From Miller to You

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

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

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

This Owner’s Manual is designed to help you get the most out of your Miller products. Please take time to read the Safety precautions. They will help you protect yourself against potential hazards on the worksite. We’ve made installation and operation quick and easy. With Miller you can count on years of reliable service with proper maintenance. And if for some reason the unit needs repair, there’s a Troubleshooting section that will help you figure out what the problem is. The parts list will then help you to decide which exact part you may need to fix the problem. Warranty and service information for your particular model are also provided.

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

Manufacturer’s Name: Miller Electric Mfg. Co.
Manufacturer’s Address: 1635 W. Spencer Street
                        Appleton, WI 54914 USA

Declares that the product: Auto Invision II

conforms to the following Directives and Standards:

Directives

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

Standards

Electromagnetic compatibility (EMC) Product standard for arc welding equipment:
EN50199: December 1995
Arc Welding Equipment part 1: CEI IEC 60974
Degrees of Protection provided by Enclosures (IP code): IEC 529: 1989
Draft IEC 60974-5 Arc Welding Equipment part 5: wire feeders JWG1 (Sec) 158 July 2000
Insulation coordination for equipment within low-voltage systems:
Part 1: Principles, requirements and tests: IEC 664-1: 1992

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SECTION 1 – SAFETY PRECAUTIONS - READ BEFORE USING

1-1. Symbol Usage

- Marks a special safety message.

□ Marks “Note”; not safety related.

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

1-2. Arc Welding Hazards

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

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

- During operation, keep everybody, especially children, away.

ELECTRIC SHOCK can kill.

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

- Do not touch live electrical parts.
- Wear dry, hole-free insulating gloves and body protection.
- Insulate yourself from work and ground using dry insulating mats or covers big enough to prevent any physical contact with the work or ground.
- Do not use AC output in damp areas, if movement is confined, or if there is a danger of falling.
- Use AC output ONLY if required for the welding process.
- If AC output is required, use remote output control if present on unit.
- Disconnect input power or stop engine before installing or servicing this equipment. Lockout/tagout input power according to OSHA 29 CFR 1910.147 (see Safety Standards).
- Properly install and ground this equipment according to its Owner’s Manual and national, state, and local codes.
- Always verify the supply ground – check and be sure that input power cord ground wire is properly connected to ground terminal in disconnect box or that cord plug is connected to a properly grounded receptacle outlet.
- When making input connections, attach proper grounding conductor first – double-check connections.
- Frequently inspect input power cord for damage or bare wiring – replace cord immediately if damaged – bare wiring can kill.
- Turn off all equipment when not in use.
- Do not use worn, damaged, undersized, or poorly spliced cables.
- Do not drape cables over your body.
- Do not touch electrode if you are in contact with the work, ground, or another electrode from a different machine.
- Use only well-maintained equipment. Repair or replace damaged parts at once. Maintain unit according to manual.
- Wear a safety harness if working above floor level.
- Keep all panels and covers securely in place.
- Clamp work cable with good metal-to-metal contact to workpiece or worktable as near the weld as practical.
- Insulate work clamp when not connected to workpiece to prevent contact with any metal object.
- Do not connect more than one electrode or work cable to any single weld output terminal.

SIGNIFICANT DC VOLTAGE exists after removal of input power on inverters.

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

FUMES AND GASES can be hazardous.

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

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

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

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

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

FLYING METAL can injure eyes.

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

BUILDUP OF GAS can injure or kill.

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

HOT PARTS can cause severe burns.

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

MAGNETIC FIELDS can affect pacemakers.

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

NOISE can damage hearing.

- Noise from some processes or equipment can damage hearing.
- Wear approved ear protection if noise level is high.

CYLINDERS can explode if damaged.

- Protect compressed gas cylinders from excessive heat, mechanical shocks, slag, open flames, sparks, and arcs.
- Install cylinders in an upright position by securing to a stationary support or cylinder rack to prevent falling or tipping.
- Keep cylinders away from any welding or other electrical circuits.
- Never drape a welding torch over a gas cylinder.
- Never allow a welding electrode to touch any cylinder.
- Never weld on a pressurized cylinder – explosion will result.
- Use only correct shielding gas cylinders, regulators, hoses, and fittings designed for the specific application; maintain them and associated parts in good condition.
- Turn face away from valve outlet when opening cylinder valve.
- Keep protective cap in place over valve except when cylinder is in use or connected for use.
- Read and follow instructions on compressed gas cylinders, associated equipment, and CGA publication P-1 listed in Safety Standards.
### 1-3. Additional Symbols For Installation, Operation, And Maintenance

<table>
<thead>
<tr>
<th>Hazard</th>
<th>Symbols</th>
<th>Notes</th>
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| **FIRE OR EXPLOSION** hazard. | ![Fire Symbol] | - Do not install or place unit on, over, or near combustible surfaces.  
- Do not install unit near flammables.  
- Do not overload building wiring – be sure power supply system is properly sized, rated, and protected to handle this unit. |
| **MOVING PARTS** can cause injury. | ![Moving Parts Symbol] | - Keep away from moving parts such as fans.  
- Keep all doors, panels, covers, and guards closed and securely in place. |
| **FALLING UNIT** can cause injury. | ![Falling Unit Symbol] | - 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** | ![Overheating Symbol] | - 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. | ![Static Symbol] | - 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. | ![Moving Parts Symbol] | - Keep away from moving parts.  
- Keep away from pinch points such as drive rolls. |
| **WELDING WIRE** can cause injury. | ![Welding Wire Symbol] | - Do not press gun trigger until instructed to do so.  
- Do not point gun toward any part of the body, other people, or any metal when threading welding wire. |
| **H.F. RADIATION** can cause interference. | ![Radiation Symbol] | - 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. | ![Arc Welding Symbol] | - Electromagnetic energy can interfere with sensitive electronic equipment such as computers and computer-driven equipment such as robots.  
- Be sure all equipment in the welding area is electromagnetically compatible.  
- To reduce possible interference, keep weld cables as short as possible, close together, and down low, such as on the floor.  
- Locate welding operation 100 meters from any sensitive electronic equipment.  
- Be sure this welding machine is installed and grounded according to this manual.  
- If interference still occurs, the user must take extra measures such as moving the welding machine, using shielded cables, using line filters, or shielding the work area. |

### 1-4. Principal Safety Standards

- **Safety in Welding and Cutting**, ANSI Standard Z49.1, from American Welding Society, 550 N.W. LeJeune Rd, Miami FL 33126
- **Safe Practices For Occupation And Educational Eye And Face Protection**, ANSI Standard Z87.1, from American National Standards Institute, 1430 Broadway, New York, NY 10018.
- **Cutting And Welding Processes**, NFPA Standard 51B, from National Fire Protection Association, Batterymarch Park, Quincy, MA 02269.
Considerations About Welding And The Effects Of Low Frequency Electric And Magnetic Fields

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

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

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

About Pacemakers:

Pacemaker wearers consult your doctor first. If cleared by your doctor, then following the above procedures is recommended.
1-1. Signification des symboles

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

▲ Identifie un message de sécurité particulier.

⚠️⚠️⚠️ Signifie NOTA ; n’est pas relatif à la sécurité.

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

▲ Les symboles présentés ci-après sont utilisés tout au long du présent manuel pour attirer votre attention et identifier les risques de danger. Lorsque vous voyez un symbole, soyez vigilant et suivez les directives mentionnées afin d’éviter tout danger. Les consignes de sécurité présentées ci-après ne font que résumer l’information contenue dans les normes de sécurité énumérées à la section 1-4. Veuillez lire et respecter toutes ces normes de sécurité.

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

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

UN CHOC ÉLECTRIQUE peut tuer.

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

• Ne jamais toucher les pièces électriques sous tension.
• Porter des gants et des vêtements de protection secs ne comportant pas de trous.
• S’isoler de la pièce et de la terre au moyen de tapis ou d’autres moyens isolants suffisamment grands pour empêcher le contact physique éventuel avec la pièce ou la terre.
• Ne pas se servir de source électrique accrochant électrique dans les zones humides, dans les endroits confinés ou là où on risque de tomber.
• Se servir d’une source électrique accrochant électrique UNIQUEMENT si le procédé de soudage le demande.
• Si l’utilisation d’une source électrique accrochant électrique s’avère nécessaire, se servir de la fonction de télécommande si l’appareil en est équipé.
• Installer et mettre à la terre correctement cet appareil conformément à son manuel d’utilisation et aux codes nationaux, provinciaux et municipaux.
• Toujours vérifier la terre du cordon d’alimentation – Vérifier et s’assurer que le fil de terre du cordon d’alimentation est bien raccordé à la borne de terre du sectionneur ou que la fiche du cordon est raccordée à une prise correctement mise à la terre.
• En effectuant les raccordements d’entrée fixer d’abord le conducteur de mise à la terre approprié et contre-vérifier les connexions.
• Vérifier fréquemment le cordon d’alimentation pour voir s’il n’est pas endommagé ou dénudé – remplacer le cordon immédiatement s’il est endommagé – un câble dénudé peut provoquer une électrocution.
• Mettre l’appareil hors tension quand on ne l’utilise pas.
• Ne pas utiliser des câbles usés, endommagés, de grosseur insuffisante ou mal épissés.
• Ne pas enrouler les câbles autour du corps.
• Si la pièce soudée doit être mise à la terre, le faire directement avec un câble distinct.
• Ne pas toucher l’électrode quand on est en contact avec la pièce, la terre ou une électrode provenant d’une autre machine.

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

• Arrière 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 votre santé.

• Éloigner votre tête des fumées. Ne pas respirer les fumées.
• A l’intérieur, ventiler la zone et/ou utiliser un échappement au niveau de l’arc pour l’évacuation des fumées et des gaz de soudage.
• Si la ventilation est insuffisante, utiliser un respirateur à alimentation d’air homologué.
• Lire les spécifications de sécurité des matériaux (MSDSs) et les instructions du fabricant concernant les métaux, les consommateurs, les revêtements, les nettoyants et les dégraissants.
• Travailler dans un espace fermé seulement s’il est bien ventilé ou en portant un respirateur à alimentation d’air. Demander toujours à un surveillant dûment formé de se tenir à proximité. Des fumées et des gaz de soudage peuvent déplacer l’air et abaisser le niveau d’oxygène provoquant des blessures ou des accidents mortels. S’assurer que l’air de respiration ne présente aucun danger.
• Ne pas souder dans des endroits situés à proximité d’opérations de dégraissage, de nettoyage ou de pulvérisation. La chaleur et les rayons de l’arc peuvent réagir en présence de vapeurs et former des gaz hautement toxiques et irritants.
• Ne pas souder des métaux munis d’un revêtement, tels que l’acier galvanisé, plaqué en plomb ou au cadmium à moins que le revêtement n’ait été enlevé dans la zone de soudure, que l’endroit soit bien ventilé, et si nécessaire, en portant un respirateur à alimentation d’air. Les revêtements et tous les métaux renfermant ces éléments peuvent dégager des fumées toxiques en cas de soudage.
LES RAYONS DE L’ARC peuvent provoquer des brûlures dans les yeux et sur la peau.
Le rayonnement de l’arc du procédé de soudage génère des rayons visibles et invisibles intensifs (ultraviolets et infrarouges) susceptibles de provoquer des brûlures dans les yeux et sur la peau. Des étincelles sont projetées pendant le soudage.
- Porter un casque de soudage muni d’un écran de filtre approprié pour protéger votre visage et vos yeux pendant le soudage ou pour regarder (voir ANSI Z49.1 et Z87.1 énuméré dans les normes de sécurité).
- Porter des protections approuvées pour les oreilles si le niveau sonore est trop élevé.
- Utiliser des écrous ou des barrières pour protéger des tiers de l’éclair et de l’éboulissemment; demander aux autres personnes de ne pas regarder l’arc.
- Porter des vêtements de protection constitué dans une matière durable, résistant au feu (cuir ou laine) et une protection des pieds.

LE SOUTAGE peut provoquer un incendie ou une explosion.
Le soudage effectué 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).
- Se protéger et d’autres personnes de la projection d’étincelles et de métal chaud.
- Ne pas souder dans un endroit là où des étincelles peuvent tomber sur des substances inflammables.
- Déplacer toutes les substances inflammables à une distance de 10,7 m de l’arc de soudage. En cas d’impossibilité les recouvrir soigneusement avec des protections homologuées.
- Des étincelles et des matériaux chauds du soudage peuvent facilement passer dans d’autres zones en traversant de petites fissures et des ouvertures.
- Surveiller tout déclenchement d’incendie et tenir un extincteur à proximité.
- Le soudage effectué sur un plafond, plancher, paroi ou séparation peut déclencher un incendie de l’autre côté.
- Ne pas effectuer le soudage sur des conteneurs fermés tels que des réservoirs, tambours, ou conduites, à moins qu’ils n’aient été préparés correctement conformément à AWS F4.1 (voir les normes de sécurité).
- Brancher le câble sur la pièce le plus près possible de la zone de soudage pour éviter le transport du courant sur une longue distance par des chemins inconnus éventuels en provoquant des risques d’électrocution et d’incendie.
- Ne pas utiliser le poste de soudage pour dégeler des conduites gelées.
- En cas de non utilisation, enlever la baguette d’électrode du porte-électrode ou couper le fil à la pointe de contact.
- Porter des vêtements de protection dépourvus d’huile tels que des gants en cuir, une chemise en matériau lourd, des pantalons sans revers, des chaussures hautes et un couvre-chef.
- Avant de souder, retirer toute substance combustible de vos poches telles qu’un allumeur au butane ou des allumettes.

DES PARTICULES VOLANTES peuvent blesser les yeux.
- Le soudage, l’écaillage, le passage de la pièce à la brosse en fil de fer, et le meulage génèrent des étincelles et des particules métalliques volantes. Pendant la période de refroidissement des soudures, elles risquent de projeter du laitier.
- Porter des lunettes de sécurité avec écrans latéraux ou un écran facial.

LES ACCUMULATIONS DE GAZ risquent de provoquer des blessures ou même la mort.
- Fermer l’alimentation du gaz protecteur en cas de non utilisation.
- Veiller toujours à bien aérer les espaces confinés ou se servir d’un respirateur d’adduction d’air homologué.

DES PIÈCES CHAUDES peuvent provoquer des brûlures graves.
- Ne pas toucher des parties chaudes à mains nues.
- Prévoir une période de refroidissement avant d’utiliser le pistolet ou la torche.

LES CHAMPS MAGNÉTIQUES peuvent affecter les stimulateurscardiaques.
- Porteurs de stimulateur cardiaque, restez à distance.
- Les porteurs d’un stimulateur cardiaque doivent d’abord consulter leur médecin avant de s’approcher des opérations de soudage à l’arc, de gougereage ou de soudage par points.

LE BRUIT peut affecter l’ouïe.
Le bruit des processus et des équipements peut affecter l’ouïe.
- Porter des protections approuvées pour les oreilles si le niveau sonore est trop élevé.

Si des BOUTEILLES sont endommagées, elles pourront exploser.
Des bouteilles de gaz protecteur contiennent du gaz sous haute pression. Si une bouteille est endommagée, elle peut exploser. Du fait que les bouteilles de gaz sont normalement partiel du procédé de soudage, les manipuler avec précaution.
- Protéger les bouteilles de gaz comprimé d’une chaleur excessive, des chocs mécaniques, du laitier, des flammes ouvertes, des étincelles et des arcs.
- Placer les bouteilles debout en les fixant dans un support stationnaire ou dans un porte-bouteilles pour les empêcher de tomber ou de se renverser.
- Tenir les bouteilles éloignées des circuits de soudage ou autres circuits électriques.
- Ne jamais placer une torche de soudage sur une bouteille à gaz.
- Une électrode de soudage ne doit jamais entrer en contact avec une bouteille.
- Ne jamais souder une bouteille pressurisée – risque d’explosion.
- Utiliser seulement des bouteilles de gaz protecteur, régulateurs, tuyaux et raccords convenables pour cette application spécifique; les maintenir ainsi que les éléments associés en bon état.
- Ne pas tenir la tête en face de la sortie en ouvrant la soupape de la bouteille.
- Maintenir le chapeau de protection sur la soupape, sauf en cas d’utilisation ou de branchement de la bouteille.
- Lire et suivre les instructions concernant les bouteilles de gaz comprimé, les équipements associés et les publications P-1 CGA énumérées dans les normes de sécurité.
1-3. Dangers supplémentaires en relation avec l’installation, le fonctionnement et la maintenance

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

**LA CHUTE DE L’APPAREIL peut blesser.**
- Utiliser l’anneau de levage uniquement pour soulever l’appareil, NON PAS les chariots, les bouteilles de gaz ou tout autre accessoire.
- En utilisant des fourches de levage pour déplacer l’unité, s’assurer que les fourches sont suffisamment longues pour dépasser du côté opposé de l’appareil.

**L’EMPLOI EXCESSIF peut SURCHAUFFER L’ÉQUIPEMENT.**
- Prévoir une période de refroidissement, respecter le cycle opératoire nominal.
- Réduire le courant ou le cycle opératoire avant de recommencer le soudage.
- Ne pas obstruer les passages d’air du poste.

**LES CHARGES ÉLECTROSTATIQUES peuvent endommager les circuits imprimés.**
- Établir la connexion avec la barrette de terre avant de manipuler des cartes ou des pièces.
- Utiliser des pochettes et des boîtes antistatiques pour stocker, déplacer ou expédier des cartes de circuits imprimés.

**DES ORGANES MOBILES peuvent provoquer des blessures.**
- Ne pas s’approcher des organes mobiles.
- Ne pas s’approcher des points de coinement tels que des rouleaux de commande.

**LES FILS DE SOUDAGE peuvent provoquer des blessures.**
- Ne pas appuyer sur la gachette avant d’en avoir reçu l’instruction.
- Ne pas diriger le pistolet vers soi, d’autres personnes ou toute pièce mécanique en engageant le fil de soudage.

**DES ORGANES MOBILES peuvent provoquer des blessures.**
- Rester à l’écart des organes mobiles comme le ventilateur.
- Maintenir fermés et fixement en place les portes, panneaux, recouvrements et dispositifs de protection.

**LE RAYONNEMENT HAUTE FRÉQUENCE (H.F.) risque de provoquer des interférences.**
- Le rayonnement haute fréquence peut provoquer des interférences avec les équipements de radio-navigation et de communication, les services de sécurité et les ordinateurs.
- Demander seulement des personnes qualifiées familiarisées avec des équipements électroniques de faire fonctionner l’installation.
- L’utilisateur est tenu de surveiller 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 éclaireurs à une distance correcte et utiliser une terre et un blindage pour réduire les interférences éventuelles.

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

**LES CHAMPS MAGNÉTIQUES peuvent affecter les stimulateurs cardiaques.**
- Porteurs de stimulateur cardiaque, restez à distance.
- Les porteurs d’un stimulateur cardiaque doivent d’abord consulter leur médecin avant de s’approcher des opérations de soudage à l’arc, de gougeage ou de soudage par points.
1-4. Principales normes de sécurité

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


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

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


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


1-5. Information sur les champs électromagnétiques

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

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

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

1. Garder les câbles ensemble en les torsadant ou en les attachant avec du ruban adhésif.
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. Rester la pince de masse le plus près possible de la zone de soudure.

Consignes relatives aux stimulateurs cardiaques :
Les personnes qui portent un stimulateur cardiaque doivent avant tout consulter leur docteur. Si vous êtes déclaré apte par votre docteur, il est alors recommandé de respecter les consignes ci-dessus.
2-1. Manufacturer’s Warning Label Definitions

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

1. Electric shock from welding electrode or wiring can kill.
   1.1 Wear dry insulating gloves. Do not touch electrode with bare hand. Do not wear wet or damaged gloves.
   1.2 Protect yourself from electric shock by insulating yourself from work and ground.
   1.3 Disconnect input plug or power before working on machine.

2. Breathing welding fumes can be hazardous to your health.
   2.1 Keep your head out of the fumes.
   2.2 Use forced ventilation or local exhaust to remove the fumes.
   2.3 Use ventilating fan to remove fumes.

3. Welding sparks can cause explosion or fire.
   3.1 Keep flammables away from welding. Do not weld near flammables.
   3.2 Welding sparks can cause fires. Have a fire extinguisher nearby, and have a watchperson ready to use it.
   3.3 Do not weld on drums or any closed containers.

4. Arc rays can burn eyes and injure skin.
   4.1 Wear hat and safety glasses. Use ear protection and button shirt collar. Use welding helmet with correct shade of filter. Wear complete body protection.

5. Become trained and read the instructions before working on the machine or welding.

6. Do not remove or paint over (cover) the label.
Warning! Watch Out! There are possible hazards as shown by the symbols.

2 Electric shock from wiring can kill.

3 Disconnect input plug or power before working on machine.

4 Hazardous voltage remains on input capacitors after power is turned off. Do not touch fully charged capacitors.

5 Always wait 60 seconds after power is turned off before working on unit, OR

6 Check input capacitor voltage, and be sure it is near 0 before touching any parts.

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

2 When power is applied failed parts can explode or cause other parts to explode.

3 Flying pieces of parts can cause injury. Always wear a face shield when servicing unit.

4 Always wear long sleeves and button your collar when servicing unit.

5 After taking proper precautions as shown, connect power to unit.

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

2 Falling equipment can cause injury and damage to unit.

3 Always lift and support unit using both handles. Keep angle of lifting device less than 60 degrees.

4 Use a proper cart to move unit.

5 Do not use one handle to lift or support unit.
2-2. Symbols And Definitions

<table>
<thead>
<tr>
<th></th>
<th>Amperage</th>
<th>Positive</th>
<th>Remote</th>
<th>Voltage</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>A</td>
<td></td>
<td></td>
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</table>

<table>
<thead>
<tr>
<th></th>
<th>Output</th>
<th>Circuit Breaker</th>
<th>Negative</th>
<th>On</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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<table>
<thead>
<tr>
<th></th>
<th>Off</th>
<th>Inductance</th>
<th>Protective Earth (Ground)</th>
<th>Voltage Input</th>
</tr>
</thead>
<tbody>
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</table>

2-3. Manufacturer’s Rating Label

![Rating Label Image]

2-4. Harmonic Data

HARMONIC DATA per IEC 61000-3-12, draft 2000-9-29

PRIMARY: 400V/30.5A/60hz
LOAD: 450A/38Vdc/390IPM/,MAXIMUM OUTPUT, GMAW.

R sce = 227.28

<table>
<thead>
<tr>
<th>THD</th>
<th>61 Amps</th>
</tr>
</thead>
<tbody>
<tr>
<td>PWHD</td>
<td>35 Amps</td>
</tr>
</tbody>
</table>

Table 4, balanced three phase equipment.
SECTION 3 – INSTALLATION

3-1. Specifications

<table>
<thead>
<tr>
<th>Input Power</th>
<th>Rated Welding Output</th>
<th>Voltage Range</th>
<th>Wire Feed Speed Range*</th>
<th>Wire Diameter Range</th>
<th>Maximum Open-Circuit Voltage DC</th>
<th>Amperes Input At Rated Load Output 60 Hz, Three-Phase</th>
<th>KVA</th>
<th>KW</th>
</tr>
</thead>
<tbody>
<tr>
<td>Three Phase</td>
<td>450 A @ 38 Volts DC, 100% Duty Cycle; 565 A @ 43 Volts DC, 60% Duty Cycle</td>
<td>10 – 38</td>
<td>Standard: 50 To 780 ipm (1.3 To 19.8 mpm)</td>
<td>.030 To .062 in (0.8 To 1.6 mm)</td>
<td>95</td>
<td>31</td>
<td>21.6</td>
<td>19.4</td>
</tr>
</tbody>
</table>

*Wire feed speed ranges are for GMAW welding. While pulse welding, wire feed speed ranges may be more limited (see Section 6)

**While idling

3-2. Dimensions And Weight

<table>
<thead>
<tr>
<th>Hole Layout Dimensions</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
<th>F</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>14-21/64 in (363.9 mm)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>B</td>
<td>20-3/4 in (527.1 mm)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>C</td>
<td>23-27/64 in (594.9 mm)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>D</td>
<td>24-31/32 in (634.2 mm)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>E</td>
<td>12-3/8 in (314.3 mm)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>F</td>
<td>9/32 in (7.1 mm) Dia.</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Weight</td>
<td>130 lb (59 kg)</td>
<td></td>
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</tr>
</tbody>
</table>

801 914-A
3-3. Selecting A Location

Location

18 in (460 mm)

1 Lifting Forks
Use lifting forks to move unit.
Extend forks beyond opposite side of unit.

2 Lifting Handles
Use handles to lift unit.

3 Hand Cart
Use cart or similar device to move unit.

4 Rating Label
Use rating label to determine input power needs.

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.

Do not move or operate unit where it could tip.

3-4. Connection Diagram

The proper interface kit must be installed in the interface unit to allow it to be connected to the robot.

1 Robot (Will Vary According To Application)
2 Motor/Drive Assembly
3 Gas Cylinder
4 Gas Hose
5 Robot Control
6 Robot Input/Output Cable
7 Remote Program Select Cable (Optional)
8 Gas And Motor Control Cable
9 Welding Power Source/Interface Unit
10 Negative (−) Weld Cable
11 Workpiece
12 Voltage Sensing Lead

Positive (+) voltage sensing lead is contained in the motor cable.

13 Positive (+) Weld Cable
### 3-5. Weld Output Terminals And Selecting Cable Sizes

**Total Cable (Copper) Length In Weld Circuit Not Exceeding**

<table>
<thead>
<tr>
<th>Welding Amperes</th>
<th>30 m (100 ft) Or Less</th>
<th>45 m (150 ft)</th>
<th>60 m (200 ft)</th>
<th>70 m (250 ft)</th>
<th>90 m (300 ft)</th>
<th>105 m (350 ft)</th>
<th>120 m (400 ft)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>10 – 60% Duty Cycle</td>
<td>60 – 100% Duty Cycle</td>
<td>10 – 100% Duty Cycle</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>100</td>
<td>25</td>
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<td>2-70</td>
<td>2-70</td>
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<tr>
<td>300</td>
<td>50</td>
<td>55</td>
<td>95</td>
<td>120</td>
<td>2-70</td>
<td>2-95</td>
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<tr>
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<tr>
<td>600</td>
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<td>2-95</td>
<td>2-120</td>
<td>3-95</td>
<td>3-120</td>
</tr>
</tbody>
</table>

*Weld cable size (mm²) is based on either a 4 volts or less drop or a current density of at least 300 circular mils per ampere.

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### 3-6. 115 Volts AC Duplex Receptacle And Circuit Breakers

1. **115 V 10 A AC Receptacle**
   Power is shared between duplex receptacle and internal 14 socket receptacle.

2. **Circuit Breaker CB1**
   CB1 protects duplex receptacle and 115 volts ac portion of internal 14 socket receptacle from overload.
   Press button to reset breaker.

3. **Circuit Breaker CB2**
   CB2 protects 24 volts ac portion of internal 14 socket receptacle from overload.
   Press button to reset breaker.

4. **Circuit Breaker CB1**
   CB1 protects the motor control circuitry from overload. If CB1 trips, the wire drive motor is inoperative.
   Press button to reset breaker.
3-7. Electrical Service Guide

<table>
<thead>
<tr>
<th>Input Voltage</th>
<th>Three-Phase</th>
</tr>
</thead>
<tbody>
<tr>
<td>Input Amperes At Rated Output</td>
<td>400</td>
</tr>
<tr>
<td>3-Phase Input Voltage</td>
<td>31</td>
</tr>
<tr>
<td>Max Recommended Standard Fuse Or Circuit Breaker Rating In Amperes</td>
<td>45</td>
</tr>
<tr>
<td>Min Input Conductor Size In AWG/Kcmil</td>
<td>10</td>
</tr>
<tr>
<td>Max Recommended Input Conductor Length In Feet (Meters)</td>
<td>264 (80)</td>
</tr>
<tr>
<td>Min Grounding Conductor Size In AWG/Kcmil</td>
<td>10</td>
</tr>
</tbody>
</table>

3-8. Connecting Input Power

⚠️ Tools Needed:
- 5/16 in

Input Filter Board

▲ =GND/PE

▲ Always connect grounding conductor first.

▲ Turn Off welding power source, and check voltage on input capacitors according to Section 13-3 before proceeding.

Check input voltage available at site.

Remove left side panel.

1 Input And Grounding Conductors
   See Section 3-7.
   Install ring terminals of proper size onto input conductors for connection to input filter board terminals (see illustration).

2 Line Disconnect Device
   Select type and size of overcurrent protection using Section 3-7. Connect input and grounding conductors to a deenergized line disconnect device.

Reinstall left side panel.

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3-9. Rear Panel Connections

1. Receptacle
2. Keyway
3. 4-Pin Receptacle (Optional External Voltage Sensing Connection)
   To connect interconnecting cord to receptacle, align keyway, insert plug, and tighten threaded collar.
   Secure ring terminal on remaining end of cord to work.
4. Peripheral Receptacle
   Receptacle provides connection to touch sensor, water flow switch, jog +/-, and n/o relay contacts circuitry.
5. Robot Control Receptacle
   (Remote Program Select Connection To Robot Control)
   To connect matching interconnecting cord to one of the above receptacles, align keyway, insert plug, and tighten threaded collar.
   Connect remaining end of cord to matching receptacle on applicable equipment (see Section 3-4).
6. 10-Socket Receptacle (Wire Feed/Shielding Gas Control Connection To Motor Drive Assembly)
### 3-10. Peripheral Receptacle Functions

<table>
<thead>
<tr>
<th>Function</th>
<th>Socket</th>
<th>Socket Information</th>
</tr>
</thead>
<tbody>
<tr>
<td>Programmable Output Relay Contacts</td>
<td>A</td>
<td>Contact closure to B dependent upon state of programmed output (see Section 11-5). The closure between A and B can carry a maximum of 0.6 amps at 125 VAC; or a maximum of 0.6 amps at 110 VDC.</td>
</tr>
<tr>
<td></td>
<td>B</td>
<td>Contact closure to A dependent upon state of programmed output (see Section 11-5). See socket A information for current carrying capacity of closure.</td>
</tr>
<tr>
<td>Purge</td>
<td>C*</td>
<td>Circuit common.</td>
</tr>
<tr>
<td></td>
<td>D</td>
<td>Contact closure to C completes 24 volts dc solenoid circuit to purge shielding gas line.</td>
</tr>
<tr>
<td>Coolant Flow Switch Input Signal</td>
<td>E</td>
<td>Contact closure to F indicates coolant flow switch is closed and recirculating coolant system is operational.</td>
</tr>
<tr>
<td></td>
<td>F*</td>
<td>Circuit common.</td>
</tr>
<tr>
<td>Jog +</td>
<td>H**</td>
<td>Contact closure to circuit common advances welding wire at wire drive assembly.</td>
</tr>
<tr>
<td></td>
<td>J**</td>
<td>Contact closure to circuit common retracts welding wire at wire drive assembly.</td>
</tr>
<tr>
<td>Touch Sensor ON And Output Signal</td>
<td>K</td>
<td>Contact closure to L energizes Touch Sensor circuitry.</td>
</tr>
<tr>
<td></td>
<td>L*</td>
<td>Circuit common.</td>
</tr>
<tr>
<td></td>
<td>M</td>
<td>Part touched +24 volts dc output signal referenced to circuit common.</td>
</tr>
</tbody>
</table>

*Circuit common is same electrical reference point.

**Speed of Jog + and Jog – is at setup value for Jog IPM parameter.

Note: A customer supplied matching amphenol plug (Part No. MS3106A20-33P and strain relief clamp AN3057-12) is required to use peripheral receptacle.

### 3-11. Touch Sensor Operation

The touch sensor feature allows the robot to locate a weldment using the wire feed system and welding power source. Voltage sense leads provide a path for touch sensor voltage when this feature is turned on at the peripheral receptacle. Turning on touch sensor causes a dc voltage to be present on the welding wire. When welding wire touches the weldment, the voltage sensing circuit closes, and a +24 volts dc output signal is sent to the robot control indicating weldment detection. Touch sensor dc voltage on the welding wire will vary from 60 to 150 volts dc depending on the welding power source. As soon as touch sensor turns on, DANGER SENSOR ON appears on the front panel display.
3-12. Connecting Setup Pendant To Welding Power Source

⚠️ Turn Off welding power source and weld control.

1  Welding Power Source
2  Interconnecting Cord
3  Setup Pendant

To make connections, align plug with receptacle, insert plug, and use thumb screws on receptacle to secure plug.

⚠️ Disconnect the setup pendant from the welding power source before welding.
4-1. Operational Terms

The following is a list of terms and their definitions as they apply to this interface unit:

**General Terms:**

**Adaptive Pulse Welding**

When the “adaptive pulse” welding process is selected, the unit will attempt to automatically regulate pulse frequency in order to maintain a constant arc length, regardless of change in welding wire stick-out.

**Abk (Background Amperage)**

Abk is the low weld current. Background current preheats welding wire and maintains the arc. When background current is too low, the arc is unstable and hard to maintain.

**Apk (Peak Amperage)**

Apk is the high pulse of welding current. Peak current melts the welding wire and forms a droplet. The droplet is forced into the weld puddle.

**Vpk (Peak Voltage)**

Arc voltage during peak current phase of the pulse waveform. This determines arc length during adaptive pulse welding.

**Inductance**

In short circuit GMAW welding, an increase in inductance will decrease the number of short circuit metal transfers per second (provided no other changes are made) and increase the arc-on time. The increased arc-on time makes the pool more fluid.

**PPS (Pulses Per Second)**

PPS, pulse rate, and frequency (Hz) are used interchangeably. A PPS or pulse rate of 60 Hz means 60 pulses of current are produced each second.

**PWms (Pulse Width in Milliseconds)**

PWms is the time spent at peak current (1.2 ms is .0012 seconds). This time must be long enough to form a droplet of welding wire. The stiffness or fluidity of the molten weld puddle is controlled by PWms.

**Synergic**

Synergic refers to the unit’s ability to use preprogrammed pulse parameters to determine the actual pulse settings of Peak Amperage, Background Amperage, Pulse Frequency and Pulse Width at any specific wire feed speed setting.

**Trim**

Term used to represent arc length adjustments in pulse programs. Increasing trim increases the actual arc length. Likewise, decreasing trim shortens arc length. Trim is replaced by volts in MIG programs.

**Setup Pendant Terms:**

**Card Mode**

Is used to select use of the optional data card storage and retrieval capabilities.

**Process Mode**

Is used to select the type of process to be used, including Pulse, Adaptive Pulse, or Mig.

**Sequence Mode**

Is used to select and program the weld sequences which include preflow, run-in, weld, crater, burnback, and postflow.

**Setup Screen Terms:**

**Access Code**

NOTE: The optional Data Card is required to activate this feature. With code off, access to the setup displays is not restricted. With code on, the operator must know and enter the access code to access or change any of the setup displays.

To use code, press Parameter Select button to enter access code. When the correct letter is entered, the indicator automatically moves to the next character. When the final access code letter is entered, the display automatically changes to the initial setup display.

**Arc Start**

NOTE: Do not use the Hot Start setting for .035 in (9 mm) or smaller wire. Use the Hot Start mode for pulse welding with 450 Ampere Inverter Model when high initial weld current is necessary to start large diameter welding wires. When in Hot Start, the 450 Ampere Inverter Model starts the arc in the CV mode and switches to CC once the arc is started. Do not use Hot Start unless using 450 Ampere Inverter Model.

**Arc Time**

Allows actual arc time up to 9,999.99 hours and weld cycles up to 999,999 to be accumulated and displayed on the digital display, and can be reset to zero as required.

**Mig Type (Voltage Correction)**

With DVC Voltage Correction On, the unit uses closed-loop control based on voltage feedback to maintain set voltage parameters. With DVC Voltage Correction Off, feedback from the arc is not used for closed-loop feedback to maintain voltage parameters. Feedback from the arc is still used for other functions.

**Name Feature**

When using the optional Data Card and turning the name feature on, programs written to the card can be identified by name, number, job number, etc.

**Program Reset**

By selecting program reset in the memory reset mode, the unit defaults to original factory program settings for the program last active. All other program and setup information remains the same.

**Range**

The interface requires that the voltage and amperage range of the welding power source be entered. Obtain this information from the welding power source Owner’s Manual.

**Security**

NOTE: The optional Data Card is required to activate this feature. Is used to limit what the operator can control. This includes accessing the number of the program, 1 through 8, and the range of welding parameters within the program.

**Software Screen**

Selection of this function will display the software version of the unit. When talking with factory service personnel, this number may be required.
System Reset

By selecting system reset in the memory reset mode, the unit defaults to original factory settings for all programs and all set up excluding System, Arc Time, and Model Type.

Voltage (Control Feedback)

Allows voltage to be monitored at the output terminals by two methods. This can be selected through the internal connections of the unit, or through the unit’s external voltage sense lead. When using the V. Sense setting, arc voltage feedback is through the voltage sense leads connected to the feeder. Use this setting when there is more than 50 ft (15 m) of weld cable used.

Arc Start/Volt Sense Shutdown

When this feature is on, the system immediately shuts down if no arc voltage is sensed. An error message is displayed. When this feature is off, wire feeds even when there is no arc voltage sensed.

Wire Feed Mode

Allows the selection of inches per minute or meters per minute for wire feed speed. This mode is also used to select motor type; standard speed, low speed, or high speed.

4-2. Lower Front Panel Controls

1 Power Switch
2 Voltmeter (see Section 4-3)
3 Ammeter (see Section 4-3)

1 Power Switch
2 Voltmeter (see Section 4-3)
3 Ammeter (see Section 4-3)

The fan motor is thermostatically controlled and only runs when cooling is needed.

4-3. Meter Functions

Note: The meters display the actual weld output values for approximately three seconds after the arc is broken.

<table>
<thead>
<tr>
<th>Mode</th>
<th>Meter Reading At Idle</th>
<th>Meter Reading While Welding</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>V</td>
<td>A</td>
</tr>
<tr>
<td>MIG</td>
<td>24.5</td>
<td>Blank</td>
</tr>
<tr>
<td></td>
<td>Preset Volts</td>
<td>Blank</td>
</tr>
<tr>
<td>Pulsed MIG</td>
<td>PPP</td>
<td>PPP</td>
</tr>
<tr>
<td></td>
<td>Pulse Display</td>
<td>Pulse Display</td>
</tr>
</tbody>
</table>
4-4. Upper Front Panel Controls

1 Setup Pendant Receptacle
Receptacle for connecting pendant interconnecting cord.

2 Jog Forward Push Button
Advances wire out of the gun.

3 Wirefeed Indicator LED
LED lights when wire feed motor is energized.

4 Jog Reverse Push Button
Retracts wire up into the gun.

5 Gas Indicator LED
LED lights when gas solenoid is energized.

6 Purge Push Button
Momentarily energizes gas solenoid to purge air from gun shielding gas line, or to adjust shielding gas regulator.

7 Contactor Indicator LED
LED lights when welding power source contactor is energized.

8 Main Display
Shows system state, active program, error messages, weld parameters at idle and during welding.
4-5. Duty Cycle And Overheating

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

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

⚠️ Exceeding duty cycle can damage unit and void warranty.

<table>
<thead>
<tr>
<th>% Duty Cycle</th>
<th>WELD AMPERES</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>10</td>
<td>100</td>
</tr>
<tr>
<td>20</td>
<td>200</td>
</tr>
<tr>
<td>30</td>
<td>300</td>
</tr>
<tr>
<td>40</td>
<td>400</td>
</tr>
<tr>
<td>50</td>
<td>500</td>
</tr>
<tr>
<td>60</td>
<td>600</td>
</tr>
<tr>
<td>70</td>
<td>700</td>
</tr>
<tr>
<td>80</td>
<td>800</td>
</tr>
<tr>
<td>90</td>
<td>900</td>
</tr>
<tr>
<td>100</td>
<td>1000</td>
</tr>
</tbody>
</table>

100% Duty Cycle At 450 Amperes

60% Duty Cycle At 565 Amperes

Continuous Welding

6 Minutes Welding

4 Minutes Resting

Overheating

0 Minutes

A/V

Reduce Duty Cycle

4-6. Volt-Ampere Curves

Volt-ampere curves show minimum and maximum voltage and amperage output capabilities of unit. Curves of other settings fall between curves shown.
4-7. Setup Pendant Controls

1 Increase Button
Works with security feature on welding power source to allow increasing weld parameter values within the allowable range.

2 Decrease Button
Works with security feature on welding power source to allow decreasing weld parameter values within the allowable range.

3 Parameter Select Button
Press button to move indicator in right window display, and to make selections in setup screens.

4 Mode Select Button
Press button to move indicator in left window display.

5 Interconnecting Cable Receptacle

6 Parameter Display

7 Mode Display

8 Card Slot
5-1. Pulse MIG Programs

The interface unit is designed for use in pulse MIG welding (adaptive or standard), or MIG welding.

The unit is factory-equipped with eight programs for pulse MIG welding.

The unit also provides memory for the creation of up to eight MIG programs (see Section 8).

The weld programs require the user to enter information specific to the welding application. This information is entered as a part of program development (see Section 6 for pulsed MIG information), and during setup (see Section 11).

The eight pulse programs are shown in the table. Each program can be used in standard pulse MIG or adaptive pulse MIG.

In an adaptive pulse MIG program, the unit manipulates certain weld variables to hold arc voltage constant. This feature is described in Section 7-5.

The factory-set parameters for each program can be changed to customize them for an application (see Section 7).

5-2. Standard Pulse Welding Programs

The following sixteen (16) pulse welding programs are in the control memory. Use this information if it is necessary to change a standard program, or as a basis to build your own custom program. If at any time while changing a standard program, or while building your own custom program, you want to go back to the standard program in the control memory, see Section 11-12 for System memory Reset instructions. See Section 7 for explanation of Pulse welding settings.

Apk = Peak Amperage, Abk = Background Amperage, PPS = Pulses Per Second, PWms = Pulse Width (milliseconds), Vpk = Peak Voltage
### 5-3. Program 1 – 1.2 mm Steel (0.045")(.), 98-2 Argon-Oxy

<table>
<thead>
<tr>
<th>Wire Size/Type: 1.2 mm (0.045&quot;) Steel</th>
<th>Gas: Ar - Oxy / 19 L/min (40 CFH)</th>
</tr>
</thead>
<tbody>
<tr>
<td>MPM / IPM</td>
<td>Apk</td>
</tr>
<tr>
<td>------------</td>
<td>------</td>
</tr>
<tr>
<td>19.1 / 750</td>
<td>540</td>
</tr>
<tr>
<td>17.8 / 700</td>
<td>530</td>
</tr>
<tr>
<td>16.5 / 650</td>
<td>520</td>
</tr>
<tr>
<td>15.2 / 600</td>
<td>510</td>
</tr>
<tr>
<td>14.0 / 550</td>
<td>500</td>
</tr>
<tr>
<td>12.7 / 500</td>
<td>490</td>
</tr>
<tr>
<td>11.4 / 450</td>
<td>480</td>
</tr>
<tr>
<td>10.2 / 400</td>
<td>470</td>
</tr>
<tr>
<td>8.9 / 350</td>
<td>460</td>
</tr>
<tr>
<td>7.6 / 300</td>
<td>450</td>
</tr>
<tr>
<td>6.4 / 250</td>
<td>422</td>
</tr>
<tr>
<td>5.1 / 200</td>
<td>395</td>
</tr>
<tr>
<td>3.8 / 150</td>
<td>367</td>
</tr>
<tr>
<td>2.5 / 100</td>
<td>340</td>
</tr>
<tr>
<td>1.3 / 50</td>
<td>312</td>
</tr>
</tbody>
</table>

### 5-4. Program 2 – 1.0 mm Steel (0.040"), 80-20 Argon-CO₂

<table>
<thead>
<tr>
<th>Wire Size/Type: 1.0 mm (0.040&quot;) Steel</th>
<th>Gas: Ar - CO₂/ 19 L/min (40 CFH)</th>
</tr>
</thead>
<tbody>
<tr>
<td>MPM / IPM</td>
<td>Apk</td>
</tr>
<tr>
<td>------------</td>
<td>------</td>
</tr>
<tr>
<td>17.9 / 705</td>
<td>471</td>
</tr>
<tr>
<td>17.8 / 700</td>
<td>470</td>
</tr>
<tr>
<td>16.5 / 650</td>
<td>460</td>
</tr>
<tr>
<td>15.2 / 600</td>
<td>450</td>
</tr>
<tr>
<td>14.0 / 550</td>
<td>440</td>
</tr>
<tr>
<td>12.7 / 500</td>
<td>430</td>
</tr>
<tr>
<td>11.4 / 450</td>
<td>410</td>
</tr>
<tr>
<td>10.2 / 400</td>
<td>390</td>
</tr>
<tr>
<td>8.9 / 350</td>
<td>370</td>
</tr>
<tr>
<td>7.6 / 300</td>
<td>350</td>
</tr>
<tr>
<td>6.4 / 250</td>
<td>355</td>
</tr>
<tr>
<td>5.1 / 200</td>
<td>360</td>
</tr>
<tr>
<td>3.8 / 150</td>
<td>365</td>
</tr>
<tr>
<td>2.5 / 100</td>
<td>370</td>
</tr>
</tbody>
</table>
5-5. Program 3 – 1.2 mm Steel (.045”), 80-20 Argon-CO₂

<table>
<thead>
<tr>
<th>Wire Size/Type: 1.2 mm (.045”) Steel</th>
<th>Gas: Ar - CO₂ / 19 L/min (40 CFH)</th>
<th>MPM / IPM</th>
<th>Apk</th>
<th>Abk</th>
<th>PPS</th>
<th>PWms</th>
<th>Vpk</th>
<th>COMMENTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>19.1 / 750</td>
<td>570</td>
<td>134</td>
<td>246</td>
<td>2.9</td>
<td>41.2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>17.8 / 700</td>
<td>560</td>
<td>130</td>
<td>235</td>
<td>2.9</td>
<td>40.6</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>16.5 / 650</td>
<td>550</td>
<td>126</td>
<td>224</td>
<td>2.9</td>
<td>40.0</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>15.2 / 600</td>
<td>540</td>
<td>123</td>
<td>213</td>
<td>2.9</td>
<td>39.5</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>14.0 / 550</td>
<td>530</td>
<td>119</td>
<td>201</td>
<td>2.8</td>
<td>38.9</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>12.7 / 500</td>
<td>520</td>
<td>115</td>
<td>190</td>
<td>2.8</td>
<td>38.3</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>11.4 / 450</td>
<td>502</td>
<td>107</td>
<td>177</td>
<td>2.7</td>
<td>37.4</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10.2 / 400</td>
<td>485</td>
<td>100</td>
<td>165</td>
<td>2.7</td>
<td>36.6</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8.9 / 350</td>
<td>467</td>
<td>92</td>
<td>152</td>
<td>2.6</td>
<td>35.7</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7.6 / 300</td>
<td>450</td>
<td>85</td>
<td>140</td>
<td>2.6</td>
<td>34.9</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6.4 / 250</td>
<td>435</td>
<td>74</td>
<td>120</td>
<td>2.4</td>
<td>34.1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5.1 / 200</td>
<td>420</td>
<td>64</td>
<td>100</td>
<td>2.3</td>
<td>33.4</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3.8 / 150</td>
<td>405</td>
<td>53</td>
<td>80</td>
<td>2.1</td>
<td>32.6</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.5 / 100</td>
<td>390</td>
<td>43</td>
<td>60</td>
<td>1.9</td>
<td>31.8</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1.3 / 50</td>
<td>375</td>
<td>32</td>
<td>40</td>
<td>1.7</td>
<td>31.0</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

5-6. Program 4 – .8 mm 316 (.030”), 98-2 Argon-CO₂

<table>
<thead>
<tr>
<th>Wire Size/Type: .8 mm (.030”) 316</th>
<th>Gas: Ar - CO₂ / 19 L/min (40 CFH)</th>
<th>MPM / IPM</th>
<th>Apk</th>
<th>Abk</th>
<th>PPS</th>
<th>PWms</th>
<th>Vpk</th>
<th>COMMENTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>15.6 / 615</td>
<td>301</td>
<td>66</td>
<td>117</td>
<td>2.0</td>
<td>33.1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>15.2 / 600</td>
<td>300</td>
<td>65</td>
<td>115</td>
<td>2.0</td>
<td>33.1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>14.0 / 550</td>
<td>295</td>
<td>61</td>
<td>109</td>
<td>1.9</td>
<td>33.0</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>12.7 / 500</td>
<td>290</td>
<td>58</td>
<td>103</td>
<td>1.9</td>
<td>33.0</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>11.4 / 450</td>
<td>285</td>
<td>54</td>
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### 5-8. Program 6 – 1.2 mm 316 (.045”), 98-2 Argon-CO₂

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5-9. Program 7 – 1.0 mm 308L (.040”), 98-2 Argon-CO₂

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5-10. Program 8 – 1.2 mm 308L (.045”), 98-2 Argon-CO₂

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5-11. Program 1 – 1.2 mm Metal Core (.045”), 95-5 Argon-CO₂

**Note**  
The next 8 programs are available after changing software wiretype (see Section 11-10).

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5-13. Program 3 – 1.2 mm ER 4043 (.045”), Argon

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<tbody>
<tr>
<td>MPM / IPM</td>
<td>Apk</td>
</tr>
<tr>
<td>-----------</td>
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</tr>
<tr>
<td>17.9 / 705</td>
<td>492</td>
</tr>
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<td>17.8 / 700</td>
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<td>16.5 / 650</td>
<td>451</td>
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<td>15.2 / 600</td>
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<td>14.0 / 550</td>
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<td>12.7 / 500</td>
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<td>11.4 / 450</td>
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<tr>
<td>10.2 / 400</td>
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<tr>
<td>8.9 / 350</td>
<td>279</td>
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<td>7.6 / 300</td>
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<td>6.4 / 250</td>
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</tr>
<tr>
<td>5.1 / 200</td>
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<td>3.8 / 150</td>
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<tr>
<td>2.5 / 100</td>
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5-14. Program 4 – 1.0 mm ER 4043 (.040”), Argon

<table>
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<th>Gas: Ar / 19 L/min (40 CFH)</th>
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<tbody>
<tr>
<td>MPM / IPM</td>
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</tr>
<tr>
<td>-----------</td>
<td>-----</td>
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<tr>
<td>19.4 / 760</td>
<td>476</td>
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<tr>
<td>18.5 / 725</td>
<td>470</td>
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<tr>
<td>17.7 / 695</td>
<td>464</td>
</tr>
<tr>
<td>16.9 / 665</td>
<td>459</td>
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<tr>
<td>16.1 / 630</td>
<td>453</td>
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<tr>
<td>15.2 / 595</td>
<td>448</td>
</tr>
<tr>
<td>13.8 / 540</td>
<td>421</td>
</tr>
<tr>
<td>12.4 / 485</td>
<td>394</td>
</tr>
<tr>
<td>11.0 / 430</td>
<td>367</td>
</tr>
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<td>9.7 / 380</td>
<td>340</td>
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<tr>
<td>8.3 / 325</td>
<td>318</td>
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<td>6.9 / 270</td>
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<td>4.1 / 160</td>
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5-15. Program 5 – 1.0 mm 5356 (.040”), Argon

<table>
<thead>
<tr>
<th>Wire Size/Type: 1.0 mm (.040”)</th>
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<tbody>
<tr>
<td>MPM / IPM</td>
<td>Apk</td>
<td>Abk</td>
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<td>13.8 / 540</td>
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<td>51</td>
</tr>
<tr>
<td>12.4 / 485</td>
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<td>51</td>
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<tr>
<td>11.0 / 430</td>
<td>306</td>
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</tr>
<tr>
<td>9.7 / 380</td>
<td>275</td>
<td>50</td>
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<td>8.3 / 325</td>
<td>281</td>
<td>44</td>
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<tr>
<td>6.9 / 270</td>
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<tr>
<td>5.5 / 215</td>
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5-16. Program 6 – 1.2 mm ER 5356 (.045”), Argon

<table>
<thead>
<tr>
<th>Wire Size/Type: 1.2 mm (.045”) ER 5356</th>
<th>Gas: Ar / 19 L/min (40 CFH)</th>
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<tbody>
<tr>
<td>MPM / IPM</td>
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<tr>
<td>19.4 / 760</td>
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<td>18.5 / 725</td>
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<td>17.7 / 695</td>
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<td>16.9 / 665</td>
<td>366</td>
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<tr>
<td>16.1 / 630</td>
<td>362</td>
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<tr>
<td>15.2 / 595</td>
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<td>12.4 / 485</td>
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<tr>
<td>11.0 / 430</td>
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<td>9.7 / 380</td>
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<td>4.1 / 160</td>
<td>280</td>
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<td>2.7 / 105</td>
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### 5-17. Program 7 – .8 mm Steel (.030"), 98-2 Argon-Oxy

<table>
<thead>
<tr>
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<th>Gas: Ar - Oxy / 19 L/min (40 CFH)</th>
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<td><strong>MPM / IPM</strong></td>
<td><strong>Apk</strong></td>
</tr>
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<td>17.8 / 700</td>
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<tr>
<td>15.9 / 625</td>
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<td>14.0 / 550</td>
<td>358</td>
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<tr>
<td>12.1 / 475</td>
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<td>10.2 / 400</td>
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<td>8.9 / 350</td>
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<td>7.6 / 300</td>
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<td>4.4 / 170</td>
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<td>298</td>
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<td>3.2 / 125</td>
<td>289</td>
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<td>2.5 / 100</td>
<td>280</td>
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### 5-18. Program 8 – 1.0 mm Steel (.040"), 98-2 Argon-Oxy

<table>
<thead>
<tr>
<th>Wire Size/Type: 1.0 mm (.040&quot;) Steel</th>
<th>Gas: Ar - Oxy/ 19 L/min (40 CFH)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>MPM / IPM</strong></td>
<td><strong>Apk</strong></td>
</tr>
<tr>
<td>17.9 / 705</td>
<td>451</td>
</tr>
<tr>
<td>17.8 / 700</td>
<td>450</td>
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<tr>
<td>16.5 / 650</td>
<td>440</td>
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<td>15.2 / 600</td>
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<td>14.0 / 550</td>
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<td>7.6 / 300</td>
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<td>5.1 / 200</td>
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<td>3.8 / 150</td>
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</tr>
<tr>
<td>2.5 / 100</td>
<td>260</td>
</tr>
<tr>
<td>2.4 / 95</td>
<td>257</td>
</tr>
</tbody>
</table>
5-19. Setup Pendant Mode Select Button

Press Mode Select button to move indicator in left window display.
Go to Section 5-20.

Process Sequence SharpArc Card

> Process Sequence SharpArc Card

> Prg 1 Pulse 0.35" Steel Argon – Oxy

Ref. 154 109
5-20. Setup Pendant Parameter Select Button

1 Parameter Display
2 Moving Line
Moving line is under value that can be changed.
3 Pulse Panel Parameter Select Button
Press pulse panel parameter select button to move indicator in right window display.

- Process Sequence SharpArc Card
- Prg 1 Pulse 035° Steel Argon – Oxy
- Prg 1 Pulse 035° Steel Argon – Oxy
- Pulse 035° Steel Argon – Oxy
- Teach Off
Use mode select button to select mode to be changed (see 5-19).

Use pulse panel parameter select button to select parameter to be changed (see 5-20).

1 Increase Button
Press button to increase value that is underlined by the moving line.

2 Decrease Button
Press button to decrease value that is underlined by the moving line.

> Prg 1
Pulse
035° Steel
Argon – Oxy

> Prg 2
Pulse
045° Steel
Argon – Oxy

> Prg 3
Pulse
052° Steel
Argon – Oxy

Ref. 154 109
6-1. Weld Cycle For Pulse Welding

The type of robot connected determines what combination of parameters are available.

6-2. Setting Preflow Sequence Display

1 Mode Select Button
When unit is turned On, Process is the default mode, at other times, use mode select button to select Sequence.

2 Parameter Select Button
Use parameter select button to select parameters.

3 Preflow Parameters Display
Preflow can be adjusted from 0-9.9 seconds. If value set is zero (0), there is no Preflow sequence.
Go to Section 6-3.
6-3. Setting Weld Sequence Display

Parameter ranges are as follows:
- Trim (Arc Length), 0-99
- Wire Feed Speed, 50-780 Inches Per Minute, IPM

Go to Section 6-4.

6-4. Setting Crater Sequence Display

Parameter ranges are as follows:
- Seconds, 0-2.50 Sec. If value set is zero (0), there is no Crater sequence.
- Trim (Arc Length), 0-99
- Wire Feed Speed, 50-780 Inches Per Minute, IPM

Go to Section 6-5.
6-5. Setting Postflow Sequence Display

<table>
<thead>
<tr>
<th>Postflow Parameters Display</th>
</tr>
</thead>
<tbody>
<tr>
<td>Postflow can be adjusted from 0-9.9 seconds. If value set is zero (0), there is no Postflow sequence.</td>
</tr>
</tbody>
</table>

Postflow Parameters Display

SECTION 7 – TEACHING A PULSE WELDING PROGRAM

NOTE

See GMAW-P (Pulsed MIG) Process Guide supplied with unit for more information.

7-1. Pulse Waveform Explained

This unit controls weld output for pulsed welds.

1 Apk – Peak Current Of 100-600 Amperes

Apk is the high pulse of welding current. Peak current melts the welding wire and forms a droplet. The droplet is forced into the weld puddle.

2 Abk – Background Current Of 10-255 Amperes

Abk is the low weld current. Background current preheats welding wire and maintains the arc. When background current is too low, the arc is unstable and hard to maintain.

3 PPS – Pulses Per Second Of 20-400

PPS, pulse rate, and frequency (Hz) are used interchangeably. A PPS or pulse rate of 60 Hz means 60 pulses of current are produced each second.

4 PWms – Pulse Width Of 1.0-5.0 Milliseconds

PWms is the time spent at peak current (1.2 ms is .0012 seconds). This time must be long enough to form a droplet of welding wire. The stiffness or fluidity of the molten weld puddle is controlled by PWms.

Vpk = Peak Voltage

Arc Voltage during peak current phase of the pulse waveform. This determines arc length during adaptive pulse welding.

Ref. S-0259
The teach mode allows the user to create custom pulse MIG welding programs. The teach mode has 15 teach points. At each teach point, the user can adjust five parameters: peak amperage (Apk), background amperage (Abk), pulses per second (PPS), pulse width in milliseconds (PWms), and peak voltage (Vpk) to shape the pulse waveform of the weld output.

Wire feed speed teach points can range from the minimum to the maximum wire feed speed of the feeder. When using a standard speed motor, wire feed speed teach points typically range from 50 to 750 ipm. The feeder uses pulse parameters at teach points to establish the pulse parameters at any wire feed speed setting.

Below the wire feed speed of the lowest teach point, and above the wire feed speed of the highest teach point, the unit may limit wire feed speed settings in pulse MIG to maintain all pulse parameters within the capability of the unit.

Pulse MIG programs made by the manufacturer have pulse waveform information entered for all 15 teach points. The operator can relocate and modify the setting of one, or any number of the 15 teach points if the factory set information is not appropriate for a specific application.

After the parameters for each teach point are established, an arc must be struck and maintained for at least 5 seconds in teach mode. This allows the wire feeder to learn the arc voltage length associated with the taught pulse parameters. To ensure a proper arc length reading, electrode stick-out must be carefully maintained. An alternate method is to adjust the Vpk value, then turn off Teach Mode and weld. If welding is performed with Teach Mode on, Vpk will be updated for other parameter settings.

The taught arc length represents a Trim (arc length) setting of 50. Increasing the value of Trim, increases the actual arc length. Likewise, decreasing the value of Trim will decrease actual arc length.

In the Pulse mode, the unit does not maintain a constant arc length with variations in electrode stick-out. In the Adaptive Pulse mode, the unit adjusts pulse frequency to maintain a constant arc length regardless of variations in electrode stick-out.

Proceed to next section to teach a pulse MIG program.
7-3. Selecting Teach Point Wire Feed Speed For Pulse Welding Program

1 Process Display
When unit is first turned On, Process is the default screen, at other times use mode select button to select Process.

2 Teach Display
Use parameter select button to select Teach.
Use increase/decrease buttons to select On.

3 IPM (Teach Point)
The parameters associated with this wire feed speed teach point can be modified. The wire feed speed value itself cannot be changed from the set point.
To set or adjust teach point parameters, go to Section 7-4.
When the Process Teach mode is On, and one of the following pulse parameters is selected: Apk, Abk, PPS, PWms, or Vpk, the pulse panel displays the selected pulse parameter instead of Trim (arc length). When the pulse parameter is selected, the value can be changed with the pulse panel controls as follows:

1  Vpk Display
2  Apk Display
3  Abk Display
4  PPS Display
5  PWms Display
6  Custom Pulse Screen

When values have been set for a teach point, strike and maintain an arc for five seconds. Repeat procedure at each teach point until custom program is complete (see Section 7-2).

Turn Teach mode Off.

The letter C will appear in the upper right corner of all customized programs.

Customized programs can be reverted back to factory-set values through memory reset (see Section 11-12).
### Make copies of this chart for future use.

<table>
<thead>
<tr>
<th>Program #</th>
<th>Wire Size/Type</th>
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</thead>
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<table>
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<th>Card #</th>
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<table>
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<tr>
<th>Gun Model</th>
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<th>CFH</th>
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<table>
<thead>
<tr>
<th>IPM</th>
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<th>Abk</th>
<th>PPS</th>
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<th>Vpk</th>
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</tr>
</tbody>
</table>

Preflow: ____________ Sec.

Run-In Trim: ____________ IPM: ____________ Sec.: ____________

Crater Trim: ____________ IPM: ____________ Sec.: ____________

Postflow: ____________ Sec.
7-5. Changing To Adaptive Pulse Welding

Welding parameters are the same for both a Pulse and an Adaptive Pulse welding program. While welding adaptively, the unit uses feedback to attempt to maintain a constant arc length. To change to Adaptive Pulse welding, proceed as shown:

1. Setup Pendant Display
   Default display when unit is first turned On, at other times use mode select button to select Process.

SECTION 8 – TEACHING A MIG WELDING PROGRAM

8-1. Weld Cycle For Mig Welding

The type of robot kit installation will determine what combination of parameters are available.

Ref. S-0271
8-2. Changing To Mig Welding

1 Setup Pendant Display
Default display when unit is first turned On, at other times use mode select button to select Process.

Go to Section 8-3.

8-3. Setting Preflow Sequence Display

1 Setup Pendant Display
When unit is turned On, Process is the default mode. Use mode select button to select Sequence.

2 Parameter Select Button
Use parameter select button to select parameters.

3 Preflow Parameters Display
Preflow can be adjusted from 0-9.9 seconds. If value set is zero (0), there is no Preflow sequence.

Go to Section 8-4.
8-4. Setting Start Sequence Display

Parameter ranges are as follows:
Seconds, 0-2.5 Sec. If value set is zero (0), there is no Run-In sequence. With zero (0) time value, programmed values for volts and wire feed speed are used until a valid arc condition is detected.

Volts, 10.0-38.0 Volts
Wire Feed Speed, 50-780 inches per minute, IPM
Go on to Section 8-5.

8-5. Setting Weld Sequence Display

Parameter ranges are as follows:
Inductance, 0-99
Volts, 10.0-38.0 Volts
Wire Feed Speed, 50-780 inches per minute, IPM
Go to Section 8-6.
8-6. Setting Crater Sequence Display

Parameter ranges are as follows:
Seconds, 0-2.50 Sec. If value set is zero (0), there is no Crater sequence.
Volts, 10.0-38.0 Volts.
Wire Feed Speed, 50 to 780 inches per minute, IPM.

Go to Section 8-7.

8-7. Setting Retract Sequence Display

Parameter range is as follows:
Seconds, 0-1.00 seconds. If value set is zero (0), there is no Burnback sequence.

Go to Section 8-8.
Postflow can be adjusted from 0-9.9 seconds. If value set is zero (0), there is no Postflow sequence.
9-1. Selecting And Adjusting SharpArc™ Control

**Warning**

- **SharpArc**
  - SharpArc™ is used to adjust arc cone width and arc characteristics.
  - Use mode select button to move > to select SharpArc. Use Display Control to adjust Arc setting.
  - SharpArc™ setting range is from 0 to 20. The factory default is set at zero (0). When Arc value is increased toward 20, the arc cone narrows and the weld puddle becomes less fluid.

```
> Process Sequence
  > SharpArc Card

> Prg 1
  > Pulse
  035° Steel
  Argon – Oxy

1
Mode Select

> Process Sequence
  > SharpArc Card

> SharpArc
  > 0

Set Desired Value

Parameter Select

Increase/Decrease

> SharpArc
  > 10
```

**SharpArc**

- **Parameter Select**
- **Process Sequence**
  - > Prg 1
    - Pulse
    - 035° Steel
    - Argon – Oxy

- **Mode Select**
- **Parameter Select**
- **Set Desired Value**
- **Increase/Decrease**

**SharpArc**

- **Parameter Select**
- **Set Desired Value**
- **Increase/Decrease**
SECTION 10 – USING THE OPTIONAL DATA CARD

10-1. Installing Data Card

1. **Label**
   - Peel backing from label and apply to data card with THIS SIDE UP by metal pins.
   - Write the names of the programs stored on the card on the label.
   - Write the name of the piece of equipment the card is used with on the label.

2. **Data Card**

3. **Card Slot**
   - Insert card into slot. To format card, turn On power to the unit. Select Card from menu. Data card formats when unit enters Card mode. Exit Card mode and turn Off power.

Ref. 802 816 / Ref. 155 823
Use Mode Select button to select Card.

1  Card Display
2  Write

Used to transfer program data from unit to card. The program card can hold up to 32 programs. When writing to the card, the next available program number is automatically assigned.

3  Read

Used to transfer program data from card to unit.

4  Delete

Used to delete program data from card.

5  Done

Used to exit card display.

6  Moving Line

Moving line is under value that can be changed.

10-2. Using The Data Card
10-3. Naming Programs And Writing To Card

**NOTE**

All program types (Pulse, Adaptive Pulse, and MIG) can be stored on a data card and retrieved.

---

1. **Card Display**
   - Use Mode Select button to select Card.

2. **Moving Line**
   - Moving line is under value that can be changed. Use increase or decrease button to change value.

3. **Name Display**
   - If no name is desired, press Parameter Select button to continue the write procedure.
Use Mode Select button to select Card.
1 Card Display
2 Moving Line
Moving line is under value that can be changed. Use increase or decrease button to select program number to read from card to feeder.
3 Read Display
Use increase or decrease button to select feeder program number where the card program goes.
10-5. Reading (Or Deleting) From An Empty Card

1 Warning Display
If there are no programs on the card, this series of displays appear.

Write
> Read
Delete
Done

Parameter Select Once

Write
Read
Delete
> Done

Parameter Select

> Process
Sequence
SharpArc
Card

Prg 2
MIG

10-6. Deleting Programs From Card

Process
Sequence
SharpArc
> Card

Mode
Select
Twice

Parameter Select

Write
Read
Delete
> Done

Parameter Select

#2 MIG
Press

Parameter Select

Delete
Card Prg2
Lose? Yes
Press

Yes

Parameter Select

Delete
Card Prg2
Lose? No
Press

No

Increase

Parameter Select

Card Prg2
Deleted
Press

Parameter Select

# 2 MIG
Press

Parameter Select

# 3 MIG
Press

WARNING:
Card Empty
Press Below

Card Prg2
Deleted
Press

Parameter Select

WARNING:
Delete
Card Prg2
Lose? Yes
Press

Yes

Parameter Select

WARNING:
Delete
Card Prg2
Lose? No
Press

No

Increase

Parameter Select

Card Prg2
Deleted
Press

Parameter Select

# 2 MIG
Press

Parameter Select

# 3 MIG
Press

Parameter Select

WARNING:
Card Empty
Press Below

Card Prg2
Deleted
Press

Parameter Select

# 2 MIG
Press

Parameter Select

# 3 MIG
Press

Parameter Select

WARNING:
Card Empty
Press Below

Card Prg2
Deleted
Press

Parameter Select

# 2 MIG
Press

Parameter Select

# 3 MIG
Press

Parameter Select

WARNING:
Card Empty
Press Below

Card Prg2
Deleted
Press

Parameter Select

# 2 MIG
Press

Parameter Select

# 3 MIG
Press

Parameter Select

WARNING:
Card Empty
Press Below

Card Prg2
Deleted
Press

Parameter Select

# 2 MIG
Press

Parameter Select

# 3 MIG
Press

Parameter Select

WARNING:
Card Empty
Press Below

Card Prg2
Deleted
Press

Parameter Select

# 2 MIG
Press

Parameter Select

# 3 MIG
Press

Parameter Select

WARNING:
Card Empty
Press Below

Card Prg2
Deleted
Press

Parameter Select

# 2 MIG
Press

Parameter Select

# 3 MIG
Press

Parameter Select

WARNING:
Card Empty
Press Below

Card Prg2
Deleted
Press

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10-7. Selecting Security Lock

**NOTE**

*Security lock works only when a data card is inserted.*

1. **Security Display**
   - Use this display to lock a program’s weld parameters so that changes cannot be made using pulse panel controls.

2. **Program Number**
   - Choose the program number (1 through 8) to be locked.

3. **Program Lock Display**
   - When lock is off a program, the operator can change all weld parameters of that program without restriction.
   - With lock on a program, the operator cannot change parameters of that program.

---

![Diagram of security lock process](image-url)
11-1. Setup Flow Chart

To set up features that customize operation, use the setup displays. Features that can be customized are as follows:

- **Access**
  - Code: Off/On
  - Default: Off
  - Section: 11-3

- **Mig Type**
  - Voltage Correction: DVC On/Off
  - Default: Off
  - Section: 11-4

- **Aux Output**
  - Auxiliary Output: On
  - Default: Never
  - Section: 11-5

- **Voltage**
  - Control Feedback: Internal Volt Sense
  - Default: Internal
  - Section: 11-6

- **Arc Start**
  - Arc Start Type: Standard Hot Start Soft Start
  - Default: Standard
  - Section: 11-7

- **Arc Time**
  - Run Hours: 0–9999.99
  - Default: No Reset
  - Section: 11-8

- **Wire Feed**
  - Display: IPM/MPM
  - Motor Type: Standard
  - Default: Standard
  - Section: 11-9

- **Wire Type**
  - Wire Type: Hardwire/Softwire
  - Default: Hardwire
  - Section: 11-10

- **Display**
  - Actual Amps Command
  - Command
  - Default: Command
  - Section: 11-11

- **Memory**
  - No Reset
  - Default: No Reset
  - Section: 11-12

- **Shuffle**
  - Arc Start/Off/On: On/Volt Sense
  - Default: Off
  - Section: 11-13

- **Name**
  - Card Programs: Off/On
  - Default: Off
  - Section: 11-14

- **Program**
  - Remote Select: Off/On
  - Default: Off
  - Section: 11-15

- **Jog IPM**
  - Robot Jog Local Jog
  - Default: Local IPM
  - Section: 11-16

- **Flow**
  - Detect Flow: Off/On
  - Default: Off
  - Section: 11-17

- **Monitor**
  - Arc Volts: Off/On
  - Range: 0.1 - 9.9
  - Default: 2.0 Volts
  - Section: 11-18

- **Stick**
  - Stick Check: Off/On
  - Default: Off
  - Section: 11-19

- **Ramps**
  - Program Number: 1
  - Start: Off/On
  - Default: Off
  - Section: 11-20

- **Software Version**
  - Default: Software Version
  - Section: 11-21

- **Exit**
  - Exit Setup Menu Now: Press
  - Default: Press
  - Section: 11-22
11-2. Using Setup Displays

1 Front Panel Setup Display
   Front panel display during setup.

2 Pulse Panel Mode And
   Parameter Select Buttons

3 Power Switch On Rear Panel
   Press and hold down both buttons
   while turning On unit.

4 Setup Pendant Display
   Follow this procedure any time
   access is required. Once in the set-
   up displays, use the Mode Select
   button to select a particular display.

   To save any or all of the changes
   made while in the setup displays,
   and/or to exit the setup displays,
   turn power to the unit Off and back
   On.

Front Panel Display

Setup Pendant Display

NOTE

Access code works only when a data card is inserted (see Section 10).

1 Code Display
With code off, access to the setup displays is not restricted.
With code on, the operator must know and enter the access code to access or change any of the setup displays.

2 Access Display
With a code set, this display appears when power is turned on while holding the pulse panel Mode and Parameter Select buttons.
Press Parameter Select button to enter access code. When the correct letter is entered, the indicator automatically moves to the next character. When the final access code letter is entered, the display automatically changes to the initial setup display.

Turn Power Off And Back On And Access Security Display
11-4. Selecting Voltage Correction

With DVC Voltage Correction On, the unit uses closed-loop feedback or voltage sensing leads to maintain set voltage parameters.

With DVC Voltage Correction Off, feedback from the arc is not used for closed-loop feedback to maintain voltage parameters. Feedback from the arc is still used for other functions.

Be sure voltage sensing leads are connected.

11-5. Selecting Auxiliary Output

This output can be set to several conditions:
- On whenever the wire feeder is operating
- On during the welding arc until arc goes out
- On during the entire weld cycle
- Off or never On.

11-6. Selecting Voltage Sensing Method

The Internal setting allows the unit to obtain voltage feedback directly from the welding power source output terminals.

When using the V. Sense setting, arc voltage feedback is through the voltage sense leads connected to the feeder. Use this setting when there is more than 50 ft (15 m) of weld cable used or when using Touch Sensor.
11-7. Selecting Arc Start Method

NOTE
Arc Start selection is not used when welding in non-pulsed MIG.
Do not use the Hot Start setting for .035 in (9 mm) or smaller wire.

1 Standard Start
Welding operation is performed at set values for welding parameters.

2 Hot Start
Use the Hot Start mode for pulse welding when high initial weld current is necessary to start large diameter welding wires. When in Hot Start, welding power source starts the arc in the CV mode and switches to CC once the arc is started.

3 Soft Start
Use the Soft Start mode for .035 in (9 mm) or smaller wire. Low wire feed speeds may also require the Soft Start mode. Arc start is at 75% of maximum amperage for pulse welding and once an arc is established, welding is performed at set parameter values.

11-8. Resetting Arc Time

1 Arc Time Display
The unit accumulates arc hours up to 9999.99 hours or 999999 weld cycles before rolling over to zero (0). The arc timer can be reset using this display or by performing a total reset (see Section 11-12).
11-9. Selecting Units For Wire Feed Speed And Motor Type

Wire Feed Display
The displayed unit of wire speed (IPM or MPM) can be changed along with the wire feed motor type (Standard, Low Speed, or High Speed).

Access Setup Display
Press Mode Select

1

ArcStart
Arc Time
> Wirefeed
Wiretype

Display
> IPM
Motor Type
Standard

Display
IPM
Motor Type
High Spd

Display
IPM
Motor Type
Low Spd

Display
IPM
Motor Type
Standard

Display
MPM
Motor Type
Standard

Increase
Increase
Parameter Select
Decrease

11-9. Selecting Units For Wire Feed Speed And Motor Type

Press Mode Select

ArcStart
Arc Time
> Wirefeed
Wiretype

Display
> IPM
Motor Type
Standard

Display
IPM
Motor Type
High Spd

Display
IPM
Motor Type
Low Spd

Display
IPM
Motor Type
Standard

Display
MPM
Motor Type
Standard

Increase
Increase
Parameter Select
Decrease
11-10. Selecting Wire Type

**NOTE**
If wire type is changed, perform a system reset (see Section 11-12) immediately after selecting wire type to bring up the correct welding programs.

After using system reset to store wire type selection into memory, all other setup parameters return to factory default settings. See Section 11-2 for procedure to return to setup displays and reset parameters.

1 Wire Type Display
Select soft wire when using aluminum wire in the wire feeder. Select hard wire when using any other kind of wire.

11-11. Defining Display Value

1 Display Select Display
The display can show amps, actual reading or print out command.

Press Mode
Select

Increase

Amps
Actual
Command
Memory
Display
Wirefeed
Wiretype
> Wiretype Display
Arc Time
Wire feed
> Wiretype Display

Press Mode
Select

Increase

Wire Type
> Hardwire
System
Reset
Now

Wire Type
> Softwire
System
Reset
Now
11-12. Resetting Memory

1. No Reset
   Press Parameter Select button to exit memory reset parameter without resetting any data.

2. Program Reset
   Press Parameter Select button to reset last active program to original factory program settings. All other program and setup information remains the same. If setup card is in card slot, program will be loaded from card.

3. System Reset
   Press Parameter Select button to reset programs and setup to original factory settings. System, Arc Time, and Robot Control settings are not affected by the system reset. If setup card is in card slot, program will be loaded from card.

4. Total Reset
   Press Parameter Select button to reset programs and setup to original factory settings for all programs and setup including System and Arc Time. If setup card is in card slot, program will be loaded from card.

5. Reset (Default) Displays

11-13. Selecting Arc Start/Volt Sense Error Shutdown

1. Voltage Shutdown Display
   With Arc Start/Volt Sense on, the unit shuts down when no arc voltage is sensed. If the unit shuts down, an error message appears (see Section 13-5).

   With Arc Start/Volt Sense off, the unit continues to feed wire even when there is no arc voltage sensed.
11-14. Selecting Program Name Feature

When a data card is used, the programs written from the unit to the card can be named.

11-15. Remote Program Select

When Program is On, a remote device or robot Teach Pendant may be used to select programs (see Section 11-16). When Off, program selection must be done from Setup Pendant.

11-16. Remote Program Setting

**NOTE**

When Remote Program Select is “On”, program selection will be determined by remote input once a weld is initiated. In “Standby” mode, program selection can be done in a normal manner from the Setup Pendant.

See the following table for the remote program select binary code.

<table>
<thead>
<tr>
<th>Program No.</th>
<th>Output A</th>
<th>Output B</th>
<th>Output C</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Off</td>
<td>Off</td>
<td>Off</td>
</tr>
<tr>
<td>2</td>
<td>On</td>
<td>Off</td>
<td>Off</td>
</tr>
<tr>
<td>3</td>
<td>Off</td>
<td>On</td>
<td>Off</td>
</tr>
<tr>
<td>4</td>
<td>On</td>
<td>On</td>
<td>Off</td>
</tr>
<tr>
<td>5</td>
<td>Off</td>
<td>Off</td>
<td>On</td>
</tr>
<tr>
<td>6</td>
<td>On</td>
<td>Off</td>
<td>On</td>
</tr>
<tr>
<td>7</td>
<td>Off</td>
<td>On</td>
<td>On</td>
</tr>
<tr>
<td>8</td>
<td>On</td>
<td>On</td>
<td>On</td>
</tr>
</tbody>
</table>
11-17. Jog Wire Feed Speed Selection

Jog wire feed speed can be varied between 50 and 780 inches per minute, IPM.

When not welding, a Robot Jog local setting will jog wire at the Local Jog ipm setting, even if robot provides wire jog signal.

A Robot Jog remote setting requires that the robot provide a jog command and jog speed signal.

Auxiliary jog connections at the peripheral receptacle and front panel jog push buttons will jog wire at the Local Jog ipm setting even if Robot Jog is set for remote.

11-18. Flow Selection

When a system reset is done, Flow is set to Off.

Flow Display

Provides a means to enable/disable the flow switch input.

When this feature is off, no monitoring is done for a flow switch input signal.

When this feature is on, the flow detect input monitors flow switch signal and will cause an error if flow is not present.
11-19. Arc Voltage Error Selection

- When a system reset is done, Monitor is set to Off.
- Jog IPM Flow > Monitor Stick

<table>
<thead>
<tr>
<th>Jog IPM Flow &gt; Monitor Stick</th>
<th>Arc Volts &gt; On 2.0 Volts 1.0 Sec</th>
</tr>
</thead>
</table>

- When this feature is off, arc voltage or arc length variations will not cause an error or shut the unit down.
- When this feature is on and a range of deviation is set (the range limits are ±0.1 to 9.9 volts from desired weld voltage, and ±0.1 to 9.9 seconds), arc voltage or arc length variations outside of the defined range, for a period of time exceeding the defined acceptable time period, cause either the error relay to energize or the unit to shut down depending on the Arc Start/Volt Sense shutdown error setting.

11-20. Stick Check Selection

- Stick Check Display
- Flow Monitor > Stick Ramps

<table>
<thead>
<tr>
<th>Flow Monitor &gt; Stick Ramps</th>
<th>Stick Check &gt; On</th>
</tr>
</thead>
</table>

- When stick check is On, a stick check routine is performed at the end of each weld. When Off, no stick check is done.
11-21. Setting Ramps Function

1. Ramps Display
   The ramps function allows output power to be tapered from start to weld and/or from weld to crater.

2. Program Number
   Choose the desired program number (1 through 8). Turns start and/or crater ramping On or Off as desired.

3. Start Display
   Turns start ramping On or Off as defined.

4. Crater Display
   Turns crater ramping On or Off as defined.

11-22. Software Version Number

1. Example Version Number Display
   When talking with service personnel, this number may be required. (Check actual unit display for number.) The factory keeps this number on file with the serial number of the unit.

11-23. Exiting The Setup Menu

1. Exit Setup Menu Display
   Allows user to exit setup menu without cycling power.
The control menu allows the user access to rise time setting that controls rise and fall time of the pulse square wave. Changing the rise time setting changes the square wave shape by rounding off the corners, and makes it possible to quiet the pulse arc by just changing the rise time.

12-1. Using Menu Display

1 Front Panel Control Display
Front panel display during control setting.

2 Setup Pendant Increase And Decrease Buttons

3 Power Switch On Front Panel
Press and hold down both buttons while turning On unit. Release buttons when Control appears on the front panel display.

4 Setup Pendant Control Display
Follow this procedure any time access is required. To save any changes made while in the control display, and/or to exit the control display, cycle power off and back on at power switch.
12-2. Setting Rise Time Parameter

**NOTE**

Maximum Rise Time setting will make the welding power source go to its maximum output in the maximum amount of time (1250 amperes per millisecond).

<table>
<thead>
<tr>
<th>Access Control Display</th>
<th>&gt; Rise Time</th>
<th>Adaptive</th>
<th>AutoConfig</th>
<th>Retract</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>&gt; 800</td>
<td>A/ms</td>
</tr>
<tr>
<td>Increase/Decrease</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Power Switch</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mode Select</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Press Mode Select button</td>
<td>Go To</td>
<td>Section 12-4</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

1 Rise Time Display
Setting is depend on desired arc characteristics. Make a sample weld after each setting until desired arc characteristics are obtained.
Use Increase or Decrease button to change setting.
Range is 250 to 1250 amperes per millisecond (A/ms).
Press Mode Select button to go to next parameter or cycle power off and back on at power switch to save setting and exit Control menu.

12-3. Setting Adaptive Parameters

1 Adaptive Parameter Display
Settings allow user to choose between two adaptive programs, A or B.
Use Increase or Decrease button to change setting.
Press Mode Select button to go to next parameter or cycle power off and back on at power switch to save setting and exit Control menu.

For more detailed information on A vs. B adaptive programs, consult factory specialist.
12-4. Setting Auto Configure Parameter

1 Auto Configure Display
Setting allows user to do manual configuration or automatic configuration by welding power source/interface.

Use Increase or Decrease button to change setting.

Press Mode Select button to go to next parameter or cycle power off and back on at power switch to save setting and exit Control menu.

Press Mode Select

Go To Section 12-5
12-5. Setting Retract On/Off

Settings allow user to turn the retract feature On or Off. The retract feature allows the user to set a time and wire feed speed to pull wire away from work when the weld is done.

Use Increase or Decrease button to change setting. If the retract feature is turned On, a weld sequence step is added in the process screens.

Press Mode Select button to go to next parameter or cycle power off and back on at power switch to save setting and exit Control menu.

12-6. Setting Sharp Start On/Off

Settings allow user to turn the sharp start feature On or Off.

Sharp start should normally be left On. The ability to turn sharp start Off is provided in case the user experiences problems with weld ends using flux cored wires.

Use Increase or Decrease button to change setting.

Press Mode Select button to go to next parameter or cycle power off and back on at power switch to save setting and exit Control menu.
12-7. Exiting The Control Menu

1 Exit Control Menu Display
Allows the user to leave the control menu.

1 Exit Cntrl
Menu Now
Press

SECTION 13 – MAINTENANCE & TROUBLESHOOTING

13-1. Routine Maintenance

▲ Disconnect power before maintaining.
▲ Maintain more often during severe conditions.

3 Months

Replace damaged or unreadable label.

Repair or replace cracked cables.

Replace cracked torch body.

6 Months

Clean and tighten weld terminals.

Blow out inside.

13-2. Blowing Out Inside Of Unit

▲ Do not remove case when blowing out inside of unit.
To blow out unit, direct airflow through front and back louvers as shown.
13-3. Removing Case and Measuring Input Capacitor Voltage

Turn Off welding power source, and disconnect input power.

1. Outside Handle Screws
To loosen top, remove two outside handle screws from both handles and all side bolts.

2. Interconnect Board PC2

3. Voltmeter
Measure the dc voltage across the screw terminals on PC2 as shown until voltage drops to near 0 (zero) volts.

Proceed with job inside unit. Reinstall cover when finished.

Important: Significant DC voltage can remain on capacitors after unit is Off. Always check the voltage as shown to be sure the input capacitors have discharged before working on unit.

Tools Needed:

5/16 in

+ lead to lower right terminal, – lead to upper right terminal
13-4. 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 Help 1 Display
Indicates a malfunction in the primary power circuit. If this display is shown, contact a Factory Authorized Service Agent.

2 Help 2 Display
Indicates a malfunction in the thermal protection circuitry located on the left side of the unit. If this display is shown, contact a Factory Authorized Service Agent.

3 Help 3 Display
Indicates the left side of the unit has overheated. The unit has shut down to allow the fan to cool it (see Section 4-5). Operation will continue when the unit has cooled.

4 Help 4 Display
Indicates a malfunction in the thermal protection circuitry located on the right side of the unit. If this display is shown, contact a Factory Authorized Service Agent.

5 Help 5 Display
Indicates the right side of the unit has overheated. The unit has shut down to allow the fan to cool it (see Section 4-5). Operation will continue when the unit has cooled.

6 Help 6 Display
Indicates that the input voltage is too low and the unit has automatically shut down. Operation will continue when the voltage is within ±15% of the operating range. If this display is shown, have an electrician check the input voltage.

7 Help 7 Display
Indicates that the input voltage is too high and the unit has automatically shut down. Operation will continue when the voltage is within ±15% of the operating range. If this display is shown, have an electrician check the input voltage.

8 Help 8 Display
Indicates a malfunction in the secondary power circuit of the unit. If this display is shown, contact a Factory Authorized Service Agent. In addition, when the optional ground current sensor is installed, this display indicates weld current in the ground conductor. When this occurs, have an electrician check the primary and secondary connections.
1 Memory CRC Error Display
Corrupted program data has been detected or loaded. The “X” value indicates the program number.
May be caused by incompatible information on the data card or bad memory.

2 Memory Range Error Display
Improper welding power source range is selected. The “X” value indicates the program number.
May be caused by improper range settings or improper data loaded into the interface unit.

3 No Volt Sensed Error
The arc voltage sense circuit did not receive feedback within the required time after an arc was established.
May be caused by an inability to establish an arc in the pulse schedule, or a lack of voltage feedback.

4 No Tach Sensed Error
The motor tachometer feedback is not reaching the control.
May be caused by obstructions in the wire feed system or a faulty wire drive system.

5 Arc Stop Error Display
Trouble is occurring at arc end.
May be caused by obstructions in the wire feed system or a faulty wire drive system or torch is touching part at end of weld.

6 Arc Start Error Display
Trouble is occurring at arc start.
May be caused by obstructions in the wire feed system or a faulty wire drive system.

7 Stop Weld Cycle Error Display
An error has been detected and the robot hasn’t stopped the weld cycle, causing the interface unit to stop the weld cycle and wait for the robot to stop.

8 Error Card Read Display
The card reader is not working properly.
May be caused by a bad data card, a bad data card reader, a faulty microprocessor circuit board, or a wiring problem.

9 No Flow Detected
No coolant is detected after preflow in the weld cycle. Check coolant system and flow switch for proper operation.

10 Ground Current Detect Error Display
Weld current has been detected in the earth ground connection.
May be caused by a conductor making connection to the unit chassis.

11 Wire Stick Error Display
The welding wire has stuck to the workpiece at the end of the weld.
May be caused by poor weld conditions.

12 Arc Fail Time Out Error Display
An arc was not established within the allotted time.
May be caused by an inoperable wire drive, absence of shield gas, or improperly operating welding power source.

13 No Input IPM Display
Analog IPM (inches per minute) from robot is not being received.
May be caused by having no wire feed speed programmed at the robot.
Diagnostic LED’s are visible inside unit, located on PC12 (see illustration for board location).

Refer to Section 13-7 for information on diagnostic LED’s.

Reinstall cover and left side panel after checking diagnostic LED’s.

Top View
### 13-7. Diagnostic LED’s On Weld Interface Board PC12

<table>
<thead>
<tr>
<th>LED</th>
<th>Status</th>
<th>Diagnosis</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>On</td>
<td>Indicates auxiliary output relay is not energized.</td>
</tr>
<tr>
<td></td>
<td>Off</td>
<td>Indicates auxiliary output relay is energized.</td>
</tr>
<tr>
<td>2</td>
<td>On</td>
<td>Indicates gas valve is not energized.</td>
</tr>
<tr>
<td></td>
<td>Off</td>
<td>Indicates gas valve is energized.</td>
</tr>
<tr>
<td>3</td>
<td>On</td>
<td>Indicates +24 volts dc is present for gas valve.</td>
</tr>
<tr>
<td></td>
<td>Off</td>
<td>Indicates +24 volts dc is not present for gas valve.</td>
</tr>
<tr>
<td>4</td>
<td>On</td>
<td>Indicates +15 volts dc is present on weld interface board PC12.</td>
</tr>
<tr>
<td></td>
<td>Off</td>
<td>Indicates +15 volts dc is not present on weld interface board PC12.</td>
</tr>
<tr>
<td>5</td>
<td>On</td>
<td>Indicates –15 volts dc is present on weld interface board PC12.</td>
</tr>
<tr>
<td></td>
<td>Off</td>
<td>Indicates –15 volts dc is not present on weld interface board PC12.</td>
</tr>
<tr>
<td>6</td>
<td>On</td>
<td>Indicates +15 volts dc power source supply is present on weld interface board PC12.</td>
</tr>
<tr>
<td></td>
<td>Off</td>
<td>Indicates +15 volts dc power source supply is not present on weld interface board PC12.</td>
</tr>
<tr>
<td>7</td>
<td>On</td>
<td>Indicates –15 volts dc power source supply is present on weld interface board PC12.</td>
</tr>
<tr>
<td></td>
<td>Off</td>
<td>Indicates –15 volts dc power source supply is not present on weld interface board PC12.</td>
</tr>
<tr>
<td>8</td>
<td>On</td>
<td>Indicates +5 volts dc is present on weld interface board PC12.</td>
</tr>
<tr>
<td></td>
<td>Off</td>
<td>Indicates +5 volts dc is not present on weld interface board PC12.</td>
</tr>
<tr>
<td>9</td>
<td>On</td>
<td>Input signal for no Jog retract.</td>
</tr>
<tr>
<td></td>
<td>Off</td>
<td>Input signal for Jog retract.</td>
</tr>
<tr>
<td>10</td>
<td>On</td>
<td>Input signal for no Jog advance.</td>
</tr>
<tr>
<td></td>
<td>Off</td>
<td>Input signal for Jog advance.</td>
</tr>
<tr>
<td>11</td>
<td>On</td>
<td>Indicates CV mode is selected.</td>
</tr>
<tr>
<td></td>
<td>Off</td>
<td>Indicates CC mode is selected.</td>
</tr>
<tr>
<td>12</td>
<td>On</td>
<td>Input signal for no welding power source contactor.</td>
</tr>
<tr>
<td></td>
<td>Off</td>
<td>Input signal for welding power source contactor.</td>
</tr>
<tr>
<td>13</td>
<td>On</td>
<td>Indicates an Emergency Stop condition is not present.</td>
</tr>
<tr>
<td></td>
<td>Off</td>
<td>Indicates an Emergency Stop condition is present.</td>
</tr>
</tbody>
</table>
Customer Interface Board PC14 Diagnostic LED’s

Diagnostic LED’s are visible inside unit, located on PC14 (see illustration for board location).

Refer to Section 13-9 for information on diagnostic LED’s.

Reinstall top cover after checking diagnostic LED’s.
<table>
<thead>
<tr>
<th>LED</th>
<th><strong>Status</strong></th>
<th><strong>Diagnosis</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>On</td>
<td>Indicates -15 volts dc RA supply is present on customer interface board PC14.</td>
</tr>
<tr>
<td></td>
<td>Off</td>
<td>Indicates -15 volts dc RA supply is not present on customer interface board PC14.</td>
</tr>
<tr>
<td>2</td>
<td>On</td>
<td>Indicates +15 volts dc RA supply is present on customer interface board PC14.</td>
</tr>
<tr>
<td></td>
<td>Off</td>
<td>Indicates +15 volts dc RA supply is not present on customer interface board PC14.</td>
</tr>
<tr>
<td>3</td>
<td>On</td>
<td>Input signal On from robot for no Emergency Stop.</td>
</tr>
<tr>
<td></td>
<td>Off</td>
<td>Input signal Off from robot for Emergency Stop.</td>
</tr>
<tr>
<td>4</td>
<td>On</td>
<td>Indicates +24 volts dc RD supply is present on customer interface board PC14.</td>
</tr>
<tr>
<td></td>
<td>Off</td>
<td>Indicates +24 volts dc RD supply is not present on customer interface board PC14.</td>
</tr>
<tr>
<td>5</td>
<td>On</td>
<td>Input signal On from robot for shielding gas.</td>
</tr>
<tr>
<td></td>
<td>Off</td>
<td>Input signal Off from robot for no shielding gas.</td>
</tr>
<tr>
<td>6</td>
<td>On</td>
<td>Input signal On from robot to energize contactor.</td>
</tr>
<tr>
<td></td>
<td>Off</td>
<td>Input signal Off from robot to not energize contactor.</td>
</tr>
<tr>
<td>7</td>
<td>On</td>
<td>Input signal On from robot for jog retract.</td>
</tr>
<tr>
<td></td>
<td>Off</td>
<td>Input signal Off from robot for no jog retract.</td>
</tr>
<tr>
<td>8</td>
<td>On</td>
<td>Input signal On from robot for jog advance.</td>
</tr>
<tr>
<td></td>
<td>Off</td>
<td>Input signal Off from robot for no jog advance.</td>
</tr>
<tr>
<td>9</td>
<td>On</td>
<td>Indicates automatic configuration Bit D is set.</td>
</tr>
<tr>
<td></td>
<td>Off</td>
<td>Indicates automatic configuration Bit D is not set.</td>
</tr>
<tr>
<td>10</td>
<td>On</td>
<td>Input signal On for RPS-C.</td>
</tr>
<tr>
<td></td>
<td>Off</td>
<td>Input signal Off for RPS-C.</td>
</tr>
<tr>
<td>11</td>
<td>On</td>
<td>Input signal On for RPS-B.</td>
</tr>
<tr>
<td></td>
<td>Off</td>
<td>Input signal Off for RPS-B.</td>
</tr>
<tr>
<td>12</td>
<td>On</td>
<td>Indicates remote program A selected.</td>
</tr>
<tr>
<td></td>
<td>Off</td>
<td>Indicates remote program A not selected.</td>
</tr>
<tr>
<td>13</td>
<td>On</td>
<td>Input signal On from peripheral for touch sensor.</td>
</tr>
<tr>
<td></td>
<td>Off</td>
<td>Input signal Off from peripheral for no touch sensor.</td>
</tr>
<tr>
<td>14</td>
<td>On</td>
<td>Indicates automatic configuration Bit B is set.</td>
</tr>
<tr>
<td></td>
<td>Off</td>
<td>Indicates automatic configuration Bit B is not set.</td>
</tr>
<tr>
<td>15</td>
<td>On</td>
<td>Indicates automatic configuration Bit A is set.</td>
</tr>
<tr>
<td></td>
<td>Off</td>
<td>Indicates automatic configuration Bit A is not set.</td>
</tr>
<tr>
<td>16</td>
<td>On</td>
<td>Indicates automatic configuration Bit C is set.</td>
</tr>
<tr>
<td></td>
<td>Off</td>
<td>Indicates automatic configuration Bit C is not set.</td>
</tr>
<tr>
<td>17</td>
<td>On</td>
<td>Input signal On from relay CR4 for wire stuck in weld joint.</td>
</tr>
<tr>
<td></td>
<td>Off</td>
<td>Input signal Off from relay CR4 for wire not stuck in weld joint.</td>
</tr>
<tr>
<td>18</td>
<td>On</td>
<td>Input signal On from relay CR6 for flow (shielding gas or coolant) present.</td>
</tr>
<tr>
<td></td>
<td>Off</td>
<td>Input signal Off from relay CR6 for flow (shielding gas or coolant) not present.</td>
</tr>
<tr>
<td>19</td>
<td>On</td>
<td>Input signal On from relay CR5 for arc detect.</td>
</tr>
<tr>
<td></td>
<td>Off</td>
<td>Input signal Off from relay CR5 for no arc detect.</td>
</tr>
<tr>
<td>20</td>
<td>On</td>
<td>Input signal On from relay CR2.</td>
</tr>
<tr>
<td></td>
<td>Off</td>
<td>Input signal Off from relay CR2.</td>
</tr>
<tr>
<td>21</td>
<td>On</td>
<td>Input signal On from relay CR1 for welding power source ready and no detected errors present.</td>
</tr>
<tr>
<td></td>
<td>Off</td>
<td>Input signal Off from relay CR1 for welding power source not ready, detected errors are present, or unit is in Setup or Control mode.</td>
</tr>
<tr>
<td>22</td>
<td>On</td>
<td>Input signal On from peripheral for flow switch.</td>
</tr>
<tr>
<td></td>
<td>Off</td>
<td>Input signal Off from peripheral for no flow switch.</td>
</tr>
</tbody>
</table>
## 13-10. Motor Board PC13 Diagnostic LED’s

### Table: Motor Board PC13 Diagnostic LED’s

<table>
<thead>
<tr>
<th>LED</th>
<th>Status</th>
<th>Diagnosis</th>
</tr>
</thead>
<tbody>
<tr>
<td>23</td>
<td>On</td>
<td>Input signal On from peripheral for jog advance.</td>
</tr>
<tr>
<td></td>
<td>Off</td>
<td>Input signal Off from peripheral for no jog advance.</td>
</tr>
<tr>
<td>24</td>
<td>On</td>
<td>Input signal On from peripheral for jog retract.</td>
</tr>
<tr>
<td></td>
<td>Off</td>
<td>Input signal Off from peripheral for no jog retract.</td>
</tr>
<tr>
<td>25</td>
<td>On</td>
<td>Input signal On from peripheral for shielding gas purge.</td>
</tr>
<tr>
<td></td>
<td>Off</td>
<td>Input signal Off from peripheral for no shielding gas purge.</td>
</tr>
<tr>
<td>26</td>
<td>On</td>
<td>Input signal On for touch sensor.</td>
</tr>
<tr>
<td></td>
<td>Off</td>
<td>Input signal Off for no touch sensor.</td>
</tr>
</tbody>
</table>

**1 Motor Board PC13**

Diagnostic LED’s are visible inside unit, located on PC13 (see illustration for board location).

Refer to Section 13-11 for information on diagnostic LED’s.

Reinstall cover after checking diagnostic LED’s.
13-11. Diagnostic LED’s On Motor Board PC13

<table>
<thead>
<tr>
<th>LED</th>
<th>Status</th>
<th>Diagnosis</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>On</td>
<td>Indicates motor reverse relay is energized.</td>
</tr>
<tr>
<td></td>
<td>Off</td>
<td>Indicates motor reverse relay is not energized.</td>
</tr>
<tr>
<td>2</td>
<td>On</td>
<td>Indicates bus voltage is present.</td>
</tr>
<tr>
<td></td>
<td>Off</td>
<td>Indicates bus voltage is not present.</td>
</tr>
<tr>
<td>3</td>
<td>On</td>
<td>Indicates microprocessor is operational.</td>
</tr>
<tr>
<td></td>
<td>Off</td>
<td>Indicates microprocessor is not operational.</td>
</tr>
<tr>
<td>4</td>
<td>On</td>
<td>Indicates tachometer feedback signal is present.</td>
</tr>
<tr>
<td></td>
<td>Off</td>
<td>Indicates tachometer feedback signal is not present.</td>
</tr>
<tr>
<td>5</td>
<td>On</td>
<td>Indicates +5 volts dc is present on motor board PC13.</td>
</tr>
<tr>
<td></td>
<td>Off</td>
<td>Indicates +5 volts dc is not present on motor board PC13.</td>
</tr>
<tr>
<td>6</td>
<td>On</td>
<td>Indicates +15 volts dc is present on motor board PC13.</td>
</tr>
<tr>
<td></td>
<td>Off</td>
<td>Indicates +15 volts dc is not present on motor board PC13.</td>
</tr>
<tr>
<td>7</td>
<td>On</td>
<td>Indicates auxiliary forward signal is present.</td>
</tr>
<tr>
<td></td>
<td>Off</td>
<td>Indicates auxiliary forward signal is not present.</td>
</tr>
<tr>
<td>8</td>
<td>On</td>
<td>Indicates auxiliary output signal is present.</td>
</tr>
<tr>
<td></td>
<td>Off</td>
<td>Indicates auxiliary output signal is not present.</td>
</tr>
</tbody>
</table>

13-12. Troubleshooting

<table>
<thead>
<tr>
<th>Trouble</th>
<th>Remedy</th>
</tr>
</thead>
<tbody>
<tr>
<td>No weld output; unit completely inoperative.</td>
<td>Place line disconnect switch in On position (see Section 3-8).</td>
</tr>
<tr>
<td></td>
<td>Check and replace line fuse(s), if necessary, or reset circuit breaker (see Section 3-8).</td>
</tr>
<tr>
<td></td>
<td>Check for proper input power connections (see Section 3-8).</td>
</tr>
<tr>
<td>No weld output; meter display On.</td>
<td>Check, repair, or replace remote control.</td>
</tr>
<tr>
<td></td>
<td>Unit overheated. Allow unit to cool with fan On (see Section 4-5).</td>
</tr>
<tr>
<td></td>
<td>Check voltmeter/ammeter Help displays.</td>
</tr>
<tr>
<td>Erratic or improper weld output.</td>
<td>Use proper size and type of weld cable (see Section 3-5).</td>
</tr>
<tr>
<td></td>
<td>Clean and tighten all weld connections.</td>
</tr>
<tr>
<td>No 115 volts ac output at duplex receptacle, Remote 14 receptacle.</td>
<td>Reset circuit breaker CB1 (see Section 3-6).</td>
</tr>
<tr>
<td>No 24 volts ac output at Remote 14 receptacle.</td>
<td>Reset circuit breaker CB2 (see Section 3-6).</td>
</tr>
</tbody>
</table>
Figure 14-1. Circuit Diagram For Welding Power Source
Figure 14-2. Circuit Diagram For Control Board PC1 (Part 1 of 3)
Figure 14-3. Circuit Diagram For Control Board PC1 (Part 2 of 3)
Figure 14-4. Circuit Diagram For Control Board PC1 (Part 3 of 3)
Figure 14-5. Circuit Diagram For Function/Meter Board PC3
Figure 14-6. Circuit Diagram For Interconnect Board PC2

Figure 14-7. Circuit Diagram For Gate Boards PC4 And PC5
Figure 13-8. Circuit Diagram For Interface Module
Figure 13-9. Circuit Diagram For Microprocessor Board PC11
Figure 13-10. Circuit Diagram For Motor Board PC13
Figure 13-11. Circuit Diagram For Switch Board PC15
Figure 13-12. Circuit Diagram For Junction Board PC16
Figure 13-13. Circuit Diagram For Interface Board PC12 (Part 1 of 2)
Figure 13-14. Circuit Diagram For Interface Board PC12 (Part 2 of 2)
Figure 13-15. Circuit Diagram For Customer Interface Board PC14 (Part 1 of 3)
Figure 13-17. Circuit Diagram For Customer Interface Board PC14 (Part 3 of 3)
Figure 13-18. Circuit Diagram For Touch Sensor Board PC18
Figure 13-19. Circuit Diagram For Setup Pendant
Figure 13-20. Circuit Diagram For Setup Pendant Centronix Junction Board PC3
Hardware is common and not available unless listed.

Figure 15-1. Complete Assembly
<table>
<thead>
<tr>
<th>Item No.</th>
<th>Dia. Mkgs.</th>
<th>Part No.</th>
<th>Description</th>
<th>Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td></td>
<td>185970</td>
<td>COVER, top</td>
<td>1</td>
</tr>
<tr>
<td>2</td>
<td></td>
<td>195588</td>
<td>HANDLE, carrying rubber</td>
<td>2</td>
</tr>
<tr>
<td>3</td>
<td>+185967</td>
<td>115094</td>
<td>PANEL, side RH (230/460 volt model)</td>
<td>1</td>
</tr>
<tr>
<td>4</td>
<td></td>
<td>180994</td>
<td>LABEL, warning match input (230/460 volt model)</td>
<td>1</td>
</tr>
<tr>
<td>5</td>
<td></td>
<td>134327</td>
<td>LABEL, warming general precautionary</td>
<td>2</td>
</tr>
<tr>
<td>6</td>
<td></td>
<td>183827</td>
<td>BUS BAR, output</td>
<td>1</td>
</tr>
<tr>
<td>7</td>
<td>HD1</td>
<td>168829</td>
<td>TRANSUDER, current 100A</td>
<td>1</td>
</tr>
<tr>
<td>8</td>
<td></td>
<td>115094</td>
<td>HOUSING PLUG &amp; SOCKETS</td>
<td>1</td>
</tr>
<tr>
<td>9</td>
<td></td>
<td>185835</td>
<td>LABEL, warning electric shock</td>
<td>3</td>
</tr>
<tr>
<td>10</td>
<td>T1</td>
<td>179933</td>
<td>TRANSFORMER, HF (230/460 volt model)</td>
<td>1</td>
</tr>
<tr>
<td>11</td>
<td>T1</td>
<td>186984</td>
<td>TRANSFORMER, HF (575 volt model)</td>
<td>1</td>
</tr>
<tr>
<td>12</td>
<td>FM2</td>
<td>183918</td>
<td>MOTOR, fan 24VDC 3000RPM 43CFM w/10 ohm resistor</td>
<td>1</td>
</tr>
<tr>
<td>13</td>
<td>PC1</td>
<td>201455</td>
<td>CIRCUIT CARD ASSEMBLY, control (400 volt model)</td>
<td>1</td>
</tr>
<tr>
<td>14</td>
<td></td>
<td>180994</td>
<td>LABEL, warning match input (230/460 volt model)</td>
<td>1</td>
</tr>
<tr>
<td>15</td>
<td></td>
<td>195588</td>
<td>HANDLE, carrying rubber</td>
<td>2</td>
</tr>
<tr>
<td>16</td>
<td></td>
<td>115094</td>
<td>PANEL, side RH (230/460 volt model)</td>
<td>1</td>
</tr>
<tr>
<td>17</td>
<td></td>
<td>180994</td>
<td>LABEL, warning match input (230/460 volt model)</td>
<td>1</td>
</tr>
<tr>
<td>18</td>
<td></td>
<td>115094</td>
<td>PANEL, side RH (230/460 volt model)</td>
<td>1</td>
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<tr>
<td>19</td>
<td></td>
<td>180994</td>
<td>LABEL, warning match input (230/460 volt model)</td>
<td>1</td>
</tr>
<tr>
<td>20</td>
<td></td>
<td>115094</td>
<td>PANEL, side RH (230/460 volt model)</td>
<td>1</td>
</tr>
<tr>
<td>21</td>
<td></td>
<td>115094</td>
<td>PANEL, side RH (230/460 volt model)</td>
<td>1</td>
</tr>
<tr>
<td>22</td>
<td></td>
<td>115094</td>
<td>PANEL, side RH (230/460 volt model)</td>
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</tr>
<tr>
<td>23</td>
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<tr>
<td>24</td>
<td></td>
<td>115094</td>
<td>PANEL, side RH (230/460 volt model)</td>
<td>1</td>
</tr>
<tr>
<td>25</td>
<td></td>
<td>115094</td>
<td>PANEL, side RH (230/460 volt model)</td>
<td>1</td>
</tr>
<tr>
<td>26</td>
<td></td>
<td>115094</td>
<td>PANEL, side RH (230/460 volt model)</td>
<td>1</td>
</tr>
<tr>
<td>27</td>
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<td>115094</td>
<td>PANEL, side RH (230/460 volt model)</td>
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<tr>
<td>28</td>
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<td>115094</td>
<td>PANEL, side RH (230/460 volt model)</td>
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<tr>
<td>29</td>
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<td>115094</td>
<td>PANEL, side RH (230/460 volt model)</td>
<td>1</td>
</tr>
<tr>
<td>30</td>
<td></td>
<td>115094</td>
<td>PANEL, side RH (230/460 volt model)</td>
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</tr>
<tr>
<td>31</td>
<td></td>
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<td>PANEL, side RH (230/460 volt model)</td>
<td>1</td>
</tr>
<tr>
<td>32</td>
<td></td>
<td>115094</td>
<td>PANEL, side RH (230/460 volt model)</td>
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</tr>
<tr>
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<td></td>
<td>115094</td>
<td>PANEL, side RH (230/460 volt model)</td>
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<td>34</td>
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</tr>
<tr>
<td>35</td>
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<td>115094</td>
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</tr>
<tr>
<td>36</td>
<td></td>
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<td>PANEL, side RH (230/460 volt model)</td>
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</tr>
<tr>
<td>37</td>
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<td>115094</td>
<td>PANEL, side RH (230/460 volt model)</td>
<td>1</td>
</tr>
<tr>
<td>38</td>
<td></td>
<td>115094</td>
<td>PANEL, side RH (230/460 volt model)</td>
<td>1</td>
</tr>
<tr>
<td>39</td>
<td></td>
<td>115094</td>
<td>PANEL, side RH (230/460 volt model)</td>
<td>1</td>
</tr>
<tr>
<td>40</td>
<td></td>
<td>115094</td>
<td>PANEL, side RH (230/460 volt model)</td>
<td>1</td>
</tr>
<tr>
<td>41</td>
<td></td>
<td>115094</td>
<td>PANEL, side RH (230/460 volt model)</td>
<td>1</td>
</tr>
<tr>
<td>42</td>
<td></td>
<td>115094</td>
<td>PANEL, side RH (230/460 volt model)</td>
<td>1</td>
</tr>
<tr>
<td>43</td>
<td></td>
<td>115094</td>
<td>PANEL, side RH (230/460 volt model)</td>
<td>1</td>
</tr>
<tr>
<td>44</td>
<td></td>
<td>115094</td>
<td>PANEL, side RH (230/460 volt model)</td>
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</tr>
<tr>
<td>45</td>
<td></td>
<td>115094</td>
<td>PANEL, side RH (230/460 volt model)</td>
<td>1</td>
</tr>
<tr>
<td>46</td>
<td></td>
<td>115094</td>
<td>PANEL, side RH (230/460 volt model)</td>
<td>1</td>
</tr>
</tbody>
</table>

**Figure 15-1. Complete Assembly**
<table>
<thead>
<tr>
<th>Item No.</th>
<th>Dia. Mkgs.</th>
<th>Part No.</th>
<th>Description</th>
<th>Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>47</td>
<td>T2</td>
<td>183 192</td>
<td>TRANSFORMER, control 230/460 VAC</td>
<td>1</td>
</tr>
<tr>
<td>47</td>
<td>T2</td>
<td>185 232</td>
<td>TRANSFORMER, control 460/575 VAC</td>
<td>1</td>
</tr>
<tr>
<td>47</td>
<td>RC10</td>
<td>166 679</td>
<td>HOUSING RECEPTACLE PINS &amp; SOCKETS</td>
<td>1</td>
</tr>
<tr>
<td>48</td>
<td></td>
<td>180 105</td>
<td>BRACKET, mtg transformer aux</td>
<td>1</td>
</tr>
<tr>
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<td>+194 449</td>
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<td>51</td>
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<td>53</td>
<td></td>
<td>179 847</td>
<td>PLATE, identification (order by model &amp; serial number)</td>
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<td>54</td>
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<td>55</td>
<td>W1</td>
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<td>57</td>
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<td>CT1</td>
<td>181 271</td>
<td>TRANSFORMER, current</td>
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<td>177 547</td>
<td>BUSHING, snap-in nyl ct</td>
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<td>61</td>
<td>T4</td>
<td>185 208</td>
<td>CHOKE, common mode</td>
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<td>COIL, DI/DT</td>
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<td>179 930</td>
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<td>72</td>
<td>R1,2,C9-12</td>
<td>175 194</td>
<td>RESISTOR/CAPACITOR</td>
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<td>D1-4</td>
<td>179 630</td>
<td>KIT, diode ultra-fast recovery</td>
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<td>181 853</td>
<td>INSULATOR, screw</td>
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<td>76</td>
<td>FM1</td>
<td>175 084</td>
<td>MOTOR, fan 24VDC 3000 RPM</td>
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<td>179 928</td>
<td>SHROUD, fan</td>
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<td>78</td>
<td>PC3</td>
<td>190 694</td>
<td>CIRCUIT CARD, front panel</td>
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<td>PLG11</td>
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<td>CABLE, ribbon 34 posn</td>
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<td>200 324</td>
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<td>81</td>
<td>S1</td>
<td>128 756</td>
<td>SWITCH, tgl 3PST 40A 600VAC</td>
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<td>176 226</td>
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<td>83</td>
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<td>185 968</td>
<td>PANEL, side</td>
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### Figure 15-1. Complete Assembly (Continued)

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<tr>
<th>Item No.</th>
<th>Dia. Mkgs.</th>
<th>Part No.</th>
<th>Description</th>
<th>Quantity</th>
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<tbody>
<tr>
<td>144 844</td>
<td></td>
<td>STAND-OFF, No. 6-32 x .875</td>
<td>5</td>
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<td>091 772</td>
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<td>STAND-OFF, No. 6-32 x .625</td>
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<td>88</td>
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<td>CAPACITOR ASSY</td>
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<tr>
<td>89</td>
<td></td>
<td>BUSHING, snap-in nyl 1.000 x 1.375mtg hole</td>
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</tbody>
</table>

*Optional

+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.

### Setup Pendant

<table>
<thead>
<tr>
<th>Item No.</th>
<th>Dia. Mkgs.</th>
<th>Part No.</th>
<th>Description</th>
<th>Quantity</th>
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<tbody>
<tr>
<td>201 990</td>
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<td>CASE, front/bottom</td>
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<tr>
<td>186 529</td>
<td></td>
<td>WRAPPER</td>
<td>1</td>
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<tr>
<td>173 111</td>
<td></td>
<td>PANEL, rear</td>
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<td></td>
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<tr>
<td>185 963</td>
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<td>NAMEPLATE</td>
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<td></td>
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<tr>
<td>PC1</td>
<td>158 160</td>
<td>CIRCUIT CARD ASSY, side display</td>
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<tr>
<td>PC2</td>
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<td>CIRCUIT CARD ASSY, data card</td>
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<td>PC3</td>
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<td>CIRCUIT CARD ASSY, connector</td>
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<tr>
<td>PB1-4</td>
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<td>ACTUATOR, switch</td>
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<td>CABLE, 6ft</td>
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<td>604 804</td>
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<td>SCREW, 8-15 x .375 hexwhd-pln stl pld sht met</td>
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<td>072 785</td>
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<td>SCREW, 6-32 x .375 hexwhd-slt stl pld slffmg</td>
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<td>STAND-OFF, No. 6-32 x .843 lg</td>
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<tr>
<td>133 528</td>
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<td>RIVET, al .125 dia x .188-.250 grip blk blind dome</td>
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<td>602 062</td>
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<td>SCREW, 4-40 x .375 pa hd-phl stl pld cone</td>
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<tr>
<td>019 663</td>
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<td>MOUNT, NPRN 15/16OD x 3/8REC 3/16 x 3/8</td>
<td>4</td>
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<td>601 892</td>
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<td>RIVET, al .125 dia x .188-.250 grip blind domed hd</td>
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<tr>
<td>150 316</td>
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<td>CONNECTOR, rect univ 039 6p/s 3 row</td>
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<td>155 024</td>
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<td>LENS, clear anti-glare .030 x 2.000 x 4.250</td>
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</tbody>
</table>

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

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

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

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

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

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

1. 5 Years Parts – 3 Years Labor
   * Original main power rectifiers
   * Inverters (input and output rectifiers only)
2. 3 Years Parts and Labor
   * Transformer/Rectifier Power Sources
   * Plasma Arc Cutting Power Sources
   * Semi-Automatic and Automatic Wire Feeders
   * Inverter Power Supplies
   * Intellitig
   * Engine Driven Welding Generators
   (NOTE: Engines are warranted separately by the engine manufacturer.)
3. 1 Year Parts and Labor
   * DS-2 Wire Feeder
   * Motor Driven Guns (with exception of Spoolmate 185 & Spoolmate 250)
   * Process Controllers
   * Positioners and Controllers
   * Automatic Motion Devices
   * RFCS Foot Controls
   * Induction Heating Power Sources
   * Water Coolant Systems
   * HF Units
   * Grids
   * Maxstar 140
   * Spot Welders
   * Load Banks
   * Miller Cyclomatic Equipment
   * Running Gear/Trailers
   * Plasma Cutting Torches (except APT & SAF Models)
   * Field Options
   (NOTE: Field options are covered under True Blue® for the remaining warranty period of the product they are installed in, or for a minimum of one year — whichever is greater.)

4. 6 Months – Batteries
5. 90 Days – Parts
   * MIG Guns/TIG Torches
   * Induction Heating Coils and Blankets

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

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

TO THE EXTENT PERMITTED BY LAW, THE REMEDIES PROVIDED HEREIN ARE THE SOLE AND EXCLUSIVE REMEDIES, IN NO EVENT SHALL MILLER BE LIABLE FOR DIRECT, INDIRECT, SPECIAL, INCIDENTAL OR CONSEQUENTIAL DAMAGES (INCLUDING LOSS OF PROFIT), WHETHER BASED ON CONTRACT, TORT OR ANY OTHER LEGAL THEORY. ANY EXPRESS WARRANTY NOT PROVIDED HEREIN AND ANY IMPLIED WARRANTY, GUARANTY OR REPRESENTATION AS TO PERFORMANCE, AND ANY REMEDY FOR BREACH OF CONTRACT TORT OR ANY OTHER LEGAL THEORY WHICH, BUT FOR THIS PROVISION, MIGHT ARISE BY IMPLICATION, OPERATION OF LAW, CUSTOM OF TRADE OR COURSE OF DEALING, INCLUDING ANY IMPLIED WARRANTY OF MERCHANTABILITY OR FITNESS FOR PARTICULAR PURPOSE, WITH RESPECT TO ANY AND ALL EQUIPMENT FURNISHED BY MILLER IS EXCLUDED AND DISCLAIMED BY MILLER.

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

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

miller_warr 7/00
Owner’s Record

Please complete and retain with your personal records.

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<th>Model Name</th>
<th>Serial/Style Number</th>
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<th>(Date which equipment was delivered to original customer.)</th>
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For Service

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

Always provide Model Name and Serial/Style Number.

Contact your Distributor for:

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

Contact the Delivering Carrier for:

- File a claim for loss or damage during shipment.

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