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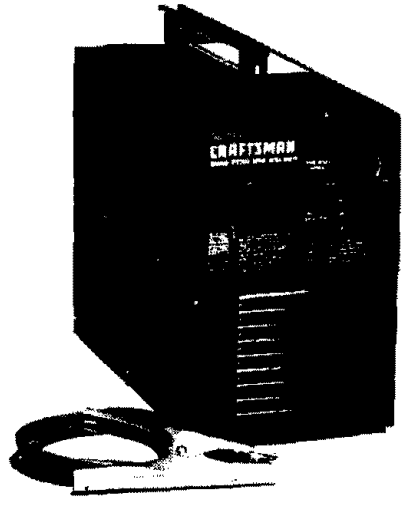
MANUAL

SEARS

OWNERS MANUAL



WIRE FEED MIG WELDER

Operation Repair Parts

MODEL No. 934.20105

CAUTION: Read Rules for Safe Operation and Instructions Carefully

811-309-000

SEARS ROEBUCK AND CO., CHICAGO, IL 60684 U.S.A.

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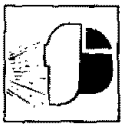
IMPORTANT SAFETY INSTRUCTIONS

SAVE THESE INSTRUCTIONS! DO NOT OPERATE YOUR WELDER UNTIL YOU HAVE READ AND UNDERSTAND THESE INSTRUCTIONS

ELECTRIC SHOCK CAN KILL!



ARC RAYS CAN INJURE EYES AND BURN SKIN!

FIRE OR EXPLOSION CAN CAUSE DEATH, INJURY, AND PROPERTY DAMAGE!

FUMES, GASSES, AND VAPORS CAN CAUSE DISCOMFORT, ILLNESS, AND DEATH!

IMPROPER HANDLING AND MAINTENANCE OF COMPRESSED GAS CYLINDERS AND REGULATORS CAN RESULT IN SERIOUS INJURY OR DEATH!

IMPORTANT! DO NOT ATTEMPT OPERATION of this welding equipment until reading and understanding the following safety instructions to reduce risk of **DEATH, INJURY, AND PROPERTY DAMAGE.**

SHOCK HAZARDS

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

NEVER Stand, Sit, Lie, Lean On, Touch, or come into physical contact in any way with any part of the welding current circuit including:
the work piece or any conductive material in contact with it. The ground clamp. The electrode (welding rod or welding wire). Any metal parts on the electrode holder or MIG gun.

NEVER weld in a damp area or come in contact with a moist or wet surface when welding.

NEVER attempt to weld if any part of clothing or body is wet.

NEVER allow the welding equipment to come in contact with water or moisture.

NEVER drag welding cables (or MIG gun assembly) or weld powercord through or allow them to come into contact with water or moisture.

NEVER touch welder, attempt to turn welder on or off, or attempt to plug welder into powersource if any part of body or clothing is wet or damp, or if standing in or in physical contact of any kind with water or moisture.

NEVER connect welder ground clamp to or weld on electrical conduit.

NEVER alter powercord or powercord plug in any way.

NEVER attempt to plug welder into powersource if ground prong on powercord plug is bent over, broken off, or missing.

NEVER allow welder to be connected to powersource or attempt to weld if welder, welding cables (or MIG gun assembly), welding site, or welder powercord are exposed to rain, snow, sleet, mist, fog or other forms of atmospheric precipitation or mist or spray off an ocean or other body of water.

NEVER carry coiled welding cables around shoulders, or any other part of the body, when they are plugged into the welder.

NEVER modify any wiring, ground connections, switches, or fuses in this welding equipment.

ALWAYS wear welding gloves to help insulate hands from welding circuit.

ALWAYS keep containers of water or other liquids far enough away from welder and work area so that if spilled, the liquid could not possibly come in contact with the welder, welding cables (or MIG gun assembly), welder powercord, the workpiece being welded, or any other part of the electrical welding circuit.

ALWAYS replace any cracked or damaged parts that are insulated or act as insulators such as welding cables (or MIG gun assembly), or powercord IMMEDIATELY.

FLASH HAZARDS

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

NEVER look at an electric arc without proper protection. A welding arc is extremely bright and intense and, with inadequate or no eye protection, the retina can be burned, leaving a permanent dark spot in the field of vision. A shield or helmet with a number 10 shade filter lens (minimum) must be used.

NEVER strike a welding arc until all bystanders and you (the welder) have welding shields and/or helmets in place.

NEVER wear a cracked or broken helmet and replace any cracked or broken filter lenses **IMMEDIATELY.**

ALWAYS provide bystanders with shields or helmets fitted with a number 10 shade filter lens.

ALWAYS wear protective clothing. The intense light of the welding arc can burn the skin in much the same way as the sun, even through lightweight clothing. Wear dark clothing of heavy material. The shirt worn should be long sleeved and the collar kept buttoned to protect chest and neck.

ALWAYS protect against **REFLECTED ARC RAYS.** Arc rays can be reflected off shiny surfaces such as a glossy painted surface, aluminum, stainless steel, and glass. It is possible for your eyes to be injured by reflected arc rays even when wearing a protective helmet or shield. If welding with a reflective surface behind you, arc rays can "bounce off" the surface, then off the filter lens on the inside of your helmet or shield, then into your eyes. If a reflective background exists in your welding area, either remove it or cover it with something nonflammable and non-reflective. Reflective arc rays can also cause skin burn in addition to eye injury.

FIRE HAZARDS

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

NEVER wear gloves or other clothing that contain oil, grease, or other flammable substances.

NEVER wear flammable hair preparations.

NEVER weld in an area until it has been checked and cleared of combustable and/or flammable materials. **BE AWARE** that sparks and slag can fly 35 feet and can pass through small cracks and openings. If work and combustibles cannot be separated by a minimum of 35 feet, protect against ignition with suitable, snug-fitting, fire resistant covers or shields.

NEVER weld on walls until checking for and removing combustibles touching the wall on the other side.

NEVER weld, cut, or perform other hot work on used barrels, drums, tanks, or other containers that contained a flammable or toxic substance. The techniques for removing flammable substances and vapors, to make a used container safe for welding or cutting, are quite complex and require special education and training.

NEVER strike an arc on a compressed gas or air cylinder or other pressure vessel. Doing so will create a brittle area that can result in a violent rupture immediately or at a later time as a result of rough handling.

NEVER weld or cut in an area where the air may contain flammable dust (such as grain dust), gas, or liquid vapors (such as gasoline).

NEVER handle hot metal, such as the workpiece or welding wire, with bare hands.

ALWAYS wear leather gloves, heavy long sleeve shirt, cuffless trousers, high-topped shoes, helmet, and cap. As necessary, use additional protective clothing such as leather jacket or sleeves, fire resistant leggings, or apron. Hot sparks or metal can lodge in rolled up sleeves, trouser cuffs, or pockets. Sleeves and collars should be kept buttoned and pockets eliminated from the front.

ALWAYS have fire extinguishing equipment handy for instant use! A portable chemical fire extinquisher, type ABC, is recommended.

ALWAYS wear ear plugs when welding overhead to prevent spatter or slag from falling into ear.

ALWAYS make sure welding area has a good, solid, safe floor, preferably concrete or masonry, not tiled, carpeted, or made of any other flammable material.

ALWAYS protect flammable walls, ceilings, and floors with heat resistant covers or shields.

ALWAYS check welding area to make sure it is free of sparks, glowing metal or slag, and flames before leaving the welding area.

FUME HAZARDS

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

NEVER weld in an area until it has been checked for adequate ventilation as described in ANSI standard #Z49.1. If ventilation is not adequate to exchange all fumes and gasses generated during the welding process with fresh air, do not weld unless you (the welder) and all bystanders are wearing air-supplied respirators.

NEVER heat metals coated with or containing materials that produce toxic fumes, such as galvanized steel, unless the coating is removed, the area is well ventilated, or the operator and all bystanders wear air-supplied respirators.

NEVER weld, cut, or heat lead, zinc, cadmium, mercury, beryllium, or similar metals without seeking professional advise and inspection of the ventilation of the welding area. These metals produce **EXTREMELY TOXIC** fumes which can cause discomfort, illness, and death.

NEVER weld or cut in areas that are near chlorinated solvents. Vapors from chlorinated hydrocarbons, such as trichloroethylene and perchloroethylene, can be decomposed by the heat of an electric arc or its ultraviolet radiation to form **PHOSGENE**, a **HIGHLY TOXIC** gas, along with other lung and eye-irritating gasses. Do not weld or cut where these solvent vapors can be drawn into the work area or where the ultraviolet radiation can penetrate to areas containing even very small amounts of these vapors.

NEVER weld in a confined area unless it is being ventilated or the operator (and anyone else in the area) is wearing an air-supplied respirator.

NEVER bring gas cylinders into or allow gas leaks in a confined space. Leaked gas can rapidly reduce oxygen concentration levels in a confined space.

ALWAYS shut off shielding gas supply at its source before leaving a confined area and check to make sure that the area is safe before reentering it.

ALWAYS stop welding if you develop momentary eye, nose, or throat irritation as this indicates inadequate ventilation. Stop work and take necessary steps to improve ventilation in the welding area. Do not resume welding if physical discomfort persists.

COMPRESSED GASSES AND EQUIPMENT HAZARDS

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

NEVER use flammable gasses with MIG welders. Only inert or non-flammable gasses are suitable for MIG welding. Examples are Carbon Dioxide, Argon, Helium, etc. or mixtures of more than one of these gasses.

NEVER attempt to mix gasses or refill a cylinder yourself.

NEVER expose cylinders to excessive heat, sparks, slag, and flame, etc. Cylinders exposed to temperatures above 130 degrees F. will require water spray cooling.

NEVER expose cylinders to electricity of any kind.

NEVER use cylinder or its contents for anything other than its intended use. Do not use as a support or roller.

NEVER locate cylinders in passageways or work areas where they may be struck.

NEVER lift cylinders off the ground by their valves or caps or with chains, slings, or magnets.

NEVER use a wrench or hammer to open a cylinder valve that cannot be opened by hand. Notify your supplier.

NEVER modify or exchange gas cylinder fittings.

NEVER deface or altar name, number, or other markings on a cylinder. It is illegal and hazardous.

NEVER use cylinders without the name of the gas marked on the cylinder. Do not rely on cylinder color to identify the content.

NEVER connect a regulator to a cylinder containing gas other than that for which the regulator was designed.

NEVER attempt to make regulator repairs. Send faulty regulators for repair to manufacturer's designated repair center.

NEVER attempt to lubricate regulator.

ALWAYS handle cylinders carefully to prevent leaks and damage to their walls, valves, or safety devices.

ALWAYS secure cylinders with a steel chain so that they cannot be knocked over.

ALWAYS protect cylinder, especially valve, from bumps, falls, falling objects, and weather.

ALWAYS make sure cylinder cap is securely in place, on the cylinder, whenever cylinder is moved.

ALWAYS remove faulty regulator from service immediately for repair (first close cylinder valve) if any of the following occur: Gas leaks externally, delivery pressure continues to rise with down stream valve closed, and/or gauge pointer does not move off the stop pin when pressurized or fails to return to the stop pin after pressure is released.

ADDITIONAL SAFETY INFORMATION

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

1. ANSI Standard Z49.1 — SAFETY IN WELDING AND CUTTING —obtainable from the American Welding Society, 2051 N.W. 7th St., Miami, FL 33125 Telephone (305) 443-9353

2. ANSI Standard Z87.1 — SAFE PRACTICE FOR OCCUPATION AND EDUCATIONAL EYE AND FACE PROTECTION — obtainable from the American National Standards Institute, 1430 Broadway, New York, NY 10018

3. NFPA Standard 51B — CUTTING AND WELDING PROCESSES — obtainable from the National Fire Protection Association, 470 Atlantic Ave., Boston, MA 02210

4. CGA Pamphlet P-1 — SAFE HANDLING OF COMPRESSED GASSES IN CYLINDERS — obtainable from the Compressed Gas Association, 500 5th Ave., New York, NY 10036

5. OSHA Standard 29 CFR, Part 1910, Subpart Q, WELDING, CUTTING AND BRAZING — obtainable from your state OSHA office.

6. CSA Standard W177.2 — Code for SAFETY IN WELDING AND CUTTING — obtainable from Canadian Standards Association, 178 Rexdale Blvd., Rexdale, Ontario, Canada M9W 1R3

PRODUCT DESCRIPTION

Your new Metal Inert Gas (MIG) wire feed welder is designed for maintenance, and sheetmetal fabrication. The welder consists of a single-phase power transformer, stabilizer, rectifier, and a unique built-in control/feeder. This MIG welder is capable of welding with .024" and .030" solid steel, or stainless steel wires and .030" aluminum (spec #5356 alloy) wire on DC positive polarity and with .030", self-shielding flux-core wire on DC negative polarity.

NOTE: When using .035 Flux Core wire your duty cycle may be shorter than 20%.

Now you can weld 20 gauge sheet metal up to 3/16" with a single pass. Welds 1/4" steel with beveling and multiple pass.

SPECIFICATIONS

Primary (input) volts	120 VAC
Primary (input) Amps	18
Phase	Single
Frequency	60 Hz
Kilovolt Amps	2.2
Secendary (output) volts	18
Secondary (output) amps	75
Duty Cycle Rating:	20%
Open Circuit Volts (Max.)	31 VDC

WELDER CONTROLS AND THEIR FUNCTIONS

POWER SWITCH- Has three settings: LOW, OFF, and HIGH. Setting the switch to OFF shuts the welder off. When set to LOW, the welder can produce up to 45 amps of welding current. When set on HIGH, up to 75 amps of welding current will be available. **NOTE:** The actual amperage will vary depending on wire speed, length of the arc held when welding, the type of wire being used, and the **ACTUAL** voltage available at the wall receptacle.

ELECTRIC SHOCK CAN KILL! To reduce risk of electric shock, be aware that having the POWER SWITCH in the OFF position does not remove power from all internal circuitry of the welder.

WIRE SPEED - This control adjusts the speed at which the wire is fed out of the gun. The wire speed needs to be closely matched ("tuned-in") to the rate at which it is being melted off. Some things that affect wire speed selection are the type and diameter of the wire being used, the heat setting selected, and the welding position to be used.

DUTY CYCLE

The duty cycle rating of a welder tells the operator how long he or she can weld and how long the welder must rest to cool. It is expressed as a percentage of 10 minutes (the industry recognized cycle time) and represents the maximum welding time allowed, with the balance of the 10-minute cycle required for cooling (see chart below).

Your new welder has a duty cycle rating of 20%. You can weld for 2 minutes out of 10, with the remaining 8 minutes required for cooling.

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

INTERNAL THERMAL PROTECTION

If you exceed the duty cycle of your welder, and internal thermal protector will open and shut off all welder functions. After cooling, the thermal protector will automatically reset and the welder will function normally again.

DO NOT CONSTANTLY EXCEED THE DUTY CYCLE OR DAMAGE TO THIS WELDER CAN RESULT!

ASSEMBLY AND INSTALLATION

ELECTRIC SHOCK CAN KILL! To reduce risk of electric shock, **DO NOT PLUG WELDER IN TO AC POWER SOURCE UNTIL TOLD TO DO SO** later in this manual.

UNPACKING YOUR WELDER

1. Open the top of the shipping carton.

2. Remove any cartons or bags containing accessories.

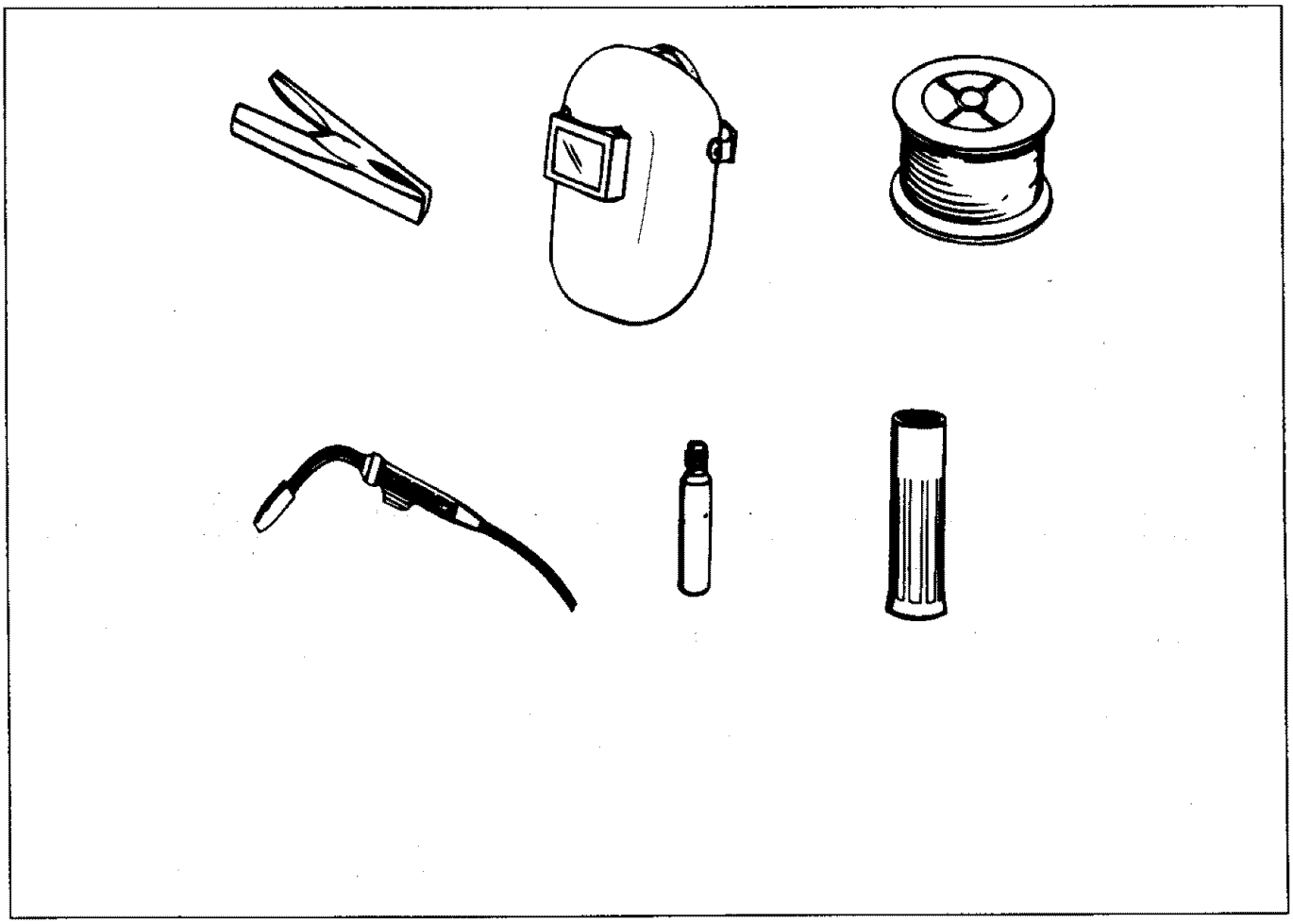
3. Open the cartons or bags packed with your welder and inspect their contents for damage. Report any missing or damaged items immediately!

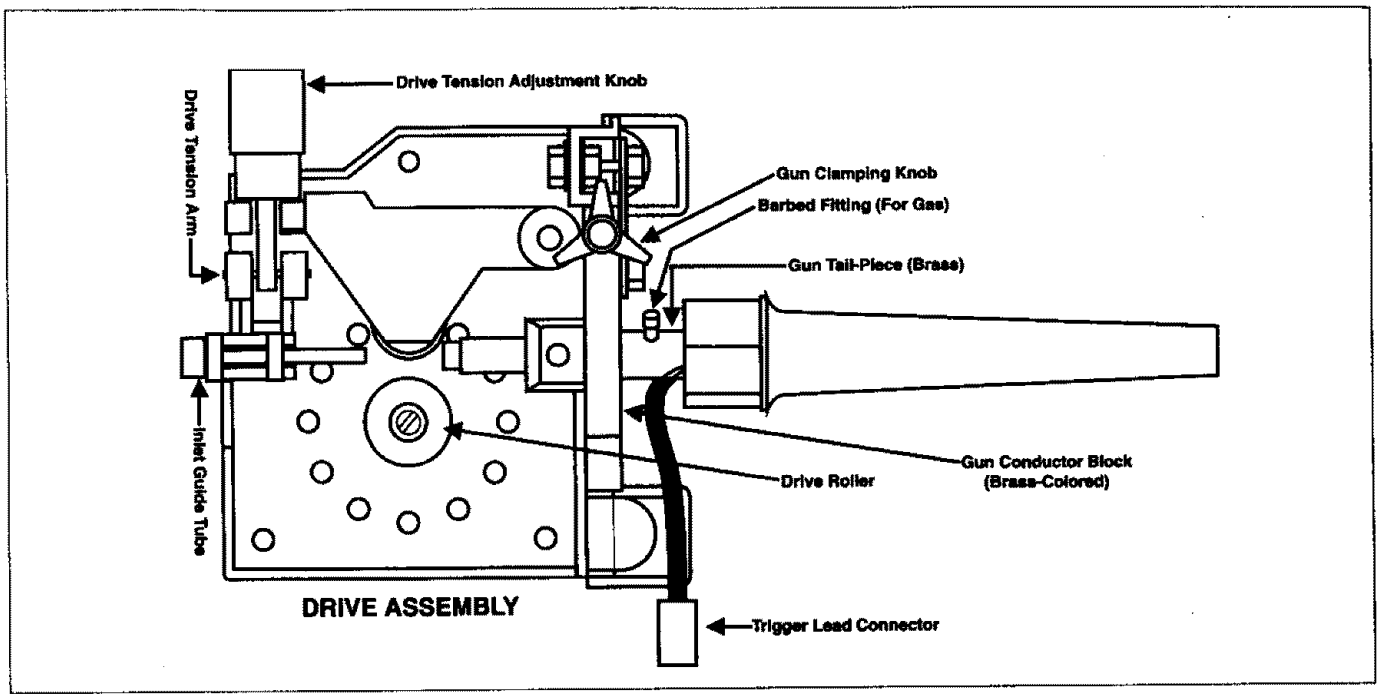
4. Lay out the parts and compare to following illustrations to familiarize yourself with the parts and what they are called. This will help you when reading the manual.

5. Grasp the top handle of the welder and lift the welder out of the carton.

INSTALL THE GROUND CLAMP

Connect the ground clamp to the ground cable (coming out of the front of the welder) according to the instructions packaged with the ground clamp.





INSTALL WELDING GUN ASSEMBLY

1. Insert the brass tail piece of the welding gun through hole in the front of the welder.

2. Align the gun's tail-piece with the hole in the brass conductor block on the front of the drive assembly.

3. Push the gun's tail-piece into the drive assembly ALL THE WAY until it stops against the brass conductor block. (NOTE: The gun's tail piece should be about 1/16" from the drive roller)

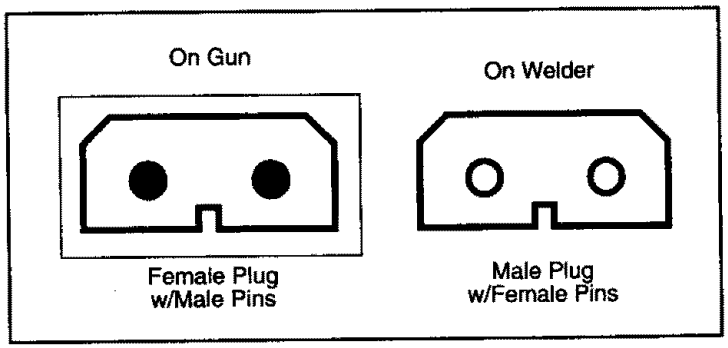
4. Rotate the gun so the brass fitting (on the gun's tail-piece) is pointing up, then plug the gas hose (coming up through the welder's drive deck) onto the barbed fitting.

NOTE: A hose clamp is not needed on this fitting.

5. Make sure gun is still pushed all the way into the brass conductor block, then tighten the gun clamping knob (on top of the brass gun conductor block) until the gun is held securely in place.

IMPORTANT: Hand tighten only. do not over-tighten.

6. Plug the trigger lead connector (hanging from the gun's tail-piece) into the mating connector that's mounted in the deck of the welder.



NOTE: The connectors will plug together only one way, due to their shape (see illustration). The connectors will lock together when properly connected.

PROVIDE REQUIRED POWER

Power Requirements

This welder is designed to operate on a properly grounded 120 volt, 60 hertz, single phase, alternating current (AC) power source on a 20 amp branch circuit. It is recommended that a qualified electrician verify the ACTUAL VOLTAGE at the receptacle into which the welder will be plugged and confirm that the receptacle is properly fused and grounded.

DO NOT OPERATE THIS WELDER if the ACTUAL power source voltage is less that 105 volts AC greater than 132 volts AC. Contact a qualified electrician if this problem exists. Improper perform-

ance and/or damage to the welder will result if operated on inadequate or excessive power.

ELECRIC SHOCK CAN KILL! FIRE CAN KILL, INJURE, AND CAUSE PROPERTY DAMAGE! To reduce the risk of electric shock and fire, connect only to properly grounded and fused outlets. **NEVER ALTER** the AC powercord or powercord plug provided on the welder. **NEVER ALTER** and extension cord or extension cord plugs.

Connect Welder to Power Source

1. **DO NOT ALTER** the AC power cord or powercord plug on the welder. Doing so may VOID THE WARRANTY. If the welder's AC powercord plug does not mate with your existing receptacle, have an appropriate receptacle installed by a qualified electrician in accordance with the National Electrical Code and local codes and ordinances. Do not use any adapters between the welder's AC powercord plug and AC power source receptacle.

2. Make sure the POWER SWITCH on the front of the welder is turned to its "OFF" position. Then plug the welder's powercord plug into the AC power source receptacle.

Extension Cord Use

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

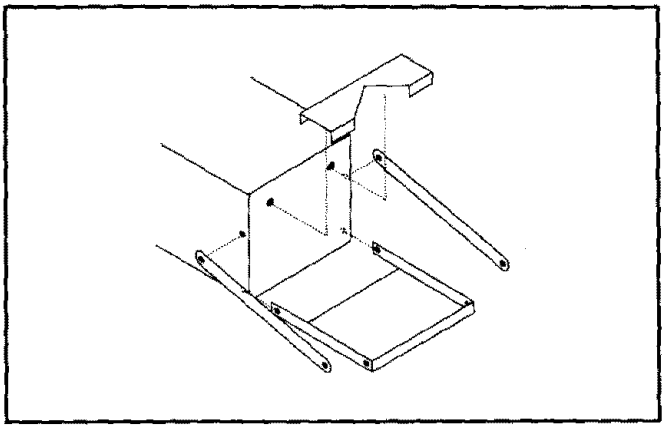
Select a properly grounded extension cord that the AC powercord of the welder and AC power source receptacle will mate with directly without the use of adaptors. Make sure the extension cord is properly wired and in good electrical condition.

For an extension cord length not exceeding 25 feet, choose one with the same AWG wire size as that stamped on the welder's powercord. Extension cord lengths longer than 25 feet will require heavier wire gauges to compensate for voltage losses that will cause decreased perfomance.

INSTALL TANK TRAY AND BRACKET

1. Remove the screw from the bottom-rear corner of each side of the welder. Slide the tank tray into position, lining up the slotted holes in the tabs of the tank tray with the two holes in the welder. Reinstall the two sheetmetal screws that were removed and **TIGHTEN ONLY.**

2. Attach the two tank support straps to the tank support tray using 1 each #10 Phillips head screw, 1 each #10 lockwasher, and 1 each #10 Hex nut on each side. The straps should be mounted to the outside surface of the tank tray. **TIGHTEN LIGHTLY.**



3. Remove the two sheetmetal screws (one from each side) that are located directly above the screws removed in step #1 above. Position the ends of the tank support straps over the holes in the welder and reinstall the screws.

4. Tighten all hardware securely.

5. Position the upper tank bracket (flanges pointing downward) over the two empty holes on the back of the welder and push two #10 Phillips head bolts through the holes.

6. Raise the wire drive compartment lid of the welder, place a lockwasher on each of the bolts, then thread a #10 hex nut onto each bolt and tighten securely.

7. Place each end of the tank restraining chain into each of the key-hole slots in the upper tank bracket. This chain will restrain a tank from falling over and should always be used.

IMPORTANT-GAS CYLINDER SIZE RESTRICTION! The tank tray you have installed on the back of this welder will handle gas cylinders no longer than 20 cubic feet. If you select a cylinder larger than 20 cubic feet, it must be chained to a wall or other fixed support.

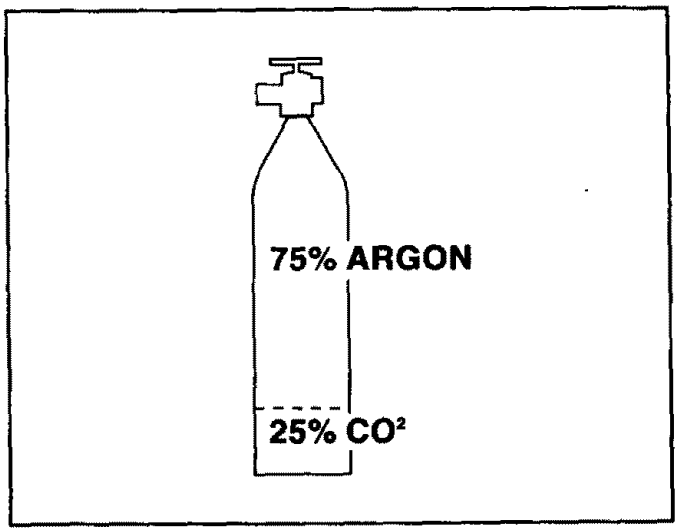
SELECT SHIELDING GAS

The shielding gas plays an extremely important role in the MIG welding process. As with most welding processes, it is critical that the molten weld puddle be "shielded" from the atmosphere. Inadequate shielding will result in porous, brittle welds.

Not only is shielding the weld important, but selecting the proper gas to shield with is of equal importance. Generally, the shielding gas selected is dependent upon the type and thickness of metal being welded. Selecting the wrong gas for the metal to be welded can result in porosity, brittleness, and/or undesirable penetration of the weld.

Although there are many gasses and mixtures available for MIG welding, the following recommendations are based on the electrical output characteristics and metal-thickness welding capabilities of this specific MIG welder.

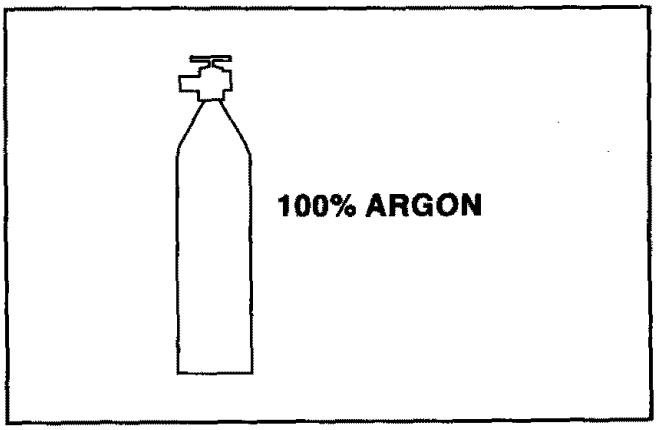
GAS SELECTION FOR STEEL WELDING WITH STEEL WIRE



For either mild or low carbon (High Strength Structural) steel, in the thicknesses that can be welded with this welder, our primary recommendation is a gas mixture of 75% Argon and 25% Carbon Dioxide. This gas mixture helps to prevent burn through and distortion on very thin steel, yet provides food penetration on thicker steel. Its ability to minimize spatter results in clean, smooth weld appearances. In addition, it provides food puddle control when welding vertically or overhead. This gas mixture is available pre-mixed in a single cylinder from your local gas distributor.

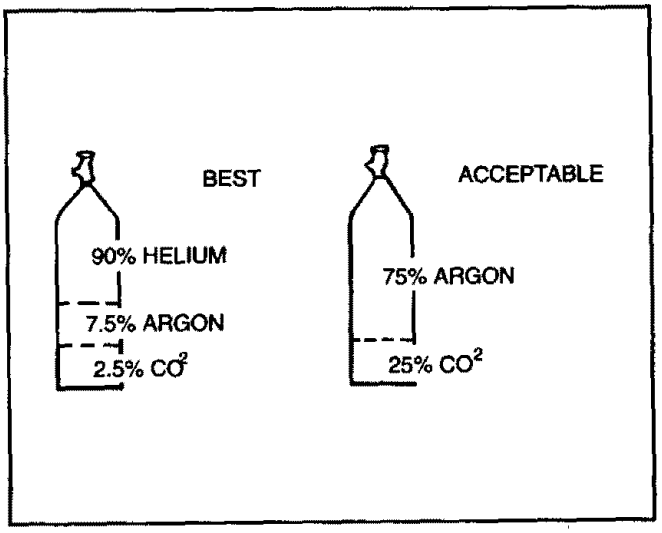
Note: Potential Shielding Gas Problems

Gas Selection For Aluminum Gas Welding



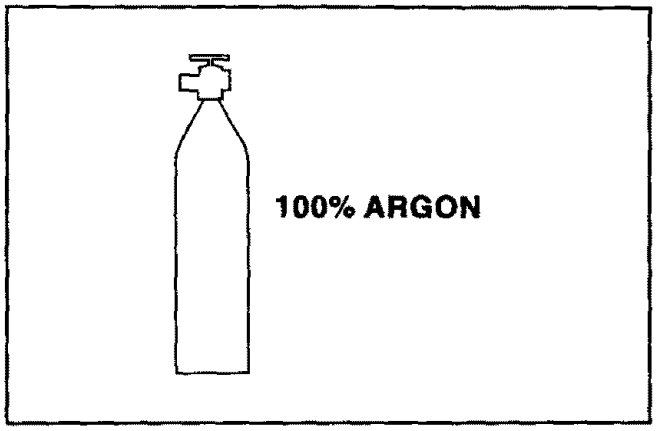
Our only recommendation for shielding an aluminum weld is pure Argon. Do not attempt to use the Argon/Carbon Dioxide mixture (recommended for steel) when welding aluminum.

Gas Selection For Stainless Steel Welding



The best shielding gas for stainless steel welding is a mixture of 90% helium, 7.5% Argon, and 2.5% Carbon Dioxide. However, the 75% argon 25% Carbon Dioxide mixture (recommended for steel) can also be used, but an increase in the area being heated by the arc will be experienced causing slightly greater distortion of the base metal. Also this mixture can cause a decrease in the ability of the stainless steel weld to resist corrosion. Either mixture can be obtained in a single cylinder from your local gas distributor.

Gas Selection For Steel Welding With Silicon-bronze Wire



Use only pure Argon when welding steel with Silicon-Bronze wire.

1. **DEFECTIVE GAS** — Just like any other product, a cylinder of gas can be defective. Moisture or other impurities in the gas can create dirty porous, brittle welds with greatly reduced penetration. The only remedy is to replace the cylinder.

2. **MIXTURE COMPOSITION CHANGE** — This problem concerns only cylinders that contain a mixture of two or more gasses. The mixture composition in a cylinder can be changed if the cylinder is stored in cold temperatures. For the 75% Argon 25% Carbon Dioxide mixture, the cylinder should not be stored below 40 degrees F. This information is normally found on the label on the cylinder that indicates the contents of the cylinder.

This problem can create a variety of unfavorable weld characteristics including porosity, brittles, and improper penetration.

3. **INSUFFICIENT SHIELDING GAS COVERAGE** — This problem can be created by several causes as listed in the TROUBLESHOOTING section of this manual. The symptoms are the same for all of them; dirty, porous, brittle, and/or non-penetrating welds.

INSTALL THE SHIELDING GAS

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

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

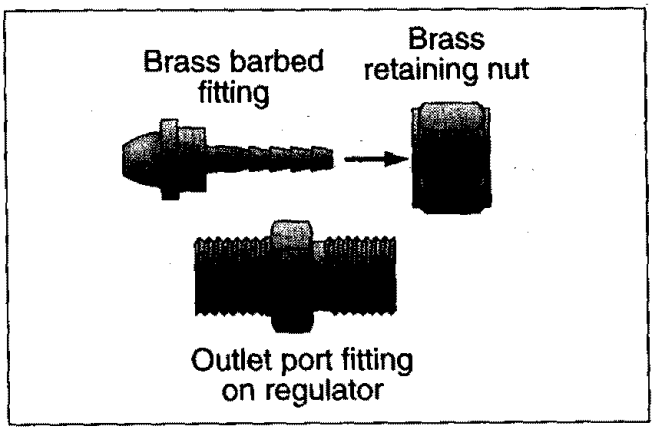
2. Remove the protective cap from the cylinder and inspect the regulator connecting threads for dust, dirt, oil, and grease. Remove any dust or dirt with a clean cloth. **DO NOT ATTACH THE REGULATOR IF OIL, GREASE, OR DAMAGE ARE PRESENT.**

3. Open the cylinder valve FOR JUST AN INSTANT to blow out any foreign matter inside the valve port to reduce the risk of plugging or damaging the regulator. **NEVER AIM THE CYLINDER VALVE PORT AT YOURSELF OR ANY BYSTANDERS WHEN OPENING CYLINDER TO REDUCE THE RISK OF PERSONAL INJURY.**

4. Screw the regulator into the cylinder valve and tighten with a wrench while keeping gauges upright for easy and accurate reading.

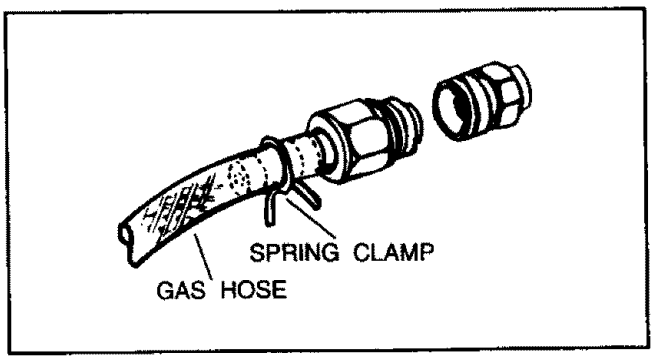
NOTE: If the cylinder you have is equipped with male regulator connecting threads instead of female, you will need to obtain a special compressed gas cylinder adapter from your gas supplier to install between your gas cylinder and regulator.

5. Locate the brass barbed fitting and brass retaining nut in the parts bag and place the fitting through the nut as pictured on next page. Then thread the nut onto the male-threaded outlet port on the regulator and wrench tighten.

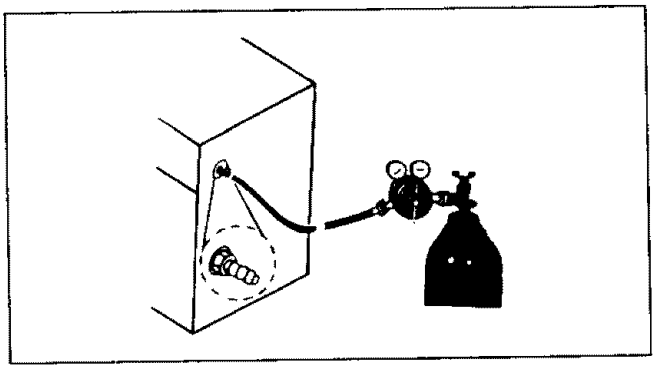


6. Slide the spring clamp (in parts bag) down one end of the gas hose about three inches. Push the same end of the gas hose onto the barbed fitting. Then compress the ears of the spring

clamp with a pliers, slide it up the gas hose, and release clamp when it is positioned on a portion of the hose that is over the brass fitting.



7. Locate the remaining brass barbed fitting (male threaded) in the parts bag and thread the fitting into the gas solenoid port located in the rear of the welder (see illustration below) **BEING CAREFUL TO PREVENT CROSS THREADING.** Turn the fitting into the solenoid port **WITH YOUR FINGERS ONLY** until you can't turn any more. Then, use a wrench to tighten it securely - do not overtighten.



8. Slide the remaining hose clamp about 3" up the end of the gas hose opposite the regulator. Then push the hose onto the barbed fitting installed in step #7 above and clamp into place.

CHECKING GAS FLOW

IMPROPER HANDLING AND MAINTENANCE OF COMPRESSED GAS CYLINDERS AND REGULATORS CAN RESULT IN SERIOUS INJURY AND DEATH! To reduce risk of injury or death, always stand to the side of the cylinder opposite the regulator when opening the cylinder valve, keeping the cylinder valve between you and the regulator.

1. Slowly crack open the cylinder valve, then turn open **ALL THE WAY!**

2. Turn **POWER SWITCH** on the front of the welder to either the LOW or HIGH position.

3. Pull the trigger on the gun to allow the gas to flow. **KEEP PULLED.** Listen for gas to flow from the end of the welding gun. If no gas is heard or felt, check all previous steps in connecting the gas.

4. Release the trigger.

Your gas regulator has been factory set for delivery of 20 Cubic Feet Per Hour of shielding gas. If welding outside or in a draft, it may become necessary to set up a windbreak to keep the shielding gas from being blown from the weld area.

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

SELECT WELDING CURRENT POLARITY

This welder comes factory set for DC Positive Polarity operation. This polarity is required when using gas-shielded steel welding wires.

If you wish to use self-shielding flux-core wire, it will be necessary to set the welder for DC Negative Polarity operation. To do this, refer to on sticker on the inside of hood.

SELECT THE WELDING WIRE

Selecting the Type of Wire

It is very important to select a type of wire that is compatible with the metal to be welded (base metal). If the wire is incompatible with the base metal, the quality of important characteristics such as penetration and strength may be sacrificed.

The welding wires recommended for most of the mild and low carbon steel applications you will have are AWS classification numbers E70S-3 and E70S-6. These two wires are very similar, but the E70S-6 tends to work a little better on moderately dirty steel and on sheet metal where smooth weld beads are required. These differences are very subtle, so in most applications, either wire is acceptable.

Self-shielding, flux-core, steel wire is used primarily for welding mild steel without the use of a shielding gas. It is especially good to use when welding needs to take place in windy environment. However, it produces more spatter than solid wire gas-shielded welding and leaves a slag on top of the weld that needs to be chipped off. Our recommen-

dation for self-shielding, flux-core, steel wire is AWS classification number E71T-GS.

NOTE: With flux core wire you will burn through metals thinner than 18 gauge

WARNING: When welding aluminum with a wire feed welder rated at 90 amps or less, we highly recommend that:

a. The aluminum to be welded is between 1/16" (1.59mm) and 1/8" (3.17mm) thick.

b. A .030 diameter, 5356 aluminum alloy welding wire is used.

c. The teflon gun liner (part # 4325) is installed in the mig gun.

d. The composite rubber drive roller (part # 4324) is installed in the wire feed welder.

e. 100% pure argon shielding gas is used.

NOTE: Failure to utilize these set-up recommendations will result in wire feeding problems and poor quality welds.

1. **Stainless Steel Wire Selection**
When welding stainless steel, the alloy of the welding wire must be the same as the alloy of the base metal. As with aluminum, the alloy number can most often be determined by consulting the owner/operator manual, service manual, dealer, distributor, or manufacturer of the item to be welded. Otherwise, seek the advise of someone who may have had previous experience with the same or similar welding application. Stainless steel wire is quite expensive, the trial-and-error method of alloy determination should be avoided if at all possible.

2. **Silicon-Bronze Wire Selection**
The most popular application for silicon-bronze MIG welding is non-structure sheetmetal welding, especially auto body work. A weld with silicon-bronze wire is very similar to that produced by oxygen-acetylene brazing. It is fairly flat and easy to grind smooth. Our recommended wire for this application is AWS classification number ERCuSi-A.

SELECT THE SPOOL SIZE

This welder will accept either 4" or 8" spools. Wire on a 4" spool will usually cost more per pound than that on an 8" spool. However, welding wire oxidizes over time, so it is important to select a spool size that will be used up within the times recommended below.

1. **STEEL WIRE** is usually coated with copper to prevent the wire from rusting and to enhance the transmission of welding current from the contact tip to the wire. It is recommended that copper-coated steel welding wire be bought in spool sizes that will be consumed in six months or less.
In the early stages of aging, the copper coating will begin oxidizing. The more time passes, the heavier the oxidization will get. To check the wire for copper oxidization, unspool about two feet of wire, pinch wire between thumb and forefinger, then pull thumb and forefinger down the length of wire. Look at thumb and forefinger; there will be a line created by the copper oxidization. A fairly fresh spool will leave a light gray line, whereas a well-oxidized spool will leave a darker line. Heavy copper oxidization will cause arc flutter and possibly wire drive slippage. If steel wire continues to oxidize, the steel wire under the copper coating will rust causing even worse arc flutter and drive problems.

2. **SELF-SHIELDING, FLUX-CORE, STEEL WIRE** spools should be selected based on the same guidelines as for steel wire.

3. **ALUMINUM WIRE** is even more of a potential storage problem than steel. It tends to oxidize much faster and the oxidation is much heavier. The early stages of oxidation are virtually invisible, but as time passes, a white powder will develop that will cause extreme arc flutter, wire drive problems, contamination build-up in the liner, wire burn-back into the contact tip, and a poor weld. Ideally it would be best to use up a spool of aluminum wire within three months.

4. **STAINLESS STEEL WIRE** oxidizes at a relatively slow rate and its oxidation is very light, so the care for handling and storing stainless steel wire is much less critical than for aluminum and steel wires. However, because stainless steel wire is quite expensive, it is still a good practice to follow the storage recommendations.

5. **SILICON-BRONZE WIRE** spools should be selected based on the same guidelines as for copper-coated steel wire.

Wire Spool Storage

The above recommended spool storage times are rules-of-thumb and can be impacted by many factors such as length of time in distribution prior to retail sale, warehouse conditions, time of year (ie: Humid months or dry months), and how packaged by the manufacturer.

Although these factors are out of your control, there are some things that you can do to slow down the oxidization process: store in a dry place when not in use; store in sealed plastic bag when not in use and leave unopened in the manufacturer's package until ready to use.

NOTE: If spool has developed heavy oxidation, the only solution to the problem is to discard the spool of wire. However, if you have an oxidized spool of wire, do not discard it until trying the following: unspool a few turns of wire to see if the wire further down on the spool is in usable condition, if not — discard the spool.

SELECT THE WIRE DIAMETER

1. **Steel and Stainless Steel Welding**

Base Metal Thickness	Wire Diameter
20 Gauge to 1/8" Gauge	.024" (.6mm)
18 Gauge to 1/8"	.030" (.8mm)

2. **Aluminum Welding**

Base Metal Thickness	Wire Diameter
1/16" to 1/8"	.030" (.8mm)

3. **Silicon-Bronze Wire Welding of Steel**
   To be used for welding non-structural sheetmetal to sheetmetal or non-structural sheetmetal to heavier steel. Use .030" (.8mm) diameter wire for these applications.

4. **Steel welding with Self-Shielding Flux-Core Wire**
   Your welder can use only .30 Flux-Core wire AWS #E71T-GS.

Base Metal Thickness	Wire Diameter
18 Gauge to 3/16"	.030" (.8 mm)

INSTALL THE WELDING WIRE

ELECTRIC SHOCK CAN KILL! Always turn the **POWER SWITCH** to its **OFF** position and unplug the welder's powercord from the AC power source before installing wire.

1. Remove the nozzle and contact tip from the end of the gun assembly.

2. Unscrew (turn counter-clockwise) the tension adjusting screw **ALL THE WAY.**

3. Make sure that the wire diameter stamped on the outside of the drive roller is the same as the diameter of the wire being installed. If it is not the same, change the drive roller as follows:

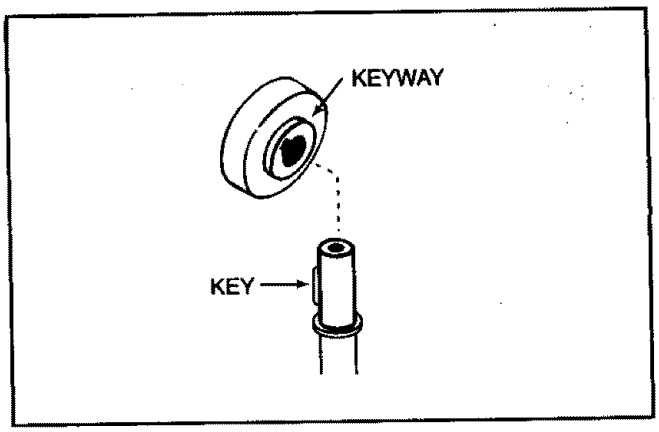
CHANGING THE DRIVE ROLLER

ELECTRIC SHOCK CAN KILL! Always turn the **POWER SWITCH** to its **OFF** position and unplug the welder's powercord from the AC power source before changing a drive roller.

a. Remove drive tension (see step #2 above).

b. If there is wire already installed in the welder, roll it back onto the wire spool by hand-turning the spool clockwise (to the right), but be careful not to allow the wire to come out of the rear end of the gun without holding onto it or it will unspool itself. Put the end of the wire into the hole on the outside edge of the spool and bend it over to hold the wire in place, then remove the spool of wire from the welder.

c. Remove the retaining screw and washer from the drive roller.

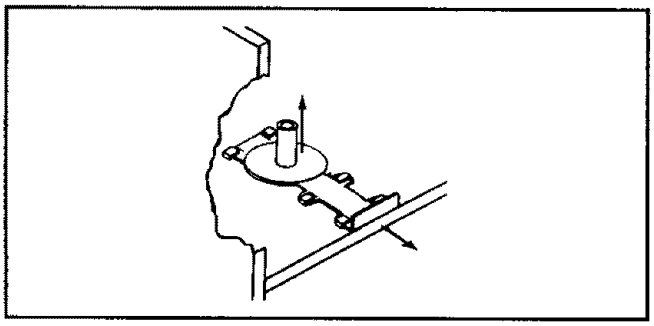


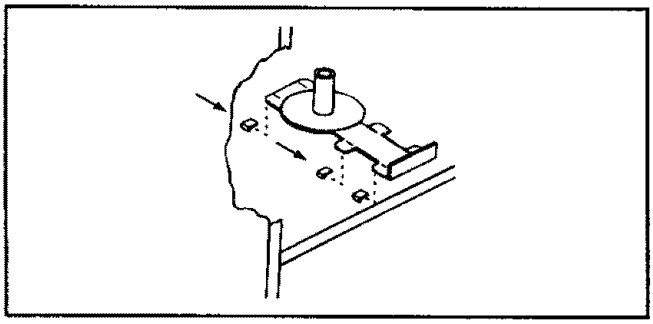
d. Remove the drive roller by pulling it straight out and off the drive motor shaft.

e. Find the side of the drive roller that is stamped with the same wire diameter as that of the wire being installed. Push the drive roller onto the drive motor shaft. Make sure the side stamped with the desired wire diameter is facing out. IMPORTANT! Make sure the key remains properly installed in its slot in the drive motor shaft.

f. Replace the drive roller retaining screw and washer, then tighten securely.

4. Remove the wire spool holder from the deck of the welder by pulling up lightly on the spindle while pulling firmly outward on the tab of the wire spool holder until it clears the hold-down tabs on the deck of the welder.



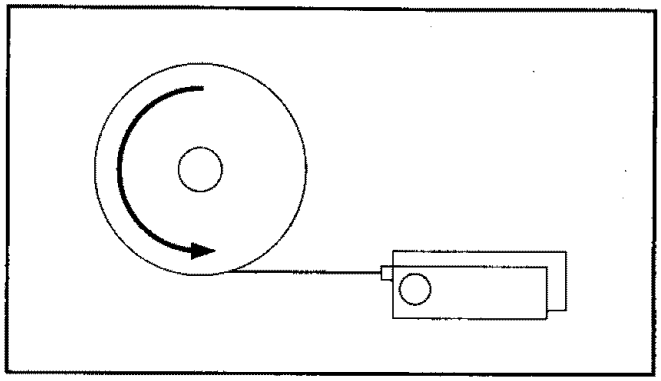


5. Turn wire spool holder over and insert the 1/4-20 x 2 3/4" hex head bolt through the hole that goes up through the spindle. Make sure that you push the hex head of the bolt all the way into the hex hole in the bottom of the wire spool holder.

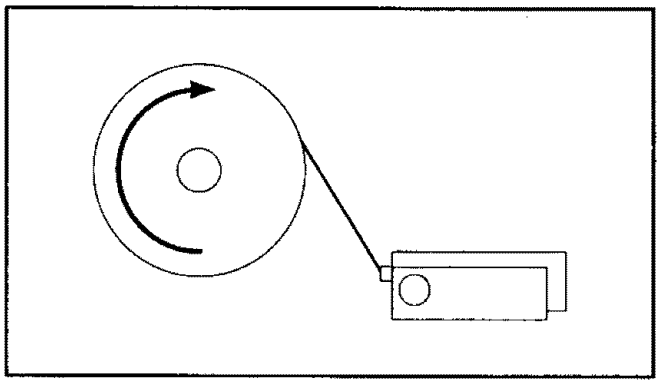
6. Reinstall the wire spool holder onto the welder making sure to push it all the way into the hold-down tabs.

7. Unwrap the spool of wire then find the leading end of the wire (it goes through a hole in the outer edge of the spool, and is bent over the spool edge to prevent the wire from unspooling), BUT DO NOT UNHOOK IT YET!

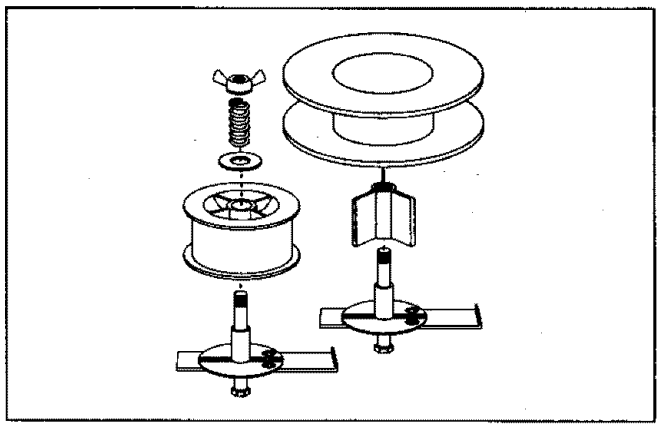
8. Place the spool on the spindle in such a manner that when the wire comes off the spool it will look like this:



not like this:



9. If you are installing a 4-inch spool of wire, install the drive brake hardware on top of the spool of wire according to the following illustration. However, if you are installing an 8-inch spool, install the spindle adaptor INSTEAD of the drive brake hardware and move on to step #11.



10. Adjust the drive brake tension. The purpose of the drive brake is to cause the spool of wire to stop turning at nearly the same moment that wire feeding stops.

a. With one hand, turn the wire spool and continue turning it while adjusting the tension.

b. With your free hand, tighten (turn clockwise) the wing-nut.

c. Stop tightening when drag is felt on the wire spool that you are turning, then stop hand turning the wire spool.

NOTE: If **TOO MUCH** tension is applied, the wire will slip on the drive roller or will not be able to be fed at all. If **TOO LITTLE** tension is applied, the spool of wire will want to unspool itself. Readjust the drive brake tenion as necessary to correct for either of these problems.

11. After checking to make sure that your welder is disconnected from the AC power source, free the leading-end of the wire from the spool, but do not let go of it until told to do so, or the wire will unspool itself.

12. Using a wire cutter, cut the bent end off the leading-end of the wire so that only a straight leading-end remains.

13. Hold the tension arm up off the drive roller and insert the leading-end of the wire into the inlet guide tube. Then push it across the drive roller and into the gun assembly about six inches.

14. Line the wire up in the outside groove of the drive roller, then allow the drive tension arm to drop onto the drive roller.

15. Tighten (turn clockwise) the tension adjusting screw until the tension roller is applying enough force on the wire to prevent it from slipping out of the drive assembly. **NOW YOU CAN LET GO OF THE WIRE.**

16. Plug the welder's powercord into the AC power source, turn the **POWER SWITCH** on the front of the welder to either **HIGH** or **LOW**, and set the **WIRE SPEED** control to the middle of the wire speed range.

17. Pull the trigger on the welding gun to feed the wire through the gun assembly.

ARC FLASH CAN INJURE EYES! To reduce the risk of arc flash, make certain that the welding wire, when it finally comes out of the endof the gun, does not touch the ground calmp or any grounded piece of metal. **IMPORATANT!** The welding wire is carrying welding current whenever the welder is turned on — **WHETHER THE TRIGGER IS PULLED OR NOT!**

18. When at least and inch of wire sticks out past the end of the gun, release the trigger.

19. Select a contact tip stamped with the same wire diameter as the diameter of the wire being used. If stamped in metric, use the cross-reference chart below.

U.S. Tip Size	Metric Tip Size
.024"	.6mm
.030"	.8mm
.035"	.9mm

20. Slide the contact tip over the wire (protruding from the end of the gun), thread it into the end of the gun, and hand tighten securely.

21. Install the nozzle on the end of the gun assembly, then coat the inside of the nozzle with anti-stick spray or gel (not supplied).

22. Cut off excess wire that extends past the end of the nozzle.

23. Set the wire drive tension.

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

a. Pull the trigger on the gun.

b. Turn the drive tension adjustment knob clockwise (to the right), increasing the drive tension until the wire seems to feed smoothly without slipping.

c. Block the end of the nozzle by holding it up against something that doesn't conduct electricity, such as a block of wood or a concreate floor, then trigger the gun again. The wire should slip at the drive roller. However, if the bird-nests at the drive roller, rethread the drive system using less drive tension and try again.

When set correctly, there should be no slippage between the wire and the drive roller under normal conditions, but if an obstruction occurs along the wire feed path, the wire should then slip on the drive roller.

INSTALLING ALUMINUM WIRE

Install aluminum wire the same as steel wire, but with the following exceptions.

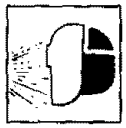
a. Select only .030" diameter wire of the 5356 aluminum alloy. Use a .035" contact tip, the composite rubber drive roller (Part # 4324), and teflon line (Part # 4325).

b. Be sure to adjust the drive tension properly. Aluminum wire is very sensitive to slight changes in drive tension.

PREPARING TO WELD

PREPARING A SAFE WELDING WORK AREA

ELECTRIC SHOCK CAN KILL!



ARC RAYS CAN INJURE EYES AND BURN SKIN!

FIRE OR EXPLOSION CAN CAUSE DEATH, INJURY, AND PROPERTY DAMAGE!

FUMES, GASSES, AND VAPORS CAN CAUSE DISCOMFORT, ILLNESS, AND DEATH!

IMPROPER HANDLING AND MAINTENANCE OF COMPRESSED GAS CYLINDERS AND REGULATORS CAN RESULT IN SERIOUS INJURY OR DEATH!

DO NOT PROCEED TO PREPARE TO WELD until you read and understand each of the five parts of the SAFETY INSTRUCTIONS section in this manual. The SAFETY INSTRUCTIONS will tell you how to **REDUCE THE RISKS OF DEATH, INJURY, ILLNESS, DISCOMFORT, AND PROPERTY DAMAGE** to you, the bystanders in the welding area, and property in the vicinity of the welding area from **SHOCK HAZARDS, FLASH HAZARDS, FIRE HAZARDS, FUME HAZARDS, AND COMPRESSED GASSES AND EQUIPMENT HAZARDS.**

An important factor in making a satisfactory weld is preparation. This includes the study of the welding process and equipment by the operator and then practicing on scrap material before actual welding jobs are attempted. An organized, well-lighted work area should be available to provide comfort, convenience, and safety to the operator and all bystanders in the welding area. It is a must that the welding work area be cleared of all flammables and that a type ABC chemical fire extinguisher is always close at hand.

READ The **SAFETY INSTRUCTIONS!** They will tell you how to properly prepare for welding by:

1. Preparing a safe welding work area.

2. Providing the necessary personal eye and skin protection for you and all bystanders in the welding area.

3. Providing adequate ventilation, or respiration equipment if necessary, to protect you and any bystanders in the welding area.

PREPARING THE WORK PIECE

Much of the success in producing a quality weld can be attributed to the preparation of the weld-joint area of the work piece.

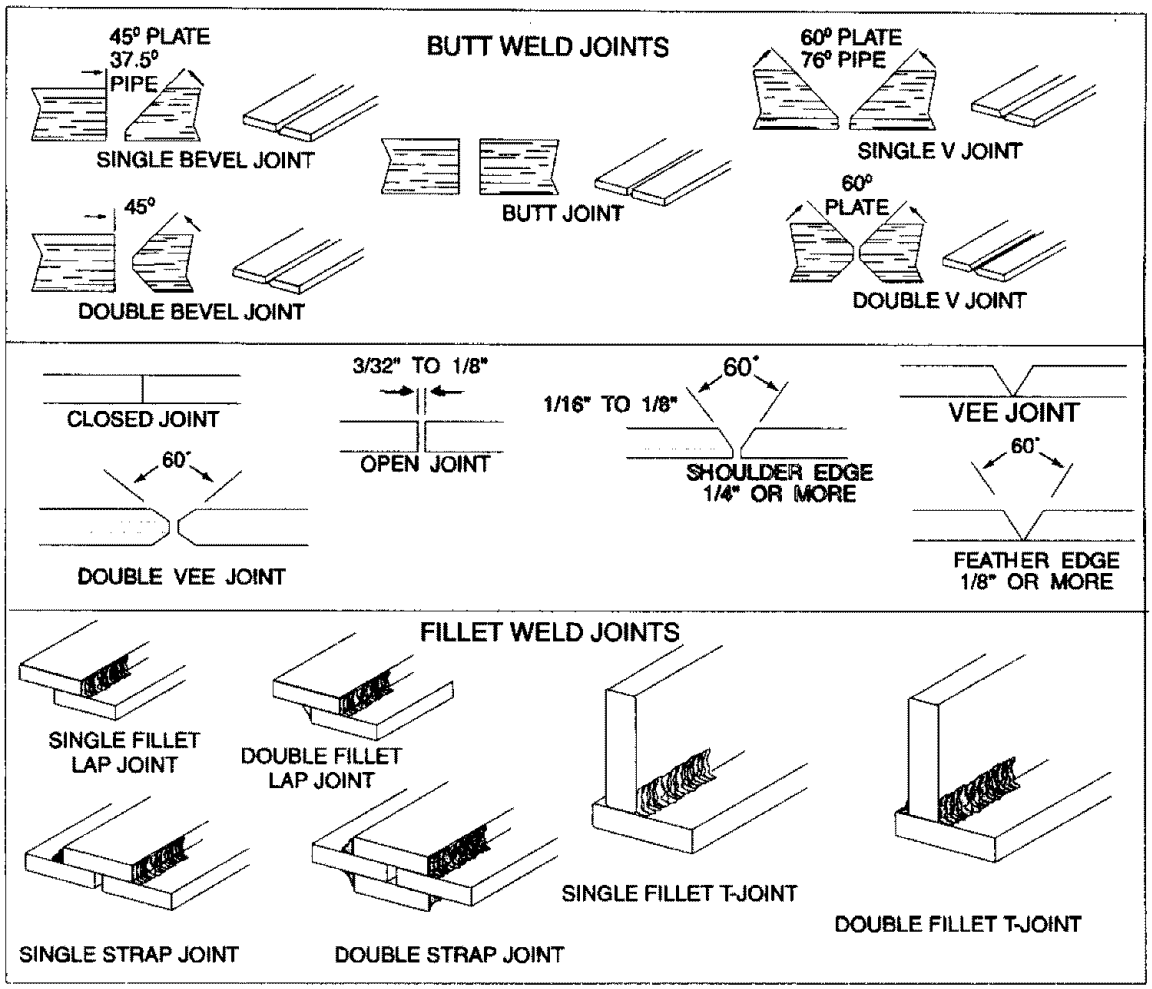
1. Clean the weld-joint area of dirt, rust, scale, oil, and/or paint. Failure to do so may result in a porous, brittle weld.

2. Select a type of joint appropriate for your application. The more popular types of welding joints are illustrated in the TYPES OF JOINTS chart at the end of this section.

NOTE: If you select a BUTT WELD JOINT, you may have to prepare the edges of the metal to be joined by grinding a bevel on the edges.

GRINDING METAL CAN INJURE EYES! To reduce the risk of eye injury, ALWAYS wear goggles and inspect the grinder to verify that it is in good condition before using.

During the welding process, the work pieces will become hot and tend to expand causing the pieces to shift from their initial position. If possible, it is best if the work pieces can be securely clamped (before welding) into the position desired after welding is completed.



ALUMINUM WELDING PREPARATION

1. A clean weld-joint area is a must in obtaining a quality aluminum weld. Remove dirt and oxidation with a stainless steel bristled wire brush and any oil or grease with a good chemical aluminum cleaner.

2. Aluminum is often anodized to prevent it from oxidizing. However, and anodized surface will NOT conduct electricity. Therefore, to weld anodized aluminum, you must sand or grind the anodized coating from the weld joint area and from the site where the ground clamp will be connected.

To determine if the aluminum you intend to weld is anodized, simply touch the two probes of an electrical continuity test light or ohmmeter to the aluminum in question. The probes should be an inch or two apart. If there is no indication of electrical continuity, the aluminum IS anodized.

CONNECT WELDER GROUND

Attach the ground clamp to the work piece making sure that the work piece is cleaned of dirt, oil, rust, scale, oxidation, and paint at the point of connection.

It is best to connect the ground clamp directly to the work piece and as close to the weld as possible. If it is impractical to connect the ground clamp directly to the work piece, connect it to metal that is securely attached to the work piece, but not electrically insulated from it. Also, make sure this other metal is of about the same or greater thickness than that of the work piece.

RISK OF ELECTRONIC COMPONENT DAMAGE! If the ground clamp is being connected to an automobile or other equipment with on-board computer systems, solid state electronic controls, solid state sound systems, etc., DO NOT WELD until disconnecting the cable from the battery that is attached to chassis ground. Failure to do so may result in **ELECTRONIC COMPONENT DAMAGE!**

OPERATION

GETTING TO KNOW YOUR NEW WELDER

Whether you have welded before or not, it is important that you become familiar with your new welder, its controls, and the results achieved at different settings. We strongly recommend that you practice with your new welder on scrap metal trying different heat settings, base metal thicknesses, and welding positions for each type and size of wire that you will be using. By doing this you will gain a feel for how changes in these welding variables affect the weld.

Of course, if you have not MIG welded before, you will need to develop welding skills and techniques as well. The self-taught welder learns through a process of trial and error. The best way to teach yourself how to weld is with short periods of practice at regular intervals.

DO NOT ATTEMPT TO WELD on any valuable equipment until you have made practice welds on scrap metal that can be discarded. The scrap metal should be of the same type and thickness as that of the item to be welded. Only after you are satisfied that your practice welds are of good strength and appearance, should you attempt your actual welding job.

SETTING THE CONTROLS

1. The **POWER SWITCH** has three settings: LOW, OFF, and HIGH. When in the OFF position, power is disconnected from all welder functions. The LOW position is selected for welding steel thicknesses of 16 gauge or thinner. The HIGH position is selected for steel thicker than 16 gauge. The variables that affect the heat selector setting are wire type and size, base metal type and thickness, and desired penetration.

2. The **WIRE SPEED CONTROL** is variable from SLOW to FAST. To achieve successful welding results, it is important that the wire be fed at the same rate it is being melted off into the weld puddle; if too fast the wire will tend to push the gun away from the work piece and if too slow, the wire will burn back into, and may damage the contact tip. In either case, an extremely poor weld will result.

"TUNING IN" THE WIRE SPEED is one of the most important parts of MIG welder operation and must be done before starting each welding job or whenever any of the following variables are changed: heat setting, wire diameter, or wire type.

a. Set up and ground a scrap piece of the same type of metal that you will be welding. It should be equal to or greater than the thickness of the actual work piece and free of paint, oil, rust, etc.

b. Select a heat setting.

c. Hold the gun in one hand allowing the nozzle to rest on the edge of the work piece farthest away from you and at an angle similar to that which will be used when actually welding.

d. With your free hand, turn the WIRE SPEED control to maximum and continue to hold onto the knob.

ARC RAYS CAN INJURE EYES AND BURN SKIN! To reduce risk of injury from arc rays, never strike a welding arc until you and all bystanders in the welding area have welding helmets or shields in place and are wearing the recommended protective clothing. DO NOT CONTINUE unless you have read, understand, and intend to follow the entire SAFETY INSTRUCTIONS section of this manual.

e. Lower your welding helmet and pull the trigger on the gun to start an arc, then begin to drag the gun toward you while turning down on the WIRE SPEED control knob at the same time.

f. **LISTEN!** As you decrease the wire speed, the sound that the arc makes will change from a sputtering to a smooth, high-pitched buzzing sound and then will begin sputtering again if you decrease the wire speed too far.

Selecting the best wire speed setting is much the same as "tuning in" a radio: continue decreasing the wire speed until the arc noise passes the best-sounding, high-pitched buzz and begins to sputter again, then turn the WIRE SPEED control the opposite direction until you come back to the best sounding arc noise. The welder is now "tuned in" and welding can begin.

REPEAT THIS TUNE-IN PROCEDURE if you select a new heat setting, a different diameter wire, or a different type wire.

NOTE: When "tuning-in" the wire speed for self-shielding flux-core wire, you will find a very wide "best-sounding range", spanning as much as 60 degrees on the WIRE SPEED control. It is important to know that the heat of the arc and penetration into the base metal increases as the wire speed is increased within the "best-sounding range" for a given heat setting.

Therefore, you can use the wire speed control to slightly increase or decrease heat and penetration for a given heat setting by selecting higher or lower wire speed settings WITHIN the "best-sounding range".

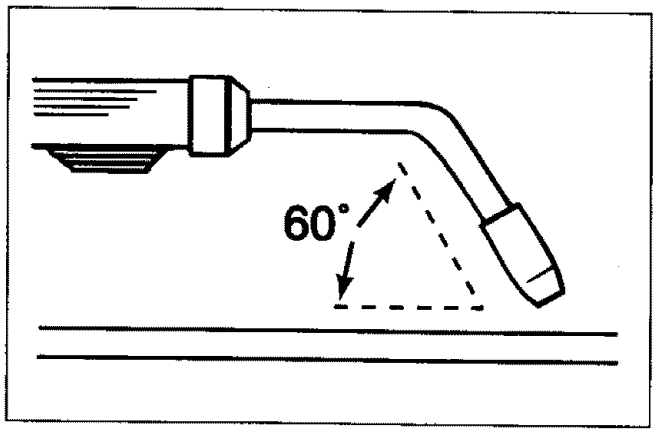
HOLDING THE GUN

The best way to hold the welding gun is the way that feels most comfortable to you. While practicing to use your new welder, experiment holding the gun in different positions until you find the one that seems to work best for you.

Position of the Gun to the Work Piece

There are two angles of the gun nozzle in relation to the work piece that must be considered when welding.

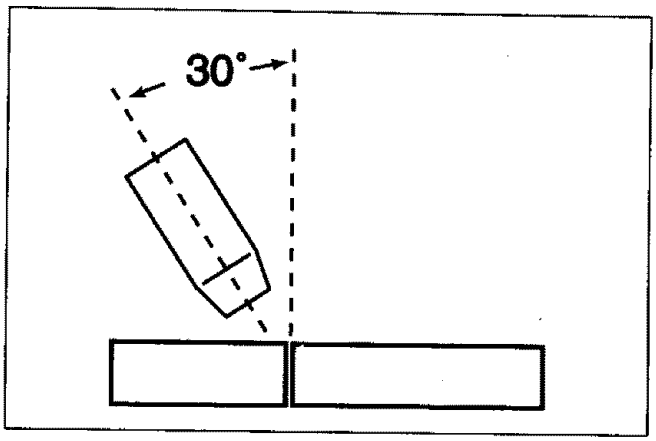
1. Angle "A" can be varied, but in most cases the optimum angle will be 60 degrees; the point at which the gun handle is parallel to the work piece. If angle "A" is increased, penetration will increase. If it is decreased, so will penetration.



2. Angle "B" can be varied for two reasons: to improve the ability to see the arc in relation to the weld puddle and to direct the force of the arc.

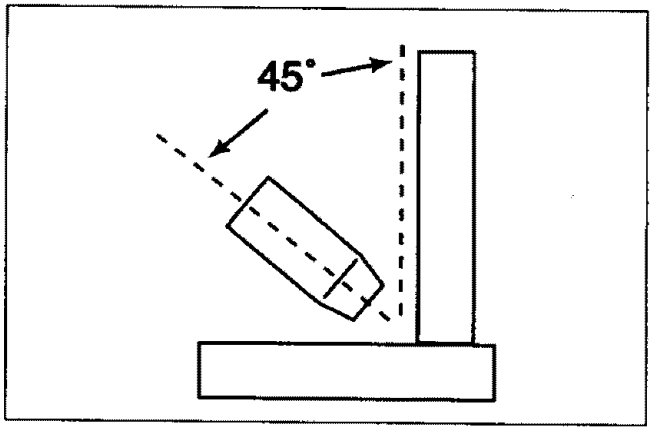
The force of the welding arc follows a straight line out the end of the nozzle. If angle "B" is changed, so will the direction of the arc force and the point at which penetration will be concentrated.

On a butt weld joint, the only reason to vary angle "B" from being perpendicular (straight up) to the work piece would be to improve visibility of the weld puddle. In this case, angle "B" can be varied anywhere from zero to 45 degrees with 30 degrees working about the best.



Angle A

On a fillet weld joint the nozzle is generally positioned in such a manner so as to "split" the angle between the horizontal and vertical members of the weld joint. In most cases, a fillet weld joint is a 90 degree angle so angle "B" will most often be 45 degrees.



Angle B

Distance from the Work Piece

The end of the welding gun is designed with the contact tip recessed from the end of the nozzle and the nozzle electrically insulated from the rest of the gun. This permits the operator to actually rest the nozzle on and drag it along the work piece while welding. This can be very helpful to beginning welders to steady the gun, allowing the welder to concentrate on welding technique. If the nozzle is held off the work piece, the distance between the nozzle and the work piece should be kept constant and should not exceed 1/4" or the arc may begin sputtering, signaling a loss in welding performance.

LAYING A BEAD

ARC RAYS CAN INJURE EYES AND BURN SKIN! To reduce the risk of injury from arc rays, never start a welding arc until you and all bystanders in the welding area have welding helmets or shields in place and are wearing the recommended protective clothing. **DO NOT CONTINUE** unless you have read, understand, and intend to follow the entire SAFETY INSTRUCTIONS section of this manual.

IMPORTANT! The wire in this welder is always electrically energized whenever the switch is not in the OFF position, and will arc whenever brought into contact with any electrically conductive materials that the ground clamp of the welder is connected to or in contact with.

Therefore, it is best to clip the wire back to the contact tip so that you don't create an arc when lining up on the seam to be welded.

Once you have the gun in position with the wire lined up on the weld joint, lower your helmet, pull the trigger and the arc will start. In a second or two, you will notice a weld puddle form and the base of a bead beginning to build. It is now time to begin to travel with the gun. If you are just learning to weld, travel by simply dragging the gun in a straight line and at a steady speed along the weld joint. Try to achieve a weld with the desired penetration and a bead that is fairly flat and consistant in width.

CLEANING THE WELD BEAD

When using solid wire and shielding gas, cleaning of the weld bead is not normally necessary. However, when welding with self-shielding flux-core wire, slag is deposited on the top of the weld bead. This slag consists of the flux from the welding wire as well as any impurities the flux was able to remove from the molten weld puddle.

This slag must be cleaned from the weld bead both for cosmetic reasons and to visually inspect the finished weld bead. Cleaning the weld bead is done best with a chipping hammer followed by a wire brush.

Slag must also be cleaned from a weld bead that was stopped in the middle and now will be restarted from the point at which it was stopped. A poor weld will result when a weld bead is started or laid on a weld bead that has not been cleaned of slag.

CHIPPING AND BRUSHING SLAG CAN INJURE EYES! To reduce the risk of eye injury from flying slag, always have eye protection such as goggles, in place prior to chipping slag.

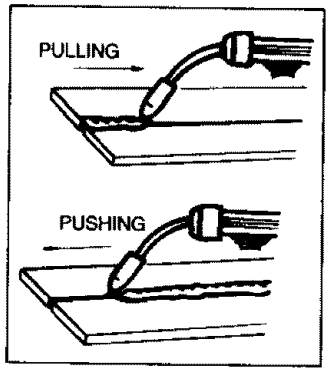
WELDING TECHNIQUES

As you become more familiar with your new welder and better at laying some simple weld beads, you can begin to try some different welding techniques to improve and add versatility to your welding skills.

TRAVELING WITH THE GUN

Gun travel refers to the movement of the gun along the weld joint and is broken into two elements: Direction and Speed. A solid weld bead requires that the welding gun be moved steadily and at the right speed along the weld joint. Moving the gun too fast, too slow, or irratically will prevent proper fusion or create a lumpy, uneven bead.

1. **TRAVEL DIRECTION** is the direction the gun is moved along the weld joint in relation to the weld puddle. The gun is either **PUSHED** into the weld puddle or **PULLED** away from the weld puddle.



For most welding jobs you will "pull" the gun along the weld joint to take advantage of the greater weld puddle visability. However, there are a few applications where "pushing" the gun may provide some advantages:

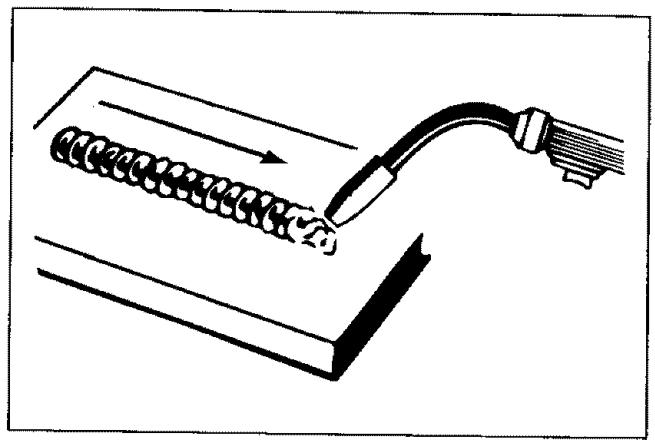
VERTICAL WELDING can be done by starting at the top of a weld joint and "pulling" the gun down toward the bottom. However, in the event that puddle control becomes difficult (such as the puddle wanting to "run" downward), starting a vertical weld at the bottom of a weld joint and "pushing" the gun up toward the top will help to overcome this problem.

ALUMINUM WELDING can be done using either direction of gun travel, but "pushing" will leave a weld that is cleaner in appearance. "Pulling" the gun will leave a sooty weld since the finished weld is always being blasted by the arc and the impurities coming out of the weld puddle. This problem affects the weld appearance only and the weld can be cleaned up with a stainless steel bristled wire brush.

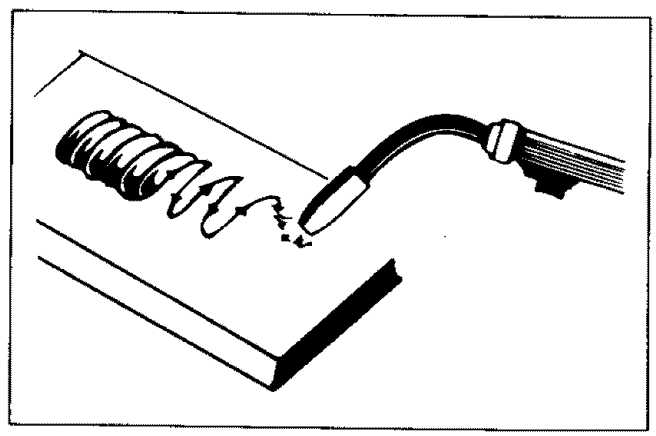
2. **TRAVEL SPEED** is the rate at which the gun is being "pushed" or "pulled" along the weld joint. For a fixed heat setting, the faster the travel speed, the lower the penetration and the lower and narrower the finished weld bead. Likewise, the slower the travel speed, the deeper the penetration and the higher and wider the finished weld bead.

TYPES OF WELD BEADS

1. The **STRINGER BEAD** is formed by traveling with the gun in a straight line while keeping the wire and nozzle centered over the weld joint. This is the easiest type of bead to make and is the type you have been using up to this point.



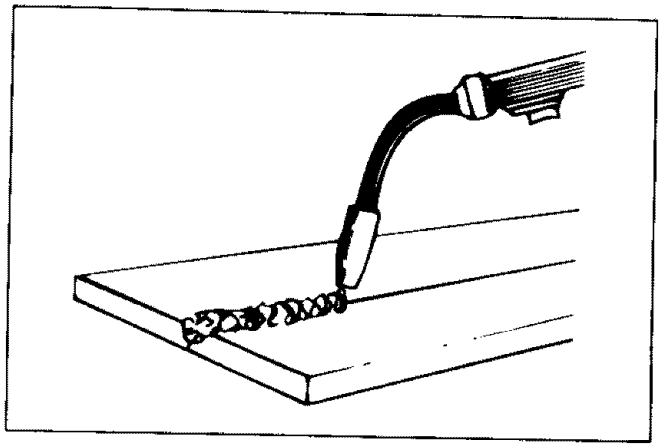
2. The **WEAVE BEAD** is used when you want to deposit metal over a wider space than would be possible with a stringer bead. It is made by weaving from side to side while traveling with the gun. It is best to hesitate momentarily at each side before weaving back the other way.



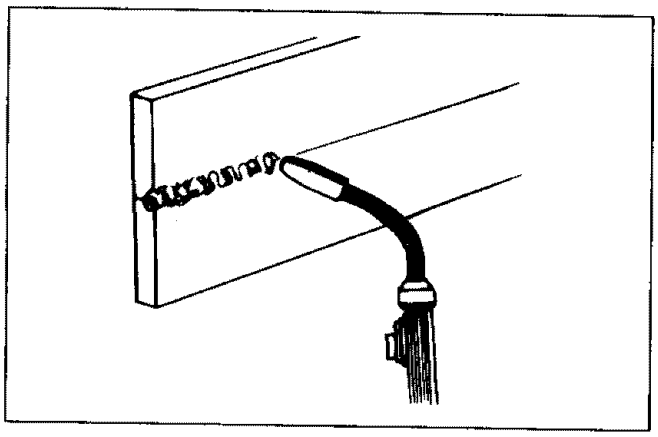
WELDING POSITIONS

There are four basic welding positions: flat, horizontal, vertical, and overhead.

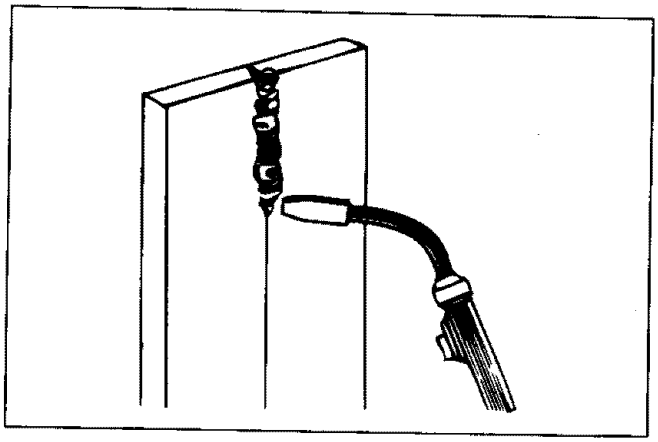
1. The **FLAT POSITION** is the easiest of the welding positions and is probably the one you have been using thus far. It is best if you can weld in the flat position if at all possible as good results are easier to achieve.



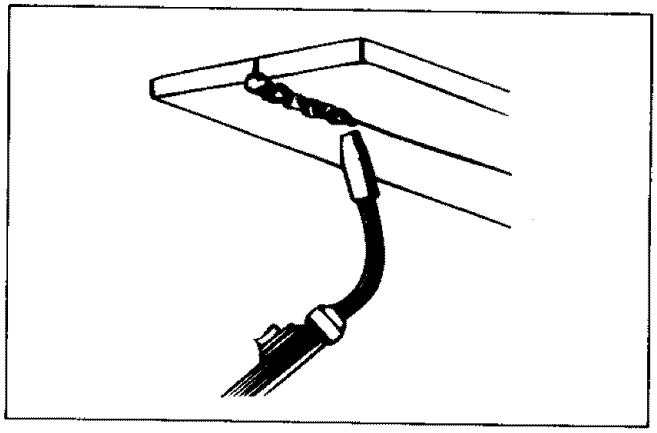
2. The **HORIZONTAL POSITION** is next in difficulty level. It is performed very much the same as the flat weld except that angle "B" (see POSITION OF THE GUN TO THE WORK PIECE above) is such that the wire, and therefore the arc force, is directed more toward the metal above the weld joint. This is to help prevent the weld puddle from "running" downward while still allowing slow enough travel speed to achieve good penetration. A good starting point for angle "B" is about 30 degrees DOWN from being perpendicular to the work piece.



3. The **VERTICAL POSITION** is the next most difficult position. "Pulling" the gun from top to bottom may be easier for many people, but in some instances it can be difficult to prevent the puddle from "running" downward. "Pushing" the gun from bottom to top may provide better puddle control and allow slower rates of travel speed to achieve deeper penetration. When vertical welding, angle"B" (see POSITION OF GUN TO THE WORK PIECE above) is usually always kept at zero, but angle "A" will generally range from 45 to 60 degrees to provide better puddle control.



4. The **OVERHEAD POSITION** is the most difficult welding position because gravity is pulling at the weld puddle trying to make it drip off the work piece. Angle "A" (see POSITION OF THE GUN TO THE WORK PIECE above) should be maintained at 60 degrees, the same as in the flat position. Maintaining this angle will reduce the chances of molten metal falling into the nozzle should it drip from the weld puddle. Angle "B" should be held at zero degrees so that the wire is aiming directly into the weld joint. If you experience excessive dripping of the weld puddle, select a lower heat setting. Also, the weave bead tends to work better than the stringer bead when welding overhead.



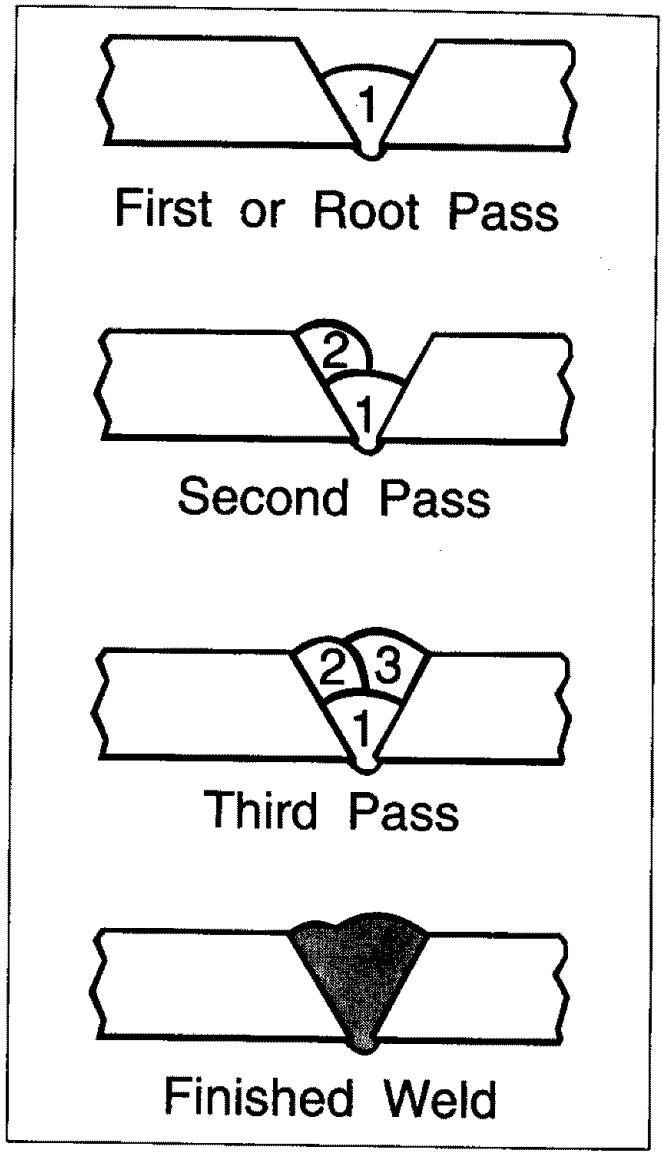
MULTIPLE PASS WELDING

1. Butt Weld Joints

In PREPARING THE WORK PIECE, we discussed the need for edge preparation on thicker materials by grinding a bevel on the edge of one or both pieces of the metal being joined. When this is done, a "V" is created, between the two pieces of metal, that will have to be welded closed. In most cases more than one "pass" or bead will need to be layed into the joint to close the "V". Laying more than one bead into the same weld joint is known as a "multiple-pass" weld.

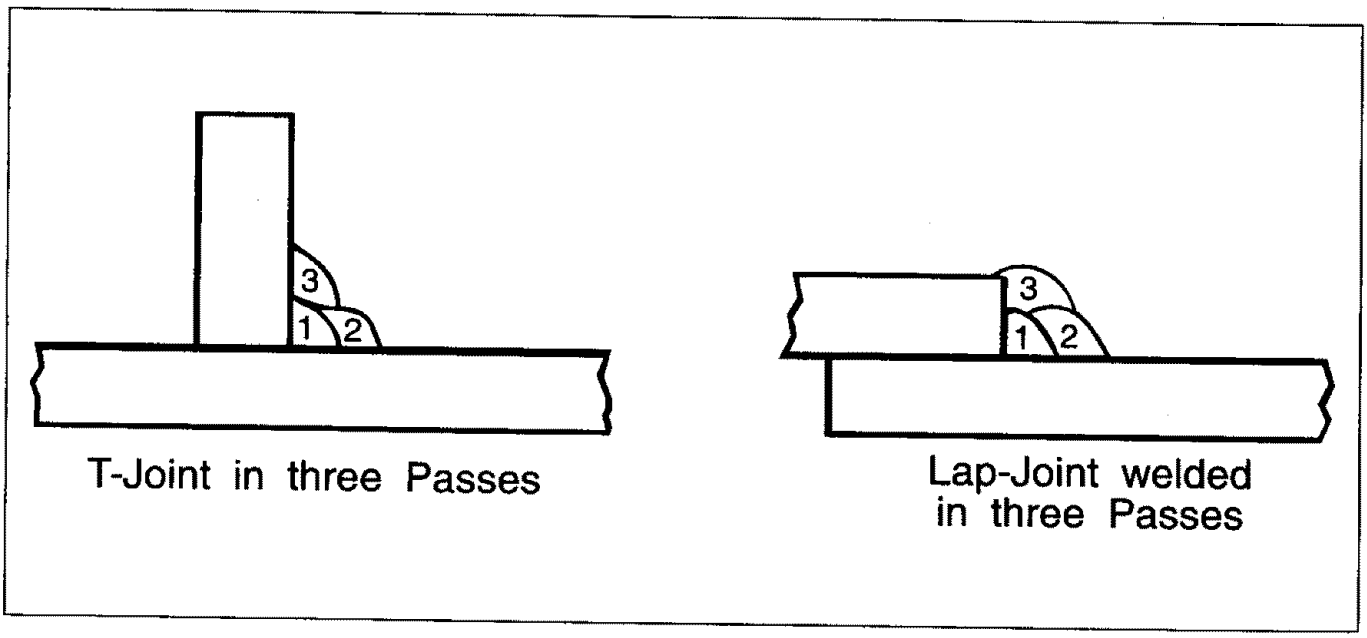
The illustrations, on this page, show the sequence for laying multiple pass beads into a single "v" butt joint.

NOTE: WHEN USING SELF-SHIELDING FLUX-CORE WIRE it is very important to thoroughly chip and brush the slag off each completed weld bead before making another pass or the next pass will be of poor quality.



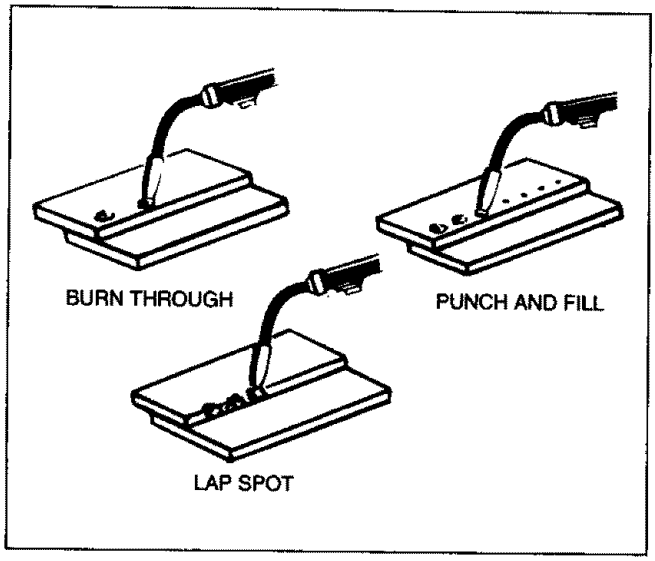
2. Fillet Weld Joints

Most fillet weld joints, on metals of moderate to heavy thickness, will require multiple pass welds to produce a strong joint. The illustrations below show the sequence of laying multiple pass beads into a "T" fillet joint and a lap fillet joint.



SPECIAL WELDING METHODS

SPOT WELDING



The purpose of a spot weld is to join pieces of metal together with a "spot" of weld instead of a continuous weld bead. There are three methods of spot welding: Burn-Through, Punch and Fill, and Lap. Each has advantages and disadvantages depending on the specific application as well as personal preferance.

1. The **BURN-THROUGH METHOD** welds two overlapped pieces of metal together by burning through the top piece and into the bottom piece.

With the burn-through method, larger wire diameters tend to work better than smaller diameters because they have greater current carrying capacities allowing the arc to burn through very quickly while leaving a minimal amount of filler metal build up. .030" diameter solid wire or .035" self-shielding flux-core wire tend to work the best.

.024" diameter solid and .030" self-shielding flux-core wires should not be used with the burn-through method unless the metal is VERY thin or excessive filler metal build-up and minimal penetration is acceptable.

Always select the HIGH heat setting with the burn-through method and "tune-in" the wire speed prior to making a spot weld.

2. The **PUNCH AND FILL METHOD** produces a weld with the most "finished" appearance of the three spot weld methods. In this method, a hole is punched or drilled into the top piece of metal and the arc is directed through this hole to penetrate into the bottom piece. The puddle is allowed to fill up the hole leaving a spot weld that is smooth and flush with the surface of the top piece.

Select the wire diameter, heat setting, and "tune-in" the wire speed as if you were welding the same thickness material with a continuous bead.

3. The **LAP SPOT METHOD** directs the welding arc to penetrate the bottom and top pieces, at the same time, right along each side of the lap joint seam.

Select the wire diameter, heat setting, and "tune-in" the wire speed as if you were welding the same thickness material with a continuous bead.

SPOT WELDING INSTRUCTIONS

1. Select the wire diameter and heat setting recommended above for the method of spot welding you intend to use.

2. Tune in the wire speed as if you were going to make a continuous weld.

3. Hold the nozzle piece completely perpendicular to and about 1/4" off the work piece.

4. Pull the trigger on the gun and release it when it appears that the desired penetration has been achieved.

5. Make practice spot welds on scrap metal, varying the length of time you hold the trigger, until a desired spot weld is made.

6. Make spot welds on the actual work piece at desired locations.

MAINTENANCE AND TROUBLESHOOTING

GENERAL MAINTENANCE

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

1. Keep the wire drive compartment lid closed at all times unless the wire needs to be changed or the drive tension needs adjusting.

2. Keep all consumables (contact tips, nozzles, and gun liner) clean and replace when necessary. See CONSUMABLE MAINTENANCE AND TROUBLESHOOTING later in this section for detailed information.

3. Replace powercord, ground cable, ground clamp, or gun assembly when damaged or worn.

4. Periodically clean dust, dirt, grease, etc. from your welder. Every six months or as necessary, remove the side panels from the welder and air-blow any dust and dirt that may have accumulated inside the welder.

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

CONSUMABLE MAINTENANCE AND TROUBLESHOOTING

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

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

TO REPLACE A GUN LINER:

When removing or installing a gun liner, care must be taken not to kink or otherwise damage it or replacement will be necessary.

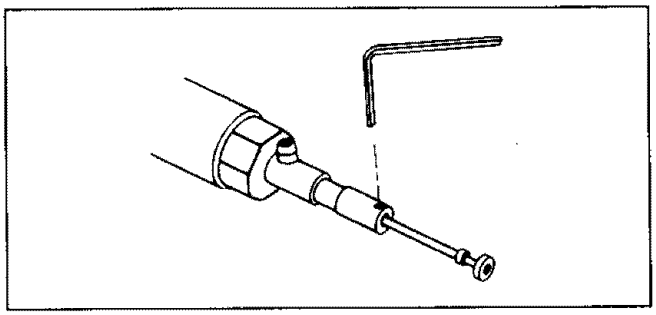
a. Turn POWER SWITCH to the OFF position.

b. Remove wire from gun assembly and gun assembly from welder.

c. Remove nozzle and contact tip from gun

d. Loosen set screw holding liner collet in place at rear of gun.

e. Lay gun assembly out in a straight line.



f. Holding rear of gun assembly, grasp liner collet and pull liner out of gun assembly.

g. Insert new liner into gun assembly and push all the way through being careful not to kink the liner. The excess liner will protrude from the end of the gun.

h. With the gun assembly lying in a straight line, mark the liner at the end of the gun's gas diffuser.

i. Hold the gun handle firmly in place, then gently pull outward on the excess liner so that the mark you made is about 1/8" out past the end of the gas diffuser.

j. Using a wire cutter, cut the liner at the end of the gas diffuser so that the liner ends up recessed into the gas diffuser about 1/8", then use a file to remove any burrs on the liner where the cut was made.

k. Tighten the set screw, but **DO NOT OVER TIGHTEN** or damage to the collet may result.

l. Reinstall gun assembly into welder (see INSTALL WELDING GUN ASSEMBLY in the ASSEMBLY AND INSTALLATION section).

2. The **CONTACT TIP's** purpose is to transfer welding current to the welding wire while allowing the wire to pass through it smoothly.

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

   b. If the wire burns back into the tip, remove the tip from the gun and clean the hole running through it with an oxygen-acetylene torch tip cleaner. This is especially important to do after an aluminum wire burn-back.

   c. Over time, the hole in the contact tip will become worn by the wire passing through it. The more worn this hole becomes, the less efficient is the transfer of welding current to the wire and eventually arc breakage and difficult arc starting will result. Replace contact tips when signs of wear become apparent.

3. The **NOZZLE** prevents the electrically "hot" contact tip from contacting the work piece.

KEEP THE NOZZLE CLEAN! During the welding process, spatter and slag will build up inside the nozzle and must be cleaned out periodically.

   a. Always coat the inside of a new or freshly cleaned nozzle with anti-stick spray or gel.

   b. Stop welding and clean any accumulated slag or spatter from the nozzle every 5 to 10 minutes of welding time.

   c. When welding overhead, if any molten metal drips from the weld puddle and falls into the nozzle, **STOP WELDING IMMEDIATELY** and clean the nozzle.

   d. If the slag cannot be thoroughly cleaned from the nozzle, **REPLACE THE NOZZLE!**

Failure to keep the nozzle adequately cleaned can result in a SHORTED NOZZLE which results when spatter build-up bridges the insulation in the nozzle allowing welding current to flow through it as well as the contact tip. When shorted, a nozzle will steal welding current from the wire whenever it contacts the grounded work piece. This causes erratic welds and reduced penetration. In addition, a shorted nozzle overheats the end of the gun which can DAMAGE the gas diffuser and/or conductor tube.

TESTING FOR A SHORTED NOZZLE

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

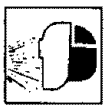
With the welder unplugged from the AC power source, touch the probes of an ohmmeter or continuity tester to the end of the contact tip and the outside of the nozzle. If there is any continuity at all, the nozzle IS shorted. Clean or replace as needed.

TROUBLESHOOTING

The following TROUBLESHOOTING section is provided as a guide to help resolve some of the more common problems that could be encountered. Should you or qualified repair personnel be unable to resolve a problem or determine which of the possible solutions will remedy a specific problem, contact MIG WELDER SERVICE for over-the-phone diagnostic assistance at: (800)-328-2921. In Minnesota call: (612) 884-3211.

BEFORE CALLING MIG WELDER SERVICE, have the welder unplugged from the AC power source, the side panels removed, and the telephone as near to the welder as possible.

 **ELECTRIC SHOCK CAN KILL!**

 **ARC RAYS CAN INJURE EYES AND BURN SKIN!**

 **FIRE OR EXPLOSION CAN CAUSE DEATH, INJURY, AND PROPERTY DAMAGE!**

 **FUMES, GASSES, AND VAPORS CAN CAUSE DISCOMFORT, ILLNESS, AND DEATH!**

IMPROPER HANDLING AND MAINTENANCE OF COMPRESSED GAS CYLINDERS AND REGULATORS CAN RESULT IN SERIOUS INJURY OR DEATH!

DO NOT ATTEMPT TO TROUBLESHOOT THIS WELDER unless you have read, understand, and intend to follow all five parts of the SAFETY INSTRUCTIONS section of this welder.

DISCONNECT THE WELDER FROM THE AC POWER SOURCE BEFORE ATTEMPTING ANY INSPECTION OR WORK ON THE INSIDE OF THE WELDER.

In the following TROUBLESHOOTING table, a POSSIBLE CAUSE, listed for certain problems, is INSUFFICIENT SHIELDING GAS COVERAGE. This "cause" itself can be the result of many different causes. Below, and preceeding the TROUBLESHOOTING table, is a table listing the causes and solutions for insufficient shielding gas coverage. All of these causes have one or more of the following symptoms: a weld that is dirty, porous, brittle, and/or non-penetrating.

BASIC TROUBLESHOOTING GUIDE

SYMPTOM	POSSIBLE CAUSE	REMEDY
DIRTY, POROUS, BRITTLE WELD	Gas cylinder valve turned off	Open gas valve
	Gas cylinder empty or near empty	Replace gas cylinder
	Loose gas supply-line fittings	Tighten fitting
	Gas supply hose leaking	Replace hose
	Plugged welding nozzle or gas diffuser	Clean or replace nozzle or clean gas diffuser
	Frozen regulator/flowmeter	Thaw regulator/flowmeter and change gas from CO2 to a mix (see selecting shielding gas)
	Broken or defective regulator/flowmeter	Have repaired or replace
	Wrong polarity	Change polarity

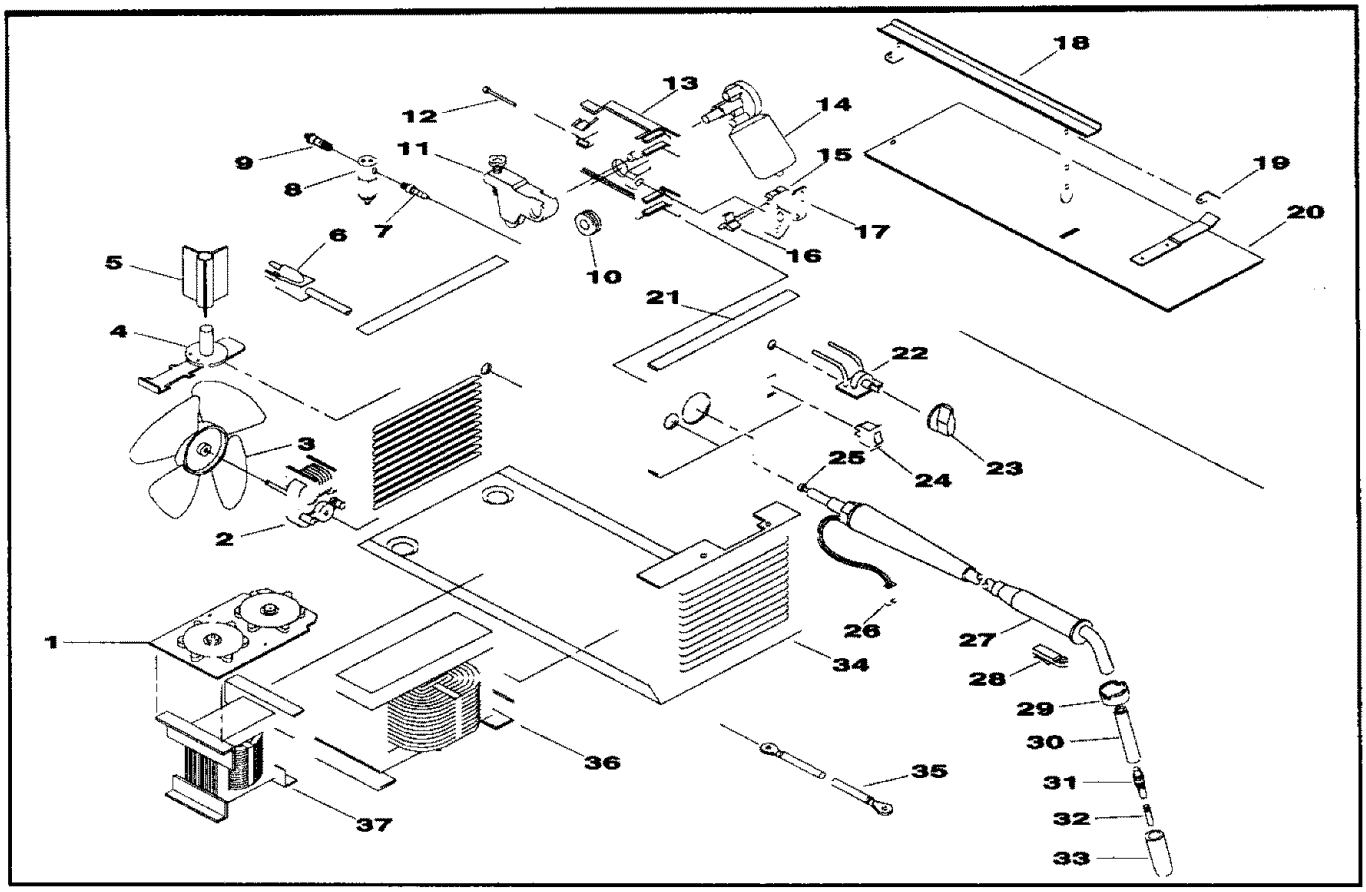
DIRTY, POROUS, BRITTLE WELD	Gas flow rate too low	Increase flow rate from regulator/flowmeter
	Wind or draft blowing gas away from weld puddle	Try Increasing flow rate or set up wind break
	Wrong type of gas	See select shielding gas
WIRE FEED AND GAS WORKS, BUT NO ARC	Bad ground or loose connection	Check ground or tighten all connections
	Bad connection to gun or faulty gun	Check connection to gun or replace gun
GAS AND ARC WORK BUT NOT WIRE FEED	Faulty wire speed circuit board/potentiometer	Replace wire speed circuit board/potentiometer
	No tension on driver roller	Adjust drive tension
	Faulty drive motor (extremely rare)	Replace drive motor
WIRE FEED AND ARC BUT NO GAS	Faulty solenoid switch	Replace solenoid switch
	Faulty regulator/flowmeter	Have repaired or replace regulator/flowmeter
	Gas bottle empty	Replace gas bottle
	Clogged nozzle or gas diffuser	Clean or replace as needed
NOTHING WORKS BUT FAN IS ON	Faulty trigger on gun	Replace trigger

NOTHING WORKS BUT FAN IS ON	Exceeded duty cycle; thermal protector opened circuit	Allow welder to cool at least 10 minutes with fan running (observe duty cycle)
	Faulty rectifier	Replace rectifier
	Faulty transformer (extremely rare)	Replace transformer
LOW OUTPUT OR NON-PENETRATING WELD	Loose connection inside the machine	Blow inside of machine out with compressed air clean and tighten all connections
	Too long or improper extension cord	See manual under extension cord use
	Wrong type or size of wire	Check manual for proper wire size or type
	Wrong type of gas or no gas	Check manual and change gas
	Poor ground connection	Reposition clamp and check cable to clamp connection
	Wrong polarity	Change polarity
	Wrong size contact tip	Use proper size tip
	Loose gun connection or faulty gun assembly	Tighten gun connection or replace gun
WIRE "BIRDNESTING" AT DRIVE ROLLER	Too much tension on drive roller	Adjust drive tension (see manual)
	Gun assembly not completely seated into drive assembly	See gun assembly instruction in manual

WIRE "BIRDNESTING" AT DRIVE ROLLER	Gun liner worn or damaged	Replace liner
	Contact tip is clogged or damaged	Replace contact tip
	Liner stretched or too long	Trim liner to proper length
	Using aluminum wire with a steel liner	Replace liner with teflon liner (Part # 4325)
	Using aluminum wire with a steel drive roller	Replace drive roller with a rubber drive roller (Part # 4324)
WIRE BURNS BACK TO CONTACT TIP	Gun liner worn or damaged	Replace liner
	Liner stretched or too long	Trim liner to proper length
	Wrong size contact tip	Use correct size contact tip
	Contact tip clogged or damaged	Replace contact tip
	Using aluminum wire with a steel liner	Replace liner with teflon liner (Part # 4325)
	Using aluminum wire with a steel drive roller	Replace drive roller with a rubber drive roller (Part # 4324)
	Problems feeding aluminum wire	See installing aluminum wire in manual
CONSTANT GAS FLOW	Faulty solenoid or debris in solenoid	Replace solenoid

FAN MOTOR DOES NOT RUN	Loose connection or faulty motor	Check connections and replace fan motor if needed
GROUND CLAMP AND/OR CABLE GETS HOT	Bad connection from cable to clamp	Tighten connection or replace cable
GUN NOZZLE ARCS TO WORK SURFACE	Slag buildup inside nozzle or nozzle shorted	Clean nozzle or replace nozzle

REPLACEMENT PARTS LIST



ITEM	DESCRIPTION	PART No.	ITEM	DESCRIPTION	PART No.
1	Rectifier	860-905-666	21	Faceplate	410-694-020
2	Fan Motor Kit	216-087-666	22	Wire Speed Control	880-094-666
3	Fan Blade	316-009-666	23	Knob	246-041-666
4	Spindle	312-076-666	24	Power Switch	246-177-666
5	Spindle Adaptor	312-077-666	25	Steel Liner, Teflon Liner	4331 4325
6	Power Cord w/Strain Relief	248-197-666	26	Gun Wiring Harness	860-744-000
7	Fitting	253-018-666	27	Complete Gun Assembly	238-224-100
8	Solenoid	246-212-666	28	Trigger Assembly	334-221-000
9	Fitting	253-038-000	29	Handle Cap	334-219-000
10	Drive Roller .024/.030/.035	4323	30	Conductor Tube Insulation	334-269-000
11	Tension Arm	880-089-666	31	Gas Diffuser	334-228-000
12	Inlet Guide Tube	239-123-666	32	.024 Contact Tips (Bag of 6)	4309
13	Drive Base	312-103-666	33	Steel Nozzle(Tapered), Spot Nozzle (Notched)	4328 4329
14	Drive Motor	216-089-666	34	Base	410-643-010
15	Mig Gun Connector	412-465-666	35	Ground Cable Less Clamp	238-216-666
16	Knob	246-326-000	36	Transformer	880-011-888
17	Mig Connector Jumper	412-464-666	37	Reactor Coil	880-010-888
18	Handle	880-012-010	38	(Not Shown) Left Side Panel	410-557-030
19	Hood Hinge	412-278-010	39	(Not Shown) Hood	410-575-010
20	Right Side & Cover	410-568-030	40	(Not Shown) Regulator	332-226-000

WARRANTY

FULL 1-YEAR WARRANTY

If, within 1-year from the date of purchase, this Welder fails due to a defect in material or workmanship, simply return it to the nearest Sears store throughout the United States, and Sears will repair or replace it, free of charge.

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

Sears, Roebuck and Co., Dept. 817WA Hoffman Estates, IL 60179.

SERVICING SHOULD BE PERFORMED BY QUALIFIED SERVICE PERSONNEL

The Model Number will be found on the welder nameplate. Always mention the Model Number when requesting service or repair parts for your Sears Welder.

All parts listed herein may be ordered from any Sears Service Center and most Sears stores.

WHEN ORDERING REPAIR PARTS, ALWAYS GIVE THE FOLLOWING INFORMATION:

1. PART NUMBER
2. PART DESCRIPTION
3. MODEL NUMBER
4. NAME OF ITEM

If the parts you need are not stocked locally, your order will be electronically transmitted to a Sears Repair Parts Distribution Center for expedited handling.

SEARS ROEBUCK AND CO., Chicago, IL. 60684 U.S.A.

FORM NO. 811-449-000 **PRINTED IN USA**