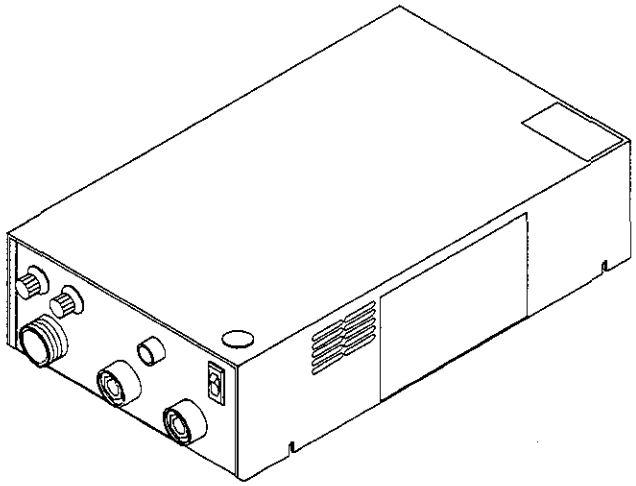
Miller®

August 1993 Form: OM-625E

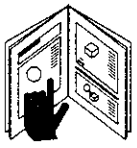
Effective With Serial No. KD461760

OWNER'S MANUAL

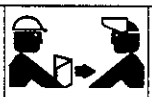


Snap Start™

- Portable High Frequency Arc Starter
- For GTAW Welding With DC Output Welding Power Source
- Operates On 115 Or 230 VAC 50/60 Hz
- Provides Variable Shielding Gas Preflow And Postflow
- 14-Pin Remote Control Receptacle



- 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

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.)
   - 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.

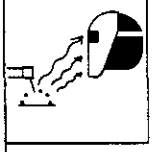
In welding, as in most jobs, exposure to certain hazards occurs. Welding is safe when precautions are taken. The safety information given below is only a summary of the more complete safety information that will be found in the Safety Standards listed on the next page. Read and follow all Safety Standards.

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.

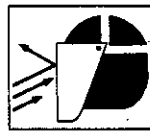
Welding produces fumes and gases. Breathing these fumes and gases can be hazardous to your health.

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.

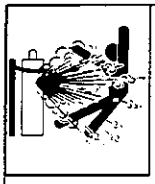
1. Protect yourself and others from flying sparks and hot metal.
2. Do not weld where flying sparks can strike flammable material.
3. Remove all flammables within 35 ft (10.7 m) of the welding arc. If this is not possible, tightly cover them with approved covers.
4. Be alert that welding sparks and hot 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.



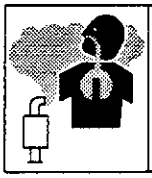
CYLINDERS can explode if damaged.

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.

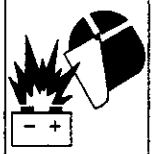
Engine fuel is highly flammable.

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.

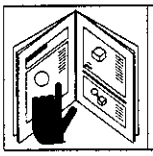
Safe Practices For Occupation And Educational Eye And Face Protection, ANSI Standard Z87.1, from American National Standards Institute, 1430 Broadway, New York, NY 10018.

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

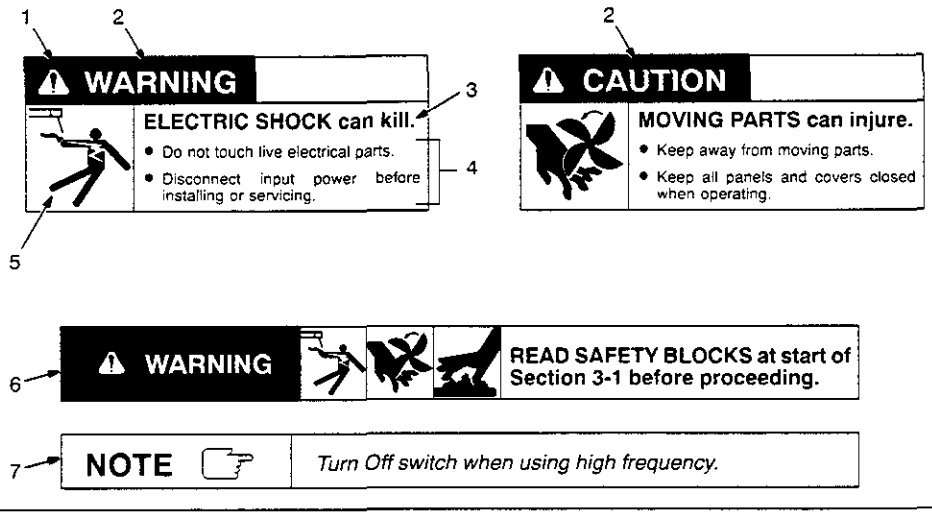
TABLE OF CONTENTS

SECTION 1 – SAFETY INFORMATION

mod1.1 2/93



- 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

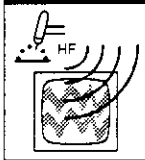
SECTION 2 – SPECIFICATIONS

Table 2-1. High-Frequency Unit

Specification	Description
Welding Process	Gas Tungsten Arc Welding (GTAW)
Welding Circuit Rating	175 Amperes At 100% Duty Cycle
Type Of Input Power	When Used With 115 Volts: 115 Volts AC Single-Phase 50/60 Hz, 0.5 Amperes When Used With 230 Volts: 230 Volts AC Single-Phase 50/60 Hz, 0.3 Amperes
Overall Dimensions	Height: 4-1/4 in (108 mm); Width: 9-3/4 in (248 mm); Length: 16-1/2 in (419 mm)
Weight	Net: 20 lb (9.1 kg); Ship: 21 lb (9.5 kg)

SECTION 3 – INSTALLATION

⚠ 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.
- Read and follow entire Section 7 for proper location and installation requirements for high-frequency equipment before installing unit.

swarn13.1 4/93

3-1. Typical Process Connections

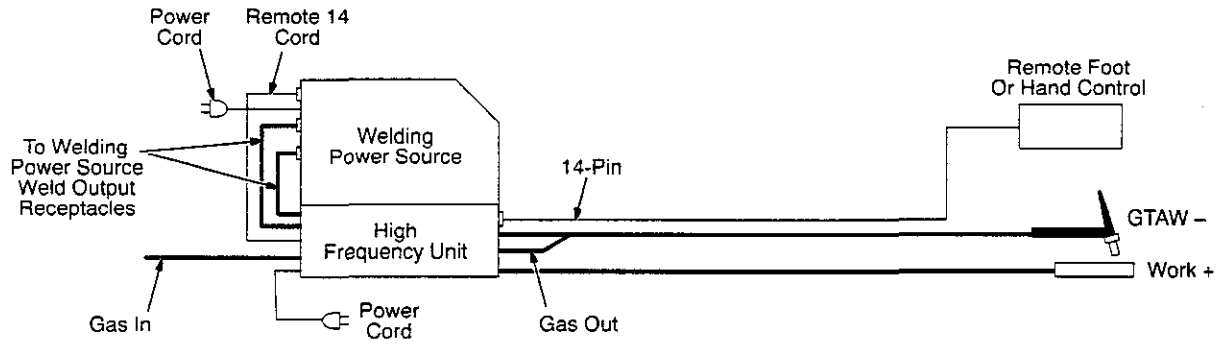
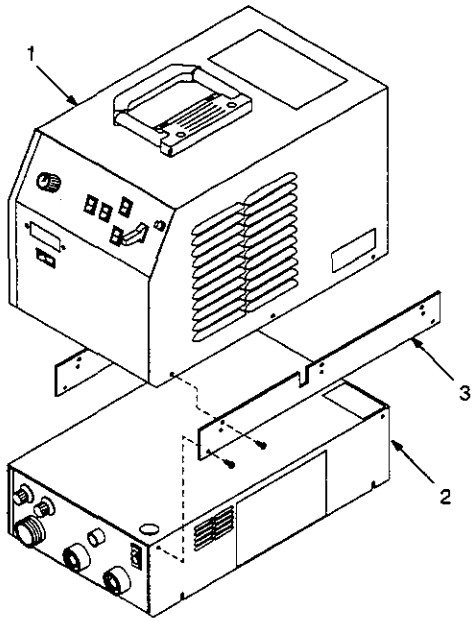


Figure 3-1. Typical Process Connections

3-2. Installing Mounting Brackets (Optional)

NOTE ☞

The supplied mounting brackets allow the high-frequency unit to be mounted under a Maxstar welding power source. If connecting to the Maxstar for input power, make input power connections according to Section 3-7C before installing mounting brackets.



1 Maxstar Welding Power Source

Position on top of high-frequency unit.

Remove screws from lower edge of wrapper on both sides of Maxstar.

2 High-Frequency Unit

Remove screws from upper edge of wrapper on both sides of high-frequency unit.

3 Notched Mounting Bracket

Position notched bracket on right side of units so holes align and reinstall screws.

Position remaining bracket on left side of units and install with remaining screws.

Tools Needed:

1/4, 516 in

ST-800 295-A

Figure 3-2. Installing Mounting Brackets

3-3. Installing Gas Supply

⚠ WARNING

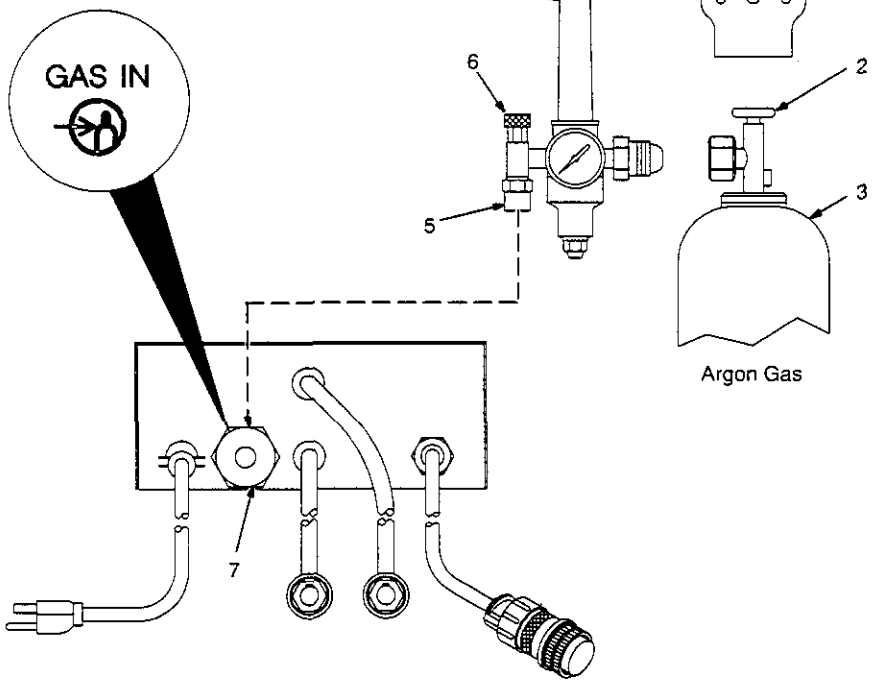
CYLINDERS can explode if damaged.

- Keep cylinders away from welding and other electrical circuits.
- Never touch cylinder with welding electrode.
- Always secure cylinder to running gear, wall, or other stationary support.

BUILDUP OF SHIELDING GAS can harm health or kill.

- Shut off shielding gas supply when not in use.

warn4.1 9/91



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/Flowmeter

Install so face is vertical.

5 Gas Hose Connection

Fitting has 5/8-18 right-hand threads.

6 Flow Adjust

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

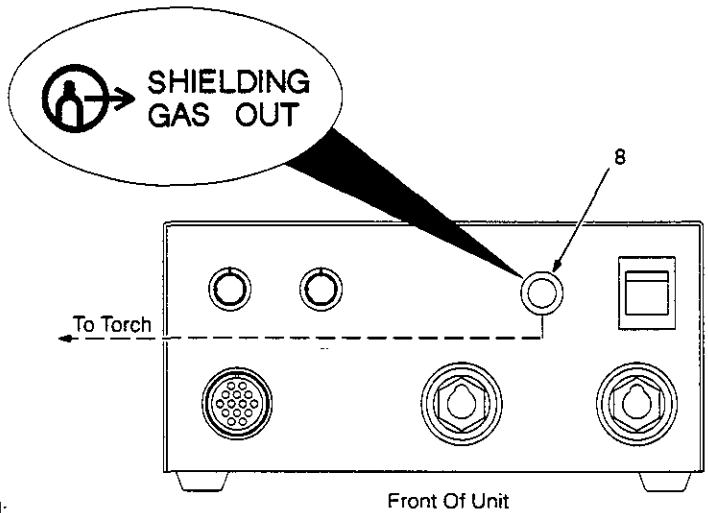
7 Gas In Fitting

8 Gas Out Fitting

The Gas In and Gas Out fittings have 5/8-18 right-hand threads. Obtain proper size, type, and length hose and make connections as follows:

Connect hose from shielding gas supply regulator/flowmeter to Gas In fitting.

Connect shielding gas hose from torch to Gas Out fitting.



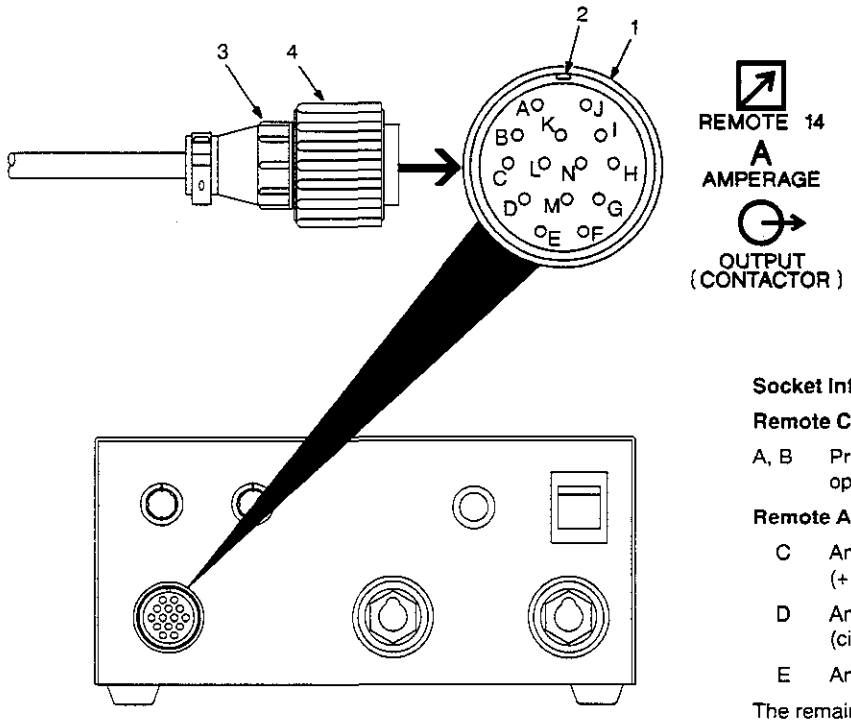
Tools Needed:

5/8, 1-1/8 in

ssb3.3* 6/93 – Ref. ST-158 697-A / Ref. ST-158 511 / Ref. ST-135 671 / ST-800 293 / SA-132 499-A

Figure 3-3. Shielding Gas Connections

3-4. Remote 14 Receptacle Information And Connections



1 Remote 14 Receptacle RC3

2 Keyway

3 Plug

4 Threaded Collar

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

Socket Information:

Remote Contactor Control

A, B Provides contact closure for Output (Contactor) operation.

Remote Amperage/Voltage Control

C Amperage control connection – maximum side (+10 volts dc)

D Amperage control connection – minimum side (circuit common).

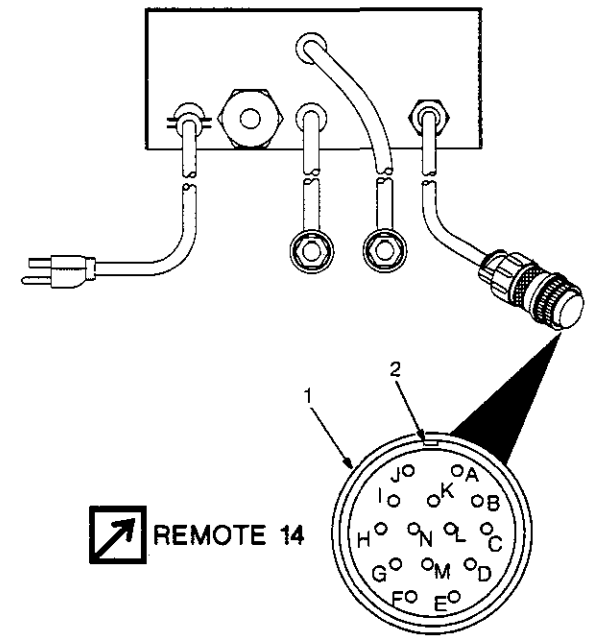
E Amperage control connection – wiper contact.

The remaining sockets are not used.

sb7.1* 8/92 – ST-800 293 / SC-158 511 / Ref. S-0004-A / S-0750

Figure 3-4. Remote 14 Receptacle Connections

3-5. Remote 14 Plug Information And Connections



1 Remote 14 Plug PLG3

2 Keyway

To connect plug to a Remote 14 receptacle on the welding power source, align keyway, insert plug, and tighten threaded collar.

Pin Information:

Remote Contactor Control

A, B Provides contact closure for Output (Contactor) operation.

Remote Amperage/Voltage Control

C Amperage control connection – maximum side

D Amperage control connection – minimum side (circuit common).

E Amperage control connection – wiper contact.

The remaining pins are not used.

sb7.1* 8/92 – SA-132 499-A / SC-135 671 / Ref. S-0004-A

Figure 3-5. Remote 14 Plug Connections

3-6. Connecting To Weld Input And Output Receptacles

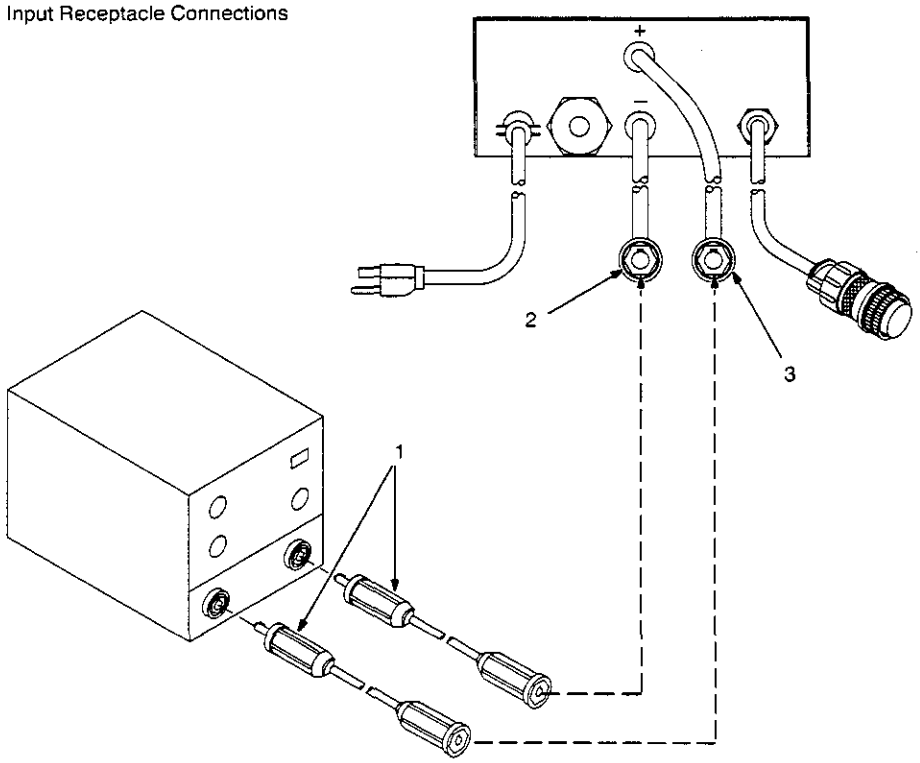
⚠ WARNING

ELECTRIC SHOCK can kill.

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

swarn12.1* 2/92

Input Receptacle Connections



1 Weld Input Extension Cables

Needed when HF unit is used with welding power source other than a Maxstar. If connecting to a Maxstar, make connections directly to weld output receptacles (see Figure 3-1).

2 Negative (–) Input Plug

Connect negative (–) input plug to negative (–) weld output receptacle on welding power source.

3 Positive (+) Input Plug

Connect positive (+) input plug to positive (+) weld output receptacle on welding power source.

GTAW DC Electrode Negative/ Straight Polarity (DCEN)

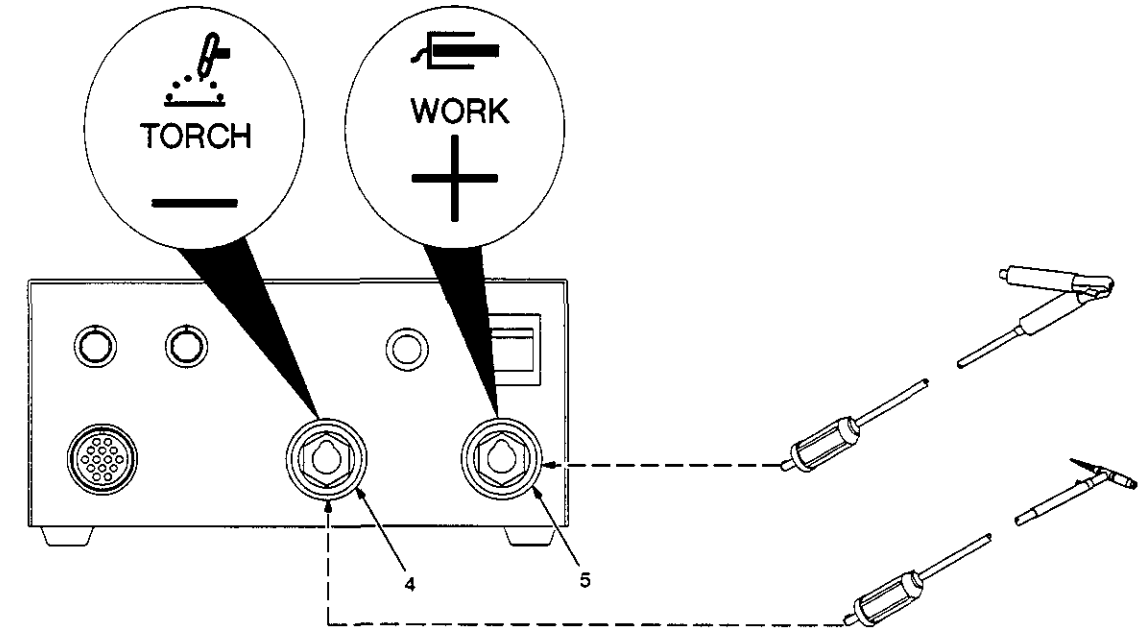
4 Torch (–) Receptacle

Connect torch cable.

5 Work (+) Receptacle

Connect one end of work cable, connect remaining end to workpiece.

Output Receptacle Connections

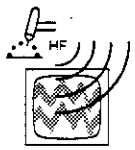


S-0841 / SA-132 499-A / ST-800 293 / Ref. SC-158 511

Figure 3-6. Weld Input And Output Receptacle Connections

3-7. Connecting Input Power

⚠ WARNING



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

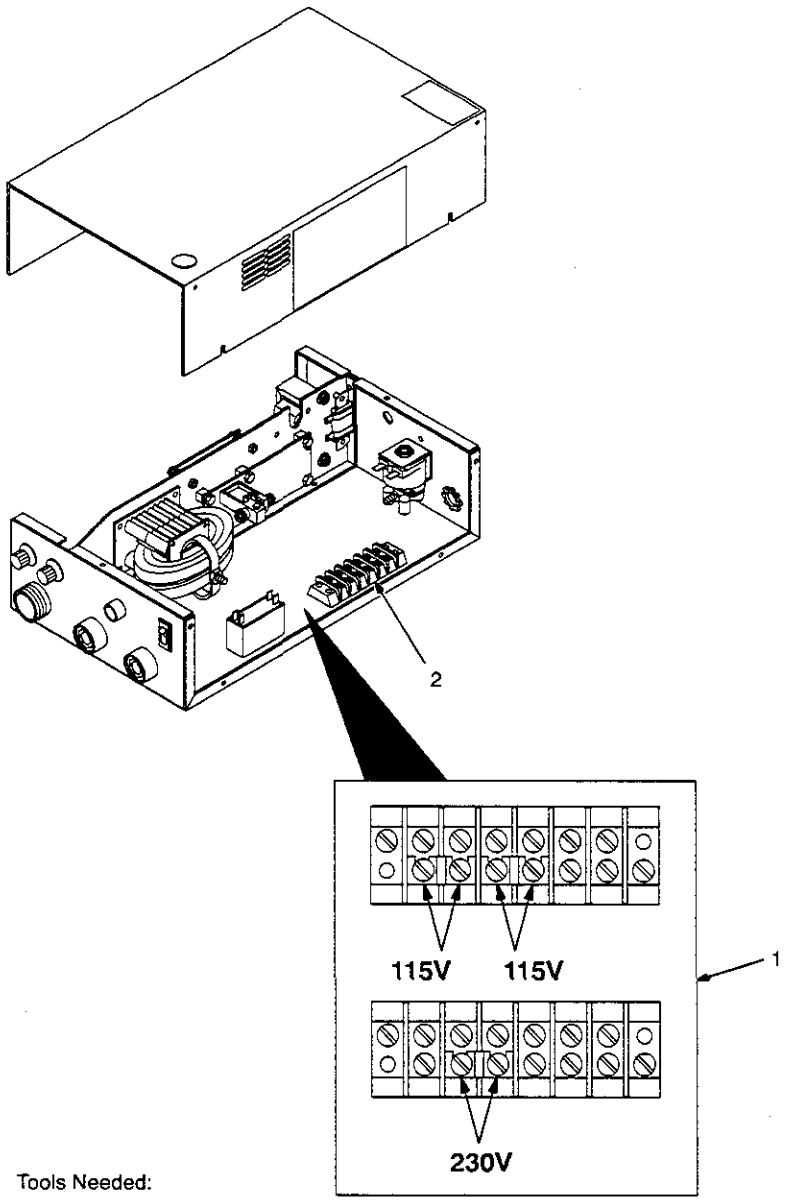
- Have only qualified person familiar with electronic equipment perform this installation.
- Read and follow entire Section 7 for proper location and installation requirements for high-frequency equipment before installing unit.

ELECTRIC SHOCK can kill.

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

swarn13.2* 4/93

A. Positioning Jumper Links



Jumper links allow operation on different input voltages and are factory set for 115 VAC.

Necessary input power can be obtained from a suitable 115 VAC receptacle, or by making internal connections to a Maxstar 91 for 115 VAC, or to a Maxstar 152 for 230 VAC. Internal connections cannot be made to a Maxstar 175 for input power.

Determine desired input power connections.

Remove wrapper.

1 Input Voltage Label

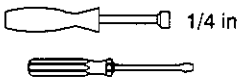
Look at jumper links and compare link position with unit label.

2 Input Voltage Jumper Links

Move links to match input voltage. For example, use 115 volts position when 115 VAC power cord is being used.

If using 115 VAC input power cord, reinstall wrapper. If making internal input power connections to a Maxstar welding power source, go on to Figure 3-9.

Tools Needed:



ssb5.1* 2/92 – Ref. ST-800 294-A / Ref. S-135 669

Figure 3-7. Input Voltage Jumper Links Location

B. 115 VAC Input Power Cord Connections

⚠ WARNING

ELECTRIC SHOCK can kill; DIRECT CURRENT (DC) will damage HF unit.

- Do not touch live electrical parts.
- Have only qualified persons install unit.
- Connect unit only to alternating current (AC) supply.
- Do not cut off ground terminal from plug.
- Installation must meet National Electrical Code and all other codes.

BLOCKED AIRFLOW causes overheating and possible damage to unit.

- Do not block or filter airflow.

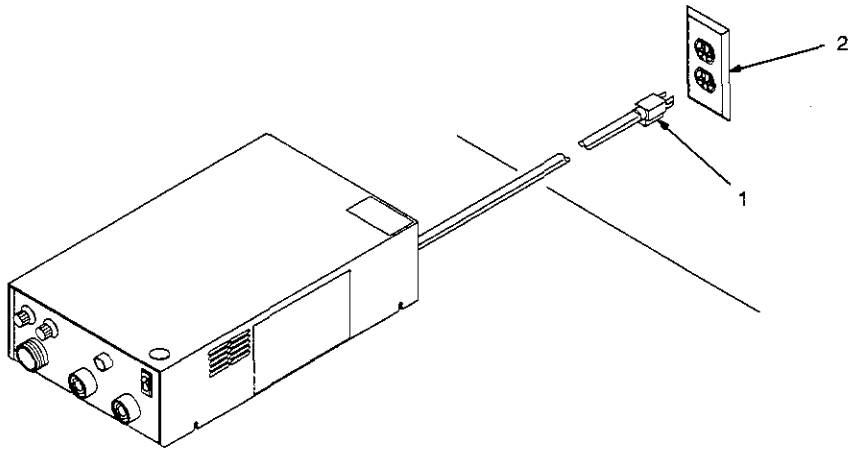
Warranty is void if any type of filter is used.

warn3.1* 9/91

1 115 VAC Cord/Plug

2 115 VAC Grounded Receptacle

See Table 2-1 for type of input power required. Connect input power plug to proper 115 VAC receptacle.



ST-800 297-A

Figure 3-8. 115 VAC Input Power Cord Connections

C. Power Connections To A Maxstar 91 Or 152 Welding Power Source

⚠ WARNING

ELECTRIC SHOCK from unused power cord can kill.

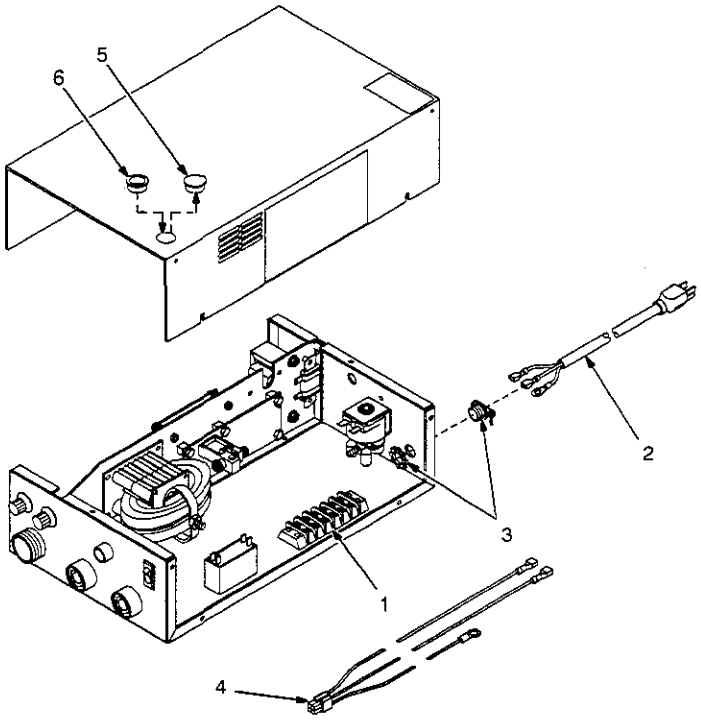
- If using internal source of power, disconnect and remove power cord and install supplied blank into hole.

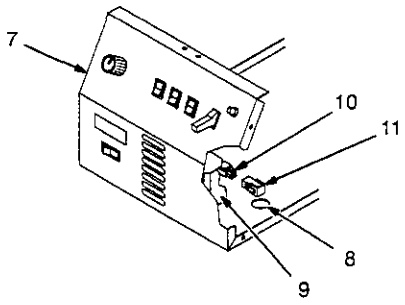
NOTE ☞

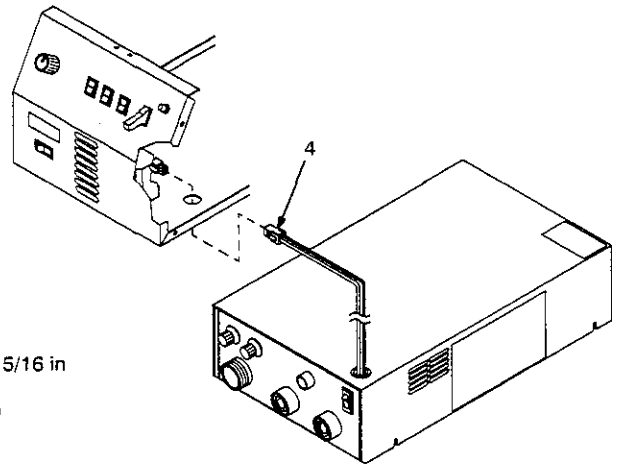
Making internal connections to the Maxstar 91 provides 115 VAC input power. Making internal connections to the Maxstar 152 provides 230 VAC input power. Be sure jumper links in high-frequency unit are installed for correct input power according to Figure 3-7 when making internal power connections to a Maxstar welding power source.

Internal connections cannot be made to a Maxstar 175 for input power.

Parts needed for this procedure are supplied with the high-frequency unit.







Tools Needed:

1/4, 5/16 in

11/32 in

Remove wrapper from high-frequency unit.

1 Terminal Strip TE1

2 115 VAC Input Power Cord

Disconnect 115 VAC input power cord leads from TE1. Remove power cord ground connection from ground terminal on rear of case.

3 Strain Relief Connector

Remove power cord and matching strain relief connector from rear panel.

Install supplied snap-in blank into power cord hole.

4 Receptacle RC11

Locate supplied RC11 with leads attached. Connect lead 16 to terminal F on TE1. Connect lead 17 to terminal E. Connect lead 42 to ground terminal on case bottom below Work (+) weld output terminal.

5 Snap-In Blank

6 Bushing

Remove blank and install bushing into hole.

Reinstall wrapper onto high-frequency unit, routing RC11 through installed bushing.

7 Welding Power Source (Maxstar 91 Shown)

Remove wrapper.

8 Snap-In Blank

Remove blank and install supplied bushing into hole.

9 Control Relay CR1

10 Plug PLG11

PLG11 is secured in a lead bundle near control relay CR1. It may be necessary to remove cable tie to access PLG11.

11 Protective Blank

Remove blank from PLG11.

Position welding power source above high-frequency unit, and route RC11 through bushing in welding power source case bottom.

Connect plug PLG11 to receptacle RC11. Use cable ties to secure leads to lead bundle in welding power source so leads are away from fan blade.

Reinstall welding power source wrapper.

Install mounting brackets according to Section 3-2.

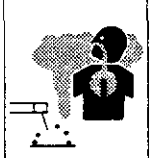
ST-800 294-A / SB-146 578-C

Figure 3-9. Power Connections To A Maxstar Welding Power Source

⚠ 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.

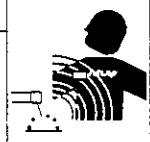
- Do not weld near flammable material.
- Watch for fire; keep extinguisher nearby.
- Do not locate unit over combustible surfaces.
- Do not weld on closed containers.
- Allow work and equipment to cool before handling.

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.

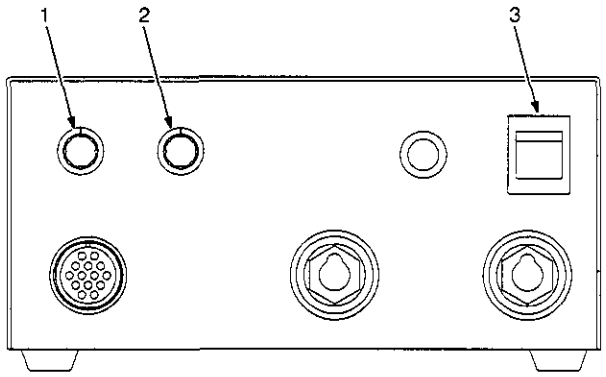


MAGNETIC FIELDS FROM HIGH CURRENTS can affect pacemaker operation.

- 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.

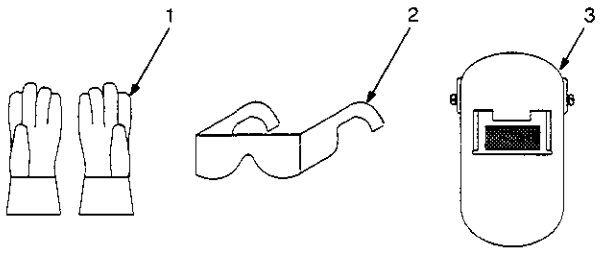
swam6.1 10/91



1 Preflow Time Control
2 Postflow Time Control
3 Power And HF On/Off Switch

ST-800 293

Figure 4-1. Controls



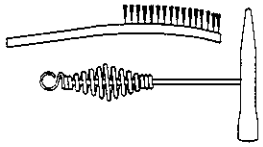
1 Insulating Gloves
2 Safety Glasses With Side Shields
3 Welding Helmet

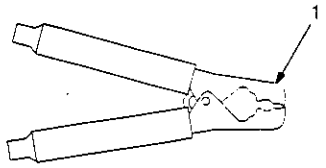
Wear dry insulating gloves, safety glasses with side shields, and a welding helmet with a correct shade of filter (see ANSI Z49.1).

sb3.1 10/91

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

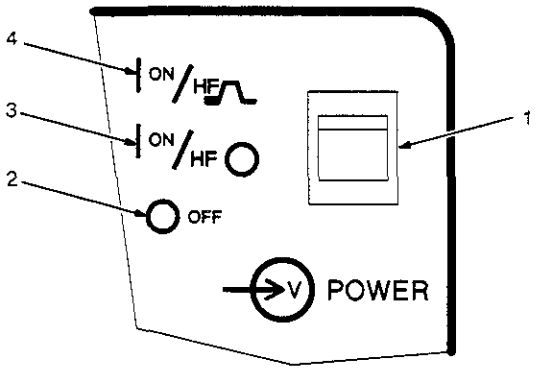
Figure 4-3. Work Clamp

⚠ WARNING

USING HIGH FREQUENCY WITH THE SHIELDED METAL ARC WELDING PROCESS can result in serious personal injury.

- Disconnect high-frequency unit from welding power source before doing the Shielded Metal Arc Welding (SMAW) process.

NOTE ☞ *High-frequency intensity is factory set and cannot be adjusted by user.*



1 Power And HF On/Off Switch

2 Power Off

Turns unit Off.

3 Power On/HF Off

Turns unit On with no high frequency (HF). Gas flow controls are functional.

Use for scratch start GTAW or if Touch Start feature on welding power source is used.

4 Power On/HF On

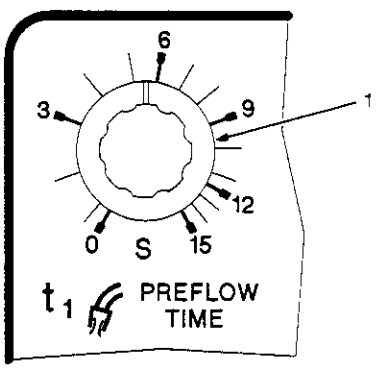
Turns unit On with HF for arc starting only. Gas controls are functional.

HF is available when the weld output contactor is energized and an open-circuit voltage of 50 volts or greater is present. HF stops when an arc is established.

If an arc is not established within 35 seconds of closing the remote output (contactor) device, the HF circuitry deactivates, and HF is no longer available. To make HF available again, open the remote device and then close it. HF will again be available for 35 seconds.

Ref. SC-158 511

Figure 4-4. Power And HF On/Off Switch

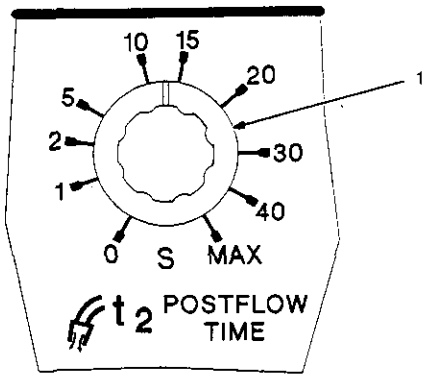


1 Preflow Time Control

Use control to adjust the time that gas flows before the welding arc is started.

The scale around control is marked in seconds.

Figure 4-5. Preflow Time Control



1 Postflow Time Control

Use control to adjust the time that gas flows after the welding arc stops.

The scale around control is marked in seconds.

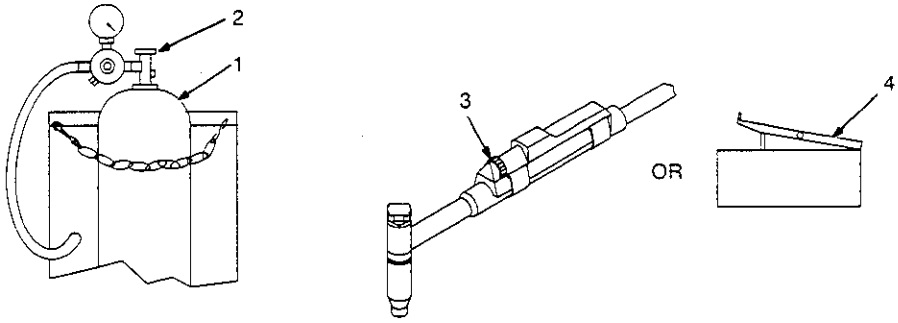
Figure 4-6. Postflow Time Control

⚠ WARNING

BUILDUP OF SHIELDING GAS can harm health or kill.

- Shut off shielding gas supply when not in use.

warn1.1 9/91



1 Shielding Gas Cylinder

2 Valve

3 Hand Control

4 Foot Control

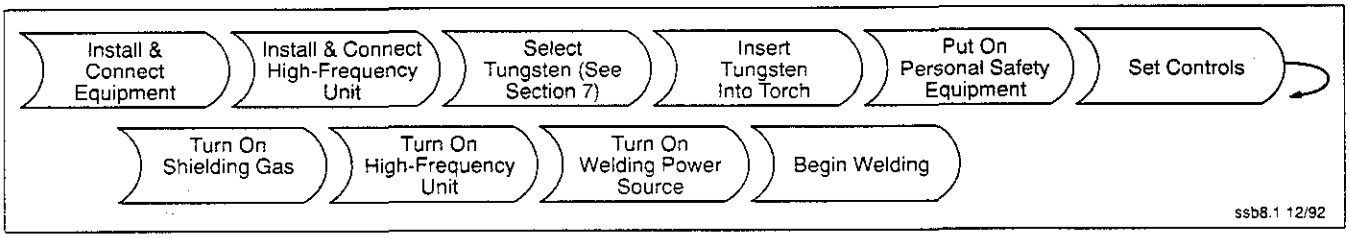
Open valve on cylinder just before welding.

Hand control or foot control turns weld output and gas flow on and off.

Close valve on cylinder when finished welding.

sb5.2* 2/92 – Ref. S-0621-C / Ref. ST-159 059

Figure 4-7. Shielding Gas



ssb8.1 12/92

Figure 4-8. Sequence Of Gas Tungsten Arc Welding (GTAW)

SECTION 5 – MAINTENANCE & TROUBLESHOOTING

⚠ WARNING

ELECTRIC SHOCK can kill.

- Do not touch live electrical parts.
- Turn Off HF unit and 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.

Maintenance to be performed only by qualified persons.

swarm8.1* 2/93

5-1. Routine Maintenance

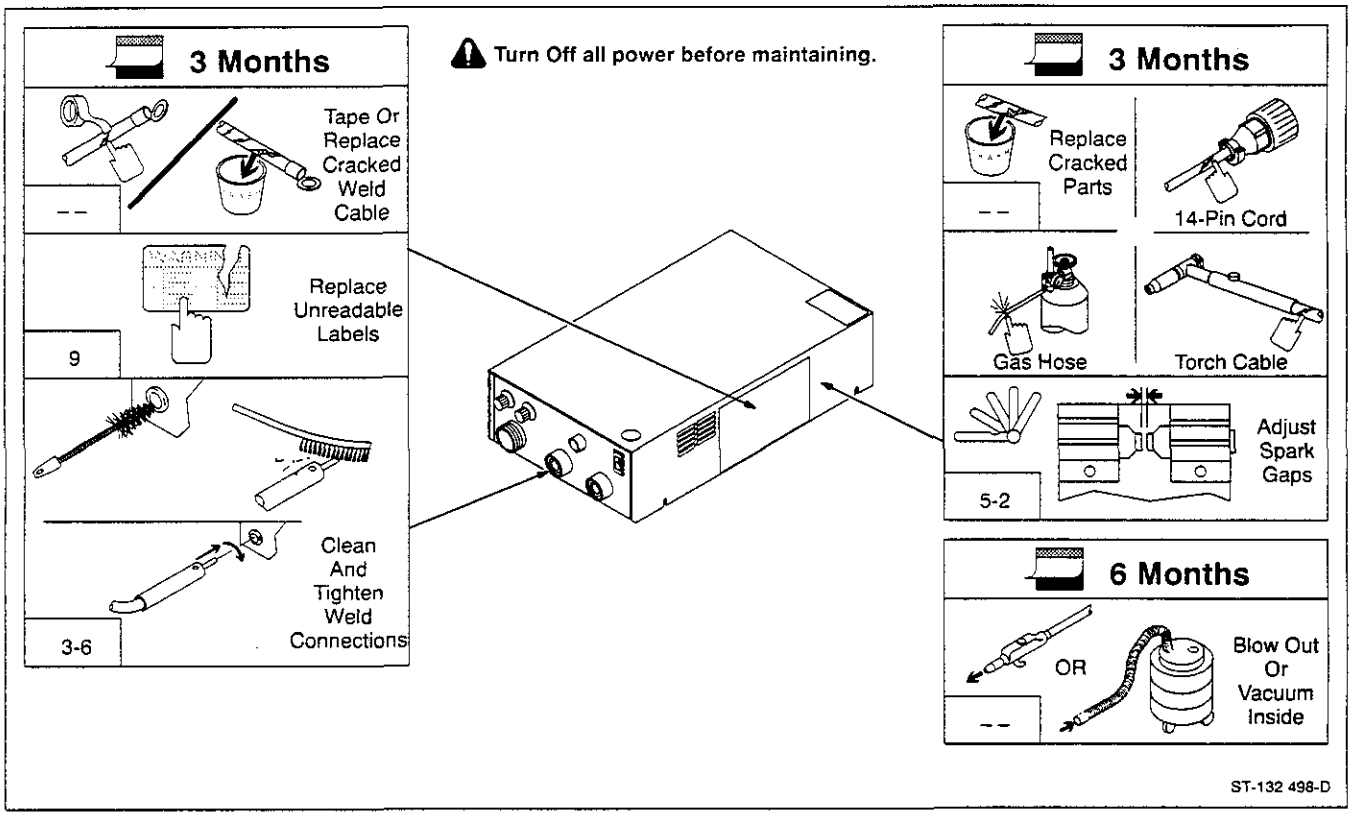
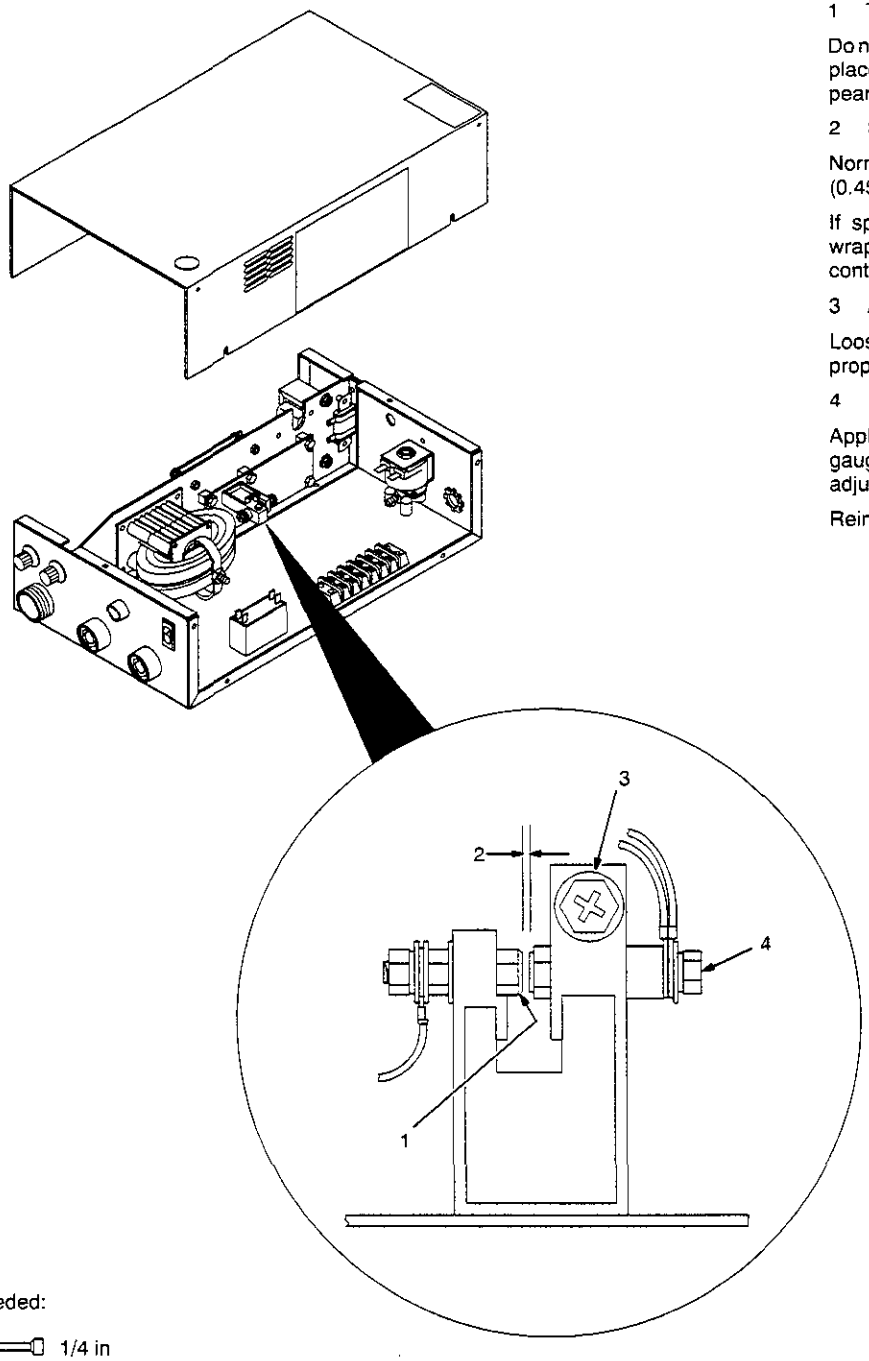


Figure 5-1. Maintenance Schedule

5-2. Adjusting Spark Gaps

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



Turn Off unit and welding power source and disconnect input power.

Remove wrapper.

1 Tungsten End Of Point

Do not clean or dress tungsten. Replace point if tungsten end disappears.

2 Spark Gap

Normal spark gap is 0.018 in. (0.457 mm).

If spark gaps are okay, reinstall wrapper. If adjustment is needed, continue as follows:

3 Adjustment Screw

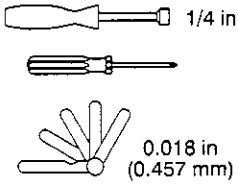
Loosen screw. Place gauge of proper thickness in spark gap.

4 Pressure Point

Apply slight pressure at point until gauge is held firmly in gap. Tighten adjustment screw.

Reinstall wrapper.

Tools Needed:



Ref. ST-800 294-A / S-0658

Figure 5-2. Adjusting Spark Gap

5-3. Troubleshooting

⚠ WARNING

ELECTRIC SHOCK can kill.

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

HOT PARTS can cause severe burns.

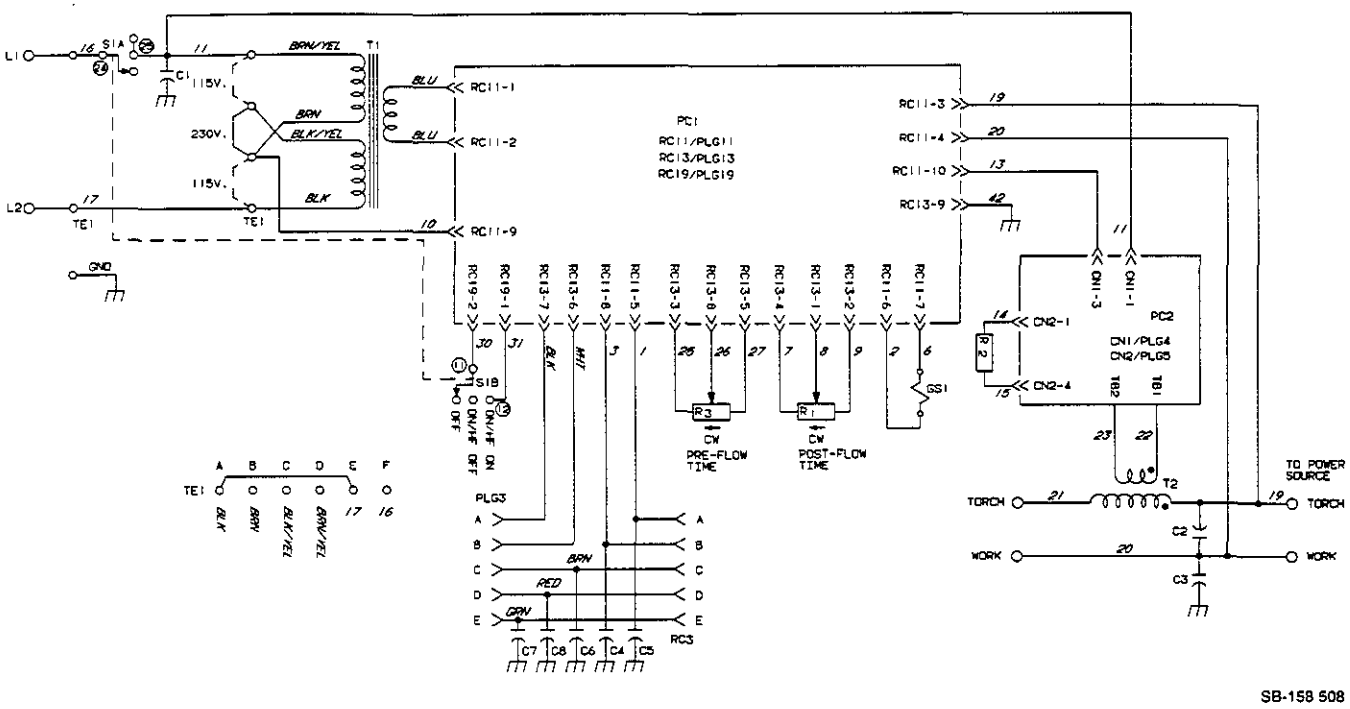
- Allow cooling period before servicing.

Troubleshooting to be performed only by qualified persons.

swam9.1* 2/93

Table 5-1. HF Unit Trouble

Trouble	Remedy	Section
Unit completely inoperative.	Secure input power cord plug in receptacle.	3-7B
	Place Power switch in a Power On position.	Figure 4-4
	Check for proper input power connections.	3-7
Lack of high-frequency; difficulty in establishing an arc.	Place Power and HF On/Off switch in the correct position.	Figure 4-4
	Be sure torch cable is not close to any grounded metal.	7
	Check cables and torch for cracked insulation or bad connections. Repair or replace necessary parts.	--
	Select proper size tungsten.	8-1
	Check spark gaps and adjust if necessary.	5-2
Wandering arc – poor control of direction of arc.	Reduce gas flow rate.	3-3
	Select proper size tungsten.	8-1
	Properly prepare tungsten.	8-2
Tungsten electrode oxidizing and not remaining bright after conclusion of weld.	Shield weld zone of drafts.	--
	Increase postflow time.	Figure 4-6
	Check and tighten all gas fittings	3-3
	Properly prepare tungsten.	8-2
	Replace torch parts if water has leaked into torch.	--



SB-158 508

Figure 6-1. Circuit Diagram

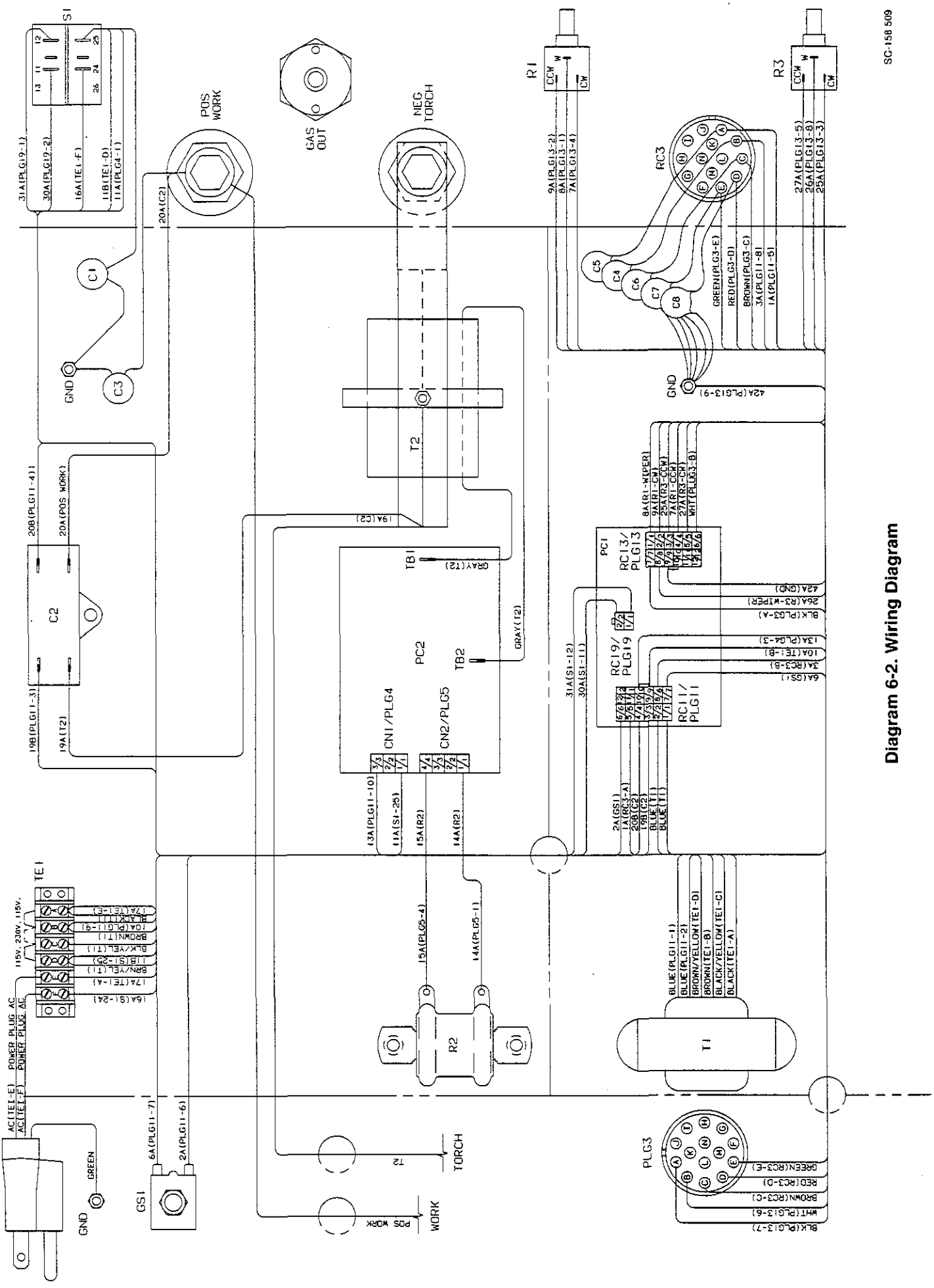
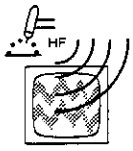


Diagram 6-2. Wiring Diagram

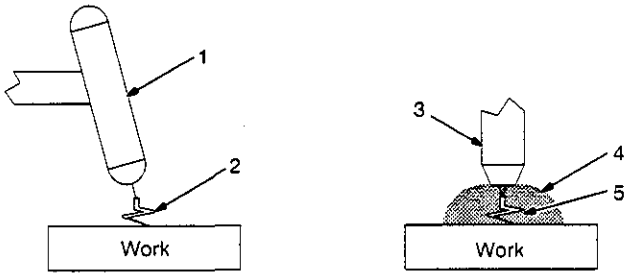
SECTION 7 – HIGH FREQUENCY

⚠ 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

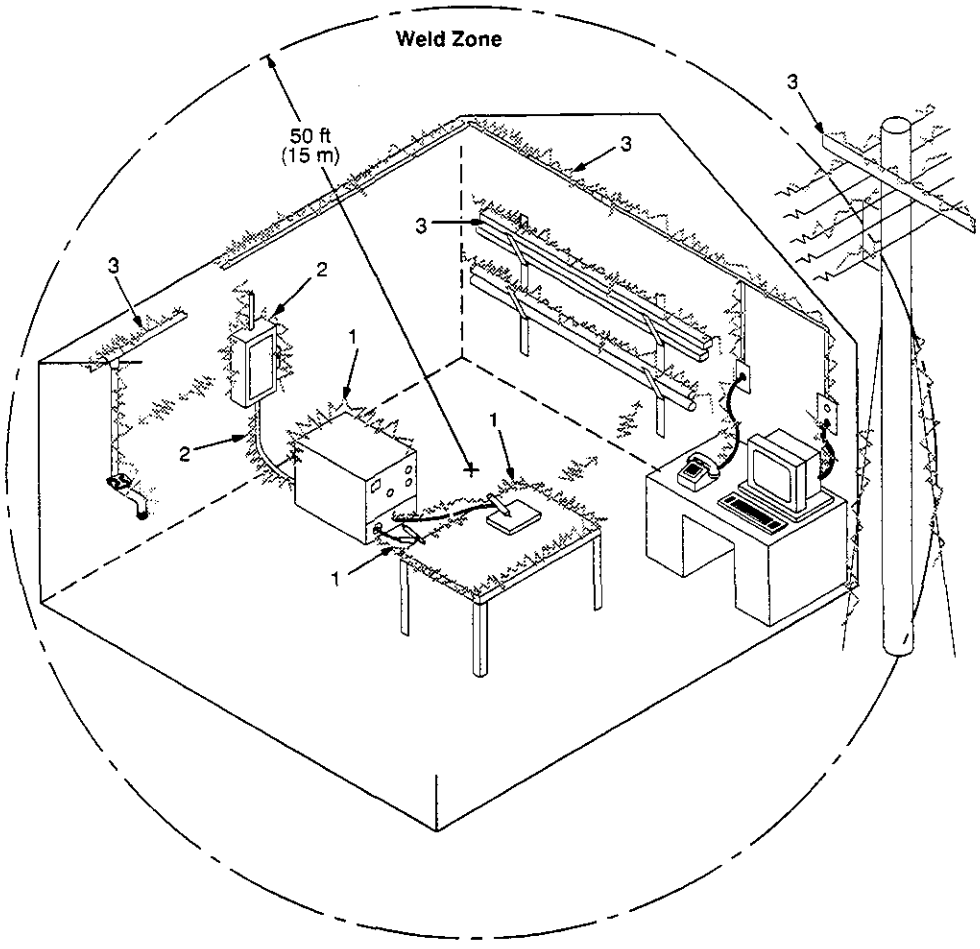
4 Flux

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

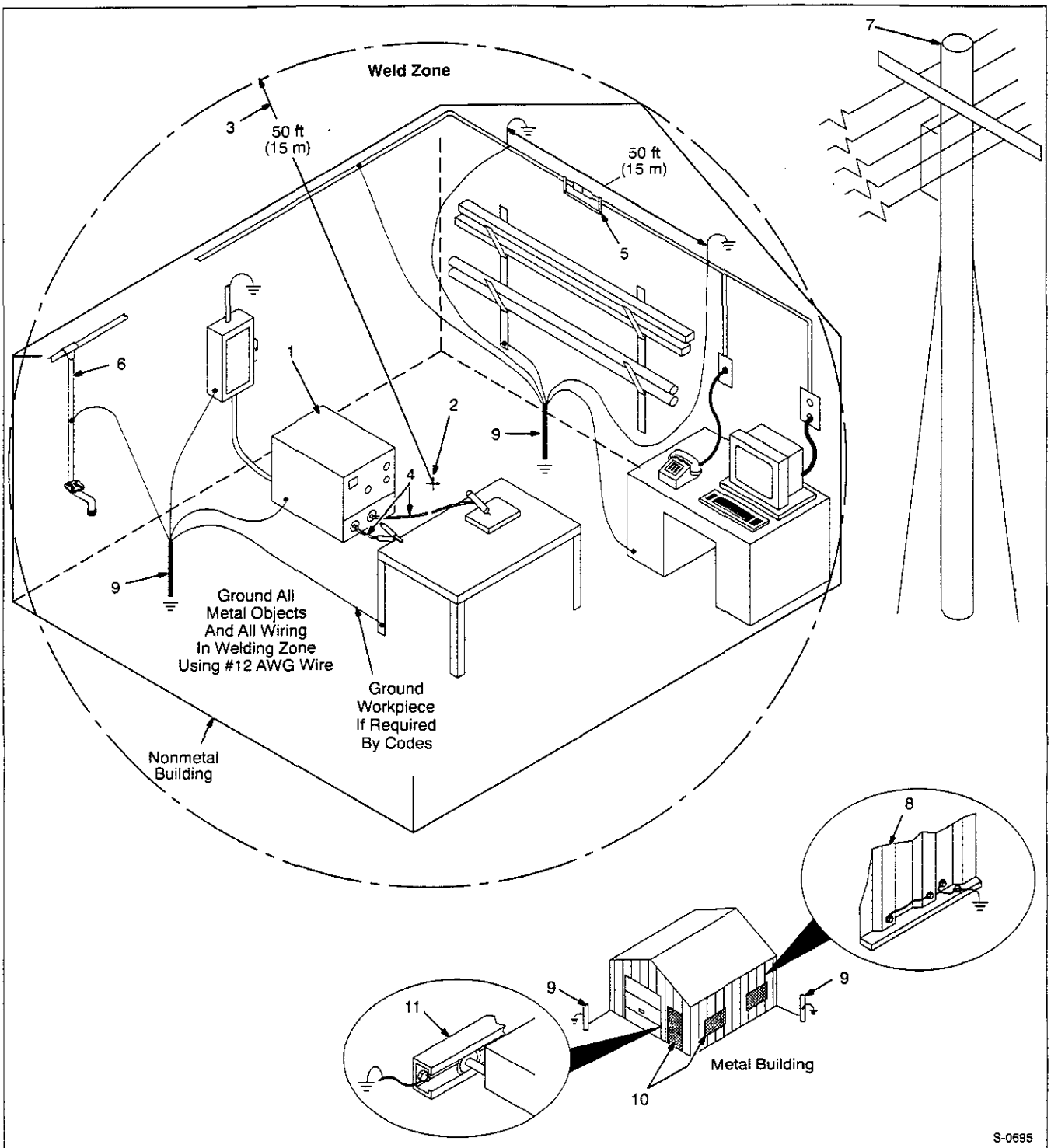
Input power cable, line disconnect switch, and input supply wiring.

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



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 – TUNGSTEN ELECTRODE

mod2.1 3/93

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.
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

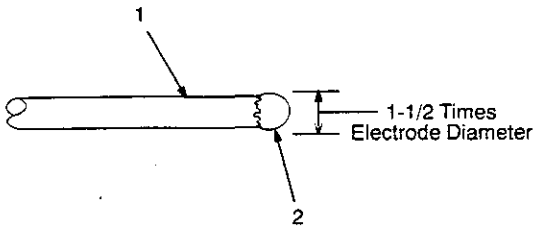
◆Typical argon shielding gas flow rates are 15 to 35 cfh (cubic feet per hour).

*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

8-2. Preparing Tungsten



1 Tungsten Electrode

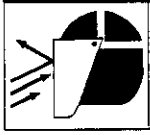
2 Balled End

Ball end of tungsten before welding by applying either an ac amperage slightly higher than what is recommended for a given electrode diameter (see Table 8-1), or a dc electrode positive amperage.

Ref. S-0161

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

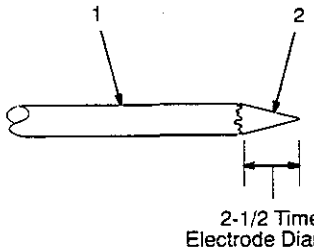
⚠ CAUTION



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.

warn2.1 9/91

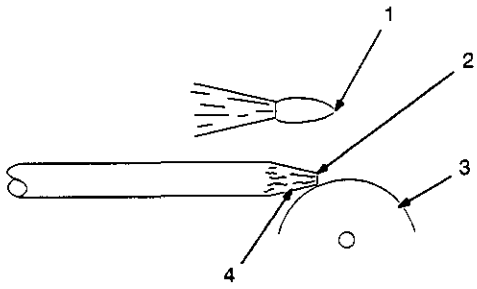


1 Tungsten Electrode

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

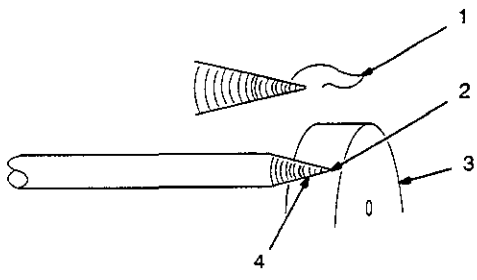
2 Flat

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

NOTES

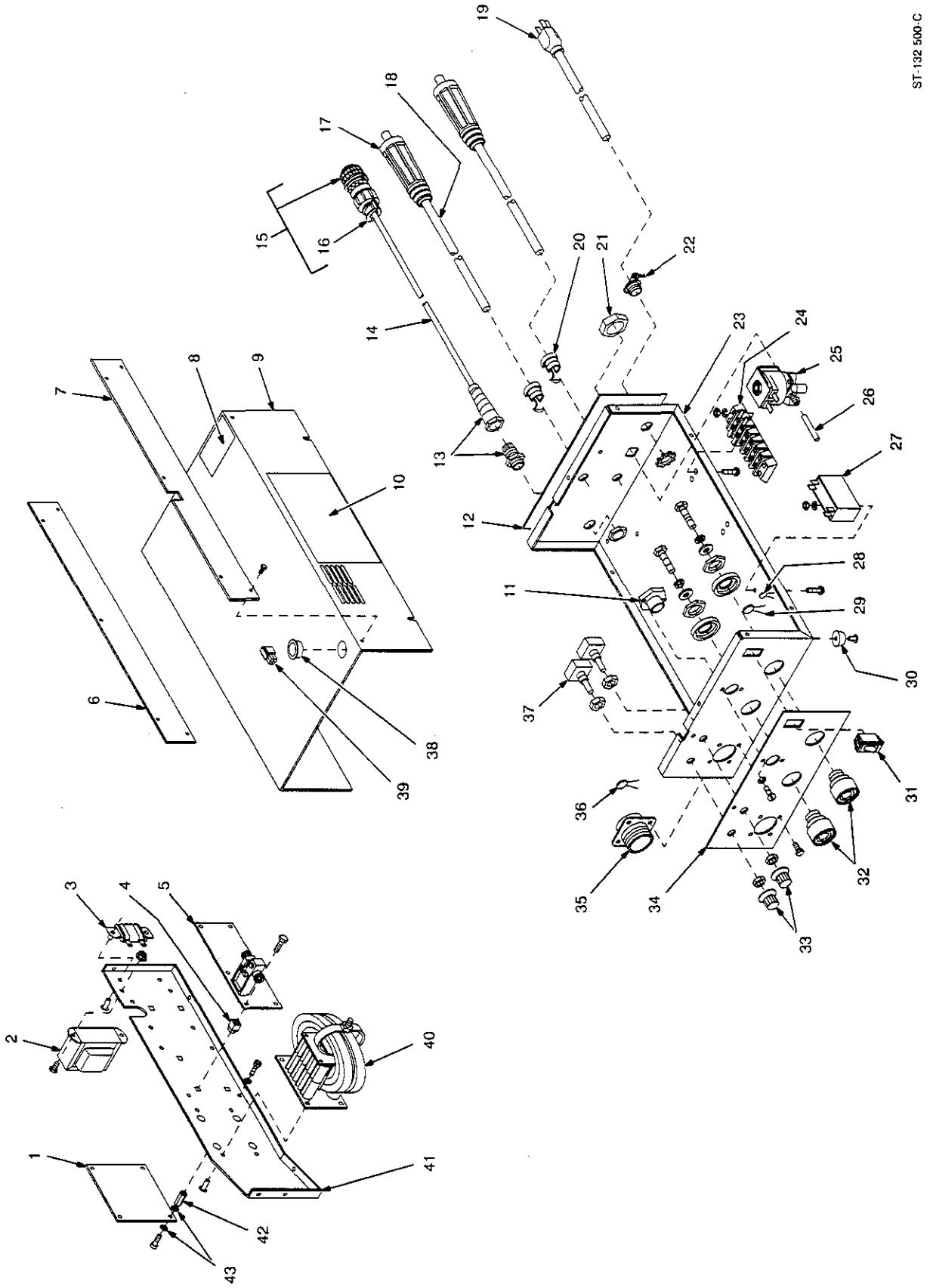


Figure 9-1. Main Assembly

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

Figure 9-1. Main Assembly

1	PC1	163 784	CIRCUIT CARD,HF preflow/postflow	1
	PLG11,13	130 203	HOUSING PLUG & SOCKETS, (consisting of)	2
		113 746	TERMINAL, female 1skt 24-18 wire	12
	PLG19	131 054	HOUSING RECEPTACLE & SOCKETS, (consisting of)	1
		113 746	TERMINAL, female 1skt 24-18 wire	2
2	T1	136 926	TRANSFORMER, control	1
3	R2	136 076	RESISTOR, WW fxd 30W 200 ohm	1
4		083 147	GROMMET, scr No. 8/10 panel hole .312sq .500 high	5
5	PC2	162 493	CIRCUIT CARD, arc starter	1
	PLG4	128 336	HOUSING, term plug nyl 3cont 1 row	1
		125 748	TERMINAL, contact box shaped leaf 22-18 wire	3
	PLG5	146 099	HOUSING PLUG & SOCKETS, (consisting of)	1
		125 748	TERMINAL, contact box shaped leaf 22-18 wire	4
6		131 804	BRACKET, mtg LH	1
7		131 803	BRACKET, mtg RH	1
8		085 220	LABEL, caution electric circuit	1
9		+ 135 834	WRAPPER	1
10		134 327	LABEL, warning general precautionary	1
11		120 854	FITTING, gas	1
12			PLATE, ident (order by model and serial number)	1
13		123 531	STRAIN RELIEF, cable flexible .231-.394 cable	1
14		052 246	CABLE, pwr No. 20ga 5/c (order by ft)	4ft
15	PLG3	141 162	HOUSING PLUG & PINS, (consisting of)	1
		134 731	TERMINAL, male 1 pin 18-14 wire	14
16		143 922	CLAMP, cable strain relief sz 17 & 20	1
17		042 418	CONNECTOR KIT, Dinse male 50 series	2
18		600 318	CABLE, weld cop strd No. 3 (order by ft)	6ft
19		136 080	CABLE, pwr 10ft 16ga 3/c	1
20		010 325	BUSHING, strain relief .840 ID x .875mtg hole	2
21		605 227	NUT, nyl hex jam .750NPST	1
22		115 104	CONNECTOR, clamp cable .500	1
23		158 507	CASE SECTION, front/bottom/rear	1
24	TE1	038 772	BLOCK, term 20A 6P	1
		120 561	CONNECTOR, blk 20A	2
		601 219	LINK, jumper term blk 20A	2
25	GS1	125 785	VALVE, 24VAC 2 way custom port 1/8 orf	1
26		134 834	HOSE, SAE .187 ID x .410 OD (order by ft)	2ft
27	C2	106 935	CAPACITOR, polyp film 10uf 250VAC	1
28	C1	130 466	CAPACITOR	1
29	C3	138 115	CAPACITOR	1
30		019 663	MOUNT, nprn 15/16 OD	4
31	S1	158 506	SWITCH, rocker DPDT 10A 250VAC	1
32	Work/Torch	129 525	RECEPTACLE, twlk insul fem (Dinse type) 50/70 series	2
33		093 551	KNOB, .125dia shaft w/.125 set screws	2
34			NAMEPLATE, (order by model and serial number)	1
35	RC3	143 976	RECEPTACLE w/TERMINALS, (consisting of)	1
		079 534	TERMINAL, female 1skt 18-14 wire	14
		134 734	HOUSING, term plug 14cont shell sz 20 Amp 213571-2	
		134 731	TERMINAL, male 1 pin 18-14 wire Amp 213603-1	
		079 739	CLAMP, cable strain relief sz 17 Amp 206322-2	
36	C6-8	151 679	CAPACITOR	3
36	C4	150 244	LEAD ASSEMBLY, elect	1
36	C5	150 245	LEAD ASSEMBLY, elect	1
37	R1,3	121 770	POTENTIOMETER, C sltd sft 1/T 1W 100K ohm	2

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

Figure 9-1. Main Assembly (Continued)

. 38		030 170 . .	BUSHING, snap-in nyl .750 ID x 1.000mtg hole	2
		047 838 . .	BLANK, snap-in nyl 1.000mtg hole	1
		000 527 . .	BLANK, snap-in nyl .875mtg hole	1
. 39	RC11	115 094 . .	HOUSING PLUG & SOCKETS, (consisting of)	1
		113 746	TERMINAL, female 1skt 24-18 wire	4
. 40	T2	132 614 . .	ARC STARTER, pulsed HF	1
. 41		137 466 . .	PANEL, mtg components	1
. 42		141 588 . .	STAND-OFF, No. 8-32 x .500 lg	4
. 43		144 162 . .	WASHER, flat nyl .171 ID x .375 OD x .032thk	8

+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.