector at PCB1	Secure P10 connector
	Faulty left PWM / Drive PCB	Replace left PWM / Drive PCB P/N 0558038324
LED 12 – (red) Right –12V missing	Loose or unplugged P1 connector at the right PWM / Drive PCB	Secure P1 connector
	Loose or unplugged P11 connector at PCB1	Secure P11 connector
	Faulty right PWM / Drive PCB	Replace right PWM / Drive PCB P/N 0558038324

Problem	Possible cause	Action
Very high output current accompanied by either a left or right over current (LED 9 or LED 6 respectively	Shorted IGBT	Replace the IGBTs
	Current pot set too high	Lower the current setting
	Faulty left PWM / Drive PCB	Replace left PWM / Drive PCB P/N 0558038324
	High remote current signal	Decrease remote current signal
	Faulty PCB1	Replace PCB1 P/N 0558038312
Over temp lamp illuminates	One or more fans inoperable	Repair or replace fan(s)
	Broken wire or unplugged connector at thermal switch.	Repair broken wires and unplugged connector
	Obstruction to air flow closer than 3 feet (1 m) to rear of power source.	Allow 3 ft. (1 m) minimum between the rear of the power source and any object that may restrict air flow.
	Excessive dirt restricting cooling air flow	Clean out excessive dirt, especially in the extrusions for the IGBTs and freewheeling diodes, the POS, NEG and Electrode Plates, the main transformer (T1) and the filter inductors (L1 and L2).
	Obstructed air intake	Check and clear any obstructions from the bottom, front, and top rear of the Power source.

10.3.6 Torch will not fire

Problem	Possible cause	Action
Main arc transfers to the work with a short “pop”, placing only a small dimple in the work.	Remote control removes the start signal when the main arc transfers to the work. Panel/Remote switch in “Remote” with no remote control of the current	Place Panel/Remote switch in “Panel” position
	Remote current control present but signal missing.	Check for current reference signal at TB1- 4(+) and TB1-5(-). See Signal vs. Output Current Curve this section.
	Current pot set too low.	Increase current pot setting
	Start current pot, located behind the cover for the control PCB is set too low.	Increase the start current post setting to “7”.

Problem	Possible cause	Action
Arc does not start. There is no arc at the torch. Open circuit voltage is OK.	Open connection between the power source positive output and the work.	Repair connection
	Fuse F6 in the Pilot arc circuit is blown.	Replace F6
	Fuse F7 in the pilot arc circuit is blown	Replace F7
	Pilot arc High/Low switch is in the ”LOW” position when using consumables for 100A or higher (Refer to process data included in torch manuals)	Change Pilot arc to “High” position. (Refer to process data included in torch manuals)
	Pilot arc contactor (K4) faulty.	Replace K4
	Faulty PCB1	Replace PCB1 P/N 0558038312

10.3.7 Fuses F1 and F2 blown

Problem	Possible cause	Action
Fuses F1 and F2 blown	Process controller ignites pilot arc too soon after providing the “Contactor On” signal	Process controller must allow at least 300MS to lapse between the application of the “Contactor On” signal and the ignition of the pilot arc. Fix process controller logic and replace diodes.
	Faulty negative (Electrode) output cable shorting to earth ground.	Repair cable
	Shorted freewheeling diode.	Replace shorted freewheeling diode and F1-F2
	One or more shorted diode rectifiers (D13-D18) on “POS Plate”.	Replace all diode rectifiers on the “POS Plate”.
	One or more shorted diode rectifiers (D7-D12) on “NEG Plate”.	Replace all diode rectifiers on the “NEG Plate”.

10.3.8 Intermittent, interrupted or partial operation

Problem	Possible cause	Action
Works OK at 275A or less - Over current right side when cutting over 275A. LED 6 on control board illuminated.	Loose or unplugged connector at left PWM / Drive PCB (PCB2)	Secure connector
	Faulty left PWM / Drive PCB	Replace right PWM / Drive PCB P/N0558038324
	Check voltage between P5-1 and P5-2 at the left PWM / Drive PCB (PCB2). Should be 20V AC. Between P5-1 and P5-3 should be 40V AC. If not the control transformer (T5) is faulty.	Replace control transformer T5

Problem	Possible cause	Action
Works OK at 275A or less - Over current left side when cutting over 275A. LED 9 on control board illuminated.	Loose or unplugged connector at Right PWM / Drive PCB (PCB3)	Secure connector
	Faulty Right PWM / Drive PCB	Replace right PWM / Drive PCB P/N 0558038324
	Check voltage between P5-1 and P5-2 at the right PWM / Drive PCB (PCB3). Should be 20V AC. Between P5-1 and P5-3 should be 40V AC. If not the control transformer (T7) is faulty.	Replace control transformer T7

CAUTION

NEVER attempt to power-up or operate the power source with any gate/admitter IGBT plug disconnected from it´s PWM/gate drive board. Attempting to operate the power source with any open (unplugged) IGBT gate/emitter connector may damage the IGBT and the plasma cutting torch.

Problem	Possible cause	Action
Power supply turns off prematurely in the middle of the cut.	“Contactor On” signal is removed from unit.	Power source is OK. Trouble shoot process controller.
	Momentary loss of primary input power.	Restore and maintain input voltage within ±10% of nominal.
	Faulty condition, indicated by illumination of the fault lamp.	Remove control PCB (PCB1) access panel to determine the fault causing the shutdown. Refer to fault light illumination section.
	Faulty condition, indicated by the illumination of the power reset fault lamp.	Remove control PCB (PCB1) access panel to determine the fault causing the shutdown. Refer to fault light illumination section.
	Current setting too low.	Increase current setting
	Remote current signal removed during cut.	Fix remote current signal

Problem	Possible cause	Action
Output current is unstable and drifts above or below the setting.	Place the PANEL / REMOTE switch in the “PANEL” position. Adjust current control pot. If current no longer drifts, the remote current control signal is faulty.	Fix the remote current control signal to operate the PANEL / REMOTE switch in the “PANEL” position.
	Select “PANEL” on the PANEL / REMOTE switch and adjust the current control pot. The current still drifts, measure the current reference signal at TB1-4 (+) and TB1-5 (-). If the signal drifts, the current control pot is faulty. If the signal does not drift, the Control PCB (PCB1) is faulty.	Replace the current control pot. Replace the control PCB (PCB1) P/N 0558038312

10.4 Testing and replacing components

NOTICE

- Replace a PC board only when a problem is isolated to that board.
- Always disconnect power before removing or installing a PC board.
- Do not grasp or pull on board components.
- Always place a removed board on a static free surface.
- If a PC board is found to be a problem, check with your ESAB distributor for a replacement. Provide the distributor with the part number of the board as well as the serial number of the power source.
- Do not attempt to repair the board yourself. Warranty will be voided if repaired by the customer or an unauthorized repair shop.

Power semiconductor components

Categories of power semiconductors include;

- Power Rectifiers
- Modules containing the free wheeling diodes and IGBTs

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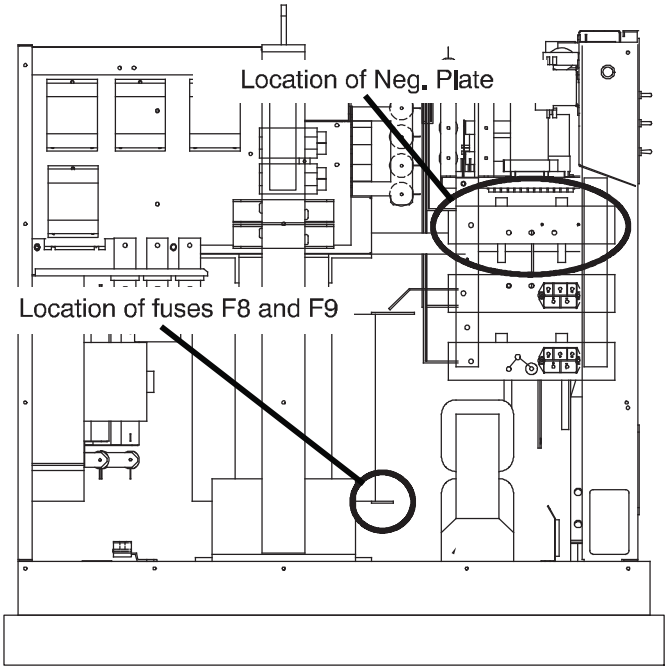
10.4.1 Power rectifiers and blocking diodes

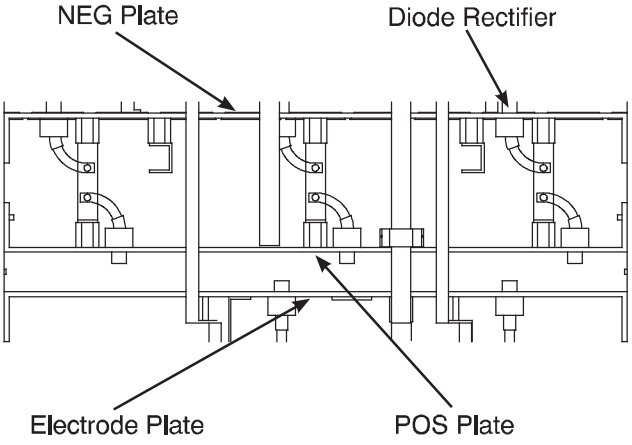
Power rectifiers, procedure to access behind the front panel

1. Remove top cover and side panels
2. Locate and disconnect plug in rear of ammeter (attached tone red and one black wire)
3. Remove pilot arc switch
4. Disconnect voltmeter
5. Disconnect orange and yellow wires from relay K4.
6. Remove two bolts holding the left side of the front panel to the base.
7. Remove three bolts holding across the center base of the front panel. These are accessed from underneath.
8. Remove one of the bolts holding the right side of the front panel to the base. Loosen the second bolt. Of these two bolts, remove the bolt on the left and loosen the bolt on the right.
9. Swing the front panel out to gain access to power rectifier components.

Troubleshooting procedures – negative plate

1. Visually inspect fuses F8 and F9. Replace if they show signs of being blown or melted. Inspect diodes. If ruptured or burned, replace all diodes on the NEG Plate. If diodes appear to be OK, proceed to next step.

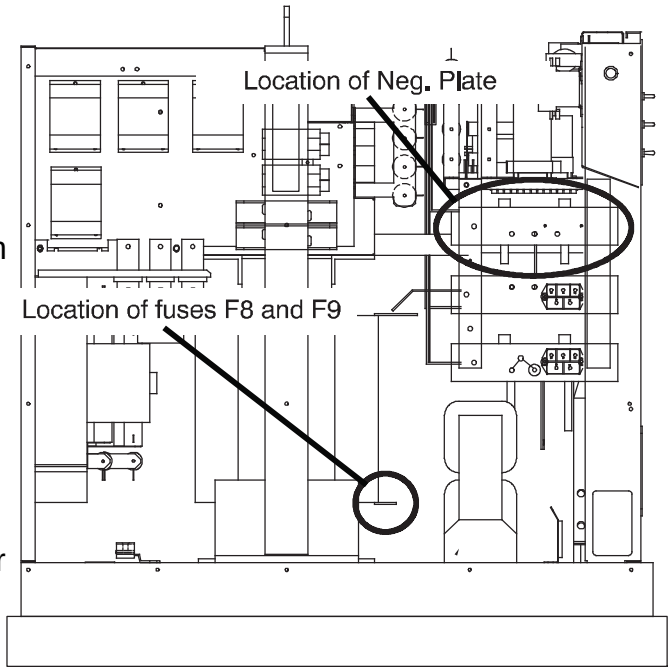




1. Check ohms between NEG Plate and BR “A” Bus. A reading of 2 ohms or less indicates one or more shorted diodes. Replace all Diodes on NEG Plate.
2. If fuses F8 and/or F9 were open in the first step, make two more ohmmeter readings.
   a. Measure resistance between the NEG Plate and BR “B” bus.
   b. Measure between NEG Plate and BR “C” bus.

If resistance is 2 ohms or less in either case, replace all the diodes on the NEG Plate.

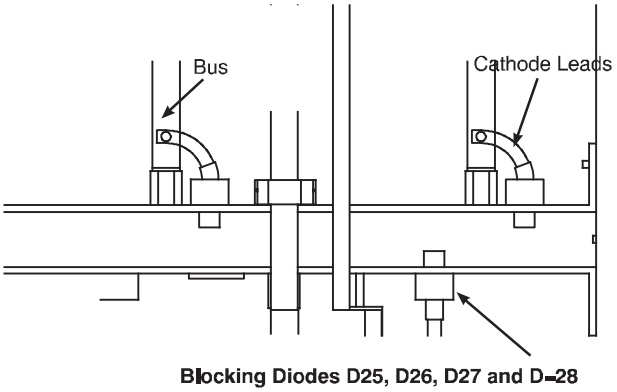
Troubleshooting POS plate



1. Check ohms between POS Plate and BR “A” Bus. A reading of 2 ohms or less indicates one or more shorted diodes. Replace all diodes on POS Plate.
2. If fuses F8 and/or F9 were open in the first step, make two more ohmmeter readings.
   a. Measure resistance between the POS Plate and BR “B” bus.
   b. B. Measure between POS Plate and BR “C” bus.

If resistance is 2 ohms or less in either case, replace all the diodes on the POS Plate.

Troubleshooting electrode plate



Blocking Diodes D25, D26, D27 and D-28

1. Visually inspect for ruptured or burned diodes. Replace only those damaged.
2. Check resistance between Electrode Plate and the parallel pig tails (cathode leads) of D25 and D26. If reading is 2 ohms or less, disconnect leads from bus and check each diode. Replace only shorted diodes.

Repeat procedure for D27 and D28. Replace only shorted diodes.

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10.4.2 IGBT / freewheeling diode (FWD) replacement

! CAUTION	**The emitter and the gate of each affected IGBT must be jumpered together to prevent electrostatic damage. Each power source is supplied with six jumper plugs that mate to the IGBT gate/ emitter plug.**

! CAUTION	**Electrostatic discharge hazard** **Electrostatic discharge may damage these components.** **- Damage is accumulative and may only appear as shortened component life and not as a catastrophic failure.** **- Wear a protective ground strap when handling to prevent damage to PCB components.** **- Always place a PC board in a static-free bag when not installed.**

Removal:

1. Insure that input power is removed by two actions such as a disconnect switch and removal of fuses. Tag and lock any disconnect switch to prevent accidental activation.
2. Remove the top panel to gain access to the modules located in the top rear of the power source.
3. Clean the compartment containing the modules with dry, oil-free compressed air.
4. Unplug the gate drive leads connecting the IGBT Gates to the PWM/Gate Drive PC Board. In order to prevent damage to the IGBT, install jumper plugs into the IGBT Gate Drive Connector. See Caution below. Jumper plugs are supplied with each power source.
5. Remove the copper bus plates and bars connected to the IGBT's. Save the M6 hardware connecting the bus structure to the module terminals. You may need to re-use the hardware. Longer hardware can damage the module by contacting the circuitry directly below the terminals.
6. Remove the M6 hardware mounting the modules to the heat sink. Save the hardware because you may need to re-use it. Hardware too short can strip the threads in the Aluminum heat sink. Hardware too long can hit the bottom of the holes causing the modules to have insufficient thermal contact to the heat sink. Hardware too long or too short can cause module damage due to over heating.

! CAUTION	**The module gate plugs must be plugged into the PWM/gate drive PC board whenever the power source is in operation. Failure to plug them in will result in damage to the module and possible damage to the torch.**

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Replacement:

1. Thoroughly clean any thermal compound from the heat sink and the modules. Any foreign material trapped between the module and heat sink, other than an appropriate thermal interface, can cause module damage due to over heating
2. Inspect the thermal (interface) pad, P/N 951833, for damage. A crease or deformity can prevent the module from seating properly, impeding the heat transfer from the module to the heat sink. The result can be module damage due to over heating.

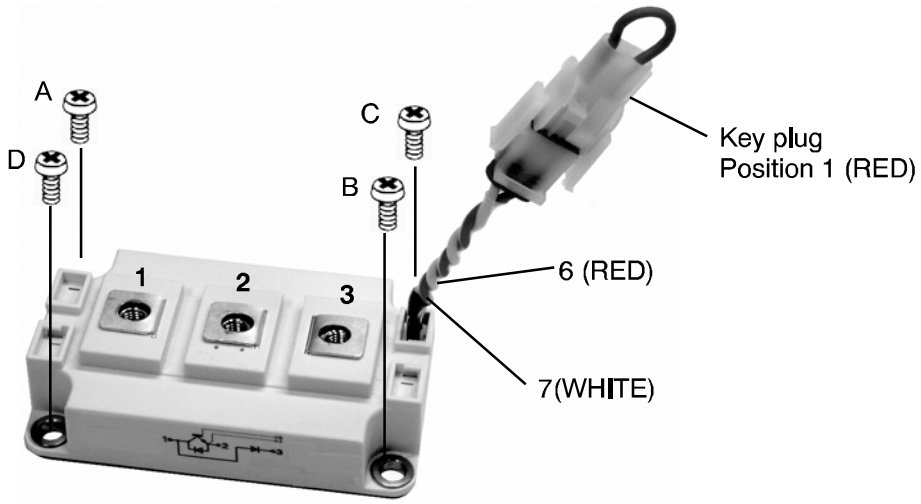
   If a thermal pad is not available, a heat sink compound such as Dow Corning® 340 Heat Sink Compound may be used. It's a good idea to mount all paralleled modules located on the same heat sink using the same thermal interface. Different interfaces can cause the modules to operate at different temperatures resulting in un-equal current sharing. The imbalance can shorten module life.
3. Place a thermal pad, and an IGBT module on the heat sink. Carefully align the holes in the thermal pad with the heatsink and module holes. If heat sink compound is used in place of a thermal pad, apply a thin coat of even thickness to the metal bottom of the module. A thickness of 0.002" – 0.003" (0.050mm – 0.075mm) is optimum. Too much compound impedes heat transfer from the module to the heat sink resulting in short module life due to over heating.
4. Insert the four M6 mounting bolts, but do not tighten. Leave them loose a few turns. Be certain that the threads from the mounting bolts do not bend the edges of the thermal pad clearance holes. A bent thermal pad can prevent the module from seating properly, impeding the heat transfer from the module to the heat sink. The result can be module damage due to over heating.
5. Partially tighten the four mounting bolts a little more than finger tight in the order: A-B-C-D. See figure below.
6. Fully tighten, in the same order above, to a torque of 35 – 44 in-lbs (4.0 – 5.0 N-M). See figure below.
7. Install the bus plates and bus bars. Be careful that the sheets of insulation separating the bus plates are still in their original positions. It's a good idea to tighten the mounting hardware only after getting it all started. Torque the M6 module terminal hardware to 35 – 44 in-lbs (4.0 – 5.0 N-M).
8. Remove the jumper plugs from the module gate lead plugs, and plug into the appropriate plugs from the PWM/gate drive PC board. See Caution below.
9. Replace the top panel.

CAUTION

The module gate plugs must be plugged into the PWM/gate drive PC board whenever the power source is in operation. Failure to plug them in will result in damage to the module and possible damage to the torch.

Four-Point Mounting Type:

- Partial tightening - A-B-C-D
- Fully tightening - A-B-C-D



1	IBGT Collector, Free Wheeling Diode (FWD) Anode	2	IGBT Emitter	3	FWD Cathode
6	IGBT Gate	7	IGBT Emitter		

10.4.3 Power shunt installation

CAUTION

Instability or oscillation in cutting current can be caused by improper dressing of shunt pick-up leads.
Poor torch consumable life will be the result.

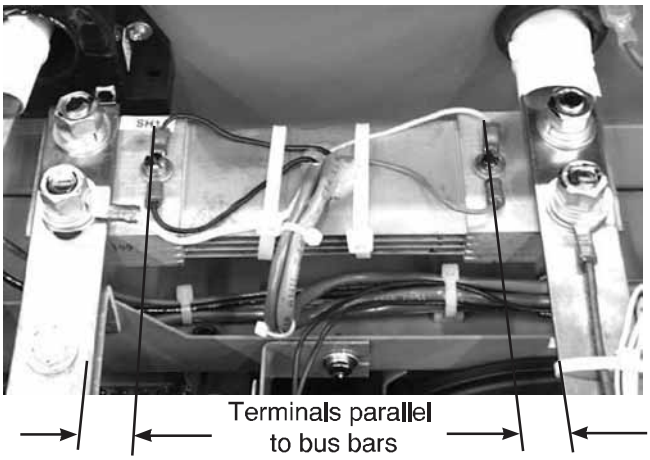
There are two cables that attach to the shunt pick-up points:

- a two conductor cable drives the ammeter
- a three conductor which provides the current feedback signal to PCB1 (control PCB).

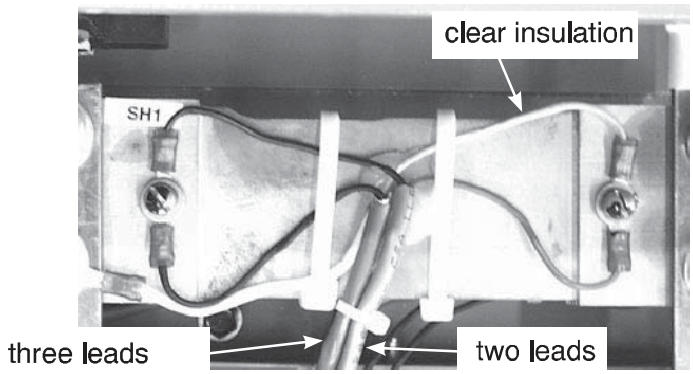
Dressing of the 2 conductor cable is not critical.

The following is the dressing procedure for the 3 conductor cable.

- The breakout point should be physically at the middle of the shunt. The breakout point is the place where the conductors exit from the outer insulation jacket.
- The black and clear insulated wires must be kept next to the shunt and under the cable ties.
- The wire terminals for the black and clear insulated wires should be oriented in parallel with bus bars as shown.



- It is important to have the barrels of the black and clear insulated wires, from the three lead cable, be pointing in opposite directions.
- The third wire attaches to the bus bar on the left with the shunt mounting hardware. Orientation of this wire is not critical.



10.4.4 Procedure for verifying calibration of digital meters.

Voltmeter

1. Connect a digital meter known to be calibrated to the positive and negative output bus bars.
2. Compare the power source voltmeter reading to the calibrated meter reading. Readings should match within ±0.75%.

Ammeter

1. External to the power source, connect a precision shunt in series with the work lead(s). The best shunt is one with a value of 100 micro-ohms (50mV / 500A or 100mV / 1000A) and a calibrated tolerance of 0.25%.
2. Use a calibrated 4 ½ digit meter to measure the output of the shunt. The amperage indicated with the external shunt and meter should match power source ammeter to within 0.75%.

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10.5 Control circuit interface using J1and J6 connectors

Interface to the EPP-450 control circuitry is made with connectors J1 and J6 on the front panel. J1 has 24 conductors and J6 has 8.

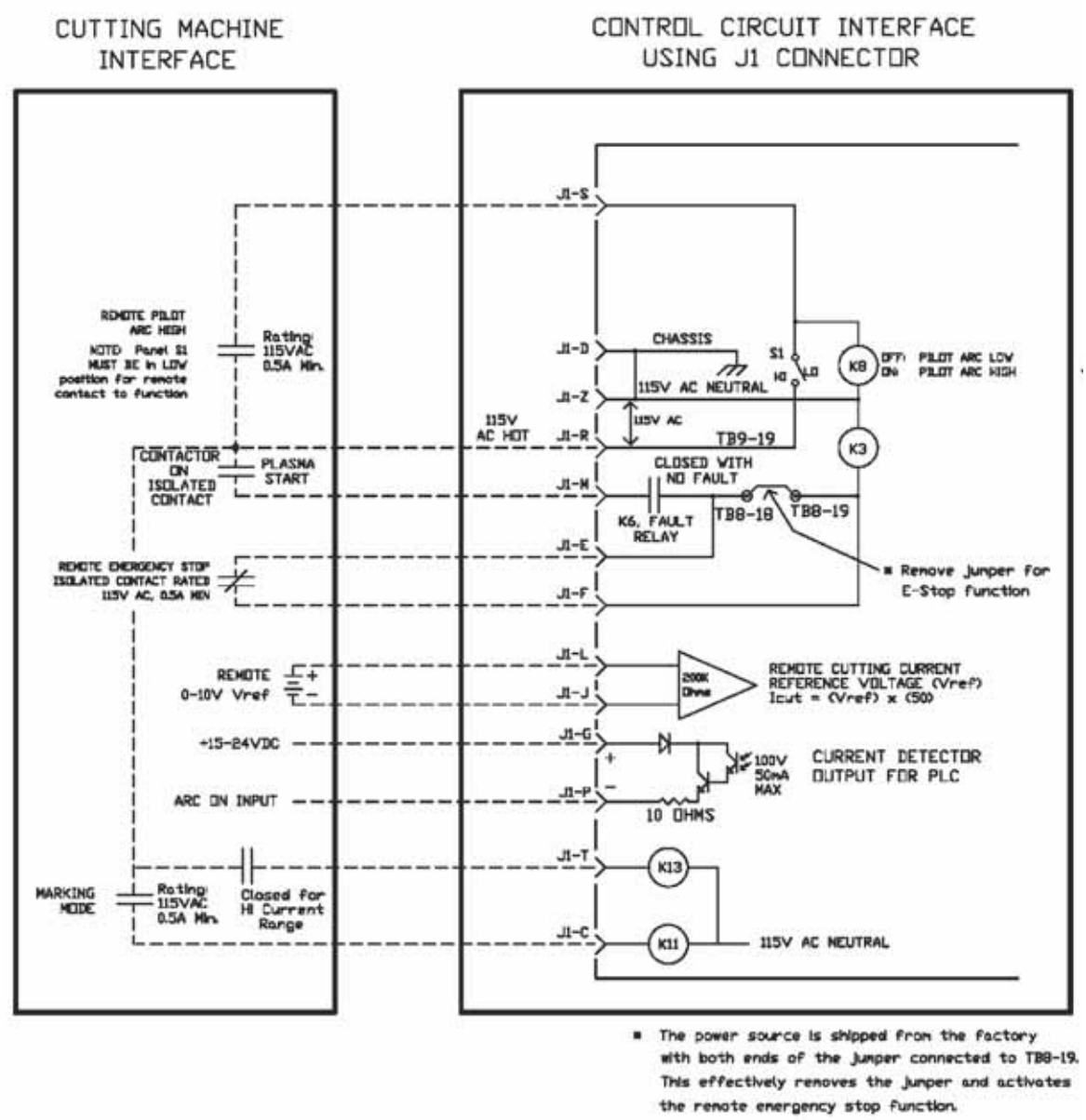
J1-P and J1-G provide access to the galvanically isolated transistor output signal indicating an “Arc On” condition. See Subsection 10.8 Arc Current Detector Circuits. J1-L and J1-J are the inputs for the remote Voltage Reference Signal that commands the EPP-450 output current Subsection 10.9 Current Control Pot & Remote Vref. J1-R and J1-Z supply 115V AC for remote controls. See Subsection 10.6., Auxiliary Main Contactor (K3) & Solid State Contactor Circuits and Subsection 10.10, Pilot Arc Hi/lo & Cut/mark Circuits.

J1-E and J1-F are the input connections for the Emergency Stop function. For Emergency Stop to operate, the Jumper between TB8-18 and TB8-19 must be removed.

J1-S is the input to K8 that parallels S1 switch contact. When 115V AC from J1-R is fed into J1-S, K8 activates placing the Pilot Arc in High.

J6 Cut / Mark selection: The power source defaults to Cutting mode when there is no signal fed into J1-C. When 115V AC from J1-R is fed into J1-C, K11 is activated placing the EPP-450 in the Marking mode. For more details concerning the operation of K11 and the Cut / Mark modes, refer to Subsection 10.10, High / Low Cut Current Modes and Mark Mode.

J6 connects to the water cooler. J6-A and J6-B are 115VAC hot and neutral respectively. This 115VAC activates the contactor for the pump. J6-C and J6-D connect to the flow switch. The flow switch is closed when coolant is flowing. J6-E and J6-H connect to the coolant level switch. The switch is closed when the coolant reservoir contains sufficient coolant and it is open when the reservoir is low.

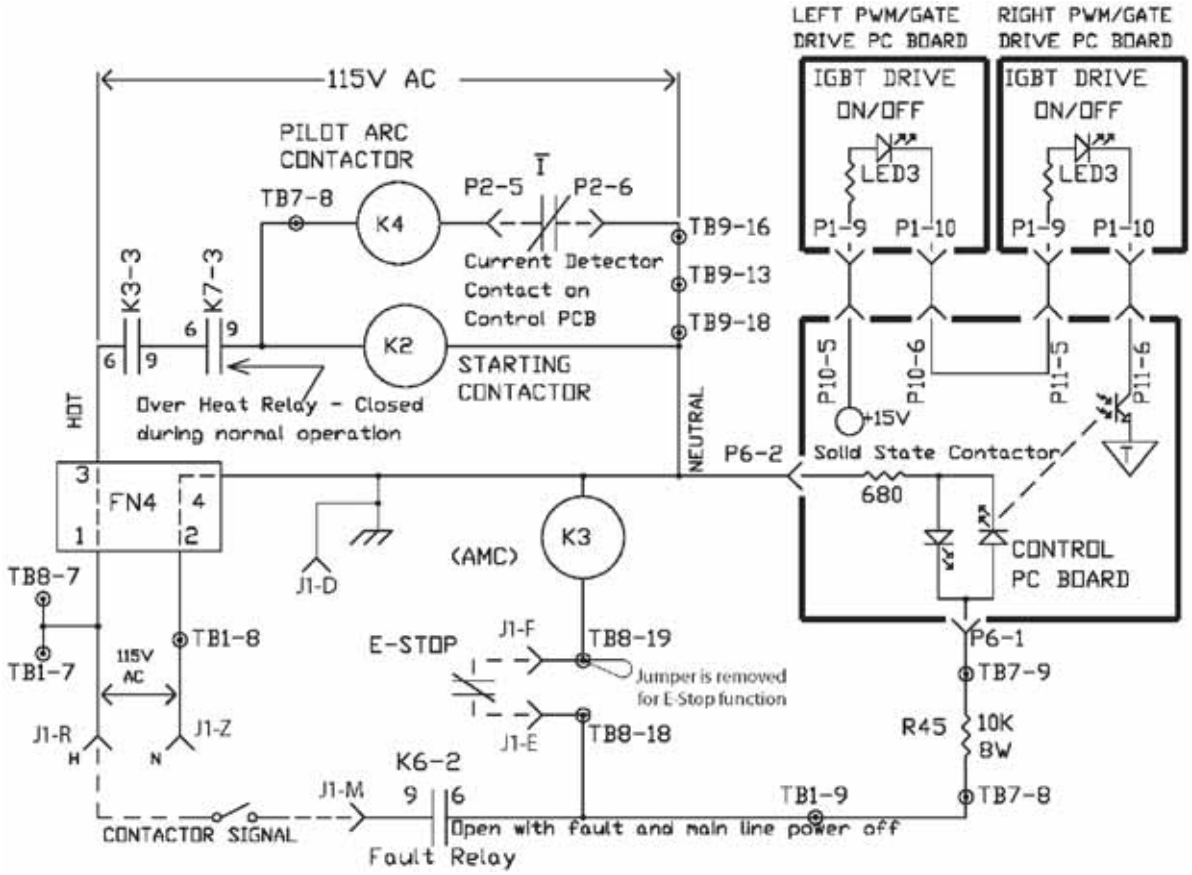

CUTTING MACHINE INTERFACE
CONTROL CIRCUIT INTERFACE USING J1 CONNECTOR
REMOTE PILOT ARC HIGH
NOTE: Panel S1 MUST BE in LOW position for remote contact to function
Rating: 115VAC 0.5A Min.
CONTACTOR ON ISOLATED CONTACT
PLASMA START
REMOTE EMERGENCY STOP ISOLATED CONTACT RATED 115V AC, 0.5A MIN
REMOTE 0-10V Vref
+15-24VDC
ARC ON INPUT
MARKING MODE
Rating: 115VAC 0.5A Min.
Closed for HI Current Range
J1-S
J1-D
J1-Z
J1-R
J1-M
J1-E
J1-F
J1-L
J1-J
J1-G
J1-P
J1-T
J1-C
CHASSIS
115V AC NEUTRAL
115V AC
115V AC HOT
TB9-19
S1
HI
LO
K8
OFF: PILOT ARC LOW
ON: PILOT ARC HIGH
K3
CLOSED WITH NO FAULT
K6, FAULT RELAY
TB8-18
TB8-19
* Remove jumper for E-Stop function
200K Ohms
REMOTE CUTTING CURRENT REFERENCE VOLTAGE (Vref)
Icut = (Vref) x (50)
100V 50mA MAX
CURRENT DETECTOR OUTPUT FOR PLC
10 OHMS
K13
K11
115V AC NEUTRAL
* The power source is shipped from the factory with both ends of the jumper connected to TB8-19. This effectively removes the jumper and activates the remote energency stop function.

US

10.6 Auxiliary main contact (K3) and solid state contactor circuit

K3, activated by supplying a Contactor Signal, initiate and controls the operation of K2 (Starting Contactor) and K4 (Pilot Arc Contactor). K3 is called the Auxiliary Main Contactors because it must be activated before the Main Contactor (K1) power-up sequence can occur. The Contactor Signal is supplied through a remote contact connecting 115VAC from J1-R to J1-M. If K6-2 is closed (no fault)and the Emergency Stop loop is closed, K3 will activate. The closing of K3-3 activates K2, the Starting Contactor, and K4, the Pilot Arc Contactor, provided the power source is not over heated. See Subsection 6.7, Main Contactor (K1A, K1B and K1C) Activation Circuit for more information on the operation of K2. K4 is turned off when the Current Detector senses arc current and opens the contact connecting P2-5 to P2-6 on the Control PC Board.

In addition to operating K3, the Contactor Signal also activates the Solid State Contactor. The Solid State Contactor is a logic and interlock circuit permitting the IGBT's to conduct whenever the remote Contactor Signal is present. The 115V AC Contactor Signal is fed to TB1-9, TB7-8, and resistors R45 and R45-A. These resistors reduce the 115V to approximately 16V AC fed into the Control PC Board at P6-1 and P6-2. The Control PC Board sends a signal to both the Left and Right PWM / Gate Drive PC Boards mounted directly on the IGBT´s. Illumination of LED3 on both of the PWM / Gate Drive PC Boards is indication that the Solid State Contactor is functioning.



US

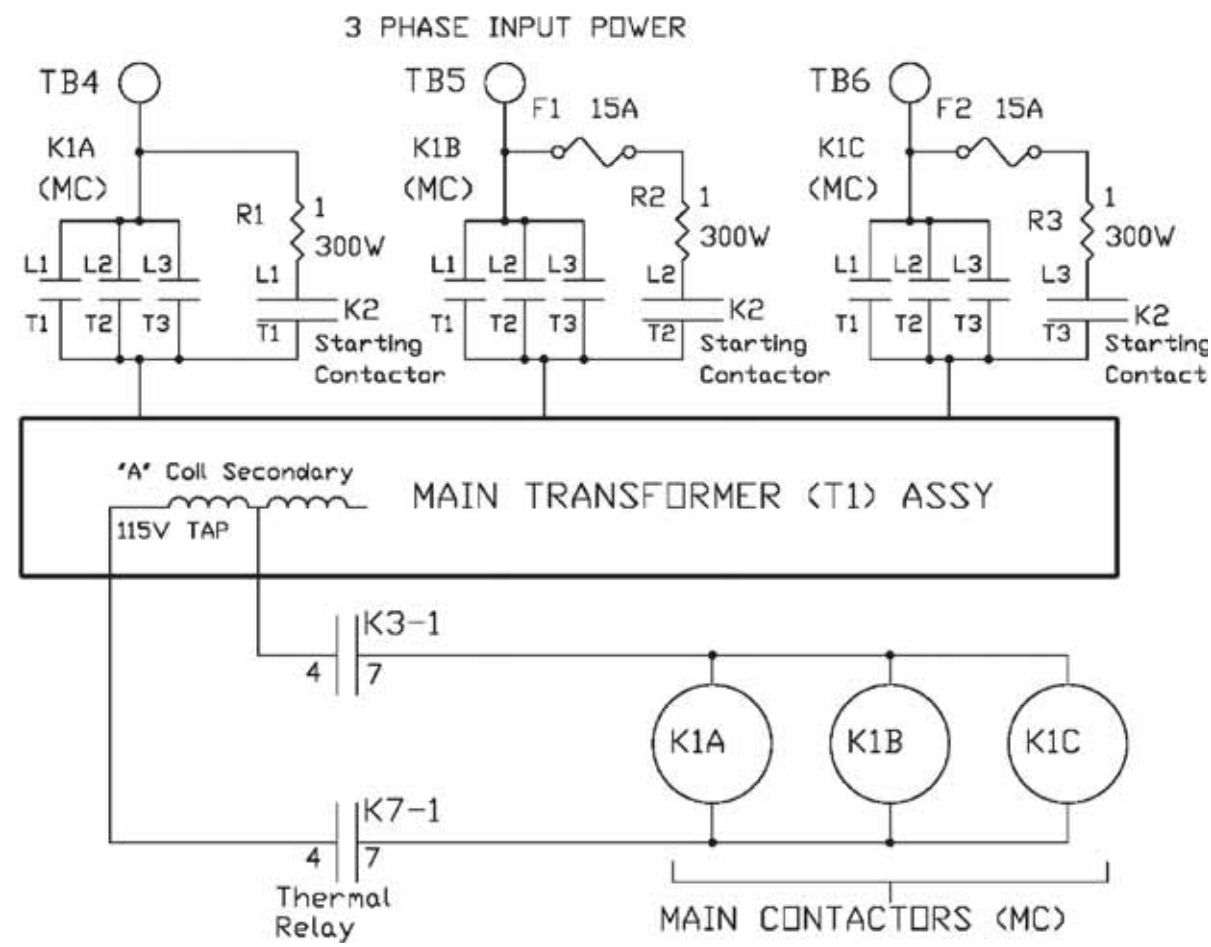
10.7 Main contactor (K1A, K1B and K1C) activation circuit

A power-up sequence takes place before the Main Contactor (K1) activates. K1 is actually three separate contactors – one for each primary input phase. Thus, K1A, K1B and K1C switch phases A, B, and C respectively to the Main Transformer, T1.

The power-up sequence begins with a remote Contactor Signal activating K3. Refer to the description entitled, “Auxiliary Main Contactor (K3) & Solid State Contactor Circuits” for more information. K3 activates K2 closing the three contacts of K2. K2 bypasses K1 contacts providing primary input power to the Main Transformer, T1. This current is limited by three one Ohm resistors, R1, R2, and R3. The resistors eliminate the high surge currents typical of the turn-on inrush transients associated with large transformers. The high current surge of charging the Bus Capacitor Bank is also eliminated by initially powering the Main Transformer through K2 and the resistors.

The discharged Bus Capacitor Bank initially prevents the output of the Main transformer from reaching its normal value. As the Bus Capacitor Bank charges, the Main Transformer output voltage rises and becomes high enough for K1A, K1B, and K1C to close. Once the K1’s are closed, the contacts of the Starting Contactor, K2, are bypassed, and full primary line power is supplied to the Main Transformer.

Because the starting sequence takes time, it is important at least 300 mS lapse between applying the Contactor Signal and applying load to the power source. Applying load too soon will prevent K1 from closing, and fuses F1 and F2 will open.



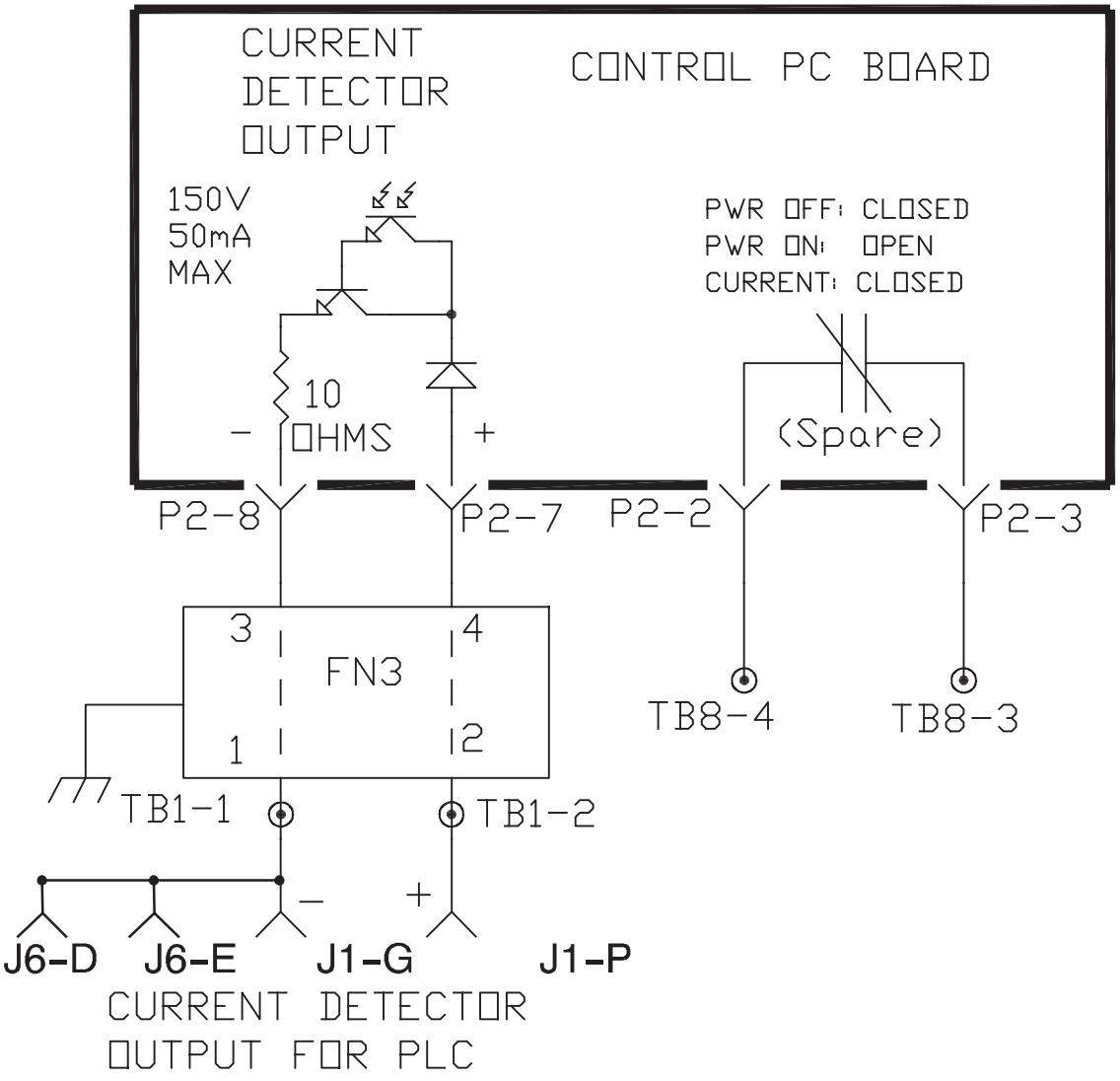
US

10.8 Arc current detector circuits

There are three arc current detector circuits in the EPP-450. One is used internally to control the pilot arc contactor, K4. The other two are available for remote use.

A galvanically isolated transistor Current Detector Output is accessible at J1-G (-) and J1-P (+). J1 is the 24 conductor connector on the EPP-450 front panel. The transistor is best suited for switching small relays or low current logic signals like those utilized by PLC's (Programmable Logic Controllers). The transistor can withstand a maximum peak voltage of 150V. It can switch a maximum of 50 mA. The transistor turns on whenever the arc current through the Work Lead exceeds 5A. Pilot arcs not establishing main arcs will not turn on the transistor.

A second current detector output is available at TB8-3 and TB8-4. This output is supplied by an isolated relay contact rated for 150V, 3 Amperes. This contact is closed when the primary input power to the EPP-450 is off. It opens whenever primary power is supplied to the power source, and it closes when main arc current is established. Like the transistor output, the relay contact closes whenever the arc current through the Work Lead exceeds 3A. Pilot arcs not establishing main arcs will not close the contact.



US

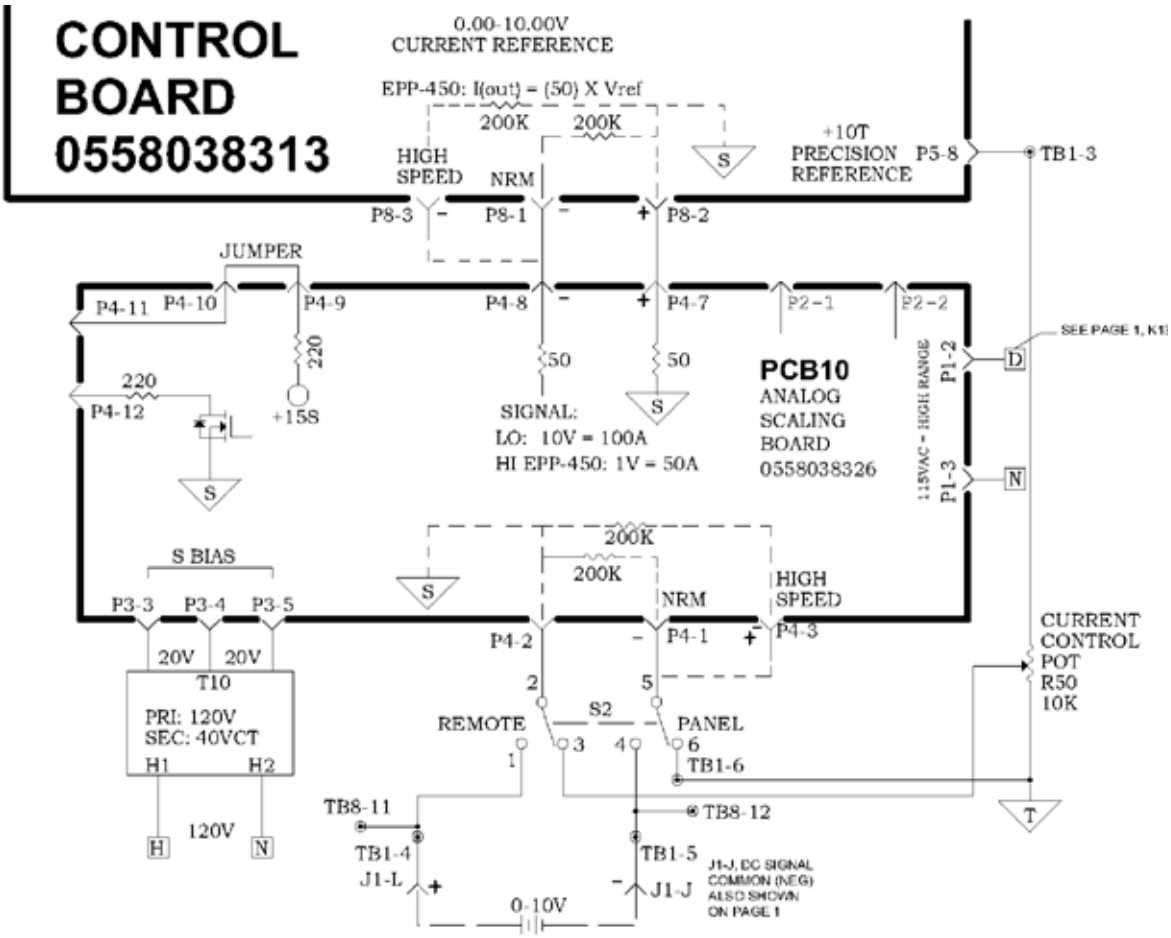
10.9 Current control pot and remote V_{ref}

A Reference Voltage, V_{REF}, is used to command the output current of the EPP-450. V_{REF} is a DC voltage that can come from either the Current Control Potentiometer on the front panel or from a remote source. In the “Panel” position, S2, the Panel / Remote switch selects the Current Control Potentiometer. In the “Remote” position, the Panel/Remote switch selects the V_{REF} fed into J1-L (+) and J1-J (-). The EPP-450 Output Current, I_{OUT}, will follow V_{REF} with the following relationship:

I_{OUT} = (50) x (V_{REF}) in the high output current mode and I_{OUT} = (10) x (V_{REF}) in the low output current mode.

PCB10 is the analog signal scaling board. If 115VAC is fed into P1-2 and P1-3 the output current range is in the high mode used for cutting from 50 to 450A. With the 115VAC absent, the output current range is in the low mode used for marking between 10 and 100A and cutting between 35 and 100A.

The Control PC Board contains two inputs for V_{REF}: High Speed; and Normal. When the negative of the V_{REF} signal is fed into the High Speed input (P8-3), the EPP-450 will respond to a change in V_{REF} within 10 mS. When the negative of the V_{REF} signal is fed into the Low Speed input (P8-1), the EPP-450 will respond to a change in V_{REF} within 50 mS. The slower response of the “Normal” input helps filter electrical noise sometimes encountered in industrial environments.

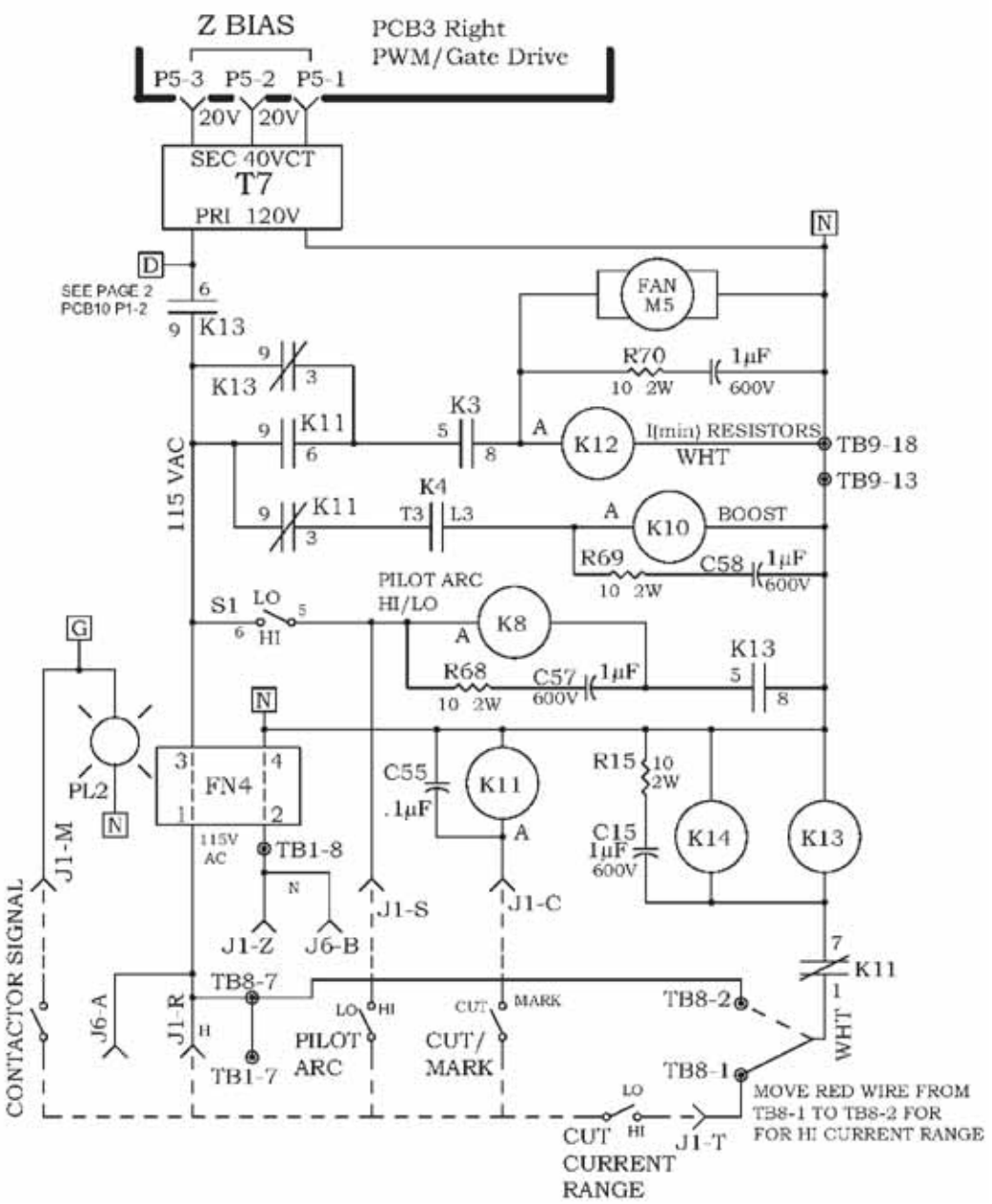


US

10.10 Pilot arc HI/LO and Cut/Mark circuits

A remote contact connecting 115V AC from J1-F to J1-L places the Pilot Arc in High by operating K8. Note, that for this function to operate, the Pilot Arc Hi/Lo switch on the front panel must be in the “LO” position.

The EPP-450 is placed in the Marking mode when a remote contact connecting 115V AC from J1-R to J1-C operates K11. In the Marking mode, a normally closed contact on K11 opens turning off K10. When K10 turns off, the Boost supply is disconnected lowering the normal Cutting Mode 425V DC Open Circuit Voltage to 360VDC for Marking. A normally open contact on K11 activates K12. K12 connects the I (min) resistors necessary for stabilizing the low currents required for marking. In the Cutting mode, the minimum stable output current is 50A in the high current range, 35A in the low current range and 10A in the marking mode. In the marking mode, the normally closed contact K11-1 and K11-7 opens. This deactivates K13 and K14 placing the power source in the low current range.



10.11 Low current range

The EPP-450 operates in either LOW or HIGH current output ranges. The LOW range is used for marking from 10 to 100 amperes and cutting from 35 to 100 amperes. The HIGH range is used for cutting from 50 to 450 amperes.

In the HIGH range, both the left and right power sources are used. Each side contributes 50% of the total output current. The left side acts as a master power source by synchronizing the switching of the right side to its own switching frequency of 10 KHz.

In the LOW range, only the left power source is used. The normally open contact, K13-6 / K13-9 prevents T7 from supplying bias supply power to PCB-3, the right PWM / IGBT Gate Drive PC Board. This disables the right side.

The same K13 contact (square labeled “D” on the schematic diagrams) places the EPP-450 in the HIGH current mode. In addition to providing bias power to PCB-3 in the HIGH current mode, this 115 VAC is fed into PCB-10 P1-2.

PCB-10 performs two functions. With no input on PCB-10 P1-2, PCB-10 scales the 0 to 10 VDC current reference signal for 0 to 100 amperes (LOW range). In the LOW range, PCB-10 P4-11 / P4-12 provides a signal to PCB-2 P4-1 / P4-2. This signal commands PCB-2, the left (master) PWM / IGBT Gate Drive PC Board to change the switching frequency from 10 KHz to 25 KHz.

The higher switching frequency results in the more power dissipation by the heat sinks on PCB-3. Therefore, in the LOW current mode, a small fan, M5, turns on to provide additional cooling. M5 does not operate in the HIGH current mode.

11 REPLACEMENT PARTS

11.1 General

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

11.2 Ordering

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

Replacement parts may be ordered from your ESAB Distributor.

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

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

EPP-450					
	EPP-450 380V 50/60HZ 380V TAPS	EPP-450 380V 50/60HZ 400V TAPS	EPP-450 400V 50/60HZ	EPP-450 460V 60HZ	EPP-450 575V 60HZ
Part Number	0558007730			0558007731	0558007732

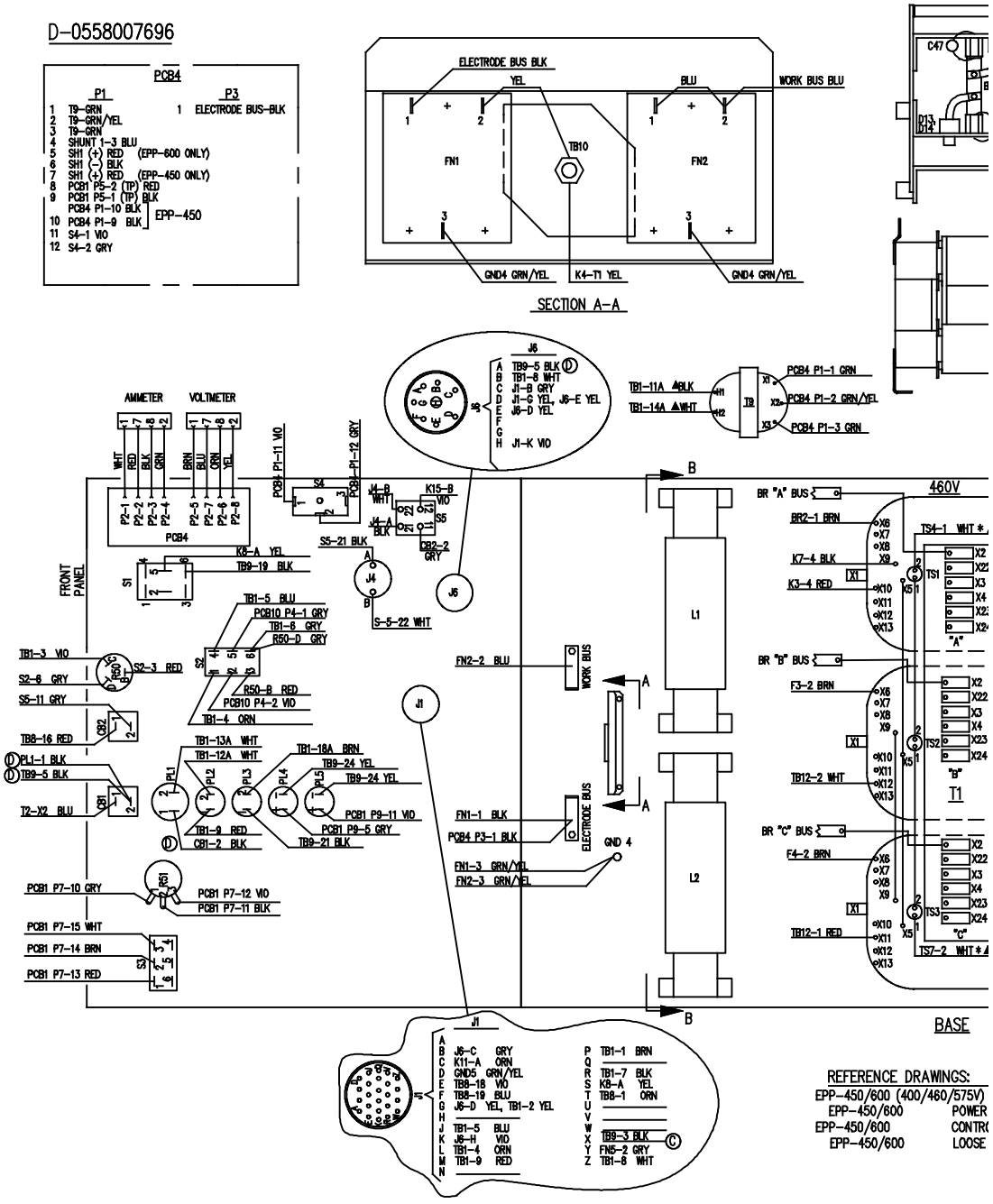
US

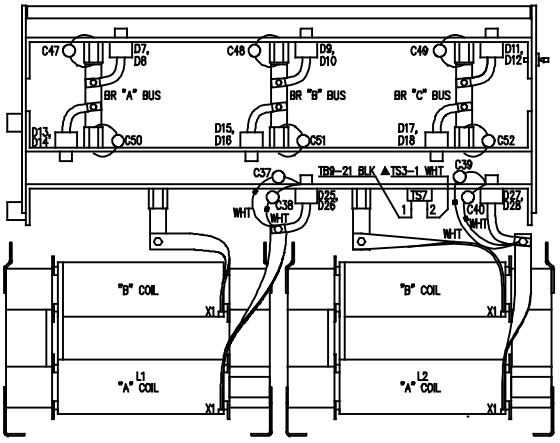
12 REVISION HISTORY

Original release - 12/2007

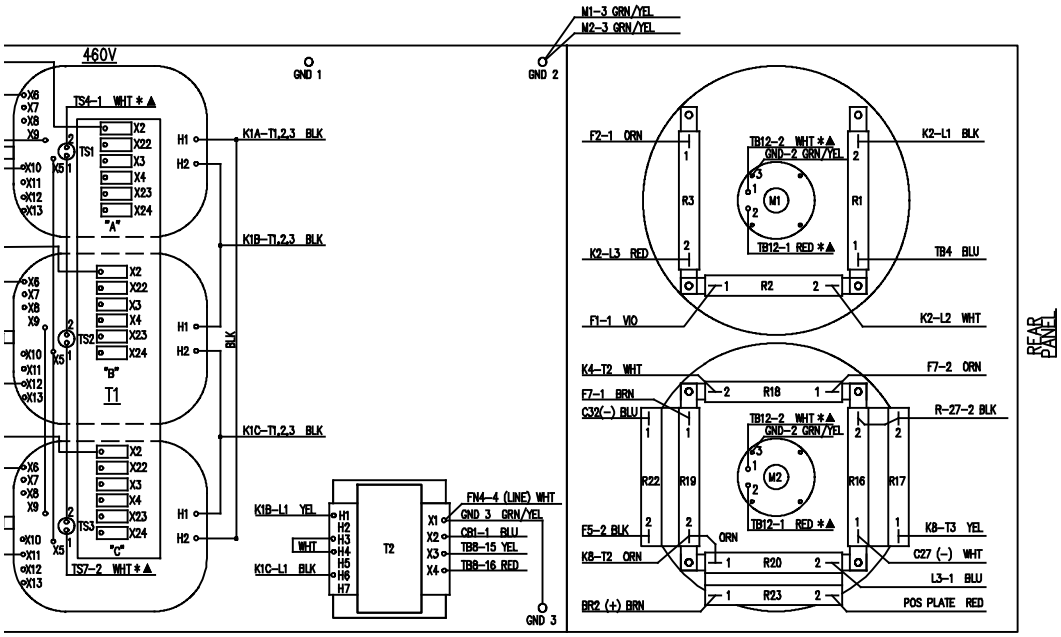
1. 06/2010
   Changed serial number.
   Separated the replacement parts list from instruction manual.
2. 07/2010
   Included the replacement parts list
3. 07/2011
   Updated the diagram
   Added copyright

EPP-450, 460V, CSA





SECTION B-B



BASE

RENCE DRAWINGS:

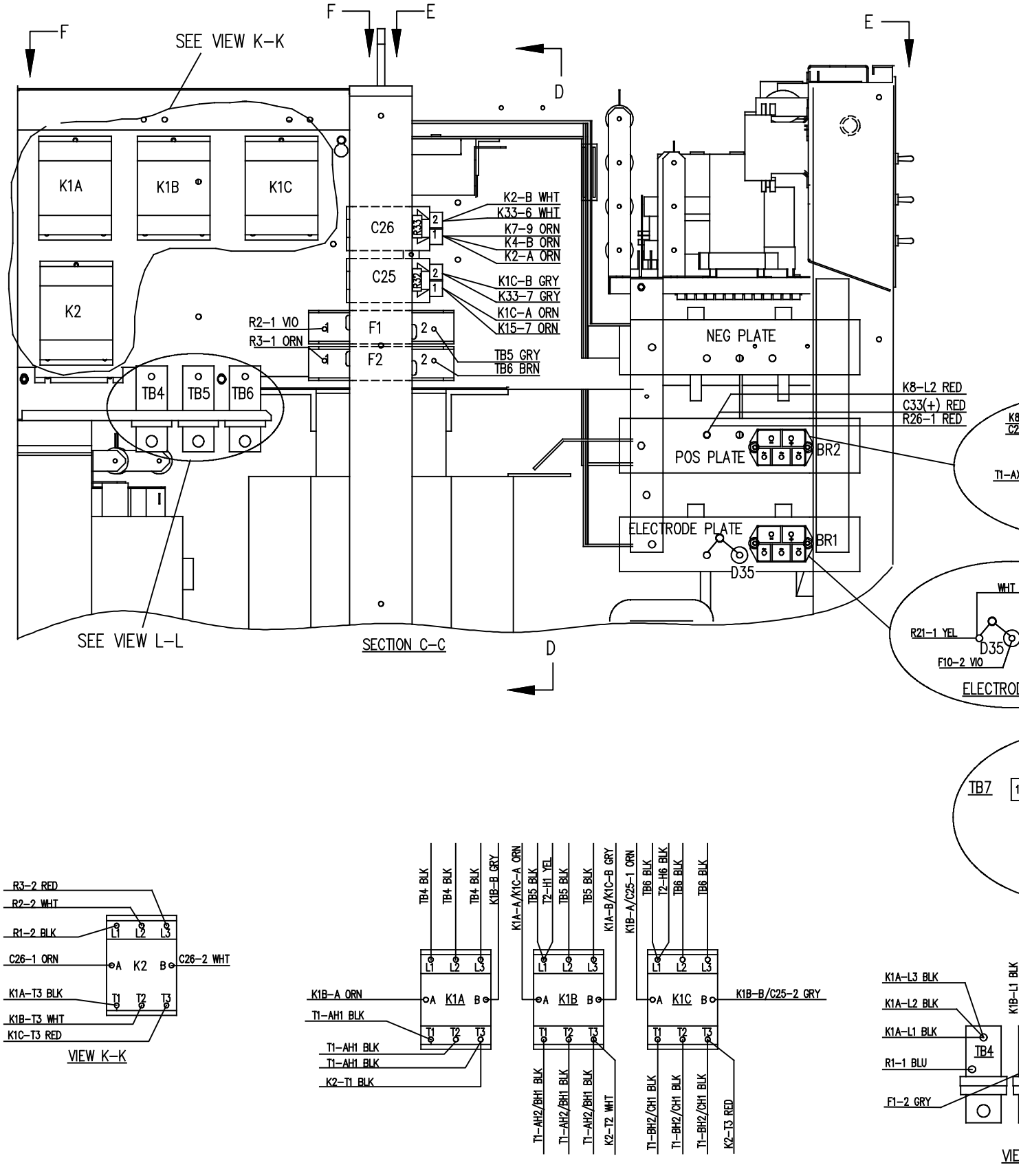
D/600 (400/460/575V) SCHEM DIAG: 0558007695
450/600 POWER WIRE KIT: 0558007699
D/600 CONTROL WIRE KIT: 0558007700
450/600 LOOSE WIRE KIT: 0558007701

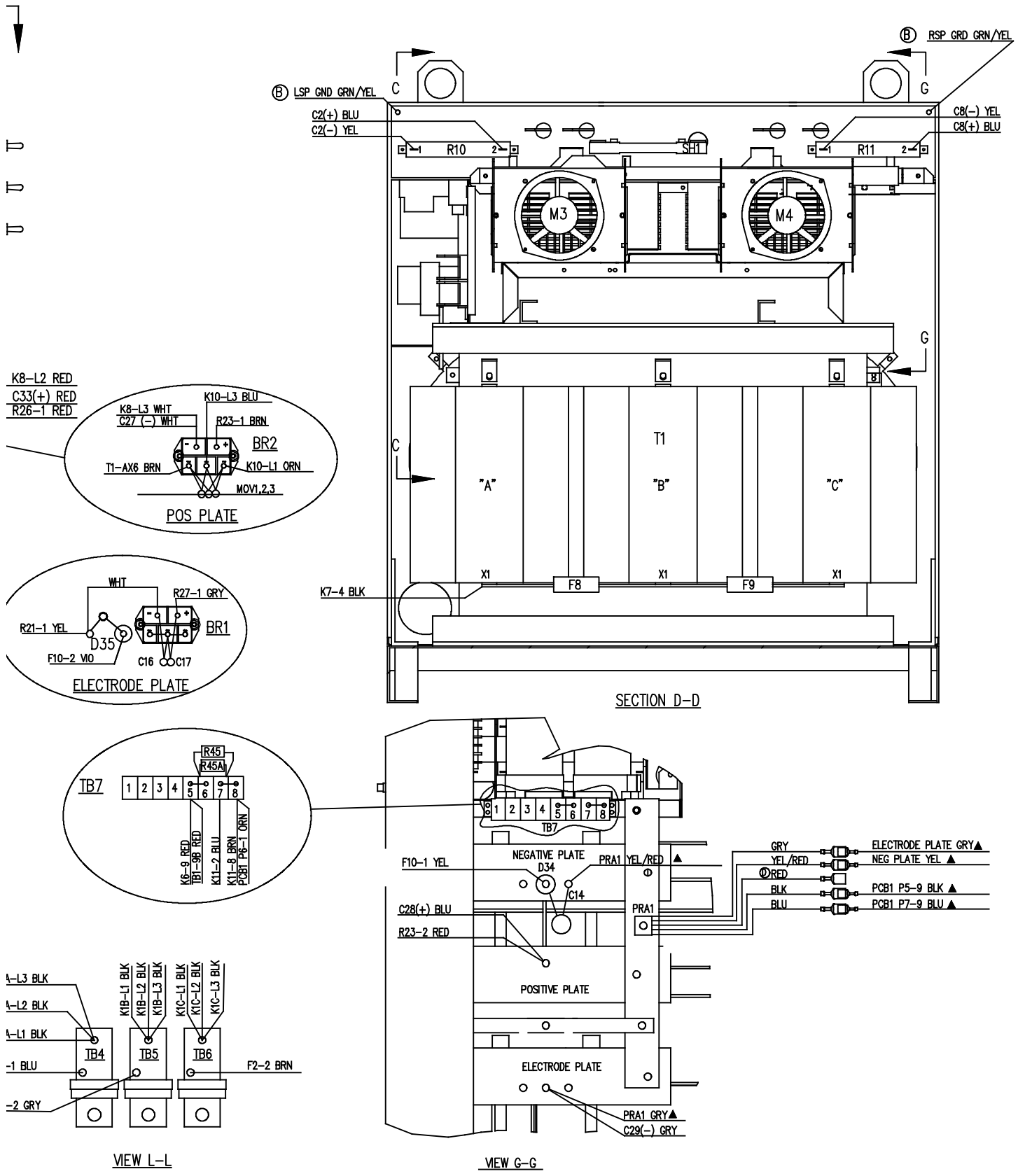
LEGEND:

* INDICATES SELF LEAD
▲ INDICATES CONNECTION MADE THROUGH IN-LINE SPLICE
(TP) INDICATES TWISTED PAIR

EPP-450, 460V, CSA

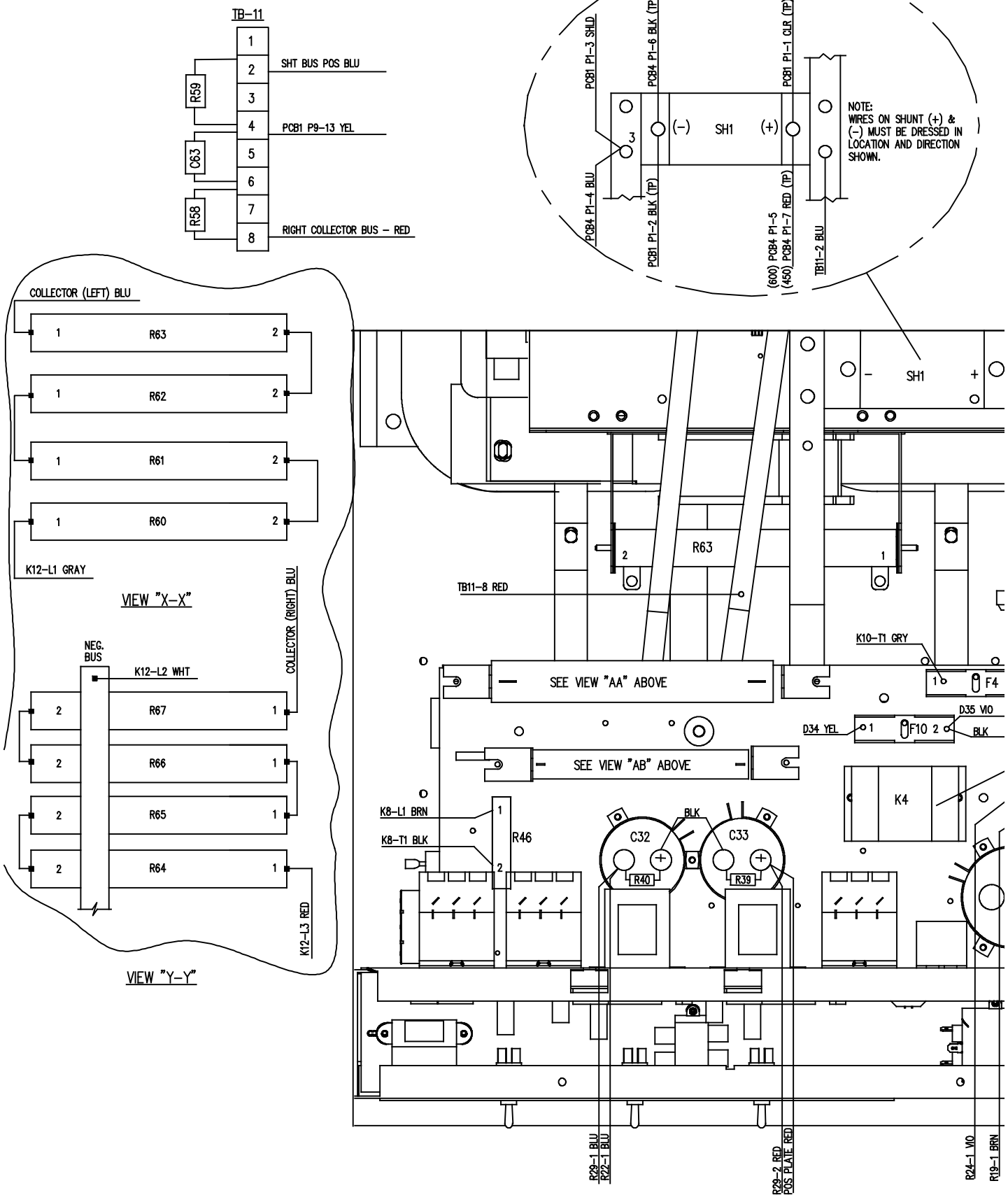
D–0558007696

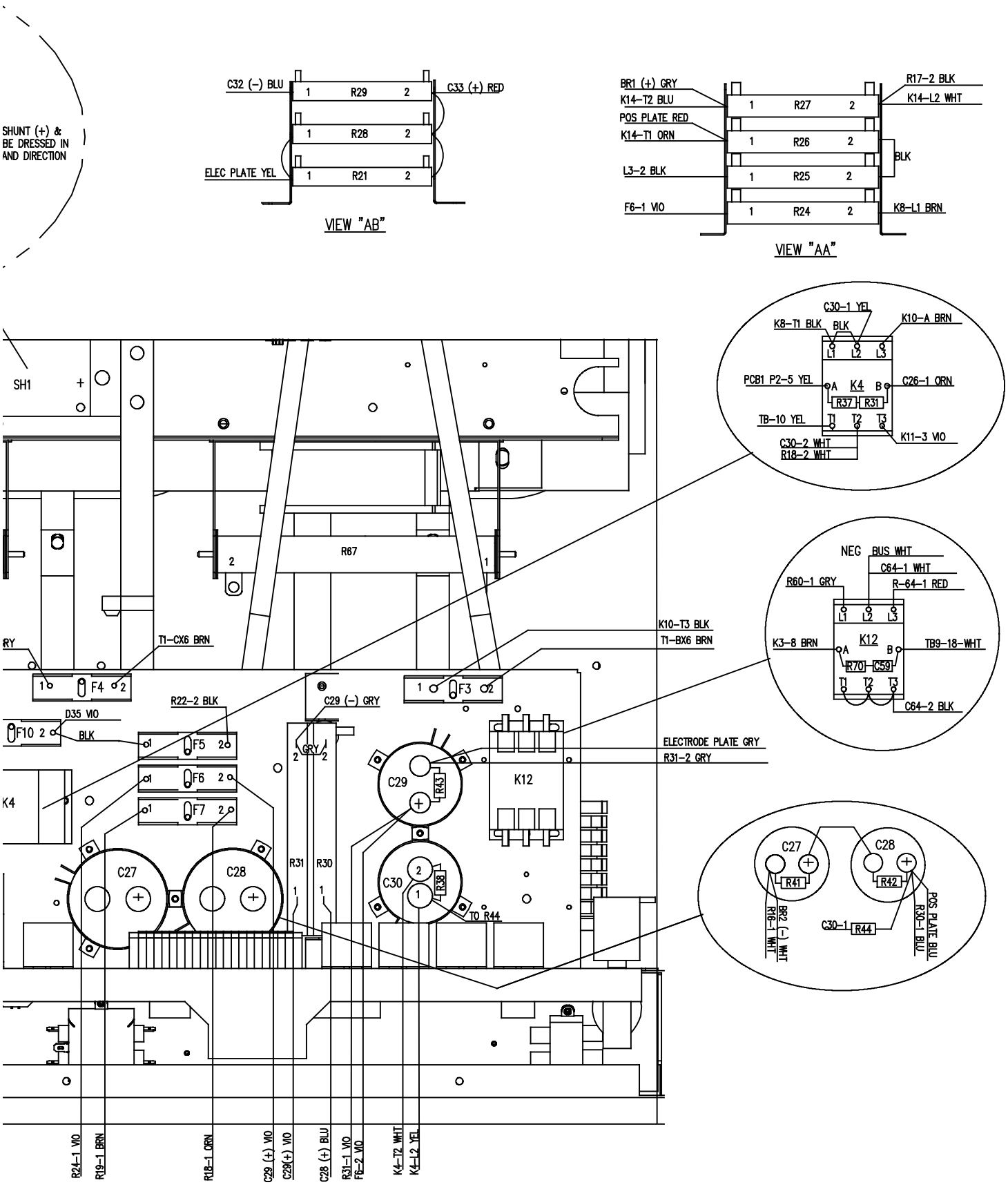



RSP GRD GRN/YEL
LSP GND GRN/YEL
C2(+) BLU
C2(-) YEL
C8(-) YEL
C8(+) BLU
R10
R11
SH1
M3
M4
T1
"A"
"B"
"C"
X1
F8
F9
K7-4 BLK
SECTION D-D
K8-L2 RED
C33(+) RED
R26-1 RED
K8-L3 WHT
C27 (-) WHT
K10-L3 BLU
R23-1 BRN
BR2
T1-AX6 BRN
K10-L1 ORN
MOV1,2,3
POS PLATE
WHT
R27-1 GRY
R21-1 YEL
D35
BR1
F10-2 VIO
C16
C17
ELECTRODE PLATE
TB7
R45
R45A
K6-9 RED
TB1-9B RED
K11-2 BLU
K11-8 BRN
PCB1 P6-1 ORN
F10-1 YEL
NEGATIVE PLATE
D34
C14
PRA1 YEL/RED
C28(+) BLU
R23-2 RED
PRA1
POSITIVE PLATE
ELECTRODE PLATE
PRA1 GRY
C29(-) GRY
GRY
YEL/RED
RED
BLK
BLU
ELECTRODE PLATE GRY
NEG PLATE YEL
PCB1 P5-9 BLK
PCB1 P7-9 BLU
K1B-L1 BLK
K1B-L2 BLK
K1B-L3 BLK
K1C-L1 BLK
K1C-L2 BLK
K1C-L3 BLK
TB4
TB5
TB6
F2-2 BRN
VIEW L-L
VIEW G-G

EPP-450, 460V, CSA

D-0558007696




SHUNT (+) &
BE DRESSED IN
AND DIRECTION
C32 (-) BLU
C33 (+) RED
R29
R28
R21
ELEC PLATE YEL
VIEW "AB"
BR1 (+) GRY
K14-T2 BLU
POS PLATE RED
K14-T1 ORN
L3-2 BLK
F6-1 VIO
R27
R26
R25
R24
R17-2 BLK
K14-L2 WHT
BLK
K8-L1 BRN
VIEW "AA"
C30-1 YEL
K8-T1 BLK
BLK
K10-A BRN
L1 L2 L3
PCB1 P2-5 YEL
A K4 B
C26-1 ORN
R37 R31
TB-10 YEL
T1 T2 T3
K11-3 VIO
C30-2 WHT
R18-2 WHT
NEG
BUS WHT
C64-1 WHT
R60-1 GRY
R-64-1 RED
K3-8 BRN
K12
TB9-18-WHT
R70 C59
C64-2 BLK
SH1
R67
T1-CX6 BRN
K10-T3 BLK
T1-BX6 BRN
F4
F3
R22-2 BLK
C29 (-) GRY
D35 VIO
F10
BLK
F5
F6
F7
GRY
ELECTRODE PLATE GRY
R31-2 GRY
C29
R43
K12
K4
C27
C28
R31
R30
C30
R38
TO R44
C27
C28
R41
R42
R16-1 WHT
BR2 (-) WHT
C30-1
R44
R30-1 BLU
POS PLATE BLU
R24-1 VIO
R19-1 BRN
R18-1 ORN
C29 (+) VIO
C28(+) VIO
C28 (+) BLU
R31-1 VIO
F6-2 VIO
K4-T2 WHT
K4-L2 YEL

EPP-450, 460V, CSA

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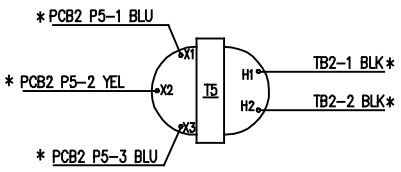
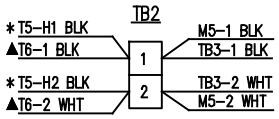
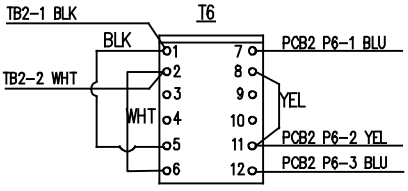
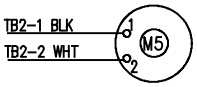


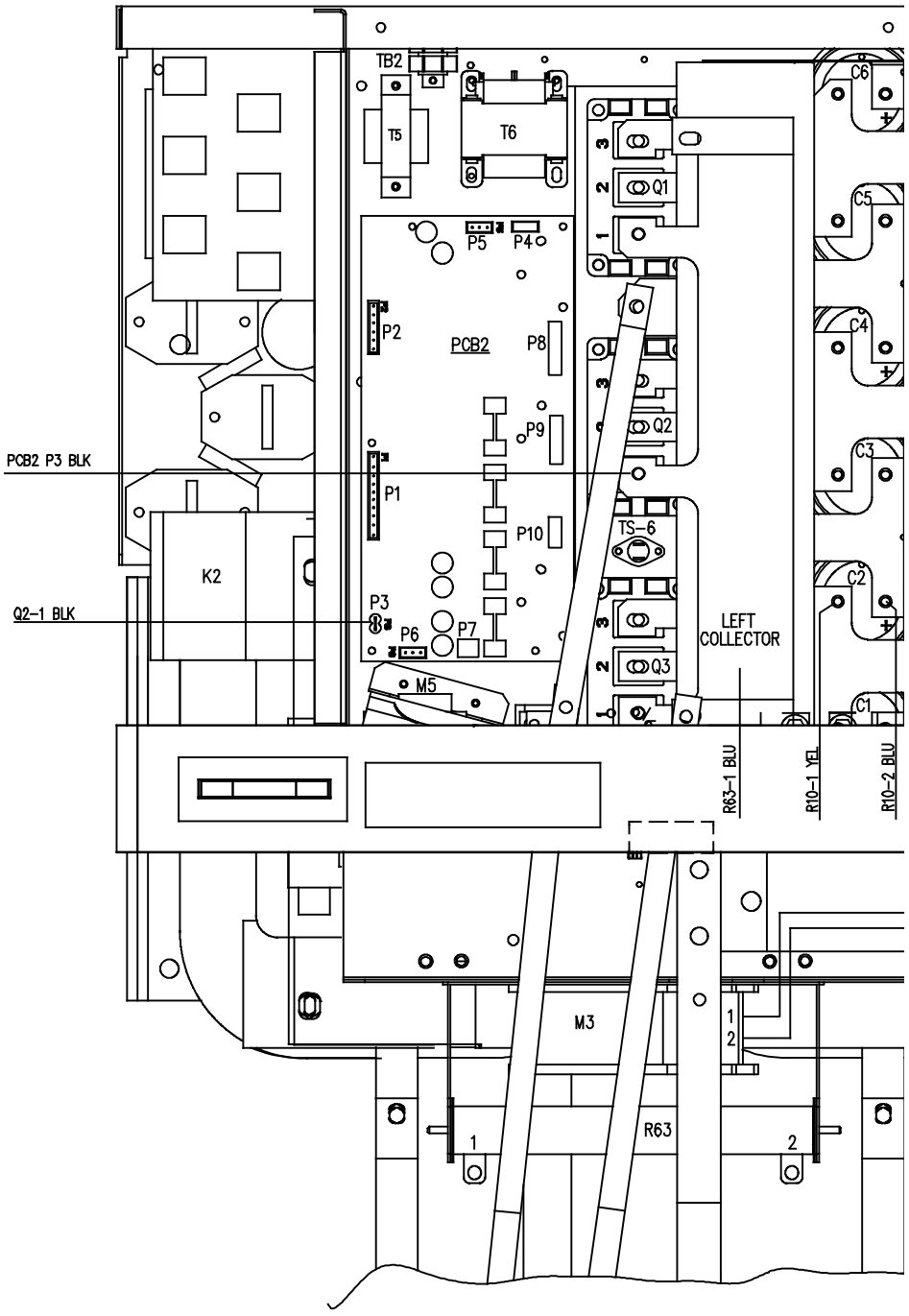
PCB2

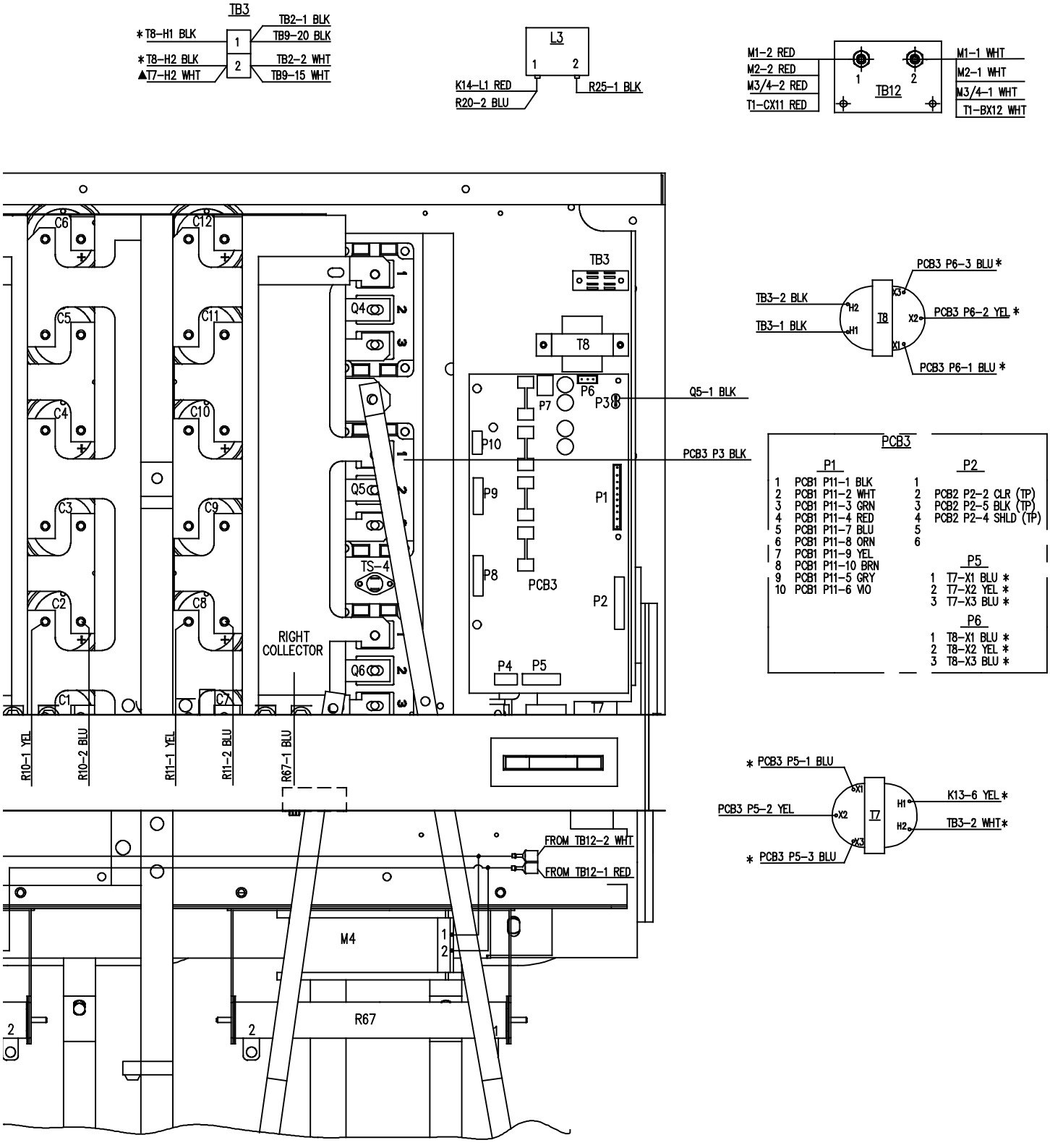
P1		P2	
1	PCB1 P10-1 BLK	1	PCB2 P2-3 YEL
2	PCB1 P10-2 WHT	2	PCB3 P2-2 CLR (TP)
3	PCB1 P10-3 GRN	3	PCB2 P2-1 YEL
4	PCB1 P10-4 RED	4	PCB3 P2-4 SHLD (TP)
5	PCB1 P10-7 BLU	5	PCB3 P2-3 BLK (TP)
6	PCB1 P10-8 ORN	6	
7	PCB1 P10-9 YEL		
8	PCB1 P10-10 BRN	P5	
9	PCB1 P10-5 GRY	1	T5-X1 BLU *
10	PCB1 P10-6 VIO	2	T5-X2 YEL *
		3	T5-X3 BLU *
P4		P6	
1	PCB10 P4-11 WHT	1	T6-7 BLU
2	PCB10 P4-12 BLK	2	T6-11 YEL
		3	T6-12 BLU










TB3
*T8-H1 BLK
*T8-H2 BLK
▲T7-H2 WHT
TB2-1 BLK
TB9-20 BLK
TB2-2 WHT
TB9-15 WHT
L3
K14-L1 RED
R20-2 BLU
R25-1 BLK
M1-2 RED
M2-2 RED
M3/4-2 RED
T1-CX11 RED
TB12
M1-1 WHT
M2-1 WHT
M3/4-1 WHT
T1-BX12 WHT
TB3
T8
Q4
Q5
Q6
TS-4
RIGHT COLLECTOR
P6
P7
P3
P10
P9
P8
P1
P2
P4
P5
PCB3
T7
Q5-1 BLK
PCB3 P3 BLK
TB3-2 BLK
TB3-1 BLK
PCB3 P6-3 BLU*
PCB3 P6-2 YEL*
PCB3 P6-1 BLU*
PCB3
P1
1 PCB1 P11-1 BLK
2 PCB1 P11-2 WHT
3 PCB1 P11-3 GRN
4 PCB1 P11-4 RED
5 PCB1 P11-7 BLU
6 PCB1 P11-8 ORN
7 PCB1 P11-9 YEL
8 PCB1 P11-10 BRN
9 PCB1 P11-5 GRY
10 PCB1 P11-6 VIO
P2
2 PCB2 P2-2 CLR (TP)
3 PCB2 P2-5 BLK (TP)
4 PCB2 P2-4 SHLD (TP)
P5
1 T7-X1 BLU*
2 T7-X2 YEL*
3 T7-X3 BLU*
P6
1 T8-X1 BLU*
2 T8-X2 YEL*
3 T8-X3 BLU*
* PCB3 P5-1 BLU
PCB3 P5-2 YEL
* PCB3 P5-3 BLU
K13-6 YEL*
TB3-2 WHT*
R10-1 YEL
R10-2 BLU
R11-1 YEL
R11-2 BLU
R67-1 BLU
FROM TB12-2 WHT
FROM TB12-1 RED
M4
R67

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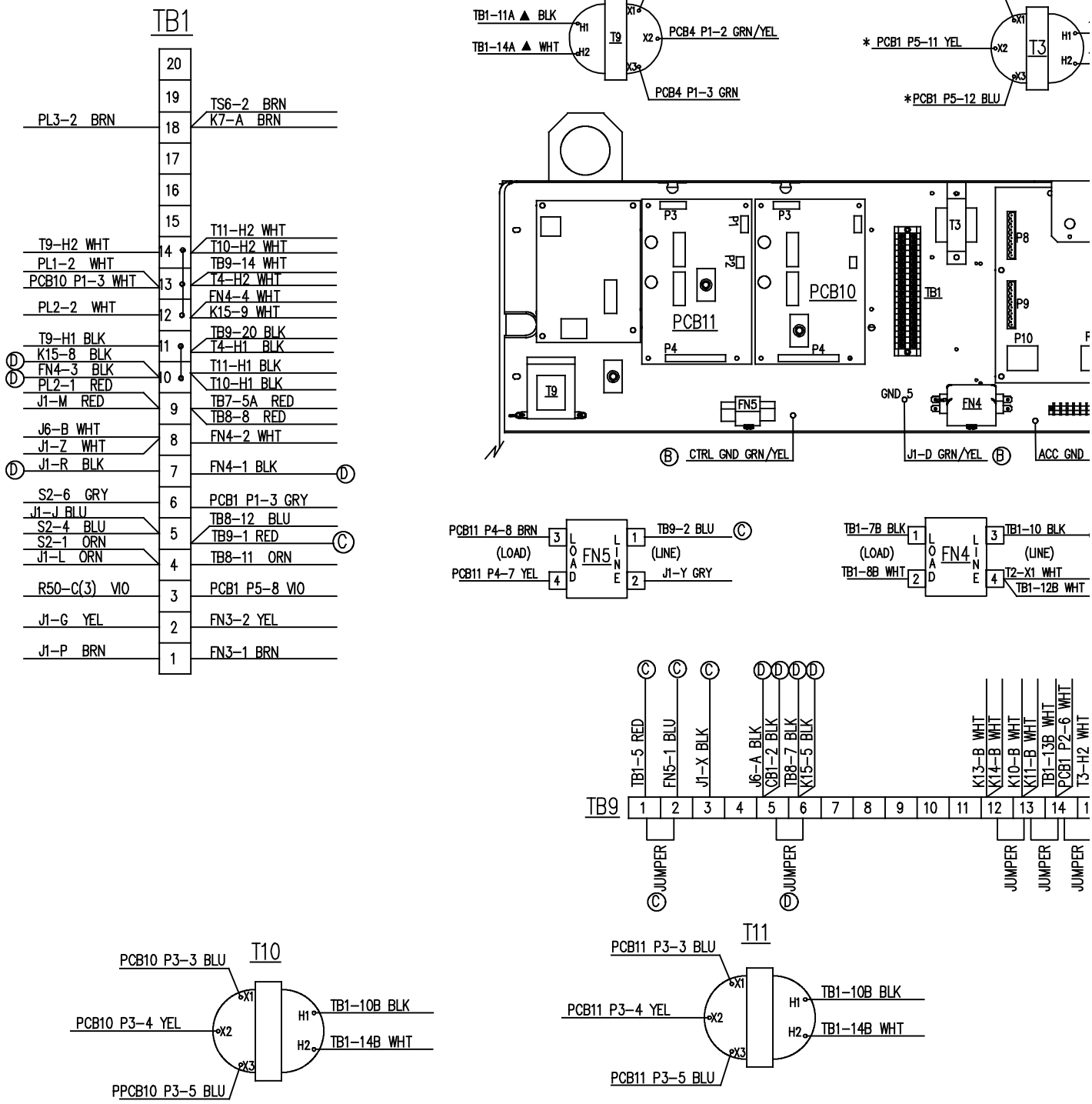
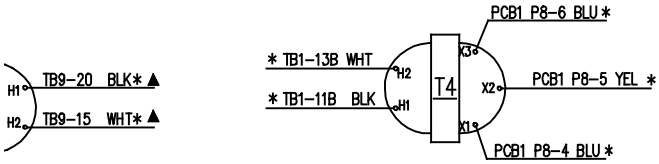
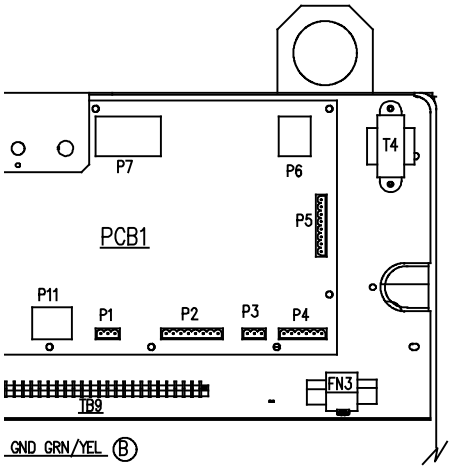
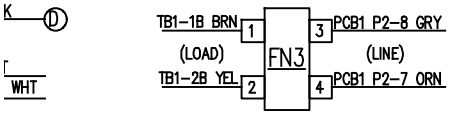
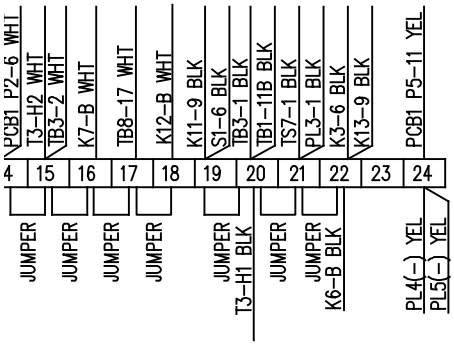










PCB1

P1
1 SH1(+) CLR(TP)
2 SH1(-) BLK(TP)
3 TB1-6 GRY
SH1-3 SHLD

P2
1
2 TB8-4 ORN
3 TB8-3 BLK
4
5 K4-A YEL
6 TB9-14 WHT
PCB1 P3-3 WHT
7 FN3-4 (LINE) ORN
8 FN3-3 (LINE) GRY

P3
1
2 K6-A BLU
3 PCB1 P2-6 WHT
PCB1 P6-2 WHT

P4
1
2
3
4
5

P9
1 GRY
2 GRY
3 GRY
4 GRY
5 PL4(+) GRY
6 VIO
7 VIO
8 VIO
9 VIO
10 VIO
11 PL5(+) VIO
12
13 TB11-4 YEL
14

P5
1 PCB4 P1-9 BLK (TP)
2 PCB4 P1-8 RED (TP)
3
4
5
6
7
8 TB1-3 VIO
9 PRA1-BLK ▲
10 T3-X1 BLU *
11 TB9-24 YEL
T3-X2 YEL *
12 T3-X3 BLU *

P10
1 PCB2 P1-1 BLK
2 PCB2 P1-2 WHT
3 PCB2 P1-3 GRN
4 PCB2 P1-4 RED
5 PCB2 P1-9 GRY
6 PCB2 P1-10 VIO
7 PCB2 P1-5 BLU
8 PCB2 P1-6 ORN
9 PCB2 P1-7 YEL
10 PCB2 P1-8 BRN
11
12

P6
1 TB7-8A ORN
2 PCB1 P3-3 WHT
3
4
5
6

P8
1 PCB10 P4-8 GRY
2 PCB10 P4-7 VIO
3
4 T4-X1 BLU *
5 T4-X2 YEL *
6 T4-X3 BLU *

P11
1 PCB3 P1-1 BLK
2 PCB3 P1-2 WHT
3 PCB3 P1-3 GRN
4 PCB3 P1-4 RED
5 PCB3 P1-9 GRY
6 PCB3 P1-10 VIO
7 PCB3 P1-5 BLU
8 PCB3 P1-6 ORN
9 PCB3 P1-7 YEL
10 PCB3 P1-8 BRN
11
12

P7
1 TD1 P1-1 BLK
2 TD1 P1-3 GRN
3 TD1 P1-4 WHT
4 TD1 P1-2 RED
5 TD2 P1-1 BLK
6 TD2 P1-3 GRN
7 TD2 P1-4 WHT
8 TD2 P1-2 RED
9 PRA1- BLU ▲
10 R51-1 GRY
11 R51-2 BLK
12 R51-3 VIO
13 S3-1 RED
14 S3-2 BRN
15 S3-3 WHT

PCB11

P1
1 PCB11 P3-1 GRY
2 PCB11 P3-2 ORN
3

P3
1 PCB11 P1-1 GRY
2 PCB11 P1-2 ORN
3 T11-X1 BLU
4 T11-X2 YEL
5 T11-X3 BLU

P4
1 PCB11 P4-5 WHT
2 TD3 P1-3 GRN
3
4 TD3 P1-1 BLK
5 TD3 P1-4 WHT
PCB11 P4-1 WHT
6 TD3 P1-2 RED
7 FN5-4 YEL
8 FN5-3 BRN >LOAD

PCB10

P1
1
2 K13-6 YEL
3 TB1-13A WHT

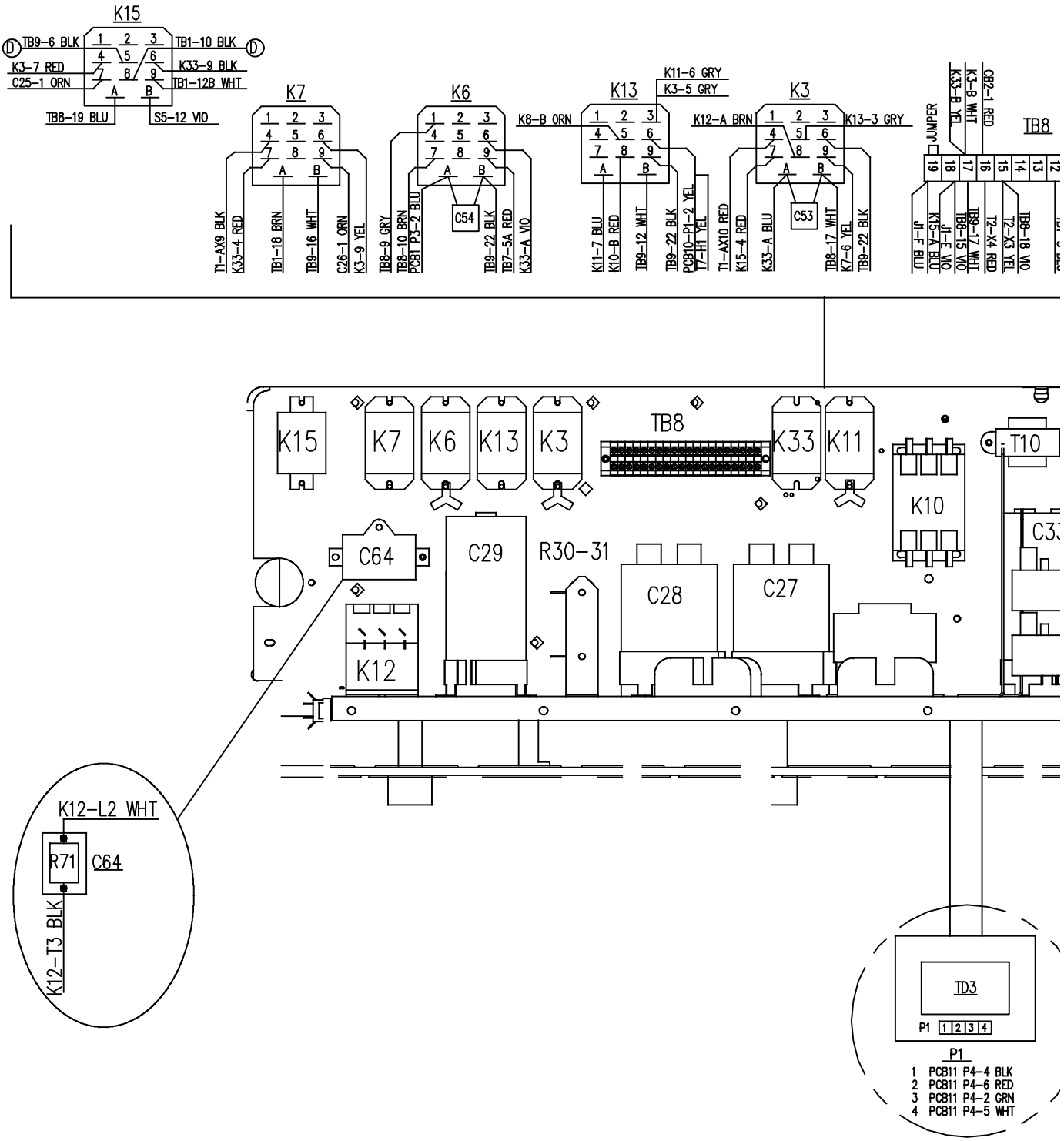
P2
1 PCB10 P2-2 WHT
2 PCB10 P2-1 WHT
> EPP-600 ONLY

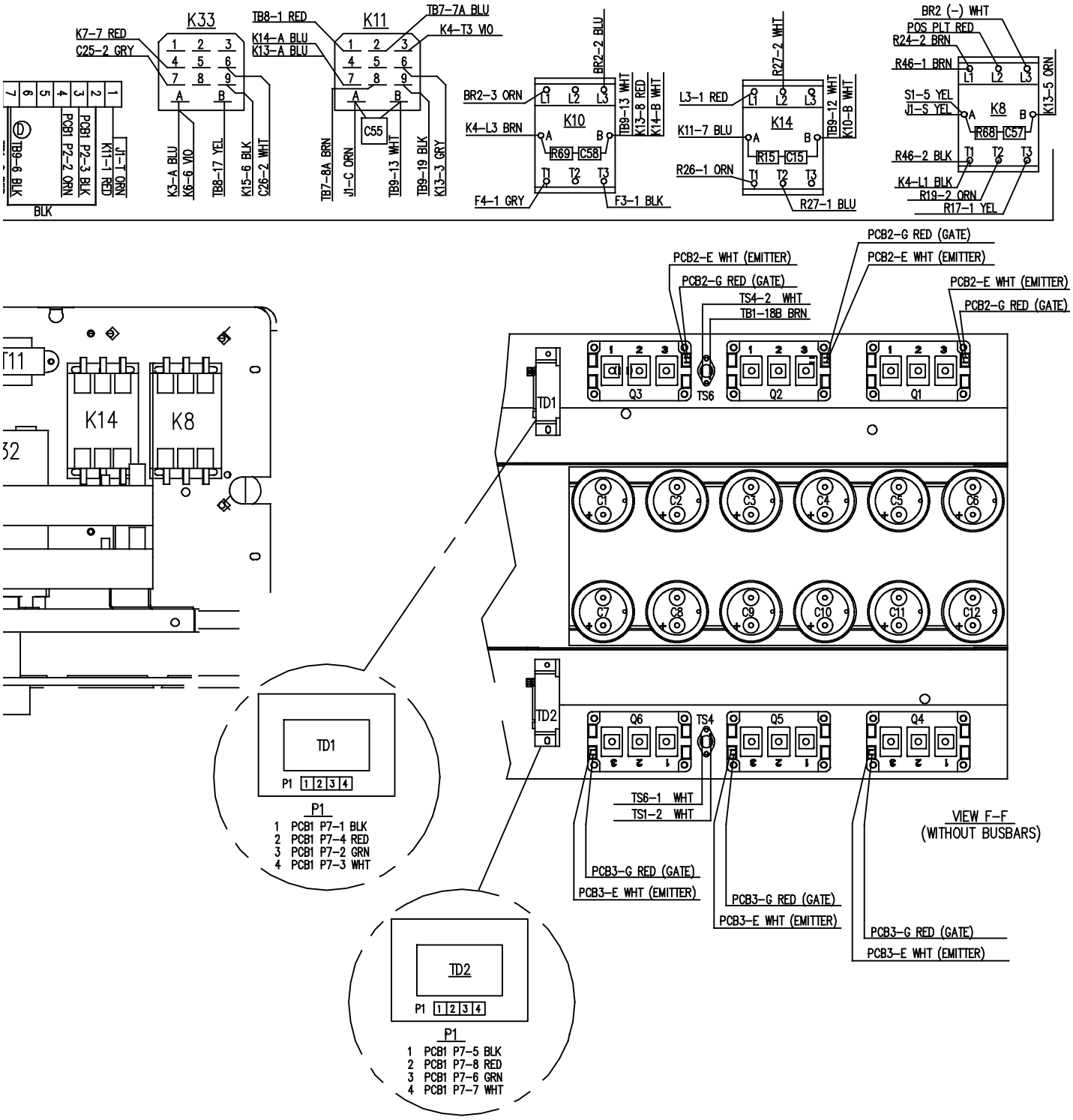
P3
1
2
3 T10-X1 BLU
4 T10-X2 YEL
5 T10-X3 BLU

P4
1 S2-5 GRY
2 S2-2 VIO
3
4
5
6
7 PCB1 P8-2 VIO
8 PCB1 P8-1 GRY
9 PCB10 P4-10 WHT
10 PCB10 P4-9 WHT
11 PCB2 P4-1 WHT
12 PCB2 P4-2 BLK

EPP-450, 460V, CSA

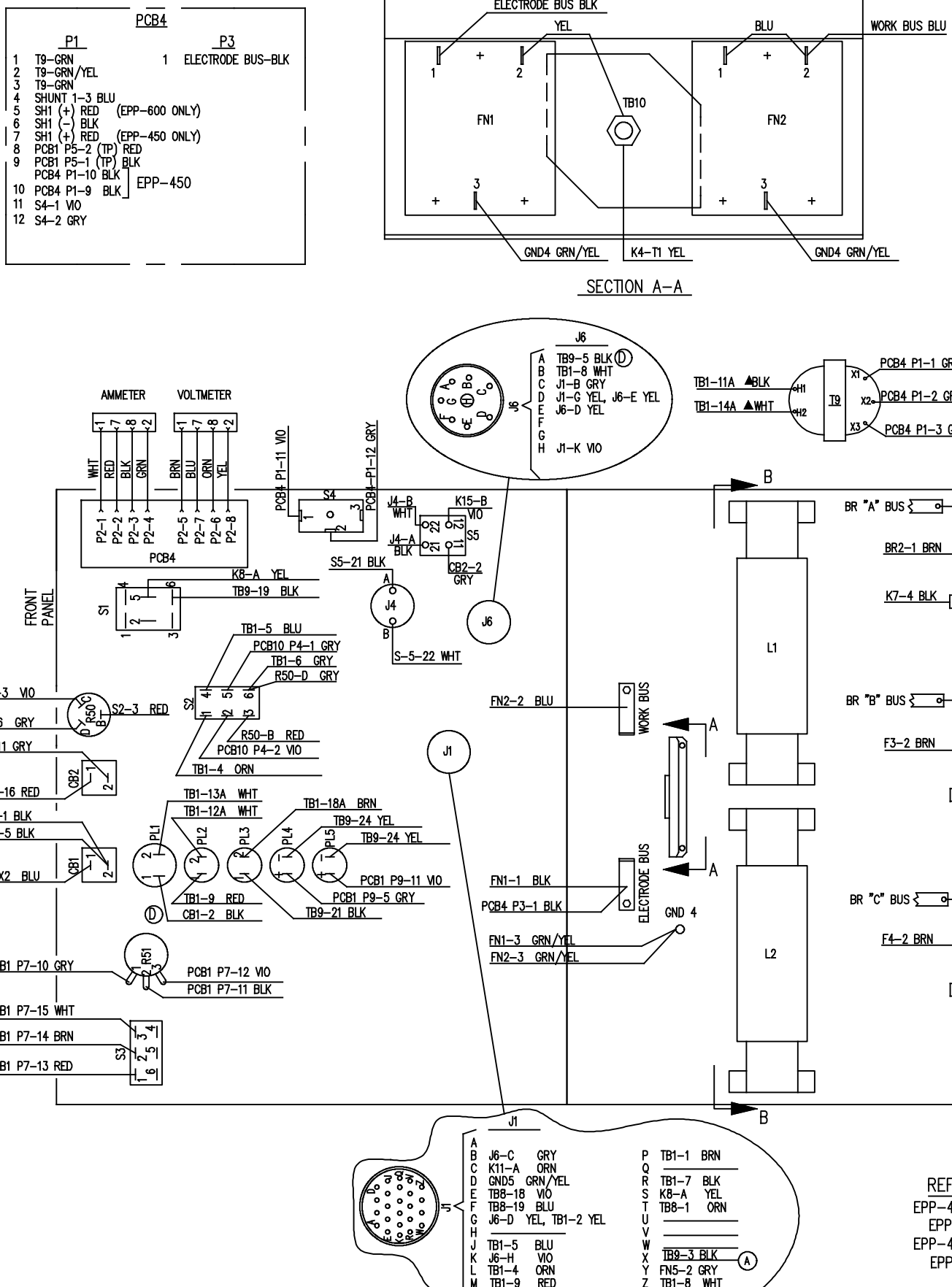
D-0558007696

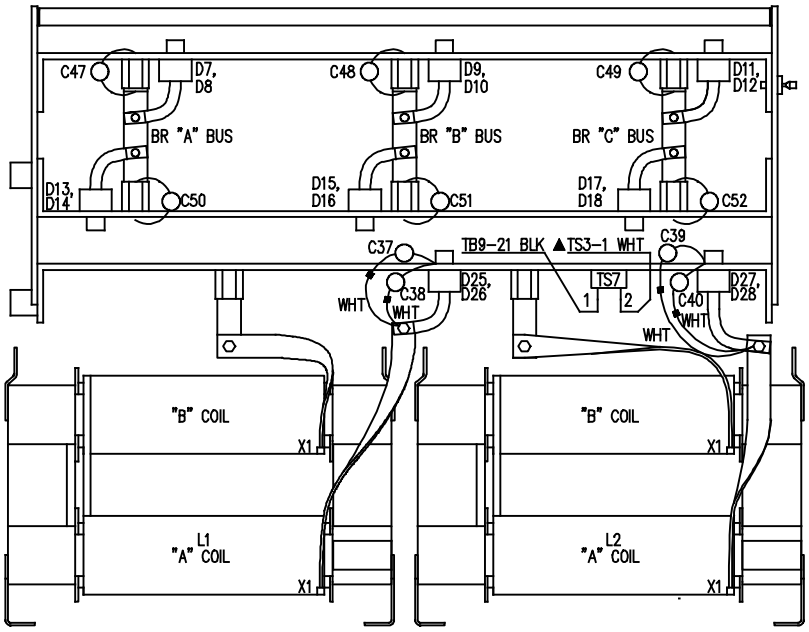



K33
K11
K10
K14
K8
K7-7 RED
C25-2 GRY
TB8-1 RED
K14-A BLU
K13-A BLU
TB7-7A BLU
K4-T3 VIO
BR2-2 BLU
BR2-3 ORN
K4-L3 BRN
TB9-13 WHT
K13-8 RED
K14-B WHT
L3-1 RED
K11-7 BLU
R26-1 ORN
R27-2 WHT
TB9-12 WHT
K10-B WHT
R27-1 BLU
F4-1 GRY
F3-1 BLK
BR2 (-) WHT
POS PLT RED
R24-2 BRN
R46-1 BRN
S1-5 YEL
J1-S YEL
K13-5 ORN
R68
C57
R46-2 BLK
K4-L1 BLK
R19-2 ORN
R17-1 YEL
C55
R69
C58
R15
C15
TB9-6 BLK
PCB1 P2-2 ORN
PCB1 P2-3 BLK
K11-1 RED
J1-T ORN
K3-A BLU
K6-6 VIO
TB8-17 YEL
K15-6 BLK
C26-2 WHT
TB7-8A BRN
J1-C ORN
TB9-13 WHT
TB9-19 BLK
K13-3 GRY
BLK
PCB2-E WHT (EMITTER)
PCB2-G RED (GATE)
TS4-2 WHT
TB1-18B BRN
PCB2-G RED (GATE)
PCB2-E WHT (EMITTER)
PCB2-E WHT (EMITTER)
PCB2-G RED (GATE)
TD1
Q3
TS6
Q2
Q1
C5
C2
C3
C4
C5
C6
C7
C8
C9
C10
C11
C12
TD2
Q6
TS4
Q5
Q4
TS6-1 WHT
TS1-2 WHT
PCB3-G RED (GATE)
PCB3-E WHT (EMITTER)
PCB3-G RED (GATE)
PCB3-E WHT (EMITTER)
PCB3-G RED (GATE)
PCB3-E WHT (EMITTER)
VIEW F-F
(WITHOUT BUSBARS)
TD1
P1
1 2 3 4
P1
1 PCB1 P7-1 BLK
2 PCB1 P7-4 RED
3 PCB1 P7-2 GRN
4 PCB1 P7-3 WHT
TD2
P1
1 2 3 4
P1
1 PCB1 P7-5 BLK
2 PCB1 P7-8 RED
3 PCB1 P7-6 GRN
4 PCB1 P7-7 WHT

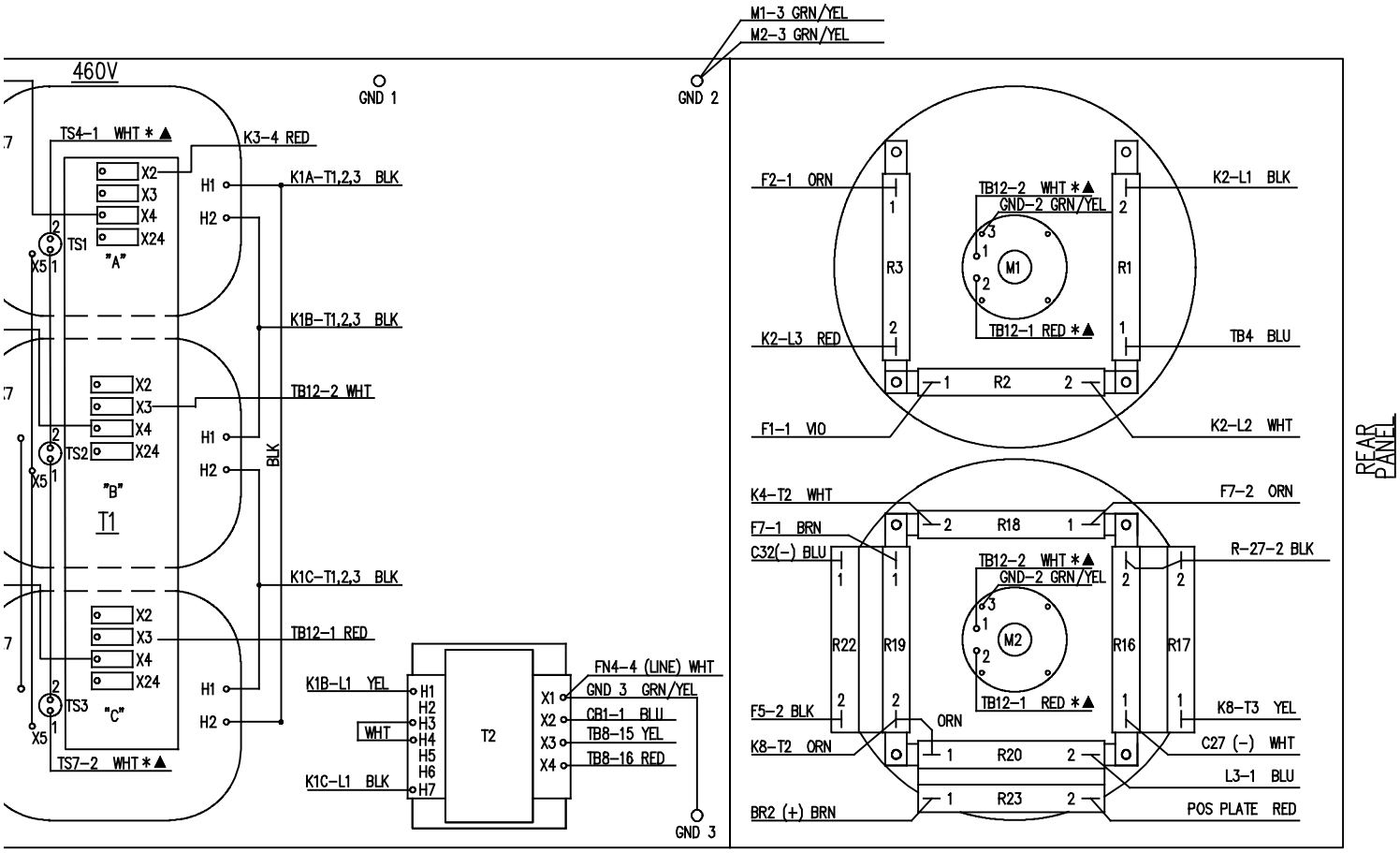
EPP-450, 575V, CSA

D-0558007697





SECTION B-B



BASE

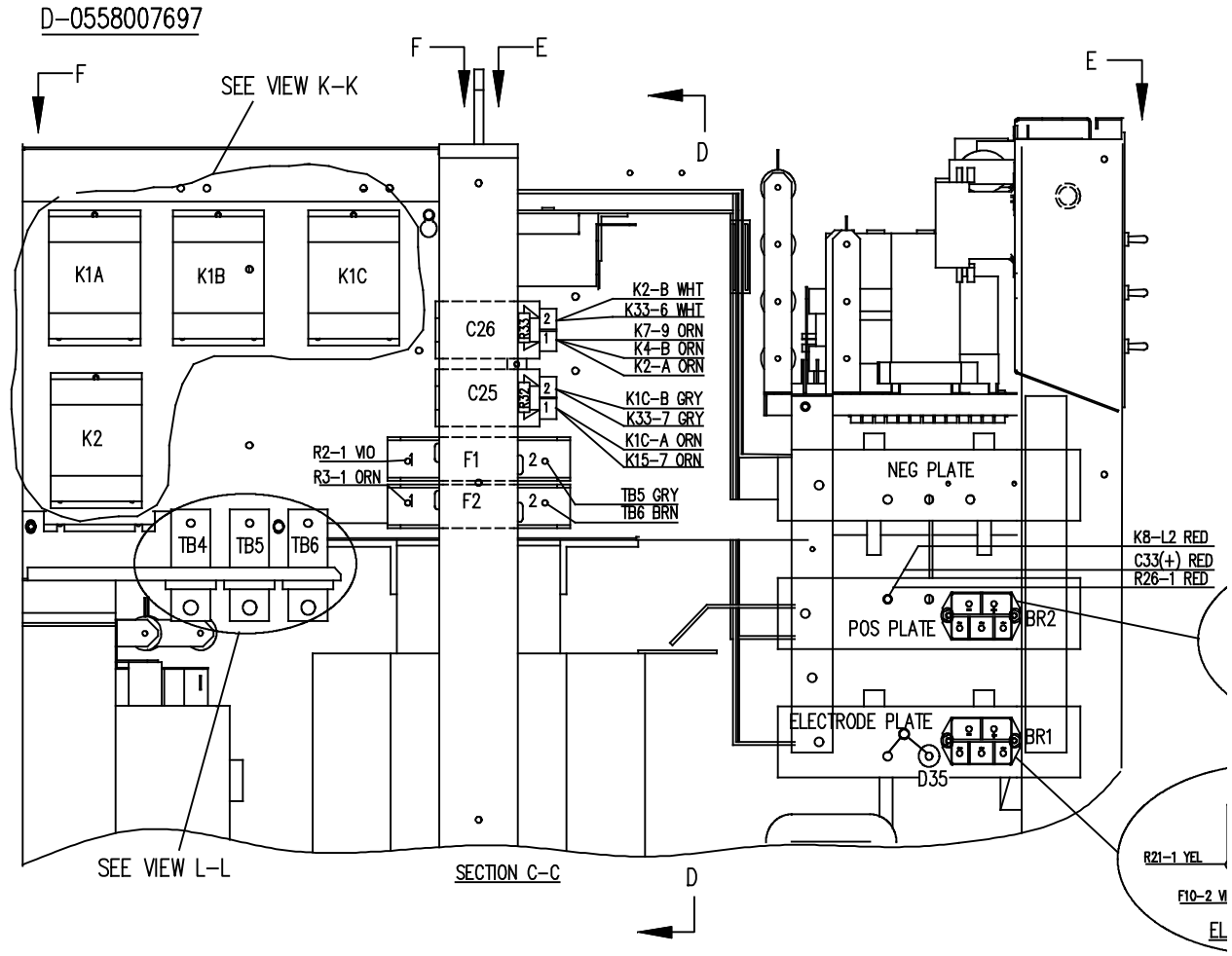
CE DRAWINGS:

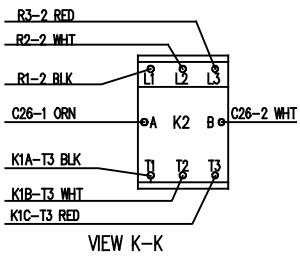
0 (400/460/575V) SCHEM DIAG: 0558007695
600 POWER WIRE KIT: 0558007699
0 CONTROL WIRE KIT: 0558007700
'600 LOOSE WIRE KIT: 0558007701

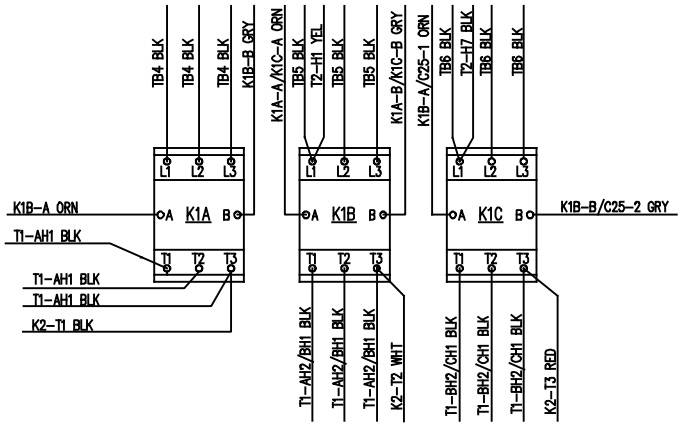
LEGEND:

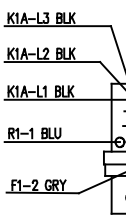
* INDICATES SELF LEAD
▲ INDICATES CONNECTION MADE THROUGH IN-LINE SPLICE
(TP) INDICATES TWISTED PAIR

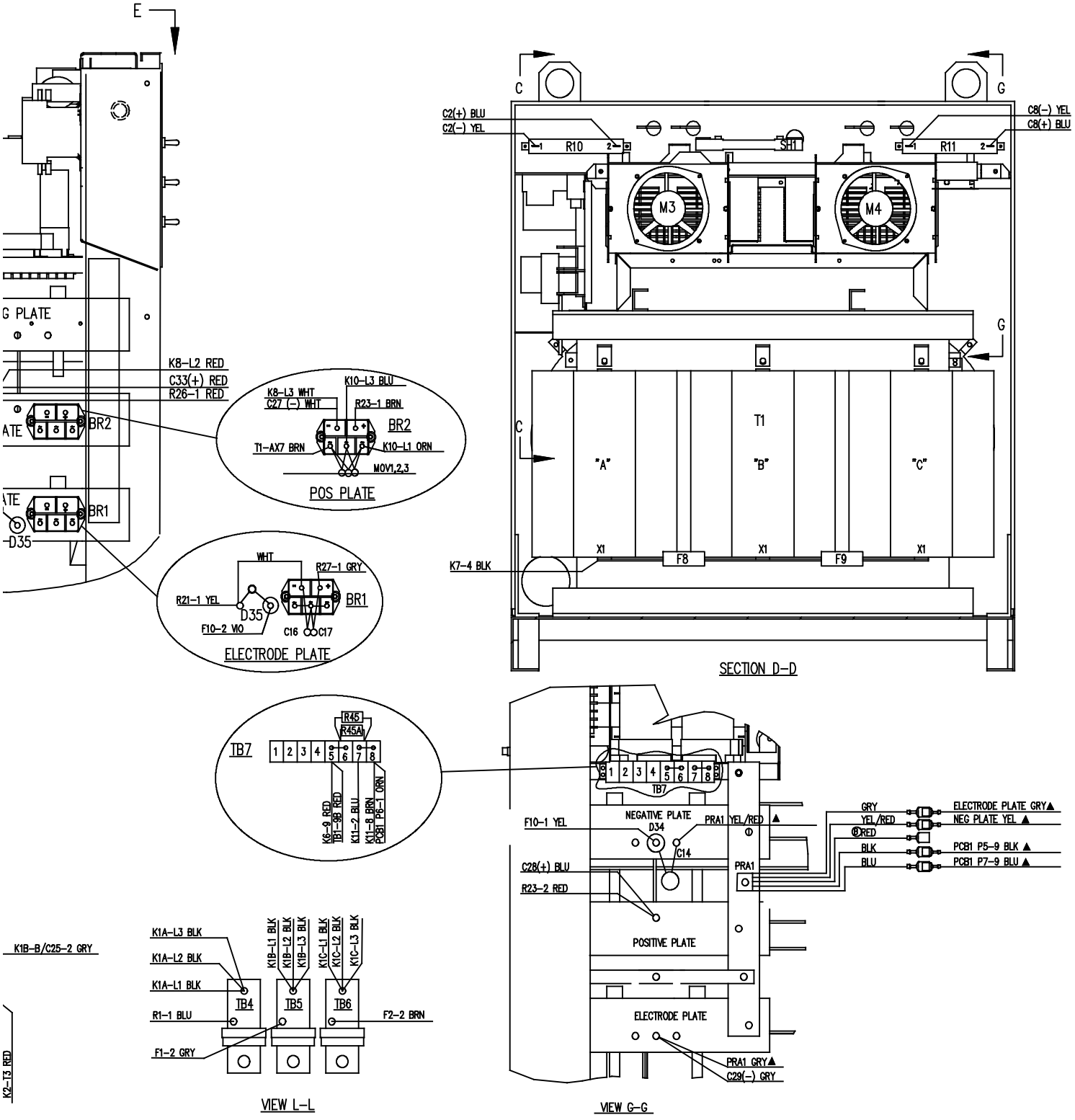
EPP-450, 575V, CSA



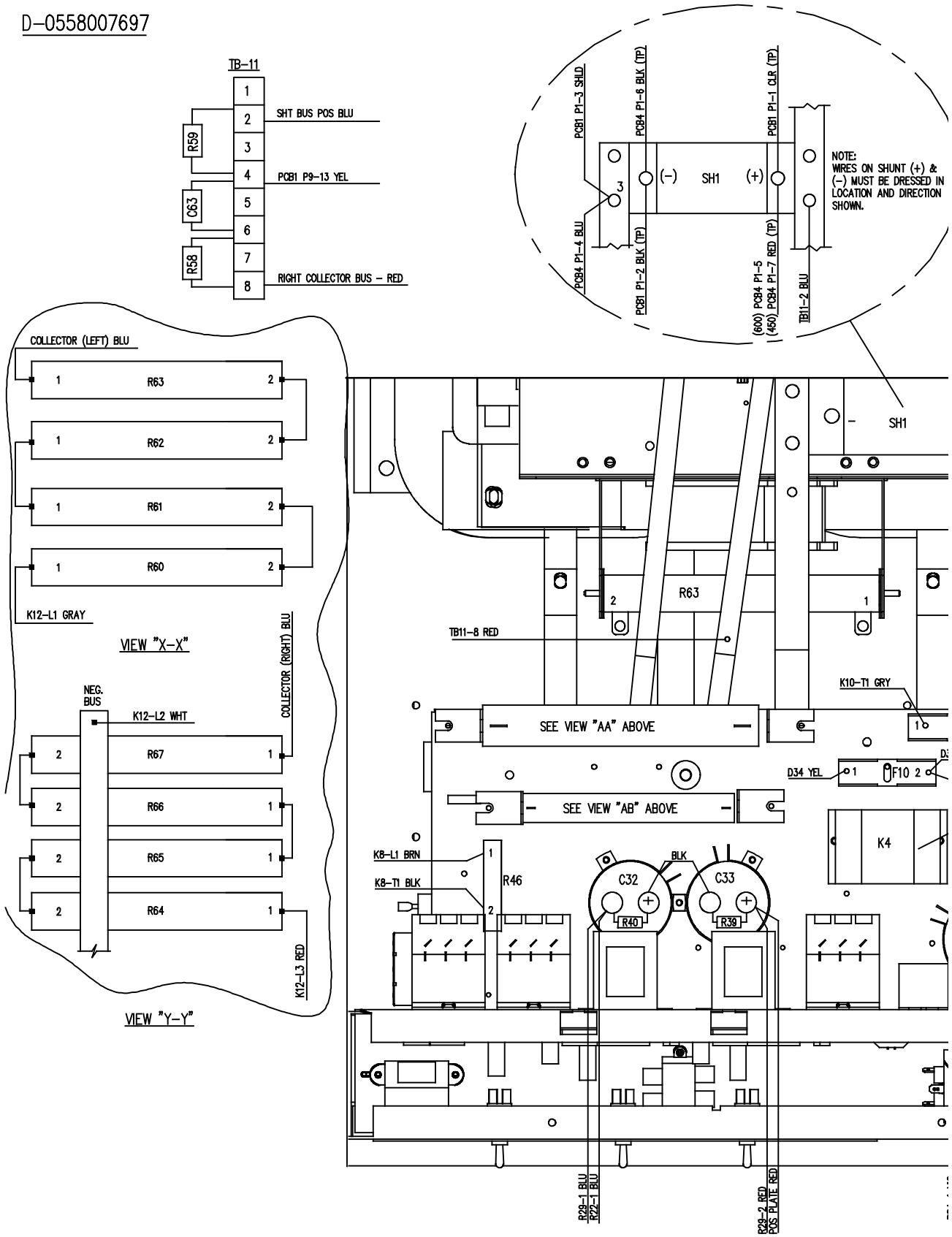


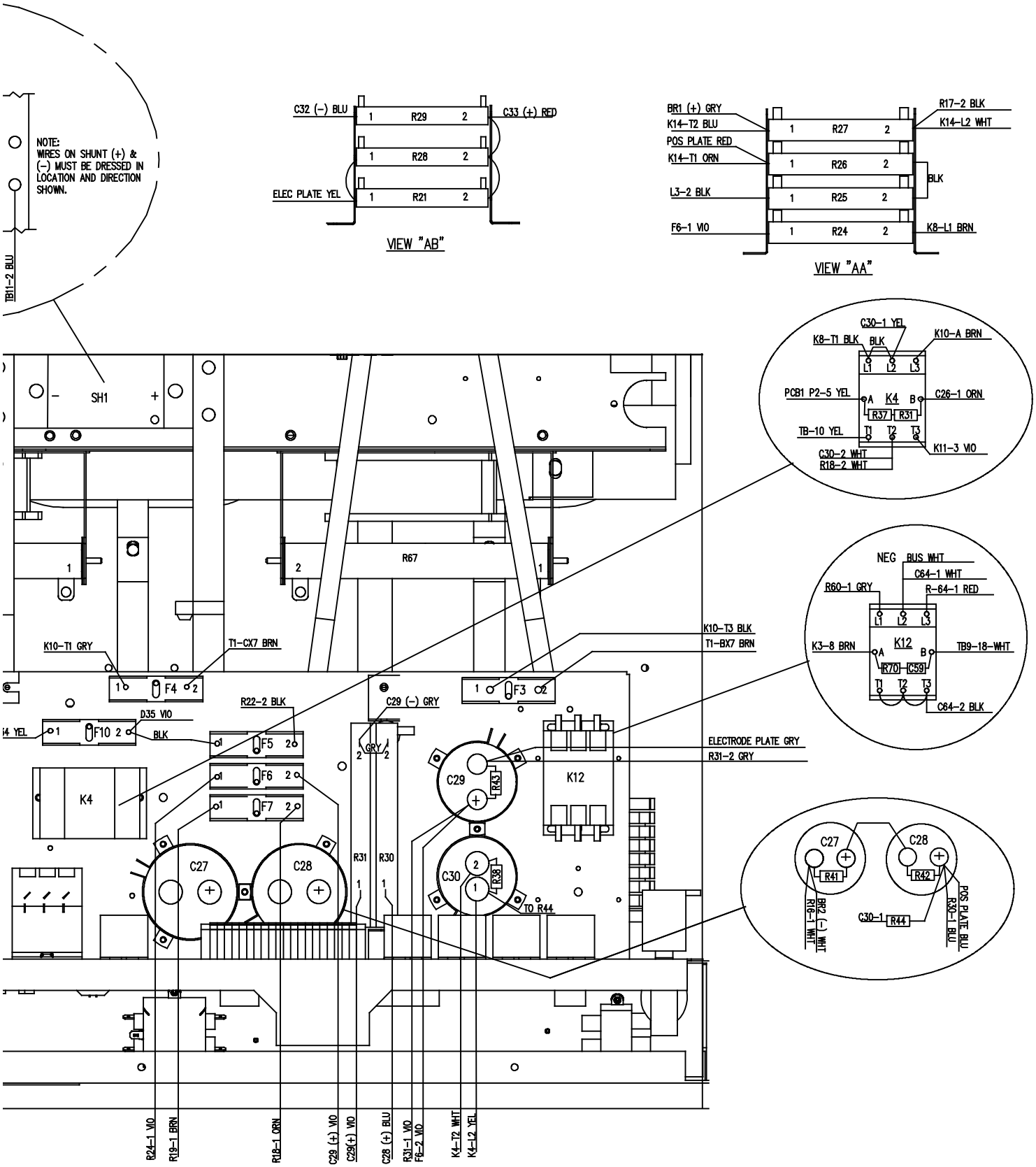





E
C
G
C2(+) BLU
C2(-) YEL
C8(-) YEL
C8(+) BLU
R10
R11
SHT
M3
M4
T1
"A"
"B"
"C"
X1
F8
F9
K7-4 BLK
SECTION D-D
K8-L2 RED
C33(+) RED
R26-1 RED
BR2
BR1
D35
K8-L3 WHT
C27 (-) WHT
K10-L3 BLU
R23-1 BRN
T1-AX7 BRN
K10-L1 ORN
MOV1,2,3
POS PLATE
WHT
R27-1 GRY
R21-1 YEL
F10-2 WHT
C16
C17
ELECTRODE PLATE
TB7
R45
R45A
K6-9 RED
TB1-9B RED
K11-2 BLU
K11-8 BRN
PCB1 P6-1 ORN
NEGATIVE PLATE
D34
C14
PRA1
PRA1 YEL/RED
F10-1 YEL
C28(+) BLU
R23-2 RED
POSITIVE PLATE
ELECTRODE PLATE
PRA1 GRY
C29(-) GRY
GRY
YEL/RED
RED
BLK
BLU
ELECTRODE PLATE GRY
NEG PLATE YEL
PCB1 P5-9 BLK
PCB1 P7-9 BLU
K1B-B/C25-2 GRY
K2-T3 RED
K1A-L3 BLK
K1A-L2 BLK
K1A-L1 BLK
K1B-L1 BLK
K1B-L2 BLK
K1B-L3 BLK
K1C-L1 BLK
K1C-L2 BLK
K1C-L3 BLK
TB4
TB5
TB6
R1-1 BLU
F1-2 GRY
F2-2 BRN
VIEW L-L
VIEW G-G

EPP-460, 575V, CSA




NOTE:
WIRES ON SHUNT (+) &
(-) MUST BE DRESSED IN
LOCATION AND DIRECTION
SHOWN.
TB11-2 BLU
C32 (-) BLU
R29
C33 (+) RED
R28
ELEC PLATE YEL
R21
VIEW "AB"
BR1 (+) GRY
K14-T2 BLU
POS PLATE RED
K14-T1 ORN
L3-2 BLK
F6-1 VIO
R27
R26
R25
R24
R17-2 BLK
K14-L2 WHT
BLK
K8-L1 BRN
VIEW "AA"
SH1
R67
K10-T1 GRY
T1-CX7 BRN
K10-T3 BLK
T1-BX7 BRN
F4
F3
F10
F5
F6
F7
D35 VIO
BLK
R22-2 BLK
C29 (-) GRY
GRY
ELECTRODE PLATE GRY
R31-2 GRY
K4
K12
C29
R43
C27
C28
C30
R38
R31
R30
TO R44
C30-1 YEL
K8-T1 BLK
BLK
K10-A BRN
L1 L2 L3
PCB1 P2-5 YEL
A K4 B
C26-1 ORN
R37 R31
TB-10 YEL
T1 T2 T3
K11-3 VIO
C30-2 WHT
R18-2 WHT
NEG BUS WHT
C64-1 WHT
R60-1 GRY
R-64-1 RED
K3-8 BRN
K12
TB9-18-WHT
R70 C59
C64-2 BLK
C27
C28
R41
R42
BR2 (-) WHT
R19-1 WHT
C30-1
R44
POS PLATE BLU
R30-1 BLU
R24-1 VIO
R19-1 BRN
R18-1 ORN
C29 (+) VIO
C29(+) VIO
C28 (+) BLU
R31-1 VIO
F6-2 VIO
K4-T2 WHT
K4-L2 YEL

EPP-450, 575V, CSA

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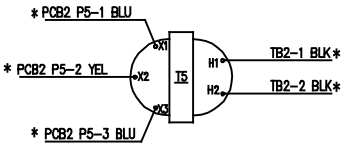

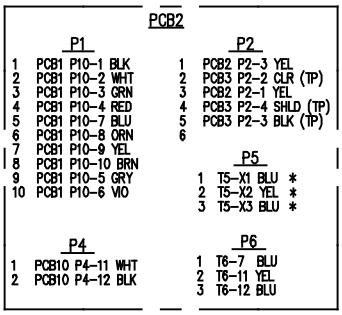

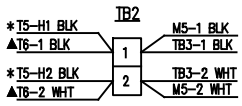

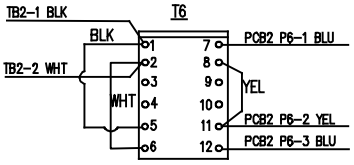

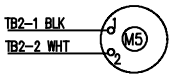

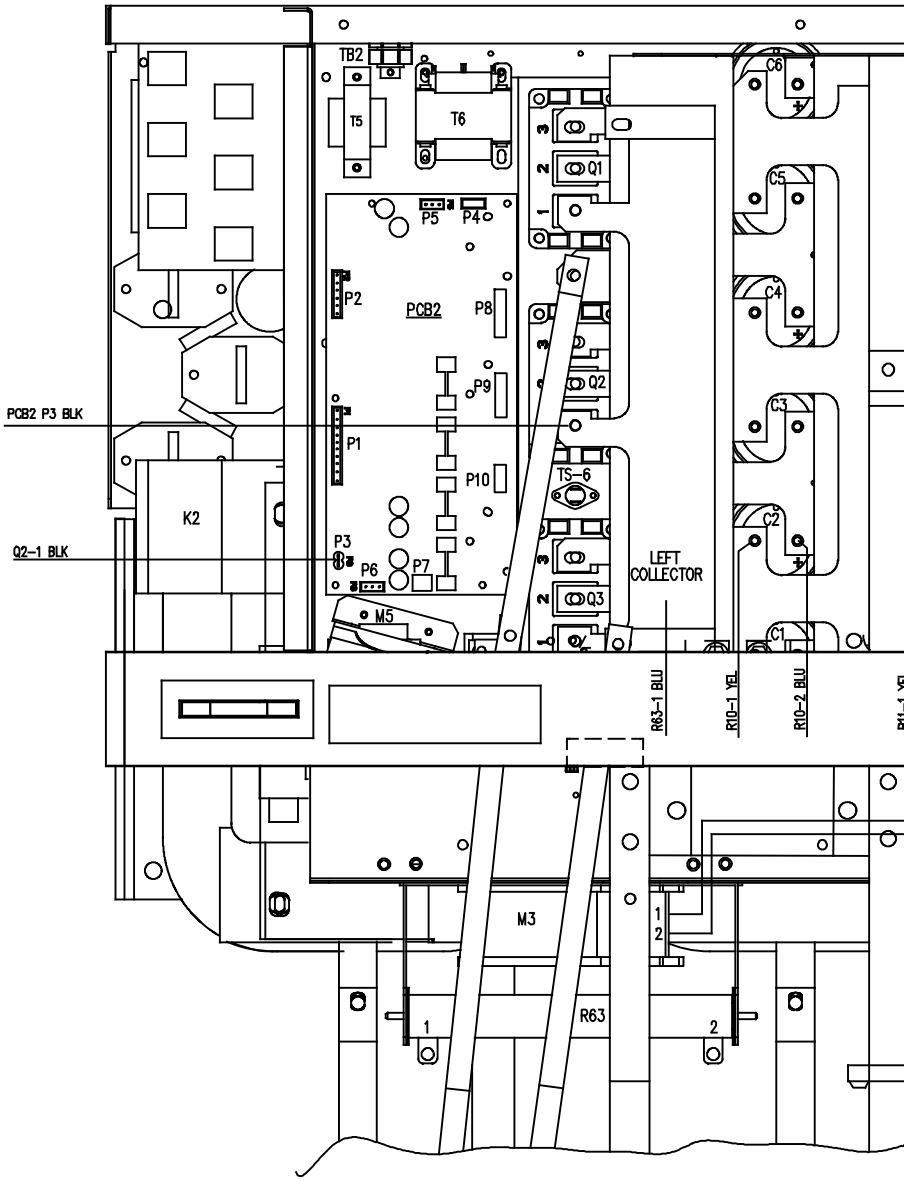

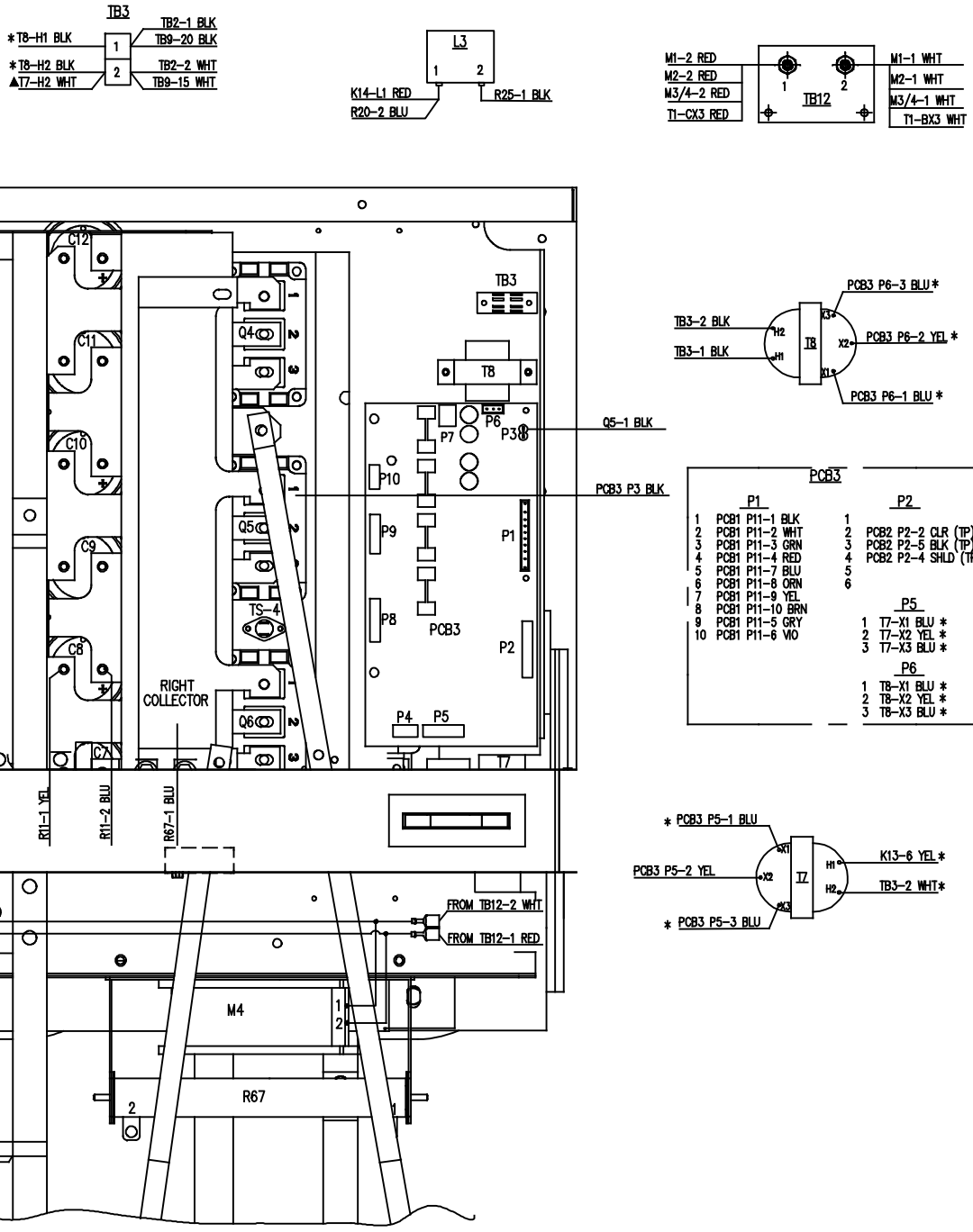
TB3
*T8-H1 BLK
*T8-H2 BLK
▲T7-H2 WHT
TB2-1 BLK
TB9-20 BLK
TB2-2 WHT
TB9-15 WHT
L3
K14-L1 RED
R20-2 BLU
R25-1 BLK
M1-2 RED
M2-2 RED
M3/4-2 RED
T1-CX3 RED
TB12
M1-1 WHT
M2-1 WHT
M3/4-1 WHT
T1-BX3 WHT
PCB3 P6-3 BLU*
TB3-2 BLK
TB3-1 BLK
T8
PCB3 P6-2 YEL *
PCB3 P6-1 BLU *
Q5-1 BLK
PCB3 P3 BLK
PCB3
P1
1 PCB1 P11-1 BLK
2 PCB1 P11-2 WHT
3 PCB1 P11-3 GRN
4 PCB1 P11-4 RED
5 PCB1 P11-7 BLU
6 PCB1 P11-8 ORN
7 PCB1 P11-9 YEL
8 PCB1 P11-10 BRN
9 PCB1 P11-5 GRY
10 PCB1 P11-6 VIO
P2
2 PCB2 P2-2 CLR (TP)
3 PCB2 P2-5 BLK (TP)
4 PCB2 P2-4 SHLD (TP)
P5
1 T7-X1 BLU *
2 T7-X2 YEL *
3 T7-X3 BLU *
P6
1 T8-X1 BLU *
2 T8-X2 YEL *
3 T8-X3 BLU *
* PCB3 P5-1 BLU
PCB3 P5-2 YEL
* PCB3 P5-3 BLU
T7
K13-6 YEL *
TB3-2 WHT*
RIGHT COLLECTOR
FROM TB12-2 WHT
FROM TB12-1 RED
R10-2 BLU
R11-1 YEL
R11-2 BLU
R67-1 BLU
M4
R67

EPP-450, 575V, CSA

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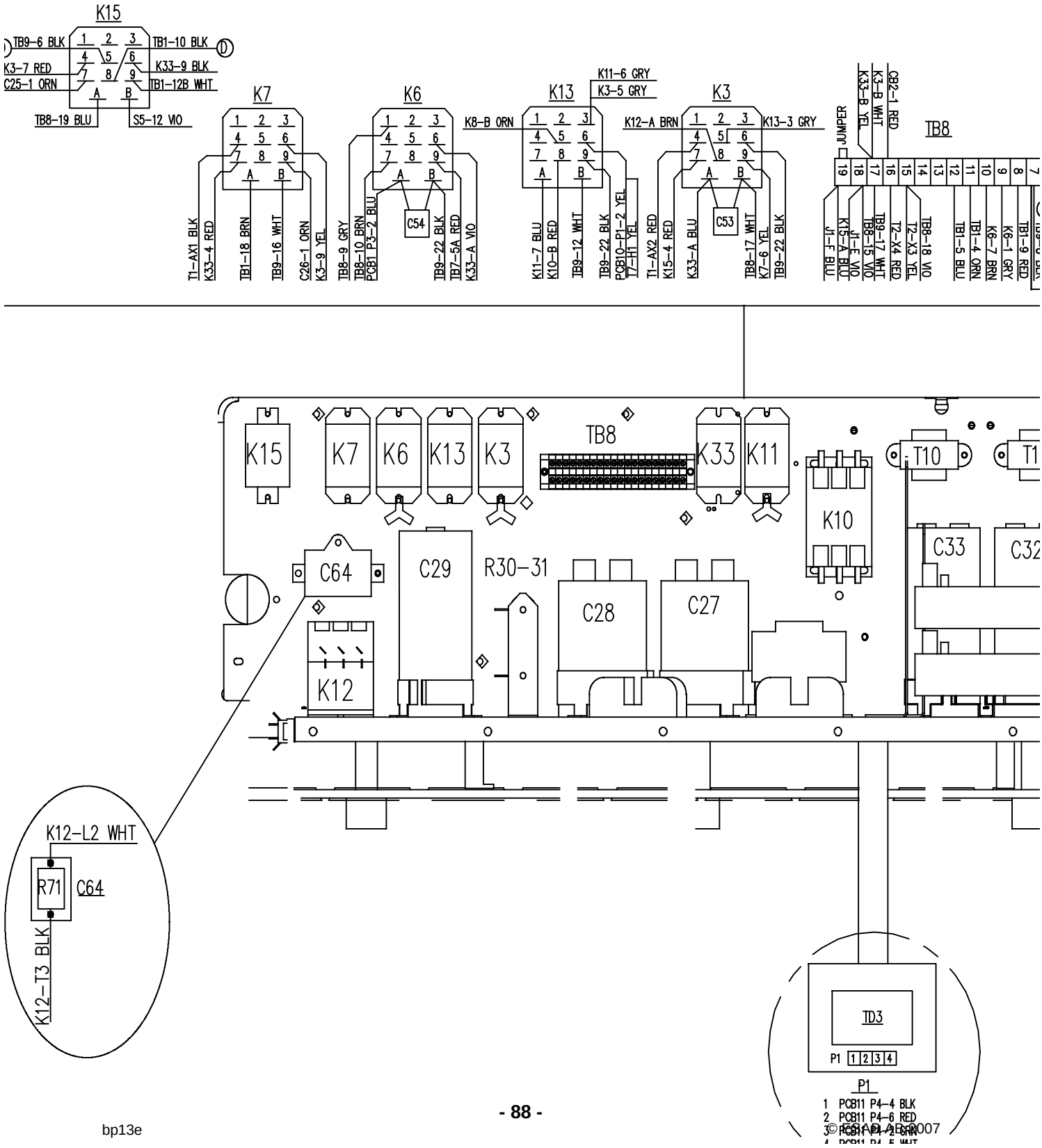
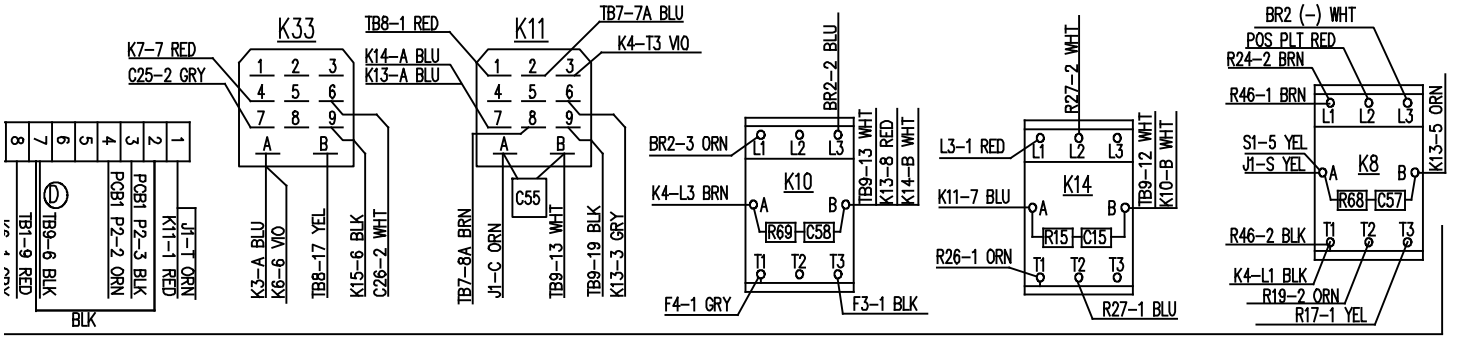
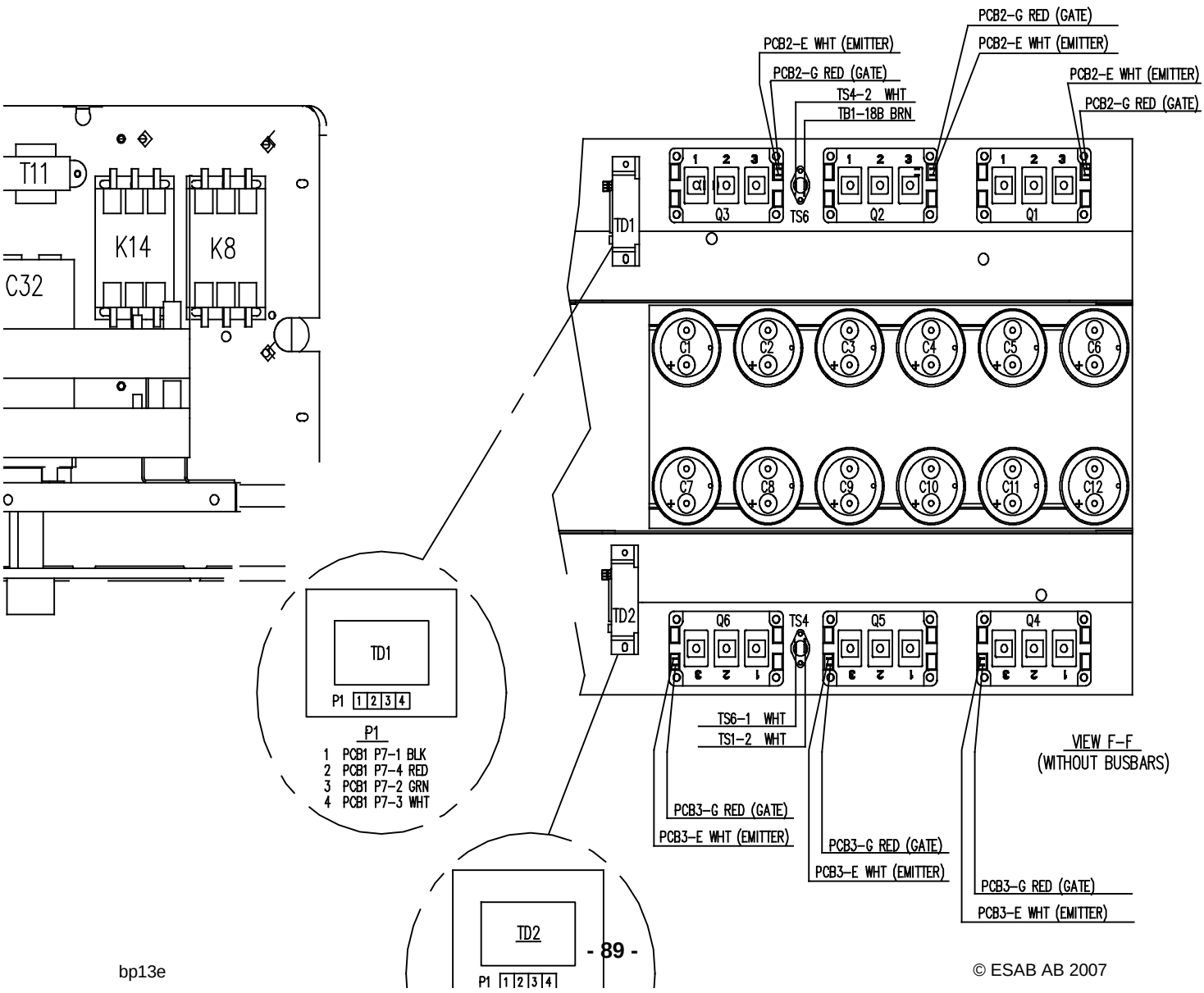
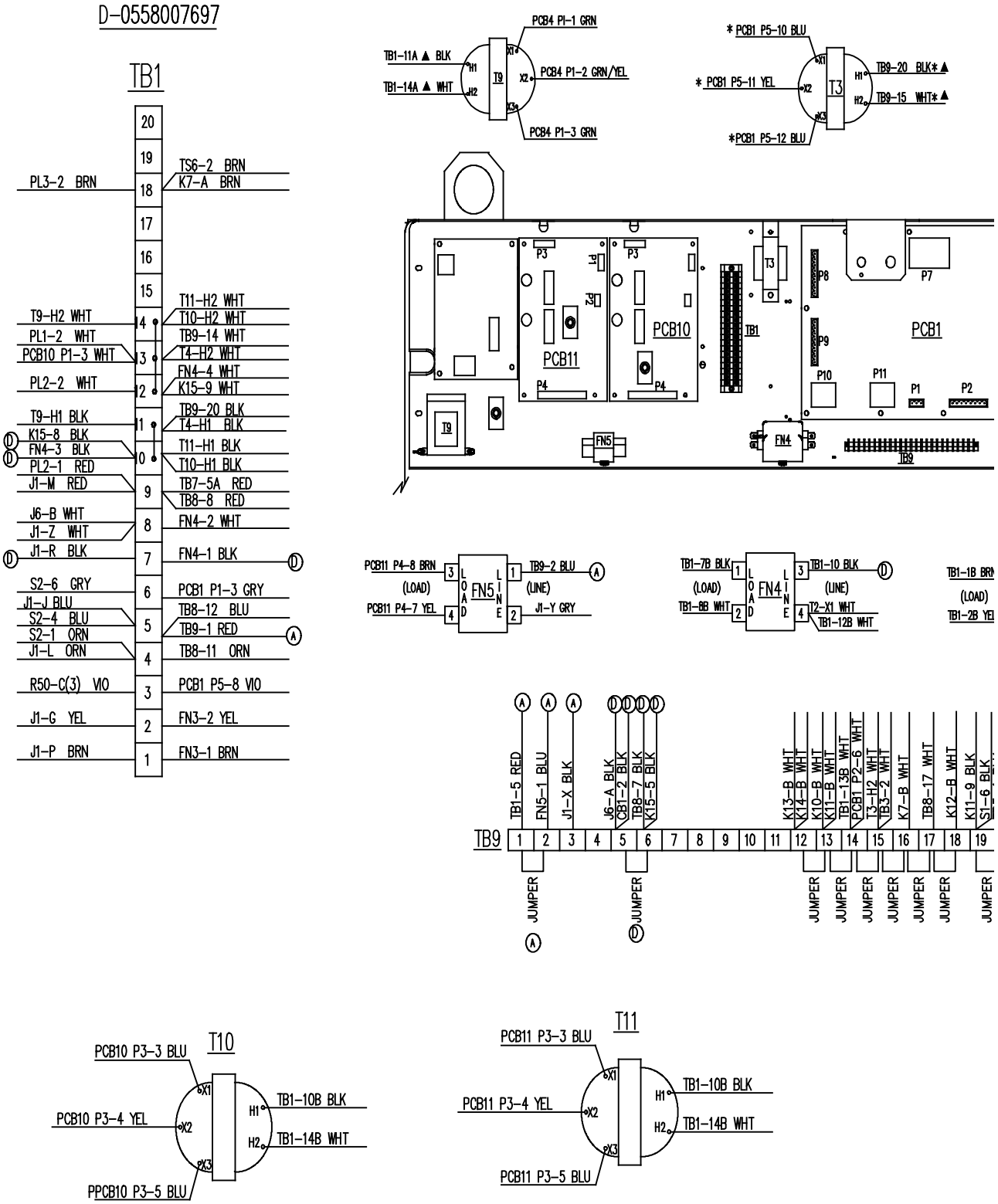
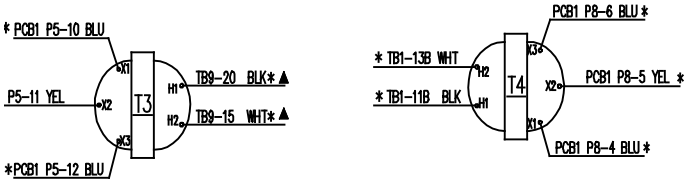


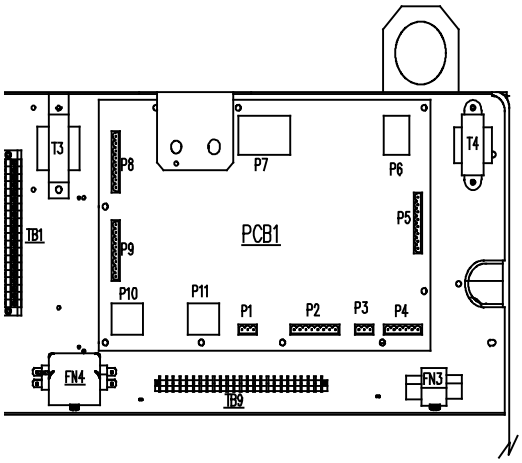

K33
K11
K10
K14
K8
K7-7 RED
C25-2 GRY
TB8-1 RED
K14-A BLU
K13-A BLU
TB7-7A BLU
K4-T3 VIO
BR2-2 BLU
BR2-3 ORN
K4-L3 BRN
TB9-13 WHT
K13-8 RED
K14-B WHT
R27-2 WHT
L3-1 RED
K11-7 BLU
R26-1 ORN
TB9-12 WHT
K10-B WHT
BR2 (-) WHT
POS PLT RED
R24-2 BRN
R46-1 BRN
S1-5 YEL
J1-S YEL
K13-5 ORN
R46-2 BLK
K4-L1 BLK
R19-2 ORN
R17-1 YEL
TB9-6 BLK
PCB1 P2-2 ORN
PCB1 P2-3 BLK
K11-1 RED
J1-T ORN
TB1-9 RED
BLK
K3-A BLU
K6-6 VIO
TB8-17 YEL
K15-6 BLK
C26-2 WHT
TB7-8A BRN
J1-C ORN
C55
TB9-13 WHT
TB9-19 BLK
K13-3 GRY
F4-1 GRY
F3-1 BLK
R27-1 BLU
R68
C57
R69
C58
R15
C15


PCB2-G RED (GATE)
PCB2-E WHT (EMITTER)
PCB2-E WHT (EMITTER)
PCB2-E WHT (EMITTER)
PCB2-G RED (GATE)
TS4-2 WHT
TB1-18B BRN
T11
K14
K8
C32
TD1
TD2
Q3
Q2
Q1
Q6
Q5
Q4
TS6
TS4
C1
C2
C3
C4
C5
C6
C7
C8
C9
C10
C11
C12
P1
1 PCB1 P7-1 BLK
2 PCB1 P7-4 RED
3 PCB1 P7-2 GRN
4 PCB1 P7-3 WHT
TS6-1 WHT
TS1-2 WHT
PCB3-G RED (GATE)
PCB3-E WHT (EMITTER)
PCB3-G RED (GATE)
PCB3-E WHT (EMITTER)
PCB3-G RED (GATE)
PCB3-E WHT (EMITTER)
VIEW F-F
(WITHOUT BUSBARS)

EPP-450, 575V, CSA







PCB1

P1
1 SH1(+) CLR(TP)
2 SH1(-) BLK(TP)
3 TB1-6 GRY
SH1-3 SHLD

P2
1
2 TB8-4 ORN
3 TB8-3 BLK
4
5 K4-A YEL
6 TB9-14 WHT
PCB1 P3-3 WHT
7 FN3-4 (LINE) ORN
8 FN3-3 (LINE) GRY

P3
1
2 K6-A BLU
3 PCB1 P2-6 WHT
PCB1 P6-2 WHT

P4
1
2
3
4
5

P9
1 GRY
2 GRY
3 GRY
4 GRY
5 GRY
PL4(+) GRY
6 VIO
7 VIO
8 VIO
9 VIO
10 VIO
11 VIO
PL5(+) VIO
12
13 TB11-4 YEL
14

P5
1 PCB4 P1-9 BLK (TP)
2 PCB4 P1-8 RED (TP)
3
4
5
6
7
8 TB1-3 VIO
9 PRA1-BLK ▲
10 T3-X1 BLU *
11 TB9-24 YEL
T3-X2 YEL *
12 T3-X3 BLU *

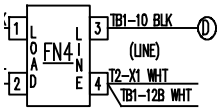
P6
1 TB7-8A ORN
2 PCB1 P3-3 WHT
3
4
5
6

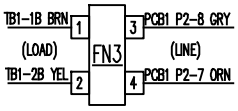
P8
1 PCB10 P4-8 GRY
2 PCB10 P4-7 VIO
3
4 T4-X1 BLU *
5 T4-X2 YEL *
6 T4-X3 BLU *

P10
1 PCB2 P1-1 BLK
2 PCB2 P1-2 WHT
3 PCB2 P1-3 GRN
4 PCB2 P1-4 RED
5 PCB2 P1-9 GRY
6 PCB2 P1-10 VIO
7 PCB2 P1-5 BLU
8 PCB2 P1-6 ORN
9 PCB2 P1-7 YEL
10 PCB2 P1-8 BRN
11
12

P11
1 PCB3 P1-1 BLK
2 PCB3 P1-2 WHT
3 PCB3 P1-3 GRN
4 PCB3 P1-4 RED
5 PCB3 P1-9 GRY
6 PCB3 P1-10 VIO
7 PCB3 P1-5 BLU
8 PCB3 P1-6 ORN
9 PCB3 P1-7 YEL
10 PCB3 P1-8 BRN
11
12

P7
1 TD1 P1-1 BLK
2 TD1 P1-3 GRN
3 TD1 P1-4 WHT
4 TD1 P1-2 RED
5 TD2 P1-1 BLK
6 TD2 P1-3 GRN
7 TD2 P1-4 WHT
8 TD2 P1-2 RED
9 PRA1- BLU ▲
10 R51-1 GRY
11 R51-2 BLK
12 R51-3 VIO
13 S3-1 RED
14 S3-2 BRN
15 S3-3 WHT



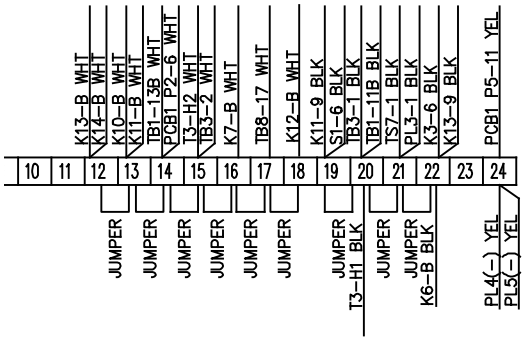


PCB11

P1
1 PCB11 P3-1 GRY
2 PCB11 P3-2 ORN
3

P3
1 PCB11 P1-1 GRY
2 PCB11 P1-2 ORN
3 T11-X1 BLU
4 T11-X2 YEL
5 T11-X3 BLU

P4
1 PCB11 P4-5 WHT
2 TD3 P1-3 GRN
3
4 TD3 P1-1 BLK
5 TD3 P1-4 WHT
PCB11 P4-1 WHT
6 TD3 P1-2 RED
7 FN5-4 YEL >LOAD
8 FN5-3 BRN



PCB10

P1
1
2 K13-6 YEL
3 TB1-13A WHT

P2
1 PCB10 P2-2 WHT > EPP-600 ONLY
2 PCB10 P2-1 WHT

P3
1
2
3 T10-X1 BLU
4 T10-X2 YEL
5 T10-X3 BLU

P4
1 S2-5 GRY
2 S2-2 VIO
3
4
5
6
7 PCB1 P8-2 VIO
8 PCB1 P8-1 GRY
9 PCB10 P4-10 WHT
10 PCB10 P4-9 WHT
11 PCB2 P4-1 WHT
12 PCB2 P4-2 BLK

BLK

WHT

p

Replacement parts

NOTES:

1. APPLY A SMALL AMOUNT OF COMPOUND (ITEM 213) ON MOUNTING SURFACES.
2. ELECTRICAL COMPONENTS DESIGNATED DO NOT APPEAR ON B.O.M. BUT ARE PART OF THE WIRE KIT AS LISTED FOR A PARTICULAR MODEL.
3. NUMBERS IN PARENTHESIS REPRESENT QUANTITIES.
4. APPLY HEATSINK COMPOUND (ITEM 212) TO ALL COPPER AND ALUMINUM TO COPPER CONNECTIONS.
5. PLACE (1) CORE ITEM 111 AND (2) FUSES ITEM 78 IN CLOTH BAG(ITEM 247) AND TIE TO TERMINAL(ITEM 123) USED ONLY ON 0558007730, & 0558007733
6. LABEL SET ITEM 138 TO BE APPLIED AT LOCATIONS SPECIFIED ON PROCESS SHEETS.
7. APPLY .25" DIA. FILLET OF SILICONE RUBBER (ITEM 213) AROUND LIFTING EYE BEFORE INSTALLING WEATHER STRIP (ITEM 154). FLATTEN WEATHER STRIP AND REMOVE ANY EXCESS SILICON RUBBER THAT MAY SQUIRT OUT.
8. PLACE SHORTING CLIPS REMOVED FROM IGBT'S(ITEM 35) INTO CLOTH BAG(ITEM 247) AND TIE TO TERMINAL(ITEM 123).

G CN-103017 JBM 3/1/98 MEA

MODEL NO. / REVISION LEVEL / QUANTITY — BILL OF MATERIALS

0558007732	0558007730	0558007731				0558007735	0558007733	0558007734	ITEM NO.	PART OR CODE NO.	SYMBOL (ELEC-AY)	DESCRIPTION	REVISION LETTER
1	1	1				1	1	1	64	634516	S4	SW TOGL SPDT 2 POS 10A 250V Q/D	
2	2	2				2	2	2	65	674969	FN1,2	PC BOARD FILTER	
2	2	2				2	2	2	66	950118	FN3,5	FILTER EMI	
1	1	1				1	1	1	67	951275	FN4	FILTER RFI	
16	16	16				16	16	16	68	950631		SUPPORT PC BOARD	
14	14	14				14	14	14	69	2062195		FASTENER EXPANSION	
1	1	1				1	1	1	70	0558001178	R50	POTENTIOMETER 10K 3W	
1	1	1				1	1	1	71	2062018	R51	POTENTIOMETER 10K 2W	
1	1	1				1	1	1	72	950929	CB2	CIRCUIT BREAKER 3A	A
1	1	1				1	1	1	73	678678		INSULATOR NOMEX	
1	1	1				1	1	1	74	0558005719		KNOB	
1	1	1				1	1	1	75	951502		KNOB	
2	4	2				2	4	2	76	2048333	F1-2	FUSE SLO-BLO 15.00A 600V	
5	5	5				5	5	5	77	0558007711	F3,4,5,7,10	FUSE 30A AC/DC TIME DELAY	
1	1	1				1	1	1	78	0558007710	F6	FUSE 15A AC/DC TIME DELAY	
1	1	1				1	1	1	79	677298	F8,F9	FUSE ASSY	
2	2	2				2	2	2	80	952103		FUSE HOLDER 60A	
6	6	6				6	6	6	81	951756		FUSE MOUNT 600V 30A	
1	1	1				1	1	1	82	950122	CB1	CIRCUIT BREAKER 10A	
1	1	1				1	1	1	83	2091558		GROUND LABEL	
2	2	2				2	2	2	84	634518	S1,S2	SWITCH TOGL DPDT 2 POS	
1	1	1				1	1	1	85	950458	S3	SWITCH TOGL DPDT 3 POS	
2	2	2				2	2	2	86	951328	PL1,PL2	LAMP NEON WHT	
2	2	2				2	2	2	87	951032	PL4,PL5	LAMP LED RED 12V	
1	1	1				1	1	1	88	2134828	PL3	LAMP INDICATOR AMBER	
1	1	1				1	1	1	89	598800	J1	CONN BOX RECP 24P	
						1	1	1	90	951282	SH1	SHUNT 100mV 800A	
1	1	1								951223		SHUNT, 100MV, 500A	
1	1	1				3	3	3	91	0558006176	TD1,TD2,TD3	TRANSDUCER CURRENT	
2	2	2								0558002348	TD1,2	TRANSDUCER CURRENT ESP-400C LEM	
1	1	1				1	1	1	92	0558007693		TRANSDUCER BRACKET EPP-450/601	
1	1	1				1	1	1	93	0558007738	K15	RELAY ENCLOSED 3PDT 24VAC 10A	A
2	2	2				2	2	2	94	950487	TB2,TB3	TERMINAL BLOCK 2 POS	
3	3	3				3	3	3	95	A-0878025	TB4,5,6	TERMINAL ASSY	
	1						1		96	0558954020		LABEL CCC	D,F
1	1	1				1	1	1	97	0558007719		SWITCH GUARD	A
47	47	47				47	47	47	98	0558004783	TB1,7,8	BLOCK TERMINAL 6MM	
6	6	6				6	6	6	99	0558004784		SECTION MOUNTING 7MM	
1	1	1				1	1	1	100	995103	TB9	TERMINAL STRIP 24 POS	
1	1	1				1	1	1	101	950238		STRIP MARKING	
1	1	1				1	1	1	102	35908	TB10	TERMINAL BOARD ASSY PILOT ARC	
1	1	1				1	1	1	103	0558002322		TERMINAL STRIP BRACKET	
2	2	2				2	2	2	104	951085	TS4,6	SWITCH THERMAL 178°F	
1	1	1				1	1	1	105	950711	TS7	SWITCH THERMAL 194°F	
2	2	2				2	2	2	106	2062334	M1,M2	MOTOR FAN 1/3 HP	
2	2	2				2	2	2	107	672330M		SHROUD FAN	
2	2	2				2	2	2	108	673679		BLADE FAN	
2	2	2				2	2	2	109	951182	M3,4	FAN 230V 50/60Hz	
2	2	2				2	2	2	110	0558006479		RESISTOR/FAN BRKT	
	1						1		111	952002		CORE SATURABLE AMORPHOUS	
7	7	7				7	7	7	112	951005	[illegible]	RCPT P/C 3 POS	
2	2	2				2	2	2	113	951007	PCB10,11 P5	RCPT P/C 5 POS	
3	3	3				3	3	3	114	951009	[illegible]	RCPT P/C 6 POS	
3	3	3				3	3	3	115	951018	[illegible]	RCPT P/C 10 POS	
3	3	3				3	3	3	116	2213375	PCB1 P5	RCPT P/C 12 POS	
1	1	1				1	1	1	117	951340	PCB1 P8	RCPT P/C 14 POS	
1	1	1				1	1	1	118	2062348	PCB4 P2	PLUG HOUSING 8 POS	
1	1	1				1	1	1	119	950022	PCB1 P6	PLUG HOUSING 6 POS	
3	3	3				3	3	3	120	2062387	PCB1 P1, PCB1 P1, PCB4 P1	PLUG HOUSING 12 POS	
1	1	1				1	1	1	121	951504	PCB1 P7	PLUG HOUSING 15 POS	
3	3	3				3	3	3	122	952008	TD1-3 P1	HOUSING CRIMP 4 POS	
1	1	1				1	1	1	123	86W93		TERMINAL RING 3/8" 1/0-2/0	
1	1	1				1	1	1	124	634230		TAB	
3	3	3				3	3	3	125	0558004792		BAR JUMPER 2 POSITION	
1	1	1				1	1	1	126	0558004793		BAR JUMPER 3 POSITION	
6	6	6				6	6	6	127	951833		PAD THERMAL IGBT	
2	2	2				2	2	2	128	0558006396		BRKT, 4 RES. MNTG	
2	2	2				2	2	2	129	0558006188		HEATSINK IGBT	
2	2	2				2	2	2	130			SKID 480 X 035 X 035 PINE	
4	4	4				4	4	4	131	950254		BRACKET MTG CAPACITOR	
8	8	8				8	8	8	132	87W19		BRACKET MTG RESISTOR SINGLE	
8	8	8				8	8	8	133	6793100Y		BRACKET MTG RESISTOR DUAL	
2	2	2				2	2	2	134	879910		BRACKET MTG RESISTOR TRIPLE	

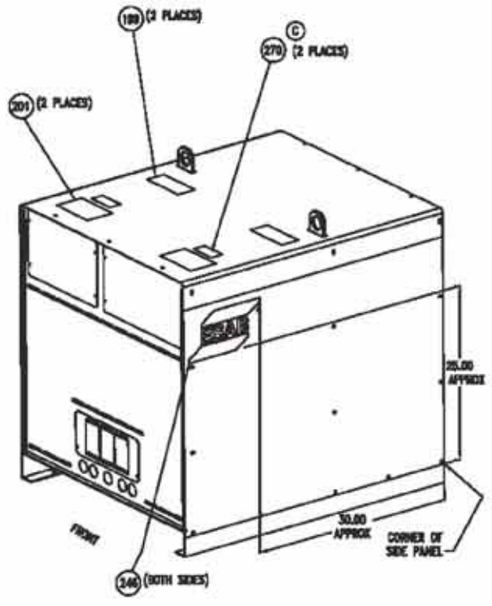
MODEL NO. / REVISION LEVEL / QUANTITY — BILL OF MATERIALS

0558007732	0558007730	0558007731				0558007735	0558007733	0558007734	ITEM NO.	PART OR CODE NO.	SYMBOL (ELEC-AY)	DESCRIPTION	REVISION LETTER
1	1	1				1	1	1	1	35749Y		BASE	
1	1	1				1	1	1	2	0558006176M		PANEL REAR	
1	1	1				1	1	1	3	0558005712M		PANEL FRONT	
1	1	1				1	1	1	4	35751Y		PANEL SIDE RIGHT	
1	1	1				1	1	1	5	35752Y		PANEL SIDE LEFT	
1	1	1				1	1	1	6	0558005709Y		COVER TOP	
1	1	1				1	1	1	7	0558008189		SHELF POWER MODULE	
1	1	1				1	1	1	8	35615		PLATE CONTACTOR	
1	1	1				1	1	1	9	0558006173		SUPPORT, CAP. BANK	
2	2	2				2	2	2	10	0558006184		TUNNEL HEATSINK IGBT	
1	1	1				1	1	1	11	0558006187		PLATE HEATSINK COVER	
2	2	2				2	2	2	12	35619		BRKT BRIDGE SUPPORT	
3	3	3				3	3	3	13	35620		PLATE HEATSINK	
1	1	1				1	1	1	14	35621		PLATE COMPONENT MOUNTING	
1	1	1				1	1	1	15	35822M		DOOR ACCESS	
1	1	1				1	1	1	16	0558007980		CONTROL BOX EPP	
1	1	1				1	1	1	17	0558007717S		PANEL CONTROL EPP	A
1	1	1				1	1	1	18	35825M		BRKT PA TERM	
1	1	1				1	1	1	19	35721Y		BAIL	
	1	1					1	1	20	0558007704	T1	XFMR AY MN 380/400/480 EPP	
1						1				0558007707	T1	XFMR AY MAIN 575V 60HZ AL	
2	2	2				2	2	2	21	35710	L1,L2	INDUCTOR	
1	1	1				1	1	1	22	647086	L3	CHOKE SIGNAL	
3	3	3				3	3	3	23	35606		BUSBAR BRIDGE	
1	1	1				1	1	1	24	0580865471	S5	ACTUATOR EMER SWITCH	A
1	1	1				1	1	1	25	35605		BUSBAR ELECTRODE	
1	1	1				1	1	1	26	0580040239		CONTACT BLOCK DPST	A
2	2	2				2	2	2	27	0558006172		BUSBAR NEGATIVE	
						1	1	1	28	0558007718S		PANEL ACCESS EPP	A
1		1								0558007712S		PANEL ACCESS EPP	
	887									0558007720S		PANEL ACCESS EPP	A
1	1	1				1	1	1	29	0558006174		BUSBAR LINKING	
1	1	1				1	1	1	30	35608		BUSBAR POSITIVE	
1	1	1				1	1	1	31	35610		BUSBAR WORK	
1	1	1				1	1	1	32	0558006484		BUS POSITIVE	
1	1	1				1	1	1	33	0558006485		BUS NEGATIVE	
2	2	2				2	2	2	34	0558006486		BUS COLLECTOR	
6	6	6				6	6	6	35	0558006183	Q1-6	MODULE IGBT 600A 600V	
2	2	2				2	2	2	36	0558006365	BR1,BR2	INPUT BRIDGE RECTIFIER	
10	10	10				10	10	10	37			M5X12 HDW	A
6	6	6				6	6	6	38	0558003656	D15-D18	DIODE FORWARD 300A 1200V	
10	10	10				10	10	10	39	0558003657	[illegible]	DIODE REVERSE 300A 1200V	
2	2	2				2	2	2	40	950703	D34,D35	RECT SIL FOR 85A	
1	1	1				1	1	1	41	0558007716		BUSBAR 2 X .50 X.04"THK COPPER	
15	15	15				15	15	15	42	951535	[illegible]	CAPACITOR 1800µF 450V	
2	2	2				2	2	2	43	0558002435	C27,28	CAPACITOR 3100µF 450VDC	
1	1	1				1	1	1	44	23210751	J4	CONN BOX RECP 2PIN	A
1	1	1				1	1	1	45	951968	C24	CAPACITOR 5.0µF 800VDC	
2	2	2				2	2	2	46	672772	C25,26	CAPACITOR 10µF 370V	
1	1	1				1	1	1	47	950255	C30	CAPACITOR 40µF 370V	
5	5	5				5	5	5	48	17300001	[illegible]	RESISTOR 1 OHM 300W	
7	7	7				7	7	7	49	17260215	[illegible]	RESISTOR 1.5K OHMS 100W	
1	1	1				1	1	1	50	17250025	R48	RES WWFXD VE ST 50W 5% 25 OHM	
4	4	4				4	4	4	51	17300008	[illegible]	RESISTOR 8 OHM 300W	
5	5	5				5	5	5	52	17300004	[illegible]	RESISTOR 4 OHM 300W	
1	1	1				1	1	1	53	0558007687	T6	XFMR CTRL 117/36CT 50/60HZ 2A	
1	1	1				1	1	1	54	0558007688	M5	FAN MUFF 3" 115V	
1	1	1				1	1	1	55	0558007702		3" FAN BRACKET	
4	4	4				4	4	4	56	951491	K2,K1A,B,C	CONTACTOR 3 POLE 90 AMP	
5	5	5				5	5	5	57	673458	[illegible]	CONTACTOR 3 POLE 40 AMP	
6	6	6				6	6	6	58	2089196	[illegible]	RELAY 3PDT BRKT MT	A
1	1	1				1	1	1	59	647343		8 POSITION TERMINAL MARKER	
1	1	1				1	1	1	60	638466	TB11	TERM BLOCK 8POS 30A F	
1	1	1				1	1	1	61	35717	T2	TRANSFORMER CONTROL	
						1	1	1	62	0558005313	PCB1	CTRL BRD EPP-601-LC	
1	1	1								0558005312		CTRL PC BRD EPP-450 LC	
2	2	2				2	2	2	63	0558005324	PCB2,3	PCA IGBT PWM/DRV DUAL FREQ	

EPP-450/601_POWER_SUPPLY_FAN

0558007694

SHEET 1 OF 7

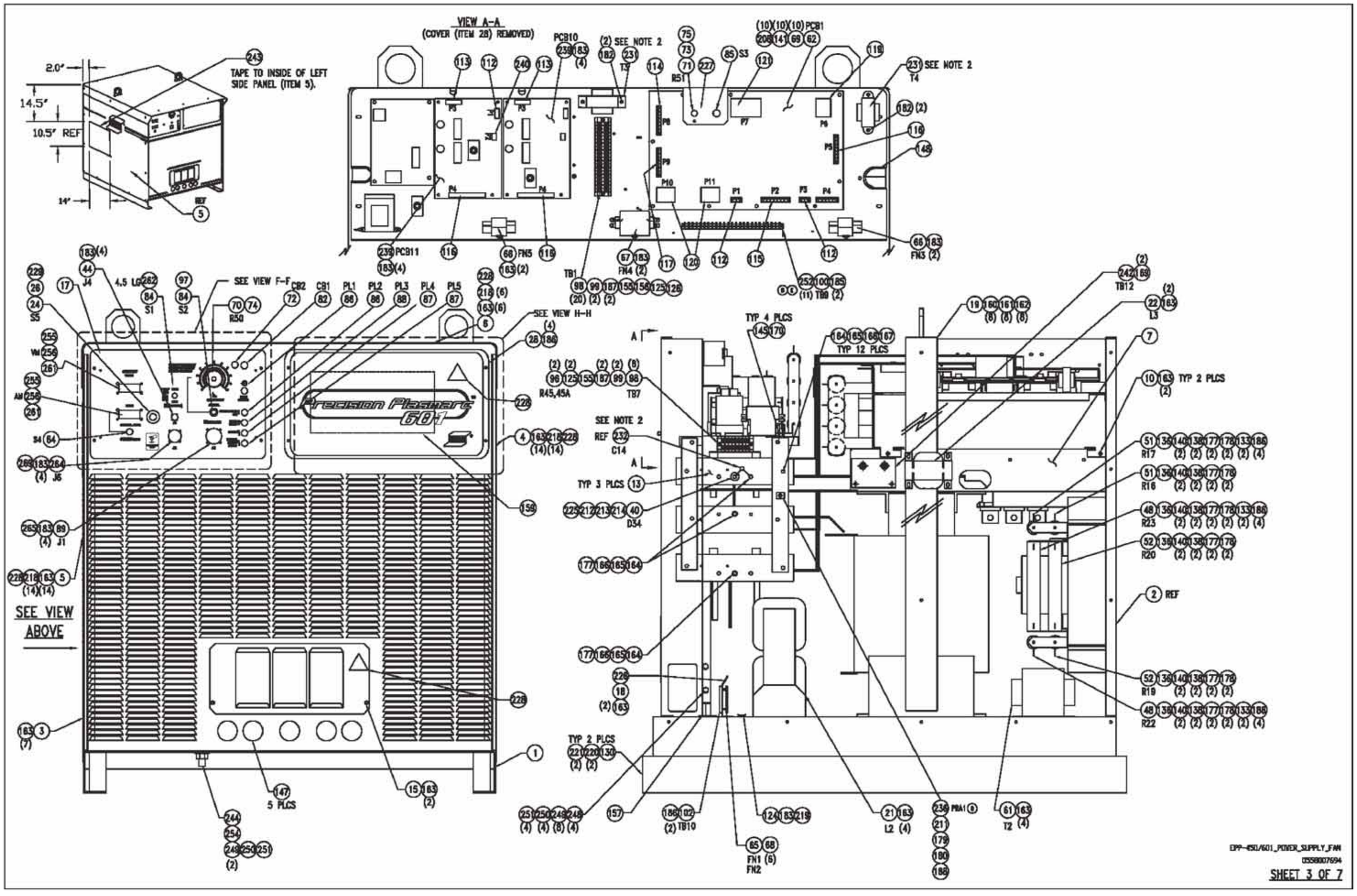


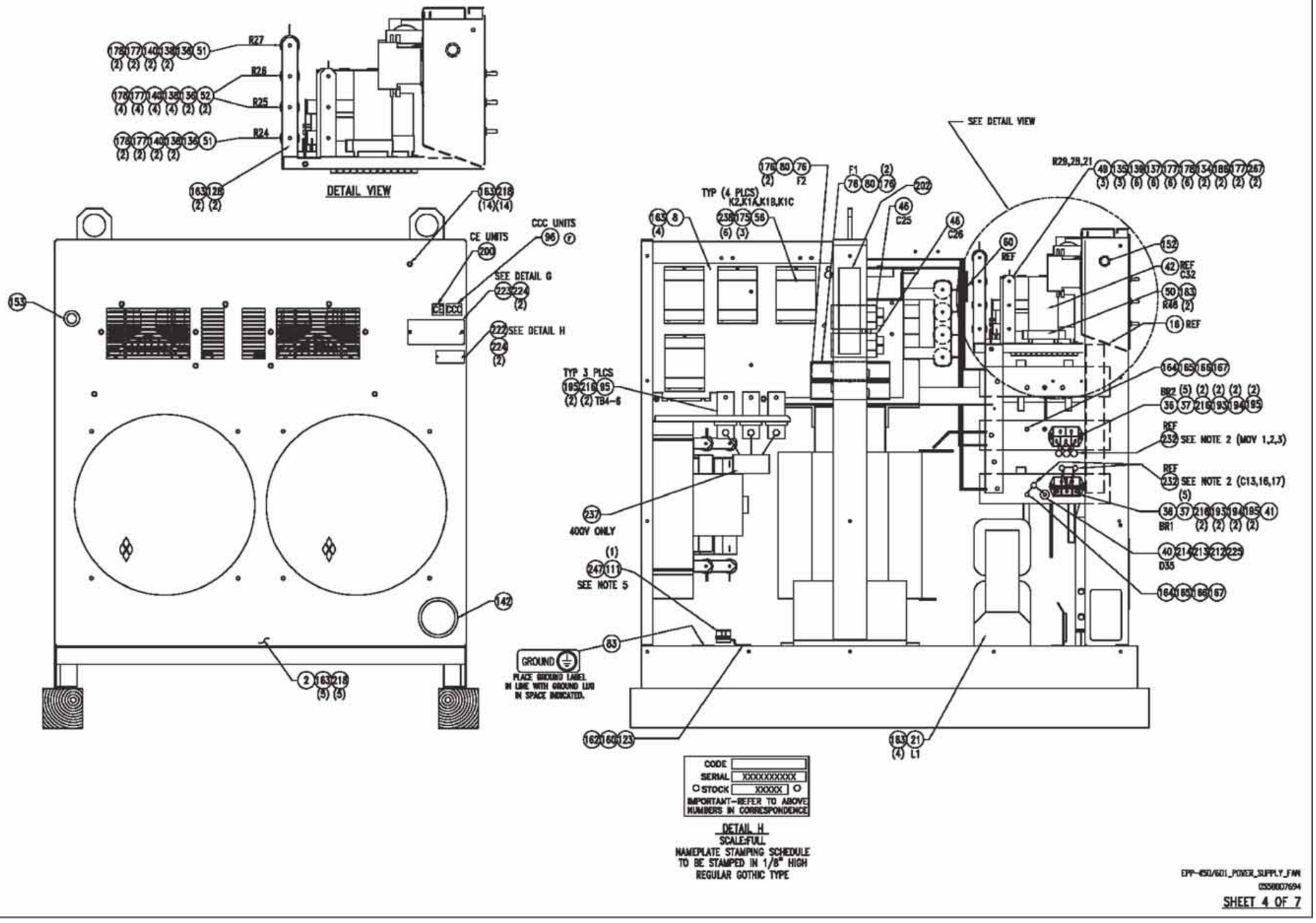
LABEL LOCATION DETAIL
(NO SCALE)

MODEL NO. 0558007732	0558007730	0558007731	0558007735	0558007733	0558007734	ITEM NO.	PART OR CODE NO.	SYMBOL (ELEC-AY)	DESCRIPTION	REVISION LETTER
REVISION LEVEL										
QUANTITY										
3	3	2	3	2	3	198	99512240		LABEL, CAUTION LIFTING EYE	
	1			1		200	0558054035		LABEL CE LOGO	
3	3	2	3	2	3	201	2091514		LABEL, WARNING	
2	2	2	2	2	2	202	990119		LABEL, WARNING HIGH VOLT	
AR	AR	AR	AR	AR	AR	203			SCR 10001 STLZPC .250-20 X 0.50	
AR	AR	AR	AR	AR	AR	204			SCR 10001 STL .313-18 X 1.0	
AR	AR	AR	AR	AR	AR	205			SCR 12009 STLZPC M05-0.80 X 16	
AR	AR	AR	AR	AR	AR	206			SCR 12009 STLZPC M08-1.00 X 20	
AR	AR	AR	AR	AR	AR	207			WASHER 53001 STLZPC M8	
14	14	14	14	14	14	208			SCR 24501 STLZPC 0.190-12 X 0.75	A
10	10	10	10	10	10	209			WASHER BELVILLE ADAPTOR .750	
8	6	6	6	6	8	210			WASHER BELVILLE ADAPTOR .250	
1	1	1	1	1	1	211			SCR #6-32 X 1 1/2 LG. PAN HD MACH SLOTTED	
AR	AR	AR	AR	AR	AR	212			CMPD ELEC JNT ALCOA #2	
AR	AR	AR	AR	AR	AR	213			ADH SILICON-RUBBER CLR	
AR	AR	AR	AR	AR	AR	214			TUBING H/SHRINK .063	
AR	AR	AR	AR	AR	AR	215			TUBING H/SHRINK .187	
AR	AR	AR	AR	AR	AR	216			SCREW, 10-24 X 3/8 HEXHD	
AR	AR	AR	AR	AR	AR	217			SCREW 1/4-20 X 5/8 HEXHD	
AR	AR	AR	AR	AR	AR	218			WASHER LOCK .25 INT TOOTH STEEL	
1	1	1	1	1	1	219			WASHER LOCK #8 EXT TOOTH	
AR	AR	AR	AR	AR	AR	220			NUT HEX 7/16-14	
AR	AR	AR	AR	AR	AR	221			WASHER,LOCK,7/16	
1	1	1	1	1	1	222	13730763		NAMEPLATE SERIAL NUMBER	
					1	223	0558054099		LABEL RATING 460V EPP-601	A
			1				0558054098		LABEL RATING 400V CE/CCC EPP-601	A,F
			1				0558054100		LABEL RATING 575V EPP-601	A
		1					0558054096		LABEL RATING 460V EPP-450	
	1						0558054095		LABEL RATING 400V (CE/CCC) EPP-450	F
1							0558054097		LABEL RATING 575V EPP-450	
4	4	4	4	4	4	224			RIVET, 43501 SST 0.125 X 0.375	
AR	AR	AR	AR	AR	AR	225			SOLDER SN96/WRAP-3 0.062 DIA	
1	1	1	1	1	1	229	954507		LABEL PILOT ARC WORK ELECTRODE	
1	1	1	1	1	1	227	954508		LABEL START/UPSLOPE	
		5				228	954509		LABEL HIGH VOLTAGE SYMBOL	
1	1	1	1	1	1	229	0558008415		LABEL, EMERGENCY-STOP	B
1	1	1	1	1	1	230			WIRE KIT POWER ESP-601 460V	
1	1	1	1	1	1	231			WIRE KIT CONTROL ESP-601 460/575V	
1	1	1	1	1	1	232			WIRE KIT LOOSE EPP/ESP-601	
.043	.043	.043	.043	.043	.043	233			HONEX 10 MIL X 2.00 W (QTY IN LBS)	
.016	.016	.016	.016	.016	.016	234			HONEX 10 MIL 2.75W	
1	1	1	1	1	1	235	38139	PCB4	PCB METER DIGITAL	
1	1	1	1	1	1	238	0558009485	PRA1	POTTED RESISTOR ASSY	C
	1			1		237	35885		CE FILTER MODULE	
16	16	16	16	16	16	239	0558008418		FERRULE, 4 GA. CABLE	B
2	2	2	2	2	2	239	0558030329	PCB10,11	PCB ANOLOG SCRLING	
1	1	1	1	1	1	240	0580999171	PCB11 P2	RCPT PLUG CONNECON 2 POS	
2	2	2	2	2	2	241	97834		GROMMET RUB .31 ID 0.4400 .089W	
1	1	1	1	1	1	242	0558007715	TB12	TERMINAL BOARD ASSY (2 POS)	
.047	.047	.047	.047	.047	.047	243	4800474		PAPER INSUL 7MIL X 10.5	B
1	1	1	1	1	1	244	88200179		BOLT CARRIAGE .50-13 x 1.75 LG	B
8	6	8	6	8	8	245	17300020	R6C-67	RESISTOR 30-OHM 300W	
2	2	2	2	2	2	246	13734086		LABEL ESAB	
1	1	1	1	1	1	247	9386		BAG CLOTH	
4	4	4	4	4	4	248			SCREW CAP HEX .50-13 X 1.5 LG	
10	10	10	10	10	10	249			WASHER FLAT .50 STL	B
5	5	5	5	5	5	250			WASHER LOCK .50 STL	B
5	5	5	5	5	5	251			NUT HEX .50-13 STL	B
11	11	11	11	11	11	252	13733543		JUMPER	E,C
2	2	2	2	2	2	253	92857		GROMMET RUB 0.630 X 0.866D X .09W	
1	1	1	1	1	1	254			WASHER, LOCK .50 EXT TOOTH	B
2	2	2	2	2	2	255	951070		BEZEL #31	
3	2	2	2	2	2	256	951081	AM/VM	METER LED 3VDC 200MA #DPM-350	
5	5	5	5	5	5	257	950008		CABLE TIE PUSH MOUNT 500/PK	
.039	.039	.039	.039	.039	.039	258			HONEX 10 MIL X 3.50 W	
.062	.062	.062	.062	.062	.062	259			HONEX 10 MIL X 4.00W	
2	2	2	2	2	2	280	0558008171		BUSBAR COLLECTOR	
2	2	2	2	2	2	261	951052		HOUSING CONTACT CRIMP 10 PIN	
.38'	.38'	.38'	.38'	.38'	.38'	262			TUBING, HEAT SHRINK, 1.5 ID, POLY, BLK	
2	2	2	2	2	2	283	936525		CAPACITOR BRACKET	
1	1	1	1	1	1	264	647233	J6	CONNECTOR BOX	
1	1	1	1	1	1	295	0558006511		CAP 24 PIN	
2	2	2	2	2	2	298			SCR 24006 STLZPC 0.164-32X0.75	
2	2	2	2	2	2	297			WSR 53002 STLZPC 0.164	
16	16	16	16	16	16	286			M6 X 12 HARDWARE	
	1			1		299	0558005720		CAP 10 PIN	
2	2	2	2	2	2	270	953288		LABEL CAUTION READ MANUAL	C

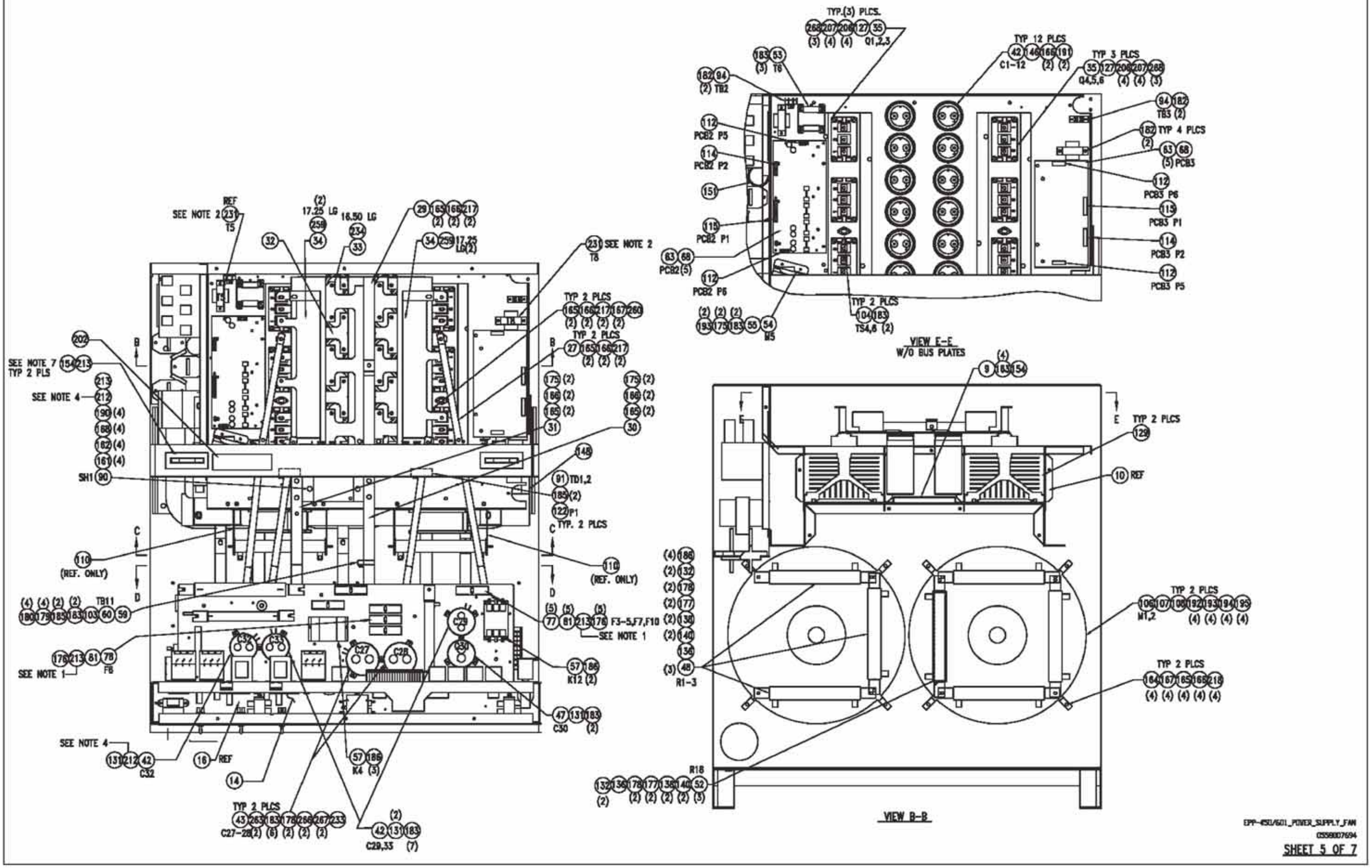
MODEL NO. 0558007732	0558007730	0558007731	0558007735	0558007733	0558007734	ITEM NO.	PART OR CODE NO.	SYMBOL (ELEC-AY)	DESCRIPTION	REVISION LETTER
REVISION LEVEL										
QUANTITY										
5	5	5	5	5	5	135	677907		ROD THREADED	
22	22	22	22	22	22	156	469438		ROD MTG RESISTOR	
19	19	19	19	19	19	137			WASHER FLAT 1.00 X .50 X .03 MICA	
44	44	44	44	44	44	138			WASHER FLAT 1.35 X .63 X .03 MICA	
19	19	19	19	19	19	139			WASHER SPECIAL	
44	44	44	44	44	44	140			WASHER CENTERING 1.00 X .63 X .25	
14	14	14	14	14	14	141			WASHER FLAT .44 X .19 X .06 NYLON	
1		1	1		1	142	30K1435		BUSHING INSULATING 3"	
	1			1			52196		CLAMP CABLE	
17	17	17	17	17	17	143	672225		STANDOFF INSULATED HEX	
1	1	1	1	1	1	144	679481		ANGLE GLASTIC	
4	4	4	4	4	4	145	53755		INSULATOR BRIDGE	
13	12	12	12	13	12	148	186491		GROMMET RUBBER 2.63 ID	
5	5	5	5	5	5	147	983428		GROMMET RUBBER 1.26 ID	
3	3	3	3	3	3	148	9501167		GROMMET RUBBER 1.12 ID	
5	5	5	5	5	5	149	33002102		GROMMET RUBBER 1.14 ID	
4	4	4	4	4	4	150	953038		GROMMET RUBBER .69 ID	
1	1	1	1	1	1	151	673038		BUSHING SNAP 1.38 ID	
1	1	1	1	1	1	152	936625		BUSHING SNAP	
1	1	1	1	1	1	153	33610167		PLUG HOLE .875 D BLK	
2	2	2	2	2	2	154	679453		SEAL WEATHER STRIP	
3	3	3	3	3	3	155	953016		STRIP MARKING 1-10	
2	2	2	2	2	2	156	953019		STRIP MARKING 11-20	
1	1	1	1	1	1	157	20K1544		LABEL WARNING	
1	1	1	1	1	1	158	0558054101		LABEL SET ESP-601	
			1	1	1	159	0558054084		LABEL PC BOX EPP-601	A
1	1	1					0558054083		LABEL PC BOX EPP-450	
8	8	8	8	8	8	180			SCR STL Z PC .375-16 X 1.0	
8	8	8	8	8	8	181			WASHER FLAT 3/8	
8	8	8	8	8	8	182			WASHER LOCK 3/8	
AR	AR	AR	AR	AR	AR	183			SCR 22501 STLZPC 0.250-20 X 0.50	
AR	AR	AR	AR	AR	AR	184			SCR 10001 STLZPC 0.250-20 X 0.75	
AR	AR	AR	AR	AR	AR	185			WASHER FLAT 1/4	
AR	AR	AR	AR	AR	AR	188			WASHER LOCK 1/4	
AR	AR	AR	AR	AR	AR	187			NUT 30001 STLZPC 0.250-20	
4	6	4	4	6	4	188			SCR .375-16 X 1.75	
AR	AR	AR	AR	AR	AR	189			SCR #8-32 X 5/8 PH THD FORM	
AR	AR	AR	AR	AR	AR	170			SCR 22501 STLZPC 0.250-20 X 0.75	
AR	AR	AR	AR	AR	AR	171			5/16 HX ST CAP SC	
AR	AR	AR	AR	AR	AR	172			WASHER FLAT 5/16"	
AR	AR	AR	AR	AR	AR	173			WASHER LOCK 5/16	
AR	AR	AR	AR	AR	AR	174			NUT 33501 STLZPC 0.312-18	
AR	AR	AR	AR	AR	AR	175			SCR #10-24 X 1/2 PH THD FORM	
AR	AR	AR	AR	AR	AR	176			SCR #8-32 X 1/2 PH THD FORM	
AR	AR	AR	AR	AR	AR	177			WASHER LOCK #8 INT TOOTH	
AR	AR	AR	AR	AR	AR	178			NUT HEX #8-32	
AR	AR	AR	AR	AR	AR	179			WASHER FLAT #8	
AR	AR	AR	AR	AR	AR	180			WASHER LOCK #8	
AR	AR	AR	AR	AR	AR	181			SCREW #4-40 X .38 PH THD FORM	
AR	AR	AR	AR	AR	AR	182			SCREW #8-32 X .20 PH THD FORM	
AR	AR	AR	AR	AR	AR	183			SCREW #8-32 X .38 PH THD FORM	
AR	AR	AR	AR	AR	AR	184			SCREW #8-32 X .50 PH THD FORM	
AR	AR	AR	AR	AR	AR	185			SCREW #8-32 X .62 PH THD FORM	
AR	AR	AR	AR	AR	AR	158			SCREW #8-32 X .88 PH THD FORM	
AR	AR	AR	AR	AR	AR	187			SCREW #4-40 X .50 PH THD FORM	
AR	AR	AR	AR	AR	AR	188			NUT HEX #8-32	
AR	AR	AR	AR	AR	AR	189			SCR 10001 STLZPC .375-16 X 1.25	
AR	AR	AR	AR	AR	AR	190			NUT HEX 3/8-16	
AR	AR	AR	AR	AR	AR	191			SCR 10001 STLZPC .250-28 X .50	
AR	AR	AR	AR	AR	AR	192			SCR #10-24 X .75	
AR	AR	AR	AR	AR	AR	193			WASHER LOCK #10	
AR	AR	AR	AR	AR	AR	194			WASHER FLAT #10	
AR	AR	AR	AR	AR	AR	195			NUT HX #10-24	
AR	AR	AR	AR	AR	AR	196			WASHER 53001 STLZPC M5	
7	7	7	7	7	7	197			NUT #8-32 NYLON	A
6	6	6	6	6	6	198	673013		TAB "F" FASTON	

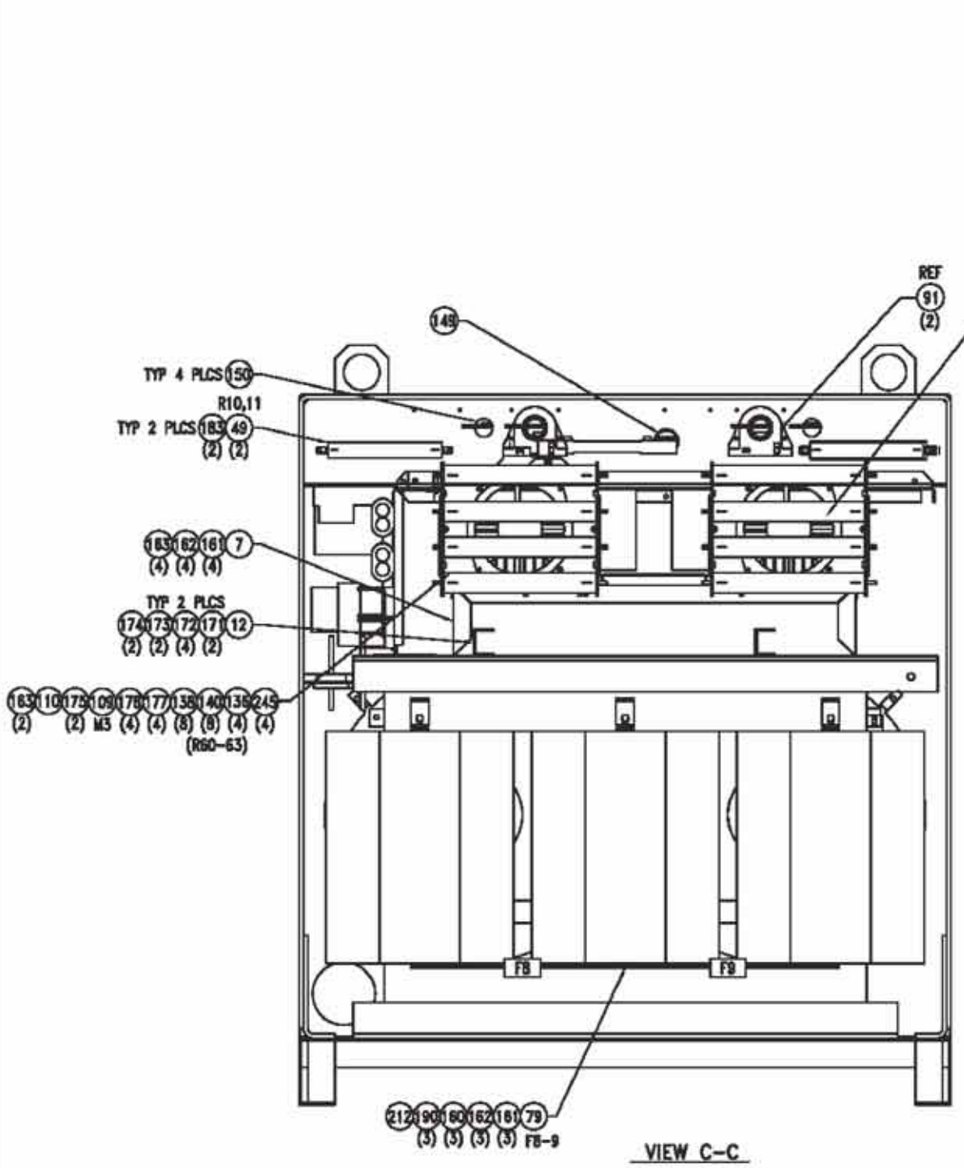
EPP-450/601_POWER_SUPPLY_FRM
0558007694

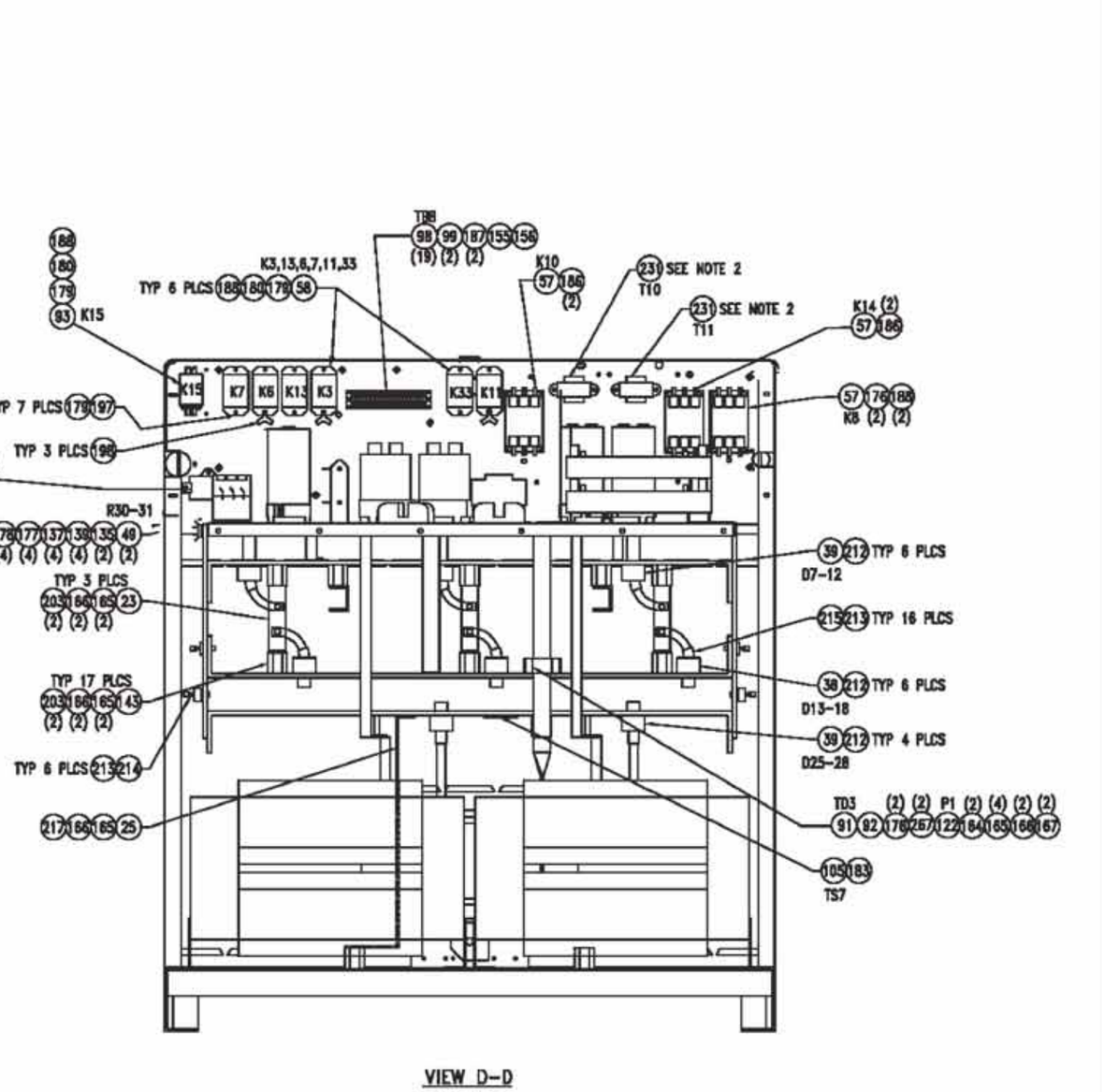

VIEW A-A
(COVER (ITEM 28) REMOVED)
2.0"
14.5"
10.5" REF
14"
TAPE TO INSIDE OF LEFT SIDE PANEL (ITEM 5).
SEE NOTE 2
SEE VIEW F-F
SEE VIEW H-H
SEE VIEW ABOVE
TYP 4 PLCS
TYP 12 PLCS
TYP 2 PLCS
TYP 3 PLCS
5 PLCS
SEE NOTE 2
REF
EPP-450i/601_POWER_SUPPLY_FAN
03598007694
SHEET 3 OF 7


DETAIL VIEW
R27
R26
R25
R24
CCC UNITS
CE UNITS
SEE DETAIL G
SEE DETAIL H
SEE DETAIL VIEW
TYP (4 PLCS) K2,K1A,K1B,K1C
TYP 3 PLCS
400V ONLY
SEE NOTE 5
GROUND
PLACE GROUND LABEL IN LINE WITH GROUND LUG IN SPACE INDICATED.
CODE
SERIAL XXXXXXXXX
STOCK XXXXX
IMPORTANT-REFER TO ABOVE NUMBERS IN CORRESPONDENCE
DETAIL H
SCALE:FULL
NAMEPLATE STAMPING SCHEDULE TO BE STAMPED IN 1/8" HIGH REGULAR GOTHIC TYPE
SEE NOTE 2 (MOV 1,2,3)
SEE NOTE 2 (C13,16,17)
EPP-450/601_POWER_SUPPLY_FAN
05588037694

SHEET 4 OF 7

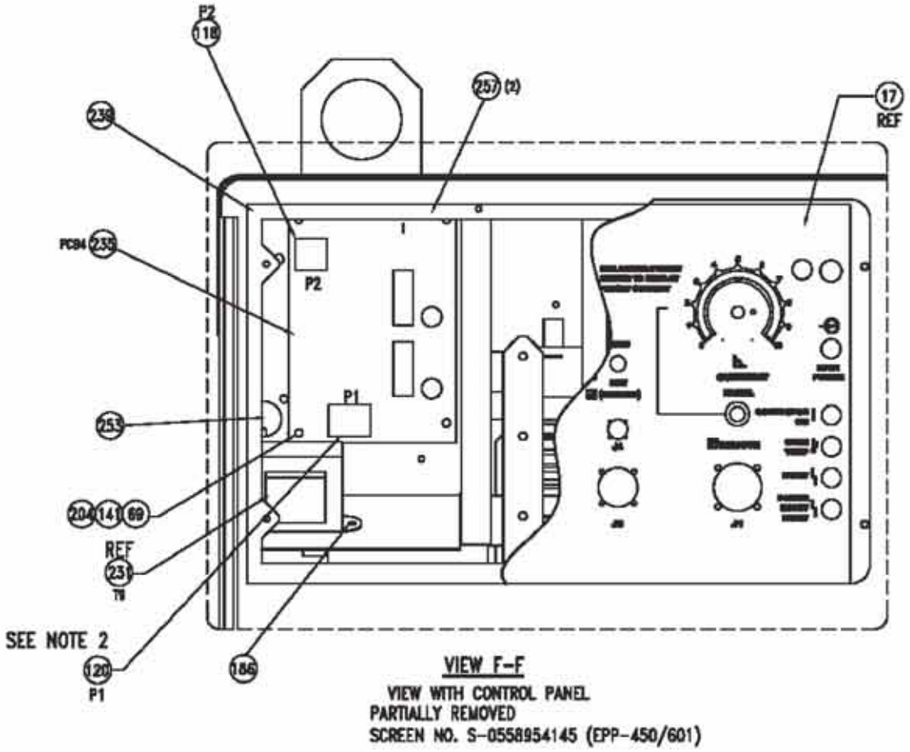

TYP.(3) PLCS.
TYP 12 PLCS
TYP 3 PLCS
TYP 4 PLCS
TYP 2 PLCS
SEE NOTE 2
SEE NOTE 7 TYP 2 PLS
SEE NOTE 4
SEE NOTE 1
SEE NOTE 4
TYP. 2 PLCS
(REF. ONLY)
TYP 2 PLCS
TYP 2 PLCS
TYP 2 PLCS
TYP 2 PLCS
VIEW E-E
W/O BUS PLATES
VIEW B-B
EPP-450/601_POWER_SUPPLY_FAN
0559007694
SHEET 5 OF 7



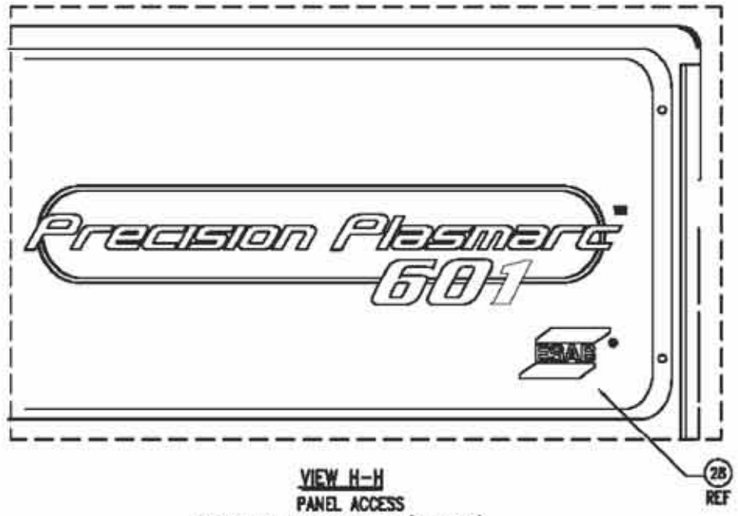


EPP-450/601_POWER_SUPPLY_FAN
05580007694

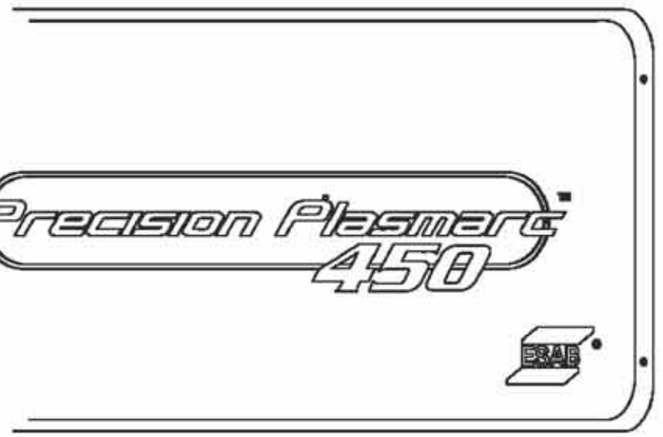
SHEET 6 OF 7



VIEW F-F
VIEW WITH CONTROL PANEL
PARTIALLY REMOVED
SCREEN NO. S-0558954145 (EPP-450/601)

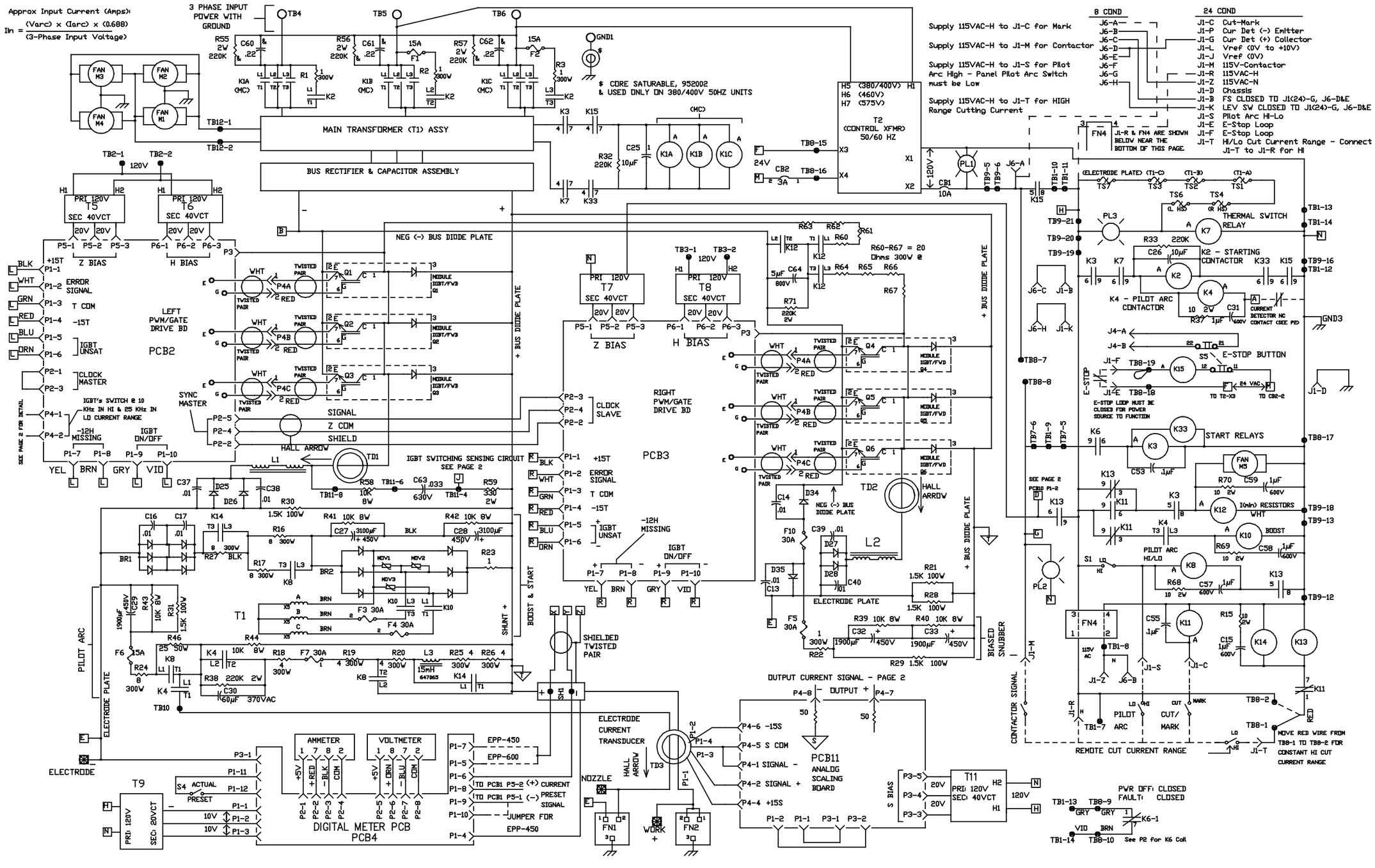


VIEW H-H
PANEL ACCESS
SCREEN NO. S-0558954110 (EPP-450)
SCREEN NO. S-0558954144 (EPP-601)

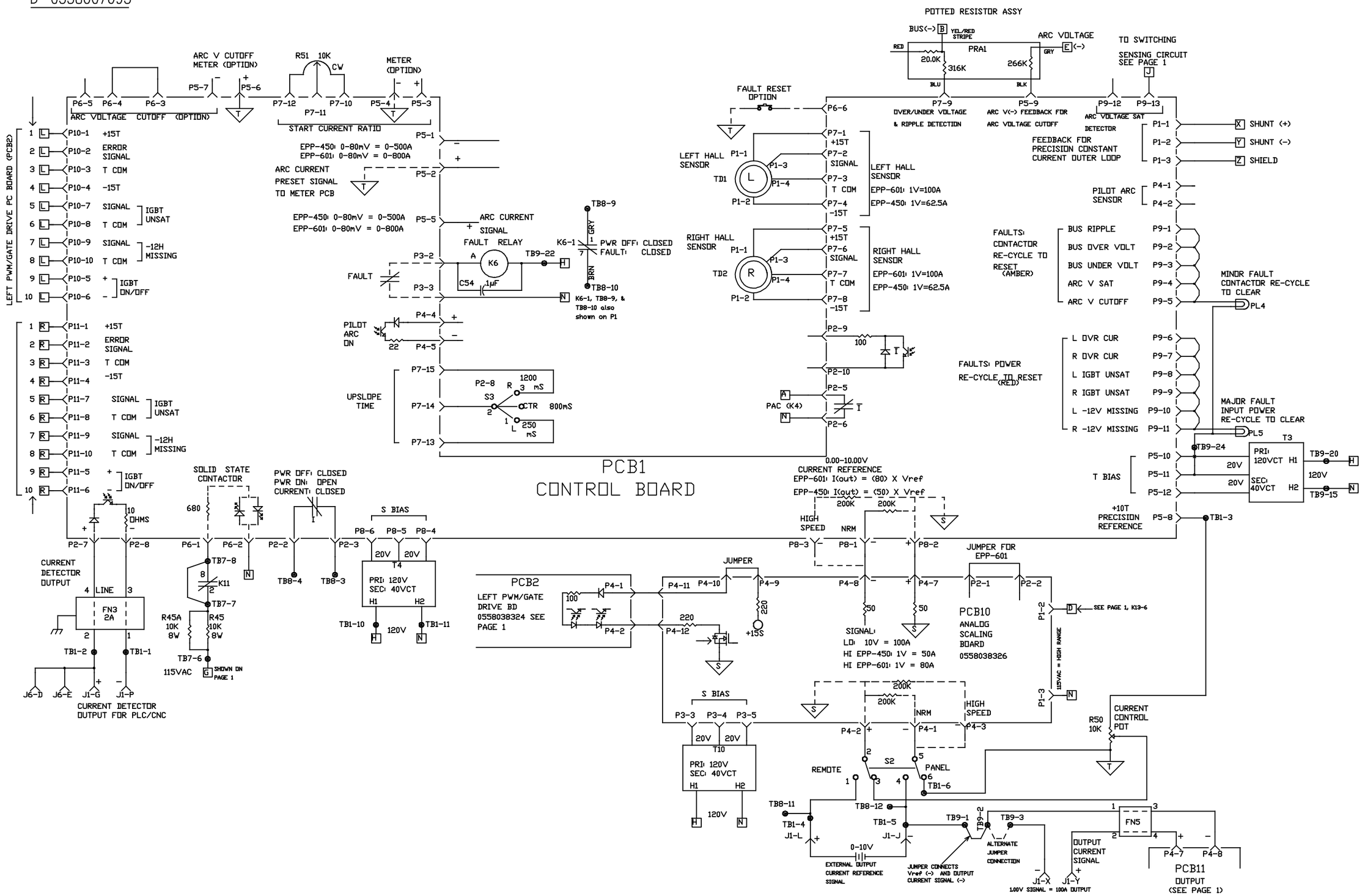


EPP-450/601_POWER_SUPPLY_FAN
0558007694
SHEET 7 OF 7

D-0558007695



D-0558007695



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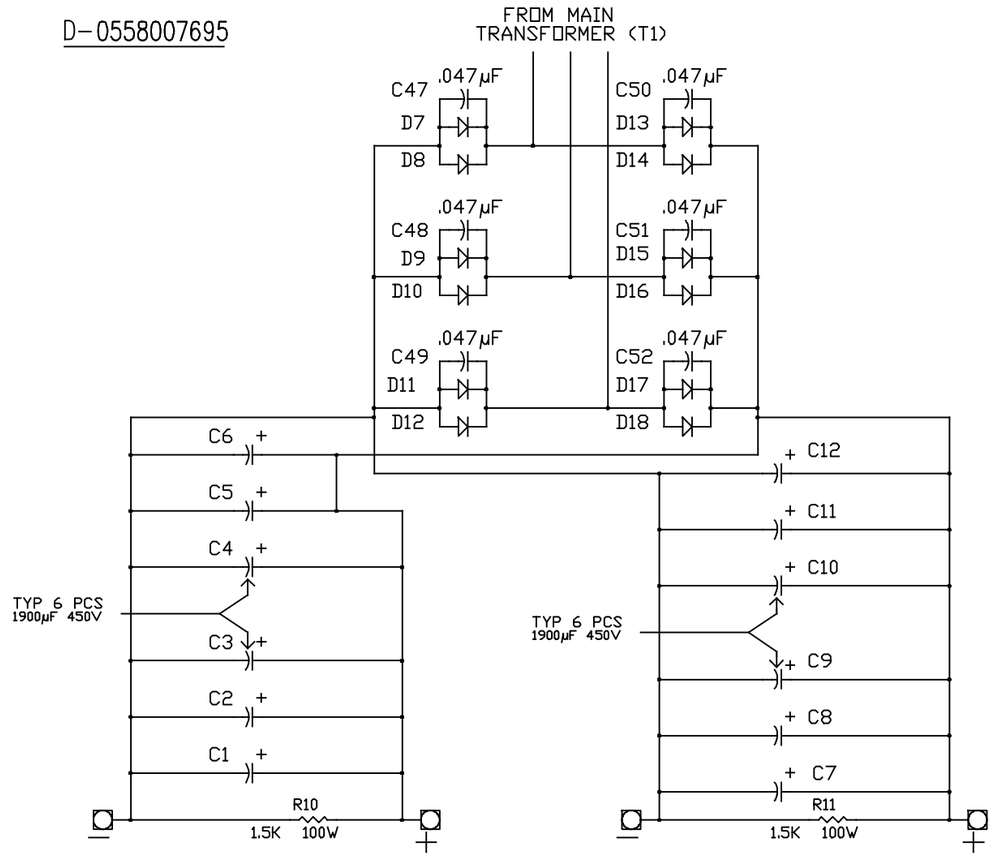
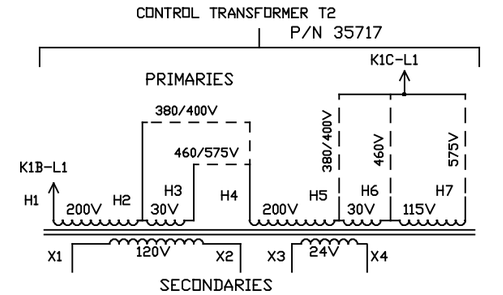
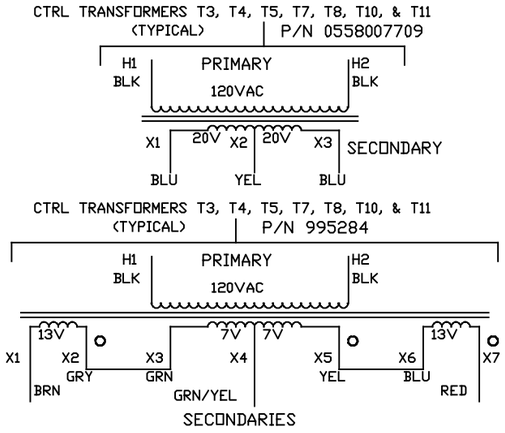
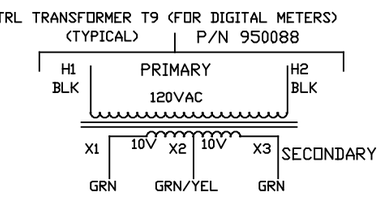
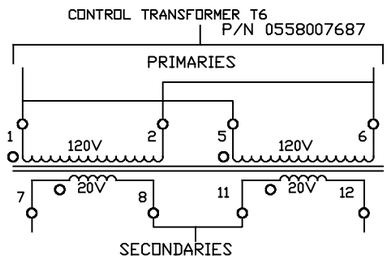




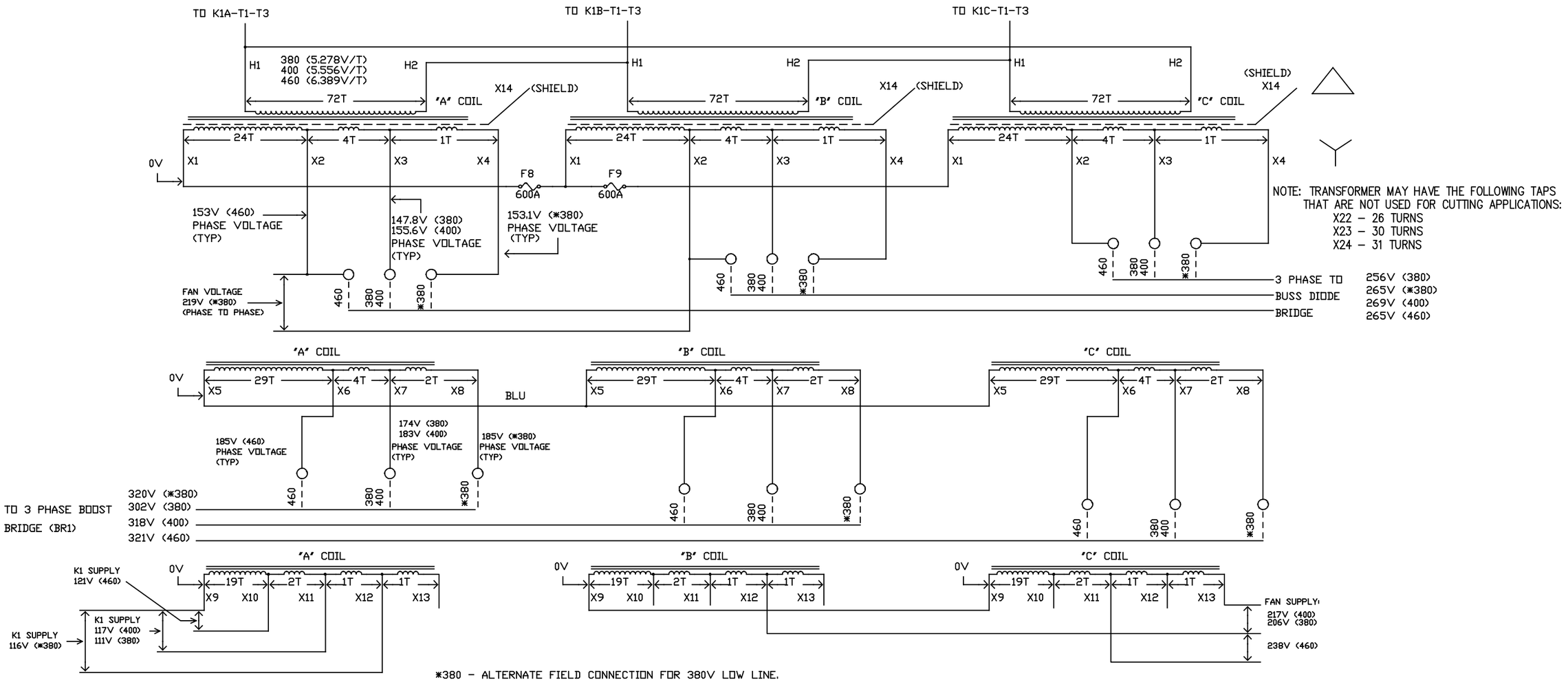






D-0558007695

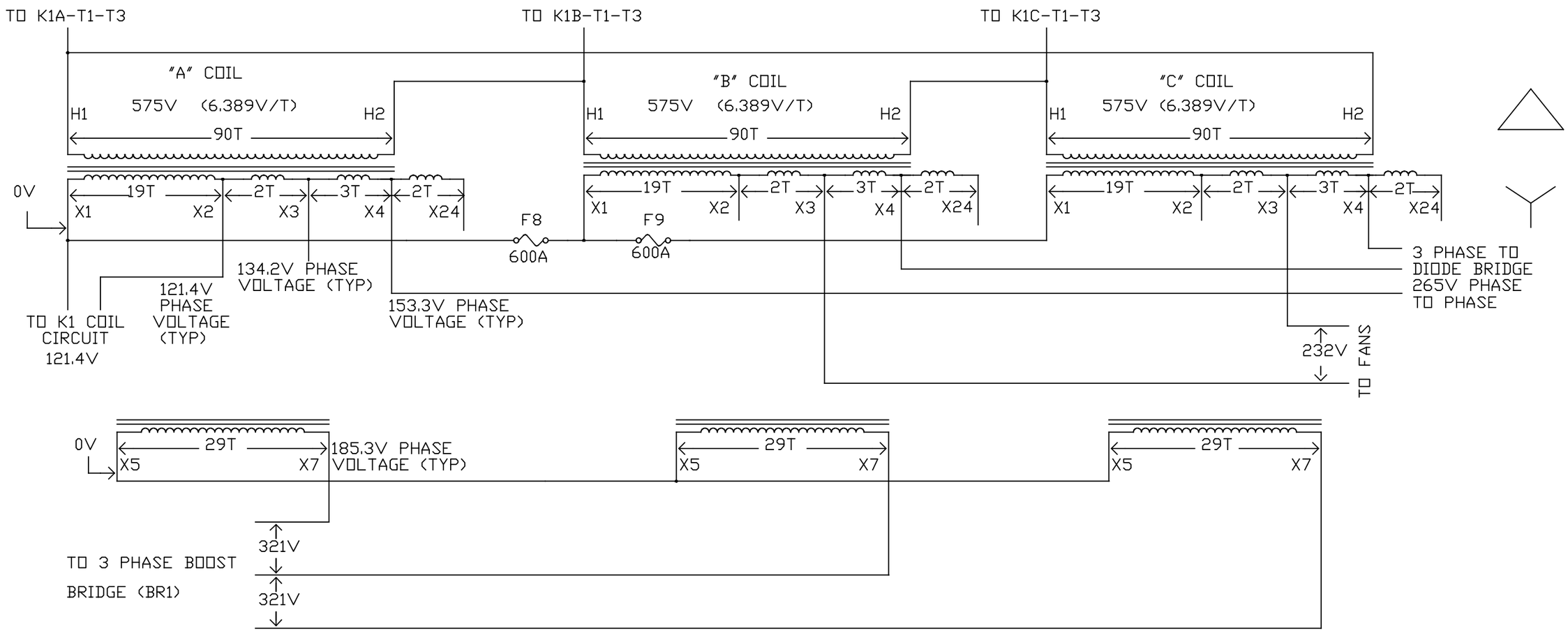
MAIN TRANSFORMER (T1) 380/400V 50Hz, 460V 60Hz, 3 PHASE

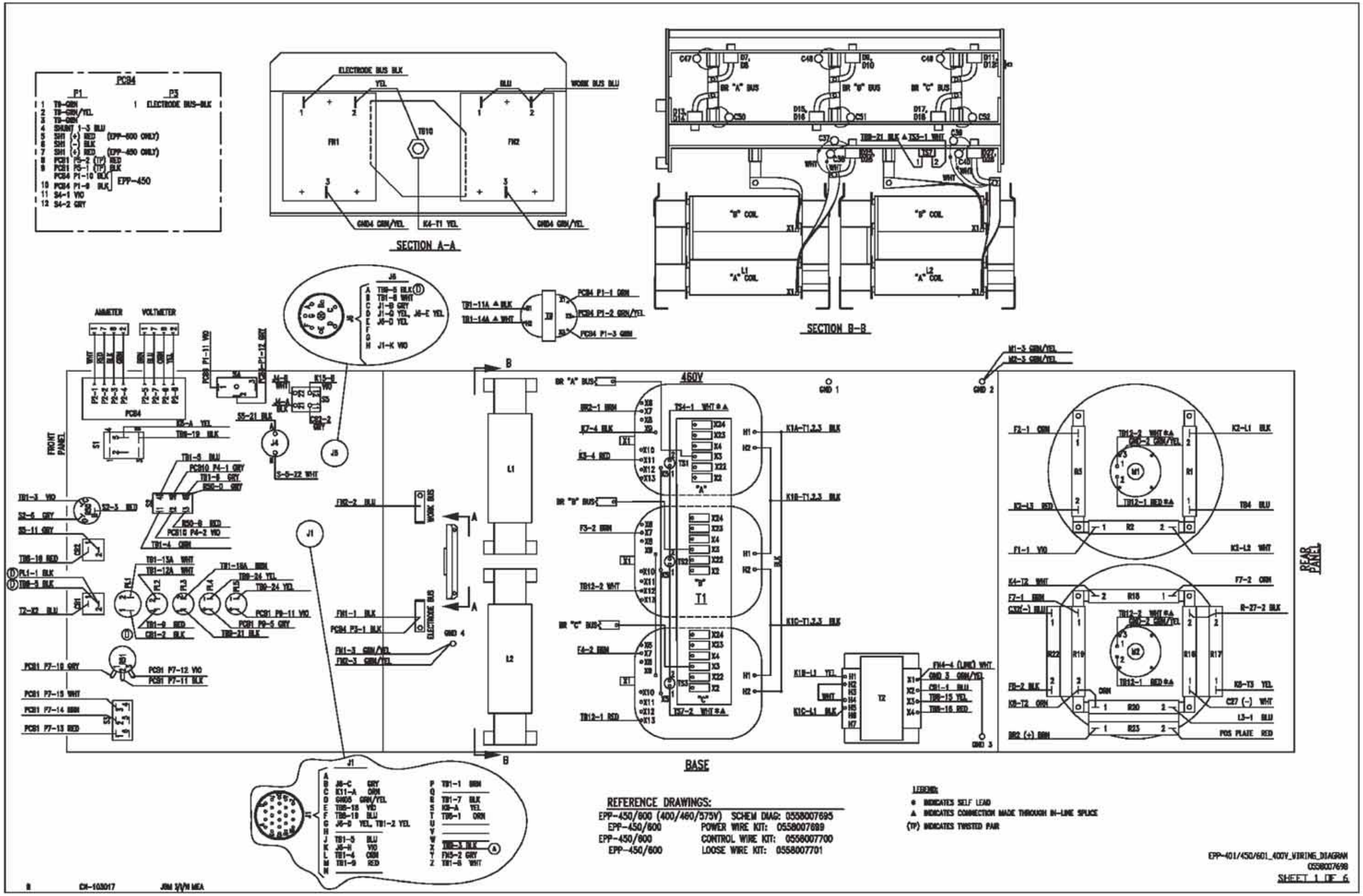


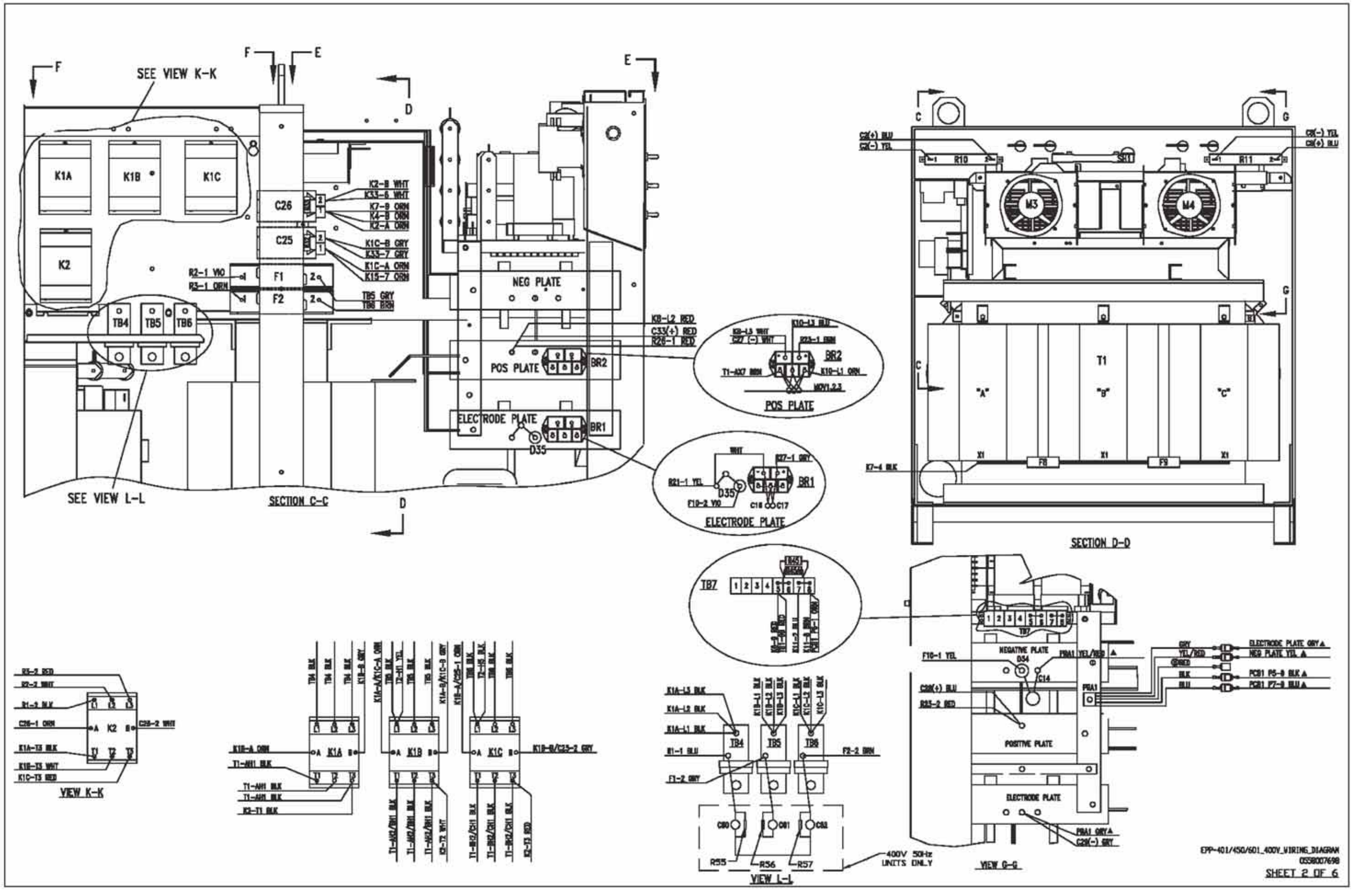
*380 - ALTERNATE FIELD CONNECTION FOR 380V LOW LINE.

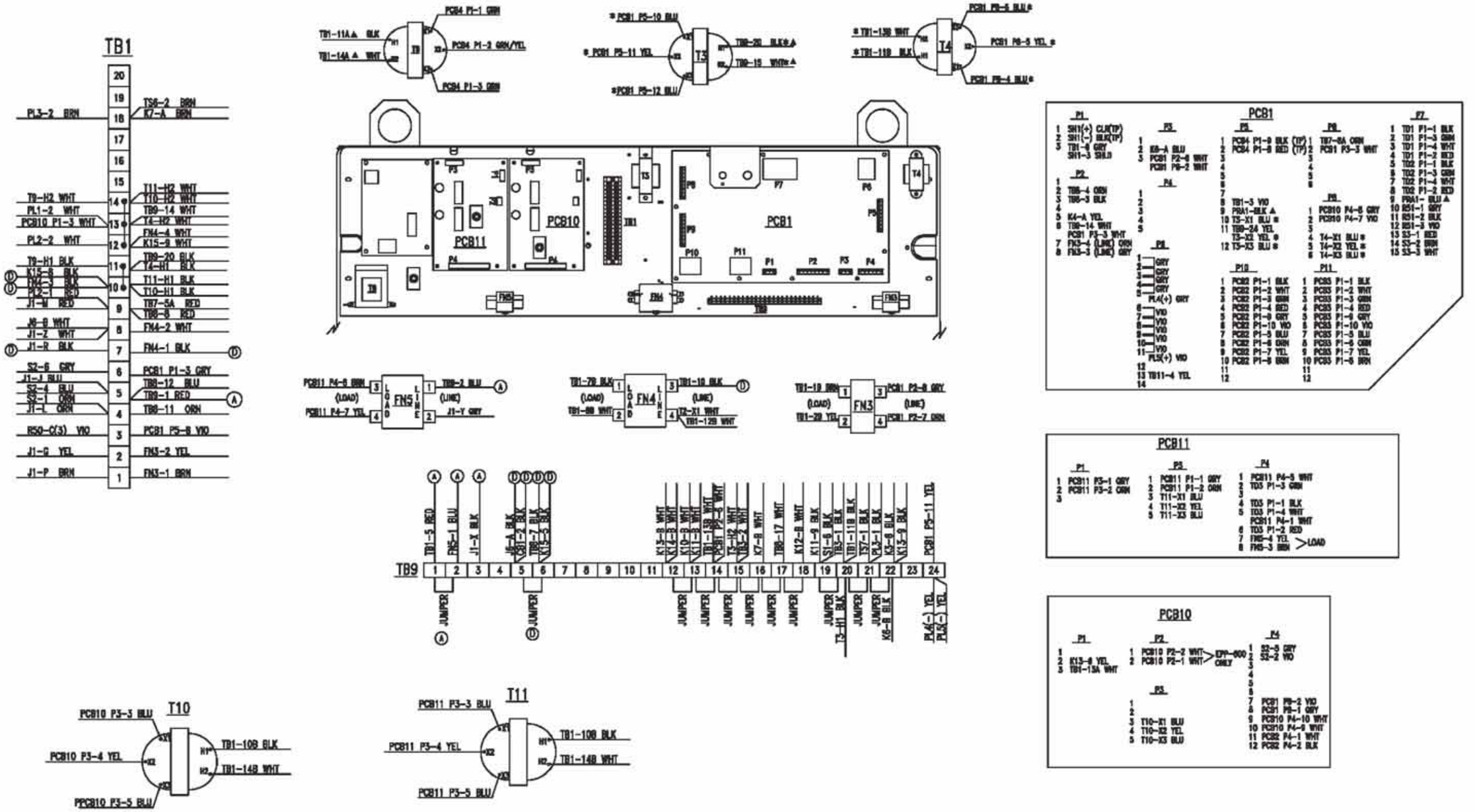
D-0558007695

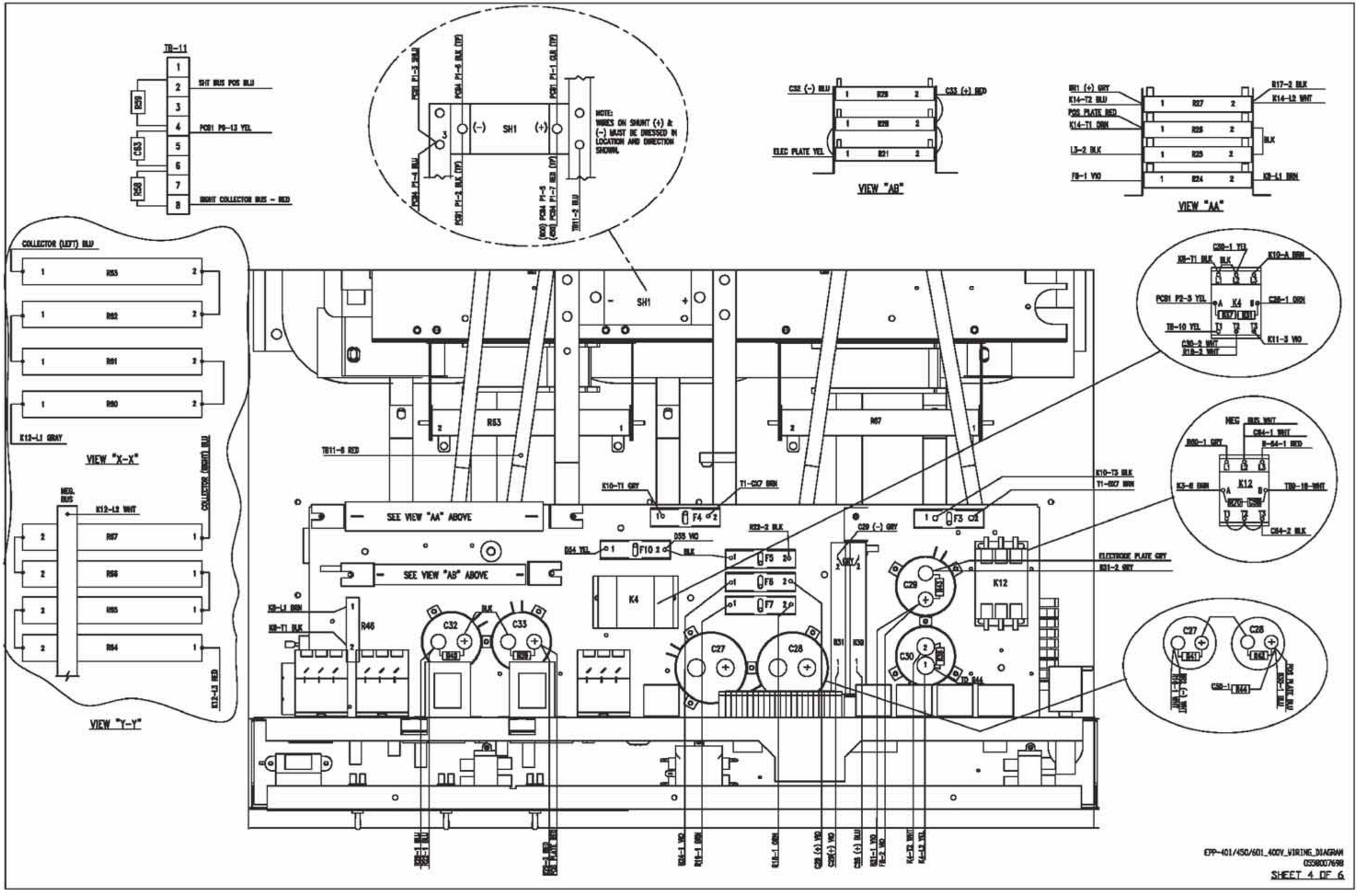
MAIN TRANSFORMER (T1) 575V 60Hz, 3 PHASE

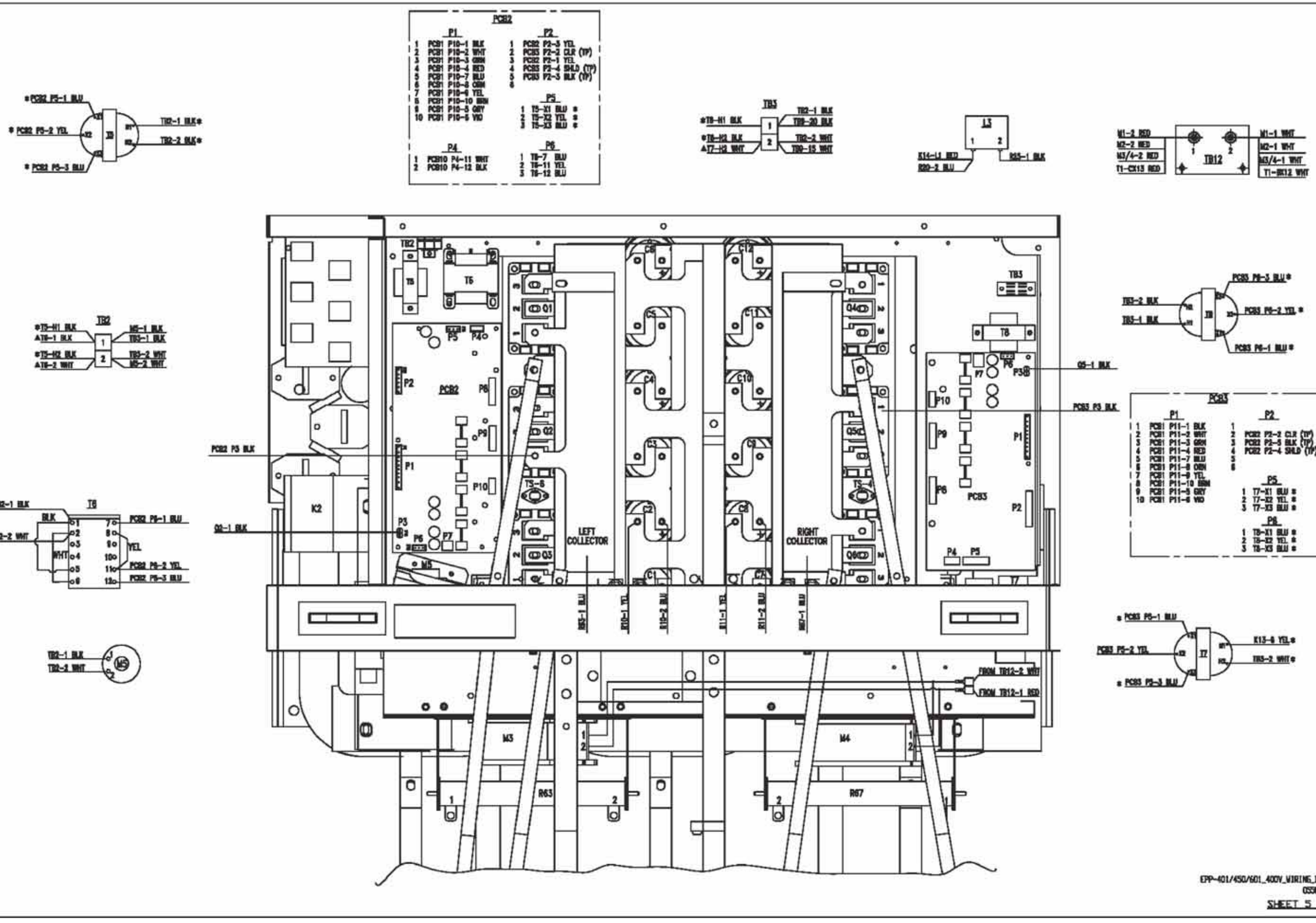


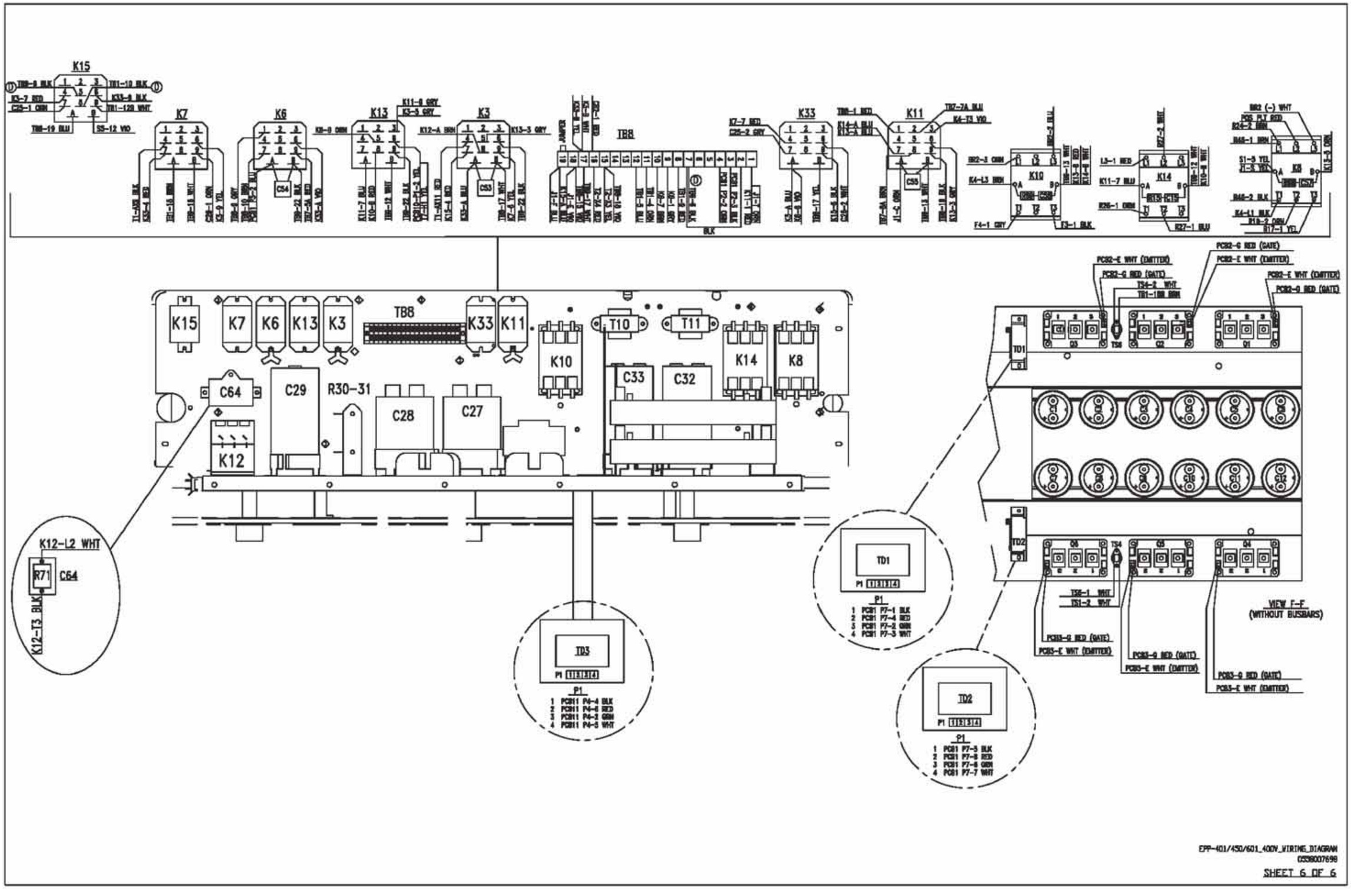

PCB4
P1
P3
1 TB-GRN
2 TB-GRN/YEL
3 TB-GRN
4 SHUNT 1-3 BLU
5 SH1 (+) RED (EPP-600 ONLY)
6 SH1 (-) BLK
7 SH1 (+) RED (EPP-450 ONLY)
8 PCB1 P3-2 (TP) RED
9 PCB1 P3-1 (TP) BLK
PCB4 P1-10 BLK
10 PCB4 P1-9 BLK
11 S4-1 VIO
12 S4-2 GRY
EPP-450
1 ELECTRODE BUS-BLK
ELECTRODE BUS BLK
YEL
BLU
WORK BUS BLU
FR1
FR2
TB10
GND4 GRN/YEL
K4-T1 YEL
GND4 GRN/YEL
SECTION A-A
BR "A" BUS
BR "B" BUS
BR "C" BUS
"B" COIL
"A" L1 COIL
"B" COIL
"A" L2 COIL
SECTION B-B
AMMETER
VOLTMETER
PCB4
FRONT PANEL
S1
J6
J1-K VIO
J6-C YEL
J6-D YEL
TB1-11A BLK
TB1-14A WHT
PCB4 P1-1 GRN
PCB4 P1-2 GRN/YEL
PCB4 P1-3 GRN
PCB9 P1-11 VIO
PCB9 P1-12 GRY
K4-A YEL
TB6-19 BLK
S5-21 BLK
S-5-22 WHT
TB1-5 BLU
PCB10 P4-1 GRY
TB1-8 GRY
R50-D GRY
R50-B RED
PCB10 P4-2 VIO
TB1-4 ORN
TB1-3 VIO
S2-3 RED
S2-6 GRY
S5-11 GRY
TB6-18 RED
PL1-1 BLK
TB6-5 BLK
T2-X2 BLU
TB1-13A WHT
TB1-12A WHT
TB1-18A BRN
TB9-24 YEL
TB9-24 YEL
PCB1 P9-11 VIO
PCB1 P9-5 GRY
TB1-9 RED
CR1-2 BLK
TB8-21 BLK
PCB1 P7-10 GRY
PCB1 P7-12 VIO
PCB1 P7-11 BLK
PCB1 P7-15 WHT
PCB1 P7-14 BRN
PCB1 P7-13 RED
B
FW2-2 BLU
WORK BUS
FW1-1 BLK
PCB4 P3-1 BLK
ELECTRODE BUS
FW1-3 GRN/YEL
FW2-3 GRN/YEL
GND 4
A
A
J1
J1
A J6-C GRY
B K11-A ORN
C GND5 GRN/YEL
D TB6-18 VIO
E TB6-19 BLU
F J6-D YEL, TB1-2 YEL
G
H
J TB1-5 BLU
K J6-H VIO
L TB1-4 ORN
M TB1-9 RED
F TB1-1 BRN
Q
R TB1-7 BLK
S K8-A YEL
T TB6-1 ORN
U
V
W TB6-3 BLK
X FW5-2 GRY
Y TB1-8 WHT
Z
L1
L2
B
460V
BR "A" BUS
BR "B" BUS
BR "C" BUS
BR2-1 BRN
X8
X7
X6
X9
X1
X10
X11
X12
X13
TS4-1 WHT
X24
X23
X4
X3
X22
X2
TS1
"A"
H1
H2
K1A-T1,2,3 BLK
K3-4 RED
F3-2 BRN
TB12-2 WHT
T1
"B"
K1B-T1,2,3 BLK
F4-2 BRN
TB12-1 RED
TS2
TS3
"C"
K1C-T1,2,3 BLK
K1B-L1 YEL
WHT
K1C-L1 BLK
T2
FW4-4 (LINE) WHT
GND 3 GRN/YEL
CR1-4 BLU
TB6-15 YEL
TB6-16 RED
GND 3
GND 1
GND 2
M1-3 GRN/YEL
M2-3 GRN/YEL
F2-1 ORN
TB12-2 WHT
GND-3 GRN/YEL
K2-L1 BLK
K2-L2 RED
TB12-1 RED
TB4 BLU
F1-1 YEL
K3-L2 WHT
K4-T2 WHT
F7-2 ORN
F7-1 BRN
C37(-) BLU
R-27-2 BLK
F8-2 BLK
K8-T2 ORN
K8-T3 YEL
C27 (-) WHT
L3-1 BLU
BR2 (+) BRN
POS PLATE RED
REAR PANEL
BASE
REFERENCE DRAWINGS:
EPP-450/600 (400/460/575V) SCHEM DIAG: 0558007695
EPP-450/600 POWER WIRE KIT: 0558007699
EPP-450/600 CONTROL WIRE KIT: 0558007700
EPP-450/600 LOOSE WIRE KIT: 0558007701
LEGEND:
● INDICATES SELF LEAD
▲ INDICATES CONNECTION MADE THROUGH IN-LINE SPLICE
(TP) INDICATES TWISTED PAIR
EPP-401/450/601_400V_WIRING_DIAGRAM
0558007698
SHEET 1 OF 6
B CH-103017 JRM 3/9/98 MEA

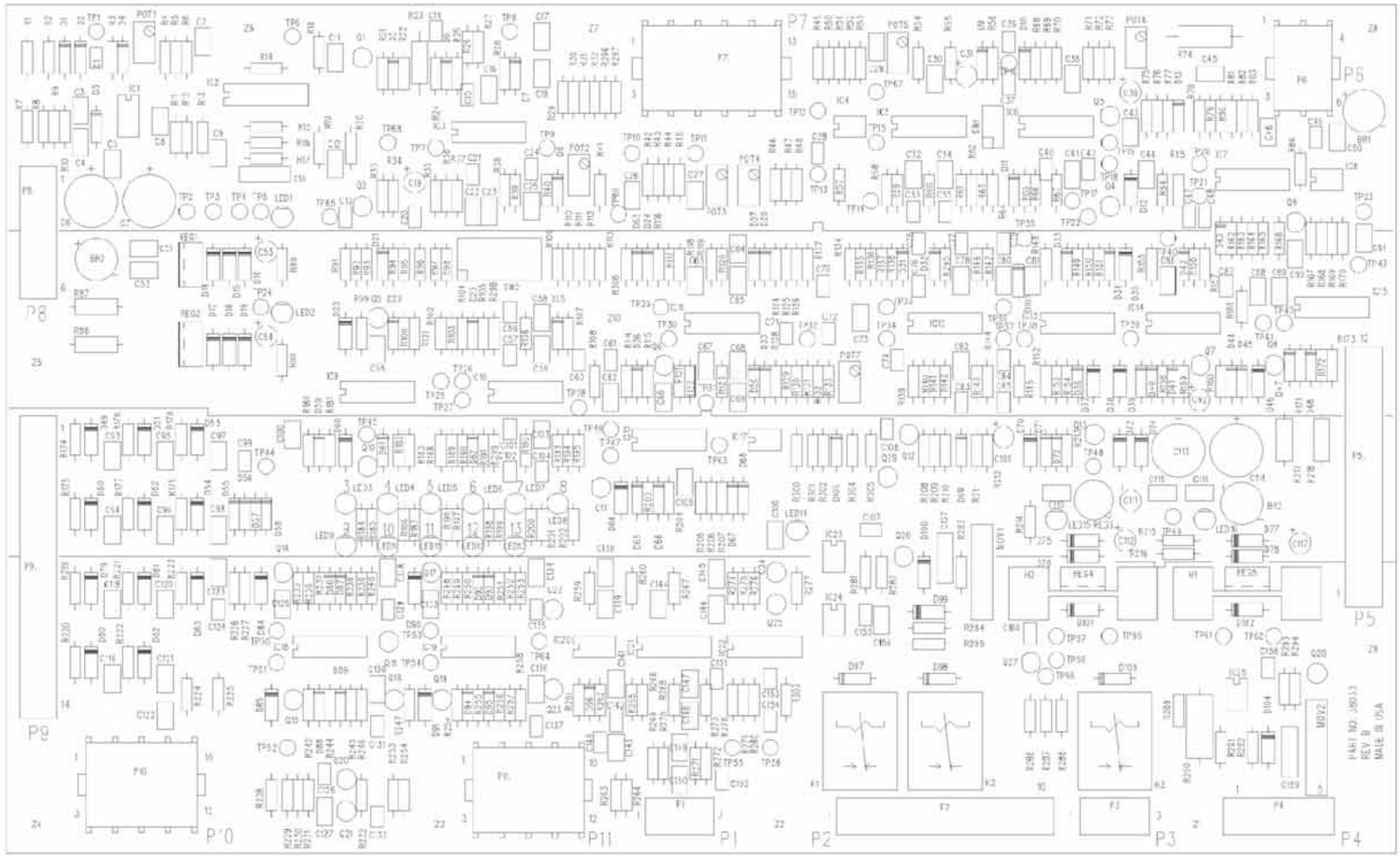

SEE VIEW K-K
SEE VIEW L-L
SECTION C-C
SECTION D-D
K1A
K1B
K1C
K2
C26
C25
F1
F2
TB4
TB5
TB6
NEG PLATE
POS PLATE
ELECTRODE PLATE
BR1
BR2
D35
T1
M3
M4
R10
R11
F8
F9
TB7
NEGATIVE PLATE
POSITIVE PLATE
ELECTRODE PLATE
VIEW K-K
VIEW L-L
VIEW G-G
400V 50Hz UNITS ONLY
EPP-401/450/601_400V_WIRING_DIAGRAM
0558007698
SHEET 2 OF 6


TB1
PL3-2 BRN
TS6-2 BRN
K7-A BRN
T9-H2 WHT
T11-H2 WHT
T10-H2 WHT
PL1-2 WHT
TB9-14 WHT
PCB10 P1-3 WHT
T4-H2 WHT
PL2-2 WHT
FN4-4 WHT
K15-B WHT
T9-H1 BLK
TB9-20 BLK
T4-H1 BLK
K15-B BLK
T11-H1 BLK
T10-H1 BLK
J1-M RED
TB7-5A RED
TB9-8 RED
A6-B WHT
FN4-2 WHT
J1-Z WHT
J1-R BLK
FN4-1 BLK
S2-6 GRY
PCB1 P1-3 GRY
J1-J BLU
TB9-12 BLU
S2-4 BLU
S2-1 ORN
TB9-1 RED
J1-L ORN
TB9-11 ORN
R50-C(3) VIO
PCB1 P5-8 VIO
J1-G YEL
FN3-2 YEL
J1-P BRN
FN3-1 BRN
PCB84 P1-1 GRN
TB1-11A BLK
PCB84 P1-2 GRN/YEL
TB1-14A WHT
PCB84 P1-3 ORN
T3
PCB1 P5-10 BLU
PCB1 P5-11 YEL
PCB1 P5-12 BLU
TB9-20 BLK
TB9-15 WHT
TB1-13B WHT
TB1-11B BLK
T4
PCB1 P5-6 BLU
PCB1 P5-5 YEL
PCB1 P5-4 BLU
PCB11
PCB10
TB1
FN5
FN4
FN3
PCB11 P4-6 GRN
(LOAD)
PCB11 P4-7 YEL
TB9-2 BLU
(LINE)
J1-Y GRY
TB1-7B BLK
TB1-8B WHT
TB1-10B BLK
T2-X1 WHT
TB1-12B WHT
TB1-19 BRN
TB1-20 YEL
PCB1 P2-8 GRY
PCB1 P2-7 ORN
TB9
TB1-5 RED
FN5-1 BLU
J1-X BLK
J6-A BLK
PCB1 P2-5 WHT
TB8-7 BLK
K15-5 BLK
K13-8 WHT
K14-B WHT
K10-B WHT
K11-B WHT
TB1-13B WHT
PCB11 P3-5 WHT
T3-H2 WHT
TB8-2 WHT
K7-B WHT
TB8-17 WHT
K12-B WHT
K11-9 BLK
S1-6 BLK
TB5-1 BLK
TB1-11B BLK
TS7-1 BLK
PL3-1 BLK
K3-6 BLK
K13-9 BLK
PCB1 P3-11 YEL
JUMPER
T3-H1 BLK
K6-B BLK
PL4(-) YEL
PL5(-) YEL
T10
PCB10 P3-3 BLU
PCB10 P3-4 YEL
PCB10 P3-5 BLU
TB1-10B BLK
TB1-14B WHT
T11
PCB11 P3-3 BLU
PCB11 P3-4 YEL
PCB11 P3-5 BLU
TB1-10B BLK
TB1-14B WHT
PCB1
P1
1 SH1(+) CLK(TP)
2 SH1(-) BLK(TP)
3 TB1-6 GRY
SH1-3 SHLD
P2
1
2 TB6-4 ORN
3 TB6-3 BLK
4
5 K4-A YEL
6 TB8-14 WHT
PCB1 P3-3 WHT
7 FN3-4 (LINE) ORN
8 FN3-3 (LINE) GRY
P3
1
2 K6-A BLU
3 PCB1 P2-6 WHT
PCB1 P4-2 WHT
P4
1
2
3
4
5
6
7
8
P5
1 PCB84 P1-3 BLK (TP)
2 PCB84 P1-2 RED (TP)
3
4
5
6
7
8 TB1-3 VIO
9 PRA1-BLK A
10 T3-X1 BLU
11 TB9-24 YEL
T3-X2 YEL
12 T3-X3 BLU
P6
1 TB7-8A ORN
2 PCB1 P3-3 WHT
3
4
5
6
P8
1 PCB10 P4-6 GRY
2 PCB10 P4-7 VIO
3
4 T4-X1 BLU
5 T4-X2 YEL
6 T4-X3 BLU
P7
1 TB1 P1-1 BLK
2 TB1 P1-3 GRN
3 TB1 P1-4 WHT
4 TB1 P1-2 RED
5 TB2 P1-1 BLK
6 TB2 P1-3 GRN
7 TB2 P1-4 WHT
8 TB2 P1-2 RED
9 PRA1- BLU A
10 DS1-1 GRY
11 DS1-2 BLK
12 DS1-3 VIO
13 SS-1 RED
14 SS-2 GRN
15 V3-3 WHT
P9
1 PCB1 P4-1 BLK
2 PCB1 P4-2 WHT
3 PCB1 P4-3 GRN
4 PCB1 P4-4 RED
5 PCB1 P4-5 GRY
6 PCB1 P4-10 VIO
7 PCB1 P4-8 YEL
8 PCB1 P4-9 ORN
9 PCB1 P4-7 YEL
10 PCB1 P4-6 BRN
11
12
P10
1 PCB2 P1-1 BLK
2 PCB2 P1-2 WHT
3 PCB2 P1-3 GRN
4 PCB2 P1-4 RED
5 PCB2 P1-5 GRY
6 PCB2 P1-10 VIO
7 PCB2 P1-8 BLU
8 PCB2 P1-9 ORN
9 PCB2 P1-7 YEL
10 PCB2 P1-6 BRN
11
12
P11
1 PCB3 P1-1 BLK
2 PCB3 P1-2 WHT
3 PCB3 P1-3 GRN
4 PCB3 P1-4 RED
5 PCB3 P1-5 GRY
6 PCB3 P1-10 VIO
7 PCB3 P1-8 BLU
8 PCB3 P1-9 ORN
9 PCB3 P1-7 YEL
10 PCB3 P1-6 BRN
11
12
P12
1 GRY
2 GRY
3 GRY
4 GRY
5 PL4(+) GRY
6
7 VIO
8 VIO
9 VIO
10 VIO
11 VIO
12 PL5(+) VIO
13 TB11-4 YEL
14
PCB11
P1
1 PCB11 P3-1 GRY
2 PCB11 P3-2 ORN
3
P3
1 PCB11 P1-1 GRY
2 PCB11 P1-2 ORN
3 T11-X1 BLU
4 T11-X2 YEL
5 T11-X3 BLU
P4
1 PCB11 P4-5 WHT
2 TD3 P1-3 GRN
3
4 TD3 P1-1 BLK
5 TD3 P1-4 WHT
PCB11 P4-1 WHT
6 TD3 P1-2 RED
7 FN5-4 YEL >LOAD
8 FN5-3 BRN >LOAD
PCB10
P1
1
2 K13-8 YEL
3 TB1-13A WHT
P2
1 PCB10 P2-2 WHT > EPP-600 ONLY
2 PCB10 P2-1 WHT > EPP-600 ONLY
P3
1
2
3 T10-X1 BLU
4 T10-X2 YEL
5 T10-X3 BLU
P4
1 SS-5 GRY
2 SS-2 VIO
3
4
5
6
7 PCB1 P8-2 VIO
8 PCB1 P8-1 GRY
9 PCB10 P4-10 WHT
10 PCB10 P4-9 WHT
11 PCB2 P4-1 WHT
12 PCB2 P4-2 BLK
EPP-401/450/601_400V_WIRING_DIAGRAM
0559007698
SHEET 3 OF 6

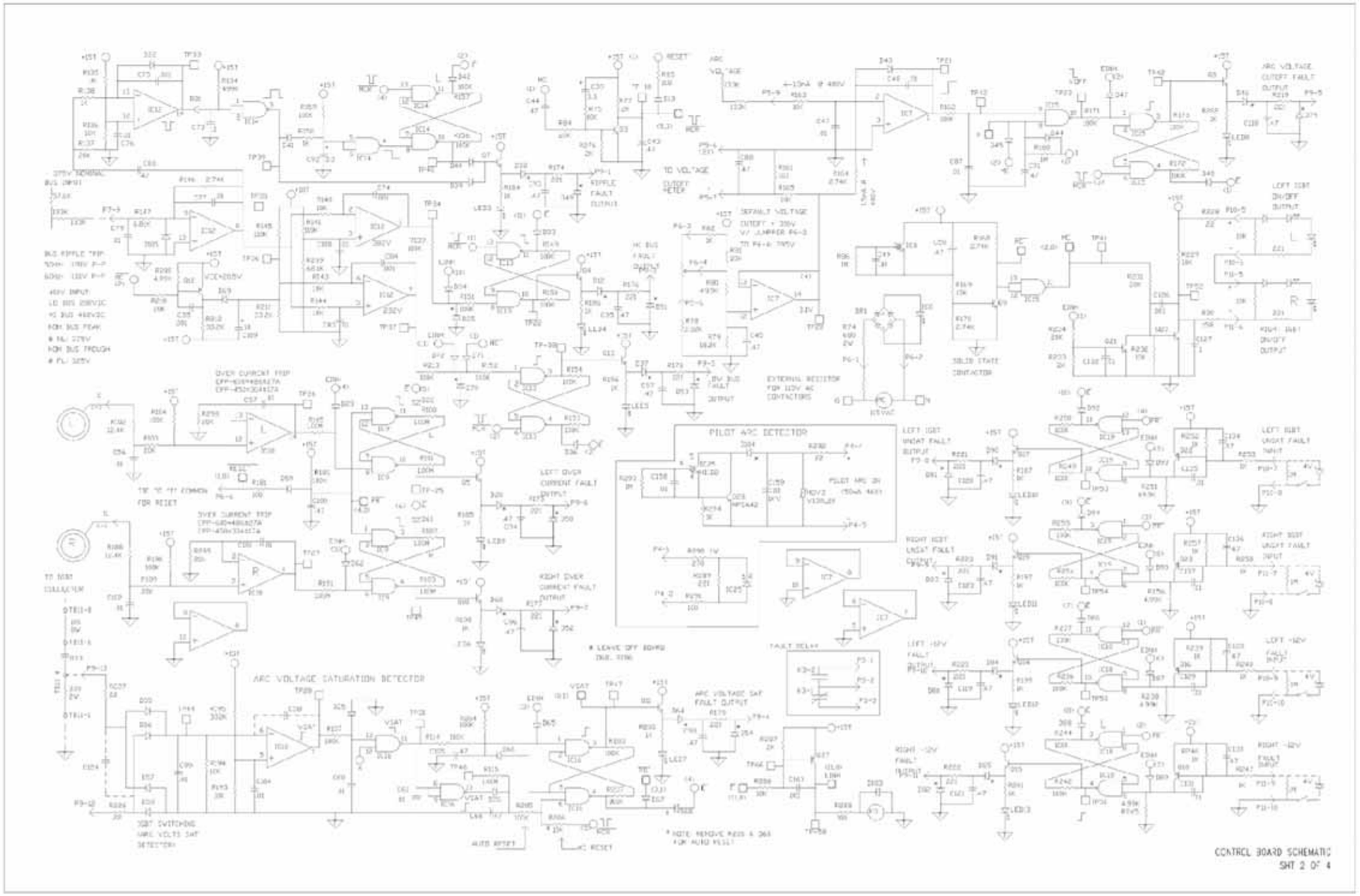

TB-11
SHT BUS POS BLU
PCB1 P9-13 YEL
BRGHT COLLECTOR BUS - RED
NOTE: WIRES ON SHUNT (+) & (-) MUST BE DRESSED IN LOCATION AND DIRECTION SHOWN.
SH1
VIEW "AB"
VIEW "AA"
COLLECTOR (LEFT) BLU
VIEW "X-X"
VIEW "Y-Y"
SEE VIEW "AA" ABOVE
SEE VIEW "AB" ABOVE
K4
K12
C27
C28
C29
C30
C32
C33
R46
R53
R57
TB11-6 RED
K10-T1 GRY
T1-CX7 BRN
K10-T3 BLK
ELECTRODE PLATE GRY
EPP-401/450/601_400V_WIRING_DIAGRAM
0559007698
SHEET 4 OF 6

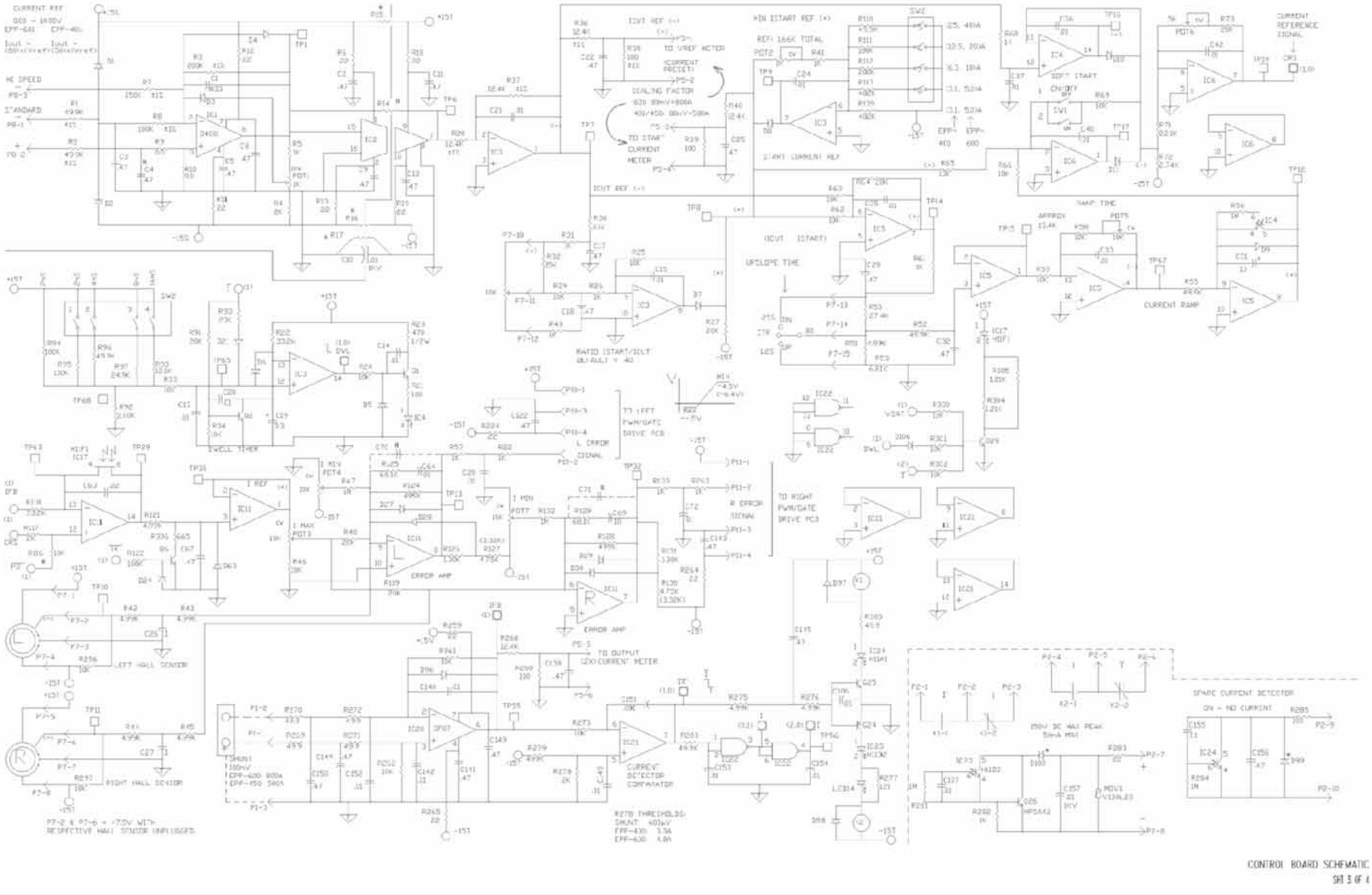

PCB2
P1
1 PCB1 P10-1 BLK
2 PCB1 P10-2 WHT
3 PCB1 P10-3 GRN
4 PCB1 P10-4 RED
5 PCB1 P10-7 BLU
6 PCB1 P10-8 ORN
7 PCB1 P10-9 YEL
8 PCB1 P10-10 BRN
9 PCB1 P10-5 GRY
10 PCB1 P10-6 VIO
P2
1 PCB2 P2-3 YEL
2 PCB3 P2-2 CLK (TP)
3 PCB2 P2-1 YEL
4 PCB3 P2-4 SHLD (TP)
5 PCB3 P2-3 BLK (TP)
6
P4
1 PCB10 P4-11 WHT
2 PCB10 P4-12 BLK
P5
1 T5-X1 BLU *
2 T5-X2 YEL *
3 T5-X3 BLU *
P6
1 T8-7 BLU
2 T8-11 YEL
3 T8-12 BLU
* PCB2 P5-1 BLU
* PCB2 P5-2 YEL
* PCB2 P5-3 BLU
TR2-1 BLK *
TR2-2 BLK *
TB3
*T8-H1 BLK
*T8-H2 BLK
▲T7-H3 WHT
TR2-1 BLK
TB9-20 BLK
TR2-2 WHT
TB9-15 WHT
L3
X14-L3 RED
R20-2 BLU
R45-1 BLK
W1-2 RED
W2-2 RED
W3/4-2 RED
T1-CX13 RED
TR12
W1-1 WHT
W2-1 WHT
W3/4-1 WHT
T1-BR12 WHT
TR2
*T5-H1 BLK
▲T8-1 BLK
*T5-H2 BLK
▲T8-2 WHT
M5-1 BLK
TB3-1 BLK
TB3-2 WHT
M5-2 WHT
T6
TR2-1 BLK
BLK
TR2-2 WHT
WHT
YEL
PCB2 P5-1 BLU
PCB2 P5-2 YEL
PCB2 P5-3 BLU
TR2-1 BLK
TR2-2 WHT
M5
TB3-2 BLK
TB3-1 BLK
PCB3 P5-3 BLU *
PCB3 P5-2 YEL *
PCB3 P5-1 BLU *
Q5-1 BLK
PCB3 P3 BLK
PCB2 P3 BLK
Q2-1 BLK
PCB3
P1
1 PCB1 P11-1 BLK
2 PCB1 P11-2 WHT
3 PCB1 P11-3 GRN
4 PCB1 P11-4 RED
5 PCB1 P11-7 BLU
6 PCB1 P11-8 ORN
7 PCB1 P11-9 YEL
8 PCB1 P11-10 BRN
9 PCB1 P11-5 GRY
10 PCB1 P11-6 VIO
P2
1 PCB2 P3-2 CLK (TP)
2 PCB2 P3-3 BLK (TP)
3 PCB2 P2-4 SHLD (TP)
4
P5
1 T7-X1 BLU *
2 T7-X2 YEL *
3 T7-X3 BLU *
P6
1 T8-X1 BLU *
2 T8-X2 YEL *
3 T8-X3 BLU *
PCB3 P5-1 BLU *
PCB3 P5-2 YEL *
PCB3 P5-3 BLU *
K13-6 YEL *
TR5-2 WHT *
FROM TR12-2 WHT
FROM TR12-1 RED
LEFT COLLECTOR
RIGHT COLLECTOR
M3
M4
R63
R67
EPP-401/450/601_400V_WIRING_DIAGRAM
05598007698
SHEET 5 OF 6

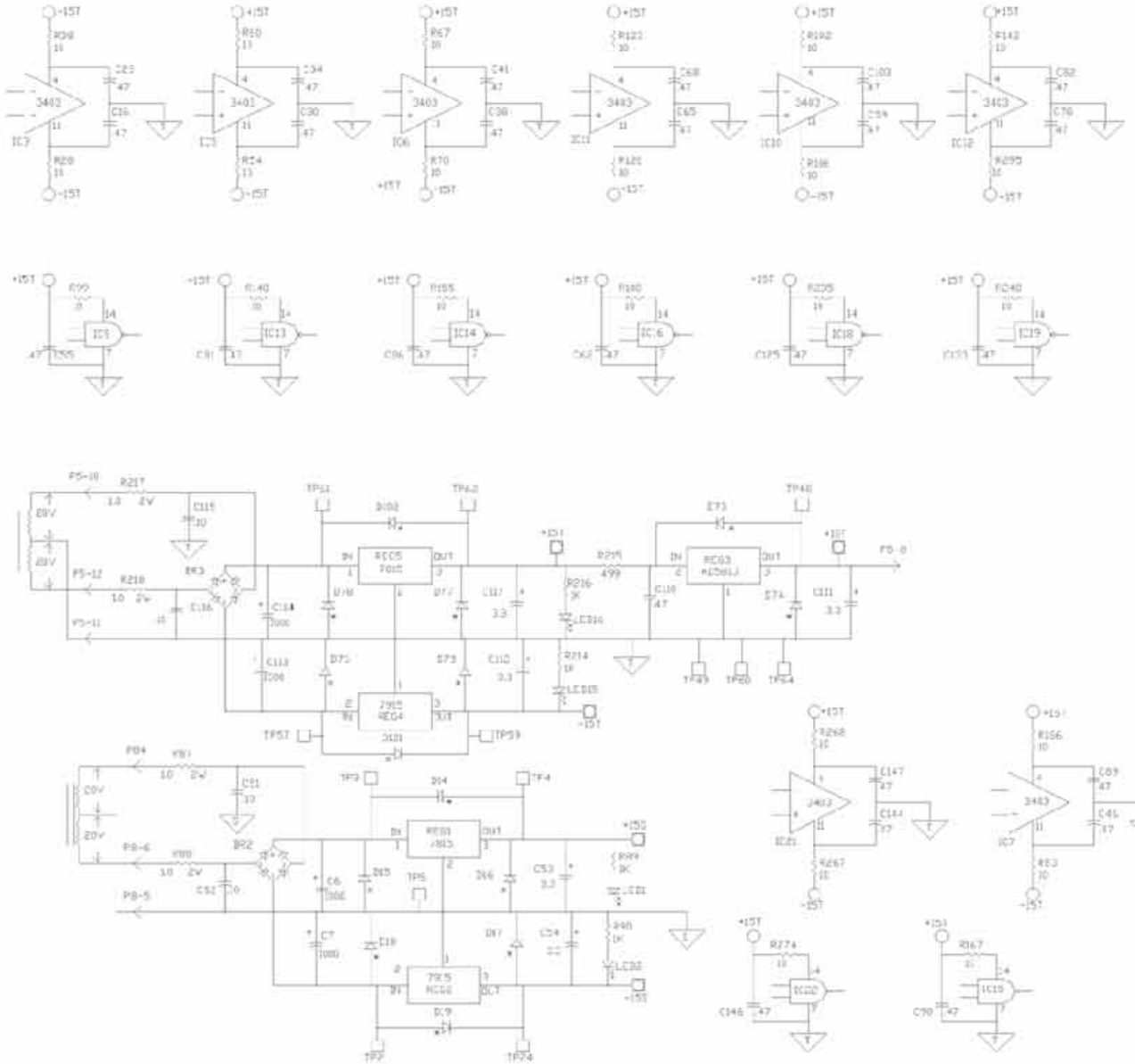

K15
K7
K6
K13
K3
K33
K11
K10
K14
K8
TB8
T10
T11
C64
C29
R30-31
C28
C27
C33
C32
K12
K12-L2 WHT
R71
C64
K12-T3 BLK
TD3
P1
1 PCB11 P4-4 BLK
2 PCB11 P4-6 RED
3 PCB11 P4-3 GRN
4 PCB11 P4-5 WHT
TD1
P1
1 PCB1 P7-1 BLK
2 PCB1 P7-4 RED
3 PCB1 P7-2 GRN
4 PCB1 P7-3 WHT
TD2
P1
1 PCB1 P7-5 BLK
2 PCB1 P7-8 RED
3 PCB1 P7-6 GRN
4 PCB1 P7-7 WHT
PC82-G RED (GATE)
PC82-E WHT (EMITTER)
TS4-2 WHT
TR1-18B BRN
TD1
TS6
TS4
Q3
Q2
Q1
Q6
Q5
Q4
TS6-1 WHT
TS1-2 WHT
PC83-G RED (GATE)
PC83-E WHT (EMITTER)
VIEW F-F
(WITHOUT BUSBARS)
EPP-401/450/601_400V_WIRING_DIAGRAM
0338007698
SHEET 6 OF 6



CONTROL BOARD SCHEMATIC
SHT 1 OF 4


ARC VOLTAGE SATURATION DETECTOR
PILOT ARC DETECTOR
CONTROL BOARD SCHEMATIC
SHT 2 OF 4

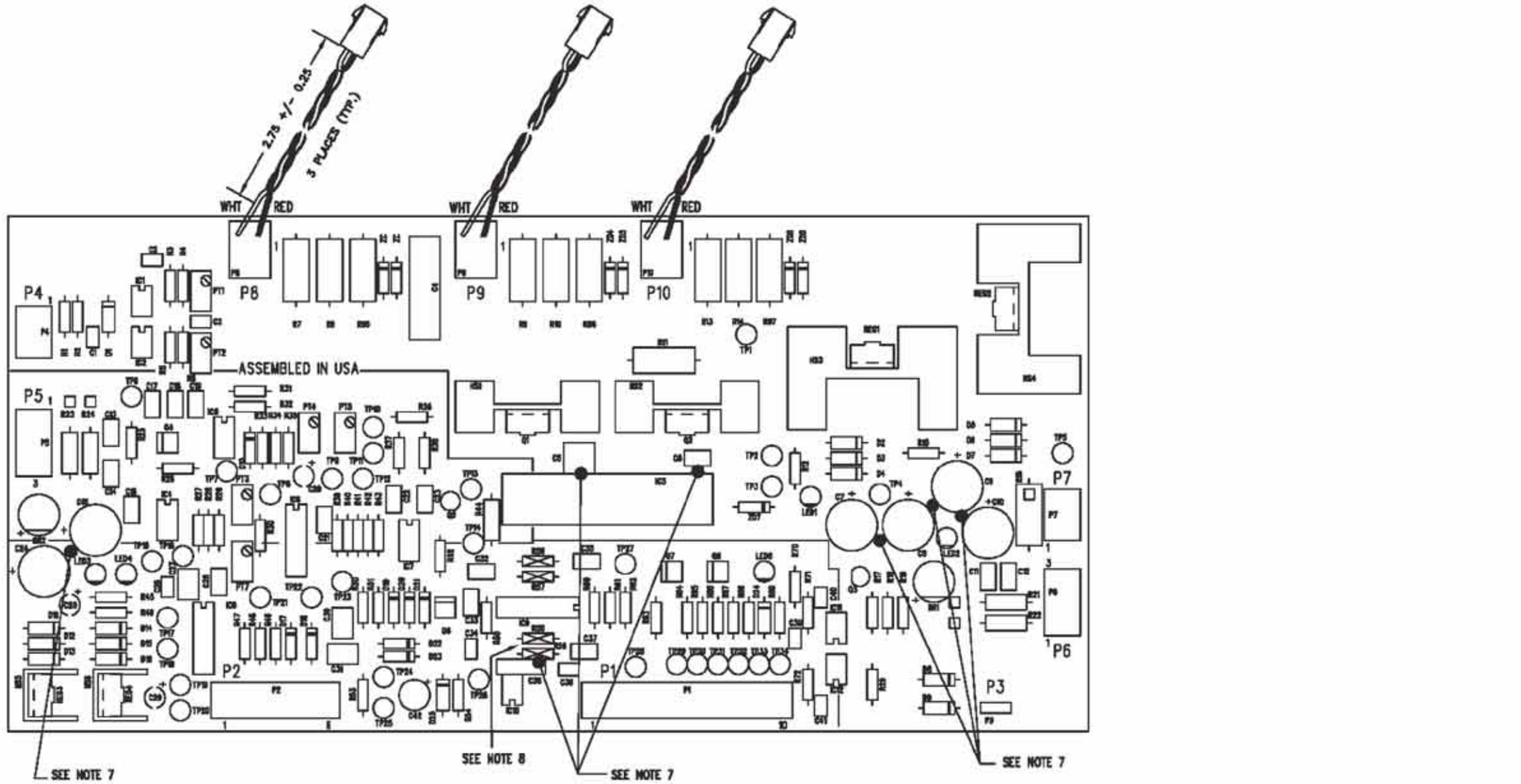

CURRENT REF
HI SPEED
STANDARD
TO VREF METER
CURRENT REFERENCE SIGNAL
SOFT START
ON/OFF
RAMP TIME
CURRENT RAMP
RATIO ISTART/ICUT
DEFAULT = 40
UPSLOPE TIME
L ERROR SIGNAL
R ERROR SIGNAL
TO RIGHT PWM/GATE DRIVE PCB
TO OUTPUT (2X) CURRENT METER
CURRENT DETECTOR COMPARATOR
ERROR AMP
LEFT HALL SENSOR
RIGHT HALL SENSOR
SPARE CURRENT DETECTOR
ON = NO CURRENT
CONTROL BOARD SCHEMATIC
SHT 3 OF 4

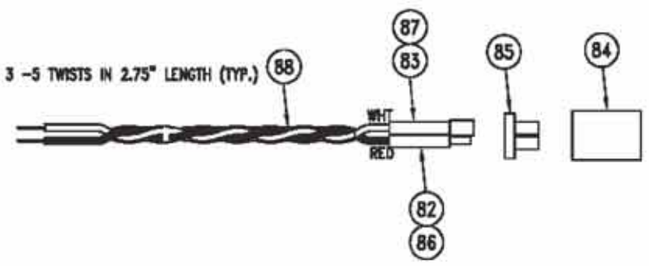


NOTES:

*	LEAVE OFF BOARD.
CRS	CURRENT REFERENCE SIGNAL, ANALOG, 0-10V=0-450A PRECISION INPUT TO INNER SERVO (INCLUDES INITIAL CURRENT AND RAMP UP).
DWL	DWELL. HI (>14) HOLDS CRS AT INITIAL CURRENT LEVEL, LO (<14) PERMITS CRS RAMP UP.
E*	ERROR NOT. HI WHEN NO ERROR EXISTS.
EINH	ERROR INHIBIT. FIRST ERROR CREATES HI WHICH PREVENTS MULTIPLE ERRORS.
I	CURRENT. HI WHEN MAIN ARC CURRENT THROUGH SHUNT > 5.0A (> 3.5A IN EPP-600 <3.5A IN EPP-450).
I*	CURRENT NOT. HI WHEN MAIN ARC CURRENT THROUGH THE SHUNT < 5.0A (< 3.5A IN EPP-600 <3.5A IN EPP-450).
IFB	CURRENT FEEDBACK. +10V=600A IN EPP-600, AND +10V=450A IN EPP-450.
I*	CURRENT X NOT. CURRENT DETECTOR COMPARATOR. HI (>14) WHEN MAIN ARC CURRENT < 5.0A (EPP-600), LO (<14) WHEN > 3.5A (EPP-450).
MC	MAIN CONTACTOR. HI WHEN K3 RELAY COIL, PS POWER SUPPLY IS ON.
MC*	MAIN CONTACTOR NOT. LO WHEN K3 RELAY COIL, PS POWER SUPPLY IS ON.
MCR*	MAIN CONTACTOR RESET NOT. LO PULSE ACTS AS POWER RESET.
PR*	POWER RESET NOT. LO PULSE ON POWER UP RESETS ALL ERRORS.
RESET*	RESET NOT. CONNECT P6-6 TO "I" COMMON TO RESET ALL ERRORS. PERFORMS SAME FUNCTION AS PR (POWER RESET NOT).
VSAT	VOLTAGE SATURATION. HI WHEN IGBT'S REACH 90% ON TIME AND WITH ARC CURRENT OVER 5.0A IN EPP-600 (3.5A IN EPP-450).
PD	PULL DOWN NOT. LO EXISTS WHEN VSAT EXISTS. LO PULLS DOWN CPS TO MINIMIZE CURRENT OVERSHOOT WHEN COMING OUT OF SATURATION. THIS FUNCTION IS DISABLED IN EPP-450'S & EPP-600'S BY THE REMOVAL OF R106.

CONTROL BOARD SCHEMATIC
SHT 4 OF 4



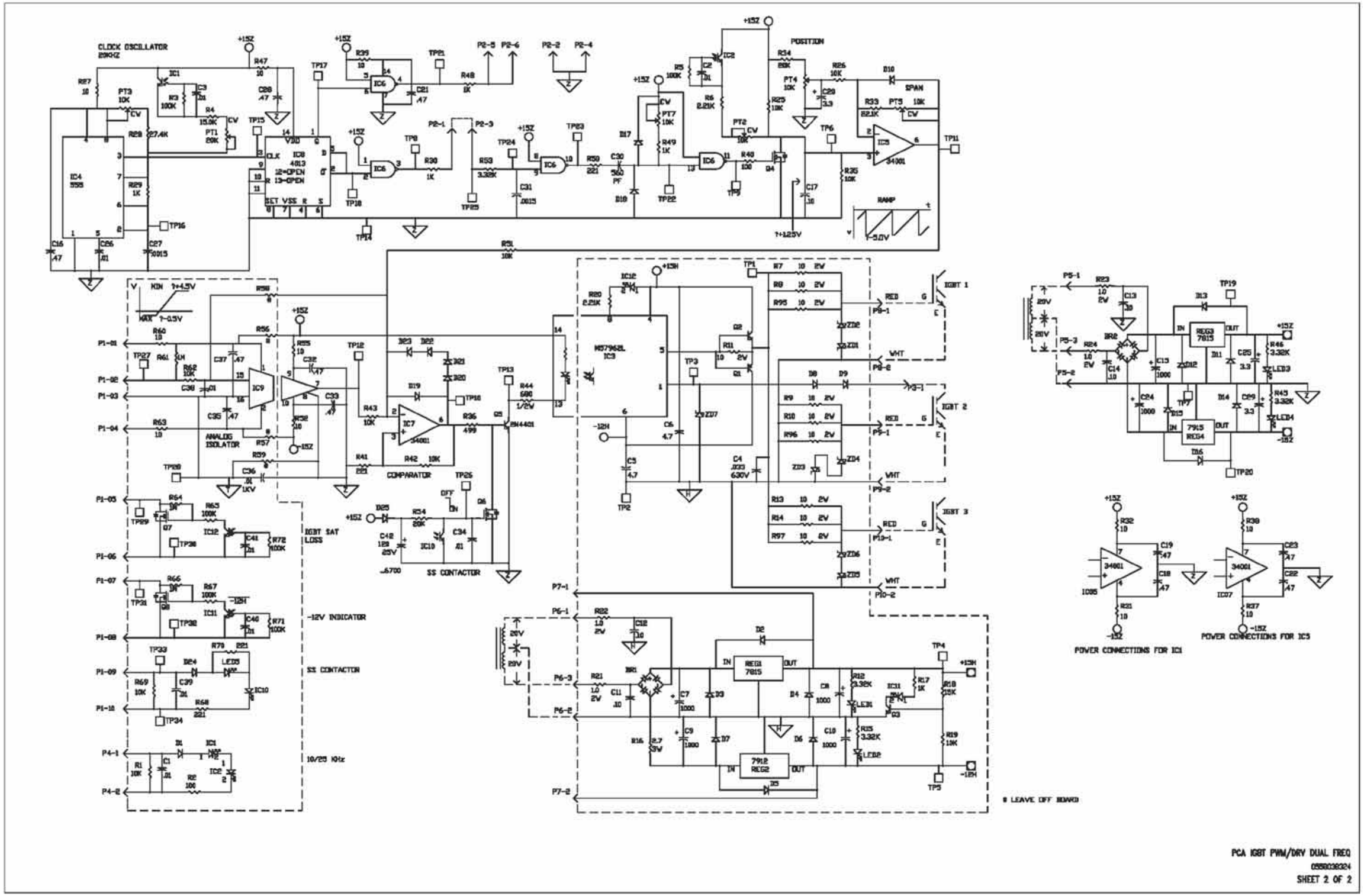


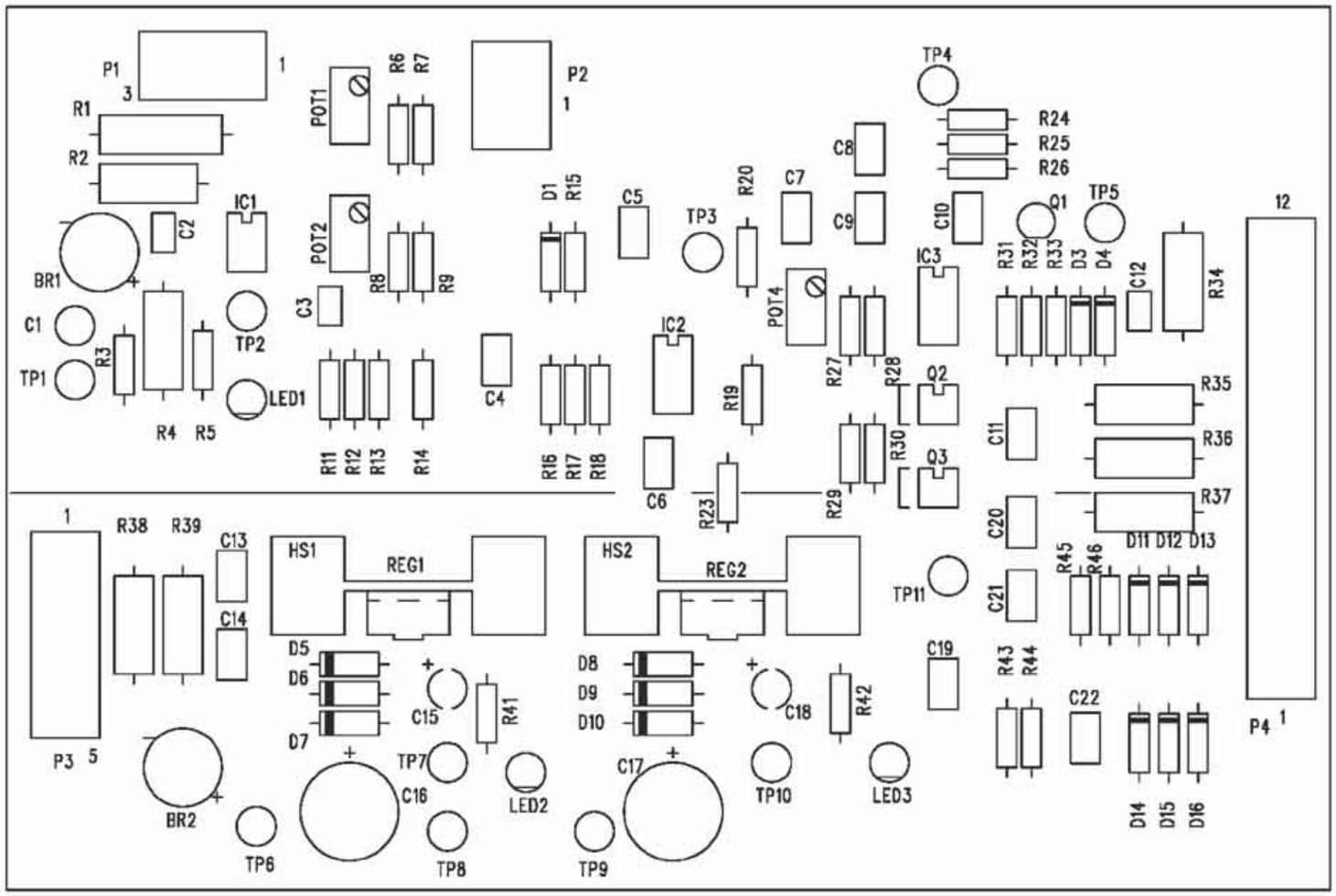
NOTES:

5. ALL RESISTOR VALUES TO BE IN OHMS UNLESS NOTED OTHERWISE.
6. CAPACITOR VALUES ASR IN MICROFARADS UNLESS NOTED OTHERWISE.
7. PLACE SMALL AMOUNT OF ITEW 80, SILICON RUBBER IN PLACES INDICATED.

Rev. B

PCA IGBT PWM/DRV DUAL FREQ
0558038324
SHEET 1 OF 2


CLOCK OSCILLATOR 20KHZ
POSITION
SPAN
RAMP
ANALOG ISOLATOR
COMPARATOR
IGBT SAT LOSS
-12V INDICATOR
SS CONTACTOR
10/20 KHz
SS CONTACTOR
IGBT 1
IGBT 2
IGBT 3
POWER CONNECTIONS FOR IC1
POWER CONNECTIONS FOR IC5
* LEAVE OFF BOARD
PCA IGBT PWM/DRV DUAL FREQ
0550030324
SHEET 2 OF 2

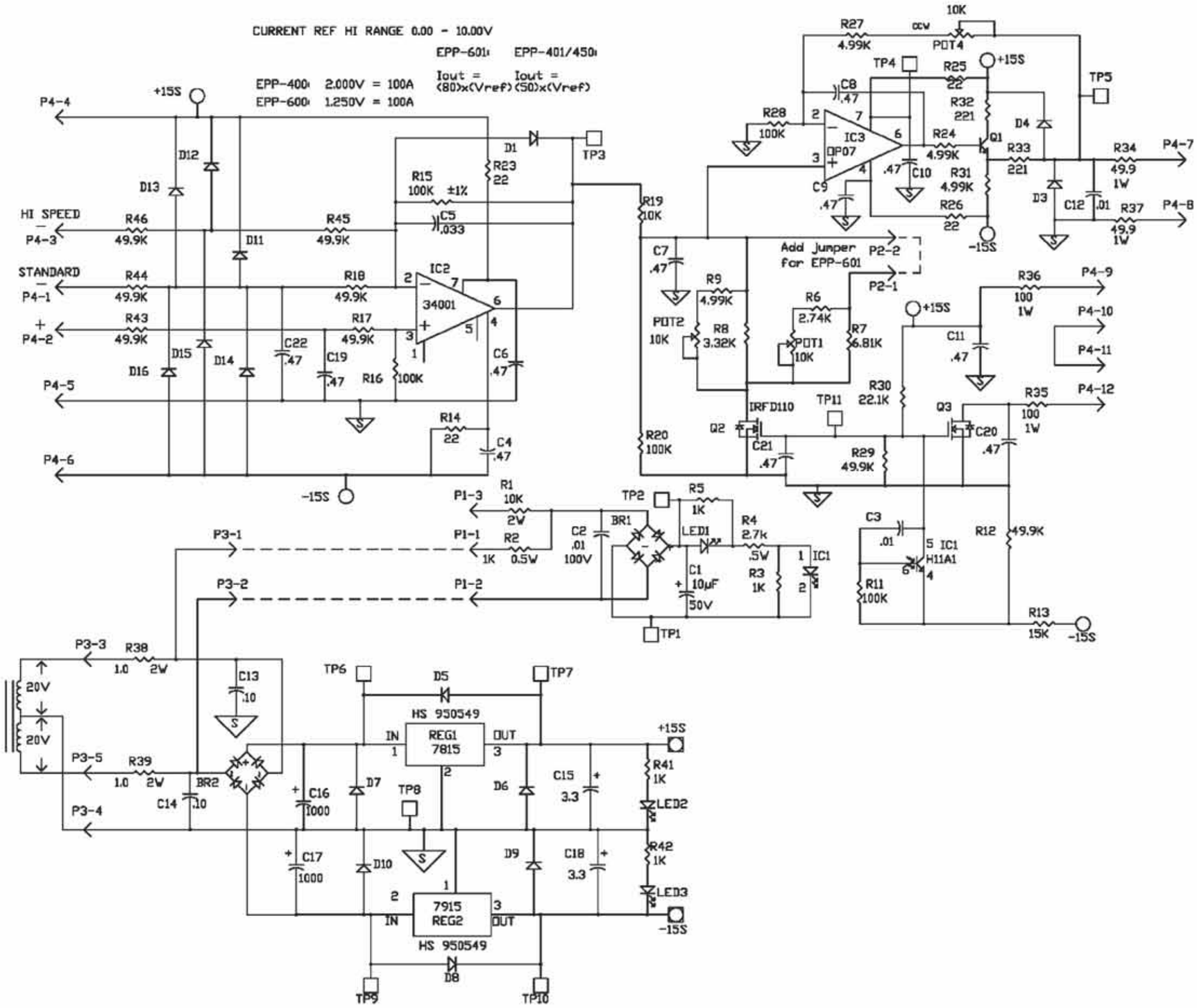


NOTES:

5. ALL RESISTOR VALUES TO BE IN OHMS UNLESS NOTED OTHERWISE.
6. CAPACITOR VALUES ASR IN MICROFARADS UNLESS NOTED OTHERWISE.

Rev. B

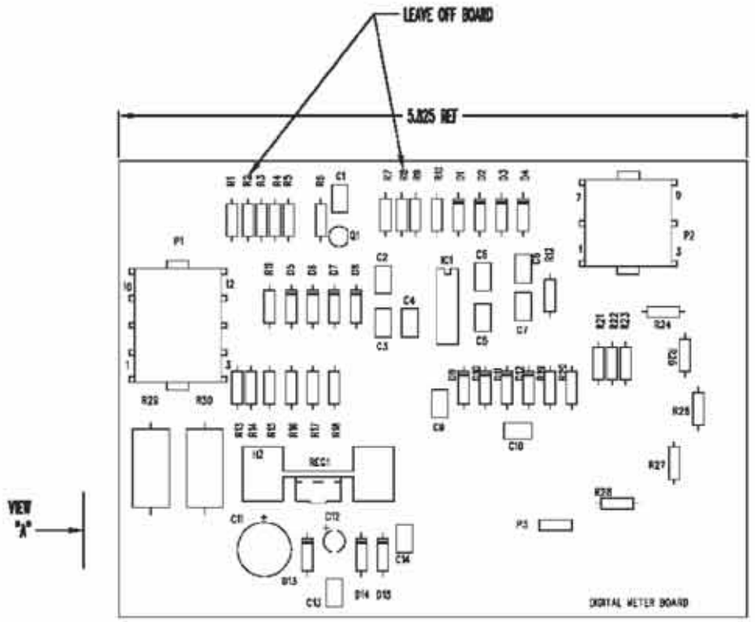
PCA ANALOG SCALING
0558038326
SHEET 1 OF 2

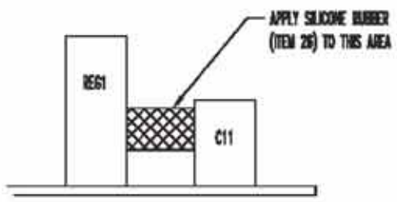


PCA ANALOG SCALING
0558038326
SHEET 2 OF 2

NOTES:

4. ALL RESISTOR VALUES ARE IN OHMS UNLESS NOTED OTHERWISE.
5. ALL CAPACITOR VALUES ARE IN MICROFARADS UNLESS NOTED OTHERWISE.





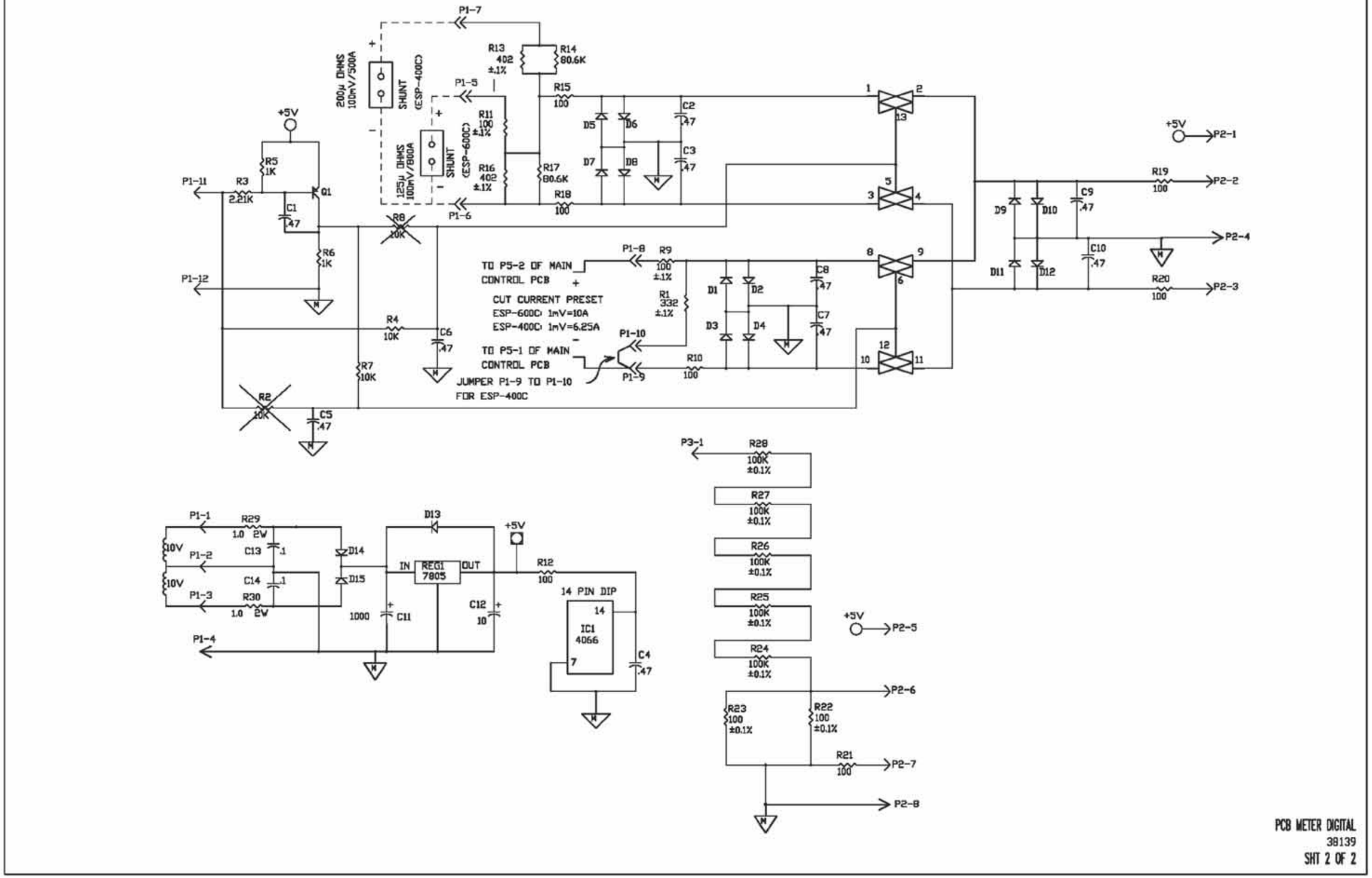
VIEW "A"

BILL OF MATERIALS

SYMBOL	ITEM NO.	PART OR IDENT NUMBER	QTY.	DESCRIPTION	APPROVED DATE	DATA PAGE NO.
	1	C-38194	1	DRILLED PCB (FOR 38139)		
C1-C10	2	2027979	10	CAPACITOR .47µF 50V (CERAMIC)		
C11	3	991256	1	CAPACITOR 1000 µF 35V (ELECTROLYTIC)		
C12	4	995626	1	CAPACITOR 10 µF 35V (TANTALUM)		
C13 & C14	5	952271	2	CAPACITOR .1 µF 100V (CERAMIC)		
D1-D15	6	953415	15	DIODE 1N4007		
	7	950549	1	HEAT SINK		
IC1	8	996560	1	IC 4066 QUAD ANALOG SWITCH		
P1	9	2062388	1	HEADER MALE 12 PIN		
P2	10	2062347	1	HEADER MALE 9 PIN		
P3	11	950723	1	TERMINAL P/C BOARD MTG .250		
Q1	12	993668	1	TRANSISTOR BIPOLAR PNP 2N5358		
R1	13	17108433	1	RESISTOR 332 OHMS 1/8 W MIN, ±0.1%		
R3	14	17111222	1	RESISTOR 2.21K OHMS 1/4 W 1%		
R4 & R7	15	17111310	2	RESISTOR 10.0K OHMS 1/4 W 1%		
R5 & R6	16	17111210	2	RESISTOR 1.00K OHMS 1/4 W 1%		
R9,R22,R23	17	17109110	3	RESISTOR 100 OHMS 1/4 W 0.1%		
R10,12,15, 16,19,20,21	18	17111110	7	RESISTOR 100 OHMS 1/4 W 1%		
R11	19	17108110	1	RESISTOR 100 OHMS 1/8 W MIN, ±0.1%		
R13 & R18	20	17108402	2	RESISTOR 402 OHMS 1/8 W MIN, ±0.1%		
R14 & R17	21	17111378	2	RESISTOR 80.6K OHMS 1/4 W 1%		
R24,25,26, 27,28	22	17109410	5	RESISTOR 100K OHMS 1/4 W 0.1%		
R29 & R30	23	17211001	2	RESISTOR 1.0 OHM 2 W 5%		
	24	73585976	AR	COMPOUND HEAT SINK		
	25	72251001	AR	CONFORMAL COATING		
	26	71200732	AR	SILICONE RUBBER		
REG1	27	2062321	1	REGULATOR VOLT +5V MC7805		
	28	81307826	1	SCH 12048 STLZPC 0.112-40X.039		
	29	83300833	1	NUT 30024 STLZPC 0.112-40		
	30	84302837	1	WSR 52002 STLZPC .0112		

Rev. B

PCB METER DIGITAL
38139
SHT 1 OF 2

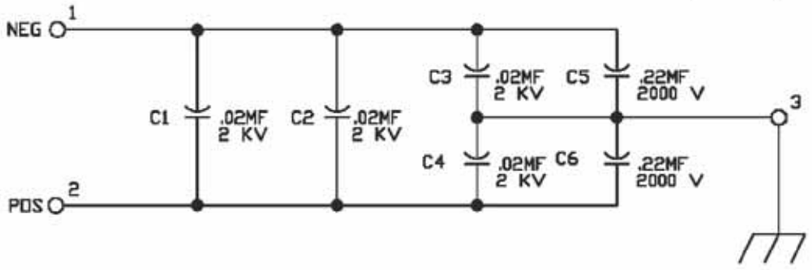


PCB METER DIGITAL
38139
SHT 2 OF 2

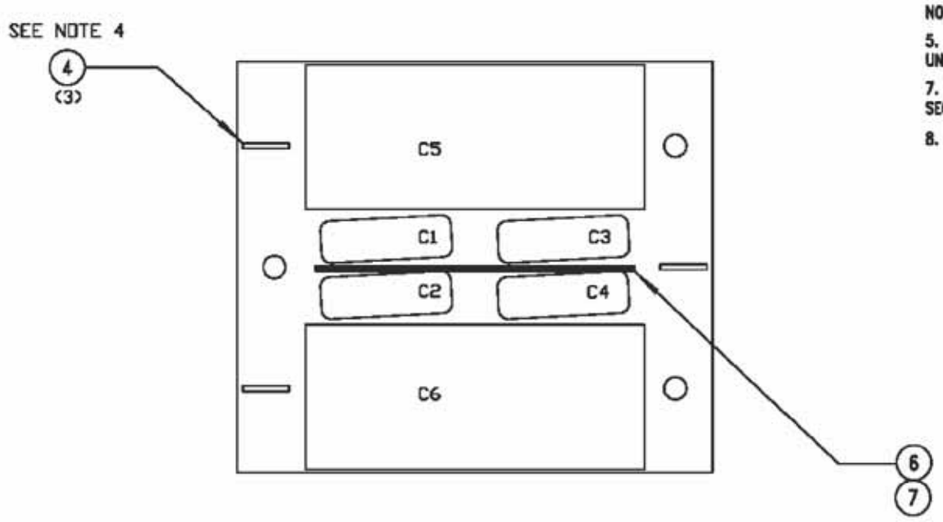
BILL OF MATERIALS

QUANTITIES ARE IN U/A ESTIMATED BY INVENTORY

SYMBOL	ITEM NO.	PART OR REF CODE NO.	QTY.	DESCRIPTION	APPROVED MFR	MFR PART NO.
	1	674920	1	PC BOARD DRILLED FILTER NW		
C1-C4	2	0558007451	4	CAPACITOR .02MF 1KV		
C5, C6	3	0558007452	2	CAPACITOR .22MF 2000V		
	4	950723	3	TERMINAL PC BOARD MTG		
	5		AR	CONFORMAL COATING POLYURETHANE		
	6	84600017	1.375"	NOMEX 1" X 0.007		
	7	71200732	AR	SILICONE RUBBER		



THIS ASSEMBLY MUST BE ROHS COMPLIANT



NOTES:

5. ALL RESISTOR VALUES ARE IN OHMS UNLESS OTHERWISE NOTED.

7. USA A SMALL AMOUNT OF ITEM 7 TO SECURE ITEM 6 TO ITEM 2

8. MUST BE RoHS COMPLIANT.

Rev. B

PC BOARD ASSY FILTER
SHEET 1 OF 1
674969

NOTES

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