

CHICAGO welding
ELECTRIC systems

DUAL MIG WELDER

Model 93793

ASSEMBLY AND OPERATING INSTRUCTIONS



Due to continuing improvements, actual product may differ slightly from the product described herein.

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Harbor Freight Tools®.

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**TO PREVENT SERIOUS INJURY,
READ AND UNDERSTAND ALL WARNINGS
AND INSTRUCTIONS BEFORE USE.**

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For technical questions, please call 1-800-444-3353.

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PRODUCT SPECIFICATIONS

Item	Description
Welding Current	35 ~ 140 Amps
Duty Cycle	18% @ 140 Amps / 100% @ 45 Amps (Refer to chart and explanation on page 18)
Power Consumption	230 Volt / 60 Hz / Single Phase / 25 Amps (Should be connected to a 25 Amp minimum dedicated circuit)
Open Voltage	15.5 - 20 Volts
Required Power Plug Type	3-Prong, 220 VAC, polarized, twist lock (not included) NEMA #L6-30 or equivalent
Power Cord Rating	12 AWG x 3C x 6' Long
Gas Inlet Size	1/4"
Ground Cable	4 Gauge / 6' Long
Torch Power Cable	8 Gauge / 6' Long
Thermal Overload Protection (with Light)	Automatic shutdown and restart after cool down
Wire Size	0.23" to 0.035"
Wire Spool Size	7-3/4" Diameter
Included Torch Tip Size	0.030"
Accessories	Wheel Kit / Wire Spool / Torch Assy. / Grounding Clamp Wire Brush & Hammer / Spare 1.0 & 0.8 Welding Tips Hand-Held Face Shield
Net Weight	103 Pounds

SAVE THIS MANUAL

You will need this manual for the safety warnings and precautions, assembly, operating, inspection, maintenance and cleaning procedures, parts list and assembly diagram. Keep your invoice with this manual. Write the invoice number on the inside of the front cover. Keep this manual and invoice in a safe and dry place for future reference.

GENERAL SAFETY RULES

 **WARNING!**
READ AND UNDERSTAND ALL INSTRUCTIONS
Failure to follow all instructions listed below may result in
electric shock, fire, and/or serious injury.
SAVE THESE INSTRUCTIONS

WORK AREA

1. **Keep your work area clean and well lit.** Cluttered benches and dark areas invite accidents.
2. **Do not operate power tools in explosive atmospheres, such as in the presence of flammable liquids, gases, or dust.** Power tools create sparks which may ignite the dust or fumes.
3. **Keep bystanders, children, and visitors away while operating a power tool.** Distractions can cause you to lose control. Protect others in the work area from debris such as chips and sparks. Provide barriers or shields as needed.

ELECTRICAL SAFETY

4. **Grounded tools must be plugged into an outlet properly installed and grounded in accordance with all codes and ordinances. Never remove the grounding prong or modify the plug in any way. Do not use any adapter plugs. Check with a qualified electrician if you are in doubt as to whether the outlet is properly grounded.** If the tools should electrically malfunction or break down, grounding provides a low resistance path to carry electricity away from the user.
5. **Avoid body contact with grounded surfaces such as pipes, radiators, ranges, and refrigerators.** There is an increased risk of electric shock if your body is grounded.
6. **Do not expose power tools to rain or wet conditions.** Water entering a power tool will increase the risk of electric shock.
7. **Do not abuse the Power Cord. Never use the Power Cord to carry the tools or pull the Plug from an outlet. Keep the Power Cord away from heat, oil, sharp edges, or moving parts. Replace damaged Power Cords immediately.** Damaged Power Cords increase the risk of electric shock.
8. **When operating a power tool outside, use an outdoor extension cord marked “W-A” or “W”.** These extension cords are rated for outdoor use, and reduce the risk of electric shock.

PERSONAL SAFETY

9. **Stay alert. Watch what you are doing, and use common sense when operating a power tool. Do not use a power tool while tired or under the influence of drugs, alcohol, or medication.** A moment of inattention while operating power tools may result in serious personal injury.
10. **Dress properly. Do not wear loose clothing or jewelry. Contain long hair. Keep your hair, clothing, and gloves away from moving parts.** Loose clothes, jewelry, or long hair can be caught in moving parts.
11. **Avoid accidental starting. Be sure the Power Switch is off before plugging in.** Carrying power tools with your finger on the Power Switch, or plugging in power tools with the Power Switch on, invites accidents.
12. **Remove adjusting keys or wrenches before turning the power tool on.** A wrench or a key that is left attached to a rotating part of the power tool may result in personal injury.
13. **Do not overreach. Keep proper footing and balance at all times.** Proper footing and balance enables better control of the power tool in unexpected situations.
14. **Always wear eye, hearing, and breathing protection.** For welding safety equipment, refer to number 9 on page 6.


TOOL USE AND CARE

15. **Use clamps (not included) or other practical ways to secure and support the workpiece to a stable platform.** Holding the work by hand or against your body is unstable and may lead to loss of control.
16. **Do not force the tool. Use the correct tool for your application.** The correct tool will do the job better and safer at the rate for which it is designed.
17. **Do not use the power tool if the Power Switch does not turn it on or off.** Any tool that cannot be controlled with the Power Switch is dangerous and must be replaced.
18. **Disconnect the Power Cord Plug from the power source before making any adjustments, changing accessories, or storing the tool.** Such preventive safety measures reduce the risk of starting the tool accidentally.
19. **Store idle tools out of reach of children and other untrained persons.** Tools are dangerous in the hands of untrained users.
20. **Maintain tools with care. Keep cutting tools sharp and clean.** Properly maintained tools with a sharp cutting edge are less likely to bind and are easier to control. Do not use a damaged tool. Tag damaged tools “Do not use” until repaired.
21. **Check for misalignment or binding of moving parts, breakage of parts, and any other condition that may affect the tool’s operation. If damaged, have the tool serviced before using.** Many accidents are caused by poorly maintained tools.
22. **Use only accessories that are recommended by the manufacturer for your model.** Accessories that may be suitable for one tool may become hazardous when used on another tool.

SERVICE

23. **Tool service must be performed only by qualified repair personnel.** Service or maintenance performed by unqualified personnel could result in a risk of injury.
24. **When servicing a tool, use only identical replacement parts. Follow instructions in the “*Inspection, Maintenance, And Cleaning*” section of this manual.** Use of unauthorized parts or failure to follow maintenance instructions may create a risk of electric shock or injury.

SPECIFIC SAFETY RULES

1. **Ground this product.** This Welder requires the attachment and use of a UL[®]-listed, 220 volt, grounded, 3-prong, electrical Power Cord Plug (not included). Only a qualified electrician should install the Power Cord Plug. Never remove the grounding prong or modify the Power Cord Plug in any way. Do not use adapter plugs with this product. To comply with the National Electric Code, and to provide additional protection from the risk of electrical shock, this product should only be connected to a 220 volt, 3-hole outlet that is properly grounded.
2. **Maintain labels and nameplates on the Welder.** These carry important information. If unreadable or missing, contact Harbor Freight Tools for a replacement.
3. **Avoid unintentional starting.** Make sure you are prepared to begin work before turning on the Welder.
4. **Do not force the Welder.** This tool will do the work better and safer at the speed and capacity for which it was designed.
5. **Never leave the Welder unattended when it is plugged into an electrical outlet.** Turn off the tool, and unplug it from its electrical outlet before leaving.
6. **Industrial applications must follow OSHA guidelines.**
7. **Never stand on the Welder.** Serious injury could result if the Welder is tipped or if hot surfaces are accidentally contacted.
8. **Maintain a safe working environment.** Keep the work area well lit. Make sure there is adequate surrounding workspace. Always keep the work area free of obstructions, grease, oil, trash, and other debris. Do not use a power tool in areas near flammable chemicals, dusts, and vapors. Do not use this product in a damp or wet location.
9.  **Prevent eye injury and burns.** Wearing and using ANSI-approved personal safety clothing and safety devices reduce the risk for injury.
 - Wear ANSI-approved safety impact eye goggles with a welding helmet with protective lens.
 - Leather leggings, fire resistant shoes or boots should be worn when using this product. Do not wear pants with cuffs, shirts with open pockets, or any clothing that can catch and hold molten metal or sparks.
 - Keep clothing free of grease, oil, solvents, or any flammable substances. Wear dry, insulating gloves and protective clothing.
 - Wear an approved head covering to protect the head and neck. Use aprons, cape, sleeves, shoulder covers, and bibs designed and approved for welding and cutting procedures.
 - When welding/cutting overhead or in confined spaces, wear flame resistant ear plugs or ear muffs to keep sparks out of ears.

10.



Prevent accidental fires. Remove any combustible material from the work area.

- When possible, move the work to a location well away from combustible materials. If relocation is not possible, protect the combustibles with a cover made of fire resistant material.
- Remove or make safe all combustible materials for a radius of 35 feet (10 meters) around the work area. Use a fire resistant material to cover or block all open doorways, windows, cracks, and other openings.
- Enclose the work area with portable fire resistant screens. Protect combustible walls, ceilings, floors, etc., from sparks and heat with fire resistant covers.
- If working on a metal wall, ceiling, etc., prevent ignition of combustibles on the other side by moving the combustibles to a safe location. If relocation of combustibles is not possible, designate someone to serve as a fire watch, equipped with a fire extinguisher, during the cutting process and for at least one half hour after the cutting is completed.
- Do not weld or cut on materials having a combustible coating or combustible internal structure, as in walls or ceilings, without an approved method for eliminating the hazard.
- Do not dispose of hot slag in containers holding combustible materials. Keep a fire extinguisher nearby and know how to use it.
- After spot welding, make a thorough examination for evidence of fire. Be aware that easily-visible smoke or flame may not be present for some time after the fire has started. Do not weld or cut in atmospheres containing dangerously reactive or flammable gases, vapors, liquids, and dust. Provide adequate ventilation in work areas to prevent accumulation of flammable gases, vapors, and dust. Do not apply heat to a container that has held an unknown substance or a combustible material whose contents, when heated, can produce flammable or explosive vapors. Clean and purge containers before applying heat. Vent closed containers, including castings, before preheating, welding, or cutting.

11. **Avoid overexposure to fumes and gases.** Always keep your head out of the fumes. Do not breathe the fumes. Use enough ventilation or exhaust, or both, to keep fumes and gases from your breathing zone and general area.

- Where ventilation is questionable, have a qualified technician take an air sampling to determine the need for corrective measures. Use mechanical ventilation to improve air quality. If engineering controls are not feasible, use an approved respirator.
- Work in a confined area only if it is well ventilated, or while wearing an air-supplied respirator.
- Follow OSHA guidelines for Permissible Exposure Limits (PEL's) for various fumes and gases.
- Follow the American Conference of Governmental Industrial Hygienists recommendations for Threshold Limit Values (TLV's) for fumes and gases.

- Have a recognized specialist in Industrial Hygiene or Environmental Services check the operation and air quality and make recommendations for the specific welding or cutting situation.

Inhalation Hazard

Welding Produces TOXIC FUMES and GASSES.







Exposure to welding gasses can increase the risk of developing certain cancers, such as cancer of the larynx and lung cancer. Also, some diseases that may be linked to exposure to welding gasses or fumes are:

- Early onset of Parkinson's Disease
- Heart Disease
- Damage to the reproductive organs
- Ulcers
- Inflammation of the small intestine or stomach
- Kidney damage
- Respiratory diseases such as emphysema, bronchitis or pneumonia



Safety precautions, such as using natural or forced air ventilation and wearing a NIOSH-approved respirator, are **ESSENTIAL** to reduce the risk of developing the above illnesses.

12. **Read and understand all instructions and safety precautions as outlined in the manufacturer's manual for the material you will weld or cut.**
13. **Do not touch live electrical parts.** Wear dry, insulating gloves. Do not touch electrode or conductor tong with bare hand. Do not wear wet or damaged gloves.
14. **Protect yourself from electric shock.** Do not use outdoors. Insulate yourself from the workpiece and ground. Use nonflammable, dry insulating material if possible, or use dry rubber mats, dry wood or plywood, or other dry insulating material big enough to cover your full area of contact with the work or ground.
15. **Ensure that the unit is placed on a stable location before use.** If this unit falls while plugged in, severe injury, electric shock, or fire may result.
16.  **Cylinders can explode when damaged:**
 - Never weld on a pressurized or a closed cylinder.
 - Never lay a welding torch on a cylinder.
 - Never allow a welding electrode to touch the cylinder.
 - Keep cylinders away from any electrical circuits, including welding circuits.
 - Keep protective cap in place over the valve except when the cylinder is in use.
 - Use only correct gas shielding equipment designed specifically for the type of welding you will do. Maintain this equipment properly.
 - Always protect gas cylinders from heat, being struck, physical damage, slag, flames, sparks, and arcs.
 - Always use proper procedures to move cylinders.

17. **Use the right tool for the job.** Do not attempt to force small equipment to do the work of larger industrial equipment. There are certain applications for which this Welder was designed. It will do the job better and more safely at the rate for which it was intended. Do not modify this Welder, and do not use this Welder for a purpose for which it was not intended.
18.  **WARNING!** People with pacemakers should consult their physician(s) before using this product. Electromagnetic fields in close proximity to a heart pacemaker could cause interference to or failure of the pacemaker.
19.  **WARNING!** The warnings and cautions discussed in this manual cannot cover all possible conditions and situations that may occur. It must be understood by the operator that common sense and caution are factors which cannot be built into this product, but must be supplied by the operator.
20.  **WARNING!** This product, when used for welding and similar applications, produces chemicals known to the State of California to cause cancer and birth defects (or other reproductive harm).
(California Health & Safety Code § 25249.5, *et seq.*)

SAVE THESE INSTRUCTIONS

GROUNDING

NOTE:

**This Welder requires the installation of a 3-Prong, 220 VAC, polarized, twistlock Power Cord Plug (not included).
NEMA configuration # L6-30 or equivalent
The Plug must be installed by a certified electrician.**

 **WARNING!**

Improperly connecting the grounding wire can result in the risk of electric shock. Check with a qualified electrician if you are in doubt as to whether the outlet is properly grounded. Do not modify the power cord plug used with the tool. Never remove the grounding prong from the plug. Do not use the tool if the power cord or plug is damaged. If damaged, have it repaired by a service facility before use. If the plug will not fit the outlet, have a proper outlet installed by a qualified electrician.

GROUNDING TOOLS: TOOLS WITH THREE PRONG PLUGS




1. Tools marked with “Grounding Required” have a three wire cord and three prong grounding plug. The plug must be connected to a properly grounded outlet. If the tool should electrically malfunction or break down, grounding provides a low resistance path to carry electricity away from the user, reducing the risk of electric shock.

2. The grounding prong in the plug is connected through the green wire inside the cord to the grounding system in the tool. The green wire in the cord must be the only wire connected to the tool's grounding system and must never be attached to an electrically "live" terminal.
3. Your tool must be plugged into an appropriate outlet, properly installed **by a certified electrician** and grounded in accordance with all codes and ordinances.

EXTENSION CORDS

AN EXTENSION CORD MUST NEVER BE USED WITH THIS ITEM. Use of an extension cord could result in damage to the item or fire.

SYMBOLOLOGY

	Double Insulated
	Canadian Standards Association
	Underwriters Laboratories, Inc.
V ~	Volts Alternating Current
A	Amperes
noxxxx/min.	No Load Revolutions per Minute (RPM)

UNPACKING

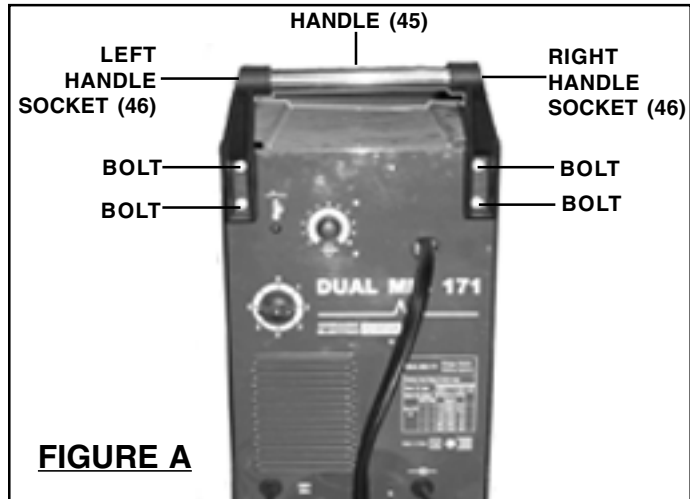
When unpacking both boxes, check to make sure all the parts shown on the **Parts Lists on pages 29 through 31** are included. If any parts are missing or broken, please call Harbor Freight Tools at the number shown on the cover of this manual as soon as possible.

ASSEMBLY INSTRUCTIONS

⚠ WARNING! Always turn off the Welder and unplug the unit from its electrical outlet prior to performing any assembly, maintenance, or service.

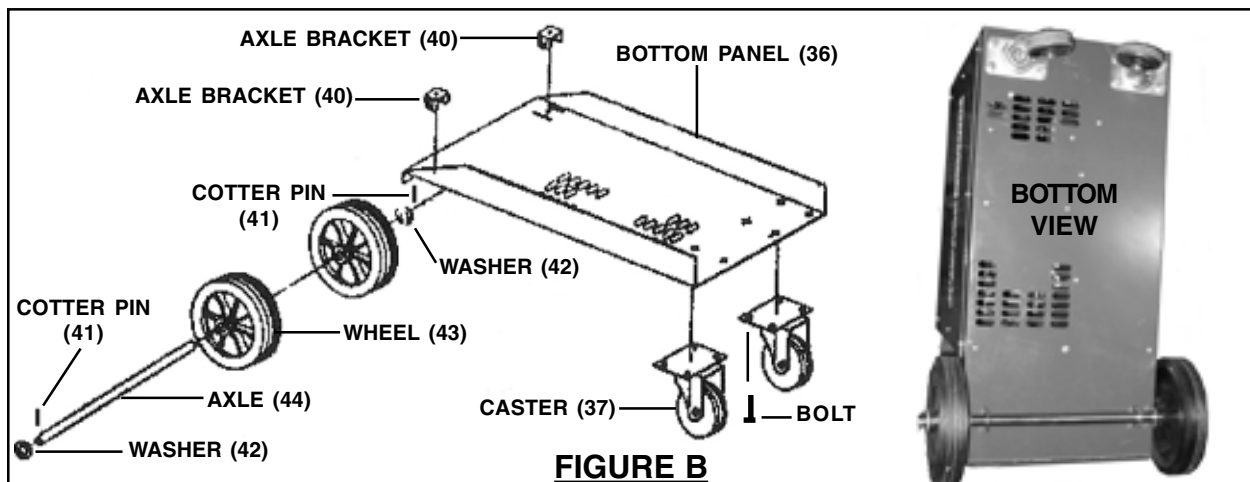
TO ATTACH THE HANDLE

Insert the Handle (45) into the Right Handle Socket (46) and Left Handle Socket (58). Then attach the Right and Left Handle Sockets to the Front Panel (57), using the four Bolts provided. (See Figure A.)



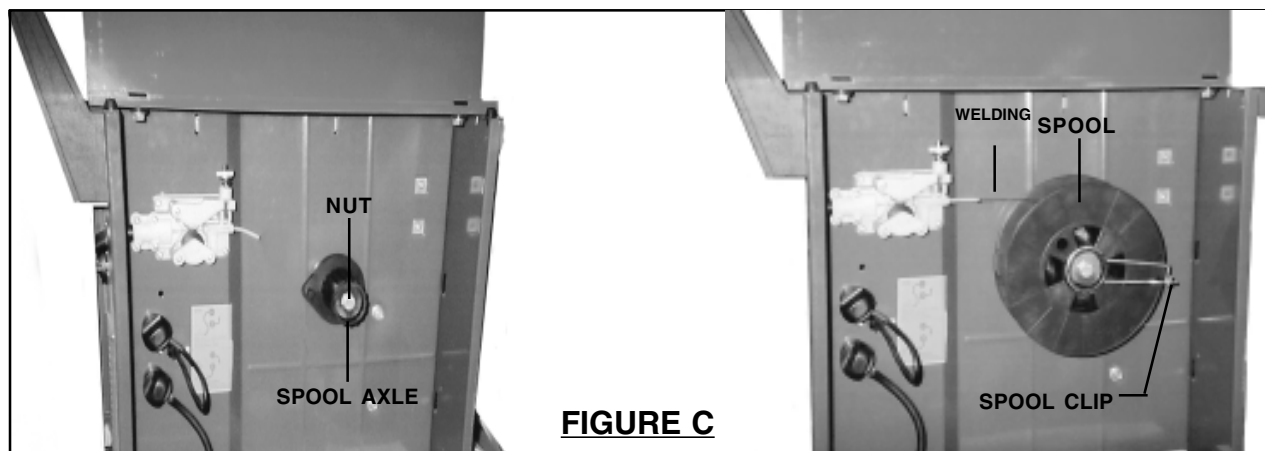
TO INSTALL THE REAR WHEELS AND CASTERS

1. Insert the two Axle Brackets (40) into the slots located at the rear of the Bottom Panel (36). Secure the Axle Brackets to the Bottom Panel, using the two Screws provided. Insert the Axle (44) through the openings (located on the underside of the Bottom Panel) in the Axle Brackets. Insert one Wheel (43) on each end of the Axle. Insert one Washer (42) on each end of the Axle. Then secure the two Wheels to the Axle, using one Cotter Pin (41) on each end of the Axle. (See Figure B.)
2. Align the four mounting holes in each of the two Casters (37) with the threaded mounting holes located at the front of the Bottom Panel (36). Then secure the two Casters to the Bottom Panel, using the eight Bolts provided. (See Figure B.)



TO INSTALL A 10 LB. WIRE SPOOL

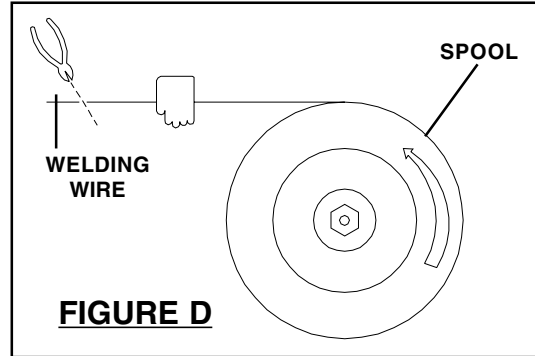
1. Lift the Access Panel (31) of the Welder to expose the Wire Feed Assembly.
2. If the 10 lb. Spool Axle is not already installed: Unscrew and remove the Nut and Washer. Install the 10 lb. Spool Axle (13) onto the Shaft, using the spring underneath and the washer and nut above. **(See Figure C.)**
3. Remove the Spool Clip (14), if installed. Install a 10 lb. Spool (not included) onto the Spool Axle (13), **making sure that the wire unwinds from the top** and the hole on the spool lines up with the peg on the Axle. **(See Figure C.)**
4. Attach the Spool Clip (14) to the Axle, securing it in place. **(See Figure C.)**



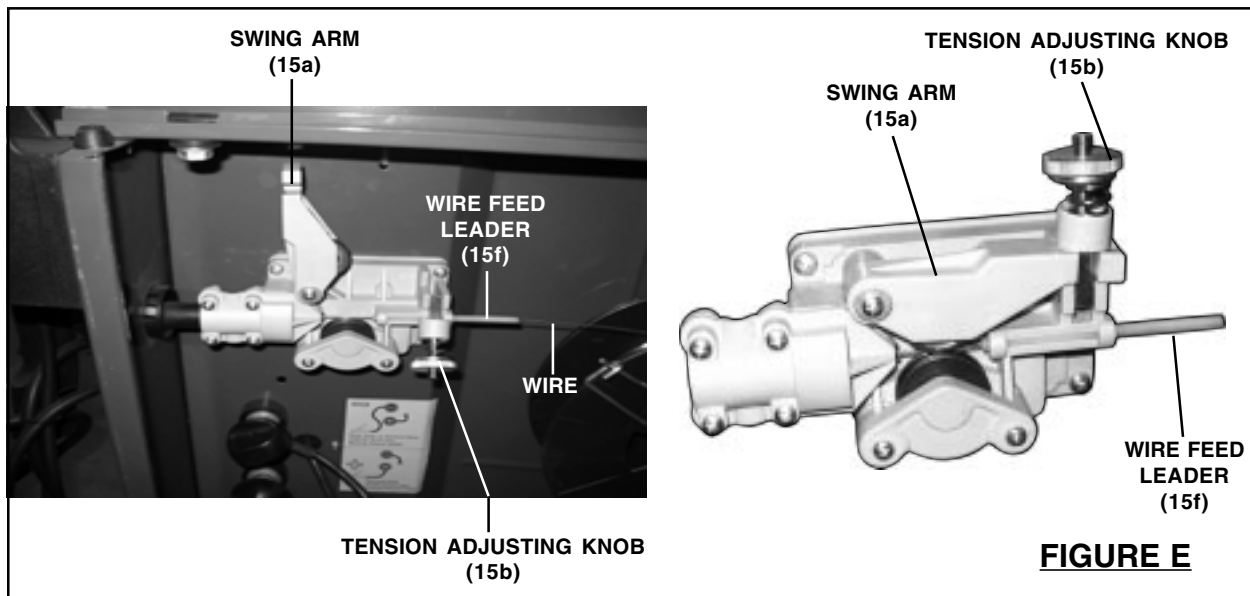
TO ROUTE THE WIRE

NOTE: When installing wire of a different size or composition, you will also need to change wire settings, set the gun polarity, and, possibly, install a gas cylinder. See pages 15-17.

1. **IMPORTANT:** Securely hold onto the end of the Welding Wire and keep tension on it during the following steps. If this is not done the Welding Wire will spring backward, creating a tangled “bird’s nest” and resulting in wasted wire. **(See Figure D.)**



2. Hold the Welding Wire securely while you cut enough Wire off the end of the Spool to remove all bent and crimped Wire. Make sure the cut end has no burrs or sharp edges (cut again, if needed). **(See Figure D.)**
3. Loosen and lower the Tension Adjusting Knob (15b) on the Wire Feed Assembly. Then, raise the Swing Arm (15a). **(See Figure E.)**
4. Keep tension on the Welding Wire, and guide at least 12 inches of Wire into the Wire Feed Leader (15f). **(See Figure E.)**
5. Lower the Swing Arm (15a) on the Wire Feed Assembly. Lower and tighten the Tension Adjusting Knob (15b). Once the Wire is held in place, you may release it. **(See Figure E.)**



6. Lay the Torch Cable out in a straight line so that the Welding Wire moves through it easily. Leave the Access Panel (31) of the Welder open so that the Wire Feed Assembly can be observed.
7. Remove the Gun Nozzle (51a) and Contact Tip (51b). **(See Figure F, next page.)**



WARNING!

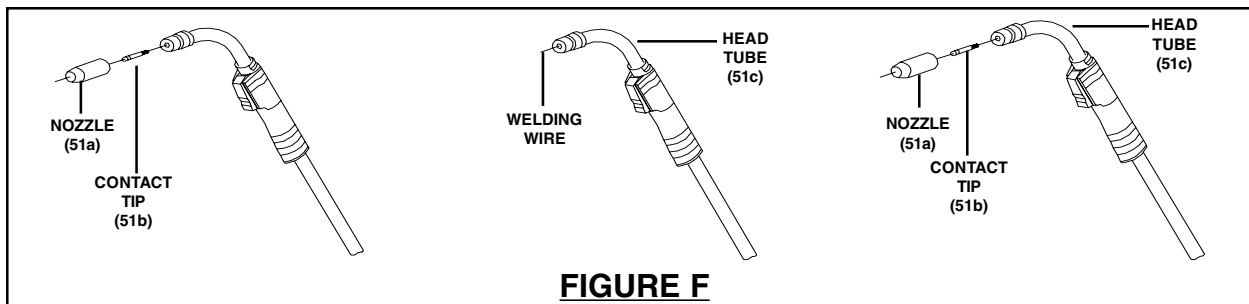


EXERCISE EXTREME CAUTION - RISK OF FIRE AND/OR ELECTRIC SHOCK!

The following steps require applying power to the Welder. Do not touch anything with the Torch Handle or Welding Wire or an arc will be ignited. Do not touch the internal components of the unit while it is plugged in.

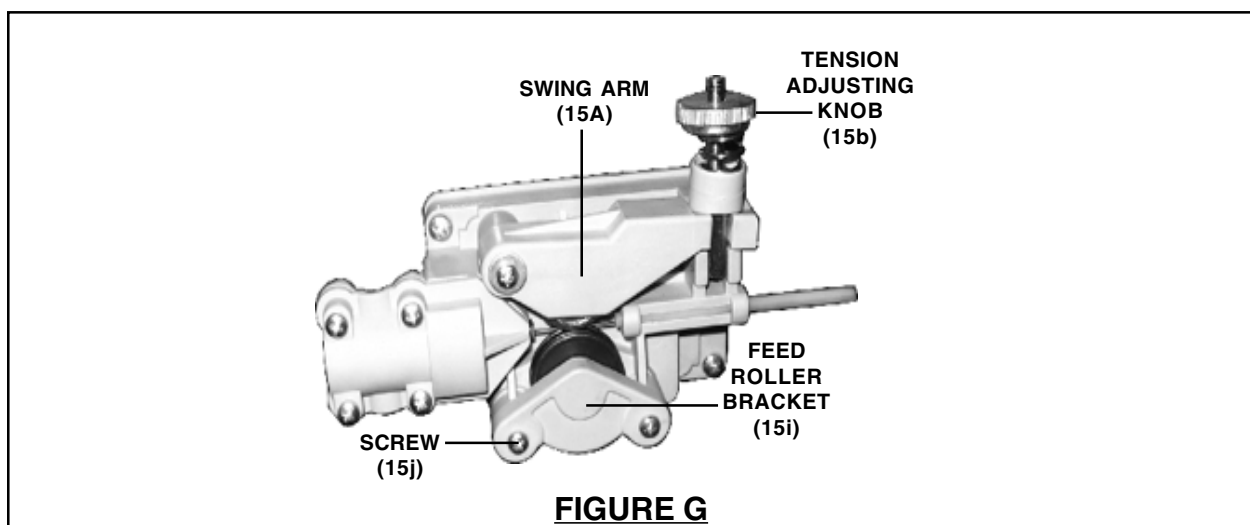
8. Plug the Power Cord (54) into its 220 volt, grounded, electrical outlet. Then, turn the Welder **ON**.
9. Point the Torch Handle away from all objects. Then, squeeze the Trigger Switch (51e) on the Torch Handle until the Welding Wire feeds through the Head Tube (51c) of the Torch Handle about 2 inches. If necessary, move the Torch Handle slightly in a circular motion to help feed the Welding Wire properly out of the Head Tube. **(See Figure F.)**
10. **NOTE:** If the Welding Wire does not feed properly, and the Spool is stationary, turn the Welder off. Unplug the Welder. Slightly tighten the Tension Adjusting Knob (15b) on the Wire Feed Assembly, and rewind the Welding Wire slightly before retrying. **(See Figure E.)**
11. To check the tension on the Wire Feed Assembly, feed the Welding Wire against a piece of scrap wood from 2 to 3 inches away. If the Wire stops instead of bending, turn the Welder **OFF**. Unplug the unit from its electrical outlet. Then, slightly tighten the Tension Adjusting Knob (15b) on the Wire Feed Assembly. **(See Figure E.)**
12. **Turn the Welder OFF, unplug it, and discharge the electrode to ground.** Insert the Contact Tip (51b) onto the Welding Wire and screw it firmly into the Head Tube (51c) of the Torch Handle. Replace the Nozzle (51a), and cut off any excess Welding Wire over 1/2 inch. Then, close the Access Panel (31) of the Welder. **(See Figure F.)**

REMINDER: When installing wire of a different size or composition, you will also need to change wire settings, set the gun polarity, and, possibly, install a gas cylinder. See pages 15-17.



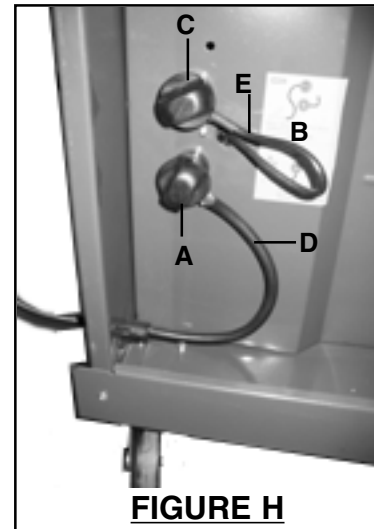
TO CHANGE WIRE SETTINGS

1. **⚠ WARNING!** Make sure to turn off the Welder and unplug it from its electrical outlet prior to changing wire settings.
2. Open the Access Panel (31) of the Welder to expose the Wire Feed Assembly.
3. Loosen, and lower the Tension Adjusting Knob (15b) on the Wire Feed Assembly. Then, raise the Swing Arm (15a). **(See Figure G.)**
4. Remove the two Screws (15j) that secures the Feed Roller Bracket (15i) in place. Then, remove the Feed Roller Bracket. **(See Figure G.)**
5. Install a Wire Feed Roller (16) with the proper groove size facing towards the Inner Panel (11) of the welder.
6. Replace the Feed Roller Bracket (15i), and secure in place with the Screws. **(See Figure G.)**
7. Lower the Swing Arm (15a) on the Wire Feed Assembly. Then, lower and tighten the Tension Adjusting Knob (15b). **(See Figure G.)**
8. Remove the Gun Nozzle (51a) and Contact Tip (51b). Install a Contact Tip that is one size larger* than the diameter of Welding Wire used. Then, replace the Gun Nozzle. **(See Figure F, previous page.)**
*This accommodates thermal expansion of the wire.
9. Install the Spool of Welding Wire, and route the Wire to the Torch Gun. Then, test and, if necessary, adjust the Wire Feed Assembly as discussed in the previous pages of this manual.



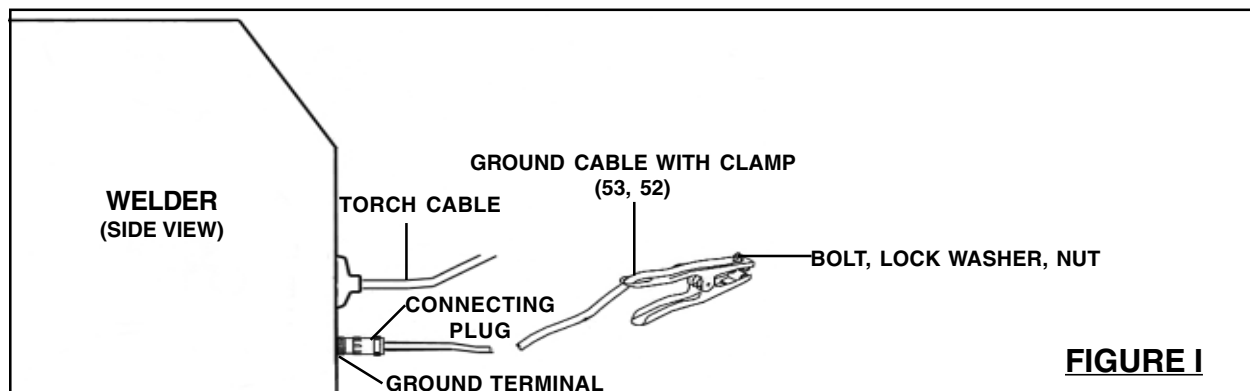
SETTING THE GUN POLARITY FOR WIRE TYPE

1. Set for Electrode Positive (DCEP) for **gas welding** with solid-core wire. Positive electrode (C), negative ground (D). **SHOWN IN ILLUSTRATION, INITIAL SETUP. (See Figure H.)**
2. Set for Electrode Negative (DCEN) for **gasless** flux core wire. Negative electrode (C), positive ground (D). **(See Figure H.)**
3. When connecting to the weld output terminals, do not place anything between the welding Cable Terminals (A and C) and their copper connections. **(See Figure H.)**
4. Always read and follow wire manufacturer's recommended polarity.
5. **A. Positive (+) Output Terminal**
B. Polarity Changeover Label
C. Negative (-) Output Terminal
D. Red Cable
E. Black Cable




TO ATTACH THE GROUND CABLE WITH CLAMP

1. Insert the bare end of the Ground Cable (53) upward through the hole located at the rear of the Ground Clamp (52). Then secure the bare end of the Ground Cable to the Ground Clamp, using the Bolt, Lock Washer, and Nut provided. **(See Figure I.)**
2. Insert the Connecting Plug of the Ground Cable (53) into the Ground Terminal and twist the Connecting Plug to lock it in place. **(See Figure I.)**



TO INSTALL A GAS CYLINDER

 **WARNING:** Maximum cylinder height is 3 feet 3 inches (1m). Maximum cylinder weight is 88 lb., including gas. NEVER exceed either of these maximums.

1. **CAUTION!** Do not use an Argon/Mixed pressure regulator/flow meter with CO₂ shielding gas. To use CO₂ shielding gas, you must install a CO₂ gas pressure regulator/flow meter (neither one included).
2. Thread the provided straps through the slots on the back of the welder. With assistance, set the cylinder onto the shelf at the back of the welder. Use the provided chain to secure the cylinder in place.
3. Secure the cylinder in place with both of the straps.
4. Remove the protective cap from the cylinder. Stand to the side of the cylinder valve, and open the valve slightly to blow dust and dirt from the valve. Then, close the valve.
5. Make sure the Flow Adjust on the Pressure Regulator/Flow Meter is turned off. Then, screw the Pressure Regulator/Flow Meter (not included) firmly onto the cylinder valve.
6. Attach the Gas Line (2) to the Pressure Regulator/Flow Meter from the Gas Inlet located on the Back Panel (5) of the Welder.
7. Adjust the flow rate of the gas by turning the Flow Adjust. The typical flow rate is 10-30 CFH (cubic feet per hour). **Make sure to check the Welding Wire manufacturer's recommended flow rate.**

OPERATING INSTRUCTIONS

BEFORE YOU BEGIN WELDING

Good welding requires a high degree of skill and experience. You should practice a few sample welds on scrap metal before you begin welding your first project. Additional practice periods are recommended whenever you weld a different thickness of material, wire, or weld a different type of connection.

DUTY CYCLE (DURATION OF USE)

1. **CAUTION!** Avoid damage to the Welder by not leaving the unit on for more than the prescribed duty cycle time.
2. The duty cycle defines the number of minutes, within a 10 minute period, during which a given Welder can safely produce a particular welding current. **For example, this Welder, with a 18% duty cycle at 140 Amps (setting 6), must be allowed to rest for at least 8 minutes and 12 seconds after every minute and 48 seconds of continuous weld at 140 Amps. (See Figure K.)**
3. Failure to carefully observe duty cycle limitations can easily over stress a Welder's power generation system, contributing to premature Welder failure.
4. This Welder is equipped with an internal thermal protection system to help prevent over stressing the unit. When the unit overheats, it automatically shuts down, then automatically returns to service when it cools down.
NOTE: Once the unit returns to service, follow a more conservative duty cycle routine to help prevent excess wear to the Welder. **(See Figure K.)**

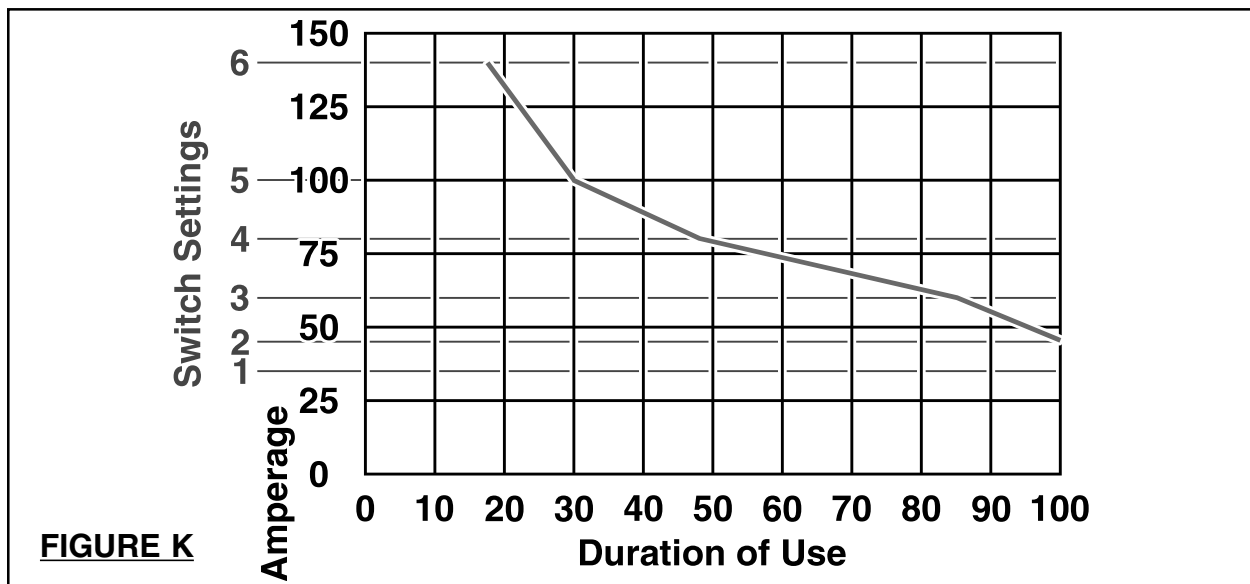


FIGURE K

SETTING UP THE WELD

WARNING!

Before welding, make sure to read and understand all safety precautions and warnings discussed on pages 3 through 10.

1. **Overload Indicator Light (50):** If too much current is drawn from the Welder, the Overload Protector will activate. The **RED** Overload Indicator Light will illuminate and the Welder will automatically turn off until it cools down. If this happens, turn the Power Switch to its “**OFF**” position and wait approximately 20 minutes. (See Figure L.)
2. **Wire Speed Control Knob (49):** The Scale surrounding the Knob is relative value, not wire feed speed. (See Figure L.)
3. **Voltage Control Knob (55):** The Scale surrounding the Knob is relative value, not voltage. Adjust the Voltage Control Knob based on thickness of metal being welded. (See Figure L.)



4. If using solid-core wire, connect and secure an Argon/ CO2 gas hose to the rear of the Welder. (If using flux core wire, protective gas is not required.)
5. Securely clamp the Ground Clamp (52) as close as possible to the metal object to be welded, or to the metal workbench where the object is mounted and electrically connected. (See Figure L.)

7. **NOTE:** The workpieces should be firmly held together and in position while welding. Use clamps (not included) to hold the workpieces so you can concentrate on the job at hand. The distance (if any) between the two workpieces must be controlled properly to allow the weld to hold both sides securely while allowing the weld to penetrate fully into the joint.
8. Set the desired welding current (35 to 140 amps) for the type of metal being welded, using the Wire Speed Control Knob (49) and Voltage Control Knob (55).
(See Figure L.)
9. Make sure the Power Switch is in its “OFF” position. Then plug Power Cord of the Welder into a dedicated, 230 VAC, 25 amp line with delayed action type circuit breaker or fuse.
10. While holding the Welding Torch (51), with the Welding Wire clearly out of the way of any grounded objects, turn the Power Switch to its “ON” position.
11. Momentarily squeeze the Trigger (51e) of the Welding Torch (51) to test the wire feed speed. If necessary, adjust the speed by turning the Wire Speed Control Knob (49). **(See Figure L.)**
12. Orient yourself on the area to be welded, then place a Face Shield over your eyes.



⚠ WARNING! Never look at the ignited arc without ANSI-approved, arc-shaded, eye protection in a full face shield. Permanent eye damage or blindness can occur. Skin burns can occur. Never breathe arc fumes. (See page 8.)

HOLDING THE WELDING TORCH

13. Hold the Welding Torch (51) in one hand and the face shield in the other. If a hands-free welding shield is used, then both hands can be used to control the Welding Torch.
14. The Welding Wire should be directed straight into the joint. This gives an angle of 90 degrees (straight up and down) for groove (end to end) welds, and an angle of 45 degrees for fillet (T-shaped) welds.
15. The end of the Welding Torch should be tilted so that the Welding Wire is angled anywhere in between straight on and 15 degrees in the direction of the weld. The amount of tilt is called the “**drag angle**”. **(See Figure M.)**
16. The Welding Wire should extend no more than 1/2” past the Nozzle (51a) of the Welding Torch (51). This distance is called “stickout”. **(See Figure M.)**
17. Set the Wire Speed and Voltage Control Knobs (49, 55) to the recommended start settings as shown in the Weld Settings Chart on the next page. **(See Figure N.)**

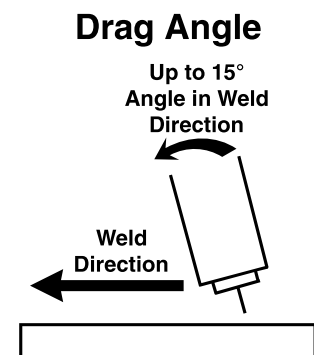


FIGURE M

WELD SETTINGS CHART

FIGURE N

First number is Voltage Setting.
Second number is Wire Speed Setting.

NOTE: The numbers within the spaces are the approximate wire feed/voltage settings recommended* for this wire size and material thickness.

Wire Size (Flux Core, Mild Steel)		Material Thickness (Steel)					
		.035"-.047"	.047"-.075"	.075"-.125"	.125"-.157"	.157"-.250"	
Wire Size (Solid Core, Mild Steel)	.030"	1, 1	2, 2	4, 5	5, 6	6, 7	
	.035"	1, 1	3, 2	4, 4	5, 5	6, 6	
	.023"	2, 3	3, 4	4, 6	5, 7		
Wire Size (Solid Core, Mild Steel)	.030"	2, 2	3, 3	4, 4	5, 5	6, 6	
	.035"	2, 1	3, 2	4, 3	5, 4	6, 5	

*This chart is only intended to show *general* guidelines for different wire sizes and for different thicknesses of material. The settings should only be used at the beginning of a weld and must be adjusted after stopping and carefully inspecting the weld. Proper welding takes good technique and practice.

Welding Instructions continued on next page.

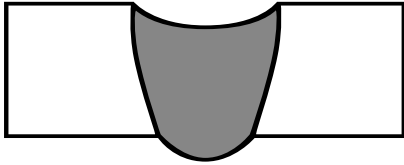
18. Squeeze (and hold) the Trigger Switch (51e) of the Welding Torch (51) and stroke the area to be welded with the Welding Wire to ignite the arc.
 - A. Never tap the Welding Wire into the welding surface to ignite the arc. This will cause the Welding Wire to stick to the workpiece.
 - B. For a narrow weld, you can usually draw the Welding Wire in a steady straight line. This is called a “**stringer bead**”.
 - C. For a wider weld, draw the Welding Wire back and forth across the joint in a curve. This is called a “**weave bead**”.
19. **NOTE:** If too much current is drawn from the Welder, the internal Thermal Overload Protector will activate. The Overload Indicator Light (50) will illuminate and the Welder will automatically turn off. If this happens, turn the Power Switch to its “**OFF**” position and wait 3 to 5 minutes for the unit to cool down. **(See Figure P.)**
20. After a few seconds, stop. Switch off the Welder, and check your progress. Compare your weld’s appearance with the diagrams and descriptions shown in the “*Weld Diagnosis*” section beginning on page 23. After making any necessary adjustments, continue the weld while carefully following the DUTY CYCLE guidelines. **(See Figure N.)**

Welding Instructions continued on page 25.

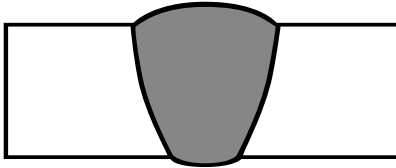
WELD DIAGNOSIS

WELD PENETRATION

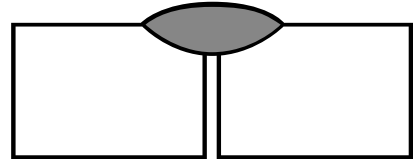
EXCESS OR BURN-THROUGH
Weld droops on top and underneath, or falls through entirely, making a hole.



PROPER
Weld is visible underneath and bulges slightly on top.



INADEQUATE
Weld does not contact the joint fully, just on the surface.



CROSS SECTIONS

POSSIBLE CAUSES AND SOLUTIONS

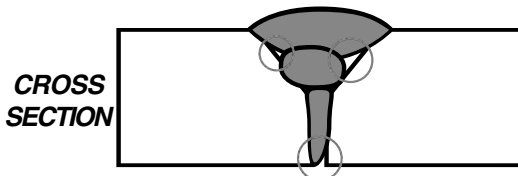
1. **Excessive material at weld:**
Reduce wire feed speed.
2. **Overheating:**
Increase welding speed and ensure that welding speed is kept steady.

POSSIBLE CAUSES AND SOLUTIONS

1. **Workpieces too thick/close:**
Joint design must allow weld to reach bottom of groove and allow proper welding procedures.
2. **Incorrect welding technique:**
Maintain $\frac{1}{2}$ " or less stickout.
Keep arc on leading edge of weld puddle.
Hold gun at proper angles as stated under Holding The Torch on page 20.
3. **Insufficient weld material:**
Increase wire feed speed.
4. **Insufficient weld heat:**
Reduce Welding Speed.

WELD NOT ADHERING PROPERLY

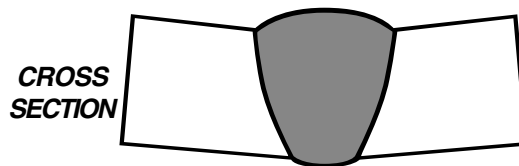
Gaps present between weld and previous bead or between weld and workpiece. See areas below.



POSSIBLE CAUSES AND SOLUTIONS

1. **Dirty workpiece:**
Make certain that workpiece is clean and free from oil, coatings, and other residues.
2. **Insufficient weld material:**
Increase wire feed speed.
3. **Incorrect welding technique:**
Place stringer bead at correct place in joint.
Adjust workpiece position or weld angle to permit proper welding at bottom of workpiece.
Pause briefly at sides when using a weave bead.
Keep arc on leading edge of weld puddle.
Hold gun at proper angles as stated under Holding The Torch on page 20.

BEND AT JOINT



POSSIBLE CAUSES AND SOLUTIONS

1. **Improper clamping:**
Make sure that pieces are clamped securely in place.
Make tack welds to help hold pieces.
2. **Excessive heat:**
Weld a small portion and allow to cool before proceeding.
Reduce wire feed speed.
Increase weld speed.

POROSITY

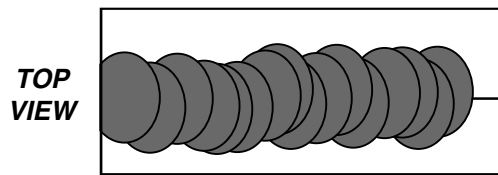
Small cavities or holes in the bead.



POSSIBLE CAUSES AND SOLUTIONS

1. **Stickout too long:**
Reduce stickout.
2. **Dirty workpiece or welding wire:**
Make certain that workpiece and wire are both clean and free from oil, coatings, and other residues.
3. **Insufficient gas flow at weld:**
Increase flow of shielding gas.
4. **Dirty nozzle:**
Clean nozzle by following the directions in the cleaning section of this manual.
5. **Wrong type of shielding gas:**
Use only the correct welding gas for the application and wire.

CROOKED/WAVY BEAD

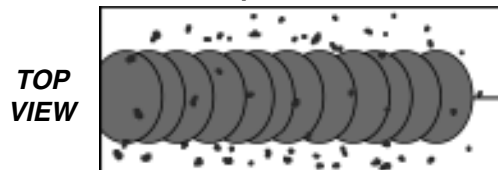


POSSIBLE CAUSES AND SOLUTIONS

1. **Stickout too long:**
Reduce stickout.
2. **Inaccurate welding:**
Use two hands or rest hand on steady surface.

EXCESSIVE SPATTER

Spatter that is grainy and large.
Fine spatter is normal.



POSSIBLE CAUSES AND SOLUTIONS

1. **Wire feeding too fast:**
Reduce wire feed speed.
2. **Stickout too long:**
Reduce stickout.
3. **Dirty workpiece or welding wire:**
Make certain that workpiece and wire are both clean and free from oil, coatings, and other residues.
4. **Insufficient gas flow at weld:**
Increase flow of shielding gas.
5. **Shielding gas being blown away from weld area:**
Protect the weld area from drafts.

STRIKE TEST

A test weld on a **PIECE OF SCRAP** can be tested by using the following procedure.

WEAR ANSI GOGGLES DURING THIS PROCEDURE.

1. After two scraps have been welded together and the weld has cooled, clamp one **scrap*** in a sturdy vise.
2. Stay clear from underneath while you strike the opposite scrap with a heavy hammer, preferably a dead-blow hammer.
3. A good weld will deform but not break. A poor weld will be brittle and snap at the weld.

*This test **WILL** damage the weld it is performed on. This test is **ONLY** an indicator of weld technique and is not intended to test working welds.

WHEN THE WELD IS COMPLETED

21. Lift the Welding Wire completely away from any grounded object. Set the face shield down. Then, turn the Power Switch to its “**OFF**” position.
22. Unplug the Power Cord (54) from the electrical outlet. Then, make sure to set the Welding Torch (51) on a nonflammable, nonconductive surface.
23. **NOTE:** A wire brush/hammer (not included) can now be used to clean up the weld.

CAUTION! The weld may still be quite hot, and sparks/chips may fly when cleaning. Make sure to continue wearing ANSI-approved safety impact eye goggles and other protective wear when cleaning a weld.



- A.** The hammer can be used to knock off any excess spatter and to help knock down any ridges. Make sure not to damage the weld or material when striking it.
- B.** The wire brush can then be used to help remove oxidation and some fine spatter.

INSPECTION, MAINTENANCE, AND CLEANING



WARNING!

Before performing any maintenance on the Welder, unplug the Power Cord (54) from its electrical outlet and allow all components of the Welder to completely cool.

1. Periodically open the Access Panel (31) from the unit and, using compressed air, blow out all dust and debris from the interior.
2. Always store the Welder in a clean, dry, safe location out of reach of children and other unauthorized people.
3. For optimal weld quality, clean and inspect the Contact Tip (51b) and Nozzle (51a) before each use, as follows:

NOZZLE INSPECTION, CLEANING, AND REPLACEMENT

1. Turn the Nozzle (51a) counterclockwise while pulling to remove.
2. Scrub the interior of the Nozzle (51a) clean with a wire brush.
3. Examine the end of the Nozzle (51a). The end should be flat and even. If the end is uneven, chipped, melted, cracked, or otherwise damaged, the Nozzle will adversely affect the weld and should be replaced.
4. Reinstall the Nozzle (51a) after inspecting and cleaning the Contact Tip (51b).

CONTACT TIP INSPECTION, CLEANING, AND REPLACEMENT

1. Make sure the entire Welding Torch (51) is completely cool before proceeding.
2. Remove the Nozzle (51a) as explained above. Then remove the Contact Tip (51b).
3. Scrub the exterior of the Contact Tip (51b) clean with a wire brush. Check that the Contact Tip is the proper type for the wire size used.
4. Examine the hole at the end of the Contact Tip (51b) for the following problems:
Shape: The hole should be an even circle, and should not be oblong or have any bulges in it.
Size: The Contact Tip will decrease in efficiency as the center hole enlarges. A Contact Tip that measures 150% or more the original size* should be replaced.
(* .045" or more for .030" Tips; .035" or more for .023 Tips.)
5. If any problems are noted with a Contact Tip (51b), it is recommended to have it replaced.
6. When inspection and maintenance is completed, reinstall the Contact Tip (51b) and Nozzle (51a).

REPLACING THE WELDING TORCH LINER

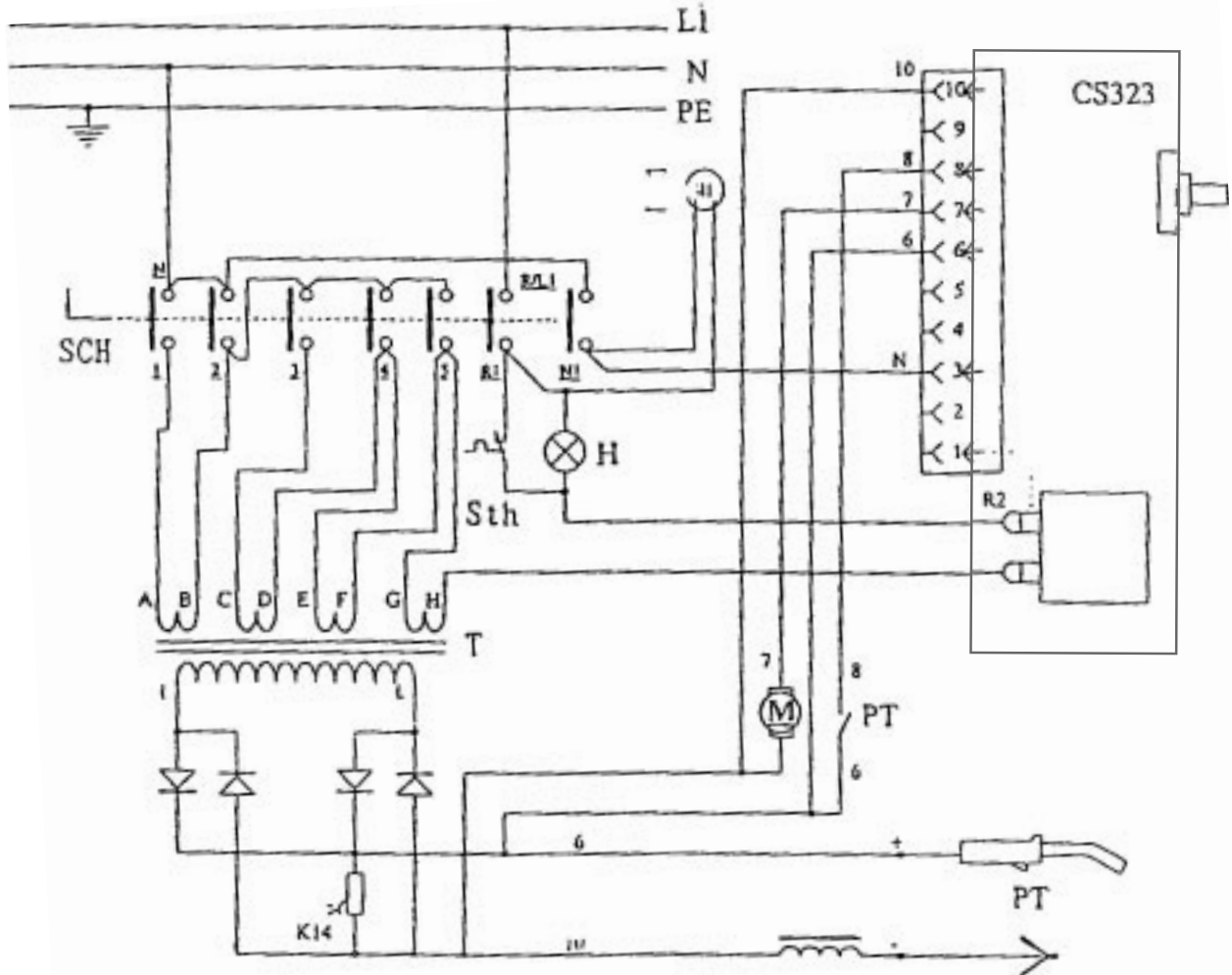
1. Switch welder off, disconnect power, and discharge electrode to ground before proceeding.
2. Secure welding wire to the spool, cut it near the spool, and remove it from the torch and cable.
3. Remove the four Screws (51l) holding the Torch Housings (51j & 51k) together. Set Housings and Screws aside.
4. Remove the four Screws (15g) that hold the Cable Clamp (15h) in place. Set aside the Cable Clamp, Screws, and the black sleeve on the liner underneath the cable clamp.
5. Lay torch cable out straight to allow the cable to twist within the sleeve.
6. Loosen the Fitting at the end of the Liner (51g). Once it is detached, remove the Liner from the gun end.
7. Install a new Liner and Fitting from the gun end with the end without a Fitting first.
8. Attach the Fitting at the end of the Liner (51g) through the ring at the end of the Power Cable (51i) and into the Switch Box (51d). Tighten securely.
9. Slide the black sleeve back onto the end of the liner. Reinstall the Cable Clamp (15h) and Screws (15g). Trim off the Liner that extends past the Clamp.
10. Carefully put the two Torch Housings (51j & 51k) back onto the torch. Make sure that all torch parts lay back into place properly including the Protective Sleeve (51m), Head Tube (51c), and Trigger (51e). **See Assembly Diagram on page 31.** While all parts are properly in place, use the four screws to reassemble the Torch Housings (51j, 51k).
11. Check the Torch (51) for carefully for proper operation.
12. Route the Wire as instructed on page 13.

PLEASE READ THE FOLLOWING CAREFULLY

THE MANUFACTURER AND/OR DISTRIBUTOR HAS PROVIDED THE PARTS DIAGRAM IN THIS MANUAL AS A REFERENCE TOOL ONLY. NEITHER THE MANUFACTURER NOR DISTRIBUTOR MAKES ANY REPRESENTATION OR WARRANTY OF ANY KIND TO THE BUYER THAT HE OR SHE IS QUALIFIED TO MAKE ANY REPAIRS TO THE PRODUCT OR THAT HE OR SHE IS QUALIFIED TO REPLACE ANY PARTS OF THE PRODUCT. IN FACT, THE MANUFACTURER AND/OR DISTRIBUTOR EXPRESSLY STATES THAT ALL REPAIRS AND PARTS REPLACEMENTS SHOULD BE UNDERTAKEN BY CERTIFIED AND LICENSED TECHNICIANS AND NOT BY THE BUYER. THE BUYER ASSUMES ALL RISK AND LIABILITY ARISING OUT OF HIS OR HER REPAIRS TO THE ORIGINAL PRODUCT OR REPLACEMENT PARTS THERETO, OR ARISING OUT OF HIS OR HER INSTALLATION OF REPLACEMENT PARTS THERETO.

PARTS LISTS AND DIAGRAMS

WIRING SCHEMATIC



	R/L1	N	N	2	2	2	N
	R1	1	2	3	4	5	N1
0							
1
2
3
4
5
6

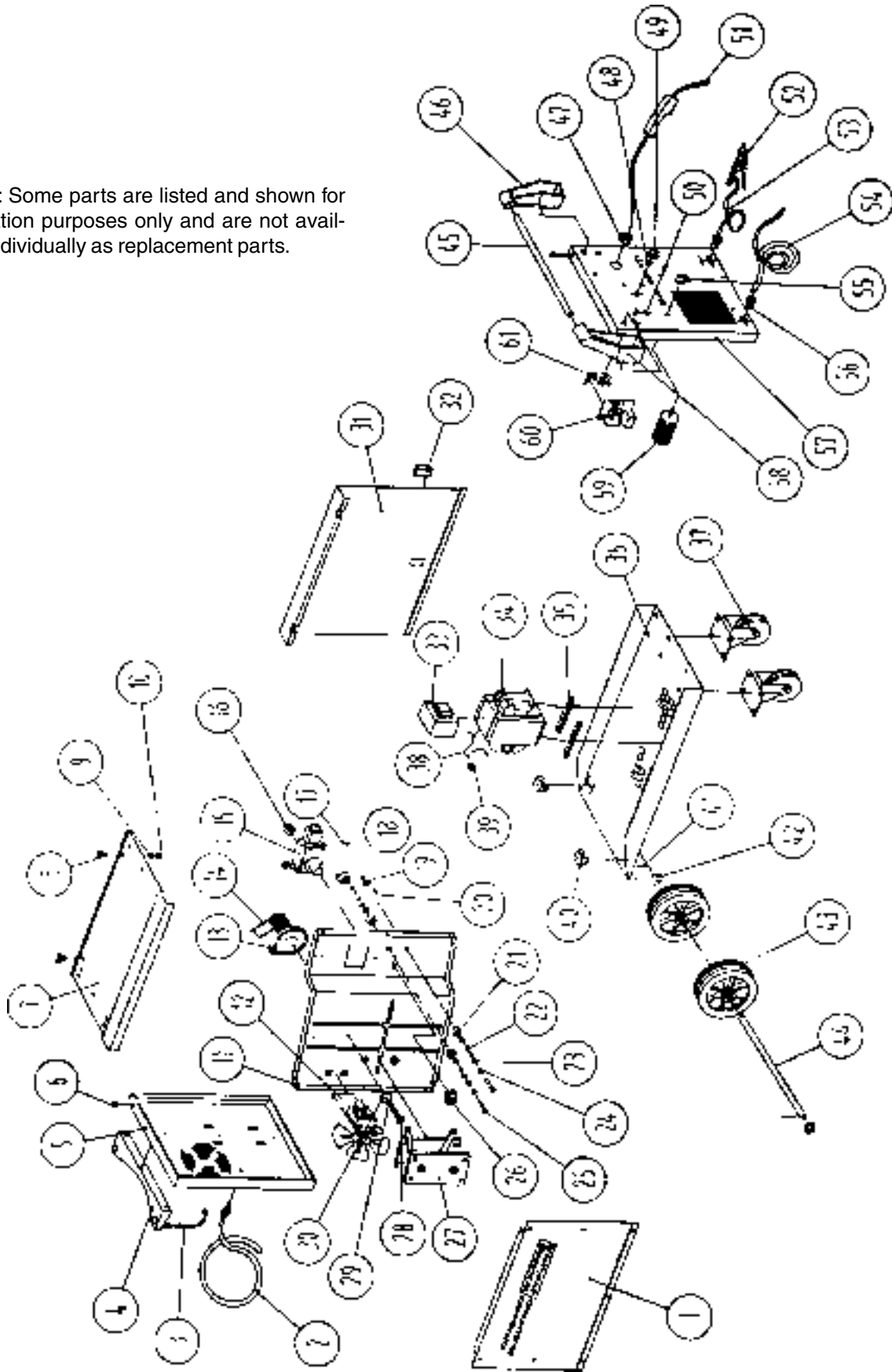
PARTS LIST

Part	Description
1	Side Panel
2	Gas Line
3	Chain
4	Gas Bottle Support
5	Back Panel
6	Rubber Support
7	Top Panel
8	Hinge
9	Rubber Washer
10	Nut, M8
11	Inner Panel
12	Fan
13	10 lb. Spool Axle
14	10 lb. Spool Clip
15	Wire Feed Mechanism (includes parts 15a-15j, & 16)
15a	Swing Arm
15b	Tension Adjusting Knob
15c	Tensioning Arm
15d	Tension Spring
15e	Tension Pusher
15f	Wire Feed Leader
15g	Screw
15h	Cable Clamp
15i	Feed Roller Bracket
15j	Screw
16	Wire Feed Wheel (0.6 & 0.8 mm)
17	Knob
18	Copper Washer
19	Washer
20	Insulating Washer
21	Insulating Washer
22	Copper Washer
23	Copper Nut, M8
24	Washer
25	Copper Bolt, M8
26	Cable Tip
27	Rectifier Rack
28	Bolt, M10 x 25
29	Lock Washer
30	Washer
31	Access Panel

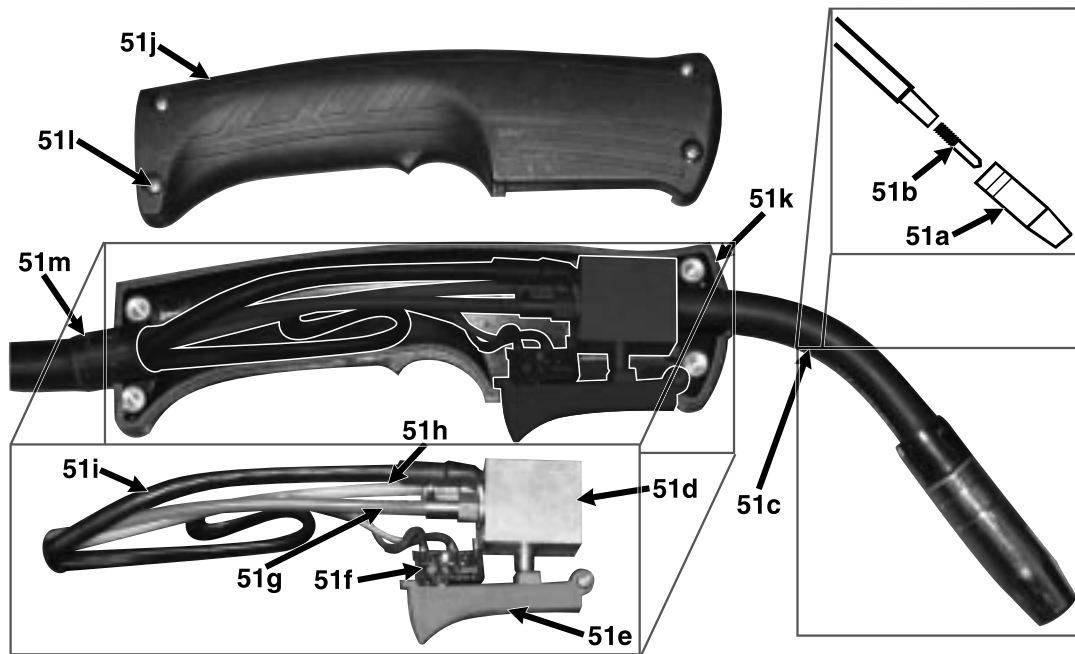
Part	Description
32	Latch
33	Filter Reactor
34	Main Transformer
35	Transformer Carriage
36	Bottom Panel
37	Caster
38	Thermal Switch Bracket
39	Thermal Switch
40	Axle Bracket
41	Cotter Pin
42	Washer
43	Wheel
44	Axle
45	Handle
46	Right Handle Socket
47	Grommet
48	Grommet
49	Wire Speed Control Knob
50	Overload Indicator Light
51	Welding Torch/Cable Assembly
51a	Nozzle
51b	Contact Tip (.8 mm)
51c	Head Tube
51d	Switch Box
51e	Trigger
51f	Control Switch
51g	Liner and Fitting
51h	Gas Hose (white)
51i	Power Cable (black)
51j	Right Torch Housing
51k	Left Torch Housing
51l	Screw
51m	Protective Sleeve
52	Ground Clamp
53	Ground Cable
54	Line Cord
55	Voltage Control Knob
56	Cable Tip
57	Front Panel
58	Left Handle Socket
59	Voltage Control
60	Circuit Board
61	Circuit Board Bracket

ASSEMBLY DIAGRAM

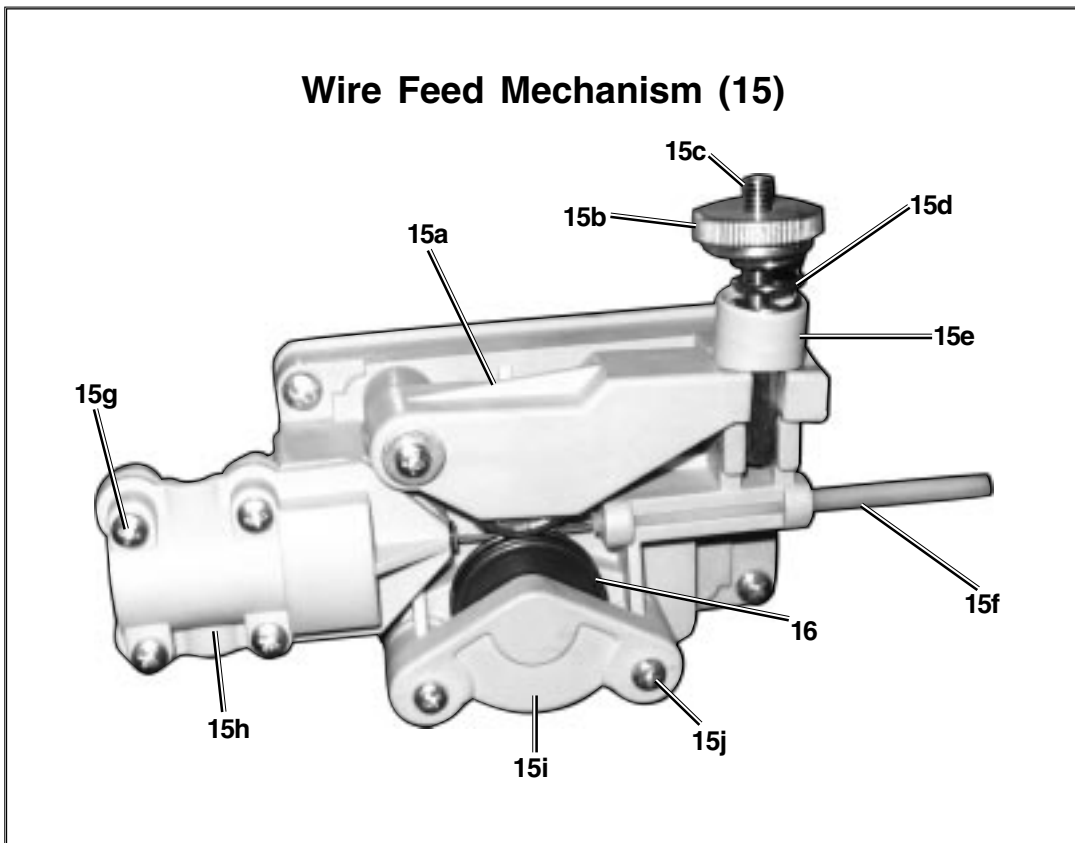
NOTE: Some parts are listed and shown for illustration purposes only and are not available individually as replacement parts.



ASSEMBLY DIAGRAM (CONTINUED)



Wire Feed Mechanism (15)



TROUBLESHOOTING

IMPORTANT!

Be **CERTAIN** to shut off the Welder, disconnect it from power, and discharge the torch to ground before adjusting, cleaning, or repairing the unit.

WIRE FEED MOTOR RUNS BUT WIRE DOES NOT FEED PROPERLY

POSSIBLE CAUSES AND SOLUTIONS

1. **Insufficient wire feed pressure:**
Increase wire feed pressure properly - follow instructions on page 13-14.
2. **Incorrect wire feed roll size:**
Replace with the proper one - follow the *Wire Spool* instructions on page 12.
3. **Damaged torch, cable, or liner assembly:**
Have a qualified technician inspect these parts and replace as necessary.

WIRE CREATES A BIRDS NEST DURING OPERATION

POSSIBLE CAUSES AND SOLUTIONS

1. **Excess wire feed pressure:**
Adjust wire feed pressure properly - follow instructions on page 13-14.
2. **Incorrect contact tip size:**
Replace with the proper tip for the wire size used.
3. **Gun end not inserted into drive housing properly:**
Loosen gun securing bolt and push gun end into housing just enough so that it does not touch wire feed mechanism.
4. **Damaged liner:**
Have a qualified technician inspect and repair/replace as necessary.

WELDING ARC NOT STABLE

POSSIBLE CAUSES AND SOLUTIONS

1. **Wire not feeding properly:**
See first *Troubleshooting* section above.
2. **Incorrect contact tip size:**
Replace with the proper tip for the wire size used.
3. **Incorrect wire feed speed:**
Adjust wire feed speed to achieve a more stable arc.
4. **Loose torch cable or ground cable:**
Check to ensure that all connections are tight.
5. **Damaged torch or loose connection within torch:**
Have a qualified technician inspect and repair/replace as necessary.

If the steps above do not solve the problem or if the repairs involved are too complex, contact a qualified technician.

TROUBLESHOOTING (continued)

IMPORTANT!

Be **CERTAIN** to shut off the Welder, disconnect it from power, and discharge the torch to ground before adjusting, cleaning, or repairing the unit.

WELDER DOES NOT FUNCTION WHEN SWITCHED ON

POSSIBLE CAUSES AND SOLUTIONS

1. **Tripped thermal protection device:**
Shut the welder's switch to off and allow it to cool for at least 20 minutes.
Reduce duration or frequency of welding periods to help reduce wear on the welder.
Refer to ***Duty Cycle*** section on page 18.
2. **Faulty or improperly connected Control Switch (51f):**
Have a technician check and secure/replace Control Switch (51f).
3. **Internal fuse blown:**
Have a qualified technician check/replace.

WEAK ARC STRENGTH

POSSIBLE CAUSES AND SOLUTIONS

1. **Incorrect line voltage:**
Check the line voltage and, if insufficient, have a licensed electrician remedy the situation.

WIRE FEEDS, BUT ARC DOES NOT IGNITE

POSSIBLE CAUSES AND SOLUTIONS

1. **Improper ground connection:**
Make certain that the workpiece is contacted properly by the Ground Clamp and that the workpiece is properly cleaned near the ground clamp and the welding location.
2. **Improperly sized or excessively worn Contact Tip (51b):**
Verify that Contact Tip (51b) is the proper size for the welding wire used. Check that the hole in the tip is not deformed or enlarged. Also, check that the tip is not dirty; this would prevent a good connection. If needed, replace Contact Tip (51b) with proper size and type.

If the steps above do not solve the problem or if the repairs involved are too complex, contact a qualified technician.

TROUBLESHOOTING (continued)

IMPORTANT!

Be CERTAIN to shut off the Welder, disconnect it from power, and discharge the torch to ground before adjusting, cleaning, or repairing the unit.

WIRE FEEDS, BUT SHIELDING GAS DOES NOT FLOW

POSSIBLE CAUSES AND SOLUTIONS

1. **Empty Gas Cylinder:**
Check gas cylinder.
2. **Nozzle Plugged:**
Clean nozzle. If damaged, replace.
3. **Regulator or cylinder valve closed:**
Make sure both valves are adjusted properly.
4. **Gas line blocked:**
Check external hose, and hose within Torch cable.
5. **Gas solenoid broken or not connected properly:**
Have a qualified technician check/replace.

WARRANTY



CHICAGO welding
ELECTRIC systems

LIMITED 1 YEAR/90 DAY WARRANTY

Harbor Freight Tools Co. makes every effort to assure that its products meet high quality and durability standards, and warrants to the original purchaser that for a period of ninety days from date of purchase that the torch, liner, wire feed mechanism (if applicable), welding clamps, electrode holders, cables and accessories packed with the welder are free of defects in materials and workmanship. **This Limited 1 Year/90 Day Warranty shall not apply to consumable parts such as tips, welding wire, and gas nozzles.** Harbor Freight Tools also warrants to the original purchaser, for a period of one year from date of purchase, that the transformer and rectifier are free from defects in materials and workmanship. This warranty does not apply to damage due directly or indirectly to misuse, abuse, negligence or accidents; repairs or alterations outside our facilities; or to lack of maintenance. We shall in no event be liable for death, injuries to persons or property, or for incidental, contingent, special or consequential damages arising from the use of our product. Some states do not allow the exclusion or limitation of incidental or consequential damages, so the above limitation of exclusion may not apply to you. **THIS WARRANTY IS EXPRESSLY IN LIEU OF ALL OTHER WARRANTIES, EXPRESS OR IMPLIED, INCLUDING THE WARRANTIES OF MERCHANTABILITY AND FITNESS.**

To take advantage of this warranty, the product or part must be returned to us with transportation charges prepaid. Proof of purchase date and an explanation of the complaint must accompany the merchandise. If our inspection verifies the defect, we will either repair or replace the product at our election or we may elect to refund the purchase price if we cannot readily and quickly provide you with a replacement. We will return repaired products at our expense, but if we determine there is no defect, or that the defect resulted from causes not within the scope of our warranty, then you must bear the cost of returning the product.

This warranty gives you specific legal rights and you may also have other rights which vary from state to state.

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If the steps above do not solve the problem or if the repairs involved are too complex, contact a qualified technician.

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