

CHICAGO **welding**
ELECTRIC **systems**

90 AMP FLUX WIRE WELDER

Model 55167

ASSEMBLY AND OPERATING INSTRUCTIONS



3491 Mission Oaks Blvd., Camarillo, CA 93011

Visit our Web site at <http://www.harborfreight.com>

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

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

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SPECIFICATIONS

Welding Current	63 ~ 68 amps; High setting: 79 ~ 90 amps
Duty Cycle	10% at 80 amps; 18% at 60 amps (See explanation of Duty Cycle on page 15.)
Power Consumption	120 VAC, 24 amps peak, single phase Should be connected to a 20 amp minimum dedicated circuit
Heat Control	2 settings
Ground Cable	6 AWG, 6 foot
Torch Power Cable	8 AWG, 6 foot
Power Cord	3-wire, 14 AWG, UL listed
Welder Tip	Included tips will accept 0.030" flux core wire (0.9 mm tips, to account for thermal expansion of the wire)
Wire Size	0.030" flux core wire
Wire Spool Size	4" diameter/ 2 lb. spool
Overall Dimensions	14-1/2 (L) x 8-1/2 (W) x 15-1/2 (H) inches
Weight	34.45 lb.
Accessories	Spare Welder Tip 0.9mm (for .030" wire) Welding Face Shield Wire Brush / Hammer combination

SAVE THIS MANUAL

You will need the manual for the safety warnings and precautions, assembly instructions, operating and maintenance procedures, parts list and diagram. Keep your invoice with this manual. Write the invoice number on the inside of the front cover. Keep the 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. **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.
5. **Do not expose power tools to rain or wet conditions.** Water entering a power tool will increase the risk of electric shock.
6. **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.
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 arc.** Loose clothes, jewelry, or long hair can catch fire.
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. **Use safety equipment. Always wear eye protection.** For welding safety equipment, refer to number 7 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. **Unless explicitly instructed otherwise, 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 tools in good repair.** Properly maintained tools will get the job done better. Do not use a damaged tool. Tag damaged tools “Do not use” until repaired.
21. **Check for 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. **Maintain labels and nameplates on the Welder.** These carry important information. If unreadable or missing, contact Harbor Freight Tools for a replacement.
2. **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.
3. **Avoid unintentional starting.** Make sure you are prepared to begin work before turning on the Welder.

4. **Unplug before performing maintenance.** Always unplug the Welder from its electrical outlet before performing any inspection, maintenance, or cleaning procedures.
5. **Never leave the Welder unattended while energized.** Turn power off if you have to leave the Welder.
6. **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.

7.



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 underneath welding eye protection featuring at least a number 10 shade lens rating, such as the one included.
- 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.

8.



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.

9. **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
- Damage to the reproductive organs
- Inflammation of the small intestine or stomach
- Respiratory diseases such as emphysema, bronchitis or pneumonia
- Heart Disease
- Ulcers
- Kidney damage



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

10. **Read and understand all instructions and safety precautions as outlined in the manufacturer's manual for the material you will weld or cut.**
11. **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.

12. **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.
13. **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.
14. **Use care not to touch the welding tip to grounded material whenever the unit is plugged in. This unit is what is referred to as a “hot tip” welder, meaning that current is available to the wire at all times that the power Switch (7a) is in the ON position.** Electric shock, fire, or burns may happen if appropriate precautions are not taken.
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. **WARNING!** This product, when used for welding and similar applications, contains or produces a chemical known to the State of California to cause cancer and birth defects (or other reproductive harm). (California Health & Safety Code § 25249.5, *et seq.*)

GROUNDING

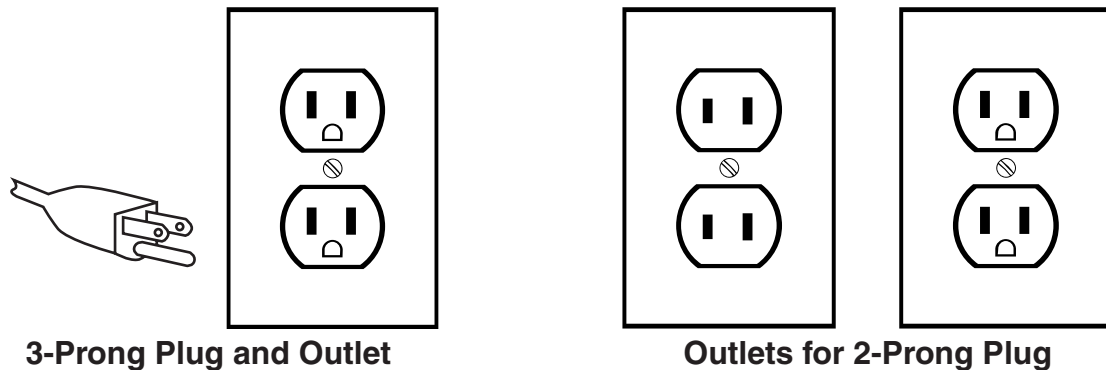
WARNING!

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 provided 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. **(See 3-Prong Plug and Outlet.)**
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. **(See 3-Prong Plug and Outlet.)**

3. Your tool must be plugged into an appropriate outlet, properly installed and grounded in accordance with all codes and ordinances. The plug and outlet should look like those in the following illustration. **(See 3-Prong Plug and Outlet.)**



DOUBLE INSULATED TOOLS: TOOLS WITH TWO PRONG PLUGS

1. Tools marked “Double Insulated” do not require grounding. They have a special double insulation system which satisfies OSHA requirements and complies with the applicable standards of Underwriters Laboratories, Inc., the Canadian Standard Association, and the National Electrical Code. **(See Outlets for 2-Prong Plug.)**
2. Double insulated tools may be used in either of the 120 volt outlets shown in the preceding illustration. **(See Outlets for 2-Prong Plug.)**

EXTENSION CORDS




1. **Grounded** tools require a three wire extension cord. **Double Insulated** tools can use either a two or three wire extension cord.
2. As the distance from the supply outlet increases, you must use a heavier gauge extension cord. Using extension cords with inadequately sized wire causes a serious drop in voltage, resulting in loss of power and possible tool damage. **(See Figure C, next page.)**
3. The smaller the gauge number of the wire, the greater the capacity of the cord. For example, a 14 gauge cord can carry a higher current than a 16 gauge cord. **(See Figure C.)**
4. When using more than one extension cord to make up the total length, make sure each cord contains at least the minimum wire size required. **(See Figure C.)**
5. If you are using one extension cord for more than one tool, add the nameplate amperes and use the sum to determine the required minimum cord size. **(See Figure C.)**
6. If you are using an extension cord outdoors, make sure it is marked with the suffix “W-A” (“W” in Canada) to indicate it is acceptable for outdoor use.
7. Make sure your extension cord is properly wired and in good electrical condition. Always replace a damaged extension cord or have it repaired by a qualified electrician before using it.
8. Protect your extension cords from sharp objects, excessive heat, and damp or wet

areas.

RECOMMENDED MINIMUM WIRE GAUGE FOR EXTENSION CORDS*					
NAMEPLATE AMPERES (At Full Load)	EXTENSION CORD LENGTH				
	25 Feet	50 Feet	75 Feet	100 Feet	150 Feet
0 - 2.0	18	18	18	18	16
2.1 - 3.4	18	18	18	16	14
3.5 - 5.0	18	18	16	14	12
5.1 - 7.0	18	16	14	12	12
7.1 - 12.0	18	14	12	10	-
12.1 - 16.0	14	12	10	-	-
16.1 - 20.0	12	10	-	-	-

FIGURE C * Based on limiting the line voltage drop to five volts at 150% of the rated amperes.

SYMBOLGY

	Double Insulated
	Canadian Standards Association
	Underwriters Laboratories, Inc.
V~	Volts Alternating Current
A	Amperes
n ₀ xxxx/min.	No Load Revolutions per Minute (RPM)

UNPACKING

When unpacking, check to make sure the following parts are included: Flux Wire Welder, Shade #10 Face Shield (38), Torch (1), Ground Cable (33), Wire Brush / Hammer (39), Power Cord (32), Wire Spool, Spare Welding Tip, and Contact Tip Wrench (43).

This unit is packed with a protective light film of oil, wipe the unit of with a clean rag prior to assembly.

If any parts are missing or broken, please call Harbor Freight Tools at the number on the cover of this manual as soon as possible.

ASSEMBLY

1. Attach the Handle (30) to the Cover (31) using screw (29) inserted from the Handle top-rear. Refer to the photo at the top of the next page, and the Assembly Diagram on page 24.
2. Attach the Cover Locking Spring (8) to the front of the Base Frame (14) using the supplied Machine Screw (42), Washer (40), and Nut (41).

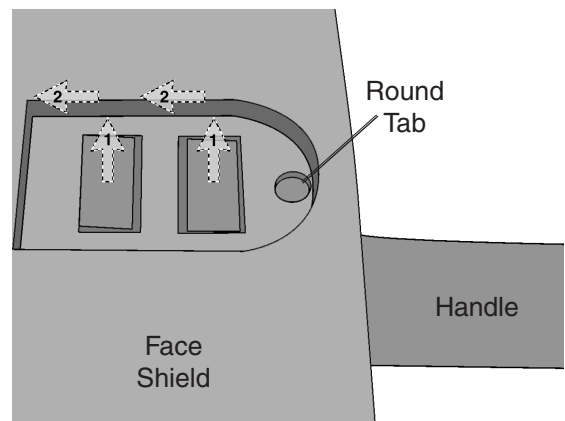
3. Attach the handle to the Face Shield (38) by lining up the two rectangular tabs on the handle with the corresponding holes in the face shield and

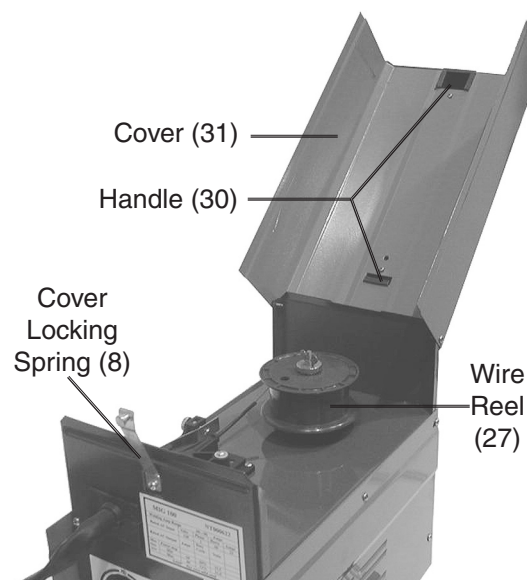
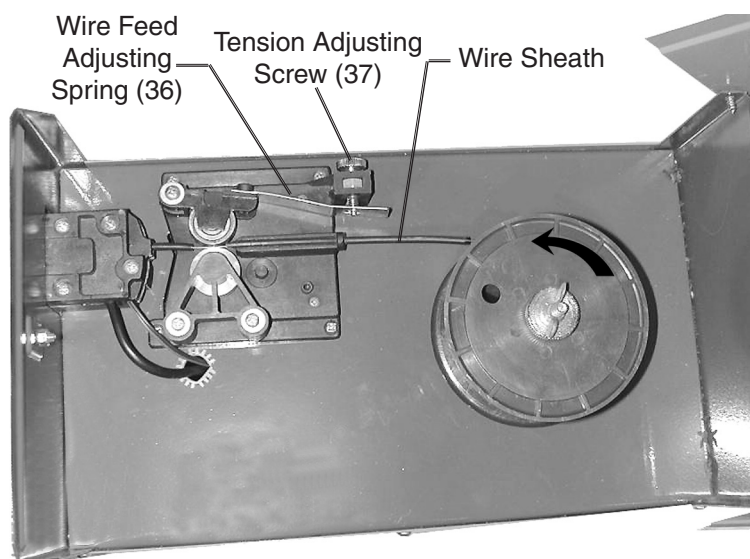
1) pressing it upwards

and then

2) pressing it forward from the back, locking the round tab in place.

See numbered steps in illustration to the right.





INSTALLING THE WIRE REEL

1. **WARNING! Turn the welder OFF and unplug it before proceeding.**
2. Press on the Cover Locking Spring (8), then lift the Cover (31) using Handle (30), to expose the Wire Feed Unit (23).
3. Unscrew the Wing Nut (25) and remove the Reel Locking Knob (26). If replacing an old Reel, remove the old Reel and all old wire from within the Torch (1) and Torch cable.
4. Place the new **flux core*** Wire Reel over the shaft and onto the Reel Spring (24).
*This welder can only weld using FLUX-CORED wire.

IMPORTANT:

To help avoid wire feed problems, the reel must be set so that it will unwind counterclockwise (see photo above).

5. Replace the Reel Locking Knob and the Wing Nut. Tighten well.
6. Loosen the Tension Adjusting Screw (37). Press the Wire Feed Swing Arm (36) forward slightly and lift it to remove tension.

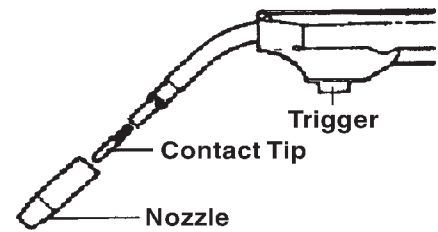
IMPORTANT:

Securely hold onto the end of the welding wire and keep tension on it during these steps.

If this is not done, the welding wire will spring backwards and create a tangled "bird's nest", wasting wire.

7. Hold the wire securely while you cut enough wire off the end of the spool to remove all bent and crimped wire. Make sure that the cut end has no burrs or sharp edges, cut again if needed. Keep tension on the wire and guide at least 12 inches of wire into the Torch Sheath.
8. Swing the Wire Feed Swing Arm (36) down while pressing it forward to latch it across the tip of the Tension Adjusting Screw (37). Tighten the Tension Adjusting Screw until the Wire Feed Bearing (35) just touches the wire and then three full turns farther. After the wire is held by the Tensioner, you may release it.

9. Turn the Nozzle (3) counterclockwise while pulling to remove.
10. Using the third oval hole on the provided Wrench (43), turn the Contact Tip (2b) counterclockwise and remove.
11. Lay the Torch Cable out in a straight line so that the wire moves through it easily. Leave the cover open, so that the feed mechanism can be observed.

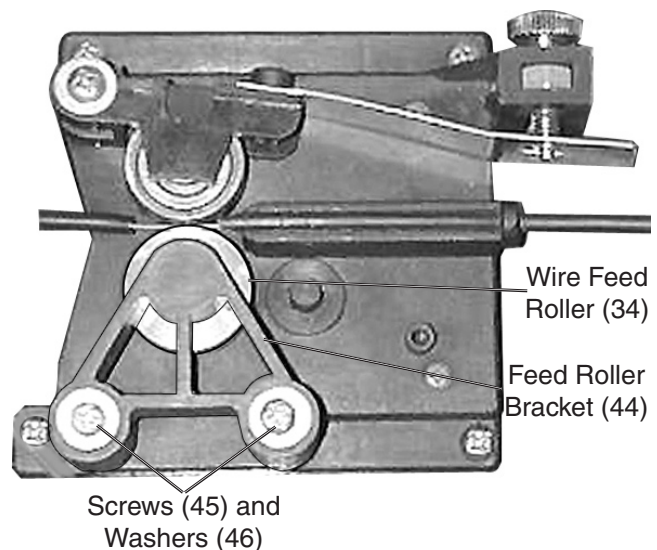


EXERCISE EXTREME CAUTION - RISK OF FIRE AND/OR ELECTRIC SHOCK!
The following steps require applying power to the welder. Do not touch anything with the Torch Handle or welding wire or an arc will be ignited. Do not touch the internal components of the unit with it plugged in.

12. Plug the Power Cord into its electrical outlet and turn the welder ON.
13. Point the Torch Handle away from all objects and continue pressing the Trigger until the wire feeds through two inches. Move the handle slightly in a circular motion to help the wire feed properly out the end. If the wire does not feed properly and the reel is stationary, turn the welder OFF, unplug it, slightly tighten the Wire Tension Adjusting Screw (37), and rewind the wire slightly before retrying.
14. To check the wire's drive tension, feed the wire against a piece of wood from 2 to 3 inches away. If the wire stops instead of bending, turn the welder OFF, unplug it, and slightly tighten the Wire Tension Adjusting Screw (37).
15. **Turn the welder OFF.** Slide the Contact Tip over the wire and screw it into Torch Handle. Tighten the Contact Tip (2b) using the provided Wrench (43)
16. Replace the Nozzle and cut off any excess wire over $\frac{1}{2}$ ".
17. Secure the Cover.

CHANGING WIRE FEED ROLLER

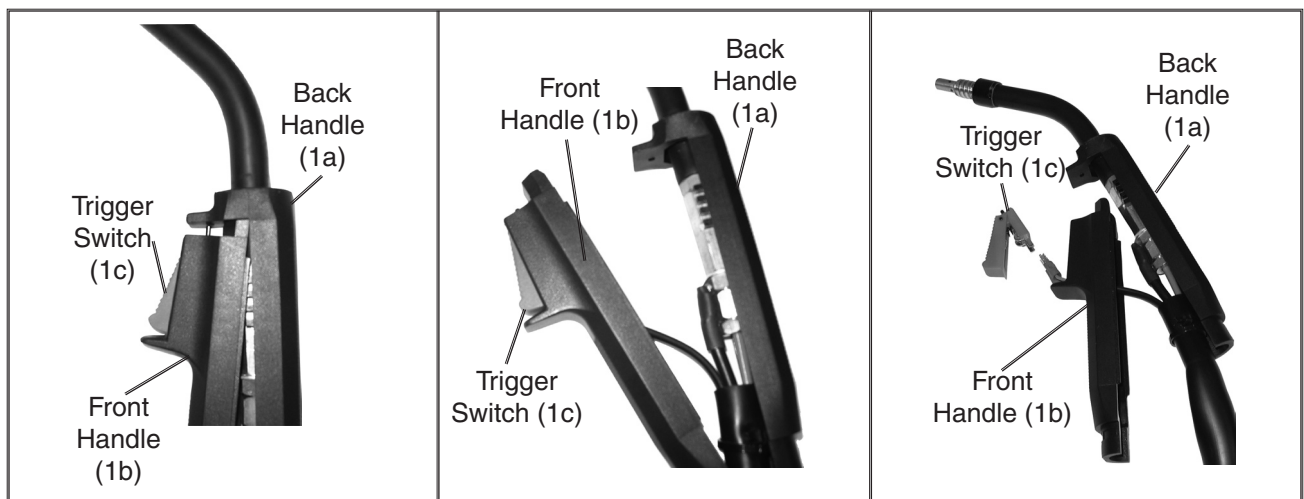
1. **WARNING! Turn the welder OFF and unplug it before proceeding.**
2. Press on the Cover Locking Spring (8), then lift the Cover (31) using Handle (30), to expose the Wire Feed Unit (23).
3. Loosen the Tension Adjusting Screw (37). Press the Wire Feed Swing Arm (36) forward slightly and lift it to remove tension.
4. Remove Screws (45) and Washers (46). Remove the Feed Roller Bracket (44).



5. Remove the Wire Feed Roller (34) and install one with the proper size (.030") facing up.
6. Reassemble the Roller Bracket (44), Screws (45), and Washers (46). Put the welding wire into the top groove on the Roller, if it is not already in place.
7. Swing the Wire Feed Adjusting Spring (36) down while pressing it forward to latch it over the Tension Adjusting Screw (37). Tighten the Tension Adjusting Screw until the Wire Feed Bearing (35) just touches the wire and then three full turns farther.
8. Turn the Nozzle (3) counterclockwise while pulling to remove. Using the third oval hole on the provided Wrench (43), turn the Contact Tip (2b) counterclockwise and remove it.
9. Install an appropriately sized Contact Tip (2b, 0.9 mm) over the wire and tighten to the Torch with the Wrench (43).
10. Test and adjust the drive tension as explained in steps 12-14 on the previous page.
11. Close the welder's cover and switch the Welder OFF. Unplug the Welder if it is not to be used at this time.

TRIGGER SWITCH REPLACEMENT

1. **WARNING! Turn the welder OFF and unplug it before proceeding. This procedure should be performed by a qualified technician.**
2. Turn the Handle Lock Ring (1d) at the base of the torch handle counterclockwise and slide it down the cable.
3. Pull the Front Handle (1b) down to disengage the pin at its top - see illustration, below left.
4. Pull the Front Handle (1b) away from the Back Handle (1a), exposing the wires and connections - see illustration, below center.
5. Pull the Trigger Switch (1c) out, being careful not to stress or damage the wires. Disconnect the terminals and replace the Switch - see illustration, below right.



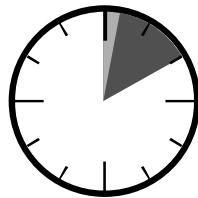
6. Connect the new Switch (1c); polarity does not matter. When reinstalling, make sure that the new Switch fits securely in place.
7. Reassemble, reversing the steps on the previous page.
8. Put on appropriate safety equipment, as explained in the safety section of this manual. **After the unit is fully assembled**, plug the Welder back in and turn it back ON. **Carefully point the torch away from yourself and conductive materials, and check that the new switch functions properly.**
9. **Shut the unit off and unplug it before storing.**

OPERATION

BEFORE YOU START WELDING

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

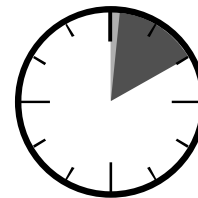
DUTY CYCLE (DURATION OF USE)



18% Duty Cycle
(60 amp setting)

1 minute, 48 seconds ON
followed by

at least 8 minutes, 12 seconds OFF



10% Duty Cycle
(80 amp setting)

1 minute on
followed by

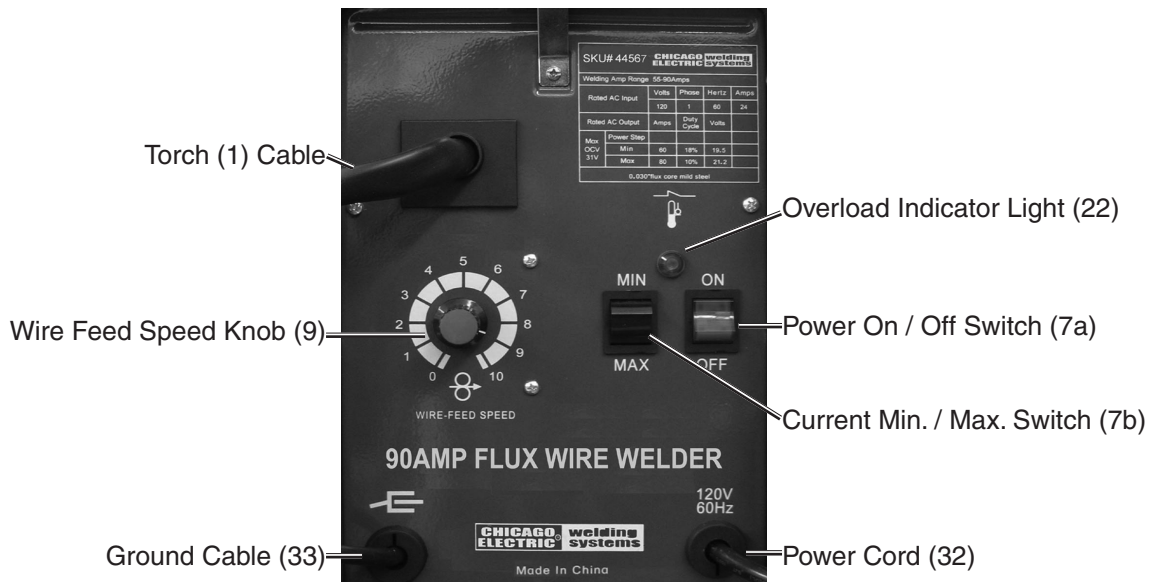
at least 9 minutes off

Avoid damage to the Welder by not leaving it on for more than the prescribed duty cycle time. 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 10% duty cycle at 80 amps must be allowed to rest for at least 9 minutes after every minute of continuous weld at 80 amps. Failure to carefully observe duty cycle limitations can easily over stress a welder's power generation system contributing to premature welder failure. This welder has an internal thermal protection system to assist with preventing this sort of over stress. When the unit overheats, it automatically shuts down, then automatically returns to service when it cools down. When it returns to service, follow a more conservative duty cycle routine to help prevent excess wear to the welder.

SETTING UP THE WELD

WARNING! Use care not to touch the welding tip to grounded material whenever the unit is plugged in. This unit is what is referred to as a “hot tip” welder, meaning that current is available to the wire at all times that the power Switch (7a) is in the ON position. ELECTRIC SHOCK, FIRE, or BURNS may happen if appropriate precautions are not taken.

The Flux Wire Welder is used to weld sheet metal and light carbon steel.



Warning: Before arc welding, read and understand all safety precautions and warnings listed on pages 3 through 10.

1. Securely clamp the Ground Cable Clamp (33) as close as possible to the metal object to be welded, or to the metal work bench where the object is mounted and electrically connected.
2. Set the Current Switch (7b) to the desired current setting. Refer to the chart on the face of the welder or the chart on page 18 of this manual.

DO NOT SWITCH THE CURRENT WHILE WELDING.

3. Verify that the Power Switch is in the OFF position, then plug the Flux Wire Welder plug into a dedicated, 110 VAC, 20 amp line with delayed action type circuit breaker or fuses.

If an extension cord is used, it must have the following wire size: up to 30 feet, use 10 AWG size wire; 30 to 50 feet, use 8 AWG wire; Over 50 feet, use 6 AWG wire.

4. The workpieces should be firmly held together and in position while welding. Use clamps (not included) to hold the workpieces so that 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.
5. While holding the Torch with the wire and tip clearly out of the way of any grounded

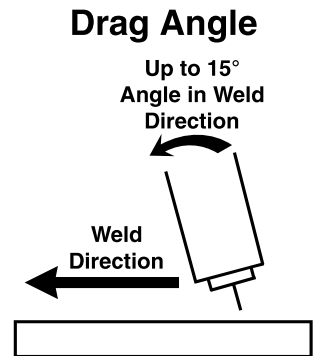
objects, turn the Power Switch to the ON position.

6. Orient yourself on the area to be welded, then place the 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.

HOLDING THE TORCH

7. Hold the Torch (1) in one hand and the face shield in the other. If a hands-free welding shield (not included, see #7, page 6 for guidelines) is used, then both hands can be used to control the Torch. The welding wire should be directed straight into the joint. This gives an angle of 90° (straight up and down) for groove (end to end) welds, and an angle of 45° for fillet (T-shaped) welds. The end of the gun should be tilted so that the wire is angled anywhere in-between straight on and 15° in the direction of the weld. The amount of tilt is called the **drag angle** - see illustration, right. The welding wire should extend no more than 1/2" past the tip (this distance is called **stickout**).



8. Set the Wire Feed Control Knob (9) to the recommended start setting as shown in the chart on the next page. Press (and hold) the Trigger Switch (1c) and stroke the area to be welded with the electrode wire to ignite the arc.

Never tap the electrode wire into the welding surface to ignite the arc. This will cause the welding wire to stick to the workpiece.

For a narrow weld, you can usually draw the wire in a steady straight line, this is called a **stringer bead**.

For a wider weld, draw the wire back and forth across the joint in a curve, this is called a **weave bead**.

Note: If too much current is drawn from the Flux Wire Welder, the Thermal Overload protector will activate, the amber indicator will light, and the Arc Welder will turn off until it cools down. If this happens, turn the Power Switch to the OFF position and wait about 3 ~ 5 minutes.

9. **After a few seconds**, stop, switch off the welder, and check the progress. Compare your weld's appearance with the diagrams and descriptions in the **Weld Diagnosis** section starting on page 19. After making any necessary adjustments, continue the weld **while carefully following the DUTY CYCLE guidelines as explained on page 15**.

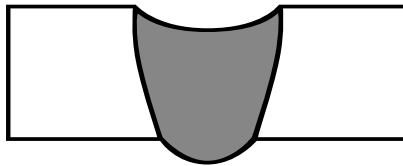
WELD SETTINGS CHART

<p>NOTE: The numbers within the spaces are the approximate wire feed settings recommended* for this wire size and material thickness.</p>	Material Thickness (Steel)			
	16 Gauge	14 Gauge	12 Gauge	1/8"
<p>Wire Size (Flux Core, Mild Steel) .030"</p>	<p>Minimum Current 1</p>	<p>Minimum Current 4</p>	<p>Minimum Current 7</p>	<p>Maximum Current 6</p>
<p>*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.</p>				

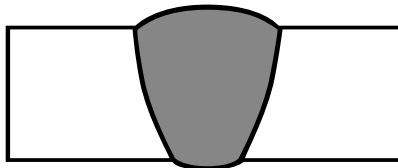
WELD DIAGNOSIS

WELD PENETRATION

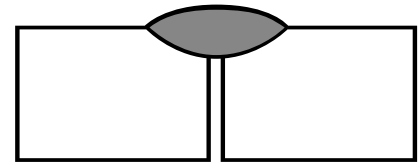
EXCESS OR BURN-THROUGH
Weld droops on top and underneath, or falls through entirely, making a hole.



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

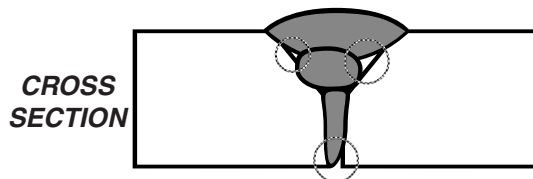
1. **Excessive material at weld:**
Reduce wire feed speed.
2. **Overheating:**
Increase welding speed and ensure that welding speed is kept steady.

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 17.
3. **Insufficient weld material:**
Increase wire feed speed.
4. **Insufficient weld heat:**
Reduce Welding Speed.

WELD NOT ADHERING PROPERLY

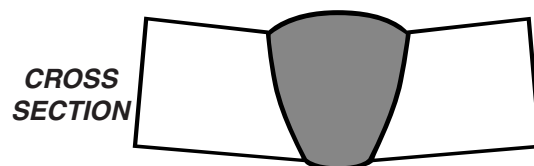
Gaps present between weld and previous bead or between weld and workpiece. See areas below.



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 to bottom of piece. 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 17.

BEND AT JOINT

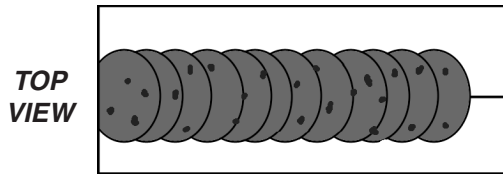


POSSIBLE CAUSES AND SOLUTIONS

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.

STRIKE TEST

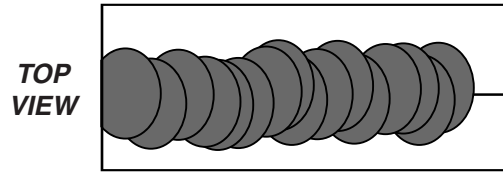
A test weld on a **PIECE OF SCRAP** can be tested by using the following procedure.

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.**

CROOKED/WAVY BEAD

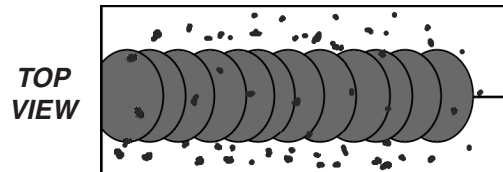


POSSIBLE CAUSES AND SOLUTIONS

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.

10. **When the weld is complete**, lift the electrode wire clearly away from any grounded object, set the Face Shield down, turn toward the Flux Wire Welder, and turn the Power Switch to the OFF position.
11. **Unplug the Power Cord from the electrical outlet. Be sure to set the torch down on a nonflammable, nonconductive surface.**
12. The Wire Brush/Hammer (39) can now be used to clean up the weld.
CAUTION: The weld may still be quite hot and sparks/chips may fly when cleaning. Be certain to continue to wear ANSI approved safety goggles and protective wear when cleaning a weld.

The Hammer can be used to knock off any excess spatter and to help knock down any ridges. Be careful not to damage the weld or material when striking it.

The Wire Brush can then be used to help remove oxidation and some fine spatter.

MAINTENANCE

Warning: Before performing any maintenance on the Welder, unplug the Power Cord from the electrical outlet and allow all parts of the welder to cool thoroughly.

1. Periodically remove the Right and Left side panels (12 and 13), and using compressed air, blow out all dust from the interior.
2. Store in a clean and dry location.
3. **For optimal weld quality, clean and inspect the Contact Tip (2b) and Nozzle (3) before each use, as follows:**

Nozzle Inspection, Cleaning, and Replacement

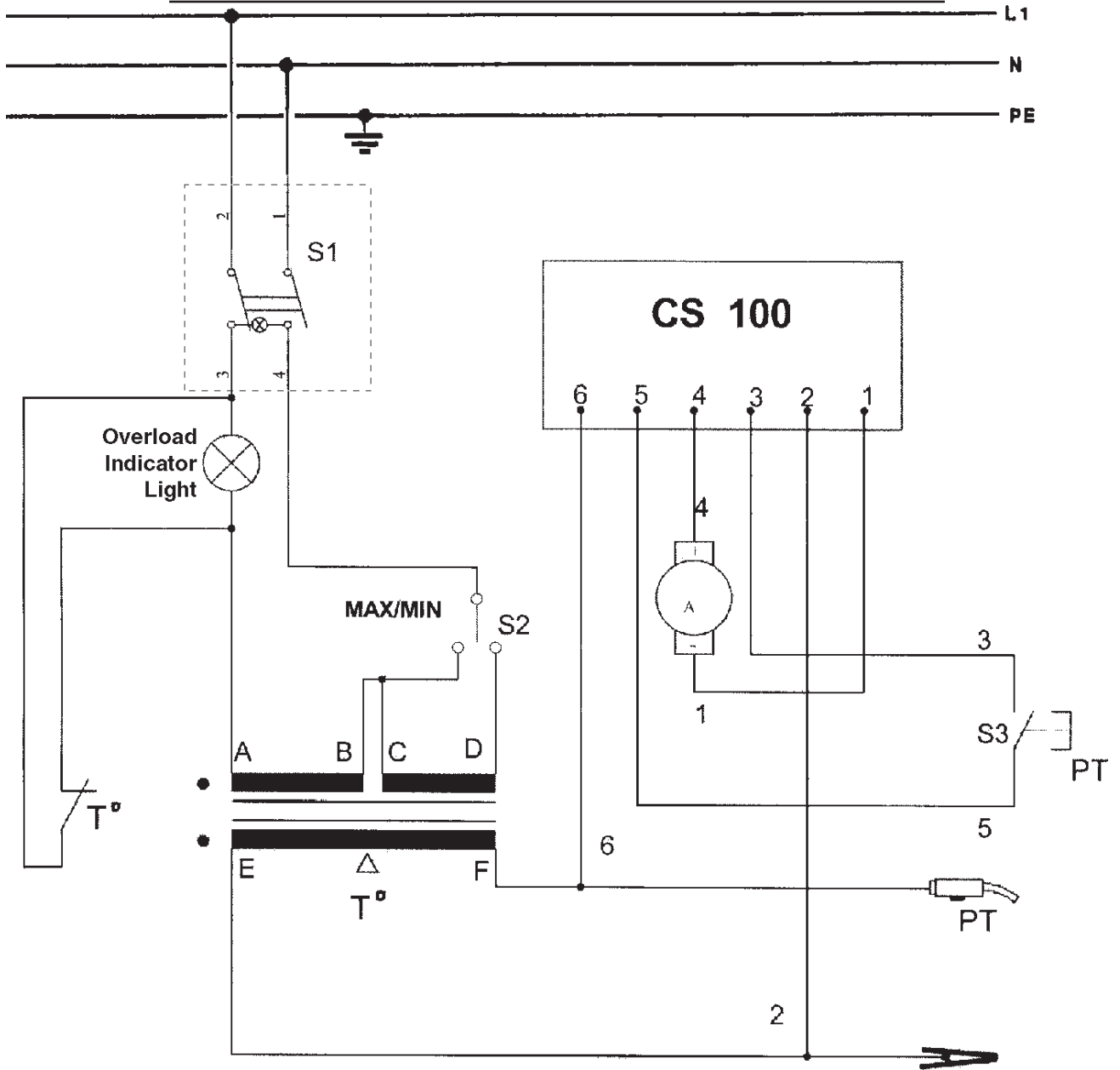
- A. **Make sure that the entire Torch (parts 1a through 3) is completely cool and that the Power Cord is unplugged from the electrical outlet before proceeding.**
- B. Turn the Nozzle (3) counterclockwise while pulling to remove.
- C. Scrub the interior of the Nozzle clean with a wire brush.
- D. Examine the end of the Nozzle (3). The end should be flat and even. If the end is uneven, chipped, melted, cracked, or otherwise damaged, the Nozzle will adversely effect the weld and should be replaced.
- E. Reinstall the Nozzle (3) after inspecting and cleaning the Contact Tip (2b).

Contact Tip Inspection, Cleaning, and Replacement

- A. **Make sure that the entire Torch (parts 1a through 3) is completely cool and that the Power Cord is unplugged from the electrical outlet before proceeding.**
 - B. Remove the Nozzle as explained above. Using the third oval hole on the provided Wrench (43), turn the Contact Tip (2b) counterclockwise and slide it off the welding wire.
 - C. Scrub the exterior of the Tip clean with a wire brush. Check that the Tip is the proper type for the wire size used (0.9 mm for .030" wire).
 - D. Examine the hole at the end of the Contact Tip (3) for the following problems:
 - Shape:** The hole should be an even circle, it should not be oblong or have any bulges in it.
 - Size:** The Tip will decrease in efficiency as the center hole enlarges. A tip that measures 150% or more the original size* should usually be replaced.
***13.5 mm or more for 0.9 mm Tips (2b)**
- If any problems are noted, Contact Tip (2b) replacement would be advisable. Make sure to select a new Tip that is the correct size (0.9 mm) for the welding wire used (.030").
- E. Reinstall the Tip (2b) and securely reinstall the Nozzle (3) as well.

PARTS LISTS AND DIAGRAMS

WIRING SCHEMATIC



PARTS LIST

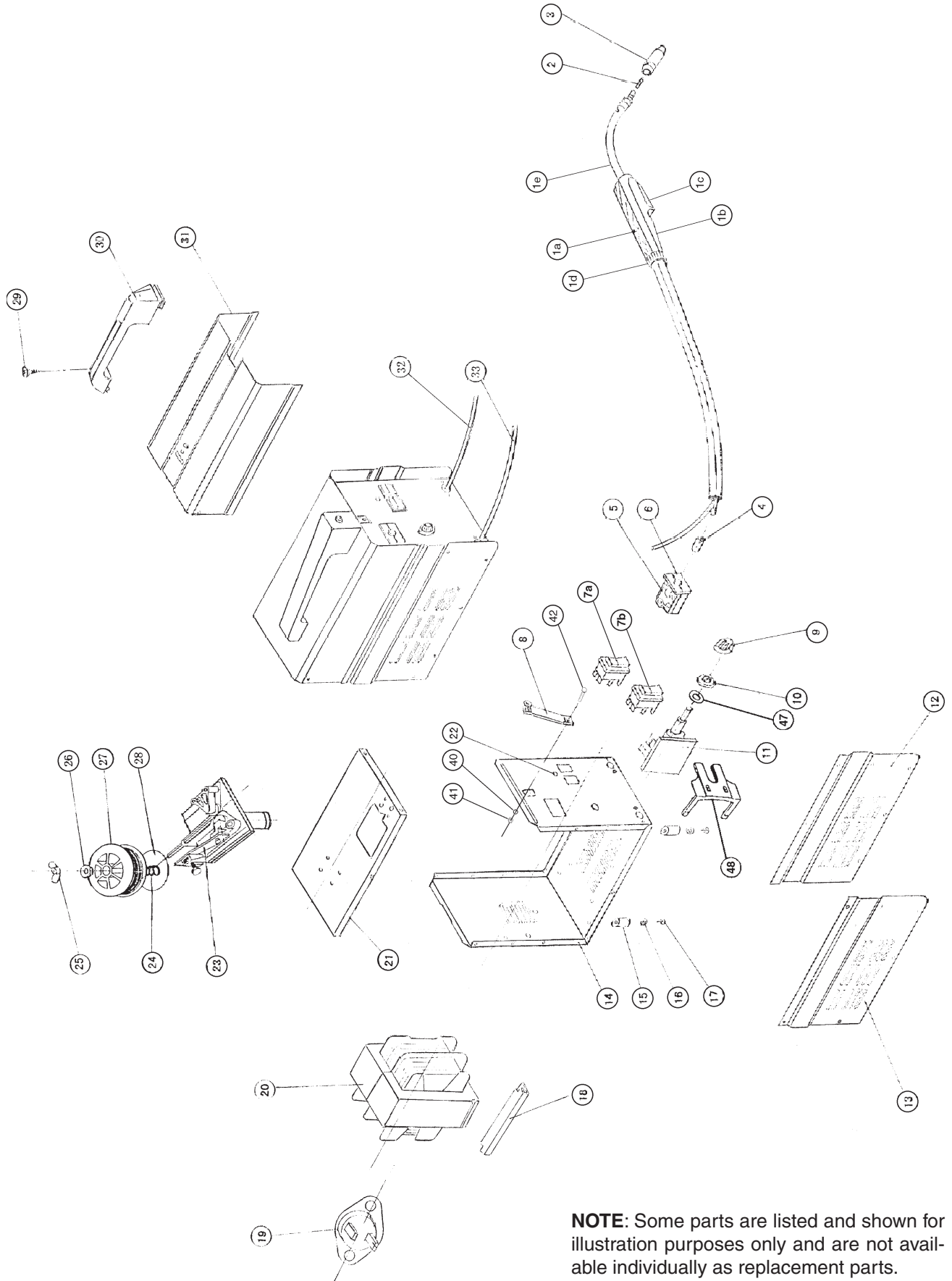
Part	Description	Q'ty
1a	Back Handle	1
1b	Front Handle	1
1c	Trigger Switch	1
1d	Handle Lock Ring	1
1e	Torch Tube	1
2b	.9 mm Contact Tip	1
3	Nozzle	1
4	Liner	1
5	Fixing Pole (A) for Gun Body	1
6	Fixing Pole (B) for Gun Body	1
7a	Power Switch (with Light)	1
7b	Max/Min Switch	1
8	Cover Locking Spring	1
9	Wire Feed Control Knob	1
10	Nut	1
11	Speed Control Circuit Board	1
12	Right Side Panel	1
13	Left Side Panel	1
14	Base Frame	1
15	Foot	4
16	Washer	4
17	Self-tapping Screw, ST4.2*13	4
18	Transformer Carriage	2
19	Thermostat	1
20	Transformer	1
21	Middle Partition Board	1
22	Overload Indicator Lamp	1

Part	Description	Q'ty
23	Wire Feed Unit	1
24	Reel Spring	1
25	Wing Nut, M6	1
26	Reel Locking Knob	1
27	Wire Reel	1
28	Reel Holder	1
29	Self-tapping Screw, ST4.2*25	1
30	Handle	1
31	Cover	1
32	Power Cord	1
33	Ground Cable	1
34	Wire Feed Roller	1
35	Wire Feed Bearing	1
36	Wire Feed Swing Arm	1
37	Adjustment Screw	1
38	Face Shield (shade #10)	1
39	Wire Brush / Hammer	1
40	Washer	1
41	Nut	1
42	Machine Screw	1
43	Contact Tip Wrench	1
44	Feed Roller Bracket	1
45	Roller Bracket Screw	2
46	Roller Bracket Washer	2
47	Washer	1
48	Support Bracket	1

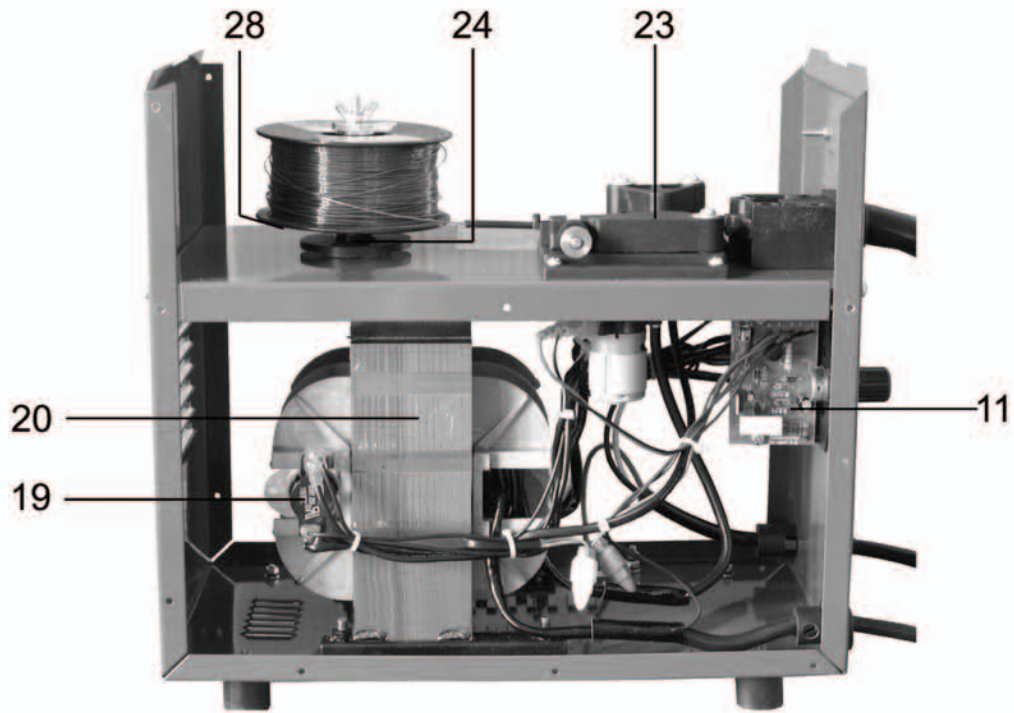
PLEASE READ THE FOLLOWING CAREFULLY

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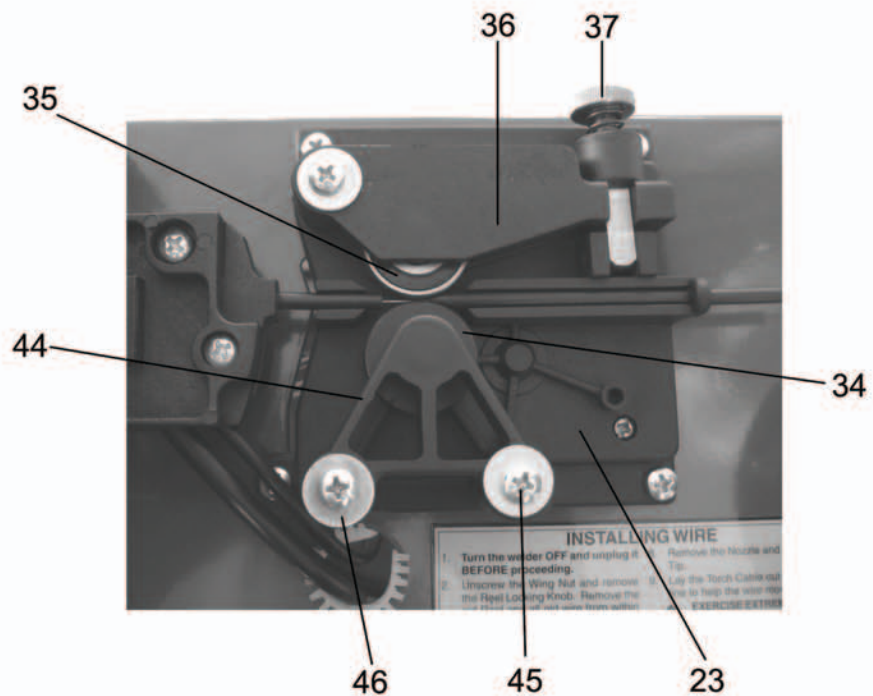
ASSEMBLY DIAGRAM



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



Detail of Part 23



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 steps 12-15 on page 13.
2. **Incorrect wire feed roll size:**
Replace with the proper one - .8 mm (.030") - follow the *Installing The Wire Reel* instructions, starting on page 12.
3. **Damaged torch, cable, or liner assembly:**
Have a qualified technician inspect these parts and replace as necessary.

WIRE CREATES A BIRD'S NEST DURING OPERATION

POSSIBLE CAUSES AND SOLUTIONS

1. **Excess wire feed pressure:**
Adjust wire feed pressure properly - follow steps 12-15 on page 13.
2. **Incorrect contact tip size:**
Replace with the proper tip for .030" wire (0.9 mm).
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 .030" wire (0.9 mm).
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.

POWER SWITCH (7A) DOES NOT LIGHT WHEN SWITCHED ON

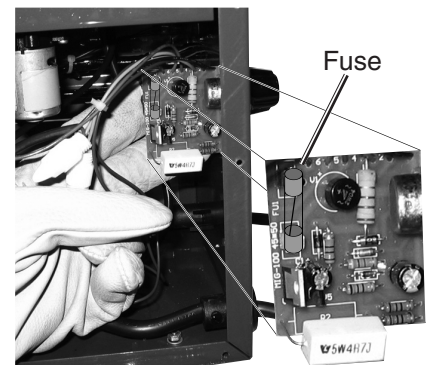
POSSIBLE CAUSES AND SOLUTIONS

1. **Unit is not connected to outlet properly or outlet is unpowered:**
Verify the voltage at the outlet and the connection to the outlet.
If voltage is not present at outlet, check circuit breaker/GFCI devices; if any are tripped, determine and remedy cause before resetting. Verify that the circuit is designed to supply the required input amperage as detailed on the **Specifications** table.

POWER SWITCH (7A) LIGHTS, BUT 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 15.
2. **Faulty or improperly connected Trigger Switch (1c):**
Check and secure/replace Trigger Switch (1c), according to the instructions outlined on page 14 of this manual.
3. **Internal fuse blown:**
Check/replace according to the following directions.
 - a. **WARNING! Turn the welder OFF and unplug it before proceeding.**
 - b. Press on the Cover Locking Spring (8), then lift the Cover (31) using Handle (30). Remove Left Side Panel (13).
 - c. Examine fuse on panel to see if metal wire inside is broken or not. See illustration to the right.
NOTE: The circuit board is very delicate and will be damaged if it is not supported while the fuse is being removed/replaced. If you have any doubts about doing this without damaging the welder, have a qualified technician replace the fuse.
 - d. If the fuse is broken, carefully support the circuit board with a gloved hand while you remove the old fuse. Support the circuit board from behind while you install a new 2 Amp, 250 Volt fuse of the same type.
NEVER use another type or size fuse in this unit.
 - e. Reinstall the Left Side Panel (13), close the Cover (31), and test the unit for proper function before use.



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 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 (2b):**
Verify that Contact Tip (2b) is the proper size for .030" wire (0.9 mm). 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 (2b) with proper size and type.
-

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.
2. **Improper gauge or length of extension cord:**
Extension cords are not recommended. If possible, eliminate the use of an extension cord. If an extension cord is needed, refer to the gauge and length chart on page 10 and in relation to the required input amperage stated on the **Specifications** table.

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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