



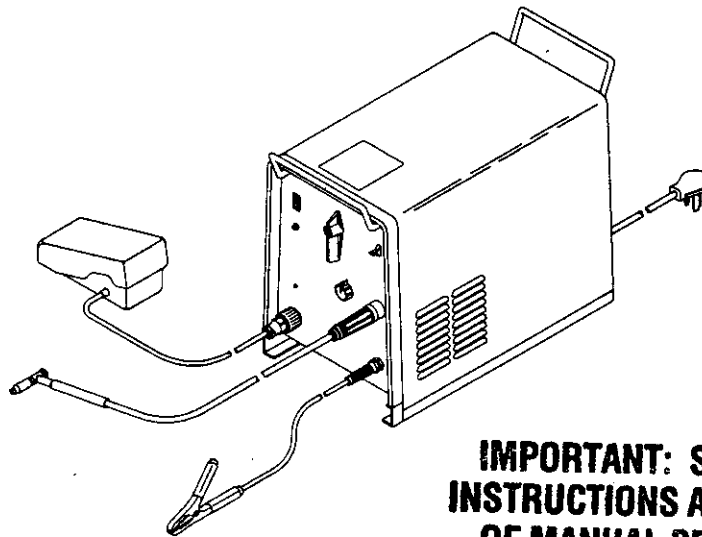
**Miller**®

August 1993

Form: OM-303A

Effective With Serial No. KD468226

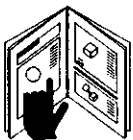
# OWNER'S MANUAL



**IMPORTANT: SEE SPECIAL  
INSTRUCTIONS AT BEGINNING  
OF MANUAL BEFORE USE.**

**Econotig™**

- CC AC/DC Welding Power Source For GTAW And SMAW Welding
- GTAW Output: 150 A, 15 V AC/DC At 20% Duty Cycle
- SMAW Output: 130 A, 25 V DC Or 150 A, 25 V AC At 20% Duty Cycle
- Uses Single-Phase Input Power (See Rating Label)
- Built-In Arc Start For GTAW
- Overheating Protection
- Includes Accessory Equipment For GTAW And SMAW



- 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.)
  - 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 fall 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, GUARANTEE OR REPRESENTATION AS TO PERFORMANCE, AND ANY REMEDY FOR BREACH OF CONTRACT TORT OR ANY OTHER LEGAL THEORY WHICH, BUT FOR THIS PROVISION, MIGHT ARISE BY IMPLICATION, OPERATION OF LAW, CUSTOM OF TRADE OR COURSE OF DEALING, INCLUDING ANY IMPLIED WARRANTY OF MERCHANTABILITY OR FITNESS FOR PARTICULAR PURPOSE, WITH RESPECT TO ANY AND ALL EQUIPMENT FURNISHED BY MILLER IS EXCLUDED AND DISCLAIMED BY MILLER.

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

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

## 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 \_\_\_\_\_

# SUPPLEMENTARY DATA

January 1994

FORM: S167 439

Use above FORM number when ordering extra manuals.

## For Econotig™ CY50 (50 Hz) Using 380 Volts Input Power

The data contained in this supplement is either in addition to or takes exception to data appearing later in this manual.

### NOTE



Change all Owner's Manual references from 60 Hertz to 50 Hertz electrical input power.

### CHANGES TO SECTION 2 – SPECIFICATIONS

Change the following entries in Table 2-1. Welding Power Source

Specification	Description
Input Amperes At Rated Output	39A At 380V
KVA Used At Rated Output	14.8
KW Used At Rated Output	6.7

### CHANGES TO SECTION 3 – INSTALLATION

Change title of Section 3-8B as follows: Connecting Input Power For 380 Volts Model

Replace Table 3-2. Electrical Service Requirements

Table 3-1. Electrical Service Requirements\*

Input Voltage	380
Number Of Phases	1
Input Amperes At Rated Output	39
Recommended Standard Fuse Or Circuit Breaker Rating In Amperes <sup>1</sup>	60
Input Conductor Size In AWG/Kcmil <sup>2</sup>	12
Max Input Conductor Length In Feet (Meters) <sup>3</sup>	151 (46)
Grounding Conductor Size In AWG/Kcmil <sup>4</sup>	12

\* 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

### CHANGES TO SECTION 6 – ELECTRICAL DIAGRAMS

Add the following NOTE to Figure 6-1. Circuit Diagram For Welding Power Source

### NOTE



For Primary Circuit Diagram Portion, refer to the Circuit Diagram located inside the wrapper of the welding power source.

Delete Figure 6-2. Wiring Diagram For Welding Power Source

**CHANGES TO SECTION 10 – PARTS LIST**

Change Parts List as follows:

**	Dia. Mkgs.	Part No.	Replaced With	Description	Quantity
. 35-14	.....	605 077	..... 605 077	.. CABLE, (380V) (order by ft)	..... 8ft
. 35-22	... T1	..... Added	..... 161 389	.. TRANSFORMER, pwr main 380 (consisting of)	... 1
. 35-23	.....	.....	..... 160 525	... COIL, sec	..... 1
. 35-24	.....	.....	..... 161 326	... COIL, shunt	..... 1
. 35-25	.....	.....	..... 160 521	... COIL, pri	..... 1
.. 35-	... TP1,2	.....	..... 119 581	... THERMOSTAT	..... 2

\*\*First digit represents page no – digits following dash represent item no.

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

# ERRATA SHEET

December 2, 1993

FORM: OM-303A

Use above FORM number when ordering extra manuals.

After this manual was printed, refinements in equipment design occurred. This sheet lists exceptions to data appearing later in this manual.

## CHANGES TO SECTION 10 – PARTS LIST

Change Parts List as follows:

**	Part No.	Replaced With	Description	Quantity
. 35-3	155 402	165 986	.. WRAPPER, (Eff w/KD518130)	1
. 35-23	155 781	160 523	.. COIL, pri 200V	1
. 35-23	155 781	155 780	.. COIL, pri 230V	1
. 35-23	155 781	160 524	.. COIL, pri 460V	1
. 35-25	160 523	155 781	.. COIL, sec 200V	1
. 35-25	155 780	155 781	.. COIL, sec 230V	1
. 35-25	160 524	155 781	.. COIL, sec 460V	1
. 35-36	155 401	165 987	.. BASE, (Eff w/KD518130)	1

\*\*First digit represents page no – digits following dash represent item no.

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



# 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.**

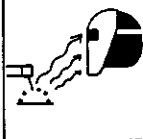


### ELECTRIC SHOCK can kill.

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.

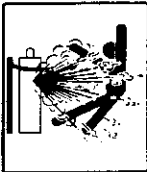
5. Watch for fire, and keep a fire extinguisher nearby.
6. Be aware that welding on a ceiling, floor, bulkhead, or partition can cause fire on the hidden side.
7. Do not weld on closed containers such as tanks or drums.
8. Connect work cable to the work as close to the welding area as practical to prevent 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.

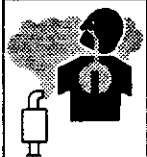
1. Protect compressed gas cylinders from excessive heat, mechanical shocks, and arcs.
2. Install and secure cylinders in an upright position by chaining them to a stationary support or equipment cylinder rack to prevent falling or tipping.

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.

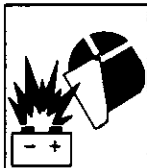


### MOVING PARTS can cause injury.

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 consommables, 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.

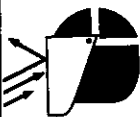

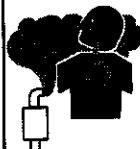






### Le SOUDAGE peut causer un incendie ou une explosion.

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.

	<p><b>LES ÉTINCELLES ET LES PROJECTIONS BRULANTES peuvent causer des blessures.</b> Le piquage et le meulage produisent des éclats de</p>	<p>métal. En refroidissant, la soudure peut projeter du laitier.</p> <ol style="list-style-type: none"> <li>1. Portez un écran facial ou des lunettes à coques approuvées. Des écrans latéraux sont recommandés.</li> <li>2. Portez des vêtements de protection individuelle appropriés.</li> </ol>
	<p><b>Les BOUTEILLES endommagées peuvent exploser.</b> 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.</p> <ol style="list-style-type: none"> <li>1. Les bouteilles doivent être protégées contre les sources de chaleur intense, les chocs et les arcs de soudage.</li> <li>2. Enchaînez verticalement les bouteilles à un support ou à un cadre fixe pour les empêcher de tomber ou d'être renversées.</li> <li>3. Éloignez les bouteilles de tout circuit électrique ou de soudage.</li> </ol>	<ol style="list-style-type: none"> <li>4. Empêchez tout contact entre une bouteille et une électrode.</li> <li>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.</li> <li>6. Ne mettez pas le visage devant le robinet de bouteille en l'ouvrant.</li> <li>7. Remettez le chapeau de bouteille après utilisation.</li> <li>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.</li> </ol>
<h2>MISE EN GARDE</h2>		<h2>Les MOTEURS peuvent être dangereux.</h2>
	<p><b>Les GAZ D'ÉCHAPPEMENT DES MOTEURS PEUVENT ÊTRE MORTELS.</b> Les moteurs produisent des gaz d'échappement nocifs.</p>	<ol style="list-style-type: none"> <li>1. Utilisez des machines à l'extérieur dans des aires ouvertes et bien ventilées.</li> <li>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.</li> </ol>
	<p><b>Le CARBURANT peut causer un incendie ou une explosion.</b> Le carburant est hautement inflammable.</p> <ol style="list-style-type: none"> <li>1. Arrêtez le moteur avant de vérifier le niveau de carburant ou de faire le plein.</li> <li>2. Ne faites pas le plein en fumant ou proche d'une source</li> </ol>	<p>d'étincelles ou d'une flamme nue.</p> <ol style="list-style-type: none"> <li>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.</li> <li>4. Ne faites pas le plein de carburant à ras bord : prévoyez de l'espace pour son expansion.</li> <li>5. Faites attention de ne pas renverser de carburant. Nettoyez tout carburant renversé avant de faire démarrer le moteur.</li> </ol>
	<p><b>Des PIÈCES EN MOUVEMENT peuvent causer des blessures.</b> Des pièces en mouvement, telles des ventilateurs, des rotors et des courroies peuvent couper les doigts et les mains, ou accrocher des vêtements amples.</p> <ol style="list-style-type: none"> <li>1. Assurez-vous que les portes, les panneaux, les capots et les protecteurs sont bien fermés.</li> <li>2. Avant d'installer ou de connecter un système, arrêtez-en le moteur.</li> <li>3. Seules des personnes qualifiées doivent démonter des</li> </ol>	<p>protecteurs ou des capots pour faire l'entretien ou le dépannage nécessaire.</p> <ol style="list-style-type: none"> <li>4. Pour empêcher un démarrage accidentel d'un système pendant l'entretien, débranchez le câble d'accumulateur à la borne négative.</li> <li>5. N'approchez pas les mains ou les cheveux de pièces en mouvement; elles peuvent aussi accrocher des vêtements amples et des outils.</li> <li>6. Réinstallez les capots ou les protecteurs et fermez les portes après des travaux d'entretien et avant de faire démarrer le moteur.</li> </ol>
	<p><b>Des ÉTINCELLES peuvent FAIRE EXPLOSER UN ACCUMULATEUR; L'ÉLECTROLYTE D'UN ACCUMULATEUR peut brûler la peau et les yeux.</b> Les accumulateurs contiennent de l'électrolyte et dégagent des vapeurs explosives.</p> <ol style="list-style-type: none"> <li>1. Portez toujours un écran facial en travaillant sur</li> </ol>	<p>un accumulateur.</p> <ol style="list-style-type: none"> <li>2. Arrêtez le moteur avant de connecter ou de déconnecter des câbles d'accumulateur.</li> <li>3. N'utilisez que des outils anti-étincelles pour travailler sur un accumulateur.</li> <li>4. N'utilisez pas un poste de soudage pour charger un accumulateur ou connecter provisoirement un véhicule.</li> <li>5. Utilisez la polarité correcte (+ et -) de l'accumulateur.</li> </ol>
	<p><b>La VAPEUR ET LE LIQUIDE DE REFROIDISSEMENT BRÛLANT SOUS PRESSION peuvent brûler la peau et les yeux.</b> Le liquide de refroidissement d'un radiateur peut être brûlant et sous pression.</p>	<ol style="list-style-type: none"> <li>1. N'ôtez pas le bouchon de radiateur tant que le moteur n'a pas refroidi.</li> <li>2. Mettez des gants et posez un torchon sur le bouchon pour l'ôter.</li> <li>3. Laissez la pression s'échapper avant d'ôter complètement le bouchon.</li> </ol>

### 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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# 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 → **WARNING**

2 → **ELECTRIC SHOCK can kill.**

3 → **Do not touch live electrical parts.**

4 → **Disconnect input power before installing or servicing**

5 →

2 → **CAUTION**

3 → **MOVING PARTS can injure.**

4 → **Keep away from moving parts.**

5 → **Keep all panels and covers closed when operating**

6 →

6 → **WARNING** **READ SAFETY BLOCKS at start of Section 3-1 before proceeding.**

7 → **NOTE** *Turn Off switch when using high frequency.*

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

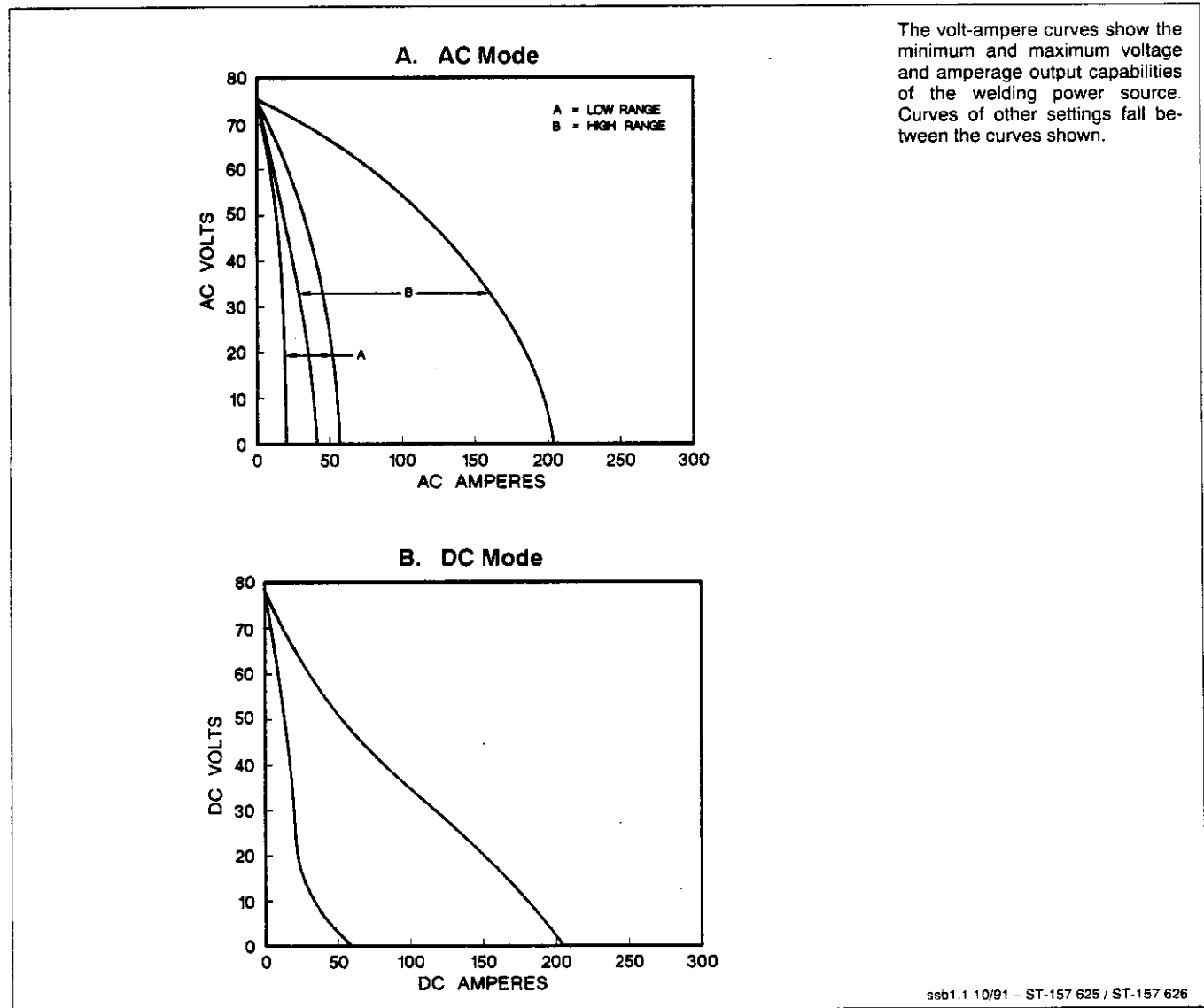
Table 2-1. Welding Power Source

Specification	Description
Type Of Output	CC (Constant Current) AC/DC (Alternating Current/Direct Current)
Welding Processes	Gas Tungsten Arc (GTAW) And Shielded Metal Arc Welding (SMAW)
GTAW Rated Weld Output	150 Amperes At 15 Volts AC/DC
SMAW Rated Weld Output	130 Amperes At 25 Volts DC; 150 Amperes At 25 Volts AC
Duty Cycle	20% (See Section 2-2)
Type Of Input Power	Single-Phase; 200, 230, or 460 Volts AC; 60 Hz
Input Amperes At Rated Output	59 A At 200 V. 52 A At 230 V. 33 A At 460 V
KVA Used At Rated Output	12.0 kVA
Max. Open-Circuit Voltage	GTAW: 78 Volts; DC SMAW: 78 Volts; AC SMAW: 75 Volts
Input Power Cord	6 ft (1.8 m)
Work Cable	12 ft (3.7 m)
Overall Dimensions	See Figure 3-4
Weight	Net: 140 lb (63.5 kg); Ship: 166 lb (75 kg)
Options	See Rear Cover

**Table 2-2. Items Included With Welding Power Source**

Welding Process	Item
For GTAW	Torch With 12-1/2 ft (3.8 m) Cable Foot Control With 15 ft (4.6 m) Cable Argon Regulator/Flow Gauge 12-1/2 ft (3.8 m) Gas Hose Dinse Electrode/Gas Connector 3/32 x 7 in 2% Thoriated Tungsten Electrode 1-27/32 in Long Alumina Gas Cup 3/32 in Standard Collet Body 3/32 in Standard Collet "How To" VHS Videotape
For GTAW Or SMAW	Work Clamp With 12 ft (3.7 m) Cable
For SMAW	Electrode Holder With 15 ft (4.6 m) Cable Dinse Electrode Connector

**2-1. Volt-Ampere Curves**



**Figure 2-1. Volt-Ampere Curves**

## 2-2. Duty Cycle

### CAUTION

EXCEEDING DUTY CYCLE RATINGS will damage unit.

- Do not exceed indicated duty cycles.

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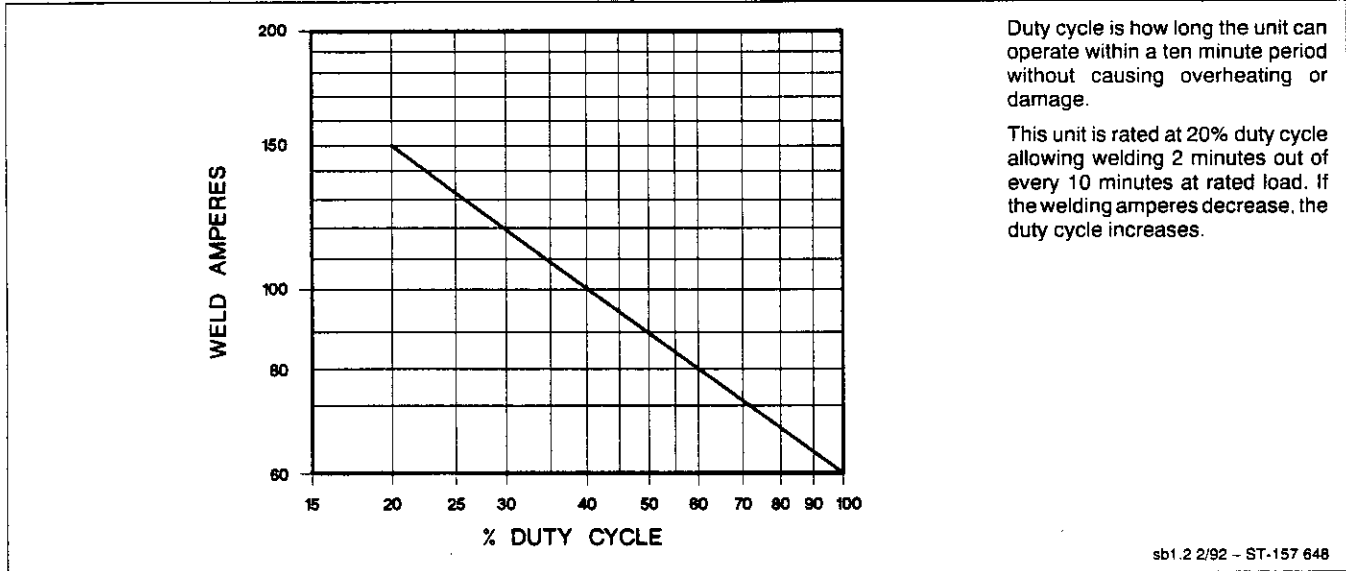


Figure 2-2. Duty Cycle Chart

## SECTION 3 – INSTALLATION

### 3-1. Typical Process Connections

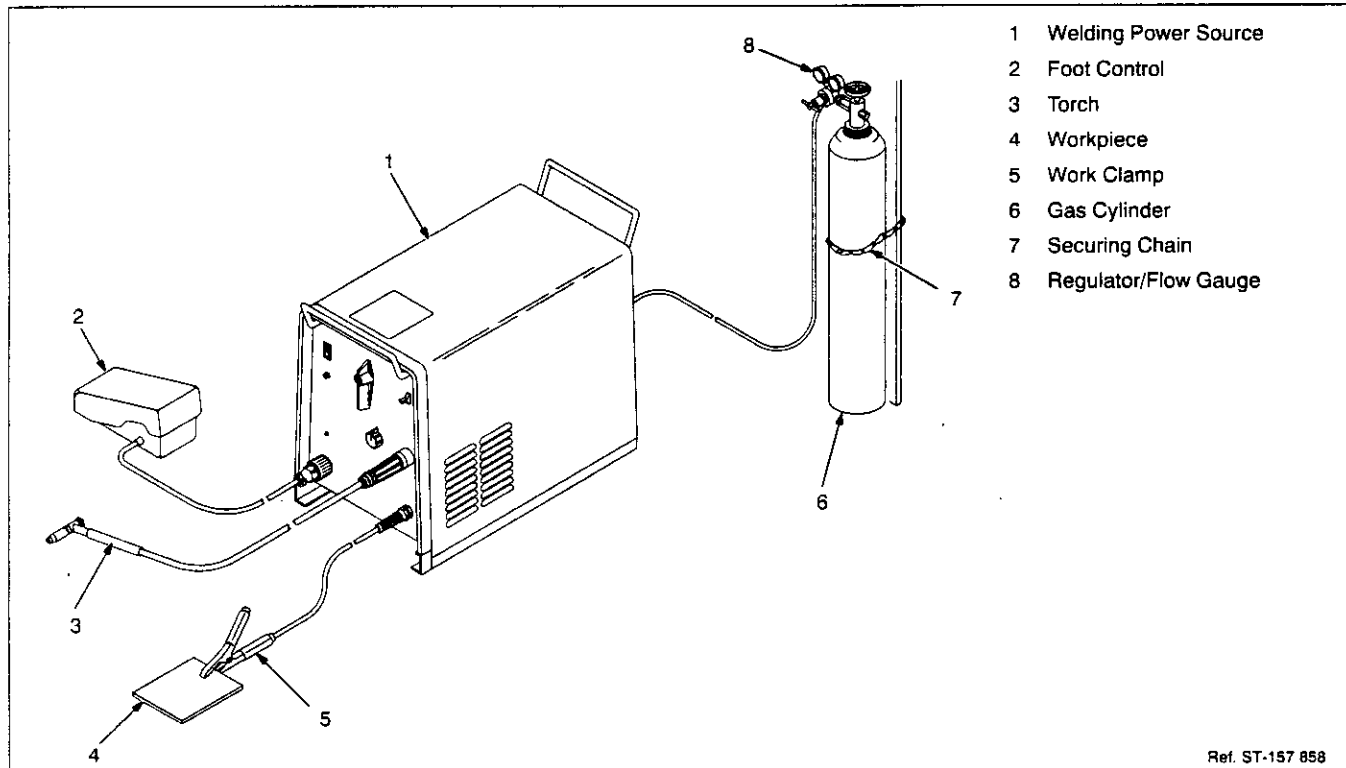


Figure 3-1. GTAW Connections

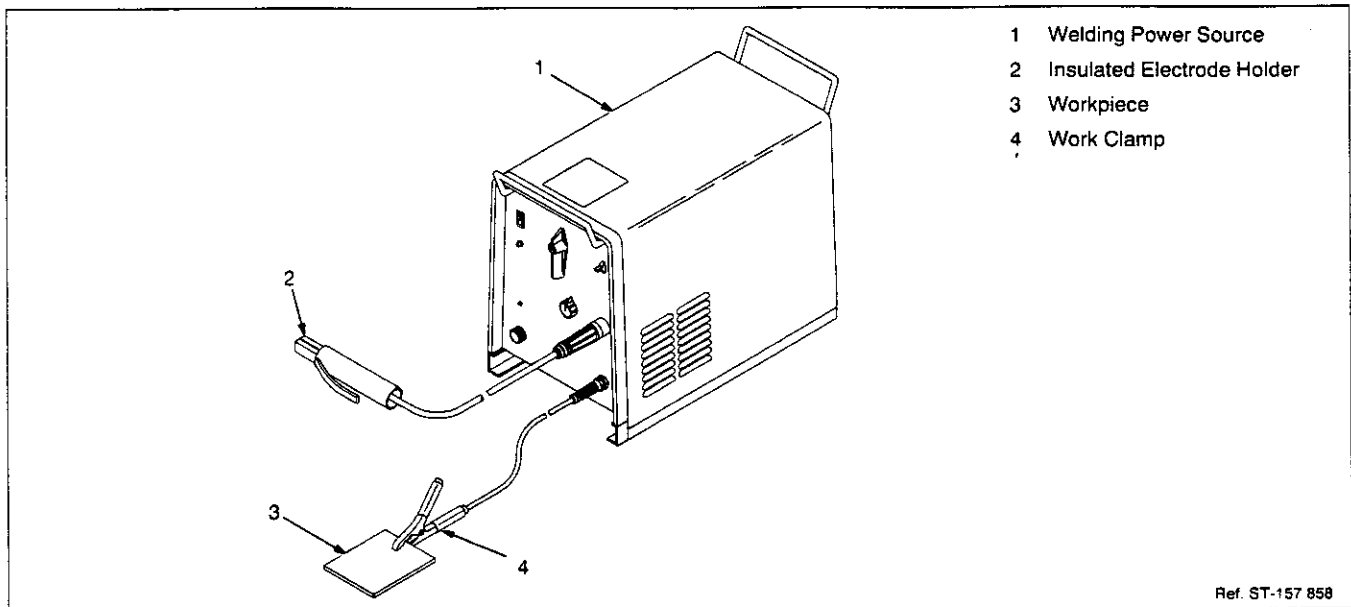


Figure 3-2. SMAW Connections

### 3-2. Selecting A Location And Moving Welding Power Source

<b>WARNING</b>			
	<p><b>ELECTRIC SHOCK can kill.</b></p> <ul style="list-style-type: none"> <li>Do not touch live electrical parts.</li> <li>Disconnect input power conductors from deenergized supply line <b>BEFORE</b> moving welding power source.</li> </ul>		<p><b>FUMES can be hazardous; LACK OF FRESH AIR AND PROPER VENTILATION can be harmful.</b></p> <ul style="list-style-type: none"> <li>Do not breathe welding fumes.</li> <li>Place unit only where there is a good fresh air supply and proper ventilation.</li> </ul>
	<p><b>FIRE OR EXPLOSION can result from placing unit on, over, or near combustible surfaces.</b></p> <ul style="list-style-type: none"> <li>Do not locate unit on, over, or near combustible surfaces.</li> <li>Do not install unit near flammables.</li> </ul>		<p><b>FALLING EQUIPMENT can cause serious personal injury and equipment damage.</b></p> <ul style="list-style-type: none"> <li>Lift unit at handles.</li> <li>Have two persons of adequate physical strength lift unit.</li> <li>Move unit with hand cart or similar device of adequate capacity.</li> <li>If using fork lift vehicle, secure unit on a proper skid before transporting.</li> </ul>
	<p><b>BLOCKED AIRFLOW causes overheating and possible damage to unit.</b></p> <ul style="list-style-type: none"> <li>Do not block or filter airflow.</li> </ul> <p>Warranty is void if any type of filter is used.</p>		swarn11.1* 3/93

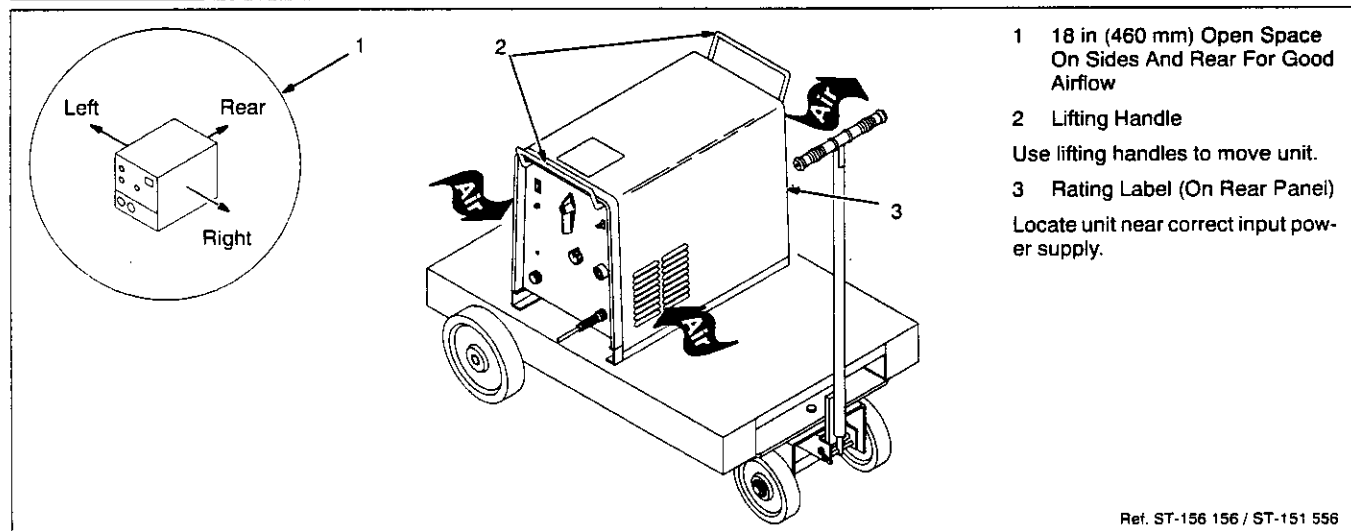


Figure 3-3. Location and Movement Of Welding Power Source



**NOTE** 

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

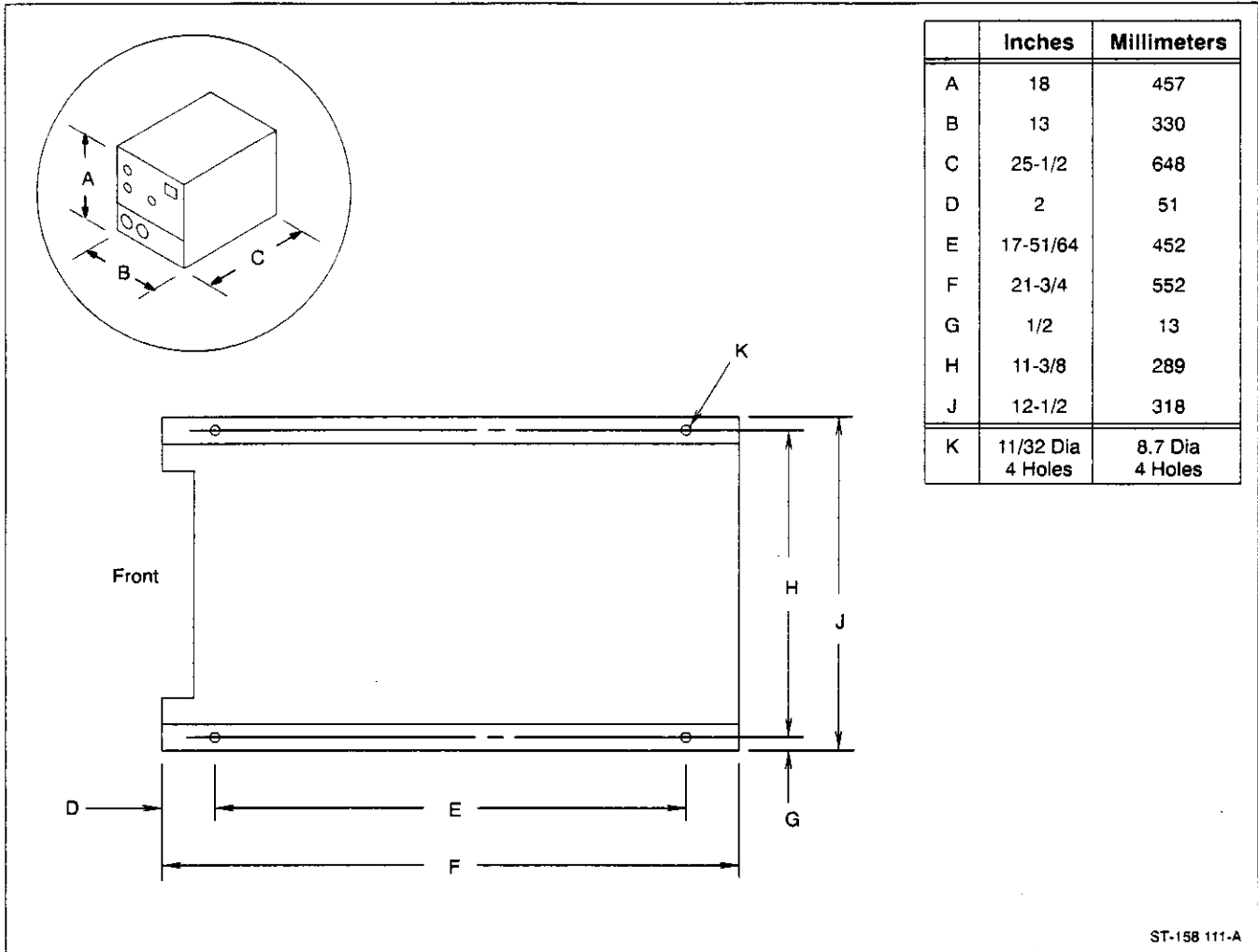


Figure 3-4. Overall Dimensions And Base Mounting Hole Layout

**3-3. Installing Work Clamp**

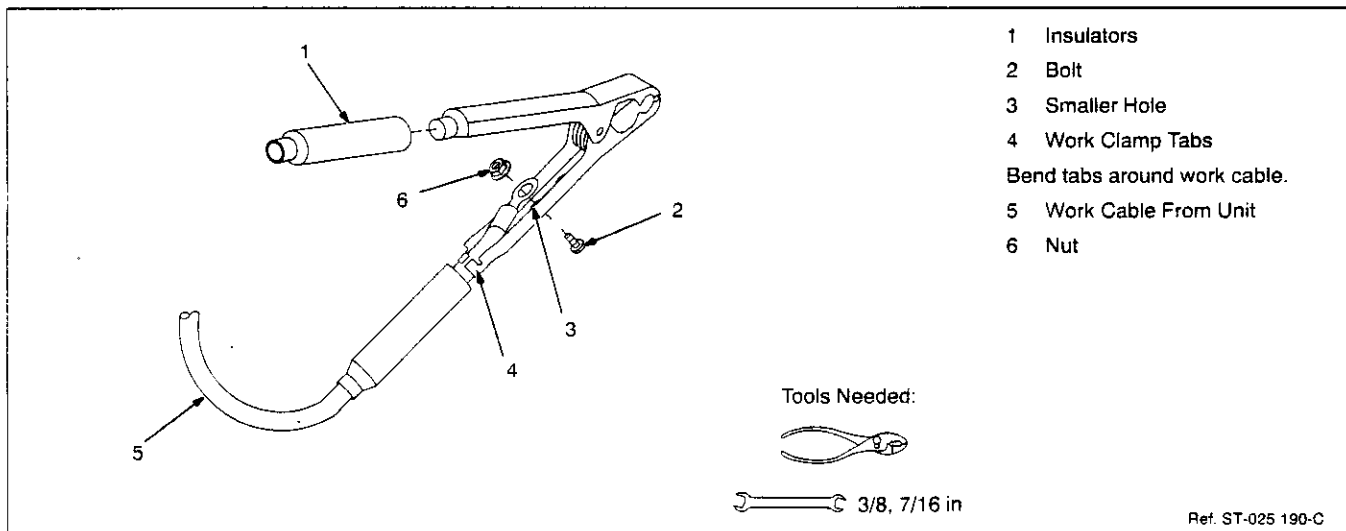


Figure 3-5. Installing Work Clamp

### 3-4. Installing Gas Supply For GTAW

<b>WARNING</b>	
<p><b>CYLINDERS can explode if damaged.</b></p> <ul style="list-style-type: none"> <li>Keep cylinders away from welding and other electrical circuits.</li> <li>Never touch cylinder with welding electrode.</li> <li>Always secure cylinder to running gear, wall, or other stationary support.</li> </ul>	<p><b>BUILDUP OF SHIELDING GAS can harm health or kill.</b></p> <ul style="list-style-type: none"> <li>Shut off shielding gas supply when not in use.</li> </ul>
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Obtain gas cylinder and chain to running gear, wall, or other stationary support so cylinder cannot fall and break off valve.

- 1 Cap
- 2 Cylinder Valve

Remove cap, stand to side of valve, and open valve slightly. Gas flow blows dust and dirt from valve. Close valve.

- 3 Cylinder
- 4 Regulator

Install so face is vertical.

- 5 Flow Gauge
- 6 Flow Adjust

Typical flow rate is 20 cfh (cubic feet per hour).

- 7 Gas Hose Connection
- 8 Gas Hose
- 9 Gas Inlet Fitting

Connect supplied gas hose between regulator/flow gauge and welding power source.

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**Figure 3-6. Installing Argon Or Mixed Gas Regulator/Flow Gauge**

### 3-5. Preparing Weld Output Cables

- 1 GTAW Torch
- 2 Weld Output Cable
- 3 Dinse Electrode/Gas Connector

Install onto torch cable as shown in Figure 3-8.

- 4 Insulated Electrode Holder
- 5 Dinse Electrode Connector

Install onto electrode cable as shown in Figure 3-9.

- 6 Work Clamp

Install onto work cable (see Section 3-3).

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**Figure 3-7. Weld Cable Connections**

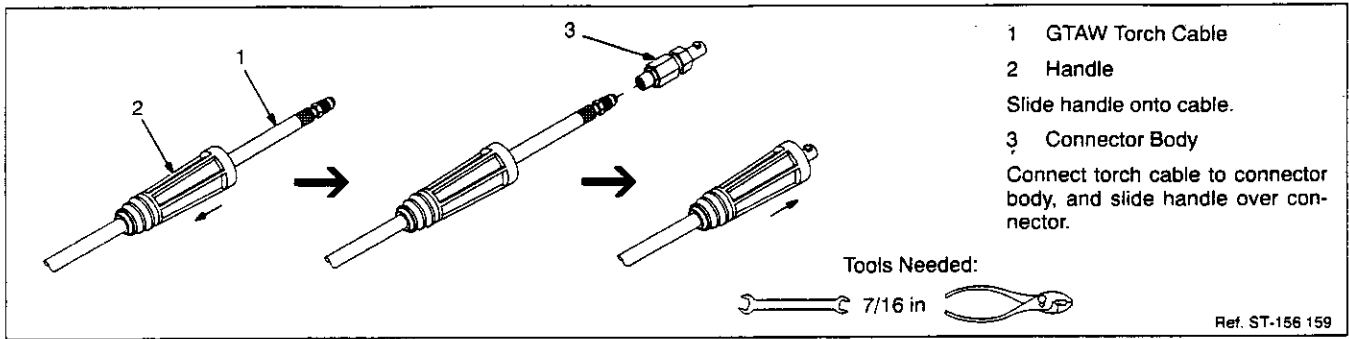


Figure 3-8. GTAW Torch Electrode/Gas Connector Assembly

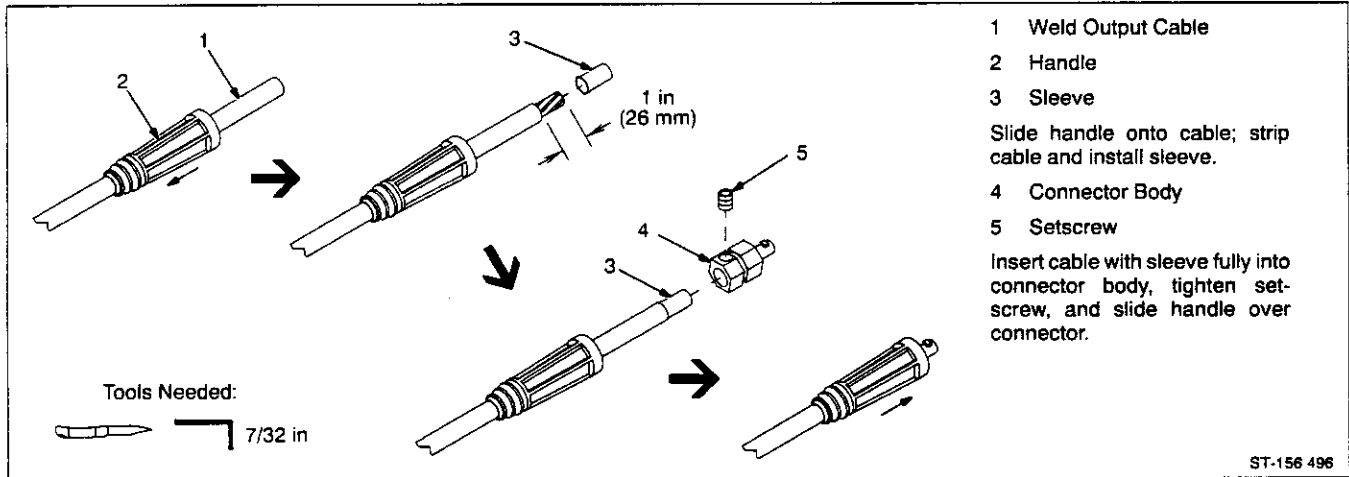


Figure 3-9. SMAW Electrode Connector Assembly

### 3-6. Connecting To Weld And Gas Output Receptacle

**⚠ WARNING**

**ELECTRIC SHOCK can kill; ARCING can burn skin or damage electrical equipment.**

- Do not touch live electrical parts.
- Turn Off welding power source before making any weld output connections.
- Do not change position of welding cable connectors while welding.
- Be sure connectors are secure in receptacles before welding.

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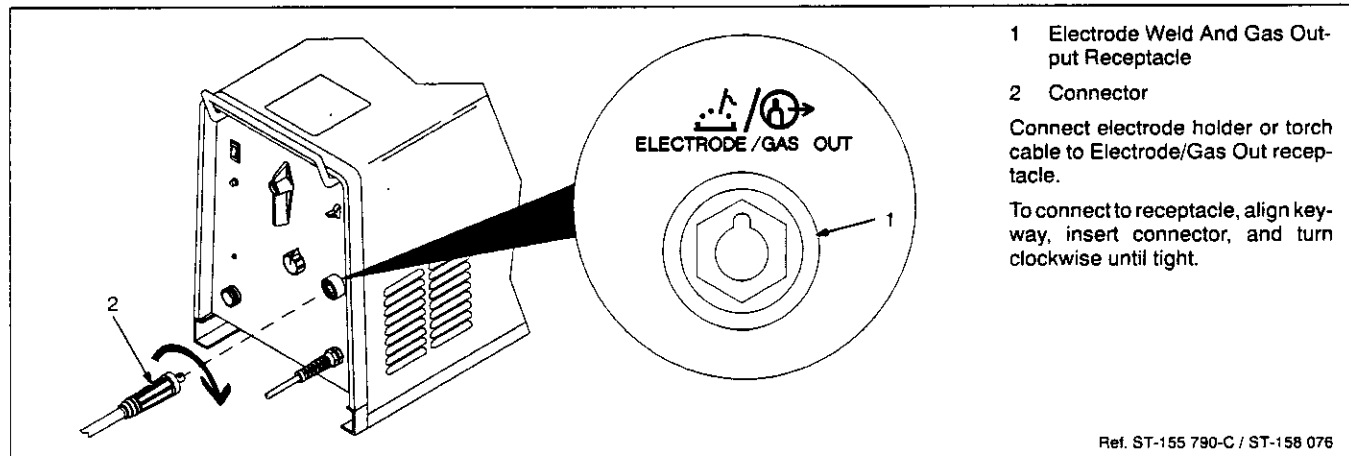


Figure 3-10. Weld And Gas Output Connection

### 3-7. Remote 14 Receptacle Information And Connections

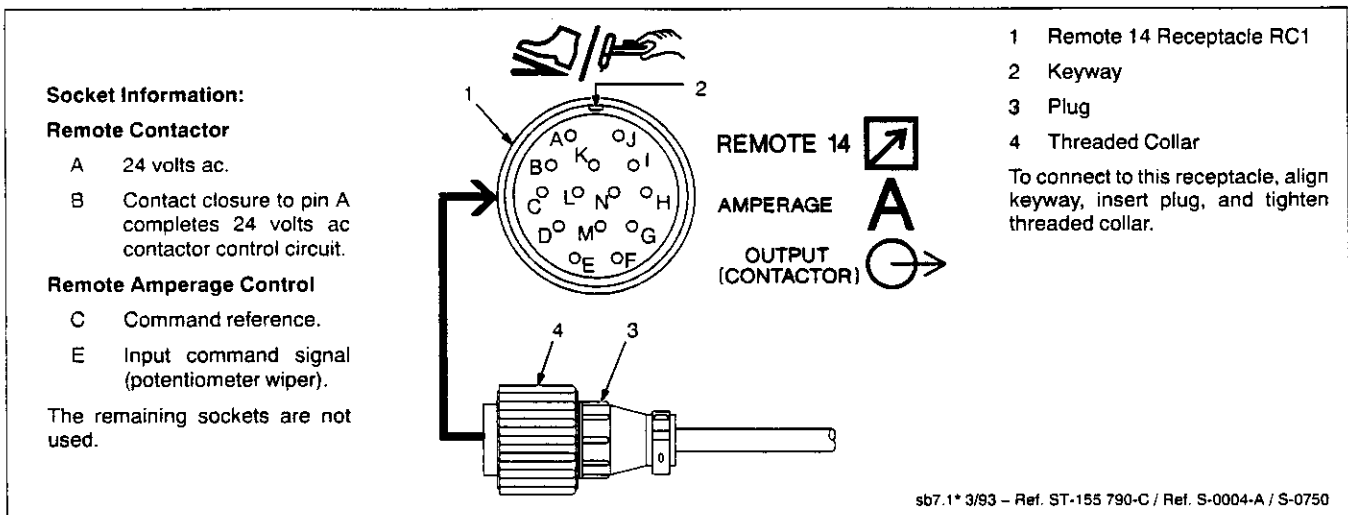


Figure 3-11. Remote 14 Connections

### 3-8. 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. Connecting Input Power For 230 Volts Model

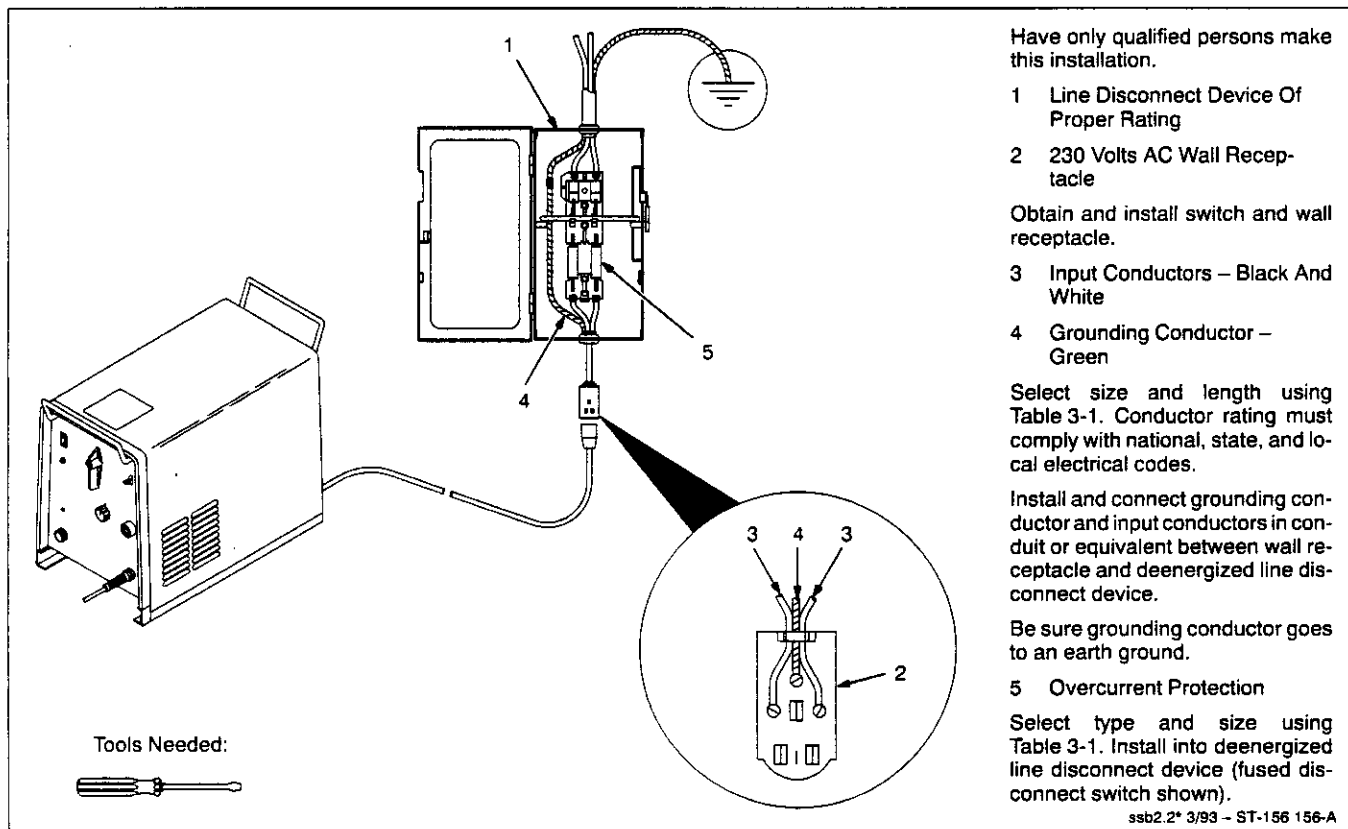


Figure 3-12. Input Power Connections For Units With Plug And Wall Receptacle

## B. Connecting Input Power For 200 Or 460 Volts Model

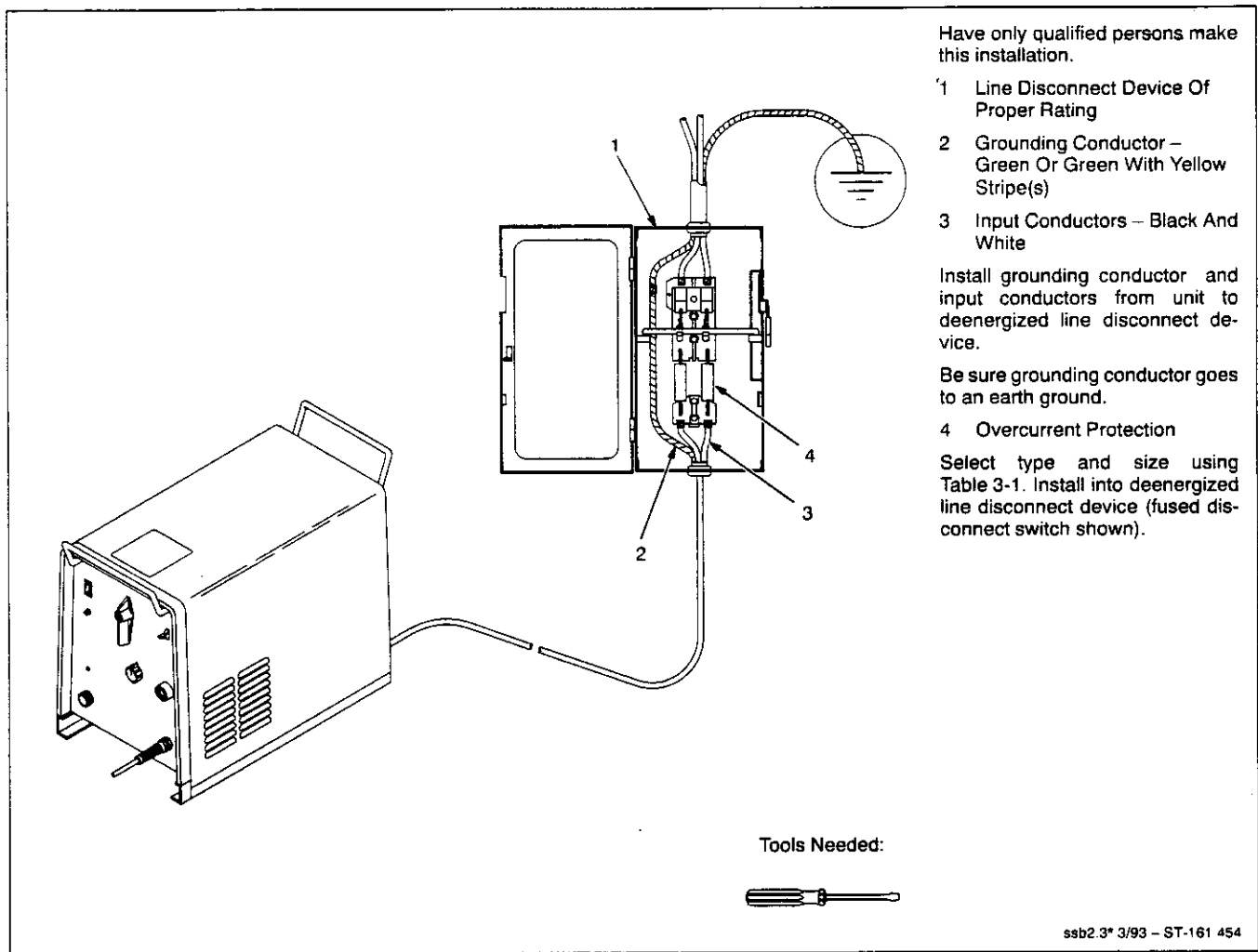


Figure 3-13. Input Power Connections For 200 Or 460 Volts Model

Table 3-1. Electrical Service Requirements\*

Input Voltage	200	230	460
Number Of Phases	1	1	1
Input Amperes At Rated Output	59	52	33
Recommended Standard Fuse Or Circuit Breaker Rating In Amperes <sup>1</sup>	90	80	40
Input Conductor Size In AWG/Kcmil <sup>2</sup>	10	6	14
Max Input Conductor Length In Feet (Meters) <sup>3</sup>	177 (54)	134 (41)	413 (126)
Grounding Conductor Size In AWG/Kcmil <sup>4</sup>	10	8	14

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



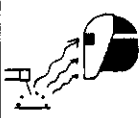
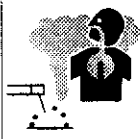


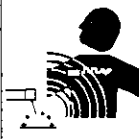
1 Recommended fuse or circuit breaker size is that closest to 150% of rated input amperage of the welding power source. Article 630-12(a) of NEC allows fuse or circuit breaker sizing up to 200% of rated input amperage.

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).

# SECTION 4 – OPERATION

 <b>WARNING</b>			
	<b>ELECTRIC SHOCK can kill.</b> <ul style="list-style-type: none"> <li>• Always wear dry insulating gloves.</li> <li>• Insulate yourself from work and ground.</li> <li>• Do not touch live electrical parts.</li> <li>• Keep all panels and covers securely in place.</li> </ul>		<b>ARC RAYS can burn eyes and skin; NOISE can damage hearing.</b> <ul style="list-style-type: none"> <li>• Wear welding helmet with correct shade of filter.</li> <li>• Wear correct eye, ear, and body protection.</li> </ul>
	<b>FUMES AND GASES can be hazardous to your health.</b> <ul style="list-style-type: none"> <li>• Keep your head out of the fumes.</li> <li>• Ventilate area, or use breathing device.</li> <li>• Read Material Safety Data Sheets (MSDSs) and manufacturer's instructions for material used.</li> </ul>		<b>MOVING PARTS can cause injury.</b> <ul style="list-style-type: none"> <li>• Keep away from moving parts.</li> <li>• Keep all doors, panels, covers, and guards closed and securely in place.</li> </ul>
	<b>WELDING can cause fire or explosion.</b> <ul style="list-style-type: none"> <li>• Do not weld near flammable material.</li> <li>• Watch for fire; keep extinguisher nearby.</li> <li>• Do not locate unit over combustible surfaces.</li> <li>• Do not weld on closed containers.</li> <li>• Allow work and equipment to cool before handling.</li> </ul>		<b>MAGNETIC FIELDS FROM HIGH CURRENTS can affect pacemaker operation.</b> <ul style="list-style-type: none"> <li>• Pacemaker wearers keep away.</li> <li>• Wearers should consult their doctor before going near arc welding, gouging, or spot welding operations.</li> </ul>
		See Safety Precautions at beginning of manual for basic welding safety information. <span style="float: right;">swarn6.1 10/91</span>	

## 4-1. Front Panel Controls

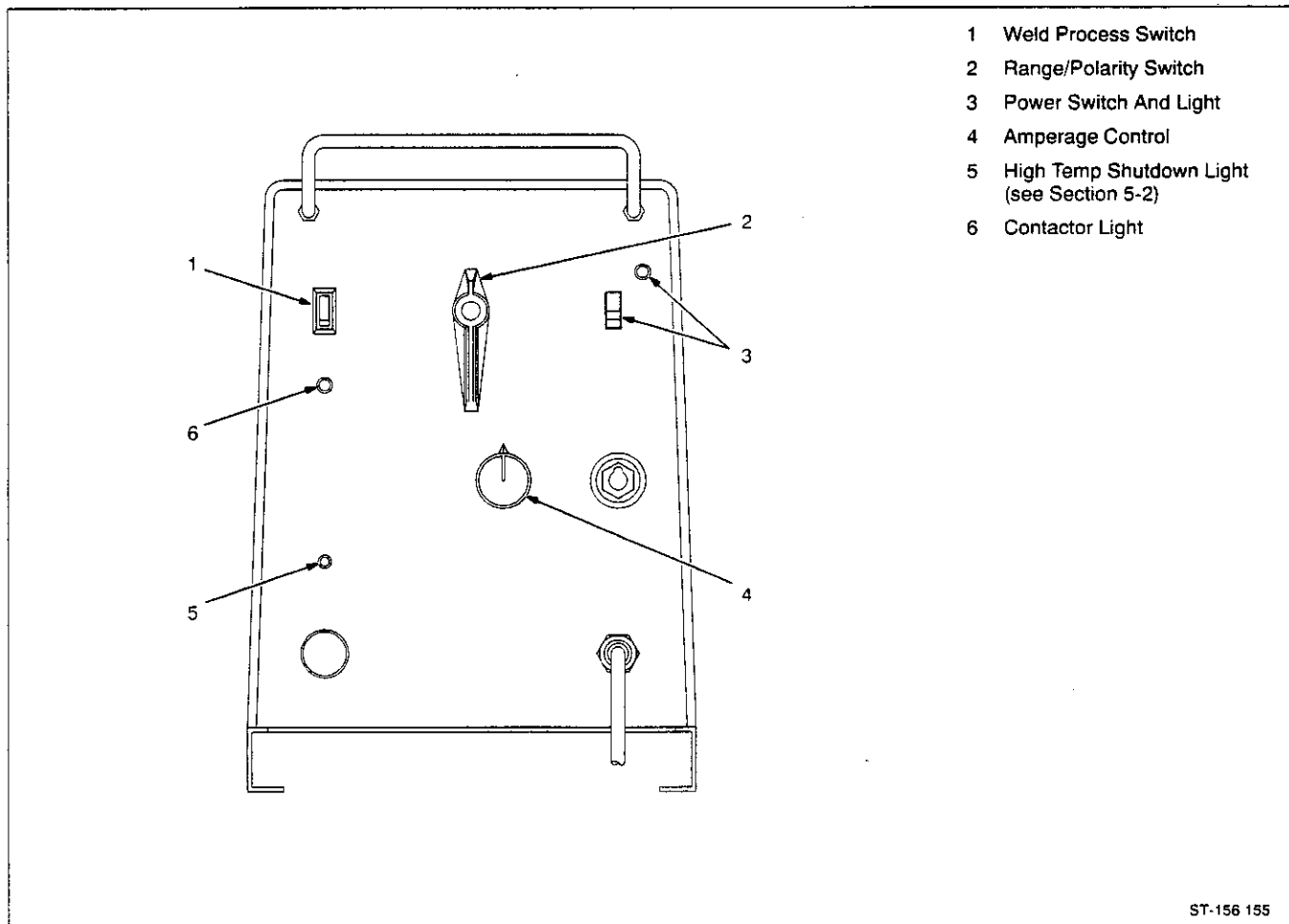


Figure 4-1. Controls

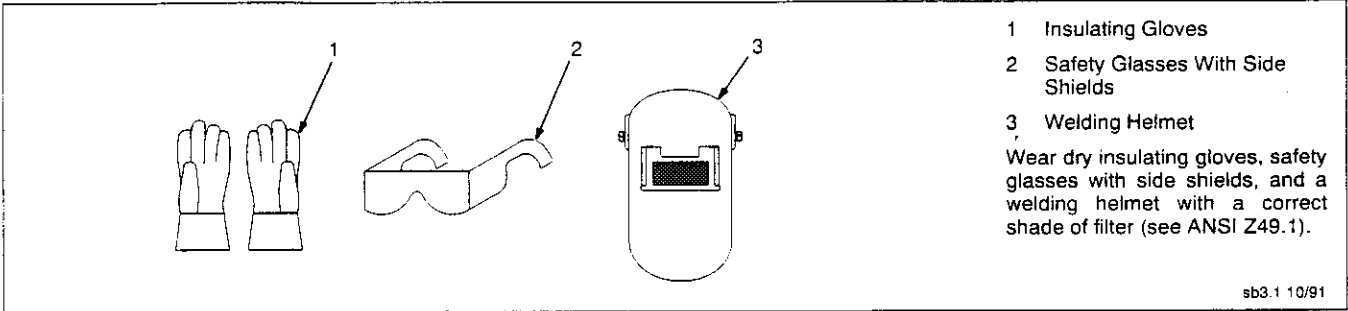


Figure 4-2. Safety Equipment

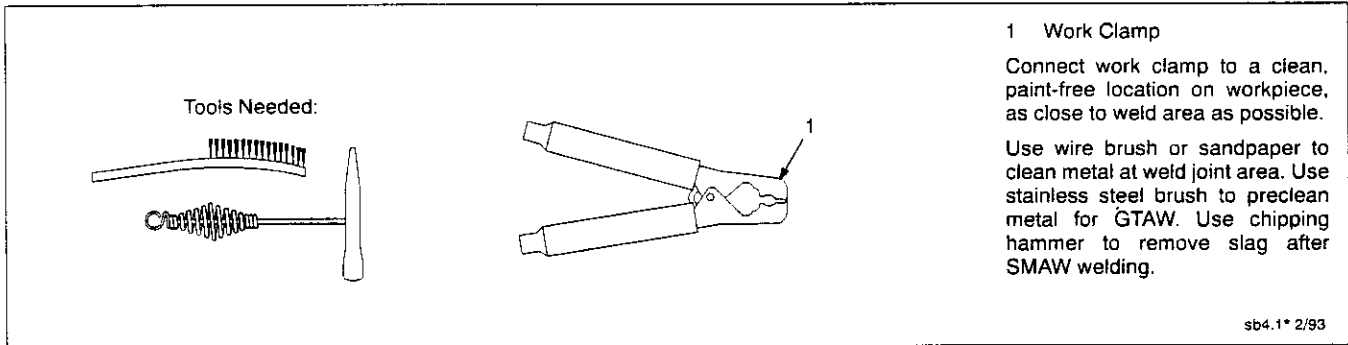


Figure 4-3. Work Clamp

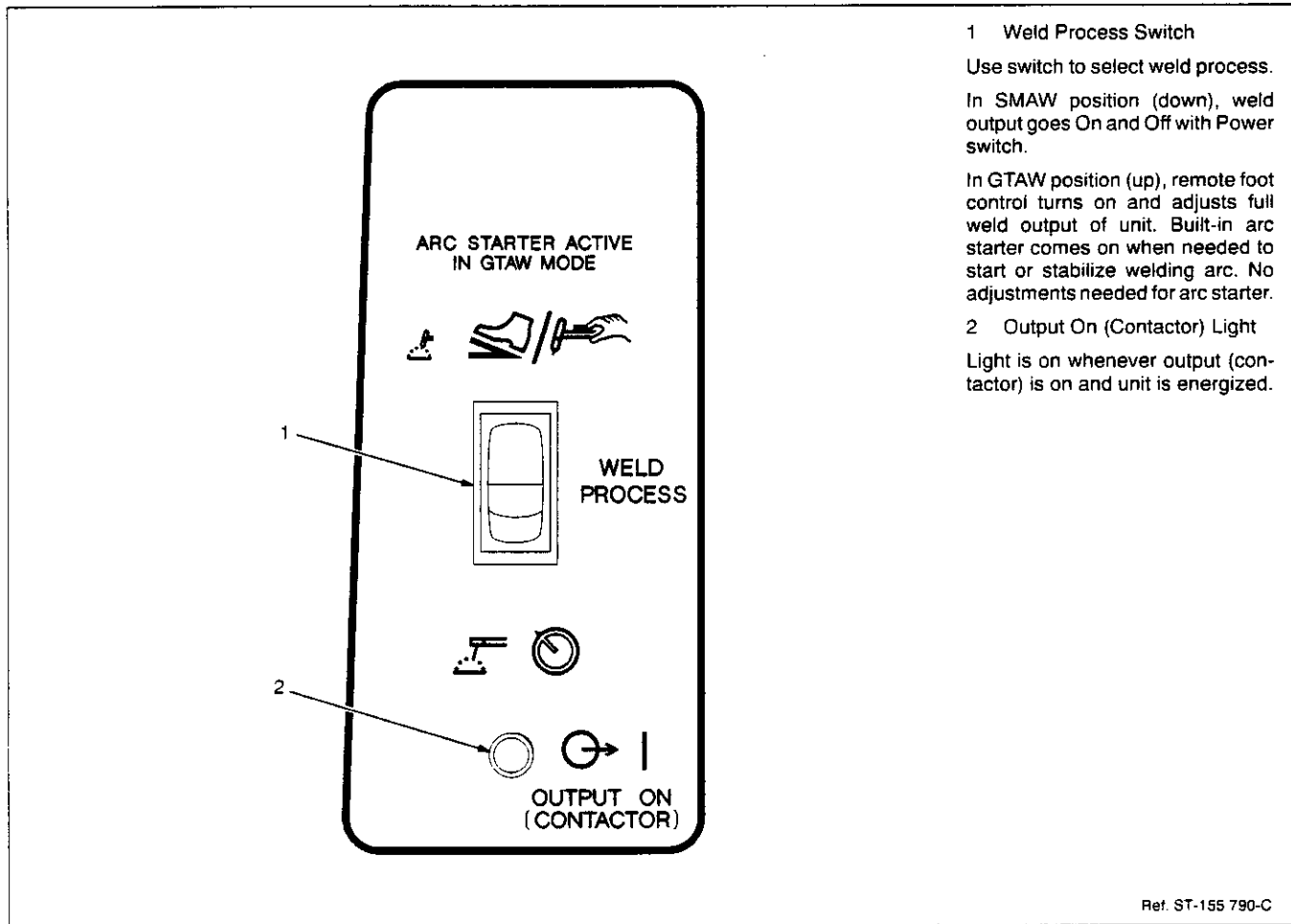


Figure 4-4. Weld Process Switch And Contactor Light

# ⚠ WARNING



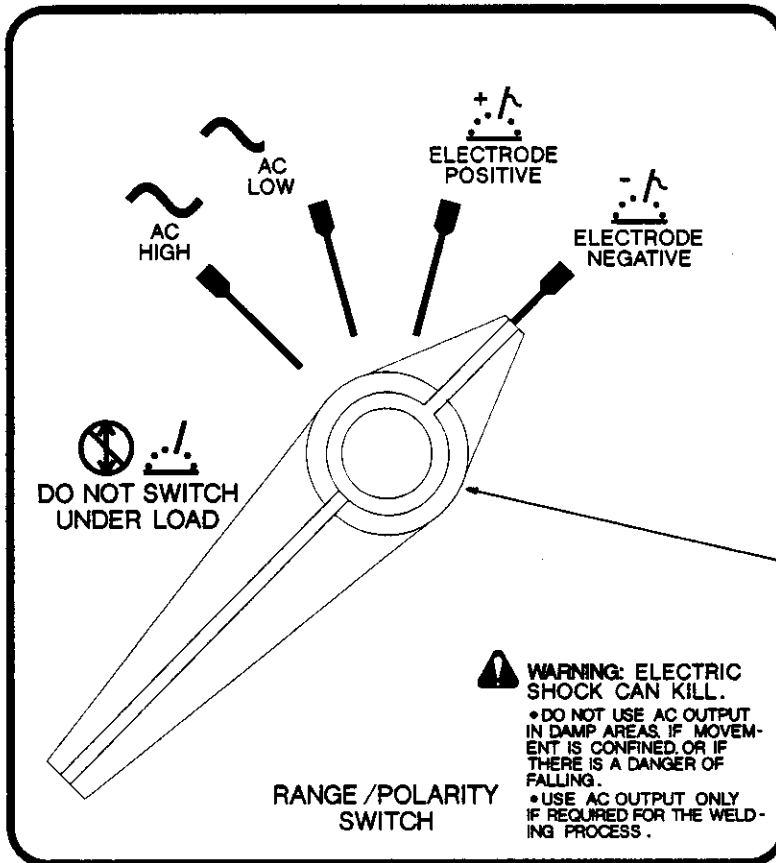
## ELECTRIC SHOCK can kill.

- Do not use AC output in damp areas, if movement is confined, or if there is a danger of falling.
- Use AC output ONLY if required for the welding process.
- Read Safety Precautions at beginning of this manual.

## ARCING can damage switch.

- Do not change Range/Polarity Switch position while welding.
- Arcing inside switch can damage contacts, causing switch to fail.

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### 1 Range/Polarity Switch

Use switch to select range and polarity of weld output.

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

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

For alternating current (AC), use range needed for welding application – AC Low or AC High position – see Warning.

Use table to find suggested type of weld output for application.

Welding Process	Suggested Weld Output
GTAW Of Steel Or Stainless Steel	Electrode Negative (DCEN)
GTAW Of Aluminum	AC High Or Low
SMAW	Electrode Positive (DCEP)

Figure 4-5. Range/Polarity Switch



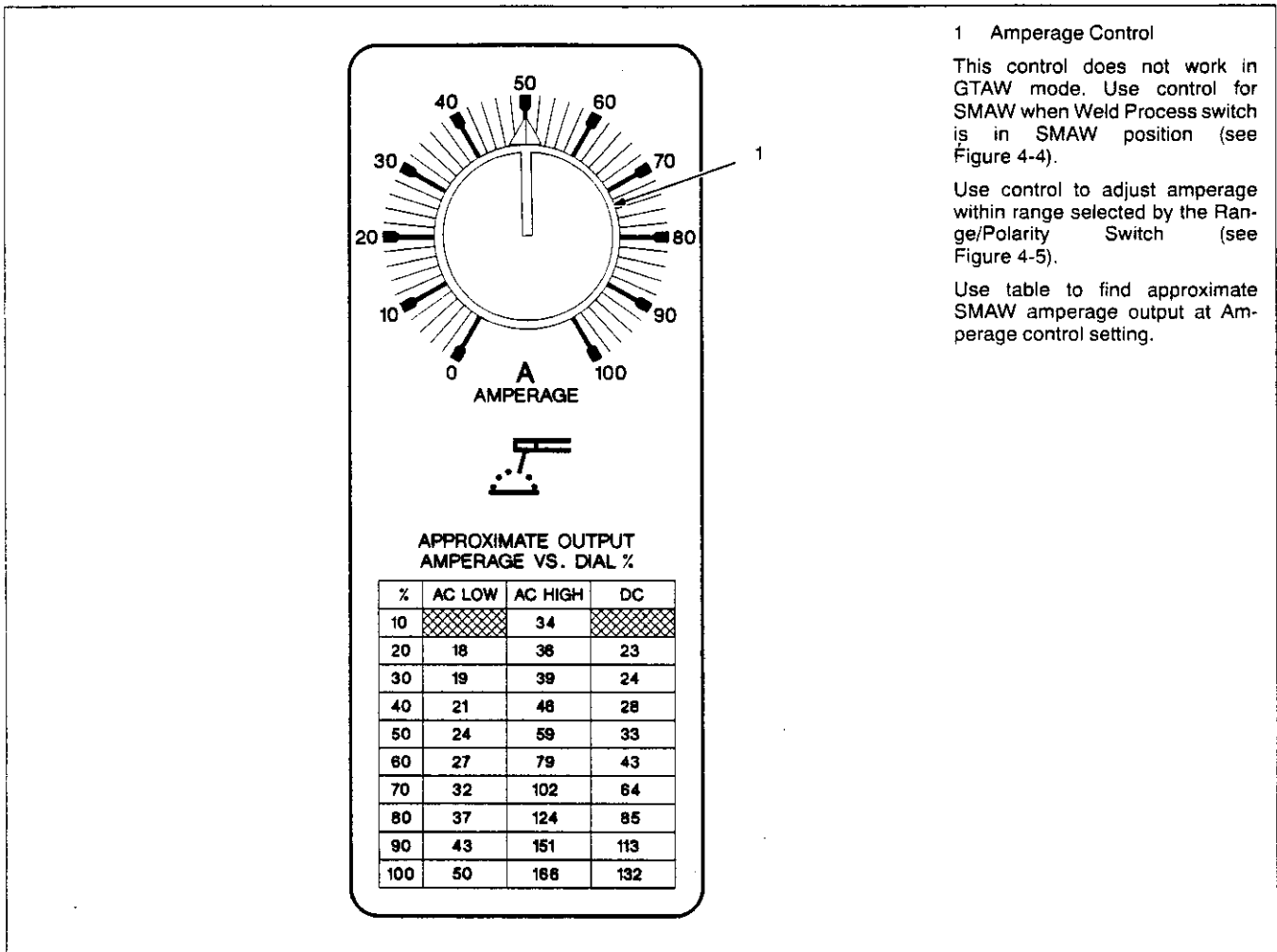


Figure 4-6. Amperage Control

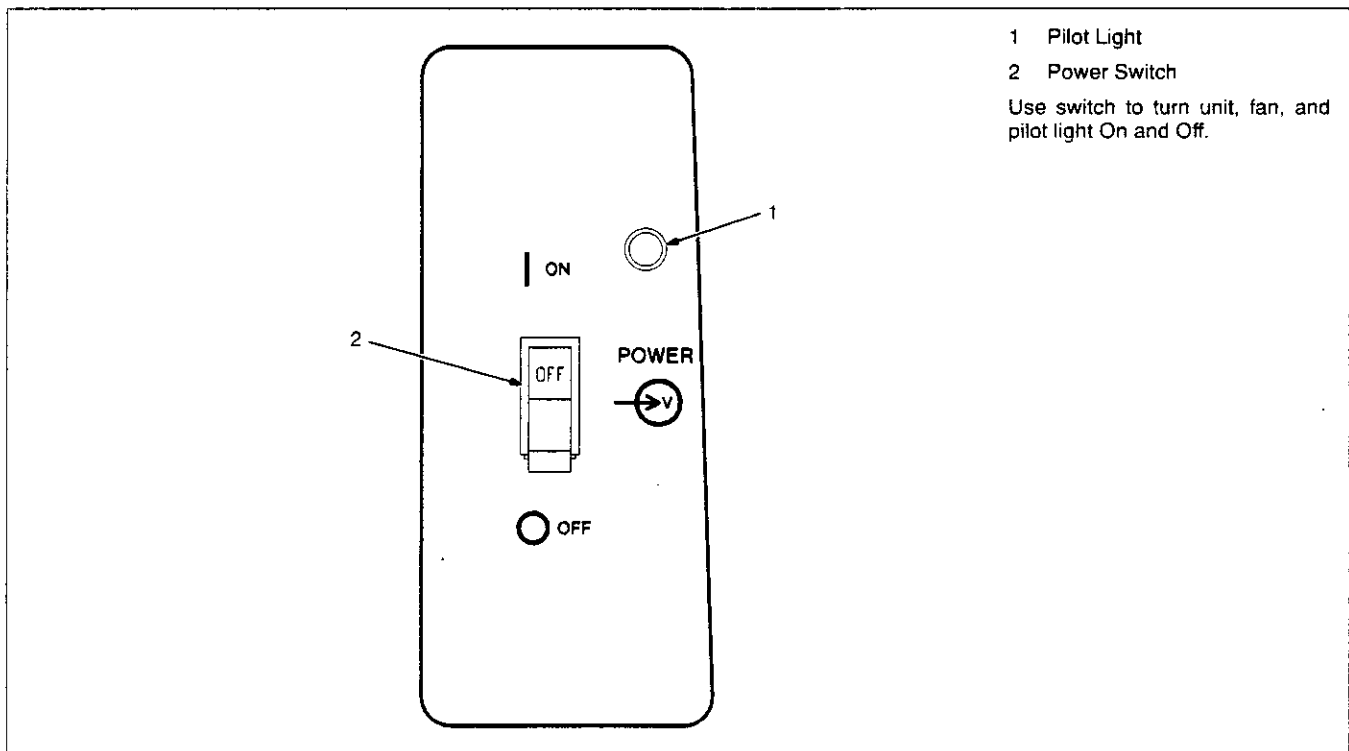


Figure 4-7. Power Switch And Pilot Light

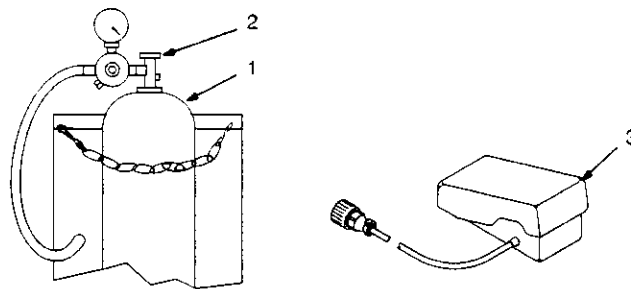
# ⚠ WARNING



## BUILDUP OF SHIELDING GAS can harm health or kill.

- Shut off shielding gas supply when not in use.

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- 1 Shielding Gas Cylinder
- 2 Valve
- 3 Foot Control

Open valve on cylinder just before welding. Adjust to about 20 cfh.

Foot control turns weld output and gas flow on and off.

Close valve on cylinder when finished welding.

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Figure 4-8. Shielding Gas

## 4-2. Settings For Welding Processes

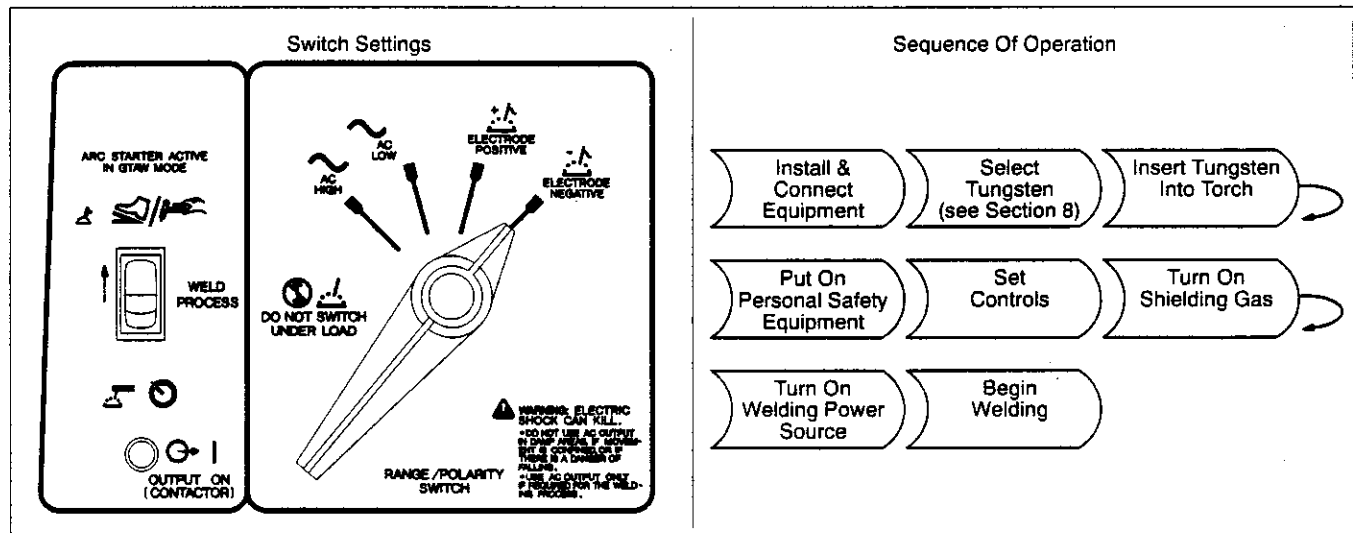


Figure 4-9. Gas Tungsten Arc Welding (GTAW) Of Steel And Stainless Steel

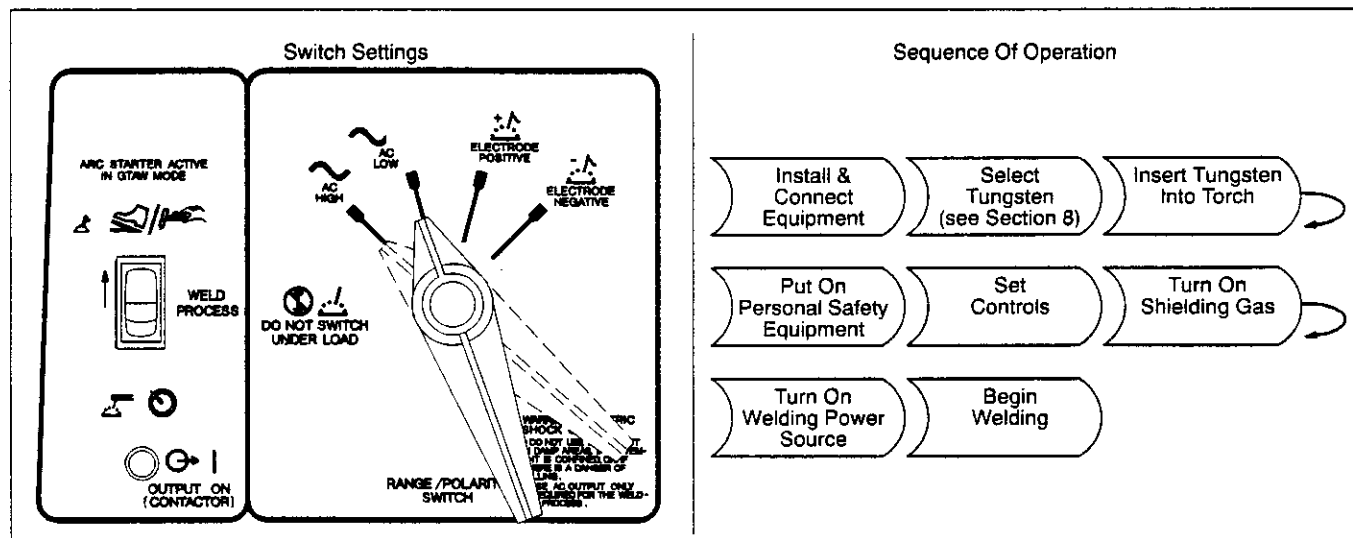


Figure 4-10. Gas Tungsten Arc Welding (GTAW) Aluminum

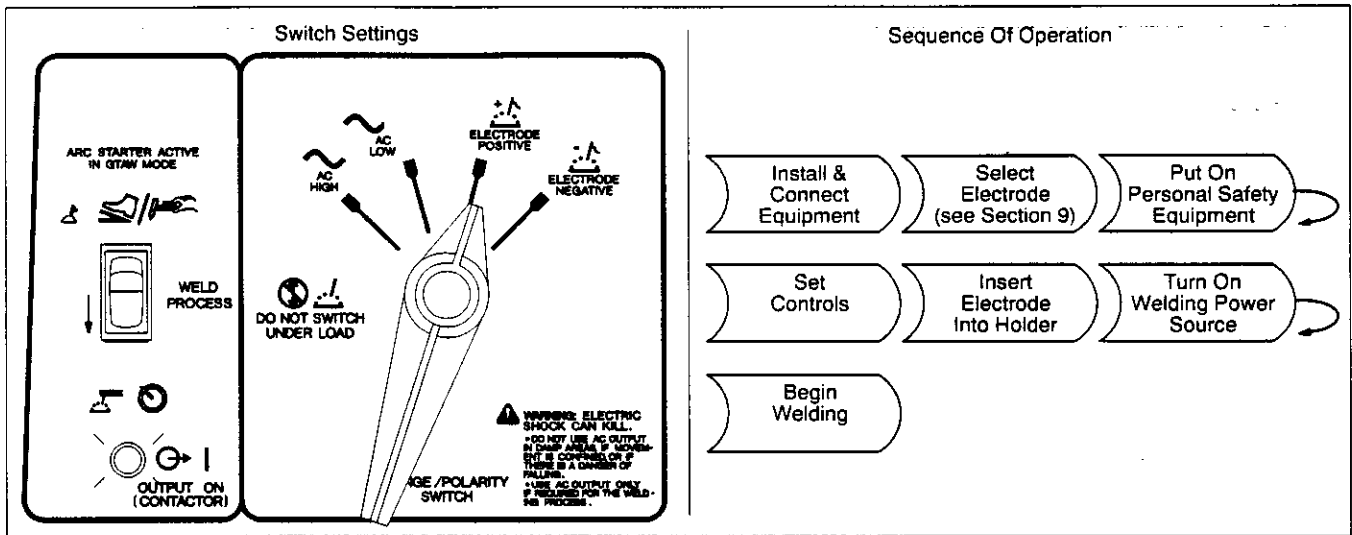


Figure 4-11. Shielded Metal Arc Welding (SMAW)

## SECTION 5 – MAINTENANCE & TROUBLESHOOTING

<b>WARNING</b>			
	<p><b>ELECTRIC SHOCK can kill.</b></p> <ul style="list-style-type: none"> <li>Do not touch live electrical parts.</li> <li>Turn Off welding power source, and disconnect input power before inspecting, maintaining, or servicing.</li> </ul>		<p><b>MOVING PARTS can cause injury.</b></p> <ul style="list-style-type: none"> <li>Keep away from moving parts.</li> </ul>
	<p><b>HOT PARTS can cause severe burns.</b></p> <ul style="list-style-type: none"> <li>Allow cooling period before maintaining or servicing.</li> </ul>	<p>Maintenance to be performed only by qualified persons.</p> <p style="text-align: right; font-size: small;">swam8.1 2/93</p>	

### 5-1. Routine Maintenance

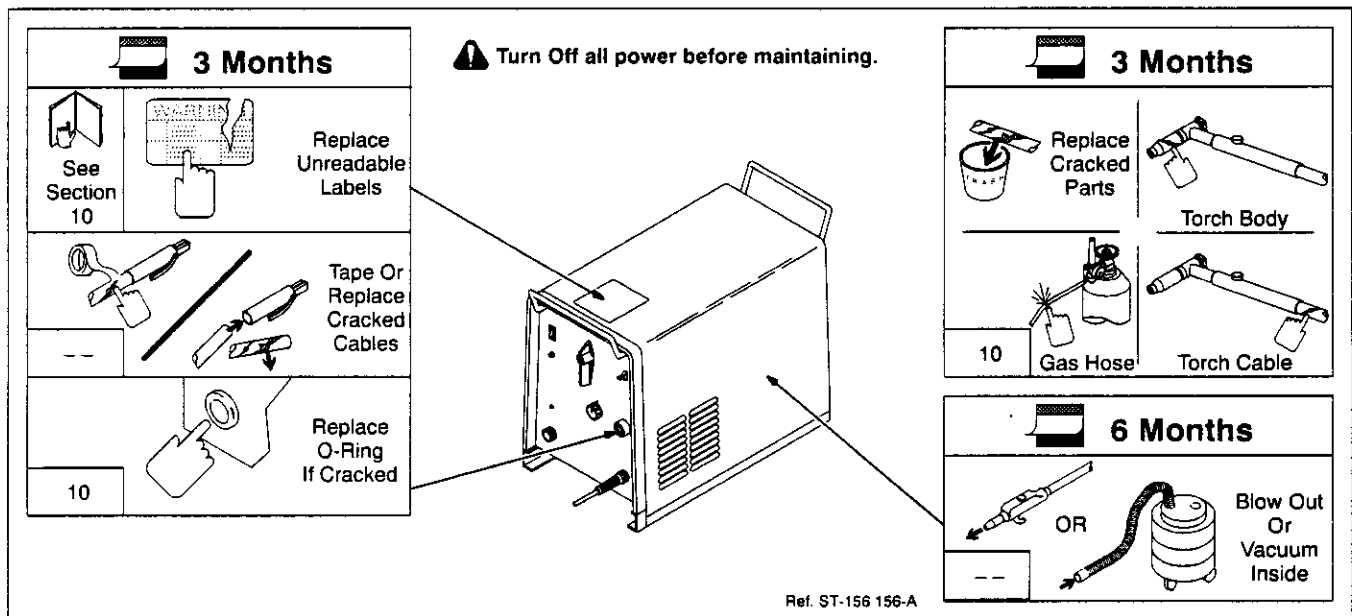


Figure 5-1. Maintenance Schedule

## 5-2. Overload Protection

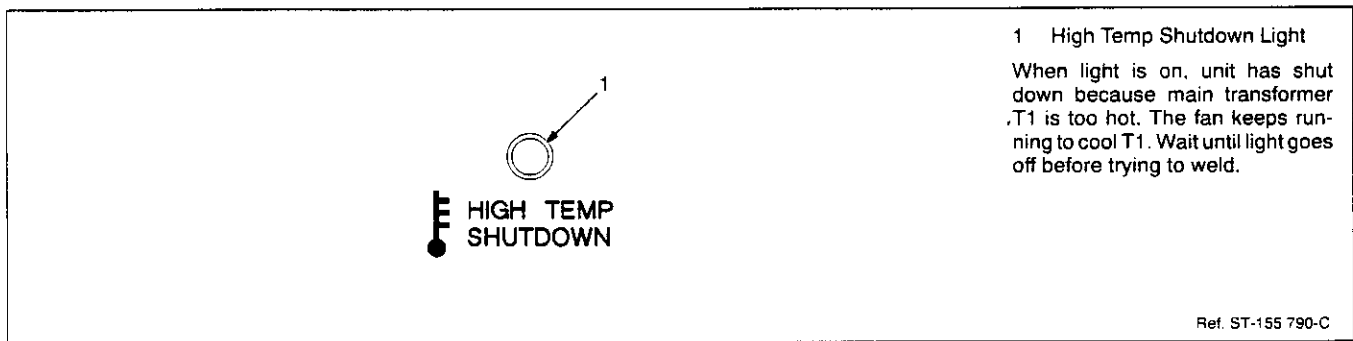


Figure 5-2. High Temp Shutdown Light

## 5-3. Troubleshooting





 <b>WARNING</b>			
	<b>ELECTRIC SHOCK can kill.</b> <ul style="list-style-type: none"> <li>Do not touch live electrical parts.</li> <li>Turn Off welding power source, and disconnect input power before inspecting, maintaining, or servicing.</li> </ul>		<b>MOVING PARTS can cause injury.</b> <ul style="list-style-type: none"> <li>Keep away from moving parts.</li> </ul>
	<b>HOT PARTS can cause severe burns.</b> <ul style="list-style-type: none"> <li>Allow cooling period before servicing.</li> </ul>	Troubleshooting to be performed only by qualified persons.	
		swarn9.1 2/93	

Table 5-1. Welding Power Source Trouble

Trouble	Remedy	Section
No weld output; fan does not run.	Be sure line disconnect device is in On position.	3-8
	Check and replace line fuses or reset circuit breakers if open.	3-8
	Have Factory Authorized Service Station/Service Distributor check Power switch.	---
No weld output; fan on.	Be sure Range/Polarity switch is not set between positions.	Figure 4-5
	Check and secure connections to Remote 14 receptacle.	3-7
	If Weld Process switch is in GTAW position, connect remote control to Remote 14 receptacle.	3-7
	Check, repair, or replace remote control.	*
	Unit overheated. Allow unit to cool.	5-2
Fan does not run; weld output available.	Be sure nothing is blocking movement of fan. If fan does not move freely, replace fan motor.	---

\*See remote control Owner's Manual.

**Table 5-2. GTAW Process Trouble**

Trouble	Remedy	Section
Difficulty in establishing welding arc.	Use proper size tungsten for welding amperage.	8-1
	Place Weld Process switch in GTAW position.	Figure 4-4
	Move tungsten closer to workpiece.	8-3
	If tungsten is cold, arc starter may not start arc. Use touch start, if required.	--
	Check cables and torch for cracked or deteriorated insulation or bad connections. Repair or replace necessary parts.	--
Wandering arc – poor control of arc direction.	Use proper size tungsten.	8-1
	Properly prepare tungsten.	8-2
	Reduce gas flow rate.	3-4
Tungsten electrode oxidizing and not remaining bright after conclusion of weld.	Check and tighten all gas fittings.	3-4, 3-6
	Shield weld zone from drafts.	--
	Use clean filler rod or material.	--

**Table 5-3. SMAW Process Trouble**

Trouble	Remedy	Section
Erratic welding arc.	Tighten and clean connections both inside and outside welding power source.	--
	Have Factory Authorized Service Station/Service Distributor check connections to Range/Polarity switch.	--
Erratic welding arc with excessive spatter.	Use dry, properly stored electrodes.	--
	Shorten arc length.	9-2
	Reduce Amperage control setting.	Figure 4-6
Electrode freezing to work.	Use dry, properly stored electrodes.	--
	Increase arc length.	9-1
	Increase Amperage control setting.	Figure 4-6
Narrow, high-crowned weld bead.	Increase Amperage control setting.	Figure 4-6
	Reduce travel speed.	Figure 9-7
Weld metal does not penetrate base metal.	Shorten arc length.	9-2
	Reduce travel speed.	Figure 9-7
	Increase Amperage control setting.	Figure 4-6
	Improve design of weld joint.	9-1



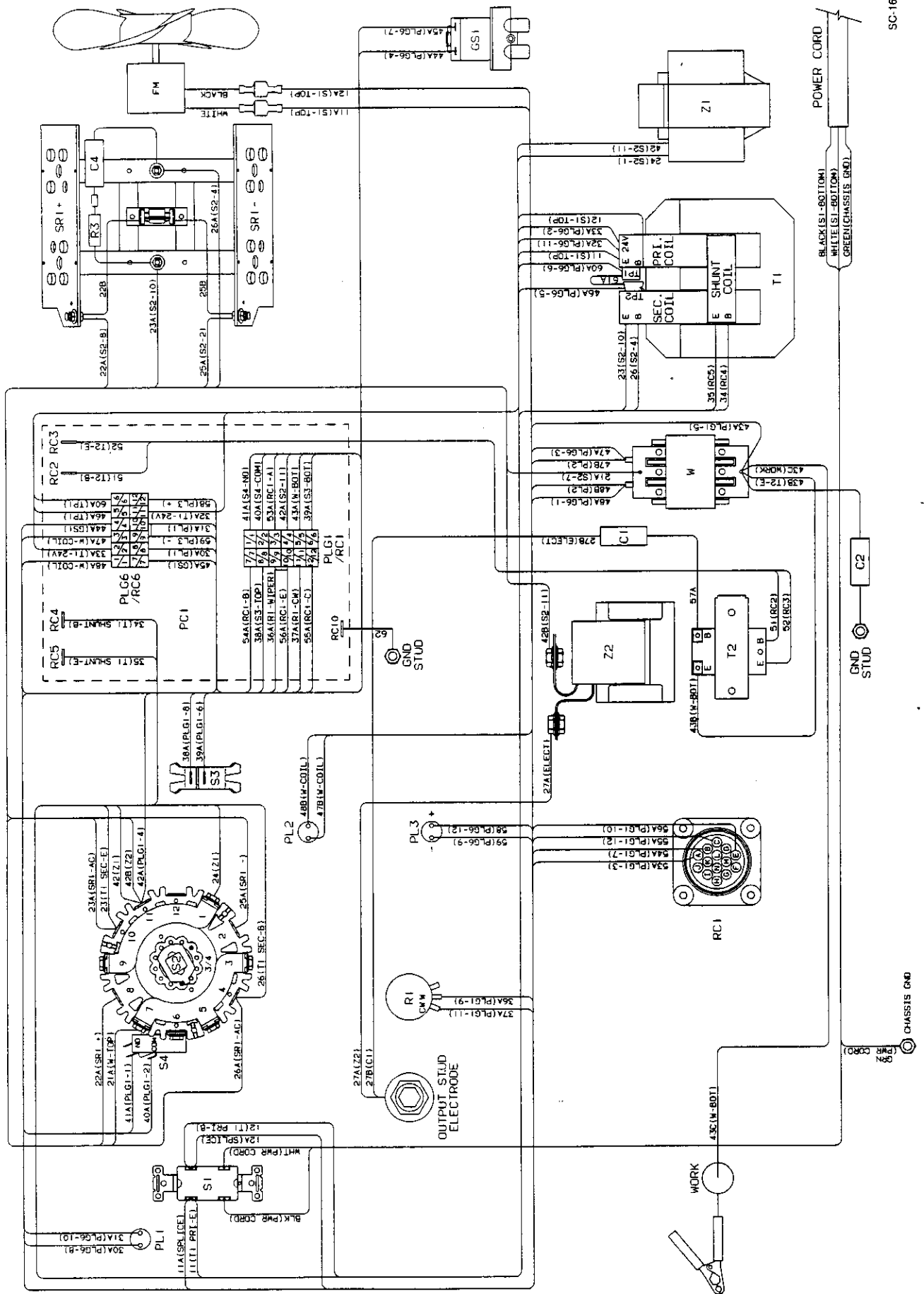


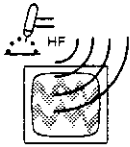
Figure 6-2. Wiring Diagram For Welding Power Source

# SECTION 7 – HIGH FREQUENCY

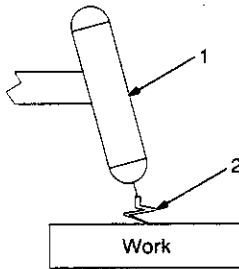
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## WARNING

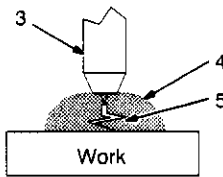
**HIGH-FREQUENCY RADIATION can interfere with radio navigation, safety services, computers, and communications equipment.**



- Have only qualified person familiar with electronic equipment perform this installation.
- The user is responsible for having a qualified electrician promptly correct any interference problem resulting from the installation.
- If notified by the FCC about interference, stop using the equipment at once.
- Have the installation regularly checked and maintained.
- Keep high-frequency source doors and panels tightly shut, keep spark gaps at correct setting, and use grounding and shielding as shown in Figure 7-3 to minimize the possibility of interference.



Gas Tungsten Arc Welding (GTAW)

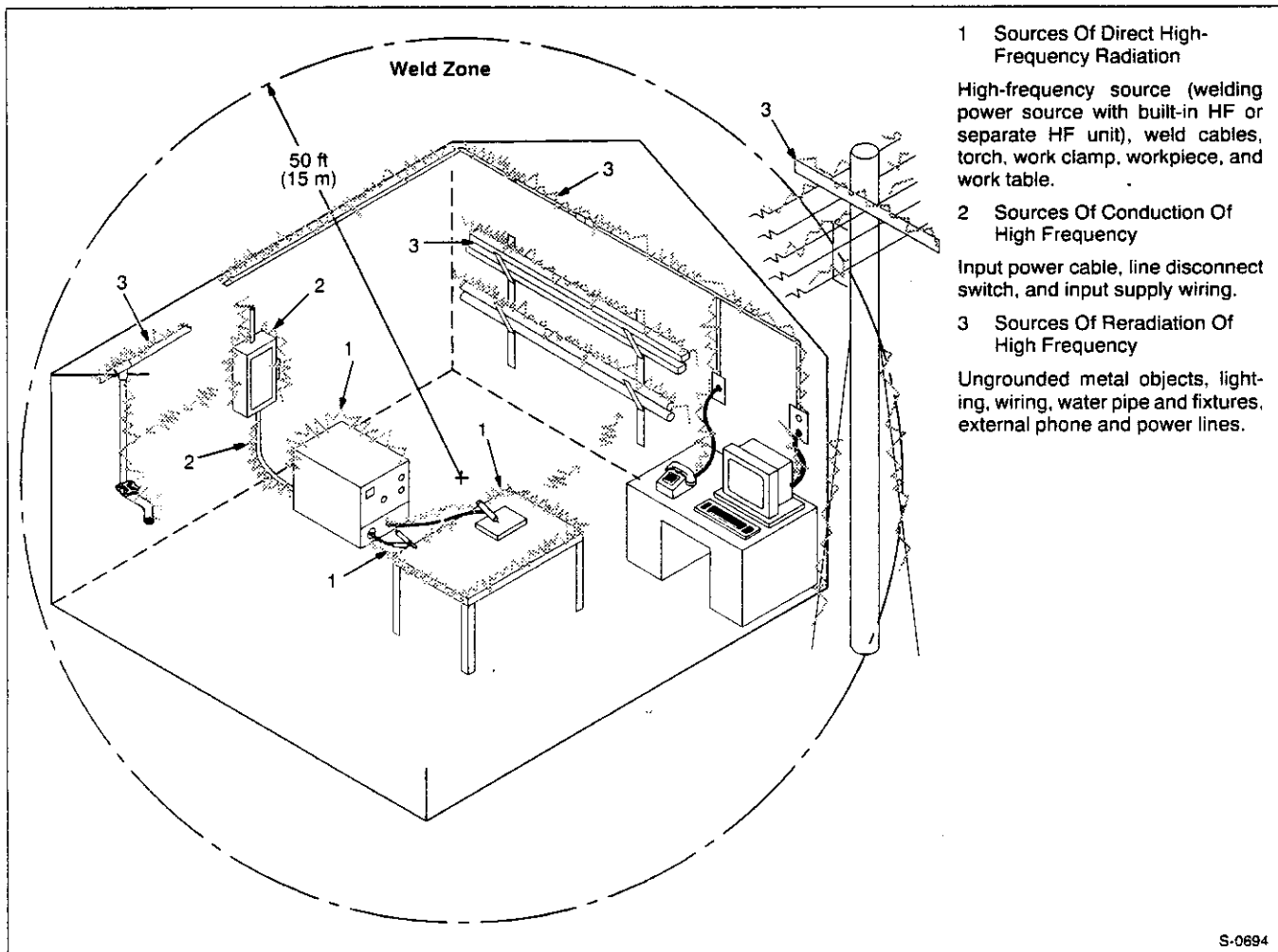


Submerged Arc Welding (SAW)

- 1 Gas Tungsten Arc Torch
- 2 High-Frequency Voltage  
Used to help arc jump air gap between torch and workpiece and/or stabilize the arc.
- 3 Submerged Arc Welding Gun
- 4 Flux
- 5 High-Frequency Voltage  
Used to help arc reach workpiece through flux granules.

S-0693

Figure 7-1. Welding Processes Requiring High Frequency

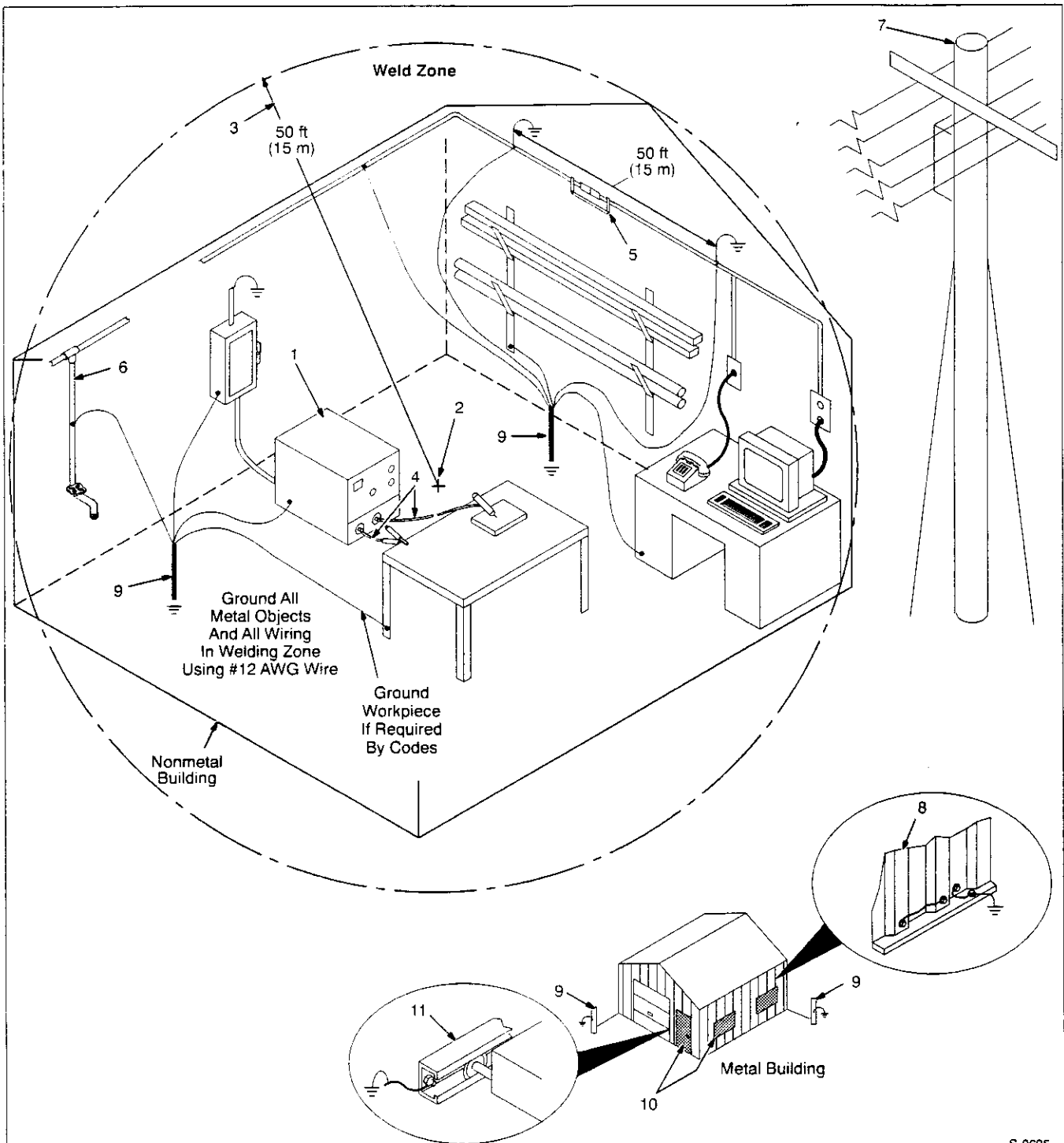


- 1 Sources Of Direct High-Frequency Radiation  
High-frequency source (welding power source with built-in HF or separate HF unit), weld cables, torch, work clamp, workpiece, and work table.
- 2 Sources Of Conduction Of High Frequency  
Input power cable, line disconnect switch, and input supply wiring.
- 3 Sources Of Reradiation Of High Frequency  
Ungrounded metal objects, lighting, wiring, water pipe and fixtures, external phone and power lines.

S-0694

Figure 7-2. Sources Of High-Frequency Radiation From Incorrect Installation





S-0695

**1 High-Frequency Source (Welder With Built-In HF Or Separate HF Unit)**

Ground metal machine case, work output terminal, line disconnect switch, input supply, and worktable.

**2 Center Point Of Welding Zone**

Midpoint between high-frequency source and welding torch.

**3 Welding Zone**

A circle 50 ft (15 m) from center point in all directions.

**4 Weld Output Cables**

Keep cables short and close together.

**5 Conduit Joint Bonding**

Electrically join (bond) all conduit sections using copper straps or braided wire. Ground conduit every 50 ft (15 m).

**6 Water Pipe And Fixtures**

Ground water pipe every 50 ft (15 m).

**7 External Power Or Telephone Lines**

Locate high-frequency source at least 50 ft (15 m) away from power and phone lines.

**8 Metal Building Panel Bonding Methods**

Bolt or weld building panels together, install copper straps or braided wire across seams, and ground frame.

**9 Grounding Rod**

Consult the National Electrical Code for specifications.

**10 Windows And Doorways**

Cover all windows and doorways with grounded copper screen of not more than 1/4 in (6.4 mm) mesh.

**11 Overhead Door Track**

Ground the track.

**Figure 7-3. Correct Installation**

# SECTION 8 – GTAW METHODS

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## 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.

### 8-1. Selecting Tungsten Electrode

Table 8-1. 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.
<b>Pure Tungsten (Green Band)</b>				
.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
<b>2% Thorium Alloyed Tungsten (Red Band)</b>				
.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
<b>Zirconium Alloyed Tungsten (Brown Band)</b>				
.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

## 8-2. Preparing Tungsten

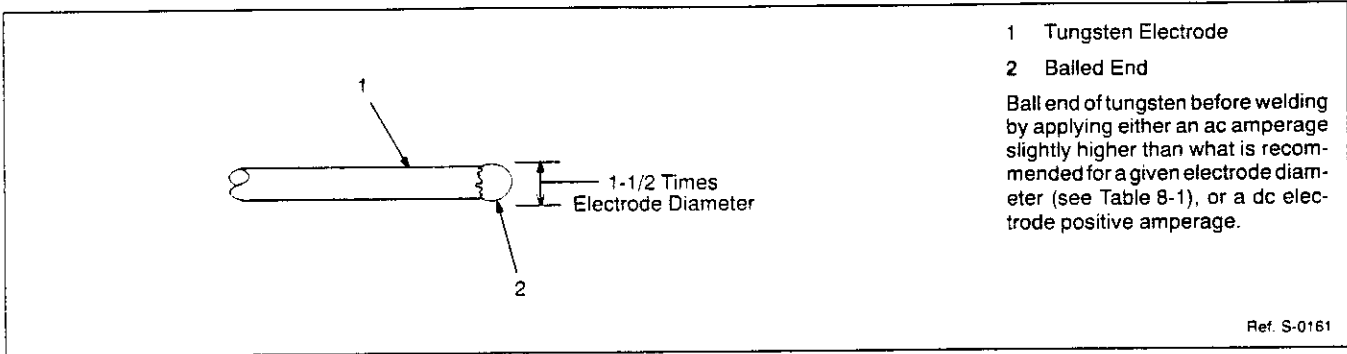


Figure 8-1. Preparing Tungsten For AC Or DC Electrode Positive (DCEP) Welding

**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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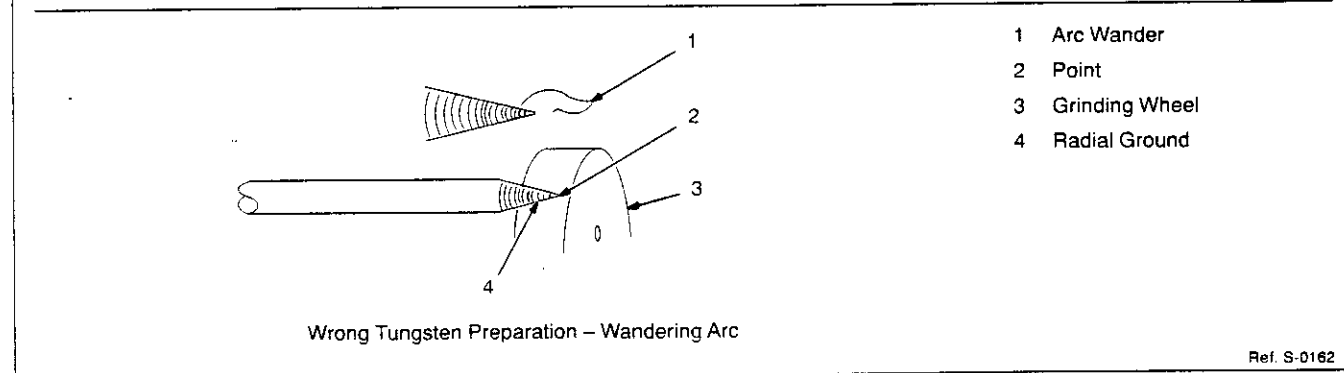
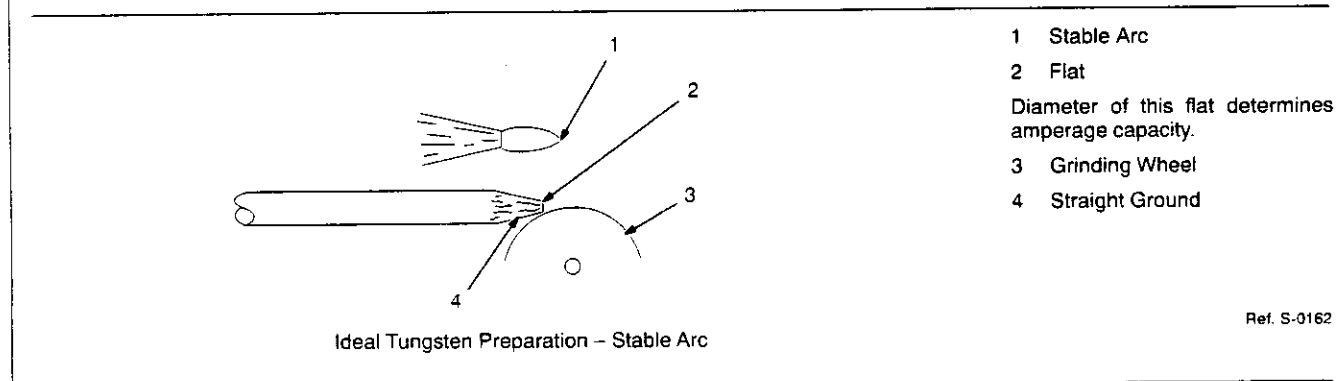
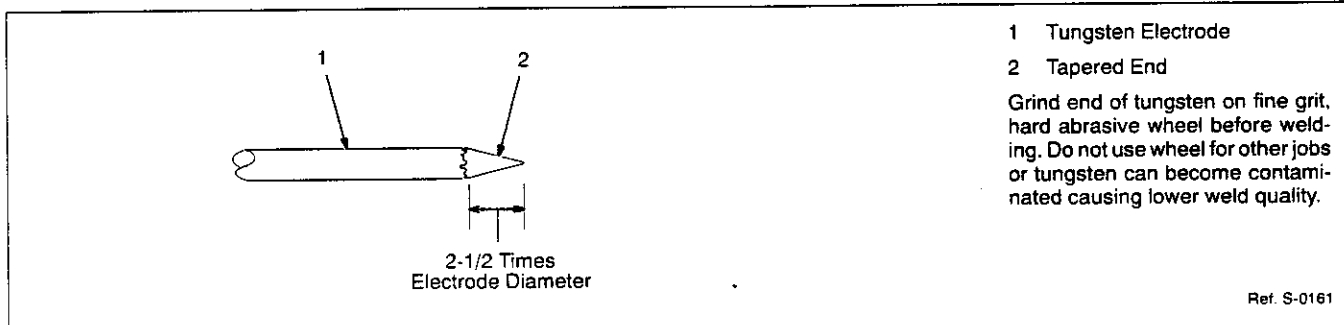


Figure 8-2. Preparing Tungsten For DC Electrode Negative (DCEN) Welding

### 8-3. Gas Tungsten Arc Welding (GTAW) Techniques

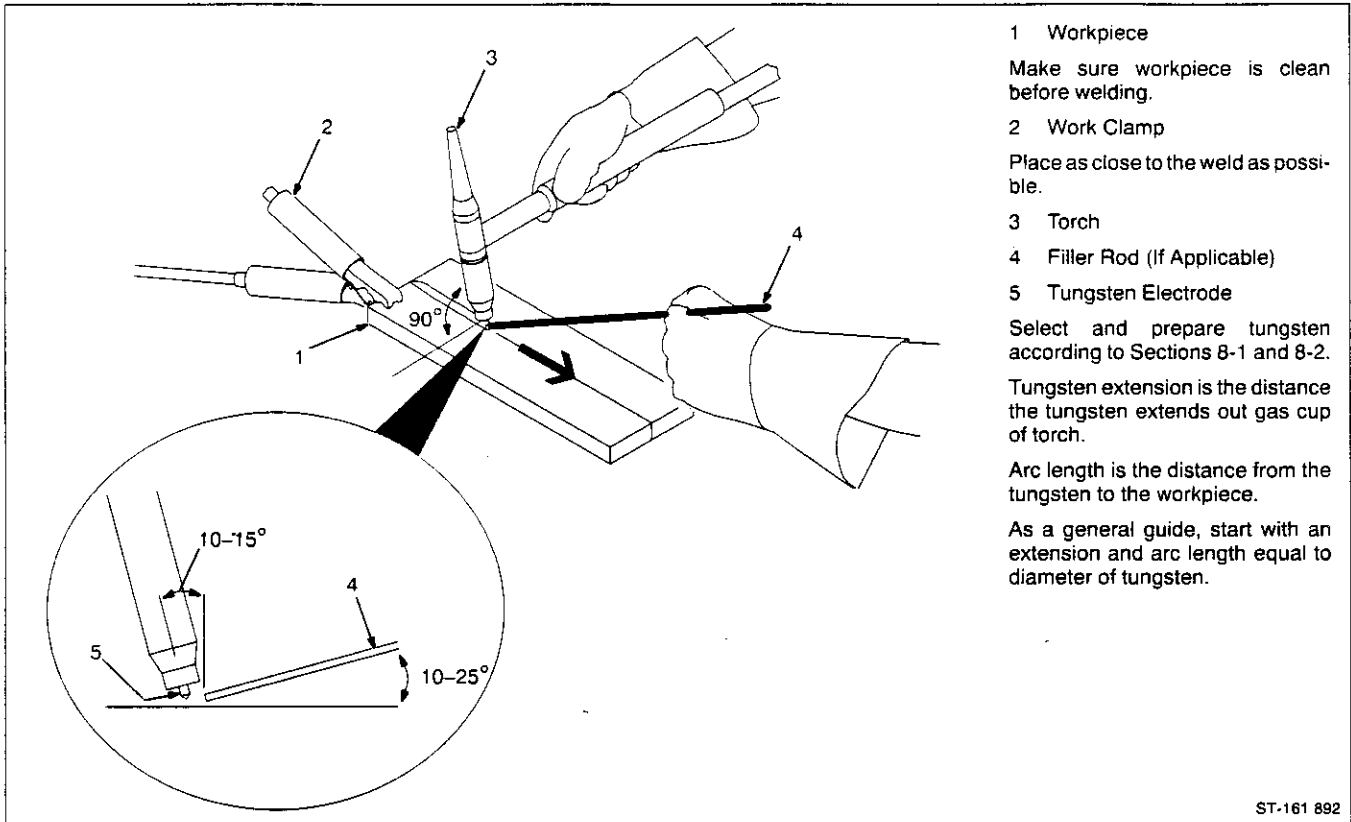


Figure 8-3. Gas Tungsten Arc Welding (GTAW) Positions

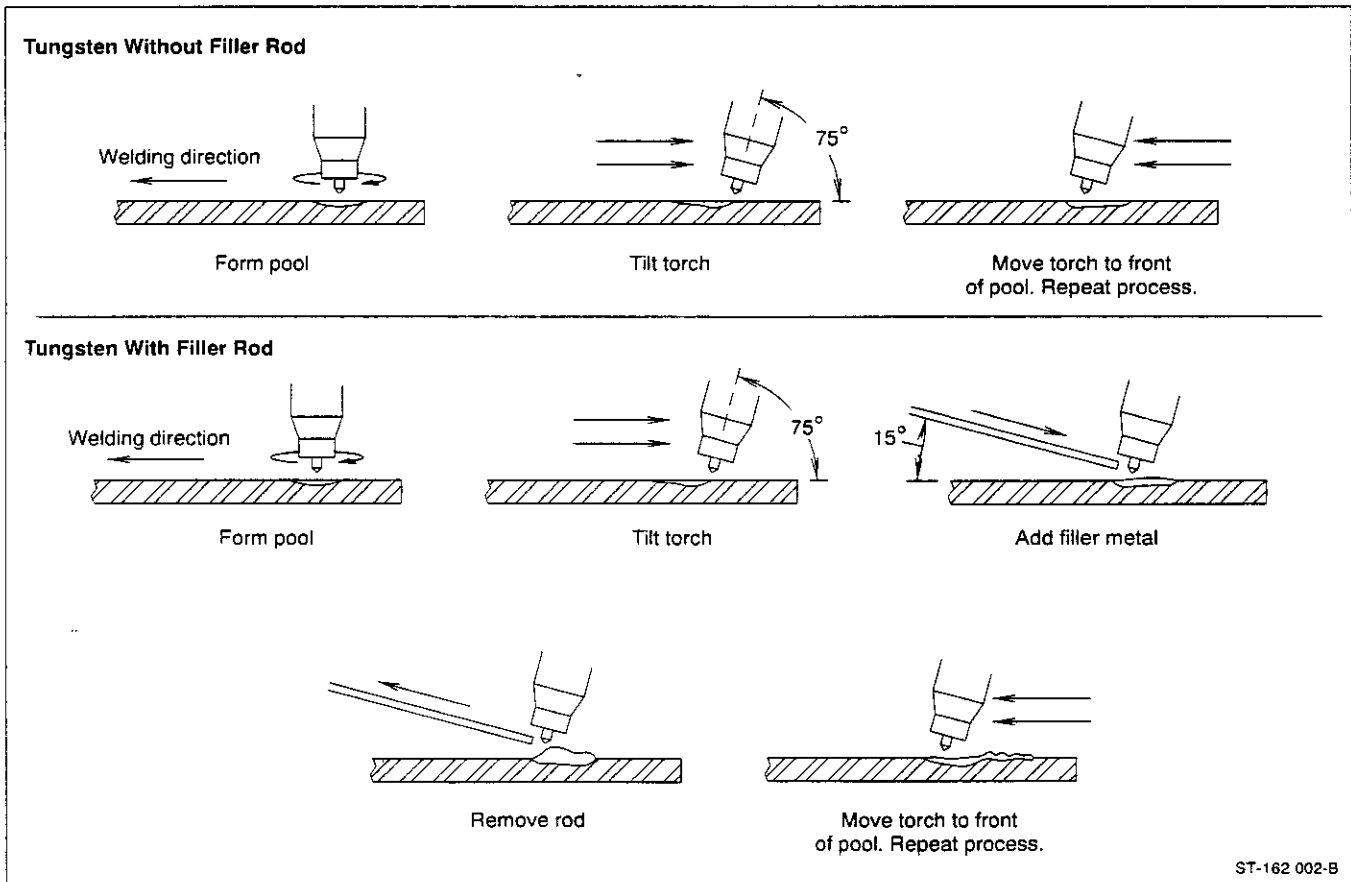
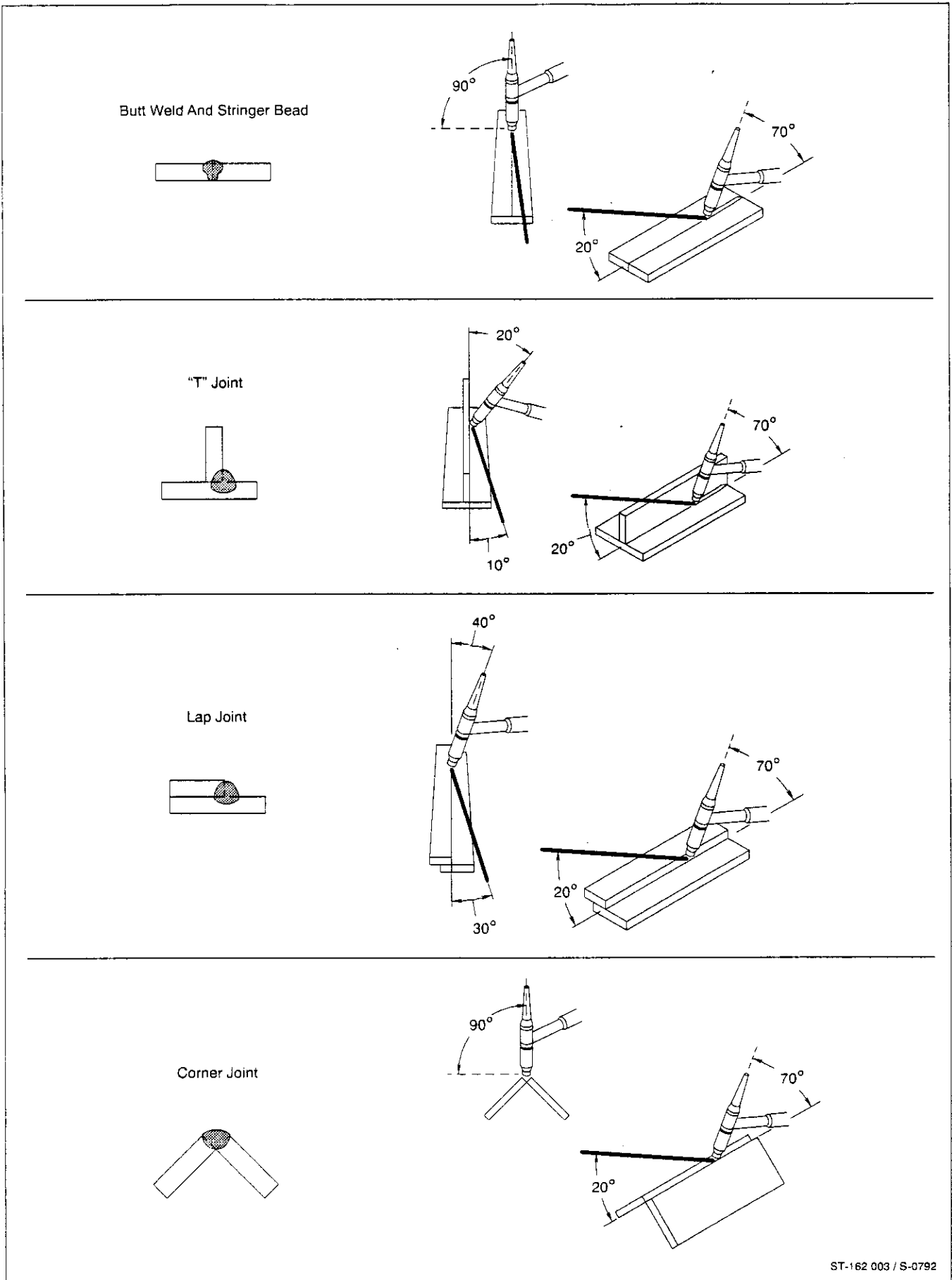


Figure 8-4. Movement During Welding

# 8-4. Weld Joint Positions








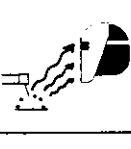


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Figure 8-5. Weld Joint Positions

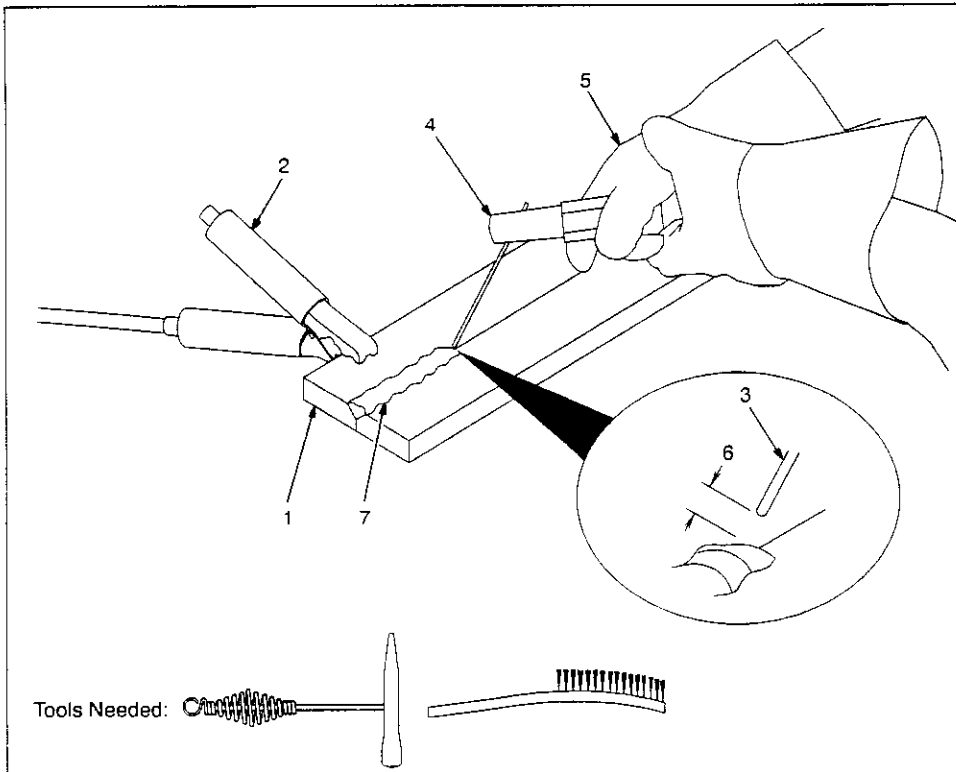
# SECTION 9 – WELDING METHODS & TROUBLESHOOTING

mod5.1 9/92

 <b>WARNING</b>			
	<b>ELECTRIC SHOCK can kill.</b> <ul style="list-style-type: none"> <li>Always wear dry insulating gloves.</li> <li>Insulate yourself from work and ground.</li> <li>Do not touch live electrical parts.</li> <li>Keep all panels and covers securely in place.</li> </ul>		<b>MOVING PARTS can cause injury.</b> <ul style="list-style-type: none"> <li>Keep away from moving parts such as fans, belts, and rotors.</li> <li>Keep all doors, panels, covers, and guards closed and securely in place.</li> </ul>
	<b>FUMES AND GASES can be hazardous to your health.</b> <ul style="list-style-type: none"> <li>Keep your head out of the fumes.</li> <li>Ventilate area, or use breathing device.</li> <li>Read Material Safety Data Sheets (MSDSs) and manufacturer's instructions for material used.</li> </ul>		<b>HOT PARTS can cause severe burns.</b> <ul style="list-style-type: none"> <li>Allow cooling period before touching welded metal.</li> <li>Wear protective gloves and clothing.</li> </ul>
	<b>WELDING can cause fire or explosion.</b> <ul style="list-style-type: none"> <li>Do not weld near flammable material.</li> <li>Watch for fire: keep extinguisher nearby.</li> <li>Do not locate unit over combustible surfaces.</li> <li>Do not weld on closed containers.</li> <li>Allow work and equipment to cool before handling.</li> </ul>		<b>MAGNETIC FIELDS FROM HIGH CURRENTS can affect pacemaker operation.</b> <ul style="list-style-type: none"> <li>Pacemaker wearers keep away.</li> <li>Wearers should consult their doctor before going near arc welding, gouging, or spot welding operations.</li> </ul>
	<b>ARC RAYS can burn eyes and skin; NOISE can damage hearing.</b> <ul style="list-style-type: none"> <li>Wear welding helmet with correct shade of filter.</li> <li>Wear correct eye, ear, and body protection.</li> </ul>		<b>WELDING CURRENT can damage electronic parts in vehicles.</b> <ul style="list-style-type: none"> <li>Disconnect both battery cables before welding on a vehicle.</li> <li>Place work clamp as close to the weld as possible.</li> </ul>
		See Safety Rules at beginning of manual for basic welding safety information.	

## 9-1. Shielded Metal Arc Welding (SMAW)

<b>NOTE</b> 	<i>Welding current starts as soon as electrode touches the workpiece.</i>
---	---



- 1 Workpiece  
Make sure workpiece is clean before welding.
- 2 Work Clamp  
Place as close to the weld as possible.
- 3 Electrode  
A small diameter electrode requires less current than a large one. Follow recommendations of electrode manufacturer when setting weld amperage (see Figure 9-2).
- 4 Insulated Electrode Holder
- 5 Electrode Holder Position
- 6 Arc Length  
Arc length is the distance from the electrode to the workpiece. A short arc with correct amperage will give a sharp, crackling sound.
- 7 Slag  
Use a chipping hammer and wire brush to remove slag. Remove slag and check weld bead before making another weld pass.

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Figure 9-1. Shielded Metal Arc Welding (SMAW) Procedure

ELECTRODE	DIAMETER	AMPERAGE RANGE								
		50	100	150	200	250	300	350	400	450
6010 & 6011	3/32									
	1/8									
	5/32									
	3/16									
	7/32									
	1/4									
6013	1/16									
	5/64									
	3/32									
	1/8									
	5/32									
	3/16									
7014	7/32									
	1/4									
	3/32									
	1/8									
	5/32									
	3/16									
7018	7/32									
	1/4									
	3/32									
	1/8									
	5/32									
	3/16									
7024	7/32									
	1/4									
	3/32									
	1/8									
	5/32									
	3/16									
Ni-CI	7/32									
	1/4									
	3/32									
	1/8									
308L	5/32									
	1/8									
	3/32									

ELECTRODE	DC*	AC	POSITION	PENETRATION	USAGE
6010	EP		ALL	DEEP	MIN. PREP. ROUGH HIGH SPATTER
6011	EP	✓	ALL	DEEP	
6013	EP,EN	✓	ALL	LOW	GENERAL
7014	EP,EN	✓	ALL	MED	SMOOTH, EASY, FAST
7018	EP	✓	ALL	LOW	LOW HYDROGEN, STRONG
7024	EP,EN	✓	FLAT HORIZ FILLET	LOW	SMOOTH, EASY, FASTER
NI-CL	EP	✓	ALL	LOW	CAST IRON
308L	EP	✓	ALL	LOW	STAINLESS

\*EP = ELECTRODE POSITIVE (REVERSE POLARITY)  
EN = ELECTRODE NEGATIVE (STRAIGHT POLARITY)

Ref. S-087 985-A

Figure 9-2. Electrode And Amperage Selection Chart

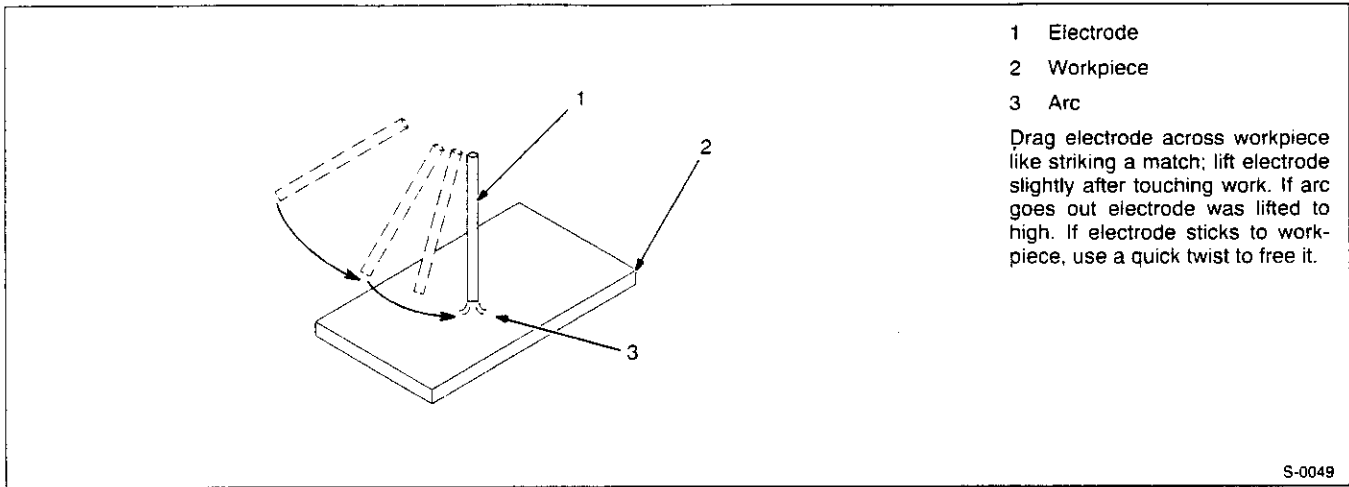


Figure 9-3. Striking An Arc – Scratch Start Technique

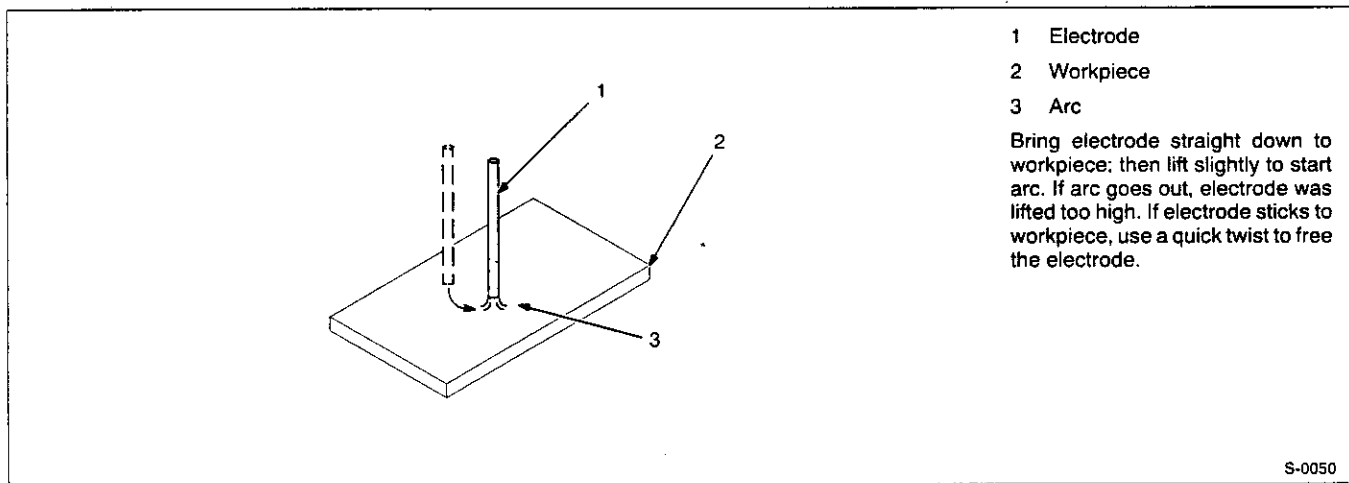


Figure 9-4. Striking An Arc – Tapping Technique

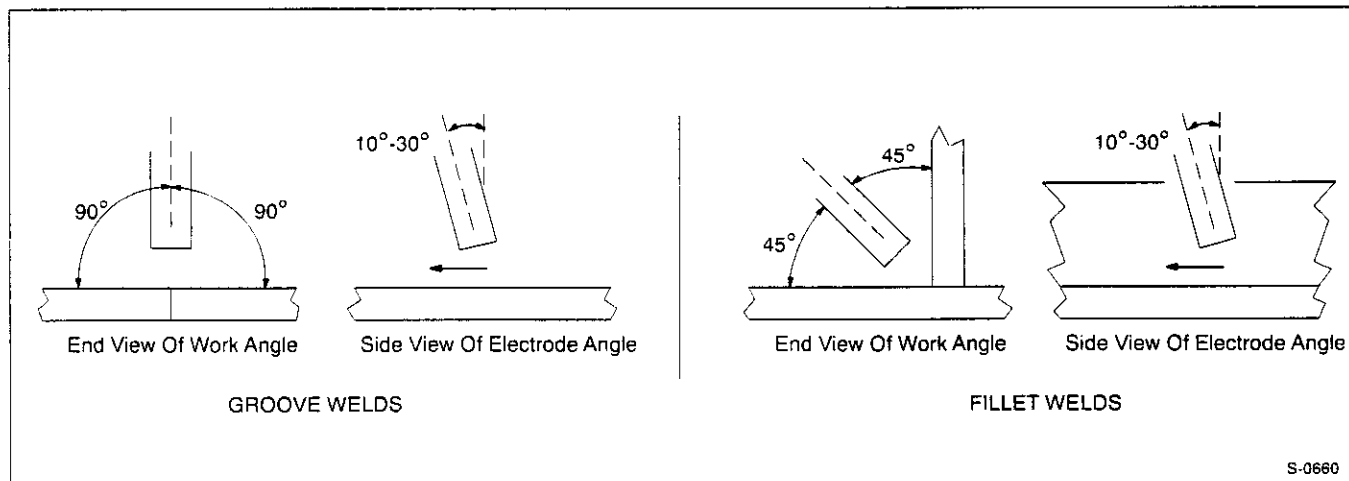
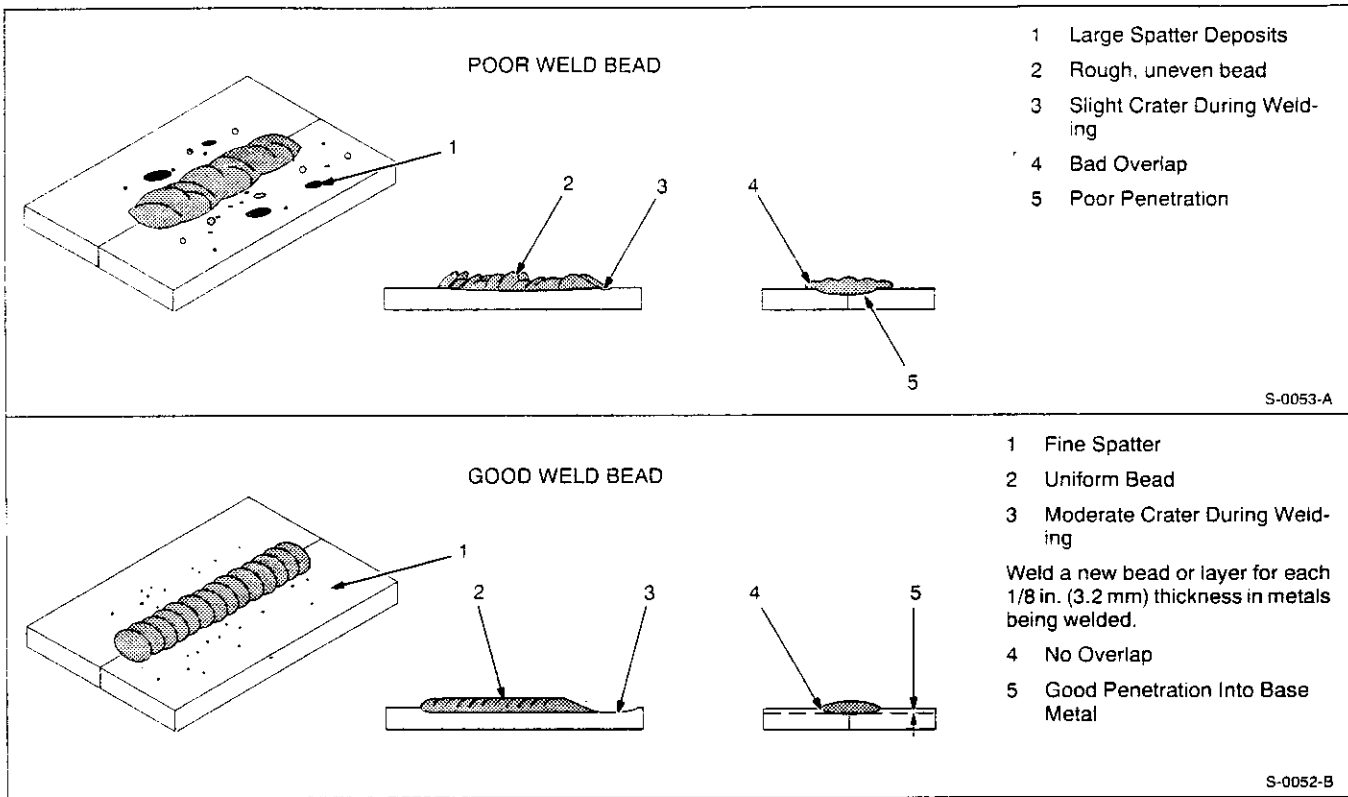
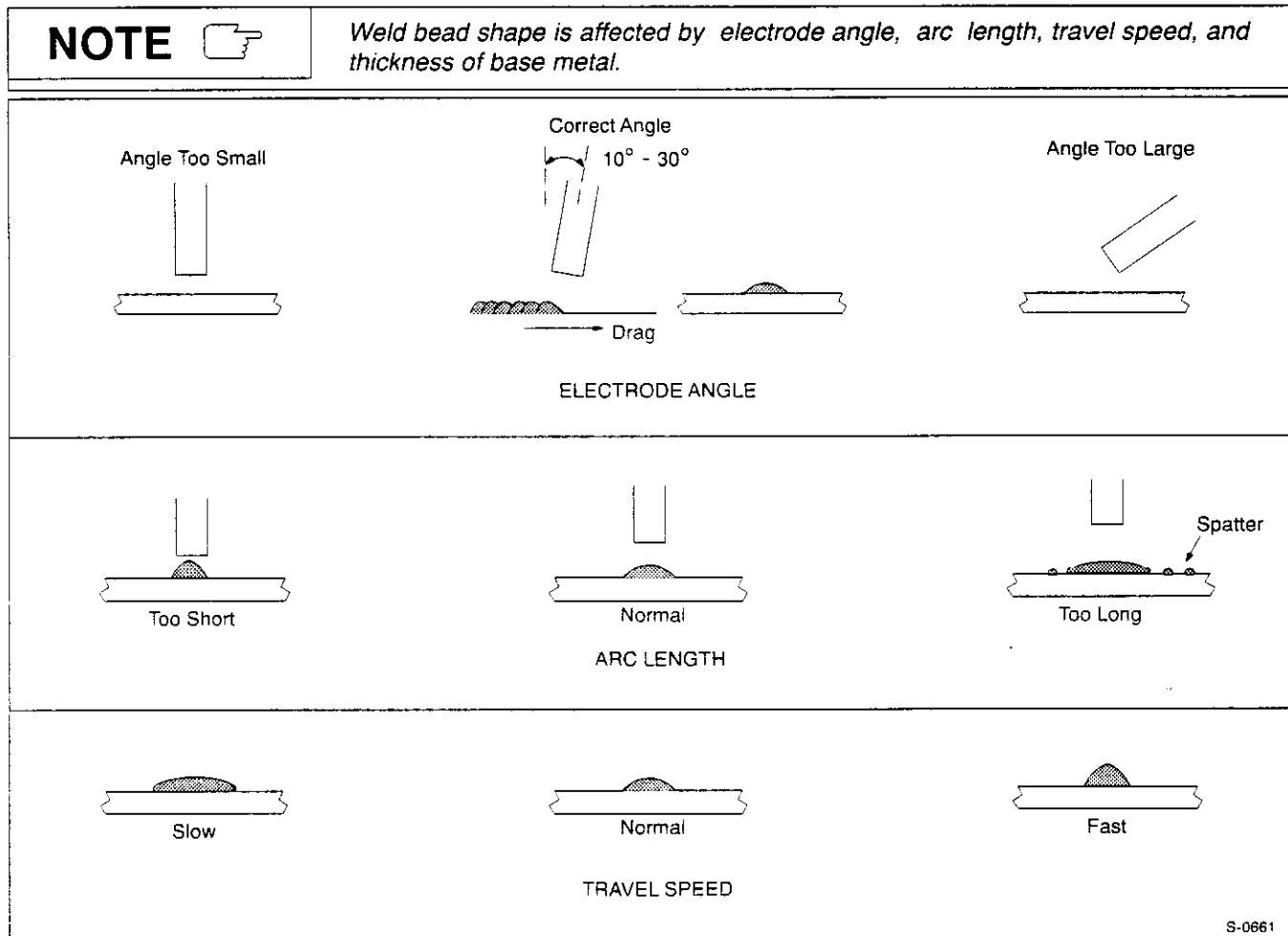


Figure 9-5. Positioning Electrode Holder





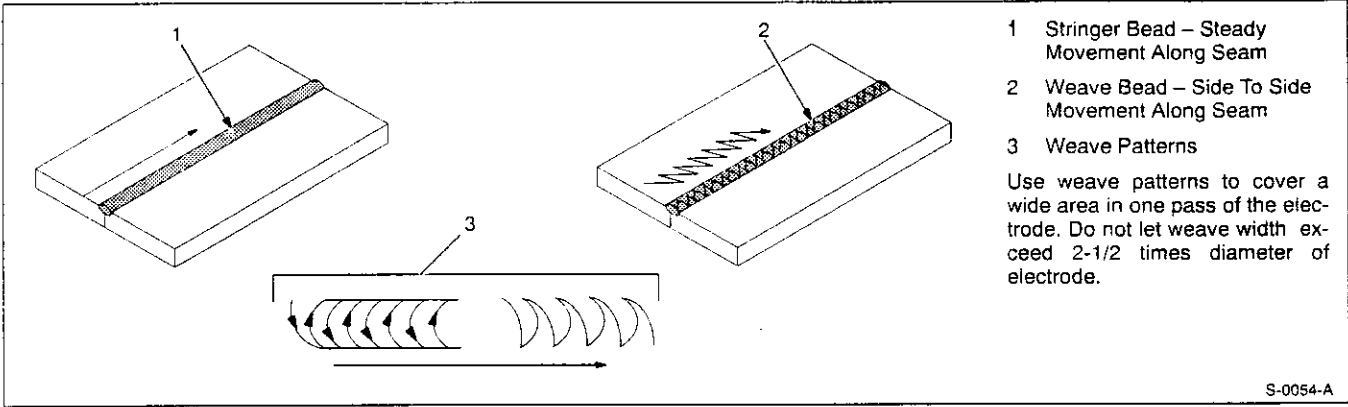
**Figure 9-6. Weld Bead Characteristics**



**Figure 9-7. Conditions That Affect Weld Bead Shape**

**NOTE** 

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

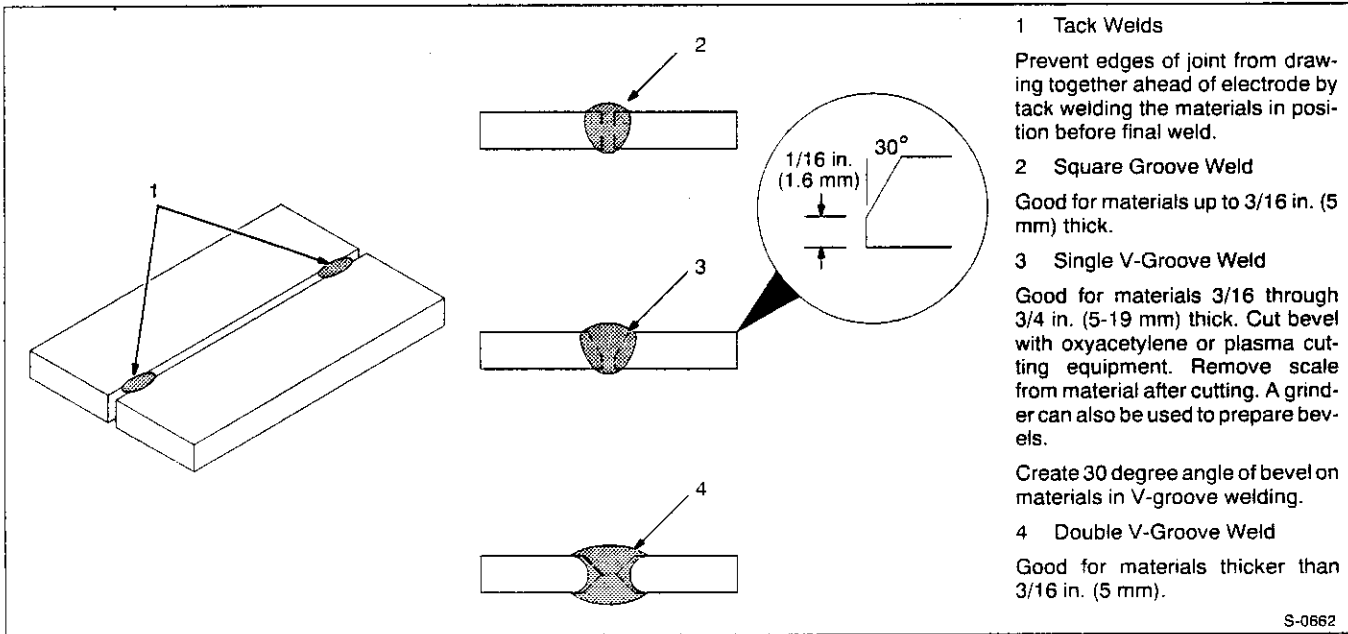


- 1 Stringer Bead – Steady Movement Along Seam
- 2 Weave Bead – Side To Side Movement Along Seam
- 3 Weave Patterns

Use weave patterns to cover a wide area in one pass of the electrode. Do not let weave width exceed 2-1/2 times diameter of electrode.

S-0054-A

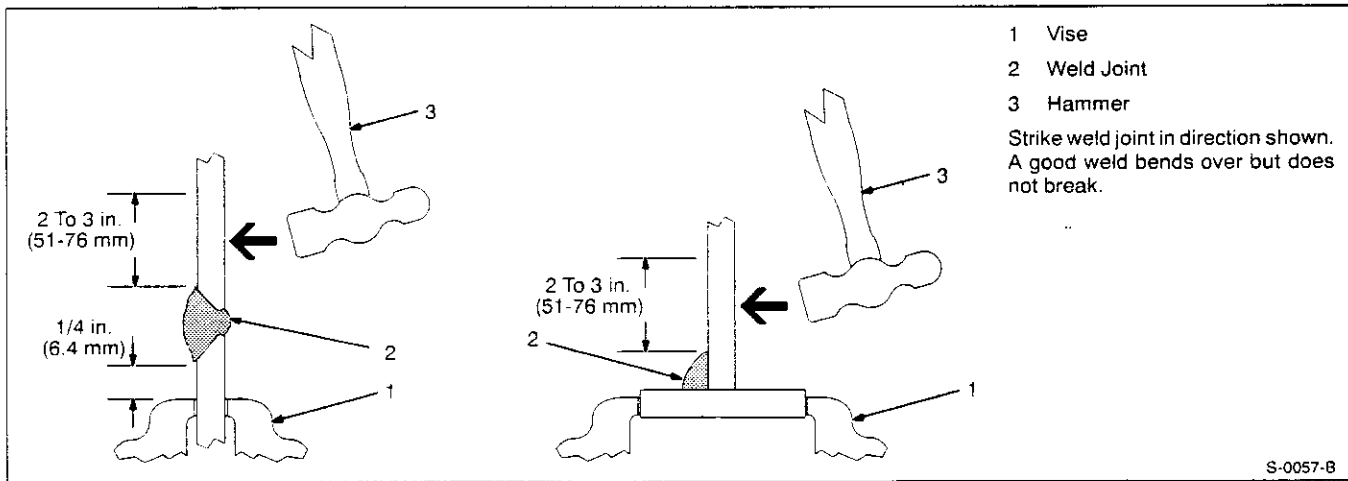
**Figure 9-8. Electrode Movement During Welding**



- 1 Tack Welds  
Prevent edges of joint from drawing together ahead of electrode by tack welding the materials in position before final weld.
- 2 Square Groove Weld  
Good for materials up to 3/16 in. (5 mm) thick.
- 3 Single V-Groove Weld  
Good for materials 3/16 through 3/4 in. (5-19 mm) thick. Cut bevel with oxyacetylene or plasma cutting equipment. Remove scale from material after cutting. A grinder can also be used to prepare bevels.  
Create 30 degree angle of bevel on materials in V-groove welding.
- 4 Double V-Groove Weld  
Good for materials thicker than 3/16 in. (5 mm).

S-0662

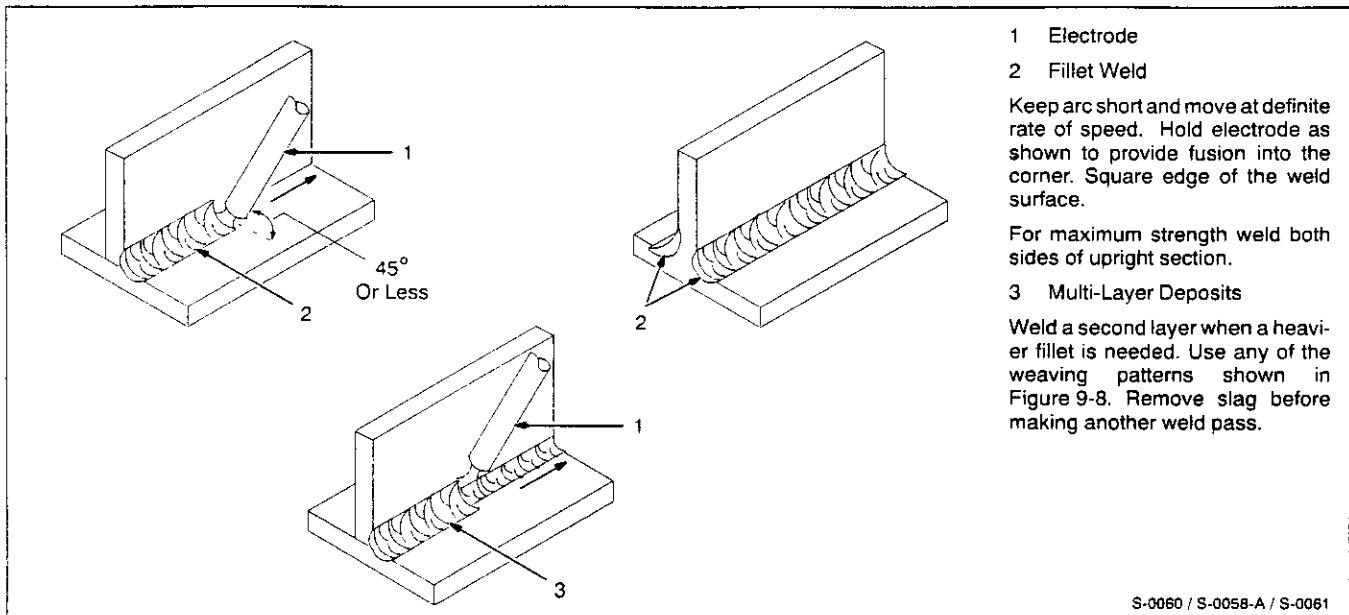
**Figure 9-9. Butt Joints**



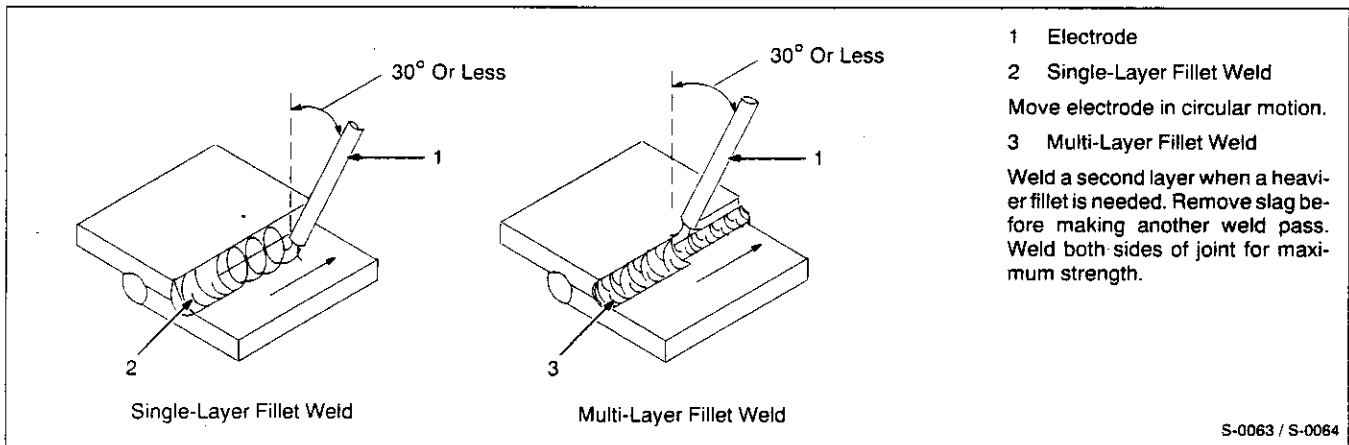
- 1 Vise
  - 2 Weld Joint
  - 3 Hammer
- Strike weld joint in direction shown. A good weld bends over but does not break.

S-0057-B

**Figure 9-10. Weld Test**



**Figure 9-11. Tee Joint**

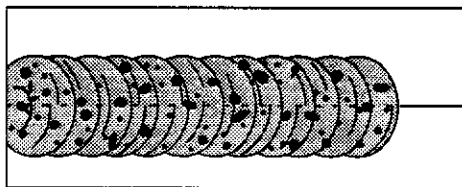


**Figure 9-12. Lap Joint**

## 9-2. Welding Troubleshooting

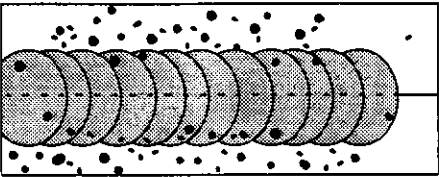
**Table 9-1. Porosity**

Possible Causes	Corrective Actions
Arc length too long.	Reduce arc length.
Damp electrode.	Use dry electrode.
Workpiece dirty.	Remove all grease, oil, moisture, rust, paint, coatings, slag, and dirt from work surface before welding.




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

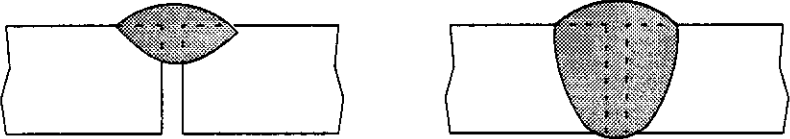
**Table 9-2. Excessive Spatter**

		<p>Excessive Spatter – scattering of molten metal particles that cool to solid form near weld bead.</p>
Possible Causes	Corrective Actions	
Amperage too high for electrode.	Decrease amperage or select larger electrode.	
Arc length too long or voltage too high	Reduce arc length or voltage.	

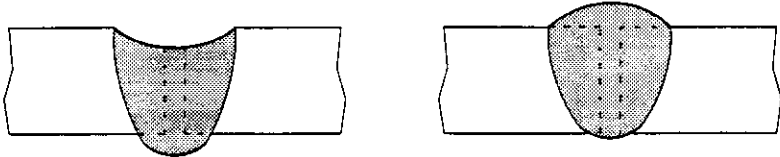
**Table 9-3. Incomplete Fusion**

		<p>Incomplete Fusion – failure of weld metal to fuse completely with base metal or a preceding weld bead.</p>
Possible Causes	Corrective Actions	
Insufficient heat input.	Increase amperage. Select larger electrode and increase amperage.	
Improper welding technique.	<p>Place stringer bead in proper location(s) at joint during welding.</p> <p>Adjust work angle or widen groove to access bottom during welding.</p> <p>Momentarily hold arc on groove side walls when using weaving technique.</p> <p>Keep arc on leading edge of weld puddle.</p>	
Workpiece dirty.	Remove all grease, oil, moisture, rust, paint, coatings, slag, and dirt from work surface before welding.	

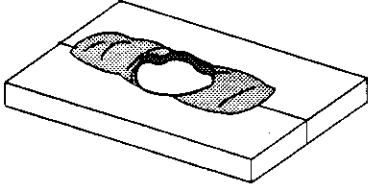
**Table 9-4. Lack Of Penetration**

		<p>Lack Of Penetration – shallow fusion between weld metal and base metal.</p>
Possible Causes	Corrective Actions	
Improper joint preparation.	Material too thick. Joint preparation and design must provide access to bottom of groove.	
Improper weld technique.	Keep arc on leading edge of weld puddle.	
Insufficient heat input.	<p>Increase amperage. Select larger electrode and increase amperage.</p> <p>Reduce travel speed.</p>	

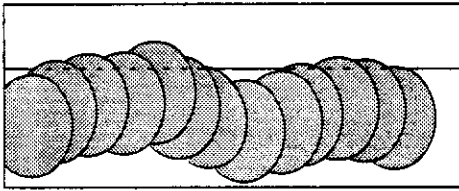
**Table 9-5. Excessive Penetration**

		<p>Excessive Penetration – weld metal melting through base metal and hanging underneath weld.</p>
<p style="text-align: center;">Excessive Penetration                      Good Penetration</p>		
Possible Causes	Corrective Actions	
Excessive heat input.	<p>Select lower amperage. Use smaller electrode.</p> <p>Increase and/or maintain steady travel speed.</p>	

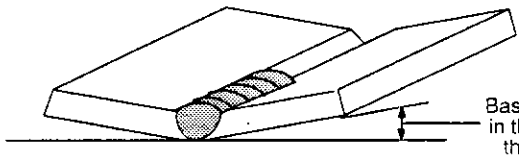
**Table 9-6. Burn-Through**

		<p>Burn-Through – weld metal melting completely through base metal resulting in holes where no metal remains.</p>
Possible Causes	Corrective Actions	
Excessive heat input.	<p>Select lower amperage. Use smaller electrode.</p> <p>Increase and/or maintain steady travel speed.</p>	

**Table 9-7. Waviness Of Bead**

		<p>Waviness Of Bead – weld metal that is not parallel and does not cover joint formed by base metal.</p>
Possible Causes	Corrective Actions	
Unsteady hand.	<p>Use two hands. Practice technique.</p>	

**Table 9-8. Distortion**

		<p>Distortion – contraction of weld metal during welding that forces base metal to move.</p>
Possible Causes	Corrective Actions	
Excessive heat input.	<p>Use restraint (clamp) to hold base metal in position.</p> <p>Make tack welds along joint before starting welding operation.</p> <p>Select lower amperage for electrode.</p> <p>Increase travel speed.</p> <p>Weld in small segments and allow cooling between welds.</p>	

# SECTION 10 – PARTS LIST

ST-164 350

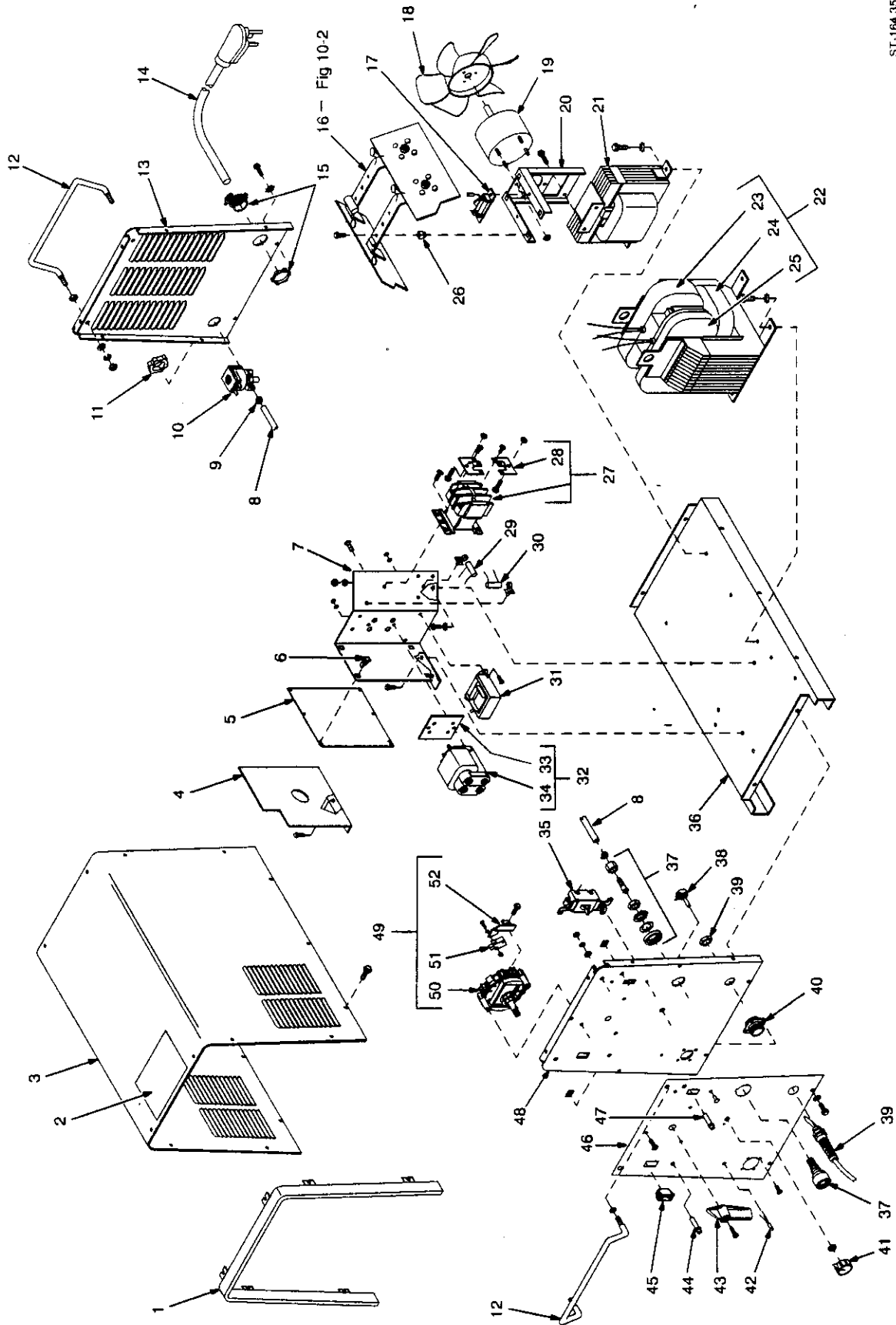


Figure 10-1. Main Assembly

Item No.	Dia. Mkgs.	Part No.	Description	Quantity
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**Figure 10-1. Main Assembly**

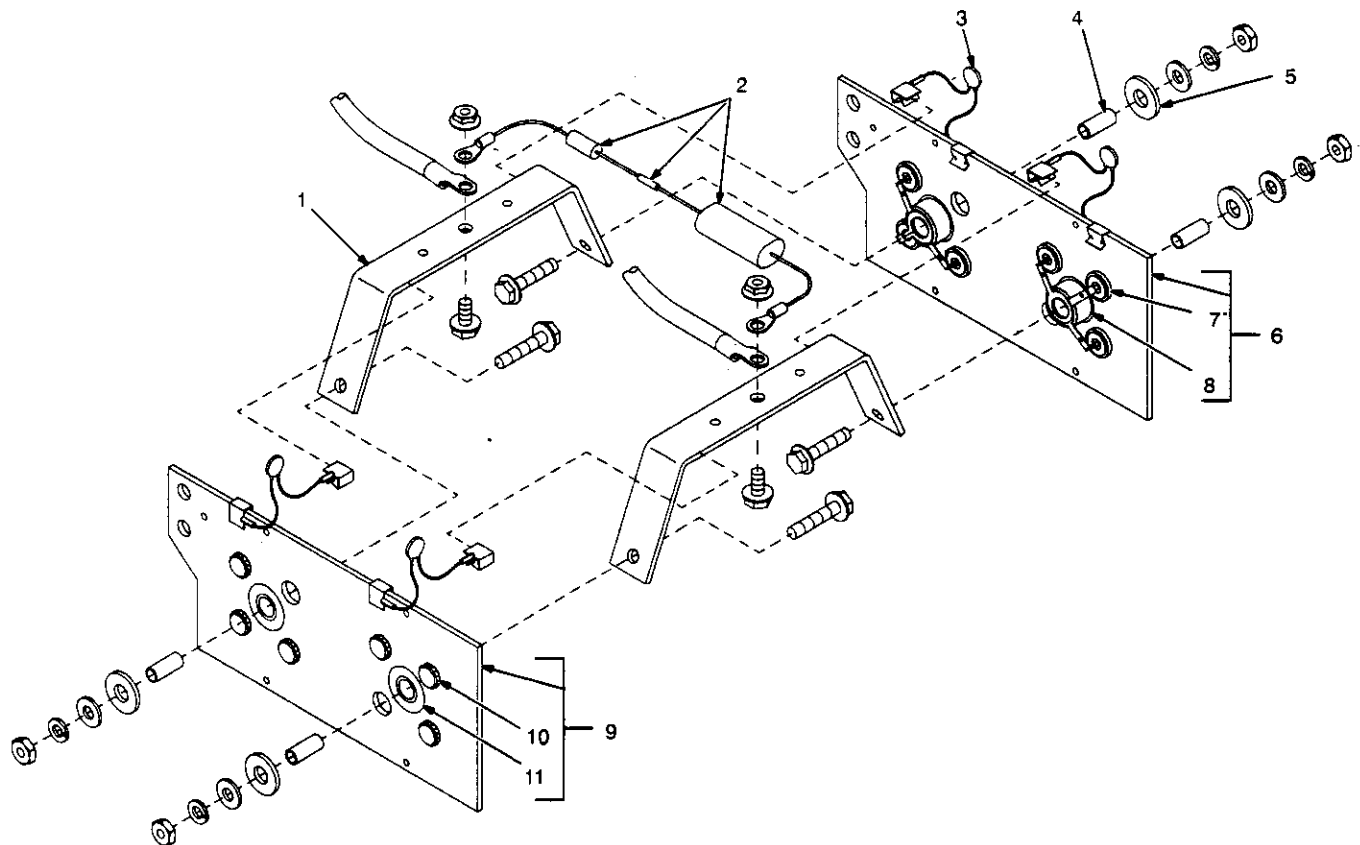
1		154 335	BEZEL, front	1
2		134 327	LABEL, warning general precautionary	1
3		+155 402	WRAPPER	1
4		157 415	BAFFLE, PC board	1
5	PC1	164 431	CIRCUIT CARD, arc start/control	1
	PLG1,6	130 203	CONNECTOR & SOCKETS, (consisting of)	2
		113 746	CONNECTOR, rect skt 24-18ga Molex 39-00-0038	12
6		134 201	STAND-OFF SUPPORT, PC card	4
7		155 404	BRACKET, mtg components	1
8		603 106	HOSE, nprn brd No. 1 (order by ft)	3ft
9		010 865	CLAMP, hose .430-.515 clp dia	2
10	GS1	125 785	VALVE, 24VAC 2 way custom port 1/8 orf	1
11		605 227	NUT, nylon hex jam .750NPST	1
12		147 571	HANDLE	2
13		155 399	PANEL, rear	1
14		071 906	CORD SET, 8-10ga 3/c (200V model only)	1
14	PLG12	047 721	CORD SET, 250V 6-50P 8-10ga 3/c (230V model only)	1
14		605 077	CABLE, port No. 10 3/c (460V model only) (order by ft)	8ft
15		044 426	CONNECTOR, clamp cable .690/1.070	1
16	SR1	154 848	RECTIFIER, si diode (Fig 10-2)	1
17	VR1, R2	044 482	SUPPRESSOR	1
18		150 783	BLADE, fan 9 in .312 hub	1
19	FM	148 808	MOTOR, fan 230V 1550RPM .312dia shaft	1
20		155 403	BRACKET, mtg fan & rectifier	1
21	Z1	155 469	STABILIZER	1
22	T1	161 344	TRANSFORMER, pwr main 200V (consisting of)	1
22	T1	155 760	TRANSFORMER, pwr main 230V (consisting of)	1
22	T1	161 345	TRANSFORMER, pwr main 460V (consisting of)	1
23		155 781	COIL, sec 200V	1
23		155 781	COIL, sec 230V	1
23		155 781	COIL, sec 460V	1
24		155 779	COIL, shunt 200V	1
24		155 779	COIL, shunt 230V	1
24		155 779	COIL, shunt 460V	1
25		160 523	COIL, pri 200V	1
25		155 780	COIL, pri 230V	1
25		160 524	COIL, pri 460V	1
	TP1,2	020 520	THERMOSTAT, NC	2
26		083 147	GROMMET, No. 8/10	4
27	W	034 893	CONTACTOR, (consisting of)	1
28		034 260	LINK, connecting contactor terminal	2
		024 493	COIL, cntor 24VAC 40A	1
29	C2	155 501	CAPACITOR	1
30	C1	155 290	CAPACITOR	1
		155 107	CABLE TIE	2
31	T2	157 596	TRANSFORMER, impulse HV	1
32	Z2	155 499	TRANSFORMER, blocking (consisting of)	1
33		159 102	PLATE, mtg block xfmr	1
34		155 288	COIL, blocking	1
35	S1	124 511	SWITCH, tgl DPST 40A 600VAC	1
36		155 401	BASE	1
37	Elec	155 551	RECEPTACLE, twlk insul fem w/gas passage	1
38	R1	035 897	POTENTIOMETER, C sltd 1T 2W 1K	1
39		134 900	STRAIN RELIEF, cable flex .270-.480 cable	1
40	RC1	143 976	CONNECTOR w/SOCKETS, (consisting of)	1
		079 534	CONNECTOR, circ skt push-in 14-18ga Amp 66358-6	14
41		097 924	KNOB, pointer	1
42	PL3	155 500	LIGHT, indicator	1
43		148 956	HANDLE, switch	1

Item No.	Dia. Mkgs.	Part No.	Description	Quantity
<b>Figure 10-1. Main Assembly (Continued)</b>				
.. 44	.. PL2	.. 157 957	.. LIGHT, ind blu lens 28V snap mtg	1
.. 45	.. S3	.. 155 013	.. SWITCH, rocker SPST 10A 250VAC	1
.. 46			.. NAMEPLATE, (order by model and serial number)	1
.. 47	.. PL1	.. 157 958	.. LIGHT, ind wht lens 28V	1
.. 48		.. 155 422	.. PANEL, front	1
.. 49		.. 154 896	.. SWITCH, polarity (consisting of)	1
.. 50	.. S2	.. 154 899	.. SWITCH, polarity 4 position	1
.. 51	.. S4	.. 089 645	.. SWITCH, lim 11A 125V roller lever actr	1
.. 52		.. 155 406	.. BRACKET, mtg switch	1
		.. 059 712	.. CLIP, cmpnt .437dia mtg	1
		.. 648 489	.. CLAMP, nyl 1.000 clamp dia x .500 wide	1
		.. 600 317	.. CABLE, weld/cop strd No. 4 (order by ft)	15ft
		.. 604 872	.. LUG, univ w/clr+scr 125A	1
		.. 028 592	.. CONTACT, sta electrode holder	1
		.. 028 594	.. BODY, electrode holder	1
		.. 032 796	.. ROLLER, bearing needle .187dia x 1.250	1
		.. 028 591	.. CONTACT, mvbl electrode holder	1
		.. 025 475	.. SPRING, cprsn .490 OD x .090 wire	1
		.. 028 593	.. LEVER, clamp electrode holder	1
		.. 128 188	.. HOSE, gas (consisting of)	1
		.. 056 851	.. FITTING, hose brs barbed nipple 3/16tbg	2
		.. 010 606	.. FITTING, hose brs nut .625-18RH	2
		.. 056 108	.. FITTING, brs ferrule .425 ID x .718 lg	2
		.. 134 834	.. HOSE, SAE .187 ID x .410 OD (order by ft)	13ft
		.. 128 434	.. REGULATOR/FLOWMETER	1
		.. 134 460	.. CONNECTOR, twik insul male	1
		.. 155 552	.. CONNECTOR, twik insul male (consisting of)	1
		.. 159 169	.. O-RING, 7mm ID x 4mm thk	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.**



Item No.	Dia. Mkgs.	Part No.	Description	Quantity
<b>SR1                      Figure 10-2. Rectifier, Si Diode (Fig 10-2 Item 16)</b>				
1		154 849	BUS BAR, rectifier	2
2	C4, R3	156 327	CAPACITOR/RESISTOR	1
3		151 880	CAPACITOR	4
4		126 233	TUBING, fbr vulc .250 ID x .312 OD	4
5		602 195	WASHER, fbr .375 ID x .875 OD	4
6		154 695	RECTIFIER, straight polarity (consisting of)	1
7		119 607	DIODE, rect 35A 1000V RP	6
8		120 229	SPACER, nylon shldr .860 OD x .420 ID x .502 lg	2
9		154 696	RECTIFIER, reverse polarity (consisting of)	1
10		119 351	DIODE, rect 35A 1000V SP	6
11		120 229	SPACER, nylon shldr .860 OD x .420 ID x .502 lg	2



ST-154 848-B

**Figure 10-2. Rectifier, Si Diode**

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

## OPTIONS AND ACCESSORIES

### **CARRYING CART AND CYLINDER RACK**

**(#042 934)**

This cart adds convenience to the Econotig package. The power source mounts securely to the top, and a cylinder rack supports the argon cylinder. The bottom tray can hold electrode leads or welding hood, gloves, etc. Cylinder rack will accommodate 6 to 9 in. (152 to 228 mm) diameter, and 24 to 56 in. (610 to 1422 mm) high cylinders.

### **CASTER KIT**

**(#042 811)**

Allows Econotig to be moved short distances. Does **not** include gas cylinder rack.

### **REMOTE CONTROLS**

A fingertip control (mounted to the TIG torch) can be used instead of the supplied remote foot control. Useful when welding where a foot control cannot be used.

### **AMTV-14 REMOTE CONTACTOR AND CURRENT CONTROL**

**(#152 608)**

Linear motion fingertip control. Fastens to TIGtorch using two Velcro strips. Allows complete current and contactor control at operator's fingertips — a practical alternative to a foot control. Includes 28 ft. (8.5 m) control cord with 14-pin plug.

### **RCC-14 REMOTE CONTACTOR AND CURRENT CONTROL**

**(#151 086)**

Rotary motion fingertip control. Fastens to TIGtorch handle using two Velcro strips. Includes 28 ft. (8.5 m) cord and plug. Allows complete current and contactor control.

### **25 FT., 150 AMP TIG TORCH**

**(#116 108)**

MT-17-25-1 includes backcap.

*Note: Does not include flow-through International-style quick connect.*

### **FLOW-THROUGH INTERNATIONAL-STYLE QUICK CONNECT**

**(#042 964)**

Econotig package includes one flow-through International-style quick connect.

### **TAK-1 TIG ACCESSORY KIT**

**(#129 585)**

.40, 1/16, and 3/32 in. (10.2, 1.6, and 2.4 mm) for MT-17 torch. Kit includes one backcap and three each of the following: collet, collet body, alumina cup, and 2% thoriated tungsten pieces.

### **AMPERAGE REDUCTION KIT**

**(#042 942 Field only)**

Used to reduce the output amperage of the power source to compensate for higher than normal input voltage or when lower welding amperage is required.