OM-354 147819 G
December 1997

Processes

TIG (GTAW) Welding

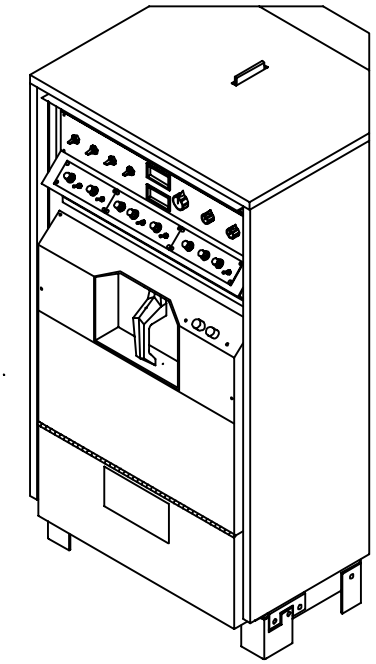
Stick (SMAW) Welding

Description

CC AC/DC 1 Phase

Arc Welding Power Source

Syncrowave® 351



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.

ISO 9001 REGISTERED QUALITY SYSTEM

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

TRUE BLUE® WARRANTY

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.

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.**

Miller
The Power of Blue.

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⚠ 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

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® 351**

conforms to the following Directives and Standards:

Directives

Low Voltage Directive: 73/23/EEC

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

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

Standards

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

Arc Welding Equipment Part 1: Welding Power Sources: IEC 974-1 (December 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

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1-1. Symbol Usage

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

▲ **Marks a special safety message.**

☞ *Means "Note"; not safety related.*

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

1-2. Arc Welding Hazards

▲ **The symbols shown below are used throughout this manual to call attention to and identify possible hazards. When you see the symbol, watch out, and follow the related instructions to avoid the hazard. The safety information given below is only a summary of the more complete safety information found in the Safety Standards listed in Section 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 watch-person nearby. Welding fumes and gases can displace air and lower the oxygen level causing injury or death. Be sure the breathing air is safe.
- Do not weld in locations near degreasing, cleaning, or spraying operations. The heat and rays of the arc can react with vapors to form highly toxic and irritating gases.
- Do not weld on coated metals, such as galvanized, lead, or cadmium plated steel, unless the coating is removed from the weld area, the area is well ventilated, and if necessary, while wearing an air-supplied respirator. The coatings and any metals containing these elements can give off toxic fumes if welded.

ARC RAYS can burn eyes and skin.

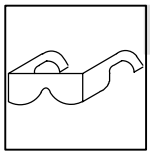
Arc rays from the welding process produce intense visible and invisible (ultraviolet and infrared) rays that can burn eyes and skin. Sparks fly off from the weld.

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

WELDING can cause fire or explosion.

Welding on closed containers, such as tanks, drums, or pipes, can cause them to blow up. Sparks can fly off from the welding arc. The flying sparks, hot workpiece, and hot equipment can cause fires and burns. Accidental contact of electrode to metal objects can cause sparks, explosion, overheating, or fire. Check and be sure the area is safe before doing any welding.

- Protect yourself and others from flying sparks and hot metal.
- Do not weld where flying sparks can strike flammable material.
- Remove all flammables within 35 ft (10.7 m) of the welding arc. If this is not possible, tightly cover them with approved covers.
- Be alert that welding sparks and hot materials from welding can easily go through small cracks and openings to adjacent areas.
- Watch for fire, and keep a fire extinguisher nearby.
- Be aware that welding on a ceiling, floor, bulkhead, or partition can cause fire on the hidden side.
- Do not weld on closed containers such as tanks, drums, or pipes, unless they are properly prepared according to AWS F4.1 (see Safety Standards).
- Connect work cable to the work as close to the welding area as practical to prevent welding current from traveling long, possibly unknown paths and causing electric shock and fire hazards.
- Do not use welder to thaw frozen pipes.
- Remove stick electrode from holder or cut off welding wire at contact tip when not in use.
- Wear oil-free protective garments such as leather gloves, heavy shirt, cuffless trousers, high shoes, and a cap.
- Remove any combustibles, such as a butane lighter or matches, from your person before doing any welding.



FLYING METAL can injure eyes.

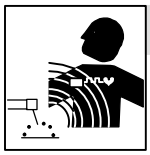
- Welding, chipping, wire brushing, and grinding cause sparks and flying metal. As welds cool, they can throw off slag.
- Wear approved safety glasses with side shields even under your welding helmet.

BUILDUP OF GAS can injure or kill.

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

HOT PARTS can cause severe burns.

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



MAGNETIC FIELDS can affect pacemakers.

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

NOISE can damage hearing.

Noise from some processes or equipment can damage hearing.

- Wear approved ear protection if noise level is high.

CYLINDERS can explode if damaged.

Shielding gas cylinders contain gas under high pressure. If damaged, a cylinder can explode. Since gas cylinders are normally part of the welding process, be sure to treat them carefully.

- Protect compressed gas cylinders from excessive heat, mechanical shocks, slag, open flames, sparks, and arcs.
- Install cylinders in an upright position by securing to a stationary support or cylinder rack to prevent falling or tipping.
- Keep cylinders away from any welding or other electrical circuits.
- Never drape a welding torch over a gas cylinder.
- Never allow a welding electrode to touch any cylinder.
- Never weld on a pressurized cylinder – explosion will result.
- Use only correct shielding gas cylinders, regulators, hoses, and fittings designed for the specific application; maintain them and associated parts in good condition.
- Turn face away from valve outlet when opening cylinder valve.
- Keep protective cap in place over valve except when cylinder is in use or connected for use.
- Read and follow instructions on compressed gas cylinders, associated equipment, and CGA publication P-1 listed in Safety Standards.

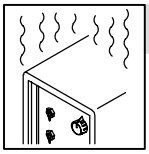
1-3. Additional Symbols For Installation, Operation, And Maintenance

FIRE OR EXPLOSION hazard.

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

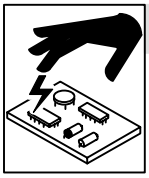
FALLING UNIT can cause injury.

- Use lifting eye to lift unit only, NOT running gear, gas cylinders, or any other accessories.
- Use equipment of adequate capacity to lift and support unit.
- If using lift forks to move unit, be sure forks are long enough to extend beyond opposite side of unit.



OVERUSE can cause OVERHEATING

- Allow cooling period; follow rated duty cycle.
- Reduce current or reduce duty cycle before starting to weld again.
- Do not block or filter airflow to unit.



STATIC (ESD) can damage PC boards.

- Put on grounded wrist strap BEFORE handling boards or parts.
- Use proper static-proof bags and boxes to store, move, or ship PC boards.

MOVING PARTS can cause injury.

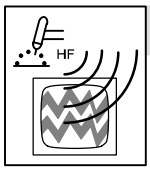
- Keep away from moving parts.
- Keep away from pinch points such as drive rolls.

WELDING WIRE can cause injury.

- Do not press gun trigger until instructed to do so.
- Do not point gun toward any part of the body, other people, or any metal when threading welding wire.

MOVING PARTS can cause injury.

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



H.F. RADIATION can cause interference.

- High-frequency (H.F.) can interfere with radio navigation, safety services, computers, and communications equipment.
- Have only qualified persons familiar with electronic equipment perform this installation.
- The user is responsible for having a qualified electrician promptly correct any interference problem resulting from the installation.
- If notified by the FCC about interference, stop using the equipment at once.
- Have the installation regularly checked and maintained.
- Keep high-frequency source doors and panels tightly shut, keep spark gaps at correct setting, and use grounding and shielding to minimize the possibility of interference.

ARC WELDING can cause interference.

- Electromagnetic energy can interfere with sensitive electronic equipment such as computers and computer-driven equipment such as robots.
- Be sure all equipment in the welding area is electromagnetically compatible.
- To reduce possible interference, keep weld cables as short as possible, close together, and down low, such as on the floor.
- Locate welding operation 100 meters from any sensitive electronic equipment.
- Be sure this welding machine is installed and grounded according to this manual.
- If interference still occurs, the user must take extra measures such as moving the welding machine, using shielded cables, using line filters, or shielding the work area.

1-4. Principal Safety Standards

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

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

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

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

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

Code for Safety in Welding and Cutting, CSA Standard W117.2, from Canadian Standards Association, Standards Sales, 178 Rexdale Boulevard, Rexdale, Ontario, Canada M9W 1R3.

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

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

1-5. EMF Information

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

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

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

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

About Pacemakers:

Pacemaker wearers consult your doctor first. If cleared by your doctor, then following the above procedures is recommended.

SECTION 1 – CONSIGNES DE SECURITE – LIRE AVANT UTILISATION

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 àcourant électrique dans les zones humides, dans les endroits confinés ou là où on risque de tomber.
- Se servir d'une source électrique àcourant électrique UNIQUEMENT si le procédé de soudage le demande.
- Si l'utilisation d'une source électrique àcourant 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. Entretenir l'appareil conformément à ce manuel.
- Porter un harnais de sécurité quand on travaille en hauteur.
- Maintenir solidement en place tous les panneaux et capots.
- Fixer le câble de retour de façon à obtenir un bon contact métal-métal avec la pièce à souder ou la table de travail, le plus près possible de la soudure.
- Isoler la pince de masse quand pas mis à la pièce pour éviter le contact avec tout objet métallique.

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

- Arrêter les convertisseurs, débrancher le courant électrique, et décharger les condensateurs d'alimentation selon les instructions indiquées dans la partie entretien avant de toucher les pièces.

LES FUMÉES ET LES GAZ peuvent être dangereux.

Le soudage génère des fumées et des gaz. Leur inhalation peut être dangereux pour votre santé.

- Eloigner votre tête des fumées. Ne pas respirer les fumées.
- A l'intérieur, ventiler la zone et/ou utiliser un échappement au niveau de l'arc pour l'évacuation des fumées et des gaz de soudage.
- Si la ventilation est insuffisante, utiliser un respirateur à alimentation d'air homologué.
- Lire les spécifications de sécurité des matériaux (MSDSs) et les instructions du fabricant concernant les métaux, les consommables, les revêtements, les nettoyants et les dégraisseurs.
- 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.

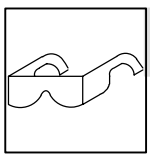
Le rayonnement de l'arc du procédé de soudage génère des rayons visibles et invisibles intenses (ultraviolets et infrarouges) susceptibles de provoquer des brûlures dans les yeux et sur la peau. Des étincelles sont projetées pendant le soudage.

- 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 sondre 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.

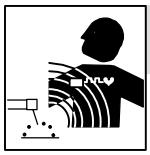
- Le soudage, l'écaillement, le passage de la pièce à la brosse en fil de fer, et le meulage génèrent des étincelles et des particules métalliques volantes. Pendant la période de refroidissement des soudures, elles risquent de projeter du laitier.
- Porter des lunettes de sécurité avec écrans latéraux 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 sondre 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.

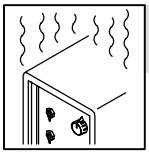
1-3. Dangers supplémentaires en relation avec l'installation, le fonctionnement et la maintenance

Risque D'INCENDIE OU D'EXPLOSION.

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

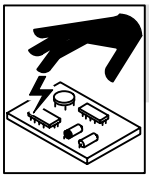
LA CHUTE DE L'APPAREIL peut blesser.

- Utiliser l'anneau de levage uniquement pour soulever l'appareil, NON PAS les chariot, les bouteilles de gaz ou tout autre accessoire.
- Utiliser un engin d'une capacité appropriée pour soulever l'appareil.
- En utilisant des fourches de levage pour déplacer l'unité, s'assurer que les fourches sont suffisamment longues pour dépasser du côté opposé de l'appareil.



L'EMPLOI EXCESSIF peut SURCHAUFFER L'ÉQUIPEMENT.

- Prévoir une période de refroidissement, respecter le cycle opératoire nominal.
- Réduire le courant ou le cycle opératoire avant de recommancer 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 imprimes.

DES ORGANES MOBILES peuvent provoquer des blessures.

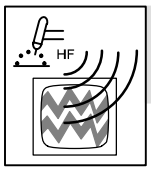
- Ne pas s'approcher des organes mobiles.
- Ne pas s'approcher des points de coincement tels que des rouleaux de commande.

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 frequence 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 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 Sandards, 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 ensembles 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.

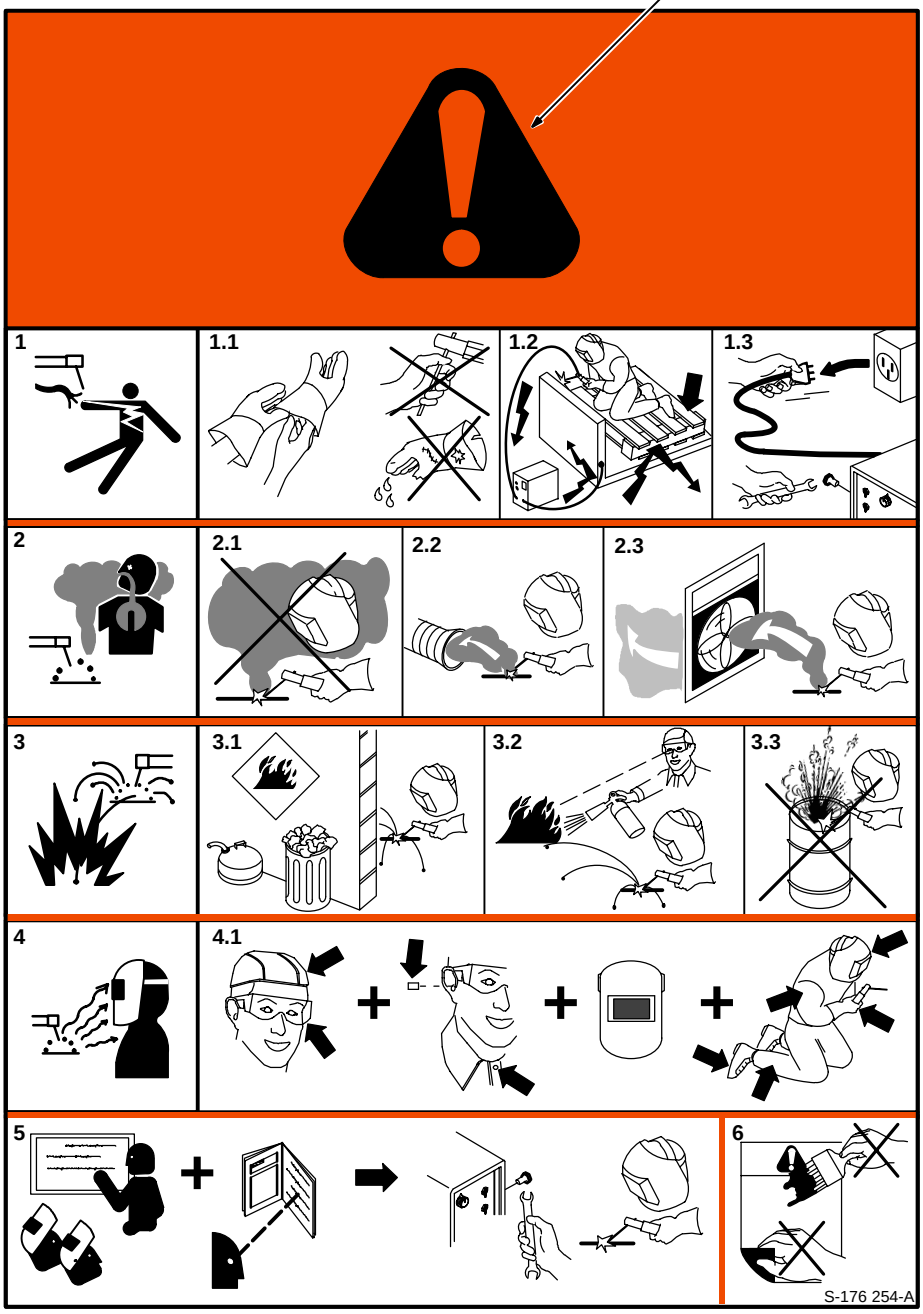
5 Relier la pince de masse le plus près possible de la zone de soudure.

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.

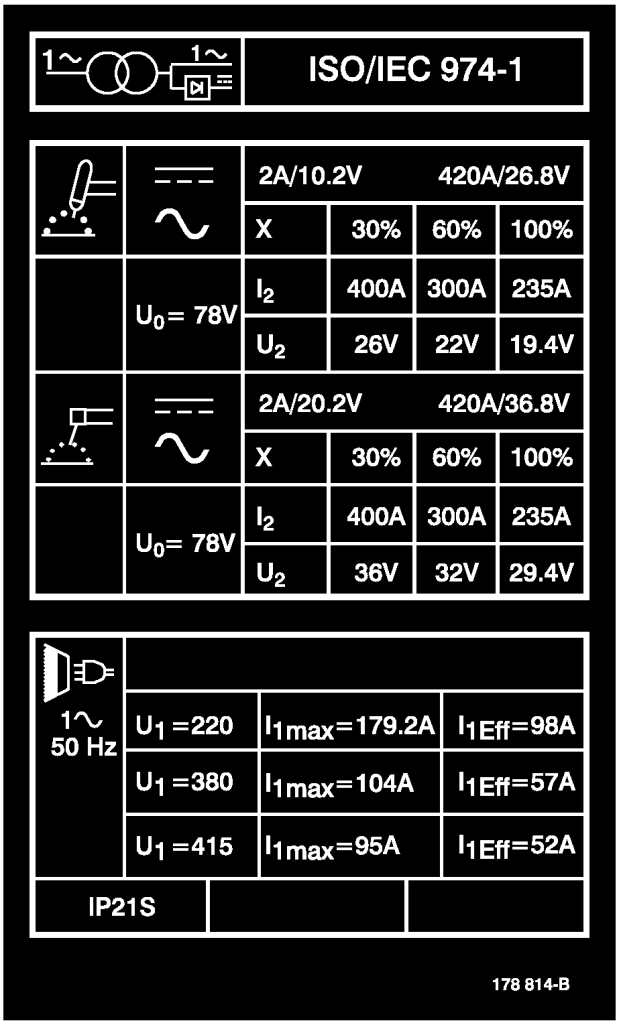
4 Arc rays can burn eyes and injure skin.

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.

2-2. Rating Label For CE Products



2-3. Symbols And Definitions

NOTE ☞	*Some symbols are found only on CE products.*

A	Amperes		Panel–Local		Gas Tungsten Arc Welding (GTAW)		Shielded Metal Arc Welding (SMAW)
V	Volts		Do Not Switch While Welding		Arc Force (DIG)	●●●●t	Spot Timer
	Output		Circuit Breaker		Remote		High Temperature
	Protective Earth (Ground)		Alternating Current	HF	High Frequency - Start	V	Input
t2	Postflow Timer	t1	Preflow Timer	HF	High Frequency - Continuous	HF	High Frequency
S	Seconds		Gas Input		Gas Output		Gas (Supply)
I	On	O	Off		Thickness Gauge		Direct Current
+ –	Balance Control		Maximum Cleaning		Maximum Penetration	+	Electrode Positive
–	Electrode Negative		Work		Electrode	1	Single-Phase
f	Pulse Frequency	% t	Pulse Percent On Time	A	Pulse Background Amperage	Hz	Hertz
t	Start Time	A	Start Amperage	t	Crater Time	%	Percent
U_0	Rated No Load Voltage (Average)	U_1	Primary Voltage	U_2	Conventional Load Voltage		Line Connection
I_1	Primary Current	I_2	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		Spark Gap
	Increase/Decrease Of Quantity						

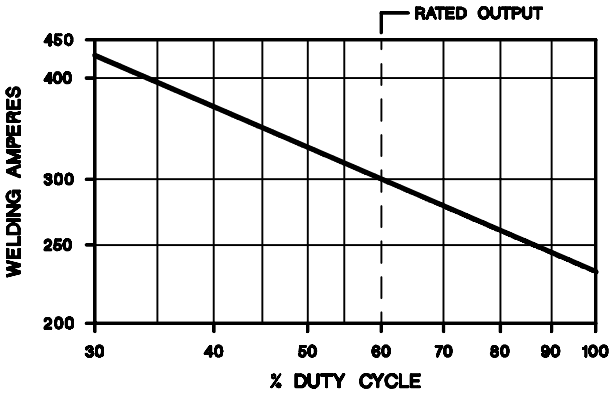
SECTION 3 – INSTALLATION

3-1. Specifications

Rated Welding Output	PFC**	Amperes Input at AC Balanced Rated Load Output, 50/60 Hz, Single-Phase							KVA	KW	Amperage Range	Max OCV
		200 V	220 V	230 V	380 V	415 V	460 V	575 V				
NEMA Class I (60) – 300 Amperes, 32 Volts AC, 60% Duty Cycle	No PFC	130 (5.6*)	138	112 (4.9*)	80	73	57 (2.4*)	46 (1.9*)	26 (1.14*)	13.7 (0.42*)	3 – 430A	80
	With PFC	112 (69*)	88	84 (60*)	51	47	45 (30*)	34 (24*)	20.6 (13.9*)	13.6 (0.59*)		
NEMA Class II (40) – 350 Amperes, 34 Volts AC, 40% Duty Cycle	No PFC	151 (5.6*)		131 (4.9*)			67 (2.4*)	52 (1.9*)	30.3 (1.14*)	17.4 (0.42*)	3 – 430A	80
	With PFC	131 (69*)		102 (60*)			53 (30*)	43 (24*)	24.6 (13.9*)	17.3 (0.59*)		

*While idling
**Power Factor Correction

3-2. Duty Cycle And Overheating

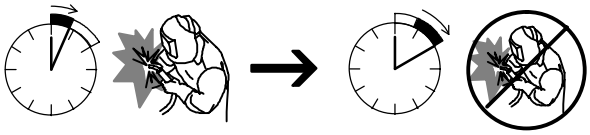


Duty Cycle is percentage of 10 minutes that unit can weld at rated load without overheating.

If unit overheats, thermostat opens, output stops, light goes on (CE Models Only), and cooling fans run. Wait fifteen minutes for unit to cool. Reduce amperage or duty cycle before welding.

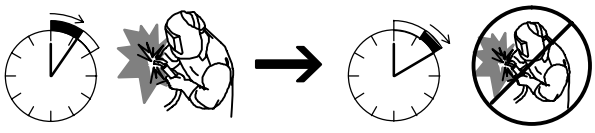
▲ **Exceeding duty cycle can damage unit and void warranty.**

40% Duty Cycle At 350 Amperes (60 Hz Models Only)



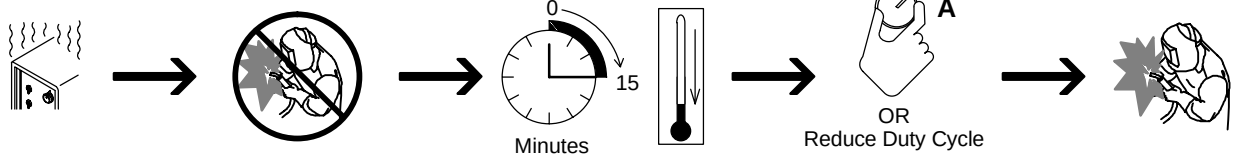
4 Minutes Welding — 6 Minutes Resting

60% Duty Cycle At 300 Amperes



6 Minutes Welding — 4 Minutes Resting

Overheating

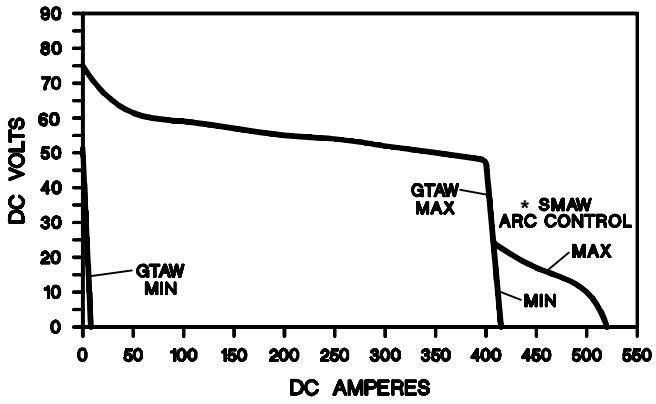


duty1 4/95 / SB-159 284

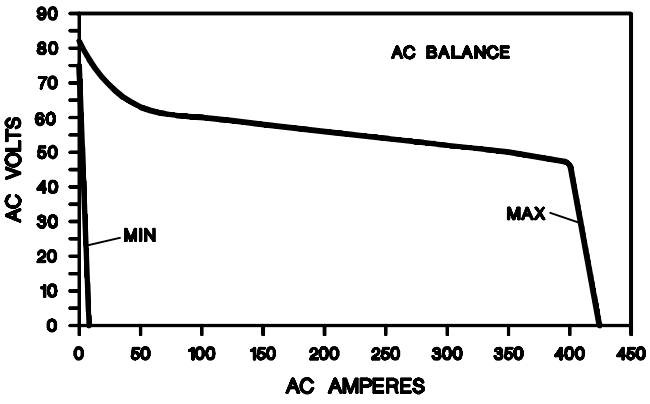
3-3. Volt-Ampere Curves

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.

A. DC Mode



B. AC Mode

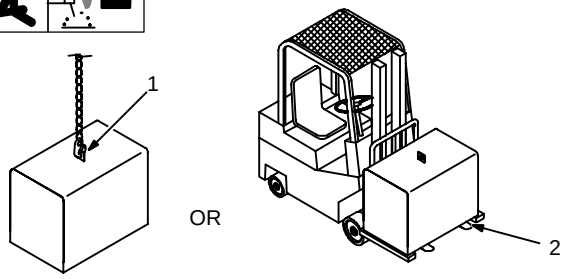


*During low arc voltage conditions (short arc length), increasing Arc Control setting increases amperage (see Section 4-2).

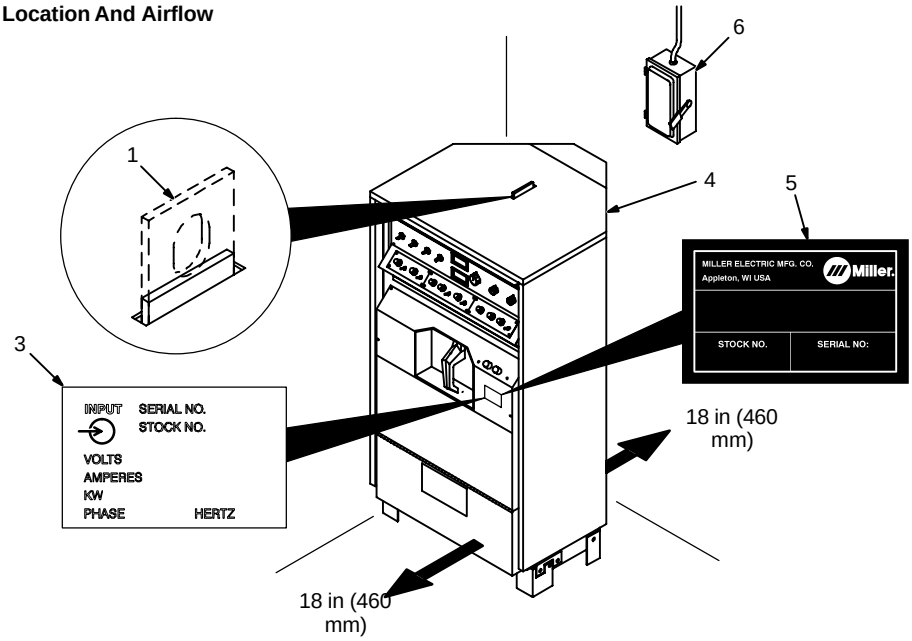
ssb1.1 10/91 – ST-159 286 / ST-159 285

3-4. Dimensions and Weights / Selecting A Location

Movement



Location And Airflow



Net Weight: 541 lb (245 kg), Length: 22-1/2 in (577 mm), Width: 24 in (577 mm), Height: 44 in (1,218 mm) with retractable lifting eye down.

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

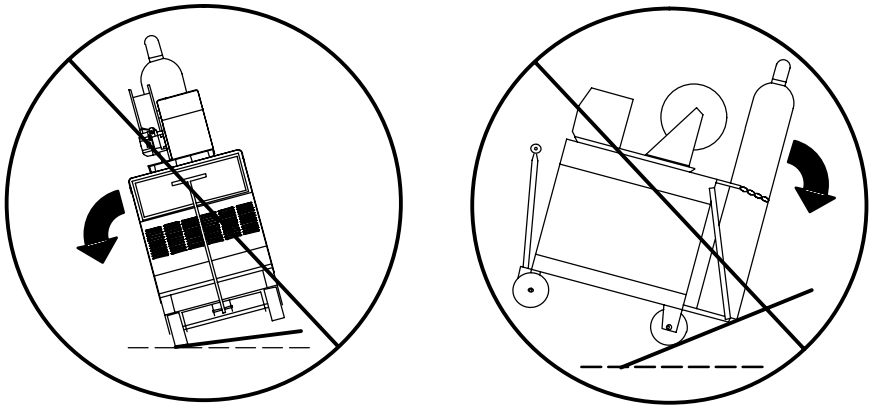
Locate unit near correct input power supply.

▲ **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-C

3-5. Tipping

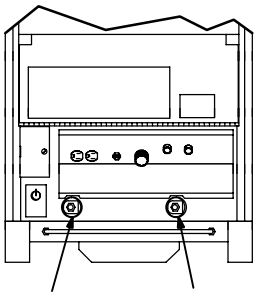
▲ **Be careful when placing or moving unit over uneven surfaces.**



3-6. Weld Output Terminals And Selecting Cable Sizes

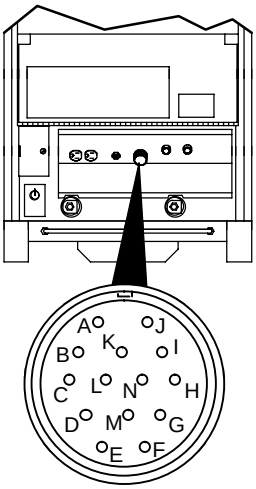
▲ **ARC WELDING can cause Electromagnetic Interference.**

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 Ref. ST-149 842-E	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. S-0007-D

3-7. Remote 14 Receptacle

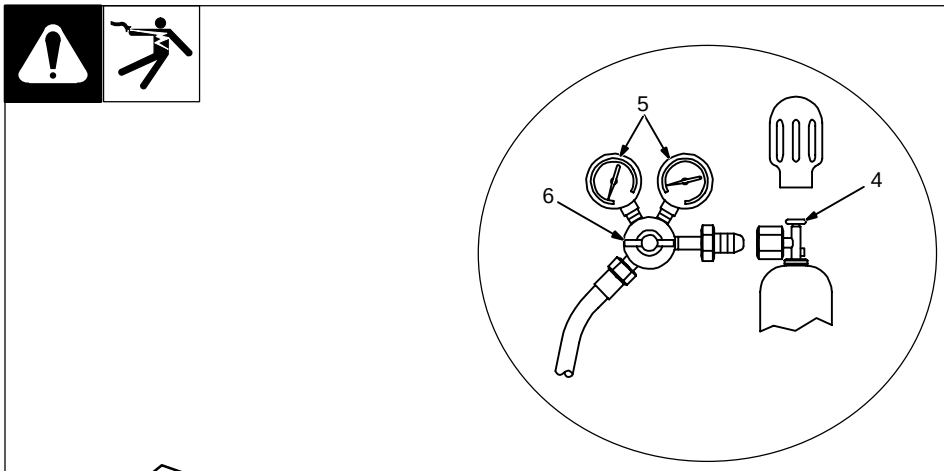


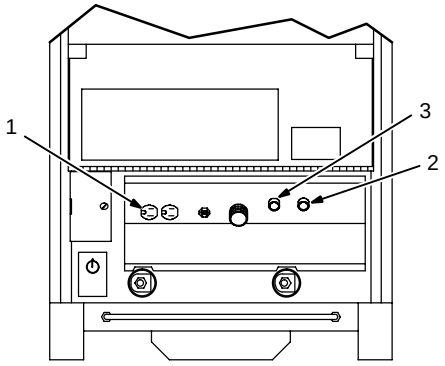
ST-149 842-E

Socket*	Socket Information
A	24 volts ac.
B	Contact closure to A completes 24 volts ac contactor control circuit.
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.

*The remaining sockets are not used.

3-8. 115 Volts AC Duplex Receptacle And Shielding Gas Connections





▲ **Turn Off power before connecting to receptacle.**

1 115 V AC Receptacle

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

2 Gas Valve In Fitting

3 Gas Valve Out Fitting

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

4 Cylinder Valve

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

5 Regulator/Flow Gauge

6 Flow Adjust

Typical flow rate is 20 cfh (cubic feet per hour).

Ref. ST-154 795-B / Ref. ST-149 842-E

3-9. Electrical Service Guide

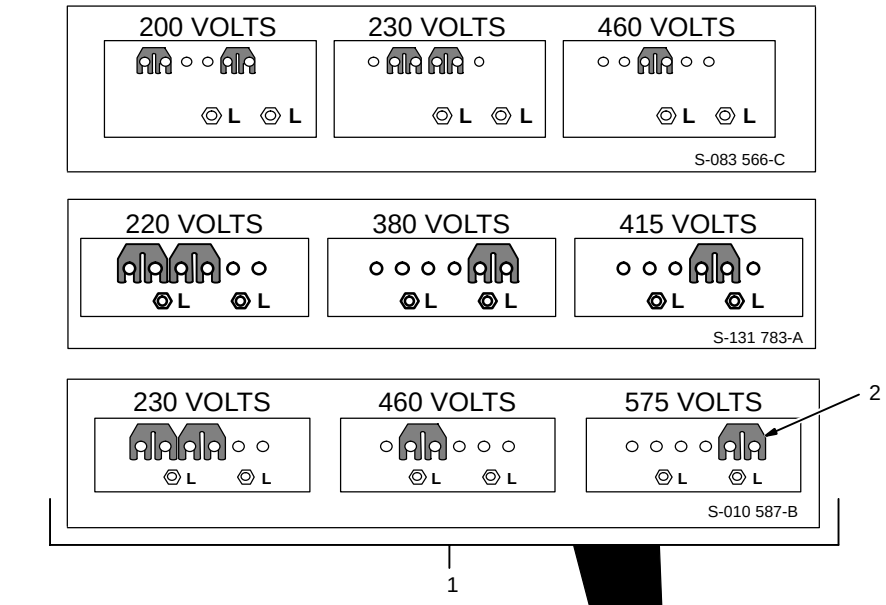
NOTE ☞	*All values calculated at 60% duty cycle.*

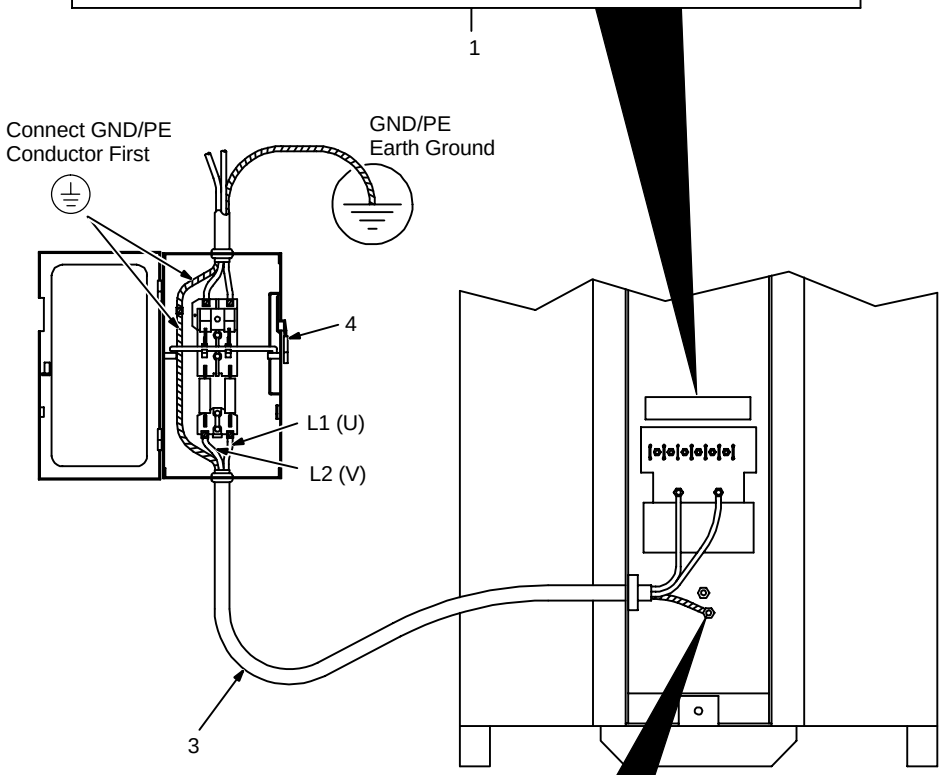
60 Hertz Models	Without Power Factor Correction				With Power Factor Correction			
Input Voltage	200	230	460	575	200	230	460	575
Input Amperes At Rated Output	130	112	57	46	112	84	45	34
Max Recommended Standard Fuse Or Circuit Breaker Rating In Amperes	200	175	80	70	150	125	70	50
Min Input Conductor Size In AWG/Kcmil	2	3	8	8	4	4	8	10
Max Recommended Input Conductor Length In Feet (Meters)	150 (46)	168 (51)	262 (80)	409 (25)	117 (36)	154 (47)	273 (83)	287 (87)
Min Grounding Conductor Size In AWG/Kcmil	6	6	8	8	6	6	8	10
Reference: 1996 National Electrical Code (NEC)								S-0092-J

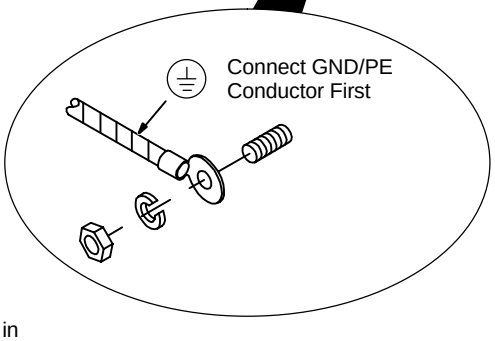
NOTE ☞	*All values calculated at 60% duty cycle.*

50 Hertz Models	Without Power Factor Correction			With Power Factor Correction		
Input Voltage	220	380	415	220	380	415
Input Amperes At Rated Output	138	80	73	88	51	47
Max Recommended Standard Fuse Or Circuit Breaker Rating In Amperes	200	125	110	150	80	70
Min Input Conductor Size In AWG/Kcmil	3	6	8	4	8	8
Max Recommended Input Conductor Length In Feet (Meters)	125 (38)	214 (65)	170 (52)	141 (43)	187 (57)	222 (68)
Min Grounding Conductor Size In AWG/Kcmil	6	6	8	6	8	8
Reference: 1996 National Electrical Code (NEC)						S-0092-J

3-10. Placing Jumper Links And Connecting Input Power







Tools Needed:

3/8 in

3/8, 1/2, 7/16 in

Check input voltage available at site.

1 Jumper Link Label

Check label – only one is on unit.

2 Jumper Links

Move jumper links to match input voltage.

3 Input And Grounding Conductors

Select size and length using Section 3-9.

4 Line Disconnect Device

Select type and size of overcurrent protection using Section 3-9.

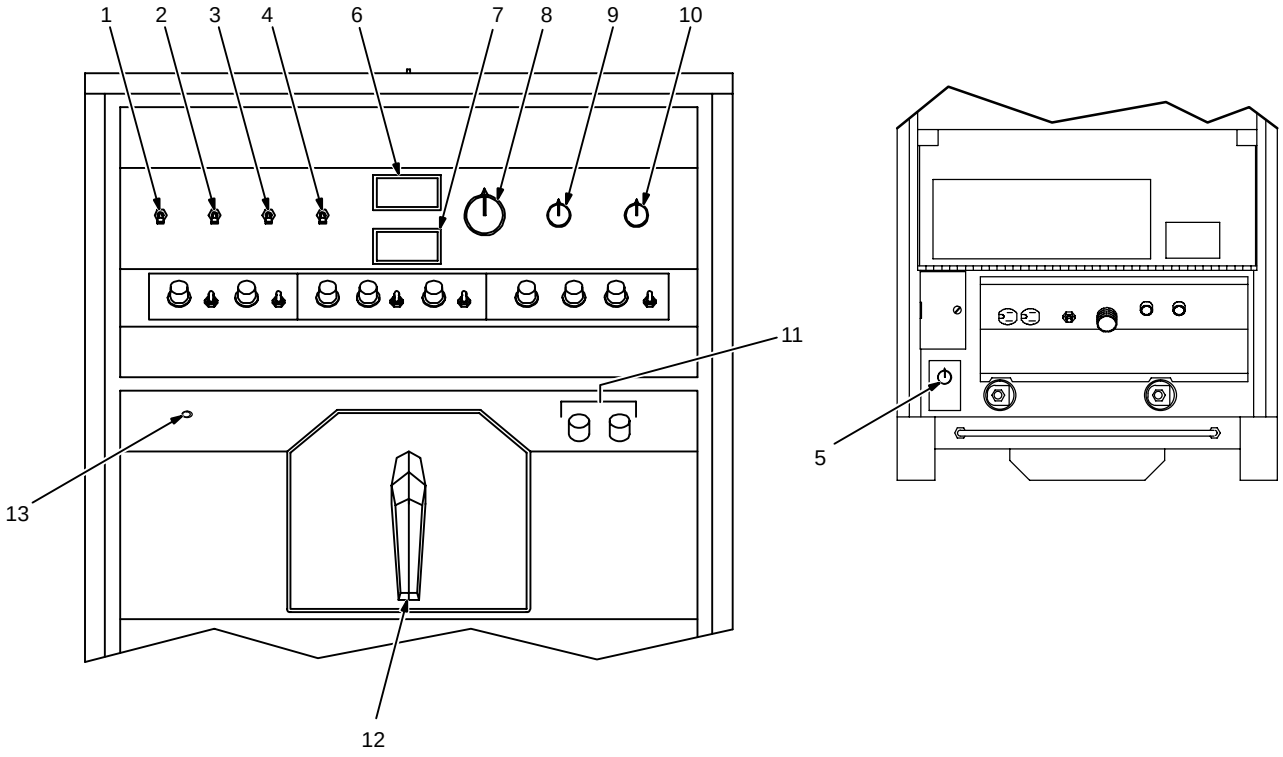
Reinstall side panel.

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

Ref. ST-149 843-C

SECTION 4 – OPERATION

4-1. Standard Controls



☞ *Place 4 switches in upper left corner up for SMAW and down for GTAW.*

1 Mode Switch

Switch selects SMAW or GTAW.

2 Amperage Control Switch

Switch selects front panel or remote amperage control.

3 Output Switch

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

Switch selects front panel or remote output control.

4 High Frequency Switch

For GTAW, use switch to select continuous HF, HF for arc starting only, or no HF.

5 High Frequency Control

For GTAW, use control to set HF intensity. Set as low as possible.

6 Ammeter

7 Voltmeter

8 Amperage Adjustment Control

☞ *Control can be turned past the minimum and maximum stops without damage to the control.*

Control requires 3 turns to go from minimum to maximum. Use ammeter to preset amps.

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 0 to 200 A.

9 Arc/Balance Control

Control functions as an arc control for SMAW DC output and as a balance control for AC output (see Section 4-2 for more information).

10 Postflow Time Control

Control sets length of time gas flows after welding stops.

11 Power Switch Pushbuttons

12 Output Selector Switch

13 High Temperature Shutdown Light (CE Models Only)

Lights when unit overheats and shuts down (see Section 3-2).

Ref. ST-154 795-B / Ref. ST-149 842-E

4-2. Arc/Balance Control

Balance Control Examples		
Setting	**Output Waveforms**	**Arc**
Balanced 30	50% Electrode Positive 50% Electrode Negative	
More Penetration 100	32% Electrode Positive 68% Electrode Negative	
More Cleaning 0	55% Electrode Positive 45% Electrode Negative	

Arc Control (DC SMAW):

Control helps arc starting or making vertical or overhead welds by increasing amperage at low arc voltage.

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.

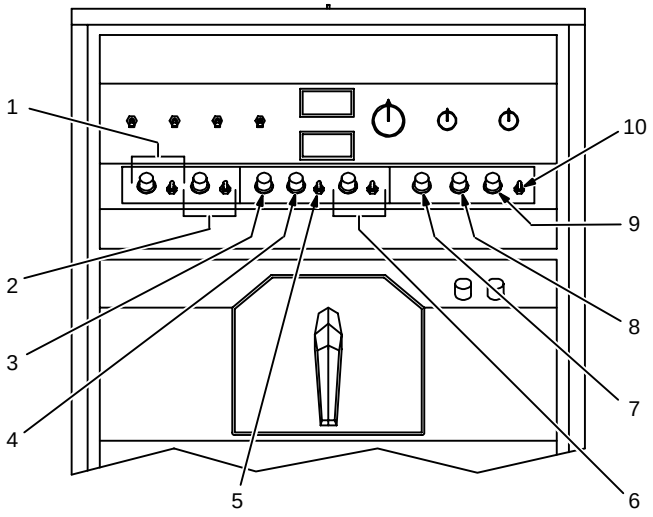
Balance Control (AC):

Control changes the ac output square wave.

Adjust setting for deeper penetration or more cleaning action. Position 30 (balanced) is a recommended starting point for GTAW.

Ref. S-0795-A

4-3. Optional Controls (For GTAW Only)



Ref. ST-154 795-B

Preflow/Spot Timer Controls:

1 Preflow Time Control And Switch

Control sets length of time that gas flows before arc starts.

2 Spot Time Control And Switch

Control sets spot weld time. Timer begins when arc starts. If arc is broken during spot time cycle, timer stops but does not reset. When spot time ends, arc stops and timer resets for next cycle.

Start Controls/Crater Fill Controls:

3 Start Amperage Control

4 Start Time Control

5 Start Control Switch

Use start control to select a starting amperage that is different from the weld amperage.

Start Amperage control can be adjusted from 0 to 400 A (100% = 400 A).

For example, to select start amperage of 300 A for 3 seconds and weld amperage of 200 A: Set start Amperage control to 75 (75% of 400 A = 300 A), set start time control to 3, and set front panel or remote amperage control to 200 A.

6 Crater Fill Control And Switch

Control sets length of time to taper weld output from weld amperage setting to 0 A.

☞ *Be sure to set Postflow control for a longer period of time than the Crater Fill control.*

Pulser Controls:

7 Background Amperage Control

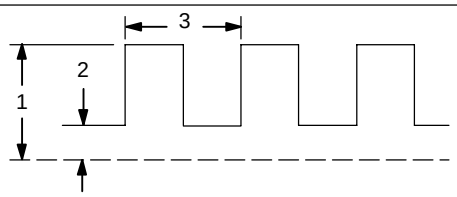
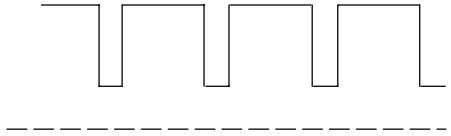
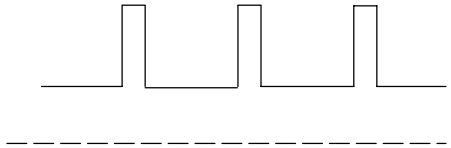
8 Pulses Per Second Control

9 % On Time

10 Pulser On/Off Switch

Use controls to set pulsing parameters (see Section 4-4 for more information).

4-4. Setting Optional Pulser Controls

Pulser Examples	
Percent (%) On Time Control Setting	**Pulsed Output Waveforms**
Balanced (50%)	
More Time At Peak Amperage (80%)	
More Time At Background Amperage (20%)	

1 Peak Amperage

2 Background Amperage

Use Background Amperage control to set the low pulse of weld amperage which cools the weld puddle. Peak amperage, which is the front panel or remote control amperage setting, is the high pulse which heats the weld puddle. Background amperage setting is a percent of the peak amperage.

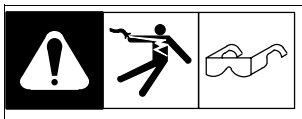
3 One Pulse Period

Use Percent On Time control to set percent of pulse period that is at peak amperage.

Use Pulses Per Second control to set number of pulse periods that occur in one second.

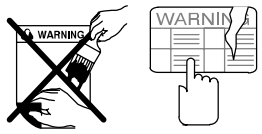
SECTION 5 – MAINTENANCE & TROUBLESHOOTING

5-1. Routine Maintenance

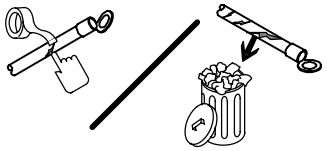


▲ **Disconnect power before maintaining.**

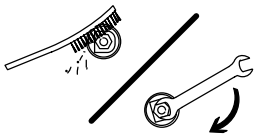
3 Months



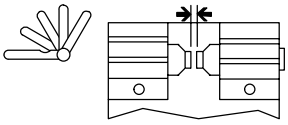
Replace Unreadable Labels



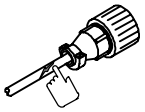
Repair Or Replace Cracked Weld Cables



Clean And Tighten Weld Terminals

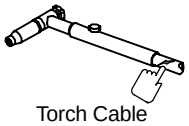


Adjust Spark Gaps



14-Pin Cord

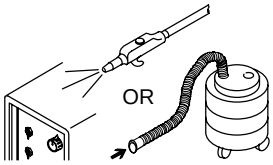
Gas Hose



Torch Cable

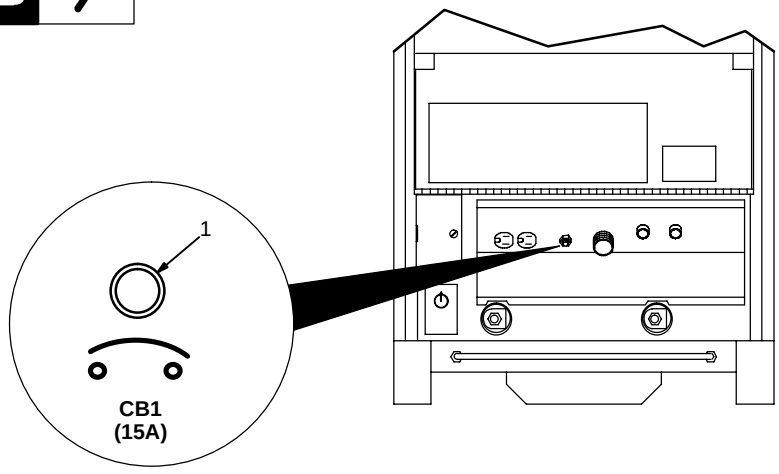
Replace Cracked Parts

6 Months



Blow Out Or Vacuum Inside, During Heavy Service, Clean Monthly

5-2. Circuit Breaker CB1

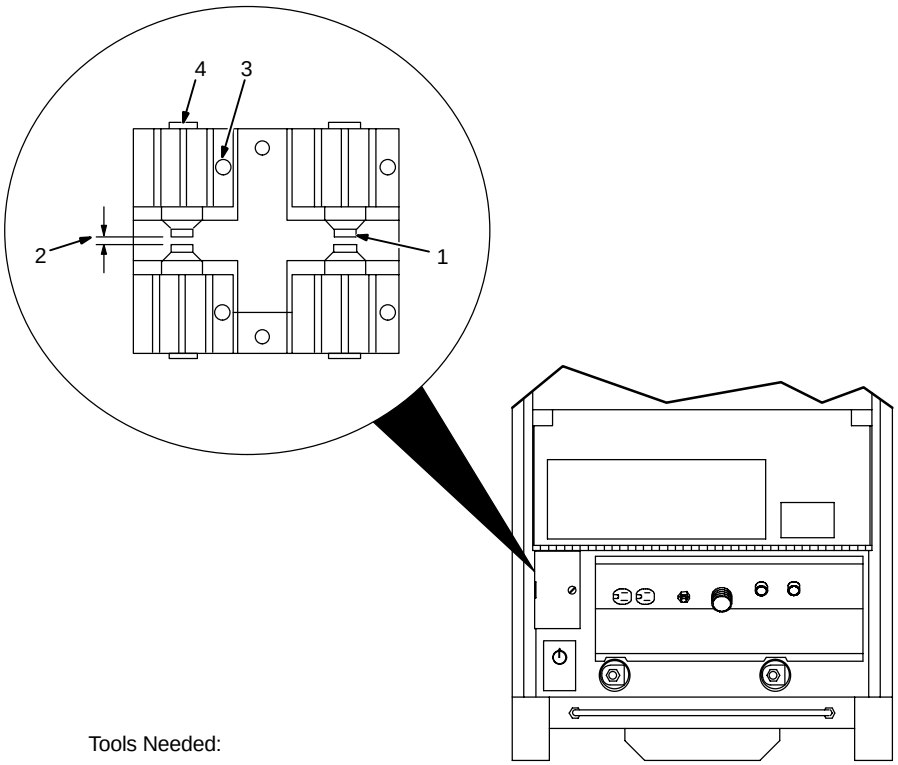


1 Circuit Breaker CB1

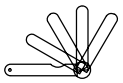
If CB1 opens, high frequency and output to the 115 volts ac duplex receptacle stop. Press button to reset breaker.

Ref. ST-149 842-E / Ref. ST-146 562-C

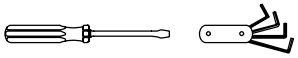
5-3. Adjusting Spark Gaps



Tools Needed:



0.008 in (0.203 mm)



5/32 in

▲ 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.

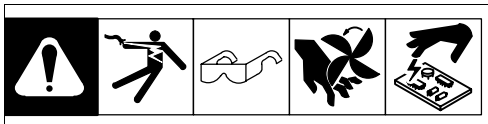
4 Pressure Point

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

Close access door.

Ref. ST-149 842-E / Ref. S-0043

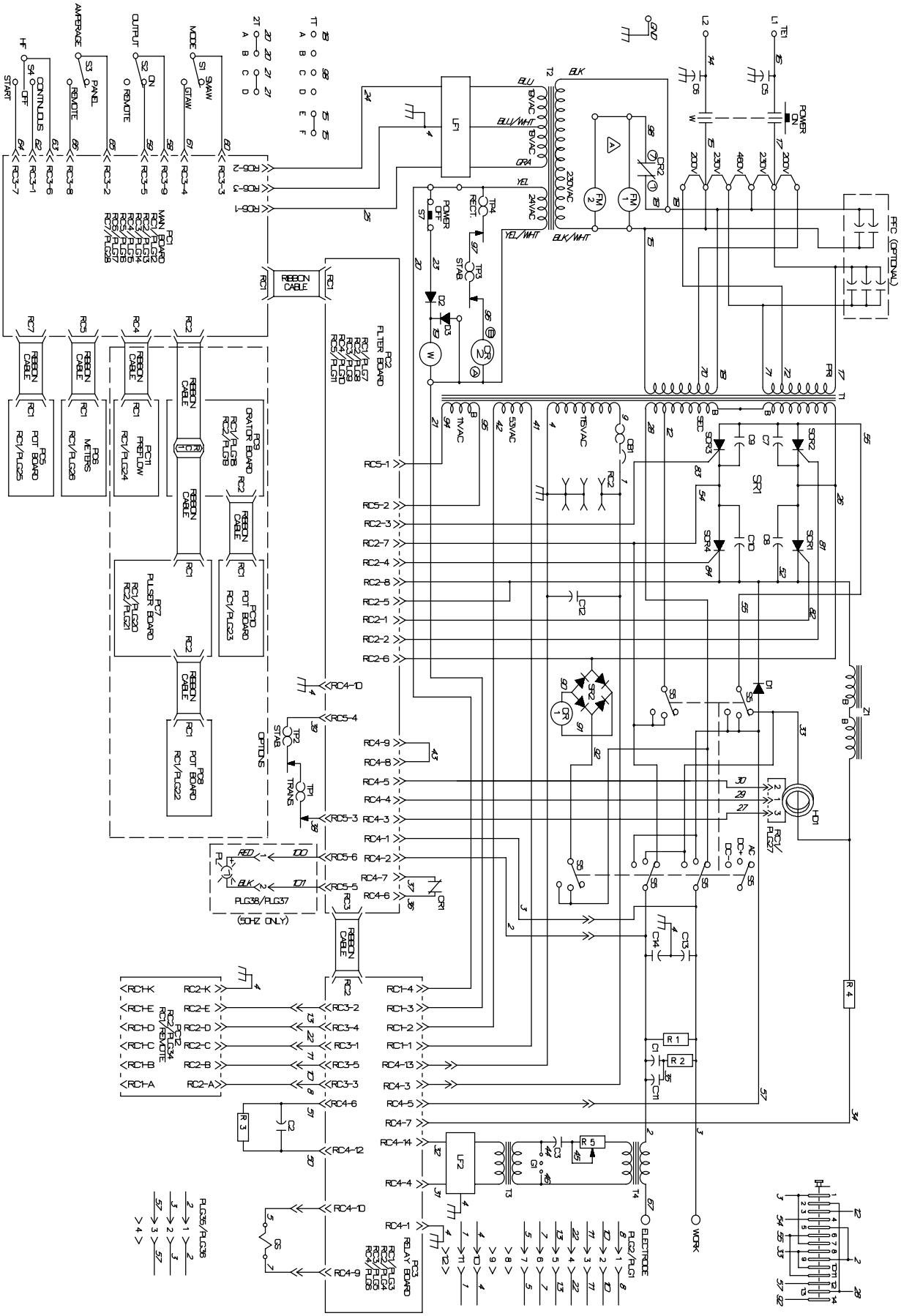
5-4. Troubleshooting



Trouble	Remedy
No weld output; unit completely inoperative.	Place line disconnect switch in On position (see Section 3-10).
	Check and replace line fuse(s), if necessary (see Section 3-10).
	Check for proper input power connections (see Section 3-10).
	Check for proper jumper link position (see Section 3-10).
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 switch in On position (see Section 4-1).
	Check, repair, or replace remote control.
	Unit overheated. Allow unit to cool with fans On (see Section 3-2).
	Have Factory Authorized Service Agent check control board PC1.
Unit provides only maximum or minimum weld output.	Make sure Amperage switch is in proper position (see Section 4-1).
	Have Factory Authorized Service Agent check hall device HD1, filter board PC2, and control board PC1.
Erratic or improper weld output.	Use proper size and type of weld cable (see Section 3-6).
	Clean and tighten all weld connections.
	Check position of Output Selector switch (see Section Figure 4-1).
	If using remote control, check position of Amperage Adjustment control (see Section 4-1).
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 (see Section 4-1).
	Make sure Amperage switch is in proper position (see Section 4-1).
No Arc/Balance Control.	Make sure Arc/Balance Control is in proper position (see Section 4-1).
	Have Factory Authorized Service Agent check main potentiometer board PC5 and control board PC1.
No output from duplex receptacle RC2 and no high frequency.	Reset circuit breaker CB1 (see Section 5-2).
Remote 14 receptacle RC1 not working properly.	Be sure Amperage control switch and Output switch are in Remote 14 position (see Section 4-1).
Lack of high frequency; difficulty in starting GTAW arc.	Reset circuit breaker CB1 (see Section 5-2).
	Select proper size tungsten.
	Check High Frequency Intensity 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.

Trouble	Remedy
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.
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.

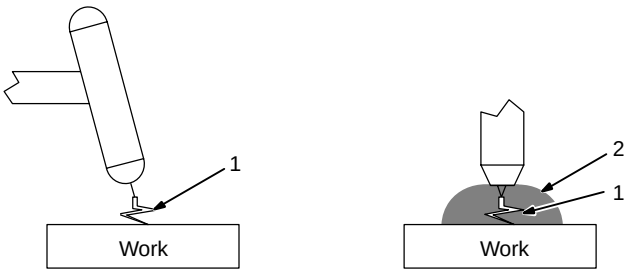
5-5. Electrical Diagram



SC-181 682-D

SECTION 6 – HIGH FREQUENCY (HF)

6-1. Welding Processes Using HF



Gas Tungsten Arc Welding (GTAW)

Submerged Arc Welding (SAW)

1 HF Voltage

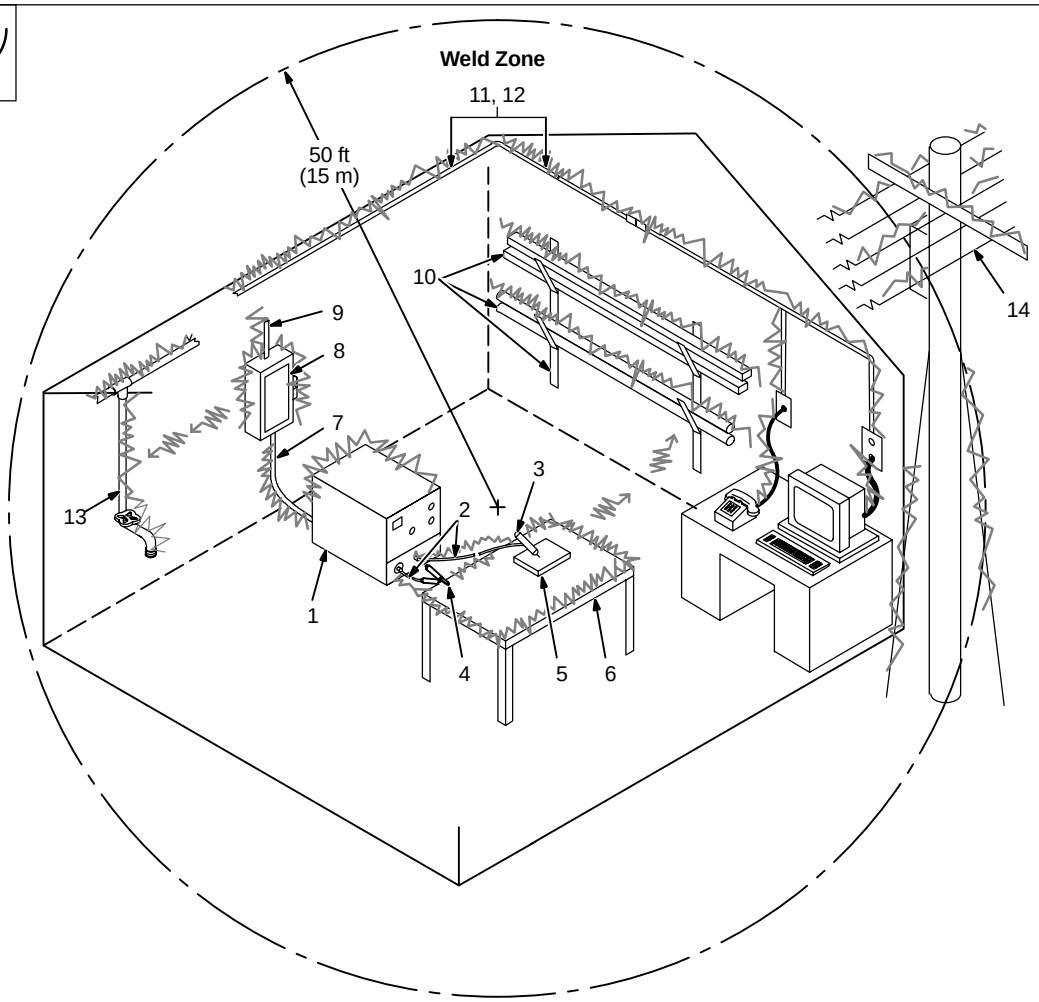
GTAW – helps arc jump air gap between torch and workpiece and/or stabilize the arc.

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

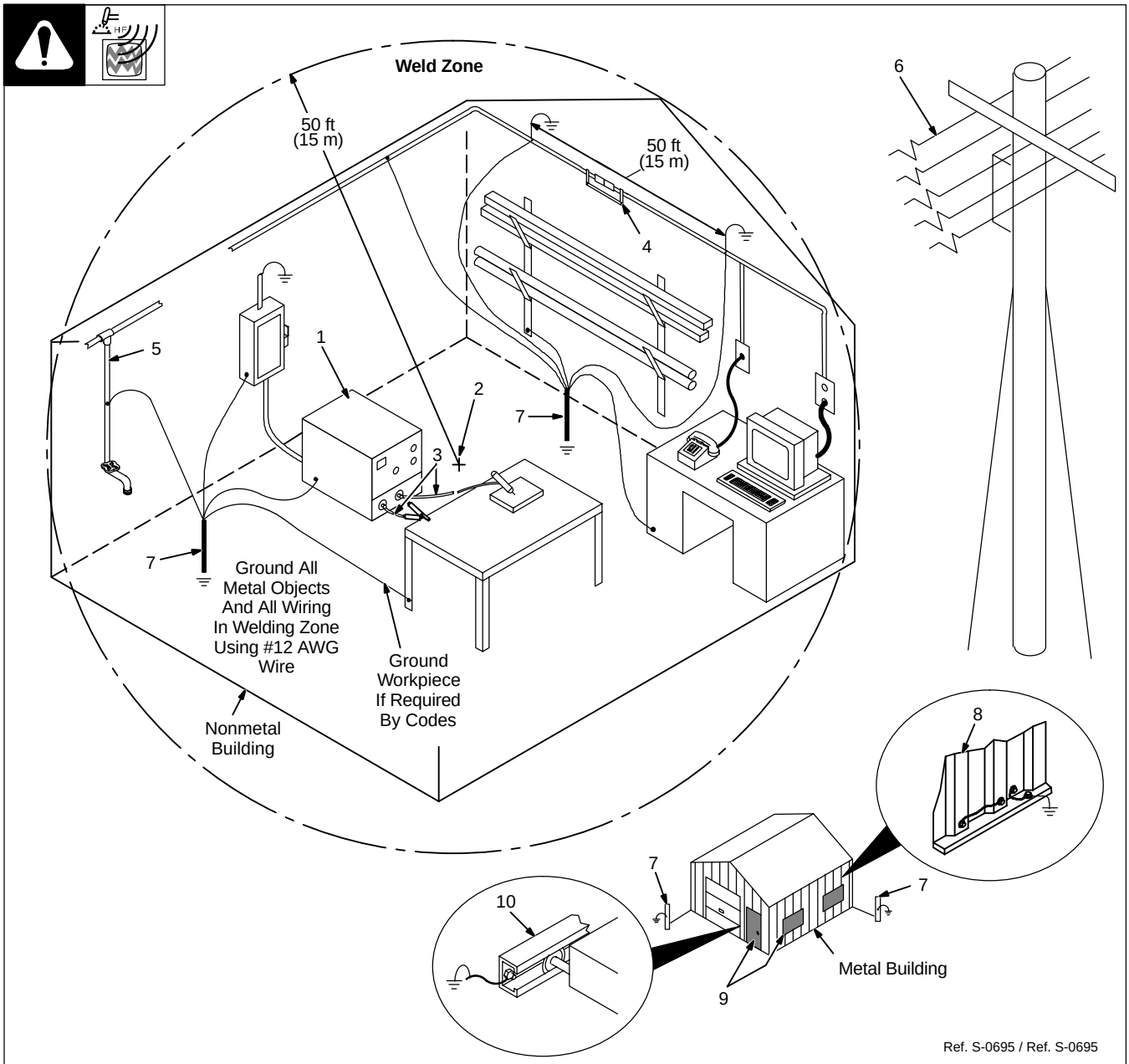
Sources Of Conduction Of HF

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.

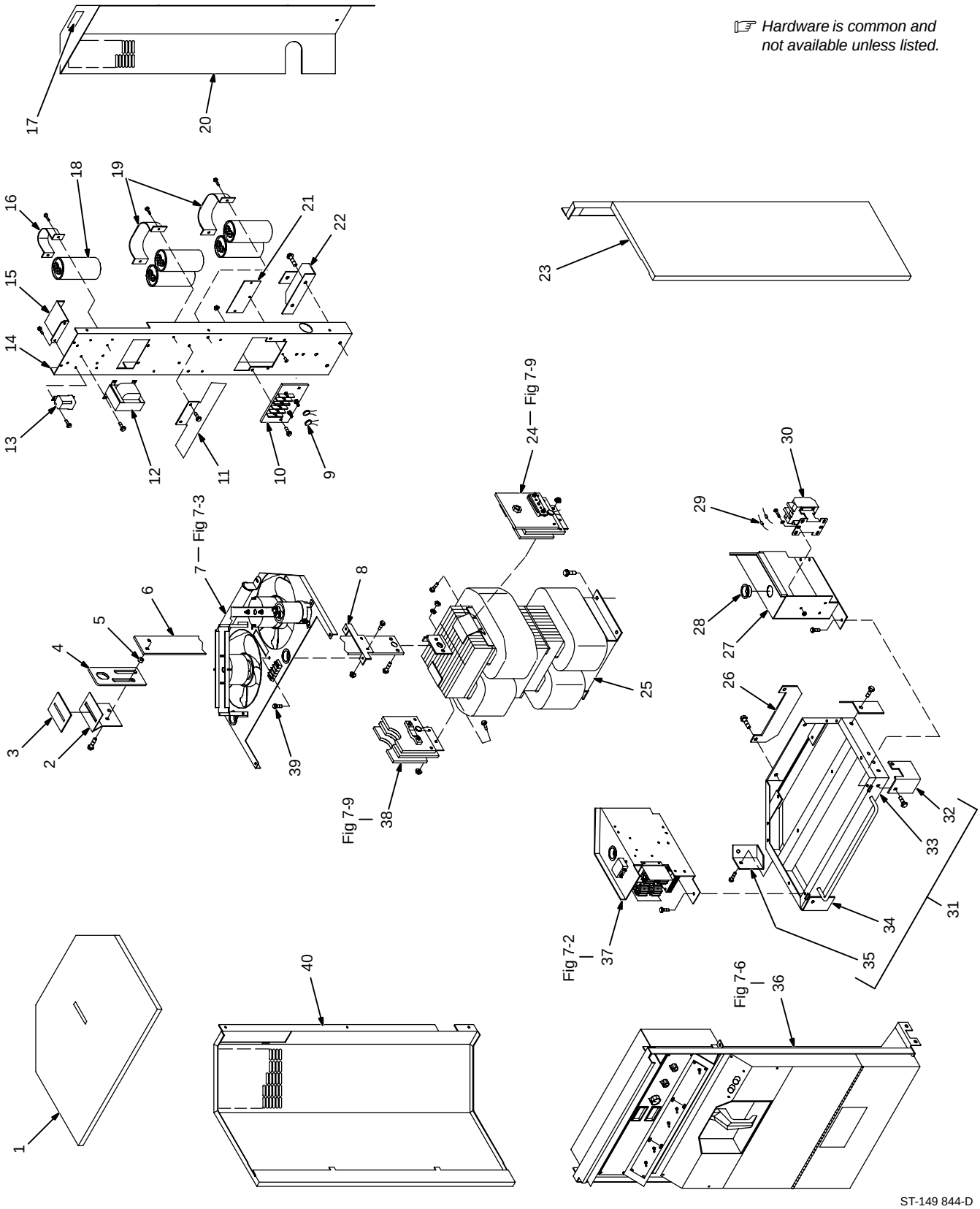


Figure 7-1. Main Assembly

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

Figure 7-1. Main Assembly

1		182 126	COVER, top	1
2		155 904	BRACKET, lift eye	1
3		026 627	GASKET, lift eye	1
4		155 905	LIFT EYE	1
5		155 903	BUSHING, lift eye	2
6		155 902	SUPPORT, lift eye	1
7		Fig 7-3	BAFFLE, w/components	1
8		145 045	BRACKET, mtg baffle fan	1
9	C5,6	111 634	CAPACITOR	1
10	TE1	034 587	TERMINAL ASSEMBLY, pri (consisting of)	1
		601 835	NUT, brs hex 10-32	12
		601 836	NUT, brs hex .250-20 jam	4
		010 915	WASHER, flat brs .250 ID x .625 OD x .031thk	4
		083 426	TERMINAL BOARD, pri	1
		038 888	STUD, primary bd brs .250-20 x 1.500	2
		038 887	STUD, primary bd brs 10-32 x 1.375	6
		010 913	WASHER, flat brs .218 ID x .460 OD x .031thk	6
		602 207	WASHER, lock .255 ID x .489 OD	2
		038 618	LINK, jumper term bd pri	2
11		144 757	BAFFLE, air rear	1
12	T2	140 846	TRANSFORMER, control 230VAC pri 11.5/18/24VAC	1
13	CR2	110 386	RELAY, encl 24VDC DPDT 5A/120V	1
14		157 416	PANEL, mtg component	1
		169 488	BRACKET, support electrical box	1
15		152 582	BRACKET, mtg panel rear	1
16		♦150 377	CLAMP, capacitor	1
		♦601 835	NUT, brs hex 10-32 (used on pri brd)	6
17		109 035	LABEL, warning electric shock can kill	1
18	C15-19	♦125 781	CAPACITOR, polyp film 150uf 250VAC	5
19		♦129 201	BRACKET, mtg capacitor	2
20		+182 129	PANEL, rear	1
		176 272	CONNECTOR, cable clamp (50Hz model)	1
21		145 693	INSULATION, leads pri	1
22		144 758	BRACKET, mtg panel rear	1
23		182 608	PANEL, side RH	1
24	SR1	144 849	RECTIFIER, SCR main RH (Fig 7-9)	1
25	T1	183 352	TRANSFORMER/STABILIZER ASSY, 200/230/460	1
25	T1	183 353	TRANSFORMER/STABILIZER ASSY, 230/460/575	1
25	T1	183 354	TRANSFORMER/STABILIZER ASSY, 220/380/415	1
	TP1,2	020 520	THERMOSTAT, NC (thermal shutdown)	2
	TP3	168 891	THERMOSTAT, NC (fan on demand)	1
26		144 762	FOOT, base rear	1
27		144 743	BAFFLE, contactor	1
28		010 494	BUSHING, snap-in nyl 1.375 ID x 1.750mtg	1
29	D2,3	082 456	DIODE	1
30	W	187 416	Contactor, with bracket	1
31		144 745	BASE, (consisting of)	1
32		144 761	FOOT, base front RH	1
33		144 739	FRAME, base	1
34		144 760	FOOT, base front LH	1
35		146 093	FOOT, base side LH	2
36		Fig 7-6	PANEL, front w/components	1
37		Fig 7-2	HF PANEL	1
38	SR1	182 114	RECTIFIER, SCR main LH (Fig 7-9)	1
39		086 863	SCREW, cap stl hex whd .375-16 x 1.000	2
40		182 607	PANEL, side LH	1

♦Part of 042 671 Optional Power Factor Correction.

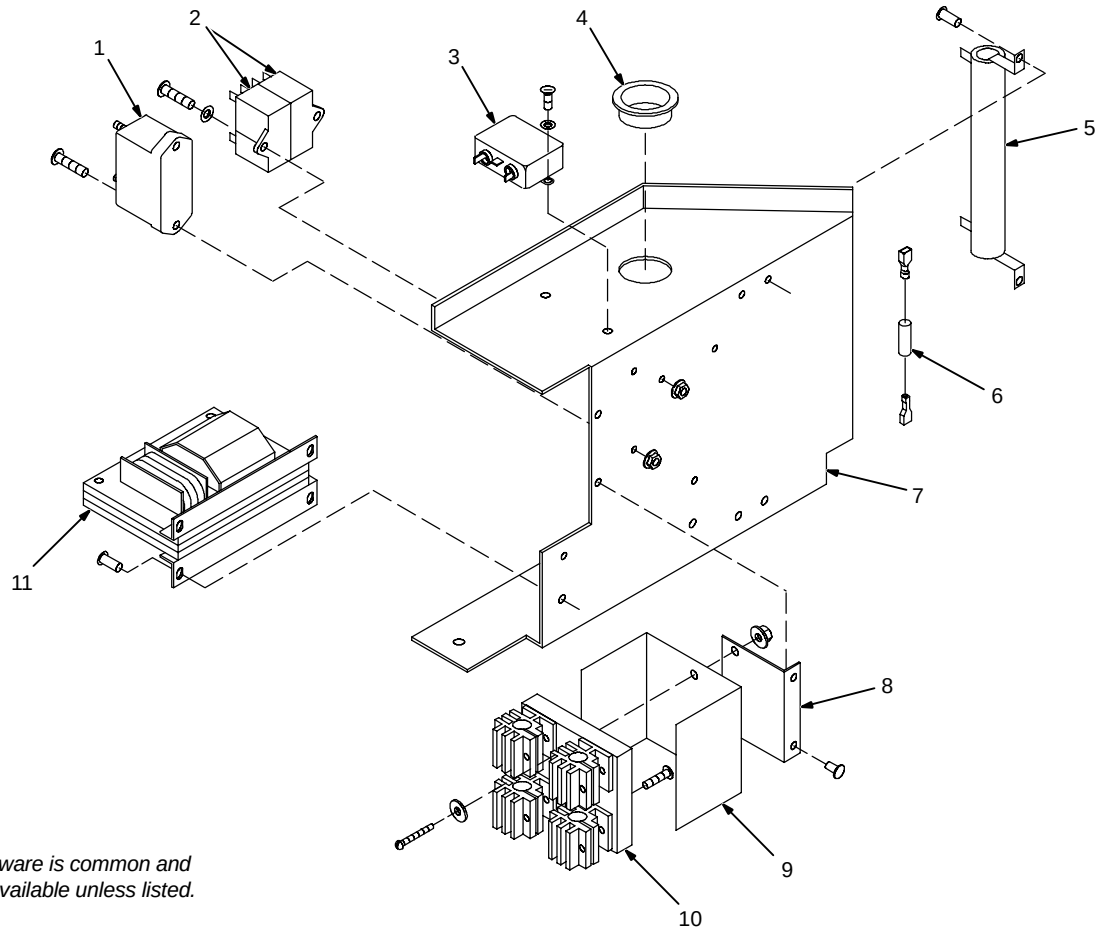
+When ordering a component originally displaying a precautionary label, the label should also be ordered.

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

Figure 7-2. HF Panel (Fig 7-1 Item 37)

1	C3	096 761	CAPACITOR, mica .002uf 10000V	1
2	C1,11	106 935	CAPACITOR, polyp film 10uf 250VAC	2
3	LF2	084 171	FILTER, line pwr 115/250V	1
4		010 494	BUSHING, snap-in nyl 1.375 ID x 1.750mtg hole	1
5	R1	186 468	RESISTOR, WW fxd 100W 50 ohm	1
6	R2	182 417	RESISTOR ASSEMBLY, WW fxd 5W	1
7		182 120	PANEL, HF	1
8		149 950	BRACKET, mtg spark gap	1
9		149 951	INSULATOR, bracket mtg spark gap	1
10		020 623	SPARK GAP ASSEMBLY (consisting of)	1
		095 621	BASE, spark gap	1
		020 622	HOLDER, points	4
		020 603	POINT, spark gap	4
11	T3	074 398	TRANSFORMER, high voltage 115V pri 3600V sec 30mA	1



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

ST-150 188-A

Figure 7-2. HF Panel

*Recommended Spare Parts.

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

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

Figure 7-3. Baffle, w/Components (Fig 7-1 Item 7)

1		157 874	BRACKET, mounting motor fan	2
2	FM1,2	148 808	MOTOR, fan 230V 1550RPM	2
3		150 783	BLADE, fan 9 in .312 hub	2
4	R4	186 949	RESISTOR, WW fxd 175W 20 ohm	1
5	R3	118 459	RESISTOR	1
6		168 976	INSULATOR, capacitor	1
7	C2	031 668	CAPACITOR, elctlt 4000uf 100VDC	1
8		108 105	CLAMP, capacitor 2.500 mtg	1
9		155 906	BAFFLE, fan	1
10		004 214	BUSHING, snap-in nyl 1.625 ID x 2.000mtg hole	2
11	1T	038 772	BLOCK, term 20A 6P	1
		035 129	CONNECTOR, blk 20A	4

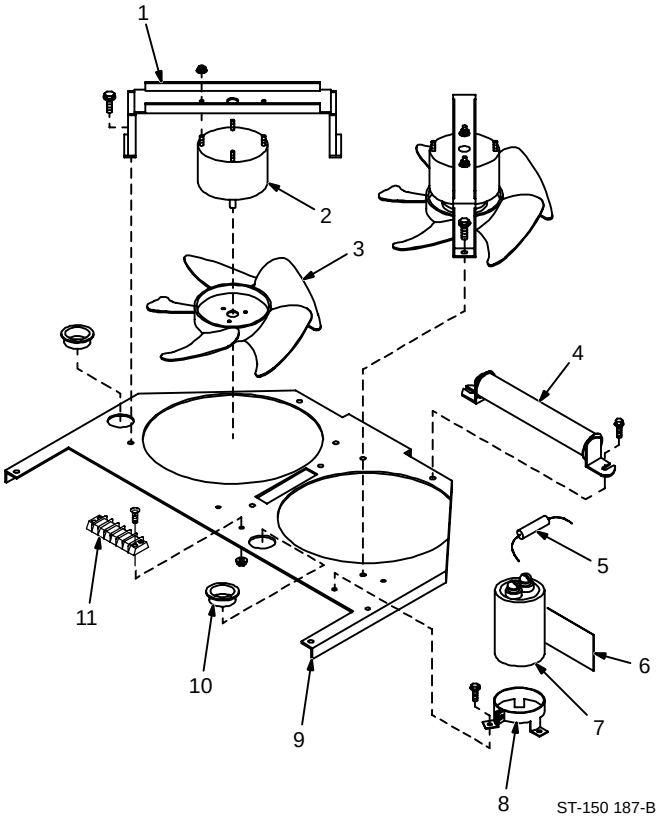


Figure 7-3. Baffle, w/Components

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

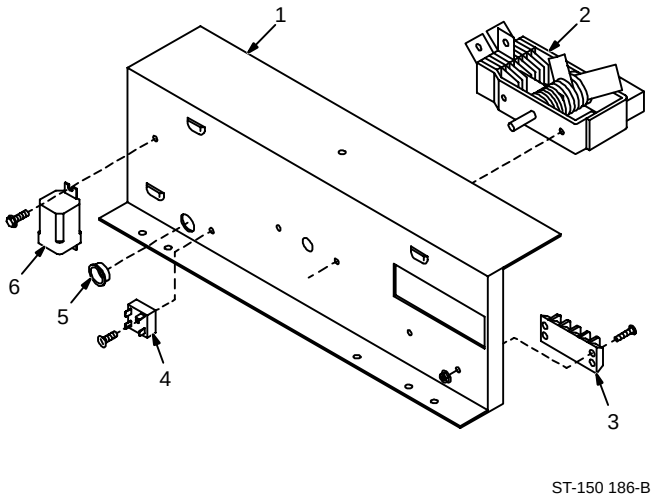


Figure 7-4. Panel, Center w/Components

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

Figure 7-4. Panel, Center w/Components (Fig 7-6 Item 9)

1		182 121	PANEL, mtg components	1
2	S5A,B	169 142	SWITCH, polarity 5posn	1
		021 795	TUBING, stl .375 OD x 18ga wall x .750 lg	2
	PLG35	164 899	CONNECTOR & SOCKETS	1
	PLG36	168 809	CONNECTOR & PINS	1
3	2T	038 621	BLOCK, term 30A 4P	1
		038 620	LINK, jumper term blk 30A	2
4	SR2	035 704	RECTIFIER, integ 40A 800V	1
5		030 170	BUSHING, snap-in nyl .750 ID x 1.000mtg hole	1
6	CR1	052 603	RELAY, encl 110VDC DPDT	1

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, Front Upper w/Components (Fig 7-6 Item 10)

1	S1-3	145 475	SWITCH, tgl SPDT 15A 125VAC	3
2	S4	145 476	SWITCH, tgl DPDT 15A 125VAC	1
3		173 997	RETAINER, screw No. 2	1
4		078 034	FASTENER, screw sltd hd .736 lg	1
5	PLG16,26	155 511	CABLE, ribbon 10posn	1
6	PC6	157 741	CIRCUIT CARD, meter	1
7		107 551	STRAIN RELIEF, cover	1
8		010 494	BUSHING, snap-in nyl 1.375 ID x 1.750mtg hole	1
9	PC3	140 028	CIRCUIT CARD, relay	1
	PLG3	115 094	CONNECTOR & SOCKETS	1
	PLG5	115 093	CONNECTOR & SOCKETS	1

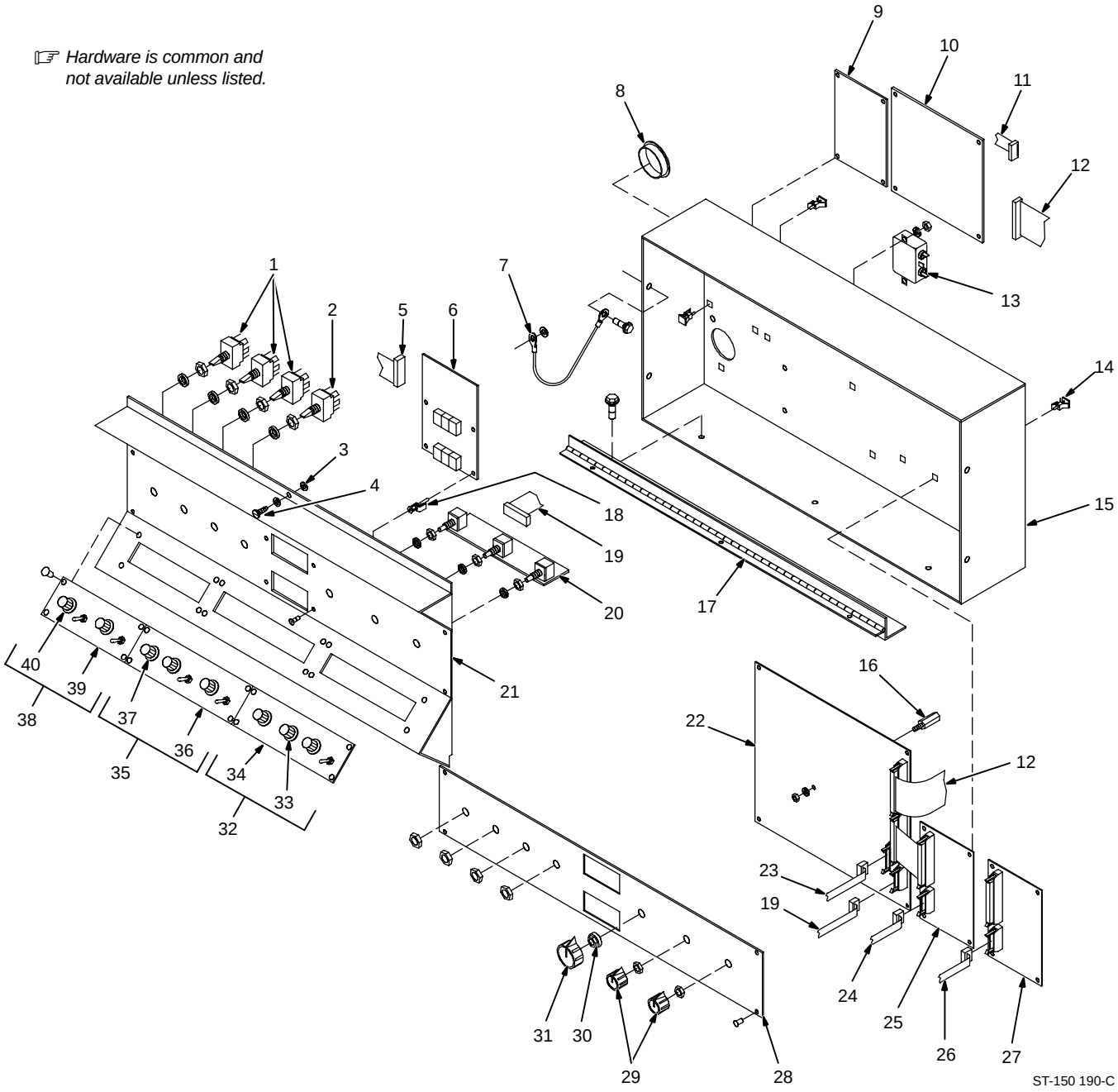


Figure 7-5. Panel, Front Upper w/Components

Item No.	Dia. Mkgs.	Part No.	Description	Quantity
			Figure 7-5. Panel, Front Upper w/Components (Fig 7-6 Item 10) (Continued)	
	PLG6	131 056	CONNECTOR & SOCKETS	1
10	PC2	182 154	CIRCUIT CARD, filter	1
	PLG8	115 092	CONNECTOR & SOCKETS, (see Fig 7-9)	
	PLG10	115 091	CONNECTOR & SOCKETS	1
	PLG11	115 093	CONNECTOR & SOCKETS	1
11	PLG4,9	142 142	CABLE, ribbon 14posn	1
12	PLG7,12	142 141	CABLE, ribbon 40posn	1
13	LF1	084 171	FILTER, line pwr 115/250V	1
14		134 201	STAND-OFF SUPPORT, PC card	20
15		182 124	ELECTRONICS BOX	1
16		098 691	STAND-OFF, No. 6-32 x .500 lg	1
17		155 433	HINGE, mtg front electronics	1
18		110 375	STAND-OFF SUPPORT, PC card	4
19	PLG25,28	142 139	CABLE, ribbon 14 posn	1
20	PC5	139 969	CIRCUIT CARD, main pot	1
21		155 516	COVER, front electrical box	1
22	PC1	186 768	CIRCUIT CARD, control	1
	PLG17	115 094	CONNECTOR & SOCKETS	1
	PLG14	115 091	CONNECTOR & SOCKETS	1
23	PLG15,24	142 139	CABLE, ribbon 10posn	1
24	PLG19,23	♦142 143	CABLE, ribbon 14posn	1
25	PC9	♦139 309	CIRCUIT CARD, crater fill	1
26	PLG21,22	♦♦142 140	CABLE, ribbon 10posn	1
27	PC7	♦♦139 398	CIRCUIT CARD, pulser	1
28		See Note	PLATE, indicator	1
29		097 922	KNOB, pointer	2
30		135 299	LOCK, shaft pot .375-32 x .250dia shaft	1
31		097 924	KNOB, pointer	1
32		♦♦♦	PULSER, (consisting of)	1
33		093 551	KNOB	3
34		See Note	PLATE, control pulser	1
	PC8	139 528	CIRCUIT CARD, pulser	1
		See Note	COVER, opening pulser control (not used when unit has pulser option)	1
35		♦♦♦	START CURRENT/crater fill, (consisting of)	1
36		See Note	PLATE, control start/crater control	1
37		093 551	KNOB	3
	PC10	139 524	CIRCUIT CARD, crater/start	1
		See Note	COVER, opening start/crater control (Not used when unit has start current/crater fill option)	1
38		♦♦♦	PRE-FLOW/SPOT TIMER, (consisting of)	1
39		See Note	PLATE, control pre-flow/spot timer	1
40		093 551	KNOB	2
	PC11	139 973	CIRCUIT CARD, pre-flow/spot timer	1
	PLG15,24	142 138	CABLE, ribbon 14posn	1
		See Note	COVER, pre-flow/spot timer (Not used when unit has preflow/spot timer option)	1

♦Part of Optional Start Current/Crater Fill.

♦♦Part of Optional Pulser.

Note: Order by model and serial number.

♦♦♦OPTIONAL

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

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

Figure 7-6. Panel, Front w/Components (Fig 7-1 Item 36)

1		169 133	RECESS, handle switch	1
2	PL1	155 500	LED, yellow (50Hz model)	1
	PLG37	135 635	CONNECTOR & PINS, (50Hz model)	1
3			NAMEPLATE, (order by model and serial number)	1
4	S7	046 746	SWITCH, pushbutton (Fig 7-8)	1
5		164 347	BRACKET, mtg lem	1
6	HD1/PC4	156 313	TRANSDUCER, current 300A module sply	1
7	PLG27	130 204	CONNECTOR & SOCKETS	1
8		141 690	GROMMET, scr No. 8/10	2
9		Fig 7-4	PANEL, center w/components	1
10		Fig 7-5	PANEL, front upper w/components	1
11		163 110	UPRIGHT, base front	1
12		182 125	BAFFLE, front center	1
13		Fig 7-7	PANEL, front lower w/components	1
14		169 134	PANEL, door switch	1
15		+144 753	DOOR, HF panel	1
16		145 784	TAPE, adh dual lock 1.000 wide (order by ft)	1ft
17		127 363	LABEL, warning electric shock can kill	1
18		134 327	LABEL, warning general precautionary	1
19		169 136	PIN, handle	1
20		175 952	HANDLE, switch	1

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

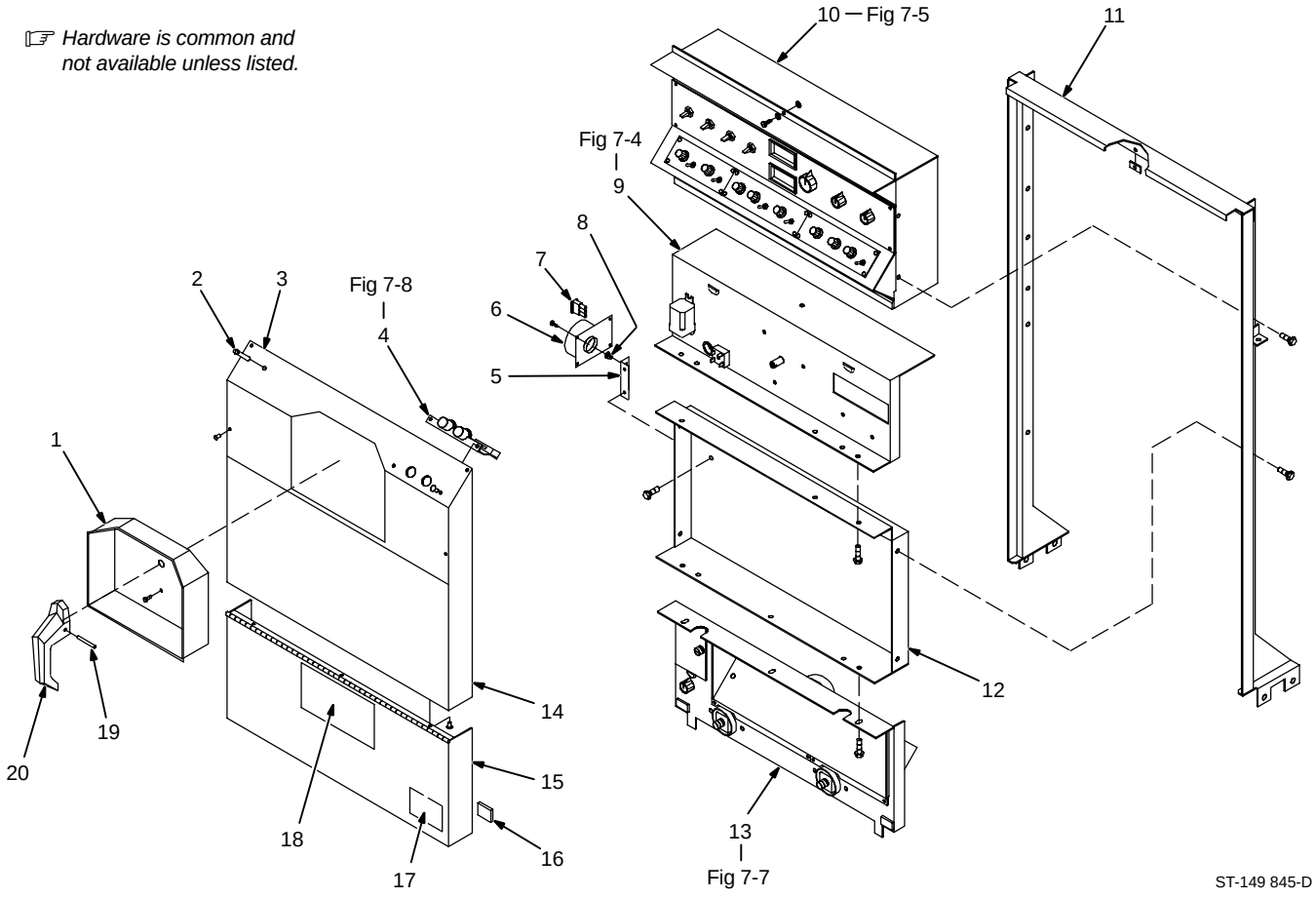


Figure 7-6. Panel, Front w/Components

+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

Figure 7-7. Panel, Front Lower w/Components (Fig 7-6 Item 13)

1		182 118	PANEL, HF door	1
2		010 855	RETAINER, scr No. 2	1
3		182 119	PANEL, front control	1
4		010 357	NUT, speed No. 2 clip	1
5	R5	174 037	RHEOSTAT, WW 50W 1.5 ohm	1
6		157 318	HOLDER, HF coil	2
7	T4	146 278	COIL, HF coil	1
8		157 317	HOLDER, HF coil	2
9	Elect/Work	039 047	TERMINAL, pwr output red (consisting of)	2
10		601 976	SCREW, 500-13 x 1.50 hexhd-pln stl	1
11		039 049	TERMINAL BOARD, red	1
12		601 880	NUT, stl hex jam .500-13	1
13		039 044	BUS BAR, term bd	1
14		601 879	NUT, stl hex full fnsh .500-13	1
15		145 784	TAPE, adh dual lock 1.000 wide (order by ft)	1ft
16		182 117	PANEL, front HF control	1
17		000 527	BLANK, snap-in .875mtg hole	1
18	C13,14	187 254	CAPACITOR	2
19		010 381	CONNECTOR, rectifier	4
20	GS	109 930	VALVE, 24VAC 2 way 1/4IPS 1/8 orf	1
21	PC12,RC1	157 959	CIRCUIT CARD, connector	1
	PLG34	153 501	CONNECTOR & SOCKETS	1
22	CB1	093 995	CIRCUIT BREAKER, man reset 1P 15A 250VAC	1
23	C12	135 664	CAPACITOR	1
24	RC2	604 176	RECEPTACLE, str dx grd 2P3W 15A 125V	1
25		097 922	KNOB, pointer	1
26		602 358	FASTENER, scr No. 2	1

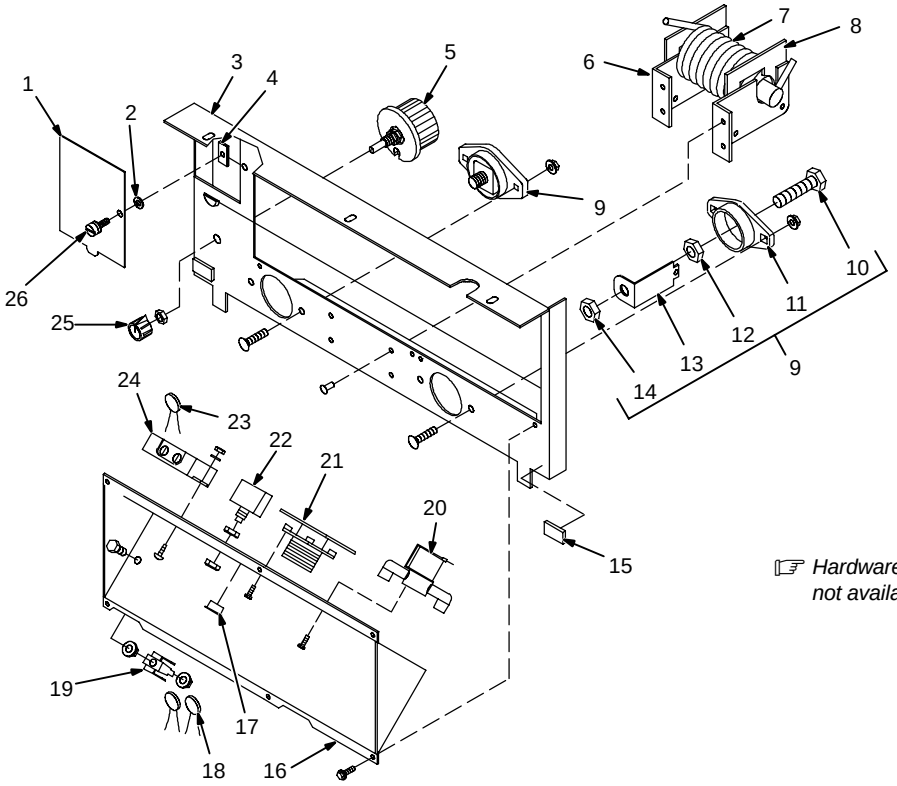


Figure 7-7. Panel, Front Lower w/Components

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
	S7	**046 746**	**Figure 7-8. Switch, Push Button (Fig 7-6 Item 4)**	
1		059 885	BUTTON, push reset red	1
2		018 606	SPRING, compression	1
3		045 546	PUSH BUTTON, w/cable and housing	1
4		081 008	BRACKET, mtg switch PB	1
5		178 856	SWITCH, limit leaf actuating SPDT	1

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

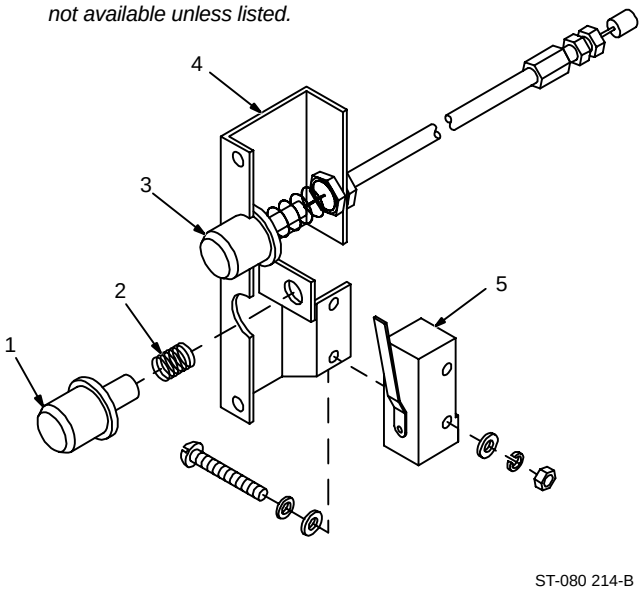


Figure 7-8. Switch, Push Button

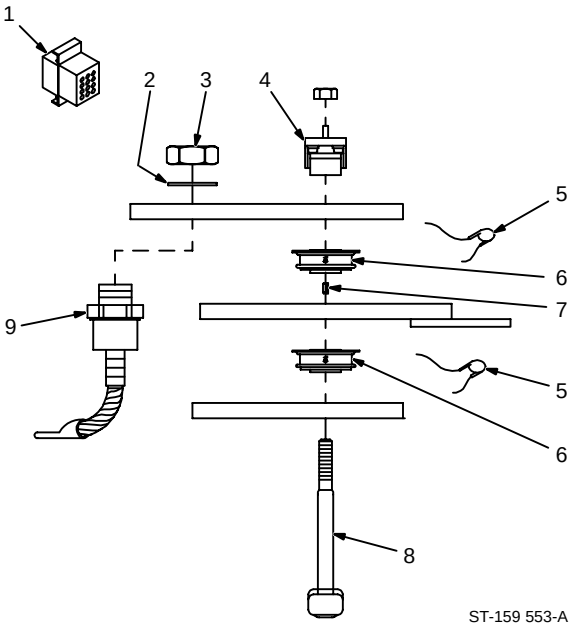


Figure 7-9. Rectifier, SCR Main

Item No.	Dia. Mkgs.	Part No.	Description	Quantity	
	SR1		**Figure 7-9. Rectifier, SCR Main Right And Left (Fig 7-1 Items 24 & 39)**	144 849	182 114
1	PLG8	115 092	CONNECTOR & SOCKETS	1	
2		605 886	WASHER, lock stl intl tooth .750	1	
3		605 884	NUT, stl hex jam .750-16	1	
4		166 667	CLAMP, spring thyristor	1	1
5	C7,8	031 689	CAPACITOR, rectifier	2	
5	C9,10	031 689	CAPACITOR, rectifier		2
6	SCR1,2	119 371	THYRISTOR, scr 300A 300V	2	
6	SCR3,4	119 371	THYRISTOR, scr 300A 300V		2
7		028 516	PIN, spring CS .125 x .250	1	1
8		173 714	CLAMP, thyristor	1	1
9	D1	037 956	DIODE, rect 275A 300V SP	1	
		168 898	THERMOSTAT, NC open 125F close 105F		1

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.

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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
   * Intellitig
   * 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

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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.
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