



OM-251 387G

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Processes



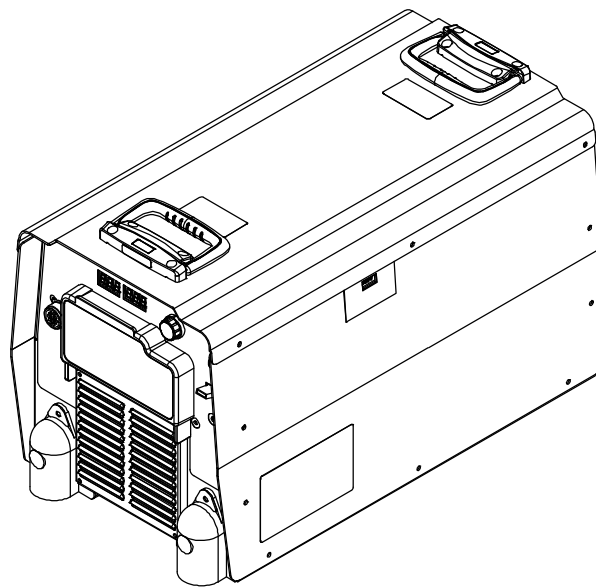
Multiprocess Welding

Description



Arc Welding Power Source

# XMT<sup>®</sup> 450 CC/CV



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

## OWNER'S MANUAL

File: MULTIPROCESS



# 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.

## 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

 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.

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 and ground conductor for damage or bare wiring – replace immediately if damaged – bare wiring can kill.
- Turn off all equipment when not in use.
- Do not use worn, damaged, undersized, or repaired 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.
- Use GFCI protection when operating auxiliary equipment in damp or wet locations.

### 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. The recommended way to determine adequate ventilation is to sample for the composition and quantity of fumes and gases to which personnel are exposed.
- If ventilation is poor, wear an approved air-supplied respirator.
- Read and understand the Safety Data Sheets (SDSs) and the manufacturer's instructions for adhesives, coatings, cleaners, consumables, coolants, degreasers, fluxes, and metals.
- 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 body protection made from durable, flame-resistant material (leather, heavy cotton, wool). Body protection includes oil-free clothing such as leather gloves, heavy shirt, cuffless trousers, high shoes, and a cap.

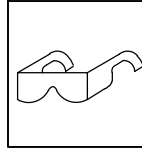


### WELDING can cause fire or explosion.

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 burns. Accidental contact of electrode to metal objects can cause sparks, explosion, overheating, or fire. Check and be sure the area is safe before doing any welding.

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

- Remove stick electrode from holder or cut off welding wire at contact tip when not in use.
- Wear body protection made from durable, flame-resistant material (leather, heavy cotton, wool). Body protection includes oil-free clothing 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.
- Read and understand the Safety Data Sheets (SDSs) and the manufacturer's instructions for adhesives, coatings, cleaners, consumables, coolants, degreasers, fluxes, and metals.



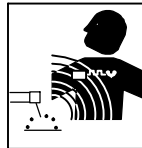
### FLYING METAL or DIRT can injure eyes.

- 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.



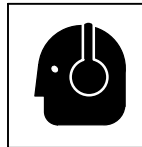
### BUILDUP OF GAS can injure or kill.

- 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.

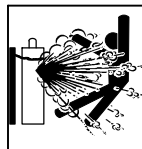
- Wearers of Pacemakers and other Implanted Medical Devices should keep away.
- Implanted Medical Device wearers should consult their doctor and the device manufacturer before going near arc welding, spot welding, gouging, plasma arc cutting, or induction heating operations.



### 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. Do not stand in front of or behind the regulator when opening the 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



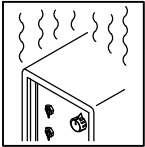
### FIRE OR EXPLOSION hazard.

- 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.



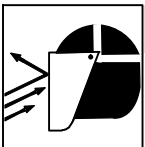
### FALLING EQUIPMENT can injure.

- 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.



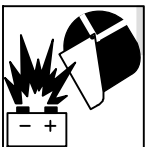
### MOVING PARTS can injure.

- 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.



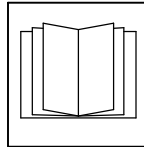
### BATTERY EXPLOSION can injure.

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



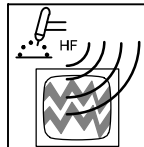
### MOVING PARTS can injure.

- 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.



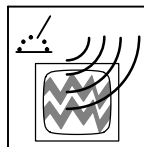
### READ INSTRUCTIONS.

- 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). The current from arc welding (and allied processes including spot welding, gouging, plasma arc cutting, and induction heating operations) creates an EMF field around the welding circuit. 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 ÉLECTRIQUE, PIÈCES EN MOUVEMENT, et PIÈCES 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 et le conducteur de mise à la terre afin de s'assurer qu'il n'est pas altéré ou dénudé –, le remplacer immédiatement s'il l'est –. Un fil dénudé 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.
- Utiliser une protection différentielle lors de l'utilisation d'un équipement auxiliaire dans des endroits humides ou mouillés.

## 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 dangereuse 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. Pour déterminer la bonne ventilation, il est recommandé de procéder à un prélèvement pour la composition et la quantité de fumées et de gaz auxquels est exposé le personnel.
- Si la ventilation est médiocre, porter un respirateur anti-vapeurs approuvé.
- Lire et comprendre les fiches de données de sécurité et les instructions du fabricant concernant les adhésifs, les revêtements, les nettoyeurs, les consommables, les produits de refroidissement, les dégraisseurs, les flux et les métaux.
- 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 intenses (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.

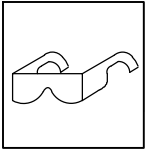
- Avoir recours à des écrans protecteurs ou à des rideaux pour protéger les autres contre les rayonnements les éblouissements et les étincelles ; prévenir toute personne sur les lieux de ne pas regarder l'arc.
- Porter un équipement de protection pour le corps fait d'un matériau résistant et ignifuge (cuir, coton robuste, laine). La protection du corps comporte des vêtements sans huile comme par ex. des gants de cuir, une chemise solide, des pantalons sans revers, des chaussures hautes et une casquette.



### 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 là 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 un équipement de protection pour le corps fait d'un matériau résistant et ignifuge (cuir, coton robuste, laine). La protection du corps comporte des vêtements sans huile comme par ex. des gants de cuir, une chemise solide, des pantalons sans revers, des chaussures hautes et une casquette.
- 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.
- Lire et comprendre les fiches de données de sécurité et les instructions du fabricant concernant les adhésifs, les revêtements, les nettoyeurs, les consommables, les produits de refroidissement, les dégraisseurs, les flux et les métaux.



### 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.



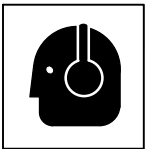
### LES ACCUMULATIONS DE GAZ risquent de provoquer des blessures ou même la mort.

- 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.

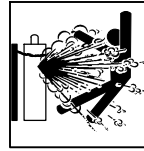
- Les porteurs de stimulateurs cardiaques et autres implants médicaux doivent rester à distance.
- Les porteurs d'implants médicaux doivent consulter leur médecin et le fabricant du dispositif avant de s'approcher de la zone où se déroule du soudage à l'arc, du soudage par points, du gougeage, de la 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.
- Tourner le dos à la sortie de vanne lors de l'ouverture de la vanne de la bouteille. Ne pas se tenir devant ou derrière le régulateur lors de l'ouverture de la vanne.
- 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.

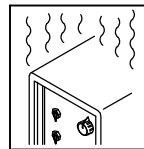
- Ne pas placer l'appareil sur, au-dessus ou à proximité de surfaces inflammables.
- Ne pas installer l'appareil à proximité de produits inflammables.
- Ne pas surcharger l'installation électrique – s'assurer que l'alimentation est correctement dimensionnée et protégée avant de mettre l'appareil en service.



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

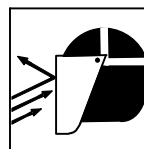
- Utiliser l'anneau de levage uniquement pour soulever l'appareil, NON PAS les chariots, les bouteilles de gaz ou tout autre accessoire.
- Utiliser un équipement de levage de capacité suffisante pour lever l'appareil.
- En utilisant des fourches de levage pour déplacer l'unité, s'assurer que les fourches 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.



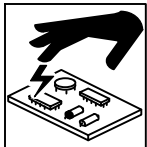
### L'EMPLOI EXCESSIF peut SURCHAUFFER L'ÉQUIPEMENT.

- 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.



### LES ÉTINCELLES PROJÉTÉES 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.

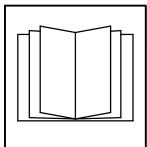
- Ne pas utiliser l'appareil de soudage pour charger des batteries ou faire démarrer des véhicules à l'aide de câbles de démarrage, sauf si l'appareil dispose d'une fonctionnalité de charge de batterie destinée à cet usage.



### Les PIÈCES MOBILES peuvent causer des blessures.

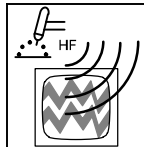
- S'abstenir de toucher des organes mobiles tels que des ventilateurs.
- Maintenir fermés et verrouillés les portes, panneaux, recouvrements et dispositifs de protection.

- 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.



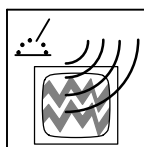
### LIRE LES INSTRUCTIONS.

- 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 issu d'un soudage à l'arc (et de procédés connexes, y compris le soudage par points, le gougeage, le découpage plasma et les opérations de chauffage par induction) crée un champ électromagnétique (CEM) autour du circuit 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.








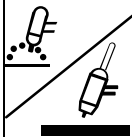







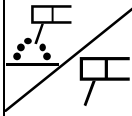
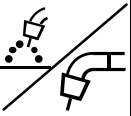








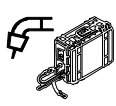
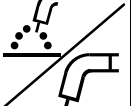
# SECTION 3 – DEFINITIONS

## 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.	Safe89 2012-07

## 3-2. Miscellaneous Symbols And Definitions

<b>A</b>	Amperage		Panel		Alternating Current (AC)	<b>V</b>	Voltage
	Output		Circuit Breaker		Remote	<b>I</b>	On
<b>O</b>	Off		Gas Tungsten Arc Welding (GTAW)	<b>—</b>	Negative		Voltage Input
<b>==</b>	Direct Current (DC)	<b>+</b>	Positive		Gas Output		Protective Earth (Ground)
	Constant Current		Constant Voltage		Foot Control		Line Connection
<b>S</b>	Suitable For Welding In An Environment With Increased Risk Of Electric Shock		Shielded Metal Arc Welding (SMAW)		Gas Metal Arc Welding (GMAW)		Three Phase Static Frequency Converter-Transformer-Rectifier
<b>U<sub>0</sub></b>	Rated No Load Voltage (Average)	<b>U<sub>1</sub></b>	Primary Voltage	<b>U<sub>2</sub></b>	Conventional Load Voltage	<b>X</b>	Duty Cycle
<b>Hz</b>	Hertz	<b>IP</b>	Degree Of Protection	<b>I<sub>2</sub></b>	Rated Welding Current	<b>%</b>	Percent
	Pulsed		Lift-Arc Trigger Hold Operation (GTAW)	<b>1</b> 	Single Phase	<b>3</b> 	Three Phase
<b>I<sub>1max</sub></b>	Rated Maximum Supply Current	<b>I<sub>1eff</sub></b>	Maximum Effective Supply Current		Increase		Lift-Arc Operation (GTAW)
	Scratch Start TIG		Voltage Sensing Feeder		Flux Cored Arc Welding (FCAW)		







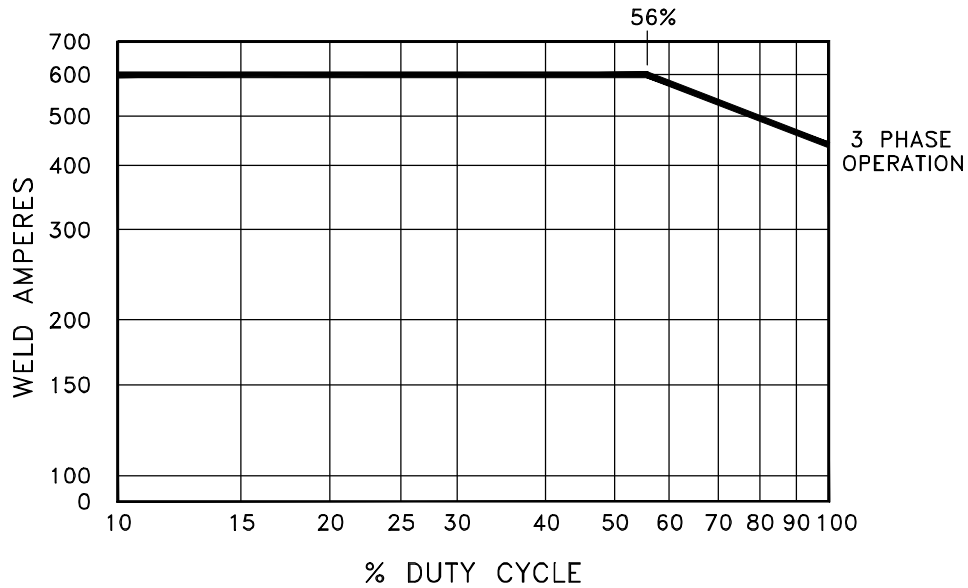
## 4-7. Duty Cycle and Overheating



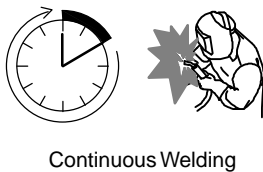
Duty Cycle is percentage of 10 minutes that unit can weld at rated load without overheating.

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.

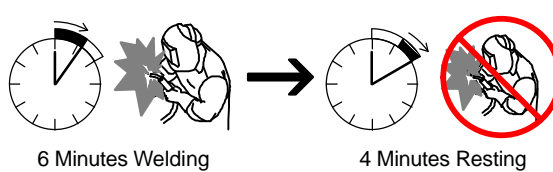
**NOTICE** – Exceeding duty cycle can damage unit and void warranty.



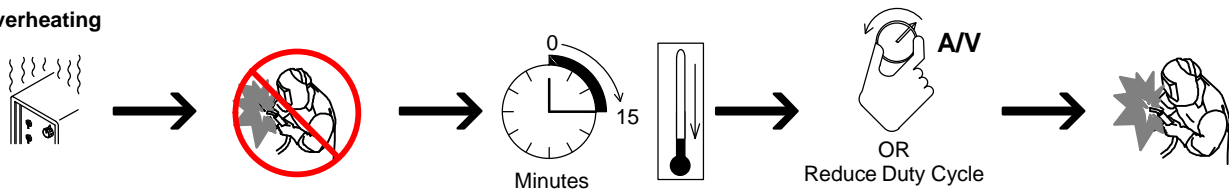
100% Duty Cycle At 450 Amperes



60% Duty Cycle At 580 Amperes

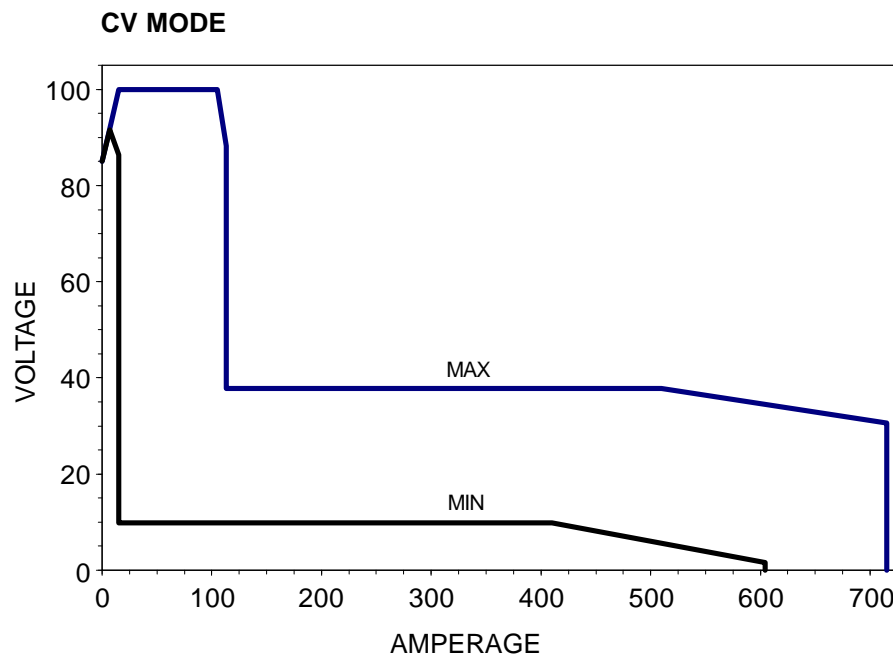
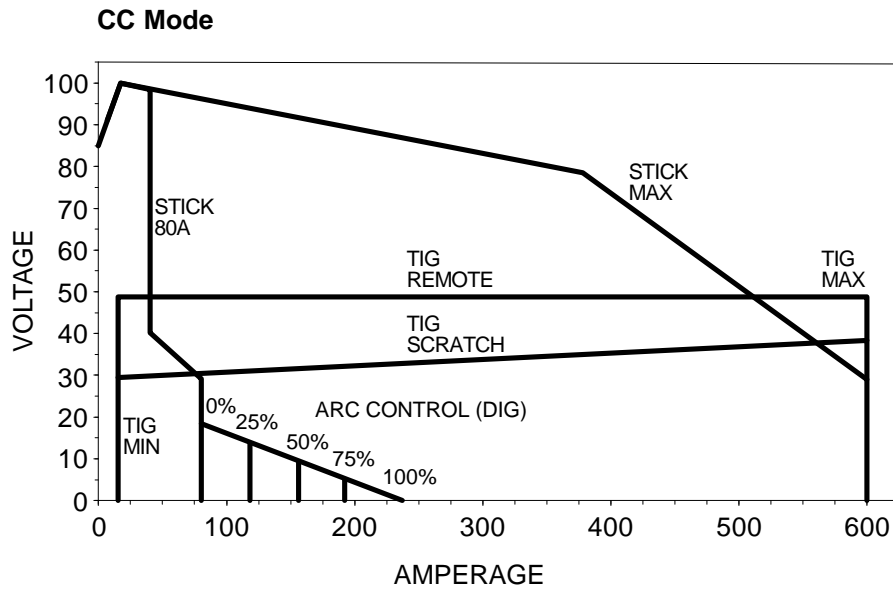


### Overheating



## 4-8. Volt-Ampere Curves

Volt-ampere curves show minimum and maximum voltage and amperage output capabilities of welding power source. Curves of other settings fall between curves shown.

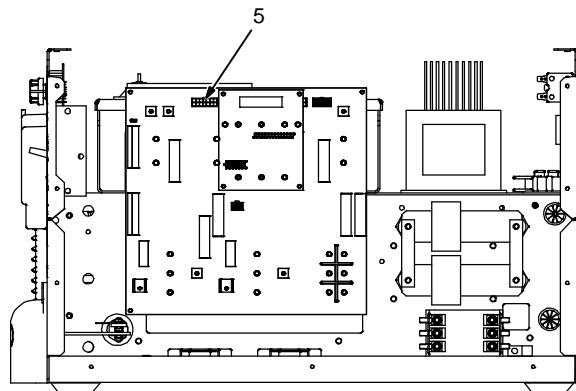
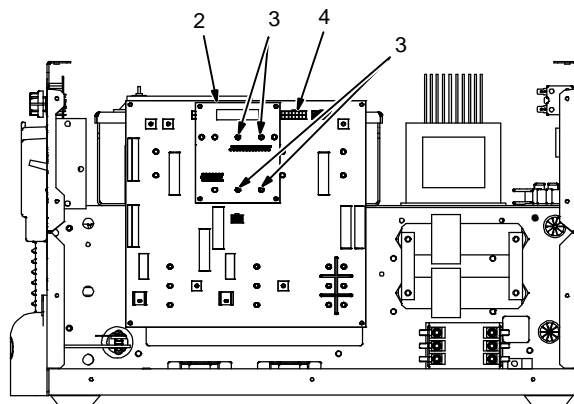
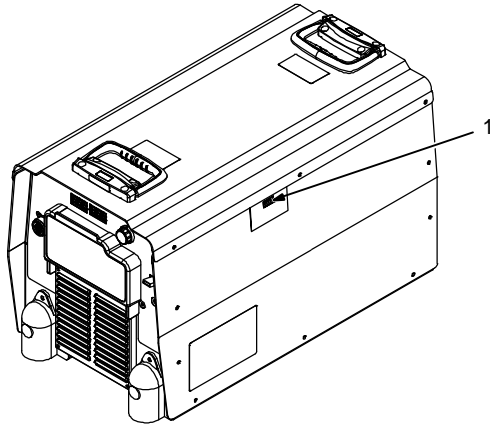




## 5-2. Selecting Input Voltage (230/460 Volt Models Only)



☞ Be sure to reinstall all four screws securing relinking board in place.



**⚠ Turn Off welding power source, disconnect input power, and check voltage on input capacitors according to Section 10-3 before proceeding.**

Check input voltage available at site.

1 Voltage Selection View Window

Check voltage selected in unit. Changing selection is only necessary if selected value does not match available input voltage.

2 Relinking Board PC6

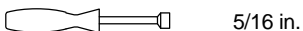
3 Mounting Screws

4 Receptacle RC8 (Connection For 230 VAC Input Power)

5 Receptacle RC7 (Connection For 460 VAC Input Power)

Move relinking board as needed and connect plug PLG4 (in unit) to RC8 or RC7 according to input power voltage.

Tools Needed:


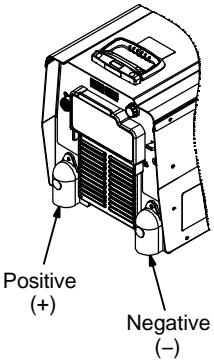


5/16 in.

252 018-A / 252 019-A

### 5-3. Weld Output Terminals And Selecting 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>⚠ Turn off power before connecting to weld output terminals.</p> <p>⚠ Do not use worn, damaged, undersized, or repaired cables.</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 AWG (mm <sup>2</sup> )	60 – 100% Duty Cycle AWG (mm <sup>2</sup> )	10 – 100% Duty Cycle AWG (mm <sup>2</sup> )						
 <p>Positive (+)</p> <p>Negative (-)</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)	2x2/0 (2x70)	2x2/0 (2x70)	
	300	1 (50)	1/0 (60)	2/0 (70)	3/0 (95)	4/0 (120)	2x2/0 (2x70)	2x3/0 (2x95)	2x3/0 (2x95)	
	350	1/0 (60)	2/0 (70)	3/0 (95)	4/0 (120)	2x2/0 (2x70)	2x3/0 (2x95)	2x3/0 (2x95)	2x4/0 (2x120)	
	400	1/0 (60)	2/0 (70)	3/0 (95)	4/0 (120)	2x2/0 (2x70)	2x3/0 (2x95)	2x4/0 (2x120)	2x4/0 (2x120)	
	500	2/0 (70)	3/0 (95)	4/0 (120)	2x2/0 (2x70)	2x3/0 (2x95)	2x4/0 (2x120)	3x3/0 (3x95)	3x3/0 (3x95)	
	600	3/0 (95)	4/0 (120)	2x2/0 (2x70)	2x3/0 (2x95)	2x4/0 (2x120)	3x3/0 (3x95)	3x4/0 (3x120)	3x4/0 (3x120)	

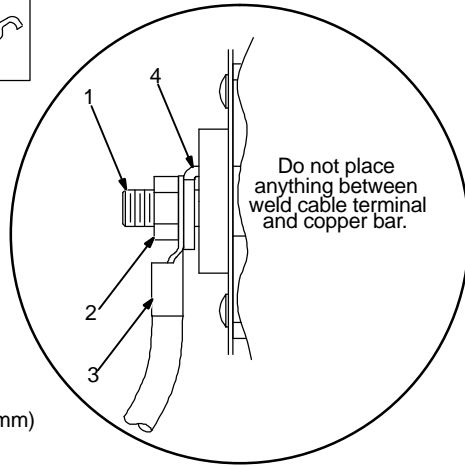
\* This chart is a general guideline and may not suit all applications. If cable overheats, use next size larger cable.

\*\*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 rep. at 920-735-4505 (Miller) or 1-800-332-3281 (Hobart).

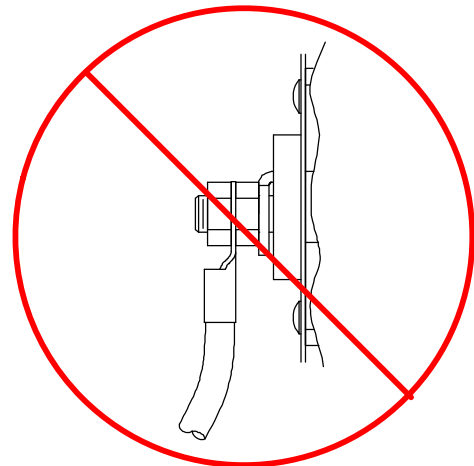
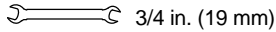
Ref. S-0007-K 2013-10

## 5-4. Connecting Weld Output Cables



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

Tools Needed:



Incorrect Installation

803 778-B

- ⚠ Turn off power before connecting to weld output terminals.**
- ⚠ Failure to properly connect weld cables may cause excessive heat and start a fire, or damage your machine.**

- 1 Weld Output Terminal
  - 2 Supplied Weld Output Terminal Nut
  - 3 Weld Cable Terminal
  - 4 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.**

## 5-5. Remote 14 Receptacle Information

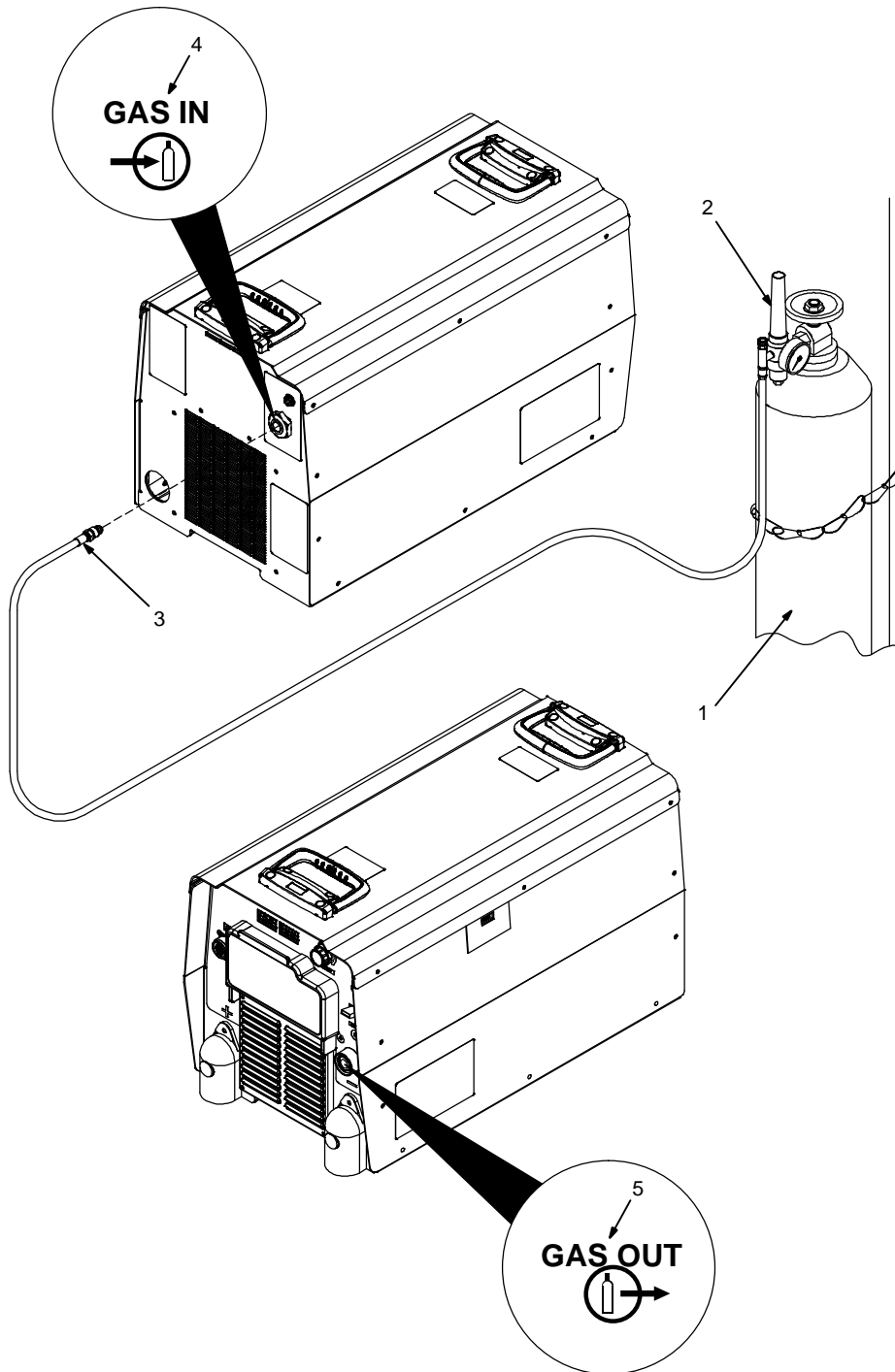
<p>Ref. 252 018-A</p>	<b>REMOTE 14</b>	<b>Socket*</b>	<b>Socket Information</b>
	<b>24 VOLTS AC OUTPUT (CONTACTOR)</b>	A	24 volts AC. Protected by supplementary protect- or CB2.
		B	Contact closure to A completes 24 volts AC con- tactor control circuit.
	<b>REMOTE CONTROL</b>	C	Output to remote control; +10 volts DC in MIG mode. 0 to +10 volts DC in other modes.
		D	Remote control circuit common.
		E	0 to +10 volts DC input command signal from re- mote control.
	<b>A/V AMPLERAGE VOLTAGE</b>	M	CC/CV select 0 to +10 volts DC.
F		Current feedback; +1 volt DC per 100 amperes.	
<b>GND</b>	H	Voltage feedback; +1 volt DC per 10 arc volts.	
	G	Circuit common for 24 volt AC circuit.	
	K	Chassis common.	

\*The remaining sockets are not used.





## 5-7. Optional Gas Valve Operation And Shielding Gas Connection



Obtain gas cylinder and chain to running gear, wall, or other stationary support so cylinder cannot fall and break off valve.

- 1 Cylinder
- 2 Regulator/Flowmeter

Install so face is vertical.

- 3 Gas Hose Connection

Fitting has 5/8-18 right-hand threads. Obtain and install gas hose.

- 4 Gas In Fitting
- 5 Gas Out Fitting

The Gas In and Gas Out fittings have 5/8-18 right-hand threads. Obtain proper size, type, and length hose and make connections as follows:

Connect hose from shielding gas supply regulator/flowmeter to Gas In fitting.

Connect hose coupler to torch. Connect one end of gas hose to hose coupler. Connect remaining end of gas hose to Gas Out fitting.

### Operation

The gas solenoid controls gas flow during the TIG process as follows:

#### Remote TIG

Gas flow starts with remote contactor on.

Gas flow stops at end of post-flow if current was detected, or with remote contactor off if no current was detected.

#### Lift-Arc TIG

Gas flow starts when tungsten touches work (touch sensed).

Gas flow stops at end of post-flow.

#### Scratch Start TIG

Gas flow starts when current is detected.

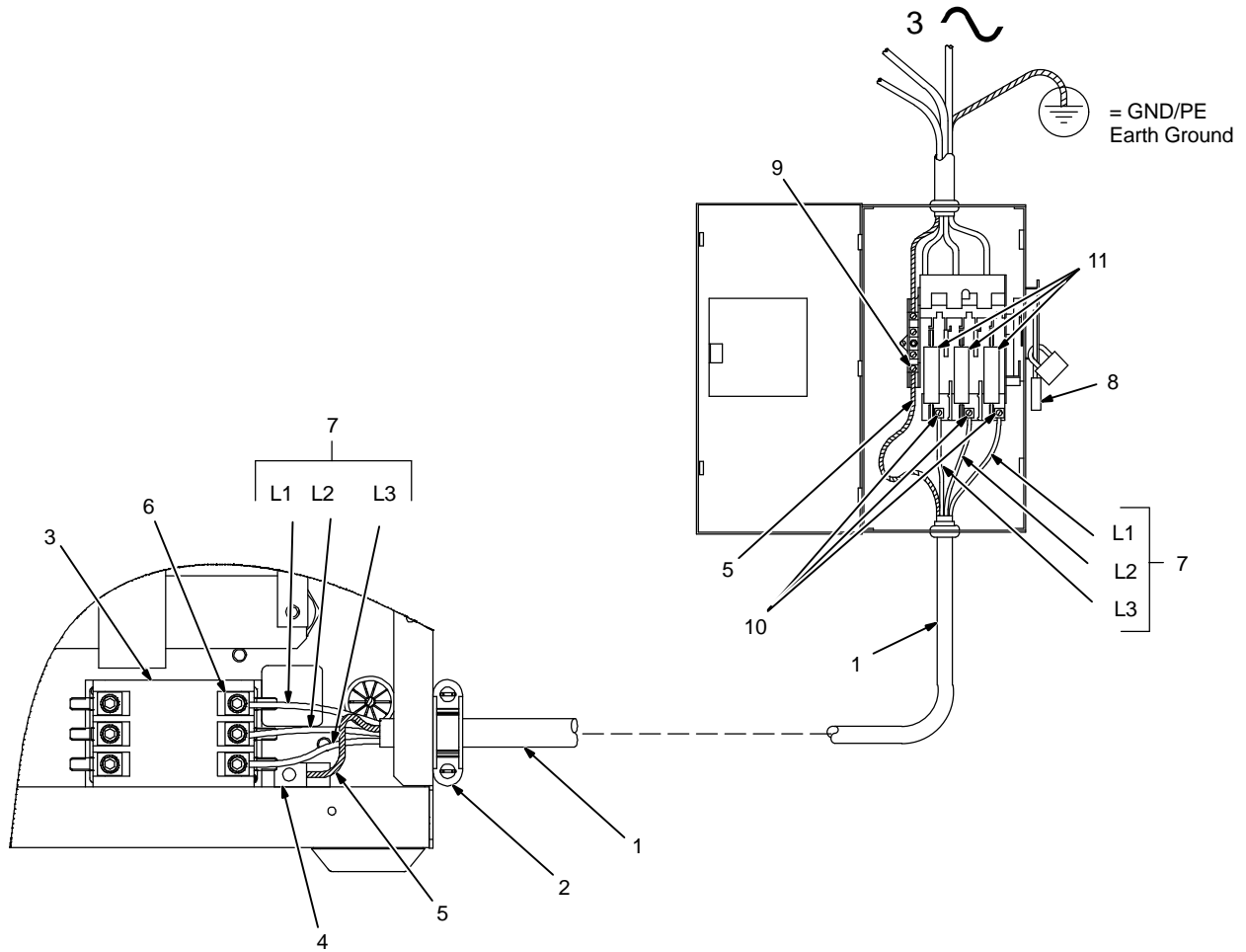
Gas flow stops at end of post-flow.

**Post-flow** time is factory set to 4 seconds per 100 amps of weld current. The minimum post-flow time is 5 seconds. The maximum post-flow is 24 seconds (post flow settings are not adjustable by the end user).

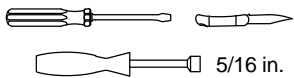




## 5-9. Connecting Input Power



Tools Needed:



## 5-9. Connecting Input Power (Continued)



**⚠ Turn Off welding power source, and check voltage on input capacitors according to Section 10-3 before proceeding.**

**⚠ Installation must meet all National and Local Codes – have only qualified persons make this installation.**

**⚠ Disconnect and lockout/tagout input power before connecting input conductors from unit. Follow established procedures regarding the installation and removal of lockout/tagout devices.**

**⚠ Make input power connections to the welding power source first.**

**⚠ Always connect green or green/yellow conductor to supply grounding terminal first, and never to a line terminal.**

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

1 Input Power Conductors (Customer

Supplied Cord)

Select size and length of conductors using Section 5-3. Conductors must comply with national, state, and local electrical codes. If applicable, use lugs of proper amperage capacity and correct hole size.

### Welding Power Source Input Power Connections

2 Strain Relief (Customer Supplied)

Install strain relief or proper size for unit and input conductors. Route conductors (cord) through strain relief and tighten screws.

3 Contactor W1

4 Welding Power Source Grounding Terminal

5 Green Or Green/Yellow Grounding Conductor

Connect green or green/yellow grounding conductor to machine grounding terminal first.

6 Welding Power Source Line Terminals

7 Input Conductors L1, L2, L3

Connect input conductors L1, L2, and L3 to welding power source line terminals.

Reinstall side panel on welding power source.

### Disconnect Device Input Power Connections

8 Disconnect Device (switch shown in the OFF position)

9 Disconnect Device Grounding Terminal

10 Disconnect Device Line Terminals

Connect green or green/yellow grounding conductor to disconnect device grounding terminal first.

Connect input conductors L1, L2, and L3 to disconnect device line terminals.

11 Over-Current Protection

Select type and size of over-current protection using Section 5-8 (fused disconnect switch shown).

Close and secure door on disconnect device. Remove lockout/tagout device, and place switch in the On position.

Input5 2012-05

## Notes

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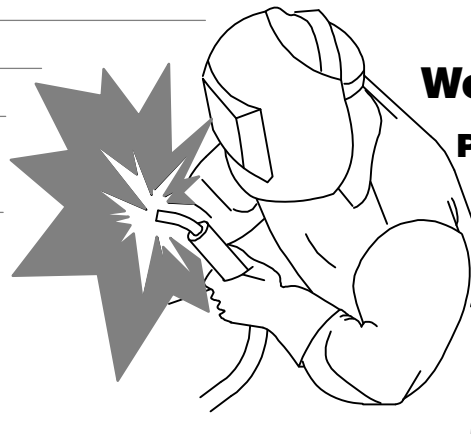
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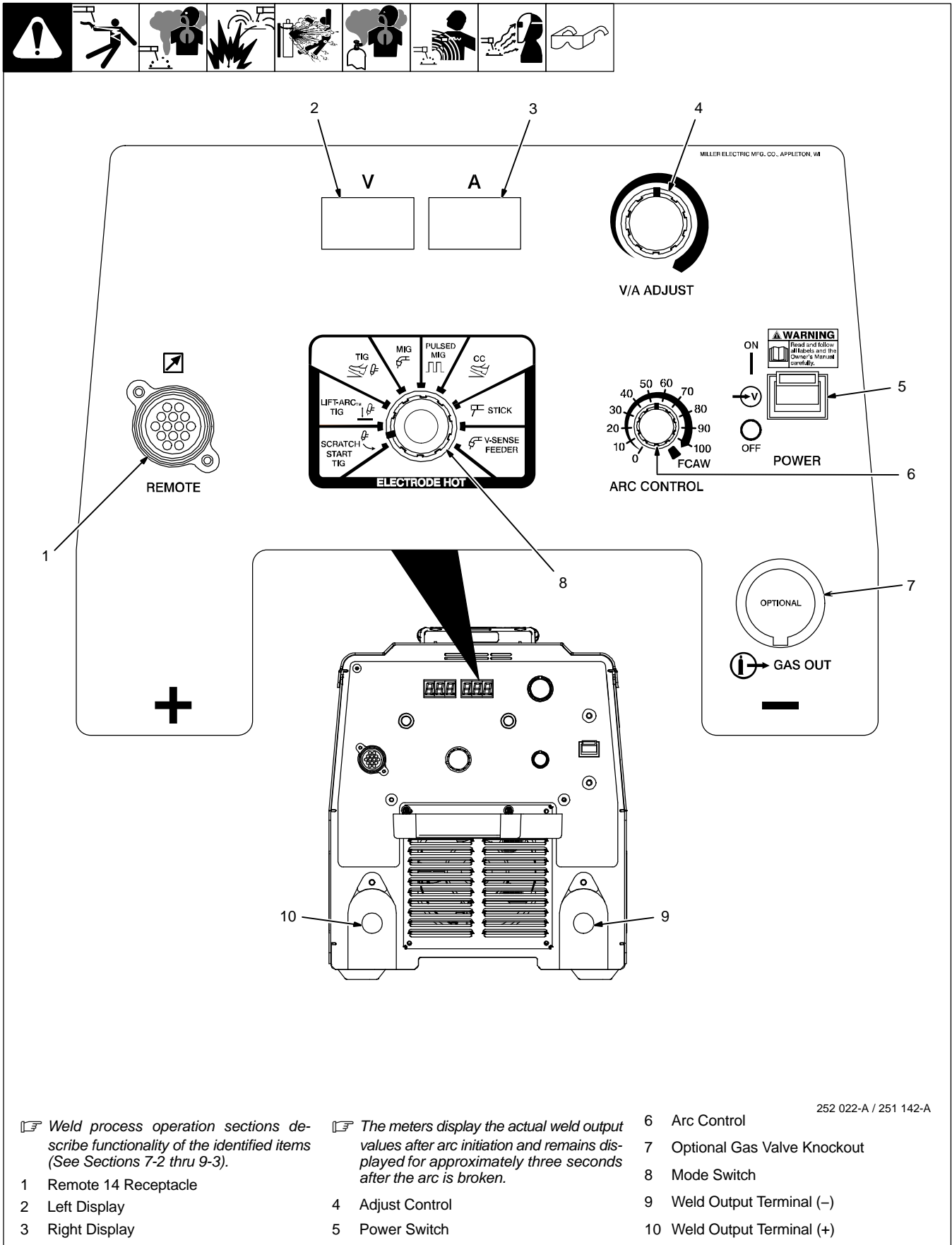


**Work like a Pro!**

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

# SECTION 6 – GENERAL OPERATION

## 6-1. Front Panel



252 022-A / 251 142-A

Weld process operation sections describe functionality of the identified items (See Sections 7-2 thru 9-3).

- 1 Remote 14 Receptacle
- 2 Left Display
- 3 Right Display

The meters display the actual weld output values after arc initiation and remains displayed for approximately three seconds after the arc is broken.

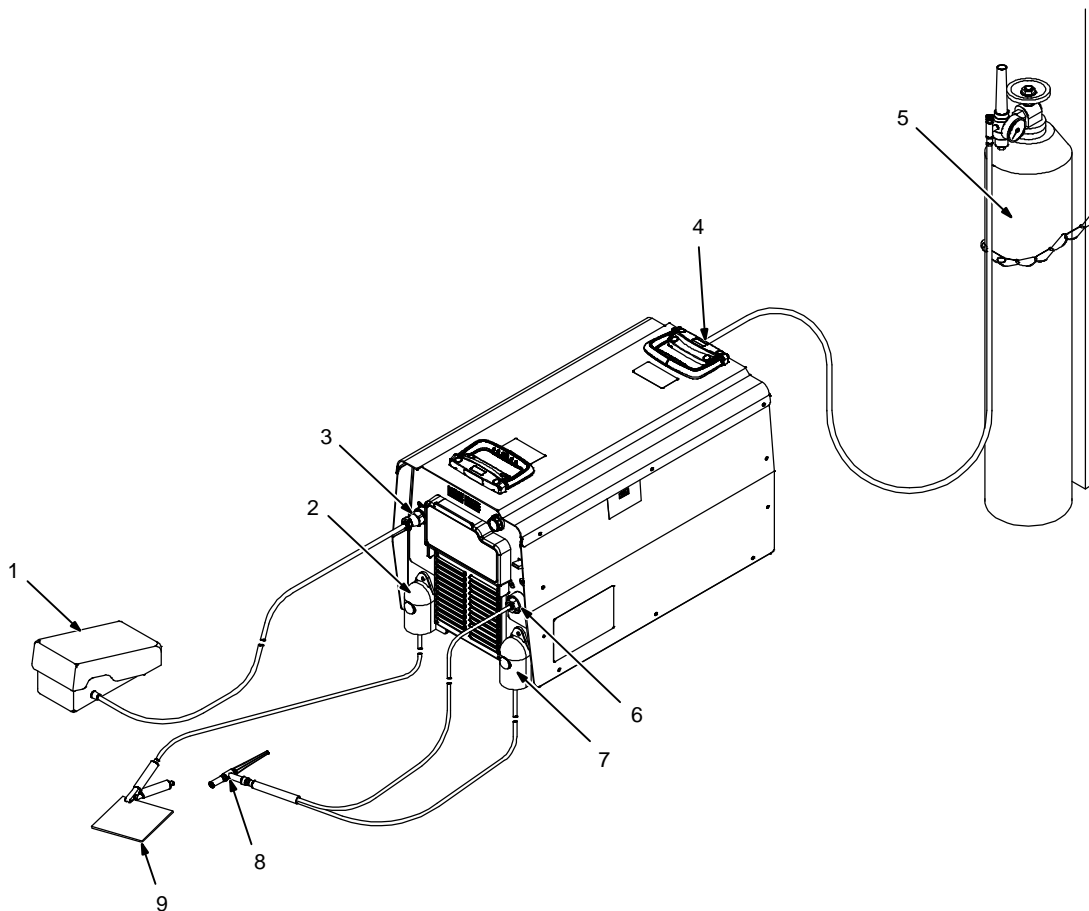
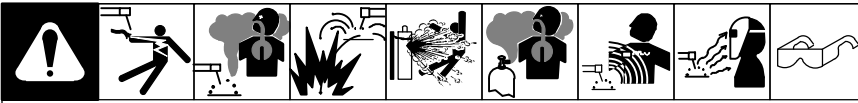
- 4 Adjust Control
- 5 Power Switch

- 6 Arc Control
- 7 Optional Gas Valve Knockout
- 8 Mode Switch
- 9 Weld Output Terminal (-)
- 10 Weld Output Terminal (+)



# SECTION 7 – GTAW OPERATION

## 7-1. Typical Connection For GTAW Process



252 920-A

**⚠ Turn off power before making connections.**

1 Foot Control

2 Positive (+) Weld Output Terminal

3 Remote 14 Receptacle

Connect desired remote control to Remote 14 receptacle if required.

4 Gas In Connection (Optional)

5 Gas Cylinder

6 Gas Out Connection (Optional)

7 Negative (-) Weld Output Terminal

8 TIG Torch

9 Workpiece



## 7-2. Scratch Start TIG Welding Mode - GTAW Process

251 142-A

**⚠** Weld terminals are energized at all times in Scratch Start TIG welding mode.

- 1 Mode Switch
- 2 Left Display
- 3 Right Display
- 4 Adjust Control

### Setup

For typical system connections refer to Section 7-1.

Rotate Mode Switch to SCRATCH START TIG position as shown.

The open circuit voltage is shown in the Left Display. Preset amperage is shown in the Right Display.

### Operation

The Adjust Control is used to set desired preset amperage.

☞ *If a remote control is used for amperage adjustment, the adjustment will function as a percentage of the preset amperage.*

☞ *For best results, gently scratch the tungsten electrode to the work to initiate an arc. To minimize arc flare at the end of the weld, pull back the electrode quickly to extinguish the arc.*

## 7-3. Lift-Arc TIG Welding Mode - GTAW Process

251 142-A

**⚠** Weld terminals are energized at all times in Lift Arc TIG welding mode.

- 1 Mode Switch
- 2 Left Display
- 3 Right Display
- 4 Adjust Control
- 5 Workpiece
- 6 Tungsten Electrode

### Setup

For typical system connections refer to Section 7-1.

Rotate Mode Switch to LIFT-ARC TIG position as shown.

The open-circuit voltage is shown in the Left Display. Preset amperage is shown in the Right Display.

Normal open-circuit voltage is not present before the electrode touches the workpiece, instead a low sensing voltage is present. The sensing voltage allows the electrode to touch the workpiece without overheating, sticking, or getting contaminated.

### Operation

The Adjust Control is used to set desired preset amperage.

**☞** If a remote control is used for amperage adjustment, the adjustment will function as a percentage of the preset amperage.

**☞** For best results, firmly touch the tungsten electrode to the workpiece at the weld start point. Hold electrode to workpiece for 1-2 seconds, and lift electrode. An arc will form when the electrode is lifted. To minimize arc flare at the end of the weld, pull back the electrode quickly to extinguish the arc.

## 7-4. TIG Welding Mode - GTAW Process

MILLER ELECTRIC MFG. CO., APPLETON, WI

2 V

3 A 85

4 V/A ADJUST

REMOTE

ELECTRODE HOT

ARC CONTROL

POWER

OPTIONAL

GAS OUT

251 142-A

**⚠** Weld terminals are energized through the remote control in TIG welding mode.

- 1 Mode Switch
- 2 Left Display
- 3 Right Display
- 4 Adjust Control

### Setup

For typical system connections refer to Section 7-1.

Rotate Mode Switch to TIG position as shown.

The preset amperage is shown in the Right Display.

### Operation

The Adjust Control is used to set desired preset amperage.

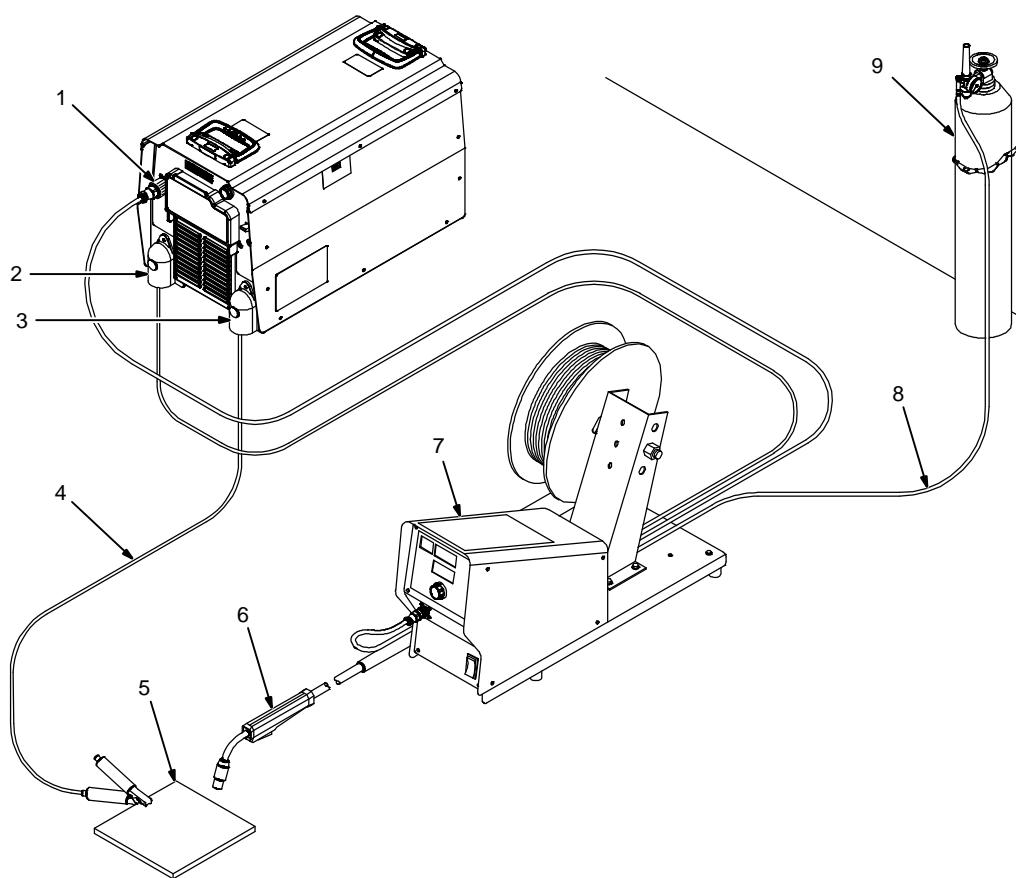
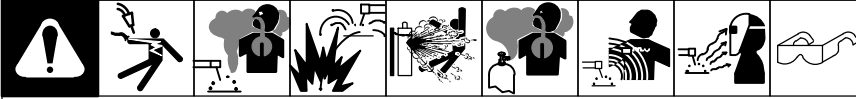
A remote control is required to turn on the weld output.

**ℹ** If the remote control has an amperage adjustment, the adjustment will function as a percentage of the preset amperage.

**ℹ** For best results, gently scratch the tungsten electrode to the work to initiate an arc. To minimize arc flare at the end of the weld, pull back the electrode quickly to extinguish the arc.

# SECTION 8 – GMAW/FCAW OPERATION

## 8-1. Typical Connection For Remote Control Feeder GMAW/FCAW Process



252 921-A

**⚠ Turn off power before making connections.**

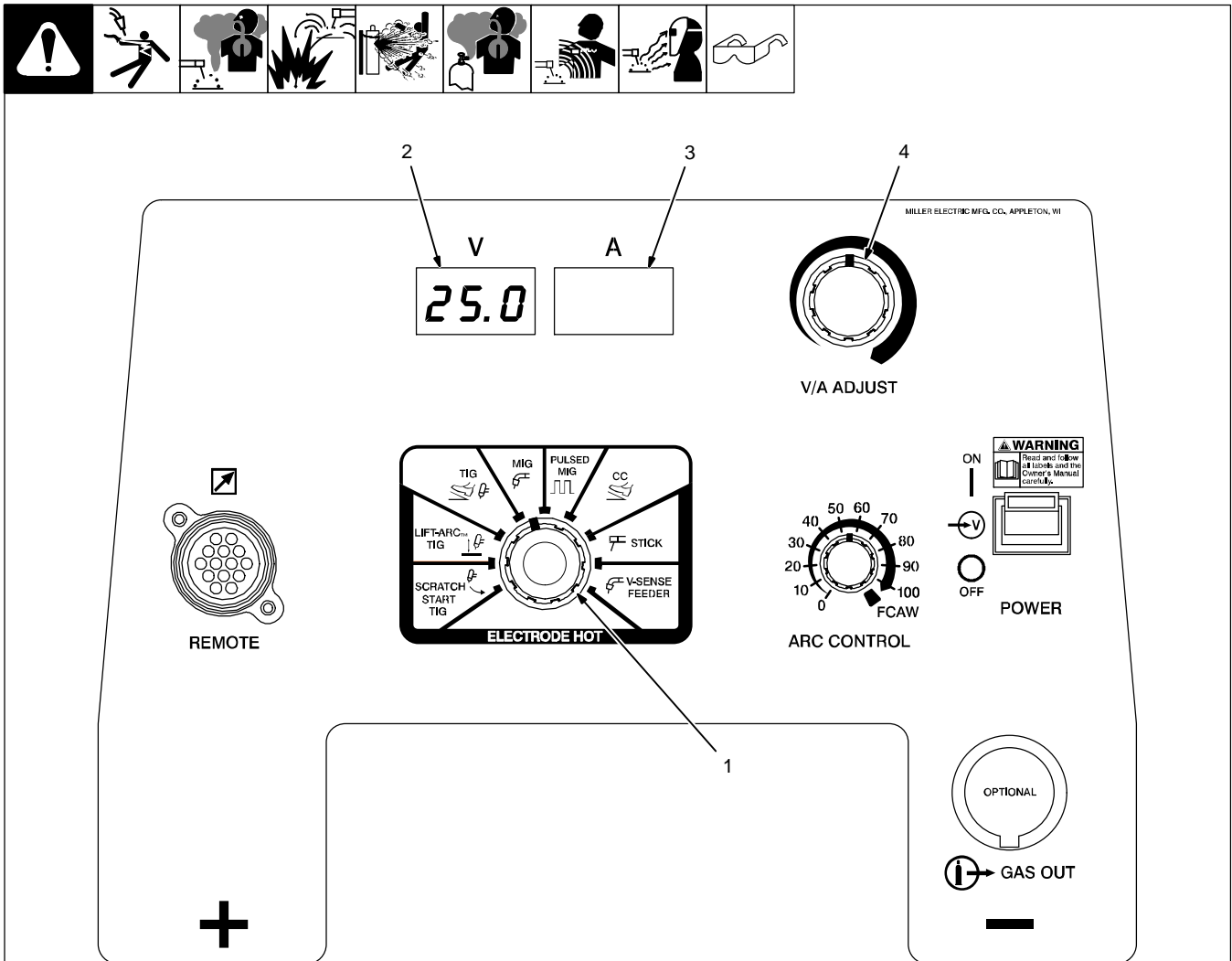
- 1 Remote 14-Receptacle
- 2 Positive (+) Weld Output Terminal
- 3 Negative (-) Weld Output Terminal
- 4 Ground Cable to Workpiece

- 5 Workpiece
- 6 Gun
- 7 Wire Feeder
- 8 Gas Hose
- 9 Gas Cylinder

Use of shielding gas is dependant on Wire Type.

**☞** The connection diagram illustrates DCEP (reverse polarity) suitable for all wires except self-shielded FCAW. The majority of self-shielded FCAW wires require DCEN (straight polarity).

## 8-2. MIG Welding Mode - GMAW/FCAW Process



251 142-A

**⚠** Weld terminals are energized through the remote control in MIG welding mode.

- 1 Mode Switch
- 2 Left Display
- 3 Right Display
- 4 Adjust Control

### Setup

For typical system connections refer to Section 8-1.

Rotate Mode Switch to MIG position as shown.

The preset voltage is shown in the Left Display.

### Operation

The Adjust Control is used to set desired preset voltage.

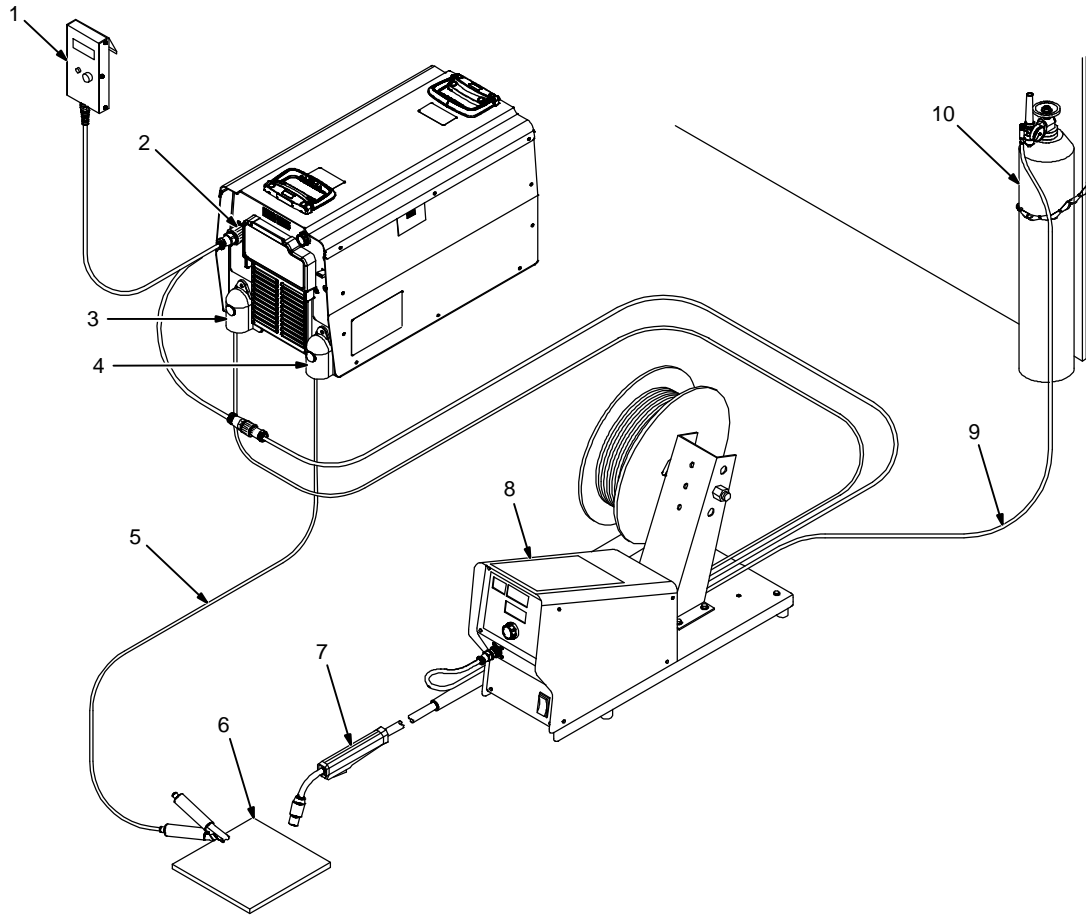
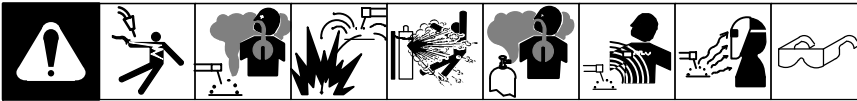
*⚠* The preset voltage can be adjusted remotely at the wire feeder if the feeder

has a voltage control. This voltage control will override the Adjust Control of preset voltage on the welding power source.

### Arc Control (Inductance)

Rotate Arc Control to select desired inductance setting from 0 to 100. Use lower inductance settings to stiffen the arc and reduce puddle fluidity. Use higher inductance settings to soften the arc and increase puddle fluidity.

### 8-3. Typical Connection For Remote Control Feeder GMAW-P Process



252 836-A

**⚠ Turn off power before making connections.**

- 1 Optima - External Pulsing Device
- 2 Remote 14-Receptacle
- 3 Positive (+) Weld Output Terminal
- 4 Negative (-) Weld Output Terminal
- 5 Ground Cable to Workpiece

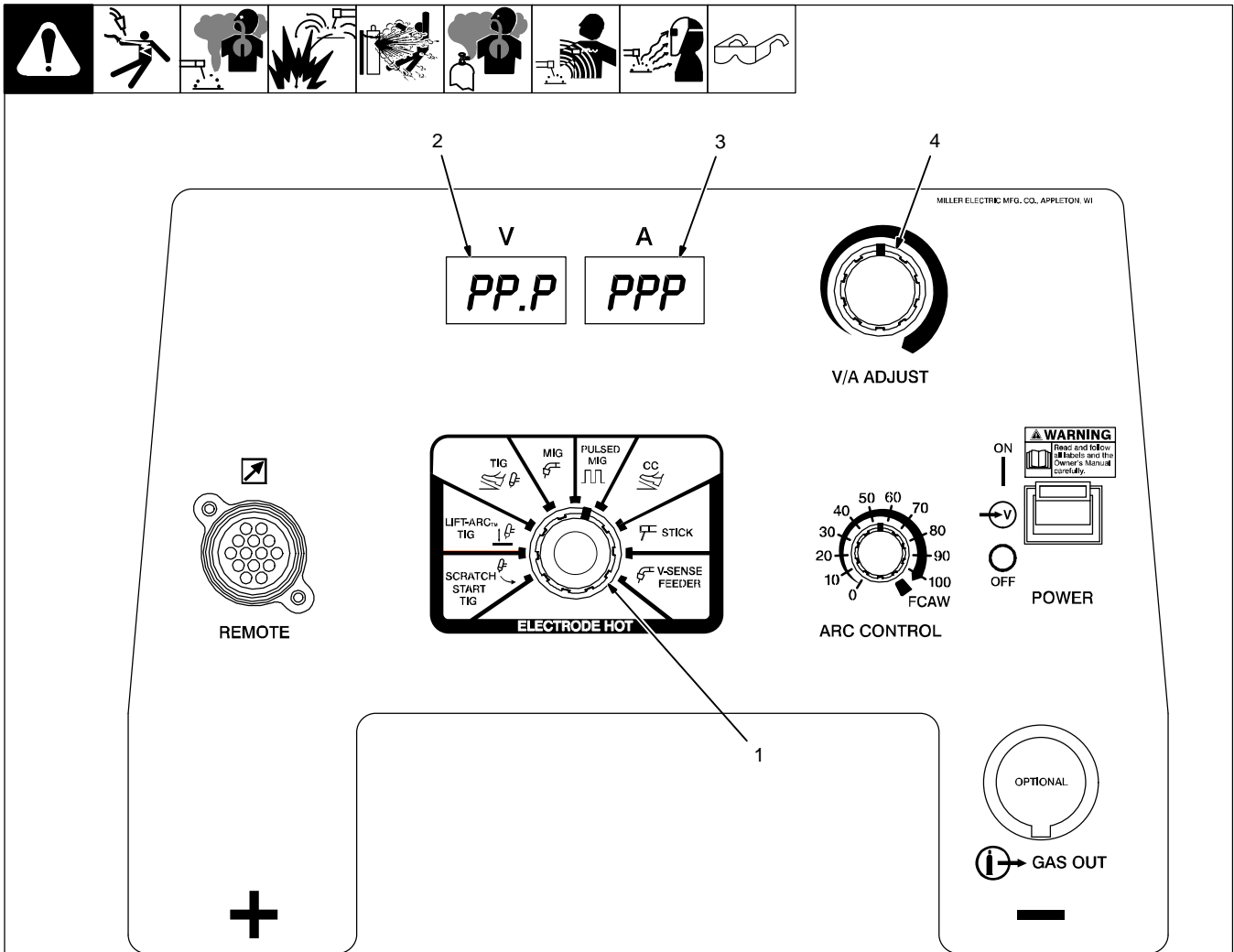
- 6 Workpiece
- 7 Gun
- 8 Wire Feeder
- 9 Gas Hose
- 10 Gas Cylinder

Use of shielding gas is dependant on Wire

Type.

**☞** The connection diagram illustrates DCEP (reverse polarity) suitable for all wires except self-shielded FCAW. The majority of self-shielded FCAW wires require DCEN (straight polarity). Flux cored wires are not pulsed. No pulse program available for FCAW.

## 8-4. Pulsed MIG Welding Mode - GMAW-P Process



251 142-A

**⚠** Weld terminals are energized through the remote control in Pulsed MIG welding mode.

- 1 Mode Switch
- 2 Left Display
- 3 Right Display

### 4 Adjust Control Setup

For typical system connections refer to Section 8-3.

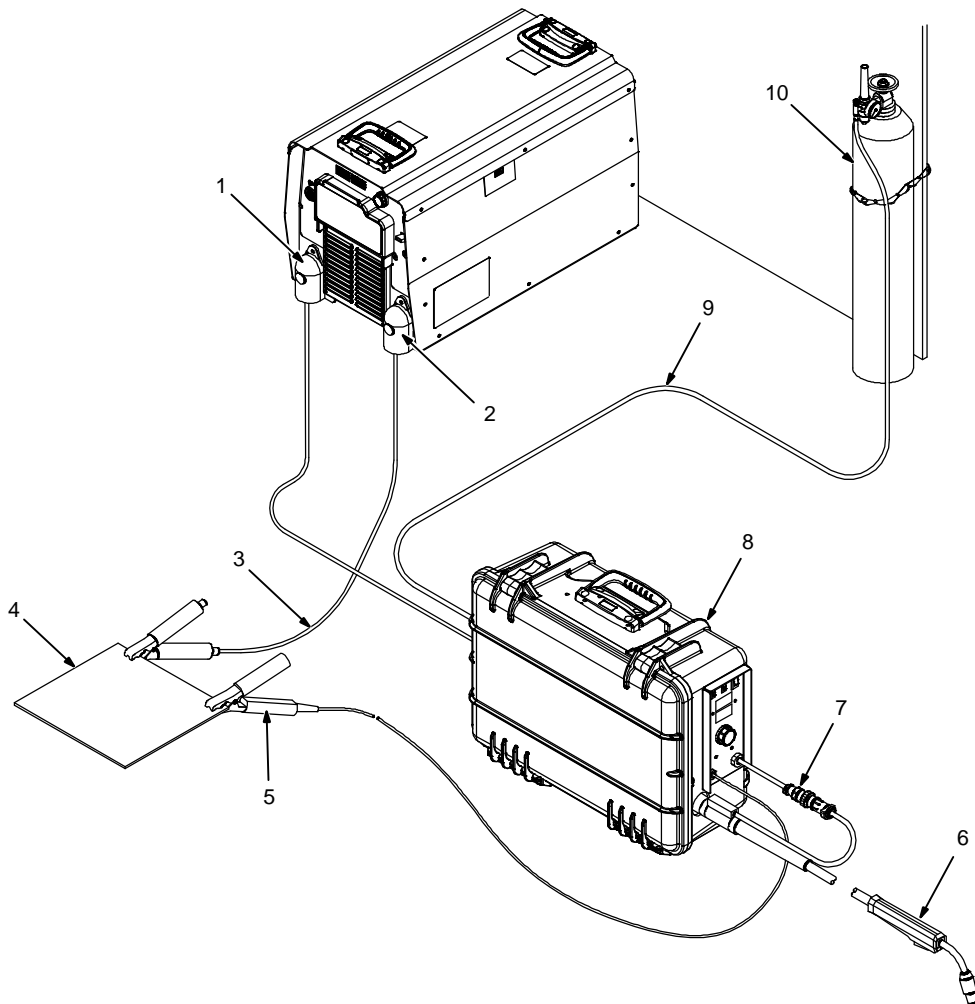
Rotate Mode Switch to PULSED MIG position as shown.

Left and Right Display will show *PPP PPP*.

### Operation

This unit requires an external pulsing device, like an Optima to pulse MIG weld. See Optima owner's manual for more information.

## 8-5. Typical Connection For Voltage-Sensing Feeder GMAW/FCAW Process



252 924-A

**⚠ Turn off power before making connections.**

- 1 Positive (+) Weld Output Terminal
- 2 Negative (-) Weld Output Terminal
- 3 Ground Cable to Workpiece
- 4 Workpiece
- 5 Voltage Sensing Clamp

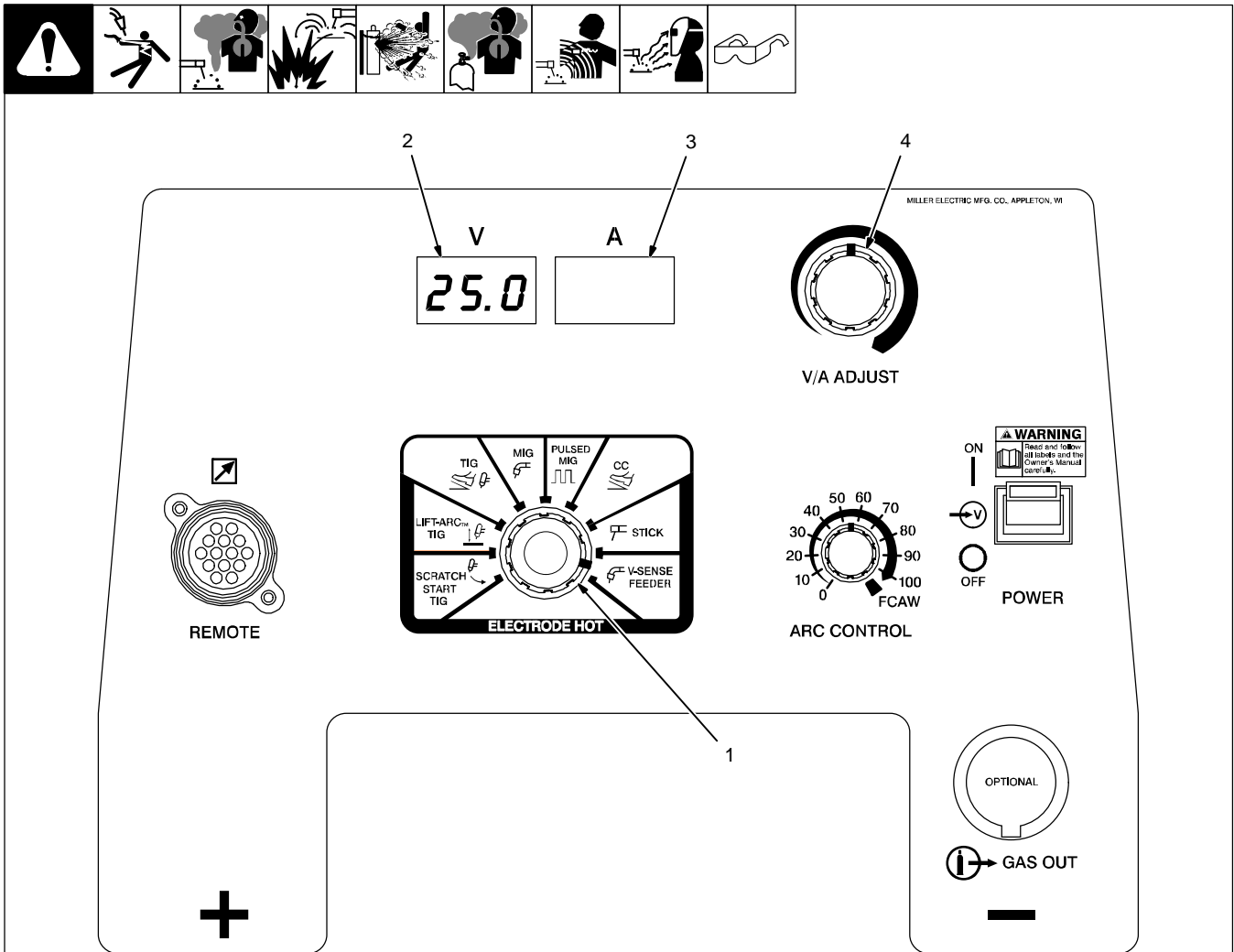
- 6 Gun
- 7 Gun Trigger Receptacle
- 8 Wire Feeder
- 9 Gas Hose
- 10 Gas Cylinder

Use of shielding gas is dependant on Wire Type.

**ℹ** The connection diagram illustrates DCEP (reverse polarity) suitable for all wires except self-shielded FCAW. The majority of self-shielded FCAW wires require DCEN (straight polarity).



## 8-6. V-Sense Feeder Welding Mode - GMAW/FCAW Process



251 142-A

**⚠** Weld terminals are energized at all times in V-Sense Feeder welding mode.

- 1 Mode Switch
- 2 Left Display
- 3 Right Display
- 4 Adjust Control

### Setup

For typical system setup connections refer

to Section 8-5.

Rotate Mode Switch to V-SENSE FEEDER position as shown.

The Left Display toggles between open circuit voltage and preset voltage.

### Operation

The Adjust Control is used to set desired preset voltage.

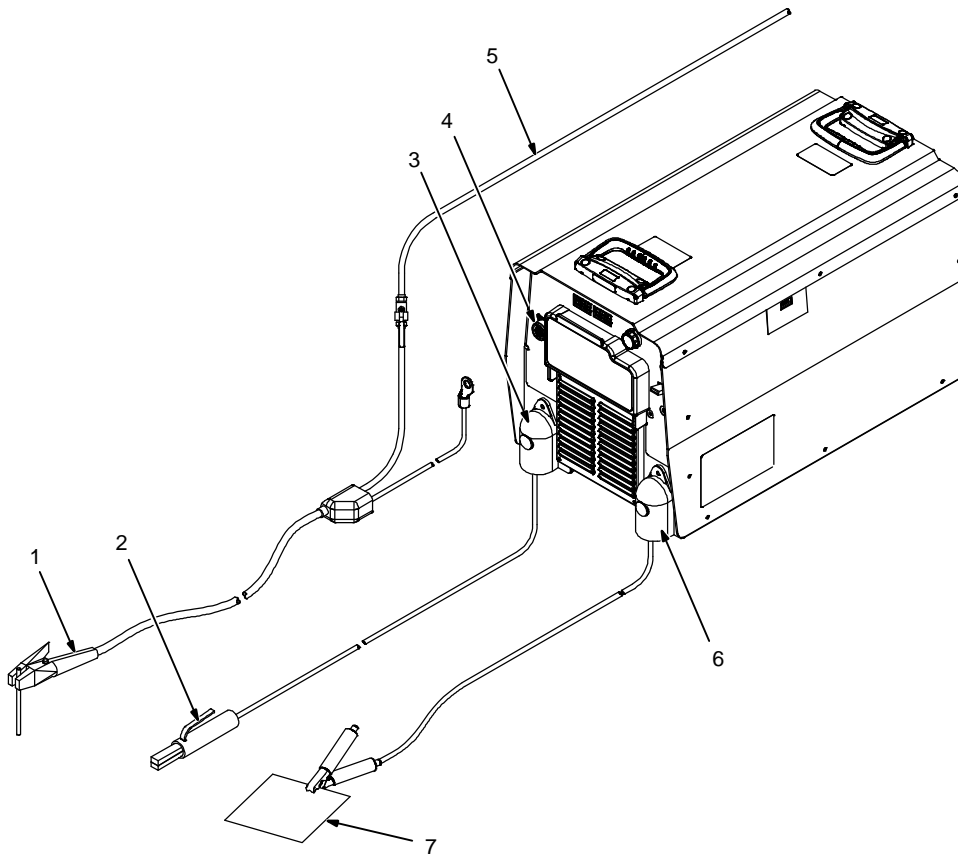
*☞ The Left Display toggling momentarily pauses while the preset voltage is adjusted.*

### Arc Control (Inductance)

Rotate Arc Control to select desired inductance setting from 0 to 100. Use lower inductance settings to stiffen the arc and reduce puddle fluidity. Use higher inductance settings to soften the arc and increase puddle fluidity.

# SECTION 9 – SMAW/CAC-A OPERATION

## 9-1. Typical Connection For SMAW And CAC-A Process



252 926-A

**⚠ Turn off power before making connections.**

1 Electrode Holder  
(Carbon Arc)

For CAC-A process connect carbon arc

cutting torch to to positive weld output terminal.

2 Electrode Holder

3 Positive (+) Weld Output Terminal

4 Remote 14 Receptacle

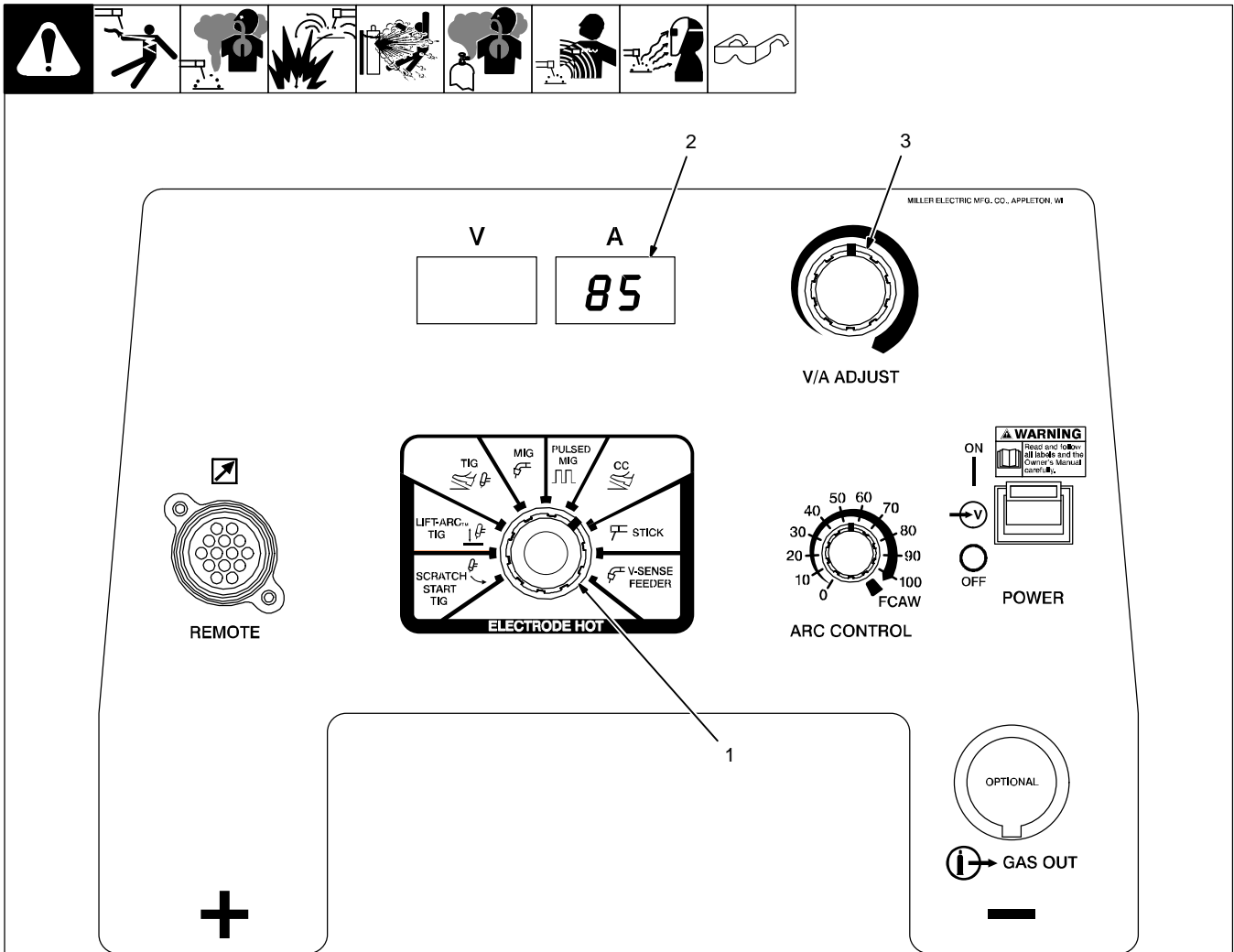
Connect desired remote control to remote 14 receptacle as required.

5 Compressed Air Line

6 Negative (-) Weld Output Terminal

7 Workpiece

## 9-2. CC Welding Mode - SMAW/CAC-A Process



251 142-A

**⚠** Weld terminals are energized through the remote control in CC welding mode.

- 1 Mode Switch
- 2 Right Display
- 3 Adjust Control

### Setup

For typical system connections refer to Section 9-1.

Rotate Mode Switch to CC position as shown.

The preset amperage is shown in the Right Display with the Amps Indicator lit.

### Operation

The Adjust Control is used to set desired preset amperage.

A remote control is required to turn on the weld output.

**ℹ** If the remote control has an amperage adjustment, the adjustment will function as a percentage of the preset amperage. When Configuration 3 is selected remote control preset will be displayed in the amperage window. See section 9-5 for more information regarding Alternate Configuration Functionality.

Adaptive Hot Start automatically increases welding amperage at the start of a weld. This helps eliminate electrode sticking during arc initiation.

**ℹ** For best results at the end of the weld, pull back the electrode quickly to extinguish the arc.

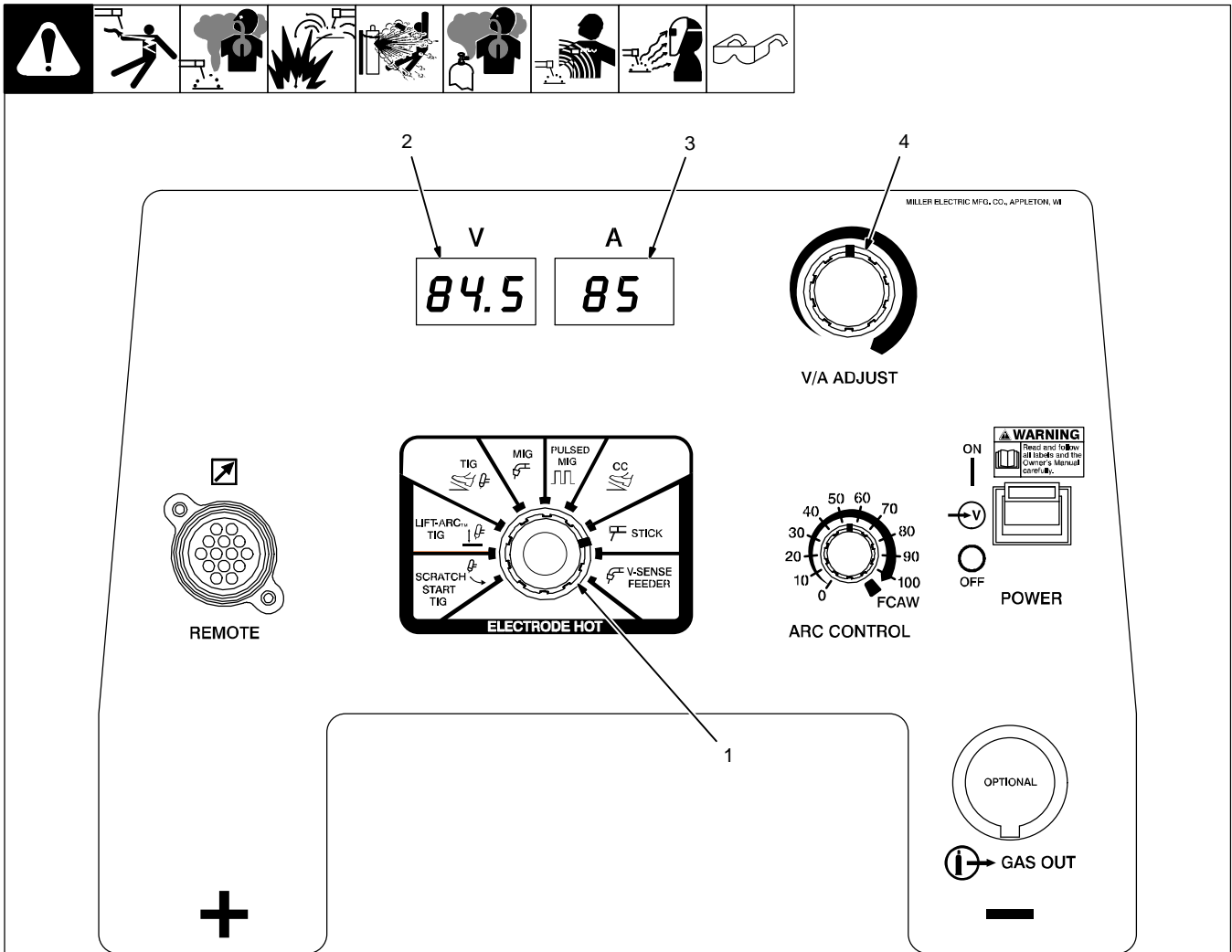
### Arc Control (Dig)

Rotate Arc Control to select desired dig setting from 0 to 100.

Dig control allows the arc characteristics, soft versus stiff, to be changed for specific applications and electrodes. Lower the dig setting for smooth running electrodes like E7018 and increase the dig setting for stiffer, more penetrating electrodes like E6010.

**ℹ** Use this mode for Air Carbon Arc (CAC-A) cutting and gouging. For best results, adjust Arc Control to maximum.

## 9-3. Stick Welding Mode - SMAW/CAC-A Process



251 142-A

**⚠ Weld terminals are energized at all times in Stick welding mode.**

- 1 Mode Switch
- 2 Left Display
- 3 Right Display
- 4 Adjust Control

### Setup

For typical system connections refer to Section 9-1.

Rotate Mode Switch to STICK position as shown.

The open circuit voltage is shown in the Left Display and the preset amperage is shown in the Right Display.

### Operation

The Adjust Control is used to set desired preset amperage.

If a remote control is plugged into the 14-Pin receptacle, the remote will be a percentage of the preset amperage. When Configuration 2 or Configuration 3 are active, remote controls will be ignored and amperage will operate in panel only control. See section 9-5 for more information regarding Alternate Configurations.

Adaptive Hot Start automatically increases welding amperage at the start of a weld. This helps eliminate electrode sticking during arc initiation.

*☞ For best results at the end of the weld, pull back the electrode quickly to extinguish the arc.*

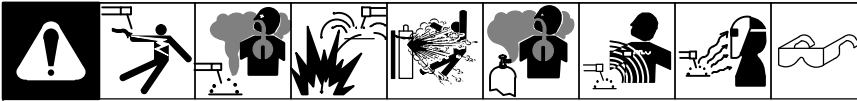
### Arc Control (Dig)

Rotate Arc Control to select desired dig setting from 0 to 100.

Dig control allows the arc characteristics, soft versus stiff, to be changed for specific applications and electrodes. Lower the dig setting for smooth running electrodes like E7018 and increase the dig setting for stiffer, more penetrating electrodes like E6010.

*☞ Use this mode for Air Carbon Arc (CAC-A) cutting and gouging. For best results, adjust Arc Control to maximum.*

## 9-4. Optional Low Open Circuit Voltage (OCV) Welding Modes



### Low OCV Operation

The unit can be optionally configured for low open circuit voltage (OCV) operation in Stick and Scratch Start TIG modes. When the unit is configured for low OCV operation only a low sensing voltage (approximately 15 VDC) is present between the electrode and the workpiece prior to the electrode touching the workpiece. Consult a Factory Authorized Service Agent for information regarding how to configure unit for low OCV welding operation.

## 9-5. Alternate Configuration Functions

There are 3 ways that the remote control can be configured to operate on this machine. The configuration of the meters can be changed by placing the process selection switch into Stick mode and turning the output on and off 3–5 times within a few seconds, this can be done by triggering a feeder or by activating the output on–off switch on a remote control. The amperage window will briefly display what mode is selected before returning to preset display

C 1

Configuration 1 is the default that the unit leaves the factory set for. Stick mode recognizes a remote plugged into the preset output set at the panel, CC mode displays preset panel control instead of the percentage of the remote.

C 2

Configuration 2 changes Stick modes remote operation. When configuration 2 is selected Stick mode operates in Panel Only control, meaning any remote control that is plugged into the remote 14 control will be ignored and have no effect on the output. When Stick mode is active, a decimal point will be displayed in the amperage window.

C 3

Configuration 3 changes how the display works in the CC mode. When configuration 3 is selected the amperage window will display the percentage of preset amperage being set from the remote amperage control, the panel will set the maximum amperage. When CC mode is active, a decimal point will be displayed in the amperage window.

# SECTION 10 – MAINTENANCE & TROUBLESHOOTING

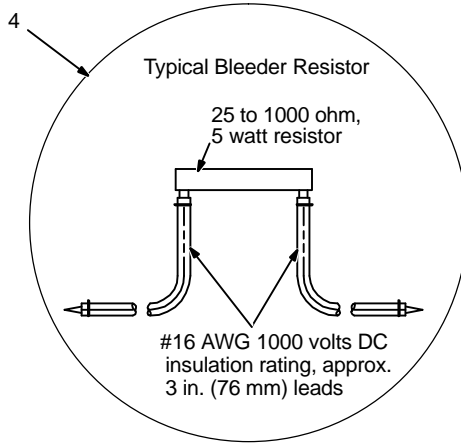
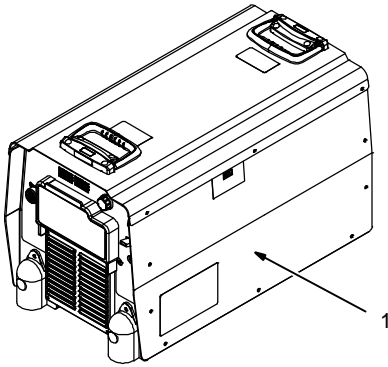
## 10-1. Routine Maintenance

		<b>Disconnect power before maintaining.</b>		<i>Maintain more often during severe conditions.</i>	
<b>3 Months</b>					
		<b>Replace Damaged Or Unreadable Labels</b>		<b>Repair Or Replace Cracked Cables</b>	
<b>Replace Cracked Torch Body</b>					
				<b>Repair Or Replace Cracked Cables And Cords</b>	
				<b>Clean And Tighten Weld Connections</b>	
<b>6 Months</b>					
<b>Blow Out Inside</b>					

## 10-2. Blowing Out Inside Of Unit

<b>Do not remove case when blowing out inside of unit.</b>	
To blow out unit, direct airflow through front and back louvers as shown.	

# 10-3. Removing Right Side Panel and Measuring Input Capacitor Voltage In 230/460 Volt Models



**⚠ 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.**

1 Right Side Panel

To remove panel, remove screws securing panel to unit.

2 Relinking Board PC6

3 Voltmeter

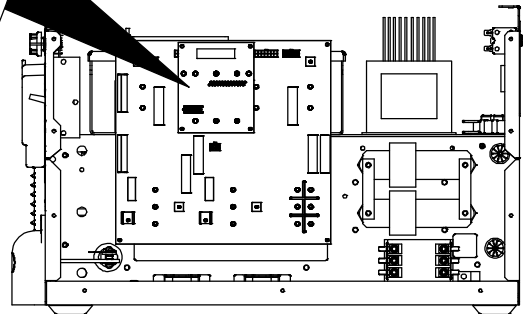
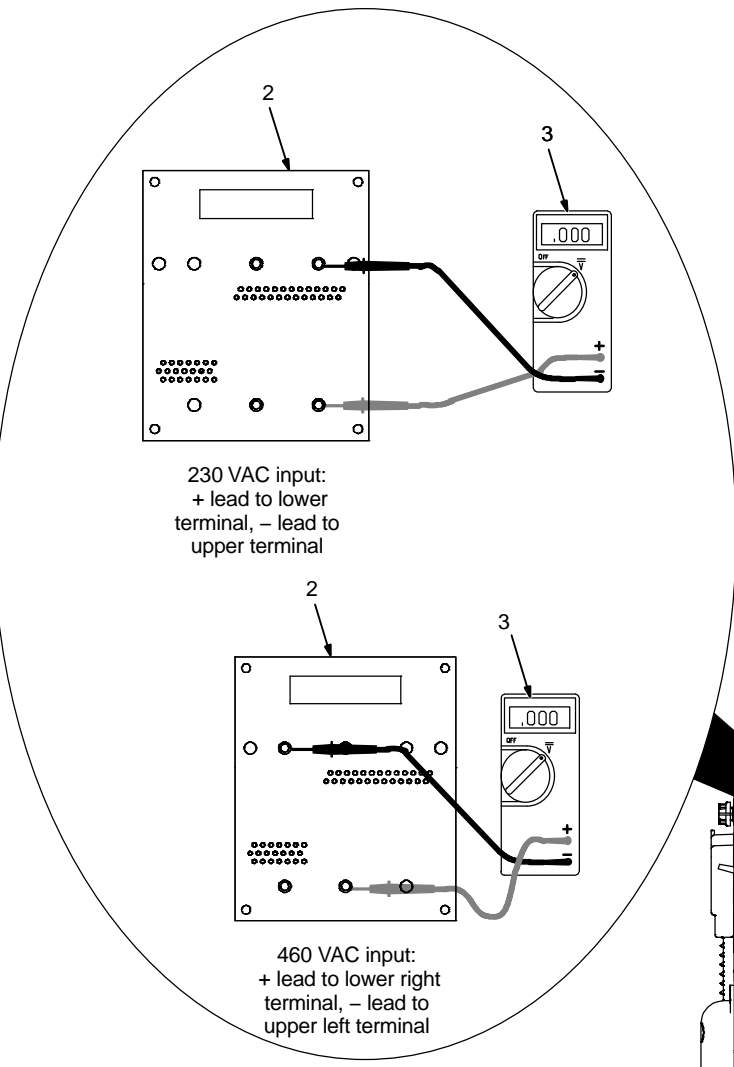
Measure the DC voltage across the screw terminals on PC6 as shown until voltage drops to near 0 (zero) volts.

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

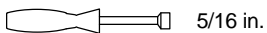
4 Typical Bleeder Resistor

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


Proceed with job inside unit. Reinstall right side panel when finished.

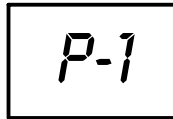


Tools Needed:



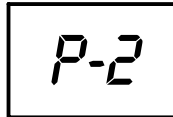
## 10-4. Help Displays

 All directions are in reference to the front of the unit. All circuitry referred to is located inside the unit.

A rectangular box containing the text "HEL" in a digital font.A rectangular box containing the text "P-1" in a digital font.

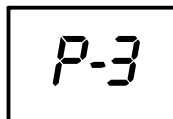
### Help 1 Display

Indicates a malfunction in the primary power circuit. If this display is shown, contact a Factory Authorized Service Agent.

A rectangular box containing the text "HEL" in a digital font.A rectangular box containing the text "P-2" in a digital font.

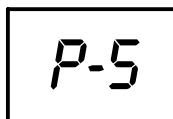
### Help 2 Display

Indicates a malfunction in the thermal protection circuitry. If this display is shown, contact a Factory Authorized Service Agent.

A rectangular box containing the text "HEL" in a digital font.A rectangular box containing the text "P-3" in a digital font.


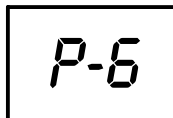
### Help 3 Display

Indicates the left side of the unit has overheated. The unit has shut down to allow the fan to cool it (see Section 4-7). Operation will continue when the unit has cooled.

A rectangular box containing the text "HEL" in a digital font.A rectangular box containing the text "P-5" in a digital font.

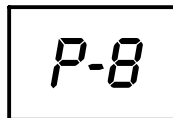
### Help 5 Display

Indicates the right side of the unit has overheated. The unit has shut down to allow the fan to cool it (see Section 4-7). Operation will continue when the unit has cooled.

A rectangular box containing the text "HEL" in a digital font.A rectangular box containing the text "P-6" in a digital font.

### Help 6 Display

Indicates a malfunction in the input circuitry of the unit. If this display is shown, contact a Factory Authorized Service Agent.

A rectangular box containing the text "HEL" in a digital font.A rectangular box containing the text "P-8" in a digital font.

### Help 8 Display

Indicates a malfunction in the secondary power circuit of the unit. If this display is shown, contact a Factory Authorized Service Agent.

A rectangular box containing the text "HEL" in a digital font.A rectangular box containing the text "P25" in a digital font.

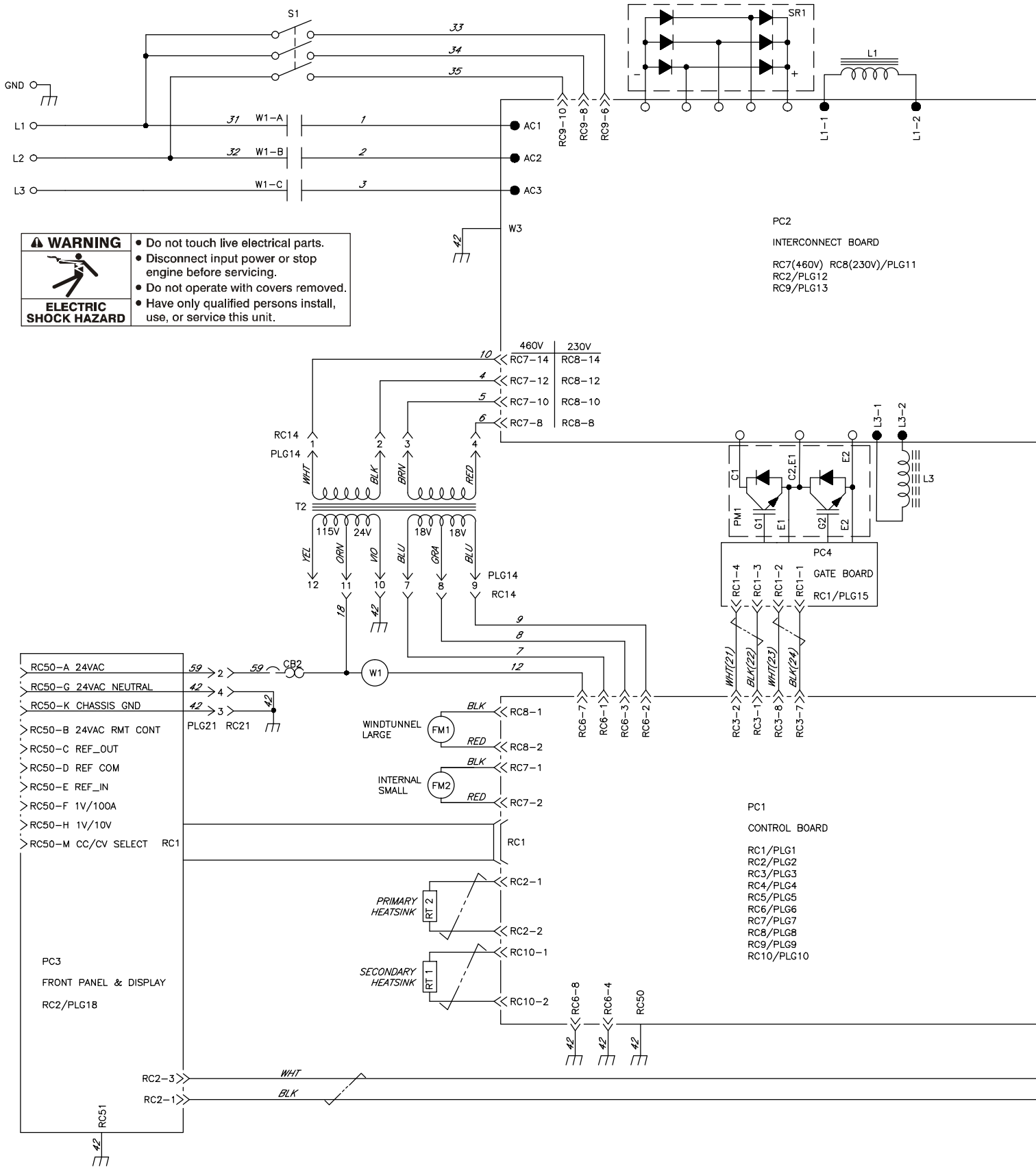
### Help 25 Display

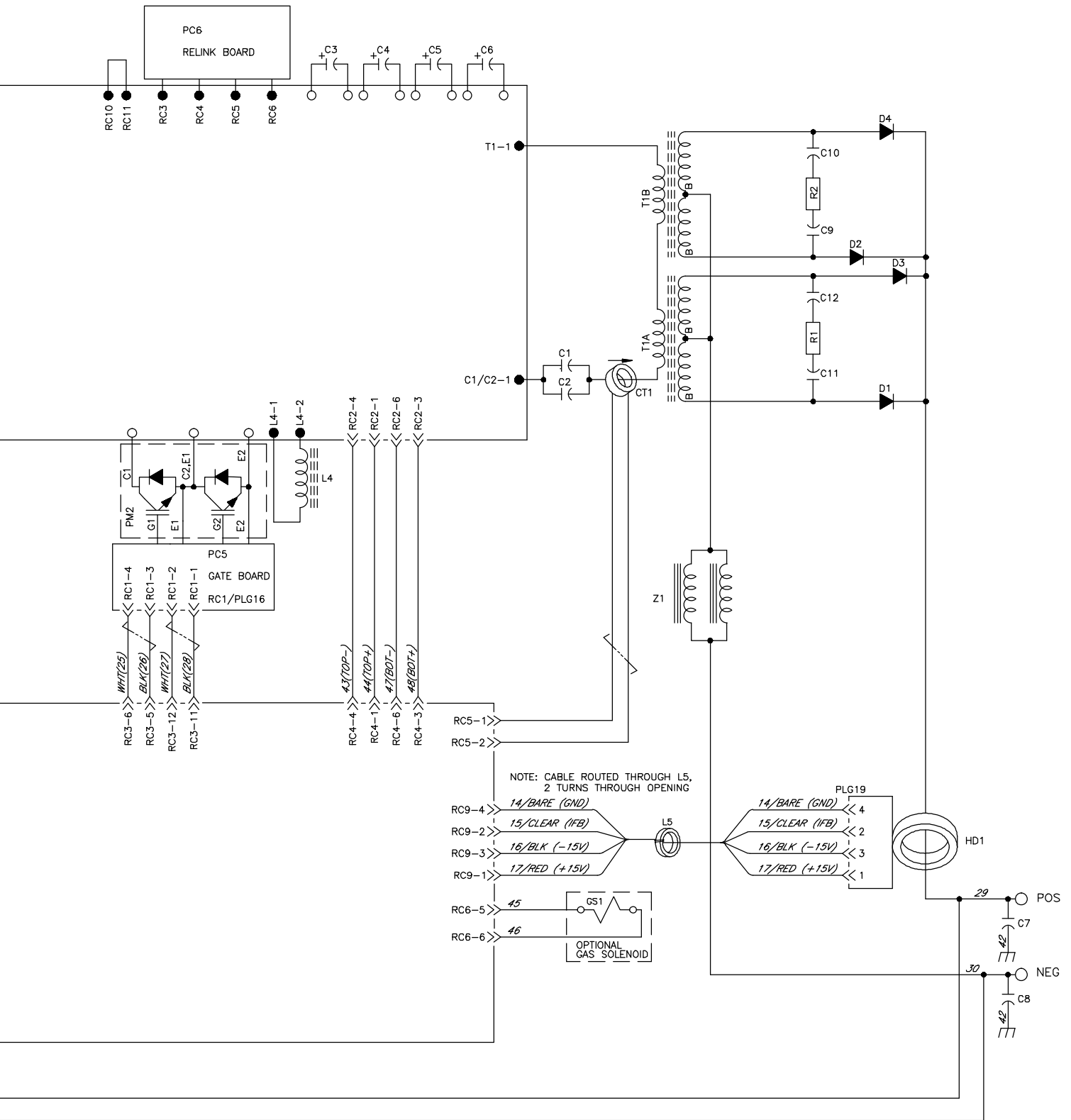
Indicates machine has reached Duty Cycle limit (See Section 4-7). Unit must be left on to power the fan for cooling. Duty Cycle limit will automatically reset when unit has cooled.






# SECTION 11 – ELECTRICAL DIAGRAM





# SECTION 12 – PARTS LIST

 Hardware is common and not available unless listed.

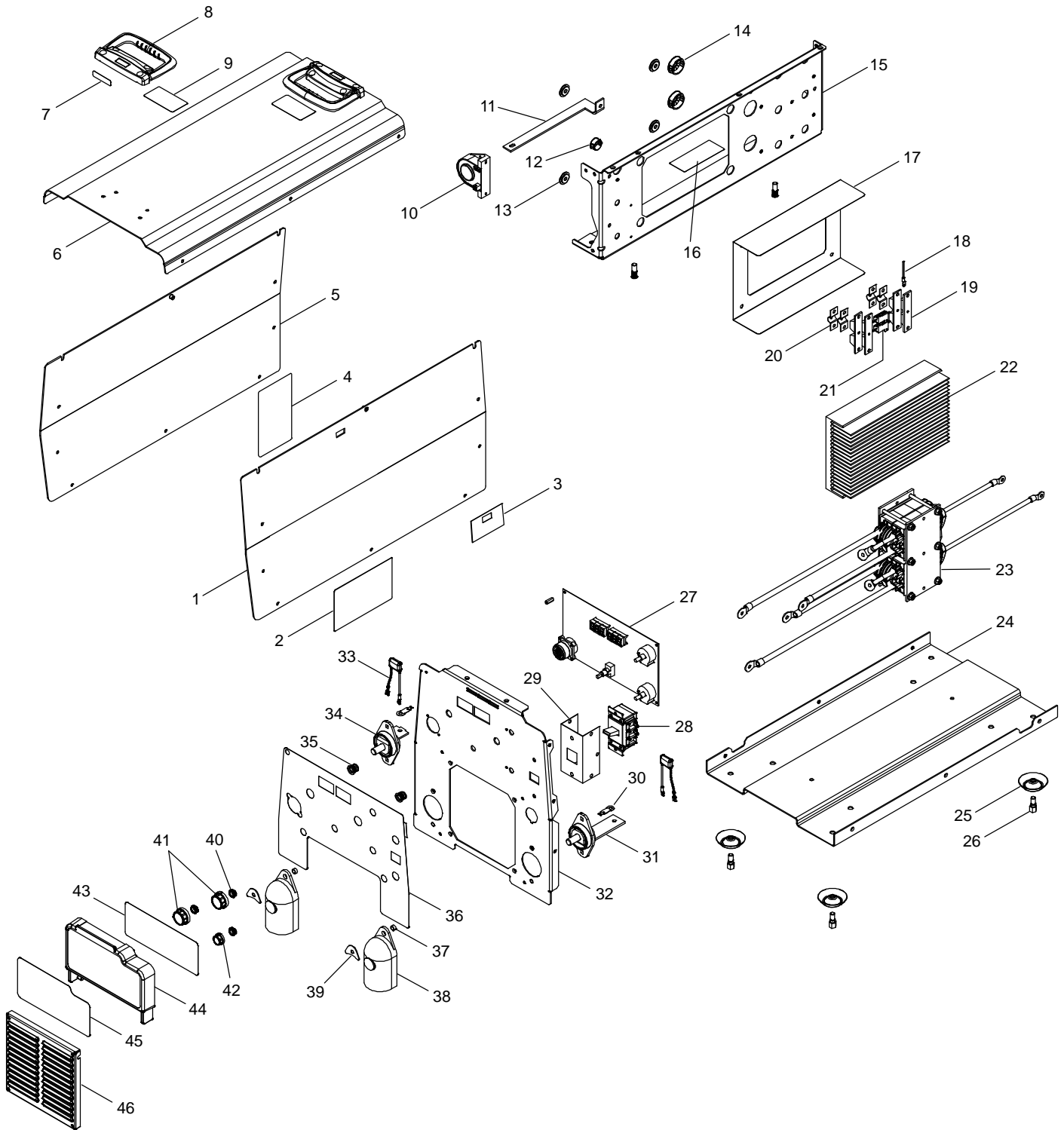
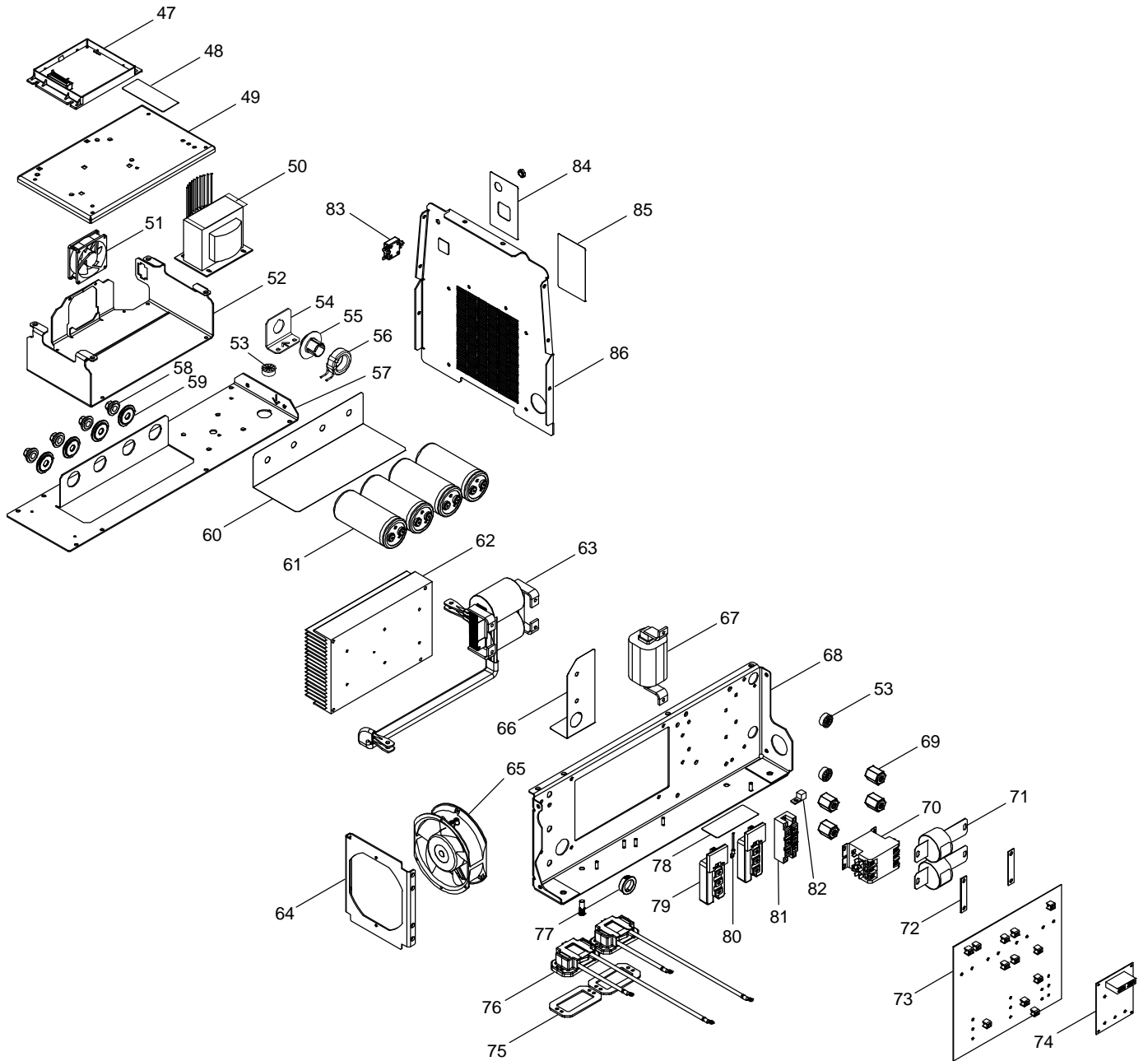


Figure 12-1. Parts Assembly



Item No.	Dia. Mkgs.	Part No.	Description	Quantity
<b>Figure 12-1. Parts Assembly</b>				
1		249 804	Panel, Side Rh W/Nut Insert	1
2		134 327	Label, Warning General Precautionary Static&Wire Fe	2
3		222 317	Label, Warning Match Input Power To Voltage Shown	1
4		237 155	Label, Important Input Power/Relink Connections	1
5		249 803	Panel, Side Lh W/Nut Insert	1
6		+249 111	Cover, Top	1
7		135 483	Label, Important Remove These Two Handle Screws	2
8		249 848	Handle, Rubberized Carrying	2
9		138 442	Label, Caution Falling Equipment Can Cause Injury	2
10	HD1	168 829	Transducer, Current 1000A Module Max Open Loop	1
	L5	254 680	Cable Assy, Current Feedback W/Ferrite Core	1
	PLG 9, 19	115 094	Housing Plug+Pins (Service Kit)	2
11		183 827	Bus Bar, Output	1
12		154 408	Bushing, Snap-In Nyl .562 Id X .875 Mtg Hole Cent	1
13		196 355	Insulator, Screw	4
14		179 276	Bushing, Snap-In Nyl 1.000 Id X 1.375 Mtg Hole Cent	2
15		+249 527	Windtunnel, Lh W/Studs	1
16		218 004	Label, Warning Electric Shock/Exploding Parts	1
17		249 618	Insulator, Heat Sink	1
18	RT1	199 798	Thermistor, NTC 30K OHM @ 25 Deg C 18.00In2500V	1
19		201 531	Kit, Diode Power Module	4
20		199 840	Bus Bar, Diode	4
21		232 296	Resistor/Capacitor Assy	2
22		204 165	Heat Sink, Rect Dual Diode	1
23	T1	263 252	XFMR, HF	1
24		249 110	Base	1
25		229 325	Foot, Mtg Unit	4
26		176 736	Screw, Mtg Foot	4
27	PC3	251 315	Circuit Card Assy, Front Pnl & Dspl W/Program	1
	PLG 18	250 065	Plug, W/Leads (Voltage Feedback) RC2	1
	PLG 21	136 810	Housing Plug+Pins (Service Kit)	1
	RC 21	167 640	Housing Plug+Pins (Service Kit)	1
28	S1	244 920	Switch, Tgl 3Pst 40A 600VAC Scr Term Wide Tgl	1
29		176 226	Insulator, Switch Power	1
30		010 381	Connector, Rectifier	2
31		182 707	Terminal, Pwr Output Black	1
32		251 596	Panel, Front W/Studs	1
33	C7, 8	222 488	Capacitor Assy,	2
34		181 245	Terminal, Pwr Output Red	1
35		216 112	Fastener, Panel Receptacle Quick Access	2
36		251 142	Nameplate	1
37		181 169	Spacer, Output Stud	2
38		186 621	Boot, Generic Output Stud	2
39		180 735	Washer, Output Stud	2
40		231 468	Nut, 375-32 .56Hex .22h Brs Conical Knurl	3
41		174 991	Knob, Pointer 1.250 Dia X .250 Id W/Spring Clip-.21	2
42		174 992	Knob, Pointer .840 Dia X .250 Id W/Spring Clip-.21	1
43		251 154	Label, Process	1
44		246 919	Door, W/Quick Access Ball Fasteners	1
45			Nameplate (Order By Model And Serial Number)	1
46		175 138	Box, Louver	1
47	PC1	251 592	Circuit Card Assy, Control W/Program	1
	PLG 2, 5, 7, 8, 10	131 054	Housing Plug+Pins (Service Kit) RC2, 5, 7, 8, 10	4
	PLG 3	130 203	Housing Plug+Pins (Service Kit) RC3	1
	PLG 4	115 093	Housing Plug+Pins (Service Kit) RC4	1
	PLG 6	115 092	Housing Plug+Pins (Service Kit) RC6	1
	PLG 9	115 094	Housing Plug+Pins (Service Kit) RC9	1

Item No.	Dia. Mkgs.	Part No.	Description	Quantity
48		218 004	Label, Warning Electric Shock/Exploding Parts	3
49		+249 237	Panel, Mtg PC Card	1
50	T2	201 684	XFMR, Control 230/460 VAC Pri 305 Va 60 Hz	1
	RC14	166 679	Plug+Pins (Service Kit)	1
51	FM2	183 918	Motor, Fan 24VDC 3000 RPM 43 Cfm W/10 Ohm Resistor	1
52		249 236	Bracket, Mtg Capacitor/PC Board/Fan	1
53		153 403	Bushing, Snap-in Nyl .750 Id X 1.000 Mtg Hole Cent	2
54		255 855	Bracket, Mtg Ct	1
55		177 547	Bushing, Snap-in Nyl Ct-Mount 1.093 Mtg Hole	1
56	CT1	181 271	XFMR, Current 500 Turn	1
57		251 137	Windtunnel, Cover	1
58		217 040	Nut, Nylon M12 Thread Capacitor Mounting	4
59		251 701	Adapter, Nut Capacitor	4
60		250 260	Insulator, Capacitor Mtg	1
61	C3, 4, 5, 6	206 755	Kit, Capacitor	1
62		179 930	Heat Sink, Power Module	1
63	Z1	180 029	Stabilizer, Output	1
64		251 220	Shroud, Fan	1
65	FM1	175 084	Fan, Muffin 24VDC 3000 RPM 255 Cfm 6.378 Mtg Holes	1
66		181 925	Insulator, Stabilizer Lead	1
67		180 026	Inductor, Input	1
68		+249 105	Windtunnel, Rh W/Studs	1
69		025 248	Stand-off, Insul .250-20 X 1.250 Lg X .437 Thd	4
70	W1	180 270	Contact, Def Prp 40A 3P 24VAC Coil W/Boxlug	1
71	C1, 2	230 272	Capacitor, Polyp Film .34 UF 1000 VRMS +/-10%	2
72		185 992	Bus Bar, Capacitor	2
73	PC2	236 049	Circuit Card Assy, Interconnecting With Components	1
	PLG 11	131 056	Housing Plug+Pins (Service Kit) RC7, 8	1
	PLG 12	115 093	Housing Plug+Pins (Service Kit) RC2	1
	PLG 13	115 091	Housing Plug+Pins (Service Kit) RC9	1
74	PC6	249 114	Circuit Card Assy, Relink	1
75		218 566	Gasket, Inductor Mounting E70 Ferrite Core	2
76		256 646	Inductor, DI/DT	2
77		057 358	Bushing, Snap-in Nyl 1.000 Id X 1.375 Mtg Hole	1
78		218 004	Label, Warning Electric Shock/Exploding Parts	1
79	PM1, 2	235 309	Kit, Transistor IGBT Module	1
		260 751	Plug W/Leads Gate	1
	PLG 3	130 203	Housing Plug+Pins (Service Kit) RC3 On PC1	1
	PLG 15, 16	115 094	Housing Plug+Pins (Service Kit) RC1 On PC4, 5	2
80	RT2	199 798	Thermistor, NTC 30K Ohm @ 25 Deg C 18.00In2500V	1
81	SR1	184 260	Kit, Diode Power Module	1
82		145 743	Lug, Univ W/Scr 600V 2-14 Wire .250 Stud	1
83	CB2	083 432	Supplementary Pro, Man Reset 1P 10A 250VAC Frict	1
84		249 830	Nameplate, Rear W/Out Aux	1
85		181 181	Label, Warning Electric Shock And Incorrect Input P	1
86		+249 119	Panel, Rear	1

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

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





# Notes

## DECIMAL EQUIVALENTS

	$\frac{1}{64}$	.015625
	$\frac{2}{64}$	.03125
	$\frac{3}{64}$	.046875
	$\frac{4}{64}$	.0625
$\frac{1}{16}$	$\frac{5}{64}$	.078125
	$\frac{6}{64}$	.09375
	$\frac{7}{64}$	.109375
$\frac{1}{8}$	$\frac{8}{64}$	.125
	$\frac{9}{64}$	.140625
	$\frac{10}{64}$	.15625
	$\frac{11}{64}$	.171875
$\frac{3}{16}$	$\frac{12}{64}$	.1875
	$\frac{13}{64}$	.203125
	$\frac{14}{64}$	.21875
	$\frac{15}{64}$	.234375
$\frac{1}{4}$	$\frac{16}{64}$	.25
	$\frac{17}{64}$	.265625
	$\frac{18}{64}$	.28125
	$\frac{19}{64}$	.296875
$\frac{5}{16}$	$\frac{20}{64}$	.3125
	$\frac{21}{64}$	.328125
	$\frac{22}{64}$	.34375
	$\frac{23}{64}$	.359375
$\frac{3}{8}$	$\frac{24}{64}$	.375
	$\frac{25}{64}$	.390625
	$\frac{26}{64}$	.40625
	$\frac{27}{64}$	.421875
$\frac{7}{16}$	$\frac{28}{64}$	.4375
	$\frac{29}{64}$	.453125
	$\frac{30}{64}$	.46875
	$\frac{31}{64}$	.484375
$\frac{1}{2}$	$\frac{32}{64}$	.5
	$\frac{33}{64}$	.515625
	$\frac{34}{64}$	.53125
	$\frac{35}{64}$	.546875
$\frac{9}{16}$	$\frac{36}{64}$	.5625
	$\frac{37}{64}$	.578125
	$\frac{38}{64}$	.59375
	$\frac{39}{64}$	.609375
$\frac{5}{8}$	$\frac{40}{64}$	.625
	$\frac{41}{64}$	.640625
	$\frac{42}{64}$	.65625
	$\frac{43}{64}$	.671875
$\frac{11}{16}$	$\frac{44}{64}$	.6875
	$\frac{45}{64}$	.703125
	$\frac{46}{64}$	.71875
	$\frac{47}{64}$	.734375
$\frac{3}{4}$	$\frac{48}{64}$	.75
	$\frac{49}{64}$	.765625
	$\frac{50}{64}$	.78125
	$\frac{51}{64}$	.796875
$\frac{13}{16}$	$\frac{52}{64}$	.8125
	$\frac{53}{64}$	.828125
	$\frac{54}{64}$	.84375
	$\frac{55}{64}$	.859375
$\frac{7}{8}$	$\frac{56}{64}$	.875
	$\frac{57}{64}$	.890625
	$\frac{58}{64}$	.90625
	$\frac{59}{64}$	.921875
$\frac{15}{16}$	$\frac{60}{64}$	.9375
	$\frac{61}{64}$	.953125
	$\frac{62}{64}$	.96875
	$\frac{63}{64}$	.984375
1		1.



# TRUE BLUE<sup>®</sup>

## WARRANTY

Effective January 1, 2014

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

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

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 twelve months after the equipment is shipped to a North American distributor or eighteen months after the equipment is shipped to an International distributor.

- 5 Years Parts — 3 Years Labor
  - \* Original Main Power Rectifiers Only to Include SCRs, Diodes, and Discrete Rectifier Modules
- 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)
  - \* Plasma Arc Cutting Power Sources
  - \* Process Controllers
  - \* Semi-Automatic and Automatic Wire Feeders
  - \* Transformer/Rectifier Power Sources
- 2 Years — Parts and Labor
  - \* Auto-Darkening Helmet Lenses – Classic Series Only (No Labor)
  - \* Fume Extractors – Capture 5, Filtair 400 and Industrial Collector Series
- 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.)**
  - \* 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.)**
  - \* LiveArc Welding Performance Management System
  - \* 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
  - \* TIG Torches (No Labor)
  - \* Wireless Remote Foot/Hand Controls and Receivers
  - \* Work Stations/Weld Tables (No Labor)

- 6 Months — Parts
  - \* Batteries
  - \* Bernard Guns (No Labor)
  - \* Tregaskiss Guns (No Labor)
- 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:

- 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.)**
- 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.
- 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.

miller\_warr 2014-04-14

### 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.





# 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)

