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# **WELDER USER'S GUIDE**

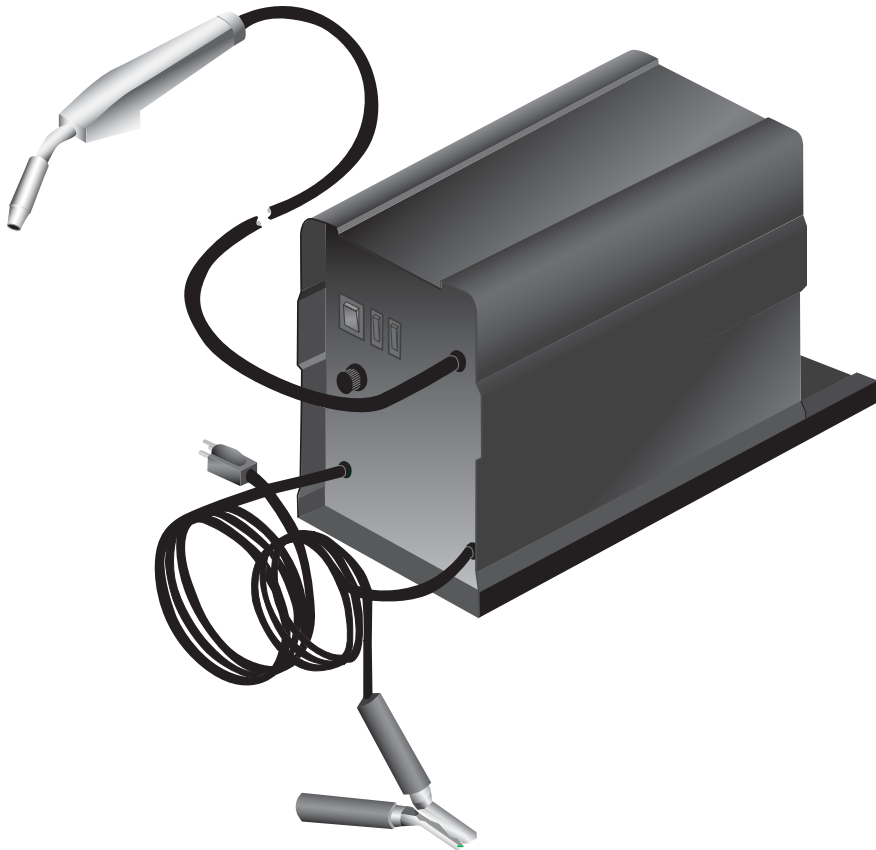
# **GUÍA PARA USAR LA SOLDADORA**

# **GUIDE DE L'UTILISATEUR DE LA**

# **SOUDEUSE**

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Instructions on the use of your Wire Feed Welder  
Instrucciones para el uso de su soldadora de carrete  
Instructions d'utilisation de votre soudeuse  
à alimentation en fil



Model 117-086

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# INTRODUCTION

This Welder User's Guide provides specific information about your wire feed welder. It is to be used together with the Welding Instruction Guide to provide all of the information needed to safely and effectively use your wire feed welder. The information in this book applies to your specific model of wire feed welder and gives instruction on set-up, installation, and actual use of the welder.

Optional on some welder models

Where information is shown that does not necessarily apply to all models or brands of welder, it will be marked as either *optional on some welder models* or *does not apply to all models*.

## SAFETY SUMMARY

Every craftsman respects the tools with which they work. They know that the tools represent years of constantly improved designs and developments. The true craftsman also knows that tools are dangerous if misused or abused.

Reading this User's Guide and the Welding Instruction Guide before using the welder will enable you to do a better, safer job. Learn the welder's applications and limitations as well as the specific potential hazards peculiar to welding.

### SAFETY INFORMATION

The following safety information is provided as guidelines to help you operate your new welder under the safest possible conditions. Any equipment that uses electrical power can be potentially dangerous to use when safety or safe handling instructions are not known or not followed. The following safety information is provided to give you the information necessary for safe use and operation.

When a procedure step is preceded by a **WARNING**, it is an indication that the step contains a procedure that might be injurious to a person if proper safety precautions are not heeded.

When a procedure step is preceded by a **CAUTION**, it is an indication that the step contains a procedure that might damage the equipment being used.

A **NOTE** may be used before or after a procedure step to highlight or explain something in that step.

**READ ALL SAFETY INSTRUCTIONS CAREFULLY** before attempting to install, operate, or service this welder. Failure to comply with these instructions could result in personal injury and/or property damage.

#### RETAIN THESE INSTRUCTIONS FOR FUTURE REFERENCE.

**Note:** The following safety alert symbols identify important safety messages in this manual.

When you see one of the symbols shown here, be alert to the possibility of personal injury and carefully read the message that follows.



This symbol indicates that the possibility of electric shock hazard exists during the operation of the step(s) that follow.



This symbol indicates that the possibility of fire hazard exists during the operation of the step(s) that follow.



This symbol indicates that the helmet must be worn during the step(s) that follow to protect against eye damage and burns due to flash hazard.



This symbol indicates that the possibility of toxic gas hazard exists during operation of the step(s) that follow.



This symbol indicates that the possibility of being burned by hot slag exists during operation of the step(s) that follow.



This symbol indicates that the eye protection should be worn to protect against flying debris in the following step(s).



This symbol indicates that the possibility of injury or death exists due to improper handling and maintenance of compressed gas cylinders or regulators.

Full explanations of the specific hazards are shown in the **WELDING INSTRUCTION GUIDE**. Make sure you have read and understand all of the information before proceeding with any of the instructions contained in this user's guide.

Published standards on safety are available. They are listed in **ADDITIONAL SAFETY INFORMATION** at the end of this **SAFETY SUMMARY**.

The National Electrical Code, Occupational Safety and Health Act regulations, local industrial codes and local inspection requirements also provide a basis for equipment installation, use, and service.

### SHOCK HAZARDS



#### WARNING

**ELECTRIC SHOCK CAN KILL!** To reduce the risk of death or serious injury from shock, read, understand, and follow the following safety instructions. In addition, make certain that anyone else who uses this welding equipment, or who is a bystander in the welding area understands and follows these safety instructions as well.

### FIRE HAZARDS



#### WARNING

**FIRE OR EXPLOSION CAN CAUSE DEATH, INJURY, AND PROPERTY DAMAGE!** To reduce risk of death, injury, or property damage from fire or explosion, read, understand, and follow the following safety instructions. In addition, make certain that anyone else that uses this welding equipment, or is a bystander in the welding area, understands and follows these safety instructions as well. **REMEMBER!** Welding by nature produces sparks, hot spatter, molten metal drops, hot slag, and hot metal parts that can start fires, burn skin, and damage eyes.

### FLASH HAZARDS



## WARNING

**ARC RAYS CAN INJURE EYES AND BURN SKIN!** To reduce risk of injury from arc rays, read, understand, and follow the following safety instructions. In addition, make certain that anyone else that uses this welding equipment, or is a bystander in the welding area, understands and follows these safety instructions as well.

## FUME HAZARDS



## WARNING

**FUMES, GASSES, AND VAPORS CAN CAUSE DISCOMFORT, ILLNESS, AND DEATH!** To reduce risk of discomfort, illness, or death, read, understand, and follow the following safety instructions. In addition, make certain that anyone else that uses this welding equipment or is a bystander in the welding area, understands and follows these safety instructions as well.

## COMPRESSED GASSES AND EQUIPMENT HAZARDS



## WARNING

**IMPROPER HANDLING AND MAINTENANCE OF COMPRESSED GAS CYLINDERS AND REGULATORS CAN RESULT IN SERIOUS INJURY OR DEATH!** To reduce risk of injury or death from compressed gasses and equipment hazards, read understand and follow the following safety instructions. In addition, make certain that anyone else who uses this welding equipment or a bystander in the welding area understands and follows these safety instructions as well.

Do not use flammable gasses with MIG welders. Only inert or nonflammable gasses are suitable for MIG welding. Examples are Carbon Dioxide, Argon, Helium, etc. or mixtures of more than one of these gasses.

## BURN HAZARDS



## WARNING

**Hot slag can cause fires and serious injury from burns.** To reduce the risk of discomfort or serious injury due to burns always wear heavy protective clothing, eye and face protection, and gloves designed for welding. To prevent the risk of fires starting, use a metal plate or some other material with a high flash point to catch and shield combustibles from the hot slag.

## ADDITIONAL SAFETY INFORMATION

For additional information concerning welding safety, refer to the following standards and comply with them as applicable.

- ANSI Standard Z49.1 — SAFETY IN WELDING AND CUTTING — obtainable from the American Welding Society, 550 NW Le Jeune Road, Miami, FL 33126 Telephone (800) 443-9353, Fax (305) 443-7559 — [www.amweld.org](http://www.amweld.org) or [www.aws.org](http://www.aws.org)
- ANSI Standard Z87.1 — SAFE PRACTICE FOR OCCUPATION AND EDUCATIONAL EYE AND FACE

PROTECTION — obtainable from the American National Standards Institute, 11 West 42<sup>nd</sup> St., New York, NY 10036 Telephone (212) 642-4900, Fax (212) 398-0023 — [www.ansi.org](http://www.ansi.org)

- NFPA Standard 51B — CUTTING AND WELDING PROCESS — obtainable from the National Fire Protection Association, 1 Batterymarch Park, P.O. Box 9101, Quincy, MA 02269-9101 Telephone (617) 770-3000, Fax (617) 770-0700 — [www.nfpa.org](http://www.nfpa.org)
- CGA Pamphlet P-1 — SAFE HANDLING OF COMPRESSED GASSES IN CYLINDERS — obtainable from the Compressed Gas Association, 1725 Jefferson Davis Highway, Suite 1004, Arlington, VA 22202-4102 Telephone (703) 412-0900 Fax (703) 412-0128 — [www.cagnet.com](http://www.cagnet.com)
- OSHA Standard 29 CFR, Part 1910, Subpart Q., WELDING, CUTTING AND BRAZING — obtainable from your state OSHA office or U. S. Dept. of Labor OSHA, Office of Public Affairs, Room N3647, 200 Constitution Ave. Washington, DC 20210 — [www.osha.gov](http://www.osha.gov)
- CSA Standard W117.2 — Code for SAFETY IN WELDING AND CUTTING. — obtainable from Canadian Standards Association, 178 Rexdale Blvd. Etobicoke, Ontario M9W 1R3 — [www.csa.ca](http://www.csa.ca)
- American Welding Society Standard A6.0. WELDING AND CUTTING CONTAINERS WHICH HAVE HELD COMBUSTIBLES. — obtainable from the American Welding Society, 550 NW Le Jeune Road, Miami, FL 33126 Telephone (800) 443-9353, Fax (305) 443-7559 — [www.amweld.org](http://www.amweld.org) or [www.aws.org](http://www.aws.org)

# WELDER SPECIFICATIONS

## DESCRIPTION

Your new wire feed welder is designed for maintenance and sheet metal fabrication. The welder consists of a single-phase power transformer, stabilizer, rectifier, and a unique built-in control/feeder.

Now you can weld sheet metal from 26 gauge up to 3/16 inch thick with a single pass. You can weld thicker steel with beveling and multiple pass techniques.

### Optional on some welder models

MIG welders equipped with gas are capable of welding with 0.024 (0.6mm) and 0.030 (0.8mm) solid steel wire on dc reverse polarity and with 0.030 (0.8mm) self-shielding flux-core wire on dc straight polarity. Larger, 0.035 inch (0.9mm) diameter solid steel wire, on dc reverse polarity may also be used on this welder. The use of larger diameter wire makes welding difficult and the results cannot be guaranteed. The manufacturer does not recommend the use of larger diameter wire.

Table 1 lists your MIG welder specifications.

**Table 1. Welder Specifications**

Primary (input ) volts	120 Vac
Primary (inputs) Amps	15
Phase	Single
Frequency	60 Hz
Secondary (output) volts	18
Secondary (UL output) amps	90
Open Circuit Volts (Max.)	31 Vdc
Duty Cycle Rating @ 90 amps	10%

# WELDER OPERATING CHARACTERISTICS

## DUTY CYCLE

The duty cycle rating of a welder defines how long the operator can weld and how long the welder must be rested and cooled. Duty cycle is expressed as a percentage of 10 minutes and represents the maximum welding time allowed. The balance of the 10-minute cycle is required for cooling.

Your new welder has a duty cycle rating of 10% at the rated output. This means that you can weld for one (1) minutes out of 10 with the remaining nine (9) minutes required for cooling. (See Table 2).

Table 2. Duty Cycle Ratings

Duty Cycle Rating	Maximum Welding Time	Required Resting Time
10%	1 Minute	9 Minutes
20%	2 Minutes	8 Minutes
40%	4 Minutes	6 Minutes
60%	6 Minutes	4 Minutes
80%	8 Minutes	2 Minutes
100%	10 Minutes	0 Minutes

## INTERNAL THERMAL PROTECTION

### CAUTION

Do not constantly exceed the duty cycle or damage to this welder can result. If you exceed the duty cycle of your welder, an internal thermal protector will open, shutting off all welder functions. If this happens, DO NOT SHUT OFF THE WELDER. Leave the welder turned on. After cooling, the thermal protector will automatically reset and the welder will function normally again. However, you should wait at least 10 minutes after the thermal protector opens before resuming welding. You must do this even if the thermal protector resets itself before the 10 minutes is up or you may experience less than specified duty cycle performance.

If you find that your welder will not weld for 1 minute without stopping, reduce the wire speed slightly and tune the welder in at the lowest wire speed setting that still produces a smooth arc. Welding with the wire speed set too high causes excessive current draw and shortens the duty cycle.

# WELDER INSTALLATION

## POWER SOURCE CONNECTION

### POWER REQUIREMENTS

This welder is designed to operate on a properly grounded 120 Volt, 60 Hz, single-phase alternating current (ac) power source fused with a 15 amp time-delayed fuse or circuit breaker. It is recommended that a qualified electrician verify the **ACTUAL VOLTAGE** at the receptacle into which the welder will be plugged and confirm that the receptacle is properly fused and grounded. The use of the proper circuit size can eliminate nuisance circuit breaker tripping when welding.

**DO NOT OPERATE THIS WELDER** if the ACTUAL power source voltage is less than 105 Volts ac or greater than 132 Volts ac. Contact a qualified electrician if this problem exists. Improper performance and/or damage to the welder will result if operated on inadequate or excessive power.

## CONNECT TO POWER SOURCE



### WARNING

**High voltage danger from power source!** Consult a qualified electrician for proper installation of receptacle at the power source.

This welder must be grounded while in use to protect the operator from electrical shock. If you are not sure if your outlet is properly grounded, have it checked by a qualified electrician. Do not cut off the grounding prong or alter the plug in any way and do not use any adapters between the welder's power cord and the power source receptacle.

Make sure the POWER switch is OFF then connect your welder's power cord to a properly grounded 120 Vac, 60 Hz, single phase, 15 amp power source.

### EXTENSION CORDS

For optimum welder performance, an extension cord should not be used unless absolutely necessary. If necessary, care must be taken in selecting an extension cord appropriate for use with your specific welder.

Select a properly grounded extension cord that will mate directly with the ac power source receptacle and the welder power cord without the use of adapters. Make certain that the extension is properly wired and in good electrical condition.

Extension cords must be at the smallest a #12 gauge cord. Do not use an extension cord over 25 ft. in length.

## ASSEMBLING THE WELDER

The following procedures describe the process required to assemble, install, maintain, and prepare to weld with your new wire feed welder.

### UNPACKING THE WELDER

1. Remove any cartons or bags containing parts/accessories.
2. Open the cartons or bags packed with your welder and inspect their contents for damage. Report any missing or damaged items immediately.
3. Grasp the top of the welder and lift the welder out of the carton.

### ATTACHING THE GROUND CLAMP

Select the ground cable and attach the ground clamp according to Figure 1 and the following steps.

1. Remove the rubber grip from ground clamp.
2. Push the cable through the grip as illustrated in Figure 2.
3. Attach cable lug to the ground clamp with lockwasher and screw.
4. Slide grip back up over ground clamp.



## INSTALL THE HANDLE

1. Place black bracket over the handle tube.
2. Fasten to the top of the welder with four (4) screws supplied with the handle.
3. Snap oval shaped caps into each end of handle tube.

## INSTALL THE SHIELDING GAS

Optional on some welder models



### WARNING

**IMPROPER HANDLING AND MAINTENANCE OF COMPRESSED GAS CYLINDERS AND REGULATORS CAN RESULT IN SERIOUS INJURY OR DEATH!** Always secure gas cylinders to the tank bracket kit, a wall, or other fixed support to prevent the cylinder from falling over and rupturing. Read, understand, and follow all the COMPRESSED GASSES AND EQUIPMENT HAZARDS in the SAFETY SUMMARY at the front of this manual.

Secure your gas cylinder to the tank bracket kit, a wall, or other fixed support.

1. Remove the protective cap from the cylinder and inspect the regulator connecting threads for dust, dirt oil, and grease. Remove any dust or dirt with a clean cloth. **DO NOT ATTACH THE REGULATOR IF OIL, GREASE, OR DAMAGE ARE PRESENT.**



### WARNING

**IMPROPER HANDLING AND MAINTENANCE OF COMPRESSED GAS CYLINDERS AND REGULATORS CAN RESULT IN SERIOUS INJURY OR DEATH!** To reduce the risk of injury or death, always stand to the side of the cylinder opposite the regulator when opening the cylinder valve, keeping the cylinder valve between you and the regulator. Never aim the open cylinder valve port at yourself or bystanders. Failure to comply with this warning could result in serious personal injury.

2. Open the cylinder valve **FOR JUST AN INSTANT** to blow out any foreign matter inside the valve port to reduce the risk of plugging or damaging the regulator.
3. Screw the preset regulator supplied with this welder (see Figure 3) into the cylinder valve and tighten with a wrench.

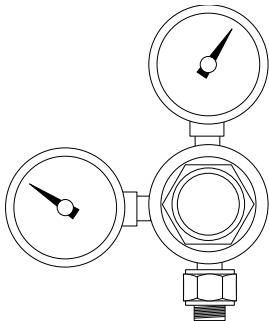


Figure 3. Preset Regulator

4. Insert the gas hose over the outlet port of the gas regulator.

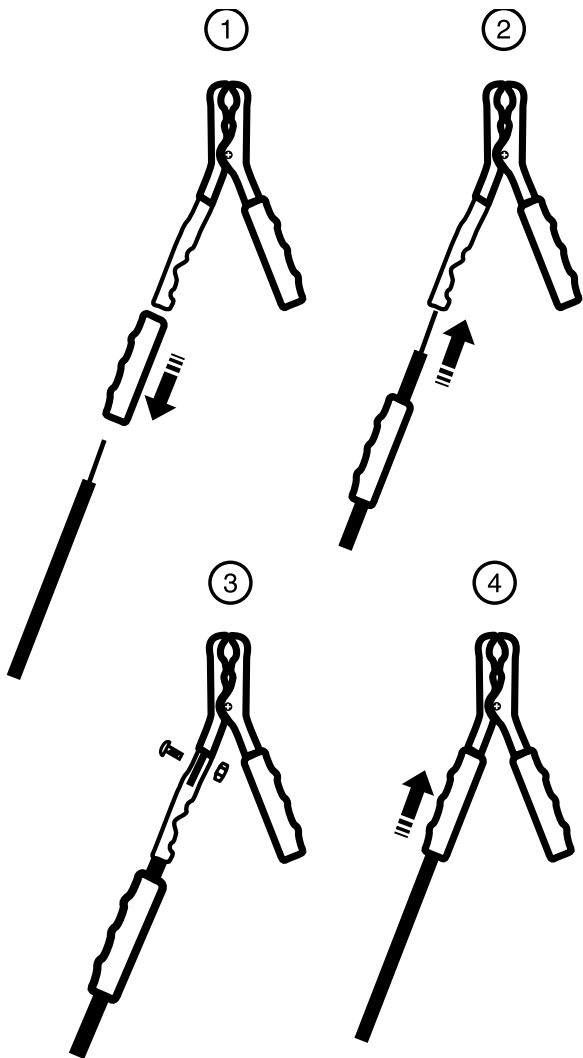


Figure 1. Attaching the Ground Clamp

## INSTALL TANK SUPPORT STRAPS

Optional on some welder models

1. Insert the two nylon straps supplied for use with 20 cubic foot or smaller gas cylinders through slots in rear of welder.
2. Place gas cylinder on back plate and secure according to Figure 2.

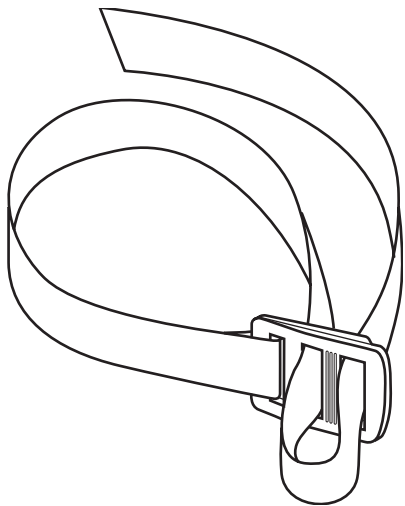


Figure 2. Secure gas cylinder with strap

## CHECK THE GAS FLOW

**Note:** If the cylinder you have is equipped with male regulator connecting threads instead of female, you will need to obtain a special compressed gas cylinder adapter from your gas supplier to install between your gas cylinder and regulator.

- The gas control function does not require the welder to be turned on or plugged in.
1. Slowly crack open the cylinder valve, then turn open **ALL THE WAY**.
  2. Pull the trigger on the gun to allow the gas to flow. **KEEP THE TRIGGER PULLED**. Listen and feel for gas flowing from the end of the welding gun. If your regulator has no adjustment, it has been pre-set at the factory for a flow of 20 cubic feet per hour. If your gas regulator has an adjustment to control the gas flow rate, turn the adjustment key clockwise to increase gas flow; counterclockwise to reduce flow. For most welding, the gas flow should be set at 15-20 cubic feet per hour. If no gas is heard or felt, verify all steps involved in connecting the gas.
  3. Release the trigger.

**Note:** If welding outside or in a draft, it may become necessary to set up a windbreak to keep the shielding gas from being blown from the weld area.

- **MAKE SURE TO TURN OFF THE GAS CYLINDER VALVE WHEN DONE WELDING.**

## ALIGN AND SET THE DRIVE ROLLER

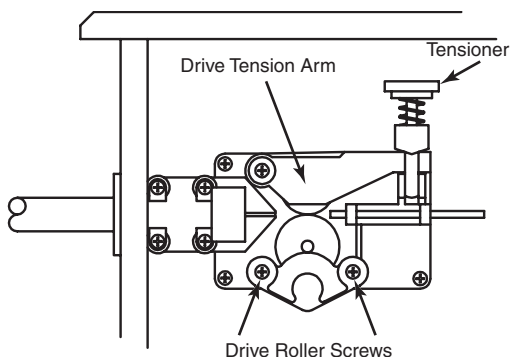
Before installing any welding wire into the unit, the proper sized groove must be placed into position on the wire drive mechanism. Change to a neoprene drive roller when welding with aluminum wire.

**Note:** Your unit is shipped with wire installed and the standard drive roller is already positioned for the included wire.

## STANDARD DRIVE ROLLER

Change the standard drive roller according to the following steps:

1. Flip down the quick release drive tensioner and swing the drive tension arm out away from the drive roller.
2. If there is wire already installed in the welder, roll it back onto the wire spool by hand-turning the spool clockwise. Be careful not to allow the wire to come out of the rear end of the gun without holding onto it or it will unspool itself. Put the end of the wire into the hole on the outside edge of the wire spool and bend it over to hold the wire in place. Remove the spool of wire from the welder.
3. Loosen the drive roller screws and cover, then pull the drive roller off the drive shaft.



**Figure 4.** Drive Assembly

**Note:** The drive roller has two wire size grooves built into it. When installing the drive roller the number stamped on the drive roller for the wire size you are using should be away from you. If you can read the wire size you are using on the drive roller, it is installed backwards. Use only the proper size drive roller when using your welder.

4. Find the side of the drive roller that is stamped with the same wire diameter as that of the wire being installed. Push the drive roller onto the motor shaft. Make sure the side stamped with the desired wire diameter is facing away from you.
5. Slide the roller onto the shaft so that the groove in the roller lines up with the inlet tube and the welding gun liner. You can look at the alignment from the top of the welder.
6. Tighten the screws and cover while holding the drive roller in place.

## INSTALL THE WELDING WIRE

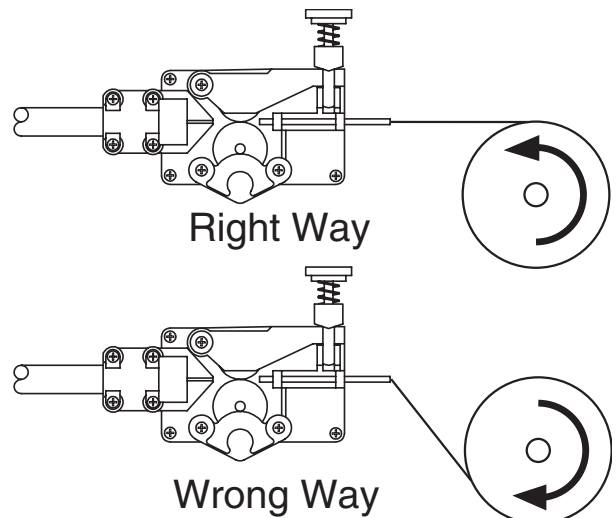


### WARNING

**Electric shock can kill!** Always turn the POWER switch OFF and unplug the power cord from the ac power source before installing wire.

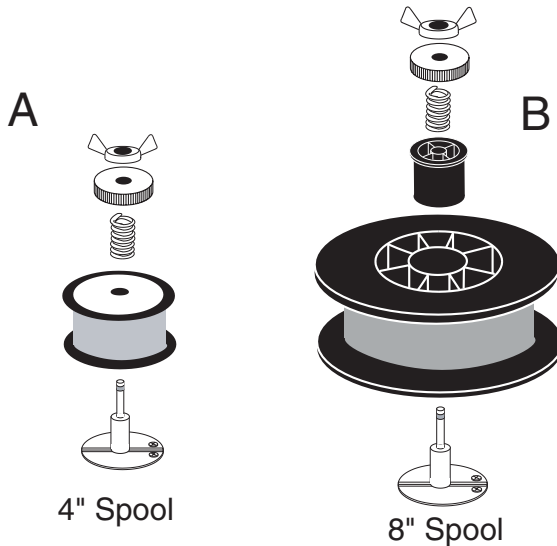
Be very careful when removing the welding nozzle. The contact tip on this welder is electrically hot as long as POWER is turned ON. Make certain POWER is turned OFF.

1. Remove the nozzle and contact tip from the end of the gun assembly.
2. Make sure the proper groove on the drive roller is in place for the wire being installed. If the proper groove is not in place, change the drive roller as described above.
3. Unwrap the spool of wire then find the leading end of the wire (it goes through a hole in the outer edge of the spool and is bent over the spool edge to prevent the wire from unspooling) BUT DO NOT UNHOOK IT YET.
4. Place the spool on the spindle in such a manner that when the wire comes off the spool, it will look like the top illustration in Figure 5. The welding wire should always come off the top of the spool into the drive mechanism.



**Figure 5.** Right and Wrong Way To Feed Wire From Spool

- If you are installing a four-inch spool of wire, install the drive brake hardware on the top of the spool of wire according to Figure 6A. If you are installing an eight-inch spool, install the spindle adapter and drive brake hardware as shown in Figure 6B. The purpose of the drive brake is to cause the spool of wire to stop turning at nearly the same moment that wire feeding stops.



**Figure 6.** Drive Brake Assemblies with Four Inch and Eight Inch Wire Spools

- Once the drive brake hardware is installed, set the spool tension. With one hand, turn the wire spool and continue turning it while adjusting the tension on the spool. With your free hand, tighten (turn clockwise) the tension nut that holds the spool in place. Stop tightening when drag is felt on the wire spool that you are turning, then stop hand turning the wire spool. Tighten wing nut to lock tension nut in place.
- Note:** If TOO MUCH tension is applied to the wire spool, the wire will slip on the drive roller or will not be able to feed at all. If TOO LITTLE tension is applied, the spool of wire will want to unspool itself. Readjust the drive brake tension as necessary to correct for either problem.
- After checking to make sure that your welder is disconnected from the ac power source, free the leading end of the wire from the spool, but do not let go of it until told to do so, or the wire will unspool itself.
  - Using a wire cutter, cut the bent end off the leading end of the wire so that only a straight leading end remains.
  - Loosen the tension adjusting screw holding the drive tension arm in place and lift the tension arm up off the drive roller.
  - Insert the leading end of the wire into the inlet guide tube. Then push it across the drive roller and into the gun assembly about six inches.

### CAUTION

Make certain that the welding wire is actually going into the gun liner. Be very sure it has not somehow been accidentally been routed alongside the liner or even in some other direction. If this should happen, the wire could feed inside the cable casing or take a right angle and follow the wires and gas hose inside the welder. It could also feed back on itself jamming up the mechanism.

- Line the wire up in the inside groove of the drive roller, then allow the drive tension arm to drop onto the drive

roller.

- Tighten (turn clockwise) the drive tension adjusting screw until the tension roller is applying enough force on the wire to prevent it from slipping out of the drive assembly.
- Let go of the wire.
- Connect the welder power cord to the ac power source. Turn the welder ON.
- Set the WIRE SPEED control to the middle of the wire speed range.
- Pull the trigger on the welding gun to feed the wire through the gun assembly.
- When at least an inch of wire sticks out past the end of the gun, release the trigger.
- Select a contact tip stamped with the same diameter as the wire being used. If stamped in metric, see DESCRIPTION.
- Slide the contact tip over the wire (protruding from the end of the gun). Thread the contact tip into the end of the gun and hand-tighten securely.
- Install the nozzle on the gun assembly. For best results, coat the inside of the nozzle with anti-stick spray or gel.
- Cut off the excess wire that extends past the end of the nozzle.

## SET THE WIRE DRIVE TENSION



### WARNING

To reduce the risk of arc flash, make certain that the wire coming out of the end of the gun does not come in contact with the workpiece clamp or any grounded material during the drive tension setting process or arcing will occur.

- Pull the trigger on the gun.
- Turn the drive tension adjustment knob clockwise, increasing the drive tension until the wire seems to feed smoothly without slipping.
- Block the end of the nozzle by holding it up against something that doesn't conduct electricity, such as a block of wood or a concrete floor, then trigger the gun again. The wire should slip at the drive roller. However, if the wire bird-nests at the drive roller, rethread the drive system using less drive tension and try again.
- When the drive tension is set correctly, there should be no slippage between the wire and the drive roller. However, if an obstruction occurs along the wire feed path, the wire should then slip on the drive roller.

## PREPARATION

### CHANGE POLARITY

This welder allows you the capability to change the welding current polarity. You may select either dc Straight (dc – Flux Cored) or dc Reverse Polarity (dc + MIG). For welding steel with solid wire, stainless steel, flux cored hardfacing of steel, and silicon bronze welding of steel, select dc Reverse Polarity (dc + MIG). When using self-shielding, flux-core steel wire, use dc Straight Polarity (dc – Flux Cored).

Change the polarity of your welder by switching the cables under the cover of your welder. It is directly under the drive motor for the welding wire.

- Disconnect power to the welder.
- Remove the thumbscrews.
- Reconnect according to Figure 7.



# MAINTENANCE

## GENERAL

This welder has been engineered to give many years of trouble-free service providing that a few very simple steps are taken to properly maintain it.

1. Keep the wire drive compartment lid closed at all times unless the wire needs to be changed or the drive tension needs adjusting.
2. Keep all consumables (contact tips, nozzles, and gun liner) clean and replace when necessary. See CONSUMABLE MAINTENANCE AND TROUBLESHOOTING later in this section for detailed information.
3. Replace power cord, ground cable, ground clamp, or gun assembly when damaged or worn.
4. Periodically clean dust, dirt, grease, etc. from your welder. Every six months or as necessary, remove the side panels from the welder and air-blow any dust and dirt that may have accumulated inside the welder.

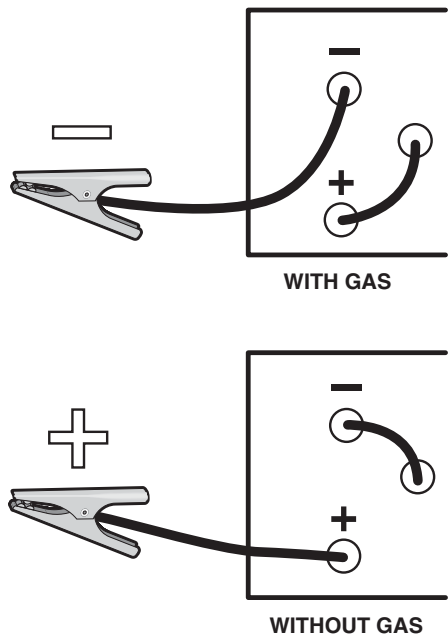


Figure 7. Welder Polarity Selections

## OPERATION

Operation of this welder consists of selecting and adjusting operating controls for optimum voltage (welding heat) and wire speed settings.

## CONTROLS AND INDICATORS



### WARNING

**ELECTRIC SHOCK CAN KILL!** To remove the risk of electric shock, be aware that the VOLTAGE selector, when OFF, does not remove power from all internal circuitry in the welder. Whenever the VOLTAGE selector is in any position except OFF, the welding circuit is activated. Under this condition, an arc will occur if the welding wire or any part of the welding circuit comes in contact with welding ground.

**POWER** – This welder has a POWER switch mounted on the front panel. The POWER switch is used to turn the welder ON or OFF.

**VOLTAGE SELECTOR** – This welder has two rocker switches which control the output voltage or heat setting. MIN-MAX is the primary switch and 1-2 is the secondary switch. Refer to the table for correct heat setting.

Table 3. Heat Settings

Setting	MIN-MAX	1-2
Low	MIN	1
Medium Low	MIN	2
Medium High	MAX	1
High	MAX	2

**WIRE SPEED CONTROL** – The WIRE SPEED CONTROL adjusts the speed at which the wire is fed out of the welding gun. The wire speed needs to be closely matched (*tuned-in*) to the rate at which it is being melted off (see TUNING IN THE WIRE SPEED, *in the Welding Instruction Guide*). Some things that affect wire speed selection are the type and diameter of the wire being used, the heat setting selected, and the welding position to be used.



### WARNING

**ELECTRIC SHOCK CAN KILL!** To reduce the risk of electric shock, always unplug the welder from its ac power source before removing side panels.

IT IS VERY IMPORTANT TO MAINTAIN THE CONSUMABLES TO AVOID THE NEED FOR PREMATURE REPLACEMENT OF THE GUN ASSEMBLY.

The **GUN LINER** is intended to provide an unrestricted path for the welding wire to flow through the gun assembly. Over time it will accumulate dust, dirt, and other debris. Replacement is necessary when these accumulations begin to restrict the free flow of wire through the gun assembly.

### REPLACE A GUN LINER

When removing or installing a gun liner, care must be taken not to kink or otherwise damage the gun liner or replacement will be necessary. See Figure 9 for the drive assembly and Figure 10 for the gun assembly.

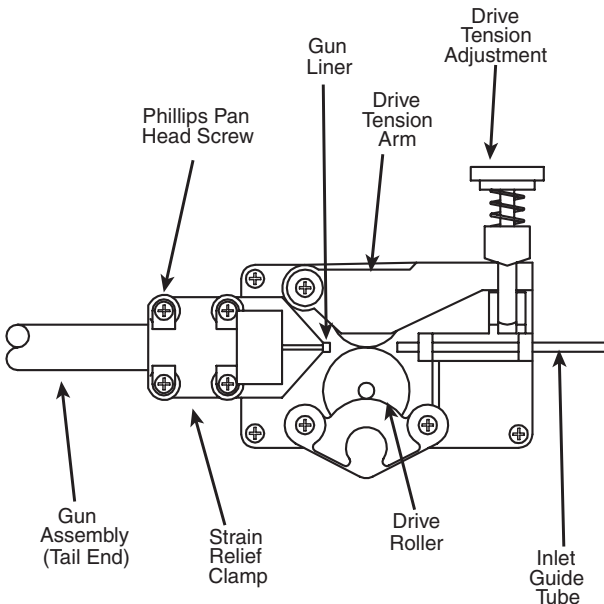
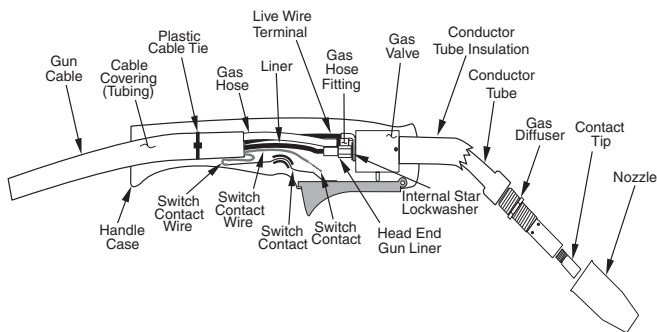


Figure 8. Drive Assembly



**Figure 9. Gun Assembly**

#### Tools Required:

- Phillips Screwdriver

1. Turn OFF welder POWER SWITCH.
  2. Open the welder side panel.
  3. Loosen the tension arm and lift it up off the drive roller.
  4. Turn the wire spool clockwise removing wire from gun assembly. Be sure to hold onto the wire itself while turning the spool or the wire will unspool itself when it becomes free of the gun liner.
  5. Remove the four phillips head screws from the strain relief clamp that holds the tail end of the gun in the drive assembly.
  6. Twist the collar at the base of the gun handle and remove the upper part of the handle by lifting up and toward the nozzle end of the gun.
  7. Cut the plastic cable tie away from the cable covering (tubing).
  8. Leave the gun assembly (consists of nozzle, gas diffuser, goose-neck, handle and cable containing gas tubing electrical cable and liner) attached to the welder but move the welder to a place where the gun assembly can be laid out straight on a table or workbench or similar flat surface.
  9. Pull the liner out of the cable covering (tubing) from the handle end and push the small piece of liner out of the conductor tube.
  10. Carefully insert the new liner into the cable taking particular care to keep the liner straight (especially at the terminal end) to ease its passage through cable covering. It may be desirable, perhaps even necessary, to apply some silicon grease to the outside of the new liner so that it will slide easily through the cable.
  11. Insert the new piece of liner into the lower hole on the gas valve.
- Note:** If you found it necessary to remove the gas and hose connector at step 9, remember to reconnect it after completing step 12. The gas hose can be reconnected by simply pushing it into the back of the connector.
12. Insert a new plastic cable tie in place around the cable and tighten it in approximately the same location as the plastic cable tie that was cut in step 7.
  13. Return all components to the handle casing and realign them as they were originally.
  14. With both halves of the handle case in place, replace collar.
  15. Position the gun liner into the drive motor and replace the strain relief clamp with the four screws removed earlier.

16. Re-install the welding wire according to INSTALL THE WELDING WIRE.

#### MAINTAINING THE CONTACT TIP

The purpose of the CONTACT TIP is to transfer welding current to the welding wire while allowing the wire to pass through it smoothly.

Always use a contact tip stamped with the same diameter as the wire it will be used with.

1. If the wire burns back into the tip, remove the tip from the gun and clean the hole running through it with an oxygen-acetylene torch tip cleaner or tip drill.
2. Over time, the hole in the contact tip will become worn by the wire passing through it. The more worn this hole becomes, the less efficient is the transfer of welding current to the wire and eventually arc breakage and difficult arc starting will result. Replace contact tips when signs of wear become apparent.

#### MAINTAINING THE NOZZLE

The nozzle directs the shielding gas to the weld puddle, determines the size of the shielding area, and prevents the electrically *hot* contact tip from contacting the work piece.

#### CAUTION

**KEEP THE NOZZLE CLEAN!** During the welding process, spatter and slag will build up inside the nozzle and must be cleaned out periodically. Failure to clean and/or replace the nozzle in a timely fashion WILL CAUSE DAMAGE TO THE FRONT-END OF THE GUN ASSEMBLY.

For best results, coat the inside of a new or freshly cleaned nozzle with anti-stick spray or gel.

1. Stop welding and clean any accumulated slag or spatter from the nozzle every 5 to 10 minutes of welding time.
2. When welding overhead, if any molten metal drips from the weld puddle and falls into the nozzle, STOP WELDING IMMEDIATELY and clean the nozzle.
3. If the slag cannot be thoroughly cleaned from the nozzle, REPLACE THE NOZZLE!

Failure to keep the nozzle adequately cleaned can result in the following problems:

A **SHORTED** nozzle results when spatter buildup bridges the insulation in the nozzle allowing welding current to flow through it as well as the contact tip. When shorted, a nozzle will steal welding current from the wire whenever it contacts the grounded work piece. This causes erratic welds and reduced penetration. In addition, a shorted nozzle overheats the end of the gun, which can **DAMAGE** the front-end of the gun.

A **RESTRICTED** nozzle is created when enough slag builds up in the nozzle to affect the direction, concentration, and or rate of the shielding gas flow. This problem can cause porous, brittle welds and reduce penetration.

#### TESTING FOR A SHORTED NOZZLE

Arcing between the nozzle and the work piece **ALWAYS** means the nozzle is shorted, but this can be hard to detect through the lens of a welding helmet. The following testing method is another way to tell if a nozzle is shorted.

With the welder unplugged from the ac power source, touch the probes of an ohmmeter or continuity tester to the end of the contact tip and the outside of the nozzle. If there is any continuity at all, the nozzle IS shorted. Clean or replace as needed.

#### PREVENTIVE MAINTENANCE

Except for internal and external cleaning, cleaning the nozzle, and occasionally retightening screws, there is no periodic maintenance recommended for your welder.

# TROUBLESHOOTING

The following TROUBLESHOOTING information is provided as a guide to help resolve some of the more common problems that could be encountered.

Table 4 is a troubleshooting table provided to help you determine a possible remedy when you are having a problem with your welder. This table does not provide all possible solutions, only those possibilities considered to likely be common faults. The table consists of a TROUBLE or symptom, a POSSIBLE CAUSE for that symptom, and a POSSIBLE REMEDY for that symptom.

Table 4. Troubleshooting

TROUBLE	POSSIBLE CAUSE	POSSIBLE REMEDY
Dirty, porous, brittle weld	1. Plugged welding nozzle 2. No shielding gas 3. Wrong type of gas 4. Dirty or rusty welding wire	1. Clean or replace nozzle 2. Tank empty, flow restricted, or regulator set too low 3. See SELECTING SHIELDING GAS in the WELDING INSTRUCTION GUIDE for proper selection. 4. Replace spool of wire
Wire feed works but no arc	1. Bad ground or loose connection 2. Bad connection to gun or faulty gun	1. Check ground and connections tighten as necessary 2. Check connection to gun or replace gun
Arc works but not feeding wire.	1. Faulty wire speed circuit board 2. No tension on the drive roller 3. Faulty drive motor (very rare)	1. Replace wire speed circuit board 2. Adjust the drive tension 3. Replace drive motor
Nothing works	1. Faulty trigger on gun 2. Faulty transformer (rare) 3. Exceeded duty cycle; thermal protector opened	1. Replace trigger 2. Replace transformer 3. Allow welder to cool at least 10 minutes (observe and maintain proper duty cycle)
Low output or non-penetrating weld.	1. Loose connection inside machine 2. Too long or improper extension cord 3. Wrong type or size wire 4. Poor ground connection 5. Wrong size contact tip 6. Loose gun connection or faulty gun assembly	1. Blow inside of machine out with compressed air, clean and tighten all connections 2. See EXTENSION CORD USE in this manual 3. Use only 0.030 (0.8mm) E71T-GS self shielding flux-core wire 4. Reposition clamp and check cable to clamp connection 5. Use only 0.030 inch (0.8mm) contact tip 6. Tighten gun or replace gun
Wire is birdnesting at the drive roller	1. Too much tension on drive roller 2. Gun liner worn or damaged 3. Contact tip is clogged or damaged 4. Liner is stretched or is too long	1. Adjust the drive tension see INSTALLING THE WELDING WIRE 2. Replace gun 3. Replace contact tip 4. Trim liner to proper length
Wire burns back to contact tip	1. Gun liner is worn or damaged 2. Liner stretched or is too long 3. Wrong size contact tip 4. Contact tip clogged or damaged	1. Replace gun 2. Trim liner for proper length 3. Use correct size contact tip 4. Replace contact tip
Ground clamp and/or cable gets hot	Bad connection from cable to clamp	Tighten connection or replace cable
Gun nozzle arcs to work surface	Slag buildup inside nozzle or nozzle is shorted	Clean or replace nozzle as needed

## SCHEMATIC DIAGRAM

