

MIG-135PRO

FLUX CORE MIG/ LIFT TIG/ STICK WELDER 135AMP

LED DISPLAY

USER'S MANUAL



Customer Support (888)680-2849
inquiry@bilthardusa.com

Note: Please read this user's manual carefully before using this product.

BILT HARD®

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SAFETY INFORMATION

Welding can be dangerous to you and other persons in the work area. Read and understand this instruction manual before using your BILT HARD welding machine. Injury or death can occur if safe welding practices are not followed.

Safety information is set forth below and throughout this manual.

The following explanations are displayed in this manual, on the labeling, and on all other information provided with this product:

DANGER

DANGER indicates a hazardous situation which, if not avoided, will result in death or serious injury.

WARNING

WARNING indicates a hazardous situation which, if not avoided, could result in death or serious injury.

CAUTION

CAUTION used with the safety alert symbol, indicates a hazardous situation which, if not avoided, could result in minor or moderate injury.

NOTICE

NOTICE is used to address practices not related to personal injury.



READ INSTRUCTIONS

Thoroughly read and understand this manual before using. Save for future reference.



DANGER **ELECTRIC SHOCK CAN CAUSE INJURY OR DEATH!**

- Improper use of an electric Welder can cause electric shock, injury and death! Read all precautions described in the Welder Manual to reduce the possibility of electric shock.
- Disconnect Welder from power supply before assembly, disassembly or maintenance of the torch, contact tip and when installing or removing nozzles.
- Always wear dry, protective clothing and leather welding gloves and insulated footwear. Use suitable clothing made from durable flame-resistant material to protect your skin.
- Always operate the Welder in a clean, dry, well ventilated area. Do not operate the Welder in humid, wet, rainy or poorly ventilated areas.
- The electrode and work (or ground) circuits are electrically “hot” when the Welder is on. Do not allow these “hot” parts to come in contact with your bare skin or wet clothing.
- Separate yourself from the welding circuit by using insulating mats to prevent contact from the work surface.
- Be sure that the work piece is properly supported and grounded prior to beginning an electric welding operation.
- Always attach the Work Clamp to the piece to be welded and as close to the weld area as possible. This will give the least resistance and best weld.

**⚠ DANGER****WELDING SPARKS CAN CAUSE FIRE OR EXPLOSION!**

- Electric welding produces sparks which can be discharged considerable distances at high velocity igniting flammable or exploding vapors and materials.
- DO NOT operate electric arc Welder in areas where flammable or explosive vapors are present.
- DO NOT use near combustible surfaces. Remove all flammable items from the work area where welding sparks can reach (min. of 35 feet).
- Always keep a fire extinguisher nearby while welding.
- Use welding blankets to protect painted and or flammable surfaces; rubber weather-stripping, dash boards, engines, etc.
- Ensure power supply has properly rated wiring to handle power usage.

**⚠ WARNING****ELECTROMAGNETIC FIELDS CAN BE A HEALTH HAZARD!**

- The electromagnetic field that is generated during arc welding may interfere with various electrical and electronic devices such as cardiac pacemakers. Anyone using such devices should consult with their physician prior to performing any electric welding operations.
- Exposure to electromagnetic fields while welding may have other health effects which are not known.

**⚠ WARNING****ARC RAYS CAN INJURE EYES AND BURN!**

- Arc rays produce intense ultraviolet radiation which can burn exposed skin and cause eye damage. Use a shield with the proper filter (a minimum of #11) to protect your eyes from sparks and the rays of the arc when welding or when observing open arc welding (see ANSI Z49.1 and Z87.1 for safety standards).
- Use suitable clothing made from durable flame-resistant material to protect your skin.
- If other persons or pets are in the area of welding, use welding screens to protect bystanders from sparks and arc rays.

**⚠ WARNING****FUMES AND WELDING GASES CAN BE A HEALTH HAZARD!**

- Fumes and gasses released during welding are hazardous. Do not breathe fumes that are produced by the welding operation. Wear an OSHA-approved respirator when welding.
- Always work in a properly ventilated area.
- Never weld coated materials including but not limited to: cadmium plated, galvanized, lead based paints.



⚠ CAUTION HOT METAL AND TOOLS WILL BURN!!

- Electric welding heats metal and tools to temperatures that will cause severe burns!
- Use protective, heat resistant gloves and clothing when using BILT HARD or any other welding equipment. Never touch welded work surface, torch tip or nozzle until they have completely cooled.



⚠ CAUTION FLYING METAL CHIPS CAN CAUSE INJURY!

- Grinding and sanding will eject metal chips, dust, debris and sparks at high velocity. To prevent eye injury wear approved safety glasses.
- Wear an OSHA-approved respirator when grinding or sanding.
- Read all manuals included with specific grinders, sanders or other power tools used before and after the welding process. Be aware of all power tool safety warnings.



⚠ CAUTION INADEQUATE WIRING CAN CAUSE FIRE AND INJURY!

- Verify that the facility power source has properly rated wiring to handle power requirements of this Welder.

DESCRIPTION

BRIEF INTRODUCTION

The BILT HARD MIG-135PRO WELDER is designed for use by the serious hobbyist or the professional with the versatility to flux cored MIG, MMA(Stick) or Lift TIG weld all from a single compact, space-saving and light-weight unit combined with self-sensing for go anywhere convenience. The latest IGBT inverter technology produces the most stable arc possible and provides the capability of welding thin or heavy gauge steel with precision and ease.

LARGE LED DIGITAL DISPLAY: Advanced digital display, increases the visual clarity and improves the efficiency of the operation.

READ AND UNDERSTAND ALL INSTRUCTIONS AND PRECAUTIONS BEFORE OPERATION.

This unit emits a powerful high voltage and extreme heat which can cause severe burns, dismemberment, electrical shock and death. BILT HARD shall not be held liable for consequences due to deliberate or unintentional misuse of this product.

CONTENTS

Remove all items from the box. Compare with list below to make sure unit is complete

1. BILT HARD **MIG-135PRO** Welder
2. Solar Powered Auto Darking Welding Helmet
3. 6.6ft MIG Welding Torch (assembled 0.8mm/0.030" Contact Tip)
4. 10ft Electrode Holder
5. 10ft Work Clamp
6. 0.30"/2lb Flux Cored Wire
7. 0.9mm/0.035" Contact Tip
8. Brush&Hammer
9. User Manual



INSTALLATION

TECHNICAL SPECIFICATION: MIG-135PRO

INPUT-SINGLE PHASE ONLY

Standard Voltage/Frequency	Input Current
AC 110V±10% 50/60Hz	I _n max=58A , I _n eff=36.5A

RATED OUTPUT -DC ONLY

Voltage	Mode	Duty Cycle	Current	Volts at Rated Current
110V	MIG	60%	135A	20.8V
		100%	104A	19.2V
110V	MMA	60%	135A	25.4V
		100%	104A	24.2V
110V	TIG	60%	135A	15.4V
		100%	104A	14.2V

OUTPUT RANGE

Voltage	Mode	Open Circuit Voltage	Welding Current Range	Welding Voltage Range
110V	MIG	82V	30A-135A	15.5V-20.8V
110V	MMA	82V	20A-135A	20.8V-25.4V
110V	TIG	82V	15A-135A	10.6V-15.4V

APPLICABLE / WELDING WIRE

Drive Rolls	Size	Wire Type
W Type	0.8-0.9mm (0.030in.-0.035in.)	Flux Cored Wire

APPLICABLE / WELDING ROD

Size	1.6mm (1/16")	2.0mm (5/64")	2.5mm (3/32")	3.2mm (1/8")
Welding Current Range	30-50A	40-60A	60-100A	80-135A

TEMPERATURE RANGE

Operating Temperature Range	-10°C--+40°C (14°F-104°F)
Storage Temperature Range	-25°C--+55°C (-13°F-131°F)

PHYSICAL DIMENSIONS

Model	Length	Width	Height	Weight
MIG-135PRO	13.6in (345mm)	6.6in (167mm)	11.15in (283mm)	10.45lbs (4.75kg)

DUTY CYCLE

The rated duty cycle refers to the amount of welding that can be done within an amount of time. The MIG-135PRO has a duty cycle of 60% at 135A. If welding at 135A with a 60% duty cycle, within a 10 minute block of time you can weld for 6 minutes with 4 minutes of cooling for the welder. If the duty cycle is exceeded, the welder will automatically shut off, however the fan will continue running to cool the components. When a safe temperature has been reached, the welder will automatically switch the welder output back on, To increase the duty cycle you can turn down the voltage output control.

CONTROL AND DISPLAY PANEL



1. Voltage/Plate Thickness/Spot Time Display

Display the voltage value in Manual MIG/SYN welding

Display the plate thickness in MMA(stick), Lift-TIG welding

Display the Spot time MIG welding

2. Amperage/ Wire Feeding Speed Display

Display welding current in SYN MIG/ MMA(stick)/ Lift-TIG welding

Display wire feeding speed (inch/min) in Manual MIG

Display hot start value, arc force value, VRD ON/OFF in MMA(stick) welding

3. Weld Mode

Select welding modes Manual **MIG**, **Synergic MIG**, **MMA(Stick)**, **Lift TIG**

4. MIG Welding Wire Diameter

Select diameter of flux core welding wire .030"(0.8mm)/.035"(0.9mm)/.040"(1.0mm)/.045"(1.2mm)

5. MIG Torch Steps Mode

Select welding step mode of 2T or 4T or SPOT

Note: 2T provides weld power only while the trigger switch is depressed

4T Trigger interlock mode eliminates the need to hold the gun trigger while welding

6. Adjust Knob

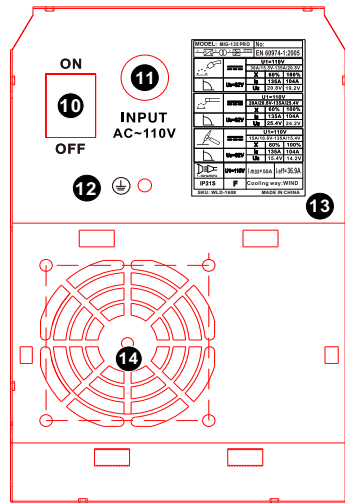
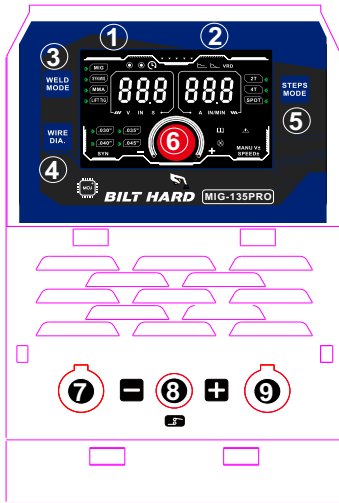
Adjust Manual MIG/ SYN MIG Volatage, Spot time

Adjust Manual MIG wire feeding speed

Adjust Current in SYN MIG/MMA(Stick)/Lift-TIG welding

Adjust hot start value, arc force value, VRD ON/OFF

LAYOUT



- 1.Voltage/ Plate Thickness/Spot Time Display
- 2.Amperage/Wire Feeding Speed Display
3. Weld Mode Options
4. Wire Diameter Options
5. Steps Mode Options
6. Adjust Knob
7. MIG Gun Socket/ Negative Output Terminal
8. Control Switch Socket
9. Positive Output Terminal

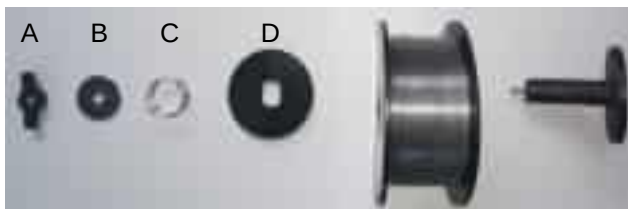
10. Power Switch
11. Input power Cable
12. Earth Pin
13. Nameplate
14. Fan



15. Wire Spool Spindle
16. Wire Feeder

INSTALLING WELDING WIRE SPOOL

D100 WIRE SPOOL



1. Open the side door of the welder.
2. Unscrew and remove wing nut (A), spacer (B), spring (C) and spacer (D) from the spool spindle, store these someplace safe.
3. Place the D100 (4") Wire Spool onto the spindle.
4. Reinstall the spacer(D), spring(C), spacer (B) and the wing nut (A), Tighten the wing nut till there is a slight resistance to spin the wire spool on the spindle. If the tension is loosely set, the wire spool will spin on the shaft and un-spool all of the wire. If the tension is tightly set, the drive roller will have difficulty feeding the wire, and may cause slipping.

NOTE: Hold the exposed wire end to keep the spool visible.

CHANGING THE DRIVER ROLLER

Select a suitable filler wire according to process being used(W type drive roll for gasless flux cored welding). The wire diameter must be matched to the drive roll, the liner and contact tip.

Open the side panel of wire feeder and mount the wire spool post. The end of the wire must be at the bottom of the wire spool, opposite wire feeder inlet guide tube.

The spool post is fitted with a brake, the wing nut in the centre of the spool post adjusts the brake tension. Pull the wire from the reel by hand and adjust the tension to provide some drag clockwise will increase the braking and anticlockwise reduces it.

Release the wire tensioning device on the drive rolls, insert the filler wire and into the inlet guide tube of wire feeder, align wire with the drive roll groove and feed a short length into the torch connector so that it protrudes out of the front panel, then replace the tensioner over the wire. (The filler wire can be feed through the torch cable once the input power is switched on pressing the trigger of MIG gun.)

(SEE FIG.1 And FIG.2)

FIG.1

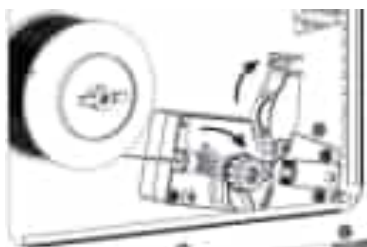
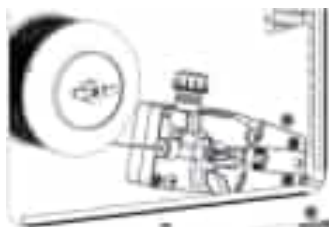


FIG. 2



INSTALLATION

⚠ DANGER ELECTRIC SHOCK HAZARD!

Turn welder off and unplug from electrical outlet before disassembly, assembly, or replacing torch consumables, or changing wire spool.

INSTALLATION OF MIG GUN, WORK CLAMP AND ELECTRODE HOLDER

1. MIG/SYN MIG Welding

Insert the terminal connection of MIG gun through MIG gun Connector ()

Insert the wire drive polarity lead through the negative hole (-).

Insert the terminal connection of the work clamp through the positive hole (+).



FIG.3

2. MMA (Stick) Welding

Insert the terminal connection of the work clamp through the negative hole (-).

Insert the terminal connection of the electrode holder through the positive hole (+).

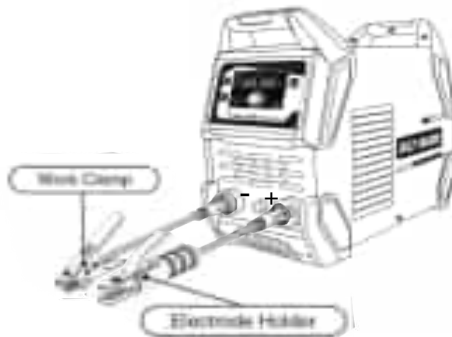


FIG.4

3. Lift TIG Welding

Insert the terminal connection of the work clamp through the positive hole (+).

Insert the terminal connection of the lift TIG torch (Not included in the machine) through the negative hole (-).

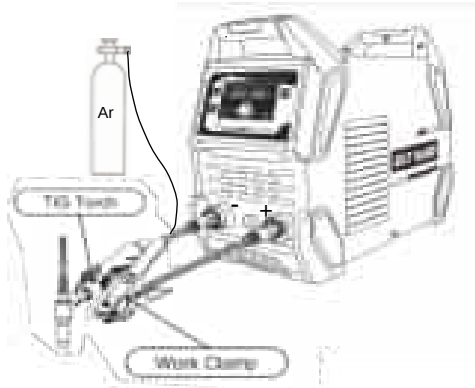


FIG.5

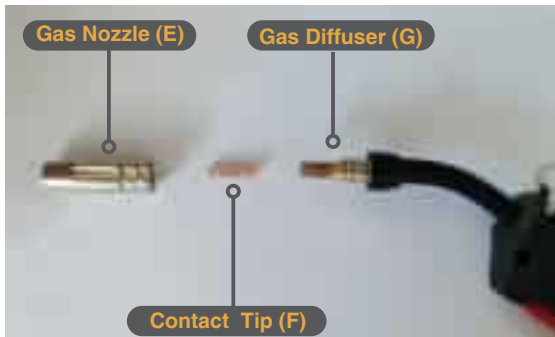
WELDING PARAMETERS

FLUX MIG	.030" 0.8mm	Workpiece Thickness	.040"(.1.0mm)	.059"(.1.5mm)	5/64"(2.0mm)	3/32"(2.5mm)
		Wire Feeding Speed	168	251	307	360
		Welding Voltage V	13.8	16.1	17.6	18.5
		Welding Current A	63	94	115	135
	.035" 0.9mm	Workpiece Thickness	.040"(.1.0mm)	.059"(.1.5mm)	5/64"(2.0mm)	3/32"(2.5mm)
		Wire Feeding Speed	110	164	201	236
		Welding Voltage V	14.7	15.9	16.6	17.7
		Welding Current A	63	94	115	135
	.040" 1.0mm	Workpiece Thickness	.040"(.1.0mm)	.059"(.1.5mm)	5/64"(2.0mm)	3/32"(2.5mm)
		Wire Feeding Speed	97	145	177	208
		Welding Voltage V	14.7	15.9	16.6	17.7
		Welding Current A	63	94	115	135
	.045" 1.2mm	Workpiece Thickness	.040"(.1.0mm)	.059"(.1.5mm)	5/64"(2.0mm)	3/32"(2.5mm)
		Wire Feeding Speed	81	120	147	172
		Welding Voltage V	14.7	15.9	16.6	17.7
		Welding Current A	63	94	115	135

TIG	Tungsten Needle	.040"(.1.0mm)		1/16" (.1.6mm)
	Workpiece Thickness	1/32"(0.8mm)	.059"(.1.5mm)	.059"(.1.5mm)
	Welding Current A	20~40	50~80	90~135

MMA	Welding Rod	3/32" (.2.4mm)	1/8"(3.2mm)
	Workpiece Thickness	.059"(.1.5mm)	.118"(3.0mm)
	Welding Current A	60	100-135

INSTALLING MIG GUN



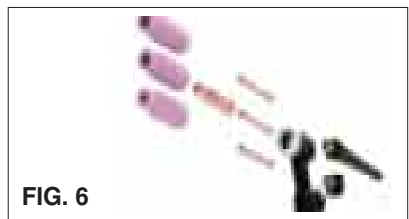
1. Remove the gas nozzle (E) and contact tip (F) from the end of the gun assembly.
2. Choose the matched contact tip according to the diameter of the welding wire you use.
3. Press the WIRE DIA. button ④ (refer to page 6) on the panel to feed the wire through the gun assembly. or press the gun trigger to feed the wire through the gun assembly.
4. When at least one inch of wire sticks out past the end of the gun, release the button or gun trigger.
5. Slide the contact tip (F) over the wire protruding from the end of the gun.
6. Install the gas nozzle (E) on the gun assembly.

INSTALLING LIFT-TIG GUN

Assembly: (FIG. 6)

- Select a Collet body that matches your Tungsten diameter size and thread it into the front of the Torch.
- Select a Collet that matches your Tungsten diameter size. Insert the Tungsten into the Collet and put the Collet and Tungsten back into the Torch.
- The Gas Shielding Nozzle size should be changed according to shielding gas requirements for the material being welded. Thicker material requires a large Nozzle. Select the correct Gas Shielding Nozzle and thread it onto the Collet body.

Install the back cap to lock the tungsten in place. Always make sure the tungsten protrudes 1/8" to 1/4" beyond the gas shielding nozzle (FIG. 7).



SHARPENING THE TUNGSTEN

To avoid contamination of the tungsten and ultimately the weld, it is imperative to have a dedicated grinding wheel used for tungsten grinding only. A fine grit standard 6" synthetic stone grinding wheel on a bench top grinder is sufficient.

- Shut off the welder.
- Make sure the tungsten and torch are sufficiently cooled for handling then loosen and remove the back cap then the collet and remove the tungsten from the FRONT of the torch only. (Removing from the rear will damage the collet).
- If the tungsten is used and the end is contaminated, use pliers or a suitable tool to grip the tungsten above the contaminated section and snap off the end of the Tungsten.
- Holding the tungsten tangent to the surface of the grinding wheel, rotate the tungsten while exerting light pressure until a suitable point is formed. The ideal tip will have the length of the conical portion of the sharpened area at 2-1/2 times the tungsten rod diameter (**FIG. 8**).
- Replace the tungsten in the collet with the tip extending 1/8"-1/4" beyond the gas shielding nozzle, then re-tighten the back cap (**FIG. 9**).

FIG. 8



FIG. 9



OVERLOAD PROTECTION

Your BILT HARD MIG-135 PRO Welder is equipped with overheat and overcurrent breaker. These device will protect your Welder if the temperature or current exceeded, the internal breaker will trip and stop power supply to the drive motor although the fan will still run to cool the unit. If the breaker tripped resulting from an over-current, the Indicator will illuminate E1, If resulting from an over-heat, the Indicator will illuminate E2. Allow the Welder to cool for 5 to 10 minutes before attempting to resume welding.

MIG/SYN MIG WELDING OPERATION

After installing MIG torch and Work clamp as FIG.3

Install welding wire, and then turn on the power switch. The power indicator is on and fan works. Press the gun trigger till the wire extends to the nozzle. (The nozzle may need to be removed from the gun to allow this function).

1) Press button ③ to choose welding mode to Manual MIG/ Synergic MIG.

2) Press button ④ to choose diameter of welding wire.

Note: This MIG welder can use .030"(0.8mm)/ .035"(0.9mm)/ .040"(1.0mm) / .045"(1.2mm) flux welding wire

3) Press button ⑤ to choose 2T/4T/SPOT mode.

Note: 2T provides weld power only while the trigger switch is depressed. 4T Trigger inter-lock mode eliminates the need to hold the gun trigger while welding.

4) Rotate the knob ⑥ to adjust the voltage as you need.

5) Rotate the knob ⑥ to adjust the output current, time, wire feeding speed, adjust the inductance as you need. Increasing inductance produces a more fluid, softer arc. Decreasing inductance produces a stiffer arc. also use knob ⑥ to adjust Burn back time/Spot time in Manual&Synergic MIG welding.

When wire feeding, keep the cable straight.

When wire feeding, make sure the wire is located on the drive roll groove and the feeding speed should be smooth. if the wirefeeding speed is not smooth, adjust the tension of the drive roll. Adjust the welding current and welding voltage to match the wire being used. Point the wire into the joint to be welded, press down the gun trigger, the wire feeds automatically. The arc is started once the wire is touched the work piece.

MMA (STICK) WELDING OPERATION

After installing Electrode Holder and Work clamp as FIG.4

1) Press button ③ to choose welding mode on Stick.

2) Rotate the knob ⑥ to adjust the current as you need.

3) Press button ⑥ to switch the Hot Start/ VRD/ Anti Stick function, rotate the knob ⑥ to adjust the value.

LIFT TIG WELDING OPERATION

After installing Lift TIG Torch and Work clamp as FIG.5

Turn on the gas regulator on the gas cylinder, the gas pressure is shown on the gauge.

Press button ① to choose welding mode on Lift TIG.

Set the welding amperage with the Amp knob ⑥ as you need..

Turn the gas valve located on the TIG torch to start the flow of shielding gas.

Touch the tungsten electrode to the work piece, then lift the tungsten and the welding arc

will start, To stop welding lift TIG torch away from the work piece.. Turn the gas valve located on the TIG torch off to stop the flow of shielding gas.

All above ①②③④⑤⑥ refer to page 6

TYPES OF WELD JOINTS



BUTT WELD

Joint between two pieces that are laying in the same direction.



CORNER WELD

Joint between two pieces that meet at or near perpendicular at their edges.



EDGE WELD

Joint between two pieces where the edges are being joined.



LAP WELD

Joint between two overlapping pieces.



TEE WELD

Joint between two pieces where one is perpendicular to the other.



PLUG WELD

Joint two overlapping pieces by filling in a hole punched in the top piece.

MMA (STICK) WELD TROUBLESHOOTING

While welding, keep the ignited end of the electrode closer to the weld joint.

Adjust the current on the front of the welder to a lower current setting.

Adjust the current on the front of the welder to a higher current setting.

Excessive Penetration	High Voltage	Adjust voltage output to lower setting.
	Fast Wire Speed	Adjust wire speed to slower setting.
	Slow Gun Travel	Increase your travel speed with the Welding Gun.
Warping	Lack of Tack Welds	Tack weld the pieces in multiple areas to keep the pieces from pulling apart.
	No Clamping	Use welding clamps to secure the pieces in the proper shape.
	Poor Technique	To prevent warping, allow the workpiece to cool after welding small sections at a time. Move your welding areas around by not completing all the welding in one section all at once, rather, welding a small amount in one area and then move to another section area to spread out the heat in the piece.
Wire feeding works but no arc start	Bad ground or loose ground connection	Check connection of the ground cable to the work clamp. Tighten cable connection to work clamp if needed. Ensure that the connection between the work clamp and workpiece is good and is on clean, bare (not painted or rusted) metal.
	Trigger not pulled while wire is in contact with workpiece	Pull the trigger while in contact with the workpiece. The machine does not arc unless the trigger is pulled.
Arc works but not feeding wire	No pressure on the drive roller; insufficient or excessive pressure on the drive roller	Adjust the drive pressure.
	Wire spool is empty	Check if wire is in place and replace if necessary.
No arc or wire feed. Fan operates normally (can be heard)	Gun trigger is not being pulled or is not making contact	Pull the trigger while in contact with the workpiece. The machine does not arc unless the trigger is pulled. Depress the trigger ALL THE WAY until the trigger stops moving into the gun.
	Exceeded duty cycle; thermal protector engaged	Allow welder to cool 5 to 10 minutes with machine ON (observe and maintain proper duty cycle). OVERHEAT INDICATOR should turn off after the machine has cooled.
	Insufficient air flow causing machine to overheat before reaching duty cycle	Check for obstructions blocking air flow and ensure that there are 12 inches of clearance between any obstacles and the vents on all sides of the machine.

No arc or wire feed. Fan does not operate (cannot be heard)	No voltage or incorrect voltage supplied to welder	Make sure the machine is plugged in. Check the status of your INPUT VOLTAGE INDICATOR LED. It should be illuminated. Check the voltage of your outlet. If it is 10% more or less than optimal, call a qualified electrician.
	ON/OFF SWITCH is in the OFF position	Turn the ON/OFF SWITCH to the ON position.
	Circuit breaker has been tripped	Make sure the circuit breaker has been reset.
Poor quality welds	Insufficient gas at weld area	Check that the gas is not being blown away by drafts and, if so, move to a more sheltered weld area. If not, check gas cylinder contents, gauge, regulator setting, and operation of gas valve.
	Rusty, painted, oily or greasy workpiece	Ensure workpiece is clean and dry.
	Poor ground connection or torch/electrode connection	Check work clamp/workpiece connection and all connections to the machine.
	Incorrect settings	Check welding parameters and polarity.
Work clamp, ground cable, and/or welding cable get hot	Bad ground or loose ground connection	Check the connection of the work clamp and gun to the machine. Check the connection of the MIG Gun. Check connection of the ground cable to the work clamp. Tighten cable connection to work clamp if needed. Ensure the contact between the work clamp and workpiece is good and on a clean, bare metal surface. Make sure the cable is not damaged.
Gun nozzle arcs to work surface	Spatter or Slag build-up inside nozzle or nozzle is clogged	Clean or replace nozzle as needed.
Wire burns back to contact tip	Wire feed speed is set too low for voltage setting being used	Increase wire feed speed (turn left knob clockwise).
	Stick-out too short	Increase stick-out (the amount the wire extends past the contact tip).
	Wrong size contact tip	Use correct size contact tip.
	Contact tip is clogged or damaged	Replace contact tip.
	Burn back time setting is too long	Reduce the burn back time setting.

TIG WELDING TROUBLESHOOTING

PROBLEM	CAUSE	CORRECTION
Arc is Triggered but Will Not Start	Incomplete Circuit	Check Ground connection. Make sure that the ground is on a freshly cleaned surface and close to the welding area. It is suggested to weld towards the ground connection.
	Incorrect Tungsten	Consult chart for proper Tungsten for the base metal being welded. In most cases Thoriated will be used for all steels.
	No Shielding Gas	Make sure the shielding gas cylinder is turned all the way open and set at the correct flow rate.
Arc wanders and it is Hard to Concentrate Heat in a Specific Area	Poorly Prepped Tungsten	Follow guidelines for prepping Tungsten.
	Poor Gas Flow	Adjust the flow rate of the shielding gas (refer to settings chart). Check for loose fittings where gas could be leaking.
	Contaminated Tungsten	Remove Tungsten from Torch, break off contaminated section, and resharpen.
	Incorrect Arc Length	Make sure the Tungsten is held 1/8 to 1/4 inch off the work piece.
	Incomplete Circuit	Check Ground connection. Make sure that the ground is on a freshly cleaned surface and close to the welding area. It is suggested to weld towards the ground connection.
	Contaminated Base Metal	Clean base metal making sure to remove any oil, debris, coatings, or moisture. If base metal is aluminum make sure all of the oxide is removed using either a dedicated stainless brush or flap wheel.
Porosity in Weld Bead	Poor Gas Flow	Adjust the flow rate of the shielding gas. Check for loose fittings where gas could be leaking.
	Contaminated Filler Metal	Clean filler metal making sure to remove any oil, debris, or moisture.
	Contaminated Filler Metal	Clean base metal making sure to remove any oil, debris, coatings, or moisture.
	Contaminated Base Metal	Make sure to be in an area with no wind and with any fans turned off. Wind or fans will blow the shielding gas away from the weld causing porosity.
	Poor Shielding	Adjust the Tungsten so that 1/8 to 1/4 inch protrudes from the Collet.
Contamination in Weld Bead	Contamination Tungsten	Remove Tungsten from Torch and break off contaminated section and resharpen.
	Contaminated Filler Metal	Clean filler metal making sure to remove any oil, debris, or moisture.

	Contaminated Base Metal	Clean base metal making sure to remove any oil, debris, coatings, or moisture. If base metal is cold rolled steel make sure to remove any mill scale.
Melting Tungsten	Poor Gas Flow	Adjust the flow rate of the shielding gas. Check for loose fittings where gas could be leaking.
	Wrong Size Tungsten	Increase Tungsten diameter. Refer to chart for proper sizing.
	Incorrect Shielding Gas	Only use 100% Argon when TIG Welding.
Poor Penetration	Low Voltage	Voltage setting is too low for material/thickness. Increase as needed.
Tungsten Contaminated	Contact of Tungsten with Base Metal	Keep Tungsten 1/8 to 1/4 inch from the base metal. If Tungsten comes in contact break off end and resharpen immediately.
Poor Weld Appearance	Incorrect Positioning	The angle between the filler metal and the Torch must be less than 90 degrees otherwise the filler metal will prematurely melt and glob off causing poor weld appearance.
Crater in the End of the Weld Bead	Insufficient Shielding	Keep the Torch on the base metal while the post flow shielding gas flows to protect and cool the metal and Tungsten.
	Not Enough Filler Material	Reduce current and add more filler at end of weld. It may also be beneficial to back step to ensure no crater will form.
Weld Bead is Cracking	Too Much Heat in Material	Reduce heat and allow more time between passes.
	Base Metal is Absorbing Too Much Heat	Preheat base metal (consult welding codes for requirements)
	Incorrect Filler Wire	Use appropriate filler wire type and diameter for the joint being welded.
Material is Warping	Insufficient Clamping	Clamp work piece tightly and weld while clamps are in place.
	Insufficient Tack Welds	Add more tack welds until rigidity and stiffness is developed.
	Too Much Heat in Material	To reduce heat it is best to spread the welding out around the area. This can be done by using stitch welding techniques, alternating sides, and/or taking your time and allowing the pieces to cool between passes.

BILT HARD