



OM-353

122200T

October 2000

Processes



TIG (GTAW) Welding



Stick (SMAW) Welding

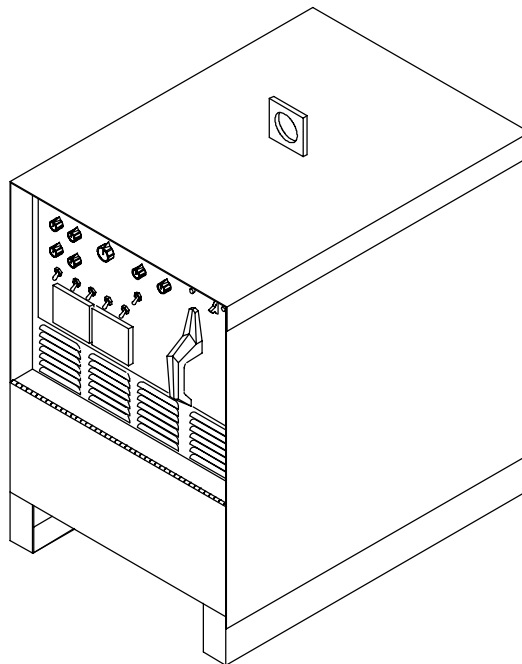
Description



Arc Welding Power Source

CE

Syncrowave[®] 250



60 Hz, 50 Hz

OWNER'S MANUAL



Visit our website at
www.MillerWelds.com

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

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

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



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

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.



TABLE OF CONTENTS

WARNING

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

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

SECTION 1 – SAFETY PRECAUTIONS - READ BEFORE USING	1
1-1. Symbol Usage	1
1-2. Arc Welding Hazards	1
1-3. Additional Symbols for Installation, Operation, and Maintenance	3
1-4. Principal Safety Standards	3
1-5. EMF Information	4
SECTION 1 – CONSIGNES DE SECURITE – LIRE AVANT UTILISATION	5
1-1. Signification des symboles	5
1-2. Dangers relatifs au soudage à l'arc	5
1-3. Dangers supplémentaires en relation avec l'installation, le fonctionnement et la maintenance	7
1-4. Principales normes de sécurité	8
1-5. Information sur les champs électromagnétiques	8
SECTION 2 – DEFINITIONS	9
2-1. Warning Label Definitions	9
2-2. Rating Label For CE Products	10
2-3. Symbols And Definitions	11
SECTION 3 – INSTALLATION	12
3-1. Specifications	12
3-2. Volt-Ampere Curves	12
3-3. Duty Cycle And Overheating	13
3-4. Selecting A Location	14
3-5. Dimensions And Weights	14
3-6. Tipping	15
3-7. Weld Output Terminals And Selecting Cable Sizes	15
3-8. Remote 14 Receptacle	16
3-9. 115 Volts AC Duplex Receptacle And Shielding Gas Connections	16
3-10. Electrical Service Guide	17
3-11. Placing Jumper Links And Connecting Input Power	18
SECTION 4 – OPERATION	19
4-1. Controls	19
4-2. Output Selector Switch	20
4-3. Meters	20
4-4. Crater Time Controls	21
4-5. Spot Time Controls	21
4-6. AC Balance Control	22
4-7. Amperage Adjustment Controls	23
4-8. Output (Contactor) Control Switch	23
4-9. Arc Controls	24
4-10. Postflow Time Control	24
4-11. High Frequency Controls	25
4-12. Preflow Time Control (Optional)	25
SECTION 5 – MAINTENANCE & TROUBLESHOOTING	26
5-1. Routine Maintenance	26
5-2. Circuit Breaker CB1	26
5-3. Adjusting Spark Gaps	27
5-4. Troubleshooting	27
5-5. Circuit Diagram	29
SECTION 6 – HIGH FREQUENCY (HF)	30
6-1. Welding Processes Using HF	30
6-2. Sources Of HF Radiation From Incorrect Installation	30
6-3. Correct Installation	31
SECTION 7 – PARTS LIST	32
OPTIONS AND ACCESSORIES	
WARRANTY	

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: **Syncrowave® 250**

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
(April 1995 – 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*

European Contact: Mr. Luigi Vacchini, Managing Director
MILLER Europe S.P.A.
Via Privata Iseo
20098 San Giuliano
Milanese, Italy

Telephone: 39(02)98290-1
Fax: 39(02)98281-552

SECTION 1 – SAFETY PRECAUTIONS - READ BEFORE USING

som_nd_5/97

1-1. Symbol Usage



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

▲ Marks a special safety message.

☞ Means "Note"; not safety related.



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

1-2. Arc Welding Hazards

▲ The symbols shown below are used throughout this manual to call attention to and identify possible hazards. When you see the symbol, watch out, and follow the related instructions to avoid the hazard. The safety information given below is only a summary of the more complete safety information found in the Safety Standards listed in Section 1-4. 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.



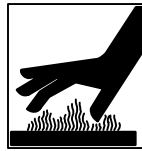
FLYING METAL can injure eyes.

- 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.



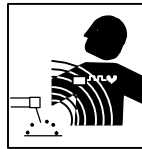
BUILDUP OF GAS can injure or kill.

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



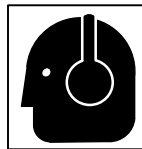
HOT PARTS can cause severe burns.

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



MAGNETIC FIELDS can affect pacemakers.

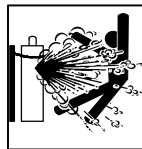
- Pacemaker wearers keep away.
- Wearers should consult their doctor before going near arc welding, gouging, or spot welding operations.



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.



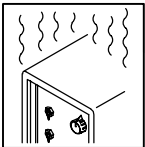
MOVING PARTS can cause injury.

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



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.



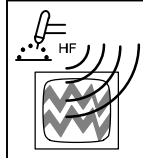
MOVING PARTS can cause injury.

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



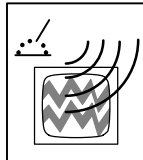
WELDING WIRE can cause injury.

- 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.



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.

SECTION 1 – CONSIGNES DE SECURITE – LIRE AVANT UTILISATION

som_nd_fre 5/97

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 1-4. 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.

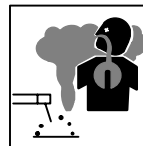
Un simple contact avec des pièces électriques peut provoquer une électrocution ou des blessures graves. L'électrode et le circuit de soudage sont sous tension dès que l'appareil est sur ON. Le circuit d'entrée et les circuits internes de l'appareil sont également sous tension à ce moment-là. En soudage 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 épissés.
- Ne pas enrouler les câbles autour du corps.
- Si la pièce soudée doit être mise à la terre, le faire directement avec un câble distinct – ne pas 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. Entretien 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 dégraissateurs.
- 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 là 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 le plus près possible de la zone de soudage pour éviter le transport du courant sur une longue distance par des chemins inconnus éventuels en provoquant des risques d'électrocution et d'incendie.
- Ne pas utiliser le poste de soudage pour dégeler des conduites gelées.
- En cas de non utilisation, enlever la baguette d'électrode du porte-électrode ou couper le fil à la pointe de contact.
- Porter des vêtements de protection dépourvus d'huile tels que des gants en cuir, une chemise en matériau lourd, des pantalons sans revers, des chaussures hautes et un couvre chef.
- Avant de souder, retirer toute substance combustible de vos poches telles qu'un allumeur au butane ou des allumettes.



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.



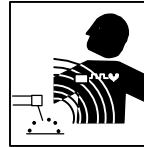
LES ACCUMULATIONS DE GAZ risquent de provoquer des blessures ou même la mort.

- 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.



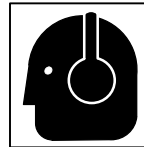
DES PIÈCES CHAUDES peuvent provoquer des brûlures graves.

- 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.

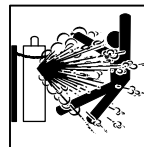
- Porteurs de stimulateur cardiaque, restez à distance.
- Les porteurs d'un stimulateur cardiaque doivent d'abord consulter leur médecin avant de s'approcher des opérations de soudage à l'arc, de gougeage ou de soudage par points.



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



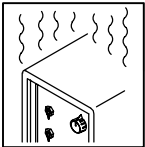
Risque D'INCENDIE OU D'EXPLOSION.

- 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 protégée avant de mettre l'appareil en service.



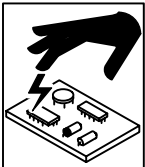
LA CHUTE DE L'APPAREIL peut blesser.

- Utiliser l'anneau de levage uniquement pour soulever l'appareil, NON PAS les 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.



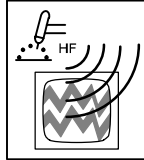
LES FILS DE SOUDAGE peuvent provoquer des blessures.

- 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.



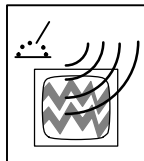
DES ORGANES MOBILES peuvent provoquer des blessures.

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



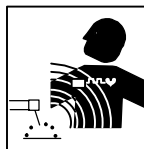
LE RAYONNEMENT HAUTE FRÉQUENCE (H.F.) risque de provoquer des interférences.

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



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

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



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

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

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 votre corps.
- 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.

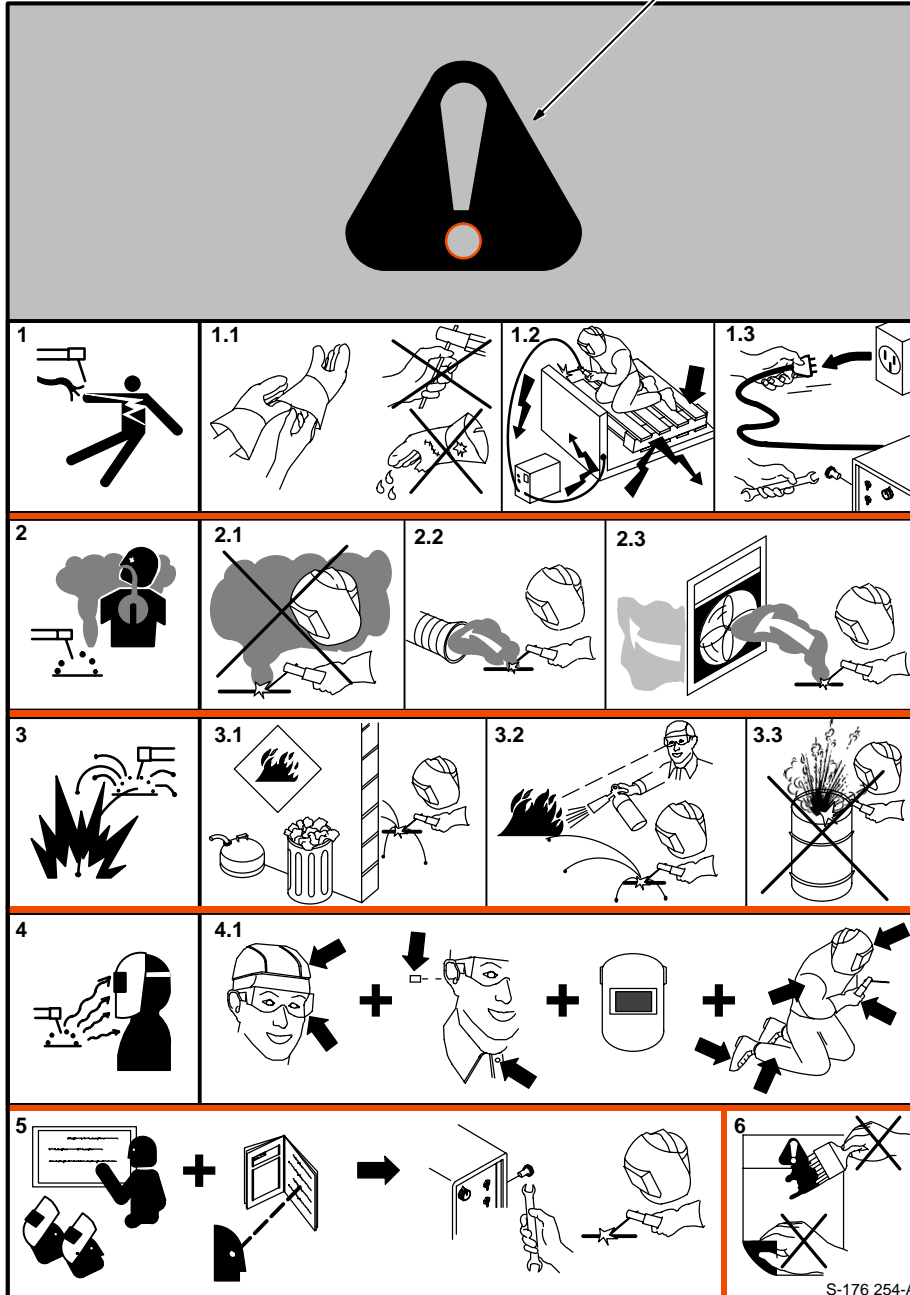
Consignes relatives aux stimulateurs cardiaques :

Les personnes qui portent un stimulateur cardiaque doivent avant tout consulter leur docteur. Si vous êtes déclaré apte par votre docteur, il est alors recommandé de respecter les consignes ci-dessus.

SECTION 2 – DEFINITIONS

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. Don't weld near flammables.
 - 3.2 Welding sparks can cause fires. Have a fire extinguisher nearby and have a watch person 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.














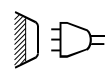
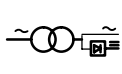
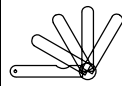
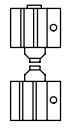
S-176 254-A

2-2. Rating Label For CE Products

		ISO/IEC 974-1			
		7A/10.2V		310A/22.4V	
		X	25%	60%	100%
	U ₀ = 80V	I ₂	310A	200A	155A
		U ₂	22.4V	18V	16.2V
		5A/20.2V		310A/32.4V	
		X	25%	60%	100%
	U ₀ = 80V	I ₂	310A	200A	155A
		U ₂	32.4V	28V	26.2V
	1 ~ 50 Hz	U ₁ = 220	I _{1max} = 117.2A	I _{1Eff} = 59A	
		U ₁ = 380	I _{1max} = 72.2A	I _{1Eff} = 36A	
		U ₁ = 415	I _{1max} = 63.8A	I _{1Eff} = 32A	
IP 21S					

S-178 813-A

2-3. Symbols And Definitions

NOTE 		<i>Some symbols are found only on CE products.</i>					
A	Amperes		Panel-Local		Gas Tungsten Arc Welding (GTAW)		Shielded Metal Arc Welding (SMAW)
V	Volts		Do Not Switch While Welding		Arc Force (DIG)		Spot Timer
	Output		Circuit Breaker		Remote		Temperature
	Protective Earth (Ground)		Alternating Current		High Frequency - Start		Input
	Postflow Timer t_2		Preweld Timer t_1		High Frequency - Continuous	HF	High Frequency
	Gas (Supply)		Gas Input		Gas Output		Increase/Decrease Of Quantity
I	On		Off	%	Percent		Direct Current
	Balance Control		Maximum Cleaning		Maximum Penetration		Electrode Positive
	Electrode Negative		Crater Time t		Meter		Single-Phase
U₀	Rated No Load Voltage (Average)	U₁	Primary Voltage	U₂	Conventional Load Voltage		Line Connection
I₁	Primary Current	I₂	Rated Welding Current	X	Duty Cycle		Single-Phase Combined AC/DC Power Source
IP	Degree Of Protection	I_{1eff}	Maximum Effective Supply Current	I_{1max}	Rated Maximum Supply Current	Hz	Hertz
	Electrode		Work		Thickness Gauge		Spark Gap
S	Seconds						

SECTION 3 – INSTALLATION

3-1. Specifications

Rated Welding Output	PFC**	Amperes Input at AC Balanced Rated Load Output, 50/60 Hz, Single-Phase				KVA	KW	Amp Range	Max OCV	IP Rating
		200 V	230 V	460 V	575 V					
NEMA Class II (40) – 250 Amperes, 30 Volts AC, 40% Duty Cycle	No PFC	106 (4.6*)	92 (4*)	46 (2*)	37 (1.6*)	21 (0.89*)	11.4 (0.68*)	5–310 A	80 V	21 S
	With PFC	76	66	33	26	15.2	11.4			

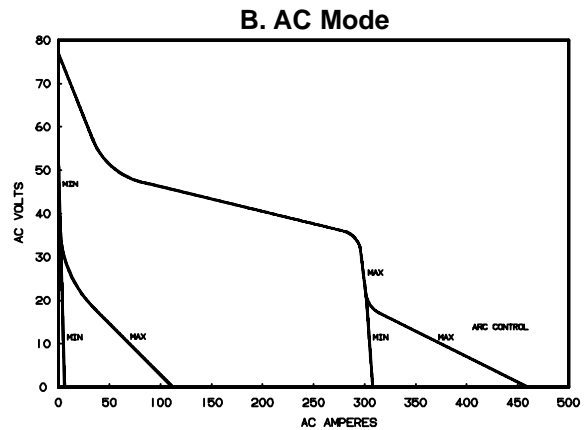
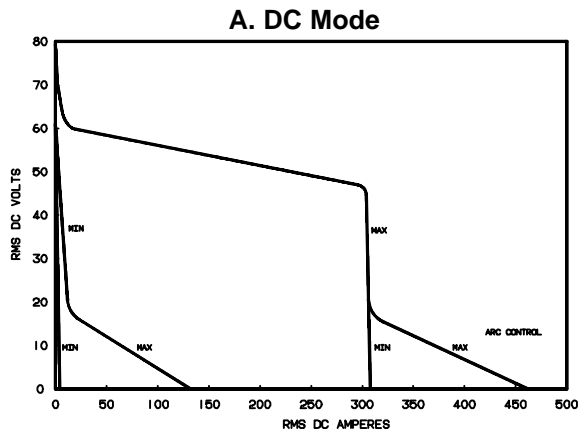
*While idling
**Power Factor Correction

Rated Welding Output	PFC**	Amperes Input at AC Balanced Rated Load Output, 50/60 Hz, Single-Phase									KVA	KW	Amp Range	Max OCV	IP Rating
		200 V	220 V	230 V	260 V	380 V	415 V	460 V	520 V	575 V					
NEMA Class I (60) – 200 Amperes, 28 Volts AC, 60% Duty Cycle	No PFC	85 (4.6*)	77 (4.2*)	74 (4*)	65 (3.5*)	45 (2.4*)	41 (2.2*)	37 (2*)	33 (1.8*)	30 (1.6*)	17 (0.9*)	8.3 (0.7*)	5–310 A	80 V	21 S
	With PFC	55 (57*)	64 (51*)	48 (49*)	48 (49*)	37 (30*)	34 (27*)	24 (25*)	48 (49*)	19 (20*)	11 (11*)	8.3 (0.6*)			

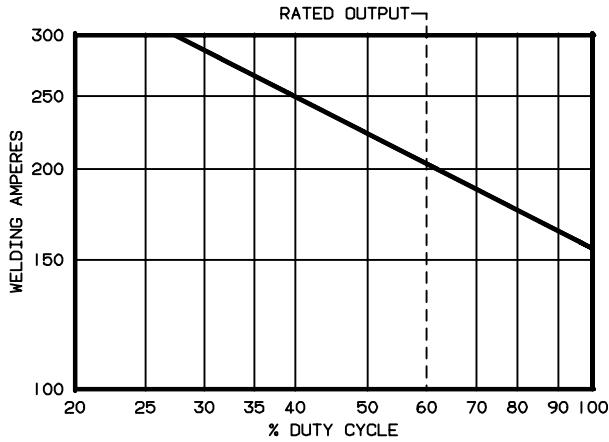
*While idling
**Power Factor Correction

3-2. Volt-Ampere Curves

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



3-3. Duty Cycle And Overheating

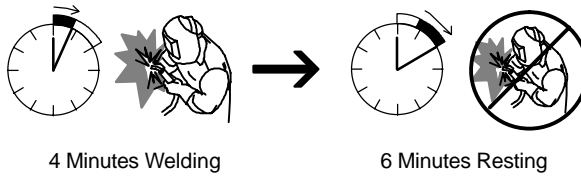


Duty Cycle is percentage of 10 minutes that unit can weld at rated load without overheating.

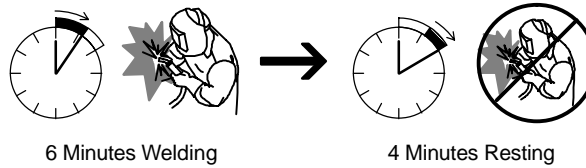
If unit overheats, thermostat opens, output stops, light goes on (CE models only), and cooling fan runs. Wait fifteen minutes for unit to cool. Reduce amperage or duty cycle before welding.

▲ Exceeding duty cycle can damage unit and void warranty.

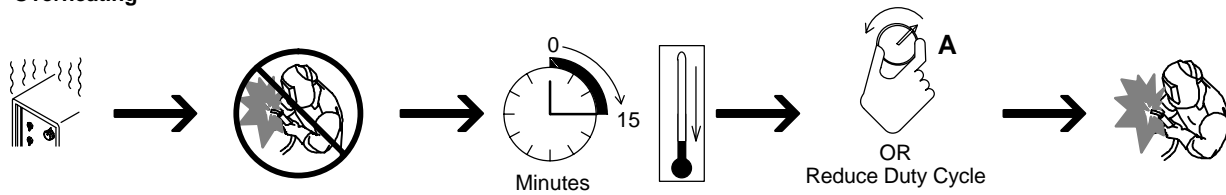
40% Duty Cycle At 250 Amperes (60 Hz Models Only)



60% Duty Cycle At 200 Amperes




Overheating

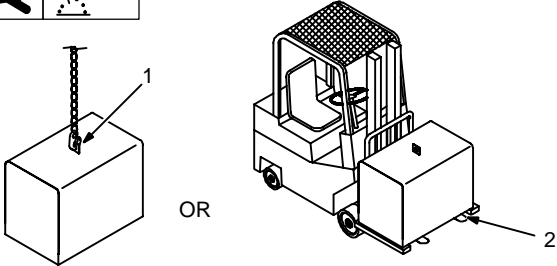


duty1 4/95 / SB-116 198

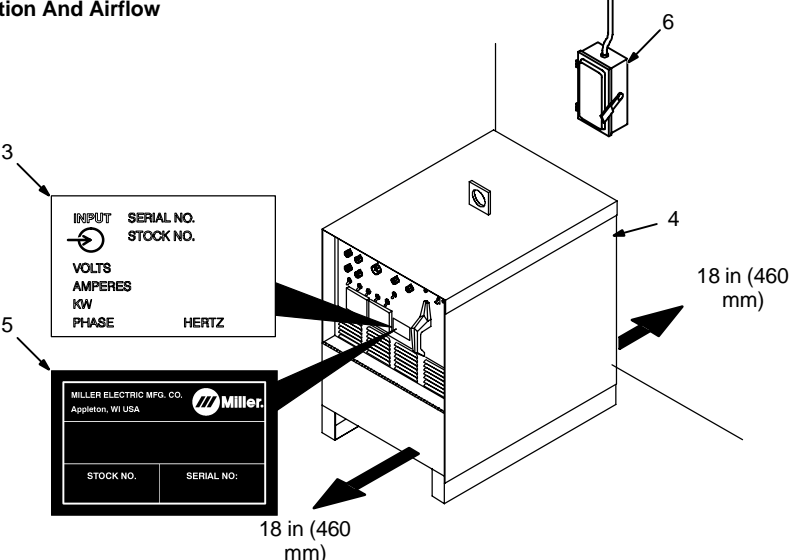
3-4. Selecting A Location



Movement



Location And Airflow



- 1 Lifting Eye
- 2 Lifting Forks

Use lifting eye or lifting forks to move unit.

If using lifting forks, extend forks beyond opposite side of unit.

- 3 Rating Label (Non CE Models Only)
- 4 Rating Label (CE Models Only, See Section 2-2)

Use rating label to determine input power needs. CE label located on rear panel.

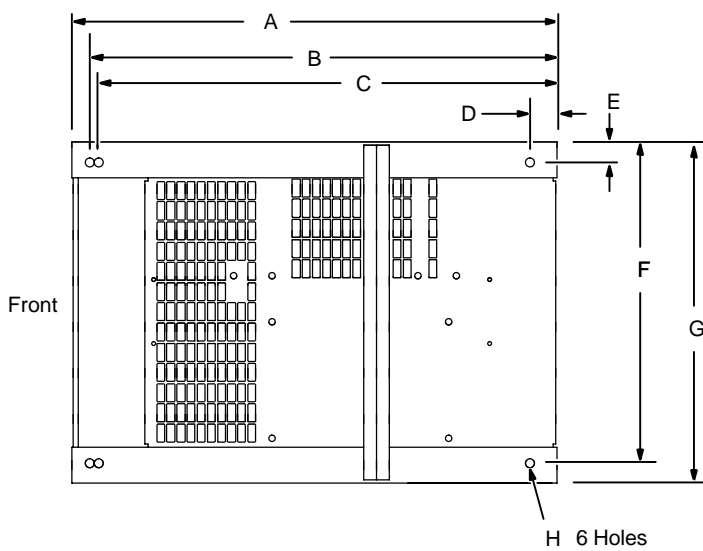
- 5 Plate Label (CE Models Only)
- 6 Line Disconnect Device

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.

ST-800 402 / ST-117 264-F


3-5. Dimensions And Weights

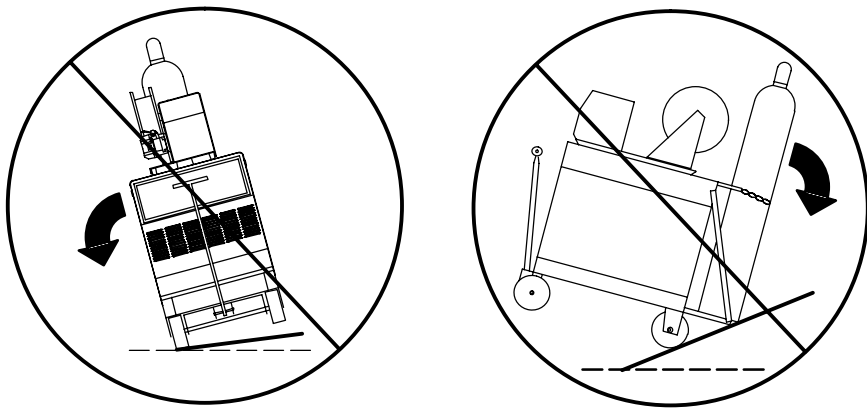


ST-154 792-B

Dimensions	
Height	30-3/4 in (781 mm)
Width	19-3/4 in (502 mm)
Length	27-1/2 in (698 mm)
A	27 in (686 mm)
B	26 in (661 mm)
C	25-1/4 in (642 mm)
D	1-1/2 in (38 mm)
E	1-1/8 (29 mm)
F	17-7/8 (454 mm)
G	19-1/4 (489 mm)
H	1/2 in (13 mm) Dia
Weight	
355 lbs (161 kg)	


3-6. Tipping






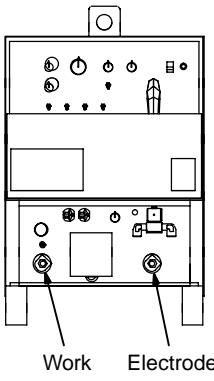
▲ Be careful when placing or moving unit over uneven surfaces.

3-7. Weld Output Terminals And Selecting Cable Sizes



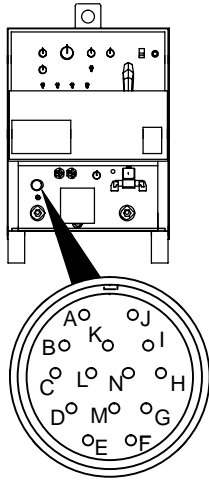


▲ **ARC WELDING** can cause **Electromagnetic Interference**.

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.


 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					
 Work Electrode ST-154 795-C	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
	400	1/0	2/0	3/0	4/0	2-2/0	2-3/0	2-4/0	2-4/0
	500	2/0	3/0	4/0	2-2/0	2-3/0	2-4/0	3-3/0	3-3/0

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. S-0007-E

3-8. Remote 14 Receptacle

 <p>ST-154 795-C</p>		Socket*	Socket Information
		A	24 volts ac.
		B	Contact closure to A completes 24 volts ac contactor control circuit.
	A	C	Command reference; 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.
K		Chassis common.	
<p>*The remaining sockets are not used.</p>			

3-9. 115 Volts AC Duplex Receptacle And Shielding Gas Connections



▲ Turn Off power before connecting to receptacle.

- 1 115 V AC Receptacle
- 2 Gas Valve In Fitting
- 3 Gas Valve Out Fitting

Receptacle is protected from overload by circuit breaker CB1 (see Section 5-2).

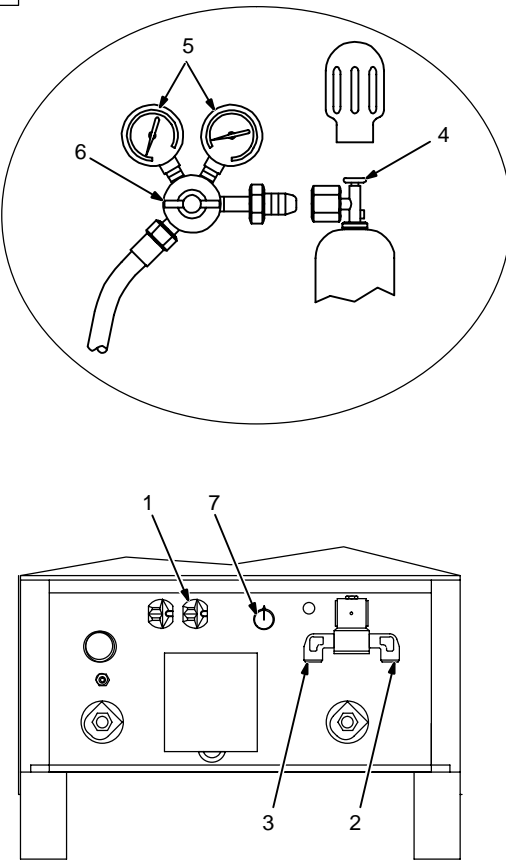
- 4 Cylinder Valve
- 5 Regulator/Flow Gauge
- 6 Flow Adjust

Fittings have 5/8-18 right-hand threads

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

Typical flow rate is 20 cfh (cubic feet per hour) (9.4 L/min)

- 7 High Frequency Control (see Section 4-1)



Ref. ST-154 795-C / Ref. ST-157 858

3-10. Electrical Service Guide

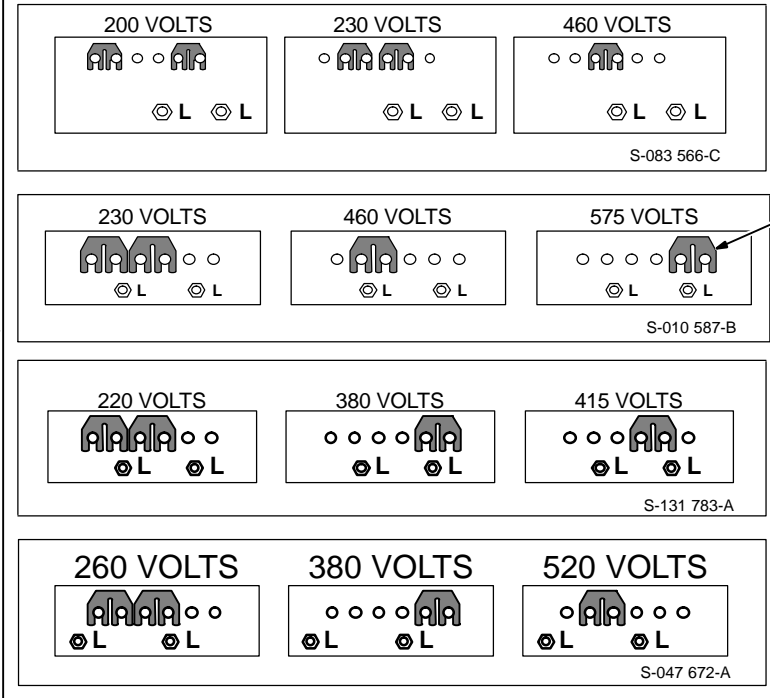
NOTE

All values calculated at 60% duty cycle.

60 Hertz Models	Without Power Factor Correction				With Power Factor Correction				
	200	230	460	575	200	230	460	575	
Input Voltage	200	230	460	575	200	230	460	575	
Input Amperes At Rated Output	85	74	37	30	55	48	24	19	
Max Recommended Standard Fuse Or Circuit Breaker Rating In Amperes	125	110	60	45	80	70	35	30	
Min Input Conductor Size In AWG/Kcmil	4	6	10	10	8	8	12	14	
Max Recommended Input Conductor Length In Feet (Meters)	173 (53)	158 (48)	291 (89)	455 (139)	86 (26)	114 (35)	186 (58)	189 (48)	
Min Grounding Conductor Size In AWG/Kcmil	6	6	10	10	8	8	12	14	
Reference: 1996 National Electrical Code (NEC)								S-0092-J	

50 Hertz Models	Without Power Factor Correction					With Power Factor Correction		
	220	260	380	415	520	220	380	415
Input Voltage	220	260	380	415	520	220	380	415
Input Amperes At Rated Output	77	65	45	41	33	64	37	34
Max Recommended Standard Fuse Or Circuit Breaker Rating In Amperes	125	100	70	60	50	90	60	50
Min Input Conductor Size In AWG/Kcmil	6	6	8	8	10	6	10	10
Max Recommended Input Conductor Length In Feet (Meters)	145 (44)	202 (62)	291 (89)	347 (106)	372 (113)	145 (44)	291 (89)	347 (106)
Min Grounding Conductor Size In AWG/Kcmil	6	8	8	10	10	6	8	10
Reference: 1996 National Electrical Code (NEC)							S-0092-J	

3-11. Placing Jumper Links And Connecting Input Power



Check input voltage available at site.

1 Jumper Link Label

Check label inside your unit—only one label is on unit.

▲ Only make connections for the voltages shown on the label inside your unit. Do not make connections for any other voltages. If jumper link label is missing from inside unit, check rating label (see Section 3-4) for allowable input voltages.

2 Jumper Links

Move jumper links to match input voltage.

3 Input And Grounding Conductors

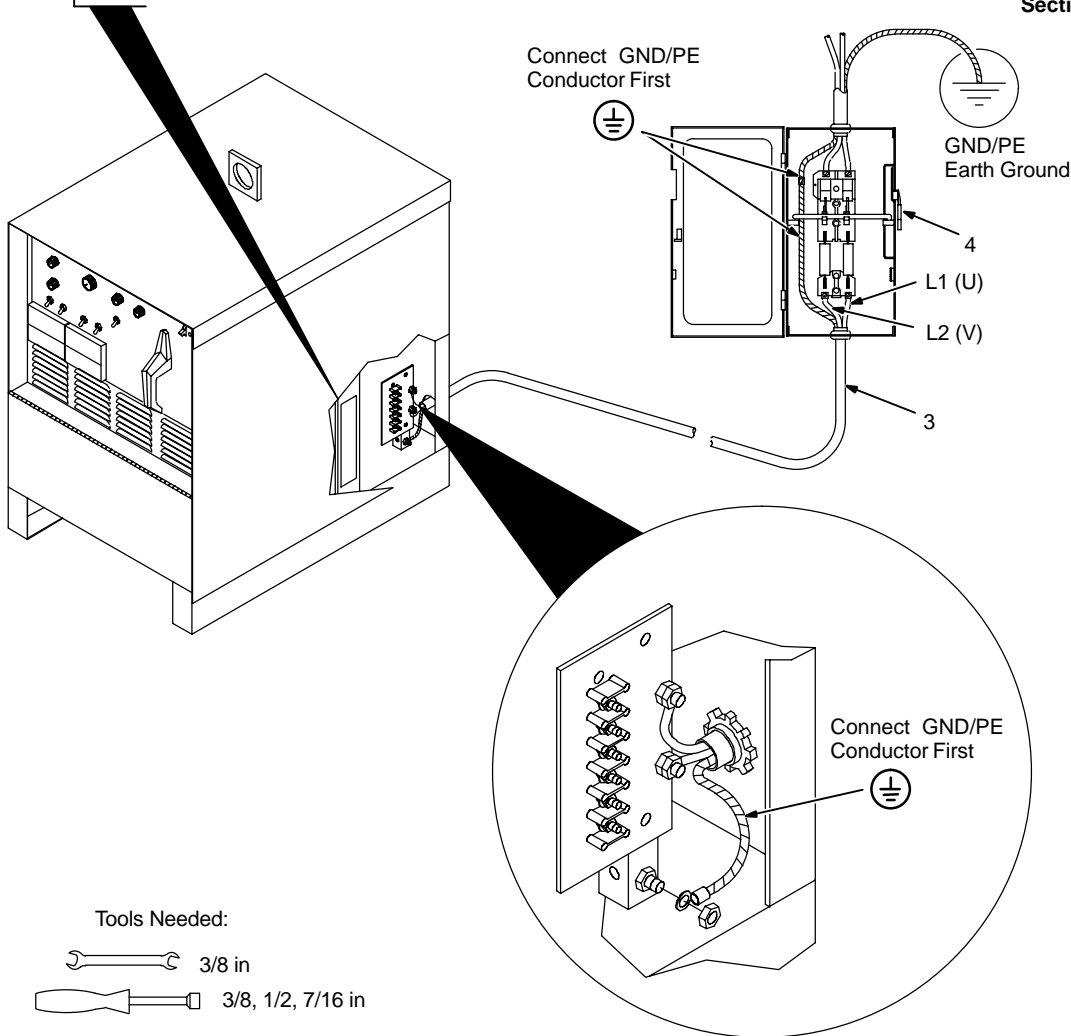
Select size and length using Section 3-10.

4 Line Disconnect Device

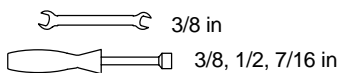
Select type and size of overcurrent protection using Section 3-10.

Reinstall side panel.

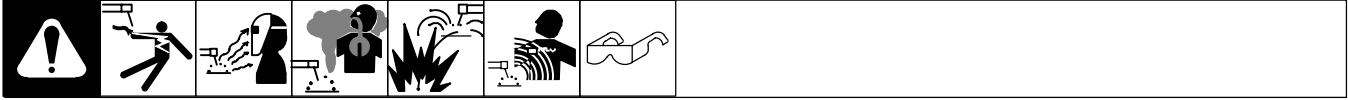
▲ Special installation may be required where gasoline or volatile liquids are present – see NEC Article 511 or CEC Section 20.



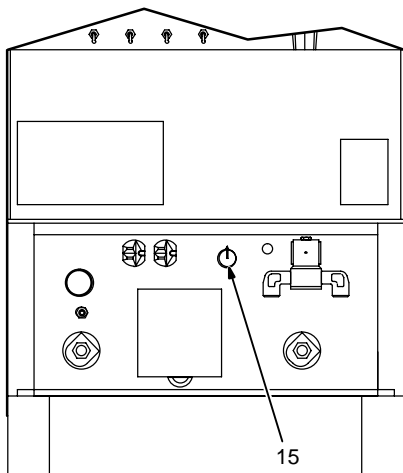
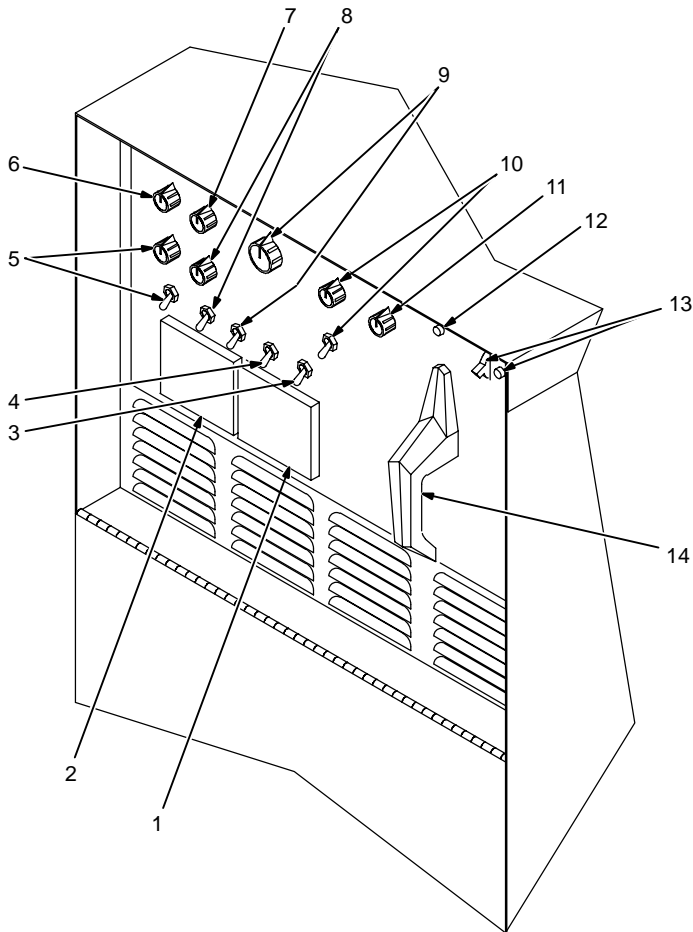
Tools Needed:



SECTION 4 – OPERATION

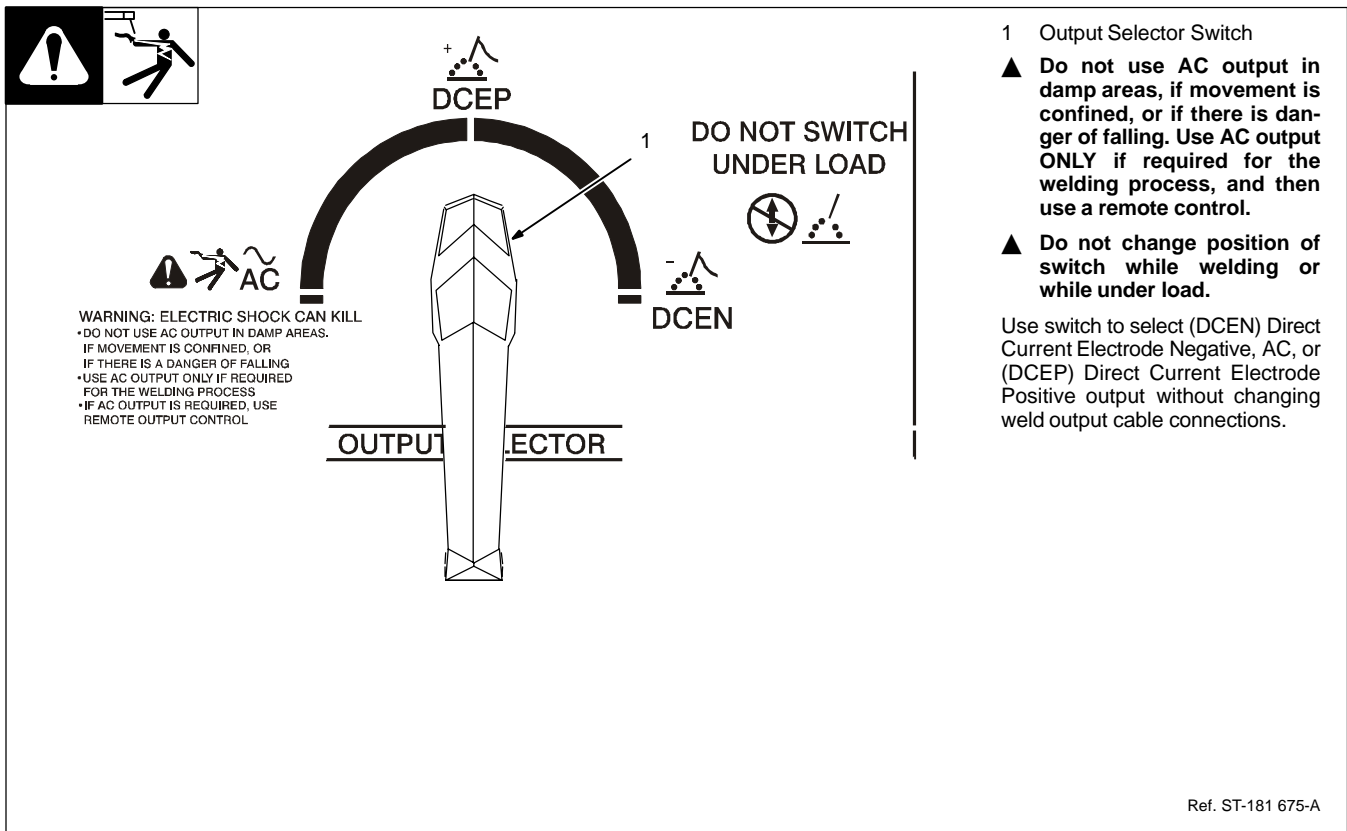


4-1. Controls



- 1 Ammeter
See Section 4-3.
- 2 Voltmeter
See Section 4-3.
- 3 High Frequency Switch
See Section 4-11.
- 4 Output (Contactor) Switch
See Section 4-8.
- 5 Spot Time Switch And Control (Optional)
See Section 4-5.
- 6 Preflow Time Control (Optional)
See Section 4-12.
- 7 AC Balance Control
See Section 4-6.
- 8 Crater Time Control And Switch
See Section 4-4.
- 9 Amperage Adjustment Control And Switch
See Section 4-7.
- 10 Arc Force (Dig) Switch And Control
See Section 4-9.
- 11 Postflow Time Control
See Section 4-10.
- 12 High Temperature Shutdown Light (CE Models Only)
Lights when unit overheats and shuts down (see Section 3-3).
- 13 Power Switch And Pilot Light
Use switch to turn unit and light On and Off.
- 14 Output Selector Switch
See Section 4-2.
- 15 High Frequency Control
See Section 4-11.

4-2. Output Selector Switch



The diagram shows a central vertical component labeled "OUTPUT SELECTOR" with a semi-circular switch mechanism on top. The switch has three positions: "DCEP" (Direct Current Electrode Positive) at the top, "AC" in the middle, and "DCEN" (Direct Current Electrode Negative) at the bottom. A number "1" points to the switch mechanism. To the left, there is a warning icon of a person being struck by lightning and a person slipping, with the text "AC". To the right, there is a warning icon of a person slipping and a person being struck by lightning, with the text "DO NOT SWITCH UNDER LOAD".

WARNING: ELECTRIC SHOCK CAN KILL

- 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

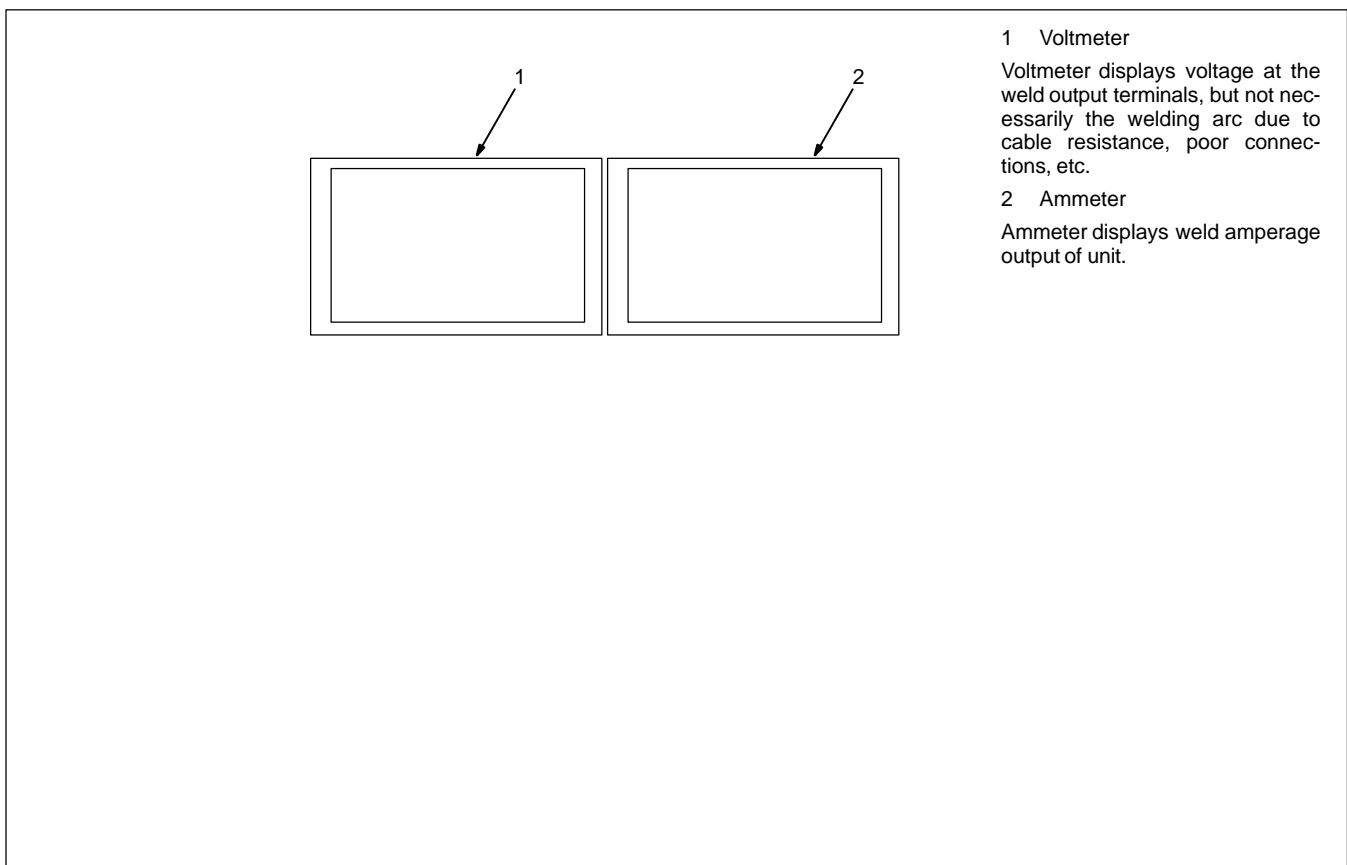
1 Output Selector Switch

- ▲ Do not use AC output in damp areas, if movement is confined, or if there is danger of falling. Use AC output ONLY if required for the welding process, and then use a remote control.
- ▲ Do not change position of switch while welding or while under load.

Use switch to select (DCEN) Direct Current Electrode Negative, AC, or (DCEP) Direct Current Electrode Positive output without changing weld output cable connections.

Ref. ST-181 675-A

4-3. Meters



The diagram shows two rectangular meters side-by-side. The left meter is labeled "1" and the right meter is labeled "2".

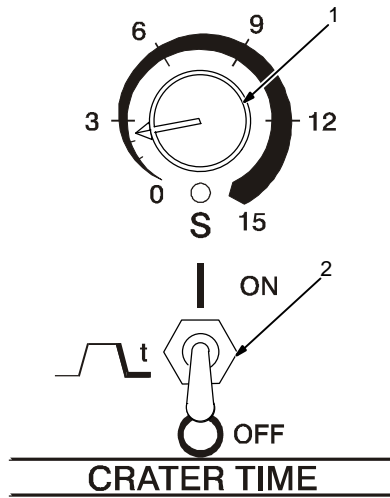
1 Voltmeter

Voltmeter displays voltage at the weld output terminals, but not necessarily the welding arc due to cable resistance, poor connections, etc.

2 Ammeter

Ammeter displays weld amperage output of unit.

4-4. Crater Time Controls



1 Crater Time Control

Use control to reduce current over a set period of time (0–15 seconds) at the end of the weld cycle when NOT using a remote current control.

2 Crater Time Switch

ON – provides crater time.

OFF – provides no crater time.

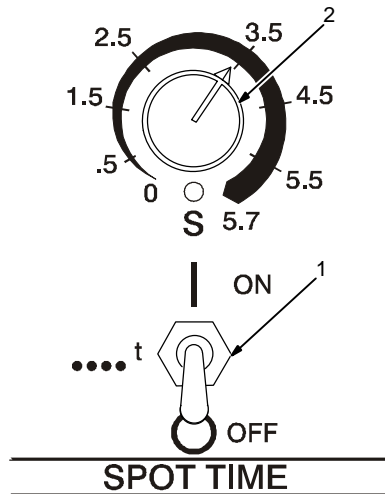
Place switch in the OFF position for Shielded Metal Arc Welding (SMAW).

Application:

Crater 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.

4-5. Spot Time Controls



1 Spot Time Switch

Place switch in the ON position to turn on spot weld circuitry.

The (GTAW) TIG Spot process is generally used with a direct current electrode negative (DCEN) set-up.

Place switch in the OFF position to turn off spot weld circuitry. Put switch in the OFF position while doing Shielded Metal Arc Welding (SMAW).

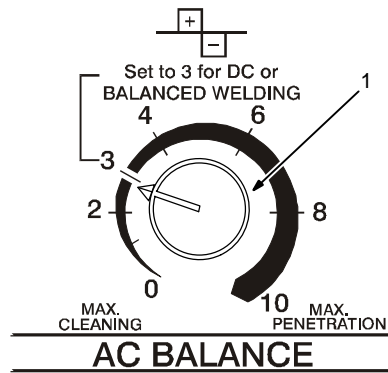
2 Spot Time Control

Use control to set time (0–5.7 seconds) for Gas Tungsten Arc (GTAW) spot welds. Spot time begins at arc initiation. If the arc is broken during the spot time cycle, the timer stops but does not reset. When the spot time has ended, weld output stops. Postflow starts when the remote contactor is opened. The spot timer resets after the contactor opens.

Application:

TIG spot welding is used for joining thinner materials that are in close contact, with the fusion method. A good example would be joining coil ends.

4-6. AC Balance Control



1 AC Balance Control

Balance Control (AC GTAW):

Control changes the AC output square wave. Rotating the control towards 10 provides deeper penetration. Rotating the control towards 0 provides more cleaning action of the workpiece.


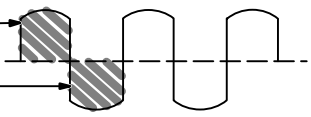
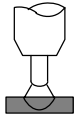

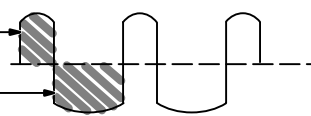
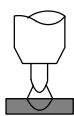

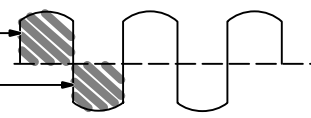
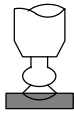
When the control is in the Balanced position, the wave shape provides equal penetration and cleaning action.

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.

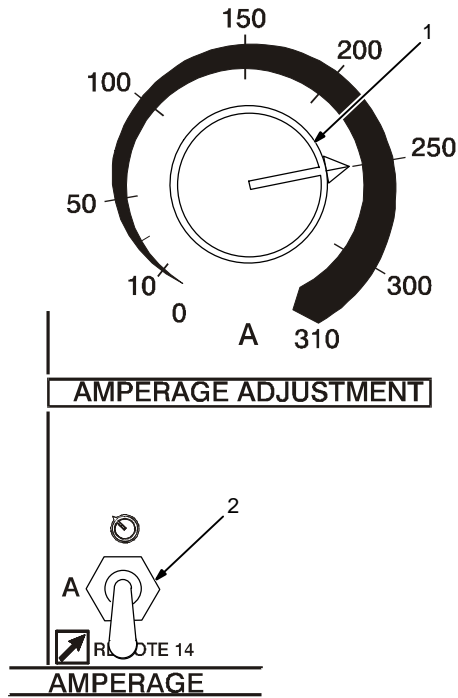
Set control to 7 and adjust as necessary. Joint configuration, set-up, process variables, and oxide thickness may affect setting.

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.

Setting	Output Waveforms	Arc
Balanced 3 	50% Electrode Positive  50% Electrode Negative	
More Penetration 10 	32% Electrode Positive  68% Electrode Negative	
More Cleaning 0 	55% Electrode Positive  45% Electrode Negative	

Ref. S-0795-A

4-7. Amperage Adjustment Controls



1 Amperage Adjustment Control
Use control to adjust amperage, and preset amperage on ammeter (see Section 4-3). This control may be adjusted while welding.

For remote amperage control, front panel control setting is the maximum amperage available. For example: If front panel control is set to 200 A, the range of the remote amperage control is 5 to 200 A.

For spot welding, use Amperage Adjust control to select from 5–310 amps of peak amperage (see Section 4-5).

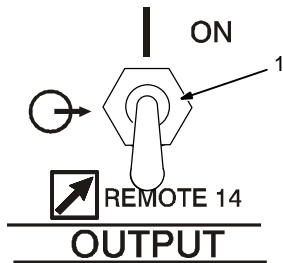
2 Amperage Control Switch

Use switch to select way of controlling amperage adjustment.

For front panel control, place switch in the PANEL position.

For remote control, place switch in REMOTE 14 position, and connect remote control device (see Section 3-8).

4-8. Output (Contactor) Control Switch



▲ **Weld output terminals are energized when Output (Contactor) switch is On and Power is On.**

1 Output/Contactor Switch

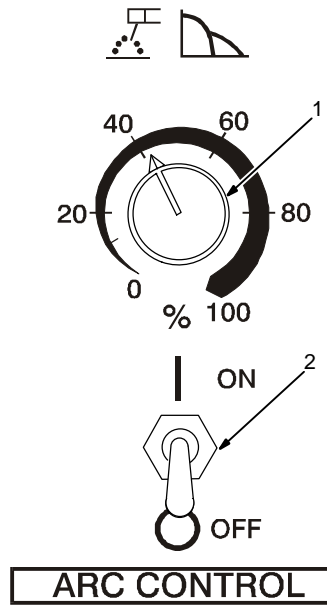
Use switch to select way of controlling unit output.

For front panel control, place switch in ON position.

When On is selected, HF and gas control are disabled.

For remote control, place switch in REMOTE 14 position, and connect remote control device (see Section 3-8).

4-9. Arc Controls



1 Arc Control (Dig)

For AC And DC SMAW Welding

When set at 0, short-circuit amperage at low arc voltage is the same as normal welding amperage.

When setting is increased, short-circuit amperage at low arc voltage increases.

Set at 0 for GTAW welding.

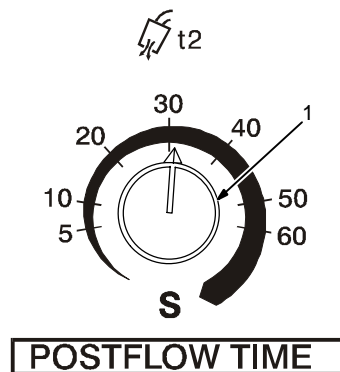
2 Arc Control Switch

Place switch in the ON position to turn on arc control circuitry. When switch is in the OFF position, no additional amperage is available at low arc voltages. Place switch in the OFF position while performing Gas Tungsten Arc Welding (GTAW).

Application:

Control helps arc starting or making vertical or overhead welds by increasing amperage at low arc voltage, and reduces electrode sticking while welding.

4-10. Postflow Time Control



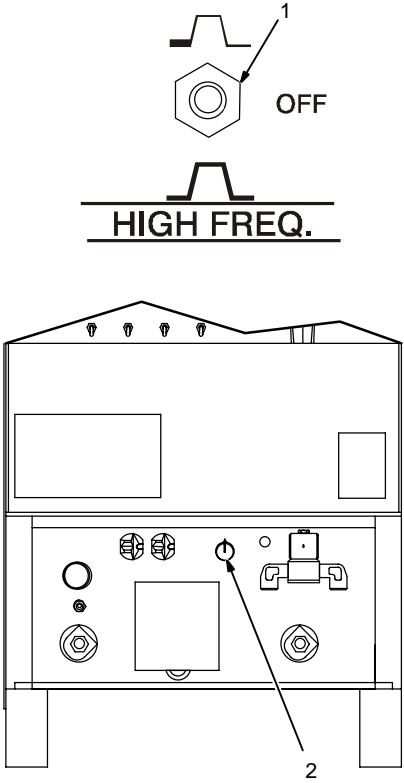
1 Postflow Time Control

Use control to set length of time (0–70 seconds) gas flows after welding stops. It is important to set enough time to allow gas to flow until after the tungsten and weld puddle has cooled down.

Application:

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

4-11. High Frequency Controls



▲ Place High Frequency switch in Off position before using the shielded metal arc welding (SMAW) process.

1 High Frequency Switch

START – (Up position) provides HF for arc starting only. 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.

Application:

HF Start is used when the DCEN GTAW process is required.

OFF – provides no HF. Use OFF for SMAW (stick electrode) welding.

CONTINUOUS – (Down position) provides HF continuously throughout the weld.

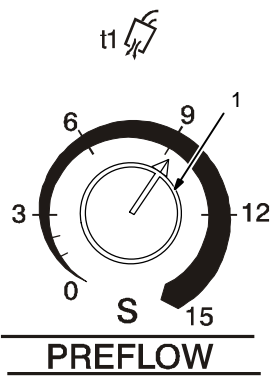
Application:

HF Continuous is used when the AC GTAW process is required.

2 High Frequency Intensity Control

Use control to change amount of HF energy used to start and maintain the arc. Set as low as practical to prevent interfering with electronic equipment.

4-12. Preflow Time Control (Optional)



1 Preflow Time Control




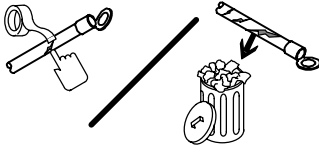
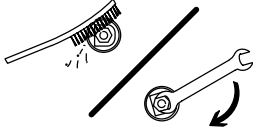
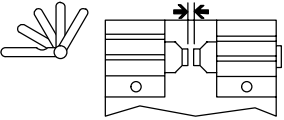
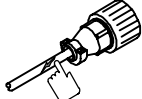

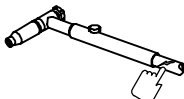

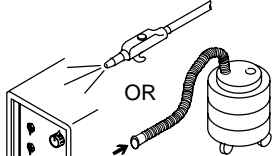
Use control to set the length of time (0–15 seconds) that gas flows before an arc is started.

Application:


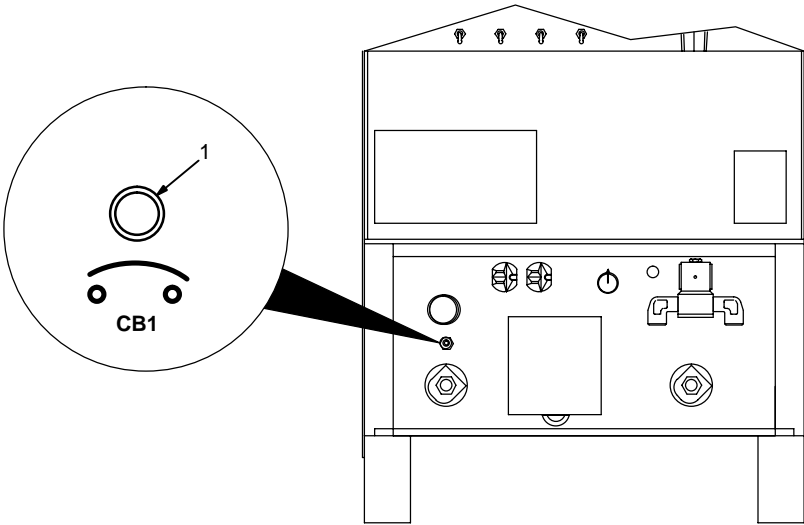
Preflow is used to purge the immediate weld area of atmosphere. Preflow also aids in consistent arc starting.

SECTION 5 – MAINTENANCE & TROUBLESHOOTING

5-1. Routine Maintenance

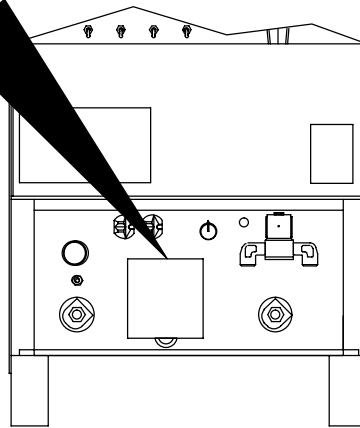
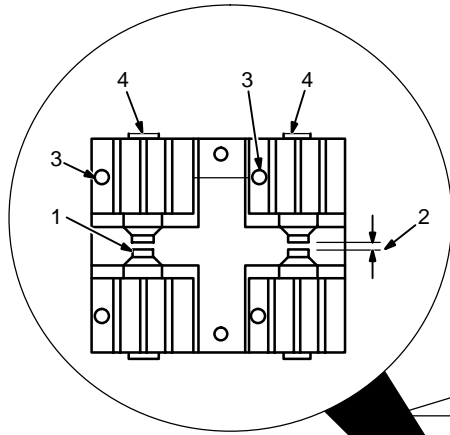
		<p>▲ Disconnect power before maintaining.</p>	
 3 Months			
	<p>Replace Unreadable Labels</p>		<p>Repair Or Replace Cracked Weld Cables</p>
			<p>Clean And Tighten Weld Terminals</p>
	<p>Adjust Spark Gaps</p>		<p>14-Pin Cord</p>
			<p>Gas Hose</p>
			<p>Torch Cable</p>
		<p>Replace Cracked Parts</p>	
 6 Months			
			<p>Blow Out Or Vacuum Inside, During Heavy Service, Clean Monthly</p>

5-2. Circuit Breaker CB1

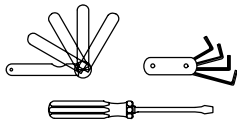
		<p>1 Circuit Breaker CB1</p> <p>If CB1 opens, output to the 115 volts ac duplex receptacle, high frequency, and gas flow stop. Press button to reset breaker.</p>
		

Ref. ST-154 795-C

5-3. Adjusting Spark Gaps



Tools Needed:



▲ Turn Off power before adjusting spark gaps.

Open access door.

1 Tungsten End Of Point

Replace point if tungsten end disappears; do not clean or dress tungsten.

2 Spark Gap

Normal spark gap is 0.008 in (0.203 mm).

If adjustment is needed, proceed as follows:

3 Adjustment Screws

Loosen screws. Place gauge of proper thickness in spark gap.

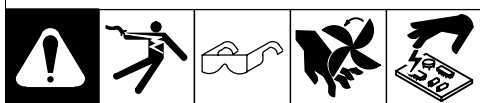
4 Pressure Point

Apply slight pressure at point until gauge is held firmly in gap. Tighten screws. Adjust other gap.

Close access door.

Ref. ST-154 795-C / Ref. S-0043

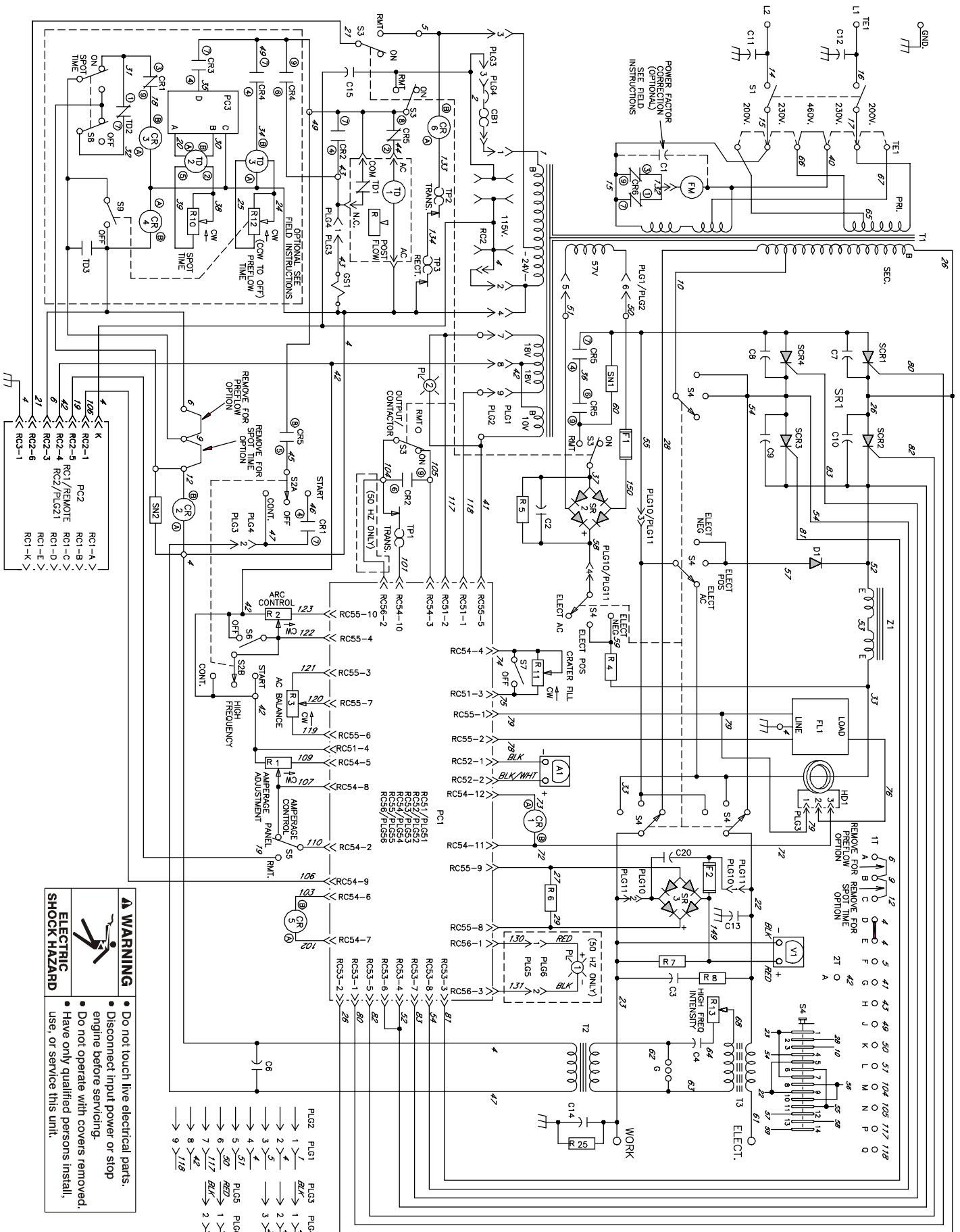
5-4. Troubleshooting



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 (see Section 3-11).
	Check for proper input power connections (see Section 3-11).
	Check for proper jumper link position (see Section 3-11).
No weld output; unit on.	If using remote control, place Output switch in Remote 14 position, and make sure remote control is connected to Remote 14 receptacle. If remote is not being used, place Output (Contactor) switch in On position.
	Check, repair, or replace remote control.
	Unit overheated. Allow unit to cool with fan On (see Section 3-3).
	Have Factory Authorized Service Agent check control board PC1.

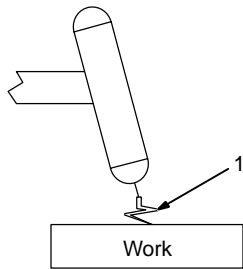
Trouble	Remedy
Fan not operating. NOTE: fan only runs when cooling is necessary.	Check and remove anything blocking fan movement.
	Have Factory Authorized Service Agent check fan motor.
Unit provides only maximum or minimum weld output.	Have Factory Authorized Service Agent check control board PC1.
Weld output always above or always below set value.	Have Factory Authorized Service Agent check control board PC1 and hall device HD1.
Erratic or improper weld output.	Use proper size and type of weld cable (see Section 3-7).
	Clean and tighten all weld connections.
	Check position of Output Selector switch (see Section Figure 4-1).
	Have Factory Authorized Service Agent check control board PC1 and hall device HD1.
No AC Balance control.	Have Factory Authorized Service Agent check AC Balance control and control board PC1.
No control of weld output.	If using remote control, place Output switch in Remote 14 position, and make sure remote control is connected to Remote 14 receptacle. If remote is not being used, place Output switch in On position.
	Have Factory Authorized Service Agent check Amp Adjust control and control board PC1.
No high frequency, no gas flow, and no 115 volts ac output from duplex receptacle.	Reset circuit breaker CB1 (see Section 5-2).
Lack of high frequency; difficulty in starting GTAW arc.	Select proper size tungsten.
	Check High Frequency control setting (see Figure 4-1).
	Be sure electrode holder cable is not close to any grounded metal.
	Check cables and torch for cracked insulation or bad connections. Repair or replace.
	Check spark gaps (see Section 5-3).
Wandering arc – poor control of direction of arc.	Reduce gas flow rate.
	Select proper size tungsten.
	Properly prepare tungsten.
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.
	Properly prepare tungsten.
	Check for water in torch, and repair torch if necessary. See torch Owner's Manual.

5-5. Circuit Diagram

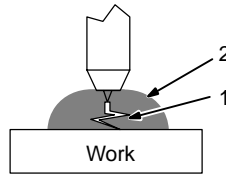


SECTION 6 – HIGH FREQUENCY (HF)

6-1. Welding Processes Using HF



Gas Tungsten Arc Welding (GTAW)



Submerged Arc Welding (SAW)

1 HF Voltage

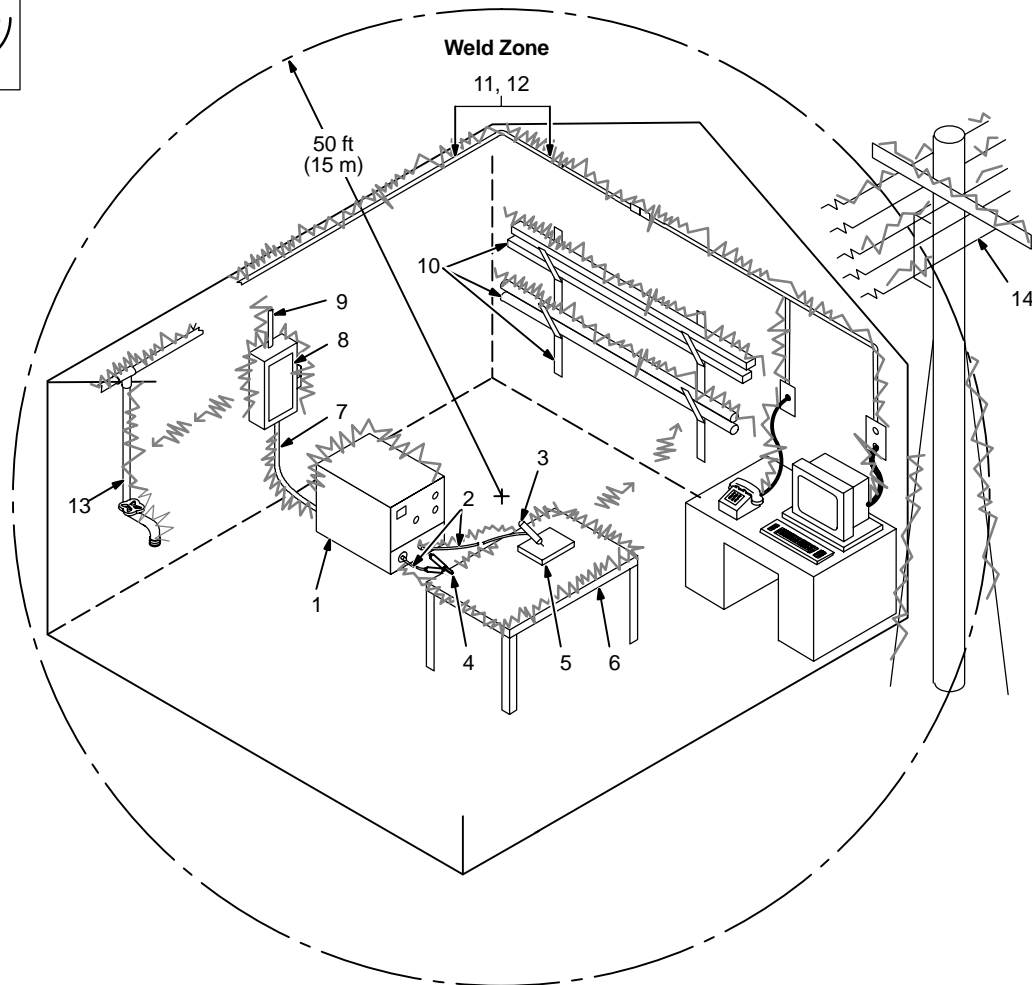
GTAW – helps arc jump air gap between torch and workpiece and/or stabilize the arc.

SAW – helps arc reach workpiece through flux granules.

2 Flux

high_freq1 7/95 – S-0693

6-2. Sources Of HF Radiation From Incorrect Installation



S-0694

Sources Of Direct HF Radiation

- 1 HF 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

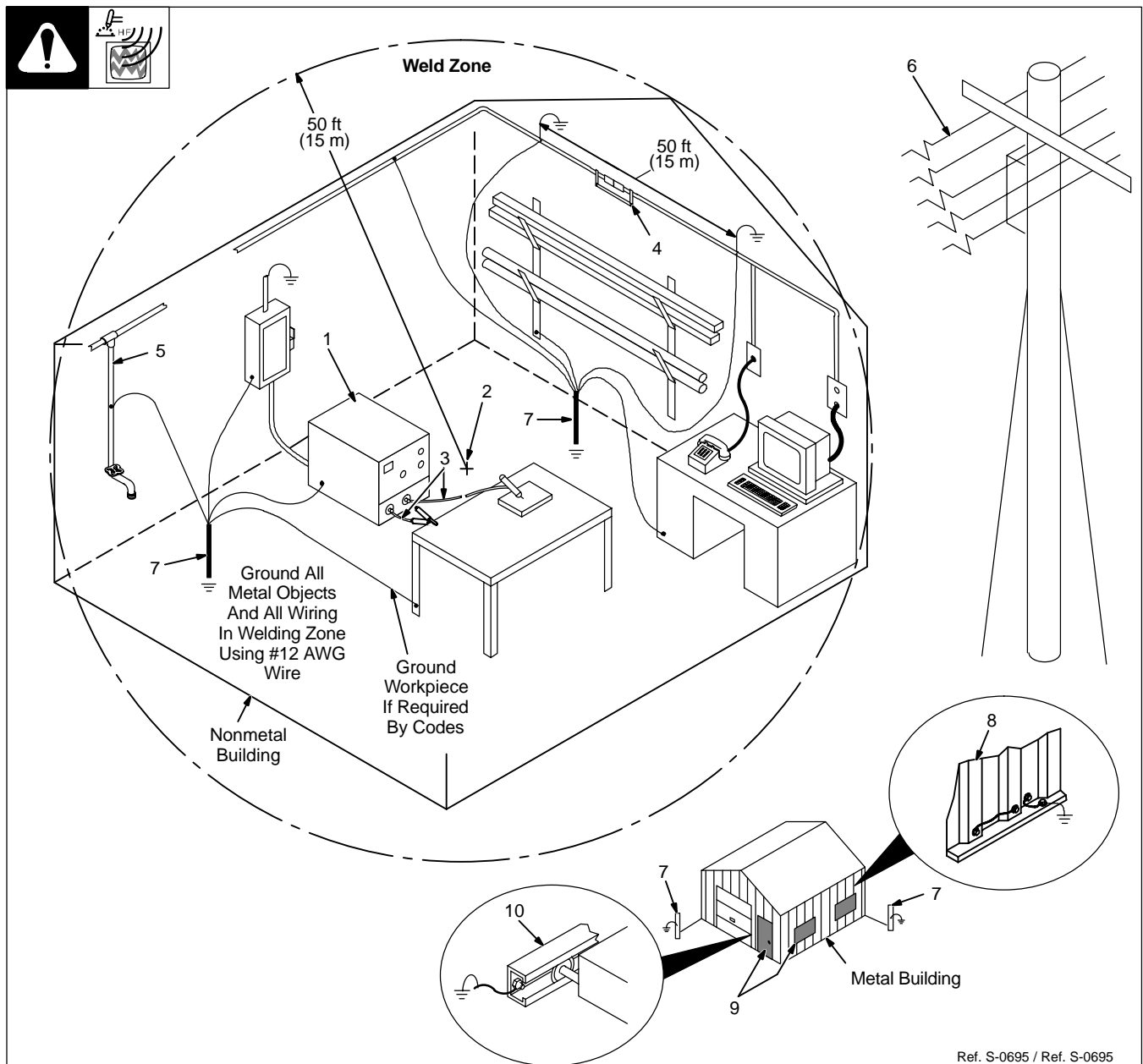
Sources Of Conduction Of HF

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

Sources Of Reradiation Of HF

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

6-3. Correct Installation



Ref. S-0695 / Ref. S-0695

- 1 HF Source (Welder With Built-In HF Or Separate HF Unit)

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

- 2 Welding Zone And Centerpoint

A circle 50 ft (15 m) from centerpoint between HF source and welding torch in all directions.

- 3 Weld Output Cables

Keep cables short and close together.

- 4 Conduit Joint Bonding And Grounding

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

- 5 Water Pipes And Fixtures

Ground water pipes every 50 ft (15 m).

- 6 External Power Or Telephone Lines

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

- 7 Grounding Rod

Consult the National Electrical Code for specifications.

- 8 Metal Building Panel Bonding Methods

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

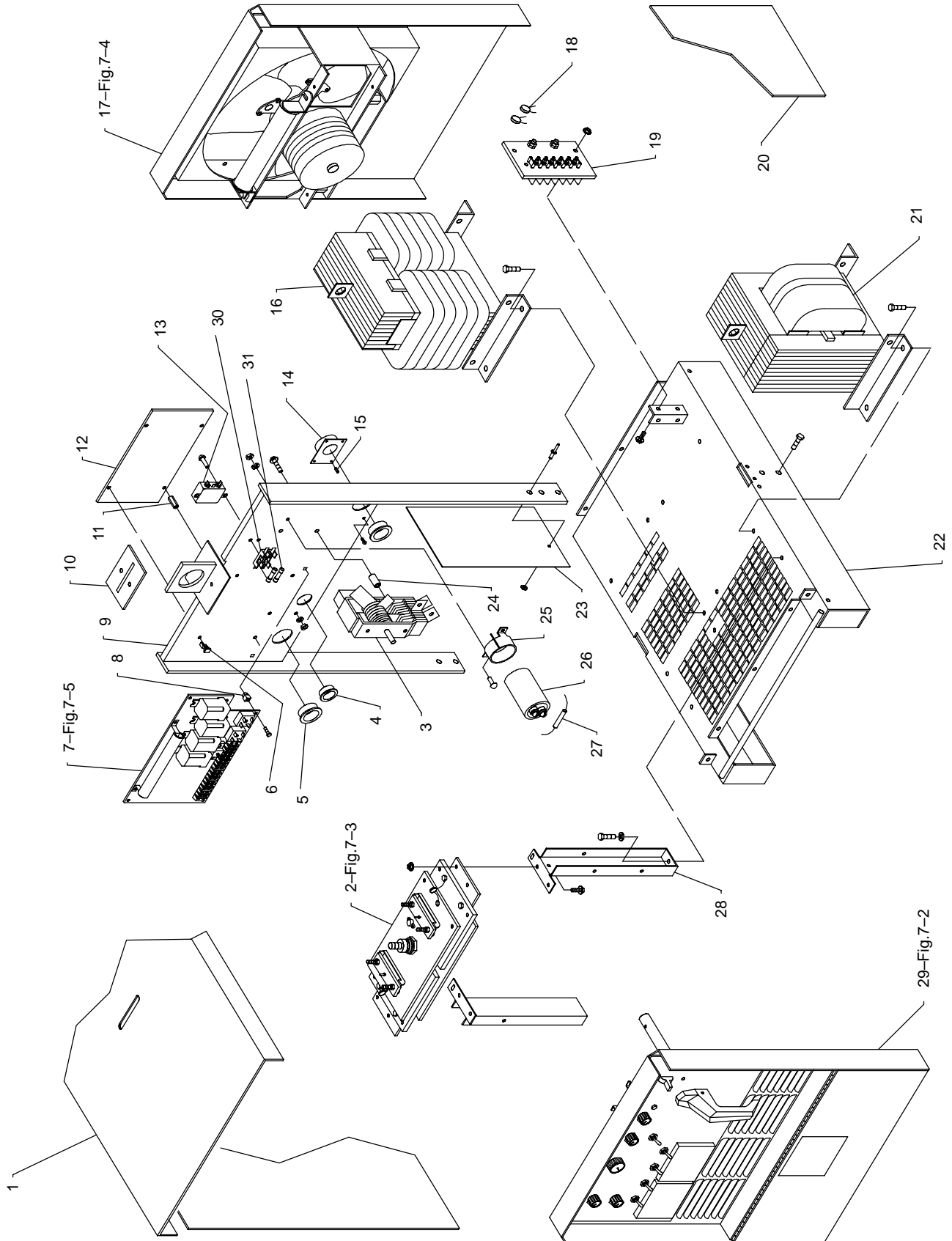
- 9 Windows And Doorways

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

- 10 Overhead Door Track

Ground the track.

SECTION 7 – PARTS LIST




 Hardware is common and not available unless listed.

Figure 7-1. Main Assembly

ST-120 135-R

Replace Coils at Factory or Authorized Factory Service Station

Item No.	Dia. Mkgs.	Part No.	Description	Quantity
Figure 7-1. Main Assembly				
1		182 605	COVER, top	1
2	SR1	181 106	RECTIFIER, si diode (Fig 7-3)	1
3	S4	133 061	SWITCH, plrty/changeover	1
	PLG10	164 899	CONNECTOR & SOCKETS	1
	PLG11	168 809	CONNECTOR & SOCKETS	1
4		057 357	BUSHING, snap-in nyl .937 ID x 1.125mtg hole	1
5		010 494	BUSHING, snap-in nyl 1.375 ID x1.750mtg hole	2
6		134 201	STAND-OFF SUPPORT, PC card No. 6 screw	3
7		Fig 7-5	PANEL, mtg components	1
8		083 147	GROMMET, screw No. 8/10 panel hole .312sq .500 high	4
9		181 101	FRAME, lifting	1
10		026 627	GASKET, lift eye	2
11		070 026	STAND-OFF, No. 6-32 x .437 lg	1
12	PC1	187 642	CIRCUIT CARD, control	1
	PLG51	115 093	CONNECTOR PLUG & SOCKETS	1
	PLG54	130 203	CONNECTOR PLUG & SOCKETS	1
	PLG55	115 091	CONNECTOR PLUG & SOCKETS	1
13	FL1	084 171	FILTER, line power 115/250V	1
14	HD1	156 313	TRANSDUCER, current 300A	1
	PLG3	130 204	CONNECTOR PLUG & SOCKETS	1
15		073 756	STAND-OFF, 6-32 x .625 lg	2
16	Z1	114 826	REACTOR	1
	C13	097 750	CAPACITOR, cer disc .05uf 500VDC	1
17		Fig 7-4	PANEL, rear w/components	1
18	C11,12	111 634	CAPACITOR	1
19	TE1	034 587	TERMINAL ASSEMBLY, pri	1
20		+182 606	PANEL, side	2
		109 035	LABEL, warning electric shock can kill etc	1
21	T1	180 674	TRANSFORMER, pwr main 200/230/460 (consisting of)	1
21	T1	180 673	TRANSFORMER, pwr main 220/380/415 (consisting of)	1
21	T1	180 672	TRANSFORMER, pwr main 230/460/575 (consisting of)	1
21	T1	191 887	TRANSFORMER, pwr main 260/380/520 (consisting of)	1
	TP1	020 520	THERMOSTAT, NC open 135C w/insulator	1
	TP2	168 891	THERMOSTAT, NC open 80C close 50C	1
	PLG1,2	168 071	CONNECTOR & SOCKETS	2
22		171 677	BASE	1
23		157 196	INSULATOR, upright	1
24		010 150	TUBING, stl .500 OD x 17ga x 1	2
25		108 105	CLAMP, capacitor 2.500dia	1
26	C2	031 668	CAPACITOR, elctlt 4000uf 100VDC	1
27	R5	117 803	RESISTOR, WW fxd 10W 1K ohm	1
28		114 722	BRACKET, mtg rectifier	2
29		Fig 7-2	PANEL, front w/components	1
30		098 376	HOLDER, fuse mintr	1
31	F1,2	085 874	FUSE, mintr gl slo-blo 10A	2

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

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

☐ Hardware is common and not available unless listed.

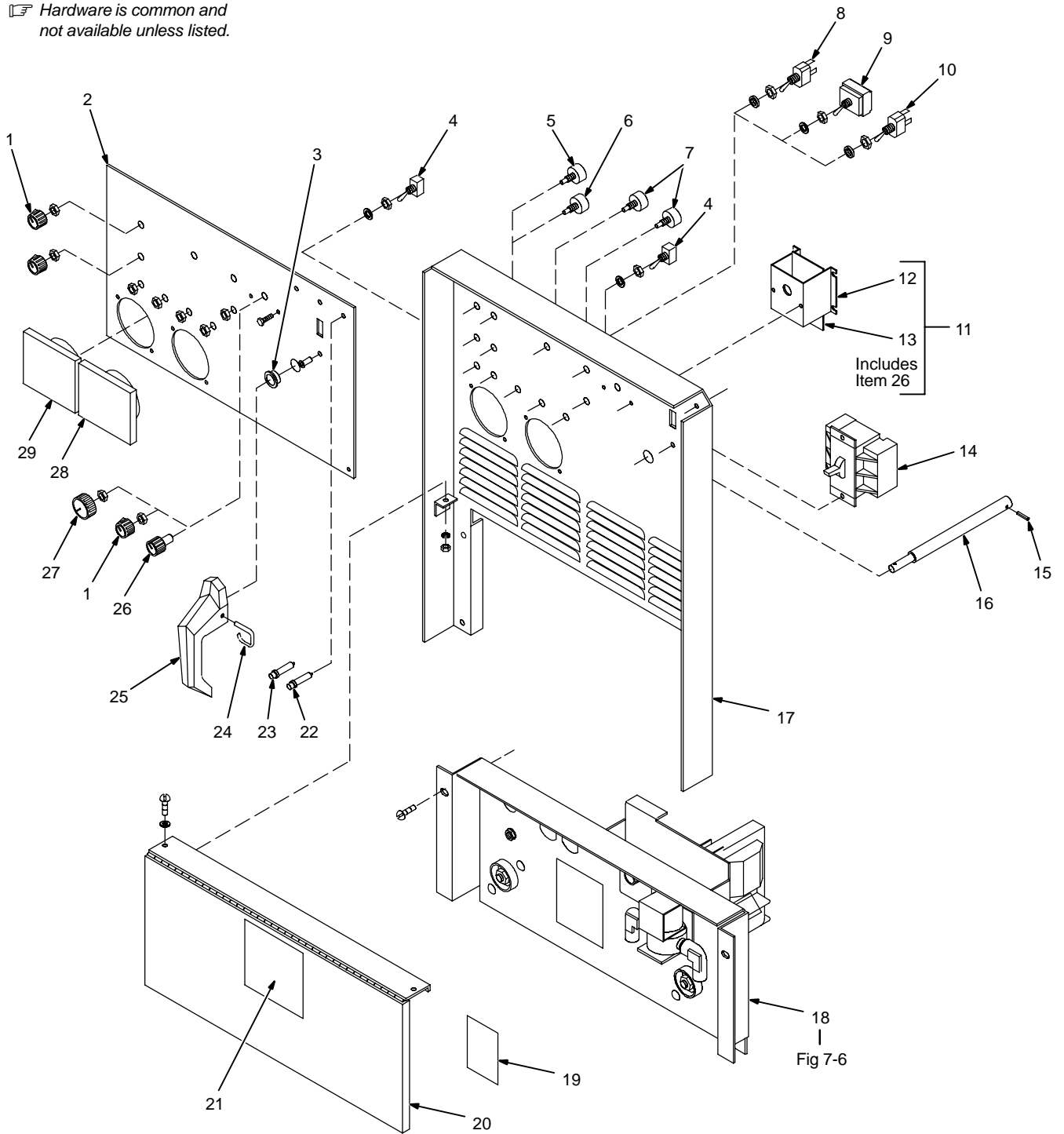


Figure 7-2. Panel, Front w/Components

ST-120 088-G

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

Figure 7-2. Panel, Front w/Components (Fig 7-1 Item 29)

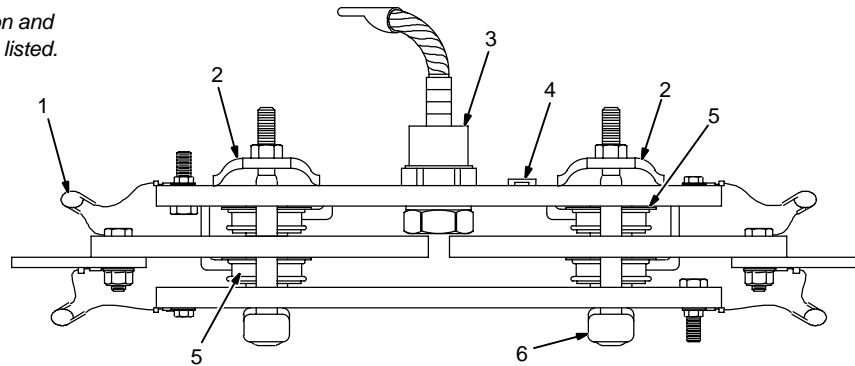
.. 1		097 922	.. KNOB, pointer	3
.. 2			.. NAMEPLATE, (order by model and serial number)	1
.. 3		109 013	.. BUSHING, snap-in nyl .375 ID x .562mtg hole	1
.. 4	S6,7	176 882	.. SWITCH, tgl SPST 15A 125VAC	2
.. 5	R3	030 109	.. POTENTIOMETER, C sltd sft 1/T 2W 5K ohm	1
.. 6	R11	030 684	.. POTENTIOMETER, C sltd sft 1/T 2W 5 meg ohm	1
.. 7	R1,2	035 897	.. POTENTIOMETER, C sltd sft 1/T 2W 1K ohm	2
.. 8	S5	011 609	.. SWITCH, tgl SPDT 15A 125VAC	1
.. 9	S3	052 769	.. SWITCH, tgl 4PDT 15A 125VAC	1
.. 10	S2	088 409	.. SWITCH, tgl 2PDT 15A 125VAC	1
.. 11	TD1	052 192	.. TIMER, delay on make – postflow (consisting of)	1
.. 12		039 449	.. BRACKET, mtg circuit card	1
.. 13		044 723	.. CIRCUIT CARD, postflow	1
.. 14	S1	128 757	.. SWITCH, tgl DPST 60A 600VAC	1
.. 15		106 398	.. PIN, spring CS .156 x .625	1
.. 16		171 420	.. EXTENSION, handle switch	1
.. 17		181 096	.. PANEL, front	1
.. 18		Fig 7-6	.. CONTROL PANEL, lower	1
.. 19		128 230	.. LABEL, warning electric shock etc	1
.. 20		+181 589	.. DOOR, access front	1
.. 21		134 327	.. LABEL, warning general precautionary	1
.. 22	PL2	157 958	.. LIGHT, ind wht lens 28V (power indicator)	1
.. 23	PL1	155 500	.. LED, yellow (50Hz model)	1
..	PLG5	135 635	.. CONNECTOR & SOCKETS	1
..	PLG6	131 054	.. CONNECTOR & SOCKETS	1
.. 24		169 136	.. PIN, spring CS .156 x 1.250	1
.. 25		175 952	.. HANDLE, plrty/changeover switch	1
.. 26		052 370	.. KNOB, indicator	1
.. 27		097 924	.. KNOB, pointer	1
.. 28	A1	115 920	.. METER, amp AC/DC 100MV D-300 scale	1
.. 29	V1	004 189	.. METER, volt AC/DC 0-100 scale	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.

Item No.	Dia. Mkgs.	Part No.	Description	Quantity
181 106 Figure 7-3. Rectifier, Si Diode (Fig 7-1 Item 2)				
.. 1 ..	C7-10	031 689	CAPACITOR, rectifier	4
.. 2 ..		166 667	CLAMP, spring rectifier	2
.. 3 ..	D1	037 956	DIODE, rect 275A 300V SP	1
.. 4 ..	TP3	168 898	THERMOSTAT, NC, open 125°C	1
.. 5 ..	SCR1-4	115 114	THYRISTOR, SCR 300A 300V	4
.. 6 ..		173 714	CLAMP, thyristor	2
.....		028 516	PIN, spring CS .125 x .250	2
.....	PLG53	115 092	CONNECTOR PLUG & SOCKETS	1

☞ Hardware is common and not available unless listed.

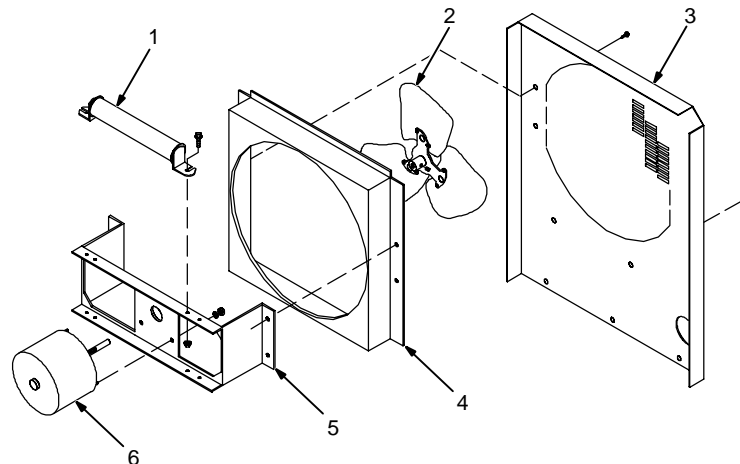


ST-120 205-A

Figure 7-3. Rectifier, Si Diode

Item No.	Dia. Mkgs.	Part No.	Description	Quantity
Figure 7-4. Panel, Rear w/Components (Fig 7-1 Item 17)				
.. 1 ..	R4	186 949	RESISTOR, WW fxd 175W 20 ohm	1
.. 2 ..		180 165	BLADE, fan 14 in 3wg 28deg .375 bore	1
.. 3 ..		181 099	PANEL, rear	1
.. 4 ..		173 283	CHAMBER, plenum 14 in (50Hz only)	1
.. 5 ..		124 274	BRACKET, mtg fan motor	1
.. 6 ..	FM	116 190	MOTOR, 1/12 hp 230V 1550 RPM 50/60Hz 1.5A	1
.....		176 272	CONNECTOR, cable clamp (50Hz model)	1

☞ Hardware is common and not available unless listed.



ST-120 089-F


Figure 7-4. Panel, Rear w/Components

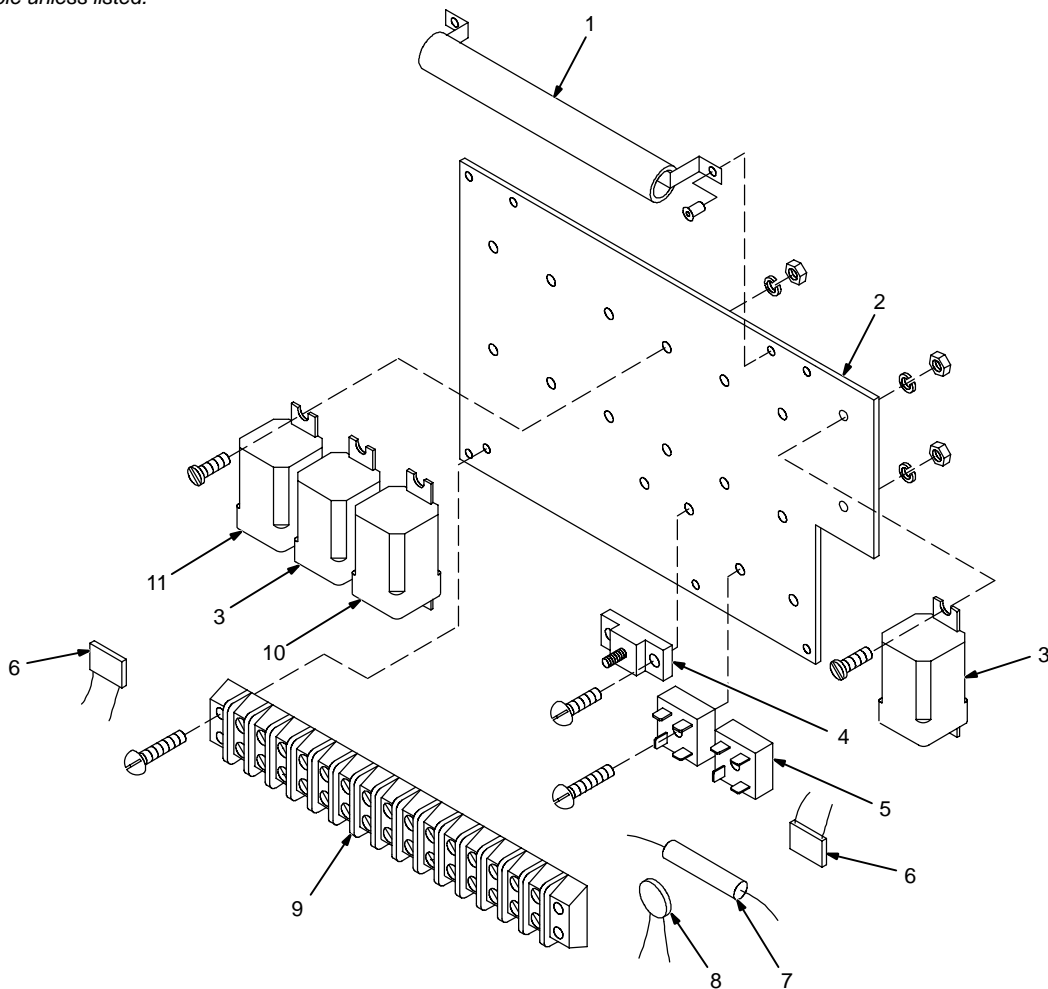
To maintain the factory original performance of your equipment, use only Manufacturer's Suggested Replacement Parts. Model and serial number required when ordering parts from your local distributor.

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

Figure 7-5. Panel, Mtg Components (Fig 7-1 Item 7)

.. 1	.. R7	.. 186 468	.. RESISTOR, WW fxd 100W50 ohm	.. 1
.. 2 117 721	.. PANEL, mtg relay	.. 1
.. 3	.. CR2,6	.. 110 386	.. RELAY, encl 24VAC DPDT	.. 2
.. 4	.. 2T	.. 072 253	.. STUD, single connection 10-32	.. 1
.. 5	.. SR2,3	.. 035 704	.. RECTIFIER, integ 40A 800V	.. 2
.. 6	.. SN1,2	.. 118 625	.. SNUBBER, poly metal film .5uf 200VDC 100 ohm	.. 2
.. 7	.. R6	.. 117 803	.. RESISTOR, WW fxd 10W 1K ohm	.. 1
.. 8	.. C20	.. 119 834	.. CAPACITOR, cer disc .05uf 500V	.. 1
.. 9	.. 1T	.. 117 372	.. BLOCK, term 10A 15P	.. 1
.. 108 023	.. LINK, jumper term blk 10A	.. 3
.. 10	.. CR5	.. 000 770	.. RELAY, encl 24VDC 3PDT	.. 1
.. 11	.. CR1	.. 052 964	.. RELAY, encl 24VDC DPDT	.. 1


 Hardware is common and not available unless listed.

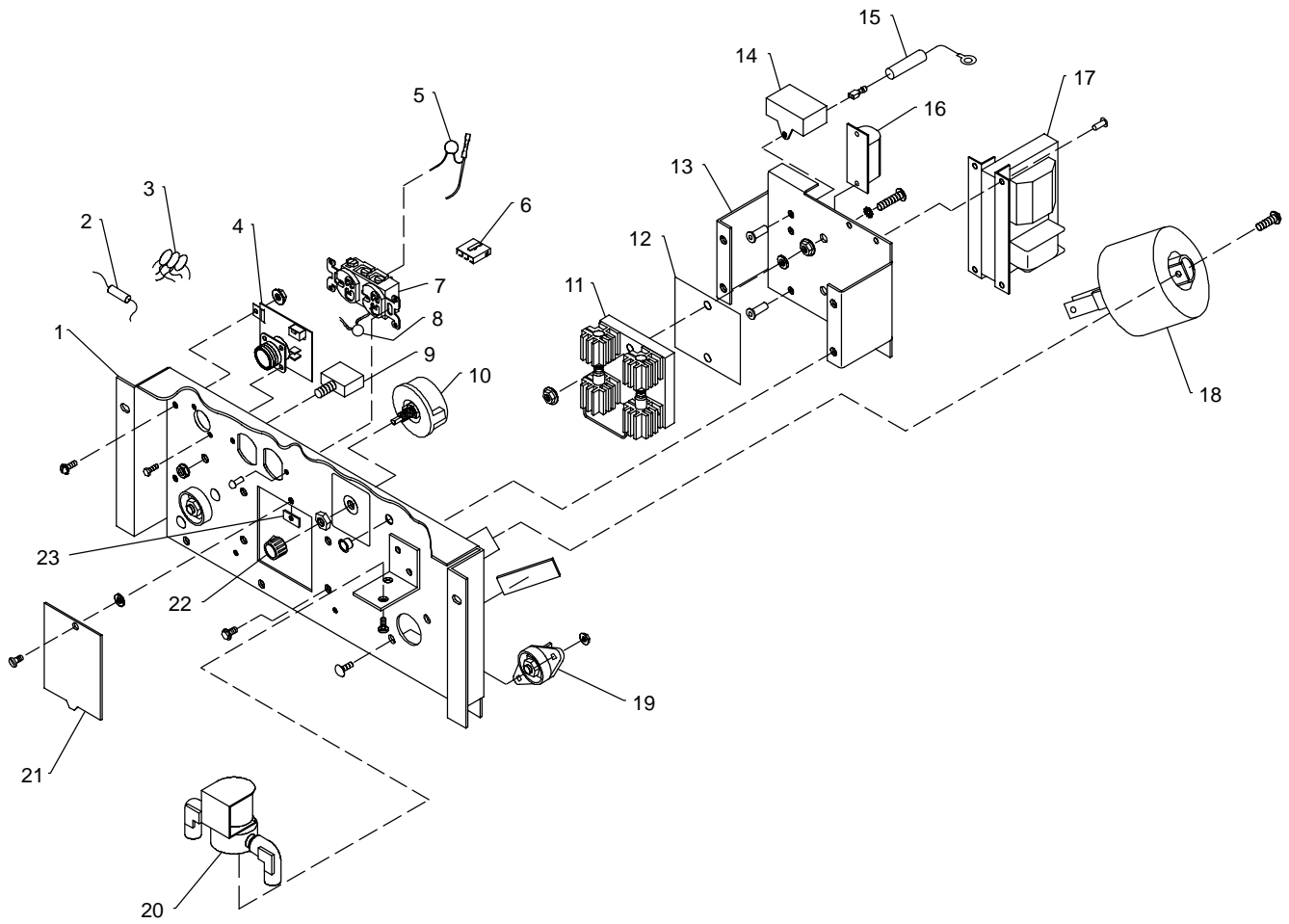


ST-120 090-F

Figure 7-5. Panel, Mtg Components

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

 Hardware is common and not available unless listed.



ST-120 003-P

Figure 7-6. Control Panel, Lower Front

Item No.	Dia. Mkgs.	Part No.	Description	Quantity
Figure 7-6. Control Panel, Lower Front (Fig 7-2 Item 18)				
.. 1		171 652	PANEL, front lower	1
.. 2	R25	137 429	RESISTOR, C2 W 3.3K	1
.. 3	C14	132 433	CAPACITOR, cer disc .05uf 500 VDC	3
.. 4	PC2, RC1	157 959	CIRCUIT CARD ASSEMBLY	1
	PLG21	153 501	CONNECTOR & SOCKETS	1
.. 5	C6	164 290	CAPACITOR, polyp film .01uf 500VDC	1
.. 6	PLG3	131 204	CONNECTOR & SOCKETS	1
.. 7	RC2	604 176	RECEPTACLE, str dx grd 15A 125V	1
.. 8	C15	170 920	CAPACITOR	1
.. 9	CB1	093 995	CIRCUIT BREAKER, man reset 1P 15A 250VDC	1
.. 10	R13	198 547	RHEOSTAT, WW 25W 1.5 ohm	1
.. 11	G	020 623	SPARK GAP ASSEMBLY (consisting of)	1
		121 790	BASE, spark gap	1
		020 622	HOLDER, points	4
		*020 603	POINT, spark gap	4
.. 12		097 712	STRIP, insulator	1
.. 13		174 070	BRACKET, mounting components	1
.. 14	C3	191 944	CAPACITOR, polyp met film	1
.. 15	R8	181 107	RESISTOR ASSEMBLY, w/leads	1
.. 16	C4	201 197	CAPACITOR, polyp met film .002uf 4400VAC panel mtg	1
.. 16	C4	096 761	CAPACITOR, mica .002uf 10,000V panel mtg (CE Models Only)	1
.. 17	T2	074 398	TRANSFORMER, high voltage 115V	1
.. 18	T3	174 692	COIL, HF coupling	1
.. 19		039 047	TERMINAL, pwr output	2
.. 20	GS1	174 036	VALVE, w/fitting and leads (consisting of)	1
		035 601	VALVE, 115VAC 2 way	1
		010 296	FITTING, pipe brs elbow 1/4NPT x .625-18R	2
	PLG4	131 203	CONNECTOR & SOCKETS	1
.. 21		174 038	PANEL, door access HF	1
.. 22		097 922	KNOB, pointer .875dia x .250 ID w/set screw	1
.. 23		010 357	NUT, speed 1.00L	1

*Recommended Spare Parts

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

TRUE BLUE® WARRANTY

Effective January 1, 2000

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

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

Warranty Questions?

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

Your distributor also gives
you ...

Service

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

Support

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

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

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

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

1. 5 Years Parts – 3 Years Labor
 - * Original main power rectifiers
 - * Inverters (input and output rectifiers only)
2. 3 Years — Parts and Labor
 - * Transformer/Rectifier Power Sources
 - * Plasma Arc Cutting Power Sources
 - * Semi-Automatic and Automatic Wire Feeders
 - * Inverter Power Supplies
 - * Intelligig
 - * Engine Driven Welding Generators
(NOTE: Engines are warranted separately by the engine manufacturer.)
3. 1 Year — Parts and Labor
 - * DS-2 Wire Feeder
 - * Motor Driven Guns (w/exception of Spoolmate 185 & Spoolmate 250)
 - * Process Controllers
 - * Positioners and Controllers
 - * Automatic Motion Devices
 - * RFCS Foot Controls
 - * Induction Heating Power Sources
 - * Water Coolant Systems
 - * HF Units
 - * Grids
 - * Maxstar 140
 - * Spot Welders
 - * Load Banks
 - * Miller Cyclomatic Equipment
 - * Running Gear/Trailers
 - * Plasma Cutting Torches (except APT & SAF Models)
 - * 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
 - * MIG Guns/TIG Torches
 - * Induction Heating Coils and Blankets

- * APT, ZIPCUT & PLAZCUT Model Plasma Cutting Torches
- * Remote Controls
- * Accessory Kits
- * Replacement Parts (No labor)
- * Spoolmate 185 & Spoolmate 250
- * Canvas Covers

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

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

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

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

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

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

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

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





Owner's Record

Please complete and retain with your personal records.

Model Name	Serial/Style Number
------------	---------------------

Purchase Date	(Date which equipment was delivered to original customer.)
---------------	------------------------------------------------------------

Distributor

Address

City

State	Zip
-------	-----



For Service

Call 1-800-4-A-Miller or see our website at www.MillerWelds.com to locate a DISTRIBUTOR or SERVICE AGENCY near you.

Always provide Model Name and Serial/Style Number.

Contact your Distributor for:

- Welding Supplies and Consumables
- Options and Accessories
- Personal Safety Equipment
- Service and Repair
- Replacement Parts
- Training (Schools, Videos, Books)
- Technical Manuals (Servicing Information and Parts)
- Circuit Diagrams
- Welding Process Handbooks

Contact the Delivering Carrier for:

File a claim for loss or damage during shipment.

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

Miller Electric Mfg. Co.

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

International Headquarters—USA

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

European Headquarters – United Kingdom

Phone: 44 (0) 1204-593493
FAX: 44 (0) 1204-598066

www.MillerWelds.com



Miller
The Power of Blue.