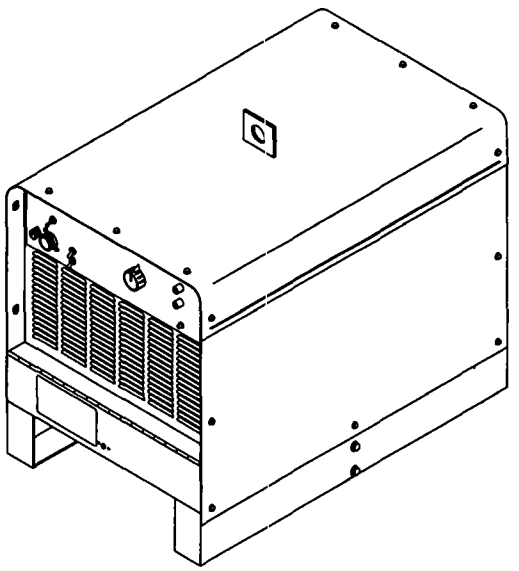
Miller®

April 1994 Form: OM-168 256

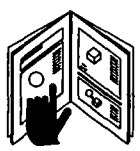
Effective With Serial No. KE600689

OWNER'S MANUAL

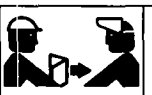


Gold Star® 500SSX

- CC/DC Welding Power Source
- For SMAW and GTAW Welding
- 510 Amperes, 41 Volts DC, At 35% Duty Cycle
- Requires Three-Phase, 50/60 Hz Input Power
- Overheating Protection
- Arc (Dig) Control



- Read and follow these instructions and all safety blocks carefully.
- Have only trained and qualified persons install, operate, or service this unit.
- Call your distributor if you do not understand the directions.



- Give this manual to the operator.

- For help, call your distributor
- or: MILLER Electric Mfg. Co., P.O. Box 1079, Appleton, WI 54912 414-734-9821

MILLER'S TRUE BLUE™ LIMITED WARRANTY

Effective January 1, 1992
(Equipment with a serial number preface of "KC" 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 the distributor.

1. 5 Years Parts – 3 Years Labor
   - Original main power rectifiers
2. 3 Years — Parts and Labor
   - Transformer/Rectifier Power Sources
   - Plasma Arc Cutting Power Sources
   - Semi-Automatic and Automatic Wire Feeders
   - Robots
3. 2 Years — Parts and Labor
   - Engine Driven Welding Generators
     (NOTE: Engines are warranted separately by the engine manufacturer for a period of two years.)
   - Air Compressors
4. 1 Year — Parts and Labor
   - Motor Driven Guns
   - Process Controllers
   - Water Coolant Systems
   - HF Units
   - Grids
   - Spot Welders
   - Load Banks
   - SDX Transformers
   - Running Gear/Trailers
   - 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.)
5. 6 Months — Batteries
6. 90 Days — Parts and Labor
   - MIG Guns/TIG Torches
   - Plasma Cutting Torches
   - Remote Controls
   - Accessory Kits
   - Replacement Parts

MILLER'S True Blue™ Limited Warranty shall not apply to:

1. 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.
2. Consumable components; such as contact tips, cutting nozzles, contactors and relays or parts that fail due to normal wear.
3. Equipment that has been modified by any party other than MILLER, or equipment that has been improperly installed, improperly operated or misused based upon industry standards, or equipment which has not had reasonable and necessary maintenance, or equipment which has been used for operation outside of the specifications for the equipment.

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

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

TO THE EXTENT PERMITTED BY LAW, THE REMEDIES PROVIDED HEREIN ARE THE SOLE AND EXCLUSIVE REMEDIES. IN NO EVENT SHALL MILLER BE LIABLE FOR DIRECT, INDIRECT, SPECIAL, INCIDENTAL OR CONSEQUENTIAL DAMAGES (INCLUDING LOSS OF PROFIT), WHETHER BASED ON CONTRACT, TORT OR ANY OTHER LEGAL THEORY.

ANY EXPRESS WARRANTY NOT PROVIDED HEREIN AND ANY IMPLIED WARRANTY, GUARANTY OR REPRESENTATION AS TO PERFORMANCE, AND ANY REMEDY FOR BREACH OF CONTRACT TORT OR ANY OTHER LEGAL THEORY WHICH, BUT FOR THIS PROVISION, MIGHT ARISE BY IMPLICATION, OPERATION OF LAW, CUSTOM OF TRADE OR COURSE OF DEALING, INCLUDING ANY IMPLIED WARRANTY OF MERCHANTABILITY OR FITNESS FOR PARTICULAR PURPOSE, WITH RESPECT TO ANY AND ALL EQUIPMENT FURNISHED BY MILLER IS EXCLUDED AND DISCLAIMED BY MILLER.

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

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

RECEIVING-HANDLING

Before unpacking equipment, check carton for any damage that may have occurred during shipment. File any claims for loss or damage **with the delivering carrier**. Assistance for filing or settling claims may be obtained from distributor and/or equipment manufacturer's Transportation Department.

When requesting information about this equipment, always provide Model Designation and Serial or Style Number.

Use the following spaces to record Model Designation and Serial or Style Number of your unit. The information is located on the rating label or nameplate.

Model _____

Serial or Style No. _____

Date of Purchase _____

ARC WELDING SAFETY PRECAUTIONS

⚠ WARNING

ARC WELDING can be hazardous.

PROTECT YOURSELF AND OTHERS FROM POSSIBLE SERIOUS INJURY OR DEATH. KEEP CHILDREN AWAY. PACEMAKER WEARERS KEEP AWAY UNTIL CONSULTING YOUR DOCTOR.

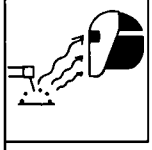
In welding, as in most jobs, exposure to certain hazards occurs. Welding is safe when precautions are taken. The safety information given below is only a summary of the more complete safety information that will be found in the Safety Standards listed on the next page. Read and follow all Safety Standards.

HAVE ALL INSTALLATION, OPERATION, MAINTENANCE, AND REPAIR WORK PERFORMED ONLY BY QUALIFIED PEOPLE.

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.

1. Do not touch live electrical parts.
2. Wear dry, hole-free insulating gloves and body protection.
3. Insulate yourself from work and ground using dry insulating mats or covers.
4. Disconnect input power or stop engine before installing or servicing this equipment.
5. Properly install and ground this equipment according to its Owner's Manual and national, state, and local codes.
6. When making input connections, attach proper grounding conductor first.
7. Turn off all equipment when not in use.
8. Do not use worn, damaged, undersized, or poorly spliced cables.
9. Do not wrap cables around your body.
10. Ground the workpiece to a good electrical (earth) ground.
11. Do not touch electrode if in contact with the work or ground.
12. Use only well-maintained equipment. Repair or replace damaged parts at once.
13. Wear a safety harness if working above floor level.
14. Keep all panels and covers securely in place.



ARC RAYS can burn eyes and skin; NOISE can damage hearing.

Arc rays from the welding process produce intense heat and strong ultraviolet rays that can burn eyes and skin. Noise from some processes can damage hearing.

NOISE

1. Use approved ear plugs or ear muffs if noise level is high.

ARC RAYS

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

FUMES AND GASES can be hazardous to your health.

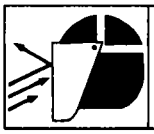
Welding produces fumes and gases. Breathing these fumes and gases can be hazardous to your health.

1. Keep your head out of the fumes. Do not breathe the fumes.
2. If inside, ventilate the area and/or use exhaust at the arc to remove welding fumes and gases.
3. If ventilation is poor, use an approved air-supplied respirator.
4. Read the Material Safety Data Sheets (MSDSs) and the manufacturer's instruction for metals, consumables, coatings, and cleaners.
5. Work in a confined space only if it is well ventilated, or while wearing an air-supplied respirator. Shielding gases used for welding can displace air causing injury or death. Be sure the breathing air is safe.
6. 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.
7. 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.

WELDING can cause fire or explosion.

Sparks and spatter fly off from the welding arc. The flying sparks and hot metal, weld spatter, hot workpiece, and hot equipment can cause fires and burns. Accidental contact of electrode or welding wire to metal objects can cause sparks, overheating, or fire.

1. Protect yourself and others from flying sparks and hot metal.
2. Do not weld where flying sparks can strike flammable material.
3. Remove all flammables within 35 ft (10.7 m) of the welding arc. If this is not possible, tightly cover them with approved covers.
4. Be alert that welding sparks and hot materials from welding can easily go through small cracks and openings to adjacent areas.
5. Watch for fire, and keep a fire extinguisher nearby.
6. Be aware that welding on a ceiling, floor, bulkhead, or partition can cause fire on the hidden side.
7. Do not weld on closed containers such as tanks or drums.
8. 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.
9. Do not use welder to thaw frozen pipes.
10. Remove stick electrode from holder or cut off welding wire at contact tip when not in use.
11. Wear oil-free protective garments such as leather gloves, heavy shirt, cuffless trousers, high shoes, and a cap.



FLYING SPARKS AND HOT METAL can cause injury.

Chipping and grinding cause flying metal. As welds cool, they can throw off slag.

1. Wear approved face shield or safety goggles. Side shields recommended.
2. Wear proper body protection to protect skin.

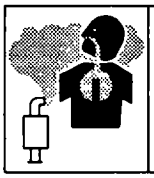
CYLINDERS can explode if damaged.

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.

1. Protect compressed gas cylinders from excessive heat, mechanical shocks, and arcs.
2. Install and secure cylinders in an upright position by chaining them to a stationary support or equipment cylinder rack to prevent falling or tipping.
3. Keep cylinders away from any welding or other electrical circuits.
4. Never allow a welding electrode to touch any cylinder.
5. Use only correct shielding gas cylinders, regulators, hoses, and fittings designed for the specific application; maintain them and associated parts in good condition.
6. Turn face away from valve outlet when opening cylinder valve.
7. Keep protective cap in place over valve except when cylinder is in use or connected for use.
8. Read and follow instructions on compressed gas cylinders, associated equipment, and CGA publication P-1 listed in Safety Standards.

⚠ WARNING

ENGINES can be hazardous.



ENGINE EXHAUST GASES can kill.

Engines produce harmful exhaust gases.

1. Use equipment outside in open, well-ventilated areas.
2. If used in a closed area, vent engine exhaust outside and away from any building air intakes.

ENGINE FUEL can cause fire or explosion.

Engine fuel is highly flammable.

1. Stop engine before checking or adding fuel.
2. Do not add fuel while smoking or if unit is near any sparks or open flames.
3. Allow engine to cool before fueling. If possible, check and add fuel to cold engine before beginning job.
4. Do not overfill tank – allow room for fuel to expand.
5. Do not spill fuel. If fuel is spilled, clean up before starting engine.

MOVING PARTS can cause injury.

Moving parts, such as fans, rotors, and belts can cut fingers and hands and catch loose clothing.

1. Keep all doors, panels, covers, and guards closed and securely in place.
2. Stop engine before installing or connecting unit.
3. Have only qualified people remove guards or covers for maintenance and troubleshooting as necessary.
4. To prevent accidental starting during servicing, disconnect negative (–) battery cable from battery.
5. Keep hands, hair, loose clothing, and tools away from moving parts.
6. Reinstall panels or guards and close doors when servicing is finished and before starting engine.

SPARKS can cause BATTERY GASES TO EXPLODE; BATTERY ACID can burn eyes and skin.

Batteries contain acid and generate explosive gases.

1. Always wear a face shield when working on a battery.
2. Stop engine before disconnecting or connecting battery cables.
3. Do not allow tools to cause sparks when working on a battery.
4. Do not use welder to charge batteries or jump start vehicles.
5. Observe correct polarity (+ and –) on batteries.

STEAM AND PRESSURIZED HOT COOLANT can burn face, eyes, and skin.

The coolant in the radiator can be very hot and under pressure.

1. Do not remove radiator cap when engine is hot. Allow engine to cool.
2. Wear gloves and put a rag over cap area when removing cap.
3. Allow pressure to escape before completely removing cap.

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.

PRÉCAUTIONS DE SÉCURITÉ EN SOUDAGE À L'ARC

MISE EN GARDE

LE SOUDAGE À L'ARC est dangereux.

PROTÉGEZ-VOUS, AINSI QUE LES AUTRES, CONTRE LES BLESSURES GRAVES POSSIBLES OU LA MORT. NE LAISSEZ PAS LES ENFANTS S'APPROCHER, NI LES PORTEURS DE STIMULATEUR CARDIAQUE (A MOINS QU'ILS N'AIENT CONSULTÉ UN MÉDECIN).

Le soudage, comme la plupart des activités industrielles, expose à certains risques. Le soudage n'est pas dangereux lorsqu'on prend des précautions. Les consignes de sécurité suivantes ne font que résumer l'information contenue dans les normes énumérées ci-après. Lisez et respectez toutes ces normes.

SEULES DES PERSONNES QUALIFIÉES DOIVENT FAIRE DES TRAVAUX D'INSTALLATION, DE RÉPARATION, D'ENTRETIEN ET D'ESSAI.

L'ÉLECTROCUTION peut être mortelle.

Une décharge électrique peut vous tuer ou vous brûler gravement. L'électrode et le circuit de soudage sont sous tension au démarrage. Le circuit d'entrée et les circuits internes des matériels sont aussi sous tension dès la mise en marche. En soudage automatique ou semi-automatique avec fil, ce dernier, le support de roquette, le logement des galets d'entraînement et toutes les pièces métalliques en contact avec le fil de soudage sont sous tension. Des matériels mal installés ou mal mis à la terre sont dangereux.

1. Ne touchez pas à des pièces sous tension.
2. Portez des gants et des vêtements isolants, secs et non troués.
3. Isolez-vous de la tôle à souder et de la mise à la terre au moyen de petits tapis isolants ou autres.
4. Déconnectez la prise d'entrée des matériels ou arrêtez leur moteur avant de les installer ou d'en faire l'entretien.
5. Veillez à installer ces matériels et à les mettre à la terre selon le manuel d'utilisation et les codes nationaux, provinciaux et locaux applicables.
6. Arrêtez tous les matériels après utilisation.
7. N'utilisez pas de câbles usés, endommagés, mal épissés ou de calibre trop petits.
8. N'enroulez pas de câbles autour de votre corps.
9. Mettez à la terre la tôle à souder au moyen d'une bonne prise de terre.
10. Ne touchez pas à l'électrode si vous êtes en contact avec le circuit de soudage (terre).
11. N'utilisez que des matériels en bon état. Réparez ou remplacez sur-le-champ les pièces endommagées.
12. Portez un harnais de sécurité si vous travaillez en hauteur.
13. Fermez solidement tous les panneaux et les capots.

Le RAYONNEMENT DE L'ARC peut brûler les yeux et la peau; le BRUIT peut endommager l'ouïe.

L'arc de soudage produit une chaleur et des rayons ultraviolets intenses, susceptibles de brûler les yeux et la peau. Le bruit causé par certains procédés peut endommager l'ouïe.

1. Portez un casque de soudeur avec écran filtrant de teinte appropriée (consultez la norme ANSI Z49 indiquée ci-après), pour vous protéger le visage et les yeux lorsque vous soudez ou que vous observez l'exécution d'une soudure.
2. Portez des lunettes de sécurité approuvées. Des écrans latéraux sont recommandées.
3. Entourez l'aire de soudage de rideaux ou de cloisons de protection contre les coups d'arc ou l'éblouissement; avertissez les observateurs de ne pas regarder l'arc.
4. Portez des vêtements en tissus ignifuge durable (laine et cuir) et des chaussures de sécurité.
5. Portez un casque antibruit ou des bouchons d'oreille approuvés si le niveau de bruit est élevé.

Les VAPEURS ET LES FUMÉES sont dangereuses pour la santé.

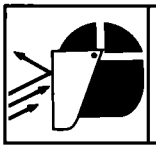
Le soudage dégage des vapeurs et des fumées qu'il est dangereux de respirer.

1. Écartez le visage pour éviter de respirer les fumées.
2. À l'intérieur, assurez-vous que l'aire de soudage est bien ventilée ou que les fumées et les vapeurs sont aspirées à l'arc.
3. Si la ventilation est mauvaise, portez un respirateur à adduction d'air approuvé.
4. Lisez les fiches signalétiques et les consignes du fabricant relatives aux métaux, aux produits consummables, aux revêtements et aux produits nettoyants.
5. Ne travaillez dans un espace confiné que s'il est bien ventilé; sinon, portez un respirateur à adduction d'air. Les gaz protecteurs de soudage peuvent déplacer l'oxygène de l'air et causer des blessures ou la mort. Assurez-vous que l'air est propre à la respiration.
6. Ne soudez pas à proximité d'opérations de dégraissage, de nettoyage ou de pulvérisation. La chaleur et les rayons de l'arc peuvent réagir avec des vapeurs et former des gaz hautement toxiques et irritants.
7. Ne soudez pas de tôles galvanisées ou plaquées en plomb ou en cadmium sans les avoir grattées à fond, car ces métaux, et tout revêtement qui en contient, peuvent alors dégager des fumées toxiques. Assurez-vous d'une bonne ventilation et portez un respirateur à adduction d'air si c'est nécessaire.

Le SOUDAGE peut causer un incendie ou une explosion.

L'arc produit des étincelles et des projections. Avec la chaleur intense dégagée par la tôle et les matériels, elles peuvent causer un incendie et des brûlures. Le contact accidentel de l'électrode avec un objet métallique peut provoquer des étincelles, un échauffement ou un incendie.

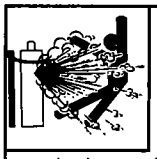
1. Protégez-vous, ainsi que les autres, contre les étincelles et les projections.
2. Ne soudez pas dans un endroit où des étincelles peuvent atteindre des matériaux inflammables.
3. Enlevez toutes les matières inflammables dans un rayon de 10,7 mètres autour de l'arc, ou couvrez-les soigneusement avec des bâches approuvées.
4. Méfiez-vous des étincelles et des éclats brûlants, susceptibles de pénétrer dans des aires adjacentes par de petites ouvertures ou fissures.
5. Méfiez-vous des incendies et gardez un extincteur à portée de la main.
6. N'oubliez pas qu'une soudure sur un plafond, un plancher, une cloison ou une paroi peut en enflammer l'autre côté.
7. Ne soudez pas un récipient fermé, comme un réservoir ou un tonneau.
8. Connectez le câble de soudage le plus près possible de la tôle de soudage pour empêcher le courant de suivre un parcours long et inconnu, et prévenir ainsi les risques d'électrocution et d'incendie.
9. Ne faites pas dégeler des tuyaux avec un chalumeau.
10. Videz votre carquois porte-électrodes ou coupez le fil au tube-contact après le soudage.
11. Portez des vêtements protecteurs non huileux, tels des gants en cuir, une chemise épaisse, un pantalon sans revers, des chaussures montantes et un casque.



LES ÉTINCELLES ET LES PROJECTIONS BRULANTES peuvent causer des blessures.

Le piquage et le meulage produisent des éclats de métal. En refroidissant, la soudure peut projeter du laitier.

1. Portez un écran facial ou des lunettes à coques approuvées. Des écrans latéraux sont recommandés.
2. Portez des vêtements de protection individuelle appropriés.



Les BOUTEILLES endommagées peuvent exploser.

Les bouteilles contiennent des gaz protecteurs sous haute pression. Des bouteilles endommagées peuvent exploser. Comme les bouteilles font normalement partie du procédé de soudage, traitez-les avec soin.

1. Les bouteilles doivent être protégées contre les sources de chaleur intense, les chocs et les arcs de soudage.
2. Enchaînez verticalement les bouteilles à un support ou à un cadre fixe pour les empêcher de tomber ou d'être renversées.
3. Éloignez les bouteilles de tout circuit électrique ou de soudage.
4. Empêchez tout contact entre une bouteille et une électrode.
5. N'utilisez que des bouteilles de gaz protecteur, des détendeurs, des flexibles et des raccords conçus pour chaque application spécifique; ces matériels et les pièces connexes doivent être en bon état.
6. Ne mettez pas le visage devant le robinet de bouteille en l'ouvrant.
7. Remettez le chapeau de bouteille après utilisation.
8. Lisez et respectez les consignes relatives aux bouteilles de gaz comprimé et aux matériels connexes, ainsi que la publication P-1 de la CGA, énumérées dans les normes ci-dessous.

MISE EN GARDE

Les MOTEURS peuvent être dangereux.

Les GAZ D'ÉCHAPPEMENT DES MOTEURS PEUVENT ÊTRE MORTELS.

Les moteurs produisent des gaz d'échappement nocifs.

1. Utilisez des machines à l'extérieur dans des aires ouvertes et bien ventilées.
2. Si vous utilisez des machines dans un endroit confiné, les fumées d'échappement doivent être envoyées à l'extérieur, loin des prises d'air du bâtiment.

Le CARBURANT peut causer un incendie ou une explosion.

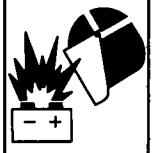
Le carburant est hautement inflammable.

1. Arrêtez le moteur avant de vérifier le niveau de carburant ou de faire le plein.
2. Ne faites pas le plein en fumant ou proche d'une source d'étincelles ou d'une flamme nue.
3. Si c'est possible, laissez le moteur refroidir avant de faire le plein de carburant ou d'en vérifier le niveau au début du soudage.
4. Ne faites pas le plein de carburant à ras bord : prévoyez de l'espace pour son expansion.
5. Faites attention de ne pas renverser de carburant. Nettoyez tout carburant renversé avant de faire démarrer le moteur.

Des PIÈCES EN MOUVEMENT peuvent causer des blessures.

Des pièces en mouvement, telles des ventilateurs, des rotors et des courroies peuvent couper les doigts et les mains, ou accrocher des vêtements amples.

1. Assurez-vous que les portes, les panneaux, les capots et les protecteurs sont bien fermés.
2. Avant d'installer ou de connecter un système, arrêtez-en le moteur.
3. Seules des personnes qualifiées doivent démonter des protecteurs ou des capots pour faire l'entretien ou le dépannage nécessaire.
4. Pour empêcher un démarrage accidentel d'un système pendant l'entretien, débranchez le câble d'accumulateur à la borne négative.
5. N'approchez pas les mains ou les cheveux de pièces en mouvement; elles peuvent aussi accrocher des vêtements amples et des outils.
6. Réinstallez les capots ou les protecteurs et fermez les portes après des travaux d'entretien et avant de faire démarrer le moteur.



Des ÉTINCELLES peuvent FAIRE EXPLOSER UN ACCUMULATEUR; L'ÉLECTROLYTE D'UN ACCUMULATEUR peut brûler la peau et les yeux.

Les accumulateurs contiennent de l'électrolyte et dégagent des vapeurs explosives.

1. Portez toujours un écran facial en travaillant sur un accumulateur.
2. Arrêtez le moteur avant de connecter ou de déconnecter des câbles d'accumulateur.
3. N'utilisez que des outils anti-étincelles pour travailler sur un accumulateur.
4. N'utilisez pas un poste de soudage pour charger un accumulateur ou connecter provisoirement un véhicule.
5. Utilisez la polarité correcte (+ et -) de l'accumulateur.

La VAPEUR ET LE LIQUIDE DE REFROIDISSEMENT BRÛLANT SOUS PRESSION peuvent brûler la peau et les yeux.

Le liquide de refroidissement d'un radiateur peut être brûlant et sous pression.

1. N'ôtez pas le bouchon de radiateur tant que le moteur n'a pas refroidi.
2. Mettez des gants et posez un torchon sur le bouchon pour l'ôter.
3. Laissez la pression s'échapper avant d'ôter complètement le bouchon.

PRINCIPALES NORMES DE SÉCURITÉ

Safety in Welding and Cutting, norme ANSI Z49.1, American Welding Society, 550, N.W. LeJeune Rd., Miami FL 33128.

Safety and Health Standards, OSHA 29 CFR 1910, 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, norme AWS F4.1, American Welding Society, 550, N.W. LeJeune Rd., Miami FL 33128.

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

Safe Handling of Compressed Gases in Cylinders, document P-1, Compressed Gas Association, 1235 Jefferson Davis Highway, Suite 501, Arlington, Va 22202.

Code for Safety in Welding and Cutting, norme CSA W117.2, Association canadienne de normalisation, Standards Sales, 176 Rexdale Boulevard, Rexdale, Ontario, Canada M9W 1R3.

Safe Practices for Occupation and Educational Eye and Face Protection, norme ANSI Z87.1, American National Standards Institute, 1430 Broadway, New York, NY 10018.

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

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EMF INFORMATION

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

The following is a quotation from the General Conclusions Section of the U.S. Congress, Office of Technology Assessment, *Biological Effects of Power Frequency Electric & Magnetic Fields – Background Paper*, OTA-BP-E-53 (Washington, DC: U.S. Government Printing Office, May 1989): ". . . there is now a very large volume of scientific findings based on experiments at the cellular level and from studies with animals and people which clearly establish that low frequency magnetic fields can interact with, and produce changes in, biological systems. While most of this work is of very high quality, the results are complex. Current scientific understanding does not yet allow us to interpret the evidence in a single coherent framework. Even more frustrating, it does not yet allow us to draw definite conclusions about questions of possible risk or to offer clear science-based advice on strategies to minimize or avoid potential risks."

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 the body.
4. Keep welding power source and cables as far away as practical.
5. Connect work clamp to workpiece as close to the weld as possible.

About Pacemakers:

The above procedures are among those also normally recommended for pacemaker wearers. Consult your doctor for complete information.

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TABLE OF CONTENTS

SECTION 1 – SAFETY INFORMATION

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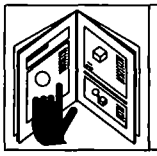
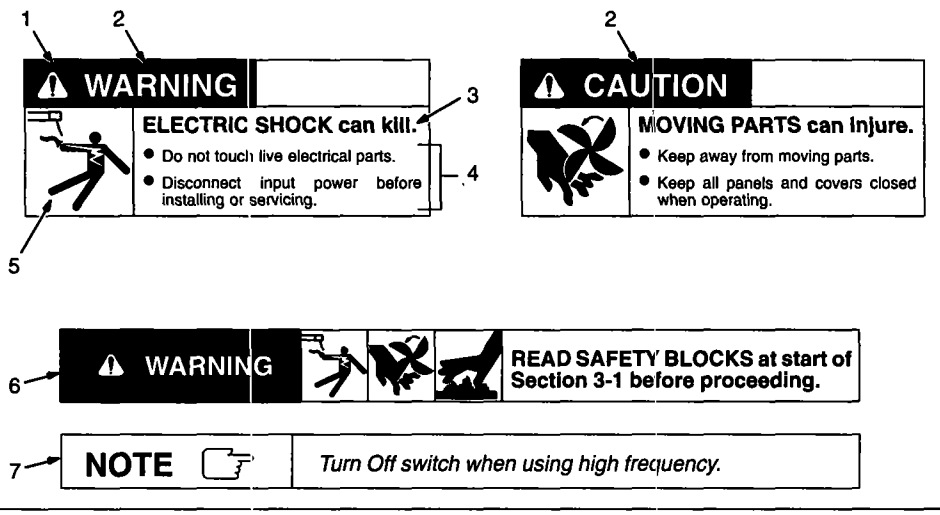


- Read all safety messages throughout this manual.
- Obey all safety messages to avoid injury.
- Learn the meaning of WARNING and CAUTION.



1 Safety Alert Symbol

2 Signal Word

WARNING means possible death or serious injury can happen.

CAUTION means possible minor injury or equipment damage can happen.

3 Statement Of Hazard And Result

4 Safety Instructions To Avoid Hazard

5 Hazard Symbol (If Available)

6 Safety Banner

Read safety blocks for each symbol shown.

7 NOTE

Special instructions for best operation – not related to safety.

Figure 1-1. Safety Information

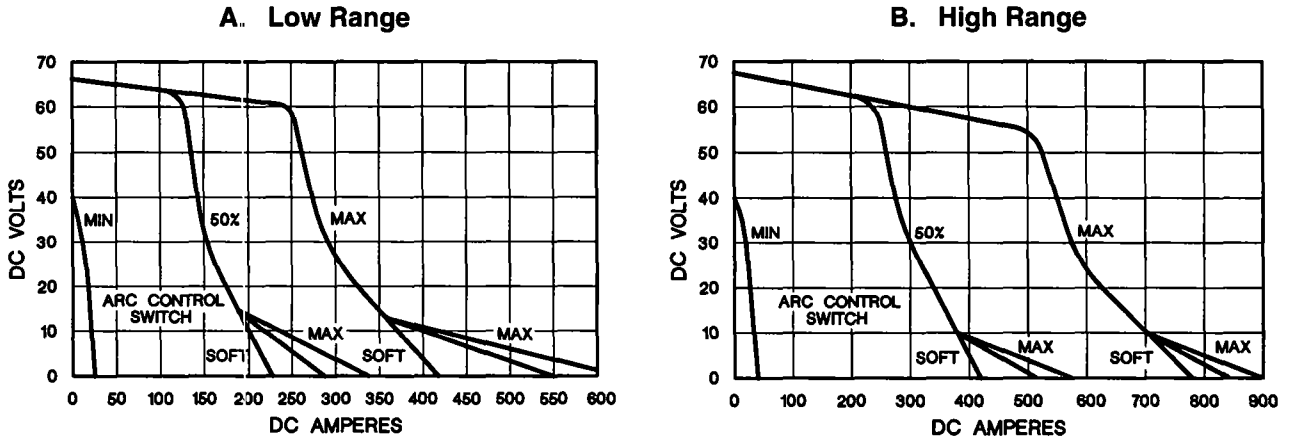
SECTION 2 – SPECIFICATIONS

Table 2-1. Welding Power Source

Specifications	Description
Type Of Output	Constant Current/Direct Current (CC/DC)
Welding Process	Shielded Metal Arc (SMAW) And Gas Tungsten Arc (GTAW) Welding
Max Open-Circuit Voltage	70 Volts DC
Type Of Input Power	Three-Phase; 220, 380, 400, Or 415 Volts AC, 50/60 Hz
Overall Dimensions	See Figure 3-2
Input Amperes At Rated Output	102 A At 220 V, 59 A At 380 V, 56 A At 400 V, 54 A At 415 V
Rated Weld Output	510 Amperes, 41 Volts DC At 35% Duty Cycle (see Section 2-2)
KVA/KW Used At Rated Output	38.8 kVA/25.6 kW
Amperage Range	Low: 20 - 270 A; High: 37 - 510 A
Weight	Net: 543 lb (246 kg); Ship: 568 lb (258 kg)

2-1. 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.



ssb1.1 10/91 – SB-084 850-A / SB-084 845-A

Figure 2-1. Volt-Ampere Curves

2-2. Duty Cycle

⚠ CAUTION

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

- Do not weld at rated load longer than shown below.

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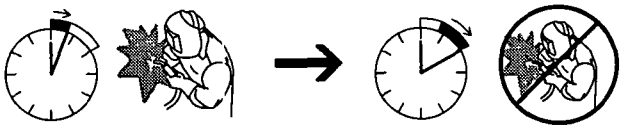
Definition

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

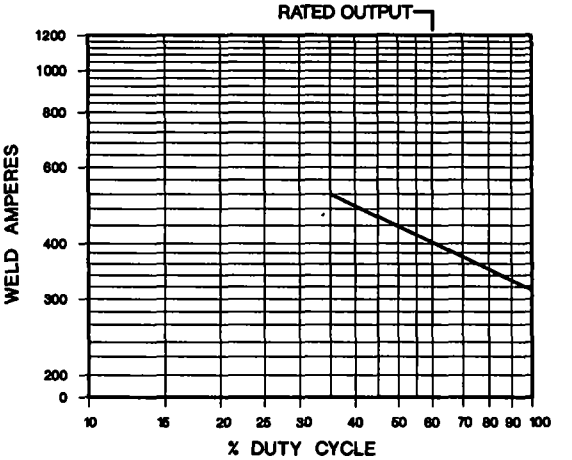
35% Duty Cycle At 510 Amperes



3-1/2 Minutes Welding

6-1/2 Minutes Resting

Chart



sb1.2 8/93 – Ref. SB-000 865-D

Figure 2-2. Duty Cycle

3-1. Selecting A Location And Moving Welding Power Source

⚠ WARNING

ELECTRIC SHOCK can kill.

- Do not touch live electrical parts.
- Disconnect input power conductors from de-energized supply line BEFORE moving welding power source.

FIRE OR EXPLOSION can result from placing unit on, over, or near combustible surfaces.

- Do not locate unit on, over, or near combustible surfaces.
- Do not install unit near flammables.

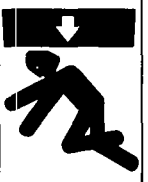
BLOCKED AIRFLOW causes overheating and possible damage to unit.

- Do not block or filter airflow.

Warranty is void if any type of filter is used.

FUMES can be hazardous; LACK OF FRESH AIR AND PROPER VENTILATION can be harmful.

- Do not breathe welding fumes.
- Place unit only where there is a good fresh air supply and proper ventilation.



FALLING EQUIPMENT can cause serious personal injury and equipment damage.

- Use lifting eye to lift unit only, NOT running gear, gas cylinders, or any other accessories.
- Use equipment of adequate capacity to lift the unit.

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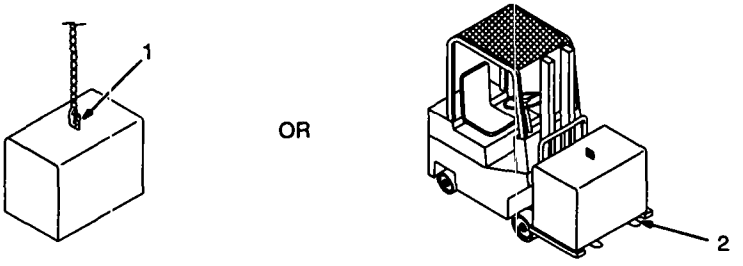
Movement



1 Lifting Eye

2 Lifting Forks

Use lifting eye or lifting forks to move unit.

If using lifting forks, extend forks beyond opposite side of unit.

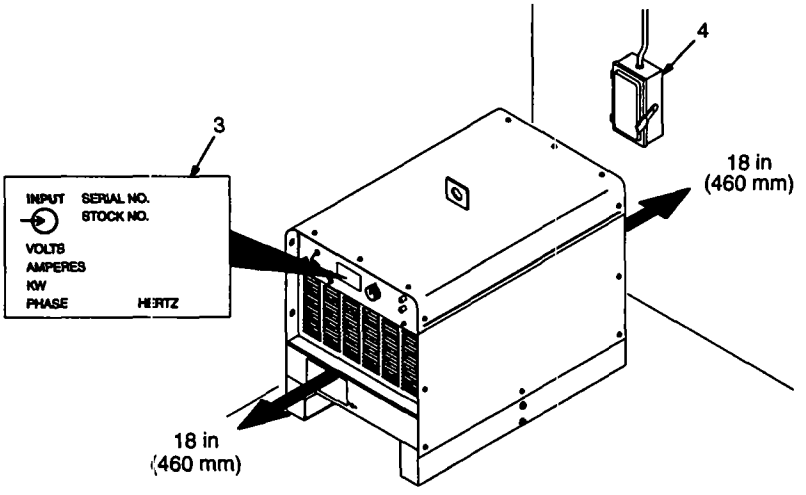
3 Rating Label

Use rating label to determine input power needs.

4 Line Disconnect Device

Locate unit near correct input power supply.

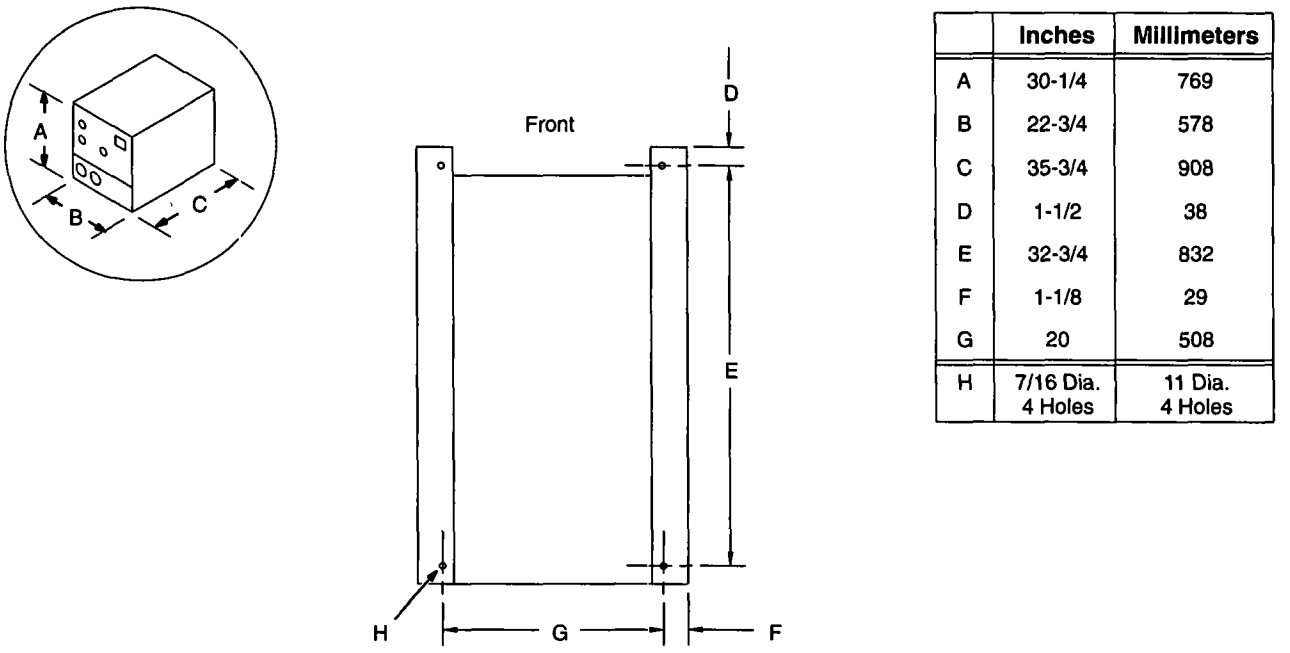
Location And Airflow



ssb9.1 12/93 – ST-800 402 / ST-000 599-H

Figure 3-1. Movement And Location Of Welding Power Source

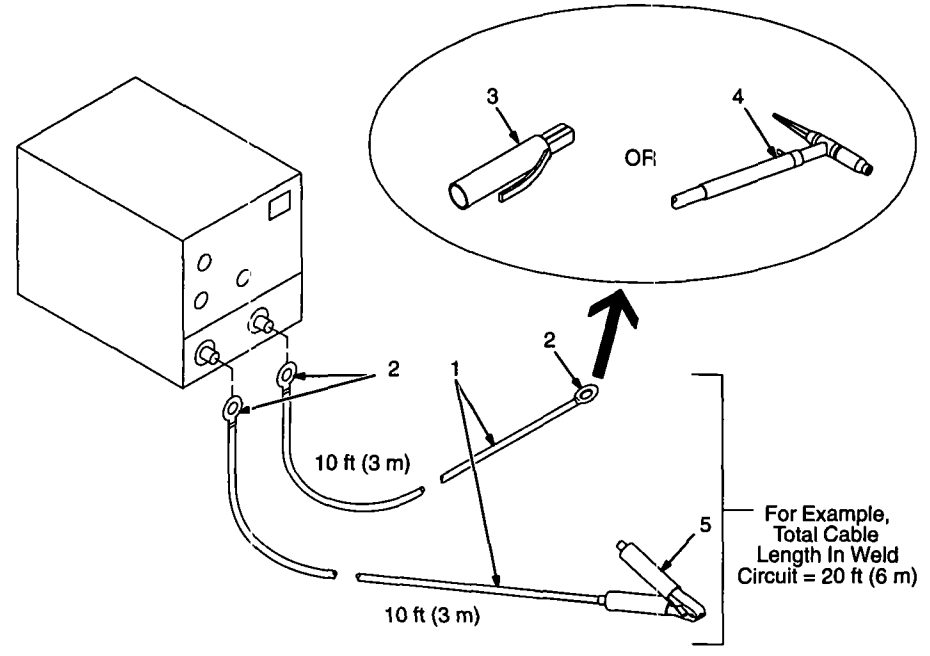
NOTE ☞ *Overall dimensions (A, B, and C) include lifting eye, handles, hardware, etc.*



	Inches	Millimeters
A	30-1/4	769
B	22-3/4	578
C	35-3/4	908
D	1-1/2	38
E	32-3/4	832
F	1-1/8	29
G	20	508
H	7/16 Dia. 4 Holes	11 Dia. 4 Holes

Figure 3-2. Overall Dimensions And Base Mounting Hole Layout

3-2. Selecting And Preparing Weld Output Cables



1 Weld Output Cable

Determine total cable length in weld circuit and maximum welding amperes. Use Table 3-1 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 or electrode holder, and weld output terminals.

3 Insulated Electrode Holder

4 GTAW Torch

Install according to manufacturer's instructions.

5 Work Clamp

Install onto work cable.

Figure 3-3. Selecting And Preparing Weld Output Cables

Table 3-1. 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
900	2-2/0	2-3/0	2-4/0	3-3/0	3-4/0	4-4/0	4-4/0	
1000	2-2/0	2-3/0	2-4/0	3-3/0	4-3/0	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

3-3. Connecting To Weld Output Terminals

⚠ WARNING

ELECTRIC SHOCK can kill.

- Do not touch live electrical parts.
- Turn Off welding power source, and disconnect input power before making any weld output connections.

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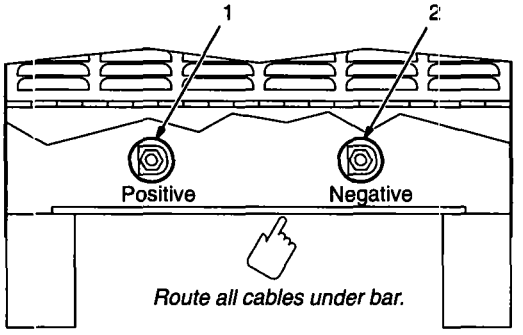


Turn screw and open lower access door.

1 Positive (+) Weld Output Terminal

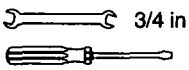
2 Negative (–) Weld Output Terminal

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

For Electrode Negative (DCEN), reverse cable connections.

Close door.

Tools Needed:



Ref. ST-155 048-A

Figure 3-4. Weld Output Connections

3-4. Remote 14 Receptacle Information And Connections

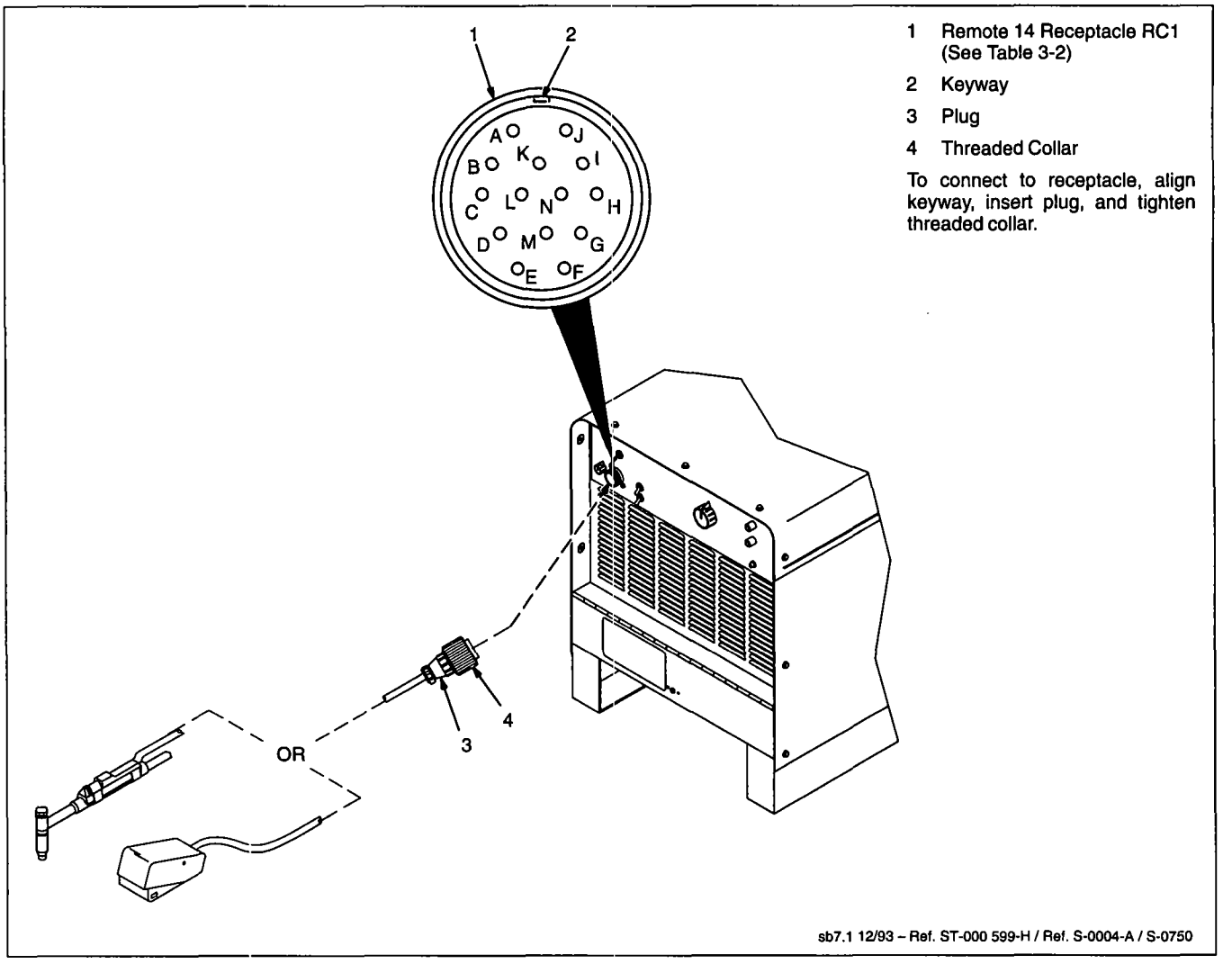


Figure 3-5. Remote 14 Connections

Table 3-2. Remote 14 Socket Information

REMOTE 14	Socket*	Socket Information
OUTPUT (CONTACTOR)	A	24 volts ac.
	B	Contact closure to A completes 24 volts ac contactor control circuit.
A AMPERAGE	C	+10 volts dc output to remote control.
	D	Remote control circuit common.
	E	0 to +10 volts dc input command signal from remote control.

*The remaining sockets are not used.

3-5. Connecting Input Power

⚠ WARNING

ELECTRIC SHOCK can kill.

- Do not touch live electrical parts.
- Turn Off welding power source, and disconnect input power before inspecting or installing.
- Have only qualified persons install unit.
- Installation must meet National Electrical Code and all other codes.

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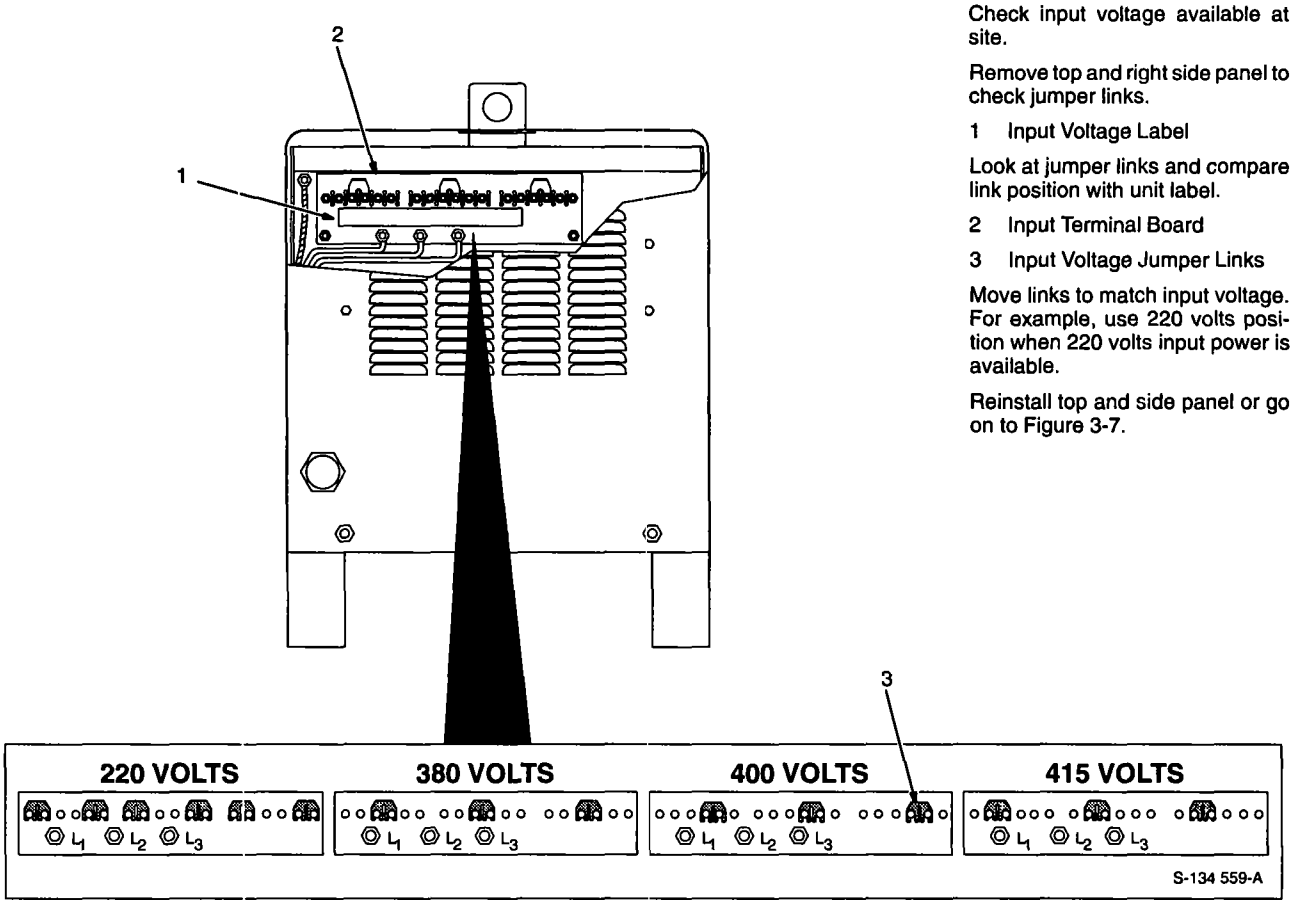
A. Positioning Jumper Links



Jumper links allow operation on different input voltages and are factory set for the highest input voltage.

Check input voltage available at site.

Remove top and right side panel to check jumper links.

1 Input Voltage Label

Look at jumper links and compare link position with unit label.

2 Input Terminal Board

3 Input Voltage Jumper Links

Move links to match input voltage. For example, use 220 volts position when 220 volts input power is available.

Reinstall top and side panel or go on to Figure 3-7.

Tools Needed:

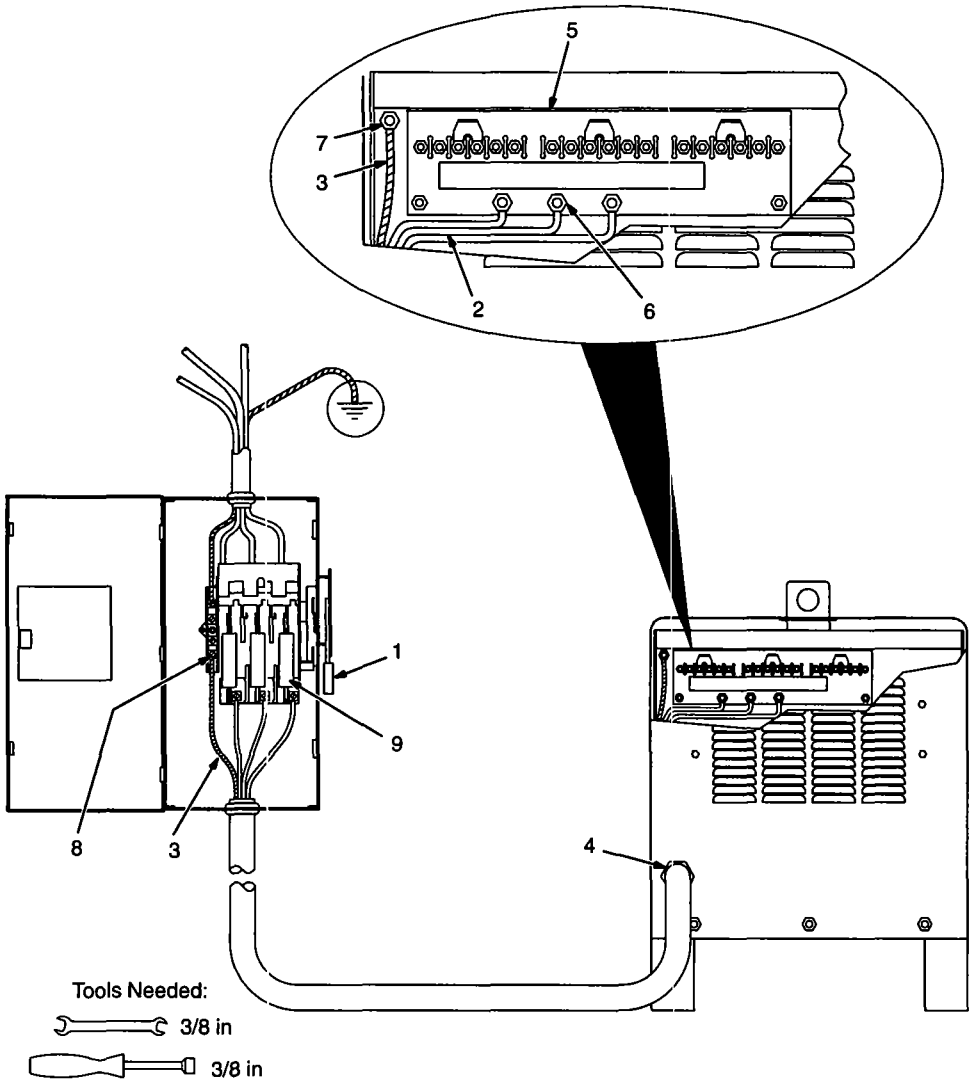
3/8 in

3/8 in

ssb5.1* 2/92 – Ref. ST-094 762-E

Figure 3-6. Input Voltage Jumper Links Location

B. Connecting Input Power



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 Table 3-3. Conductor rating must comply with national, state, and local electrical codes. Use lugs of proper amperage capacity and correct hole size.

4 Strain Relief Connector

Insert conductors through strain relief.

5 Input Terminal Board

6 Line Terminals

7 Welding Power Source Ground Terminal

Connect grounding conductor to ground terminal first. Then connect input conductors to line terminals.

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 side panel.

9 Overcurrent Protection

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

ssb2.4* 1/94 – ST-094 762-E

Figure 3-7. Input Power Connections

Table 3-3. Electrical Service Requirements*

Input Voltage	220	380	400	415
Input Amperes At Rated Output	102	59	56	54
Recommended Standard Fuse Or Circuit Breaker Rating In Amperes[1]	150	90	80	80
Input Conductor Size In AWG/Kcmil[2] (MM²)	4 (19)	8 (8)	8 (8)	8 (8)
Max Input Conductor Length In Feet (Meters)[3]	130 (140)	172 (52)	190 (58)	205 (62)
Grounding Conductor Size In AWG/Kcmil[4] (MM²)	6 (13)	8 (8)	8 (8)	8 (8)

* These values are calculated from the 1993 edition of the National Electrical Code (NEC).

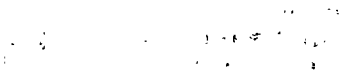
1 Recommended fuse or circuit breaker size is that closest to 150% of rated input amperage of the welding power source. Article 630-12(a) of NEC allows fuse or circuit breaker sizing up to 200% of rated input amperage.

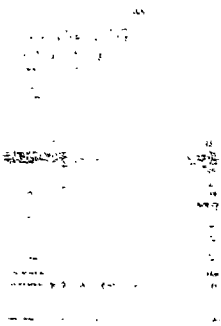
2 Input conductor size is for insulated copper wire with 75°C rating with not more than three single current-carrying conductors in a cable or raceway (Table 310-16 of NEC).

3 Maximum length is to prevent more than a 3% voltage drop between service entrance and input terminals of the welding power source (Articles 210-19(a) and 215-2(b) of NEC).

4 The grounding conductor shall be colored or identified as specified in the NEC. Grounding conductor size for copper wire is not required to be larger than input conductor (Article 250-95 of NEC).

Ref. S-0092-G





SECTION 4 – OPERATION

⚠ WARNING

ELECTRIC SHOCK can kill.

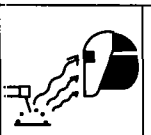
- Always wear dry insulating gloves.
- Insulate yourself from work and ground.
- Do not touch live electrical parts.
- Keep all panels and covers securely in place.

FUMES AND GASES can be hazardous to your health.

- Keep your head out of the fumes.
- Ventilate area, or use breathing device.
- Read Material Safety Data Sheets (MSDSs) and manufacturer's instructions for material used.

WELDING can cause fire or explosion.

- Do not weld near flammable material.
- Watch for fire; keep extinguisher nearby.
- Do not locate unit over combustible surfaces.
- Do not weld on closed containers.
- Allow work and equipment to cool before handling.

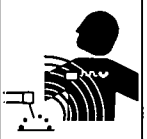


ARC RAYS can burn eyes and skin; NOISE can damage hearing.

- Wear welding helmet with correct shade of filter.
- Wear correct eye, ear, and body protection.

MOVING PARTS can cause injury.

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



MAGNETIC FIELDS FROM HIGH CURRENTS can affect pacemaker operation.

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

See Safety Precautions at beginning of manual for basic welding safety information.

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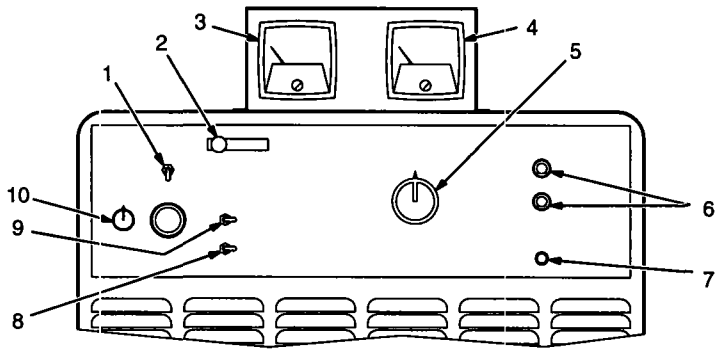
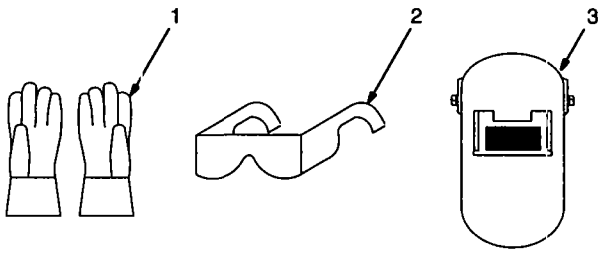


1 Range Switch
2 Polarity Switch (Optional)
3 Voltmeter (Optional)
4 Ammeter (Optional)
5 Amperage Adjustment Control
6 Power Push Buttons Switch
7 Pilot Light
8 Output/Contactor Switch
9 Amperage Control Switch
10 Arc Control

Ref. ST-155 048-A

Figure 4-1. Controls



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)

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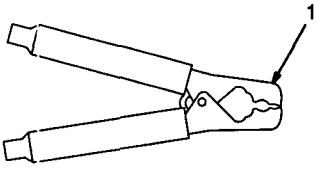
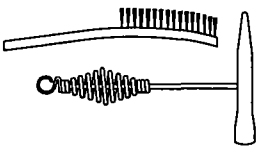
Figure 4-2. Safety Equipment



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

Figure 4-3. Work Clamp

⚠ WARNING

ELECTRIC SHOCK can kill.

- Do not touch live electrical parts.
- Do not touch weld output terminals when contactor is energized.
- Do not touch electrode and work clamp at the same time.

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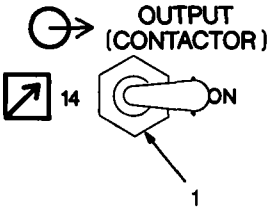
⚠ **Weld output terminals are energized when switch is On and Power is On.**



1 Output/Contactor Switch

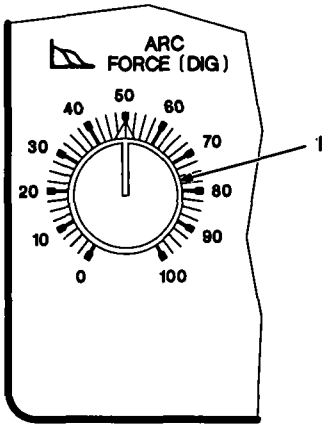
Use switch to select way of controlling unit output.

For weld output, place switch in On position.

For remote output control, place switch in Remote 14 position (see Section 3-4).

Ref. ST-168 257

Figure 4-4. Output/Contactor Control Switch



1 Arc Force Control (Dig)

This control is used for SMAW welding and is used to help start an arc or make vertical or overhead welds (control increases amperage at low arc voltage).

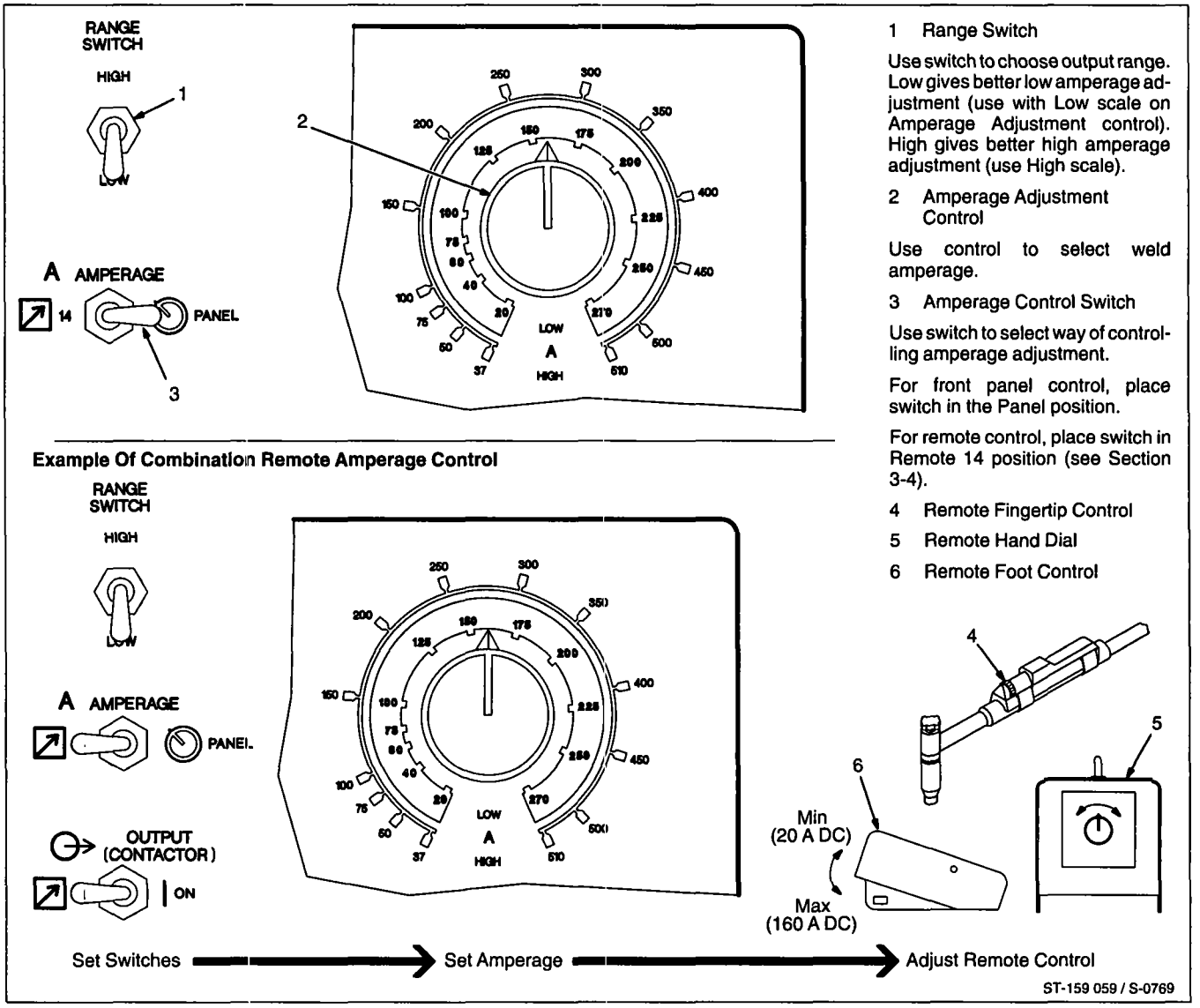
When set at 0, short-circuit amperage at low arc voltage is the same as normal welding amperage.

When set at 100, short-circuit amperage at low arc voltage increases to help arc starting.

Select setting best suited for application. Numbers around control are for reference only.

Set control at 0 for GTAW welding.

Figure 4-5. Arc Control



1 Range Switch

Use switch to choose output range. Low gives better low amperage adjustment (use with Low scale on Amperage Adjustment control). High gives better high amperage adjustment (use High scale).

2 Amperage Adjustment Control

Use control to select weld amperage.

3 Amperage Control Switch

Use switch to select way of controlling amperage adjustment.

For front panel control, place switch in the Panel position.

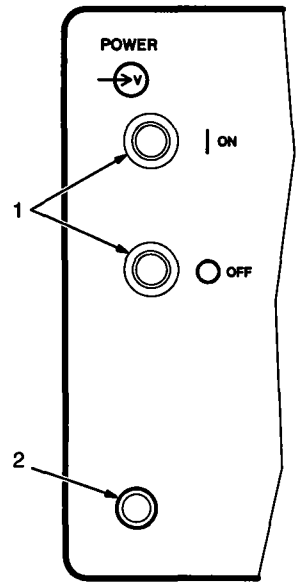
For remote control, place switch in Remote 14 position (see Section 3-4).

4 Remote Fingertip Control

5 Remote Hand Dial

6 Remote Foot Control

Figure 4-6. Amperage Adjustment Controls



1 Power Push Buttons Switch

Use buttons to turn unit, fan motor, and pilot light On and Off.

2 Pilot Light

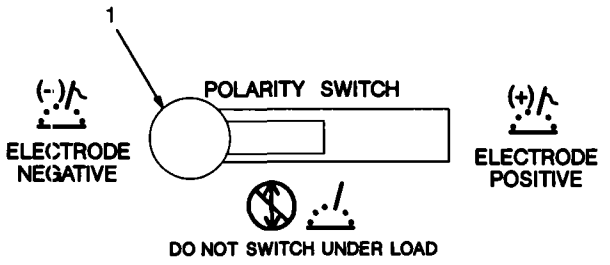
Figure 4-7. Power Push Buttons Switch And Pilot Light

⚠ WARNING

ARCING can damage switch contacts.

- Do not change Polarity Switch position while welding.

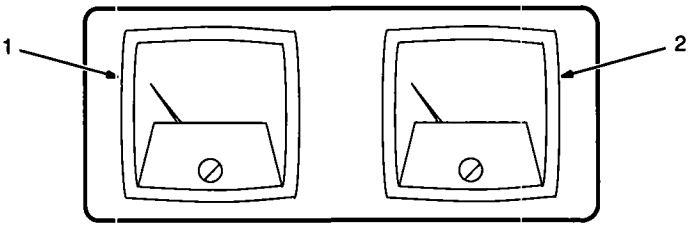
Arcing inside switch can damage contacts, causing switch to fail.



1 Polarity Switch

Use switch to select weld polarity.

Figure 4-8. Polarity Switch (Optional)



1 Voltmeter

Voltmeter displays voltage at the weld output terminals, but not necessarily the welding arc due to cable resistance, poor connections, etc.

2 Ammeter

Ammeter displays weld amperage output of unit.

Figure 4-9. Voltmeter And Ammeter (Optional)

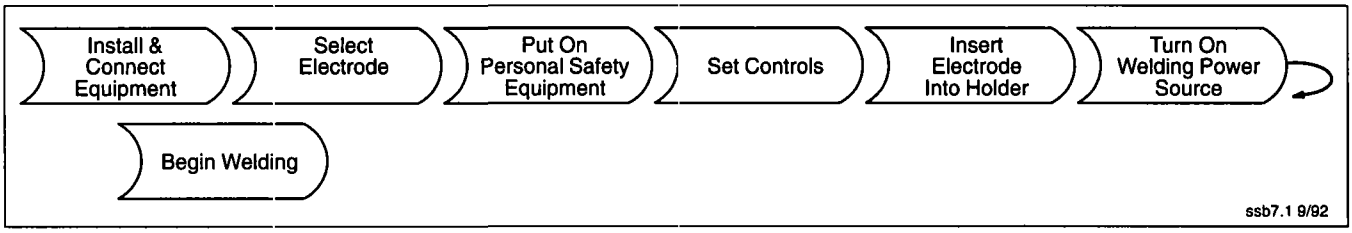


Figure 4-10. Sequence Of Shielded Metal Arc Welding (SMAW)

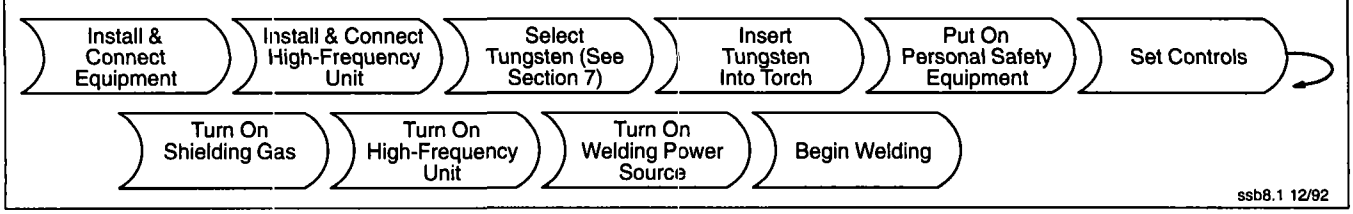


Figure 4-11. Sequence Of Gas Tungsten Arc Welding (GTAW)

⚠ WARNING

ELECTRIC SHOCK can kill.
- Do not touch live electrical parts.
- Turn Off welding power source, and disconnect input power before inspecting, maintaining, or servicing.

HOT PARTS can cause severe burns.
- Allow cooling period before maintaining or servicing.

MOVING PARTS can cause injury.
- Keep away from moving parts.

Maintenance to be performed only by qualified persons.

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5-1. Routine Maintenance

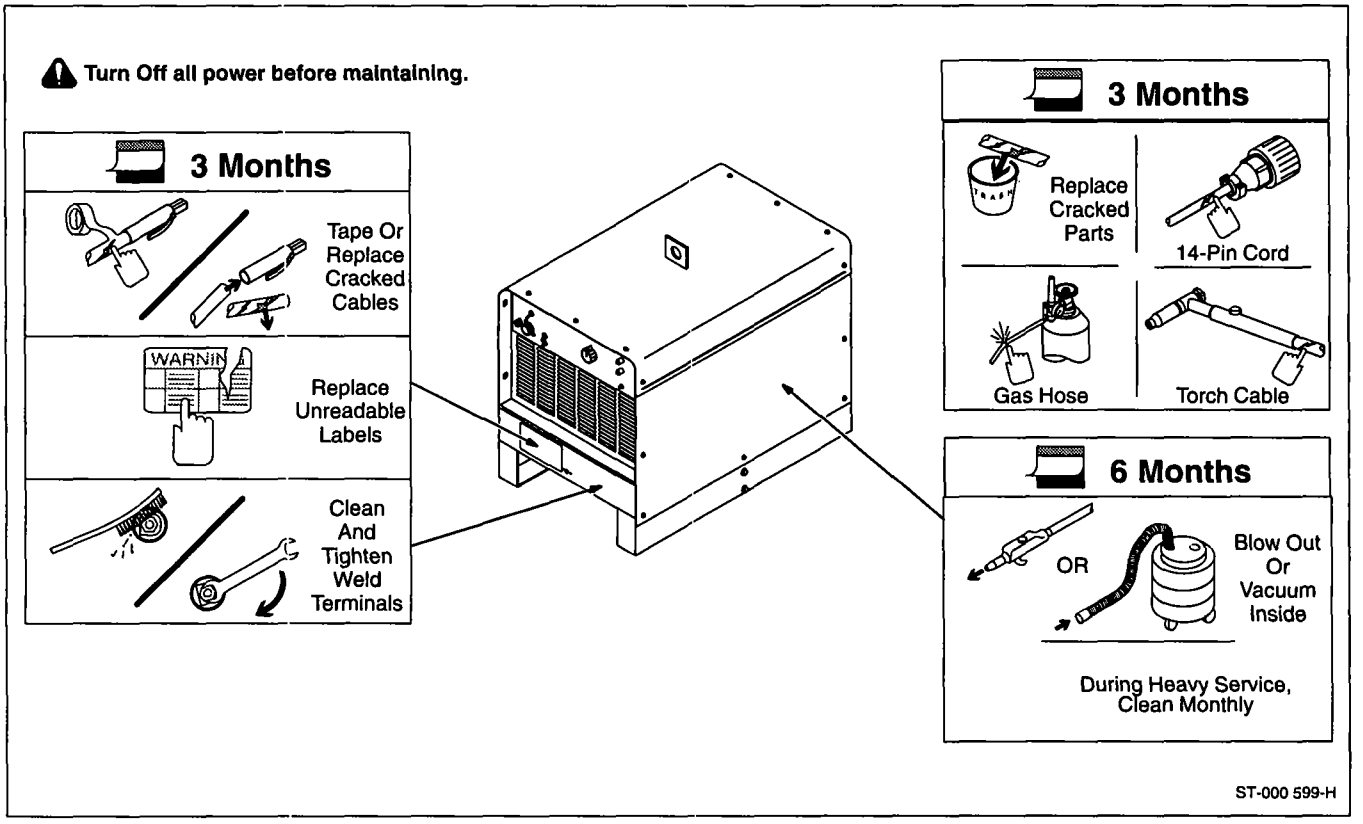

Figure 5-1. Maintenance Schedule

5-2. Overload Protection

⚠ WARNING **READ SAFETY BLOCKS at start of Section 5 before proceeding.**

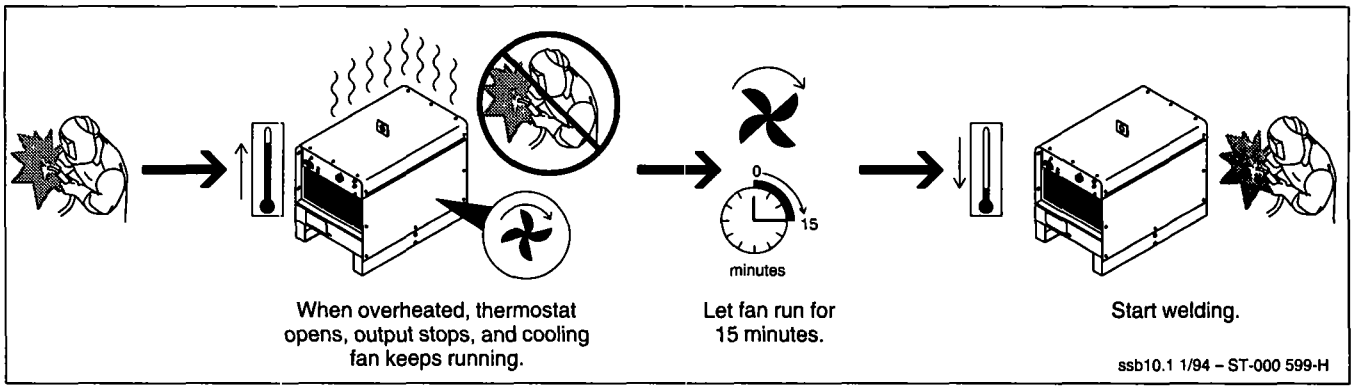

Figure 5-2. Overheating

5-3. Troubleshooting

⚠ WARNING

ELECTRIC SHOCK can kill.
- Do not touch live electrical parts.
- Turn Off welding power source, and disconnect input power before inspecting, maintaining, or servicing.

HOT PARTS can cause severe burns.
- Allow cooling period before servicing.

MOVING PARTS can cause injury.
- Keep away from moving parts.

Troubleshooting to be performed only by qualified persons.

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Table 5-1. Welding Trouble

Trouble	Remedy	Section
No weld output; unit completely inoperative.	Place line disconnect switch in the On position.	3-5B
	Check for open line fuse(s), and replace if necessary. Check and reset circuit breakers.	3-5B
	Check for proper input connections.	3-5B
	Check for proper jumper link positions.	3-5A
	Thermostat TP1 open. Allow a cooling period of approximately fifteen minutes.	5-2
	Check push button Power switch linkage for restrictions or obstructions.	- -
No weld output; pilot light PL1 on.	Clean and tighten all weld connections.	3-3
	Place Output (Contactor) switch in the On position or connect Remote Contactor Control To RC1.	Figure 4-4
	Check remote contactor control switch for proper operation with an ohmmeter, and replace if necessary.	- -
	Have Factory Authorized Service Station/Service Distributor check control board PC1.	- -

Trouble	Remedy	Section
Low or minimum weld output.	Check for proper line voltage.	--
	Check for open line fuse(s), and replace if necessary. Check and reset circuit breakers.	3-5B
	Clean and tighten all weld connections.	3-3
	Place Amperage control switch in the correct position.	Figure 4-6
	Have Factory Authorized Service Station/Service Distributor check control board PC1 and/or hall device HD1.	--
Maximum weld output.	Have Factory Authorized Service Station/Service Distributor check Amperage Adjustment control, control board PC1 and/or hall device HD1.	--
Erratic weld output.	Check for proper input connections.	3-5B
	Use proper size and type electrode.	--
Excessive line current or line fuse(s) opens repeatedly.	Check for proper input connections.	3-5B
	Check for proper jumper link positions.	3-5A
	Check for shorted fan motor FM leads, and repair if necessary.	--
Fan motor inoperative and/or overheating.	Check for fan blade obstruction.	--
	Replace fan motor FM, if necessary.	--
Wandering arc; poor control of arc direction.	Reduce gas flow rate.	--
	Select proper size tungsten.	7
	Properly prepare tungsten.	7
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

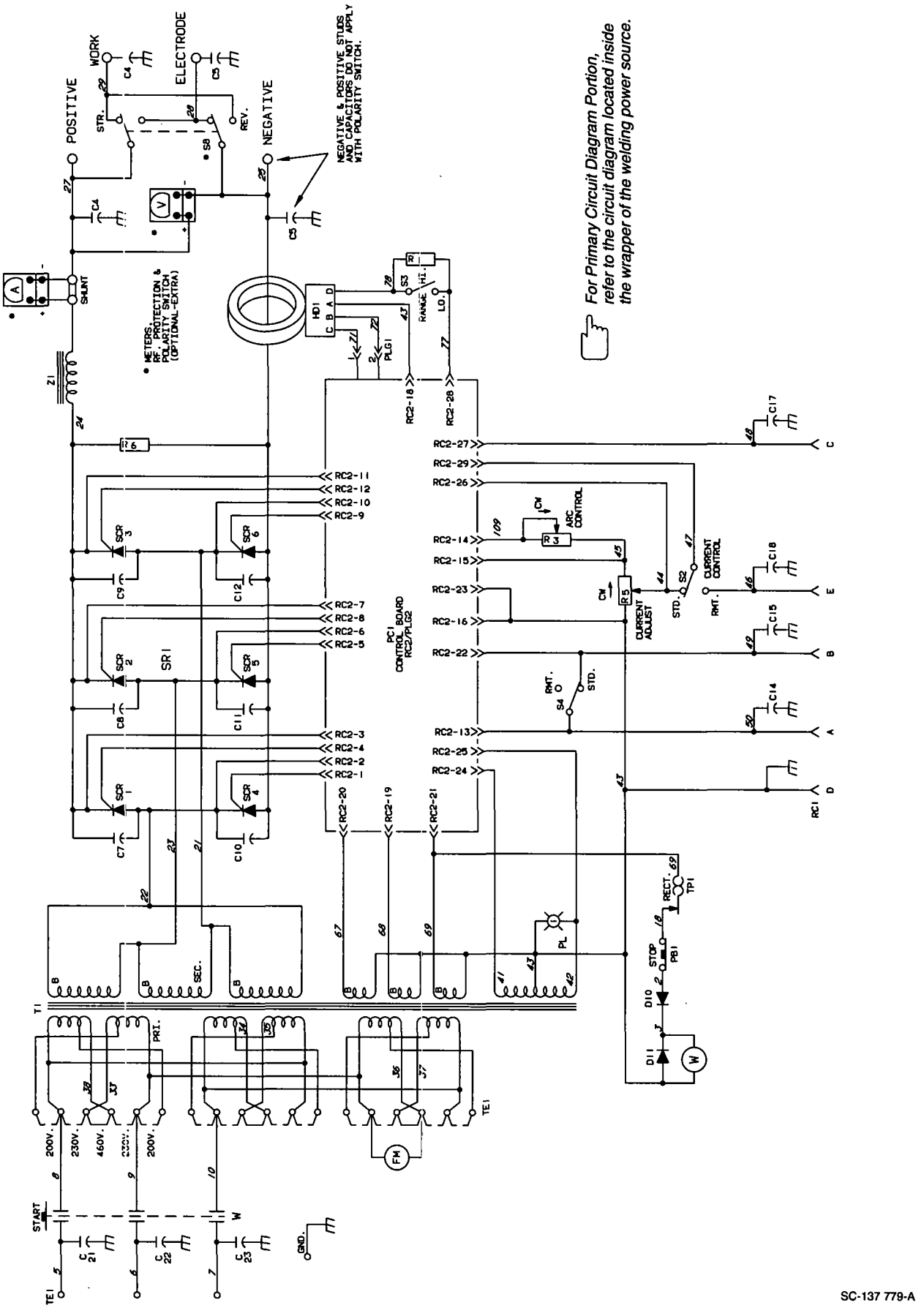

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Figure 6-1. Circuit Diagram For Welding Power Source

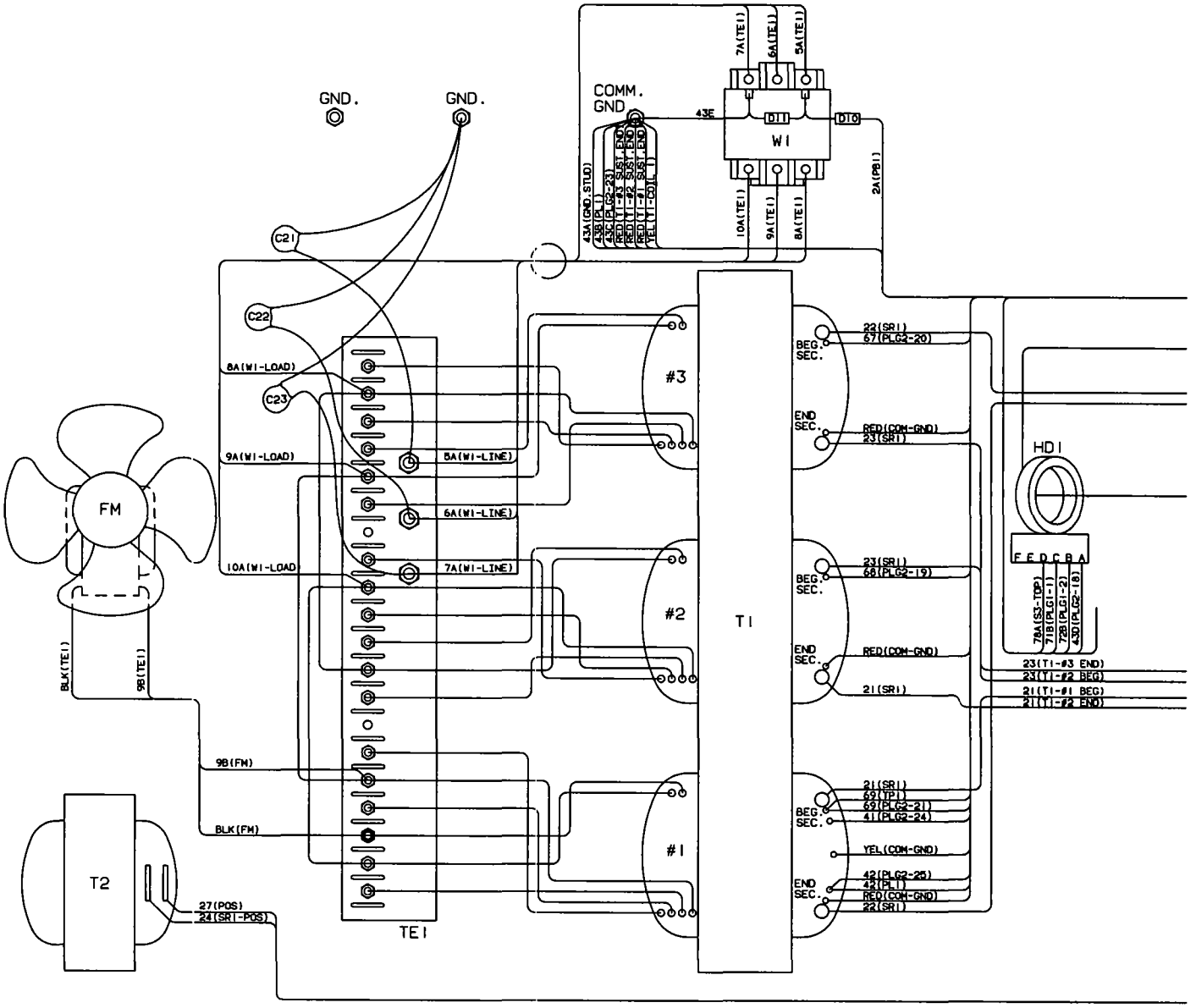
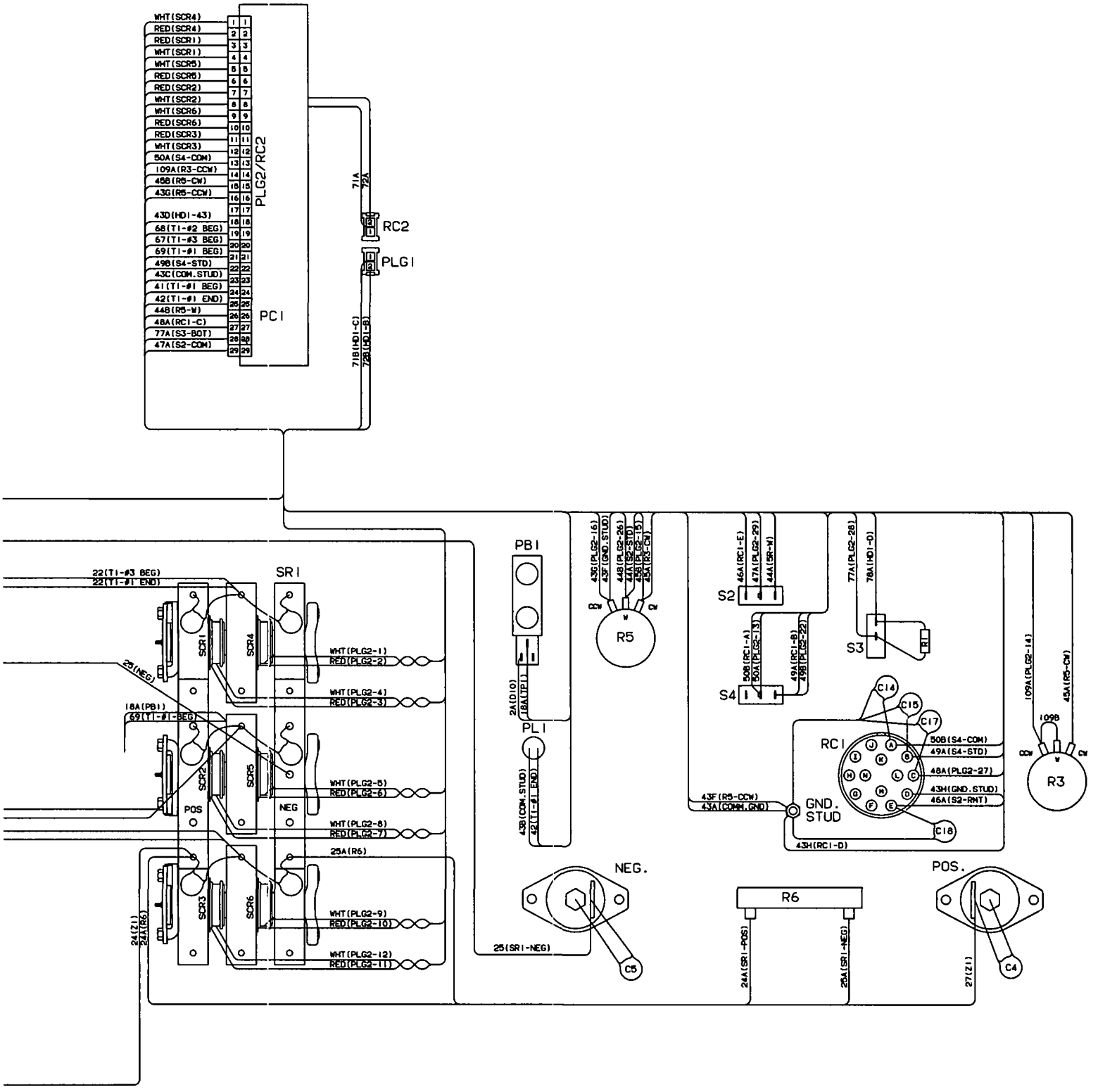


Figure 6-2. Wiring Diagram For Welding Power Source



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SECTION 7 – 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

Table 7-1. Tungsten Size

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

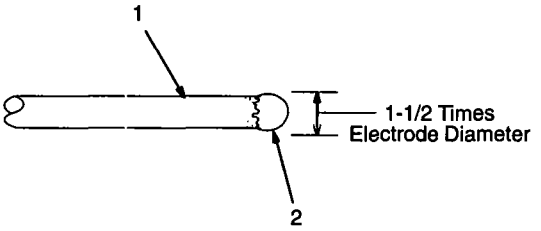
♦ Typical argon shielding gas flow rates are 15 to 35 cfh (cubic feet per hour).

*Not Recommended.

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

S-0009

7-2. Preparing Tungsten



1 Tungsten Electrode

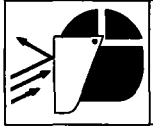
2 Balled End

Ball end of tungsten before welding by applying either an ac amperage slightly higher than what is recommended for a given electrode diameter (see NO TAG), or a dc electrode positive amperage.

Ref. S-0161

Figure 7-1. Preparing Tungsten For AC Or DC Electrode Positive (DCEP) Welding

⚠ CAUTION



FLYING SPARKS AND HOT METAL can cause injury and start fires.

- Shape tungsten electrode only on grinder with proper guards in a safe location wearing proper face, hand, and body protection.
- Keep flammables away.

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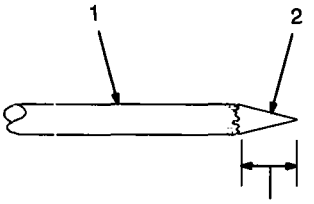
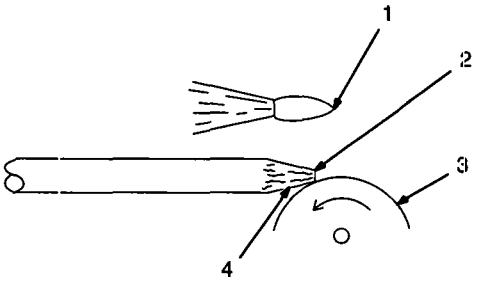


1 Tungsten Electrode

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.

Ref. S-0161



Ideal Tungsten Preparation – Stable Arc

1 Stable Arc

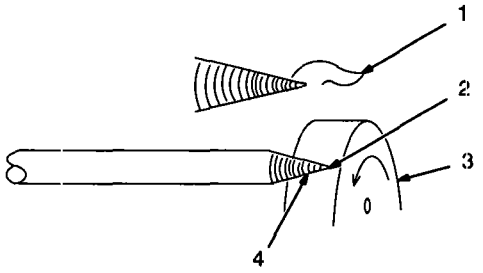
2 Flat

Diameter of this flat determines amperage capacity.

3 Grinding Wheel

4 Straight Ground

Ref. S-0162



Wrong Tungsten Preparation – Wandering Arc

1 Arc Wander

2 Point

3 Grinding Wheel

4 Radial Ground

Ref. S-0162

Figure 7-2. Preparing Tungsten For DC Electrode Negative (DCEN) Welding

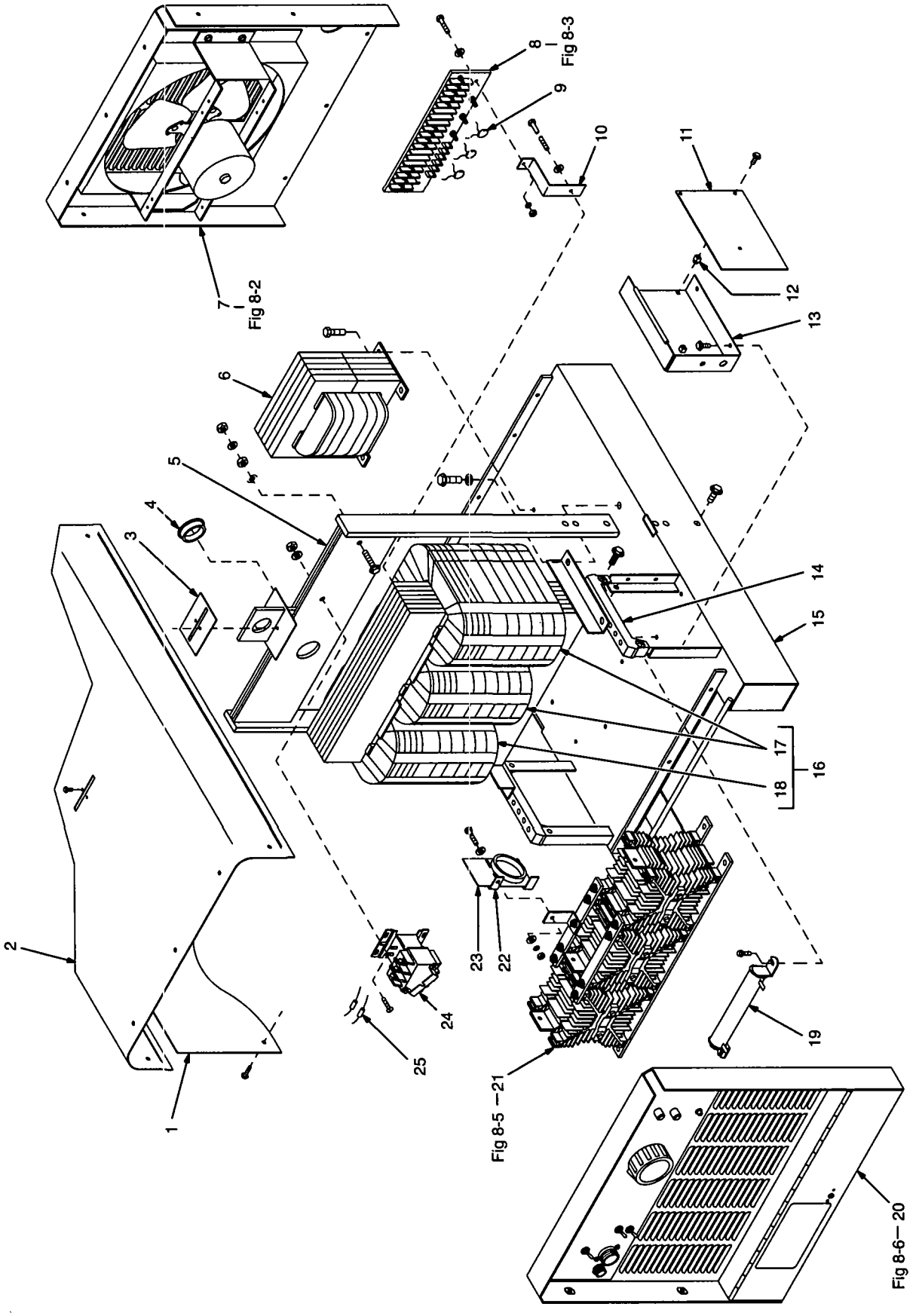


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Figure 8-1. Main Assembly

Item No.	Dia. Mkgs.	Part No.	Description	Quantity
			Figure 8-1. Main Assembly	
1		♦006 016	PANEL, side	2
		109 035	LABEL, warning electric shock can kill etc	1
2		006 017	COVER, top	1
3		026 627	GASKET, lifting eye	1
4		004 214	BUSHING, snap-in nyl 1.625 ID x 2.000mtg hole	1
5		091 164	FRAME, upright base	1
		134 771	PLUG, protective .640sq	2
6	Z	035 279	STABILIZER	1
7		Fig 8-2	PANEL, rear w/components	1
8	TE1	038 138	TERMINAL ASSEMBLY, triple voltage (Fig 8-3)	1
9	C21	137 674	CAPACITOR	1
9	C22,23	137 771	CAPACITOR	2
10		097 918	BRACKET, mtg terminal board	2
11	PC1	084 553	CIRCUIT CARD, root pass	1
	RC1	**048 281	CONNECTOR w/SOCKETS, (consisting of)	1
		058 972	. CONNECTOR, rect skt 20-14ga Amp 350415-1	2
	PLG1	048 280	CONNECTOR & PINS, (consisting of)	1
		058 971	. CONNECTOR, rect pin 20-14ga Amp 350416-1	2
	PLG2	035 815	CONNECTOR, rect 29skt plug Amp 531590-3	1
12		080 509	GROMMET, scr No. 8/10 panel hole .312sq .375 high	3
13		090 781	CIRCUIT CARD BOX	1
14		138 378	BRACKET, mtg rectifier (included w/SR1)	2
15		139 785	BASE	1
16	T1	137 055	TRANSFORMER, power main 220/380/400/415 (consisting of)	1
17		137 057	. COIL, pri/sec RH & center	2
18		137 056	. COIL, pri/sec LH	1
19	R6	039 210	RESISTOR, WW fxd 375W 12 ohm	1
20		Fig 8-6	PANEL, front w/components	1
21	SR1	140 121	RECTIFIER, SCR (Fig 8-5)	1
22		144 017	BRACKET, mtg hall	1
23	HA1,HD1	134 826	CIRCUIT CARD, hall booster	1
24	W	137 900	KIT, contactor	1
25	D10,11	082 456	DIODE ASSEMBLY	1

♦When ordering a component originally displaying a precautionary label, the label should also be ordered.
**Included w/PC1.
BE SURE TO PROVIDE MODEL AND SERIAL NUMBER WHEN ORDERING REPLACEMENT PARTS.

Item No.	Dia. Mkgs.	Part No.	Description	Quantity
			Figure 8-2. Panel, Rear w/Components (Fig 8-1 Item 7)	
1	FM	116 190	MOTOR, 1/12hp 230V 1550rpm	1
2		131 361	CHAMBER, plenum 14 in	1
3		032 611	BLADE, fan 14 in 3wg 23deg .375 bore CCW	1
4		158 289	PANEL, rear	1

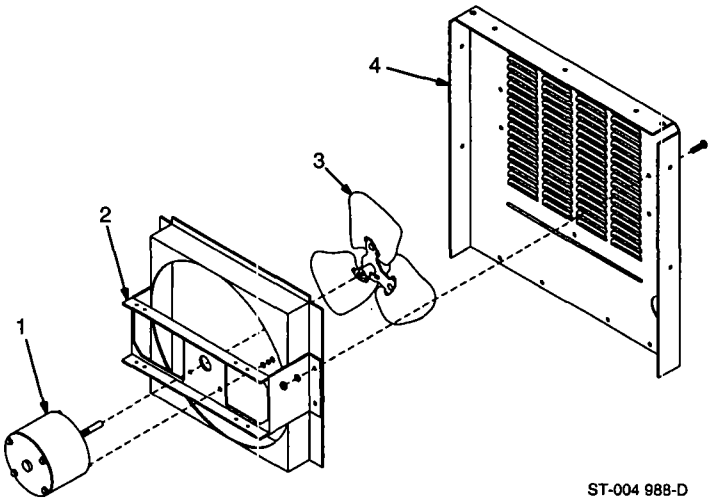


Figure 8-2. Panel, Rear w/Components

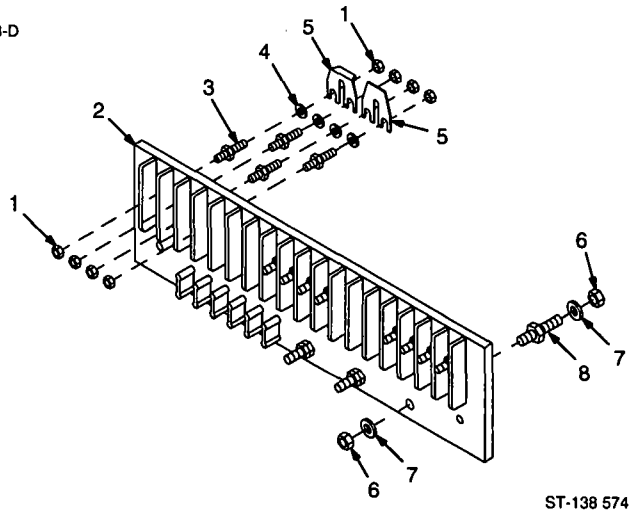


Figure 8-3. Terminal Assembly, Pri

Item No.	Part No.	Description	Quantity
	038 138	**Figure 8-3. Terminal Assembly, Pri (Fig 8-1 Item 8)**	
1	601 835	NUT, brs hex 10-32	36
2	038 058	TERMINAL BOARD, primary	1
3	038 887	STUD, pri board brs 10-32 x 1.375	18
4	010 913	WASHER, flat brs .218 ID x .460 OD x .031thk	18
5	038 618	LINK, jumper term bd pri	6
6	601 836	NUT, brs hex .250 -20 jam hvy	6
7	010 915	WASHER, flat brs .250 ID x .625 OD x .031thk	6
8	038 888	STUD, pri board brs .250-20 x 1.500	3

BE SURE TO PROVIDE MODEL AND SERIAL NUMBER WHEN ORDERING REPLACEMENT PARTS.

Item No.	Part No.	Description	Quantity
	046 745	**Figure 8-4. Switch, PB (Fig 8-6 Item 11)**	
1	059 885	BUTTON, push reset red	1
2	018 606	SPRING, cprsn .430 OD x .040 wire x 1.500stnls	1
3	045 546	PUSH BUTTON SET, w/cable & housing	1
4	081 008	BRACKET, mtg switch PB	1
5	027 878	SWITCH, lim leaf actg SPDT	1

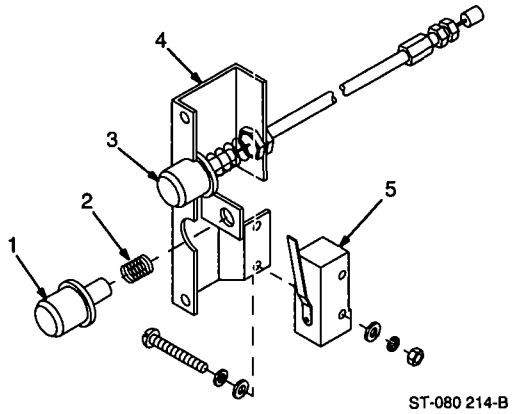


Figure 8-4. Switch, PB

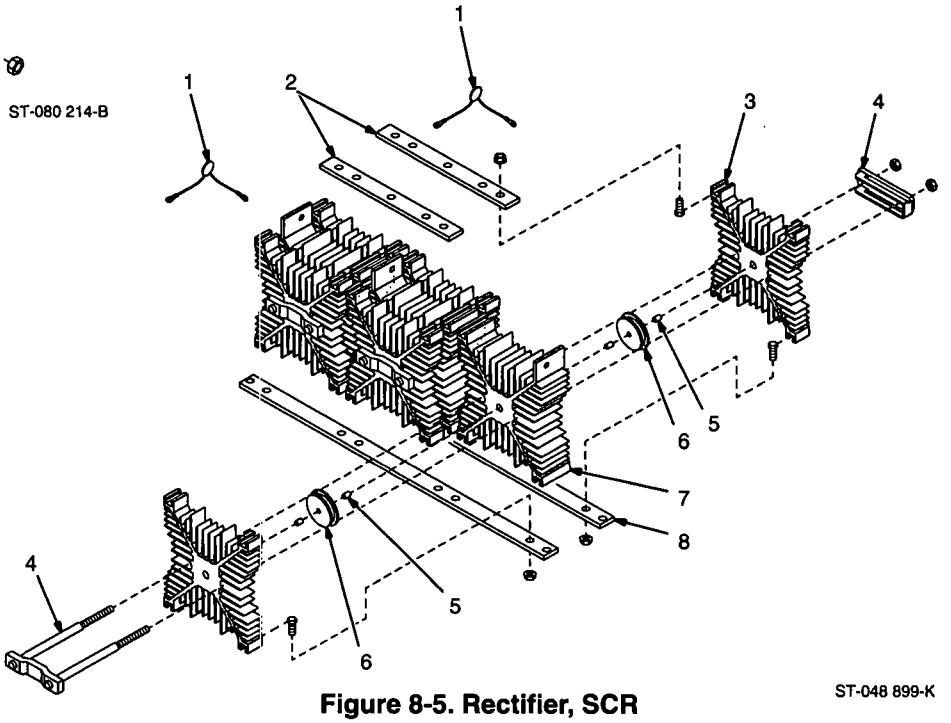


Figure 8-5. Rectifier, SCR

Item No.	Dia. Mkgs.	Part No.	Description	Quantity
	SR1	**140 121**	**Figure 8-5. Rectifier, SCR (Fig 8-1 Item 21)**	
1	C7-12	048 420	CAPACITOR, rectifier	6
2		082 852	BUS BAR, output rectifier	2
3		048 779	HEAT SINK, rectifier snowflake 1.000	6
4		082 694	CLAMP, thyristor rectifier 5.500	3
5		028 516	PIN, spring CS .125 x .250	12
6	SCR1-6	097 397	THYRISTOR, SCR 300A 300V	6
7		045 109	HEAT SINK, rectifier snowflake 1.000	3
	TP1	117 275	THERMOSTAT, NC	1
		026 701	INSULATION, thermostat	1
8		114 530	BAR, mtg rectifier	2

BE SURE TO PROVIDE MODEL AND SERIAL NUMBER WHEN ORDERING REPLACEMENT PARTS.

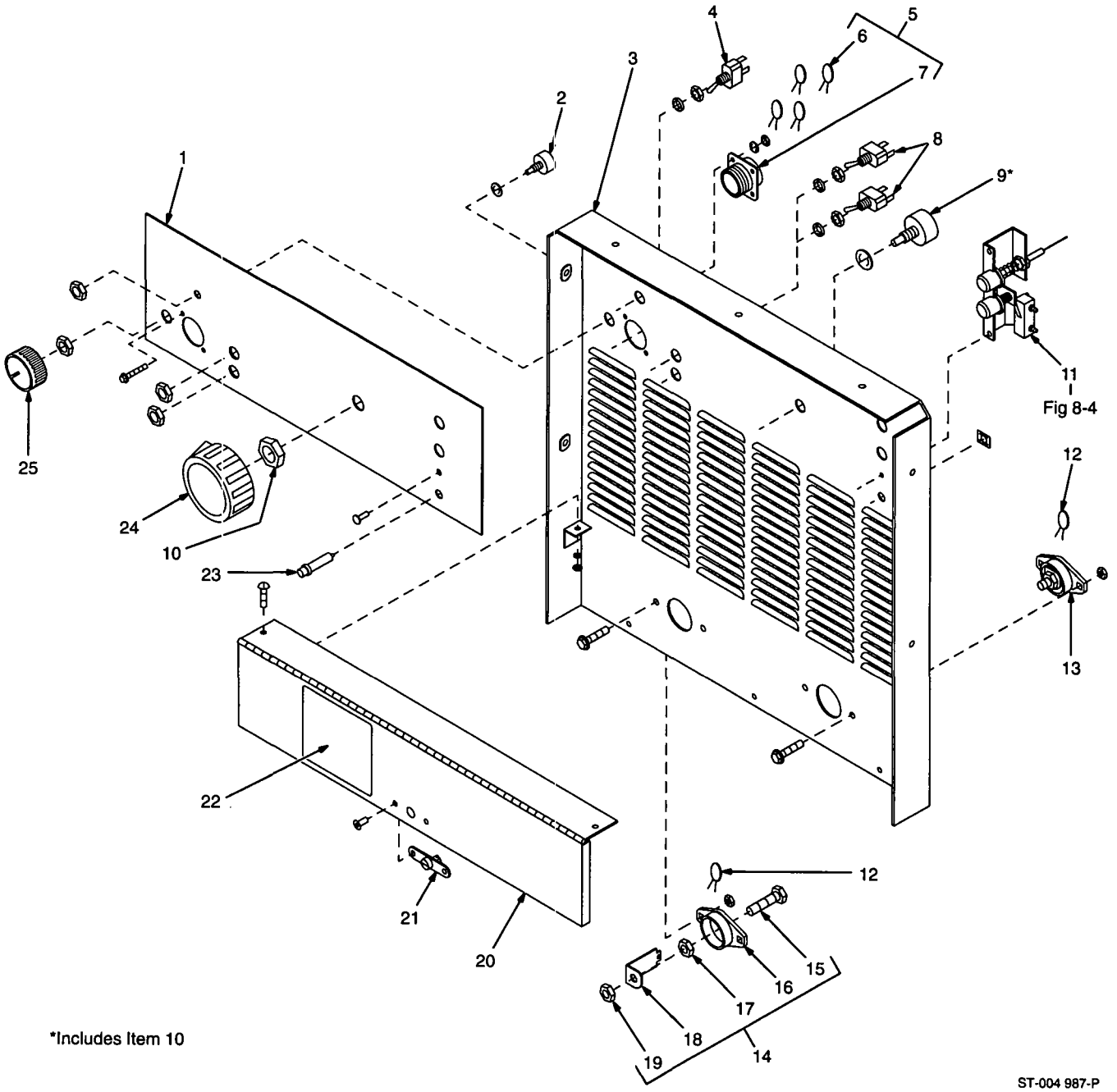
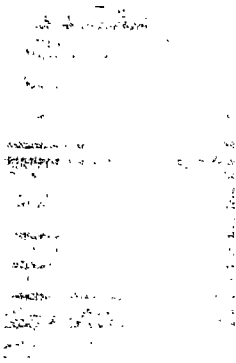


Figure 8-6. Panel, Front w/Components



Item No.	Dia. Mkgs.	Part No.	Description	Quantity
			Figure 8-6. Panel, Front w/Components (Fig 8-1 Item 20)	
1			NAMEPLATE, (order by model and serial number)	1
2	R3	009 156	POTENTIOMETER, C sltd sft 1/T 2W 2.5K ohm	1
3		+158 258	PANEL, front	1
4	S3	089 085	SWITCH, tgl SPST 20A 125VAC	1
	R1	084 206	RESISTOR, MF .25W 3.32K ohm	1
5		130 257	CONNECTOR, w/leads (consisting of)	1
6	C14	143 935	LEAD ASSEMBLY, elect	1
6	C15	143 934	LEAD ASSEMBLY, elect	1
6	C17	143 933	LEAD ASSEMBLY, elect	1
6	C18	143 936	LEAD ASSEMBLY, elect	1
7	RC1	143 976	CONNECTOR w/TERMINALS, (consisting of)	1
		079 534	CONNECTOR, circ skt push-in 14-18ga Amp 66358-6	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 Amp 206322-2	
8	S2,4	011 609	SWITCH, tgl SPDT 15A 125VAC	2
9	R5	072 462	POTENTIOMETER, w/shaft lock (consisting of)	1
10		072 590	LOCK, pot .375-32 x .250dia shaft	1
11	PB1	046 745	SWITCH, PB (Fig 8-4)	1
12	C4,5	087 337	CAPACITOR	2
13	NEG	039 046	TERMINAL, pwr output black (consisting of)	1
14	POS	039 047	TERMINAL, pwr output red (consisting of)	1
15		601 976	SCREW, cap stl hexhd .500-13 x 1.500	1
16		039 045	TERMINAL BOARD, black	1
16		039 049	TERMINAL BOARD, red	1
17		601 880	NUT, stl hex jam .500-13	1
18		039 044	BUS BAR, term bd	1
19		601 879	NUT, stl hex full .500-13	1
20		+109 449	DOOR, access front	1
21		605 583	CATCH, spr loaded door	1
22		134 327	LABEL, warning general precautionary	1
23	PL1	048 573	LIGHT, ind red lens 28V	1
24		097 926	KNOB, pointer	1
25		097 922	KNOB, pointer	1

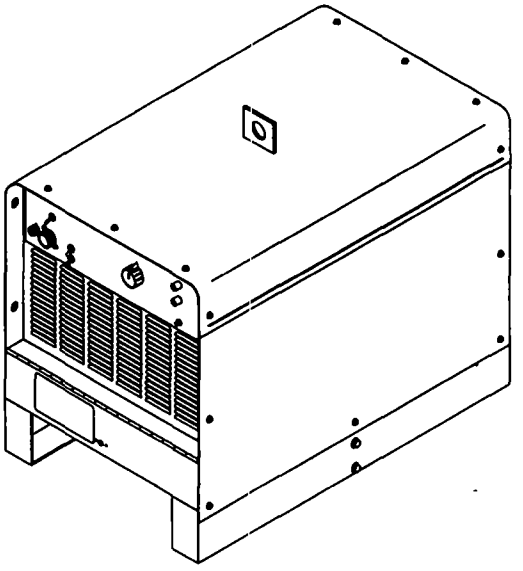
+When ordering a component originally displaying a precautionary label, the label should also be ordered.
BE SURE TO PROVIDE MODEL AND SERIAL NUMBER WHEN ORDERING REPLACEMENT PARTS.

Miller®

April 1994 Form: OM-168 256

Effective With Serial No. KE600689

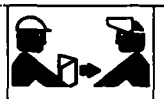
OWNER'S MANUAL



Gold Star® 500SSX

- CC/DC Welding Power Source
- For SMAW and GTAW Welding
- 510 Amperes, 41 Volts DC, At 35% Duty Cycle
- Requires Three-Phase, 50/60 Hz Input Power
- Overheating Protection
- Arc (Dig) Control

- Read and follow these instructions and all safety blocks carefully.
- Have only trained and qualified persons install, operate, or service this unit.
- Call your distributor if you do not understand the directions.



- Give this manual to the operator.

- For help, call your distributor
- or: MILLER Electric Mfg. Co., P.O. Box 1079, Appleton, WI 54912 414-734-9821

cover 1/94 – ST-000 599-H

PRINTED IN USA

MILLER'S TRUE BLUE™ LIMITED WARRANTY

Effective January 1, 1992
(Equipment with a serial number preface of "KC" 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 the distributor.

1. 5 Years Parts – 3 Years Labor
   - Original main power rectifiers
2. 3 Years — Parts and Labor
   - Transformer/Rectifier Power Sources
   - Plasma Arc Cutting Power Sources
   - Semi-Automatic and Automatic Wire Feeders
   - Robots
3. 2 Years — Parts and Labor
   - Engine Driven Welding Generators (NOTE Engines are warranted separately by the engine manufacturer for a period of two years.)
   - Air Compressors
4. 1 Year — Parts and Labor
   - Motor Driven Guns
   - Process Controllers
   - Water Coolant Systems
   - HF Units
   - Grids
   - Spot Welders
   - Load Banks
   - SDX Transformers
   - Running Gear/Trailers
   - 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.)
5. 6 Months — Batteries
6. 90 Days — Parts and Labor
   - MIG Guns/TIG Torches
   - Plasma Cutting Torches
   - Remote Controls
   - Accessory Kits
   - Replacement Parts

MILLER'S True Blue™ Limited Warranty shall not apply to:

1. 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.
2. Consumable components; such as contact tips, cutting nozzles, contactors and relays or parts that fail due to normal wear.
3. Equipment that has been modified by any party other than MILLER, or equipment that has been improperly installed, improperly operated or misused based upon industry standards, or equipment which has not had reasonable and necessary maintenance, or equipment which has been used for operation outside of the specifications for the equipment.

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

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

TO THE EXTENT PERMITTED BY LAW, THE REMEDIES PROVIDED HEREIN ARE THE SOLE AND EXCLUSIVE REMEDIES. IN NO EVENT SHALL MILLER BE LIABLE FOR DIRECT, INDIRECT, SPECIAL, INCIDENTAL OR CONSEQUENTIAL DAMAGES (INCLUDING LOSS OF PROFIT), WHETHER BASED ON CONTRACT, TORT OR ANY OTHER LEGAL THEORY

ANY EXPRESS WARRANTY NOT PROVIDED HEREIN AND ANY IMPLIED WARRANTY, GUARANTY OR REPRESENTATION AS TO PERFORMANCE, AND ANY REMEDY FOR BREACH OF CONTRACT TORT OR ANY OTHER LEGAL THEORY WHICH, BUT FOR THIS PROVISION, MIGHT ARISE BY IMPLICATION, OPERATION OF LAW, CUSTOM OF TRADE OR COURSE OF DEALING, INCLUDING ANY IMPLIED WARRANTY OF MERCHANTABILITY OR FITNESS FOR PARTICULAR PURPOSE, WITH RESPECT TO ANY AND ALL EQUIPMENT FURNISHED BY MILLER IS EXCLUDED AND DISCLAIMED BY MILLER.

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

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

RECEIVING-HANDLING

Before unpacking equipment, check carton for any damage that may have occurred during shipment. File any claims for loss or damage **with the delivering carrier**. Assistance for filing or settling claims may be obtained from distributor and/or equipment manufacturer's Transportation Department.

When requesting information about this equipment, always provide Model Designation and Serial or Style Number.

Use the following spaces to record Model Designation and Serial or Style Number of your unit. The information is located on the rating label or nameplate.

Model _____

Serial or Style No. _____

Date of Purchase _____

ARC WELDING SAFETY PRECAUTIONS

⚠ WARNING

ARC WELDING can be hazardous.

PROTECT YOURSELF AND OTHERS FROM POSSIBLE SERIOUS INJURY OR DEATH. KEEP CHILDREN AWAY. PACEMAKER WEARERS KEEP AWAY UNTIL CONSULTING YOUR DOCTOR.

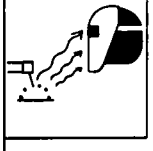
In welding, as in most jobs, exposure to certain hazards occurs. Welding is safe when precautions are taken. The safety information given below is only a summary of the more complete safety information that will be found in the Safety Standards listed on the next page. Read and follow all Safety Standards.

HAVE ALL INSTALLATION, OPERATION, MAINTENANCE, AND REPAIR WORK PERFORMED ONLY BY QUALIFIED PEOPLE.

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.

1. Do not touch live electrical parts.
2. Wear dry, hole-free insulating gloves and body protection.
3. Insulate yourself from work and ground using dry insulating mats or covers.
4. Disconnect input power or stop engine before installing or servicing this equipment.
5. Properly install and ground this equipment according to its Owner's Manual and national, state, and local codes.
6. When making input connections, attach proper grounding conductor first.
7. Turn off all equipment when not in use.
8. Do not use worn, damaged, undersized, or poorly spliced cables.
9. Do not wrap cables around your body.
10. Ground the workpiece to a good electrical (earth) ground.
11. Do not touch electrode if in contact with the work or ground.
12. Use only well-maintained equipment. Repair or replace damaged parts at once.
13. Wear a safety harness if working above floor level.
14. Keep all panels and covers securely in place.



ARC RAYS can burn eyes and skin; NOISE can damage hearing.

Arc rays from the welding process produce intense heat and strong ultraviolet rays that can burn eyes and skin. Noise from some processes can damage hearing.

NOISE

1. Use approved ear plugs or ear muffs if noise level is high.

ARC RAYS

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

FUMES AND GASES can be hazardous to your health.

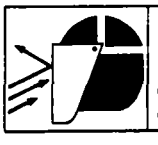
Welding produces fumes and gases. Breathing these fumes and gases can be hazardous to your health.

1. Keep your head out of the fumes. Do not breathe the fumes.
2. If inside, ventilate the area and/or use exhaust at the arc to remove welding fumes and gases.
3. If ventilation is poor, use an approved air-supplied respirator.
4. Read the Material Safety Data Sheets (MSDSs) and the manufacturer's instruction for metals, consumables, coatings, and cleaners.
5. Work in a confined space only if it is well ventilated, or while wearing an air-supplied respirator. Shielding gases used for welding can displace air causing injury or death. Be sure the breathing air is safe.
6. 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.
7. 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.

WELDING can cause fire or explosion.

Sparks and spatter fly off from the welding arc. The flying sparks and hot metal, weld spatter, hot workpiece, and hot equipment can cause fires and burns. Accidental contact of electrode or welding wire to metal objects can cause sparks, overheating, or fire.

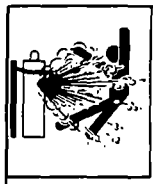
1. Protect yourself and others from flying sparks and hot metal.
2. Do not weld where flying sparks can strike flammable material.
3. Remove all flammables within 35 ft (10.7 m) of the welding arc. If this is not possible, tightly cover them with approved covers.
4. Be alert that welding sparks and hot materials from welding can easily go through small cracks and openings to adjacent areas.
5. Watch for fire, and keep a fire extinguisher nearby.
6. Be aware that welding on a ceiling, floor, bulkhead, or partition can cause fire on the hidden side.
7. Do not weld on closed containers such as tanks or drums.
8. 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.
9. Do not use welder to thaw frozen pipes.
10. Remove stick electrode from holder or cut off welding wire at contact tip when not in use.
11. Wear oil-free protective garments such as leather gloves, heavy shirt, cuffless trousers, high shoes, and a cap.



FLYING SPARKS AND HOT METAL can cause injury.

Chipping and grinding cause flying metal. As welds cool, they can throw off slag.

1. Wear approved face shield or safety goggles. Side shields recommended.
2. Wear proper body protection to protect skin.



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.

1. Protect compressed gas cylinders from excessive heat, mechanical shocks, and arcs.
2. Install and secure cylinders in an upright position by chaining them to a stationary support or equipment cylinder rack to prevent falling or tipping.
3. Keep cylinders away from any welding or other electrical circuits.
4. Never allow a welding electrode to touch any cylinder.
5. Use only correct shielding gas cylinders, regulators, hoses, and fittings designed for the specific application; maintain them and associated parts in good condition.
6. Turn face away from valve outlet when opening cylinder valve.
7. Keep protective cap in place over valve except when cylinder is in use or connected for use.
8. Read and follow instructions on compressed gas cylinders, associated equipment, and CGA publication P-1 listed in Safety Standards.

⚠ WARNING

ENGINES can be hazardous.

ENGINE EXHAUST GASES can kill.

Engines produce harmful exhaust gases.

1. Use equipment outside in open, well-ventilated areas.
2. If used in a closed area, vent engine exhaust outside and away from any building air intakes.

ENGINE FUEL can cause fire or explosion.

Engine fuel is highly flammable.

1. Stop engine before checking or adding fuel.
2. Do not add fuel while smoking or if unit is near any sparks or open flames.
3. Allow engine to cool before fueling. If possible, check and add fuel to cold engine before beginning job.
4. Do not overfill tank – allow room for fuel to expand.
5. Do not spill fuel. If fuel is spilled, clean up before starting engine.

MOVING PARTS can cause injury.

Moving parts, such as fans, rotors, and belts can cut fingers and hands and catch loose clothing.

1. Keep all doors, panels, covers, and guards closed and securely in place.
2. Stop engine before installing or connecting unit.
3. Have only qualified people remove guards or covers for maintenance and troubleshooting as necessary.
4. To prevent accidental starting during servicing, disconnect negative (–) battery cable from battery.
5. Keep hands, hair, loose clothing, and tools away from moving parts.
6. Reinstall panels or guards and close doors when servicing is finished and before starting engine.

SPARKS can cause BATTERY GASES TO EXPLODE; BATTERY ACID can burn eyes and skin.

Batteries contain acid and generate explosive gases.

1. Always wear a face shield when working on a battery.
2. Stop engine before disconnecting or connecting battery cables.
3. Do not allow tools to cause sparks when working on a battery.
4. Do not use welder to charge batteries or jump start vehicles.
5. Observe correct polarity (+ and –) on batteries.

STEAM AND PRESSURIZED HOT COOLANT can burn face, eyes, and skin.

The coolant in the radiator can be very hot and under pressure.

1. Do not remove radiator cap when engine is hot. Allow engine to cool.
2. Wear gloves and put a rag over cap area when removing cap.
3. Allow pressure to escape before completely removing cap.

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.

PRÉCAUTIONS DE SÉCURITÉ EN SOUDAGE À L'ARC

MISE EN GARDE

LE SOUDAGE À L'ARC est dangereux.

PROTÉGEZ-VOUS, AINSI QUE LES AUTRES, CONTRE LES BLESSURES GRAVES POSSIBLES OU LA MORT. NE LAISSEZ PAS LES ENFANTS S'APPROCHER, NI LES PORTEURS DE STIMULATEUR CARDIAQUE (A MOINS QU'ILS N'AIENT CONSULTÉ UN MÉDECIN).

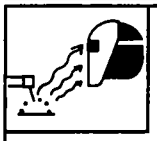
Le soudage, comme la plupart des activités industrielles, expose à certains risques. Le soudage n'est pas dangereux lorsqu'on prend des précautions. Les consignes de sécurité suivantes ne font que résumer l'information contenue dans les normes énumérées ci-après. Lisez et respectez toutes ces normes.

SEULES DES PERSONNES QUALIFIÉES DOIVENT FAIRE DES TRAVAUX D'INSTALLATION, DE RÉPARATION, D'ENTRETIEN ET D'ESSAI.

L'ÉLECTROCUTION peut être mortelle.

Une décharge électrique peut vous tuer ou vous brûler gravement. L'électrode et le circuit de soudage sont sous tension au démarrage. Le circuit d'entrée et les circuits internes des matériels sont aussi sous tension dès la mise en marche. En soudage automatique ou semi-automatique avec fil, ce dernier, le support de roquette, le logement des galets d'entraînement et toutes les pièces métalliques en contact avec le fil de soudage sont sous tension. Des matériels mal installés ou mal mis à la terre sont dangereux.

1. Ne touchez pas à des pièces sous tension.
2. Portez des gants et des vêtements isolants, secs et non troués.
3. *Isolez-vous de la tôle à souder et de la mise à la terre au moyen* de petits tapis isolants ou autres.
4. Déconnectez la prise d'entrée des matériels ou arrêtez leur moteur avant de les installer ou d'en faire l'entretien.
5. Veillez à installer ces matériels et à les mettre à la terre selon le manuel d'utilisation et les codes nationaux, provinciaux et locaux applicables.
6. Arrêtez tous les matériels après utilisation.
7. N'utilisez pas de câbles usés, endommagés, mal épissés ou de calibre trop petits.
8. N'enroulez pas de câbles autour de votre corps.
9. Mettez à la terre la tôle à souder au moyen d'une bonne prise de terre.
10. Ne touchez pas à l'électrode si vous êtes en contact avec le circuit de soudage (terre).
11. N'utilisez que des matériels en bon état. Réparez ou remplacez sur-le-champ les pièces endommagées.
12. Portez un harnais de sécurité si vous travaillez en hauteur.
13. Fermez solidement tous les panneaux et les capots.



Le RAYONNEMENT DE L'ARC peut brûler les yeux et la peau; le BRUIT peut endommager l'ouïe.

L'arc de soudage produit une chaleur et des rayons ultraviolets intenses, susceptibles de brûler les yeux et la peau. Le bruit causé par certains procédés peut endommager l'ouïe.

1. Portez un casque de soudeur avec écran filtrant de teinte appropriée (consultez la norme ANSI Z49 indiquée ci-après), pour vous protéger le visage et les yeux lorsque vous soudez ou que vous observez l'exécution d'une soudure.
2. Portez des lunettes de sécurité approuvées. Des écrans latéraux sont recommandées.
3. Entourez l'aire de soudage de rideaux ou de cloisons de protection contre les coups d'arc ou l'éblouissement; avertissez les observateurs de ne pas regarder l'arc.
4. Portez des vêtements en tissus ignifuge durable (laine et cuir) et des chaussures de sécurité.
5. Portez un casque antibruit ou des bouchons d'oreille approuvés si le niveau de bruit est élevé.

Les VAPEURS ET LES FUMÉES sont dangereuses pour la santé.

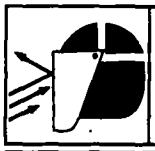
Le soudage dégage des vapeurs et des fumées qu'il est dangereux de respirer.

1. Écartez le visage pour éviter de respirer les fumées.
2. À l'intérieur, assurez-vous que l'aire de soudage est bien ventilée ou que les fumées et les vapeurs sont aspirées à l'arc.
3. Si la ventilation est mauvaise, portez un respirateur à adduction d'air approuvé.
4. Lisez les fiches signalétiques et les consignes du fabricant relatives aux métaux, aux produits consummables, aux revêtements et aux produits nettoyants.
5. Ne travaillez dans un espace confiné que s'il est bien ventilé; sinon, portez un respirateur à adduction d'air. Les gaz protecteurs de soudage peuvent déplacer l'oxygène de l'air et causer des blessures ou la mort. Assurez-vous que l'air est propre à la respiration.
6. Ne soudez pas à proximité d'opérations de dégraissage, de nettoyage ou de pulvérisation. La chaleur et les rayons de l'arc peuvent réagir avec des vapeurs et former des gaz hautement toxiques et irritants.
7. Ne soudez pas de tôles galvanisées ou plaquées en plomb ou en cadmium sans les avoir grattées à fond, car ces métaux, et tout revêtement qui en contient, peuvent alors dégager des fumées toxiques. Assurez-vous d'une bonne ventilation et portez un respirateur à adduction d'air si c'est nécessaire.

Le SOUDAGE peut causer un incendie ou une explosion.

L'arc produit des étincelles et des projections. Avec la chaleur intense dégagée par la tôle et les matériels, elles peuvent causer un incendie et des brûlures. Le contact accidentel de l'électrode avec un objet métallique peut provoquer des étincelles, un échauffement ou un incendie.

1. Protégez-vous, ainsi que les autres, contre les étincelles et les projections.
2. Ne soudez pas dans un endroit où des étincelles peuvent atteindre des matériaux inflammables.
3. Enlevez toutes les matières inflammables dans un rayon de 10,7 mètres autour de l'arc, ou couvrez-les soigneusement avec des bâches approuvées.
4. Méfiez-vous des étincelles et des éclats brûlants, susceptibles de pénétrer dans des aires adjacentes par de petites ouvertures ou fissures.
5. Méfiez-vous des incendies et gardez un extincteur à portée de la main.
6. N'oubliez pas qu'une soudure sur un plafond, un plancher, une cloison ou une paroi peut en enflammer l'autre côté.
7. Ne soudez pas un récipient fermé, comme un réservoir ou un tonneau.
8. Connectez le câble de soudage le plus près possible de la tôle de soudage pour empêcher le courant de suivre un parcours long et inconnu, et prévenir ainsi les risques d'électrocution et d'incendie.
9. Ne faites pas dégeler des tuyaux avec un chalumeau.
10. Videz votre carquois porte-électrodes ou coupez le fil au tube-contact après le soudage.
11. Portez des vêtements protecteurs non huileux, tels des gants en cuir, une chemise épaisse, un pantalon sans revers, des chaussures montantes et un casque.



LES ÉTINCELLES ET LES PROJECTIONS BRULANTES peuvent causer des blessures.

Le piquage et le meulage produisent des éclats de métal. En refroidissant, la soudure peut projeter du laitier.

1. Portez un écran facial ou des lunettes à coques approuvées. Des écrans latéraux sont recommandés.
2. Portez des vêtements de protection individuelle appropriés.

Les BOUTEILLES endommagées peuvent exploser.

Les bouteilles contiennent des gaz protecteurs sous haute pression. Des bouteilles endommagées peuvent exploser. Comme les bouteilles font normalement partie du procédé de soudage, traitez-les avec soin.

1. Les bouteilles doivent être protégées contre les sources de chaleur intense, les chocs et les arcs de soudage.
2. Enchaînez verticalement les bouteilles à un support ou à un cadre fixe pour les empêcher de tomber ou d'être renversées.
3. Éloignez les bouteilles de tout circuit électrique ou de soudage.
4. Empêchez tout contact entre une bouteille et une électrode.
5. N'utilisez que des bouteilles de gaz protecteur, des détendeurs, des flexibles et des raccords conçus pour chaque application spécifique; ces matériels et les pièces connexes doivent être en bon état.
6. Ne mettez pas le visage devant le robinet de bouteille en l'ouvrant.
7. Remettez le chapeau de bouteille après utilisation.
8. Lisez et respectez les consignes relatives aux bouteilles de gaz comprimé et aux matériels connexes, ainsi que la publication P-1 de la CGA, énumérées dans les normes ci-dessous.

MISE EN GARDE

Les MOTEURS peuvent être dangereux.

Les GAZ D'ÉCHAPPEMENT DES MOTEURS PEUVENT ÊTRE MORTELS.

Les moteurs produisent des gaz d'échappement nocifs.

1. Utilisez des machines à l'extérieur dans des aires ouvertes et bien ventilées.
2. Si vous utilisez des machines dans un endroit confiné, les fumées d'échappement doivent être envoyées à l'extérieur, loin des prises d'air du bâtiment.

Le CARBURANT peut causer un incendie ou une explosion.

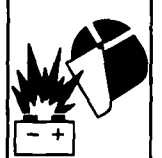
Le carburant est hautement inflammable.

1. Arrêtez le moteur avant de vérifier le niveau de carburant ou de faire le plein.
2. Ne faites pas le plein en fumant ou proche d'une source d'étincelles ou d'une flamme nue.
3. Si c'est possible, laissez le moteur refroidir avant de faire le plein de carburant ou d'en vérifier le niveau au début du soudage.
4. Ne faites pas le plein de carburant à ras bord : prévoyez de l'espace pour son expansion.
5. Faites attention de ne pas renverser de carburant. Nettoyez tout carburant renversé avant de faire démarrer le moteur.

Des PIÈCES EN MOUVEMENT peuvent causer des blessures.

Des pièces en mouvement, telles des ventilateurs, des rotors et des courroies peuvent couper les doigts et les mains, ou accrocher des vêtements amples.

1. Assurez-vous que les portes, les panneaux, les capots et les protecteurs sont bien fermés.
2. Avant d'installer ou de connecter un système, arrêtez-en le moteur.
3. Seules des personnes qualifiées doivent démonter des protecteurs ou des capots pour faire l'entretien ou le dépannage nécessaire.
4. Pour empêcher un démarrage accidentel d'un système pendant l'entretien, débranchez le câble d'accumulateur à la borne négative.
5. N'approchez pas les mains ou les cheveux de pièces en mouvement; elles peuvent aussi accrocher des vêtements amples et des outils.
6. Réinstallez les capots ou les protecteurs et fermez les portes après des travaux d'entretien et avant de faire démarrer le moteur.



Des ÉTINCELLES peuvent FAIRE EXPLOSER UN ACCUMULATEUR; L'ÉLECTROLYTE D'UN ACCUMULATEUR peut brûler la peau et les yeux.

Les accumulateurs contiennent de l'électrolyte et dégagent des vapeurs explosives.

1. Portez toujours un écran facial en travaillant sur un accumulateur.
2. Arrêtez le moteur avant de connecter ou de déconnecter des câbles d'accumulateur.
3. N'utilisez que des outils anti-étincelles pour travailler sur un accumulateur.
4. N'utilisez pas un poste de soudage pour charger un accumulateur ou connecter provisoirement un véhicule.
5. Utilisez la polarité correcte (+ et -) de l'accumulateur.

La VAPEUR ET LE LIQUIDE DE REFROIDISSEMENT BRÛLANT SOUS PRESSION peuvent brûler la peau et les yeux.

Le liquide de refroidissement d'un radiateur peut être brûlant et sous pression.

1. N'ôtez pas le bouchon de radiateur tant que le moteur n'a pas refroidi.
2. Mettez des gants et posez un torchon sur le bouchon pour l'ôter.
3. Laissez la pression s'échapper avant d'ôter complètement le bouchon.

PRINCIPALES NORMES DE SÉCURITÉ

Safety in Welding and Cutting, norme ANSI Z49.1, American Welding Society, 550, N.W. LeJeune Rd., Miami FL 33128.

Safety and Health Standards, OSHA 29 CFR 1910, 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, norme AWS F4.1, American Welding Society, 550, N.W. LeJeune Rd., Miami FL 33128.

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

Safe Handling of Compressed Gases in Cylinders, document P-1, Compressed Gas Association, 1235 Jefferson Davis Highway, Suite 501, Arlington, Va 22202.

Code for Safety in Welding and Cutting, norme CSA W117.2, Association canadienne de normalisation, Standards Sales, 176 Rexdale Boulevard, Rexdale, Ontario, Canada M9W 1R3.

Safe Practices for Occupation and Educational Eye and Face Protection, norme ANSI Z87.1, American National Standards Institute, 1430 Broadway, New York, NY 10018.

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

EMF INFORMATION

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

The following is a quotation from the General Conclusions Section of the U.S. Congress, Office of Technology Assessment, *Biological Effects of Power Frequency Electric & Magnetic Fields – Background Paper*, OTA-BP-E-53 (Washington, DC: U.S. Government Printing Office, May 1989): ". . . there is now a very large volume of scientific findings based on experiments at the cellular level and from studies with animals and people which clearly establish that low frequency magnetic fields can interact with, and produce changes in, biological systems. While most of this work is of very high quality, the results are complex. Current scientific understanding does not yet allow us to interpret the evidence in a single coherent framework. Even more frustrating, it does not yet allow us to draw definite conclusions about questions of possible risk or to offer clear science-based advice on strategies to minimize or avoid potential risks."

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 the body.
4. Keep welding power source and cables as far away as practical.
5. Connect work clamp to workpiece as close to the weld as possible.

About Pacemakers:

The above procedures are among those also normally recommended for pacemaker wearers. Consult your doctor for complete information.

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TABLE OF CONTENTS

SECTION 1 – SAFETY INFORMATION

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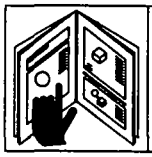
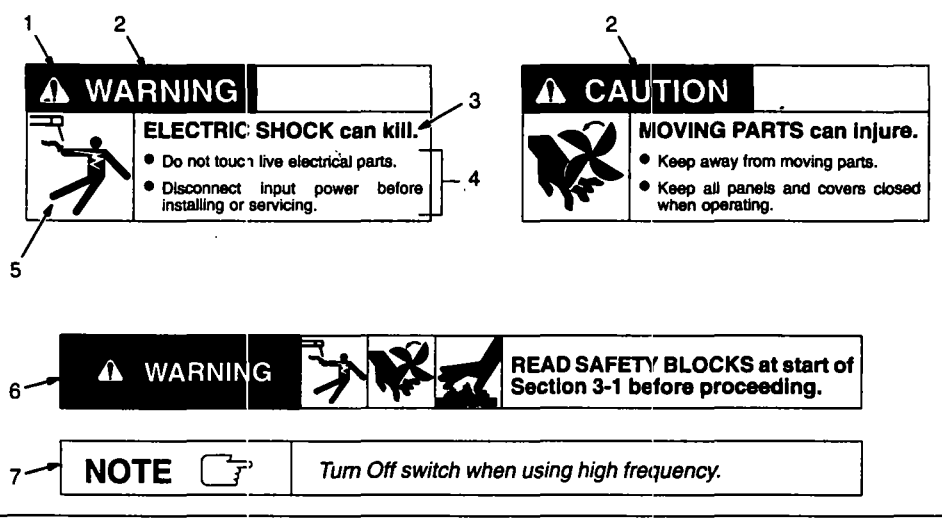


- Read all safety messages throughout this manual.
- Obey all safety messages to avoid injury.
- Learn the meaning of WARNING and CAUTION.



1 Safety Alert Symbol

2 Signal Word

WARNING means possible death or serious injury can happen.

CAUTION means possible minor injury or equipment damage can happen.

3 Statement Of Hazard And Result

4 Safety Instructions To Avoid Hazard

5 Hazard Symbol (If Available)

6 Safety Banner

Read safety blocks for each symbol shown.

7 NOTE

Special instructions for best operation – not related to safety.

Figure 1-1. Safety Information

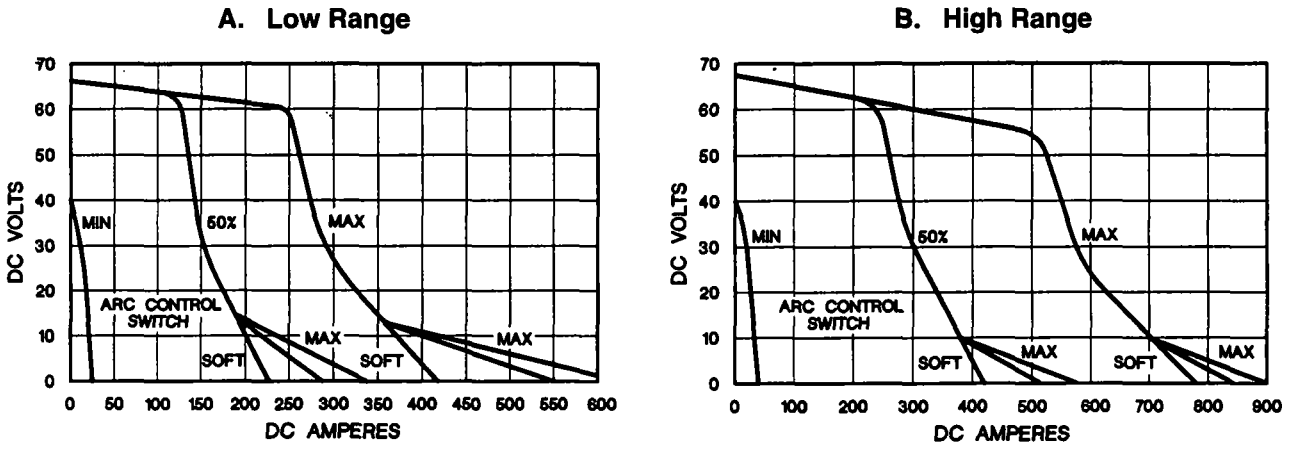
SECTION 2 – SPECIFICATIONS

Table 2-1. Welding Power Source

Specifications	Description
Type Of Output	Constant Current/Direct Current (CC/DC)
Welding Process	Shielded Metal Arc (SMAW) And Gas Tungsten Arc (GTAW) Welding
Max Open-Circuit Voltage	70 Volts DC
Type Of Input Power	Three-Phase; 220, 380, 400, Or 415 Volts AC, 50/60 Hz
Overall Dimensions	See Figure 3-2
Input Amperes At Rated Output	102 A At 220 V, 59 A At 380 V, 56 A At 400 V, 54 A At 415 V
Rated Weld Output	510 Amperes, 41 Volts DC At 35% Duty Cycle (see Section 2-2)
KVA/KW Used At Rated Output	38.8 kVA/25.6 kW
Amperage Range	Low: 20 - 270 A; High: 37 - 510 A
Weight	Net: 543 lb (246 kg); Ship: 568 lb (258 kg)

2-1. 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.



ssb1.1 10/91 – SB-084 850-A / SB-084 845-A

Figure 2-1. Volt-Ampere Curves

2-2. Duty Cycle

⚠ CAUTION

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

- Do not weld at rated load longer than shown below.

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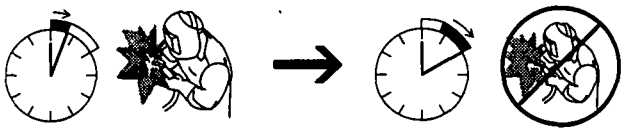
Definition

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

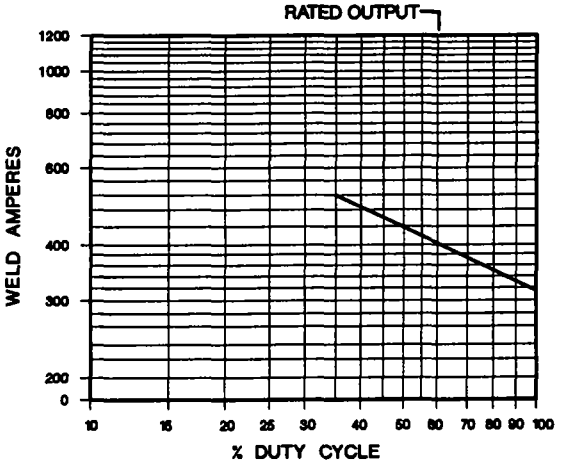
35% Duty Cycle At 510 Amperes



3-1/2 Minutes Welding

6-1/2 Minutes Resting

Chart



sb1.2 8/93 – Ref. SB-000 865-D

Figure 2-2. Duty Cycle

3-1. Selecting A Location And Moving Welding Power Source

⚠ WARNING

ELECTRIC SHOCK can kill.

- Do not touch live electrical parts.
- Disconnect input power conductors from de-energized supply line BEFORE moving welding power source.

FIRE OR EXPLOSION can result from placing unit on, over, or near combustible surfaces.

- Do not locate unit on, over, or near combustible surfaces.
- Do not install unit near flammables.

BLOCKED AIRFLOW causes overheating and possible damage to unit.

- Do not block or filter airflow.

Warranty is void if any type of filter is used.

FUMES can be hazardous; LACK OF FRESH AIR AND PROPER VENTILATION can be harmful.

- Do not breathe welding fumes.
- Place unit only where there is a good fresh air supply and proper ventilation.

FALLING EQUIPMENT can cause serious personal injury and equipment damage.

- Use lifting eye to lift unit only, NOT running gear, gas cylinders, or any other accessories.
- Use equipment of adequate capacity to lift the unit.

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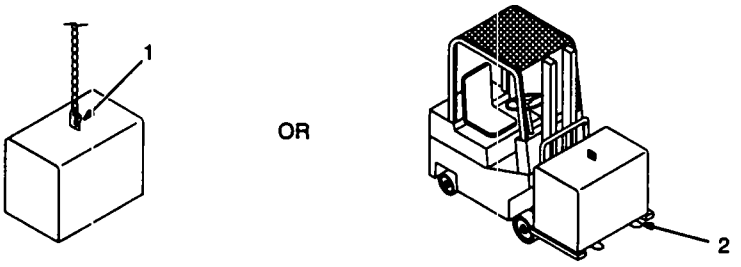
Movement



1 Lifting Eye

2 Lifting Forks

Use lifting eye or lifting forks to move unit.

If using lifting forks, extend forks beyond opposite side of unit.

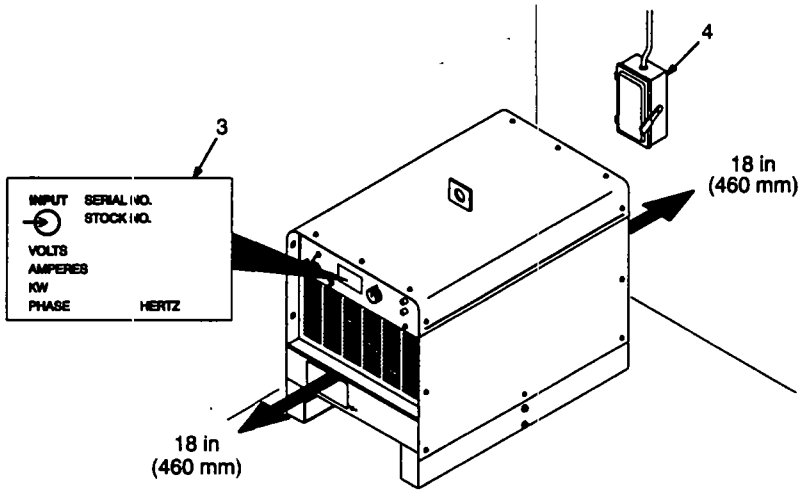
3 Rating Label

Use rating label to determine input power needs.

4 Line Disconnect Device

Locate unit near correct input power supply.

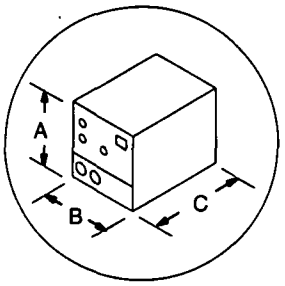
Location And Airflow

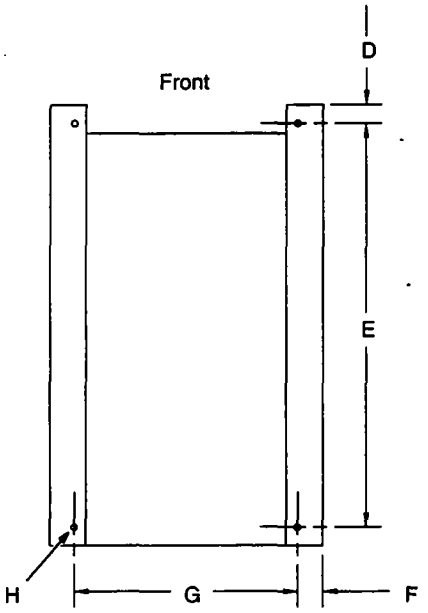


ssb9.1 12/93 – ST-800 402 / ST-000 599-H

Figure 3-1. Movement And Location Of Welding Power Source

NOTE ☞ *Overall dimensions (A, B, and C) include lifting eye, handles, hardware, etc.*



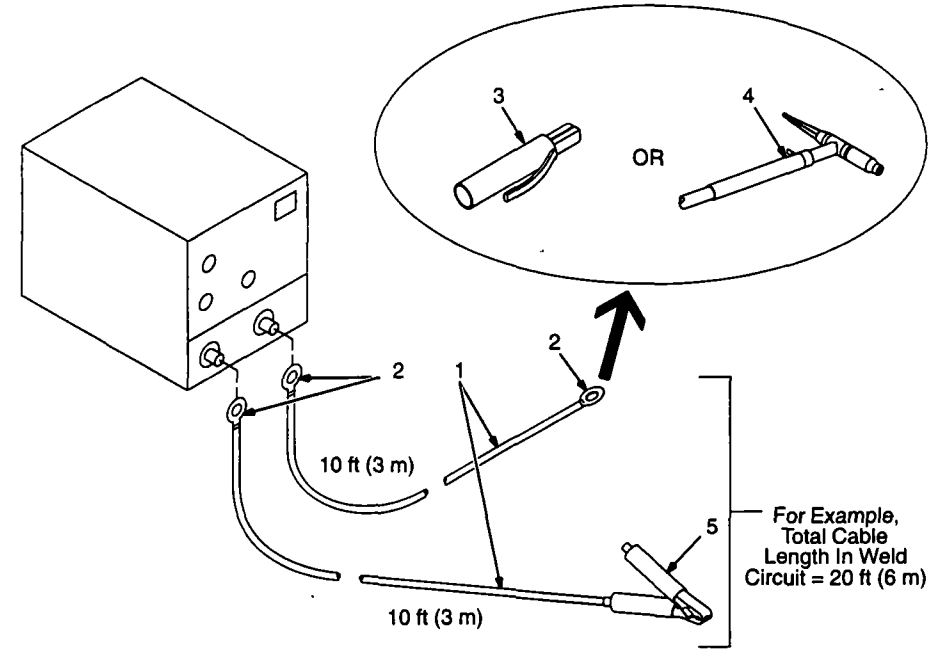


	Inches	Millimeters
A	30-1/4	769
B	22-3/4	578
C	35-3/4	908
D	1-1/2	38
E	32-3/4	832
F	1-1/8	29
G	20	508
H	7/16 Dia. 4 Holes	11 Dia. 4 Holes

ST-153 600

Figure 3-2. Overall Dimensions And Base Mounting Hole Layout

3-2. Selecting And Preparing Weld Output Cables



1 Weld Output Cable

Determine total cable length in weld circuit and maximum welding amperes. Use Table 3-1 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 or electrode holder, and weld output terminals.

3 Insulated Electrode Holder

4 GTAW Torch

Install according to manufacturer's instructions.

5 Work Clamp

Install onto work cable.

sb6.5* 11/92 – S-0752

Figure 3-3. Selecting And Preparing Weld Output Cables

Table 3-1. 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
900	2-2/0	2-3/0	2-4/0	3-3/0	3-4/0	4-4/0	4-4/0	
1000	2-2/0	2-3/0	2-4/0	3-3/0	4-3/0	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

3-3. Connecting To Weld Output Terminals

⚠ WARNING

ELECTRIC SHOCK can kill.

- Do not touch live electrical parts.
- Turn Off welding power source, and disconnect input power before making any weld output connections.

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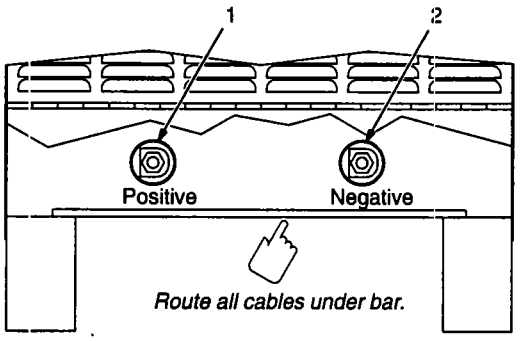


Turn screw and open lower access door.

1 Positive (+) Weld Output Terminal

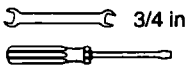
2 Negative (–) Weld Output Terminal

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

For Electrode Negative (DCEN), reverse cable connections.

Close door.

Tools Needed:



Ref. ST-155 048-A

Figure 3-4. Weld Output Connections

3-4. Remote 14 Receptacle Information And Connections

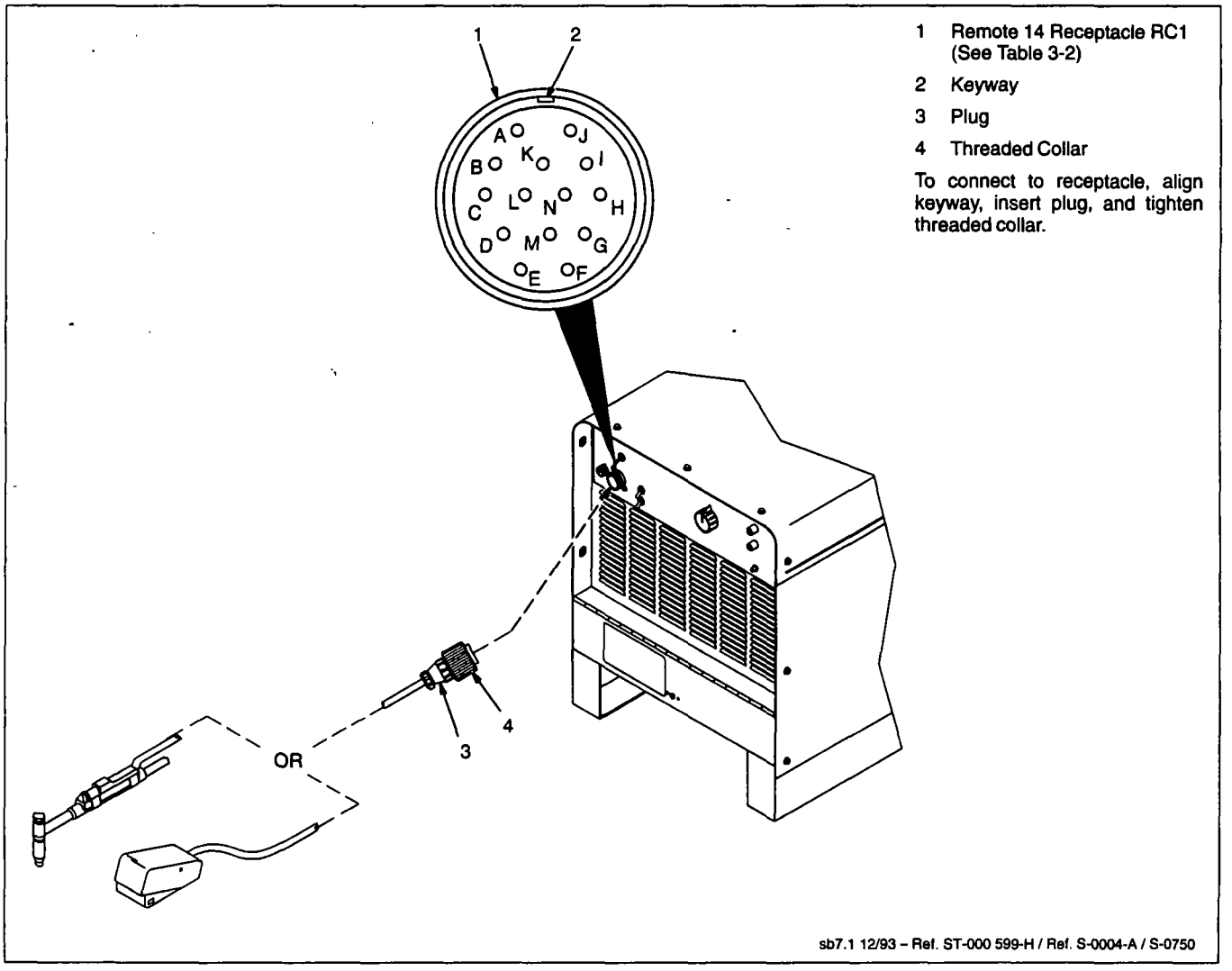


Figure 3-5. Remote 14 Connections

Table 3-2. Remote 14 Socket Information

REMOTE 14	Socket*	Socket Information
OUTPUT (CONTACTOR)	A	24 volts ac.
	B	Contact closure to A completes 24 volts ac contactor control circuit.
A AMPERAGE	C	+10 volts dc output to remote control.
	D	Remote control circuit common.
	E	0 to +10 volts dc input command signal from remote control.

*The remaining sockets are not used.

3-5. Connecting Input Power

⚠ WARNING

ELECTRIC SHOCK can kill.

- Do not touch live electrical parts.
- Turn Off welding power source, and disconnect input power before inspecting or installing.
- Have only qualified persons install unit.
- Installation must meet National Electrical Code and all other codes.

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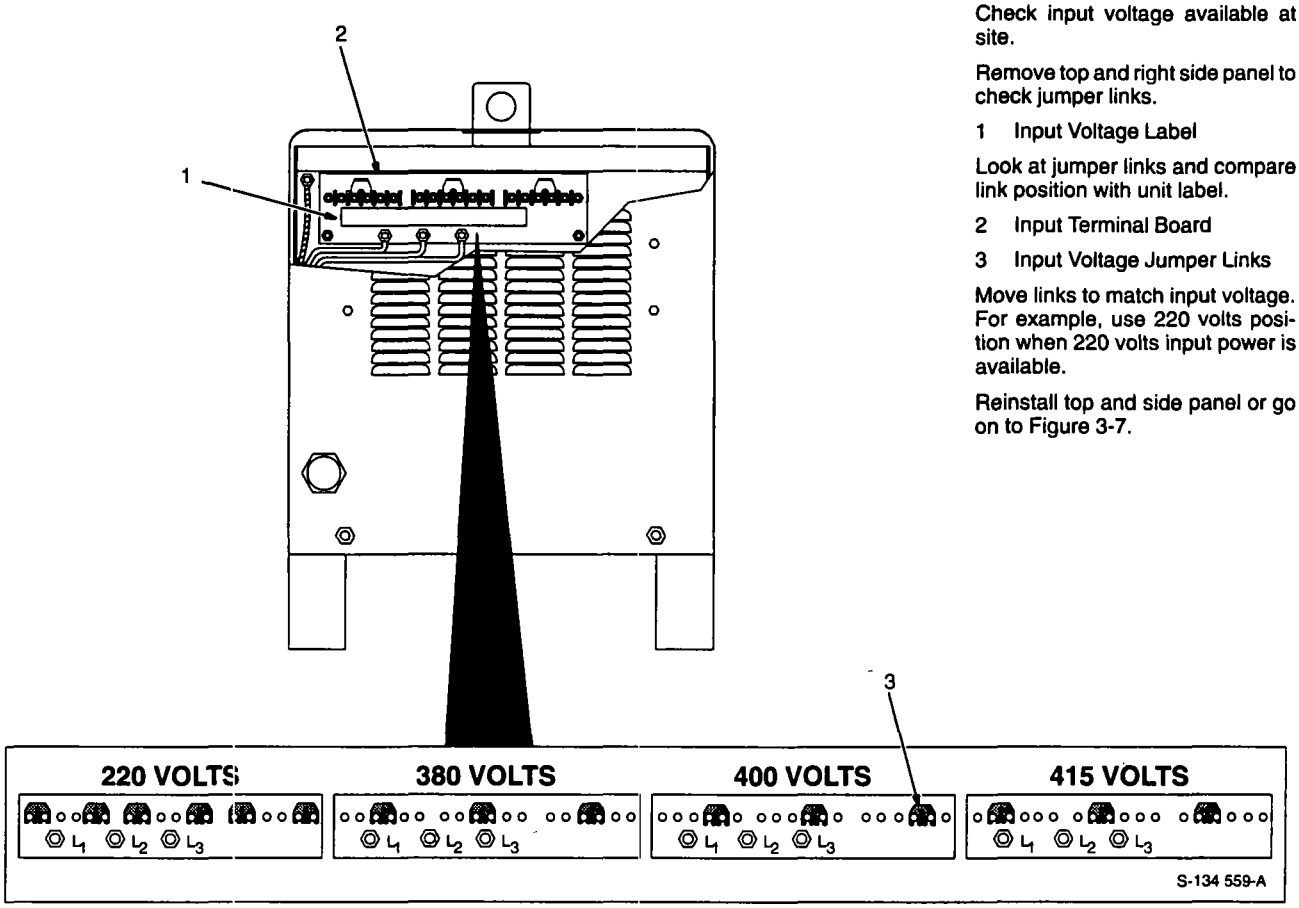
A. Positioning Jumper Links



Jumper links allow operation on different input voltages and are factory set for the highest input voltage.

Check input voltage available at site.

Remove top and right side panel to check jumper links.

1 Input Voltage Label

Look at jumper links and compare link position with unit label.

2 Input Terminal Board

3 Input Voltage Jumper Links

Move links to match input voltage. For example, use 220 volts position when 220 volts input power is available.

Reinstall top and side panel or go on to Figure 3-7.

Tools Needed:

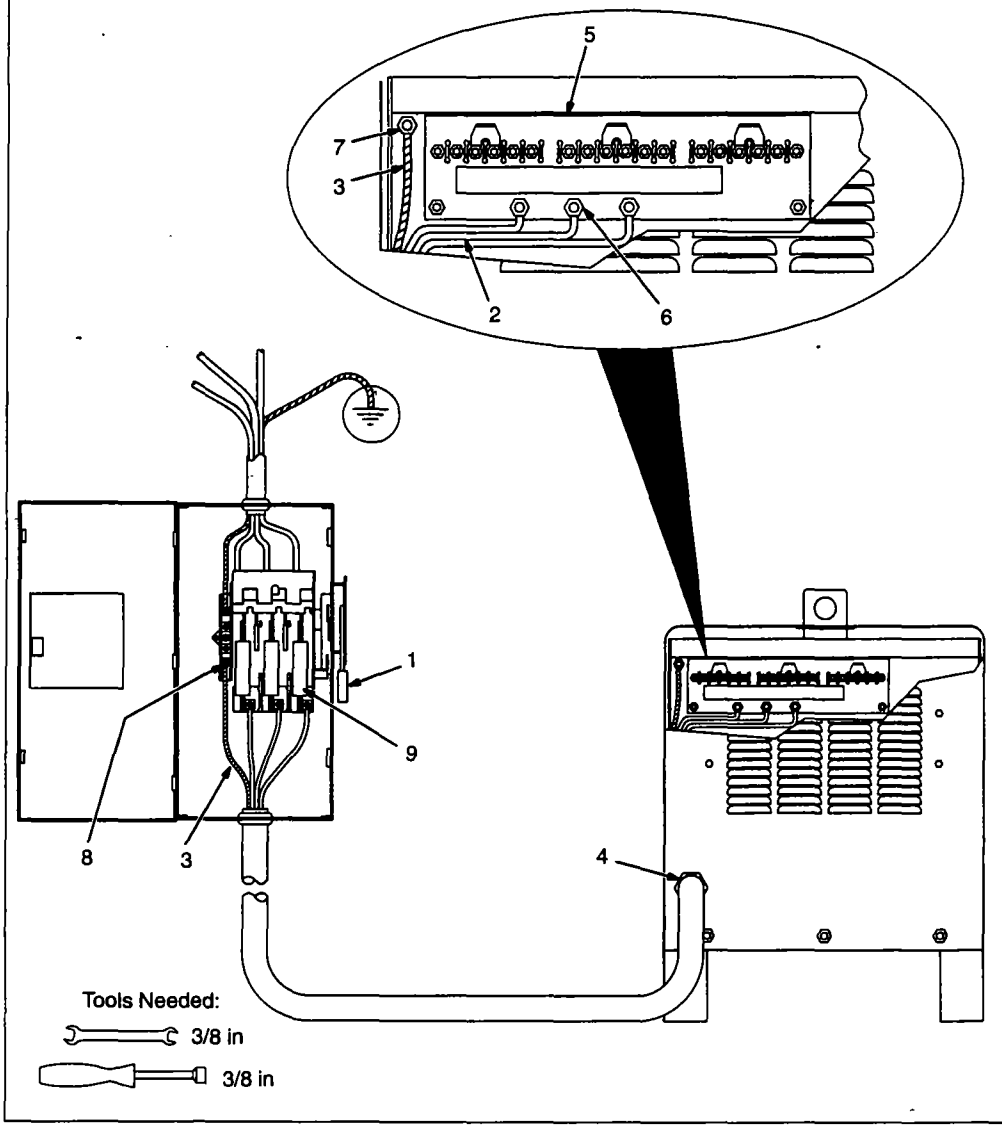
3/8 in

3/8 in

ssb5.1* 2/92 – Ref. ST-094 762-E

Figure 3-6. Input Voltage Jumper Links Location

B. Connecting Input Power



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 Table 3-3. Conductor rating must comply with national, state, and local electrical codes. Use lugs of proper amperage capacity and correct hole size.

4 Strain Relief Connector

Insert conductors through strain relief.

5 Input Terminal Board

6 Line Terminals

7 Welding Power Source Ground Terminal

Connect grounding conductor to ground terminal first. Then connect input conductors to line terminals.

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 side panel.

9 Overcurrent Protection

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

ssb2.4* 1/94 – ST-094 762-E

Figure 3-7. Input Power Connections

Table 3-3. Electrical Service Requirements*

Input Voltage	220	380	400	415
Input Amperes At Rated Output	102	59	56	54
Recommended Standard Fuse Or Circuit Breaker Rating In Amperes[1]	150	90	80	80
Input Conductor Size In AWG/Kcmil[2] (MM^2)	4 (19)	8 (8)	8 (8)	8 (8)
Max Input Conductor Length In Feet (Meters)[3]	130 (140)	172 (52)	190 (58)	205 (62)
Grounding Conductor Size In AWG/Kcmil[4] (MM^2)	6 (13)	8 (8)	8 (8)	8 (8)

* These values are calculated from the 1993 edition of the National Electrical Code (NEC).

1 Recommended fuse or circuit breaker size is that closest to 150% of rated input amperage of the welding power source. Article 630-12(a) of NEC allows fuse or circuit breaker sizing up to 200% of rated input amperage.

2 Input conductor size is for insulated copper wire with 75°C rating with not more than three single current-carrying conductors in a cable or raceway (Table 310-16 of NEC).

3 Maximum length is to prevent more than a 3% voltage drop between service entrance and input terminals of the welding power source (Articles 210-19(a) and 215-2(b) of NEC).

4 The grounding conductor shall be colored or identified as specified in the NEC. Grounding conductor size for copper wire is not required to be larger than input conductor (Article 250-95 of NEC).

Ref. S-0092-G

SECTION 4 – OPERATION

⚠ WARNING

ELECTRIC SHOCK can kill.

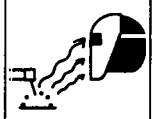
- Always wear dry insulating gloves.
- Insulate yourself from work and ground.
- Do not touch live electrical parts.
- Keep all panels and covers securely in place.

FUMES AND GASES can be hazardous to your health.

- Keep your head out of the fumes.
- Ventilate area, or use breathing device.
- Read Material Safety Data Sheets (MSDSs) and manufacturer's instructions for material used.

WELDING can cause fire or explosion.

- Do not weld near flammable material.
- Watch for fire; keep extinguisher nearby.
- Do not locate unit over combustible surfaces.
- Do not weld on closed containers.
- Allow work and equipment to cool before handling.



ARC RAYS can burn eyes and skin; NOISE can damage hearing.

- Wear welding helmet with correct shade of filter.
- Wear correct eye, ear, and body protection.

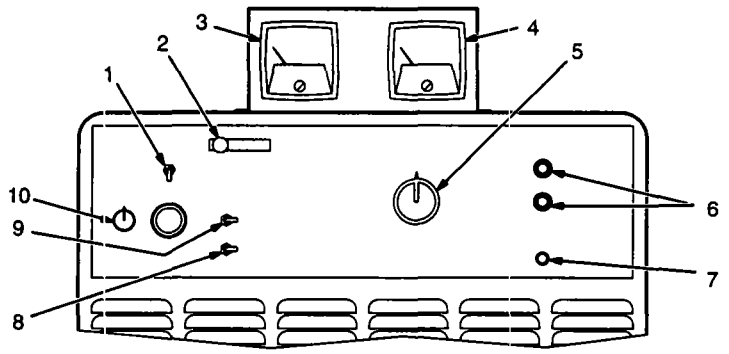
MOVING PARTS can cause injury.

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

MAGNETIC FIELDS FROM HIGH CURRENTS can affect pacemaker operation.

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

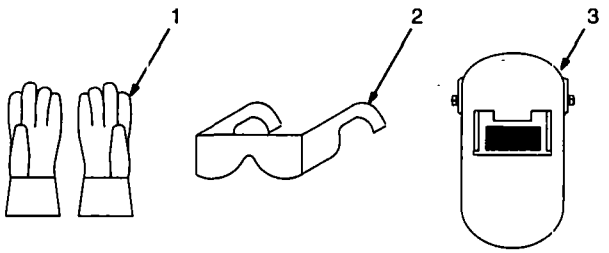
See Safety Precautions at beginning of manual for basic welding safety information. swarn6.1 10/91



1 Range Switch
2 Polarity Switch (Optional)
3 Voltmeter (Optional)
4 Ammeter (Optional)
5 Amperage Adjustment Control
6 Power Push Buttons Switch
7 Pilot Light
8 Output/Contactor Switch
9 Amperage Control Switch
10 Arc Control

Ref. ST-155 048-A

Figure 4-1. Controls



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)

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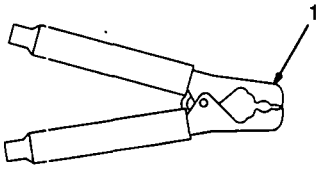
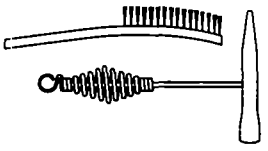
Figure 4-2. Safety Equipment



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

Figure 4-3. Work Clamp

⚠ WARNING

ELECTRIC SHOCK can kill.

- Do not touch live electrical parts.
- Do not touch weld output terminals when contactor is energized.
- Do not touch electrode and work clamp at the same time.

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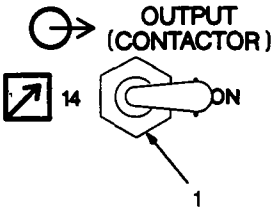
⚠ **Weld output terminals are energized when switch is On and Power is On.**



1 Output/Contactor Switch

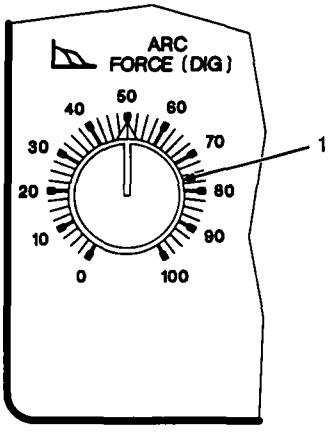
Use switch to select way of controlling unit output.

For weld output, place switch in On position.

For remote output control, place switch in Remote 14 position (see Section 3-4).

Ref. ST-168 257

Figure 4-4. Output/Contactor Control Switch



1 Arc Force Control (Dig)

This control is used for SMAW welding and is used to help start an arc or make vertical or overhead welds (control increases amperage at low arc voltage).

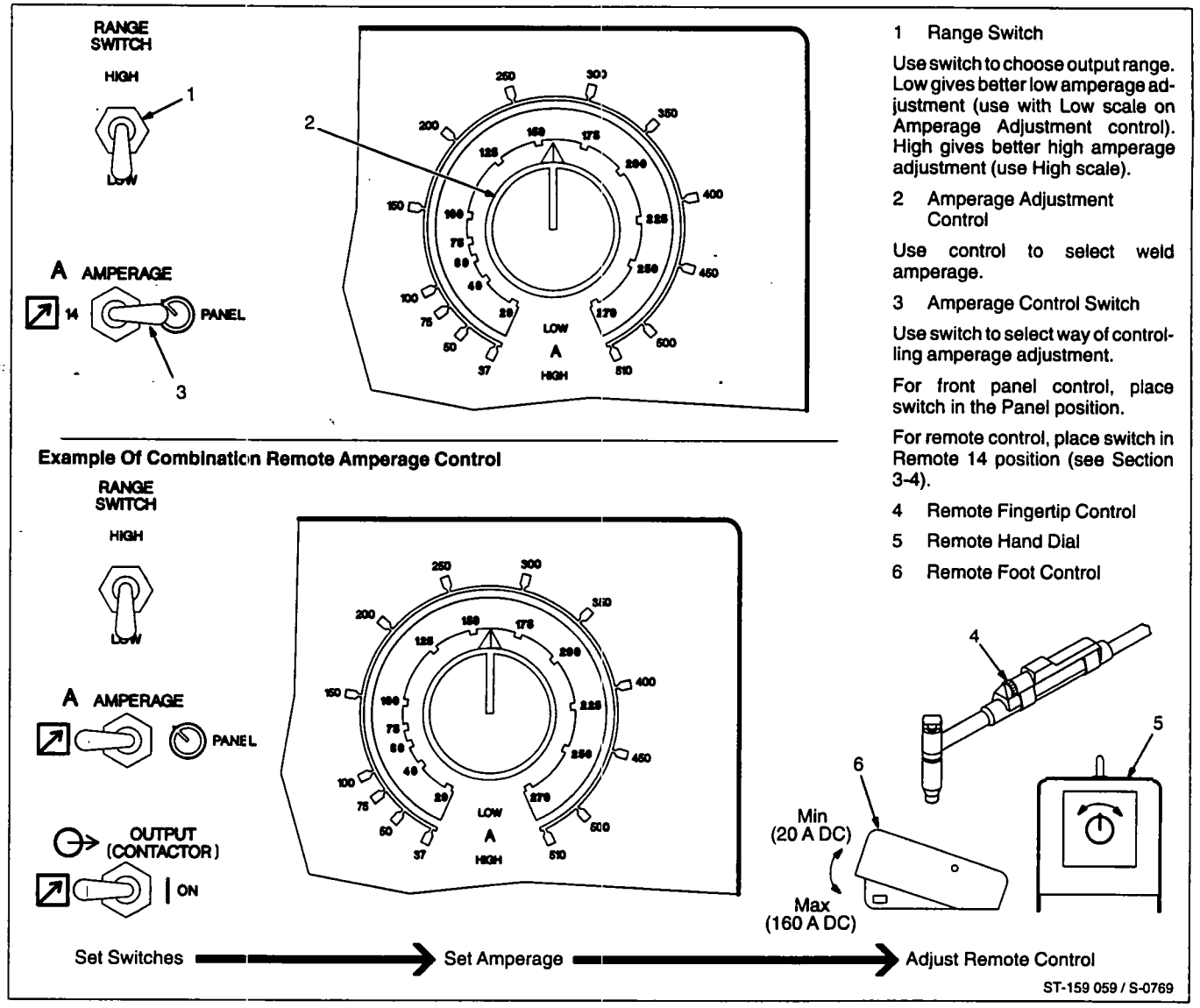
When set at 0, short-circuit amperage at low arc voltage is the same as normal welding amperage.

When set at 100, short-circuit amperage at low arc voltage increases to help arc starting.

Select setting best suited for application. Numbers around control are for reference only.

Set control at 0 for GTAW welding.

Figure 4-5. Arc Control



1 Range Switch

Use switch to choose output range. Low gives better low amperage adjustment (use with Low scale on Amperage Adjustment control). High gives better high amperage adjustment (use High scale).

2 Amperage Adjustment Control

Use control to select weld amperage.

3 Amperage Control Switch

Use switch to select way of controlling amperage adjustment.

For front panel control, place switch in the Panel position.

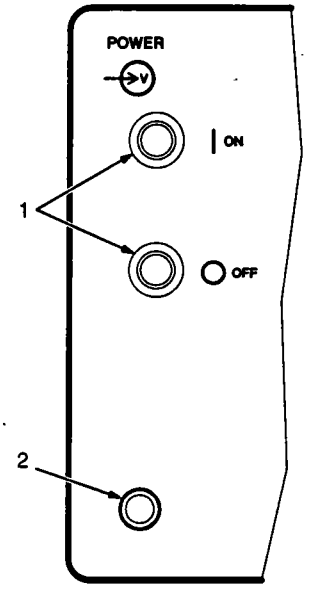
For remote control, place switch in Remote 14 position (see Section 3-4).

4 Remote Fingertip Control

5 Remote Hand Dial

6 Remote Foot Control

Figure 4-6. Amperage Adjustment Controls



1 Power Push Buttons Switch

Use buttons to turn unit, fan motor, and pilot light On and Off.

2 Pilot Light

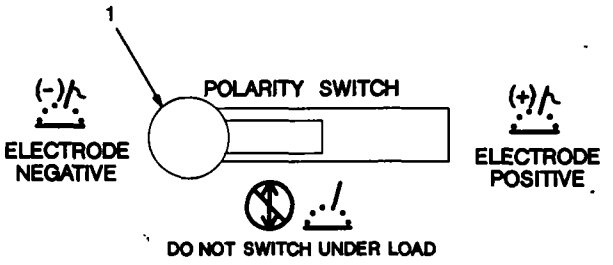
Figure 4-7. Power Push Buttons Switch And Pilot Light

⚠ WARNING

ARCING can damage switch contacts.

- Do not change Polarity Switch position while welding.

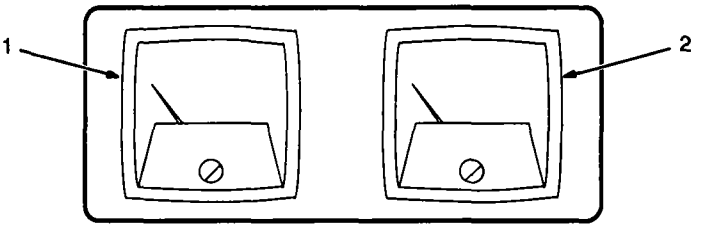
Arcing inside switch can damage contacts, causing switch to fail.



1 Polarity Switch

Use switch to select weld polarity.

Figure 4-8. Polarity Switch (Optional)



1 Voltmeter

Voltmeter displays voltage at the weld output terminals, but not necessarily the welding arc due to cable resistance, poor connections, etc.

2 Ammeter

Ammeter displays weld amperage output of unit.

Figure 4-9. Voltmeter And Ammeter (Optional)

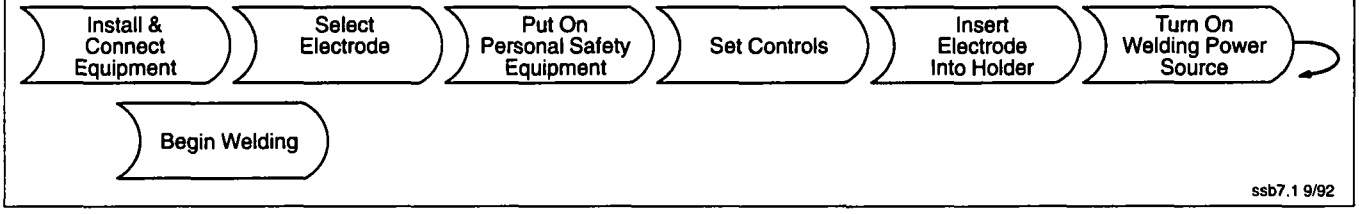


Figure 4-10. Sequence Of Shielded Metal Arc Welding (SMAW)

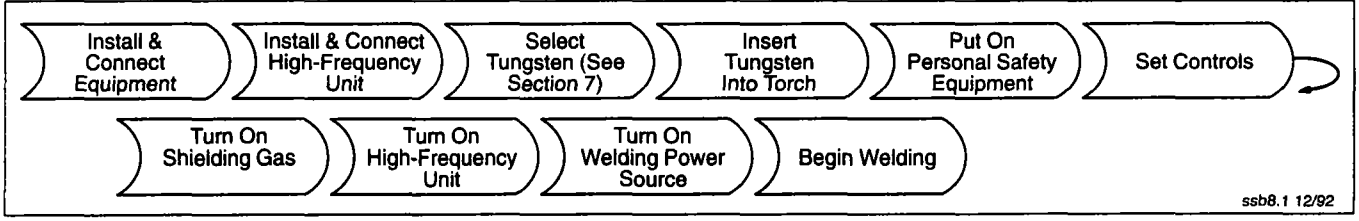


Figure 4-11. Sequence Of Gas Tungsten Arc Welding (GTAW)

⚠ WARNING

ELECTRIC SHOCK can kill.

- Do not touch live electrical parts.
- Turn Off welding power source, and disconnect input power before inspecting, maintaining, or servicing.

HOT PARTS can cause severe burns.

- Allow cooling period before maintaining or servicing.

MOVING PARTS can cause injury.

- Keep away from moving parts.

Maintenance to be performed only by qualified persons.

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5-1. Routine Maintenance

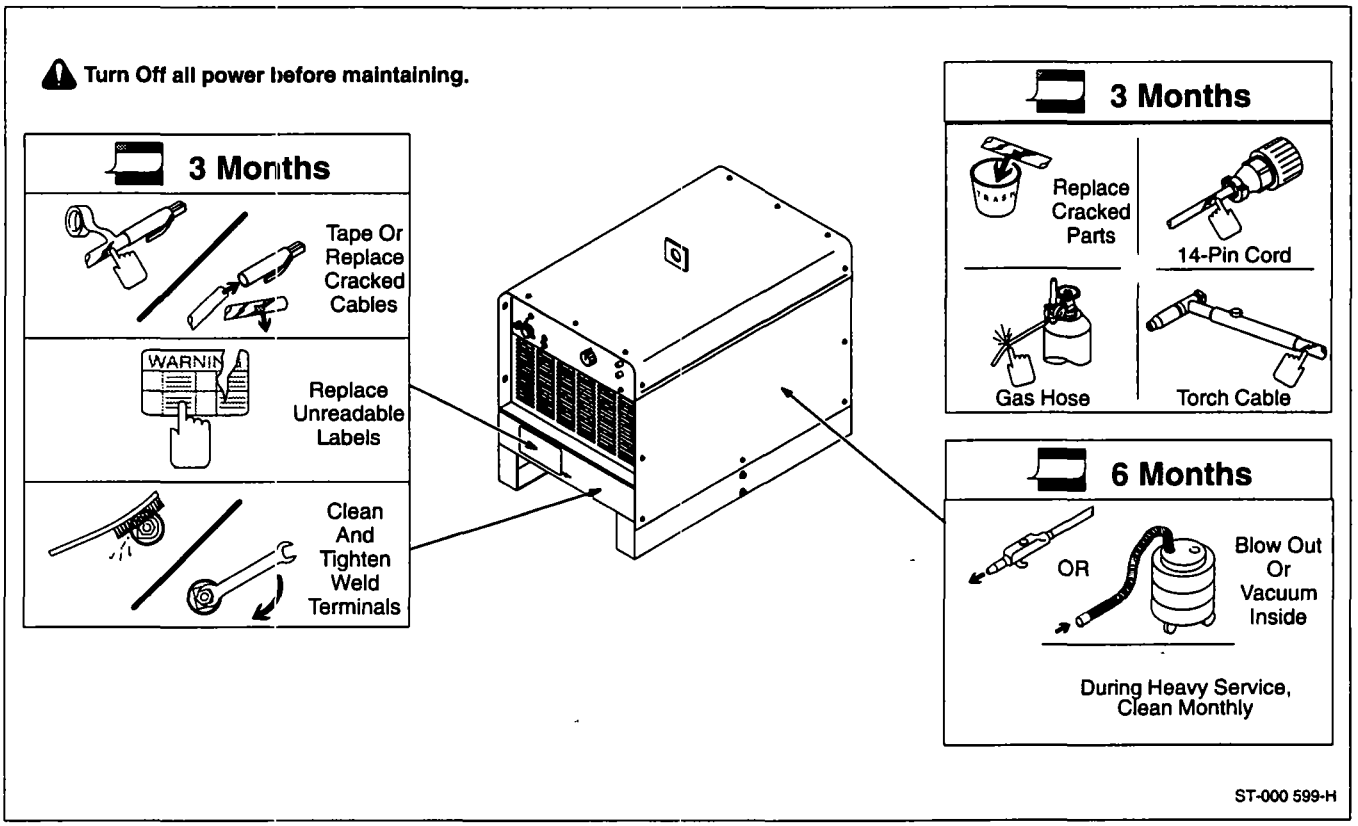
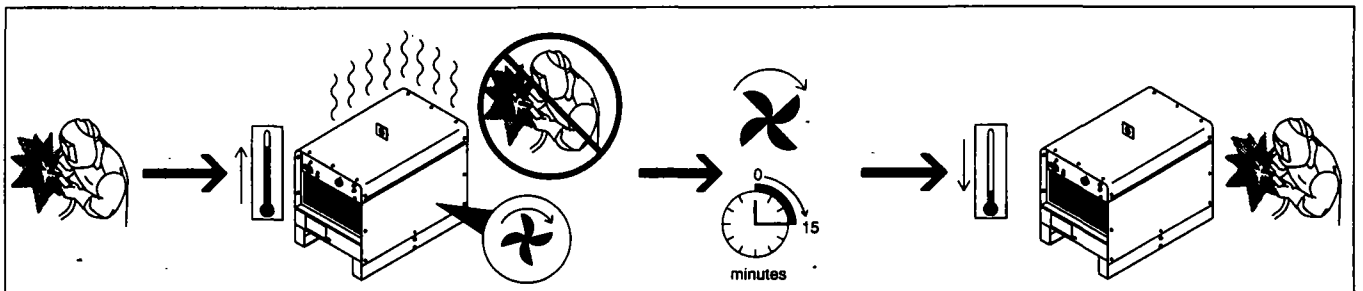


Figure 5-1. Maintenance Schedule

5-2. Overload Protection

⚠ WARNING **READ SAFETY BLOCKS at start of Section 5 before proceeding.**



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

Let fan run for 15 minutes.

Start welding.

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Figure 5-2. Overheating

5-3. Troubleshooting

⚠ WARNING

ELECTRIC SHOCK can kill.

- Do not touch live electrical parts.
- Turn Off welding power source, and disconnect input power before inspecting, maintaining, or servicing.

HOT PARTS can cause severe burns.

- Allow cooling period before servicing.

MOVING PARTS can cause injury.

- Keep away from moving parts.

Troubleshooting to be performed only by qualified persons.

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Table 5-1. Welding Trouble

Trouble	Remedy	Section
No weld output; unit completely inoperative.	Place line disconnect switch in the On position.	3-5B
	Check for open line fuse(s), and replace if necessary. Check and reset circuit breakers.	3-5B
	Check for proper input connections.	3-5B
	Check for proper jumper link positions.	3-5A
	Thermostat TP1 open. Allow a cooling period of approximately fifteen minutes.	5-2
	Check push button Power switch linkage for restrictions or obstructions.	- -
No weld output; pilot light PL1 on.	Clean and tighten all weld connections.	3-3
	Place Output (Contactor) switch in the On position or connect Remote Contactor Control To RC1.	Figure 4-4
	Check remote contactor control switch for proper operation with an ohmmeter, and replace if necessary.	- -
	Have Factory Authorized Service Station/Service Distributor check control board PC1.	- -

Trouble	Remedy	Section
Low or minimum weld output.	Check for proper line voltage.	- -
	Check for open line fuse(s), and replace if necessary. Check and reset circuit breakers.	3-5B
	Clean and tighten all weld connections.	3-3
	Place Amperage control switch in the correct position.	Figure 4-6
	Have Factory Authorized Service Station/Service Distributor check control board PC1 and/or hall device HD1.	- -
Maximum weld output.	Have Factory Authorized Service Station/Service Distributor check Amperage Adjustment control, control board PC1 and/or hall device HD1.	- -
Erratic weld output.	Check for proper input connections.	3-5B
	Use proper size and type electrode.	- -
Excessive line current or line fuse(s) opens repeatedly.	Check for proper input connections.	3-5B
	Check for proper jumper link positions.	3-5A
	Check for shorted fan motor FM leads, and repair if necessary.	- -
Fan motor inoperative and/or overheating.	Check for fan blade obstruction.	- -
	Replace fan motor FM, if necessary.	- -
Wandering arc; poor control of arc direction.	Reduce gas flow rate.	- -
	Select proper size tungsten.	7
	Properly prepare tungsten.	7
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

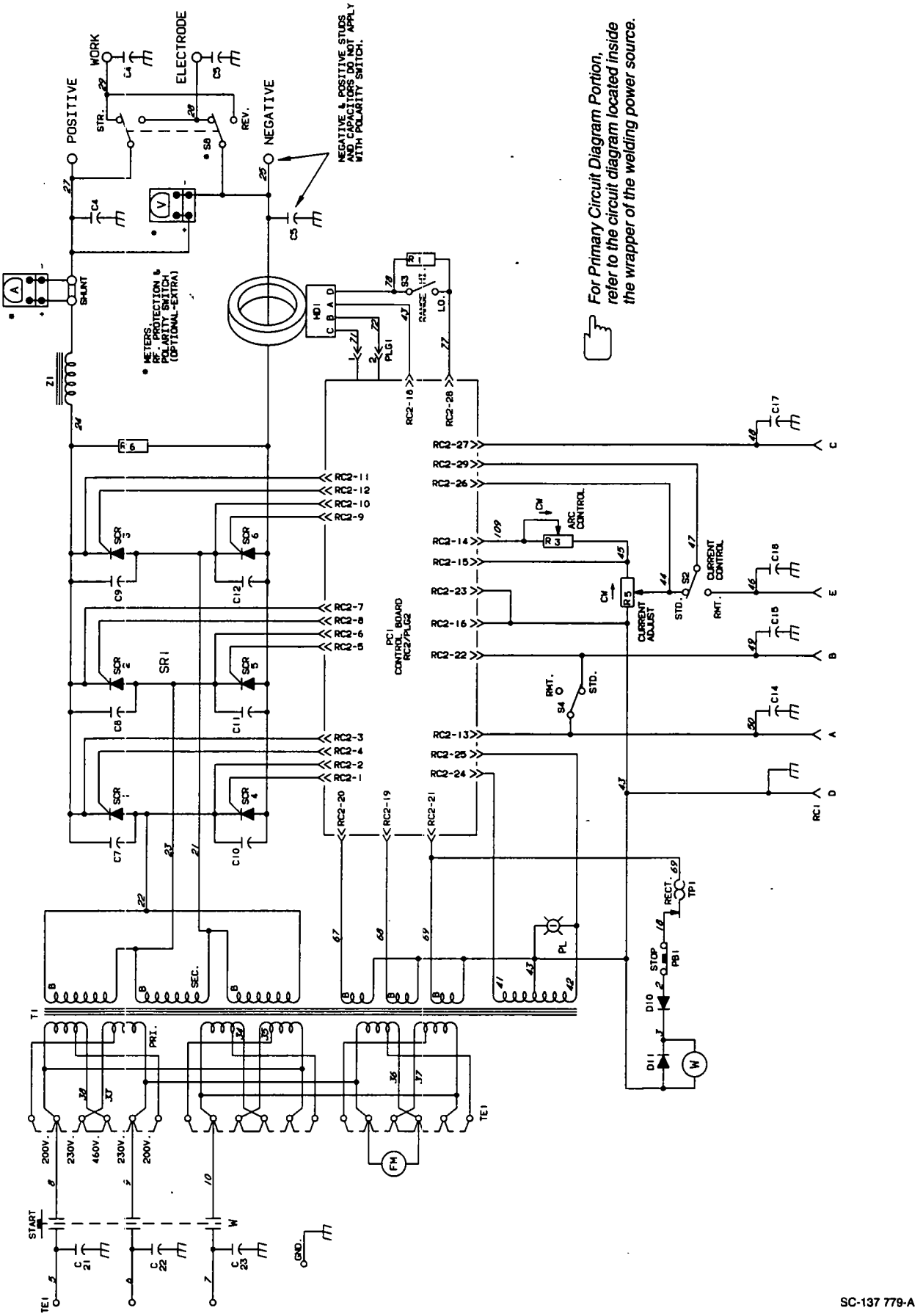

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Figure 6-1. Circuit Diagram For Welding Power Source

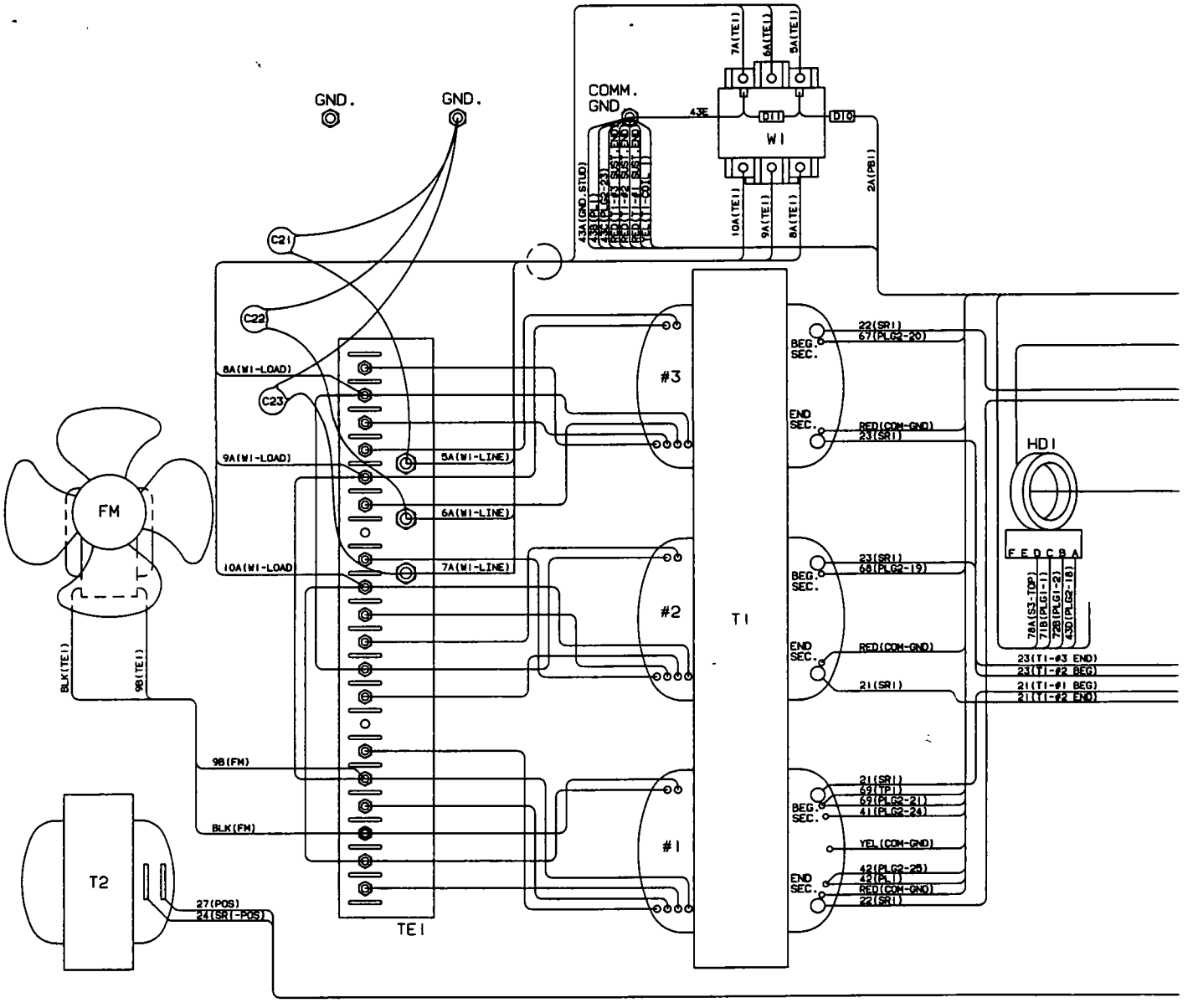
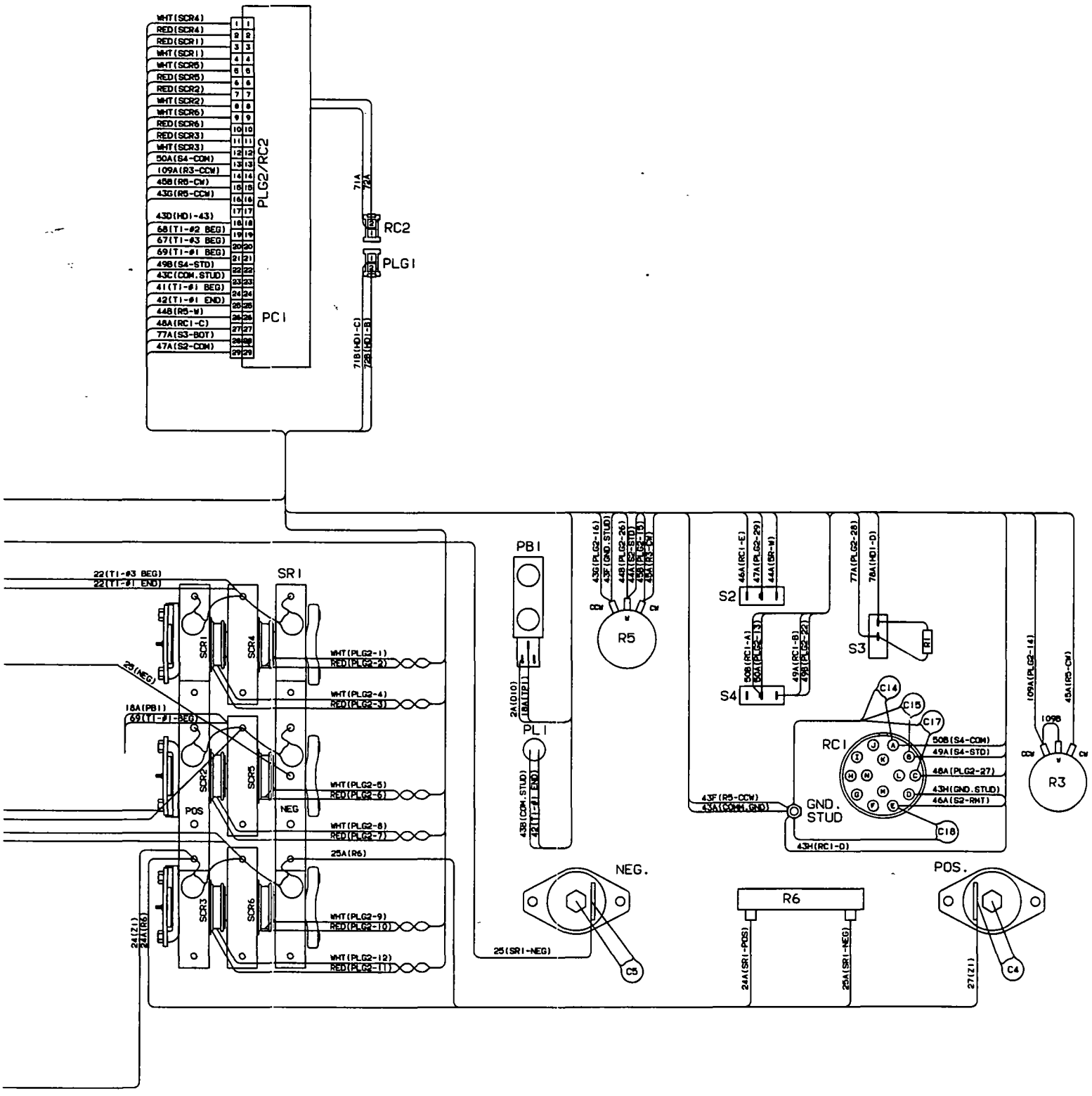


Figure 6-2. Wiring Diagram For Welding Power Source



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SECTION 7 – 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

Table 7-1. Tungsten Size

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

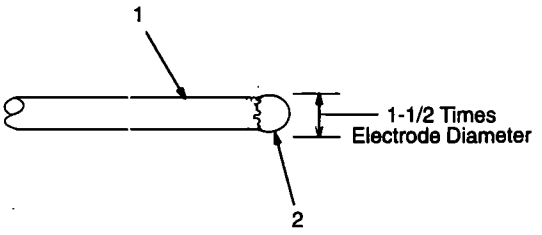
♦ Typical argon shielding gas flow rates are 15 to 35 cfh (cubic feet per hour).

*Not Recommended.

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

S-0009

7-2. Preparing Tungsten



1 Tungsten Electrode

2 Balled End

Ball end of tungsten before welding by applying either an ac amperage slightly higher than what is recommended for a given electrode diameter (see NO TAG), or a dc electrode positive amperage.

Ref. S-0161

Figure 7-1. Preparing Tungsten For AC Or DC Electrode Positive (DCEP) Welding

⚠ CAUTION

FLYING SPARKS AND HOT METAL can cause injury and start fires.

- Shape tungsten electrode only on grinder with proper guards in a safe location wearing proper face, hand, and body protection.
- Keep flammables away.

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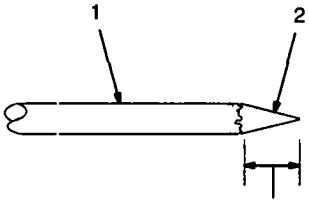
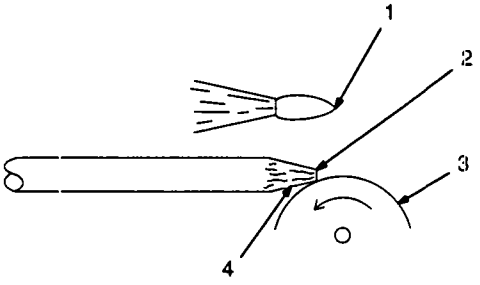


1 Tungsten Electrode

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.

Ref. S-0161



Ideal Tungsten Preparation – Stable Arc

1 Stable Arc

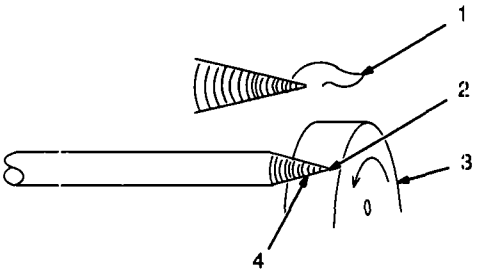
2 Flat

Diameter of this flat determines amperage capacity.

3 Grinding Wheel

4 Straight Ground

Ref. S-0162



Wrong Tungsten Preparation – Wandering Arc

1 Arc Wander

2 Point

3 Grinding Wheel

4 Radial Ground

Ref. S-0162

Figure 7-2. Preparing Tungsten For DC Electrode Negative (DCEN) Welding

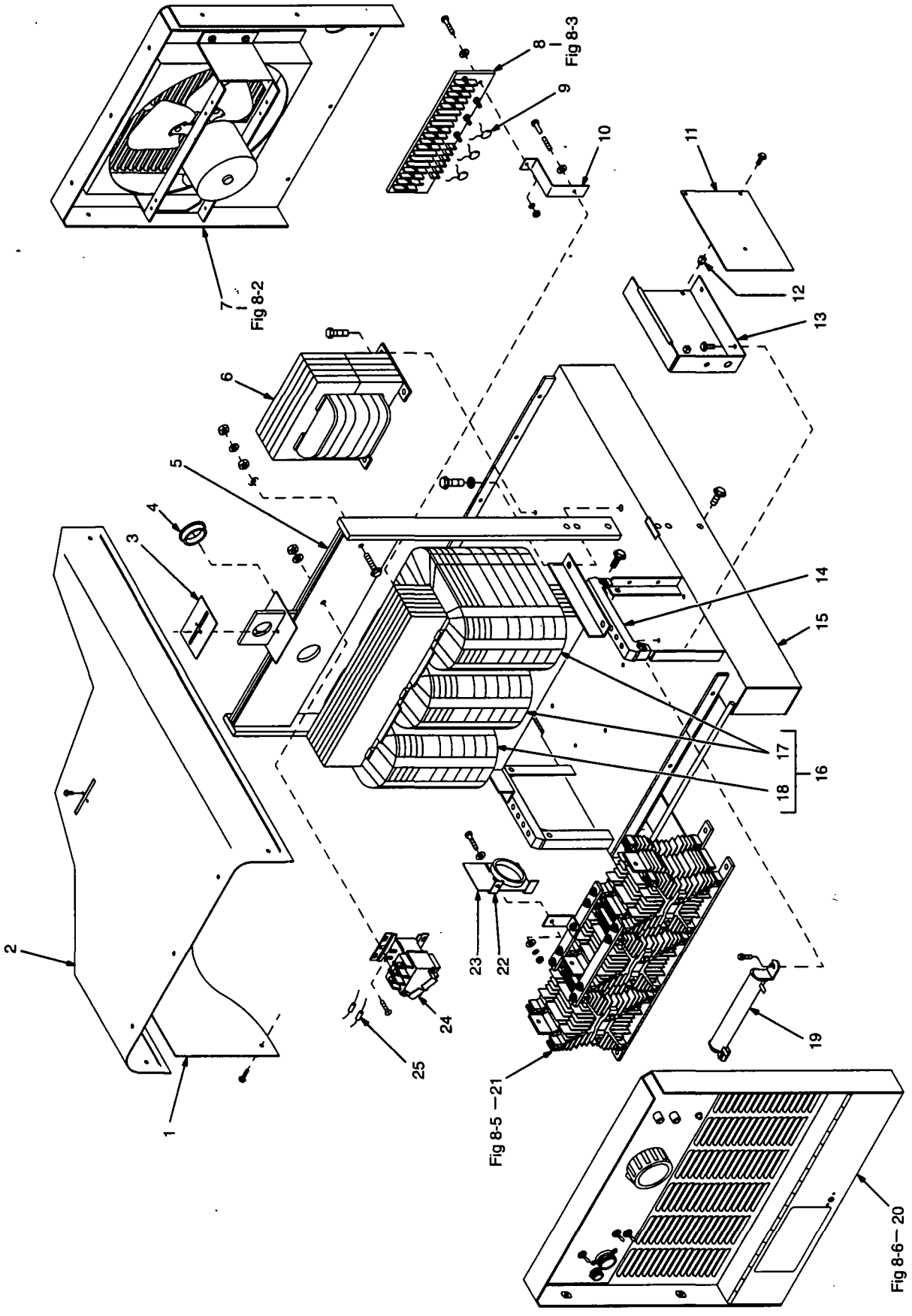


Figure 8-1. Main Assembly

Item No.	Dia. Mkgs.	Part No.	Description	Quantity

Figure 8-1. Main Assembly

1		♦006 016	PANEL, side	2
		109 035	LABEL, warning electric shock can kill etc	1
2		006 017	COVER, top	1
3		026 627	GASKET, lifting eye	1
4		004 214	BUSHING, snap-in nyl 1.625 ID x 2.000mtg hole	1
5		091 164	FRAME, upright base	1
		134 771	PLUG, protective .640sq	2
6	Z	035 279	STABILIZER	1
7		Fig 8-2	PANEL, rear w/components	1
8	TE1	038 138	TERMINAL ASSEMBLY, triple voltage (Fig 8-3)	1
9	C21	137 674	CAPACITOR	1
9	C22,23	137 771	CAPACITOR	2
10		097 918	BRACKET, mtg terminal board	2
11	PC1	084 553	CIRCUIT CARD, root pass	1
	RC1	**048 281	CONNECTOR w/SOCKETS, (consisting of)	1
		058 972	CONNECTOR, rect skt 20-14ga Amp 350415-1	2
	PLG1	048 280	CONNECTOR & PINS, (consisting of)	1
		058 971	CONNECTOR, rect pin 20-14ga Amp 350416-1	2
	PLG2	035 815	CONNECTOR, rect 29skt plug Amp 531590-3	1
12		080 509	GROMMET, scr No. 8/10 panel hole .312sq .375 high	3
13		090 781	CIRCUIT CARD BOX	1
14		138 378	BRACKET, mtg rectifier (included w/SR1)	2
15		139 785	BASE	1
16	T1	137 055	TRANSFORMER, power main 220/380/400/415 (consisting of)	1
17		137 057	COIL, pri/sec RH & center	2
18		137 056	COIL, pri/sec LH	1
19	R6	039 210	RESISTOR, WW fxd 375W 12 ohm	1
20		Fig 8-6	PANEL, front w/components	1
21	SR1	140 121	RECTIFIER, SCR (Fig 8-5)	1
22		144 017	BRACKET, mtg hall	1
23	HA1,HD1	134 826	CIRCUIT CARD, hall booster	1
24	W	137 900	KIT, contactor	1
25	D10,11	082 456	DIODE ASSEMBLY	1

♦When ordering a component originally displaying a precautionary label, the label should also be ordered.
**Included w/PC1.
BE SURE TO PROVIDE MODEL AND SERIAL NUMBER WHEN ORDERING REPLACEMENT PARTS.

Item No.	Dia. Mkgs.	Part No.	Description	Quantity
			Figure 8-2. Panel, Rear w/Components (Fig 8-1 Item 7)	
1	FM	116 190	MOTOR, 1/12hp 230V 1550rpm	1
2		131 361	CHAMBER, plenum 14 in	1
3		032 611	BLADE, fan 14 in 3wg 23deg .375 bore CCW	1
4		158 289	PANEL, rear	1

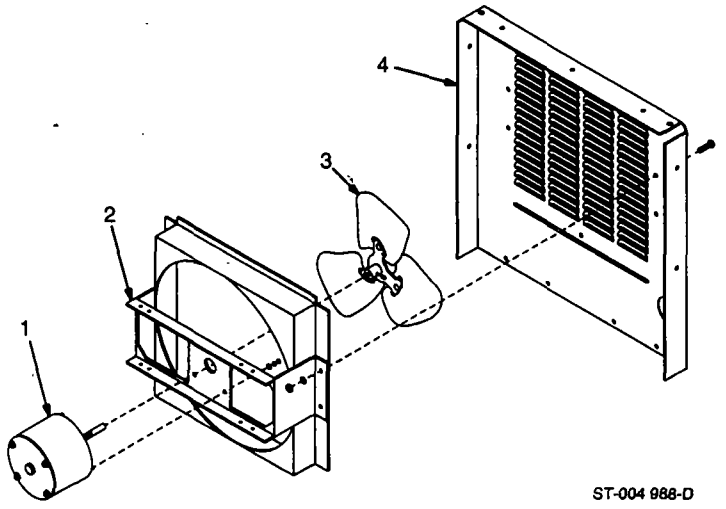


Figure 8-2. Panel, Rear w/Components

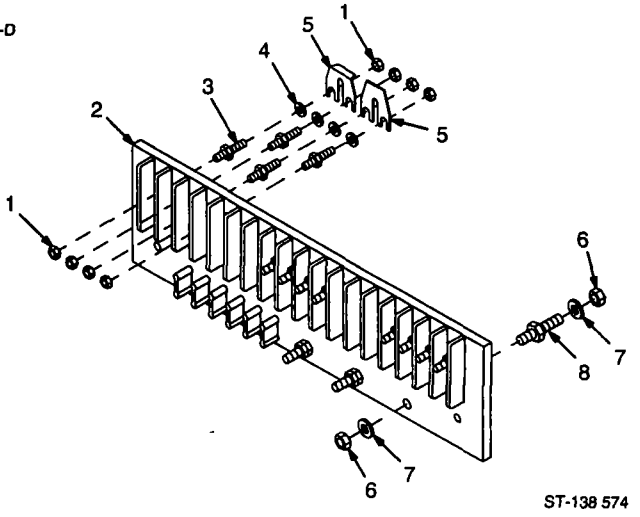


Figure 8-3. Terminal Assembly, Pri

Item No.	Part No.	Description	Quantity
	038 138	**Figure 8-3. Terminal Assembly, Pri (Fig 8-1 Item 8)**	
1	601 835	NUT, brs hex 10-32	36
2	038 058	TERMINAL BOARD, primary	1
3	038 887	STUD, pri board brs 10-32 x 1.375	18
4	010 913	WASHER, flat brs .218 ID x .460 OD x .031thk	18
5	038 618	LINK, jumper term bd pri	6
6	601 836	NUT, brs hex .250 -20 jam hvy	6
7	010 915	WASHER, flat brs .250 ID x .625 OD x .031thk	6
8	038 888	STUD, pri board brs .250-20 x 1.500	3

BE SURE TO PROVIDE MODEL AND SERIAL NUMBER WHEN ORDERING REPLACEMENT PARTS.

Item No.	Part No.	Description	Quantity
	046 745	**Figure 8-4. Switch, PB (Fig 8-6 Item 11)**	
1	059 885	BUTTON, push reset red	1
2	018 606	SPRING, cprsn .430 OD x .040 wire x 1.500stnls	1
3	045 546	PUSH BUTTON SET, w/cable & housing	1
4	081 008	BRACKET, mtg switch PB	1
5	027 878	SWITCH, lim leaf actg SPDT	1

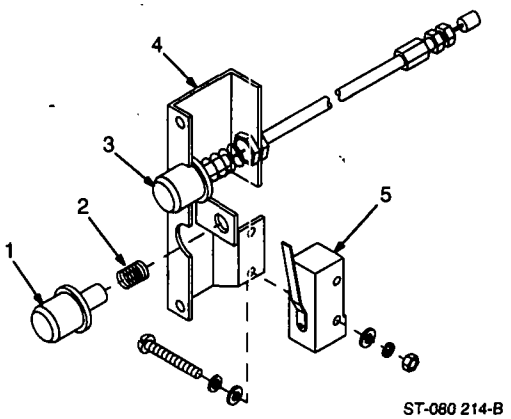


Figure 8-4. Switch, PB

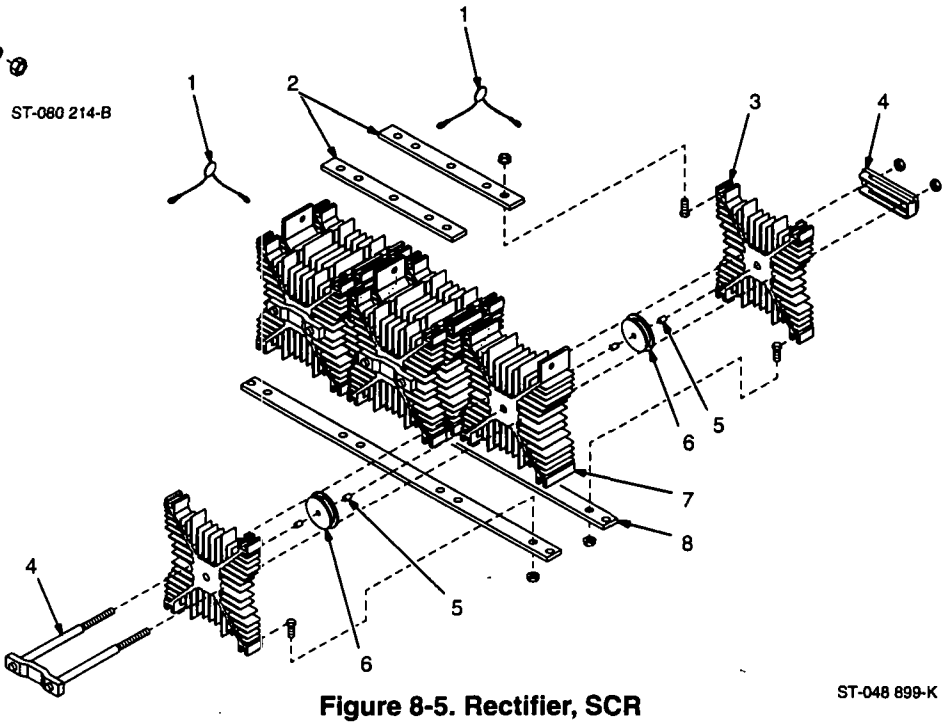


Figure 8-5. Rectifier, SCR

Item No.	Dia. Mkgs.	Part No.	Description	Quantity
	SR1	**140 121**	**Figure 8-5. Rectifier, SCR (Fig 8-1 Item 21)**	
1	C7-12	048 420	CAPACITOR, rectifier	6
2		082 852	BUS BAR, output rectifier	2
3		048 779	HEAT SINK, rectifier snowflake 1.000	6
4		082 694	CLAMP, thyristor rectifier 5.500	3
5		028 516	PIN, spring CS .125 x .250	12
6	SCR1-6	097 397	THYRISTOR, SCR 300A 300V	6
7		045 109	HEAT SINK, rectifier snowflake 1.000	3
	TP1	117 275	THERMOSTAT, NC	1
		026 701	INSULATION, thermostat	1
8		114 530	BAR, mtg rectifier	2

BE SURE TO PROVIDE MODEL AND SERIAL NUMBER WHEN ORDERING REPLACEMENT PARTS.

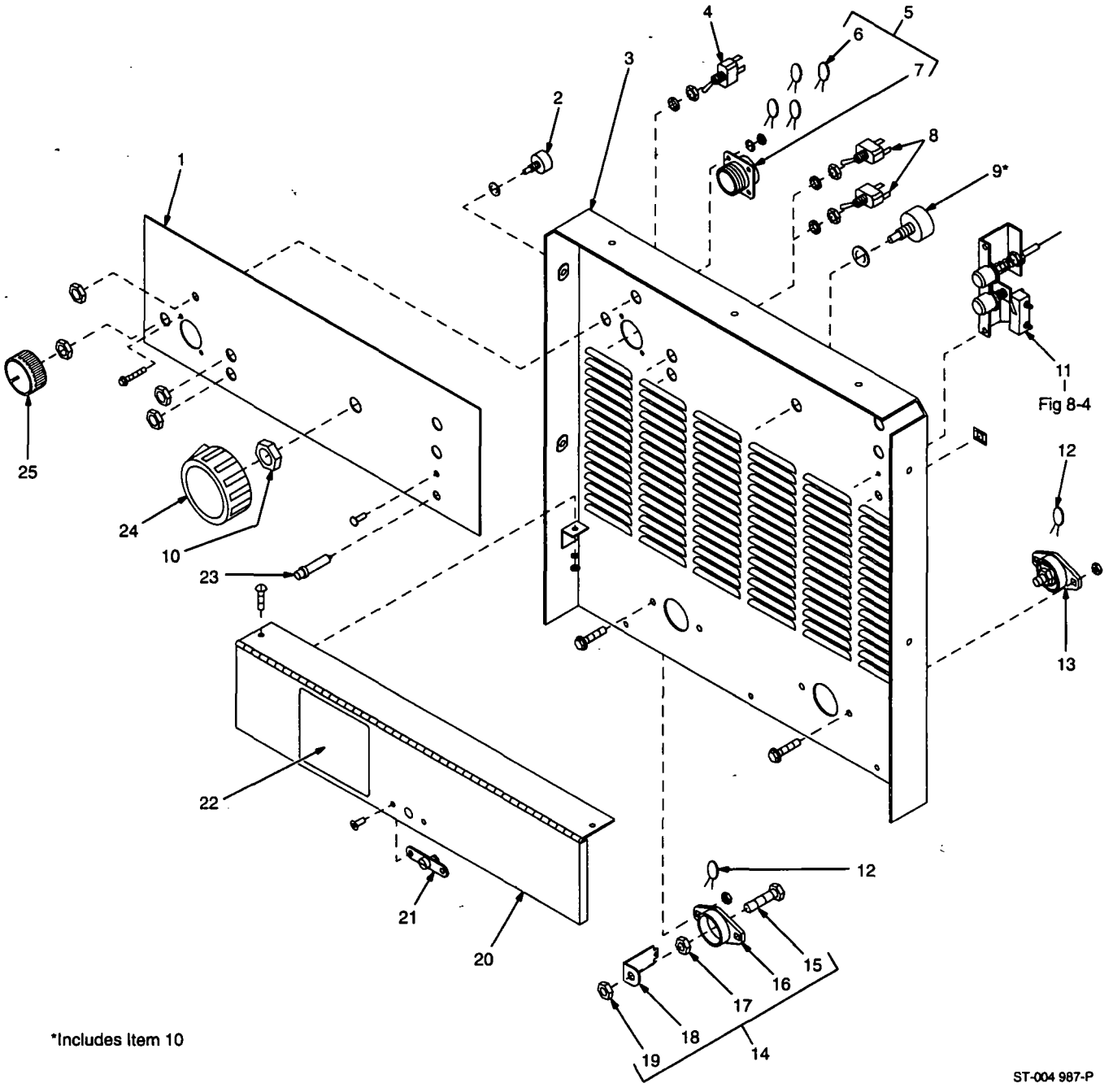


Figure 8-6. Panel, Front w/Components

Item No.	Dia. Mkgs.	Part No.	Description	Quantity
			Figure 8-6. Panel, Front w/Components (Fig 8-1 Item 20)	
1			NAMEPLATE, (order by model and serial number)	1
2	R3	009 156	POTENTIOMETER, C sltd sft 1/T 2W 2.5K ohm	1
3		+158 258	PANEL, front	1
4	S3	089 085	SWITCH, tgl SPST 20A 125VAC	1
	R1	084 206	RESISTOR, MF .25W 3.32K ohm	1
5		130 257	CONNECTOR, w/leads (consisting of)	1
6	C14	143 935	LEAD ASSEMBLY, elect	1
6	C15	143 934	LEAD ASSEMBLY, elect	1
6	C17	143 933	LEAD ASSEMBLY, elect	1
6	C18	143 936	LEAD ASSEMBLY, elect	1
7	RC1	143 976	CONNECTOR w/TERMINALS, (consisting of)	1
		079 534	CONNECTOR, circ skt push-in 14-18ga Amp 66358-6	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 Amp 206322-2	
8	S2,4	011 609	SWITCH, tgl SPDT 15A 125VAC	2
9	R5	072 462	POTENTIOMETER, w/shaft lock (consisting of)	1
10		072 590	LOCK, pot .375-32 x .250dia shaft	1
11	PB1	046 745	SWITCH, PB (Fig 8-4)	1
12	C4,5	087 337	CAPACITOR	2
13	NEG	039 046	TERMINAL, pwr output black (consisting of)	1
14	POS	039 047	TERMINAL, pwr output red (consisting of)	1
15		601 976	SCREW, cap stl hexhd .500-13 x 1.500	1
16		039 045	TERMINAL BOARD, black	1
16		039 049	TERMINAL BOARD, red	1
17		601 880	NUT, stl hex jam .500-13	1
18		039 044	BUS BAR, term bd	1
19		601 879	NUT, stl hex full .500-13	1
20		+109 449	DOOR, access front	1
21		605 583	CATCH, spr loaded door	1
22		134 327	LABEL, warning general precautionary	1
23	PL1	048 573	LIGHT, ind red lens 28V	1
24		097 926	KNOB, pointer	1
25		097 922	KNOB, pointer	1

+When ordering a component originally displaying a precautionary label, the label should also be ordered.
BE SURE TO PROVIDE MODEL AND SERIAL NUMBER WHEN ORDERING REPLACEMENT PARTS.