



OM-265 270A

2013-11

Processes



TIG (GTAW) Welding



Stick (SMAW) Welding

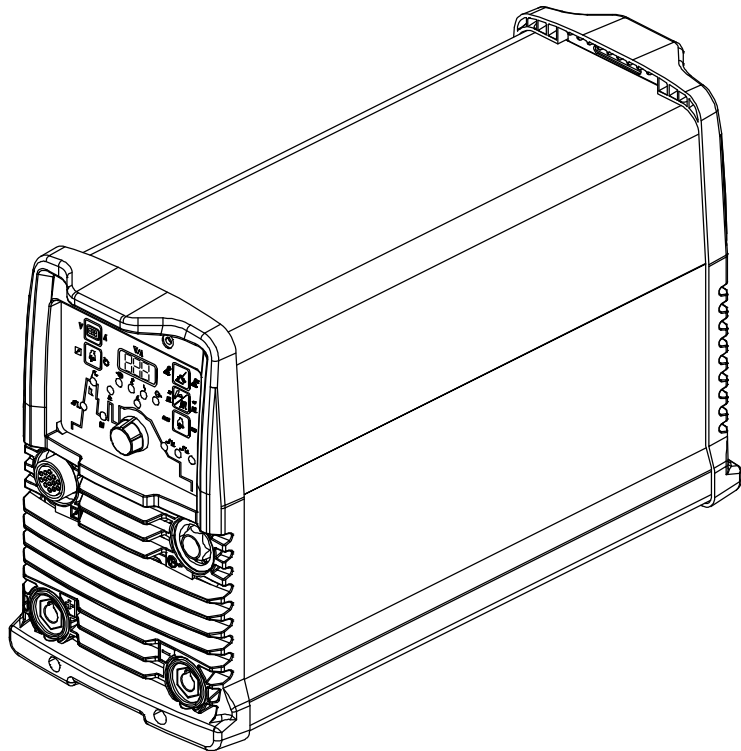
Description



Arc Welding Power Source

STH 270

CE



OWNER'S MANUAL

From Miller to You

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

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

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

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



Miller Electric manufactures a full line of welders and welding related equipment. For information on other quality Miller products, contact your local Miller distributor to receive the latest full line catalog or individual catalog sheets.



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



TABLE OF CONTENTS

SECTION 1 – SAFETY PRECAUTIONS - READ BEFORE USING	1
1-1. Symbol Usage	1
1-2. Arc Welding Hazards	1
1-3. Additional Symbols For Installation, Operation, And Maintenance	3
1-4. California Proposition 65 Warnings	4
1-5. Principal Safety Standards	4
1-6. EMF Information	4
SECTION 2 – DEFINITIONS	5
2-1. Additional Safety Symbols And Definitions	5
2-2. Miscellaneous Symbols And Definitions	7
SECTION 3 – SPECIFICATIONS	8
3-1. Important Information Regarding CE Products (Sold Within The EU)	8
3-2. IP Rating	8
3-3. Specifications For STH 270	8
3-4. Volt-Ampere Curves	9
3-5. Duty Cycle And Overheating	9
SECTION 4 – INSTALLATION	10
4-1. Serial Number And Rating Label Location	10
4-2. Selecting A Location	10
4-3. Weld Output Terminals And Selecting Cable Sizes*	11
4-4. Remote 14 Receptacle Information	11
4-5. TIG Lift-Arc DCEN (Direct Current Electrode Negative) Weld Output Connections	12
4-6. Gas Connections	12
4-7. Stick DCEP (Direct Current Electrode Positive) Weld Output Connections	13
4-8. Electrical Service Guide	13
4-9. Connecting 3-Phase Input Power	14
4-10. Connecting To 3-Phase Engine Generator w/400 Volt Output	15
SECTION 5 – OPERATION	16
5-1. Controls	16
5-2. Preparing Unit For Stick (SMAW) Welding	17
5-3. Preparing Unit For TIG (GTAW) Welding	18
5-4. Amperage Control	19
5-5. Trigger Mode Selection	19
5-6. Sequence Control Settings	20
5-7. Pulser Control Settings	21
5-8. HF Current Settings	22
5-9. Lift-Arc Start Procedure	23
5-10. Stick Start Procedure – Scratch Start Technique	23
SECTION 6 – MAINTENANCE AND TROUBLESHOOTING	24
6-1. Routine Maintenance	24
6-2. Blowing Out Inside Of Unit	24
6-3. Troubleshooting	25
SECTION 7 – ELECTRICAL DIAGRAMS	26
SECTION 8 – HIGH FREQUENCY	27
8-1. Welding Processes Requiring High Frequency	27
8-2. Installation Showing Possible Sources Of HF Interference	27
8-3. Recommended Installation To Reduce HF Interference	28
SECTION 9 – SELECTING AND PREPARING A TUNGSTEN FOR DC OR AC WELDING	29
SECTION 10 – GUIDELINES FOR TIG WELDING (GTAW)	30
SECTION 11 – STICK WELDING (SMAW) GUIDELINES	32
SECTION 12 – PARTS LIST	40
WARRANTY	



DECLARATION OF CONFORMITY

for European Community (CE marked) products.

ITW Welding Italy S.r.l Via Privata Iseo 6/E, 20098 San Giuliano M.se, (MI) Italy declares that the product(s) identified in this declaration conform to the essential requirements and provisions of the stated Council Directive(s) and Standard(s).

Product/Apparatus Identification:

Product	Stock Number
STH 270	059016024

Council Directives:

- 2006/95/EC Low Voltage
- 2004/108/EC Electromagnetic Compatibility
- 2011/65/EU Restriction of the use of certain hazardous substances in electrical and electronic equipment

Standards:

- IEC 60974-1 Arc Welding Equipment - Welding Power Sources: edition 3, 2005-07.
- IEC 60974-3 Arc Welding Equipment – Arc Striking and Stabilizing Devices: edition 2.0, 2007-11.
- IEC 60974-10 Arc Welding Equipment - Electromagnetic Compatibility Requirements: edition 2.0, 2007-08.
- EN 50445:2008 Product family standard to demonstrate compliance of equipment for resistance welding, arc welding and allied processes with the basic restrictions related to human exposure to electromagnetic fields (0Hz-300Hz)

EU Signatory:

August 1st, 2013

Massimiliano Lavarini

Date of Declaration

ELECTRONIC ENGINEER R&D TECH. SUPPORT

SECTION 1 – SAFETY PRECAUTIONS - READ BEFORE USING

som 2013–09

 Protect yourself and others from injury — read, follow, and save these important safety precautions and operating instructions.

1-1. Symbol Usage



DANGER! – Indicates a hazardous situation which, if not avoided, will result in death or serious injury. The possible hazards are shown in the adjoining symbols or explained in the text.



Indicates a hazardous situation which, if not avoided, could result in death or serious injury. The possible hazards are shown in the adjoining symbols or explained in the text.

NOTICE – Indicates statements not related to personal injury.

1-2. Arc Welding Hazards



The symbols shown below are used throughout this manual to call attention to and identify possible hazards. When you see the symbol, watch out, and follow the related instructions to avoid the hazard. The safety information given below is only a summary of the more complete safety information found in the Safety Standards listed in Section 1-5. Read and follow all Safety Standards.



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



During operation, keep everybody, especially children, away.



ELECTRIC SHOCK can kill.

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

- Do not touch live electrical parts.

- Wear dry, hole-free insulating gloves and body protection.
- Insulate yourself from work and ground using dry insulating mats or covers big enough to prevent any physical contact with the work or ground.
- Do not use AC output in damp areas, if movement is confined, or if there is a danger of falling.
- Use AC output ONLY if required for the welding process.
- If AC output is required, use remote output control if present on unit.
- Additional safety precautions are required when any of the following electrically hazardous conditions are present: in damp locations or while wearing wet clothing; on metal structures such as floors, gratings, or scaffolds; when in cramped positions such as sitting, kneeling, or lying; or when there is a high risk of unavoidable or accidental contact with the workpiece or ground. For these conditions, use the following equipment in order presented: 1) a semiautomatic DC constant voltage (wire) welder, 2) a DC manual (stick) welder, or 3) an AC welder with reduced open-circuit voltage. In most situations, use of a DC, constant voltage wire welder is recommended. And, do not work alone!
- Disconnect input power or stop engine before installing or servicing this equipment. Lockout/tagout input power according to OSHA 29 CFR 1910.147 (see Safety Standards).
- Properly install, ground, and operate this equipment according to its Owner's Manual and national, state, and local codes.
- Always verify the supply ground – check and be sure that input power cord ground wire is properly connected to ground terminal in

 Indicates special instructions.



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

disconnect box or that cord plug is connected to a properly grounded receptacle outlet.

- When making input connections, attach proper grounding conductor first – double-check connections.
- Keep cords dry, free of oil and grease, and protected from hot metal and sparks.
- Frequently inspect input power cord and ground conductor for damage or bare wiring – replace immediately if damaged – bare wiring can kill.
- Turn off all equipment when not in use.
- Do not use worn, damaged, undersized, or repaired cables.
- Do not drape cables over your body.
- If earth grounding of the workpiece is required, ground it directly with a separate cable.
- Do not touch electrode if you are in contact with the work, ground, or another electrode from a different machine.
- Do not touch electrode holders connected to two welding machines at the same time since double open-circuit voltage will be present.
- Use only well-maintained equipment. Repair or replace damaged parts at once. Maintain unit according to manual.
- Wear a safety harness if working above floor level.
- Keep all panels and covers securely in place.
- Clamp work cable with good metal-to-metal contact to workpiece or worktable as near the weld as practical.
- Insulate work clamp when not connected to workpiece to prevent contact with any metal object.
- Do not connect more than one electrode or work cable to any single weld output terminal. Disconnect cable for process not in use.
- Use GFCI protection when operating auxiliary equipment in damp or wet locations.

SIGNIFICANT DC VOLTAGE exists in inverter welding power sources AFTER removal of input power.

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



HOT PARTS can burn.

- Do not touch hot parts bare handed.
- Allow cooling period before working on equipment.
- To handle hot parts, use proper tools and/or wear heavy, insulated welding gloves and clothing to prevent burns.



FUMES AND GASES can be hazardous.

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

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



ARC RAYS can burn eyes and skin.

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

- Wear an approved welding helmet fitted with a proper shade of filter lenses to protect your face and eyes from arc rays and sparks when welding or watching (see ANSI Z49.1 and Z87.1 listed in Safety Standards).
- Wear approved safety glasses with side shields under your helmet.
- Use protective screens or barriers to protect others from flash, glare and sparks; warn others not to watch the arc.
- Wear body protection made from durable, flame-resistant material (leather, heavy cotton, wool). Body protection includes oil-free clothing such as leather gloves, heavy shirt, cuffless trousers, high shoes, and a cap.

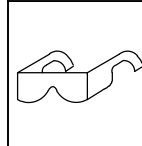


WELDING can cause fire or explosion.

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

- Remove all flammables within 35 ft (10.7 m) of the welding arc. If this is not possible, tightly cover them with approved covers.
- Do not weld where flying sparks can strike flammable material.
- Protect yourself and others from flying sparks and hot metal.
- Be alert that welding sparks and hot materials from welding can easily go through small cracks and openings to adjacent areas.
- Watch for fire, and keep a fire extinguisher nearby.
- Be aware that welding on a ceiling, floor, bulkhead, or partition can cause fire on the hidden side.
- Do not weld on containers that have held combustibles, or on closed containers such as tanks, drums, or pipes unless they are properly prepared according to AWS F4.1 and AWS A6.0 (see Safety Standards).
- Do not weld where the atmosphere may contain flammable dust, gas, or liquid vapors (such as gasoline).
- 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, sparks, and fire hazards.
- Do not use welder to thaw frozen pipes.

- Remove stick electrode from holder or cut off welding wire at contact tip when not in use.
- Wear body protection made from durable, flame-resistant material (leather, heavy cotton, wool). Body protection includes oil-free clothing such as leather gloves, heavy shirt, cuffless trousers, high shoes, and a cap.
- Remove any combustibles, such as a butane lighter or matches, from your person before doing any welding.
- After completion of work, inspect area to ensure it is free of sparks, glowing embers, and flames.
- Use only correct fuses or circuit breakers. Do not oversize or bypass them.
- Follow requirements in OSHA 1910.252 (a) (2) (iv) and NFPA 51B for hot work and have a fire watcher and extinguisher nearby.
- Read and understand the Safety Data Sheets (SDSs) and the manufacturer's instructions for adhesives, coatings, cleaners, consumables, coolants, degreasers, fluxes, and metals.



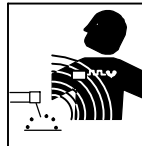
FLYING METAL or DIRT can injure eyes.

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



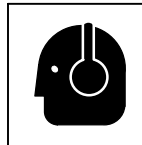
BUILDUP OF GAS can injure or kill.

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



ELECTRIC AND MAGNETIC FIELDS (EMF) can affect Implanted Medical Devices.

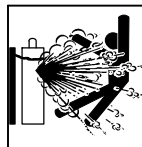
- Wearers of Pacemakers and other Implanted Medical Devices should keep away.
- Implanted Medical Device wearers should consult their doctor and the device manufacturer before going near arc welding, spot welding, gouging, plasma arc cutting, or induction heating operations.



NOISE can damage hearing.

Noise from some processes or equipment can damage hearing.

- Wear approved ear protection if noise level is high.



CYLINDERS can explode if damaged.

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

- Protect compressed gas cylinders from excessive heat, mechanical shocks, physical damage, slag, open flames, sparks, and arcs.
- Install cylinders in an upright position by securing to a stationary support or cylinder rack to prevent falling or tipping.
- Keep cylinders away from any welding or other electrical circuits.
- Never drape a welding torch over a gas cylinder.
- Never allow a welding electrode to touch any cylinder.
- Never weld on a pressurized cylinder – explosion will result.
- Use only correct compressed gas cylinders, regulators, hoses, and fittings designed for the specific application; maintain them and associated parts in good condition.
- Turn face away from valve outlet when opening cylinder valve. Do not stand in front of or behind the regulator when opening the valve.
- Keep protective cap in place over valve except when cylinder is in use or connected for use.
- Use the right equipment, correct procedures, and sufficient number of persons to lift and move cylinders.
- Read and follow instructions on compressed gas cylinders, associated equipment, and Compressed Gas Association (CGA) publication P-1 listed in Safety Standards.

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



FIRE OR EXPLOSION hazard.

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



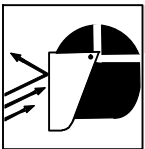
FALLING EQUIPMENT can injure.

- Use lifting eye to lift unit only, NOT running gear, gas cylinders, or any other accessories.
- Use equipment of adequate capacity to lift and support unit.
- If using lift forks to move unit, be sure forks are long enough to extend beyond opposite side of unit.
- Keep equipment (cables and cords) away from moving vehicles when working from an aerial location.
- Follow the guidelines in the Applications Manual for the Revised NIOSH Lifting Equation (Publication No. 94–110) when manually lifting heavy parts or equipment.



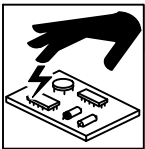
OVERUSE can cause OVERHEATING

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



FLYING SPARKS can injure.

- Wear a face shield to protect eyes and face.
- Shape tungsten electrode only on grinder with proper guards in a safe location wearing proper face, hand, and body protection.
- Sparks can cause fires — keep flammables away.



STATIC (ESD) can damage PC boards.

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



MOVING PARTS can injure.

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



WELDING WIRE can injure.

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



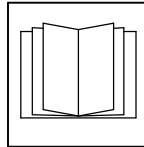
BATTERY EXPLOSION can injure.

- Do not use welder to charge batteries or jump start vehicles unless it has a battery charging feature designed for this purpose.



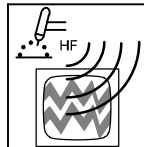
MOVING PARTS can injure.

- Keep away from moving parts such as fans.
- Keep all doors, panels, covers, and guards closed and securely in place.
- Have only qualified persons remove doors, panels, covers, or guards for maintenance and troubleshooting as necessary.
- Reinstall doors, panels, covers, or guards when maintenance is finished and before reconnecting input power.



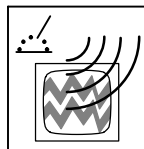
READ INSTRUCTIONS.

- Read and follow all labels and the Owner's Manual carefully before installing, operating, or servicing unit. Read the safety information at the beginning of the manual and in each section.
- Use only genuine replacement parts from the manufacturer.
- Perform maintenance and service according to the Owner's Manuals, industry standards, and national, state, and local codes.



H.F. RADIATION can cause interference.


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




ARC WELDING can cause interference.

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

1-4. California Proposition 65 Warnings

 **Welding or cutting equipment produces fumes or gases which contain chemicals known to the State of California to cause birth defects and, in some cases, cancer. (California Health & Safety Code Section 25249.5 et seq.)**

 **This product contains chemicals, including lead, known to the state of California to cause cancer, birth defects, or other reproductive harm. *Wash hands after use.***

1-5. Principal Safety Standards

Safety in Welding, Cutting, and Allied Processes, ANSI Standard Z49.1, is available as a free download from the American Welding Society at <http://www.aws.org> or purchased from Global Engineering Documents (phone: 1-877-413-5184, website: www.global.ihs.com).

Safe Practices for the Preparation of Containers and Piping for Welding and Cutting, American Welding Society Standard AWS F4.1, from Global Engineering Documents (phone: 1-877-413-5184, website: www.global.ihs.com).

Safe Practices for Welding and Cutting Containers that have Held Combustibles, American Welding Society Standard AWS A6.0, from Global Engineering Documents (phone: 1-877-413-5184, website: www.global.ihs.com).

National Electrical Code, NFPA Standard 70, from National Fire Protection Association, Quincy, MA 02269 (phone: 1-800-344-3555, website: www.nfpa.org and www.sparky.org).

Safe Handling of Compressed Gases in Cylinders, CGA Pamphlet P-1, from Compressed Gas Association, 14501 George Carter Way, Suite 103, Chantilly, VA 20151 (phone: 703-788-2700, website: www.cganet.com).

Safety in Welding, Cutting, and Allied Processes, CSA Standard W117.2, from Canadian Standards Association, Standards Sales, 5060

Spectrum Way, Suite 100, Ontario, Canada L4W 5NS (phone: 800-463-6727, website: www.csa-international.org).

Safe Practice For Occupational And Educational Eye And Face Protection, ANSI Standard Z87.1, from American National Standards Institute, 25 West 43rd Street, New York, NY 10036 (phone: 212-642-4900, website: www.ansi.org).

Standard for Fire Prevention During Welding, Cutting, and Other Hot Work, NFPA Standard 51B, from National Fire Protection Association, Quincy, MA 02269 (phone: 1-800-344-3555, website: www.nfpa.org).

OSHA, Occupational Safety and Health Standards for General Industry, Title 29, Code of Federal Regulations (CFR), Part 1910, Subpart Q, and Part 1926, Subpart J, from U.S. Government Printing Office, Superintendent of Documents, P.O. Box 371954, Pittsburgh, PA 15250-7954 (phone: 1-866-512-1800) (there are 10 OSHA Regional Offices—phone for Region 5, Chicago, is 312-353-2220, website: www.osha.gov).

Applications Manual for the Revised NIOSH Lifting Equation, The National Institute for Occupational Safety and Health (NIOSH), 1600 Clifton Rd, Atlanta, GA 30333 (phone: 1-800-232-4636, website: www.cdc.gov/NIOSH).

1-6. EMF Information

Electric current flowing through any conductor causes localized electric and magnetic fields (EMF). The current from arc welding (and allied processes including spot welding, gouging, plasma arc cutting, and induction heating operations) creates an EMF field around the welding circuit. EMF fields may interfere with some medical implants, e.g. pacemakers. Protective measures for persons wearing medical implants have to be taken. For example, restrict access for passers-by or conduct individual risk assessment for welders. All welders should use the following procedures in order to minimize exposure to EMF fields from the welding circuit:

1. Keep cables close together by twisting or taping them, or using a cable cover.
2. Do not place your body between welding cables. Arrange cables to one side and away from the operator.
3. Do not coil or drape cables around your body.


4. Keep head and trunk as far away from the equipment in the welding circuit as possible.
5. Connect work clamp to workpiece as close to the weld as possible.
6. Do not work next to, sit or lean on the welding power source.
7. Do not weld whilst carrying the welding power source or wire feeder.



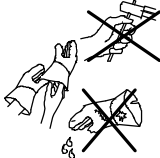
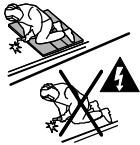
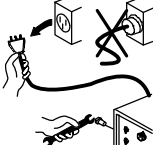

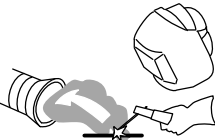

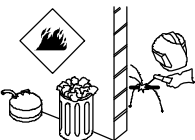

About Implanted Medical Devices:



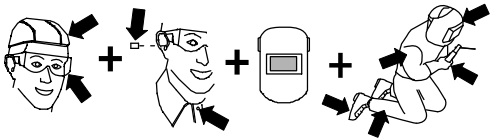
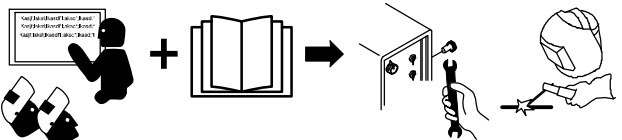
Implanted Medical Device wearers should consult their doctor and the device manufacturer before performing or going near arc welding, spot welding, gouging, plasma arc cutting, or induction heating operations. If cleared by your doctor, then following the above procedures is recommended.

SECTION 2 – DEFINITIONS


























2-1. Additional Safety Symbols And Definitions

 Some symbols are found only on CE products.

	<p>Warning! Watch Out! There are possible hazards as shown by the symbols.</p> <p style="text-align: right;">Safe1 2012-05</p>
	<p>Do not discard product (where applicable) with general waste. Reuse or recycle Waste Electrical and Electronic Equipment (WEEE) by disposing at a designated collection facility. Contact your local recycling office or your local distributor for further information.</p> <p style="text-align: right;">Safe37 2012-05</p>
	<p>Wear dry insulating gloves. Do not touch electrode with bare hand. Do not wear wet or damaged gloves.</p> <p style="text-align: right;">Safe2 2012-05</p>
	<p>Protect yourself from electric shock by insulating yourself from work and ground.</p> <p style="text-align: right;">Safe3 2012-05</p>
	<p>Disconnect input plug or power before working on machine.</p> <p style="text-align: right;">Safe5 2012-05</p>
	<p>Keep your head out of the fumes.</p> <p style="text-align: right;">Safe6 2012-05</p>
	<p>Use forced ventilation or local exhaust to remove the fumes.</p> <p style="text-align: right;">Safe8 2012-05</p>
	<p>Use ventilating fan to remove fumes.</p> <p style="text-align: right;">Safe10 2012-05</p>
	<p>Keep flammables away from welding. Do not weld near flammables.</p> <p style="text-align: right;">Safe12 2012-05</p>
	<p>Welding sparks can cause fires. Have a fire extinguisher nearby, and have a watchperson ready to use it.</p> <p style="text-align: right;">Safe14 2012-05</p>

	<p>Do not weld on drums or any closed containers.</p> <p style="text-align: right;">Safe16 2012-05</p>
	<p>Do not remove or paint over (cover) the label.</p> <p style="text-align: right;">Safe20 2012-05</p>
	<p>Wear hat and safety glasses. Use ear protection and button shirt collar. Use welding helmet with correct shade of filter. Wear complete body protection.</p> <p style="text-align: right;">Safe38 2012-05</p>
	<p>Become trained and read the instructions before working on the machine or welding.</p> <p style="text-align: right;">Safe40 2012-05</p>

2-2. Miscellaneous Symbols And Definitions

A Amperes	 Output/On	 Gas Tungsten Arc Welding (GTAW)	 Shielded Metal Arc Welding (SMAW)
V Volts	 Voltage Input	 3 Phase Static Frequency Converter-Transformer-Rectifier	
 Voltage Output	 Off	 Remote	 Lift-Arc Start (GTAW)
 Protective Earth (Ground)	 Process	 High Temperature	 Hot Start
I On	% Percent	+ Positive	- Negative
 Alternating Current	Hz Hertz	 Arc Force	I₂ Rated Welding Current
X Duty Cycle	 Direct Current	 Line Connection	U₂ Conventional Load Voltage
U₁ Primary Voltage	IP Degree Of Protection	I_{1max} Rated Maximum Supply Current	I_{1eff} Maximum Effective Supply Current
U₀ Rated No Load Voltage (Average)	 Output Voltage	 Postflow	 Slope Down Time
 Set-Up	 Panel	 Background Current	 Slope Up Time
 Final Current			

SECTION 3 – SPECIFICATIONS

3-1. Important Information Regarding CE Products (Sold Within The EU)

A. Information On Electromagnetic Fields (EMF)

⚠ This equipment shall not be used by the general public as the EMF limits for the general public might be exceeded during welding.

This equipment is built in accordance with EN 60974–1 and is intended to be used only in an occupational environment (where the general public access is prohibited or regulated in such a way as to be similar to occupational use) by an expert or an instructed person.

Wire feeders and ancillary equipment (such as torches, liquid cooling systems and arc striking and stabilizing devices) as part of the welding circuit may not be a major contributor to the EMF. See the Owner's Manuals for all components of the welding circuit for additional EMF exposure information.

- The EMF assessment on this equipment was conducted at 0.5 meter.
- At a distance of 1 meter the EMF exposure values were less than 20% of the permissible values.

B. Information On Electromagnetic Compatibility (EMC)

⚠ This Class A equipment is not intended for use in residential locations where the electrical power is provided by the public low voltage supply system. There can be potential difficulties in ensuring electromagnetic compatibility in those locations, due to conducted as well as radiated disturbances.

⚠ This equipment does not comply with IEC 61000–3–12. If it is connected to a public low voltage system, it is the responsibility of the installer or user of the equipment to ensure, by consultation with the distribution network operator if necessary, that the equipment can be connected.

ce-emc 2 2011-09

3-2. IP Rating

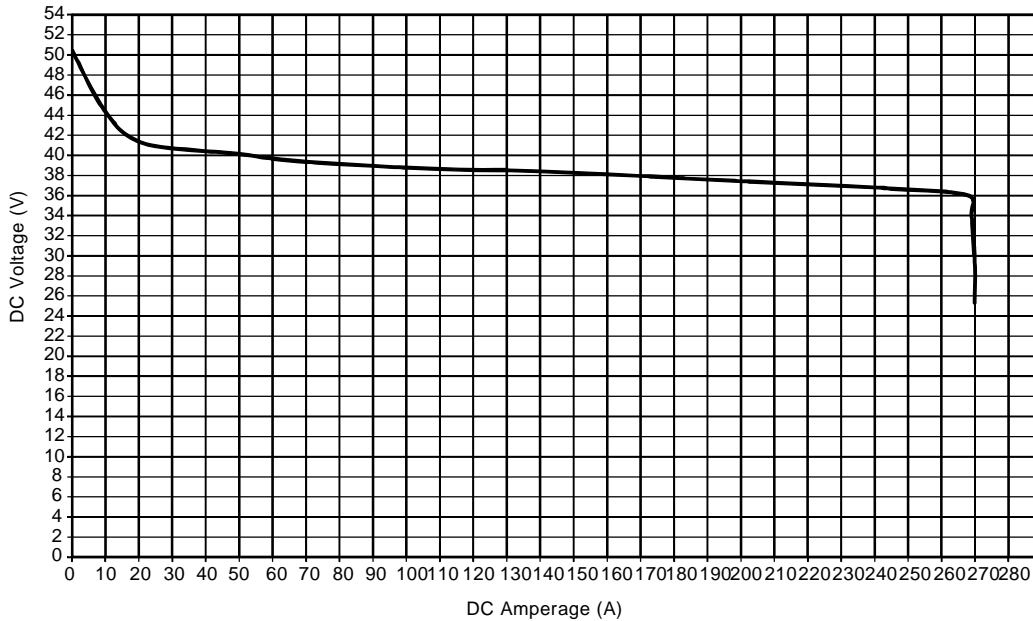
IP Rating: 23S. This equipment is designed for outdoor use. It may be stored, but is not intended to be used outside during precipitation unless sheltered. Operating temperature Range: 14° F (-10° C) to 104° F (40° C). Ratings were developed at an ambient temperature of 20° C to 25° C.

3-3. Specifications For STH 270

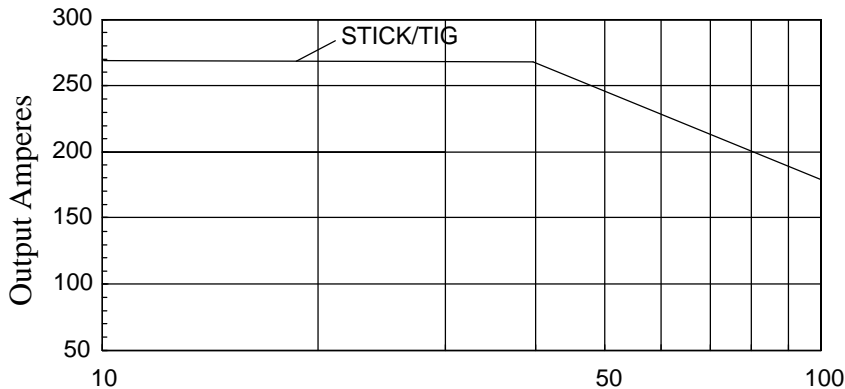
Input Power Three Phase AC 50/60 Hz Voltage	Rated Welding Output		Max. Open Circuit Voltage	Amperage/ Voltage Range DC	KVA/KW @ Duty Cycle	Dimensions (in.)	Weight
	100%	40%					
400 Volts Stick	180A 27.2V	270 A 30.8 V	50 V	5–270 A 20 – 30.8 V	11.4 KVA/ 10.3 KW @ 40 % DC 7.9 KVA/ 7.0 KW @ 100% DC	L: 568 mm (22.4 in.) W: 219 mm (8.6 in.) H: 345 mm (13.6 in.)	Net: 24 Kg (52.9 lb) Ship: 26Kg (57.3 lb)
400 Volts TIG	180A 17.2V	270 A 20.8 V	50 V	5–270 A 10 – 20.8 V	7.7 KVA/ 6.7 KW @ 40% DC 4.8 KVA/ 4.0 KW @ 100% DC		

3-4. Volt-Ampere Curves

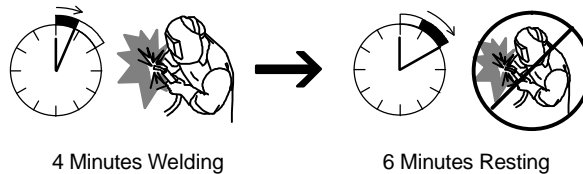
Volt-ampere curves show minimum and maximum voltage and amperage output capabilities of welding power source. Curves of other settings fall between curves shown.



3-5. Duty Cycle And Overheating



270 Amps @ 40% Duty Cycle
180 Amps @ 100% Duty Cycle

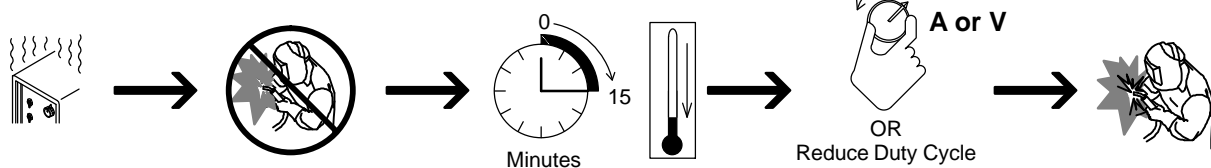


Duty Cycle is percentage of 10 minutes that unit can weld at rated load without overheating.

If unit overheats, output stops and cooling fan runs. Wait fifteen minutes for unit to cool. Reduce amperage or voltage, or duty cycle before welding.

NOTICE – Exceeding duty cycle can damage unit and void warranty.

Overheating



SECTION 4 – INSTALLATION

4-1. Serial Number And Rating Label Location

The serial number and rating information for the power source is located on the bottom of the machine. Use the rating labels to determine input power requirements and/or rated output. For future reference, write serial number in space provided on back cover of this manual.

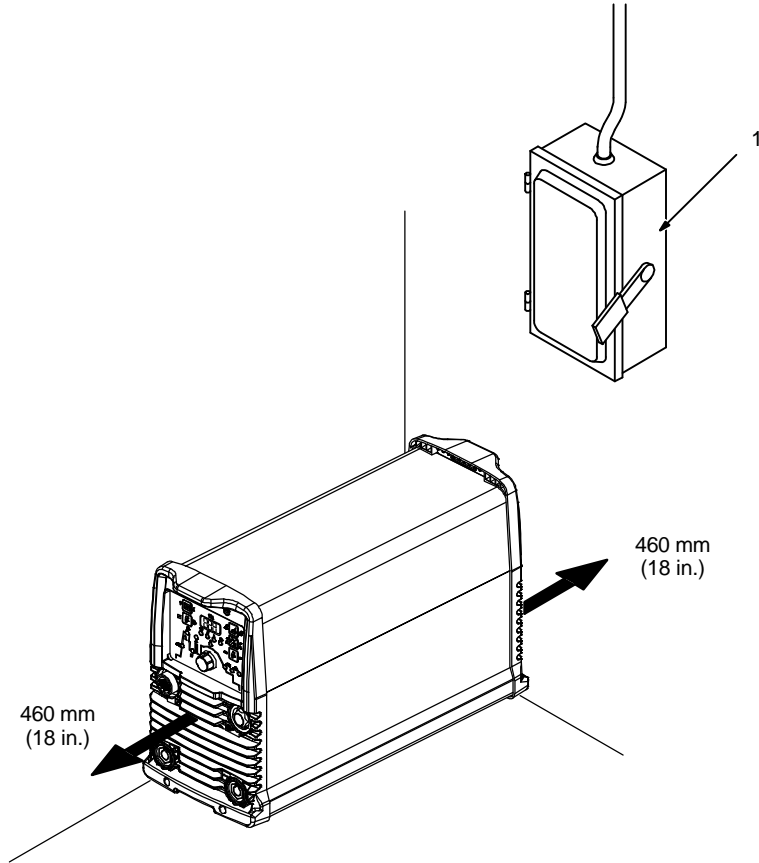
4-2. Selecting A Location



Location And Airflow


⚠ Special installation may be required where gasoline or volatile liquids are present – see NEC Article 511 or CEC Section 20.

- 1 Line Disconnect Device
Locate unit near correct input power supply.

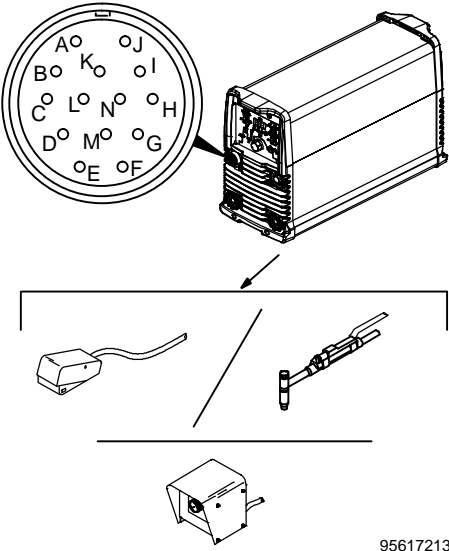




4-3. Weld Output Terminals And Selecting Cable Sizes*


NOTICE – The Total Cable Length in Weld Circuit (see table below) is the combined length of both weld cables. For example, if the power source is 30 m (100 ft) from the workpiece, the total cable length in the weld circuit is 60 m (2 cables x 30 m). Use the 60 m (200 ft) column to determine cable size.

 <p>Weld Output Terminals</p> <p>⚠ Turn off power before connecting to weld output terminals.</p> <p>⚠ Do not use worn, damaged, undersized, or repaired cables.</p>	Weld Cable Size** and Total Cable (Copper) Length in Weld Circuit Not Exceeding***									
	Welding Amperes		30 m (100 ft) or Less		45 m (150 ft)	60 m (200 ft)	70 m (250 ft)	90 m (300 ft)	105 m (350 ft)	120 m (400 ft)
			10 – 60% Duty Cycle mm² (AWG)	60 – 100% Duty Cycle mm² (AWG)	10 – 100% Duty Cycle mm² (AWG)					
100	20 (4)	20 (4)	20 (4)	30 (3)	35 (2)	50 (1)	60 (1/0)	60 (1/0)		
150	30 (3)	30 (3)	35 (2)	50 (1)	60 (1/0)	70 (2/0)	95 (3/0)	95 (3/0)		
200	30 (3)	35 (2)	50 (1)	60 (1/0)	70 (2/0)	95 (3/0)	120 (4/0)	120 (4/0)		
<p>* This chart is a general guideline and may not suit all applications. If cable overheats, use next size larger cable.</p> <p>**Weld cable size is based on either a 4 volts or less drop or a current density of at least 300 circular mils per ampere.</p> <p>***For distances longer than those shown in this guide, call a factory applications representative.</p>									Milan Ref. S-0007-K 2013-10	

4-4. Remote 14 Receptacle Information

 <p style="text-align: right; font-size: small;">956172131_1-A</p>	 REMOTE 14	Socket*	Socket Information
	15 VOLTS DC  OUTPUT CONTACTOR	A	Contactactor control +15 volts DC.
		B	Contact closure to A completes 15 volts DC contactor control circuit and enables output.
	REMOTE OUTPUT CONTROL	C	Output to remote control; +10 volts DC output to remote control.
		D	Remote control circuit common.
		E	0 to +10 volts DC input command signal from remote control.
	A/V AMPERAGE VOLTAGE	F	Current feedback; +1 volt DC per 100 amperes.
H		Voltage feedback; +1 volt DC per 10 volts output.	
GND	G	+15 volts DC GND	
CHASSIS	K	Chassis common.	

* The remaining socket es are not used.

 If a remote hand control, like the RHC-14, is connected to the Remote 14 receptacle, some current value above min. must be set on the remote control before the Panel or Remote contactor is turned on. Failure to do so will cause current to be controlled by the panel control, and the remote hand control will not function.

4-5. TIG Lift-Arc DCEN (Direct Current Electrode Negative) Weld Output Connections



⚠ Turn off power before making connections.

1 Positive (+) Weld Output Terminal

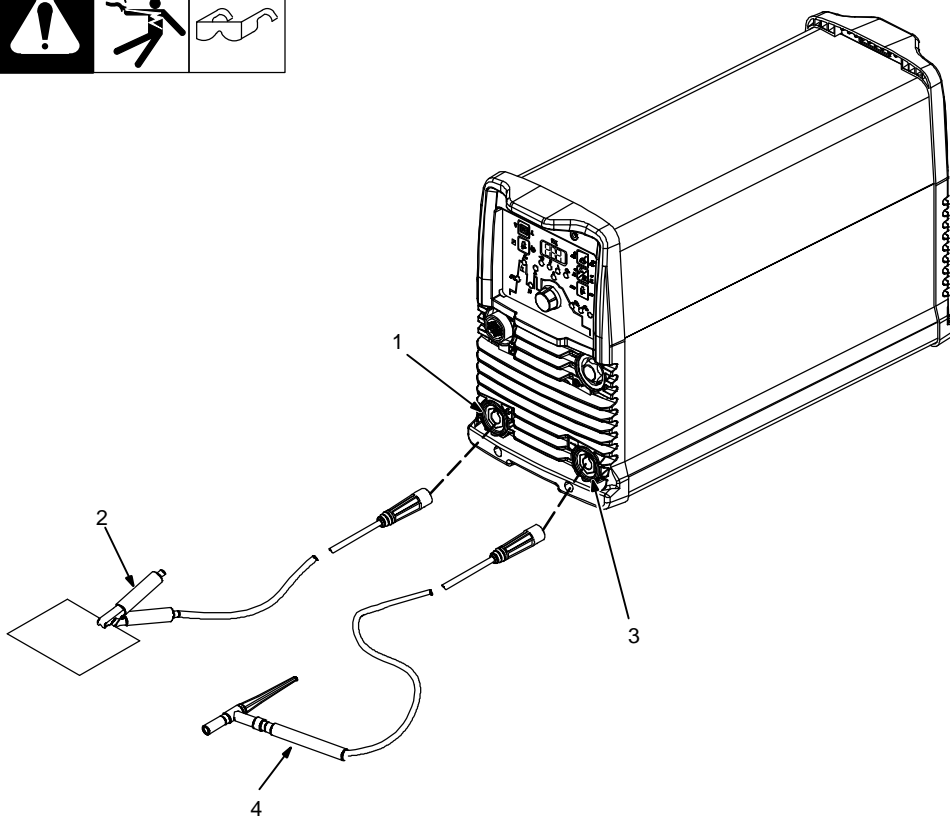
2 Work Lead

Connect work lead to positive weld output terminal.

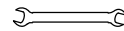
3 Negative (-) Weld Output Terminal

4 Electrode Holder

Connect TIG torch to negative weld output terminal.



Tools Needed:



21 mm (11/16, 1-1/8 in.)

4-6. Gas Connections



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

2 Regulator/Flowmeter

Install so face is vertical.

3 Flow Adjust

Typical flow rate is 15 CFH (cubic feet per hour) (7.1 liters per minute).

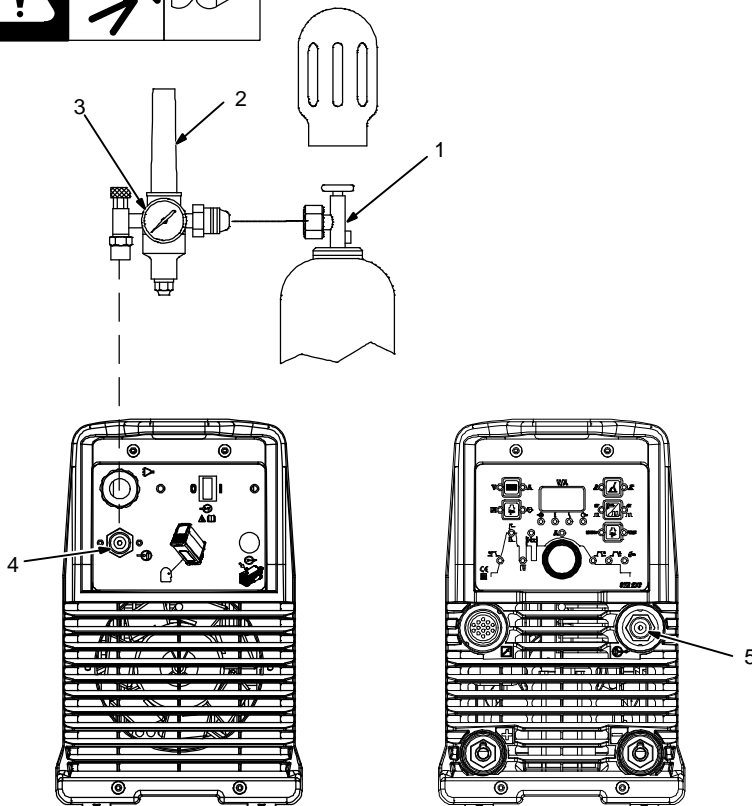
Make sure flow adjust is closed when opening cylinder to avoid damage to the flowmeter.

4 Gas In Fitting

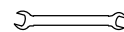
Connect hose from shielding gas supply regulator/flowmeter to gas in fitting. Fitting has 5/8-18 right-hand threads.

5 Gas Out Fitting

Connect shielding gas hose from torch to gas out fitting. Fitting has 3/8-19 BSPP right-hand threads.

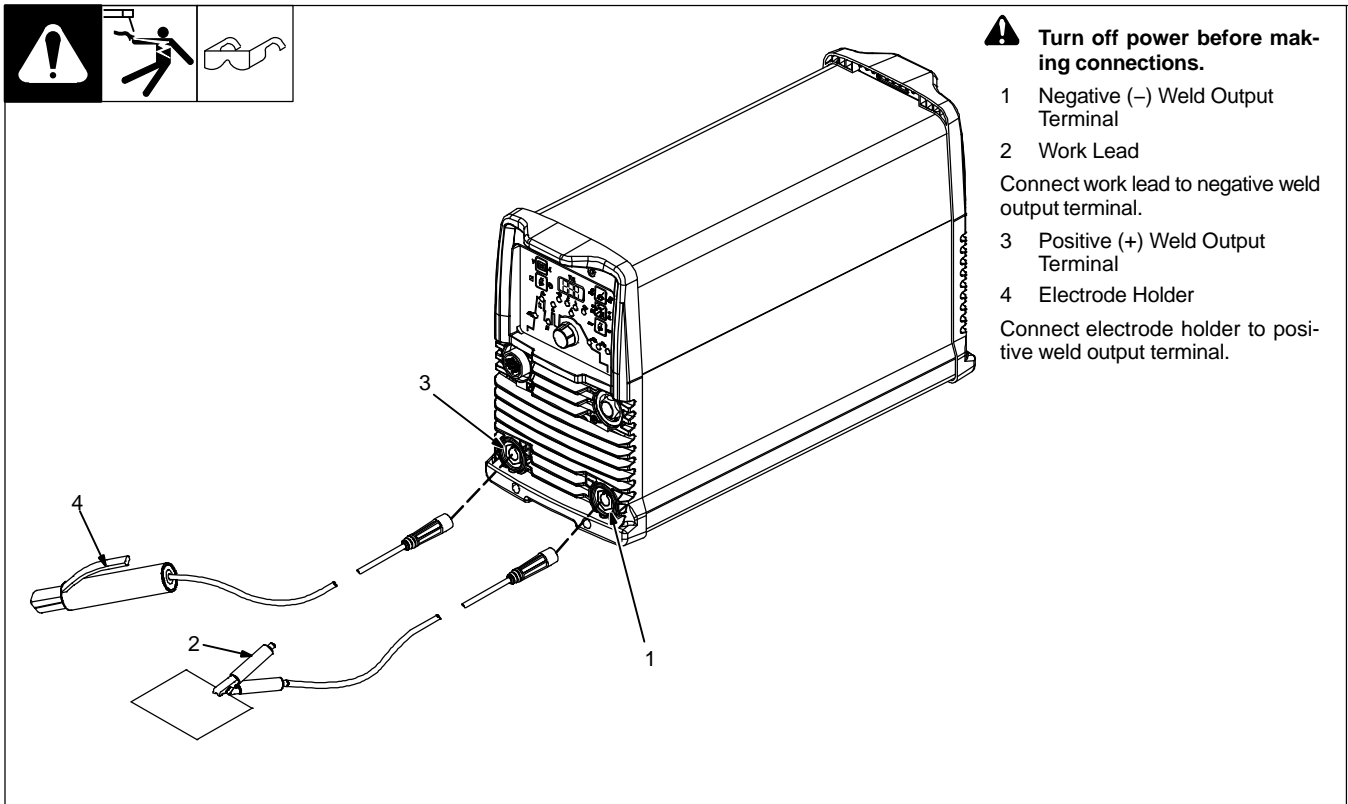


Tools Needed:



21 mm (11/16, 1-1/8 in.)

4-7. Stick DCEP (Direct Current Electrode Positive) Weld Output Connections



4-8. Electrical Service Guide

☞ Actual input voltage cannot exceed -10% of minimum, or +10% of maximum input voltages indicated in table.

⚠ Failure to follow these electrical service guide recommendations could create an electric shock or fire hazard. These recommendations are for a dedicated circuit sized for the rated output and duty cycle of the welding power source.

In dedicated circuit installations, the National Electrical Code (NEC) allows the receptacle or conductor rating to be less than the rating of the circuit protection device. All components of the circuit must be physically compatible. See NEC articles 210.21, 630.11, and 630.12.

	Three-Phase, 40% Duty Cycle
Input Voltage (V)	380–440 +/- 10%
Input Amperes (A) At Rated Output	15 – 17
Max Recommended Standard Fuse Rating In Amperes ¹	
Time Delay Fuses ²	20
Normal Operating Fuses ³	25
Min Input Conductor Size In mm² (AWG) ⁴	2.5 mm ² (14)
Max Recommended Input Conductor Length In Meters (Feet)	45 (149)
Min Grounding Conductor Size In AWG ⁴	2.5 mm ² (14)

Reference: 2011 National Electrical Code (NEC) (including article 630)

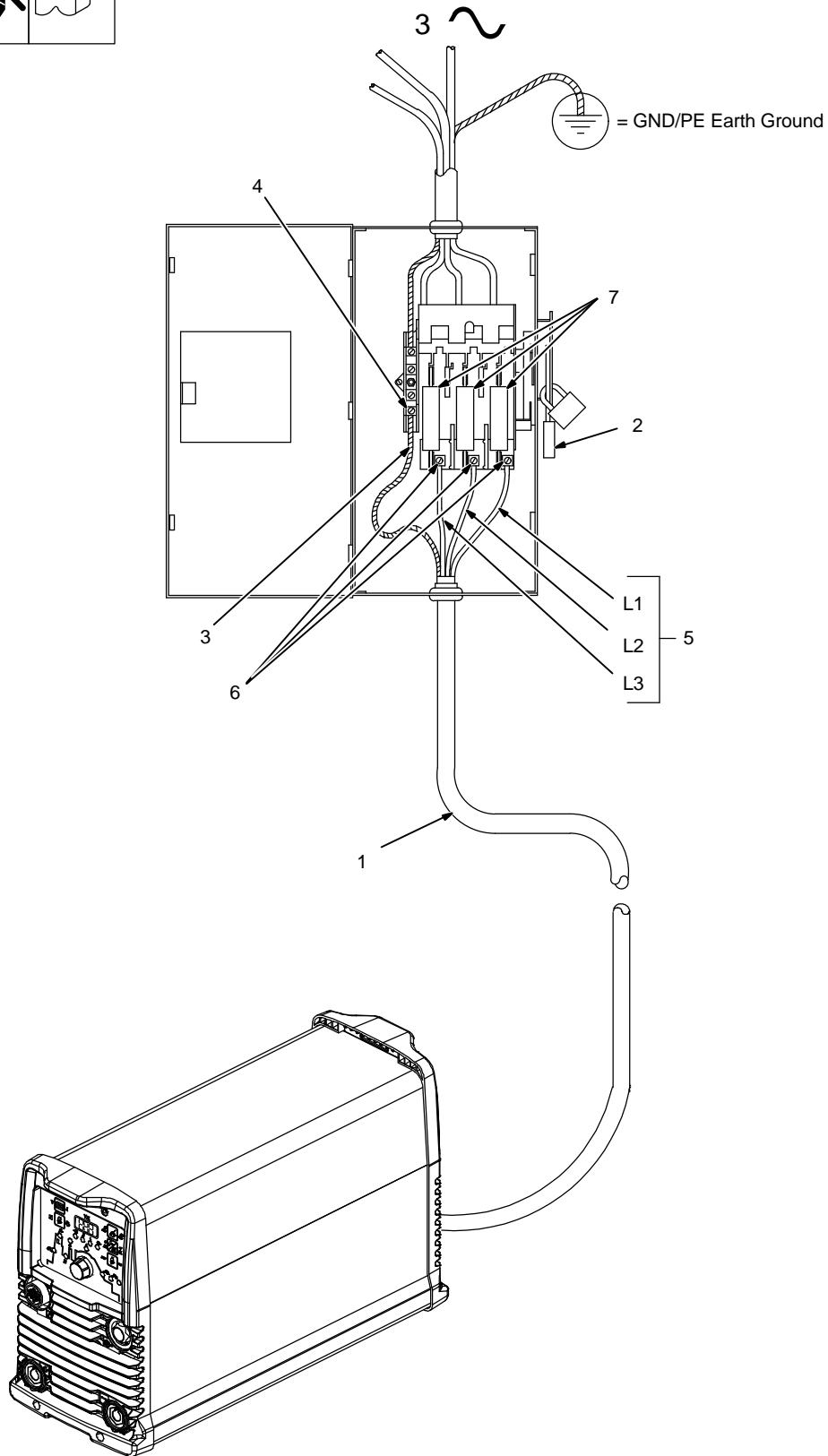
1 If a circuit breaker is used in place of a fuse, choose a circuit breaker with time-current curves comparable to the recommended fuse.

2 "Time-Delay" fuses are UL class "RK5" . See UL 248.

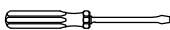
3 "Normal Operating" (general purpose - no intentional delay) fuses are UL class "K5" (up to and including 60 amps), and UL class "H" (65 amps and above).

4 Conductor data in this section specifies conductor size (excluding flexible cord or cable) between the panelboard and the equipment per NEC Table 310.15(B)(16). If a flexible cord or cable is used, minimum conductor size may increase. See NEC Table 400.5(A) for flexible cord and cable requirements.

4-9. Connecting 3-Phase Input Power



Tools Needed:



4-9. Connecting 3-Phase Input Power (Continued)



⚠ Installation must meet all National and Local Codes – have only qualified persons make this installation.

⚠ Disconnect and lockout/tagout input power before connecting input conductors from unit. Follow established procedures regarding the installation and removal of lockout/tagout devices.

⚠ Always connect green or green/yellow conductor to supply grounding terminal first, and never to a line terminal.

See rating label on unit and check input voltage available at site.

For Three-Phase Operation

- 1 Input Power Cord.
- 2 Disconnect Device (switch shown in the OFF position)
- 3 Green Or Green/Yellow Grounding Conductor
- 4 Disconnect Device Grounding Terminal
- 5 Input Conductors (L1, L2 And L3)
- 6 Disconnect Device Line Terminals

Connect green or green/yellow grounding conductor to disconnect device grounding terminal first.

Connect input conductors L1, L2, and L3 to disconnect device line terminals.

7 Over-Current Protection


Select type and size of over-current protection using Section 4-8 (fused disconnect switch shown).

Close and secure door on disconnect device. Follow established lockout/tagout procedures to put unit in service.

input2 2012-05

4-10. Connecting To 3-Phase Engine Generator w/400 Volt Output

⚠ Installation must meet all National and Local Codes – have only qualified persons make this installation.

 Obtain a 400 volt plug that matches the receptacle on the engine generator. Install the plug on the cord of the welding power source according to the plug manufacturer's instructions.


Generator Requirements

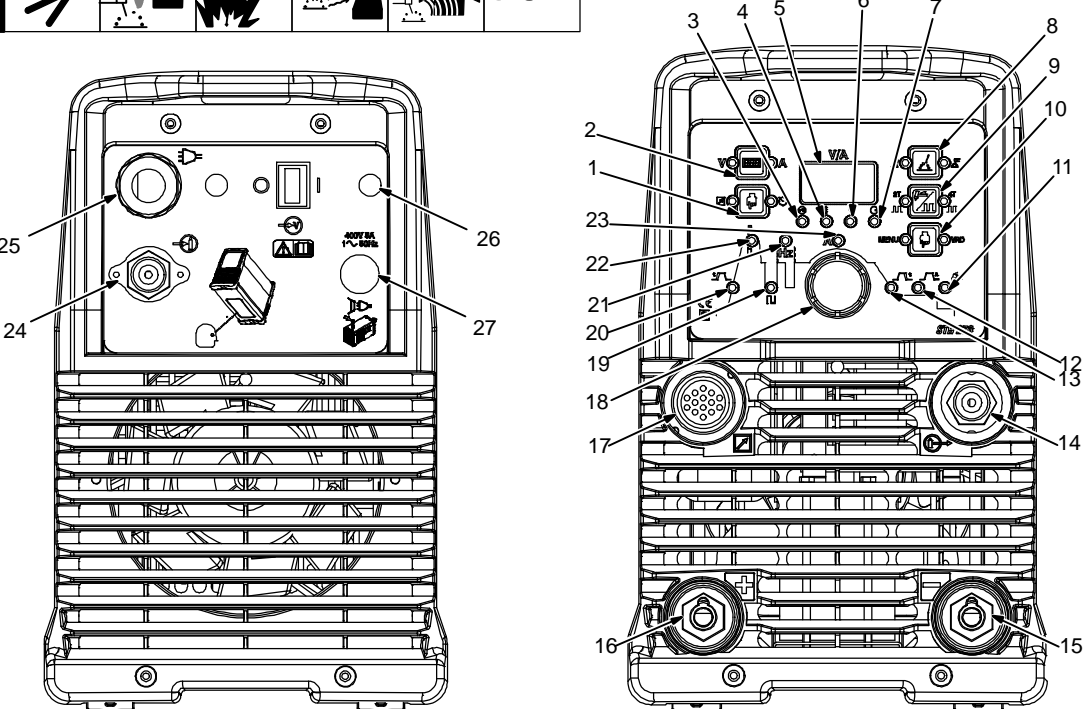
- Engine generator must provide the correct input amperage (see Section 4-8).
- Frequency must be between 50 and 60 Hz

NOTICE – Make sure welding power source is off during engine generator start-up. Do not turn on the welding power source until the generator has reached normal operating speed.

SECTION 5 – OPERATION

5-1. Controls





1 Output Control Selector Switch
Use switch to select way of controlling unit output. LED on the left illuminates when remote output is selected. Connect remote control to Remote 14 receptacle (see Section 4-4). LED on the right illuminates when panel control is selected.

2 Voltage/Amperage Control
Use switch to display welding voltage or welding amperage on the display.

3 Power On Pilot Light
Is lit when power is on.

4 High Temperature Indicator Light
Light comes on if unit overheats. Once unit has cooled down, welding can resume (see Section 3-5).

5 Amperage/Voltage Parameter Display (Meter)
Meter displays actual amperage/voltage while welding.

6 Output Voltage Indicator Light
When lit indicates the absence of output voltage (TIG mode), or the presence of 12 volts DC with active VRD function (Stick mode).

7 Input Line Voltage Error Indicator Light
When lit and emitting a continuous beep signal, indicates an out of range input voltage condition.

8 Process Selector Switch
See Section 5-2 and/or 5-3.

9 Trigger Mode Selector Switch
See Section 5-5 for trigger mode settings.

10 Menu/VRD Selector Switch
Press and release switch to scroll through welding parameters of the selected process. Use Amperage/Parameter Adjustment control to change parameter values. In Stick mode, push and hold switch for five seconds to select or disable VRD (voltage reduction device).
See Section 3-5.

11 Postflow Timer
See Section 5-6.

12 Final Current Indicator Light
See Section 5-6).

13 Slope Down Time Indicator Light
See Section 5-6).

14 Gas Out Fitting
See Section 4-6.

15 Negative Weld Output Receptacle
For Stick welding, connect work lead to this receptacle. For TIG welding, connect torch to this receptacle.

16 Positive Weld Output Receptacle
For Stick welding, connect electrode cable to this receptacle. For TIG welding, connect work cable to this receptacle.

17 Remote 14 Receptacle
If desired, connect a remote control to the Remote 14 receptacle See Section 4-4.

18 Amperage/Parameter Adjustment Control
Use control to adjust welding amperage (see Section 5-4) and welding parameters.

19 Background Current Indicator Light
See Section 5-7.

20 Slope Up Time Indicator Light
See Section 5-6.

21 Pulse Frequency (Hz) Indicator Light
See Section 5-7.

22 Hot Start/Arc Force Indicator Light
See Section 5-2.

23 Amperage Indicator Light
LED is lit while using the Amperage control (see Section 5-4)

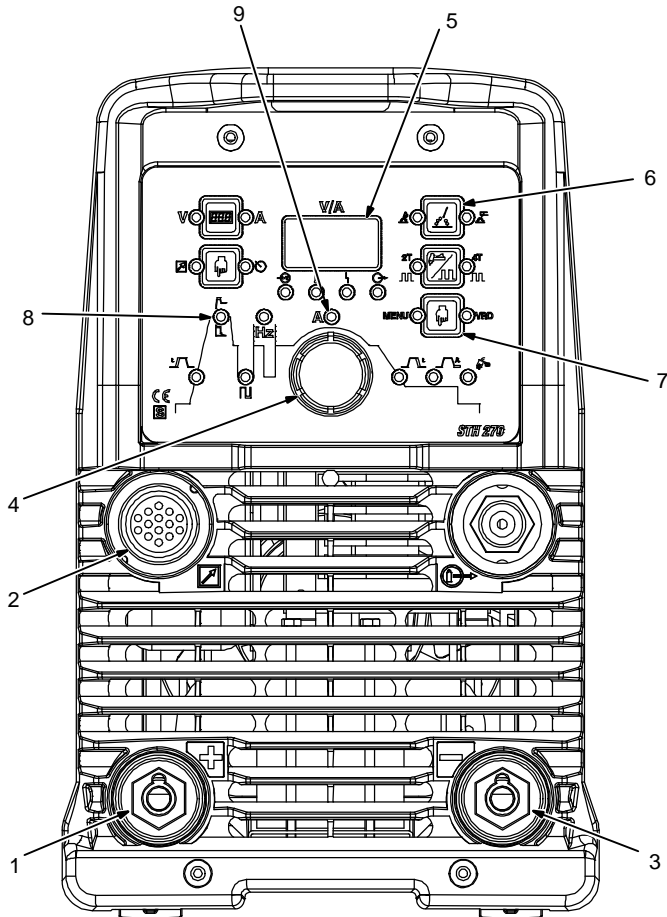
24 Gas In Fitting
Connect hose from shielding gas supply regulator/flowmeter to gas in fitting. Fitting has 5/8-18 right-hand threads. See Section 4-6.

25 Input Power Cord

26 Power Switch
Use switch to turn unit on/off.

27 Output Voltage Connection Hole
Connection point for a Hydracool 270. See Hydracool 270 Owner's Manual.

5-2. Preparing Unit For Stick (SMAW) Welding



- 1 Positive Weld Output Terminal
- 2 Remote 14 Receptacle
- 3 Negative Weld Output Terminal
- 4 Amperage/Parameter Adjustment Control
- 5 Ammeter/Voltage Display (Meter)
- 6 Process Selector Switch
- 7 MENU/VRD Selector Switch
- 8 Hot Start/Arc Force Light
- 9 Welding Amperage Light

Prepare unit for Stick welding as follows:

Connect electrode holder and work lead (see Section 4-7) . If desired, connect a remote control to the Remote 14 receptacle (see Section 4-4). Turn power on. Allow time for unit to complete its start-up cycle.

Press and release Process control to select Stick welding and light corresponding LED.

Voltage Reduction Setting (VRD)

To change voltage reduction setting (VRD), proceed as follows: press and hold the MENU/VRD switch for five seconds to select VRD (LED on) or disable VRD (LED off). When Voltage Reduction is enabled, VRD is 12 volts.

Hot Start Setting

Use Hot Start to increase output amperage at the start of a weld to help prevent electrode sticking. To change Hot Start setting, proceed as follows: while in the set-up menu, press and release MENU/VRD switch until Hot Start/Arc Force light is on. The display meter will display H. Use Amperage/Parameter control to adjust the Hot Start value.

Arc Force Setting

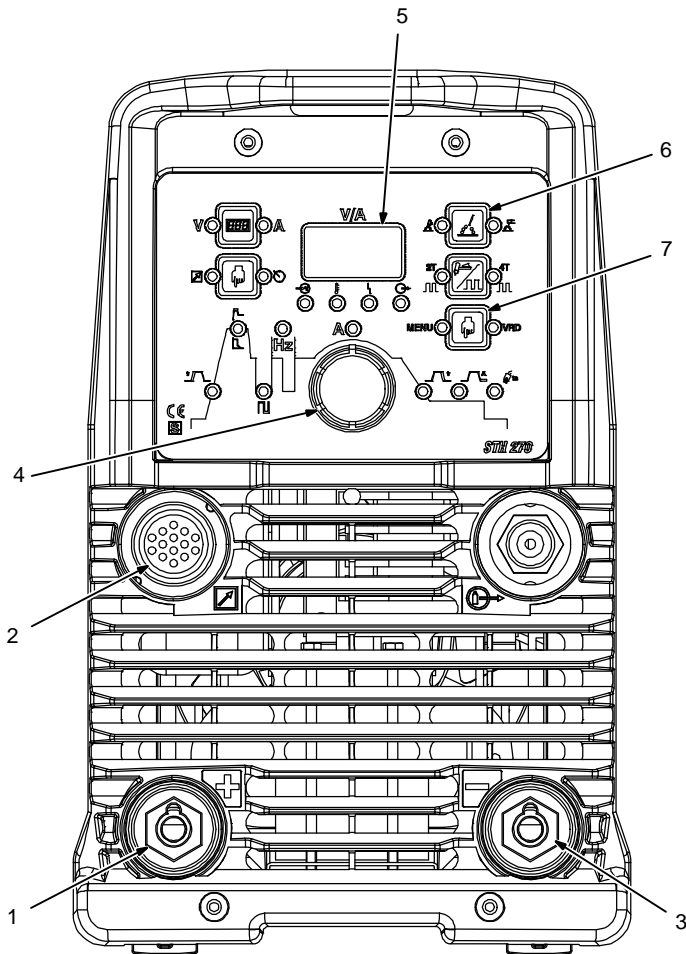
Use Arc Force to increase short-circuit amperage at low arc voltage. Set at 0 for normal welding amperage. Turn control clockwise to increase short-circuit amperage. To change Arc Force setting, proceed as follows: while in the set-up menu, press and release MENU/VRD switch until the Arc Force light is on. The display meter will display A. Use the Amperage/Parameter control to adjust the Arc Force value.

Unit will automatically exit the set-up menu if no activity is detected for more than five seconds. Press and hold the Menu/VRD switch to re-enter set-up mode.

Adjusting Welding Amperage

Use Amperage/Parameter Adjust control to adjust welding amperage (see Section 5-4).

5-3. Preparing Unit For TIG (GTAW) Welding



- 1 Positive Weld Output Terminal
- 2 Remote 14 Receptacle
- 3 Negative Weld Output Terminal
- 4 Amperage/Parameter Adjustment Control
- 5 Ammeter/Voltage/Parameter Display Meter
- 6 Process Selector Switch
- 7 Menu/VRD Selector Switch

Prepare Unit For TIG Welding As Follows: connect electrode holder and work lead (see Section 4-5) . If desired, connect a remote control to the Remote 14 receptacle (see Section 4-4). Turn power on. Allow time for unit to complete its start-up cycle.

Press and release Process Selector switch to select TIG and light corresponding LED.

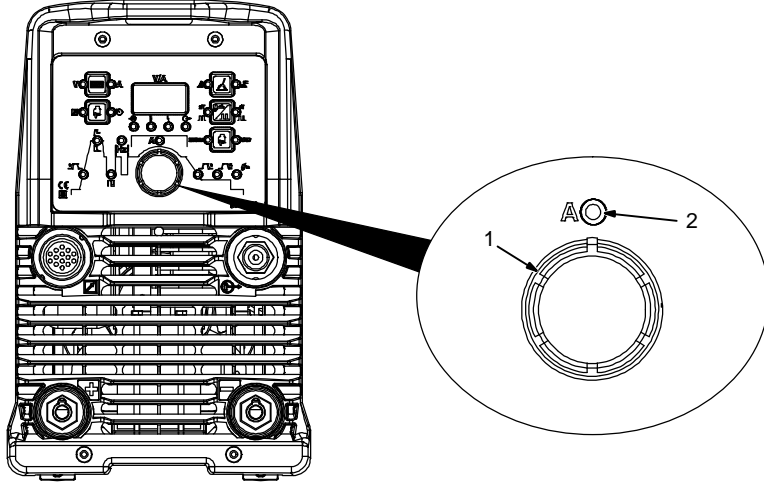
Make gas connections (see Section 4-6).

Select Trigger Mode (see Section 5-5).

Adjust Sequencer Control Settings (see Section 5-6).

Adjust Pulser Control Settings (TIG HF) (see Section 5-7).

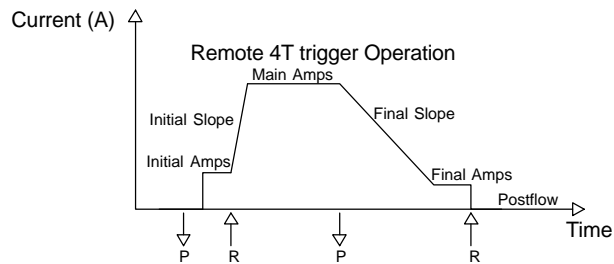
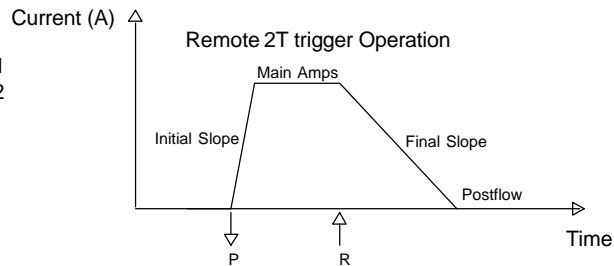
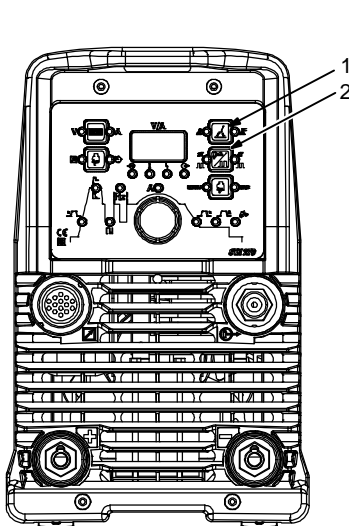
5-4. Amperage Control



- 1 Amperage Control
Rotate control clockwise to increase amperage (5-270 amps).
- 2 Amperage Indicator Light

956172131_5-A

5-5. Trigger Mode Selection

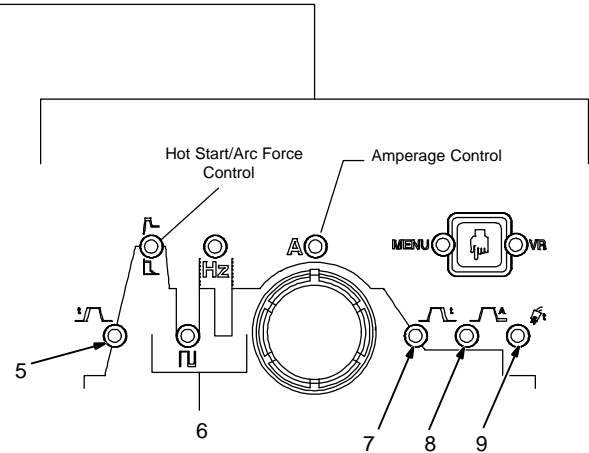
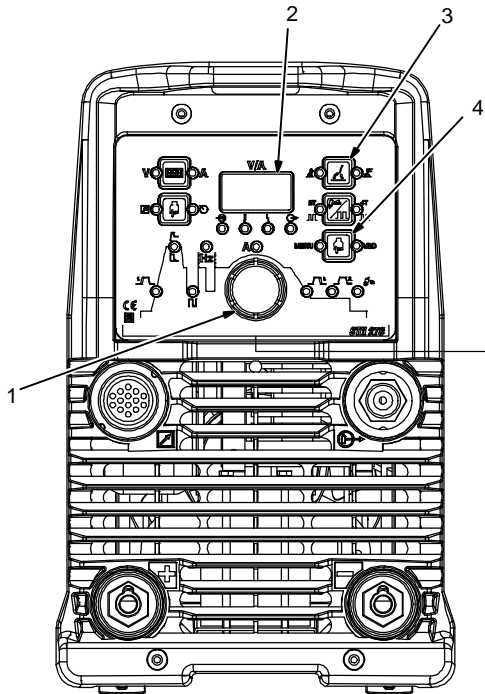


- 1 Process Selector Switch
Rotate knob clockwise to increase amperage (0-270 amps).
- 2 Trigger Mode Selector Switch
2T and 4T are used with the TIG process. Select TIG (see Section 5-3).

To change between 2T and 4T, proceed as follows: press and release Trigger Mode selector switch until desired trigger mode is selected. Indicator light begins flashing to confirm selected trigger mode.

956172131_7-A

5-6. Sequence Control Settings



1 Amperage/Parameter Adjustment Control

2 Ammeter/Voltage/Parameter Display (Meter)

3 Process Selector Switch

4 MENU/VRD Selector Switch

To enter Sequencer Control set-up mode and scroll through parameters (slope up time, weld amperage, slope down time, final current, and postflow) press and release the MENU/VRD selector switch. Selected parameter is displayed on the meter and the corresponding LED lights. Turn Amperage/Parameter Adjustment control to change value of selected parameter. Value selected is displayed on the meter.

5 Slope Up Time

Is the amount of time it takes to slope up/down from initial amperage to weld amperage. (min=0s, max=10s).

6 Weld Amperage

7 Slope Down Time

Is the amount of time it takes to slope up/down from weld (main) amperage to final amperage. (min=0s, max=15s).

8 Final Current

Is the amperage to which weld amperage has sloped up/down to.

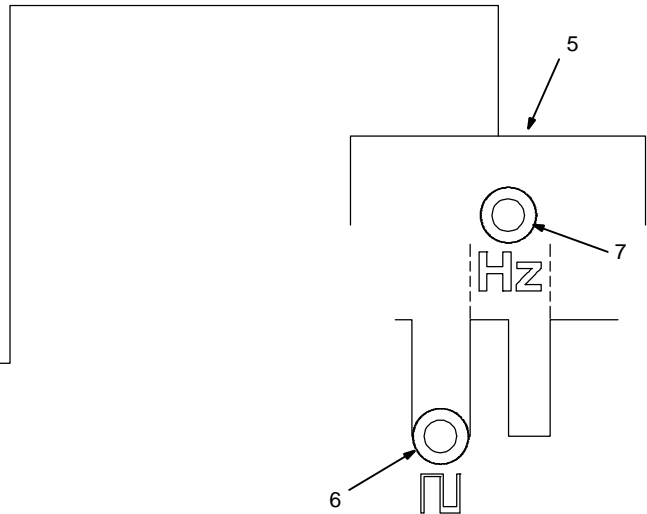
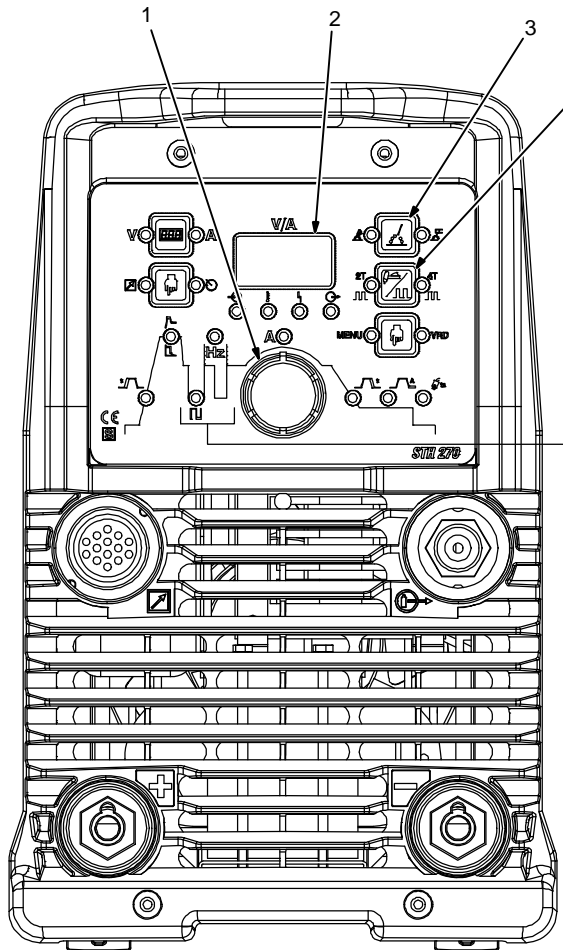
9 Postflow Time

Is the length of time gas flows after welding stops to protect weld puddle (min.0s-max.20s).

Prewflow time is 0.3 seconds.

Unit will automatically exit the set-up menu if no activity is detected for more than five seconds. Press and hold the Menu/VRD switch to re-enter set-up mode.

5-7. Pulsar Control Settings



- 1 Amperage/Parameter Adjustment Control
- 2 Ammeter/Voltage/Parameter Display (Meter)
- 3 Process Selector Switch
- 4 MENU/VRD Selector Switch

To enter Pulsar set-up mode and scroll through parameters, press and release the MENU/VRD selector switch. Selected parameter is displayed on the meter and the corresponding LED lights. Turn Amperage/Parameter Adjustment control to change value of selected parameter. Value selected is displayed on the meter.

- 5 Pulsar LEDs
- 6 Background Current

Background Current controls the low pulse of the weld amperage, which cools the weld puddle and affects overall heat input. Background Current is set as a percentage of peak amperage.


- 7 Pulse Frequency (Hz)

Pulse Frequency controls weld bead appearance. (min=0 Hz, max=500Hz).

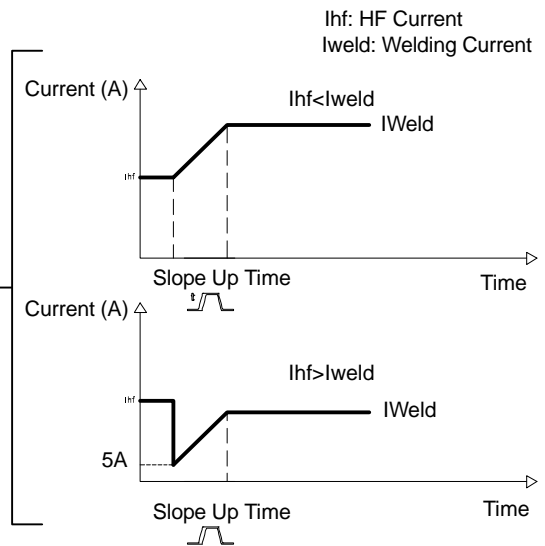
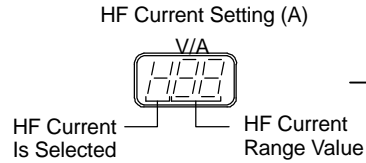
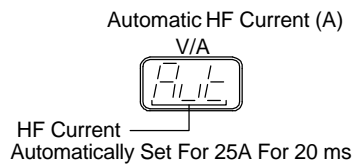
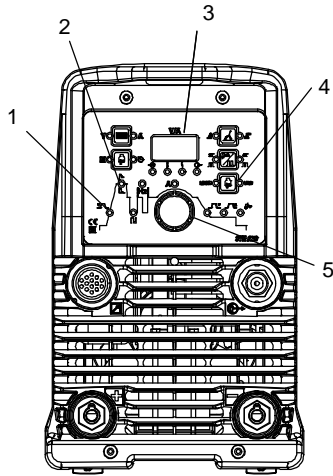
Application:

Pulsing refers to the alternating raising and lowering of the weld output at a specific rate. The raised portions of the weld output

are controlled in width, height, and frequency, forming pulses of weld output. These pulses and the lower amperage level between them (called the background current) alternately heat and cool the molten weld puddle. The combined effect gives the operator better control of penetration, bead width, crowning, undercutting, and heat input.

 Unit will automatically exit the set-up menu if no activity is detected for more than five seconds. Press and hold the Menu/VRD switch to re-enter set-up mode.

5-8. HF Current Settings



- 1 Slope Up Indicator Light
- 2 Hot Start/Arc Force
- 3 Ammeter/Voltage/Parameter Display (Meter)

To enter HF current control settings, press and hold the MENU/VRD Selector Switch for five seconds. Hot Start/Arc Indicator LED lights. Meter displays *H* and two digital numbers indicating the amperage range value. Turn Amperage/Parameter Adjustment control knob to change the amperage range value. Turn control knob clockwise to

increase value. To enter HF automatic set-up menu proceed as follow: While in the set up menu, turn knob counterclockwise to the minimum value. Meter displays *AUTO*, and the amperage value is automatically set by the power source (25A for 20ms).

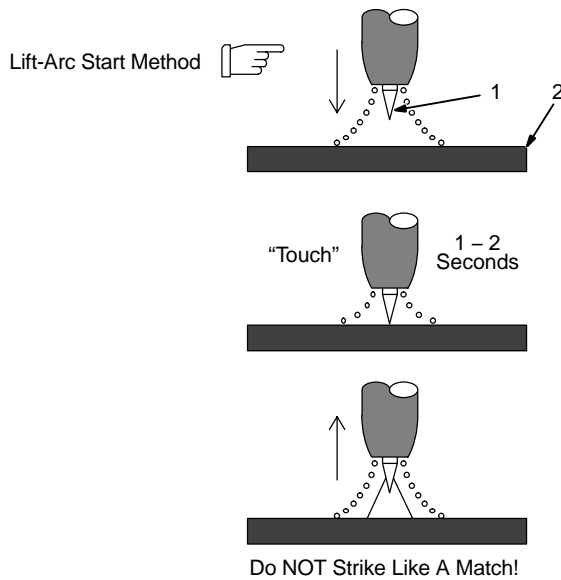
Understanding the A/T curves:
I_{weld}: Welding Amperage (see Section 5-4)
I_{hf}: HF Amperage

- I_{hf} < I_{weld}: HF Amperage value is maintained for 20 ms and then reaches welding amperage within the slope time.

- I_{hf} > I_{weld}: HF Amperage value is maintained for 20 ms and then falls down to the minimum value of 5A. After that, welding amperage is reached within the slope time.

☞ Unit will automatically exit the set-up menu if no activity is detected for more than five seconds. Press and hold the MENU/VRD switch to re-enter set-up mode.

5-9. Lift-Arc Start Procedure



Lift-Arc Start

With Lift-Arc™ selected, start arc as follows:

- 1 Tungsten Electrode
- 2 Workpiece

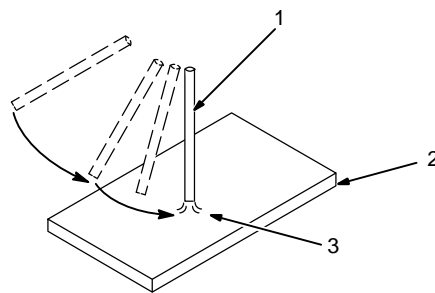
Turn gas on. Touch tungsten electrode to workpiece at weld start point. **Hold electrode to workpiece for 1-2 seconds**, and slowly lift electrode. Arc is formed when electrode is lifted.

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

Application:

Lift-Arc is used for the DCEN GTAW process when HF Start method is not permitted, or to replace the scratch method.

5-10. Stick Start Procedure – Scratch Start Technique



With Stick selected, start arc as follows:

- 1 Electrode
- 2 Workpiece
- 3 Arc

Drag electrode across workpiece like striking a match; lift electrode slightly after touching work. If arc goes out electrode was lifted too high. If electrode sticks to workpiece, use a quick twist to free it.








For models with stock number 907 220, normal open-circuit voltage (80 volts) is present before electrode touches workpiece.




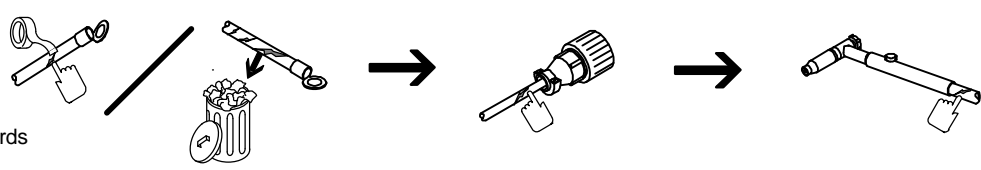

For models with stock numbers 907 036 and 907 037, normal open-circuit voltage is not present before electrode touches workpiece; only a low sensing voltage is present between electrode and workpiece.

SECTION 6 – MAINTENANCE AND TROUBLESHOOTING



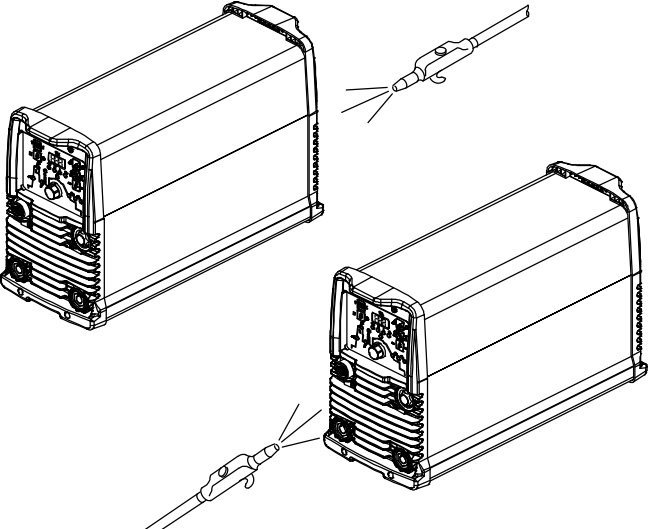
6-1. Routine Maintenance

				<p>⚠ Disconnect power before maintaining.</p> <p> Maintain more often during severe conditions.</p>
---	---	---	---	---

A. Welding Power Source

		✓ = Check * To be done by Factory Authorized Service Agent	◇ = Change	● = Clean	Δ = Repair	☆ = Replace
Every 3 Months	 ✓ ☆ Labels	 ✓ ☆ Gas Hoses				
Every 3 Months	 ✓ Δ ☆ Cables And Cords					
Every 6 Months	<p>⚠ Do not remove case when blowing out inside of unit (see Section 6-2).</p> <p style="text-align: center;">  </p> <p>●: During heavy service, clean monthly.</p>					

6-2. Blowing Out Inside Of Unit


			<p>⚠ Do not remove case when blowing out inside of unit.</p> <p>To blow out unit, direct airflow through front and back louvers as shown.</p>
---	---	--	--

6-3. Troubleshooting



Trouble	Remedy
No weld output; unit completely inoperative.	Place line disconnect switch in On position (see Section 4-9).
	Check and replace line fuse(s), if necessary, or reset circuit breaker (see Section 4-9).
	Check for proper input power connections (see Section 4-9).
No weld output; Output LED on.	Input voltage outside acceptable range of variation (see Section 4-8).
No weld output; Overtemp LED on.	Unit overheated. Allow unit to cool with fan On (see Sections 3-5).
Erratic or improper weld output.	Use proper size and type of weld cable (see Section 4-3).
	Clean and tighten all weld connections (see Section 4-3).
Fan not operating.	Check for and remove anything blocking fan movement.
	Have Factory Authorized Service Agent check fan motor.
Wandering arc	Use proper size tungsten (see Section 9).
	Use properly prepared tungsten (see Section 9).
	Reduce gas flow rate (see Section 4-5).
Tungsten electrode oxidizing and not remaining bright after conclusion of weld.	Shield weld zone from drafts.
	Allow adequate postflow time to shield tungsten while it cools, after welding stops.
	Check and tighten all gas fittings (see Section 4-5).
	Water in torch. Refer to torch manual.

SECTION 7 – ELECTRICAL DIAGRAMS

	WARNING
	<ul style="list-style-type: none"> ● Do not touch live electrical parts. ● Disconnect input power or stop engine before servicing. ● Do not operate with covers removed. ● Have only qualified persons install, use, or service this unit.
ELECTRIC SHOCK HAZARD	

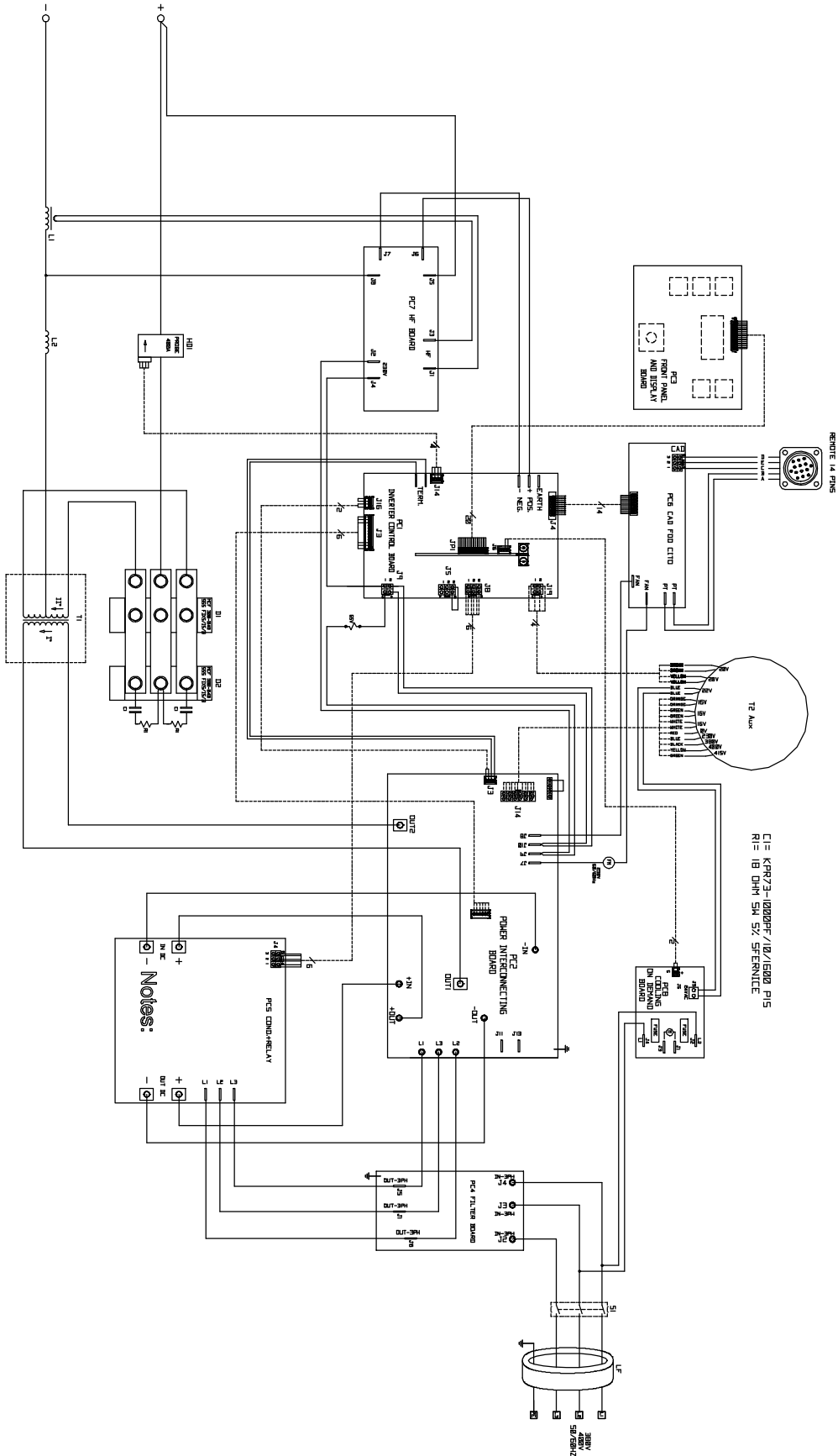

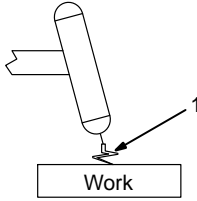


Figure 7-1. Circuit Diagram

SECTION 8 – HIGH FREQUENCY

8-1. Welding Processes Requiring High Frequency






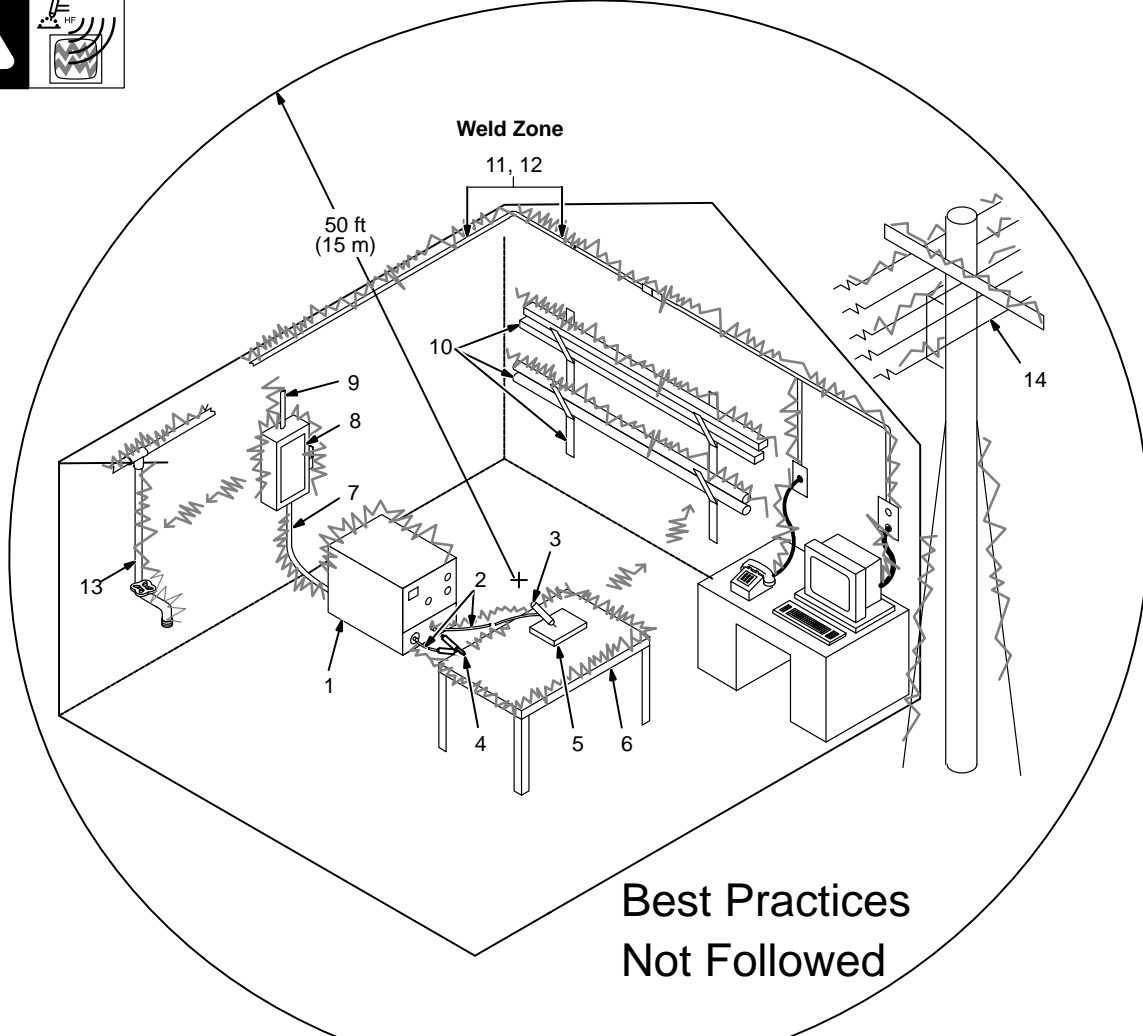
TIG

1 High-Frequency Voltage
TIG – helps arc jump air gap between torch and workpiece and/or stabilize the arc.

high_freq 5/10 – S-0693

8-2. Installation Showing Possible Sources Of HF Interference



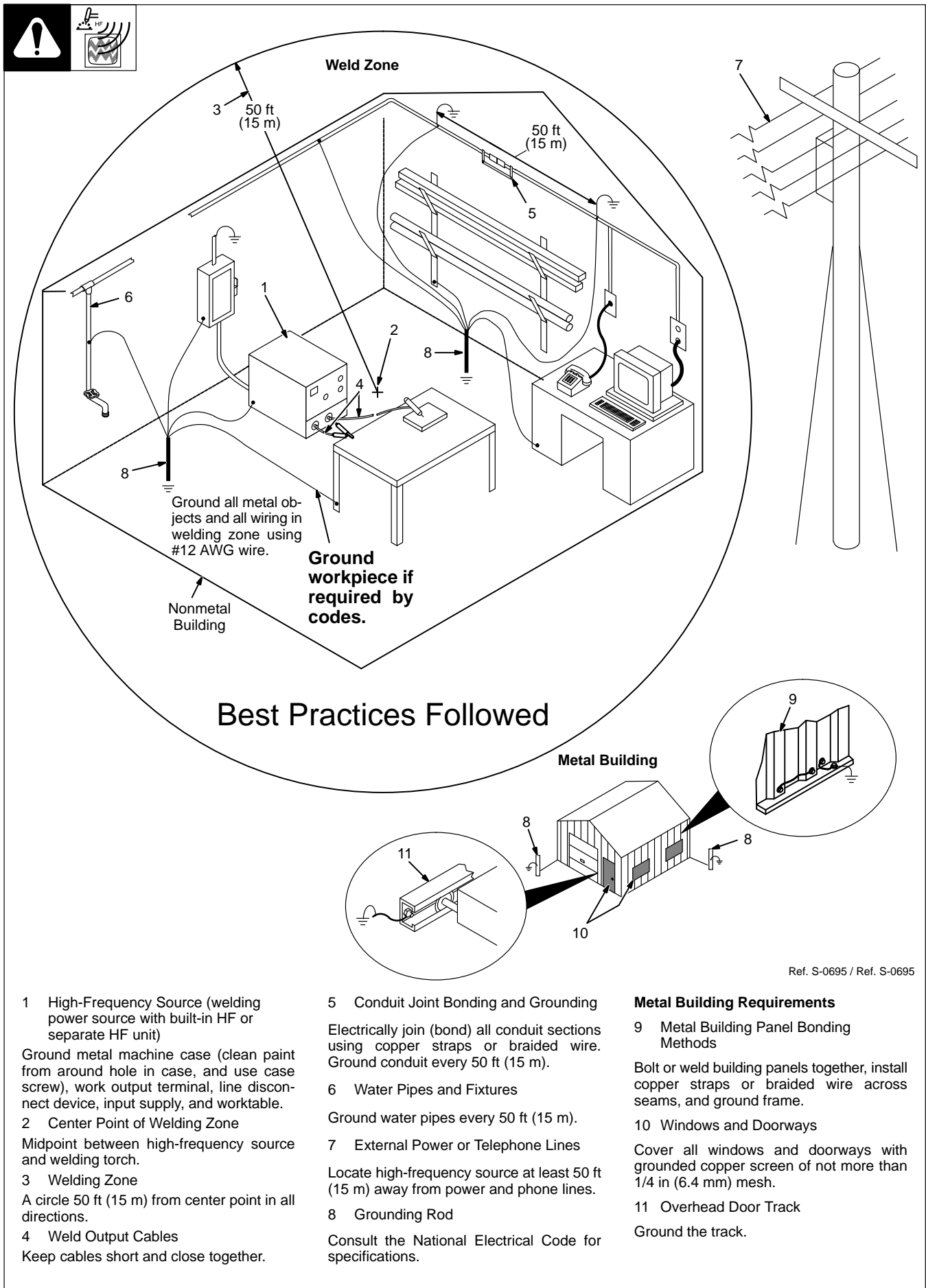


Best Practices
Not Followed

Sources of Direct High-Frequency Radiation	Sources of Conduction of High Frequency	Sources of Reradiation of High Frequency
<ul style="list-style-type: none"> 1 High-Frequency Source (welding power source with built-in HF or separate HF unit) 2 Weld Cables 3 Torch 4 Work Clamp 5 Workpiece 6 Work Table 	<ul style="list-style-type: none"> 7 Input Power Cable 8 Line Disconnect Device 9 Input Supply Wiring 	<ul style="list-style-type: none"> 10 Ungrounded Metal Objects 11 Lighting 12 Wiring 13 Water Pipes and Fixtures 14 External Phone and Power Lines

S-0694

8-3. Recommended Installation To Reduce HF Interference



Best Practices Followed

- 1 High-Frequency Source (welding power source with built-in HF or separate HF unit)
Ground metal machine case (clean paint from around hole in case, and use case screw), work output terminal, line disconnect device, 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 and Grounding
Electrically join (bond) all conduit sections using copper straps or braided wire. Ground conduit every 50 ft (15 m).
- 6 Water Pipes and Fixtures
Ground water pipes 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 Grounding Rod
Consult the National Electrical Code for specifications.

- Metal Building Requirements**
- 9 Metal Building Panel Bonding Methods
Bolt or weld building panels together, install copper straps or braided wire across seams, and ground frame.
 - 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.

Ref. S-0695 / Ref. S-0695

SECTION 9 – SELECTING AND PREPARING A TUNGSTEN FOR DC OR AC WELDING WITH INVERTER MACHINES

gtaw_Inverter_2011-06



Whenever possible and practical, use DC weld output instead of AC weld output.

9-1. Selecting Tungsten Electrode (Wear Clean Gloves To Prevent Contamination Of Tungsten)

☞ Not all tungsten electrode manufacturers use the same colors to identify tungsten type. Contact the tungsten electrode manufacturer or reference the product packaging to identify the tungsten you are using.

Electrode Diameter	Amperage Range - Gas Type ♦ - Polarity	
	(DCEN) – Argon Direct Current Electrode Negative (For Use With Mild Or Stainless Steel)	AC – Argon Balance Control @ 65% Electrode Negative (For Use With Aluminum)
2% Ceria, 1.5% Lanthanum, Or 2% Thorium Alloy Tungstens		
.010 in. (1 mm)	Up to 25	Up to 20
.020 in. (1 mm)	15-40	15-35
.040 in. (1 mm)	25-85	20-80
1/16 in. (1.6 mm)	50-160	50-150
3/32 in. (2.4 mm)	130-250	135-235
1/8 in. (3.2 mm)	250-400	225-360
5/32 in. (4.0 mm)	400-500	300-450
3/16 in (4.8 mm)	500-750	400-500
1/4 in. (6.4 mm)	750-1000	600-800

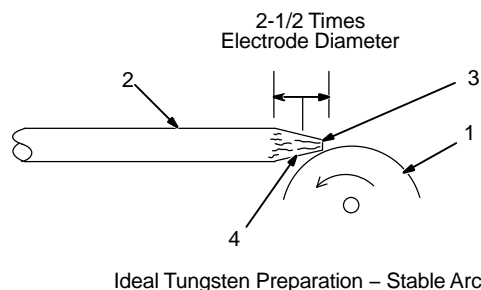
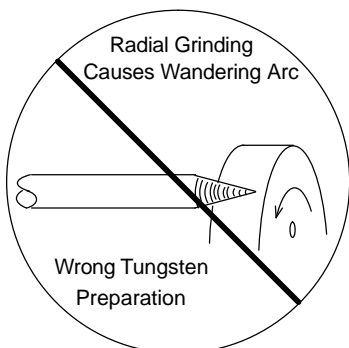
♦ Typical argon shielding gas flow rates are 11 to 35 CFH (cubic feet per hour).

Figures listed are a guide and are a composite of recommendations from American Welding Society (AWS) and electrode manufacturers.

9-2. Preparing Tungsten Electrode For DC Electrode Negative (DCEN) Welding Or AC Welding With Inverter Machines



Grinding the tungsten electrode produces dust and flying sparks which can cause injury and start fires. Use local exhaust (forced ventilation) at the grinder or wear an approved respirator. Read MSDS for safety information. Consider using tungsten containing ceria, lanthana, or yttria instead of thoria. Grinding dust from thoriated electrodes contains low-level radioactive material. Properly dispose of grinder dust in an environmentally safe way. Wear proper face, hand, and body protection. Keep flammables away.



1 Grinding Wheel

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.

2 Tungsten Electrode

A 2% ceriated tungsten is recommended.

3 Flat

Diameter of this flat determines amperage capacity.

4 Straight Ground

Grind lengthwise, **not radial**.

SECTION 10 – GUIDELINES FOR TIG WELDING (GTAW)

10-1. Positioning The Torch

⚠ Grinding the tungsten electrode produces dust and flying sparks which can cause injury and start fires. Use local exhaust (forced ventilation) at the grinder or wear an approved respirator. Read MSDS for safety information. Consider using cerium or lanthanum based tungsten instead of thoriated. Thorium dust contains low-level radioactive material. Properly dispose of grinder dust in an environmentally safe way. Wear proper face, hand, and body protection. Keep flammables away.

- 1 Workpiece
- 2 Work Clamp
- 3 Torch
- 4 Filler Rod (If Applicable)
- 5 Gas Cup
- 6 Tungsten Electrode

Make sure workpiece is clean before welding.

Place as close to the weld as possible.

Select and prepare tungsten according to Section 9.

Guidelines:

The inside diameter of the gas cup should be at least three times the tungsten diameter to provide adequate shielding gas coverage. (For example, if tungsten is 1/16 in. diameter, gas cup should be a minimum of 3/16 in. diameter.)

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

The tungsten extension should be no greater than the inside diameter of the gas cup.

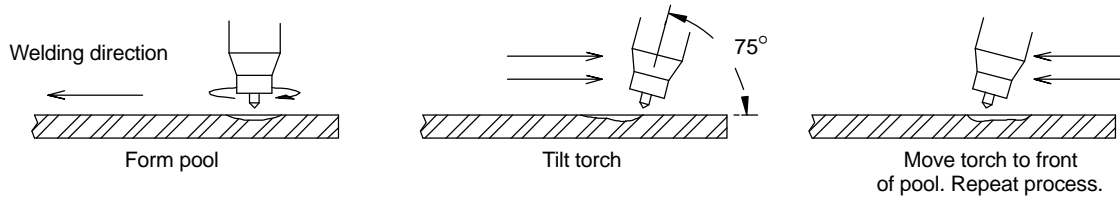
Arc length is the distance from the tungsten to the workpiece.

Bottom View Of Gas Cup

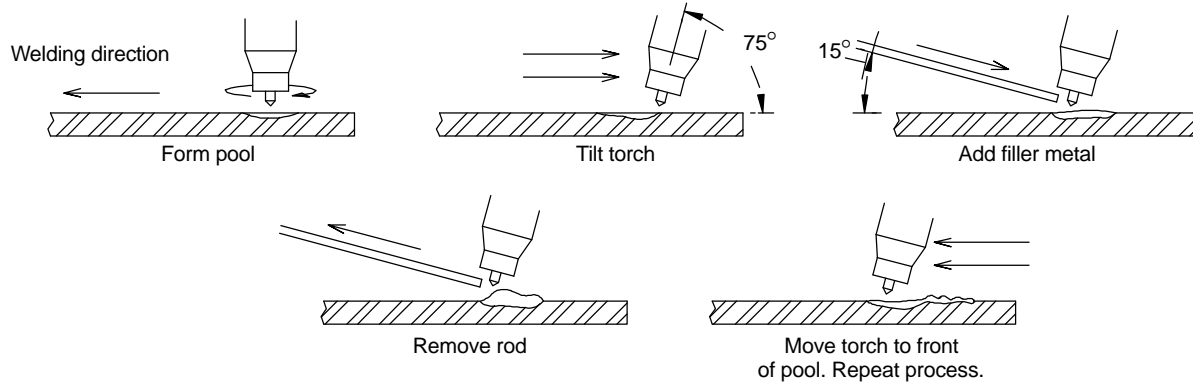
Ref. ST-161 892

10-2. Torch Movement During Welding

Tungsten Without Filler Rod



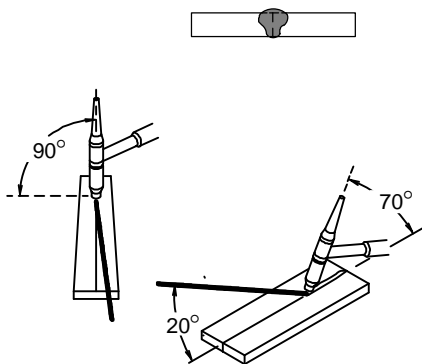
Tungsten With Filler Rod



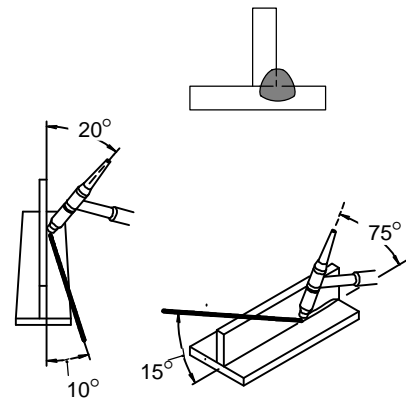
ST-162 002-B

10-3. Positioning Torch Tungsten For Various Weld Joints

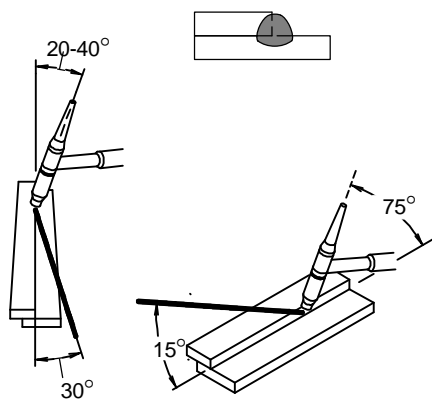
Butt Weld And Stringer Bead



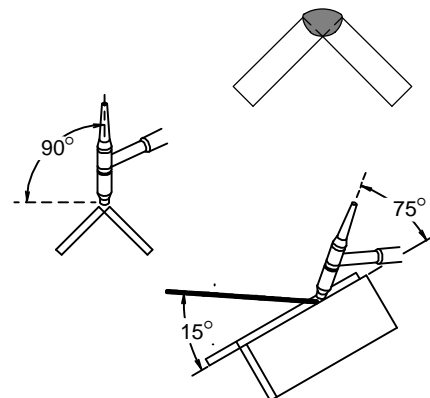
"T" Joint



Lap Joint



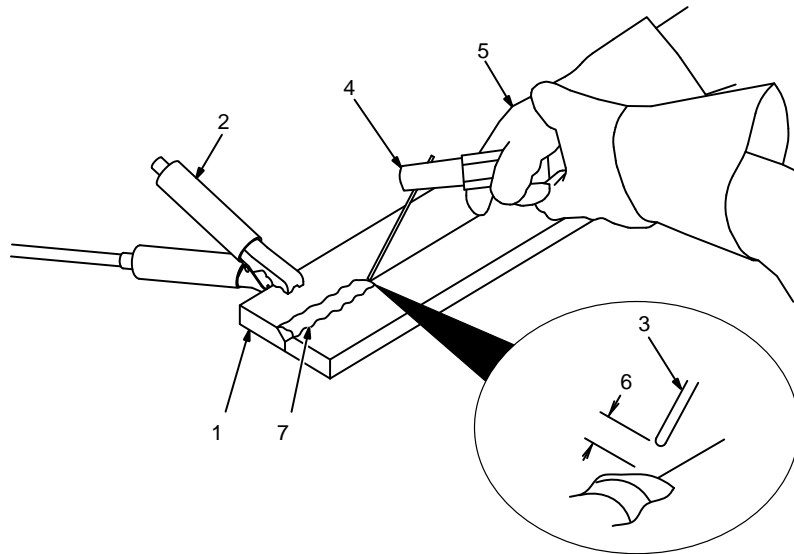
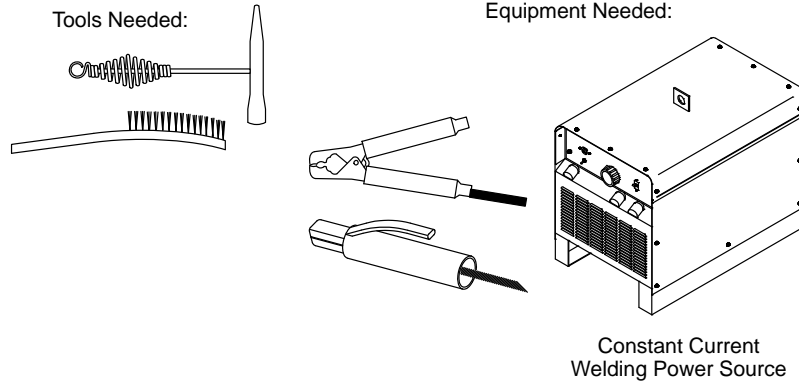
Corner Joint



ST-162 003 / S-0792

SECTION 11 – STICK WELDING (SMAW) GUIDELINES

11-1. Stick Welding Procedure



⚠ Weld current starts when electrode touches workpiece.

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

📖 Always wear appropriate personal protective clothing.

1 Workpiece

Make sure workpiece is clean before welding.

2 Work Clamp

Place as close to the weld as possible.

3 Electrode

Before striking an arc, insert an electrode in the electrode holder. A small diameter electrode requires less current than a large one. Follow recommendations of the electrode manufacturer when setting weld amperage (see Section 11-2).

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. Correct arc length is related to electrode diameter. Examine the weld bead to determine if the arc length is correct.

Arc length for 1/16 and 3/32 in. diameter electrodes should be about 1/16 in. (1.6 mm); arc length for 1/8 and 5/32 in. electrodes should be about 1/8 in. (3 mm).

7 Slag

Use a chipping hammer and wire brush to remove slag. Remove slag and check weld bead before making another weld pass.

11-2. Electrode and Amperage Selection Chart



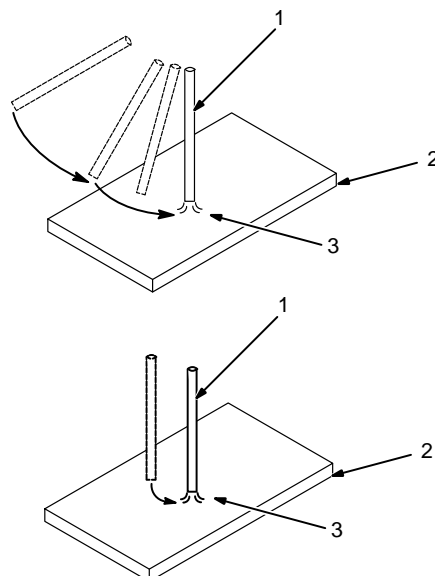
ELECTRODE	DIAMETER	AMPERAGE RANGE								
		50	100	150	200	250	300	350	400	450
6010 & 6011	3/32									
	1/8									
	5/32									
	3/16									
	7/32									
6013	1/4									
	1/16									
	5/64									
	3/32									
	1/8									
	5/32									
	3/16									
7014	7/32									
	1/4						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

ELECTRODE	DC*	AC	POSITION	PENETRATION	USAGE
6010	EP		ALL	DEEP	MIN. PREP, ROUGH HIGH SPATTER
6011	EP	✓	ALL	DEEP	MIN. PREP, ROUGH HIGH SPATTER
6013	EP,EN	✓	ALL	LOW	GENERAL
7014	EP,EN	✓	ALL	MED	SMOOTH, EASY, FAST
7018	EP	✓	ALL	MED	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

11-3. Striking an Arc



⚠ Weld current starts when electrode touches workpiece.

- 1 Electrode
- 2 Workpiece
- 3 Arc

Scratch Technique

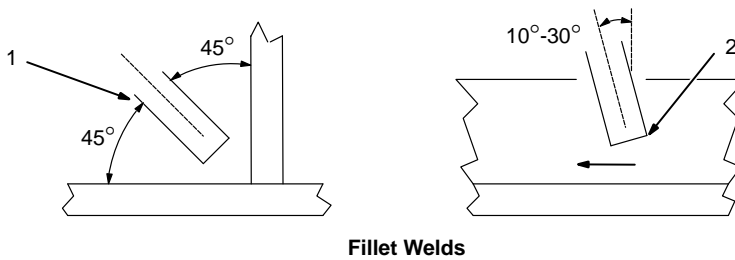
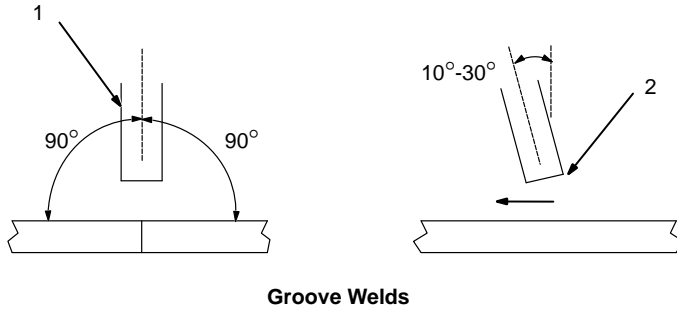
Drag electrode across workpiece like striking a match; lift electrode slightly after touching work. If arc goes out, electrode was lifted too high. If electrode sticks to workpiece, use a quick twist to free it.

Tapping Technique

Bring electrode straight down to workpiece; then lift slightly to start arc. If arc goes out, electrode was lifted too high. If electrode sticks to workpiece, use a quick twist to free it.

S-0049 / S-0050

11-4. Positioning Electrode Holder



- 1 End View Of Work Angle
- 2 Side View Of Electrode Angle

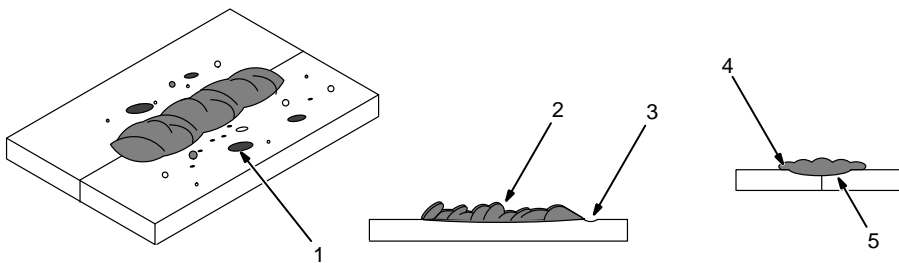
After learning to start and hold an arc, practice running beads of weld metal on flat plates using a full electrode.

Hold the electrode nearly perpendicular to the work, although tilting it ahead (in the direction of travel) will be helpful.

To produce the best results, hold a short arc, travel at a uniform speed, and feed the electrode downward at a constant rate as it melts.

S-0060

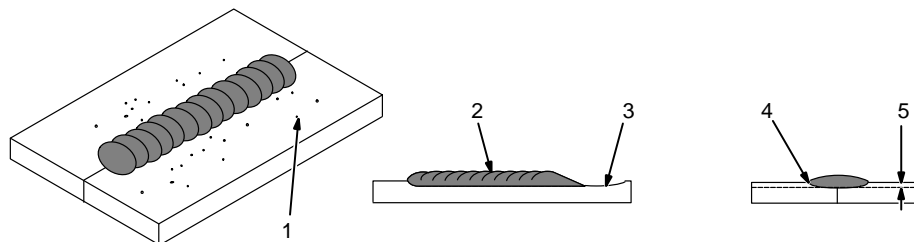
11-5. Poor Weld Bead Characteristics



- 1 Large Spatter Deposits
- 2 Rough, Uneven Bead
- 3 Slight Crater During Welding
- 4 Bad Overlap
- 5 Poor Penetration

S-0053-A

11-6. Good Weld Bead Characteristics



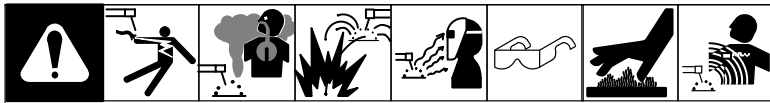
- 1 Fine Spatter
- 2 Uniform Bead
- 3 Moderate Crater During Welding

Weld a new bead or layer for each 1/8 in. (3.2 mm) thickness in metals being welded.

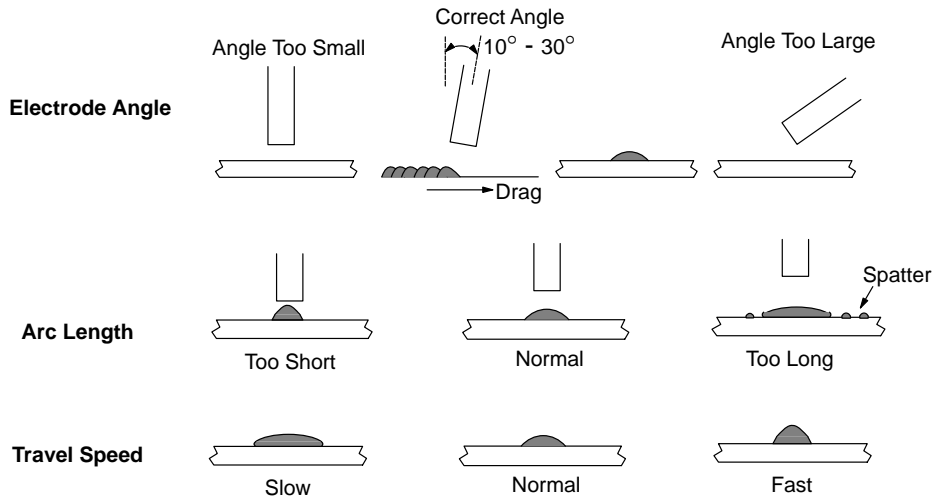
- 4 No Overlap
- 5 Good Penetration into Base Metal

S-0052-B

11-7. Conditions That Affect Weld Bead Shape



☞ Weld bead shape is affected by electrode angle, arc length, travel speed, and thickness of base metal.

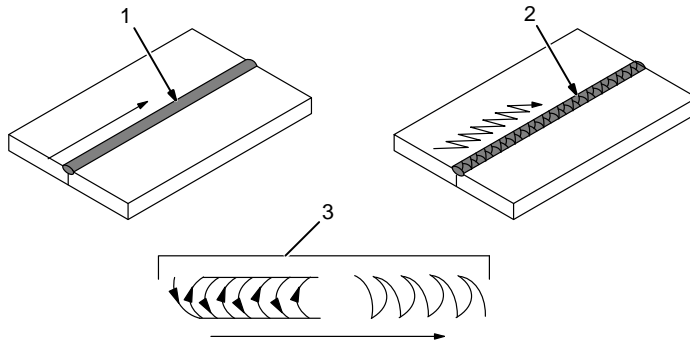


S-0061

11-8. Electrode Movement During Welding



☞ 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.

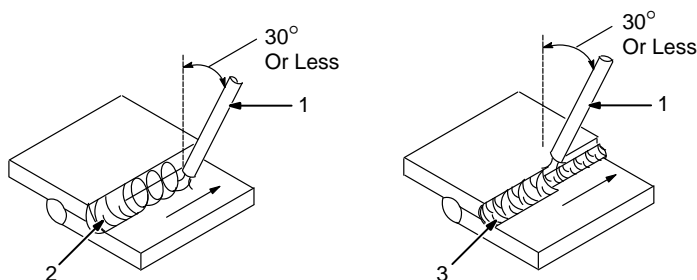


- 1 Stringer Bead – Steady Movement Along Seam
- 2 Weave Bead – Side to Side Movement Along Seam
- 3 Weave Patterns

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

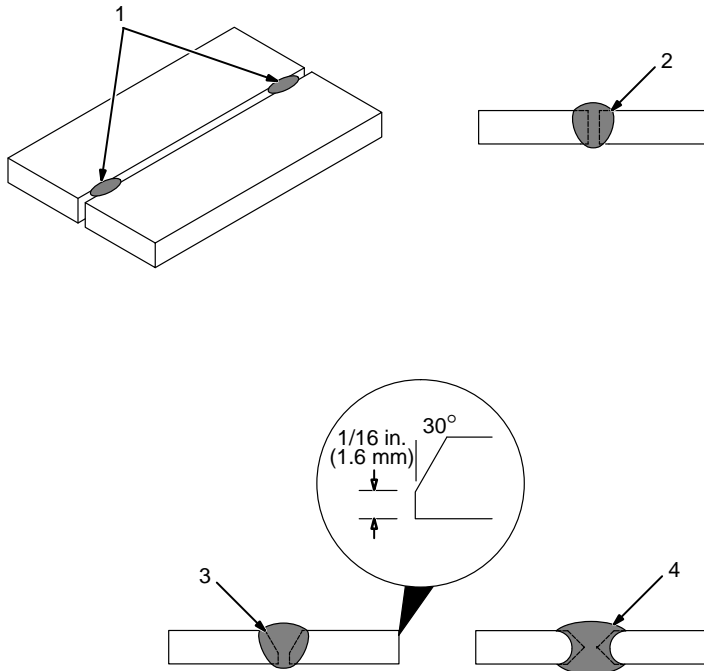
11-9. Welding Lap Joints



- 1 Electrode
- 2 Single-Layer Fillet Weld
Move electrode in circular motion.
- 3 Multi-Layer Fillet Weld
Weld a second layer when a heavier fillet is needed. Remove slag before making another weld pass. Weld both sides of joint for maximum strength.

S-0063 / S-0064

11-10. Welding Groove (Butt) Joints



1 Tack Welds

Prevent butt joint distortion by tack welding the materials in position before final weld.

Workpiece distortion occurs when heat is applied locally to a joint. One side of a metal plate will “curl” up toward the weld. Distortion will also cause the edges of a butt joint to pull together ahead of the electrode as the weld cools.

2 Square Groove Weld

3 Single V-Groove Weld

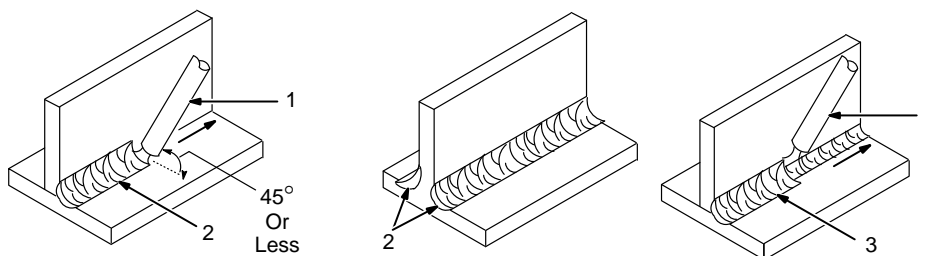
4 Double V-Groove Weld

Materials up to 3/16 in. (5 mm) thick can often be welded without special preparation using the square groove weld. However, when welding thicker materials it may be necessary to prepare the edges (V-groove) of butt joints to ensure good welds.

The single or double V-groove weld is good for materials 3/16 – 3/4 in. (5-19 mm) thick. Generally, the single V-groove is used on materials up to 3/4 in. (19 mm) thick and when, regardless of thickness, you can weld from one side only. Create a 30 degree bevel with oxy-acetylene or plasma cutting equipment. Remove scale from material after cutting. A grinder can also be used to prepare bevels.

S-0062

11-11. Welding Tee Joints



1 Electrode

2 Fillet Weld

Keep arc short and move at definite rate of speed. Hold electrode as shown to provide fusion into the corner. Square edge of the weld surface.

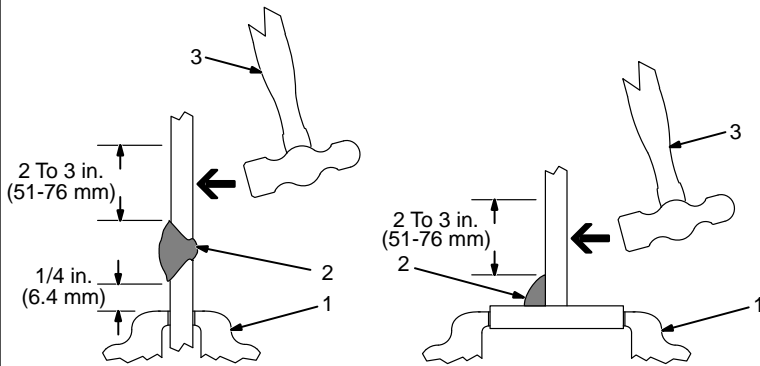
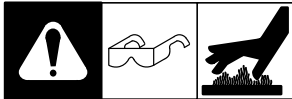
For maximum strength weld both sides of upright section.

3 Multi-Layer Deposits

Weld a second layer when a heavier fillet is needed. Use any of the weaving patterns shown in Section 11-8. Remove slag before making another weld pass.

S-0060 / S-0058-A / S-0061

11-12. Weld Test



- 1 Vise
- 2 Weld Joint
- 3 Hammer

Strike the weld joint in the direction shown. A good weld bends over but does not break.

If the weld breaks, examine it to determine the cause.

If the weld is porous (many holes), the arc length was probably too long.

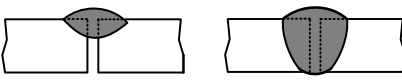
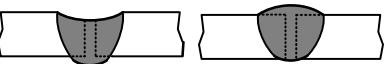
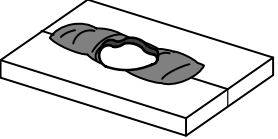
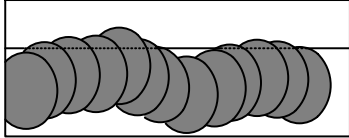
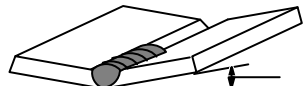
If the weld contains bits of slag, the arc may have been too long or the electrode was moved incorrectly which allowed molten slag to be trapped in the weld. This may happen on a V-groove joint made in several layers and calls for additional cleaning between layers.

If the original beveled surface is visible the material was not fully melted which is often caused by insufficient heat or too fast a travel speed.

S-0057-B

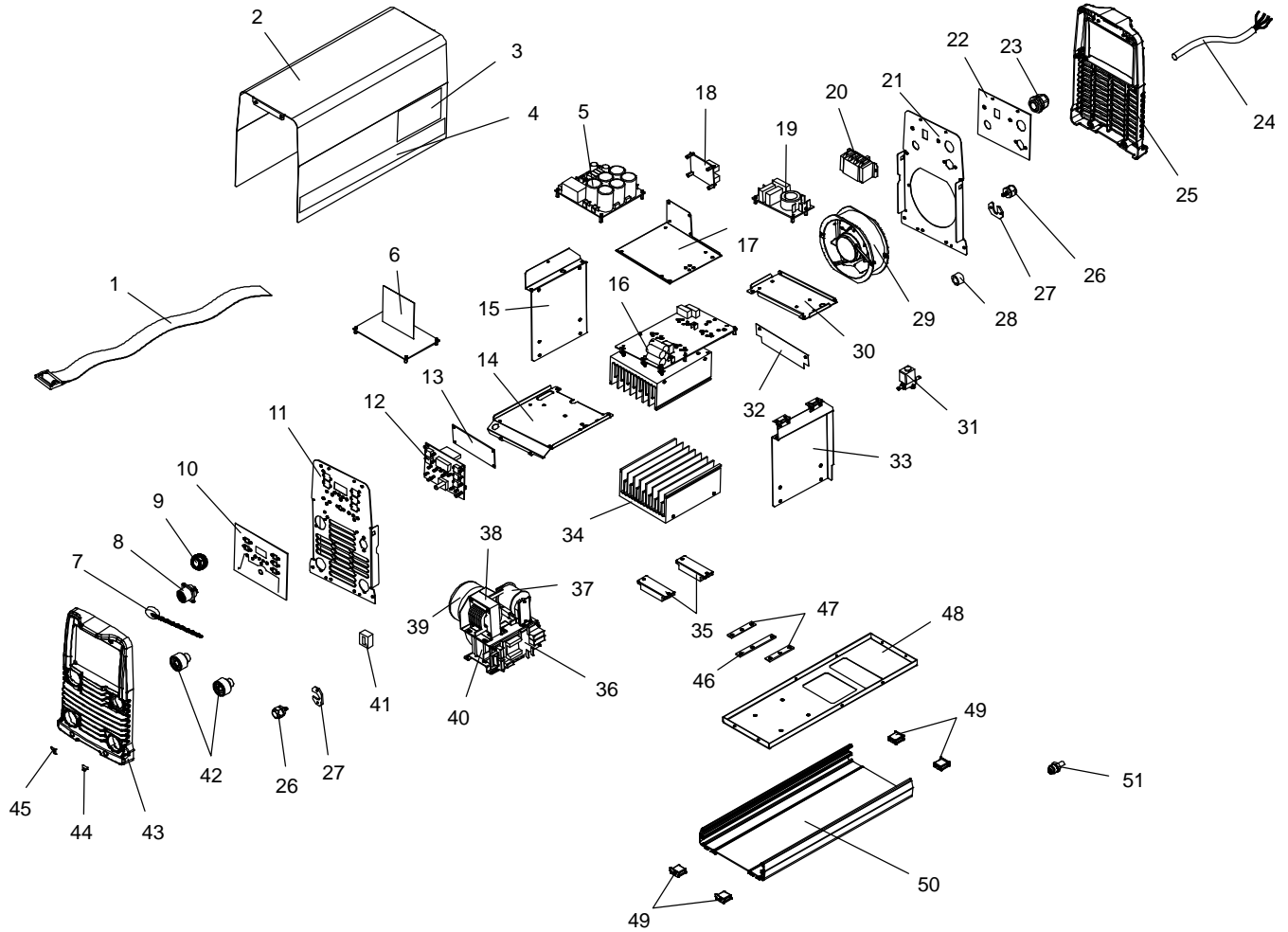
11-13. Troubleshooting

	<p>Porosity – small cavities or holes resulting from gas pockets in weld metal.</p>
<p>Possible Causes</p>	<p>Corrective Actions</p>
<p>Arc length too long.</p>	<p>Reduce arc length.</p>
<p>Damp electrode.</p>	<p>Use dry electrode.</p>
<p>Workpiece dirty.</p>	<p>Remove all grease, oil, moisture, rust, paint, coatings, slag, and dirt from work surface before welding.</p>
	<p>Excessive Spatter – scattering of molten metal particles that cool to solid form near weld bead.</p>
<p>Possible Causes</p>	<p>Corrective Actions</p>
<p>Amperage too high for electrode.</p>	<p>Decrease amperage or select larger electrode.</p>
<p>Arc length too long or voltage too high.</p>	<p>Reduce arc length or voltage.</p>
	<p>Incomplete Fusion – failure of weld metal to fuse completely with base metal or a preceding weld bead.</p>
<p>Possible Causes</p>	<p>Corrective Actions</p>
<p>Insufficient heat input.</p>	<p>Increase amperage. Select larger electrode and increase amperage.</p>
<p>Improper welding technique.</p>	<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>
<p>Workpiece dirty.</p>	<p>Remove all grease, oil, moisture, rust, paint, coatings, slag, and dirt from work surface before welding.</p>

 <p>Lack of Penetration Good Penetration</p>	<p>Lack Of Penetration – shallow fusion between weld metal and base metal.</p>
<p>Possible Causes</p>	<p>Corrective Actions</p>
<p>Improper joint preparation.</p>	<p>Material too thick. Joint preparation and design must provide access to bottom of groove.</p>
<p>Improper weld technique.</p>	<p>Keep arc on leading edge of weld puddle.</p>
<p>Insufficient heat input.</p>	<p>Increase amperage. Select larger electrode and increase amperage.</p>
	<p>Reduce travel speed.</p>
 <p>Excessive Penetration Good Penetration</p>	<p>Excessive Penetration – weld metal melting through base metal and hanging underneath weld.</p>
<p>Possible Causes</p>	<p>Corrective Actions</p>
<p>Excessive heat input.</p>	<p>Select lower amperage. Use smaller electrode.</p>
	<p>Increase and/or maintain steady travel speed.</p>
	<p>Burn-Through – weld metal melting completely through base metal resulting in holes where no metal remains.</p>
<p>Possible Causes</p>	<p>Corrective Actions</p>
<p>Excessive heat input.</p>	<p>Select lower amperage. Use smaller electrode.</p>
	<p>Increase and/or maintain steady travel speed.</p>
	<p>Waviness Of Bead – weld metal that is not parallel and does not cover joint formed by base metal.</p>
<p>Possible Causes</p>	<p>Corrective Actions</p>
<p>Unsteady hand.</p>	<p>Use two hands. Practice technique.</p>
 <p>Base metal moves in the direction of the weld bead.</p>	<p>Distortion – contraction of weld metal during welding that forces base metal to move.</p>
<p>Possible Causes</p>	<p>Corrective Actions</p>
<p>Excessive heat input.</p>	<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 12 – PARTS LIST

☞ Hardware is common and not available unless listed.



956172131_11-A

Figure 12-1. Main Assembly

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

Figure 12-1. Main Assembly

...	1	057116003	Strap, Shoulder Assy	1
...	2	+156122096	Wrapper	1
...	3	179310	Label, Gen. Precautionary	2
...	4	956172114	Label, Side STH 270	2
...	5	PC5 057084194	Circuit Card, Capacitor And Relay Board	1
...	6	PC1 057084200	Circuit Card, Inverter Control Board	1
...	7	656043046	Screw Cap, 14-Pin Rcpt	1
...	8	056076265	Receptacle, 14-Pin	1
...	9	193919	Knob, Pointer	1
...	10	356029261	Nameplate, Front, STH 270	1
...	11	156118097	Panel, Front	1
...	12	PC3 057084201	Circuit Card, Display Board	1
...	13	PC6 057084202	Circuit Card, Cad Fod HF 270	1

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

Figure 12-1. Main Assembly (continued)

... 14		156122097	... Bulkhead, Front	1
... 15		156005192	... Bracket, LH	1
... 16	PC2	028069156	... Circuit Card, Power Interconnecting Board	1
... 17		156005195	... Bracket, Door	1
... 18	PC8	057084203	... Circuit Card, Cooling On Demand Board	1
... 19	PC4	057084198	... Circuit Card, Filter Board	1
... 20	S1	244920	... Switch, TGL 3PST 40A 600 VAC SCR Term Wide TGL	1
... 21		156118098	... Panel, Rear	1
... 22		356029265	... Nameplate, Rear, STH 270	1
... 23		656089046	... Strain Relief, M25x1.5	1
... 24		256071011	... Cable, Primary 4 Core 2.5 MM 2 3.3 MT	1
... 25		246624	... Bezel, Rear	1
... 26		231279	... Fitting, Gas-Clip Mount	2
... 27		230155	... Bracket, Valve MTG	2
... 28	LF	156160003	... Core, Toroidal, 13x26x28.5	1
... 29	FM	057035023	... Fan, 230 VAC	1
... 30		156122098	... Bulkhead, Rear	1
... 31	GSV	056061037	... Valve, 230vac 4w 1/8in. FF	1
... 32		756033060	... Insulator, Secondary Output	1
... 33		156005194	... Bracket, RH	1
... 34		056082105	... Heat Sink, Secondary Output	1
... 35	D1, D2	028069158	... Kit, Diode Power Module	2
... 36	PC7	057084204	... Circuit Card, HF Board	1
... 37	L1	057015109	... Coil, HF	1
... 38	L2	057098025	... Choke	1
... 39	T2	058021163	... Transformer, Toroidal 400 VAC	1
... 40	T1	058021165	... Transformer	1
... 41	HD1	056167009	... Probe, 400 A	1
... 42		056076260	... Dinse, Socket, Female, 50 MMQ	2
... 43		246623	... Bezel, Front	1
... 44		956172116	... Label, Negative	1
... 45		956172115	... Label, Positive	1
... 46		216031080	... Bus Bar, 3x15 L.110	1
... 47		316031024	... Bus Bar, 4x20 L.110	2
... 48		156006094	... Base, Internal	1
... 49		250946	... Foot, Base	4
... 50		246626	... Base	1
... 51		057052053	... Hose, Connector, 5/8 in.	1

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

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

TRUE BLUE[®]

WARRANTY

Effective January 1, 2013
(Equipment with a serial number preface of MD 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, ITW Welding Products Italy 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 the equipment was delivered to the original retail purchaser or one year after the equipment is shipped to a European distributor or eighteen months after the equipment is shipped to an International distributor.

1. 5 Years Parts — 3 Years Labor
 - * Original main power rectifiers only to include SCRs, diodes, and discrete rectifier modules with exclusion of STR, Si, STI, STH and MPi series.
2. 3 Years — Parts and Labor
 - * Engine Driven Welding Generators
(NOTE: Engines are warranted separately by the engine manufacturer.)
 - * Inverter Power Sources (Unless Otherwise Stated)
 - * Process Controllers
 - * Semi-Automatic and Automatic Wire Feeders
 - * Transformer/Rectifier Power Sources
 - * Water Coolant System (Integrated)
3. 2 Years — Parts
 - * Auto-Darkening Helmet Lenses (No Labor)
 - * Migmatic 175
 - * HF Units
 - * Water Coolant Systems (EU Models, Non-Integrated)
4. 1 Year — Parts and Labor Unless Specified
 - * Automatic Motion Devices
 - * 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.)
 - * Induction Heating Power Sources, Coolers, and Electronic Controls/Recorders
 - * Motor Driven Guns (w/exception of Spoolmate Spoolguns)
 - * Positioners and Controllers
 - * Powered Air Purifying Respirator (PAPR) Blower Unit (No Labor)
 - * Racks
 - * Running Gear and Trailers
 - * Subarc Wire Drive Assemblies
 - * Water Coolant Systems (USA Models, Non-Integrated)
 - * Work Stations/Weld Tables (No Labor)
5. 6 Months — Parts
 - * Batteries

6. 90 Days — Parts
 - * Accessory (Kits)
 - * Canvas Covers
 - * Induction Heating Coils and Blankets
 - * MIG Guns
 - * Remote Controls
 - * Replacement Parts (No Labor)
 - * Spoolmate Spoolguns
 - * Cables and Non-Electronic Controls

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

1. **Consumable components; such as contact tips, cutting nozzles, contactors, brushes, switches, slip rings, relays or parts that fail due to normal wear.**
2. Items furnished by Miller, but manufactured by others, such as engines or trade accessories. These items are covered by the manufacturer's warranty, if any.
3. Equipment that has been modified by any party other than Miller, or equipment that has been improperly installed, improperly operated or misused based upon industry standards, or equipment which has not had reasonable and necessary maintenance, or equipment which has been used for operation outside of the specifications for the equipment.

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

In the event of a warranty claim covered by this warranty, the exclusive remedies shall be, at Miller's option: (1) repair; or (2) replacement; or, where authorized in writing by Miller in appropriate cases, (3) the reasonable cost of repair or replacement at an authorized Miller service station; or (4) payment of or credit for the purchase price (less reasonable depreciation based upon actual use) upon return of the goods at customer's risk and expense. Miller's option of repair or replacement will be F.O.B., Factory at ITW Welding Products Group Europe 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.





Owner's Record

Please complete and retain with your personal records.

Model Name

Serial/Style Number

Purchase Date

(Date which equipment was delivered to original customer.)

Distributor

Address

Country

Zip/Postal Code



For Service

Contact a *DISTRIBUTOR* or *SERVICE AGENCY* near you.

Always provide Model Name and Serial/Style Number.

Contact your Distributor for:

Welding Supplies and Consumables

Options and Accessories

Service and Repair

Replacement Parts

Owner's Manuals

Contact the Delivering Carrier to:

File a claim for loss or damage during shipment.

For assistance in filing or settling claims, contact your distributor and/or equipment manufacturer's Transportation Department.

ITW Welding Italy S.r.l.

Via Privata Iseo, 6/E

20098 San Giuliano

Milanese, Italy

Phone: 39 (0) 2982901

Fax: 39 (0) 298290-203

email: miller@itw-welding.it

