OM-206 141 754E
July 1999

Processes

TIG (GTAW) Welding

Stick (SMAW) Welding

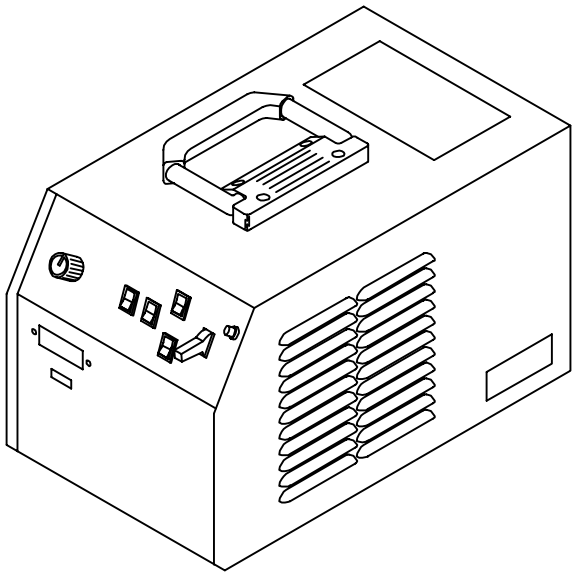
Description

Arc Welding Power Source

152 Model

175 Model

Maxstar® 152 And 175



OWNER'S MANUAL

Visit our website at
www.MillerWelds.com

From Miller to You

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

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

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

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

ISO 9001 REGISTERED QUALITY SYSTEM

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

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 orindividual 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.**

TRUE BLUE® WARRANTY

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

Miller offers a Technical Manual which provides more detailed service and parts information for your unit. To obtain a Technical Manual, contact your local distributor. Your distributor can also supply you with Welding Process Manuals such as SMAW, GTAW, GMAW, and GMAW-P.

Miller® *The Power of Blue.*

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

⚠ WARNING

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

TABLE OF CONTENTS

SECTION 1 – SAFETY PRECAUTIONS - READ BEFORE USING

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1-1. Symbol Usage

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

▲ **Marks a special safety message.**

☞ *Means "Note"; not safety related.*

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

1-2. Arc Welding Hazards

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

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

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

ELECTRIC SHOCK can kill.

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

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

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

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

FUMES AND GASES can be hazardous.

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

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

ARC RAYS can burn eyes and skin.

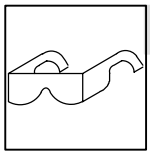
Arc rays from the welding process produce intense visible and invisible (ultraviolet and infrared) rays that can burn eyes and skin. Sparks fly off from the weld.

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

WELDING can cause fire or explosion.

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

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



FLYING METAL can injure eyes.

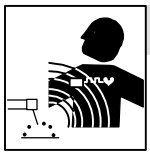
- Welding, chipping, wire brushing, and grinding cause sparks and flying metal. As welds cool, they can throw off slag.
- Wear approved safety glasses with side shields even under your welding helmet.

BUILDUP OF GAS can injure or kill.

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

HOT PARTS can cause severe burns.

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



MAGNETIC FIELDS can affect pacemakers.

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

NOISE can damage hearing.

Noise from some processes or equipment can damage hearing.

- Wear approved ear protection if noise level is high.

CYLINDERS can explode if damaged.

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

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

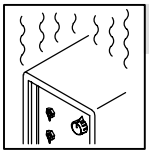
1-3. Additional Symbols For Installation, Operation, And Maintenance

FIRE OR EXPLOSION hazard.

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

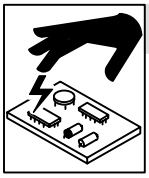
FALLING UNIT can cause injury.

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



OVERUSE can cause OVERHEATING

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



STATIC (ESD) can damage PC boards.

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

MOVING PARTS can cause injury.

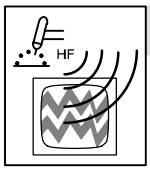
- Keep away from moving parts.
- Keep away from pinch points such as drive rolls.

WELDING WIRE can cause injury.

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

MOVING PARTS can cause injury.

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



H.F. RADIATION can cause interference.

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

ARC WELDING can cause interference.

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

1-4. Principal Safety Standards

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

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

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

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

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

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

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

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

1-5. EMF Information

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

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

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

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

About Pacemakers:

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

SECTION 1 – CONSIGNES DE SECURITE – LIRE AVANT UTILISATION

1-1. Signification des symboles

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

▲ **Identifie un message de sécurité particulier.**

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

Ce groupe de symboles signifie Mise en garde ! Soyez vigilant ! Il y a des risques de danger reliés aux CHOCS ÉLECTRIQUES, aux PIÈCES EN MOUVEMENT et aux PIÈCES CHAUDES. Reportez-vous aux symboles et aux directives ci-dessous afin de connaître les mesures à prendre pour éviter tout danger.

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

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

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

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

UN CHOC ÉLECTRIQUE peut tuer.

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

- Ne jamais toucher les pièces électriques sous tension.
- Porter des gants et des vêtements de protection secs ne comportant pas de trous.
- S'isoler de la pièce et de la terre au moyen de tapis ou d'autres moyens isolants suffisamment grands pour empêcher le contact physique éventuel avec la pièce ou la terre.
- Ne pas se servir de source électrique àcourant électrique dans les zones humides, dans les endroits confinés ou là où on risque de tomber.
- Se servir d'une source électrique àcourant électrique UNIQUEMENT si le procédé de soudage le demande.
- Si l'utilisation d'une source électrique àcourant électrique s'avère nécessaire, se servir de la fonction de télécommande si l'appareil en est équipé.
- Couper l'alimentation ou arrêter le moteur avant de procéder à l'installation, à la réparation ou à l'entretien de l'appareil. Déverrouiller l'alimentation selon la norme OSHA 29 CFR 1910.147 (voir normes de sécurité).
- Installer et mettre à la terre correctement cet appareil conformément à son manuel d'utilisation et aux codes nationaux, provinciaux et municipaux.
- Toujours vérifier la terre du cordon d'alimentation – Vérifier et s'assurer que le fil de terre du cordon d'alimentation est bien raccordé à la borne de terre du sectionneur ou que la fiche du cordon est raccordée à une prise correctement mise à la terre.
- En effectuant les raccordements d'entrée fixer d'abord le conducteur de mise à la terre approprié et contre-vérifier les connexions.
- Vérifier fréquemment le cordon d'alimentation pour voir s'il n'est pas endommagé ou dénudé – remplacer le cordon immédiatement s'il est endommagé – un câble dénudé peut provoquer une électrocution.
- Mettre l'appareil hors tension quand on ne l'utilise pas.
- Ne pas utiliser des câbles usés, endommagés, de grosseur insuffisante ou mal épissés.
- Ne pas enrouler les câbles autour du corps.
- Si la pièce soudée doit être mise à la terre, le faire directement avec un câble distinct – ne pas utiliser le connecteur de pièce ou le câble de retour.
- Ne pas toucher l'électrode quand on est en contact avec la pièce, la terre ou une électrode provenant d'une autre machine.
- N'utiliser qu'un matériel en bon état. Réparer ou remplacer sur-le-champ les pièces endommagées. Entretenir l'appareil conformément à ce manuel.
- Porter un harnais de sécurité quand on travaille en hauteur.
- Maintenir solidement en place tous les panneaux et capots.
- Fixer le câble de retour de façon à obtenir un bon contact métal-métal avec la pièce à souder ou la table de travail, le plus près possible de la soudure.
- Isoler la pince de masse quand pas mis à la pièce pour éviter le contact avec tout objet métallique.

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

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

LES FUMÉES ET LES GAZ peuvent être dangereux.

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

- Eloigner votre tête des fumées. Ne pas respirer les fumées.
- A l'intérieur, ventiler la zone et/ou utiliser un échappement au niveau de l'arc pour l'évacuation des fumées et des gaz de soudage.
- Si la ventilation est insuffisante, utiliser un respirateur à alimentation d'air homologué.
- Lire les spécifications de sécurité des matériaux (MSDSs) et les instructions du fabricant concernant les métaux, les consommables, les revêtements, les nettoyants et les dégraisseurs.
- Travailler dans un espace fermé seulement s'il est bien ventilé ou en portant un respirateur à alimentation d'air. Demander toujours à un surveillant dûment formé de se tenir à proximité. Des fumées et des gaz de soudage peuvent déplacer l'air et abaisser le niveau d'oxygène provoquant des blessures ou des accidents mortels. S'assurer que l'air de respiration ne présente aucun danger.
- Ne pas souder dans des endroits situés à proximité d'opérations de dégraissage, de nettoyage ou de pulvérisation. La chaleur et les rayons de l'arc peuvent réagir en présence de vapeurs et former des gaz hautement toxiques et irritants.
- Ne pas souder des métaux munis d'un revêtement, tels que l'acier galvanisé, plaqué en plomb ou au cadmium à moins que le revêtement n'ait été enlevé dans la zone de soudure, que l'endroit soit bien ventilé, et si nécessaire, en portant un respirateur à alimentation d'air. Les revêtements et tous les métaux renfermant ces éléments peuvent dégager des fumées toxiques en cas de soudage.

LES RAYONS DE L'ARC peuvent provoquer des brûlures dans les yeux et sur la peau.

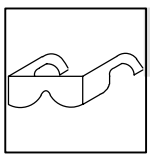
Le rayonnement de l'arc du procédé de soudage génère des rayons visibles et invisibles intenses (ultraviolets et infrarouges) susceptibles de provoquer des brûlures dans les yeux et sur la peau. Des étincelles sont projetées pendant le soudage.

- Porter un casque de soudage muni d'un écran de filtre approprié pour protéger votre visage et vos yeux pendant le soudage ou pour regarder (voir ANSI Z49.1 et Z87.1 énuméré dans les normes de sécurité).
- Porter des protections approuvés pour les oreilles si le niveau sondre est trop élevé.
- Utiliser des écrans ou des barrières pour protéger des tiers de l'éclair et de l'éblouissement; demander aux autres personnes de ne pas regarder l'arc.
- Porter des vêtements de protection constitué dans une matière durable, résistant au feu (cuir ou laine) et une protection des pieds.

LE SOUDAGE peut provoquer un incendie ou une explosion.

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

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



DES PARTICULES VOLANTES peuvent blesser les yeux.

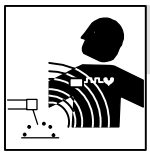
- Le soudage, l'écaillement, le passage de la pièce à la brosse en fil de fer, et le meulage génèrent des étincelles et des particules métalliques volantes. Pendant la période de refroidissement des soudures, elles risquent de projeter du laitier.
- Porter des lunettes de sécurité avec écrans latéraux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

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

- Fermer l'alimentation du gaz protecteur en cas de non utilisation.
- Veiller toujours à bien aérer les espaces confinés ou se servir d'un respirateur d'adduction d'air homologué.

DES PIÈCES CHAUDES peuvent provoquer des brûlures graves.

- Ne pas toucher des parties chaudes à mains nues
- Prévoir une période de refroidissement avant d'utiliser le pistolet ou la torche.



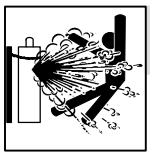
LES CHAMPS MAGNÉTIQUES peuvent affecter les stimulateurs cardiaques.

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

LE BRUIT peut affecter l'ouïe.

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

- Porter des protections approuvés pour les oreilles si le niveau sondre est trop élevé.



Si des BOUTEILLES sont endommagées, elles pourront exploser.

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

- Protéger les bouteilles de gaz comprimé d'une chaleur excessive, des chocs mécaniques, du laitier, des flammes ouvertes, des étincelles et des arcs.
- Placer les bouteilles debout en les fixant dans un support stationnaire ou dans un porte-bouteilles pour les empêcher de tomber ou de se renverser.
- Tenir les bouteilles éloignées des circuits de soudage ou autres circuits électriques.
- Ne jamais placer une torche de soudage sur une bouteille à gaz.
- Une électrode de soudage ne doit jamais entrer en contact avec une bouteille.
- Ne jamais souder une bouteille pressurisée – risque d'explosion.
- Utiliser seulement des bouteilles de gaz protecteur, régulateurs, tuyaux et raccords convenables pour cette application spécifique; les maintenir ainsi que les éléments associés en bon état.
- Ne pas tenir la tête en face de la sortie en ouvrant la soupape de la bouteille.
- Maintenir le chapeau de protection sur la soupape, sauf en cas d'utilisation ou de branchement de la bouteille.
- Lire et suivre les instructions concernant les bouteilles de gaz comprimé, les équipements associés et les publications P-1 CGA énumérées dans les normes de sécurité.

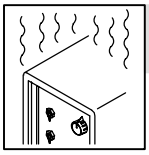
1-3. Dangers supplémentaires en relation avec l'installation, le fonctionnement et la maintenance

Risque D'INCENDIE OU D'EXPLOSION.

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

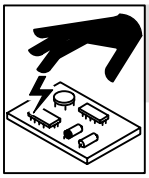
LA CHUTE DE L'APPAREIL peut blesser.

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



L'EMPLOI EXCESSIF peut SURCHAUFFER L'ÉQUIPEMENT.

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



LES CHARGES ÉLECTROSTATIQUES peuvent endommager les circuits imprimés.

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

DES ORGANES MOBILES peuvent provoquer des blessures.

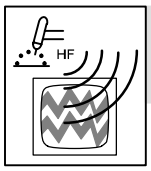
- Ne pas s'approcher des organes mobiles.
- Ne pas s'approcher des points de coincement tels que des rouleaux de commande.

LES FILS DE SOUDAGE peuvent provoquer des blessures.

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

DES ORGANES MOBILES peuvent provoquer des blessures.

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



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

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

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

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

LES CHAMPS MAGNÉTIQUES peuvent affecter les stimulateurs cardiaques.

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

1-4. Principales normes de sécurité

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

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

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

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

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

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

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

Cutting and Welding Processes, norme NFPA 51B, de la National Fire Protection Association, Batterymarch Park, Quincy, MA 02269.

1-5. Information sur les champs électromagnétiques

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

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

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

1 Garder les câbles ensembles en les torsadant ou en les attachant avec du ruban adhésif.

2 Mettre tous les câbles du côté opposé de l'opérateur.

3 Ne pas courber pas et ne pas entourer pas les câbles autour de votre corps.

4 Garder le poste de soudage et les câbles le plus loin possible de vous.

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

Consignes relatives aux stimulateurs cardiaques :

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

SECTION 2 – SPECIFICATIONS

NOTE ☞	*Unless otherwise noted, the 175 model is shown throughout this manual.*

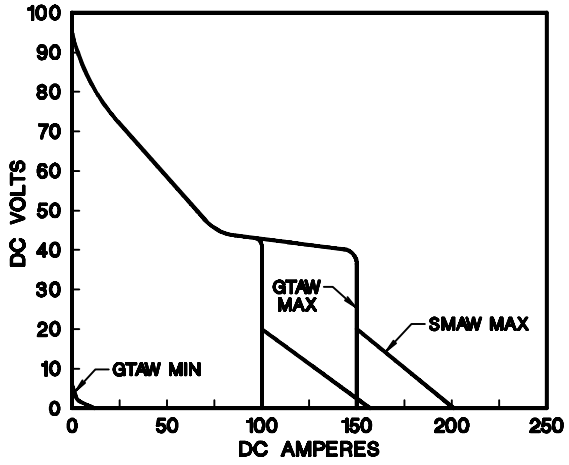
2-1. Specifications

Model	Rated Welding Output	Amperage Range	Maximum Open-Circuit Voltage DC	Amperes Input at Rated Load Output	KVA	KW	Weight	Overall Dimensions
152	120 A @ 25 Volts DC, 100% Duty Cycle	1–150	95	230 Volts AC; 50/60 Hz; Single-Phase 27.1 (0.5)*	6.2 0.12*	3.7 0.01*	31 lb (14 kg)	Length: 16-1/2 in (419 mm) Width: 9-1/2 in (241 mm) Height: 8 in (203 mm)
175	140 A @ 25.6 Volts DC, 100% Duty Cycle	1–175	95	460 Volts AC; 50/60 Hz; Three-Phase 7.4 (1.0)*	5.9 0.4*	3.9 0.17*	39 lb (18 kg)	Length: 16-1/2 in (419 mm) Width: 9-1/2 in (241 mm) Height: 10 in (254 mm)
* While idling								

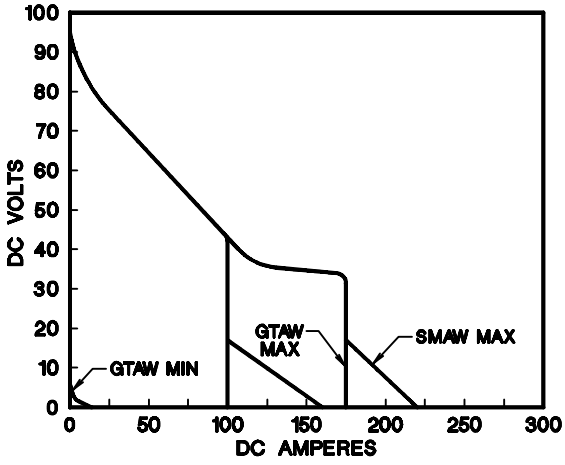
2-2. Volt-Ampere Curves

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

A. 152 Model



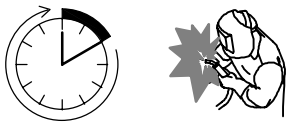
B. 175 Model



ssb1.1 10/91 – SB-151 604 / SB-143 476-B

2-3. Duty Cycle And Overheating

100% Duty Cycle At 120 Amperes For 152 Models; 140 Amperes For 175 Models

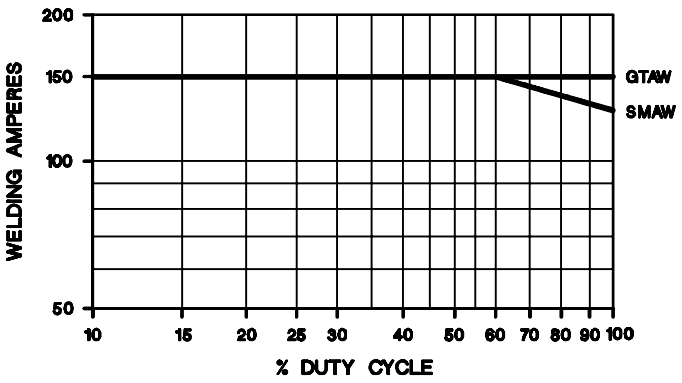


Continuous Welding

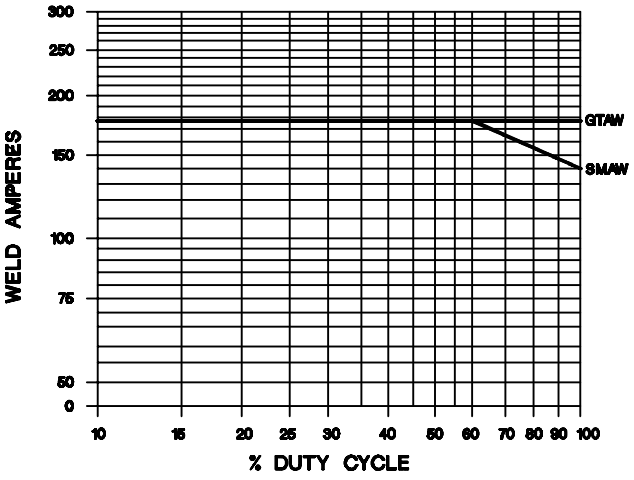
Duty Cycle is percentage of 10 minutes that unit can weld at rated load without overheating.

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

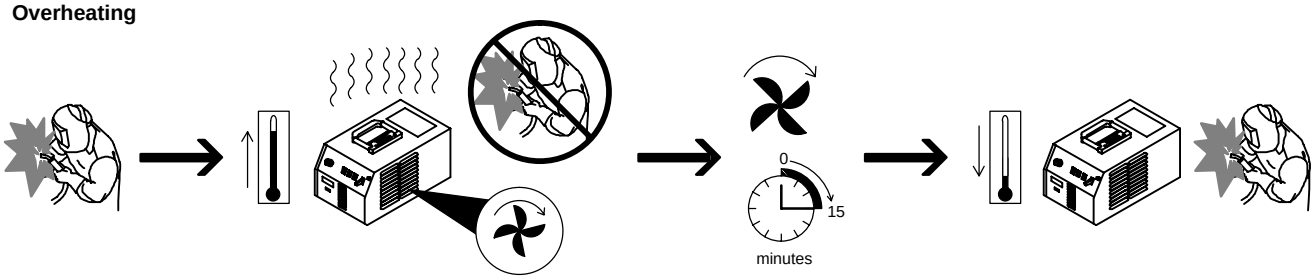
A. 152 Model



B. 175 Model



Overheating



When overheated, thermostat opens, output stops, and cooling fan keeps running.

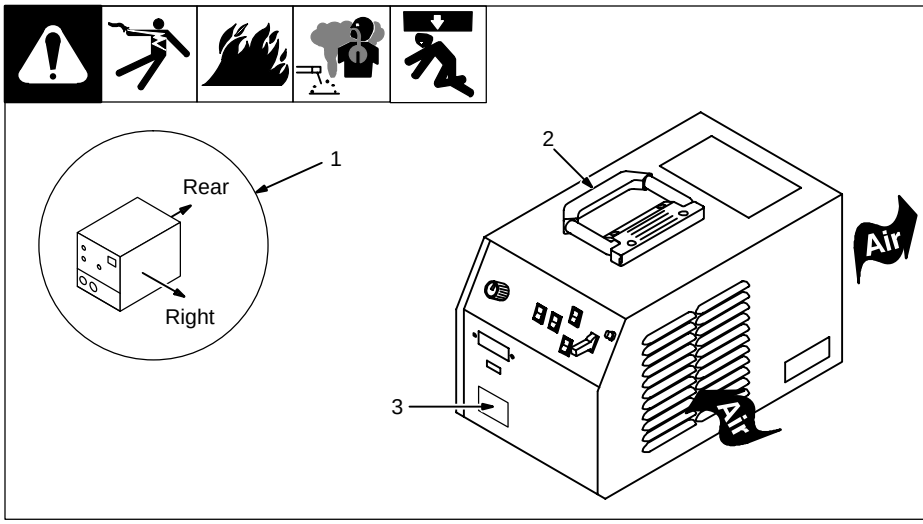
Let fan run for 15 minutes.

Start welding.

rduty1 5/95 – SB-121 591-B / SB-144 507-B / ST-157 356-B

SECTION 3 – INSTALLATION

3-1. Selecting A Location



1 10 in (254 mm) Open Space On Right Side And Rear Of Unit For Good Airflow

2 Lifting Handle

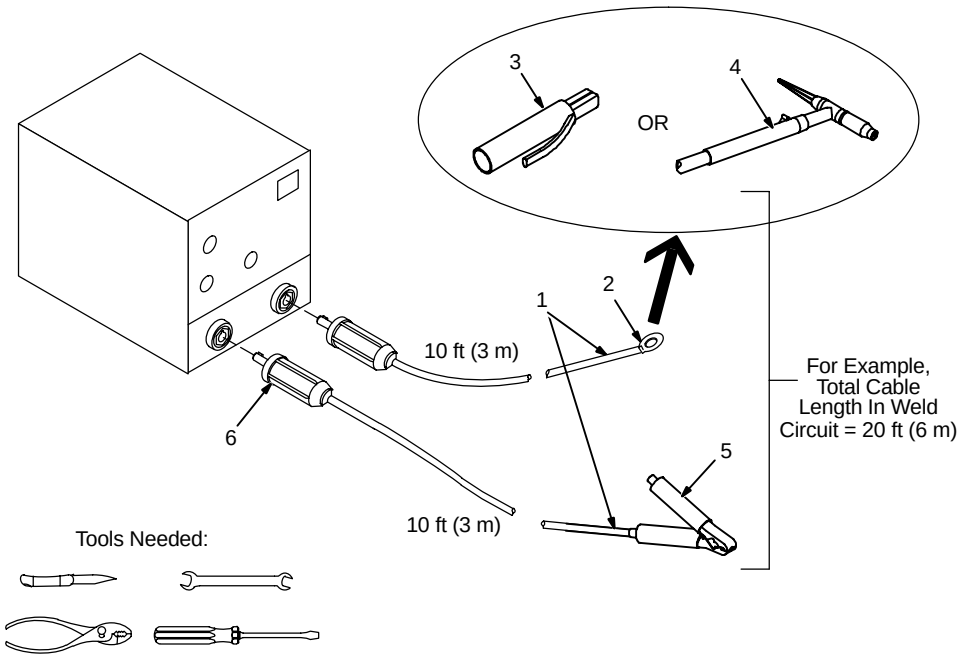
Use handle to move unit.

3 Rating Label

Locate unit near correct input power supply.

Ref. SA-145 666-C

3-2. Selecting And Preparing Weld Output Cables



1 Weld Output Cable

Determine total cable length in weld circuit and maximum welding amperes. Use Section 3-3 to select proper cable size.

Use shortest cables possible.

Do not use damaged cables.

2 Terminal Lug

Use lugs of proper amperage capacity and hole size for connecting to work clamp, electrode holder, or wire feeder.

3 Insulated Electrode Holder

Install according to manufacturer's instructions.

4 Work Clamp

Install onto work cable.

5 Dinse-Type Connector

Install onto weld cable.

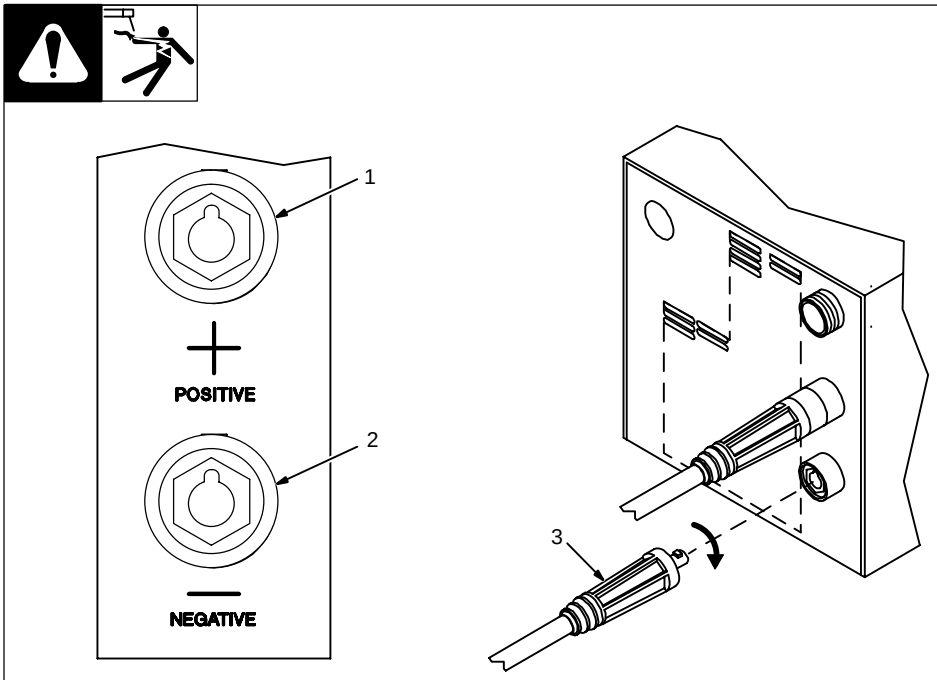
sb6.2* 5/94 – S-0656

3-3. Weld Cable Size*

Welding Amperes	Total Cable (Copper) Length In Weld Circuit Not Exceeding							
	100 ft (30 m) Or Less		150 ft (45 m)	200 ft (60 m)	250 ft (70 m)	300 ft (90 m)	350 ft (105 m)	400 ft (120 m)
	10 To 60% Duty Cycle	60 Thru 100% Duty Cycle	10 Thru 100% Duty Cycle					
100	4	4	4	3	2	1	1/0	1/0
150	3	3	2	1	1/0	2/0	3/0	3/0
200	3	2	1	1/0	2/0	3/0	4/0	4/0
250	2	1	1/0	2/0	3/0	4/0	2-2/0	2-2/0

*Weld cable size (AWG) is based on either a 4 volts or less drop or a current density of at least than 300 circular mils per ampere. S-0007-D

3-4. Connecting To Weld Output Receptacles



1 Positive (+) Weld Output Receptacle

2 Negative (–) Weld Output Receptacle

3 Connector

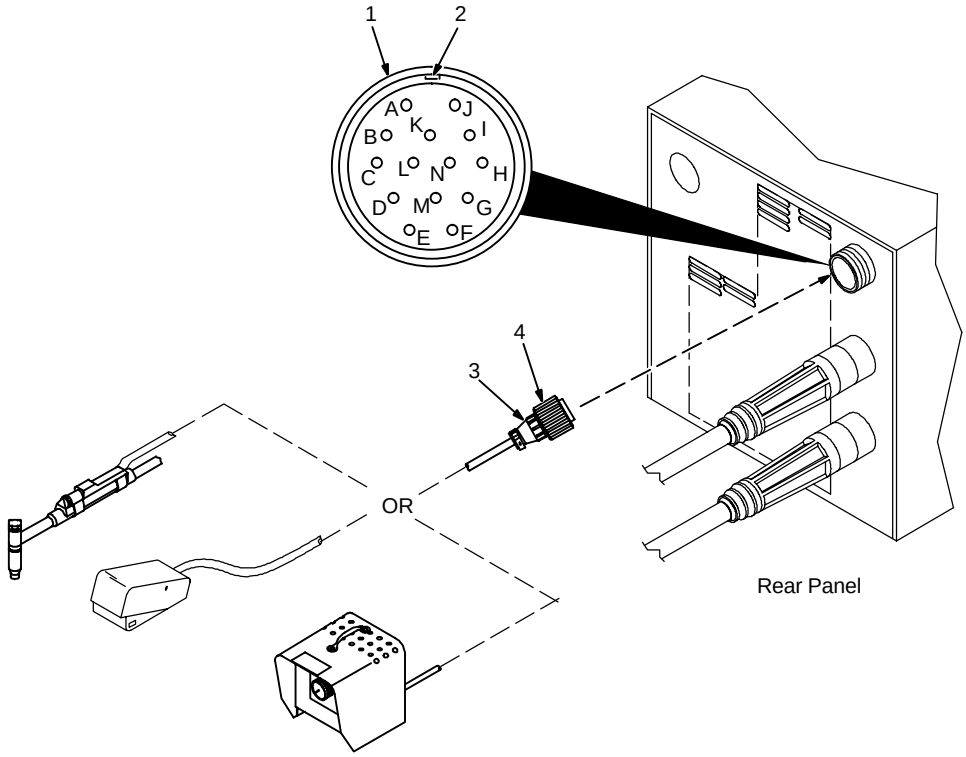
For Electrode Positive (DCEP), connect work cable connector to negative (–) receptacle and electrode holder cable connector to positive (+) receptacle.

For Electrode Negative (DCEN), reverse cable connections.

Align keyway, insert connector, and turn clockwise.

Ref. SC-140 373 / Ref. ST-152 126

3-5. Remote 14 Receptacle Information And Connections



1 Remote 14 Receptacle RC7 (See Section 3-6)

2 Keyway

3 Plug

4 Threaded Collar

To connect to receptacle, align keyway, insert plug, and tighten threaded collar.

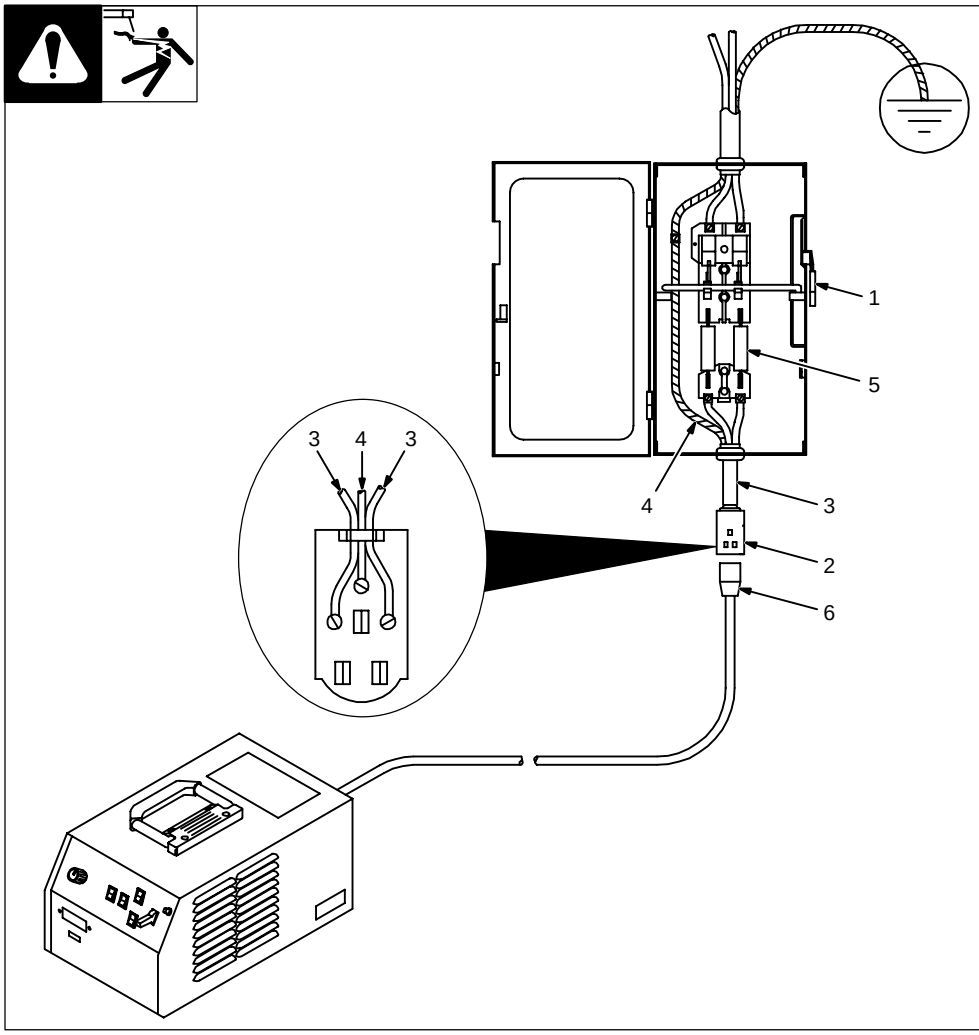
sb7.1 5/94 – ST-801 174 / Ref. S-0004-A / S-0750 / Ref. ST-141 127-B

3-6. Remote 14 Socket Information

REMOTE 14	Socket*	Socket Information
OUTPUT (CONTACTOR)	A	+15 volts dc.
	B	Contact closure to A completes +15 volts dc contactor control circuit.
A/V AMPERAGE/ VOLTAGE	C	Output command reference; 0 to +10 volts dc depending on setting of Amperage Adjustment control R4.
	D	Remote control circuit common.
	E	Input command signal (potentiometer wiper or 0 to +10 volts dc).
	K	Chassis common

*The remaining sockets are not used.

3-7. Connecting Input Power To 152 Models



Have only qualified persons make this installation.

1 Line Disconnect Device Of Proper Rating

2 230 Volts AC Wall Receptacle

3 Input Conductors

4 Grounding Conductor

Select size and length using Section 3-8. Conductor rating must comply with national, state, and local electrical codes.

Install and connect input conductors and grounding conductor in conduit or equivalent between wall receptacle and deenergized line disconnect device.

Connect grounding conductor first, then line input conductors.

Be sure grounding conductor goes to an earth ground.

5 Overcurrent Protection

Select type and size using Section 3-8. Install into deenergized line disconnect device (fused disconnect switch shown).

6 Input Power Plug

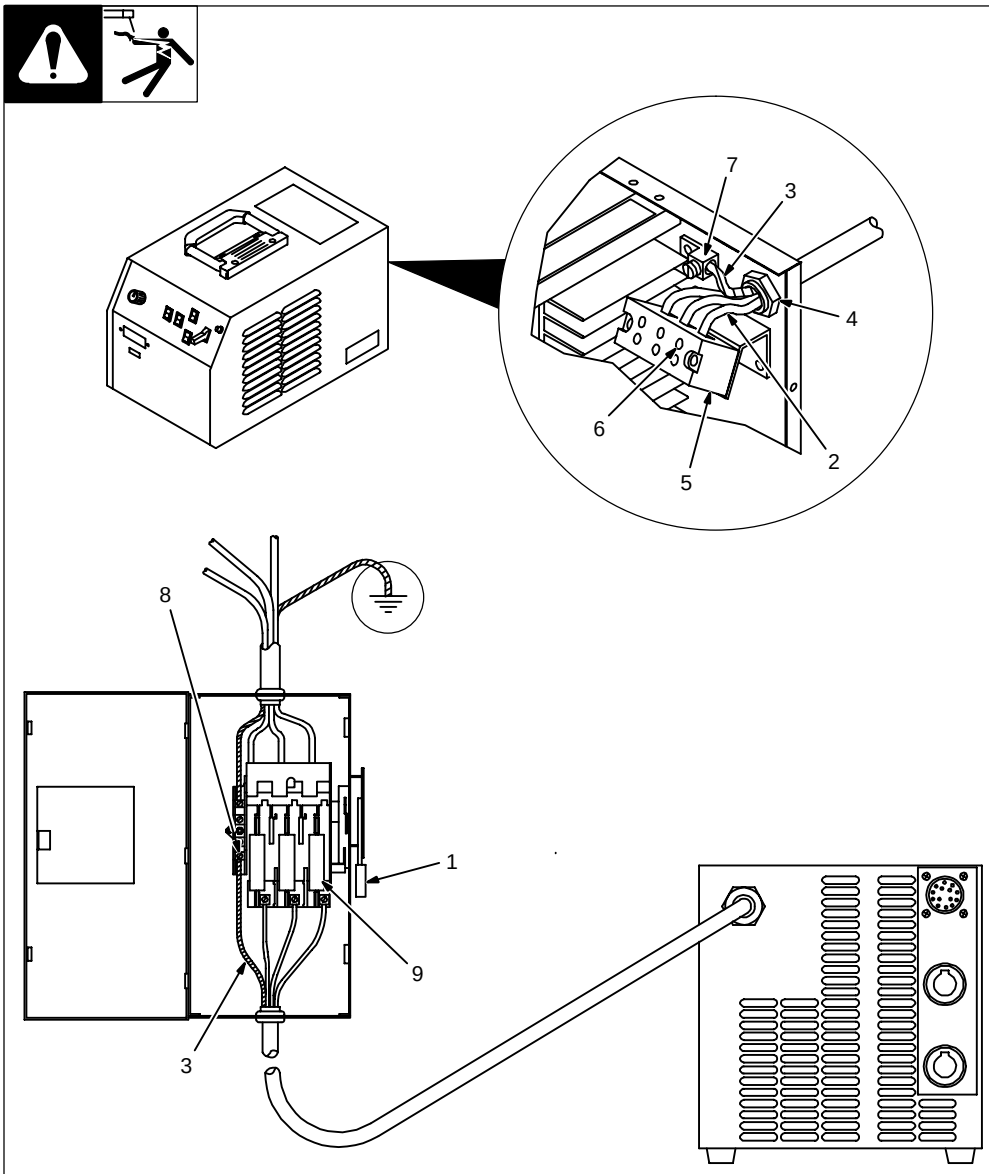
Turn Off unit Power switch, and connect plug to receptacle.

ssb2.2* 1/94 – ST-156 250-A

3-8. Electrical Service Guide For 152 Ampere Models

Input Voltage	230
Input Amperes At Rated Output	27.1
Max Recommended Standard Fuse Or Circuit Breaker Rating In Amperes	40
Min Input Conductor Size In AWG/Kcmil	10
Max Recommended Input Conductor Length In Feet (Meters)	167 (51)
Min Grounding Conductor Size In AWG/Kcmil	10
Reference: 1993 National Electrical Code (NEC).	S-0092J

3-9. Connecting Input Power To 175 Models



Have only qualified persons make this installation.

1 Line Disconnect Device Of Proper Rating

2 Input Conductors

3 Grounding Conductor

Select size and length using Section 3-10. Conductor rating must comply with national, state, and local electrical codes. Strip 3/8 in (10 mm) insulation off conductors.

4 Strain Relief Connector

Remove wrapper and insert conductors.

5 Input Terminal Block

6 Line Terminals

7 Welding Power Source Ground Terminal

Connect grounding conductor to ground terminal first. Then connect input conductors to line terminals. Tighten strain relief connector.

8 Disconnect Device Ground Terminal

Install and connect grounding conductor and input conductors in conduit or equivalent to deenergized line disconnect device.

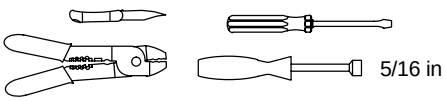
Connect grounding conductor first, then line input conductors. Be sure grounding conductor goes to an earth ground.

Reinstall wrapper.

9 Overcurrent Protection

Select type and size using Section 3-10. Install into deenergized line disconnect device (fused disconnect switch shown).

Tools Needed:



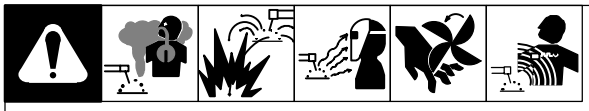
ssb2.4* 1/94 – ST-145 667-B / SA-145 666-C

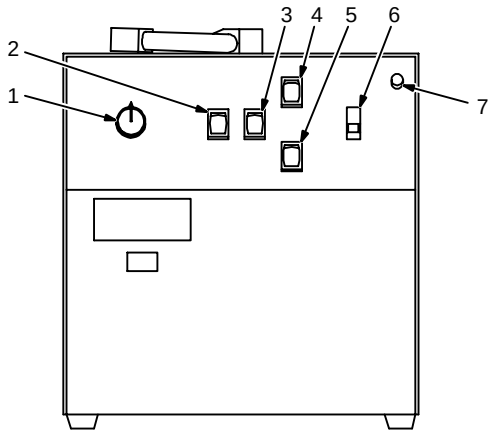
3-10. Electrical Service Guide For 175 Ampere Models

Input Voltage	460
Input Amperes At Rated Output	7.4
Max Recommended Standard Fuse Or Circuit Breaker Rating In Amperes	10
Min Input Conductor Size In AWG/Kcmil	14
Max Recommended Input Conductor Length In Feet (Meters)	443 (135)
Min Grounding Conductor Size In AWG/Kcmil	14
Reference: 1993 National Electrical Code (NEC).	S-0092J

SECTION 4 – OPERATION

4-1. Controls

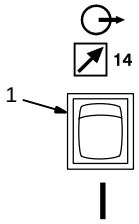




1 Amperage Adjustment Control
2 Amperage Control Switch
3 Output (Contactor) Switch
4 Lift-Arc Switch
5 Weld Process Switch
6 Power Switch
7 Pilot Light

ST-152 127-A

4-2. Output (Contactor) Switch



Weld output receptacles are energized when switch is On and Power is On.

OUTPUT

1 Output (Contactor) Switch

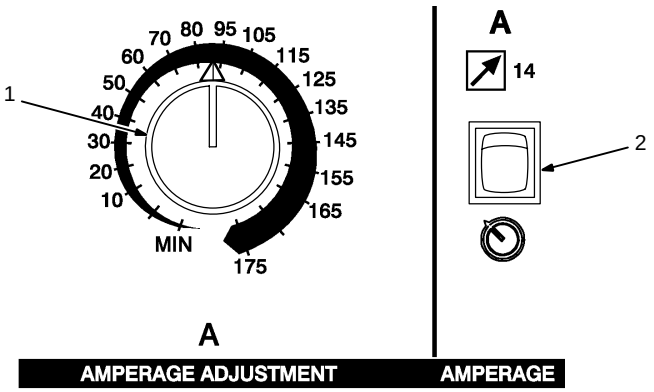
Use switch to select way of controlling output.

For front panel control, place switch in On position.

For remote control, place switch in Remote 14 position (see Section 3-5).

Ref. SC-157 579-A

4-3. Amperage Controls



1 Amperage Adjustment Control

Use control to select weld amperage. Amperage may be adjusted while welding.

2 Amperage Control Switch

Use switch to select way of controlling amperage adjustment.

For front panel control, place switch in Panel position.

For remote control, place switch in Remote 14 position (see Section 3-5).

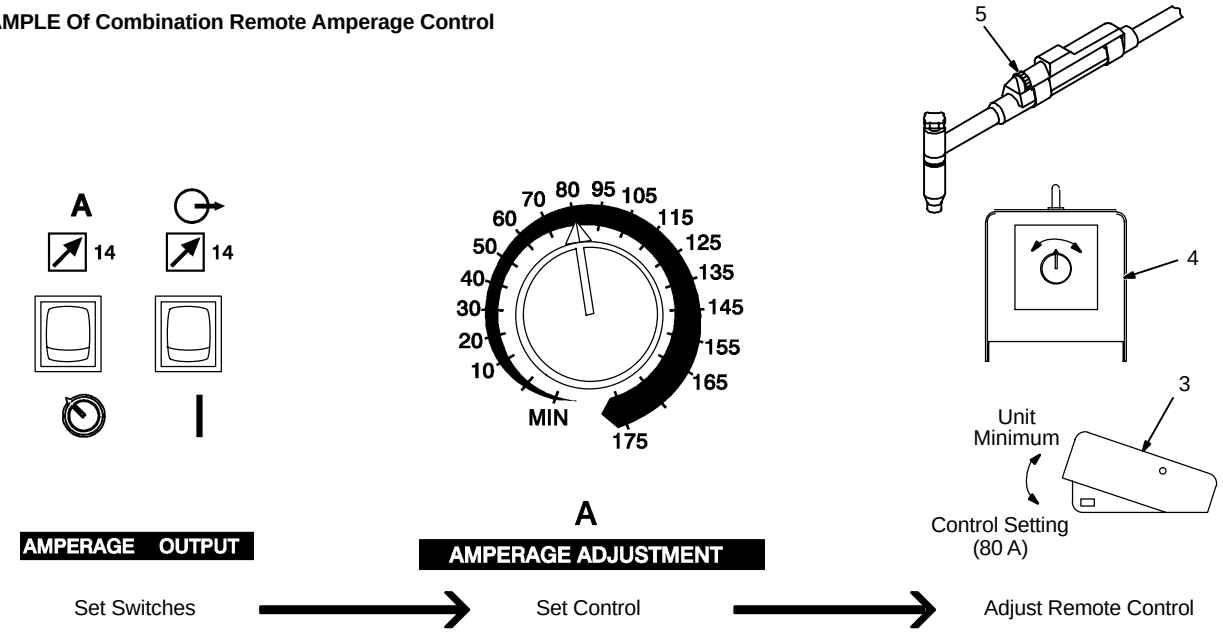
See Example below.

3 Remote Foot Control

4 Remote Hand Dial

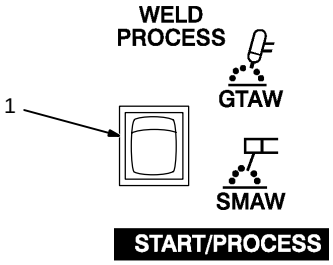
5 Fingertip Control

EXAMPLE Of Combination Remote Amperage Control



ST-159 059 / S-0769

4-4. Weld Process Switch



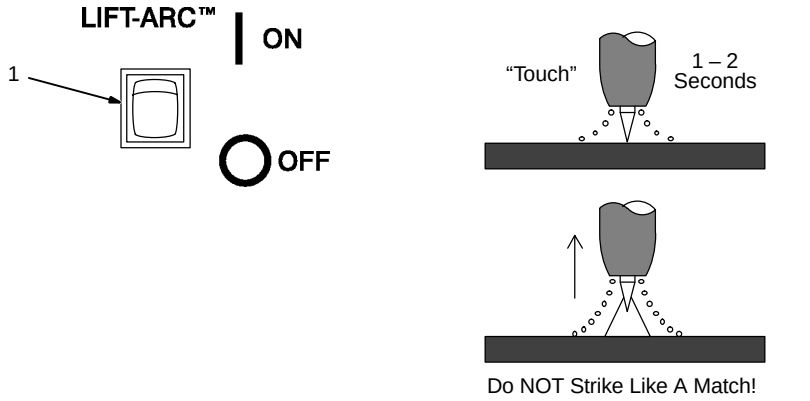
1 Weld Process Switch

Use switch to select type of weld output current. Use GTAW position for Gas Tungsten Arc Welding. Use SMAW position for Shielded Metal Arc Welding.

Switch position determines the operation of the Lift-Arc switch (see Section 4-5).

NOTE ☞ *Lift-Arc switch must be in Off position when using a High-Frequency unit with this welding power source, or when using the SMAW welding process.*

4-5. Lift-Arc Switch



Do NOT Strike Like A Match!

1 Lift-Arc Switch

Use switch to select Lift-Arc On or Off.

With Lift-Arc On, start an arc in GTAW welding as follows:

2 GTAW Electrode

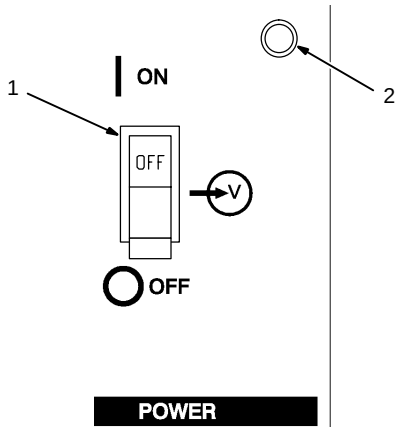
3 Workpiece

Touch tungsten electrode to workpiece at weld start point, **hold electrode to workpiece for 1-2 seconds**, and slowly lift electrode. An arc will form when electrode is lifted.

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

Ref. S-156 279

4-6. Power Switch And Pilot Light



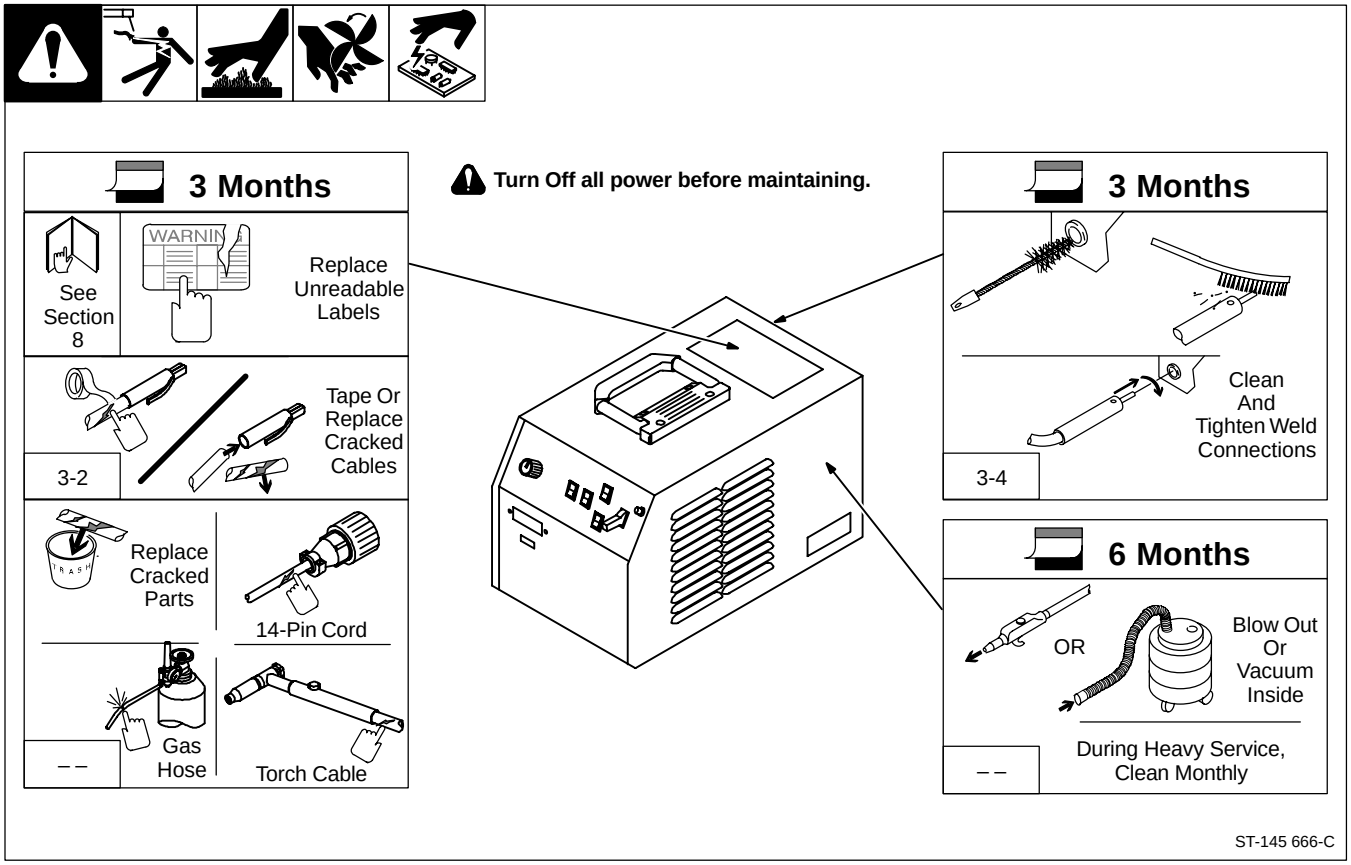
1 Power Switch

Use switch to turn unit and pilot light On and Off.

2 Pilot Light

SECTION 5 – MAINTENANCE & TROUBLESHOOTING

5-1. Routine Maintenance



5-2. Measuring Input Capacitor Voltage

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

Turn Off welding power source and disconnect input power.

Remove wrapper.

1 Input Capacitor C1 (Both Models)

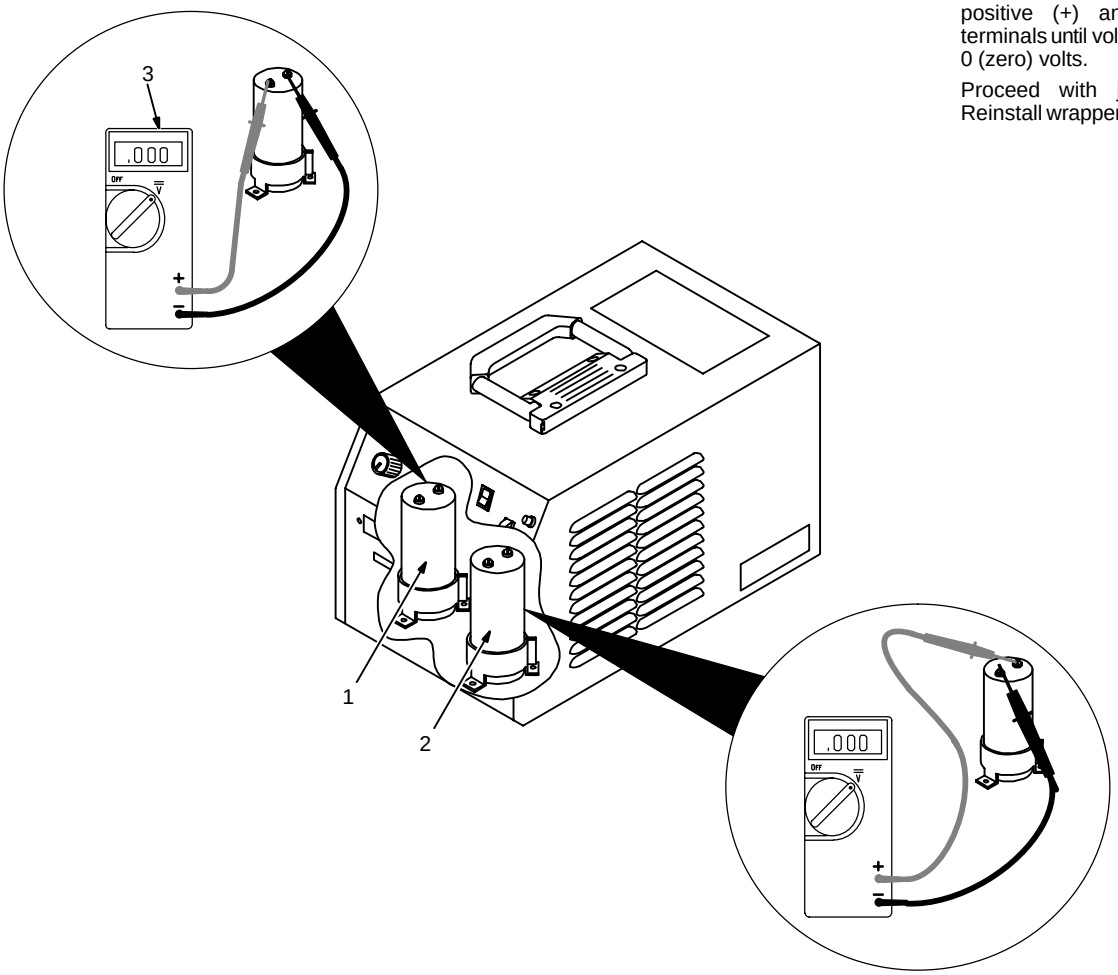
2 Input Capacitor C2 (175 Models Only)

3 Voltmeter

Check input capacitor(s).

Measure the dc voltage across the positive (+) and negative (–) terminals until voltage drops to near 0 (zero) volts.

Proceed with job inside unit. Reinstall wrapper when finished.

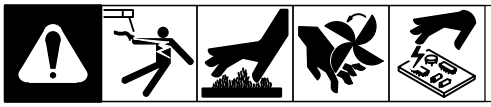


Tools Needed:

5/16 in

ST-153 136-B

5-3. Troubleshooting



Trouble	Remedy
No weld output; unit completely inoperative.	Be sure Power switch is On (see Section 4-6).
	Secure power cord plug in receptacle (152 model) (see Section 3-7).
	Be sure line disconnect switch is On (see Section 3-9).
	Check line fuse(s) and replace if necessary. Reset circuit breakers (see Sections 3-7 or 3-9).
	Check for proper input power connections (see Sections 3-7 or 3-9).
No weld output; fan motor FM running and pilot light on.	Check position of Output (Contactor) switch (see Section 4-2).
	Thermostats TP1 and/or TP2 open (overheating). Allow fan to run; thermostat(s) closes when unit has cooled (see Section 2-3).
Low weld output with no control.	Check position of Amperage Control switch (see Section 4-3).
	Have Factory Authorized Service Station/Service Distributor check control board PC1.
Limited output and low open-circuit voltage.	Check incoming power for correct voltage. Replace line fuse if open or reset circuit breaker (see Sections 3-7 or 3-9).
	Check for proper input and output connections (see Sections 3-2, 3-4, and 3-7 or 3-9).
Erratic or improper weld output.	Tighten all welding cable connections (see Sections 3-2 and 3-4).
	Check for proper size and type of cable (see Section 3-2).
	Check for proper input and output connections (see Sections 3-2, 3-4, and 3-7 or 3-9).
	Replace electrode (see Section 7).
Arc not forming when using Lift-Arc.	Check electrode and workpiece, clean as needed to allow good contact.
Fan motor FM does not run.	Check and clear blocked fan blade; be sure blade is secure on shaft.
	Have Factory Authorized Service Station/Service Distributor check fan motor FM.
Wandering arc; poor control of arc direction.	Reduce gas flow rate.
	Select proper size tungsten (see Section 7-1).
	Properly prepare tungsten (see Sections 7-2 and 7-3).
Tungsten electrode oxidizing and not remaining bright after conclusion of weld.	Shield weld zone from drafts.
	Increase postflow time.
	Check and tighten all gas fittings.
	Water in torch. Refer to torch Owner's Manual for part(s) requiring replacement, and repair torch as necessary.

Notes

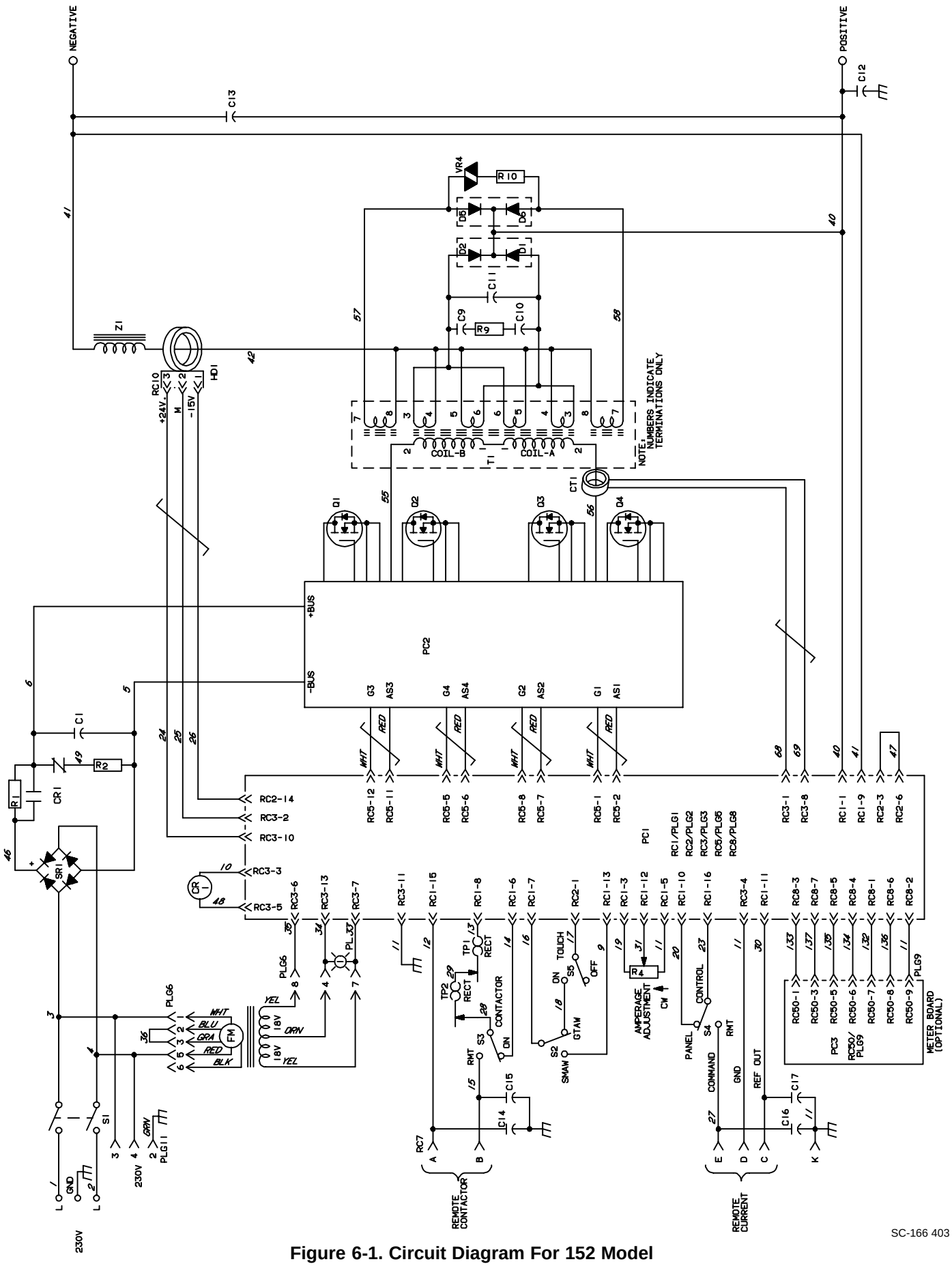


Figure 6-1. Circuit Diagram For 152 Model

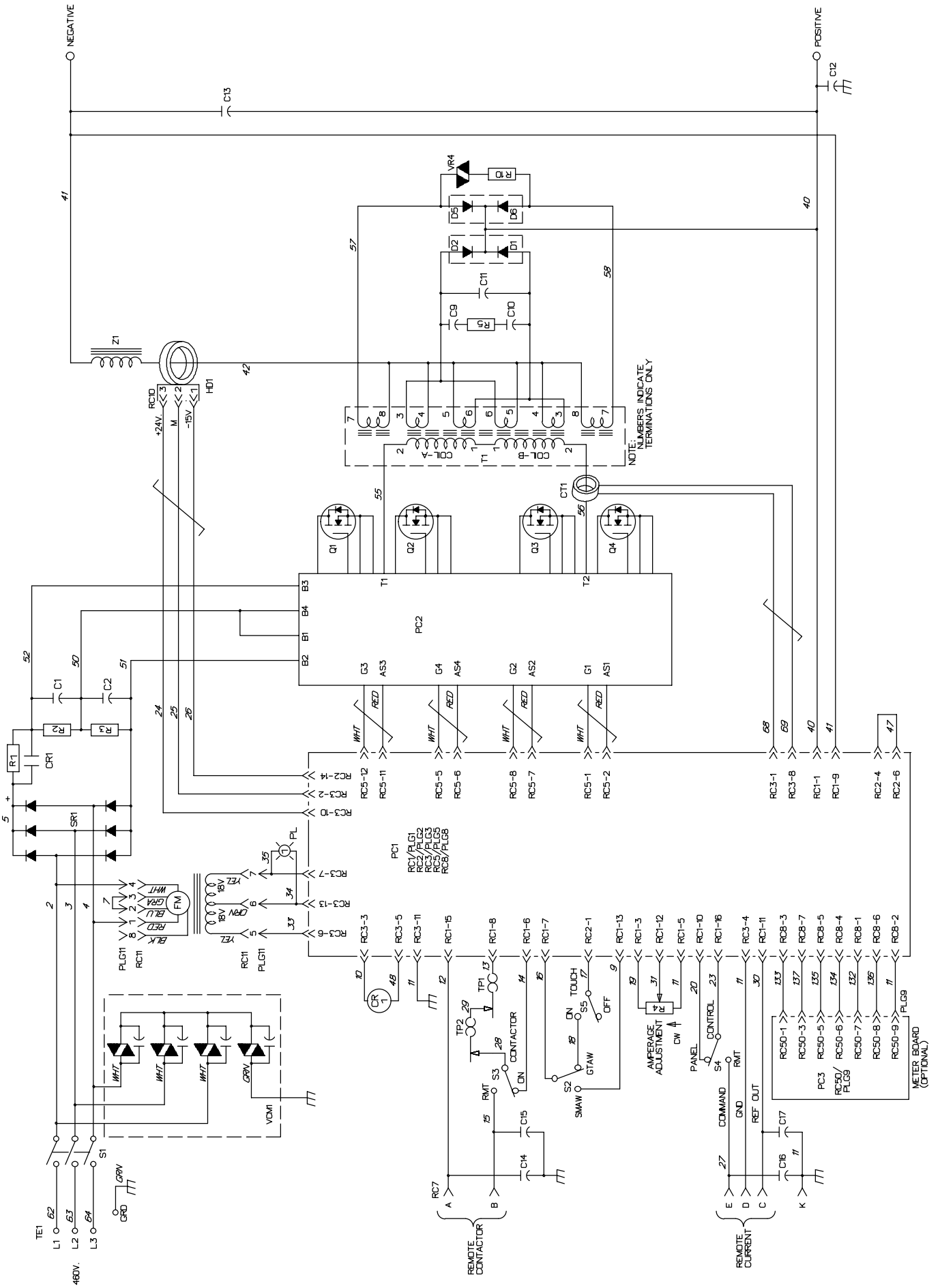


Figure 6-2. Circuit Diagram For 175 Model

SC-170 697

SECTION 7 – SELECTING AND PREPARING TUNGSTEN ELECTRODE

NOTE ☞ *For additional information, see your distributor for a handbook on the Gas Tungsten Arc Welding (GTAW) process.Wear clean gloves to prevent contamination of tungsten electrode.*

7-1. Selecting Tungsten Electrode

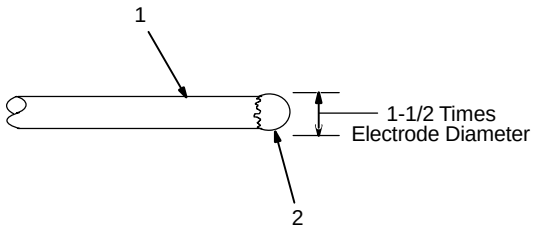
Electrode Diameter	Amperage Range - Gas Type♦ - Polarity			
	DC – Argon – Electrode Negative/Straight Polarity	DC – Argon – Electrode Positive/Reverse Polarity	AC – Argon – Using High Frequency	AC – Argon – Balanced Wave Using High Freq.
Pure Tungsten (Green Band)				
.010”	Up to 15	*	Up to 15	Up to 10
.020”	5-20	*	5-20	10-20
.040”	15-80	*	10-60	20-30
1/16”	70-150	10-20	50-100	30-80
3/32”	125-225	15-30	100-160	60-130
1/8”	225-360	25-40	150-210	100-180
5/32”	360-450	40-55	200-275	160-240
3/16”	450-720	55-80	250-350	190-300
1/4”	720-950	80-125	325-450	250-400
2% Thorium Alloyed Tungsten (Red Band)				
.010”	Up to 25	*	Up to 20	Up to 15
.020”	15-40	*	15-35	5-20
.040”	25-85	*	20-80	20-60
1/16”	50-160	10-20	50-150	60-120
3/32”	135-235	15-30	130-250	100-180
1/8”	250-400	25-40	225-360	160-250
5/32”	400-500	40-55	300-450	200-320
3/16”	500-750	55-80	400-500	290-390
1/4”	750-1000	80-125	600-800	340-525
Zirconium Alloyed Tungsten (Brown Band)				
.010”	*	*	Up to 20	Up to 15
.020”	*	*	15-35	5-20
.040”	*	*	20-80	20-60
1/16”	*	*	50-150	60-120
3/32”	*	*	130-250	100-180
1/8”	*	*	225-360	160-250
5/32”	*	*	300-450	200-320
3/16”	*	*	400-550	290-390
1/4”	*	*	600-800	340-525

♦Typical argon shielding gas flow rates are 15 to 35 cfh (cubic feet per hour).

*Not Recommended.

The figures listed are intended as a guide and are a composite of recommendations from American Welding Society (AWS) and electrode manufacturers.

7-2. Preparing Tungsten For AC Or DC Electrode Positive (DCEP) Welding



1 Tungsten Electrode

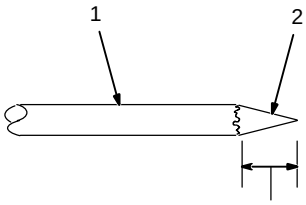
2 Balled End

▲ **Understand and follow safety symbols at start of Section 8-1 before preparing tungsten.**

Ball end of tungsten before welding by applying either an ac amperage slightly higher than what is recommended for a given electrode diameter (see Section 7-1), or a dc electrode positive amperage.

Ref. S-0161

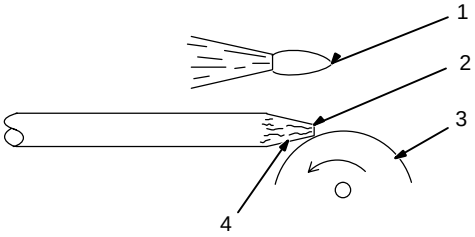
7-3. Preparing Tungsten For DC Electrode Negative (DCEN) Welding



1 Tungsten Electrode

2 Tapered End

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



Ideal Tungsten Preparation – Stable Arc

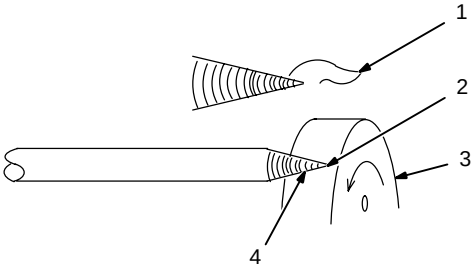
1 Stable Arc

2 Flat

Diameter of this flat determines amperage capacity.

3 Grinding Wheel

4 Straight Ground



Wrong Tungsten Preparation – Wandering Arc

1 Arc Wander

2 Point

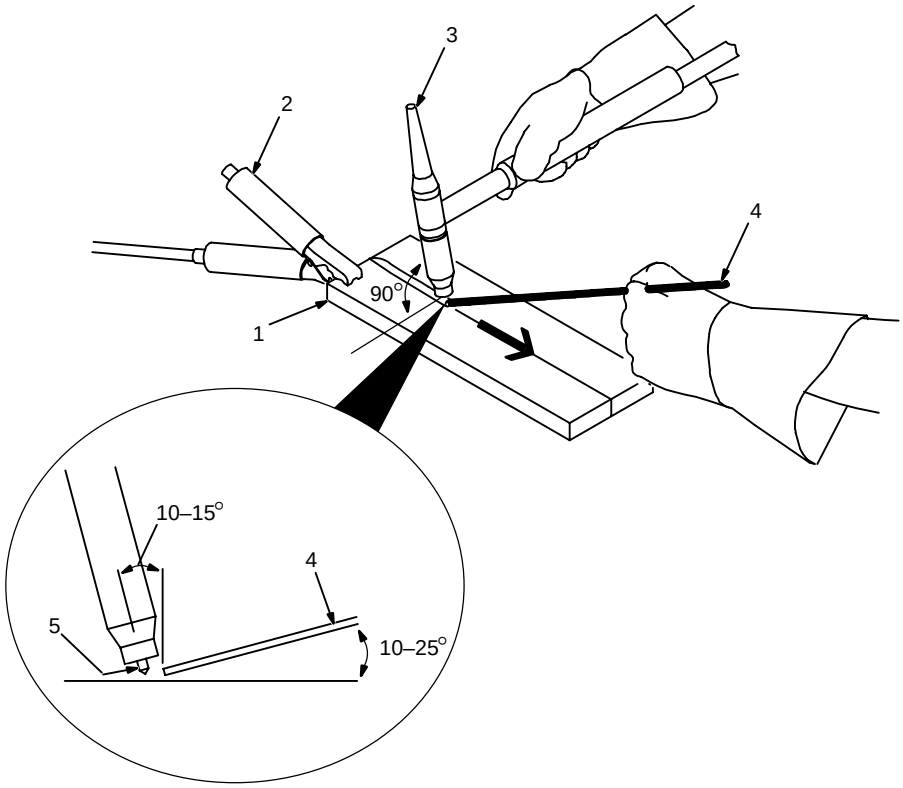
3 Grinding Wheel

4 Radial Ground

Ref. S-0161 / Ref. S-0162

SECTION 8 – GUIDELINES FOR TIG WELDING (GTAW)

8-1. Positioining The Torch



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

1 Workpiece

Make sure workpiece is clean before welding.

2 Work Clamp

Place as close to the weld as possible.

3 Torch

4 Filler Rod (If Applicable)

5 Tungsten Electrode

Select and prepare tungsten according to Sections 7-1, and 7-2 or 7-3.

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

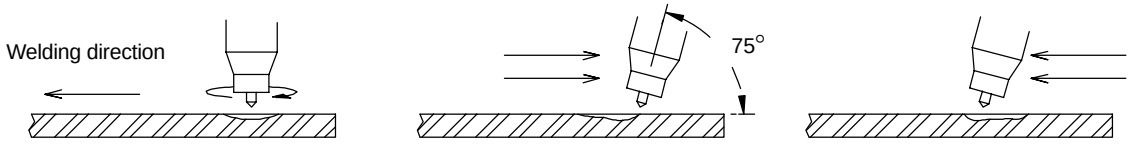
Arc length is the distance from the tungsten to the workpiece.

As a general guide, start with an extension and arc length equal to diameter of tungsten.

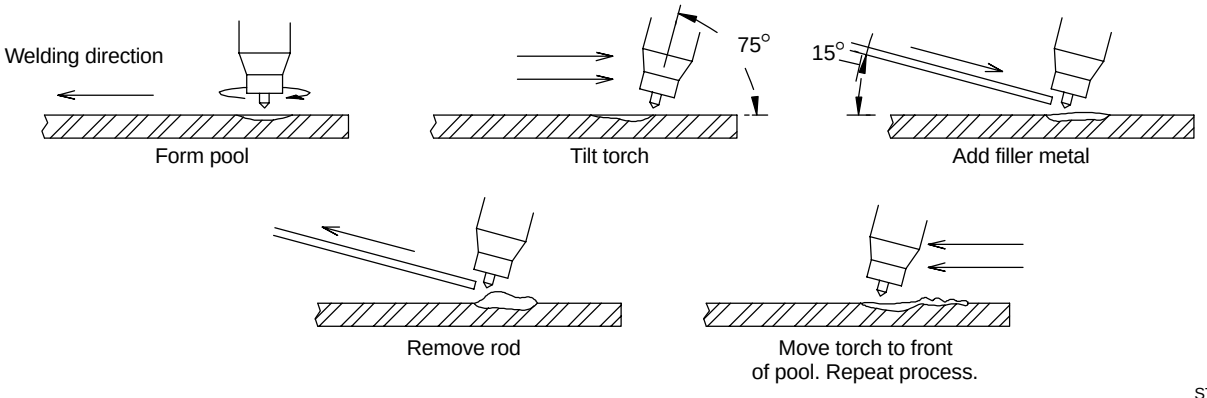
ST-161 892

8-2. Torch Movement During Welding

Tungsten Without Filler Rod



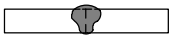
Tungsten With Filler Rod

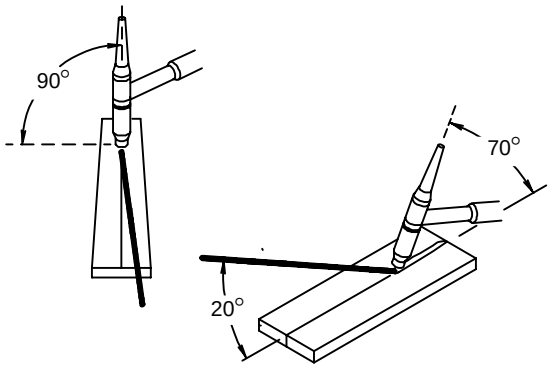


ST-162 002-B

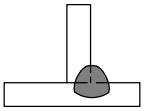
8-3. Positioning Torch Tungsten For Various Weld Joints

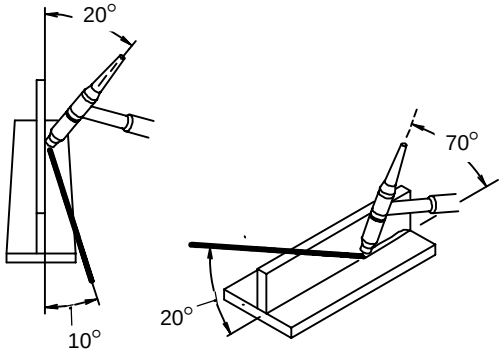
Butt Weld And Stringer Bead



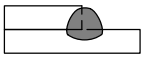


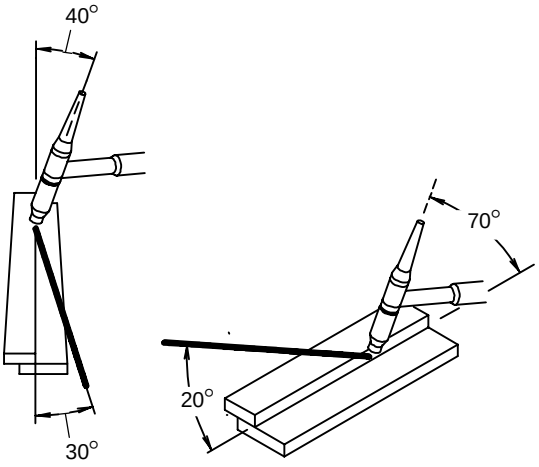
"T" Joint



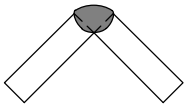


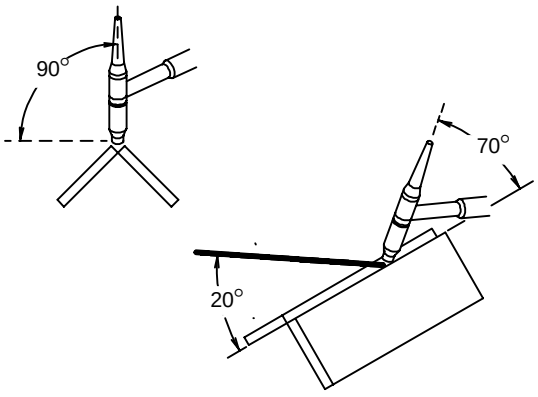
Lap Joint





Corner Joint





ST-162 003 / S-0792

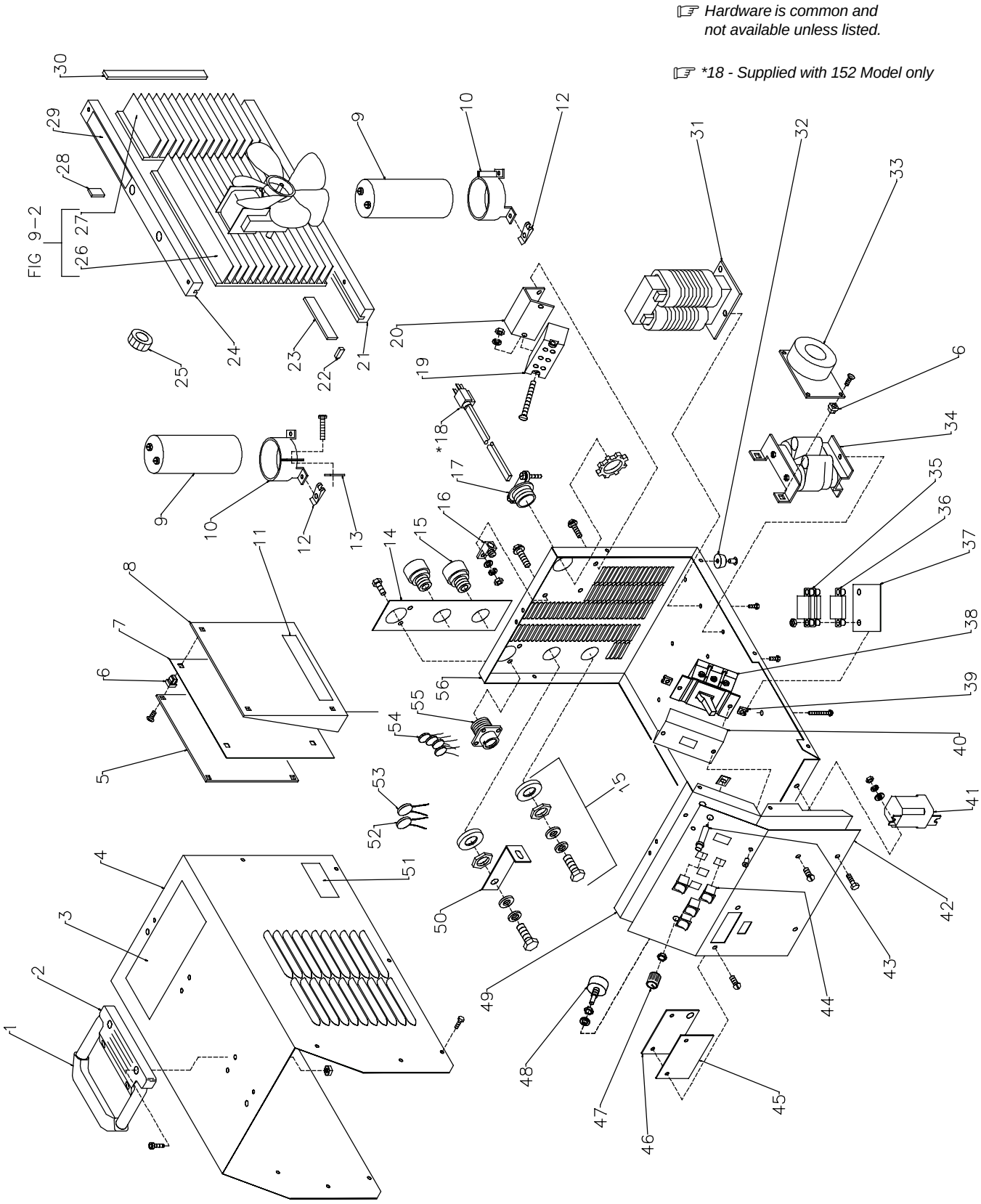


Figure 9-1. Main Assembly (175 Model Illustrated)

Item No.	Dia. Mkgs.	Part No.	Description	Quantity Model 152	Quantity Model 175
1		126 416	HANDLE	1	1
2		126 415	CLAMP, saddle	1	1
3		134 327	LABEL, warning general precautionary	1	1
4		+163 781	WRAPPER	1	
4		+163 782	WRAPPER		1
5	PC1	164 619	CIRCUIT CARD, control	1	1
	PLG1,2	131 052	CONNECTOR & SOCKETS, (consisting of)	2	2
		113 746	CONNECTOR, rect skt 24-18ga Molex 39-00-0038	16	16
	PLG3	131 056	CONNECTOR & SOCKETS, (consisting of)	1	1
		113 746	CONNECTOR, rect skt 24-18ga Molex 39-00-0038	14	14
	PLG5	++130 203	CONNECTOR & SOCKETS, (consisting of)	1	1
		113 746	CONNECTOR, rect skt 24-18ga Molex 39-00-0038	12	12
6		141 690	GROMMET, scr No. 8/10 panel hole .281sq .197 high	6	6
7		140 627	INSULATION, PC card	1	1
8		151 280	BRACKET, mtg PC card	1	
8		+141 520	BRACKET, mtg PC card		1
9	C1	151 281	CAPACITOR, elctlt 1600uf 400VDC	1	
9	C1,2	151 281	CAPACITOR, elctlt 1600uf 400VDC		2
10		006 426	CLAMP, capacitor 2.000dia	1	2
11		153 178	LABEL, warning exploding parts etc		1
12		136 190	NUT, speed U type 10-32	2	4
13		133 405	NUT, speed 10-24 flat type rectangular	1	2
14		130 215	PLATE, output rear panel	1	
14		140 373	PLATE, output rear panel		1
15	Neg,Pos	129 525	RECEPTACLE, twlk insul fem (Dinse type) 50/70 series	2	2
		129 527	CONN, twlk insul male (dinse type) 50 series	2	2
16		145 743	LUG, univ w/scr 600V 2-14 wire		1
17		010 916	CONNECTOR, clamp cable .750	1	1
18		120 484	CORD SET, 250V 6-50P 12ga 3/c 8ft	1	
19	TE1	147 386	BLOCK, term 70A 3P		1
20		147 255	BRACKET, mtg terminal block		1
21		119 757	BAR, support heat sink bottom	1	1
22		126 372	STRIP, polyest gl lam .187 x .250 x .625	1	1
23		140 626	STRIP, polyest gl lam .187 x .500 x 2.250	1	1
24		+128 803	BAR, support heat sink top	1	1
25	CT1	150 925	TRANSFORMER, current	1	1
26		Fig 9-2	MODULE, power	1	1
27		Fig 9-2	MODULE, diode	1	1
28		141 515	STRIP, polyest gl lam .187 x .500 x .812	1	1
29		126 026	LABEL, warning electric shock can kill	1	1
30		119 943	STRIP, polyest gl lam .187 x .500 x 6.500	1	
30		140 380	STRIP, polyest gl lam .187 x .500 x 8.687		1
31	Z1	130 794	STABILIZER	1	
31	Z1	131 866	STABILIZER		1
32		019 663	MOUNT, nprn 15/16 OD	4	4
33	HD1	156 149	TRANSDUCER, current	1	
33	HD1	124 684	TRANSDUCER, current 300A module supply		1
	PLG10	130 204	CONNECTOR & SOCKETS, (consisting of)	1	1
		114 066	CONNECTOR, rect skt 20-14ga Amp 350536-1	3	3
34	T1	151 585	TRANSFORMER, pwr main	1	
34	T1	141 669	TRANSFORMER, pwr main 325		1
35	R2	139 203	RESISTOR, WW fxd 30W 8K ohm	1	
35	R2,3	139 203	RESISTOR, WW fxd 30W 8K ohm		2
36	R1	136 076	RESISTOR, WW fxd 30W 200 ohm	1	1
37		141 422	INSULATOR, flat pack	1	1
38	S1	090 328	SWITCH, tgl DPST 40A 600VAC	1	

Figure 9-1. Main Assembly

Item No.	Dia. Mkgs.	Part No.	Description	Quantity Model 152	Quantity Model 175
	PLG11	115 094	CONNECTOR & SOCKETS, (consisting of)	1	
		113 746	CONNECTOR, rect skt 24-18ga Molex 39-00-0038	4	
	RC11	115 090	CONNECTOR & PINS, (consisting of)	1	
		114 656	CONNECTOR, rect pin 24-18ga Molex 39-00-0040	4	
		047 838	BLANK, snap-in nyl 1.000mtg hole	1	
38	S1	091 441	SWITCH, tgl 3PST 40A 600V		1
39		148 297	NUT, speed U type 10-32	2	2
40		146 684	INSULATOR, switch pwr		1
41	CR1	106 462	RELAY, encl 24VDC DPDT	1	1
42			NAMEPLATE, (order by model and serial number)	1	1
43	PL1	157 958	LIGHT, ind white lens 28V	1	1
44	S2-5	120 376	SWITCH, rocker SPDT 4A 250VAC	4	4
45		166 883	NAMEPLATE, meter	1	1
46		166 881	BLANK, meter nameplate backing	1	1
47		097 922	KNOB, pointer	1	1
48	R4	073 562	POTENTIOMETER, C sltd sft 1/T 2W 10K ohm	1	1
49		151 533	PANEL, front	1	
49		146 333	PANEL, front		1
50		161 098	BUS BAR, output	1	1
51		134 756	LABEL, warning electric shock can kill		1
52	C12	135 286	CAPACITOR	1	1
53	C13	135 289	CAPACITOR	1	1
54	C14	141 524	LEAD ASSEMBLY, elect	1	1
54	C15	141 525	LEAD ASSEMBLY, elect	1	1
54	C16	141 522	LEAD ASSEMBLY, elect	1	1
54	C17	141 523	LEAD ASSEMBLY, elect	1	1
55	RC7	143 976	CONNECTOR w/SOCKETS, (consisting of)	1	1
		079 534	CONNECTOR, circ skt push-in 14-18ga Amp 66358-6	14	14
		134 734	CONNECTOR, circ 14 pin plug Amp 213571-2		
		134 731	CONNECTOR, circ pin push-in 14-18ga Amp 213603-1		
		079 739	CONNECTOR, circ clamp str rlf .703 max cable OD Amp 206322-2 (or)		
		143 922	CONNECTOR, circ clamp str rlf .453 max cable OD Amp 206070-3		
56		168 755	CASE SECTION, bottom/rear	1	
56		140 621	CASE SECTION, bottom/rear		1

Figure 9-1. Main Assembly (Continued)

+When ordering a component originally displaying a precautionary label, the label should also be ordered.
++Included with Interconnecting Circuit Card PC2.

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

Item No.	Dia. Mkgs.	Part No.	Description	Quantity Model 152	Quantity Model 175
1	C11	093 085	CAPACITOR, polye MF .0047uf 1000V	1	1
2		158 540	MODULE, pwr (consisting of)	1	
2		170 702	MODULE, pwr (consisting of)		1
3		156 247	BLADE, fan 6 in 4wg 30deg .252 bore CCW	1	
3		170 706	KIT, fan blade (consisting of)		1
4		605 525	NUT, .312-24 stl elastic stop		1
5	FM	156 246	MOTOR, fan 120/230V 2600RPM w/36V sec (consisting of)	1	
	RC6	135 409	CONNECTOR & PINS, (consisting of)	1	
		114 656	CONNECTOR, rect pin 24-18ga	8	
5	FM	170 692	MOTOR, fan 230/460V 2600RPM w/36V sec (consisting of)		1
	RC11	165 895	CONNECTOR & PINS, (consisting of)		1
		147 996	CONNECTOR, rect skt pin 22-18ga		9
6		146 238	BRACKET, mtg fan motor	1	1
7		+151 484	HEAT SINK, pwr module	1	
		153 178	LABEL, warning exploding parts etc	1	
7		141 423	HEAT SINK, pwr module		1
8	Q1-4	149 207	KIT, transistor mosfet	4	4
9	D5	149 215	KIT, diode fast recovery		1
10	TP2	032 810	THERMOSTAT, NC	1	1
11	SR1	149 218	KIT, rectifier integ 100A	1	
11	SR1	149 217	KIT, rectifier integ 100A		1
12	VCM1	164 849	MODULE, varistor/capacitor 4 400 joule 1620-1980VDC		1
13	PC2	151 284	CIRCUIT CARD, interconnecting	1	
13	PC2	167 368	CIRCUIT CARD, interconnecting		1
	PLG6	115 092	CONNECTOR & SOCKETS, (consisting of)	1	
		113 746	CONNECTOR, rect skt 24-18 ga	8	
	PLG11	163 467	CONNECTOR & SOCKETS, (consisting of)		1
		147 995	CONNECTOR, rect skt 24-18 ga		9
14	VR4	004 113	VARISTOR, 40 joule 390VDC	1	1

Figure 9-2. Module, Power & Diode (Fig 9-1 Item 25 & 26)

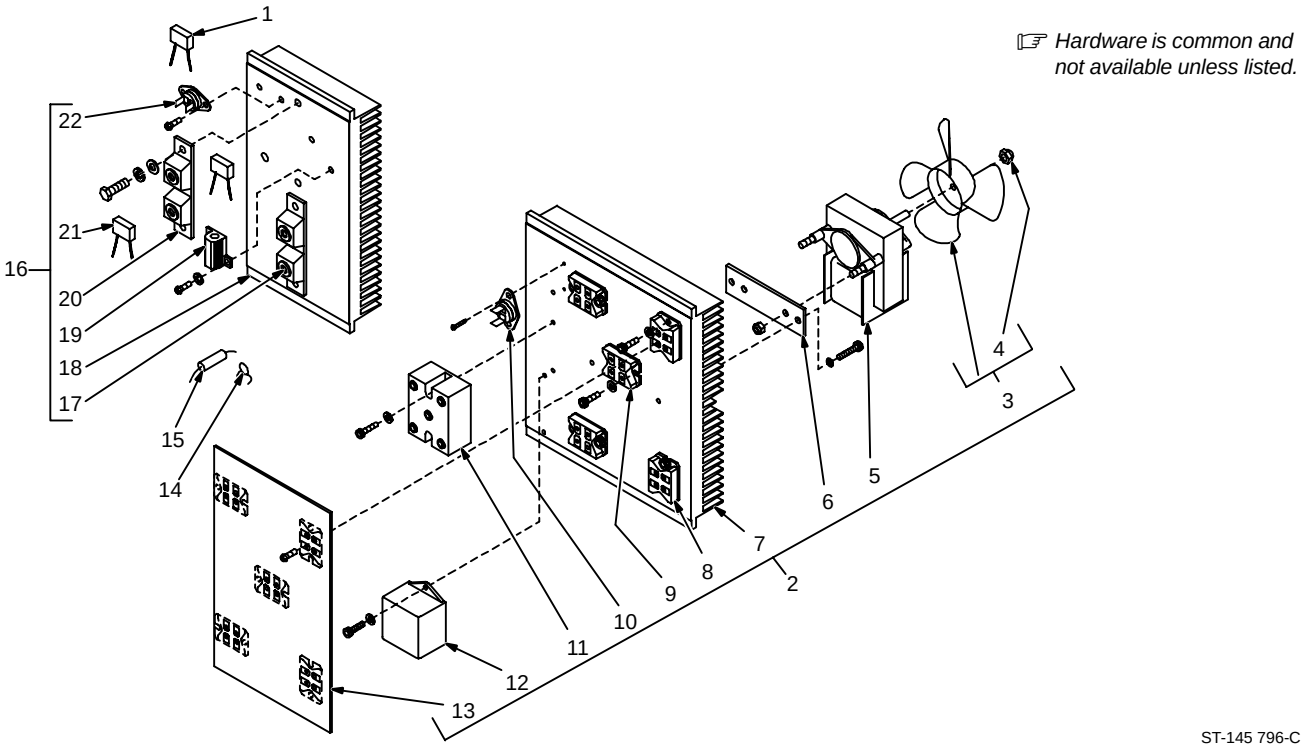


Figure 9-2. Module, Power & Diode (175 Model Illustrated)

Item No.	Dia. Mkgs.	Part No.	Description	Quantity Model 152	Quantity Model 175

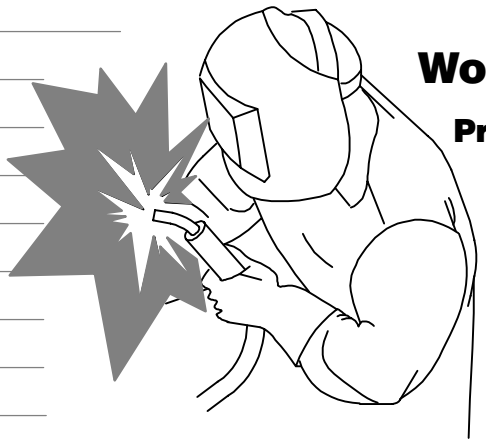
Figure 9-2. Module, Power & Diode (Fig 9-1 Item 25 & 26) (Continued)

15	R10	030 839	RESISTOR, WW fxd 5W 220 ohm	1	1
16	DM1	151 479	MODULE, diode (consisting of)	1	
16	DM1	140 492	MODULE, diode (consisting of)		1
17	D5,6	151 229	KIT, diode ultra fast recovery	1	1
18		151 470	HEAT SINK, diode module	1	
18		140 622	HEAT SINK, diode module		1
19	R9	098 324	RESISTOR, WW fxd 25W 5 ohm	1	
19	R5	098 324	RESISTOR, WW fxd 25W 5 ohm		1
20	D1,2	151 431	KIT, diode ultra fast recovery	1	1
21	C9,10	098 325	CAPACITOR, polyp film .027uf 630V	2	2
22	TP1	129 552	THERMOSTAT, NC	1	1

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

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

Notes



Work like a Pro!

Pros weld and cut safely. Read the safety rules at the beginning of this manual.

Notes

Warranty Questions?

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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.

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The Power of Blue.

TRUE BLUE® WARRANTY

Effective January 1, 2001
(Equipment with a serial number preface of "LB" or newer)

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

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 (w/exception of Spoolmate Spoolguns)
   * Process Controllers
   * Positioners and Controllers
   * Automatic Motion Devices
   * RFCS Foot Controls
   * Induction Heating Power Sources
   * Water Coolant Systems
   * HF Units
   * Grids
   * Maxstar 140
   * Spot Welders
   * Load Banks
   * Miller Cyclomatic Equipment
   * Running Gear/Trailers
   * Plasma Cutting Torches (except APT & SAF Models)
   * Field Options
     (NOTE: Field options are covered under True Blue® for the remaining warranty period of the product they are installed in, or for a minimum of one year — whichever is greater.)
4. 6 Months — Batteries
5. 90 Days — Parts
   * MIG Guns/TIG Torches
   * Induction Heating Coils and Blankets
   * APT, ZIPCUT & PLAZCUT Model Plasma Cutting Torches
   * Remote Controls
   * Accessory Kits
   * Replacement Parts (No labor)
   * Spoolmate Spoolguns
   * Canvas Covers

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

1. **Consumable components; such as contact tips, cutting nozzles, contactors, brushes, slip rings, relays or parts that fail due to normal wear.**
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.

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Owner's Record

Please complete and retain with your personal records.

Model Name Serial/Style Number

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

Distributor

Address

City

State Zip

For Service

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

Always provide Model Name and Serial/Style Number.

Contact your Distributor for:	Welding Supplies and Consumables
	Options and Accessories
	Personal Safety Equipment
	Service and Repair
	Replacement Parts
	Training (Schools, Videos, Books)
	Technical Manuals (Servicing Information and Parts)
	Circuit Diagrams
	Welding Process Handbooks
Contact the Delivering Carrier for:	File a claim for loss or damage during shipment.
For assistance in filing or settling claims, contact your distributor and/or equipment manufacturer's Transportation Department.	

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