



OM-218

029 920Z

July 2005

Processes



TIG (GTAW) Welding



Stick (SMAW) Welding



Air Carbon Arc (CAC-A) Cutting and Gouging

With Optional Equipment:



MIG (GMAW) Welding



Flux Cored (FCAW) Welding



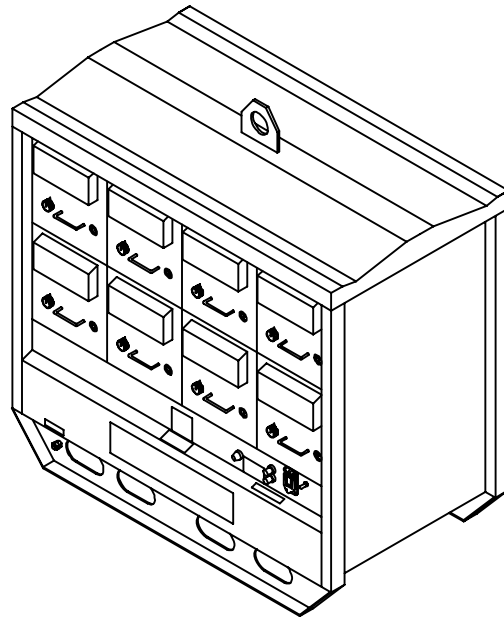
Air Plasma Cutting and Gouging

Description



Arc Welding Power Source

# MARK VIII-2<sup>®</sup>



Visit our website at  
[www.MillerWelds.com](http://www.MillerWelds.com)

## OWNER'S MANUAL

# 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 9001:2000 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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▲ **Warning: Protect yourself and others from injury — read and follow these precautions.**

## 1-1. Symbol Usage



Means Warning! Watch Out! There are possible hazards with this procedure! The possible hazards are shown in the adjoining symbols.

▲ **Marks a special safety message.**

☞ Means "Note"; not safety related.



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

## 1-2. Arc Welding Hazards

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

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

▲ **During operation, keep everybody, especially children, away.**



### ELECTRIC SHOCK can kill.

Touching live electrical parts can cause fatal shocks or severe burns. The electrode and work circuit is electrically live whenever the output is on. The input power circuit and machine internal circuits are also

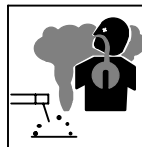
live when power is on. In semiautomatic or automatic wire welding, the wire, wire reel, drive roll housing, and all metal parts touching the welding wire are electrically live. Incorrectly installed or improperly grounded equipment is a hazard.

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

- Turn off all equipment when not in use.
- Do not use worn, damaged, undersized, or poorly spliced cables.
- Do not drape cables over your body.
- If earth grounding of the workpiece is required, ground it directly with a separate cable.
- Do not touch electrode if you are in contact with the work, ground, or another electrode from a different machine.
- Do not touch electrode holders connected to two welding machines at the same time since double open-circuit voltage will be present.
- Use only well-maintained equipment. Repair or replace damaged parts at once. Maintain unit according to manual.
- Wear a safety harness if working above floor level.
- Keep all panels and covers securely in place.
- Clamp work cable with good metal-to-metal contact to workpiece or worktable as near the weld as practical.
- Insulate work clamp when not connected to workpiece to prevent contact with any metal object.
- Do not connect more than one electrode or work cable to any single weld output terminal.

### SIGNIFICANT DC VOLTAGE exists in inverter-type 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.



### FUMES AND GASES can be hazardous.

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

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



### ARC RAYS can burn eyes and skin.

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

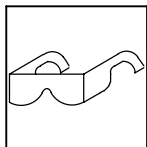
- Wear an approved welding helmet fitted with a proper shade of filter lenses to protect your face and eyes when welding or watching (see ANSI Z49.1 and Z87.1 listed in Safety Standards).
- Wear approved safety glasses with side shields under your helmet.
- Use protective screens or barriers to protect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



### WELDING can cause fire or explosion.

Welding on closed containers, such as tanks, drums, or pipes, can cause them to blow up. Sparks can fly off from the welding arc. The flying sparks, hot workpiece, and hot equipment can cause fires and 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 closed containers such as tanks, drums, or pipes, unless they are properly prepared according to AWS F4.1 (see Safety Standards).
- Connect work cable to the work as close to the welding area as practical to prevent welding current from traveling long, possibly unknown paths and causing electric shock, sparks, and fire hazards.
- Do not use welder to thaw frozen pipes.
- Remove stick electrode from holder or cut off welding wire at contact tip when not in use.
- Wear oil-free protective garments such as leather gloves, heavy shirt, cuffless trousers, high shoes, and a cap.
- Remove any combustibles, such as a butane lighter or matches, from your person before doing any welding.
- Follow requirements in OSHA 1910.252 (a) (2) (iv) and NFPA 51B for hot work and have a fire watcher and extinguisher nearby.



### FLYING METAL 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.



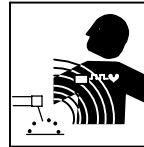
### BUILDUP OF GAS can injure or kill.

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



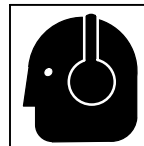
### HOT PARTS can cause severe burns.

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



### MAGNETIC FIELDS can affect pacemakers.

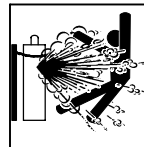
- Pacemaker wearers keep away.
- Wearers should consult their doctor before going near arc welding, gouging, or spot welding operations.



### 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.

Shielding 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 shielding gas cylinders, regulators, hoses, and fittings designed for the specific application; maintain them and associated parts in good condition.
- Turn face away from valve outlet when opening cylinder valve.
- Keep protective cap in place over valve except when cylinder is in use or connected for use.
- Use the right equipment, correct procedures, and sufficient number of persons to lift and move cylinders.
- Read and follow instructions on compressed gas cylinders, associated equipment, and Compressed Gas Association (CGA) publication P-1 listed in Safety Standards.

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



### FIRE OR EXPLOSION hazard.

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



### FALLING UNIT can cause injury.

- 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.



### 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.



### 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 cause injury.

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



### WELDING WIRE can cause injury.

- 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.



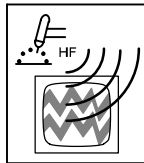
### MOVING PARTS can cause injury.

- 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 as necessary.
- Reinstall doors, panels, covers, or guards when maintenance is finished and before re-connecting input power.



### READ INSTRUCTIONS.

- Read Owner's Manual before using or servicing unit.
- Use only genuine Miller/Hobart replacement parts.



### 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.)**
- ▲ **Battery posts, terminals and related accessories contain lead and lead compounds, chemicals known to the State of California to cause cancer and birth defects or other reproductive harm. Wash hands after handling.**

### For Gasoline Engines:

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

### For Diesel Engines:

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

## 1-5. Principal Safety Standards

*Safety in Welding, Cutting, and Allied Processes*, ANSI Standard Z49.1, from Global Engineering Documents (phone: 1-877-413-5184, website: www.global.ihs.com).

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

*National Electrical Code*, NFPA Standard 70, from National Fire Protection Association, P.O. Box 9101, 1 Battery March Park, Quincy, MA 02269-9101 (phone: 617-770-3000, website: www.nfpa.org).

*Safe Handling of Compressed Gases in Cylinders*, CGA Pamphlet P-1, from Compressed Gas Association, 1735 Jefferson Davis Highway, Suite 1004, Arlington, VA 22202-4102 (phone: 703-412-0900, website: www.cganet.com).

*Code for Safety in Welding and Cutting*, CSA Standard W117.2, from Canadian Standards Association, Standards Sales, 178 Rexdale

Boulevard, Rexdale, Ontario, Canada M9W 1R3 (phone: 800-463-6727 or in Toronto 416-747-4044, website: www.csa-international.org).

*Practice For Occupational And Educational Eye And Face Protection*, ANSI Standard Z87.1, from American National Standards Institute, 11 West 42nd Street, New York, NY 10036-8002 (phone: 212-642-4900, website: www.ansi.org).

*Standard for Fire Prevention During Welding, Cutting, and Other Hot Work*, NFPA Standard 51B, from National Fire Protection Association, P.O. Box 9101, 1 Battery March Park, Quincy, MA 02269-9101 (phone: 617-770-3000, website: www.nfpa.org).

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

## 1-6. EMF Information

Considerations About Welding And The Effects Of Low Frequency Electric And Magnetic Fields

Welding current, as it flows through welding cables, will cause electromagnetic fields. There has been and still is some concern about such fields. However, after examining more than 500 studies spanning 17 years of research, a special blue ribbon committee of the National Research Council concluded that: "The body of evidence, in the committee's judgment, has not demonstrated that exposure to power-frequency electric and magnetic fields is a human-health hazard." However, studies are still going forth and evidence continues to be examined. Until the final conclusions of the research are reached, you may wish to minimize your exposure to electromagnetic fields when welding or cutting.

To reduce magnetic fields in the workplace, use the following procedures:

1. Keep cables close together by twisting or taping them.
2. Arrange cables to one side and away from the operator.
3. Do not coil or drape cables around your body.
4. Keep welding power source and cables as far away from operator as practical.
5. Connect work clamp to workpiece as close to the weld as possible.

### **About Pacemakers:**

Pacemaker wearers consult your doctor before welding or going near welding 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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▲ **Avertissement : se protéger et protéger les autres contre le risque de blessure — lire et respecter ces consignes.**

## 2-1. Symboles utilisés



Symbole graphique d'avertissement ! Attention ! Cette procédure comporte des risques possibles ! Les dangers éventuels sont représentés par les symboles graphiques joints.



Ce groupe de symboles signifie Avertissement ! Attention ! Risques d'ÉLECTROCUTION, ORGANES MOBILES et PARTIES CHAUDES. Consulter les symboles et les instructions afférentes ci-dessous concernant les mesures à prendre pour supprimer les dangers.

▲ **Indique un message de sécurité particulier**

☞ Signifie NOTE ; n'est pas relatif à la sécurité.

## 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.**

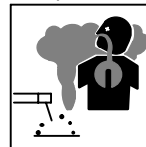
Le contact d'organes électriques sous tension peut provoquer des accidents mortels ou des brûlures graves. Le circuit de l'électrode et de la pièce est sous tension lorsque le courant est délivré à la sortie. Le circuit d'alimentation et les circuits internes de la machine sont également sous tension 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).
- Installer le poste correctement et le mettre à la terre convenablement selon les consignes du manuel de l'opérateur et les normes nationales, provinciales 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.

- Vérifier fréquemment le cordon d'alimentation afin de s'assurer qu'il n'est pas altéré ou à nu, le remplacer immédiatement s'il l'est. Un fil à nu peut entraîner la mort.
- L'équipement doit être hors tension lorsqu'il n'est pas utilisé.
- Ne pas utiliser des câbles usés, endommagés, de grosseur insuffisante ou mal épiés.
- 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. Entretien 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.

**Il reste une TENSION DC NON NÉGLIGEABLE dans les sources de soudage onduleur quand on a coupé l'alimentation.**

- 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 FUMÉES ET LES GAZ peuvent être dangereux.**

Le soudage génère des fumées et des gaz. Leur inhalation peut être dangereuse pour la santé.

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



### LES RAYONS D'ARC peuvent entraîner des brûlures aux yeux et à 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 pendant le soudage (voir ANSI Z49.1 et Z87.1 énumérés dans les normes de sécurité).
- Porter des lunettes de sécurité avec écrans latéraux même sous votre casque.
- Avoir recours à des écrans protecteurs ou à des rideaux pour protéger les autres contre les rayonnements les éblouissements et les étincelles ; prévenir toute personne sur les lieux de ne pas regarder l'arc.
- Porter des vêtements confectionnés avec des matières résistantes et ignifuges (cuir, coton lourd ou laine) et des bottes de protection.



### LE SOUDAGE peut provoquer un incendie ou une explosion.

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

- Déplacer toutes les substances inflammables à une distance de 10,7 m de l'arc de soudage. En cas d'impossibilité, les recouvrir soigneusement avec des protections homologuées.
- Ne pas souder dans un endroit où des étincelles peuvent tomber sur des substances inflammables.
- Se protéger, ainsi que toute autre personne travaillant sur les lieux, contre les étincelles et le 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.
- Afin d'éliminer tout risque de feu, être vigilant et garder toujours un extincteur à la portée de main.
- 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 (voir les normes de sécurité).
- Brancher le câble de masse sur la pièce la plus près possible de la zone de soudage pour éviter le transport du courant sur une longue distance par des chemins inconnus éventuels en provoquant des risques d'électrocution, d'étincelles et d'incendie.
- Ne pas utiliser le poste de soudage pour dégelier des conduites gelées.
- En cas de non-utilisation, enlever la baguette d'électrode du porte-électrode ou couper le fil à la pointe de contact.
- Porter des vêtements de protection exempts d'huile tels que des gants en cuir, une veste résistante, des pantalons sans revers, des bottes et un casque.
- Avant de souder, retirer toute substance combustible de ses poches telles qu'un allumeur au butane ou des allumettes.
- Suivre les consignes de OSHA 1910.252 (a) (2) (iv) et de NFPA 51B pour travaux de soudage et prévoir un détecteur d'incendie et un extincteur à proximité.



### DES PARTICULES VOLANTES peuvent blesser 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 protecteur en cas de non-utilisation.
- Veiller toujours à bien aérer les espaces confinés ou se servir d'un respirateur d'adduction d'air homologué.



### DES PIÈCES CHAUDES peuvent provoquer des brûlures graves.

- Ne pas toucher des parties chaudes à mains nues.
- Prévoir une période de refroidissement avant d'utiliser le pistolet ou la torche.
- 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 CHAMPS MAGNÉTIQUES peuvent affecter les stimulateurs cardiaques.

- Porteurs de stimulateur cardiaque, rester à distance.
- Les porteurs d'un stimulateur cardiaque doivent d'abord consulter leur médecin avant de s'approcher des opérations de soudage à l'arc, de gougeage ou de soudage par points.



### 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.

Des bouteilles de gaz protecteur 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.

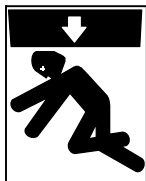
- Protéger les bouteilles de gaz comprimé d'une chaleur excessive, des chocs mécaniques, des dommages physiques, du laitier, des flammes ouvertes, des étincelles et des arcs.
- Placer les bouteilles debout en les fixant dans un support stationnaire ou dans un porte-bouteilles pour les empêcher de tomber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

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



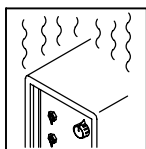
### Risque D'INCENDIE OU D'EXPLOSION.

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



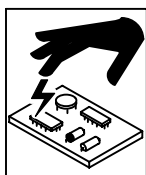
### LA CHUTE DE L'APPAREIL peut blesser.

- 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.



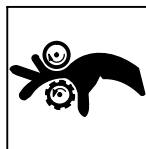
### L'EMPLOI EXCESSIF peut SURCHAUFFER L'ÉQUIPEMENT.

- 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 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 PC.



### DES ORGANES MOBILES peuvent provoquer des blessures.

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



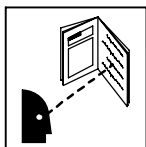
### LES FILS DE SOUDAGE peuvent provoquer des blessures.

- 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.



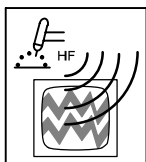
### DES ORGANES MOBILES peuvent provoquer des blessures.

- S'abstenir de toucher des organes mobiles tels que des ventilateurs.
- Maintenir fermés et verrouillés les portes, panneaux, recouvrements et dispositifs de protection.
- Seules des personnes qualifiées sont autorisées à enlever les portes, panneaux, recouvrements ou dispositifs de protection pour l'entretien.
- Remettre les portes, panneaux, recouvrements ou dispositifs de protection quand l'entretien est terminé et avant de rebrancher l'alimentation électrique.



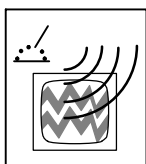
### LIRE LES INSTRUCTIONS.

- Lire le manuel d'utilisation avant d'utiliser ou d'intervenir sur l'appareil.
- Utiliser uniquement des pièces de rechange Miller/Hobart.



### LE RAYONNEMENT HAUTE FRÉQUENCE (HF) risque de provoquer des interférences.

- Le rayonnement haute fréquence (HF) 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 peut gêner le fonctionnement d'appareils électroniques comme des ordinateurs et des 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)

▲ Les batteries, les bornes et autres accessoires contiennent du plomb et des composés à base de plomb, produits chimiques dont l'État de Californie reconnaît qu'ils provoquent des cancers et des malformations congénitales ou autres problèmes de procréation. Se laver les mains après manipulation.

Pour les moteurs à essence :

▲ Les gaz d'échappement des moteurs contiennent des produits chimiques dont l'État de Californie reconnaît qu'ils provoquent des cancers et des malformations congénitales ou autres problèmes de procréation.

Pour les moteurs diesel :

▲ Les gaz d'échappement des moteurs diesel et certains de leurs composants sont reconnus par l'État de Californie comme provoquant des cancers et des malformations congénitales ou autres problèmes de procréation.

## 2-5. Principales normes de sécurité

*Safety in Welding, Cutting, and Allied Processes*, ANSI Standard Z49.1, de Global Engineering Documents (téléphone : 1-877-413-5184, site Internet : [www.global.ihs.com](http://www.global.ihs.com)).

*Recommended Safe Practices for the Preparation for Welding and Cutting of Containers and Piping*, American Welding Society Standard AWS F4.1 de Global Engineering Documents (téléphone : 1-877-413-5184, site Internet : [www.global.ihs.com](http://www.global.ihs.com)).

*National Electrical Code*, NFPA Standard 70, de National Fire Protection Association, P.O. Box 9101, 1 Battery March Park, Quincy, MA 02269-9101 (téléphone : 617-770-3000, site Internet : [www.nfpa.org](http://www.nfpa.org)).

*Safe Handling of Compressed Gases in Cylinders*, CGA Pamphlet P-1, de Compressed Gas Association, 1735 Jefferson Davis Highway, Suite 1004, Arlington, VA 22202-4102 (téléphone : 703-412-0900, site Internet : [www.cganet.com](http://www.cganet.com)).

*Code for Safety in Welding and Cutting*, CSA Standard W117.2, de Canadian Standards Association, Standards Sales, 178 Rexdale

Boulevard, Rexdale, Ontario, Canada M9W 1R3 (téléphone : 800-463-6727 ou à Toronto 416-747-4044, site Internet : [www.csa-international.org](http://www.csa-international.org)).

*Practice For Occupational And Educational Eye And Face Protection*, ANSI Standard Z87.1, de American National Standards Institute, 11 West 42nd Street, New York, NY 10036-8002 (téléphone : 212-642-4900, site Internet : [www.ansi.org](http://www.ansi.org)).

*Standard for Fire Prevention During Welding, Cutting, and Other Hot Work*, NFPA Standard 51B, de National Fire Protection Association, P.O. Box 9101, 1 Battery March Park, Quincy, MA 02269-9101 (téléphone : 617-770-3000, site Internet : [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, de U.S. Government Printing Office, Superintendent of Documents, P.O. Box 371954, Pittsburgh, PA 15250 (il y a 10 bureaux régionaux—le téléphone de la région 5, Chicago, est 312-353-2220, site Internet : [www.osha.gov](http://www.osha.gov)).

## 2-6. Information EMF

Considérations sur le soudage et les effets de basse fréquence et des champs magnétiques et électriques.

Le courant de soudage, pendant son passage dans les câbles de soudage, causera des champs électromagnétiques. Il y a eu et il y a encore un certain souci à propos de tels champs. Cependant, après avoir examiné plus de 500 études qui ont été faites pendant une période de recherche de 17 ans, un comité spécial ruban bleu du National Research Council a conclu : « L'accumulation de preuves, suivant le jugement du comité, n'a pas démontré que l'exposition aux champs magnétiques et champs électriques à haute fréquence représente un risque à la santé humaine ». Toutefois, des études sont toujours en cours et les preuves continuent à être examinées. En attendant que les conclusions finales de la recherche soient établies, il vous serait souhaitable de réduire votre exposition aux champs électromagnétiques pendant le soudage ou le coupage.

Pour réduire les champs magnétiques sur le poste de travail, appliquer les procédures suivantes :

1. Maintenir les câbles ensemble en les tordant ou en les enveloppant.
2. Disposer les câbles d'un côté et à distance de l'opérateur.
3. Ne pas courber pas et ne pas entourer pas les câbles autour de votre corps.
4. Garder le poste de soudage et les câbles le plus loin possible de vous.
5. Connecter la pince sur la pièce aussi près que possible de la soudeuse.

### En ce qui concerne les stimulateurs cardiaques

Les porteurs de stimulateur cardiaque doivent consulter leur médecin avant de souder ou d'approcher des opérations de soudage. Si le médecin approuve, il est recommandé de suivre les procédures précédentes.

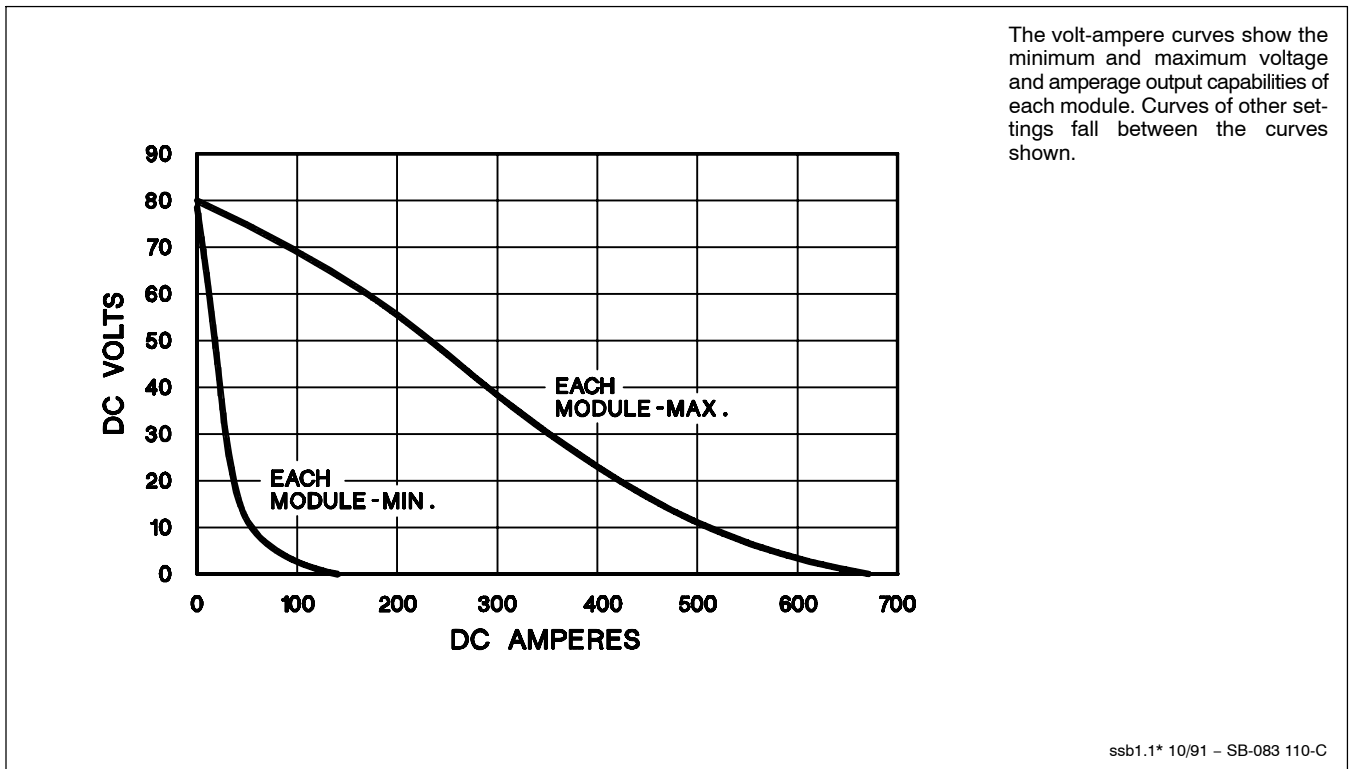
# SECTION 3 – SPECIFICATIONS

## 3-1. Specifications



Rated Welding Output For Main Transformer	Rated Welding Output For Each Module	Max OCV DC	Amperes Input at Rated Load Output, 60 Hz, Three-Phase						KVA	KW
			220 V	230 V	380 V	440 V	460 V	575 V		
800 A @ 40 Volts DC, 100% Duty Cycle; 1600 A @ 40 Volts DC, 25% Duty Cycle	200 A @ 40 Volts DC, 60% Duty Cycle	80	178 8*	170 8*	103 5*	89 4*	85 4*	68 3.2*	68 3.18*	48.6 2.65*

\*While idling

## 3-2. Volt-Ampere Curves



### 3-3. Duty Cycle And Overheating

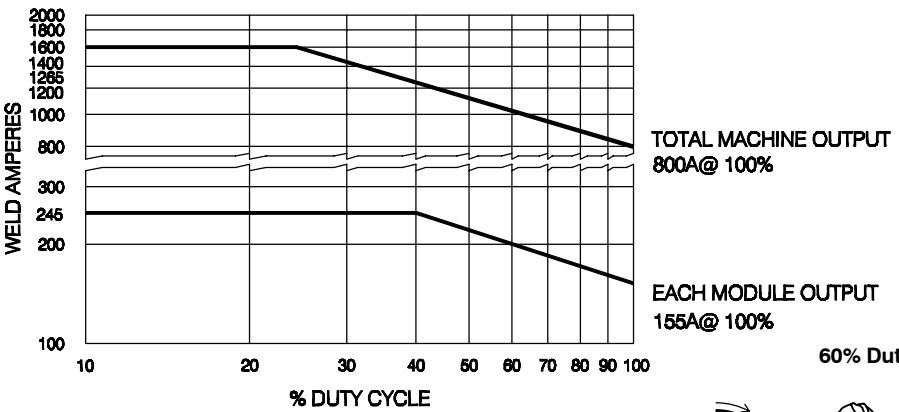



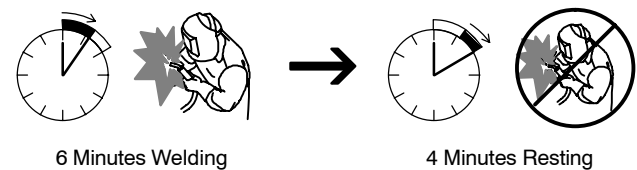
**For Each Module And Total System**

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.

**▲ Exceeding duty cycle can damage unit and void warranty.**





6 Minutes Welding                      4 Minutes Resting

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**For Main Transformer**

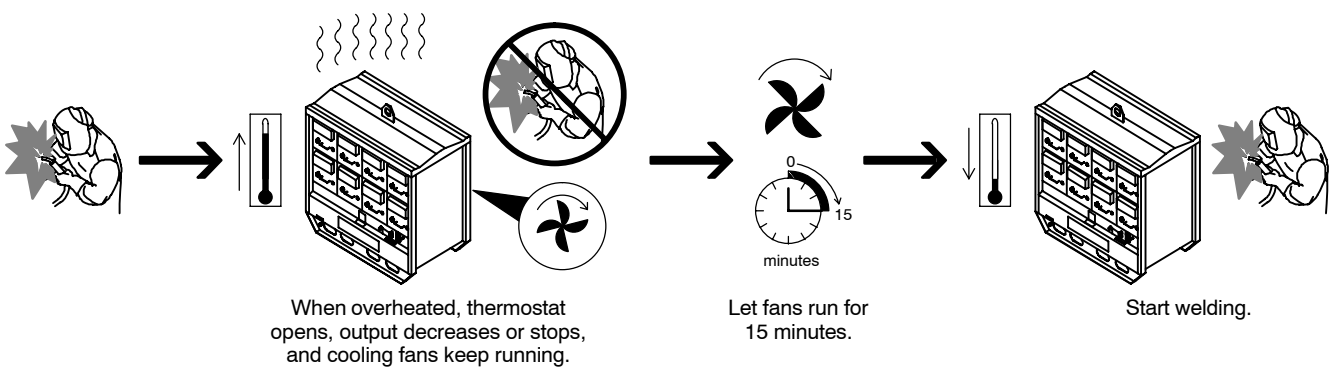
The main transformer of the polyweld system has dual duty cycle ratings, each for a specific amperage output range. If the unit is operated in the 800 ampere range, the unit is rated at 100% duty cycle. This means the polyweld system can be operated at 800 amperes continuously. When the unit is operated in the 1600 ampere range, it is rated at 25% duty cycle.

The sum of the outputs of each module should not exceed the rated duty cycle of the main transformer. For example, the polyweld system can be safely operated at a load of 1000 amperes at 60 percent duty cycle. This value could be obtained by operating five modules at a load of 200 amperes at 60 percent duty cycle, or by operating eight modules at a load of 125 amperes at 60 percent duty cycle.

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**Overheating**

Thermostat TP1 protects the polyweld system. If main transformer T1 gets too hot, TP1 opens and weld output stops. The stabilizer in each of the eight modules is protected from overheating by thermostat TPX1 ("X" represents the number of the applicable module, 1-8). If overheating of a stabilizer occurs, the associated thermostat opens, reducing weld output to a minimum that cannot be regulated. The fans keep running to cool the stabilizer. Wait several minutes before trying to weld.



When overheated, thermostat opens, output decreases or stops, and cooling fans keep running.

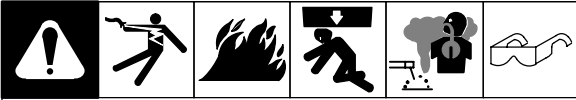
Let fans run for 15 minutes.

Start welding.

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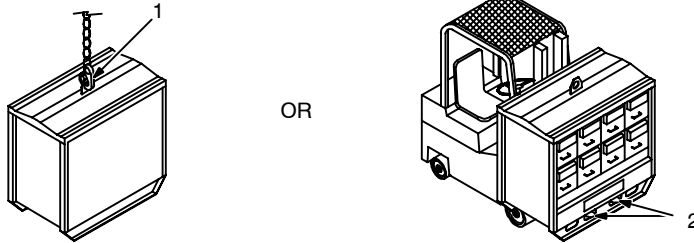
# SECTION 4 – INSTALLATION

## 4-1. Selecting A Location And Moving Polyweld System



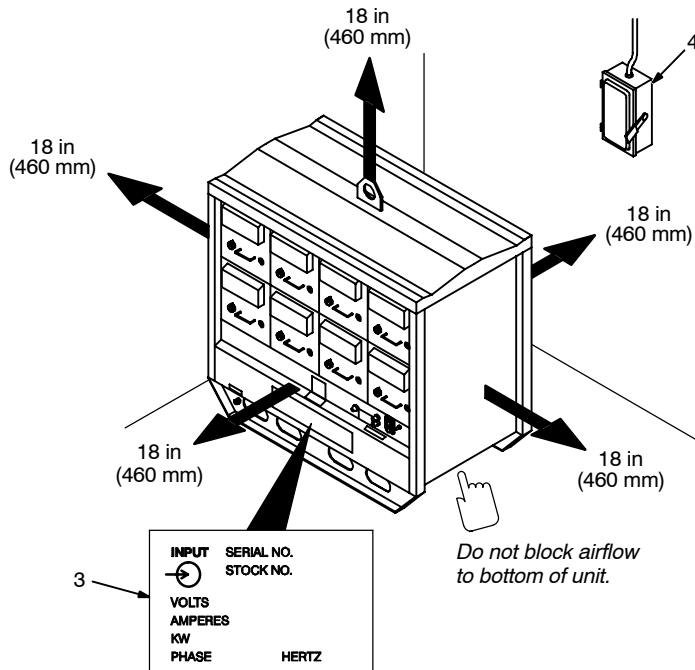
▲ Disconnect input power conductors from deenergized supply BEFORE moving polyweld system.

### Movement



- 1 Lifting Eye
  - 2 Lifting Forks
- Use lifting eye or lifting forks to move unit.  
If using lifting forks, extend forks beyond opposite side of unit.
- 3 Rating Label
  - 4 Line Disconnect Device
- Use rating label to determine input power needs.  
Locate unit near correct input power supply.

### Location And Airflow



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

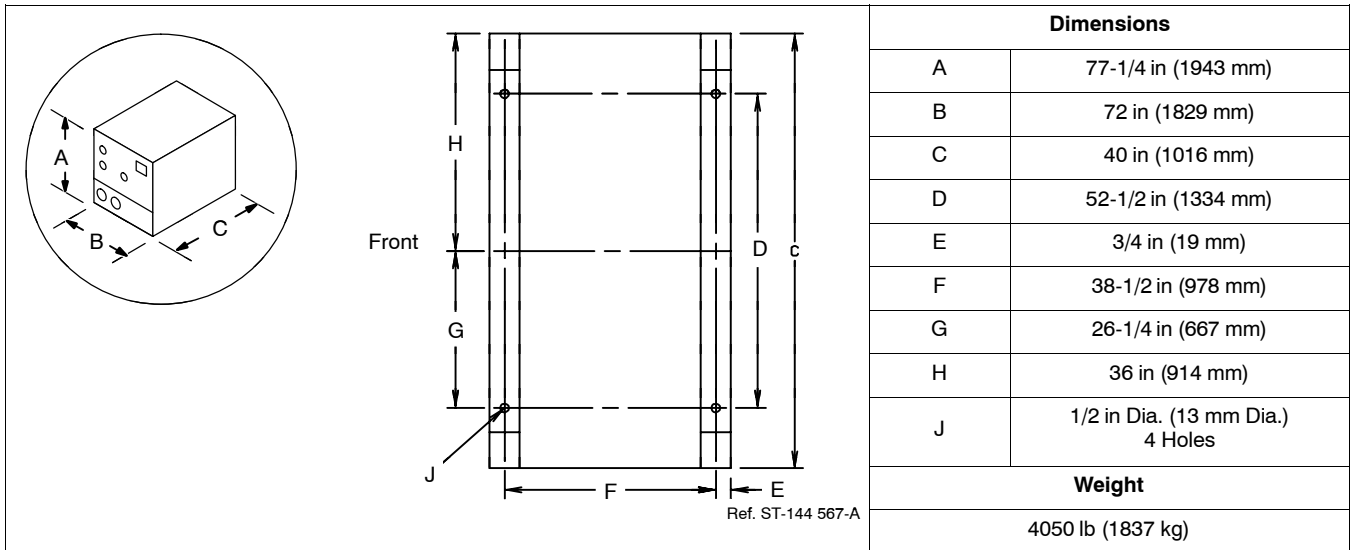
ssb9.1 5/94 – ST-801 180 / ST-144 567-A

## 4-2. Dimensions, Weights And Base Mounting Hole Layout

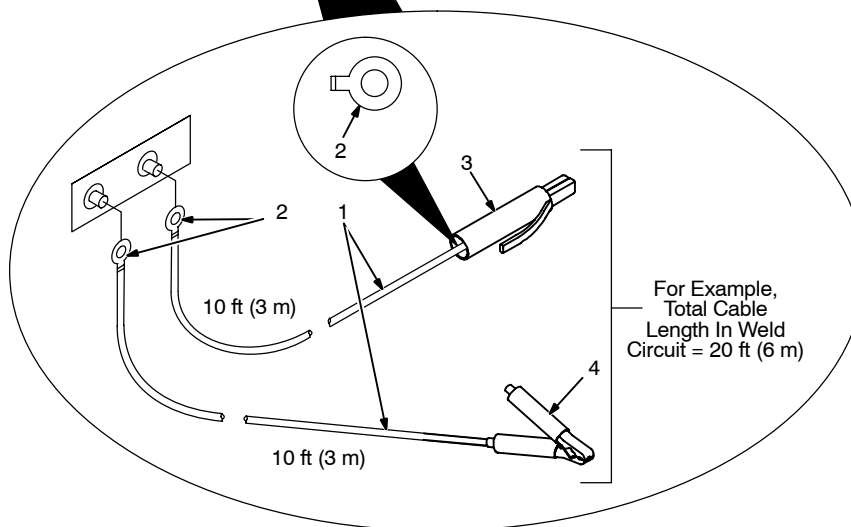
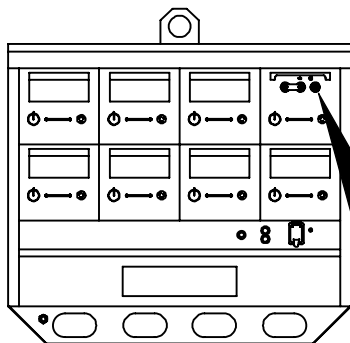
### NOTE



Overall dimensions (A, B, and C) include lifting eye, handles, hardware, etc.



## 4-3. Selecting And Preparing Weld Output Cables



### 1 Weld Output Cable

Determine total cable length in weld circuit and maximum welding amperes. Use Section 4-4 to select proper cable size.

Use shortest cables possible.

Do not use damaged cables.

### 2 Terminal Lug

Use lugs of proper amperage capacity and hole size for connecting to work clamp, electrode holder, and weld output terminals.

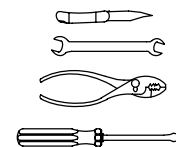
### 3 Insulated Electrode Holder

Install according to manufacturer's instructions.

### 4 Work Clamp

Install onto work cable.

### Tools Needed:



sb6.1\* 5/94 - Ref. ST-144 570-A / Ref. S-0653



#### 4-4. Weld Cable Size

Welding Amperes	Total Cable (Copper) Length In Weld Circuit Not Exceeding*							
	50 ft Or Less (15m)	100 ft (30m)	150 ft (45 m)	200 ft (60 m)	250 ft (70 m)	300 ft (90 m)	350 ft (105 m)	400 ft (120 m)
	10 Thru 100% Duty Cycle							
100	4	4	4	3	2	1	1/0	1/0
150	3	3	2	1	1/0	2/0	3/0	3/0
200	2	2	1	1/0	2/0	3/0	4/0	4/0
250	1	1	1/0	2/0	3/0	4/0	2-2/0	2-2/0
300	1/0	1/0	2/0	3/0	4/0	2-2/0	2-3/0	2-3/0
350	2/0	2/0	3/0	4/0	2-2/0	2-3/0	2-3/0	2-4/0
400	2/0	2/0	3/0	4/0	2-2/0	2-3/0	2-4/0	2-4/0
500	4/0	4/0	4/0	2-2/0	2-3/0	2-4/0	1000	1000
600	4/0	4/0	2-2/0	2-3/0	2-4/0	1000	1000	2-750
700	4/0	2-2/0	2-3/0	2-4/0	1000	1000	2-750	2-750
800	2-2/0	2-2/0	2-3/0	2-4/0	1000	2-750	2-750	2-1000
900	2-3/0	2-3/0	2-4/0	1000	1000	2-750	2-1000	2-1000
1000	2-3/0	2-3/0	2-4/0	1000	2-750	2-750	2-1000	2-1000
1250	2-4/0	2-4/0	750	2-750	2-750	2-1000	2-1000	
1500	500	750	1000	2-750	2-1000	2-1000		
1750	750	1000	2-750	2-1000	2-1000			
2000	750	1000	2-750	2-1000				

\*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. Contact your distributor for the mm<sup>2</sup> equivalent weld cable sizes.

S-0008-C

## 4-5. Connecting Weld Output Cables

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

Tools Needed:  
 3/4 in (19 mm)

**▲ 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.**

**Correct Installation**

- 1 Weld Output Terminal
- 2 Supplied Weld Output Terminal Nut
- 3 Weld Cable Terminal
- 4 Copper Bar

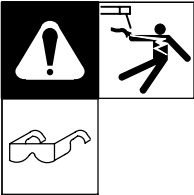
Remove supplied nut from weld output terminal. Slide weld cable terminal onto weld output terminal and secure with nut so that weld cable terminal is tight against copper bar. **Do not place anything between weld cable terminal and copper bar. Make sure that the surfaces of the weld cable terminal and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

803 778-B

## 4-6. Connecting To Weld Output Terminals

<b>WARNING</b>	
	<p><b>ELECTRIC SHOCK can kill; ARCING can burn skin or damage electrical connections.</b></p> <ul style="list-style-type: none"> <li>Do not touch live electrical parts.</li> <li>Turn Off polyweld system by pressing Power Off push button before making any weld output connections.</li> <li>Do not connect welding output of different polarities to the same structure.</li> <li>See ANSI Z49.1 and OSHA Title 29, Chapter XVII, Part 1910, Subpart Q (addresses at beginning of manual).</li> <li>When Positive or Negative weld output terminal is jumper linked to the Frame Connection terminal and the work cable is connected to the Common Work Connection stud on the machine base, do not connect a cable between the remaining weld output terminal and the work.</li> <li>Remove jumper link from any module where work and electrode connections are made directly to the Positive and Negative output studs.</li> <li>Do not handle or come in contact with two live electrodes at the same time.</li> <li>Connect all paralleled modules for the same polarity.</li> </ul>
	<p><b>ELECTRIC SHOCK can kill; TWO TIMES NORMAL OPEN-CIRCUIT VOLTS exist between electrode holders of opposite polarity.</b></p> <ul style="list-style-type: none"> <li>Do not touch electrode holders of opposite polarity at the same time.</li> <li>Separate electrode holders of opposite polarity to prevent contact.</li> <li>Consult ANSI Z49.1 for common grounding safe practices.</li> </ul>

## A. Standard Module Connections



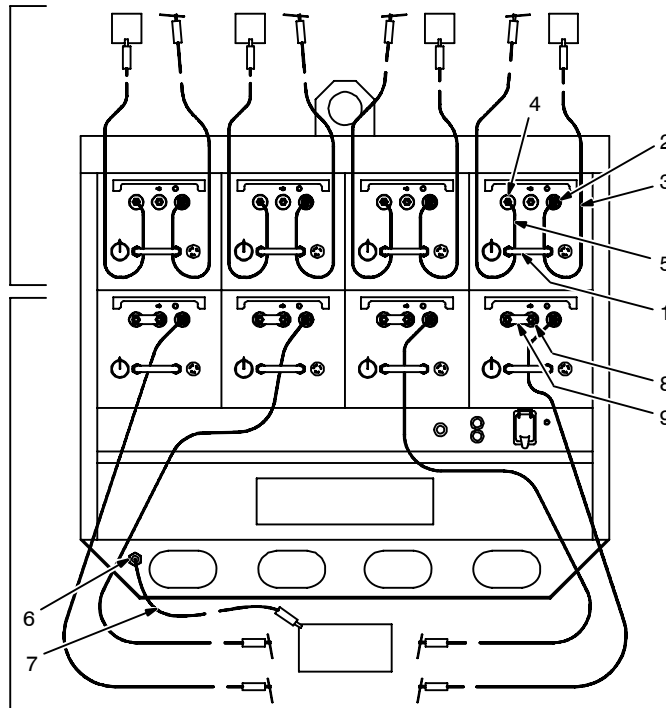
▲ **READ SAFETY BLOCKS** at start of Section 4-6 before proceeding.

**INADEQUATE WORK CABLE CONNECTIONS** can cause serious damage to input power service and create a hazardous condition.

Connect an electrical cable of adequate size between the common work connection terminal and the workpiece whenever any module(s) is connected to use the frame connection terminal and the common work connection terminal.

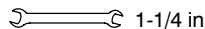
Separate Work Connections

Common Work Connections



▲ For common work connection, work cable must be able to carry combined weld output of all modules using the common work connection terminal (see Table 3-1 for proper cable size). When using the common work connection terminal, all connections to the common work connection terminal must be of the same polarity.

Tools Needed:



1 Cable Restraint

Route all cables under cable restraint.

### Separate Work Connections

See Section 4-4 for proper cable size.

2 Negative (-) Weld Output Terminal

3 Work Cable

4 Positive (+) Weld Output Terminal

5 Electrode Holder Cable

For Electrode Positive (Reverse Polarity/DCEP), connect work cable to Negative (-) terminal and electrode holder cable to Positive (+) terminal.

For Electrode Negative (Straight Polarity/DCEN), reverse cable connections.

### Common Work Connections

6 Common Work Connection Terminal

7 Common Work Cable

See Table 3-1 for proper cable size.

8 Frame Connection Terminal

9 Jumper Link

For Electrode Negative (Straight Polarity/DCEN), connect jumper link across Positive (+) terminal and Frame Connection terminal, and connect electrode holder to Negative (-) terminal.

For Electrode Positive (Reverse Polarity/DCEP), connect jumper link across Negative (-) terminal and Frame Connection terminal, and connect electrode holder to Positive (+) terminal.

ST-144 568-C

**Table 3-1. Common Work Cable Size**

Common Work Cable Sizes At Main Transformer Rated Welding Current	
Cable Length	Cable Size
50 Feet	2 No. 3/0
100 Feet	2 No. 4/0
150 Feet	3 No. 3/0
200 Feet	3 No. 4/0

## B. Parallel Module Connections



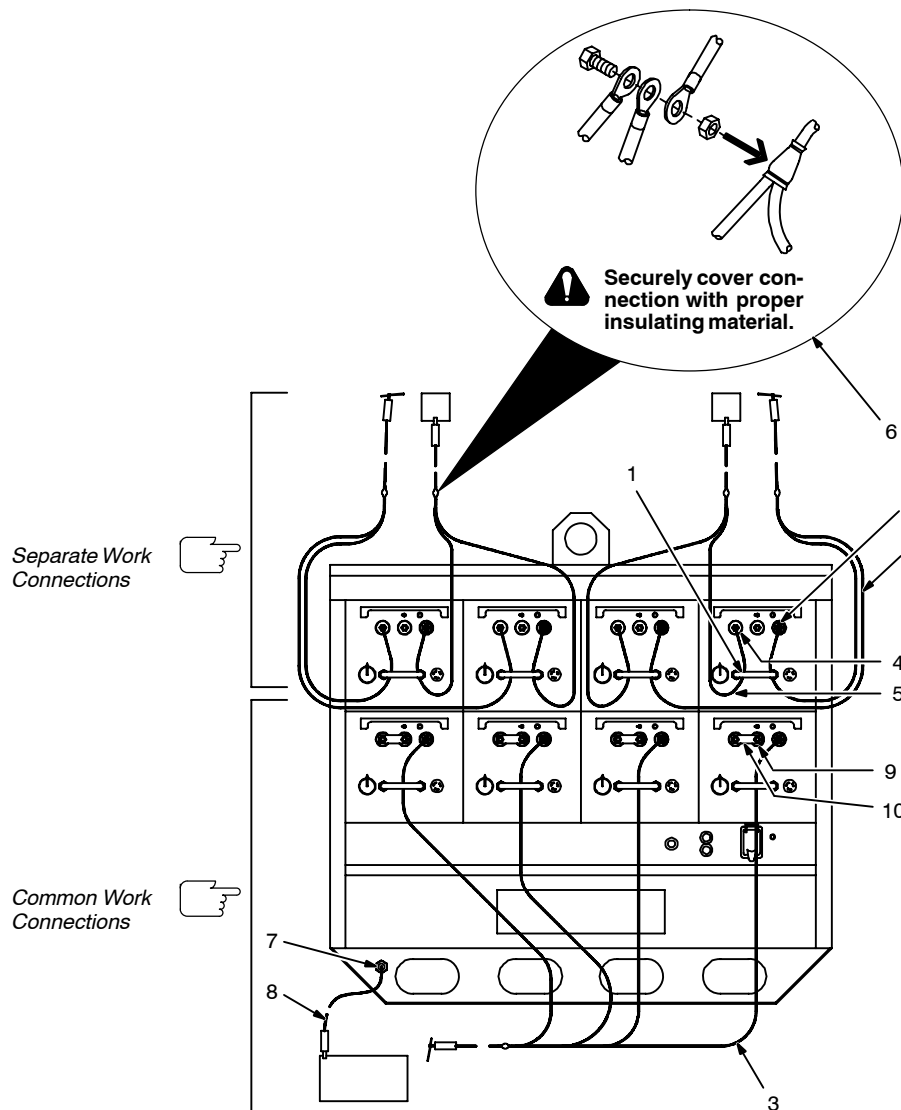
▲ **READ SAFETY BLOCKS** at start of Section 4-6 before proceeding.

**UNDERSIZED WELDING CABLES** can cause fire.

Use **single cables of adequate capacity** to carry the total combined amperage of the paralleled modules (see Section 4-4).

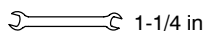
**Securely cover common connections** with proper insulating materials.

Set the Amperage Adjustment controls on all paralleled modules to provide the same output.



▲ For common work connection, work cable must be able to carry combined weld output of all modules using the common work connection terminal (see Table 3-1 for proper cable size). When using the common work connection terminal, all connections to the common work connection terminal must be of the same polarity.

Tools Needed:



### 1 Cable Restraint

Route all cables under cable restraint.

### Separate Work Connections

See Section 4-4 for proper cable size.

### 2 Negative (-) Weld Output Terminal

### 3 Electrode Holder Cable

### 4 Positive (+) Weld Output Terminal

### 5 Work Cable

### 6 Connection Point

For Electrode Negative (Straight Polarity/DCEN), connect separate cables of same size and length from Positive (+) terminals to the work or to a suitable connection point connecting to a single work cable. Connect separate cables of same size and length from Negative (-) terminals to a suitable connection point connecting to a single electrode holder cable.

For Electrode Positive (Reverse Polarity/DCEP), reverse cable connections.

### Common Work Connections

### 7 Common Work Connection Terminal

### 8 Common Work Cable

See Table 3-1 for proper size cable.

### 9 Frame Connection Terminal

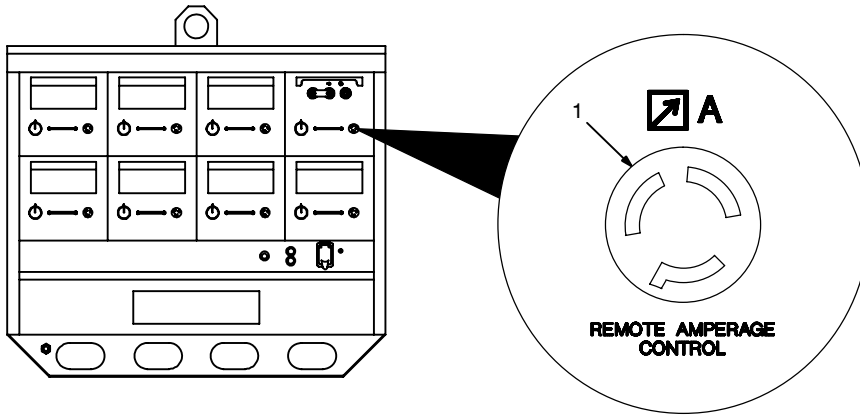
### 10 Jumper Link

For Electrode Negative (Straight Polarity/DCEN), connect jumper link across Positive (+) terminal and Frame Connection terminal for each paralleled module. Connect separate cables of same size and length from Negative (-) terminals to a suitable connection point connecting to a single electrode holder cable.

For Electrode Positive (Reverse Polarity/DCEP), connect jumper link across Negative (-) terminal and Frame Connection terminal for each paralleled module, and connect separate cables of same size and length from Positive (+) terminals to a suitable connection point connecting to a single electrode holder cable.

ST-085 152-D

## 4-7. Remote Amperage Control Receptacle

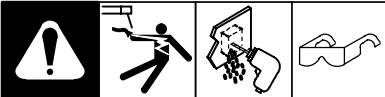


- 1 Remote Amperage Control Receptacles RCX1 ("X" Represents The Number Of The Applicable Module 1-8)

The twistlock receptacle in each module provides a connection point for an optional remote amperage control. To connect to one of these receptacles, insert plug from remote amperage control and turn clockwise.

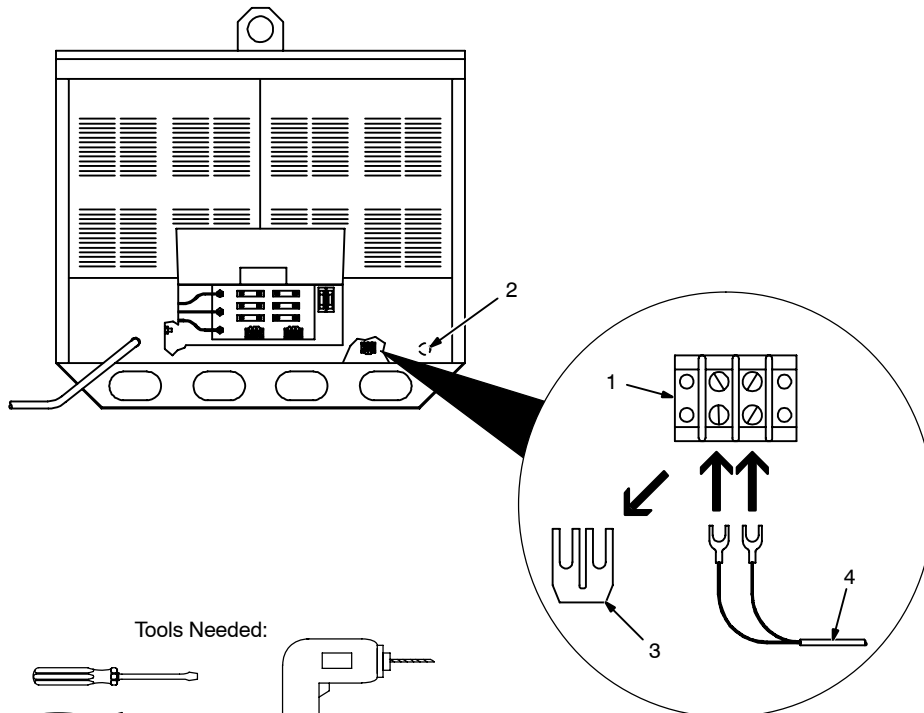
ST-144 570-A / Ref. ST-174 143

## 4-8. Remote Contactor Control Connections (Optional)



- ▲ Turn Off polyweld system, and disconnect input power before making contactor control connections.

Whenever the Remote Contactor switch is closed with Power switch On button pressed, input power is applied to all modules.



Terminal strip 1T provides a connection point for connecting a normally open, momentary contact switch for remote contactor control.

To connect a remote contactor control, proceed as follows:

- 1 Terminal Strip 1T
- 2 Access Hole Location

Drill or punch a hole in lower right rear panel to provide access to terminal strip 1T. Hole size should accept standard strain relief connector.

Install strain relief into access hole.

- 3 Jumper Link

Remove jumper link.

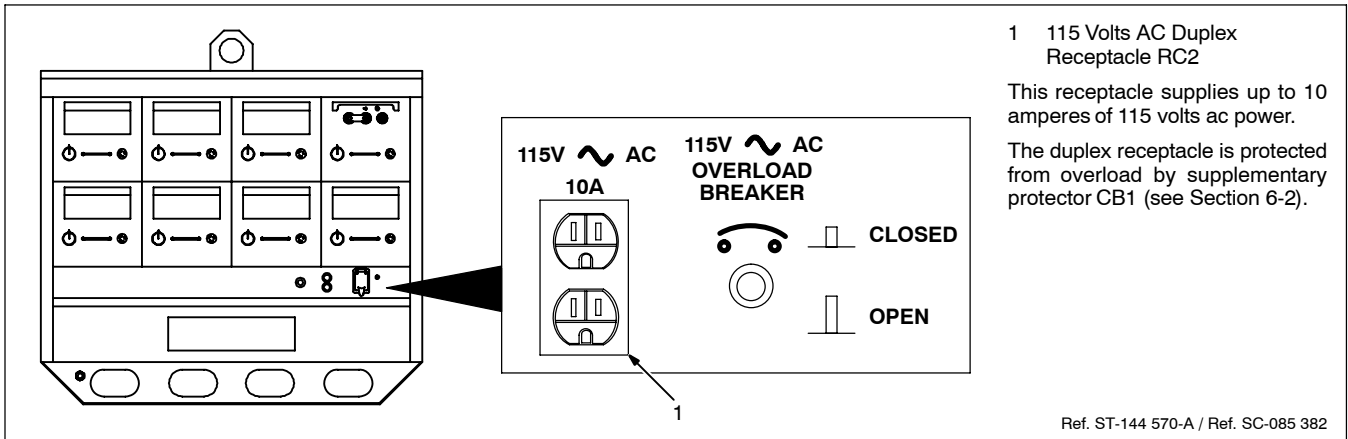
- 4 Lead Connections

Route cord through strain relief and connect leads to 1T as shown. Polarity is not important. Connect leads on other end of cord to a suitable switch.

Close and secure rear panel access door.

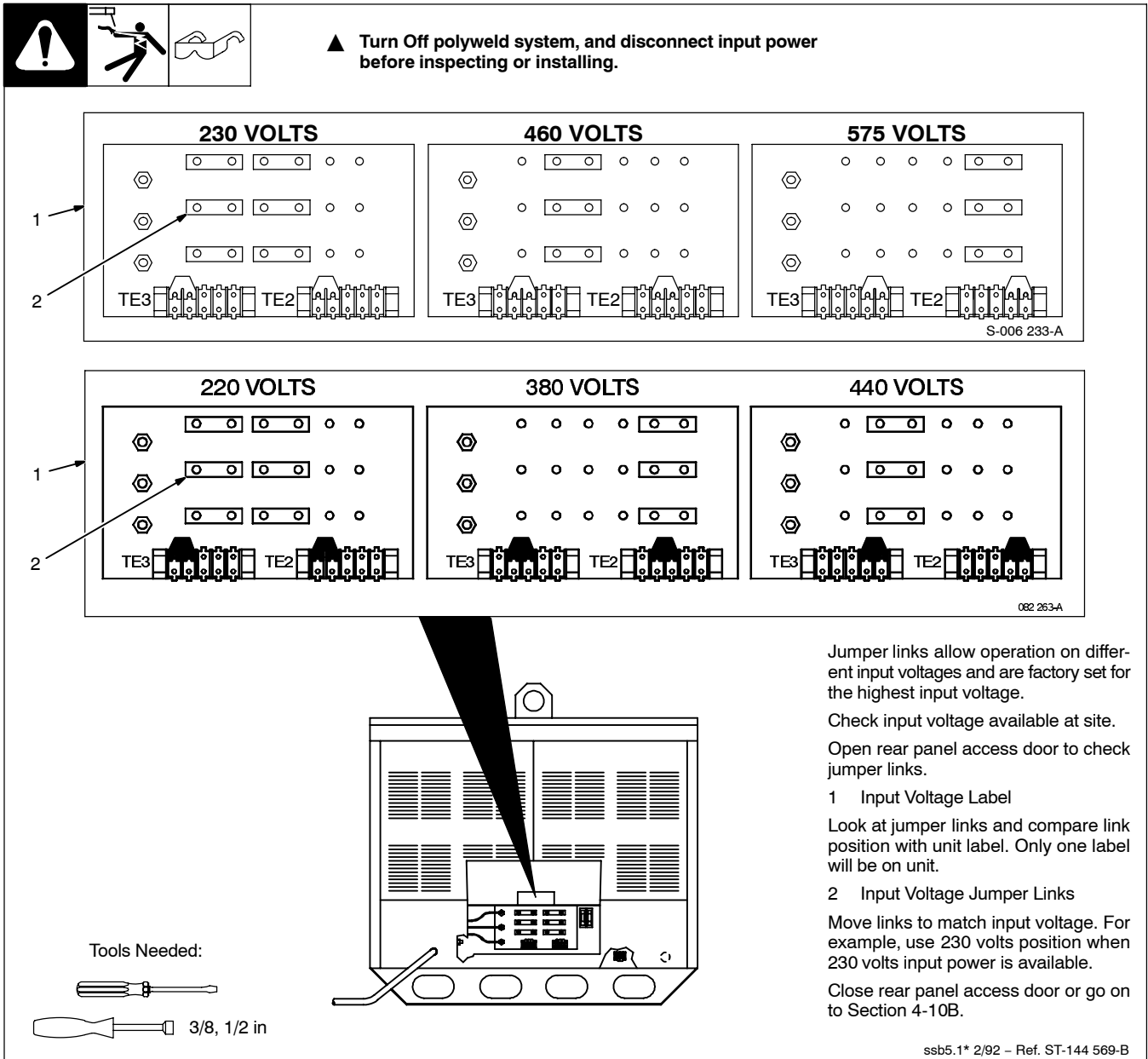
Ref. ST-144 569-B

## 4-9. 115 Volts AC Duplex Receptacle






## 4-10. Connecting Input Power

### A. Positioning Jumper Links



## B. Connecting Input Power

**Tools Needed:**

- 1-1/16 in
- 3/8 in

ssb2.4\* 1/94 – Ref. ST-144 569-B

<p>▲ <b>Installation must meet all National and Local Codes – have only qualified persons make this installation.</b></p> <p>▲ <b>Disconnect and lockout/tagout input power before connecting input conductors from unit.</b></p> <p>▲ <b>Make input power connections to the welding power source first.</b></p> <p>▲ <b>Always connect green or green/yellow conductor to supply grounding terminal first, and never to a line terminal.</b></p> <p>See rating label on unit and check input voltage available at site.</p> <p>1 Input Power Conductors (Customer Supplied Cord)</p> <p>Select size and length of conductors using Section 4-11. Conductors must comply with national, state, and local electrical codes. If applicable, use lugs of proper amperage capacity and correct hole size.</p>	<p><b>Welding Power Source Input Power Connections</b></p> <p>2 Strain Relief (Customer Supplied) Route conductors (cord) through strain relief and tighten screws.</p> <p>3 Machine Grounding Terminal</p> <p>4 Green Or Green/Yellow Grounding Conductor Connect green or green/yellow grounding conductor to welding power source grounding terminal first.</p> <p>5 Welding Power Source Line Terminals</p> <p>6 Input Conductors L1 (U), L2 (V) And L3 (W) Connect input conductors L1 (U), L2 (V) and L3 (W) to welding power source line terminals. Close and secure access door on welding power source.</p>	<p><b>Disconnect Device Input Power Connections</b></p> <p>7 Disconnect Device (switch shown in OFF position)</p> <p>8 Disconnect Device (Supply) Grounding Terminal Connect green or green/yellow grounding conductor to disconnect device grounding terminal first.</p> <p>9 Disconnect Device Line Terminals Connect input conductors L1 (U), L2 (V) And L3 (W) to disconnect device line terminals.</p> <p>10 Overcurrent Protection Select type and size of overcurrent protection using Section 4-11 (fused disconnect switch shown). Close and secure door on line disconnect device. Remove lockout/tagout device, and place switch in the On position.</p>
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## 4-11. Electrical Service Guide

<b>Input Voltage</b>	220	230	380	440	460	575
<b>Input Amperes At Rated Output</b>	178	170	103	89	85	68
<b>Max Recommended Standard Fuse Rating In Amperes <sup>1</sup></b>						
<b>Time-Delay <sup>2</sup></b>	200	200	125	110	100	80
<b>Normal Operating <sup>3</sup></b>	250	250	150	125	125	100
<b>Min Input Conductor Size In AWG <sup>4</sup></b>	3/0	2/0	2	3	3	4
<b>Max Recommended Input Conductor Length In Feet (Meters)</b>	230 (70)	214 (65)	349 (106)	389 (118)	424 (129)	554 (169)
<b>Min Grounding Conductor Size In AWG <sup>4</sup></b>	4	4	6	6	6	8

Reference: 2005 National Electrical Code (NEC)

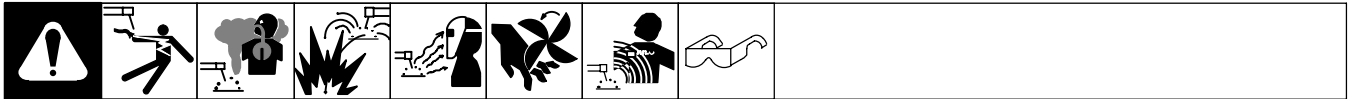
1 Consult factory for circuit breaker applications.

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

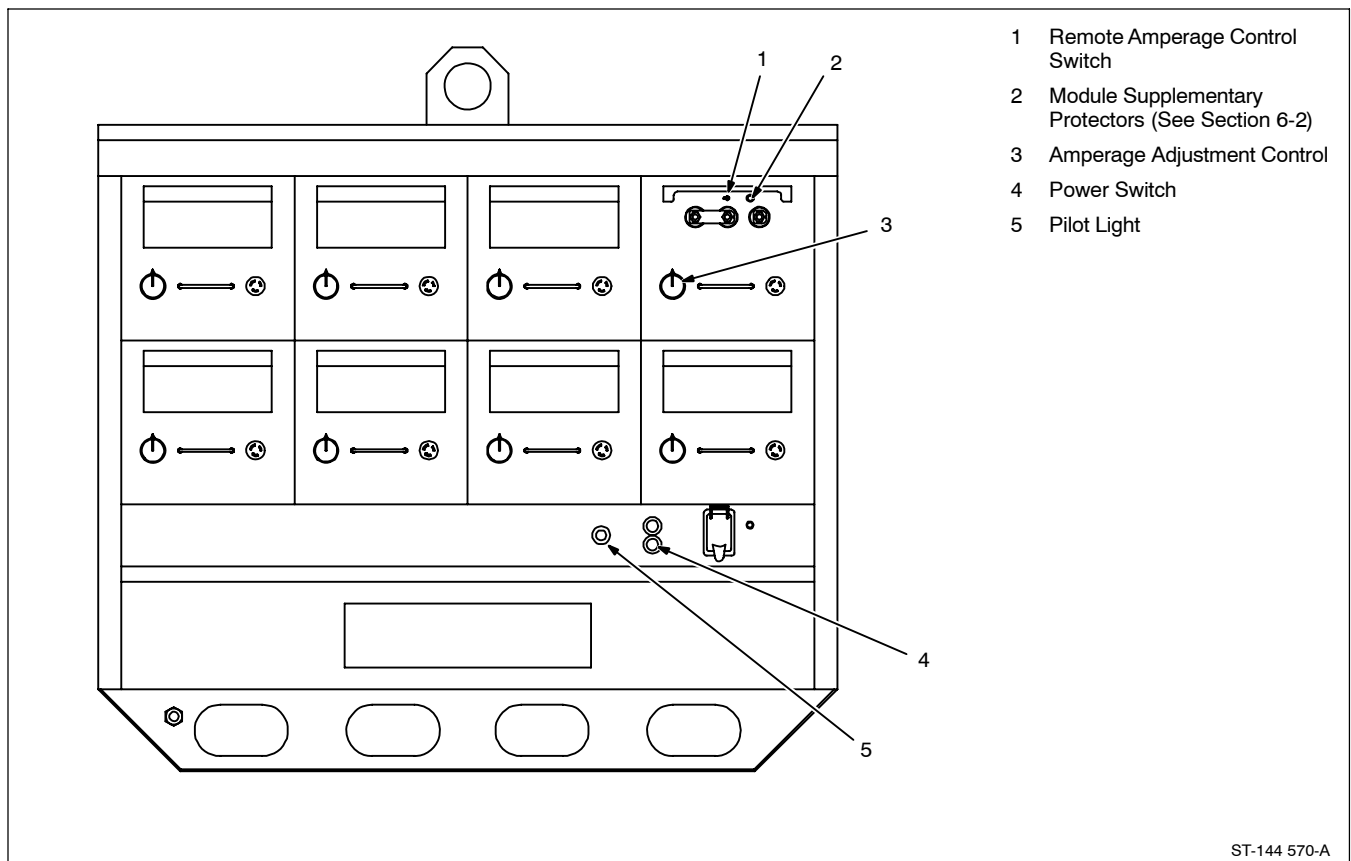
3 "Normal Operating" (general purpose - no intentional delay) fuses are UL class "K5" (up to and including 60 amp), and UL class "H" ( 65 amp and above).

4 Conductor data in this section specifies conductor size (excluding flexible cord or cable) between the panelboard and the equipment per NEC Table 310.16. If a flexible cord or cable is used, minimum conductor size may increase. See NEC Table 400.5(A) for flexible cord and cable requirements.

## SECTION 5 – OPERATION



### 5-1. Controls

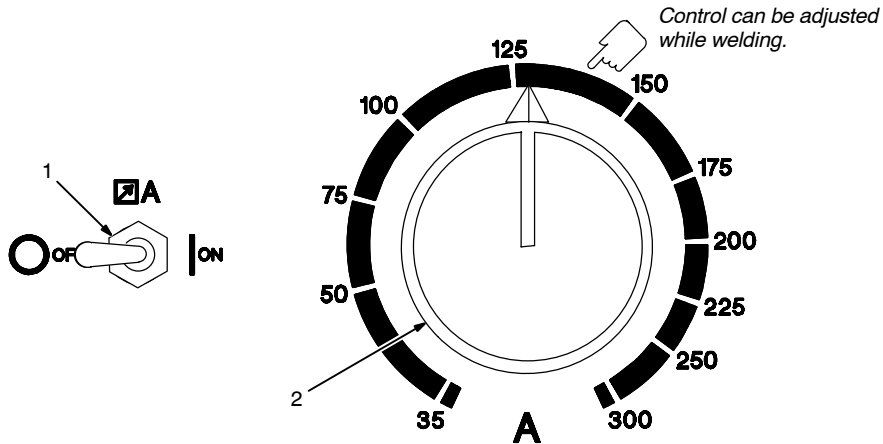


ST-144 570-A



## 5-2. Amperage Adjustment Controls

60 Hz Model Shown



1 Remote Amperage Control Switch

For front panel control of a module, place switch on that module in Off position.

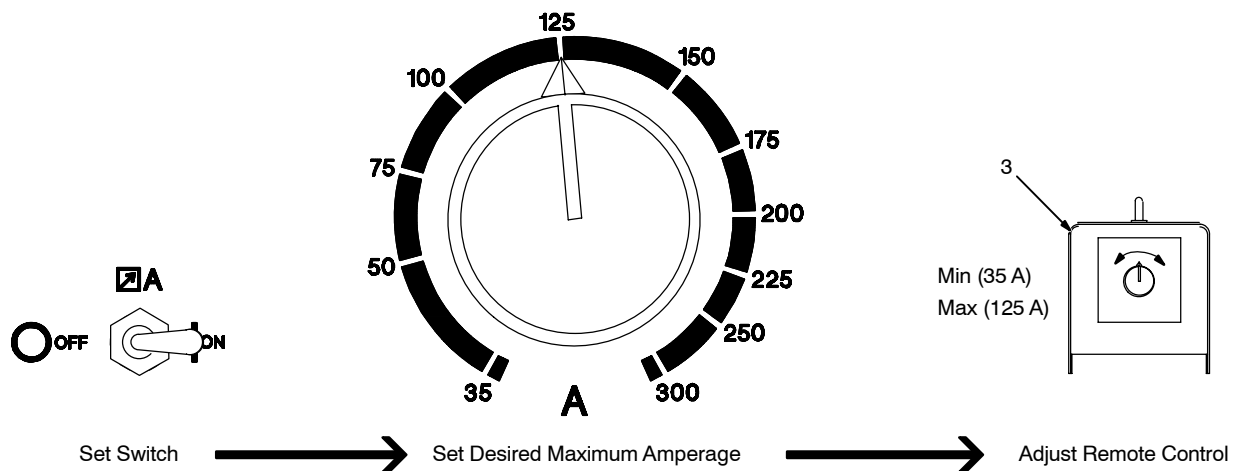
For remote control, place switch in On position. See Example below.

2 Amperage Adjustment Control

Use control at each module to select weld amperage for that module. The numbers are weld amperes.

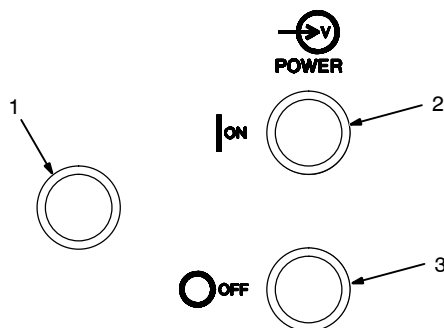
3 Remote Hand Control

### Example Of Combination Remote Amperage Control



Ref. ST-174 143

## 5-3. Power Switch Push Buttons And Pilot Light



1 Pilot Light

2 Power On Push Button


Press button to turn unit, pilot light, and fan motors On.

3 Power Off Push Button


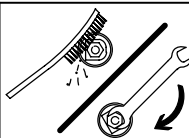
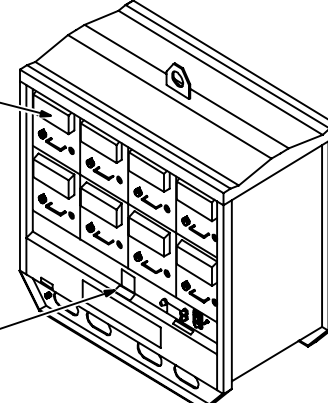
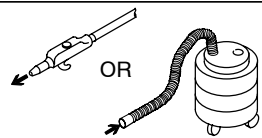
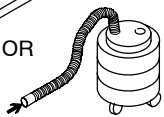
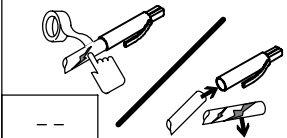
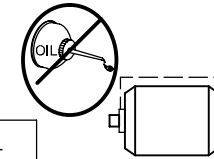

Press button to turn unit, pilot light, and fan motors Off.

# SECTION 6 – MAINTENANCE & TROUBLESHOOTING

## 6-1. Routine Maintenance




▲ Turn Off polyweld system, and disconnect input power before inspecting, maintaining, or servicing.

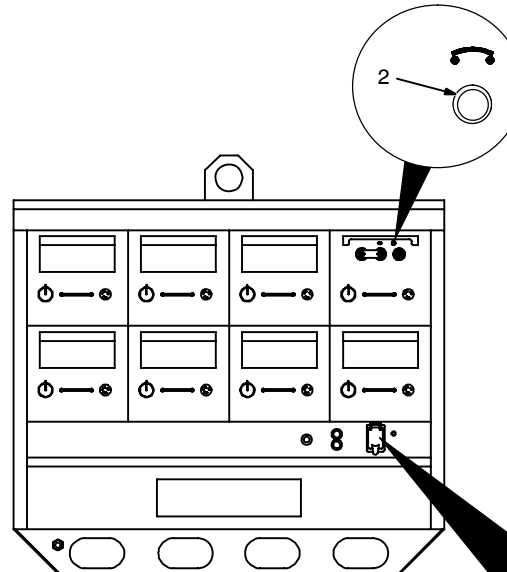
3 Months		6 Months
<div style="display: flex; justify-content: space-between;"> <div style="width: 45%;">  <p>See Section 4-6</p> </div> <div style="width: 45%;">  <p>Clean And Tighten Weld Terminals</p> </div> </div>		<div style="display: flex; justify-content: space-between;"> <div style="width: 45%;">  <p>Blow Out Or Vacuum Inside</p> </div> <div style="width: 45%;"> <p>OR</p>  </div> </div>
<div style="display: flex; justify-content: space-between;"> <div style="width: 45%;">  <p>Tape Or Replace Cracked Cables</p> </div> <div style="width: 45%;"> <p>During Heavy Service, Clean Monthly</p> </div> </div>		<div style="display: flex; justify-content: space-between;"> <div style="width: 45%;">  <p>Fan Motor Sealed Bearings - No Oil Needed</p> </div> <div style="width: 45%;"> <p>WARNIN</p>  <p>Replace Unreadable Labels</p> </div> </div>
<div style="display: flex; justify-content: space-between;"> <div style="width: 45%;"> <p>10</p> </div> <div style="width: 45%;"> <p>10</p> </div> </div>		<p>ST-144 567-A</p>

## 6-2. Overload Protection

### A. Overload Supplementary Protector CB1 And Module Supplementary Protectors CB11 Through CB81



▲ Turn Off polyweld system, and disconnect input power before inspecting, maintaining, or servicing.

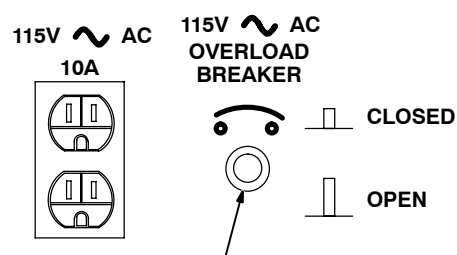


- 1 Overload Supplementary Protecotr CB1

Supplementary protector CB1 protects the 115 volts ac windings of control transformer T3 from overload. If CB1 opens, the 115 volts ac duplex receptacle RC2 would not work. Manually reset CB1.

- 2 Module Supplementary Protectors CB11 Through CB81

The control circuitry in each of the eight modules is protected from overload by a supplementary protector CBX1 ("X" represents the number of the applicable module, 1-8). If a module supplementary protector opens, output from the affected module would drop to minimum and can not be regulated. Manually reset the affected protector.



115V ~ AC 10A OVERLOAD BREAKER

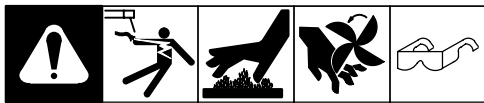
CLOSED

OPEN

1

ST-144 570-A / Ref. ST-174 143 / Ref. SC-085 382

## B. Control Fuses F3 And F4



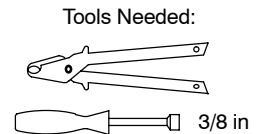
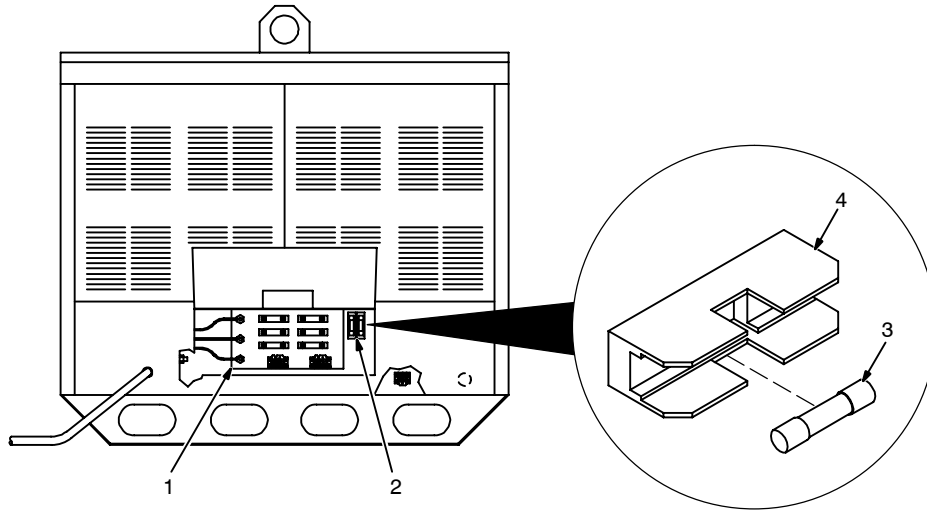
▲ Turn Off polyweld system, and disconnect input power before inspecting, maintaining, or servicing.

Turn Off polyweld system and disconnect input power.

- 1 Input Terminal Board
- 2 Fuses F3 And F4 Location
- 3 Fuse F3 Or F4 (See Parts List For Rating)
- 4 Fuse Holder

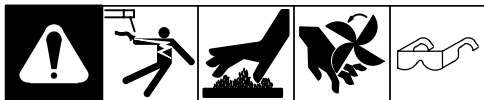
Check F3 or F4, and replace if needed. Use proper tool when removing fuse.

Close rear access door.



Ref. ST-144 569-B / Ref. ST-146 126-C

## C. Module Fuse Links F11 And F12 Through F81 And F82



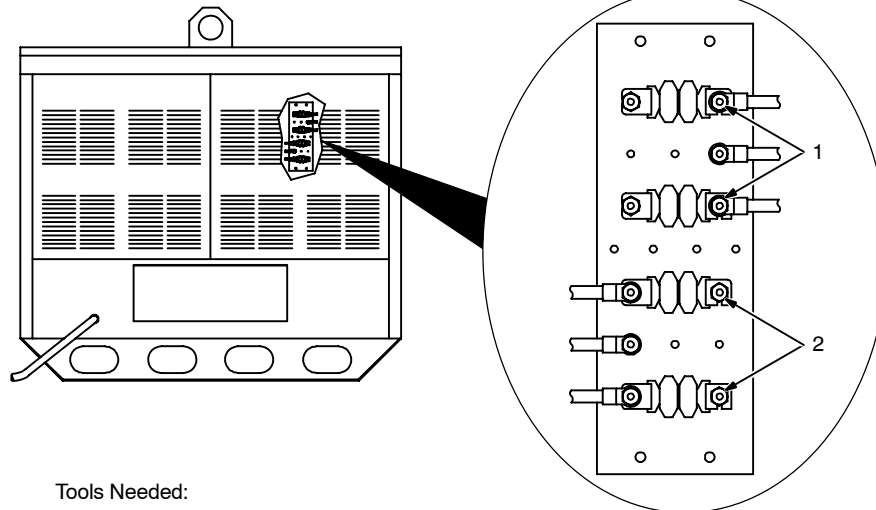
▲ Turn Off polyweld system, and disconnect input power before inspecting, maintaining, or servicing.

Turn Off polyweld system and disconnect input power.

- 1 Fuse Links (Odd Number Modules)
- 2 Fuse Links (Even Number Modules)

Each of the eight modules is protected from overload by a pair of link-type fuses FX1 and FX2 ("X" represents the number of the applicable module, 1-8). If one fuse link for a module opens, low weld output is available at the applicable module. If both fuse links open, no weld output is available at the affected module.

To replace fuse(s), proceed as follows: Remove upper rear panel. Check fuse(s), and replace if necessary. Reinstall upper rear panel.



Tools Needed:



ST-800 479 / ST-155 300






## 6-3. Blank Module Panel



▲ Turn Off polyweld system, and disconnect input power before inspecting, maintaining, or servicing.

A blank module panel is included with each polyweld system. If a module is removed, install the blank module panel in the location where the module was removed before using the remaining modules. This panel prevents the touching of inside parts and wires, and ensures proper air flow through the polyweld system.

## 6-4. Troubleshooting

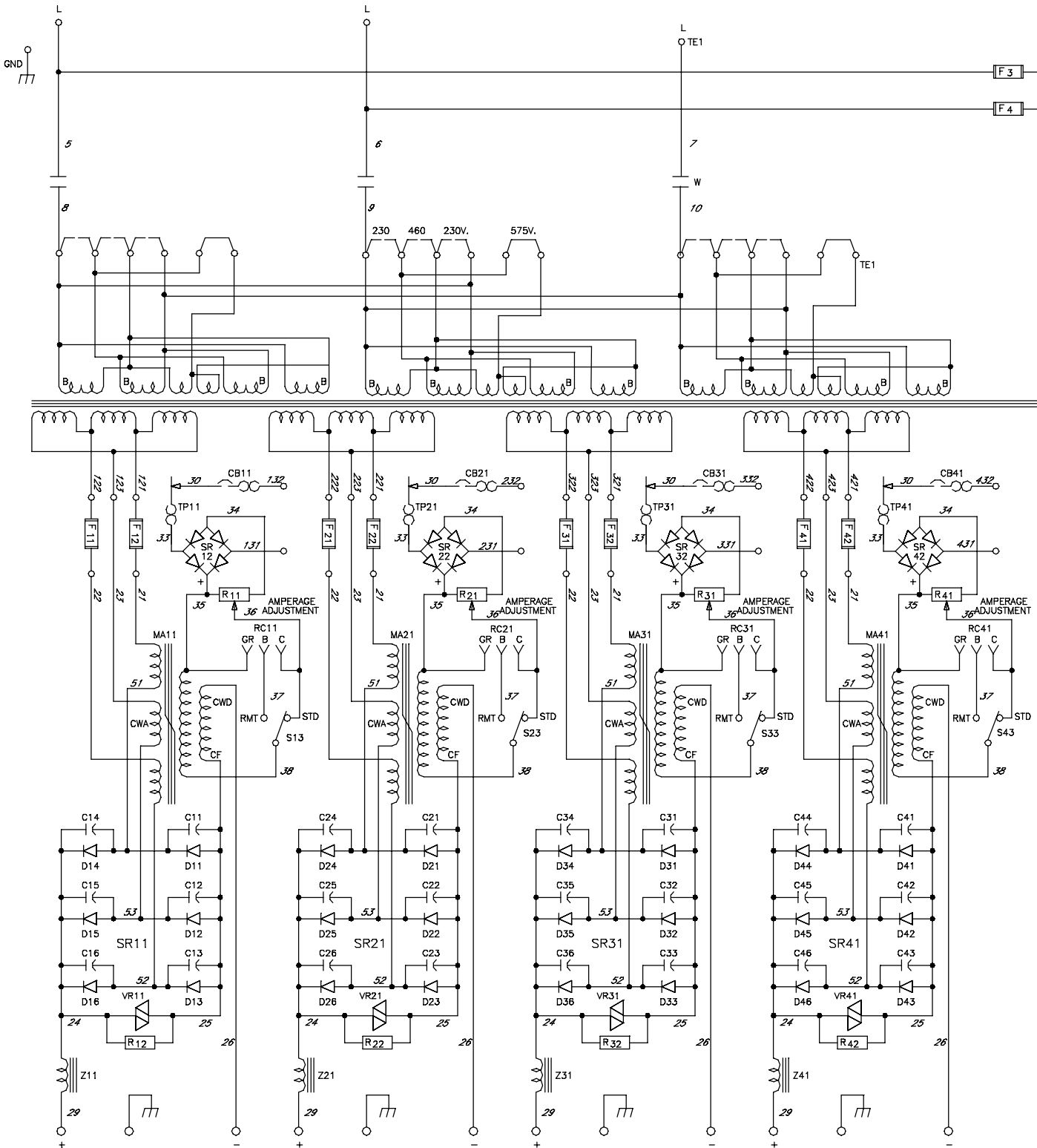
    		<p style="text-align: center;">▲ Turn Off polyweld system, and disconnect input power before inspecting, maintaining, or servicing.</p>
Trouble	Remedy	
No weld output from any module; fan motors off; pilot light off.	Place line disconnect device in On position (see Section 4-10).	
	Check line fuse(s), and replace if needed. Reset circuit breakers (see Section 4-10).	
	Check for proper input connections (see Section 4-10).	
	Check position of input voltage jumper links (see Section 4-10).	
	Be sure power switch is On (see Section 5-3).	
	Check fuse F3 and/or F4, and replace if needed (see Section 6-2).	
	Have Factory Authorized Service Station/Service Distributor check Start/Stop push buttons PB1/PB2 and replace if necessary.	
No weld output from any module; fan motors on; pilot light off.	Thermostat TP1 open (overheating). Allows fans to run; thermostat closes when unit has cooled (see Section 6-2).	
No weld output from any module; fan motors on; pilot light on.	Have Factory Authorized Service Station/Service Distributor check contactor W and replace if needed.	
Limited output and low open circuit voltage from All modules.	Check incoming power for correct voltage. Replace line fuse if open or reset circuit breaker (see Section 4-10).	
	Check position of input voltage jumper links (see Section 4-10).	
No weld output from one module only.	Check fuse links, and replace if needed (see Section 6-2).	
Low weld output from one module only. No amperage control.	Place Remote Amperage control switch in Off position or connect remote amperage control to Remote Amperage Control receptacle (see Section 5-2).	
	Check module fuse link, and replace if needed (see Section 6-2).	
	Reset module supplementary protector (see Section 6-2).	
	Module thermostat open (overheating). Allow module to cool down; thermostat closes when module has cooled (see Section 6-2).	
Erratic weld output.	Tighten all weld cable connections (see Section 4-6).	
	Check for proper size and type of cable (see Section 4-10).	
	Check for proper input and output connections (see Sections 4-10 and 4-6).	
	Use dry, properly stored electrodes.	
No weld output at 115 volts ac duplex receptacle.	Reset overload supplementary protector CB1 (see Section 6-2).	
	Check fuse F3 and/or F4, and replace if needed (see Section 6-2).	
Fan motor(s) does not run when On push button is pressed.	Check fuse F3 and/or F4, and replace if needed (see Section 6-2).	
	Have Factory Authorized Service Station/Service Distributor check control relay CR1 and fan motor FM1 or FM2.	
For GTAW, wandering arc – poor control of direction of arc.	Select proper size tungsten (see Section 8-1).	
	Properly prepare tungsten (see Sections 8-2 or 8-3).	
Tungsten electrode oxidizing and not remaining bright after conclusion of weld.	Shield weld zone of drafts.	
	Properly prepare tungsten (see Sections 8-2 or 8-3).	
	Replace torch parts if water has leaked into torch.	

# Notes

## DECIMAL EQUIVALENTS

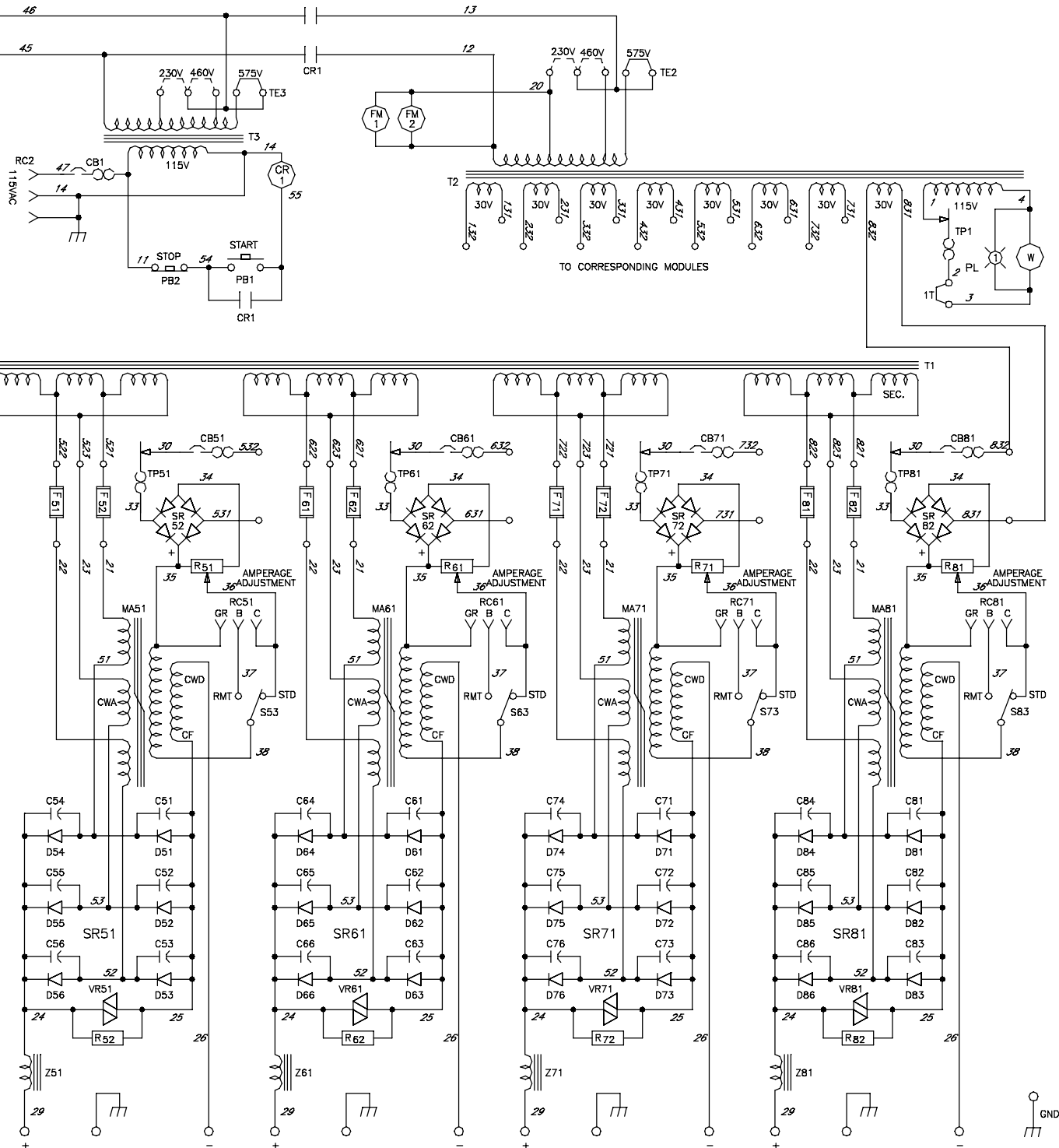
	$\frac{1}{64}$	.015625
	$\frac{1}{32}$	.03125
	$\frac{3}{64}$	.046875
$\frac{1}{16}$	$\frac{5}{64}$	.0625
	$\frac{7}{64}$	.078125
	$\frac{3}{32}$	.09375
	$\frac{9}{64}$	.109375
$\frac{1}{8}$	$\frac{11}{64}$	.125
	$\frac{13}{64}$	.140625
	$\frac{5}{32}$	.15625
	$\frac{15}{64}$	.171875
$\frac{3}{16}$	$\frac{17}{64}$	.1875
	$\frac{19}{64}$	.203125
	$\frac{7}{32}$	.21875
	$\frac{21}{64}$	.234375
$\frac{1}{4}$	$\frac{23}{64}$	.25
	$\frac{25}{64}$	.265625
	$\frac{9}{32}$	.28125
	$\frac{27}{64}$	.296875
$\frac{5}{16}$	$\frac{29}{64}$	.3125
	$\frac{31}{64}$	.328125
	$\frac{11}{32}$	.34375
	$\frac{33}{64}$	.359375
$\frac{3}{8}$	$\frac{35}{64}$	.375
	$\frac{37}{64}$	.390625
	$\frac{13}{32}$	.40625
	$\frac{39}{64}$	.421875
$\frac{7}{16}$	$\frac{41}{64}$	.4375
	$\frac{43}{64}$	.453125
	$\frac{15}{32}$	.46875
	$\frac{45}{64}$	.484375
$\frac{1}{2}$	$\frac{47}{64}$	.5
	$\frac{49}{64}$	.515625
	$\frac{17}{32}$	.53125
	$\frac{51}{64}$	.546875
$\frac{9}{16}$	$\frac{53}{64}$	.5625
	$\frac{55}{64}$	.578125
	$\frac{19}{32}$	.59375
	$\frac{57}{64}$	.609375
$\frac{5}{8}$	$\frac{59}{64}$	.625
	$\frac{61}{64}$	.640625
	$\frac{21}{32}$	.65625
	$\frac{63}{64}$	.671875
$\frac{11}{16}$	$\frac{65}{64}$	.6875
	$\frac{67}{64}$	.703125
	$\frac{23}{32}$	.71875
	$\frac{69}{64}$	.734375
$\frac{3}{4}$	$\frac{71}{64}$	.75
	$\frac{73}{64}$	.765625
	$\frac{25}{32}$	.78125
	$\frac{75}{64}$	.796875
$\frac{13}{16}$	$\frac{77}{64}$	.8125
	$\frac{79}{64}$	.828125
	$\frac{27}{32}$	.84375
	$\frac{81}{64}$	.859375
$\frac{7}{8}$	$\frac{83}{64}$	.875
	$\frac{85}{64}$	.890625
	$\frac{29}{32}$	.90625
	$\frac{87}{64}$	.921875
$\frac{15}{16}$	$\frac{89}{64}$	.9375
	$\frac{91}{64}$	.953125
	$\frac{31}{32}$	.96875
	$\frac{93}{64}$	.984375
$1$	$\frac{95}{64}$	1.

# SECTION 7 – ELECTRICAL DIAGRAM



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

Figure 7-1. Circuit Diagram For Polyweld System



# SECTION 8 – SELECTING AND PREPARING TUNGSTEN ELECTRODE

gtaw 7/97

## NOTE

*For additional information, see your distributor for a handbook on the Gas Tungsten Arc Welding (GTAW) process. Wear clean gloves to prevent contamination of tungsten electrode.*

### 8-1. Selecting Tungsten Electrode

Electrode Diameter	Amperage Range - Gas Type♦ - Polarity			
	DC – Argon – Electrode Negative/Straight Polarity	DC – Argon – Electrode Positive/Reverse Polarity	AC – Argon – Using High Frequency	AC – Argon – Balanced Wave Using High Freq.
<b>Pure Tungsten (Green Band)</b>				
.010"	Up to 15	*	Up to 15	Up to 10
.020"	5-20	*	5-20	10-20
.040"	15-80	*	10-60	20-30
1/16"	70-150	10-20	50-100	30-80
3/32"	125-225	15-30	100-160	60-130
1/8"	225-360	25-40	150-210	100-180
5/32"	360-450	40-55	200-275	160-240
3/16"	450-720	55-80	250-350	190-300
1/4"	720-950	80-125	325-450	250-400
<b>2% Thorium Alloyed Tungsten (Red Band)</b>				
.010"	Up to 25	*	Up to 20	Up to 15
.020"	15-40	*	15-35	5-20
.040"	25-85	*	20-80	20-60
1/16"	50-160	10-20	50-150	60-120
3/32"	135-235	15-30	130-250	100-180
1/8"	250-400	25-40	225-360	160-250
5/32"	400-500	40-55	300-450	200-320
3/16"	500-750	55-80	400-500	290-390
1/4"	750-1000	80-125	600-800	340-525
<b>Zirconium Alloyed Tungsten (Brown Band)</b>				
.010"	*	*	Up to 20	Up to 15
.020"	*	*	15-35	5-20
.040"	*	*	20-80	20-60
1/16"	*	*	50-150	60-120
3/32"	*	*	130-250	100-180
1/8"	*	*	225-360	160-250
5/32"	*	*	300-450	200-320
3/16"	*	*	400-550	290-390
1/4"	*	*	600-800	340-525

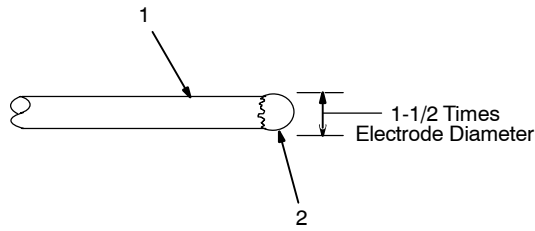
♦ Typical argon shielding gas flow rates are 15 to 35 cfh (cubic feet per hour).

\*Not Recommended.

The figures listed are intended as a guide and are a composite of recommendations from American Welding Society (AWS) and electrode manufacturers.



## 8-2. Preparing Tungsten For AC Or DC Electrode Positive (DCEP) Welding



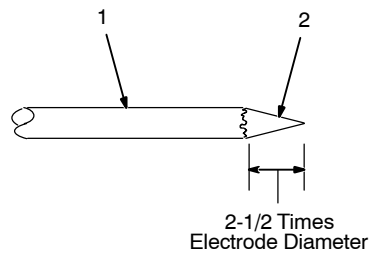
- 1 Tungsten Electrode
- 2 Balled End

▲ **Understand and follow safety symbols at start of Section 9-1 before preparing tungsten.**

Ball end of tungsten before welding by applying either an ac amperage slightly higher than what is recommended for a given electrode diameter (see Section 8-1), or a dc electrode positive amperage.

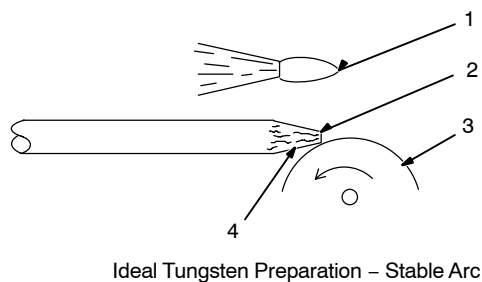
Ref. S-0161

## 8-3. Preparing Tungsten For DC Electrode Negative (DCEN) Welding



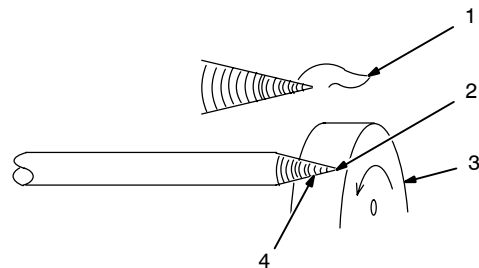
- 1 Tungsten Electrode
- 2 Tapered End

Grind end of tungsten on fine grit, hard abrasive wheel before welding. Do not use wheel for other jobs or tungsten can become contaminated causing lower weld quality.



- 1 Stable Arc
- 2 Flat
- 3 Grinding Wheel
- 4 Straight Ground

Diameter of this flat determines amperage capacity.



- 1 Arc Wander
- 2 Point
- 3 Grinding Wheel
- 4 Radial Ground

Wrong Tungsten Preparation - Wandering Arc

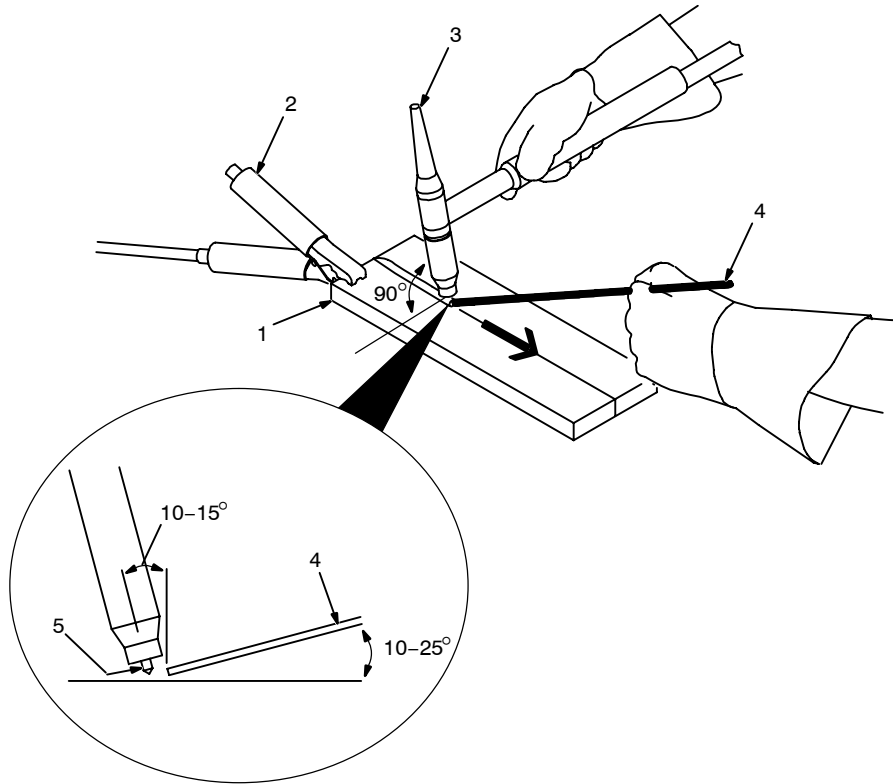
Ref. S-0161 / Ref. S-0162

# SECTION 9 – GUIDELINES FOR TIG WELDING (GTAW)

## 9-1. Positioning The Torch



▲ Weld current can damage electronic parts in vehicles. Disconnect both battery cables before welding on a vehicle. Place work clamp as close to the weld as possible.



1 Workpiece

Make sure workpiece is clean before welding.

2 Work Clamp

Place as close to the weld as possible.

3 Torch

4 Filler Rod (If Applicable)

5 Tungsten Electrode

Select and prepare tungsten according to Sections 8-1, and 8-2 or 8-3.

Tungsten extension is the distance the tungsten extends out gas cup of torch.

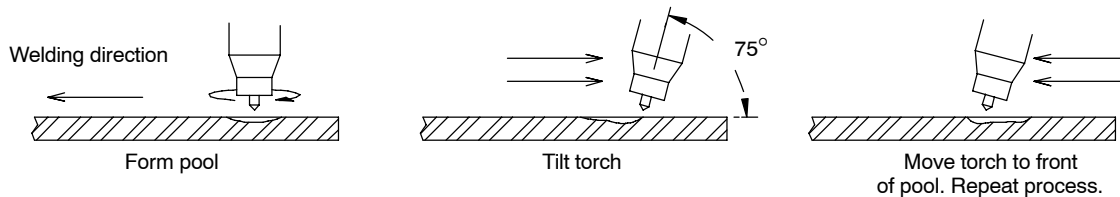
Arc length is the distance from the tungsten to the workpiece.

As a general guide, start with an extension and arc length equal to diameter of tungsten.

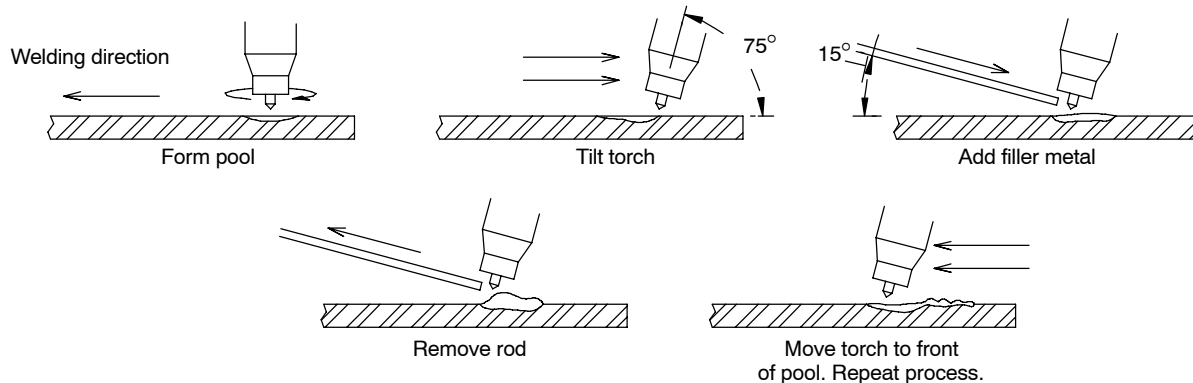
ST-161 892

## 9-2. Torch Movement During Welding

### Tungsten Without Filler Rod



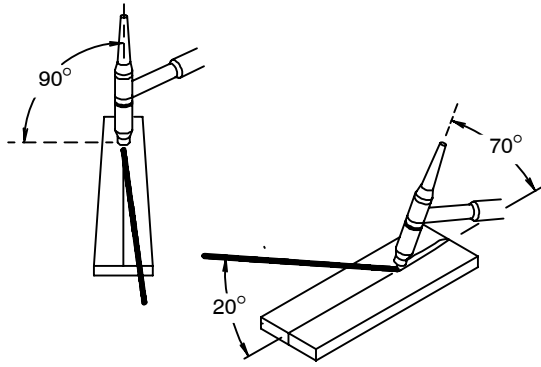
### Tungsten With Filler Rod



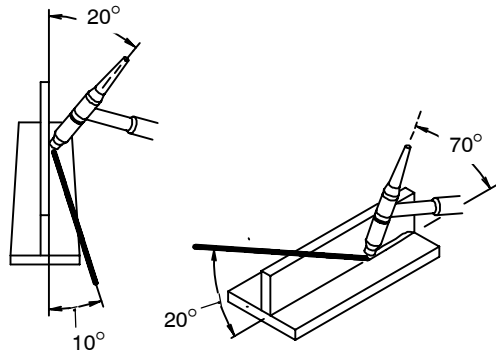
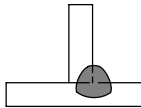
ST-162 002-B

### 9-3. Positioning Torch Tungsten For Various Weld Joints

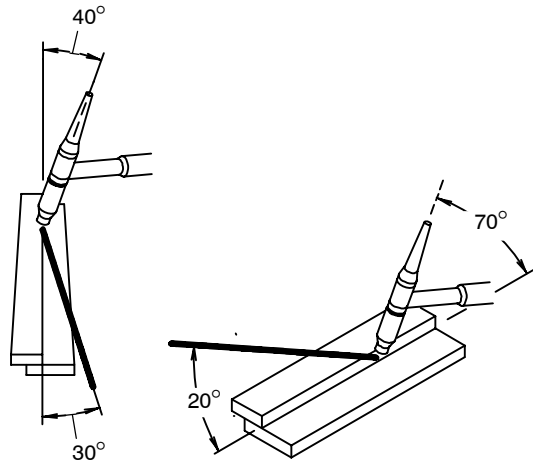
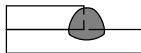
Butt Weld And Stringer Bead



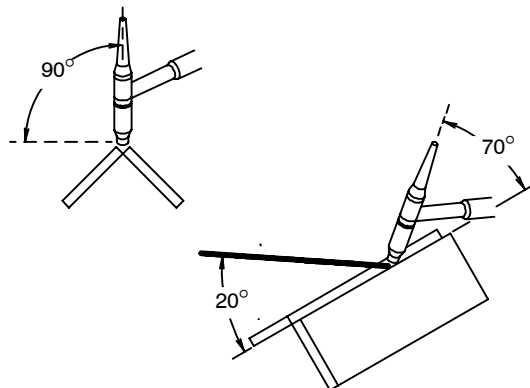
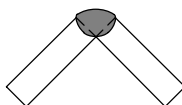
"T" Joint




Lap Joint

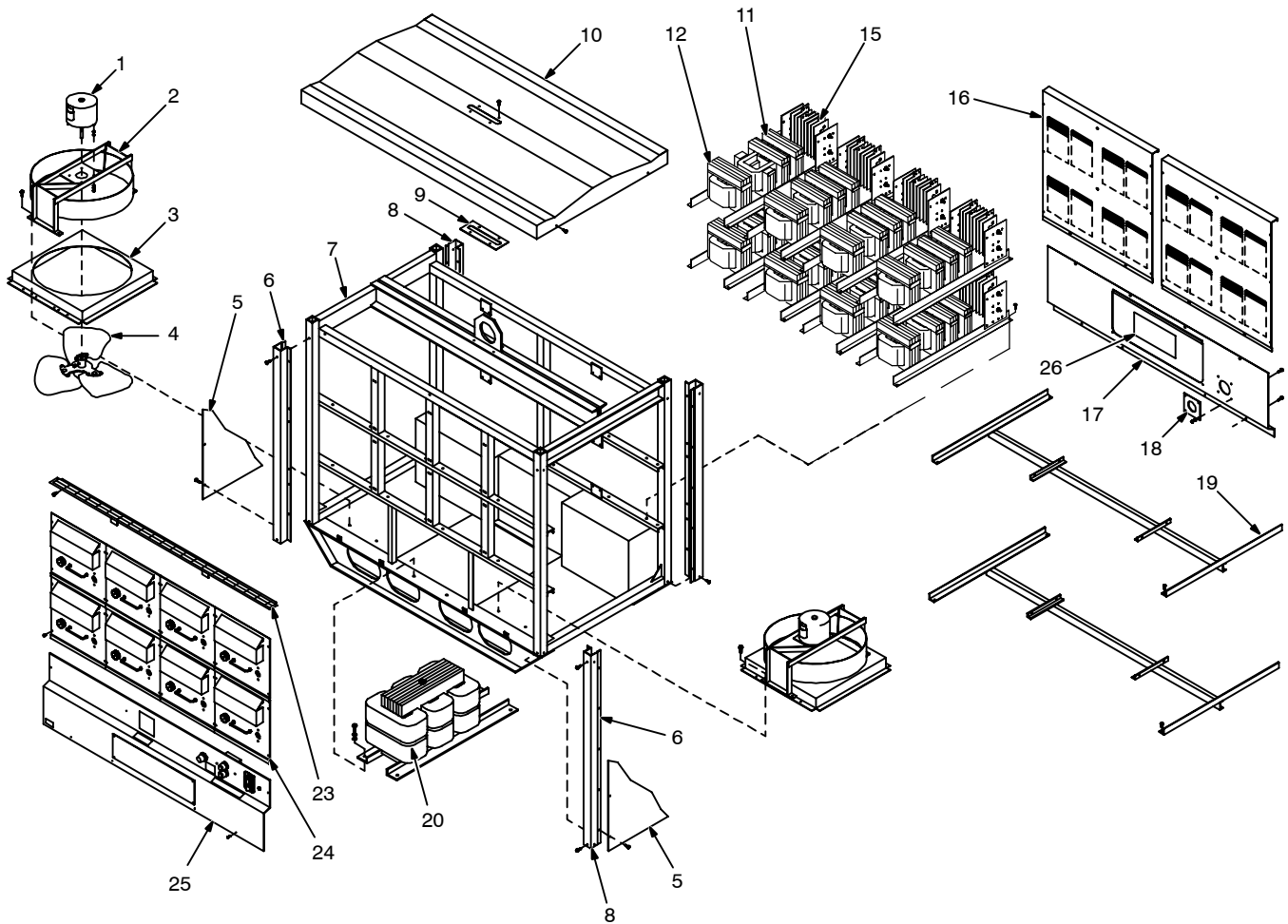


Corner Joint



# SECTION 10 – PARTS LIST

 Hardware is common and not available unless listed.



ST-144 531-D

**Figure 10-1. Main Assembly (Section A)**

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

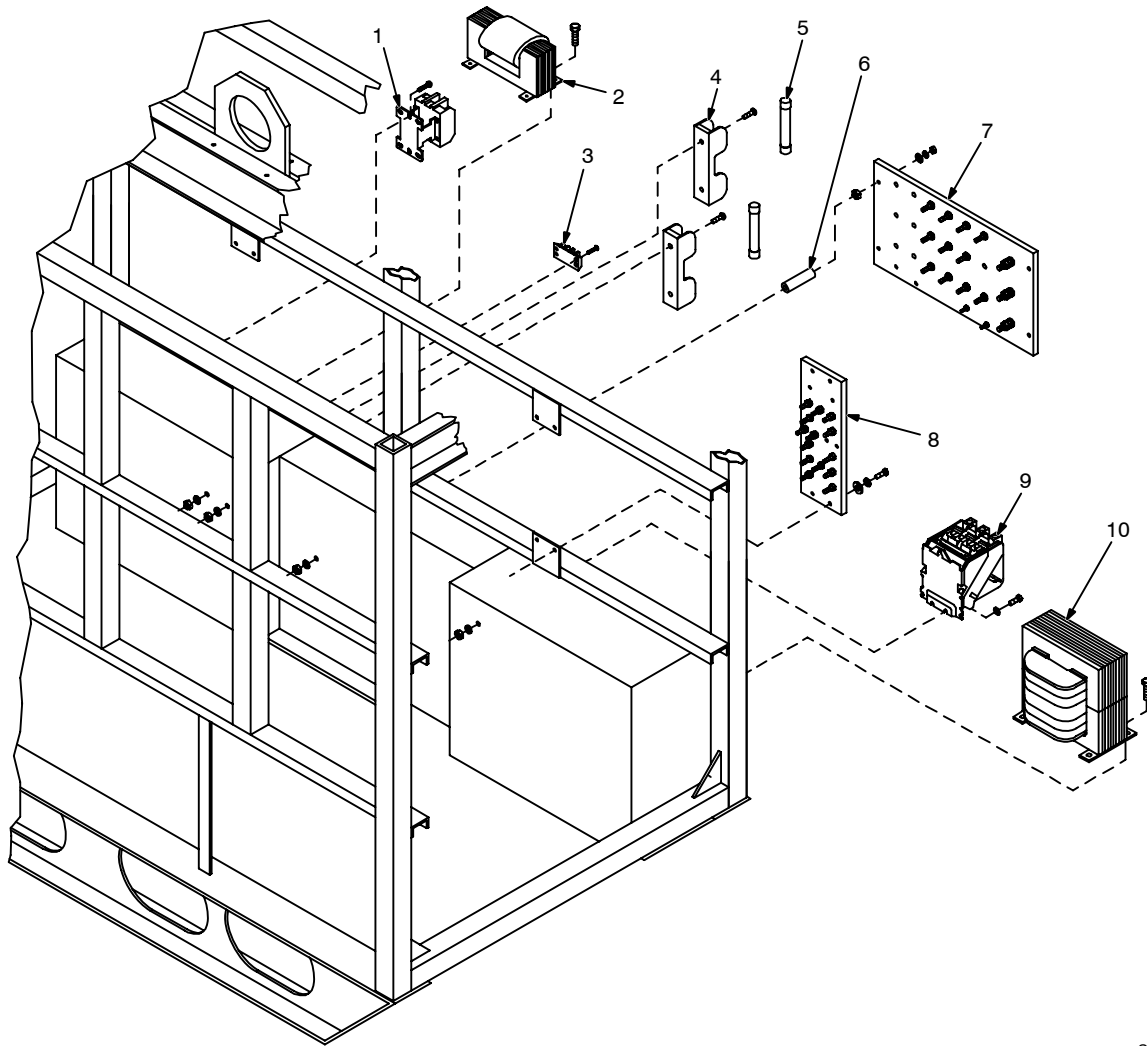
**Figure 10-1. Main Assembly (Section A)**

... 1	FM1,2	032 605	.. MOTOR, cap perm SP 1/4hp 230VAC 1625RPM	2
... 2		071 763	.. FRAME, mtg fan motor	2
... 3		014 544	.. CHAMBER, plenum	2
... 4		147 558	.. BLADE, fan 20 in 3wg 21deg .500 bore CCW	2
... 5		087 125	.. PANEL, side	2
... 6		086 677	.. COLUMN, corner LH front & RH rear	2
... 7		144 583	.. BASE	1
... 8		086 678	.. COLUMN, corner RH front & LH rear	2
... 9		032 473	.. GASKET, lift eye	1
... 10		032 474	.. COVER, top	1
... 11	MA,Z	099 480	.. AMPLIFIER & STABILIZER, mag (includes)	8
... 12		084 932	.. STABILIZER, (includes)	1
... 13	TP11	200 936	.. THERMOSTAT, NC	1
... 15	SR11	210 352	.. RECTIFIER ASSEMBLY, si diode	1
... 16		086 679	.. PANEL, rear upper	2
... 17		+087 178	.. PANEL, rear lower	1
... 18		102 207	.. PLATE, adapter power cord	1
... 19		087 124	.. FRAME, mtg module center	2
...		020 279	.. CLAMP, stl cush .750dia x .281mtg hole	6
...		087 318	.. CLAMP, stl cush 1.000dia x .203mtg hole	6
... 20	T1	128 492	.. TRANSFORMER, pwr main (230/460/575) (includes)	1
...	TP1	026 181	.. THERMOSTAT, NC	1
... 20	T1	128 493	.. TRANSFORMER, pwr main (220/380/440) (includes)	1
...	TP1	026 181	.. THERMOSTAT, NC	1
... 23		173 513	.. SCREEN, front upper	1
... 24		Fig10-3	.. PANEL, front module w/components	8
... 25		Fig 10-1	.. PANEL, front lower w/components	1
...		603 732	.. NUT, brs hex .750-10 full hvy	2
... 26		217 733	.. LABEL, warning electric shock & input power (EN/FR)	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.**

☞ Hardware is common and not available unless listed.



ST-144 660

**Figure 10-2. Main Assembly (Section B)**

Item No.	Dia. Mkgs.	Part No.	Description	Quantity
<b>Figure 10-2. Main Assembly (Section B)</b>				
1	CR1	194 307	CONTACTOR, def prp 40A 3P 120V	1
2	T3	092 324	TRANSFORMER, kVA 1 115-230/460/575	1
2	T3	092 322	TRANSFORMER, kVA 1 115-220/380/440 (50 Hz)	1
3	1T	038 617	BLOCK, term 30A 2P	1
		038 620	LINK, jumper term blk 30A	1
4		070 404	HOLDER, fuse crtg 30A 600V 1P w/clips	2
5	F3,4	*012 664	FUSE, crtg 15A 600V	2
6		010 117	TUBING, stl .625 OD x .156 wall x 2.625 lg	4
7	TE1	027 096	TERMINAL ASSEMBLY, pri 3ph dual voltage (includes)	1
		038 974	TERMINAL BOARD, pri	1
		601 836	NUT, brs hex .250-20 jam hvy	30
		010 915	WASHER, flat brs .250 ID x .625 OD x .031thk	15
		038 890	STUD, pri bd brs .250-20 x 2.125	18
		038 994	LINK, jumper pri	6
		038 620	LINK, jumper term blk 30A	2
		038 622	BLOCK, term 30A 5P	2
		601 838	NUT, brs hex .375-16 jam hvy	9
		010 910	WASHER, flat stl SAE .375	3
		602 213	WASHER, lock stl split .375	3
		038 804	STUD, brs .375-16 x 2.500	3
		010 913	WASHER, flat brs .218 ID x .460 OD x .031thk	4
8	F11-82	012 237	FUSE PANEL, module (includes)	4
		038 888	STUD, pri bd brs .250-20 x 1.500	10
		038 205	PANEL, fuse	1
		010 915	WASHER, flat brs .250 ID x .625 OD x .031thk	10
		601 836	NUT, brs hex .250-20 jam hvy	14
		*012 207	FUSE, link 200A 250V	4
		602 241	WASHER, flat stl SAE .250	4
		602 207	WASHER, lock stl split .250	4
		601 835	NUT, brs hex 10-32	4
		010 913	WASHER, flat brs .218 ID x .460 OD x .031thk	4
		038 887	STUD, pri bd brs 10-32 x 1.375	4
		177 711	INSULATOR, cover fuse	4
9	W	099 044	CONTACTOR, sz 3-1/2 3P 110-120/220-240 (includes)	1
		048 599	COIL, cntor 115/230V sz 3-1/2	1
10	T2	144 589	TRANSFORMER, kVA 2 115-230/460/575	1
10	T2	144 590	TRANSFORMER, kVA 2 115-220/230/380/440 (50 Hz)	1
		015 722	GROMMET, rbr 1.250 ID x 1.500mtg hole	2


\*Recommended Spare Parts.

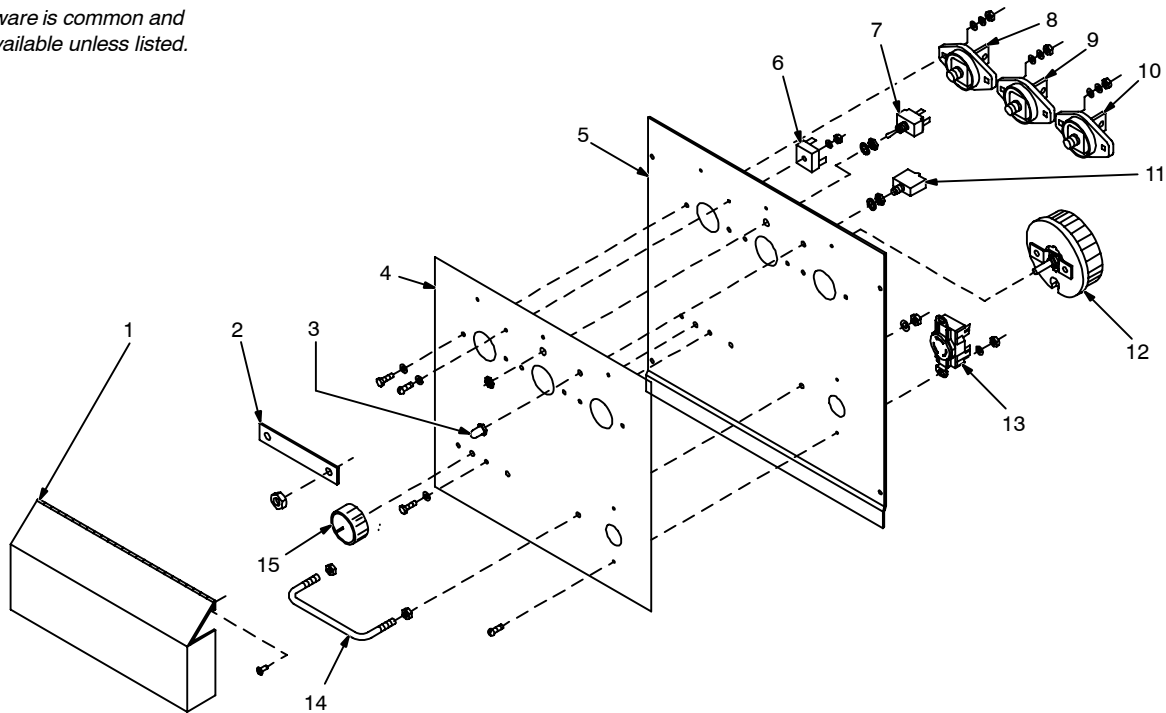
**To maintain the factory original performance of your equipment, use only Manufacturer's Suggested Replacement Parts. Model and serial number required when ordering parts from your local distributor.**

Item No.	Dia. Mkgs.	Part No.	Description	Quantity
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**Figure 10-3. Panel, Front Module w/Components (Fig 10-1 Item 24)**

1		034 253	DOOR, access pwr output (includes)	1
		032 477	INSULATOR, cover secondary	1
2		038 978	LINK, jumper	1
3		026 758	BOOT, circuit breaker	1
4		177 618	PLATE, front module 50/60 HZ models	1
4		174 143	PLATE, front module 60 HZ models	1
5		098 899	PANEL, front module	1
6	SR12	035 704	RECTIFIER, integ 40A 800V	1
7	S13	*011 609	SWITCH, tgl SPDT 156A 125VAC	1
8		181 245	TERMINAL, pwr output red	1
9		182 665	TERMINAL, pwr output neutral	1
10		181 246	TERMINAL, pwr output black	1
11	CB11	083 432	SUPPLEMENTARY PROTECTOR, man reset 1P 10A 250V	1
12	R11	222 736	RHEOSTAT, WW 150W 15 ohm	1
13	RC11	039 607	RECEPTACLE, twlk 3P3W 20A 250V	1
		605 797	PLUG, twlk 3P3W 20A 120V Arrow Hart 6312	1
14		010 828	HANDLE	1
15		097 926	KNOB, pointer	1

 Hardware is common and not available unless listed.



ST-155 304-C

**Figure 10-3. Panel, Front Module w/Components**

\*Recommended Spare Parts.

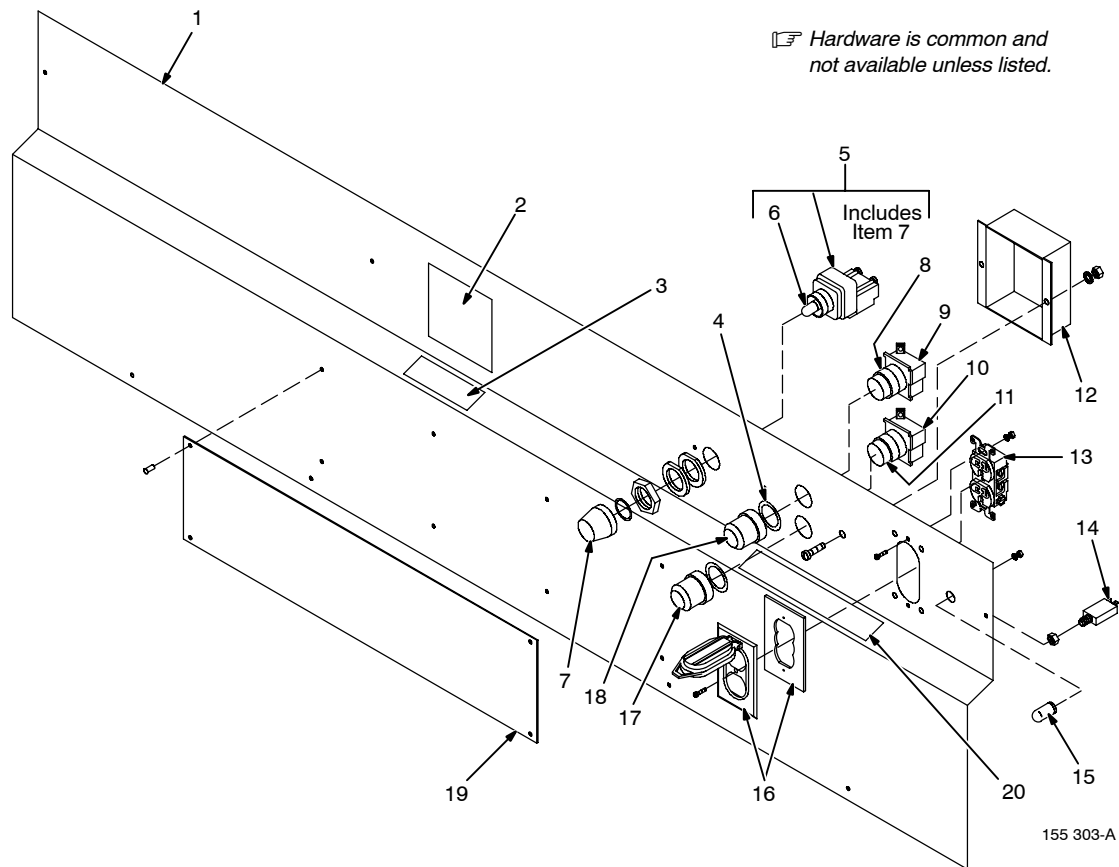
**To maintain the factory original performance of your equipment, use only Manufacturer's Suggested Replacement Parts. Model and serial number required when ordering parts from your local distributor.**



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

**Figure 10-4. Panel, Front Lower w/Components (Fig 10-1 Item 25)**

1		+086 855	PANEL, front lower	1
2		217 136	LABEL, warning electric shock	1
3		174 847	LABEL, general precautionary	1
4		004 449	RING, spacer switch	2
5		204 360	LIGHT, ind white lens (includes)	1
6	PL1	*027 633	BULB, incand bayonet base 8V	1
7		204 361	LENS, light ind white	1
8	Start	011 033	PUSH BUTTON, operator black	1
9	Start	011 035	CONTACT BLOCK, NO PB	1
10	Stop	011 036	CONTACT BLOCK, NC PB	1
11	Stop	011 034	PUSH BUTTON, operator red	1
12		016 585	COVER, dust	1
13	RC2	604 176	RECEPTACLE, str dx grd 2P3W 15A 125V	1
		073 690	PLUG, str grd armd 2P3W 15A 125V P & S 5266DF	
14	CB1	083 432	SUPPLEMENTARY PROTECTOR, man reset 1P 10A 250V	1
15		026 758	BOOT, circuit breaker	1
16		038 805	COVER, rcpt weatherproof duplex	1
17		004 450	BOOT, PB red	1
18		004 451	BOOT, PB black	1
19			NAMEPLATE, (order by model and serial number)	1
20		085 382	LABEL, component location	1



**Figure 10-4. Panel, Front Lower w/Components**

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

\*Recommended Spare Parts.

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



# TRUE BLUE<sup>®</sup>

## WARRANTY

Effective January 1, 2005

(Equipment with a serial number preface of "LF" or newer)

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

### Warranty Questions?

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

Your distributor also gives  
you ...

#### Service

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

#### Support

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

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

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

Miller shall honor warranty claims on warranted equipment listed below in the event of such a failure within the warranty time periods. All warranty time periods start on the date that the equipment was delivered to the original retail purchaser, or one year after the equipment is sent to a North American distributor or eighteen months after the equipment is sent to an International distributor.

1. 5 Years Parts — 3 Years Labor
  - \* Original main power rectifiers
  - \* Inverters (input and output rectifiers only)
2. 3 Years — Parts and Labor
  - \* Transformer/Rectifier Power Sources
  - \* Plasma Arc Cutting Power Sources
  - \* Semi-Automatic and Automatic Wire Feeders
  - \* Inverter Power Sources (Unless Otherwise Stated)
  - \* Water Coolant Systems (Integrated)
  - \* Intelligig
  - \* Maxstar 150
  - \* Engine Driven Welding Generators  
**(NOTE: Engines are warranted separately by the engine manufacturer.)**
3. 1 Year — Parts and Labor Unless Specified
  - \* DS-2 Wire Feeder
  - \* Motor Driven Guns (w/exception of Spoolmate Spoolguns)
  - \* Process Controllers
  - \* Positioners and Controllers
  - \* Automatic Motion Devices
  - \* RFCS Foot Controls
  - \* Induction Heating Power Sources and Coolers
  - \* Water Coolant Systems (Non-Integrated)
  - \* Flowgauge and Flowmeter Regulators (No Labor)
  - \* HF Units
  - \* Grids
  - \* Maxstar 85, 140
  - \* Spot Welders
  - \* Load Banks
  - \* Arc Stud Power Sources & Arc Stud Guns
  - \* Racks
  - \* Running Gear/Trailers
  - \* Plasma Cutting Torches (except APT & SAF Models)
  - \* Field Options  
(NOTE: Field options are covered under True Blue<sup>®</sup> for the remaining warranty period of the product they are installed in, or for a minimum of one year — whichever is greater.)
4. 6 Months — Batteries
5. 90 Days — Parts
  - \* MIG Guns/TIG Torches

- \* Induction Heating Coils and Blankets
- \* APT & SAF Model Plasma Cutting Torches
- \* Remote Controls
- \* Accessory Kits
- \* Replacement Parts (No labor)
- \* Spoolmate Spoolguns
- \* Canvas Covers

Miller's True Blue<sup>®</sup> Limited Warranty shall not apply to:

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

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

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

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

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

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

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





# Owner's Record

Please complete and retain with your personal records.

Model Name	Serial/Style Number
Purchase Date	(Date which equipment was delivered to original customer.)
Distributor	
Address	
City	
State	Zip



## For Service

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

Always provide Model Name and Serial/Style Number.

Contact your Distributor for:

- Welding Supplies and Consumables
  - Options and Accessories
  - Personal Safety Equipment
  - Service and Repair
  - Replacement Parts
  - Training (Schools, Videos, Books)
  - Technical Manuals (Servicing Information and Parts)
  - Circuit Diagrams
  - Welding Process Handbooks
- To locate a Distributor or Service Agency visit [www.millerwelds.com](http://www.millerwelds.com) or call 1-800-4-A-Miller

Contact the Delivering Carrier to:

- File a claim for loss or damage during shipment.
- For assistance in filing or settling claims, contact your distributor and/or equipment manufacturer's Transportation Department.

### Miller Electric Mfg. Co.

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

### International Headquarters—USA

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

### European Headquarters – United Kingdom

Phone: 44 (0) 1204-593493  
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[www.MillerWelds.com](http://www.MillerWelds.com)



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