OM-358 188 291AG
2006–05

Processes

TIG (GTAW) Welding

Stick (SMAW) Welding

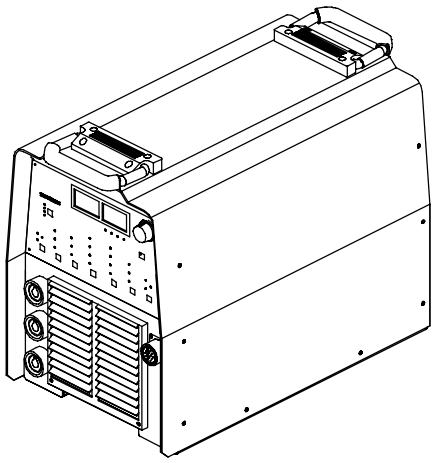
Description

230/460 Volt Models W/Auto-Link®

400 Volt Models

Arc Welding Power Source

Dynasty® 300 SD, DX And LX



And Non-CE Models

OWNER'S MANUAL

File: TIG (GTAW)

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.

ISO 9001:2000 REGISTERED QUALITY SYSTEM

Miller is the first welding equipment manufacturer in the U.S.A. to be registered to the ISO 9001:2000 Quality System Standard.

We've made installation and operation quick and easy. With Miller you can count on years of reliable service with proper maintenance. And if for some reason the unit needs repair, there's a Troubleshooting section that will help you figure out what the problem is. The parts list will then help you to decide the exact part you may need to fix the problem. Warranty and service information for your particular model are also provided.

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

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®

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Declaration of Conformity For European Community (CE) Products

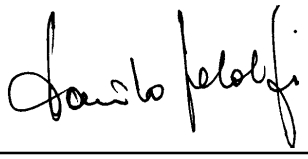
NOTE ☞	*This information is provided for units with CE certification (see rating label on unit.)*

Manufacturer:

Miller Electric Mg. Co.
1635 W. Spencer St.
Appleton, WI 54914 USA
Phone: (920) 734-9821

European Contact:

Mr. Danilo Fedolfi,
Managing Director
MILLER Europe S.r.l.
Via Privata Iseo 6/E
20098 San Giuliano
Milanese, Italy
Phone: 39(02)98290-1
Fax: 39(02)98290203

European Contact Signature: 

Declares that the product: **Dynasty® 300 SD, DX, LX**

conforms to the following Directives and Standards:

Directives

Low Voltage Directive: 73/23/EEC

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

Machinery Directives: 98/37EEC, 91/368/EEC, 92/31/EEC, 133/04, 93/68/EEC

Standards

Arc Welding Equipment – Part 10: Electromagnetic Compatibility (EMC) Requirements. IEC 60974-10 August 2002

Arc Welding Equipment – Part 1: Welding Power Sources. IEC 60974-1 Ed. 2.1

Degrees of Protection Provided By Enclosures (IP Code): IEC 60529 Ed. 2.1

Insulation Coordination For Equipment Within Low-Voltage Systems: Part 1: Principles, Requirements And Tests. IEC 60664-1 Ed. 1.1

Notes

SECTION 1 – SAFETY PRECAUTIONS - READ BEFORE USING

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

1-1. Symbol Usage

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

▲ **Marks a special safety message.**

☞ *Means "Note"; not safety related.*

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

1-2. Arc Welding Hazards

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

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

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

ELECTRIC SHOCK can kill.

Touching live electrical parts can cause fatal shocks or severe burns. The electrode and work circuit is electrically live whenever the output is on. The input power circuit and machine internal circuits are also live when power is on. In semiautomatic or automatic wire welding, the wire, wire reel, drive roll housing, and all metal parts touching the welding wire are electrically live. Incorrectly installed or improperly grounded equipment is a hazard.

- Do not touch live electrical parts.
- Wear dry, hole-free insulating gloves and body protection.
- Insulate yourself from work and ground using dry insulating mats or covers big enough to prevent any physical contact with the work or ground.
- Do not use AC output in damp areas, if movement is confined, or if there is a danger of falling.
- Use AC output ONLY if required for the welding process.
- If AC output is required, use remote output control if present on unit.
- Additional safety precautions are required when any of the following electrically hazardous conditions are present: in damp locations or while wearing wet clothing; on metal structures such as floors, gratings, or scaffolds; when in cramped positions such as sitting, kneeling, or lying; or when there is a high risk of unavoidable or accidental contact with the workpiece or ground. For these conditions, use the following equipment in order presented: 1) a semiautomatic DC constant voltage (wire) welder, 2) a DC manual (stick) welder, or 3) an AC welder with reduced open-circuit voltage. In most situations, use of a DC, constant voltage wire welder is recommended. And, do not work alone!
- Disconnect input power or stop engine before installing or servicing this equipment. Lockout/tagout input power according to OSHA 29 CFR 1910.147 (see Safety Standards).
- Properly install and ground this equipment according to its Owner's Manual and national, state, and local codes.
- Always verify the supply ground – check and be sure that input power cord ground wire is properly connected to ground terminal in disconnect box or that cord plug is connected to a properly grounded receptacle outlet.
- When making input connections, attach proper grounding conductor first – double-check connections.
- Frequently inspect input power cord for damage or bare wiring – replace cord immediately if damaged – bare wiring can kill.
- Turn off all equipment when not in use.
- Do not use worn, damaged, undersized, or poorly spliced cables.
- Do not drape cables over your body.
- If earth grounding of the workpiece is required, ground it directly with a separate cable.
- Do not touch electrode if you are in contact with the work, ground, or another electrode from a different machine.
- Do not touch electrode holders connected to two welding machines at the same time since double open-circuit voltage will be present.
- Use only well-maintained equipment. Repair or replace damaged parts at once. Maintain unit according to manual.
- Wear a safety harness if working above floor level.
- Keep all panels and covers securely in place.
- Clamp work cable with good metal-to-metal contact to workpiece or worktable as near the weld as practical.
- Insulate work clamp when not connected to workpiece to prevent contact with any metal object.
- Do not connect more than one electrode or work cable to any single weld output terminal.

SIGNIFICANT DC VOLTAGE exists in inverter-type welding power sources after removal of input power.

- Turn Off inverter, disconnect input power, and discharge input capacitors according to instructions in Maintenance Section before touching any parts.

FUMES AND GASES can be hazardous.

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

- Keep your head out of the fumes. Do not breathe the fumes.
- If inside, ventilate the area and/or use local forced ventilation at the arc to remove welding fumes and gases.
- If ventilation is poor, wear an approved air-supplied respirator.
- Read and understand the Material Safety Data Sheets (MSDSs) and the manufacturer's instructions for metals, consumables, coatings, cleaners, and degreasers.
- Work in a confined space only if it is well ventilated, or while wearing an air-supplied respirator. Always have a trained 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 while wearing an air-supplied respirator. The coatings and any metals containing these elements can give off toxic fumes if welded.

ARC RAYS can burn eyes and skin.

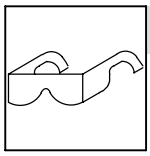
Arc rays from the welding process produce intense visible and invisible (ultraviolet and infrared) rays that can burn eyes and skin. Sparks fly off from the weld.

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

WELDING can cause fire or explosion.

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

- Remove all flammables within 35 ft (10.7 m) of the welding arc. If this is not possible, tightly cover them with approved covers.
- Do not weld where flying sparks can strike flammable material.
- Protect yourself and others from flying sparks and hot metal.
- Be alert that welding sparks and hot materials from welding can easily go through small cracks and openings to adjacent areas.
- Watch for fire, and keep a fire extinguisher nearby.
- Be aware that welding on a ceiling, floor, bulkhead, or partition can cause fire on the hidden side.
- Do not weld on closed containers such as tanks, drums, or pipes, unless they are properly prepared according to AWS F4.1 (see Safety Standards).
- Connect work cable to the work as close to the welding area as practical to prevent welding current from traveling long, possibly unknown paths and causing electric shock, sparks, and fire hazards.
- Do not use welder to thaw frozen pipes.
- Remove stick electrode from holder or cut off welding wire at contact tip when not in use.
- Wear oil-free protective garments such as leather gloves, heavy shirt, cuffless trousers, high shoes, and a cap.
- Remove any combustibles, such as a butane lighter or matches, from your person before doing any welding.
- Follow requirements in OSHA 1910.252 (a) (2) (iv) and NFPA 51B for hot work and have a fire watcher and extinguisher nearby.



FLYING METAL can injure eyes.

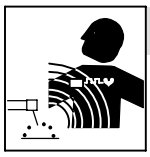
- Welding, chipping, wire brushing, and grinding cause sparks and flying metal. As welds cool, they can throw off slag.
- Wear approved safety glasses with side shields even under your welding helmet.

BUILDUP OF GAS can injure or kill.

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

HOT PARTS can cause severe burns.

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



MAGNETIC FIELDS can affect pacemakers.

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

NOISE can damage hearing.

Noise from some processes or equipment can damage hearing.

- Wear approved ear protection if noise level is high.

CYLINDERS can explode if damaged.

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

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

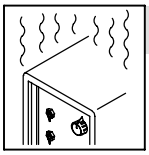
1-3. Additional Symbols For Installation, Operation, And Maintenance

FIRE OR EXPLOSION hazard.

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

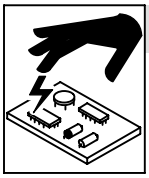
FALLING UNIT can cause injury.

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



OVERUSE can cause OVERHEATING

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



STATIC (ESD) can damage PC boards.

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

MOVING PARTS can cause injury.

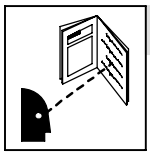
- Keep away from moving parts.
- Keep away from pinch points such as drive rolls.

WELDING WIRE can cause injury.

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

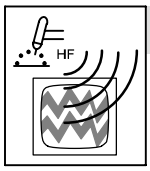
MOVING PARTS can cause injury.

- Keep away from moving parts such as fans.
- Keep all doors, panels, covers, and guards closed and securely in place.
- Have only qualified persons remove doors, panels, covers, or guards for maintenance as necessary.
- Reinstall doors, panels, covers, or guards when maintenance is finished and before re-connecting input power.



READ INSTRUCTIONS.

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



H.F. RADIATION can cause interference.

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

ARC WELDING can cause interference.

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

1-4. California Proposition 65 Warnings

▲ **Welding or cutting equipment produces fumes or gases which contain chemicals known to the State of California to cause birth defects and, in some cases, cancer. (California Health & Safety Code Section 25249.5 et seq.)**

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

For Gasoline Engines:

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

For Diesel Engines:

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

1-5. Principal Safety Standards

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

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

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

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

Code for Safety in Welding and Cutting, CSA Standard W117.2, from Canadian Standards Association, Standards Sales, 178 Rexdale Boulevard, Rexdale, Ontario, Canada M9W 1R3 (phone: 800–463–6727 or in Toronto 416–747–4044, website: www.csa–international.org).

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

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

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

1-6. EMF Information

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

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

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

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

About Pacemakers:

Pacemaker wearers consult your doctor before welding or going near welding operations. If cleared by your doctor, then following the above procedures is recommended.

SECTION 2 – CONSIGNES DE SÉCURITÉ – LIRE AVANT UTILISATION

▲ **Avertissement : se protéger et protéger les autres contre le risque de blessure — lire et respecter ces consignes.**

2-1. Symboles utilisés

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

▲ **Indique un message de sécurité particulier**

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

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

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

▲ **Les symboles représentés ci-dessous sont utilisés dans ce manuel pour attirer l'attention et identifier les dangers possibles. En présence de l'un de ces symboles, prendre garde et suivre les instructions afférentes pour éviter tout risque. Les instructions en matière de sécurité indiquées ci-dessous ne constituent qu'un sommaire des instructions de sécurité plus complètes fournies dans les normes de sécurité énumérées dans la Section 2-5. Lire et observer toutes les normes de sécurité.**

▲ **Seul un personnel qualifié est autorisé à installer, faire fonctionner, entretenir et réparer cet appareil.**

▲ **Pendant le fonctionnement, maintenir à distance toutes les personnes, notamment les enfants de l'appareil.**

UNE DÉCHARGE ÉLECTRIQUE peut entraîner la mort.

Le contact d'organes électriques sous tension peut provoquer des accidents mortels ou des brûlures graves. Le circuit de l'électrode et de la pièce est sous tension lorsque le courant est délivré à la sortie. Le circuit d'alimentation et les circuits internes de la machine sont également sous tension lorsque l'alimentation est sur Marche. Dans le mode de soudage avec du fil, le fil, le dérouleur, le bloc de commande du rouleau et toutes les parties métalliques en contact avec le fil sont sous tension électrique. Un équipement installé ou mis à la terre de manière incorrecte ou impropre constitue un danger.

- Ne pas toucher aux pièces électriques sous tension.
- Porter des gants isolants et des vêtements de protection secs et sans trous.
- S'isoler de la pièce à couper et du sol en utilisant des housses ou des tapis assez grands afin d'éviter tout contact physique avec la pièce à couper ou le sol.
- Ne pas se servir de source électrique à courant électrique dans les zones humides, dans les endroits confinés ou là où on risque de tomber.
- Se servir d'une source électrique à courant électrique UNIQUEMENT si le procédé de soudage le demande.
- Si l'utilisation d'une source électrique à courant électrique s'avère nécessaire, se servir de la fonction de télécommande si l'appareil en est équipé.
- D'autres consignes de sécurité sont nécessaires dans les conditions suivantes : risques électriques dans un environnement humide ou si l'on porte des vêtements mouillés ; sur des structures métalliques telles que sols, grilles ou échafaudages ; en position coincée comme assise, à genoux ou couchée ; ou s'il y a un risque élevé de contact inévitable ou accidentel avec la pièce à souder ou le sol. Dans ces conditions, utiliser les équipements suivants, dans l'ordre indiqué : 1) un poste à souder DC à tension constante (à fil), 2) un poste à souder DC manuel (électrode) ou 3) un poste à souder AC à tension à vide réduite. Dans la plupart des situations, l'utilisation d'un poste à souder DC à fil à tension constante est recommandée. En outre, ne pas travailler seul !
- Couper l'alimentation ou arrêter le moteur avant de procéder à l'installation, à la réparation ou à l'entretien de l'appareil. Déverrouiller l'alimentation selon la norme OSHA 29 CFR 1910.147 (voir normes de sécurité).
- Installer le poste correctement et le mettre à la terre convenablement selon les consignes du manuel de l'opérateur et les normes nationales, provinciales et locales.
- Toujours vérifier la terre du cordon d'alimentation. Vérifier et s'assurer que le fil de terre du cordon d'alimentation est bien raccordé à la borne de terre du sectionneur ou que la fiche du cordon est raccordée à une prise correctement mise à la terre.
- En effectuant les raccordements d'entrée, fixer d'abord le conducteur de mise à la terre approprié et contre-vérifier les connexions.
- Vérifier fréquemment le cordon d'alimentation afin de s'assurer qu'il n'est pas altéré ou à nu, le remplacer immédiatement s'il l'est. Un fil à nu peut entraîner la mort.
- L'équipement doit être hors tension lorsqu'il n'est pas utilisé.
- Ne pas utiliser des câbles usés, endommagés, de grosseur insuffisante ou mal épissés.
- Ne pas enrouler les câbles autour du corps.
- Si la pièce soudée doit être mise à la terre, le faire directement avec un câble distinct.
- Ne pas toucher l'électrode quand on est en contact avec la pièce, la terre ou une électrode provenant d'une autre machine.
- Ne pas toucher des porte électrodes connectés à deux machines en même temps à cause de la présence d'une tension à vide doublée.
- N'utiliser qu'un matériel en bon état. Réparer ou remplacer sur-le-champ les pièces endommagées. Entretenir l'appareil conformément à ce manuel.
- Porter un harnais de sécurité si l'on doit travailler au-dessus du sol.
- S'assurer que tous les panneaux et couvercles sont correctement en place.
- Fixer le câble de retour de façon à obtenir un bon contact métal-métal avec la pièce à souder ou la table de travail, le plus près possible de la soudure.
- Isoler la pince de masse quand pas mis à la pièce pour éviter le contact avec tout objet métallique.
- Ne pas raccorder plus d'une électrode ou plus d'un câble de masse à une même borne de sortie de soudage.

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

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

LES FUMÉES ET LES GAZ peuvent être dangereux.

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

- Ne pas mettre sa tête au-dessus des vapeurs. Ne pas respirer ces vapeurs.
- À l'intérieur, ventiler la zone et/ou utiliser une ventilation forcée au niveau de l'arc pour l'évacuation des fumées et des gaz de soudage.
- Si la ventilation est médiocre, porter un respirateur anti-vapeurs approuvé.
- Lire et comprendre les spécifications de sécurité des matériaux (MSDS) et les instructions du fabricant concernant les métaux, les consommables, les revêtements, les nettoyants et les 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 en portant un respirateur à alimentation d'air. Les revêtements et tous les métaux renfermant ces éléments peuvent dégager des fumées toxiques en cas de soudage.

LES RAYONS D'ARC peuvent entraîner des brûlures aux yeux et à la peau.

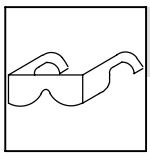
Le rayonnement de l'arc du procédé de soudage génère des rayons visibles et invisibles intenses (ultraviolets et infrarouges) susceptibles de provoquer des brûlures dans les yeux et sur la peau. Des étincelles sont projetées pendant le soudage.

- Porter un casque de soudage approuvé muni de verres filtrants approprié pour protéger visage et yeux pendant le soudage (voir ANSI Z49.1 et Z87.1 énuméré dans les normes de sécurité).
- Porter des lunettes de sécurité avec écrans latéraux même sous votre casque.
- Avoir recours à des écrans protecteurs ou à des rideaux pour protéger les autres contre les rayonnements les éblouissements et les étincelles ; prévenir toute personne sur les lieux de ne pas regarder l'arc.
- Porter des vêtements confectionnés avec des matières résistantes et ignifuges (cuir, coton lourd ou laine) et des bottes de protection.

LE SOUDAGE peut provoquer un incendie ou une explosion.

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

- Déplacer toutes les substances inflammables à une distance de 10,7 m de l'arc de soudage. En cas d'impossibilité, les recouvrir soigneusement avec des protections homologuées.
- Ne pas souder dans un endroit où des étincelles peuvent tomber sur des substances inflammables.
- Se protéger, ainsi que toute autre personne travaillant sur les lieux, contre les étincelles et le métal chaud.
- Des étincelles et des matériaux chauds du soudage peuvent facilement passer dans d'autres zones en traversant de petites fissures et des ouvertures.
- Afin d'éliminer tout risque de feu, être vigilant et garder toujours un extincteur à la portée de main.
- Le soudage effectué sur un plafond, plancher, paroi ou séparation peut déclencher un incendie de l'autre côté.
- Ne pas effectuer le soudage sur des conteneurs fermés tels que des réservoirs, tambours, ou conduites, à moins qu'ils n'aient été préparés correctement conformément à AWS F4.1 (voir les normes de sécurité).
- Brancher le câble de masse sur la pièce le plus près possible de la zone de soudage pour éviter le transport du courant sur une longue distance par des chemins inconnus éventuels en provoquant des risques d'électrocution, d'étincelles et d'incendie.
- Ne pas utiliser le poste de soudage pour dégeler des conduites gelées.
- En cas de non-utilisation, enlever la baguette d'électrode du porte-électrode ou couper le fil à la pointe de contact.
- Porter des vêtements de protection exempts d'huile tels que des gants en cuir, une veste résistante, des pantalons sans revers, des bottes et un casque.
- Avant de souder, retirer toute substance combustible de ses poches telles qu'un allumeur au butane ou des allumettes.
- Suivre les consignes de OSHA 1910.252 (a) (2) (iv) et de NFPA 51B pour travaux de soudage et prévoir un détecteur d'incendie et un extincteur à proximité.



DES PARTICULES VOLANTES peuvent blesser les yeux.

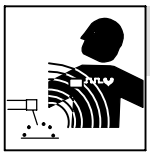
- Le soudage, l'écaillement, le passage de la pièce à la brosse en fil de fer, et le meulage génèrent des étincelles et des particules métalliques volantes. Pendant la période de refroidissement des soudures, elles risquent de projeter du laitier.
- Porter des lunettes de sécurité avec écrans latéraux 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.
- Ne pas toucher aux pièces chaudes, utiliser les outils recommandés et porter des gants de soudage et des vêtements épais pour éviter les brûlures.



LES CHAMPS MAGNÉTIQUES peuvent affecter les stimulateurs cardiaques.

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

LE BRUIT peut endommager l'ouïe.

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

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

LES BOUTEILLES peuvent exploser si elles sont endommagées.

Des bouteilles de gaz protecteur contiennent du gaz sous haute pression. Si une bouteille est endommagée, elle peut exploser. Du fait que les bouteilles de gaz font normalement partie du procédé de soudage, les manipuler avec précaution.

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

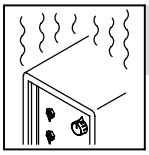
2-3. Dangers supplémentaires en relation avec l'installation, le fonctionnement et la maintenance

Risque D'INCENDIE OU D'EXPLOSION.

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

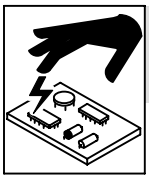
LA CHUTE DE L'APPAREIL peut blesser.

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



L'EMPLOI EXCESSIF peut SURCHAUFFER L'ÉQUIPEMENT.

- Prévoir une période de refroidissement ; respecter le cycle opératoire nominal.
- Réduire le courant ou le facteur de marche avant de poursuivre le soudage.
- Ne pas obstruer les passages d'air du poste.



LES CHARGES ÉLECTROSTATIQUES peuvent endommager les circuits imprimés.

- Établir la connexion avec la barrette de terre avant de manipuler des cartes ou des pièces.
- Utiliser des pochettes et des boîtes antistatiques pour stocker, déplacer ou expédier des cartes PC.

DES ORGANES MOBILES peuvent provoquer des blessures.

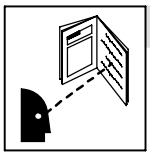
- Ne pas s'approcher des organes mobiles.
- Ne pas s'approcher des points de coincement tels que des rouleaux de commande.

LES FILS DE SOUDAGE peuvent provoquer des blessures.

- Ne pas appuyer sur la gâchette avant d'en avoir reçu l'instruction.
- Ne pas diriger le pistolet vers soi, d'autres personnes ou toute pièce mécanique en engageant le fil de soudage.

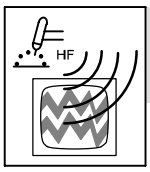
DES ORGANES MOBILES peuvent provoquer des blessures.

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



LIRE LES INSTRUCTIONS.

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



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

- Le rayonnement haute fréquence (HF) peut provoquer des interférences avec les équipements de radio-navigation et de communication, les services de sécurité et les ordinateurs.
- Demander seulement à des personnes qualifiées familiarisées avec des équipements électroniques de faire fonctionner l'installation.
- L'utilisateur est tenu de faire corriger rapidement par un électricien qualifié les interférences résultant de l'installation.
- Si le FCC signale des interférences, arrêter immédiatement l'appareil.
- Effectuer régulièrement le contrôle et l'entretien de l'installation.
- Maintenir soigneusement fermés les portes et les panneaux des sources de haute fréquence, maintenir les éclateurs à une distance correcte et utiliser une terre et un blindage pour réduire les interférences éventuelles.

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

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

2-4. Proposition californienne 65 Avertissements

▲ **Les équipements de soudage et de coupage produisent des fumées et des gaz qui contiennent des produits chimiques dont l'État de Californie reconnaît qu'ils provoquent des malformations congénitales et, dans certains cas, des cancers. (Code de santé et de sécurité de Californie, chapitre 25249.5 et suivants)**

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

Pour les moteurs à essence :

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

Pour les moteurs diesel :

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

2-5. Principales normes de sécurité

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

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

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

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

Code for Safety in Welding and Cutting, CSA Standard W117.2, de Canadian Standards Association, Standards Sales, 178 Rexdale Boulevard, Rexdale, Ontario, Canada M9W 1R3 (téléphone : 800-463-6727 ou à Toronto 416-747-4044, site Internet : www.csa-international.org).

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

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

OSHA, Occupational Safety and Health Standards for General Industry, Title 29, Code of Federal Regulations (CFR), Part 1910, Subpart Q, and Part 1926, Subpart J, de U.S. Government Printing Office, Superintendent of Documents, P.O. Box 371954, Pittsburgh, PA 15250 (il y a 10 bureaux régionaux––le téléphone de la région 5, Chicago, est 312-353-2220, site Internet : www.osha.gov).

2-6. Information EMF

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

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

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

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

En ce qui concerne les stimulateurs cardiaques

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

SECTION 3 – DEFINITIONS (CE Models Only)

3-1. Manufacturer's Rating Labels

☞ *For label location see Section 4-4.*

Manufacture's Rating Label For Non-CE Models

(1)3 ~ f1 f2 1~AC ⎓			IEC 60974-1		
		5A	10V	300A	22V
		X	15%	60%	100%
S		I_2	300	220~ / 190 ⎓	180
	U_O = 95V	U_2	22	18.8~ / 17.6 ⎓	17.2
		5A	20V	300A	32V
		X	15%	60%	100%
S		I_2	300	220~ / 190 ⎓	180
	U_O = 95V	U_2	32	28.8~ / 27.6 ⎓	27.2
				I_1 max	I_1 eff
(1)3 ~60 Hz	U_1 = 230V (1)			81	40
	U_1 = 230V (3)			35	19
	U_1 = 460V (1)			41	22
	U_1 = 460V (3)			21	11
	IP 23				
2 X1 ~60 Hz			115V	10A	X=100%

Ref. ST-189 906-B

Manufacture's Rating Label For CE Models

3~ f1 f2 1~AC ⎓			IEC 60974-1		
		5A	10V	300A	22V
		X	15%	60%	100%
S		I_2	300	220~ / 190 ⎓	180
	U_O = 95V	U_2	22	18.8~ / 17.6 ⎓	17.2
		5A	20V	300A	32V
		X	15%	60%	100%
S		I_2	300	220~ / 190 ⎓	180
	U_O = 95V	U_2	32	28.8~ / 27.6 ⎓	27.2
3~50 Hz	U_1 = 400V			I_1 max = 22	I_1 eff = 14
	IP 23				

ST-189 968-A

3-2. Symbols And Definitions

A Amperes	Panel–Local	Gas Tungsten Arc Welding (GTAW)	Shielded Metal Arc Welding (SMAW)
V Volts	Input	3 Phase Static Frequency Converter-Transformer-Rectifier	
Output	Supplementary Protector	Remote	Lift-Arc (GTAW)
Protective Earth (Ground)	Postflow Timer (t_2)	Preflow Timer (t_1)	S Seconds
On	Off	Positive	Negative
Alternating Current	Gas Input	Gas Output	I_2 Rated Welding Current
X Duty Cycle	Direct Current	Line Connection	U_2 Conventional Load Voltage
U_1 Primary Voltage	IP Degree Of Protection	I_{1max} Rated Maximum Supply Current	I_{1eff} Maximum Effective Supply Current
U_0 Rated No Load Voltage (Average)	Pulse Background Amperage	Initial Amperage	Increase/Decrease Of Quantity
Normal Trigger Operation (GTAW)	Two-Step Trigger Operation (GTAW)	Four-Step Trigger Operation (GTAW)	% Percent
Hz Hertz	Recall From Memory	Arc Force (DIG)	Impulse Starting (GTAW)
Final Slope	Final Amperage	Pulse Percent On Time	Initial Slope
Contactor Control (Stick)	Pulser	TIG Weld Amps And Peak Amps While Pulsing	Pulse Frequency
Work	Electrode	Balance % EN Time (AC GTAW)	Process
Unit may be used in environments with increased hazard of electric shock	Sequence	Adjust	

SECTION 4 – INSTALLATION

4-1. Specifications

A. For Multivoltage Units

Input Power	Rated Welding Output	Amperage Range	Maximum Open-Circuit Voltage DC	Amperes Input at Rated Load Output 60 Hz			
				230 V	460 V	KVA	KW
Three Phase	250 A @ 30 Volts AC, 40% Duty Cycle	5–300	95∇ 6–10♦	32 *.27	16 *.15	12.8 *.09	10.0 *.04
	200 A @ 28 Volts DC, 40% Duty Cycle			21.0 *.27	11.0 *.15	8.4 *.09	7.6 *.04
Single Phase	250 A @ 30 Volts AC, 40% Duty Cycle	5–300	95∇ 6–10♦	61.0 *.33	30.0 *.18	14.0 *.10	10.0 *.07
	200 A @ 28 Volts DC, 40% Duty Cycle			46.0 *.33	23.0 *.18	10.5 *.1	7.5 *.07

*While idling

♦ Low open-circuit voltage while in TIG Lift Arc™, or while in Stick with low open-circuit voltage selected (see Section 6-6).

∇**Normal open-circuit voltage (95 volts) is present while in Stick with normal open-circuit voltage selected** (see Section 6-6).

Note: This unit is equipped with Auto-Link®. Auto-Link is an internal inverter power source circuit that automatically links the power source to the primary voltage being applied (230 to 460 V), without the need for manually linking primary voltage terminals.

B. For Single Voltage Units

Rated Welding Output	Amperage Range	Maximum Open-Circuit Voltage DC	Amperes Input At Rated Output, 50Hz - Three-Phase 400 V	KVA	KW
250 A @ 30 Volts AC, 40% Duty Cycle	5 – 300	95∇ 6–10♦	20.0 (0.13*)	14.0 (0.09*)	10.5 (0.04*)
200 A @ 28 Volts DC, 40% Duty Cycle	5 – 300	95∇ 6–10♦	15.0 (0.13*)	10.5 (0.09*)	7.5 (0.04*)

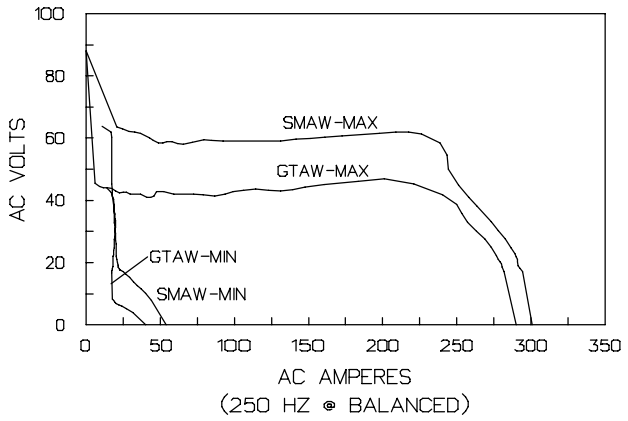
*While idling

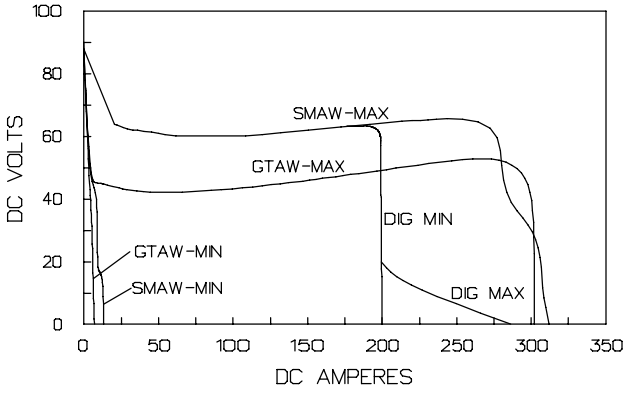
♦ Low open-circuit voltage while in TIG Lift Arc™, or while in Stick with low open-circuit voltage selected (see Section 6-6).

∇**Normal open-circuit voltage (95 volts) is present while in Stick with normal open-circuit voltage selected** (see Section 6-6).

4-2. Volt-Ampere Curves

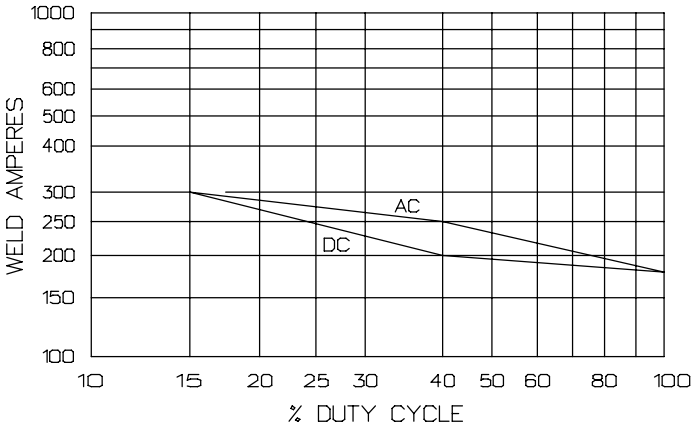
Volt-ampere curves show minimum and maximum voltage and amperage output capabilities. Other settings fall between curves shown.





SA-185 793 / SA-186 294

4-3. Duty Cycle and Overheating

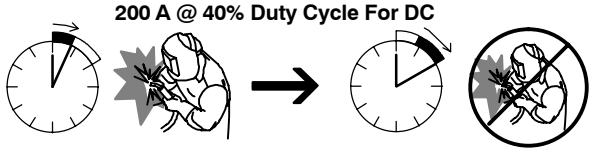


Duty Cycle is the percentage of 10 minutes that unit can weld at rated load without overheating.

If unit overheats, output stops, a Help message is displayed (see Section 7-3), and fan runs. Wait for unit to cool. Reduce amperage, voltage, or duty cycle before welding.

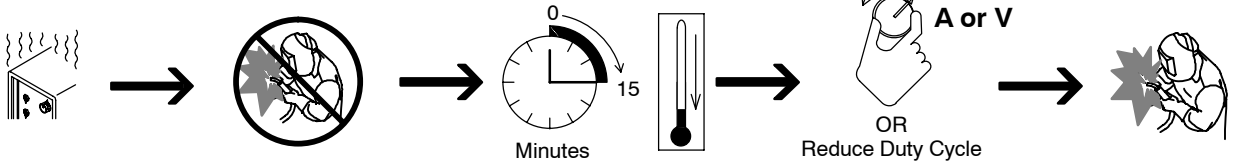
▲ **Exceeding duty cycle can damage unit and void warranty.**

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



4 Minutes Welding — 6 Minutes Resting

Overheating

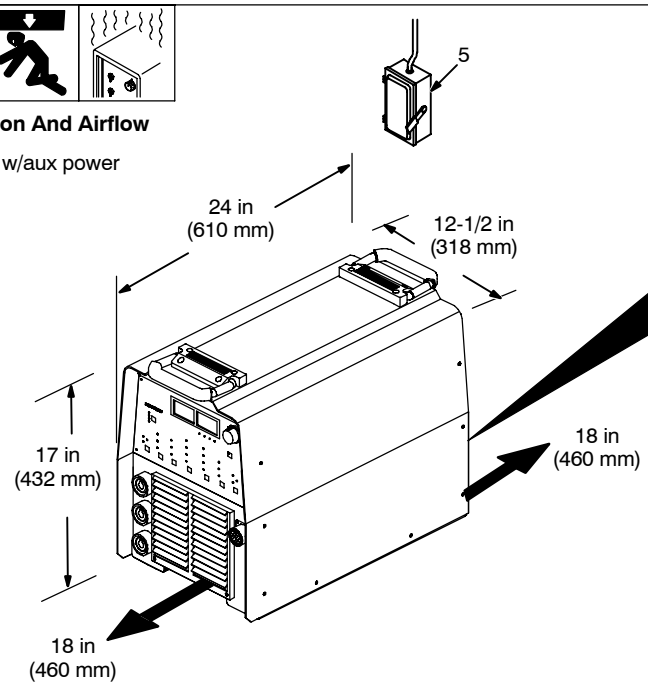


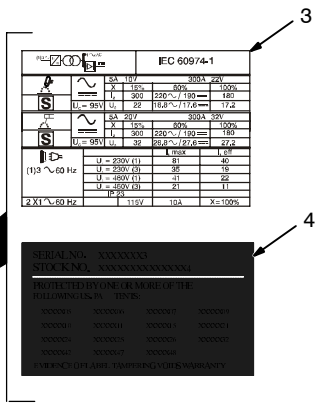
sduty1 5/95 / SA-185 794

4-4. Selecting a Location

Dimensions, Weight, Location And Airflow

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





loc_2 3/96 - ST-802 135-B

1 Lifting Handles

Use handles to lift unit.

2 Hand Cart

Use cart or similar device to move unit.

3 Rating Label

Use rating label to determine input power needs.

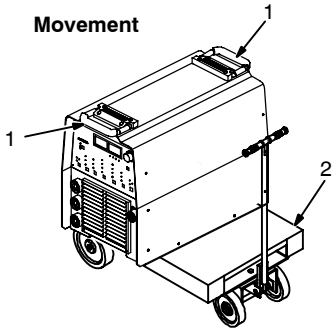
4 Plate Label

5 Line Disconnect Device

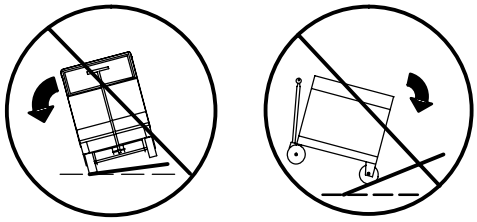
Locate unit near correct input power supply.

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

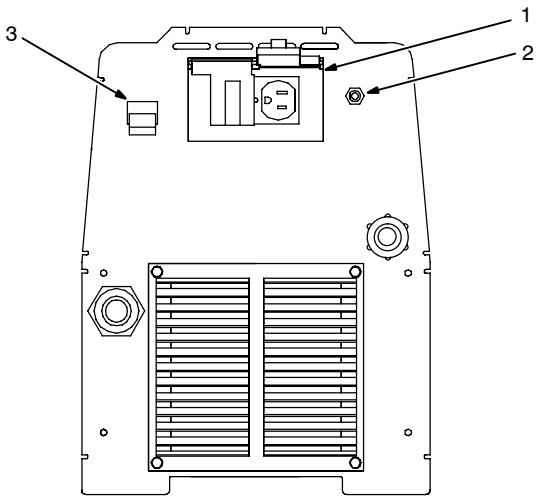
Movement



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



4-5. 115 Volts AC Duplex Receptacle, Supplementary Protector CB1 (Optional), And Power Switch



1 AC Duplex Receptacle

115 V 10 A for 230/460 volt models.
115 V 7 A for 400 volt models.

2 Supplementary Protector CB1

CB1 protects duplex receptacle.

Press button to reset protector.

3 Power On/Off Switch

ST-801 866-A

4-6. Weld Output Terminals And Selecting Cable Sizes*

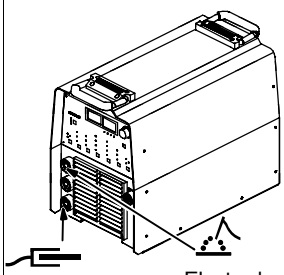
▲ **ARC WELDING can cause Electromagnetic Interference.**

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

▲ **Turn off power before connecting to weld output terminals.**

▲ **Do not use worn, damaged, undersized, or poorly spliced cables.**



Welding Amps***	Weld Cable Size** and Total Cable (Copper) Length in Weld Circuit Not Exceeding							
	100 ft (30 m) or Less		150 ft (45 m)	200 ft (60 m)	250 ft (70 m)	300 ft (90 m)	350 ft (105 m)	400 ft (120 m)
	10 – 60% Duty Cycle	60 – 100% Duty Cycle	10 – 100% Duty Cycle					
100	4 (20)	4 (20)	4 (20)	3 (30)	2 (35)	1 (50)	1/0 (60)	1/0 (60)
150	3 (30)	3 (30)	2 (35)	1 (50)	1/0 (60)	2/0 (70)	3/0 (95)	3/0 (95)
200	3 (30)	2 (35)	1 (50)	1/0 (60)	2/0 (70)	3/0 (95)	4/0 (120)	4/0 (120)
250	2 (35)	1 (50)	1/0 (60)	2/0 (70)	3/0 (95)	4/0 (120)	2 ea. 2/0 (2x70)	2 ea. 2/0 (2x70)
300	1 (50)	1/0 (60)	2/0 (70)	3/0 (95)	4/0 (120)	2 ea. 2/0 (2x70)	2 ea. 3/0 (2x95)	2 ea. 3/0 (2x95)
350	1/0 (60)	2/0 (70)	3/0 (95)	4/0 (120)	2 ea. 2/0 (2x70)	2 ea. 3/0 (2x95)	2 ea. 3/0 (2x95)	2 ea. 4/0 (2x120)

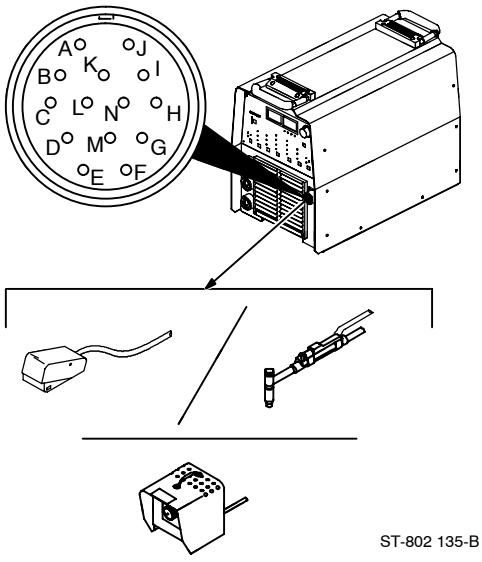
* This chart is a general guideline and may not suit all applications. If cable overheats, use next size larger cable.

**Weld cable size (AWG) is based on either a 4 volts or less drop or a current density of at least 300 circular mils per ampere.
( ) = mm^2 for metric use

S-0007-E–

***Select weld cable size for pulsing application at peak amperage value.

4-7. Remote 14 Receptacle Information



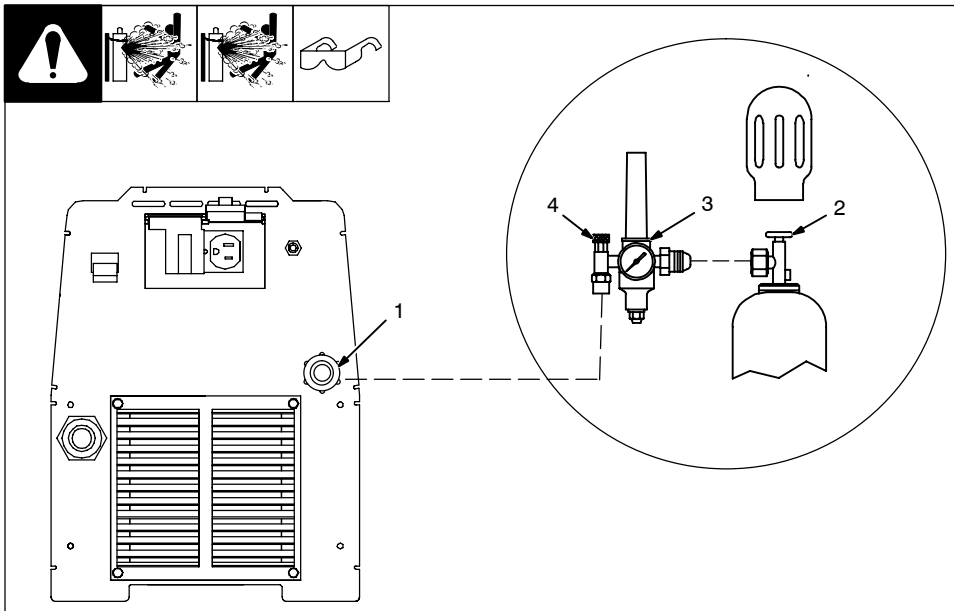
ST-802 135-B

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

*The remaining sockets are not used.

If a remote hand control (RHC-14) is connected to this Remote 14 receptacle and the remote control is set at minimum when the welding power source is turned on, the Sequencer function is disabled.

4-8. Gas Connections



1 Gas Fitting

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

2 Cylinder Valve

Open valve slightly to blow dirt from valve. Close valve.

3 Regulator/Flowmeter

4 Flow Adjust

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

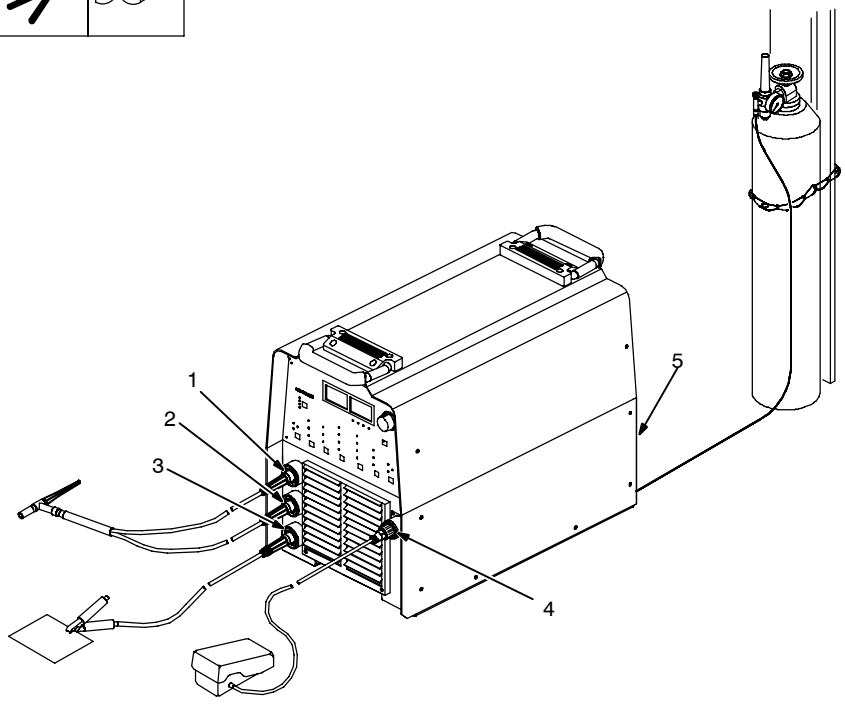
Connect gas hose between regulator/flowmeter and gas fitting on rear of unit.

Tools Needed:

5/8, 1-1/8 in

ST-801 866

4-9. TIG HF Impulse/ Lift-Arc™ Connections



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

1 Electrode Weld Output Terminal

Connect TIG torch to electrode weld output terminal.

2 Gas Out Connection

Connect torch gas hose to gas out fitting.

3 Work Weld Output Terminal

Connect work lead to work weld output terminal.

4 Remote 14 Receptacle

If desired, connect remote control to Remote 14 receptacle.

5 Gas In Connection

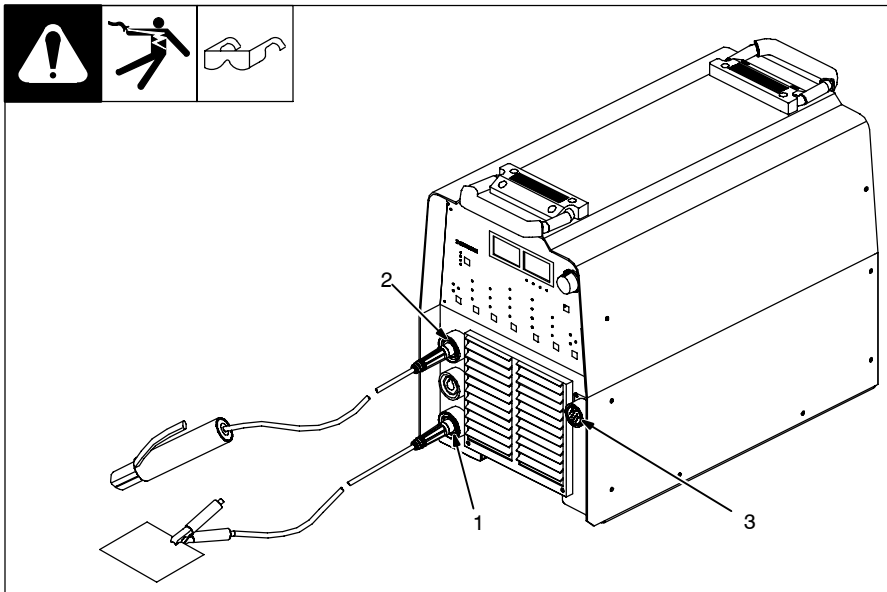
Connect gas hose from gas supply to gas in fitting.

Tools Needed:

11/16 in, (21 mm)

Ref. ST-802 680

4-10. Stick Connections



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

1 Work Weld Output Terminal

Connect work lead to work weld output terminal.

2 Electrode Weld Output Terminal

Connect electrode holder to electrode weld output terminal.

3 Remote 14 Receptacle

If desired, connect remote control to Remote 14 receptacle (see Section 4-7).

Ref. ST-802 650-A

4-11. Electrical Service Guide

▲ **CAUTION: INCORRECT INPUT POWER can damage this welding power source. This welding power source requires a CONTINUOUS supply of input power at rated frequency⟨±10%) and voltage ⟨±10%). Phase to ground voltage shall not exceed +10% of rated input voltage. Do not use a generator with automatic idle device (that idles engine when no load is sensed) to supply input power to this welding power source.**

	Three Phase			Single Phase	
Input Voltage	230	*400	460	230	460
Input Amperes At Rated Output	32	20	16	61	30
Max Recommended Standard Fuse Rating In Amperes[1]					
Time-Delay [2]	40	25	20	70	35
Normal Operating [3]	50	30	25	90	45
Min Input Conductor Size In AWG [4]	10	14	14	8	12
Max Recommended Input Conductor Length In Feet (Meters)	127 (39)	144 (44)	201 (61)	94 (29)	154 (47)
Min Grounding Conductor Size In AWG [4]	10	14	14	8	12
***For 400 Volt Single Voltage Model**					

Reference: 2005 National Electrical Code (NEC) (including article 630)

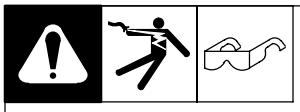
1 Consult factory for circuit breaker applications.

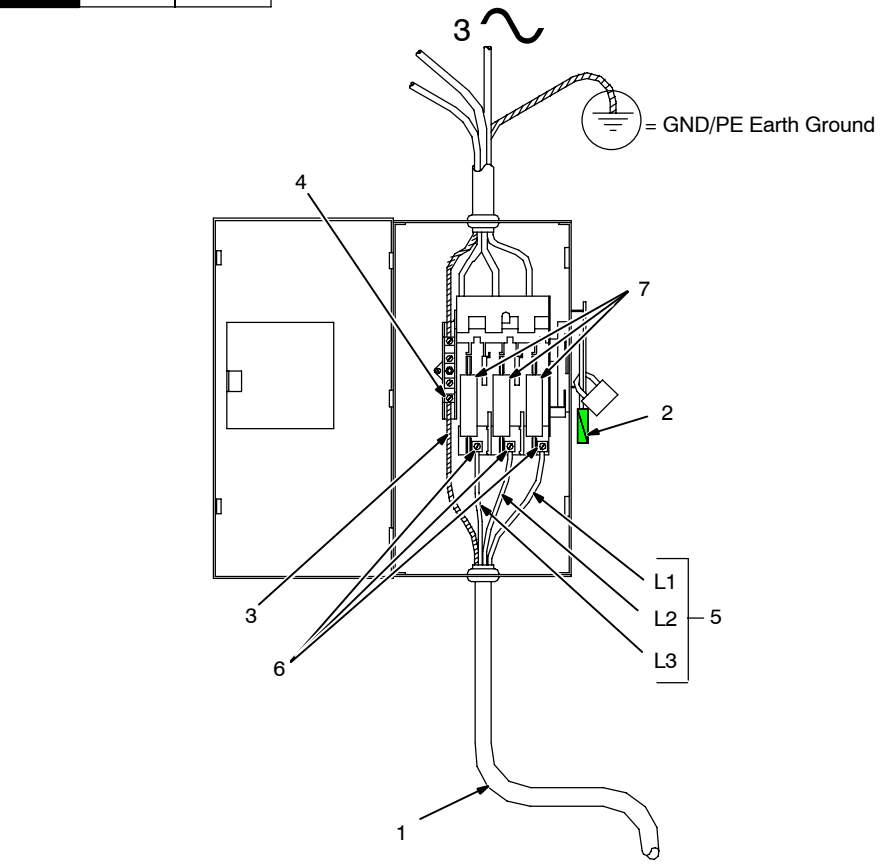
2 “Time-Delay” fuses are UL class “RK5” .

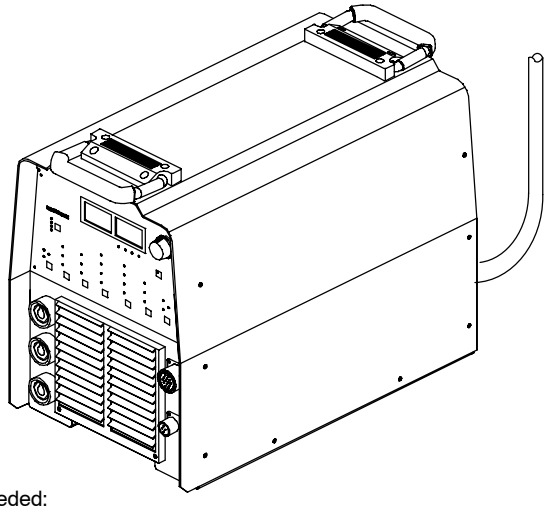
3 “Normal Operating” (general purpose - no intentional delay) fuses are UL class “K5” (up to and including 60 amp), and UL class “H” (65 amp and above).

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

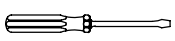
4-12. Connecting 3-Phase Input Power







Tools Needed:



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

▲ **Disconnect and lockout/tagout input power before connecting input conductors from unit.**

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

☞ *This unit is equipped with Auto-Link.*

Auto-Link is an internal inverter power source circuit that automatically links the power source to the primary voltage being applied (230 to 460 V), without the need for manually linking primary voltage terminals.

For Three-Phase Operation

1 Input Power Cord.

2 Disconnect Device (switch shown in the OFF position)

3 Green Or Green/Yellow Grounding Conductor

4 Disconnect Device Grounding Terminal

5 Input Conductors (L1, L2 And L3)

6 Disconnect Device Line Terminals

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

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

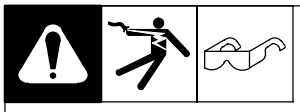
7 Overcurrent Protection

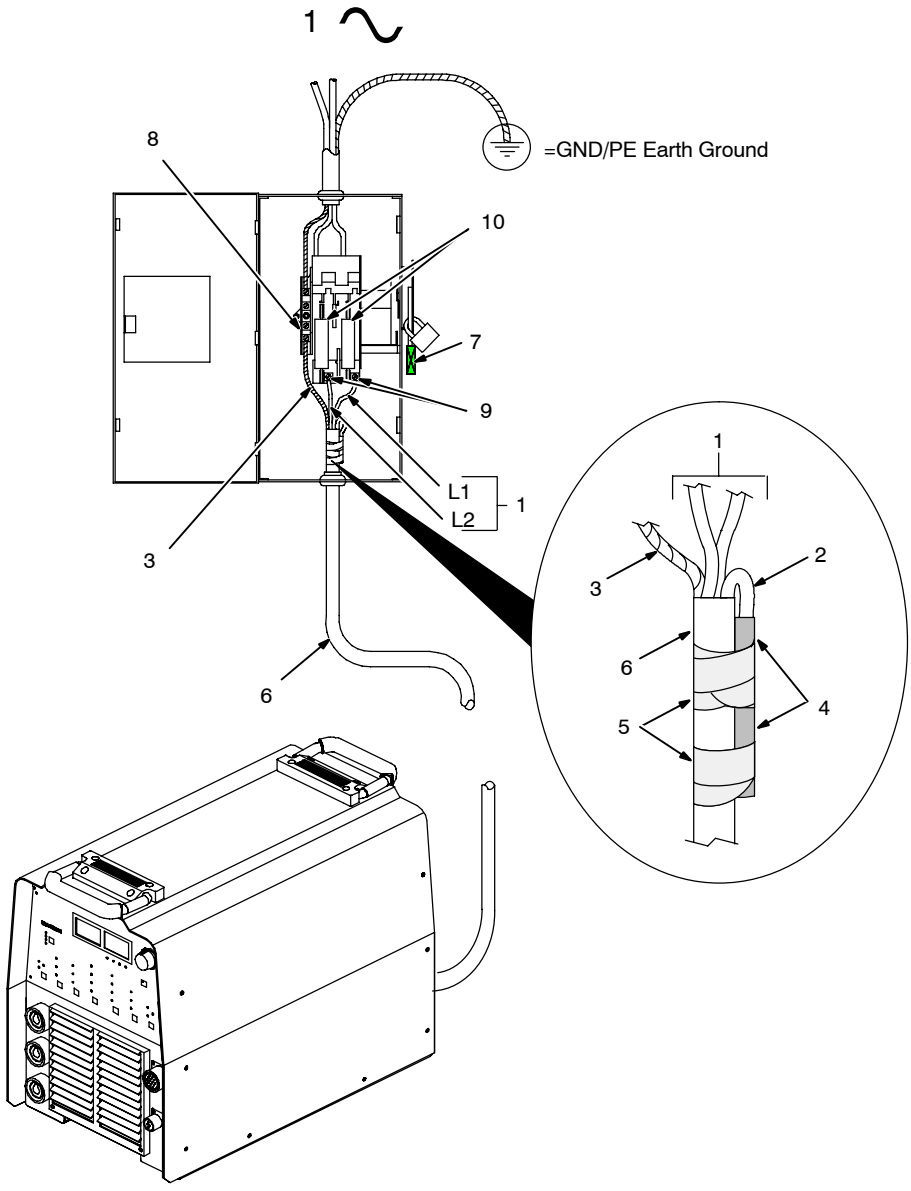
Select type and size of overcurrent protection using Section 4-11 (fused disconnect switch shown).

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

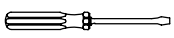
2/04 - Ref. 802 136-A

4-13. Connecting 1-Phase Input Power





Tools Needed:



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

▲ **Disconnect and lockout/tagout input power before connecting input conductors from unit.**

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

☞ *This unit is equipped with Auto-Link.*

Auto-Link is an internal inverter power source circuit that automatically links the power source to the primary voltage being applied (230 to 460 V), without the need for manually linking primary voltage terminals.

1 Black And White Input Conductor (L1 And L2)

2 Red Input Conductor

3 Green Or Green/Yellow Grounding Conductor

4 Insulation Sleeving

5 Electrical Tape

Insulate and isolate red conductor as shown.

6 Input Power Cord.

7 Disconnect Device (switch shown in the OFF position)

8 Disconnect Device Grounding Terminal

9 Disconnect Device Line Terminals

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

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

10 Overcurrent Protection

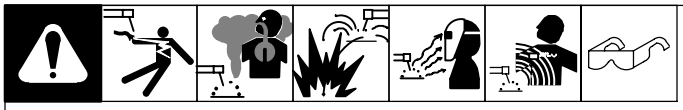
Select type and size of overcurrent protection using Section 4-11 (fused disconnect switch shown).

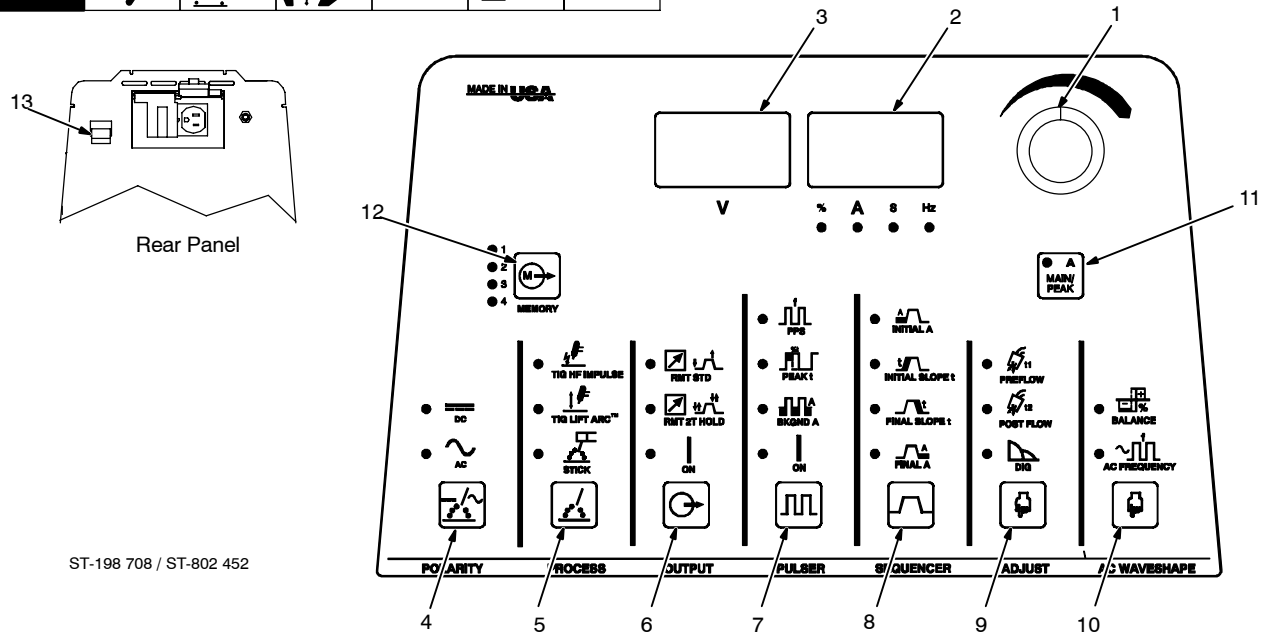
Close and secure door on disconnect device. Remove lockout/tagout device, and place switch in the On position.

2/04 - ST-802 136-A

SECTION 5 – OPERATION

5-1. Controls





ST-198 708 / ST-802 452

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

NOTE: Green on nameplate indicates a TIG function, Gray indicates a normal Stick function.

1 Encoder Control

2 Ammeter And Parameter Display

See Section 5-4.

3 Voltmeter

See Section 5-5.

4 Polarity Control

See Section 5-6.

5 Process Controls

See Section 5-7.

6 Output Controls

See Section 5-9.

7 Pulser Controls (DX And LX Models)

See Section 5-10.

8 Sequencer Controls (DX, LX And All CE Models)

See Section 5-11.

9 Adjust Controls

See Section 5-12.

10 AC Waveshape

See Section 5-13.

11 Amperage And Spot Time Control

For Amperage Control see Section 5-3.

For Spot Time Control see Section 5-14.

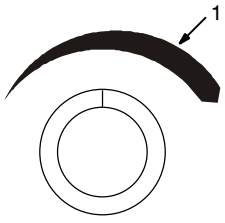
12 Memory

See Section 5-15.

13 Power Switch

Use switch to turn unit On/Off.

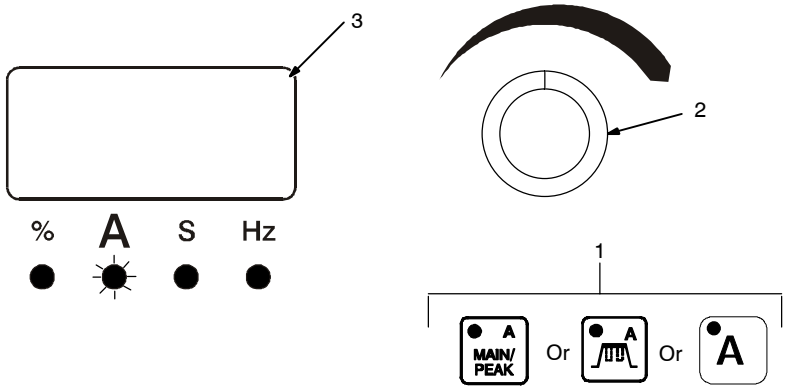
5-2. Encoder Control



1 Encoder Control

Use control in conjunction with applicable front panel function switch pad to set values for that function.

5-3. Amperage Control



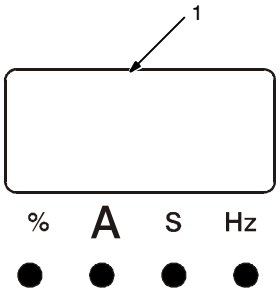
A
A

1 A (Amperage Control)
2 Encoder Control
3 Ammeter

See Section 5-17 for Amperage control range.

Press Amperage switch pad, and turn Encoder to set weld amperage or peak amperage when Pulser function is active (see Section 5-10).

5-4. Ammeter And Parameter Display

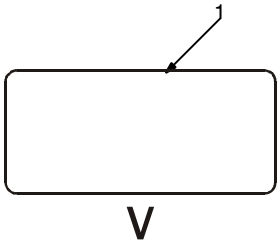


1 Ammeter

A
% A S Hz

Ammeter displays amperage while welding. It also displays preset parameters for any of the following: amperage, time, percentage or frequency. The LED, located directly below the ammeter, will also illuminate.

5-5. Voltmeter

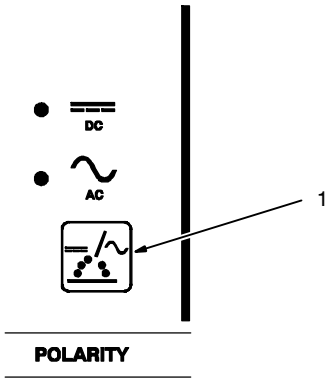


V

1 Volt Meter

Displays output or open circuit voltage. If output is off, the voltmeter will display (---).

5-6. Polarity Control (Dynasty™ Models Only)



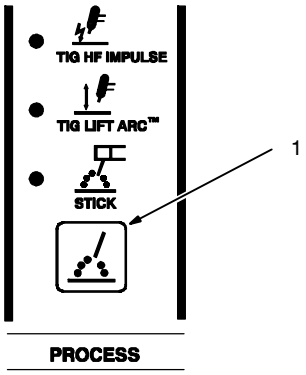
1 Polarity Control

Press switch pad until desired LED is illuminated.

DC - Machine is set to DCEN for TIG welding, and to DCEP for Stick welding.

AC - Use AC for TIG and Stick welding.

5-7. Process Control



1 Process Control

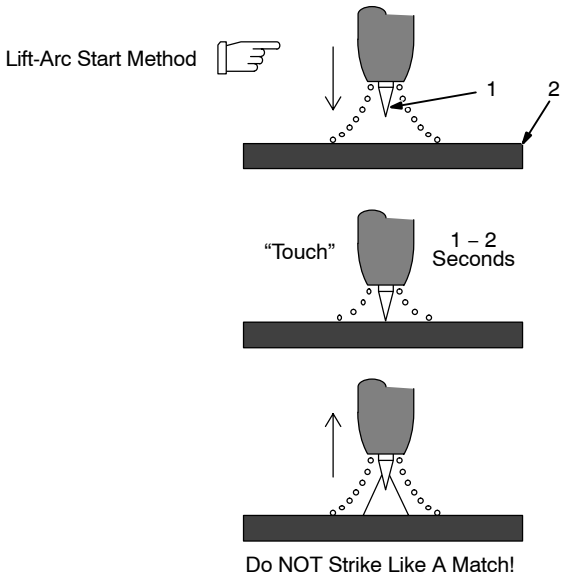
Press switch pad until desired process LED is illuminated:

TIG HF Impulse - is a pulsed HF (see Section 5-8) arc starting method that can be used with either AC or DC TIG welding. Make connections according to Section 4-9.

TIG Lift-Arc™ - is an arc starting method in which the electrode must come in contact with the workpiece (see Section 5-8). This method can be used with either AC or DC TIG welding. Make connections according to Section 4-9.

Stick (SMAW) - This method can be used with either AC or DC Stick welding. Make connections according to Section 4-10.

5-8. Lift-Arc™ And HF TIG Start Procedures



Lift-Arc Start

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

1 TIG Electrode

2 Workpiece

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

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

Application:

Lift-Arc is used for the DCEN or AC GTAW process when HF Start method is not permitted, or to replace the scratch method.

HF Start

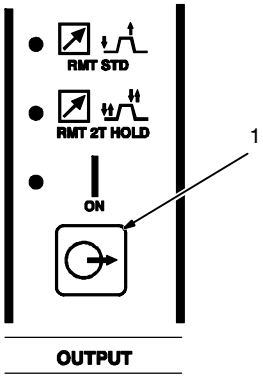
When HF Start button light is On, start arc as follows:

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

Application:

HF start is used for the DCEN GTAW process when a non-contact arc starting method is required.

5-9. Output Control



1 Output Control

Press switch pad until desired parameter LED is illuminated.

RMT STD (Remote Standard)

Application: Use Remote Trigger (Standard) with a foot pedal or finger amperage control (see Section 6-2A).

NOTE: When a foot or finger remote current control is connected, initial amps, initial slope, final slope, and final amps are controlled by the remote control.

NOTE: If an On/Off type trigger is used, it must be a maintained switch. All Sequencer functions become active, and must be set by the operator.

RMT 2T HOLD

Application: Use Remote Trigger Hold (2T) for long extended welds.

If a foot or finger current control is connected to the welding power source, only trigger input is functional (see Section 6-2B).

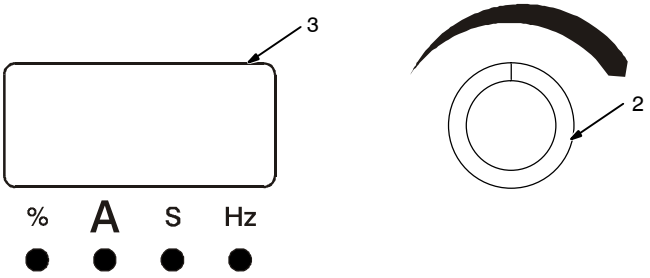
NOTE: This switch function can be reconfigured for 4T, 4T Momentary, Mini Logic, or Spot control See Section 6-2C)

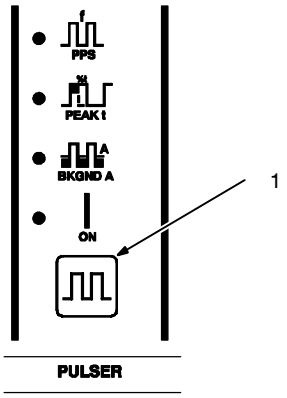
ON

Output will energize two seconds after being selected.

Application: Use Output On for Stick (SMAW) welding, or for Lift-Arc without the use of a remote control (see Section 6-2I).

5-10. Pulser Control (DX And LX Models)





1 Pulser Control

Pulsing is available while using the TIG process. Controls can be adjusted while welding.

Press switch pad to enable pulser.

ON - When illuminated, this LED indicates the pulser is on.

Press switch pad until desired parameter LED is illuminated.

To turn Pulser off, press and release switch pad until the On LED turns off.

2 Encoder Control (Set Value)

3 Ammeter (Displays Value)

See Section 5-17 for all Pulser parameter ranges.

PPS (Pulses Per Second or Pulse Frequency) Used to determine appearance of weld bead.

PEAK t - The percentage of each pulse cycle that can be spent at the peak amperage level.

BKGND A (Background Amps) - Use Background Amps to set the low pulse of the weld amperage, which cools the weld puddle and affects overall heat input. Background Amps is a percentage of peak amperage.

4 Pulsed Output Waveforms

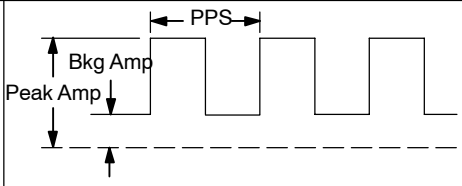
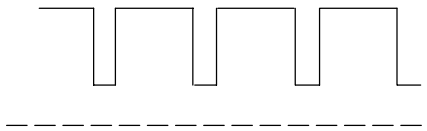
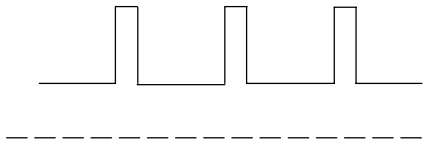
Example shows affect changing the Peak Time control has on the pulsed output waveform.

NOTE: Peak amperage is set using the Amperage control (see Section 5-3). Peak amperage is the highest welding amperage allowed in the pulse cycle. Weld penetration varies directly with peak amperage.

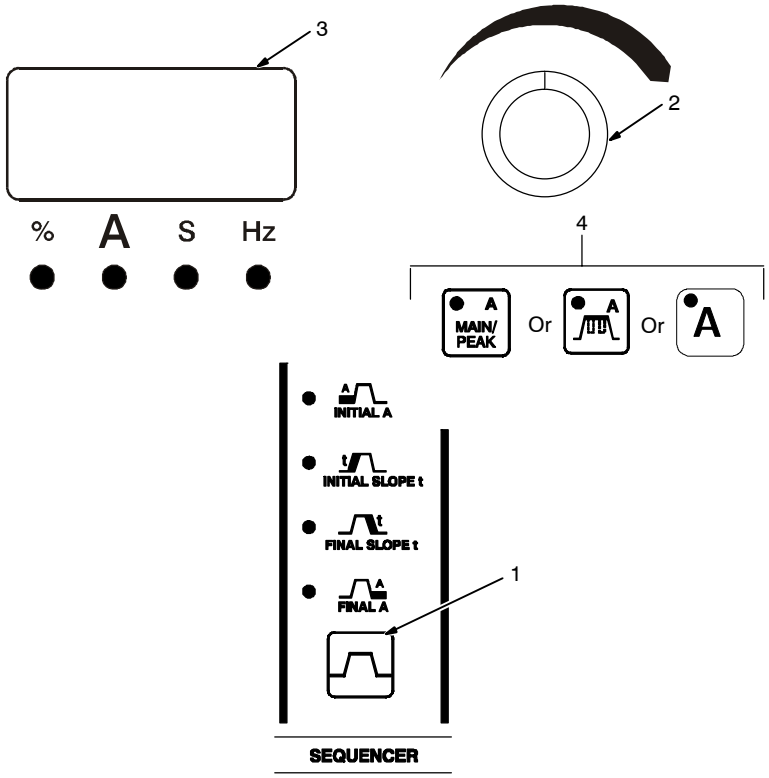
Application:

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

4

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

5-11. Sequencer Controls (DX, LX And All CE Models)



1 Sequencer Control

Sequencing is available while using the TIG process, but is disabled if a remote foot or finger current control is connected to the Remote receptacle while in the RMT STD mode.

Press switch pad until desired parameter LED is illuminated.

2 Encoder Control (Set Value)

3 Ammeter (Displays Value)

See Section 5-17 for all Sequencer parameter ranges.

INITIAL A (Initial Amperage) - Use control to select a starting amperage that is different from the weld amperage.

Application:

Initial Amperage can be used to assist in preheating cold material prior to depositing filler material, or to ensure a soft start.

INITIAL t (Initial Time)**(LX Models Only) -** Press control again and turn Encoder to set amount of time needed at the beginning of the weld.

INITIAL SLOPE t (Initial Slope Time) Use control to set amount of time that it takes to slope from initial amperage to weld amperage. To disable, set to 0.

4 Amperage Switch Pad

Weld Time (LX Models Only) - Press Amperage switch pad twice. Set desired weld time.

FINAL SLOPE t (Final Slope Time) - Use control to set amount of time it takes to slope from weld amperage to final amperage. To disable, set to 0.

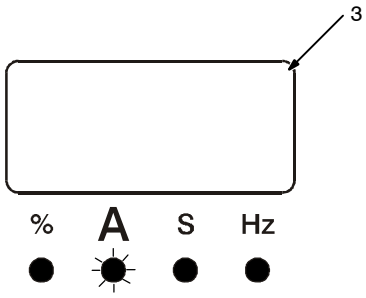
Application:

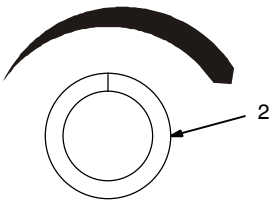
Final Slope should be used while welding materials that are crack sensitive, and/or to eliminate the crater at the end of the weld.

FINAL A (Final Amperage) - Used to set amperage to which weld amperage slopes to.

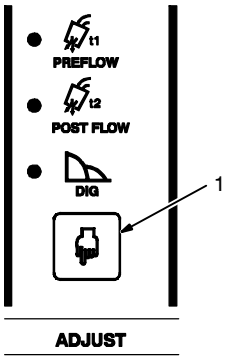
FINAL t (Final Time)**(LX Models Only)** - Press control again and turn Encoder to set Final Amperage time.

5-12. Adjust Controls (Preflow/Post Flow/DIG/Purge)





☞ *Some features shown are not available on all models.*



1 Adjust

Press switch pad until desired function LED is illuminated.

2 Encoder Control (Set Value)

3 Ammeter (Displays Value)

See Section 5-17 for all Adjust parameter ranges.

PREFLOW - If the TIG HF process is active (see Section 5-7) and Preflow is shown on the control panel, use control to set length of time gas flows before arc initiation. To set Preflow time for models that do not have Preflow Time control on the front panel, see Section 5-16.

Application: Preflow is used to purge the weld area, and aids in arc starts.

POST FLOW - If the TIG process is active (see Section 5-7), use control to set length of time gas flows after welding stops.

Application:

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

DIG - If the DC Stick process is active (see Section 5-7), use control to set amount of DIG. 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.

Application:

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

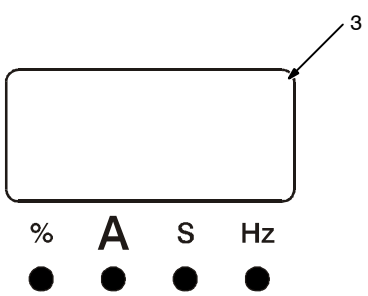
PURGE - To activate the gas valve and start the purge function, push and hold the Adjust switch pad for the desired amount of time. To set from 1 to 50 seconds of purge time, hold the Adjust switch pad while turning the encoder control. Default is 0.

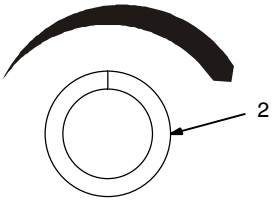
While Purge is active, *{-P-}* is shown in the left display, and purge time is shown in the right display.

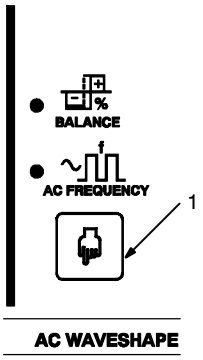
Pressing any switch pad will end the purge display, but gas will continue to flow until the preset time has timed out.

Application: Purge is used to clear the gas lines.

5-13. AC Waveshape (Dynasty Models Only)







1 AC Waveshape

Press switch pad until desired function LED is illuminated.

2 Encoder Control (Set Value)

3 Ammeter (Displays Value)

See Section 5-17 for all AC Waveshape parameter ranges.

Balance: AC Balance Control is enabled only in AC TIG to set percentage of time polarity is electrode negative.

Application:

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

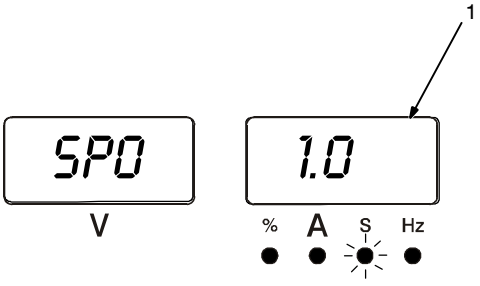
Joint configuration, set-up, process variables, and oxide thickness may affect setting.

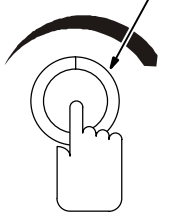
AC Frequency: AC Frequency Control is enabled only in AC TIG. Use control to set AC frequency (cycles per second).

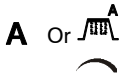
Application:

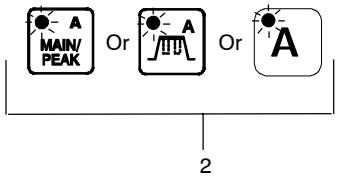
AC frequency controls bead width and directional control. As AC frequency decreases, weld bead/puddle gets wider. As AC frequency increases, weld bead/puddle becomes narrower and the arc becomes more focused. Travel speed can increase as AC frequency increases.

5-14. Spot Time Control (Reconfigured RMT 2T HOLD Output Selection) (All Models)









1 Spot Time Meter Display

Select Spot function according to Section 6-2C.

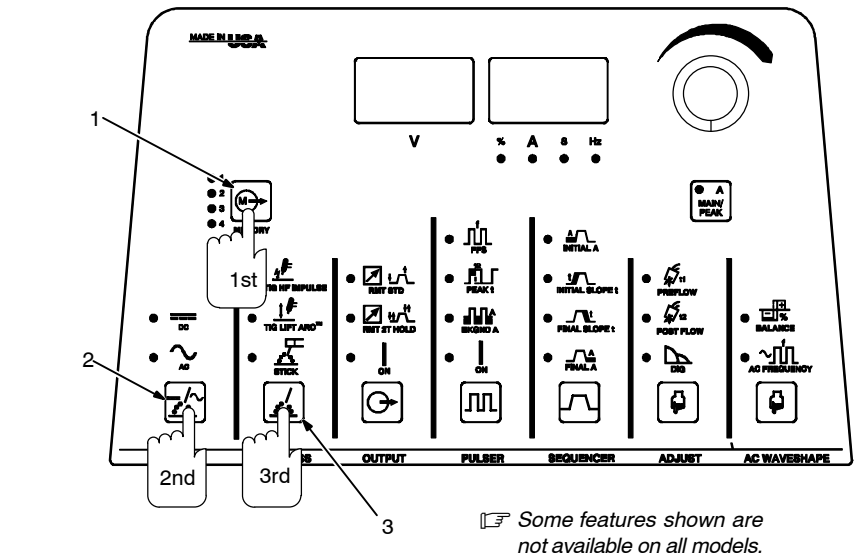
2 Amperage Switch Pad

3 Encoder Control

To set spot parameters, press Amperage switch pad once (meter A LED turns on) and turn Encoder to set spot amperage. Press Amperage switch pad again, (meter S LED lights) and turn Encoder to set spot time (.1–25 seconds). Default is 1 second.

Application: To provide a timed weld for tacking and thin sheet joining.

5-15. Memory (Program Storage Locations 1-4) (DX And LX Models If Available)



☞ *Some features shown are not available on all models.*

1 Memory (Program Storage 1-4) Switch Pad

2 Polarity Switch Pad

3 Process Switch Pad

To create, change, or recall a welding parameters program, proceed as follows:

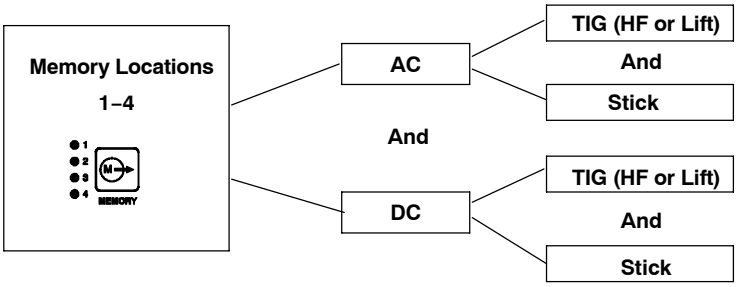
First, press Memory switch pad until the desired program storage location (1-4) LED is illuminated

Second, press Polarity switch pad until the desired polarity, AC or DC, LED is illuminated

Third, press Process switch pad until desired process, TIG HF Impulse, TIG Lift Arc, or Stick, LED is illuminated.

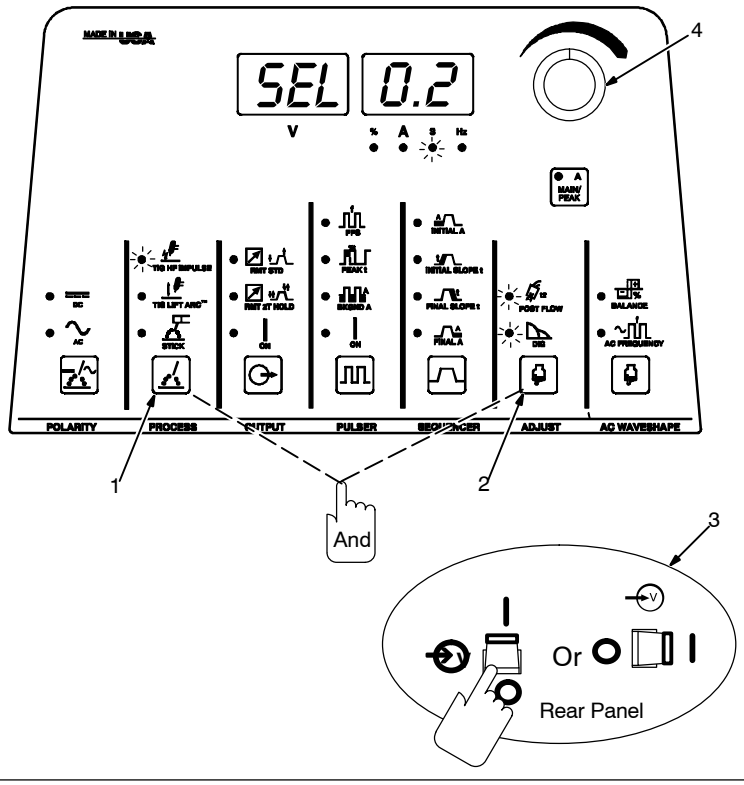
The program at the chosen location, for the desired polarity and process, is now the active program.

Fourth, change or set all desired parameters (see Section 5-1 for parameters).



Each memory location (1 thru 4) can store parameters for both polarities, and each polarity can store parameters for both process (TIG or Stick) for a total of 16 programs.

5-16. Setting Preflow Time For Use With TIG HF Impulse On Models That Do Not Have A Preflow Control On The Front Panel



1 Process Control Pad

2 Adjust Control Pad

3 Power Switch

To access preflow, turn power switch on, press and hold the Process and Adjust switch pads before the software version clears the meters, and *{SEL}*, TIG Impulse, Postflow, DIG, and meter S LED's light.

4 Encoder Control

Turn encoder to select from 0 to 25 seconds. The value is displayed on the ammeter.

Application: Preflow is used to purge the immediate weld area, and aids in arc starting.

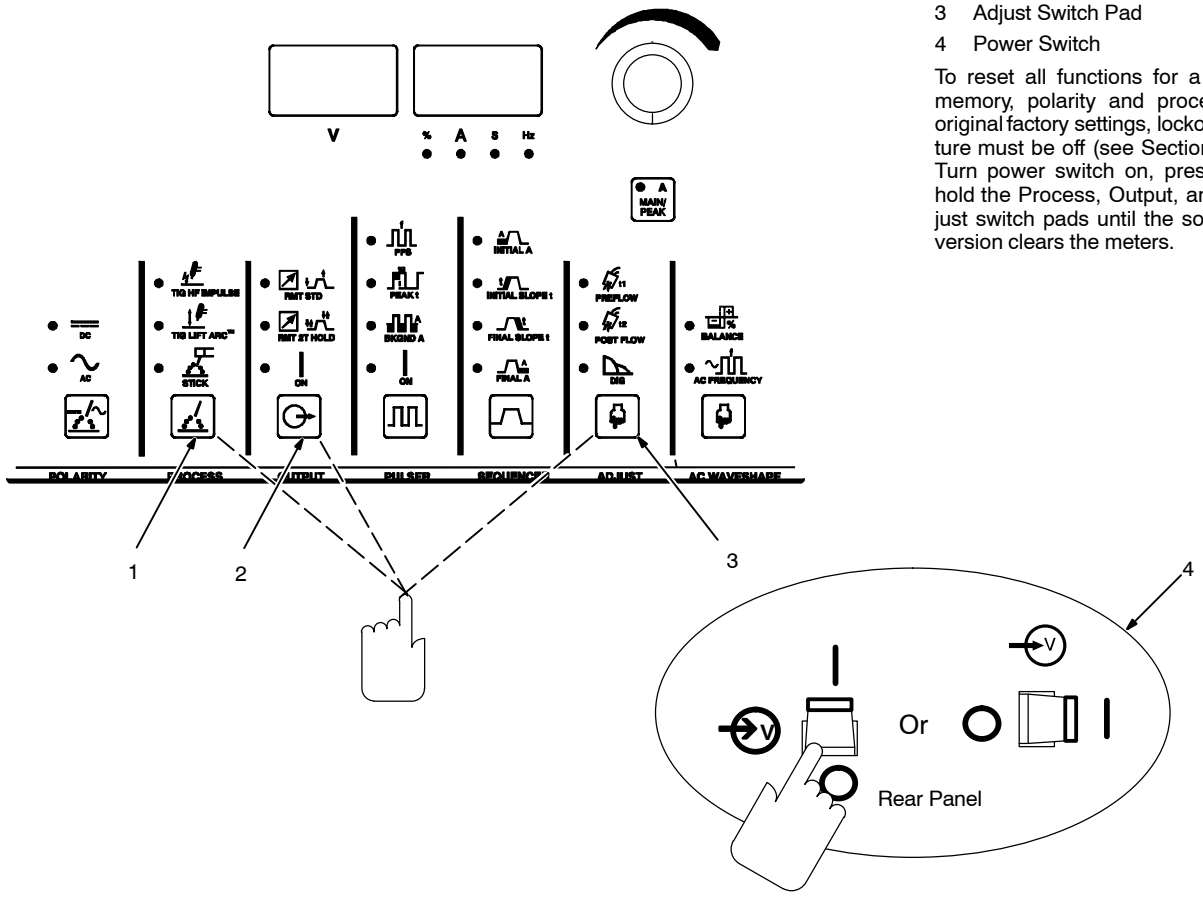
5-17. Factory Parameter Defaults And Range And Resolution

Parameter	Default	Range And Resolution
MEMORY	1	1–4
POLARITY	DC	AC / DC
PROCESS	TIG HF Impulse	TIG HF Impulse / TIG Lift / Stick
**Stick OCV	Low OCV	Low OCV / Normal OCV
OUTPUT	RMT STD	RMT STD / RMT 2T / ON
**RMT 2T	2T	RMT 2T can be reconfigured for: 2T / 4T / Mini Logic / 4T Momentary / Spot (see Section 6-2C)
A MAIN / PEAK		
AC TIG	150 A	5 – 300 Amps
AC STICK	110 A	5 – 300 Amps
DC TIG	150 A	5 – 300 Amps
DC STICK	110 A	5 – 300 Amps
Spot Time	1.0 S	0.1 – 25.0 Seconds
***Weld Time	0 S	Dual Range And Resolution 0.0 – 99.9 / 100 – 999 Seconds
PULSER	Off	ON / OFF
PPS	100 Hz	Dual Range And Resolution 0.1 – 9.9 / 10 – 500 Hertz
PEAK t	40%	5 – 95 Percent
BKGND A	25%	5 – 95 Percent
**Display *PPP* While Pulse Welding	Off	Off / On
SEQUENCER		
INITIAL A	20 A	5 – 300 Amps
***Initial Time	0 S	0.0 – 25.0 Seconds
INITIAL SLOPE t	0 S	0.0 – 25.0 Seconds
FINAL SLOPE t	0 S	0.0 – 25.0 Seconds
FINAL A	5 A	5 – 300 Amps
***Final Time	0 S	0.0 – 25.0 Seconds
ADJUST		
PREFLOW	0.2 S	0.0 – 25.0 Seconds
POST FLOW	10.0 S	0.0 – 50.0 Seconds @ 0.2 Second Resolution
DIG	30%	0 – 100 Percent
AC WAVESHAPE		
BALANCE	75%	30 – 99 Percent
FREQUENCY	120 Hz	20 – 250 Hertz
**Impulse HF Start parameters for each program (1-4)		
DC:		
Polarity	EN	EP / EN
Amperage	30 A	5 – 200 Amps
Time	3 mS	1 – 200 Milliseconds
AC:		
Polarity	EP	EP / EN
Amperage	40 A	5 – 200 Amps
Time	40 mS	1 – 200 Milliseconds

** Parameter adjusted using a power up configuration only

*** Parameter used with the automation option (LX models only)

5-18. Resetting Unit To Factory Default Settings (All Models)



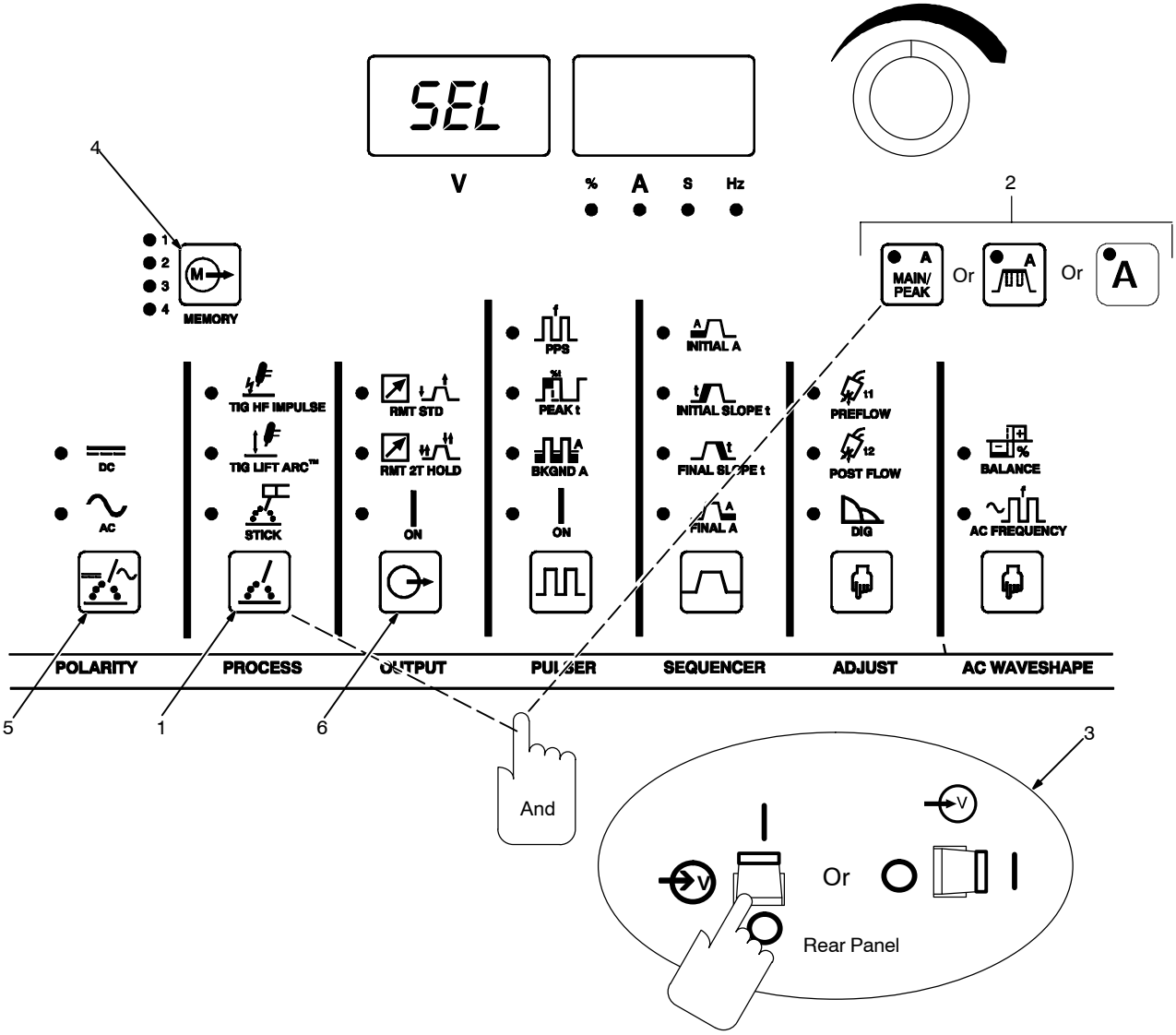
1 Process Switch Pad
2 Output Switch Pad
3 Adjust Switch Pad
4 Power Switch

To reset all functions for a given memory, polarity and process to original factory settings, lockout feature must be off (see Section 6-4). Turn power switch on, press and hold the Process, Output, and Adjust switch pads until the software version clears the meters.

SECTION 6 – ADVANCED FUNCTIONS

6-1. Programmable TIG Start Parameters (Polarity, Amperage And Time)

A. Accessing Programmable TIG Start Parameters (All Models)



NOTE: The welding cycle can be executed while in the programmable start mode. Before accessing programmable TIG Start parameters, be sure that all procedures and panel parameters are established.

1 Process Switch Pad

2 Amperage Switch Pad

3 Power Switch

To access the programmable TIG Start Parameters, turn power switch on, press and hold the Process and Amperage switch pads before the software version clears the meters, and *[SEL]* appears. A Main/Peak and % or S LED's will light.

4 Memory Switch Pad (If Equipped)

Press Memory switch pad to select desired memory location (see Section 5-15).

5 Polarity Switch Pad (If Equipped)

Press Polarity switch pad to select AC or DC (see Section 5-6).

Note: Each memory location and each polarity (AC or DC) has its own set of start parameters.

Press the Process switch pad to select the desired process, TIG HF Impulse or TIG Lift Arc (see Section 5-7). Both processes use the same parameter values.

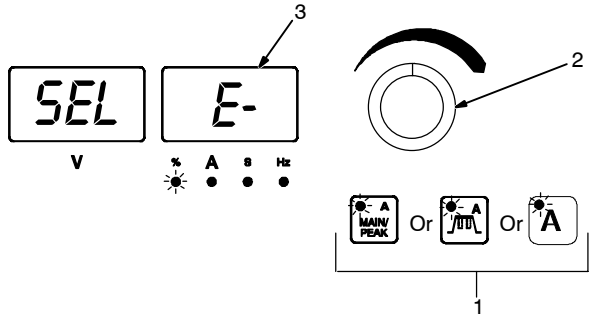
6 Output Switch Pad

Press Output switch pad to select desired type of control (see Section 5-9).

Proceed to Section B, C and/or D.

To save changes and exit, turn power off.

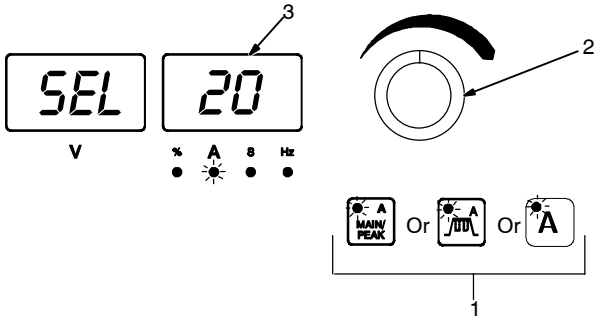
B. Changing Programmable TIG Start Polarity (Dynasty Models Only)



A 1 Amperage Switch Pad
2 Encoder Control
3 Amps Meter

To adjust TIG Start Polarity, press Amperage switch pad. Switch pad LED turns on, and meter % LED turns on. The current Start Polarity, *SEL) (E-)* or *(SEL) (EP)* is displayed on meters, and can be changed (see Section 5-17) by turning the Encoder control.

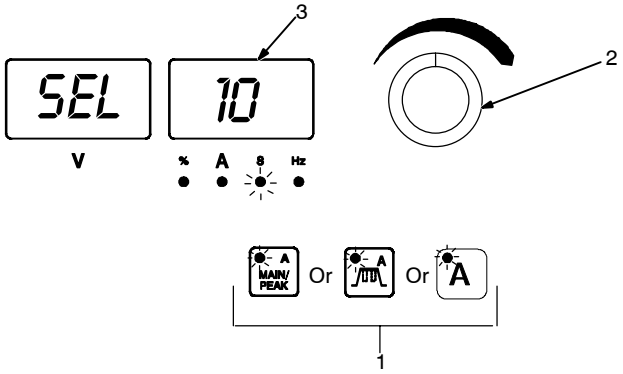
C. Changing Programmable TIG Start Amperage (All Models)



A 1 Amperage Switch Pad
2 Encoder Control
3 Amps Meter

To adjust TIG Start Amperage, press Amperage switch pad. Switch pad LED turns on, and meter A LED turns on. The current Start Amperage is displayed on the amps meter, and can be adjusted (see Section 5-17) by turning the Encoder control.

D. Changing Programmable Start Time (All Models)

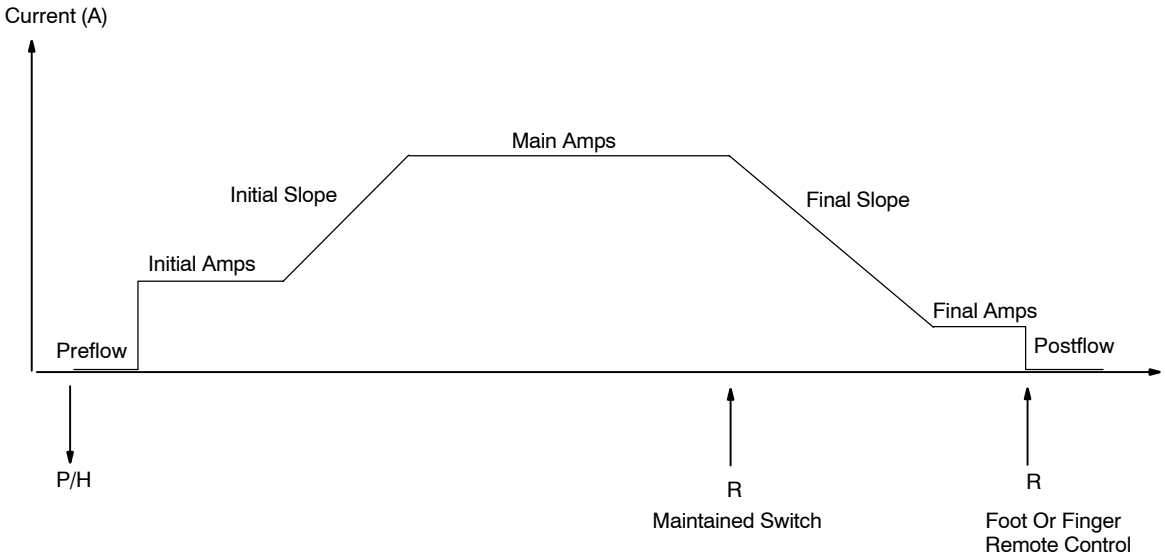


A 1 Amperage Switch Pad
2 Encoder Control
3 Amps Meter

To adjust Programmable Start Time, press Amperage switch pad, and meter S LED turns on. The current Start Time is displayed on the amps meter, and can be adjusted by turning the Encoder control (see Section 5-17).

6-2. Output Control And Trigger Functions

A. Remote (Standard) Torch Trigger Operation

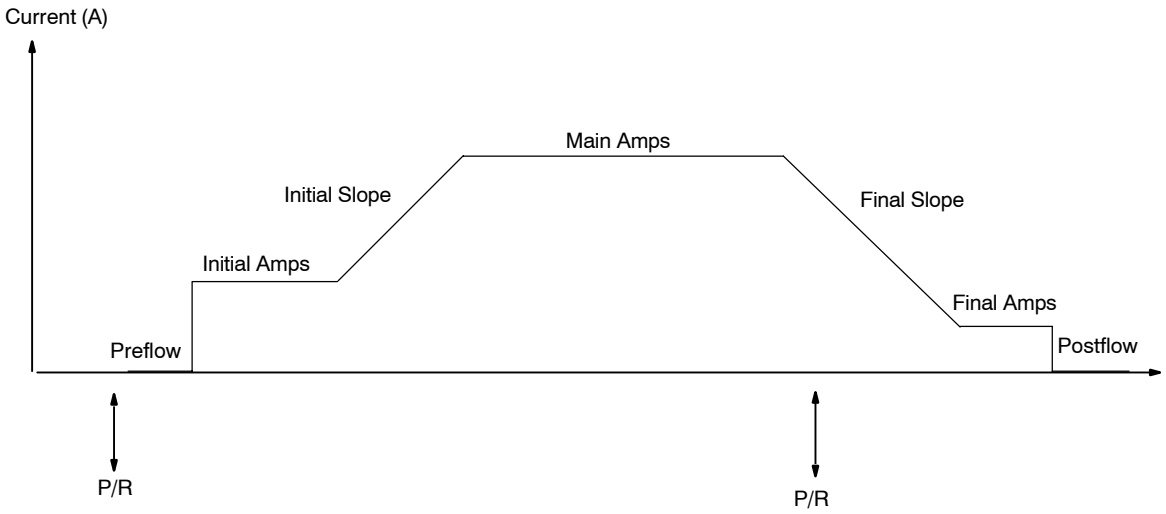


P/H = Push trigger and hold

R = Release trigger.

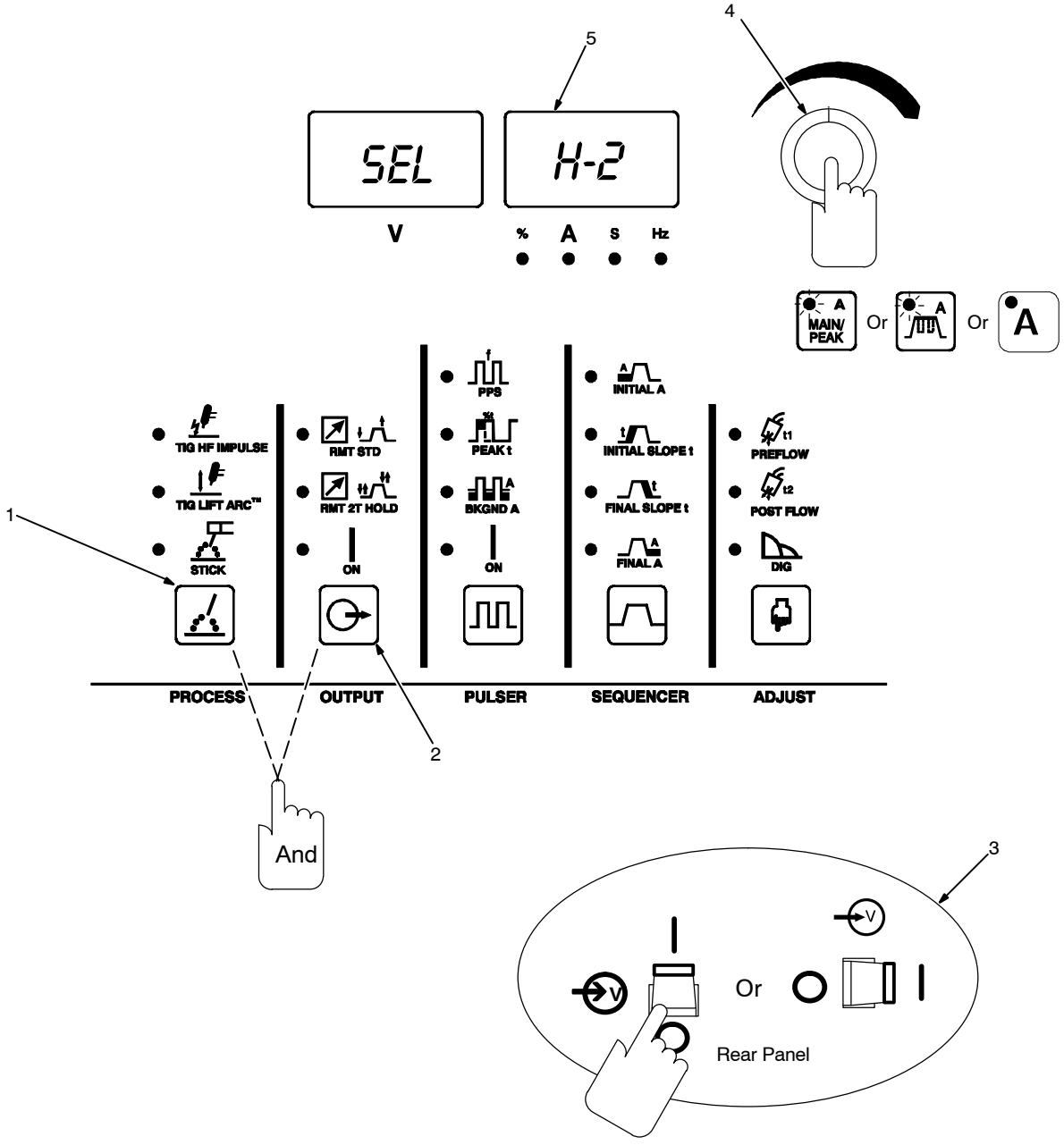
NOTE: When a foot or finger remote current control is connected to the welding power source, initial amps, initial slope, final slope and final amps are controlled by the remote control.

B. Remote 2T Torch Trigger Operation



P/R = Push trigger and release. NOTE: If torch trigger is held more than 3 seconds, operation reverts to RMT STD (Remote Standard) mode.

C. Reconfiguring RMT 2T HOLD For 2T, 3T, Spot, 4T, 4T Momentary, Or Mini Logic Control



For RMT STD (Remote Standard), RMT 2T Hold (Remote 2T Hold), and On trigger operation, see Section 6-2A, B, and I.

1 Process Switch Pad

2 Output Switch Pad

3 Power Switch

To access the RMT 2T HOLD, turn power switch on, press and hold the Process and Output switch pads before the software version clears the meters and *(SEL)* appears. RMT 2T Hold LED will light.

4 Encoder Control (Set Value)

5 Ammeter (Displays Value)

H-2 = 2T (see Section 6-2B)

SPO = Spot (see Section 6-2H

H-4 = 4T (DX, LX and CE models) (see Section 6-2E)

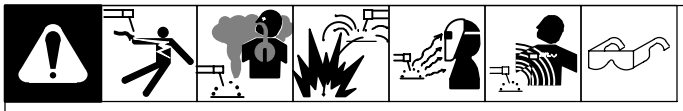
H4L = Mini Logic (DX, LX and CE models) (see Section 6-2F)

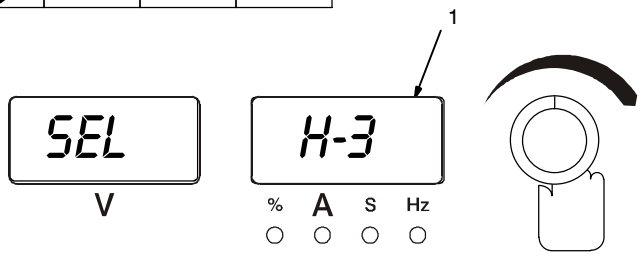
H4E = 4T Momentary (DX, LX and CE models) (see Section 6-2G).

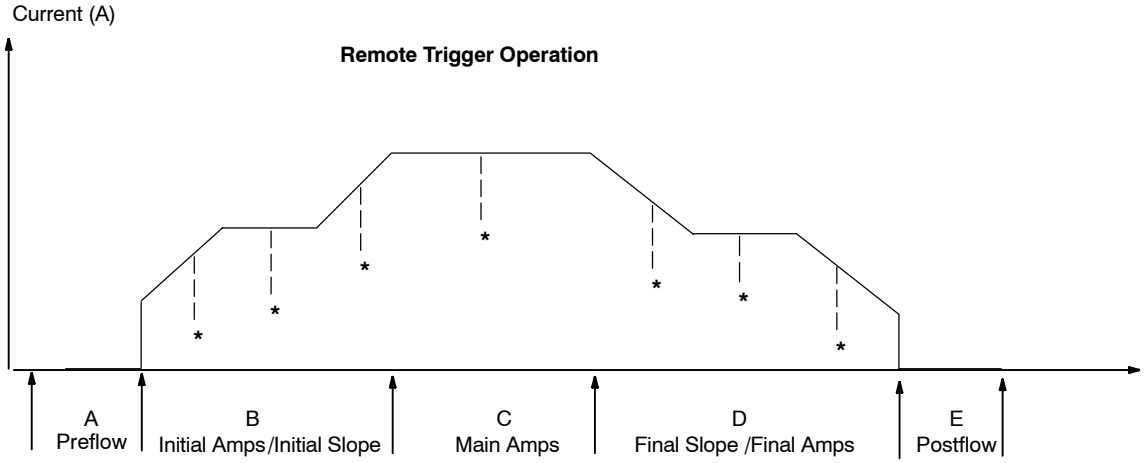
H-3 = 3T (see Section 6-2D).

Press torch trigger or turn power Off to save setting.

D. 3T Specific Trigger Method







* Arc can be extinguished at any time by pressing and releasing both initial and final switches, or by lifting the torch and breaking the arc.

1 3T (Specific Trigger Operation)

Sequencer is required to reconfigure for 3T.

3T requires a specific type of remote control with two independent momentary-contact switches. One will be designated initial switch, and it must be connected between Remote 14 receptacle pins A and B. The second will be designated as the final switch, and it must be connected between Remote 14 receptacle pins D and E.

Select 3T according to Section 6-2C.

Definitions:

Initial slope rate is the rate of amperage change determined by the initial amperage, initial slope time, and main amperage.

Final slope rate is the rate of amperage change determined by the main amperage, final slope time, and final amperage.

Operation:

A.. Press and release initial switch within 3/4 second to start shielding gas flow. To stop the preflow sequence before preflow time elapses (25 seconds), press and release final switch. The preflow timer will reset and the weld sequence can be started again.

☞ *If an initial switch closure is not made again before preflow time ends, gas flow stops, the timer resets, and an initial switch press and release is necessary to start the weld sequence again.*

B.. Press initial switch to start arc at initial amps. Holding switch will change amperage at initial slope rate (release switch to weld at desired amperage level).

C.. When main amperage level is reached, initial switch can be released.

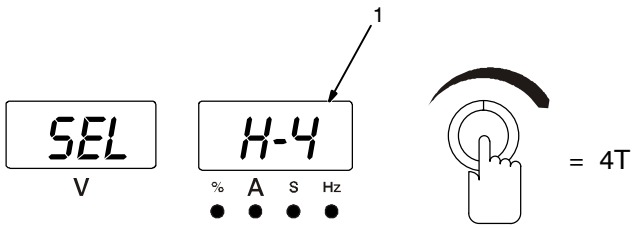
D.. Press and hold the final switch to decrease amperage at final slope rate (release switch to weld at desired amperage level).

E.. When final amperage has been reached, the arc extinguishes and shielding gas flows for the time set on the Postflow control.

Application:

With the use of two remote switches instead of potentiometers, 3T gives the operator the ability to infinitely increase, decrease, or pause and hold amperage within the range determined by the initial, main, and final amperages.

E. 4T Specific Trigger Method (DX, LX And All CE Models)



1 4T (Specific Trigger Operation)

Select 4T according to Section 6-2C.

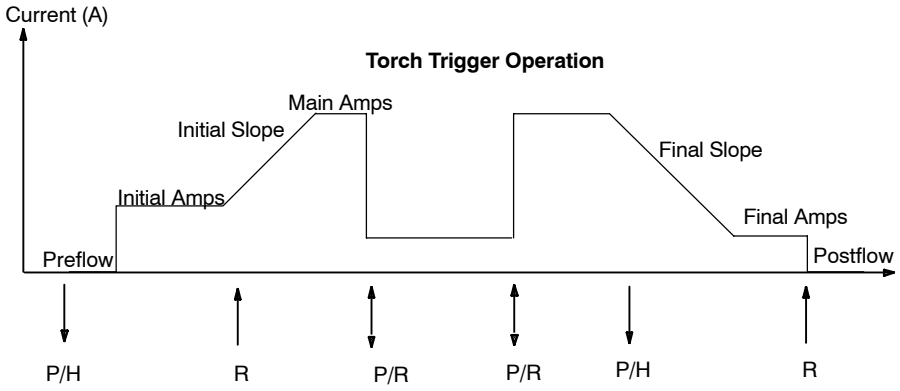
Torch trigger operation is as shown.

4T allows the operator to toggle between weld current and final current.

NOTE: When a remote switch is connected to the welding power source, use the remote switch to control the weld cycle. Amperage is controlled by the welding power source.

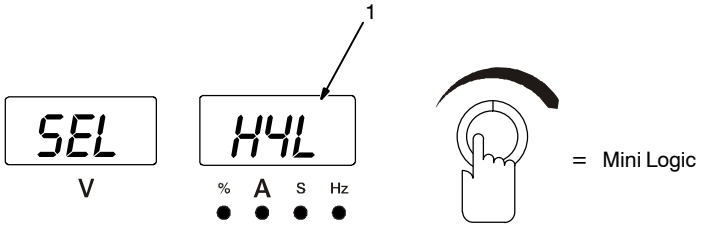
Application:

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



P/H = Push and hold trigger; R = Release trigger; P/R = Push trigger and release in less than 3/4 seconds

F. Mini Logic Operation (DX, LX And All CE Models)



1 Mini Logic Meter Display

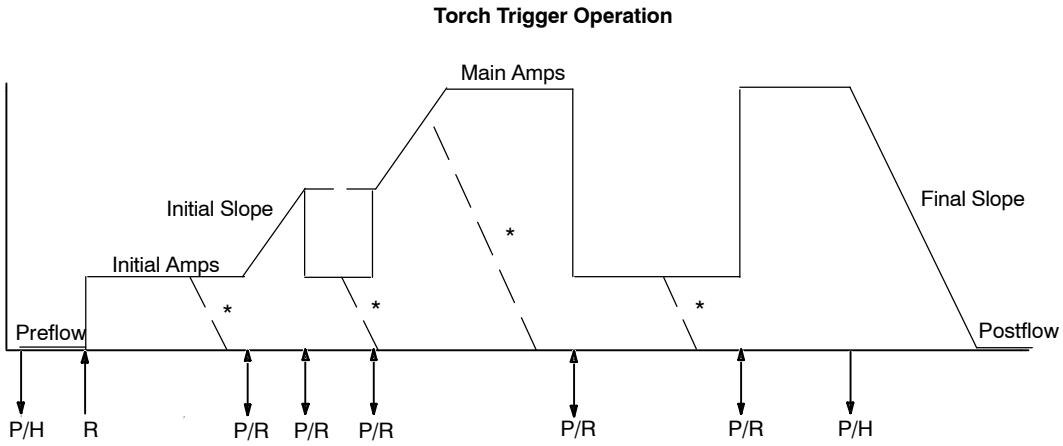
Select Mini Logic according to Section 6-2C.

Torch trigger operation is as shown.

Mini logic allows the operator to toggle between initial slope or main amps and initial amps. Final Amperage is not available. Final slope will always slope to minimum amperage and end the cycle.

NOTE: When a remote switch is connected to the welding power source, use the remote switch to control the weld cycle. Amperage is controlled by the welding power source.

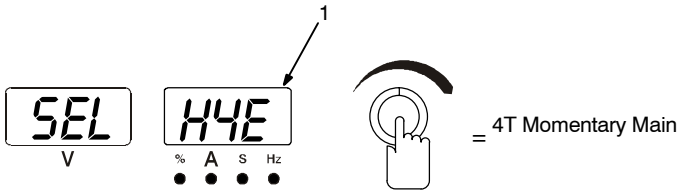
Application: This ability to change current levels without either initial slope or final slope, gives the operator the opportunity to adjust filler metal without breaking the arc.



P/H = Push and hold trigger; R = Release trigger; P/R = Push trigger and release in less than 3/4 seconds

* = Arc can be extinguished at final slope rate at any time by pushing and holding trigger

G. 4T Momentary Operation (DX, LX And All CE Models)



1 4T Momentary Meter Display

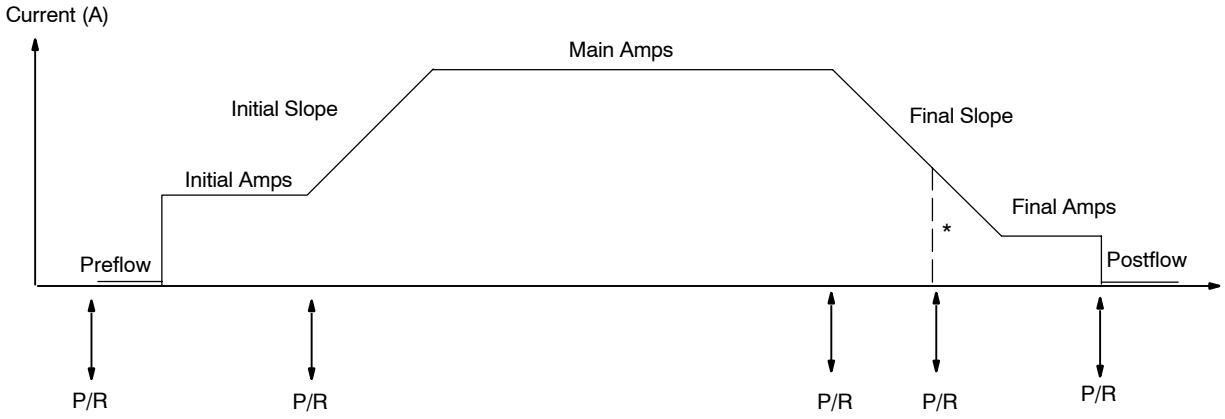
Select 4T Momentary according to Section 6-2C.

4T Momentary torch trigger operation is as shown.

NOTE: When a remote switch is connected to the welding power source, use the remote switch to control the weld cycle. Amperage is controlled by the welding power source.

Application:

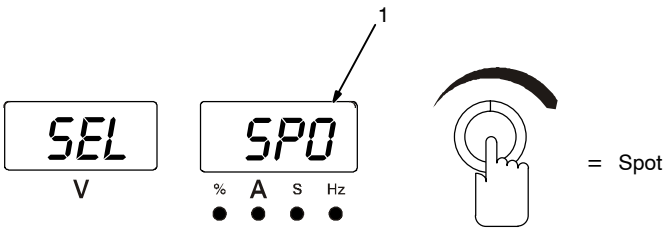
Use 4T Momentary trigger method when the functions of a remote current control are desired, but only a remote on/off control is available.



P/R = Push and release trigger; * = Push and releasing during final slope will break the arc and go to postflow

NOTE: For first torch trigger push & release, if trigger is held more than 3 seconds, trigger cycle ends

H. Spot Control Operation (All Models)



1 Spot Function Meter Display

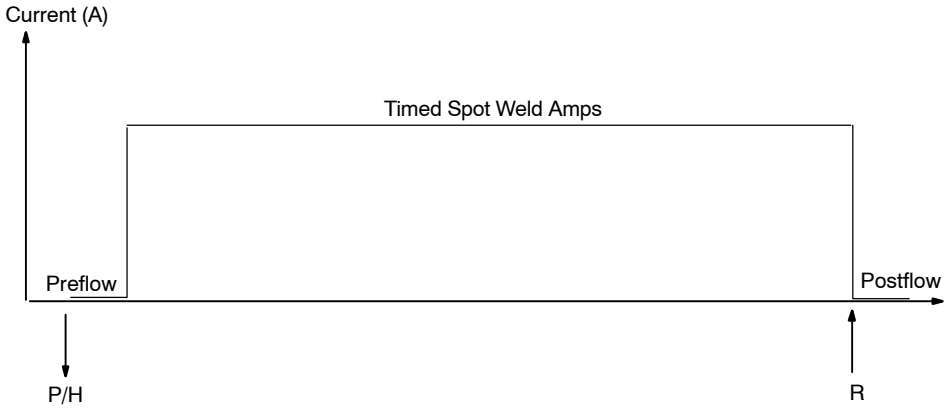
Select Spot function according to Section 6-2C.

NOTE: While in Spot Control, Sequencer settings are not be programmable.

NOTE: When a remote switch is connected to the welding power source, use the remote switch to control the weld cycle. Amperage is controlled by the welding power source.

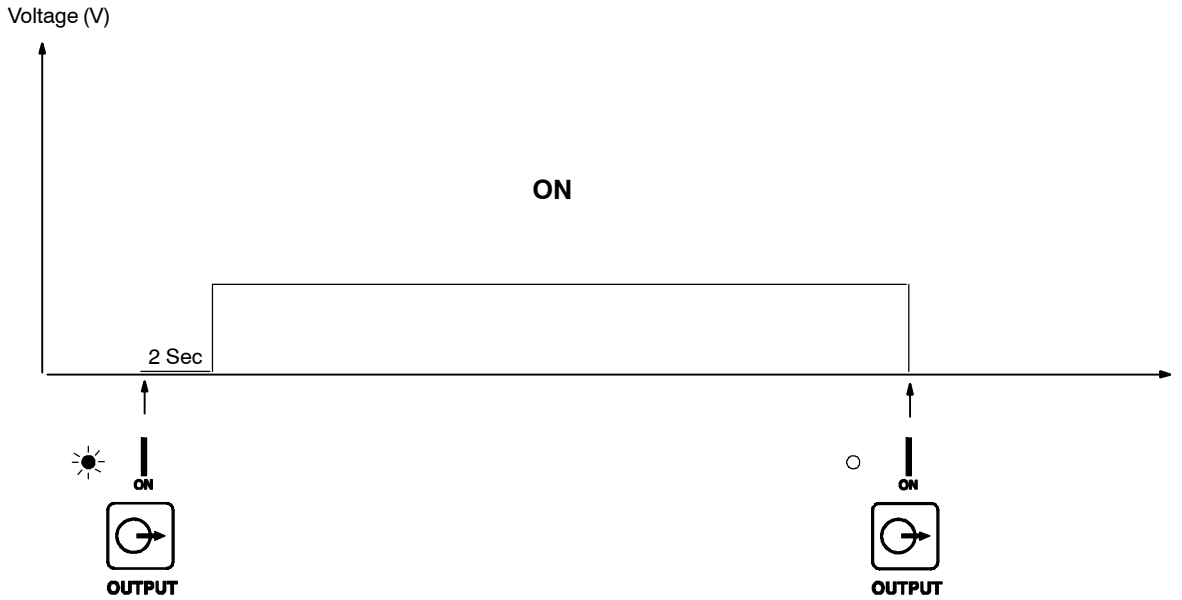
Torch trigger operation is as shown.

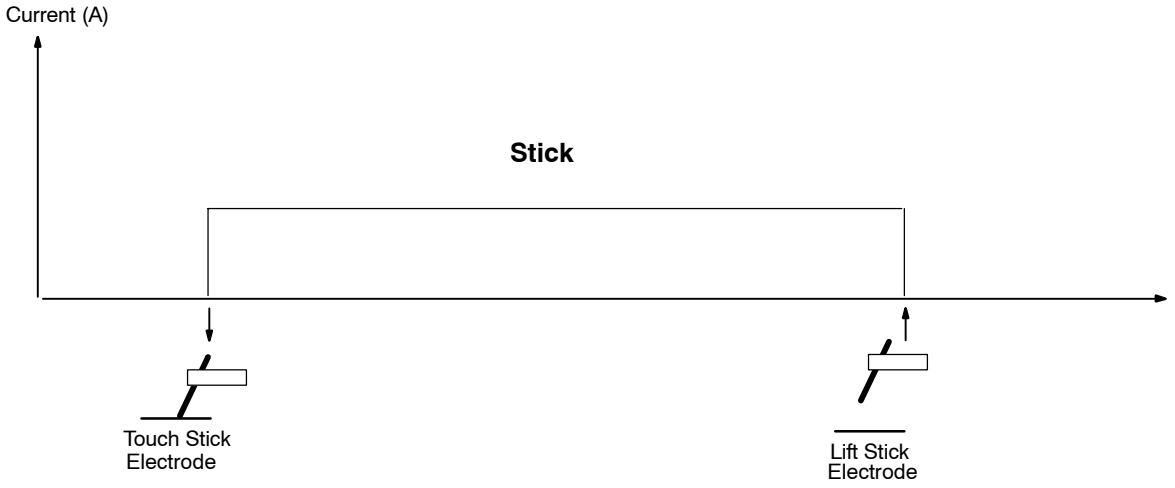
Application: Used for tacking and thin sheet joining.

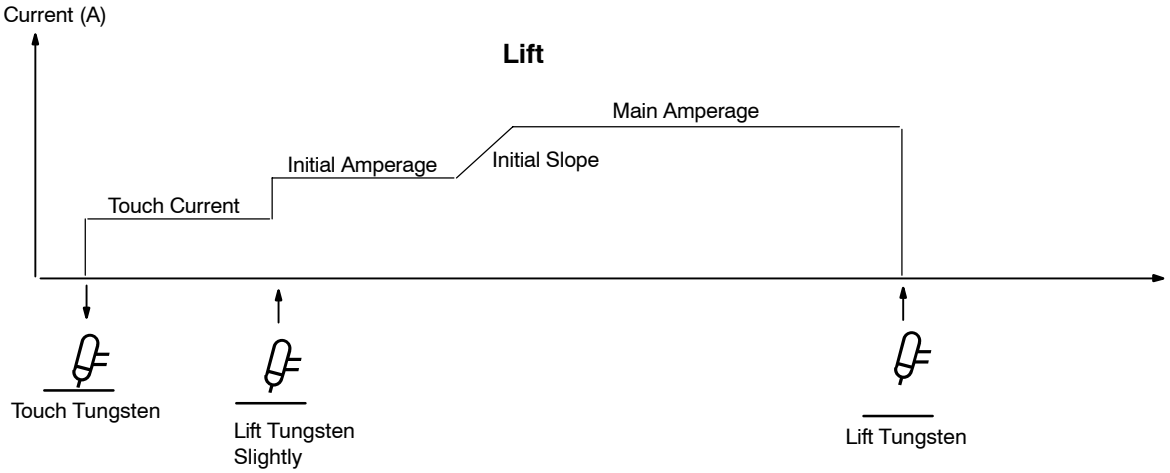


P/H = Push and hold trigger; R = Release Trigger

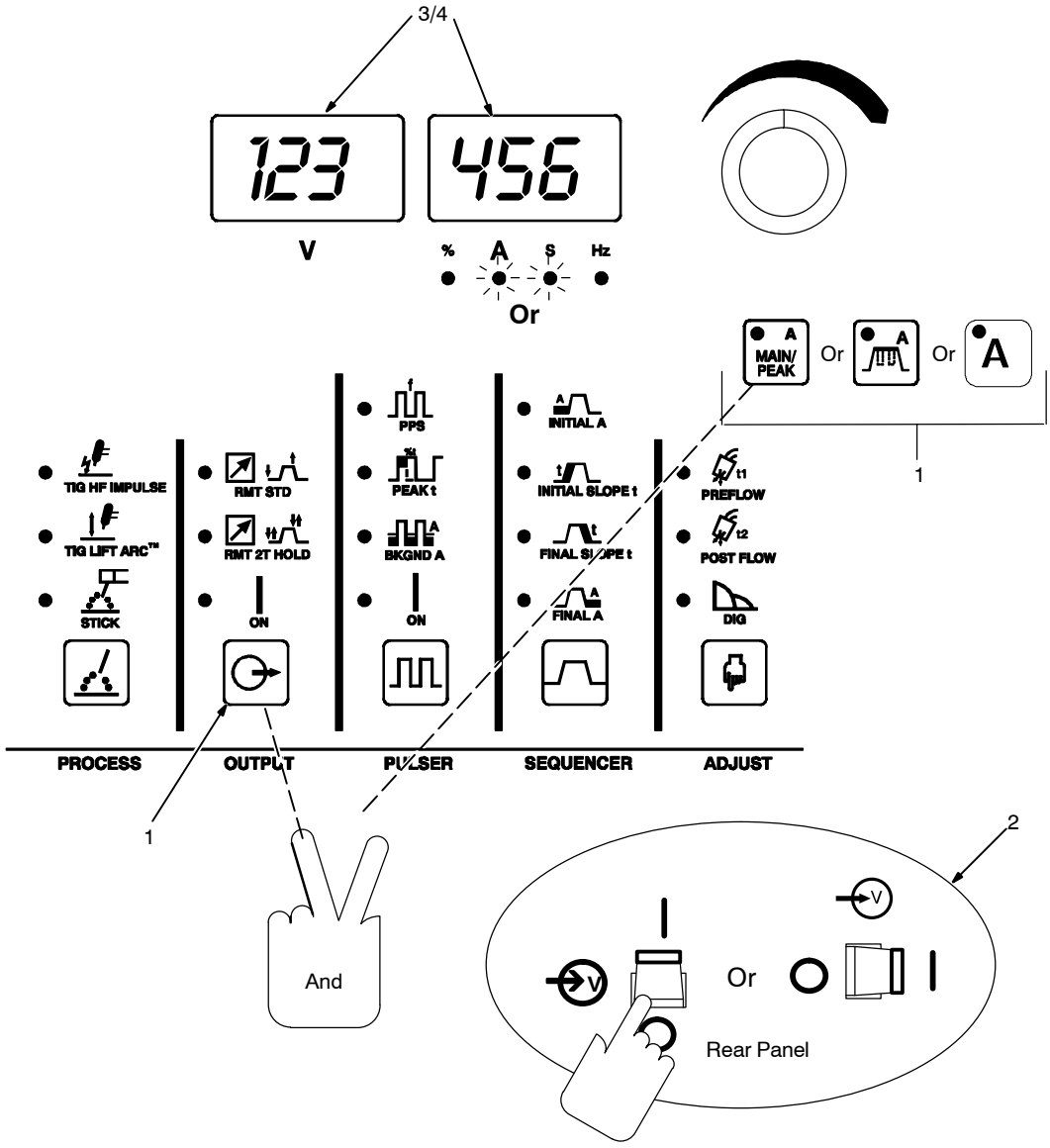
I. On Trigger Operation







6-3. Arc Timer/Counter Display (All Models)



A 1 Output And Amperage Controls

V 2 Power Switch

To display the arc timer/counter, turn power switch on, press and hold the Amperage Control and Output switch pads until the software version clears the meters.

3 Arc Timer Display

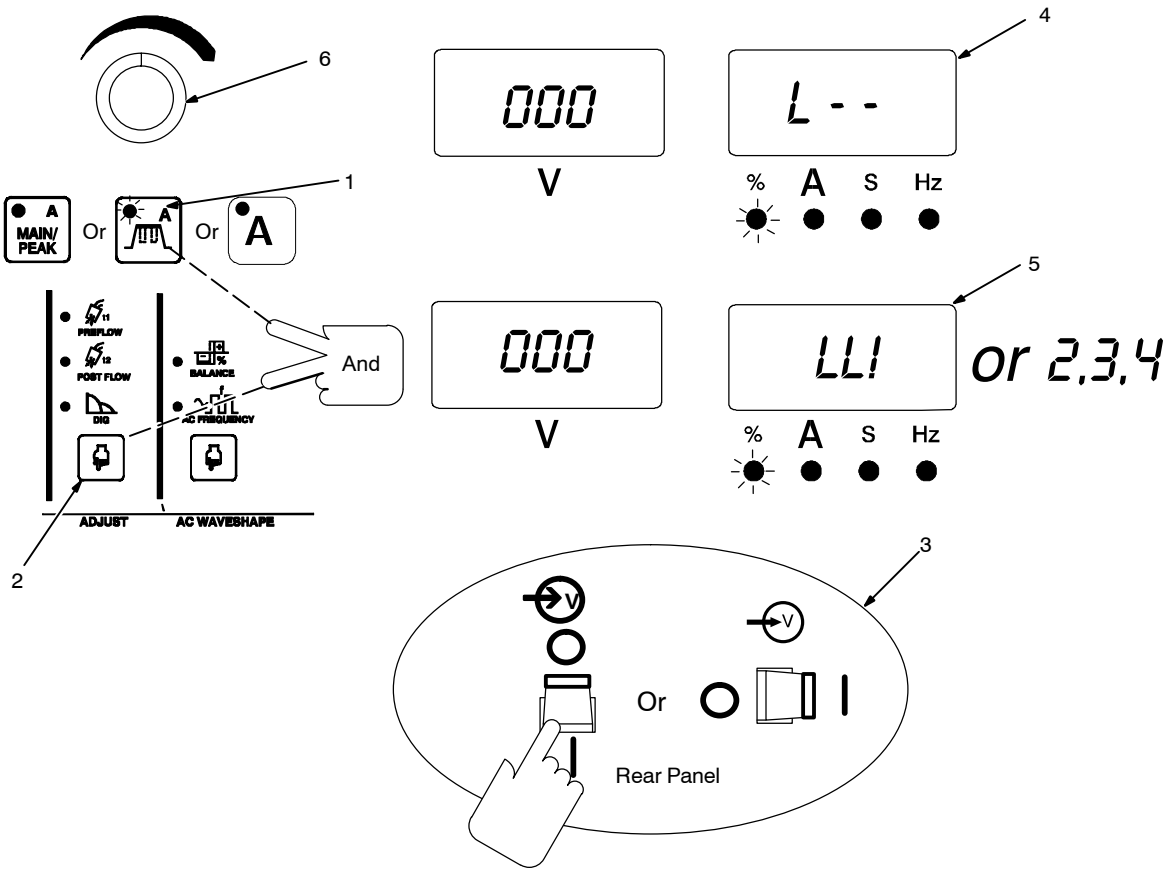
The meter S LED will turn on, and arc time will be displayed for 5 seconds as [*000 000*] to [*999 959*]. The first four numbers indicate hours, and the last two numbers indicate minutes. Example shown is read as 1,234 hours and 56 minutes. Maximum arc time is 9,999 hours and 59 minutes.

4 Arc Counter

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

6-4. Lockout Functions

A. Accessing Lockout Capability



See Section 5-1 for explanation of controls referred to in all of Section 6-4.

There are four (1–4) lockout levels. Each successive level allows the operator more flexibility.

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

1 Amperage (A) Switch Pad

2 Adjust Switch Pad

3 Power Switch

4 Lockout Off

5 Lockout On

To access lockout screens, turn power switch On. Press and hold the Amperage and Adjust switch pads until software version number clears the meters and Lockout Off or Lockout On appears. A Main/ Peak and % or S LED's will light.

6 Encoder Control

To turn On the lockout feature:

Press Amperage (A) until % LED is on.

Turn Encoder to select a three digit lockout code. The code will appear on the voltage meter. Select any number from [*001*] thru [*999*]. **IMPORTANT:** Document this code, it will be needed to turn lockout off.

To select a lockout level, press Amperage (A) switch pad until meter S LED is lit.

Turn Encoder to select a lockout level (see Sections B for lockout level descriptions).

Once the desired three digits have been entered and a lockout level selected, press torch trigger or turn Off power to complete lockout on sequence.

NOTE: Setting a three digit lockout number of [*000*], or setting a lockout level of [*L--*] will disable lockout.

To turn Off the lockout feature:

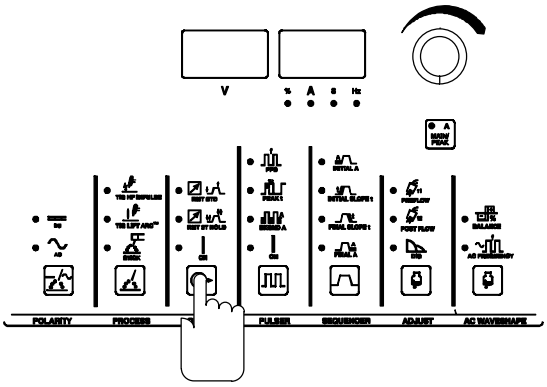
Use Encoder control to enter the same three digits that were used to turn on the lockout feature.

Press the Amperage (A) switch pad. The meter % LED will turn off and the S LED will light. The amperage meter will display [*L--*]. Lockout is now off.

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

B. LockOut Levels

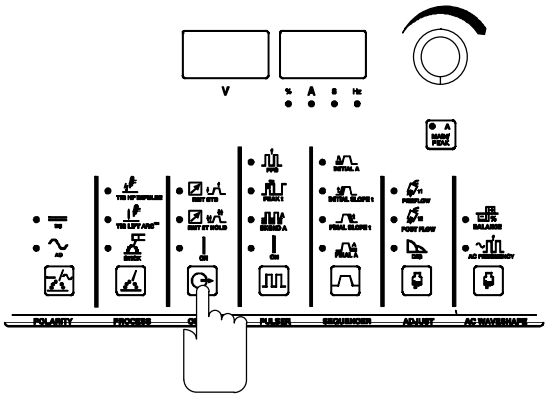
Level 1



Use Output Switch Pad To

Select A Trigger Method

For The TIG Process

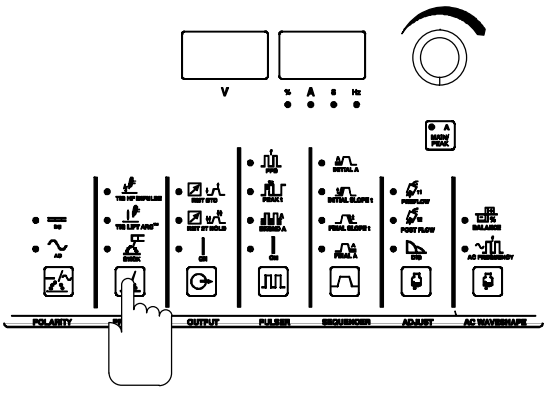


Use Output Switch Pad To

Select A Trigger Method

For The Stick Process

Level 2



Select Process

Process Selection

NOTE: Before activating lock out levels, be sure that all procedures and parameters are established.

Level 1

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

TIG Output Selection

If either TIG HF Impulse or TIG Lift Arc process (see Section 5-9) is active when lockout level 1 is activated, the operator can choose RMT STD (Remote Standard) or RMT 2T HOLD (Remote 2T Hold). The On function is available if TIG Lift Arc is active.

If RMT 2T HOLD was reconfigured (see Section 6-2C) prior to lockout level 1 activation, the reconfigured output mode (4T, 4T momentary, mini logic, or spot) is available instead of RMT 2T.

Stick Output Selection

If the Stick process is active when lockout level 1 is activated, choose between RMT STD or On.

When parameter choice or selection is limited by lock level 1, [*L-1*] is displayed.

Level 2

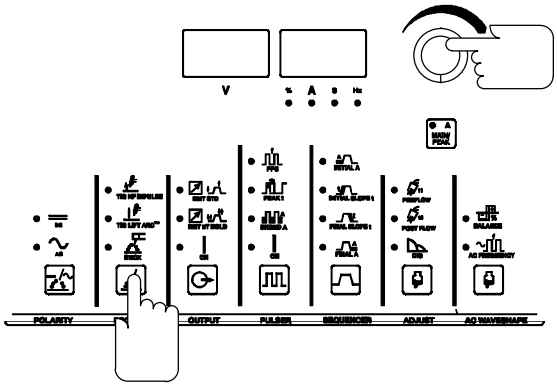
NOTE: Remote amperage control is not available in level 2.

Includes all the functions of level 1 plus Polarity and Process Selection (see Sections 5-6 and 5-7).

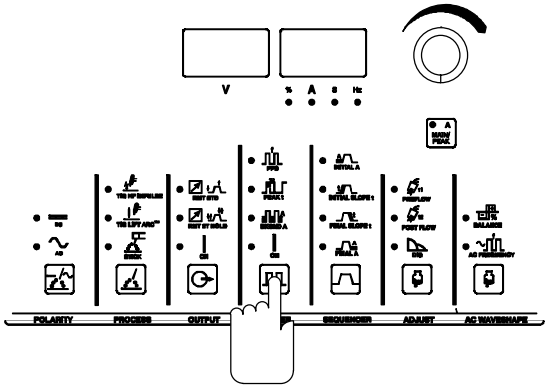
When parameter change or selection is limited by lock level 2, [*L-2*] is displayed.

B. Lock Out Levels (Continued)

Level 3



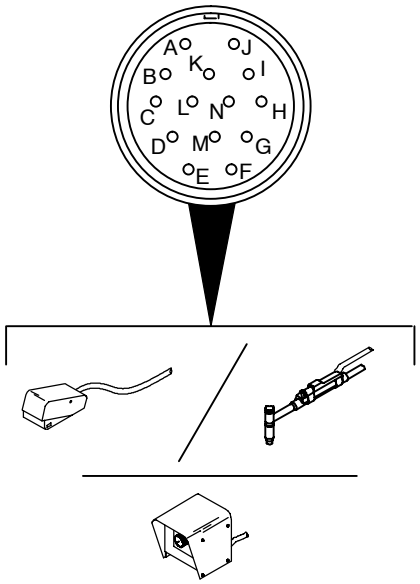
+/– 10 % Amperage Adjust Control



Pulser On/Off Control

Remote Amperage Control

Level 4



Level 3

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

Includes all the functions of levels 1 and 2 plus:

+/– 10% adjustment of preset TIG or Stick Weld Amps

Select TIG or Stick, and use the Encoder control to adjust amperage +/– 10% of preset amperage value, up to the limits of the machine. If operator goes beyond the +/– 10%, the amperage meter will display [*L-3*].

Pulser ON/Off Control

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

When parameter change or selection is limited by lock level 3, [*L-3*] is displayed.

Level 4

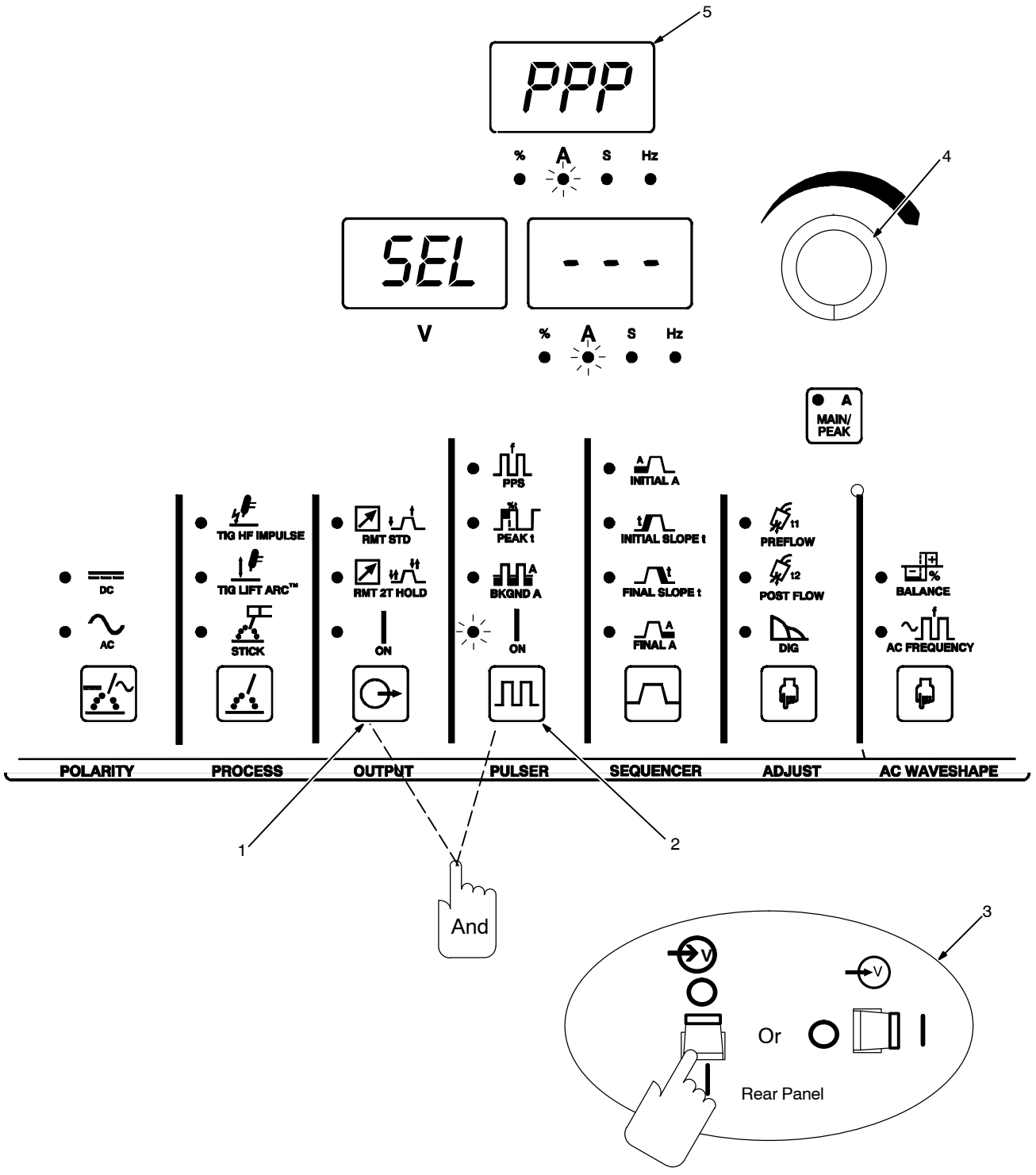
Includes all the functions of levels 1, 2, and 3 plus:

Remote Amperage Control

Allows operator to use remote amperage control. Remote control operates from minimum to maximum of preset amperage value. Connect remote control device according to Section 4-7.

When parameter change or selection is limited by lock level 4, [*L-4*] is displayed.

6-5. Setting Unit To Display PPP While Pulse Welding (DX And LX Models Only)



1 Output Switch Pad

2 Pulser Switch Pad

3 Power Switch

To access the PPP while welding display, turn power switch on, press and hold the Output and Pulser switch pads until software version clears meters and *{SEL}* appears. A and Pulser On LED's will light.

4 Encoder Control

5 PPP Meter Display

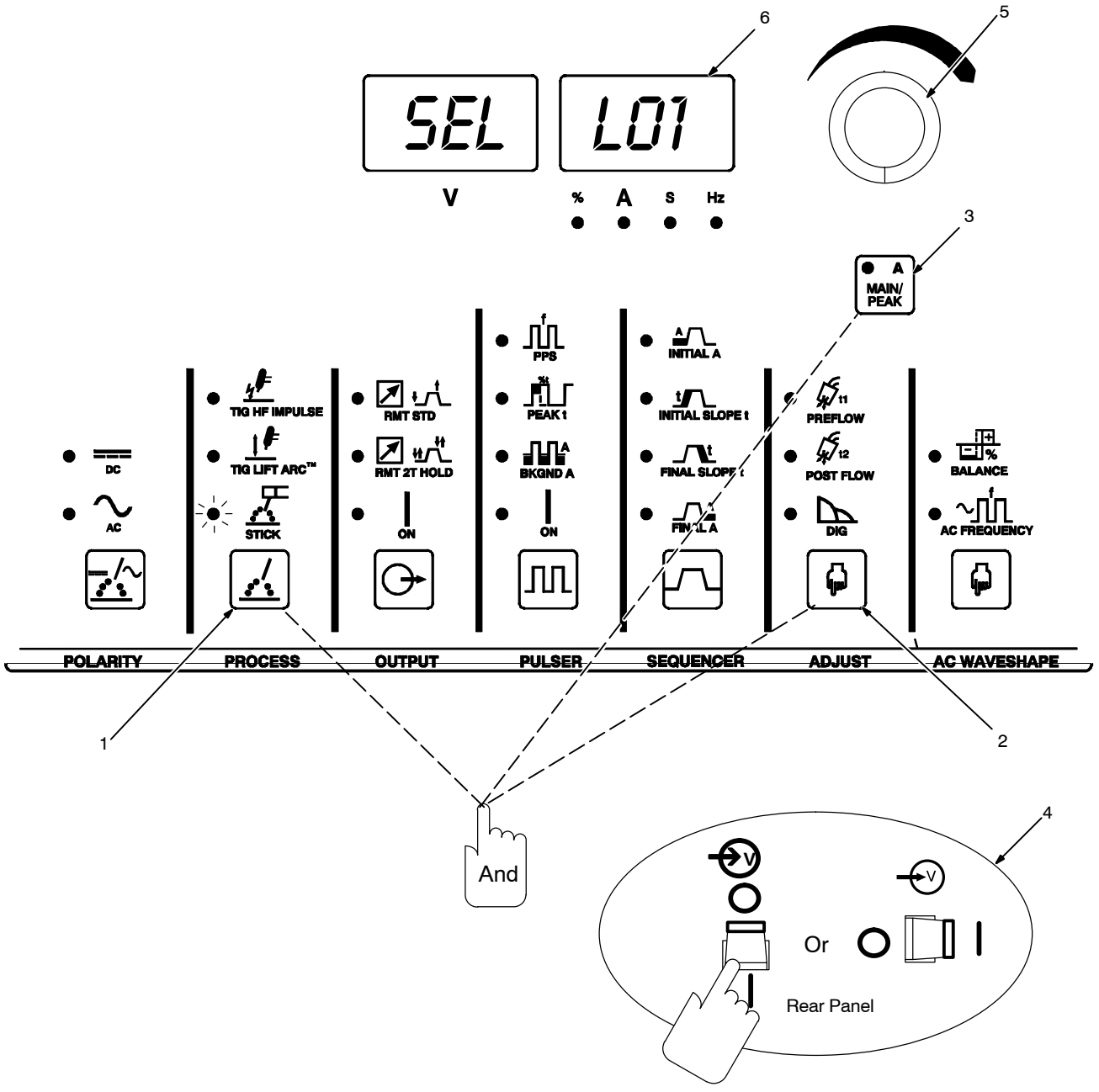
Turn Encoder to change between standard and *{PPP}* meter display.

When the *{PPP}* meter display feature is active while pulse welding, *{PPP}* is displayed, and the meter hold feature is disabled.

The *{PPP}* meter display feature will not effect the normal amperage display or Meter Hold capabilities when in a non-pulse welding mode.

Press torch trigger or turn off power to save setting.

6-6. Stick Open-Circuit Voltage (OCV) Selection (All Models)



1 Process Switch Pad

2 Adjust Switch Pad

3 Amperage Switch Pad

4 Power Switch

To access the Stick OCV selection, turn power switch on, press and hold the Process, Adjust and Amperage switch pads until software version clears the meters and *{SEL}* appears. The Process Stick LED will light.

5 Encoder Control

6 Meter Display

Turn Encoder to change between low OCV *{SEL} {L01}* and normal OCV *{SEL} {L00}*. Active selection is displayed on the meters.

When Stick low OCV is selected, open-circuit voltage is between 9 and 14 volts. When Stick normal OCV is selected, open-circuit voltage is approximately 95 volts.

Application: For most Stick applications use low open-circuit voltage. Use normal open-circuit voltage for hard to start Stick electrodes.

SECTION 7 – MAINTENANCE AND TROUBLESHOOTING

7-1. Routine Maintenance

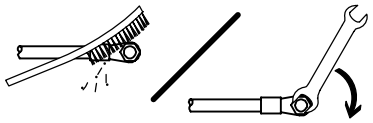
▲ **Disconnect power before maintaining.**

3 Months

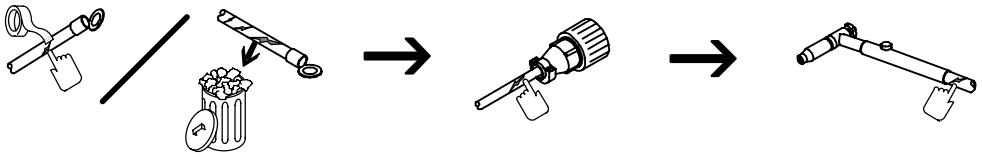
Replace unreadable labels.

Replace damaged gas hose.

Clean and tighten weld terminals.

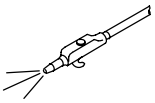


Repair or replace cracked cables and cords.



6 Months

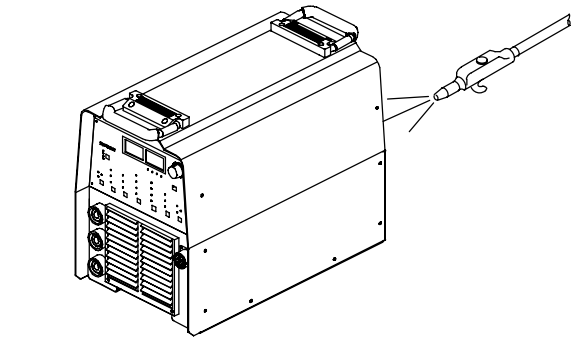
Blow out inside. During heavy service, clean monthly.

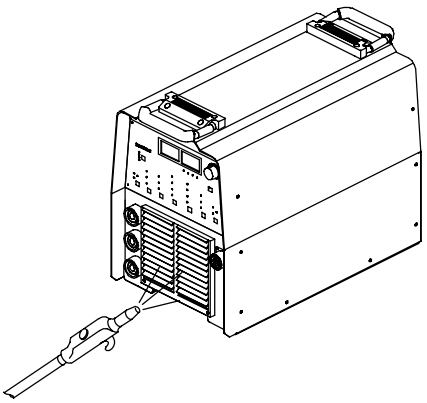


7-2. Blowing Out Inside of Unit

▲ **Do not remove case when blowing out inside of unit.**

Direct airflow through front and back louvers as shown.





ST-802 135-B

7-3. Voltmeter/Ammeter Help Displays

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

1 Typical Help Display (For Help 0)

- Help 0 Display

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

- Help 1 Display

Indicates a malfunction in the primary power circuit caused by an overcurrent condition in the primary IGBT switching circuit. Contact a Factory Authorized Service Agent if this display is shown.

- Help 2 Display

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

- Help 3 Display

Indicates the left side of the unit has overheated. The unit has shut down to allow the fan to cool it (see Section 4-3). Operation will continue when the unit has cooled.

- Help 4 Display

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

- Help 5 Display

Indicates the right side of the unit has overheated. The unit has shut down to allow the fan to cool it (see Section 4-3). Operation will continue when the unit has cooled.

- Help 6 Display

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

- Help 7 Display

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

- Help 8 Display

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

- Help 9 Display

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

- Help 10 Display

Indicates torch trigger is depressed. Release trigger to continue.

- Help 12 Display

Indicates a non-allowable set-up on the front panel.

- Help 13 Display (LX Models Only)

Output disable open causing weld output to stop, but gas continues to flow.

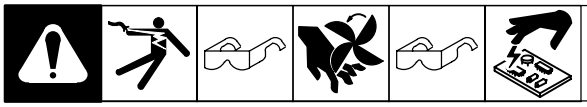
- Help 21 Display

Indicates voltage or current feedback has been detected with contactor off. Contact a Factory Authorized Service Agent if this display is shown.

- Help 22 Display

Voltage and current not present with contactor on. Contact a Factory Authorized Service Agent if this display is shown.

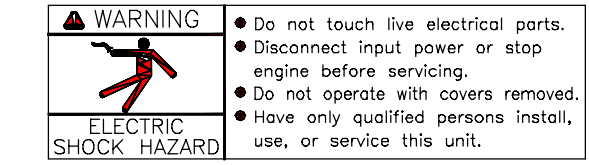
7-4. Troubleshooting



Trouble	Remedy
No weld output; unit completely inoperative.	Place line disconnect switch in On position (see Section 4-12).
	Check and replace line fuse(s), if necessary, or reset circuit breaker (see Section 4-12).
	Check for proper input power connections (see Section 4-12).
No weld output; meter display On.	If using remote control, be sure correct process is enabled to provide output control at Remote 14 receptacle (see Sections 5-1 and 4-7).
	Input voltage outside acceptable range of variation (see Section 4-11).
	Check, repair, or replace remote control.
	Unit overheated. Allow unit to cool with fan On (see Section 4-3).
Erratic or improper weld output.	Use proper size and type of weld cable (see Section 4-6).
	Clean and tighten all weld connections.
No 115 volts ac output at duplex receptacle.	Reset supplementary protector CB1 (see Section 4-5).
Fan not operating.	Check for and remove anything blocking fan movement.
	Have Factory Authorized Service Agent check fan motor.

Trouble	Remedy
Wandering arc	Use proper size tungsten.
	Use properly prepared tungsten.
	Reduce gas flow rate.
Tungsten electrode oxidizing and not remaining bright after conclusion of weld.	Increase postflow time.
	Check and tighten all gas fittings.
	Water in torch. Refer to torch manual.

SECTION 8 – ELECTRICAL DIAGRAM



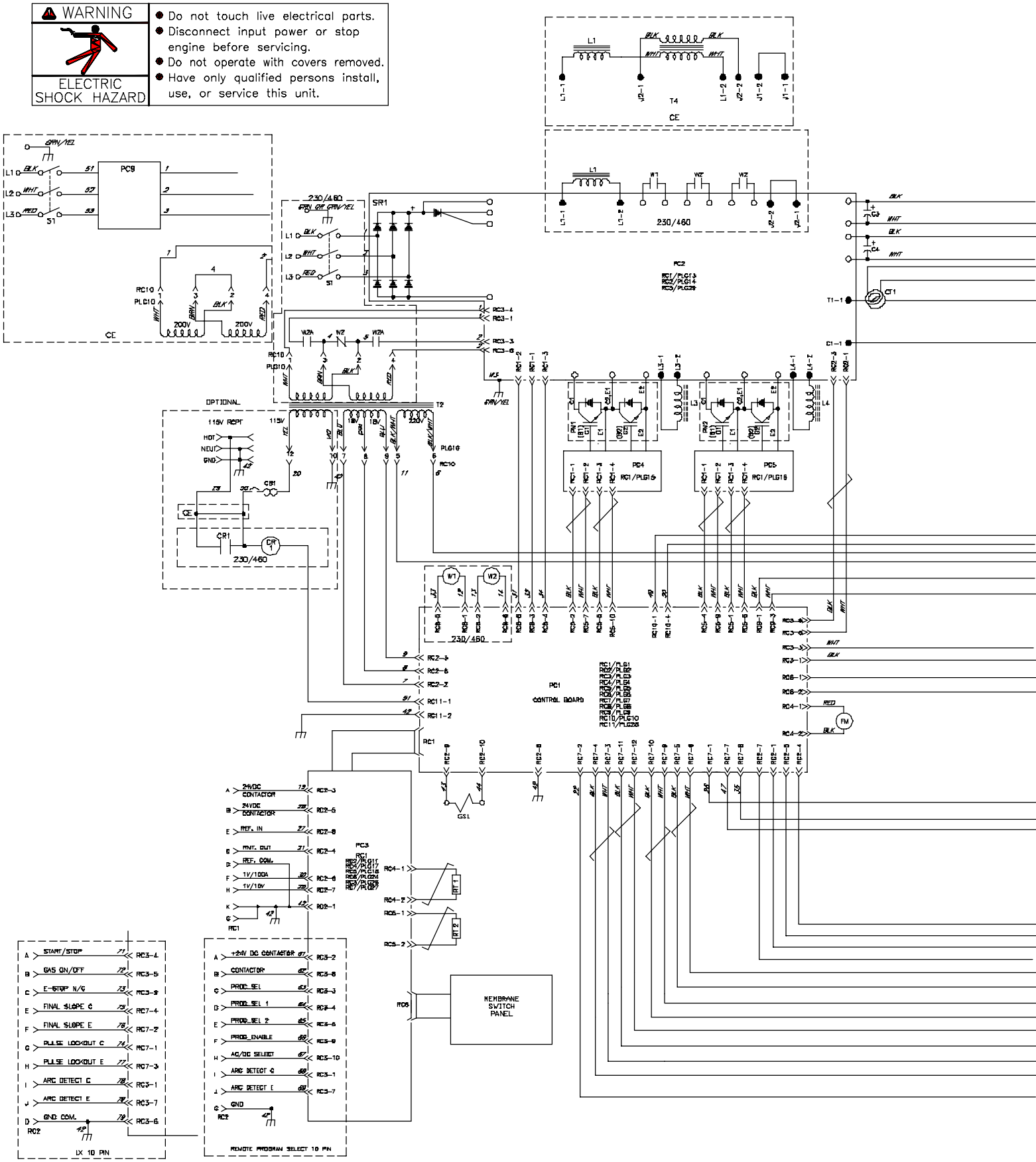
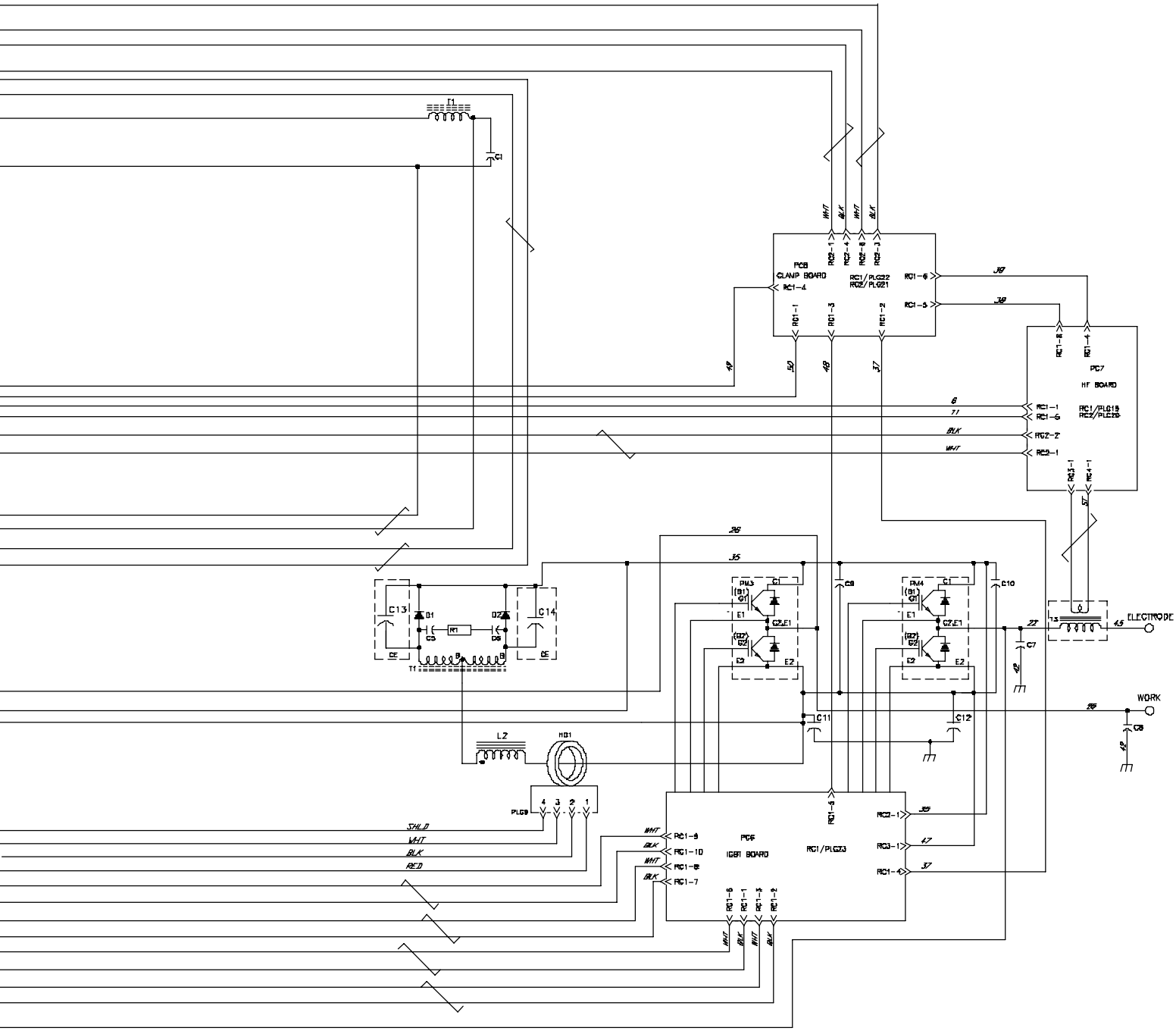


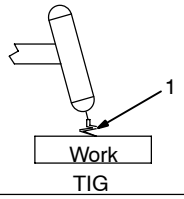
Figure 8-1. Circuit Diagram


T1
C1
PCB
CLAMP BOARD
RC1/PLG22
RC2/PLG21
PC7
HF BOARD
RC1/PLG19
RC2/PLG20
PC6
IGBT BOARD
RC1/PLG23
PW3
PW4
C1
E1
C2,E1
E2
C8
C10
C11
C12
C7
C13
C14
D1
D2
C5
C6
R1
T1
L2
HD1
PLG9
ELECTRODE
WORK
C9
SHLD
WHT
BLK
RED

200 321-G

SECTION 9 – HIGH FREQUENCY (HF)

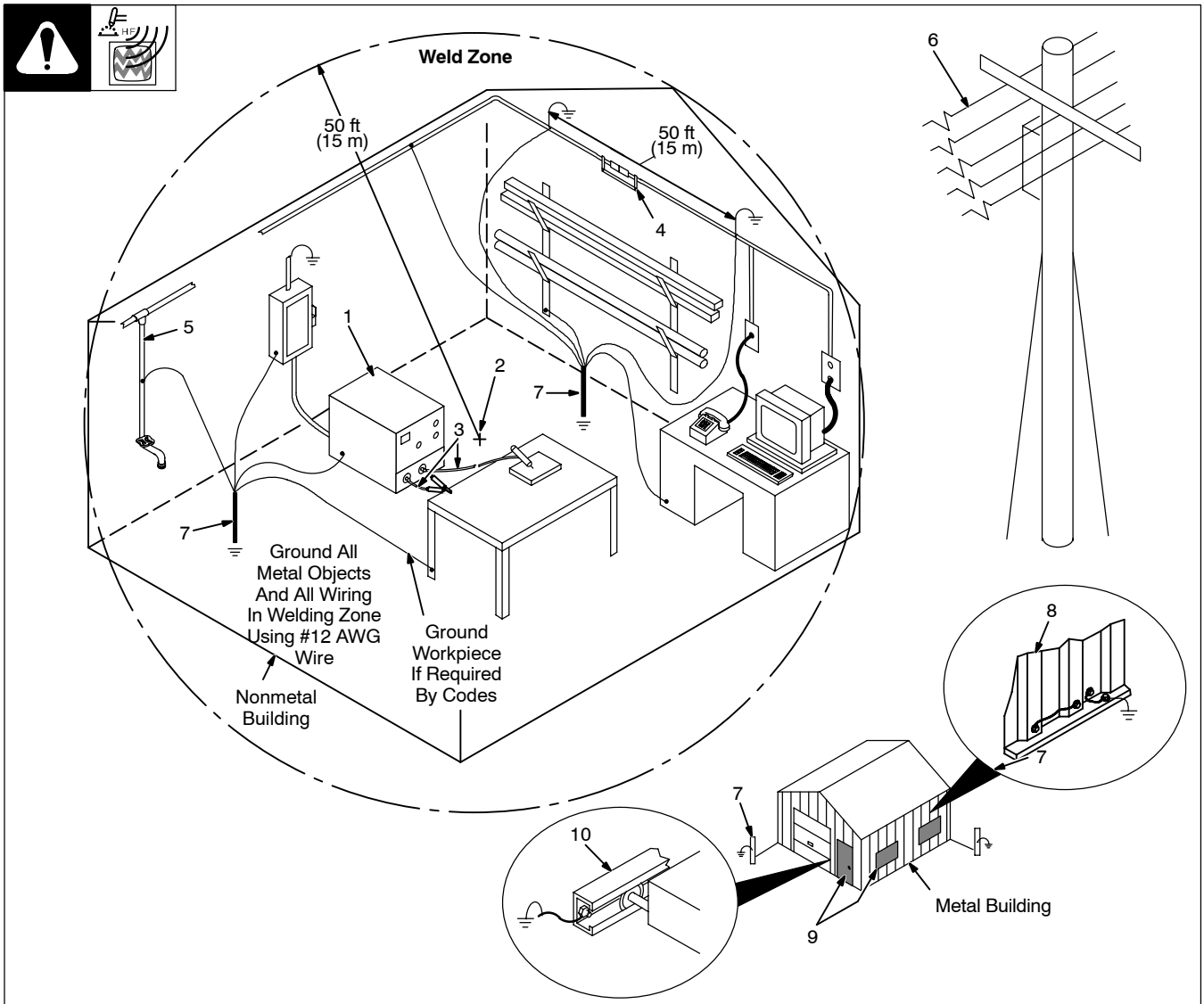
9-1. Welding Processes Requiring High Frequency



1 High-Frequency Voltage

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

9-2. Correct Installation



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 10 – SELECTING AND PREPARING TUNGSTEN ELECTRODE FOR DC OR AC WELDING

ac/dc_gtaw 2/2003

▲ **Whenever possible and practical, use DC weld output instead of AC weld output.**

10-1. Selecting Tungsten Electrode (Wear Clean gloves To Prevent Contamination Of Tungsten)

Electrode Diameter	Amperage Range - Gas Type♦ - Polarity	
	(DCEN) – Argon Direct Current Electrode Negative	AC – Argon 65% Electrode Negative
2% Ceria (Orange Band), 1.5% Lanthanum (Gray Band), Or 2% Thorium (Red Band) Alloy Tungstens		
.040" (1 mm)	25-85	20-80
1/16" (1.6 mm)	50-160	50-150
3/32" (2.4 mm)	135-235	130-250
1/8" (3.2 mm)	250-400	225-360

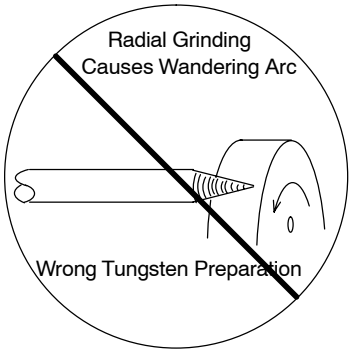
♦ Typical argon shielding gas flow rates are 11 to 35 cfh (cubic feet per hour).

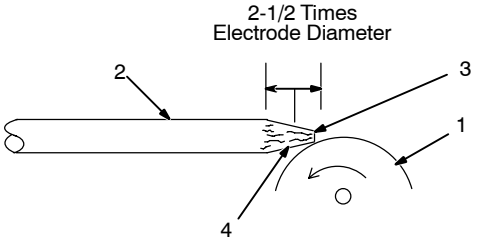
Figures listed are a guide and are a composite of recommendations from American Welding Society (AWS) and electrode manufacturers.

10-2. Preparing Tungsten Electrode For Welding

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

A. Preparing Tungsten For DC Electrode Negative (DCEN) Welding Or AC Welding With Inverter Machines





Ideal Tungsten Preparation – Stable Arc

1 Grinding Wheel

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

2 Tungsten Electrode

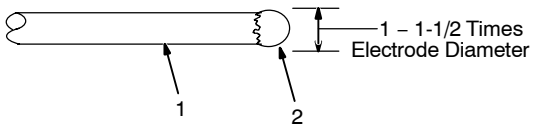
3 Flat

Diameter of this flat determines amperage capacity.

4 Straight Ground

Grind lengthwise, **not radial**.

B. Preparing Tungsten For Conventional AC Welding



1 Tungsten Electrode

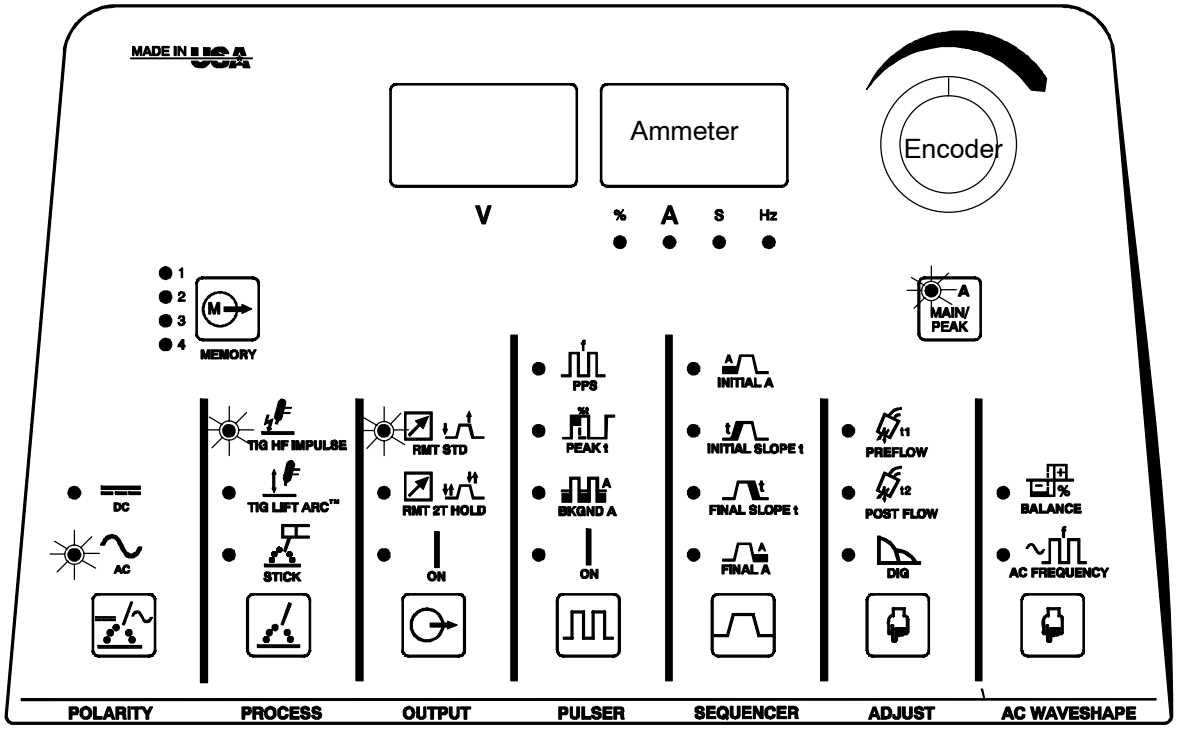
2 Balled End

Ball end of tungsten by applying AC amperage recommended for a given electrode diameter (see Section 10-1). Let ball on end of the tungsten take its own shape.

SECTION 11 – GUIDELINES FOR TIG WELDING (GTAW)

11-1. Typical GTAW Set-Ups

A. AC – GTAW 1/8 in. Aluminum Set-Up



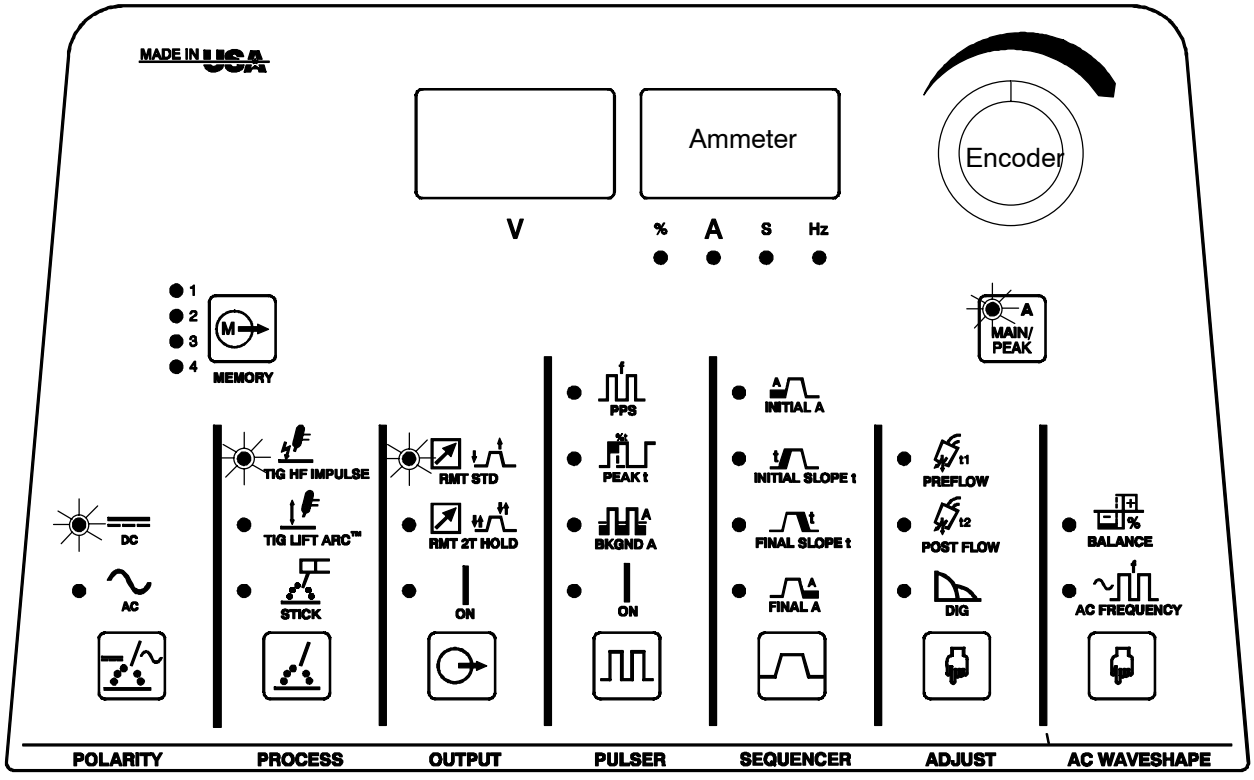
198 708

This symbol indicates which functions should be active for aluminum.

- Turn power on (switch located on rear panel)
- Press Polarity switch pad until AC LED is lit
- Press Process switch pad until TIG HF Impulse LED is lit
- Press Output switch pad until RMT STD LED is lit
- Press Adjust switch pad until Post Flow LED is lit
- Turn Encoder control to set 15 seconds of Post Flow time
- Press AC Waveshape switch pad until Balance LED is lit
- Turn Encoder control to set desired Balance (65 - 80%)
- Press AC Waveshape switch pad until AC Frequency LED is lit
- Turn Encoder control to set desired AC Frequency (100 - 150 Hz)
- Press Amperage **A** switch pad until LED is lit
- Turn Encoder control to set desired amperage (125 - 160 amps).

☞ *The ammeter displays the parameter for any of the following units of measure when they are active: amperage, time, percentage, or frequency. The corresponding LED, located directly below the ammeter, will also light up. The ammeter also displays actual amperage while welding.*

B. DC - GTAW 16 Gauge Stainless Steel Set-Up



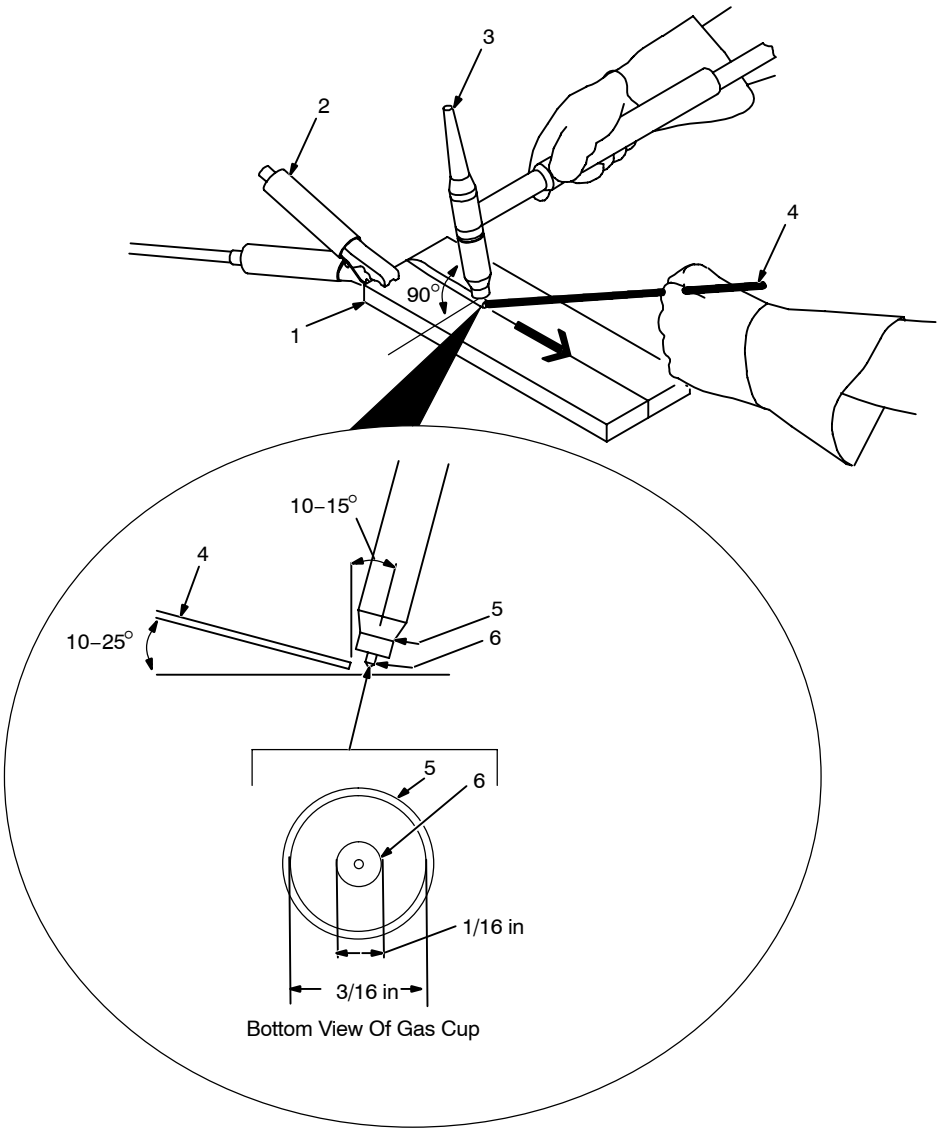
198 708

☼ This symbol indicates which functions should be active for stainless steel.

- Turn power on (switch located on rear panel)
- Press Polarity switch pad until DC LED is lit
- Press Process switch pad until TIG HF Impulse LED is lit
- Press Output switch pad until RMT STD LED is lit
- Press Adjust switch pad until Post Flow LED is lit
- Turn Encoder control to set 8 seconds of Post Flow time
- Press Amperage **A** switch pad until LED is lit
- Turn Encoder control to set desired amperage (50 - 80 amps).

☞ *The ammeter displays the parameter for any of the following units of measure when they are active: amperage, time, percentage, or frequency. The corresponding LED, located directly below the ammeter, will also light up. The ammeter also displays actual amperage while welding.*

11-2. Positioning The Torch



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

1 Workpiece

Make sure workpiece is clean before welding.

2 Work Clamp

Place as close to the weld as possible.

3 Torch

4 Filler Rod (If Applicable)

5 Gas Cup

6 Tungsten Electrode

Select and prepare tungsten according to Section 10.

Guidelines:

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

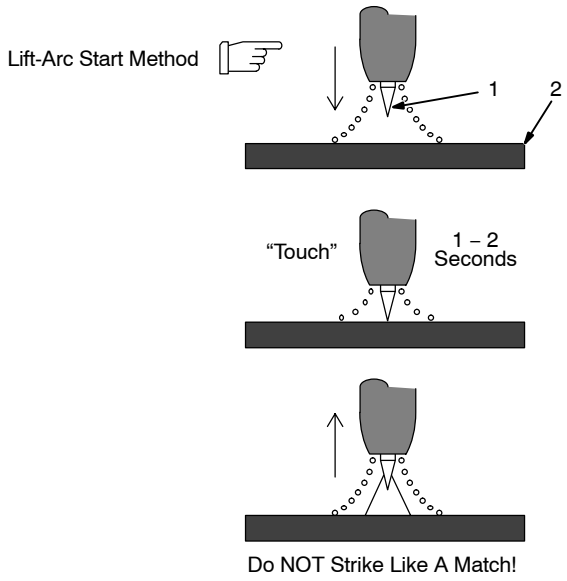
Tungsten extension is the distance the tungsten extends out gas cup of torch.

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

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

Ref. ST-161 892

11-3. Lift-Arc™ And HF TIG Start Procedures



Lift-Arc Start

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

1 TIG Electrode

2 Workpiece

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

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

Application:

Lift-Arc is used for the DCEN or AC GTAW process when HF Start method is not permitted, or to replace the scratch method.

HF Start

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

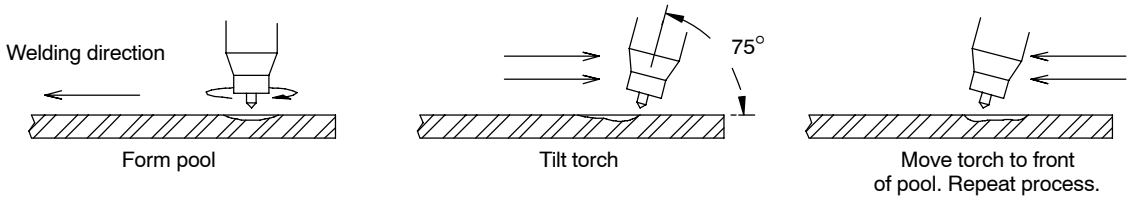
High frequency turns on to help start arc when output is enabled. High frequency turns off when arc is started, and turns on whenever arc is broken to help restart arc.

Application:

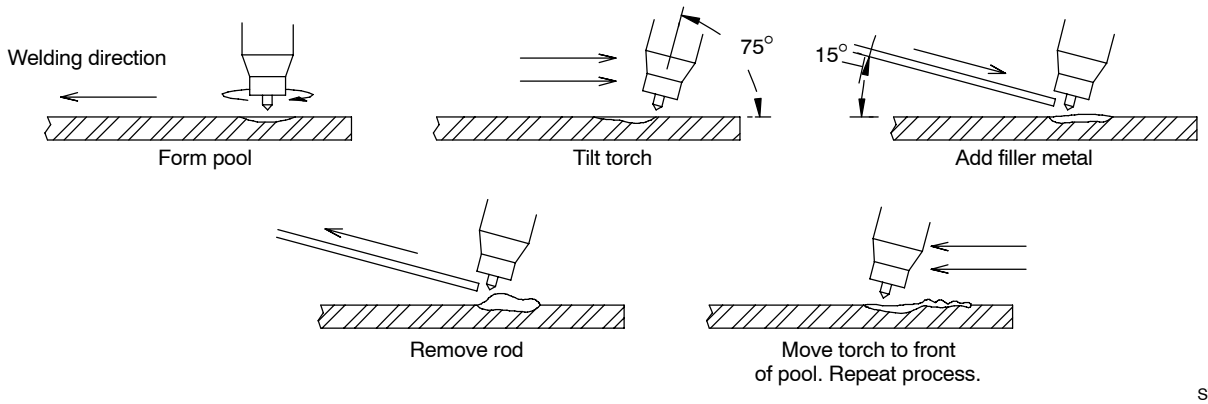
HF start is used for the DCEN GTAW process when a non-contact arc starting method is required.

11-4. Torch Movement During Welding

Tungsten Without Filler Rod



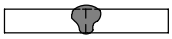
Tungsten With Filler Rod

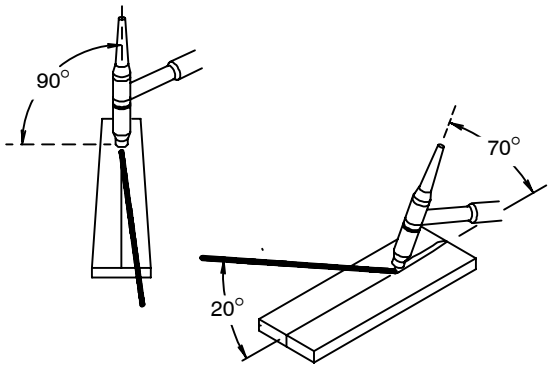


ST-162 002-B

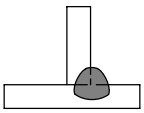
11-5. Positioning Torch Tungsten For Various Weld Joints

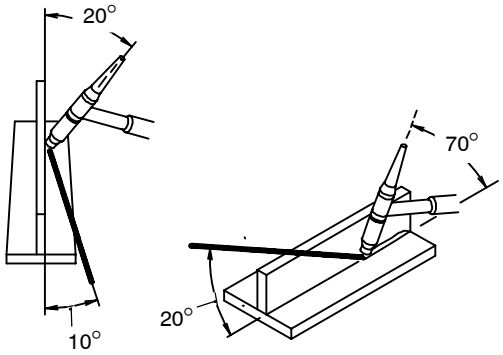
Butt Weld And Stringer Bead



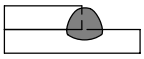


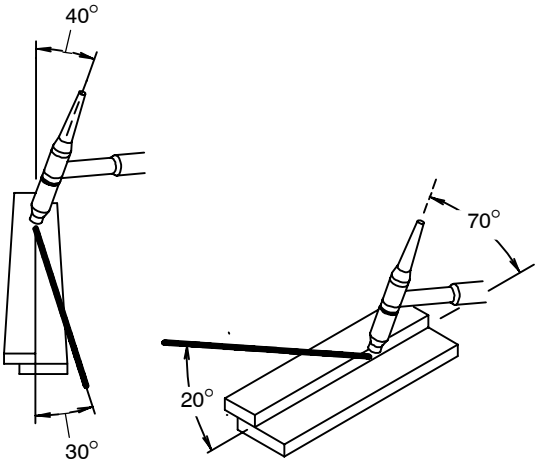
"T" Joint



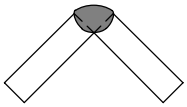


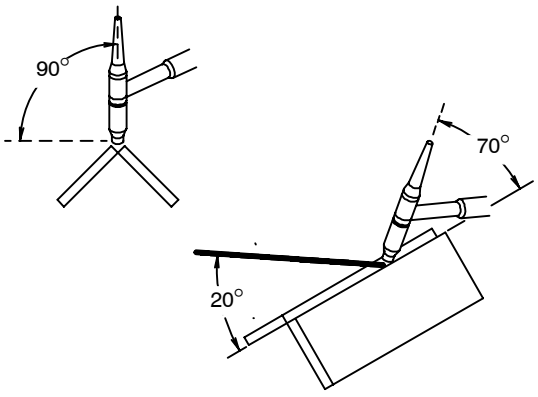
Lap Joint





Corner Joint

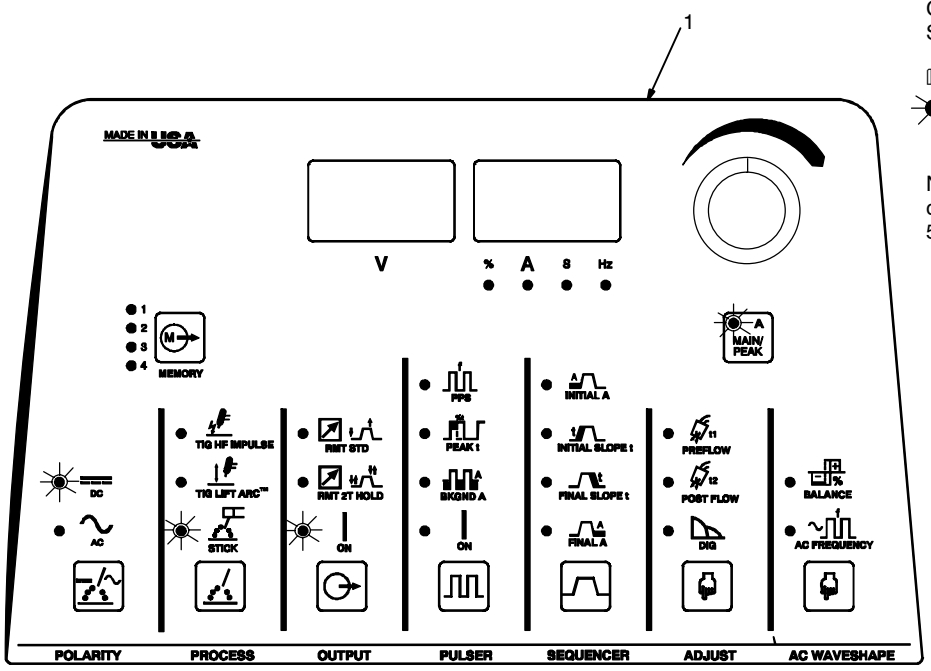




ST-162 003 / S-0792

SECTION 12 – STICK WELDING (SMAW) GUIDELINES

12-1. Front Panel Display For Stick DCEP (Direct Current Electrode Positive)



1 Front Panel

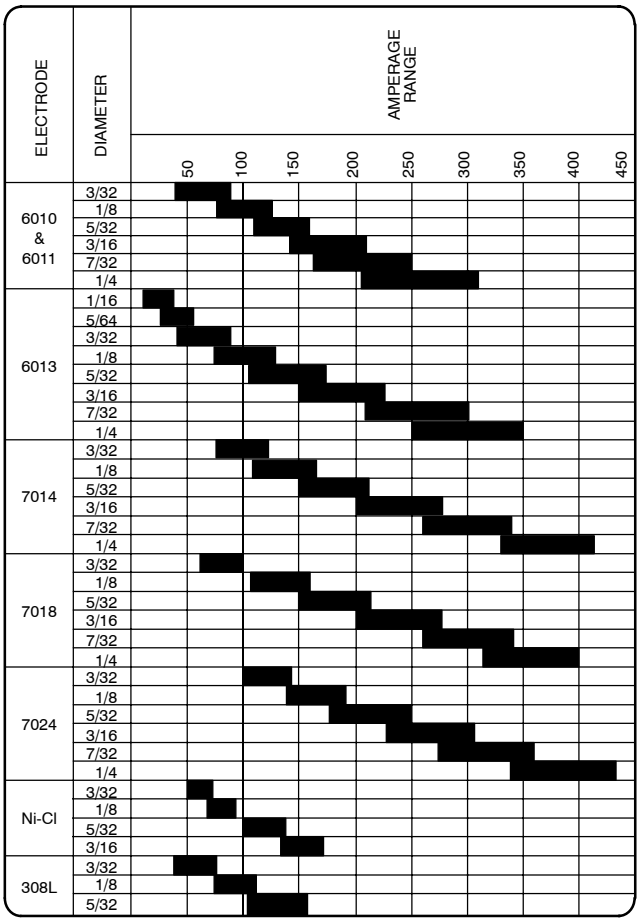
Correct front panel display for basic Stick DCEP welding.

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

NOTE: Gray on nameplate indicates a Stick function (see Section 5-1 for description of controls).

ST-198 708

12-2. Electrode and Amperage Selection Chart

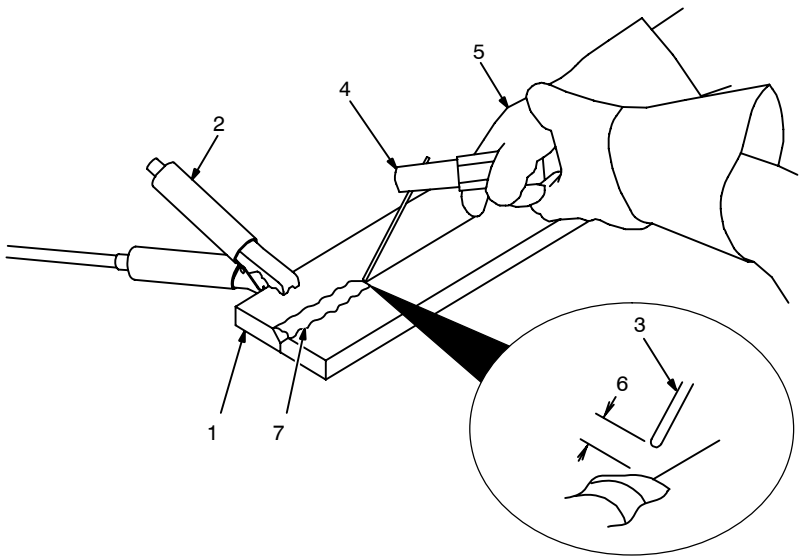


ELECTRODE	DC*	AC	POSITION	PENETRATION	USAGE
6010	EP		ALL	DEEP	MIN. PREP, ROUGH HIGH SPATTER
6011	EP	✓	ALL	DEEP	
6013	EP,EN	✓	ALL	LOW	GENERAL
7014	EP,EN	✓	ALL	MED	SMOOTH, EASY, FAST
7018	EP	✓	ALL	LOW	LOW HYDROGEN, STRONG
7024	EP,EN	✓	FLAT HORIZ FILLET	LOW	SMOOTH, EASY, FASTER
NI-CL	EP	✓	ALL	LOW	CAST IRON
308L	EP	✓	ALL	LOW	STAINLESS

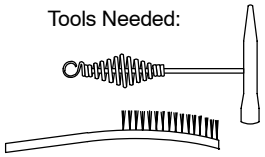
*EP = ELECTRODE POSITIVE (REVERSE POLARITY)
EN = ELECTRODE NEGATIVE (STRAIGHT POLARITY)

Ref. S-087 985-A

12-3. Stick Welding Procedure



Tools Needed:



▲ **Weld current starts when electrode touches workpiece.**

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

1 Workpiece

Make sure workpiece is clean before welding.

2 Work Clamp

3 Electrode

A small diameter electrode requires less current than a large one. Follow electrode manufacturer's instructions when setting weld amperage (see Section 12-2).

4 Insulated Electrode Holder

5 Electrode Holder Position

6 Arc Length

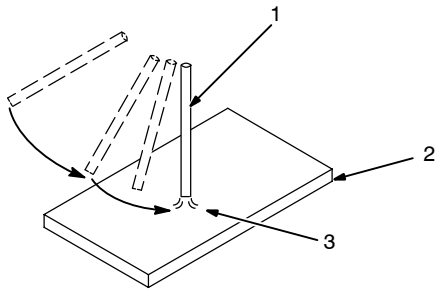
Arc length is the distance from the electrode to the workpiece. A short arc with correct amperage will give a sharp, crackling sound.

7 Slag

Use a chipping hammer and wire brush to remove slag. Remove slag and check weld bead before making another weld pass.

stick 12/96 – ST-151 593

12-4. Striking an Arc – Scratch Start Technique



1 Electrode

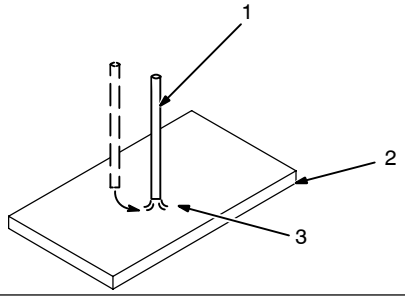
2 Workpiece

3 Arc

Drag electrode across workpiece like striking a match; lift electrode slightly after touching work. If arc goes out electrode was lifted too high. If electrode sticks to workpiece, use a quick twist to free it.

S-0049

12-5. Striking an Arc – Tapping Technique



1 Electrode

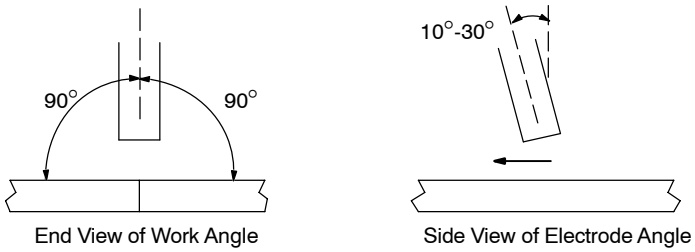
2 Workpiece

3 Arc

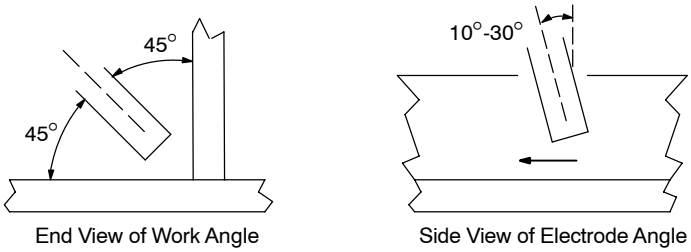
Bring electrode straight down to workpiece; then lift slightly to start arc. If arc goes out, electrode was lifted too high. If electrode sticks to workpiece, use a quick twist to free it.

S-0050

12-6. Positioning Electrode Holder



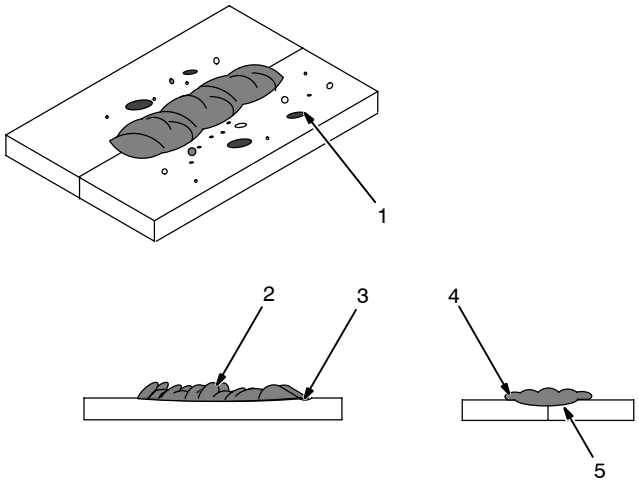
GROOVE WELDS



FILLET WELDS

S-0060

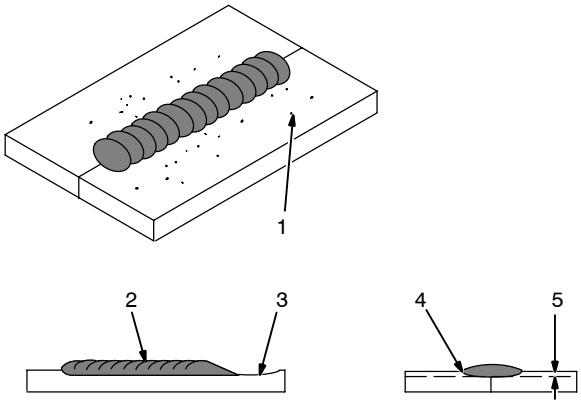
12-7. Poor Weld Bead Characteristics



1 Large Spatter Deposits
2 Rough, Uneven Bead
3 Slight Crater During Welding
4 Bad Overlap
5 Poor Penetration

S-0053-A

12-8. Good Weld Bead Characteristics



1 Fine Spatter
2 Uniform Bead
3 Moderate Crater During Welding

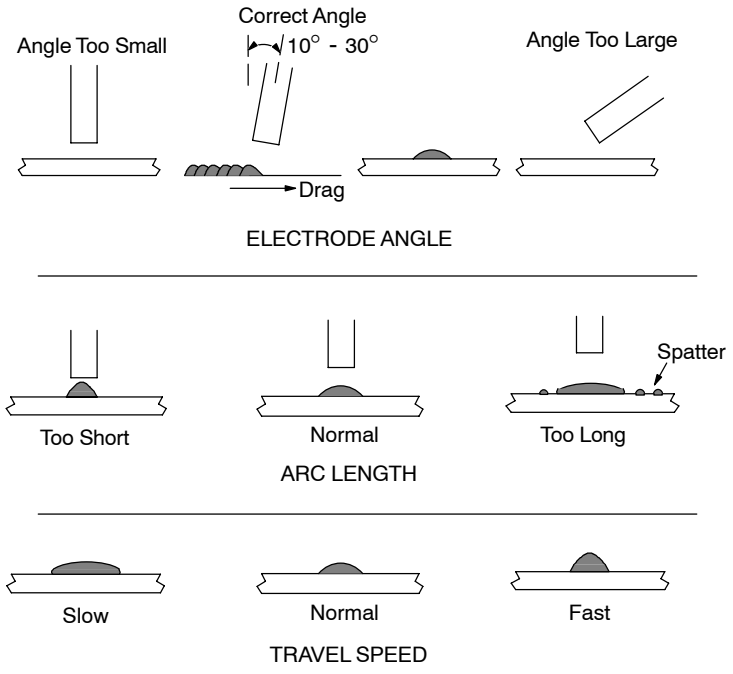
Weld a new bead or layer for each 1/8 in. (3.2 mm) thickness in metals being welded.

4 No Overlap
5 Good Penetration into Base Metal

S-0052-B

12-9. Conditions That Affect Weld Bead Shape

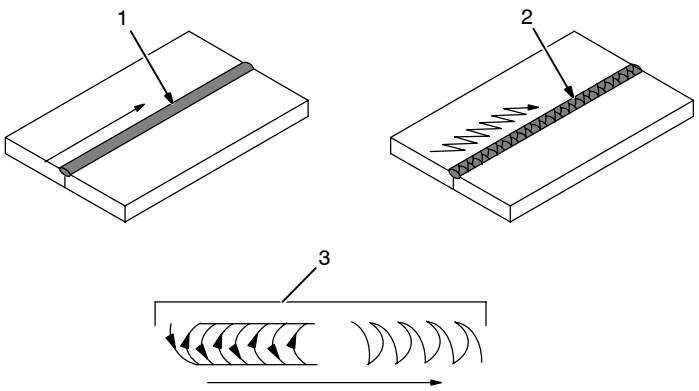
NOTE ☞ *Weld bead shape is affected by electrode angle, arc length, travel speed, and thickness of base metal.*



S-0061

12-10. Electrode Movement During Welding

NOTE ☞ *Normally, a single stringer bead is satisfactory for most narrow groove weld joints; however, for wide groove weld joints or bridging across gaps, a weave bead or multiple stringer beads work better.*



1 Stringer Bead – Steady Movement Along Seam

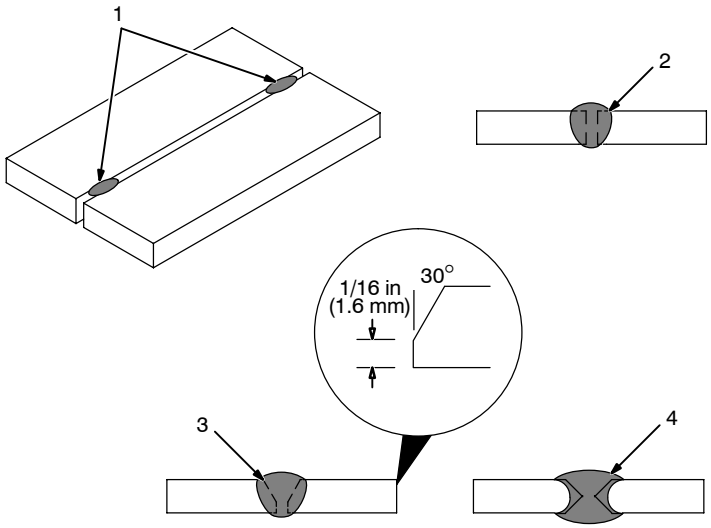
2 Weave Bead – Side to Side Movement Along Seam

3 Weave Patterns

Use weave patterns to cover a wide area in one pass of the electrode. Do not let weave width exceed 2-1/2 times diameter of electrode.

S-0054-A

12-11. Butt Joints



1 Tack Welds

Prevent edges of joint from drawing together ahead of electrode by tack welding the materials in position before final weld.

2 Square Groove Weld

Good for materials up to 3/16 in (5 mm) thick.

3 Single V-Groove Weld

Good for materials 3/16 – 3/8 in (5-9 mm) thick. Cut bevel with oxyacetylene or plasma cutting equipment. Remove scale from material after cutting. A grinder can also be used to prepare bevels.

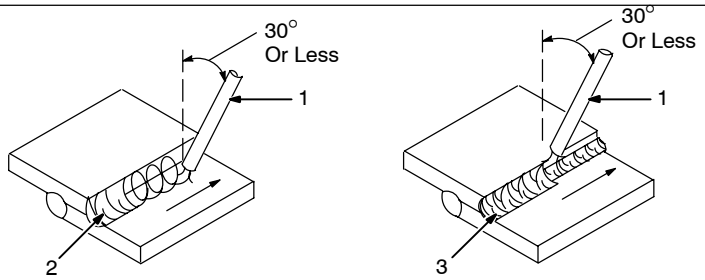
Create 30 degree angle of bevel on materials in V-groove welding.

4 Double V-Groove Weld

Good for materials thicker than 3/8 in (9 mm).

S-0662

12-12. Lap Joint



1 Electrode

2 Single-Layer Fillet Weld

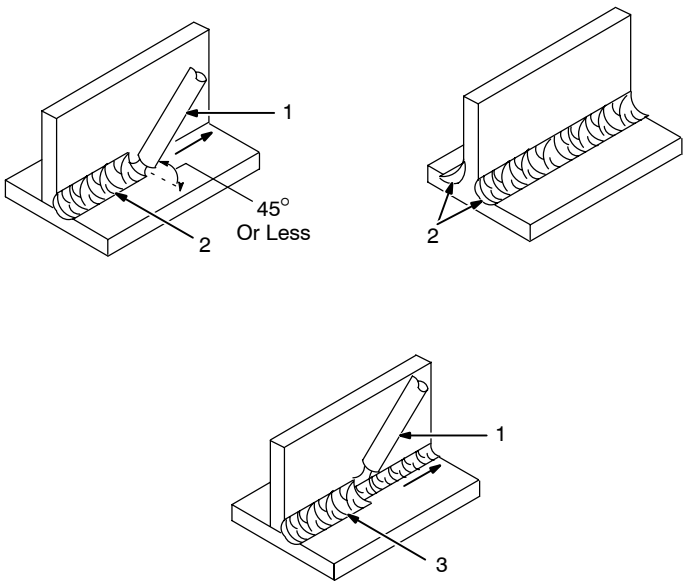
Move electrode in circular motion.

3 Multi-Layer Fillet Weld

Weld a second layer when a heavier fillet is needed. Remove slag before making another weld pass. Weld both sides of joint for maximum strength.

S-0063 / S-0064

12-13. Tee Joint



1 Electrode

2 Fillet Weld

Keep arc short and move at definite rate of speed. Hold electrode as shown to provide fusion into the corner. Square edge of the weld surface.

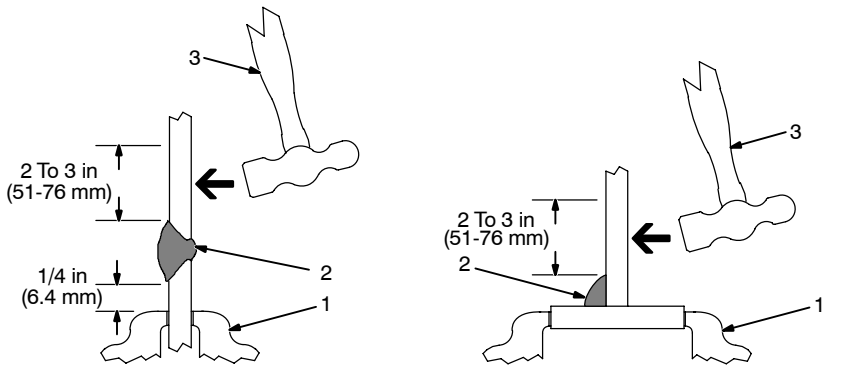
For maximum strength weld both sides of upright section.

3 Multi-Layer Deposits

Weld a second layer when a heavier fillet is needed. Use any of the weaving patterns shown in Section 12-10. Remove slag before making another weld pass.

S-0060 / S-0058-A / S-0061

12-14. Weld Test

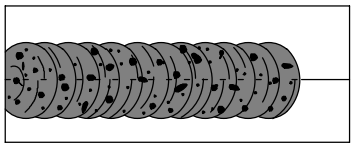


1 Vise
2 Weld Joint
3 Hammer

Strike weld joint in direction shown. A good weld bends over but does not break.

S-0057-B

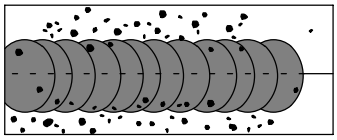
12-15. Troubleshooting – Porosity



Porosity – small cavities or holes resulting from gas pockets in weld metal.

Possible Causes	Corrective Actions
Arc length too long.	Reduce arc length.
Damp electrode.	Use dry electrode.
Workpiece dirty.	Remove all grease, oil, moisture, rust, paint, coatings, slag, and dirt from work surface before welding.

12-16. Troubleshooting – Excessive Spatter



Excessive Spatter – scattering of molten metal particles that cool to solid form near weld bead.

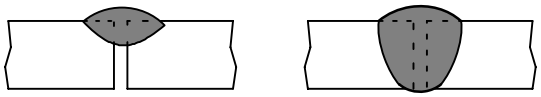
Possible Causes	Corrective Actions
Amperage too high for electrode.	Decrease amperage or select larger electrode.
Arc length too long or voltage too high.	Reduce arc length or voltage.

12-17. Troubleshooting – Incomplete Fusion

Incomplete Fusion – failure of weld metal to fuse completely with base metal or a preceeding weld bead.

Possible Causes	Corrective Actions
Insufficient heat input.	Increase amperage. Select larger electrode and increase amperage.
Improper welding technique.	Place stringer bead in proper location(s) at joint during welding.
	Adjust work angle or widen groove to access bottom during welding.
	Momentarily hold arc on groove side walls when using weaving technique.
	Keep arc on leading edge of weld puddle.
Workpiece dirty.	Remove all grease, oil, moisture, rust, paint, coatings, slag, and dirt from work surface before welding.

12-18. Troubleshooting – Lack Of Penetration

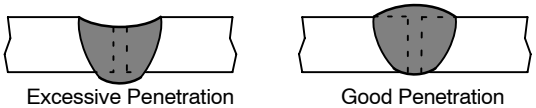


Lack of Penetration Good Penetration

Lack Of Penetration – shallow fusion between weld metal and base metal.

Possible Causes	Corrective Actions
Improper joint preparation.	Material too thick. Joint preparation and design must provide access to bottom of groove.
Improper weld technique.	Keep arc on leading edge of weld puddle.
Insufficient heat input.	Increase amperage. Select larger electrode and increase amperage.
	Reduce travel speed.

12-19. Troubleshooting – Excessive Penetration

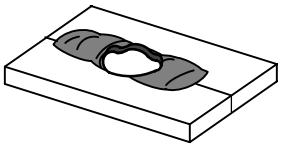


Excessive Penetration Good Penetration

Excessive Penetration – weld metal melting through base metal and hanging underneath weld.

Possible Causes	Corrective Actions
Excessive heat input.	Select lower amperage. Use smaller electrode.
	Increase and/or maintain steady travel speed.

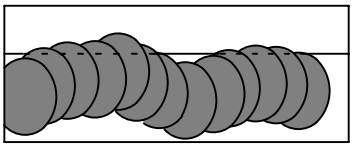
12-20. Troubleshooting – Burn-Through



Burn-Through – weld metal melting completely through base metal resulting in holes where no metal remains.

Possible Causes	Corrective Actions
Excessive heat input.	Select lower amperage. Use smaller electrode.
	Increase and/or maintain steady travel speed.

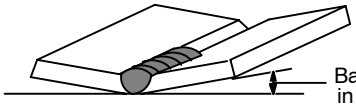
12-21. Troubleshooting – Waviness Of Bead



Waviness Of Bead – weld metal that is not parallel and does not cover joint formed by base metal.

Possible Causes	Corrective Actions
Unsteady hand.	Use two hands. Practice technique.

12-22. Troubleshooting – Distortion



Distortion – contraction of weld metal during welding that forces base metal to move.

Possible Causes	Corrective Actions
Excessive heat input.	Use restraint (clamp) to hold base metal in position.
	Make tack welds along joint before starting welding operation.
	Select lower amperage for electrode.
	Increase travel speed.
	Weld in small segments and allow cooling between welds.

Notes

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

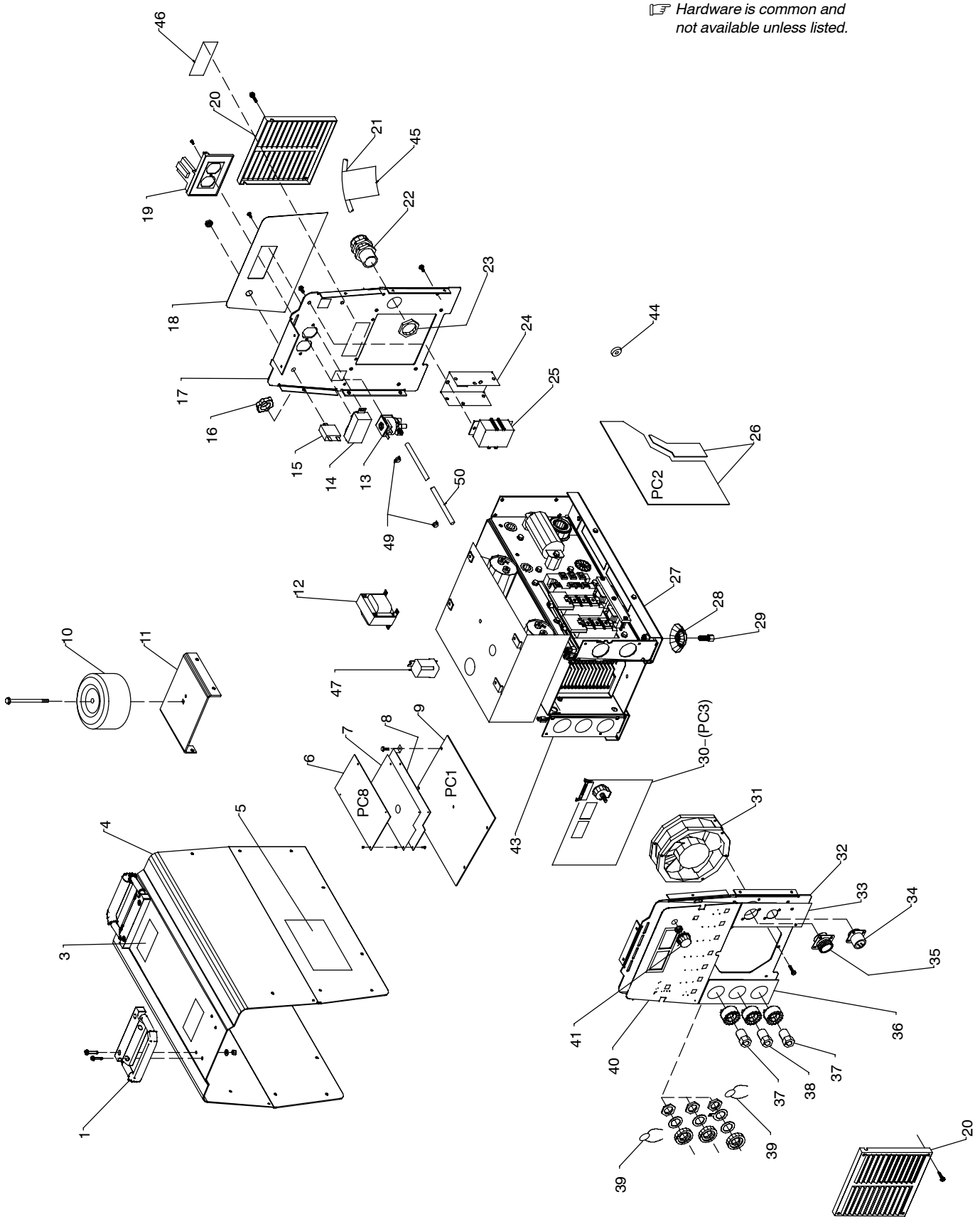


Figure 13-1. Main Assembly

ST-801 870-L

Item No.	Dia. Mkgs.	Part No.	Description	Quantity Model 230/460	Quantity Model 400 CE
			Figure 13-1. Main Assembly		
1		206 108	HANDLE, rubberized carrying	2	2
3		138 442	LABEL, caution falling	2	
3		179 309	LABEL, caution falling		2
4		+175 148	WRAPPER	1	1
		175 256	INSULATOR, side RH & LH	2	2
5		134 327	LABEL, warning general precautionary	2	
5		179 310	LABEL, warning general precautionary		2
6	PC8	206 261	CIRCUIT CARD ASSEMBLY, clamp	1	1
	PLG21	115 094	CONNECTOR & SOCKETS	1	1
	PLG22	115 093	CONNECTOR & SOCKETS	1	1
7		183 613	INSULATOR, PC card clamp	1	1
8		182 498	BRACKET, mtg PC card clamp		1
9	PC1	211 242	CIRCUIT CARD ASSEMBLY, control	1	
9	PC1	211 239	CIRCUIT CARD ASSEMBLY, control		1
	PLG2	115 091	CONNECTOR & SOCKETS	1	1
	PLG3	115 092	CONNECTOR & SOCKETS	1	1
	PLG4	131 054	CONNECTOR & SOCKETS	1	1
	PLG5	115 091	CONNECTOR & SOCKETS	1	1
	PLG7	130 203	CONNECTOR & SOCKETS	1	1
	PLG8	115 092	CONNECTOR & SOCKETS	1	1
	PLG9	131 204	CONNECTOR & SOCKETS	1	1
	PLG10	115 094	CONNECTOR & SOCKETS	1	1
10	T2	♦193 311	TRANSFORMER, control		1
10	T2	♦193 310	TRANSFORMER, control	1	
11		♦187 461	BRACKET, mtg aux transformer		1
12	T2	189 536	TRANSFORMER, control	1	
12	T2	180 873	TRANSFORMER, control		1
	RC10	166 679	CONNECTOR & SOCKETS	1	1
	PLG10	166 680	CONNECTOR & PINS	1	1
13	GS1	133 873	VALVE, 24VDC 2way	1	1
14		♦189 033	RECEPTACLE, str dx grd 2P 3W 15A	1	1
15	CB1	♦083 432	SUPPLEMENTARY PROTECTOR, 1P 10A 250VAC	1	
15	CB1	♦161 078	SUPPLEMENTARY PROTECTOR, 1P 7A 250VAC		1
16		605 227	NUT, .750-14 knurled	1	1
17		182 205	PANEL, rear	1	1
18			PLATE, identification rear (order by model and serial number)	1	1
19		♦175 282	COVER, receptacle	1	1
20		175 138	BOX, louver	2	2
21		182 561	CABLE, pwr	1	1
22		201 155	BUSHING, strain relief .450/.709 ID	1	1
23		198 245	NUT, stl locking	1	1
24		176 226	INSULATOR, switch power	1	1
25	S1	128 756	SWITCH, tgl 3PST 40A 600VAC (Power Switch)	1	1
26	PC2	213 198	KIT, interconnecting replacement	1	1
		176 879	SCREW, M5−.8−2	18	18
	PLG13	131 204	CONNECTOR & SOCKETS	1	1
	PLG14	115 094	CONNECTOR & SOCKETS	1	1
		179 626	BUS BAR, interconnecting	1	1
27		+208 471	BASE	1	1
28		173 693	FOOT, mtg unit	4	4
29		176 736	SCREW, mtg foot	4	4
30	PC3	224 480	CIRCUIT CARD, front panel (DX and SD models) (includes)	1	1
30	PC3	224 481	CIRCUIT CARD, front panel (LX models) (includes)	1	1
	DD1-6	186 914	LED	6	6
	PLG17, 18	131 054	CONNECTOR & SOCKETS	1	1

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

Figure 13-1. Main Assembly (Continued)

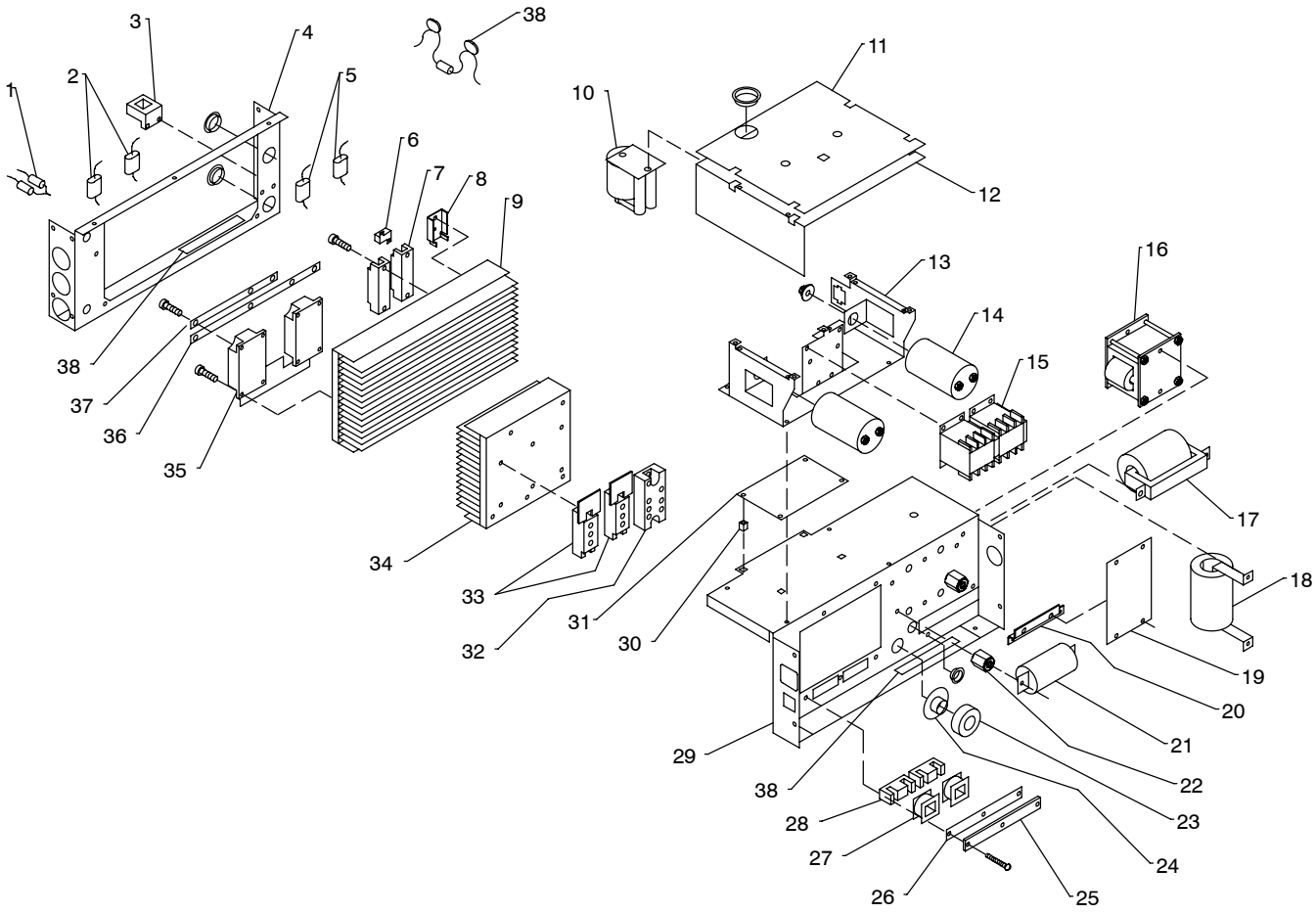
	PLG26	115 091	CONNECTOR & SOCKETS	1	1
	PLG11	115 092	RECEPTACLE, w/leads & plug	1	1
31	FM	175 084	MOTOR, fan 24VDC 3000RPM	1	1
		135 635	CONNECTOR & SOCKETS	1	1
32		200 320	PANEL, front	1	1
33		191 173	NAMEPLATE, RH	1	1
33		191 172	NAMEPLATE, RH W/Optional 10-pin Installed (LX models)	1	1
34	RC2	♦191 302	CONNECTOR & SOCKETS	1	1
34	RC2	♦197 181	CONNECTOR & SOCKETS (LX models)	1	1
35	RC1	188 186	CONNECTOR & SOCKETS	1	1
36		192 018	NAMEPLATE, LH	1	1
37		202 813	RECEPTACLE, twist lock power assembly (female)	2	2
38		202 810	RECEPTACLE, gas panel mount (male)	1	
38		202 815	RECEPTACLE, gas panel mount (female)	1	
39	C7,8	186 543	CAPACITOR ASSEMBLY	2	2
40		198 707	MEMBRANE PANEL (DX, LX models)	1	
40		198 710	MEMBRANE PANEL (SD models)	1	
40		198 713	MEMBRANE PANEL (DX, LX, CE models)		1
40		198 715	MEMBRANE PANEL (SD CE models)		1
41		174 991	KNOB, encoder	1	1
43		Fig13-2	WINDTUNNELS w/COMPONENTS	1	1
44	T4	182 108	CHOKE		1
45		182 826	LABEL, warning electric shock power cord	1	
46		148 329	LABEL, caution incorrect voltage	1	
47		♦059 266	RELAY, encl 120 VAC DPDT 10A/120VAC 8-Pin Flange Mtg	1	
49		089 120	CLAMP, hose .375 – .450 clp dia	2	2
50		188 048	HOSE, nprn brd no.1 x .250 ID x 18.00	1	1

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

♦Optional

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

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



ST-801 871-F

Figure 13-2. Windtunnels w/Components

Item No.	Dia. Mkgs.	Part No.	Description	Quantity Model 230/460	Quantity Model 400 CE
			Figure 13-2. Windtunnels w/Components (Fig 13-1 Item 43)		
1	C11,12	185 424	CAPACITOR, filter assembly	1	1
2	C9,10	201 391	CAPACITOR, polyp met film 1uf 600VDC	2	2
3	HD1	182 918	TRANSDUCER, current 400A	1	1
4		+182 206	WINDTUNNEL, LH	1	1
5		185 424	CAPACITOR, filter assembly	2	
6	R1,C5,6	175 194	RESISTOR/CAPACITOR	1	1
7	D1,2	185 775	KIT, diode	2	2
8		188 361	HEAT SINK	2	2
9		182 208	HEAT SINK	1	1
10	T3	182 667	TRANSFORMER, coupling	1	1
11		183 073	INSULATOR, PC card HF	1	1
12		182 499	ENCLOSURE, HF	1	1
13		182 806	BRACKET, mtg contactor/capacitor/PC board	1	1
14	C3,4	174 980	CAPACITOR, elctlt 2700uf 420VDC	2	2
15	W1,2,2A	223 006	CONTACTOR, w/interlock and standoffs	1	

Item No.	Dia. Mkgs.	Part No.	Description	Quantity Model 230/460	Quantity Model 400 CE
			Figure 13-2. Windtunnels w/Components (Fig 13-1 Item 43) (Continued)		
16	T1	183 014	TRANSFORMER, HF	1	1
17	L2	183 009	STABILIZER, output	1	1
18	L1	187 522	INDUCTOR, input	1	1
19	PC9	187 264	CIRCUIT CARD ASSEMBLY, input filter		1
20		187 463	BRACKET		1
21	C1	186 549	CAPACITOR, polyp .27uf 1000VDC	1	1
22		025 248	STAND-OFF, insul .250-20 x 1.250 lg	2	2
23	CT1	175 199	TRANSFORMER, current	1	1
24		177 547	BUSHING, snap-in CT-mount	1	1
25		175 140	BRACKET, DI-DT	1	1
26		181 197	GASKET, DI-DT rubber	1	1
27	L3,4	204 685	COIL, DI-DT	2	2
28		109 056	CORE	2	2
29		+187 460	WINDTUNNEL, RH	1	1
30		141 690	GROMMET, scr No. 8/10	4	4
31	PC7	189 135	CIRCUIT CARD, HF (includes)	1	1
	F1	012 633	FUSE, mintr gl 1A 250V	1	1
		196 455	POINT, spark gap	2	2
	PLG19	115 092	CONNECTOR & SOCKETS	1	1
	PLG20	131 054	CONNECTOR & SOCKETS	1	1
32	SR1	179 629	KIT, diode	1	1
33	PM1,2/PC4,5	179 628	KIT, transistor IGBT module	1	1
	RT1,2	173 632	THERMISTOR, NTC 30K ohm	2	2
34		173 631	HEAT SINK, power module	1	1
35	PM3,4/PC6	206 477	KIT, IGBT	1	1
	PLG23	115 091	CONNECTOR & SOCKETS	1	1
36		196 958	BUS BAR, diode IGBT	1	1
37		196 957	BUS BAR, IGBT	1	1
38		185 835	LABEL, warning exploding parts	2	
38		185 836	LABEL, warning exploding parts		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.

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TRUE BLUE® WARRANTY

Effective January 1, 2006
(Equipment with a serial number preface of "LG" or newer)

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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
2. 3 Years — Parts and Labor
   * Transformer/Rectifier Power Sources
   * Plasma Arc Cutting Power Sources
   * Process Controllers
   * Semi-Automatic and Automatic Wire Feeders
   * Inverter Power Sources (Unless Otherwise Stated)
   * Water Coolant Systems (Integrated)
   * Intellitig
   * Engine Driven Welding Generators **(NOTE: Engines are warranted separately by the engine manufacturer.)**
3. 1 Year — Parts and Labor Unless Specified
   * Motor Driven Guns (w/exception of Spoolmate Spoolguns)
   * Positioners and Controllers
   * Automatic Motion Devices
   * RFCS Foot Controls
   * Induction Heating Power Sources, Coolers, and Electronic Controls/Recorders
   * Water Coolant Systems (Non-Integrated)
   * Flowgauge and Flowmeter Regulators (No Labor)
   * HF Units
   * Grids
   * Spot Welders
   * Load Banks
   * Arc Stud Power Sources & Arc Stud Guns
   * Racks
   * Running Gear/Trailers
   * Plasma Cutting Torches (except APT & SAF Models)
   * Field Options (NOTE: Field options are covered under True Blue® for the remaining warranty period of the product they are installed in, or for a minimum of one year — whichever is greater.)
   * Bernard-Branded Mig Guns (No Labor)
   * Weldcraft-Branded TIG Torches (No Labor)
   * Subarc Wire Drive Assemblies
4. 6 Months — Batteries
5. 90 Days — Parts
   * MIG Guns/TIG Torches and Subarc (SAW) Guns
   * Induction Heating Coils and Blankets, Cables, and Non-Electronic Controls
   * APT & SAF Model Plasma Cutting Torches
   * Remote Controls
   * Accessory (Kits)
   * Replacement Parts (No labor)
   * Spoolmate Spoolguns
   * 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. (Exception: brushes, slip rings, and relays are covered on Bobcat, Trailblazer, and Legend models.)**
2. Items furnished by Miller, but manufactured by others, such as engines or trade accessories. These items are covered by the manufacturer's warranty, if any.
3. Equipment that has been modified by any party other than Miller, or equipment that has been improperly installed, improperly operated or misused based upon industry standards, or equipment which has not had reasonable and necessary maintenance, or equipment which has been used for operation outside of the specifications for the equipment.

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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

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Contact a DISTRIBUTOR or SERVICE AGENCY near you.

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