



OM-358

188 291

September 1998

Processes



TIG (GTAW) Welding



Stick (SMAW) Welding

Description



Dynasty DX



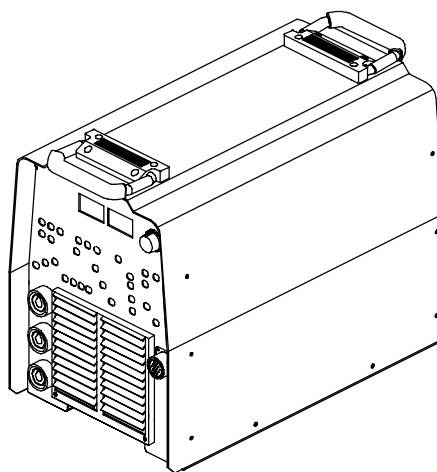
Dynasty 300 Models

Arc Welding Power Source

DynastyTM DX

With Auto-Link[®]

DynastyTM 300



And Non-CE Models



Visit our website at
www.Miller-Welds.com

OWNER'S MANUAL

From Miller to You

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

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

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

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



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

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 which exact part you may need to fix the problem. Warranty and service information for your particular model are also provided.

Miller Electric manufactures a full line of welders and welding related equipment. For information on other quality Miller products, contact your local Miller distributor to receive the latest full line catalog or individual catalog sheets. To locate your nearest distributor call 1-800-4-A-Miller.



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



Miller offers a Technical Manual which provides more detailed service and parts information for your unit. To obtain a Technical Manual, contact your local distributor. Your distributor can also supply you with Welding Process Manuals such as SMAW, GTAW, GMAW, and GMAW-P.



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The following terms are used interchangeably throughout this manual:
TIG = GTAW
Stick = SMAW

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Declaration of Conformity For European Community (CE) Products

NOTE

This information is provided for units with CE certification (see rating label on unit.)

Manufacturer's Name: **Miller Electric Mfg. Co.**

Manufacturer's Address: 1635 W. Spencer Street
Appleton, WI 54914 USA

Declares that the product: **Dynasty 300®**

conforms to the following Directives and Standards:

Directives

Low Voltage Directive: 73/23/EEC

Machinery Directives: 89/392/EEC, 91/368/EEC, 93/C 133/04, 93/68/EEC

Electromagnetic Capability Directives: 89/336, 92/31/EEC

Standards

Safety Requirements for Arc Welding Equipment part 1: EN 60974-1: 1990

*Arc Welding Equipment Part 1: Welding Power Sources: IEC 974-1
(December 1996 – Draft revision)*

Degrees of Protection provided by Enclosures (IP code): IEC 529: 1989

*Insulation coordination for equipment within low-voltage systems:
Part 1: Principles, requirements and tests: IEC 664-1: 1992*

*Electromagnetic compatibility (EMC) Product standard for arc welding equipment:
EN50199: August 1995*

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SECTION 1 – SAFETY PRECAUTIONS - READ BEFORE USING

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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 NO TAG. 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.

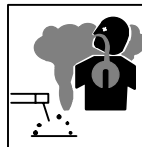
Touching live electrical parts can cause fatal shocks or severe burns. The electrode and work circuit is electrically live whenever the output is on. The input power circuit and machine internal circuits are also live when power is on. In semiautomatic or automatic wire welding, the wire, wire reel, 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.
- 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 use work clamp or work cable.
- Do not touch electrode if you are in contact with the work, ground, or another electrode from a different machine.
- 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 after removal of input power on inverters.

- 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 exhaust at the arc to remove welding fumes and gases.
- If ventilation is poor, use an approved air-supplied respirator.
- Read 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 watchperson 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 if necessary, 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.

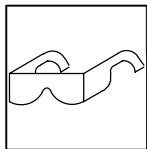
- Wear a welding helmet fitted with a proper shade of filter to protect your face and eyes when welding or watching (see ANSI Z49.1 and Z87.1 listed in Safety Standards).
- Wear approved safety glasses with side shields under your helmet.
- Use protective screens or barriers to protect others from flash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

- Protect yourself and others from flying sparks and hot metal.
- Do not weld where flying sparks can strike flammable material.
- Remove all flammables within 35 ft (10.7 m) of the welding arc. If this is not possible, tightly cover them with approved covers.
- 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 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.



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.



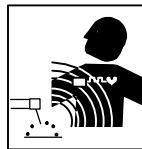
BUILDUP OF GAS can injure or kill.

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



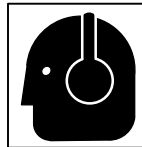
HOT PARTS can cause severe burns.

- Do not touch hot parts bare handed.
- Allow cooling period before working on gun or torch.



MAGNETIC FIELDS can affect pacemakers.

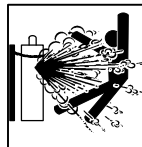
- Pacemaker wearers keep away.
- Wearers should consult their doctor before going near arc welding, gouging, or spot welding operations.



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, 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.
- Read and follow instructions on compressed gas cylinders, associated equipment, and CGA publication P-1 listed in Safety Standards.

1-3. Additional Symbols for Installation, Operation, and Maintenance



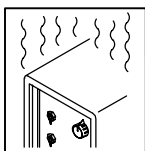
FIRE OR EXPLOSION hazard.

- 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.



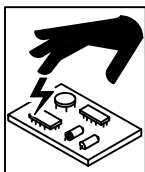
FALLING UNIT can cause injury.

- 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.



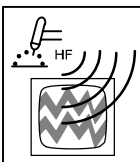
WELDING WIRE can cause injury.

- 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.



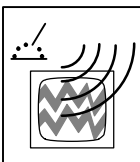
MOVING PARTS can cause injury.

- Keep away from moving parts such as fans.
- Keep all doors, panels, covers, and guards closed and securely in place.



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. Principal Safety Standards

Safety in Welding and Cutting, ANSI Standard Z49.1, from American Welding Society, 550 N.W. LeJeune Rd, Miami FL 33126

Safety and Health Standards, OSHA 29 CFR 1910, from Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402.

Recommended Safe Practices for the Preparation for Welding and Cutting of Containers That Have Held Hazardous Substances, American Welding Society Standard AWS F4.1, from American Welding Society, 550 N.W. LeJeune Rd, Miami, FL 33126

National Electrical Code, NFPA Standard 70, from National Fire Protection Association, Batterymarch Park, Quincy, MA 02269.

Safe Handling of Compressed Gases in Cylinders, CGA Pamphlet P-1, from Compressed Gas Association, 1235 Jefferson Davis Highway, Suite 501, Arlington, VA 22202.

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.

Safe Practices For Occupation And Educational Eye And Face Protection, ANSI Standard Z87.1, from American National Standards Institute, 1430 Broadway, New York, NY 10018.

Cutting And Welding Processes, NFPA Standard 51B, from National Fire Protection Association, Batterymarch Park, Quincy, MA 02269.

1-5. 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 first. If cleared by your doctor, then following the above procedures is recommended.

1-1. Signification des symboles



Signifie Mise en garde ! Soyez vigilant ! Cette procédure présente des risques de danger ! Ceux-ci sont identifiés par des symboles adjacents aux directives.

▲ Identifie un message de sécurité particulier.

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



Ce groupe de symboles signifie Mise en garde ! Soyez vigilant ! Il y a des risques de danger reliés aux CHOCS ÉLECTRIQUES, aux PIÈCES EN MOUVEMENT et aux PIÈCES CHAUDES. Reportez-vous aux symboles et aux directives ci-dessous afin de connaître les mesures à prendre pour éviter tout danger.

1-2. Dangers relatifs au soudage à l'arc

▲ Les symboles présentés ci-après sont utilisés tout au long du présent manuel pour attirer votre attention et identifier les risques de danger. Lorsque vous voyez un symbole, soyez vigilant et suivez les directives mentionnées afin d'éviter tout danger. Les consignes de sécurité présentées ci-après ne font que résumer l'information contenue dans les normes de sécurité énumérées à la section 1-5. Veuillez lire et respecter toutes ces normes de sécurité.

▲ L'installation, l'utilisation, l'entretien et les réparations ne doivent être confiés qu'à des personnes qualifiées.

▲ Au cours de l'utilisation, tenir toute personne à l'écart et plus particulièrement les enfants.



UN CHOC ÉLECTRIQUE peut tuer.

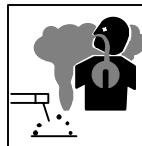
Un simple contact avec des pièces électriques peut provoquer une électrocution ou des blessures graves. L'électrode et le circuit de soudage sont sous tension dès que l'appareil est sur ON. Le circuit d'entrée et les circuits internes de l'appareil sont également sous tension à ce moment-là. En soudage semi-automatique ou automatique, le fil, le dévidoir, le logement des galets d'entraînement et les pièces métalliques en contact avec le fil de soudage sont sous tension. Des matériels mal installés ou mal mis à la terre présentent un danger.

- Ne jamais toucher les pièces électriques sous tension.
- Porter des gants et des vêtements de protection secs ne comportant pas de trous.
- S'isoler de la pièce et de la terre au moyen de tapis ou d'autres moyens isolants suffisamment grands pour empêcher le contact physique éventuel avec la pièce ou la terre.
- 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.
- 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 et mettre à la terre correctement cet appareil conformément à son manuel d'utilisation et aux codes nationaux, provinciaux et municipaux.
- 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 pour voir s'il n'est pas endommagé ou dénudé – remplacer le cordon immédiatement s'il est endommagé – un câble dénudé peut provoquer une électrocution.
- Mettre l'appareil hors tension quand on ne l'utilise pas.
- Ne pas utiliser des câbles usés, endommagés, de grosseur insuffisante ou mal épluchés.
- 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 utiliser le connecteur de pièce ou le câble de retour.
- Ne pas toucher l'électrode quand on est en contact avec la pièce, la terre ou une électrode provenant d'une autre machine.

- N'utiliser qu'un matériel en bon état. Réparer ou remplacer sur-le-champ les pièces endommagées. Entretenir l'appareil conformément à ce manuel.
- Porter un harnais de sécurité quand on travaille en hauteur.
- Maintenir solidement en place tous les panneaux et capots.
- 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.

Il y a DU COURANT CONTINU IMPORTANT dans les convertisseurs après la suppression de l'alimentation électrique.

- 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 dangereux pour votre santé.

- Eloigner votre tête des fumées. Ne pas respirer les fumées.
- A l'intérieur, ventiler la zone et/ou utiliser un échappement au niveau de l'arc pour l'évacuation des fumées et des gaz de soudage.
- Si la ventilation est insuffisante, utiliser un respirateur à alimentation d'air homologué.
- Lire les spécifications de sécurité des matériaux (MSDSs) 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 si nécessaire, en portant un respirateur à alimentation d'air. Les revêtements et tous les métaux renfermant ces éléments peuvent dégager des fumées toxiques en cas de soudage.



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

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

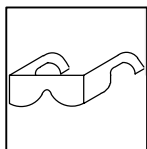
- Porter un casque de soudage muni d'un écran de filtre approprié pour protéger votre visage et vos yeux pendant le soudage ou pour regarder (voir ANSI Z49.1 et Z87.1 énuméré dans les normes de sécurité).
- Porter des protections approuvés pour les oreilles si le niveau sonore est trop élevé.
- Utiliser des écrans ou des barrières pour protéger des tiers de l'éclair et de l'éblouissement; demander aux autres personnes de ne pas regarder l'arc.
- Porter des vêtements de protection constitué dans une matière durable, résistant au feu (cuir ou laine) et une protection des pieds.



LE SOUDAGE peut provoquer un incendie ou une explosion.

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

- Se protéger et d'autres personnes de la projection d'étincelles et de métal chaud.
- Ne pas souder dans un endroit où des étincelles peuvent tomber sur des substances inflammables.
- Déplacer toutes les substances inflammables à une distance de 10,7 m de l'arc de soudage. En cas d'impossibilité les recouvrir soigneusement avec des protections homologués.
- Des étincelles et des matériaux chauds du soudage peuvent facilement passer dans d'autres zones en traversant de petites fissures et des ouvertures.
- Surveiller tout déclenchement d'incendie et tenir un extincteur à proximité.
- Le soudage effectué sur un plafond, plancher, paroi ou séparation peut déclencher un incendie de l'autre côté.
- Ne pas effectuer le soudage sur des conteneurs fermés tels que des réservoirs, tambours, ou conduites, à moins qu'ils n'aient été préparés correctement conformément à AWS F4.1 (voir les normes de sécurité).
- Brancher le câble 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 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 dépourvus d'huile tels que des gants en cuir, une chemise en matériau lourd, des pantalons sans revers, des chaussures hautes et un couvre chef.
- Avant de souder, retirer toute substance combustible de vos poches telles qu'un allumeur au butane ou des allumettes.



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.



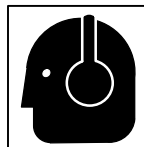
DES PIÈCES CHAUDES peuvent provoquer des brûlures graves.

- Ne pas toucher des parties chaudes à mains nues
- Prévoir une période de refroidissement avant d'utiliser le pistolet ou la torche.



LES CHAMPS MAGNÉTIQUES peuvent affecter les stimulateurs cardiaques.

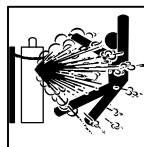
- Porteurs de stimulateur cardiaque, restez à distance.
- Les porteurs d'un stimulateur cardiaque doivent d'abord consulter leur médecin avant de s'approcher des opérations de soudage à l'arc, de gougeage ou de soudage par points.



LE BRUIT peut affecter l'ouïe.

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

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



Si des BOUTEILLES sont endommagées, elles pourront exploser.

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, 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.
- Ne pas tenir la tête en face de la sortie en ouvrant la soupape de la bouteille.
- Maintenir le chapeau de protection sur la soupape, sauf en cas d'utilisation ou de branchement de la bouteille.
- Lire et suivre les instructions concernant les bouteilles de gaz comprimé, les équipements associés et les publications P-1 CGA énumérées dans les normes de sécurité.

1-3. Dangers supplémentaires en relation avec l'installation, le fonctionnement et la maintenance



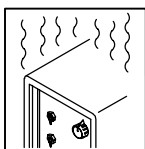
Risque D'INCENDIE OU D'EXPLOSION.

- 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 protégé avant de mettre l'appareil en service.



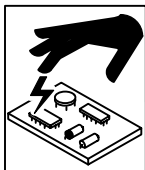
LA CHUTE DE L'APPAREIL peut blesser.

- Utiliser l'anneau de levage uniquement pour soulever l'appareil, NON PAS les chariot, les bouteilles de gaz ou tout autre accessoire.
- Utiliser un engin d'une capacité appropriée pour soulever 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 cycle opératoire avant de recommencer 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 de circuits imprimés.



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.



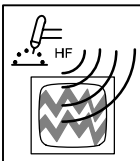
LES FILS DE SOUDAGE peuvent provoquer des blessures.

- Ne pas appuyer sur la gachette 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.



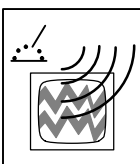
DES ORGANES MOBILES peuvent provoquer des blessures.

- Rester à l'écart des organes mobiles comme le ventilateur.
- Maintenir fermés et fixement en place les portes, panneaux, recouvrements et dispositifs de protection.



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

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



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

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



LES CHAMPS MAGNÉTIQUES peuvent affecter les stimulateurs cardiaques.

- Porteurs de stimulateur cardiaque, restez 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.

1-4. Principales normes de sécurité

Safety in Welding and Cutting, norme ANSI Z49.1, de l'American Welding Society, 550 N.W. Lejeune Rd, Miami FL 33126

Safety and Health Standards, OSHA 29 CFR 1910, du Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402.

Recommended Safe Practice for the Preparation for Welding and Cutting of Containers That Have Held Hazardous Substances, norme AWS F4.1, de l'American Welding Society, 550 N.W. Lejeune Rd, Miami FL 33126

National Electrical Code, NFPA Standard 70, de la National Fire Protection Association, Batterymarch Park, Quincy, MA 02269.

Safe Handling of Compressed Gases in Cylinders, CGA Pamphlet P-1, de la Compressed Gas Association, 1235 Jefferson Davis Highway, Suite 501, Arlington, VA 22202.

Règles de sécurité en soudage, coupage et procédés connexes, norme CSA W117.2, de l'Association canadienne de normalisation, vente de normes, 178 Rexdale Boulevard, Rexdale (Ontario) Canada M9W 1R3.

Safe Practices For Occupation And Educational Eye And Face Protection, norme ANSI Z87.1, de l'American National Standards Institute, 1430 Broadway, New York, NY 10018.

Cutting and Welding Processes, norme NFPA 51B, de la National Fire Protection Association, Batterymarch Park, Quincy, MA 02269.

1-5. Information sur les champs électromagnétiques

Données sur le soudage électrique et sur les effets, pour l'organisme, des champs magnétiques basse fréquence

L'extrait suivant est tiré des conclusions générales du document intitulé *Biological Effects of Power Frequency Electric & Magnetic Fields – Background Paper*, OTA-BP-E-53 (Washington DC : U.S. Government Printing Office, mai 1989), publié par le Office of Technology Assessment du Congrès américain : «... il existe maintenant d'abondantes données scientifiques compilées à la suite d'expériences sur la cellule ou d'études sur des animaux et des humains, qui montrent clairement que les champs électromagnétiques basse fréquence peuvent avoir des effets sur l'organisme et même y produire des transformations. Même s'il s'agit de travaux de très grande qualité, les résultats sont complexes. Cette démarche scientifique ne nous permet pas d'établir un tableau d'ensemble cohérent. Pire encore, elle ne nous permet pas de tirer des conclusions finales concernant les risques éventuels, ni d'offrir des conseils sur les mesures à prendre pour réduire sinon éliminer les risques éventuels». (Traduction libre)

Afin de réduire les champs électromagnétiques dans l'environnement de travail, respecter les consignes suivantes :

- 1 Garder les câbles ensemble en les torsadant ou en les attachant avec du ruban adhésif.
- 2 Mettre tous les câbles du côté opposé de l'opérateur.
- 3 Ne pas courber pas et ne pas entourer pas les câbles autour de vous.
- 4 Garder le poste de soudage et les câbles le plus loin possible de vous.
- 5 Relier la pince de masse le plus près possible de la zone de soudure.

Consignes relatives aux stimulateurs cardiaques :

Les consignes mentionnées précédemment font partie de celles destinées aux personnes ayant recours à un stimulateur cardiaque. Veuillez consulter votre médecin pour obtenir plus de détails.

SECTION 2 – DEFINITIONS (CE Models)

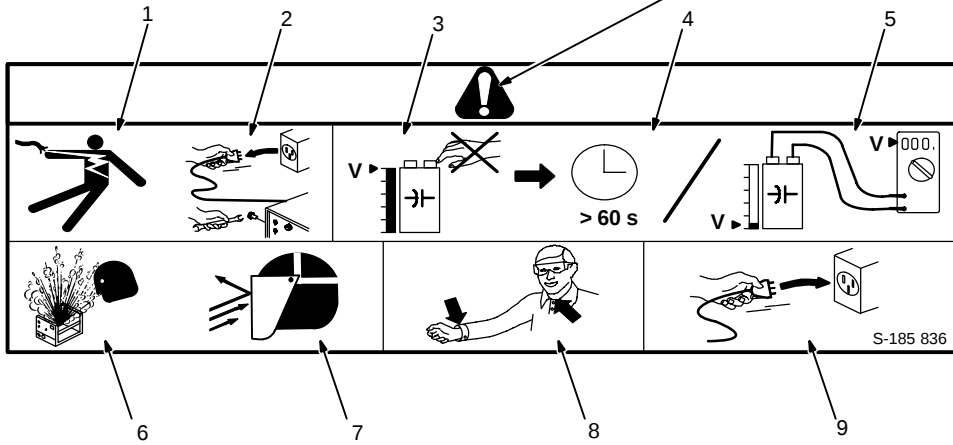
2-1. Warning Label Definitions



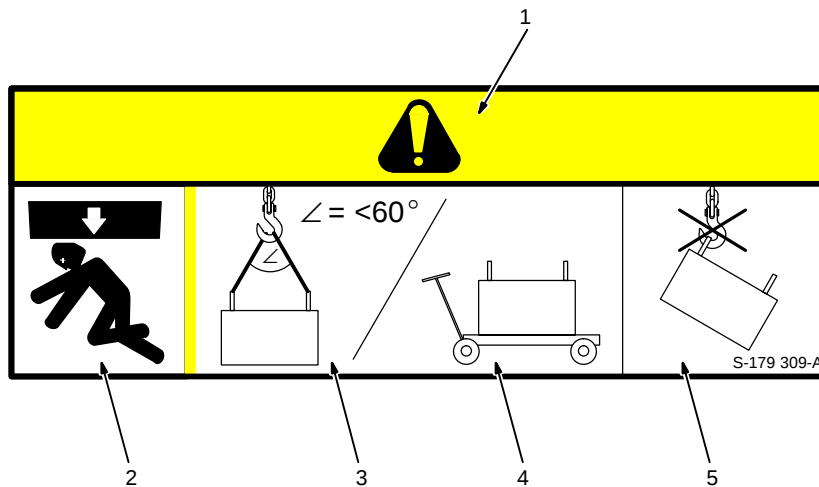
Warning! Watch Out! There are possible hazards as shown by the symbols.

- 1 Electric shock from welding electrode or wiring can kill.
 - 1.1 Wear dry insulating gloves. Do not touch electrode with bare hand. Do not wear wet or damaged gloves.
 - 1.2 Protect yourself from electric shock by insulating yourself from work and ground.
 - 1.3 Disconnect input plug or power before working on machine.
- 2 Breathing welding fumes can be hazardous to your health.
 - 2.1 Keep your head out of the fumes.
 - 2.2 Use forced ventilation or local exhaust to remove the fumes.
 - 2.3 Use ventilating fan to remove fumes.
- 3 Welding sparks can cause explosion or fire.
 - 3.1 Keep flammables away from welding. Do not weld near flammables.
 - 3.2 Welding sparks can cause fires. Have a fire extinguisher nearby, and have a watchperson ready to use it.
 - 3.3 Do not weld on drums or any closed containers.
- 4 Arc rays can burn eyes and injure skin.
 - 4.1 Wear hat and safety glasses. Use ear protection and button shirt collar. Use welding helmet with correct shade of filter. Wear complete body protection.
- 5 Become trained and read the instructions before working on the machine or welding.
- 6 Do not remove or paint over (cover) the label.

Warning! Watch Out! There are possible hazards as shown by the symbols.



- 1 Electric shock from wiring can kill.
- 2 Disconnect input plug or power before working on machine.
- 3 Hazardous voltage remains on input capacitors after power is turned off. Do not touch fully charged capacitors.
- 4 Always wait 60 seconds after power is turned off before working on unit, OR
- 5 Check input capacitor voltage, and be sure it is near 0 before touching any parts.
- 6 When power is applied failed parts can explode or cause other parts to explode.
- 7 Flying pieces of parts can cause injury. Always wear a face shield when servicing unit.
- 8 Always wear long sleeves and button your collar when servicing unit.
- 9 After taking proper precautions as shown, connect power to unit.



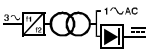
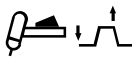
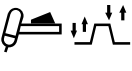
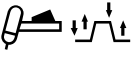
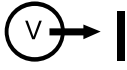
- 1 Warning! Watch Out! There are possible hazards as shown by the symbols.
- 2 Falling equipment can cause injury and damage to unit.
- 3 Always lift and support unit using both handles. Keep angle of lifting device less than 60 degrees.
- 4 Use a proper cart to move unit.
- 5 Do not use one handle to lift or support unit.

2-2. Manufacturer’s Rating Label For CE Products

For label location
see Section 3-4.

		IEC 60974-1			
		5A 10V		300A 22V	
		X	15%	60%	100%
		I ₂	300	220~ / 190=	180
	U ₀ = 95V	U ₂	22	18.8~ / 17.6=	17.2
		5A 20V		300A 32V	
		X	15%	60%	100%
		I ₂	300	220~ / 190=	180
	U ₀ = 95V	U ₂	32	28.8~ / 27.6=	27.2
 3~50 Hz		U ₁ = 400V		I ₁ max = 22 | I ₁ eff = 14	
		IP 23			

2-3. Symbols And Definitions

A Amperes	 Panel-Local	 Gas Tungsten Arc Welding (GTAW)	 Shielded Metal Arc Welding (SMAW)
V Volts	 Input	 3 Phase Static Frequency Converter-Transformer-Rectifier	
 Output	 Circuit Breaker	 Remote	 Touch Start (GTAW)
 Protective Earth (Ground)	 t_2 Postflow Timer	 t_1 Preflow Timer	S Seconds
I On	O Off	+ Positive	— Negative
 Alternating Current	 Gas Input	 Gas Output	I₂ Rated Welding Current
X Duty Cycle	 Direct Current	 Line Connection	U₂ Conventional Load Voltage
U₁ Primary Voltage	IP Degree Of Protection	I_{1max} Rated Maximum Supply Current	I_{1eff} Maximum Effective Supply Current
U₀ Rated No Load Voltage (Average)	 Pulse Background Amperage	 Initial Amperage	 Increase/Decrease Of Quantity
 Normal Trigger Operation (GTAW)	 Two-Step Trigger Operation (GTAW)	 Four-Step Trigger Operation (GTAW)	% Percent
Hz Hertz	 Recall From Memory	 Arc Force (DIG)	 Impulse Starting (GTAW)
 Final Slope	 Final Amperage	 Pulse Percent On Time	 Initial Slope
 Contactor Control (Stick)	 Pulser On-Off	 TIG Weld Amps And Peak Amps While Pulsing	 Pulse Frequency
 Work	 Electrode	 Balance % EN Time (AC GTAW)	

SECTION 3 – INSTALLATION

3-1. Specifications

A. For Multivoltage Units

Input Power	Rated Welding Output	Amperage Range	Maximum Open-Circuit Voltage DC	Amperes Input at Rated Load Output 60 Hz			
				230 V	460 V	KVA	KW
Three Phase	250 A @ 30 Volts AC, 40% Duty Cycle	5-300	95	26.3 *.27	17.9 *.15	14.2 *.09	10.5 *.04
	200 A @ 28 Volts DC, 40% Duty Cycle			20.5 *.27	13.4 *.15	8.4 *.09	7.6 *.04
Single Phase	250 A @ 30 Volts AC, 40% Duty Cycle	5-300	95	62.6 *.33	32.2 *.18	14.8 *.10	10.4 *.07
	200 A @ 28 Volts DC, 40% Duty Cycle			44 *.33	25.8 *.18	11.9 *.1	8.1 *.07

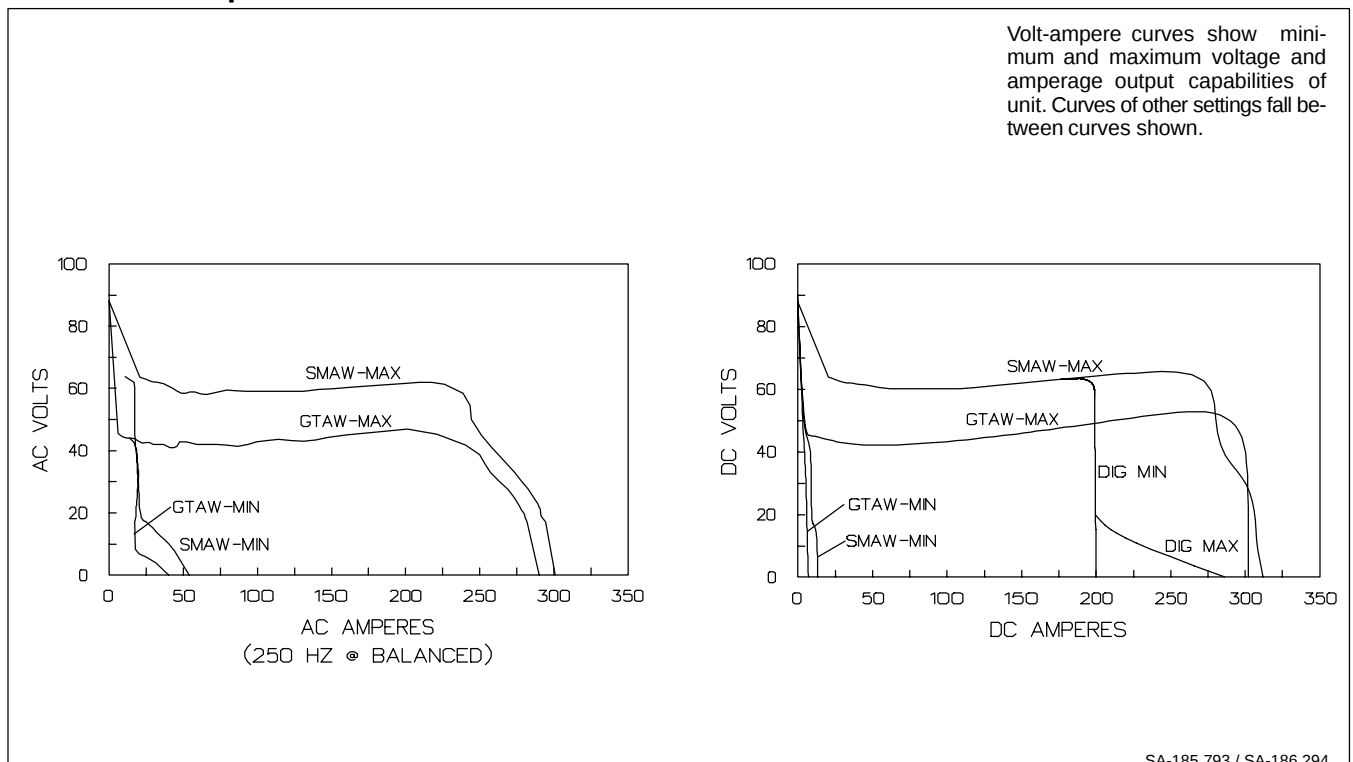
*While idling

B. For Single Voltage Units

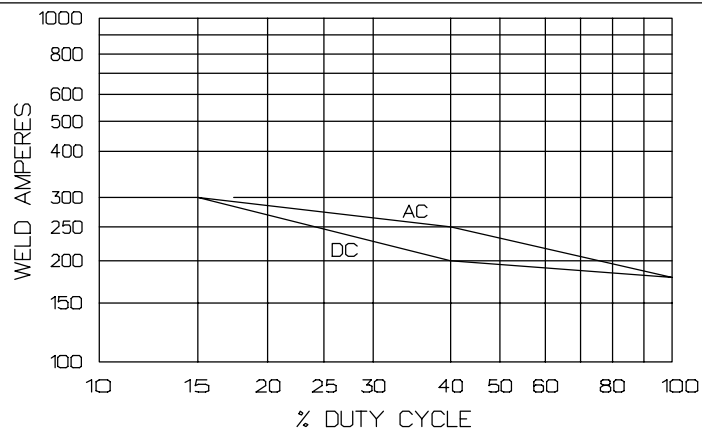
Rated Welding Output	Amperage Range	Maximum Open-Circuit Voltage DC	Amperes Input At Rated Output, 50Hz - Three-Phase 400 V	KVA	KW
250 A @ 30 VAC, 40% Duty Cycle	5 – 300	95 VDC	20.2 (0.13*)	14.0 (0.09*)	10.5 (0.04*)
200 A @ 28 VDC, 40% Duty Cycle	5 – 300	95 VDC	15.1 (0.13*)	10.5 (0.09*)	7.5 (0.04*)

*While idling

3-2. Volt-Ampere Curves



3-3. Duty Cycle and Overheating

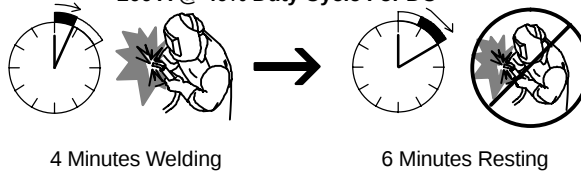


Duty Cycle is percentage of 10 minutes that unit can weld at rated load without overheating.

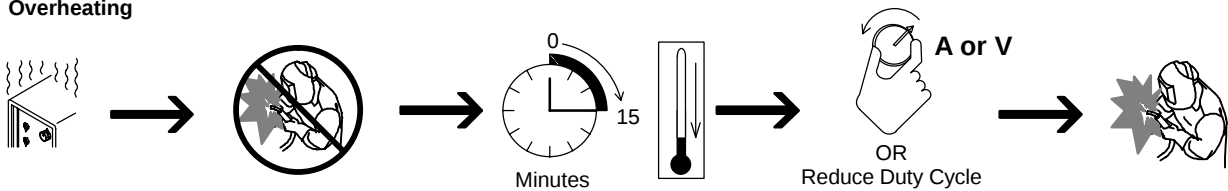
If unit overheats, output stops, a Help message is displayed (see Section 5-3), and cooling fan runs. Wait fifteen minutes for unit to cool. Reduce amperage or voltage, or duty cycle before welding.

▲ Exceeding duty cycle can damage unit and void warranty.

250 A @ 40% Duty Cycle For AC
200 A @ 40% Duty Cycle For DC



Overheating



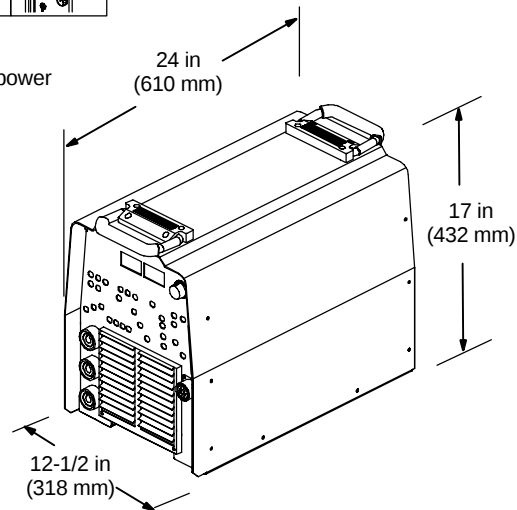
sduty1 5/95 / SA-185 794

3-4. Selecting a Location



Dimensions And Weight

90 lb (40.7 kg) – 110 lb (50kg) w/aux power



1 Lifting Handles

Use handles to lift unit.

2 Hand Cart

Use cart or similar device to move unit.

3 Rating Label (Non CE Models)

Use rating label to determine input power needs.

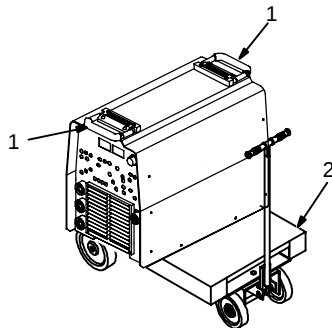
4 Plate Label (CE Models)

5 Line Disconnect Device

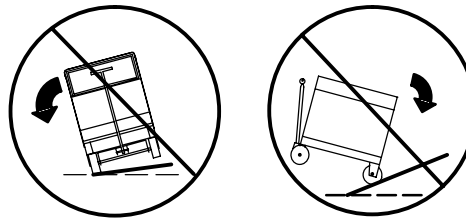
Locate unit near correct input power supply.

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

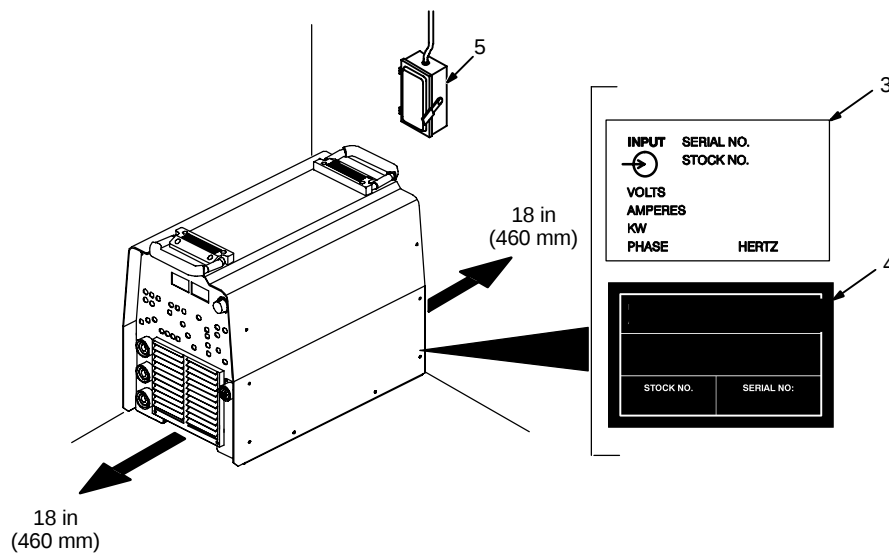
Movement



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

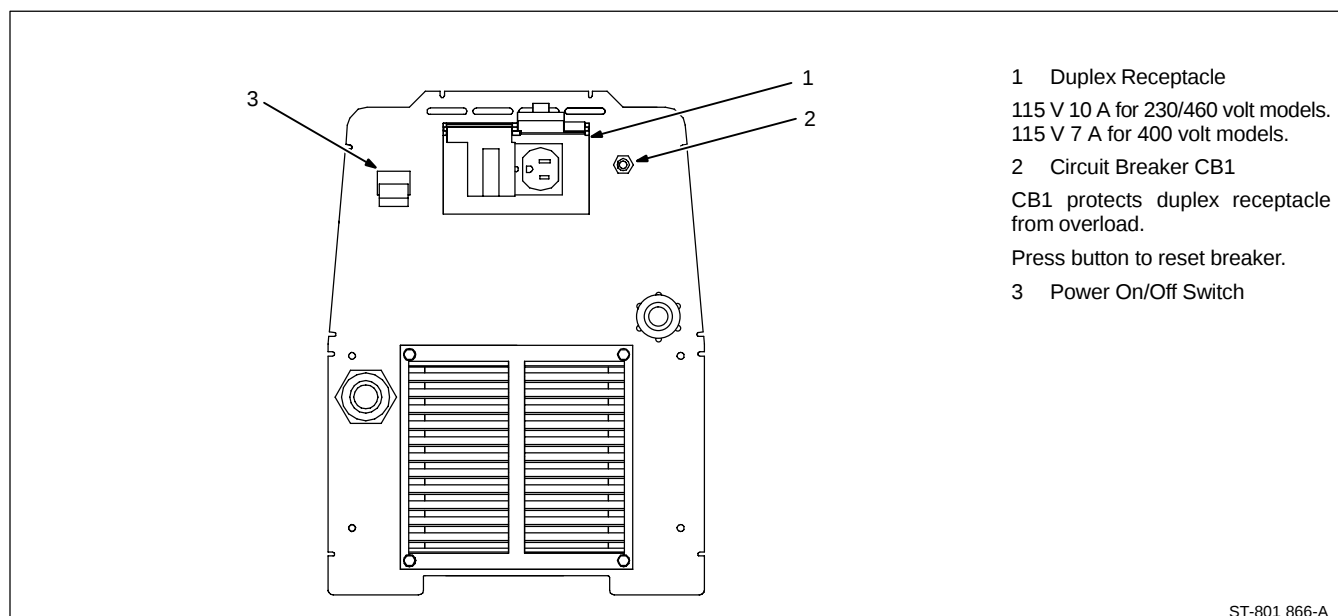


Location And Airflow



loc_2 3/96 - ST-802 135-A

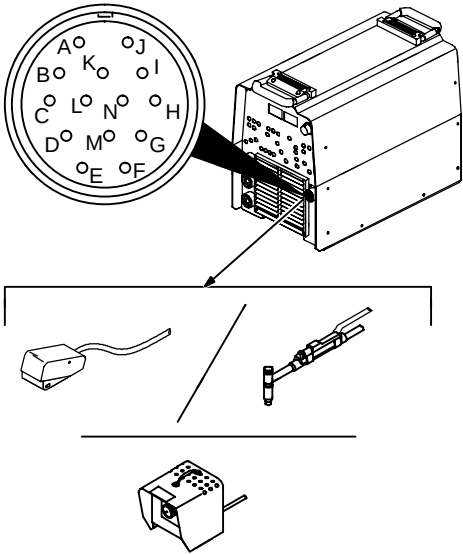
3-5. 115 Volts AC Duplex Receptacle, Circuit Breaker CB1 (Optional), And Power Switch



3-6. Weld Output Terminals and Selecting Cable Sizes

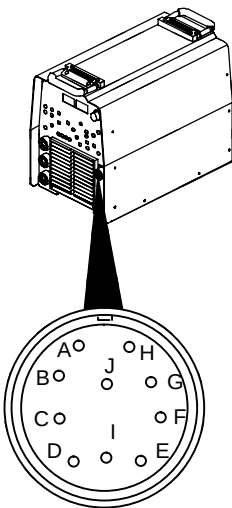
Weld Output Terminals	Welding Amperes	Total Cable (Copper) Length In Weld Circuit Not Exceeding							
		100 ft (30 m) Or Less		150 ft (45 m)	200 ft (60 m)	250 ft (70 m)	300 ft (90 m)	350 ft (105 m)	400 ft (120 m)
		10 – 60% Duty Cycle	60 – 100% Duty Cycle	10 – 100% Duty Cycle					
	100	4	4	4	3	2	1	1/0	1/0
	150	3	3	2	1	1/0	2/0	3/0	3/0
	200	3	2	1	1/0	2/0	3/0	4/0	4/0
	250	2	1	1/0	2/0	3/0	4/0	2-2/0	2-2/0
	300	1	1/0	2/0	3/0	4/0	2-2/0	2-3/0	2-3/0
	350	1/0	2/0	3/0	4/0	2-2/0	2-3/0	2-3/0	2-4/0
*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 mm² equivalent weld cable sizes. NOTE: For proper installation of gas hose, the use of a quick connect torch (such as Weldcraft QWP-17 or QWP-20), is recommended. S-0007E									

3-7. Remote 14 Receptacle Information

 ST-802 135-A	 REMOTE 14	Socket*	Socket Information
	24 VOLTS DC OUTPUT (CONTACTOR) 	A	Contactor control, 24 volts dc.
		B	Contact closure to A completes 24 volts dc contactor control circuit, and enables output.
	REMOTE OUTPUT CONTROL	C	Output to remote control; 0 to +10 volts dc output to remote control.
		D	Remote control circuit common.
		E	0 to +10 volts dc input command signal from remote control.
	A/V AMPERAGE VOLTAGE	F	Current feedback; +1 volt dc per 100 amperes.
		H	Voltage feedback; +1 volt dc per 10 output receptacle volts.
	GND	K	Chassis common.

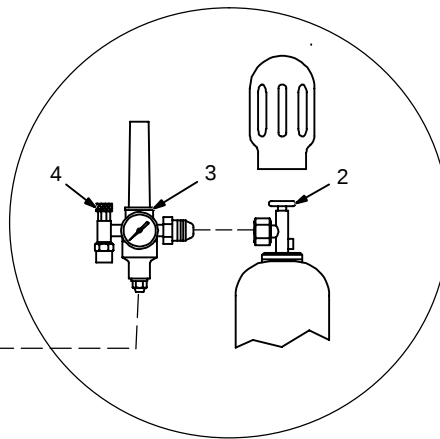
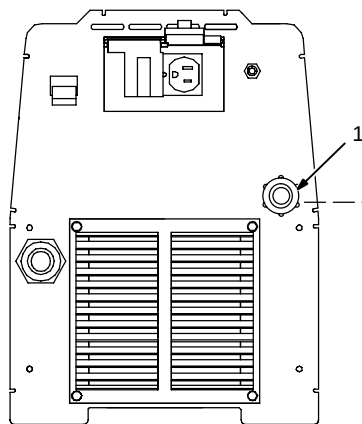
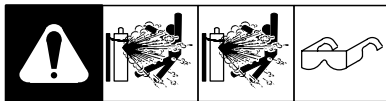
*The remaining sockets are not used.

3-8. Remote Program Select Inputs (Optional For Non CE Models)

 ST-802 135-A *The remaining sockets are not used.	10-Pin Receptacle RC2					
	Pin Designations 0=No Connection 1=Connected To Ground (Pin G)					
	Function	C	H	F	E	D
	No Remote Control	0	0	0	X	X
	Stick EP Of Current Program	1	0	0	X	X
	Stick AC Of Current Program	1	1	0	x	x
	TIG AC Of Current Program	0	1	0	x	x
	Program 1 Stick EP	1	0	1	0	0
	Program 2 Stick EP	1	0	1	0	1
	Program 3 Stick EP	1	0	1	1	0
	Program 4 Stick EP	1	0	1	1	1
	Program 1 TIG EN	0	0	1	0	0
	Program 2 TIG EN	0	0	1	0	1
	Program 3 TIG EN	0	0	1	1	0
	Program 4 TIG EN	0	0	1	1	1
	Program 1 Stick AC	1	1	1	0	0
	Program 2 Stick AC	1	1	1	0	1
	Program 3 Stick AC	1	1	1	1	0
	Program 4 Stick AC	1	1	1	1	1
	Program 1 TIG AC	0	1	1	0	0
	Program 2 TIG AC	0	1	1	0	1
	Program 3 TIG AC	0	1	1	1	0
	Program 4 TIG AC	0	1	1	1	1
	Socket A	Contactor control, 24 volts dc				
	Socket B	Contact closure to A, completes 24 volts dc contactor control circuit and enables output				
	Socket G	Chassis ground				
	Socket I	Normally open valid arc relay				
	Socket J	Circuit common for valid arc relay				

To use the Remote Process Select function for a given program, select the TIG process on the front panel while the desired program is selected.

3-9. Gas Connections



1 Gas Fitting

Fittings have 5/8-18 right-hand threads.

2 Cylinder Valve

Open valve slightly so gas flow blows dirt from valve. Close valve.

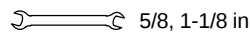
3 Regulator/Flowmeter

4 Flow Adjust

Typical flow rate is 15 cfh (cubic feet per hour).

Connect customer supplied gas hose between regulator/flowmeter and gas fitting on rear of unit.

Tools Needed:



5/8, 1-1/8 in

ST-801 866

3-10. Electrical Service Guide

A. For Multivoltage Units

NOTE



Actual input voltage cannot exceed $\pm 15\%$ of indicated required input voltage. If actual input voltage is outside of this range, no output is available.

Input Voltage		Three-Phase		Single-Phase	
		230	460	230	460
Input Amperes At Rated Output	AC	26.5	17.9	62.6	32.2
	DC	20.5	13.4	44	25.8
Max Recommended Standard Fuse Or Circuit Breaker Rating In Amperes		50	25	100	50
Min Input Conductor Size In AWG/Kcmil		10	14	8	10
Max Recommended Input Conductor Length In Feet (Meters)		104 (32)	165 (50)	90 (27)	241 (74)
Min Grounding Conductor Size In AWG/Kcmil		10	14	8	10
Reference: 1996 National Electrical Code (NEC).					

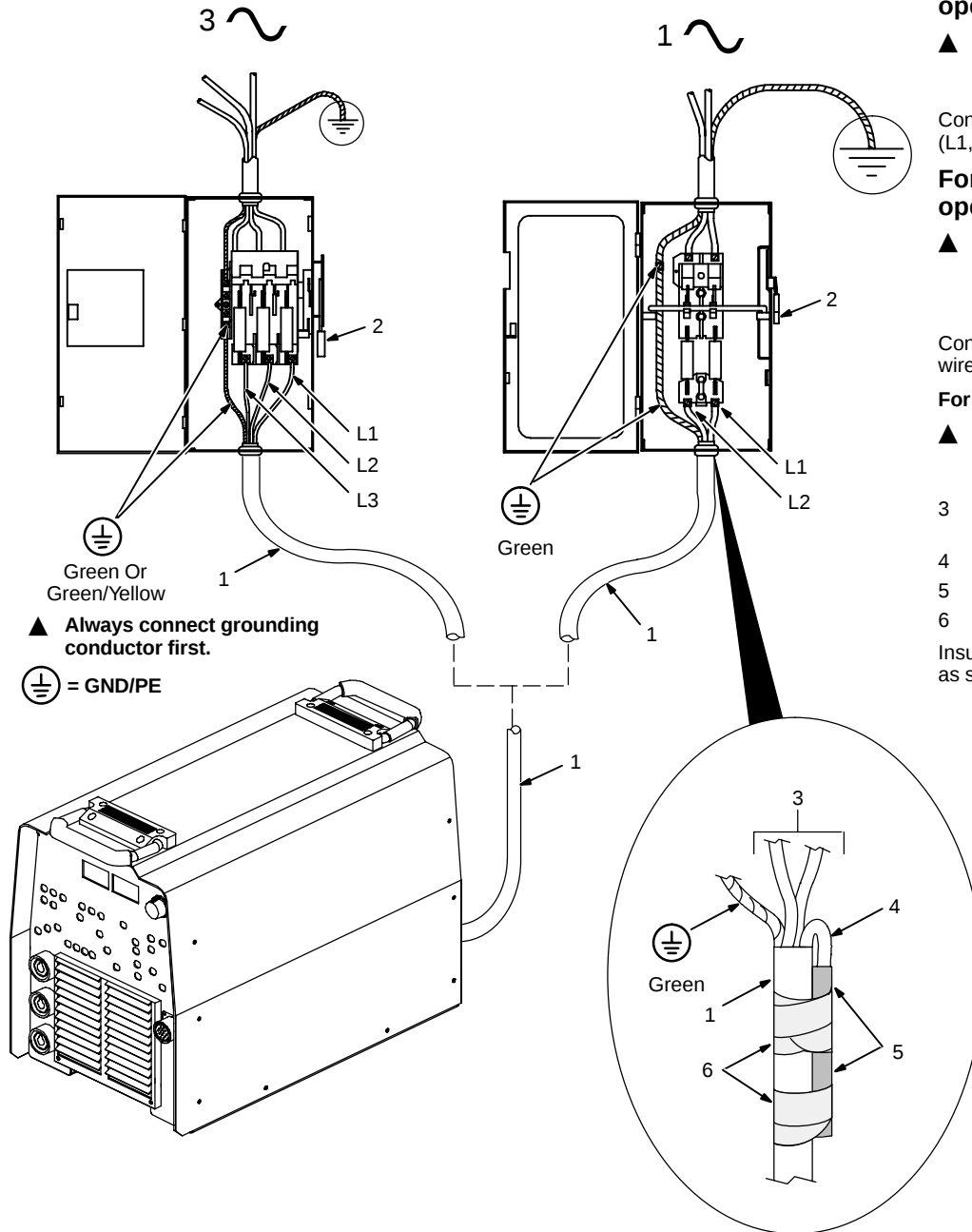
S-0092J

B. For Single Voltage Units

Input Voltage	400
Input Amperes At Rated Output	20.2
Max Recommended Standard Fuse Or Circuit Breaker Rating In Amperes	30
Min Input Conductor Size In AWG/Kcmil	14
Max Recommended Input Conductor Length In Feet (Meters)	125 (38)
Min Grounding Conductor Size In AWG/Kcmil	14
Reference: 1996 National Electrical Code (NEC).	

S-0092J

3-11. Connecting Input Power

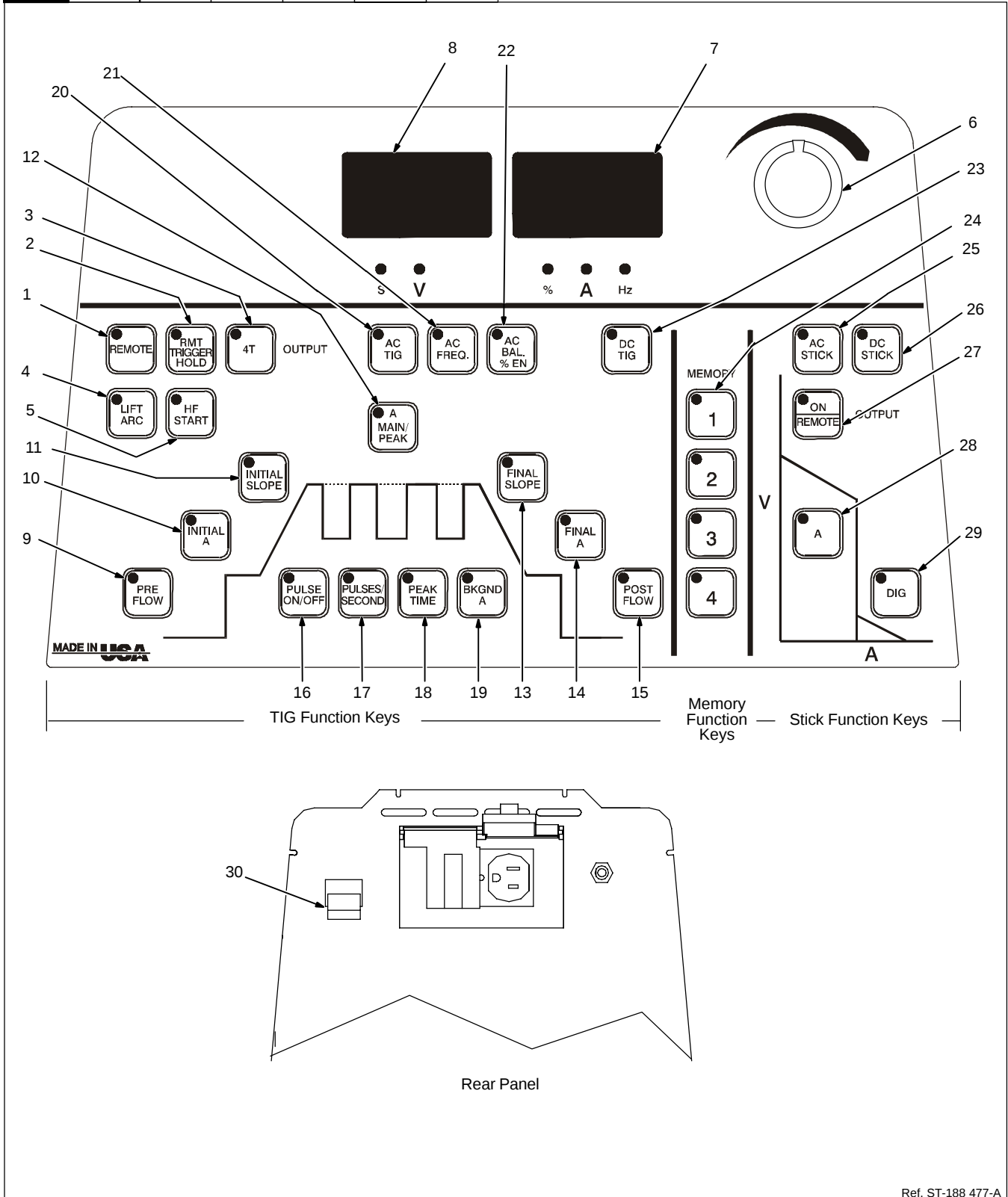


input_2 3/96 - ST-802 136-A

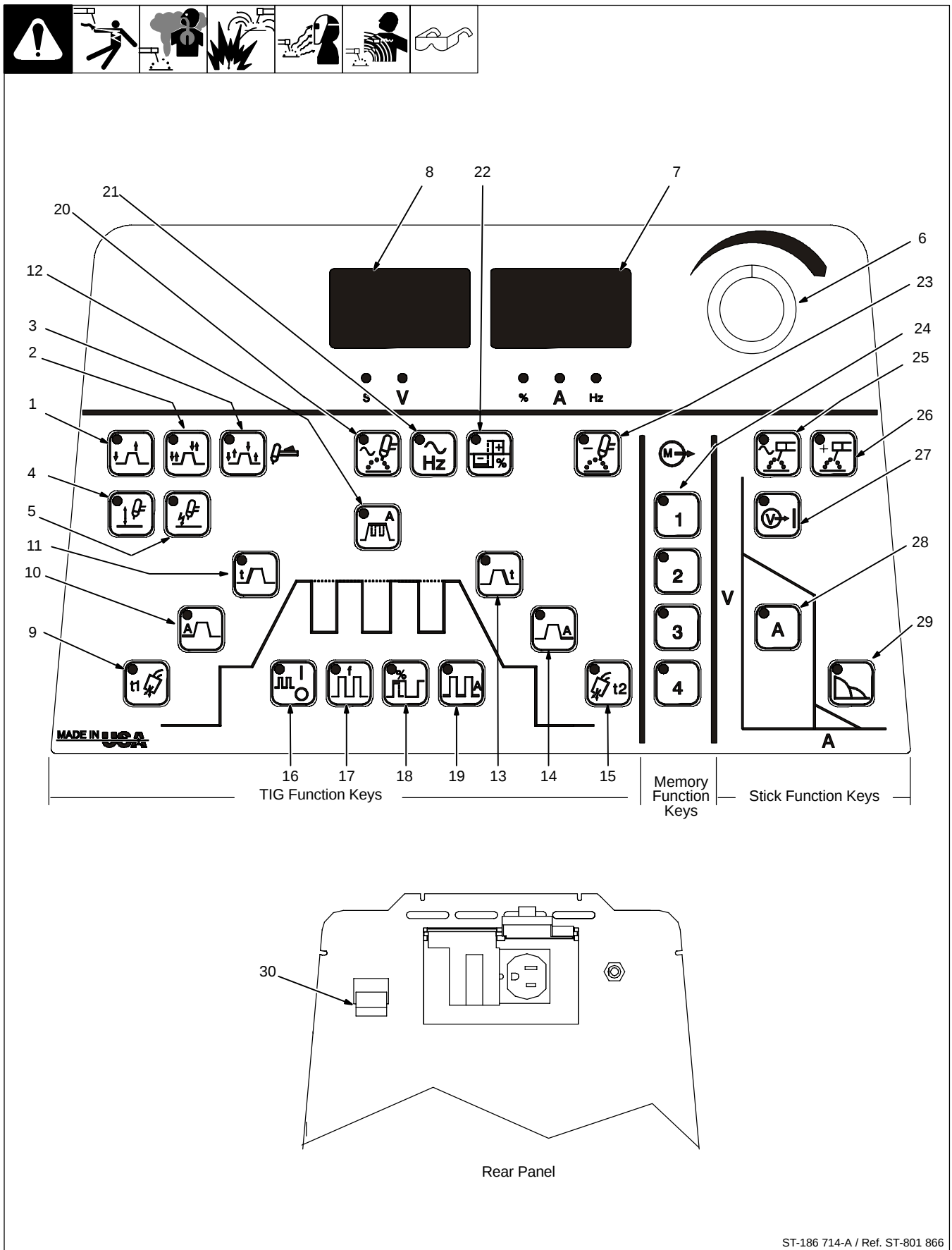
SECTION 4 – OPERATION

4-1. Controls

A. For 230/460 Volts And Non CE Units (Use With Section 4-2)



B. For CE Units (Use With Section 4-2)



ST-186 714-A / Ref. ST-801 866

4-2. Description Of Controls (Use With Sections A And B)

☞ For all front panel switch pad controls: press switch pad to turn on light and enable function.

1 Remote Trigger Mode

Press switch pad to activate. Press and hold torch trigger or foot control to start weld sequence. Release trigger or foot control to go to downslope.

2 Remote Trigger Hold

Press switch pad to activate. Press and release torch trigger, within 3 seconds, to start weld sequence. Press and release trigger, within 3 seconds, to start downslope.

3 4T Mode (Specific Trigger Method)

Press switch pad to enable function. Press and hold torch trigger to start Preflow Time and arc at the Start Current level. The arc will remain at the Start Current level as long as the trigger is depressed. Release trigger to change to main weld current. To end main weld current, press and hold trigger. Down Slope begins, and arc decays to Final Current level and remains there until trigger is released, at which time arc goes out, and Postflow Time begins.

While in 4T mode, there is a feature available during the main weld sequence that allows the operator to toggle between weld current and final current. To switch from weld current to final current, press and release torch trigger within 3/4 of a second. To return to weld current, press and release torch trigger within 3/4 of a second again.

Application:

Use 4T trigger method when the functions of a remote current control are desired, but only a remote on/off control is available.

4 Lift-Arc™ Start Mode

See Section 4-3.

5 HF Start Mode

See Section 4-3.

6 Encoder Control

Use Encoder Control in conjunction with applicable front panel function switch pads to change values for that function.

7 Ammeter

Displays amperage and preset parameters for pulse frequency, % of background amperage, % of dig, and % of peak time.

8 Voltmeter

Displays arc voltage and the following preset times (preflow, initial slope, final slope, and postflow) in seconds, for applicable function controls.

9 Preflow Control

Press switch pad and turn Encoder Control to set time, 0–15 seconds, gas flows before welding electrode is energized. Preflow control is disabled if Lift-Arc™ Start mode is selected.

Application:

Preflow is used to purge the immediate weld area of atmosphere. Preflow also aids in consistent arc starting.

10 Initial Amperage Control

Press switch pad and turn Encoder Control to select a starting amperage, 5–300 amps, that is different from the weld amperage.

Application:

Start current can be used while GTAW welding to assist in preheating a cold material prior to depositing filler material.

11 Initial Slope Time Control

Press switch pad and turn Encoder Control to select length of time, 0–25 seconds, that it takes to slope the amperage up/down from start amperage to weld amperage.

12 TIG Weld Amps And Peak Amps When Pulse Is Selected

Press switch pad and turn Encoder Control to select 5–300 amps for TIG welding or peak amps while pulsing.

13 Final Slope Time Control

Press switch pad and turn Encoder Control to select length of time, 0–25 seconds, that it takes to slope the amperage up/down from weld amperage to final amperage.

Application:

Final Slope Time should be used while GTAW welding materials that are crack sensitive, and/or the operator wants to eliminate the crater at the end of the weld.

Note: This applies if the operator is using an on/off only type control to start and stop the welding process.

14 Final Amperage Control

Press switch pad and turn Encoder Control to select 5–300 amps of final amperage. Final amperage is the amperage to which the weld amperage has sloped up/down to.

15 Postflow Control

Press switch pad and turn Encoder Control to set time, 0–50 seconds, gas flows after welding stops.

Application:

Postflow is required to cool tungsten and weld, and to prevent contamination of tungsten and weld. Increase postflow time if tungsten or welds are dark in appearance.

16 Pulser On/Off Control

Press switch pad to turn on light and enable pulser function.

Application:

Pulsing refers to the alternating raising and lowering of the weld output at a specific rate. The raised portions of the weld output are controlled in width, height, and frequency, forming pulses of weld output. These pulses and the lower amperage level between them (called the background amperage) alternately heat and cool the molten weld puddle. The combined effect gives the operator better control of penetration, bead width, crowning, undercutting, and heat input. Controls can be adjusted while welding.

Pulsing can also be used for filler material addition technique training.

17 Pulse Frequency Control

Press switch pad and turn Encoder Control to set pulse frequency, .1–500 pps (pulses per second).

18 Pulse Width Control

Press switch pad and turn Encoder Control to set percentage of time, 5–95%, amperage is at peak for each pulse.

19 Background Amperage Control

Press switch pad and turn Encoder Control to set background amperage as a percentage, 5–95%, of peak amperage.

20 AC TIG Process Select Mode

Press switch pad to select AC TIG Process.

21 AC Frequency Control

Press switch pad and turn Encoder Control to set AC frequency from 20–250 Hz (cycles per

second). AC Frequency Control is enabled only if AC TIG process is selected.

Application:

AC frequency controls bead width and directional control. As AC frequency decreases, weld bead/puddle gets wider. As AC frequency increases, weld bead/puddle becomes narrower and the arc becomes more focused. Travel speed can increase as AC frequency increases.

22 AC Balance Control

Press switch pad and turn Encoder Control to set percentage of time, 50–90%, polarity is electrode negative. AC Balance Control is enabled only if AC TIG process is selected.

Application:

When welding on oxide forming materials such as aluminum or magnesium, excess cleaning is not necessary. To produce a good weld, only a minimal amount, approximately a 0.10 in (2.5mm) of etched zone along the weld toes is required.

Joint configuration, set-up, process variables, and oxide thickness may affect setting.

Arc rectification can occur when welding above 200 amps and/or while welding with helium gas. If this condition occurs, increasing the Balance control towards maximum penetration, may help to restabilize the arc.

23 DC TIG Process Select Mode

Press switch pad to select DCEN (direct current electrode negative) TIG process.

24 1–4 Program Storage

Each program switch pad, 1–4, is capable of storing four welding parameter programs. Four for AC TIG, four for DCEN TIG, four for AC Stick, and four for DCEP (direct current electrode positive) Stick. Depending on which process is selected, a total of 16 welding parameter programs can be recalled. The welding parameters are updated to the selected memory position any time a parameter is changed. To recall a program, press the desired process select switch pad, and program pad 1–4.

25 AC Stick Process Select Mode

Press switch pad to select AC Stick process. AC frequency is fixed at 60 Hz, and AC balance is fixed at 50% EN (electrode negative). When the AC Stick Process is select, the DIG function is disabled.

26 DC Stick Process Select Mode

Press switch pad to select DCEP Stick process.

27 Output Contactor Control (Stick)

Press switch pad to enable/disable output.

28 Stick Amperage Control

Press switch pad and turn Encoder Control to select 5–300 amps for Stick welding.

29 DIG Control

Press switch pad and adjust Encoder Control to set DIG (0–100%).

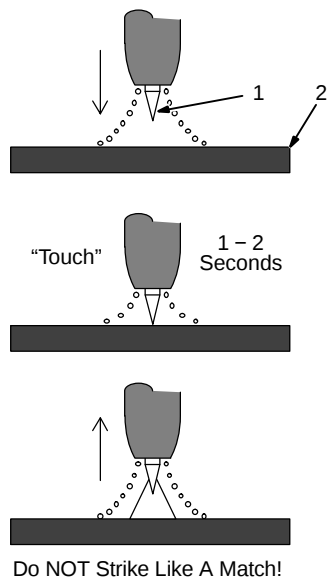
When set lower, short-circuit amperage at low arc voltage is the same as normal welding amperage.

When set higher, short-circuit amperage is increased at low arc voltage to help with arc starting and making overhead or vertical welds, as well as to reduce sticking while welding.

30 Power On/Off Switch

Switch located on rear panel.

4-3. Lift-Arc™ And HF TIG Start Procedures



Lift-Arc Start

When Lift-Arc™ button light is On, start arc as follows:

- 1 TIG Electrode
- 2 Workpiece

Touch tungsten electrode to workpiece at weld start point, enable output with torch trigger, foot control, or hand control. **Hold electrode to workpiece for 1-2 seconds**, and slowly lift electrode. An arc will form when electrode is lifted.

Normal open-circuit voltage is not present before tungsten electrode touches workpiece; only a low sensing voltage is present between electrode and workpiece. The solid-state output contactor does not energize until after electrode is touching workpiece. This allows electrode to touch workpiece without overheating, sticking, or getting contaminated.

Application:

Lift-Arc is used for the DCEN GTAW process when HF Start method is not permitted.

HF Start

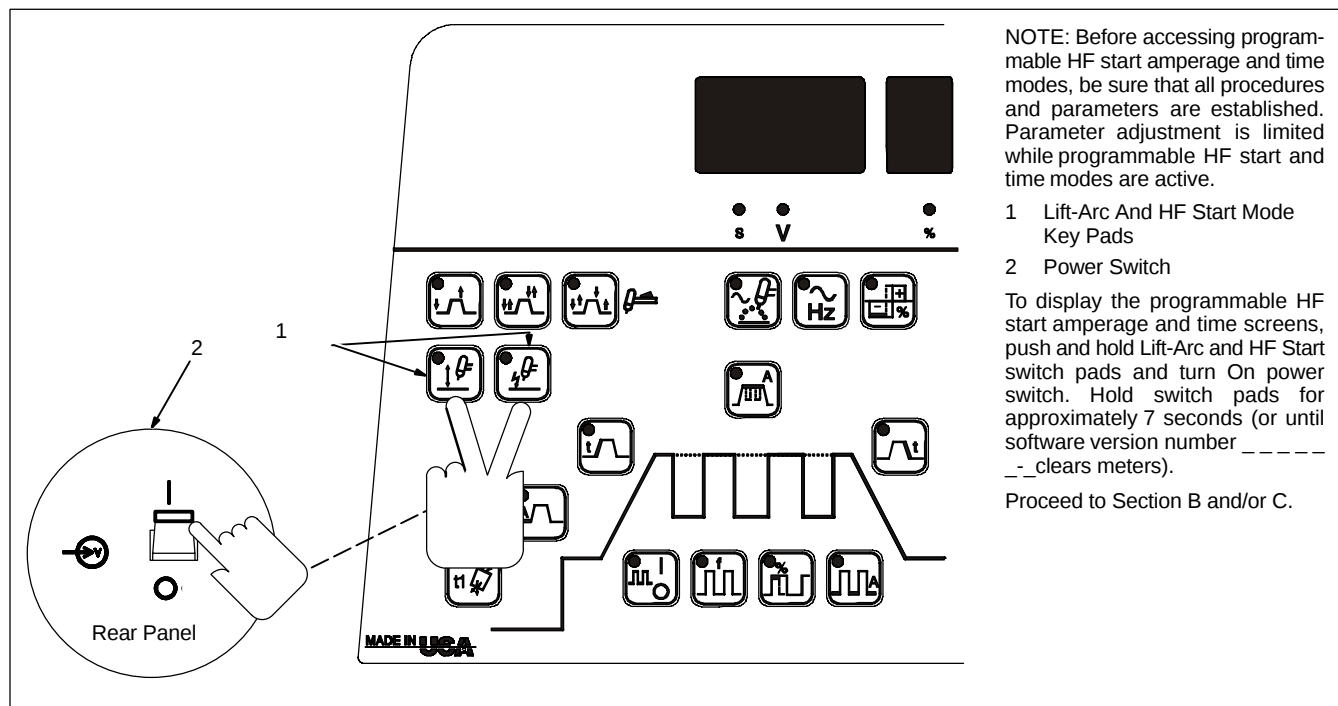
When HF Start button light is On, start arc as follows:

High frequency turns on to help start arc when output is enabled. High frequency turns off when arc is started, and turns on whenever arc is broken to help restart arc.

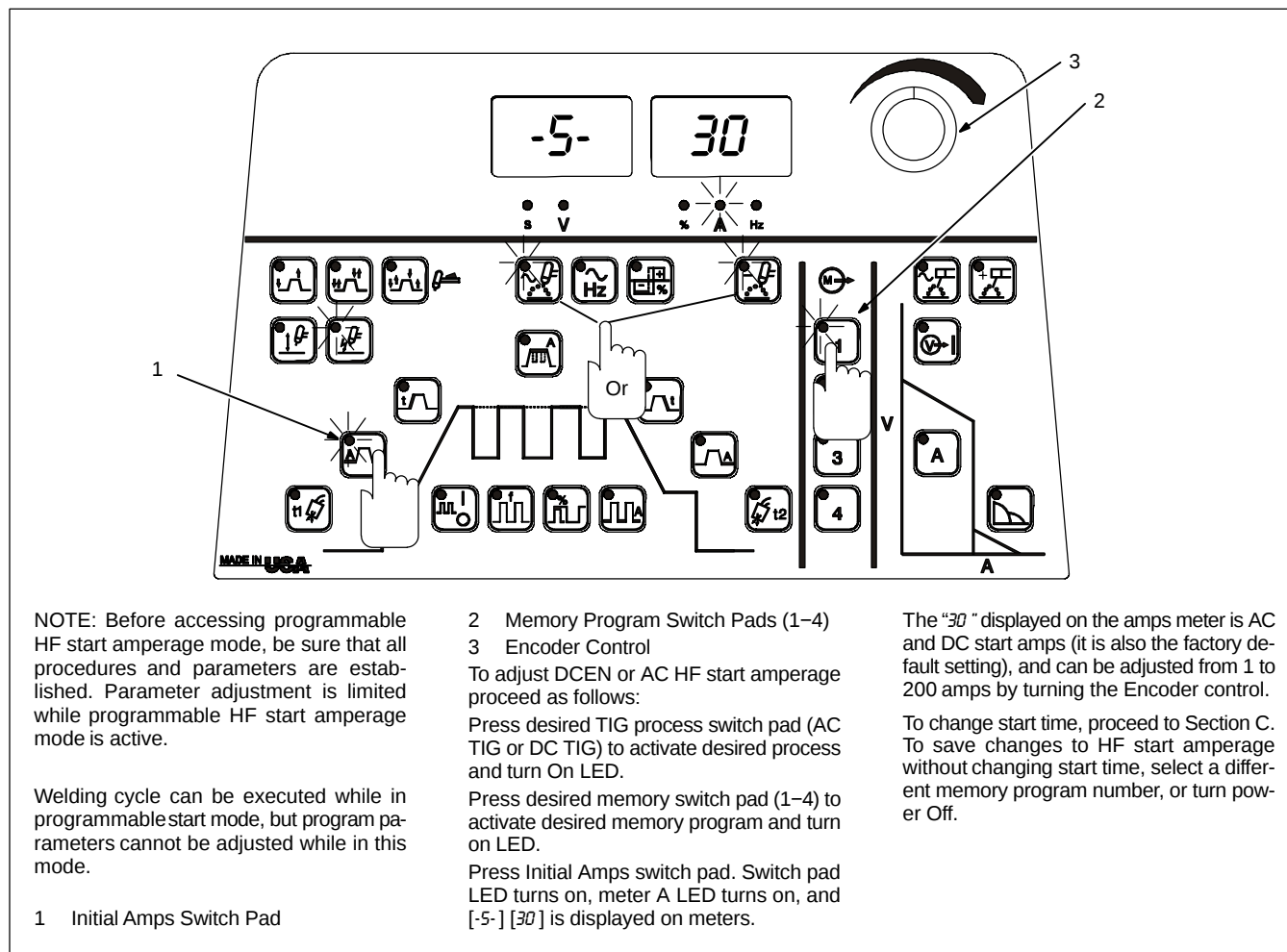
Ref. ST-156 279

4-4. Programmable HF Start Amperage And Time Modes

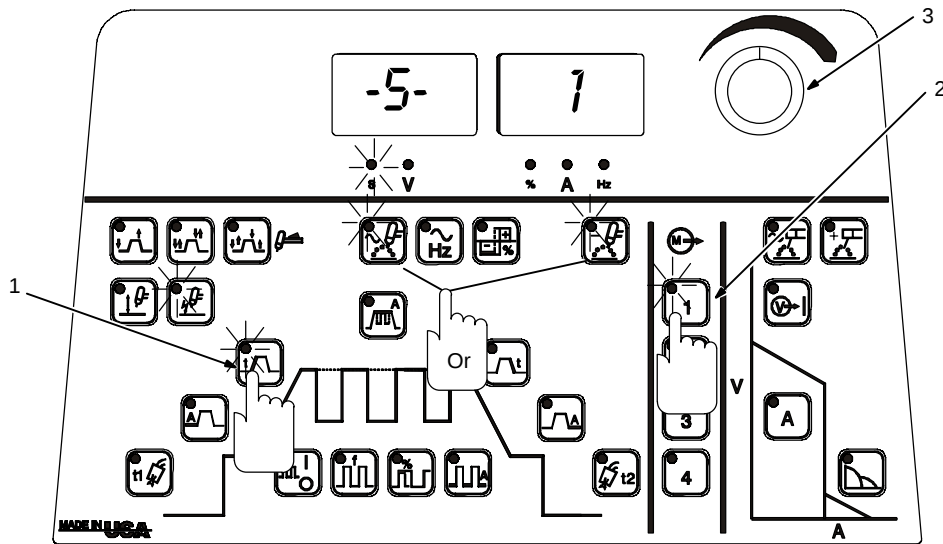
A. Accessing Programmable HF Start Amperage And Time Modes



B. Setting Programmable HF Start Amperage



C. Setting Programmable Start Time



NOTE: Before accessing programmable start time mode, be sure that all procedures and parameters are established. Parameter adjustment is limited while programmable start time mode is active.

Welding cycle can be executed while in programmable start mode, but program parameters cannot be adjusted while in this mode.

- 1 Initial Slope Switch Pad
- 2 Memory Program Switch Pads (1-4)

3 Encoder Control

To adjust start time proceed as follows:

Press desired TIG process switch pad (AC TIG or DC TIG) to activate desired process and turn On LED.

If you are adjusting start time without having adjusted start amperage in Section B, press desired memory switch pads (1-4) to activate desired memory program and turn on LED.

Press Initial Slope switch pad. Switch pad LED turns on, meter S LED turns on, and [-5-] [?] is displayed on meters.

The [?] displayed on the amps meter is AC and DC start time (it is also the factory default setting), and can be adjusted from 1 to 200 milliseconds by turning the Encoder control.

To save changes, select a different memory program number, or turn power Off.

4-5. Arc Timer/Counter Display

1 Initial And Final Slope Control Switch Pads

2 Power Switch

To display the arc timer/counter, push and hold Initial and Final Slope control switch pads, and turn On Power switch. Hold switch pads for approximately 7 seconds (or until software version number _____ clears meters).

3 Arc Timer Display

Upon power up as described above, the meter S and Memory 1 LEDs will turn on, and arc time will be displayed for 5 seconds as [000 000] to [999 999]. The first four numbers indicate hours, and the last two numbers indicate minutes. Arc time shown in example is read as 1,234 hours and 56 minutes. Maximum arc time is 9,999 hours and 59 minutes.

4 Arc Counter

After 5 seconds, the meter A and Memory 2 LEDs turn on, and the arc counter will be displayed for the next 5 seconds as [000 000] to [999 999]. The maximum arc cycle count is 999 999.

1 Initial And Final Slope Control Switch Pads

2 Power Switch

To display the arc timer/counter, push and hold Initial and Final Slope control switch pads, and turn On Power switch. Hold switch pads for approximately 7 seconds (or until software version number _____ clears meters).

3 Arc Timer Display

Upon power up as described above, the meter S and Memory 1 LEDs will turn on, and arc time will be displayed for 5 seconds as [000 000] to [999 999]. The first four numbers indicate hours, and the last two numbers indicate minutes. Arc time shown in example is read as 1,234 hours and 56 minutes. Maximum arc time is 9,999 hours and 59 minutes.

4 Arc Counter

After 5 seconds, the meter A and Memory 2 LEDs turn on, and the arc counter will be displayed for the next 5 seconds as [000 000] to [999 999]. The maximum arc cycle count is 999 999.

Arc Timer

123

456

S

V

A

Hz

Arc Counter

999

999

S

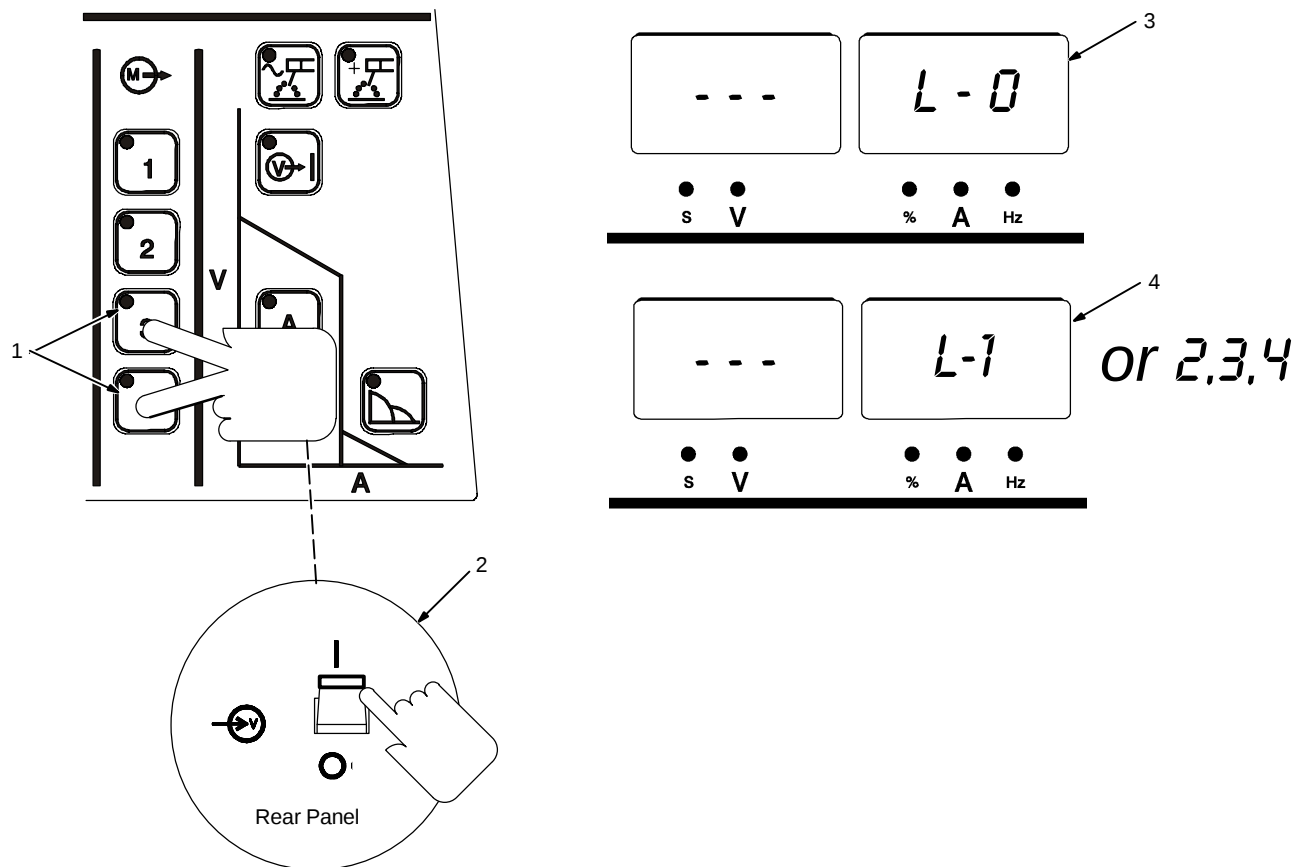
V

A

Hz

4-6. Lock Out Functions

A. Accessing Lock Out Capability



See Section 4-1 for explanation of controls referred to in all of Section 4-6.

There are four (1-4) different lock out levels. Each successive level allows the operator more flexibility.

NOTE: Before activating lock out levels, be sure that all procedures and parameters are established. Parameter adjustment is limited while lock out levels are active.

- 1 Memory Program Buttons 3 And 4
- 2 Power Switch

To access lock-out screens, press and hold memory program switch pads 3 and 4, and turn On power switch. Hold switch pads for approximately 7 seconds (or until software version number ____ _ clears meters).

- 3 Lock Out Off

If meter display is as shown, lockout feature is off.

- 4 Lock-Out On

If meter display is as shown, lockout feature is on.

To turn On the lock out feature, proceed as follows:

Enter a three digit code using the four Memory Program switch pads.

NOTE: If any switch pad other than a numbered Memory Program

switch pad is used, the lock out code is cancelled, and the lock out condition will remain inactive.

Once three digits have been entered, the amperage screen display will change from [L-0] to [L-...].

There are four lock out levels available. Enter any single digit (1-4), using the Memory Program switch pads, to access a lock out level (see Sections B and/or A).

Press torch trigger or turn Off power to complete lock out On sequence.

To turn Off the lock out feature, proceed as follows:

To access lock-out screens, press and hold memory program switch pads 3 and 4, and turn On power switch. Hold switch pads for approximately 7 seconds (or until software version number ____ _ clears meters).

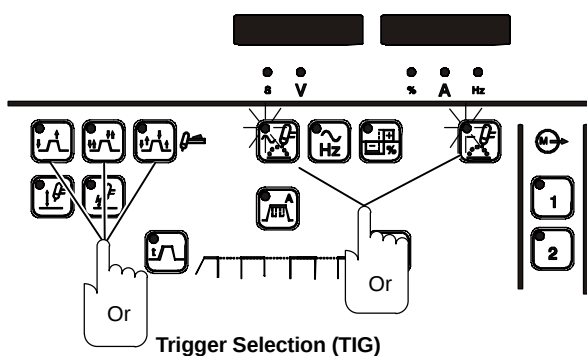
Enter the same three digits that were used to turn on the lock out feature. NOTE: If any switch pad other than a numbered Memory Program key pad is used, the code is cancelled, and the lock out condition will remain On.

Once the correct three digits have been entered, the amperage screen display will change from [L-1] or 2,3,4 to [L-0].

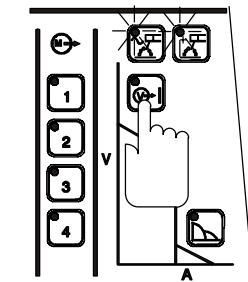
Press torch trigger or turn Off power to complete lock out Off sequence.

B. Lock Out Levels

Level 1



Trigger Selection (TIG)



Contactor Control (Stick)

Level 1

NOTE: Before activating lock out levels, be sure that all procedures and parameters are established. Parameter adjustment is limited while lock out levels are active.

NOTE: Remote amperage control is not available in level 1.

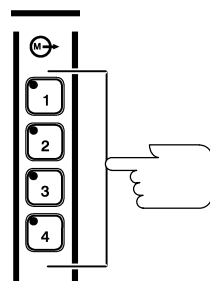
Trigger Selection

Allows for normal, 2T, or 4T trigger mode to be selected if the TIG process was selected when lock out feature was activated.

Stick Contactor Control

Allows for contactor control if the Stick process was selected when lock out feature was activated.

Level 2



Select desired program

Program Selection

Level 2

NOTE: Before activating lock out levels, be sure that all procedures and parameters are established. Parameter adjustment is limited while lock out levels are active.

NOTE: Remote amperage control is not available in level 2.

Includes all the functions of level 1 plus the following:

Program Selection 1-4

Gives operator the ability to select desired program.

Process Selection – TIG or Stick

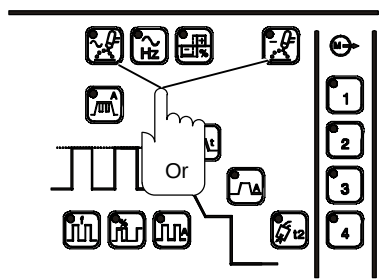
Gives operator the ability to select the TIG or Stick process.

Lift-Arc Or HF Start Mode

Gives operator the ability to select Lift-Arc or HF Start mode.

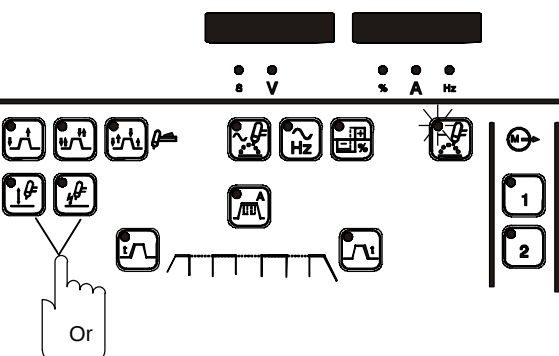
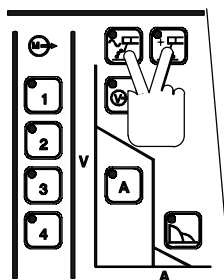
Pulser ON/Off Control

Gives operator the ability to turn on/off the Pulser control.



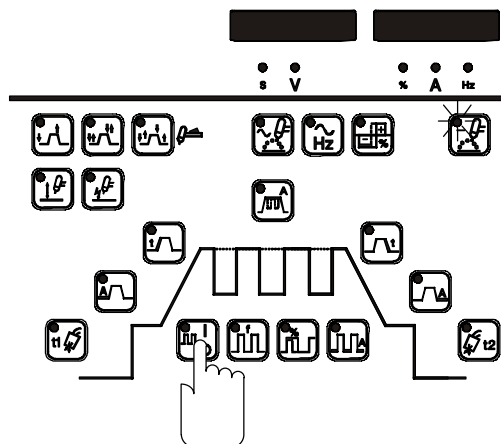
Select TIG or Stick

Process Selection



Select Lift-Arc Or HF Start mode

Lift-Arc Or HF Start Mode Selection

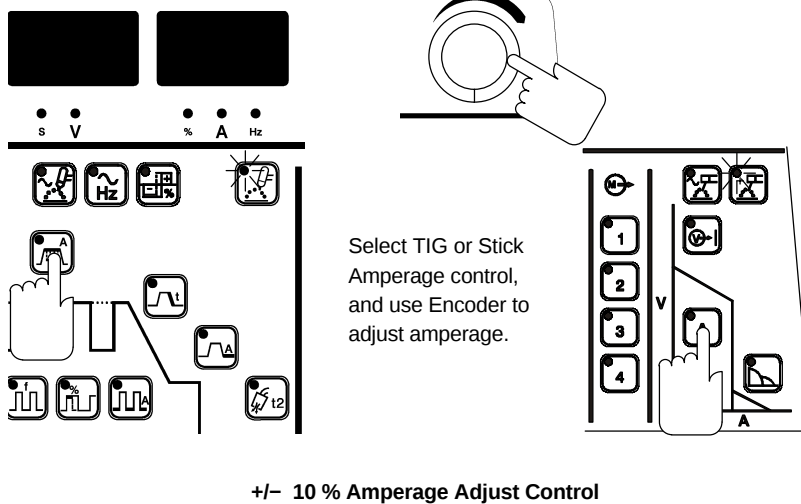


Turn Pulser control on/off

Pulser On/Off Control

C. Lock Out Levels (Continued)

Level 3



Level 3

NOTE: Before activating lock out levels, be sure that all procedures and parameters are established. Parameter adjustment is limited while lock out levels are active.

Note: Remote amperage control is not available in level 3.

Includes all the functions of levels 1 and 2 plus the following:

+/- 10% adjustment of preset TIG Weld Amps or Peak Amps While Pulsing or Stick Weld Amps

Select desired amperage control (TIG or Stick, and use Encoder control to adjust amperage +/- 10% of preset amperage value, up to the limits of the machine.

Level 4

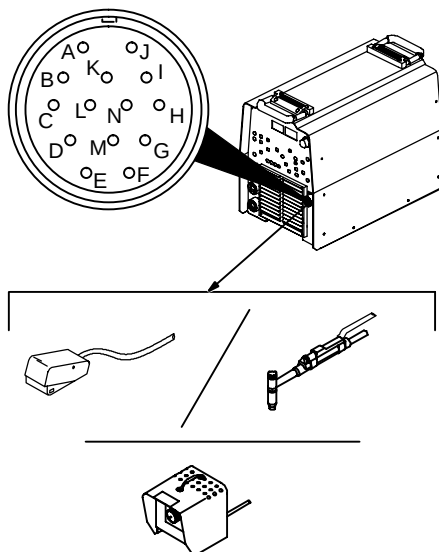
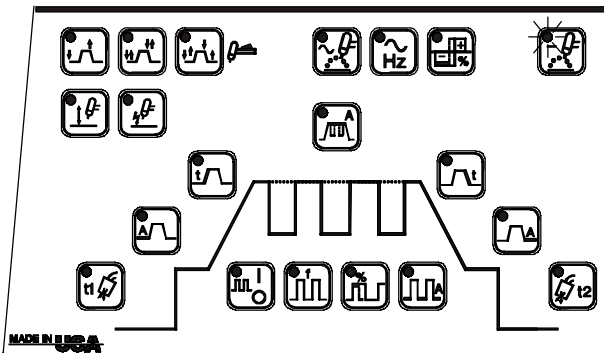
NOTE: Before activating lock out levels, be sure that all procedures and parameters are established. Parameter adjustment is limited while lock out levels are active.

Includes all the functions of levels 1, 2, and 3 plus the following:

Remote Amperage Control

Allows operator to use remote amperage control if desired. Remote control operates from minimum to maximum of preset amperage value. Connect remote control device according to Section 3-7.

Level 4



SECTION 5 – MAINTENANCE AND TROUBLESHOOTING

5-1. Routine Maintenance

			▲ Disconnect power before maintaining.
--	--	--	---

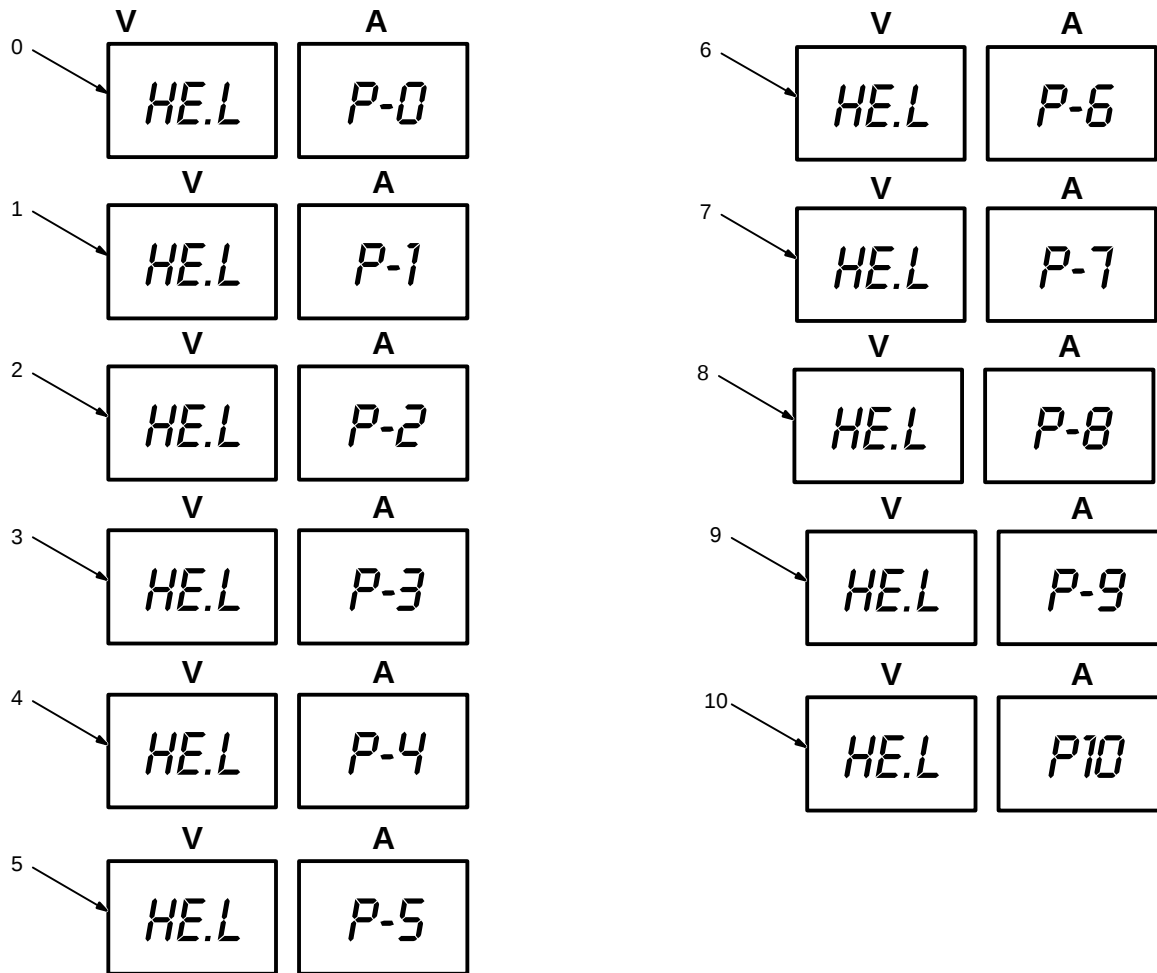
	3 Months	Replace unreadable labels.	Replace damaged gas hose.	Clean and tighten weld terminals.
Repair or replace cracked cables and cords.				
	6 Months	Blow out inside. During heavy service, clean monthly.		

5-2. Blowing Out Inside of Unit

		▲ Do not remove case when blowing out inside of unit. To blow out unit, direct airflow through front and back louvers as shown.
--	--	--

ST-802 135-A

5-3. Voltmeter/Ammeter Help Displays



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

0 Help 0 Display

Indicates a short in the thermal protection circuitry located on the left side of the unit. Contact a Factory Authorized Service Agent if this display is shown.

1 Help 1 Display

Indicates a malfunction in the primary power circuit. Contact a Factory Authorized Service Agent if this display is shown.

2 Help 2 Display

Indicates an open in the thermal protection circuitry located on the left side of the unit. Contact a Factory Authorized Service Agent if this display is shown.

3 Help 3 Display

Indicates the left side of the unit has overheated. The unit has shut down to allow the

fan to cool it (see Section 3-3). Operation will continue when the unit has cooled.

4 Help 4 Display

Indicates an open in the thermal protection circuitry located on the right side of the unit. Contact a Factory Authorized Service Agent if this display is shown.

5 Help 5 Display

Indicates the right side of the unit has overheated. The unit has shut down to allow the fan to cool it (see Section 3-3). Operation will continue when the unit has cooled.

6 Help 6 Display

Indicates that the input voltage is too low and the unit has automatically shut down. Operation will continue when the voltage is within the operating range ($\pm 10\%$). Have an electrician check the input voltage if this display is shown.

7 Help 7 Display

Indicates that the input voltage is too high and the unit has automatically shut down. Operation will continue when the voltage is within the operating range ($\pm 10\%$). Have an electrician check the input voltage if this display is shown.

8 Help 8 Display

Indicates a malfunction in the secondary power circuit of the unit. Contact a Factory Authorized Service Agent if this display is shown.

9 Help 9 Display

Indicates a short in the thermal protection circuitry located on the right side of the unit. Contact a Factory Authorized Service Agent if this display is shown.

10 Help 10 Display

Indicates torch trigger is depressed. Release trigger to continue.

5-4. Troubleshooting



Trouble	Remedy
No weld output; unit completely inoperative.	Place line disconnect switch in On position (see Section 3-11).
	Check and replace line fuse(s), if necessary, or reset circuit breaker (see Section 3-11).
	Check for proper input power connections (see Section 3-11).
No weld output; meter display On.	If using remote control, be sure correct process is enabled to provide output control at Remote 14 receptacle (see Sections 4-1 and 3-7).
	Input voltage outside acceptable range of variation (see Section 3-10).
	Check, repair, or replace remote control.
	Unit overheated. Allow unit to cool with fan On (see Section 3-3).
Erratic or improper weld output.	Use proper size and type of weld cable (see Section 3-6).
	Clean and tighten all weld connections.
No 115 volts ac output at duplex receptacle.	Reset circuit breaker CB1 (see Section 3-5).
Fan not operating.	Check for and remove anything blocking fan movement.
	Have Factory Authorized Service Agent check fan motor.
Wandering arc	Use proper size tungsten.
	Use properly prepared tungsten.
	Reduce gas flow rate.
Tungsten electrode oxidizing and not remaining bright after conclusion of weld.	Shield weld zone from drafts.
	Increase postflow time.
	Check and tighten all gas fittings.
	Water in torch. Refer to torch manual.

SECTION 6 – ELECTRICAL DIAGRAM

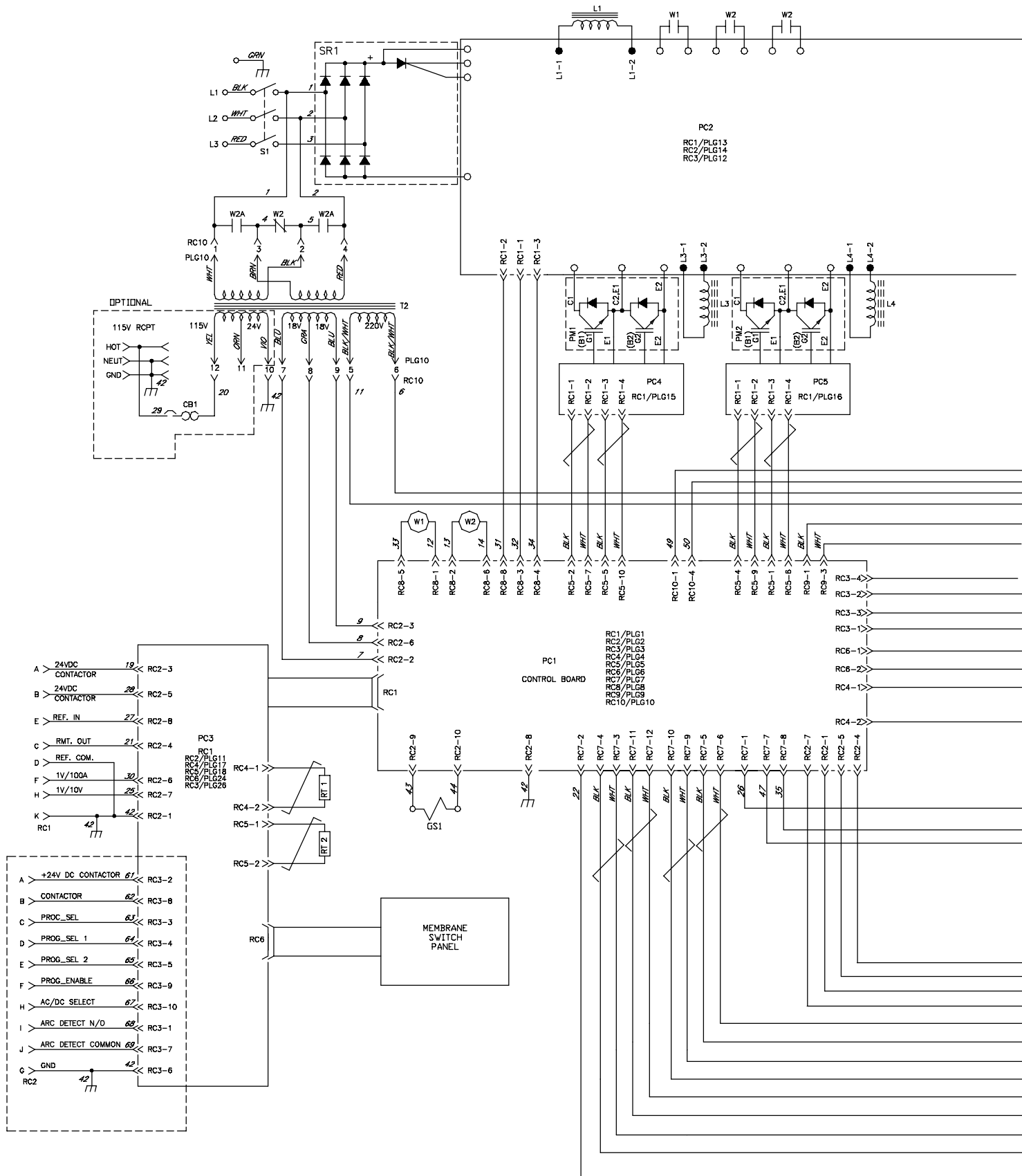
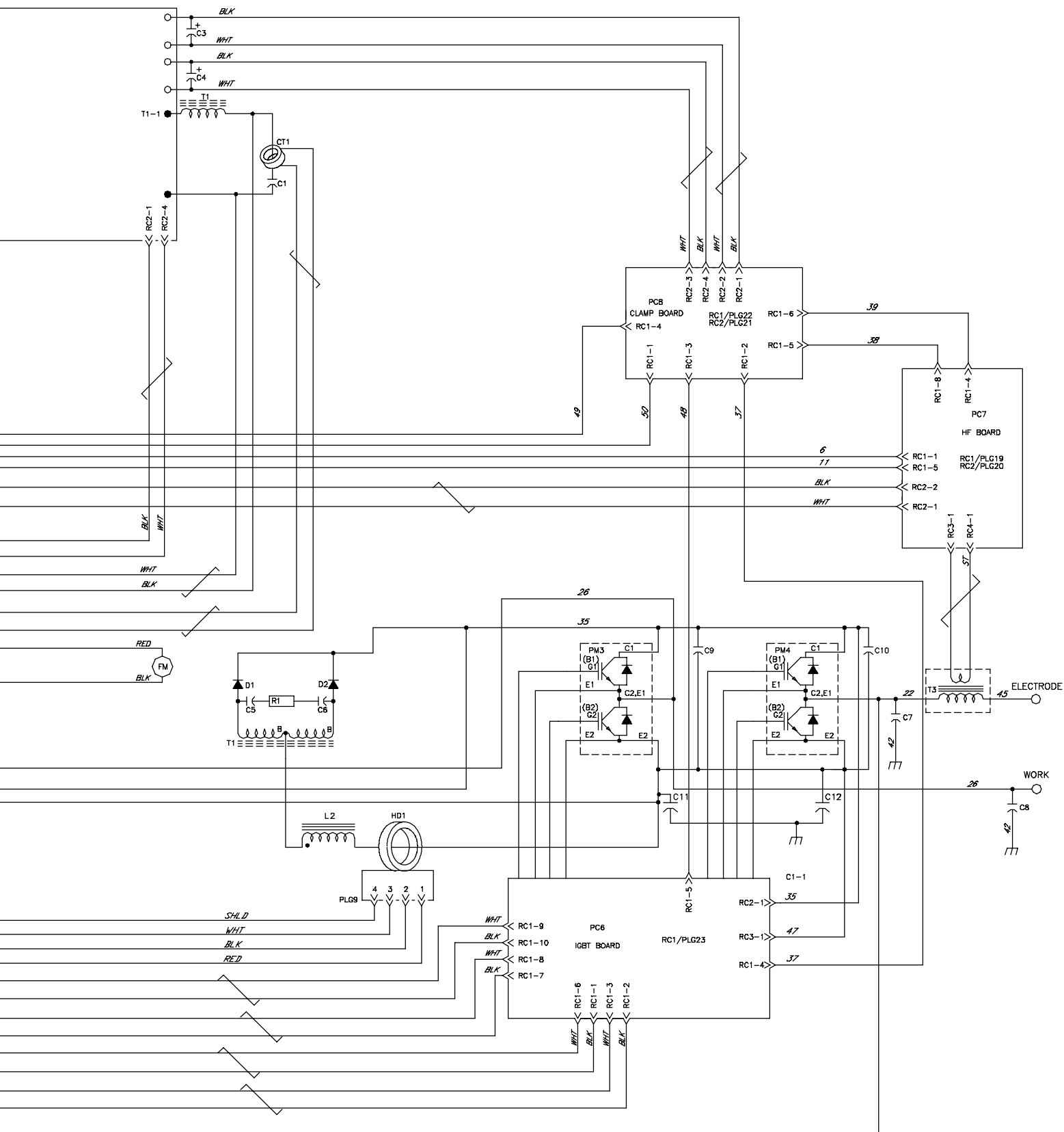


Figure 6-1. Circuit Diagram For 230/460 Volt Models



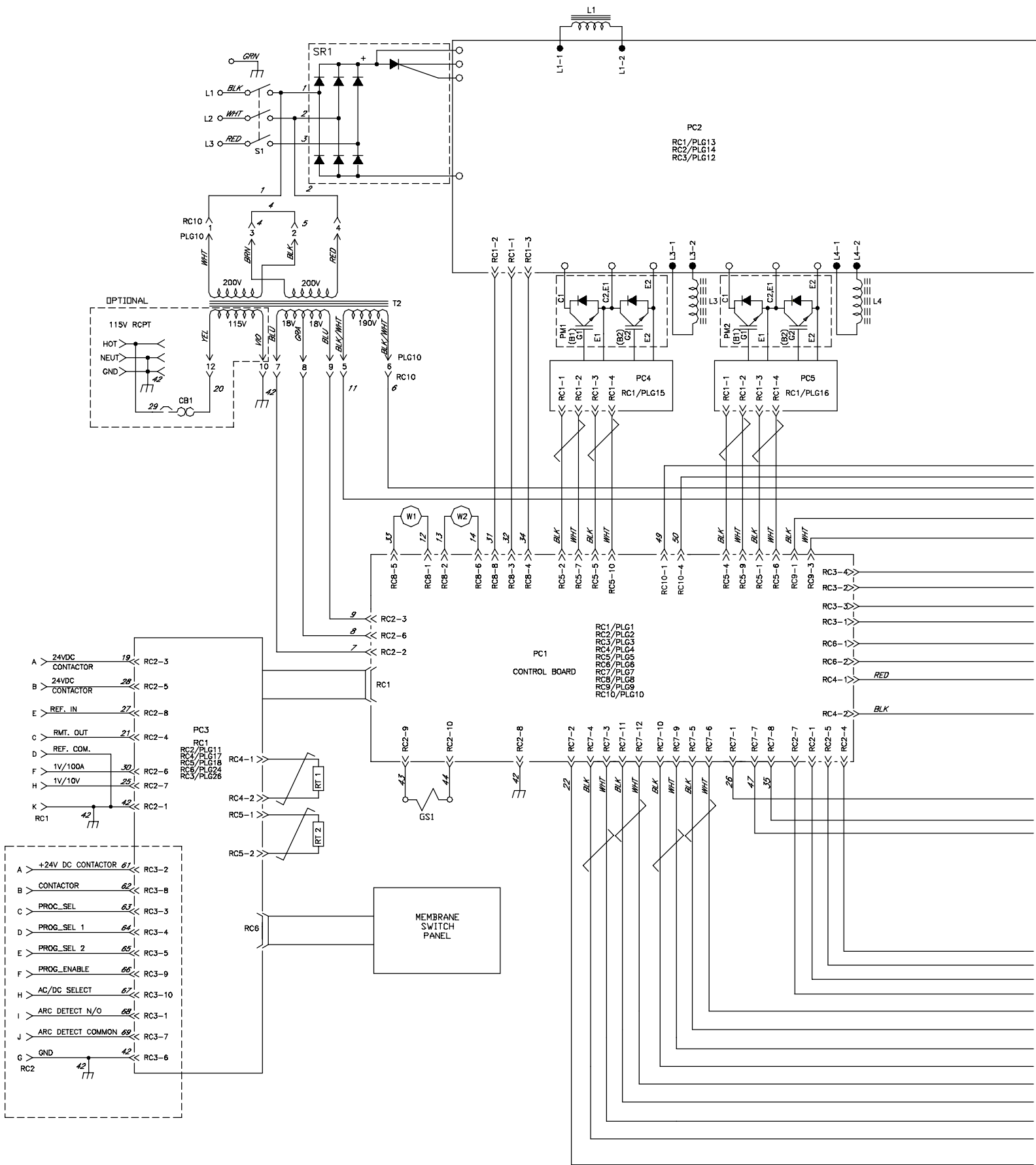
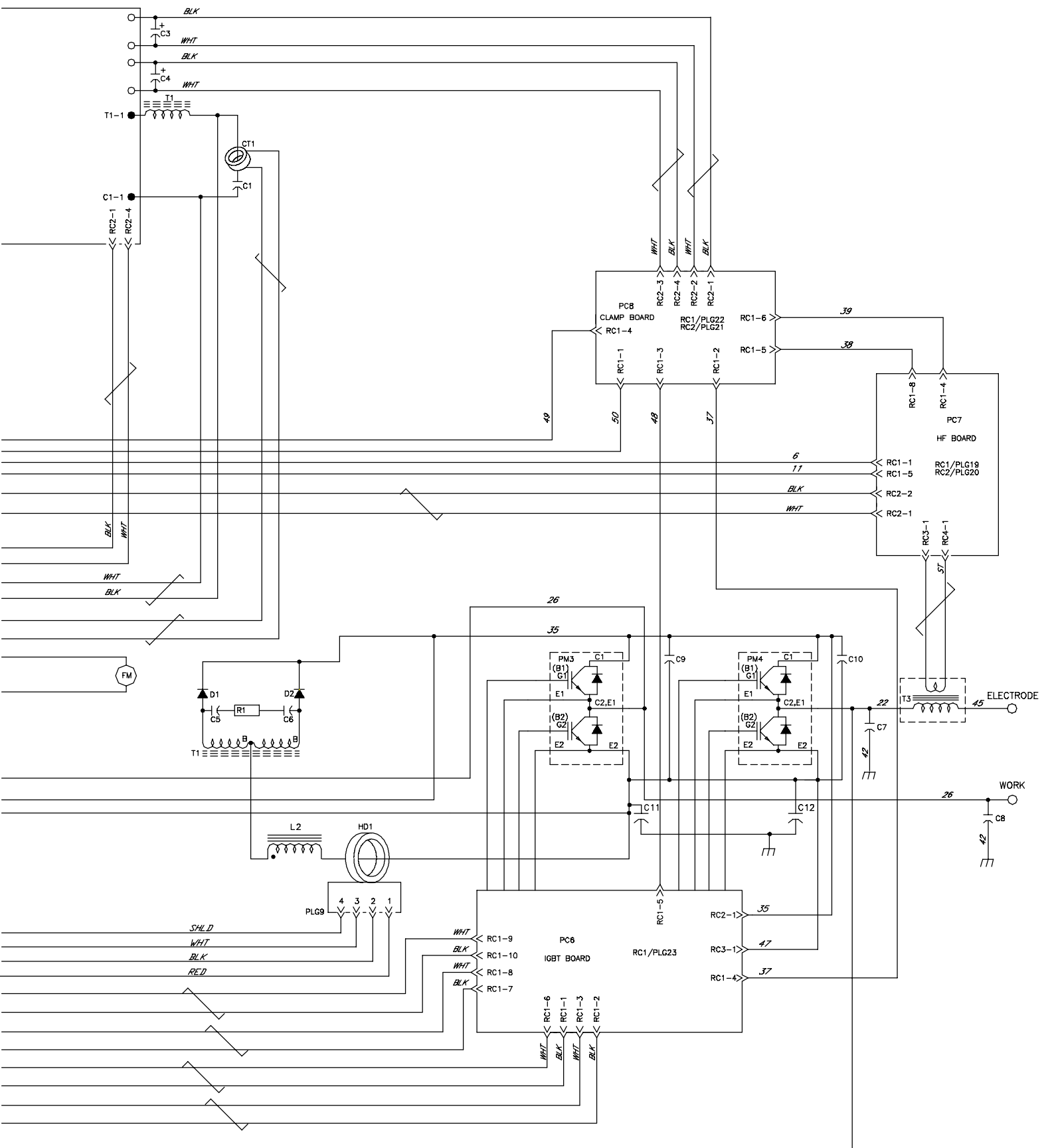
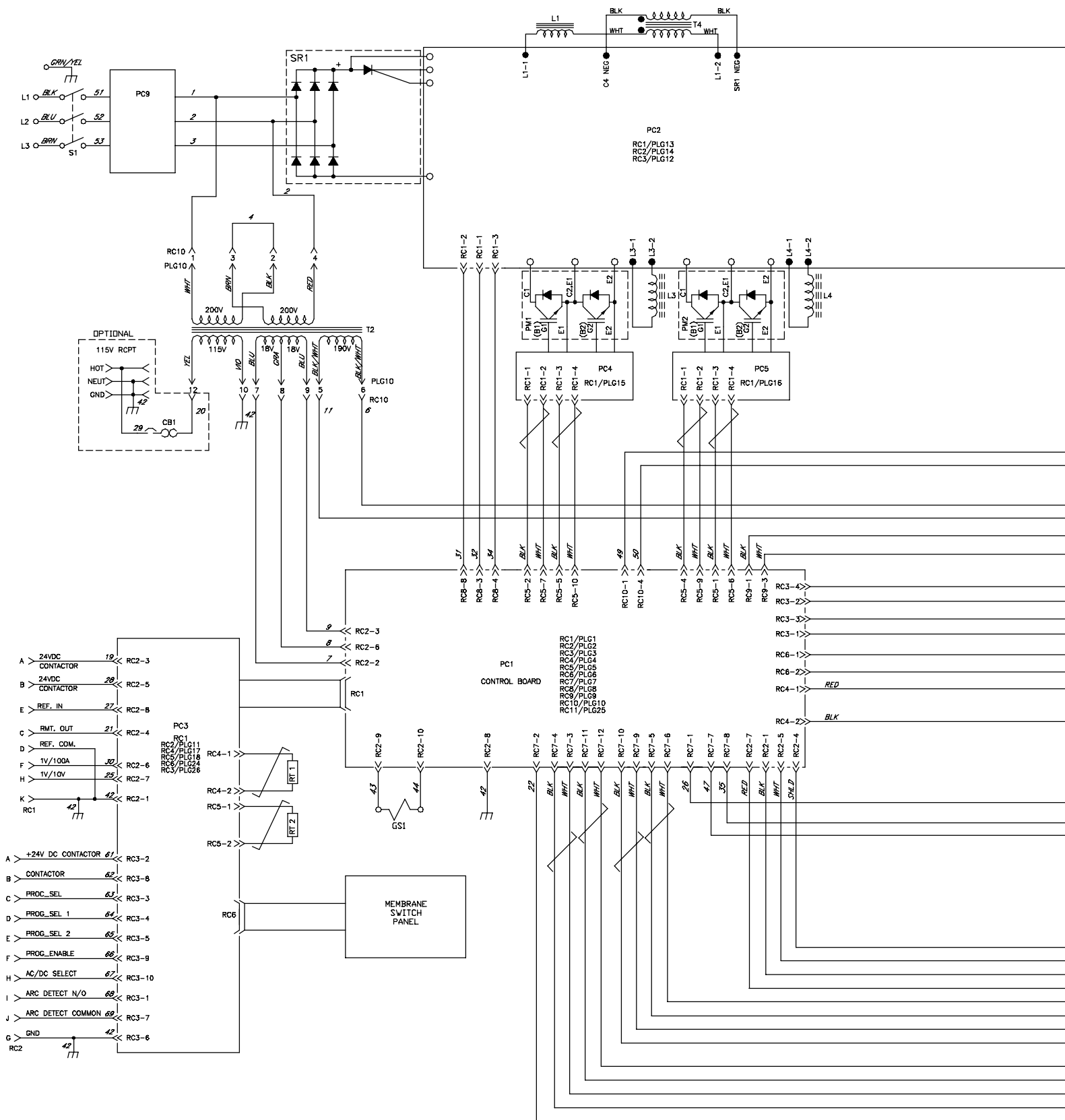
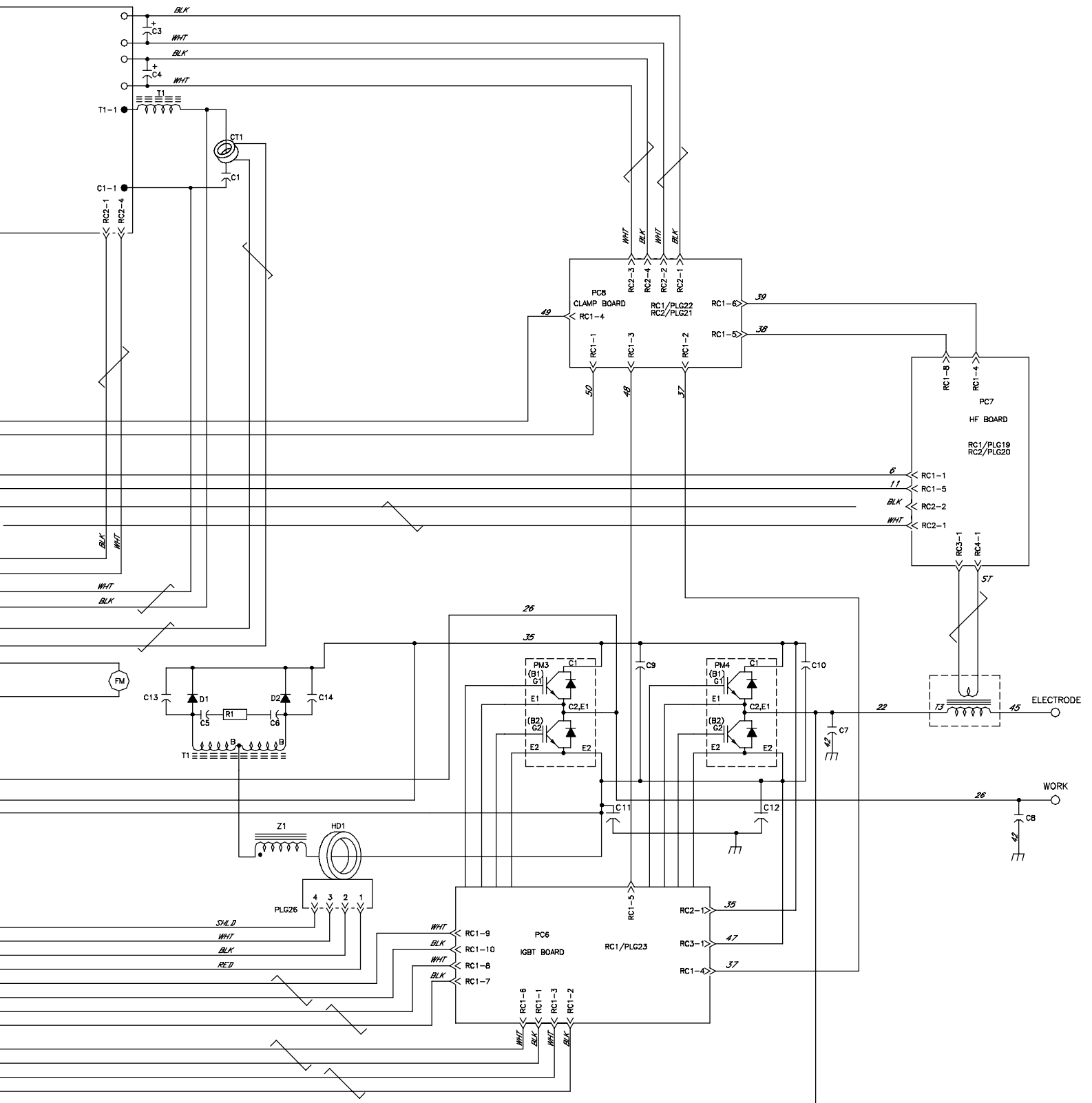


Figure 6-2. Circuit Diagram For 400 Volt Non-CE Models

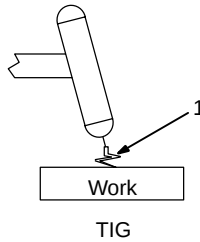






SECTION 7 – HIGH FREQUENCY

7-1. Welding Processes Requiring High Frequency

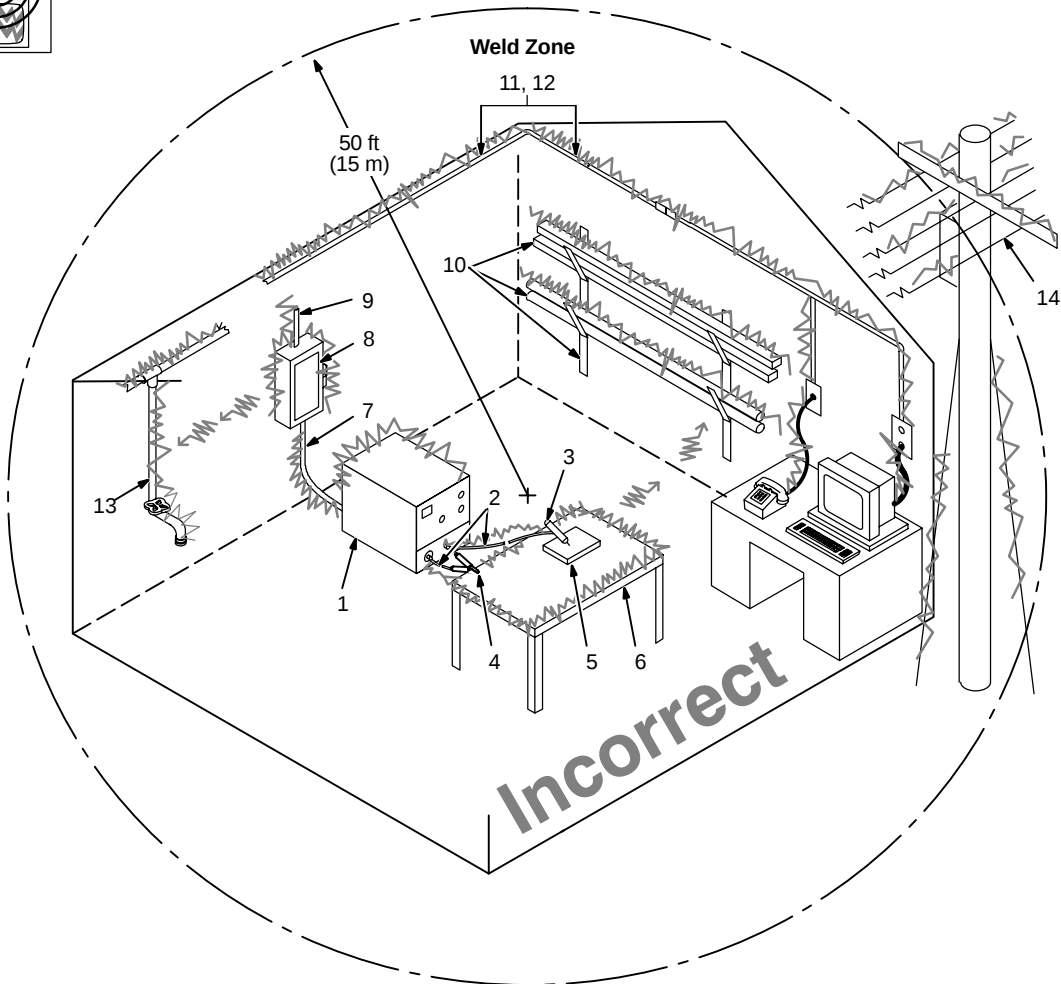


1 High-Frequency Voltage

TIG – helps arc jump air gap between torch and workpiece and/or stabilize the arc.

high_freq 12/96 – S-0693

7-2. Incorrect Installation



Sources of Direct High-Frequency Radiation

- 1 High-Frequency Source (welding power source with built-in HF or separate HF unit)
- 2 Weld Cables
- 3 Torch
- 4 Work Clamp
- 5 Workpiece
- 6 Work Table

Sources of Conduction of High Frequency

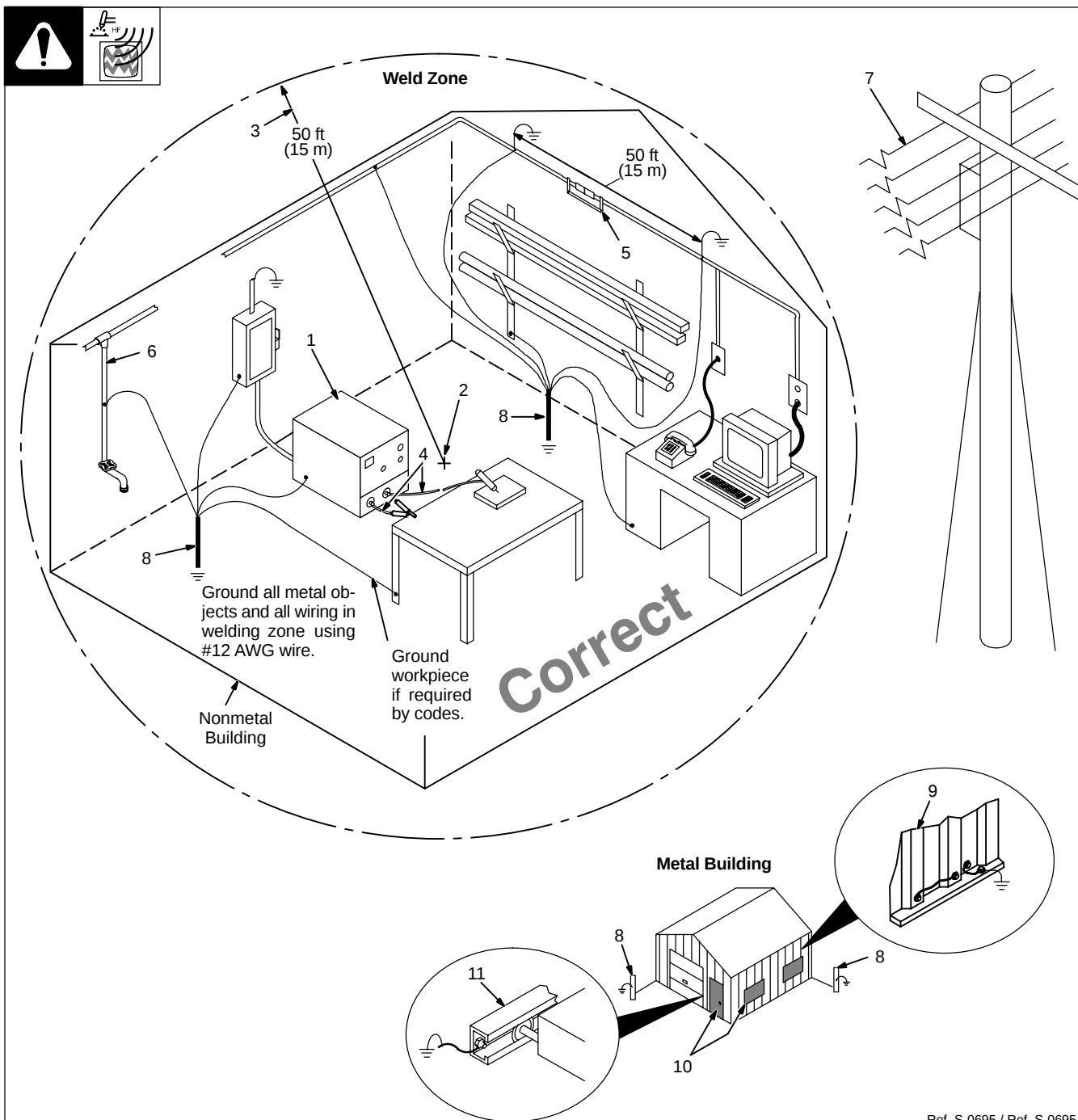
- 7 Input Power Cable
- 8 Line Disconnect Device
- 9 Input Supply Wiring

Sources of Reradiation of High Frequency

- 10 Ungrounded Metal Objects
- 11 Lighting
- 12 Wiring
- 13 Water Pipes and Fixtures
- 14 External Phone and Power Lines

S-0694

7-3. Correct Installation



Ref. S-0695 / Ref. S-0695

- 1 High-Frequency Source (welding power source with built-in HF or separate HF unit)

Ground metal machine case, work output terminal, line disconnect device, input supply, and worktable.

- 2 Center Point of Welding Zone
Midpoint between high-frequency source and welding torch.

- 3 Welding Zone
A circle 50 ft (15 m) from center point in all directions.

- 4 Weld Output Cables
Keep cables short and close together.

- 5 Conduit Joint Bonding and Grounding

Electrically join (bond) all conduit sections using copper straps or braided wire. Ground conduit every 50 ft (15 m).

- 6 Water Pipes and Fixtures

Ground water pipes every 50 ft (15 m).

- 7 External Power or Telephone Lines

Locate high-frequency source at least 50 ft (15 m) away from power and phone lines.

- 8 Grounding Rod

Consult the National Electrical Code for specifications.

Metal Building Requirements

- 9 Metal Building Panel Bonding Methods

Bolt or weld building panels together, install copper straps or braided wire across seams, and ground frame.

- 10 Windows and Doorways

Cover all windows and doorways with grounded copper screen of not more than 1/4 in (6.4 mm) mesh.

- 11 Overhead Door Track

Ground the track.

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

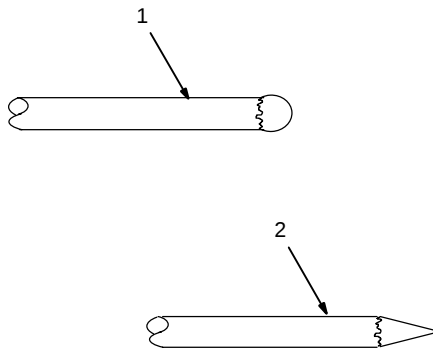
Electrode Diameter	Amperage Range - Gas Type ♦ - Polarity			
	DC – Argon – Electrode Negative/Straight Polarity	DC – Argon – Electrode Positive/Reverse Polarity	AC – Argon – Using High Frequency	AC – Argon – Balanced Wave Using High Freq.
2% Thorium Alloyed Tungsten (Red Band)				
.010"	Up to 25	*	Up 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

♦ 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. Safety Information About Tungsten

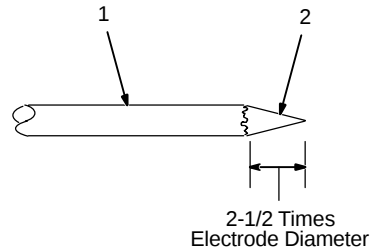


▲ Grinding the tungsten electrode produces dust and flying sparks which can cause injury and start fires. Use local exhaust (forced ventilation) at the grinder or wear an approved respirator. Read MSDS for safety information. Consider using cerium or lanthanum based tungsten instead of thoriated. Thorium dust contains low-level radioactive material. Properly dispose of grinder dust in an environmentally safe way. Wear proper face, hand, and body protection. Keep flammables away.

- 1 Tungsten Electrode With Balled End
- 2 Pointed Tungsten Electrode

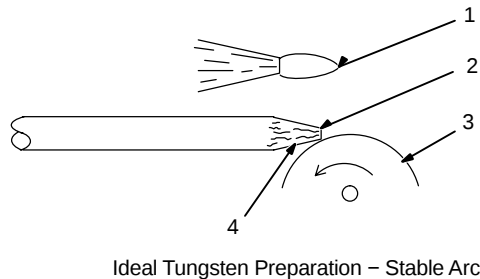
Ref. S-0161

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

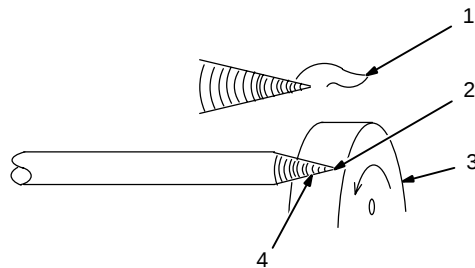


- 1 Tungsten Electrode
- 2 Tapered End

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.

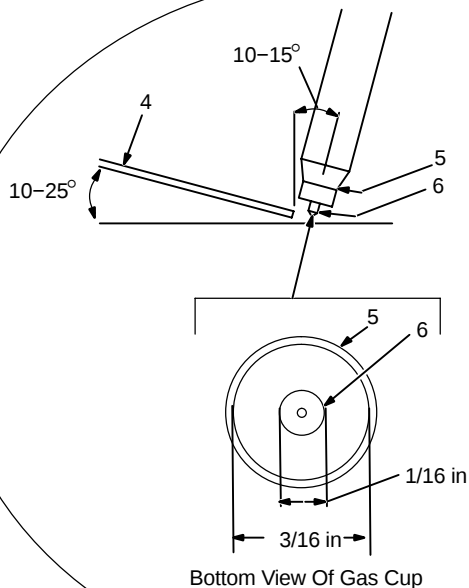
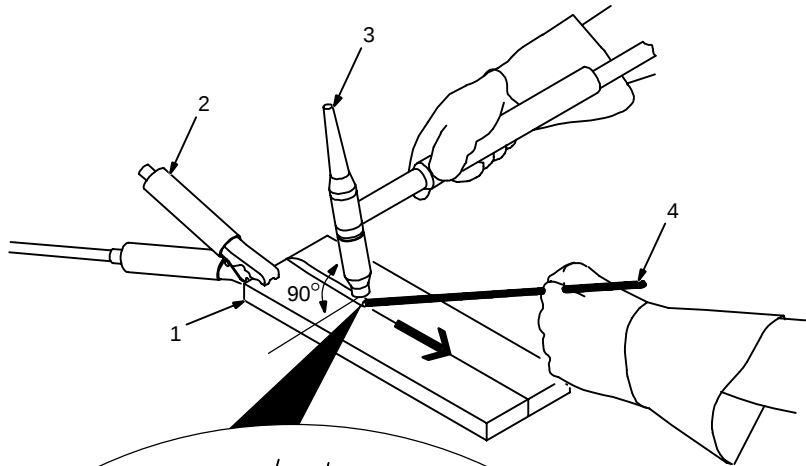


- 1 Arc Wander
- 2 Point
- 3 Grinding Wheel
- 4 Radial Ground

Ref. S-0161 / Ref. S-0162

SECTION 9 – GUIDELINES FOR TIG WELDING (GTAW)

9-1. Positioning The Torch



▲ Grinding the tungsten electrode produces dust and flying sparks which can cause injury and start fires. Use local exhaust (forced ventilation) at the grinder or wear an approved respirator. Read MSDS for safety information. Consider using cerium or lanthanum based tungsten instead of thoriated. Thorium dust contains low-level radioactive material. Properly dispose of grinder dust in an environmentally safe way. Wear proper face, hand, and body protection. Keep flammables away.

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 Gas Cup

6 Tungsten Electrode

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

Guidelines:

The inside diameter of the gas cup should be at least three times the tungsten diameter to provide adequate shielding gas coverage. (For example, if tungsten is 1/16 in diameter, gas cup should be a minimum of 3/16 in diameter.

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

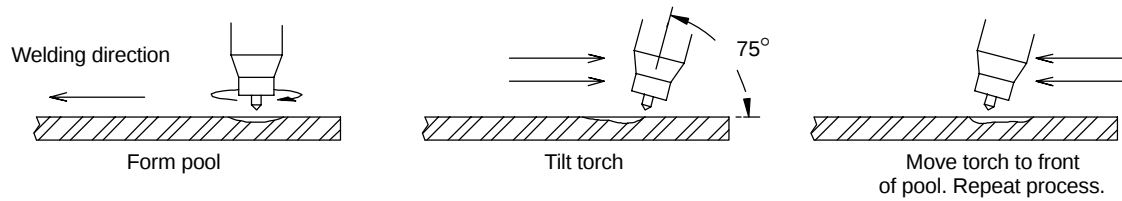
The tungsten extension should be no greater than the inside diameter of the gas cup.

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

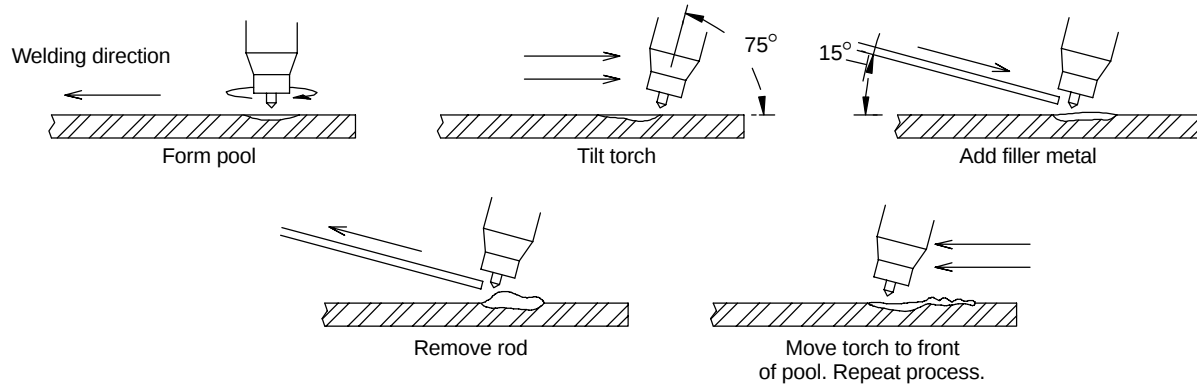
Ref. ST-161 892

9-2. Torch Movement During Welding

Tungsten Without Filler Rod



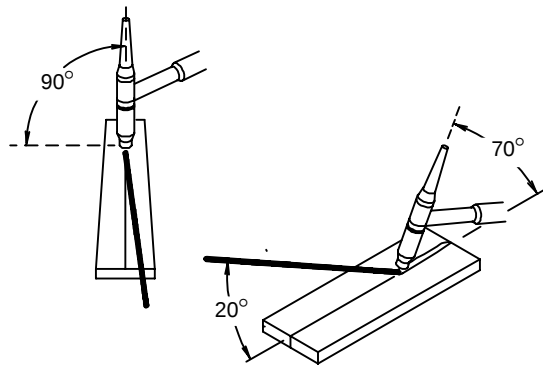
Tungsten With Filler Rod



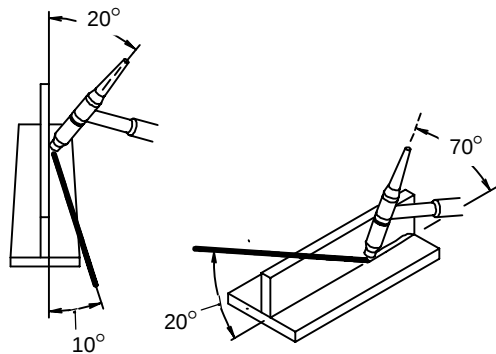
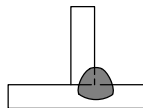
ST-162 002-B

9-3. Positioning Torch Tungsten For Various Weld Joints

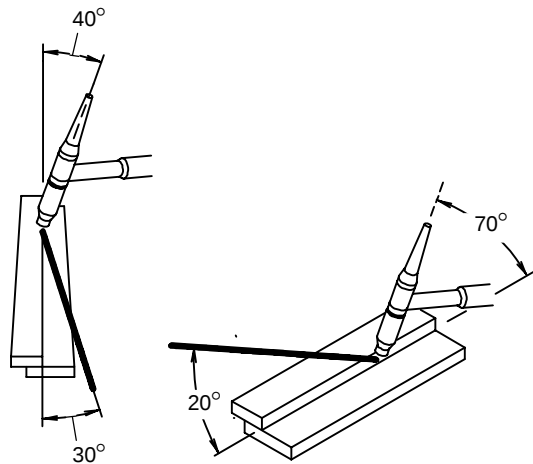
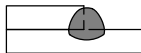
Butt Weld And Stringer Bead



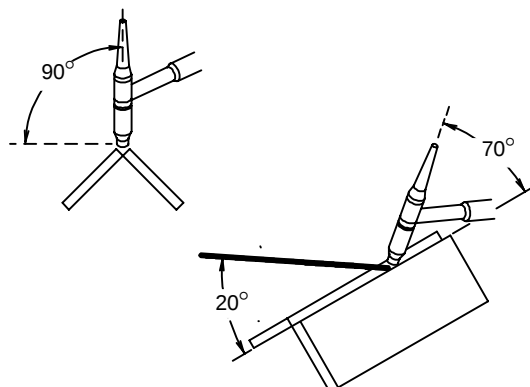
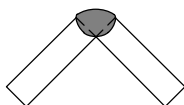
"T" Joint



Lap Joint



Corner Joint



☞ *Hardware is common and not available unless listed.*

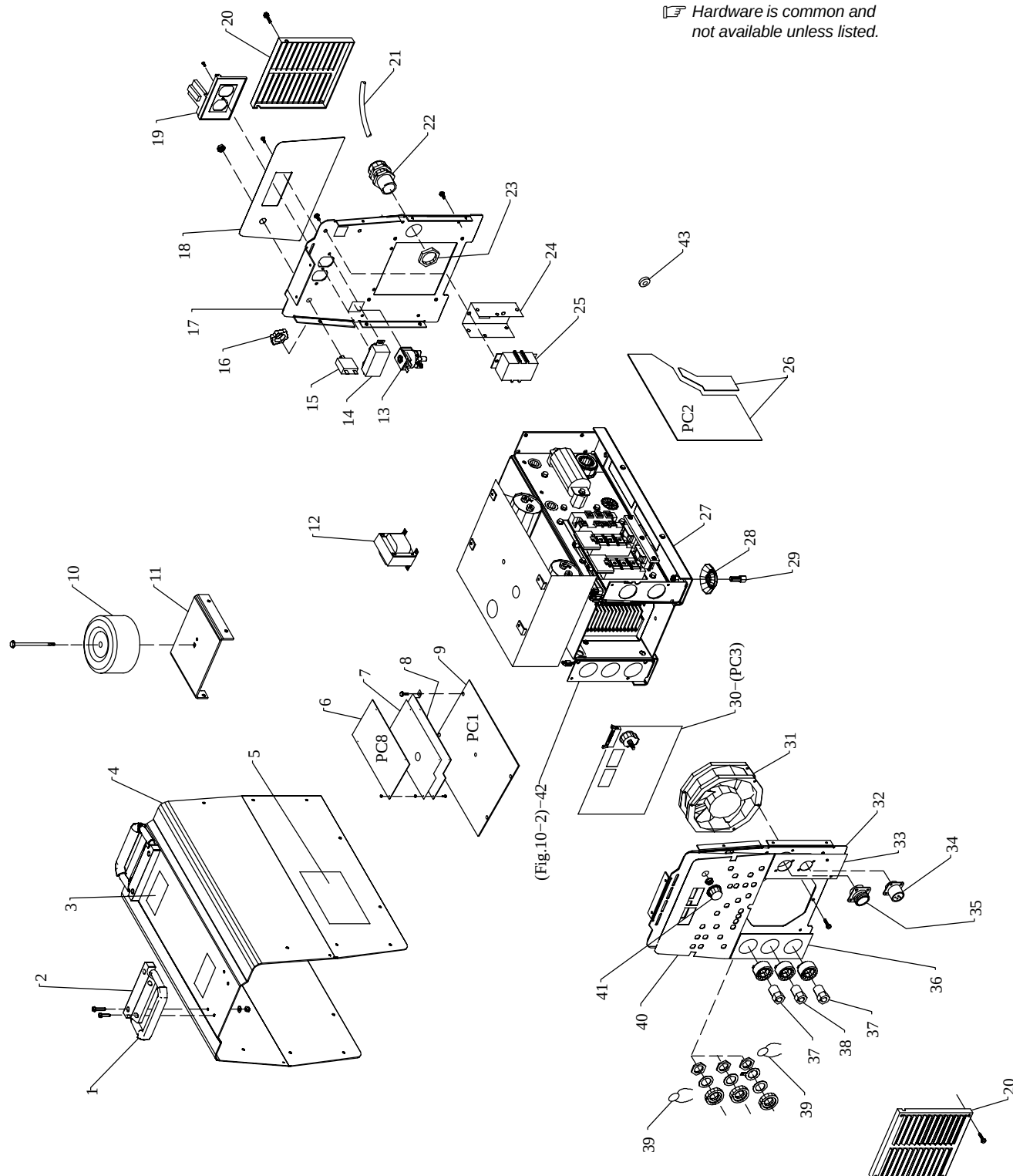


Figure 10-1. Main Assembly

ST-801 870-C

Item No.	Dia. Mkgs.	Part No.	Description	Quantity		
				Model		
				230/460	400 CE	400 Non CE

Figure 10-1. Main Assembly

...	1	126 416	HANDLE	2	2	2
...	2	126 415	CLAMP, saddle	2	2	2
...	3	138 442	LABEL, caution falling	2	2	2
...	4	+175 148	WRAPPER	1	1	1
...		175 256	INSULATOR, side RH & LH	2	2	2
...	5	134 327	LABEL, warning general precautionary	2	2	2
...	6	PC8	CIRCUIT CARD ASSEMBLY, clamp	1	1	1
...		PLG21	CONNECTOR & SOCKETS	1	1	1
...		PLG22	CONNECTOR & SOCKETS	1	1	1
...	7	183 613	INSULATOR, PC card clamp	1	1	1
...	8	182 498	BRACKET, mtg PC card clamp		1	1
...	9	PC1	CIRCUIT CARD ASSEMBLY, control	1	1	1
...		PLG2	CONNECTOR & SOCKETS	1	1	1
...		PLG3	CONNECTOR & SOCKETS	1	1	1
...		PLG4	CONNECTOR & SOCKETS	1	1	1
...		PLG5	CONNECTOR & SOCKETS	1	1	1
...		PLG7	CONNECTOR & SOCKETS	1	1	1
...		PLG8	CONNECTOR & SOCKETS	1	1	1
...		PLG9	CONNECTOR & SOCKETS	1	1	1
...		PLG10	CONNECTOR & SOCKETS	1	1	1
...	10	T2	TRANSFORMER, control	1		
...	10	T2	TRANSFORMER, control	1		
...	10	T2	TRANSFORMER, control		1	1
...	11	187 461	BRACKET, mtg aux transformer		1	1
...	12	T2	TRANSFORMER, control		1	1
...		RC10	CONNECTOR & SOCKETS	1	1	1
...		PLG10	CONNECTOR & PINS	1	1	1
...	13	GS1	VALVE, 24VDC 2way	1	1	1
...	14	189 033	RECEPTACLE, str dx grd 2P 3W 15A	1	1	1
...	15	CB1	CIRCUIT BREAKER, 1P 10A 250VAC	1		
...	15	CB1	CIRCUIT BREAKER, 1P 7A 250VAC		1	1
...	16	605 227	NUT, .750-14 knurled	1	1	1
...	17	182 205	PANEL, rear	1	1	1
...	18		PLATE, identification rear (order by model and serial number)	1	1	1
...	19	175 282	COVER, receptacle	1	1	1
...	20	175 138	BOX, louver	2	2	2
...	21	182 561	CABLE, pwr	1		1
...	21	179 625	CABLE, pwr		1	
...	22	175 213	BUSHING, strain relief .472/.787 ID	1		1
...	22	186 440	BUSHING, strain relief .350/.630 ID		1	
...	23	182 445	NUT, stl locking	1	1	1
...	24	176 226	INSULATOR, switch power	1	1	1
...	25	S1	SWITCH, tgl 3PST 40A 600VAC (Power Switch)	1	1	1
...	26	PC2	CIRCUIT CARD, assembly	1	1	1
...		176 879	SCREW, M5-.8-2	18	18	18
...		PLG13	CONNECTOR & SOCKETS	1	1	1
...		PLG14	CONNECTOR & SOCKETS	1	1	1
...		179 626	BUS BAR, interconnecting	1	1	1
...	27	+175 132	BASE	1	1	1
...		126 026	LABEL, warning electric shock	1	1	1
...	28	173 693	FOOT, mtg unit	4	4	4
...	29	176 736	SCREW, mtg foot	4	4	4
...	30	PC3	CIRCUIT CARD, front panel (consisting of)	1	1	1
...		DD1-6	LED	6	6	6
...		PLG17, 18	CONNECTOR & SOCKETS	1	1	1
...		PLG26	CONNECTOR & SOCKETS	1	1	1

Item No.	Dia. Mkgs.	Part No.	Description	Quantity		
				Model		
				230/460	400 CE	400 Non CE

Figure 10-1. Main Assembly (Continued)

.....	PLG11	.....	115 092	..	RECEPTACLE, w/leads & plug	1	.....	1	.....	1
... 31	FM	.....	175 084	..	MOTOR, fan 24VDC 3000RPM	1	.....	1	.....	1
.....			135 635	..	CONNECTOR & SOCKETS	1	.....	1	.....	1
... 32			191 571	..	PANEL, front	1	.....	1	.....	1
... 33			191 173	..	NAMEPLATE, RH (order by model and serial number)	1	.....	1		
... 33			191 172	..	NAMEPLATE, RH (order by model and serial number)	1	.....	1		
... 33			◆191 172	..	NAMEPLATE, RH (order by model and serial number)	1	.....	1		
... 34	RC2	.....	◆191 302	..	CONNECTOR & SOCKETS	1	.....	1		
... 34	RC2	.....	◆191 302	..	CONNECTOR & SOCKETS	1	.....	1		
... 35	RC1	.....	188 186	..	CONNECTOR & SOCKETS	1	.....	1	.....	1
... 36			192 018	..	NAMEPLATE, LH (order by model and serial number)	1	.....	1	.....	1
... 37			185 703	..	RECEPTACLE, twist lock assembly	2	.....	2	.....	2
... 38			187 235	..	RECEPTACLE, female gas	1	.....	1		
... 38			188 192	..	RECEPTACLE, male gas	1	.....	1		
... 39	C7,8	.....	186 543	..	CAPACITOR ASSEMBLY	2	.....	2	.....	2
... 40			186 446	..	NAMEPLATE, (order by model and serial number)	1	.....	1		
... 40			189 229	..	NAMEPLATE, (order by model and serial number)	1	.....	1	.....	1
... 41			186 952	..	KNOB, encoder	1	.....	1	.....	1
... 42			Fig 10-2	..	WINDTUNNELS w/COMPONENTS	1	.....	1	.....	1
... 43			182 108	..	CHOKE	1	.....	1		

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

◆ Optional

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

Hardware is common and not available unless listed.

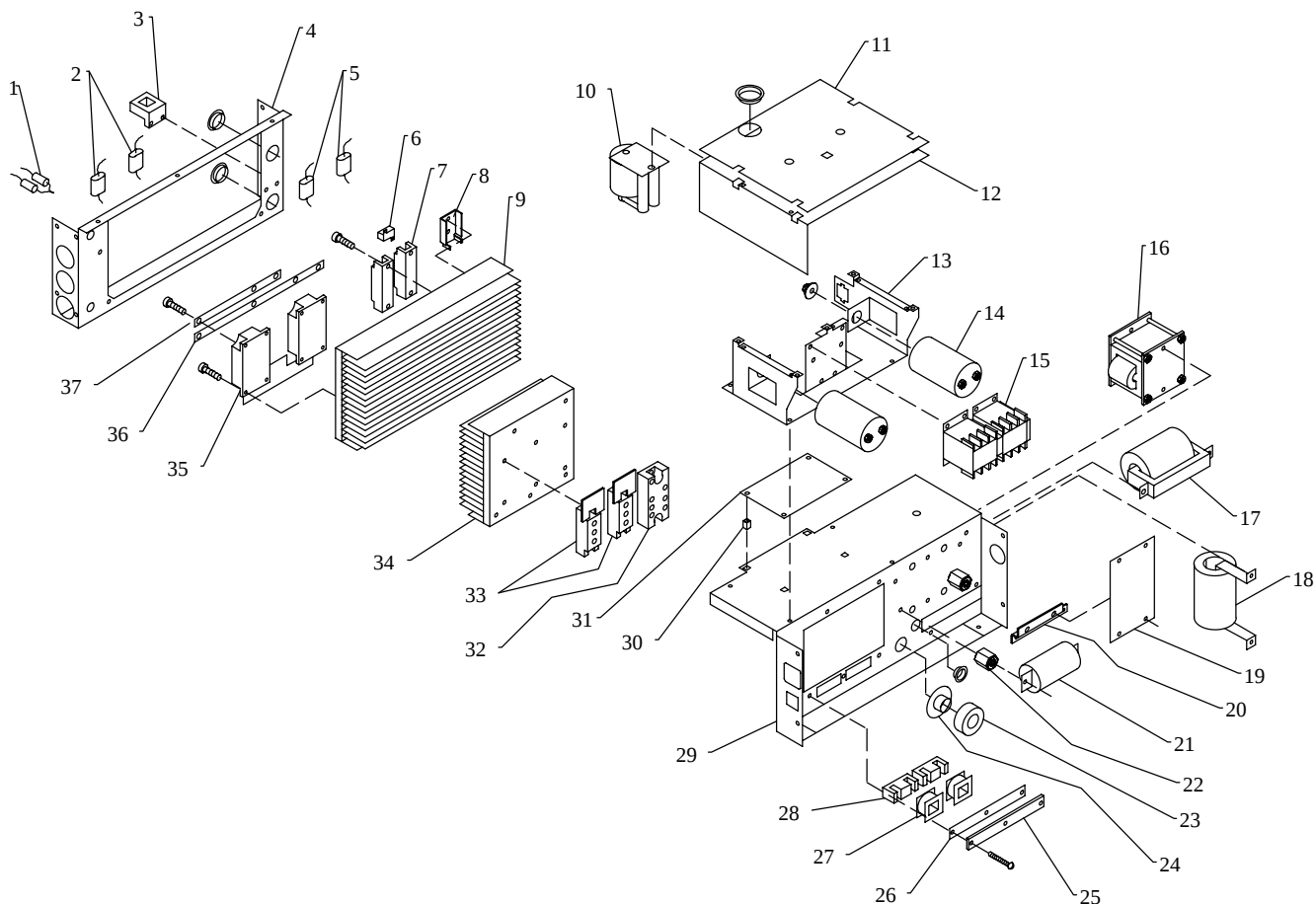


Figure 10-2. Windtunnels w/Components

ST-801 871-C

Item No.	Dia. Mkgs.	Part No.	Description	Quantity		
				Model		
				230/460	400 CE	400 Non CE

Figure 10-2. Windtunnels w/Components
(Fig 10-1 Item 39)

...	1	...	C11,12	...	185 424	..	CAPACITOR, filter assembly	...	1	...	1	...	1
...	2	...	C9,10	...	164 812	..	CAPACITOR, polyp met film 1MF 600	...	2	...	2	...	2
...	3	...	HD1	...	182 918	..	TRANSDUCER, current 400A	...	1	...	1	...	1
...	4	...		...	+182 206	..	WINDTUNNEL, LH	...	1	...	1	...	1
...		...		...	153 718	..	LABEL, warning exploding parts	...	2	...	2	...	2
...		...		...	126 026	..	LABEL, warning electric shock	...	2	...	2	...	2
...	5	...		...	185 424	..	CAPACITOR, filter assembly	...	1	...		...	
...	6	...	R1,C5,6	...	175 194	..	RESISTOR/CAPACITOR	...	1	...	1	...	1
...	7	...	D1,2	...	185 775	..	KIT, diode	...	1	...	1	...	1
...	8	...		...	188 361	..	HEAT SINK	...	2	...	2	...	2
...	9	...		...	182 208	..	HEAT SINK	...	1	...	1	...	1
...	10	...	T3	...	182 667	..	TRANSFORMER, coupling	...	1	...	1	...	1
...	11	...		...	183 073	..	INSULATOR, PC card HF	...	1	...	1	...	1
...	12	...		...	182 499	..	ENCLOSURE, HF	...	1	...	1	...	1
...	13	...		...	182 806	..	BRACKET, mtg contactor/capacitor/PC board	...	1	...	1	...	1
...	14	...	C3,4	...	174 980	..	CAPACITOR, elctlt 2700uf 420VDC	...	2	...	2	...	2
...	15	...	W1,2,2A	...	175 082	..	CONTACTOR, def prp 40A 7P	...	1	...		...	1

Item No.	Dia. Mkgs.	Part No.	Description	Quantity		
				Model		
				230/460	400 CE	400 Non CE

**Figure 10-2. Windtunnels w/Components
(Fig 10-1 Item 39) (Continued)**

...		173 763	.. STAND-OFF, No. 10-32 x 1.418 lg	1	1	1
... 16	T1	183 014	.. TRANSFORMER, HF	1	1	1
... 17	L2	183 009	.. STABILIZER, output	1	1	1
... 18	L1	187 522	.. INDUCTOR, input	1	1	1
... 19	PC9	187 264	.. CIRCUIT CARD ASSEMBLY, input filter	1		
... 20		187 463	.. BRACKET	1		
... 21	C1	186 549	.. CAPACITOR, polyp .27uf 1000VDC	1	1	1
... 22		025 248	.. STAND-OFF, insul .250-20 x 1.250 lg	2	2	2
... 23	CT1	175 199	.. TRANSFORMER, current	1	1	1
... 24		177 547	.. BUSHING, snap-in CT-mount	1	1	1
... 25		175 140	.. BRACKET, DI-DT	1	1	1
... 26		181 197	.. GASKET, DI-DT rubber	1	1	1
... 27	L3,4	175 482	.. COIL, DI-DT	2	2	2
... 28		109 056	.. CORE	2	2	2
... 29		+187 460	.. WINDTUNNEL, RH	1	1	1
... 30		141 690	.. GROMMET, scr No. 8/10	4	4	4
... 31	PC7	191 397	.. CIRCUIT CARD, HF (consisting of)	1	1	1
...	F1	012 633	.. FUSE, mintr gl 1A 250V	1	1	1
...	PLG19	115 092	.. CONNECTOR & SOCKETS	1	1	1
...	PLG20	131 054	.. CONNECTOR & SOCKETS	1	1	1
... 32	SR1	179 629	.. KIT, diode	1	1	1
... 33	PM1,2/PC4,5	179 628	.. KIT, transistor IGBT module	1	1	1
...	RT1,2	173 632	.. THERMISTOR, NTC 30K ohm	2	2	2
... 34		173 631	.. HEAT SINK, power module	1	1	1
... 35	PM3,4/PC6	185 776	.. KIT, IGBT	1	1	1
...	PLG23	115 091	.. CONNECTOR & SOCKETS	1	1	1
... 36		182 641	.. BUS BAR, diode IGBT	1	1	1
... 37		182 642	.. BUS BAR, IGBT	1	1	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.



Effective January 1, 1998
(Equipment with a serial number preface of "KJ" or newer)

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

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

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

Miller shall honor warranty claims on warranted equipment listed below in the event of such a failure within the warranty time periods. All warranty time periods start on the 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 Supplies
 - * Intelligig
 - * Engine Driven Welding Generators
(NOTE: Engines are warranted separately by the engine manufacturer.)
3. 1 Year — Parts and Labor
 - * Motor Driven Guns (w/exception of Spoolmate 185)
 - * Process Controllers
 - * Positioners and Controllers
 - * Automatic Motion Devices
 - * Robots
 - * IHPS Power Sources
 - * Water Coolant Systems
 - * HF Units
 - * Grids
 - * Spot Welders
 - * Load Banks
 - * SDX Transformers
 - * Miller Cyclomatic Equipment
 - * Running Gear/Trailers
 - * Plasma Cutting Torches (except APT, ZIPCUT & PLAZCUT Models)
 - * Deutz Engines (outside North America)
 - * Field Options
(NOTE: Field options are covered under True Blue® 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 and Labor
 - * MIG Guns/TIG Torches

- * APT, ZIPCUT & PLAZCUT Model Plasma Cutting Torches
- * Remote Controls
- * Accessory Kits
- * Replacement Parts (No labor)
- * Spoolmate 185

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

1. 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.
2. Consumable components; such as contact tips, cutting nozzles, contactors, brushes, slip rings, relays or parts that fail due to normal wear.
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.

Warranty Questions?

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





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



Resources Available

Always provide Model Name and Serial/Style Number.

Contact your Distributor for:

To locate distributor nearest you call
1-800-4-A-Miller

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

Contact the Delivering Carrier for:

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

File a claim for loss or damage during
shipment.

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