MODEL T34312
50A PLASMA CUTTER
OWNER'S MANUAL
(For models manufactured since 08/24)



⚠ WARNING!

This manual provides critical safety instructions on the proper setup, operation, maintenance, and service of this machine/tool. Save this document, refer to it often, and use it to instruct other operators.

Failure to read, understand and follow the instructions in this manual may result in fire or serious personal injury—including amputation, electrocution, or death.

The owner of this machine/tool is solely responsible for its safe use. This responsibility includes but is not limited to proper installation in a safe environment, personnel training and usage authorization, proper inspection and maintenance, manual availability and comprehension, application of safety devices, cutting/sanding/grinding tool integrity, and the usage of personal protective equipment.

The manufacturer will not be held liable for injury or property damage from negligence, improper training, machine modifications or misuse.

⚠ WARNING!

Some dust created by power sanding, sawing, grinding, drilling, and other construction activities contains chemicals known to the State of California to cause cancer, birth defects or other reproductive harm. Some examples of these chemicals are:

- **Lead from lead-based paints.**
- **Crystalline silica from bricks, cement and other masonry products.**
- **Arsenic and chromium from chemically-treated lumber.**

Your risk from these exposures varies, depending on how often you do this type of work. To reduce your exposure to these chemicals: Work in a well ventilated area, and work with approved safety equipment, such as those dust masks that are specially designed to filter out microscopic particles.

MACHINE DATA SHEET

Customer Service #: (570) 546-9663 · To Order Call: (800) 523-4777 · Fax #: (800) 438-5901

MODEL T34312 50A PLASMA CUTTER

Product Dimensions:

Weight	11 lbs.
Width (side-to-side) x Depth (front-to-back) x Height	6 x 14-1/2 x 11-1/2 in.

Shipping Dimensions:

Type	Cardboard
Content	Machine
Weight	19 lbs.
Length x Width x Height	20 x 15 x 11 in.

Electrical:

Power Requirement	110V or 220V, Single-Phase, 60 Hz
Prewired Voltage	220V
Minimum Circuit Size	20A at 110V, 50A at 220V
Output Current Range (110V)	20 - 50A
Output Current Range (220V)	20 - 50A
Output Voltage Range (110V)	88 - 100V
Output Voltage Range (220V)	88 - 100V
Duty Cycle (110V)	40% @ 50A
Duty Cycle (220V)	60% @ 50A
Power Cord Length	60 in.
Power Cord Gauge	16 AWG
Included Plug Type (220V)	6-50P
Included Plug Adapter (110V)	5-15
Switch Type	ON/OFF Switch

Operation Information:

Minimum Material Thickness	5/16 in.
Maximum Material Thickness	3/8 in.
Torch Cable Length	180 in.
Ground Cable Length	60 in.
Air Requirement	72-1/2 PSI

Other Specifications:

Country of Origin	China
Warranty	1 Year
Approximate Assembly & Setup Time	15 Minutes
Serial Number Location	Machine ID Label
Housing Protection Class	IP21S

Features:

Dual Voltage w/Included Plug Adapter
Adjustable Amperage Setting
High-Frequency Start
3/8" Cutting Capacity
Capable of Cutting Steel, Stainless Steel, and Aluminum
Air Separator
Pressure Regulator

For Your Own Safety, Read Instruction Manual Before Operating This Machine

The purpose of safety symbols is to attract your attention to possible hazardous conditions. This manual uses a series of symbols and signal words intended to convey the level of importance of the safety messages. The progression of symbols is described below. Remember that safety messages by themselves do not eliminate danger and are not a substitute for proper accident prevention measures. Always use common sense and good judgment.

⚠DANGER **Indicates an imminently hazardous situation which, if not avoided, WILL result in death or serious injury.**

⚠WARNING **Indicates a potentially hazardous situation which, if not avoided, COULD result in death or serious injury.**

⚠CAUTION **Indicates a potentially hazardous situation which, if not avoided, MAY result in minor or moderate injury. It may also be used to alert against unsafe practices.**

NOTICE **Alerts the user to useful information about proper operation of the machine to avoid machine damage.**

Safety Instructions for Machinery

⚠WARNING

OWNER'S MANUAL. Read and understand this owner's manual BEFORE using machine.

TRAINED OPERATORS ONLY. Untrained operators have a higher risk of being hurt or killed. Only allow trained/supervised people to use this machine. When machine is not being used, disconnect power, remove switch keys, or lock-out machine to prevent unauthorized use—especially around children. Make your workshop kid proof!

DANGEROUS ENVIRONMENTS. Do not use machinery in areas that are wet, cluttered, or have poor lighting. Operating machinery in these areas greatly increases the risk of accidents and injury.

MENTAL ALERTNESS REQUIRED. Full mental alertness is required for safe operation of machinery. Never operate under the influence of drugs or alcohol, when tired, or when distracted.

ELECTRICAL EQUIPMENT INJURY RISKS. You can be shocked, burned, or killed by touching live electrical components or improperly grounded machinery. To reduce this risk, only allow qualified service personnel to do electrical installation or repair work, and always disconnect power before accessing or exposing electrical equipment.

DISCONNECT POWER FIRST. Always disconnect machine from power supply BEFORE making adjustments, changing tooling, or servicing machine. This prevents an injury risk from unintended startup or contact with live electrical components.

EYE PROTECTION. Always wear ANSI-approved safety glasses or a face shield when operating or observing machinery to reduce the risk of eye injury or blindness from flying particles. Everyday eyeglasses are NOT approved safety glasses.

⚠WARNING

WEARING PROPER APPAREL. Do not wear loose clothing, gloves, neckties, or jewelry that can become entangled in moving parts. Always tie back or cover long hair. Wear non-slip footwear to reduce risk of slipping and losing control or accidentally contacting cutting tool or moving parts.

HAZARDOUS DUST. Dust created by machinery operations may cause cancer, birth defects, or long-term respiratory damage. Be aware of dust hazards associated with each workpiece material. Always wear a NIOSH-approved respirator to reduce your risk.

HEARING PROTECTION. Always wear hearing protection when operating or observing loud machinery. Extended exposure to this noise without hearing protection can cause permanent hearing loss.

REMOVE ADJUSTING TOOLS. Tools left on machinery can become dangerous projectiles upon startup. Never leave chuck keys, wrenches, or any other tools on machine. Always verify removal before starting!

USE CORRECT TOOL FOR THE JOB. Only use this tool for its intended purpose—do not force it or an attachment to do a job for which it was not designed. Never make unapproved modifications—modifying tool or using it differently than intended may result in malfunction or mechanical failure that can lead to personal injury or death!

AWKWARD POSITIONS. Keep proper footing and balance at all times when operating machine. Do not overreach! Avoid awkward hand positions that make workpiece control difficult or increase the risk of accidental injury.

CHILDREN & BYSTANDERS. Keep children and bystanders at a safe distance from the work area. Stop using machine if they become a distraction.

GUARDS & COVERS. Guards and covers reduce accidental contact with moving parts or flying debris. Make sure they are properly installed, undamaged, and working correctly BEFORE operating machine.

FORCING MACHINERY. Do not force machine. It will do the job safer and better at the rate for which it was designed.

NEVER STAND ON MACHINE. Serious injury may occur if machine is tipped or if the cutting tool is unintentionally contacted.

STABLE MACHINE. Unexpected movement during operation greatly increases risk of injury or loss of control. Before starting, verify machine is stable and mobile base (if used) is locked.

USE RECOMMENDED ACCESSORIES. Consult this owner's manual or the manufacturer for recommended accessories. Using improper accessories will increase the risk of serious injury.

UNATTENDED OPERATION. To reduce the risk of accidental injury, turn machine ***OFF*** and ensure all moving parts completely stop before walking away. Never leave machine running while unattended.

MAINTAIN WITH CARE. Follow all maintenance instructions and lubrication schedules to keep machine in good working condition. A machine that is improperly maintained could malfunction, leading to serious personal injury or death.

DAMAGED PARTS. Regularly inspect machine for damaged, loose, or mis-adjusted parts—or any condition that could affect safe operation. Immediately repair/replace BEFORE operating machine. For your own safety, DO NOT operate machine with damaged parts!

MAINTAIN POWER CORDS. When disconnecting cord-connected machines from power, grab and pull the plug—NOT the cord. Pulling the cord may damage the wires inside. Do not handle cord/plug with wet hands. Avoid cord damage by keeping it away from heated surfaces, high traffic areas, harsh chemicals, and wet/damp locations.

EXPERIENCING DIFFICULTIES. If at any time you experience difficulties performing the intended operation, stop using the machine! Contact our Technical Support at (570) 546-9663.

Additional Safety for Welders

⚠WARNING

Serious injury, burns, electric shock, or death can occur from misuse of the welder. Welding fumes can cause suffocation or poisoning if operating in an enclosed space. Arc rays can cause eye injury. Sparks and spatter can cause nearby flammable materials to ignite. To reduce the risks of welding, anyone operating this machine MUST completely heed the hazards and warnings below.

WELDING FUMES. Breathing welding fumes can cause suffocation or poisoning without warning. Keep your head out of welding fumes. Use adequate ventilation at arc to safely remove fumes from your breathing zone and general area. Use ANSI-approved respirators recommended for type of welding operation. Protect others from these fumes.

ELECTRIC SHOCK. Connect welder to power source with approved earth ground. Make sure all electrical connections are tight, clean, and dry. Connect workpiece to approved earth ground. Work lead is NOT a ground connection and is to be used only to complete working welding circuit. Welding in wet and humid conditions drastically increases risk of electrical shock.

PREVENT FIRES. Keep welding work zones clear of flammable liquids, such as gasoline and solvents; combustible solids, such as paper and wood; and flammable gases, such as acetylene and hydrogen. Provide approved fire barriers and fire extinguishing equipment for welding zone of at least 35' radius. Stay alert for sparks and spatter thrown into cracks and crevices that can start smoldering fire.

HANDLING GAS CYLINDERS. Regardless of content, pressurized gas cylinders can explode. Always secure protector cap in place over outlet valve assembly when moving cylinder. Broken valve could release pressurized contents and cause cylinder to be hurled about at dangerously high speeds, causing serious property damage, personal injury, or death. Always use safe methods when moving gas cylinders. Secure gas cylinder to wall or approved cylinder cart with chain before using or storing.

PROTECTING GAS CYLINDERS. Excessive heat can cause pressurized gas to expand and explode cylinder. Never weld on gas cylinder. Damaging cylinder can cause cylinder to crack and explode. Exploding pressurized gas cylinders can cause serious property damage, personal injury, or death.

WORK AREA. Keep working area clear of any material not involved in welding operation. Keep all equipment, workpieces, and work surfaces clean, dry, and free of entanglements. Keep lead cables organized and away from your body.

WORKPIECE. Take proper precautions and think about workpiece you are welding on. Welding certain treated metals, such as galvanized steel, can create severely toxic fumes. DO NOT weld, burn, or heat sealed or pressurized containers. Observe specific guidelines when welding workpiece to ensure safe practice has not been overlooked.

ARC BURNS, SPARKS, SPATTER, AND HOT MATERIALS. Welding without complete and approved body protection can cause severe damage to eyes and body. Wear non-flammable protective clothing, welding gloves, cap, long-sleeve shirt, cuffless pants, and leather boots. DO NOT wear jewelry or frayed clothing. Use welding helmet with correct shade of filter for operation. Protect bystanders and property in working zone from exposure to arc radiation, sparks, and spatter. Welding operations create extreme amounts of heat. Make sure to allow for cooling before handling welded materials.

WELDING IN CONFINED SPACES. Always open all covers, sustain forced ventilation, remove toxic and hazardous materials, and provide a power disconnect to the welder inside the work space. Always work with someone who can give you help from outside the space. Welding can displace oxygen. Always check for safe breathing atmosphere and provide air-supplied respirators if necessary. Keep in mind that all normal welding hazards are intensified in a confined space.

ELECTROMAGNETIC FIELDS (EMF). Welding operations create EMF around welding equipment and workpieces. Operators with pacemakers must consult their physician before using this equipment, or being within 50' of welding operations.

Additional Safety for Compressed Air

⚠WARNING

Serious impact injuries can occur from bursting air components. Eyes and other soft tissues can be easily injured by air streams and debris projected by compressed air. To reduce these risks, operator and bystanders MUST completely heed the warnings below.

AIR SUPPLY. Only supply clean, dry, regulated compressed air for plasma torch. Never exceed maximum operating pressure or components may burst and cause injury. Never use oxygen, carbon dioxide, combustible gases, or any bottled gas as air source, as these can explode. DO NOT use compressed air as breathable air supply.

PROPER PPE. Always wear ANSI-approved eye protection and any additional personal protective equipment required by attachment tools. Pneumatic tools can propel objects and debris at high speeds or even explode. Air escaping from pneumatic tools and connections can exceed safe exposure limits and may cause hearing damage with prolonged exposure.

ATTACHMENT AIR TOOLS. DO NOT exceed pressure ratings of attachments as lines and seals may burst. Never use damaged tools—they are more likely to rupture. DO NOT aim compressed air at body parts or people, as it can injure or propel debris into eyes or other soft tissues. Use proper air hose for tool and confirm air hose is long enough to reach work area without stretching. Do not carry attachment tool with hand on trigger to reduce risk of accidental firing. Always relieve line pressure before connecting or disconnecting air supply or tools. Disconnect air supply from plasma torch when not in use.

MODIFICATIONS. DO NOT adjust or remove safety relief valve. Safety relief valve is designed and adjusted for correct tolerances and abilities of machine to keep tank and other components from bursting.

INTEGRITY OF AIR COMPONENTS. Sparks, slag, and flames from operations performed with plasma torch can damage supply air compressor if it is too close. Locate air compressor at least 35 ft. away or use some kind of fire resistant shield to protect it. Inspect air tank, attachment tools, hoses, fittings, and valves for rust, damage, leaks, weakness, looseness, or excessive wear and repair/replace damaged components before operating. Do not attempt to modify, weld on, or repair tank because doing so could cause it to burst. Replace a damaged tank immediately.

DAILY MAINTENANCE. Drain moisture from tank daily to prevent internal corrosion that could weaken tank.

SERVICING. To prevent impact and soft tissue injuries, bleed air from system and disconnect tools and hoses before servicing machine or air components.

LEAVING UNATTENDED. To prevent accidental injury or explosion, disconnect air supply when leaving machine unattended.

Additional Sources for Welding Codes and Standards

American Welding Society, 8669 NW 36 Street, #130, Miami, FL 33166-6672, (305) 443-9353, Website: *www.aws.org*.

—Safety in Welding, Cutting, and Allied Processes, ANSI Standard Z49.1

—Safe Practices for the Preparation of Containers and Piping for Welding, Cutting, and Allied Processes, AWS F4.1

National Fire Protection Association, P. O. Box 9101, 1 Batterymarch Park, Quincy, MA 02169-7471, (617) 770-3000, Website: *www.nfpa.org* and *www.sparky.org*.

—National Electrical Code, NFPA Standard 70

—Standard for Fire Prevention During Welding, Cutting, and Other Hot Work, NFPA Standard 51B

Compressed Gas Association, 8484 Westpark Dr., Ste. 220, McLean, VA 22102, (703) 788-2700, Website: *www.cganet.com*.

—Standard for Safe Handling of Compressed Gases in Containers, CGA Pamphlet P-1

Canadian Standards Association, Standards Sales, 178 Rexdale Blvd., Ontario, Canada M9W 1R3, (416) 747-4000, Website: *www.csa-international.org*.

—Safety in Welding, Cutting, and Allied Processes, CSA Standard W117.2-06

American National Standards Institute (ANSI), 1180 Avenue of the Americas, 10th Fl., New York, NY 10036, (212) 642-4900, Website: *www.ansi.org*.

—Standard for Occupational and Educational Personal Eye and Face Protection Devices, ANSI Z87.1-2020

Occupational Safety and Health Administration (OSHA)

— Code of Federal Regulations, Title 29 Labor, Parts 1910.1 to 1910.1450, available from the U.S. Government Printing Office, Superintendent of Documents, P.O. Box 371954, Pittsburgh, PA 15250-7954, (800) 321-6742, Website: *www.osha.gov*

American Conference of Government Industrial Hygienists (ACGIH), 3640 Park 42 Dr., Cincinnati, OH 45241, (513) 742-2020, Website: *www.acgih.org*.

—Threshold Limit Values and Biological Exposure Indices (Booklet)

National Institute for Occupational Safety and Health (NIOSH), 1090 Tusculum Ave., Cincinnati, OH, 45226, (800) 356-4674, Website: *www.cdc.gov/niosh*

— Safety and Health in Arc Welding and Gas Welding and Cutting, NIOSH Publication No. 78-138

⚠WARNING

DO NOT start machine until all installation and operation instructions have been performed. Operating an improperly set up machine may result in malfunction or unexpected results that can lead to serious injury, death, or machine/property damage.



⚠WARNING

Always wear an ANSI-approved welding helmet, safety goggles, and hearing protection when using this machine.

Power Supply

Availability

Before installing the machine, consider the availability and proximity of the required power supply circuit. If an existing circuit does not meet the requirements for this machine, a new circuit must be installed. To minimize the risk of electrocution, fire, or equipment damage, installation work and electrical wiring must be done by an electrician or qualified service personnel in accordance with all applicable codes and standards.



⚠WARNING

Electrocution, fire, shock, or equipment damage may occur if machine is not properly grounded and connected to power supply.

Full-Load Current Rating

The full-load current rating is the amperage a machine draws at 100% of the rated output power. On machines with multiple motors, this is the amperage drawn by the largest motor or sum of all motors and electrical devices that might operate at one time during normal operations.

Full-Load Current Rating at 220V ..... 50 Amps
Full-Load Current Rating at 110V ..... 20 Amps

The full-load current is not the maximum amount of amps that the machine will draw. If the machine is overloaded, it will draw additional amps beyond the full-load rating.

If the machine is overloaded for a sufficient length of time, damage, overheating, or fire may result—especially if connected to an undersized circuit. To reduce the risk of these hazards, avoid overloading the machine during operation and make sure it is connected to a power supply circuit that meets the specified circuit requirements.

Circuit Information

A power supply circuit includes all electrical equipment between the breaker box or fuse panel in the building and the machine. The power supply circuit used for this machine must be sized to safely handle the full-load current drawn from the machine for an extended period of time. (If this machine is connected to a circuit protected by fuses, use a time delay fuse marked D.)

⚠CAUTION

For your own safety and protection of property, consult an electrician if you are unsure about wiring practices or electrical codes in your area.

Note: *Circuit requirements in this manual apply to a dedicated circuit—where only one machine will be running on the circuit at a time. If machine will be connected to a shared circuit where multiple machines may be running at the same time, consult an electrician or qualified service personnel to ensure circuit is properly sized for safe operation.*

Circuit Requirements for 220V

This machine is prewired to operate on a power supply circuit that has a verified ground and meets the following requirements:

Nominal Voltage 208V, 220V, 230V, 240V
Cycle ..... 60 Hz
Phase ..... Single-Phase
Power Supply Circuit ..... 50 Amps
Plug/Receptacle ..... NEMA 6-50

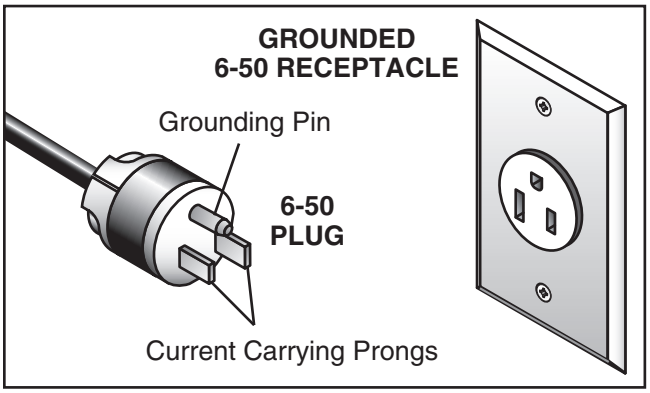


Figure 1. Typical 6-50 plug and receptacle.

Circuit Requirements for 110V Adapter

This machine can be converted to operate on a power supply circuit that has a verified ground and meets the requirements listed below. (Refer to **Voltage Conversion** instructions for details.)

Nominal Voltage 110V, 115V, 120V
Cycle ..... 60 Hz
Phase ..... Single-Phase
Power Supply Circuit ..... 20 Amps
Plug/Receptacle ..... NEMA 5-15

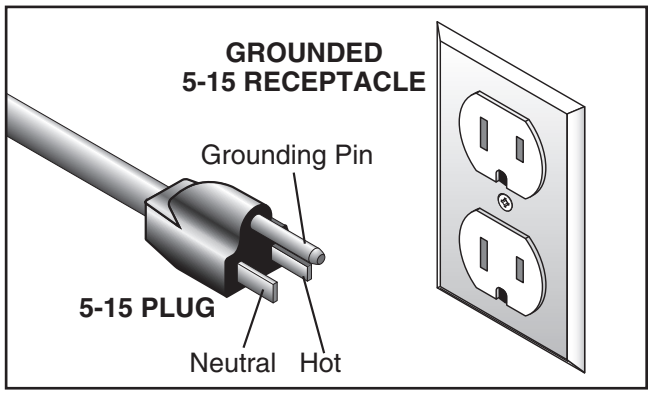


Figure 2. Typical 5-15 plug and receptacle.

Grounding Requirements

This machine MUST be grounded. In the event of certain malfunctions or breakdowns, grounding reduces the risk of electric shock by providing a path of least resistance for electric current.

This machine is equipped with a power cord that has an equipment-grounding wire and a grounding plug. Only insert plug into a matching receptacle (outlet) that is properly installed and grounded in accordance with all local codes and ordinances. DO NOT modify the provided plug!

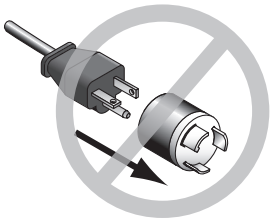
Improper connection of the equipment-grounding wire can result in a risk of electric shock. The wire with green insulation (with or without yellow stripes) is the equipment-grounding wire. If repair or replacement of the power cord or plug is necessary, do not connect the equipment-grounding wire to a live (current carrying) terminal.

Check with a qualified electrician or service personnel if you do not understand these grounding requirements, or if you are in doubt about whether the tool is properly grounded. If you ever notice that a cord or plug is damaged or worn, disconnect it from power, and immediately replace it with a new one.

⚠WARNING

Serious injury could occur if you connect machine to power before completing setup process. DO NOT connect to power until instructed later in this manual.

⚠CAUTION



No adapter should be used with plug. If plug does not fit available receptacle, or if machine must be reconnected for use on a different type of circuit, reconnection must be performed by an electrician or qualified service personnel, and it must comply with all local codes and ordinances.

Extension Cords

We do not recommend using an extension cord with this machine. If you must use an extension cord, only use it if absolutely necessary and only on a temporary basis.

Extension cords cause voltage drop, which can damage electrical components and shorten motor life. Voltage drop increases as the extension cord size gets longer and the gauge size gets smaller (higher gauge numbers indicate smaller sizes).

Any extension cord used with this machine must be in good condition and contain a ground wire and matching plug/receptacle. Additionally, it must meet the following size requirements:

Minimum Gauge Size ..... 10 AWG
Maximum Length (Shorter is Better)..... 50 ft.

Converting Voltage to 110V

To convert the machine to 110V operation, insert the 220V 6-50 plug into the included 110V adapter, then insert the 110V 5-15 plug into a grounded outlet.

Air plasma cutting technology Plasma cutters work by passing an electric arc through an air/gas that is passing through a constricted opening. The gas can be air, nitrogen, argon, oxygen. etc. The electric arc elevates the temperature of the gas to the point that it enters a 4th state of matter. We all are familiar with the first three: i.e.,Solid, liquid, and gas. Scientists call this additional state plasma. As the metal being cut is part of the circuit, the electrical conductivity of the plasma causes the arc to transfer to the work. The restricted opening (nozzle) the gas passes through causes it to squeeze by at a high speed, like air passing through a venturi in a carburetor. This high speed gas cuts through the molten metal.

Plasma cutting was invented as the result of trying to develop a better welding process. Many improvements then led to making this technology what it is today. Plasma cutters provide the best combination of accuracy, speed, and affordability for producing a variety of metal shapes. They can cut much finer, and faster than oxy-acetylene torches.

Part 1: Machine introduction



❶ Current display

The digital Ammeter is used to display the actual output current of the power source.

❷ Power indicator light

Illuminates when the machine is turned ON.

❸ Fault light

Illuminates when the machine is overloaded and the output current is too great.

Allow the machine to cool before continuing operations.

❹ Post flow rate adjustment knob

Adjusts post flow time from 1–15 seconds.

❺ Current adjustment knob

Adjusts current setting.

❻ Torch and gas connection

❼ Cutting gun control socket

Two-core aviation socket, cutting gun trigger switch control connection

❽ Negative welding socket

Work lead socket.

■ **Note: Input voltage is AC 110V or AC 220V**

Part 2: Components

No.	Picture	Name	Qty	Remark
1		T34312	1	Inventory the entire machine and check that all parts are accounted for.
2		SG-55 Plasma Torch	1	5m PT31 plasma torch.
3		Work Lead Clamp	1	2m 10MM2 cable, 300A work lead clamp +10-25mm2 quick-connect plug.
4		Transparent hose	1	3m 8 x 12 transparent network hose.
5		Hose clamps	2	Used to prevent air leakage.
6		SG-55 electrodes	2	Consumable parts. These need to be replace regularly. So keep some on hand.

7		SG-55 nozzles	2	Consumable parts. These need to be replaced regularly. So keep some on hand.
8		Pressure regulator	1	To adjust cutting air pressure.
9		Regulator inlet/outlet connectors	2	For connecting air hose to air valve.
10		220V/110V plug adapter	1	For converting the machine from 220V to 110V operation.
11		SG-55 shielding cups	2	Consumable parts. These need to be replaced regularly. So keep some on hand.

Part 3: Unpacking

Your plasma cutter was carefully packaged at the factory to ensure the highest quality control. When unpacking, separate all the enclosed items from the packaging materials and inspect them for damage.

⚠WARNING

Like all machinery there is potential danger when operating this machine. Accidents are frequently caused by lack of familiarity or failure to pay attention. Use this machine with respect and caution to decrease the risk of operator injury. If normal safety precautions are overlooked or ignored, serious personal injury may occur.

⚠CAUTION

No list of safety guidelines can be complete. Every shop environment is different. Always consider safety first, as it applies to your individual working conditions. Use this and other machinery with caution and respect. Failure to do so could result in serious personal injury, damage to equipment, or poor work results.

PART 4: Machine setup

CAUTION

1. Working Environment

1.1 The environment in which this cutting equipment is installed must be free of grinding dust, corrosive chemicals, flammable gas or materials etc., and at no more than maximum of 80% humidity.

1.2 When using the machine outdoors protect the machine from direct sun light, rain, and snow etc.; the temperature of working environment should be maintained within -14°F to +104°F.

1.3 Keep this equipment distant from the wall.

1.4 Ensure the working environment is well ventilated.

2. Safety Tips

2.1 Ventilation

This equipment is compact in structure, and of excellent performance in amperage output.

The fan is used to dissipate heat generated by this equipment during the cutting operation.

Important: Maintain good ventilation of the louvers on the fan.

The minimum distance between this equipment and any other objects in or near the working area should be 1 ft. Good ventilation is critically important for the normal performance and service life of this machine.

2.2 Thermal Overload protection.

Should the machine be used to an excessive level, in a high temperature environment, in a poorly ventilated area, or if the fan malfunctions, the Thermal Overload Switch will be activated and the machine will cease to operate. Under these circumstances, leave the machine switched ON so the fan will keep running to bring the internal temperature down. The machine will be ready for use again when the internal temperature reaches a safe level.

2.3 Over-Voltage Supply

This machine has automatic voltage compensation, which keeps the machine operating within the correct voltage range. If the power supply voltage should exceed the stipulated value, it is possible to damage the machine. Please ensure your primary power supply meets the specifications shown on the data sheet.

2.4 Do not touch the output terminals while the machine is connected to power. Severe personal injury or death may occur.

3. Maintenance

Exposure to extremely dusty, damp, or corrosive air is damaging to the machine. In order to prevent any possible failure or fault with this machine, clean off dust at regular intervals with clean and dry compressed air.

4. Trouble shooting

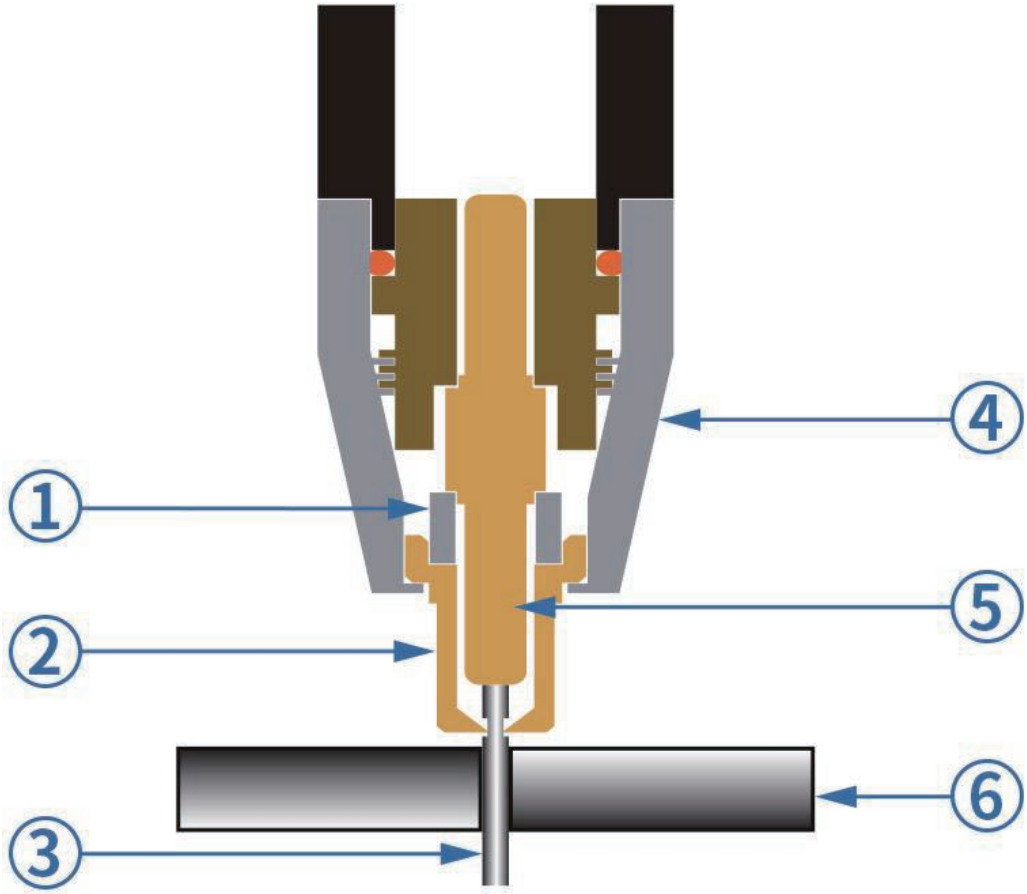
Caution: Only qualified technicians are authorized to repair this plasma cutter equipment. For your safety and to avoid electrical shock, please observe all safety notes and precautions in this manual.

5. How a plasma cutter works

Basic plasma cutters use electricity to superheat air into plasma (the 4th state of matter), which is then blown through the metal to be cut. Plasma cutters require a compressed air supply and AC power to operate.

6. Cutting Operations

1. When the trigger is squeezed, DC current flows through the torch lead into the nozzle.
2. Next, compressed air flows through the torch head, through the air diffuser that spirals the air flow around the electrode and through the hole of the cutting nozzle.
3. A fixed gap is established between the electrode and the nozzle. (The power supply increases voltage in order to maintain a constant current through the joint.) Electrons arc across the gap, ionizing and super heating the air, creating a plasma stream.
4. Finally, the regulated DC current is switched so that it no longer flows to the nozzle but instead flows from the electrode to the workpiece. Current and airflow continue until cutting is stopped.



1. Ring 2. Nozzle 3. Plasma Stream 4. Shield Cup 5. Electrode 6. Workpiece

Notes:

The nozzle and electrode require periodic replacement. The electrode has an insert of tough, highly conductive material such as hafnium or cerium. This insert erodes with use. Also, the nozzle orifice will erode with use. Quality of the air used is paramount to longer life of electrodes and nozzles. Toward this end, we highly recommend using a plasma air filter.

7. What kinds of materials can plasma cut?

Virtually any metal can be plasma cut, including steel, stainless steel, aluminium, brass, copper, etc. Any thickness from 5/16"–3/8" can be cut, depending on the power of the plasma cutter and the thickness of the workpiece material.

8. How does plasma cutting compare to oxy-fuel (gas) cutting?

Plasma cutting can be performed on any type of conductive metal: mild steel, aluminium and stainless are some examples. With mild steel, operators will experience faster, thicker cuts than with alloys. Oxy-fuel cuts by burning or oxidizing the metal it is severing. It is therefore limited to steel and other ferrous metals which support the oxidizing process. Metals like aluminium and stainless steel form an oxide that inhibits further oxidization, making conventional oxy-fuel cutting impossible. Plasma cutting, however, does not rely on oxidation to work and thus it can cut aluminium, stainless and any other conductive material. While different gasses can be used for plasma cutting, most people today use compressed air for the plasma gas. In most shops, compressed air is readily available, and thus plasma does not require fuel gas and compressed oxygen for operation. Plasma cutting is typically easier for the novice to master, and on thinner materials, plasma cutting is much faster than oxy-fuel cutting. However, for heavy sections of steel (1" and greater), oxy-fuel is still preferred since oxy-fuel is typically faster and, for heavier plate applications, high powered plasma machines are required for plasma cutting applications.

9. What are the limitations of plasma cutting? Where is oxy-fuel preferred?

The plasma cutting machines are typically more expensive than oxy/acetylene. Also, oxy/acetylene does not require access to electrical power or compressed air, which may make it a more convenient method for some users. Oxyfuel can generally cut thicker sections (>63/64") of steel more quickly than plasma.

10. Plasma introduction

The plasma cutting process involves creating an electrical channel of super-heated ,electrically ionized gas (i.e., plasma from the plasma cutter itself) through the workpiece to be cut, thus forming a completed electric circuit back to the plasma cutter via the work lead clamp. This is accomplished by a compressed gas (oxygen, air, inert and others depending on material being cut) which is blown through a focused nozzle at high speed toward the workpiece. An electrical arc is then formed within the gas, between an electrode near or integrated into the gas nozzle and the workpiece itself. The electrical arc ionizes some of the gas, thereby creating an electrically conductive channel of plasma. As electricity from the cutter torch travels down this plasma, it delivers sufficient heat to melt through the workpiece. At the same time, much of the high velocity plasma and compressed gas blow the hot molten metal away, thereby separating (i.e., cutting through) the workpiece.

■ **NOTE:** This machine is designed to use only compressed air as gas.

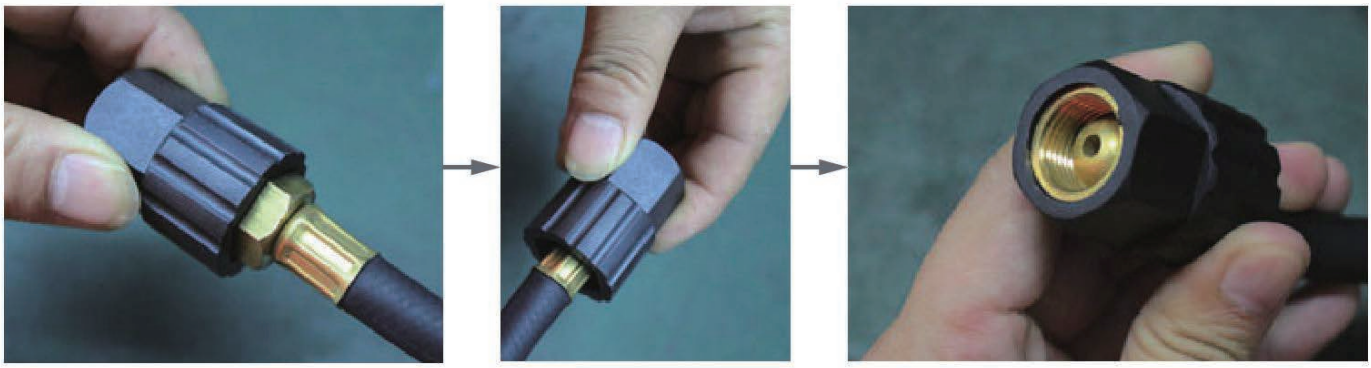
Part 5: Machine operation

Required personal protective equipment:

1. Wear a welding helmet with a proper shade of filter to protect your face and eyes when cutting or observing.
2. Wear approved safety glasses. Side shields recommended.
3. Use protective screens or barriers to protect others from flash and glare; warn others not to watch the arc.
4. Wear protective clothing made from durable, flame-resistant material (wool and leather) and foot protection.
5. Use approved ear plugs or ear muffs if noise level is high.
6. Never wear contact lenses while cutting.

Preparing to cut

1.1 Prepare connector cover.



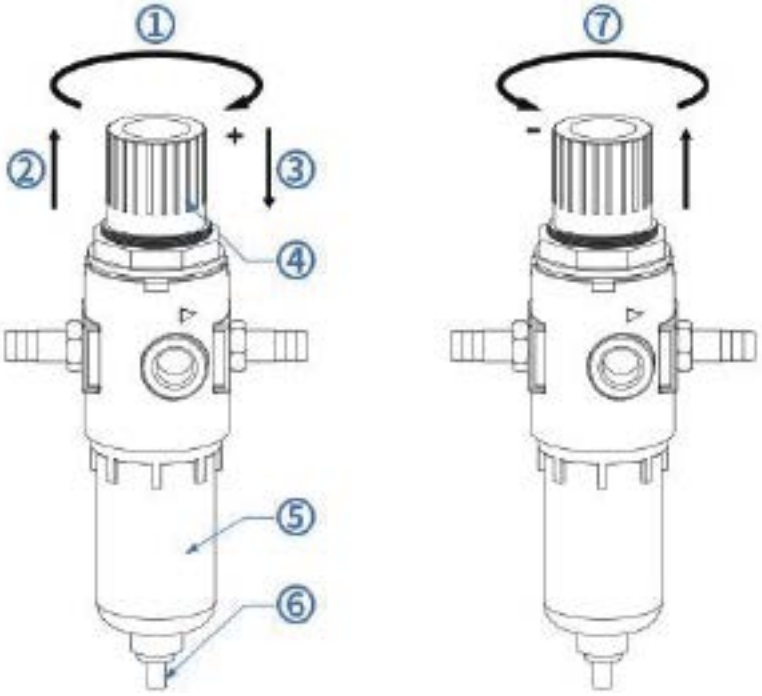
1.2 Connect cutting torch and work lead clamp to plasma cutter.



1.3 Connect compressed air.



1.4 How to use air regulator.



1. Turn clockwise to increase air pressure 2. Pull up 3. Push down 4. Air regulator

5. Air/water filter 6. Water release valve 7. Turn counterclockwise to reduce air pressure

1.5 Adjust the current and post flow rate

These settings are adjusted according to workpiece material and thickness. Generally, the thicker a workpiece, the higher the amperage setting will need to be. The post flow rate is the number of seconds the air will continue to flow through the tip after the trigger is released. For thick materials, high amps, or long-duration cuts, a 15-second setting is best. This will cool the cutting tip consumables and help ensure maximum life.

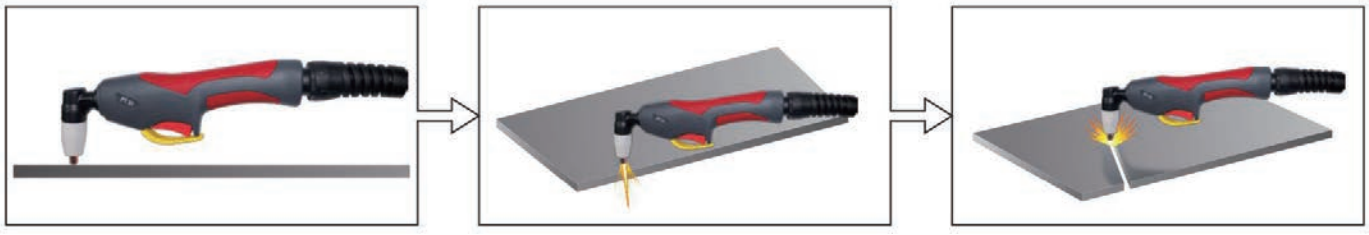


Possible problems:

1) There is no arc. Ensure there is no rust, paint, or coating on the workpiece where the work lead clamp attaches.
2) If the cutting time exceeds three minutes, the overcurrent protection may activate and stop the machine. If this occurs, let the machine cool down for several minutes. If the machine does not automatically re-engage after ten minutes, shut the machine down and restart.

Cutting operation

2.1 Start Cutting.



Hold the torch vertically at the edge of the workpiece.	Press the trigger to start the arc. The cutting arc will initiate when the torch tip is close to the workpiece.	Proceed with the cut.

2.2 Hand torch cutting technique



When cutting, ensure that sparks are exiting from the bottom of the workpiece.	If sparks are spraying up from the workpiece, you are moving the torch too quickly or the amperage is set too low.	Hold the torch vertically, and watch the arc as it cuts along the line.

2.3 Piercing



Hold the torch at an angle to the workpiece, press the trigger to start the arc, and slowly rotate the torch to an upright position.	When sparks are exiting from the bottom of the workpiece, the arc has pierced through the material.	Once the arc has pierced the material, proceed with the cut.

2.4 Amperage

Standard rule of thumb is the thicker the material the more amperage required. On thick material, set the machine to full output and vary your travel speed. On thinner material, you need to turn down the amperage and change to a lower-amperage tip (not included) to maintain a narrow kerf. The kerf is the width of the cut material that is removed during cutting.

2.5 Speed

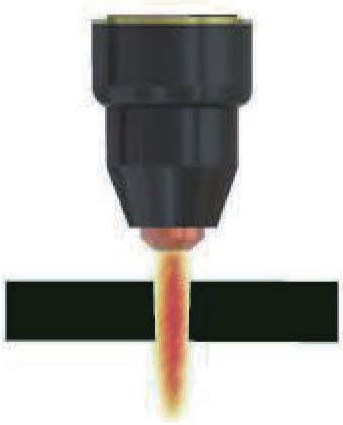
Amperage and speed are critical to producing a good quality cut. The faster you move (especially on aluminium), the cleaner your cut will be. To determine if you're going too fast or too slow, visually follow the arc that is coming from the bottom of the cut. The arc should exit the material at a slight angle away from the direction of travel. If it's going straight down, that means you're going too slow, and you'll have an unnecessary buildup of dross or slag. If you go too fast, it will start spraying back onto the surface of the material without cutting all the way through. Because the arc trails at an angle, at the end of a cut, slow your cutting speed and angle the torch in to cut through the last bit of metal.

2.6 Direction

It is easier to pull the torch towards you than push it. The plasma stream swirls as it exits the tip, biting one side and finishing off on the other, leaving a bevelled edge and a straight edge. The bevel cut effect is more noticeable on thicker material and needs to taken into consideration before starting your cut, as you want the straight side of the cut to be on the finished piece you keep.

2.7 Torch tip height & position

The distance and postion of the plasma torch cutting tip has an affect on the quality of the cut and the extent of the bevel of the cut. The easiest way to reduce bevel is by cutting at the proper speed and height for the material that is being cut.



Correct torch height Torch square to material Minimum bevel and equal bevel Longest consumable life



Torch angled to the material Unequal bevel One side may be excessively beveled



Torch positioned too high Excessive bevel Arc may not pierce material



Torch positioned too low Reverse bevel Tip may contact workpiece and short or damage the tip

2.8 Tip size and condition

The tip orifices focus the plasma stream on the workpiece. It is important to use the correct size tip for the amperage being used, for example a tip with a 3/64" orifice is good for 0-40 amps whereas a 1/16" orifice is better for 40-80 amps.

The low-amp tip has a smaller orifice which maintains a narrow plasma stream at lower settings for use on thin-gauge material. Using a 25-amp tip at an 60 amp setting will blow out and distort the tip orifice and require replacement.

Conversely, using an 80-amp tip on the lower settings will not allow you to focus the plasma stream as well and creates a wide kerf. The condition of the tip orifice is critical to the quality of the cut result, a worn or damaged tip orifice will produce a distorted plasma stream resulting in a poor cut quality.

2.9 Electrode condition

A fixed gap is established between the electrode and the inside of the cutting tip. Electrons arc across the gap, ionizing and super heating the air creating the plasma stream. The electrode contains an insert in the end made of a highly conductive material called hafnium. This insert erodes with use and develops a pit in the end of the electrode. When the pit becomes too great, poor quality cuts will result and necessitate replacement of the electrode.

2.10 Air pressure and volume

Air pressure, flow rate and air quality are critical to quality plasma cutting and consumable life span. The required air pressure and volume can vary from model to model and the manufacturer will provide the specs. For this machine, the minimum air pressure requirement is 72-1/2 PSI. The volume capacity of your compressor is important. If you have a small compressor with exactly the same l/min rating as the plasma, then the compressor will run continuously when you are plasma cutting. A compressor with a l/min rating slightly higher than the plasma would be more adequate. If you are doing a lot of cutting, cutting thick plate (same air consumption but slower cut speeds = longer cut time) then choose a compressor at 1.5 to 2 times the plasma system requirement.

2.11 Air quality

Good air quality is essential to quality plasma cutting and consumable life span. Compressors take in air at atmospheric pressure and increase the pressure and store it in a tank. Humidity in the air is condensed in the tank and in the airlines producing water, more so in humid environments. Moisture that forms in air lines has a tendency to condense into larger drops when the air pressure decreases as it is entering the plasma torch. When these droplets enter into the high temperatures (as much as 19832°f) in the plenum of the torch, they immediately break down into oxygen and hydrogen, which alters the normal chemical content of air in the torch. These elements will then dramatically change the plasma arc, which causes the torch consumable parts to wear very quickly, alters the shape of the nozzle orifice, dramatically affecting cut quality in terms of edge squareness, dross formation, and edge smoothness. Minimizing the moisture in the air supply is absolutely critical to quality plasma cuts and longevity of consumable parts. At a minimum be sure to drain the receiver (tank) on the air compressor at least daily. Most air plasma systems from reputable manufacturers have an on board particulate filter and or a coalescing filter with an auto drain that will remove some moisture from the air supply.

For home workshops and light industrial users the on board air filter is adequate. Most situations however will require additional filtration to prevent moisture from affecting the quality of the plasma cutter, and in most cases it is recommended to install a sub micronic particulate filter that is designed to trap water through absorption.

This style of filter has a replaceable filter cartridge that absorbs water and must be changed after it is near saturation. It should be installed as close as possible to the air intake of the plasma cutter.

2.12 Technique Tips

- It is easier to pull the torch through the cut than to push it.
- To cut thin material reduce the amperage until you get the best quality cut.
- Use the correct size tip orifice for the amperage being used.
- For straight cuts use a straight edge or cutting buggy as a guide. For circles, use a template or circle cutting attachment.
- Check that the front end consumable parts of the plasma cutting torch are in good condition.

Part 6: Troubleshooting

Problems	Analysis	Solution
1. Power indicator does not light up when machine is turned ON; fan does not function; torch does not activate when trigger is pressed.	1. Problem at power source. 2. Power cord or internal wires are loose. 3. Power cord not wired correctly. 4. Circuit board at fault.	1. Check power source. 2. Check power cord. 3. Have wired checked by qualified electrician. 4. Have circuit board checked by qualified electrician.
2. Power indicator does not light up when machine is turned ON; fan does not work or only works for a few seconds;machine shuts down when torch creates arc at workpiece.	1. Starting circuit or relay at fault. 2. Machine over heating.	1. Have power components and main circuit board checked by qualified electrician. Replace as necessary. 2. Machine over heating. Shut down and allow to cool.
3. Power indicator lights up and fan works, but torch does not activate when trigger is pressed.	1. Torch cable connection loose. 2. Internal wires loose.	1. Ensure torch cable connection is tight. 2. Have qualified electrician examine internal wiring.
4. Power indicator lights up, fan works, and torch sparks when trigger is pressed, but no air is blowing from torch head.	1. Electric valve at fault (DC24V). 2. Air hose clogged. 3. Air valve circuit at fault. 4. Circuit board at fault.	1. Check/replace electric valve. 2. Clean/replace hose. 3. Check/replace air valve. 4. Have qualified electrican check/replace circuit board.
5. Power indicator lights up, OC indicator is not illuminated, fan works. Gas flows from torch when trigger is squeezed, but no arc.	1. Arc strike coil is loose. 2. High-frequency capacitor is broken.	1. Have qualified electrican check/replace wiring at coil. 2. Have qualified electrican check/replace high-frequency capacitor.
6. Power indicator lights up, fan works, gas flows from torch when trigger is squeezed, but OC indicator illuminates.	1. Diodes at fault. 2. Transistors (IGBT) at fault.	1. Have qualified electrican check/replace diodes. 2. Have qualified electrican check/replace transistors.
7. Power indicator lights up, fan works, gas flows from torch when trigger is squeezed. OC indicator only illuminates while cutting.	1. Circuit at fault. 2. Circuit board at fault.	1. Have qualified electrican check/replace coil, CI3140, and related components. 2. Have qualified electrican check/replace circuit board.
8. Cutting current cannot be adjusted.	1. Wires loose or potentiometer damaged. 2. Circuit at fault.	1. Have qualified electrican check voltage as middle pin (ground). If reading is 0–5V, replace. 2. Have qualified electrican check for loose wires from main circuit board to front circuit board. Replace if necessary.

Problems	Analysis	Solution
9. Machine automatically shuts down as soon as it is turned ON.	1. Power cord at fault. 2. Circuit board at fault. 3. Silicon bridge at fault.	1. Have power cord checked by qualified electrician. Replace as necessary. 2. Have circuit board checked by qualified electrician. Replace as necessary. 3. Have silicon bridge checked by qualified electrician. Replace as necessary.
10. When torch trigger squeezed, high-frequency sound is audible and spark can be seen, but arc will not activate.	1. Torch is broken. 2. Work lead clamp lacks good connection at workpiece. 3. Connection at positive or negative terminal is loose.	1. Replace torch. 2. Ensure work lead clamp is connected to clean, bare metal on workpiece. 3. Tighten connections.
11. HF is good but cannot get arc to start.	1. Gap between tip and metal is not correct. 2. Tip and electrode are oxidized. 3. HF is weak due to leakage. 4. GAS/AIR connector damaged, resulting in leak between connector and front panel.	1. Adjust gap per metal type and thickness. 2. Clean/replace. 3. Have machine checked by qualified electrician. Repair/ replace parts as necessary. 4. Have connector checked by qualified electrician. Repair/ replace parts as necessary.
12. Torch keeps sparking after trigger has been squeezed.	1. Signal interference at circuit board.	1. Have qualified electrician check GAS/AIR connector, ground connection, and torch switch connector for HF sparks.

Part 7 : Cutting thickness chart

For best results, amperage and air pressure must be adjusted according to workpiece thickness.

	Amperage	20A	35A	40A
	Thickness (mm)	5mm	8mm	10mm
	Air Pressure (PSI)	40-50 psi	40-50 psi	50-60 psi

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Please feel free to write or call us if you have any questions about the machine or the manual.

Thank you again for your business and continued support. We hope to serve you again soon.

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