



41185

# ***90 Amp Flux Wire Welder***

## **Instruction Manual**



Need help with your new arc welder?  
Call our customer service hotline at 1-800-386-0191

**SAVE THESE INSTRUCTIONS**

## SAFETY BEGINS WITH YOU

It is the owner and/or operator's responsibility to study all WARNINGS, operating, and maintenance instructions contained on the product label and instruction manual prior to operation of this flux wire welder. The owner/operator shall retain product instructions for future reference.

The owner and/or operator are responsible for maintenance, maintaining all decals or warning labels and while in use, maintaining the unit in good working order. If the owner and/or operator are not fluent in English, the product warnings and instructions shall be read and discussed with the operator in the operator's native language by the purchaser/owner or his designee. Make sure that the operator comprehends its contents. Safety information shall be emphasized and understood prior to usage. The flux wire welder shall be inspected per the operating instructions.

Users of this flux wire welder must fully understand these instructions. Each person operating this flux wire welder must also be of sound mind and body and must not be under the influence of any substance that might impair their vision, dexterity, or judgment.

Protect yourself and others by observing all safety information.

Failure to comply with instructions could result in personal injury and/or property damage!

If you encounter any problems or difficulties, please contact our customer service department at:

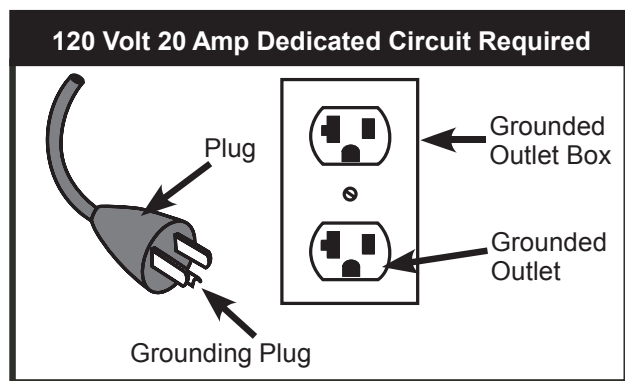
**1-800-386-0191**



**This instruction manual is intended for your benefit. Please read and follow the safety, installation, maintenance and troubleshooting steps described within to ensure your safety and satisfaction. The contents of this instruction manual are based upon the latest product information available at the time of publication. The manufacturer reserves the right to make product changes at any time without notice.**

## INTRODUCTION

Your new VAPER flux wire welder is designed for use on standard 120V household current. It is equipped with a two step output power (amperage) control to select the proper current for various welding conditions. Internal components are thermostatically protected. This VAPER welder can weld steel ranging from 14 gauge up to 1/8" thick in a single pass. The unit is setup for 0.030" (0.8 mm) flux core welding wire when it leaves the factory.



## ELECTRICAL REQUIREMENTS

This equipment requires a dedicated 120 volt 20 amp circuit equipped with a similarly rated circuit breaker or slow blow fuse. DO NOT run other appliances, lights, tools or equipment while operating this welder. EXTENSION CORDS ARE NOT RECOMMENDED for use with this welder.

## GROUNDING INSTRUCTIONS:

This product should be grounded. In the event of an electrical short circuit, grounding reduces the risk of electric shock by providing an escape wire for the electric current. This product is equipped with a cord having a grounding wire with an appropriate grounding plug. The plug must be plugged into an outlet that is properly installed and grounded in accordance with all local codes and ordinances.

## **DANGER**

Improper installation of the grounding plug can result in a risk of electric shock. If repair or replacement of the cord is necessary, do not connect the grounding wire to either flat blade terminal. The wire with insulation having an outer surface that is green with or without yellow stripes is the grounding wire. This product is for use on a nominal 120-volt circuit and has a three-prong grounding plug that looks like the plug illustrated. Make sure that the product is connected to an outlet having the same configuration as the plug. No adapter could be used with this product. The third prong is to be used to ground the welder and provide protection against electrical shock. Never remove the third prong. Check with a qualified electrician or serviceman if the grounding instructions are not completely understood, or if in doubt as to whether the product is properly grounded. Do not modify the plug provided; if it will not fit the outlet, have the proper outlet installed by a qualified electrician.

### **SAFETY ALERT**



This is the safety alert symbol. It is used to alert you to potential personal injury hazards. Obey all safety messages that follow this symbol to avoid possible injury or death.

## **WARNING**

Read and understand this entire instruction manual before attempting to assemble, install, operate or maintain this arc welder. Failure to comply with the instructions may result in serious personal injury and/or property damage!

The following signal words are used to emphasize safety warnings that must be followed when using this arc welder:

## **DANGER**

Indicates an imminently hazardous situation that, if not avoided, **WILL** result in death or serious injury.

## **WARNING**

Indicates a potentially hazardous situation that, if not avoided, **COULD** result in death or serious injury.

## **CAUTION**

Indicates a potentially hazardous situation that, if not avoided, **MAY** result in minor or moderate injury.

## **CAUTION**

Indicates important information, which if not followed, **MAY** cause damage to equipment.

## IMPORTANT SAFETY RULES - FOR ARC WELDERS SAVE THESE INSTRUCTIONS

### **WARNING**

ARC Welding can be hazardous. Protect yourself and others from possible serious injury or death. Keep children away. Pacemaker wearers should consult with their doctor before operating.

Read and understand all instructions. Failure to follow all instructions included with this product could result in serious personal injury and/or property damage.

For additional safety information, it is strongly recommended that you consult the following safety publications:

*Safety in Welding, Cutting, and Allied Processes*, ANSI Standard Z49.1, from American Welding Society, 550 N.W. LeJeune Rd, Miami FL 33126 (phone: 305-443-9353 or 800-443-9353, website: <http://www.aws.org>)

*Recommended Safe Practices for the Preparation for Welding and Cutting of Containers and Piping*, American Welding Society Standard AWS F4.1, from American Welding Society, 550 N.W. LeJeune Rd, Miami, FL 33126 (phone: 305-443-9353 or 800-443-9353, website: <http://www.aws.org>).

*National Electrical Code*, NFPA Standard 70, from National Fire Protection Association, P.O. Box 9101, 1 Battery March Park, Quincy, MA 02269-9101 (phone: 617-770-3000, website: [www.nfpa.org](http://www.nfpa.org) and [www.sparky.org](http://www.sparky.org)).

*Practice For Occupational And Educational Eye And Face Protection*, ANSI Standard Z87.1, from American National Standards Institute, 11 West 42nd Street, New York, NY 10036-8002 (phone: 212-642-4900, website: <http://www.ansi.org>).

*Standard for Fire Prevention During Welding, Cutting, and Other Hot Work*, NFPA Standard 51B, from National Fire Protection Association, P.O. Box 9101, 1 Battery March Park, Quincy, MA 02269-9101 (phone: 617-770-3000, website: [www.nfpa.org](http://www.nfpa.org) and [www.sparky.org](http://www.sparky.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 (there are 10 Regional Offices--phone for Region 5, Chicago, is 312-353-2220, website: <http://www.osha.gov>).

Follow all local electrical and safety codes as well as in the United States, the National Electrical Codes (NEC) and the Occupational Safety and Health Act (OSHA).

All installation operation, maintenance and repair procedures must be performed only by qualified individuals.

### **WARNING**

The following hazards can occur during the normal use of this product:



#### **ELECTRIC SHOCK CAN KILL!**

Reduce the risk of death or serious injury from shock. Read, understand and follow **ALL** safety instructions. Be sure that everyone who uses this welding equipment or who is a bystander in the welding area understands and follows **ALL** safety instructions as well.

- Do not touch live electrical parts. The electrode and work piece clamp are electrically "hot" when the welder is on.
- 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 physical contact with the work piece or ground.
- Do not use in damp areas, if movement is confined, or if there is a danger of falling.
- Disconnect input power before installing or servicing this equipment.
- Properly install and ground this equipment according to its Owner's manual and national, state, and local codes.
- Always verify the supply ground – check and be sure that input power cord ground wire is properly connected to ground terminal in disconnect box or that cord plug is connected to a properly grounded receptacle outlet.
- Frequently inspect input power cord for damage or bare wiring – replace cord immediately if damaged – bare wiring can kill. Do not use worn, damaged, undersized, or poorly spliced cables.
- Turn off all equipment when not in use.

- Do not drape cables over your body.
- If earth grounding of the workpiece is required, ground it directly with a separate cable.
- Do not allow any part of the body to touch the electrode if you are in contact with the ground or grounded work piece.
- Use only well-maintained equipment. Repair or replace damaged parts at once. Maintain unit according to manual.
- Always keep all panels and covers securely in place when operating the welder.
- 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.



### **FUMES AND GASES can be hazardous!**

Welding produces fumes and gases that are hazardous to your health.

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



### **ARC RAYS can burn eyes!**

Never look at arc welding without proper eye protection. Arc rays from the welding process produce intense visible and invisible (ultraviolet and infrared) rays that can burn eyes and skin. Hot sparks fly off from the weld and can burn eyes and skin.

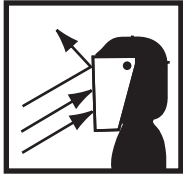
- Wear a welding helmet fitted with a proper shade of filter to protect your face and eyes when welding or watching (see ANSI Z49.1 and Z87.1 listed in Safety Standards).
- Wear approved safety glasses with side shields under your helmet.
- Use protective screens or barriers to protect others from flash and glare; warn others in the area not to watch the arc.
- Wear protective clothing made from durable, flame resistant materials, leather welding gloves and full foot protection.



### **WELDING can cause fire or explosion!**

Welding on closed containers, such as tanks, drums, or pipes, can cause them to explode. 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.

- Always keep a fire extinguisher readily available and watch for fire.
- Protect yourself and others from flying sparks and hot metal.
- Do not weld where flying sparks can strike flammable material.
- Remove all flammable materials from the welding area. If this is not possible, tightly cover them with approved covers.
- Be alert that welding sparks and hot materials from welding can easily go through small cracks and openings to adjacent areas.
- Be aware that welding on a ceiling, floor, bulkhead, or partition can cause fire on the hidden side.
- Do not weld on closed containers such as tanks, drums, or pipes; unless they are properly prepared according to AWS F4.1 standards
- Connect work cable to the work as close to the welding area as practical to prevent welding current from traveling long, possibly unknown paths and causing electric shock and fire hazards.
- Never use arc welder to thaw frozen pipes.
- Remove electrode from holder when not in use.
- Wear oil-free protective garments such as leather gloves, heavy shirt, cuff-less trousers, high shoes, and a cap.
- Remove any combustibles, such as butane lighters or matches, from your person before doing any welding.

**FLYING METAL can injure eyes!**

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

**HOT PARTS can cause severe burns!**

- Never touch hot parts bare handed.
- Allow adequate cooling period before touching work piece.

**MAGNETIC FIELDS can affect pacemakers!**

Electromagnetic fields (EMF) are generated around electric welding cables and welding machines. These EMF's can interfere with some pacemakers. Pacemaker wearers should consult their doctor before going near arc welding, gouging, or spot welding operations. To reduce magnetic fields in the workplace, use the following procedures:

- Keep cables close together by twisting or taping them.
- Arrange electrode and work piece cables to one side and away from the operator.
- Do not coil or drape cables around your body.
- Keep welding power source and cables as far away from operator as practical.
- Connect work clamp to workpiece as close to the weld as possible.

**NOISE can damage hearing!**

Noise from some processes or equipment can damage hearing.

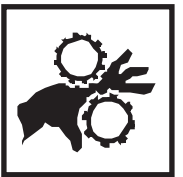
- Wear approved ear protection if noise level is high.

**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.

**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.

**MOVING PARTS can cause injury.**

- Keep away from moving parts.
- Keep away from wire feed drive rollers.
- Keep all doors, panels, covers, and guards closed and secured in place.

**WELDING WIRE can cause injury.**

- Do not point gun toward any part of the body, other people, or any metal when threading welding wire.
- Do not press gun trigger unnecessarily. When feeding welding wire through the gun, the gun is electrically "live" and can cause electric shock.



### 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.)
- Battery posts, terminals and related accessories contain lead and lead compounds, chemicals known to the State of California to cause cancer and birth defects or other reproductive harm.

#### **Wash hands after handling.**

- This product contains chemicals, including lead, known to the State of California to cause cancer, birth defects, and reproductive harm. **Wash hands after handling.**

## UNPACKING & INSPECTION

After opening the carton, unpack your new flux wire welder and related parts & accessories. Please inspect it carefully for any damage that may have occurred during transit. Please check it against the photograph on carton. If any parts are missing, please call factory customer service at 1-800-386-0191.

Do not operate this flux wire welder if damaged during shipment, handling or misuse. Do not operate the welder until the parts have been replaced or the fault rectified. Failure to do so may result in serious personal injury or property damage.

All damaged parts must be repaired or replaced as needed prior to operating this flux wire welder.

Check to see that all nuts, bolts and fittings are secure before putting this tool into service. If you have any questions, or require assistance with damaged or missing parts, please contact our factory customer service department at:

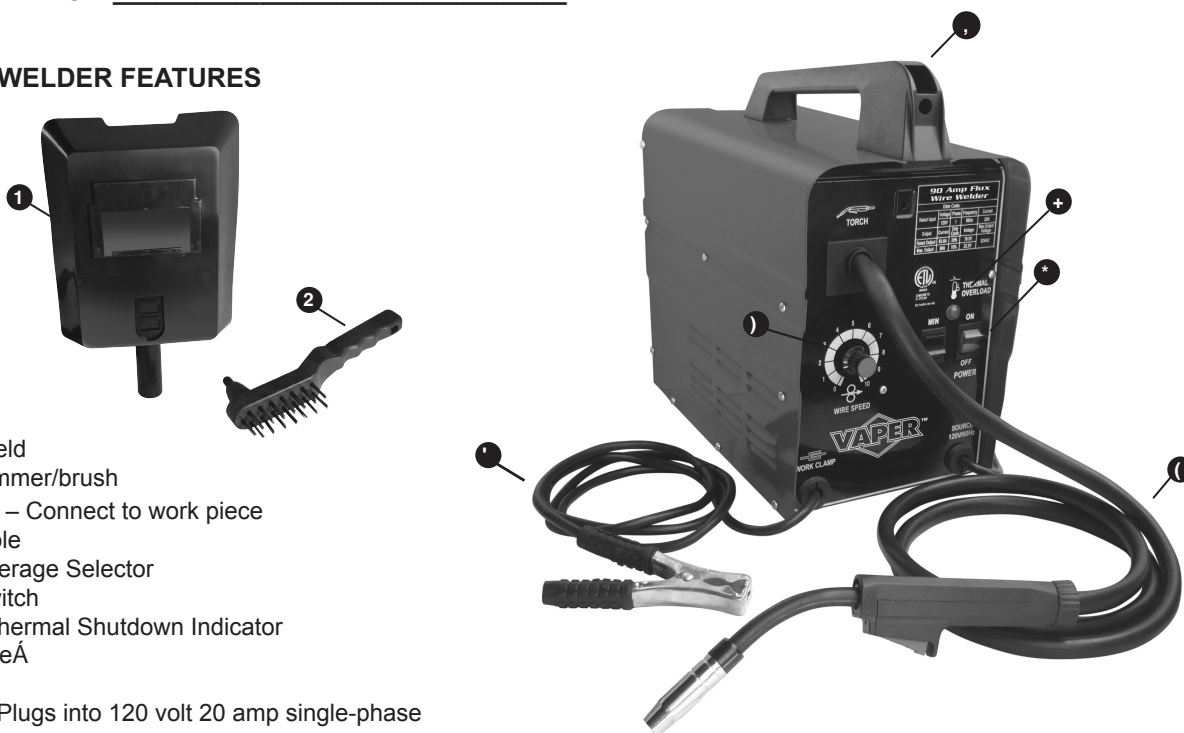
**1-800-386-0191**

Please have the model number, and date of purchase available for reference when calling.

**MODEL NUMBER:** \_\_\_\_\_

**DATE OF PURCHASE:** \_\_\_\_\_

## FLUX WIRE WELDER FEATURES



- 1) Welding shield
- 2) Welding hammer/brush
- H) Earth clamp – Connect to work piece
- I) Welding cable
- Ī) Output Amperage Selector
- Ī) ON/OFF Switch
- Ī) Automatic Thermal Shutdown Indicator
- Ī) Carry Handle
- Ā
- Power Cord – Plugs into 120 volt 20 amp single-phase power outlets



## SPECIFICATIONS:

Type:	90 Amp gasless flux-core wire welder
Input Voltage:	120 Volt (1~60Hz)
Rated Output:	90 Amps @ 10% Duty Cycle
Output Power Settings:	Switchable high/low adjustment
Output Current:	63.6 Amps - Low power output setting / 20% Duty cycle 90 Amps - High power output setting / 10% Duty cycle
Maximum Output Voltage:	32VAC
Power Switch:	Illuminated On/Off Switch
Power Cord:	6 Ft 15 Amp Power Plug
Ground Cable & Clamp:	4.9 Ft Ground Cable with Clamp
Ground Cable Connection:	Fixed Connection
Welding Cable:	6 Ft Wire feed welding cable
Welding Wire:	Uses flux-core welding wire 0.030" (0.8mm) or 0.035" (0.9mm) in diameter

## INSTALLATION

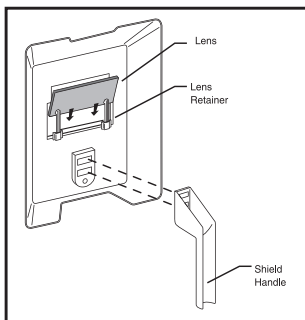
**Selecting the proper location can significantly increase the performance, reliability and life of the flux wire welder.**

For best results locate the welder in an environment that is clean and dry. Dust and dirt can accumulate in the welder and retain moisture increasing wear for moving parts. Place the welder to ensure free circulation of air around all sides of the welder.

The receptacle used for the welder must be properly grounded and the welder must be the only load on the power supply circuit. Refer to the Electrical Requirements section at the beginning of this manual for correct circuit capacity.

Turn welder OFF before plugging into appropriate 120 volt 20 amp power outlet. The use of an extension cord is not recommended for electric arc welding machines. Extension cord use will significantly degrade the performance of the welder.

## ASSEMBLY



### HAND SHIELD

- 1) Locate and insert filter lens securely into hand shield as shown.
- 2) To attach handle, place shield on flat surface and press handle into place.

**NOTE: If you have never welded before or, have little experience, a full face welding helmet is recommended. Both hands are needed to control the torch and adjust the wire speed.**

### HANDLE INSTALLATION

- 1) Place handle on top of welder in alignment with two mounting holes in top cover.
- 2) Insert screws provided through handle ends and fasten securely into top cover.

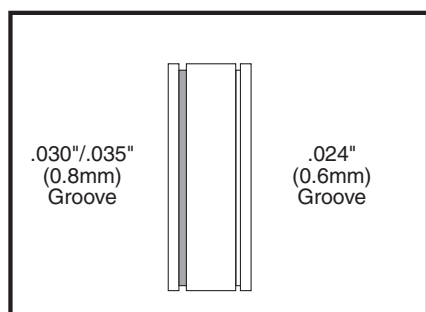
### FLUX CORE WIRE INSTALLTION

**NOTE:** Before installing welding wire, be sure that wire matches contact tip size located in end of torch. A mismatch in size can cause the welding wire to slip or bind.

Always maintain control of loose end of welding wire to prevent unspooling.

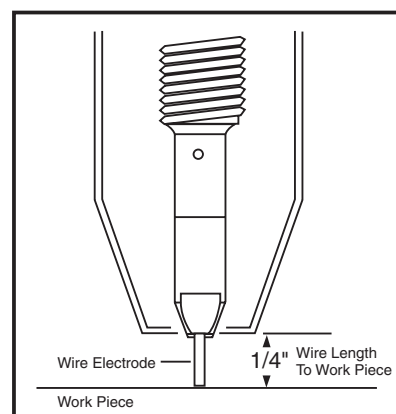


- 1) Verify that welder is turned OFF and is disconnected from the power source.
- 2) Unlock top cover panel and lift cover back to expose wire feed mechanism.
- 3) Push and rotate spool lock 1/4 turn counter-clockwise direction and pull to remove knob, spring and spool spacer.
- 4) Loosen wire feed tensioning screw on drive mechanism, lift tensioning spring arm up and hinge back the arm to allow easier installation of wire.
- 5) Install flux core welding wire spool onto spindle so that wire unwinds from spool on the end closest to the tubular wire feed guide.
- 6) Install spool spacer, spring and spool lock. Secure by pushing in spool lock and rotating knob 1/4 turn clockwise.
- 7) Hold wire spool so that it will not unravel and cut the wire end from the spool. Be sure the free end of the wire is straight and without burrs.
- 8) Feed wire through tubular wire feed guide, over the groove in the drive roller and into the gun liner.



**NOTE:** The feed roller has two grooves, one for 0.6mm (0.240") diameter wire and one for 0.8mm (0.035") diameter wire. Be sure that the correct groove size is correctly matched to the welding wire being used. To reverse the roller, unscrew the two screws securing the roller supporting bracket and remove the bracket. The roller can now be lifted off the drive shaft and reversed. Reinstall the roller supporting bracket and secure with the two screws.

- 9) Pivot tensioning spring arm into the closed position so that pressure roller presses welding wire into groove on drive roller and secure free end of spring arm onto pointed end of tensioning screw. Tighten wire feed tensioning screw. **NO NOT** over tighten. A few full turns should be enough.
- 10) Remove nozzle from end of torch by twisting and pulling to expose contact tip. Unscrew contact tip from end of torch to remove.
- 11) Plug welder into a proper receptacle and turn welder ON.
- 12) Set wire speed to high. Activate gun trigger until wire feeds out past the end of the torch. Turn the welder OFF.
- 13) Slip the contact tip over the welding wire protruding from the end of the torch and screw tip into torch end. Install nozzle onto the end of the torch and trim end of welding wire so that about 1/4" is extending from the end of the nozzle.
- 14) Close the top cover on the welder and secure with the latch.



**STICKOUT**

## DUTY CYCLE

Welder duty cycle is the percentage of actual weld time that can occur in a ten minute interval. For example, at a 20% duty cycle, actual welding can occur for two minutes, and then the welder must cool for eight minutes.

## THERMOSTATIC PROTECTION

Internal components of this welder are protected from overheating with an automatic thermal switch. A yellow lamp is illuminated on the front panel if the duty cycle is exceeded. Welding operations may continue when the yellow lamp is no longer illuminated.

## OPERATION



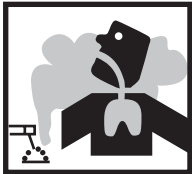
Be sure to read, understand and comply with all precautions in the Important Safety Rules section. Be sure to read the entire section entitled Welding Guidelines prior to using this equipment.

- 1) Turn welder OFF and unplug from power source during preparation for welding.
- 2) Verify that the surfaces of metals to be joined are free from dirt, rust, paint, oil, scale or other contaminants. These contaminants make welding difficult and cause poor welds.

## ⚠ WARNING

All persons operating this equipment or in the area while equipment is in use must wear protective welding gear including: eye protection with proper shade, flame resistant clothing, leather welding gloves, and full foot protection.

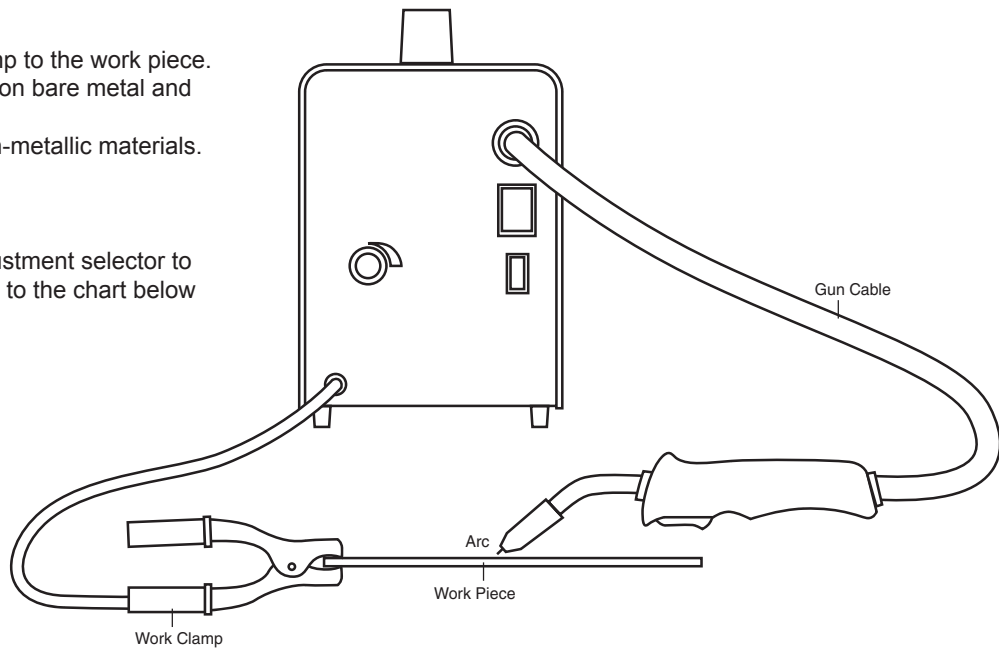
## ⚠ WARNING



If heating, welding, or cutting materials that are galvanized, zinc plated, lead, or cadmium plated refer to the Important Safety Rules Section for instructions. Extremely toxic fumes are created when these metals are heated.

- 3) Connect the work clamp to the work piece. Make sure the contact is on bare metal and not obstructed by paint, varnish, corrosion, or non-metallic materials.

- 4) Set the amperage adjustment selector to the desired setting. Refer to the chart below for proper output current settings.



**FCAW WELDING SETUP**

Metal Thickness	Output Current Settings (Amps)
18 - 14 Gauge	LOW (64A)
Thicker than 14 Gauge	HIGH (90A)

**NOTE:** Above settings are intended to serve as a general guideline only. Heat settings may vary according to welding conditions and materials being welded.

## **WARNING**

**Grounding against any metallic surface may produce an arc which could cause sparks and damage eyesight.**

- 5) Set wire speed by rotating wire speed control knob to the middle position. NOTE: Switching the output current from one setting to the other automatically increases and decreases the corresponding wire speed. The wire feed speed setting control provides fine tuning as needed after test welding.
- 6) Plug power cord into a proper power outlet as specified in the ELECTRICAL REQUIREMENTS section of this instruction manual.
- 7) Switch welder power switch to the ON position.
- 8) Ensure welding wire is protruding 1/4" from the end of the contact tip. If not, squeeze trigger to feed additional wire, release trigger and cut wire to correct 1/4" length.
- 9) Position welding torch (gun) near work piece and raise hand shield to protect your eyes. Squeeze gun trigger to activate welder. Adjust heat setting and wire speed as needed.
- 10) While welding, keep welding torch travel at a constant speed and maintain an electrode length (protruding welding wire) of 1/4" Follow the correct direction of travel for the joint type and orientation detailed in the WELDING GUIDELINES section of this manual.
- 11) To stop welding, release gun trigger.
- 12) When finished welding, turn welder off and store properly.

## **MAINTENANCE**

## **WARNING**

**Disconnect power supply and turn machine off before inspecting or servicing any components. Keep wire compartment cover closed when unit is in use. Open only when wire needs to be changed.**

### **Before every use:**

- 1) Check condition of welding cables and immediately repair or replace any cables with damaged insulation.
- 2) Check condition of power cord and immediately repair or replace any cord if damaged.
- 3) Check condition of welding torch tip and nozzle. Clean to remove any accumulated slag to avoid bridging between the nozzle and contact tip. Bridging causes shortened nozzles, poor welds and overheating of the gun. Replace welding torch tip or nozzle if damaged.

## **⚠ WARNING**

**Do not operate this welding machine with cracked or missing insulation on welding cables, welding torch, or power cord.**

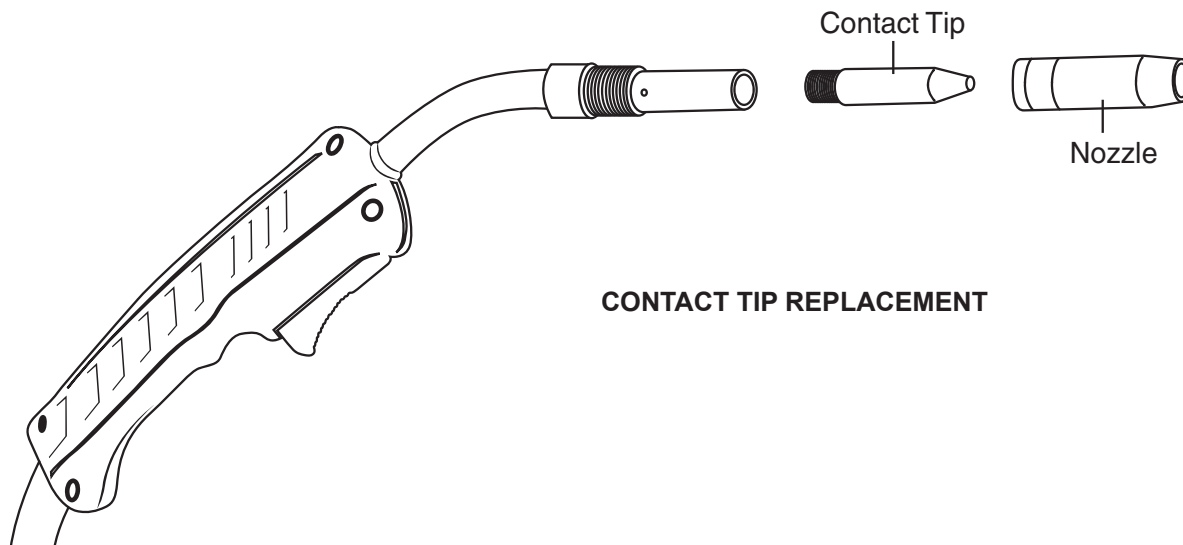
### **Every three months, or more frequently with heavy use:**

- 1) Replace any unreadable labels on the welder.
- 2) Use compressed air to blow all dust and dirt from the ventilation openings.
- 3) Vacuum dirt from wire compartment.
- 4) Clean grooves in wire feed drive roll. Remove wire from mechanism and remove two screws from drive roll housing. Remove drive roll and clean with a small brush. Replace damaged or worn drive roll as needed.
- 5) Inspect the incoming tubular wire feed guide and clean inside of tube if needed.
- 6) Clean the gun liner by removing the nozzle and contact tip. Clean the inside diameter of the welding torch with a short piece of wire. Clean the cable liner by laying the cable out straight and blowing out the liner tube with clean, dry compressed air. Flex the cable back and forth, and then blow the tube out again. Repeat this process until the liner tube is clean. Replace worn liner tube as needed.
- 7) Replace contact tip if hole is enlarged or irregularly shaped. (Refer to Consumable and Wear Parts section of this manual for details).

### **Consumable and Wear Parts:**

The following parts require periodic maintenance:

- Wire feed drive roller – Replace if worn or damaged
- Gun liner – Replace if worn or damaged
- Nozzle – Replace as needed
- Contact tips – Replace if hole is enlarged or irregularly shaped
- Wire – This welder accepts 4" diameter spools of flux cored welding wire. AWS E71T-GS or E71T-11 flux core wire is recommended for welding mild steel.



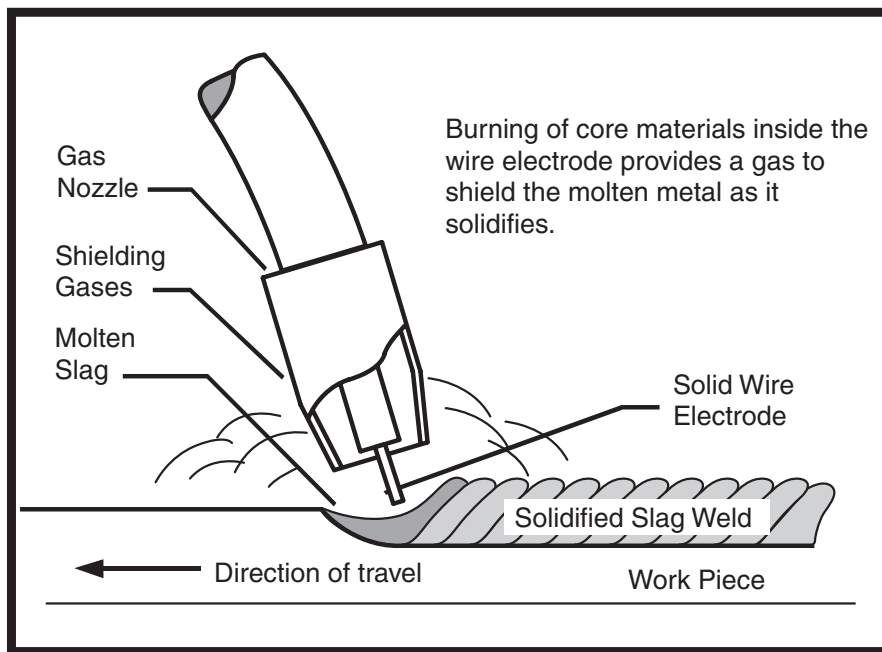
## WELDING GUIDELINES

### LEARNING TO WELD

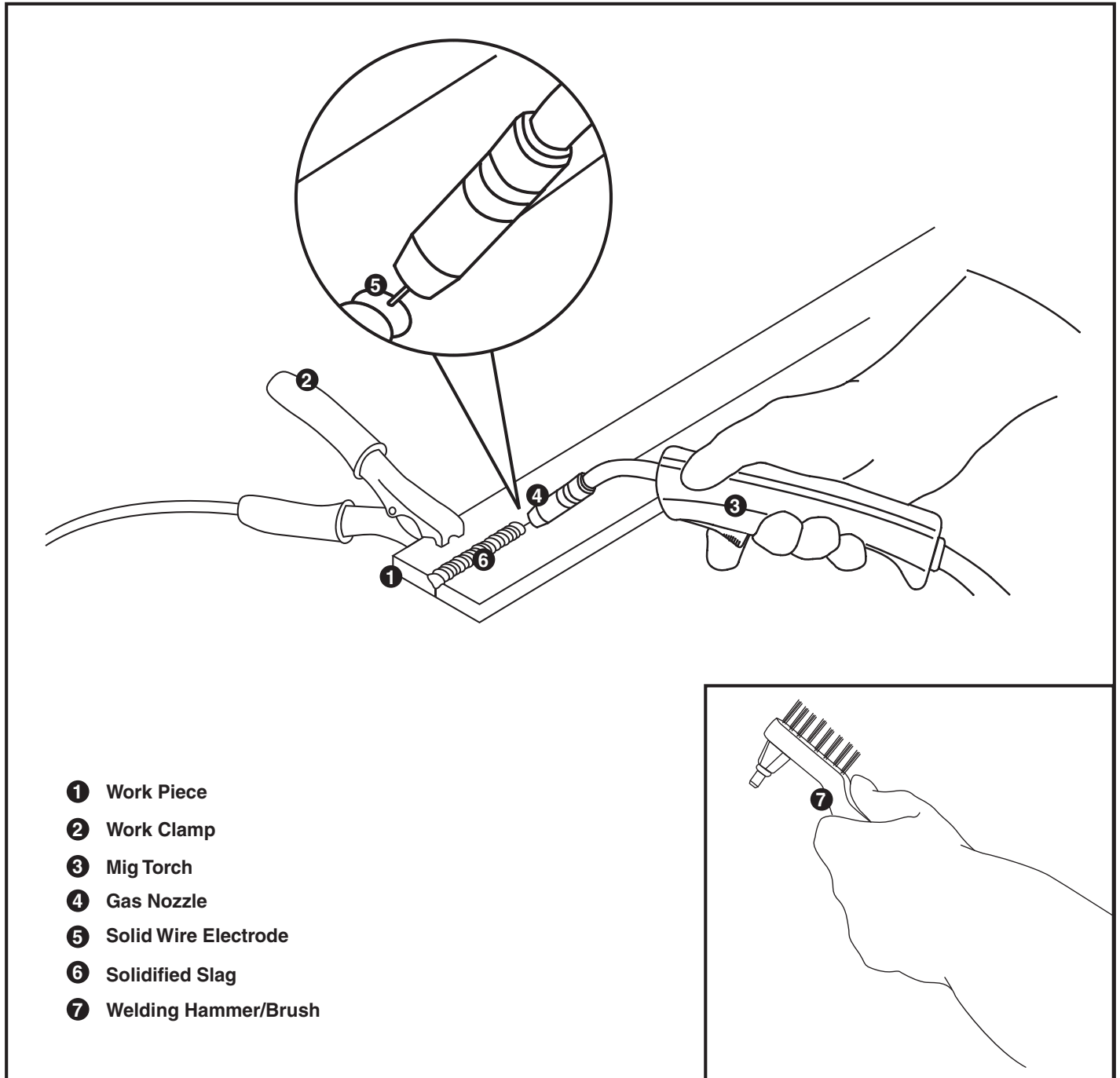
Welding is a skill that requires practice and, like any new skill, cannot be mastered without experience. The following information is designed to help the inexperienced welder understand the basics of flux wire welding. It is not a substitute for practice and is not intended to serve as the only information resource for the beginning welder.

### GENERAL

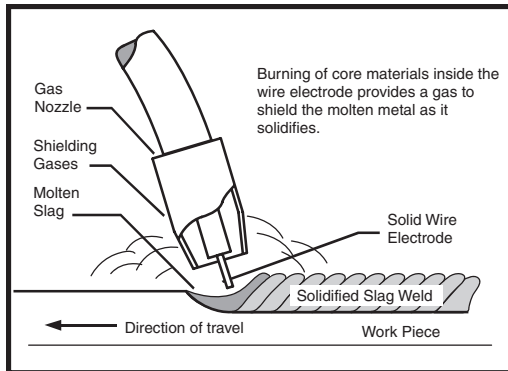
This welding machine utilizes a process known as Flux Cored Arc Welding (FCAW). This process is used to bond metals by heating them with an electric arc created between the wire electrode and the work piece. The wire electrode used for flux cored arc welding has two parts. The outer wall of the wire electrode is similar in composition to the base metal with an inner core filled with flux. While the metal is molten, it can be contaminated by elements in the air. This contamination could weaken the weld. The flux creates a shielding gas when melted which forms a protective barrier called slag that protects the molten metal from contaminants. When current (amperage) flows through the circuit to the wire electrode, an arc is formed between the end of the electrode and the work piece. The arc melts the wire and the work piece. The melted metal of the electrode wire flows into the molten crater and forms a bond with the work piece as shown below.



## SHIELDED METAL ARC WELDING SETUP



## STRIKING AN ARC



- 1) Be sure the work clamp is properly attached to the work piece.
- 2) Position gun over joint to be welded. The end of the wire may lightly touch the work piece.
- 3) Position hand shield to protect face and eyes, squeeze trigger and begin welding.
- 4) Hold gun so that the contact tip is about 1/4" to 1/2" from the work piece.
- 5) To stop welding, release the trigger and pull the gun away from the work piece after the arc goes out.

NOTE: Should a ball form at the end of the wire after welding, feed out a short length of wire and trim the wire to within about 1/4" from the nozzle and contact tip. This will allow for easier restrikes.

## ARC WELDING BASICS

Five basic techniques affect weld quality. These are: wire selection, amperage setting, weld angle, wire speed, and travel speed. Proper use of these techniques is necessary for good weld quality.

### AMPERAGE SETTING

The correct amperage involves the adjustment of the welding machine to the required amp setting. This is regulated by a switch on the welder. The amperage required depends on the size (diameter) of the wire used and the thickness of the work piece. Consult below table. Excessive amps burn through light metals and the weld bead is flat and porous. The bead appears high and irregular if the amperage is too low. NOTE: Practice on scrap material that is similar to the work piece to adjust settings.

Metal Thickness	Output Current Settings (Amps)
18 - 14 Gauge	LOW (64A)
Thicker than 14 Gauge	HIGH (90A)

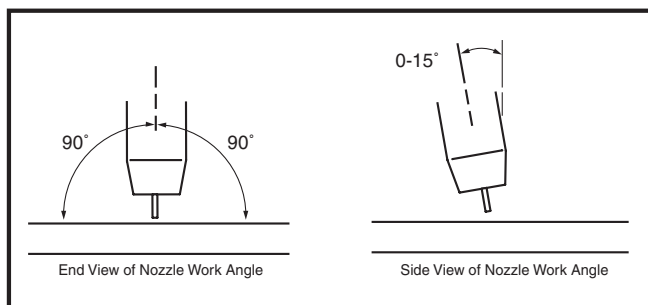
### WIRE TYPE AND SIZE

The correct type of wire involves a number of factors such as welding position, work piece material and thickness. Flux cored wire is required for this unit and is commonly known by the AWS (American Welding Society) designation. E-71T-GS or E71T-11 is recommended for this welder.

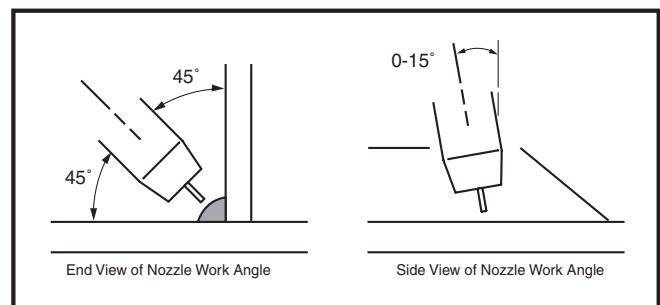
**NOTE: Store wire in a clean, dry location with low humidity to prolong the life of the wire.**

### WELD ANGLE

Weld angle is the angle at which the nozzle is held during the welding process. Using the correct angle ensures proper penetration and bead formation. Weld angle involves two positions - travel angle and work angle.



GROOVE WELD ANGLES



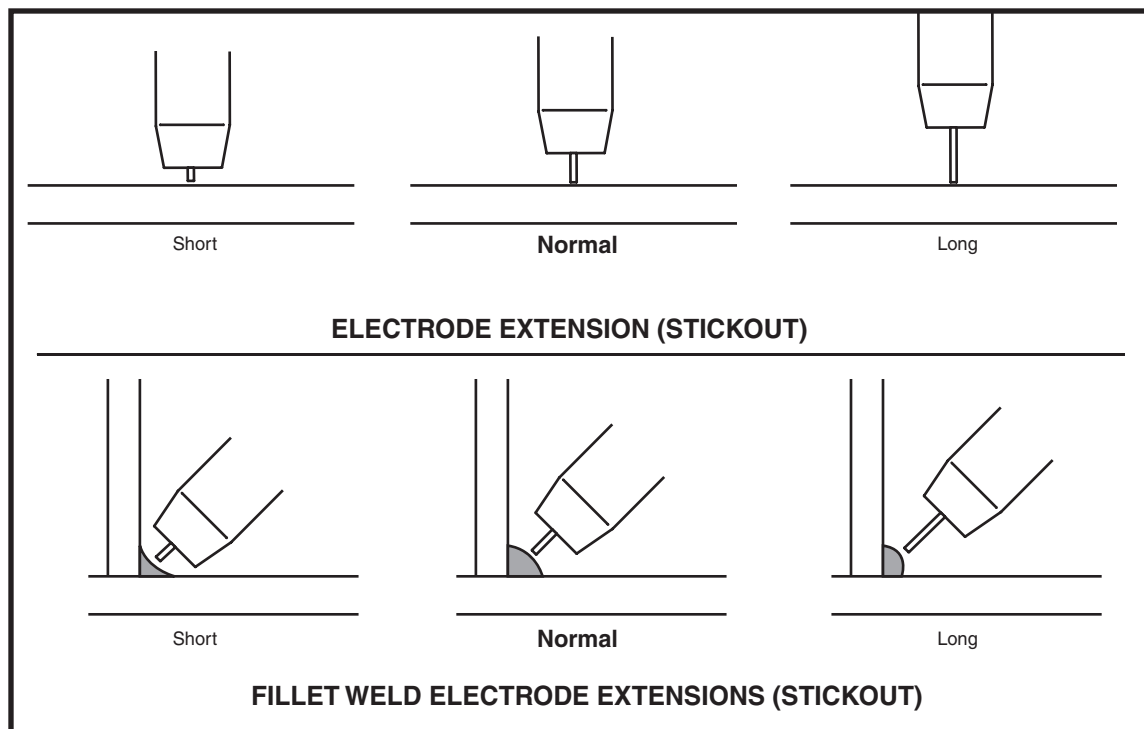
FILLET WELD ANGLES



Travel angle is the angle in the line of welding and may vary from 5° to 45° from the vertical, depending upon welding conditions and technique required. Work angle is the angle from horizontal, measured at right angles to the line of welding. For specific applications, consult an arc welding handbook.

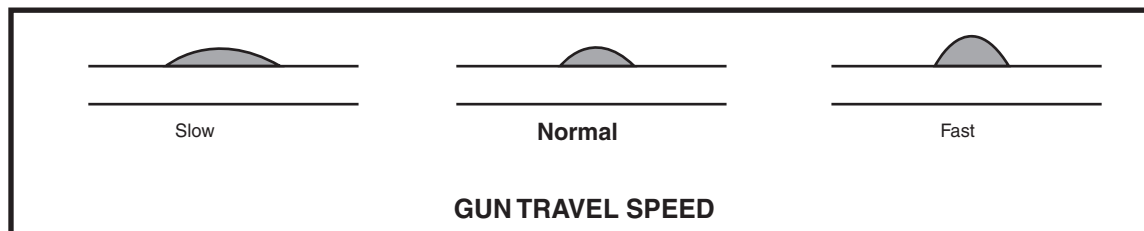
### WIRE SPEED AND STICKOUT

Wire speed is controlled by the knob on the control panel and is directly correlated to stickout. The speed needs to be matched to the rate at which the wire is being melted in the arc to maintain a stickout of approximately 3/8" to 1/2". Setting proper wire speed should be performed on scrap material that is of the same type and thickness as the work piece. Set the speed too slow and the wire will burn up into the contact tip with a sputtering sound. Set the speed too high and excessive spatter will result from the wire pushing into the work piece before melting (a sputtering sound will also be heard under this condition). You will hear the sound of a proper arc - a steady, crisp sizzle, similar to bacon frying when the wire speed is set correctly.



### TRAVEL SPEED

The travel speed is the rate at which the electrode is moved across the weld area. When the speed is too fast, the bead is narrow and bead ripples are pointed as shown. When the speed is too slow, the weld metal piles up and the bead is high and wide. To control travel speed, watch the width of the weld bead (not the arc) when welding. The weld bead is the orange, molten metal behind the arc. Control travel speed to obtain a consistent bead width.



## SLAG REMOVAL

### **WARNING**

Wear ANSI approved safety glasses (ANSI Standard Z87.1) and protective clothing when removing slag. Hot, flying debris can cause personal injury to anyone in the area.

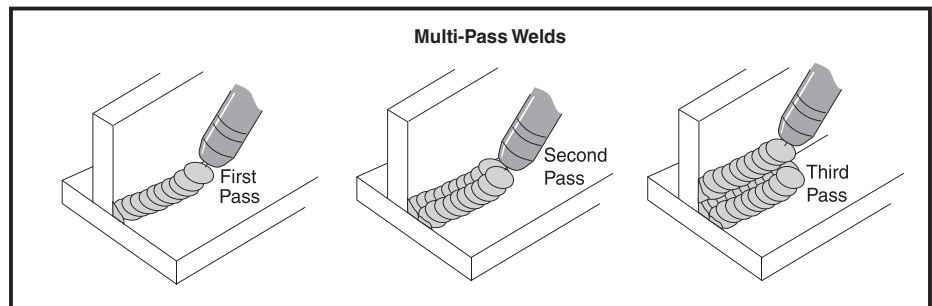
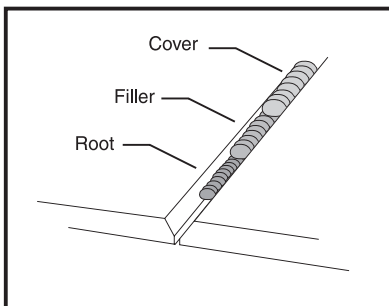
After completing the weld, wait for the welded sections to cool. A protective coating called slag now covers the weld bead which prevents contaminants in the air from reacting with the molten metal. Once the weld cools to the point that it is no longer glowing red, the slag can be removed. Removal is done with a chipping hammer. Lightly tap the slag with the hammer and break it loose from the weld bead. The final clean-up is done with a wire brush. **When making multiple weld passes, remove the slag before each pass.**

## WELDING POSITIONS

Four basic welding positions can be used; flat, horizontal, vertical, and overhead. Welding in the flat position is easier than any of the others because welding speed can be higher, the molten metal is less likely to run, better penetration can be achieved, and the work is less fatiguing. Other positions require different techniques such as a weaving pass, circular pass, and jogging. A higher skill level is required to complete these welds. All work should be performed in the flat position if possible. For specific applications, consult an arc welding handbook.

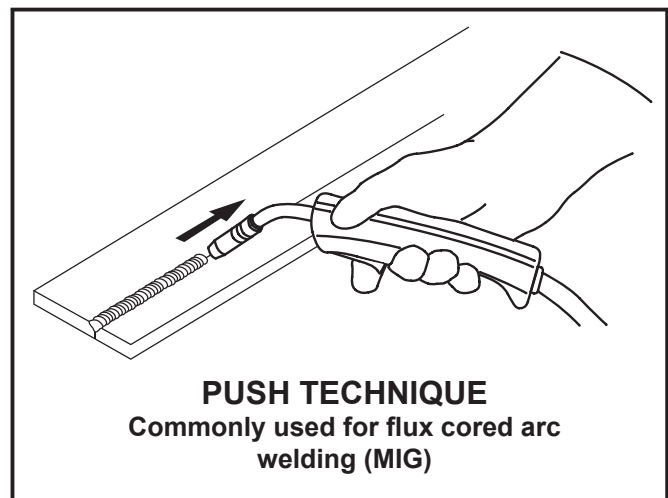
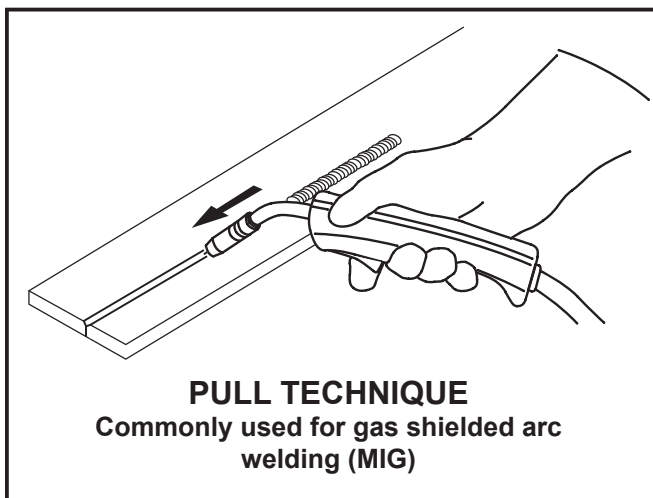
## WELD PASSES

Sometimes more than one pass is necessary to fill the joint. The root pass is first, followed by filler passes and the cover pass as illustrated below. If the pieces are thick, it may be necessary to bevel the edges that are joined at a 60° angle. Remember to remove the slag before each pass.



## PUSH VS PULL TECHNIQUE

The type and thickness of the work piece dictates which way to point the gun nozzle. For thin materials (18 gauge and up), the nozzle should be pointed out in front of the weld puddle and push the puddle across the work piece. The push technique is commonly used with Gas Shielded Arc Welding (MIG) which is better suited for welding thinner materials. For thicker materials, the nozzle should point into the puddle to increase weld penetration. This is called the **pull** or **drag** technique and is generally recommended when welding with flux cored wire.



## TROUBLESHOOTING GUIDE - WELDER

Problem Encountered	Possible Cause	Corrective Action
<b>No weld output; wire does not feed; fan does not run.</b>	No power at receptacle.  Unit is unplugged. Power switch is in the OFF position.  Defective power switch. Broken or damaged power cable.	Check circuit fuse or circuit breaker. Verify plug is properly inserted into power outlet. Confirm power switch is in the ON position. Replace switch. Power cable requires service.
<b>No weld output; wire does not feed; fan continues to run.</b>	Duty cycle exceeded – Thermostat may be tripped due to overheating. Gun trigger may be faulty. Amperage selector switch is between power settings.	Let machine cool. Do not exceed duty cycle. Remove any air obstruction to the machine. Disassemble torch handle and check trigger switch connections, tighten or reconnect as needed. Check amperage selector switch for proper setting.
<b>Welder gives trickle shocks.</b>	Accidental contact with work piece. Current leakage caused by moist clothing or work area.	Avoid contact with work piece. Make sure clothing and work area are dry.
<b>Welder overheats - blows fuses, trips circuit breaker.</b>	Use of extension cord. Overloaded circuit.	If possible, relocate welder to avoid use of extension cord. If relocation is not possible, use thicker (lower gauge number) extension cord. Welder requires a dedicated 120V circuit.
<b>No weld output; wire feeds properly.</b>	Work piece not properly grounded. Work contact tip.	Connect work clamp to work piece to get good metal to metal contact. Replace contact tip.
<b>Low weld output.</b>	Inadequate or overloaded circuit. Amperage selector switch is incorrectly set.	Welder requires a dedicated 120V circuit. If possible, relocate welder to avoid use of extension cord. If relocation is not possible, use thicker (lower gauge number) extension cord. Check amperage selector switch for proper setting.
<b>No wire feed when gun trigger is pulled.</b>	Gun cable kinked, damaged, or worn. Drive roller tension improperly set. Incorrect drive roller groove improperly matched to wire size. Wire spool hub tension too high. Improper contact tip size. Gun cable liner and/or wire inlet guide tube clogged or dirty. Worn drive roller and/or pressure bearing.	Straighten gun cable and/or replace damaged parts. Adjust drive roller pressure. Change drive driver roller to proper groove. Readjust hub tension. Replace contact tip if blocked. Clean or replace wire inlet guide tube or liner if dirty or plugged. Replace drive roller or pressure bearing if worn or slipping. Check and clear any restrictions at drive assembly and liner.
<b>Weld pops and sputters</b>	Wire speed setting is incorrect. Contact tip is too large. Drive roller slipping.	Adjust wire speed to proper setting. Replace with correct contact tip size. Increase drive roller pressure.

## TROUBLESHOOTING GUIDE - WELDS

Problem Encountered	Possible Cause	Corrective Action
<b>Bead is intermittently too thin or too thick.</b>	Inconsistent travel speed. Output amp setting incorrect.	Adjust and maintain travel speed. Carefully watch and control the width of the molten weld bead. Adjust output amp setting.
<b>Ragged depressions at edge of weld.</b>	Travel speed too fast. Wire speed too fast. Output amp setting too high.	Decrease travel speed. Decrease wire speed. Reduce output amp setting.
<b>Weld bead does not penetrate work piece.</b>	Inconsistent travel speed. Output amp setting too low. Extension cord is too long or improperly sized.	Decrease and maintain consistent travel speed. Increase output amp setting. If possible, relocate welder to avoid use of extension cord. If relocation is not possible, use thicker (lower gauge number) extension cord.
<b>Electrodes sputter and stick.</b>	Damp wire. Wire speed too fast	Use dry wire and store in a dry location. Reduce wire speed.

## **ONE YEAR LIMITED WARRANTY - STAR ASIA-USA, LLC ELECTRIC ARC WELDERS**

Star Asia-USA, LLC (hereinafter "seller") warrants to the original purchaser only, that this product will be free from defects in material or workmanship for a period of one year from date of purchase for home domestic use.

### **Warranty Performance**

Warranty coverage is conditioned upon purchaser furnishing seller or its authorized service center with adequate written proof of the original purchase date. Products returned, freight prepaid and insured, to our factory or to an Authorized Service Center will be inspected and repaired or replaced, at seller's option, free of charge if found to be defective and subject to warranty. Defective parts not subject to normal wear and tear will be repaired or replaced, at our option during the above stated warranty periods. In any event, reimbursement is limited to the purchase price paid. Other than the postage and insurance requirement, no charge will be made for repairs or replacements covered by this warranty. Under no circumstances shall the manufacturer bear any responsibility for loss of the unit, loss of time or rental, inconvenience, commercial loss or consequential damages. There are no warranties which extend beyond the description of the face hereof.

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Additional items not covered under this warranty: product failure caused by rain, excessive humidity, corrosive environments or other contaminants; cosmetic defects that do not interfere with product's functionality.

This warranty shall not apply when: the product has been used for commercial or rental purposes; defects in materials or workmanship or damages result from repairs or alterations which have been made or attempted by others or the unauthorized use of nonconforming parts; this damage is due to abuse, improper maintenance, neglect or accident; or the damage is due to use of the product after partial failure or use with improper accessories. Warranty does not apply to accessory items such as electrodes, welding wire, contact tips, gun liner, and nozzles.

Seller will not be liable for: labor charges, loss or damage resulting from improper operation, maintenance or repairs made by persons other than a Star Asia-USA, LLC Authorized Service Center.

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