



OM-251 440F

2013-09

Processes



MIG (GMAW) Welding

Pulsed MIG (GMAW-P)

Flux Cored (FCAW) Welding



Automatic Welding

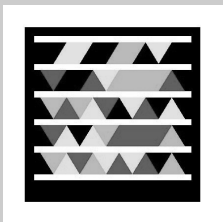
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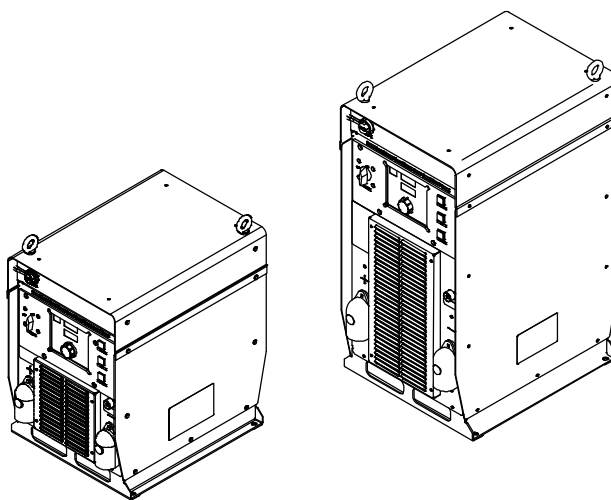
Automatic Welding Interface And
Arc Welding Power Source

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OWNER'S MANUAL

File: Advanced Manufacturing Systems



From Miller to You

Thank you and congratulations on choosing Miller. Now you can get the job done and get it done right. We know you don't have time to do it any other way.

That's why when Niels Miller first started building arc welders in 1929, he made sure his products offered long-lasting value and superior quality. Like you, his customers couldn't afford anything less. Miller products had to be more than the best they could be. They had to be the best you could buy.

Today, the people that build and sell Miller products continue the tradition. They're just as committed to providing equipment and service that meets the high standards of quality and value established in 1929.

This Owner's Manual is designed to help you get the most out of your Miller products. Please take time to read the Safety precautions. They will help you protect yourself against potential hazards on the worksite.



Miller is the first welding equipment manufacturer in the U.S.A. to be registered to the ISO 9001 Quality System Standard.

We've made installation and operation quick and easy. With Miller you can count on years of reliable service with proper maintenance. And if for some reason the unit needs repair, there's a Troubleshooting section that will help you figure out what the problem is. The parts list will then help you to decide the exact part you may need to fix the problem. Warranty and service information for your particular model are also provided.



Miller Electric manufactures a full line of welders and welding related equipment. For information on other quality Miller products, contact your local Miller distributor to receive the latest full line catalog or individual specification sheets. **To locate your nearest distributor or service agency call 1-800-4-A-Miller, or visit us at www.MillerWelds.com on the web.**



Working as hard as you do – every power source from Miller is backed by the most hassle-free warranty in the business.



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WARRANTY	



DECLARATION OF CONFORMITY

for European Community (CE marked) products.

MILLER Electric Mfg. Co., 1635 Spencer Street, Appleton, WI 54914 U.S.A. declares that the product(s) identified in this declaration conform to the essential requirements and provisions of the stated Council Directive(s) and Standard(s).

Product/Apparatus Identification:

Product	Stock Number
AUTO-AXCESS E 450 CE	907443002
AUTO-AXCESS E 300 CE	907442002

Council Directives:

- 2006/95/EC Low Voltage
- 2004/108/EC Electromagnetic Compatibility
- 2011/65/EU Restriction of the use of certain hazardous substances in electrical and electronic equipment

Standards:

- IEC 60974-1:2005 Arc welding equipment – Part 1: Welding power sources
- IEC 60974-10:2007 Arc Welding Equipment – Part 10: Electromagnetic compatibility (EMC) requirements
- EN 50445:2008 Product family standard to demonstrate compliance of equipment for resistance welding, arc welding and allied processes with the basic restrictions related to human exposure to electromagnetic fields (0 Hz – 300Hz)

Signatory:

October 8, 2012

David A. Werba

MANAGER, PRODUCT DESIGN COMPLIANCE

Date of Declaration

SECTION 1 – SAFETY PRECAUTIONS - READ BEFORE USING

som 2011–10



Protect yourself and others from injury — read, follow, and save these important safety precautions and operating instructions.

1-1. Symbol Usage



DANGER! – Indicates a hazardous situation which, if not avoided, will result in death or serious injury. The possible hazards are shown in the adjoining symbols or explained in the text.



Indicates a hazardous situation which, if not avoided, could result in death or serious injury. The possible hazards are shown in the adjoining symbols or explained in the text.

NOTICE – Indicates statements not related to personal injury.

 Indicates special instructions.



This group of symbols means Warning! Watch Out! ELECTRIC SHOCK, MOVING PARTS, and HOT PARTS hazards. Consult symbols and related instructions below for necessary actions to avoid the hazards.

1-2. Arc Welding Hazards



The symbols shown below are used throughout this manual to call attention to and identify possible hazards. When you see the symbol, watch out, and follow the related instructions to avoid the hazard. The safety information given below is only a summary of the more complete safety information found in the Safety Standards listed in Section 1-5. Read and follow all Safety Standards.



Only qualified persons should install, operate, maintain, and repair this unit.



During operation, keep everybody, especially children, away.



ELECTRIC SHOCK can kill.

Touching live electrical parts can cause fatal shocks or severe burns. The electrode and work circuit is electrically live whenever the output is on. The input power circuit and machine internal circuits are also live when power is on. In semiautomatic or automatic wire welding, the wire, wire reel, drive roll housing, and all metal parts touching the welding wire are electrically live. Incorrectly installed or improperly grounded equipment is a hazard.

- Do not touch live electrical parts.
- Wear dry, hole-free insulating gloves and body protection.
- Insulate yourself from work and ground using dry insulating mats or covers big enough to prevent any physical contact with the work or ground.
- Do not use AC output in damp areas, if movement is confined, or if there is a danger of falling.
- Use AC output ONLY if required for the welding process.
- If AC output is required, use remote output control if present on unit.
- Additional safety precautions are required when any of the following electrically hazardous conditions are present: in damp locations or while wearing wet clothing; on metal structures such as floors, gratings, or scaffolds; when in cramped positions such as sitting, kneeling, or lying; or when there is a high risk of unavoidable or accidental contact with the workpiece or ground. For these conditions, use the following equipment in order presented: 1) a semiautomatic DC constant voltage (wire) welder, 2) a DC manual (stick) welder, or 3) an AC welder with reduced open-circuit voltage. In most situations, use of a DC, constant voltage wire welder is recommended. And, do not work alone!
- Disconnect input power or stop engine before installing or servicing this equipment. Lockout/tagout input power according to OSHA 29 CFR 1910.147 (see Safety Standards).
- Properly install, ground, and operate this equipment according to its Owner's Manual and national, state, and local codes.

- Always verify the supply ground – check and be sure that input power cord ground wire is properly connected to ground terminal in disconnect box or that cord plug is connected to a properly grounded receptacle outlet.
- When making input connections, attach proper grounding conductor first – double-check connections.
- Keep cords dry, free of oil and grease, and protected from hot metal and sparks.
- Frequently inspect input power cord for damage or bare wiring – replace cord immediately if damaged – bare wiring can kill.
- Turn off all equipment when not in use.
- Do not use worn, damaged, undersized, or poorly spliced cables.
- Do not drape cables over your body.
- If earth grounding of the workpiece is required, ground it directly with a separate cable.
- Do not touch electrode if you are in contact with the work, ground, or another electrode from a different machine.
- Do not touch electrode holders connected to two welding machines at the same time since double open-circuit voltage will be present.
- Use only well-maintained equipment. Repair or replace damaged parts at once. Maintain unit according to manual.
- Wear a safety harness if working above floor level.
- Keep all panels and covers securely in place.
- Clamp work cable with good metal-to-metal contact to workpiece or worktable as near the weld as practical.
- Insulate work clamp when not connected to workpiece to prevent contact with any metal object.
- Do not connect more than one electrode or work cable to any single weld output terminal. Disconnect cable for process not in use.

SIGNIFICANT DC VOLTAGE exists in inverter welding power sources AFTER removal of input power.

- Turn Off inverter, disconnect input power, and discharge input capacitors according to instructions in Maintenance Section before touching any parts.



HOT PARTS can burn.

- Do not touch hot parts bare handed.
- Allow cooling period before working on equipment.
- To handle hot parts, use proper tools and/or wear heavy, insulated welding gloves and clothing to prevent burns.



FUMES AND GASES can be hazardous.

Welding produces fumes and gases. Breathing these fumes and gases can be hazardous to your health.

- Keep your head out of the fumes. Do not breathe the fumes.
- If inside, ventilate the area and/or use local forced ventilation at the arc to remove welding fumes and gases.
- If ventilation is poor, wear an approved air-supplied respirator.
- Read and understand the Material Safety Data Sheets (MSDSs) and the manufacturer's instructions for metals, consumables, coatings, cleaners, and degreasers.
- Work in a confined space only if it is well ventilated, or while wearing an air-supplied respirator. Always have a trained watch-person nearby. Welding fumes and gases can displace air and lower the oxygen level causing injury or death. Be sure the breathing air is safe.
- Do not weld in locations near degreasing, cleaning, or spraying operations. The heat and rays of the arc can react with vapors to form highly toxic and irritating gases.
- Do not weld on coated metals, such as galvanized, lead, or cadmium plated steel, unless the coating is removed from the weld area, the area is well ventilated, and while wearing an air-supplied respirator. The coatings and any metals containing these elements can give off toxic fumes if welded.



ARC RAYS can burn eyes and skin.

Arc rays from the welding process produce intense visible and invisible (ultraviolet and infrared) rays that can burn eyes and skin. Sparks fly off from the weld.

- Wear an approved welding helmet fitted with a proper shade of filter lenses to protect your face and eyes from arc rays and sparks when welding or watching (see ANSI Z49.1 and Z87.1 listed in Safety Standards).
- Wear approved safety glasses with side shields under your helmet.
- Use protective screens or barriers to protect others from flash, glare and sparks; warn others not to watch the arc.
- Wear protective clothing made from durable, flame-resistant material (leather, heavy cotton, or wool) and foot protection.

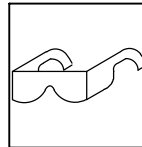


WELDING can cause fire or explosion.

Welding on closed containers, such as tanks, drums, or pipes, can cause them to blow up. Sparks can fly off from the welding arc. The flying sparks, hot workpiece, and hot equipment can cause fires and explosions. Accidental contact of electrode to metal objects can cause sparks, explosion, overheating, or fire. Check and be sure the area is safe before doing any welding.

- Remove all flammables within 35 ft (10.7 m) of the welding arc. If this is not possible, tightly cover them with approved covers.
- Do not weld where flying sparks can strike flammable material.
- Protect yourself and others from flying sparks and hot metal.
- Be alert that welding sparks and hot materials from welding can easily go through small cracks and openings to adjacent areas.
- Watch for fire, and keep a fire extinguisher nearby.
- Be aware that welding on a ceiling, floor, bulkhead, or partition can cause fire on the hidden side.
- Do not weld on containers that have held combustibles, or on closed containers such as tanks, drums, or pipes unless they are properly prepared according to AWS F4.1 and AWS A6.0 (see Safety Standards).
- Do not weld where the atmosphere may contain flammable dust, gas, or liquid vapors (such as gasoline).
- Connect work cable to the work as close to the welding area as practical to prevent welding current from traveling long, possibly unknown paths and causing electric shock, sparks, and fire hazards.

- Do not use welder to thaw frozen pipes.
- Remove stick electrode from holder or cut off welding wire at contact tip when not in use.
- Wear oil-free protective garments such as leather gloves, heavy shirt, cuffless trousers, high shoes, and a cap.
- Remove any combustibles, such as a butane lighter or matches, from your person before doing any welding.
- After completion of work, inspect area to ensure it is free of sparks, glowing embers, and flames.
- Use only correct fuses or circuit breakers. Do not oversize or bypass them.
- Follow requirements in OSHA 1910.252 (a) (2) (iv) and NFPA 51B for hot work and have a fire watcher and extinguisher nearby.



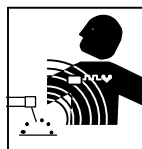
FLYING METAL or DIRT can injure eyes.

- Welding, chipping, wire brushing, and grinding cause sparks and flying metal. As welds cool, they can throw off slag.
- Wear approved safety glasses with side shields even under your welding helmet.



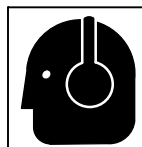
BUILDUP OF GAS can injure or kill.

- Shut off compressed gas supply when not in use.
- Always ventilate confined spaces or use approved air-supplied respirator.



ELECTRIC AND MAGNETIC FIELDS (EMF) can affect Implanted Medical Devices.

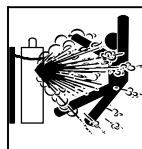
- Wearers of Pacemakers and other Implanted Medical Devices should keep away.
- Implanted Medical Device wearers should consult their doctor and the device manufacturer before going near arc welding, spot welding, gouging, plasma arc cutting, or induction heating operations.



NOISE can damage hearing.

Noise from some processes or equipment can damage hearing.

- Wear approved ear protection if noise level is high.



CYLINDERS can explode if damaged.

Compressed gas cylinders contain gas under high pressure. If damaged, a cylinder can explode. Since gas cylinders are normally part of the welding process, be sure to treat them carefully.

- Protect compressed gas cylinders from excessive heat, mechanical shocks, physical damage, slag, open flames, sparks, and arcs.
- Install cylinders in an upright position by securing to a stationary support or cylinder rack to prevent falling or tipping.
- Keep cylinders away from any welding or other electrical circuits.
- Never drape a welding torch over a gas cylinder.
- Never allow a welding electrode to touch any cylinder.
- Never weld on a pressurized cylinder – explosion will result.
- Use only correct compressed gas cylinders, regulators, hoses, and fittings designed for the specific application; maintain them and associated parts in good condition.
- Turn face away from valve outlet when opening cylinder valve.
- Keep protective cap in place over valve except when cylinder is in use or connected for use.
- Use the right equipment, correct procedures, and sufficient number of persons to lift and move cylinders.
- Read and follow instructions on compressed gas cylinders, associated equipment, and Compressed Gas Association (CGA) publication P-1 listed in Safety Standards.

1-3. Additional Symbols For Installation, Operation, And Maintenance



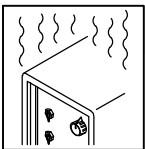
FIRE OR EXPLOSION hazard.

- Do not install or place unit on, over, or near combustible surfaces.
- Do not install unit near flammables.
- Do not overload building wiring – be sure power supply system is properly sized, rated, and protected to handle this unit.



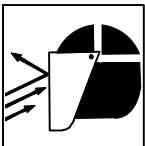
FALLING EQUIPMENT can injure.

- Use lifting eye to lift unit only, NOT running gear, gas cylinders, or any other accessories.
- Use equipment of adequate capacity to lift and support unit.
- If using lift forks to move unit, be sure forks are long enough to extend beyond opposite side of unit.
- Keep equipment (cables and cords) away from moving vehicles when working from an aerial location.
- Follow the guidelines in the Applications Manual for the Revised NIOSH Lifting Equation (Publication No. 94-110) when manually lifting heavy parts or equipment.



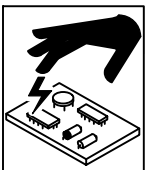
OVERUSE can cause OVERHEATING

- Allow cooling period; follow rated duty cycle.
- Reduce current or reduce duty cycle before starting to weld again.
- Do not block or filter airflow to unit.



FLYING SPARKS can injure.

- Wear a face shield to protect eyes and face.
- Shape tungsten electrode only on grinder with proper guards in a safe location wearing proper face, hand, and body protection.
- Sparks can cause fires — keep flammables away.



STATIC (ESD) can damage PC boards.

- Put on grounded wrist strap BEFORE handling boards or parts.
- Use proper static-proof bags and boxes to store, move, or ship PC boards.



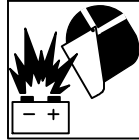
MOVING PARTS can injure.

- Keep away from moving parts.
- Keep away from pinch points such as drive rolls.



WELDING WIRE can injure.

- Do not press gun trigger until instructed to do so.
- Do not point gun toward any part of the body, other people, or any metal when threading welding wire.



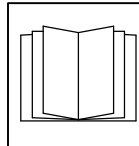
BATTERY EXPLOSION can injure.

- Do not use welder to charge batteries or jump start vehicles unless it has a battery charging feature designed for this purpose.



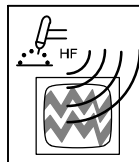
MOVING PARTS can injure.

- Keep away from moving parts such as fans.
- Keep all doors, panels, covers, and guards closed and securely in place.
- Have only qualified persons remove doors, panels, covers, or guards for maintenance and troubleshooting as necessary.
- Reinstall doors, panels, covers, or guards when maintenance is finished and before reconnecting input power.



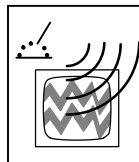
READ INSTRUCTIONS.

- Read and follow all labels and the Owner's Manual carefully before installing, operating, or servicing unit. Read the safety information at the beginning of the manual and in each section.
- Use only genuine replacement parts from the manufacturer.
- Perform maintenance and service according to the Owner's Manuals, industry standards, and national, state, and local codes.



H.F. RADIATION can cause interference.

- High-frequency (H.F.) can interfere with radio navigation, safety services, computers, and communications equipment.
- Have only qualified persons familiar with electronic equipment perform this installation.
- The user is responsible for having a qualified electrician promptly correct any interference problem resulting from the installation.
- If notified by the FCC about interference, stop using the equipment at once.
- Have the installation regularly checked and maintained.
- Keep high-frequency source doors and panels tightly shut, keep spark gaps at correct setting, and use grounding and shielding to minimize the possibility of interference.



ARC WELDING can cause interference.

- Electromagnetic energy can interfere with sensitive electronic equipment such as computers and computer-driven equipment such as robots.
- Be sure all equipment in the welding area is electromagnetically compatible.
- To reduce possible interference, keep weld cables as short as possible, close together, and down low, such as on the floor.
- Locate welding operation 100 meters from any sensitive electronic equipment.
- Be sure this welding machine is installed and grounded according to this manual.
- If interference still occurs, the user must take extra measures such as moving the welding machine, using shielded cables, using line filters, or shielding the work area.

1-4. California Proposition 65 Warnings



Welding or cutting equipment produces fumes or gases which contain chemicals known to the State of California to cause birth defects and, in some cases, cancer. (California Health & Safety Code Section 25249.5 et seq.)



This product contains chemicals, including lead, known to the state of California to cause cancer, birth defects, or other reproductive harm. **Wash hands after use.**

1-5. Principal Safety Standards

Safety in Welding, Cutting, and Allied Processes, ANSI Standard Z49.1, is available as a free download from the American Welding Society at <http://www.aws.org> or purchased from Global Engineering Documents (phone: 1-877-413-5184, website: www.global.ihs.com).

Safe Practices for the Preparation of Containers and Piping for Welding and Cutting, American Welding Society Standard AWS F4.1, from Global Engineering Documents (phone: 1-877-413-5184, website: www.global.ihs.com).

Safe Practices for Welding and Cutting Containers that have Held Combustibles, American Welding Society Standard AWS A6.0, from Global Engineering Documents (phone: 1-877-413-5184, website: www.global.ihs.com).

National Electrical Code, NFPA Standard 70, from National Fire Protection Association, Quincy, MA 02269 (phone: 1-800-344-3555, website: www.nfpa.org and www.sparky.org).

Safe Handling of Compressed Gases in Cylinders, CGA Pamphlet P-1, from Compressed Gas Association, 14501 George Carter Way, Suite 103, Chantilly, VA 20151 (phone: 703-788-2700, website: www.cga-net.com).

Safety in Welding, Cutting, and Allied Processes, CSA Standard W117.2, from Canadian Standards Association, Standards Sales, 5060

Spectrum Way, Suite 100, Ontario, Canada L4W 5N5 (phone: 800-463-6727, website: www.csa-international.org).

Safe Practice For Occupational And Educational Eye And Face Protection, ANSI Standard Z87.1, from American National Standards Institute, 25 West 43rd Street, New York, NY 10036 (phone: 212-642-4900, website: www.ansi.org).

Standard for Fire Prevention During Welding, Cutting, and Other Hot Work, NFPA Standard 51B, from National Fire Protection Association, Quincy, MA 02269 (phone: 1-800-344-3555, website: www.nfpa.org).

OSHA, Occupational Safety and Health Standards for General Industry, Title 29, Code of Federal Regulations (CFR), Part 1910, Subpart Q, and Part 1926, Subpart J, from U.S. Government Printing Office, Superintendent of Documents, P.O. Box 371954, Pittsburgh, PA 15250-7954 (phone: 1-866-512-1800) (there are 10 OSHA Regional Offices—phone for Region 5, Chicago, is 312-353-2220, website: www.osha.gov).

Applications Manual for the Revised NIOSH Lifting Equation, The National Institute for Occupational Safety and Health (NIOSH), 1600 Clifton Rd, Atlanta, GA 30333 (phone: 1-800-232-4636, website: www.cdc.gov/NIOSH).

1-6. EMF Information

Electric current flowing through any conductor causes localized electric and magnetic fields (EMF). Welding current creates an EMF field around the welding circuit and welding equipment. EMF fields may interfere with some medical implants, e.g. pacemakers. Protective measures for persons wearing medical implants have to be taken. For example, restrict access for passers-by or conduct individual risk assessment for welders. All welders should use the following procedures in order to minimize exposure to EMF fields from the welding circuit:

1. Keep cables close together by twisting or taping them, or using a cable cover.
2. Do not place your body between welding cables. Arrange cables to one side and away from the operator.
3. Do not coil or drape cables around your body.

4. Keep head and trunk as far away from the equipment in the welding circuit as possible.
5. Connect work clamp to workpiece as close to the weld as possible.
6. Do not work next to, sit or lean on the welding power source.
7. Do not weld whilst carrying the welding power source or wire feeder.

About Implanted Medical Devices:

Implanted Medical Device wearers should consult their doctor and the device manufacturer before performing or going near arc welding, spot welding, gouging, plasma arc cutting, or induction heating operations. If cleared by your doctor, then following the above procedures is recommended.

SECTION 2 – CONSIGNES DE SÉCURITÉ – LIRE AVANT UTILISATION

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⚠ Pour écarter les risques de blessure pour vous-même et pour autrui — lire, appliquer et ranger en lieu sûr ces consignes relatives aux précautions de sécurité et au mode opératoire.

2-1. Symboles utilisés



DANGER! – Indique une situation dangereuse qui si on l'évite pas peut donner la mort ou des blessures graves. Les dangers possibles sont montrés par les symboles joints ou sont expliqués dans le texte.



Indique une situation dangereuse qui si on l'évite pas peut donner la mort ou des blessures graves. Les dangers possibles sont montrés par les symboles joints ou sont expliqués dans le texte.

NOTE – Indique des déclarations pas en relation avec des blessures personnelles.

Indique des instructions spécifiques.



Ce groupe de symboles veut dire Avertissement! Attention! DANGER DE CHOC ELECTRIQUE, PIECES EN MOUVEMENT, et PIECES CHAUDES. Consulter les symboles et les instructions ci-dessous y afférant pour les actions nécessaires afin d'éviter le danger.

2-2. Dangers relatifs au soudage à l'arc



Les symboles représentés ci-dessous sont utilisés dans ce manuel pour attirer l'attention et identifier les dangers possibles. En présence de l'un de ces symboles, prendre garde et suivre les instructions afférentes pour éviter tout risque. Les instructions en matière de sécurité indiquées ci-dessous ne constituent qu'un sommaire des instructions de sécurité plus complètes fournies dans les normes de sécurité énumérées dans la Section 2-5. Lire et observer toutes les normes de sécurité.



Seul un personnel qualifié est autorisé à installer, faire fonctionner, entretenir et réparer cet appareil.



Pendant le fonctionnement, maintenir à distance toutes les personnes, notamment les enfants de l'appareil.



UNE DÉCHARGE ÉLECTRIQUE peut entraîner la mort.

Le contact d'organes électriques sous tension peut provoquer des accidents mortels ou des brûlures graves. Le circuit de l'électrode et de la pièce est sous tension lorsque le courant est délivré à la sortie. Le circuit d'alimentation et les circuits internes de la machine sont également sous tension lorsque l'alimentation est sur Marche. Dans le mode de soudage avec du fil, le fil, le dérouleur, le bloc de commande du rouleau et toutes les parties métalliques en contact avec le fil sont sous tension électrique. Un équipement installé ou mis à la terre de manière incorrecte ou impropre constitue un danger.

- Ne pas toucher aux pièces électriques sous tension.
- Porter des gants isolants et des vêtements de protection secs et sans trous.
- S'isoler de la pièce à couper et du sol en utilisant des housses ou des tapis assez grands afin d'éviter tout contact physique avec la pièce à couper ou le sol.
- Ne pas se servir de source électrique à courant électrique dans les zones humides, dans les endroits confinés ou là où on risque de tomber.
- Se servir d'une source électrique à courant électrique UNIQUEMENT si le procédé de soudage le demande.
- Si l'utilisation d'une source électrique à courant électrique s'avère nécessaire, se servir de la fonction de télécommande si l'appareil en est équipé.
- D'autres consignes de sécurité sont nécessaires dans les conditions suivantes : risques électriques dans un environnement humide ou si l'on porte des vêtements mouillés ; sur des structures métalliques telles que sols, grilles ou échafaudages ; en position coincée comme assise, à genoux ou couchée ; ou s'il y a un risque élevé de contact inévitable ou accidentel avec la pièce à souder ou le sol. Dans ces conditions, utiliser les équipements suivants, dans l'ordre indiqué : 1) un poste à souder DC à tension constante

(à fil), 2) un poste à souder DC manuel (électrode) ou 3) un poste à souder AC à tension à vide réduite. Dans la plupart des situations, l'utilisation d'un poste à souder DC à fil à tension constante est recommandée. En outre, ne pas travailler seul !

- Couper l'alimentation ou arrêter le moteur avant de procéder à l'installation, à la réparation ou à l'entretien de l'appareil. Déverrouiller l'alimentation selon la norme OSHA 29 CFR 1910.147 (voir normes de sécurité).
- Installez, mettez à la terre et utilisez correctement cet équipement conformément à son Manuel d'Utilisation et aux réglementations nationales, gouvernementales et locales.
- Toujours vérifier la terre du cordon d'alimentation. Vérifier et s'assurer que le fil de terre du cordon d'alimentation est bien raccordé à la borne de terre du sectionneur ou que la fiche du cordon est raccordée à une prise correctement mise à la terre.
- En effectuant les raccordements d'entrée, fixer d'abord le conducteur de mise à la terre approprié et contre-vérifier les connexions.
- Les câbles doivent être exempts d'humidité, d'huile et de graisse; protégez-les contre les étincelles et les pièces métalliques chaudes.
- Vérifier fréquemment le cordon d'alimentation afin de s'assurer qu'il n'est pas altéré ou à nu, le remplacer immédiatement s'il l'est. Un fil à nu peut entraîner la mort.
- L'équipement doit être hors tension lorsqu'il n'est pas utilisé.
- Ne pas utiliser des câbles usés, endommagés, de grosseur insuffisante ou mal épissés.
- Ne pas enrouler les câbles autour du corps.
- Si la pièce soudée doit être mise à la terre, le faire directement avec un câble distinct.
- Ne pas toucher l'électrode quand on est en contact avec la pièce, la terre ou une électrode provenant d'une autre machine.
- Ne pas toucher des porte électrodes connectés à deux machines en même temps à cause de la présence d'une tension à vide doublée.
- N'utiliser qu'un matériel en bon état. Réparer ou remplacer sur-le-champ les pièces endommagées. Entretenir l'appareil conformément à ce manuel.
- Porter un harnais de sécurité si l'on doit travailler au-dessus du sol.
- S'assurer que tous les panneaux et couvercles sont correctement en place.
- Fixer le câble de retour de façon à obtenir un bon contact métal-métal avec la pièce à souder ou la table de travail, le plus près possible de la soudure.
- Isoler la pince de masse quand pas mis à la pièce pour éviter le contact avec tout objet métallique.
- Ne pas raccorder plus d'une électrode ou plus d'un câble de masse à une même borne de sortie de soudage. Débrancher le câble pour le procédé non utilisé.

Il reste une TENSION DC NON NÉGLIGEABLE dans les sources de soudage onduleur UNE FOIS l'alimentation coupée.

- Arrêter les convertisseurs, débrancher le courant électrique et décharger les condensateurs d'alimentation selon les instructions indiquées dans la partie Entretien avant de toucher les pièces.



LES PIÈCES CHAUDES peuvent provoquer des brûlures.

- Ne pas toucher à mains nues les parties chaudes.
- Prévoir une période de refroidissement avant de travailler à l'équipement.
- Ne pas toucher aux pièces chaudes, utiliser les outils recommandés et porter des gants de soudage et des vêtements épais pour éviter les brûlures.



LES FUMÉES ET LES GAZ peuvent être dangereux.

Le soudage génère des fumées et des gaz. Leur inhalation peut être dangereux pour votre santé.

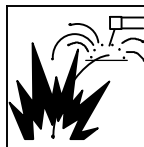
- Eloigner votre tête des fumées. Ne pas respirer les fumées.
- À l'intérieur, ventiler la zone et/ou utiliser une ventilation forcée au niveau de l'arc pour l'évacuation des fumées et des gaz de soudage.
- Si la ventilation est médiocre, porter un respirateur anti-vapeurs approuvé.
- Lire et comprendre les spécifications de sécurité des matériaux (MSDS) et les instructions du fabricant concernant les métaux, les consommables, les revêtements, les nettoyants et les dégraissants.
- Travailler dans un espace fermé seulement s'il est bien ventilé ou en portant un respirateur à alimentation d'air. Demander toujours à un surveillant dûment formé de se tenir à proximité. Des fumées et des gaz de soudage peuvent déplacer l'air et abaisser le niveau d'oxygène provoquant des blessures ou des accidents mortels. S'assurer que l'air de respiration ne présente aucun danger.
- Ne pas souder dans des endroits situés à proximité d'opérations de dégraissage, de nettoyage ou de pulvérisation. La chaleur et les rayons de l'arc peuvent réagir en présence de vapeurs et former des gaz hautement toxiques et irritants.
- Ne pas souder des métaux munis d'un revêtement, tels que l'acier galvanisé, plaqué en plomb ou au cadmium à moins que le revêtement n'ait été enlevé dans la zone de soudure, que l'endroit soit bien ventilé, et en portant un respirateur à alimentation d'air. Les revêtements et tous les métaux renfermant ces éléments peuvent dégager des fumées toxiques en cas de soudage.



LES RAYONS DE L'ARC peuvent provoquer des brûlures dans les yeux et sur la peau.

Le rayonnement de l'arc du procédé de soudage génère des rayons visibles et invisibles intense (ultraviolets et infrarouges) susceptibles de provoquer des brûlures dans les yeux et sur la peau. Des étincelles sont projetées pendant le soudage.

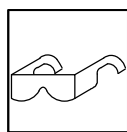
- Porter un casque de soudage approuvé muni de verres filtrants appropriés pour protéger visage et yeux pour protéger votre visage et vos yeux pendant le soudage ou pour regarder (voir ANSI Z49.1 et Z87.1 énuméré dans les normes de sécurité).
- Porter des lunettes de sécurité avec écrans latéraux même sous votre casque.
- Avoir recours à des écrans protecteurs ou à des rideaux pour protéger les autres contre les rayonnements les éblouissements et les étincelles ; prévenir toute personne sur les lieux de ne pas regarder l'arc.
- Porter des vêtements confectionnés avec des matières résistantes et ignifuges (cuir, coton lourd ou laine) et des bottes de protection.



LE SOUDAGE peut provoquer un incendie ou une explosion.

Le soudage effectué sur des conteneurs fermés tels que des réservoirs, tambours ou des conduites peut provoquer leur éclatement. Des étincelles peuvent être projetées de l'arc de soudure. La projection d'étincelles, des pièces chaudes et des équipements chauds peut provoquer des incendies et des brûlures. Le contact accidentel de l'électrode avec des objets métalliques peut provoquer des étincelles, une explosion, un surchauffement ou un incendie. Avant de commencer le soudage, vérifier et s'assurer que l'endroit ne présente pas de danger.

- Déplacer toutes les substances inflammables à une distance de 10,7 m de l'arc de soudage. En cas d'impossibilité les recouvrir soigneusement avec des protections homologuées.
- Ne pas souder dans un endroit où des étincelles peuvent tomber sur des substances inflammables.
- Se protéger et d'autres personnes de la projection d'étincelles et de métal chaud.
- Des étincelles et des matériaux chauds du soudage peuvent facilement passer dans d'autres zones en traversant de petites fissures et des ouvertures.
- Surveiller tout déclenchement d'incendie et tenir un extincteur à proximité.
- Le soudage effectué sur un plafond, plancher, paroi ou séparation peut déclencher un incendie de l'autre côté.
- Ne pas effectuer le soudage sur des conteneurs fermés tels que des réservoirs, tambours, ou conduites, à moins qu'ils n'aient été préparés correctement conformément à AWS F4.1 et AWS A6.0 (voir les Normes de Sécurité).
- Ne soudez pas si l'air ambiant est chargé de particules, gaz, ou vapeurs inflammables (vapeur d'essence, par exemple).
- Brancher le câble de masse sur la pièce la plus près possible de la zone de soudage pour éviter le transport du courant sur une longue distance par des chemins inconnus éventuels en provoquant des risques d'électrocution, d'étincelles et d'incendie.
- Ne pas utiliser le poste de soudage pour dégeler des conduites gelées.
- En cas de non utilisation, enlever la baguette d'électrode du porte-électrode ou couper le fil à la pointe de contact.
- Porter des vêtements de protection dépourvus d'huile tels que des gants en cuir, une chemise en matériau lourd, des pantalons sans revers, des chaussures hautes et un couvre chef.
- Avant de souder, retirer toute substance combustible de vos poches telles qu'un allumeur au butane ou des allumettes.
- Une fois le travail achevé, assurez-vous qu'il ne reste aucune trace d'étincelles incandescentes ni de flammes.
- Utiliser exclusivement des fusibles ou coupe-circuits appropriés. Ne pas augmenter leur puissance; ne pas les ponter.
- Une fois le travail achevé, assurez-vous qu'il ne reste aucune trace d'étincelles incandescentes ni de flammes.
- Utiliser exclusivement des fusibles ou coupe-circuits appropriés. Ne pas augmenter leur puissance; ne pas les ponter.
- Suivre les recommandations dans OSHA 1910.252(a)(2)(iv) et NFPA 51B pour les travaux à chaud et avoir de la surveillance et un extincteur à proximité.



DES PIÈCES DE MÉTAL ou DES SALETES peuvent provoquer des blessures dans les yeux.

- Le soudage, l'écaillage, le passage de la pièce à la brosse en fil de fer, et le meulage génèrent des étincelles et des particules métalliques volantes. Pendant la période de refroidissement des soudures, elles risquent de projeter du laitier.
- Porter des lunettes de sécurité avec écrans latéraux ou un écran facial.



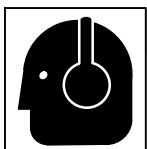
LES ACCUMULATIONS DE GAZ risquent de provoquer des blessures ou même la mort.

- Fermer l'alimentation du gaz comprimé en cas de non utilisation.
- Veiller toujours à bien aérer les espaces confinés ou se servir d'un respirateur d'adduction d'air homologué.



Les CHAMPS ÉLECTROMAGNÉTIQUES (CEM) peuvent affecter les implants médicaux.

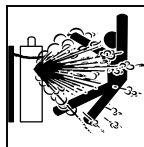
- Les porteurs de stimulateurs cardiaques et autres implants médicaux doivent rester à distance.
- Les porteurs d'implants médicaux doivent consulter leur médecin et le fabricant du dispositif avant de s'approcher de la zone où se déroule du soudage à l'arc, du soudage par points, du gougeage, de la découpe plasma ou une opération de chauffage par induction.



LE BRUIT peut endommager l'ouïe.

Le bruit des processus et des équipements peut affecter l'ouïe.

- Porter des protections approuvées pour les oreilles si le niveau sonore est trop élevé.



LES BOUTEILLES peuvent exploser si elles sont endommagées.

Les bouteilles de gaz comprimé contiennent du gaz sous haute pression. Si une bouteille est endommagée, elle peut exploser. Du fait que les bouteilles de gaz font normalement partie du procédé de soudage, les manipuler avec précaution.

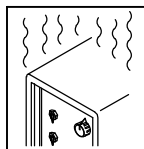
- Protéger les bouteilles de gaz comprimé d'une chaleur excessive, des chocs mécaniques, des dommages physiques, du laitier, des flammes ouvertes, des étincelles et des arcs.
- Placer les bouteilles debout en les fixant dans un support stationnaire ou dans un porte-bouteilles pour les empêcher de tomber ou de se renverser.
- Tenir les bouteilles éloignées des circuits de soudage ou autres circuits électriques.
- Ne jamais placer une torche de soudage sur une bouteille à gaz.
- Une électrode de soudage ne doit jamais entrer en contact avec une bouteille.
- Ne jamais souder une bouteille pressurisée – risque d'explosion.
- Utiliser seulement des bouteilles de gaz comprimé, régulateurs, tuyaux et raccords convenables pour cette application spécifique; les maintenir ainsi que les éléments associés en bon état.
- Détourner votre visage du détendeur-régulateur lorsque vous ouvrez la soupape de la bouteille.
- Le couvercle du détendeur doit toujours être en place, sauf lorsque la bouteille est utilisée ou qu'elle est reliée pour usage ultérieur.
- Utiliser les équipements corrects, les bonnes procédures et suffisamment de personnes pour soulever et déplacer les bouteilles.
- Lire et suivre les instructions sur les bouteilles de gaz comprimé, l'équipement connexe et le dépliant P-1 de la CGA (Compressed Gas Association) mentionné dans les principales normes de sécurité.

2-3. Dangers supplémentaires en relation avec l'installation, le fonctionnement et la maintenance



Risque D'INCENDIE OU D'EXPLOSION.

- Ne pas placer l'appareil sur, au-dessus ou à proximité de surfaces inflammables.
- Ne pas installer l'appareil à proximité de produits inflammables.
- Ne pas surcharger l'installation électrique – s'assurer que l'alimentation est correctement dimensionnée et protégée avant de mettre l'appareil en service.



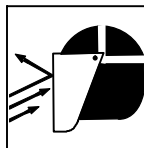
L'EMPLOI EXCESSIF peut SURCHAUFFER L'ÉQUIPEMENT.

- Prévoir une période de refroidissement ; respecter le cycle opératoire nominal.
- Réduire le courant ou le facteur de marche avant de poursuivre le soudage.
- Ne pas obstruer les passages d'air du poste.



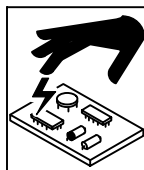
LA CHUTE DE L'ÉQUIPEMENT peut provoquer des blessures.

- Utiliser l'anneau de levage uniquement pour soulever l'appareil, NON PAS les chariots, les bouteilles de gaz ou tout autre accessoire.
- Utiliser un équipement de levage de capacité suffisante pour lever l'appareil.
- En utilisant des fourches de levage pour déplacer l'unité, s'assurer que les fourches sont suffisamment longues pour dépasser du côté opposé de l'appareil.
- Tenir l'équipement (câbles et cordons) à distance des véhicules mobiles lors de toute opération en hauteur.
- Suivre les consignes du Manuel des applications pour l'équation de levage NIOSH révisée (Publication N°94-110) lors du levage manuel de pièces ou équipements lourds.



LES ÉTINCELLES PROJETÉES peuvent provoquer des blessures.

- Porter un écran facial pour protéger le visage et les yeux.
- Affûter l'électrode au tungstène uniquement à la meuleuse dotée de protecteurs. Cette manœuvre est à exécuter dans un endroit sûr lorsque l'on porte l'équipement homologué de protection du visage, des mains et du corps.
- Les étincelles risquent de causer un incendie – éloigner toute substance inflammable.



LES CHARGES ÉLECTROSTATIQUES peuvent endommager les circuits imprimés.

- Établir la connexion avec la barrette de terre avant de manipuler des cartes ou des pièces.
- Utiliser des pochettes et des boîtes antistatiques pour stocker, déplacer ou expédier des cartes de circuits imprimés.



Les PIÈCES MOBILES peuvent causer des blessures.

- Ne pas s'approcher des organes mobiles.
- Ne pas s'approcher des points de coincement tels que des rouleaux de commande.



LES FILS DE SOUDAGE peuvent provoquer des blessures.

- Ne pas appuyer sur la gâchette avant d'en avoir reçu l'instruction.
- Ne pas diriger le pistolet vers soi, d'autres personnes ou toute pièce mécanique en engageant le fil de soudage.



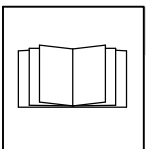
L'EXPLOSION DE LA BATTERIE peut provoquer des blessures.

- Ne pas utiliser l'appareil de soudage pour charger des batteries ou faire démarrer des véhicules à l'aide de câbles de démarrage, sauf si l'appareil dispose d'une fonctionnalité de charge de batterie destinée à cet usage.



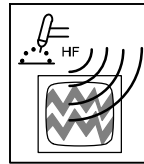
Les PIÈCES MOBILES peuvent causer des blessures.

- S'abstenir de toucher des organes mobiles tels que des ventilateurs.
- Maintenir fermés et verrouillés les portes, panneaux, recouvrements et dispositifs de protection.
- Lorsque cela est nécessaire pour des travaux d'entretien et de dépannage, faire retirer les portes, panneaux, recouvrements ou dispositifs de protection uniquement par du personnel qualifié.
- Remettre les portes, panneaux, recouvrements ou dispositifs de protection quand l'entretien est terminé et avant de rebrancher l'alimentation électrique.



LIRE LES INSTRUCTIONS.

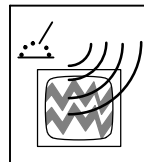
- Lire et appliquer les instructions sur les étiquettes et le Mode d'emploi avant l'installation, l'utilisation ou l'entretien de l'appareil. Lire les informations de sécurité au début du manuel et dans chaque section.
- N'utiliser que les pièces de rechange recommandées par le constructeur.
- Effectuer l'entretien en respectant les manuels d'utilisation, les normes industrielles et les codes nationaux, d'état et locaux.



LE RAYONNEMENT HAUTE FRÉQUENCE (H.F.) risque de provoquer des interférences.

- Le rayonnement haute fréquence (H.F.) peut provoquer des interférences avec les équipements de radio-navigation et de communication, les services de sécurité et les ordinateurs.

- Demander seulement à des personnes qualifiées familiarisées avec des équipements électroniques de faire fonctionner l'installation.
- L'utilisateur est tenu de faire corriger rapidement par un électricien qualifié les interférences résultant de l'installation.
- Si le FCC signale des interférences, arrêter immédiatement l'appareil.
- Effectuer régulièrement le contrôle et l'entretien de l'installation.
- Maintenir soigneusement fermés les portes et les panneaux des sources de haute fréquence, maintenir les éclateurs à une distance correcte et utiliser une terre et un blindage pour réduire les interférences éventuelles.



LE SOUDAGE À L'ARC risque de provoquer des interférences.

- L'énergie électromagnétique risque de provoquer des interférences pour l'équipement électronique sensible tel que les ordinateurs et l'équipement commandé par ordinateur tel que les robots.
- Veiller à ce que tout l'équipement de la zone de soudage soit compatible électromagnétiquement.
- Pour réduire la possibilité d'interférence, maintenir les câbles de soudage aussi courts que possible, les grouper, et les poser aussi bas que possible (ex. par terre).
- Veiller à souder à une distance de 100 mètres de tout équipement électronique sensible.
- Veiller à ce que ce poste de soudage soit posé et mis à la terre conformément à ce mode d'emploi.
- En cas d'interférences après avoir pris les mesures précédentes, il incombe à l'utilisateur de prendre des mesures supplémentaires telles que le déplacement du poste, l'utilisation de câbles blindés, l'utilisation de filtres de ligne ou la pose de protecteurs dans la zone de travail.

2-4. Proposition californienne 65 Avertissements



Les équipements de soudage et de coupage produisent des fumées et des gaz qui contiennent des produits chimiques dont l'État de Californie reconnaît qu'ils provoquent des malformations congénitales et, dans certains cas, des cancers. (Code de santé et de sécurité de Californie, chapitre 25249.5 et suivants)



Ce produit contient des produits chimiques, notamment du plomb, dont l'État de Californie reconnaît qu'ils provoquent des cancers, des malformations congénitales ou d'autres problèmes de procréation. *Se laver les mains après utilisation.*

2-5. Principales normes de sécurité

Safety in Welding, Cutting, and Allied Processes, ANSI Standard Z49.1, is available as a free download from the American Welding Society at <http://www.aws.org> or purchased from Global Engineering Documents (phone: 1-877-413-5184, website: www.global.ihs.com).

Safe Practices for the Preparation of Containers and Piping for Welding and Cutting, American Welding Society Standard AWS F4.1, from Global Engineering Documents (phone: 1-877-413-5184, website: www.global.ihs.com).

Safe Practices for Welding and Cutting Containers that have Held Combustibles, American Welding Society Standard AWS A6.0, from Global Engineering Documents (phone: 1-877-413-5184, website: www.global.ihs.com).

National Electrical Code, NFPA Standard 70, from National Fire Protection Association, Quincy, MA 02269 (phone: 1-800-344-3555, website: www.nfpa.org and www.sparky.org).

Safe Handling of Compressed Gases in Cylinders, CGA Pamphlet P-1, from Compressed Gas Association, 14501 George Carter Way, Suite 103, Chantilly, VA 20151 (phone: 703-788-2700, website: www.cga-net.com).

Safety in Welding, Cutting, and Allied Processes, CSA Standard W117.2, from Canadian Standards Association, Standards Sales, 5060

Spectrum Way, Suite 100, Ontario, Canada L4W 5NS (phone: 800-463-6727, website: www.csa-international.org).

Safe Practice For Occupational And Educational Eye And Face Protection, ANSI Standard Z87.1, from American National Standards Institute, 25 West 43rd Street, New York, NY 10036 (phone: 212-642-4900, website: www.ansi.org).

Standard for Fire Prevention During Welding, Cutting, and Other Hot Work, NFPA Standard 51B, from National Fire Protection Association, Quincy, MA 02269 (phone: 1-800-344-3555, website: www.nfpa.org).

OSHA, Occupational Safety and Health Standards for General Industry, Title 29, Code of Federal Regulations (CFR), Part 1910, Subpart Q, and Part 1926, Subpart J, from U.S. Government Printing Office, Superintendent of Documents, P.O. Box 371954, Pittsburgh, PA 15250-7954 (phone: 1-866-512-1800) (there are 10 OSHA Regional Offices—phone for Region 5, Chicago, is 312-353-2220, website: www.osha.gov).

Applications Manual for the Revised NIOSH Lifting Equation, The National Institute for Occupational Safety and Health (NIOSH), 1600 Clifton Rd, Atlanta, GA 30333 (phone: 1-800-232-4636, website: www.cdc.gov/NIOSH).

2-6. Informations relatives aux CEM

Le courant électrique qui traverse tout conducteur génère des champs électromagnétiques (CEM) à certains endroits. Le courant de soudage crée un CEM autour du circuit et du matériel de soudage. Les CEM peuvent créer des interférences avec certains implants médicaux comme des stimulateurs cardiaques. Des mesures de protection pour les porteurs d'implants médicaux doivent être prises: Limiter par exemple tout accès aux passants ou procéder à une évaluation des risques individuels pour les soudeurs. Tous les soudeurs doivent appliquer les procédures suivantes pour minimiser l'exposition aux CEM provenant du circuit de soudage:

1. Rassembler les câbles en les torsadant ou en les attachant avec du ruban adhésif ou avec une housse.
2. Ne pas se tenir au milieu des câbles de soudage. Disposer les câbles d'un côté et à distance de l'opérateur.
3. Ne pas courber et ne pas entourer les câbles autour de votre corps.

4. Maintenir la tête et le torse aussi loin que possible du matériel du circuit de soudage.
5. Connecter la pince sur la pièce aussi près que possible de la soudure.
6. Ne pas travailler à proximité d'une source de soudage, ni s'asseoir ou se pencher dessus.
7. Ne pas souder tout en portant la source de soudage ou le dévidoir.

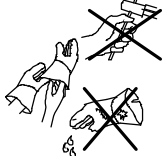
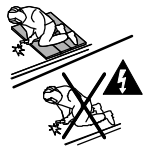
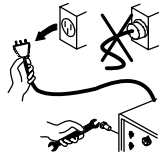
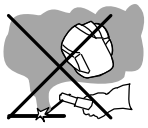
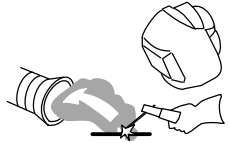
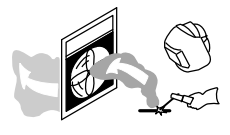
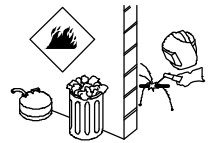
En ce qui concerne les implants médicaux :

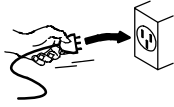
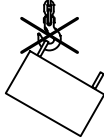
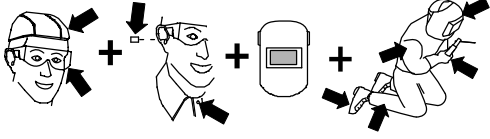
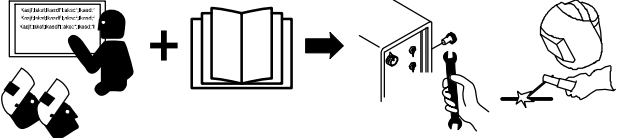
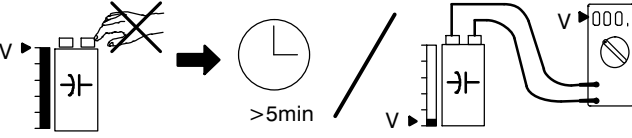
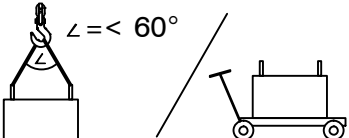
Les porteurs d'implants doivent d'abord consulter leur médecin avant de s'approcher des opérations de soudage à l'arc, de soudage par points, de gougeage, du coupage plasma ou de chauffage par induction. Si le médecin approuve, il est recommandé de suivre les procédures précédentes.

SECTION 3 – DEFINITIONS

3-1. Additional Safety Symbols and Definitions

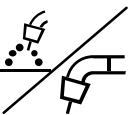
 Some symbols are found only on CE products.

	Warning! Watch Out! There are possible hazards as shown by the symbols. Safe1 2012-05
	Wear dry insulating gloves. Do not touch electrode with bare hand. Do not wear wet or damaged gloves. Safe2 2012-05
	Protect yourself from electric shock by insulating yourself from work and ground. Safe3 2012-05
	Disconnect input plug or power before working on machine. Safe5 2012-05
	Keep your head out of the fumes. Safe6 2012-05
	Use forced ventilation or local exhaust to remove the fumes. Safe8 2012-05
	Use ventilating fan to remove fumes. Safe10 2012-05
	Keep flammables away from welding. Do not weld near flammables. Safe12 2012-05
	Welding sparks can cause fires. Have a fire extinguisher nearby, and have a watchperson ready to use it. Safe14 2012-05
	Do not weld on drums or any closed containers. Safe16 2012-05

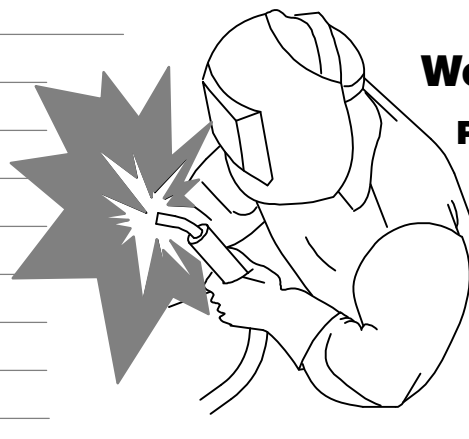
	Do not remove or paint over (cover) the label.	Safe20 2012-05
	When power is applied failed parts can explode or cause other parts to explode.	Safe26 2012-05
	Flying pieces of parts can cause injury. Always wear a face shield when servicing unit.	Safe27 2012-05
	Always wear long sleeves and button your collar when servicing unit.	Safe28 2012-05
	After taking proper precautions as shown, connect power to unit.	Safe29 2012-05
	Do not use one eye bolt to lift or support unit.	Safe31 2012-05
	Do not discard product with general waste. Reuse or recycle Waste Electrical and Electronic Equipment (WEEE) by disposing at a designated collection facility. Contact your local recycling office or your local distributor for further information.	Safe37 2012-05
	Wear hat and safety glasses. Use ear protection and button shirt collar. Use welding helmet with correct shade of filter. Wear complete body protection.	Safe38 2012-05
	Become trained and read the instructions before working on the machine or welding.	Safe40 2012-05
	Hazardous voltage remains on input capacitors after power is turned off. Do not touch fully charged capacitors. Always wait 5 minutes after power is turned off before working on unit, OR check input capacitor voltage, and be sure it is near 0 before touching any parts.	Safe43 2012-05
	Always lift and support unit using both eye bolts. Keep angle of lifting device less than 60 degrees. Use a proper cart to move unit.	Safe44 2012-05

3-2. Miscellaneous Symbols And Definitions

 Some symbols are found only on CE products.

A	Amperage		Direct Current (DC)		Alternating Current (AC)	V	Voltage
	Output		Circuit Breaker		Remote	I	On
	Off	+	Positive	-	Negative		Voltage Input
	Arc Force		Constant Voltage		Inductance		Protective Earth (Ground)
	Increase		Line Connection		Gas Metal Arc Welding (GMAW)		Three Phase Static Frequency Converter-Transformer-Rectifier
U₀	Rated No Load Voltage (Average)	U₁	Primary Voltage	U₂	Conventional Load Voltage	X	Duty Cycle
Hz	Hertz	IP	Degree Of Protection	I₂	Rated Welding Current	%	Percent
	Pulsed	S	Suitable for Some Hazardous Locations	1 	Single Phase	3 	Three Phase
I_{1max}	Rated Maximum Supply Current	I_{1eff}	Maximum Effective Supply Current				

Notes



Work like a Pro!

Pros weld and cut safely. Read the safety rules at the beginning of this manual.

Notes

SECTION 4 – SPECIFICATIONS FOR AUTO-AXCESS E 300 ANALOG

4-1. Serial Number And Rating Label Location

The serial number and rating information for this product is located on the front. Use rating label to determine input power requirements and/or rated output. For future reference, write serial number in space provided on back cover of this manual.

4-2. Unit Specifications

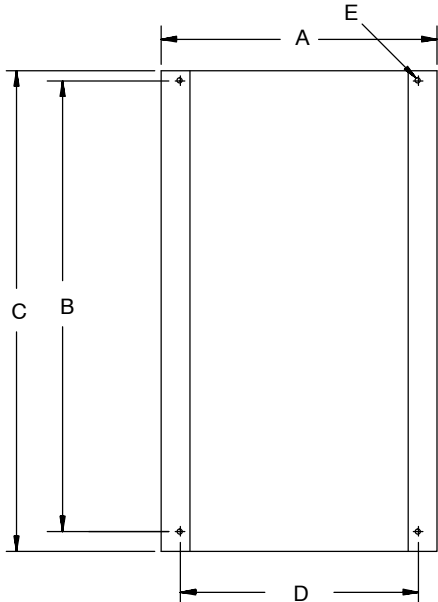
Input Power	Rated Welding Output	Voltage Range	Wire Feed Speed Range**	Wire Diameter Range	Max Open Circuit Voltage DC	Amperes Input At Rated Load Output 60 Hz, Three-Phase	Input kVA	Input KW
						400V		
Three Phase	225 A @ 25 V DC, 100% Duty Cycle	10-44	Standard: 50-1400 ipm (1.3-35.6 mpm)	.030-.062 in. (0.8-1.6 mm)	80	10.4	7.2 (0.2*)	6.9 (0.04*)

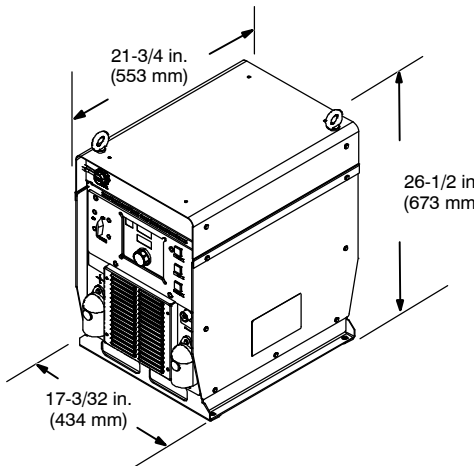
*While idling; Input amperage fluctuates while idling and is always less than one Ampere. Use one Ampere for power efficiency calculations.

**Wire feed speed ranges are for GMAW welding. While pulse welding, wire feed speed ranges may be more limited.

4-3. Dimensions And Weight

Hole Layout Dimensions	
A	17-3/32 in. (434 mm)
B	17-3/8 in. (441 mm)
C	19-3/32 in. (485 mm)
D	16-3/32 in. (409 mm)
E	1/2 in. (13 mm)
Weight	
117 lb (53 kg) Net 139 lb (63 kg) Ship	

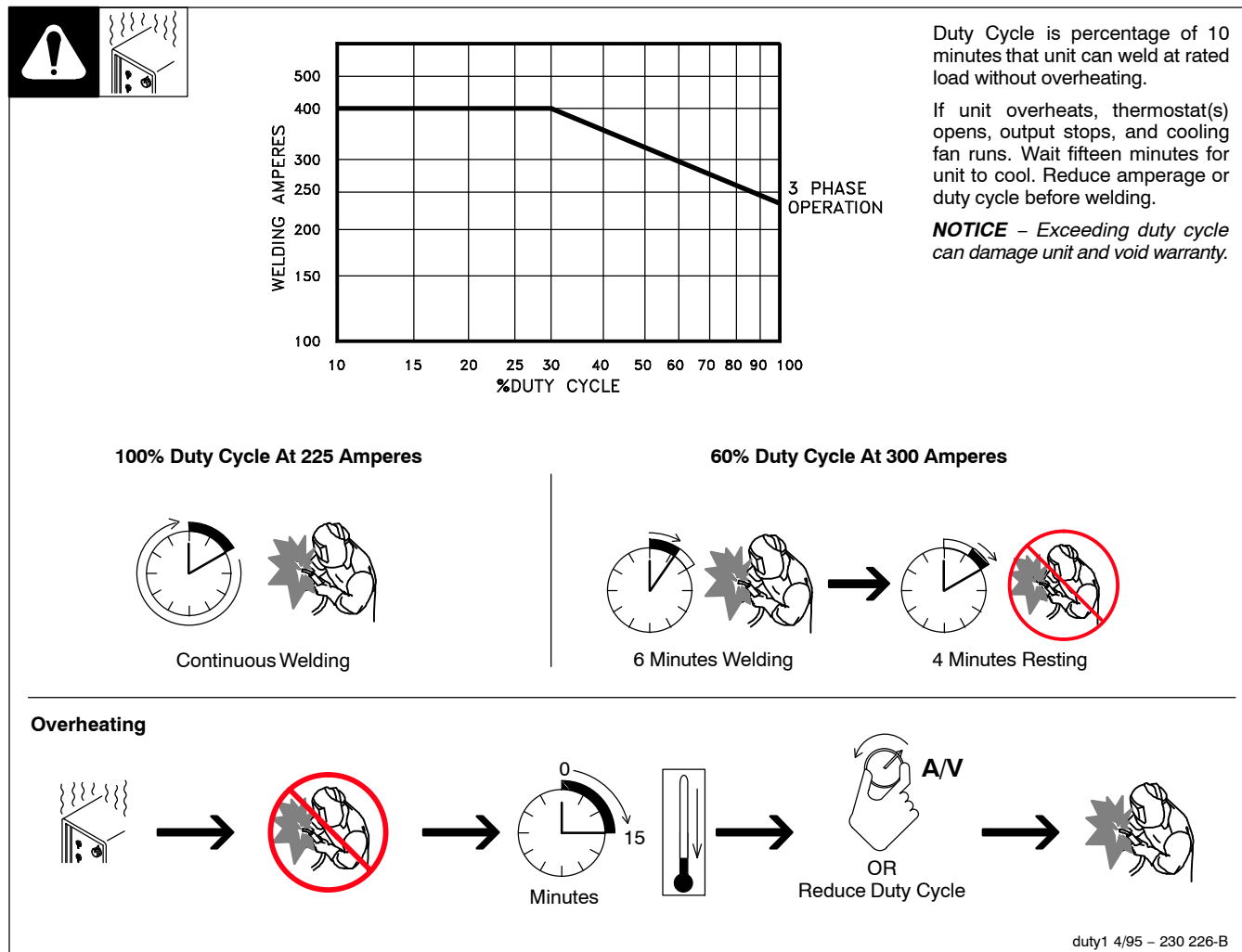




Ref. 250 016

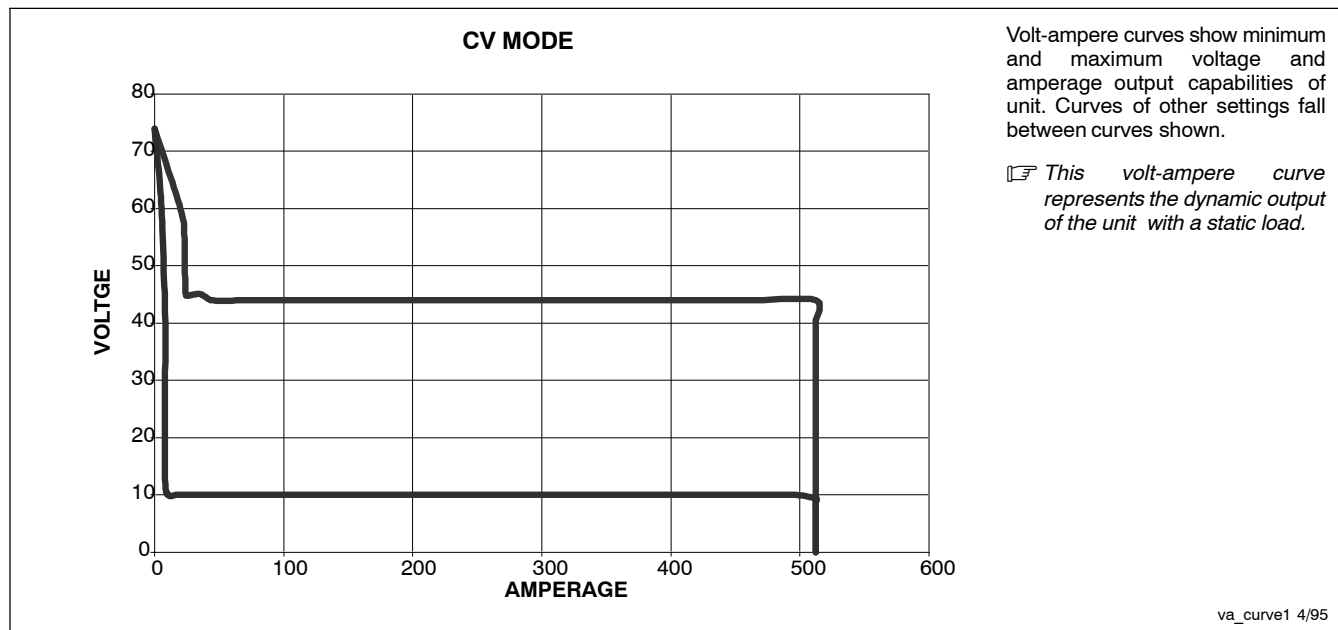
Ref. 250 016-C

4-4. Duty Cycle And Overheating



duty1 4/95 – 230 226-B

4-5. Volt-Ampere Curves



va_curve1 4/95

4-6. Electrical Service Guide

⚠ Failure to follow these electrical service guide recommendations could create an electric shock or fire hazard. These recommendations are for a dedicated circuit sized for the rated output and duty cycle of the welding power source. In dedicated circuit installations, the National Electrical Code (NEC) allows the receptacle or conductor rating to be less than the rating of the circuit protection device. All components of the circuit must be physically compatible. See NEC articles 210.21, 630.11, and 630.12.

NOTICE – **INCORRECT INPUT POWER** can damage this welding power source. This welding power source requires a **CONTINUOUS** supply of input power at rated frequency ($\pm 10\%$) and voltage ($\pm 10\%$). Phase to ground voltage shall not exceed $+10\%$ of rated input voltage. Do not use a generator with automatic idle device (that idles engine when no load is sensed) to supply input power to this welding power source.

☞ Actual input voltage should not exceed $\pm 10\%$ of indicated required input voltage. If actual input voltage is outside of this range, output may not be available.

	50/60 Hz Three Phase
Input Voltage (V)	400
Input Amperes (A) At Rated Output	10.4
Max Recommended Standard Fuse Rating In Amperes ¹	
Time-Delay Fuses ²	10
Normal Operating Fuses ³	15
Min Input Conductor Size In AWG ⁴	14
Max Recommended Input Conductor Length In Feet (Meters)	223 (68)
Min Grounding Conductor Size In AWG ⁴	14

Reference: 2011 National Electrical Code (NEC) (including article 630)

1 If a circuit breaker is used in place of a fuse, choose a circuit breaker with time-current curves comparable to the recommended fuse.

2 "Time-Delay" fuses are UL class "RK5". See UL 248.

3 "Normal Operating" (general purpose - no intentional delay) fuses are UL class "K5" (up to and including 60 amps), and UL class "H" (65 amps and above).

4 Conductor data in this section specifies conductor size (excluding flexible cord or cable) between the panelboard and the equipment per NEC Table 310.15(B)(16). If a flexible cord or cable is used, minimum conductor size may increase. See NEC Table 400.5(A) for flexible cord and cable requirements.

4-7. Environmental Specifications

A. IP Rating

IP Rating
IP21S
This equipment is designed for indoor use and is not intended to be used or stored outside.

B. Information On Electromagnetic Fields (EMF)

⚠ This equipment shall not be used by the general public as the EMF limits for the general public might be exceeded during welding. This equipment is built in accordance with EN 60974-1 and is intended to be used only in an occupational environment (where the general public access is prohibited or regulated in such a way as to be similar to occupational use) by an expert or an instructed person. Wire feeders and ancillary equipment (such as torches, liquid cooling systems and arc striking and stabilizing devices) as part of the welding circuit may not be a major contributor to the EMF. See the Owner's Manuals for all components of the welding circuit for additional EMF exposure information. - The EMF assessment on this equipment was conducted at 0.5 meter. - At a distance of 1 meter the EMF exposure values were less than 20% of the permissible values. ce-emf 1 2010-10

C. Information On Electromagnetic Compatibility (EMC) For Auto-Axcess E 300

⚠ This Class A equipment is not intended for use in residential locations where the electrical power is provided by the public low-voltage supply system. There can be potential difficulties in ensuring electromagnetic compatibility in those locations, due to conducted as well as radiated disturbances. This equipment complies with IEC 61000-3-12 provided that the short-circuit power S_{sc} is greater than or equal to 4,371,835 at the interface point between the user's supply and the public system. It is the responsibility of the installer or user of the equipment to ensure, by consultation with the distribution network operator if necessary, that the equipment is connected only to a supply with a short-circuit power S_{sc} greater than or equal to 4,371,835. ce-emc 1 2011-09

SECTION 5 – SPECIFICATIONS FOR AUTO-AXCESS E 450 ANALOG

5-1. Unit Specifications

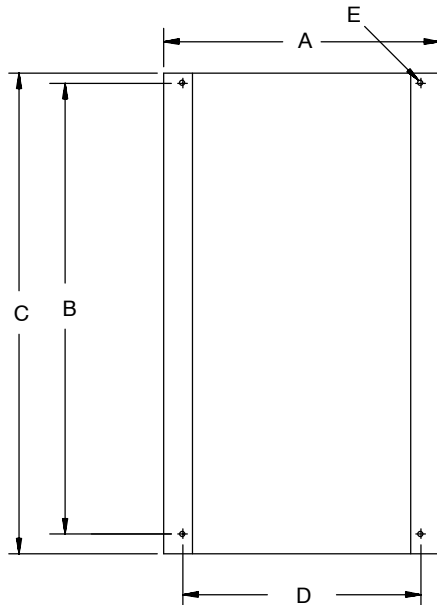
Input Power	Rated Welding Output	Voltage Range	Wire Feed Speed Range**	Wire Diameter Range	Max Open Circuit Voltage DC	Amperes Input At Rated Load Output 50/60 , Three-Phase	Input kVA	Input KW
						400V		
Three Phase	400 V Input: 450 A @ 36.5 V DC, 100% Duty Cycle	10-44	Standard: 50-1400 ipm (1.3-35.6 mpm)	.030-.062 in. (0.8-1.6 mm)	80	27.9 (0-1A*)	19.46 (0.8*)	18.68 (0.17*)

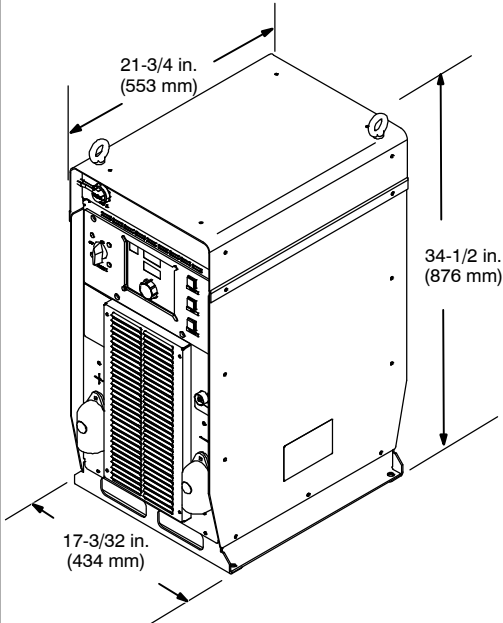
*While idling; Input amperage fluctuates while idling and is always less than one Ampere. Use one Ampere for power efficiency calculations.

**Wire feed speed ranges are for GMAW welding. While pulse welding, wire feed speed ranges may be more limited.

5-2. Dimensions And Weight

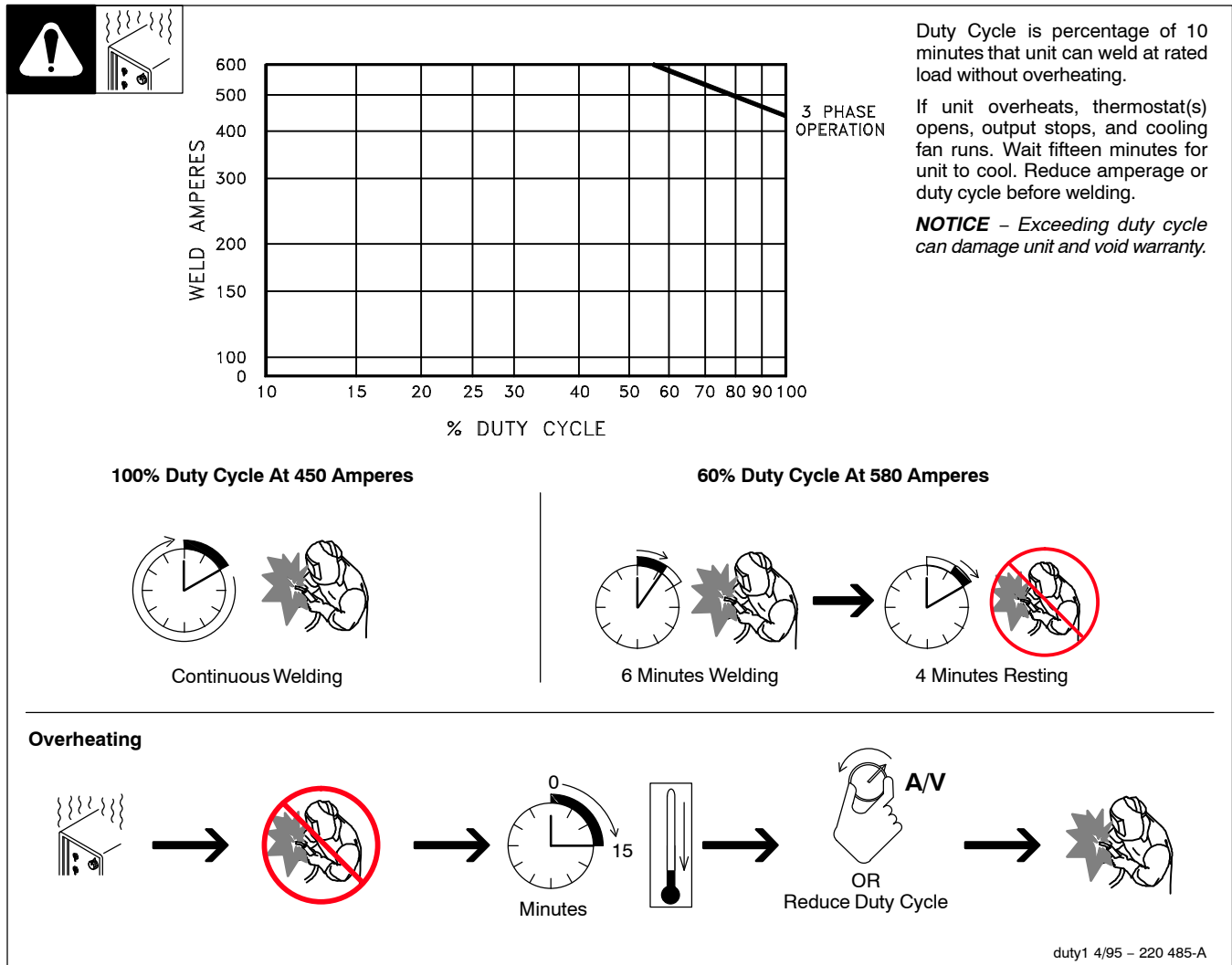
Hole Layout Dimensions	
A	17-3/32 in. (434 mm)
B	17-3/8 in. (441 mm)
C	19-3/32 in. (485 mm)
D	16-3/32 in. (409 mm)
E	1/2 in. (13 mm)
Weight	
168 lb (76 kg) Net 185 lb (84 kg) Ship	



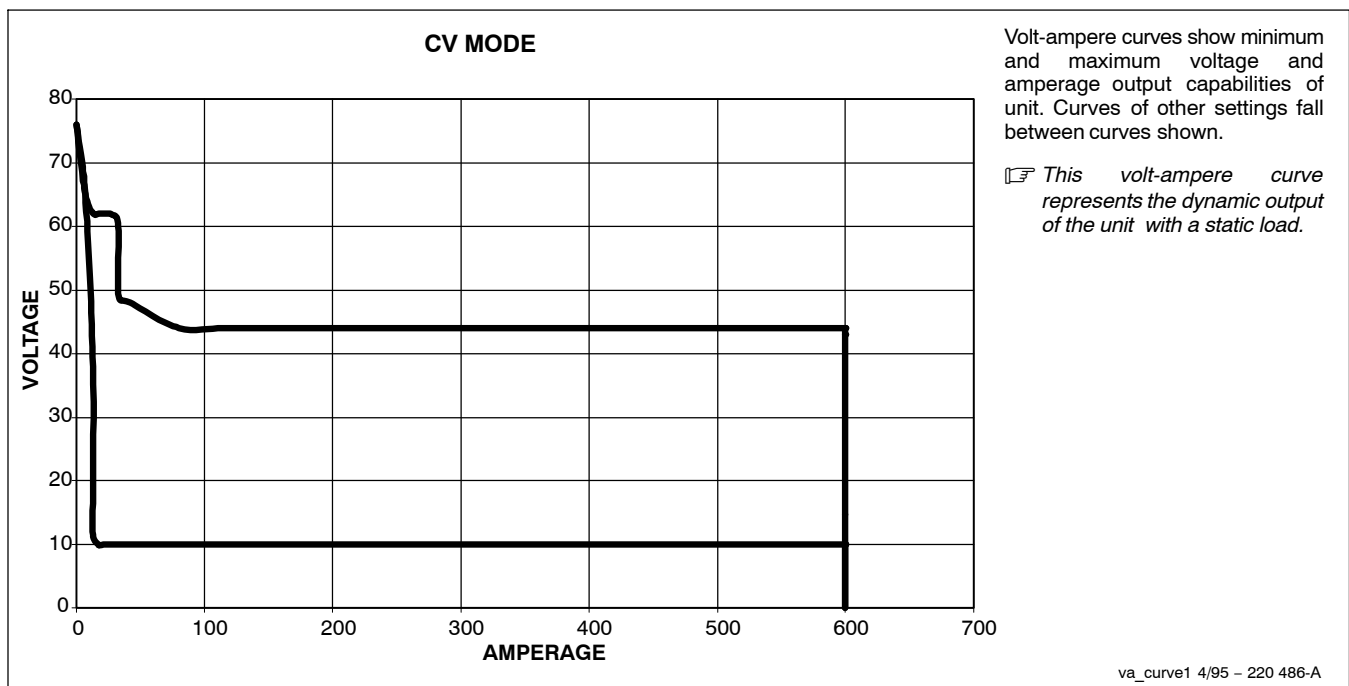


Ref. 249 889-B

5-3. Duty Cycle And Overheating



5-4. Volt-Ampere Curves



5-5. Electrical Service Guide

Elec Serv 2011-08

⚠ Failure to follow these electrical service guide recommendations could create an electric shock or fire hazard. These recommendations are for a dedicated circuit sized for the rated output and duty cycle of the welding power source. In dedicated circuit installations, the National Electrical Code (NEC) allows the receptacle or conductor rating to be less than the rating of the circuit protection device. All components of the circuit must be physically compatible. See NEC articles 210.21, 630.11, and 630.12.

NOTICE – INCORRECT INPUT POWER can damage this welding power source. This welding power source requires a CONTINUOUS supply of input power at rated frequency ($\pm 10\%$) and voltage ($\pm 10\%$). Phase to ground voltage shall not exceed $+10\%$ of rated input voltage. Do not use a generator with automatic idle device (that idles engine when no load is sensed) to supply input power to this welding power source.

⚡ Actual input voltage should not exceed $\pm 10\%$ of indicated required input voltage. If actual input voltage is outside of this range, output may not be available.

	50/60 Hz Three Phase
Input Voltage (V)	400
Input Amperes (A) At Rated Output	28
Max Recommended Standard Fuse Rating In Amperes ¹	
Time-Delay Fuses ²	35
Normal Operating Fuses ³	40
Min Input Conductor Size In AWG ⁴	10
Max Recommended Input Conductor Length In Feet (Meters)	211 (64)
Min Grounding Conductor Size In AWG ⁴	10

Reference: 2011 National Electrical Code (NEC) (including article 630)

1 If a circuit breaker is used in place of a fuse, choose a circuit breaker with time-current curves comparable to the recommended fuse.

2 "Time-Delay" fuses are UL class "RK5" . See UL 248.

3 "Normal Operating" (general purpose - no intentional delay) fuses are UL class "K5" (up to and including 60 amps), and UL class "H" (65 amps and above).

4 Conductor data in this section specifies conductor size (excluding flexible cord or cable) between the panelboard and the equipment per NEC Table 310.15(B)(16). If a flexible cord or cable is used, minimum conductor size may increase. See NEC Table 400.5(A) for flexible cord and cable requirements.

5-6. Environmental Specifications

A. IP Rating

IP Rating
IP21S
This equipment is designed for indoor use and is not intended to be used or stored outside.

B. Information On Electromagnetic Fields (EMF)

⚠ This equipment shall not be used by the general public as the EMF limits for the general public might be exceeded during welding.

This equipment is built in accordance with EN 60974-1 and is intended to be used only in an occupational environment (where the general public access is prohibited or regulated in such a way as to be similar to occupational use) by an expert or an instructed person.

Wire feeders and ancillary equipment (such as torches, liquid cooling systems and arc striking and stabilizing devices) as part of the welding circuit may not be a major contributor to the EMF. See the Owner's Manuals for all components of the welding circuit for additional EMF exposure information.

- The EMF assessment on this equipment was conducted at 0.5 meter.
- At a distance of 1 meter the EMF exposure values were less than 20% of the permissible values.

ce-emf 1 2010-10

C. Information On Electromagnetic Compatibility (EMC) For Auto-Axcess E 450

⚠ This Class A equipment is not intended for use in residential locations where the electrical power is provided by the public low-voltage supply system. There can be potential difficulties in ensuring electromagnetic compatibility in those locations, due to conducted as well as radiated disturbances.

This equipment complies with IEC 61000-3-12 provided that the short-circuit power S_{sc} is greater than or equal to 9,311,644 at the interface point between the user's supply and the public system. It is the responsibility of the installer or user of the equipment to ensure, by consultation with the distribution network operator if necessary, that the equipment is connected only to a supply with a short-circuit power S_{sc} greater than or equal to 9,311,644.

ce-emc 1 2011-09

Notes

SECTION 6 – LICENSE AGREEMENT

You have acquired a device (Auto-Access E) which includes software licensed by Miller Electric Mfg. Co. from one or more software licensors (EUROTECH, Inc. software suppliers). Such software products, as well as associated media, printed materials, and “online” or electronic documentation for such software are protected by international intellectual property laws and treaties. The software is licensed, not sold. All rights reserved.

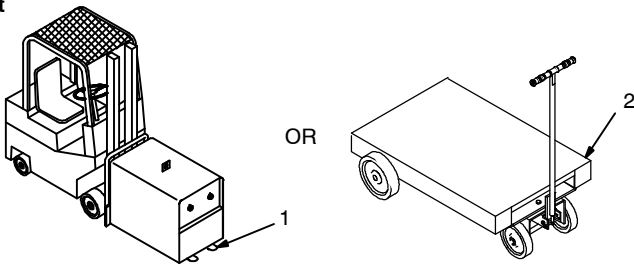
SECTION 7 – GENERAL INSTALLATION

 Appearance of actual unit may vary from unit shown in manual.

7-1. Selecting A Location

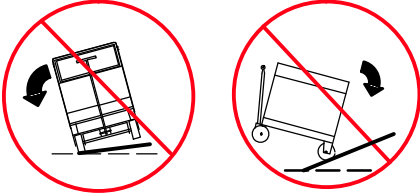


Movement

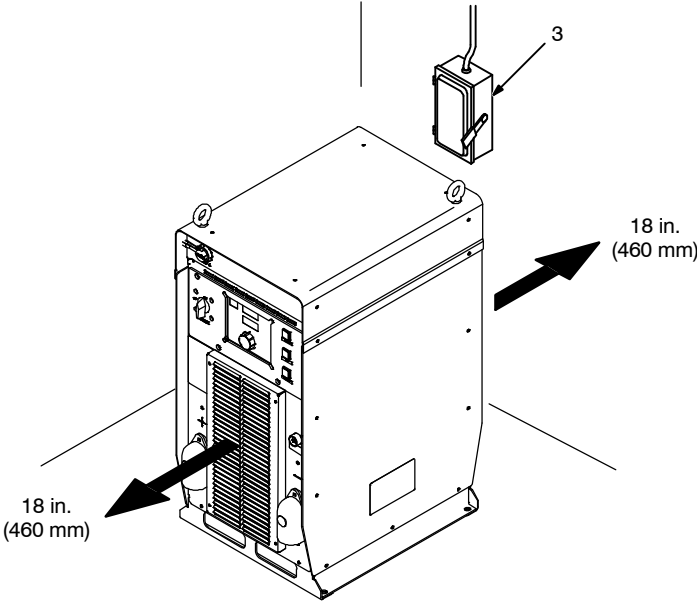


Tipping

**Do not move or operate unit where it could tip.**



Location



**Special installation may be required where gasoline or volatile liquids are present – see NEC Article 511 or CEC Section 20.**

**Do not stack units. Beware of tipping.**

1. Lifting Forks

Use lifting forks to move unit.

Extend forks beyond opposite side of unit.

2. Hand Cart

Use cart or similar device to move unit.

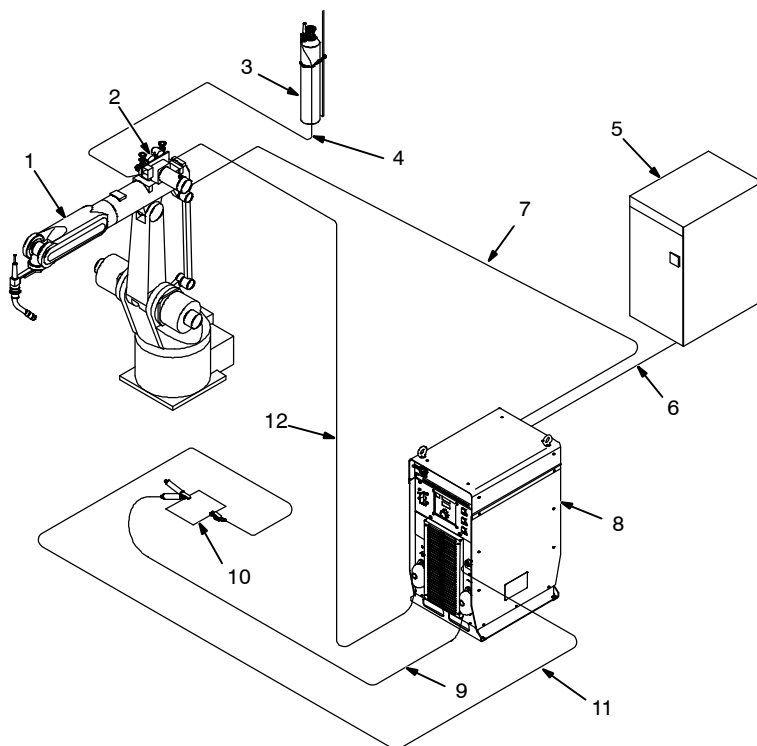
3. Line Disconnect Device

Locate unit near correct input power supply.

loc_2 3/96 -Ref. 249 889-B

General

7-2. Connection Diagram



The proper interface kit must be installed in the welding power source/interface unit to allow it to be connected to the robot.

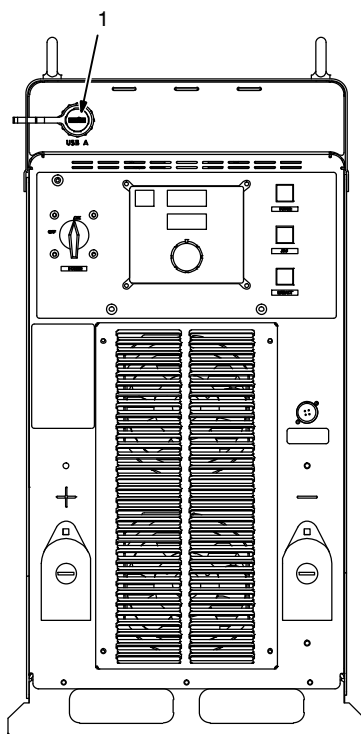
1. Robot (Will Vary According To Application)
 2. Motor/Drive Assembly
 3. Gas Cylinder
 4. Gas Hose
 5. Robot Control
 6. Robot Input/Output Cable
 7. Gas And Motor Control Cable
 8. Welding Power Source/Interface Unit
 9. Negative (-) Weld Cable
 10. Workpiece
 11. Voltage Sensing Lead
- Recommended for Accu-pulse and RMD.

Positive (+) voltage sensing lead is contained in the motor cable.

12. Positive (+) Weld Cable

249 924-B

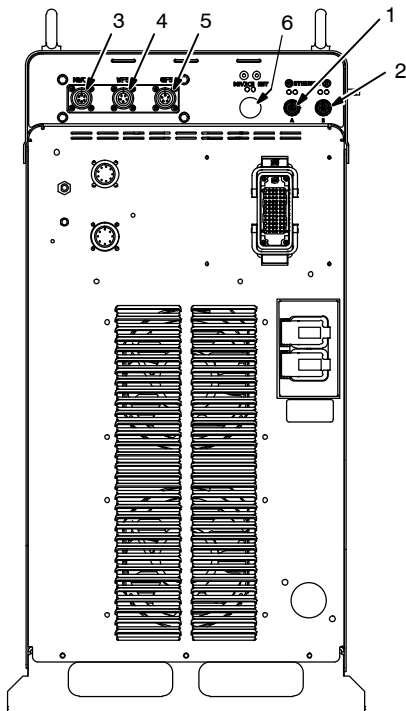
7-3. Upper Front Panel Receptacles



1. USB Host Receptacle A
- USB receptacle provides connections for various USB host devices.

Ref. 249 889-B

7-4. Upper Rear Panel Receptacles



1. Ethernet Receptacle Port A

2. Ethernet Receptacle Port B

Port A and Port B are identified by the IP address from the network server.

Ethernet receptacles provide connections for either a network cable or a laptop PC or both.

3. Optional MWC1 Receptacle

4. Optional WFS (Wire Feed Sensor) Receptacle

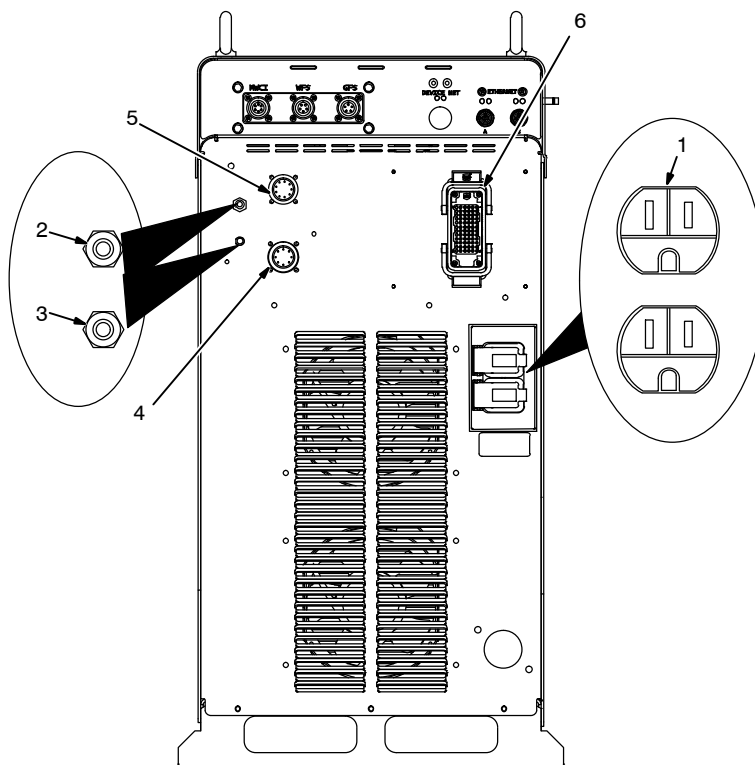
5. Optional GFS (Gas Flow Sensor) Receptacle

6. Optional DeviceNet Receptacle

DeviceNet option provides hardware and software that allows the welding power source to be connected into a DeviceNet network. Contact factory for option details.

Ref. 249 889-B

7-5. Lower Rear Panel Receptacles And Supplementary Protectors



1. 115 V 10 A AC Receptacle RC2

Receptacle supplies 60 Hz single-phase power. Maximum output from RC2 is limited by supplementary protector CB1 to 10 amps.

2. Supplementary Protector CB1

3. Supplementary Protector CB2

CB1 protects 115 volt receptacle RC2 from overload. If CB1 opens, RC2 does not work.

CB2 protects the wirefeed motor from overload. If CB2 opens, the wirefeeder does not work.

 Press button to reset breaker. If breaker continue to open, contact a Factory Authorized Service Agent.

4. Wirefeed/Gas Receptacle RC8

Use receptacle to connect gas and motor control cable to power source (see Sections 7-2 and 8 for additional information).

5. Peripheral Receptacle RC25

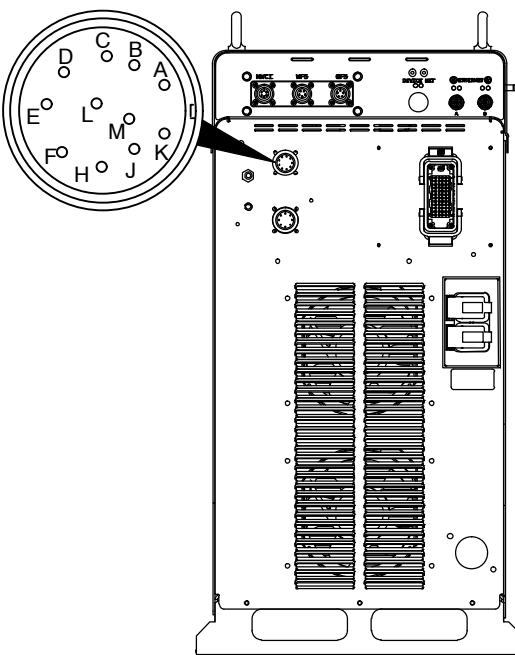
Receptacle provides connection to touch sensor, water flow switch, jog +/-, and I/O relay contacts circuitry (see Section 7-6).

6. Robot Interface Receptacle RC72

Use receptacle to connect robot input/output cable (see Sections 7-2 and 8 for additional information).

Ref. 249 889-B

7-6. Peripheral Receptacle Functions

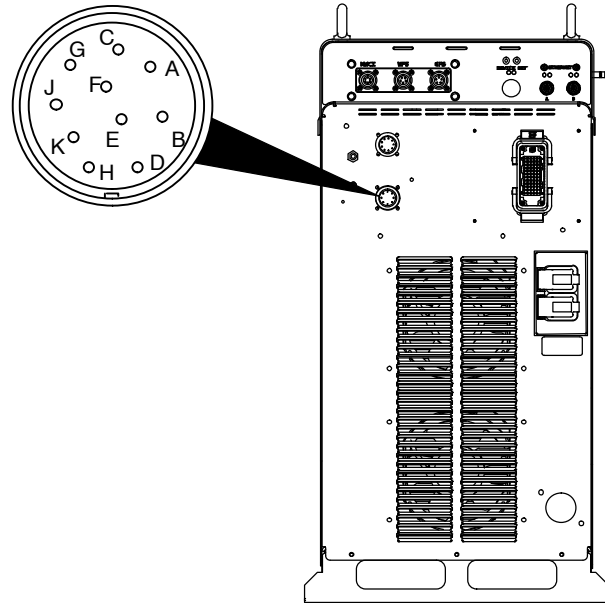
 Ref. 249 889-B	Function	Socket	Socket Information
		A	Not used.
		B	Not used.
	Purge	C*	Circuit common.
		D	Contact closure to C completes 40 volts DC solenoid circuit to purge shielding gas line.
	Coolant Flow Switch Input Signal	E	Contact closure to F indicates coolant flow switch is closed and recirculating coolant system is operational.
		F*	Circuit common.
	Jog	H**	Contact closure to circuit common advances welding wire at wire drive assembly.
	Retract	J**	Contact closure to circuit common retracts welding wire at wire drive assembly.
	Touch Sensor ON And Output Signal	K	Contact closure to L energizes Touch Sensor circuitry.
		L*	Circuit common.
		M	Part touched +24 volts DC output signal referenced to circuit common.

*Circuit common is same electrical reference point.

**Speed of Jog + (advance) and Jog - (retract) is 60 ipm for 3 seconds, then it automatically changes to 700 ipm.

Note: A customer supplied matching amphenol plug, factory Part No. 194 847, [Amphenol Part No. 97-3106A-20-33P(B)(621) and strain relief clamp 97-3057-12(0621)] is required to use peripheral receptacle.

7-7. Motor Control Receptacle Functions

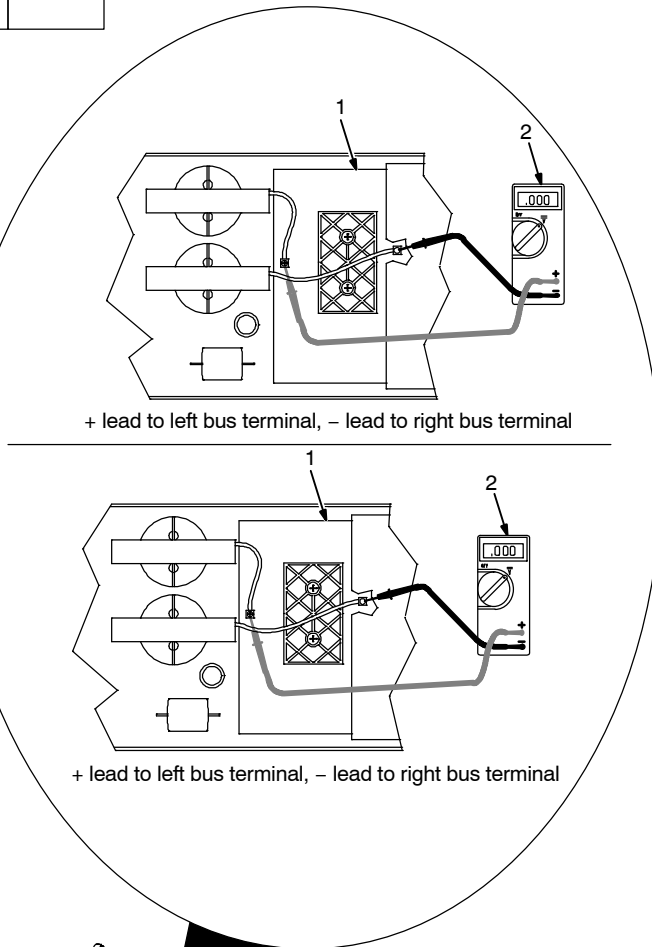
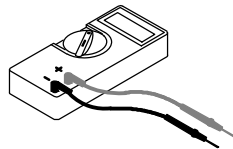
 Ref. 249 889-B	Socket	Socket Information
	A	Not used.
	B	Motor negative (-).
	C	Tach A.
	D	Motor positive (+).
	E	Tach common.
	F	Gas valve.
	G	Electrode sense.
	H	Tach +5 volts DC.
	J	Tach B.
	K	Gas valve.

7-8. Measuring Input Capacitor Voltage

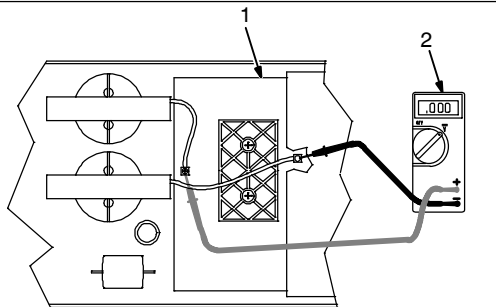


Tools Needed:

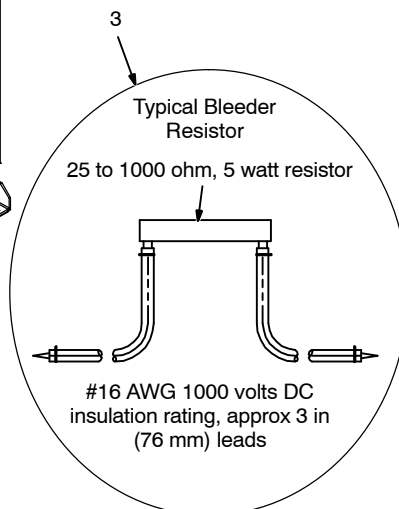
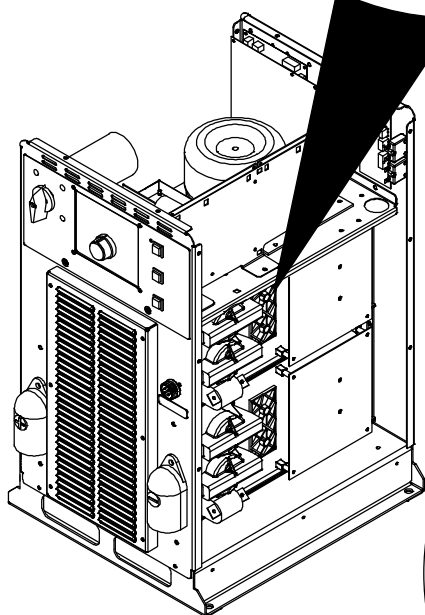
 5/16 in.



+ lead to left bus terminal, - lead to right bus terminal



+ lead to left bus terminal, - lead to right bus terminal



⚠ Turn Off welding power source, and disconnect input power.

⚠ Significant DC voltage can remain on capacitors after unit is Off. Always check the voltage as shown to be sure the input capacitors have discharged before working on unit.

Remove cover

1 Power Interconnect Board
PC2

2 Voltmeter

Measure the DC voltage across the + bus terminal and - bus terminal on PC2 as shown until voltage drops to near 0 (zero) volts. Measure input capacitor voltage on both inverter assemblies before proceeding.

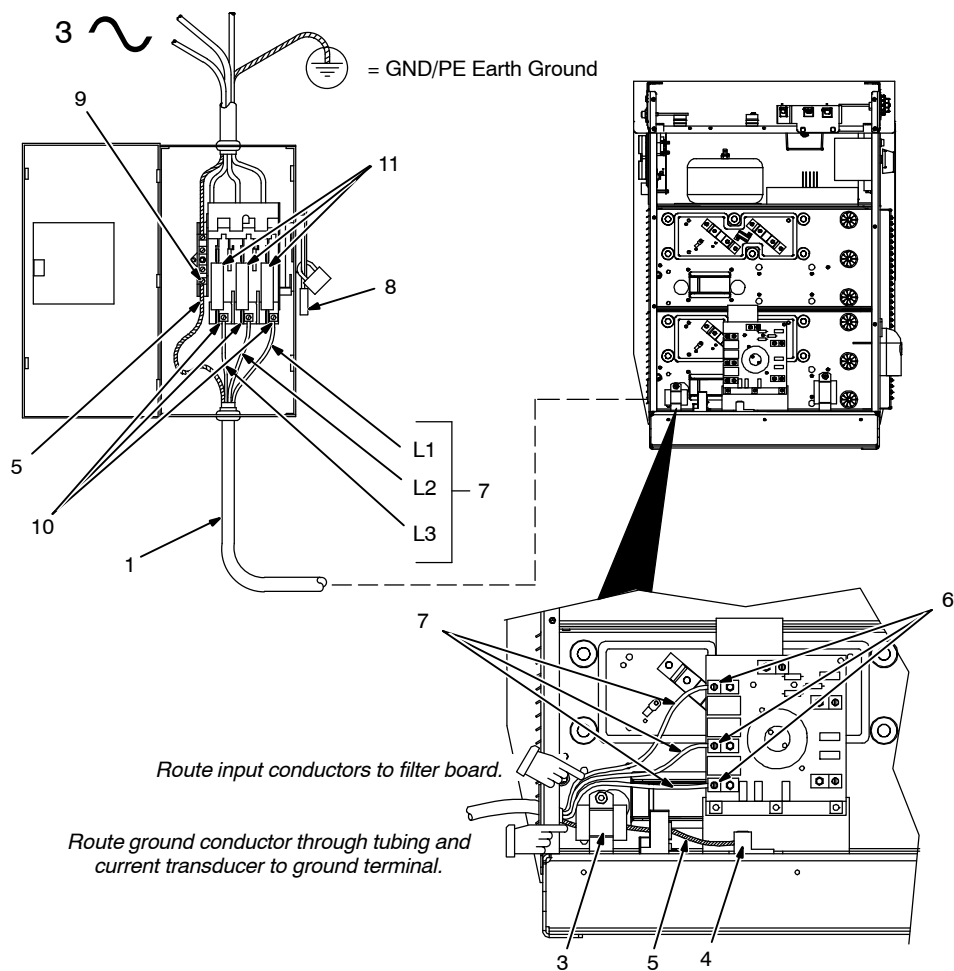
If the capacitor voltage does not drop to near zero after several minutes, use a bleeder resistor of between 25 and 1000 ohms, at least 5 watts, #16 AWG 1000 volts DC insulating rating wire to discharge the capacitor(s).

3. Typical Bleeder Resistor

An example of a typical bleeder resistor is shown on this page.

Proceed with job inside unit.
Reinstall cover when finished.

7-9. Connecting 3-Phase Input Power



Tools Needed:

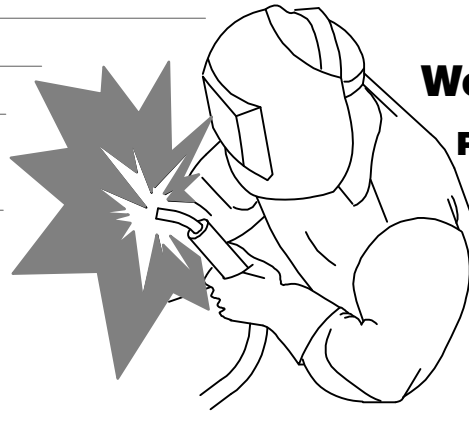


- See rating label on unit and check input voltage available at site.

1. Input Power Conductors (Customer Supplied Cord)
- Select size and length of conductors using Section 4-6 or 5-5. Conductors must comply with national, state, and local electrical codes. If applicable, use lugs of proper amperage capacity and correct hole size.
- Welding Power Source Input Power Connections**
2. Strain Relief
- Install strain relief of proper size for unit and input conductors. Route conductors (cord) through strain relief and tighten screws.
3. Current Transducer
 4. Welding Power Source Grounding Terminal
 5. Green Or Green/Yellow Grounding Conductor
- Route green or green/yellow grounding conductor through current transducer and connect to machine grounding terminal first.
6. Welding Power Source Line Terminals
 7. Input Conductors (L1, L2 And L3)

Close and secure door on disconnect device. Follow established lockout/tagout procedures to put unit in service.

Notes



Pros weld and cut safely. Read the safety rules at the beginning of this manual.

7-10. Touch Sensor Operation



The touch sensor feature allows the robot to locate a weldment using the wire feed system and welding power source. The weld output terminals provide a path for touch sensor voltage when this feature is turned on at the peripheral receptacle. Turning on touch sensor causes a DC voltage to be present on the welding wire. When welding wire touches the weldment, the voltage sensing circuit closes, and a +24 volts DC output signal is sent to the robot control indicating weldment detection. Touch sensor DC voltage on the welding wire is 80 volts DC. As soon as touch sensor turns on, WIRE LIVE appears on the front panel display.

7-11. Remote Program Select

 Remote Program Select is factory set to "On". Use the web pages to turn this function "Off".

When Remote Program Select is On, a remote device or robot pendant may be used to select programs. When Off, program selection must be done from the welding power source front panel.

7-12. Remote Program Setting

 When Remote Program Select is "On", program selection will be determined by remote input once a weld is initiated. Prior to welding, program selection can be done in a normal manner from the welding power source front control panel.

See the following table for the remote program select binary code.

Program No.	Output A	Output B	Output C
1	Off	Off	Off
2	On	Off	Off
3	Off	On	Off
4	On	On	Off
5	Off	Off	On
6	On	Off	On
7	Off	On	On
8	On	On	On

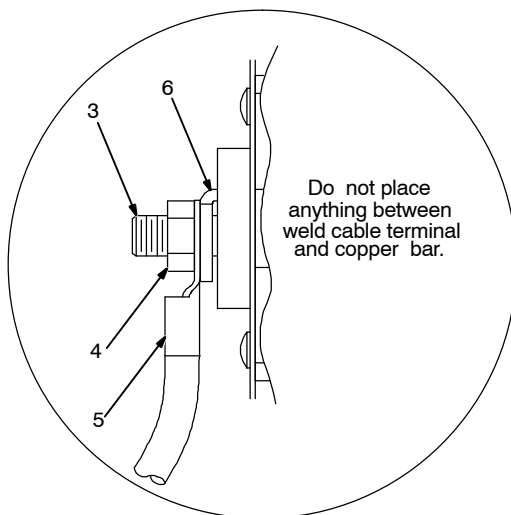
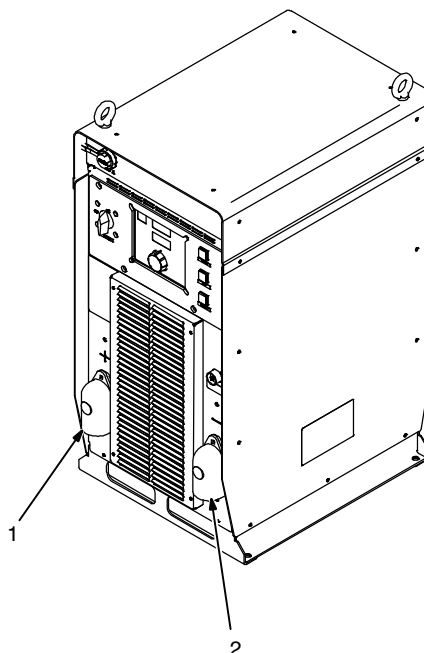
Notes

SECTION 8 – RECOMMENDED SETUP PROCEDURES

8-1. Connecting To Weld Terminals

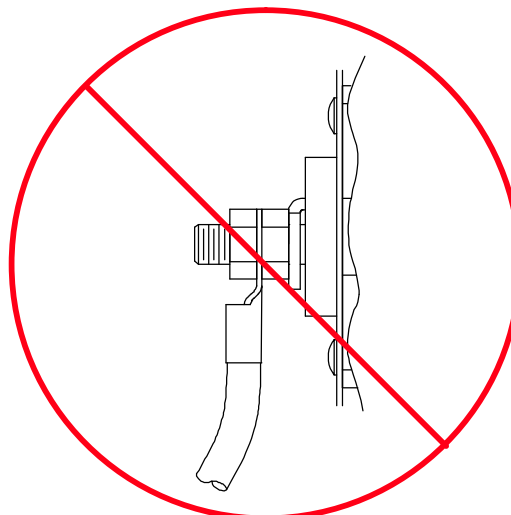


 If using an electrode negative (straight polarity) process, the volt sense lead must be connected to the work.



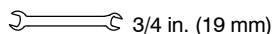
Correct Installation

Do not place anything between weld cable terminal and copper bar.



Incorrect Installation

Tools Needed:



249 889-B

 **Turn off power before connecting to weld output terminals.**

 **Failure to properly connect weld cables may cause excessive heat and start a fire, or damage your machine.**

Determine total cable length in weld circuit (both positive and negative cables combined) and maximum welding amperes. See Section 8-2 to select proper

cable size.

1. Positive (+) Weld Output Terminal
2. Negative (-) Weld Output Terminal

Connect positive weld cable to Positive (+) weld terminal and negative (-) cable to Negative weld terminal.

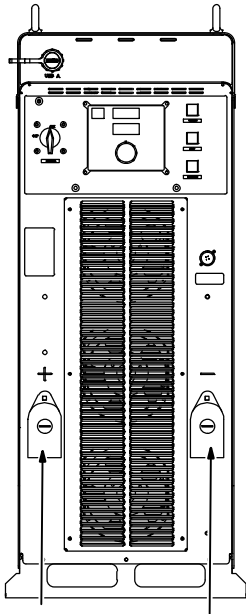
3. Weld Output Terminal
4. Supplied Weld Output Terminal Nut
5. Weld Cable Terminal

6. Copper Bar

Remove supplied nut from weld output terminal. Slide weld cable terminal onto weld output terminal and secure with nut so that weld cable terminal is tight against copper bar. **Do not place anything between weld cable terminal and copper bar. Make sure that the surfaces of the weld cable terminal and copper bar are clean.**

8-2. Selecting Weld Cable Sizes*

NOTICE – The Total Cable Length in Weld Circuit (see table below) is the combined length of both weld cables. For example, if the power source is 100 ft (30 m) from the workpiece, the total cable length in the weld circuit is 200 ft (2 cables x 100 ft). Use the 200 ft (60 m) column to determine cable size.

 Weld Output Terminals ⚠ Turn off power before connecting to weld output terminals. ⚠ Do not use worn, damaged, undersized, or poorly spliced cables.	 Positive + Negative - Ref. 250 158-B	Weld Cable Size*** and Total Cable (Copper) Length in Weld Circuit Not Exceeding****							
		100 ft (30 m) or Less		150 ft (45 m)	200 ft (60 m)	250 ft (70 m)	300 ft (90 m)	350 ft (105 m)	400 ft (120 m)
		10 – 60% Duty Cycle	60 – 100% Duty Cycle	10 – 100% Duty Cycle					
	100	4 (20)	4 (20)	4 (20)	3 (30)	2 (35)	1 (50)	1/0 (60)	1/0 (60)
	150	3 (30)	3 (30)	2 (35)	1 (50)	1/0 (60)	2/0 (70)	3/0 (95)	3/0 (95)
	200	3 (30)	2 (35)	1 (50)	1/0 (60)	2/0 (70)	3/0 (95)	4/0 (120)	4/0 (120)
	250	2 (35)	1 (50)	1/0 (60)	2/0 (70)	3/0 (95)	4/0 (120)	2 ea. 2/0 (2x70)	2 ea. 2/0 (2x70)
	300	1 (50)	1/0 (60)	2/0 (70)	3/0 (95)	4/0 (120)	2 ea. 2/0 (2x70)	2 ea. 3/0 (2x95)	2 ea. 3/0 (2x95)
	350	1/0 (60)	2/0 (70)	3/0 (95)	4/0 (120)	2 ea. 2/0 (2x70)	2 ea. 3/0 (2x95)	2 ea. 3/0 (2x95)	2 ea. 4/0 (2x120)
	400	1/0 (60)	2/0 (70)	3/0 (95)	4/0 (120)	2 ea. 2/0 (2x70)	2 ea. 3/0 (2x95)	2 ea. 4/0 (2x120)	2 ea. 4/0 (2x120)
	500	2/0 (70)	3/0 (95)	4/0 (120)	2 ea. 2/0 (2x70)	2 ea. 3/0 (2x95)	2 ea. 4/0 (2x120)	3 ea. 3/0 (3x95)	3 ea. 3/0 (3x95)
	600	3/0 (95)	4/0 (120)	2 ea. 2/0 (2x70)	2 ea. 3/0 (2x95)	2 ea. 4/0 (2x120)	3 ea. 3/0 (3x95)	3 ea. 4/0 (3x120)	3 ea. 4/0 (3x120)
	700	4/0 (120)	2 ea. 2/0 (2x70)	2 ea. 3/0 (2x95)	2 ea. 4/0 (2x120)	3 ea. 3/0 (3x95)	3 ea. 4/0 (3x120)	3 ea. 4/0 (3x120)	4 ea. 4/0 (4x120)
	800	4/0 (120)	2 ea. 2/0 (2x70)	2 ea. 3/0 (2x95)	2 ea. 4/0 (2x120)	3 ea. 4/0 (3x120)	3 ea. 4/0 (3x120)	4 ea. 4/0 (4x120)	4 ea. 4/0 (4x120)
	900	2 ea. 2/0 (2x70)	2 ea. 3/0 (2x95)	2 ea. 4/0 (2x120)	3 ea. 3/0 (3x95)				
	1000	2 ea. 2/0 (2x70)	2 ea. 3/0 (2x95)	2 ea. 4/0 (2x120)	3 ea. 3/0 (3x95)				
	1250	2 ea. 3/0 (2x95)	2 ea. 4/0 (2x120)	3 ea. 3/0 (3x95)	4 ea. 3/0 (4x95)				

* This chart is a general guideline and may not suit all applications. If cable overheating occurs, use next size larger cable.

**Cable should be sized for Peak Amperage (Apk) for pulse welding applications.

***Weld cable size (AWG) is based on either a 4 volts or less drop or a current density of at least 300 circular mils per ampere.
() = mm² for metric use

****For distances longer than those shown in this guide, call a factory applications representative at 920-735-4505.

S-0007-E

General

2. Cable installation in a stationary position will decrease the likelihood of wires breaking down in the cable.
3. Cables that are moving will breakdown over time. This time can be increased by making sure there are no stress points when installing cables, and deciding how and where to tie cables down.
4. If at all possible, do not route weld cables and control cables together. Leave as much space as reasonable between the weld cables and any other control cables. Welding generates electrical noise which is present on the weld cables (see Figure 8-1. for grounding information).

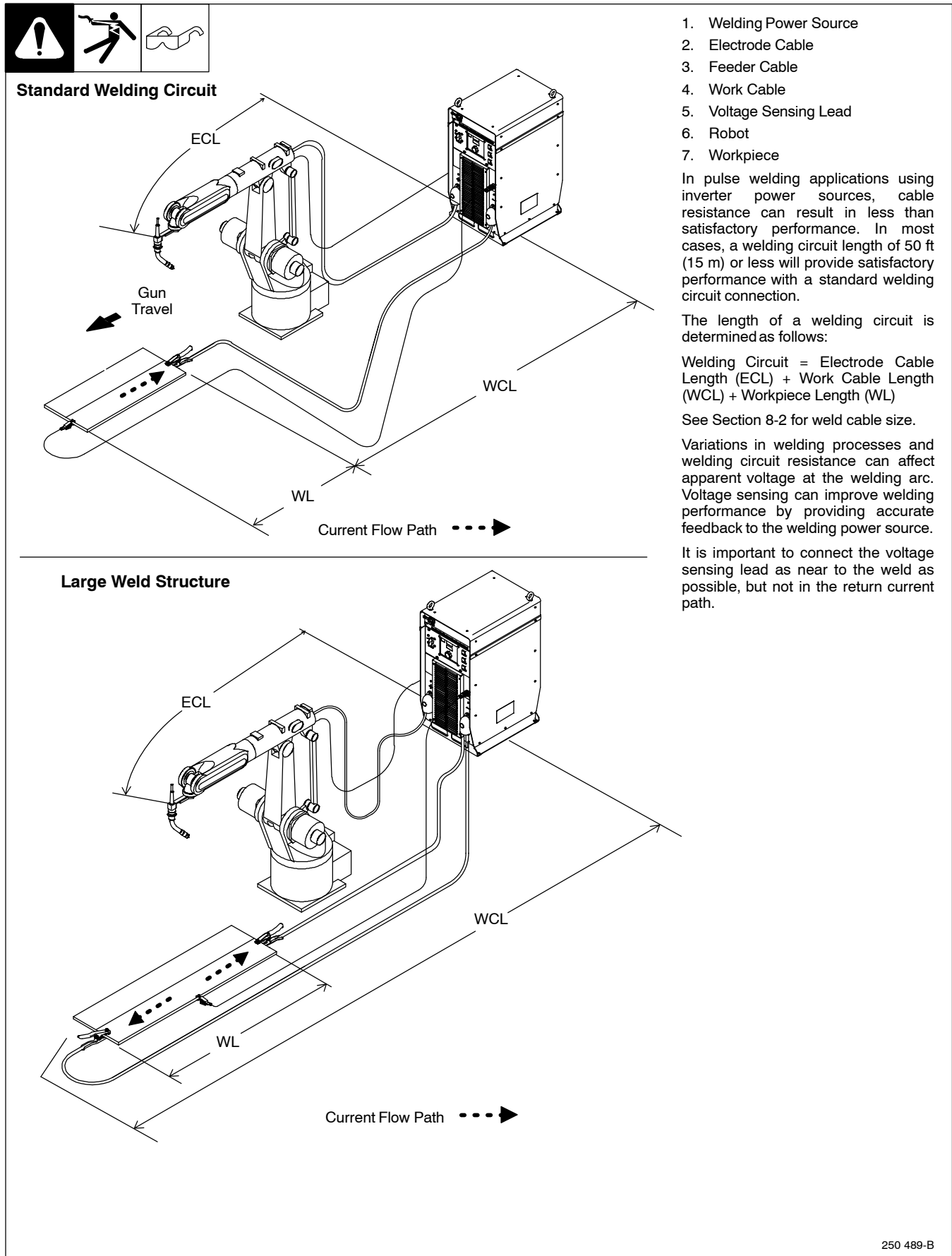
To obtain the most performance from the welding equipment, it is important to use the right transfer mode for the application. There are no hard and fast rules, but there are general guidelines to follow when making a selection. The transfer modes available depend the power source being used. The possible transfer modes are as follows: Short Arc, Spray, Pulsed Spray, Accu-pulse, and RMD (Regulated Metal Deposition).

Process	Standard Spray	Pulsed Spray	Accu-pulse™	Standard Short Circuit	RMD™ Regulate Metal Deposition
Weld Puddle Control	Flat/Horizontal All Position Performance Thin Material/Gap Filling				

Notes

8-5. Welding Circuit

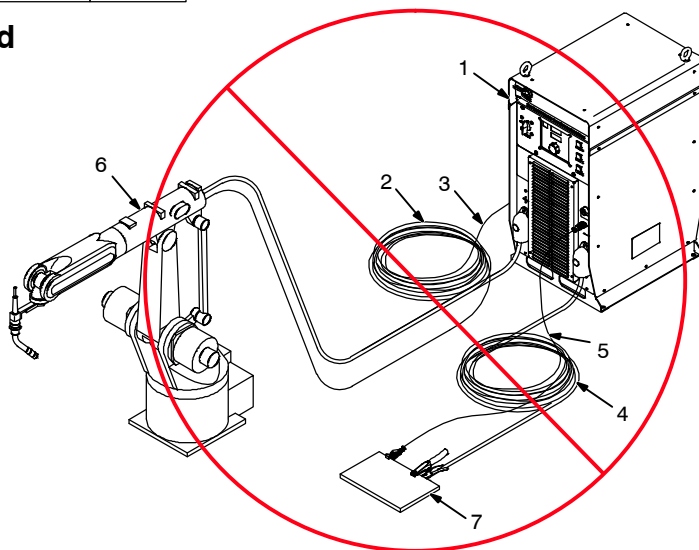
☞ Minimizing the welding circuit loop can prevent extreme voltage drops that produce poor welding characteristics.



8-6. Arranging Welding Cables To Reduce Welding Circuit Inductance



Bad



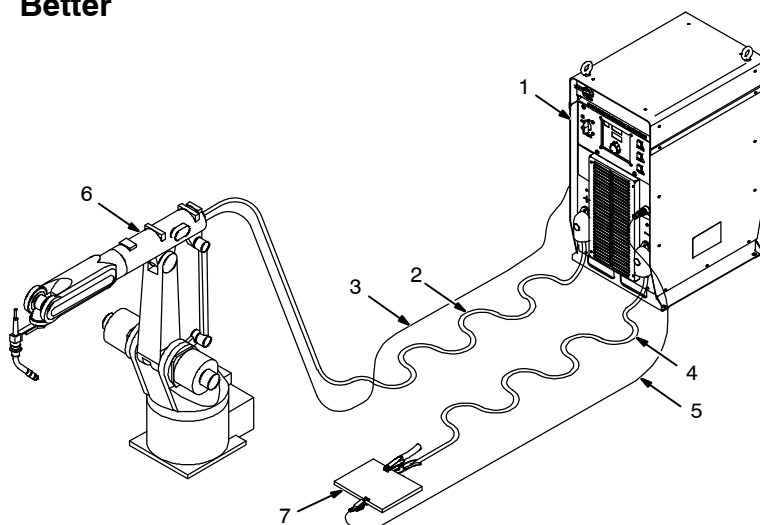
1. Welding Power Source
2. Electrode Cable
3. Feeder Cable
4. Work Cable
5. Voltage Sensing Lead
6. Robot
7. Workpiece

The arrangement of the cables has an effect that is significant to the welding properties. As an example, Accupulse and RMD welding processes can produce high welding circuit inductance depending on cable length and arrangement. This can result in limited current rise during droplet transfer into the welding puddle.

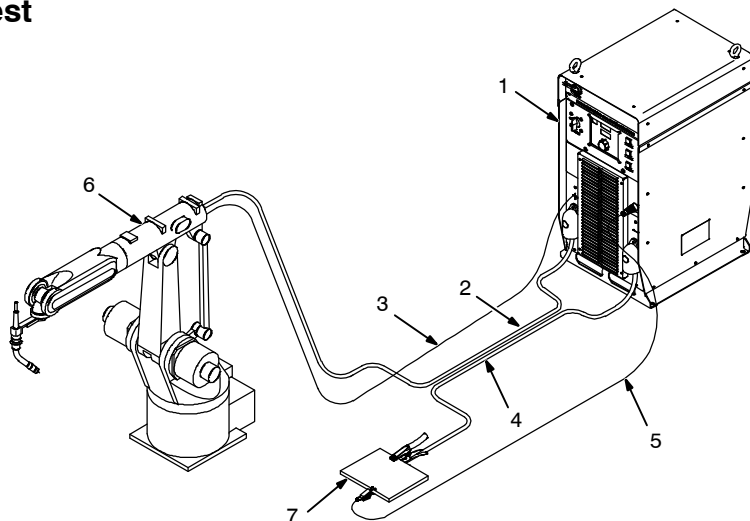
The electrode sense lead is contained in the feeder control cable and automatically becomes enabled for all semi-automatic processes. The work sense lead connects to the Axxess welding power source 4-pin connector located above the negative output terminal. This work sense lead automatically compensates for work cable voltage drop when connected to the welding power source.

Do not coil excess cables. Use cables that are the appropriate length for the application. Whenever using long weld cables [longer than 50 ft (15 m)] try to arrange positive and negative weld cables together to reduce the magnetic field surrounding the cables. Avoid coupling the feeder and work sense leads with the weld cables.

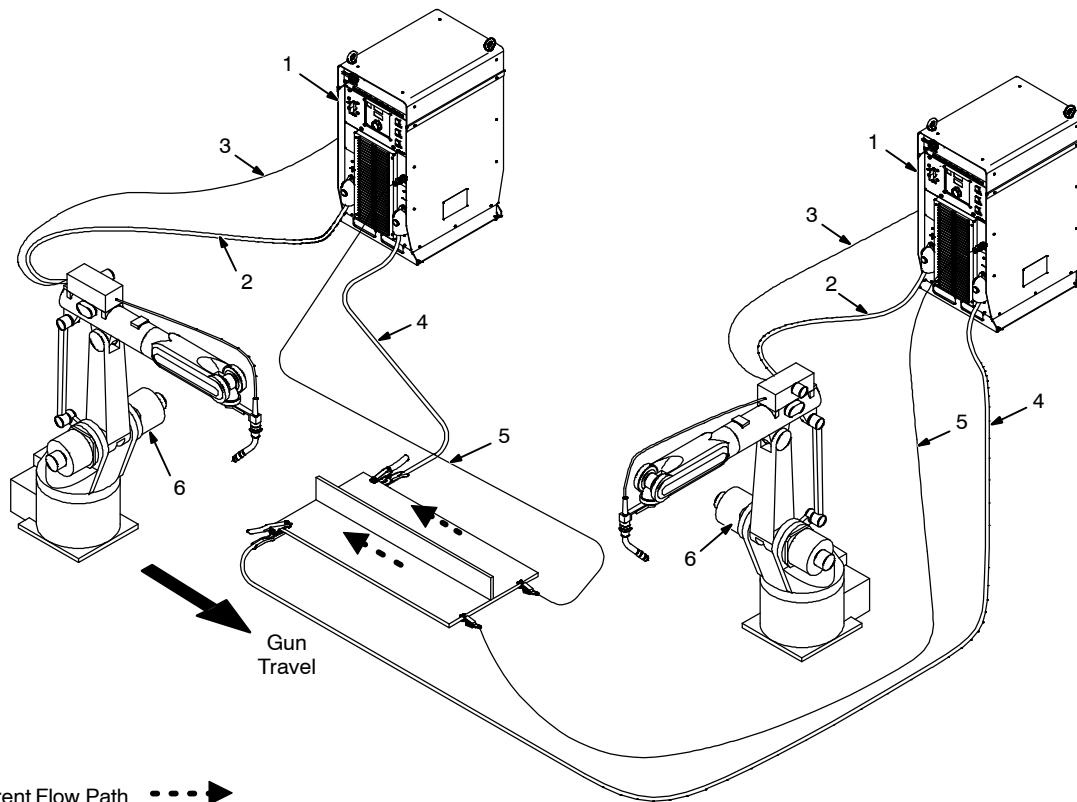
Better



Best



8-7. Using Multiple Welding Power Sources



Current Flow Path - - - ➔

250 504-B

1. Welding Power Source
2. Electrode Cable
3. Feeder Cable
4. Work Cable
5. Voltage Sensing Lead
6. Robot
7. Workpiece

Each welding power source should have a separate work cable connection to the workpiece. Do not stack or join work cables together at the workpiece. This is very important for pulse welding applications.

It is important to connect the voltage sensing lead as near to the weld as

possible, but not in the return current path. Connect voltage sensing lead at the end of the weld joint.

The direction of the welding path should be away from the work cable connections.

Connect work clamp at the beginning of the weld joint.

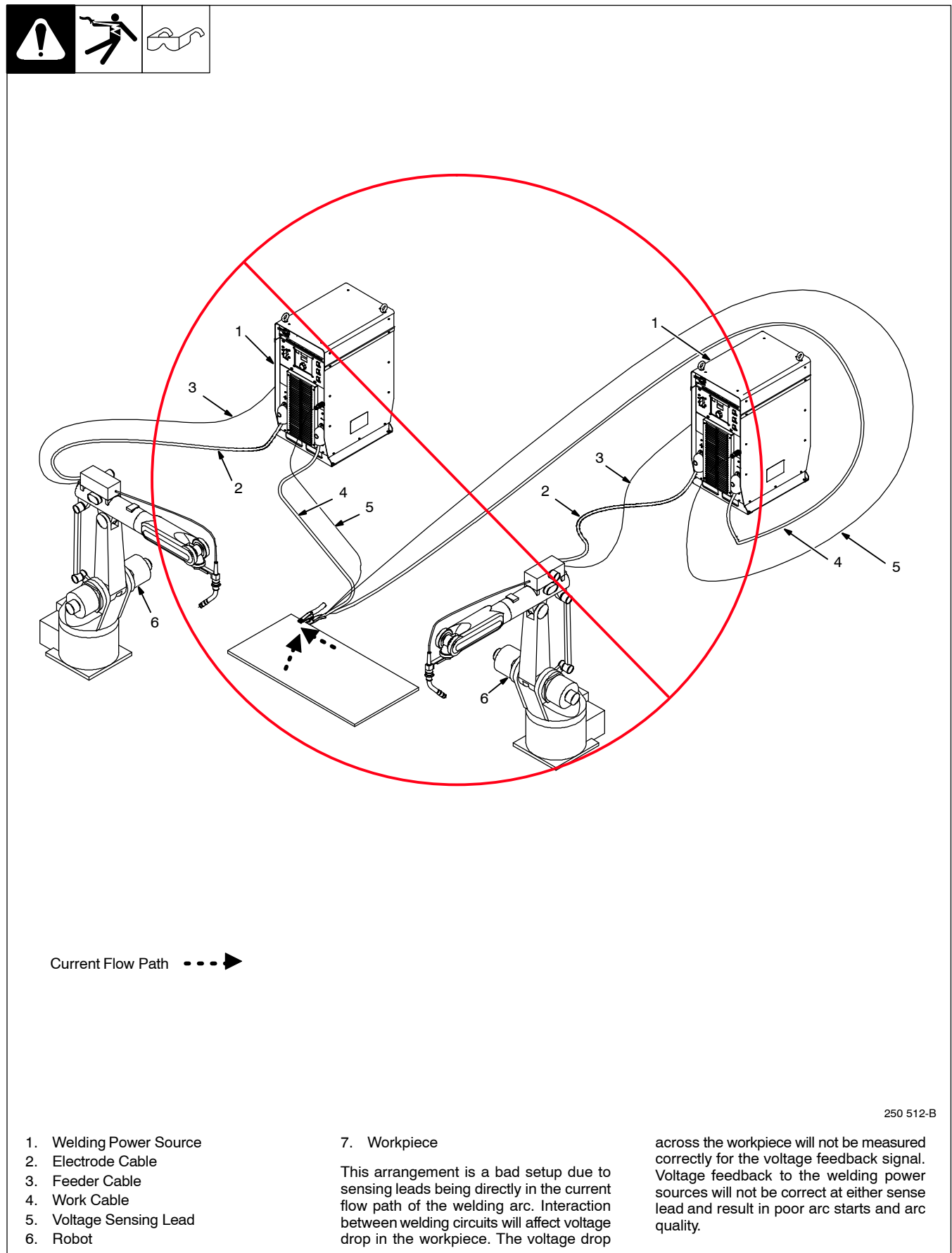
Each welding gun should have its own source of shielding gas. Use a separate shielding gas regulator and shielding gas connection for each welding gun.

Arc blow is the deflection of a welding arc from its normal path due to magnetic forces. It will adversely affect the appearance of a weld, cause excessive spatter, and impair the quality of a weld.

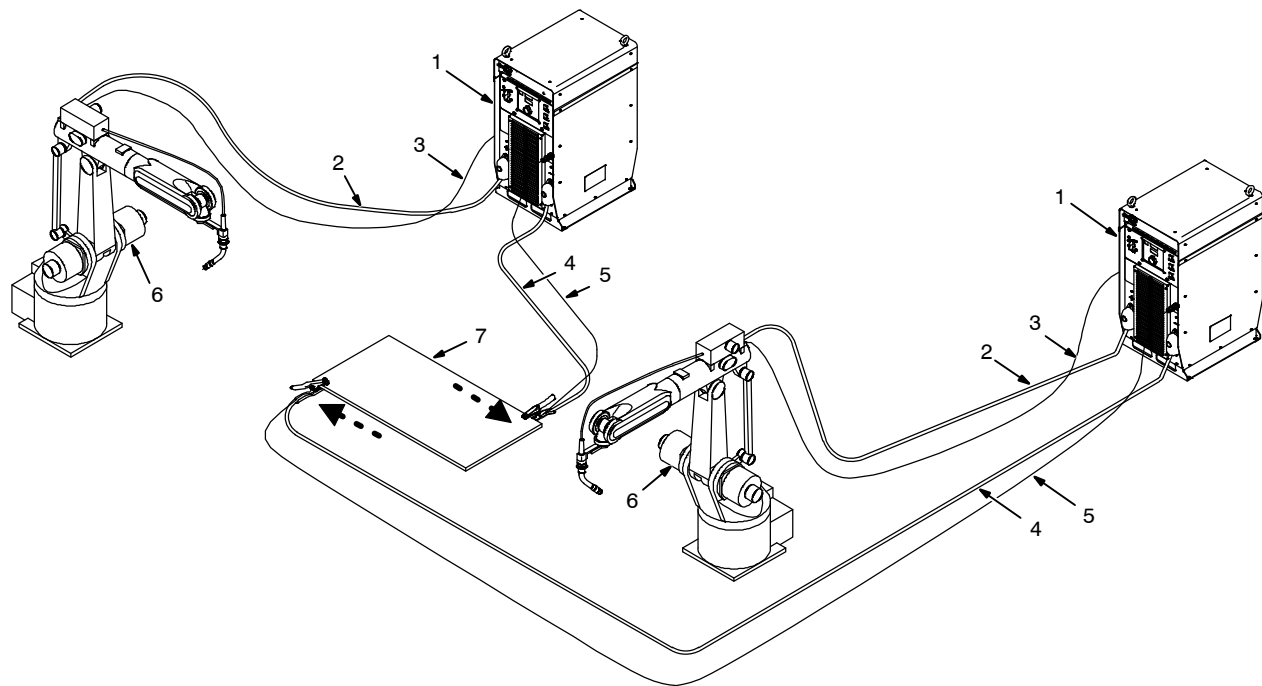
Arc blow occurs primarily during the welding of steel or ferromagnetic metals. Weld current will take the path of least resistance, but not always the most direct path through the workpiece to the work lead connection. The most intense magnet force will be around the arc due to a difference in resistance for the magnetic path in the base metal. The work clamp connection is important and should be placed at the starting point of a weld. It is recommended to have as short of an arc as possible so that there is less of an arc for the magnetic forces to control. Conditions affecting the magnetic force acting on the arc vary so widely that the reference here is only about cabling connections and arc preferences.

8-8. Voltage Sensing Lead And Work Cable Connections For Multiple Welding Arcs

A. Bad Setup



B. Better Setup



Current Flow Path - - - ➔

1. Welding Power Source
2. Electrode Cable
3. Feeder Cable
4. Work Cable
5. Voltage Sensing Lead

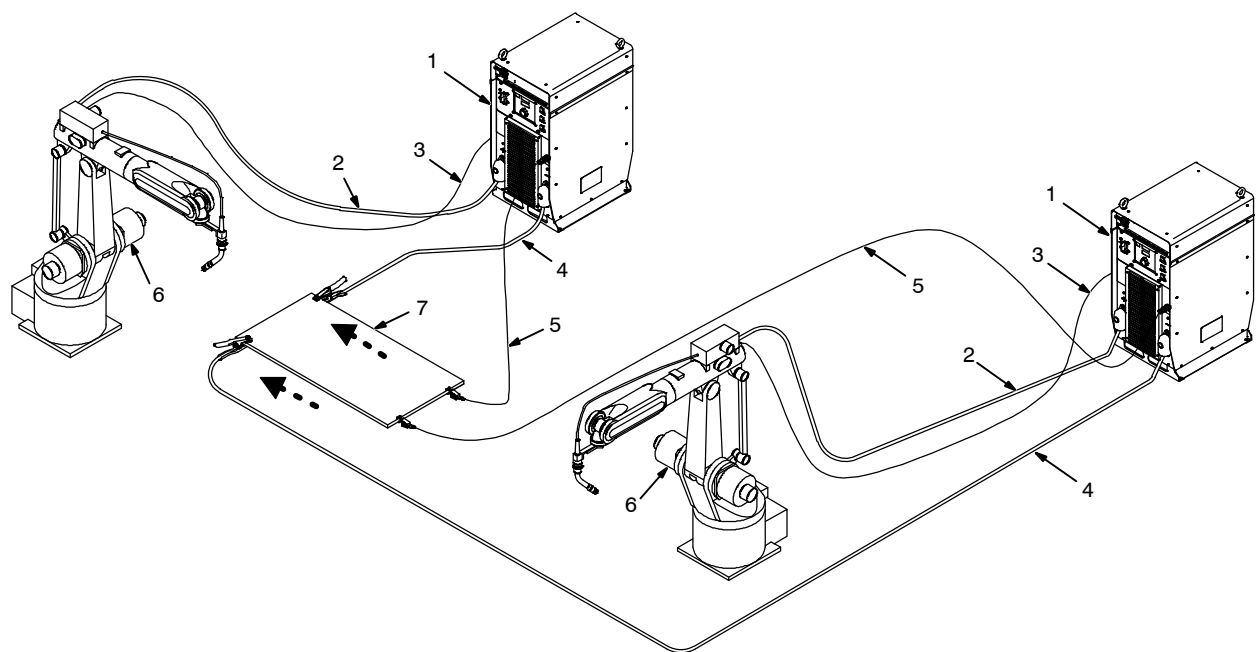
6. Robot
7. Workpiece

This arrangement is a better setup for supporting separate voltage feedback to

the welding power sources. The most accurate voltage sensing may not be achieved due to voltage drops in the workpiece. This may require compensation in the welding parameters.

250 513-B

C. Best Setup



Current Flow Path - - - - - ➔

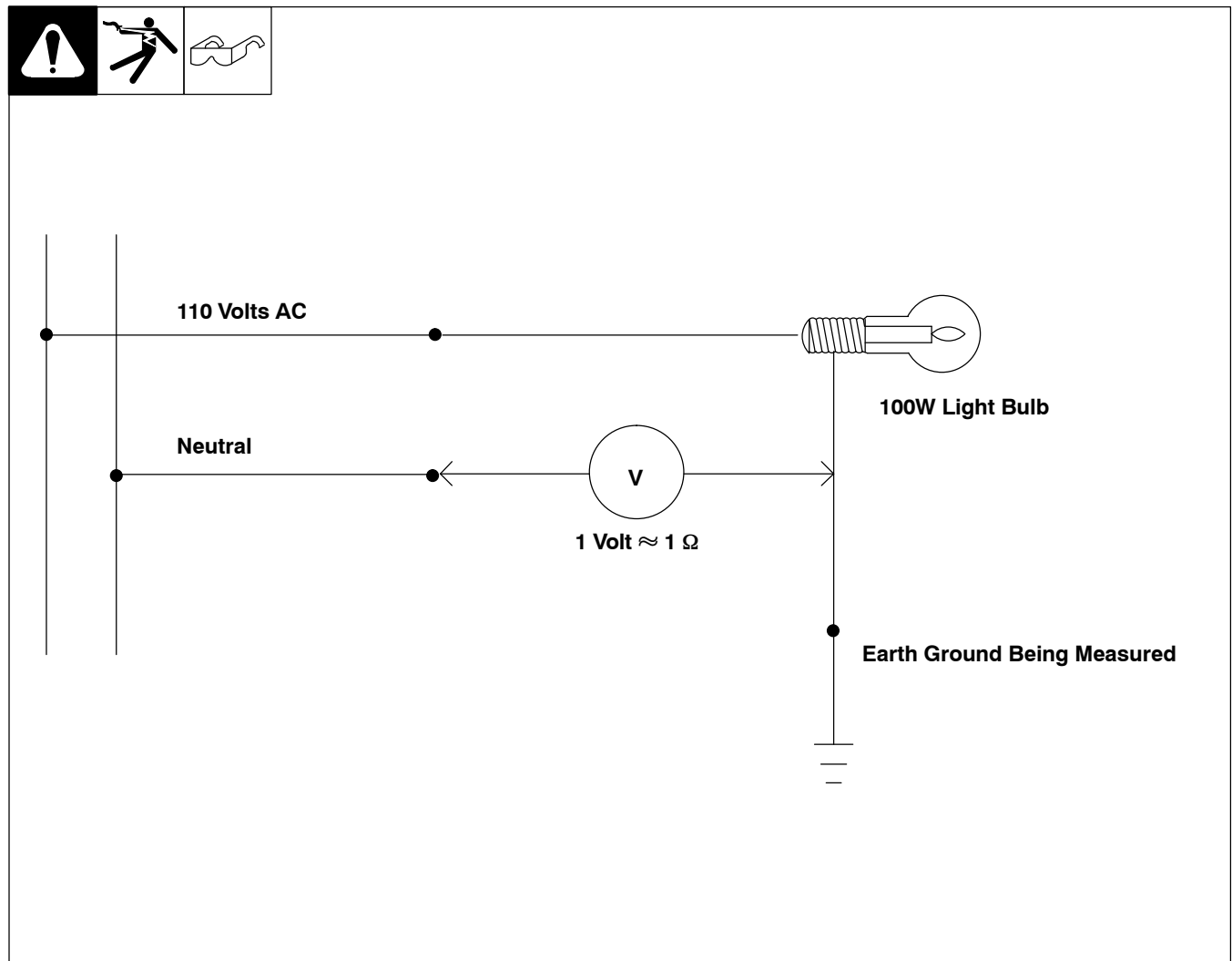
- | | |
|-------------------------|-------------------------|
| 1. Welding Power Source | 5. Voltage Sensing Lead |
| 2. Electrode Cable | 6. Robot |
| 3. Feeder Cable | 7. Workpiece |
| 4. Work Cable | |

This arrangement is the best setup for proper voltage sensing at the workpiece. Voltage feedback to the welding power sources will more accurate and result in reliable arc starts and better arc quality.

250 515-B

8-9. Earth Grounding

When using a robot or any programmable controls, it is necessary to connect equipment to a good earth ground. Grounding helps eliminate electrically generated noise from corrupting processing data or the potential damage to sensitive electrical components. Electrical noise is an issue anytime high frequency TIG equipment or inverter type power supplies are used in the area. A method for checking for a good earth ground is shown below. Also, be sure to a good connection to the earth ground.



Measuring Facility (Earth) Ground Resistance

The resistance of an earth ground can be measured using a 100W light bulb, an ac voltmeter and a 110 volts AC electrical drop. As shown in the circuit, the 110 volts AC (hot) supply and the 100W light bulb approximate a 1 ampere current source when the light bulb circuit is completed by connecting to the earth ground. The AC voltmeter, referenced to the AC neutral line, can then be used to measure the voltage rise due to the 1 ampere current source through earth ground. Each volt of rise on the earth ground represents 1 ohm of resistance. A resistance of less than 10 ohms at the earth ground should be adequate.

IMPORTANT: DO NOT mount anything to robot control cabinet.

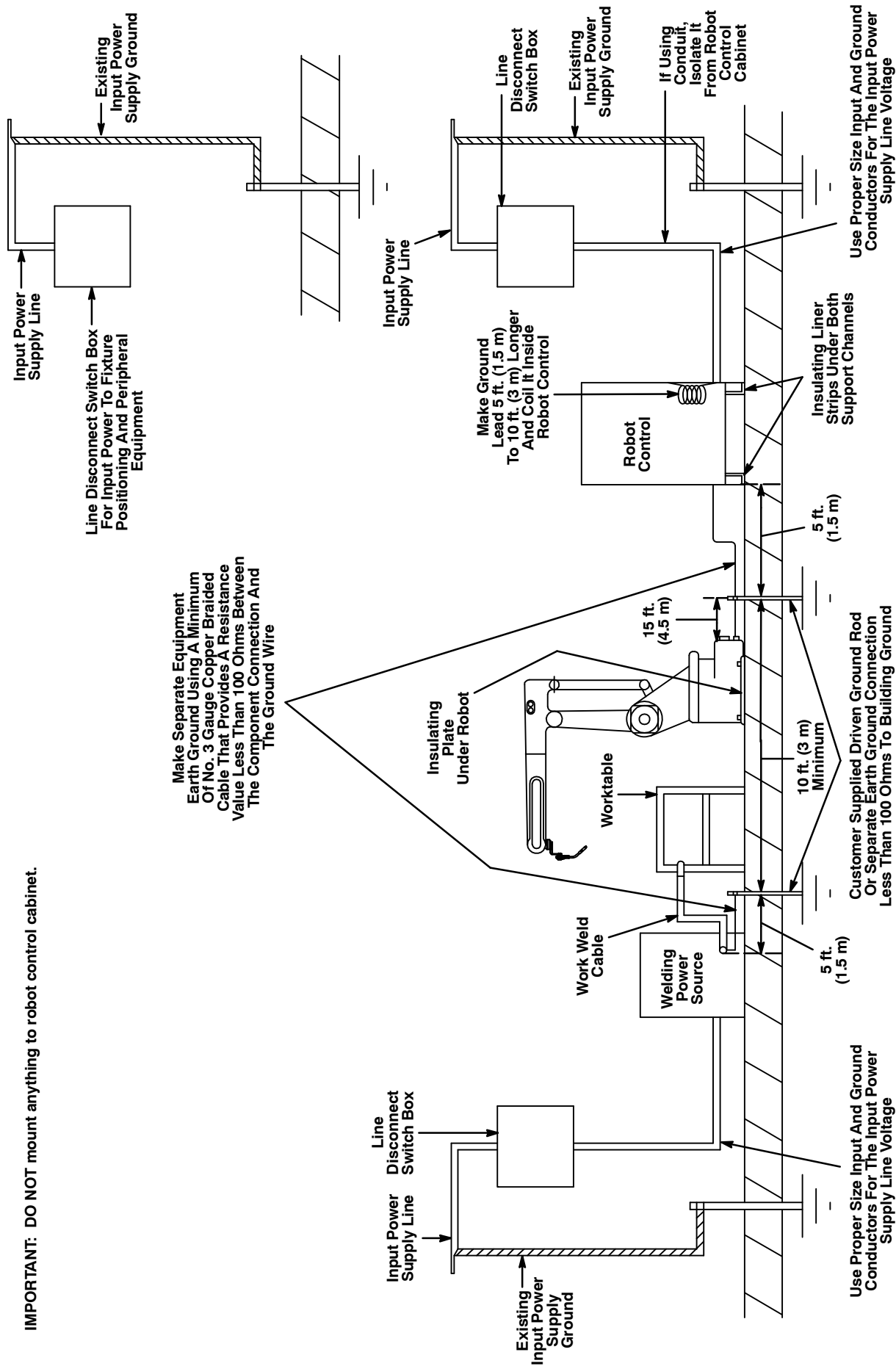


Figure 8-1. Earth Ground Connections To Stationary Robot System Components

SB-136 221-A

8-10. 30 Points Of Mechanics In MIG Welding

1. Check primary power connection at line disconnect switch or receptacle and/or cord plug.
2. Check primary power connection at welding power source.
3. Check secondary weld output connections at welding power source.
4. Inspect condition and routing of positive weld cable to wire drive motor.
5. Check connection of positive weld cable to wire drive motor.
6. Inspect condition and routing of negative weld cable to fixture.
7. Check connection of negative weld cable to fixture.
8. Inspect condition of any rotary grounds, grounding shoes or other auxiliary grounds.
9. Check gas hose connection to shielding gas supply regulator.
10. Check shielding gas flow rate.
11. Check gas hose routing.
12. Check gas hose connection at wire drive housing.
13. Inspect condition of dereeler. Check for wear at quick-connect coupling and replace if necessary.
14. Check placement of payoff pack or drum for smooth feed path.
15. Inspect condition and routing of input conduit.
16. Check installation of quick-connect coupling at rear of wire drive so that it does not contact drive rolls. Check for wear and replace if necessary.
17. Check drive rolls and replace if worn.
18. Check for drive roll tension setting.
19. Check intermediate guide for proper size to match wire size and replace if worn.
20. Check gun connection at wire drive and be sure O-rings seal at drive housing.
21. Check installation, routing and condition of welding gun.
22. Check for proper length of liner at both ends and be sure it is cut without burrs.
23. Check liner for proper size to match wire size.
24. Check liner for wear and clean out to prevent plugging.
25. Check contact tip for proper size to match wire size.
26. Check contact tip for wear and change at regular intervals.
27. Check contact tip for a tight fit and secure installation at gun.
28. Check condition of gas diffuser.
29. Check condition of nozzle.
30. Check O-ring for proper sealing at nozzle.

General

A. Signals Robot Must Have

1. Arc start (referred to as contactor on circuit diagram)
2. Arc detected (current detection)

B. Commonly Used Robot Signals

1. Purge (gas on)
2. Jog forward (motor start)
3. Jog reverse (retract)
4. Wire speed analog command (wire speed control)
5. Voltage/trim/arc adjust analog command (depends on selected mode of transfer) Voltage-MIG, Trim-M technology pulse, Arc adjust-Accu-pulse (basically arc length control)

C. Often Used Robot Signals

1. Standby signal (this means power source is ready to weld)
2. Remote program select (allows robot to change programs)
3. Wire stuck signal (relay closure)
4. Error signal (relay closure)

D. Seldom Used Robot Signals

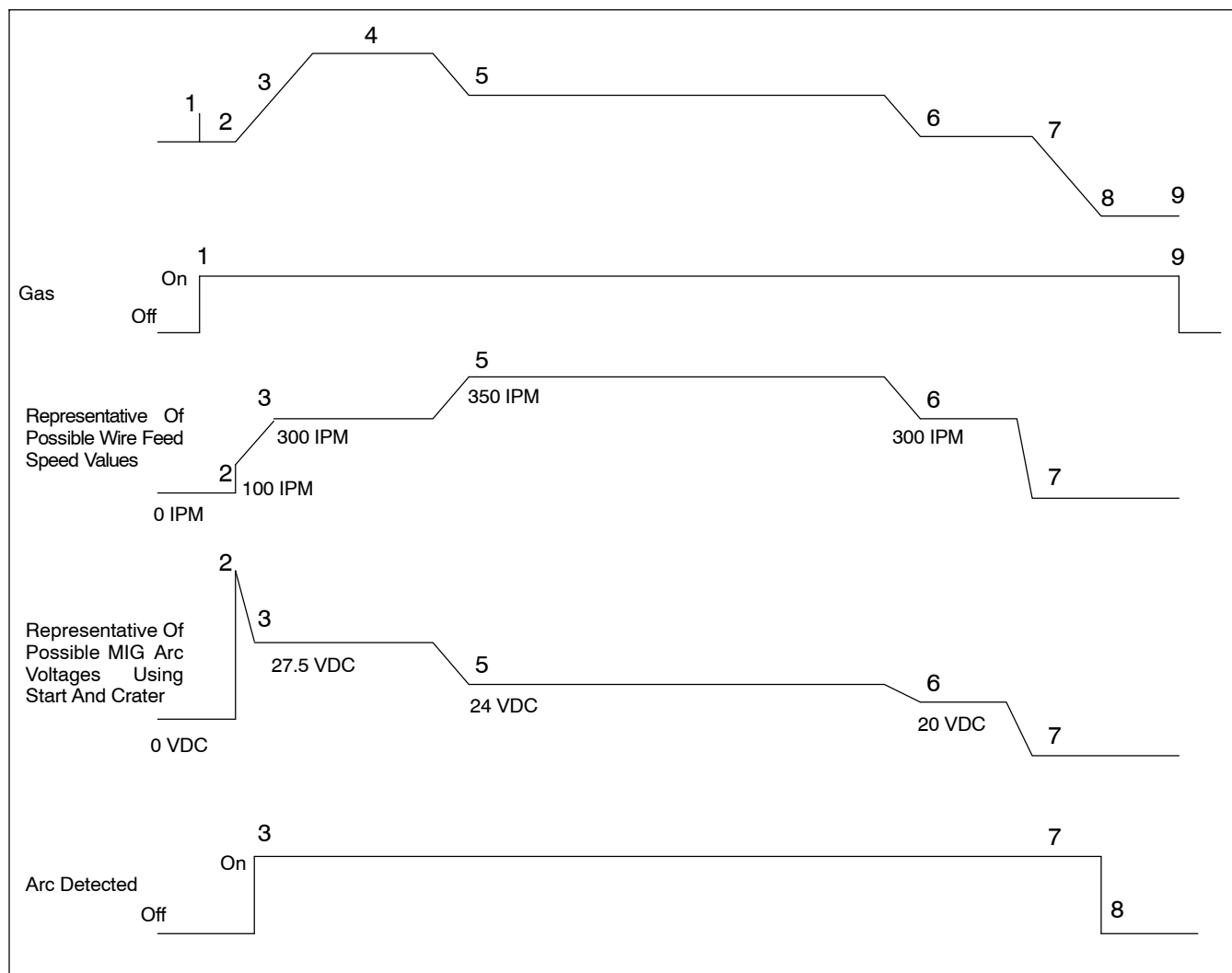
1. Touch Sense
2. Water flow error (if using a water flow switch hooked to the power source)
3. Current feedback
4. Voltage feedback

Notes

8-12. Weld Cycle Timing Charts

These charts illustrate the operation of gas valve, motor speed, voltage/arc length control, and arc detected.

1. Pressing the start button.
2. Preflow time begins if the programmed parameters in the Auto-Axcess are used.
3. Start wire feed begins at run-in speed until an arc is established. This is also the point that the arc detected signal pulls in when the current reaches 50% of expected current and arc voltage is between 20 to 60 volts DC.
4. Start time begins if the programmed parameters in the Auto-Axcess are used.
5. Weld parameters from the program are used for the welding operation.
6. Crater time begins if the programmed parameters in the Auto-Axcess are used.
7. End routines that started at beginning of welding operation, including Sharp start routine and stick check routine (this operation runs for approximately 250 to 500 milliseconds)
8. End of the welding arc and the point that arc detected signal opens.
9. Postflow time begins if the programmed parameters in the Auto-Axcess are used.



8-13. Touch Sensor Operation

The touch sensor feature allows the robot to locate a weldment using the wire feed system and the welding power source. The sense leads (weld output terminals on some models) provide a path for touch sensor voltage. Touch sensor operation is turned on by a contact closure to the Peripheral receptacle RC25 sockets K and L (see Section 7-6) or at the 72-socket receptacle RC70 sockets 17 and 28 (Auto-Axcess models). The closure is provided by the robot controller. When touch sensor is turned on "LIVE WIRE" will appear on the power source displays. The voltage at the welding wire is 80 volts DC. Generally, when the touch sensor is turned on, the robot is programmed to move slowly towards the workpiece. Once the workpiece is touched, the voltage sensing circuit closes and sends a +24 volts DC signal to the robot controller. The touched signal will remain present until the touch sensor operation is turned off by opening the contacts at the robot controller (see robot controller Owner's Manual for specific touch sensor set-up information).

Some uses for the touch sensor operation are as follows:

1. Locating welding seam
2. Identify which part is in the fixture
3. Identify what sized part is in the fixture
4. Identify what parts are installed on a weldment
5. Use for automatic tool point correction systems.

8-14. Stick Check Function

A stick check function removes welding wire that has stuck to the workpiece at the end of a weld. Automated systems should use this function to prevent damaging automated equipment that could potentially move before the wire is released from a workpiece.

The welding power source performs a stop routine call sharp start at the end of a weld that usually prevents wire from sticking to the workpiece. If sharp start does not remove the wire, the power source goes through a stick check routine. The stick check turns on the power source at a minimum amount of output. If current flows, the welding wire must be shorted to the workpiece. The output rises to burn off the short and then current flow is checked again. The stick check runs for approximately 250 ms and if it has not cleared the short during this time, ERR STUK will appear on the displays. The operator must remove the welding wire from the workpiece manually and reset the power source (see Section 12-2).

Information to remember about stick check is the following:

1. Some robots have stick check as part of their functions and it can be turned on or off in the robot. Typically, the robot stick check works fine; however, only one stick check routine should be active, either the robot function or the power source function, not both.
2. When programming the movement of the robot arm, be sure to leave enough time for the stick check to perform its function. The power source stick check time is approximately 350 ms.

8-15. Arc Blow

Arc blow is the deflection of the welding arc from its normal path due to magnetic forces. This condition is usually encountered in direct current welding of magnetic materials, such as iron and nickel. Arc blow can happen in alternating current welding under certain conditions, but these cases are rare and the intensity of the arc blow is always less severe. Direct current flowing through the electrode and base metal will set up a magnetic field around the electrode. This magnetic field tends to deflect the arc to the side at times, but usually the arc deflects either forward or backwards along the joint.

Back blow is encountered when welding toward the work cable connection on a workpiece near the end of a joint or into a corner. Forward blow is encountered when welding away from the work cable connection on a workpiece at the start of a joint. In general, arc blow is the result of two basic conditions:

1. The change of current flow direction as it enters the work and is conducted toward the work cable.
2. The asymmetric arrangement of magnetic material around the arc, a condition that normally exists when welding is performed near the end of ferromagnetic materials.

Although arc blow cannot always be completely eliminated, it can be controlled or reduced to an acceptable level through knowledge of the two conditions listed above.

Except in cases where arc blow is unusually severe, certain steps can be taken to eliminate or reduces its severity. Some or all of the following steps may be necessary:

1. Place work cable connection as far as possible from joints to be welded.
2. If back blow is the problem, place the work cable connection at the start of the joint to be welded and weld toward a heavy tack weld.
3. If forward blow is the problem, place the work cable connection at the end of the joint to be welded.
4. Position electrode angle so that arc force counteracts arc blow.
5. Use the shortest possible arc that maintains good welding practices (this helps arc force to counteract arc blow).
6. Reduce welding current if possible.
7. Weld toward a heavy tack weld or runoff tab.
8. Use the back step sequence of welding.
9. Change to an AC welding operation which may require a change in electrode classification.
10. Wrap the work cable around the workpiece in the direction that sets up a magnetic field to counteract the magnetic field causing the arc blow.

8-16. Basic Welding Troubleshooting

Listed below are some problems, causes and remedies related to welding operations; however, this list does not contain every possible condition that could be encountered in welding.

   			
Trouble	Probable Cause	Remedy	
No weld output; unit completely inoperative	Line disconnect switch in Off position	Place switch in On position	
	Power source switch in Off position	Place switch in On position	
	Primary power fuse blown or circuit breaker tripped	Replace fuse or reset circuit breaker and check input voltage	
Weld output is present, but wire stops feeding while welding	Wire feeder protective fuse blown or circuit breaker tripped	Replace fuse or reset circuit breaker and find overload condition	
	No start input signal to weld control	Check external start, PLC, or robot signal to weld control	
	Wire feeder drive rolls misaligned	Align drive rolls	
	Wrong size drive rolls	Replace with proper size drive rolls	
	Too much or too little drive roll pressure	Adjust drive roll pressure	
	Too much tension set at wire spool	Reduce wire spool tension	
	Restriction in unspooler or drum adapter	Replace unspooler or repair restriction	
	Feeder motor burnt out	Test motor and replace if necessary	
	Gun liner dirty or restricted	Remove gun liner and clean or replace	
	Wrong type or size of liner	Install proper size liner	
	Broken or damaged gun or torch	Replace faulty parts	
	Contact tip opening restricted	Replace contact tip	
	Wrong size or type of contact tip	Replace with proper size and type contact tip	
	Sharp bends or kinks in gun cable or liner	Straighten gun cable and/or replace liner	
	Inlet cable too long	Reduce distance to shorten inlet cable or use an intermediate drive	
	Gun overheating	Use gun with proper amperage rating	
	Wrong size wire	Match wire size to liner and contact tip	
	Guides rubbing on drive rolls	Adjust or position guides properly	
	Drive rolls jammed	Remove foreign object from gears	
	Motor cable disconnected or damaged	Connect, repair or replace motor cable	

Trouble	Probable Cause	Remedy
Porosity in weld	Dirty base metal, heavy oxides, mill scale, oil, etc	Clean base metal by brushing, grinding or use chemical cleansing before welding
	Regulator/flowmeter faulty	Adjust or replace regulator/flowmeter
	Gas cylinder valve closed	Open gas cylinder valve
	Gas regulator diaphragm defective	Replace regulator
	Flowmeter cracked or broken	Repair or replace flowmeter
	Gas hose disconnected or leaking	Connect or replace gas hose
	Too much or too little gas flow	Adjust for proper gas flow
	Moisture in shielding gas	Replace gas cylinder or supply
	Wrong gas for wire type or transfer mode	Use correct shielding gas
	Feeder gas solenoid faulty	Replace solenoid
	Gun or outlet cable leaking	Repair or replace faulty parts
	Wire feed speed setting too high	Reduce wire feed speed
	Contact tip extends too far out of nozzle	Adjust or replace parts (max distance should not exceed 1/8 in (3.2 mm))
	Nozzle to work distance too large	Reduce nozzle to work distance
	Incorrect gun or torch angle	Set proper gun angle (porosity or dirty welds mean gun angle is too large)
	Nozzle restriction	Clean off spatter or remove restriction
	Breeze or drafts in weld zone	Shield weld zone from drafts
	Low shielding gas cylinder pressure	Replace gas cylinder
	Gas leak at gun to feeder connection	Properly install gun or replace O-rings at gun connector
Excessive spatter	Voltage set too high	Reduce voltage setting (reduce trim or arc adjust for pulse welding)
	Incorrect gun or torch angle	Set proper gun angle
	Too much or too little gas flow	Adjust for proper gas flow
	Wrong gas for wire type or transfer mode	Use correct shielding gas
	Wrong electrode wire type or size	Use proper electrode wire
	Wrong inductance setting	Adjust inductance
	Electrode wire dirty or old	Replace with new electrode wire
	Oily or dirty base metal	Clean base metal by brushing, grinding or use chemical cleansing before welding
	Excessive wire stick-out or nozzle to work distance too great	Adjust wire stick-out or reduce nozzle to work distance
	Wrong transfer mode	Set proper transfer mode
	Travel speed too slow	Increase travel speed so that arc is on leading edge of weld puddle

Trouble	Probable Cause	Remedy
Wandering, hunting or erratic arc	Restriction in unspooler or drum adapter	Replace unspooler or repair restriction
	Dirty or worn gun liner or inlet cable	Remove gun liner or inlet cable and clean or replace
	Sharp bends or kinks in gun cable or liner	Straighten gun cable and/or replace liner
	Loose or worn contact tip	Tighten or replace contact tip
	Wrong size or type of contact tip	Replace with proper size and type contact tip
	Gun overheating	Use gun with proper amperage rating
	Loose power cables or other electrical connections	Tighten, repair or replace connections or cables, also check all rotary or brush type connections
	Incorrect gun or torch angle	Set proper gun angle
	Too much or too little gas flow	Adjust for proper gas flow
	Moisture in shielding gas	Replace gas cylinder or supply
	Wrong gas for wire type or transfer mode	Use correct shielding gas
	Wrong program selection for pulse welding	Make proper program selection
	Improper or unsteady analog command from robot controller	Check signal from robot controller (as a trouble-shooting aid go to power source control of voltage and wire speed)
	Gun or outlet cable leaking	Repair or replace faulty parts
	Incorrect nozzle to work distance	Set proper distance [3/8 in to 5/8 in (9.5 to 15.9 mm) for short arc, 5/8 in to 1 in (15.9 to 25.4 mm) for pulse welding, and 3/4 in to 1-1/4 in (19.1 to 31.8 mm) for spray welding]
	Voltage sensing leads open or shorted	Repair or replace voltage sense leads
	High frequency noise in the area	Be sure proper grounding methods are followed when TIG or plasma equipment is used in the area
	Arc blow	see Section 8-15
	Drive motor tachometer or motor cable open or shorted	Check drive motor tachometer and cables, and repair or replace
	Wrong size drive rolls	Replace with proper size drive rolls
	Too much or too little drive roll pressure	Adjust drive roll pressure
Welding wire burns back to contact tip at the start of a weld	Restriction in wire feed system	Check inlet cable, gun liner and wire guides
	Worn drive rolls	Replace drive rolls
	Wrong size drive rolls	Replace with proper size drive rolls
	Improper start parameters	Adjust start parameters
	Worn contact tip	Replace contact tip
	Wrong size or type of contact tip	Replace with proper size and type contact tip
	Not enough cast in welding wire	Add a wire straightener to put cast in wire
Welding wire burns back to contact tip during welding	Restriction in wire feed system	Check inlet cable, gun liner and wire guides
	Worn drive rolls	Replace drive rolls
	Wrong size drive rolls	Replace with proper size drive rolls
	Too much or too little drive roll pressure	Adjust drive roll pressure
	Worn contact tip	Replace contact tip
	Wrong size or type of contact tip	Replace with proper size and type contact tip
	Not enough cast in welding wire	Add a wire straightener to put cast in wire
Welding wire burns back to contact tip at the end of a weld	Welding power source output not shutting off	Make sure all switches are in correct position, repair power source if necessary
	Burnback setting too high or too long	Adjust burnback setting or turn off completely

Trouble	Probable Cause	Remedy
Shutdown at arc initiation using power source and feeder or interface	No voltage feedback signal	Broken or disconnected voltage feedback lead, no open circuit voltage, check power source
	No current feedback signal	Poor parameters, open in weld circuit, faulty hall device, check power source
	No tachometer sensing	No wire speed command from robot, material jammed in drive gears, faulty tachometer in drive motor, wire feed drive circuit board, or motor cable, check wire feed system
	Poor parameters preventing arc stability	Check for proper pulse program, material, welding wire, shielding gas, voltage setting, and wire speed setting
	Arc start error	Check contact tip, wire feed system and weld circuit
	No start signal from robot	Check robot setup and interconnect cable connection between robot controller and interface
	No wire feed with wire feed motor running	Wire stuck in contact tip, worn or wrong size drive rolls, improper drive roll pressure setting, or wire not unspooling or restriction in drum adapter, check wire feed system
Shutdown at arc initiation using robot controller	No arc detected	Check for arc detect signal coming from interface
	Robot times out before arc detected	Add more time for robot arc detect input, verify weld parameters, and check weld circuit
	Robot command scaling not set properly	Set proper robot command scaling
	Time between welds too short	Adjust welding cycle time
	Welding sequence problems	Power source should energize and welding wire should start feeding at the same time
	No wire feed speed command	Set wire feed speed
	No voltage command	Set voltage
Shutdown at arc initiation due to weld circuit condition	Poor part fit up at weld joint, wire not making contact with workpiece	Check part consistency for fitup and/or position gun so wire always contacts part
	Poor connection in weld circuit	Check welding gun, torch, contact tip adapter, contact tip, weld cable connections and any rotary or brush type connection
	Improper gas flow causing start and timeout issues	Check for correct shielding gas and flow adjustment

8-17. Electrical Functions Of Automated Welding Systems

Several important items to know about any automated welding system are as follows:

1. To troubleshoot any system, determine the functions of the individual parts of the system.
2. Determine what inputs and outputs are needed to control the timing, amount of weld output, and the movements of the part or welding gun.
3. Determine where the previous mentioned signals come from e.g. PLC, robot, or from within an interface device.
4. Determine which functions are not occurring properly and troubleshoot the appropriate circuit or replace the faulty component in the system.

A. Function Of Power Sources

1. Turns weld power on/off (commonly referred to as contactor).
2. Controls weld output (voltage in CV mode and amperage in CC mode).

B. Function Of Fixed Automation Interface

1. Signals the power source to turn on weld output.
2. Energizes the gas solenoid.
3. Energizes the wire drive motor.
4. Controls the wire speed.
5. Signals the power source as to how much output to deliver (voltage or amperage depending on weld process).
6. Controls the timing of the a weld sequence that is dictated by the interface or some of the weld sequence that is dictated by the interface or some external remote device such as a PLC.
7. Typically sends an arc established signal through the use of a relay closure.

C. Function Of Programmable Logic Controller (PLC)

1. Receives inputs from external devices such as the relay closure from an automation interface to determine arc initiation or arc error, or any safety features that may prevent the start of a weld cycle or shut down the system to prevent injuries.
2. Controls external devices with the use of electronic switches such as starting the motor that rotates the workpiece.
3. Controls the timing of the weld cycle and movement of the workpiece or the welding gun through the programming of the PLC.

D. Function Of Limit Switches/Proximity Switches

1. Limit switches are used to determine mechanical position of workpieces, positioners, guns, or for safety devices. These switches are either open or closed.

E. Function Of Flexible Automation Interfaces

1. Signals the power source to turn on weld output.
2. Energizes the gas solenoid.
3. Energizes the wire drive motor.
4. Controls wire speed by using internal commands or analog commands from the robot controller.
5. Signals the power source for amount of weld output to deliver (voltage or amperage depending on weld process) using internal commands or analog commands from the robot controller.
6. Accept or ignore wire speed and voltage analog signals from the robot controller.
7. Control weld sequence timing as directed by the interface or robot controller.
8. Send an arc established signal using a relay closure.
9. Accept an arc on signal from the robot controller.
10. Check current flow to determine if wire is stuck to the workpiece at the end of a weld.
11. Provides a remote E-Stop.
12. Accepts a remote purge signal.
13. Accepts a remote jog signal for forward or reverse.
14. Provides arc error output relays.
15. Receives remote program select signals to allow program changes while welding or at the start of any weld.

There are three modes of interface operations available depending on robot controller capabilities:

1. Arc On, No Analog (power source) mode uses the robot controller to send a signal to start the welding process and the interface controls the timing of the weld sequence (preflow, run-in, start time, weld, crater, and postflow).
2. Arc On, Analog (shared control) mode uses the robot controller to send a signal to start the welding process and send analog commands to the interface to control the amount of weld output and wire speed. The interface will still control preflow, run-in, start time, and postflow.
3. PS, Wire, Gas, & Analog (robot control) mode use the robot controller to send a signal to start gas flow, a signal to start the wire feed motor, and a signal to energize the power source. The robot controller also sends analog commands to the interface to control the amount of weld output and wire speed.

 One of the three modes is selected to match the capabilities and intended use of the robot controller. The Arc On, No Analog mode is a good selection for testing the interface and power source functions in a system.

The requirements for making a MIG weld are as follows:

1. The gas solenoid must be energized.
2. The power source must be energized.
3. The wire drive motor must be turned on.
4. A wire speed command must be present at the main control board in the power source.
5. A weld output command must be present at the main control board in the power source.

F. Function Of Gas Flow

The gas solenoid can be energized for a weld in one of two ways, either by a remote start signal from an external device or by a gas on signal from an external device. The signal type will depend on system setup and is important to know when troubleshooting a shielding gas problem in the welding operation. Severe porosity will occur if there is no signal to energize the gas solenoid or if the gas solenoid fails to energize. Even when the solenoid energizes, proper gas flow and gas mixture are necessary to obtain a good quality weld.

G. Function Of Power Source Open Circuit Voltage

The power source requires two signals to start and control weld output. First, a start signal to energize the power source in an automated system is provided by an input signal from an external device (normally referred to as arc on, start, or contactor). The actual turning on of the power source may also be dependent on the sequencing information programmed into the interface or robot controller. The power source should energize at the same time the drive motor turns on which will occur after preflow given there is preflow time programmed into the weld sequence. If there is no output start signal from an external device or the power source fails to energize, there will not be any welding. Second, control of weld output is accomplished by an analog signal (command signal) supplied to the main control board in the power source. This command signal is provided by an interface to the power source. Control of the signal is established by settings in the interface or by analog signals from a robot controller. If the command signal is not present, the result will be either an arc initiation error or noodle welding at the workpiece.

H. Function Of Drive Motor

The drive motor requires two signals to start wire feeding. First, a motor start signal is needed and this is supplied either internally after the remote start signal is present and preflow times out if applicable, or a remote jog forward signal is supplied from a robot controller. Second, an analog wire speed command signal is supplied through settings on the interface or an analog input from a robot controller. A quality weld is made when wire speed is matched properly to the weld parameters. If either of the two previously described signals is missing, the result will be an arc initiation error or wire will burn back to the contact tip depending on the proximity of the gun to the workpiece. These symptoms can also occur if the wire cannot be fed smoothly from the source to the contact tip. Liners, contact tips, and unspooling devices should all be examined when there is inconsistent or erratic welding.

To achieve a good quality weld, the output must be set properly according to material size and type, joint configuration, gas mix, travel direction, speed, design consideration, and desired weld appearance.

SECTION 9 – OPERATION

9-1. Operational Terms

The following is a list of terms and their definitions as they apply to this interface unit:

General Terms:

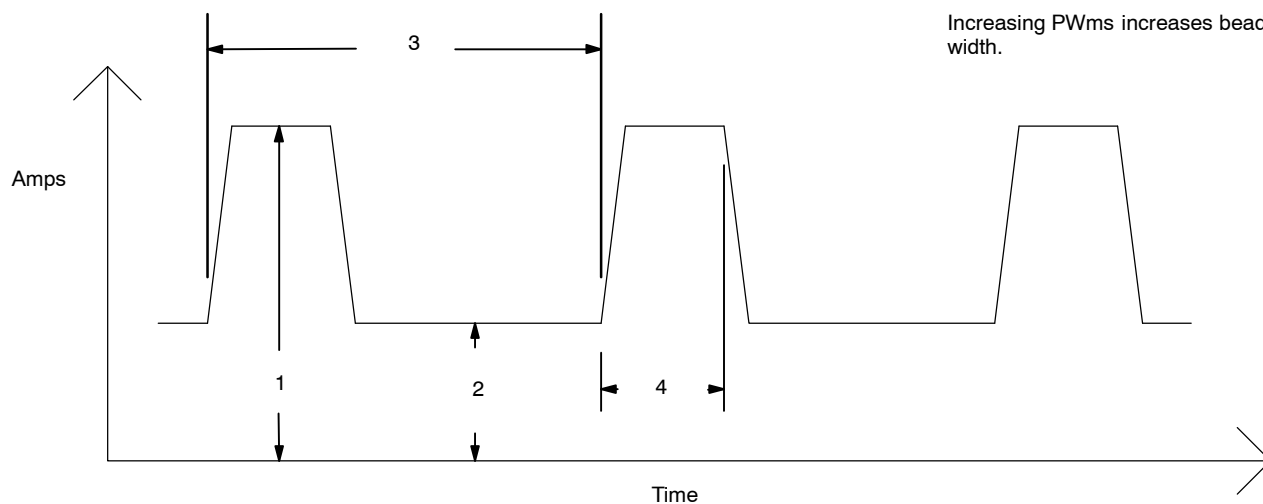
Arc Adjust	Term used to represent arc length adjustments in pulse programs. Increasing Arc Adjust increases the actual arc length. Likewise, decreasing arc adjust shortens arc length. Arc Adjust is replaced by volts in MIG programs.
AccuCurve	CV Pulse process using a pulse waveform with modified curves at particular locations within the waveform. Has a distinguished change in arc characteristics. Front panel display is ACCU – CURV.
Accu-pulse	Pulse process utilizing constant current ramps with constant voltage control of peaks and backgrounds. Adaptive response is controlled by peak, background, and minimum current levels. Benefits are shorter arc lengths, better puddle control, more tolerant of tip-to-work variation, less audible noise, no arc wandering, allows weld to fill in at toes increasing travel speed and deposition, and more tolerant to poor fit up and gaps.
Adjust	Control knob used to change or set parameters and functions.
Amps	Indicates average amperage while welding and 3 seconds hold value at end of weld.
Arc Control	Allows setting of inductance and slope in MIG mode. In pulse and Accu-pulse mode, this adjustment changes the arc characteristics by adjusting the preprogrammed factory pulse data.
Arc Length	Distance from end of wire electrode to weld pool.
Auto Thread	Method of jogging wire without holding jog or trigger switch. By rocking the switch from purge to jog within 0.5 seconds will automatically feed wire for a factory default setting of 192 in (4877 mm) of wire before stopping. Default setting is 192 at a feed rate of 700 ipm (these values can be changed using the HTML pages). Pressing jog, purge, or trigger switch will terminate the auto-threading feature.
Crater	Allows setting of voltage/arc adjust, wire feed rate, and time value for arc ends.
Feeder Set Up	Allow selection of Sequence and trigger functions.
Gas Type	Selection of shielding gas being used in application.
IGNR (Ignore)	Allows the use of a dual schedule switch between ignore welds and count welds when using Insight Centerpoint.
Inductance	In short circuit GMAW welding, an increase in inductance will decrease the number of short circuit transfers per second (provided no other changes are made) and increase the arc-on time. The increased arc-on time makes the welding puddle more fluid.
MIG	CV weld process with individual settings of voltage and wire speed.
MWCI	Manual Weld Control Interface. A separate remote user interface dedicated to providing arc data monitoring near the operator's location. This interface provides the operator with the ability to start a new part, join welds, or ignore welds. The MWCI has a display for error read-outs and status LEDs.
Preflow	Setting a time value for gas flow prior to arc start.
Postflow	Setting a time value for gas flow after arc end.
Process	A selection made for MIG, Pulse, and Accu-pulse.
Process Set Up	Selection procedure for entering program.
Program	Eight active slots for selection of various processes, wire type, and parameters.
Program Load	Enters selected program information into program slot.
Pulse	Conventional pulse program using peak, background, pulse width, frequency, and peak voltage as factory taught data. Adaptive method is controlled by frequency adjustment.
Retract	Sequence function that allows the wire to move back towards the contact tip when a welding operation is completed. Setting is both speed (IPM) and time (sec).
RMD	RMD refers to Regulated Metal Deposition. A precisely controlled short-circuit transfer. Benefits of RMD are well suited to thin materials, improves gap filling and spatter reduction. Provides less heat input into workpiece, minimizes distortion and allows use of larger diameter wire on thin gauge materials.
Sequence	Selecting Sequence will allow setting of preflow, start, crater, and postflow times and parameters.
Slope	Slope refers to the shape of a volt-amp curve. Varying the amount of slope in the welding circuit will change the amount of short-circuit current and rate of response from the welding power source.

9-1 . Operational Terms (Continued)

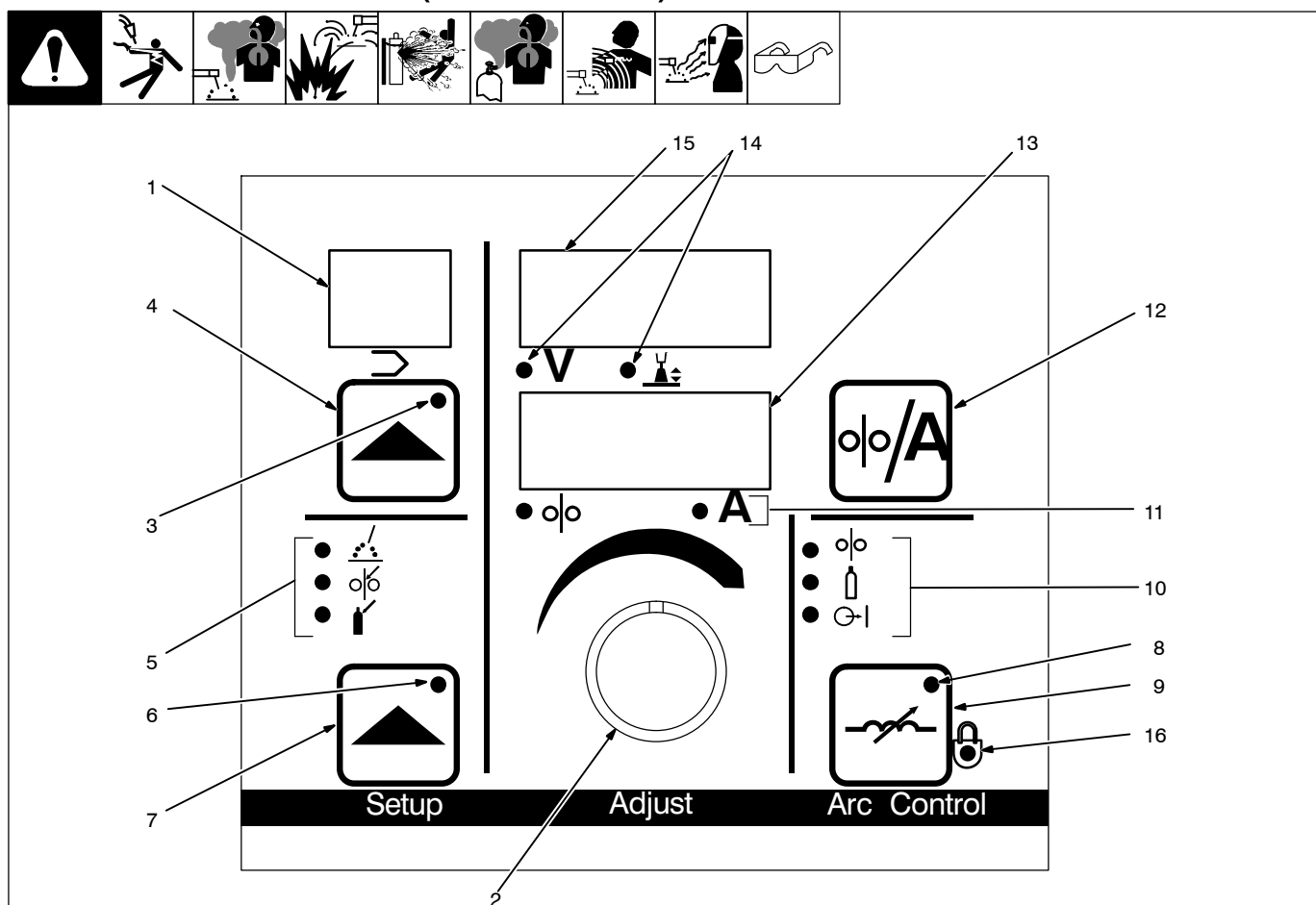
General Terms:

Start	Provides voltage/arc adjust, wire feed rate, and time value for modified arc starts.
Time	Indicates time values being set for timed functions (e.g. Preflow, Postflow which are only available in the Arc On and Analog input or the Arc On and No Analog input modes).
Volts	Preset voltage in MIG mode at idle, actual voltage while welding, and 3 seconds hold value at end of weld.
Wire Type	Selection of wire type by alloys and classification.
WFS	Term used to represent wire feed speed. In MIG mode, wire feed setting is independent of voltage setting. In pulse and Accu-pulse adjusting wire feed speed also increases power level on wire electrode (one knob control).

9-2. Pulse Welding Terms



9-3. Front Panel Controls (See Section 9-4)



☞ When an LED is lit, it means the related function is active.

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1. Program Display

Displays the number of the active program.

2. Adjust Knob

Turn the Adjust knob to change program number, Setup, Arc Control, and weld parameters.

3. Program Push Button LED

The LED lights when the Program Push Button is active.

4. Program Push Button

Press push button (LED lights) and turn Adjust knob to select active program.

The letter C is displayed with the program number if the program has been changed from the factory settings using the optional PDA with File Management/WaveWriter software (see File Management/WaveWriter Owner's Manual).

☞ The program cannot be changed through the front panel while welding.

Press and hold button to see program name. Custom programs are named using optional

PDA with File Management/WaveWriter software. Program name is shown in upper and lower displays (items 13 and 15).

5. Setup Mode Indicators

The lit LED indicates which setup mode is active. Setup mode parameters are shown in Display Windows (see Items 13 and 15).

Process LED

When this LED is lit, turn the Adjust knob to select the desired weld process. Choices include pulse welding (displayed as PULS), Accu-pulse, MIG welding (MIG), and Accu Puls/RMD [Regulated Metal Deposition (optional)].

Wire Type LED

When this LED is lit, turn the Adjust knob to select the desired wire type, wire alloy, and size. Wire type and size choices vary according to the selected weld process. Choices may include steel (displayed as STL), stainless steel (SS), metal core (MCOR), aluminum (ALUM). See Table 9-1 for all wire abbreviations.

Gas Type LED

When this LED is lit, turn the Adjust knob to select the desired weld gas. Gas type choices vary according to the selected weld process.

See Table 9-1 for all gas abbreviations.

6. Setup Push Button LED

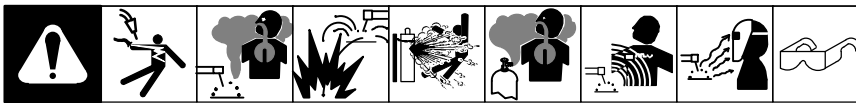
The LED lights to indicate one of the setup modes is active.

7. Setup Push Button

Press button to select Process, Wire Type, Wire Diameter, or Gas Type parameters.

☞ In order for selections to be retained in memory, the Setup push button must be pressed six times before any other push button is pressed: once to select Process, again to select Wire Type, again to select Wire Alloy, again to select Wire Size, again to select Gas Type, and a sixth time to store selections in memory. The displays will temporarily show "PROG LOAD" to indicate the data is being stored in memory.

9-4. Front Panel Controls - Continued (See Section 9-3)



8. Arc Control LED

The LED lights to indicate the Arc Control button is active. Light goes out when button is inactive.

9. Arc Control Push Button

This push button allows fine tuning inductance for MIG programs, and Arc Control for programs other than MIG. When the push button is pressed, the upper display (item 15) shows INDU for inductance, or ARC for Arc Control to indicate which parameter is selected for change. The range of possible values is 0-99 for inductance, and 0-50 for arc control. Turn the Adjust knob to change the parameter value. Press button to deactivate arc control mode (LED goes out).

10. Wire Feed/Gas/Contactor LEDs

The Wirefeed LED lights when the wire feeder is energized. For example, when the front panel Jog or Retract button is pressed, the Wirefeed LED lights.

The Gas LED lights when the gas valve is energized.

The Contactor LED lights when the output contactor is energized, making the weld output terminals live.

11. Wire Speed And Amps LEDs

The lit LED indicates whether wire speed or amps are being displayed.

12. Wire Feed Speed/Amps Display Push Button

13. Lower Display

Press Wire Feed Speed/Amps Display button to show weld amperage or wire feed speed in lower display (the applicable LED under the lower display lights to indicate which is shown). When welding, actual value is shown.

If amperage was selected for display, the unit will show actual welding amperage prior to and while welding unless the unit is in Display Command Values mode. Only wire speed command will be displayed while welding if the unit is set in Display Command Values mode, even if the Wire Feed Speed/Amps Display button is pressed.

Displays show actual or command values as determined by configuration menu when using a PDA with File Management/WaveWriter software. Command values are displayed prior to welding and actual values are displayed while welding unless a PDA with File Management software was used to set the unit in the "Display Command Values" mode. In the Display Command Values mode, command values are displayed while welding.

If a PDA with File Management/WaveWriter software is used to change wire feed units (IPM, MPM) or display welding information

(command or actual), save the changes and then turn the power to the unit off and then on again for the changes to be carried out by the unit.

14. Volts And Arc Adjust LEDs

The lit LED indicates whether voltage or arc length is being displayed.

15. Upper Display

The upper display shows different information depending on the active function of the unit and the weld process being used. When the display shows voltage (for a MIG process), the Volts LED lights. When it shows arc adjust [for a pulsed and RMD (optional) weld process], the Arc Adjust LED lights. However, during any weld process (MIG and pulse), the unit will display actual arc voltage unless a PDA with File Management/WaveWriter software has set the unit in the "Display Command Values" mode.

16. Lock LED

The lock LED is illuminated when one or more programs have been locked using an optional PDA with File Management/WaveWriter software. This indicates that some programs have been disabled. A disabled program will not show up for selection.

Refer to the File Management/WaveWriter Owner's Manual for additional information.

Table 9-1. Welding Wire And Gas Abbreviations*

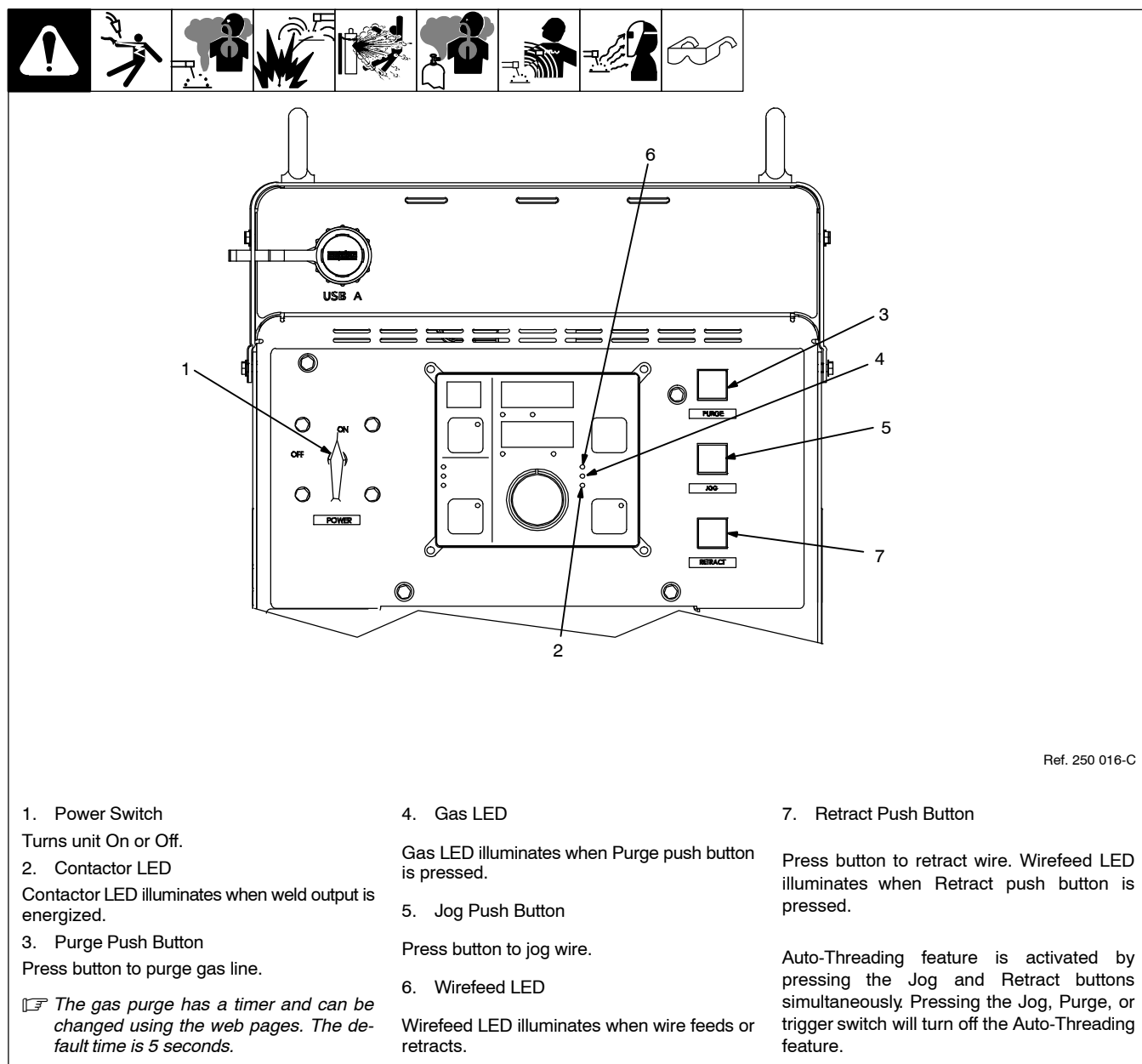
Wire Description	Wire Abbreviation	Alloy Type	Gas Type	Gas Abbreviation
Steel	STL	E70, E100, E120	100% CO ₂ , 90% Argon/10% CO ₂ , 85% Argon/15% CO ₂ , 80% Argon/20% CO ₂ , 75% Argon/25% CO ₂ , 95% Argon/5% CO ₂ , 95% Argon /5% O ₂ , 98% Argon/2% O ₂	CO2 C10 C15 C20 C25 C5 OX5 OX2
Stainless Steel	SS	308, 309, 312, 316	98% Argon, 2% O ₂ , (81Ar/18HE/1CO ₂ Accu-pulse), 90HE/7-1/2Ar/2-1/2CO ₂ (MIG/Accu-pulse), 98% Argon/2% CO ₂	OX2 Tri Gas HE90 C2
Cored Tubular Wire	MCOR	71, 76, 86R, 409, 439, MATRIX	90% Argon/10% CO ₂ , 98% Argon/2% O ₂ , 95% Argon/5% CO ₂ , 95% Argon /5% O ₂ , 100% CO ₂	C10 OX2 C5 OX5 CO2
Aluminum	ALUM	4XXX, 5XXX	100% Argon	ARGN
Flux Cored Tubular Wire	FCOR	E70T-0 E70T-1	100% CO ₂ 75% Argon/25% CO ₂	CO2 C25

* Not all wire types may be available with your unit.

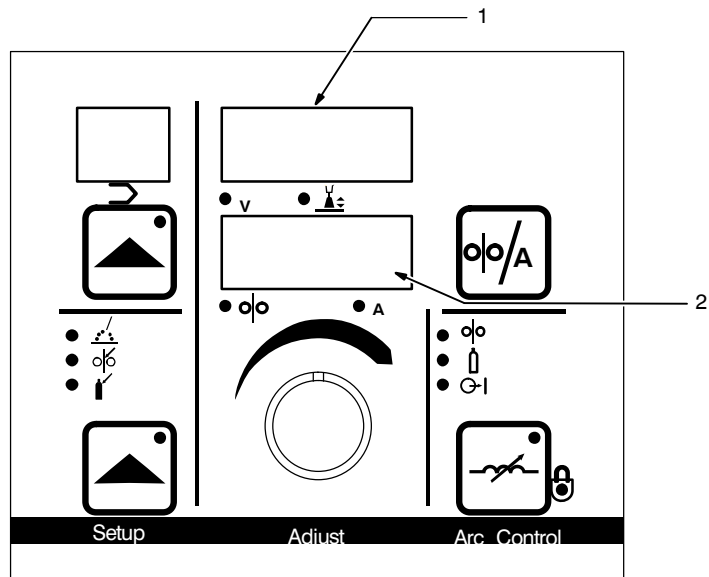
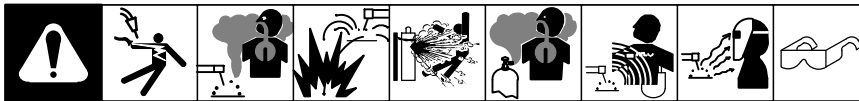
Table 9-2. Robot Abbreviations

Manufacturer	Robot Abbreviation
ABB	ABB
Fanuc	FANU
Daihen	DAHN
Kawasaki	KAWA
Kuka	KUKA
Comau	COMU
Hitachi	HCHI
Nachi	NCHI
Panasonic	PANA
Motoman	MOTO
Robot Adapter	DTEC
Detect Disabled	OFF
None	Robt DTEC

9-5. Front Panel Switches



9-6. Front Panel Display At Power Up



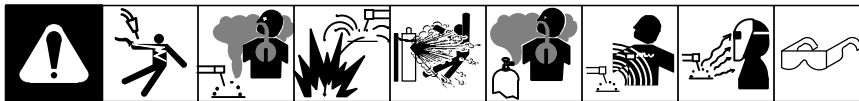
1. Upper Display
2. Lower Display

While the system is initializing, the display will alternate between “Net Wait” and counting up dashes before the power source is fully operational.

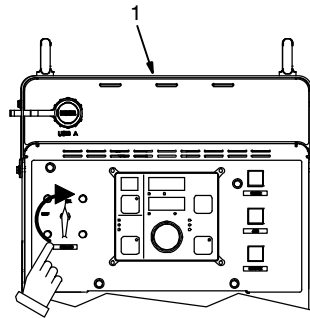
Power Source	Upper Display	Lower Display	Voltage Range	
	Net	Wait		
	—			
	Net	Wait		
	— —			
	Net	Wait		
	— — —			
	Net	Wait		
	— — — —			
	Net	Wait		
	— — — —	—		
	Net	Wait		
	— — — —	— —		
	Net	Wait		
	— — — —	— — —		
	Net	Wait		
	— — — —	— — — —		
	Net	Wait		
	DTEC	OFF		
Axcess E	Auto	E300/E450	10	44

Depends On Welding
Power Source Model

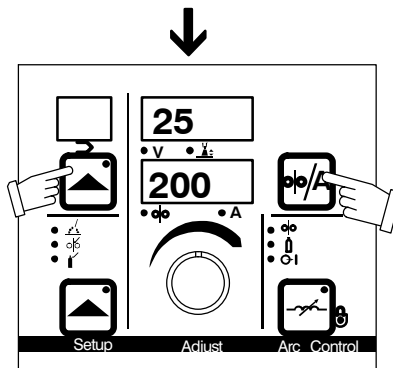
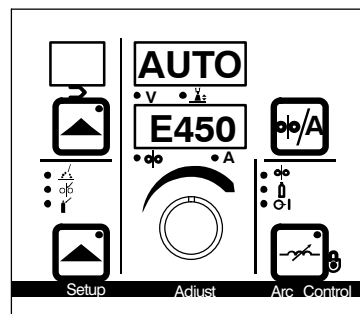
9-7. User Interface Menu



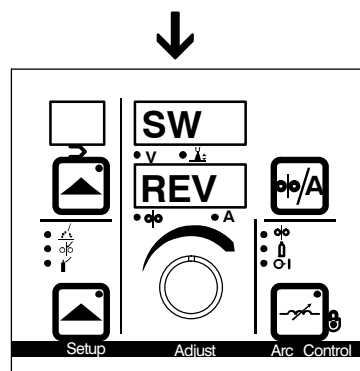
1. Welding Power Source
Turn on welding power source.
Wait for system to initialize (see Section 9-6).



Example display shows
a model 450

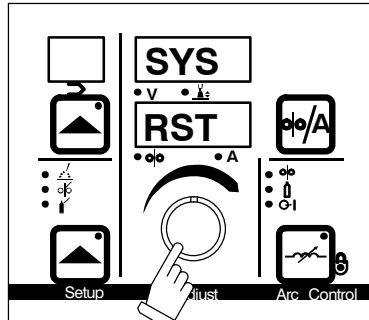
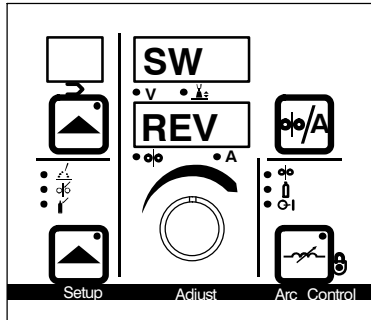
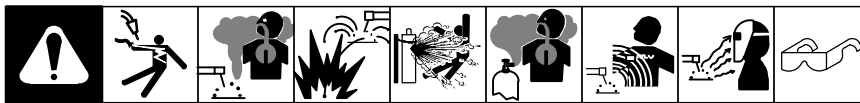


To enter the user interface menu, momentarily
press the Program push button and wire feed/
amps push button at the same time.

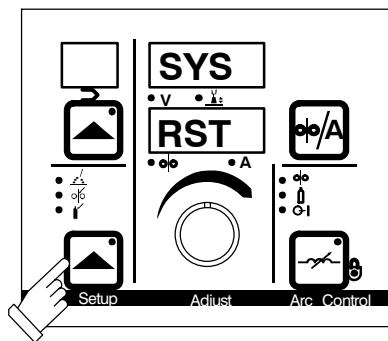


After entering the user interface menu,
the initial display will vary by the first
item that appears.

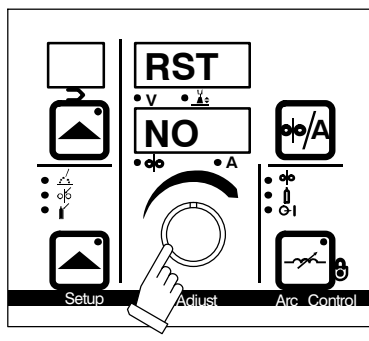
A. System Reset Mode



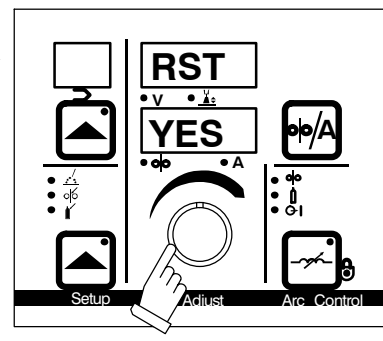
Rotate Adjust knob until System Reset (SYS RST) appears on the display.



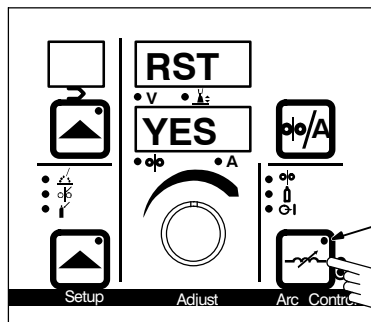
Press the Setup push button to select the reset mode.



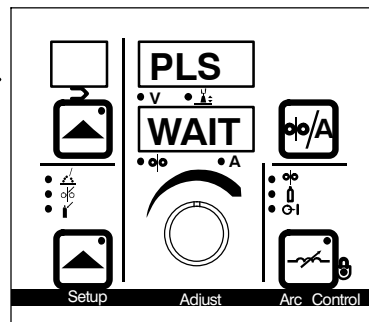
Rotate Adjust knob to select NO or YES.



Rotate Adjust knob to select NO or YES. Program push button LED flashes, press to enter reset selection. If NO is entered, unit returns to standby mode.

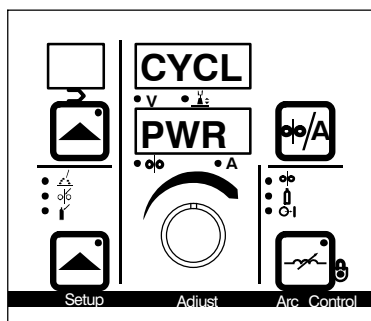


The Arc Control push button LED flashes indicating the unit is ready to perform the system reset operation. Press the Arc Control push button.



Unit will go through a soft boot and then begins initialization (see Section 9-6).

During system reset the display flashes please wait (PLS WAIT) and the following factory default programs are loaded into the unit:



When System Reset is finished, the display will show CYCL PWR for cycle power. Turn the power source off and back on again.

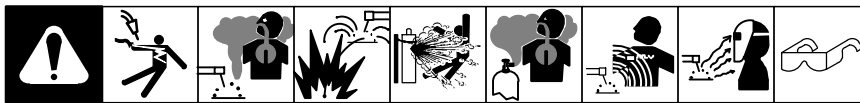
System Reset is not active when Program Lock is enabled.

System Reset allows the operator to reload factory program settings for all eight active programs in the unit.

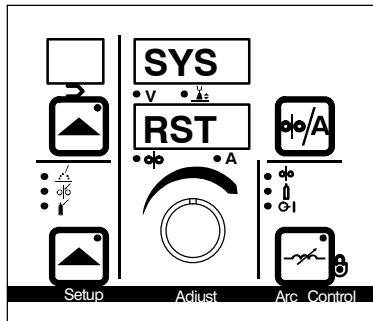
System configuration data will be lost during the Reset operation.

Program 1	Pulse .035 Mild Steel 90% Argon, 10% CO ₂
Program 2	MIG .035 Mild Steel 75% Argon, 25% CO ₂
Program 3	Accu-pulse .035 Mild Steel 90% Argon, 10% O ₂
Program 4	Pulse .045 Mild Steel 90% Argon, 10% CO ₂
Program 5	MIG .045 Mild Steel 75% Argon, 25% CO ₂
Program 6	Accu-pulse .045 Mild Steel 90% Argon, 10% O ₂
Program 7	Pulse .052 Mild Steel 90% Argon, 10% CO ₂
Program 8	MIG .052 Mild Steel 75% Argon, 25% CO ₂

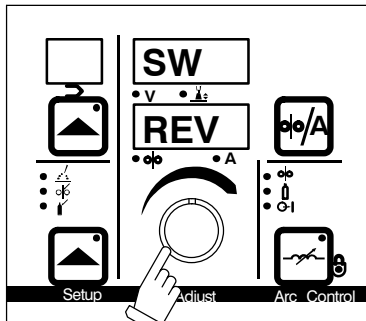
B. Software Revision Readout



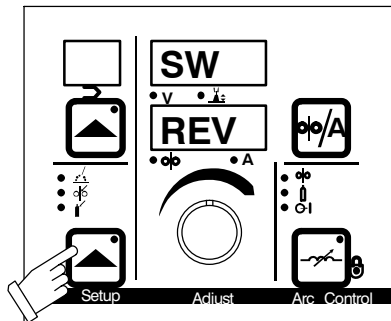
The top display shows the board (AIM, UIM, and WFCM) and the lower display shows the last 3 digits of the circuit board part number plus a letter designator.



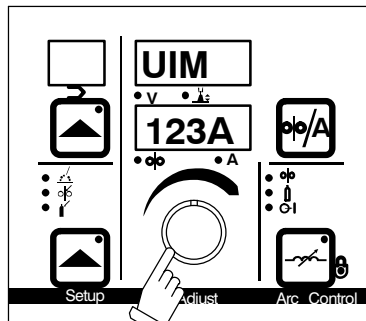
After entering the user interface menu, the initial display will vary by the first item that appears.



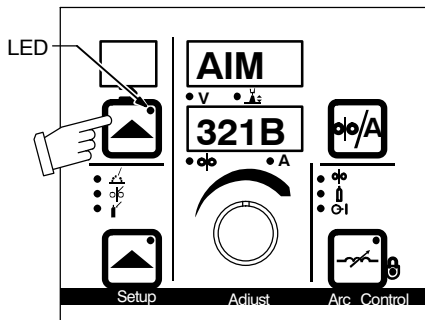
Rotate Adjust knob until Software Revision (SW REV) appears on the display.



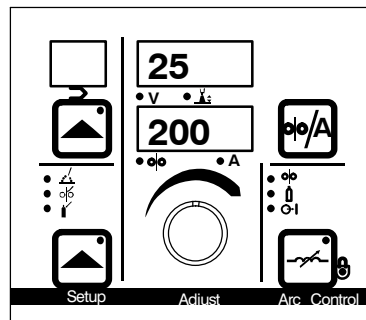
Press the Setup push button to select the software revision mode.



Rotate Adjust knob to scroll through the software revision for each circuit board.

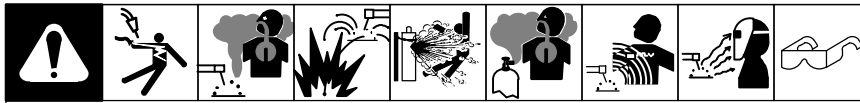


The Program push button LED flashes indicating that pressing this button will exit the user interface menu. Press the Program push button.

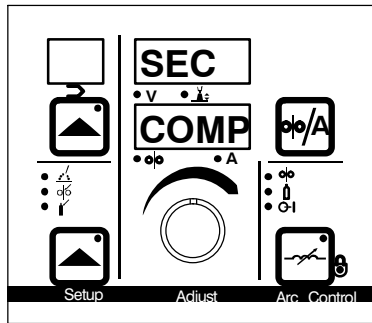


Unit goes back to its standby status.

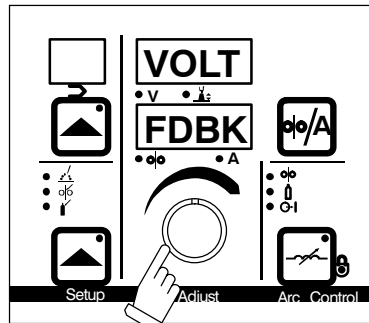
C. Voltage Feedback Method



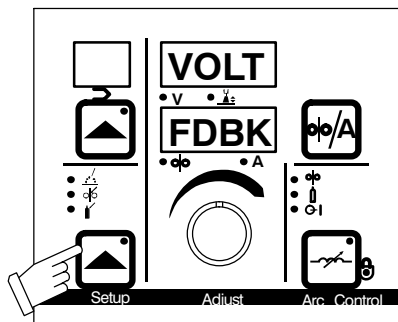
Allows changing the voltage feedback method from volt sense lead to stud feedback.



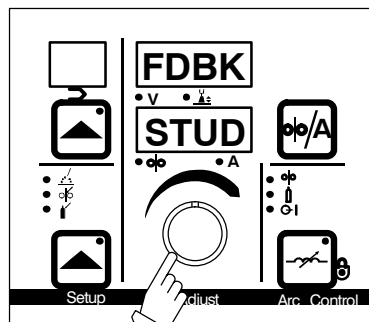
After entering the user interface menu, the initial display will vary by the first item that appears.



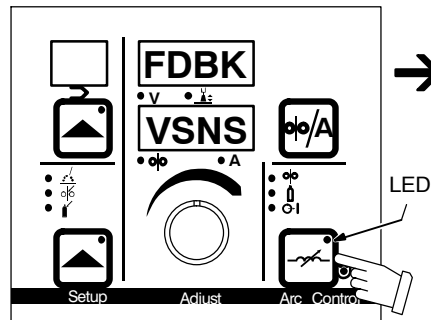
Rotate Adjust knob until Voltage Feedback (VOLT FDBK) appears on the display.



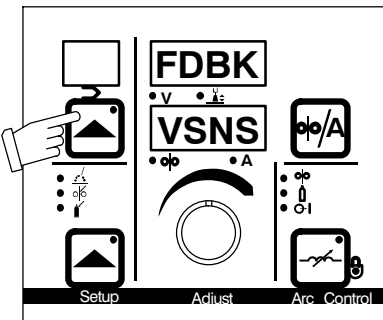
Press the Setup push button to select voltage feedback method.



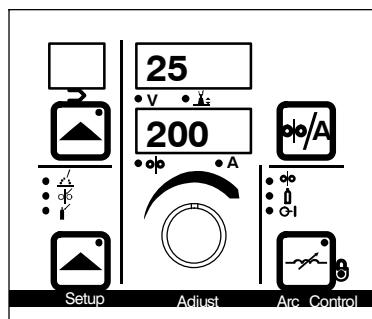
Rotate Adjust knob to select STUD or volt sense lead (VSNS).



The Arc Control push button LED flashes indicating that pressing this button will change the voltage feedback method. Press the Arc Control push button.

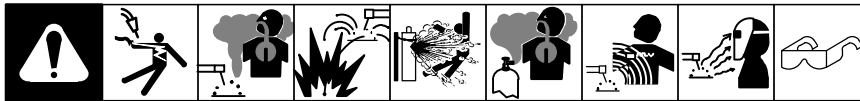


To exit the user interface menu, press the Program push button.



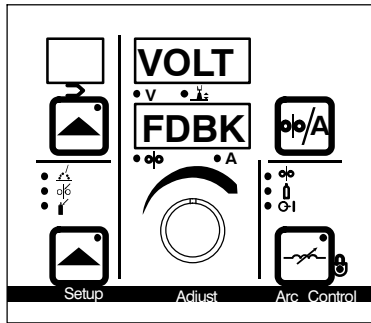
Unit goes back to its standby status.

D. Load Bank Operation

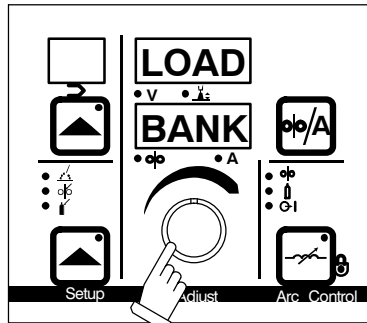


Allows setting the load bank feature on or off.

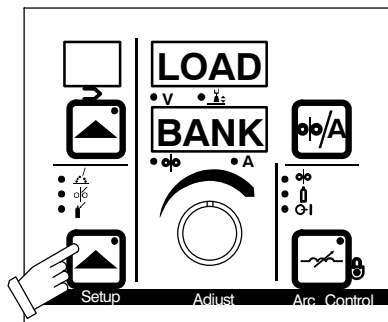
Load Bank is a diagnostic tool for testing the power conversion modules, not a welding process selection.



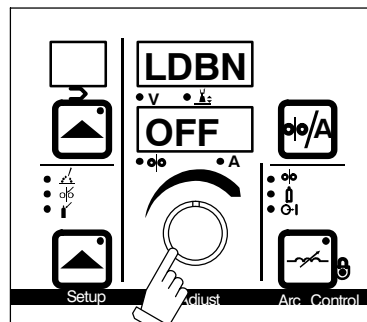
After entering the user interface menu, the initial display will vary by the first item that appears.



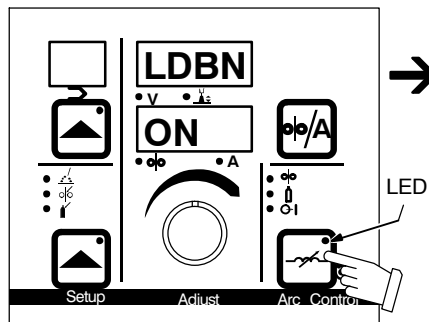
Rotate Adjust knob until Load Bank (LOAD BANK) appears on the display.



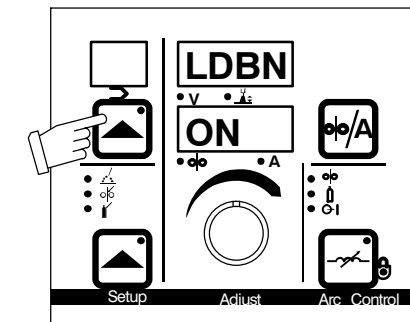
Press the Setup push button to select the Load Bank operation.



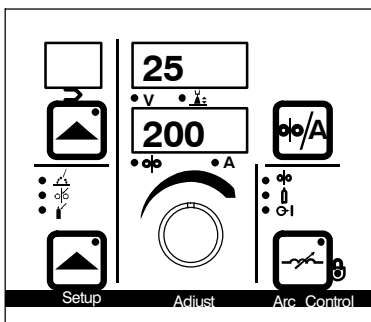
Rotate Adjust knob to select OFF or ON.



The Arc Control push button LED flashes indicating that pressing this button will set the load bank feature on. Press the Arc Control push button.

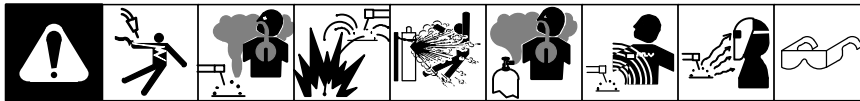


To exit the user interface menu, press the Program push button.

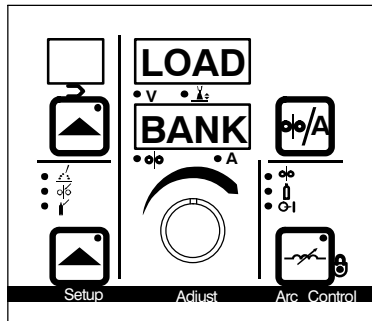


Unit goes back to its standby status.

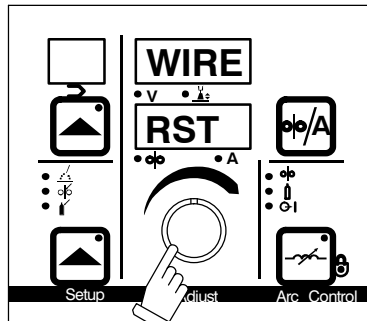
E. Wire Reset Operation



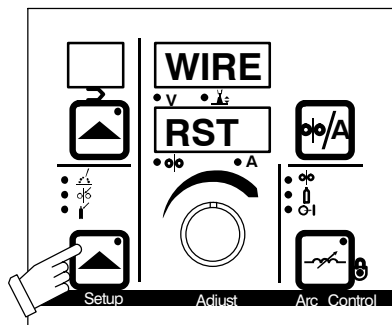
Allows the operator to reset the date/time when a new spool of wire is installed to allow wire usage tracking.



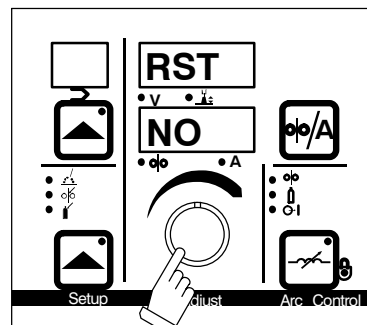
After entering the user interface menu, the initial display will vary by the first item that appears.



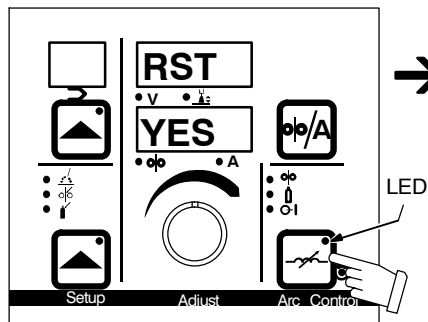
Rotate Adjust knob until Wire Reset (WIRE RST) appears on the display.



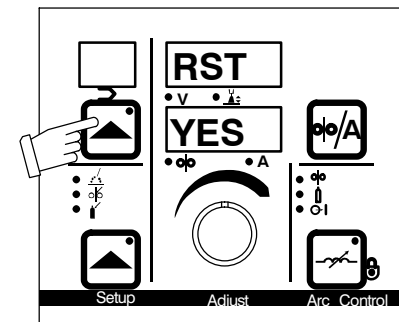
Press the Setup push button to select the wire reset operation.



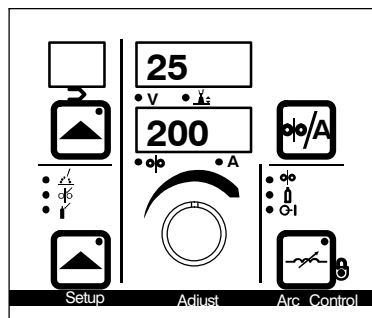
Rotate Adjust knob to select YES or NO.



The Arc Control push button LED flashes indicating that pressing this button will reset the wire spool weight and date. Press the Arc Control push button.

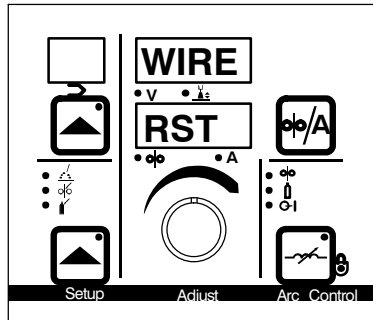
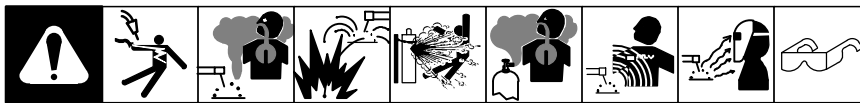


To exit the user interface menu, press the Program push button.

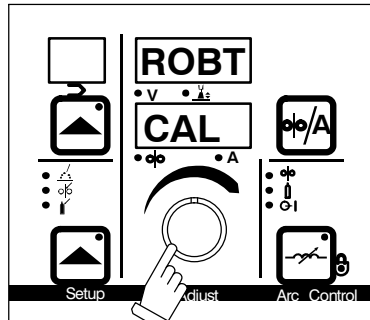


Unit goes back to its standby status.

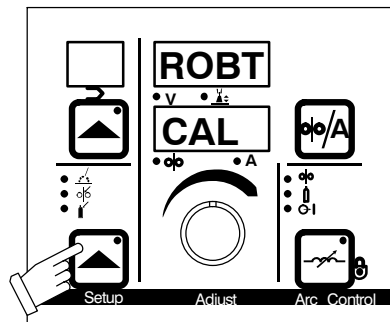
F. Robot Calibration Mode



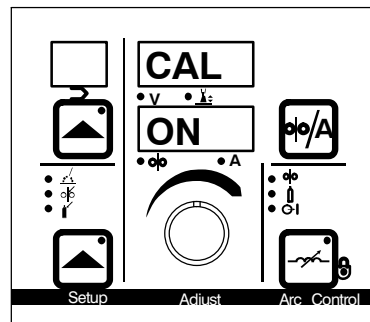
After entering the user interface menu, the initial display will vary by the first item that appears.



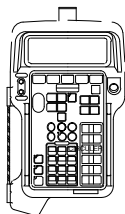
Rotate Adjust knob until Robot Calibration (ROBT CAL) appears on the display.



Press the Setup push button to select the robot calibration mode.



Calibration On (CAL ON) appears on the displays.



Use robot pendant or other method to enter two weld schedules into the robot. Maintain schedule 1 for at least 10 to 20 seconds minimum before moving on to schedule 2. Maintain schedule 2 for 10 to 20 seconds before ending the simulated weld. Schedule data is shown next.



Schedule 1	Schedule 2
10.0 Volts	44.0 Volts
100 IPM	1000 IPM

Use the robot calibration mode to custom-calibrate the power source to the robot command signals. This ensures the wire speed, voltage, and arc adjust are the same on the robot pendant as on the power source.

IMPORTANT: The factory recommendation is to perform the calibration on all installations or code updates.

Follow this procedure if the factory settings are not as accurate as desired. Synchronization of the robot and power source signals makes installation easier and improves the operation of the system.

The robot pendant must have Weld enabled, and there can be no start/stop crater conditions set in the robot.

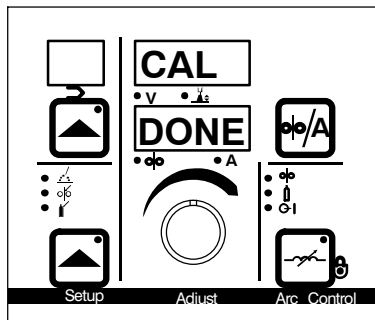
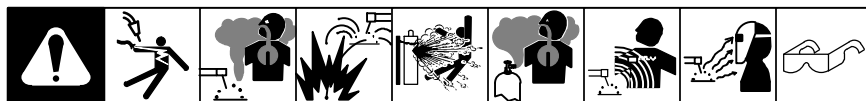
The calibration mode will execute as a "dry run" from the operator's perspective. The welding power source provides the robot with feedback so the robot thinks a weld is underway, yet the robot torch need not move during the calibration.

If you wish to stop the calibration procedure, turn unit input power off and then on again.

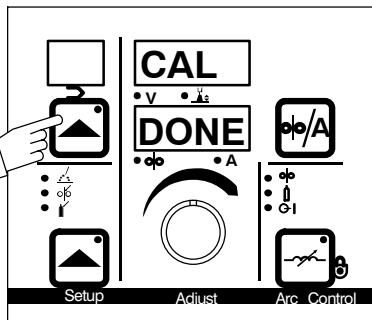


Proceed to next page.

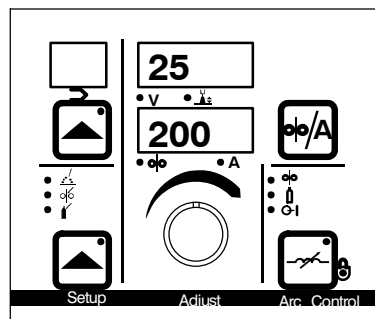
F. Robot Calibration Mode (Continued)



When calibration ends the displays will read calibration done (CAL DONE).



To exit the user interface menu, press the Program push button.



Unit goes back to its standby status.

If you wish to stop the calibration procedure, turn unit input power off and then on again.

If the calibration is performed correctly the CAL ON message stops being displayed and goes to CAL DONE; however, if it is performed incorrectly, the message remains on the display.

To start the calibration procedure over again, turn unit input power off and then on again following the calibration setup steps following the calibration setup steps.

9-8. Robot Auto-Calibration Sample Programs

 It is critical to make certain that NO start power, start conditions, run-in, or crater parameters of any kind are present in the robot program. The welding power source is looking for 2 distinct welding conditions. If there is a "start power" condition, the welding power source will equate this as the first condition and fail to execute Auto-Cal correctly. If there is a "crater fill" condition, the welding power source will equate this as the second condition and fail to execute Auto-Cal correctly.

Actual Motoman Welder Condition File

<Welding Current Output Char.>

NO.	REF (V)	MEASURE (A)
01	0.01	1
02	7.00	500
03	13.99	999
04	0.00	000

<Welding Voltage Output Char.>

NO.	REF (V)	MEASURE (V)
01	0.14	0.5
02	7.00	25.0
03	14.00	50.0
04		

Sample Auto-Calibration Routine For Motoman Robot

```
0000  NOP
0001  Mov J
0002  AWELD 1.40      (AWELD direct input of 1.40Volts = 100 ipm)
0003  VWELD 2.80      (VWELD direct input of 2.80Volts = 10.0 volts)
0004  Arcon
0005  Timer T=10.00
0006  Arcof
0007  AWELD 14.00     (AWELD direct input of 14.00Volts = 1000 ipm)
0008  VWELD 12.32     (VWELD direct input of 12.32Volts = 44.0 volts)
0009  Arcon
0010  Timer T=10.00
0011  Arcof
0012  End
```


Sample Auto-Calibration Routine For Fanuc Robot

```
1:  Call Safehome
2:  J P[1] 40% Fine
    Arcstart [10.0Volts, 100.0IPM]
3:  L P[2] 10.0 sec Fine
    Arc End [0.0Volts, 0.0IPM, 0.0Sec]
4:  Wait 1.00 (Sec)
5:  J P[3] 40% Fine
    Arcstart [44.0Volts, 1000.0IPM]
6:  L P[4] 10.0 sec Fine
    Arc End [0.0Volts, 0.0IPM, 0.0Sec]
7:  Call Safehome
```

Sample Auto-Calibration Routine For ABB Robot

```
Move J home, v500, z50, tweldgun;
Arcl \ on, *, v500, sm1, wd1, ww0, z50, tweldgun;
Arcl \ off, *, v500, sm1, wd1, ww0, z50, tweldgun;
WaitTime 5;
Arcl \ on, *, v500, sm1, wd2, ww0, z50, tweldgun;
Arcl \ off, *, v500, sm1, wd2, ww0, z50, tweldgun;
Move J home, v500, z50, tweldgun;
```

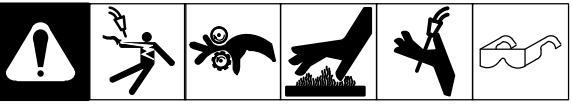
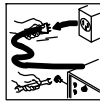
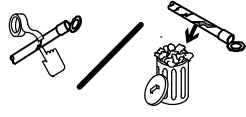
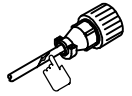
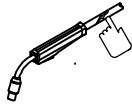
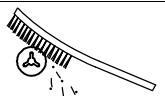
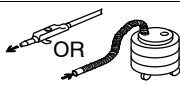
*Seam Data values must all be set at zero.

Weld Data 1:	Weld Data 2:
weld_sched:=0	weld_sched:=0
weld_speed:=5	weld_speed:=5
weld_voltage:=10	weld_voltage:=44
weld_wfs:=100	weld_wfs:=1000
org_weldspeed:=0	org_weldspeed:=0
org_weldvoltage:=0	org_weldvoltage:=0
org_weldwfeed:=0	org_weldwfeed:=0

Notes

SECTION 10 – MAINTENANCE

10-1. Routine Maintenance

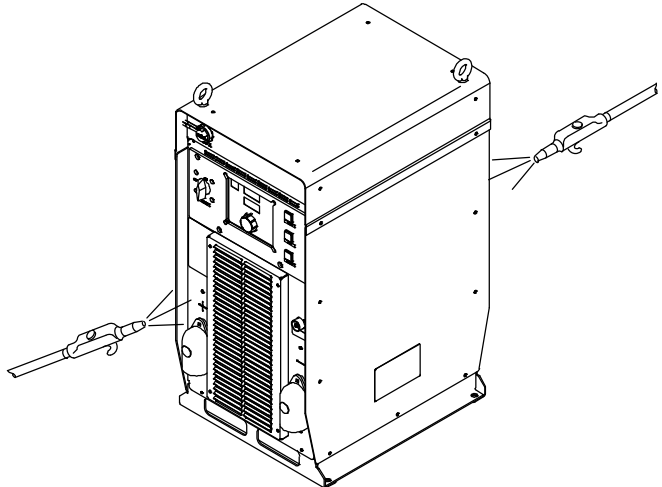
  Disconnect power before maintaining.  <i>Maintain more often during severe conditions.</i>					
 ✓ = Check ◇ = Change ● = Clean ☆ = Replace * To be done by Factory Authorized Service Agent					
Every 3 Months	 ☆ Unreadable Labels	 ● Weld Terminals	 ☆ Damaged Gas Hose	 ✓ ☆ Weld Cables	
	 ✓ ☆ Cords	 ✓ ☆ Gun Cables			
Every 6 Months	 ● Drive Rolls	 ● Inside Unit			

10-2. Blowing Out Inside Of Unit




Do not remove case when blowing out inside of unit.

To blow out unit, direct airflow through front and back louvers as shown.



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Notes

SECTION 11 – SAFETY PRECAUTIONS FOR SERVICING



Protect yourself and others from injury — read and follow these precautions.

11-1. Symbol Usage

OM-251 440F 2013-06, safety_stm 2010-03



DANGER! – Indicates a hazardous situation which, if not avoided, will result in death or serious injury. The possible hazards are shown in the adjoining symbols or explained in the text.



Indicates a hazardous situation which, if not avoided, could result in death or serious injury. The possible hazards are shown in the adjoining symbols or explained in the text.

NOTICE – Indicates statements not related to personal injury.

 Indicates special instructions.



This group of symbols means Warning! Watch Out! **ELECTRIC SHOCK**, **MOVING PARTS**, and **HOT PARTS** hazards. Consult symbols and related instructions below for necessary actions to avoid the hazards.

11-2. Servicing Hazards



The symbols shown below are used throughout this manual to call attention to and identify possible hazards. When you see the symbol, watch out, and follow the related instructions to avoid the hazard.



Only qualified persons should test, maintain, and repair this unit.



During servicing, keep everybody, especially children, away.

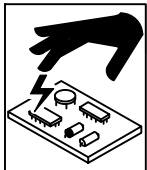


ELECTRIC SHOCK can kill.

- Do not touch live electrical parts.
- Turn Off welding power source and wire feeder and disconnect and lockout input power using line disconnect switch, circuit breakers, or by removing plug from receptacle, or stop engine before servicing unless the procedure specifically requires an energized unit.
- Insulate yourself from ground by standing or working on dry insulating mats big enough to prevent contact with the ground.
- Do not leave live unit unattended.
- If this procedure requires an energized unit, have only personnel familiar with and following standard safety practices do the job.
- When testing a live unit, use the one-hand method. Do not put both hands inside unit. Keep one hand free.
- Disconnect input power conductors from deenergized supply line BEFORE moving a welding power source.

SIGNIFICANT DC VOLTAGE exists in inverter welding power sources AFTER removal of input power.

- Turn Off inverter, disconnect input power, and discharge input capacitors according to instructions in Troubleshooting Section before touching any parts.



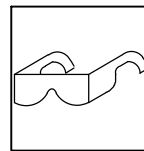
STATIC (ESD) can damage PC boards.

- Put on grounded wrist strap BEFORE handling boards or parts.
- Use proper static-proof bags and boxes to store, move, or ship PC boards.



FIRE OR EXPLOSION hazard.

- Do not place unit on, over, or near combustible surfaces.
- Do not service unit near flammables.



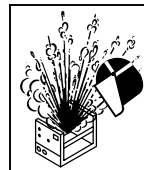
FLYING METAL or DIRT can injure eyes.

- Wear safety glasses with side shields or face shield during servicing.
- Be careful not to short metal tools, parts, or wires together during testing and servicing.



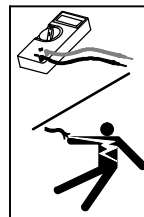
HOT PARTS can burn.

- Do not touch hot parts bare handed.
- Allow cooling period before working on equipment.
- To handle hot parts, use proper tools and/or wear heavy, insulated welding gloves and clothing to prevent burns.



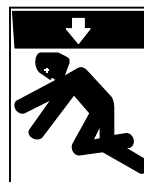
EXPLODING PARTS can injure.

- Failed parts can explode or cause other parts to explode when power is applied to inverters.
- Always wear a face shield and long sleeves when servicing inverters.



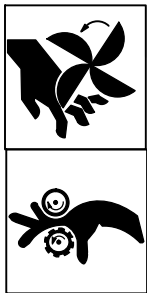
SHOCK HAZARD from testing.

- Turn Off welding power source and wire feeder or stop engine before making or changing meter lead connections.
- Use at least one meter lead that has a self-retaining spring clip such as an alligator clip.
- Read instructions for test equipment.



FALLING EQUIPMENT can injure.

- Use lifting eye to lift unit only, NOT running gear, gas cylinders, or any other accessories.
- Use equipment of adequate capacity to lift and support unit.
- If using lift forks to move unit, be sure forks are long enough to extend beyond opposite side of unit.
- Follow the guidelines in the Applications Manual for the Revised NIOSH Lifting Equation (Publication No. 94-110) when manually lifting heavy parts or equipment.



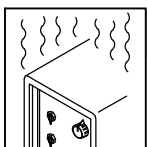
MOVING PARTS can injure.

- Keep away from moving parts such as fans.
- Keep away from pinch points such as drive rolls.
- Have only qualified persons remove doors, panels, covers, or guards for maintenance and troubleshooting as necessary.
- Keep hands, hair, loose clothing, and tools away from moving parts.
- Reinstall doors, panels, covers, or guards when maintenance is finished and before re-connecting input power.



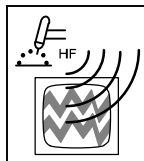
ELECTRIC AND MAGNETIC FIELDS (EMF) can affect Implanted Medical Devices.

- Wearers of Pacemakers and other Implanted Medical Devices should keep away from servicing areas until consulting their doctor and the device manufacturer.



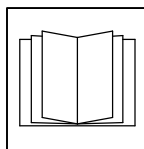
OVERUSE can cause OVERHEATING.

- Allow cooling period; follow rated duty cycle.
- Reduce current or reduce duty cycle before starting to weld again.
- Do not block or filter airflow to unit.



H.F. RADIATION can cause interference.

- High-frequency (H.F.) can interfere with radio navigation, safety services, computers, and communications equipment.
- Have only qualified persons familiar with electronic equipment install, test, and service H.F. producing units.
- The user is responsible for having a qualified electrician promptly correct any interference problem resulting from the installation.
- If notified by the FCC about interference, stop using the equipment at once.
- Have the installation regularly checked and maintained.
- Keep high-frequency source doors and panels tightly shut, keep spark gaps at correct setting, and use grounding and shielding to minimize the possibility of interference.



READ INSTRUCTIONS.

- Use Testing Booklet (Part No. 150 853) when servicing this unit.
- Consult the Owner's Manual for welding safety precautions.
- Use only genuine replacement parts from the manufacturer.
- Read and follow all labels and the Technical Manual carefully before installing, operating, or servicing unit. Read the safety information at the beginning of the manual and in each section.

11-3. California Proposition 65 Warnings

- ⚠** Welding or cutting equipment produces fumes or gases which contain chemicals known to the State of California to cause birth defects and, in some cases, cancer. (California Health & Safety Code Section 25249.5 et seq.)
- ⚠** Battery posts, terminals and related accessories contain lead and lead compounds, chemicals known to the State of California to cause cancer and birth defects or other reproductive harm. *Wash hands after handling.*
- ⚠** This product contains chemicals, including lead, known to the state of California to cause cancer, birth defects, or other reproductive harm. *Wash hands after use.*

For Gasoline Engines:

- ⚠** Engine exhaust contains chemicals known to the State of California to cause cancer, birth defects, or other reproductive harm.

For Diesel Engines:

- ⚠** Diesel engine exhaust and some of its constituents are known to the State of California to cause cancer, birth defects, and other reproductive harm.

11-4. EMF Information

Electric current flowing through any conductor causes localized electric and magnetic fields (EMF). Welding current creates an EMF field around the welding circuit and welding equipment. EMF fields may interfere with some medical implants, e.g. pacemakers. Protective measures for persons wearing medical implants have to be taken. For example, access restrictions for passers-by or individual risk assessment for welders. All welders should use the following procedures in order to minimize exposure to EMF fields from the welding circuit:

1. Keep cables close together by twisting or taping them, or using a cable cover.
2. Do not place your body between welding cables. Arrange cables to one side and away from the operator.
3. Do not coil or drape cables around your body.

4. Keep head and trunk as far away from the equipment in the welding circuit as possible.
5. Connect work clamp to workpiece as close to the weld as possible.
6. Do not work next to, sit or lean on the welding power source.
7. Do not weld whilst carrying the welding power source or wire feeder.

About Implanted Medical Devices:

Implanted Medical Device wearers should consult their doctor and the device manufacturer before performing or going near arc welding, spot welding, gouging, plasma arc cutting, or induction heating operations. If cleared by your doctor, then following the above procedures is recommended.

12-1. Set Value Mode

The Set Value mode is a troubleshooting tool that allows certain robot command values to be manually over-ridden.

Enter the Set Value mode by pressing the Setup and Arc Control push buttons at the same time. When in the Set Value mode the display windows briefly shows SET VALU and the blinking LEDs under the display windows indicate whether Volts, Arc Adjust, or Wire Speed can be changed turning the Adjust knob.

Depending on the defined weld process, either volts (MIG) or arc adjust [pulse, Accu-pulse, or RMD (optional)] can be changed in the top display. Wire speed can be

changed in the bottom display. Press the Wire Feed Speed/Amps push button to toggle between selecting information in the top display or bottom display. The LED under the active display will blink to indicate the value that can be changed.

Rotate the Adjust knob to change values.

Exit the Set Value mode by pressing the Setup and Arc Control push buttons at the same time or turning power source off and then back on again.

- 1 Setup Push Button
- 2 Arc Control Push Button
- 3 Adjust Knob
- 4 Wire Feed Speed/Amps Display Push Button

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12-2. Error Code Troubleshooting Tables

Display Example	ERR	
	TACH	

 The following error codes may appear on the upper and lower displays of the User Interface Module to indicate specific errors. Explanations of the error codes are provided in the sections referenced.

Error Type	User Interface Module Upper Display	User Interface Module Lower Display	Reference
Emergency Stop	E	STOP	Section 12-2. A
Arc Error	ERR	ARC	Section 12-2. B
No Coolant Flow	ERR	COOL	Section 12-2. C
Ground Current Detect Error	ERR	GND	Section 12-2. D
Line Error	ERR	LINE	Section 12-2. E
Motor Over Current	ERR	MOTR	Section 12-2. F
Arc Start Error	ERR	STRT	Section 12-2. G
No Tach Error	ERR	TACH	Section 12-2. H
Thermal Over Temperature	ERR	TEMP	Section 12-2. I
Unknown Error	ERR	UNKN	Section 12-2. J
Motor Communications Error	MOTR	COMM	Section 12-2. K
Over Average Current	OVER	AVE	Section 12-2. L
Over Current	OVER	CRNT	Section 12-2. M
Release Trigger	REL	TRIG	Section 12-2. N
Trigger Stuck	TRIG	STUK	Section 12-2. O
Wire Feed Speed Error	ERR	WFS	Section 12-2. P
Stop Error	ERR	STOP	Section 12-2. Q
Flow Error	ERR	FLOW	Section 12-2. R
Stuck Error	ERR	STUK	Section 12-2. S
Weld Wait	WELD	WAIT	Section 12-2. T
Please Wait	PLS	WAIT	Section 12-2. U
Low Wire Feed Speed	LOW	WFS	Section 12-2. V
Demo Done	DEMO	DONE	Section 12-2. W
Net Wait	NET	WAIT	Section 12-2. X
Software Error	SW	ERR	Section 12-2. Y
Check Web	CHCK	WEB	Section 12-2. Z

A. Emergency Stop Error

E	Indicates an emergency stop error. Receptacle RC5-1 connects to receptacle RC1-4 and receptacle RC5-2 connects to receptacle RC4-2 on E-Stop board PC12. A closure between RC4-1 and RC4-2 allows +24 volts DC to be supplied to the four relays on E-Stop board PC12. In an E-Stop situation (relays open), all four relays on the E-Stop board de-energize and cut power to the control boards.
STOP	When relay CR1 on E-Stop board PC12 is de-energized, it drops out the 18 volts AC from transformer T1 that powers the inverter control board(s). When relay CR2 on E-Stop board PC12 is de-energized, it breaks the contactor signal being sent to the inverter engine board(s) from the process control module PC4 (J2-9 to RC2-3) and causes a loss of signal to the AIM board (RC2-1 and RC2-2) and to micro input (RC5-3 and RC5-4), signaling an E-Stop is active. When relay CR3 on E-Stop board PC12 is de-energized, it breaks the secondary side output of the motor board before it goes to the filter board. Relay CR4 on E-Stop board PC12 is a soft start relay in parallel with the contacts of relay CR1.

B. Arc Error

ERR	Indicates voltage has exceeded the programmable limit of a valid arc for the programmed amount of time (default time is 500 ms). Check contact tip, weld conditions, and shielding gas. Arc error can be enabled or disabled using an optional PDA with File Management/WaveWriter software.
ARC	

C. No Coolant Flow Error

ERR	Indicates no coolant flow in water flow switch option. The error may be reset by reestablishing coolant flow to the gun, and then pressing the Jog/Purge button.
COOL	

D. Ground Current Detect Error

ERR	Indicates that weld current is flowing through the primary ground. This is a latching error and welding power source power must be cycled off and back on again.
GND	

E. Line Error

ERR	Indicates that primary power has dropped below the operating point of the welding power source. Signal is sent from inverter engine module(s) (RC6, Pin 9 on inverter control board PC1) to process control module PC4 (J2, Pin 1). Check for a brown-out condition. The primary boost capacitors have dropped below an acceptable minimum voltage threshold. This circuit monitors the 940 volts primary DC bus voltage across the electrolytic capacitors C1 and C2. Low line is displayed when this voltage drops below 858 volts DC. This could happen when attempting to draw near rated output power with an input voltage below 190 volts AC, three phase. This causes the boost section to go into current limit trying to supply the output power. Once current limit is reached, the boost section can no longer hold the bus capacitors at 940 volts DC. The inverter control will also go into an output current limit mode in an attempt to supply output power.
LINE	

F. Motor Over Current Error

ERR	Indicates that the motor has been drawing too much current for too long a time period. To remedy this fault, reduce the wire feed speed or the wire feeder torque load/duty cycle. Press Jog/Purge button to clear error.
MOTR	

G. Arc Start Error

ERR	Indicates the contactor either is or was active, but the system failed to start an arc. Conditions for a valid arc start are at least 50% of arc start current, voltage less than 60 volts, and voltage greater than min. valid arc voltage (default is 22.5 volts). This situation is usually attributed to a contact tip or feeder issue. The arc start error parameter can be disabled using an optional PDA with File Management/Wave Writer software.
STRT	

H. No Tach Error

ERR TACH	Indicates loss of tachometer feedback. Determine cause of error as follows: • Press JOG button on the front panel. • Does the motor run wide open immediately? • YES → Replace Motor Board PC6. • Does the motor ramp up in speed? • YES → Bad motor tach. Contact nearest Factory Authorized Service Agent. • Does the motor respond at all? • YES → Contact nearest Factory Authorized Service Agent. • Check motor cable. Is it damaged? • YES → Replace motor cable. • NO → Contact factory service personnel.
--------------------------------	---

I. Thermal Over Temperature Error

ERR TEMP	Indicates one or more of the inverter engines overheated. Sent from inverter engine module(s) (RC6, Pin 12, on inverter control board PC1) to process control module PC4 (J2, Pin 7). Check fan on inverter engine(s) and weld currents. This signal is the sum of two conditions: shutdown that comes from the temperature monitoring circuit on the inverter control board, and Pwr-Up-Cnt that generated by the boost section of the inverter control board. When either of these signals is active, RC6-12 is pulled low (this is the not ready line out of the inverter control board). Shutdown is active when there is an over-temperature condition on the primary or secondary heatsink or on the boost inductor. To determine which of the two locations is at fault, check LED 1 and LED 2 on inverter control board PC1. • If LED 1 is lit, this indicates an over-temperature condition on the primary heat sink. • If LED 2 is lit, this indicates an over-temperature condition on the secondary heat sink or on the boost inductor. Pwr-Up-Cnt (power up control) monitors primary voltage start-up conditions when the power source is first turned on. This signal is opto-isolated from the boost section of the inverter control board. The following conditions must be met for the power source to power up: • Auxiliary power board PC3 must be powered up and operating to supply prepower of +15 volts DC to the boost section of inverter control board PC1. • The peak voltage of the input line power must be greater than 150 volts peak. • The DC bus voltage must be greater than 85% of the rectified line voltage. This bus voltage also turns on the pre-charge relay. • The DC bus voltage must be boosted to greater than 858 volts DC. If any of these conditions are not met, then receptacle RC6-12 is pulled low and weld output is locked out.
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J. Unknown Error

ERR UNKN	Indicates error bit from process control module PC4 is set, but error value sent does not match anything defined with the UIM board PC7.
--------------------------------	---

K. Motor Communications Error

MOTR	The motor board has lost communication with the PCM board PC4. Check cabling and cable routing for boom system motor cable and secondary cables. Separate cable as much as possible. Check if WFM board PC6 code is installed and if microprocessor is running. Check LED3 and LED4 on WFM board PC6. Depending on the wire feed speed, check for 0-40 volts DC on J17-3 to J17-1. If there is no voltage present there, check for 40 volts DC at J16-1 to J16-2. If voltage is present there and neither LED is lit (Red or Green), try to download WFM code to welding power source. If neither LED turns on after downloading code and cycling power, replace WFM board PC6. If LED3 and LED4 are flashing Red or Green or they are solid Red, this indicates the WFM board is still not communicating with the PCM board PC4. Be sure that the UIM board PC7 is on-line (two green LEDs lit). - Check all Devicenet grey harness connections between process control module PC4, UIM board PC7, and WFM board PC6. - Check process control module PC4 for +24 volts DC at 6-pin connector J6-2 (+) and J6-5 (-). If +24 volts is not present at the connector, proceed as follows: - Disconnect connector J10 and J11 from WFM board PC6. Check for +24 volts DC at J10-2 (+) and J10-5 (-), and J11-2 (+) and J11-5 (-). One of the two connectors must measure +24 volts DC to ensure that the Devicenet lines are being sent from process control module PC4 to WFM board PC6. If +24 volts DC is present at either connector, replace WFM board PC6. - If +24 volts DC is not present at either J10 or J11 connector, check process control module PC4 at connectors J6, J7, and J8. Remove plugs from connectors and check for +24 volts DC at pin2 (+) and pin 5 (-). If +24 volts DC is not present at any of the connectors, replace process control module PC4. If LED3 and LED4 are both green this indicates that the WFM board went off-line and then recovered which is usually due to noise interference. - Check wire drive motor isolation. Isolated portion of motor housing should not touch robot arm, welding power source chassis, lifting eye bolts, or weld secondary common. Measure impedance between chassis and both weld secondary commons. Measure the impedance across motor isolation barrier on motor housing. All measurements should read high impedance. - Check all Devicenet grey harness connections between process control module PC4, UIM board PC7, and WFM board PC6.
COMM	

L. Over Average Current Error

OVER	Output current is exceeding the thermal capabilities of the welding power source for approximately 25 seconds. Default value is as follows: Access 450 limit is 610 A average This is a duty cycle error and requires 5 minutes with power on and NO welding to clear the error. This error indicates that an excessive amount of current was drawn over a short period of time. Over-average current is drawn for a period of approximately 25 seconds and can also be expressed as exceeding the power source duty cycle. The current limit is as follows: Access 450 is 610 amperes This alarm cannot be reset. To clear the condition, the power source must be turned on and allowed to idle for approximately 5 minutes. This cooling period is determined by an internal timer, and turn off power will not reset the timer since it is saved with the Configuration data. After the 5 minute cooling period, press the Jog or Purge button, or cycle power to clear the alarm. If this alarm was received by mistake, and the power source did not exceed the duty cycle, check the following: Check current feedback signal either while welding or connecting to a load bank. Measure between test point TP8 and grounding strap on process control module PC4. Test point TP8 is located on left-hand side of board, about 1 in. (25 mm) to the right of connector J11. TP8 is scaled: 1 volt measured equals 100 amperes actual. This measurement should read 0 volts when not welding. If the measurement reads approximately 13 volts DC, disconnect LEM device from engine (one at a time) to determine if either device is bad. If the voltage reading still does not change, unplug the lower inverter control board; if the reading remains the same, replace the upper inverter control board. Voltage readings should be present while welding. If voltage readings are not correct for current feedback scaling, check individual inverter engines.
AVE	

M. Over Current Error

OVER CRNT	Indicates one or more of the inverter engines has latched with an over-current. Signal is sent from engine module(s) (RC6, Pin 11, on inverter control board PC1) to process control module PC4 (J2, Pin 6). The over-current circuit monitors the inverter high frequency transformer primary current. Normal welding will never trip this circuit, only a fault will cause an over-current condition. LED4 will be lit on the inverter control board, and power must be cycled to clear this error. - The most likely fault to trip this circuit is an open 940 volts DC bus bleeder resistor, either R1 or R8 on the interconnect board. An open resistor will cause the bus, which is split between two series capacitors, to become unbalanced. The capacitor with the open resistor will go to approximately 340 volts DC. The other capacitor will go to approximately 600 volts DC. Normally, both capacitors are at approximately 470 volts DC. The unit will weld like this most of the time. A 16 uF balancing capacitor in series with the transformer can keep the transformer from saturating under these adverse conditions. Occasionally, the inverter transformer will saturate, and when this happens, it draws a huge amount of current and trips the over-current circuit. This condition locks off the inverter control board and eventually the bus capacitors will fail. A change to a different resistor eliminated this situation and the problem is no longer an issue. - A shorted output diode will cause an over-current error and no weld output will be available.
---------------------------------	---

N. Release Trigger Error

REL TRIG	Indicates a timed weld has expired, but the trigger is still active. Press Jog/Purge button to clear error. This error occurs after a timed weld expires and the trigger is not released. A PDA with File Management/WaveWriter software can be used to set up timed welds. This is strictly an informational-type error.
--------------------------------	---

O. Trigger Stuck Error

TRIG STUK	Indicates the welding power source was turned on and the trigger signal attempted to weld. Turn welding power source off and back on again to clear the error. This error indicates a trigger source was activated while the power source was being powered up. If the trigger source is removed, the error can be cleared. - Use a PDA with ServicePak software and view the Comm Diagnostics screen to see the source of the contactor or trigger command. - If LED2 is lit on RIO board PC10, a contactor signal is being sent from the robot.
---------------------------------	---

P. Wire Feed Speed Error

ERR WFS	Indicates a wire feed speed error. Press Jog/Purge button to clear error. This error indicates actual wire feed speed does not match wire feed speed command.
-------------------------------	---

Q. Stop Error

ERR STOP	Indicates an arc stop error. Press Jog/Purge button to clear error. This error occurs as a result of obstructions in the wire feed system or a faulty wire drive system. Check wire feed and wire drive system.
--------------------------------	---

R. Flow Error

ERR FLOW	Indicates a gas flow error. Press Jog/Purge button to clear error. This error occurs when there is no gas flow to the gun. Check shielding gas system and reestablish gas flow to the gun.
--------------------------------	--

S. Stuck Error

ERR STUK	Indicates a wire stuck error. Press Jog/Purge button to clear error. This error occurs if the welding wire sticks to the workpiece at the end of a weld. This fault may be caused by poor welding conditions. Cut the welding wire from the workpiece.
--------------------------------	--

T. Weld Wait

WELD	Indicates a weld cycle wait error. Press Jog/Purge button to clear error. This error occurs when the unit is not ready for a weld sequence.
WAIT	

U. Please Wait

PLS	Indicates a UIM communication error. Press Jog/Purge button to clear error. This error occurs when the user interface circuit board loses data communications.
WAIT	

V. Low Wire Feed Speed

LOW	Indicates a low wire feed speed command error. Press Jog/Purge button to clear error. This error occurs when actual wire feed speed is lower than the wire feed speed command. Check for obstructions in the wire feed system or a faulty wire drive system.
WFS	

W. Demo Done

DEMO	Indicates RMD/Accuspeed demo has expired. Press Jog/Purge button to clear error. This message appears when RMD and Accuspeed demos are completed. Pressing the Jog/Purge button will change the screen to CYCL PWR on the display. Turn unit power off and back on again. RMD and Accuspeed share the same demo timer. If the time expires for one demo process, both demo processes are deactivated.
DONE	

X. Net Wait

NET	Indicates a communication problem. Press Jog/Purge button to clear error. If the display remains in NET WAIT status, this indicates there is a communication problem between various circuit boards in the wire feeder or ROI and welding power source.
WAIT	

Y. Software Error

SW	Indicates incompatible software code. Press Jog/Purge button to clear error. This error occurs after a software download and the versions between circuit boards are not compatible or a feeder or ROI that has not been updated is connected to a power source with incompatible code. This error can also occur if power is cycled off and on with less than 10 seconds of off time.
ERR	

Z. Check Web

CHCK	Indicates an E Module update error. Press Jog/Purge button to clear error. This error occurs when performing an E Module update to an existing unit. This requires connecting to the web pages to enter serial number information.
WEB	

12-3. E Module Board Stack Diagnostic LEDs



D43

ARM_10

D44

E-STOP

D17

GNDNT

D19

AD_AUX

D21

AD_AWAKE

D25

OVRNT

D26

OVRPWR

D28

PLRTY

D30

OVRTMP

D33

CONTACTOR

1

D103

D91

D10D11 D7

D99

D96

D92

D101

D98

D108

D8

D1

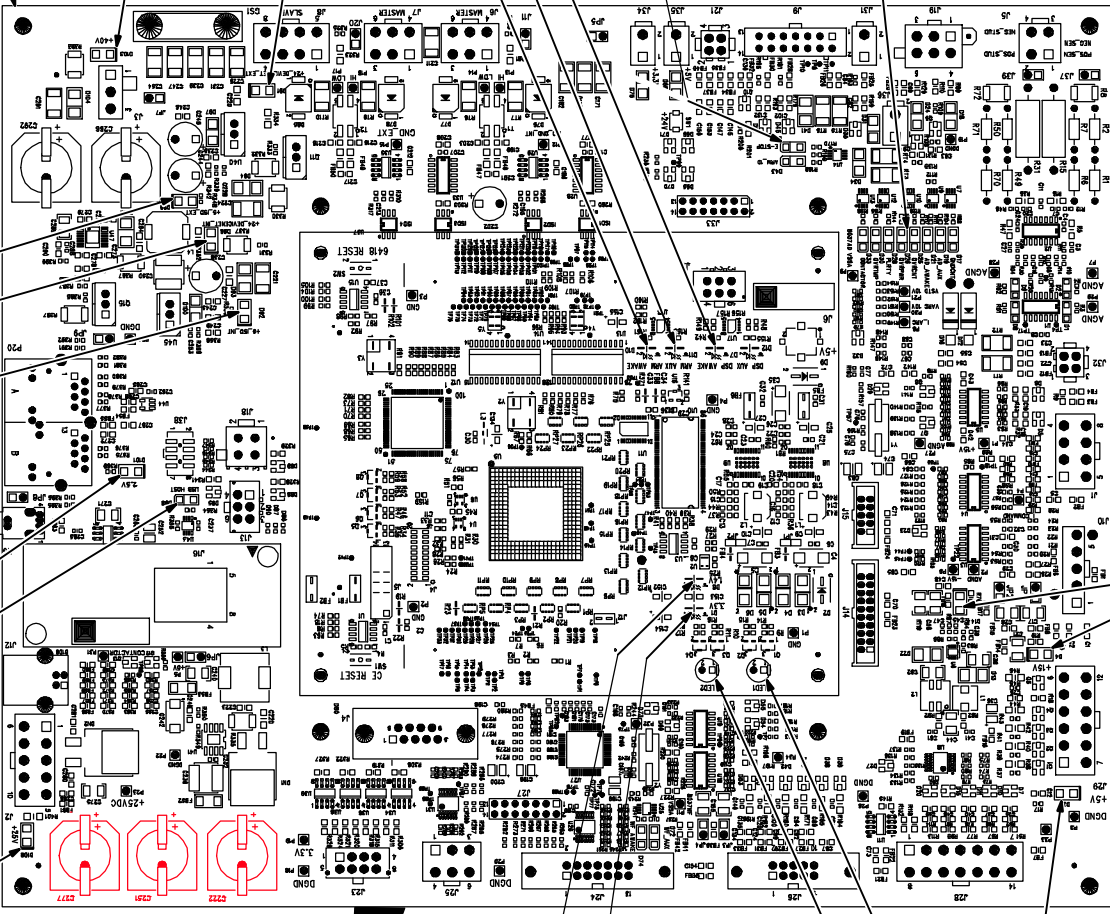
LED2

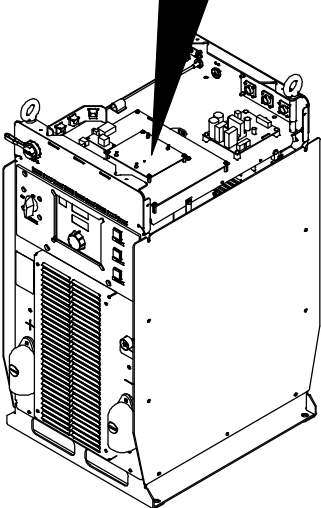
LED1

D3

D14

D4





1 E Module Board Stack

Diagnostic LEDs are visible inside unit, located on the E Module Board Stack.

Refer to Section 12-4 for information on diagnostic LEDs.

Reinstall cover after checking diagnostic LEDs.

250 237-A / 250 294-B

OM-251 440 Page 80

12-4. Diagnostic LEDs On E Module Board Stack

A. DeviceNet Communication LEDs

D7, D10, D11, D19, and D21 are off until communication is established. Once communication is established D7, D10, D11, and D19 flash on and off, and D21 turns on steady. If any of these LEDs are off, there is a problem. Contact the nearest factory Authorized Service Agent.

LED	Function	Status	Diagnosis
LED1	— —	— —	See Section 12-11.
		— —	
LED2	— —	— —	
		— —	
D7	DSP AWAKE	Flashing	Indicates DSP communicating
		Off	Indicates DSP not communicating
D10	ARM AWAKE	Flashing	Indicates ARM communicating
		Off	Indicates ARM not communicating
D11	ARM AUX	Flashing	Indicates auxiliary in use
		Off	Indicates auxiliary not in use
D19	AD AUX	Flashing	Indicates normal operation
		Off	Indicates problem with AD micro
D21	AD AWAKE	On	Indicates normal operation
		Off	Indicates problem with AD micro

B. DeviceNet Power Supply LEDs

D91	On	(Auto Units Only – DeviceNet ext) Indicates +24 VDC is present from external DeviceNet connection
	Off	(Auto Units Only – DeviceNet ext) Indicates +24 VDC is off from external DeviceNet connection
D92	On	Indicates +5 VDC for ISO-Int is present
	Off	Indicates +5 VDC for ISO-Int is not present
D96	On	Indicates +24 VDC DeviceNet is present
	Off	Indicates +24 VDC DeviceNet is not present
D99	On	(Auto Units Only – ISO ext) Indicates +5 VDC is present from external DeviceNet connection
	Off	(Auto Units Only – ISO ext) Indicates +5 VDC is not present from external DeviceNet connection
D103	On	Indicates +40 VDC is present
	Off	Indicates +40 VDC is not present

C. General Purpose LEDs

D17	On	Gnd Cnt – Indicates ground error. Contact nearest factory Authorized Service Agent.
	Off	Indicates no error
D25	On	OVR CNT – Indicates an error. Contact nearest factory Authorized Service Agent.
	Off	Indicates no error
D26	On	OVR PWR – Indicates unit is operating at max input current. Contact nearest factory Authorized Service Agent.
	Off	Indicates no error
D28	— —	Future use
	— —	
D30	On	OVR TMP – Indicates unit is overheated. Turn unit off and allow to cool. If error continues, contact nearest factory Authorized Service Agent.
	Off	Indicates no error
D33	On	Contactor – Indicates unit is receiving a contactor On signal
	Off	Indicates contactor on signal is not being received. Check input connections.
D43	On	ARM/O – Indicates +10 VDC is present, should flash at same rate as ARM AWAKE
	Off	Indicates +10 VDC is not present
D44	On	E-Stop – Indicates E-Stop is not present
	Off	Indicates E-Stop has been engaged, check external sources
D98	On	USB Host on – Indicates this function is operating properly
	Off	Indicates USB error. Cycle unit power, if error is still present contact nearest factory Authorized Service Agent
D101	On	Indicates +2.5 VDC is present
	Off	Indicates +2.5 VDC is not present
D108	On	Indicates +25 VDC is present
	Off	Indicates +25 VDC is not present

12-5. Wire Feed Module PC6 Diagnostic LEDs And Dip Switch Settings

1 Wire Feed Module PC6

Diagnostic LEDs are visible inside unit, located on PC6 mounted on the top tray assembly.

Refer to Section 12-6 for information on diagnostic LEDs.

Reinstall top cover after checking diagnostic LEDs.

2 Dip Switch S1

Dip switches are used to identify each circuit board on the internal network. Dip switch settings are different for each circuit board. For proper operation, do not change dip settings from those shown.

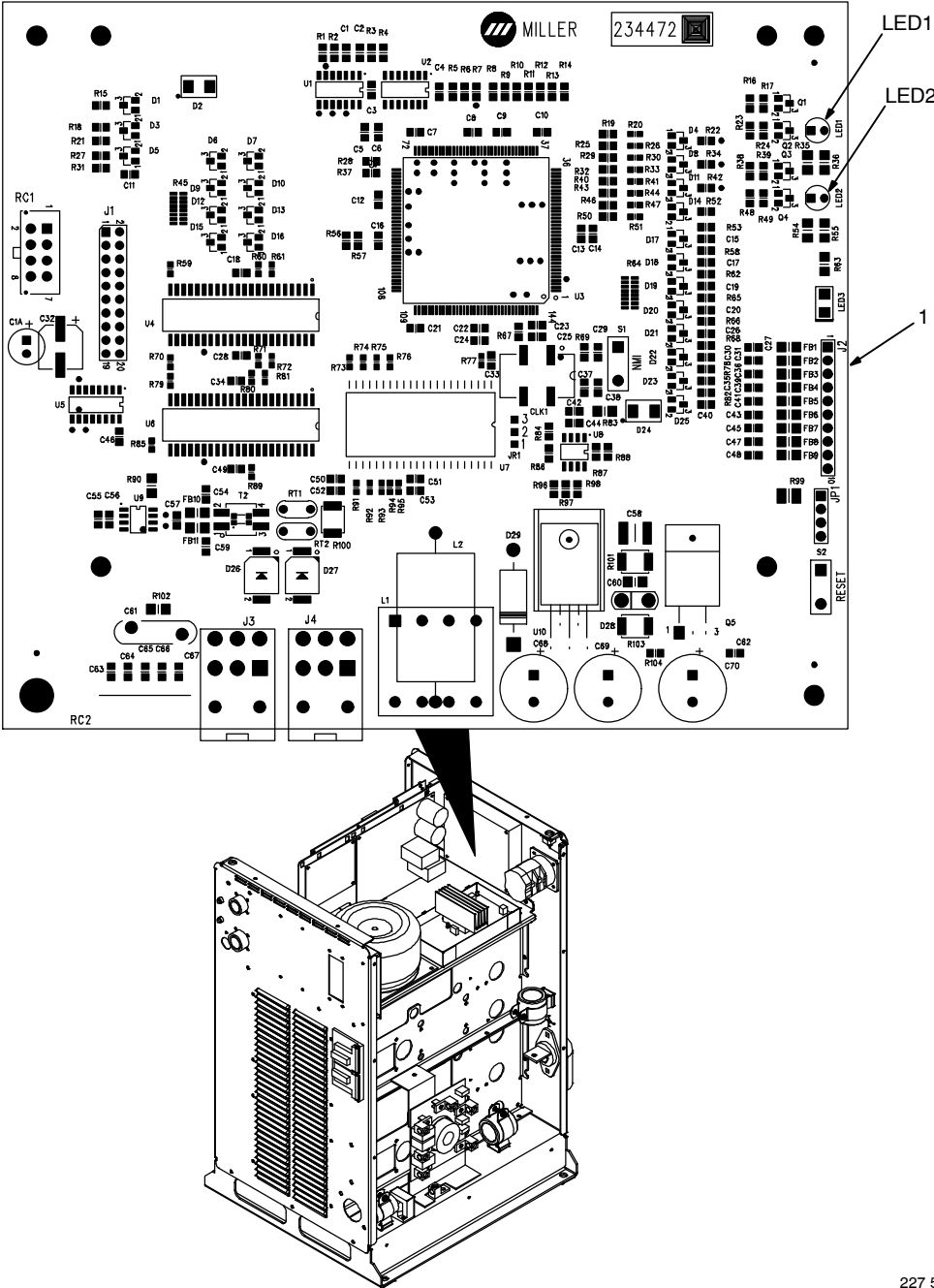
249 748-A / 803 853-A

12-6. Diagnostic LEDs On Wire Feed Module PC6

LED	Status	Diagnosis
1	On	Indicates +15 volts DC is present on wire feed module PC6
	Off	Indicates +15 volts DC is not present on wire feed module PC6
2	On	Indicates +5 volts DC is present on wire feed module PC6
	Off	Indicates +5 volts DC is not present on wire feed module PC6
3,4	On	See Network Status Table in Section 12-11
	Off	See Network Status Table in Section 12-11

12-7. User Interface Module PC7 Diagnostic LEDs





227 542-C / 803 853-A

1 User Interface Module PC7
Diagnostic LEDs are visible inside unit,
located on PC7 mounted behind the front
panel.

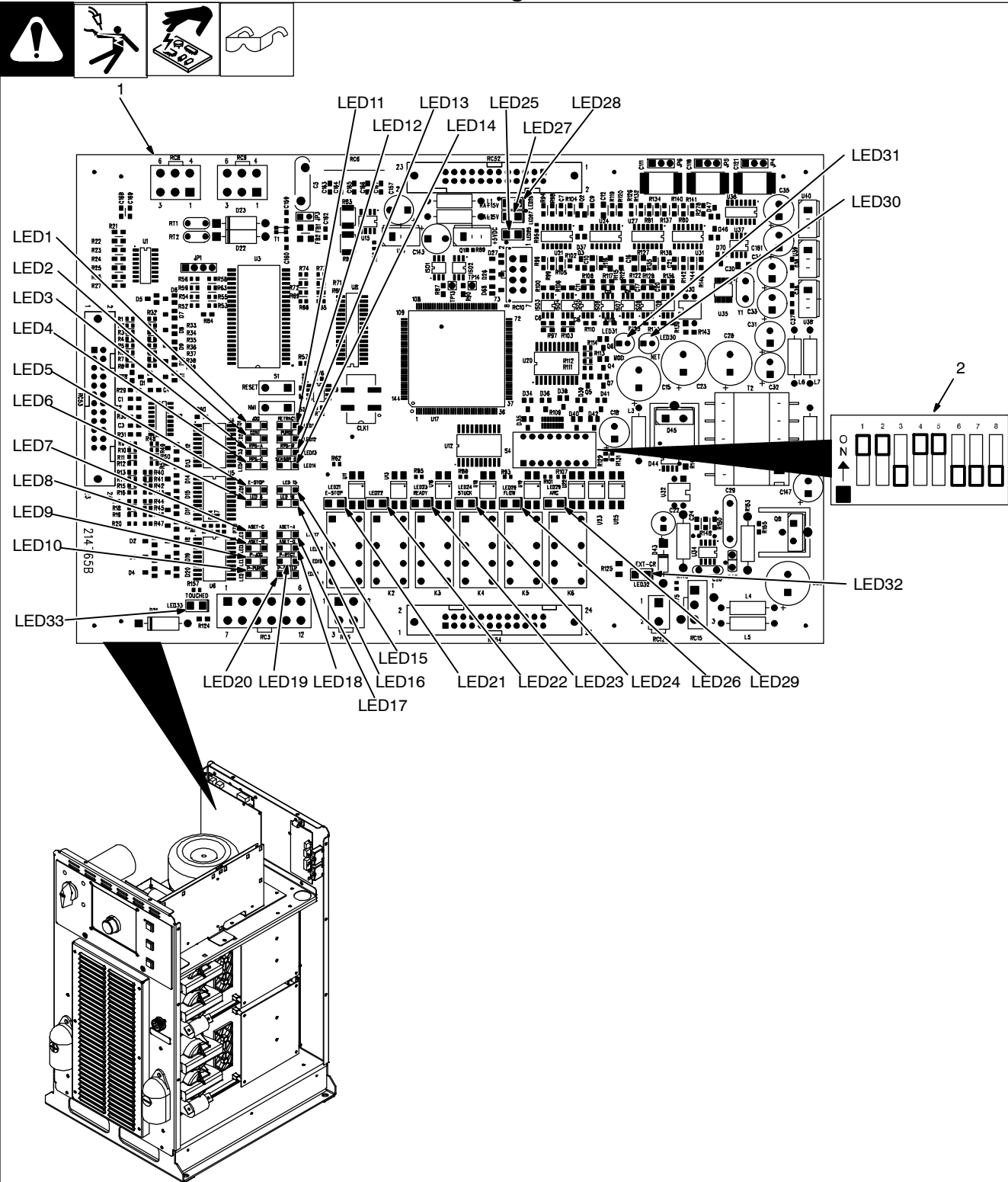
Refer to Section 12-8 for information on
diagnostic LEDs.

Reinstall cover after checking diagnostic
LEDs.

12-8. Diagnostic LEDs On User Interface Module PC7

LED	Status	Diagnosis
1, 2	On	See Network Status Table in Section 12-11
	Off	See Network Status Table in Section 12-11

12-9. Automation Interface Module PC9 Diagnostic LEDs



1 Automation Interface Module PC9
Diagnostic LEDs are visible inside unit,
located on PC9 mounted on left side.
Refer to Section 12-8 for information on
diagnostic LEDs.

Reinstall cover after checking diagnostic
LEDs.

2 Dip Switch S4

Dip switches are used to identify each
circuit board on the internal network. Dip
switch settings are different for each circuit
board. For proper operation, do not change
dip settings from those shown.

249 749-A / Ref. 249 744-A

12-10. Diagnostic LEDs On Automation Interface Module PC9

LED	Status	Diagnosis
1	On	Input signal On from robot for jog advance
	Off	Input signal Off from robot for no jog advance
2	On	Input signal On from robot to energize contactor
	Off	Input signal Off from robot to not energize contactor
3	On	Input signal On remote program A selected
	Off	Input signal Off remote program A not selected
4	On	Input signal On remote program C selected
	Off	Input signal Off remote program C not selected
5	On	Input signal On from E-stop board PC12 for no emergency stop
	Off	Input signal Off from E-stop board PC12 acknowledges E-stop is On from robot
6	On	Spare 1 not assigned
	Off	Spare 1 not assigned
7	On	Input signal On Autoset-C selected
	Off	Input signal Off Autoset-C not selected
8	On	Input signal On Autoset-B selected
	Off	Input signal Off Autoset-B not selected
9	On	Input signal On Remote Jog on from peripheral plug
	Off	Input signal Off Remote Jog off from peripheral plug
10	On	Input signal On Remote Purge on from peripheral plug
	Off	Input signal Off Remote Purge off from peripheral plug
11	On	Input signal On from robot for jog retract
	Off	Input signal Off from robot for no jog retract
12	On	Input signal On from robot for purge
	Off	Input signal Off from robot for no purge
13	On	Input signal On remote program B selected
	Off	Input signal Off remote program B not selected
14	On	Input signal On Touch Sensor on from robot or peripheral plug
	Off	Input signal Off Touch Sensor off from robot or peripheral plug
15	On	Spare 0 not assigned
	Off	Spare 0 not assigned
16	On	Spare 2 not assigned
	Off	Spare 2 not assigned
17	On	Input signal On Autoset-A selected
	Off	Input signal Off Autoset-A not selected
18	On	Input signal On Autoset-D selected
	Off	Input signal Off Autoset-D not selected
19	On	Input signal On Remote Retract on from peripheral plug
	Off	Input signal Off Remote Retract off from peripheral plug
20	On	Input signal On Remote Water Flow on from peripheral plug
	Off	Input signal Off Remote Water Flow off from peripheral plug
21	On	Input signal On from robot for no emergency stop
	Off	Input signal Off from robot for emergency stop
23	On	Input signal On from relay K3 for welding power source ready and no detected errors present
	Off	Input signal Off from relay K3 for welding power source not ready, detected errors are present, or unit is in operating mode preventing the weld ready signal from being enabled

LED	Status	Diagnosis
24	On	Input signal On from relay K4 to indicated wire stuck in weld joint
	Off	Input signal Off from relay K4 to indicate wire is not stuck in weld joint
25	On	Indicates +5 volts DC is present on automation module PC9
	Off	Indicates +5 volts DC is not present on automation module PC9
26	On	Input signal on from relay K5 for flow (shielding gas or coolant) present
	Off	Input signal off from relay K5 for flow (shielding gas or coolant) not present
27	On	Indicates –15 volts DC is present on automation interface module PC9
	Off	Indicates –15 volts DC is not present on automation interface module PC9
28	On	Indicates +15 volts DC is present on automation interface module PC9
	Off	Indicates +15 volts DC is not present on automation interface module PC9
29	On	Input signal on from relay K6 for arc detected
	Off	Input signal off from relay K6 for no arc detected
30, 31	On	See Network Status Table in Section 12-11
	Off	See Network Status Table in Section 12-11
32	On	Input signal on for aux. relay energized
	Off	Input signal off for aux. relay energized
33	On	Input signal on touch sensor touch detected
	Off	Input signal off touch sensor touch not detected

12-11. Network And Module Status LEDs

A. Network Status LED

LED2 on the E Module board stack

Status	Diagnosis
Off	The board stack is not on-line with the network or there is no power applied to the board stack.
Green	The board stack is operating normally and the on-line connection is made with the network.
Flashing Green	The board stack is waiting for an on-line connection to be made with the network.
Red	The board stack has encountered a communication link failure with the network. Check DeviceNet cable connections. Replace board stack if necessary.

B. Module Status LED

LED1 on the E Module board stack

Status	Diagnosis
Off	There is no power applied to the board stack or the board stack software is not executing its functions.
Green	The board stack is operating normally.
Flashing Red	The board stack has encountered a recoverable fault. Wait or cycle power to clear fault.
Red	The board stack has encountered an unrecoverable fault.

12-12. Troubleshooting

					
Trouble		Remedy			
No weld output; completely inoperative		Place line disconnect in On position (see Section 7-9).			
		Check and replace line fuse(s), if necessary, or reset circuit breaker (see Section 7-9).			
		Check for proper input power connections (see Section 7-9).			
No weld output; meter display on with no error displayed.		Check to see if the contactor indicator light is lit when contactor line is asserted on.			
Erratic or improper weld output with no errors displayed.		Use proper size and type of weld cable (see Section 8-2).			
		Check that proper program for wire size, process, and shielding gas is loaded.			
		Clean and tighten all weld connections.			
No 115 volts AC at the duplex receptacle.		Reset supplementary protector CB1 (see Section 7-5).			
Wire does not feed.		Check supplementary protector CB2 and reset if necessary (see Section 7-5).			
		Check motor control cable connections.			
Wire feeds erratically.		Readjust hub tension.			
		Readjust drive roll pressure.			
		Clean or replace dirty or worn drive rolls.			
		Remove weld spatter around the nozzle opening.			
		Replace contact tip or liner. See gun Owner's Manual.			
		Check motor control cable connections.			
Wire feeds as soon as power is supplied.		Check gun trigger. See gun Owner's Manual.			
Wire stubbing on low end using a constant current power source.		Increase output setting of the power source.			
		Check voltage sense lead connection, clean and tighten if necessary.			
Gas does not flow or does not stop flowing; wire feeds.		Check gas valve and flow meter.			
Wire burns back to gun contact tip when using electrode negative (straight polarity) process.		Check to be sure that volt sense lead is connected to the work.			

12-13. Check Web Message Display

When an existing Auto-Axcess power source is upgraded to an Auto-Axcess E, the first time the unit is powered up the message CHCK WEB will appear on the display (see Figure 12- 1).

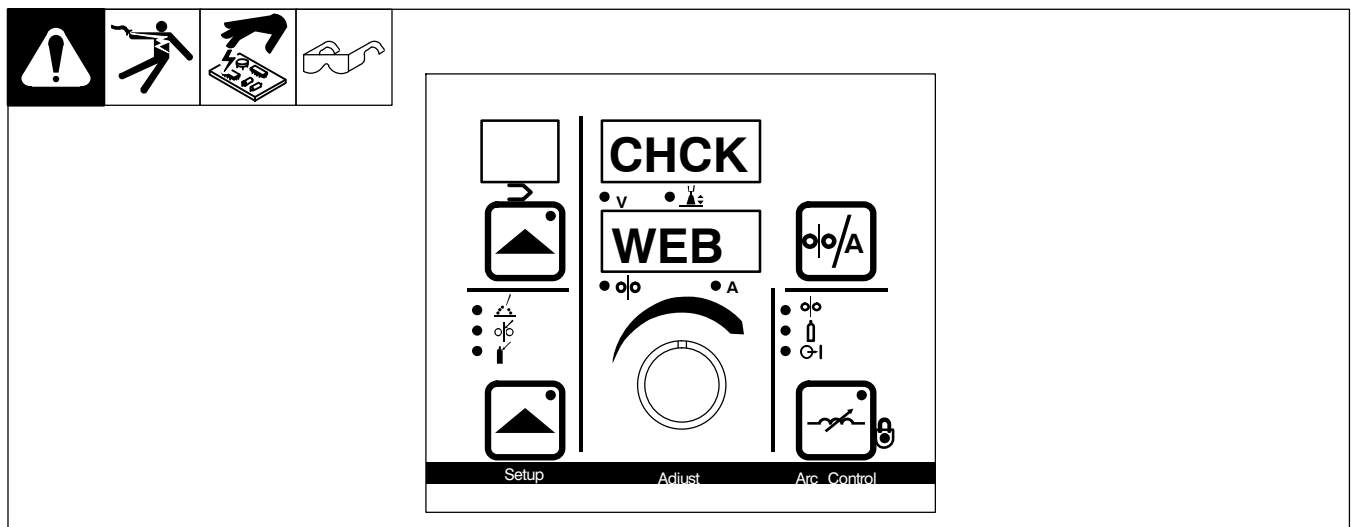


Figure 12- 1. Welding Power Source Display On First Power Up After Upgrade

Certain information must be entered on the web pages for the unit to function properly. The user will be prompted for power source serial number, model and type (Semi-Auto, AROI, AUTO, etc.) as shown in Figure 12- 2.


The Power of Blue

Serial #

LC 123456

Asset #

None

Deployment Date

8/31/2009 0:00:00

Location

None

Name

Access E 450



Information

IMPORTANT!

The Access power source you have upgraded to an Access E needs the following information entered before you can use it!

Access Upgrade Information

Access Serial Number

Format: AB 123456 U

LC

123456

U

Upgrade Module Serial Number

Format: AB 123456 U

MA

123456

U

Access Amperage Rating

Access 450

Power Source Type

Semi-Automatic (Access)

Save Access Information

Information

IMPORTANT!

The Access power source you have upgraded to an Access E needs the following information entered before you can use it!

Access Upgrade Information

Access Serial Number

Format: AB 123456 U

LJ

330470

U

Upgrade Module Serial Number

Format: AB 123456 U

MA

123456

U

Access Amperage Rating

Access 450

Power Source Type

Semi-Automatic (A

Save Access Information

UPGRADE INFORMATION

Please select the power source amperage range, power source type, and serial number from the Access power source that is being upgraded to an Access E.

Figure 12- 2. Web Site For Auto-Axcess E Information

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12-14. Software Error Message Display

1. During the initial power up sequence, the ARM checks the UIM, WFCM and RIO for software numbers or revisions and compares them to what is stored to see if they are compatible. If these software versions are not compatible, the ERR S W will appear on the display (see Figure 12- 3). Compatible software can be downloaded from www.MillerWelds.com.

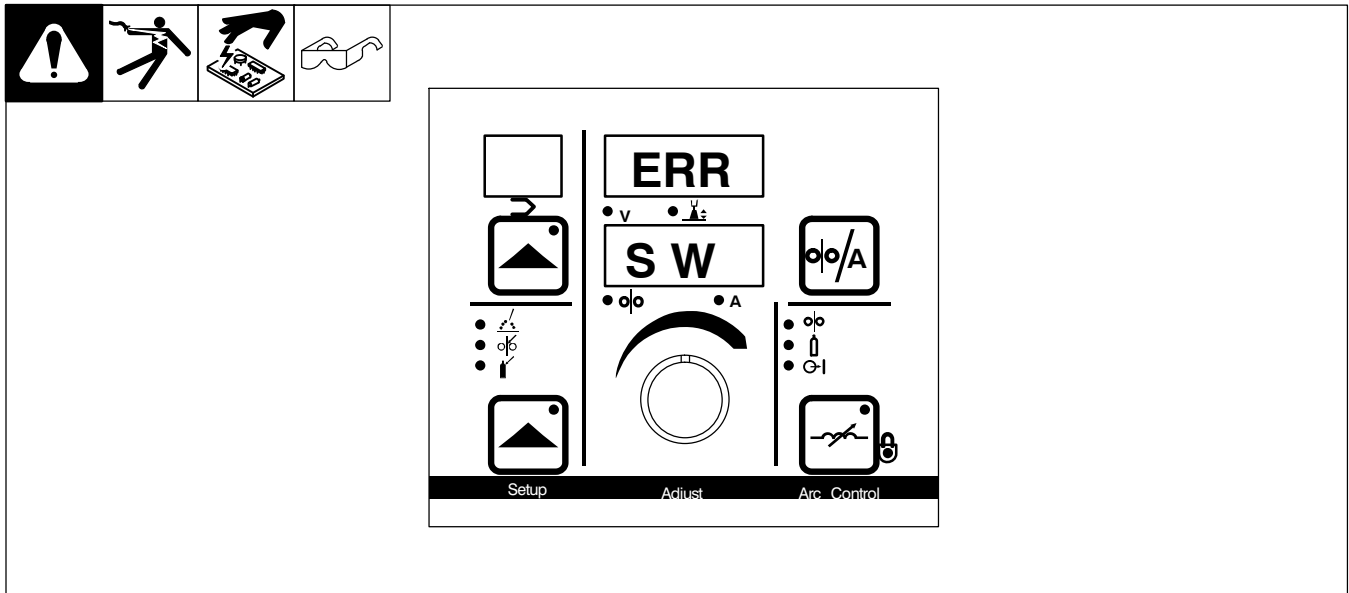


Figure 12- 3. Welding Power Source Display For Software Version Issues

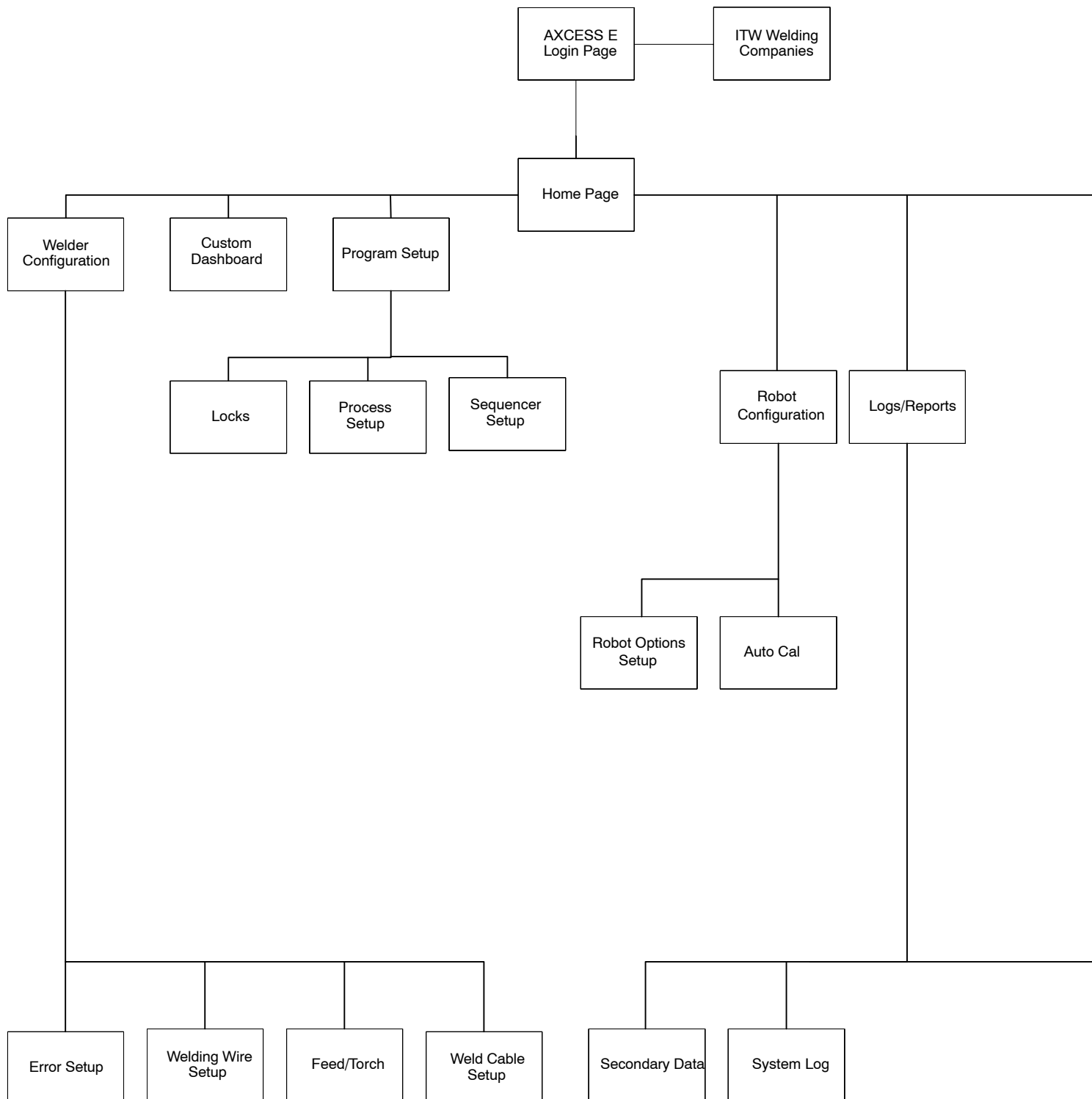
2. After supplying information on the web site and resolving any software issues, the unit as a system should now be operational.

Notes

Trouble

SECTION 13 – WEB PAGES SITE TREE

The Axxess E machine IP address is required to open the web pages. If necessary, have the IT administrator provide this address to allow opening the web pages. Port A on the power source is factory set to 169.254.0.2 as a static IP address. Connect a PC to Port A and enter 169.254.0.2 in the web browser to access the web pages.



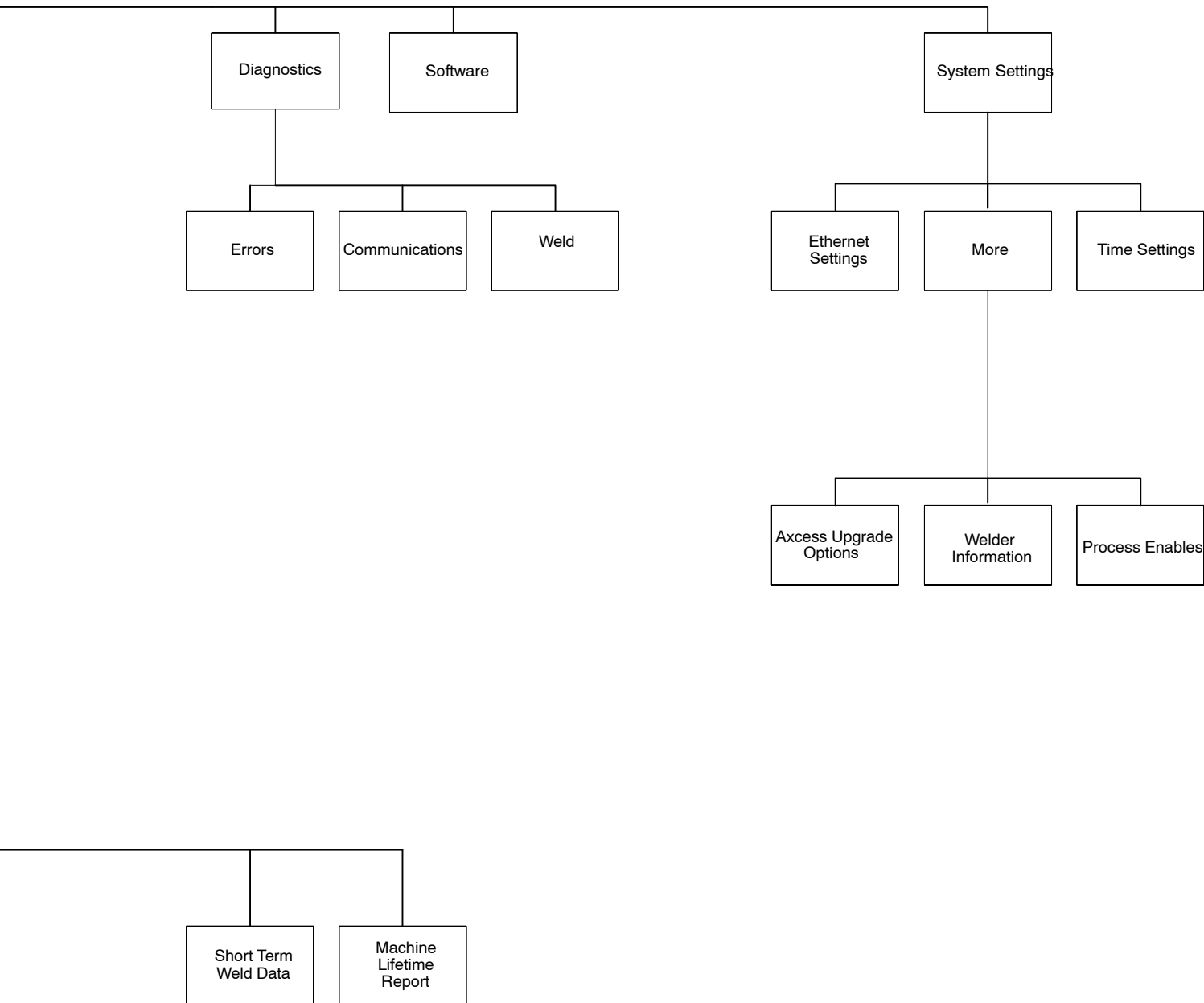
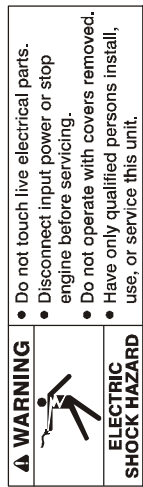


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Circuits



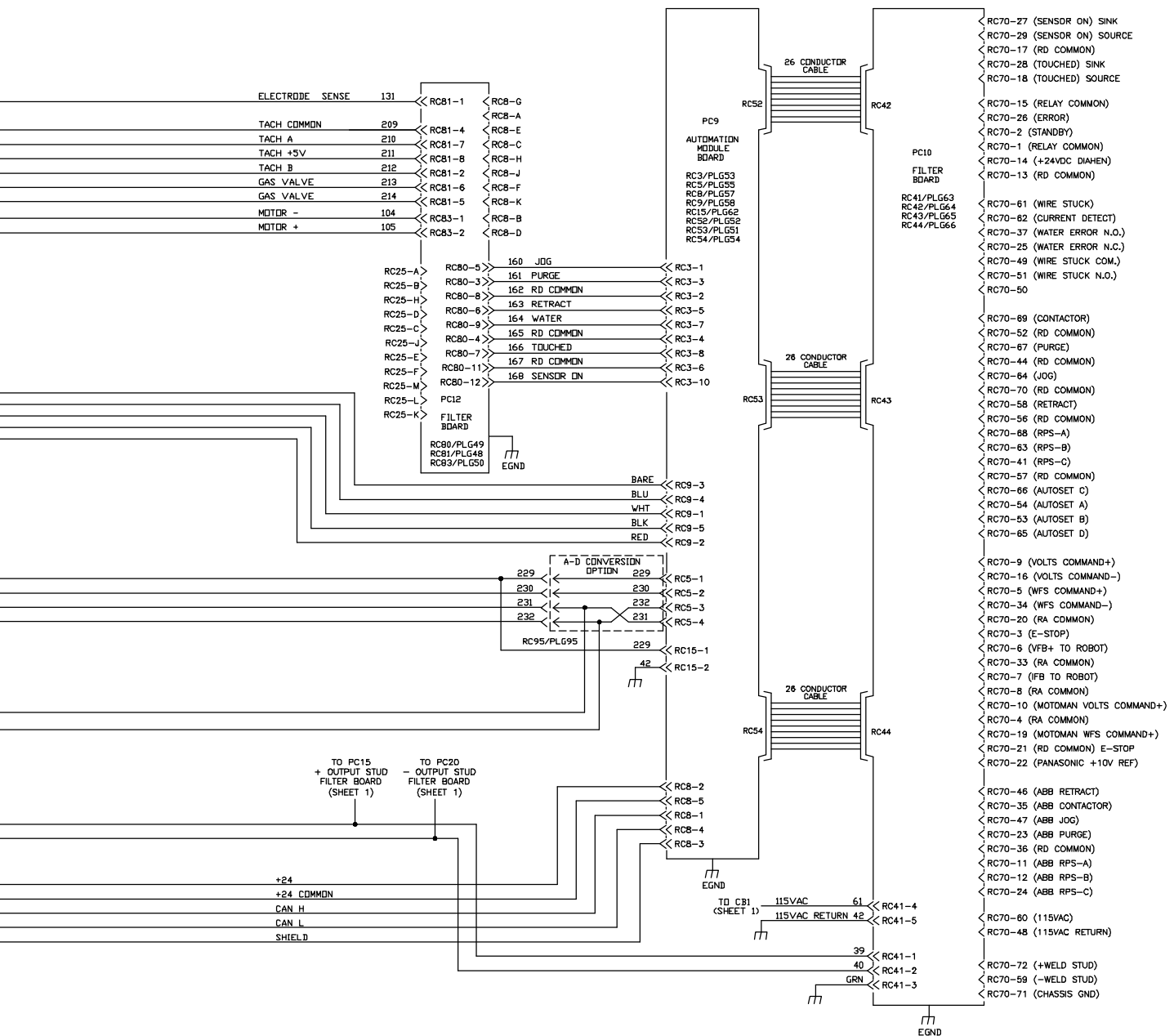
263 492-A (Part 1 Of 3)

⚠ WARNING



ELECTRIC SHOCK HAZARD

- Do not touch live electrical parts.
- Disconnect input power or stop engine before servicing.
- Do not operate with covers removed.
- Have only qualified persons install, use, or service this unit.



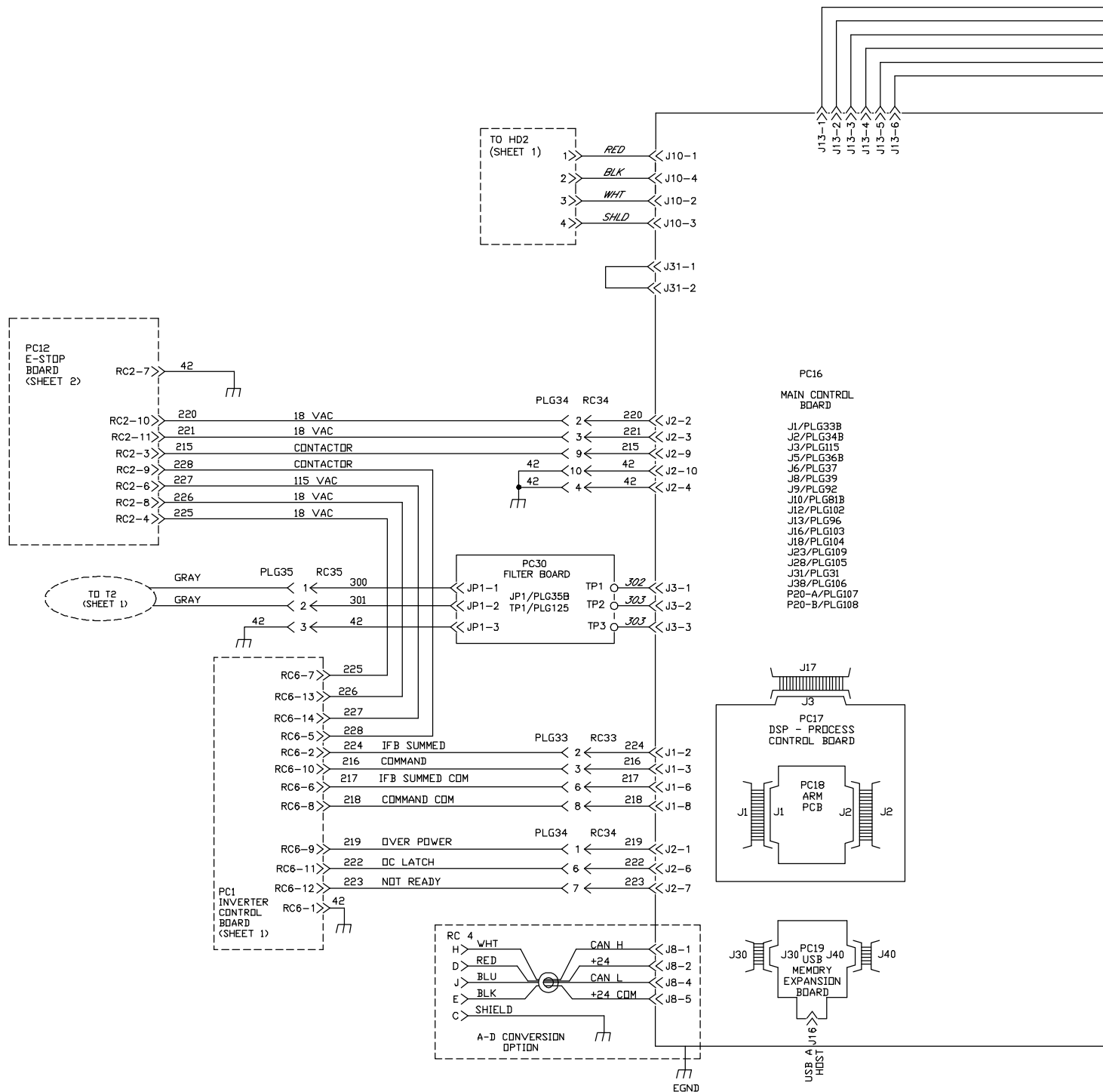


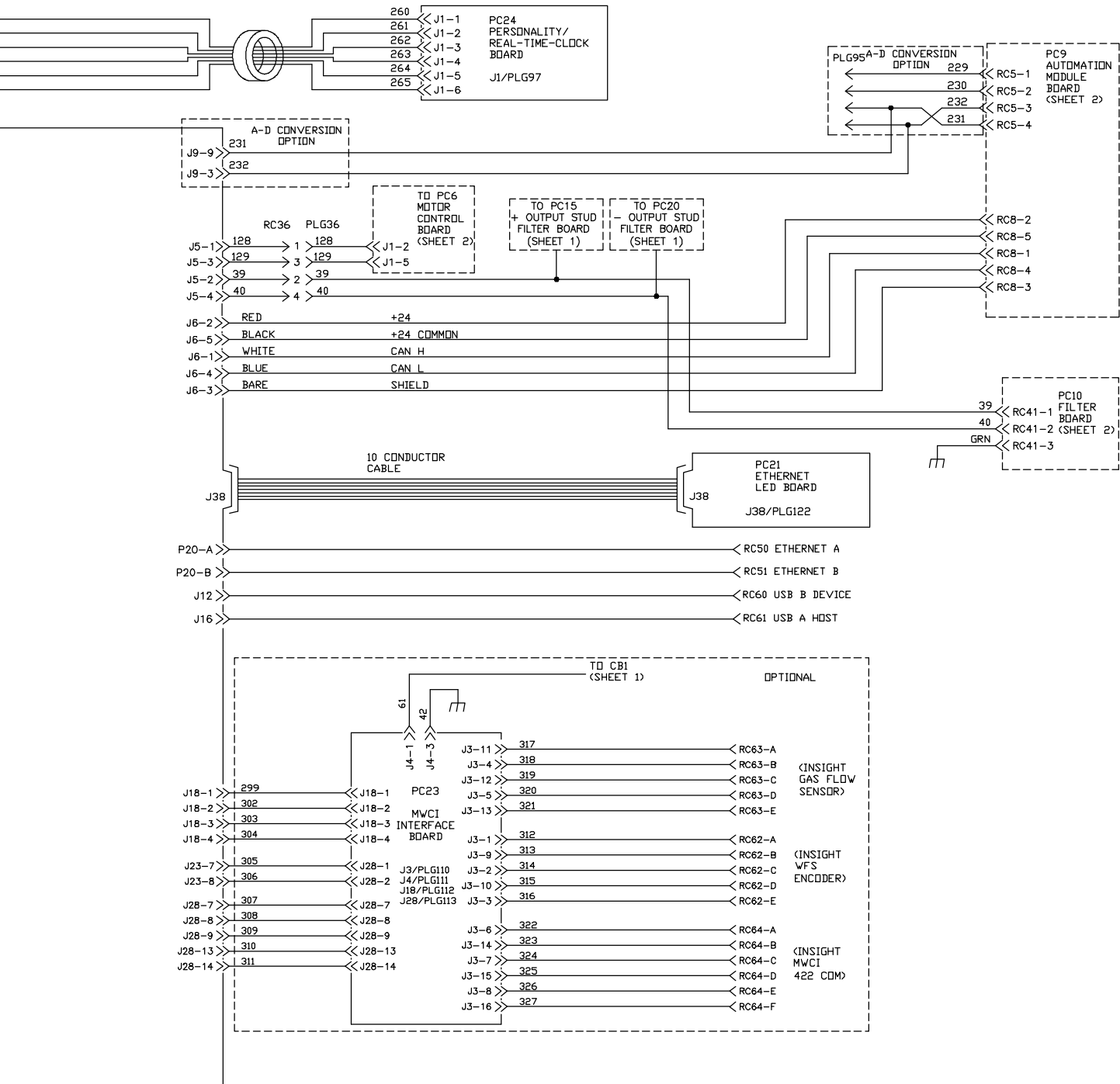
Figure 14-3. Circuit Diagram For Auto-Axcess E 300 Analog Welding Power Source (Part 3 Of 3)

⚠ WARNING



ELECTRIC SHOCK HAZARD

- Do not touch live electrical parts.
- Disconnect input power or stop engine before servicing.
- Do not operate with covers removed.
- Have only qualified persons install, use, or service this unit.

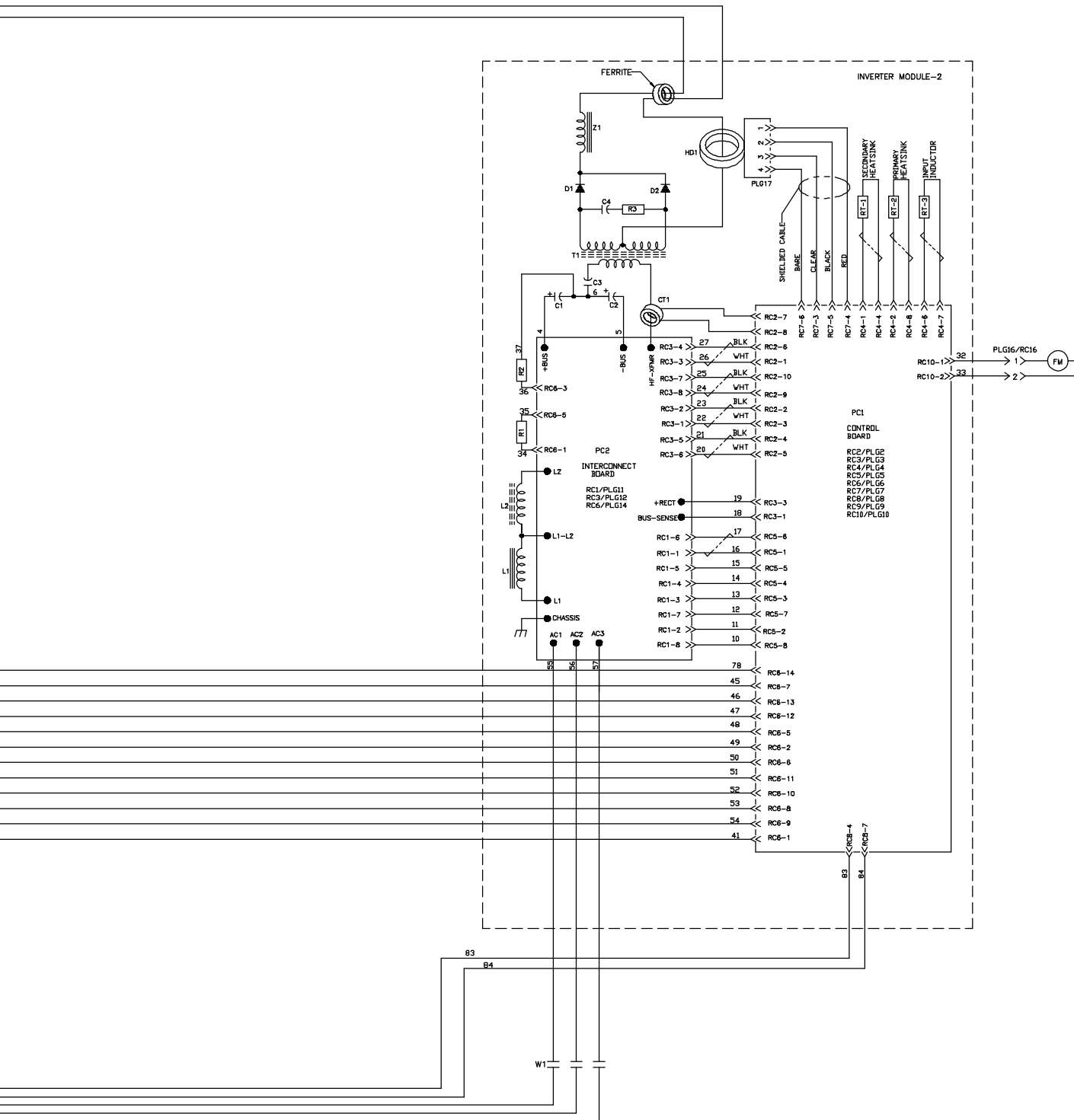


⚠ WARNING



ELECTRIC SHOCK HAZARD

- Do not touch live electrical parts.
- Disconnect input power or stop engine before servicing.
- Do not operate with covers removed.
- Have only qualified persons install, use, or service this unit.



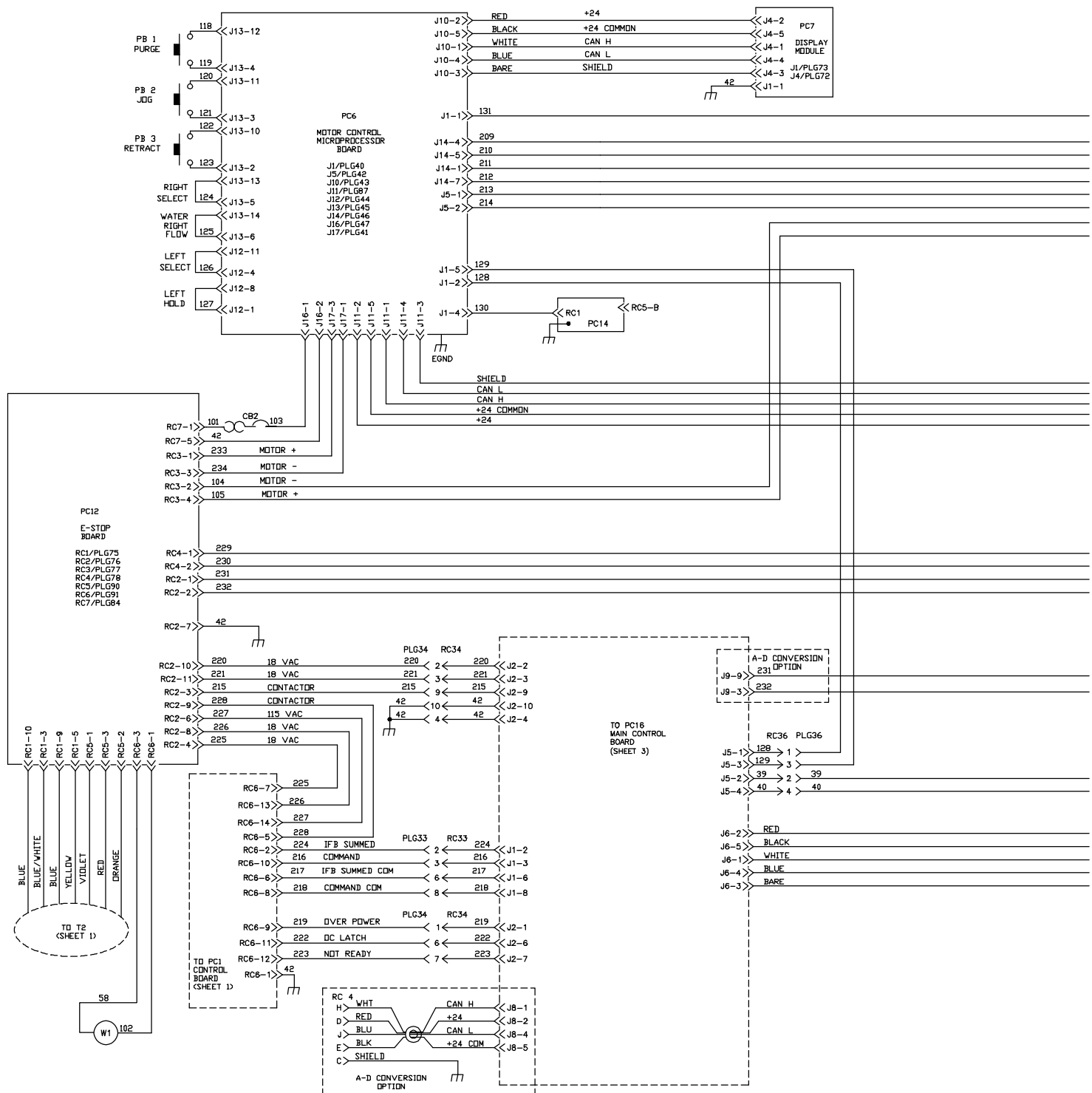
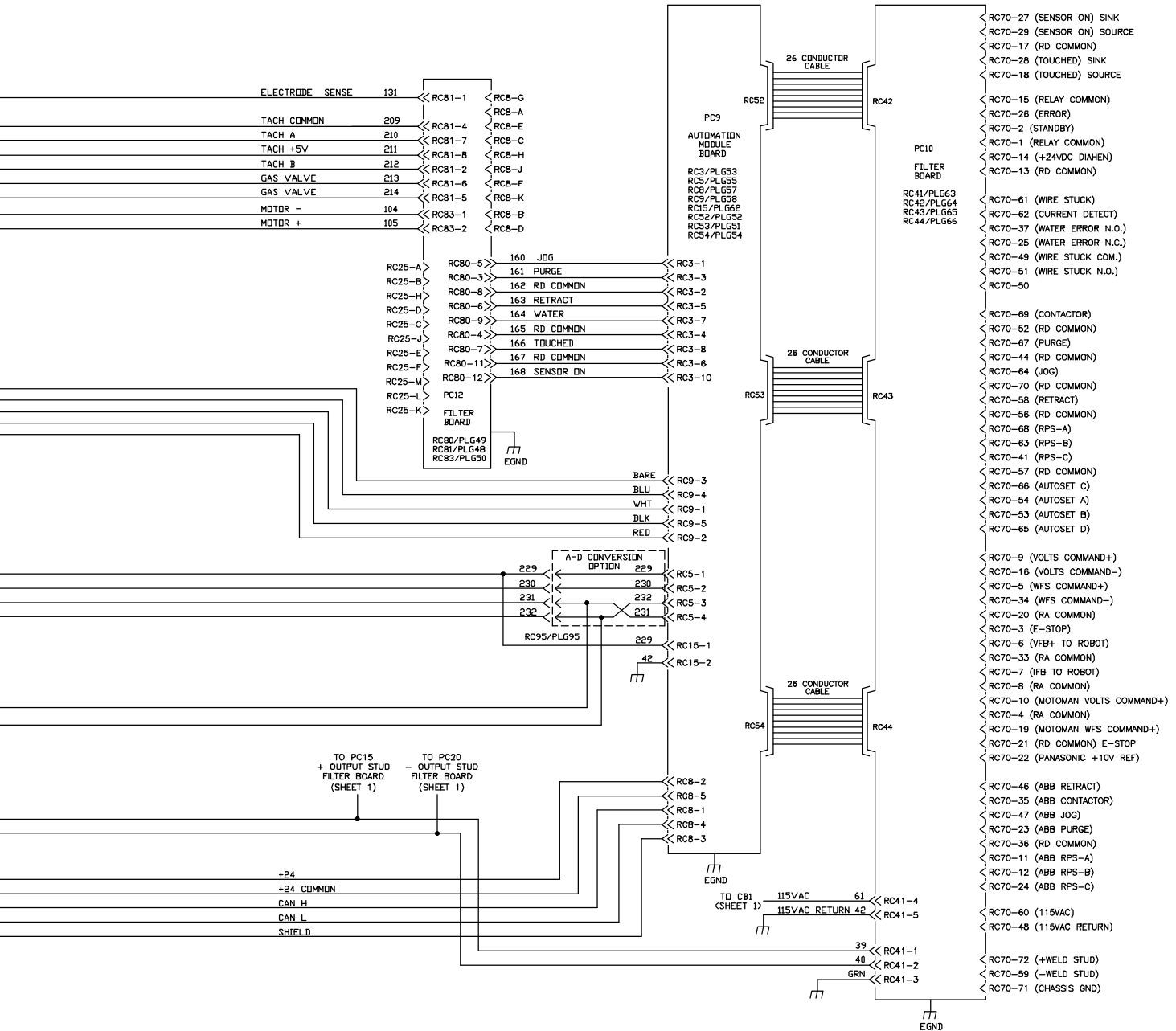


Figure 14-5. Circuit Diagram For Auto-Access E 450 Analog Welding Power Source (Part 2 Of 3)



⚠ WARNING
ELECTRIC SHOCK HAZARD

- Do not touch live electrical parts.
- Disconnect input power or stop engine before servicing.
- Do not operate with covers removed.
- Have only qualified persons install, use, or service this unit.



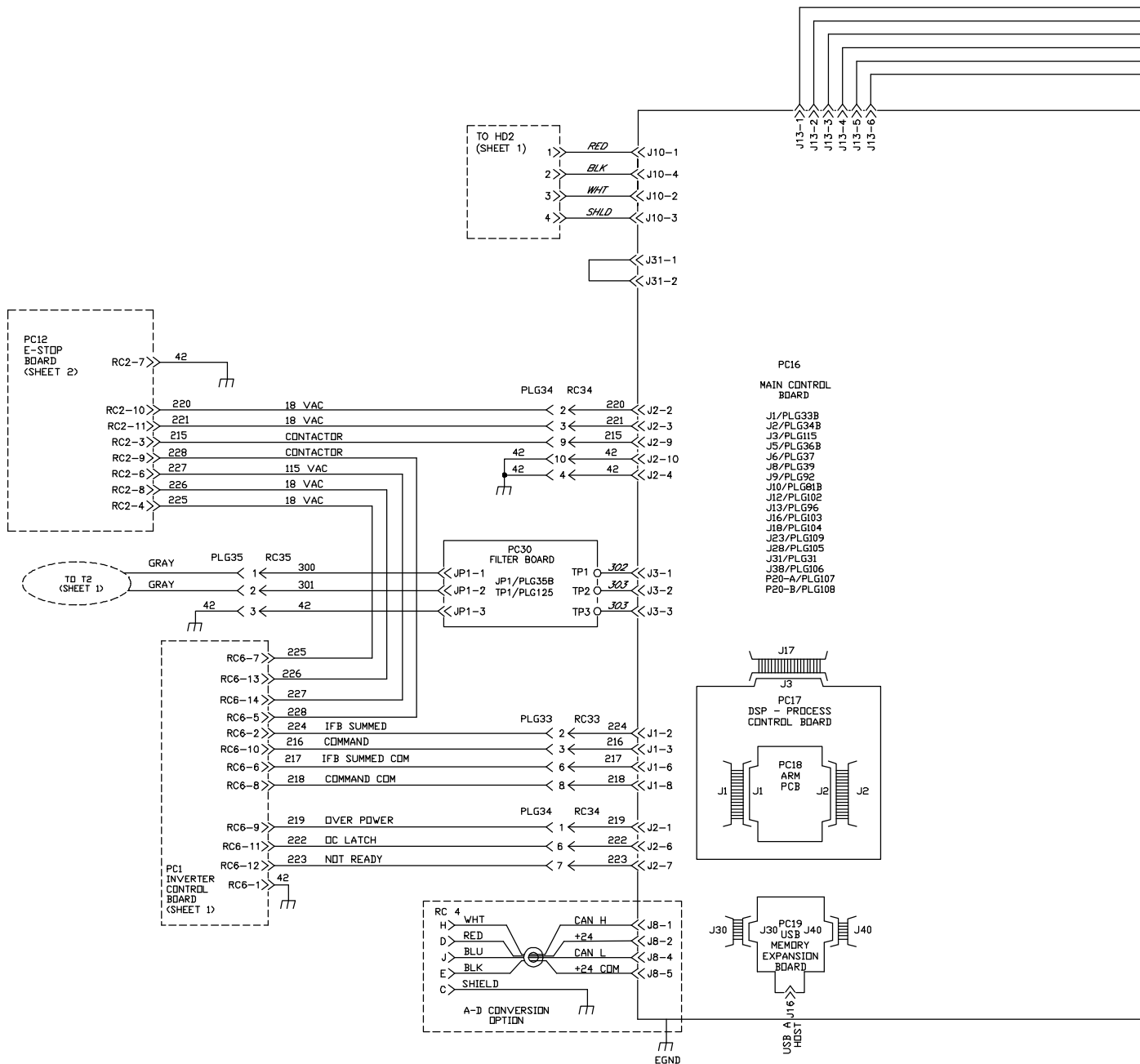


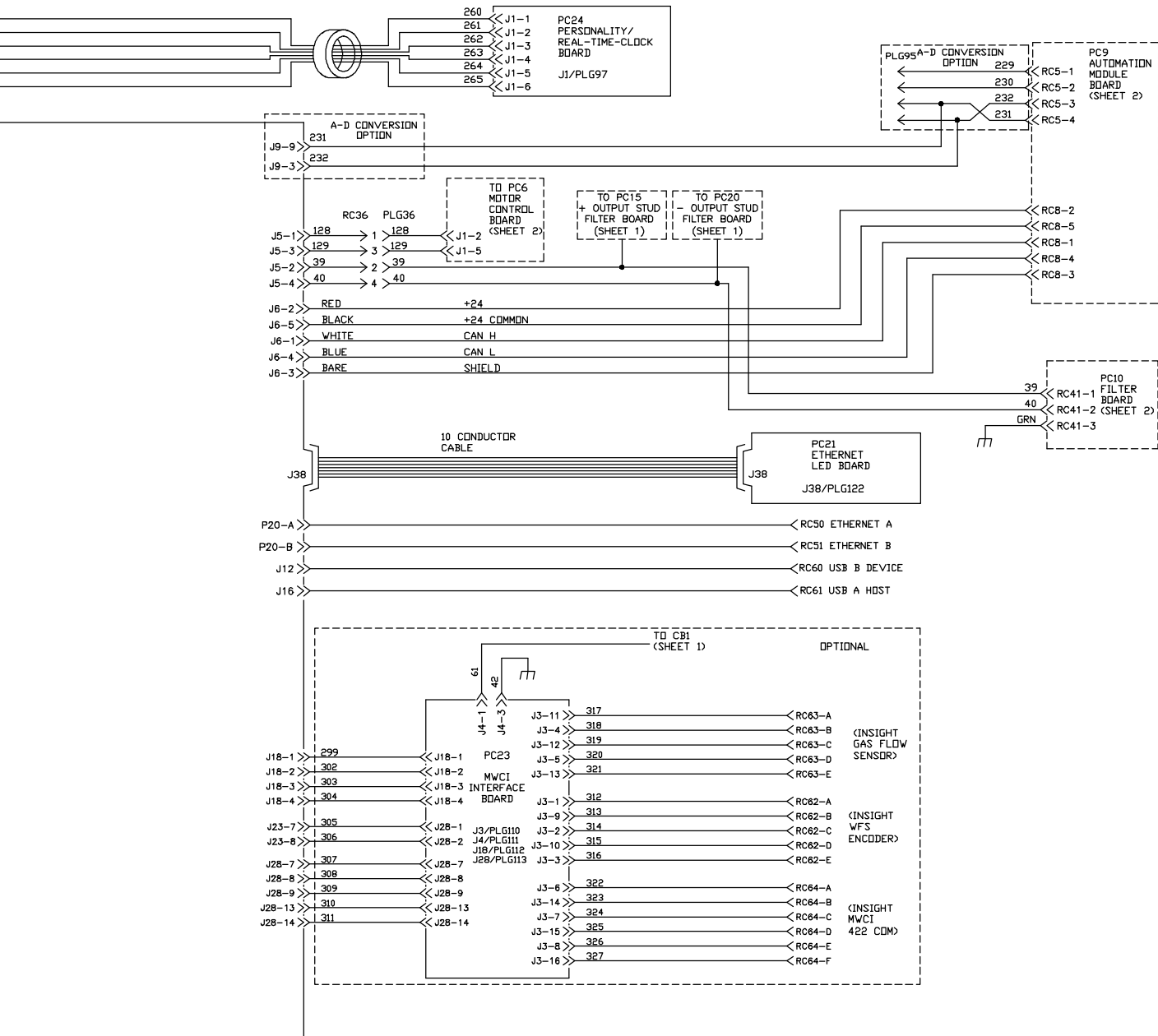
Figure 14-6. Circuit Diagram For Auto-Axcess E 450 Analog Welding Power Source (Part 3 Of 3)

⚠ WARNING



ELECTRIC SHOCK HAZARD

- Do not touch live electrical parts.
- Disconnect input power or stop engine before servicing.
- Do not operate with covers removed.
- Have only qualified persons install, use, or service this unit.



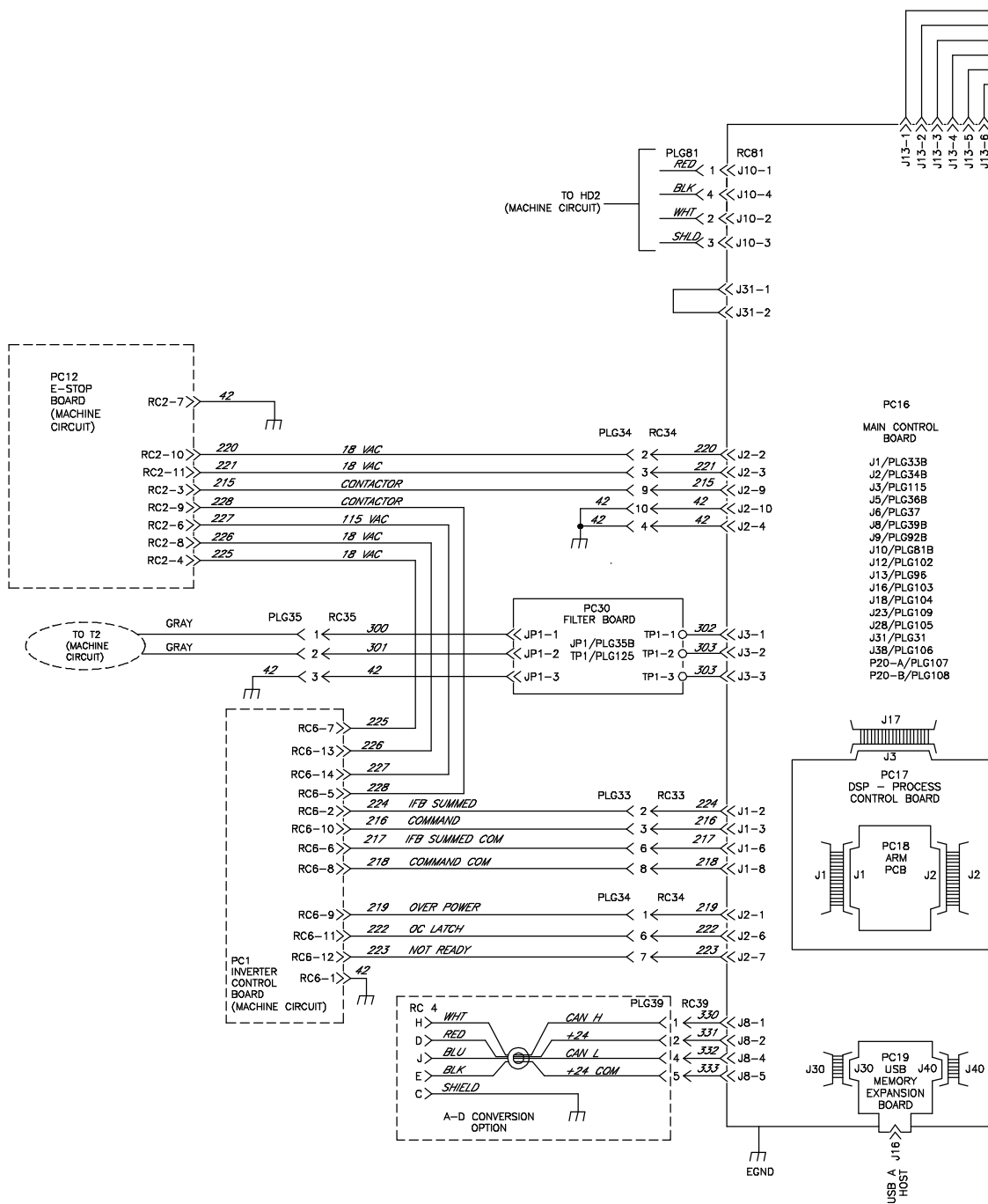
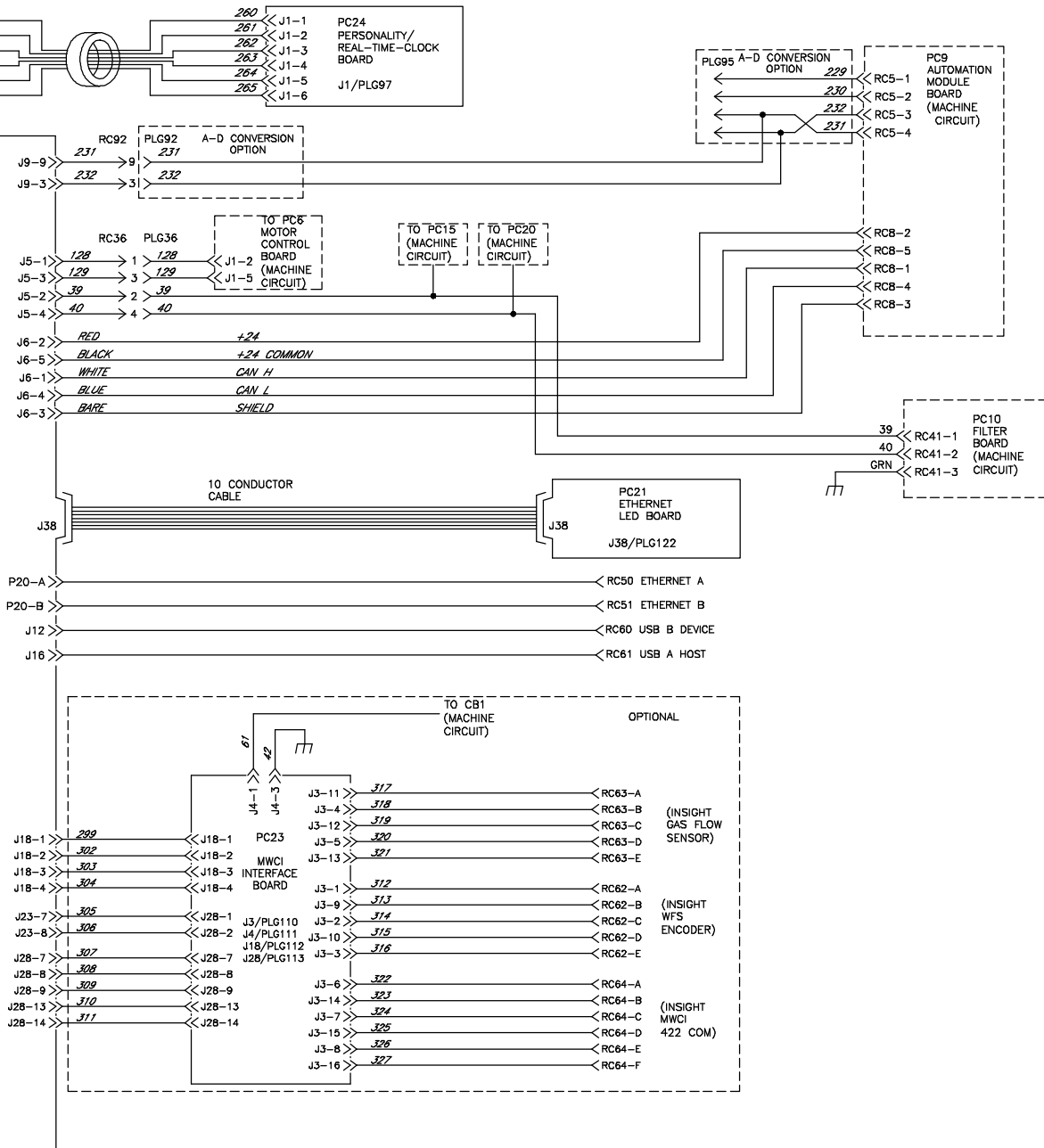


Figure 14-7. Circuit Diagram For Access E Module

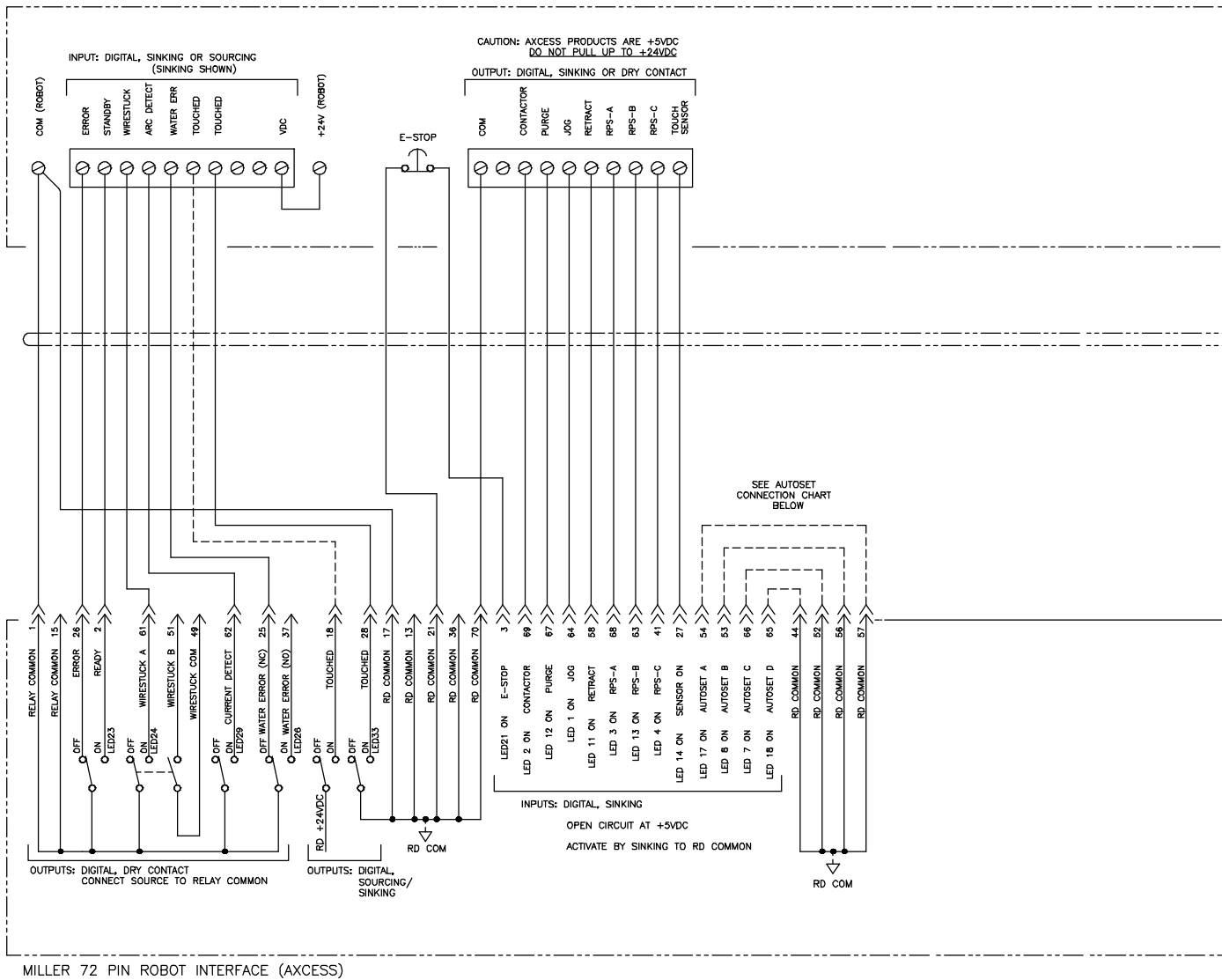


WARNING

- Do not touch live electrical parts.
- Disconnect input power or stop engine before servicing.
- Do not operate with covers removed.
- Have only qualified persons install, use, or service this unit.

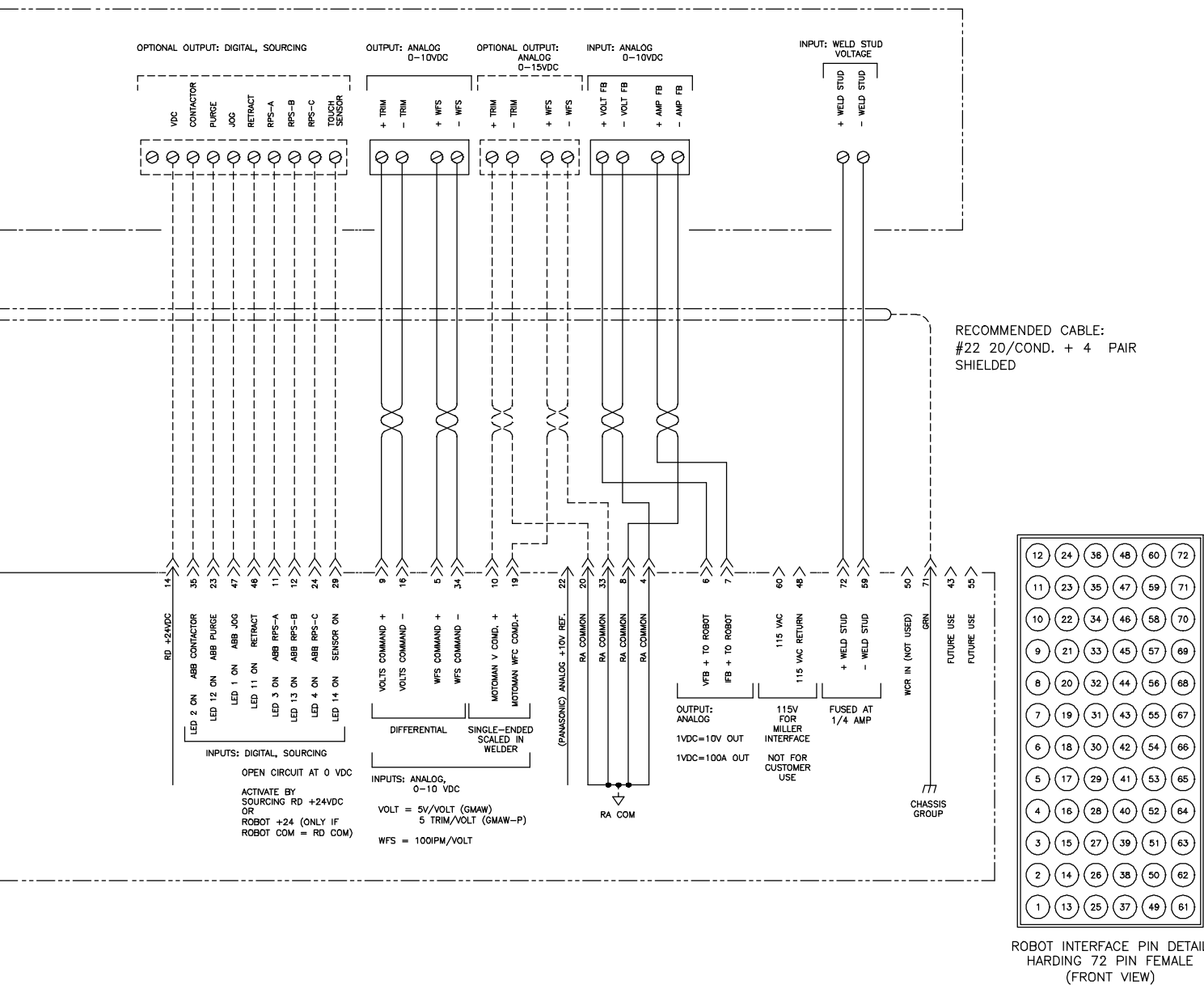


TYPICAL ROBOT CONTROL





- Do not touch live electrical parts.
- Disconnect input power or stop engine before servicing.
- Do not operate with covers removed.
- Have only qualified persons install, use, or service this unit.



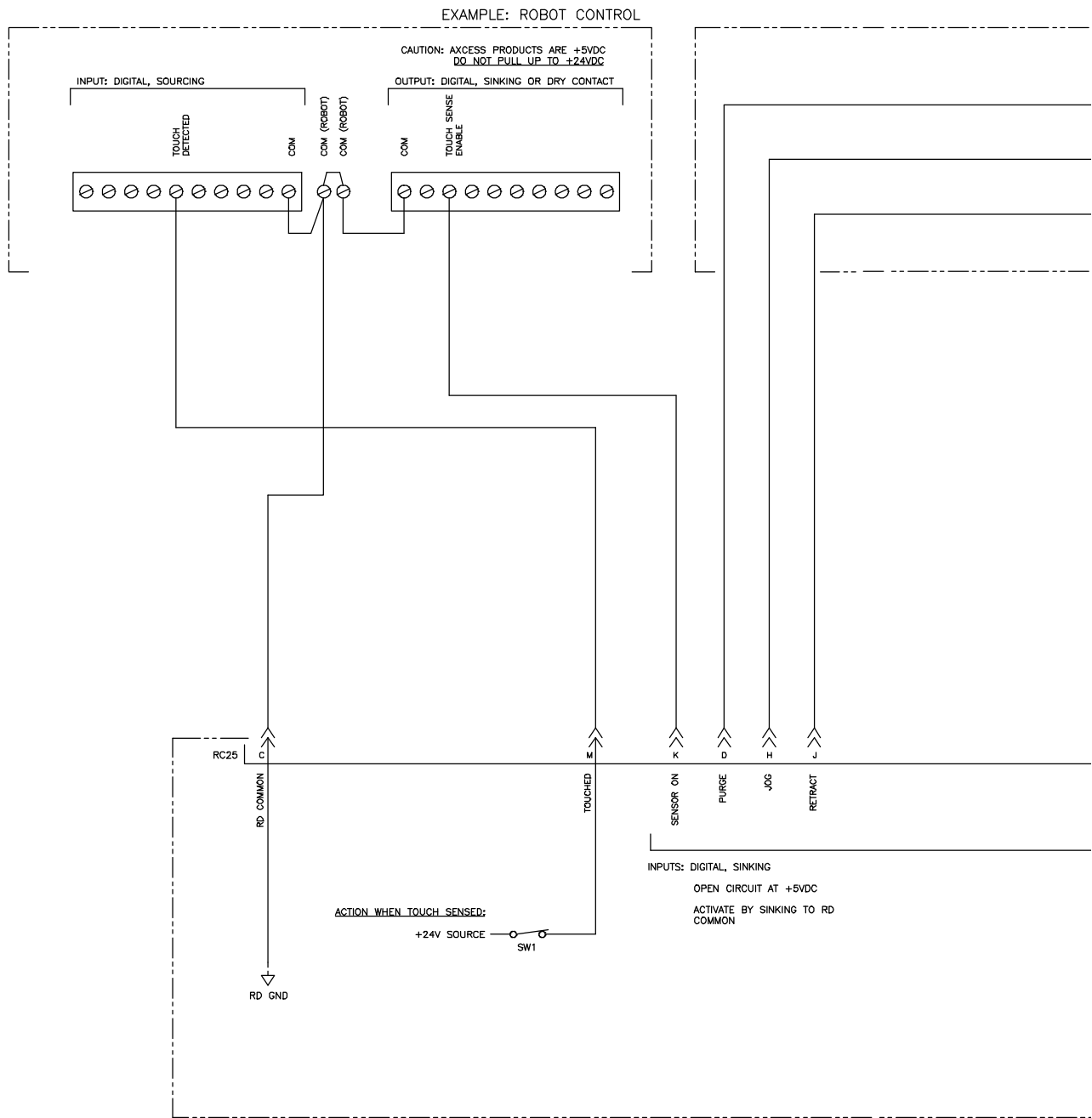
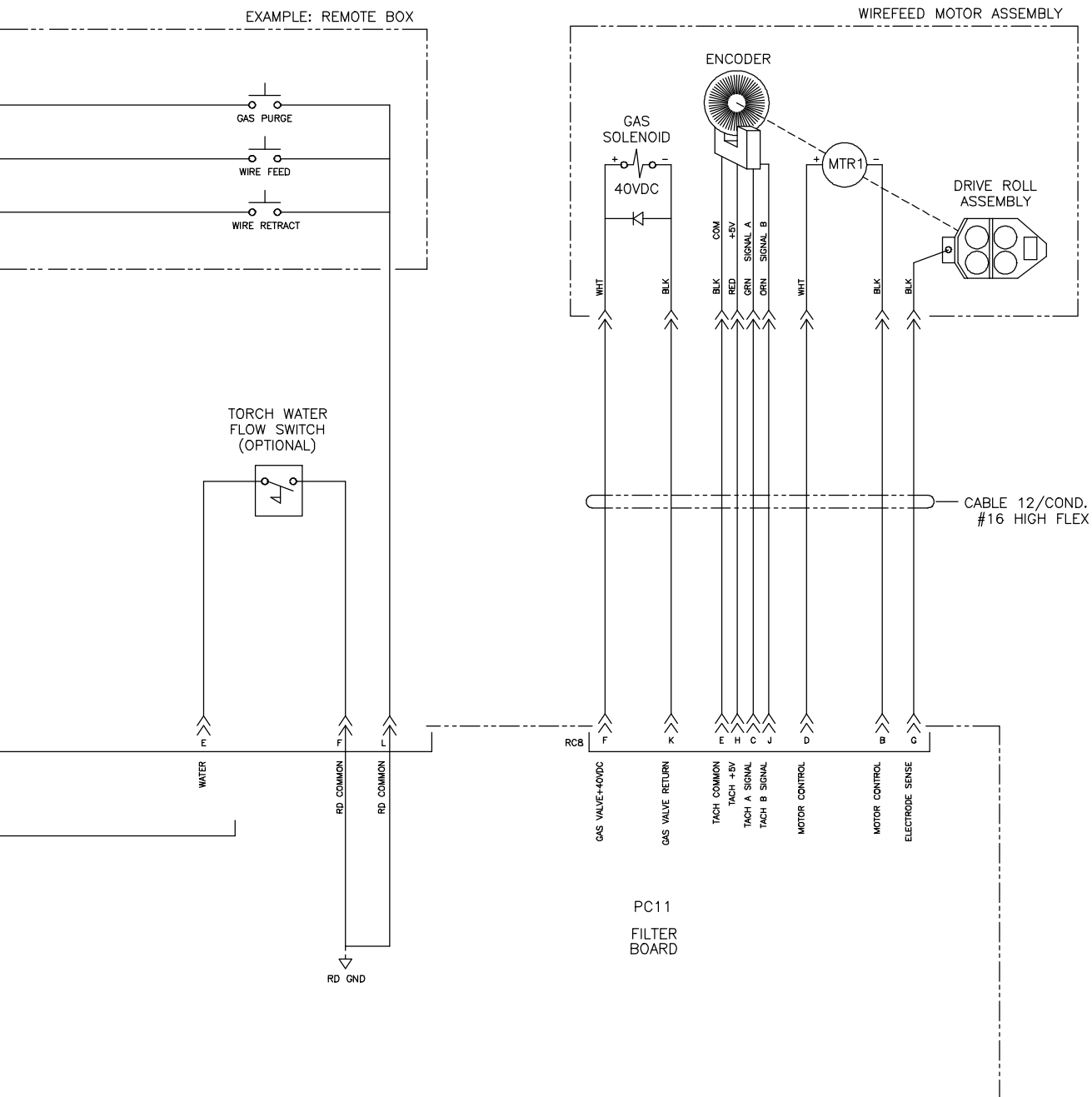


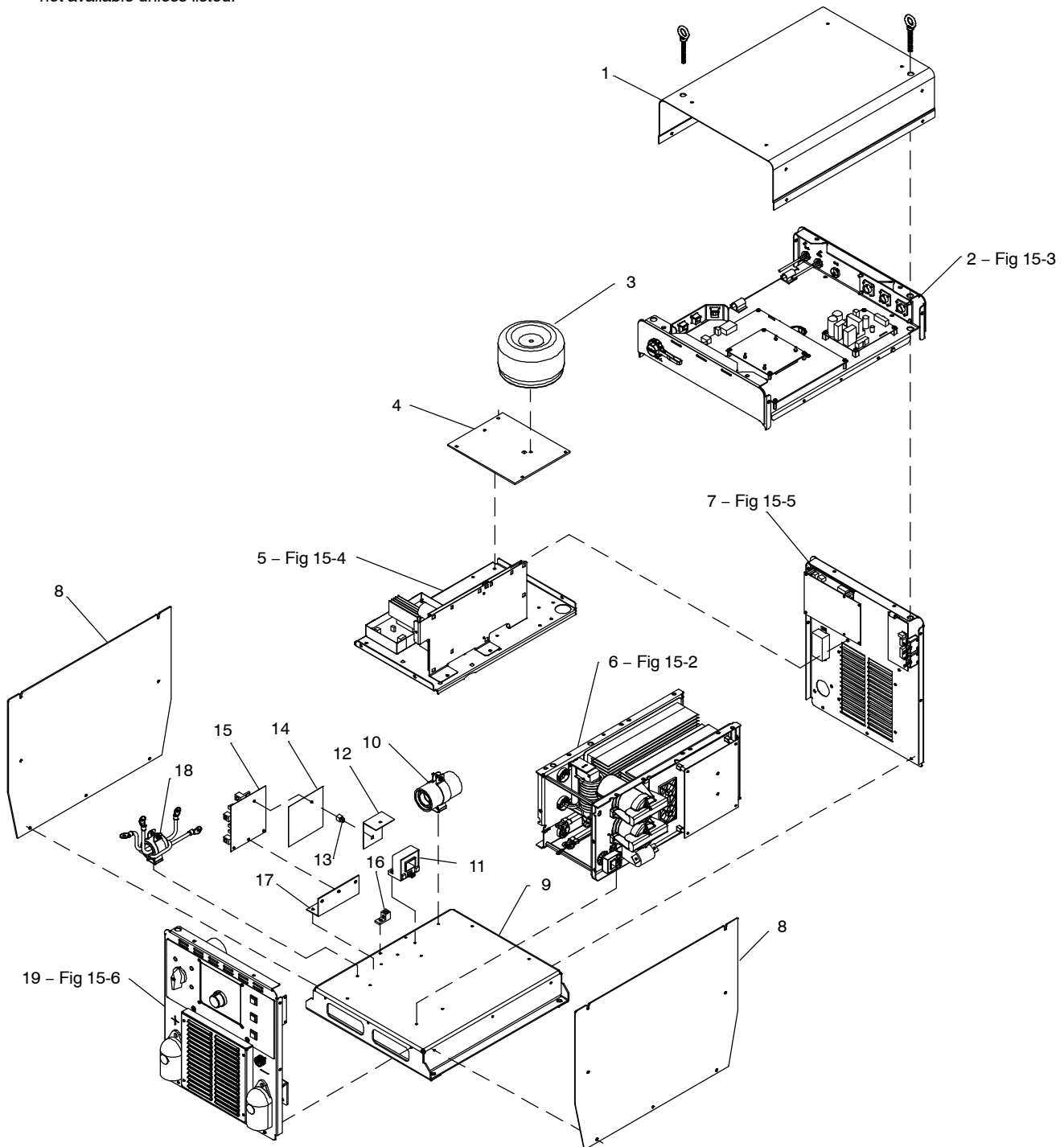
Figure 14-9. Circuit Diagram For Peripheral/Motor Interface

	WARNING • Do not touch live electrical parts. • Disconnect input power or stop engine before servicing. • Do not operate with covers removed.
	ELECTRIC SHOCK HAZARD • Have only qualified persons install, use, or service this unit.



SECTION 15 – PARTS LIST FOR AUTO-AXCESS E 300 ANALOG

 Hardware is common and
not available unless listed.



E300 Parts

251 490-C

Figure 15-1. Auto-Axcess E 300 Analog Main Assembly

Item No.	Dia. Mkgs.	Part No.	Description	Quantity
Figure 15-1. Auto-Axcess E 300 Analog Main Assembly				
... 1		242008	Cover, Top	1
... 2		250287	Assy, Auto-Axcess E Analog Module I100 (Fig 16-3)	1
... 2		250286	Assy, Auto-Axcess E Analog Module I100 W/Sensor Bd (Fig 16-3)	1
... 3	T2	212543	Xfmr, Control Toroidal 665 VAC Pri 1900 VA 60 Hz	1
... 4		210481	Plate, Mtg Toroid Xfmr	1
... 5		Fig 15-4	Top Tray Assembly	1
... 6	IM-1	214597	Windtunnel, LH w/Components (Fig 15-2)	1
...	IM-1	242680	Windtunnel, RH w/Components (Fig 15-2)	1
... 7		Fig 15-5	Rear Panel Assembly	1
... 8		230260	Panel, Side W/Insulator	2
... 9		210482	Base	1
... 10		213386	Assembly, Filter (Primary)	1
... 11	HD2	182918	Transducer, Current 400A Module Supply V +/- 15V	1
... 12		220377	Bracket, Input Filter Top	1
... 13		204846	Insulator, Screw	1
... 14		247392	Insulator, Input Filter	1
... 15	PC14	229967	Circuit Card Assy, Input Filter	1
... 16		148025	Lug, Univ W/SCR 600V 2/0-6 Wire .266 Stud	1
... 17		220376	Bracket, Input Filter Bottom	1
... 18		213372	Filter Assy, Secondary	1
... 19		Fig 15-6	Front Panel Assembly	1
...		227855	Kit, Connectors W/Washer For Power Cables (Includes)	1
... 20		010467	Connector, Clamp Cable 1.250	1
... 21		225840	Washer, Reducer 1.25 in - 0.75 in	2
... 22		010916	Connector, Clamp Cable 0.750	1

*Recommended Spare Parts.

+When ordering a component originally displaying a precautionary label, the label should also be ordered.

To maintain the factory original performance of your equipment, use only Manufacturer's Suggested Replacement Parts. Model and serial number required when ordering parts from your local distributor.

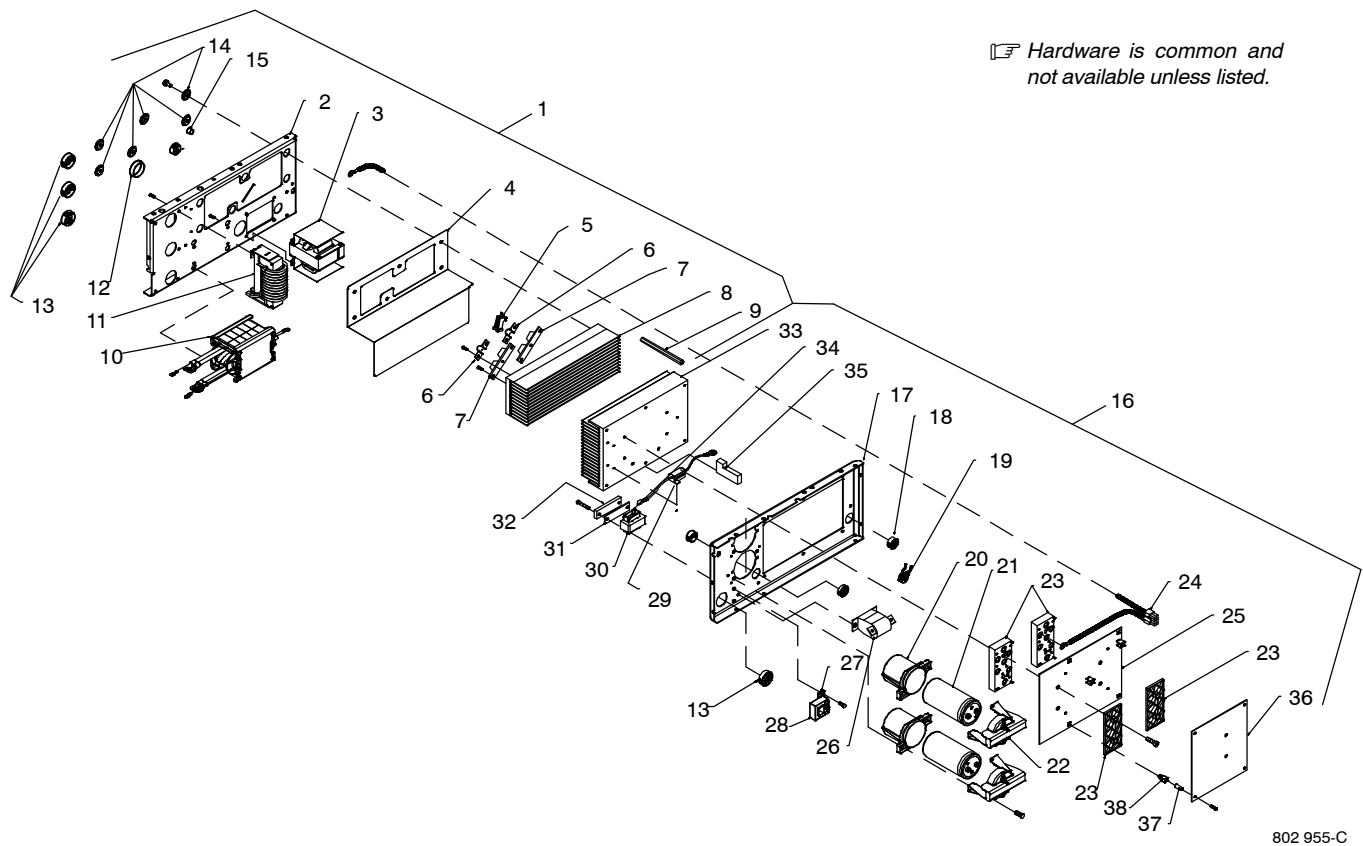


Figure 15-2. Windtunnel Assembly LH And RH

802 955-C

Item No.	Dia. Mkgs.	Part No.	Description	Quantity
----------	------------	----------	-------------	----------

Figure 15-2. Windtunnel Assembly LH And RH
(Fig 15-1 Item 6)

...	1	...	214597	...	Windtunnel, LH w/Components (including).	...	1
...	2	...	196351	...	Windtunnel, LH	...	1
...	3	L1	213940	...	Inductor, Input	...	1
...	4	...	214519	...	Insulator, Heat Sink Rectifier	...	1
...	5	R3, C4	233052	...	Resistor/Capacitor	...	1
...	6	...	199840	...	Bus Bar, Diode	...	2
...	7	D1, D2	201531	...	Kit, Diode Power Module	...	2
...	8	...	196347	...	Heat Sink, Rectifier	...	1
...	9	...	196349	...	Spacer, Windtunnel	...	3
...	10	T1	203408	...	Xfmr, HF Litz/Litz	...	1
...	11	Z1	220496	...	Output Inductor Assy	...	1
...	12	...	170647	...	Bushing, Snap-in Nyl 1.312 Id X 1.500 Mtg Hole	...	2
...	13	...	179276	...	Bushing, Snap-in Nyl 1.000 Id X 1.375 Mtg Hole Cent	...	4
...	14	...	196355	...	Insulator, Screw	...	6
...	15	...	010546	...	Bushing, Snap-in Nyl .375 Id X .500 Mtg Hole	...	1
...	16	...	242680	...	Windtunnel, RH w/Components (including)	...	1
...	17	...	196332	...	Windtunnel, RH	...	1
...	18	...	030170	...	Bushing, Snap-in Nyl .750 Id X 1.000 Mtg Hole Cent	...	2
...	19	...	196259	...	Plugs, w/Leads & Current Xfmr (including)	...	1

*Recommended Spare Parts.
 +When ordering a component originally displaying a precautionary label, the label should also be ordered.
To maintain the factory original performance of your equipment, use only Manufacturer's Suggested Replacement Parts. Model and serial number required when ordering parts from your local distributor.

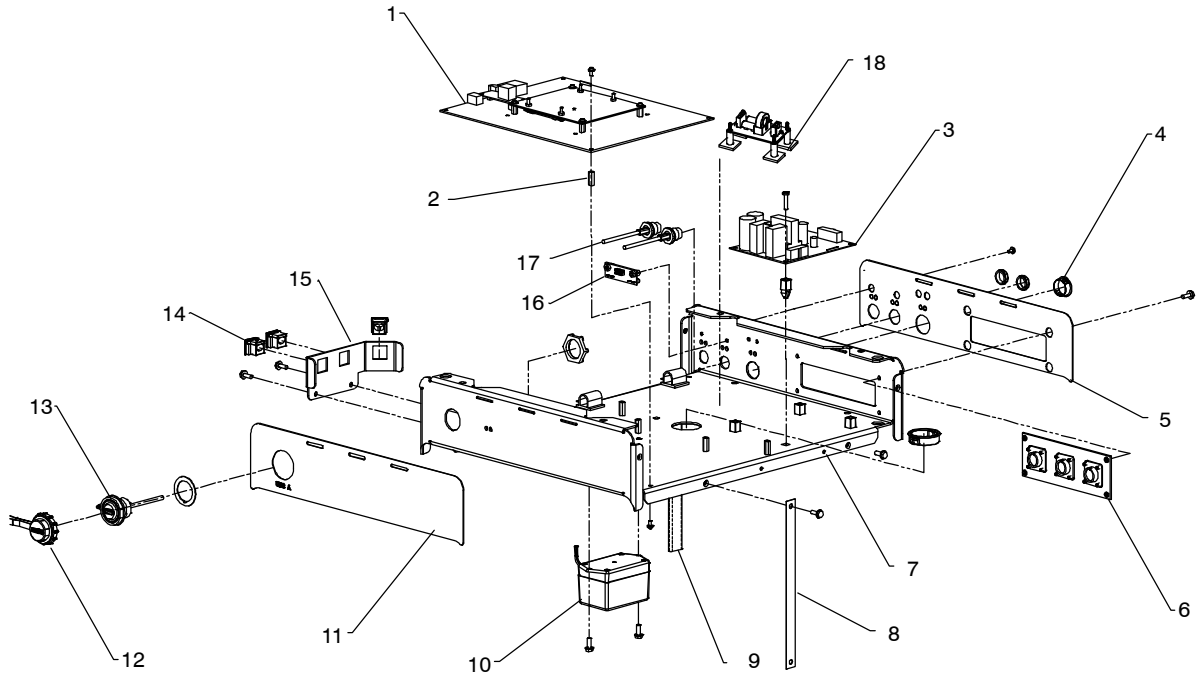
Item No.	Dia. Mkgs.	Part No.	Description	Quantity
Figure 15-2. Windtunnel Assembly LH And RH (Fig 15-1 Item 6) (Continued)				
.....		115092	Housing, Plug & Skts	1
.....		115091	Housing, Plug & Skts	1
.....	CT1	196231	Xfmr, Current Sensing 200/1	1
... 20		201695	Clamp, Capacitor (Bottom)	2
... 21	C1, C2	203912	Capacitor, Elctl 2400 Uf 500 VDC Can 2.50 Dia	2
... 22		210507	Clamp, Capacitor (Top) Machined	2
... 23		261556	Kit, Input/Pre-regulator And Inverter Module	1
... 24	RT1, RT2, RT3	214015	Thermistor, NTC 30K Ohm @ 25 Deg C 7&18in Lead	3
... 25	PC2	259491	Circuit Card Assy, Power Interconnect	1
... 26	C3	196143	Capacitor, Polyp Met Film 16. Uf 400 VAC 10%	1
... 27		196378	Bracket, Mtg Current Xfmr	1
... 28	HD1	182918	Transducer, Current 400A Module Supply V +/- 15v	1
.....		196384	Cable, Transducer 20in	1
... 29	R1, R2	196343	Resistors, W/Leads & Plug	1
.....		196840	Insulator, Resistors/Interface Board	1
... 30		109056	Core, Ferrite E 2.164 Lg X 1.094 High X .826 Wide	1
... 31	L2	196345	Coil, Inductor (Pre-regulator)	1
... 32		196514	Gasket, Inductor Mounting	2
... 33		196512	Bracket, Inductor Mounting	2
... 34		196330	Heat Sink, Power Module	1
... 35		196588	Baffle, Foam Rubber (Lower)	1
.....		196365	Plugs, w/Leads (Fan)	1
.....		199136	Plugs, w/Leads (PC2 To PC1)	1
... 36	PC1	239618	Circuit Card Assy, Control (Inverter 400A) Analog Auto-Axcess E 300	1
... 37		204846	Insulator, Screw	4
... 38		083147	Grommet, Scr No 8/10 Panel Hole .312 Sq .500 High	4

*Recommended Spare Parts.

+When ordering a component originally displaying a precautionary label, the label should also be ordered.

To maintain the factory original performance of your equipment, use only Manufacturer's Suggested Replacement Parts. Model and serial number required when ordering parts from your local distributor.

Hardware is common and not available unless listed.



245 871-D

Figure 15-3. E-module w/Ethernet And USB Assembly

Item No.	Dia. Mkgs.	Part No.	Description	Quantity
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Figure 15-3. E-module w/Ethernet And USB Assembly
(Fig 15-1 Item 3)

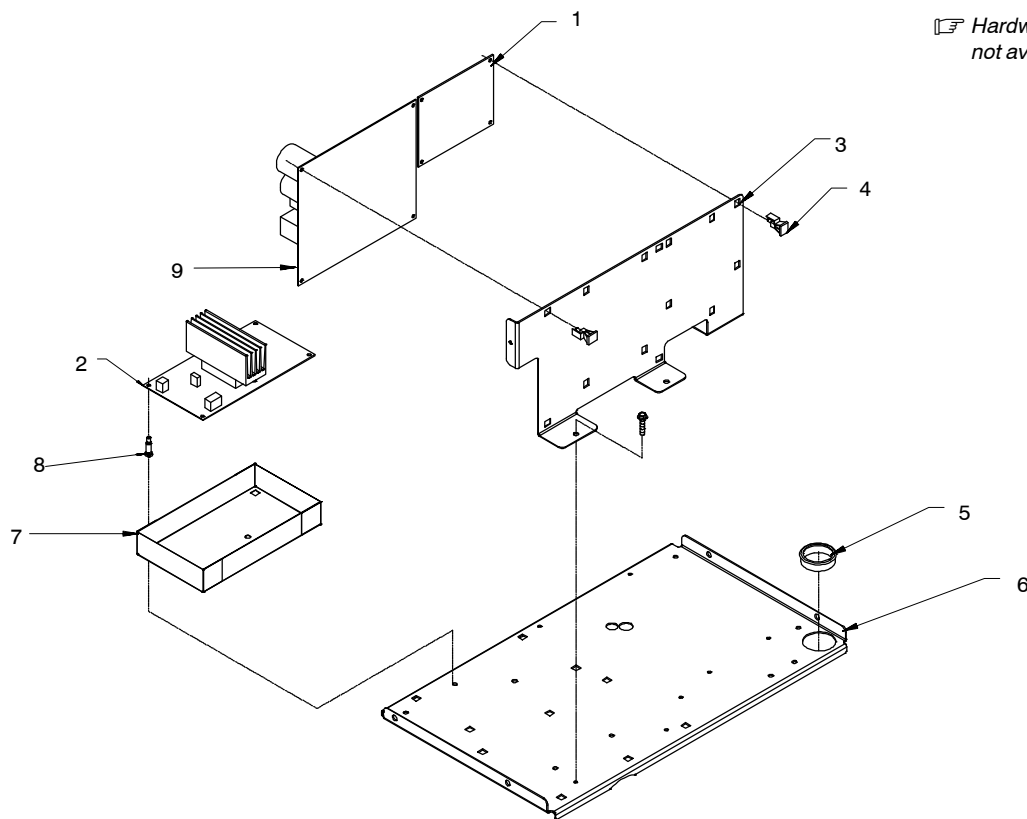
...	1	...	250516	...	Assy, Axxess E Circuit Card Board Stack	...	1
...	2	...	115440	...	Stand-off, No 6-32 X .687 Lg .250 Hex Al Fem	...	4
...	3	...	◆244985	...	Circuit Card Assy, Axxess E MWCI Interface	...	1
...	4	...	000527	...	Blank, Snap-in Nyl .875 Mtg Hole Black	...	1
...	5	...	242645	...	Nameplate, Axxess E Top Rear	...	1
...	6	...	◆242007	...	Panel, Amp W/Components	...	1
...	7	...	241996	...	Chassis, Axxess E	...	1
...	8	...	246591	...	Ground Strap	...	2
...	9	...	222808	...	Tubing, GL Acryl .750- .786 ID 8.000 Yel FA1	...	1
...	10	...	245350	...	Assembly, Personality Board	...	1
...	11	...	250299	...	Nameplate, Auto-Axxess E Top Front	...	1
...	12	...	244237	...	Dust Cap	...	1
...	13	...	244239	...	Cable, USB Type A, Sealed Panel Mount	...	1
...	14	...	203423	...	Bushing, Strain Relief .300/.360 ID X .689 Sq Mtg	...	3
...	15	...	246545	...	Bracket, Axxess E Strain Relief	...	1
...	16	...	244980	...	Circuit Card Assy, Ethernet LED	...	1
...	17	...	244257	...	Cable Assy, RJ45 Male/M12 Female .4m	...	2
...	18	...	254000	...	Assy, Filter Board Axxess E	...	1

*Recommended Spare Parts.

◆OPTIONAL

+When ordering a component originally displaying a precautionary label, the label should also be ordered.

To maintain the factory original performance of your equipment, use only Manufacturer's Suggested Replacement Parts. Model and serial number required when ordering parts from your local distributor.



Hardware is common and not available unless listed.

249 750-A

Figure 15-4. Top Tray Assembly

Item No.	Dia. Mkgs.	Part No.	Description	Quantity
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Figure 15-4. Top Tray Assembly (Fig 15-1 Item 5)

...	1	...	PC12	...	239623	...	Circuit Card Assy, E-stop	...	1
...	2	...	PC3	...	239598	...	Circuit Card Assy, Aux Power	...	1
...	3	...		...	210490	...	Panel, Mtg Circuit Boards	...	1
...	4	...		...	134201	...	Stand-Off, PC Card .312/.375/Post&Lock .43	...	4
...	5	...		...	170647	...	Bushing, Snap-in Nyl 1.312 Id X 1.500 Mtg Hole	...	1
...	6	...		...	210491	...	Panel, Mtg Components Top	...	1
...	7	...		...	223439	...	Insulator, Circuit Card (Aux Power)	...	1
...	8	...		...	198122	...	Stand-Off Support, PC Card .250 w/Post&Lock .500	...	1
...	9	...	PC6	...	245594	...	Wire Feed Module	...	1

*Recommended Spare Parts.

+When ordering a component originally displaying a precautionary label, the label should also be ordered.

To maintain the factory original performance of your equipment, use only Manufacturer's Suggested Replacement Parts. Model and serial number required when ordering parts from your local distributor.

Hardware is common and not available unless listed.

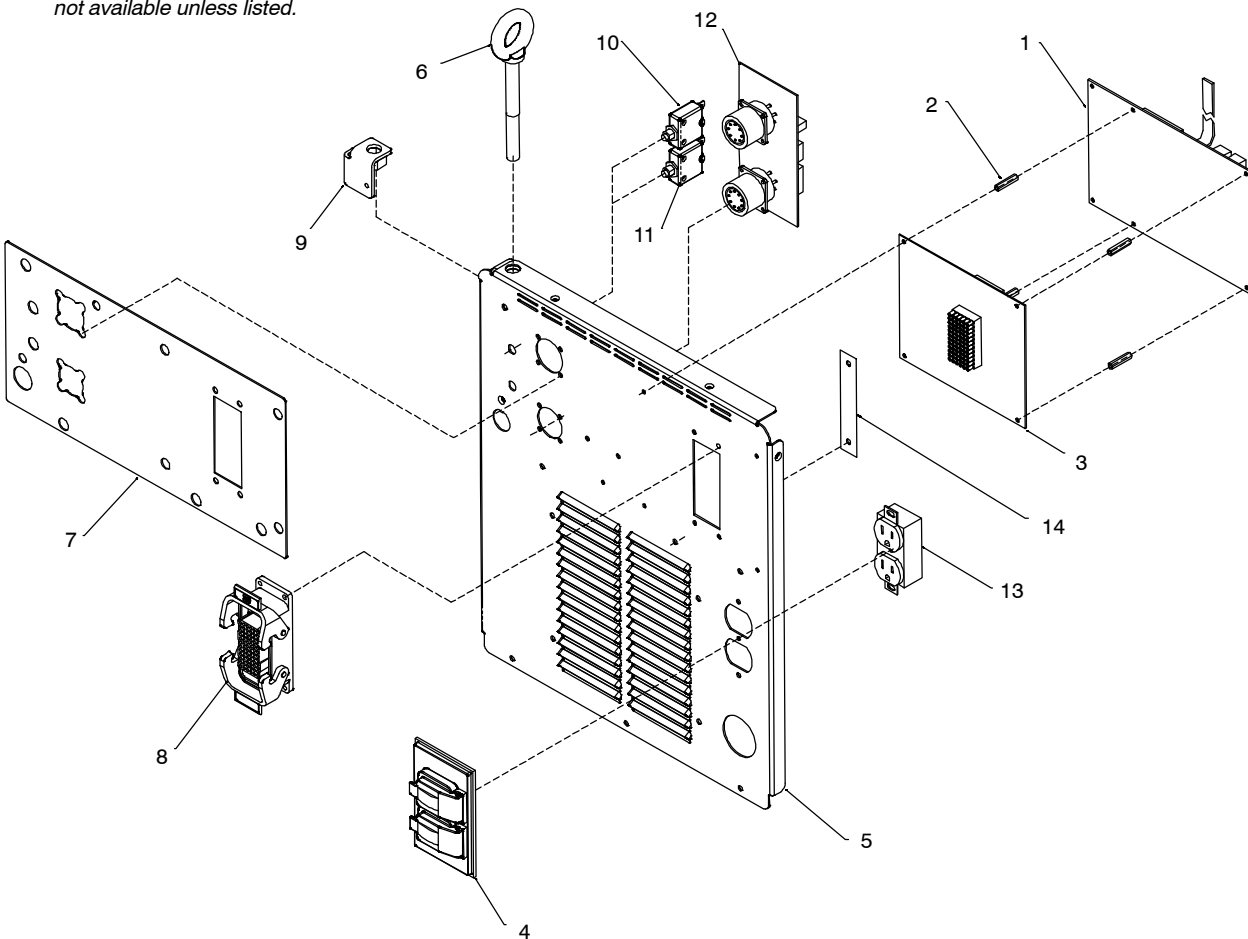


Figure 15-5. Auto-Access E 300 Analog Rear Panel Assembly

250 056-A

Item No.	Dia. Mkgs.	Part No.	Description	Quantity
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Figure 16-5. Auto-Access E 300 Analog Rear Panel Assembly
(Fig 15-1 Item 6)

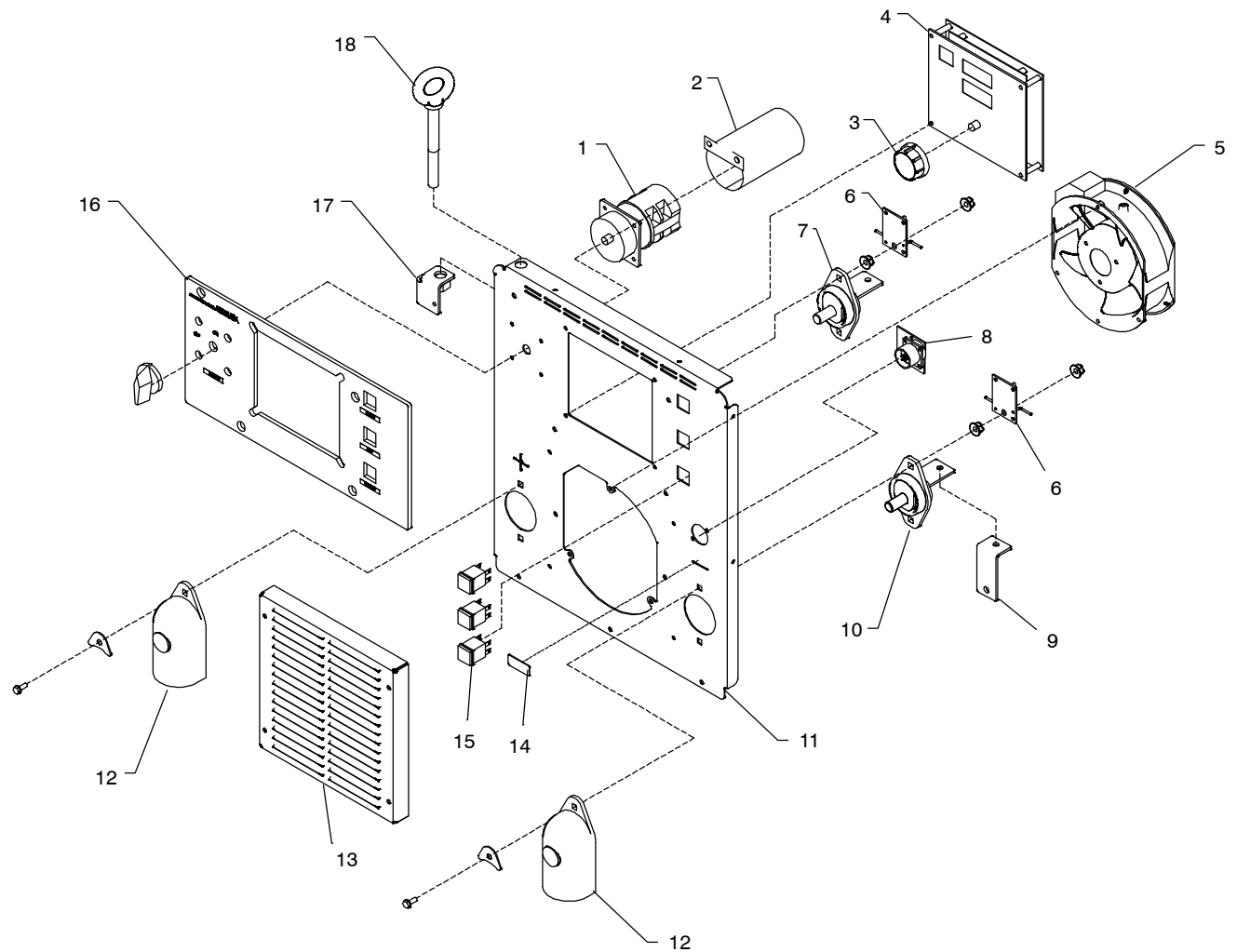
...	1	...	PC9	...	250456	...	Automation Interface Module	...	1
...	2	...		...	212628	...	Stand-off, no 6-32 x 1.000 lg .250 hex nyl fem	...	4
...	3	...	PC10	...	239627	...	Circuit Card Assy, Robot Interface Filter HF	...	1
...	4	...		...	217297	...	Cover, Receptacle Weatherproof Duplex Rcpt	...	1
...	5	...		...	210479	...	Panel, Rear	...	1
...	6	...		...	245352	...	Bolt, eye shld thd stem .500-13 X 4.000	...	1
...	7	...		...	210505	...	Nameplate, Rear	...	1
...	8	...		...	201058	...	Connector, Rect 72 Pin Assy	...	1
...	9	...		...	210483	...	Bracket, lift eye	...	1
...	10	...	CB1	...	083432	...	Supplementary Protector, Man Reset 1P 10A 250VAC Frict	...	1
...	11	...	CB2	...	093995	...	Supplementary Protector, Man Reset 1P 15A 250VAC Frict	...	1
...	12	...	PC11	...	239631	...	Circuit Card Assy, Motor Filter HF	...	1
...	13	...	RC2	...	604176	...	Receptacle, w/Leads (115V Duplex)	...	1
...	14	...		...	216596	...	Strap, Grounding 4.50 in long	...	1

*Recommended Spare Parts.

+When ordering a component originally displaying a precautionary label, the label should also be ordered.

To maintain the factory original performance of your equipment, use only Manufacturer's Suggested Replacement Parts. Model and serial number required when ordering parts from your local distributor.

Hardware is common and not available unless listed.



250 021-A

Figure 15-6. Auto-Access E 300 Analog Front Panel Assembly

Item No.	Dia. Mkgs.	Part No.	Description	Quantity
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**Figure 15-6. Auto-Access E 300 Analog Front Panel Assembly
(Fig 15-1 Item 15)**

...	1	...	S1	...	207456	...	Switch Assy, Rotary 2 Posn 1P 40A 600VAC PNLMTG 90Deg	...	1
...	2	...		...	207895	...	Insulator,Switch Power	...	1
...	3	...		...	179851	...	Knob, Pointer 1.670 Dia X .250 Id Push On W/Spring	...	1
...	4	...		...	251414	...	Panel, PC Card Front	...	1
...	5	...	FM	...	196313	...	Fan, Muffin 115V 50/60 Hz 3000 Rpm 6.378 Mtg Holes	...	1
...	6	...	PC15,PC20	...	244993	...	Circuit Card Assy, Stud Filter	...	2
...	7	...		...	210865	...	Terminal, pwr output red	...	1
...	8	...		...	244989	...	Circuit Card Assy, Vsense Filter	...	1
...	9	...		...	207980	...	Bus Bar, Output	...	1
...	10	...		...	210866	...	Terminal, pwr output black	...	1

Item No.	Dia. Mkgs.	Part No.	Description	Quantity
Figure 15-6. Auto-Axcess E 300 Analog Front Panel Assembly (Fig 15-1 Item 15) (Continued)				
... 11		250004	Panel, Front	1
... 12		186621	Boot, Generic	2
... 13		207979	Box, Louver	1
... 14		219843	Label, Work Sense	1
... 15	PB1, PB2, PB3	199443	Switch, Pb Mc No Spst 10A 115VAC w/Blk Cap Panelmt	3
... 16		250005	Nameplate, Front	1
... 17		210483	Bracket, lift eye	1
... 18		245352	Bolt, eye shld thd stem .500-13 X 4.000	1

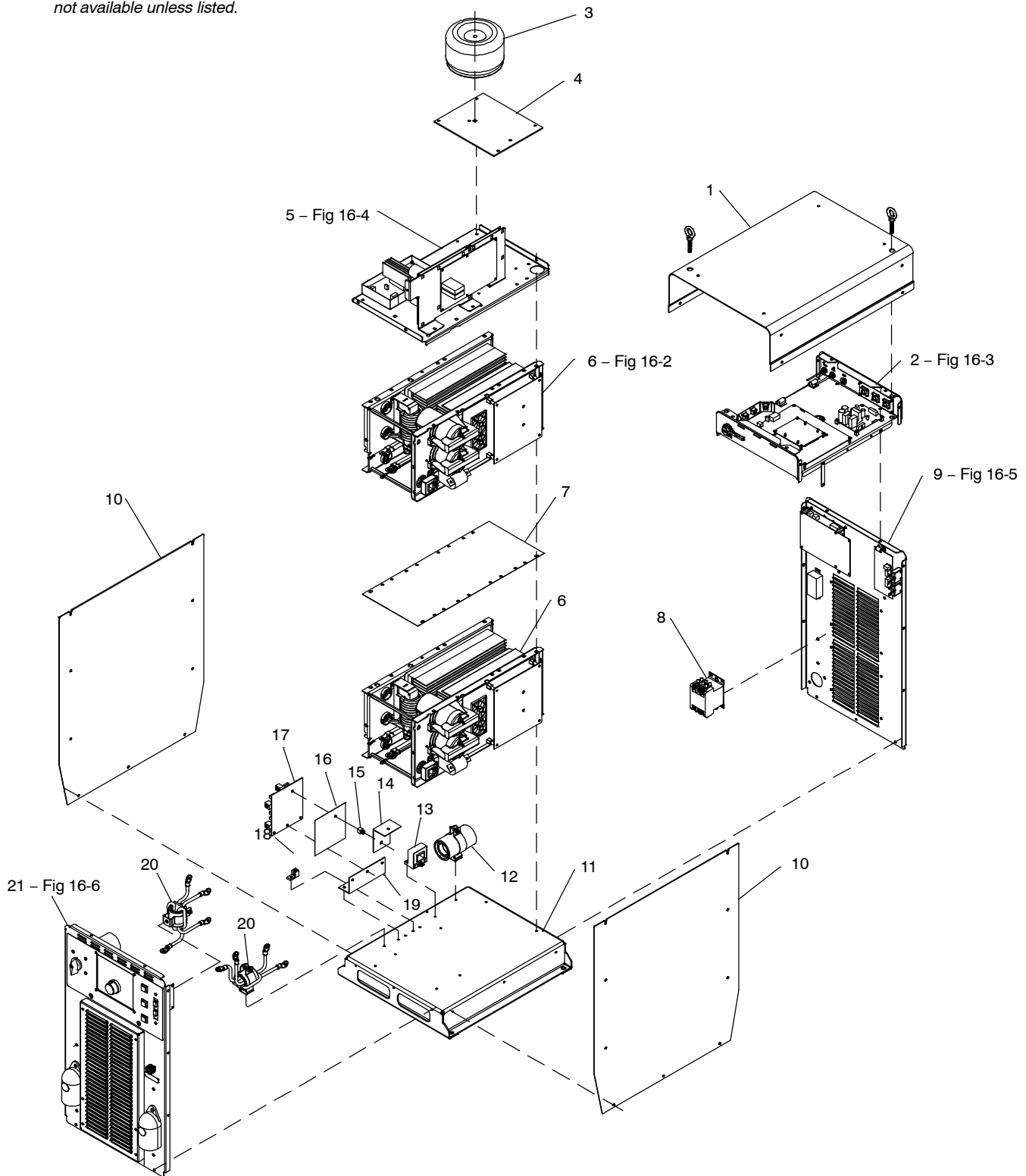
*Recommended Spare Parts.

+When ordering a component originally displaying a precautionary label, the label should also be ordered.

To maintain the factory original performance of your equipment, use only Manufacturer's Suggested Replacement Parts. Model and serial number required when ordering parts from your local distributor.

SECTION 16 – PARTS LIST FOR AUTO-AXCESS E 450 ANALOG

 Hardware is common and not available unless listed.



E450 Parts

251 481-C

Figure 16-1. Auto-Axcess E 450 Analog Main Assembly

Item No.	Dia. Mkgs.	Part No.	Description	Quantity
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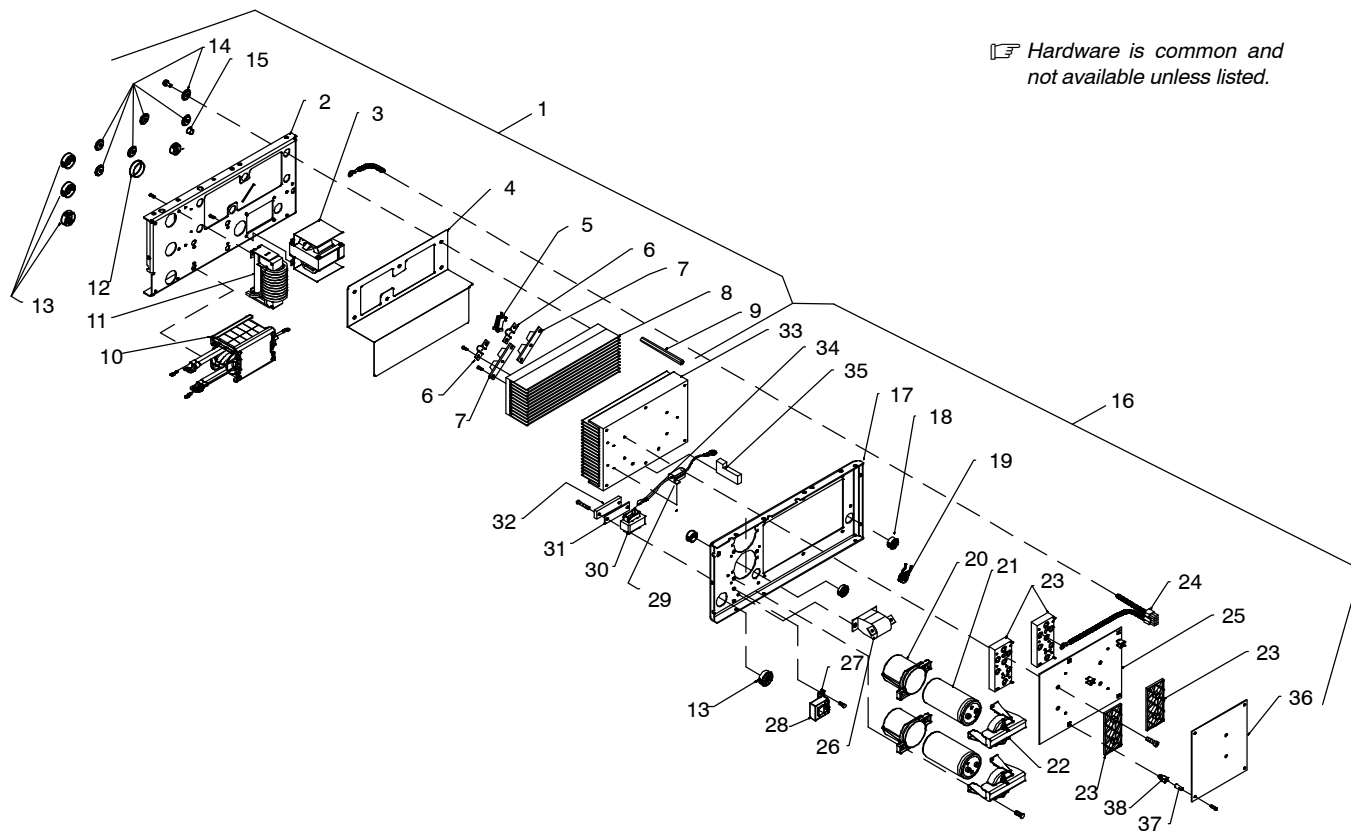
Figure 16-1. Auto-Axcess E 450 Analog Main Assembly

...	1	...	242008	...	Cover, Top	...	1
...	2	...	250287	...	Assy, Auto-Axcess E Analog Module I100 (Fig 16-3)	...	1
...	2	...	250286	...	Assy, Auto-Axcess E Analog Module I100 W/Sensor Bd (Fig 16-3)	...	1
...	3	T2	212543	...	Xfmr, Control Toroidal 665 VAC Pri 1900 VA 60 Hz	...	1
...	4	...	210481	...	Plate, Mtg Toroid Xfmr	...	1
...	5	...	Fig 16-4	...	Top Tray Assembly	...	1
...	6	IM1, IM2	214597	...	Windtunnel, LH w/Components (Fig 16-2)	...	2
...	...	...	242680	...	Windtunnel, RH w/Components (Fig 16-2)	...	2
...	7	...	198961	...	Panel, Module Divider	...	1
...	8	...	Fig 16-5	...	Rear Panel Assembly	...	1
...	10	...	237360	...	Panel, Side W/Insulator	...	2
...	11	...	210482	...	Base	...	1
...	12	...	213386	...	Filter Assembly, Primary	...	1
...	13	HD2	182918	...	Transducer, Current 400A Module Supply V +/- 15V	...	1
...	14	...	220377	...	Bracket, Input Filter Top	...	1
...	15	...	204846	...	Insulator, Screw	...	1
...	16	...	247392	...	Insulator, Input Filter	...	1
...	17	PC14	229967	...	Circuit Card Assy, Input Filter	...	1
...	18	...	148025	...	Lug, Univ W/SCR 600V 2/0-6 Wire .266 Stud	...	1
...	19	...	220376	...	Bracket, Input Filter Bottom	...	1
...	20	...	213372	...	Filter Assy, Secondary	...	2
...	21	...	Fig 16-6	...	Front Panel Assembly	...	1

◆OPTIONAL

+When ordering a component originally displaying a precautionary label, the label should also be ordered.

To maintain the factory original performance of your equipment, use only Manufacturer's Suggested Replacement Parts. Model and serial number required when ordering parts from your local distributor.



802 955-C

Figure 16-2. Windtunnel Assembly LH And RH

Item No.	Dia. Mkgs.	Part No.	Description	Quantity
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**Figure 16-2. Windtunnel Assembly LH And RH
(Fig 16-1 Item 6)**

...	1	...	214597	...	Windtunnel, LH w/Components (including).	...	1
...	2	...	196351	...	Windtunnel, LH	...	1
...	3	L1	213940	...	Inductor, Input	...	1
...	4	...	214519	...	Insulator, Heat Sink Rectifier	...	1
...	5	R3, C4	233052	...	Resistor/Capacitor	...	1
...	6	...	199840	...	Bus Bar, Diode	...	2
...	7	D1, D2	201531	...	Kit, Diode Power Module	...	2
...	8	...	196347	...	Heat Sink, Rectifier	...	1
...	9	...	196349	...	Spacer, Windtunnel	...	3
...	10	T1	203408	...	Xfmr, HF Litz/Litz	...	1
...	11	Z1	220496	...	Output Inductor Assy	...	1
...	12	...	170647	...	Bushing, Snap-in Nyl 1.312 Id X 1.500 Mtg Hole	...	2
...	13	...	179276	...	Bushing, Snap-in Nyl 1.000 Id X 1.375 Mtg Hole Cent	...	4
...	14	...	196355	...	Insulator, Screw	...	6
...	15	...	010546	...	Bushing, Snap-in Nyl .375 Id X .500 Mtg Hole	...	1
...	16	...	242680	...	Windtunnel, RH w/Components (including)	...	1
...	17	...	196332	...	Windtunnel, RH	...	1
...	18	...	030170	...	Bushing, Snap-in Nyl .750 Id X 1.000 Mtg Hole Cent	...	2
...	19	...	196259	...	Plugs, w/Leads & Current Xfmr (including)	...	1

*Recommended Spare Parts.

+When ordering a component originally displaying a precautionary label, the label should also be ordered.

To maintain the factory original performance of your equipment, use only Manufacturer's Suggested Replacement Parts. Model and serial number required when ordering parts from your local distributor.

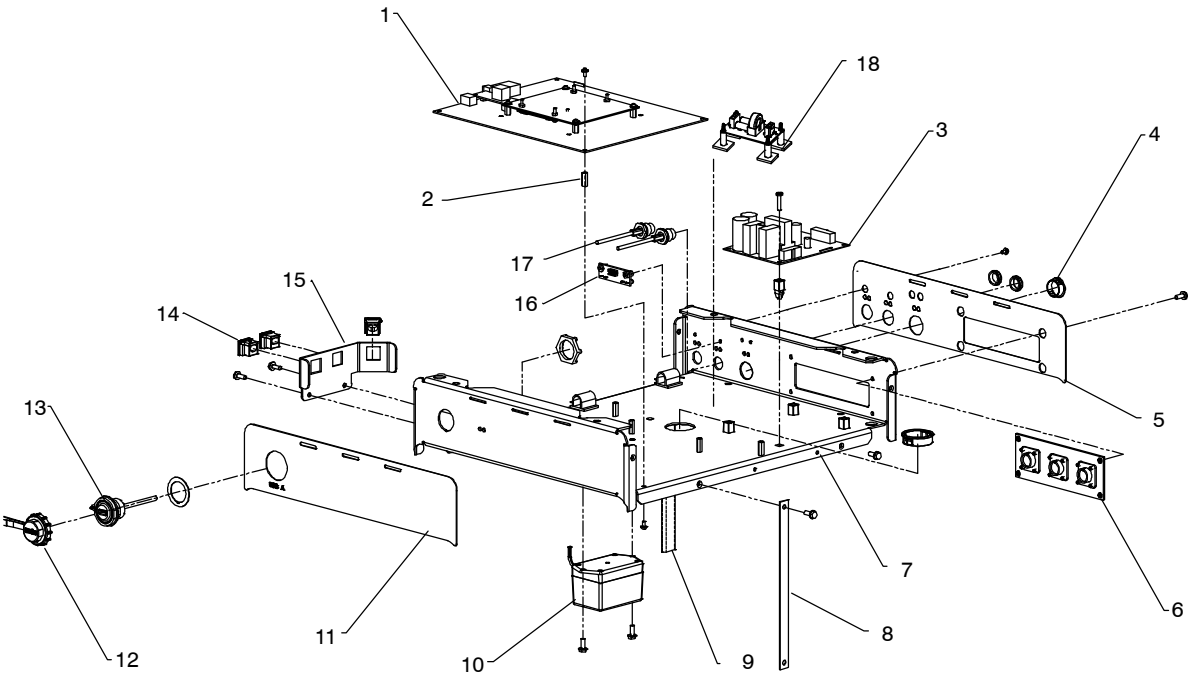
Item No.	Dia. Mkgs.	Part No.	Description	Quantity
Figure 16-2. Windtunnel Assembly LH And RH (Fig 16-1 Item 6) (Continued)				
.....		115092	Housing, Plug & Skts	1
.....		115091	Housing, Plug & Skts	1
.....	CT1	196231	Xfmr, Current Sensing 200/1	1
... 20		201695	Clamp, Capacitor (Bottom)	2
... 21	C1, C2	203912	Capacitor, Elctlt 2400 Uf 500 VDC Can 2.50 Dia	2
... 22		210507	Clamp, Capacitor (Top) Machined	2
... 23		261556	Kit, Input/Pre-regulator And Inverter Module	1
... 24	RT1, RT2, RT3	214015	Thermistor, NTC 30K Ohm @ 25 Deg C 7&18in Lead	3
... 25	PC2	259491	Circuit Card Assy, Power Interconnect	1
... 26	C3	196143	Capacitor, Polyp Met Film 16. Uf 400 VAC 10%	1
... 27		196378	Bracket, Mtg Current Xfmr	1
... 28	HD1	182918	Transducer, Current 400A Module Supply V +/- 15v	1
.....		196384	Cable, Transducer 20in	1
... 29	R1, R2	196343	Resistors, W/Leads & Plug	1
.....		196840	Insulator, Resistors/Interface Board	1
... 30		109056	Core, Ferrite E 2.164 Lg X 1.094 High X .826 Wide	1
... 31	L2	196345	Coil, Inductor (Pre-regulator)	1
... 32		196514	Gasket, Inductor Mounting	2
... 33		196512	Bracket, Inductor Mounting	2
... 34		196330	Heat Sink, Power Module	1
... 35		196588	Baffle, Foam Rubber (Lower)	1
.....		196365	Plugs, w/Leads (Fan)	1
.....		199136	Plugs, w/Leads (PC2 To PC1)	1
... 36	PC1	239612	Circuit Card Assy, Control (Inverter 300A)	1
... 37		204846	Insulator, Screw	4
... 38		083147	Grommet, Scr No 8/10 Panel Hole .312 Sq .500 High	4

*Recommended Spare Parts.

+When ordering a component originally displaying a precautionary label, the label should also be ordered.

To maintain the factory original performance of your equipment, use only Manufacturer's Suggested Replacement Parts. Model and serial number required when ordering parts from your local distributor.

Hardware is common and not available unless listed.



245 871-D

Figure 16-3. E-module w/Ethernet And USB Assembly

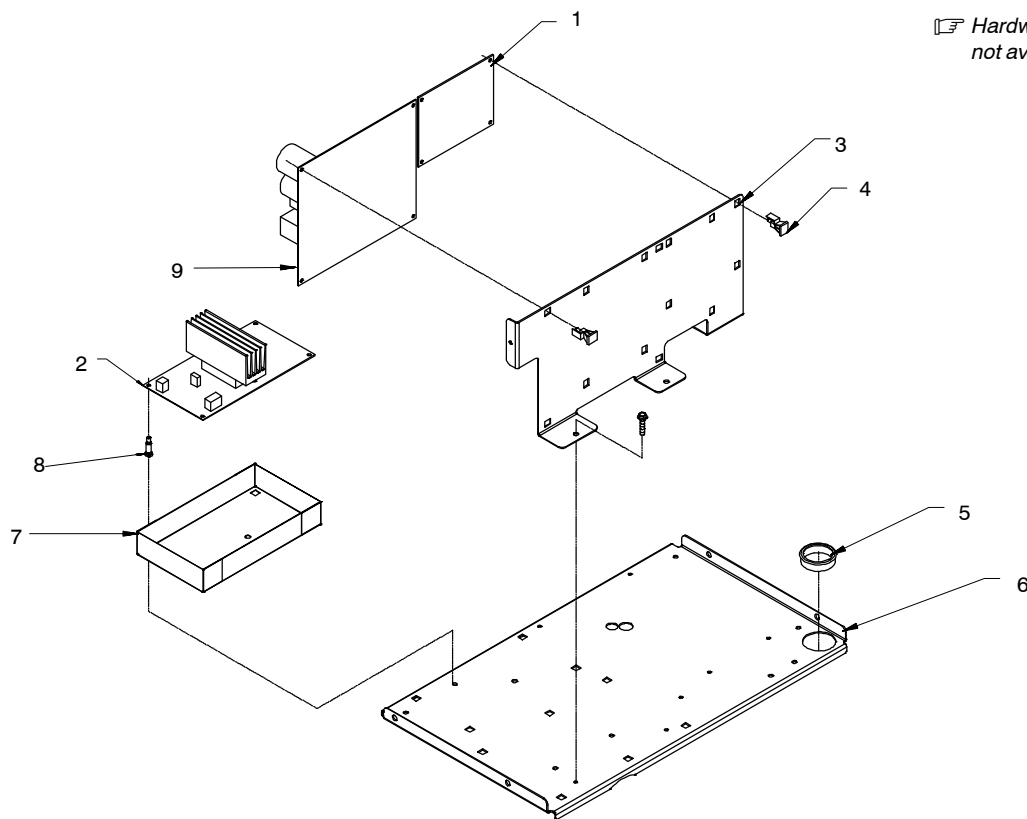
Item No.	Dia. Mkgs.	Part No.	Description	Quantity
Figure 16-3. E-module w/Ethernet And USB Assembly (Fig 16-1 Item 6)				
1		250516	Assy, Axxess E Circuit Card Board Stack	1
2		115440	Stand-off, No 6-32 X .687 Lg .250 Hex Al Fem	4
3		♦244985	Circuit Card Assy, Axxess E MWCI Interface	1
4		000527	Blank, Snap-in Nyl .875 Mtg Hole Black	1
5		242645	Nameplate, Axxess E Top Rear	1
6		♦242007	Panel, Amp W/Components	1
7		241996	Chassis, Axxess E	1
8		246591	Ground Strap	2
9		222808	Tubing, GL Acryl .750- .786 ID 8.000 Yel FA1	1
10		245350	Assembly, Personality Board	1
11		250299	Nameplate, Auto-Axxess E Top Front	1
12		244237	Dust Cap	1
13		244239	Cable, USB Type A, Sealed Panel Mount	1
14		203423	Bushing,Strain Relief .300/.360 ID X .689 Sq Mtg	3
15		246545	Bracket,Axxess E Strain Relief	1
16		244980	Circuit Card Assy, Ethernet LED	1
17		244257	Cable Assy, RJ45 Male/M12 Female .4m	2
18		254000	Assy, Filter Board Axxess E	1

*Recommended Spare Parts.

♦OPTIONAL

+When ordering a component originally displaying a precautionary label, the label should also be ordered.

To maintain the factory original performance of your equipment, use only Manufacturer's Suggested Replacement Parts. Model and serial number required when ordering parts from your local distributor.



Hardware is common and not available unless listed.

249 750-A

Figure 16-4. Top Tray Assembly

Item No.	Dia. Mkgs.	Part No.	Description	Quantity
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Figure 16-4. Top Tray Assembly (Fig 16-1 Item 4)

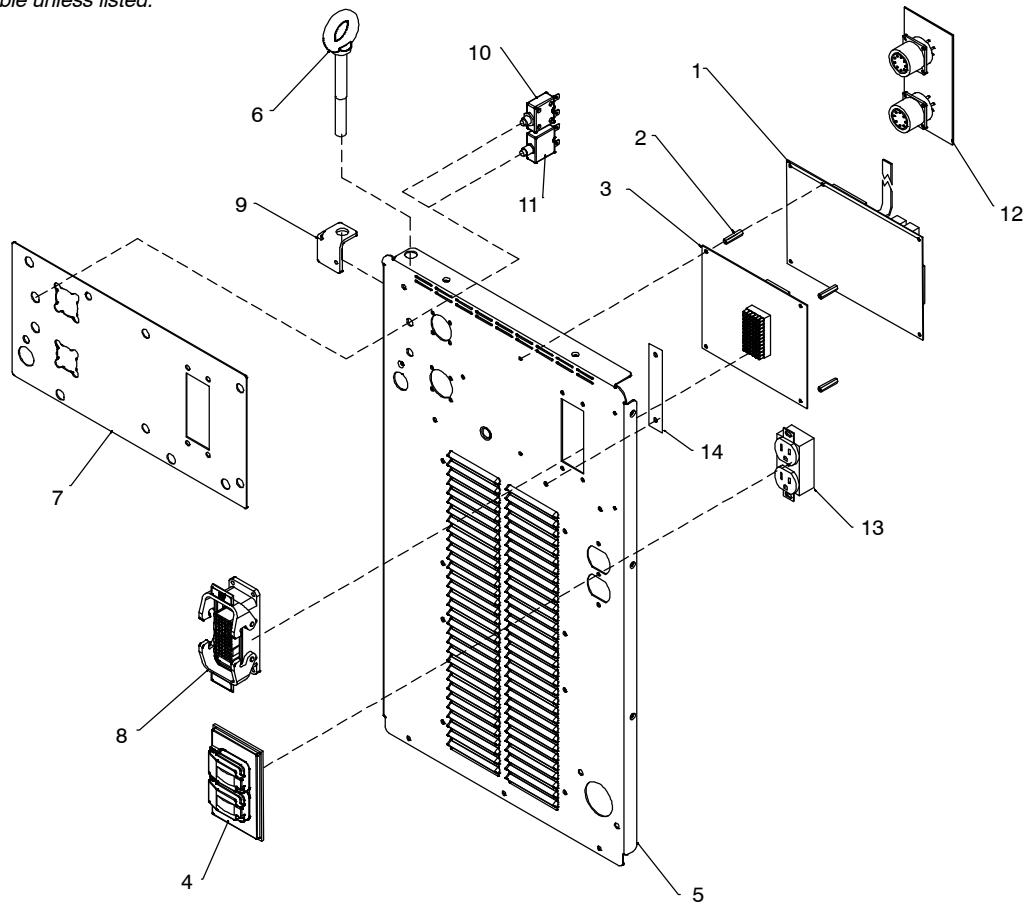
...	1	...	PC12	...	239623	...	Circuit Card Assy, E-stop	...	1
...	2	...	PC3	...	239598	...	Circuit Card Assy, Aux Power	...	1
...	3	...		...	210490	...	Panel, Mtg Circuit Boards	...	1
...	4	...		...	134201	...	Stand-Off, PC Card .312/.375/Post&Lock .43	...	4
...	5	...		...	170647	...	Bushing, Snap-in Nyl 1.312 Id X 1.500 Mtg Hole	...	1
...	6	...		...	210491	...	Panel, Mtg Components Top	...	1
...	7	...		...	223439	...	Insulator, Circuit Card (Aux Power)	...	1
...	8	...		...	198122	...	Stand-Off Support, PC Card .250 w/Post&Lock .500	...	1
...	9	...	PC6	...	245594	...	Wire Feed Module	...	1

*Recommended Spare Parts.

+When ordering a component originally displaying a precautionary label, the label should also be ordered.

To maintain the factory original performance of your equipment, use only Manufacturer's Suggested Replacement Parts. Model and serial number required when ordering parts from your local distributor.

Hardware is common and not available unless listed.

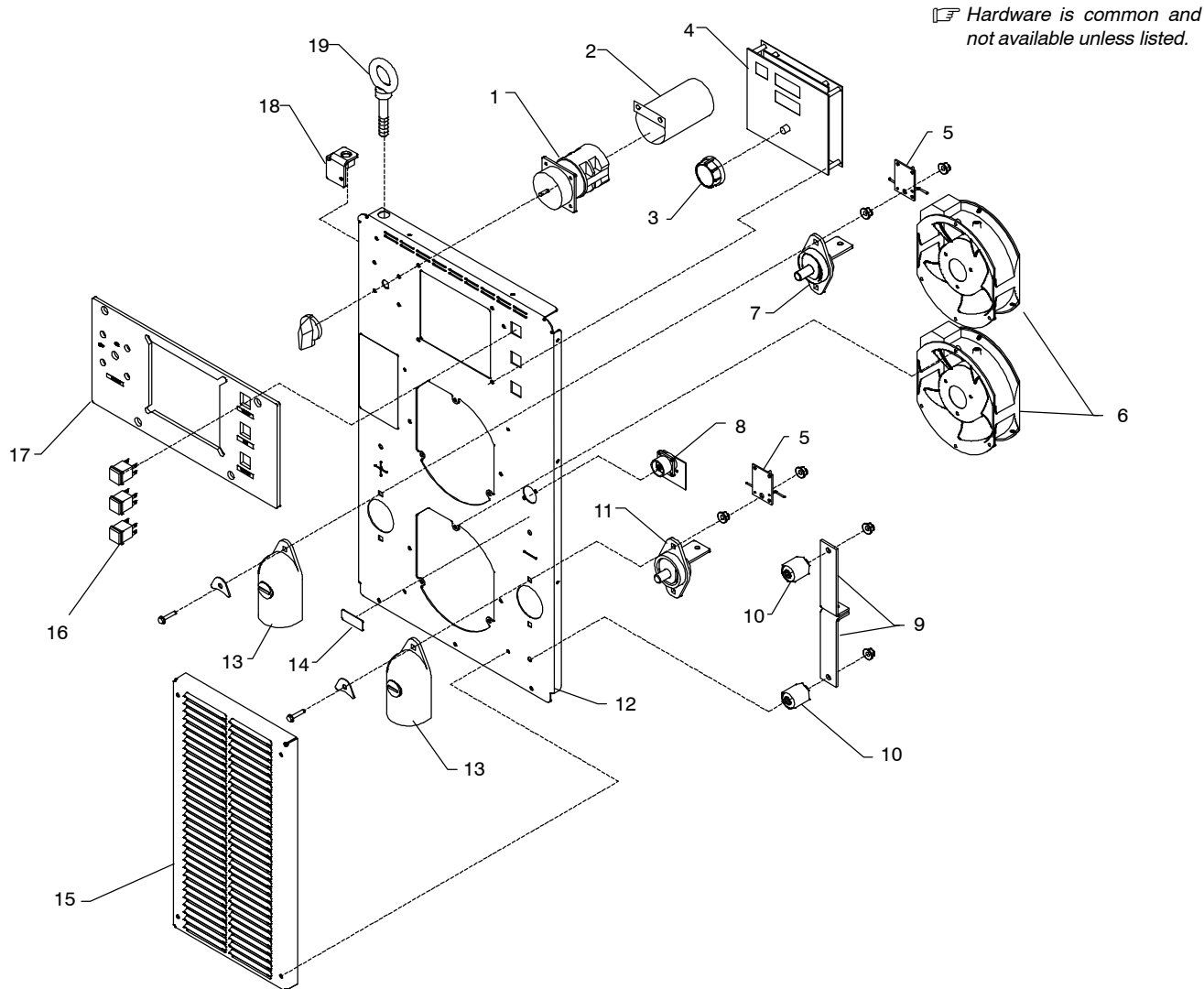


249 766-A

Figure 16-5. Auto-Access E 450 Analog Rear Panel Assembly

Item No.	Dia. Mkgs.	Part No.	Description	Quantity
Figure 16-5. Auto-Access E 450 Analog Rear Panel Assembly (Fig 15-1 Item 8)				
1	PC9	250456	Automation Interface Module	1
2		212628	Stand-off, no 6-32 x 1.000 lg .250 hex nyl fem	4
3	PC10	239627	Circuit Card Assy, Robot Interface Filter HF	1
4		217297	Cover, Receptacle Weatherproof Duplex Rcpt	1
5		210475	Panel, Rear	1
6		245352	Bolt, eye shld thd stem .500-13 X 4.000	1
7		210505	Nameplate, Rear	1
8		201058	Connector, Rect 72 Pin Assy	1
9		210483	Bracket, lift eye	1
10	CB1	083432	Supplementary Protector, Man Reset 1P 10A 250VAC Frict	1
11	CB2	093995	Supplementary Protector, Man Reset 1P 15A 250VAC Frict	1
12	PC11	239631	Circuit Card Assy, Motor Filter Hf	1
13	RC2	604176	Receptacle (115V Duplex)	1
14		216596	Strap, Grounding 4.50 in long	1

*Recommended Spare Parts.
+When ordering a component originally displaying a precautionary label, the label should also be ordered.
To maintain the factory original performance of your equipment, use only Manufacturer's Suggested Replacement Parts. Model and serial number required when ordering parts from your local distributor.



803 249-D

Figure 16-6. Auto-Access E 450 Analog Front Panel Assembly

Item No.	Dia. Mkgs.	Part No.	Description	Quantity
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Figure 16-6. Auto-Access E 450 Analog Front Panel Assembly (Fig 15-1 Item 17)

...	1	...	S1	...	207456	...	Switch Assy, Rotary 2 Posn 1P 40A 600VAC PNLMTG 90Deg	...	1
...	2	...		...	207895	...	Insulator, Switch Power	...	1
...	3	...		...	179851	...	Knob, Pointer 1.670 Dia X .250 Id Push On W/Spring	...	1
...	4	...		...	251414	...	Panel, PC Card Front	...	1
...	5	...	PC15, PC20	...	244993	...	Circuit Card Assy, Stud Filter	...	2
...	6	...	FM	...	196313	...	Fan, Muffin 115V 50/60 Hz 3000 Rpm 6.378 Mtg Holes	...	2
...	7	...		...	210865	...	Terminal, pwr output red	...	1
...	8	...		...	244989	...	Circuit Card Assy, Vsense Filter	...	1
...	9	...		...	207897	...	Bus Bar, Output	...	2
...	10	...		...	025248	...	Stand-off, Insul .250-20 X 1.250 Lg X .437 Thd	...	2
...	11	...		...	210866	...	Terminal, pwr output black	...	1
...	12	...		...	249819	...	Panel, Front	...	1
...	13	...		...	186621	...	Boot, Generic	...	2

Item No.	Dia. Mkgs.	Part No.	Description	Quantity
Figure 16-6. Auto-Axcess E 450 Analog Front Panel Assembly (Fig 15-1 Item 17) (Continued)				
... 14		219843	... Label, Work Sense	1
... 15		207896	... Box, Louver	1
... 16	PB1, PB2, PB3	199443	... Switch, Pb Mc No Spst 10A 115VAC w/Blk Cap Panelmt	3
... 17		249680	... Nameplate, Front	1
... 18		210483	... Bracket, lift eye	1
... 19		245352	... Bolt, eye shld thd stem .500-13 X 4.000	1

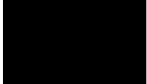
*Recommended Spare Parts.

+When ordering a component originally displaying a precautionary label, the label should also be ordered.

To maintain the factory original performance of your equipment, use only Manufacturer's Suggested Replacement Parts. Model and serial number required when ordering parts from your local distributor.

Notes

MATERIAL THICKNESS REFERENCE CHART

	24 Gauge (.025 in.)
	22 Gauge (.031 in.)
	20 Gauge (.037 in.)
	18 Gauge (.050 in.)
	16 Gauge (.063 in.)
	14 Gauge (.078 in.)
	1/8 in. (.125 in.)
	3/16 in. (.188 in.)
	1/4 in. (.25 in.)
	5/16 in. (.313 in.)
	3/8 in. (.375 in.)
	1/2 in. (.5 in.)

TRUE BLUE[®]

WARRANTY

Effective January 1, 2013

(Equipment with a serial number preface of MD or newer)

This limited warranty supersedes all previous Miller warranties and is exclusive with no other guarantees or warranties expressed or implied.

Warranty Questions?

Call
1-800-4-A-MILLER
for your local
Miller distributor.

Your distributor also gives
you ...

Service

You always get the fast,
reliable response you
need. Most replacement
parts can be in your
hands in 24 hours.

Support

Need fast answers to the
tough welding questions?
Contact your distributor.
The expertise of the
distributor and Miller is
there to help you, every
step of the way.

LIMITED WARRANTY – Subject to the terms and conditions below, Miller Electric Mfg. Co., Appleton, Wisconsin, warrants to its original retail purchaser that new Miller equipment sold after the effective date of this limited warranty is free of defects in material and workmanship at the time it is shipped by Miller. **THIS WARRANTY IS EXPRESSLY IN LIEU OF ALL OTHER WARRANTIES, EXPRESS OR IMPLIED, INCLUDING THE WARRANTIES OF MERCHANTABILITY AND FITNESS.**

Within the warranty periods listed below, Miller will repair or replace any warranted parts or components that fail due to such defects in material or workmanship. Miller must be notified in writing within thirty (30) days of such defect or failure, at which time Miller will provide instructions on the warranty claim procedures to be followed.

Miller shall honor warranty claims on warranted equipment listed below in the event of such a failure within the warranty time periods. All warranty time periods start on the delivery date of the equipment to the original end-user purchaser, and not to exceed one year after the equipment is shipped to a North American distributor or eighteen months after the equipment is shipped to an International distributor.

1. 5 Years Parts — 3 Years Labor
 - * Original Main Power Rectifiers Only to Include SCRs, Diodes, and Discrete Rectifier Modules
2. 3 Years — Parts and Labor
 - * Auto-Darkening Helmet Lenses (Except Classic Series) (No Labor)
 - * Engine Driven Welding Generators
(NOTE: Engines are Warranted Separately by the Engine Manufacturer.)
 - * Inverter Power Sources (Unless Otherwise Stated)
 - * Oxy-Fuel Cutting Torches (No Labor)
 - * Plasma Arc Cutting Power Sources
 - * Process Controllers
 - * Semi-Automatic and Automatic Wire Feeders
 - * Smith Series 30 Flowgauge, Flowmeter, and Pressure Regulators (No Labor)
 - * Transformer/Rectifier Power Sources
 - * Water Coolant Systems (Integrated)
3. 2 Years — Parts and Labor
 - * Auto-Darkening Helmet Lenses – Classic Series Only (No Labor)
 - * Fume Extractors – Filtrair 400 and Industrial Collector Series
4. 1 Year — Parts and Labor Unless Specified
 - * Automatic Motion Devices
 - * CoolBelt and CoolBand Blower Unit (No Labor)
 - * External Monitoring Equipment and Sensors
 - * Field Options
(NOTE: Field options are covered for the remaining warranty period of the product they are installed in, or for a minimum of one year — whichever is greater.)
 - * Flowgauge and Flowmeter Regulators (No Labor)
 - * RFCS Foot Controls (Except RFCS-RJ45)
 - * Fume Extractors – Filtrair 130, MWX and SWX Series
 - * HF Units
 - * ICE/XT Plasma Cutting Torches (No Labor)
 - * Induction Heating Power Sources, Coolers
(NOTE: Digital Recorders are Warranted Separately by the Manufacturer.)
 - * Load Banks
 - * Motor Driven Guns (except Spoolmate Spoolguns)
 - * PAPR Blower Unit (No Labor)
 - * Positioners and Controllers
 - * Racks
 - * Running Gear/Trailers
 - * Spot Welders
 - * Subarc Wire Drive Assemblies
 - * Water Coolant Systems (Non-Integrated)
 - * Weldcraft-Branded TIG Torches (No Labor)
 - * Wireless Remote Foot/Hand Controls and Receivers
 - * Work Stations/Weld Tables (No Labor)

5. 6 Months — Parts
 - * Batteries
 - * Bernard Guns (No Labor)
 - * Tregaskiss Guns (No Labor)
6. 90 Days — Parts
 - * Accessory (Kits)
 - * Canvas Covers
 - * Induction Heating Coils and Blankets, Cables, and Non-Electronic Controls
 - * M-Guns
 - * MIG Guns and Subarc (SAW) Guns
 - * Remote Controls and RFCS-RJ45
 - * Replacement Parts (No labor)
 - * Roughneck Guns
 - * Spoolmate Spoolguns

Miller's True Blue[®] Limited Warranty shall not apply to:

1. **Consumable components; such as contact tips, cutting nozzles, contactors, brushes, relays, work station table tops and welding curtains, or parts that fail due to normal wear. (Exception: brushes and relays are covered on all engine-driven products.)**
2. Items furnished by Miller, but manufactured by others, such as engines or trade accessories. These items are covered by the manufacturer's warranty, if any.
3. Equipment that has been modified by any party other than Miller, or equipment that has been improperly installed, improperly operated or misused based upon industry standards, or equipment which has not had reasonable and necessary maintenance, or equipment which has been used for operation outside of the specifications for the equipment.

MILLER PRODUCTS ARE INTENDED FOR PURCHASE AND USE BY COMMERCIAL/INDUSTRIAL USERS AND PERSONS TRAINED AND EXPERIENCED IN THE USE AND MAINTENANCE OF WELDING EQUIPMENT.

In the event of a warranty claim covered by this warranty, the exclusive remedies shall be, at Miller's option: (1) repair; or (2) replacement; or, where authorized in writing by Miller in appropriate cases, (3) the reasonable cost of repair or replacement at an authorized Miller service station; or (4) payment of or credit for the purchase price (less reasonable depreciation based upon actual use) upon return of the goods at customer's risk and expense. Miller's option of repair or replacement will be F.O.B., Factory at Appleton, Wisconsin, or F.O.B. at a Miller authorized service facility as determined by Miller. Therefore no compensation or reimbursement for transportation costs of any kind will be allowed.

TO THE EXTENT PERMITTED BY LAW, THE REMEDIES PROVIDED HEREIN ARE THE SOLE AND EXCLUSIVE REMEDIES. IN NO EVENT SHALL MILLER BE LIABLE FOR DIRECT, INDIRECT, SPECIAL, INCIDENTAL OR CONSEQUENTIAL DAMAGES (INCLUDING LOSS OF PROFIT), WHETHER BASED ON CONTRACT, TORT OR ANY OTHER LEGAL THEORY.

ANY EXPRESS WARRANTY NOT PROVIDED HEREIN AND ANY IMPLIED WARRANTY, GUARANTY OR REPRESENTATION AS TO PERFORMANCE, AND ANY REMEDY FOR BREACH OF CONTRACT TORT OR ANY OTHER LEGAL THEORY WHICH, BUT FOR THIS PROVISION, MIGHT ARISE BY IMPLICATION, OPERATION OF LAW, CUSTOM OF TRADE OR COURSE OF DEALING, INCLUDING ANY IMPLIED WARRANTY OF MERCHANTABILITY OR FITNESS FOR PARTICULAR PURPOSE, WITH RESPECT TO ANY AND ALL EQUIPMENT FURNISHED BY MILLER IS EXCLUDED AND DISCLAIMED BY MILLER.

Some states in the U.S.A. do not allow limitations of how long an implied warranty lasts, or the exclusion of incidental, indirect, special or consequential damages, so the above limitation or exclusion may not apply to you. This warranty provides specific legal rights, and other rights may be available, but may vary from state to state.

In Canada, legislation in some provinces provides for certain additional warranties or remedies other than as stated herein, and to the extent that they may not be waived, the limitations and exclusions set out above may not apply. This Limited Warranty provides specific legal rights, and other rights may be available, but may vary from province to province.

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Owner's Record

Please complete and retain with your personal records.

Model Name

Serial/Style Number

Purchase Date

(Date which equipment was delivered to original customer.)

Distributor

Address

City

State

Zip



For Service

Contact a *DISTRIBUTOR* or *SERVICE AGENCY* near you.

Always provide Model Name and Serial/Style Number.

Contact your Distributor for:

Welding Supplies and Consumables

Options and Accessories

Personal Safety Equipment

Service and Repair

Replacement Parts

Training (Schools, Videos, Books)

Technical Manuals (Servicing Information and Parts)

Circuit Diagrams

Welding Process Handbooks

To locate a Distributor or Service Agency visit
www.millerwelds.com or call 1-800-4-A-Miller

Contact the Delivering Carrier to:

File a claim for loss or damage during shipment.

For assistance in filing or settling claims, contact your distributor and/or equipment manufacturer's Transportation Department.

Miller Electric Mfg. Co.

An Illinois Tool Works Company
1635 West Spencer Street
Appleton, WI 54914 USA

International Headquarters-USA

USA Phone: 920-735-4505 Auto-Attended
USA & Canada FAX: 920-735-4134
International FAX: 920-735-4125

For International Locations Visit
www.MillerWelds.com

