Please read and save these instructions. Read through this owner's manual carefully before using product. Protect yourself and others by observing all safety information, warnings, and cautions. Failure to comply with instructions could result in personal injury and/or damage to product or property. Please retain instructions for future reference.

MIG/Stick Welder

Description

140MIG/Stick is a portable MIG/stick welder. It uses single phase120VAC (110-120V), 60HZ and requires a 20 amp time delayed fuse or circuit breaker. It has 90amp MIG welding capability with infinite heat/voltage setting and infinite wire speed control for welds 24 gauge to ¼". Also includes over load and thermal protection. It can also be used as a 70 amp DC Stick welder to weld with 1/16"-5/64" electrodes on materials up to 1/8".
Ideal to weld mild steel and alloy's used in Hobby and light duty applications.

Specifications and Dimension

DESCRIPTION	SPECIFICATIONS
Power supply	1ph-120V-60HZ
No-load voltage	75V
Output Range	20-90A
Duty cycle	30%
Suggested wire	.023"-.035" MIG(solid) wire or .030"-.035" Flux core wire
Wire Diameter	.023",.030, .035"
Electrode diameter	1/16", 5/64"
Dimension（L x W x H）	17.7"X 9.4"X 13.8"
Weight	44 Lbs

Removing from the carton

1.1 Remove cartons, bags or Styrofoam containing the welder and accessories.
1.2 Check the contents with the packing list below.

ITEM	QTY.
Portable MIG Welder	1 unit
MIG torch	1pc
Ground cable	1pc
Gas hose	1pc
Contact tip, .030”	2pc
Sample wire, .030” solid and flux core	2 spools
Gas regulator	1 pc
MIG nozzle	1pc
Spool adaptor	1pc
Hex wrench	1pc
Welding cable with electrode holder	1pc
Sample electrodes	1 bag
Operator’s Manual	1set

1.3 After unpacking the unit, inspect carefully for any damage that may have occurred during transit. Check for loose, missing, or damaged parts. Shipping damage claim must be filed with carrier.

Know your Welder

ON/OFF Switch
In the “off” position there is no power being supplied to the MIG gun or electrode holder circuit of the welder. In the “ON” position power is supplied to the main transformer and control circuit. The on/off switch of this unit is on the back panel.

Wire compartment
Open the wire compartment, and then you will see the wire feeder, spool holder and polarity changing
Wire speed setting
Adjusts the wire feeding/amperage speed.
Regulator
Installs on the shielding gas cylinder for MIG welding with solid wires.
Gas Hose
Used to connect the machine to the regulator.
Sample Stick Electrode
Used when Stick welding and is a consumable.
Welding Cable and MIG gun
The welding wire is driven through the welding cable and MIG gun to the work piece. It is attached to the drive system.
Sample Spools of Wire
There are two spools in the accessories package. The grey colored spool is flux core wire for gasless welding, the other is copper colored requires shielding gas for MIG welding. They are consumables and will need to be purchased when used.
Welding cable and electrode holder
Used for stick welding.
Ground cable and clamp
The ground cable and clamp gets attached to the work piece to complete the circuit to allow the flow of current needed to weld.
Indicators
There are three indicators on the left side of front panel, power indicator, thermal overload indicator and work indicator. When power is turned on, the power indicator will light. If there is a thermal/heat overload, the thermal overload indicator will light and the machine stop working. The machine will not return to work until mode until the internal temperature decreases. When welding, the work indicator is on.
Heat Setting
Set output voltage and wire speed. Refer to the “set up” chart inside the wire feed compartment. When stick welding, this knob is used for adjust output current
Power Cord
The power cord connects the welder to the 115 volt power supply. Plug the 15 amp plug into a 115 volt/20 amp receptacle to supply power to the welder.

General Safety Information

1.1 Your Welding Environment

-Keep the environment you will be welding in free from flammable materials.
-Always keep a fire extinguisher accessible to your welding environment.
-Always have a qualified person install and operate this equipment.
-Make sure the area is clean, dry and ventilated. Do not operate the welder in humid, wet or poorly ventilated areas.
-Always have your welder maintained by a qualified technician in accordance with local, state and national codes.
-Always be aware of your work environment. Be sure to keep other people, especially children, away from you while welding.
-Keep harmful arc rays shielded from the view of others.
-Mount the welder on a secure bench or cart that will keep the welder secure prevent it from tipping over or falling.

1.2 Your Welder's Condition

-Check all cables, power cord and welding cable to be sure the insulation is not damaged. Always replace or repair damaged components before using the welder.
-Check all components to ensure they are clean and in good operating condition before use.

1.3 Use of Your Welder

⚠ CAUTION

Do not operate the welder if the welding cables, electrode, MIG gun, wire or wire feed system is wet. Do not immerse them in water. These components and the welder must be completely dry before attempting to use them.
-Follow the instructions in this manual.
-Keep welder in the off position when not in use.
-Connect ground lead as close to the area being welded as possible to ensure a good ground.
-Do not allow any body part to come in contact with the welding wire if you are in contact with the material being welded, ground or electrode from another welder.
-Do not weld if you are in an awkward position. Always have a secure stance while welding to prevent accidents. Wear a safety harness if working above ground.
-Do not drape cables over or around your body.
-Wear a full coverage helmet with appropriate shade (see ANSI Z87.1 safety standard) and safety glasses while welding.
-Wear proper gloves and protective clothing to prevent your skin from being exposed to hot metals, UV and IR rays.
-Do not overuse or overheat your welder. Allow proper cooling time between duty cycles.
-Keep hands and fingers away from moving parts and stay away from the drive rolls.
-Do not point MIG gun at any body part of yourself or anyone else.
-Always use this welder in the rated duty cycle to prevent excessive heat and failure.

1.4 Specific Areas of Danger, Caution or Warning

Electrical Shock

⚠WARNING

Electric arc welders can produce a shock that can cause injury or death. Touching electrically live parts can cause fatal shocks and severe burns. While welding, all metal components connected to the wire are electrically hot. Poor ground connections are a hazard, so secure the ground lead before welding.
-Wear dry protective apparel: coat, shirt, gloves and insulated footwear.
-Insulate yourself from the work piece. Avoid contacting the work piece or ground.
- Do not attempt to repair or maintain the welder while the power is on.
-Inspect all cables and cords for any exposed wire and replace immediately.
-Use only recommended replacement cables and cords.
-Always attach ground clamp to the work piece or work table as close to the weld area as possible.
-Do not touch the welding wire and the ground or grounded work piece at the same time.
-Do not use a welder to thaw frozen pipes.

Fumes and Gases

⚠WARNING

-Fumes emitted from the welding process displace clean air and can result in injury or death.
-Do not breathe in fumes emitted by the welding process. Make sure the air you breath is clean and safe.
-Work only in a well-ventilated area or use a ventilation device to remove welding fumes from the environment where you will be working.
-Do not weld on coated materials (galvanized, cadmium plated or containing zinc, mercury or barium). They will emit harmful fumes that are dangerous to breathe. If necessary use a ventilator, respirator with air supply or remove the coating from the material in the weld area.
-The fumes emitted from some metals when heated are extremely toxic. Refer to the material safety data sheet for the manufacturer's instructions.
-Do not weld near materials that will emit toxic fumes when heated. Vapors from cleaners, sprays and degreasers can be highly toxic when heated.

UV and IR Arc Rays

⚠ DANGER

The welding arc produces ultraviolet (UV) and infrared (IR) rays that can cause injury to your eyes and skin. Do not look at the welding arc without proper eye protection.
-Always use a helmet that covers your full face from the neck to top of head and to the back of each ear.
-Use a lens that meets ANSI standards and safety glasses. For welders under 160 Amps output, use a shade 10 lens; for above 160 Amps, use a shade 12. Refer to the ANSI standard Z87.1 for more information.

-Cover all bare skin areas exposed to the arc with protective clothing and shoes. Flame-retardant cloth or leather shirts, coats, pants or coveralls are available for protection.
-Use screens or other barriers to protect other people from the arc rays emitted from your welding.
-Warn people in your welding area when you are going to strike an arc so they can protect themselves.

Fire Hazards

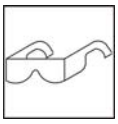
⚠WARNING

Do not weld on containers or pipes that contain or have had flammable, gaseous or liquid combustibles in them. Welding creates sparks and heat that can ignite flammable and explosive materials.
-Do not operate any electric arc welder in areas where flammable or explosive materials are present.
-Remove all flammable materials within 35 feet of the welding arc. If removal is not possible, tightly cover them with fireproof covers.
-Take precautions to ensure that flying sparks do not cause fires or explosions in hidden areas, cracks or areas you cannot see.
-Keep a fire extinguisher close in the case of fire.
-Wear garments that are oil-free with no pockets or cuffs that will collect sparks.
-Do not have on your person any items that are combustible, such as lighters or matches.
-Keep work lead connected as close to the weld area as possible to prevent any unknown, unintended paths of electrical current from causing electrical shock and fire hazards.
-To prevent any unintended arcs, cut wire back to ¼" stick out after welding.

Hot Materials

⚠ CAUTION

Welded materials are hot and can cause severe burns if handled improperly.
-Do not touch welded materials with bare hands.
-Do not touch MIG gun nozzle or electrode holder at the tip where electrodes are held after welding until it has had time to cool down.



Sparks/Flying Debris

⚠ CAUTION

Welding creates hot sparks that can cause injury. Chipping slag off welds creates flying debris.
-Wear protective apparel at all times: ANSI-approved safety glasses or shield, welder's hat and ear plugs to keep sparks out of ears and hair.

Electromagnetic Field

⚠ CAUTION

-Electromagnetic fields can interfere with various electrical and electronic devices such as pacemakers.
-Consult your doctor before using any electric arc welder or cutting device
-Keep people with pacemakers away from your welding area when welding.
-Do not wrap cable around your body while welding.
-Wrap MIG gun and ground cable together whenever possible.
-Keep MIG gun and ground cables on the same side of your body.

Shielding Gas Cylinders Can Explode

⚠WARNING

High pressure cylinders can explode if damaged, so treat them carefully

-Never expose cylinders to high heat, sparks, open flames, mechanical shocks or arcs

-Do not touch cylinder with MIG gun

-Do not weld on the cylinder.

-Always secure cylinder upright to a cart or stationary object.

-Keep cylinders away from welding or electrical circuits.

-Use the proper regulators, gas hose and fittings for the specific application.

-Do not look into the valve when opening it.

-Use protective cylinder cap whenever possible.

1.5 Proper Care, Maintenance and Repair

⚠ DANGER

-Always have power disconnected when working on internal components.

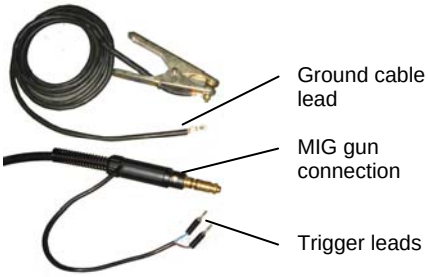
- Do not touch or handle PC board without being properly grounded with a wrist strap. Put PC board in static proof bag to move or ship.

-Do not put hands or fingers near moving parts such as drive rolls or fan

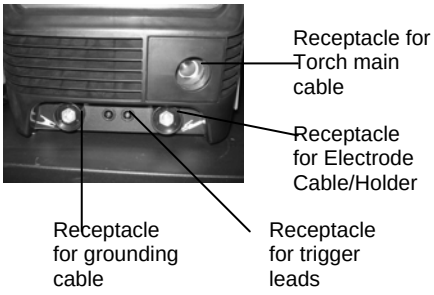
Assembly

1. Tools required for assembly: Hexagon wrench (M8).
2. Assembly

2.1 Remove the MIG torch and ground clamp from of accessories box, see following about the details



2.2 Connect all the cables to corresponding receptacles on front panel. NOTE: the MIG torch and electrode holder cable can not be connected to the welder at the same time. When MIG welding, only connect the MIG torch. When Stick welder, only connect the electrode holder cable.



2.3 Connect the trigger leads to the receptacles in the lower middle of the front panel. The two leads can be plugged in to either connection point.

2.4. The polarity terminals are inside the wire feed compartment. The terminals beside the positive (+) and negative (-) markings are for MIG gun lead and ground lead. The MIG gun lead is marked with Red, ground lead is black. When flux core welding, the ground cable lead is connected to "+", red MIG gun lead is to "-". When MIG welding, reverse the polarity or connection.

Installation

1. Power requirement

This unit uses a single phase 120VAC(110-120V), 60HZ circuit with 20 amp time delayed fuse or circuit breaker is required. DO NOT OPERATE THIS UNIT if the ACTUAL power source voltage is less than 105 volts ac or greater than 132 volts ac.

⚠WARNING

• High voltage danger from power source! Consult a qualified electrician for proper installation of receptacle. This welder must be grounded while in use to protect the operator from electrical shock.

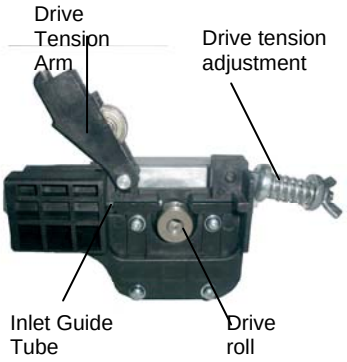
• Do not remove the ground prong or alter the plug in any way. Do not use any adapters between the welder's power cord and the power source receptacle. Make sure the POWER switch is OFF when connecting your welder's power cord to a properly grounded 120 VAC, 60Hz, single phase, 20 amp power source.

2. Extension cord

It is strongly recommended not to use an extension cord because of the voltage drop it produces. This drop in voltage can affect the performance of the welder. If you need to use an extension cord it must be a minimum of #12 gauge. Do not use an extension cord over 25 ft. in length.

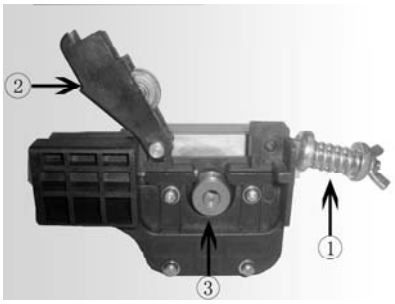
3. Install the wire roller

Before installing any welding wire into the unit, the proper sized groove must be placed into position on the wire drive mechanism. Adjust the drive roller according to the following steps, see following picture about the wire feeder structure:



3.1. Open the door to the welder drive compartment.

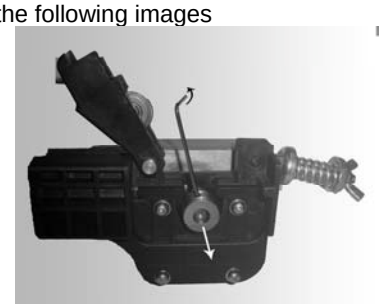
3.2. Remove the drive tension (see 1) by loosening the tension adjusting knob and lifting the Drive Tension Adjustor away from the Drive Tension Arm (see 2). Pull the drive tension arm away from the driver roller (see 3). See following images for reference

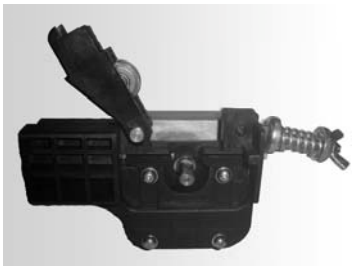


3.3. If there is wire already installed in the welder, roll it back onto the wire spool by hand-turning the spool counterclockwise. Be careful not to allow the wire to come out of the rear end of the inlet guide tube without holding onto it or it will unspool itself. Put the end of the wire into the hole on the outside edge of the wire spool and bend it over to hold the wire in place. Remove the spool of wire from the drive compartment of the welder.

3.4. Remove the drive roller.

Use the “L” shaped hex wrench in the accessory package. And insert the tool into the set screw in the drive roller and turn counter-clockwise to loosen the set screw and remove the drive roller from the drive roller shaft, see the following images

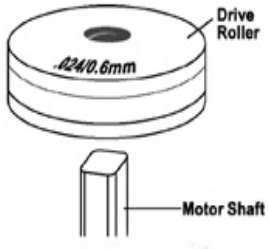




3.5 Match the drive roller wire groove to the wire diameter, see the chart below.

Wire Diameter	Roller Groove
.024 inch	0.6
.030 inch	0.9
.035 inch	0.9

The drive roller has two wire size grooves in it. When installing the drive roller, the number stamped on the drive roller indicates the wire groove it is aligned with. Push the drive roll onto the drive roller shaft and use the “L” shaped hex wrench to tighten the drive roller to the shaft. To tighten turn set screw clockwise.



3.6. Reinstall the Drive Roller Cap and lock in place by turning it clockwise.

3.7. Close the door to the welder drive compartment.

4. Install the wire

4.1 Selecting the wire

The available wire for this machine

Wire Type	Available or not
MIG wire .023 inch	Yes
MIG wire .030 inch	Yes
Flux core wire .030 inch	Yes
Flux core wire .035 inch	Yes

MIG wire can be either mild steel, stainless steel or aluminum solid wire. For use with 4" or 8" spools of wire.

NOTE:

• Metal thinner than 24 gauge cannot be welded with this machine. Attempting to do so will cause burn through in the metal you are intending to weld.

• Remove any wire that is rusty, if the whole spool is rusty discard it.

4.2 Install the wire

⚠WARNING

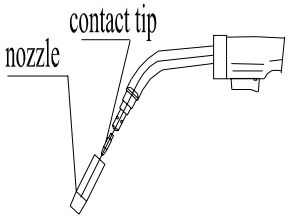
Electric shock can kill! Always turn the POWER OFF and unplug the power cord from the ac power source before installing wire.

NOTE:

• Before installing, make sure that you have removed any wire from the MIG gun assembly. This will help to prevent the possibility of the wire jamming inside the MIG gun liner.

• Be careful when removing the welding nozzle. The contact tip on this welder is electrically live when the torch trigger is pulled. Make certain POWER is turned OFF.

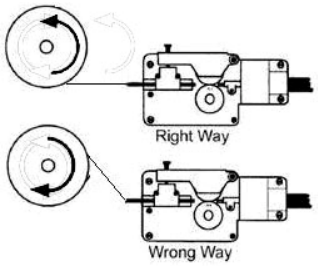
4.2.1 Remove the nozzle and contact tip from the end of the MIG gun assembly. Please see following images for reference



4.2.2 Make sure the groove on the drive roller matches the wire size being installed. If not, change the drive roller as described above.

4.2.3 Remove any wrapping from the outside of the spool of wire. DO NOT UNHOOK THE WIRE AT THIS TIME.

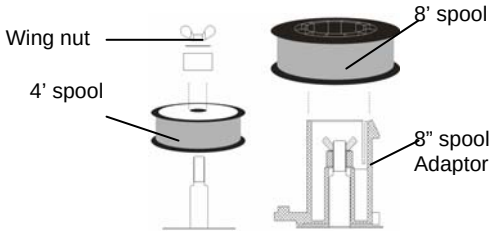
4.2.4 Place the spool on the spool hub so that the wire comes off the bottom of the spool. The welding wire should always come off the bottom of the spool into the drive mechanism. See following figure.



Wire Installation

4.2.5 The welder can use both 4in and 8in spools, see the following figure for installation: The adjustment

knob is designed to adjust the pressure tension of the wire spool.



4.2.6. . Setting the wire spool tension:
a) Turn the spool of wire with one hand.
b) Increase the spool tension by tightening (turn clockwise) the wing nut while turning the spool. Turn the spool while tightening the wing nut until the spool slows down and operator feels a slight drag.
Stop tightening the wing nut, operator may need to repeat these steps until proper spool tension is achieved.
NOTE:
If TOO MUCH tension is applied to the wire spool, the wire will slip on the drive roller or will not be able to feed at all. If TOO LITTLE tension is applied, the spool of wire will want to unspool itself when the gun trigger is released. Readjust the spool hub tension as necessary to correct for either problem.
4.2.7.After checking to make sure that your welder is disconnected from the ac power source, remove the leading end of the wire from the spool, DO NOT LET GO OF THE WIRE until told to do so, or the wire will unspool itself.
4.2.8. Using a wire cutter, cut the bent end off the leading end of the wire so that only a straight leading end remains.
4.2.9. Loosen the tension adjusting knob holding the drive tension arm in place and lift the tension arm up off the drive roller.
4.2.10. Insert the leading end of the wire into the inlet guide tube. Then push it across the drive roller and into the torch assembly about six inches.

⚠ CAUTION

• Make certain that the welding wire is actually going into the torch liner. If not, the wire can jam or keep the wire from feeding correctly.

4.2.11 Check to see if the wire is in the drive roller groove, then position the drive tension arm into place on the drive roller.
4.2.12 Flip the quick release drive tension back up into position on the drive tension arm.
4.2.13 Tighten (turn clockwise) the drive tension adjusting knob until the tension roller is applying enough force on the wire to prevent it from slipping out of the drive assembly. DO NOT OVERTIGHTEN
4.2.14. NOW YOU CAN RELEASE THE WIRE.
4.2.15. Plug in the welder, turn power switch to the ON position. Set the VOLTAGE switch to the voltage (heat) setting recommended for the gauge metal that is to be welded. Refer to the set up chart located inside the wire compartment.
4.2.16. Set the WIRE SPEED control to the middle of the wire speed range.
8.17. Straighten the MIG gun cable and pull the trigger on the welding torch to feed the wire through the torch assembly. When at least one inch of the wire sticks out past the end of the torch, release the trigger.
4.2.18 Turn the Power Switch to the OFF position.
4..2.19 Select a contact tip stamped with the same diameter as the wire being used.

NOTE:
Due to inherent variances in flux-cored welding wire, it may be necessary to use a contact tip one size larger than your flux core wire if wire jams occur.
4.2.20. Slide the contact tip over the wire (protruding from the end of the torch). Thread the contact tip into the end of the torch and hand-tighten securely with a pliers
4.2.21. Install the nozzle on the gun assembly. To keep spatter from sticking to inside of the nozzle use anti-spatter spray or gel.
4.2.22 Cut off the excess wire that extends past the end of the nozzle. Leave ¼" stick out.
4.2.23. Turn the welder ON

5. Setting the wire tension

⚠WARNING

Arc flash can injure eyes! To reduce the risk of arc flash, make certain that the wire coming out of the end of the torch does not come in contact with work piece, ground clamp or any grounded material during the drive tension setting process or arcing will occur.

5.1. Press the trigger on the torch.
5.2. Turn the drive tension adjustment knob clockwise, increasing the drive tension until the wire seems to feed smoothly without slipping.

6.Gas installation

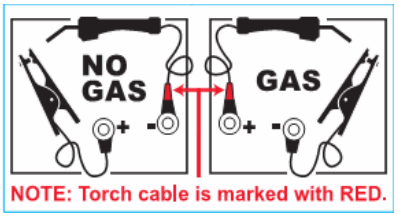
⚠WARNING

Shielding gas cylinders and high pressure cylinders can explode. if damaged, so treat them carefully.
-Never expose cylinders to high heat, sparks, open flames, mechanical shocks or arcs.
-Do not touch cylinder with MIG gun.
-Do not weld on the cylinder.
-Always secure cylinder upright to a cart or stationary object.
-Keep cylinders away from welding or electrical circuits.
-Use the proper regulators, gas hose and fittings for the specific application.

When MIG (solid) wires are used, the shielding gas is required.

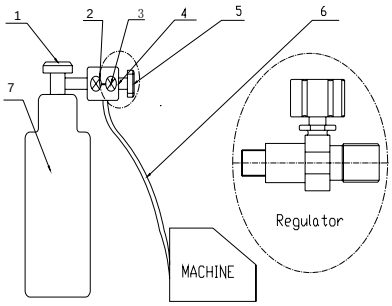
1. Polarity changing:

The factory polarity setting is for flux core welding (no shielding gas is required). At this mode, the MIG gun lead is connect to "-" (negative) polarity and ground cable end is to "+" (positive). If MIG welding with shielding gas the MIG gun lead is to "+", and ground cable is connected to "-". Secure leads tight with fasteners. See illustrations below.



2. The gas hose, regulator and gas cylinder connection

Attach one end of the gas hose to the gas solenoid valve (gas inlet) located on the back panel of the welder. Attach the other end to the gas regulator which is attached to the shielding gas cylinder. See illustration below



1. Cylinder valve: Controls GAS CYLINDER gas flow.
2. Cylinder pressure gauge
3. Gas flow gauge, set at 20 CFM
4. Regulator
5. Adjustment knob controls gas pressure to the welder.
6. Gas hose
7. Gas cylinder

NOTE:
Slowly open the cylinder valve by turning it counterclockwise until the cylinder pressure gauge registers on the first gauge of the regulator. Turn the adjustment knob clockwise (right) slowly to increase gas flow to 20 cfm. To reduce the gas flow turn the adjustment counterclockwise (left). The gas valve is located on the back panel of the welder and activated by the trigger. Gas flow should be heard when the trigger is activated. No gas flow will result in a harsh arc with excessive spatter, a smooth weld bead will be difficult to obtain. Avoid unnecessary gas loss by closing the tank valve when finished welding.

3. Gas selection.
Different materials require different shielding gas when MIG welding, refer to the set up chart inside the wire feed compartment.

Mild steel: Use 75% Argon and 25% for reduced spatter and reduced penetration for thinner materials. Do NOT USE Argon gas concentrations higher than 75% on steel. The result will be extremely poor penetration, porosity, and brittleness of weld.
Mild Steel: Use CO2 for deeper penetration but increased spatter.
Stainless steel: Use a mixed gas consisting of Helium, Argon and CO2.
Aluminum or bronze: Use 100% Argon

Operation

⚠WARNING

High voltage danger from power source! Consult a qualified electrician for proper installation of receptacle at the power source. This welder must be grounded while in use to protect the operator from electrical shock. If you are not sure if your outlet is properly grounded, have it checked by a qualified electrician. Do not cut off the grounding prong or alter the plug in any way and do not use any adapters between the welder's power cord and the power source receptacle. Make sure the POWER switch is OFF before connecting your welder's power cord to a properly grounded 120 VAC(110v-120v), 60Hz, single phase, 20 amp power source.

Part1 The MIG welding operation

1. Main control component

Power switch - The power switch supplies electrical current to the welder. Whenever the power switch is in the ON position, the welding circuit is activated. ALWAYS turn the power switch to the OFF position and unplug the welder before performing any maintenance.

Voltage selector - The voltage selector controls the welding heat. This unit has infinite voltage control. Refer to the label inside the welder side door for recommended voltage selector settings for your welding job.
Wire speed control - The wire speed control adjusts the speed at which the wire is fed out of the welding torch. 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. Note: The wire will feed faster without an arc. When an arc is being drawn, the wire speed will slow down.

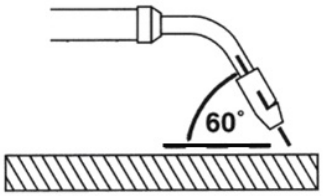
2. Hold the torch

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

3. Position the torch to the work piece

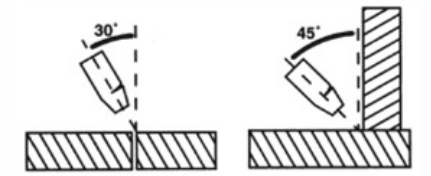
There are two angles of the torch nozzle in relation to the work piece that must be considered when welding.

3.1. Angle A can be varied, but in most cases the optimum angle will be 60 degrees, the point at which the torch handle is parallel to the work piece. If angle A is increased, penetration will increase. If angle A is decreased, penetration will decrease also.



Angle A

3.2. 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.



Angle B

4. Distance from the work piece

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 inch or the arc may begin sputtering, signaling a loss in welding performance.

5. Tuning in the wire speed

This 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.

⚠WARNING

EXPOSURE TO A WELDING ARC IS EXTREMELY HARMFUL TO THE EYES AND SKIN!
Prolonged exposure to the welding arc can cause blindness and burns. Never strike an arc or begin welding until you are adequately protected. Wear flameproof welding gloves, a heavy long

sleeved shirt, trousers with no cuffs, high topped shoes, and an ANSI approved welding helmet.

5.1. Connect the Ground Clamp to a scrap piece of the same type of material which you will be welding. It should be equal to or greater than the thickness of the actual work piece, and free of oil, paint, rust, etc.

5.2. Select a heat setting. Refer to set up chart

5.3. Hold the torch 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 welding. (See HOLDING THE TORCH if you are uncertain of the angle at which you will be welding).

5.4. With your free hand, turn the Wire Speed Dial to maximum and continue to hold onto the knob.

5.5. Lower your welding helmet and pull the trigger on the torch to start an arc, then begin to drag the torch toward you while simultaneously turning the Wire Speed Dial counter-clockwise.

5.6. LISTEN! As you decrease the wire speed, the sound that the arc makes will change from a sputtering to a high-pitched buzzing sound and then will begin sputtering again if you decrease the wire speed too much. The point on the wire speed adjustment where the high-pitched buzzing sound is achieved is the correct setting. You can use the wire speed control to slightly increase or decrease the heat and penetration for a given heat setting by selecting higher or lower wire speed settings. Repeat this tune-in procedure if you select a new heat setting, a different diameter wire, or a different type of welding wire.

6. Welding Techniques

⚠WARNING

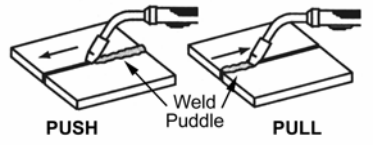
EXPOSURE TO A WELDING ARC IS EXTREMELY HARMFUL TO THE EYES AND SKIN! Prolonged exposure to the welding arc can cause blindness and burns. Never strike an arc or begin welding until you are adequately protected. Wear flameproof welding gloves, a heavy long sleeved shirt, trousers with out cuffs, high topped shoes and an ANSI approved welding helmet.

ELECTRIC SHOCK CAN KILL! To prevent ELECTRIC SHOCK, do not perform any welding while standing, kneeling, or lying directly on the grounded work.

6.1 Moving the torch

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

Travel direction is the direction the torch is moved along the weld joint in relation to the weld puddle. The torch is either PUSHED into the weld puddle or PULLED away from the weld puddle.



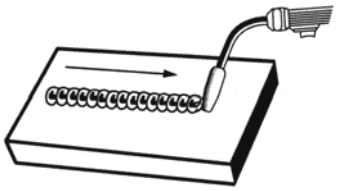
For most welding jobs you will pull the torch along the weld joint to take advantage of the greater weld puddle visibility.

Travel speed is the rate at which the torch 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.

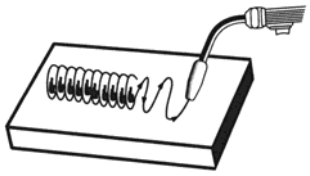
6.2 Types of welding beads

As you become more familiar with your new welder and better at laying some simple weld beads, you can begin to try some different weld bead types.

The STRINGER BEAD Is formed by traveling with the torch in a straight line while keeping the wire and nozzle centered over the weld joint (See following figure)

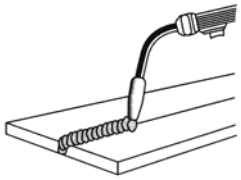


The WEAVE BEAD Is used when you want to deposit metal over a wider space than would be possible with a stringer bead. It is made by weaving from side to side while moving with the torch. It is best to hesitate momentarily at each side before weaving back the other way.

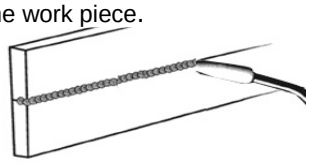


6.3 Welding position

FLAT POSITION Is easiest of the welding positions and is most commonly used. It is best if you can weld in the flat position if at all possible as good results are easier to achieve.

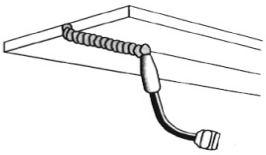


HORIZONTAL POSITION Is performed very much the same as the flat weld except that angle B (see HOLDING THE TORCH) is such that the wire, Directed more toward the metal above the weld joint is to help prevent the weld puddle from running downward while still allowing slow enough travel speed .A good starting point for angle B is about 30 degrees DOWN from being perpendicular to the work piece.

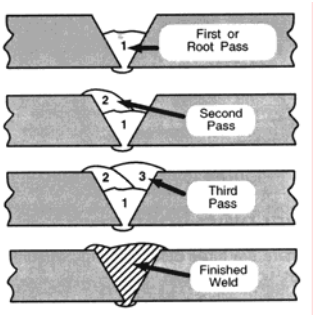


VERTICAL POSITION Is easier for many people to Pull the torch from top to bottom. It can be difficult to prevent the puddle from running downward. Pushing the torch from bottom to top may provide better

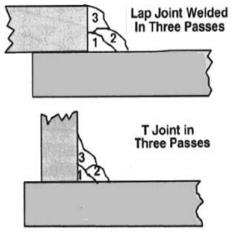
puddle control and allow slower rates of travel speed to achieve deeper penetration. When vertical welding, angle B (see HOLDING THE TORCH) is usually always kept at zero, but angle A will generally range from 45 to 60 degrees to provide better puddle control.
OVERHEAD POSITION Is the most difficult welding position. Angle A (see HOLDING THE TORCH) should be maintained at 60 degrees. Maintaining this angle will reduce the chances of molten metal falling into the nozzle. 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.



6.4 Multiple pass welding
Butt Weld Joints When butt welding thicker materials you will need to prepare the edges of the material to be joined 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 laid 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 in following figure 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.
Fillet Weld Joints. Most fillet weld joints, on metals of moderate to heavy thickness, will require multiple pass welds to produce strong joint. The illustrations in Figure 19 show the sequence of laying multiple pass beads into a T fillet joint and a lap fillet joint.



6.5 Spot welding
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 preference.

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. Wire diameters that tend to work best, with the burn-through method are 0.035 inch self-shielding flux-core wire. Do not use .030 inch self-shielding flux core wires when using 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 the 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.

6.6 SPOT WELDING INSTRUCTIONS

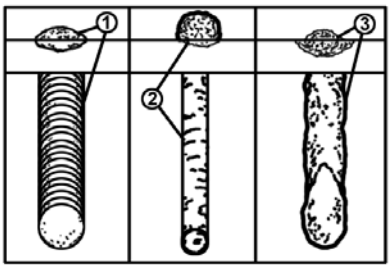
1. Select the wire diameter and heat setting recommended above for the method of spot welding you intend to use.
2. Tune in the wire speed as if you were going to make a continuous weld.
3. Hold the nozzle piece completely perpendicular to and about 1/4 inch off the work piece.
4. Pull the trigger on the torch 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.

Part 2 STICK Welding Operation

1. Electrode

The welding electrode is a rod coated with a layer of flux. When welding, electrical current flows between the electrode (rod) and the grounded metal work piece. The intense heat of the arc between the rod and the grounded metal melts the electrode and the flux. The most popular electrodes are:
-E6011 60,000 PSI tensile strength deep penetrating applications.
-E6013 60,000 PSI tensile strength used for poor fit up applications
-E7014 70,000 PSI tensile strength used for high deposition and fast travel speeds with light penetration
-E7018AC 70,000 PSI tensile strength, Used for out of position and tacking.

2. Selecting the proper electrode
The type and thickness of metal and the position of the work piece determine the electrode type and the amount of heat needed in the welding process. Heavier and thicker metals required more amperage. It is best to practice your welds on scrap metal which matches the metal you intend to work with to determine correct heat setting and electrode choice. See the following helpful trouble shooting tips to determine if you are using a correct electrode



1. When proper rod is used:
a. The bead will lay smoothly over the work without ragged edges
b. The base metal puddle will be as deep as the bead that rises above it
c. The welding operation will make a crackling sound similar to the sound of bacon frying
2. When a rod too small is used:
a. The bead will be high and irregular
b. The arc will be difficult to maintain
3. When the rod is too large
a. The arc will burn through light metals
b. The bead will undercut the work
c. The bead will be flat and porous
d. Rod may be freeze or stick to work piece

Note: Rate of travel over the work also affects the weld. To ensure proper penetration and enough rod deposit, the arc must be moved slowly and evenly along the weld seam. After the welder is reliable installed, turn on the power switch

3. Setting the amperage control
The welder has infinite output current control. It is capable of welding with 1/16"and 5/64" electrodes.
Use lower output settings for 1/16" electrodes and higher settings 5/64 electrodes. It is best to practice your welds on scrap metal which matches the metals you intend to work with to determine correct setting for your job. The electrode type and the thickness of the work piece metal determine the amount of heat needed in the welding process. Heavier and thicker metals require more voltage (amperage), whereas lighter and thinner metals require less voltage (amperage).

4. Welding techniques
The best way to teach yourself how to weld is with short periods of practice at regular intervals. All practice welds should be done on scrap metal that can be discarded. Do not attempt to make any repairs on valuable equipment until you have satisfied yourself that your practice welds are of good appearance and free of slag or gas inclusions.

4.1Holding the electrode
The best way to grip the electrode holder is the way that feels most comfortable to you. Position the Electrode to the work piece when striking the initial arc it may be necessary to hold the electrode perpendicular to the work piece. Once the arc is started the angle of the electrode in relation to the work piece should be between 10 and 30

degrees. This will allow for good penetration, with minimal spatter.

4.2 Striking the arc

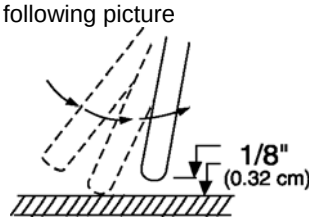
⚠WARNING

EXPOSURE TO A WELDING ARC IS EXTREMELY HARMFUL TO THE EYES AND SKIN.

• Never strike an arc or begin welding until you have adequate protection.

• Wear flameproof welding gloves, heavy long-sleeved shirt, trousers with out cuffs, high-topped shoes and a welding helmet or shield.

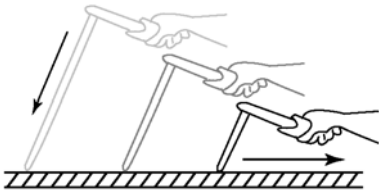
Scratch the work piece with the end of electrode to start arc and then raise it quickly about 1/8 inch gap between the rod and the work piece, see following picture



It is important that the gap be maintained during the welding process and it should be neither too wide or too narrow. If too narrow, the rod will stick to the work piece. If too wide, the arc will be extinguished.

It needs much practice to maintain the gap. When the rod sticks to the work piece, gently rock it back and forth to separate them. A stuck electrode will cause a short circuit and the circuit breaker of thermal overload will shut the welder off.

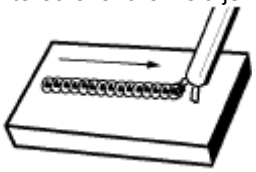
A good arc is accompanied by a crisp, cracking sound. The sound is similar to that made by bacon frying. To lay a weld bead, only 2 movements are required; downward and in the direction the weld is to be laid, as in following figure:



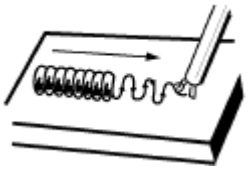
4.3 Types of weld bead

The following paragraphs discuss the most commonly used arc welding beads.

The stringer bead Formed by traveling with the torch in a straight line while keeping the wire and nozzle centered over the weld joint.



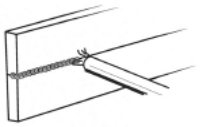
The weave bead Used when you want to deposit metal over a wider space than would be possible with a stringer bead. It is made by weaving from side to side while moving with the torch. It is best to hesitate momentarily at each side before weaving back the other way penetration.



4.4 Welding position

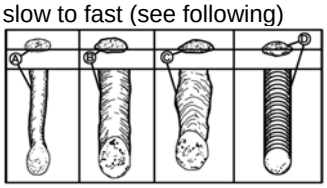
Flat position It is easiest of the welding positions and is most commonly used. It is best if you can weld in the flat position if at all possible as good results are easier to achieve.

The horizontal position it is performed very much the same as the flat weld except that the angle is different such that the electrode, and therefore the arc force, is directed more toward the metal above the weld joint. This more direct angle helps prevent the weld puddle from running downward while still allowing slow enough travel speed to achieve good penetration. A good starting point for your electrode angle is about 30 degrees DOWN from being perpendicular to the work piece.



4.5 Judging a good weld bead

When the skill of striking and holding an arc has been learned, the next step is learning how to run a good bead. The first attempts in practice will probably fall short of acceptable weld beads. Too long of an arc will be held or the travel speed will vary from slow to fast (see following)



A. Weld speed is too fast.
B. Weld speed is too slow.
C. Arc is too long.
D. Ideal weld.

A solid weld bead requires that the electrode be moved slowly and steadily along the weld seam. Moving the electrode rapidly or erratically will prevent proper fusion or create a lumpy, uneven bead. To prevent ELECTRIC SHOCK, do not perform any welding while standing, kneeling, or lying directly on the grounded work.

4.6 Finish the bead

As the coating on the outside of the electrode burns off, it forms an covering of protective gasses around the weld. This prevents air from reaching the molten metal and creating an undesirable chemical reaction. The burning coating, however, forms slag. The slag formation appears as an accumulation of dirty metal scale on the finished weld. Slag should be removed using a chipping hammer.

⚠WARNING

CHIPPING THE SLAG FROM A WELD JOINT CAUSES SMALL CHIPS OF SLAG TO FLY THROUGH THE AIR

• Slag flying through the air can cause eye injury or injury to parts of the head, hands or exposed portions of the body.

• Wear goggles or eye glasses with side shields and protect the hands and other exposed parts of the body with protective garments, or if possible, work with a shield between the body and the work piece.

The intense heat produced at the arc sets up strains in the metal joined by welding. Chipping the weld not only removes the slag left behind in the welding but relieves the internal strains developed by the heating and cooling process.

Maintenance

The welder needs regular maintenance.
Periodically clean dust, dirt, grease, etc. from your welder. Every six months, or as necessary, remove the cover panel from the welder and air-blow any dust and dirt that may have accumulated inside the welder.
Replace power cord, ground cable, ground clamp, or electrode assembly when damaged or worn.

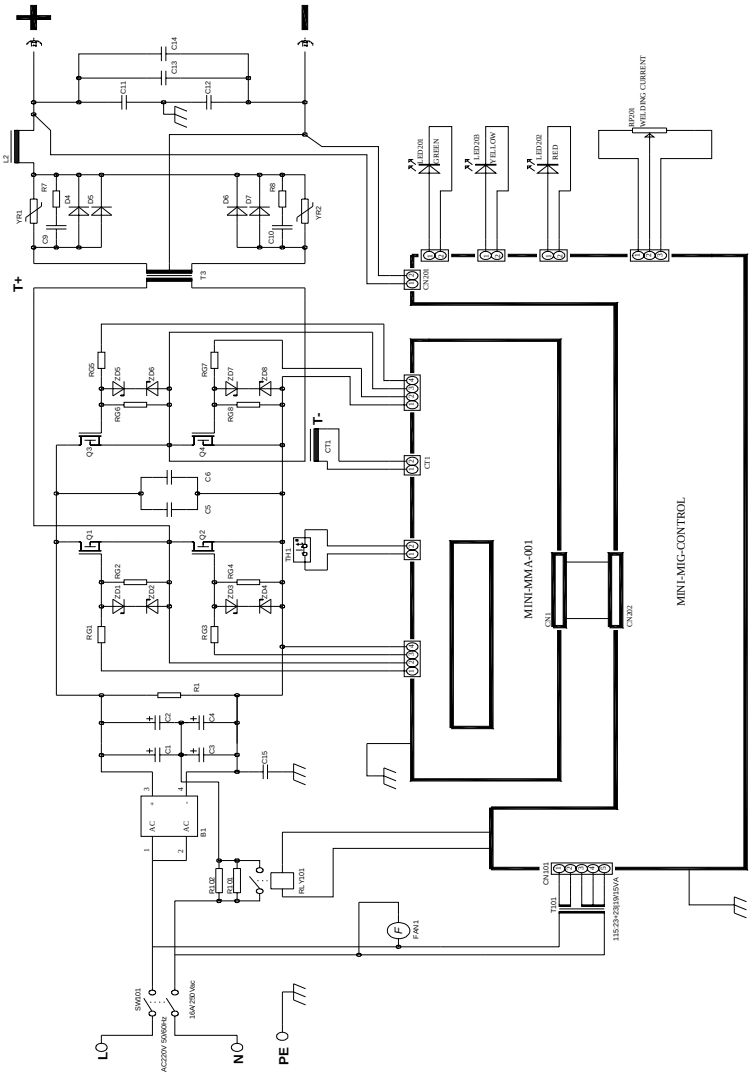
MINOR AND ROUTINE MAINTENANCE

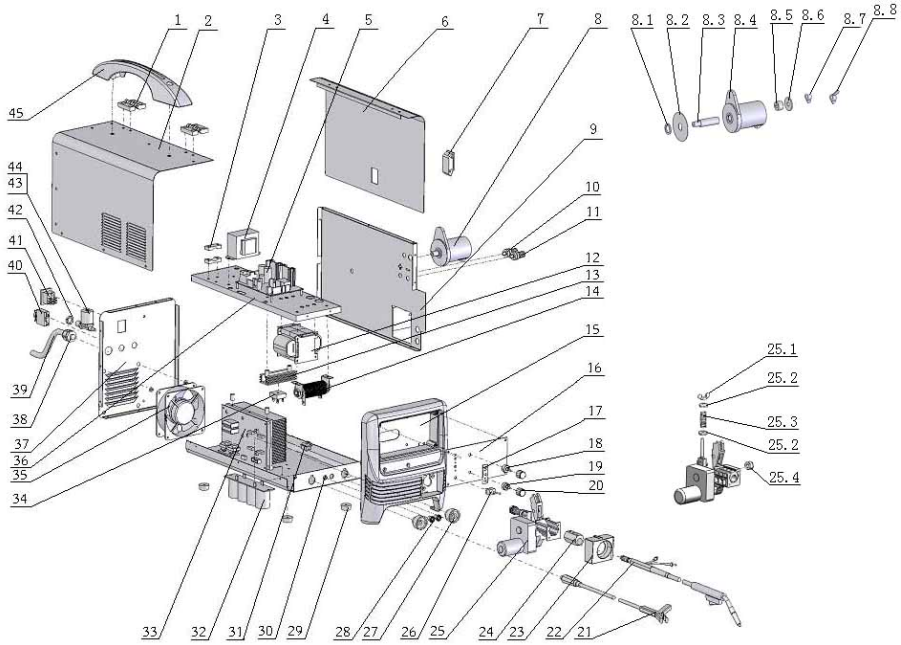
Store in a clean dry location free from corrosive gas, dust and high humidity. Temperature should range from 10° F – 120°F and a relative humidity less than 90%.When transporting or storing the welder after use, it is recommended to repack the product as it was received for protection. (Cleaning is required before storage and you must seal the plastic bag in the box for storage

Trouble shooting Chart

Symptom (s)	Possible Causes(s)	Corrective Action(s)
Welder does not works when the main switch is turned on	1. No power input 2. Power cord or power plug is broken 3. Main switch is broken 4. Transformer is broken	1. Check circuit or fuse of power source 2. Replace power cord 3. Replace switch 4. Replace the transformer
Will not weld	1. Incorrect power input 2. Inadequate current at output 3. Poor connection of output cable 4. Dirty surfaces 5. Wrong welding wire	1. Check the power source 2. Check for proper grounding to the work piece. 3. Check output connection 4. Clean surfaces 5. Use correct wire
Blown fuse or tripped circuit breaker	Inadequate fuse or circuit breaker	Check the fuse in power source should be 20amp
Arc is hard to start	1. The wrong wire 2. Base metal not grounded reliable	1. Use the correct one 2. Make sure the connection is good
Inconsistent arc or wire feed	1. Not enough drive roller pressure 2. Spool hub tension too tight or loose 3. Contact tip worn or wrong size 4. Rusty or corroded wire 5. Too big of electrode or damaged flux	1. Tighten the drive tension adjustor on wire feeder 2. Adjust the wing nut on the spool holder 3. Replace contact tip 4. Replace wire 5. Use correct or undamaged electrode.
Others		Call Tech Help

Main Circuit chart





Repair Parts List

Reference number	Description	Part number	Qty
1	Hinge	2.05.17.012	2
2	Case cover, enclosure	1.1.01.01.0277	1
3	Wire retainer	2.05.17.020	2
4	Control transformer	1.2.07.02.0645	1
5	Main PC Board	1.1.05.02.0146	1
6	Door	1.1.02.01.1902	1
7	Door lock	2.05.05.019	1
8	Spool holder	1.2.01.01.0756	1

8.1	Rear bushing	2.06.29.301	1
8.2	Spool baffle	5.02.01.502	1
8.3	4” spool holder	5.02.01.503	1
8.4	8” spool adaptor	2.05.17.008	1
8.5	Washer	5.02.01.504	1
8.6	Front Bushing	2.05.17.010	1
8.7	Mat Washer	2.06.17.005	1
8.8	Wing nut	2.06.05.002	1
9	Vertical center sheet metal	1.26.1600.11-1	1
10	Connection terminal (red)	2.05.03.104	1
11	Connection terminal (Black)	2.05.03.113	1
12	Main Transformer	1.26.1400.08-3	1
13	Rectifier heat sink	1.15.101.12	1
14	Reactor assembly	1.26.1400.14-4	1
15	Plastic front panel	2.05.05.049	1
16	Front panel support	1.26.1600.03-01	1
17	Indicator	1.26.140.01-1	1
18	Wire speed potentiometer	1.26.1400.03-1	1
19	Voltage Potentiometer	1.26.1400.03-3	1
20	Potentiometer Knob	2.07.11.017	2
21	Ground cable and clamp	1.15.140.13	1

22	MIG Torch	2.20.08.502	1
23	American Connector	2.05.05.050	1
24	MIG torch receptacle	1.21.100.10	1
25	Wire feeder assembly	1.26.1400.01-1-3	1
25.1	Tension adjustment nut	2.07.40.110-1	1
25.2	Tension nut washer	2.07.40.110-2	2
25.3	Tension spring	2.07.40.110-3	1
25.4	Drive roller	2.07.40.110-4	1
26	Welding mode (MIG/Stick) selector	1.26.1400.03-2	1
27	Quick Connector, female	2.07.57.123	2
28	Trigger lead receptacle	2.05.17.006	2
29	Feet	2.05.05.016	4
30	Sheet metal case base	1.26.1402.09-01	1
31	Loaded PCB	1.26.1402.09-3	1
32	Capacitance PCB	1.15.101.03-3	1
33	Heat Sink	1.26.1400.14-6	1
34	Rectifier	2.07.37.553	1
35	Fan	1.26.1400.10-2	1
36	Middle board	1.26.1600.08-01	1
37	Back Panel	1.26.1400.10-1	1
38	Power Cord retainer	2.04.30.102	1

39	Power Cord	1.26.1400.31	1
40	Circuit Breaker	2.07.80.301	1
41	Main Switch	2.07.80.213	1
42	Copper Nut	1.52.040.19	1
43	Gas Valve connector	1.21.100.70	1
44	Gas solenoid valve	1.31.160.10-7	1
45	Handle	2.05.08.028	1

Other Safety and Standards Information

This manual is designed to inform the operator of safety and general use of this model only. For further information about welding safety refer to the following standards and comply with them where applicable.

• **ANSI Standard Z49.1** — SAFETY IN WELDING AND CUTTING obtainable from: American Welding Society 550 NW Le Jeune Road, Miami, FL 33126 Tel. (800) 443-9353 Fax (305) 443-7559 www.amweld.org or www.aws.org

• **ANSI Standard Z87.1** — SAFE PRACTICE FOR OCCUPATION AND EDUCATIONAL EYE AND FACE PROTECTION Obtainable from: American National Standards Institute (ANSI) 11 West 42nd St. New York, NY 10036 Tel. (212) 642-4900 Fax (212) 398-0023 www.ansi.org

• **NFPA Standard 51B** — CUTTING AND WELDING PROCESS obtainable from: National Fire Protection Association, 1 Batterymarch Park, P.O. Box 9101 Quincy, MA 02269-9101 Tel. (617) 770-3000 Fax (617) 770-0700 www.nfpa.org

• **OSHA Standard 29 CFR**, Part 1910, Subpart Q. —WELDING, CUTTING AND BRAZING obtainable from your state OSHA office or from: U. S. Dept. of Labor OSHA, Office of Public Affairs Room N3647, 200 Constitution Ave. NW Washington, DC 20210 www.osha.gov

• **CSA Standard W117.2** — Code for SAFETY IN WELDING AND CUTTING
Obtainable from: Canadian Standards Association, 178 Rexdale Blvd., Etobicoke, Ontario M9W 1R3
www.csa.ca
• **American Welding Society Standard A6.0** —WELDING AND CUTTING CONTAINERS WHICH HAVE HELD COMBUSTIBLES
Obtainable from: American Welding Society, 550 NW Le Jeune Road
Miami, FL 33126
Tel. (800) 443-9353
Fax (305) 443-7559
www.amweld.org or www.aws.org