Miller
The Power of Blue.

OM-808 081 904F

January 1997

Processes

TIG (GTAW) Welding

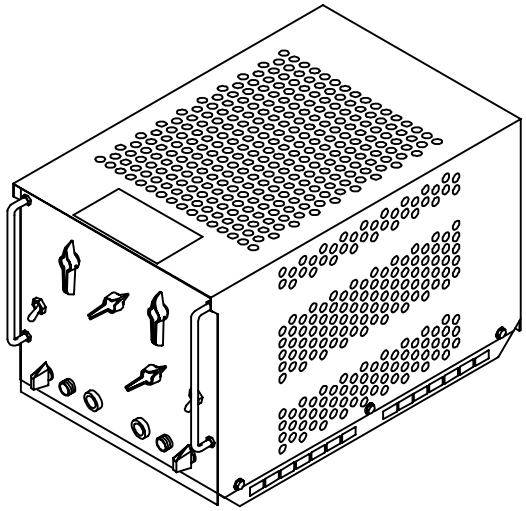
Stick (SMAW) Welding

Description

DC CV

Multiple Operator Resistance Grids (MOG), Racks, And Remote Controls

MOG-250/250, MOG-300, MOG-350/350, MOG-400, MOG-Pak, And RGC Controls



OWNER'S MANUAL

Visit our website at

www.MillerWelds.com

From Miller to You

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

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

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

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

ISO 9001 REGISTERED QUALITY SYSTEM

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

TRUE BLUE® WARRANTY

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

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

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

Miller
The Power of Blue.

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

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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.

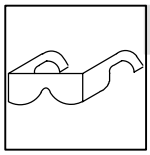
Arc rays from the welding process produce intense visible and invisible (ultraviolet and infrared) rays that can burn eyes and skin. Sparks fly off from the weld.

- 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.

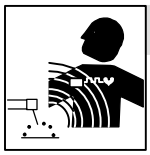
- Welding, chipping, wire brushing, and grinding cause sparks and flying metal. As welds cool, they can throw off slag.
- Wear approved safety glasses with side shields even under your welding helmet.

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.

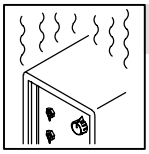
1-3. Additional Symbols For Installation, Operation, And Maintenance

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.

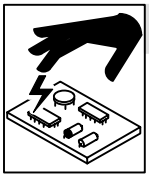
FALLING UNIT can cause injury.

- 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.

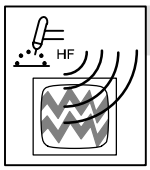
- Keep away from moving parts.
- Keep away from pinch points such as drive rolls.

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.

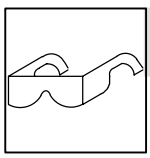
Le rayonnement de l'arc du procédé de soudage génère des rayons visibles et invisibles intenses (ultraviolets et infrarouges) susceptibles de provoquer des brûlures dans les yeux et sur la peau. Des étincelles sont projetées pendant le soudage.

- 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.

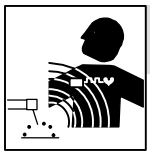
- Le soudage, l'écaillement, le passage de la pièce à la brosse en fil de fer, et le meulage génèrent des étincelles et des particules métalliques volantes. Pendant la période de refroidissement des soudures, elles risquent de projeter du laitier.
- Porter des lunettes de sécurité avec écrans latéraux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

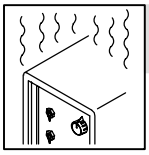
1-3. Dangers supplémentaires en relation avec l'installation, le fonctionnement et la maintenance

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.

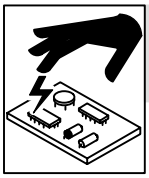
LA CHUTE DE L'APPAREIL peut blesser.

- 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.

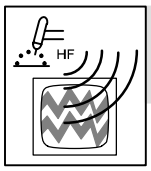
- Ne pas s'approcher des organes mobiles.
- Ne pas s'approcher des points de coincement tels que des rouleaux de commande.

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

2-1. Resistance Grid

Specification	Description			
Type Of Output	Coarse: 50 Ampere Steps; Fine: 5 Ampere Steps; Optional: 2-1/2 Ampere*			
Overall Dimensions	Height: 16 in (406 mm); Width: 16-1/2 in (419 mm); Length: 26 in (711 mm)			
	300 Ampere	**400 Ampere**	**250/250 Ampere**	**350/350 Ampere**
Rated Welding Amperes Output	295 Amperes, 100% Duty Cycle	395 Amperes, 100% Duty Cycle	245 A, 490 A If Paralleled, 100% Duty Cycle	345 A, 690 A If Paralleled, 100% Duty Cycle
Net Weight	With Case: 65 lb (20 kg); W/O Case: 50 lb (23 kg)	With Case: 72 lb (33 kg); W/O Case: 57 lb (26 kg)	With Case: 76 lb (34 kg); W/O Case: 61 lb (28 kg)	With Case: 84 lb (38 kg); W/O Case: 69 lb (31 kg)

2-2. Grid Rack

Specification	Description	
	4-Grid Rack	**6-Grid Rack**
Overall Dimensions	Height: 50-1/2 in (1334 mm); Width: 39-1/4 in (997 mm); Length: 35-3/4 in (908 mm)	Height: 50-1/2 in (1334 mm); Width: 56 in (1422 mm); Length: 35-3/4 in (908 mm)
Net Weight	204 lb (93 kg)	266 lb (121 kg)

SECTION 3 – INSTALLATION

3-1. Typical Multiple Operator System Component Relationships

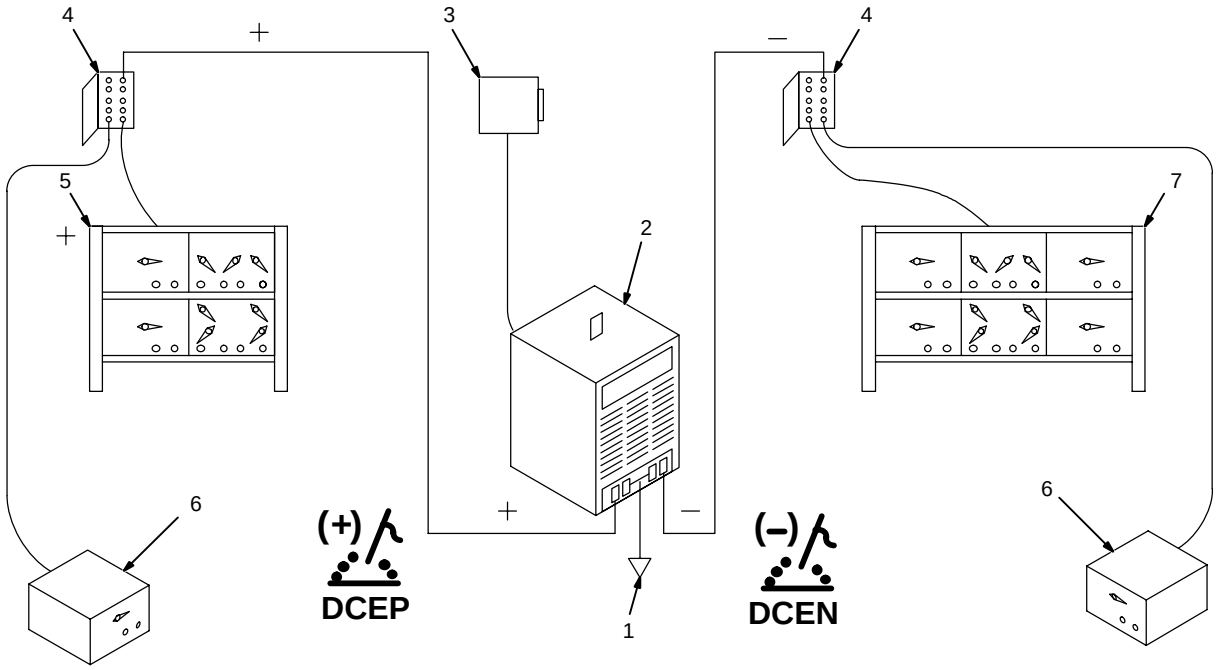
⚠ WARNING

ELECTRIC SHOCK can kill; TWO TIMES NORMAL OPEN-CIRCUIT VOLTS exists between electrode holders of opposite polarity.

- Do not touch live electrical parts.
- Do not touch electrode holders of opposite polarity at the same time.
- Separate electrode holders of opposite polarity to prevent contact.
- Consult ANSI Z49.1 for common grounding safe practices.

1 Common Work Connection
2 Welding Power Source
3 Line Disconnect Device
4 Distribution Panel
5 MOG-4 Pak Grid Rack
6 Grid
7 MOG-6 Grid Rack

This view illustrates how system components are related.



S-0808-A

3-2. Selecting A Location And Moving Resistance Grid Or Multi-Grid Rack

▲ Turn Off welding power source BEFORE moving grid or rack.

Locate grid(s) near welding power source.

Resistance Grid

1 18 in (460 mm) Open Space On Front Side

Location should allow operation of controls.

2 Handles

Use handles to lift unit.

Multi-Grid Rack

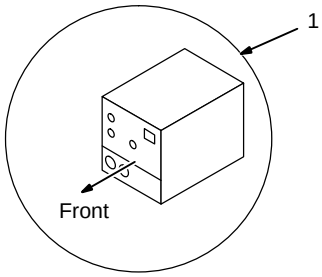
3 Minimum 20 in (508 mm) Open Space On Front And Rear Sides

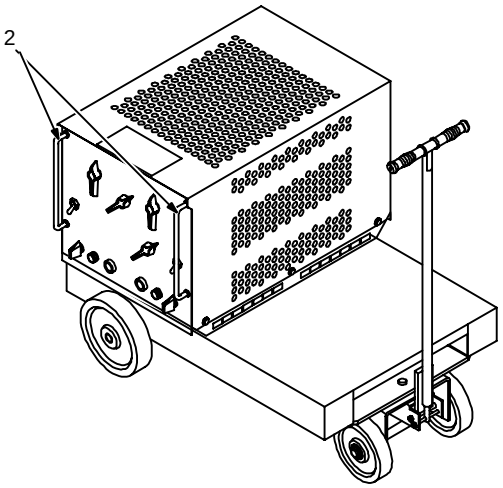
Location should allow access to rear panel and removal of grids.

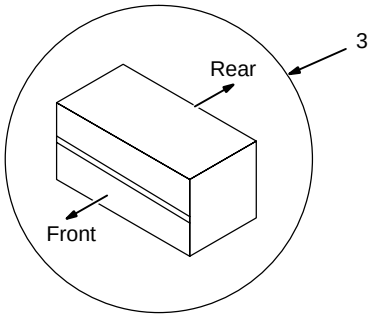
4 Lifting Eyes

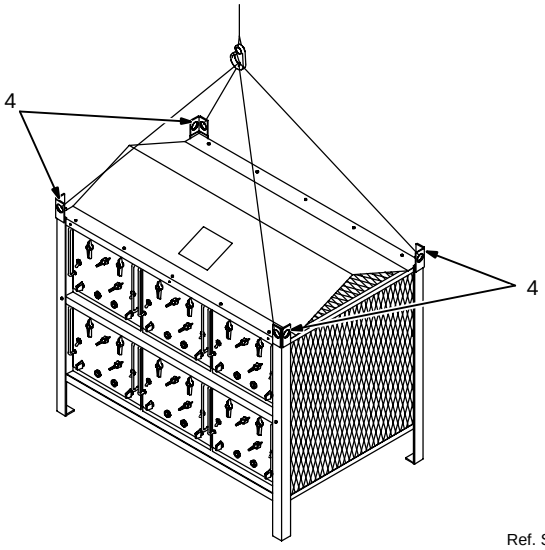
Use four sets of lifting eyes to move rack.

Have two persons of adequate physical strength lift individual grids at handles.



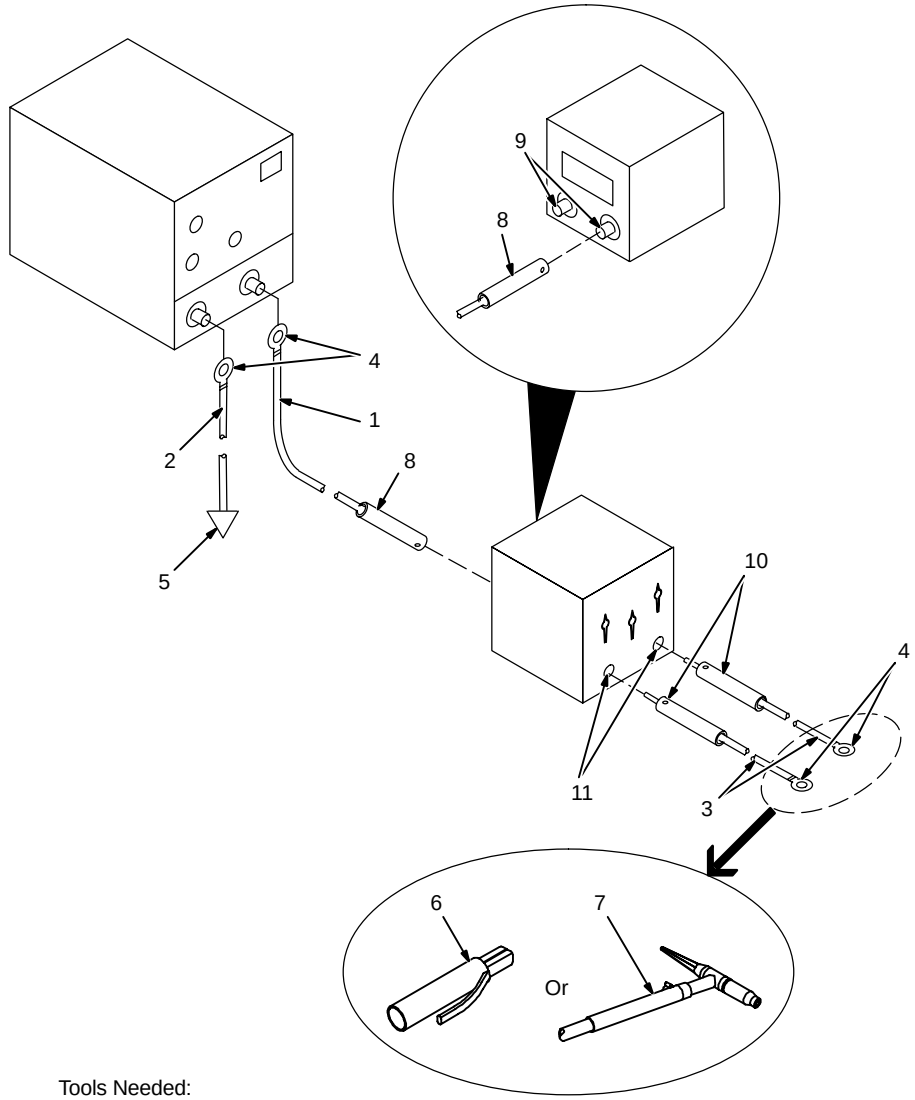






Ref. ST-124 643-A / Ref. ST-151 556 / ST-161 154-A

3-3. Weld Input/Output Cables For Resistance Grid (Dual Model Shown)



▲ **Turn Off welding power source, and disconnect input power before making any weld output connections.**

1 Weld Input Cable

2 Work Cable

3 Weld Output Cable

If necessary, use Section 3-7 to select proper cable size.

Use shortest cables possible.

Do not use damaged cables.

4 Terminal Lug

Use lugs of proper amperage capacity and hole size for connecting to common work, electrode holder(s), and weld output terminals (if applicable).

5 Common Work Connection

Connect work cable to common work according to codes.

6 Insulated Electrode Holder

7 GTAW Torch

Install according to manufacturer's instructions.

8 Female Camlok Connector

Install onto weld input cable as shown in Section 3-5.

9 Weld Input Receptacle

Connect cable to weld input receptacle on rear panel of grid.

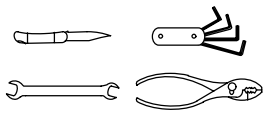
10 Male Camlok Connector

Install onto weld output cable as shown in Section 3-6.

11 Electrode Receptacle

Connect electrode holder cable to Electrode receptacle.

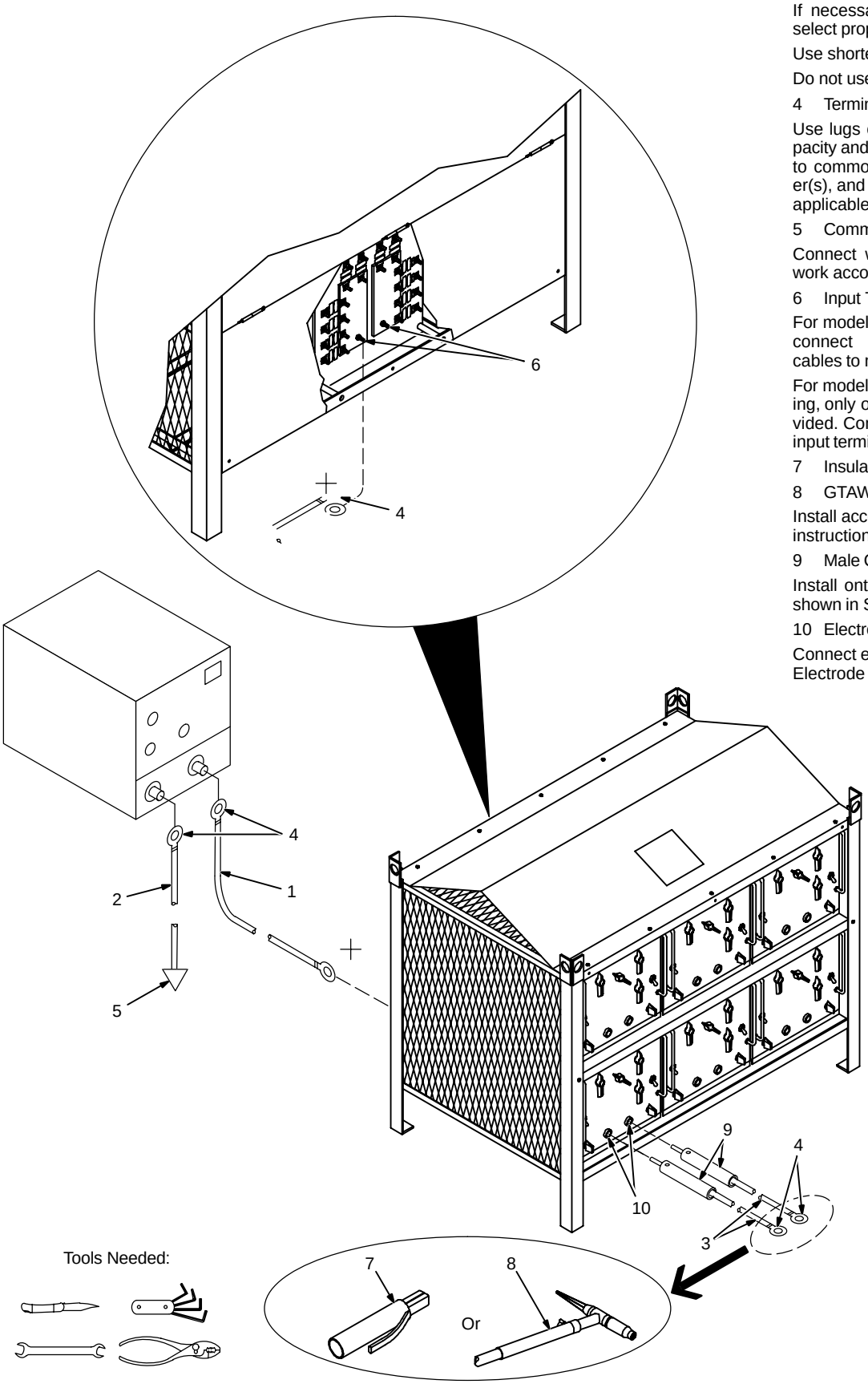
Tools Needed:



S-0793

3-4. Weld Input/Output Cables For Multi-Grid Rack

▲ **Turn Off welding power source, and disconnect input power before making any weld output connections.**



1 Weld Input Cable

2 Work Cable

3 Weld Output Cable

If necessary, use Section 3-7 to select proper cable size.

Use shortest cables possible.

Do not use damaged cables.

4 Terminal Lug

Use lugs of proper amperage capacity and hole size for connecting to common work, electrode holder(s), and weld output terminals (if applicable).

5 Common Work Connection

Connect work cable to common work according to codes.

6 Input Terminal

For models with polarity reversing, connect positive and negative cables to matching input terminal.

For models without polarity reversing, only one input terminal is provided. Connect electrode cable to input terminal.

7 Insulated Electrode Holder

8 GTAW Torch

Install according to manufacturer's instructions.

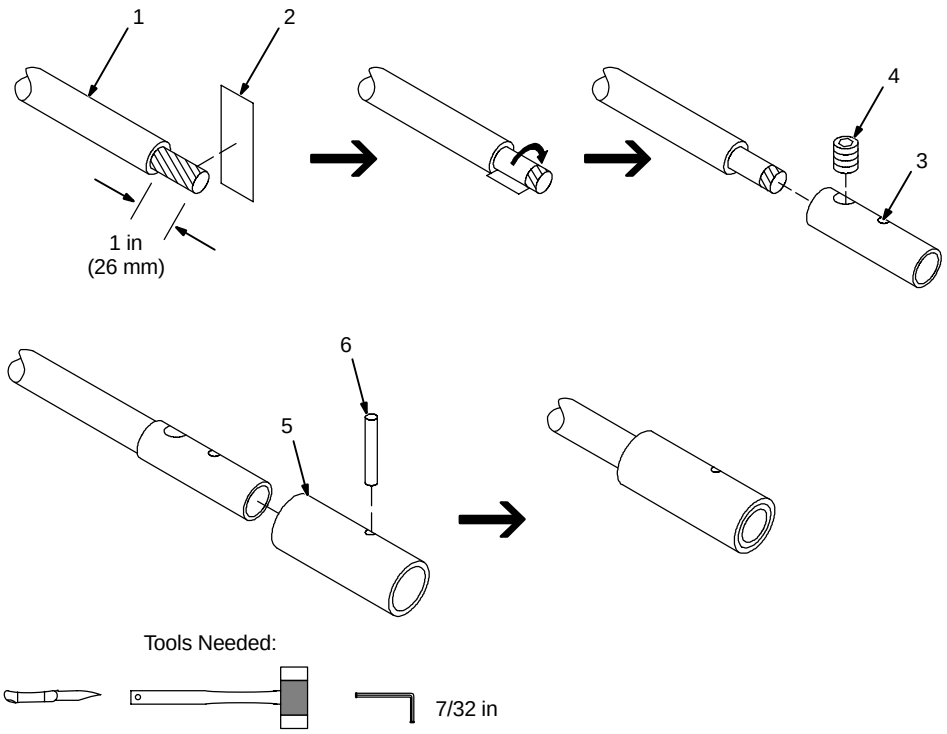
9 Male Camlok Connector

Install onto weld output cable as shown in Section 3-6.

10 Electrode Receptacle

Connect electrode holder cable to Electrode receptacle.

3-5. Female Camlok Connector Assembly



1 Weld Input Cable

Strip insulation as shown.

2 Copper Strip (Two Included)

3 Connector Body

Wrap strip around bare weld cable (use two on small diameter cable), and insert into connector body.

4 Setscrew

Tighten setscrew against copper strip.

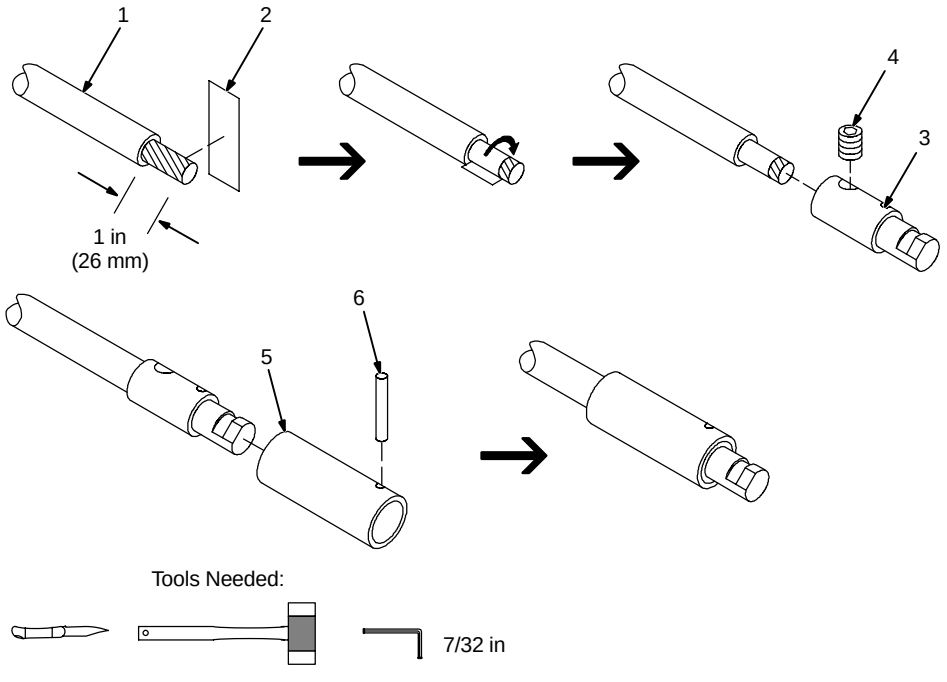
5 Handle

6 Pin

Slide handle over connector body so holes align; secure by tapping pin into place.

sb6.6* – ST-159 028

3-6. Male Camlok Connector Assembly



1 Weld Output Cable

Strip insulation as shown.

2 Copper Strip

3 Connector Body

Wrap strip around bare weld cable (use two on small diameter cable), and insert into connector body.

4 Setscrew

Tighten setscrew against copper strip.

5 Handle

6 Pin

Slide handle over connector body so holes align; secure by tapping pin into place.

sb6.4* 11/92 – ST-155 015

3-7. 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
300	1	1/0	2/0	3/0	4/0	2-2/0	2-3/0	2-3/0
350	1/0	2/0	3/0	4/0	2-2/0	2-3/0	2-3/0	2-4/0
400	1/0	2/0	3/0	4/0	2-2/0	2-3/0	2-4/0	2-4/0
500	2/0	3/0	4/0	2-2/0	2-3/0	2-4/0	3-3/0	3-3/0
600	3/0	4/0	2-2/0	2-3/0	2-4/0	3-3/0	3-4/0	3-4/0
700	4/0	2-2/0	2-3/0	2-4/0	3-3/0	3-4/0	3-4/0	4-4/0
800	4/0	2-2/0	2-3/0	2-4/0	3-4/0	3-4/0	4-4/0	4-4/0

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

3-8. Optional Remote Receptacle Information And Connections

1 Remote Receptacle

Single models have one Remote receptacle RC3. Dual models have two Remote receptacles RC3 and RC4.

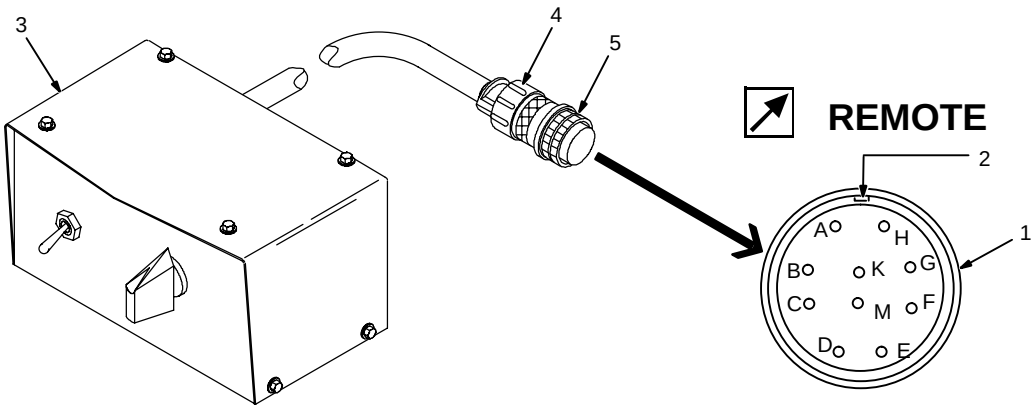
2 Keyway

3 Remote Grid Amperage Control

4 Plug PLG1

5 Threaded Collar

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



sb7.1 8/92* – Ref. S-0166-A / ST-080 370-A

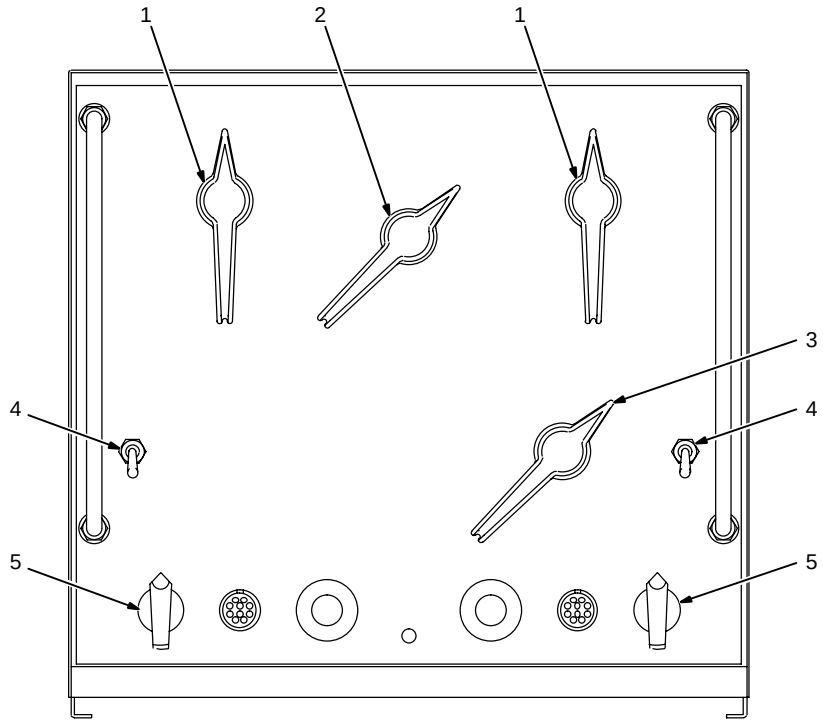
SECTION 4 – OPERATION

⚠ WARNING

ELECTRIC SHOCK can kill.

- Keep all panels and covers securely in place.
- Do not touch electrode holders of opposite polarity at the same time.
- Separate electrode holders of opposite polarity to prevent contact.
- See ANSI Z49.1 and OSHA TITLE 29, CHAPTER XVII, PART 1910, Subpart Q.

4-1. Controls (Dual Model Shown)



1 Coarse Amperage Control

2 Paralleling Switch

Included on dual models only.

3 Optional Polarity Switch

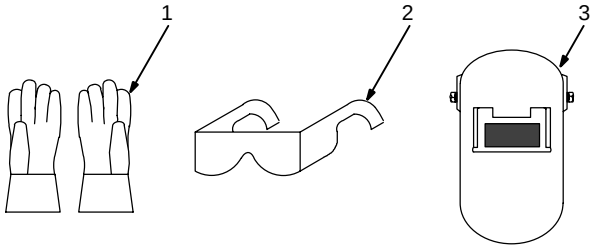
4 2-1/2 Ampere Switch

This switch is included on units with Polarity switch. Switch is optional for all other models.

5 Fine Amperage Control

Ref. ST-161 155

4-2. Safety Equipment



Wear the following while welding:

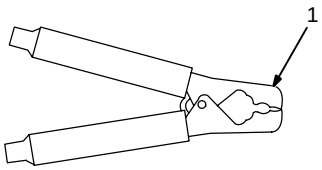
1 Dry, Insulating Gloves

2 Safety Glasses With Side Shields

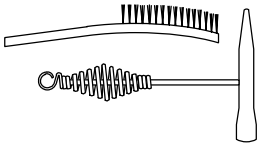
3 Welding Helmet With Correct Shade Of Filter (See ANSI Z49.1)

sb3.1 1/94

4-3. Work Clamp



Tools Needed:



1 Work Clamp

Connect work clamp to a clean, paint-free location on workpiece, as close to weld area as possible.

Use wire brush or sandpaper to clean metal at weld joint area. Use chipping hammer to remove slag after welding.

sb4.1 2/93

4-4. Optional Polarity Switch

⚠ WARNING

ELECTRIC SHOCK can kill; TWO TIMES NORMAL OPEN-CIRCUIT VOLTS exists between electrode holders of opposite polarity.

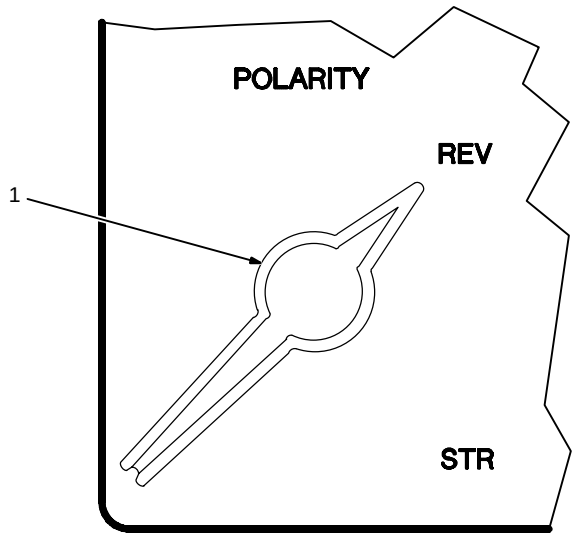
- Do not touch live electrical parts.
- Do not touch electrode holders of opposite polarity at the same time.
- Separate electrode holders of opposite polarity to prevent contact.
- See ANSI Z49.1 and OSHA TITLE 29, CHAPTER XVII, PART 1910, Subpart Q.

ARCING can damage switch.

- Do not change Polarity switch position while welding or under load.

Arcing inside switch can damage contacts, causing switch to fail.

warn5.1* 2/93



1 Polarity Switch

Use switch to select polarity of weld output.

For Direct Current Electrode Negative (DCEN), use Straight (Str) position.

For Direct Current Electrode Positive (DCEP), use Reverse (Rev) position.

Ref. ST-122 903-D

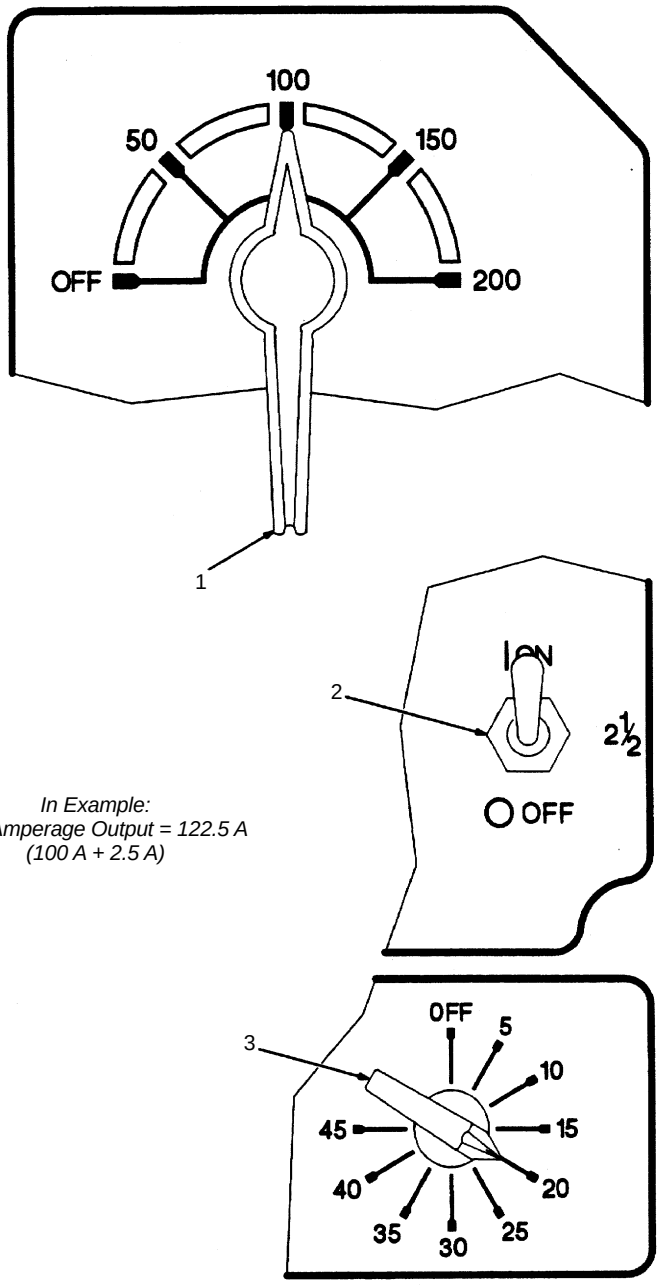
4-5. Amperage Controls

⚠ CAUTION

ARCING can damage switch.

- Do not change position of any Amperage control or switch while welding or under load.

Arcing inside switch can damage contacts, causing switch to fail.



In Example:
Total Amperage Output = 122.5 A
(100 A + 2.5 A)

1 Coarse Amperage Control

Use control to select coarse weld amperage output.

To set amperage using only the Fine Amperage control, place Coarse Amperage control in Off position.

2 2-1/2 Ampere Switch (Optional)

Use switch to add 2-1/2 amperes to weld output.

To add 2-1/2 amperes to weld output, place switch in Off position.

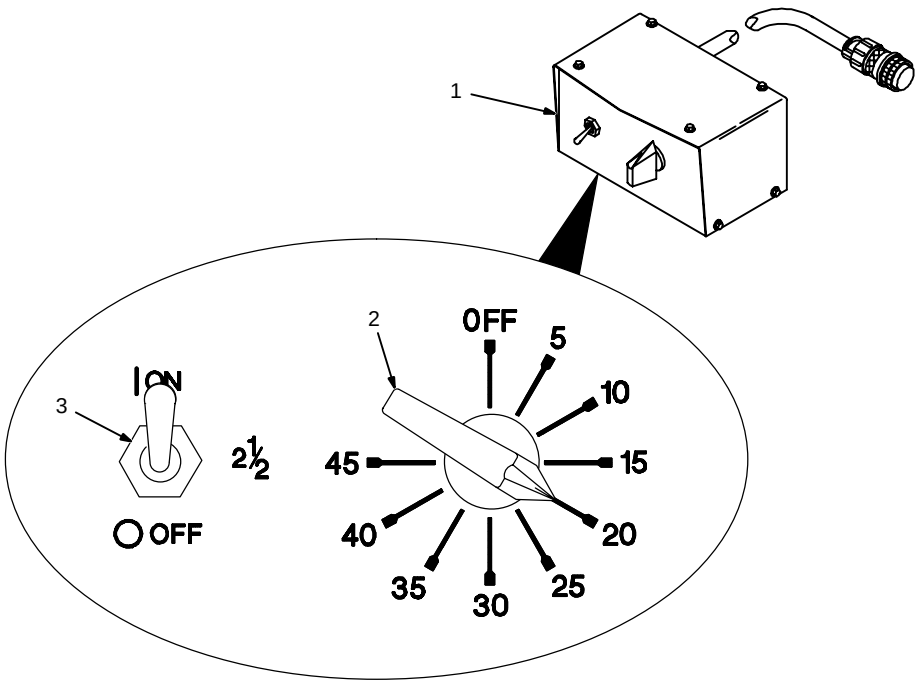
For remote amperage adjustment, place switch in Off position.

3 Fine Amperage Control

Use control to add amperage, in 5 ampere steps, to weld output.

For remote amperage adjustment, place control in Off position.

4-6. Optional Remote Grid Amperage Control



Remote amperage control only works when Fine Amperage control and optional 2-1/2 Ampere switch are in the Off position (see Section 4-5).

1 Remote Grid Amperage Control

See Section 3-8 for installation.

2 Fine Amperage Control

Use control to add amperage, in 5 ampere steps, to weld output.

For front panel amperage adjustment, place control in Off position.

3 2-1/2 Ampere Switch

Use switch to add 2-1/2 amperes to weld output.

To add 2-1/2 amperes to weld output, place switch in On position.

For front panel amperage adjustment, place control in Off position.

ST-080 370-A / Ref. ST-122 903-D

4-7. Paralleling Switch (Dual Models Only)

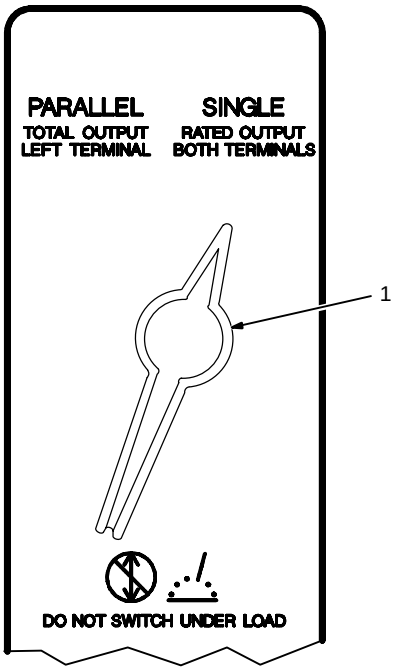
⚠ CAUTION

ARCING can damage switch.

- Do not change Paralleling switch position while welding or under load.

Arcing inside switch can damage contacts, causing switch to fail.

warn5.1* 2/93



1 Paralleling Switch

Use switch to select weld output at one or both Electrode terminals.

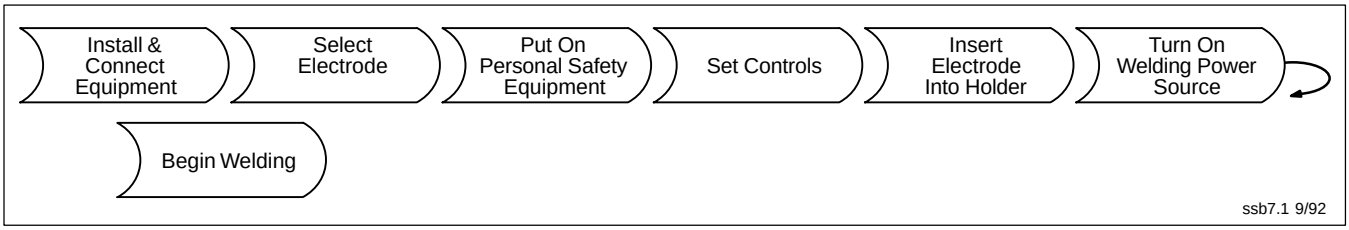
For weld output at both Electrode terminals, place switch in Single position.

For total weld output at the left Electrode terminal, place switch in Parallel position. Output at the right terminal is 0 (zero).

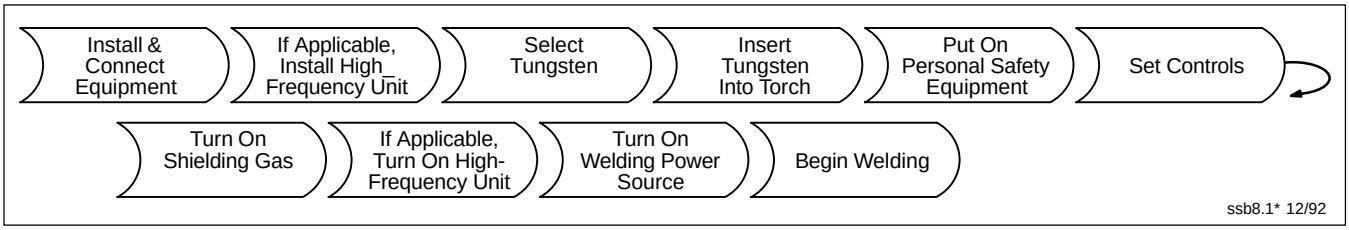
When switch is in Parallel position, all front panel amperage controls (left and right) adjust weld output (see Section 4-5).

Ref. ST-122 903-D

4-8. Sequence Of Shielded Metal Arc Welding (SMAW)

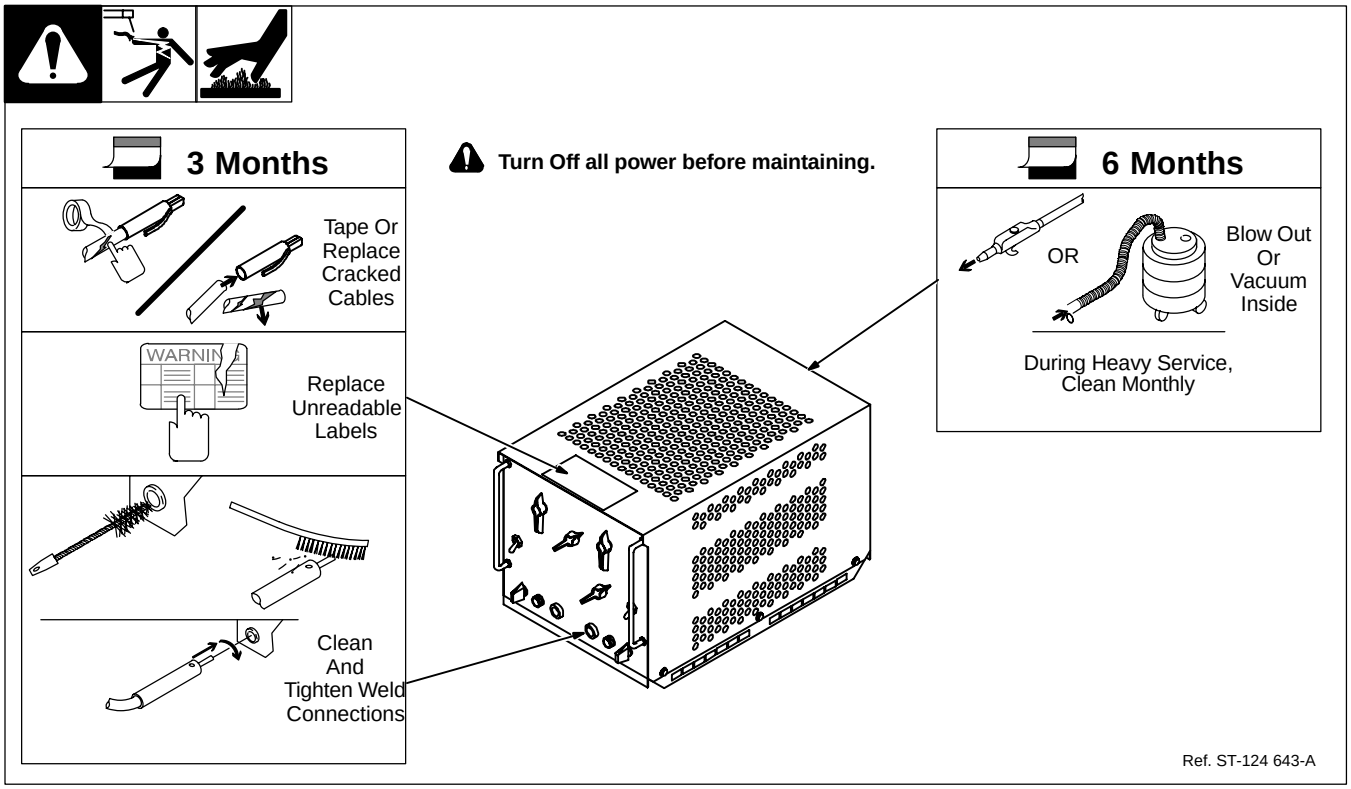


4-9. Sequence Of Gas Tungsten Arc Welding (GTAW)

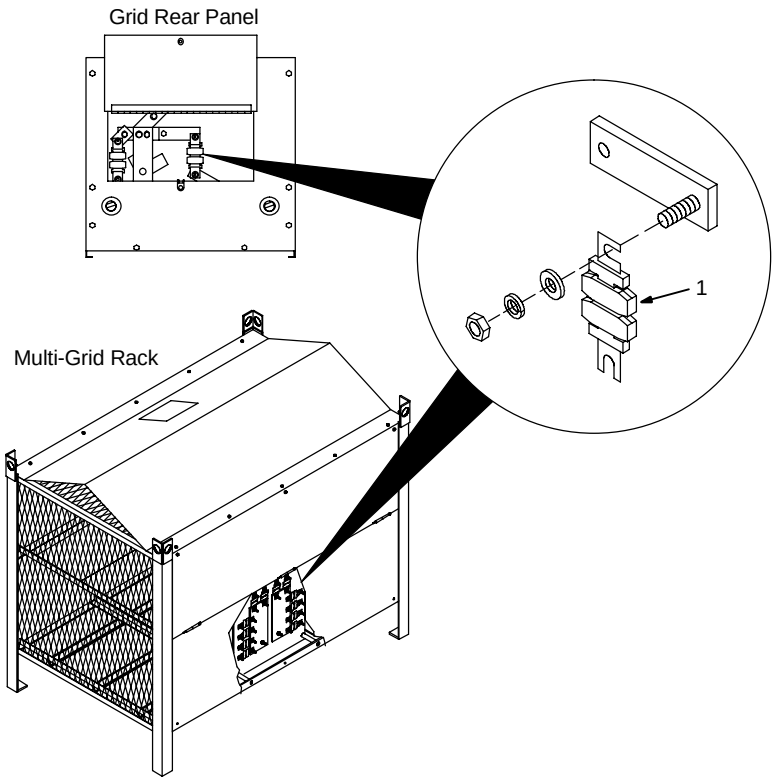


SECTION 5 – MAINTENANCE & TROUBLESHOOTING

5-1. Routine Maintenance



5-2. Overload Protection



Fuse link F1, or fuse links F1 and F2 for dual models, protect the grid from overload damage. If weld output stops, check link(s) as follows:

Turn Off welding power source and disconnect input power.

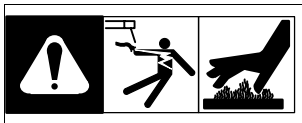
1 Fuse Link (See Parts List For Rating)

Check and replace fuse link(s), if necessary.

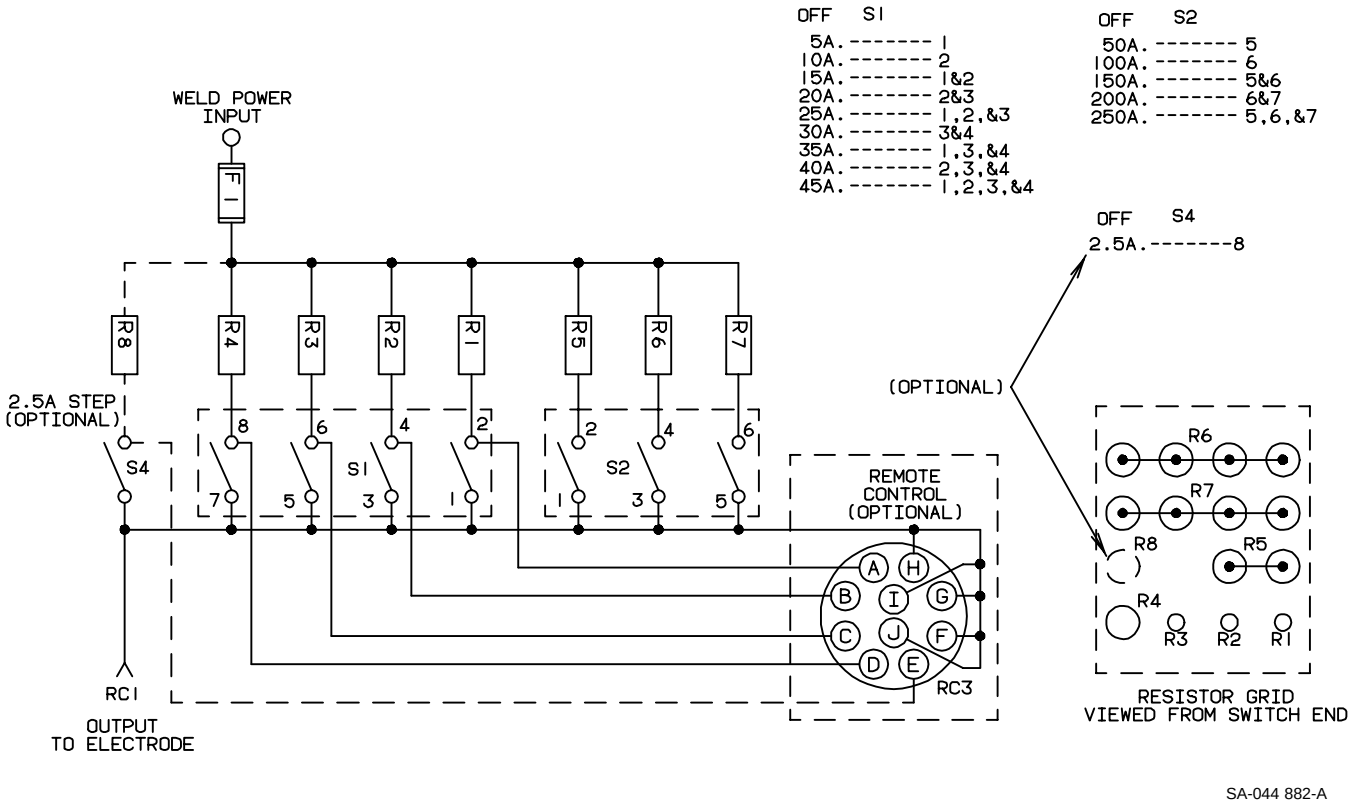
Close rear access door.

Ref. ST-124 643-A / Ref. ST-161 156-A

5-3. Troubleshooting

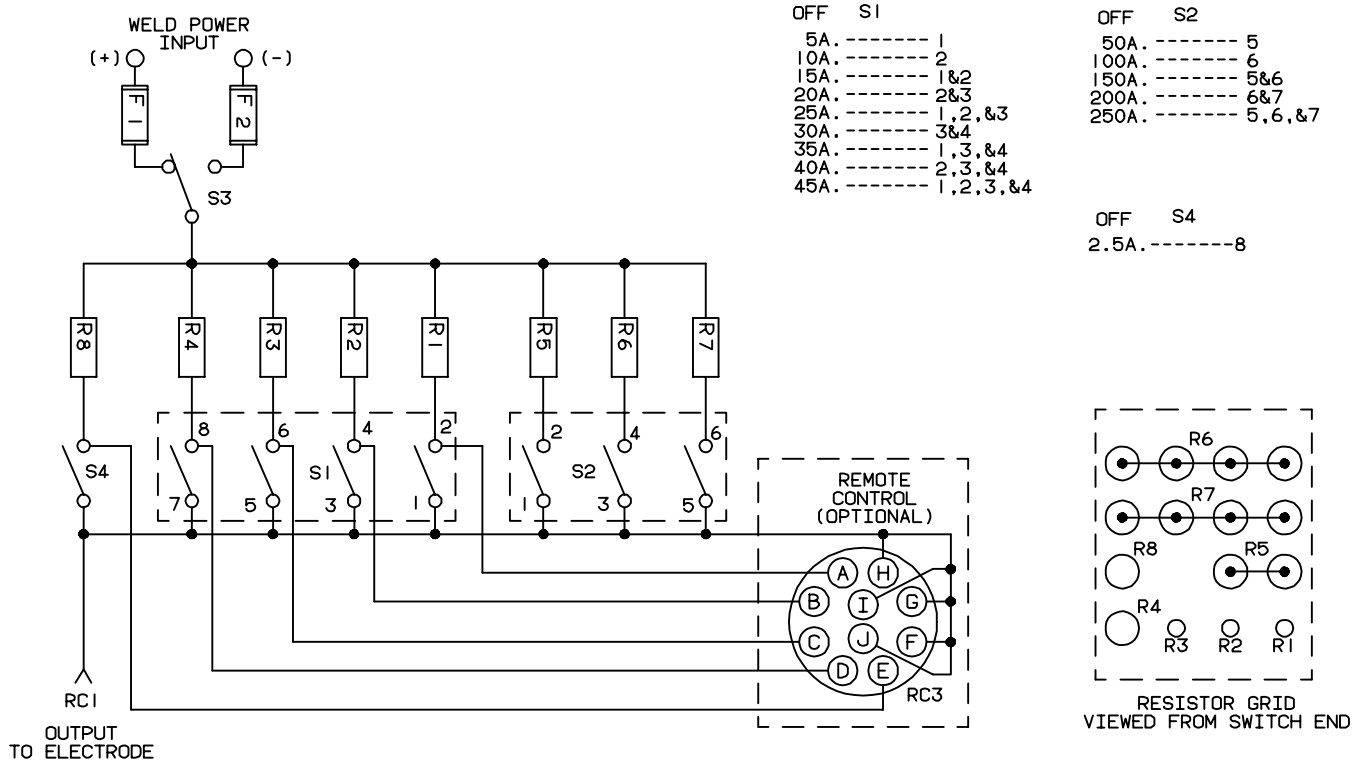


Trouble	Remedy
No weld output.	Check and replace open fuse link(s), if necessary (see Section 5-2).
	Check electrical input and output connections (see Section 3-3).
Erratic or improper weld output.	Select correct size weld cables according to Section 3-7.
	Clean and tighten weld cable connections (see Section 3-3).
	For dual models, be sure paralleling switch is in proper position (see Section 4-7).
	If using remote control, be sure Fine Amperage control and 2-1/2 Ampere switch on grid are in the Off position (see Section 4-5).



SA-044 882-A

Figure 6-1. Circuit Diagram For 300 Ampere Model



SA-096 447-A

Figure 6-2. Circuit Diagram For 300 Ampere Model With Polarity Reversing

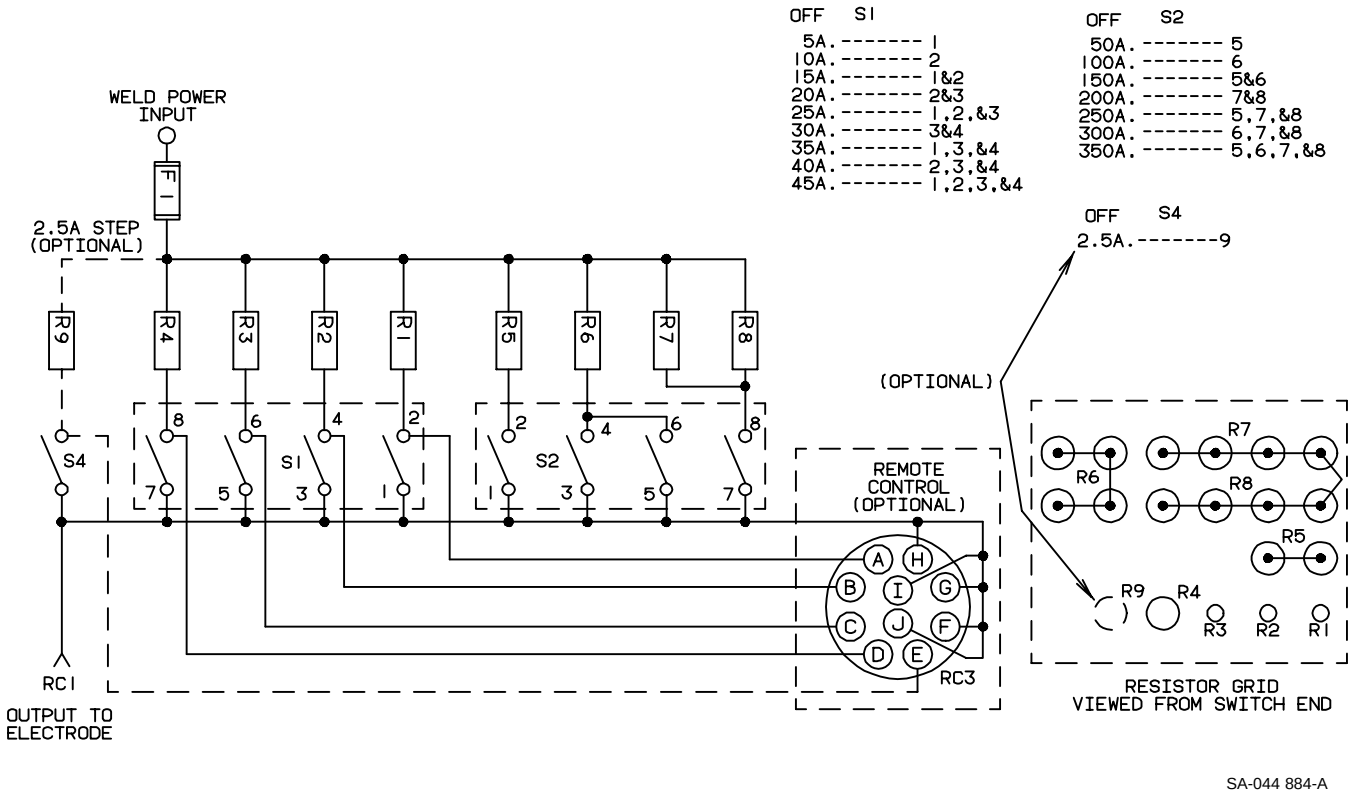


Figure 6-3. Circuit Diagram For 400 Ampere Model

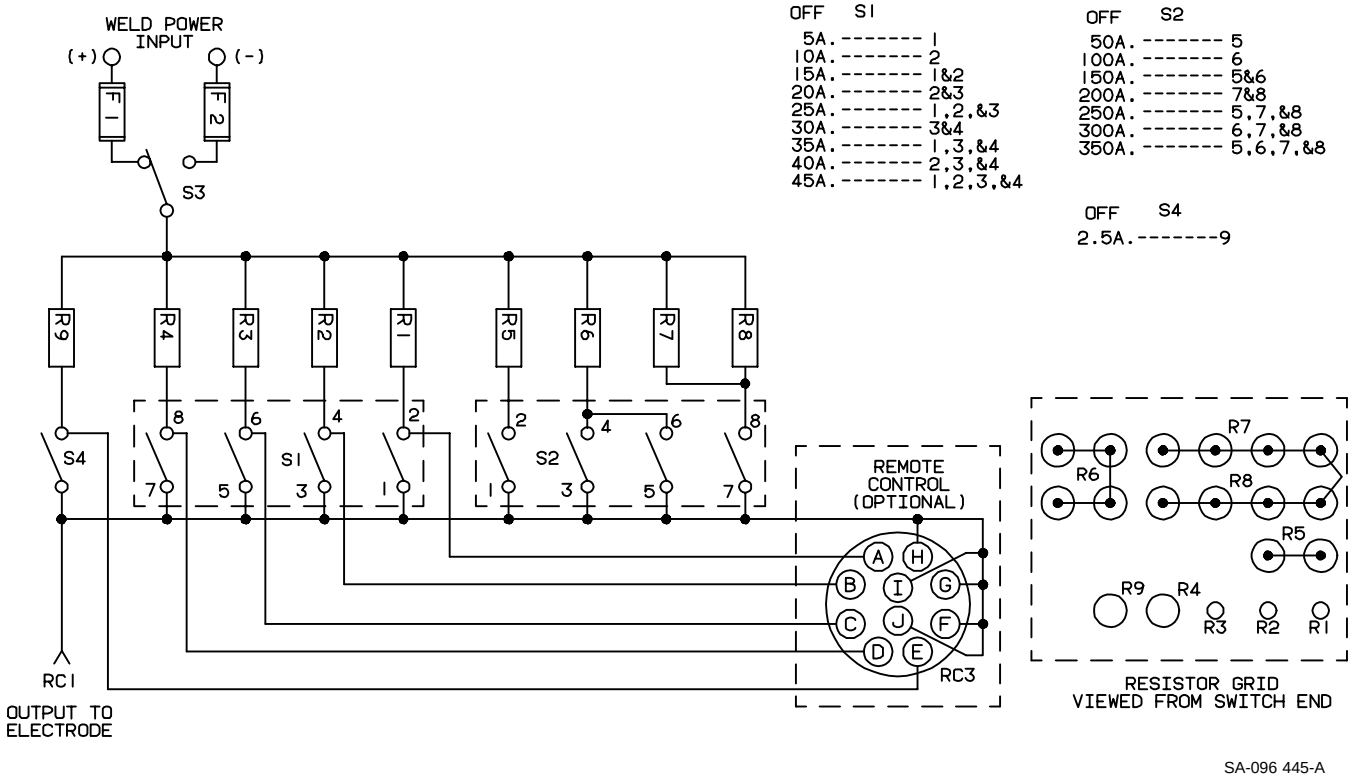
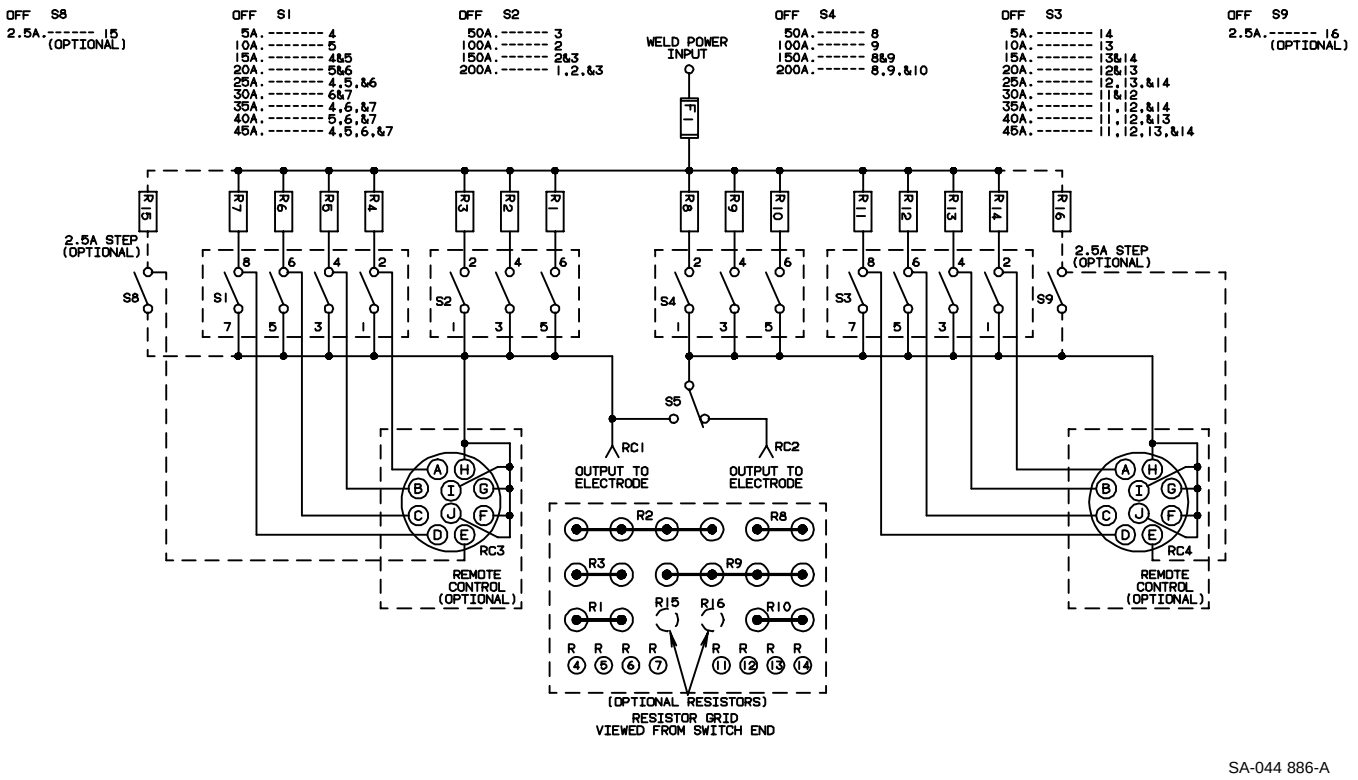
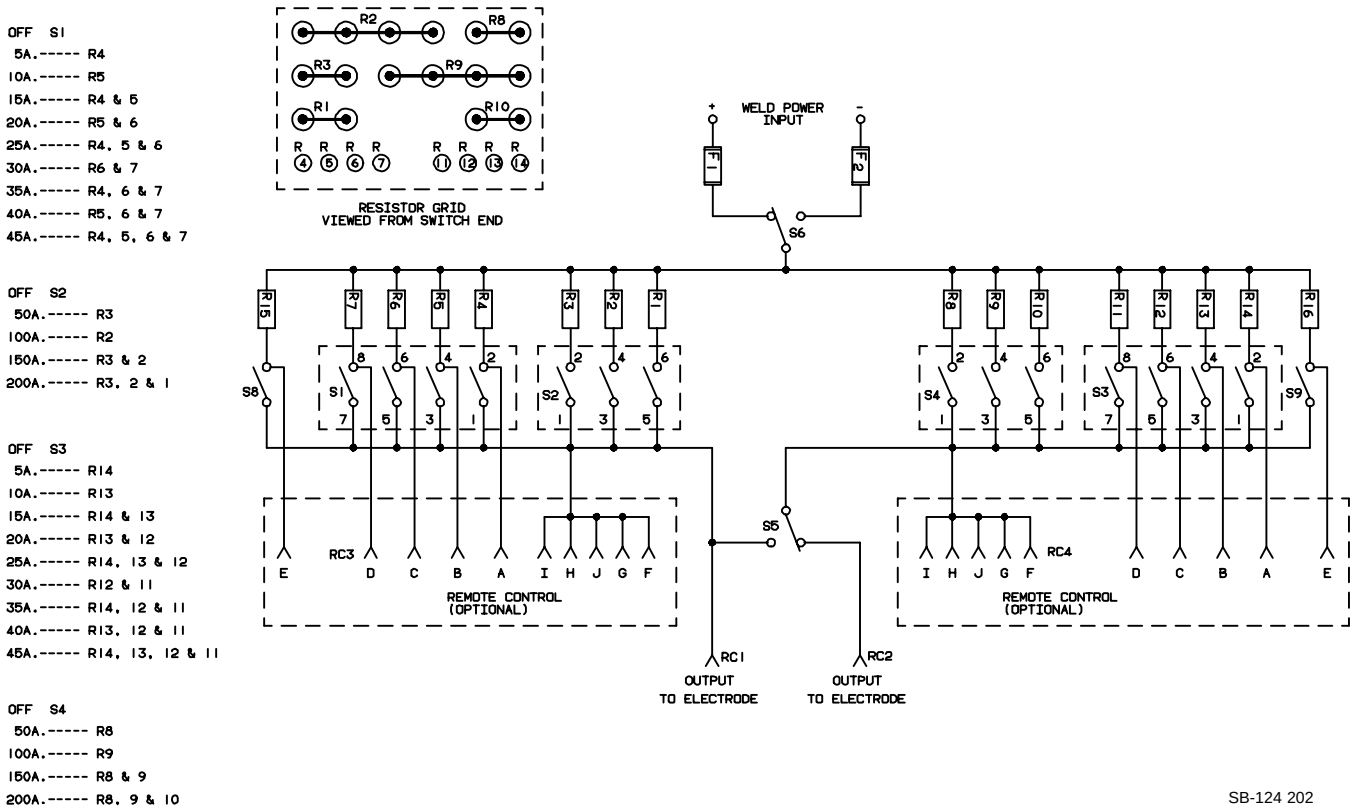


Figure 6-4. Circuit Diagram For 400 Ampere Model With Polarity Reversing



SA-044 886-A

Figure 6-5. Circuit Diagram For 250/250 Ampere Model



SB-124 202

Figure 6-6. Circuit Diagram For 250/250 Ampere Model With Polarity Reversing

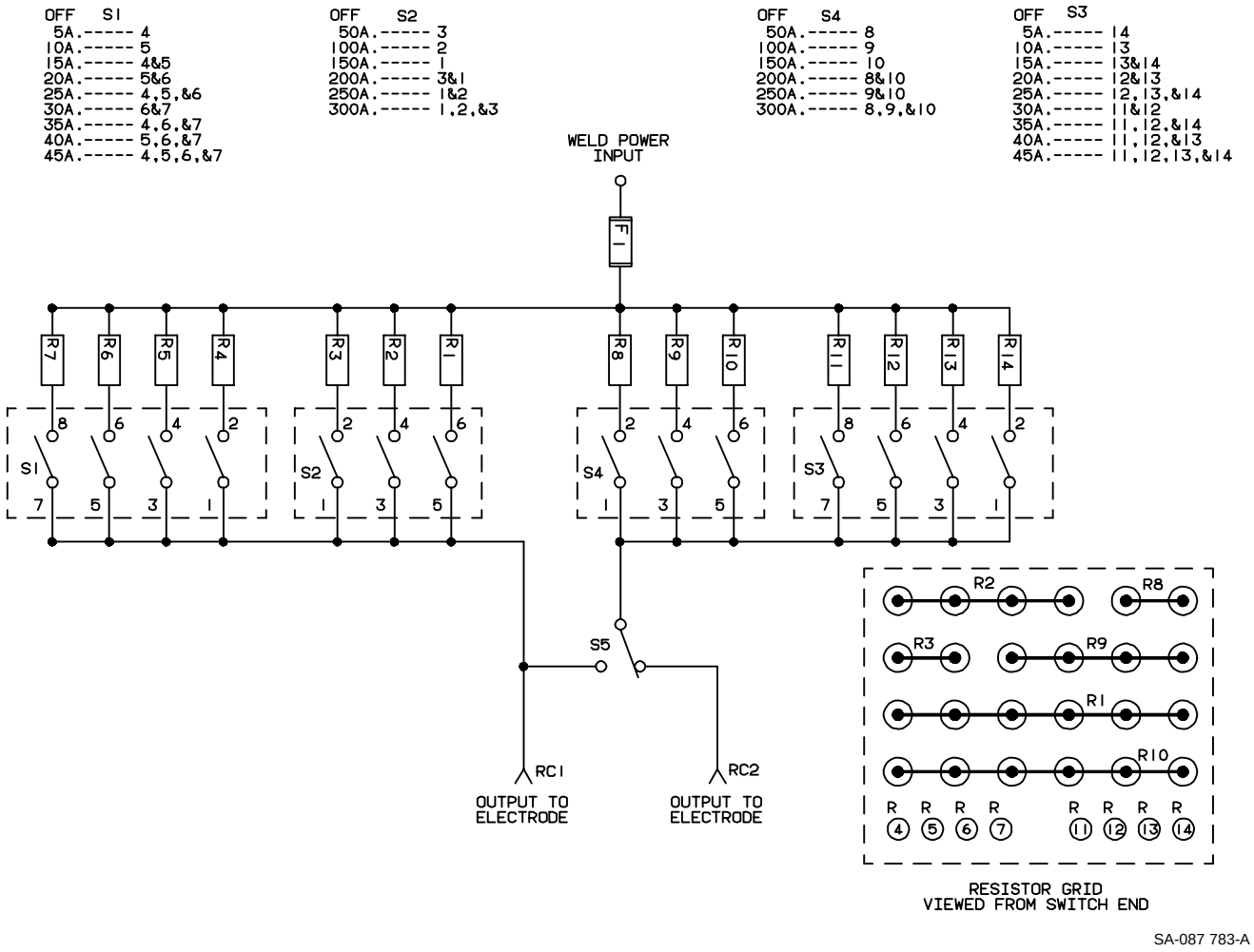


Figure 6-7. Circuit Diagram For 350/350 Ampere Model

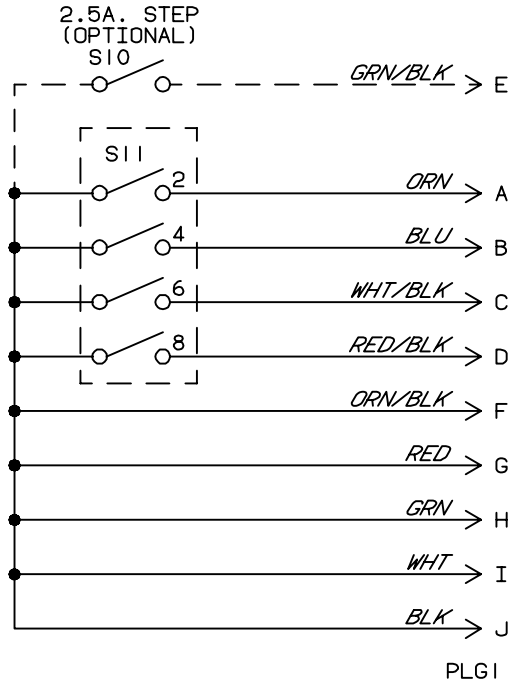


Figure 6-8. Circuit Diagram For Remote Grid Controls

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

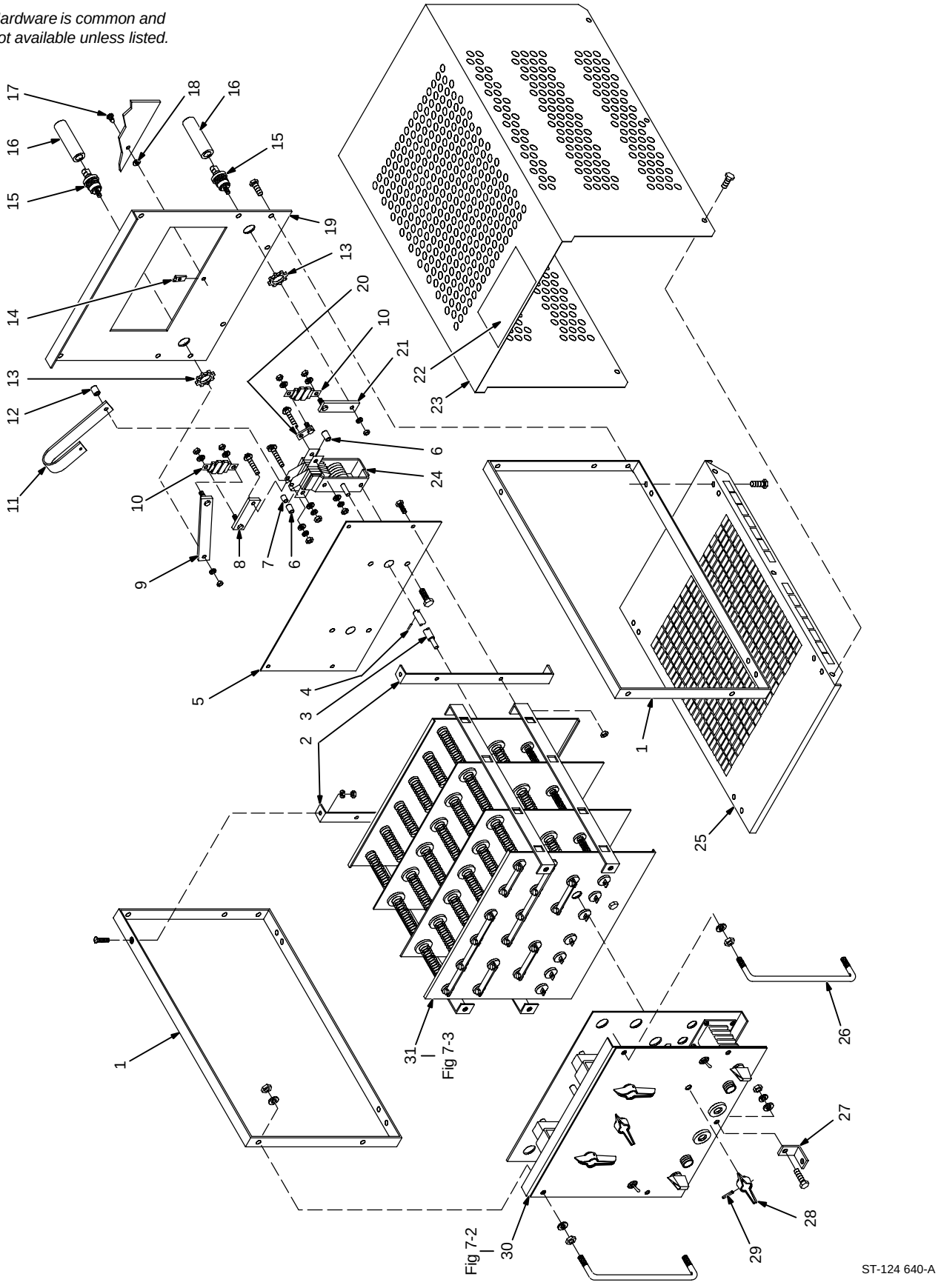


Figure 7-1. Main Assembly

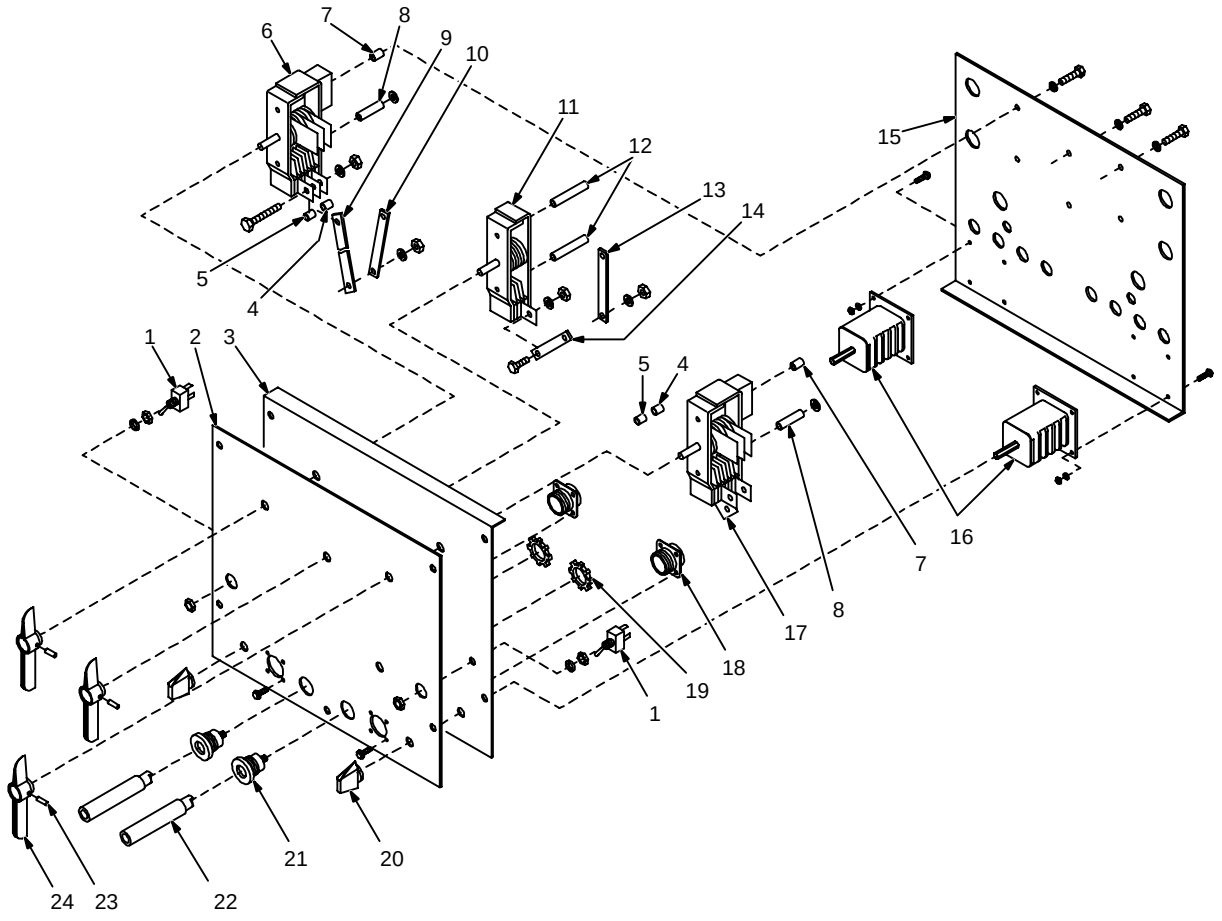
Item No.	Dia. Mkgs.	Part No.	Description	Quantity Model 300 A	300 AC	400 A	400 AC	250/250 A/B	250/250 AC/BC	350/350 A	350/350 AC
			Figure 7-1. Main Assembly								
1		049 472	RAIL, grid	2	2	2	2	2	2	2	2
2		049 470	BRACKET, side frame	2	2	2	2	2	2	2	2
3		+049 590	EXTENSION, handle	1	1	1	1	1	1		
4		+010 651	PIN, spring 5/32 x 1	1	1	1	1	1	1		
5		+049 497	PANEL, mtg plrt switch	1	1	1	1	1	1		
6		+049 633	TUBING, cop .540 OD x .123 wall x 1/2					2	2		
7		+049 611	TUBING, cop .540 OD x .123 wall x 11/16					1	1		
8		+049 610	BUS BAR, switch pos 1/4 x 1 x 3-1/4			1	1	1	1		
9		+049 602	BUS BAR, input pos 1/4 x 1 x 7-5/8 (400 APRC, 250/250 BPR)			1			1		
9		089 721	BUS BAR, input								1
9		+049 429	BUS BAR, plrt 1/8 x 1 x 6-7/16	1	1						
9		049 426	BUS BAR, input single 1/4 x 3-3/8 x 7-1/4	1							
9		049 503	BUS BAR, input 1/4 x 3-7/16 x 4-13/16			1			1		
		+059 861	BUS BAR, interconnect 1/8 x 1 x 3-13/16	1	1						
		089 724	BUS BAR, interconnect 3/16 x 1 x 7-1/2							1	1
		+049 433	BUS BAR, input pos 1/4 x 1 x 9-3/4	1							
10	F1	*059 945	FUSE, link 250A 250V	2	2						
10	F1,2	*+059 945	FUSE, link 250A 250V	4	4						
10	F1	*027 267	FUSE, link 300A 250V			2	2				
10	F1,2	*+027 267	FUSE, link 300A 250V			4	4				
10	F1	*059 943	FUSE, link 350A 250V					2	2		
10	F1,2	*+059 943	FUSE, link 350A 250V					4	4		
10	F1	*086 042	FUSE, link 400A 250V							3	3
11		+049 608	BUS BAR, common 1/4 x 1 x 11-7/8			1	1	1	1		
12		059 805	TUBING, cop 540 OD x .123 wall x 5/16	1	1	1	1	1	1		
13		010 907	NUT, locking 1 in	1		1		1			1
13		+010 907	NUT, locking 1 in	2		2		2			
14		010 854	NUT, speed No. 2	1		1		1			1
15		056 271	RECEPTACLE, twlk male	1		1		1			1
15		+056 271	RECEPTACLE, twlk male	2		2		2			
16		039 633	CONNECTOR, quick connect twlk female	1		1		1			1
16		+039 633	CONNECTOR, quick connect twlk female	2		2		2			
17		010 853	FASTENER, scr slotted hd No. 2	1		1		1			1
18		010 855	RETAINER, scr No. 2	1		1		1			1
19		049 500	PANEL, rear	1		1		1			1
		080 381	COVER, camlock opening	1		1		1			1
20		+049 428	BUS BAR, interconnect 1/8 x 1 x 1-1/4	1	1						
20		+049 607	BUS BAR, switch neg 1/4 x 1 x 1-1/2			1	1	1	1		
21		059 857	BUS BAR, plrt single 1/8 x 1 x 7-5/8	1							
21		+049 431	BUS BAR, input neg 1/8 x 1 x 3-7/8	1							
21		059 852	BUS BAR, plrt single 1/4 x 1 x 7-5/8					1		1	1
21		+049 604	BUS BAR, input neg 1/4 x 1 x 3-1/4					1		1	
22		134 327	LABEL, warning general precautionary	1		1		1		1	1
23		++049 504	WRAPPER	1		1		1		1	1
24	S3	+049 434	SWITCH, plrt reverse	1	1						
24	S3	+049 612	SWITCH, plrt reverse			1	1				
24	S3	+049 612	SWITCH, plrt reverse					1	1		
		+049 633	PIPE, cop 1/4 x 1/2			1	1	1	1		
		+049 611	PIPE, cop 1/4 x 11/16			3	2	3	1		
25		049 496	BASE	1		1		1			1
26		049 469	HANDLE, carrying	2	2	2	2	2	2	2	2
27		107 734	ANGLE, mtg bracket (also APR & BPR)	1		1		1		1	
28		+059 866	HANDLE, switch	1	1	1	1	1	1		
29		+010 647	PIN, spring 5/32 x 1-1/4	1	1	1	1	1	1		
30		Fig 7-2	PANEL, front w/components	1	1	1	1	1	1	1	1

Item No.	Dia. Mkgs.	Part No.	Description	Quantity Model 300 A	300 AC	400 A	400 AC	250/250 A/B	250/250 AC/BC	350/350 A	350/350 AC
. . 31		049 563	. . . RESISTOR ASSEMBLY, current (Fig 3)	1	1	1	1	1	1	1	1
. . 31		049 615	. . . RESISTOR ASSEMBLY, current (Fig 3)			1	1				
. . 31		049 562	. . . RESISTOR ASSEMBLY, current (Fig 3)					1	1		
. . 31		089 729	. . . RESISTOR ASSEMBLY, current (Fig 3)							1	1
		600 322	. . . CABLE, weld No. 2/0 (also 300APR) (order by ft)	3ft							
		600 323	. . . CABLE, weld No. 3 (also 250/250BPR & 400APR) (order by ft)			3ft	3ft			3ft	

Figure 7-1. Main Assembly (Continued)

+PR models only.
*Recommended Spare Parts.
++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.

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



ST-124 641-A

Figure 7-2. Panel, Front w/Components

Item No.	Dia. Mkgs.	Part No.	Description	Quantity Model 300 A	300 AC	400 A	400 AC	250/250 A/B	250/250 AC/BC	350/350 A	350/350 AC
			Figure 7-2. Panel, Front w/Components (Fig 7-1 Item 30)								
1	S4	♦011 609	SWITCH, tgl SPDT 15A 125V	1	1	1	1				
1	S8,9	♦011 609	SWITCH, tgl SPDT 15A 125V					2	2		
2			NAMEPLATE, (order by model and serial number)	1	1	1	1	1	1	1	1
3		049 486	PANEL, front	1	1	1	1	1	1	1	1
4		059 804	TUBING, cop 1/4 IPS x 7/16	2	2	4	4	3	3	6	6
5		059 805	TUBING, cop 1/4 IPS x 5/16	1	1			3	3	3	3
5		059 803	TUBING, cop 1/4 IPS x 3/16			1	1				
6	S2	049 560	SWITCH, current LH high					1	1		
6	S2	089 727	SWITCH, current LH high							1	1
7		059 875	TUBING, 3/8 OD x 0.256 ID x 7/16	1	1						
7		059 876	TUBING, 3/8 OD x 0.256 ID x 11/16					2	2		
8		059 874	TUBING, 3/8 OD x 0.256 ID x 1-3/8	1	1						
8		010 199	TUBING, 0.275 ID x 0.048 wall x 1			1	1			2	2
8		059 873	TUBING, 3/8 OD x 0.256 ID x 1-5/8					2	2		
9		049 477	BUS BAR, output 1/8 x 1 x 7-1/8					1	1	1	1
10		049 567	BUS BAR, output 1/8 x 1 x 5-9/16	1	1	2	2	1	1	1	1
11	S5	049 571	SWITCH, paralleling (if applicable)					1	1	1	1
12		059 872	TUBING, 3/8 OD x 0.256 ID x 2-1/2					2	2	2	2
13		049 568	BUS BAR, output 1/8 x 1 x 5-9/16					1	1	1	1
14		049 569	BUS BAR, interconnect 1/8 x 1 x 2-1/4					1	1	1	1
15		049 485	BAFFLE, front	1	1	1	1	1	1		
15		089 732	BAFFLE, front							1	1
16	S1	059 734	SWITCH, current 10posn	1	1	1	1				
16	S1,3	059 734	SWITCH, current 10posn					2	2	2	2
17	S2	049 435	SWITCH, current high	1	1						
17	S2	049 613	SWITCH, current high			1	1				
17	S4	049 561	SWITCH, current RH high					1	1		
17	S4	089 728	SWITCH, current RH high							1	1
18	RC3	♦039 718	RECEPTACLE, 10skt MS-3102A-18-1S	1	1	1	1				
18	RC3,4	♦039 718	RECEPTACLE, 10skt MS-3102A-18-1S					2	2	2	2
19		010 907	NUT, locking 1 in	1	1	1	1	2	2	2	2
20		006 790	KNOB, switch fine	1	1	1	1	2	2	2	2
21	RC1	039 628	RECEPTACLE, twlk insul	1	1	1	1				
21	RC1,2	039 628	RECEPTACLE, twlk insul					2	2	2	2
22		039 630	PLUG, male twlk insul	1	1	1	1	2	2	2	2
23		010 647	PIN, spring 5/32 x 1-1/4	1	1	1	1	3	3	3	3
24		059 773	HANDLE, switch	1	1	1	1	3	3	3	3

♦Parts for optional equipment.
+PR models only.

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 300	400	250/250	350/350
				049 563	049 615	049 562	089 729

Figure 7-3. Resistor Assembly, Current (Fig 7-1 Item 31)

1	049 479	BUS BAR, connecting resistors	1	5	6		2
	059 841	BUS BAR, connecting resistors	1				
2	R1	059 797	RESISTOR, 5A	1	1		
2	R4,14	059 797	RESISTOR, 5A			2	2
3	R5-7	059 800	RESISTOR, 25A	10			
3	R5-8	059 800	RESISTOR, 25A		14		
3	R1-3,8-10	059 800	RESISTOR, 25A			16	
3	R1-3,8-10	059 800	RESISTOR, 25A				24
		059 726	INSULATOR, end	28	36	48	64
		059 728	INSULATOR, support	22	30	36	52
		059 727	INSULATOR, support 5/8 bore	6	6	12	12
		059 724	RING, retaining ext .886 x 0.021	34	42	60	76
		059 725	RING, retaining ext 1.379 x 0.025	22	30	36	52
4		049 476	BUS BAR, connecting resistors	1	1	2	
5		049 475	BUS BAR, connecting resistors	1	1	2	
6		049 481	BUS BAR, connecting resistors	4	4	4	2
7		049 478	BUS BAR, connecting resistors	1	2	2	4
		089 725	BUS BAR, connecting resistors (6 hole)				6
		089 723	BUS BAR, connecting resistors				1
		089 726	BUS BAR, connecting resistors (6 hole)				1

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

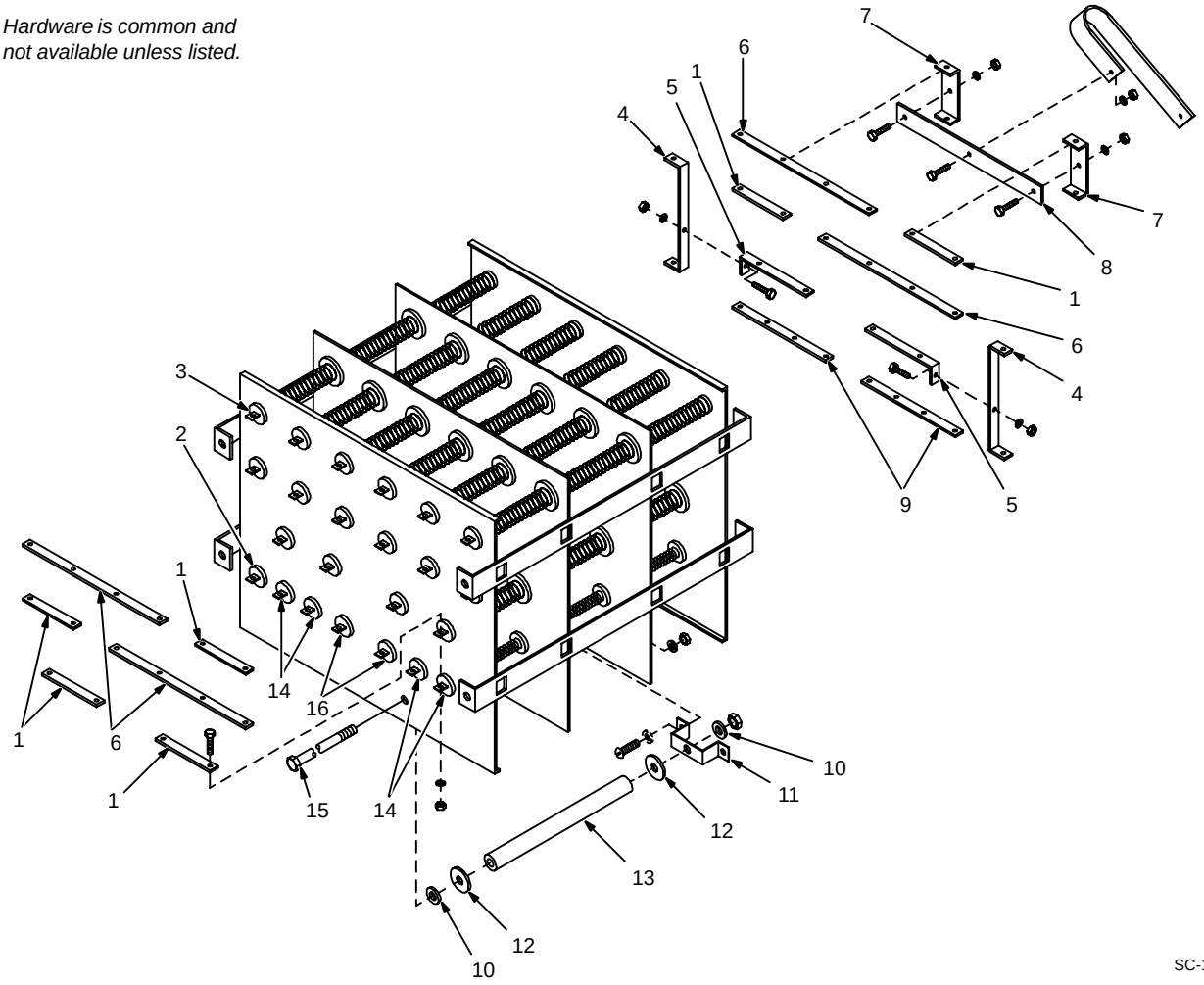


Figure 7-3. Resistor Assembly, Current

Item No.	Dia. Mkgs.	Part No.	Description	Quantity Model 300	400	250/250	350/350
				049 563	049 615	049 562	089 729

Figure 7-3. Resistor Assembly, Current (Fig 1 Item 31)

8	♦♦	049 570	BUS BAR, interconnecting resistors	1			
8		049 570	BUS BAR, interconnecting resistors		1		2
9		049 480	BUS BAR, connecting resistors	1	1	2	
10	♦	057 430	WASHER, centering No. 18	2	2	4	
11	♦	081 016	BRACKET, mtg resistor	1	1	2	
12	♦	059 933	WASHER, mica 3/4 ID x 1-1/2 OD	2	2	4	
13	R8	♦ 059 932	RESISTOR, WW fxd 175W 20 ohm	1			
13	R9	♦ 059 932	RESISTOR, WW fxd 175W 20 ohm		1		
13	R15,16	♦ 059 932	RESISTOR, WW fxd 175W 20 ohm			2	
14	R2,3	059 798	RESISTOR, 10A	2	2		
14	R5,6,12,13	059 798	RESISTOR, 10A			4	4
15	♦	604 714	BOLT, carriage 1/4-20 x 9	2	2	2	
16	R4	059 799	RESISTOR, 20A	1	1		
16	R7,11	059 799	RESISTOR, 20A			2	2

♦♦Not part of this assembly.

♦These parts are optional on all units not equipped with factory installed polarity switch.

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.*

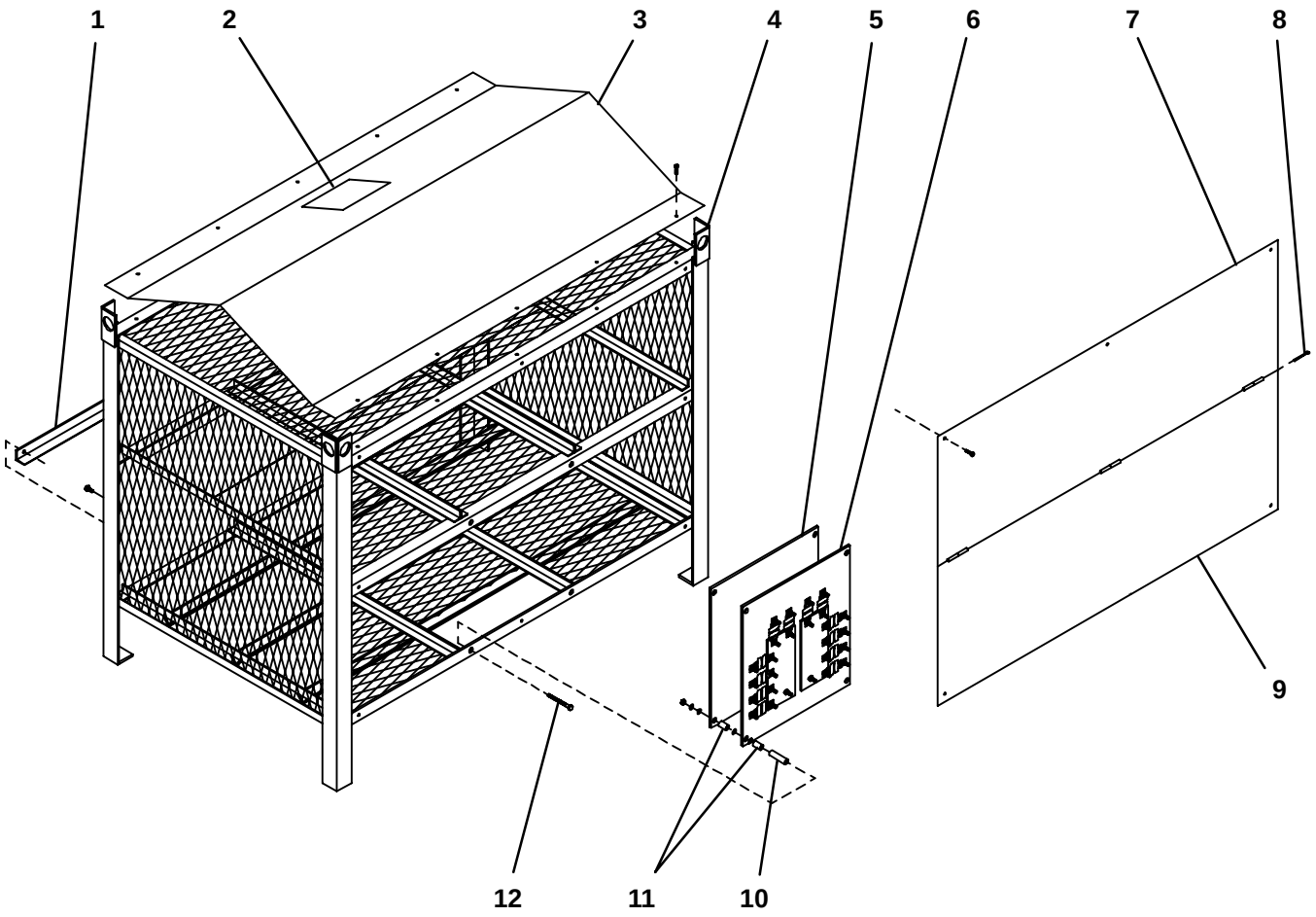


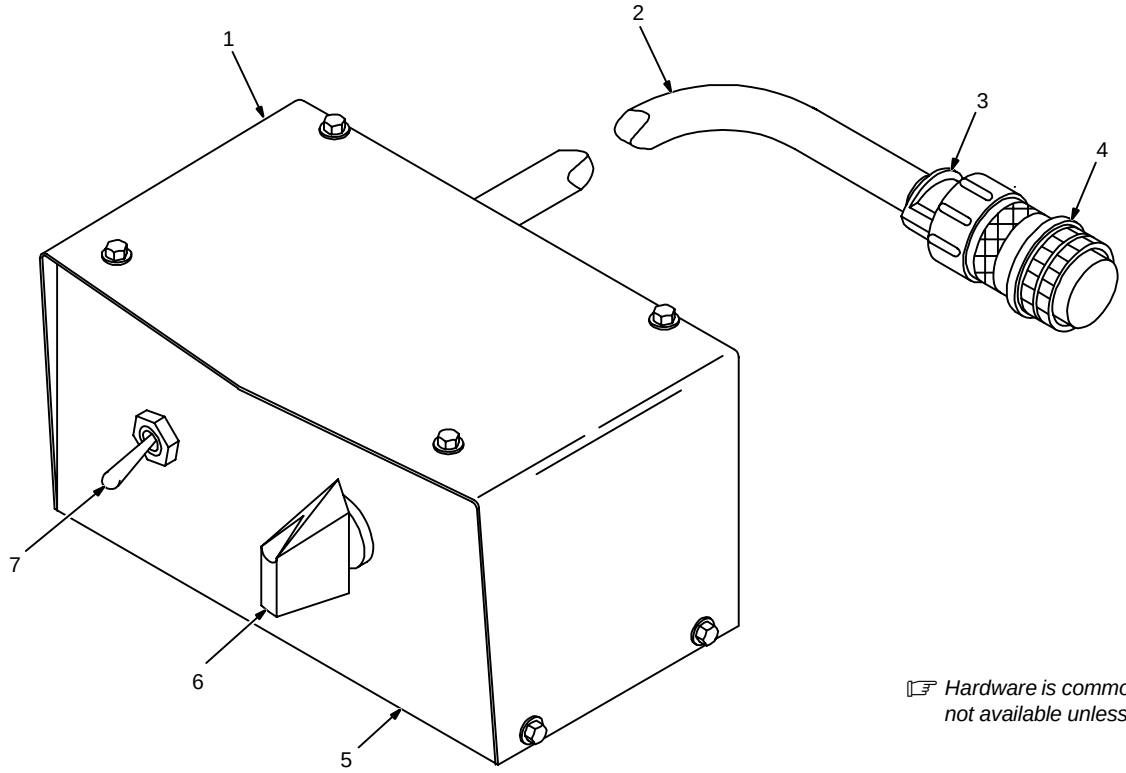
Figure 7-4. MOG-Pak 6 APR

Item No.	Part No.	Description	Quantity					
			PAK 2A		PAK 4A		PAK 6A	
			Single Polarity	Dual Polarity	Single Polarity	Dual Polarity	Single Polarity	Dual Polarity
		Figure 7-4. MOG-Pak 2, 4, & 6						
1	049 758	ANGLE, guard	1	1				
1	049 690	ANGLE, guard			1	1		
1	049 541	ANGLE, guard					1	1
2	123 154	LABEL, general precautionary	1	1	1	1	1	1
3	+085 342	ROOF	1	1				
3	+085 341	ROOF			1	1		
3	+085 340	ROOF					1	1
4	049 771	FRAME, grid rack	1	1				
4	049 706	FRAME, grid rack			1	1		
4	049 545	FRAME, grid rack					1	1
5	049 540	PANEL, baffle	1	1	1	1	1	1
6	049 770	TERMINAL ASSEMBLY, plrt single (consisting of)	1					
6	049 769	TERMINAL ASSEMBLY, plrt dual (consisting of)		1				
6	049 708	TERMINAL ASSEMBLY, plrt single (consisting of)			1			
6	049 707	TERMINAL ASSEMBLY, plrt dual (consisting of)				1		
6	049 535	TERMINAL ASSEMBLY, plrt single (consisting of)					1	
6	049 534	TERMINAL ASSEMBLY, plrt dual (consisting of)						1
	049 768	· TERMINAL BOARD	1	1				
	049 709	· TERMINAL BOARD			1	1		
	049 533	· TERMINAL BOARD					1	1
	049 757	· STRIP, mtg term	1	2				
	080 183	· STRIP, mtg term			1	2		
	080 186	· STRIP, mtg term LH					1	1
	080 187	· STRIP, mtg term RH						1
	602 216	· WASHER, lock split 1/2	2	2	1	1	1	2
	601 879	· NUT, brs hex full 1/2-13	2	2	1	2	1	2
7	049 767	PANEL, rear	1	1				
7	049 703	PANEL, rear			1	1		
7	049 536	PANEL, rear					1	1
8	027 529	PIN, cotter 1/4 x 3-1/2	2	2	2	2	3	3
9	049 766	PANEL, rear	1	1				
9	049 700	PANEL, rear			1	1		
9	049 539	PANEL, rear					1	1
10	059 872	TUBING, stl 3/8 OD x 0.256 ID x 2-1/2	4	4	4	4	4	4
11	010 199	TUBING, stl 0.275 ID x 0.048 wall x 1	8	8	8	8	8	8
12	080 139	SCREW, flat hd 1/4-20 x 6	4	4	4	4	4	4
		Optional Equipment						
6	085 349	TERMINAL ASSEMBLY, plrt single (consisting of)	1					
6	085 346	TERMINAL ASSEMBLY, plrt dual (consisting of)		1				
6	085 351	TERMINAL ASSEMBLY, plrt single (consisting of)			1			
6	085 347	TERMINAL ASSEMBLY, plrt dual (consisting of)				1		
6	085 350	TERMINAL ASSEMBLY, plrt single (consisting of)					1	
6	085 348	TERMINAL ASSEMBLY, plrt dual (consisting of)						1
	049 768	· TERMINAL BOARD	1	1				
	049 709	· TERMINAL BOARD			1	1		
	049 533	· TERMINAL BOARD					1	1
	085 331	· STRIP, mtg term	1	2				
	085 332	· STRIP, mtg term			1	2		
	085 333	· STRIP, mtg term					1	1
	085 334	· STRIP, mtg term						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.

Item No.	Part No.	Description	Quantity Model 2.5 Amp	Quantity Model 5 Amp
		Figure 7-5. Remote Control		
. 1	080 194	WRAPPER	1	1
	138 033	CONNECTOR, circ clamp	1	1
. 2	600 798	CABLE, No. 16 10/c (order by ft)	100ft	100ft
. 3	039 736	CLAMP, cable	1	1
. 4	039 716	CONNECTOR, circ 10 pin	1	1
. 5	080 198	CASE SECTION, base/front/rear	1	1
		NAMEPLATE (order by model number)	1	1
. 6	006 790	KNOB, switch	1	1
	059 734	SWITCH, current	1	1
. 7	053 359	SWITCH, tgl SPST 20A 125V	1	1



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

SA-080 370-A

Figure 7-5. Remote Control

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

Warranty Questions?

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TRUE BLUE® WARRANTY

Effective January 1, 2000
(Equipment with a serial number preface of "LA" 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 185 & Spoolmate 250)
   * Process Controllers
   * Positioners and Controllers
   * Automatic Motion Devices
   * RFCS Foot Controls
   * Induction Heating Power Sources
   * Water Coolant Systems
   * HF Units
   * Grids
   * Maxstar 140
   * Spot Welders
   * Load Banks
   * Miller Cyclomatic Equipment
   * Running Gear/Trailers
   * Plasma Cutting Torches (except APT & SAF Models)
   * Field Options
     (NOTE: Field options are covered under True Blue® for the remaining warranty period of the product they are installed in, or for a minimum of one year — whichever is greater.)
4. 6 Months — Batteries
5. 90 Days — Parts
   * MIG Guns/TIG Torches
   * Induction Heating Coils and Blankets
   * APT, ZIPCUT & PLAZCUT Model Plasma Cutting Torches
   * Remote Controls
   * Accessory Kits
   * Replacement Parts (No labor)
   * Spoolmate 185 & Spoolmate 250
   * Canvas Covers

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.

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Please complete and retain with your personal records.

Model Name Serial/Style Number

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

Distributor

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City

State Zip

For Service

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	Options and Accessories
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	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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