Millermatic® 251
And M-25 Gun

OWNER’S MANUAL
MANUAL DEL OPERADOR
(cuando disponible) sigue al manual en inglés
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 the exact part you may need to fix the problem. Warranty and service information for your particular model are also provided.

Miller Electric manufactures a full line of welders and welding related equipment. For information on other quality Miller products, contact your local Miller distributor to receive the latest full line catalog or individual 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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SECTION 9 – PARTS LIST

OPTIONS AND ACCESSORIES

WARRANTY
**SECTION 1 – SAFETY PRECAUTIONS - READ BEFORE USING**

### 1-1. Symbol Usage

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

- **Marks a special safety message.**

- **Means “Note”; not safety related.**

### 1-2. Arc Welding Hazards

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

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

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

**ELECTRIC SHOCK can kill.**

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

- Do not touch live electrical parts.
- Wear dry, hole-free insulating gloves and body protection.
- Insulate yourself from work and ground using dry insulating mats or covers big enough to prevent any physical contact with the work or ground.
- Do not use AC output in damp areas, if movement is confined, or if there is a danger of falling.
- Use AC output ONLY if required for the welding process.
- If AC output is required, use remote output control if present on unit.
- 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.

**FUMES AND GASES can be hazardous.**

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

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

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

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

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

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

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

**STATIC (ESD) can damage PC boards.**
- Put on grounded wrist strap BEFORE handling boards or parts.
- Use proper static-proof bags and boxes to store, move, or ship PC boards.

**MOVING PARTS can cause injury.**
- Keep away from moving parts.
- Keep away from pinch points such as drive rolls.

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

**MOVING PARTS can cause injury.**
- Keep away from moving parts such as fans.
- Keep all doors, panels, covers, and guards closed and securely in place.

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

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

1-4. California Proposition 65 Warnings

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

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

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

For Diesel Engines:
▲ Diesel engine exhaust and some of its constituents are known to the State of California to cause cancer, birth defects, and other reproductive harm.
1-5. Principal Safety Standards


1-6. EMF Information

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

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

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

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

About Pacemakers:
Pacemaker wearers consult your doctor first. If cleared by your doctor, then following the above procedures is recommended.
SECTION 2 – CONSIGNES DE SÉCURITÉ – À LIRE AVANT UTILISATION

2-1. Signification des symboles

Identifie un message de sécurité particulier.

Ce groupe de symboles signifie « Mise en garde. Faire preuve de vigilance. » Il y a des dangers liés aux CHOCS ÉLECTRIQUES, aux PIÈCES EN MOUVEMENT et aux PIÈCES CHAUDES. Se reporter aux symboles et aux directives ci-dessous afin de connaître les mesures à prendre pour éviter tout danger.

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

Les symboles ci-après sont utilisés tout au long du présent manuel pour attirer l’attention sur les dangers potentiels et les identifier. Lorsqu’on voit un symbole, faire preuve de vigilance et suivre les directives mentionnées afin d’éviter tout danger. Les consignes de sécurité énoncées ci-après ne font que résumer le contenu des normes de sécurité mentionnées à la section 2-4. Lire et respecter toutes ces normes.

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

Pendant l’utilisation de l’appareil, tenir à l’écart toute personne, en particulier les enfants.

LES DÉCHARGES ÉLECTRIQUES peuvent être mortelles.

Un simple contact avec des pièces sous tension peut causer une électrocution ou des blessures graves. L’électrode et le circuit de soudage sont sous tension dès que l’appareil est en fonctionnement. Le circuit d’entrée et les circuits internes de l’appareil sont également sous tension. En soudage semi-automatique ou automatisé, le fil, le déviolet, le logement des galets d’entraînement et les pièces métalliques en contact avec le fil de soudage sont sous tension. Tout matériel mal installé ou mal mis à la terre présente un danger.

- Ne jamais toucher aux pièces électriques sous tension.
- Porter des gants et des vêtements de protection secs et exempts de trous.
- S’isoler de la pièce et de la terre au moyen de tapis ou autres dispositifs isolants suffisamment grands pour empêcher tout contact physique avec la pièce ou la terre.
- Ne pas se servir d’une source de courant alternatif dans les zones humides, les endroits confinés ou là où on risque de tomber.
- Ne pas servir d’une source de courant alternatif QUE si le procédé de soudage est l’exige.
- Si l’utilisation d’une source de courant alternatif s’avère nécessaire, se servir de la fonction de télécommande si l’appareil en est équipé.
- 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.
- Pour exécuter les branchements d’entrée, fixer d’abord le conducteur de mise à la terre adéquatement et contre-vérifier les connexions.
- Vérifier fréquemment le cordon d’alimentation et s’assurer qu’il n’est ni endommagé ni dénudé : le remplacer immédiatement s’il est endommagé – tout câble dénudé peut causer une électrocution.
- Mettre l’appareil hors tension quand on ne l’utilise pas.
- Ne pas utiliser de câbles usés, endommagés, de calibre insuffisant ou mal épissés.
- Ne pas s’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 d’une autre machine.
- Porter un harnais de sécurité quand on travaille en hauteur.
- Maintenir solidement en place tous les panneaux et capots.
- Fixer le câble de retour de façon à obtenir un bon contact métal sur métal avec la pièce à souder ou la table de travail, le plus près possible de la soudure.
- Ne pas connecter plus d’une électrode ou plus d’un câble de masse à un même terminal de sortie.

Il subsiste un COURANT CONTINU IMPORTANT dans les convertisseurs après la suppression de l’alimentation électrique.

- Arêter les convertisseurs, débrancher le courant électrique et décharger les condensateurs d’alimentation selon les instructions énoncées à la section Entretien avant de toucher les pièces.

LES FUMÉES ET LES GAZ peuvent être dangereux.

Le soudage génère des fumées et des gaz dont l’inhalation peut être dangereuse pour la santé.

- Se tenir à distance des fumées et ne pas les inhaler.
- À l’intérieur, ventiler la zone et/ou utiliser un dispositif d’aspiration au niveau de l’arc pour l’évacuation des fumées et des gaz de soudage.
- Si la ventilation est insuffisante, utiliser un respirateur à adduction d’air agréé.
- Lire les fiches techniques de santé–sécurité (FTSS) et les instructions du fabricant concernant les métaux, les consommateurs, les revêtements, les nettoyants et les dégraissants.
- Ne travailler dans un espace clos que s’il est bien ventilé ou portez un respirateur à adduction d’air. Demander toujours à un surveillant dûment formé de se tenir à proximité. Des fumées et des gaz de soudage peuvent se substituer à l’air, abaisser la teneur en oxygène et causer des lésions ou des accidents mortels. S’assurer que l’air est respirable.
- Ne pas souder 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 de métaux munis d’un revêtement, tels que la tôle d’acier galvanisée, plombée ou cadmiée, à moins que le revêtement n’ait été enlevé dans la zone de soudage, que l’endroit soit bien ventilé, et si nécessaire, porter un respirateur à adduction d’air. Les revêtements et tous les métaux renfermant ces éléments peuvent dégager des fumées toxiques lorsqu’on les soude.
LES RAYONS DE L’ARC peuvent causer des brûlures oculaires et cutanées.
Le rayonnement de l’arc génère des rayons visibles et invisibles intenses (ultraviolets et infrarouges) susceptibles de causer des brûlures oculaires et cutanées. Des étincelles sont projetées pendant le soudage.

- Porter un masque de soudage muni d’un filtre de la nuance adéquate pour se protéger le visage et les yeux pendant le soudage ou pour regarder (voir les normes de sécurité ANSI Z49.1 et Z87.1).
- Porter des lunettes de sécurité à écrans latéraux sous le masque.
- Utiliser des écrans ou des barrières pour protéger les tiers de l’éclat éblouissant ou aveuglant de l’arc ; leur demander de ne pas regarder l’arc.
- Porter des vêtements de protection en matière durable et ignifuge (cuir ou laine) et des chaussures de sécurité.

LE SOUDAGE peut causer un incendie ou une explosion.
Le soudage effectué sur des récipients fermés tels que des réservoirs, des fûts ou des conduites peut causer leur éclatement. Des étincelles peuvent être projetées de l’arc de soudure. La projection d’étincelles, les pièces chaudes et les équipements chauds peuvent causer des incendies et des brûlures. Le contact accidentel de l’électrode avec tout objet métallique peut causer des étincelles, une explosion, un surchauffement ou un incendie. Avant de commencer le soudage, vérifier et s’assurer que l’endroit ne présente pas de danger.

- Se protéger et protéger les tiers de la projection d’étincelles et de métal chaud.
- Ne pas souder à un endroit où des étincelles peuvent tomber sur des substances inflammables.
- Placer 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 agréées.
- Des étincelles et des matières en fusion peuvent facilement passer même des fissures et des ouvertures de petites dimensions.
- Surveiller tout déclenchement d’incendie et tenir un extincteur à proximité.
- Le soudage effectué sur un plafond, un plancher, une paroi ou une cloison peut déclencher un incendie de l’autre côté.
- Ne pas souder des récipients fermés tels que des réservoirs, des fûts ou des conduites, à moins qu’ils n’aient été préparés conformément à l’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 que le courant ne circule sur une longue distance, par des chemins inconnus, et ne cause 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 au raz du tube–contact.
- Porter des vêtements de protection exempts d’huile tels que des gants en cuir, une chemise en tissu épais, des pantalons sans revers, des chaussures montantes et un masque.
- Avant de souder, retirer tout produit combustible de ses poches, tel qu’un briquet au butane ou des allumettes.

LES PARTICULES PROJETÉES peuvent blesser les yeux.
Le soudage, le burinage, le passage de la pièce à la brosse métallique et le meulage provoquent l’émission d’étincelles et de particules métalliques. Pendant leur refroidissement, les souches risquent de projeter du laitier.

- Porter des lunettes de sécurité à écrans latéraux agréés, même sous le masque de soudage.

LES ACCUMULATIONS DE GAZ peuvent causer des blessures ou même la mort.
- Couper l’alimentation en gaz protecteur en cas de non utilisation.
- Veiller toujours à bien ventiler les espaces confins ou porter un respirateur à adduction d’air agréé.

LES PIÈCES CHAUDES peuvent causer des brûlures graves.
- Ne pas toucher les pièces chaudes à main nue.
- Prévoir une période de refroidissement avant d’utiliser le pistolet ou la torche.

LES CHAMPS MAGNÉTIQUES peuvent perturber le fonctionnement des stimulateurs cardiaques.
- Les personnes qui portent un stimulateur cardiaque doivent se tenir à distance.
- Ils doivent consulter leur médecin avant de s’approcher d’un lieu où on exécute des opérations de soudage à l’arc, de soudage ou de soudage par points.

LE BRUIT peut affecter l’ouïe.
Le bruit de certains processus et équipements peut affecter l’ouïe.

Porter des protecteurs d’oreille agréés si le niveau sonore est trop élevé.

Les BOUTEILLES endommagées peuvent exploser.
Les bouteilles de gaz protecteur contiennent du gaz sous haute pression. Toute bouteille endommagée peut exploser. Comme les bouteilles de gaz font normalement partie du procédé de soudage, les manipuler avec précaution.

- Protéger les bouteilles de gaz comprimé de la chaleur excessive, des chocs mécaniques, du laitier, des flammes nues, 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 poser une torche de soudage sur une bouteille de gaz.
- Ne jamais mettre une électrode de soudage en contact avec une bouteille de gaz.
- Ne jamais souder une bouteille contenant du gaz sous pression – elle risquerait d’exploser.
- N’utiliser que les bouteilles de gaz protecteur, régulateurs, tuyaux et raccords adéquats pour l’application envisagée ; les maintenir en bon état, ainsi que les pièces connexes.
- Déterminer la tête lorsqu’on ouvre la soupape d’une bouteille.
- Laisser le capuchon protecteur 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 de la CGA, mentionnées dans les normes de sécurité.

**Risque D’INCENDIE OU D’EXPLOSION**
- Ne pas placer l’appareil sur une surface inflammable, ni au-dessus ou à proximité d’elle.
- 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.**
- N’utiliser que l’anneau de levage pour lever l’appareil. NE PAS utiliser le chariot, les bouteilles de gaz ou tout autre accessoire.
- Si on utilise un chariot élévateur pour déplacer l’unité, s’assurer que les fourches sont suffisamment longues pour dépasser du côté opposé de l’appareil.

**L’EMPLOI EXCESSIF peut FAIRE SURCHAUFFER L’ÉQUIPEMENT.**
- Prévoir une période de refroidissement ; respecter le cycle opératoire nominal.
- Réduire le courant ou le cycle opératoire avant de reprendre le soudage.
- Ne pas obstruer les orifices ou filtrer l’alimentation en air du poste.

**LES CHARGES ÉLECTROSTATIQUES peuvent endommager les circuits imprimés.**
- Mettre un bracelet antistatique 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.

**LES PIÈCES MOBILES peuvent causer des blessures.**
- Se tenir à l’écart des pièces mobiles.
- Se tenir à l’écart des points de coincement tels que les déviodors.

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

**LES ORGANES MOBILES peuvent causer des blessures.**
- Se tenir à l’écart des organes mobiles comme les ventilateurs.
- Maintenir fermés et bien fixés les portes, panneaux, recouvrements et dispositifs de protection.

**LE RAYONNEMENT HAUTE FRÉQUENCE (H. F.) risque de causer des interférences.**
- Le rayonnement haute fréquence peut causer des interférences avec les équipements de radio-navigation et de communication, les services de sécurité et les ordinateurs.
- Ne demander qu’à des personnes qualifiées familiarisées avec les équipements électroniques de faire fonctionner l’installation.
- L’utilisateur est tenu de faire conger rapidement par un électricien qualifié les interférences causées par l’installation.
- Si la Federal Communications Commission signale des interférences, arrêter immédiatement l’appareil.
- Faire régulièrement contrôler et entretenir l’installation.
- Maintenir soigneusement fermes les panneaux et les portes des sources de haute fréquence, maintenir le jeu d’éclatement au réglage adéquat et utiliser une terre et un blindage pour réduire les interférences éventuelles.

**LE SOUDAGE À L’ARC peut causer des interférences.**
- L’énergie électromagnétique peut causer des interférences avec l’équipement électronique sensible tel que les robots.
- Veiller à ce que tout l’équipement de la zone de soudage soit compatible au point de vue électromagnétique.
- Pour réduire la possibilité d’interférence, maintenir les câbles de soudage aussi courts que possible, les grouper, et les poser aussi bas que possible (par ex. : à terre).
- Veiller à souder à une distance de 100 mètres de tout équipement électronique sensible.
- Veiller à ce que le poste de soudage soit posé et mis à la terre conformément au présent manuel.
- En cas d’interférences après exécution des directives 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.
2-4. Principales normes de sécurité


National Electrical Code, norme NFPA 70, de la National Fire Protection Association, P.O. Box 9101, 1 Battery March Park, Quincy, MA 02269–9101 (téléphone : (617) 770–3000, sites Web : www.nfpa.org et www.sparky.org).


Practice For Occupational And Educational Eye And Face Protection, norme ANSI Z87.1, de l’American National Standards Institute, 11 West 42nd Street, New York, NY 10036–8002 (téléphone : (212) 642–4900, site Web : wwwansi.org).

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


2-5. Information sur les champs électromagnétiques

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

En parcourant les câbles de soudage, le courant crée des champs électromagnétiques. Les effets potentiels de tels champs restent préoccupants. Cependant, après avoir examiné plus de 500 études qui ont été faites pendant une période de recherche de 17 ans, un comité de spécialistes du National Research Council a conclu : « L’accumulation de preuves n’a pas démontré que l’exposition aux champs magnétiques et aux champs électriques à haute fréquence constitue un risque pour la santé humaine ». Toutefois, les études et l’examen des preuves se poursuivent. En attendant les conclusions finales de la recherche, il serait souhaitable de réduire l’exposition aux champs électromagnétiques pendant le soudage ou le coupage.

Afin de réduire les champs électromagnétiques en milieu de travail, respecter les consignes suivantes :

1. Garder les câbles ensemble en les torsadant ou en les fixant avec du ruban adhésif.
3. Ne pas s’enrouler les câbles autour du corps.
4. Garder le poste de soudage et les câbles le plus loin possible de soi.
5. Placer la pince de masse le plus près possible de la zone de soudage.

Consignes relatives aux stimulateurs cardiaques :

Les personnes qui portent un stimulateur cardiaque doivent avant tout consulter leur médecin. Si ce dernier les déclare aptes, il leur est recommandé de respecter les consignes ci-dessous.

SECTION 3 – DEFINITIONS

3-1. Symbols And Definitions

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>⚫</td>
<td>Wire Feed</td>
</tr>
<tr>
<td>⬌</td>
<td>Output</td>
</tr>
<tr>
<td>✄</td>
<td>Duty Cycle</td>
</tr>
<tr>
<td>⚫</td>
<td>Do Not Switch While Welding</td>
</tr>
<tr>
<td>⚫</td>
<td>Volts</td>
</tr>
<tr>
<td>⬌</td>
<td>Increase</td>
</tr>
<tr>
<td>✄</td>
<td>On</td>
</tr>
<tr>
<td>⚫</td>
<td>Off</td>
</tr>
<tr>
<td>⚫</td>
<td>Gas Metal Arc Welding (GMAW) Gun</td>
</tr>
<tr>
<td>⬌</td>
<td>Wire Feed Spool Gun</td>
</tr>
<tr>
<td>⚫</td>
<td>Gas Input</td>
</tr>
<tr>
<td>⚫</td>
<td>Gas Output</td>
</tr>
<tr>
<td>⚫</td>
<td>Voltage Input</td>
</tr>
<tr>
<td>⬌</td>
<td>Press To Reset</td>
</tr>
<tr>
<td>⚫</td>
<td>Rated No-Load Voltage (Average)</td>
</tr>
</tbody>
</table>

SECTION 4 – INSTALLATION

4-1. Specifications

<table>
<thead>
<tr>
<th>Rated Output</th>
<th>Max. Open-Circuit Voltage</th>
<th>Amps Input at Rated Output (60% Duty Cycle), 50 or 60 Hz, Single-Phase</th>
</tr>
</thead>
<tbody>
<tr>
<td>250 A at 28 VDC, 40% Duty Cycle</td>
<td>200 A at 28 VDC, 60% Duty Cycle</td>
<td>38</td>
</tr>
<tr>
<td>200 V</td>
<td>48</td>
<td>42</td>
</tr>
<tr>
<td>230 V</td>
<td>2.3*</td>
<td>2*</td>
</tr>
<tr>
<td>400 V</td>
<td>24</td>
<td>1.2*</td>
</tr>
<tr>
<td>460 V</td>
<td>21</td>
<td>1*</td>
</tr>
<tr>
<td>575 V</td>
<td>17</td>
<td>0.8*</td>
</tr>
<tr>
<td>KVA</td>
<td>9.8</td>
<td>0.46*</td>
</tr>
<tr>
<td>KW</td>
<td>7.5</td>
<td>0.13*</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Wire Type and Diameter</th>
<th>Wire Feed Speed</th>
<th>Dimensions</th>
<th>Net Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>Solid Steel</td>
<td>25–700 IPM (.65–17.8 m/min)</td>
<td>H: 32 in (813 mm)</td>
<td>215 lb (98 kg)</td>
</tr>
<tr>
<td>Stainless Steel</td>
<td>200 A at 28 VDC, 40% Duty Cycle</td>
<td>W: 19 in (483 mm)</td>
<td></td>
</tr>
<tr>
<td>Flux Cored</td>
<td>25–700 IPM (.65–17.8 m/min)</td>
<td>D: 39 in (991 mm)</td>
<td></td>
</tr>
</tbody>
</table>

* While idling

Operating Temperature Range – -20C to +40C
Storage Temperature Range – -30C to + 50C
4-2. Welding Power Source Duty Cycle And Overheating

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

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

Exceeding duty cycle can damage unit and void warranty.

4-3. Welding Gun Duty Cycle And Overheating

CAUTION

WELDING LONGER THAN RATED DUTY CYCLE can damage gun and void warranty.

- Do not weld at rated load longer than shown below.
- Using gasless flux cored wire reduces gun duty cycle.
4-4. Volt-Ampere Curves

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

4-5. Installing Work Cable And Clamp

1 Work Cable
2 Boot
Route cable through front panel opening. Slide boot onto work cable.
3 Negative (−) Output Terminal
Connect cable to terminal and cover connection with boot.
Close door.

Tools Needed:
3/4 in

4-6. Installing Welding Gun

1 Drive Assembly
2 Gun Securing Knob
3 Gun End
Loosen securing knob. Insert gun end through opening until it bottoms against drive assembly (make sure gun end does not touch drive rolls). Tighten knob.
4 Gun Trigger Plug
Insert plug into receptacle, and tighten threaded collar.
Close door.
4-7. Connecting A Spoolmatic® 15A Or 30A Gun

The Spoolmatic 15A or 30A welding gun connects directly to the 10-pin receptacle on the front of the welding power source — no adapter required. NOTE: Two welding guns may be connected to the welding power source at the same time, but only one welding gun may be in use at any one time. If the triggers of both welding guns are pulled at the same time, the weld output and wirefeed motor are disabled.

4-8. Setting Gun Polarity For Wire Type

![Changing Polarity Diagram]

**Changing Polarity**

Wire Drive Assembly Lead

Work Clamp Lead

Positive Terminal

Negative Terminal

Shown as shipped — **Electrode Positive** (DCEP): For solid steel, stainless steel, aluminum, or flux core with gas wires (GMAW).

**Electrode Negative** (DCEN): Reverse lead connections at terminals from that shown above for gasless flux core wires (FCAW). Drive assembly becomes negative.

Ref. 190.821-A
4-9. Installing Gas Supply

**Tools Needed:**

1. Cap
2. Cylinder Valve
3. Cylinder
4. Regulator/Flowmeter
   - Install so face is vertical.
5. Regulator/Flowmeter Gas Hose Connection
6. Welding Power Source Gas Hose Connection
7. Flow Adjust
   - Typical flow rate is 20 cfh (cubic feet per hour). Check wire manufacturer's recommended flow rate.

Obtain gas cylinder and chain to running gear, wall, or other stationary support so cylinder cannot fall and break off valve.

**DO NOT use Argon/Mixed gas regulator/flowmeter with CO₂ shielding gas. See Parts List for optional CO₂ gas regulator/flowmeter.**
4-10. Installing Wire Spool And Adjusting Hub Tension

When a slight force is needed to turn spool, tension is set.

Use compression spring with 8 in (200 mm) spools.

Installing 1 Or 2 lb Wire Spool

To install either a 1 lb or 2 lb wire spool, follow the procedure as shown in the illustration.

Remove these components from spindle.

Install these components onto spindle.

Order extra spring Part No. 186 437

Tools Needed:

15/16 in

4-11. Positioning Jumper Links

Check input voltage available at site.

1  Jumper Links Access Door
   Open door.

2  Jumper Link Label
   Check label – only one is on unit.

3  Input Voltage Jumper Links
   Move jumper links to match input voltage.
   Close and secure access door.

Tools Needed:

3/8 in
## 4-12. Electrical Service Guide

<table>
<thead>
<tr>
<th>Input Voltage</th>
<th>200</th>
<th>230</th>
<th>400</th>
<th>460</th>
<th>575</th>
</tr>
</thead>
<tbody>
<tr>
<td>Input Amperes At Rated Output</td>
<td>48</td>
<td>42</td>
<td>24</td>
<td>21</td>
<td>17</td>
</tr>
<tr>
<td>Max Recommended Standard Fuse Or Circuit Breaker Rating In Amperes</td>
<td>60</td>
<td>50</td>
<td>30</td>
<td>25</td>
<td>20</td>
</tr>
<tr>
<td>Circuit Breaker ¹, Time-Delay ²</td>
<td>70</td>
<td>60</td>
<td>35</td>
<td>30</td>
<td>25</td>
</tr>
<tr>
<td>Normal Operating ³</td>
<td>80</td>
<td>60</td>
<td>35</td>
<td>30</td>
<td>25</td>
</tr>
<tr>
<td>Min Input Conductor Size In AWG</td>
<td>8</td>
<td>8</td>
<td>12</td>
<td>12</td>
<td>14</td>
</tr>
<tr>
<td>Max Recommended Input Conductor Length In Feet (Meters)</td>
<td>96</td>
<td>127</td>
<td>156</td>
<td>206</td>
<td>209</td>
</tr>
<tr>
<td>Min Grounding Conductor Size In AWG</td>
<td>8</td>
<td>10</td>
<td>12</td>
<td>12</td>
<td>14</td>
</tr>
</tbody>
</table>

Reference: 1999 National Electrical Code (NEC)

1. Choose a circuit breaker with time-current curves comparable to a Time Delay Fuse.
2. “Time-Delay” fuses are UL class “RK5”.
3. “Normal Operating” (general purpose – no intentional delay) fuses are UL class “K5” (up to and including 60 amp), and UL class “H” (65 amp and above).

▲ Caution: Failure to follow these fuse and circuit breaker recommendations could create an electric shock or fire hazard.

## 4-13. Selecting A Location And Connecting Input Power

1. Rating Label
   - Supply correct input power.
2. Plug (NEMA Type 6-50P)
3. Receptacle (NEMA Type 6-50R)
   - Connect plug to receptacle.
4. Input And Grounding Conductors
   - Connect directly to line disconnect device if hard wiring is required.
5. Line Disconnect Device
   - See Section 4-12.

▲ Special installation may be required where gasoline or volatile liquids are present – see NEC Article 511 or CEC Section 20.
4-14. Threading Welding Wire

1. Wire Spool
2. Welding Wire
3. Inlet Wire Guide
4. Pressure Adjustment Knob
5. Drive Roll
6. Outlet Wire Guide
7. Gun Conduit Cable

Lay gun cable out straight.

Tools Needed:

- 6 in (150 mm)

Hold wire tightly to keep it from unraveling.

Open pressure assembly. Pull and hold wire; cut off end. Push wire thru guides into gun; continue to hold wire.

Close and tighten pressure assembly, and let go of wire.

Remove gun nozzle and contact tip. Turn On.

Press gun trigger until wire comes out of gun. Reinstall contact tip and nozzle

Feed wire to check drive roll pressure. Tighten knob enough to prevent slipping.

Cut off wire. Close and latch door.

Use pressure indicator scale to set a desired drive roll pressure.

Pressure Indicator Scale

Tighten

Ref. 802 064-D / S-0627-A
4-15. Using Gun/Cable Holder

1  Side Panel
2  Latch
3  Cable Holder
Press latch down to release and open door.
4  Holster (2)
Wrap cable around cable holder, and place gun nozzle into holster.
## Selecting Wire, Gas and Control Settings

<table>
<thead>
<tr>
<th>What Material are You Welding?</th>
<th>Suggested Wire Types</th>
<th>Suggested Shielding Gases and Flow Rate</th>
<th>Wire Sizes (Diameter)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Steel</td>
<td>Solid (or hard)</td>
<td>100% CO₂, 25 ccfh</td>
<td>0.023&quot; (0.6mm)</td>
</tr>
<tr>
<td></td>
<td>ER70S-6</td>
<td></td>
<td>0.030&quot; (0.8mm)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>0.035&quot; (0.9mm)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>0.045&quot; (1.1mm)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>75% Ar/25% CO₂, 25 ccfh (Ar/CO₂ produces less spatter - better overall appearance)</td>
<td>0.023&quot; (0.6mm)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>0.030&quot; (0.8mm)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>0.035&quot; (0.9mm)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>0.045&quot; (1.1mm)</td>
</tr>
<tr>
<td>Steel – for outdoor, windy applications or when weld appearance is not critical.</td>
<td>Flux core E71T-11</td>
<td>No shielding gas required</td>
<td>0.035&quot; (0.9mm)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>0.045&quot; (1.1mm)</td>
</tr>
<tr>
<td></td>
<td>Flux core E71T-1</td>
<td>100% CO₂, 25 ccfh</td>
<td>0.035&quot; (0.9mm)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>75% Ar/25% CO₂, 25 ccfh</td>
<td>0.045&quot; (1.1mm)</td>
</tr>
<tr>
<td>Stainless steel</td>
<td>Stainless steel</td>
<td>Tri-Mix, 35 ccfh (90% He/7.5% Ar/2.5% CO₂)</td>
<td>0.023&quot; (0.6mm)</td>
</tr>
<tr>
<td></td>
<td>ER 308, ER 308L, ER 308LSi</td>
<td></td>
<td>0.030&quot; (0.8mm)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>0.035&quot; (0.9mm)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>0.045&quot; (1.1mm)</td>
</tr>
<tr>
<td>Aluminum with Optional Spoolmatic® 15A or 30A spoolgun.</td>
<td>Aluminum 4043 ER</td>
<td>100% Ar, 35 ccfh</td>
<td>0.030&quot; (0.8mm)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>0.035&quot; (0.9mm)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>0.047&quot; (1.2mm)</td>
</tr>
</tbody>
</table>
Select Voltage and Wire Speed Based on Thickness of Metal Being Welded

<table>
<thead>
<tr>
<th>Thickness</th>
<th>1/2&quot; (12.7 mm)</th>
<th>3/8&quot; (9.5 mm)</th>
<th>1/4&quot; (6.4 mm)</th>
<th>3/16&quot; (4.8 mm)</th>
<th>1/8&quot; (3.2 mm)</th>
<th>14 ga. (2.0 mm)</th>
<th>16 ga. (1.6 mm)</th>
<th>18 ga. (1.2 mm)</th>
<th>20 ga. (0.9 mm)</th>
<th>22 ga. (0.8 mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>23.0/325</td>
<td>21.5/290</td>
<td>20.5/245</td>
<td>20.0/220</td>
<td>19.0/175</td>
<td>18.5/160</td>
<td>18.0/125</td>
<td>17.5/100</td>
<td>17.0/85</td>
<td></td>
<td></td>
</tr>
<tr>
<td>24.5/335</td>
<td>21.5/300</td>
<td>19.0/260</td>
<td>18.0/230</td>
<td>17.0/200</td>
<td>16.5/165</td>
<td>16.0/155</td>
<td>15.5/110</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>25.5/380</td>
<td>24.0/385</td>
<td>23.0/360</td>
<td>21.5/310</td>
<td>20.5/275</td>
<td>20.0/250</td>
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<td></td>
</tr>
<tr>
<td>26.5/410</td>
<td>25.0/420</td>
<td>24.0/400</td>
<td>22.5/370</td>
<td>21.5/325</td>
<td>20.5/295</td>
<td></td>
<td></td>
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<td></td>
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</tr>
<tr>
<td>27.5/430</td>
<td>26.0/440</td>
<td>25.0/420</td>
<td>24.5/375</td>
<td>23.5/365</td>
<td>22.5/345</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

To read settings: Number on left of slash is voltage, number on right of slash is wire-speed.

Example: 19.2/338 = Wire speed listed is a starting value only and can be fine-tuned while welding.
SECTION 5 – OPERATION

5-1. Controls

This unit has three automatic timers included in its operation to help save contact tips, gas, and wire:

- **Tip Saver** – Weld output shuts off if tip is shorted to work surface.
- **Safety shut-off** – Weld output will shut off if no arc is detected within 3 seconds after gun trigger is depressed.
- **Jog mode** – When loading a new roll of wire or if the gun trigger is accidentally pressed, gas will shut off after 1 minute and wire will shut off after 2 minutes saving wire and gas.

1. **Voltage Control**
   - Turn control clockwise to increase voltage.

2. **Wire Speed Control**
   - Turn control clockwise to increase wire feed speed.

**JOG Mode**

If the trigger on either gun is held for more than 3 seconds without striking an arc, the unit will automatically shut off weld power (and shielding gas output on MIG gun only), but will feed wire continuously at the preset wire feed speed (which may be faster or slower than Run-in Speed) until trigger is released.

**Run-in Wire Feed Speed Settings**

Run-in settings for the MIG and Spool Guns are independently set and stored in unit memory. The settings are in percent of the welding wire feed speed preset. Both settings are adjustable from 25 to 150 percent.

- MIG Gun Run-in is factory set at 100% which is recommended for most wire sizes and types.
- Spool Gun Run-in is factory set at 50% which is recommended for .030 & .035 wire. A Run-in setting of 25% is recommended for .047 wire.

To check Run-in settings, start with the power switch OFF. Press and hold the MIG or Spool Gun Trigger while turning the power switch ON. The unit will power up with both the displays reading **-----**, then the voltage display will read ---- and the wire feed display will read the preset Run-in percentage from memory for the gun selected. To return to the weld mode without making a change, simply release trigger and pull the trigger again momentarily (one second).

To change Run-in settings, start with the power switch OFF. Press and hold the MIG or Spool Gun Trigger while turning the power switch ON. The unit will power up with both the displays reading **-----**, then the voltage display will read ---- and the wire feed display will read the preset Run-in percentage from memory for the gun selected. To change the Run-in value, release the trigger and turn the wire feed control knob (or the wire feed adjustment knob located on the bottom handle of the spool gun) to the desired setting for the selected gun. To return to weld mode after the Run-in speed change, pull the trigger momentarily (one second).

3. **Power Switch**
4. **Voltmeter**
5. **Wire Feed Speed Meter**
5-2. Voltmeter And Wire Feed Speed Meter Operation

1 Voltmeter
2 Wire Feed Speed Meter

Power Up Status
Both meters display 888 at unit power up. After one second, preset values appear on both meters. The MIG gun settings (not spool gun) are always the default at initial power up of the unit. If the power is reset to quickly, characters other than 888 may appear. To reset, turn power off for at least 3 seconds, then turn power back on.

Welding Status
When either a MIG gun or spool gun trigger is pressed and a welding arc is established, the voltmeter displays actual weld voltage. When the gun trigger is released and welding arc extinguished, the voltmeter displays the last actual voltage for 5 seconds and then returns to preset voltage. If welding resumes before unit displays preset voltage, actual welding voltage will appear on the voltmeter. The wire feed speed meter always displays preset wire feed speed (IPM).

Gun Selection
The wire feed speed meter will display preset wire feed speed (IPM) for the appropriate gun selection either MIG or spool gun. To preset desired wire feed speed, connect desired gun, press gun trigger for one second, and release trigger. The meter preset will be retained by the meter board until a different gun is connected and preset is performed or the unit is turned off and back on. The MIG gun settings (not spool gun) are always the default at initial power up of the unit.

Error Messages
Volt Meter Display (HL.P)
Wire Feed Speed Display (001)
HL.P 001 – Communication Lost between Control Board PC1 and Display Board PC2
HL.P 002 – Unit over temperature, unit is inoperative until temperature is reduced inside unit (see Section 6-2)
HL.P 003 – No Open Circuit Voltage (OCV) detected when either trigger is pulled
HL.P 004 – Gun trigger was engaged for approximately 2 minutes with no arc detected, or weld wire is stuck causing a direct short. If HL.P 004 occurs during power up, see Section 6-8.
HL.P 005 – Wire feed malfunction. Check wire feed delivery system (see Section 6-8).

See Section 6-8 for additional information on all HL.P codes.
SECTION 6 – MAINTENANCE & TROUBLESHOOTING

6-1. Routine Maintenance

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

<table>
<thead>
<tr>
<th>3 Months</th>
</tr>
</thead>
<tbody>
<tr>
<td>Replace unreadable labels</td>
</tr>
<tr>
<td>Repair or replace cracked weld cable</td>
</tr>
<tr>
<td>Clean and tighten weld terminals</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>6 Months</th>
</tr>
</thead>
<tbody>
<tr>
<td>Blow out or vacuum inside.</td>
</tr>
<tr>
<td>Remove drive roll and carrier. Apply light coat of oil or grease to drive motor shaft.</td>
</tr>
</tbody>
</table>

6-2. Unit Overload

Thermistor T in SCR1 protects the unit from damage due to overheating. If HL.P 002 is displayed on the meters, wait for unit to cool allowing fan motor to run before trying to weld. If unit is cool and no weld output continues, contact Factory Authorized Service Agent.

6-3. Replacing Gun Contact Tip

- Turn Off power.
  1. Nozzle
  2. Contact Tip

Cut off welding wire at contact tip. Remove nozzle. Remove contact tip and install new contact tip. Reinstall nozzle.

Tools Needed:

Ref. 800 797-C
6-4. Changing Drive Roll and Wire Inlet Guide

1  Securing Screw
2  Inlet Wire Guide
Loosen screw. Slide tip as close to drive rolls as possible without touching. Tighten screw.
3  Anti-Wear Guide
Install guide as shown.
4  Drive Roll
The drive roll consists of two different sized grooves. The stamped markings on the end surface of the drive roll refers to the groove on the opposite side of the drive roll. The groove closest to the motor shaft is the proper groove to thread (see Section 4-14).
5  Drive Roll Securing Nut
Turn nut one click to secure drive roll.

Tools Needed:
- 5/64 in
- 7/16 in

6-5. Aligning Drive Rolls and Wire Guide

▲ Turn Off power.
View is from top of drive rolls looking down with pressure assembly open.
1  Drive Roll Securing Nut
2  Drive Roll
3  Wire Guide
4  Welding Wire
5  Drive Gear
Insert screwdriver, and turn screw in or out until drive roll groove lines up with wire guide.
Close pressure roll assembly.

Tools Needed:
- Screwdriver

Ref. 802 990
Ref. 800 412-A
6-6. Cleaning Or Replacing Gun Liner

To Reassemble Gun:
Install and tighten new liner.
Cut liner off 3/4 in (20 mm) (3/8 in [9.5 mm] for aluminum) from head tube.
Install adapter, contact tip, and nozzle.

Tools Needed:
- 5/16 in, 10 mm

Disconnect gun from unit first.
Lay gun cable out straight before installing new liner.
Remove nozzle, contact tip, and adapter.
Remove liner.
Blow out gun casing.

Head Tube

Ref. 800 797-C
6-7. Replacing Switch And/Or Head Tube

1. Remove handle locking nut.
2. Remove switch housing. Note: If installing new switch, push switch lead connectors onto terminal of new switch (polarity is not important). Install switch back into handle, and secure with handle locking nut. If replacing head tube, continue to end of figure.
3. Slide handle.
4. Secure head tube in vice.
5. Loosen jam nut. Remove from vice and turn head tube out by hand.
7. Place head tube in vice and tighten until nuts are tight.
8. Remove from vice. Reposition handle and install switch housing. Secure with handle locking nut.

Tools Needed:

Disconnect gun first.

3/4 in

Ref. 800 795-C
## 6-8. Troubleshooting

<table>
<thead>
<tr>
<th>Trouble</th>
<th>Remedy</th>
</tr>
</thead>
</table>
| No weld output; wire does not feed. | Be sure line disconnect switch is On (see Section 4-13).  
Replace building line fuse or reset circuit breaker if open (see Section 4-13).  
Secure gun trigger connections (see Section 4-6).  
HL.P 001 appears on meters. Turn power switch off and back on, if HL.P 001 appears on meters again, have Factory Authorized Service Agent check unit.  
HL.P 002 appears on meters. Thermistor T is detecting an overheating condition. Wait for unit to cool allowing the fan to run. After unit is cool, if HL.P 002 message remains, have Factory Authorized Service Agent check for an open Thermistor T (see Section 6-2).  
HL.P 004 appears on meters. Reset message by releasing the trigger or removing stuck wire causing short circuit (see Section 5-2). If message remains, have Factory Authorized Service Agent check for shorted trigger leads.  
Have Factory Authorized Service Agent check Power switch.  
Have Factory Authorized Service Agent check all board connections and main control board. |
| No Weld Output; wire feeds. | Connect work clamp to get good metal to metal contact.  
Replace contact tip (see Section 6-3).  
HL.P 003 appears on meters, have Factory Authorized Service Agent check main control board and main rectifier. |
| Low weld output. | Connect unit to proper input voltage or check for low line voltage (see Section 4-13).  
Check input voltage jumper links and correct position if necessary (see Section 4-11).  
Have Factory Authorized Service Agent check main control board. |
| Fan motor does not run. | Have Factory Authorized Service Agent check fan-on-demand circuit. |
| Low, high, or erratic wire speed. | Readjust front panel settings (see Section 5-1).  
Change to correct size drive rolls (see Section 6-4).  
Readjust drive roll pressure (see Section 4-14).  
Replace inlet guide, contact tip, and/or liner if necessary (see Sections 6-3, and 6-6).  
Check position of input jumper links (see Section 4-11).  
Have Factory Authorized Service Agent check main control board. |
<table>
<thead>
<tr>
<th>Trouble</th>
<th>Remedy</th>
</tr>
</thead>
<tbody>
<tr>
<td>No wire feed.</td>
<td>Turn Wire Speed control to higher setting (see Section 5-1).</td>
</tr>
<tr>
<td></td>
<td>Clear obstruction in gun contact tip or liner (see Sections 6-3, and 6-6).</td>
</tr>
<tr>
<td></td>
<td>Readjust drive roll pressure (see Section 4-14).</td>
</tr>
<tr>
<td></td>
<td>Change to correct size drive rolls (see Section 6-4).</td>
</tr>
<tr>
<td></td>
<td>Rethread welding wire (see Section 4-14).</td>
</tr>
<tr>
<td></td>
<td>HL.P 002 appears on meters. Thermistor T is detecting an overheating condition. Wait for unit to cool allowing the fan to run. After unit is cool, if HL.P 002 message remains, contact Factory Authorized Service Agent (see Section 6-2).</td>
</tr>
<tr>
<td></td>
<td>HL.P 004 appears on meters. Reset message by releasing the trigger or removing stuck wire causing short circuit (see Section 5-2). If message remains, have Factory Authorized Service Agent check for shorted trigger leads.</td>
</tr>
<tr>
<td></td>
<td>HL.P 005 appears on meters. Wire feed malfunction. Check wire feed delivery system.</td>
</tr>
<tr>
<td></td>
<td>Check gun trigger and leads. Repair or replace gun if necessary.</td>
</tr>
<tr>
<td></td>
<td>Have Factory Authorized Service Agent check main control board.</td>
</tr>
</tbody>
</table>
SECTION 7 – ELECTRICAL DIAGRAM

Figure 7-1. Circuit Diagram
8-1. Typical MIG Process Connections

▲ Weld current can damage electronic parts in vehicles. Disconnect both battery cables before welding on a vehicle. Place work clamp as close to the weld as possible.
8-2. Typical MIG Process Control Settings

NOTE

These settings are guidelines only. Material and wire type, joint design, fitup, position, shielding gas, etc. affect settings. Test welds to be sure they comply to specifications.

Material thickness determines weld parameters.

Convert Material Thickness to Amperage (A)

(0.001 in = 1 ampere)
0.125 in = 125 A

Select Wire Size

<table>
<thead>
<tr>
<th>Wire Size</th>
<th>Amperage Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.023 in</td>
<td>30 – 90 A</td>
</tr>
<tr>
<td>0.030 in</td>
<td>40 – 145 A</td>
</tr>
<tr>
<td>0.035 in</td>
<td>50 – 180 A</td>
</tr>
</tbody>
</table>

Select Wire Speed (Amperage)

125 A based on 1/8 in material thickness

ipm = inches per minute

Select Voltage

Low voltage: wire stubs into work
High voltage: arc is unstable (spatter)
Set voltage midway between high/low voltage

Wire speed (amperage) controls weld penetration (wire speed = burn-off rate)

Ref. 802 473-B
8-3. Holding And Positioning Welding Gun

Welding wire is energized when gun trigger is pressed. Before lowering helmet and pressing trigger, be sure wire is no more than 1/2 in (13 mm) past end of nozzle, and tip of wire is positioned correctly on seam.

1 Hold Gun and Control Gun Trigger
2 Workpiece
3 Work Clamp
4 Electrode Extension (Stickout) 1/4 to 1/2 in (6 to 13 mm)
5 Cradle Gun and Rest Hand on Workpiece

End View of Work Angle

Side View of Gun Angle

GROOVE WELDS

End View of Work Angle

Side View of Gun Angle

FILLET WELDS
8-4. Conditions That Affect Weld Bead Shape

**NOTE**

Weld bead shape depends on gun angle, direction of travel, electrode extension (stickout), travel speed, thickness of base metal, wire feed speed (weld current), and voltage.

---

**GUN ANGLES AND WELD BEAD PROFILES**

- **Push**
- **Perpendicular**
- **Drag**

**ELECTRODE EXTENSIONS (STICKOUT)**

- **Short**
- **Normal**
- **Long**

**FILLET WELD ELECTRODE EXTENSIONS (STICKOUT)**

- **Short**
- **Normal**
- **Long**

**GUN TRAVEL SPEED**

- **Slow**
- **Normal**
- **Fast**
**8-5. Gun Movement During Welding**

**NOTE**

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

1. Stringer Bead – Steady Movement Along Seam
2. Weave Bead – Side To Side Movement Along Seam
3. Weave Patterns

Use weave patterns to cover a wide area in one pass of the electrode.

**8-6. Poor Weld Bead Characteristics**

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

**8-7. Good Weld Bead Characteristics**

1. Fine Spatter
2. Uniform Bead
3. Moderate Crater During Welding

Weld a new bead or layer for each 1/8 in (3.2 mm) thickness in metals being welded.
4. No Overlap
5. Good Penetration into Base Metal
# 8-8. Troubleshooting – Excessive Spatter

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

<table>
<thead>
<tr>
<th>Possible Causes</th>
<th>Corrective Actions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wire feed speed too high.</td>
<td>Select lower wire feed speed.</td>
</tr>
<tr>
<td>Voltage too high.</td>
<td>Select lower voltage range.</td>
</tr>
<tr>
<td>Electrode extension (stickout) too long.</td>
<td>Use shorter electrode extension (stickout).</td>
</tr>
<tr>
<td>Workpiece dirty.</td>
<td>Remove all grease, oil, moisture, rust, paint, undercoating, and dirt from work surface before welding.</td>
</tr>
<tr>
<td>Insufficient shielding gas at welding arc.</td>
<td>Increase flow of shielding gas at regulator/flowmeter and/or prevent drafts near welding arc.</td>
</tr>
<tr>
<td>Dirty welding wire.</td>
<td>Use clean, dry welding wire.</td>
</tr>
<tr>
<td></td>
<td>Eliminate pickup of oil or lubricant on welding wire from feeder or liner.</td>
</tr>
</tbody>
</table>

# 8-9. Troubleshooting – Porosity

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

<table>
<thead>
<tr>
<th>Possible Causes</th>
<th>Corrective Actions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Insufficient shielding gas at welding arc.</td>
<td>Increase flow of shielding gas at regulator/flowmeter and/or prevent drafts near welding arc.</td>
</tr>
<tr>
<td></td>
<td>Remove spatter from gun nozzle.</td>
</tr>
<tr>
<td></td>
<td>Check gas hoses for leaks.</td>
</tr>
<tr>
<td></td>
<td>Place nozzle 1/4 to 1/2 in (6-13 mm) from workpiece.</td>
</tr>
<tr>
<td></td>
<td>Hold gun near bead at end of weld until molten metal solidifies.</td>
</tr>
<tr>
<td>Wrong gas.</td>
<td>Use welding grade shielding gas; change to different gas.</td>
</tr>
<tr>
<td>Dirty welding wire.</td>
<td>Use clean, dry welding wire.</td>
</tr>
<tr>
<td></td>
<td>Eliminate pick up of oil or lubricant on welding wire from feeder or liner.</td>
</tr>
<tr>
<td>Workpiece dirty.</td>
<td>Remove all grease, oil, moisture, rust, paint, coatings, and dirt from work surface before welding.</td>
</tr>
<tr>
<td></td>
<td>Use a more highly deoxidizing welding wire (contact supplier).</td>
</tr>
<tr>
<td>Welding wire extends too far out of nozzle.</td>
<td>Be sure welding wire extends not more than 1/2 in (13 mm) beyond nozzle.</td>
</tr>
</tbody>
</table>

# 8-10. Troubleshooting – Excessive Penetration

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

<table>
<thead>
<tr>
<th>Possible Causes</th>
<th>Corrective Actions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Excessive heat input.</td>
<td>Select lower voltage range and reduce wire feed speed.</td>
</tr>
<tr>
<td></td>
<td>Increase travel speed.</td>
</tr>
</tbody>
</table>
8-11. Troubleshooting – Lack Of Penetration

<table>
<thead>
<tr>
<th>Possible Causes</th>
<th>Corrective Actions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Improper joint preparation.</td>
<td>Material too thick. Joint preparation and design must provide access to bottom of groove while maintaining proper welding wire extension and arc characteristics.</td>
</tr>
<tr>
<td>Improper weld technique.</td>
<td>Maintain normal gun angle of 0 to 15 degrees to achieve maximum penetration.</td>
</tr>
<tr>
<td></td>
<td>Keep arc on leading edge of weld puddle.</td>
</tr>
<tr>
<td></td>
<td>Be sure welding wire extends not more than 1/2 in (13 mm) beyond nozzle.</td>
</tr>
<tr>
<td>Insufficient heat input.</td>
<td>Select higher wire feed speed and/or select higher voltage range.</td>
</tr>
<tr>
<td></td>
<td>Reduce travel speed.</td>
</tr>
</tbody>
</table>

8-12. Troubleshooting – Incomplete Fusion

<table>
<thead>
<tr>
<th>Possible Causes</th>
<th>Corrective Actions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Workpiece dirty.</td>
<td>Remove all grease, oil, moisture, rust, paint, undercoating, and dirt from work surface before welding.</td>
</tr>
<tr>
<td>Insufficient heat input.</td>
<td>Select higher voltage range and/or adjust wire feed speed.</td>
</tr>
<tr>
<td>Improper welding technique.</td>
<td>Place stringer bead in proper location(s) at joint during welding.</td>
</tr>
<tr>
<td></td>
<td>Adjust work angle or widen groove to access bottom during welding.</td>
</tr>
<tr>
<td></td>
<td>Momentarily hold arc on groove side walls when using weaving technique.</td>
</tr>
<tr>
<td></td>
<td>Keep arc on leading edge of weld puddle.</td>
</tr>
<tr>
<td></td>
<td>Use correct gun angle of 0 to 15 degrees.</td>
</tr>
</tbody>
</table>

8-13. Troubleshooting – Burn-Through

<table>
<thead>
<tr>
<th>Possible Causes</th>
<th>Corrective Actions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Excessive heat input.</td>
<td>Select lower voltage range and reduce wire feed speed.</td>
</tr>
<tr>
<td></td>
<td>Increase and/or maintain steady travel speed.</td>
</tr>
</tbody>
</table>
8-14. Troubleshooting – Waviness Of Bead

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

<table>
<thead>
<tr>
<th>Possible Causes</th>
<th>Corrective Actions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Welding wire extends too far out of nozzle.</td>
<td>Be sure welding wire extends not more than 1/2 in (13 mm) beyond nozzle.</td>
</tr>
<tr>
<td>Unsteady hand.</td>
<td>Support hand on solid surface or use two hands.</td>
</tr>
</tbody>
</table>

8-15. Troubleshooting – Distortion

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

<table>
<thead>
<tr>
<th>Possible Causes</th>
<th>Corrective Actions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Excessive heat input.</td>
<td>Use restraint (clamp) to hold base metal in position.</td>
</tr>
<tr>
<td></td>
<td>Make tack welds along joint before starting welding operation.</td>
</tr>
<tr>
<td></td>
<td>Select lower voltage range and/or reduce wire feed speed.</td>
</tr>
<tr>
<td></td>
<td>Increase travel speed.</td>
</tr>
<tr>
<td></td>
<td>Weld in small segments and allow cooling between welds.</td>
</tr>
</tbody>
</table>
8-16. Common MIG Shielding Gases
This is a general chart for common gases and where they are used. Many different combinations (mixtures) of shielding gases have been developed over the years. The most commonly used shielding gases are listed in the following table.

<table>
<thead>
<tr>
<th>Gas</th>
<th>Spray Arc Steel</th>
<th>Short Circuiting Steel</th>
<th>Short Circuiting Stainless Steel</th>
<th>Aluminum</th>
</tr>
</thead>
<tbody>
<tr>
<td>Argon</td>
<td></td>
<td></td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>Argon + 25% CO₂</td>
<td></td>
<td></td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>80% or greater Argon + balance CO₂ or Oxygen</td>
<td>X</td>
<td>X³</td>
<td></td>
<td></td>
</tr>
<tr>
<td>100% CO₂</td>
<td></td>
<td></td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>Tri-Mix²</td>
<td></td>
<td></td>
<td></td>
<td>X</td>
</tr>
</tbody>
</table>

1 Limited short circuiting use
2 90% HE + 7-1/2% AR + 2-1/2% CO₂

8-17. Troubleshooting Guide For Semiautomatic Welding Equipment

<table>
<thead>
<tr>
<th>Problem</th>
<th>Probable Cause</th>
<th>Remedy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wire feed motor operates, but wire does not feed.</td>
<td>Too little pressure on wire feed rolls.</td>
<td>Increase pressure setting on wire feed rolls.</td>
</tr>
<tr>
<td></td>
<td>Incorrect wire feed rolls.</td>
<td>Check size stamped on wire feed rolls, replace to match wire size and type if necessary.</td>
</tr>
<tr>
<td></td>
<td>Wire spool brake pressure too high.</td>
<td>Decrease brake pressure on wire spool.</td>
</tr>
<tr>
<td></td>
<td>Restriction in the gun and/or assembly.</td>
<td>Check and replace cable, gun, and contact tip if damaged. Check size of contact tip and cable liner, replace if necessary.</td>
</tr>
<tr>
<td>Wire curling up in front of the wire feed rolls (bird nesting).</td>
<td>Too much pressure on wire feed rolls.</td>
<td>Decrease pressure setting on wire feed rolls.</td>
</tr>
<tr>
<td></td>
<td>Incorrect cable liner or gun contact tip size.</td>
<td>Check size of contact tip and check cable liner length and diameter, replace if necessary.</td>
</tr>
<tr>
<td></td>
<td>Gun end not inserted into drive housing properly.</td>
<td>Loosen gun securing bolt in drive housing and push gun end into housing just enough so it does not touch wire feed rolls.</td>
</tr>
<tr>
<td></td>
<td>Dirty or damaged (kinked) liner.</td>
<td>Replace liner.</td>
</tr>
<tr>
<td>Wire feeds, but no gas flows.</td>
<td>Gas cylinder empty.</td>
<td>Replace empty gas cylinder.</td>
</tr>
<tr>
<td></td>
<td>Gas nozzle plugged.</td>
<td>Clean or replace gas nozzle.</td>
</tr>
<tr>
<td></td>
<td>Gas cylinder valve not open or flowmeter not adjusted.</td>
<td>Open gas valve at cylinder and adjust flow rate.</td>
</tr>
<tr>
<td></td>
<td>Restriction in gas line.</td>
<td>Check gas hose between flowmeter and wire feeder, and gas hose in gun and cable assembly.</td>
</tr>
<tr>
<td></td>
<td>Loose or broken wires to gas solenoid.</td>
<td>Have Factory Authorized Service Agent repair wiring.</td>
</tr>
<tr>
<td></td>
<td>Gas solenoid valve not operating.</td>
<td>Have Factory Authorized Service Agent replace gas solenoid valve.</td>
</tr>
<tr>
<td></td>
<td>Incorrect primary voltage connected to welding power source.</td>
<td>Check primary voltage and relink welding power source for correct voltage.</td>
</tr>
<tr>
<td>Problem</td>
<td>Probable Cause</td>
<td>Remedy</td>
</tr>
<tr>
<td>----------------------------------------------</td>
<td>-----------------------------------------------------</td>
<td>--------------------------------------------------</td>
</tr>
<tr>
<td>Welding arc not stable.</td>
<td>Wire slipping in drive rolls.</td>
<td>Adjust pressure setting on wire feed rolls. Replace worn drive rolls if necessary.</td>
</tr>
<tr>
<td></td>
<td>Wrong size gun liner or contact tip.</td>
<td>Match liner and contact tip to wire size and type.</td>
</tr>
<tr>
<td></td>
<td>Incorrect voltage setting for selected wire feed speed on welding power source.</td>
<td>Readjust welding parameters.</td>
</tr>
<tr>
<td></td>
<td>Loose connections at the gun weld cable or work cable.</td>
<td>Check and tighten all connections.</td>
</tr>
<tr>
<td></td>
<td>Gun in poor shape or loose connection inside gun.</td>
<td>Repair or replace gun as necessary.</td>
</tr>
</tbody>
</table>
SECTION 9 – PARTS LIST

Hardware is common and not available unless listed.

Figure 9-1. Main Assembly
+When ordering a component originally displaying a precautionary label, the label should also be ordered.

+ OPTIONAL

To maintain the factory original performance of your equipment, use only Manufacturer’s Suggested Replacement Parts. Model and serial number required when ordering parts from your local distributor.
Hardware is common and not available unless listed.

Figure 9-2. Baffle, Center w/Components
### Figure 9-2. Baffle, Center w/Components (Fig 9-1 Item 1)

<table>
<thead>
<tr>
<th>Item No.</th>
<th>Dia. No.</th>
<th>Part No.</th>
<th>Description</th>
<th>Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>058 427</td>
<td>RING, retaining spool</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>085 980</td>
<td>NUT, stl hex full .625-11</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>605 941</td>
<td>WASHER, flat stl .640 ID x 1.000 OD x 14ga thk</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>186 437</td>
<td>SPRING, crpsn .845 OD x .110 wire x 1.500</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>057 971</td>
<td>WASHER, flat stl keyed 1.500dia x .125thk</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>057 745</td>
<td>SPRING, crpsn 2.430 OD x .090 wire x 2.500</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>186 435</td>
<td>HUB, spool</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>186 436</td>
<td>WASHER, brake</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>177 307</td>
<td>REEL, support</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>211 413</td>
<td>BAFFLE, center</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>186 998</td>
<td>CAPACITOR ASSEMBLY KIT, (consisting of)</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>082 902</td>
<td>STRIP, mtg center capacitor</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>13</td>
<td>185 643</td>
<td>STRIP, mtg capacitors</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>14</td>
<td>083 147</td>
<td>GROMMET, scr No. 8/10 panel hole .312sq .500 high</td>
<td>6</td>
<td></td>
</tr>
<tr>
<td>15</td>
<td>204 318</td>
<td>BRACKET, mtg</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>16</td>
<td>204 319</td>
<td>CONTACTOR, def prp 25A 2P 36VDC</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>17</td>
<td>052 964</td>
<td>RELAY, 24V DPDT 10A/120VAC</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>18</td>
<td>144 425</td>
<td>VARISTOR, w/leads</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>19</td>
<td>212 360</td>
<td>CIRCUIT CARD, control</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>20</td>
<td>162 382</td>
<td>HOUSING PLUG &amp; SOCKETS</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>21</td>
<td>130 203</td>
<td>HOUSING RECEPTACLE &amp; SOCKETS</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>22</td>
<td>115 092</td>
<td>HOUSING RECEPTACLE &amp; SOCKETS</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>23</td>
<td>115 093</td>
<td>HOUSING PLUG &amp; SOCKETS</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>24</td>
<td>196 894</td>
<td>COVER</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>25</td>
<td>119 998</td>
<td>RESISTOR, WW fxd 300W 5 ohm</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>26</td>
<td>188 910</td>
<td>TERMINAL ASSEMBLY, pri 1ph double voltage (200/230 or 230/400)</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>27</td>
<td>192 907</td>
<td>TERMINAL ASSEMBLY, pri 1ph triple voltage (230/460/575)</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>28</td>
<td>038 618</td>
<td>LINK, jumper term bd pri</td>
<td>as req.</td>
<td></td>
</tr>
<tr>
<td>29</td>
<td>128 750</td>
<td>CAPACITOR</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>30</td>
<td>097 421</td>
<td>TERMINAL, pwr output red</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>31</td>
<td>097 416</td>
<td>TERMINAL, pwr output black</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>32</td>
<td>097 415</td>
<td>TERMINAL, pwr output black</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>33</td>
<td>134 201</td>
<td>WIRE DRIVE &amp; GEARS</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>34</td>
<td>188 917</td>
<td>DOOR, access changeover</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>35</td>
<td>197 555</td>
<td>TOOL TRAY</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>36</td>
<td>021 469</td>
<td>LABEL, warning high voltage</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>37</td>
<td>198 824</td>
<td>LABEL, warning electric shock and pinch points</td>
<td>1</td>
<td></td>
</tr>
</tbody>
</table>

*+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.*
Figure 9-3. M-25 Gun
<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>200 258</td>
<td>NOZZLE, slip type .500 orf flush</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>... 1 ...</td>
<td>169 724</td>
<td>NOZZLE, slip type .500 orf .125 recess</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>... 1 ...</td>
<td>169 725</td>
<td>NOZZLE, slip type .625 orf .125 recess</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>... 1 ...</td>
<td>169 726</td>
<td>NOZZLE, slip type .625 orf flush</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>... 1 ...</td>
<td>169 727</td>
<td>NOZZLE, slip type .625 orf .125 stickout</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>... 2 ...</td>
<td>087 299</td>
<td>TIP, contact scr .023 wire x 1.125</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>... 2 ...</td>
<td>000 067</td>
<td>TIP, contact scr .030 wire x 1.125</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>... 2 ...</td>
<td>000 068</td>
<td>TIP, contact scr .035 wire x 1.125</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>... 2 ...</td>
<td>000 069</td>
<td>TIP, contact scr .045 wire x 1.125</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>... 3 ...</td>
<td>169 728</td>
<td>ADAPTER, contact tip</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>... 4 ...</td>
<td>169 729</td>
<td>ADAPTER, nozzle</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>... 5 ...</td>
<td>170 467</td>
<td>RING, retaining</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>... 6 ...</td>
<td>170 468</td>
<td>O-RING</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>... 7 ...</td>
<td>169 730</td>
<td>WASHER, shock</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>... 8 ...</td>
<td>169 731</td>
<td>TUBE, head</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>... 9 ...</td>
<td>169 738</td>
<td>NUT, locking handle</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>... 10 ...</td>
<td>169 732</td>
<td>NUT, jam</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>... 11 ...</td>
<td>169 737</td>
<td>HANDLE</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>... 12 ...</td>
<td>169 741</td>
<td>STRAIN RELIEF, cable</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>... 13 ...</td>
<td>180 433</td>
<td>CORD, trigger assembly</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>... 14 ...</td>
<td>209 486</td>
<td>CONNECTOR, feeder</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>... 15 ...</td>
<td>079 974</td>
<td>O-RING, .500 ID x .103CS rbr</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>... 16 ...</td>
<td>194 011</td>
<td>LINER, monocoil .030/.035 wire x 15ft (consisting of)</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>... 16 ...</td>
<td>194 010</td>
<td>LINER, monocoil .023/.025 wire x 15ft (consisting of)</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>... 16 ...</td>
<td>194 012</td>
<td>LINER, monocoil .035/.045 wire x 15ft (consisting of)</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>... 17 ...</td>
<td>079 975</td>
<td>O-RING, .187 ID x .103CS rbr</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>... 18 ...</td>
<td>196 255</td>
<td>SWITCH, trigger</td>
<td>1</td>
<td></td>
</tr>
</tbody>
</table>

◊ OPTIONAL
To maintain the factory original performance of your equipment, use only Manufacturer’s Suggested Replacement Parts. Model and serial number required when ordering parts from your local distributor.
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.
<table>
<thead>
<tr>
<th>Item No.</th>
<th>Dia. Mks.</th>
<th>Part No.</th>
<th>Description</th>
<th>Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>602 009</td>
<td>SCREW, .250-20 x 1.25 soc hd gr 8</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>172 075</td>
<td>CARRIER, drive roll w/components</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>166 072</td>
<td>SPACER, gear</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>010 224</td>
<td>PIN, spring CS .187 x 1.000</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>182 788</td>
<td>HOUSING, adapter gun/feeder</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>085 242</td>
<td>FASTENER, pinned</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>085 244</td>
<td>WASHER, cupped stl .328 ID x .812 OD x .125 lip</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>196 896</td>
<td>CUP, spring</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>196 897</td>
<td>SPRING, cprsn .695 OD x .095 wire</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>196 895</td>
<td>KNOB, tension adj</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>166 071</td>
<td>LEVER, mtg pressure gear</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>204 510</td>
<td>PIN, hinge</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>13</td>
<td>151 828</td>
<td>PIN, cotter hair .054 x .750</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>14</td>
<td>173 616</td>
<td>COVER, right angle motor</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>15</td>
<td>M 173 435</td>
<td>MOTOR, gear 24VDC (consisting of)</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>16</td>
<td>079 633</td>
<td>FITTING, hose brs barbed M 3/16tbg</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>17</td>
<td>601 966</td>
<td>SCREW, .375−16 x 1.25hexhd</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>18</td>
<td>604 538</td>
<td>WASHER, flat stl SAE .312</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>19</td>
<td>204 585</td>
<td>KNOB, fluted</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>20</td>
<td>173 619</td>
<td>CARRIER, drive roll w/components</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>21</td>
<td>174 609</td>
<td>SCREW, M 4—.7 x 12</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>22</td>
<td>174 610</td>
<td>SCREW, M 6—1.0 x 20 soc hd</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>23</td>
<td>192 029</td>
<td>WASHER, flat .250 ID x .437 OD</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>24</td>
<td>173 620</td>
<td>BUSHING, motor mtg</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>25</td>
<td>602 243</td>
<td>WASHER, flat .438 ID X 1.00 OD</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>26</td>
<td>602 213</td>
<td>WASHER, lock .380 ID X .683 OD</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>*045 233  GUIDE, anti-wear</td>
<td>1</td>
<td></td>
</tr>
</tbody>
</table>

see Section 9-7 Drive Roll & Wire Guide Kits.

"Recommended Spare Parts.
To maintain the factory original performance of your equipment, use only Manufacturer’s Suggested Replacement Parts. Model and serial number required when ordering parts from your local distributor.
<table>
<thead>
<tr>
<th>Item No.</th>
<th>Dia.</th>
<th>Part No.</th>
<th>Description</th>
<th>Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td></td>
<td>148 809</td>
<td>BLADE, fan 9 in 5wg 34deg .309 bore CCW</td>
<td>1</td>
</tr>
<tr>
<td>2</td>
<td></td>
<td>188 706</td>
<td>MOTOR, fan 230V 50/60 Hz 1550RPM .312dia shaft</td>
<td>1</td>
</tr>
<tr>
<td>3</td>
<td></td>
<td>203 711</td>
<td>WINDTUNNEL</td>
<td>1</td>
</tr>
<tr>
<td>4</td>
<td></td>
<td>203 333</td>
<td>VALVE, 34VDC 2 way custom port 1/8 orf</td>
<td>1</td>
</tr>
<tr>
<td>5</td>
<td></td>
<td>203 478</td>
<td>PANEL, rear</td>
<td>1</td>
</tr>
<tr>
<td>6</td>
<td></td>
<td>169 654</td>
<td>+BRACKET, support tank</td>
<td>1</td>
</tr>
<tr>
<td>7</td>
<td></td>
<td>200 285</td>
<td>LABEL, warning cylinder may</td>
<td>1</td>
</tr>
<tr>
<td>8</td>
<td></td>
<td>188 441</td>
<td>CHAIN, weldless 2/0 x 31.000 lg</td>
<td>1</td>
</tr>
<tr>
<td>9</td>
<td></td>
<td>605 227</td>
<td>NUT, nyl hex jam .750NPST</td>
<td>1</td>
</tr>
</tbody>
</table>

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.
### 9-7. Drive Roll And Wire Guide Kits

**Note**
Base selection of drive rolls upon the following recommended usages:

1. **V-Grooved rolls for hard wire.**
2. **U-Grooved rolls for soft and soft shelled cored wires.**
3. **U-Cogged rolls for extremely soft shelled wires (usually hard surfacing types).**
4. **V-Knurled rolls for hard shelled cored wires.**
5. Drive roll types may be mixed to suit particular requirements (example: V-Knurled roll in combination with U-Grooved).

<table>
<thead>
<tr>
<th>Wire Diameter</th>
<th>Kit No.</th>
<th>Drive Roll</th>
<th>Inlet Wire Guide</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Part No.</td>
<td>Type</td>
</tr>
<tr>
<td>.023/.025 in.</td>
<td>.023/.025 in.</td>
<td>0.6 mm</td>
<td>087 131</td>
</tr>
<tr>
<td>.030/.035 in.</td>
<td>.030/.035 in.</td>
<td>0.8/0.9 mm</td>
<td>204 579</td>
</tr>
<tr>
<td>.030 in.</td>
<td>.030 in.</td>
<td>0.8 mm</td>
<td>079 594</td>
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<tr>
<td>.035 in.</td>
<td>.035 in.</td>
<td>0.9 mm</td>
<td>079 595</td>
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<td>.045 in.</td>
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<td>1.2 mm</td>
<td>079 596</td>
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Ref. S-0026-B/7-91
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
   * Intellig
   * Maxstar 150
   * Engine Driven Welding Generators (NOTE: Engines are warranted separately by the engine manufacturer.)
3. 1 Year — Parts and Labor Unless Specified
   * DS-2 Wire Feeder
   * Motor Driven Guns (w/exception of Spoolmate Spoolguns)
   * Process Controllers
   * Positioners and Controllers
   * Automatic Motion Devices
   * RFCS Foot Controls
   * Induction Heating Power Sources
   * Water Coolant Systems
   * Flowgauge and Flowmeter Regulators (No Labor)
   * HF Units
   * Grids
   * Maxstar 85, 140
   * Spot Welders
   * Load Banks
   * Racks
   * Running Gear/Trailers
   * Plasma Cutting Torches (except APT & SAF Models)
   * Field Options (NOTE: Field options are covered under True Blue® for the remaining warranty period of the product they are installed in, or for a minimum of one year — whichever is greater.)
4. 6 Months — Batteries
5. 90 Days — Parts
   * MIG Guns/TIG Torches

Induction Heating Coils and Blankets
APT & SAF Model Plasma Cutting Torches
Remote Controls
Accessory Kits
Replacement Parts (No labor)
Spoolmate Spoolguns
Canvas Covers

Miller’s True Blue® Limited Warranty shall not apply to:
1. Consumable components; such as contact tips, cutting nozzles, contacts, brushes, slip rings, relays or parts that fail due to normal wear. (Exception: brushes, slip rings, and relays are covered on Bobcat, Trailblazer, and Legend models.)
2. Items furnished by Miller, but manufactured by others, such as engines or trade accessories. These items are covered by the manufacturer’s warranty, if any.
3. Equipment that has been modified by any party other than Miller, or equipment that has been improperly installed, improperly operated or misused based upon industry standards, or equipment which has not had reasonable and necessary maintenance, or equipment which has been used for operation outside of the specifications for the equipment.

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, GUARANTEE 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 8/03
## 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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<table>
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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 to:
- 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.