



OM-257 675C

2013-05

**Processes**



MIG (GMAW) Welding

Pulsed MIG (GMAW-P)

Flux Cored (FCAW) Welding



Automatic Welding

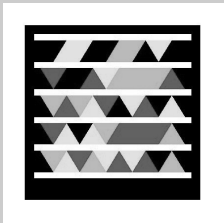
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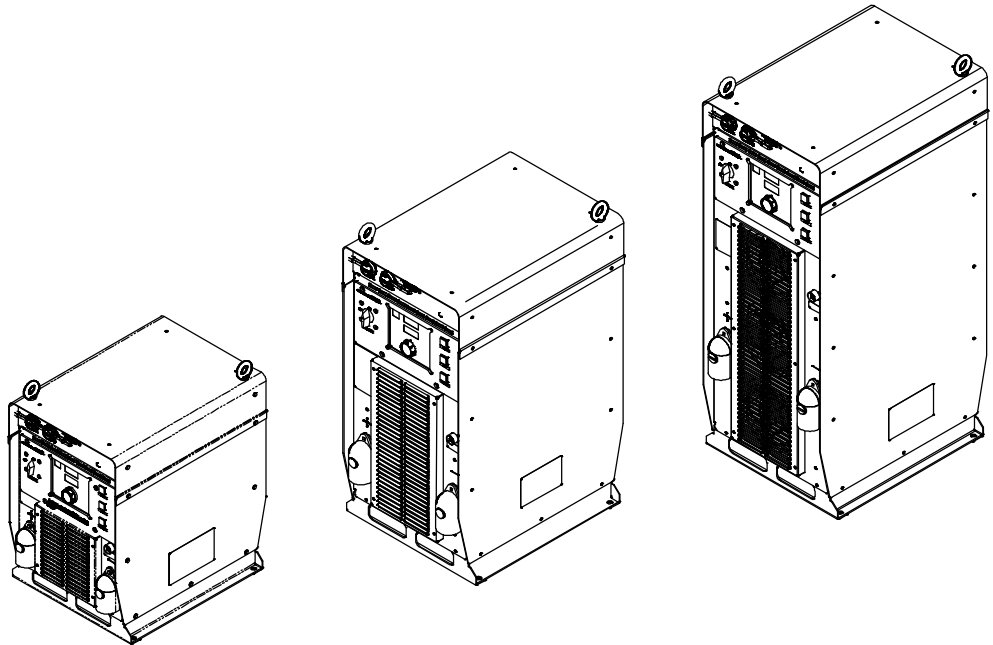
Automatic Welding Interface And Arc Welding Power Source

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# Auto-Axcess E Digital Welding Power Sources



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## OWNER'S MANUAL

File: Advanced Manufacturing Systems



# From Miller to You

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*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.

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

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](http://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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# SECTION 1 – SAFETY PRECAUTIONS - READ BEFORE USING

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 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.

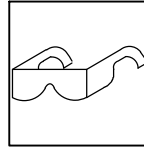


### WELDING can cause fire or explosion.

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 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.



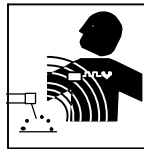
### FLYING METAL or DIRT can injure eyes.

- 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.



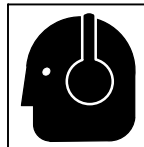
### BUILDUP OF GAS can injure or kill.

- 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.

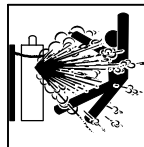
- Wearers of Pacemakers and other Implanted Medical Devices should keep away.
- Implanted Medical Device wearers should consult their doctor and the device manufacturer before going near arc welding, spot welding, gouging, plasma arc cutting, or induction heating operations.



### 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



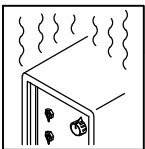
#### **FIRE OR EXPLOSION hazard.**

- 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.



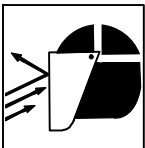
#### **FALLING EQUIPMENT can injure.**

- 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.



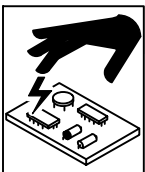
#### **OVERUSE can cause OVERHEATING**

- 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.



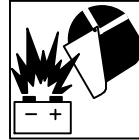
#### **MOVING PARTS can injure.**

- 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.



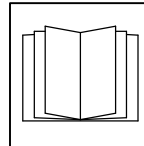
#### **BATTERY EXPLOSION can injure.**

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



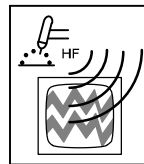
#### **MOVING PARTS can injure.**

- 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.



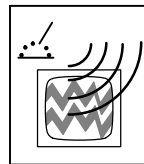
#### **READ INSTRUCTIONS.**

- 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](http://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](http://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](http://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](http://www.nfpa.org) and [www.sparky.org](http://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.cganet.com](http://www.cganet.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](http://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](http://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](http://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](http://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](http://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.

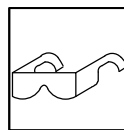
- Porter un casque de soudage approuvé muni de verres filtrants appropriés pour protéger visage et yeux pour protéger votre visage et vos yeux pendant le soudage ou pour regarder (voir ANSI Z49.1 et Z87.1 énuméré dans les normes de sécurité).
- Porter des lunettes de sécurité avec écrans latéraux même 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 soudage. 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 homologués.
- 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 le 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 METAL 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.



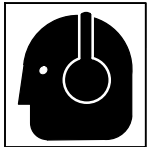
### LES ACCUMULATIONS DE GAZ risquent de provoquer des blessures ou même la mort.

- 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.

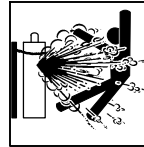
- Les porteurs de stimulateurs cardiaques et autres implants médicaux doivent rester à distance.
- Les porteurs d'implants médicaux doivent consulter leur médecin et le fabricant du dispositif avant de s'approcher de la zone où se déroule du soudage à l'arc, du soudage par points, du gougeage, de la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

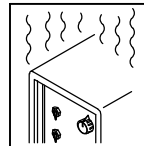
- Protéger les bouteilles de gaz comprimé d'une chaleur excessive, des chocs mécaniques, des dommages physiques, du laitier, des flammes ouvertes, des étincelles et des arcs.
- Placer les bouteilles debout en les fixant dans un support stationnaire ou dans un porte-bouteilles pour les empêcher de tomber 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.



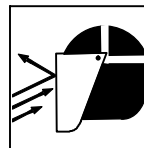
### L'EMPLOI EXCESSIF peut SURCHAUFFER L'ÉQUIPEMENT.

- 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.



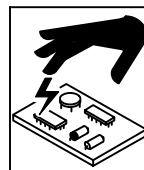
### LA CHUTE DE L'ÉQUIPEMENT peut provoquer des blessures.

- 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.



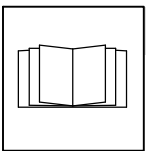
### L'EXPLOSION DE LA BATTERIE peut provoquer des blessures.

- 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.



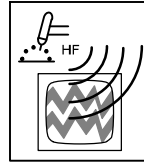
### Les PIÈCES MOBILES peuvent causer des blessures.

- 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.

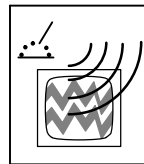
- Lire et appliquer les instructions sur les étiquettes et le Mode d'emploi avant l'installation, l'utilisation ou l'entretien de l'appareil. Lire les informations de sécurité au début du manuel et dans chaque section.
- N'utiliser que les pièces de rechange recommandées par le constructeur.
- Effectuer 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](http://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](http://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](http://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](http://www.nfpa.org) and [www.sparky.org](http://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.cganet.com](http://www.cganet.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](http://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](http://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](http://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](http://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](http://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.



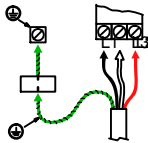




## SECTION 3 – DEFINITIONS


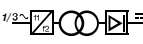



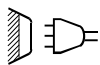





### 3-1. Additional Safety Symbols And Definitions

Some symbols are found only on CE products.

	Warning! Watch Out! There are possible hazards as shown by the symbols.	Safe1 2012-05
	When power is applied failed parts can explode or cause other parts to explode.	Safe26 2012-05
	Always connect green, Or green with yellow stripe, wire to supply grounding terminal. Connect black, white, and red wires (L1, L2, L3) to line terminals.	Safe101 2012-05

### 3-2. Miscellaneous Symbols And Definitions

Some symbols are found only on CE products.

	Three Phase Static Frequency Converter-Transformer-Rectifier		Single / Three Phase Static Frequency Converter-Transformer-Rectifier	<b>A</b>	Amperes	<b>V</b>	Volts
	Protective Earth (Ground)	<b>I<sub>2</sub></b>	Maximum Effective Supply Current		Gas Metal Arc Welding (GMAW)	<b>%</b>	Percent
<b>S</b>	Suitable For Welding In An Environment With Increased Risk Of Electric Shock		Constant Voltage		Power Connection	<b>IP</b>	Degree Of Protection
<b>X</b>	Duty Cycle	<b>I<sub>1max</sub></b>	Rated Maximum Supply Current	<b>I<sub>1eff</sub></b>	Maximum Effective Supply Current		Direct Current (DC)
<b>U<sub>0</sub></b>	Rated No-Load Voltage (Average)	<b>U<sub>1</sub></b>	Input Voltage	<b>U<sub>2</sub></b>	Load Voltage		Alternating Current (AC)
<b>1</b> 	Single Phase	<b>3</b> 	Three Phase	<b>1/3</b> 	Single / Three Phase		



# SECTION 4 – SPECIFICATIONS FOR AUTO-AXCESS E 300 DIGITAL

## 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. Power Source Functionality

This power source is designed with the necessary functionality to integrate into a robot controller or PIC (Peripheral Interface Controller) that operate using either DeviceNet or Ethernet communications.

## 4-3. Unit Specifications

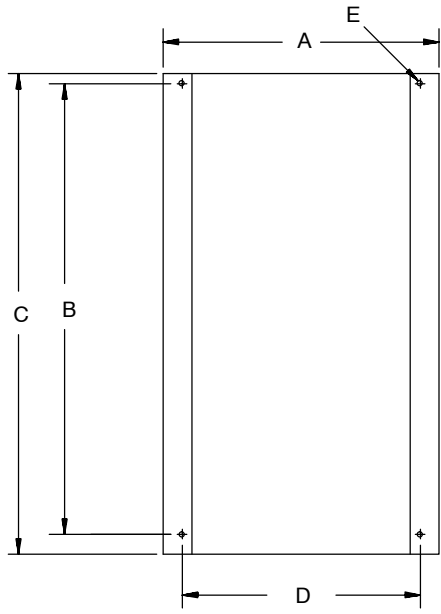
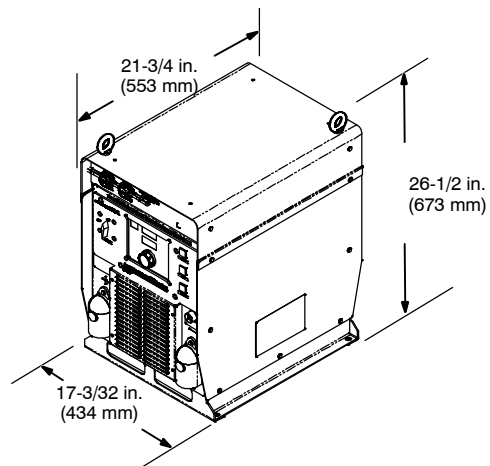
Input Power	Rated Welding Output	Voltage Range	Wire Feed Speed Range**	Wire Diameter Range	Max Open Circuit Voltage DC	Amperes Input At Rated Load Output 60 Hz, Single-Phase/Three-Phase						Input kVA	Input KW
						208 V	230 V	380V	400V	460 V	575 V		
Single Phase	175 A @ 22.8 V DC, 100% Duty Cycle	10-44	Standard: 50-1400 ipm (1.3-35.6 mpm)	.035-.062 in. (0.8-1.6 mm)	80	25.3 (0-1A*)	23.0 (0-1A*)	13.5 (0-1A*)	12.8 (0-1A*)	10.9 (0-1A*)	8.6 (0-1A*)	5.3 (0.2*)	4.9 (0.04*)
Three Phase	225 A @ 25.3 V DC, 100% Duty Cycle					19.9 (0-1A*)	17.8 (0-1A*)	10.9 (0-1A*)	10.3 (0-1A*)	9.0 (0-1A*)	7.3 (0-1A*)	7.1 (0.2*)	6.8 (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.

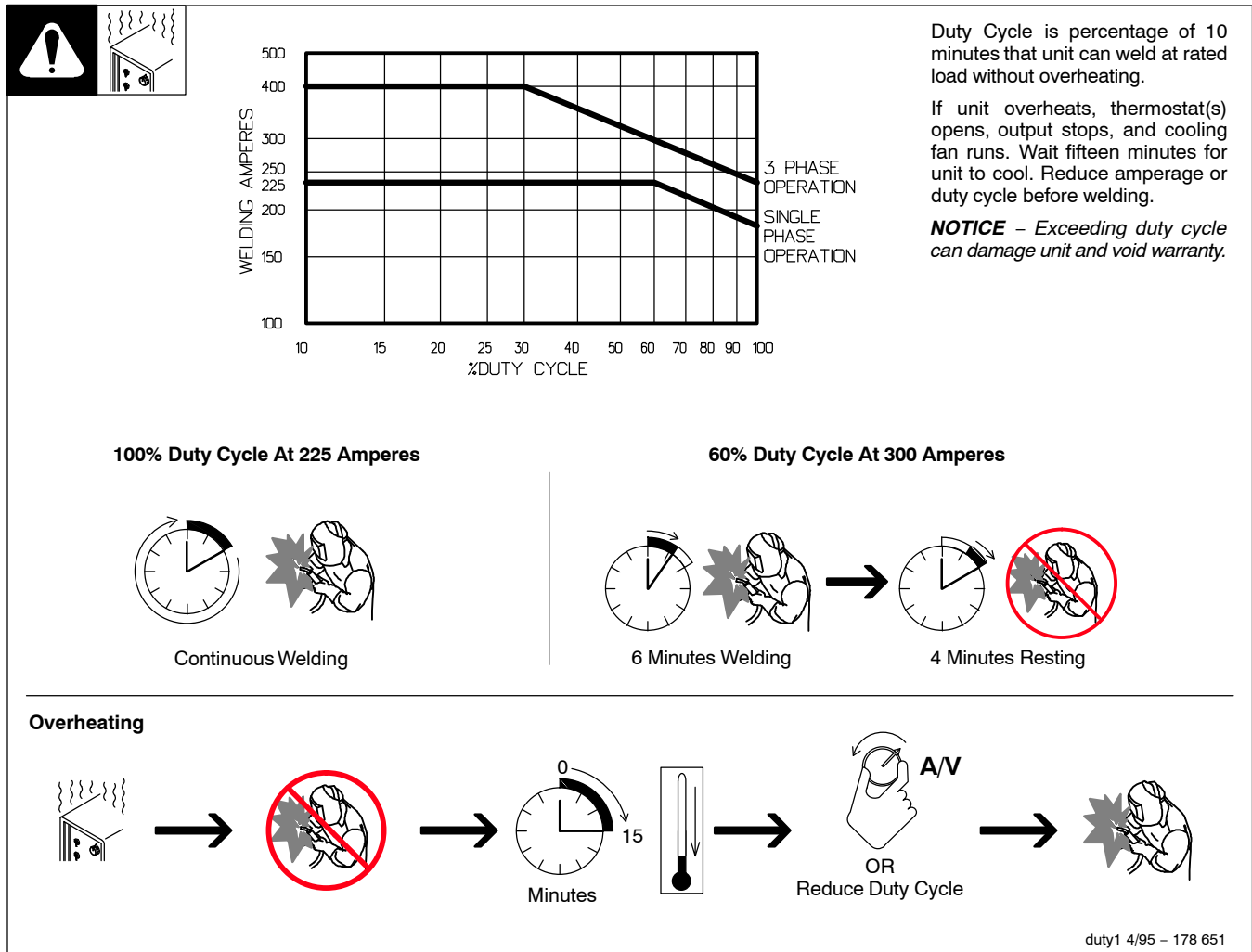
## 4-4. Dimensions And Weight

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-A

## 4-5. Duty Cycle And Overheating

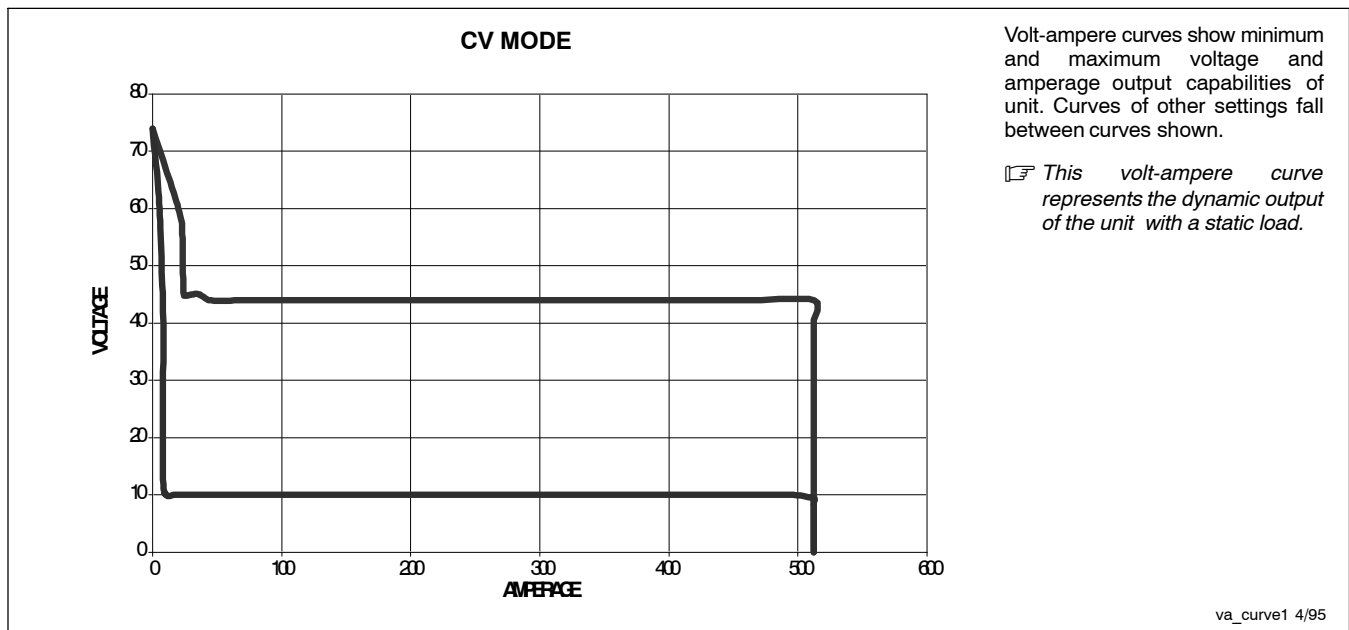


Duty Cycle is percentage of 10 minutes that unit can weld at rated load without overheating.

If unit overheats, thermostat(s) opens, output stops, and cooling fan runs. Wait fifteen minutes for unit to cool. Reduce amperage or duty cycle before welding.

**NOTICE** – Exceeding duty cycle can damage unit and void warranty.

## 4-6. Volt-Ampere Curves



## 4-7. 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 branch circuit sized for the rated output and duty cycle of the welding power source.

**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 Single Phase					
<b>Input Voltage (V)</b>	208	230	380	400	460	575
<b>Input Amperes (A) At Rated Output</b>	25.3	23.0	13.5	12.8	10.9	8.6
<b>Max Recommended Standard Fuse Rating In Amperes<sup>1</sup></b>						
<b>Time-Delay Fuses<sup>2</sup></b>	30	25	15	15	10	10
<b>Normal Operating Fuses<sup>3</sup></b>	40	35	20	20	15	15
<b>Min Input Conductor Size In AWG<sup>4</sup></b>	10	10	14	14	14	14
<b>Max Recommended Input Conductor Length In Feet (Meters)</b>	108 (33)	132 (40)	141 (43)	156 (48)	207 (63)	323 (99)
<b>Min Grounding Conductor Size In AWG<sup>4</sup></b>	10	10	14	14	14	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 amp), and UL class "H" (65 amp 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.

	50/60 Hz Three Phase					
<b>Input Voltage (V)</b>	208	230	380	400	460	575
<b>Input Amperes (A) At Rated Output</b>	19.9	17.8	10.9	10.3	9.0	7.3
<b>Max Recommended Standard Fuse Rating In Amperes<sup>1</sup></b>						
<b>Time-Delay Fuses<sup>2</sup></b>	20	20	10	10	10	8
<b>Normal Operating Fuses<sup>3</sup></b>	30	25	15	15	15	10
<b>Min Input Conductor Size In AWG<sup>4</sup></b>	12	12	14	14	14	14
<b>Max Recommended Input Conductor Length In Feet (Meters)</b>	94 (29)	116 (35)	204 (62)	226 (69)	299 (91)	467 (142)
<b>Min Grounding Conductor Size In AWG<sup>4</sup></b>	12	12	14	14	14	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 amp), and UL class "H" (65 amp 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.


## 4-8. 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.



# SECTION 5 – SPECIFICATIONS FOR AUTO-AXCESS E 450 DIGITAL

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

## 5-1. 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.

## 5-2. Power Source Functionality

This power source is designed with the necessary functionality to integrate into a robot controller or PIC (Peripheral Interface Controller) that operate using either DeviceNet or Ethernet communications.

## 5-3. Unit Specifications

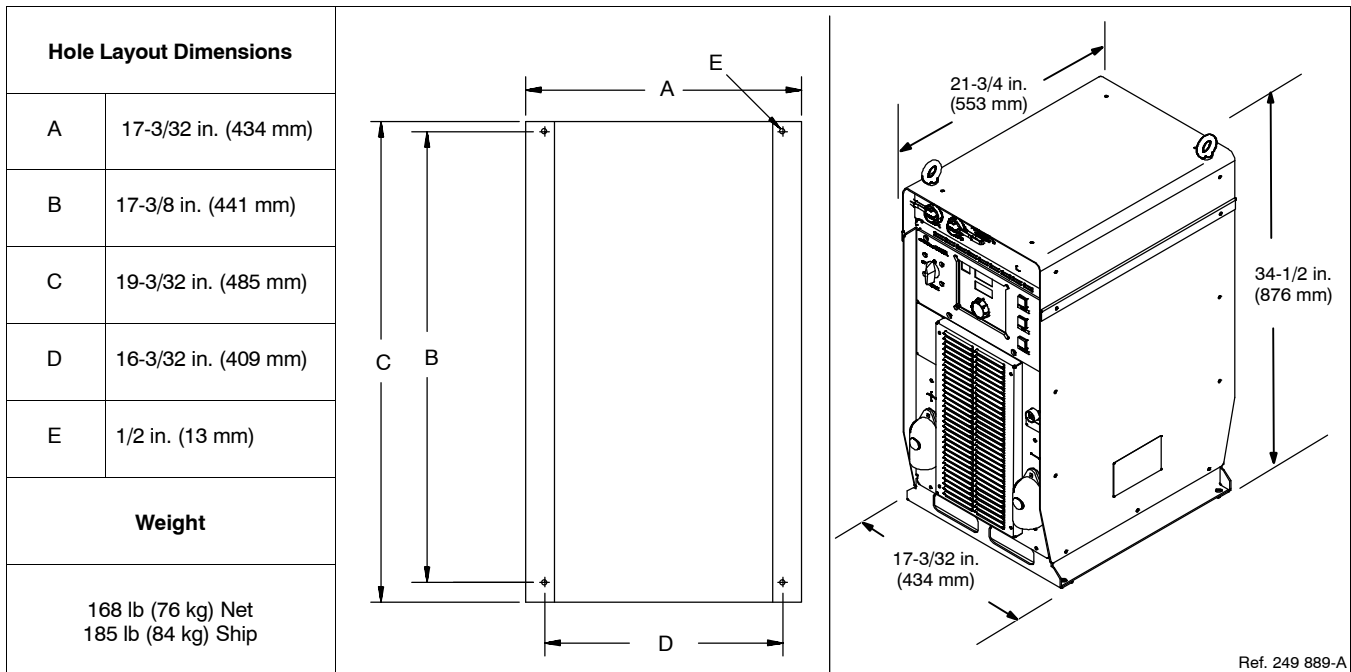
### A. Specifications

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
						208 V	230 V	380 V	400 V	460 V	575 V		
Three Phase	450 A @ 36.5 V DC, 100% Duty Cycle	10-44	Standard: 50-1400 ipm (1.3-35.6 mpm)	.035-.062 in. (0.8-1.6 mm)	80	54.0 (0-1A*)	49.0 (0-1A*)	29.0 (0-1A*)	28.0 (0-1A*)	24.0 (0-1A*)	19.0 (0-1A*)	19.9 (0.8*)	19.2 (0.17*)

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

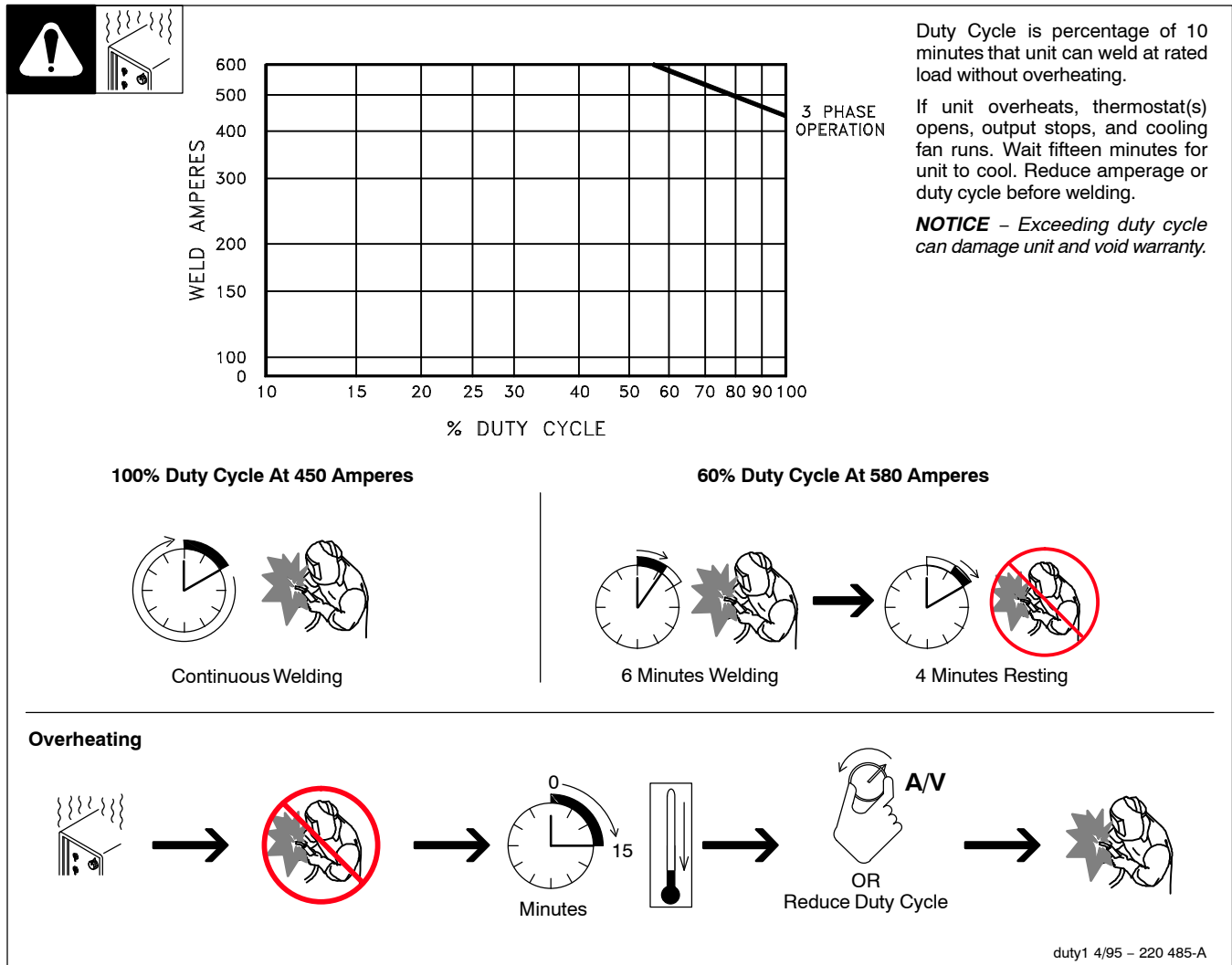
\*\*Wire feed speed ranges are for GMAW welding. While pulse welding, wire feed speed ranges may be more limited.

## 5-4. Dimensions And Weight

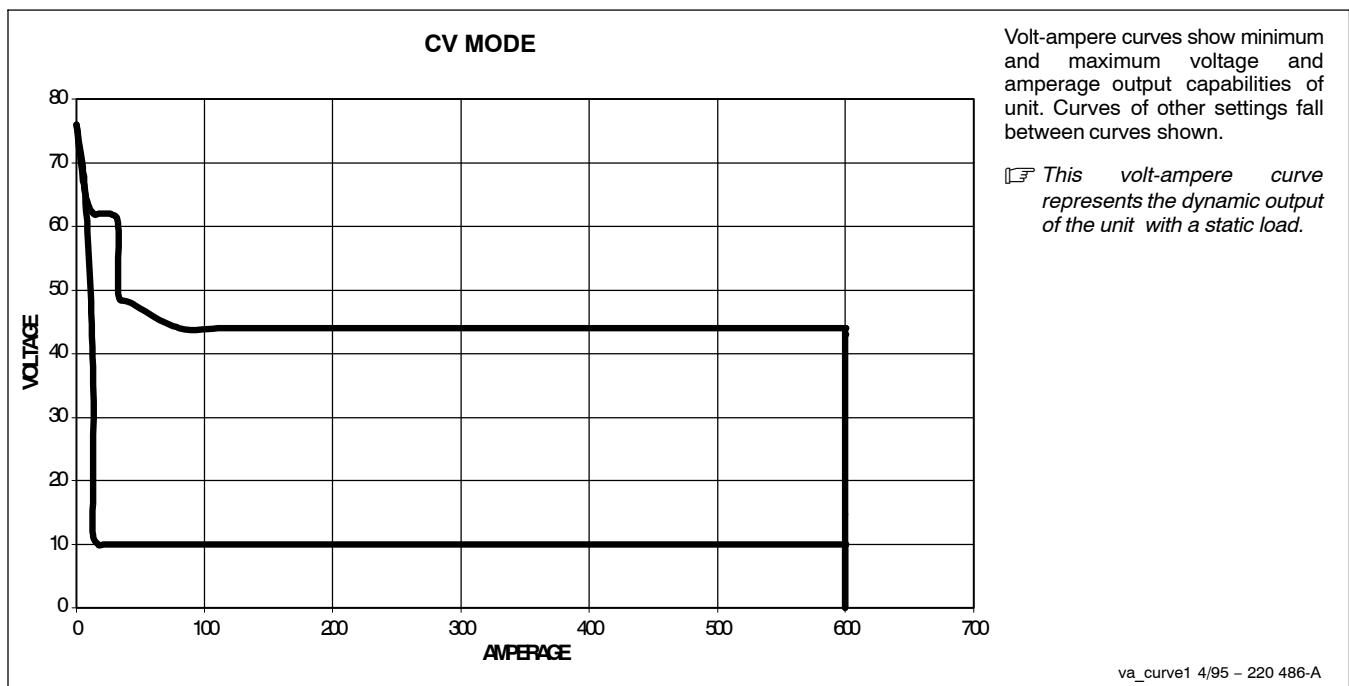


**E450 Spec**

## 5-5. Duty Cycle And Overheating



## 5-6. Volt-Ampere Curves










# SECTION 6 – SPECIFICATIONS FOR AUTO-AXCESS E 675 DIGITAL

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

## 6-1. 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.

## 6-2. Power Source Functionality

This power source is designed with the necessary functionality to integrate into a robot controller or PIC (Peripheral Interface Controller) that operate using either DeviceNet or Ethernet communications.

## 6-3. Unit Specifications

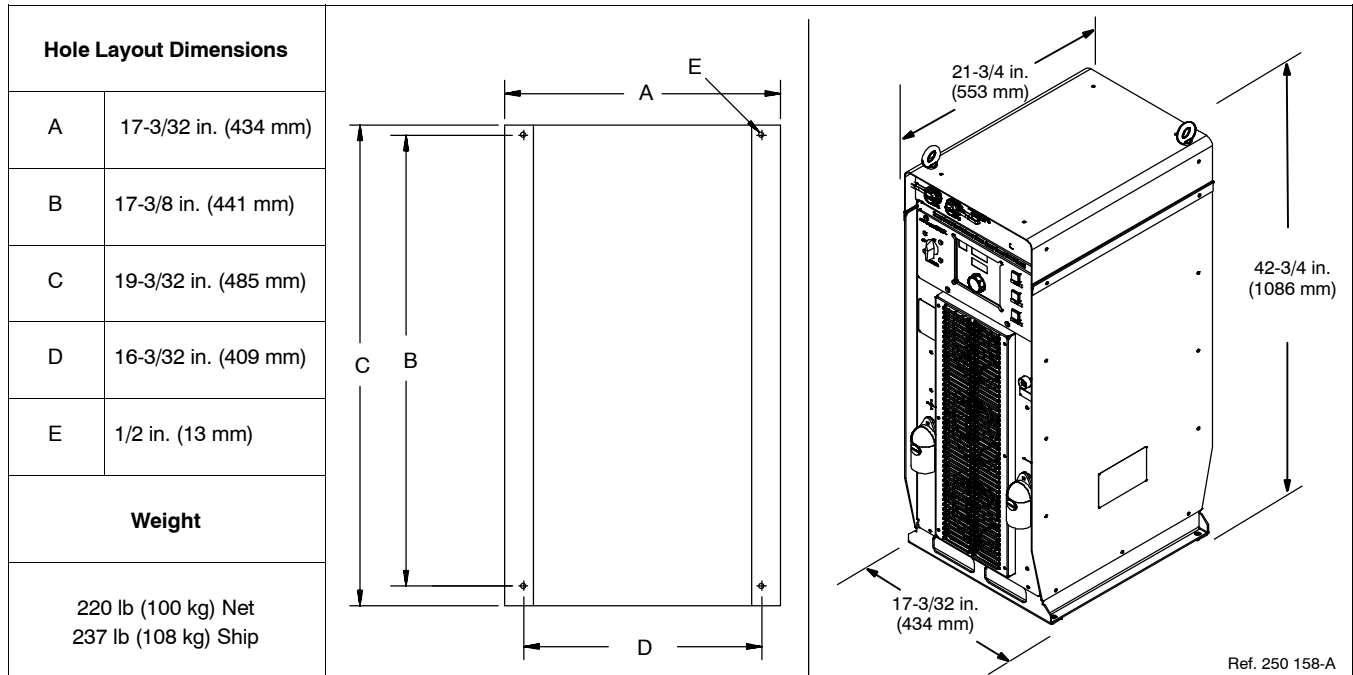
Input Power	Rated Welding Output	Voltage Range	Wire Feed Speed Range**	Wire Diameter Range	Max Open Circuit Voltage DC	Amperes Input At Rated Load Output 60 Hz, Three-Phase				Input KVA	Input KW	IP Rating
						230 V	400V	460 V	575 V			
Three Phase	675 A @ 44 V DC, 100% Duty Cycle	10-44	Standard: 50-1400 ipm (1.3-35.6 mpm)	.035-.062 in. (0.8-1.6 mm)	80	89 (0-1A*)	50 (0-1A*)	44 (0-1A*)	35 (0-1A*)	35.5 (0.8*)	34 (0.17*)	IP21S†

\*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.

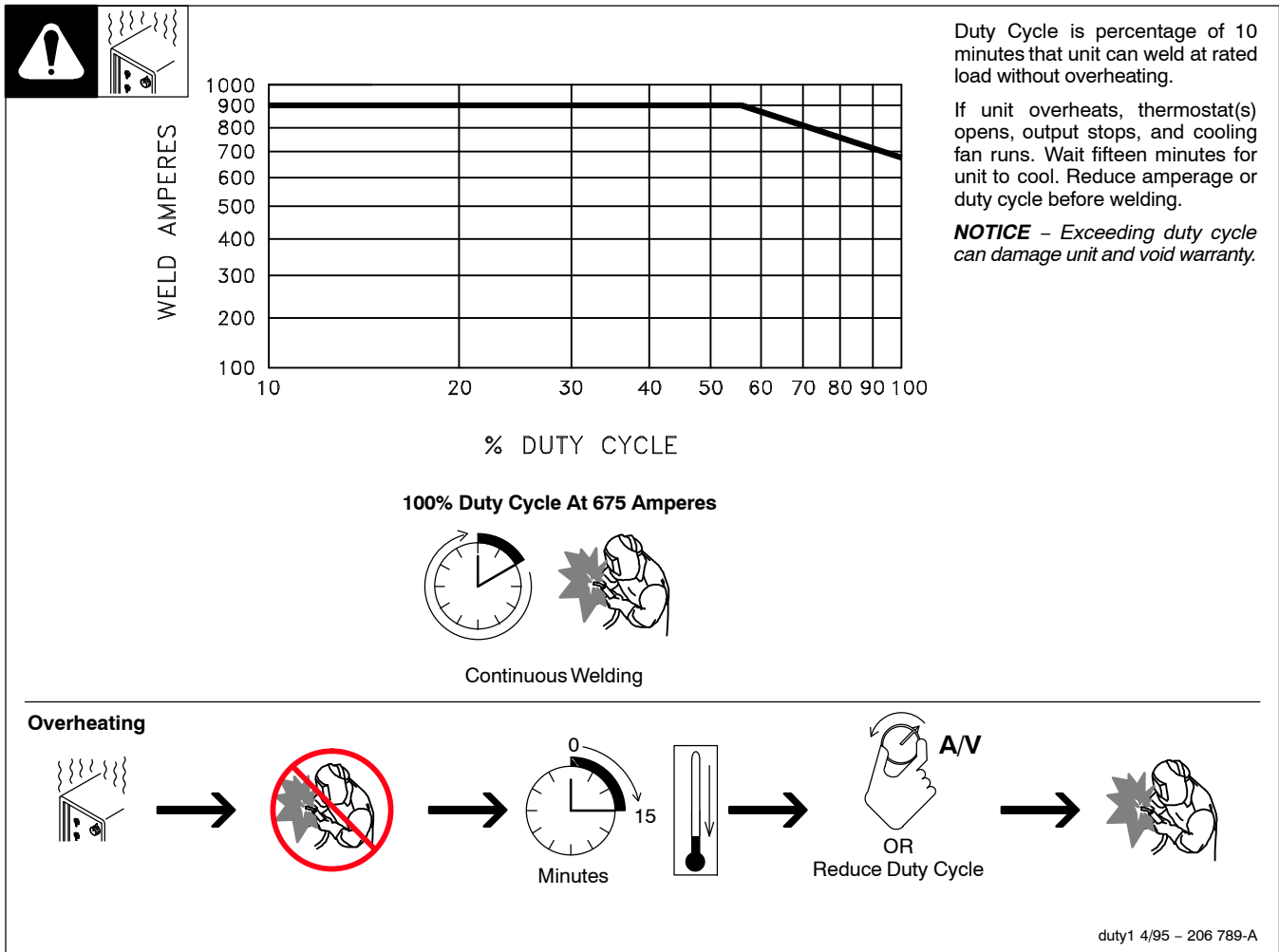
†This equipment is designed for indoor use and is not intended to be used or stored outside.

## 6-4. Dimensions And Weight

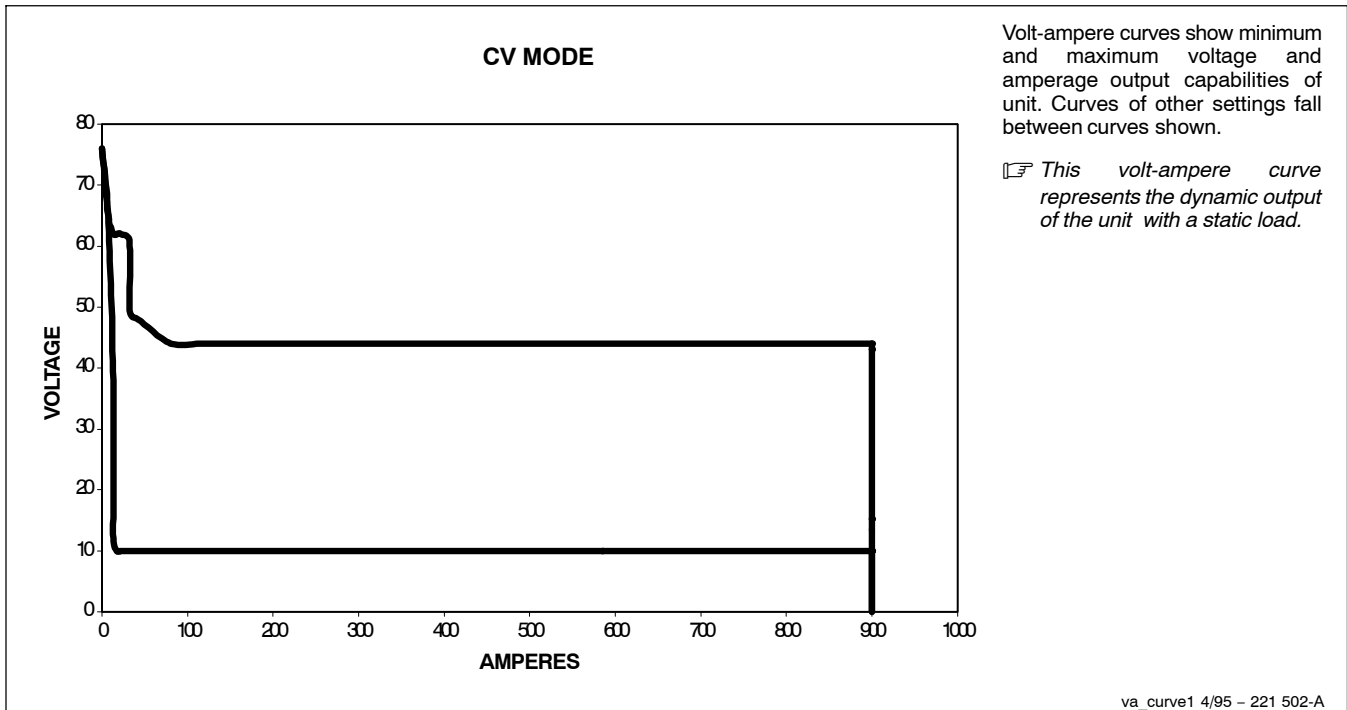


**E675 Spec**

## 6-5. Duty Cycle And Overheating



## 6-6. Volt-Ampere Curves



## 6-7. 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 branch circuit sized for the rated output and duty cycle of the welding power source.

**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.

Input Voltage (V)	60 Hz Three Phase			
	230	400	460	575
Input Amperes (A) At Rated Output	89	50	44	35
Max Recommended Standard Fuse Rating In Amperes <sup>1</sup>				
Time-Delay Fuses <sup>2</sup>	110	60	50	40
Normal Operating Fuses <sup>3</sup>	125	80	70	50
Min Input Conductor Size In AWG <sup>4</sup>	3	6	8	8
Max Recommended Input Conductor Length In Feet (Meters)	173 (53)	275 (84)	231 (70)	361 (110)
Min Grounding Conductor Size In AWG <sup>4</sup>	6	8	8	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.

## 6-8. 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.

## Notes

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
**E675 Spec**




# SECTION 7 – 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.

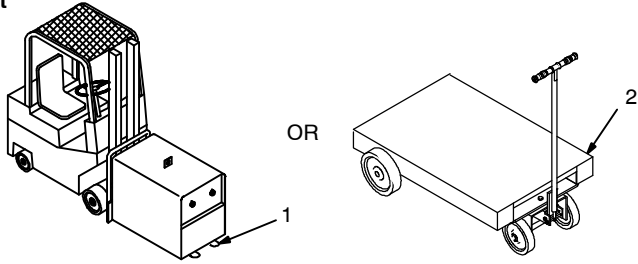
# SECTION 8 – GENERAL INSTALLATION

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


## 8-1. Selecting A Location




**Movement**




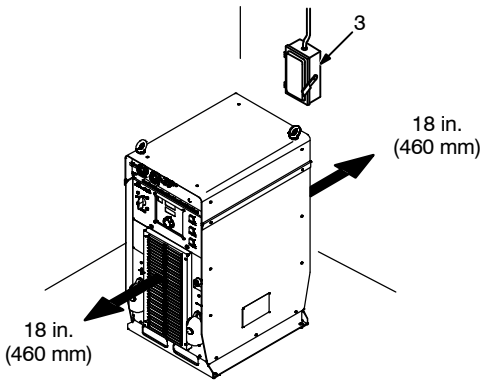
**Tipping**


 **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.**

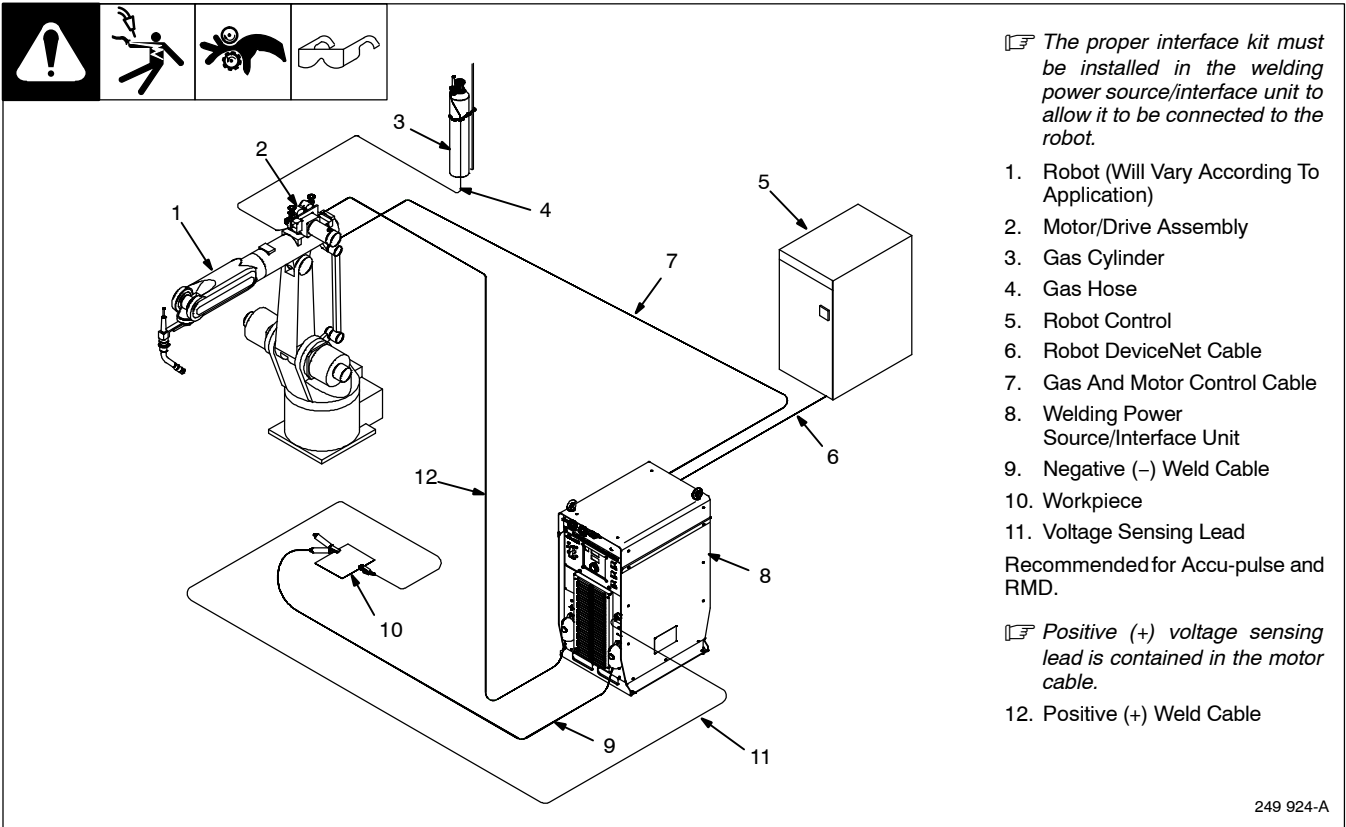


 **Do not stack units. Beware of tipping.**

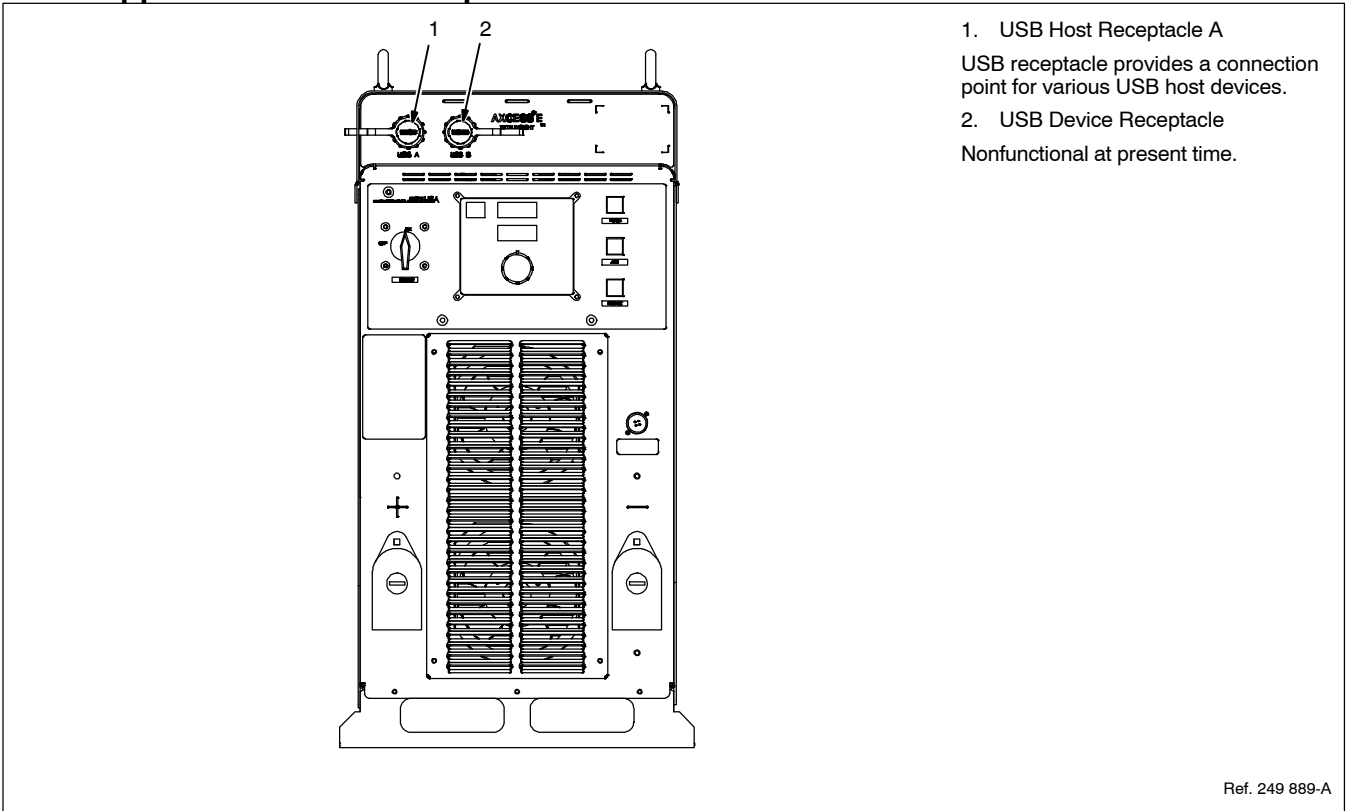
1. Lifting Forks  
Use lifting forks to move unit.  
Extend forks beyond opposite side of unit.
2. Hand Cart  
Use cart or similar device to move unit.
3. Line Disconnect Device  
Locate unit near correct input power supply.

loc\_2 3/96 -Ref. 249 889-A

## 8-2. Connection Diagram

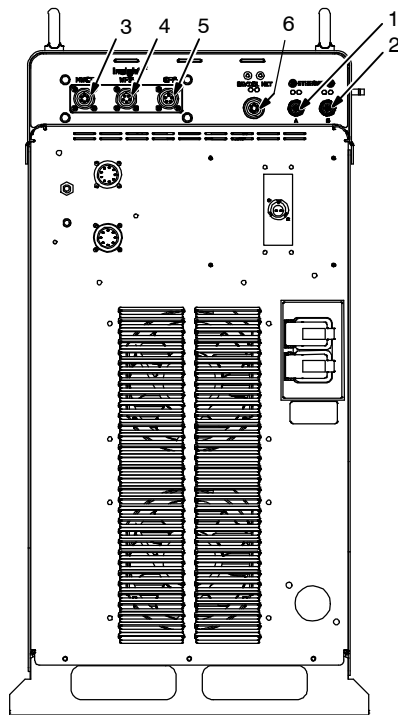


## 8-3. Upper Front Panel Receptacles





## 8-4. Upper Rear Panel Receptacles



1. Ethernet Receptacle Port A
2. Ethernet Receptacle Port B

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

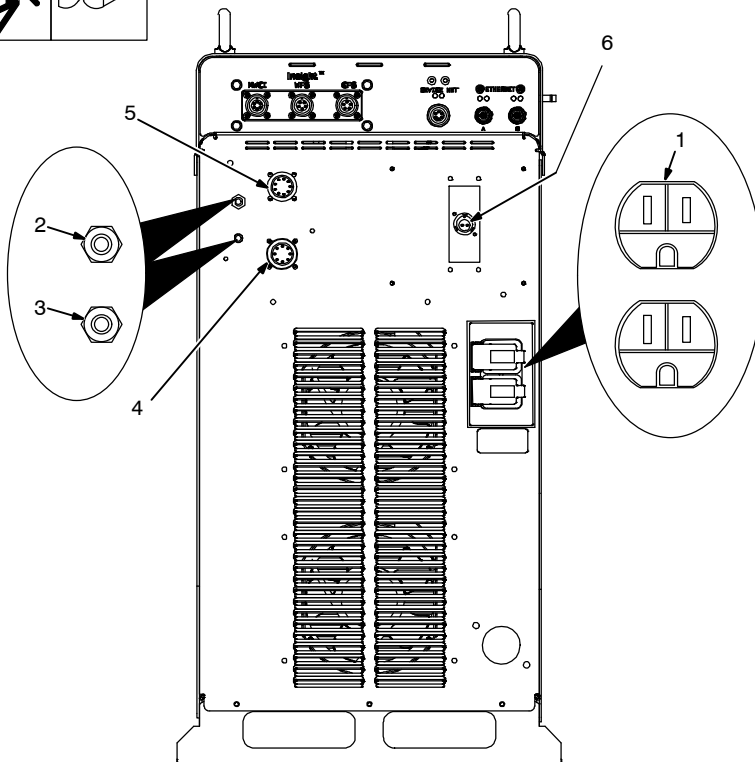
Ethernet receptacles provide a connection for a network cable, a laptop PC, robot controller, PIC controller, or ADAM module.

3. Optional MWCI Receptacle
4. Optional WFS (Wire Feed Sensor) Receptacle
5. Optional GFS (Gas Flow Sensor) Receptacle
6. DeviceNet Receptacle

DeviceNet allows the welding power source to be connected into a DeviceNet network.

Ref. 258 604-A

## 8-5. 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 8-2 and 8-8 for additional information).

5. Peripheral Receptacle RC25

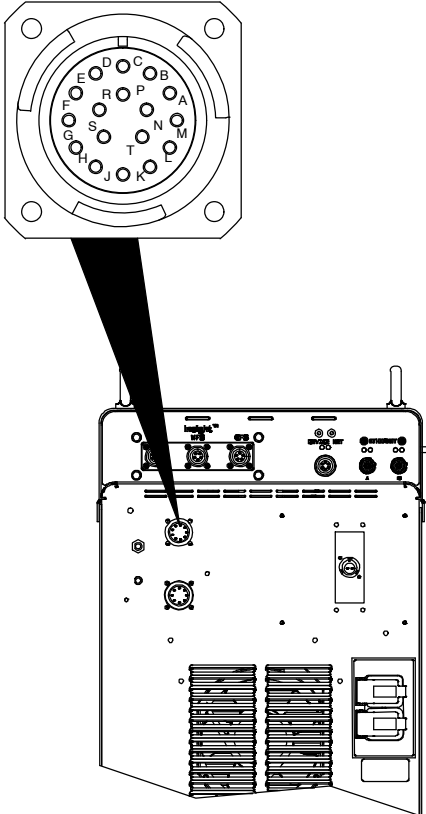
Receptacle provides connection to touch sensor and programmable I/O relay circuitry.

6. E-Stop Receptacle RC72

A short across the two sockets allows unit to weld.

Ref. 258 604-A

## 8-6. Peripheral Receptacle RC16 Functions

	Socket	Socket Information
	A	Output common
	B	Digital output 1 (DO1)
	C	Digital output 2 (DO2)
	D	Digital output 3 (DO3)
	E	Digital output 4 (DO4)
	F	Chassis ground
	G	Input common
	H	Request to turn on Touch Sense (DI1)
	J	Digital input 2 (DI2)
	K	Digital input 3 (DI3)
	L	Digital input 4 (DI4)
	M	Digital input 5 (DI5)
	N	Touched hardware signal
	P	Arc current out – 1 volt per 100 amperes
	R	Arc voltage out – 1 volt per 10 volts
	S	Digital output 5 (DO5)
T	Digital input 7 (DI7)	

Ref. 258 604-A

## 8-7. 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.

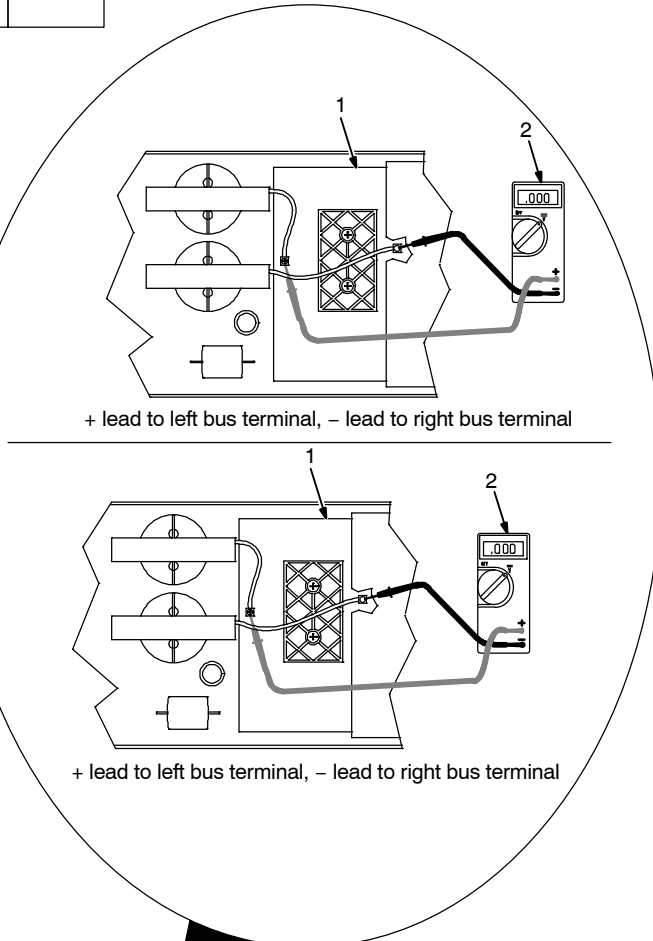
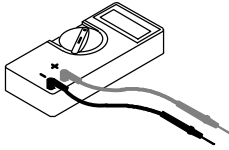


## 8-9. Measuring Input Capacitor Voltage

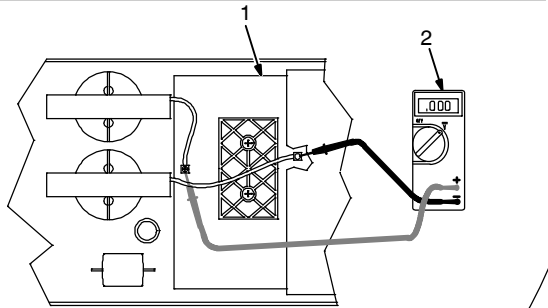


Tools Needed:

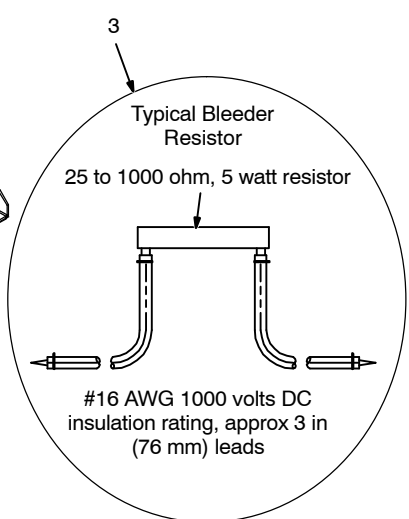
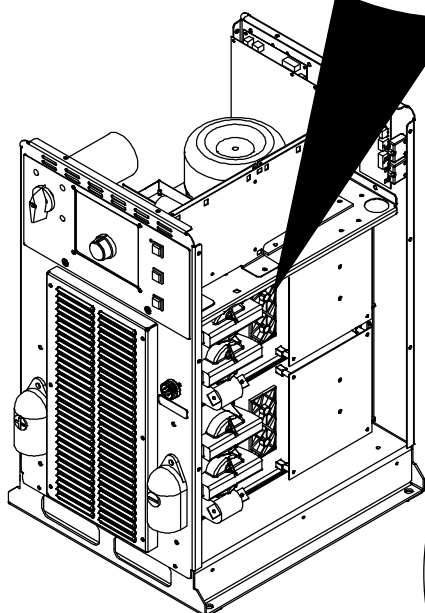
 5/16 in.



+ 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.

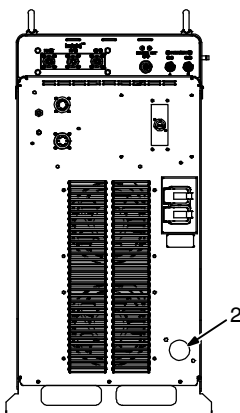
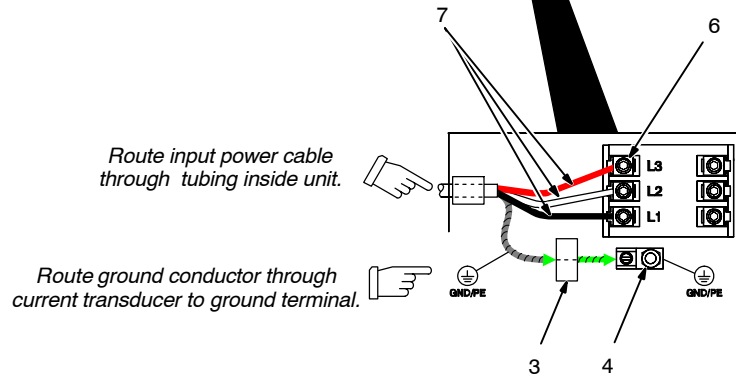
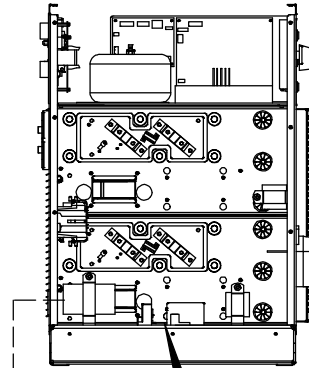
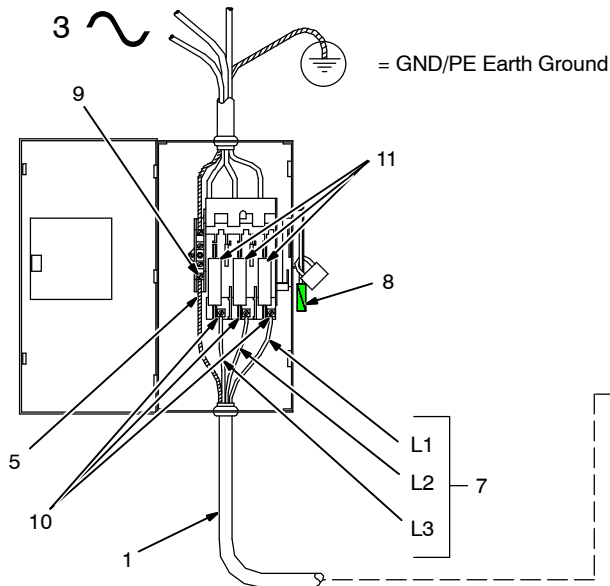
3. Typical Bleeder Resistor

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

Proceed with job inside unit. Reinstall cover when finished.



## 8-10. Connecting 3-Phase Input Power



Tools Needed:



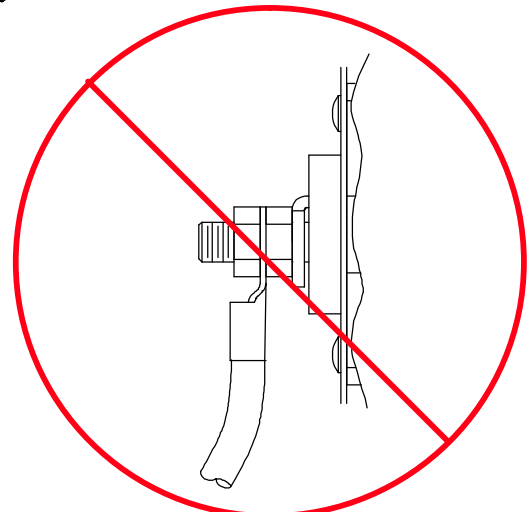
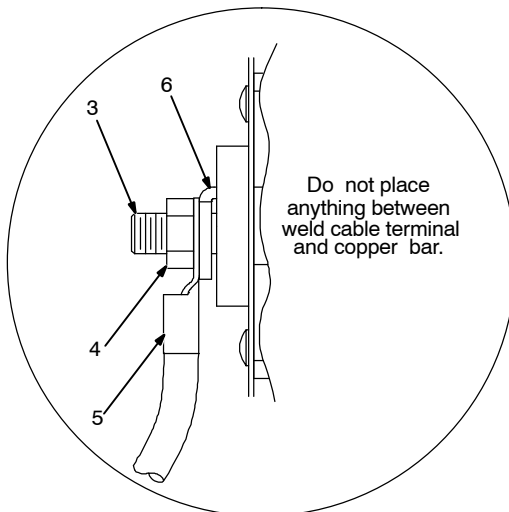
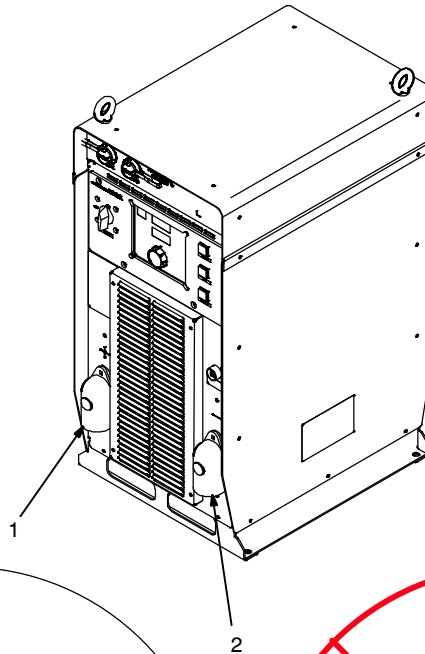


# SECTION 9 – RECOMMENDED SETUP PROCEDURES

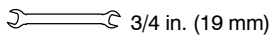
## 9-1. Connecting To Weld Terminals



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



Tools Needed:



3/4 in. (19 mm)

Correct Installation

Incorrect Installation

249 889-A

**⚠ 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 9-2 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


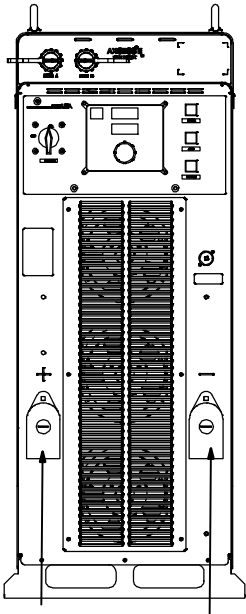
6. Copper Bar

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.**



## 9-2. 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.

 <p><b>Weld Output Terminals</b></p> <p><b>⚠ Turn off power before connecting to weld output terminals.</b></p> <p><b>⚠ Do not use worn, damaged, undersized, or poorly spliced cables.</b></p>	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)
	Welding Amperes**	10 – 60% Duty Cycle	60 – 100% Duty Cycle	10 – 100% Duty Cycle					
 <p>Positive +      Negative -</p> <p>Ref. 250 158-A</p>	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.  
( ) = mm<sup>2</sup> for metric use




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

S-0007-E

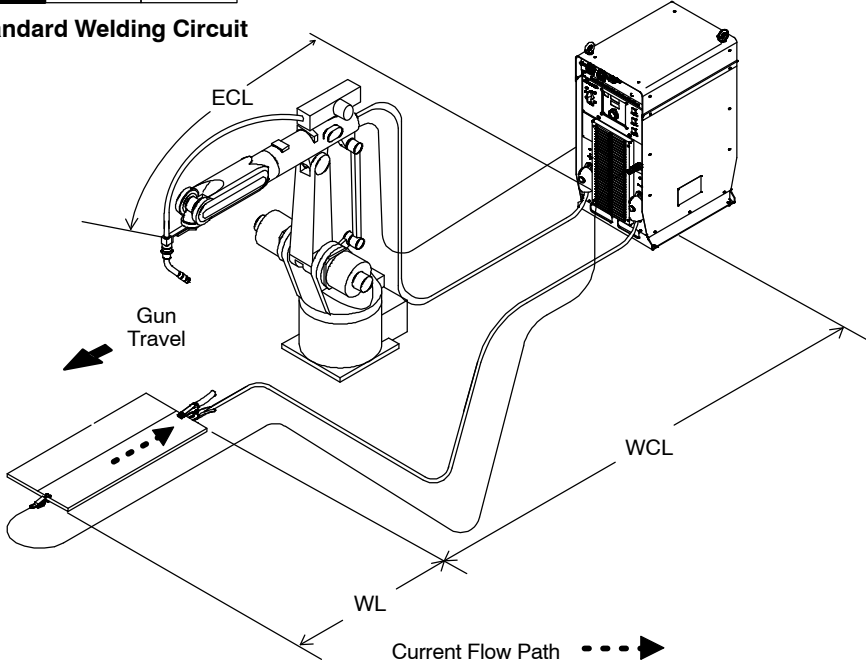


## 9-5. Welding Circuit

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

### Standard Welding Circuit



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

In pulse welding applications using inverter power sources, cable resistance can result in less than satisfactory performance. In most cases, a welding circuit length of 50 ft (15 m) or less will provide satisfactory performance with a standard welding circuit connection.

The length of a welding circuit is determined as follows:

Welding Circuit = Electrode Cable Length (ECL) + Work Cable Length (WCL) + Workpiece Length (WL)

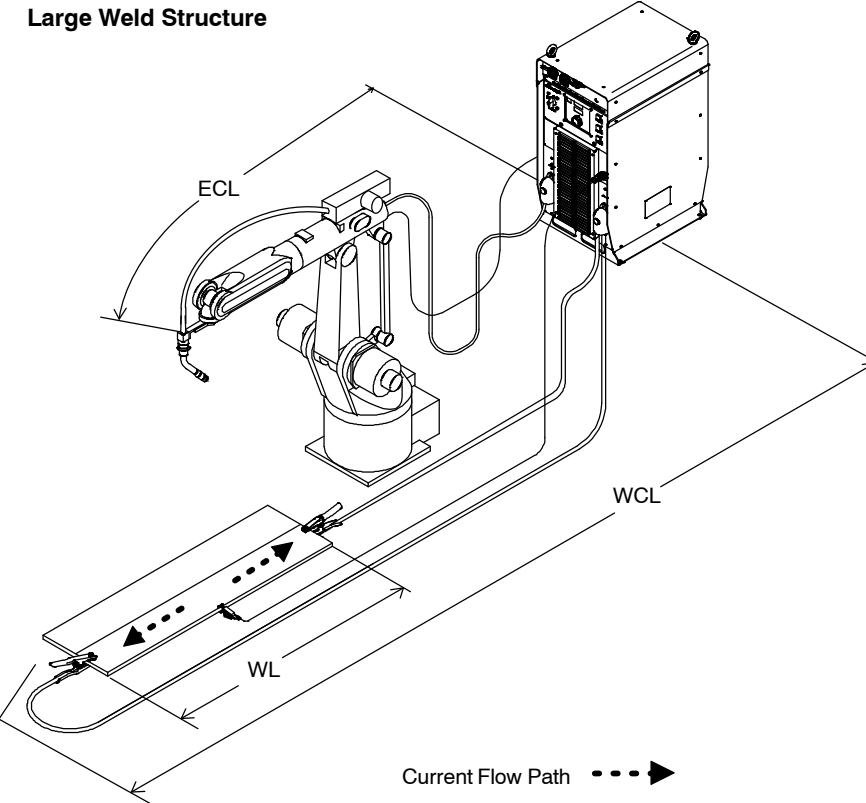
See Section 9-2 for weld cable size.

Variations in welding processes and welding circuit resistance can affect apparent voltage at the welding arc. Voltage sensing can improve welding performance by providing accurate feedback to the welding power source.

It is important to connect the voltage sensing lead as near to the weld as possible, but not in the return current path.

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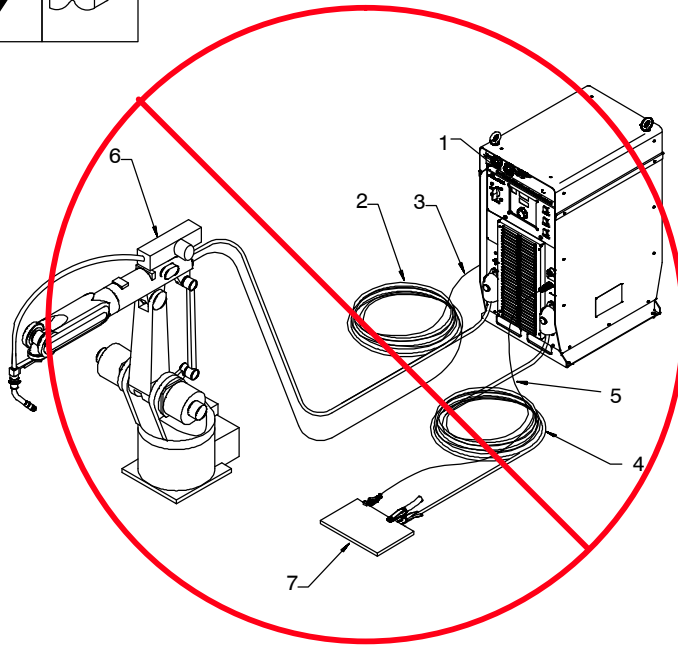
### Large Weld Structure



## 9-6. Arranging Welding Cables To Reduce Welding Circuit Inductance



**Bad**



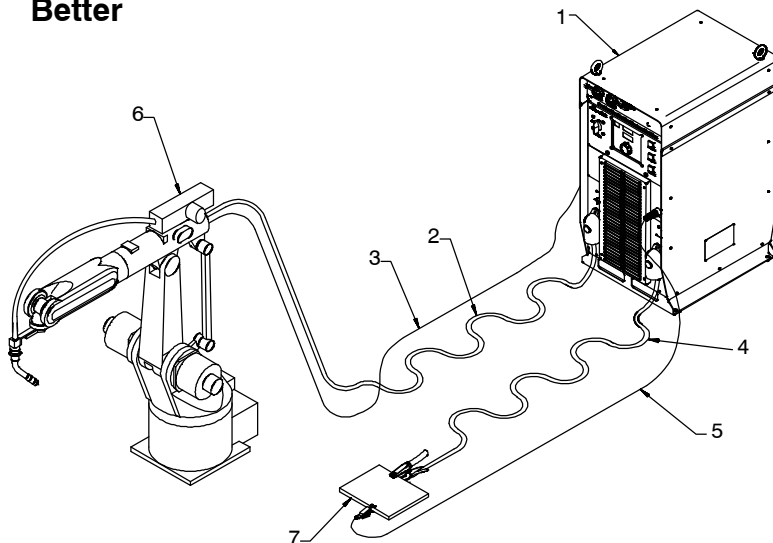
1. Welding Power Source
2. Electrode Cable
3. Feeder Cable
4. Work Cable
5. Voltage Sensing Lead
6. Robot
7. Workpiece

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.

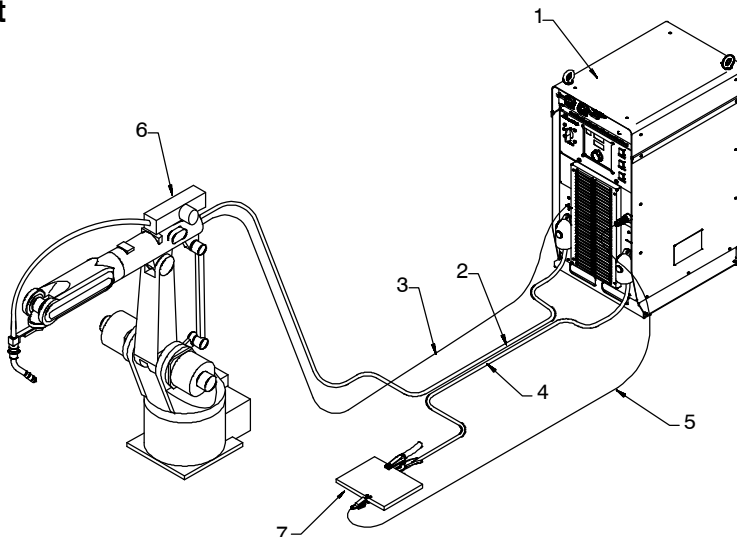
The Vsense option can be turned On or Off in the Setup menu or by using the web pages. The electrode sense lead is contained in the feeder control cable and compensates for voltage drop in all semi-automatic processes when the Vsense option is On. The work sense lead connects to the Access welding power source 4-pin connector located above the negative output terminal. This work sense lead compensates for work cable voltage drop when connected to the welding power source when the Vsense option is On.

**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**

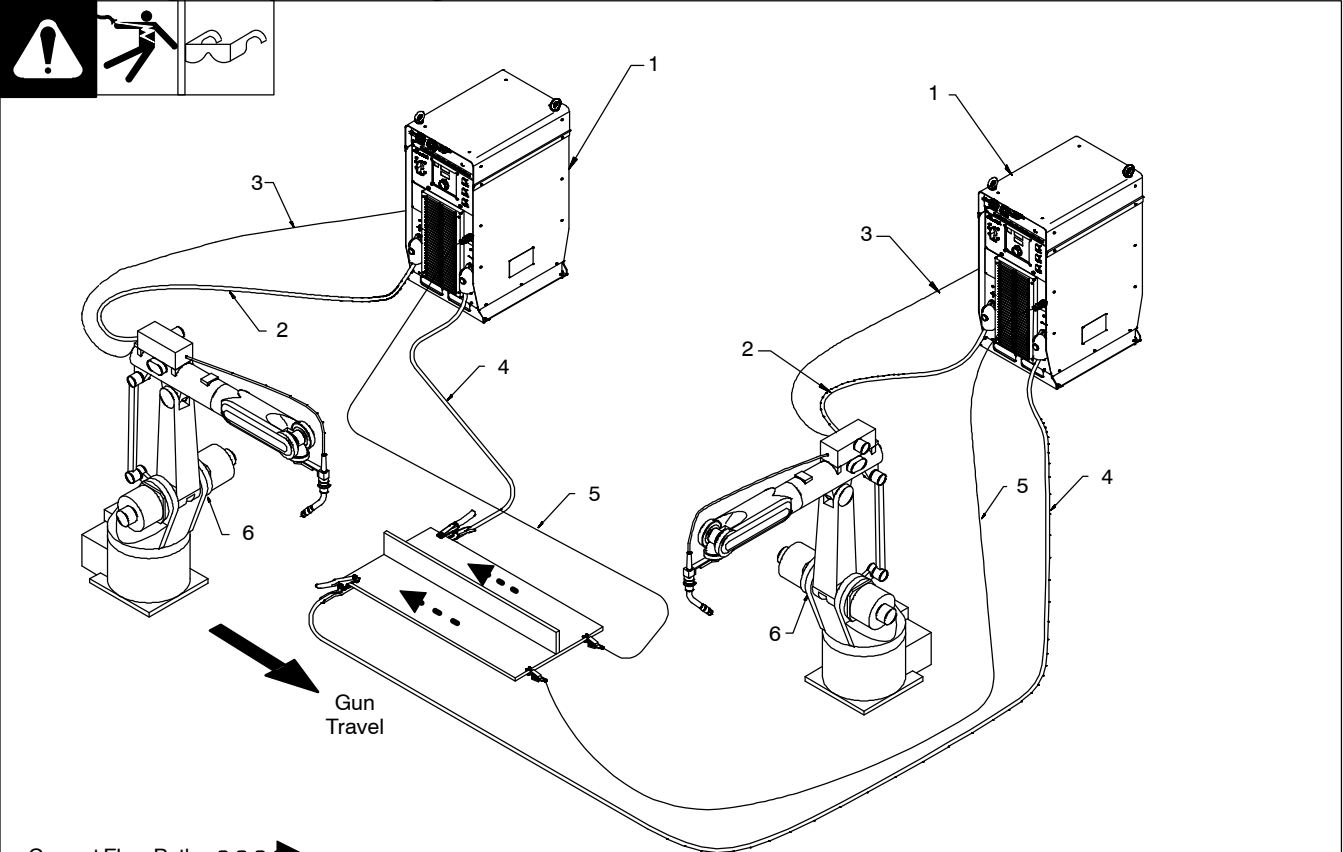


**Best**



⚠ Welding on a single workpiece using multiple welding power sources can cause arc blow and arc impedance to develop or intensify.

## 9-7. Using Multiple Welding Power Sources



Current Flow Path - - - - ->

250 504-A

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.

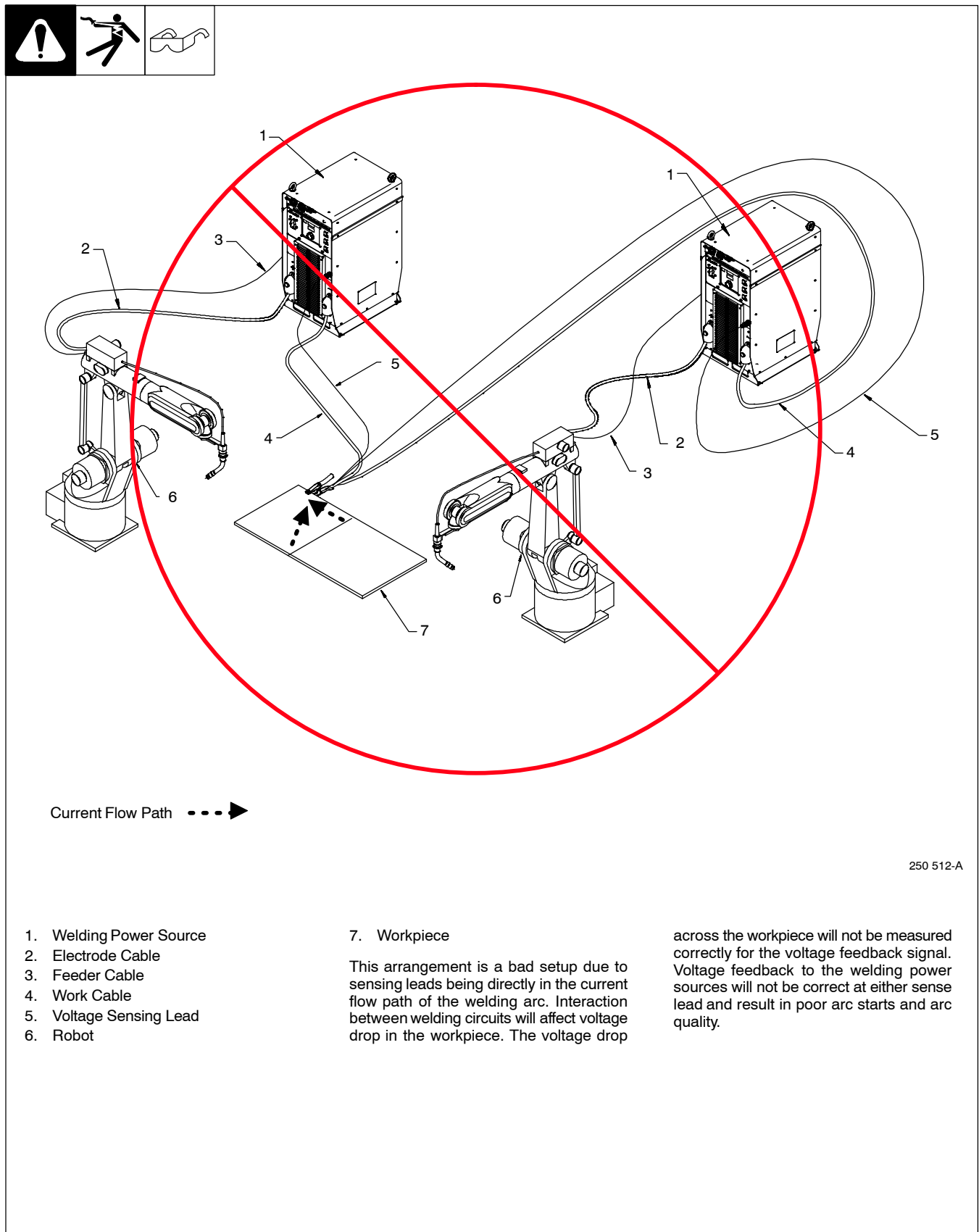
Each welding gun should have its own source of shielding gas. Use a separate shielding gas regulator and shielding gas connection for each welding gun.

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.

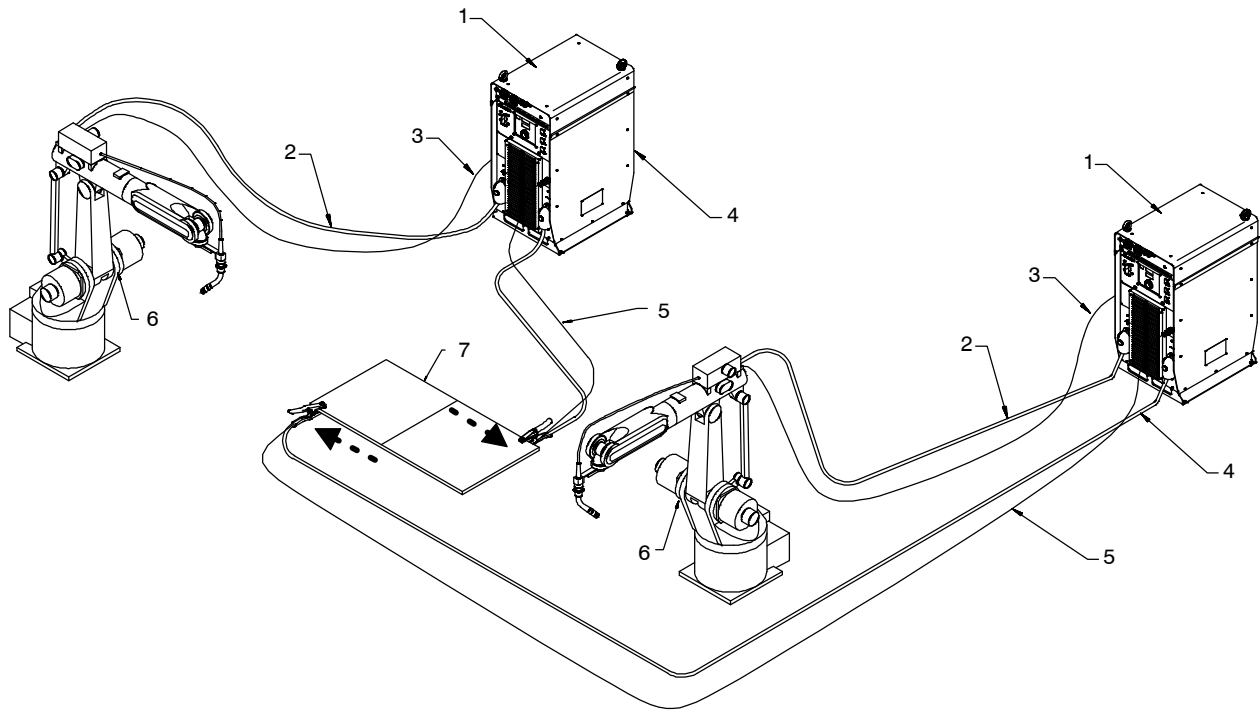
Arc blow occurs primarily during the welding of steel or ferromagnetic metals. Weld current will take the path of least resistance, but not always the most direct path through the workpiece to the work lead connection. The most intense magnet force will be around the arc due to a difference in resistance 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.

## 9-8. Voltage Sensing Lead And Work Cable Connections For Multiple Welding Arcs

### A. Bad Setup



## B. Better Setup



Current Flow Path - - - ➔

250 513-A

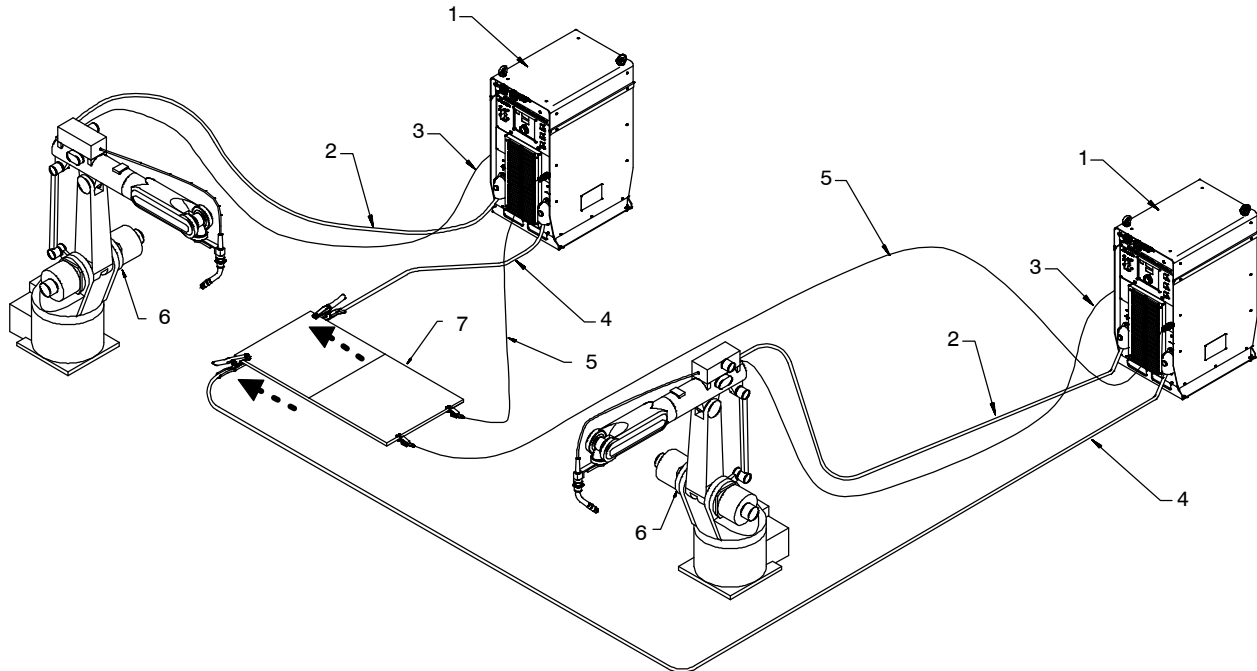
1. Welding Power Source
2. Electrode Cable
3. Feeder Cable
4. Work Cable
5. Voltage Sensing Lead

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.

### C. Best Setup



Current Flow Path - - - ►

250 515-A

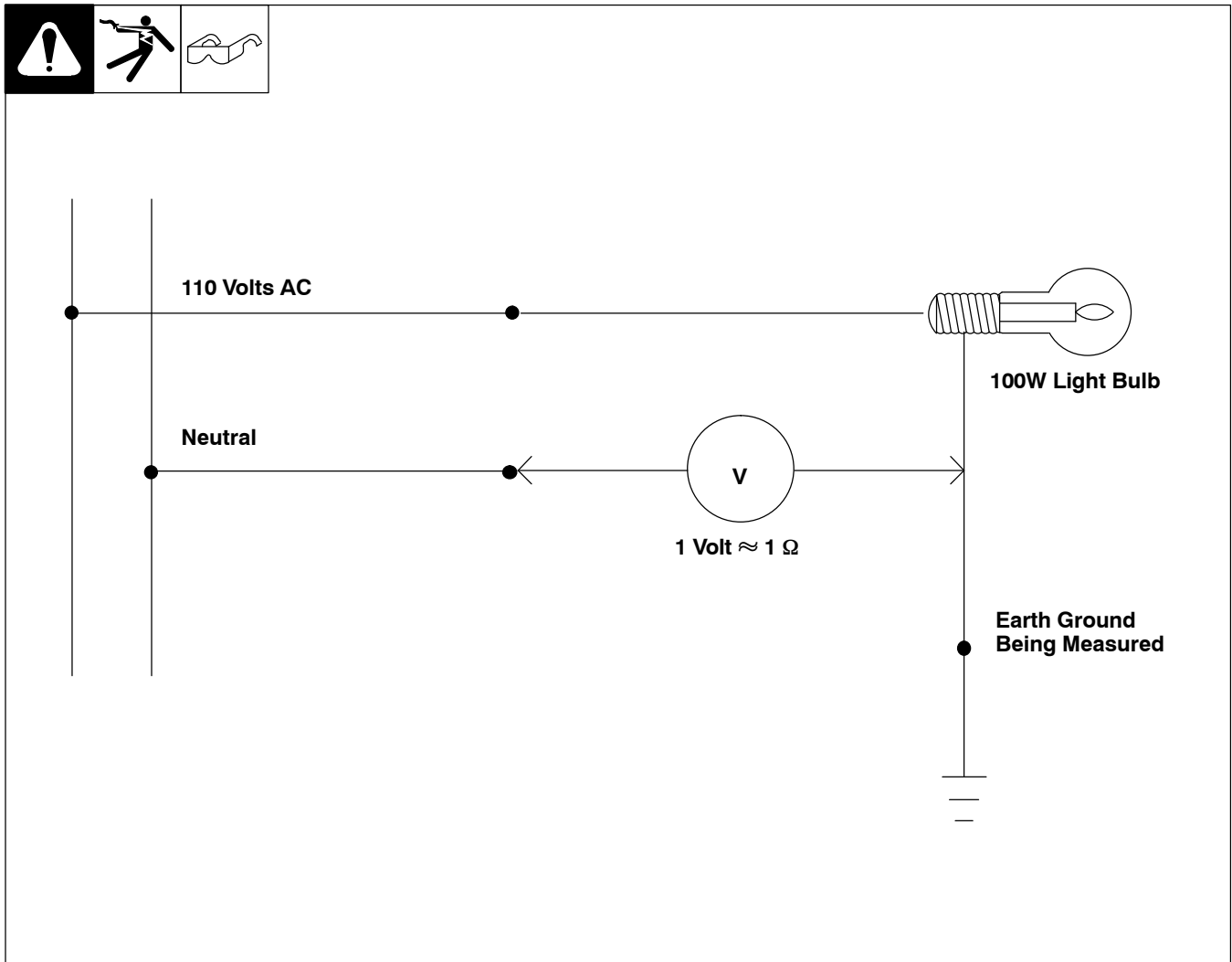
- |                         |                         |
|-------------------------|-------------------------|
| 1. Welding Power Source | 5. Voltage Sensing Lead |
| 2. Electrode Cable      | 6. Robot                |
| 3. Feeder Cable         | 7. Workpiece            |
| 4. Work Cable           | 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

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.



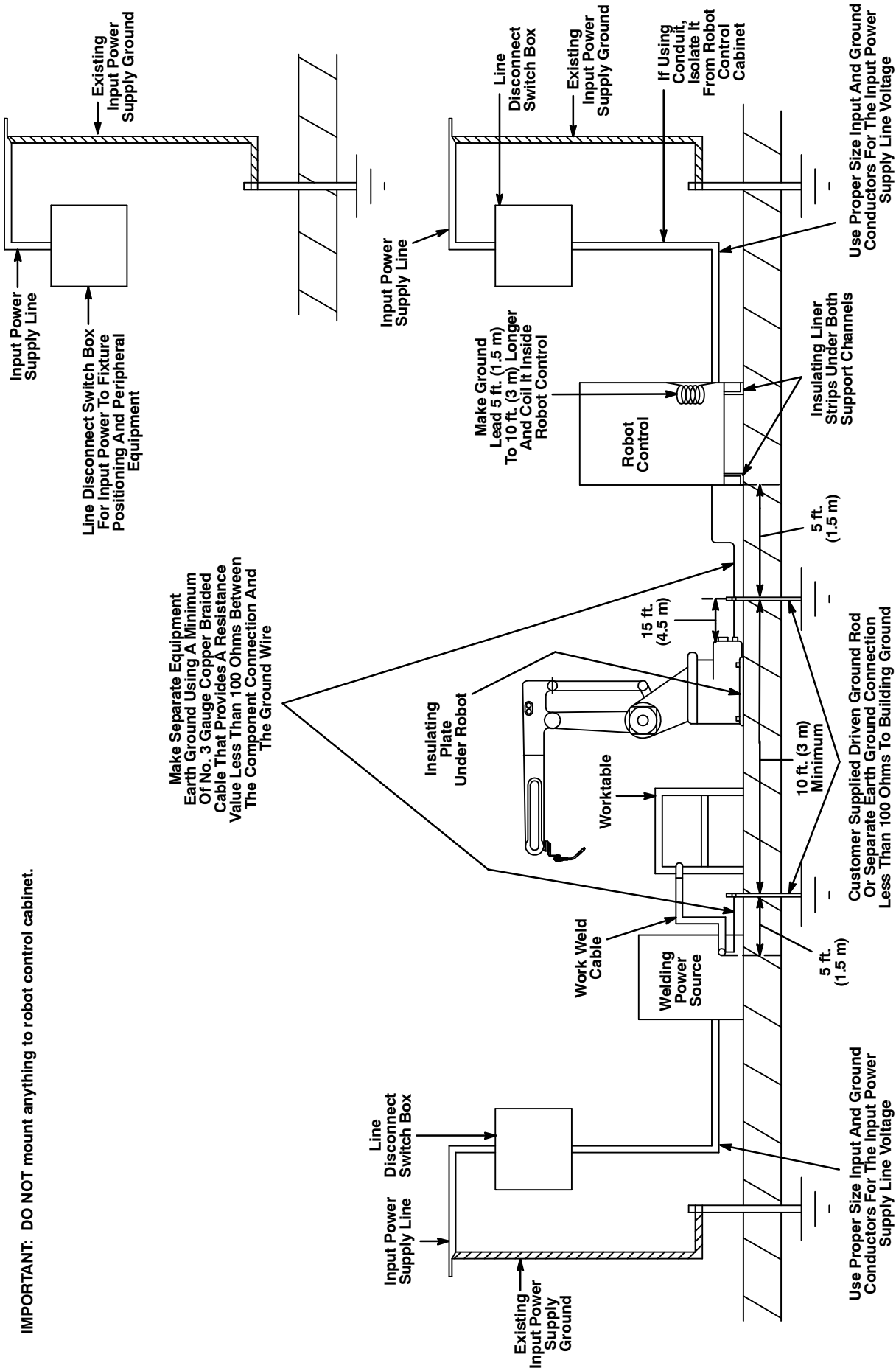
## 9-9. Earth Grounding

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.



**Figure 9-1. Earth Ground Connections To Stationary Robot System Components**


## 9-10. 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.



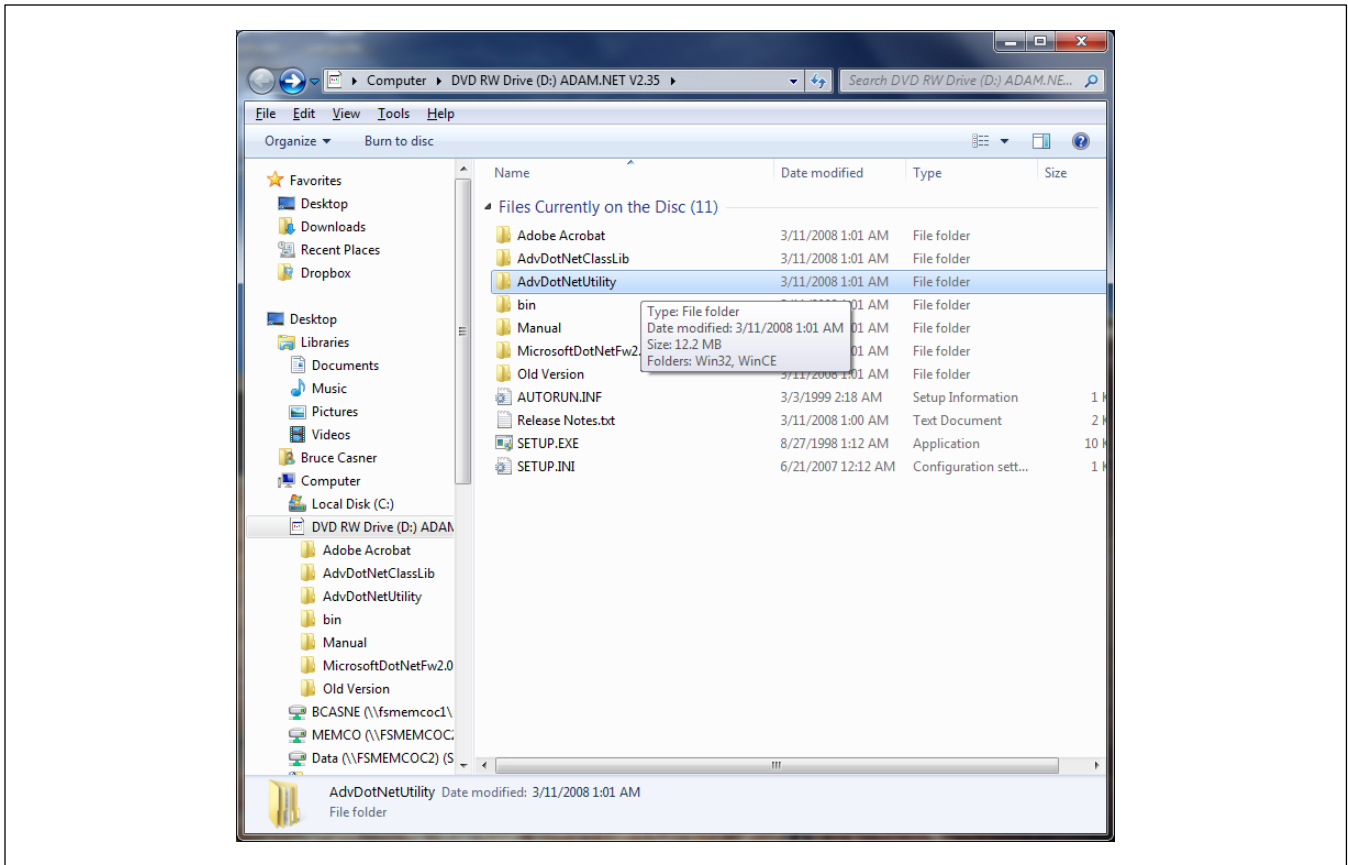
## 9-12. ADAM-6050

The ADAM-6050 is an optional A to D converter that is used for Centerpoint operation when connected into a DeviceNet communication system.

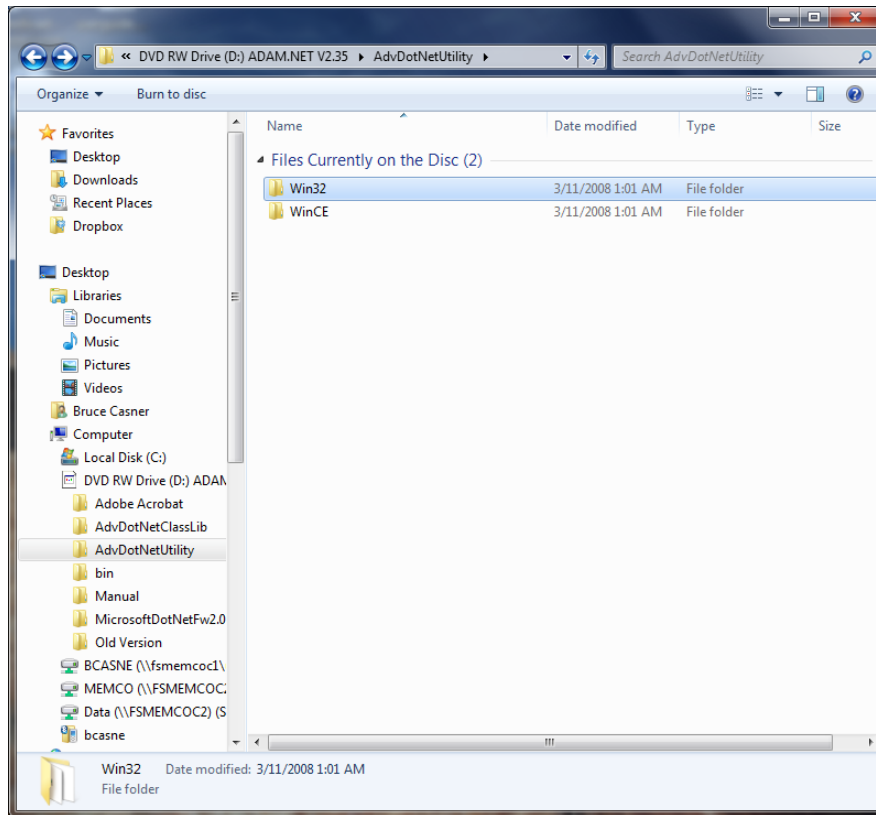
 The ADAM-6050 is not needed for Ethernet communication systems.

## 9-13. Loading The ADAM-6050 Program

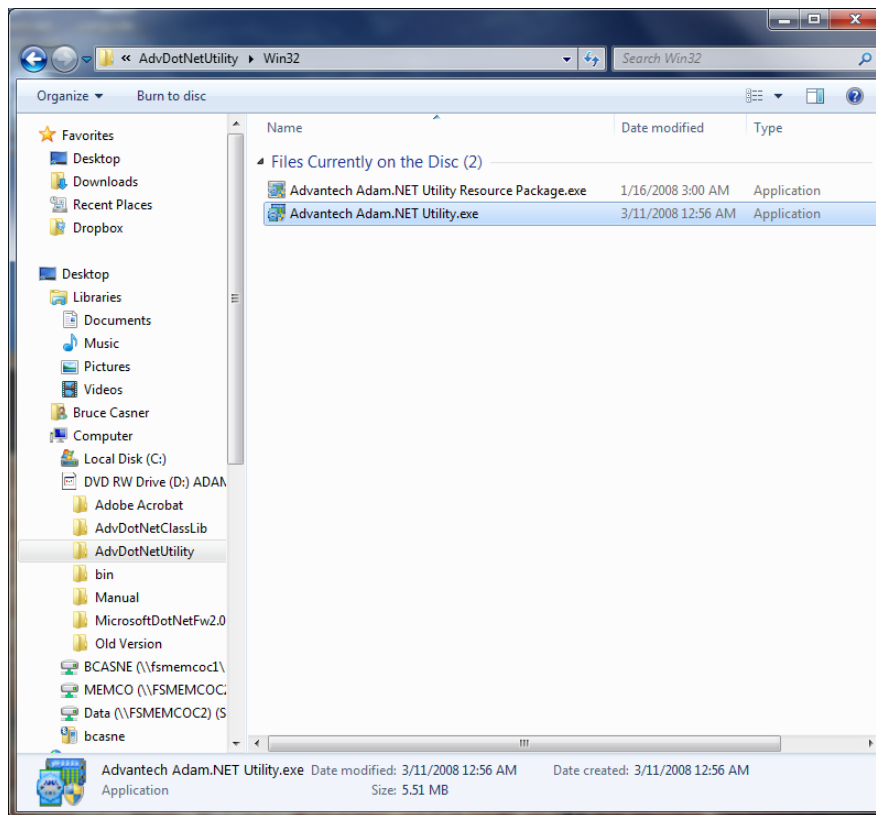
Insert the mini-CD that came with the ADAM-6050. Choose “AdvDotNetUtility”.



Choose “Win32”.

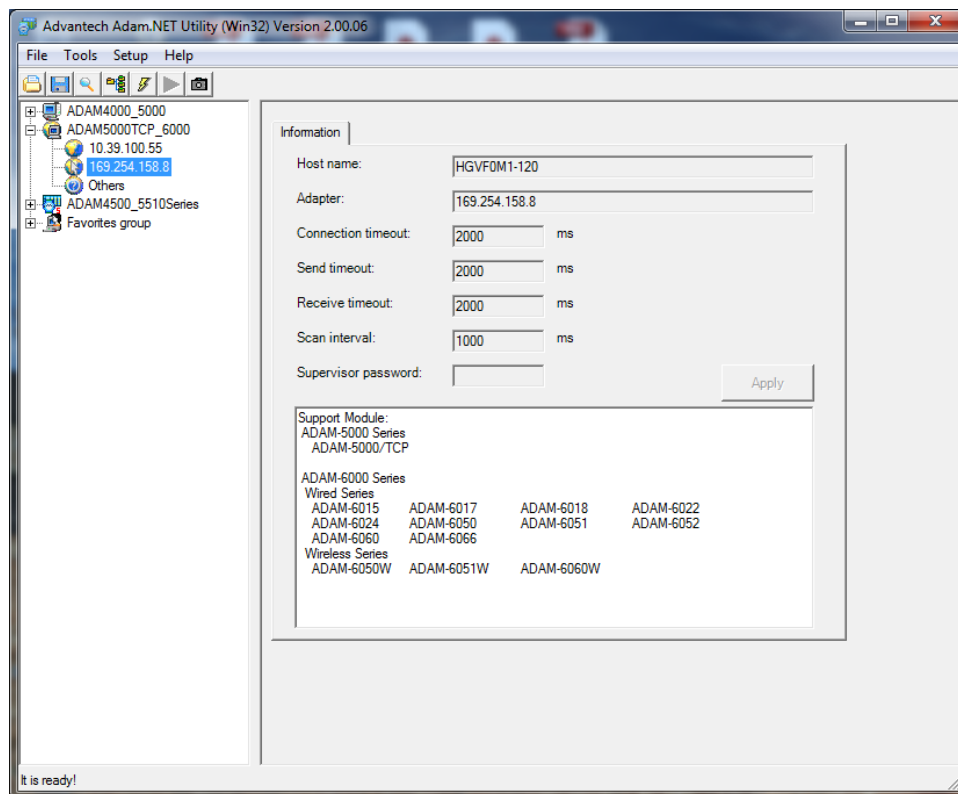


Double click "Advantech Adam.NET Utility.exe".

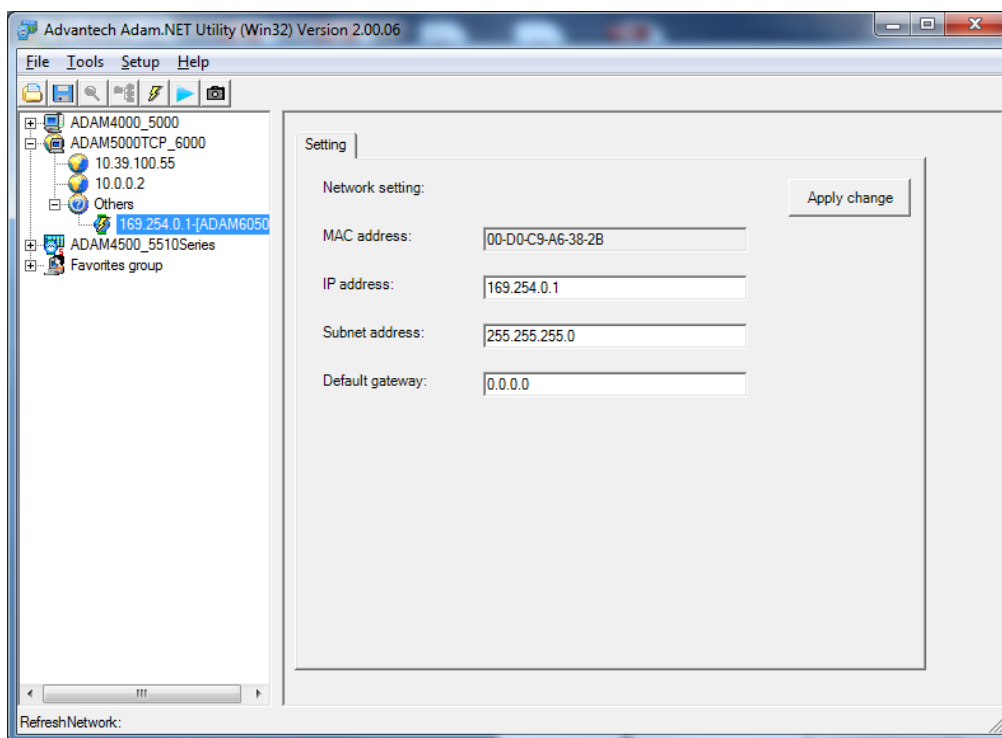


Complete the installation, connect the ADAM-6050 to appropriate power (10-30 VDC) and your computer with an Ethernet cable, then run the program just installed (Adam.Net Utility).

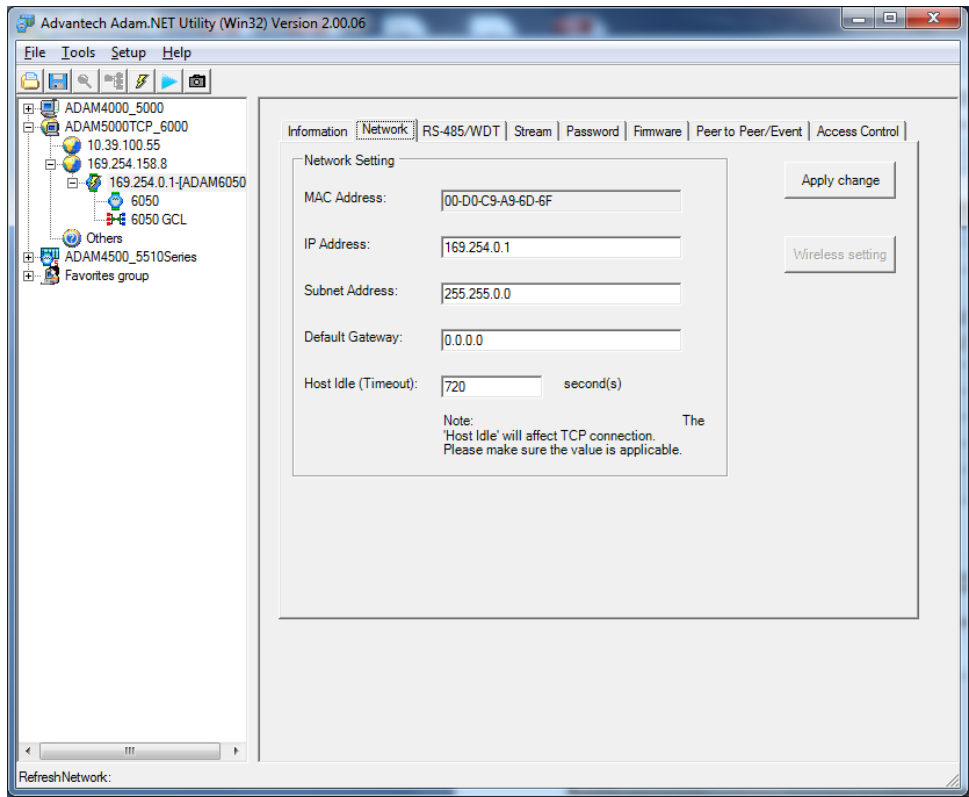
Right click "ADAM5000TCP\_6000, and click on "Search".



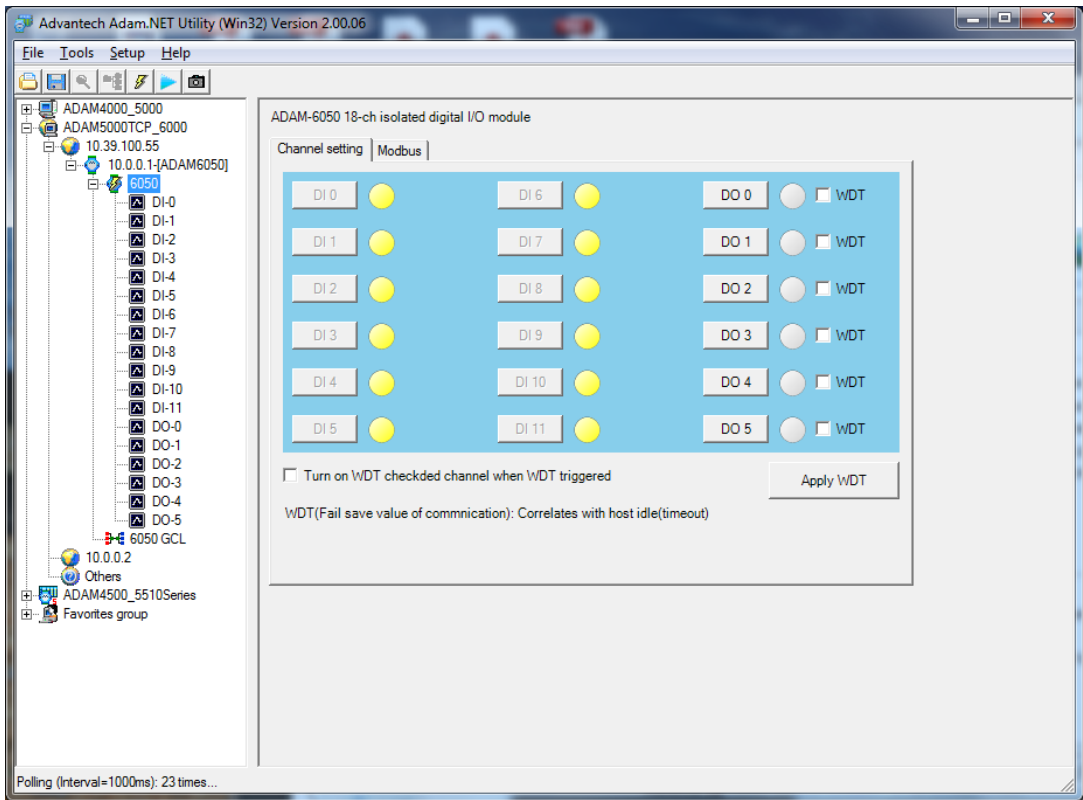
The ADAM-6050 will only show the Network setting at first, until you change the address to be compatible with the subnet of your computer's Ethernet port. The default address of the ADAM-6050 from the factory is 10.0.0.1. You may have to set a static IP on your PC in the 10.0.0.x range and restart the program to get the block to appear. If your PC connection to the ADAM-6050 is a direct connection, then set its address to 169.254.0.1 and restart the program and do a search again to get the block to appear.



If the program asks for a password, the factory default password is 00000000.

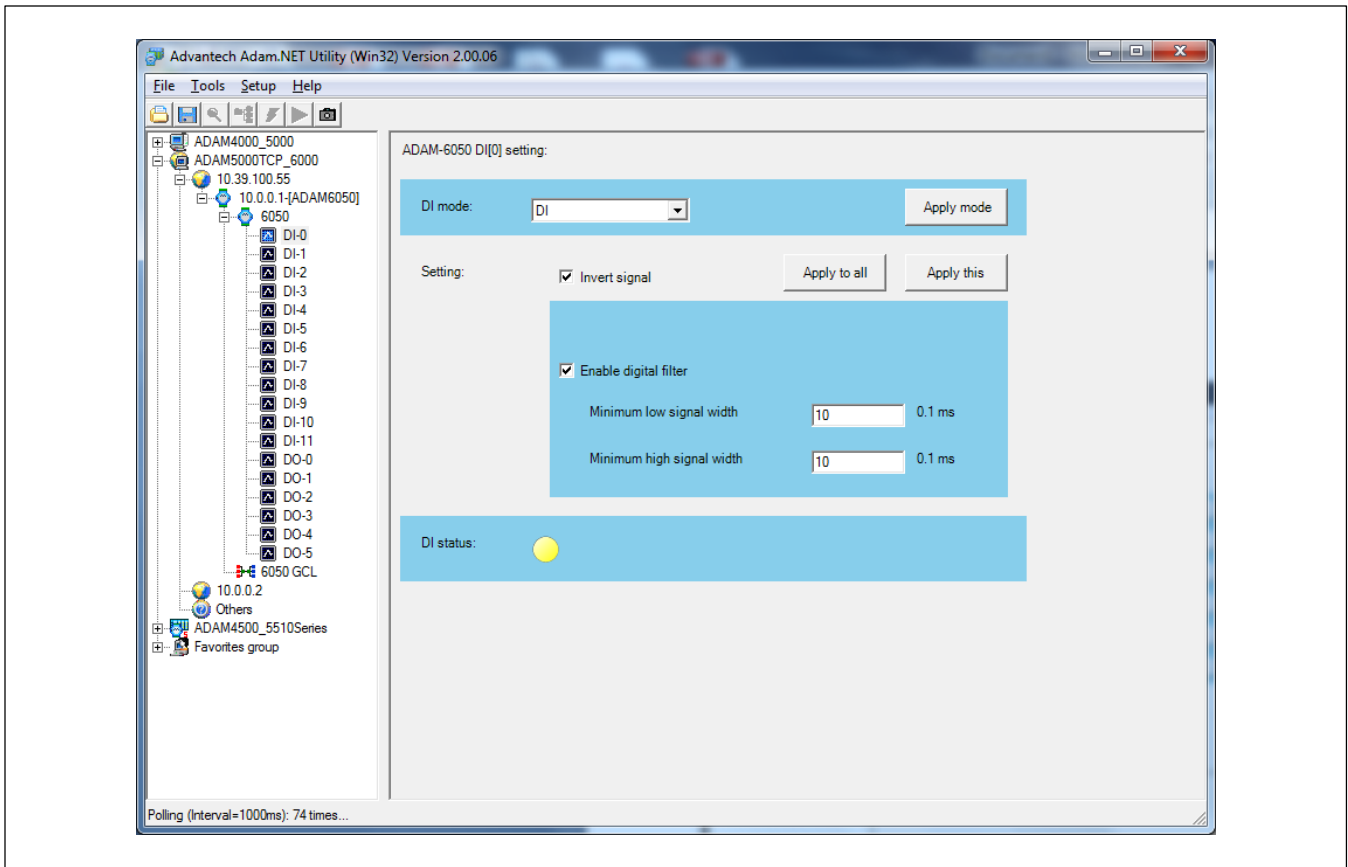


Click on the 6050 symbol, and you will see the following screen:



Click on the 6050 symbol, and then click on the "+" sign next to it to expand the list. Click on DI-0 to get the following screen:




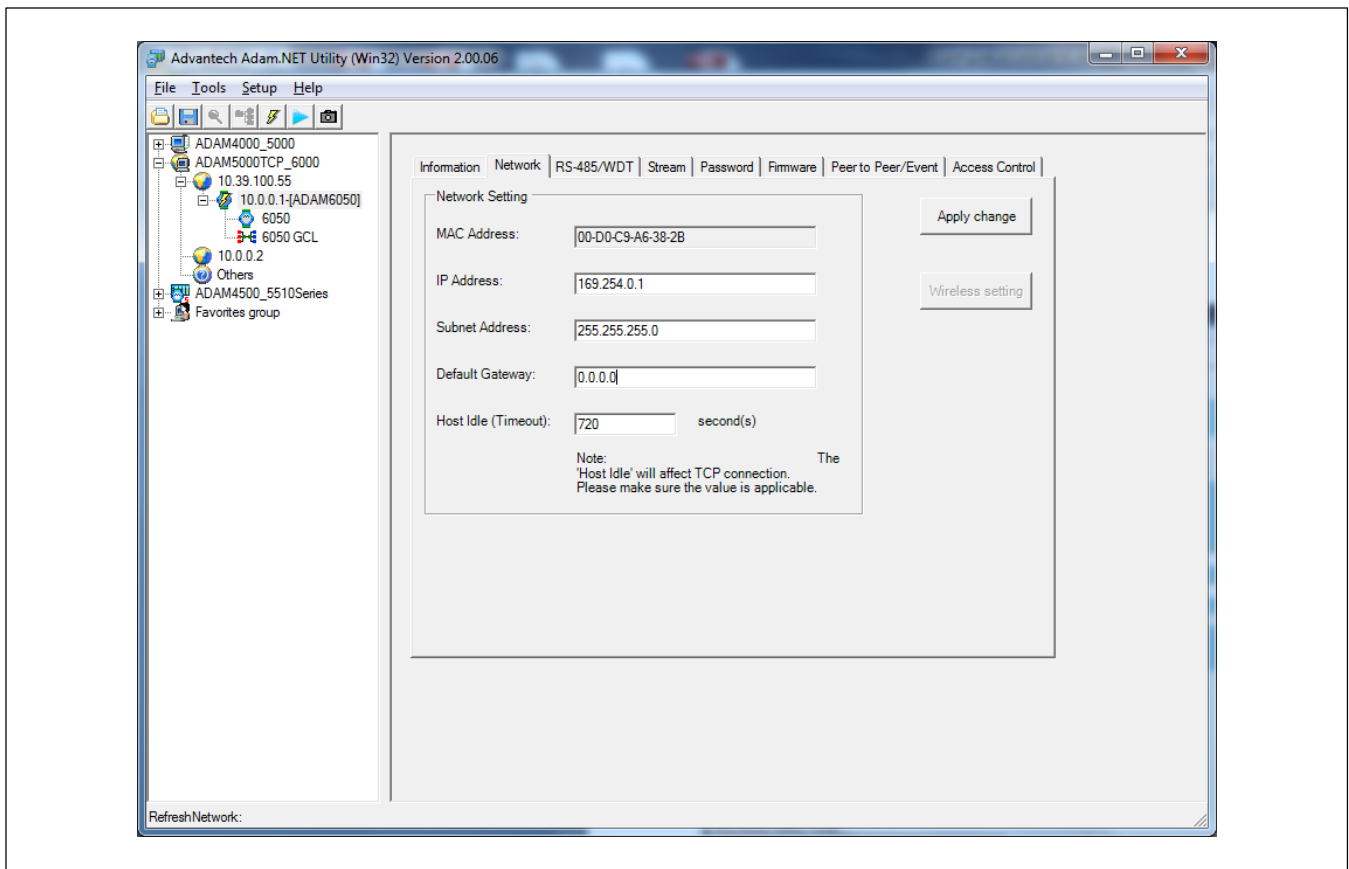


Click on the invert signal check box, Enable digital filter, and fill in a number for the minimum low and high signal widths for your robot I/O signal debouncing. The units are 0.1 ms, so 10 gives 1 ms of filter.

Click “Apply to all” to make the setting apply to all of the DI pins.

Click back on the 6050 block, click on the Network tab, and set the IP address to be compatible with the power source. If you are using the Access E port A direct connect, use 169.254.0.1. If you are connecting through a switch, get an appropriate static IP address for the network from your IT staff. After connecting the ADAM–6050 block to the power source, enter that address on the Robot Remote IO web page in the Access E web pages, test it, then cycle the Access E power.

 Ports A and B on the power source cannot be on the same subnet or the Remote IO block may not connect.



In the simplest case, the robot always follows the same sequence for every part, and the following can be used:

Add the commands to select a part ID to the robot job file for that part, as early as possible in the file:

- Turn off the Part Start
- Turn off the Part/Weld output
- Set the Part ID
- Turn on the Part Start

Add the command to end the part to the robot job file for that part, as late in the file as possible:

- Turn off the Part Start
  - Wait for Weld Monitor Error OFF (part error)\*
- \*optional – as required for each installation

In the case where it is preferable to have the robot send the weld number to Insight before each weld, use the following:

Add the commands to select a part ID to the robot job file for that part, as early as possible in the file:

- Turn off the Part Start
- Turn off the Part/Weld output
- Set the Part ID
- Turn on the Part Start
- Wait for Ack Part Start (50+ ms pulse)
- Set the Weld ID
- Turn on the Part/Weld output
- Move
- Wait for Weld Monitor Error OFF (weld error)\*
- Weld
- Set the Weld ID\*\*
- Move

- Wait for Weld Monitor Error OFF (weld error)\*
- Weld  
...Continue welding the part
- Set the Weld ID\*\*
- Move
- Wait for Weld Monitor Error OFF (weld error)\*
- Weld
- Turn off the Part/Weld output

Add the command to end the part to the robot job file for that part, after the last weld is ended:

- Turn off the Part Start
- Wait for Weld Monitor Error OFF (weld error)\*

\*optional – as required for each installation

\*\*the Weld ID can be changed for the next weld as soon as the arc is started

Reference Table 10-2.

**Table 10-1. ADAM-6050 Input/Output Signals**

The ADAM-6050 has 12 inputs and 6 outputs. These provide and expect closure to common, designed for +24 VDC operations.

Terminal	Signal	Robot IO terminal
Input 0	Part/Weld Select 0	Group of 8 output bits
Input 1	Part/Weld Select 1	
Input 2	Part/Weld Select 2	
Input 3	Part/Weld Select 3	
Input 4	Part/Weld Select 4	
Input 5	Part/Weld Select 5	
Input 6	Part/Weld Select 6	
Input 7	Part/Weld Select 7	
Iso Gnd	Reference common for inputs/outputs	Robot IO signal common
Input 8	Robot Operating Mode bit 0	TBD
Input 9	Robot Operating Mode bit 1	TBD
Input 10	Part #*/Weld #	Low 8 bits are Part when 0, Weld when 1
Input 11	Part Start/End*	1 is start, 0 is end
Output 0	Error Reason 0	Group of 4 input bits
Output 1	Error Reason 1	
Output 2	Error Reason 2	
Output 3	Error Reason 3	
Output 4	Error/Good* from Insight	0 is Good, 1 is Error
Output 5	Ack Part Number level	Acknowledge receipt of Part ID (1 = Ack)
Iso Gnd	Reference common for inputs/outputs	Robot IO signal common
+Vs	+10v to +30v, 2W	Robot IO power supply positive
GND	Common for module power	Robot IO power supply common

The Error Reason codes are bitmapped as follows:

For Welding errors: Voltage error = 1, Current error =2, Gas error = 4, WFS error = 8

For Part errors: Too Few Welds = 1, Weld Process Faults = 2, Weld Duration Faults = 4, Extra Welds = 8

**Table 10-2. ADAM-6050 For Fanuc Analog Robot (Example Only)**

☞ Not all Fanuc robots are set up in this manner. Consult with the manufacturer before connecting the ADAM-6050.

The ADAM6050 has 12 inputs and 6 outputs. These provide and expect closure to common, designed for +24 VDC operations. Signal assignments are as follows:

Terminal	Signal	Robot IO terminal CRM2B
Input 0	Part/Weld Select 0	33
Input 1	Part/Weld Select 1	34
Input 2	Part/Weld Select 2	35
Input 3	Part/Weld Select 3	36
Input 4	Part/Weld Select 4	38
Input 5	Part/Weld Select 5	39
Input 6	Part/Weld Select 6	40
Input 7	Part/Weld Select 7	41
Iso Gnd	Reference common for inputs/outputs	37
Input 8	Robot Operating Mode bit 0	43
Input 9	Robot Operating Mode bit 1	
Input 10	Part #*/Weld #	44
Input 11	Part Start/End*	46
Output 0	Ack part number level	1
Output 1	Error / Good* from Insight	2
Output 2	Error Reason 0	3
Output 3	Error Reason 1	4
Output 4	Error Reason 2	5
Output 5	Error Reason 3	6
Iso Gnd	Reference common for inputs/outputs	
+Vs	+10v to +30v, 2W	50
GND	Common for module power	18

☞ CRM2B pins 8, 42, and 45 are used for Touch Sense

The Error Reason codes are bitmapped as follows:

For Welding errors: Voltage error = 1, Current error =2, Gas error = 4, WFS error = 8

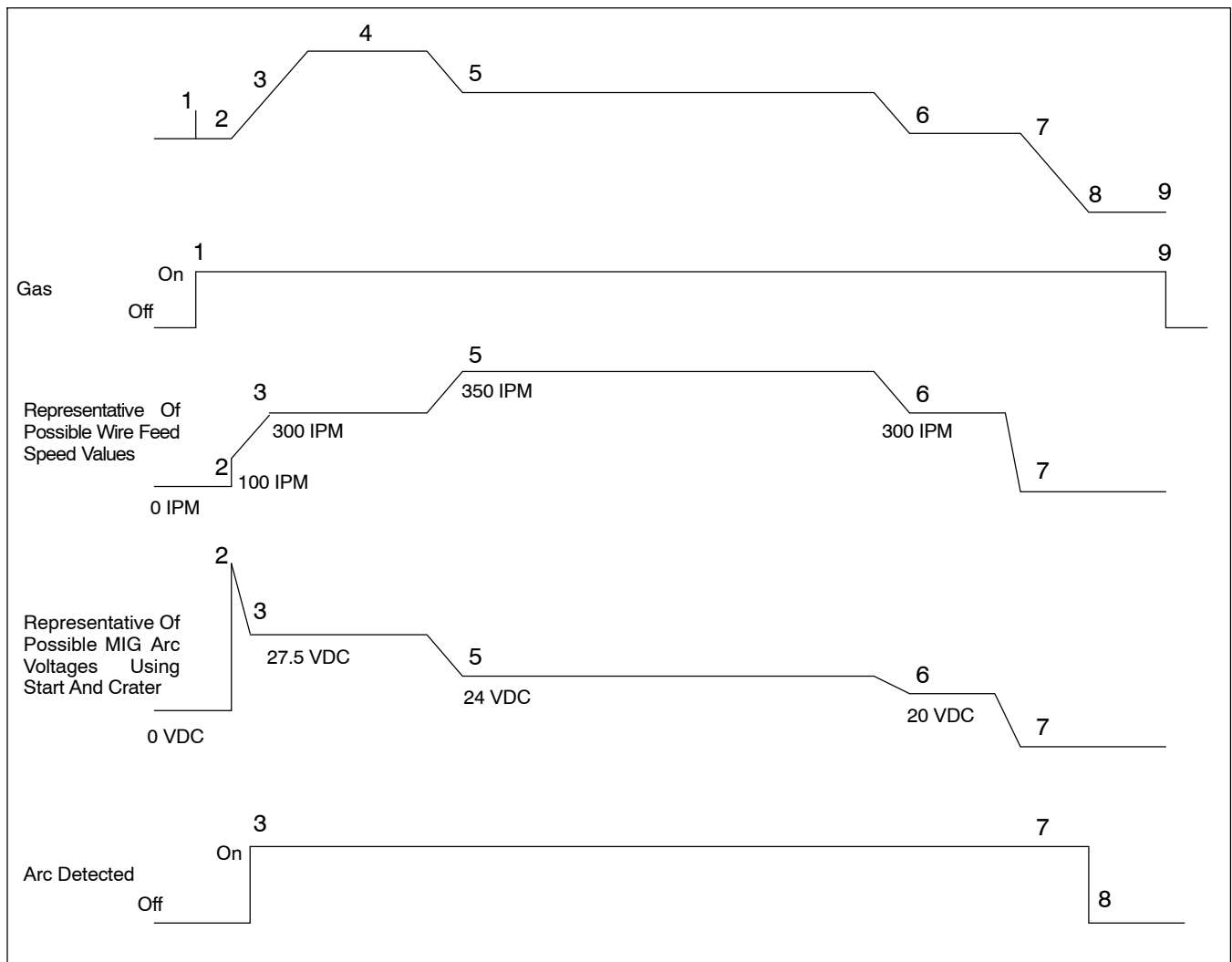
For Part errors: Too Few Welds = 1, Weld Process Faults = 2, Weld Duration Faults = 4, Extra Welds = 8

# Notes

## 9-14. 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.



## 9-15. Touch Sensor Operation

The touch sensor feature allows the robot to locate a weldment using the wire feed system and the welding power source. Touch sensor operation is turned on by a contact closure to the Peripheral receptacle RC25 sockets K and L (see Section 8-6). 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.

## 9-16. 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 13-2).

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.

## 9-17. 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.

4Except 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.

## 9-18. 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	



<b>Trouble</b>	<b>Probable Cause</b>	<b>Remedy</b>
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 troubleshooting 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 9-17
	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

<b>Trouble</b>	<b>Probable Cause</b>	<b>Remedy</b>
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

## 9-19. 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 Using Digital Communications

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)

PLC sets weld and part number for arc data monitoring. This function requires the ADAM-6050 when using DeviceNet communications.

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 Using Digital Communications

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.
16. Sets weld and part number for arc data monitoring. This function requires the ADAM-6050 when using DeviceNet communications.

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 10 – OPERATION

## 10-1. Operational Terms

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

### General Terms:

<b>Arc Adjust</b>	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.
<b>AccuCurve</b>	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.
<b>Accu-pulse</b>	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.
<b>Adjust</b>	Control knob used to change or set parameters and functions.
<b>Amps</b>	Indicates average amperage while welding and 3 seconds hold value at end of weld.
<b>Arc Control</b>	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.
<b>Arc Length</b>	Distance from end of wire electrode to weld pool.
<b>Auto Thread</b>	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.
<b>Crater</b>	Allows setting of voltage/arc adjust, wire feed rate, and time value for arc ends.
<b>DeviceNet</b>	This is a network system used in the automation industry to interconnect control devices for data exchange. It uses Controller Area Network as the backbone technology and defines an application layer to cover a range of device profiles. Typical applications include information exchange, safety devices, and large I/O control networks.
<b>Ethernet</b>	This is a family of computer networking technologies for local area networks (LANS). Ethernet was commercially introduced in 1980 and standardized in 1985 as IEEE 802.3. Ethernet has largely replaced competing wired LAN technologies.
<b>Ethernet/IP</b>	(Ethernet Industrial Protocol) is a communications protocol, managed by the Open DeviceNet Vendors Association (ODVA) and designed for use in process control and other industrial automation applications.
<b>Feeder Set Up</b>	Allow selection of Sequence and trigger functions.
<b>Gas Type</b>	Selection of shielding gas being used in application.
<b>IGNR (Ignore)</b>	Allows the use of a dual schedule switch between ignore welds and count welds when using Insight Centerpoint.
<b>Inductance</b>	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.
<b>MIG</b>	CV weld process with individual settings of voltage and wire speed.
<b>MWCI</b>	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.
<b>Preflow</b>	Setting a time value for gas flow prior to arc start.
<b>Postflow</b>	Setting a time value for gas flow after arc end.
<b>Process</b>	A selection made for MIG, Pulse, and Accu-pulse.
<b>Process Set Up</b>	Selection procedure for entering program.
<b>Program</b>	Eight active slots for selection of various processes, wire type, and parameters.
<b>Program Load</b>	Enters selected program information into program slot.
<b>Pulse</b>	Conventional pulse program using peak, background, pulse width, frequency, and peak voltage as factory taught data. Adaptive method is controlled by frequency adjustment.
<b>Remote Program Select</b>	When Remote Program Select is On, it allows a robot or PLC to select the welding process and parameters. When Off, program selection must be done from the welding power source front panel.

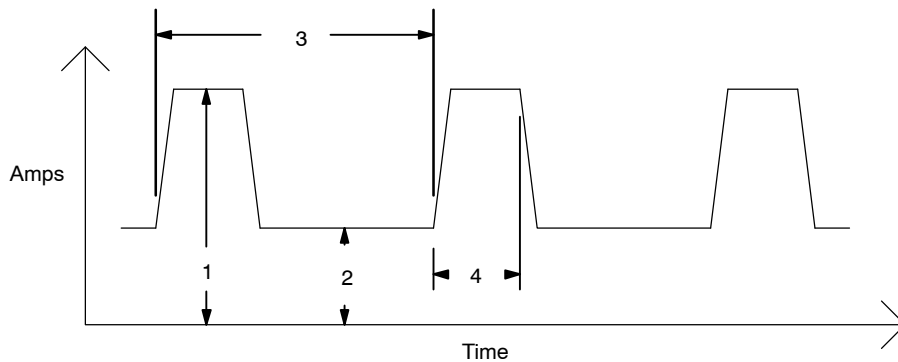
 *Remote Program Select is factory set to "On". Use the web pages to turn this function "Off". When Remote Program Select is "On", program selection will be determined by remote input once a weld is initiated. Prior to welding, program selection can be done in a normal manner from the welding power source front control panel.*

## 10-1. Operational Terms (Continued)

### General Terms:

<b>Retract</b>	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).
<b>RMD</b>	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.
<b>Sequence</b>	Selecting Sequence will allow setting of preflow, start, crater, and postflow times and parameters.
<b>Slope</b>	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.
<b>Start</b>	Provides voltage/arc adjust, wire feed rate, and time value for modified arc starts.
<b>Time</b>	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).
<b>Volts</b>	Preset voltage in MIG mode at idle, actual voltage while welding, and 3 seconds hold value at end of weld.
<b>Wire Type</b>	Selection of wire type by alloys and classification.
<b>WFS</b>	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).

## 10-2. Pulse Welding Terms



1. **Apk = Peak Amperage**

Increasing Apk increases penetration.

**Vpk = Peak Voltage**

Arc voltage during peak current phase of the pulse waveform. This determines arc length during adaptive pulse welding.

2. **Abk = Background Amperage**  
Maintains arc between pulses.

**Vbk = Background Voltage**

Arc voltage during background current phase of the pulse waveform. Stabilizes weld puddle until next peak pulse.

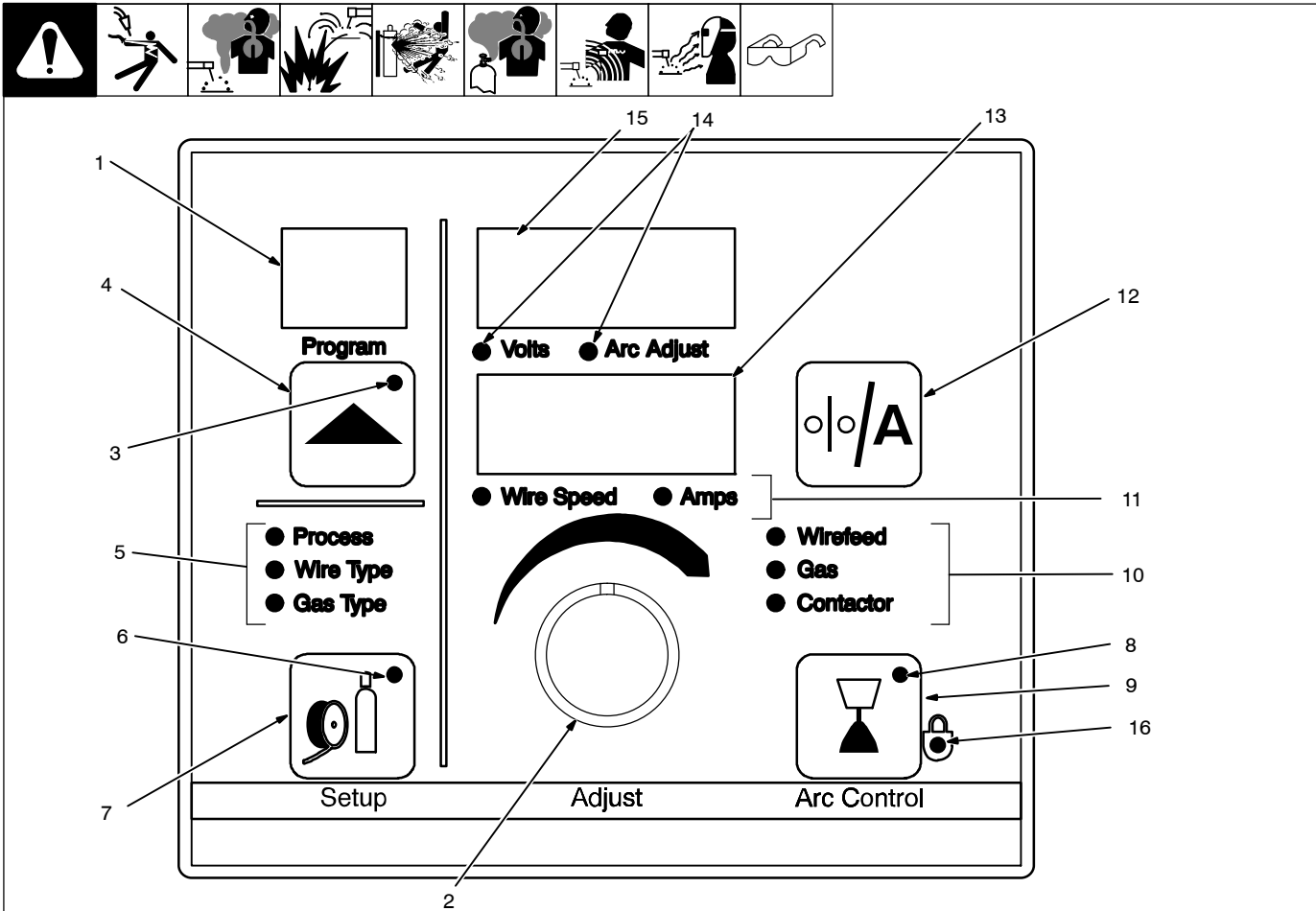
3. **PPS = Pulses Per Second**

Increasing PPS increases travel speed.

4. **PWms = Pulse Width In Milliseconds**

Increasing PWms increases bead width.

### 10-3. Front Panel Controls (See Section 10-4)



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

Press and hold button to see program name. 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), AccuCurve, and 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 10-1 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 10-1 for all gas abbreviations.

#### 6. Setup Push Button LED

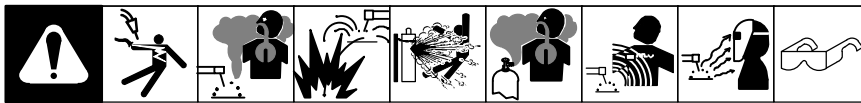
The LED lights to indicate one of the setup modes is active.

#### 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.

## 10-4. Front Panel Controls - Continued (See Section 10-3)



### 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. In a MIG process the user can toggle between Slope (SLPE) and Inductance (INDU). When the push button is pressed, the upper display (item 15) shows INDU/SLPE for inductance/slope, or ARC for Arc Control to indicate which parameter is selected for change. The Inductance and Slope range is 0-100. All other processes use Arc Control with a range of 0-50 (nominal value is 25). 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 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 the web pages. Command values are displayed prior to welding and actual values are displayed while welding unless the web pages were used to set the unit in the "Display Command Values"*

*mode. In the Display Command Values mode, command values are displayed while welding.*

*If the web pages are 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 the web pages were used to set the unit in the "Display Command Values" mode.

### 16. Lock LED

The lock LED is illuminated when the "Global Locks Enable" has been turned on using the web pages

**Table 10-1. Welding Wire And Gas Abbreviations\***

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

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



**Table 10-2. Robot Abbreviations**

Detecting a robot connection and viewing the robot abbreviation on the display is an option that is set using the web pages.

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	DTEC ROBT

**10-5. Front Panel Switches**

1. Power Switch  
Turns unit On or Off.

2. Contactor LED  
Contactor LED illuminates when weld output is energized.

3. Purge Push Button  
Press button to purge gas line.

4. Gas LED  
Gas LED illuminates when Purge push button is pressed.

5. Jog Push Button  
Press button to jog wire.

6. Wirefeed LED  
Wirefeed LED illuminates when wire feeds or retracts.

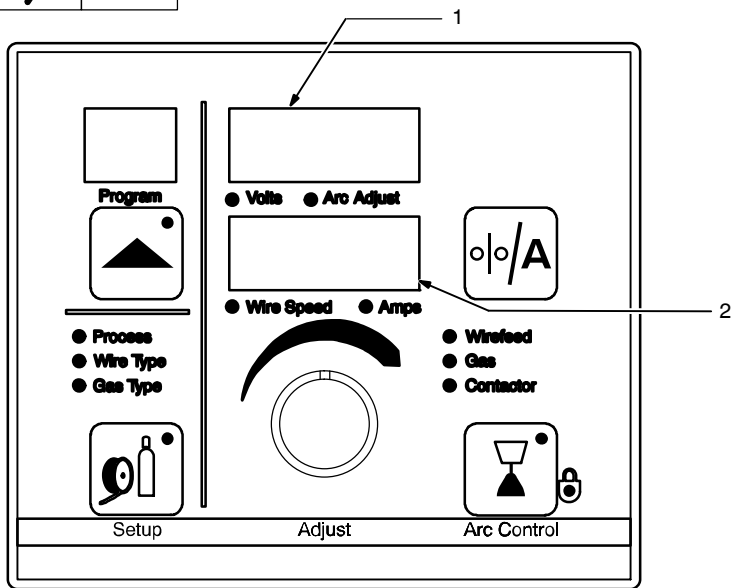
7. Retract Push Button  
Press button to retract wire. Wirefeed LED illuminates when Retract push button is pressed.

*☞ The gas purge has a timer and can be changed using the web pages. The default time is 5 seconds.*

Auto-Threading feature is activated by pressing the Jog and Retract buttons simultaneously. Pressing the Jog, Purge, or trigger switch will turn off the Auto-Threading feature.

Ref. 258 605-A

## 10-6. Front Panel Display At Power Up



1. Upper Display
2. Lower Display

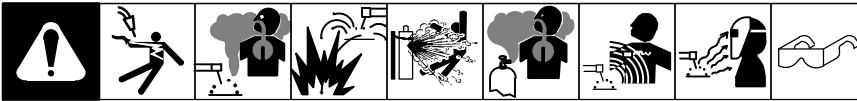
While the system is initializing, the display will alternate between "Net Wait" and counting up dashes before the power source is fully operational.

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*		
Access E	Auto	E300/E450/E675**	10	44

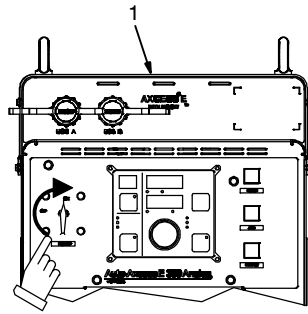
\*If software is set to ON, robot abbreviation will appear on the display (see Table 10-2).

\*\*Depends on welding power source model.

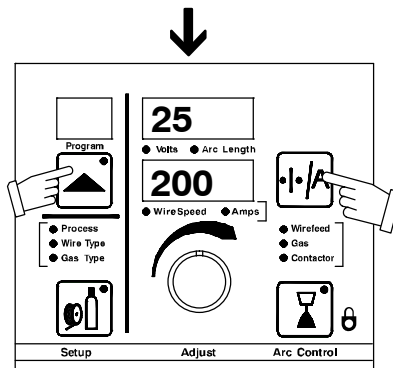
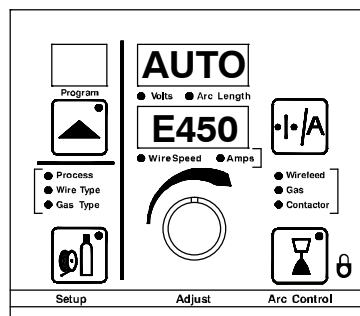
## 10-7. User Interface Menu



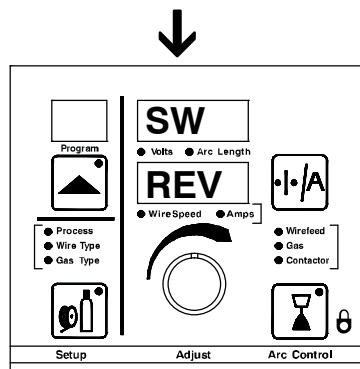
1. Welding Power Source  
Turn on welding power source.  
Wait for system to initialize (see Section 10-6).



↓  
Example display shows a model 450

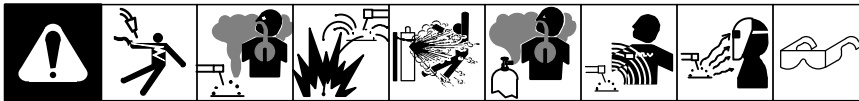


To enter the user interface menu, momentarily press the Program push button and wire feed/amps push button at the same time.



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

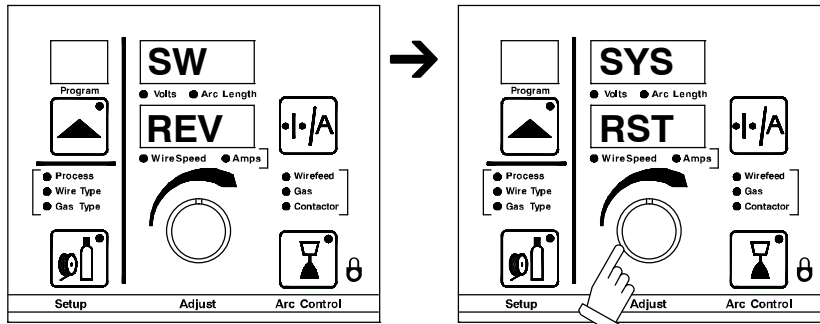
## A. System Reset Mode



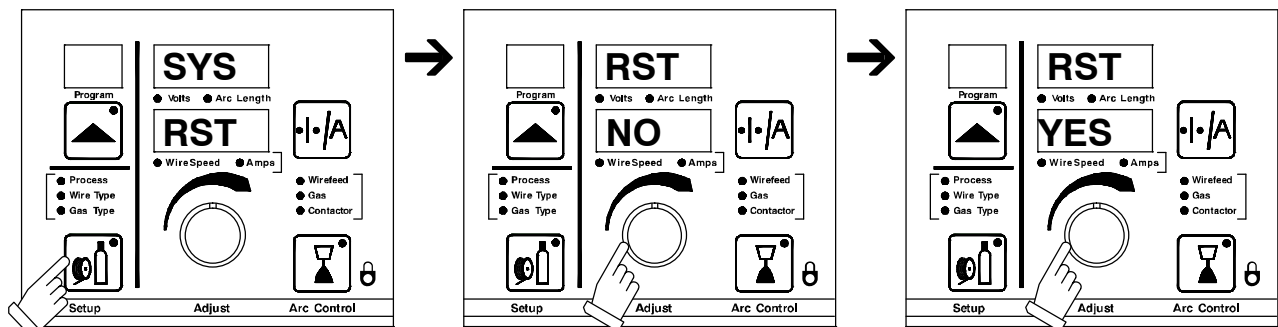
☞ System Reset is not active when Program Lock is enabled.

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.



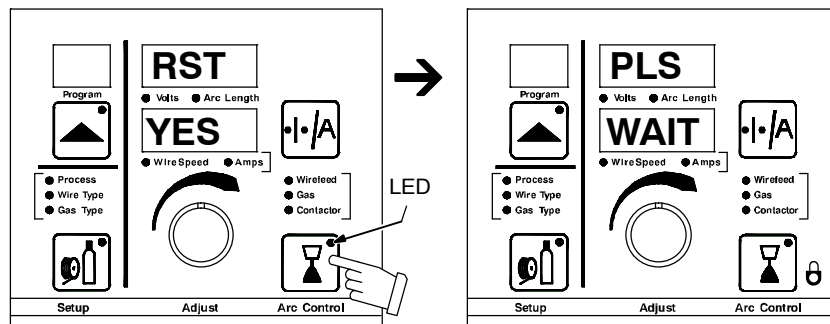
Rotate Adjust knob until System Reset (SYS RST) appears on the display.



Press the Setup push button to select the reset mode.

Rotate Adjust knob to select NO or YES.

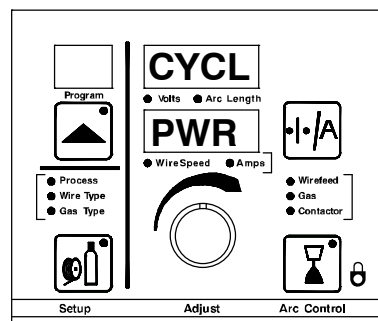
Rotate Adjust knob to select NO or YES. Program push button LED flashes, press to enter reset selection. If NO is entered, unit returns to standby mode.



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 10-6).

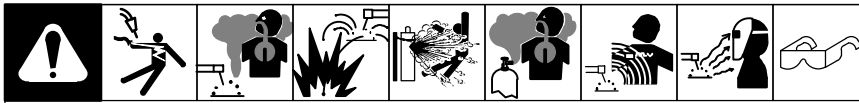
During system reset the display flashes please wait (PLS WAIT) and the following factory default programs are loaded into the unit:



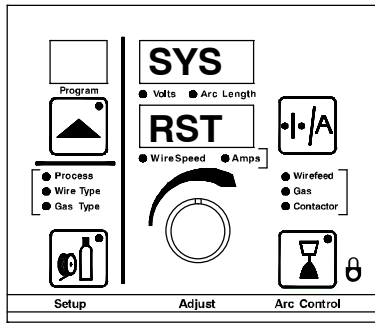
When System Reset is finished, the display will show CYCL PWR for cycle power. Turn the power source off and back on again.

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

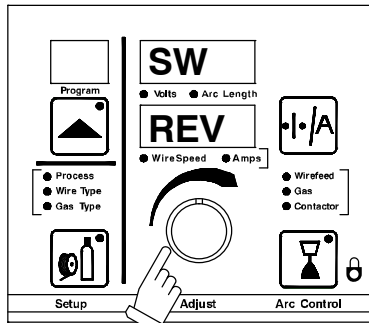
## B. Software Revision Readout



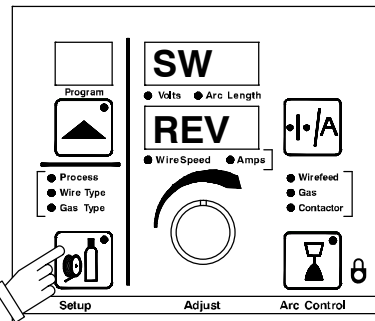
The top display shows the board (PCM, UIM, and WFCM) and the lower display shows the last 3 digits of the circuit board part number plus a letter designator.



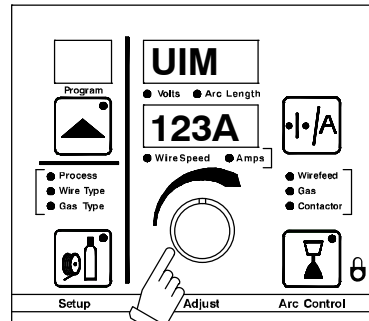
After entering the user interface menu, the initial display will vary by the first item that appears.



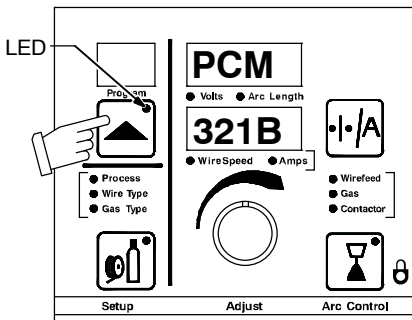
Rotate Adjust knob until Software Revision (SW REV) appears on the display.



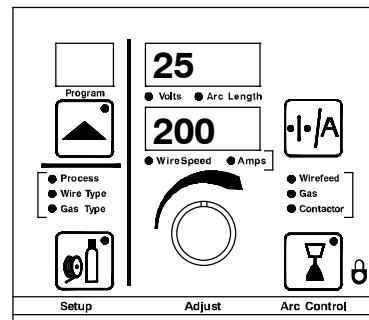
Press the Setup push button to select the software revision mode.



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

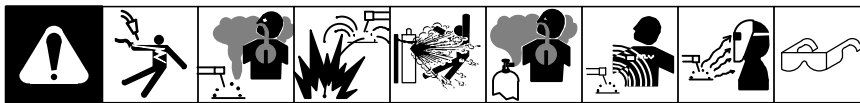


The Program push button LED flashes indicating that pressing this button will exit the user interface menu. Press the Program push button.

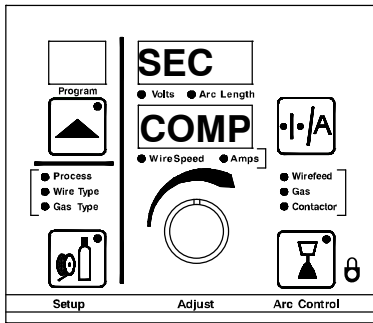


Unit goes back to its standby status.

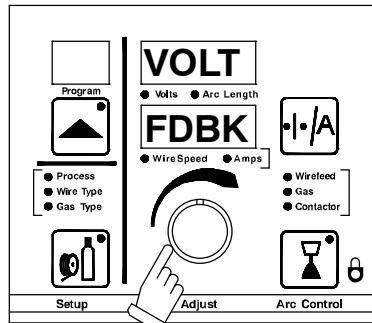
### C. Voltage Feedback Method



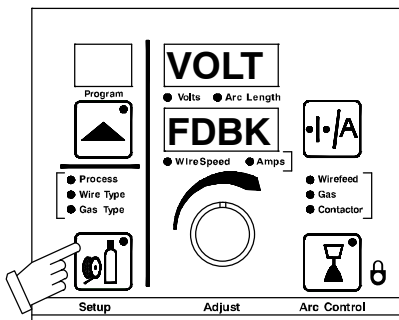
Allows changing the voltage feedback method from volt sense lead to stud feedback.



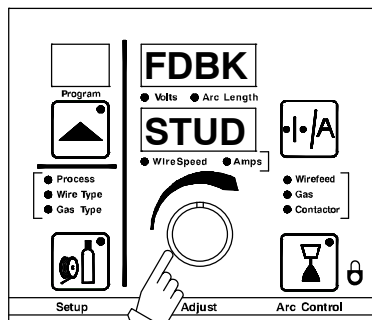
After entering the user interface menu, the initial display will vary by the first item that appears.



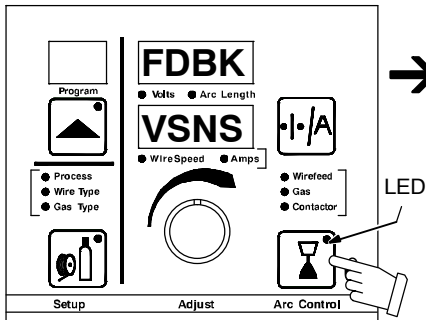
Rotate Adjust knob until Voltage Feedback (VOLT FDBK) appears on the display.



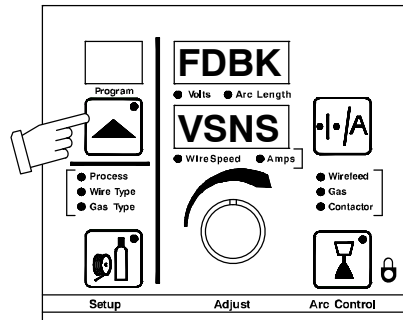
Press the Setup push button to select voltage feedback method.



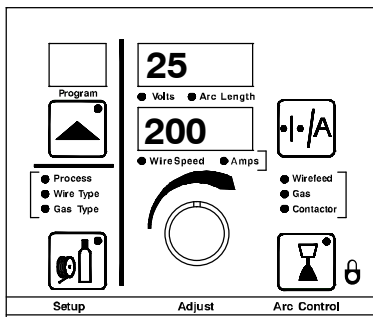
Rotate Adjust knob to select STUD or volt sense lead (VSNS).



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

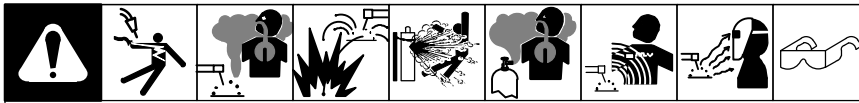


To exit the user interface menu, press the Program push button.



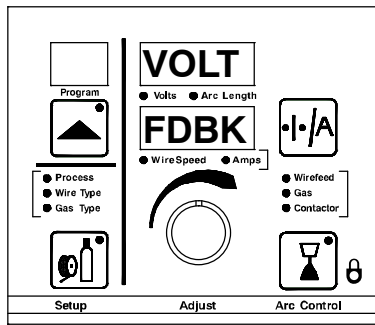
Unit goes back to its standby status.

## D. Load Bank Operation

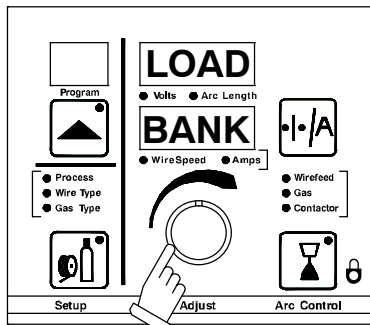


Allows setting the load bank feature on or off.

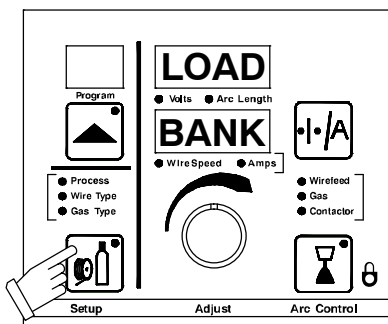
☞ *Load Bank is a diagnostic tool for testing the power conversion modules, not a welding process selection.*



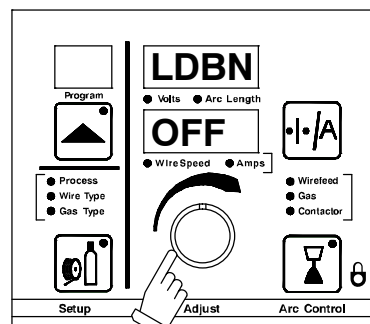
After entering the user interface menu, the initial display will vary by the first item that appears.



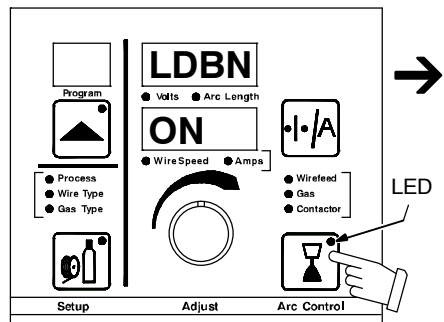
Rotate Adjust knob until Load Bank (LOAD BANK) appears on the display.



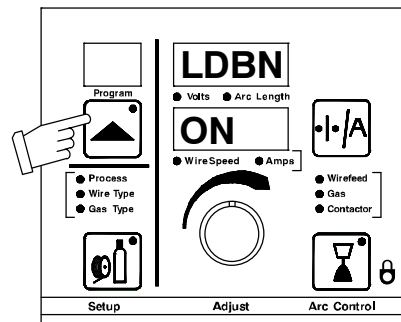
Press the Setup push button to select the Load Bank operation.



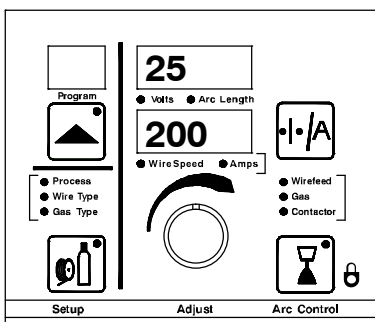
Rotate Adjust knob to select OFF or ON.



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.

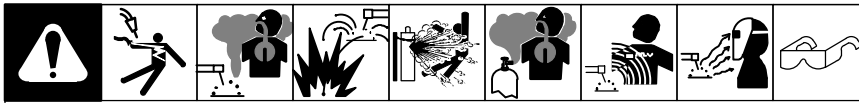


To exit the user interface menu, press the Program push button.

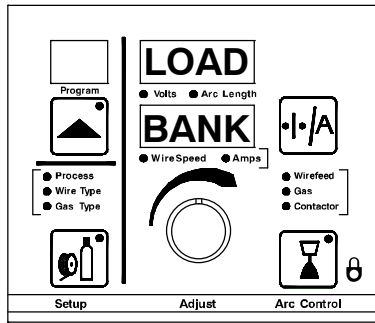


Unit goes back to its standby status.

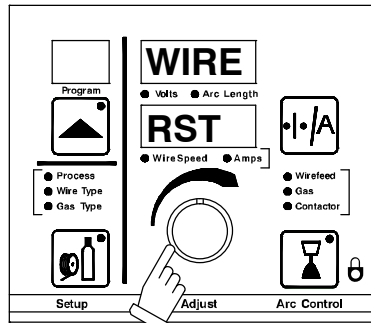
## E. Wire Reset Operation



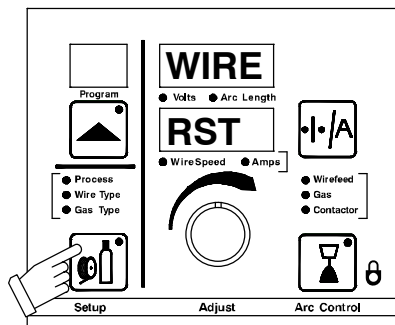
Allows the operator to reset the date/time when a new spool of wire is installed to allow wire usage tracking.



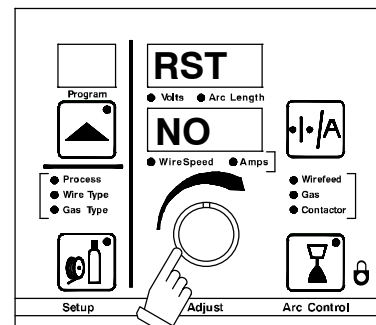
After entering the user interface menu, the initial display will vary by the first item that appears.



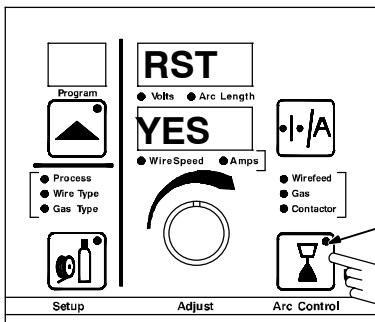
Rotate Adjust knob until Wire Reset (WIRE RST) appears on the display.



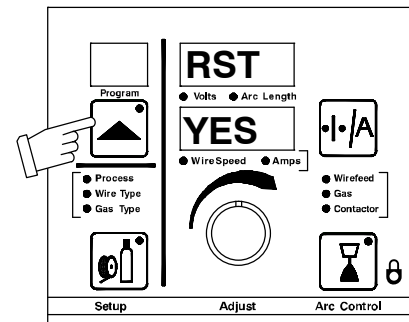
Press the Setup push button to select the wire reset operation.



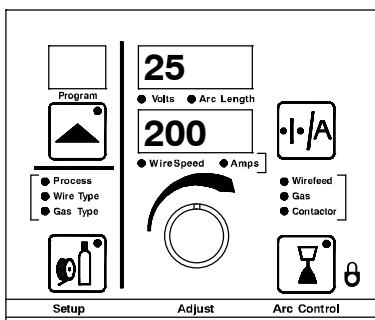
Rotate Adjust knob to select YES or NO.



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.



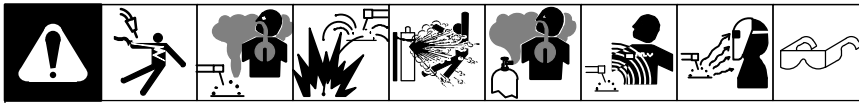
To exit the user interface menu, press the Program push button.



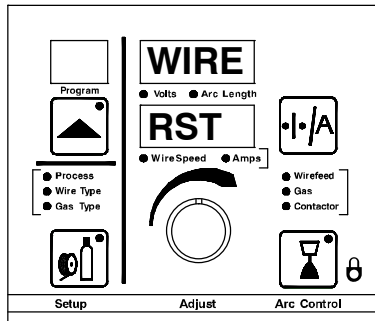
Unit goes back to its standby status.



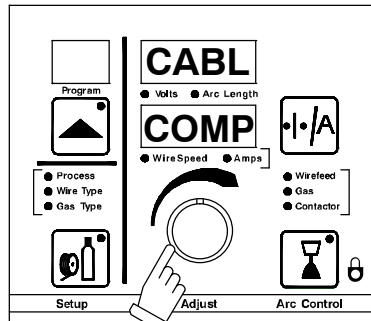
## F. Cable Compensation



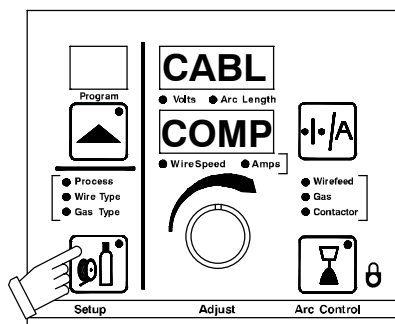
This procedure will determine secondary resistance and inductance compensation for weld cables/torch. After the test is completed, it eliminates the need to use the sense lead. See Web Page under welder configuration/weld cable setup to view secondary cable compensation log.



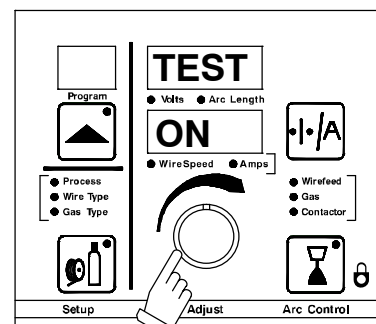
After entering the user interface menu, the initial display will vary by the first item that appears.



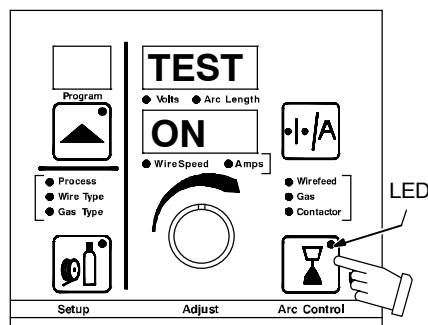
Rotate Adjust knob until Cable Compensation (CABL COMP) appears on the display.



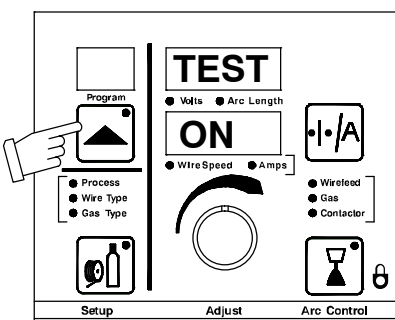
Press the Setup push button to select the wire cable compensation operation.



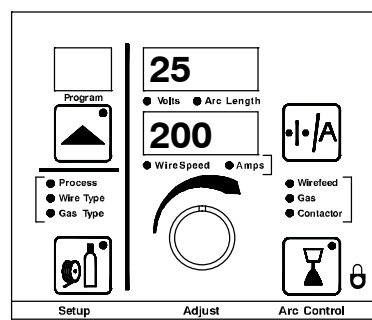
Rotate Adjust knob to select TEST ON.



The Arc Control push button LED flashes indicating that pressing this button will start the cable compensation test. After pressing the Arc Control push button the display will flash LIVE WIRE during the 3 second test. If solid contact is made between contact tip and work, display will show TEST DONE and the test was successfully completed. If contact tip is not firmly shorted to work, the display will show TEST ABORT.



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



Unit goes back to its standby status.

## 10-8. Secondary Resistance And Inductance Compensation

The purpose of the compensation routines is to allow operators to run off stud voltage (without the sense lead), but have a similar arc performance to the voltage sensed arc. This method also allows the secondary (weld cables, connections, torch, rotary grounds and fixtures) to be monitored for voltage drop and resistance, indicating potential issues in the secondary. The factory recommends performing compensation at initial install (with brand new cables and a new torch) so a baseline is set for all future measurements.

### A. Resistance Compensation

The secondary cables/torch can be defined under the +, - Weld Cable and Torch Setup on the web page screen Welder Configuration>>Weld Cable Set-up; these calculated resistance values will be used to compensate the feedback seen at the machine studs. A more accurate option is to use the actual secondary resistance. This can be measured through the Cable Compensation procedure on the Access E and the actual resistance will be used in combination with the feedback measured at the studs (more accurate than the calculated resistance values). The calculated cable and torch resistance will be used until another Cable Compensation Test is performed or the cable length/size or torch type is changed. For Resistance Compensation to work, the Use Resistance Compensation must be checked on the Welder Configuration>>Weld Cable Set-up web page.

### B. Cable Compensation Test Procedure

1. Enter the User Interface Menu system and select the Cable Compensation (CABL COMP) procedure.
2. Select the Volt Sense option (if sense leads are available and connected). Selecting Volt Sense allows the system to measure torch drop.
3. Short the contact tip to weld fixture (maintain constant pressure during the compensation test).
4. Select the test on, and press the flashing button to begin the test. The test will run approximately 3 seconds. During this time, 400 amperes are run through the gun. The average voltage is measured and resistance is then calculated. If the contact tip is not shorted to the weld fixture, a "Test Abort" will appear on the front display.
5. The results of the test are available in the web page (Welder Configuration>>Weld Cable Set-up page) under the Secondary Log after about 1 minute.
6. This test can be repeated to isolate secondary issues. For example:
  - Cable connection (short the electrode or contact tip to the end of the minus (-) work cable lead connection to measure torch drop only).
  - Rotary ground (short the electrode or contact tip to the rotary ground to weld fixture connection to measure rotary ground + torch + cable connection to weld fixture).
  - Various points on the fixture or part. Each of these points should show a slight increase in the measured torch resistance. A large increase in resistance may indicate a secondary issue.

### C. Inductance Compensation Procedure

Inductance compensation is ONLY calculated in Pulse and Accupulse. Ensure the Resistance and Inductance compensation are turned on in the web page (Welder Configuration>>Weld Cable Set-up page). A test weld must be performed in either Pulse or Accupulse (duration of at least 30 seconds and at least 200 ipm wire feed speed) to correctly compensate for the inductance. After this weld is performed, all future welds in any process will be compensated.

 Inductance compensation is reset on every power up and a new test weld will have to be performed.

### D. Waveform Compensation Procedure

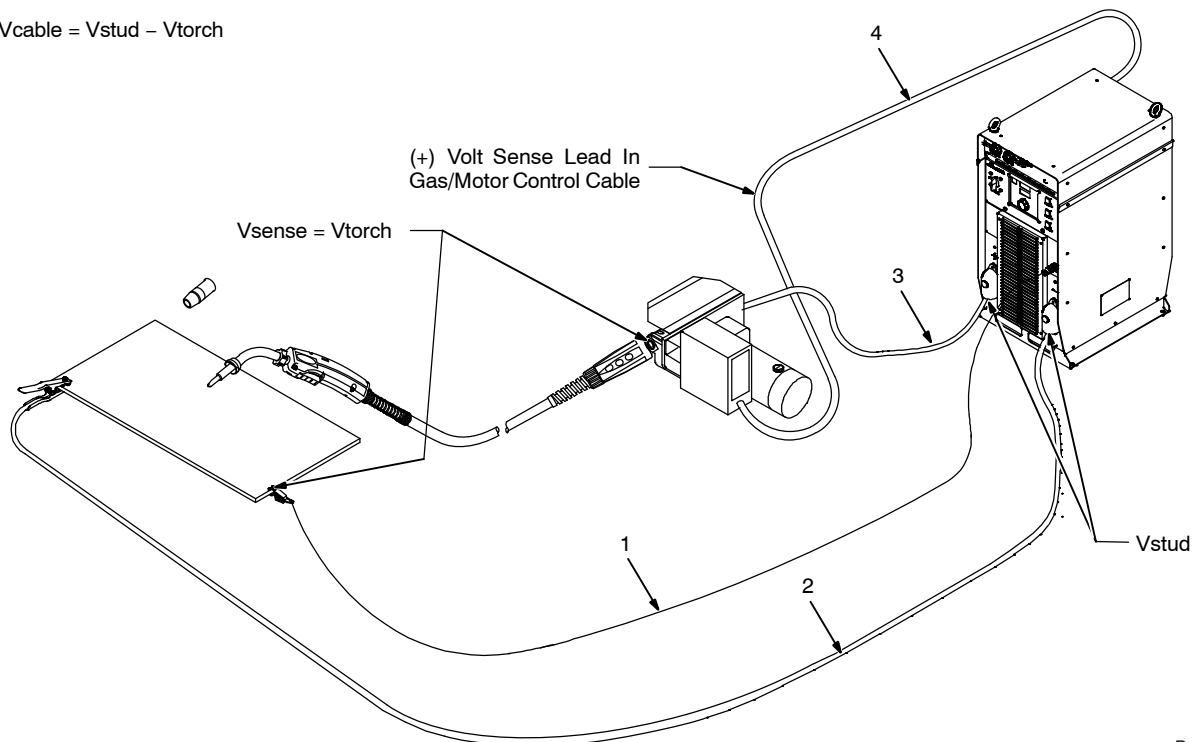
Ensure the Resistance, Inductance and Waveform compensation are turned on in the web page (Welder Configuration>>Weld Cable Set-up page). Waveform compensation is recommended for extreme inductance cases ONLY and will ONLY compensate in the Pulse and Accupulse processes. The pulse waveform parameters (ramp and peak times) are manipulated based off of arc feedback to maintain burn-off rate. This manipulation is done to compensate for extreme inductance cases. The factory recommends cleaning up secondary cable runs prior to enabling Waveform compensation.



1. (-) Volt Sense Lead
2. Negative (-) Weld Cable
3. Positive (+) Weld Cable
4. Gas/Motor Control Cable

$$V_{\text{sense}} = V_{\text{torch}} = V_{\text{positive sense}} - V_{\text{negative sense}}$$

$$V_{\text{cable}} = V_{\text{stud}} - V_{\text{torch}}$$



**Cable Compensation**

Ref. 250 504-A

## 10-9. Network Checklist For Access E

### A. General Network Information

There are two 10/100 Ethernet NICs (Network Interface Connections) on the Access E. Either port can be used for any purpose. We generally use Port A for direct connections and Port B for network connections. For flexibility, from the factory Port A is set with a static IP address and port B with a dynamic (DHCP) address. Port A may often be connected to a PC for initial configuration, to a robot with an EtherNet/IP connection, or to a robot through an ADAM block for discrete Inputs/Outputs. Sometimes Centerpoint on a PC is directly connected to Port A, and Port B is used for remote configuration over a factory network if there is no robot.

The simplest connection is to use the factory default connection of the Access E, Ethernet port A, connected directly to a computer for configuration. The factory default address for Port A is 169.254.0.2. This is in the IP address range of a PC when directly connecting to the welder (no DHCP server, will take about 1 minute after connection for Windows XP). (See <http://www.ietf.org/rfc/rfc3927.txt>, Link Local Address selection.)

Miller Electric Mfg. Co. supplies Industrial Ethernet cables for use with the Access E. These are available in 3, 5 and 10 meter lengths and have a shielded RJ-45 connection to connect to a PC or network drop. Shielded CAT-5 cable is strongly recommended in the welding environment, and proper termination of the shield is important for noise-free operation.

The Centerpoint program will run on almost any PC compatible computer. It can handle weld monitoring functions from several Access E machines, depending on the speed and configuration of the network. Some customers choose to associate one PC or PC-HMI with each Access E and operator and Centerpoint.

### B. Network Scenarios

- Access E semiautomatic with PC or PC-HMI in the cell:

This requires only a direct connection between the Access E and the PC device running Centerpoint. A cable of the appropriate length can be connected between Access E Port A and the PC device. The other port of the Access E can be connected to a factory intranet for configuration and diagnosis via web pages.

- Access E semiautomatic with multiple welders per PC device:

This configuration will require an Ethernet 10/100 capable switch, and cables between each Access E and the switch. The PC device will also plug into the switch. If the switch is also connected to a company intranet, the welders' web pages can be viewed from other PC devices on the network. IP addresses can be set before connecting the welders to the switch if static addresses are used. If DHCP on an intranet is used, connect the welders' Port B, or use the web pages to set up the Ethernet before connecting together. If the factory intranet has a lot of broadcast traffic or there are 10 or more Access E machines on one switch, it is recommended that the switch not be connected to the intranet to prevent excess network loading.

- Auto Access E analog or Devicenet connected to a robot with PC or PC-HMI in the cell:

A direct connection is needed for the ADAM block which provides part and weld information to Insight and Centerpoint. This is normally done with a cable on Port A to the ADAM block. Port B would then be used to connect Centerpoint to the welder. This could be through a network connected switch, in which case no setup is needed (DHCP) or a direct connection by assigning a fixed address to Port B.

- Auto Access E analog or Devicenet connected to a robot with multiple welders per PC device:

A direct connection is needed for the ADAM block which provides part and weld information to Insight and Centerpoint. This is normally done with a cable on Port A to the ADAM block. Port B would then be used to connect Centerpoint to the welders. This could most easily be through a network connected switch, in which case no setup is needed (DHCP) or fixed addresses could be assigned to the welders connected to the switch.

- Auto Access E digital connected to a robot with PC or PC-HMI in the cell:

A direct connection is needed for the robot which commands the welder and which provides part and weld information to Insight and Centerpoint. This is normally done with a cable on Port A to the robot. Port B would then be used to connect Centerpoint to the welder. This could be through a network connected switch, in which case no setup is needed (DHCP) or a direct connection by assigning a fixed address to Port B.

- Auto Access E digital connected to a robot with multiple welders per PC device:

A direct connection is needed for the robot which commands the welder and which provides part and weld information to Insight and Centerpoint. This is normally done with a cable on Port A to the robot. Port B would then be used to connect Centerpoint to the welders. This could most easily be through a network connected switch, in which case no setup is needed (DHCP) or fixed addresses could be assigned to the welders connected to the switch.

- Auto Access E digital connected to a robot with multiple welders per robot and per PC device:

Direct connection is needed for the robot which commands the welders and which provides part and weld information to Insight and Centerpoint. This is normally done with a cable on Port A to the robot, and in this case possibly a switch in the robot controller to connect the multiple welders. Port B would then be used to connect Centerpoint to the welders. This could most easily be through a separate network connected switch, in which case no setup is needed (DHCP) or fixed addresses could be assigned to the welders connected to the other switch. If EtherNet/IP traffic and Centerpoint traffic are mixed on the same switch, careful measurements of available bandwidth and latency will need to be performed at installation.

## 10-10. Ethernet/IP LEDs (Optional)

shows the LEDs supported by EtherNet/IP are shown in Table 10-1. If this unit is not going to use the functionality, remove the appropriate code.

**Table 10-1. Ethernet/IP Supported LEDs**

LED	Color	State	Indication
Ethernet/IP Status	None	Off	No power, no Ethernet link
	Red	Solid	Unrecoverable fault
		Flashing	Recoverable fault or I/O connection timed out
	Green	Solid	Normal run time operation (I/O connection allocated)
		Flashing	Device is idle or is not allocated to a client (PLC)
	Red/Green	Alternating	Self test

## 10-11. Ethernet/IP Object Model

**Table 10-2. Data Types**

Data Type	Description
USINT	Unsigned Short Integer (8-bit)
UINT	Unsigned Integer (16-bit)
UDINT	Unsigned Double Integer (32-bit)
INT	Signed Integer (16-bit)
STRING	Character String (1 byte per character)
SHORT STRING $nn$	Character String (1 <sup>st</sup> byte is length; up to $nn$ characters)
BYTE	Bit String (8-bits)
WORD	Bit String (16-bits)
DWORD	Bit String (32-bits)
REAL	IEEE 32-bit Single Precision Floating Point

The following sections list each object's required attributes and services, if any.

### A. Identity Object (01Hex – 1 Instance)

The following tables contain the attribute, status, and common services information for the Identity Object.

**Table 10-3. Identity Object (01<sub>HEX</sub> – 1 Instance)**

Instance	Attribute ID	Name	CIP Data Type	Data Value	Access Rule
Class (Instance 0)	1	Revision	UINT	1	Get
Instance 1	1	Vender number	UINT	486	Get
	2	Device type	UINT	43	Get
	3	Product code number	UINT	1	Get
	4	Product major revision Product minor revision	USINT USINT	01 01	Get
	5	Status	WORD	See	Get
	6	Serial number	UDINT	Unique 32 bit value	Get
	7	Product name	SHORT STRING32	"Miller Access E"	Get

**Table 10-4. Identity Object's Common Services**

Service Code	Implemented For		Service Name
	Class Level	Instance Level	
05 <sub>Hex</sub>	No	Yes	Reset
0E <sub>Hex</sub>	Yes	Yes	Get_Attribute_Single
10 <sub>Hex</sub>	No	Yes	Set_Attribute_Single

### B. Message Router Object (02<sub>HEX</sub> – 1 Instance)

 There are no supported services or attributes for this object.

### C. Assembly Object (04<sub>HEX</sub> – 2 Instances)

The following tables contain the attribute, instance, data mapping, and common services information for the Assembly Object. The values are generally represented as Group Output or Group Input in robots.

**Table 10-5. Assembly Object (04<sub>HEX</sub> – 2 Instances)**

Instance	Attribute ID	Name	CIP Data Type	Data Value	Access Rule
Class (Instance 0)	1	Revision	UINT	2	Get
	2	Max instance	UINT	129	Get
Input (T->O) Instance 100 ( From Welder to Robot )  Normally this is called an Input in CIP terms.	3	<b>Word</b>	<b>Value</b>		Get
		0	Input Flags		
		1	Actual Wire Feed Speed		
		2	Actual Arc Current		
		3	Actual Arc Voltage		
		4	Error Type		
		5	Teach Index n Value (fixed index based on robot type) / Reserved (Part Number)		
		6	Teach Index n Value (fixed index based on robot type) / Reserved (Part Number)		
		7	Teach Index n Value (fixed index based on robot type) / Reserved (Weld Number)		
		8	Teach Index n Value (fixed index based on robot type) / Reserved		
		9	Teach Index n Value (fixed index based on robot type) / Reserved		
		10	Teach Index n Value (fixed index based on robot type) / Reserved		
		11	Teach Index n Value (fixed index based on robot type) / Reserved		
		12	Teach Index n Value (fixed index based on robot type) / Reserved		
		13	Teach Index n Value (fixed index based on robot type) / Reserved		
...	Teach Index n Value (fixed index based on robot type) / Reserved				
N	Teach Index n Value (fixed index based on robot type) / Reserved				

**Table 10-5. Assembly Object (04<sub>HEX</sub> – 2 Instances) (Continued)**

Instance	Attribute ID	Name	CIP Data Type	Data Value	Access Rule
Output (O->T) Instance 112 ( From Robot to Welder )  Normally this is called an Output in CIP terms.	3	<b>Word</b>	<b>Value</b>		Get/Set
		0	Output Flags		
		1	Wire Feed Speed Command		
		2	Arc Length/Voltage Command		
		3	Inductance/Sharp Arc Command		
		4	Weld List Number		
		5	Part ID and Start/End		
		6	Weld ID		
		7	Teach Index n Value (fixed index based on robot type) / Reserved (Weld Number)		
		8	Teach Index n Value (fixed index based on robot type) / Reserved		
		9	Teach Index n Value (fixed index based on robot type) / Reserved		
		10	Teach Index n Value (fixed index based on robot type) / Reserved		
		11	Teach Index n Value (fixed index based on robot type) / Reserved		
		12	Teach Index n Value (fixed index based on robot type) / Reserved		
13	Teach Index n Value (fixed index based on robot type) / Reserved				

**Table 10-5. Assembly Object (04<sub>HEX</sub> – 2 Instances) (Continued)**

Instance	Attribute ID	Name	CIP Data Type	Data Value	Access Rule
254 (0xFE)		Input only heartbeat <sup>1</sup>	Heartbeat	0	N/A
255 (0xFF)		Listen only heartbeat <sup>2</sup>	Heartbeat	0	N/A
Unused (n)		Configuration <sup>3</sup>			

1. This instance allows clients (PLCs) to monitor input data without providing output data.

2. This instance allows clients (PLCs) to monitor input data without providing output data. To use this connection type, an owning connection must exist from a second client and the configuration of the connection must match exactly.

3. Configuration data is not required, but it must match if supplied. Contents of the configuration instance are yet to be determined.

**Table 10-6. Assembly Object's Common Services**

Service Code	Implemented For		Service Name
	Class Level	Instance Level	
0E <sub>Hex</sub>	Yes	Yes	Get_Attribute_Single
10 <sub>Hex</sub>	Yes	Yes	Set_Attribute_Single

Output Flags		Input Flags	
Bit	Names	Bit	Names
15	Reserved (0)	15	Reserved (0)
14	Reserved (0)	14	Reserved (0)
13	Reserved (0)	13	Reserved (0)
12	Reserved (0)	12	Reserved (0)
11	Touch Sense Command	11	Touch Sense Active
10	Reserved (0)	10	Weld State Status
9	Contactator on/off	9	Contactator Status
8	Reserved (0)	8	Error Active
7	Reserved (0)	7	Reserved (0)
6	Reserved (0)	6	Reserved (0)
5	Reserved (0)	5	Reserved (0)
4	Reserved (0)	4	Touched
3	Gas on/off	3	Gas Status (on/off)
2	Motor Forward on/off	2	Motor Forward Status (on/off)
1	Motor Retract on/off	1	Motor Retract Status (on/off)
0	Reserved (0)	0	Arc Detect



These are some of the available items for the Teach Index n values:

Teach Table	
Index	Description
0	NOT USED
1	TBD
2	TBD
3	TBD
4	TBD
...	...
30	TEACH_SEQUENCER_INDEX
31	TEACH_ENABLE_SEQUENCE_STATE
32	TEACH_VOLTAGE_TRIM_COMMAND
33	TEACH_WFS_COMMAND
40	TEACH_SEQUENCER_TIMEOUT
66	TEACH_SHARP_ARC
75	TEACH_INDUCTANCE
100	TEACH_LOAD_DEFAULT_PROGRAM
101	TEACH_WFS_UNITS
102	TEACH_CONTROL_TYPE
103	TEACH_DEVICENET_TO_ROBOT
105	TEACH_DI_ROBOT_TYPE
106	TEACH_UIM_VALUES_COMMANDS_OR_ACTUALS
117	TEACH_WELD_ENABLE
122	TEACH_ERROR_ENABLE
123	TEACH_POWER_SOURCE_TYPE (Read Only)
131	TEACH_ENCODER_LOCK
139	TEACH_ROBOT_PROGRAM_SELECT
411	TEACH_PROCESS_ENABLE_READ (Read Only)
421	TEACH_WELD_TIME (Reset Arc Time HH:MM:SS)
618	VOLT_SENSE_OR_STUD_VOLT_FEEDBACK
619	RESET_WIRE_SPOOL_INFO
620	SECONDARY_LOOP_TEST_START_STOP
TBD	Part Tracking Error
TBD	Weld SETPOINT Error
TBD	Weld Signature Analysis Error
TBD	Weld Cell State
TBD	Tool Center Point Weld Speed
TBD	Tool Center Point Weld Direction (Horizontal, Up, Down, Slope, relative to gravity)
TBD	Tool Center Point Weld Location
TBD	Wire Material
TBD	Wire Diameter
TBD	Gas Type

#### D. Connection Manager Object (06<sub>HEX</sub>)

 There are no supported services or attributes for this object.

### E. PCCC Object (67<sub>HEX</sub> – 1 Instance)

The PCCC Object has no class or instance attributes. The following tables contain common services information and PCCC Mapping parameters for the PCCC Object.

**Table 10-7. PCCC Object’s Common Services**

Service Code	Implemented For		Service Name
	Class Level	Instance Level	
4B <sub>HEX</sub> *	No	Yes	Execute PCCC Request

\*EtherNet/IP devices use the “Execute PCCC Request” service code (4B<sub>HEX</sub>) to communicate with older controllers like the PLC5E and the SLC 5/05.

**Table 10-8. PCCC Object (67<sub>HEX</sub> –1 Instance) (Read/Write)**

PCCC	Data	Description
N113:0	Bit 15 – 0	Data from Assembly Instance 113
N113:1	Bit 15 – 0	
...	Bit 15 – 0	
N113:39	Bit 15 – 0	

**Table 10-9. PCCC Object (67<sub>HEX</sub> –1 Instance) (Read Only)**

PCCC	Data	Description
N101:0	Bit 15 – 0	Data from Assembly Instance 101
N101:1	Bit 15 – 0	
...	Bit 15 – 0	
N101:47	Bit 15 – 0	

## F. TCP Object (F5<sub>HEX</sub> – 1 Instance)

The following tables contain the attribute and common services information for the TCP Object.

**Table 10-10. Assembly Object (04<sub>HEX</sub> – 2 Instances)**

Instance	Attribute ID	Name	CIP Data Type	Data Value	Access Rule
Class (Instance 0)	1	Revision	UINT	2	Get
Instance 1	1	Status*	DWORD	Fill in	Get
	2	Configuration capability*	DWORD	Fill in	Get
	3	Configuration control*	DWORD	Fill in	Fill in
	4	Physical Link Object* Structure of  Path Size  Path	UINT   Array of Word	Fill in   Fill in	Get
	5	Interface configuration*  Structure of  IP Address  Network Mask  Gateway Address  Name Server  Name Server 2  Domain Name Size  Domain Name	UDINT   UDINT  UDINT  UDINT  UDINT  UDINT  UDINT	Fill in   Fill in  Fill in  Fill in  Fill in  Fill in	Fill in
	6	Host name*  Structure of  Host Name Size  Host Name	UINT   STRING	Fill in   Fill in	Get
*For more details on these attributes, see <i>Volume 2: EtherNet/IP Adaptation of CIP</i> , Section 5-3.2 from ODVA.					

**Table 10-11. TCP Object's Common Services**

Service Code	Implemented For		Service Name
	Class Level	Instance Level	
0E <sub>HEX</sub>	Yes	Yes	Get_Attribute_Single
10 <sub>Hex</sub>	No	Yes	Set_Attribute_Single

\*EtherNet/IP devices use the "Execute PCCC Request" service code (4B<sub>Hex</sub>) to communicate with older controllers like the PLC5E and the SLC 5/05.

**G. Ethernet Link Object (EtherNet/IP Only) (F6<sub>HEX</sub> – 1 Instance)**

The following tables contain the attribute and common services information for the Ethernet Link Object.

**Table 10-12. Ethernet Link Object (F6<sub>HEX</sub> – 1 Instance)**

Instance	Attribute ID	Name	CIP Data Type	Data Value	Access Rule
Class (Instance 0)	1	Revision	UINT	1	Get
Instance 1	1	Interface speed*	UDINT	Fill in	Get
	2	Interface flags*	DWORD	Fill in	Get
	3	Physical address	USINT Array (6)	Fill in	Get

\*For more details on these attributes, see *Volume 2: EtherNet/IP Adaptation of CIP*, Section 5-4.2 from ODVA.

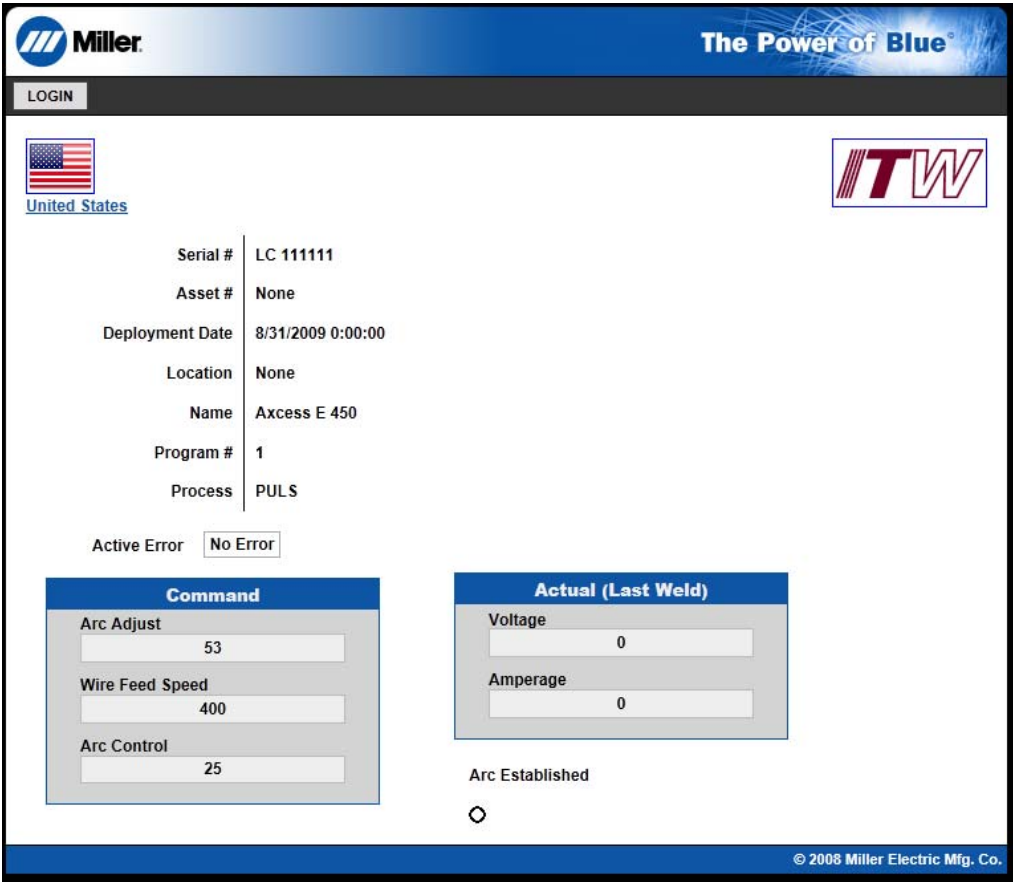
**Table 10-13. Ethernet Link Object's Common Services**

Service Code	Implemented For		Service Name
	Class Level	Instance Level	
0E <sub>HEX</sub> *	Yes	Yes	Get_Attribute_Single

## 10-12. Configuring A Robot To Work With Auto Access E EtherNet/IP

The simplest connection is to use the factory default connection of the Access E, Ethernet port A connected directly to a computer for configuration. The factory default address for Port A is 169.254.0.2, which is in the IP address range of a PC when directly connecting to the welder (no DHCP server, will take about 1 minute after connection for Windows XP).

Put this IP address into a web browser (IE 7, 8 or 9+; Firefox 3+ or Chrome 10+) and the welder configuration web pages will open. Click Login.



The screenshot shows the Miller TW web interface. At the top, there is a blue header with the Miller logo and the slogan "The Power of Blue". Below the header is a "LOGIN" button. On the left, there is a link for "United States" with a US flag icon. On the right, there is the "TW" logo. The main content area displays the following configuration details:

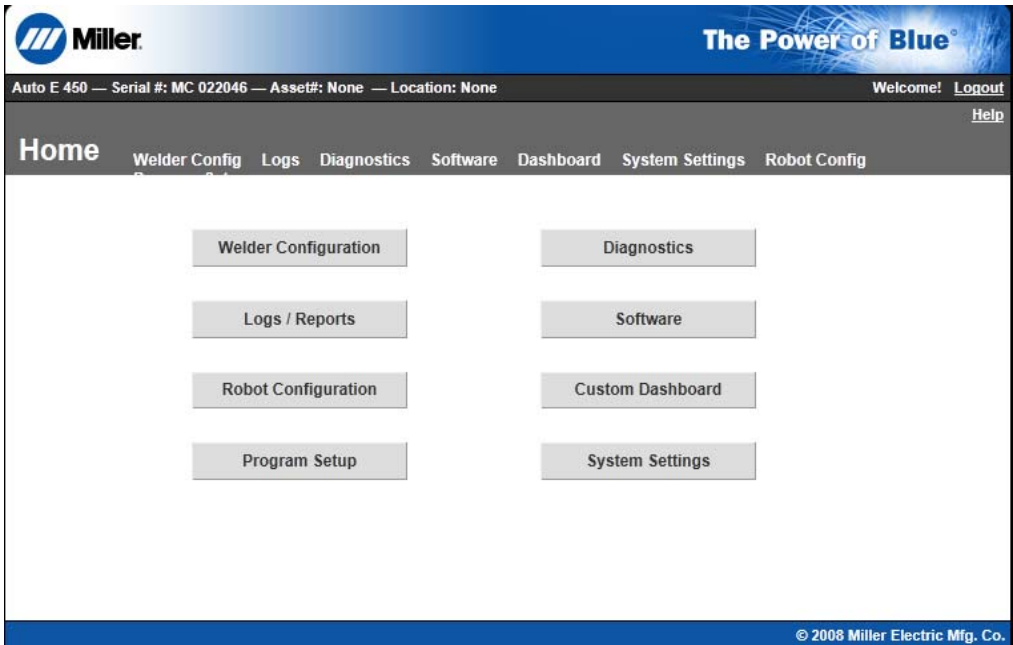
Serial #	LC 111111
Asset #	None
Deployment Date	8/31/2009 0:00:00
Location	None
Name	Access E 450
Program #	1
Process	PULS

Below the configuration details, there is an "Active Error" section with a "No Error" button. There are two panels: "Command" and "Actual (Last Weld)".

Command	Actual (Last Weld)
Arc Adjust: 53	Voltage: 0
Wire Feed Speed: 400	Amperage: 0
Arc Control: 25	Arc Established: <input type="radio"/>

At the bottom right, there is a copyright notice: "© 2008 Miller Electric Mfg. Co."

Click Robot Configuration.

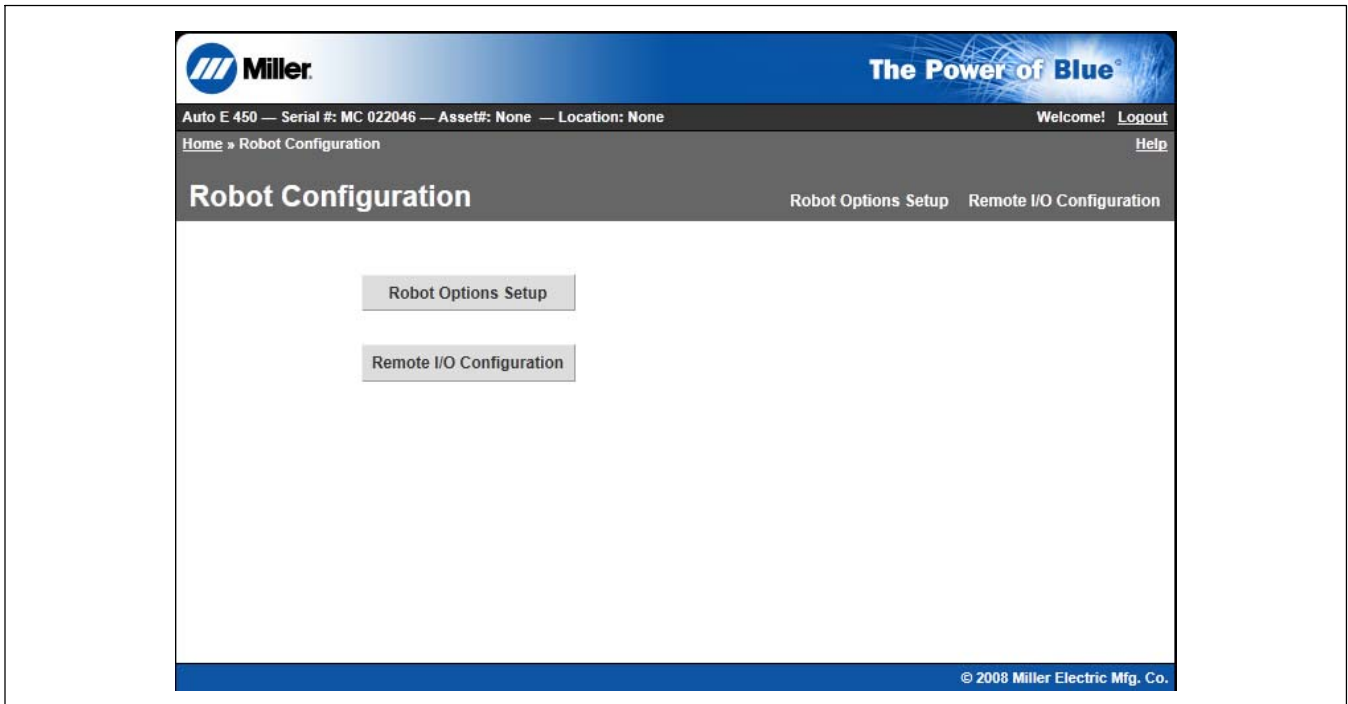


The screenshot shows the Miller TW web interface's Home page. At the top, there is a blue header with the Miller logo and the slogan "The Power of Blue". Below the header, there is a navigation bar with the following items: "Auto E 450 — Serial #: MC 022046 — Asset#: None — Location: None", "Welcome! Logout", and "Help". Below the navigation bar, there is a "Home" section with a menu of options: "Welder Config", "Logs", "Diagnostics", "Software", "Dashboard", "System Settings", and "Robot Config". The main content area displays a grid of buttons for various configuration options:

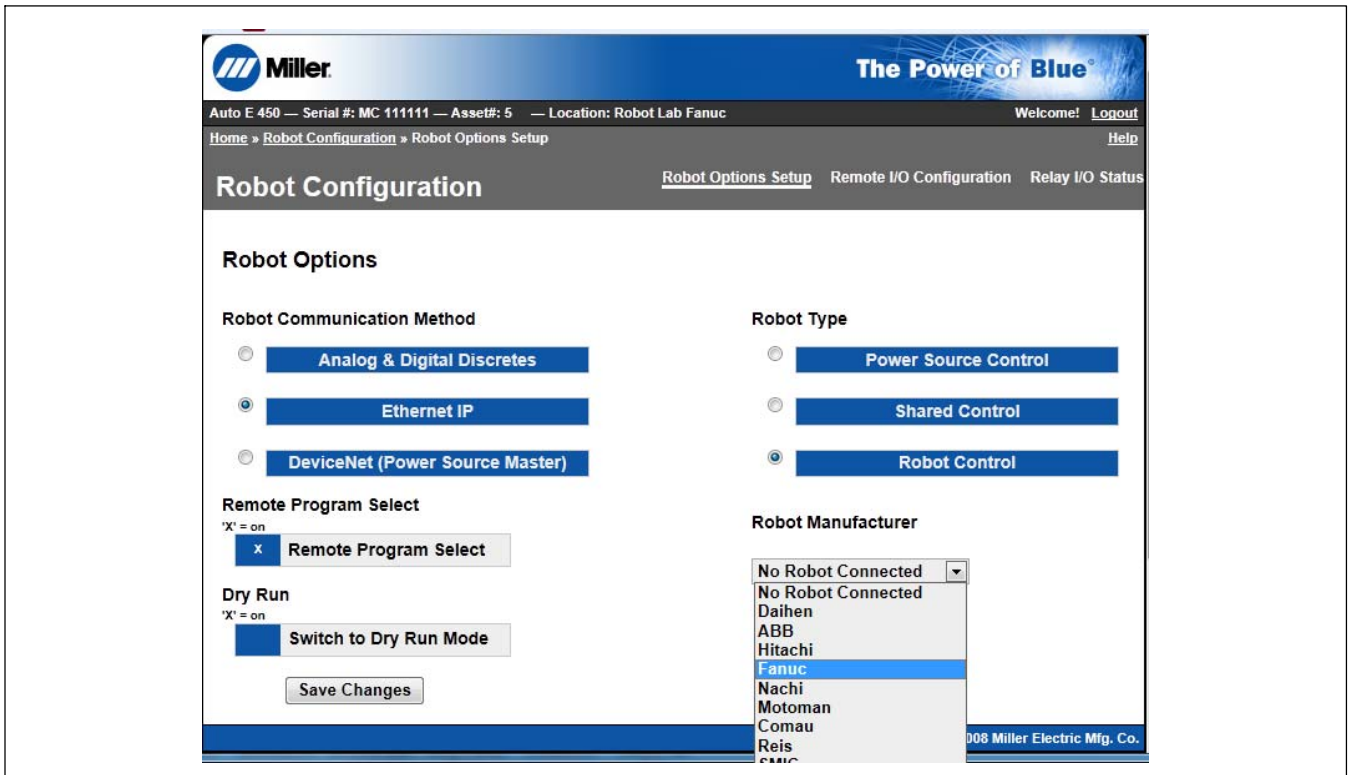
Welder Configuration	Diagnostics
Logs / Reports	Software
Robot Configuration	Custom Dashboard
Program Setup	System Settings

At the bottom right, there is a copyright notice: "© 2008 Miller Electric Mfg. Co."

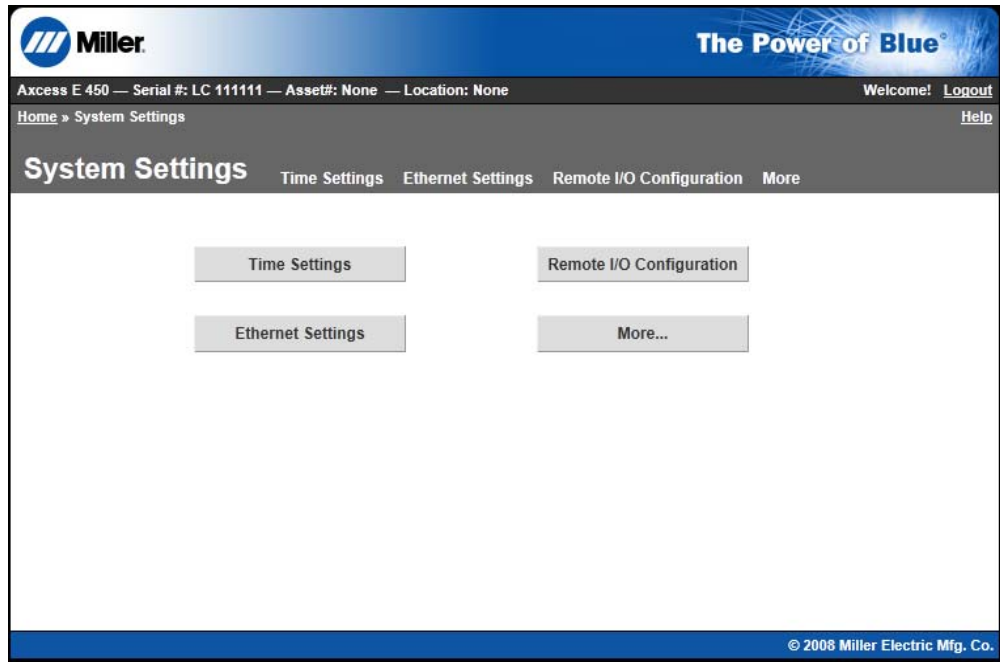
Click Robot Options.



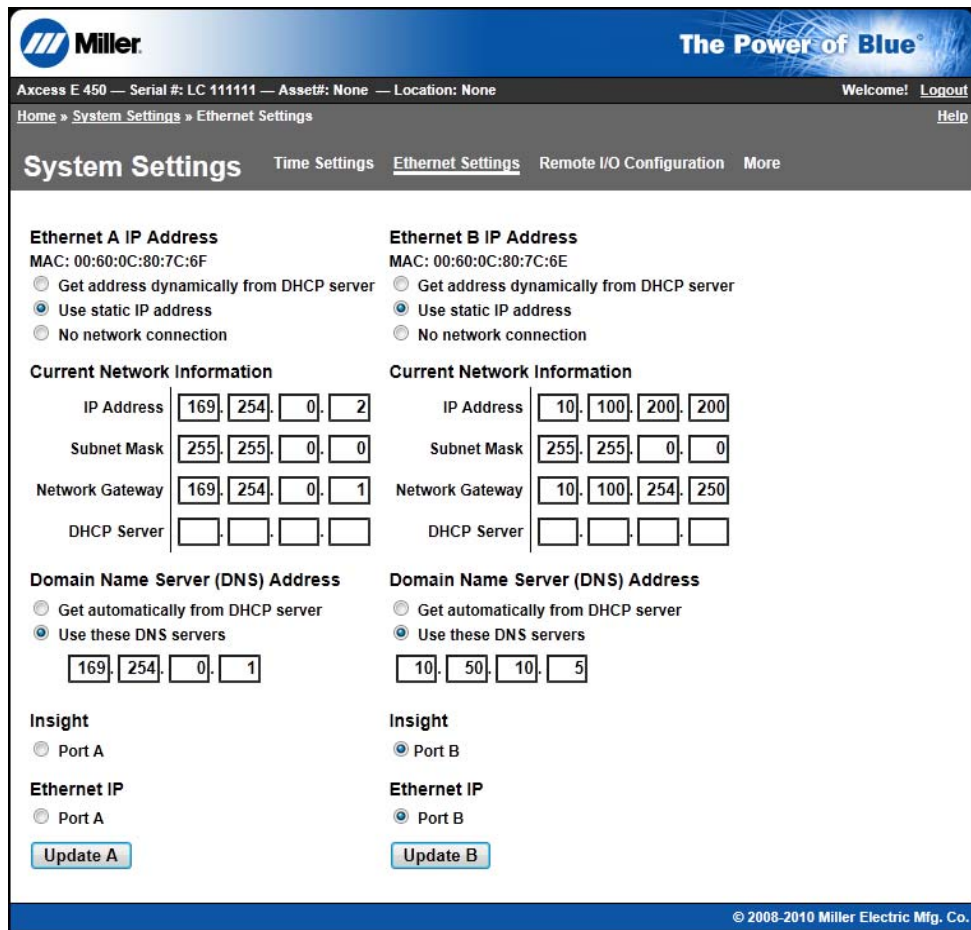
Select Ethernet IP and Robot Manufacturer, click Save Changes, and cycle power on the welder.



Return to the Home page and select System Settings.



Click on Ethernet Settings and change as necessary for your setup.



General

If you have left the welder Port A at the default setting, and you now connect that cable to the robot, set up the robot's EtherNet/IP scanner as 169.254.0.1, and have it connect to 169.254.0.2 as the welder.

Refer to the Miller Object Model document for the format of the IO Assembly.

## A. Using A Robot To Control Centerpoint

**In the simplest case, the robot always follows the same sequence for every part, and the following can be used:**

Add the commands to select a part ID to the robot job file for that part, as early as possible in the file.

- Set the Part ID plus 10000 to indicate the start of a part (Group Output). The part ID offset of 10000 is only appropriate for EtherNet and not DeviceNet communications.

Add the command to end the part to the robot job file for that part, as late in the file as possible.

- Set the Part ID without the 10000 to indicate the end of the part. (Group Output).
- Wait for Weld Monitor Error OFF (part error)\* (Digital Input).

\*Optional – as required for each installation.

**In the case where it is preferable to have the robot send the weld number to Centerpoint before each weld:**

Add the commands to select a part ID to the robot job file for that part, as early as possible in the file.

- Set the Part ID plus 10000 to indicate the start of a part (Group Output). The part ID offset of 10000 is only appropriate for EtherNet and not DeviceNet communications.
- Set the Weld ID (Group Output).
- Move.
- Wait for Weld Monitor Error OFF (weld error)\* (Digital Input).
- Weld.
- Set the next Weld ID (Group Output).
- Move.
- Wait for Weld Monitor Error OFF (weld error)\* (Digital Input).
- Weld.

... continue welding the part.

- Set the Weld ID (Group Output).
- Move.
- Wait for Weld Monitor Error OFF (weld error)\* (Digital Input).
- Weld.

Add the command to end the part to the robot job file for that part, after the last weld is ended:

- Set the Weld ID to 0 in case the next part is using counted welds as above (Group Output).
- Set the Part ID without the 10000 to indicate the end of the part. (Group Output).
- Wait for Weld Monitor Error OFF (part error)\* (Digital Input).

\*Optional – as required for each installation.



# SECTION 11 – MAINTENANCE

## 11-1. Routine Maintenance

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

## 11-2. Blowing Out Inside Of Unit

		<p><b>⚠ Do not remove case when blowing out inside of unit.</b></p> <p>To blow out unit, direct airflow through front and back louvers as shown.</p>
Ref. 349 889-A		



# SECTION 12 – SAFETY PRECAUTIONS FOR SERVICING

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

## 12-1. Symbol Usage

OM-257 675C - 2013-05, safety\_stm 2011-10



**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.

**NOTE** – 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.

## 12-2. 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.



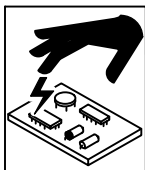
### ELECTRIC SHOCK can kill.

- 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.



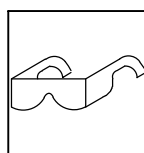
### STATIC (ESD) can damage PC boards.

- 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.



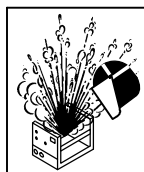
### FLYING METAL or DIRT can injure eyes.

- 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.



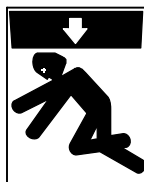
### EXPLODING PARTS can injure.

- 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.



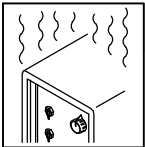
### MOVING PARTS can injure.

- 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.



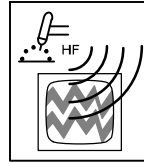
### ELECTRIC AND MAGNETIC FIELDS (EMF) can affect Implanted Medical Devices.

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



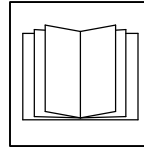
### OVERUSE can cause OVERHEATING.

- 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.

## 12-3. 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.)

**⚠** 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.*

## 12-4. 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, 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.

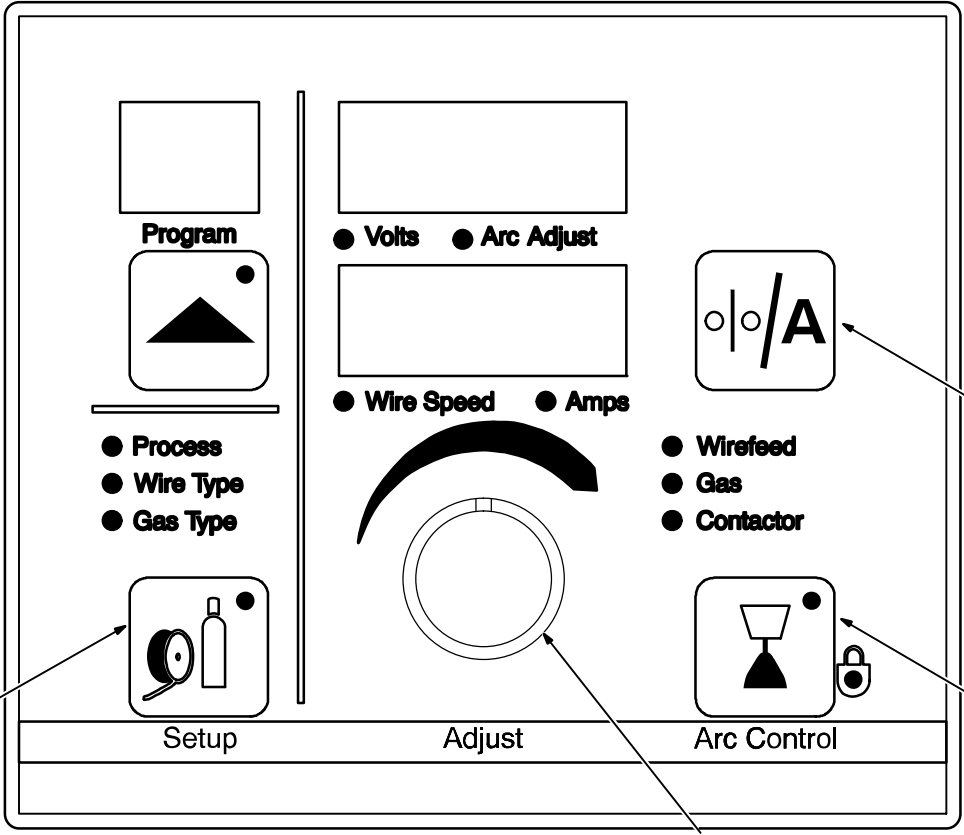
### About Implanted Medical Devices:

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 13 – TROUBLESHOOTING

## 13-1. Set Value Mode



200 410-A

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

Trouble

## 13-2. Error Code Troubleshooting Tables

<p>Display Example</p> <div style="display: flex; flex-direction: column; align-items: center; gap: 10px;"> <div style="border: 1px solid black; padding: 5px 15px; font-weight: bold;">ERR</div> <div style="border: 1px solid black; padding: 5px 15px; font-weight: bold;">TACH</div> </div>
-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------

 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 13-2. A
Arc Error	ERR	ARC	Section 13-2. B
No Coolant Flow	ERR	COOL	Section 13-2. C
Ground Current Detect Error	ERR	GND	Section 13-2. D
Line Error	ERR	LINE	Section 13-2. E
Motor Over Current	ERR	MOTR	Section 13-2. F
Arc Start Error	ERR	STRT	Section 13-2. G
No Tach Error	ERR	TACH	Section 13-2. H
Thermal Over Temperature	ERR	TEMP	Section 13-2. I
Unknown Error	ERR	UNKN	Section 13-2. J
Motor Communications Error	MOTR	COMM	Section 13-2. K
Over Average Current	OVER	AVE	Section 13-2. L
Over Current	OVER	CRNT	Section 13-2. M
Release Trigger	REL	TRIG	Section 13-2. N
Trigger Stuck	TRIG	STUK	Section 13-2. O
Wire Feed Speed Error	ERR	WFS	Section 13-2. P
Stop Error	ERR	STOP	Section 13-2. Q
Flow Error	ERR	FLOW	Section 13-2. R
Stuck Error	ERR	STUK	Section 13-2. S
Weld Wait	WELD	WAIT	Section 13-2. T
Please Wait	PLS	WAIT	Section 13-2. U
Low Wire Feed Speed	LOW	WFS	Section 13-2. V
Demo Done	DEMO	DONE	Section 13-2. W
Net Wait	NET	WAIT	Section 13-2. X
Software Error	SW	ERR	Section 13-2. Y
Check Web	CHCK	WEB	Section 13-2. Z

### A. Emergency Stop Error

	<p>Indicates an emergency stop error.</p> <p>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.</p> <p>In an E-Stop situation (relays open), all four relays on the E-Stop board de-energize and cut power to the control boards.</p>
<b>E</b>	<p>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).</p>
<b>STOP</b>	<p>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.</p> <p>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.</p> <p>Relay CR4 on E-Stop board PC12 is a soft start relay in parallel with the contacts of relay CR1.</p>

### B. Arc Error

<b>ERR</b>	<p>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.</p> <p>Arc error can be enabled or disabled using an optional PDA with File Management/WaveWriter software.</p>
<b>ARC</b>	

### C. No Coolant Flow Error

<b>ERR</b>	<p>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.</p>
<b>COOL</b>	

### D. Ground Current Detect Error

<b>ERR</b>	<p>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.</p>
<b>GND</b>	

### E. Line Error

<b>ERR</b>	<p>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.</p> <p>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.</p>
<b>LINE</b>	

### F. Motor Over Current Error

<b>ERR</b>	<p>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.</p>
<b>MOTR</b>	

### G. Arc Start Error

<b>ERR</b>	<p>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.</p>
<b>STRT</b>	

## H. No Tach Error

<b>ERR</b>	<p>Indicates loss of tachometer feedback. Determine cause of error as follows:</p> <ul style="list-style-type: none"><li>• Press JOG button on the front panel.</li><li>• Does the motor run wide open immediately?</li><li>• YES → Replace Motor Board PC6.</li><li>• Does the motor ramp up in speed?</li><li>• YES → Bad motor tach. Contact nearest Factory Authorized Service Agent.</li><li>• Does the motor respond at all?</li><li>• YES → Contact nearest Factory Authorized Service Agent.</li><li>• Check motor cable. Is it damaged?</li><li>• YES → Replace motor cable.</li><li>• NO → Contact factory service personnel.</li></ul>
<b>TACH</b>	

## I. Thermal Over Temperature Error

<b>ERR</b>	<p>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.</p> <p>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).</p> <p>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.</p> <ul style="list-style-type: none"><li>• If LED 1 is lit, this indicates an over-temperature condition on the primary heat sink.</li><li>• If LED 2 is lit, this indicates an over-temperature condition on the secondary heat sink or on the boost inductor.</li></ul> <p>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:</p> <ul style="list-style-type: none"><li>• 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.</li><li>• The peak voltage of the input line power must be greater than 150 volts peak.</li><li>• The DC bus voltage must be greater than 85% of the rectified line voltage. This bus voltage also turns on the pre-charge relay.</li><li>• The DC bus voltage must be boosted to greater than 858 volts DC.</li></ul> <p>If any of these conditions are not met, then receptacle RC6-12 is pulled low and weld output is locked out.</p>
<b>TEMP</b>	

## J. Unknown Error

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



### K. Motor Communications Error

	<p>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.</p> <p>Check if WFM board PC6 code is installed and if microprocessor is running. Check LED3 and LED4 on WFM board PC6.</p> <p>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.</p> <p>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).</p> <ul style="list-style-type: none"> <li>• Check all Devicenet grey harness connections between process control module PC4, UIM board PC7, and WFM board PC6.</li> <li>• Check process control module PC4 for +24 volts DC at 6-pin connector J6-2 (+) and J6-5 (-).</li> </ul> <p>If +24 volts is not present at the connector, proceed as follows:</p> <ul style="list-style-type: none"> <li>• 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.</li> <li>• 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.</li> </ul> <p>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.</p> <ul style="list-style-type: none"> <li>• 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.</li> <li>• Check all Devicenet grey harness connections between process control module PC4, UIM board PC7, and WFM board PC6.</li> </ul>
<b>MOTR</b>	
<b>COMM</b>	

### L. Over Average Current Error

	<p>Output current is exceeding the thermal capabilities of the welding power source for approximately 25 seconds. Default value is as follows:</p> <p style="padding-left: 40px;">Access 450 limit is 610 A average</p> <p>This is a duty cycle error and requires 5 minutes with power on and NO welding to clear the error.</p> <p>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.</p> <p>The current limit is as follows:</p> <p style="padding-left: 40px;">Access 450 is 610 amperes</p> <p>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.</p> <p>If this alarm was received by mistake, and the power source did not exceed the duty cycle, check the following:</p> <p>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.</p>
<b>OVER</b>	
<b>AVE</b>	

### M. Over Current Error

<b>OVER</b>	<p>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).</p> <p>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.</p> <ul style="list-style-type: none"><li>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.</li><li>A shorted output diode will cause an over-current error and no weld output will be available.</li></ul>
<b>CRNT</b>	

### N. Release Trigger Error

<b>REL</b>	<p>Indicates a timed weld has expired, but the trigger is still active. Press Jog/Purge button to clear error.</p> <p>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.</p>
<b>TRIG</b>	

### O. Trigger Stuck Error

<b>TRIG</b>	<p>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.</p> <p>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.</p> <ul style="list-style-type: none"><li>Use a PDA with ServicePak software and view the Comm Diagnostics screen to see the source of the contactor or trigger command.</li><li>If LED2 is lit on RIO board PC10, a contactor signal is being sent from the robot.</li></ul>
<b>STUK</b>	

### P. Wire Feed Speed Error

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

### Q. Stop Error

<b>ERR</b>	<p>Indicates an arc stop error. Press Jog/Purge button to clear error.</p> <p>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.</p>
<b>STOP</b>	

### R. Flow Error

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

### S. Stuck Error

<b>ERR</b>	<p>Indicates a wire stuck error. Press Jog/Purge button to clear error.</p> <p>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.</p>
<b>STUK</b>	

**T. Weld Wait**

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

**U. Please Wait**

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

**V. Low Wire Feed Speed**

<b>LOW</b>	<p>Indicates a low wire feed speed command error. Press Jog/Purge button to clear error.</p> <p>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.</p>
<b>WFS</b>	

**W. Demo Done**

<b>DEMO</b>	<p>Indicates RMD/Accuspeed demo has expired. Press Jog/Purge button to clear error.</p> <p>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.</p>
<b>DONE</b>	

**X. Net Wait**

<b>NET</b>	<p>Indicates a communication problem. Press Jog/Purge button to clear error.</p> <p>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.</p>
<b>WAIT</b>	

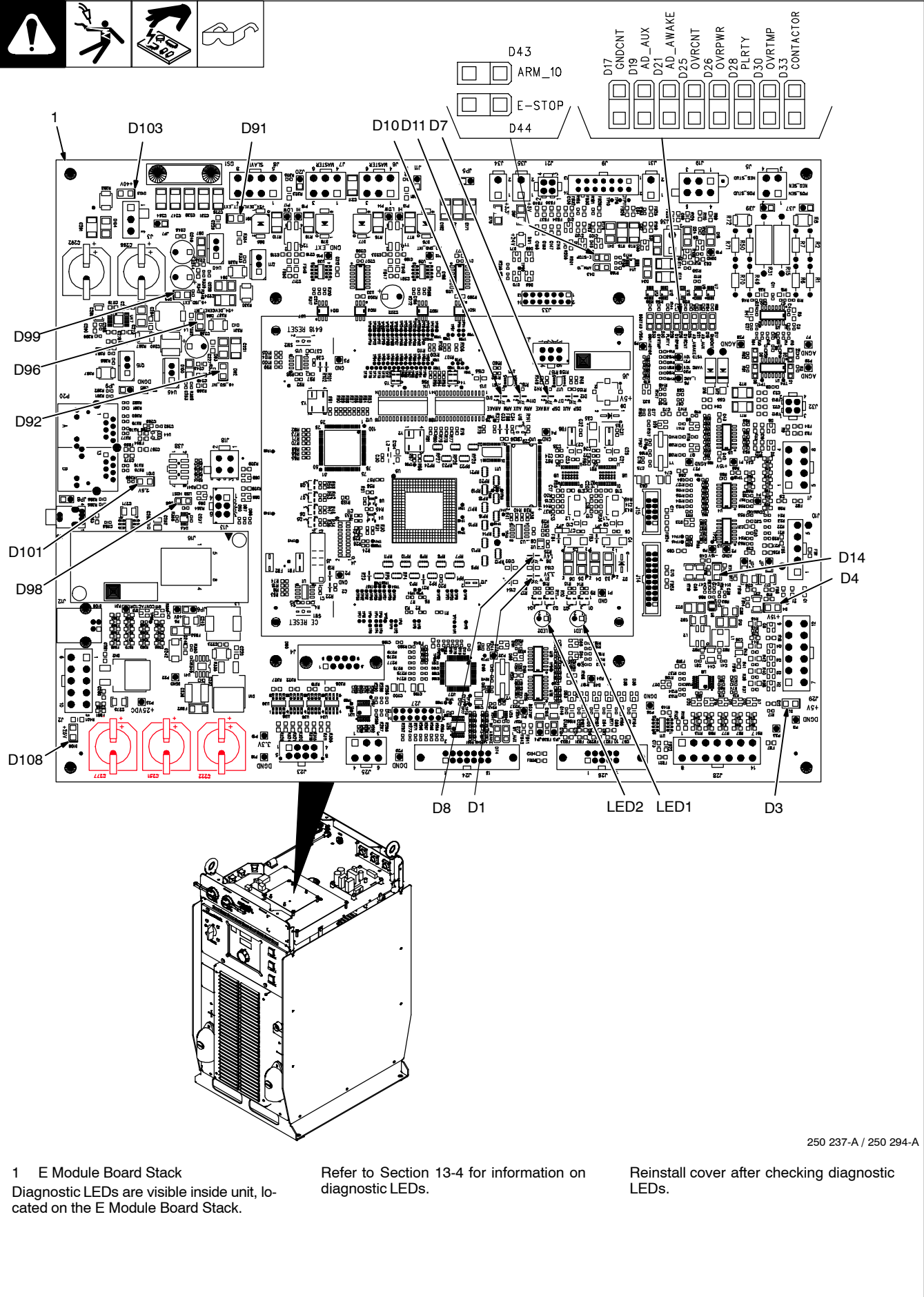
**Y. Software Error**

<b>SW</b>	<p>Indicates incompatible software code. Press Jog/Purge button to clear error.</p> <p>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.</p>
<b>ERR</b>	

**Z. Check Web**

<b>CHCK</b>	<p>Indicates an E Module update error. Press Jog/Purge button to clear error.</p> <p>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.</p>
<b>WEB</b>	

### 13-3. E Module Board Stack Diagnostic LEDs



250 237-A / 250 294-A

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

Refer to Section 13-4 for information on diagnostic LEDs.

Reinstall cover after checking diagnostic LEDs.

## 13-4. 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	---	Off	The board stack is not on-line with the network or there is no power 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 connection. Replace board stack if necessary.
LED2	---	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 Green	The board stack has encountered a recoverable fault. Wait or cycle power to clear fault.
		Red	The board stack has encountered an unrecoverable fault.
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

## 13-5. Network And Module Status LEDs

### A. Network Status LED

LED2 on the E Module board stack

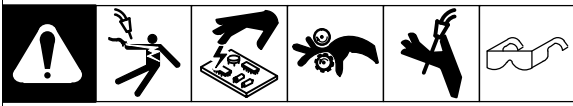
Status	Diagnosis
Off	The board stack is not on-line with the network or there is no power applied to the board stack.
Green	The board stack is operating normally and the on-line connection is made with the network.
Flashing Green	The board stack is waiting for an on-line connection to be made with the 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.

## 13-6. Troubleshooting

					
Trouble		Remedy			
No weld output; completely inoperative		Place line disconnect in On position (see Section 8-10).			
		Check and replace line fuse(s), if necessary, or reset circuit breaker (see Section 8-10).			
		Check for proper input power connections (see Section 8-10).			
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 9-2).			
		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 8-5).			
Wire does not feed.		Check supplementary protector CB2 and reset if necessary (see Section 8-5).			
		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.			
Wire feeds as soon as power is supplied.		Check motor control cable connections.			
Wire stubbing on low end using a constant current power source.		Check gun trigger. See gun Owner's Manual.			
		Increase output setting of the power source.			
Gas does not flow or does not stop flowing; wire feeds.		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.			

## 13-7. Check Web Message Display

When an existing Auto-Access power source is upgraded to an Auto-Access E, the first time the unit is powered up the message CHCK WEB will appear on the display (see Figure 13- 1).

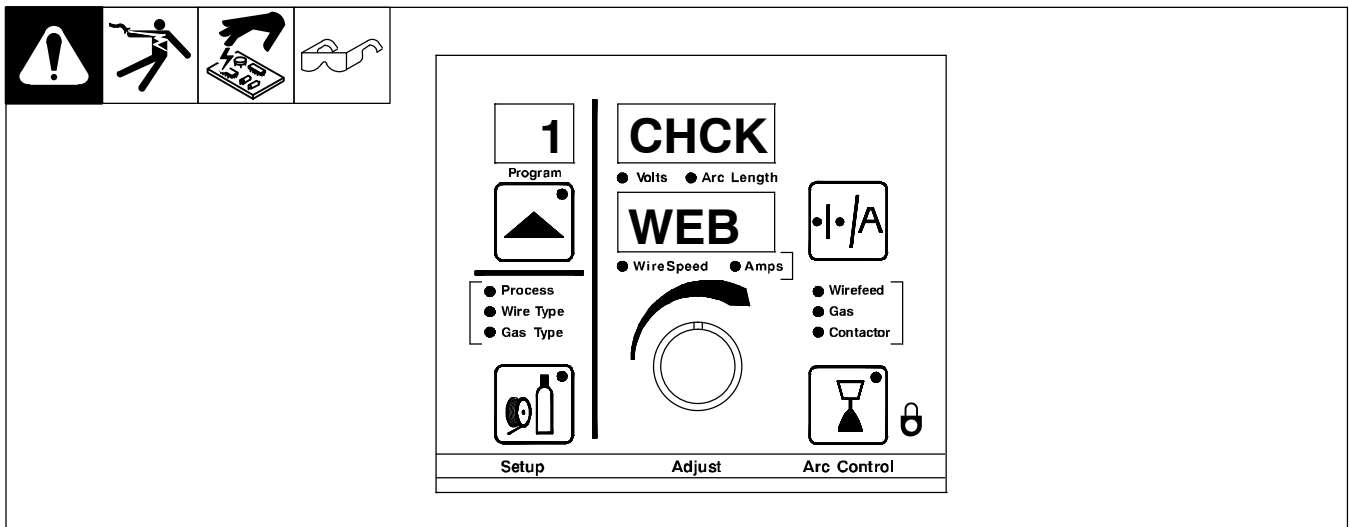


Figure 13- 1. Welding Power Source Display On First Power Up After Upgrade

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, AUTO, etc.) as shown in Figure 13- 2.

The screenshot shows the Miller web interface. At the top left is the Miller logo and 'The Power of Blue' slogan. Below is a 'LOGIN' button. A table displays unit information: Serial # LC 123456, Asset # None, Deployment Date 8/31/2009 0:00:00, Location None, and Name Access E 450. An 'ITW' logo is on the right. A blue 'Information' banner contains the text: 'IMPORTANT! The Access power source you have upgraded to an Access E needs the following information entered before you can use it!'. Below this is the 'Access Upgrade Information' form with fields for Access Serial Number (LC 123456 U), Upgrade Module Serial Number (MA 123456 U), Access Amperage Rating (Access 450), and Power Source Type (Semi-Automatic ( Access )). A 'Save Access Information' button is at the bottom.

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

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This screenshot is identical to the one above, but with a tooltip over the 'UPGRADE INFORMATION' header. The tooltip text reads: '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.' The form fields are the same as in the previous screenshot.

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 | 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

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Figure 13- 2. Web Site For Auto-Access E Information



## 13-8. 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 13- 3). Compatible software can be downloaded from [www.MillerWelds.com](http://www.MillerWelds.com).

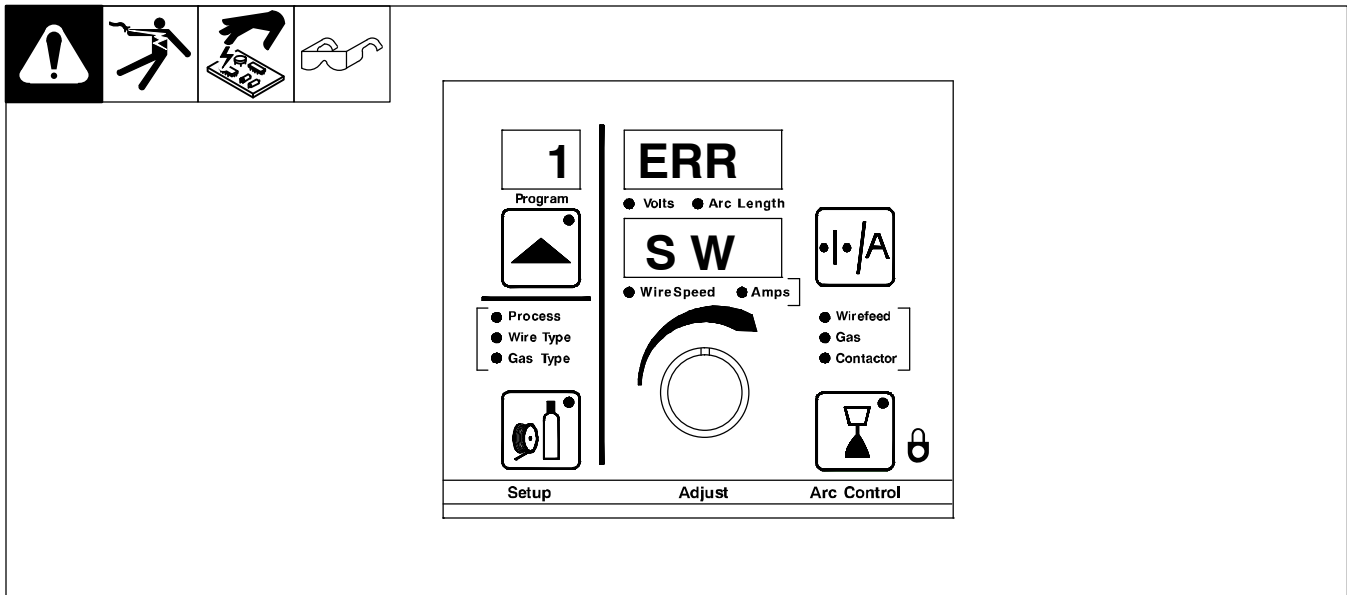


Figure 13- 3. Welding Power Source Display For Software Version Issues

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

## 13-9. Troubleshooting Ethernet Connection Issues

There are two Ethernet NICs (Network Interface Connections) on the Axxess E. Either port can be used for any purpose. We generally use Port A for direct connections and Port B for network connections. For this reason, from the factory Port A is set with a static IP address and port B with a dynamic (DHCP) address. Port A may often be connected to a PC for initial configuration, to a robot with an EtherNet/IP connection, or to a robot through an ADAM block for discrete Inputs/Outputs. Sometimes Centerpoint on a PC is directly connected to Port A, and Port B is used for remote configuration over a factory network if there is no robot.

When connecting a web browser to the welder, allow 10 seconds for the first web page. The web server sleeps when not needed and takes a little while to start. You should see Miller in the title bar before the page loads. If you don't see the web pages, try the troubleshooting ideas below.

First, look at the LEDs where the Ethernet cables plug in. The green LED is receive data and the amber LED is transmit data. If Centerpoint or an EtherNet/IP client is connected, both LEDs should be blinking rapidly. Port A is on the left in this picture and port B is on the right.

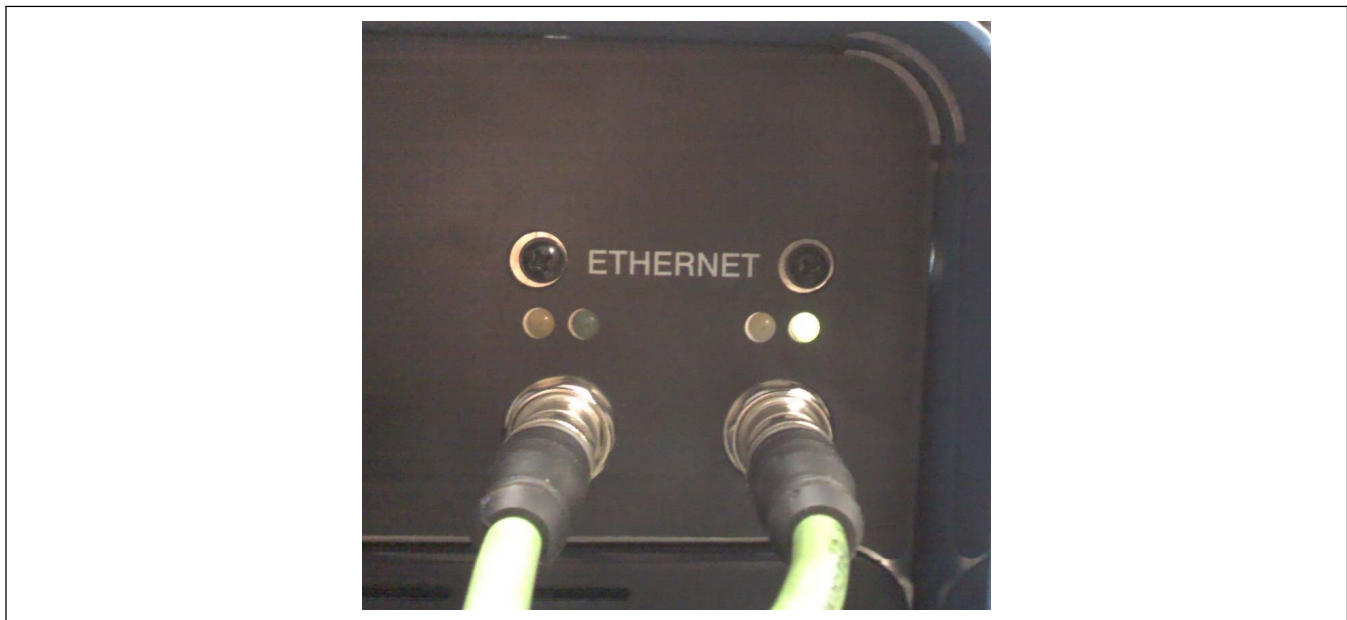


Figure 13- 4. Ethernet Connections

Make sure the connections are turned all the way in. They may look connected but the pins inside may not be making contact.

If the PC with the browser is not directly connected to the welder, but connecting through a switch or router, you may need to find the IP address that the welder acquires through DHCP. Plug a blank USB flash drive into the USB A port on the front of the welder and cycle power. When the welder is finished starting, it will write a file IP\_ADDR.TXT to the USB drive. Remove the drive and plug it into the PC. You can read the IP addresses of both ports from this file.

Sample IP\_ADDR.TXT FILE:

IP Port B = 10.100.100.139

IP Port A = 169.254.0.2

If Centerpoint or an EtherNet/IP client is connected physically but not connecting on the network, check the web page for Ethernet settings and make the correct selections at the bottom of the page.

Settings page:

The screenshot shows the 'System Settings' page for Ethernet A and B. The page is titled 'System Settings' and has tabs for 'Time Settings', 'Ethernet Settings', 'Remote I/O Configuration', and 'More'. The 'Ethernet Settings' tab is selected. The page is divided into two columns for 'Ethernet A IP Address' and 'Ethernet B IP Address'. Each column has a 'Current Network Information' section with input fields for IP Address, Subnet Mask, Network Gateway, and DHCP Server. Below each 'Current Network Information' section is a 'Domain Name Server (DNS) Address' section with radio buttons for 'Get automatically from DHCP server' and 'Use these DNS servers', and input fields for the DNS servers. At the bottom of each column are 'Insight' and 'Ethernet IP' sections with radio buttons for 'Port A' and 'Port B', and 'Update A' and 'Update B' buttons. The footer of the page contains the copyright information: '© 2008-2010 Miller Electric Mfg. Co.'

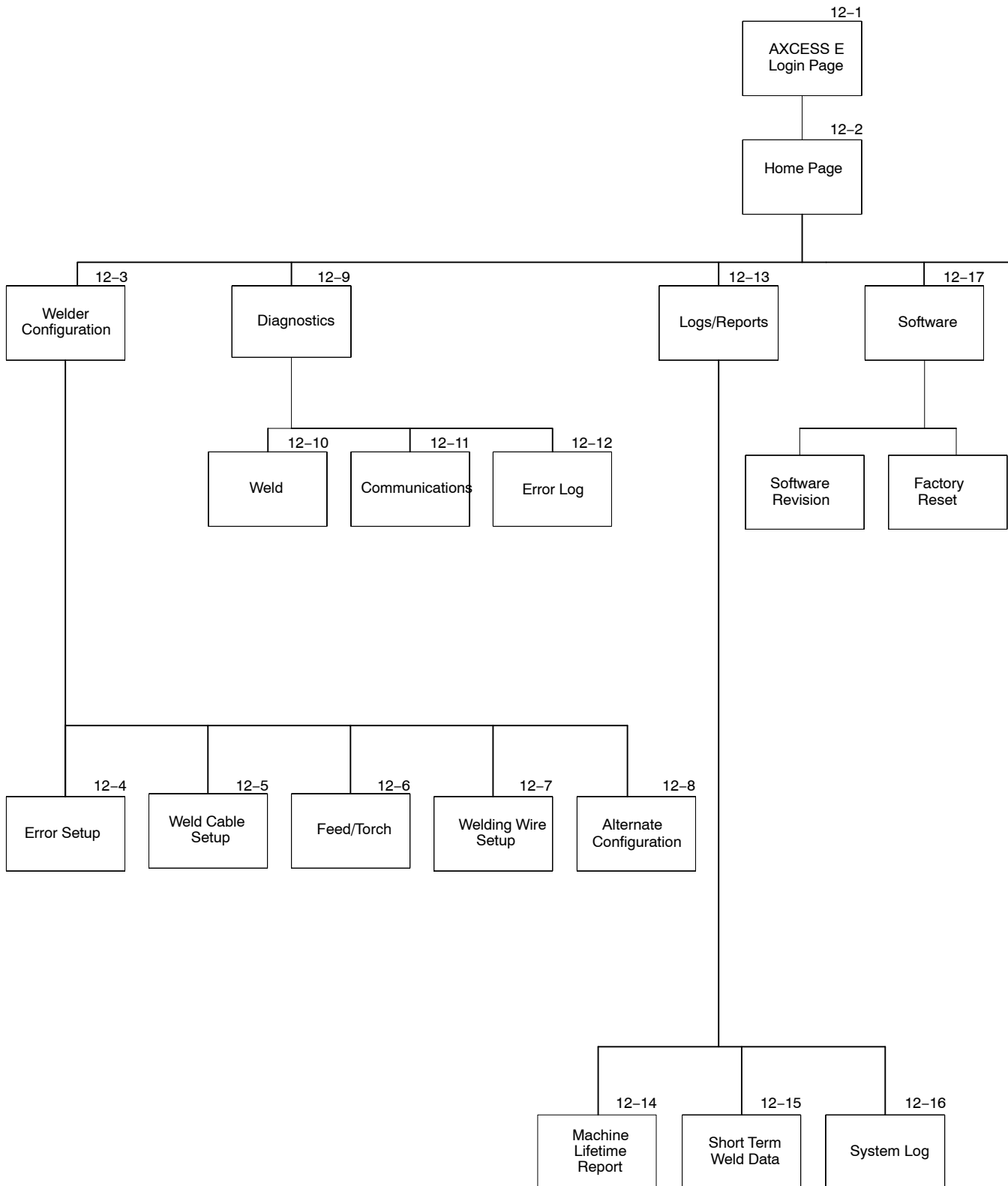
You must ensure that the two ports are not on the same subnet. (If the parts of the IP Address with the 255 in the Subnet Mask match, they are on the same subnet.) For example, plugging both ports into the same Ethernet switch would cause problems if they are both set for DHCP. It also would not provide any additional value. If the switch has separate VLAN connections per port, it may work if the switch assigns different subnets.

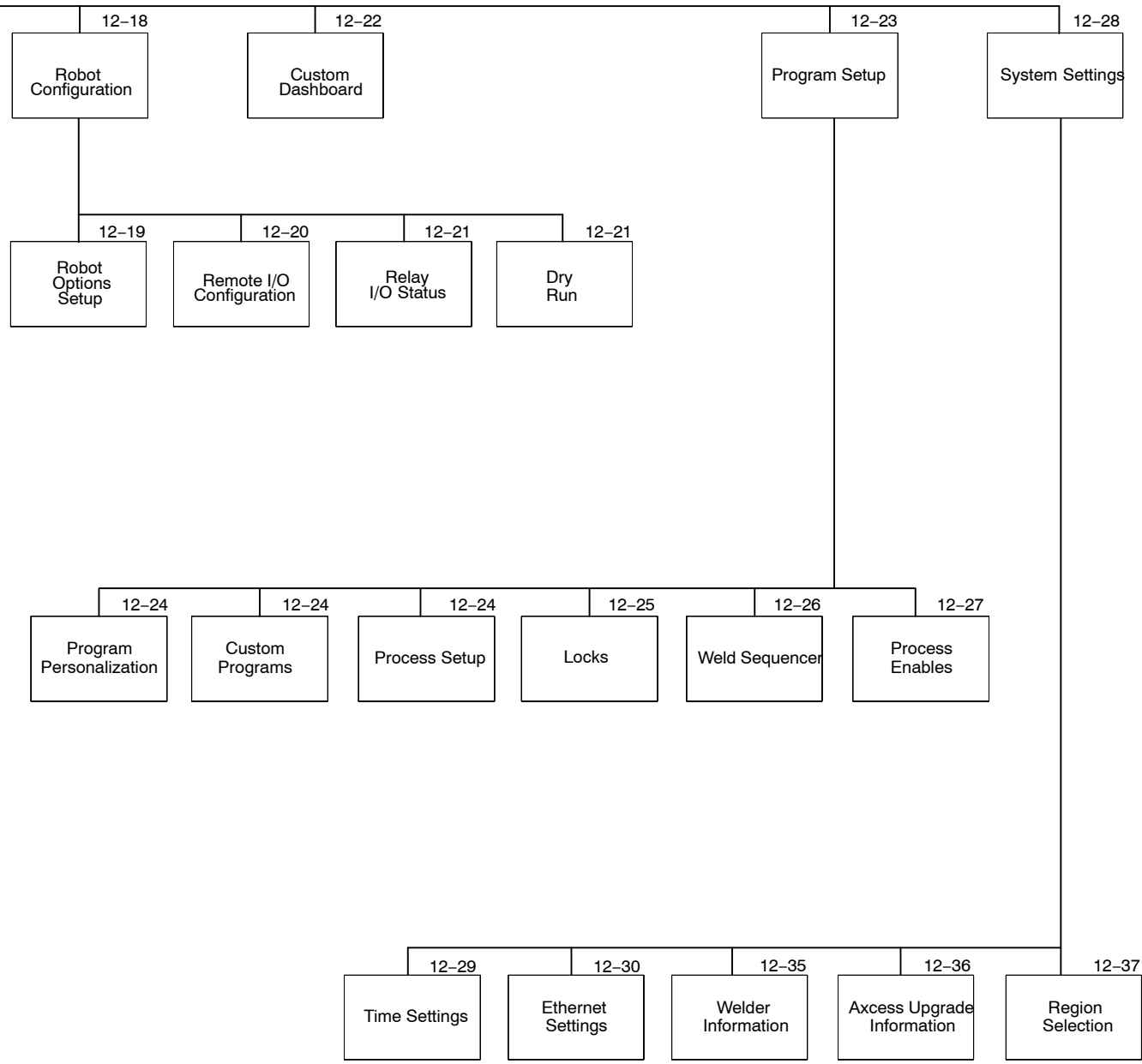
If the PC attempting to load web pages from the Axxess E is on a different subnet than the Axxess E, it may not be able to get to the machine over the network. This is a local IT setup issue and must be configured in the company routers.



# SECTION 14 – WEB PAGES SITE TREE

The Access 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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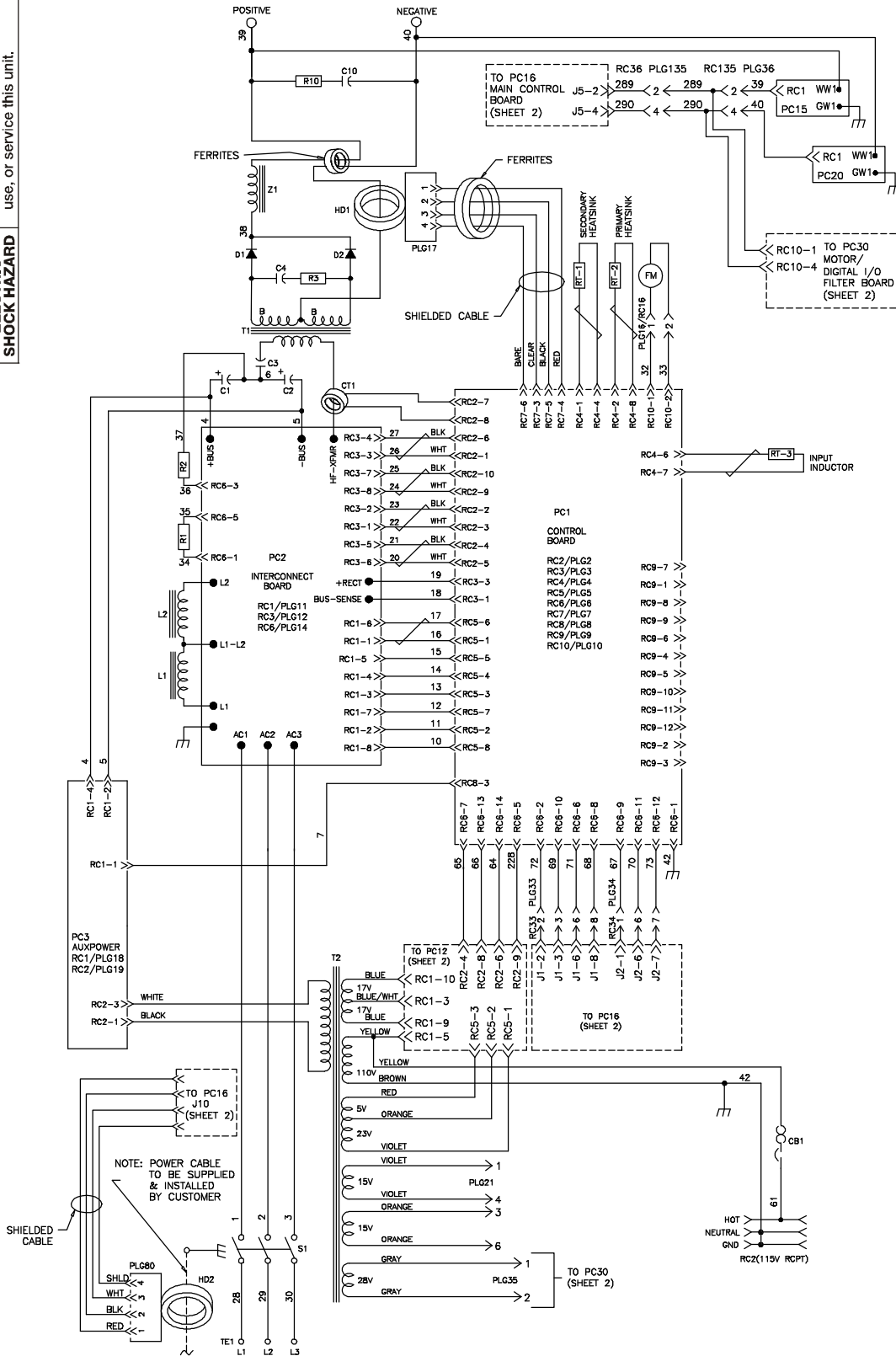
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# SECTION 15 – ELECTRICAL DIAGRAMS

**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.

**ELECTRIC SHOCK HAZARD**



Circuits

Figure 15-1. Circuit Diagram For Auto-Access E 300 Digital Welding Power Source (Part 1 Of 2)

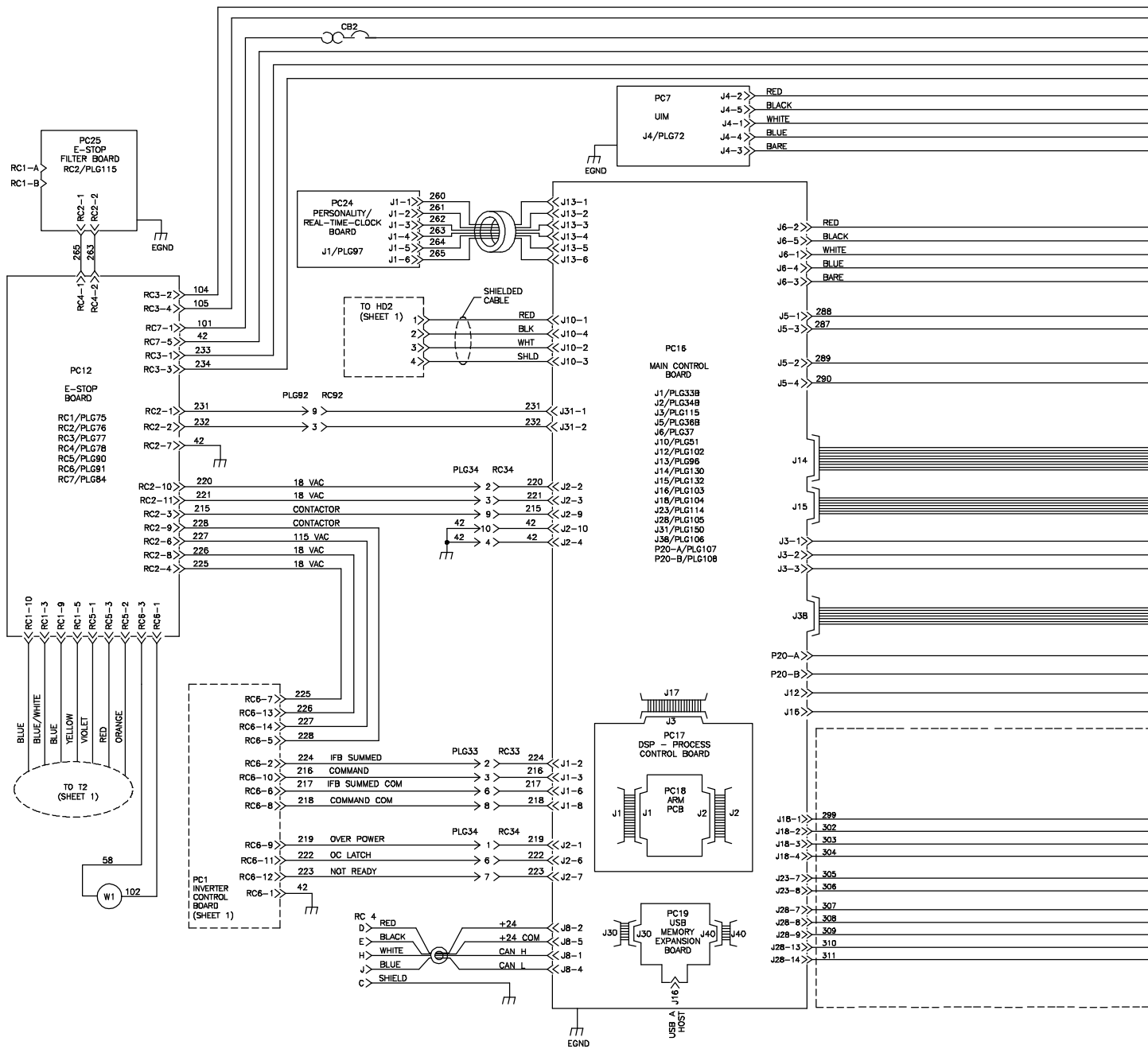


Figure 15-2. Circuit Diagram For Auto-Access E 300 Digital Welding Power Source (Part 2 Of 2)





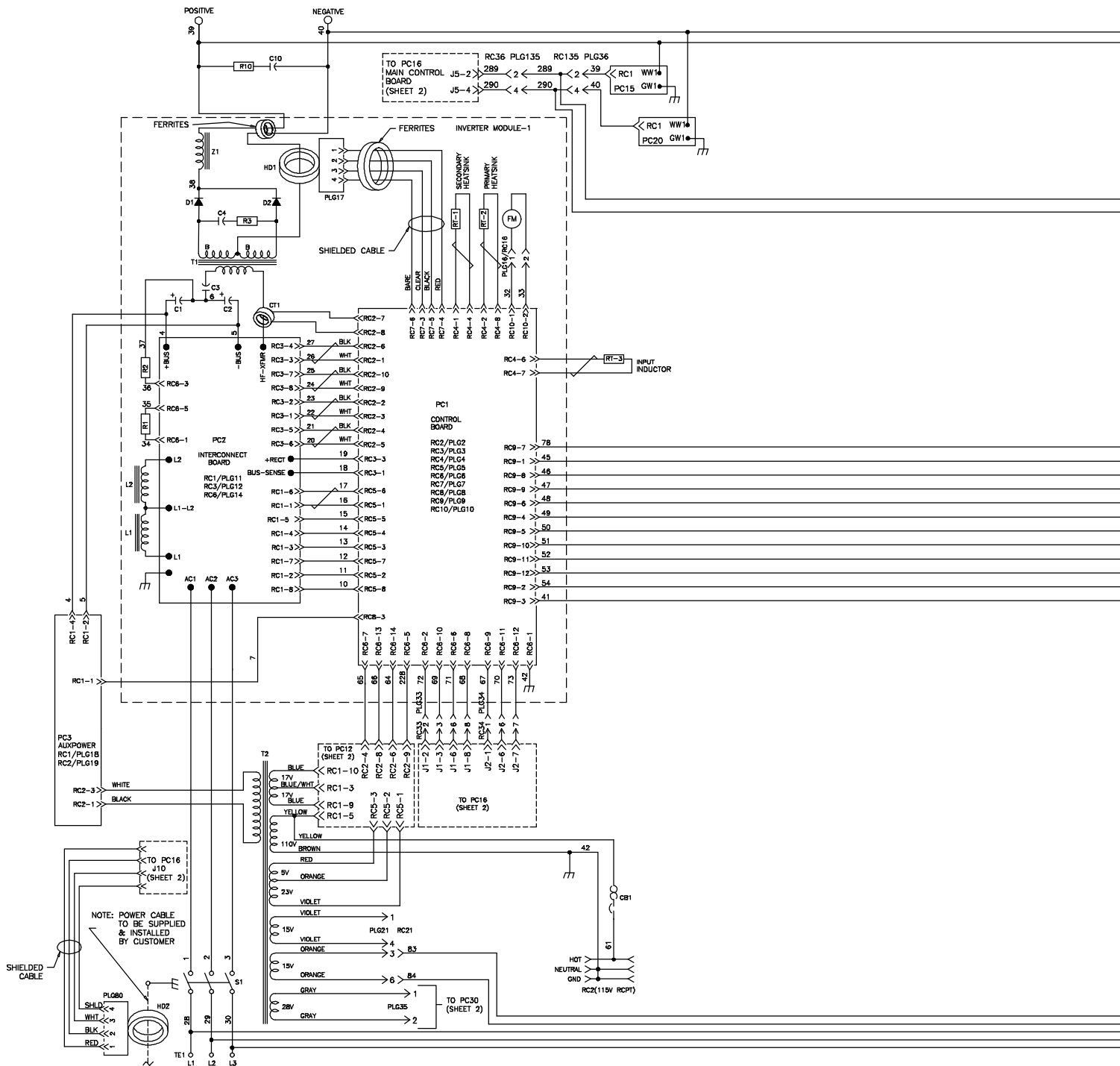


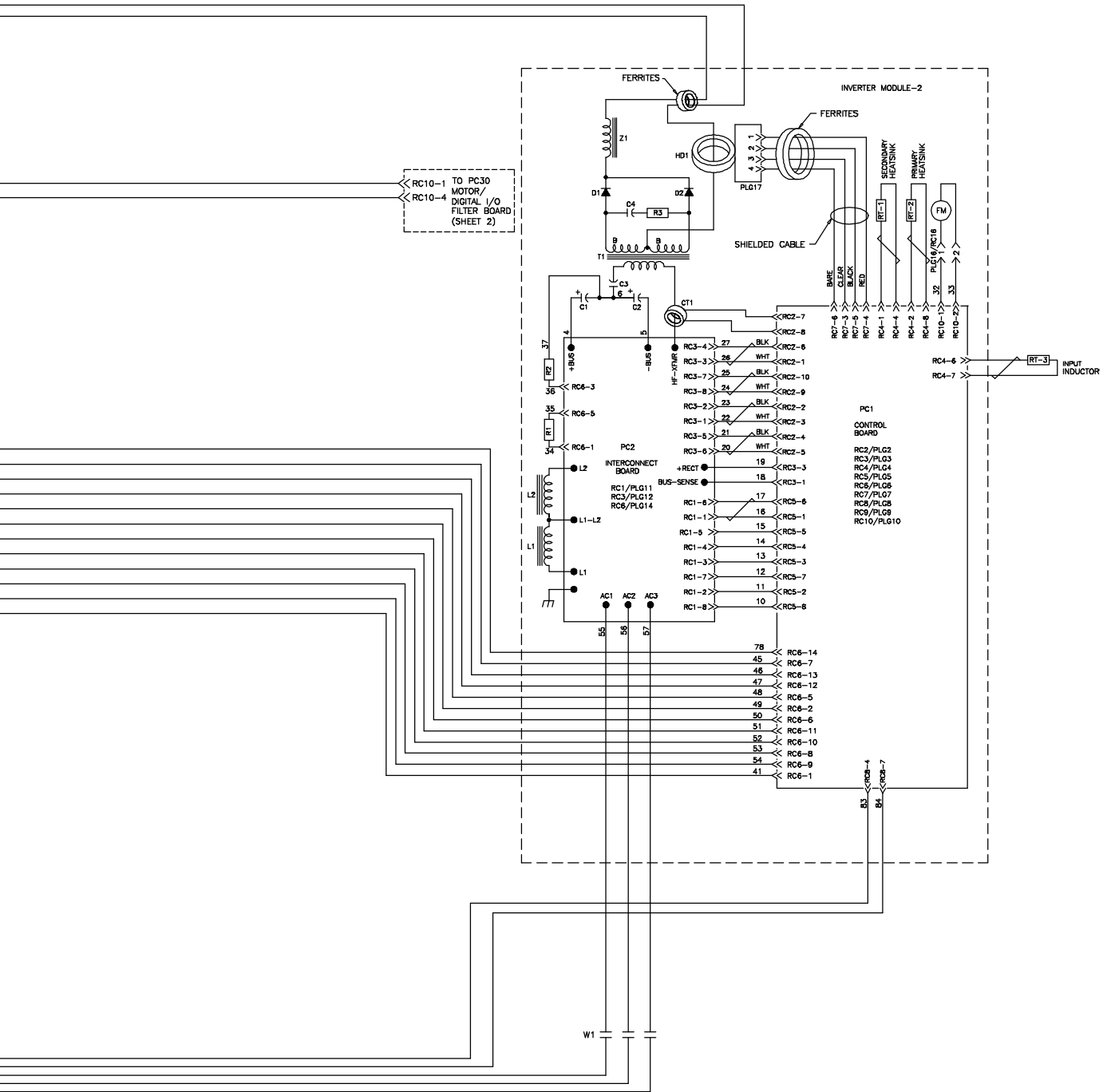
Figure 15-3. Circuit Diagram For Auto-Access E 450 Digital Welding Power Source (Part 1 Of 2)

**⚠ 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.



Circuits

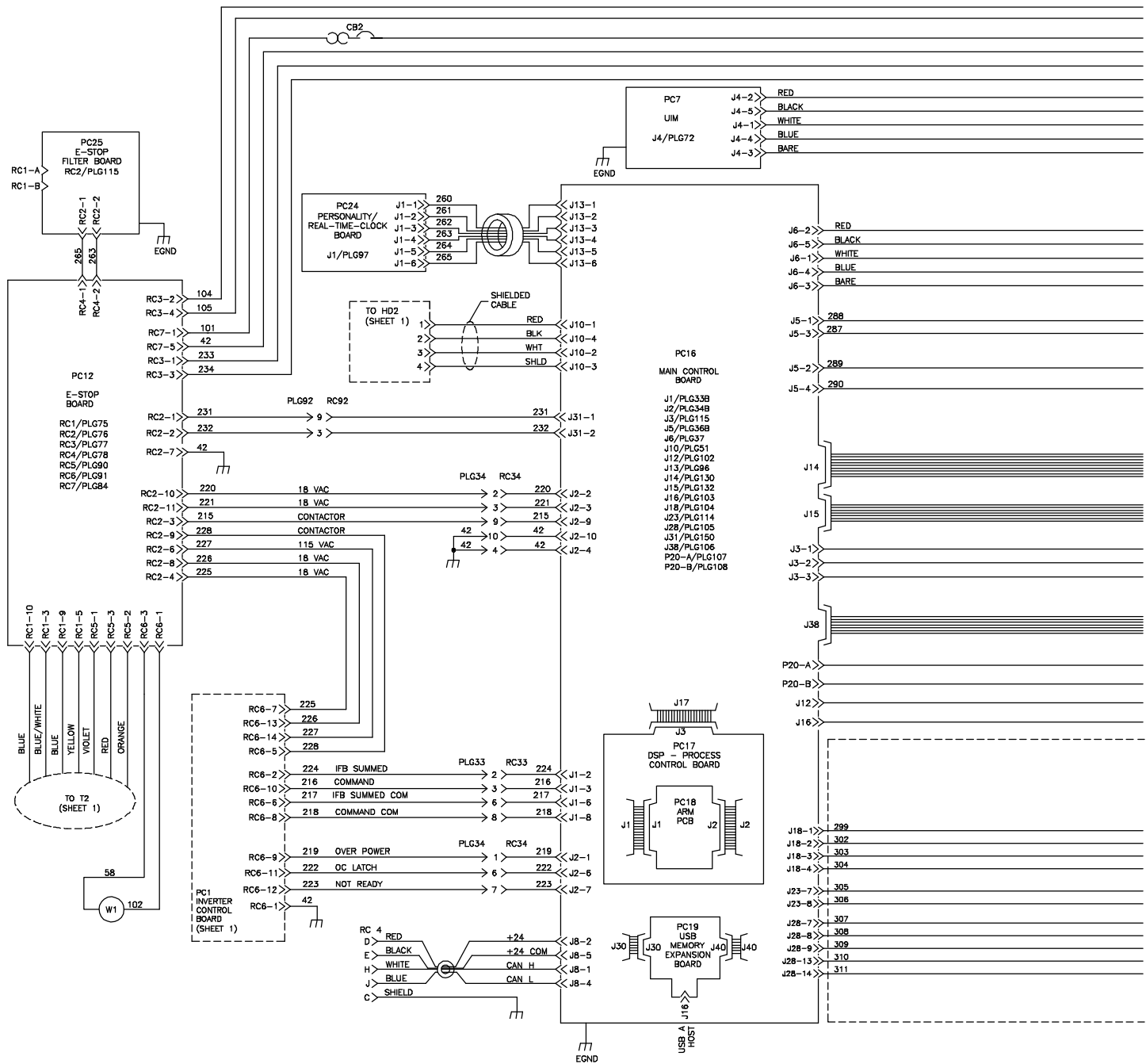


Figure 15-4. Circuit Diagram For Auto-Access E 450 Digital Welding Power Source (Part 2 Of 2)



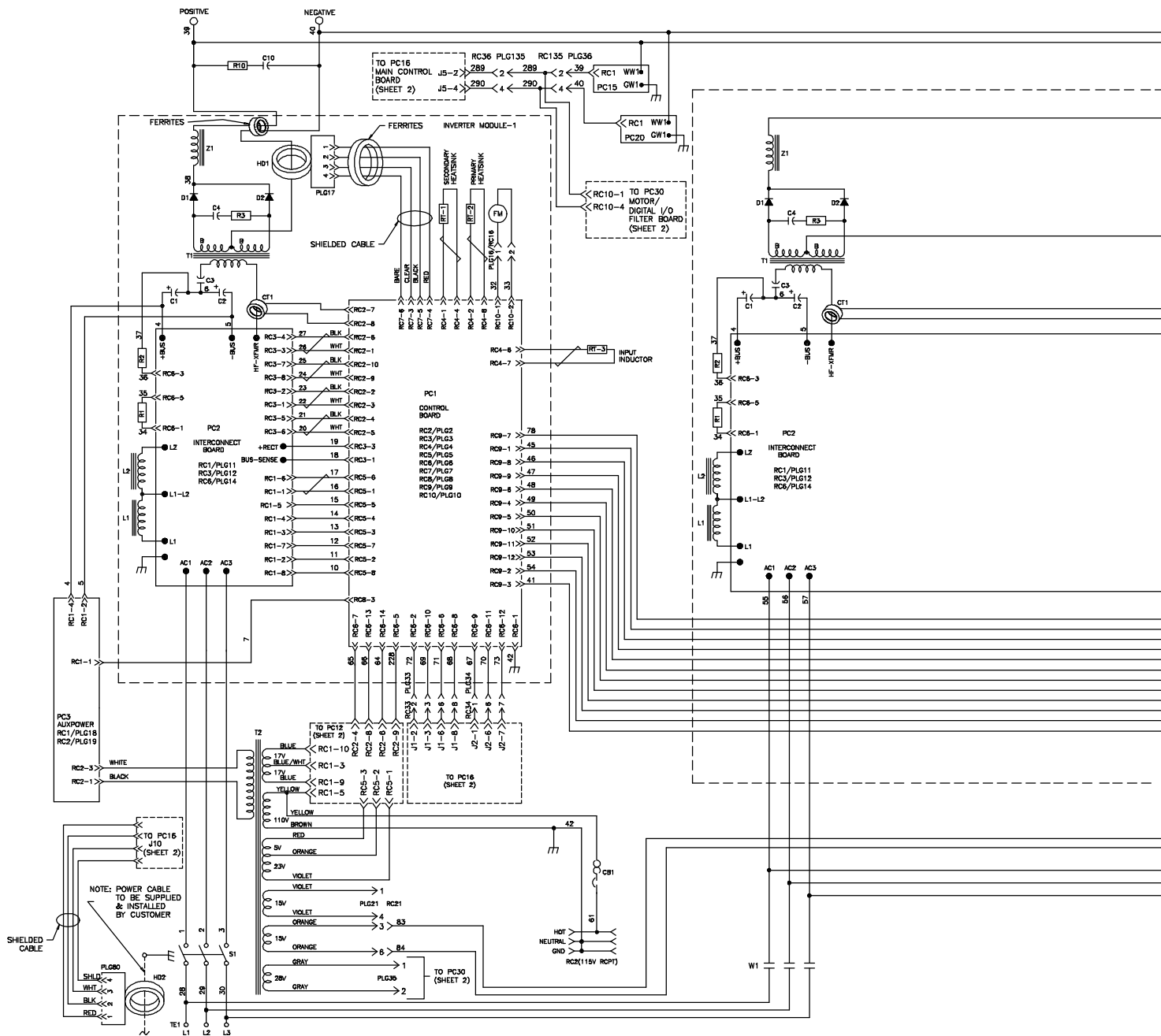



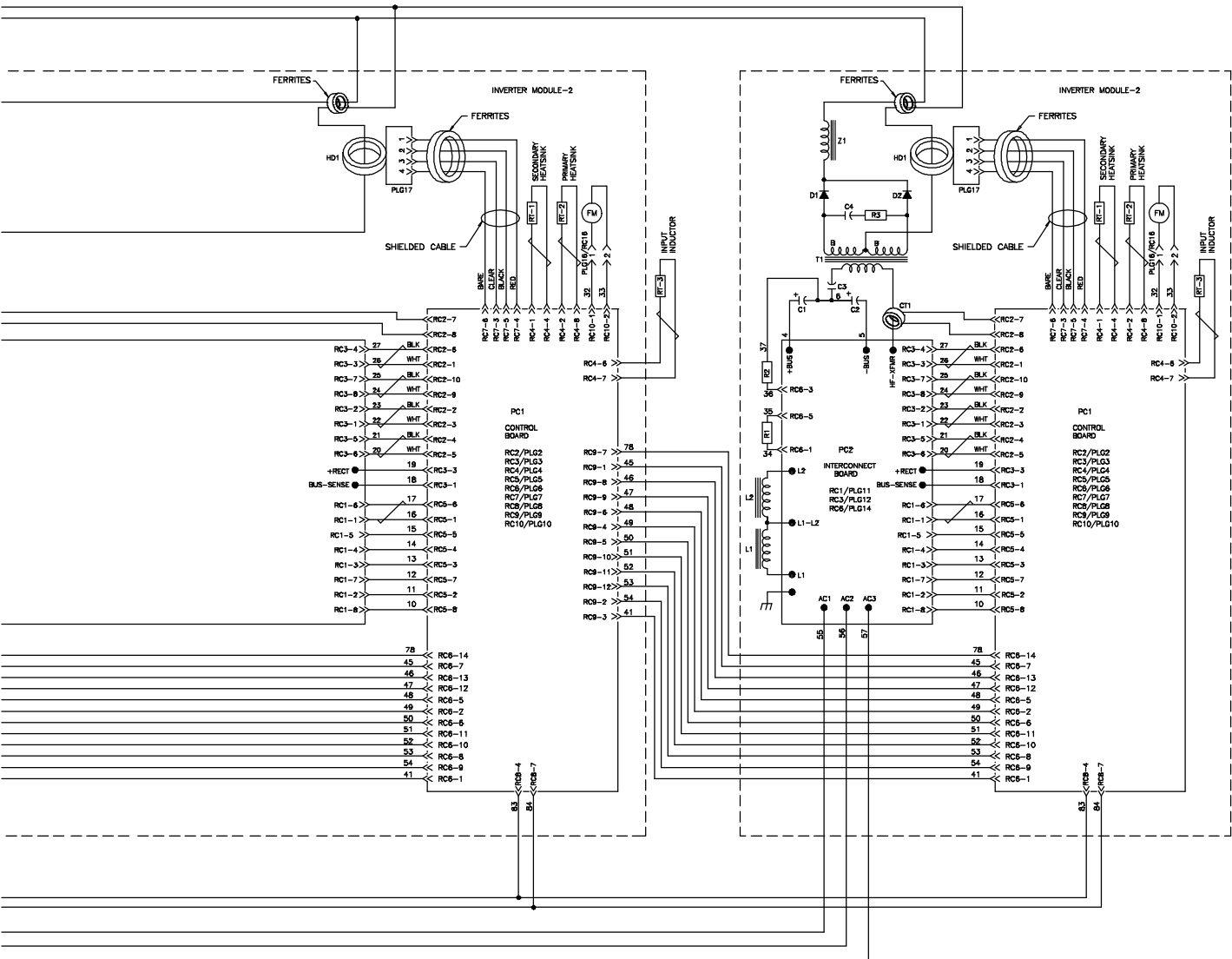
Figure 15-5. Circuit Diagram For Auto-Access E 675 Digital Welding Power Source (Part 1 Of 2)

**⚠ 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.





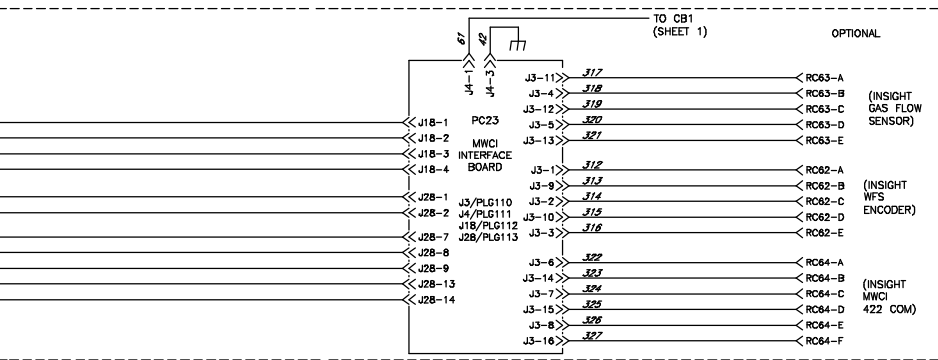
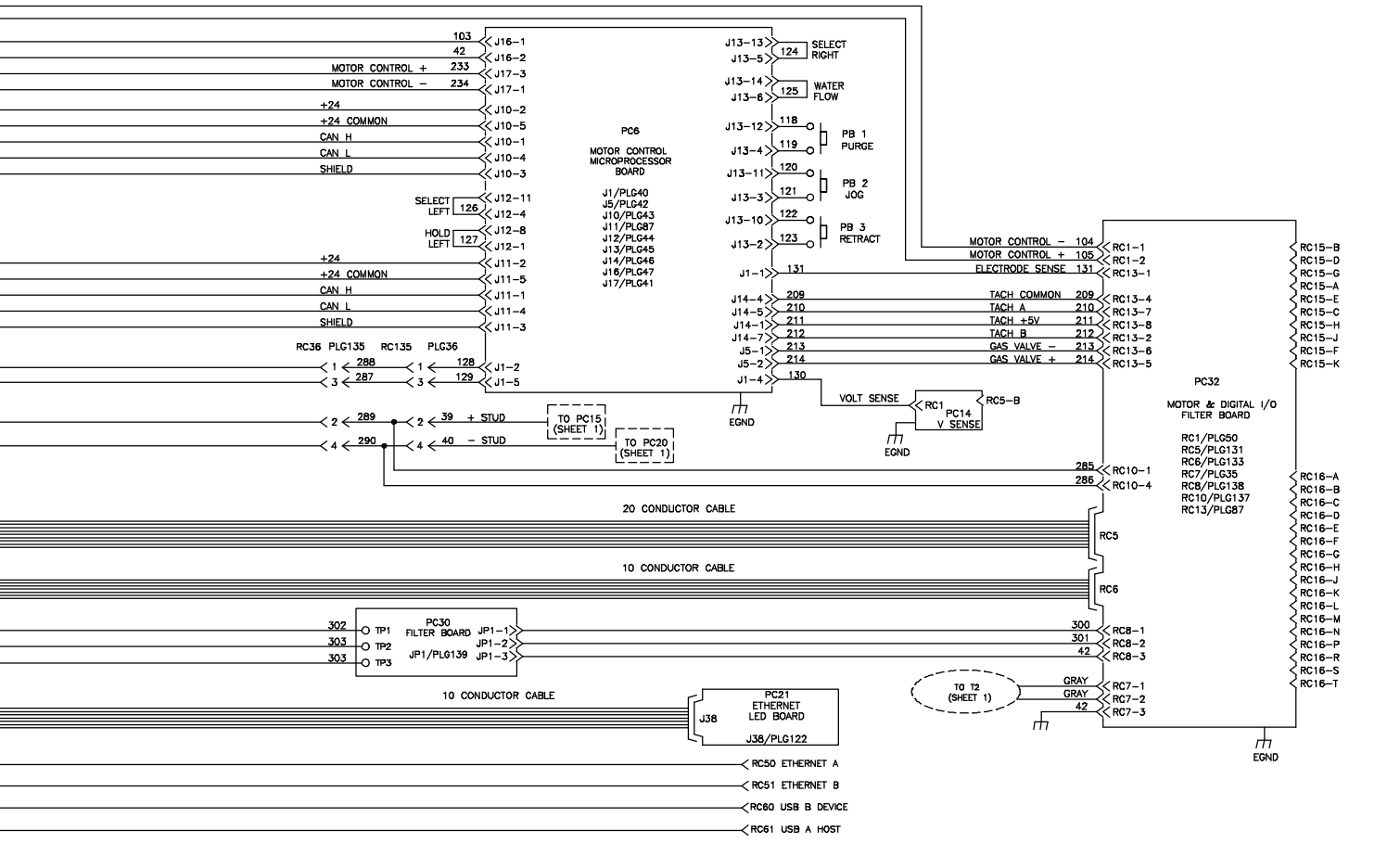


**⚠ WARNING**



**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.



Circuits

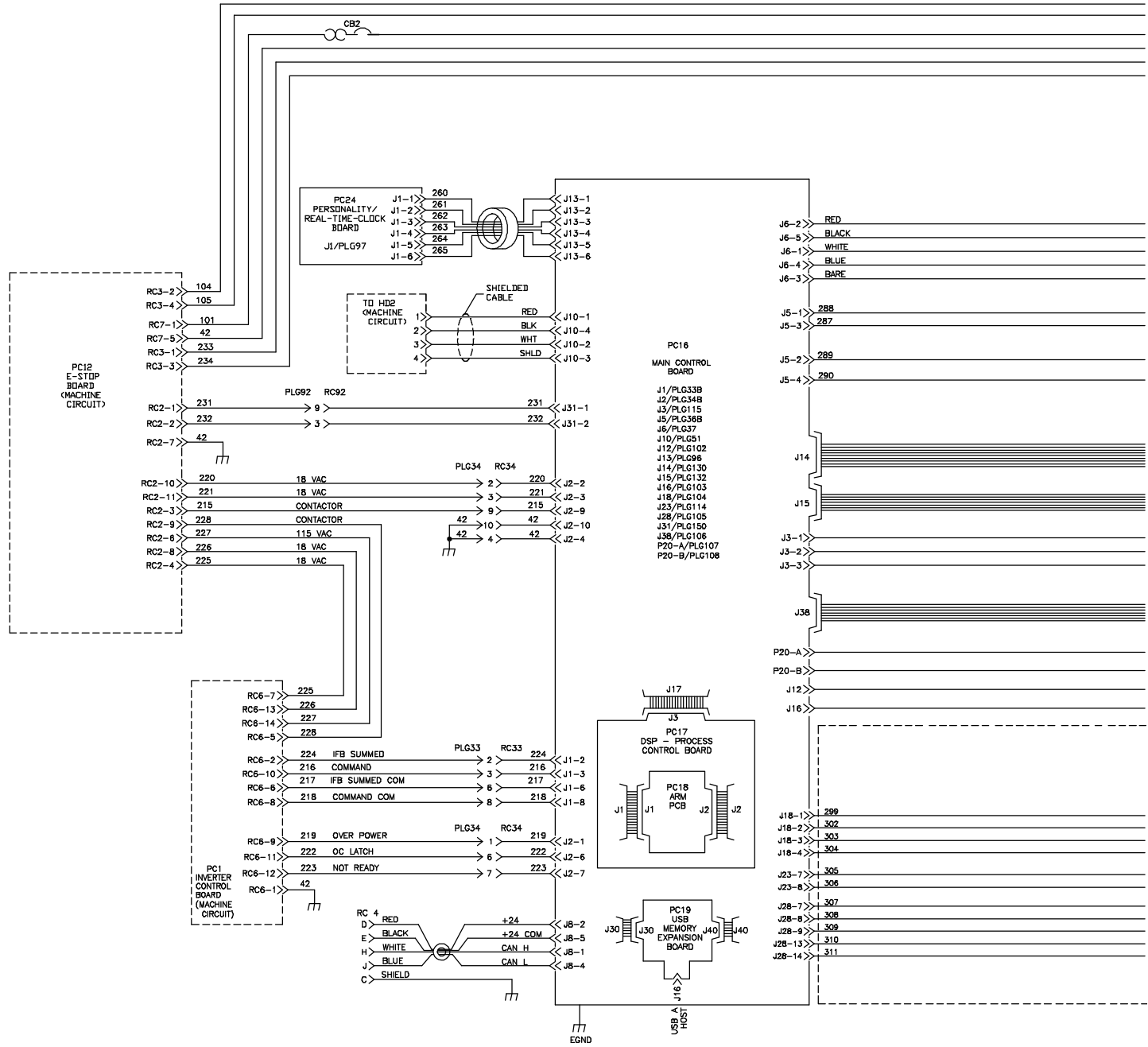

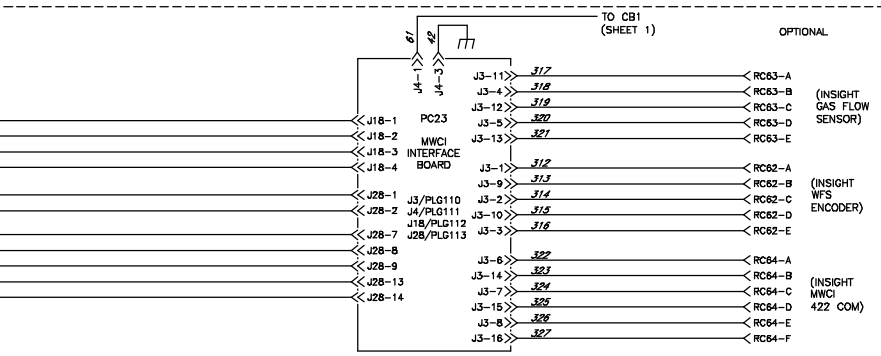
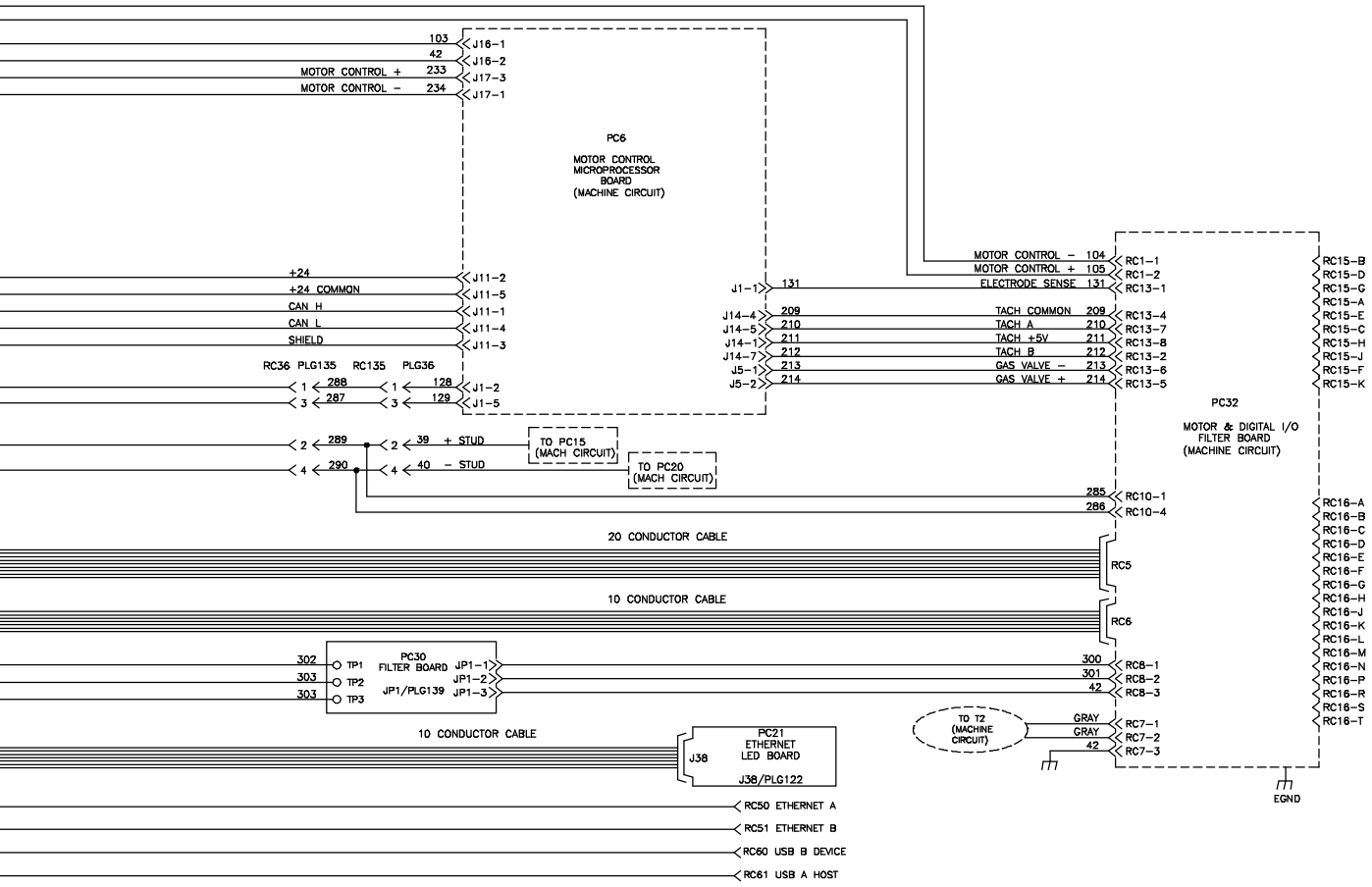
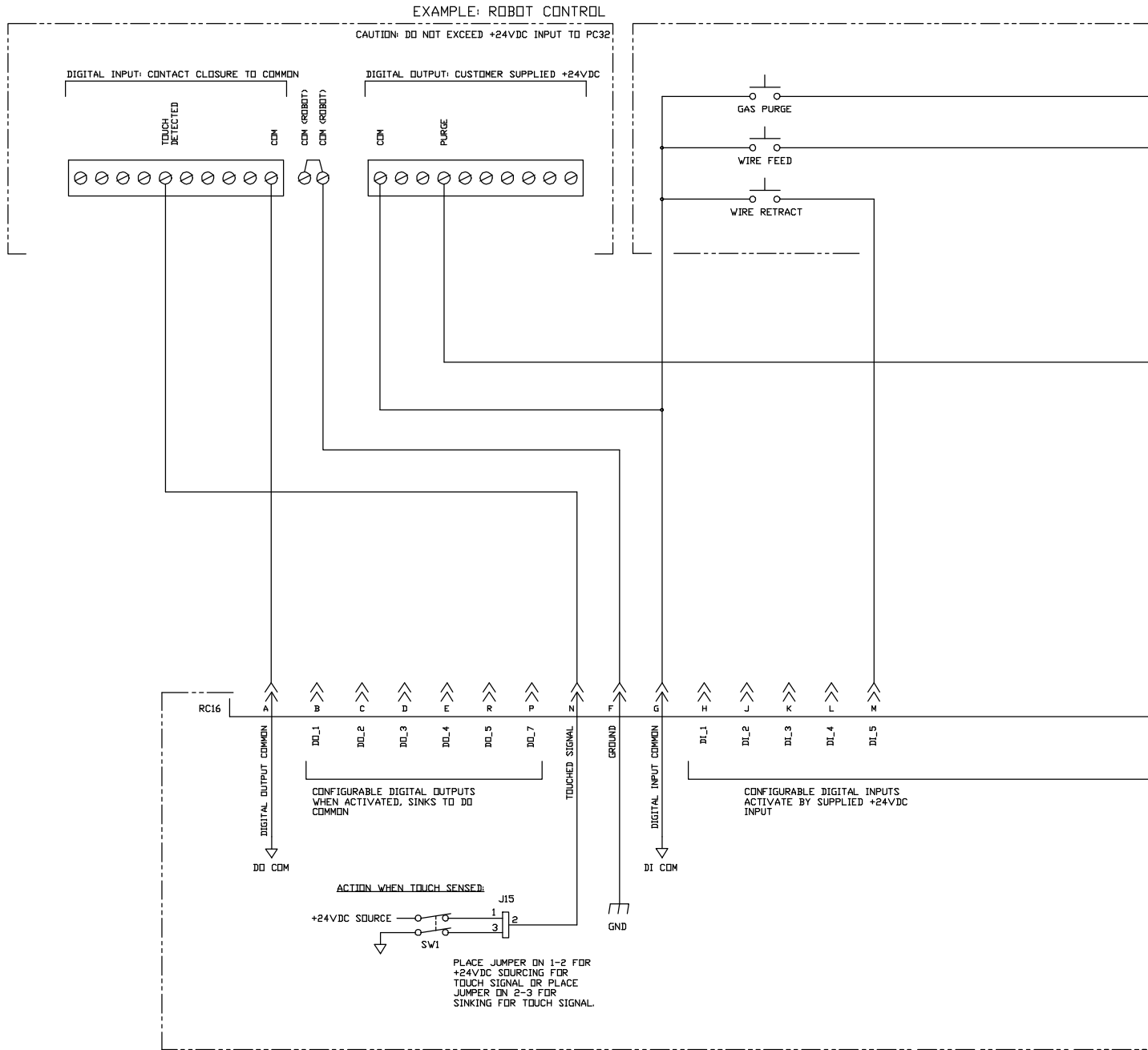


Figure 15-7. Circuit Diagram For Access E Digital Module


 <b>ELECTRIC SHOCK HAZARD</b>	<b>WARNING</b> <ul style="list-style-type: none"> <li>Do not touch live electrical parts.</li> <li>Disconnect input power or stop engine before servicing.</li> <li>Do not operate with covers removed.</li> <li>Have only qualified persons install, use, or service this unit.</li> </ul>

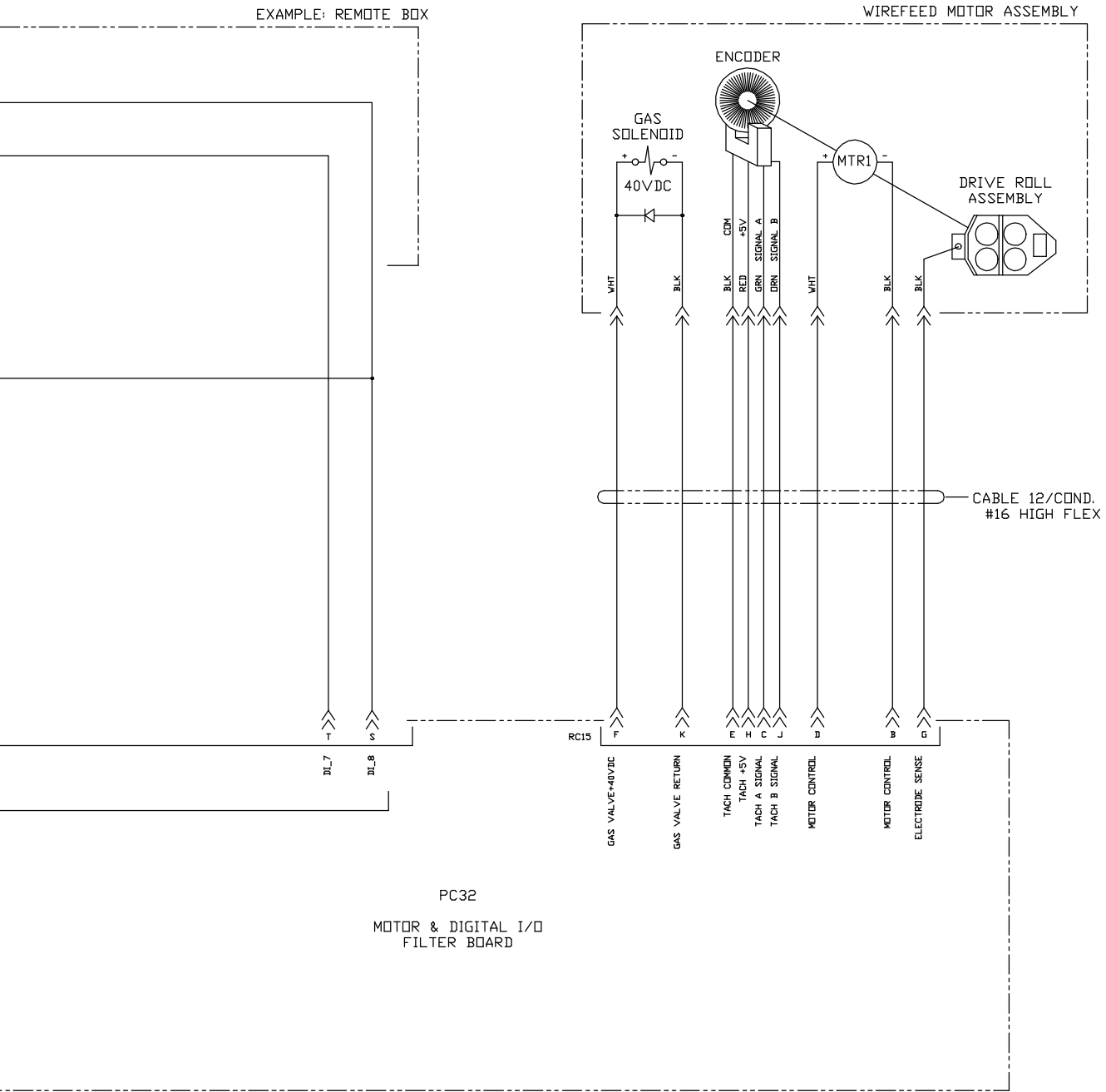


**Circuits**




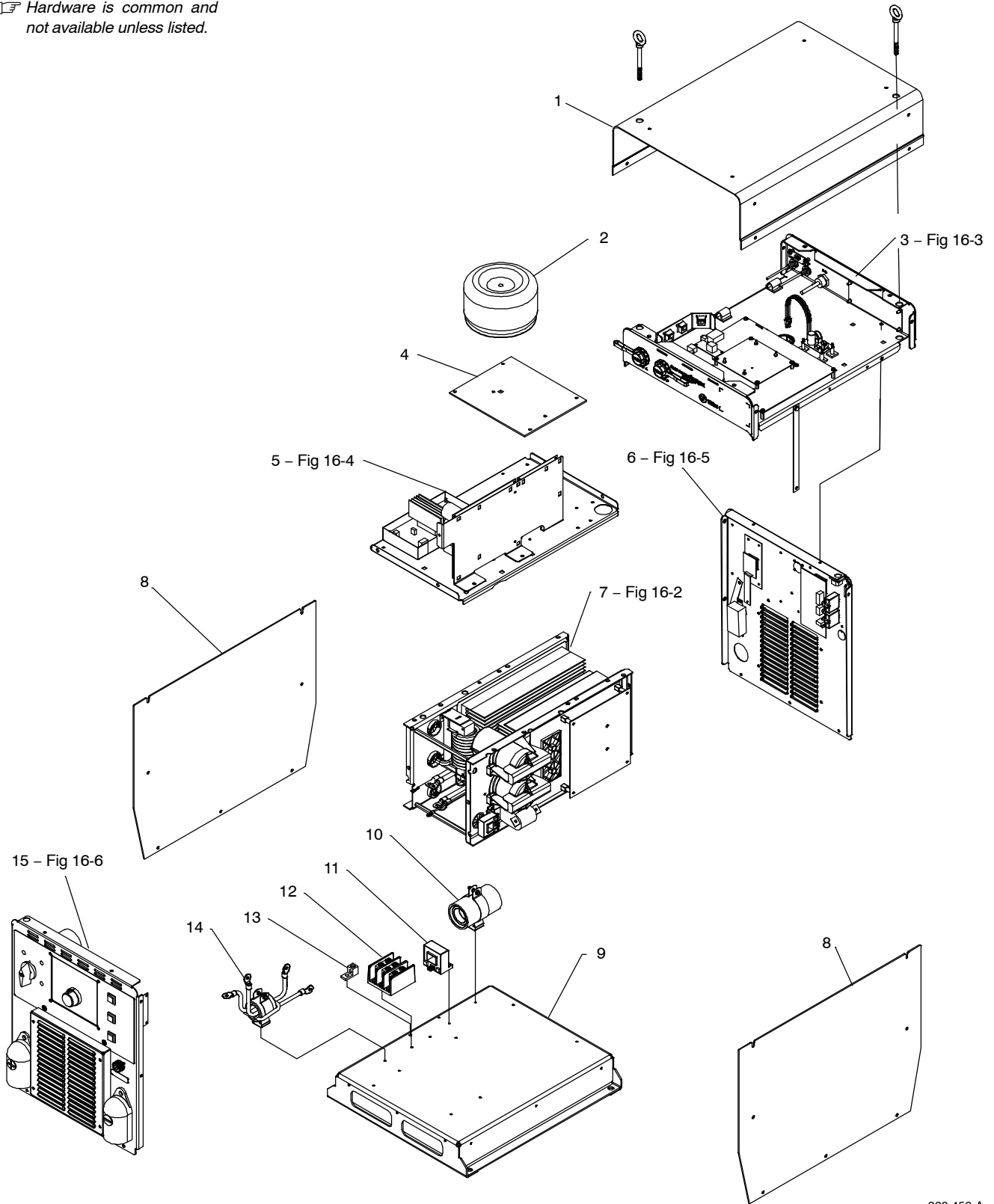
**Figure 15-8. Circuit Diagram For Motor And Digital I/O Interface**

 <b>⚠ WARNING</b> <b>ELECTRIC SHOCK HAZARD</b>	<ul style="list-style-type: none"> <li>Do not touch live electrical parts.</li> <li>Disconnect input power or stop engine before servicing.</li> <li>Do not operate with covers removed.</li> </ul>
	<ul style="list-style-type: none"> <li>Have only qualified persons install, use, or service this unit.</li> </ul>



# SECTION 16 – AUTO-ACCESS E 300 DIGITAL PARTS LIST

 Hardware is common and not available unless listed.



260 456-A

**Figure 16-1. Auto-Access E 300 Digital Main Assembly**

Item No.	Dia. Mkgs.	Part No.	Description	Quantity
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**Figure 16-1. Auto-Axcess E 300 Digital Main Assembly**

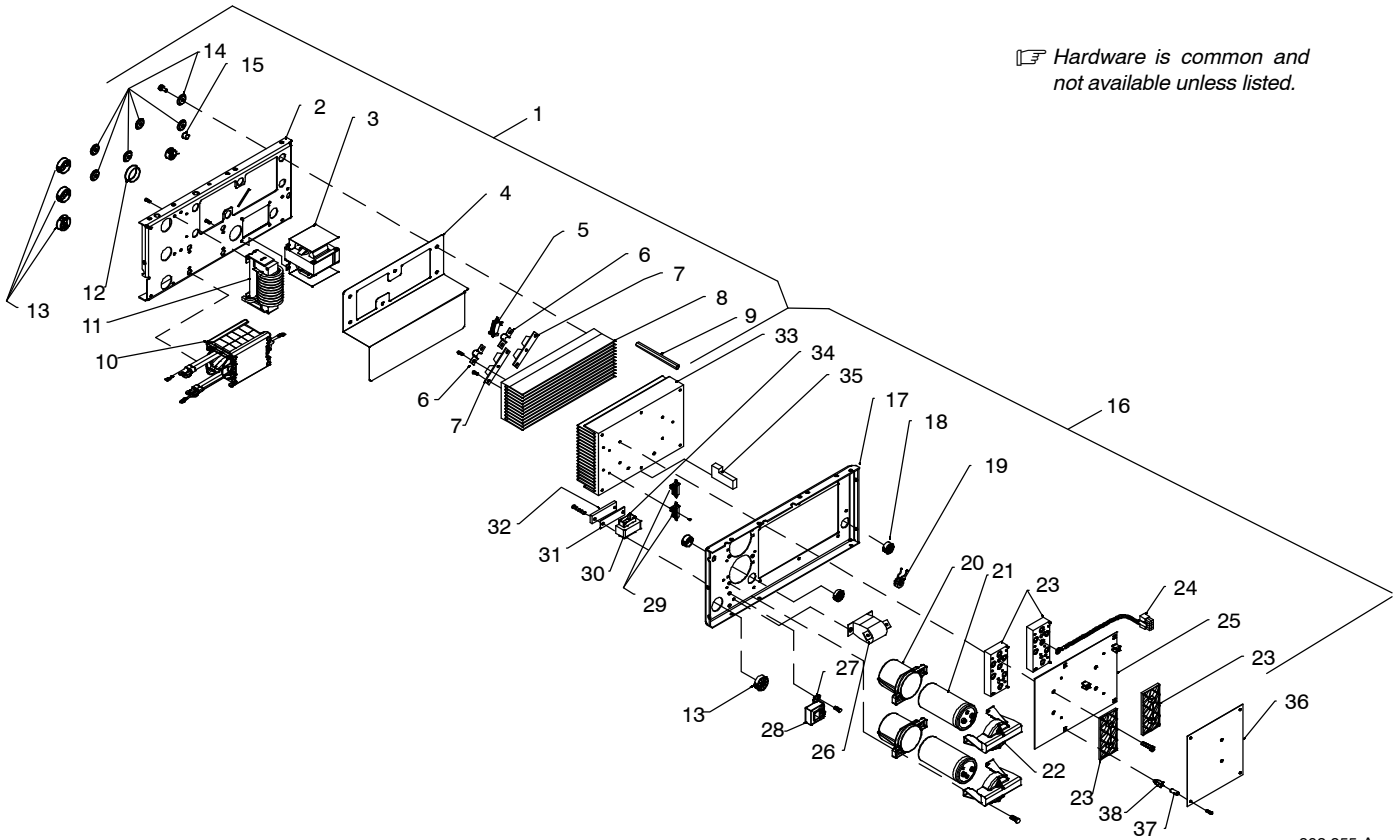
...	1	242008	Cover, Top	1
...	2	T2	212543 Xfmr, Control Toroidal 665 VAC Pri 1900 VA 60 Hz	1
...	3	257979	Assy, Auto-Axcess E Digital Module I100 (Fig 16-3)	1
...	4	210481	Plate, Mtg Toroid Xfmr	1
...	5	Fig 16-4	Top Tray Assembly	1
...	6	Fig 16-5	Rear Panel Assembly	1
...	7	IM1	214597 Windtunnel, LH w/Components (Fig 16-2)	1
...		IM1	242680 Windtunnel, RH w/Components (Fig 16-2)	1
...	8	227792	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	198951	Block, Terminal 3 Pole	1
...	13	148025	Lug, Univ W/SCR 600V 2/0-6 Wire .266 Stud	1
...	14	226550	Filter Assy, Secondary w/screw	1
...	15	Fig 16-6	Front Panel Assembly	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 16-2. Windtunnel Assembly LH And RH**

802 955-A



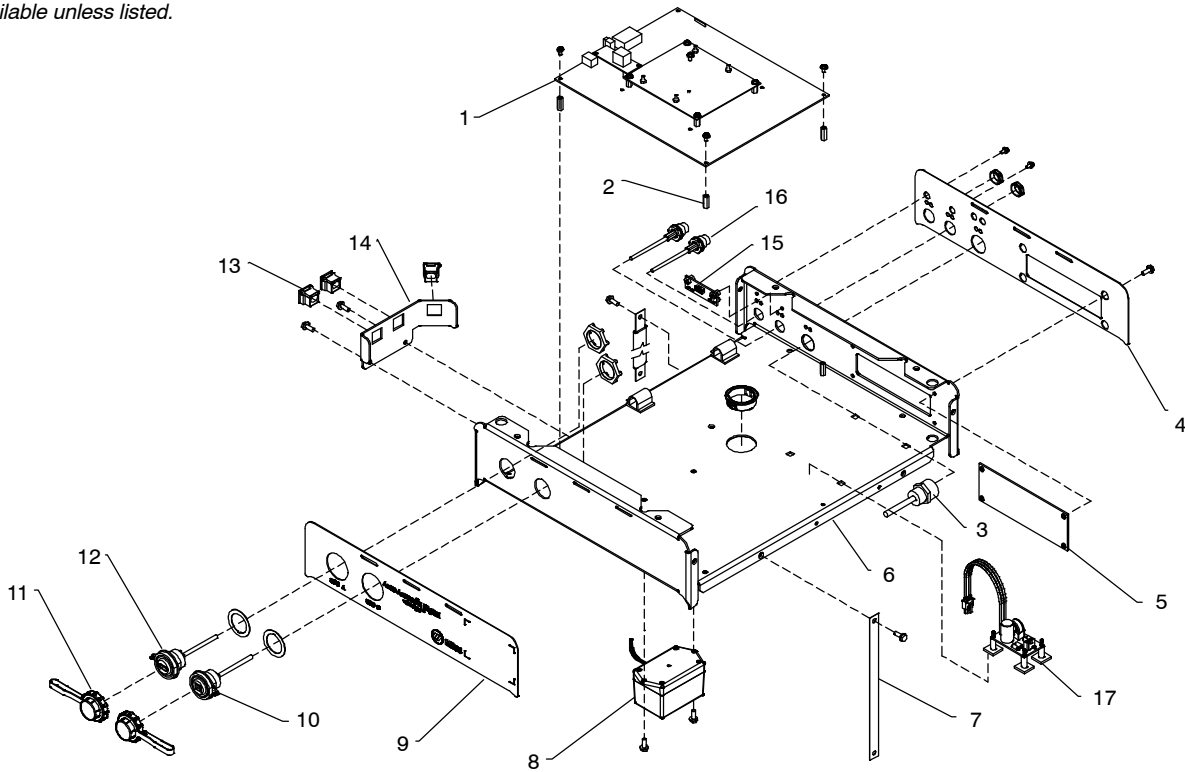
Item No.	Dia. Mkgs.	Part No.	Description	Quantity
<b>Figure 16-2. Windtunnel Assembly LH And RH (Fig 16-1 Item 7)</b>				
...	1	214597	Windtunnel, LH w/Components (including)	1
...	2	196351	Windtunnel, LH	1
...	3	L1	213940 Inductor, Input	1
...	4	214519	Insulator, Heat Sink Rectifier	1
...	5	R3, C4	233052 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
...		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	196514	Gasket, Inductor Mounting	1
...	32	196512	Bracket, Inductor Mounting	1
...	33	196330	Heat Sink, Power Module	1
...	34	L2	196345 Coil, Inductor (Pre-regulator)	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)	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.



258 675-A

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

Item No.	Dia. Mkgs.	Part No.	Description	Quantity
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**Figure 16-3. E-module w/Ethernet And USB Assembly  
(Fig 16-1 Item 6)**

...	1	250516	Assy, Access E Circuit Card Board Stack	1
...	2	115440	Stand-off, No 6-32 X .687 Lg .250 Hex Al Fem	4
...	3	000527	Receptacle Assy, Devicenet	1
...	4	242645	Nameplate, Access E Top Rear	1
...	5	◆242007	Panel, Amp W/Components	1
...	6	241996	Chassis, Access E	1
...	7	246591	Ground Strap	2
...	8	245350	Assembly, Personality Board	1
...	9	257980	Nameplate, Auto-Access E Top Front	1
...	10	244236	Cable, USB Type B, Sealed Panel Mount	1
...	11	244237	Dust Cap	2
...	12	244239	Cable, USB Type A, Sealed Panel Mount	1
...	13	203423	Bushing, Strain Relief .300/.360 ID X .689 Sq Mtg	3
...	14	246545	Bracket, Access E Strain Relief	1
...	15	244980	Circuit Card Assy, Ethernet LED	1
...	16	244257	Cable Assy, RJ45 Male/M12 Female .4m	2
...	17	254000	Assy, Filter Board Access E	1

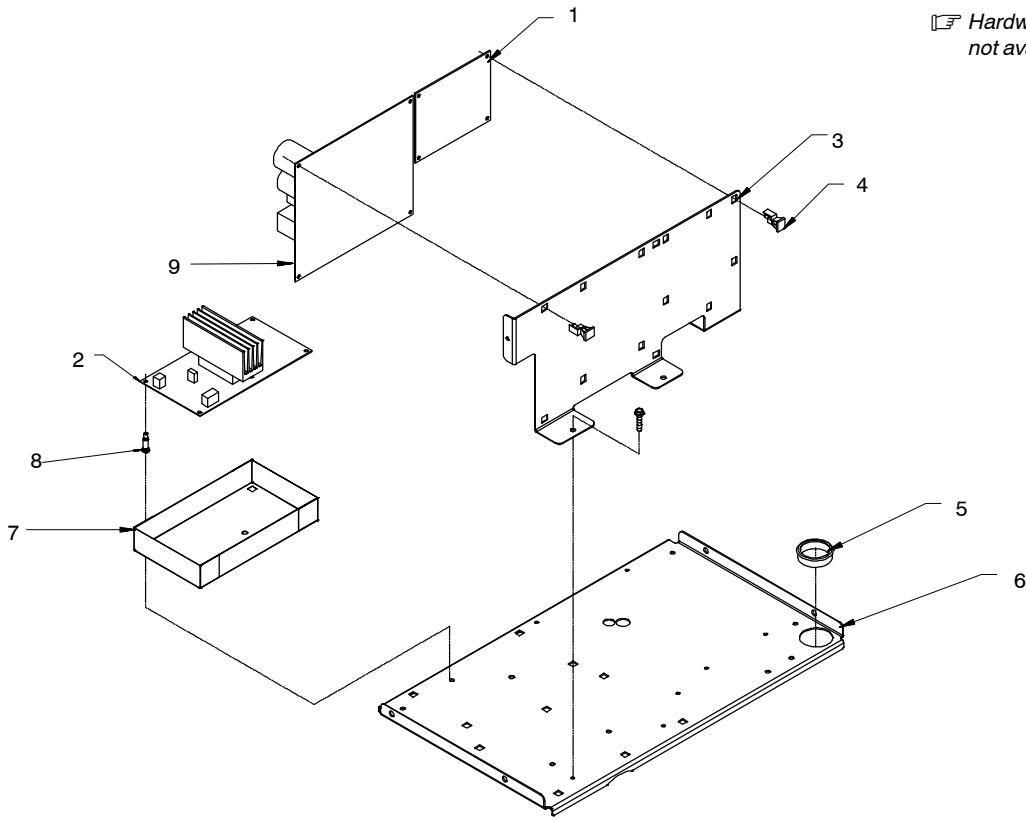
\*Recommended Spare Parts.

◆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 5)**

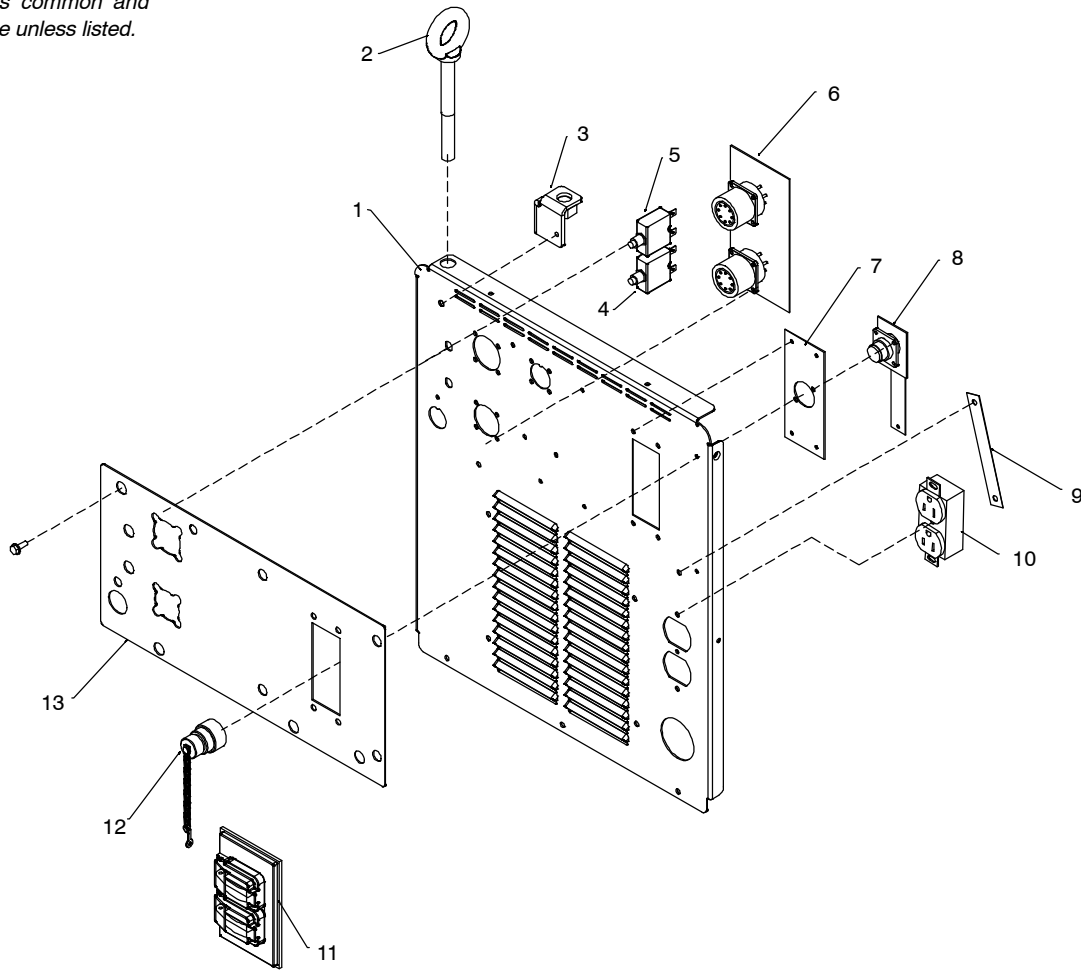
...	1	PC12	239623	Circuit Card Assy, E-stop	1
...	2	PC3	239598	Circuit Card Assy, Aux Power	1
...	3		210490	Panel, Mtg Circuit Boards	1
...	4		134201	Stand-Off, PC Card .312/.375/Post&Lock .43	4
...	5		170647	Bushing, Snap-in Nyl 1.312 Id X 1.500 Mtg Hole	1
...	6		210491	Panel, Mtg Components Top	1
...	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.



260 474-A

**Figure 16-5. Auto-Access E 300 Digital Rear Panel Assembly**

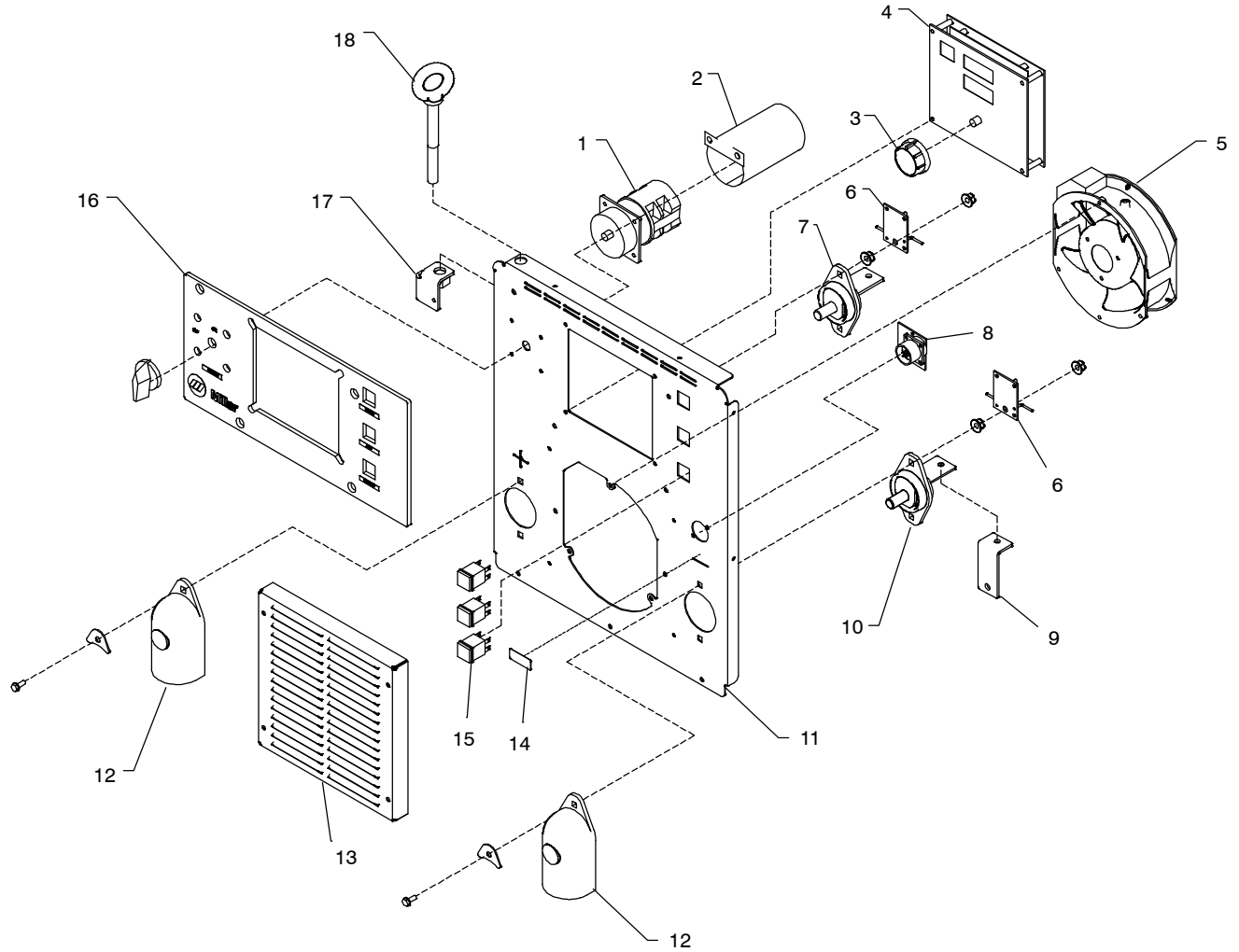
Item No.	Dia. Mkgs.	Part No.	Description	Quantity
<b>Figure 16-5. Auto-Access E 300 Digital Rear Panel Assembly (Fig 16-1 Item 6)</b>				
...	1	210479	Panel, Rear	1
...	2	245352	Bolt, eye shld thd stem .500-13 X 4.000	1
...	3	210483	Bracket, lift eye	1
...	4	CB1	Supplementary Protector, Man Reset 1P 10A 250VAC Frict	1
...	5	CB2	Supplementary Protector, Man Reset 1P 15A 250VAC Frict	1
...	6	PC32	Circuit Card Assy, Motor & Digital I/O Int	1
...	7	225955	Plate, Mounting Rcpt(E-stop)	1
...	8	239623	Circuit Card Assy, E-stop	1
...	9	216596	Strap, Grounding 4.50 in long	1
...	10	RC2	Receptacle (115V Duplex)	1
...	11	217297	Cover, Receptacle Weatherproof Duplex Rcpt	1
...	12	208898	Plugs, w/Leads (4500 Jumper)	1
...	13	210505	Nameplate, Rear	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.



260 682-A

**Figure 16-6. Auto-Access E 300 Digital Front Panel Assembly**

Item No.	Dia. Mkgs.	Part No.	Description	Quantity
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**Figure 16-6. Auto-Access E 300 Digital Front Panel Assembly (Fig 16-1 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		250451	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
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**Figure 16-6. Auto-Axcess E 300 Digital Front Panel Assembly  
(Fig 16-1 Item 15) (Continued)**

... 11		250004	Panel, Front	1
... 12		186621	Boot, Generic	2
... 13		207979	Box, Louver	1
... 14		219843	Label, Volt Sense	1
... 15	PB1, PB2, PB3	199443	Switch, Pb Mc No Spst 10A 115VAC w/Blk Cap Panelmt	3
... 16		258244	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.

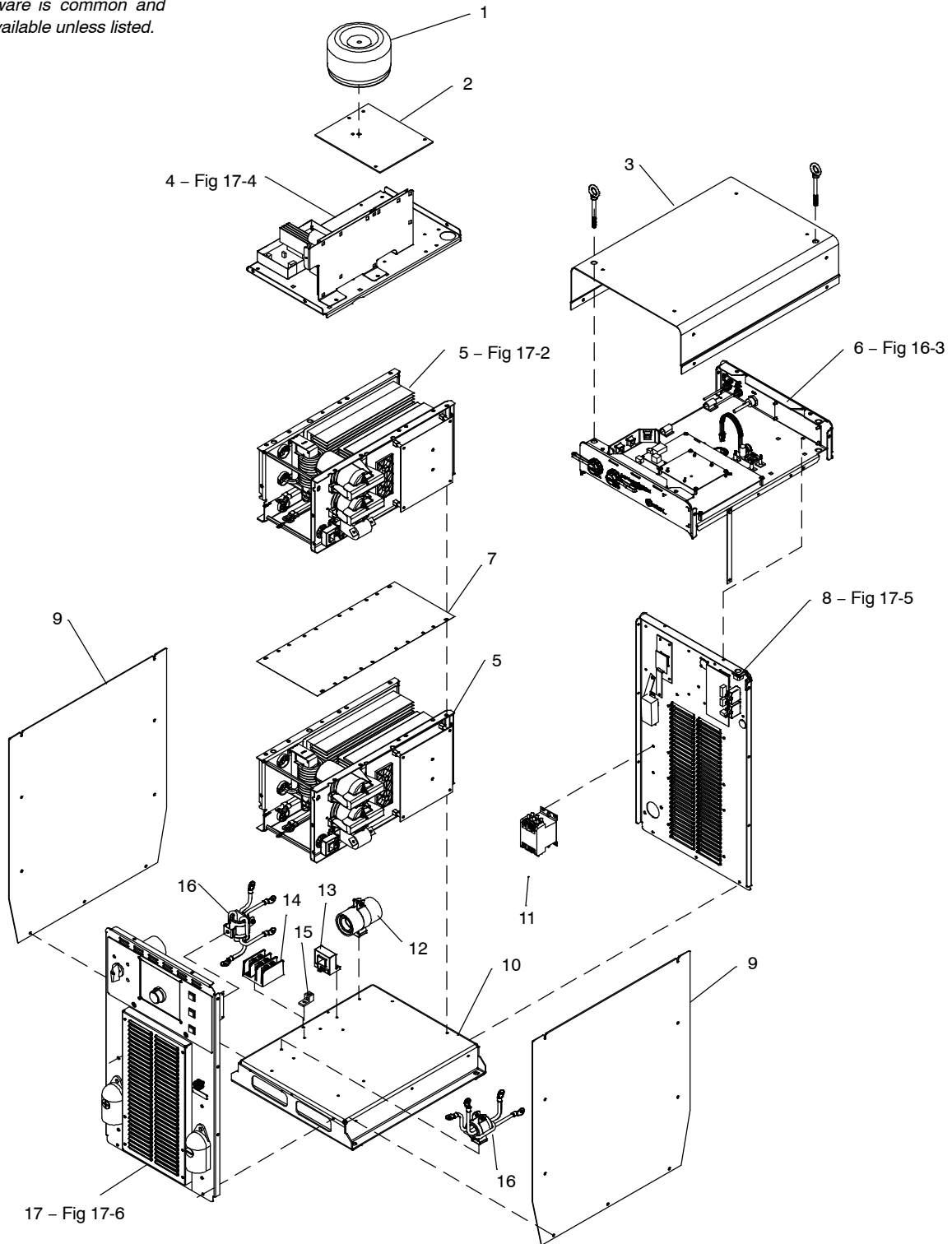
+When ordering a component originally displaying a precautionary label, the label should also be ordered.

**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 17 – AUTO-ACCESS E 450 DIGITAL PARTS LIST

 Hardware is common and not available unless listed.



259 110-A

**Figure 17-1. Auto-Access E 450 Digital Main Assembly**



Item No.	Dia. Mkgs.	Part No.	Description	Quantity
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**Figure 17-1. Auto-Access E 450 Digital Main Assembly**

... 1	T2	212543	Xfmr, Control Toroidal 665 VAC Pri 1900 VA 60 Hz	1
... 2		210481	Plate, Mtg Toroid Xfmr	1
... 3		242008	Cover, Top	1
... 4		Fig 17-4	Top Tray Assembly	1
... 5	IM1, IM2	242682	MODULE, inverter assy (300A) (Fig 17-2)	2
... 6		257979	Assy, Auto-Access E Digital Module I100 (Fig 16-3)	1
... 7		198961	Panel, Module Divider	1
... 8		Fig 17-5	Rear Panel Assembly	1
... 9		227793	Panel, Side W/Insulator	2
... 10		210482	Base	1
... 11	W1	180270	Contactora, DEF PRP 40A 3P 24VAC Coil W/Boxlug	1
... 12		213386	Assembly, Filter (Primary)	1
... 13	HD2	182918	Transducer, Current 400A Module Supply V +/- 15V	1
... 14		198951	Block, Terminal 3 Pole	1
... 15		148025	Lug, Univ W/SCR 600V 2/0-6 Wire .266 Stud	1
... 16		226550	Filter Assy, Secondary	2
... 17		Fig 17-6	Front Panel Assembly	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.

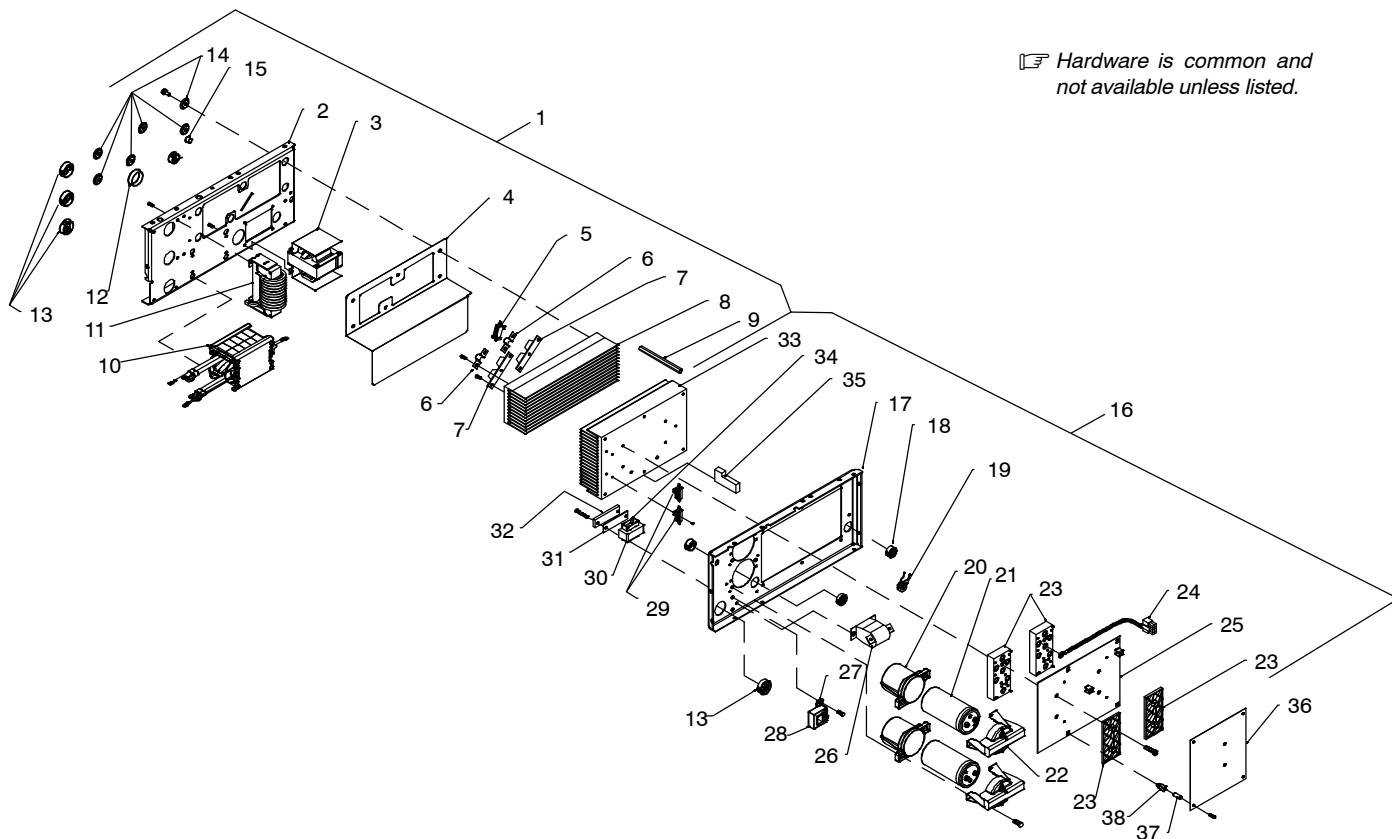


Figure 17-2. Windtunnel Assembly LH And RH

802 955-A

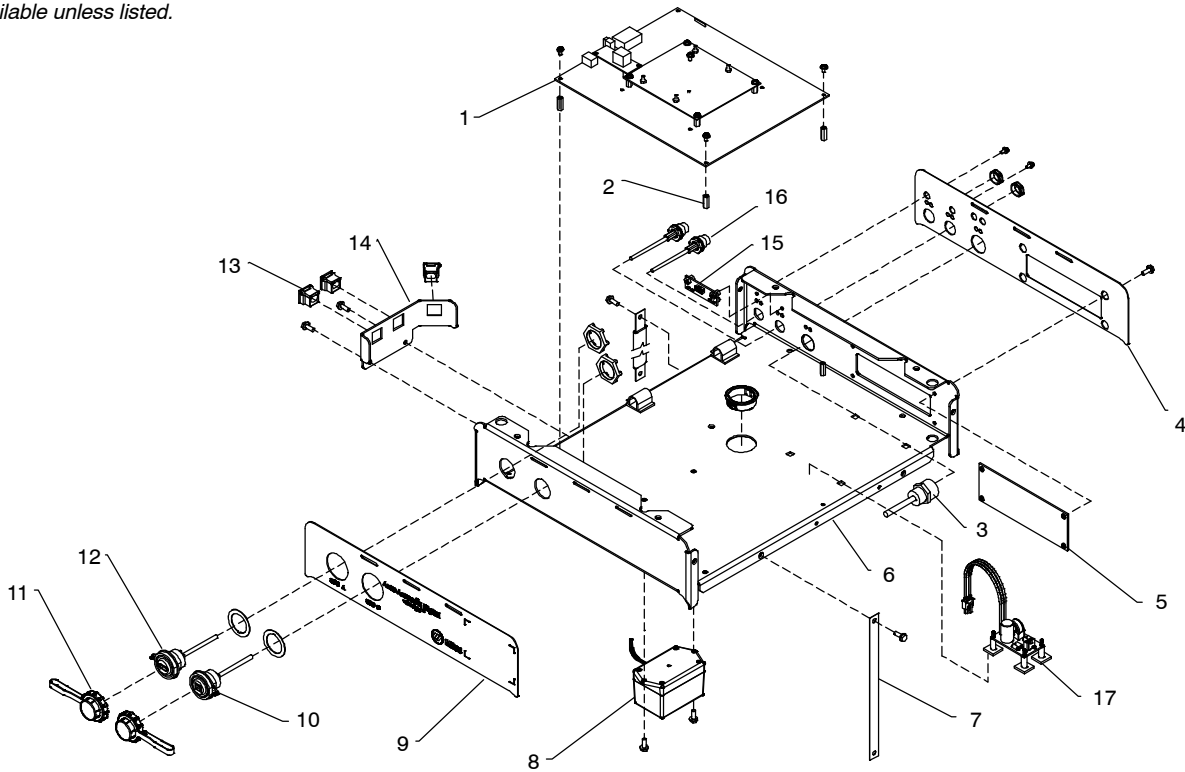
Item No.	Dia. Mkgs.	Part No.	Description	Quantity
<b>Figure 17-2. Windtunnel Assembly LH And RH (Fig 17-1 Item 5)</b>				
...	1	214597	Windtunnel, LH w/Components (including)	1
...	2	196351	Windtunnel, LH	1
...	3	L1	213940 Inductor, Input	1
...	4	214519	Insulator, Heat Sink Rectifier	1
...	5	R3, C4	233052 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
...		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	196514	Gasket, Inductor Mounting	1
...	32	196512	Bracket, Inductor Mounting	1
...	33	196330	Heat Sink, Power Module	1
...	34	L2	196345 Coil, Inductor (Pre-regulator)	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.



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**Figure 17-3. E-module w/Ethernet And USB Assembly**

Item No.	Dia. Mkgs.	Part No.	Description	Quantity
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**Figure 17-3. E-module w/Ethernet And USB Assembly  
(Fig 17-1 Item 6)**

...	1	250516	Assy, Access E Circuit Card Board Stack	1
...	2	115440	Stand-off, No 6-32 X .687 Lg .250 Hex Al Fem	4
...	3	000527	Receptacle Assy, Devicenet	1
...	4	242645	Nameplate, Access E Top Rear	1
...	5	◆242007	Panel, Amp W/Components	1
...	6	241996	Chassis, Access E	1
...	7	246591	Ground Strap	2
...	8	245350	Assembly, Personality Board	1
...	9	257980	Nameplate, Auto-Access E Top Front	1
...	10	244236	Cable, USB Type B, Sealed Panel Mount	1
...	11	244237	Dust Cap	2
...	12	244239	Cable, USB Type A, Sealed Panel Mount	1
...	13	203423	Bushing, Strain Relief .300/.360 ID X .689 Sq Mtg	3
...	14	246545	Bracket, Access E Strain Relief	1
...	15	244980	Circuit Card Assy, Ethernet LED	1
...	16	244257	Cable Assy, RJ45 Male/M12 Female .4m	2
...	17	254000	Assy, Filter Board Access E	1

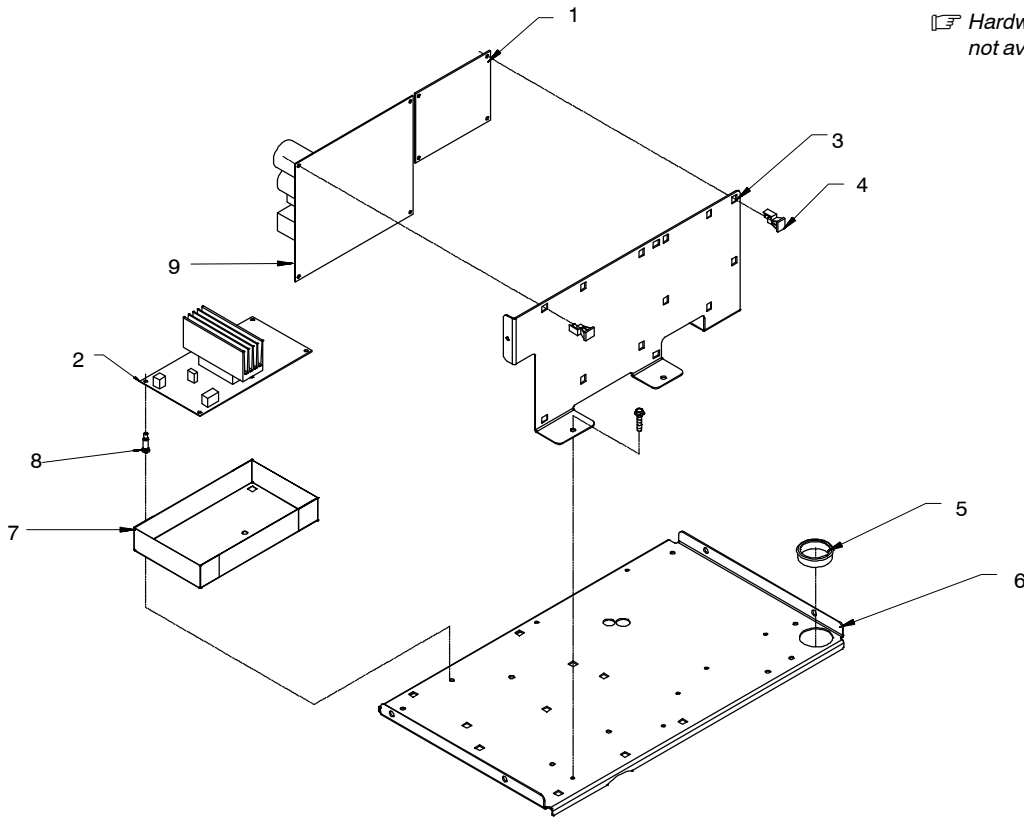
\*Recommended Spare Parts.

◆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 17-4. Top Tray Assembly**

Item No.	Dia. Mkgs.	Part No.	Description	Quantity
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**Figure 17-4. Top Tray Assembly (Fig 17-1 Item 4)**

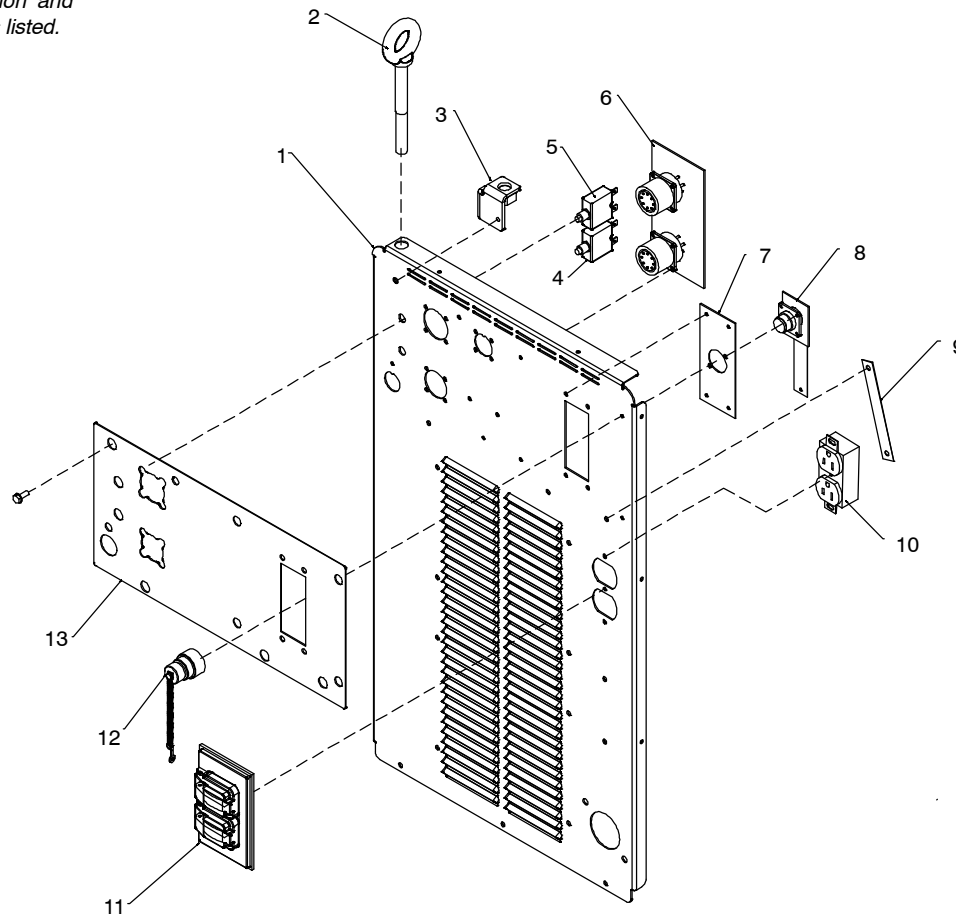
...	1	PC12	239623	Circuit Card Assy, E-stop	1
...	2	PC3	239598	Circuit Card Assy, Aux Power	1
...	3		210490	Panel, Mtg Circuit Boards	1
...	4		134201	Stand-Off, PC Card .312/.375/Post&Lock .43	4
...	5		170647	Bushing, Snap-in Nyl 1.312 Id X 1.500 Mtg Hole	1
...	6		210491	Panel, Mtg Components Top	1
...	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.



258 688-A

**Figure 17-5. Auto-Access E 450 Digital Rear Panel Assembly**

Item No.	Dia. Mkgs.	Part No.	Description	Quantity
<b>Figure 17-5. Auto-Access E 450 Digital Rear Panel Assembly (Fig 17-1 Item 8)</b>				
...	1	210475	Panel, Rear	1
...	2	245352	Bolt, eye shld thd stem .500-13 X 4.000	1
...	3	210483	Bracket, lift eye	1
...	4	CB1	083432 Supplementary Protector, Man Reset 1P 10A 250VAC Frict	1
...	5	CB2	093995 Supplementary Protector, Man Reset 1P 15A 250VAC Frict	1
...	6	PC32	249627 Circuit Card Assy, Motor & Digital I/O Int	1
...	7		225955 Plate, Mounting Rcpt(E-stop)	1
...	8		239623 Circuit Card Assy, E-stop	1
...	9		216596 Strap, Grounding 4.50 in long	1
...	10	RC2	604176 Receptacle (115V Duplex)	1
...	11		217297 Cover, Receptacle Weatherproof Duplex Rcpt	1
...	12		208898 Plugs, w/Leads (4500 Jumper)	1
...	13		210505 Nameplate, Rear	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.

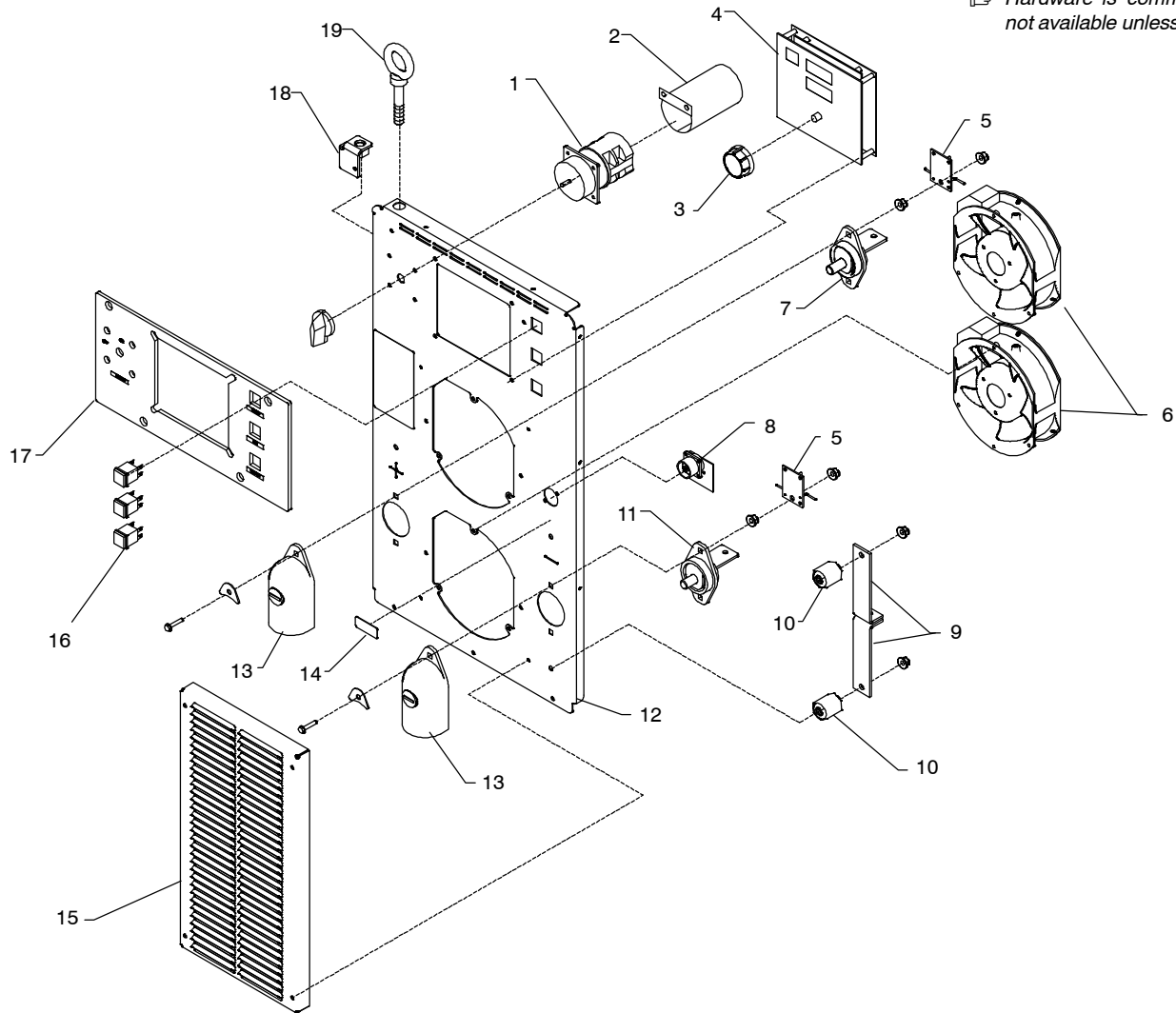


Figure 17-6. Auto-Access E 450 Digital Front Panel Assembly

803 249-D

Item No.	Dia. Mkgs.	Part No.	Description	Quantity
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Figure 17-6. Auto-Access E 450 Digital Front Panel Assembly (Fig 17-1 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		250451	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

\*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
<b>Figure 17-6. Auto-Axcess E 450 Digital Front Panel Assembly (Fig 17-1 Item 17) (Continued)</b>				
... 14		219843	Label, Volt 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		258243	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.

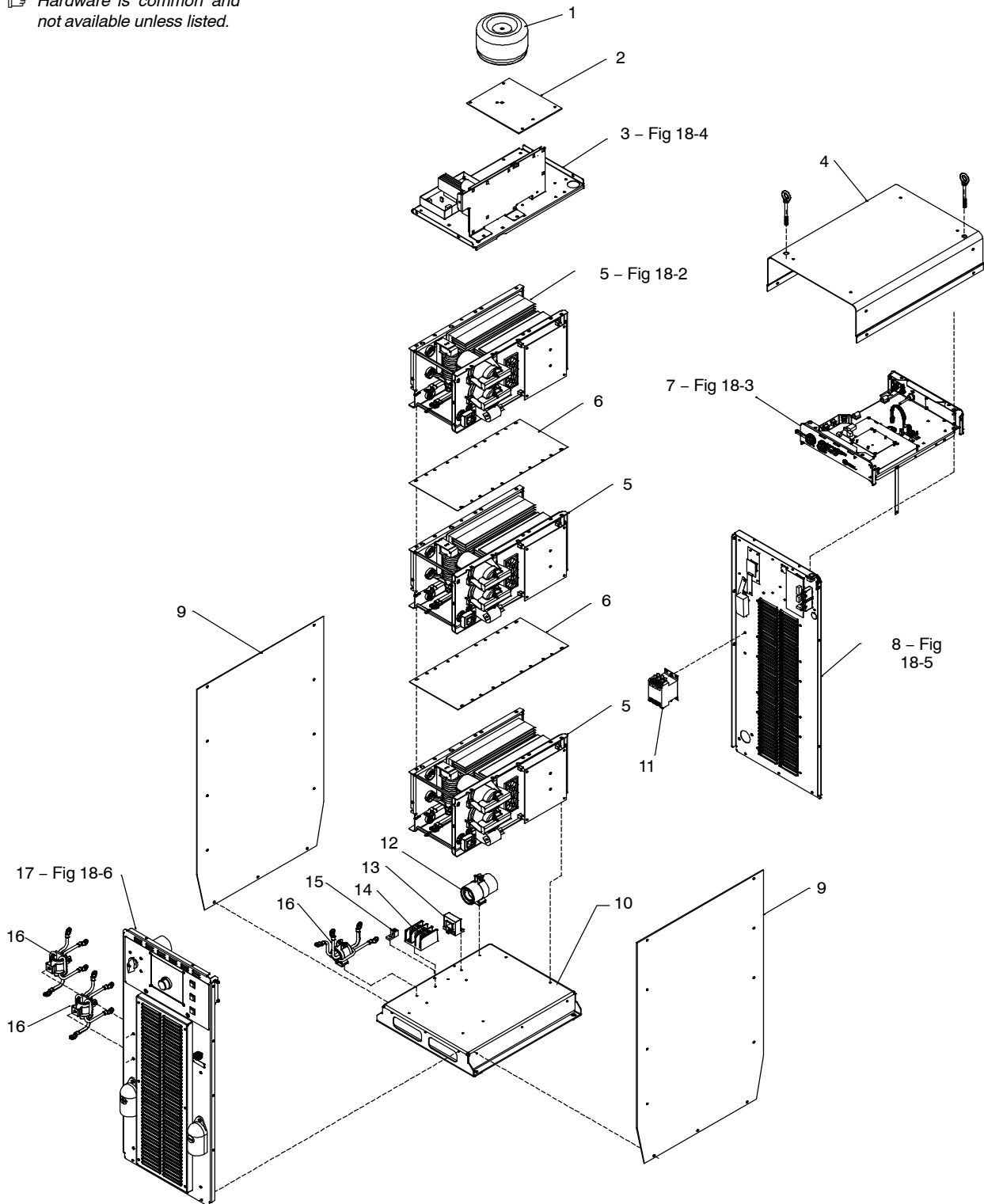
**To maintain the factory original performance of your equipment, use only Manufacturer's Suggested Replacement Parts. Model and serial number required when ordering parts from your local distributor.**





# SECTION 18 – AUTO-AXCESS E 675 DIGITAL PARTS LIST

 Hardware is common and not available unless listed.



260 710-A

**Figure 18-1. Auto-Axcess E 675 Digital Main Assembly**

Item No.	Dia. Mkgs.	Part No.	Description	Quantity
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**Figure 18-1. Auto-Axcess E 675 Digital Main Assembly**

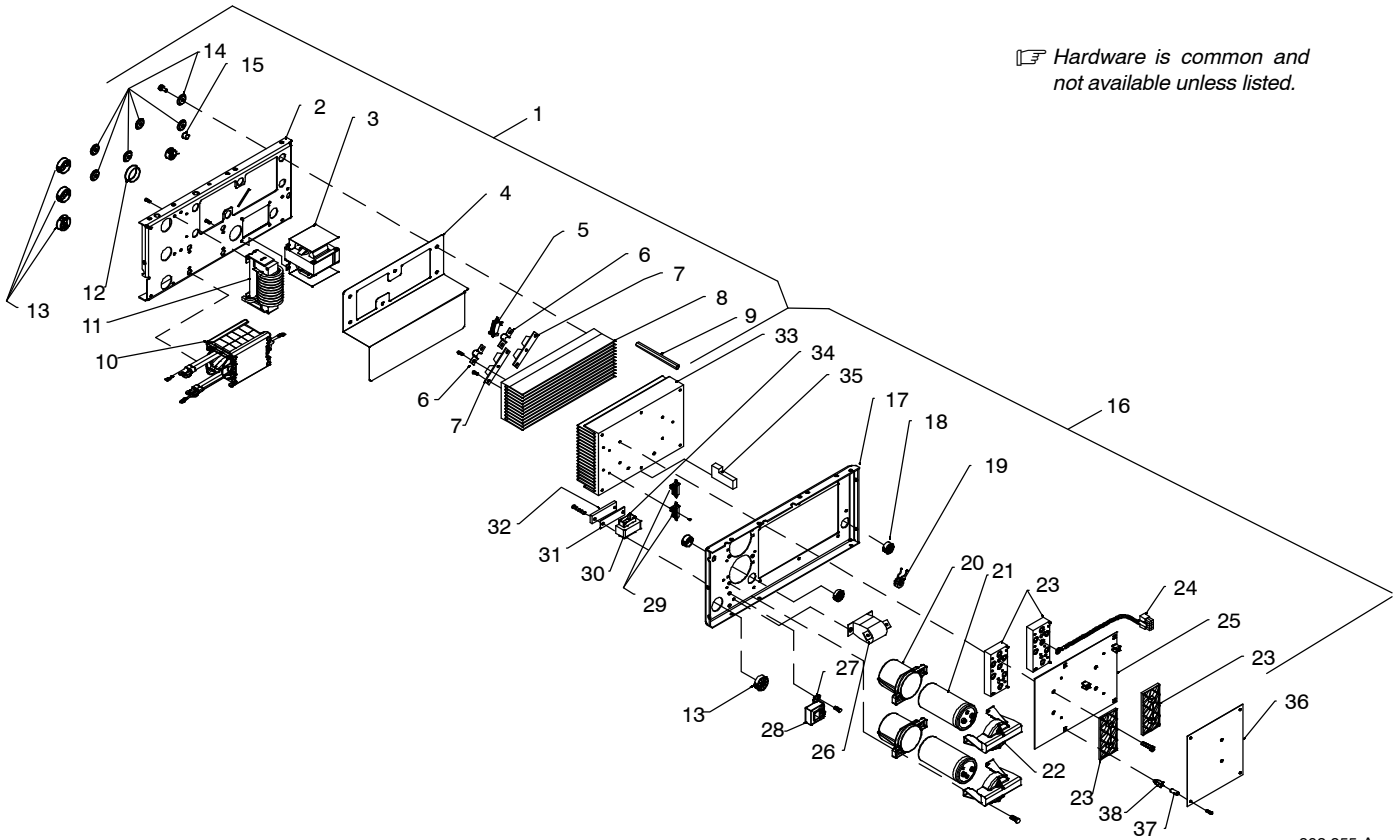
... 1	T2	212543	Xfmr, Control Toroidal 665 VAC Pri 1900 VA 60 Hz	1
... 2		210481	Plate, Mtg Toroid Xfmr	1
... 3		Fig 18-4	Top Tray Assembly	1
... 4		242008	Cover, Top	1
... 5	IM1,IM2,IM3	214597	Windtunnel, LH w/Components (Fig 18-2)	3
... 5		242680	Windtunnel, RH w/Components (Fig 18-2)	3
... 6		198961	Panel, Module Divider	2
... 7		257979	Assy, Auto-Axcess E Analog Module I100 (Fig 18-3)	1
... 8		Fig 18-5	Rear Panel Assembly	1
... 9		227791	Panel, Side W/Insulator	2
... 10		210482	Base	1
... 11	W1	160793	Contactora, DEF PRP 60A 3P 24VAC Coil W/Boxlug	1
... 12		213386	Assembly, Filter (Primary)	1
... 13	HD2	182918	Transducer, Current 400A Module Supply V +/- 15V	1
... 14		198951	Block, Terminal 3 Pole	1
... 15		148025	Lug, Univ W/SCR 600V 2/0-6 Wire .266 Stud	1
... 16		218365	Filter Assy, Secondary	2
... 17		Fig 18-6	Front Panel Assembly	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 18-2. Windtunnel Assembly LH And RH**

802 955-A

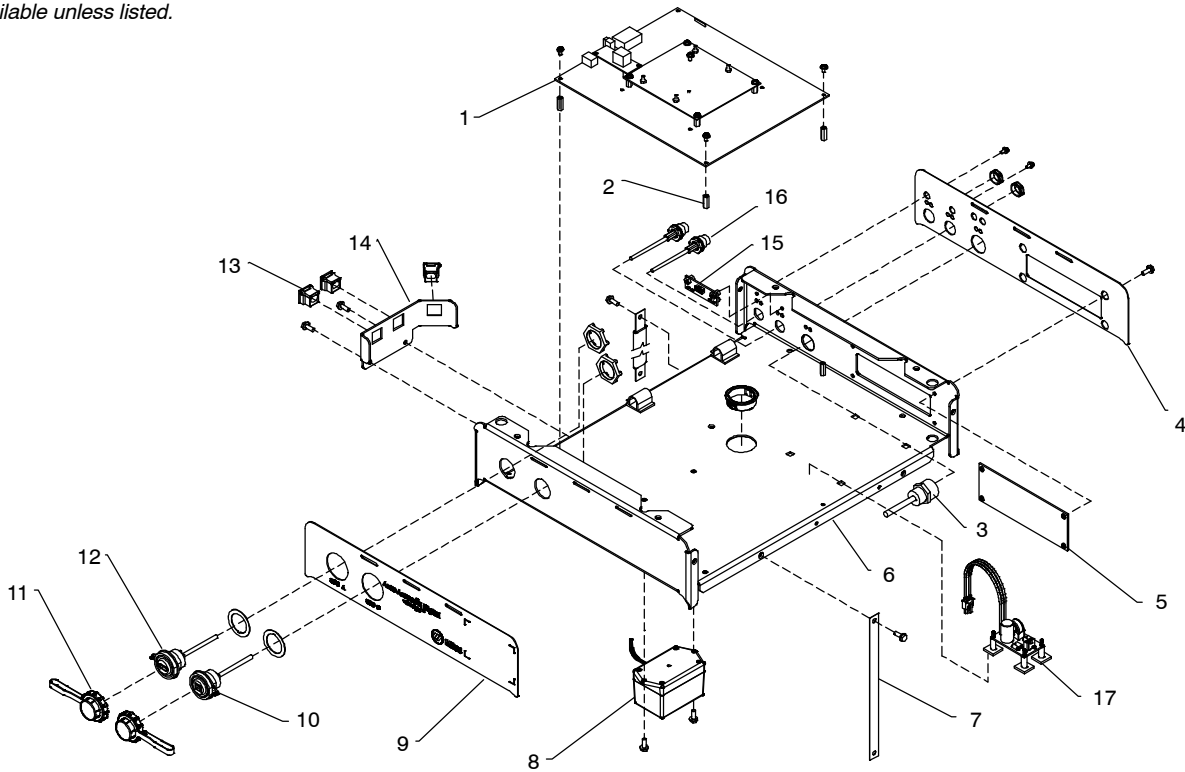
Item No.	Dia. Mkgs.	Part No.	Description	Quantity
<b>Figure 18-2. Windtunnel Assembly LH And RH (Fig 18-1 Item 5)</b>				
...	1	214597	Windtunnel, LH w/Components (including)	1
...	2	196351	Windtunnel, LH	1
...	3	L1	213940 Inductor, Input	1
...	4	214519	Insulator, Heat Sink Rectifier	1
...	5	R3, C4	233052 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
...		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	196514	Gasket, Inductor Mounting	1
...	32	196512	Bracket, Inductor Mounting	1
...	33	196330	Heat Sink, Power Module	1
...	34	L2	196345 Coil, Inductor (Pre-regulator)	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.



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**Figure 18-3. E-module w/Ethernet And USB Assembly**

Item No.	Dia. Mkgs.	Part No.	Description	Quantity
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**Figure 18-3. E-module w/Ethernet And USB Assembly  
(Fig 18-1 Item 6)**

...	1	250516	...	Assy, Access E Circuit Card Board Stack	1
...	2	115440	...	Stand-off, No 6-32 X .687 Lg .250 Hex Al Fem	4
...	3	000527	...	Receptacle Assy, Devicenet	1
...	4	242645	...	Nameplate, Axxess E Top Rear	1
...	5	◆242007	...	Panel, Amp W/Components	1
...	6	241996	...	Chassis, Access E	1
...	7	246591	...	Ground Strap	2
...	8	245350	...	Assembly, Personality Board	1
...	9	257980	...	Nameplate, Auto-Axxess E Top Front	1
...	10	244236	...	Cable, USB Type B, Sealed Panel Mount	1
...	11	244237	...	Dust Cap	2
...	12	244239	...	Cable, USB Type A, Sealed Panel Mount	1
...	13	203423	...	Bushing, Strain Relief .300/.360 ID X .689 Sq Mtg	3
...	14	246545	...	Bracket, Axxess E Strain Relief	1
...	15	244980	...	Circuit Card Assy, Ethernet LED	1
...	16	244257	...	Cable Assy, RJ45 Male/M12 Female .4m	2
...	17	254000	...	Assy, Filter Board Axxess E	1

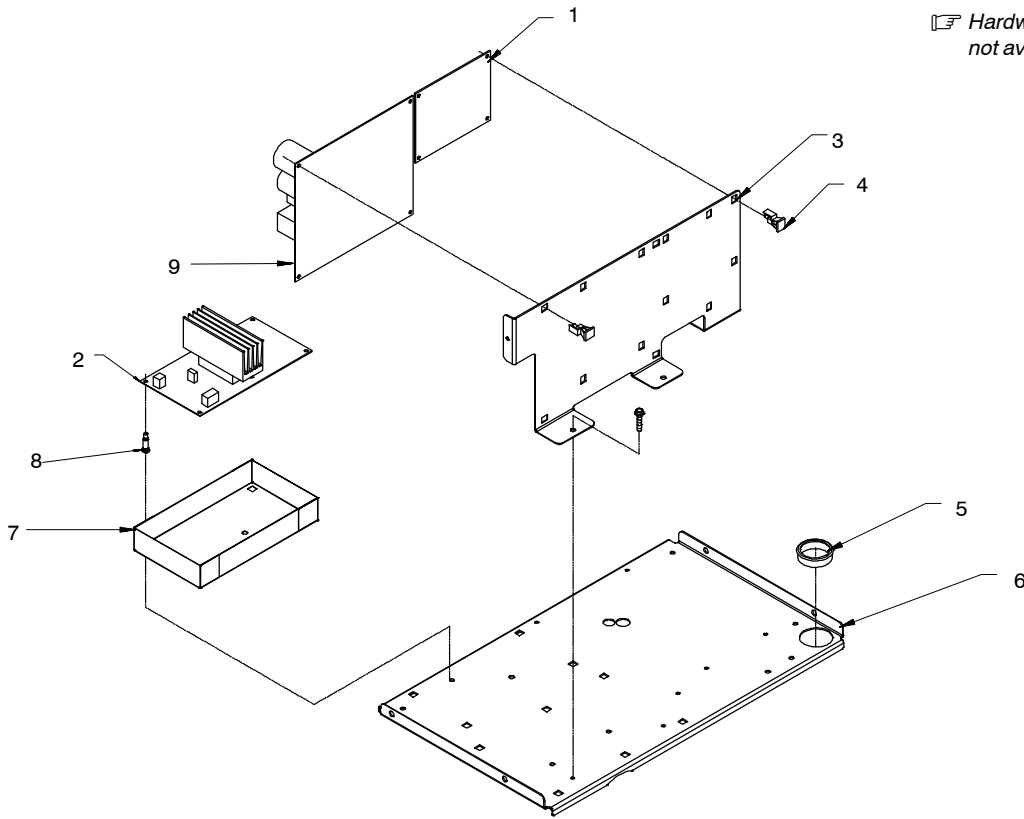
\*Recommended Spare Parts.

◆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.



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**Figure 18-4. Top Tray Assembly**

Item No.	Dia. Mkgs.	Part No.	Description	Quantity
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**Figure 18-4. Top Tray Assembly (Fig 18-1 Item 3)**

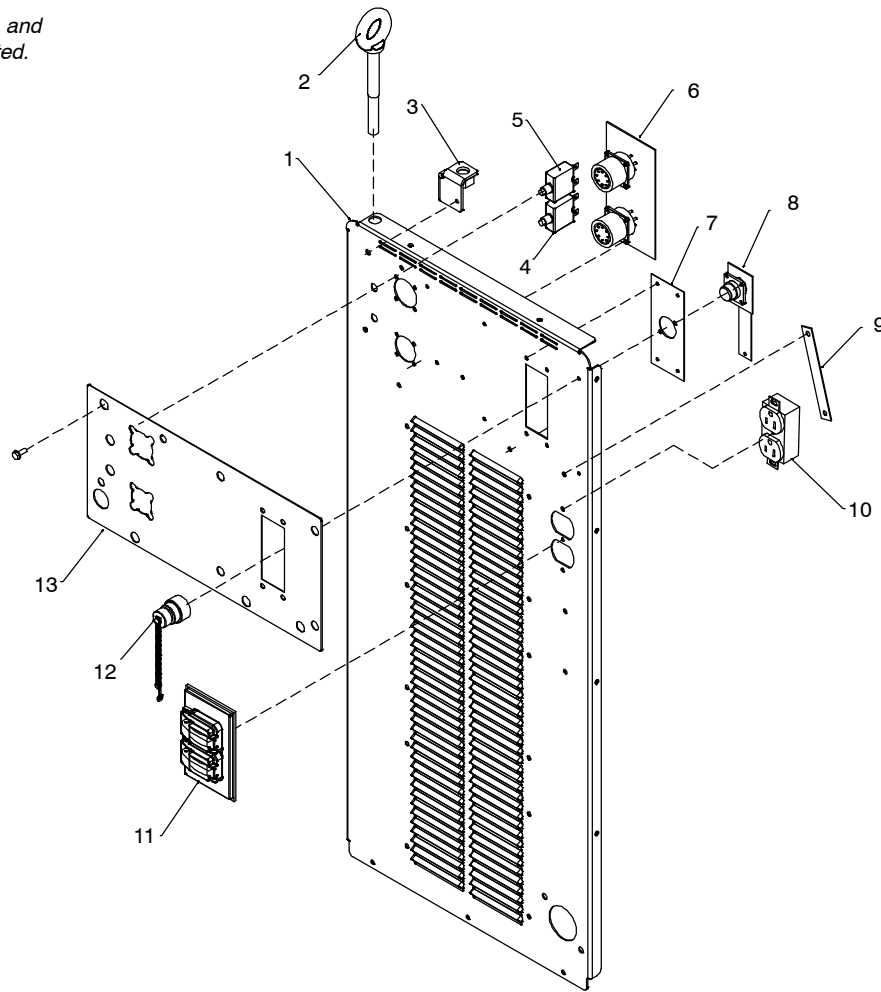
...	1	...	PC12	...	239623	...	Circuit Card Assy, E-stop	...	1
...	2	...	PC3	...	239598	...	Circuit Card Assy, Aux Power	...	1
...	3	...		...	210490	...	Panel, Mtg Circuit Boards	...	1
...	4	...		...	134201	...	Stand-Off, PC Card .312/.375/Post&Lock .43	...	4
...	5	...		...	170647	...	Bushing, Snap-in 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.



260 712-A

**Figure 18-5. Auto-Access E 675 Digital Rear Panel Assembly**

Item No.	Dia. Mkgs.	Part No.	Description	Quantity
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**Figure 18-5. Auto-Access E 675 Digital Rear Panel Assembly (Fig 18-1 Item 8)**


...	1	210471	Panel, Rear	1	
...	2	245352	Bolt, eye shld thd stem .500-13 X 4.000	1	
...	3	210483	Bracket, lift eye	1	
...	4	CB1	083432	Supplementary Protector, Man Reset 1P 10A 250VAC Frict	1
...	5	CB2	093995	Supplementary Protector, Man Reset 1P 15A 250VAC Frict	1
...	6	PC32	249627	Circuit Card Assy, Motor & Digital I/O Int	1
...	7		225955	Plate, Mounting Rcpt(E-stop)	1
...	8		239623	Circuit Card Assy, E-stop	1
...	9		216596	Strap, Grounding 4.50 in long	1
...	10	RC2	604176	Receptacle (115V Duplex)	1
...	11		217297	Cover, Receptacle Weatherproof Duplex Rcpt	1
...	12		208898	Plugs, w/Leads (4500 Jumper)	1
...	13		210505	Nameplate, Rear	1

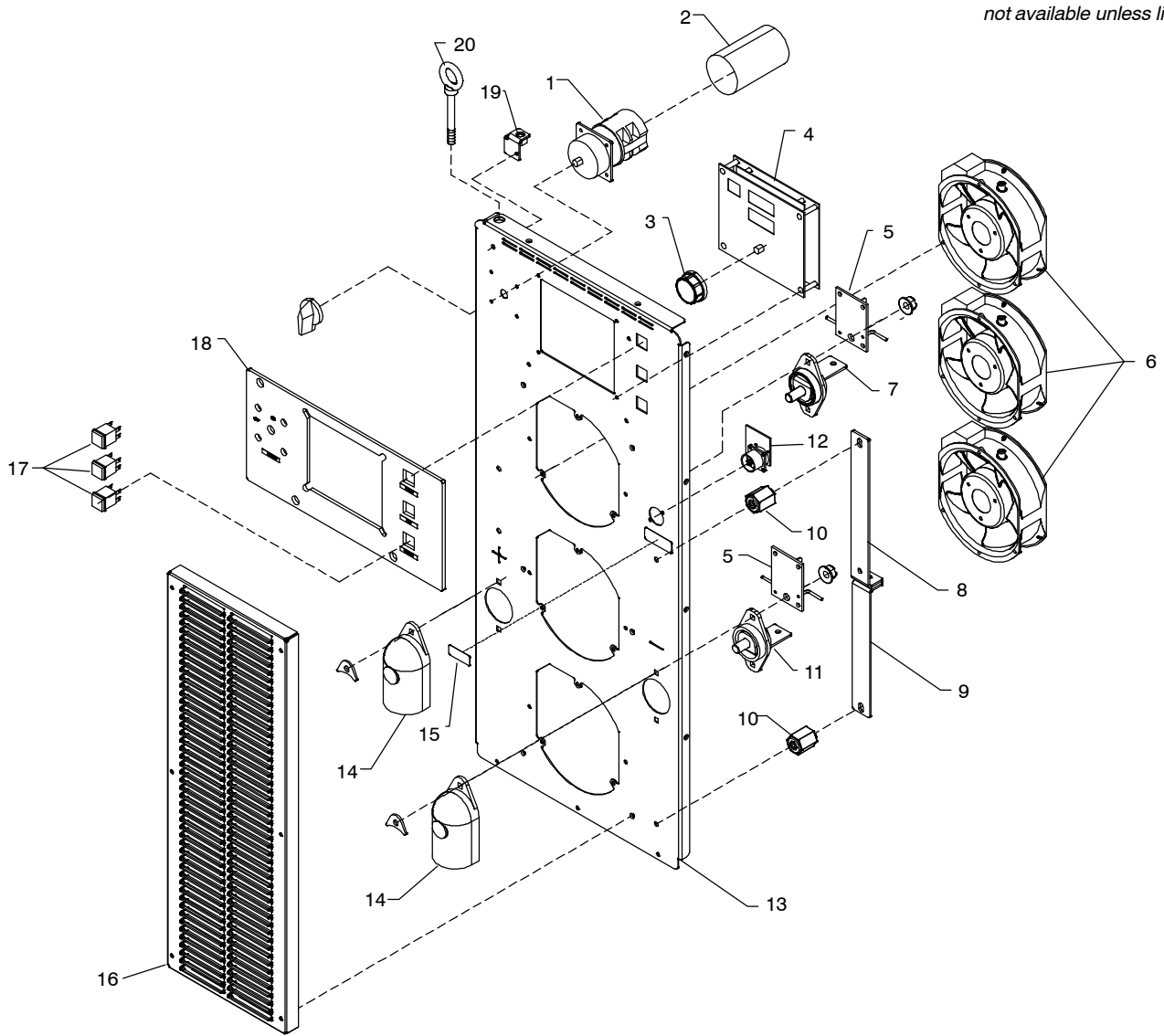
\*Recommended Spare Parts.

+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.



258 638-A

**Figure 18-6. Auto-Access E 675 Digital Front Panel Assembly**

Item No.	Dia. Mkgs.	Part No.	Description	Quantity
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**Figure 18-6. Auto-Access E 675 Digital Front Panel Assembly  
(Fig 18-1 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		250451	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	3
...	7		210865	Terminal, pwr output red	1
...	8		220815	Bus Bar, Output	1
...	9		210864	Bus Bar, Output	1
...	10		025248	Stand-off, Insul .250-20 X 1.250 Lg X .437 Thd	3
...	11		210866	Terminal, pwr output black	1
...	12		244989	Circuit Card Assy, Vsense Filter	1
...	13		250013	Panel, Front	1

Item No.	Dia. Mkgs.	Part No.	Description	Quantity
<b>Figure 18-6. Auto-Axcess E 675 Digital Front Panel Assembly (Fig 18-1 Item 17) (Continued)</b>				
... 14		186621	... Boot, Generic	2
... 15		219843	... Label, Volt Sense	1
... 16		203862	... Box, Louver	1
... 17	PB1, PB2, PB3	199443	... Switch, Pb Mc No Spst 10A 115VAC w/Blk Cap Panelmt	3
... 18		258245	... Nameplate, Front	1
... 19		210483	... Bracket, lift eye	1
... 20		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.**

# TRUE BLUE<sup>®</sup>

## 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 – Filtair 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 – Filtair 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<sup>®</sup> 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.





# 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](http://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](http://www.MillerWelds.com)

