DIY TRADE

# P40

PLASMA

# INVERTER PLASMA CUTTER

# MANUAL

1 YEAR LIMITED WARRANTY

BOSSWELD

WELD LIKE A BOSS

# Thank you for choosing a BOSSWELD P40 Inverter DC Plasma Cutter

In this manual you will find instructions on how to set up your welder along with general welding information, safety information and helpful tips. We encourage you to go online to our website for more tips and troubleshooting as well as many welding resources.

The BOSSWELD P40 is the latest in IGBT Inverter cutting technology, this lightweight plasma cutter enables the user to complete high quality cutting of ferrous and non ferrous metals up to 12mm with ease. You will be impressed with what this power house can cut.

We truly hope you enjoy using your welder!

Every effort has been made to ensure that this manual has been prepared accurately, however errors and omissions are excepted.

BOSSWELD is a trademark of Dynaweld Industrial Supplies Pty Ltd.

# WARRANTY

This warranty is in addition to the statutory warranty provided under Australian Consumer Law, but does not include damage resulting from transport, misuse, neglect or if the product has been tampered with.
The product must be maintained as per this manual, and installed and used according to these instructions on an appropriate power supply. The product must be used in accordance with industry standards and acceptable practice.

This warranty covers the materials used to manufacture the machine and the workmanship used to produce the item. This Warranty does not cover damage caused by:

1. Normal wear and tear due to usage
2. Misuse /abuse or Neglect of the item
3. Transport/ handling breakages
4. Lack of maintenance, care and cleaning
5. Environmental factors, such as usage in temperatures exceeding 40 degrees, above 1000m above sea level, rain, water, excessive damp, cold or humid conditions.
6. Improper setup or installation
7. Use on Incorrect voltage or non authorised electrical connections and plugs
8. Use of non standard parts
9. Repair, case opening, tampering with, modifications to any part of the item by non authorised BOSSWELD repairers.

This warranty covers the machine only and does not include Torches, Leads, Earth Clamps, Electrode holders, Plasma Torches, Tig Torches and any of the parts on those items unless there is a manufacturing fault.

## 1. REGISTRATION

Purchasers are encouraged to register for warranty on our website.
www.dynaweld.com.au/warranty

## 2. TIME PERIOD - 1 Year

A warranty claim must be made within 1 year from the date of purchase of this product. Any claim must include proof of purchase.

## 3. HOW TO MAKE A CLAIM - NEED SOME HELP?

- Visit our website www.dynaweld.com.au/troubleshooting for many helpful tips and guides to assist with the setup and usage of your new machine. Still stuck….?
- Call the BOSSWELD Helpdesk on 1300 460 665 for over the phone assistance.
- If the machine is not operational then return the item to the place of purchase.

DYNAWELD MAKES NO OTHER WARRANTY, EXPRESS OR IMPLIED. THIS WARRANTY IS EXCLUSIVE AND IN LIEU OF ALL OTHERS, INCLUDING, BUT NOT LIMITED TO ANY WARRANTY OF MERCHANTABILITY OR FITNESS FOR ANY PARTICULAR PURPOSE.

## BOX CONTENTS

| Refer | Item |
|---|---|
| 1. | BOSSWELD P40 Inverter DC Plasma Cutter |
| 2. | Plasma Torch |
| 3. | Earth Lead |
| 4. | Air regulator (built in, not shown) |
| 5. | Carry Strap |
| 6. | Cable / Lead tidy |
| 7. | Torch Spares (not shown) |
| 8. | Owners Manual (not shown) |

# WARNING

The device and packaging material are not toys! Children must not be allowed to play with the machine and its accessories. Plastic parts and packaging are choking risks for children.

- Open the packaging and remove the welder carefully.
- Check that the delivery is complete.
- If possible, store the packaging until the warranty period has expired.

# PERSONAL PROTECTIVE EQUIPMENT (PPE)

## GLOVES AND PROTECTIVE CLOTHING

Use protective gloves and fire resistant protective clothing when welding. Avoid exposing skin to ultraviolet rays produced by the arc.

## WELDING HELMET

Under no circumstances should the welder be operated unless the operator is wearing a welding helmet to protect the eyes and face. There is serious risk of eye damage if a helmet is not used. The sparks and metal projectiles can cause serious damage to the eyes and face. The light radiation produced by the arc can cause damage to eyesight, and burns to skin. Never remove the welding helmet whilst welding.

## SAFETY GLASSES

After welding use appropriate safety glasses when brushing, chipping or grinding the slag from the weld.

## OTHER PERSONS

Ensure that other persons are screened from the welding arc and are at least 15 metres away from the work piece. Always ensure that the welding arc is screened from onlookers, or people just passing by. Use screens if necessary, or non-reflecting welding curtain. Do not let children or animals have access to the welding equipment or to the work area.

## SWITCHING OFF

When the operator has finished welding they must switch the welder off. DO NOT put the electrode holder down with the welder switched ON. When leaving the welder unattended, move the ON/OFF switch to the OFF position and disconnect the welder from the electrical mains supply. Do not leave hot material unattended after welding.

# MACHINE CARE / SAFETY

Keep the welding cables, earth clamp and electrode holder in good condition. Failure to do this can result in poor welding quality, which could be dangerous in structural situations.

Prior to use, check for breakage of parts and any other conditions that may affect operation of the welder. Any part of the welder that is damaged should be carefully checked to determine whether it will perform its intended function whilst being safe for the operator. Any part that is damaged should be properly repaired, or replaced by an authorised service centre.

## IMPROPER USE

It is hazardous to use the welding machine for any work other than that for which it was designed e.g. do not use welder for thawing pipes.

## HANDLING

Ensure the handle is correctly fitted. As welding machines can be heavy, always use safe lifting practices when lifting.

## POSITION AND HANDLING

To reduce risk of the machine being unstable / danger of overturning, position the welding machine on a horizontal surface that is able to support the machine weight. Operators MUST NOT BE ALLOWED to weld in raised positions unless safety platforms are used.

# SAFETY INSTRUCTIONS

## WARNING

The user of this welder is responsible for their own safety and the safety of others. It is important to read, understand and respect the contents of this user guide. When using this welder, basic safety precautions, including those in the following sections must be followed to reduce the risk of fire, electric shock and personal injury. Ensure that you have read and understood all of these instructions before using this welder. Persons who are not familiar with this user guide should not use this welder. Keep this booklet in a safe place for future reference.

## TRAINING

The operator should be properly trained to use the welding machine safely and should be informed about the risks relating to arc welding procedures. This user guide does not attempt to cover welding technique. Training should be sought from qualified/ experienced personnel on this aspect, especially for any welds requiring a high level of integrity for safety.

## SERIOUS FIRE RISK

The welding process produces sparks, droplets of fused metal, metal projectiles and fumes. This constitutes a serious fire risk. Ensure that the area in which welding will be undertaken is clear of all inflammable materials. It is also advisable to have a fire extinguisher, and a welding blanket on hand to protect work surfaces.

# WORK AREA

- Ensure a clear, well lit work area with unrestricted movement for the operator.
- The work area should be well ventilated, as welding emits fumes which can be dangerous.
- Always maintain easy access to the ON/OFF switch of the welder, and the electrical mains supply.
- Do not expose the welder to rain and do not operate in damp or wet locations.

Where welding must be undertaken in environments with increased risk of electric shock, confined spaces or in the presence of flammable or explosive materials, it is important that the environment be evaluated in advance by an “expert supervisor”. It is also recommended that welding in these circumstances be carried out in the presence of persons trained to intervene in emergencies.

## AVOID ELECTRICAL CONTACT

Use adequate electrical insulation with regard to the electrode, the work piece and any accessible earthed metal parts in the vicinity. Avoid direct contact with the welding circuit. The no load voltage between the earth clamp and the electrode can be dangerous under certain circumstances.

Note: For additional protection from electric shock. It is recommended that this welder be used in conjunction with a residual current device (RCD) with rated residual current of 30MA or less.

In general the use of extension leads should be avoided. If used however, ensure that the extension lead is used with the welder is of a suitable current rating and heavy duty in nature that MUST have an earth connection. If using the welder outdoors, ensure that the extension lead is suitable for outdoor use. Always keep extension leads away from the welding zone, moisture and any hot materials.

## WELDING SURFACES

Do not weld containers or pipes that hold, or have held, flammable liquids or combustible gases or pressure. Do not weld on coated, painted or varnished surfaces as the coatings may ignite, or can give off dangerous fumes.

## WORK PIECE

When welding, the work piece will remain at high temperature for a relatively long period. The operator must not touch the weld or the work piece unless wearing welding gloves. Always use pliers or tongs. Never touch the welded material with bare hands until it has completely cooled.

## VOLTAGE BETWEEN ELECTRODE HOLDERS OR TORCHES

Working with more than one welding machine on a single work piece, or on work pieces that are connected, may generate a dangerous accumulation of no-load voltage between two different electrode holders or torches, the value of which may reach double the allowed limit.

# MAINTENANCE

## WARNING

Before starting any cleaning, or maintenance procedures on the welding machine, make sure that it is switched OFF and disconnected from the mains supply.

There are no user serviceable parts inside the welder. Refer to a qualified service personnel if any internal maintenance is required. After use, wipe the welder down with a clean soft dry cloth.

Regular inspection of the mains power cord is required and if damaged is suspected, it must be immediately replaced by the manufacturer, its service agent or similarly qualified persons in order to avoid a hazard

## STORAGE / TRANSPORT

Store the welder and accessories out of children's reach in a dry place. If possible store the welder in the original packaging. The appliance must unconditionally be secured against falling or rolling over during transport.

# DISPOSAL

## DISPOSING OF THE PACKAGING

Recycling packaging reduces the need for landfill and raw materials. Reuse of the recycled material decreases pollution in the environment. Please recycle packaging where facilities exist. Check with your local council authority for recycling advice.

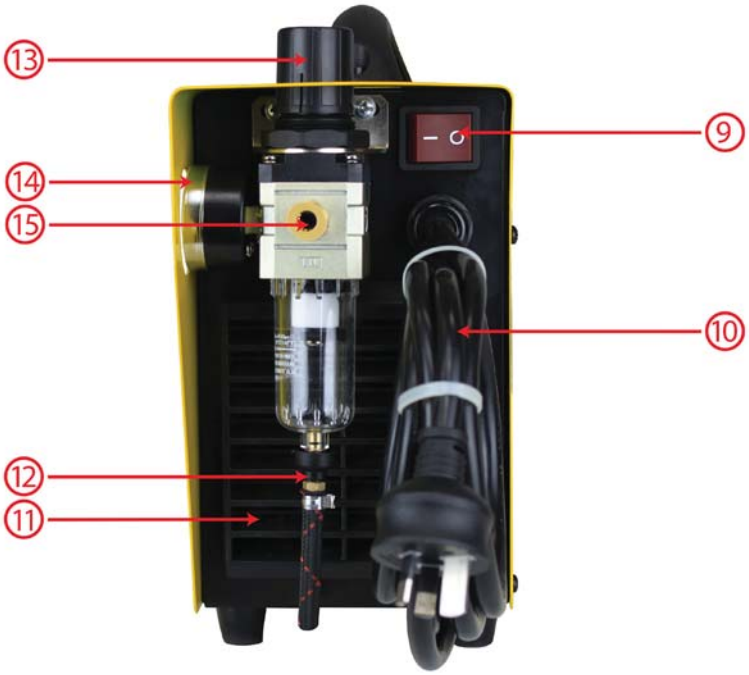
## DISPOSING OF THE WELDER

Welders that are no longer usable should not be disposed of with household waste but in an environmentally friendly way. Please recycle where facilities exist. Check with your local council authority for recycling advice.

# CONTROLS

## FRONT PANEL

## BACK PANEL




| | | | |
|---|---|---|---|
| 1. | Power Indicator Light | 9. | Mains Power Switch |
| 2. | Overload Error Indicator | 10. | 240V AC Mains Power Cord |
| 3. | Cutting Circuit Operational Lamp | 11. | Cooling Fan |
| 4. | Cutting Indictor Light | 12. | Air Filter/Water Separator Drain |
| 5. | Current Adjustment Knob | 13. | Air Regulator Pressure Adjustment |
| 6. | Run/ Set Switch | 14. | Air Pressure Gauge (view on side of machine) |
| 7. | Earth Lead Connection Socket | 15. | Compressed Air Inlet |
| 8. | Plasma Torch Central Connector | | |

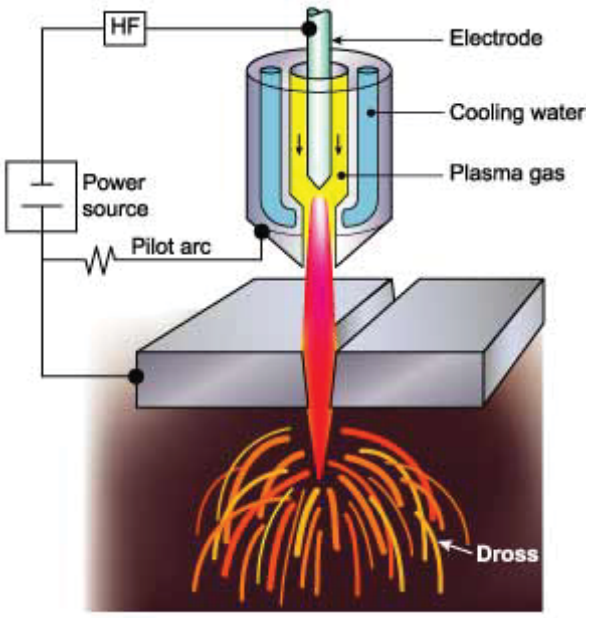
# SET UP TO PLASMA CUT

1. Install the compressed air hose to the connector at the rear panel of the machine to the Compressed Air Inlet (15).
2. Plug the machine input power lead into the 15 Amps wall socket, ensuring that the Mains Power Switch (9) is OFF.
3. Connect the Plasma torch to the Plasma Torch Central Connector (8).
4. Connect the earth lead to the Earth Lead Connection Socket (7) (positive) and connect earth clamp to workpiece ensuring that the clamp makes good contact with bare metal.
5. Make sure air compressor is turned on and capable of 5-6 CFM free air delivery.
6. Set Air pressure to 60-80 PSI, 410-550 KPA or 041-0.55 MPA
7. Switch ON the machine using Mains Power Switch (9).
8. Select your required current turning the Current Adjustment Knob (5). 5 Amps per 1mm of steel thickness is a good starting point. If the plasma is struggling to penetrate, increase amperage by turning the Current Adjustment Knob (5).
9. The plasma torch trigger switch has a safety trigger to prevent accidental triggering of the pilot arc. Slide the safety switch back and depress switch, the pilot arc fires from the nozzle and care must be taken when depressing trigger switch. This arc is designed to burn through contamination, paint or rust to allow the main cutting arc to connect with bare metal. Continued depressing of the switch away from cutting surface will reduce the effectiveness of the consumables and greatly reduce their life span.
10. When cutting up to 8mm thick plate dragging the nozzle across the work piece is acceptable on clean steel, if work-piece is contained or greater than 8mm it is important to maintain a gap of approximately 23mm.
11. After the cutting arc starts, slowly start moving the torch across the work piece. Always start the Arc on a material edge or drill a small hole in the work piece to start Arc.
12. Adjust the cutting speed so that the sparks go through the work piece and out the bottom of the cut.
13. If the sparks a blown out toward the torch or at a great angle below the work piece, reduce the cutting speed.
14. At the end of the cut pause to allow the plasma to sever the last part.
15. Regularly inspect your consumables for wear. Replace when excessive wear is apparent.

# PLASMA CUTTING FUNDAMENTALS

The Plasma arc process has always been seen as an alternative to the oxy-fuel process. The plasma arc cutting process is illustrated below. The basic principle is that the arc formed between the electrode and the workpiece is constricted by a fine bore, copper nozzle. This increases the temperature and velocity of the plasma emanating from the nozzle. The temperature of the plasma is in excess of 20 000°C and the velocity can approach the speed of sound. When used for cutting, the plasma gas flow is increased so that the deeply penetrating plasma jet cuts through the material and molten material is removed in the efflux plasma.

The process differs from the oxy-fuel process in that the plasma process operates by using the arc to melt the metal whereas in the oxy-fuel process, the oxygen oxidises the metal and the heat from the exothermic reaction melts the metal. Thus, unlike the oxy-fuel process, the plasma process can be applied to cutting metals which form refractory oxides such as stainless steel, aluminium, cast iron and non-ferrous alloys.




## POWER SOUCE

The power source required for the plasma arc process must have a drooping characteristic and a high voltage. Although the operating voltage to sustain the plasma is typically 50 to 60V, the open circuit voltage needed to initiate the arc can be up to 400V DC.

On initiation, the pilot arc is formed within the body of the torch between the electrode and the nozzle. For cutting, the arc must be transferred to the workpiece in the so-called 'transferred' arc mode. The electrode has a negative polarity and the workpiece a positive polarity so that the majority of the arc energy (approximately two thirds) is used for cutting.

## GAS COMPOSITION

In the conventional system using a tungsten electrode, the plasma is inert, formed using argon, argon-$H_2$ or nitrogen. However oxidising gases, such as air or oxygen, can be used but the electrode must be copper with hafnium

The plasma gas flow is critical and must be set according to the current level and the nozzle bore diameter. If the gas flow is too low for the current level, or the current level too high for the nozzle bore diameter, the arc will break down forming two arcs in series, electrode to nozzle and nozzle to workpiece. The effect of 'double arcing' is usually catastrophic with the nozzle melting.

## CUT QUALITY

The quality of the plasma cut edge is similar to that achieved with the oxy-fuel process. However, as the plasma process cuts by melting, a characteristic feature is the greater degree of melting towards the top of the metal resulting in top edge rounding, poor edge squareness or a bevel on the cut edge. As these limitations are associated with the degree of constriction of the arc, several torch designs are available to improve arc constriction to produce more uniform heating at the top and bottom of the cut.

# TIPS FOR PLASMA CUTTING

## COMPRESSED AIR REQUIREMENTS

1. A reliable and consistent supply of clean dry compressed air is essential for proper operation.
2. The compressed air supply must have filtration in the line feeding the power source, both a standard water trap (sintered bronze filter) and also a coalescing filter (for oil in air).
3. The unit requires a minimum of 5 cfm Free Air Delivery (FAD) and 60 – 80 PSI pressure. This normally means the compressor must be a belt drive model or if a direct drive it must have a motor power of 2.5HP or greater.
4. The air must be dry and free of oil and moisture (normally a symptom of older, worn out compressors). The air hose must also be of sufficient size (3/8”/10mm minimum) to supply the machine.

Note: Alloys generally take 50% more amperage for the thickness than steel

## PIERCING THE WORK

Many inexperienced users try to pierce the metal by coming straight down perpendicular (90°) to the work. This results in molten metal being blown back into the torch. A better method is to approach the metal at a slight angle (60°) towards the direction of the cut. This way, the molten metal is blown away from the torch.

Welding information is of a general nature and is courtesy of The Welding Institute. For more welding information go to http://www.twi-global.com/technical-knowledge/job-knowledge/

# P40 INVERTER DC PLASMA CUTTER

## PRODUCT SPECIFICATION

| BOSSWELD WELD LIKE A BOSS | | | |
|---|---|---|---|
| INVERTER DC PLASMA CUTTER<br>**BOSSWELD P40** | | PART NO. | 610120 |
| 1~ $f_1/f_2$ | | STANDARD | IEC 60974 |
| | | 20A/88V-40A/96V | |
| | | X | 20% 100% |
| S | $U_0$=32V | $I_2$ | 40A 25A |
| | | $U_2$ | 96V 92V |
| 1~50-60Hz | $U_1$=240V | $I_{1max}$=32A | $I_{1eff}$=14.3A |
| IP21 | H | AF | 6.5Kg |

Note: This unit must be connected to a 15 amp power supply. This may require a dedicated circuit.

# TROUBLESHOOTING

| Problem | What to Do |
|---|---|
| Power indicator is not lit, fan does not work and no output current | 1. Check that the welder is plugged into the 240V mains outlet and is switched on.<br>2. Check that the mains fuse or breaker has not operated.<br>3. Check that the main switch on the rear of the unit is in the on position. |
| Power indicator is lit, fan works, no output current | 1. Check the welding cables are connected correctly.<br>2. Check the output connectors are not disconnected or damaged.<br>3. Check that the earth clamp is connected securely to the workpiece and that the contact point is clean of paint or rust. |
| Over temperature indicator is on, no output current | 1. Duty cycle of the unit has been exceeded. Allow the unit to cool for 20 minutes. |
| Output current is not stable. | 1. Check mains voltage is constant.<br>2. Check the welding cable connectors are tight in the sockets.<br>3. Check the earth clamp connection to the workpiece.<br>4. Check the welding leads are not reversed. |
| Power lamp and temperature lamp on | 1. **Air flow blocked –** check for blocked air flow around the unit and correct condition.<br>2. **Fan blocked –** check and correct condition.<br>3. **Unit is overheated** - let it cool down for at least 5 minutes. Make sure the unit has not been operated beyond the duty cycle limit, refer to parameters<br>4. **Faulty components in unit –** return for repair or have qualified technician repair as per service manual. |
| Torch fails to ignite the arc when torch switch activated | 1. **Faulty torch parts –** inspect torch parts and replace if necessary.<br>2. **Gas pressure too high or too low –** adjust to proper pressure.<br>3. **Faulty components in unit –** adjust for repair or have qualified technician repair per service manual. |

# OPERATIONAL ENVIRONMENT

- Height above sea level ≤1000m
- Operation temperature range -10～+40°C
- Air relative humidity is below 90%( 20°C)
- Preferably site the machine above floor level, ensure the maximum angle does not exceed 15 degrees.
- Protect the machine against heavy rain and against direct sunshine.
- The content of dust, acid, corrosive gas in the surrounding air or substance must not exceed normal standard.
- Take care that there is sufficient ventilation during welding. There must be at least 30cm free distance between the machine and wall.

For other tips and troubleshooting refer to our website www.dynaweld.com.au/troubleshooting

# NOTES

# OTHER PRODUCTS IN OUR RANGE

- ELECTRODES
- TIG RODS
- WELDING HELMETS
- WELDING MACHINES
- TORCH SPARE PARTS
- WELDING ACCESSORIES
- MIG WIRE
- GAS EQUIPMENT
- WELDING SAFETY
- MIG TORCHES
- TIG TORCHES
- WELDING CABLE