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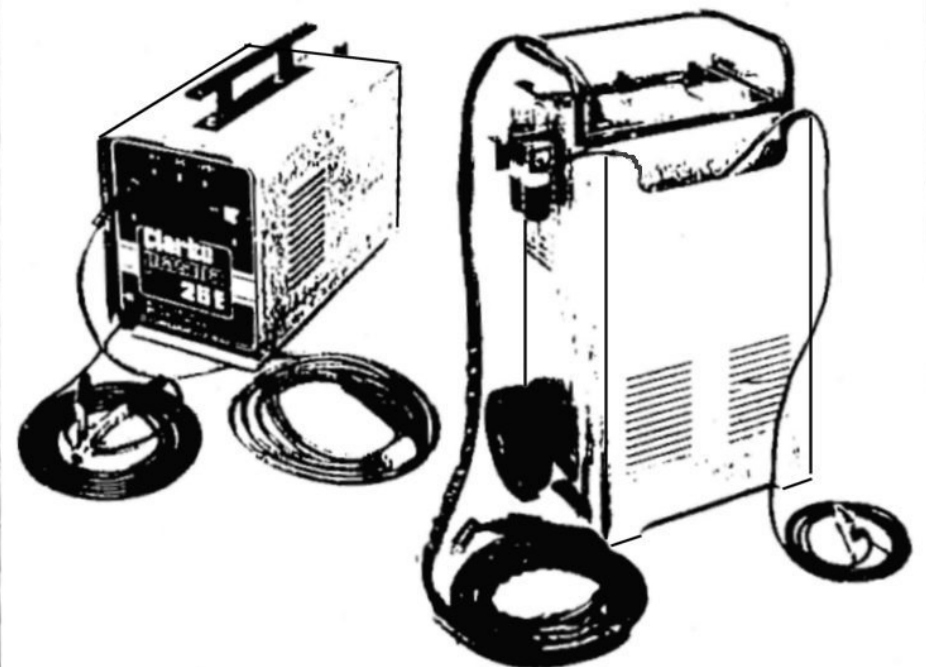
Clarke

plasma

OPERATING AND MAINTENANCE INSTRUCTIONS FOR

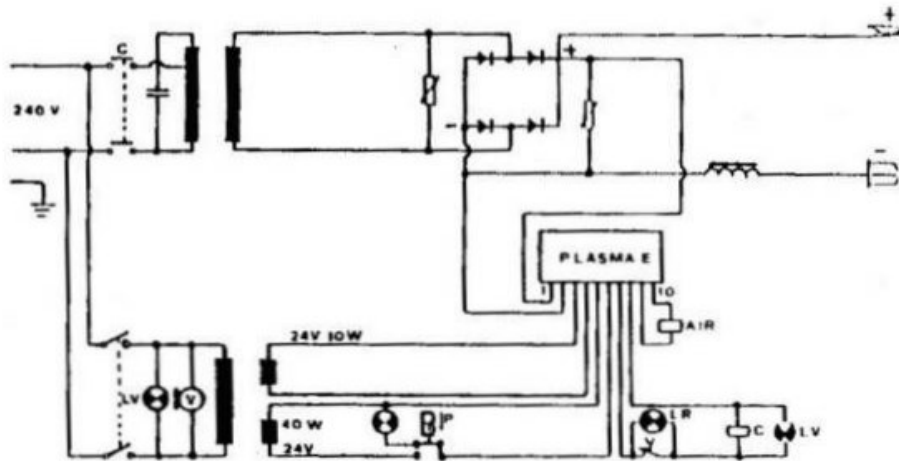
Plasma Cutters

25E, King 25, King 40, King 45

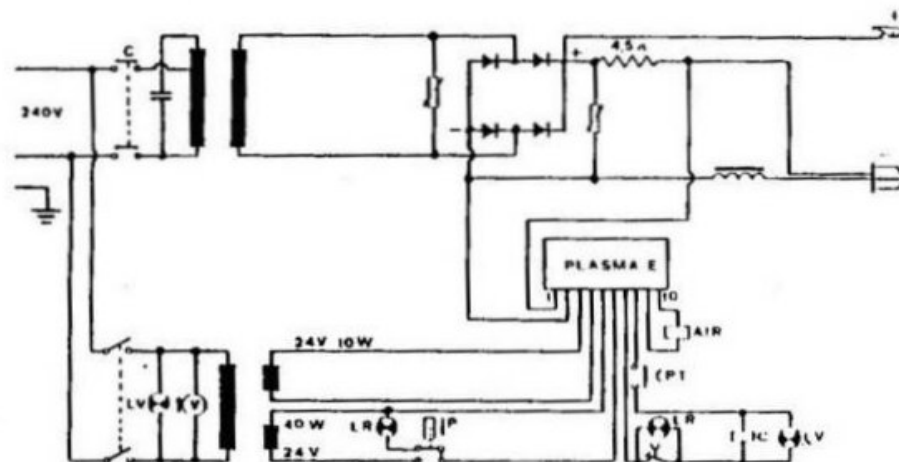


PLASMA CUTTER 25E, KING 25, KING 40 AND KING 45 OPERATING AND MAINTENANCE INSTRUCTIONS

ELECTRICAL DIAGRAM PLASMA 25E



ELECTRICAL DIAGRAMS PLASMA KING 25



Congratulations on the purchase of your new Clarke Plasma Cutter.

Before attempting to operate this machine, please READ THIS INSTRUCTION MANUAL THOROUGHLY AND FOLLOW ALL DIRECTIONS CAREFULLY. By doing so you will ensure the safety of both yourself and others around you, and at the same time you can look forward to long and troublefree service from your Clarke Plasma Cutter.

1) What is Plasma Cutting?

Plasma Cutting is a fast, clean and distortion free means of cutting through all types of metal from mild and stainless steel to aluminum brass and copper.

The process relies on the chemical reaction of a gas or mixture of gases such as air, which ionises (negative electrons are separated from the atom which is then positively charged) when subjected to very high temperature.

In this ionised state the gas is electrically conductive and is called "plasma". In plasma cutting a standing electric arc is created to achieve the very high temperature required to create the "plasma". By forcing the "plasma" through a small nozzle the arc is constricted to increase its temperature to over 20,000 °C and it is concentrated into a very small area.

When the plasma is directed at a conductive material (which is connected to the earth return lead of the cutter) the arc is transferred through the plasma to the material. The high energy of the arc melts the material which is displaced by the gas flow.

The standing arc has to be created by producing an ionised path in the gas. This is achieved by applying a very high voltage, at high frequency between the electrode and the tip/work, causing a high frequency spark. The main arc will ignite as soon as the gas between the tip and the nozzle is ionised.

2) Safety Precautions

Your Clarke Plasma Cutter is both simple and safe to operate if the INSTRUCTIONS ARE FOLLOWED CAREFULLY AND THE FOLLOWING SAFETY PRECAUTIONS ARE NOTED

- (1) Do not operate near water or any other liquid
- (2) Do not operate near anything flammable. Whilst plasma cutters do not produce an open flame, they do produce very hot metal during the cutting process; hot enough to set alight flammable materials, should contact be made.
- (3) Have a fire extinguisher handy when operating the cutter
- (4) The electric plasma arc should not be observed with the naked eye. Always wear eye protection such as welding goggles used for oxyacetylene welding.
- (5) To avoid the risk of burns wear protective clothing; overalls, gloves and sturdy footwear.
- (6) Always ensure that the cutting cable, air compressor hose and electrical input lead are kept well away from the possible "spatter" of hot metal created when cutting.
- (7) Should the cutting cable be burned REPLACE IT. DO NOT REPAIR IT.
- (8) Always operate the cutter in a well ventilated area or an area equipped with a fume extractor. Toxic gases may be given off during the cutting process.
- (9) Should you feel sick or develop sore eyes whilst using the plasma cutter, STOP WORK IMMEDIATELY and move to fresh air. do not resume cutting until you have provided good ventilation for the cutting area.

- 10) Do not use solvents of any kind on the metal before cutting. Highly toxic fumes may result if you try to cut metal treated with solvents.

IMPORTANT

- 11) DO NOT OPERATE THIS MACHINE WITH THE COVER REMOVED
- 12) DO NOT OPERATE THIS MACHINE WITHOUT A FILTER REGULATOR
- 13) DO NOT DISMANTLE THE TIP FROM THE TORCH UNLESS THE MACHINE HAS BEEN DISCONNECTED FROM THE MAINS SUPPLY.
- 14) NEVER PUSH THE TORCH NOZZLE DOWN WITH YOUR HANDS UNLESS THE MACHINE HAS BEEN DISCONNECTED FROM THE MAINS SUPPLY.
- 15) THIS MACHINE MUST BE EARTHED (SEE "ELECTRICAL CONNECTIONS" BELOW)
- 16) PLASMA ARC WILL SLICE THROUGH FLESH INSTANTLY NEVER TOUCH THE TORCH NOZZLE UNLESS YOU HAVE DISCONNECTED THE MACHINE FROM THE MAINS SUPPLY

l) Electrical connection

i) **Models 25E, King 25 and King 40.**

Connect the mains lead to a standard 240 volt mains supply through a good quality (preferably rubber) fused 3-pin plug, or a suitable fused isolator switch.

IMPORTANT

The wires in the mains lead of this machine are coloured in accordance with the following code
 Green and Yellow - Earth
 Blue - Neutral
 Brown - Live

As the colours of the wires in the mains lead of this appliance may not correspond with the coloured markings identifying the terminals in your plug, proceed as follows

The earth wire which is coloured green and yellow must be connected to the terminal in the plug which is marked with the letter E or by the earth symbol or coloured green or green and yellow
 The neutral wire which is coloured blue must be connected to the terminal in the plug which is marked with the letter N or coloured black

The live wire which is coloured brown must be connected to the terminal in the plug which is marked with the letter L or coloured Red.

ii) **Model King 45**

This machine must be connect to a 415V/3 phase supply. Employ a competent, qualified electrician to complete the installation

WARNING: THESE MACHINES MUST BE EARTHED

l) Assembly and Setting up for operation

Assembly of Models 25E and King 25.

- a) Lay the machine on its side and attach the four rubber feet using the screws and washer provided
- b) Attach the air filter regulator to the back of the machine and connect the airline from the machine to the filter regulator outlet, sealing using the worm drive jubilee clip provided

Assembly of Model King 40 and King 45

- a) Slot the axle through the holes in the sides of the machine and fit the two wheels, retaining them on the axle with the clips provided
- b) Slide the ends of the handle into the grooved channels down the sides of the machine and fix in place using four self lapping screws provided.
- c) Attach the air filter regulator to the side of the machine and connect the airline from the machine to the filter outlet, sealing with the worm drive clip provided

12) Technical Specification

| MODEL | 25E | KING 25 | KING 40 | KING 45 |
|-----------------------------|-------------|-------------|-------------|-------------|
| Volts/Phase | 240/1 | 240/1 | 240/1 | 415/3 |
| Fuse Rating (amps) | 20 | 20 | 40 | |
| Power efficiency kw | 4 | 4 | 8 | 7 |
| Electrical input amps | 16 | 16 | 34 | |
| No load voltage (DC) output | 250 | 250 | 290 | 260 |
| Cutting power volts | 80 | 80 | 90 | 90-100 |
| Cutting current amps | 25 | 25 | 40 | 45 |
| Cutting depth on mild steel | Up to 4 mm | Up to 4 mm | Up to 8 mm | Up to 8 mm |
| Cutting depth on aluminium | Up to 3 mm | Up to 3 mm | Up to 6 mm | Up to 6 mm |
| Compressed air pressure PSI | 50-65 | 50-65 | 50-65 | 60-90 |
| Compressed air capacity | 3.5 cfm | 3.5 cfm | 3.5 cfm | 3.5 cfm |
| Weight kg | 30 | 30 | 53 | 52 |
| Dimensions (LWH) mm | 500x240x350 | 500x240x350 | 460x300x760 | 460x300x760 |
| Part No. | 6010920 | 6010921 | 6010922 | 6010923 |

Note: For spares and/or servicing contact your local dealer or Clarke Group (tel 01/9868231).

11) Trouble Shooting

(a) Plasma cutter doesn't work - red pilot light lit

Check the compressed air supply, flow and pressure. If all okay the thermostatic overload has cut out. Wait for a while and let the plasma cutter cool down, it will automatically reset when it is ready to start cutting again.

(b) Plasma cutter doesn't work - red pilot light not lit

(Only for Clarke 25E) Surface of the metal to be cut not properly cleaned. Remove all rust, paint and varnish.

Check plasma electrode, it may have to be replaced.

(c) Ragged cut and lack of power

Check the hole in the nozzle, if it is over-sized too big or egg shaped replace it (see a d)

Check your air supply, make sure that the moisture is drained out of the filter regulator.

(d) Not cutting as it should

You might be trying to cut metal that is too thick.

You may be trying to cut too fast. Move the cutting torch slower.

(e) Arc falls when you are cutting (Check a,b,c, and d above).

You are probably moving the torch too slow. Move the cutting torch faster.

(f) Ragged edges on the material you are cutting

Air pressure could be set too high on the filter regulator it should be set at 60-65 psi.

(Plasma King 25 and King 40 only) you could be holding the torch too high above the metal you are cutting.

Setting up for Operation (All Models)

(a) Connect the inlet of the air filter regulator to a source of compressed air capable of delivering at least 3.5 cfm at 60-65 psi.

(b) Set the regulator on the machine to 60-65 psi.

Note: Compressed air must be of good quality if the machine is to function correctly. Wet air will prevent correct operation and will cause torch damage.

(c) Connect the machine to a 240V single phase supply checking first that the fuse rating is compatible with the fuse rating of the machine you are using. (See technical specification on Page 9)

5) Operation of Model No. 25E

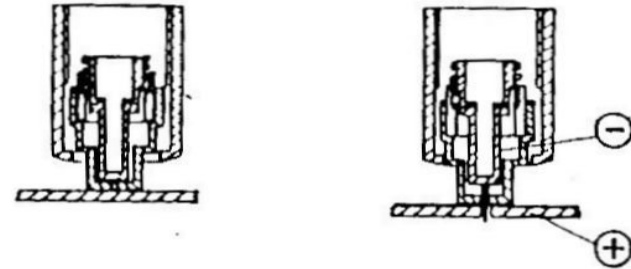
(a) Make sure that the surface of the metal where you wish to cut is clean and rust and paint free.

(b) connect the earth return lead to the workpiece ensuring that good contact is made with bare metal (rust and paint free).

(c) Switch on the machine.

(d) Press the torch tip down firmly on the metal to be cut (the tip is spring loaded). Slowly release the pressure on the tip until you strike an arc. You can now commence the cutting operation. (See "Cutting Technique" Page 7)

(e) To stop cutting remove the torch from the workpiece. The arc will extinguish immediately but compressed air will continue to flow for a further 60 seconds to cool the tip. Do not switch the machine off whilst the air is still flowing otherwise the torch may be damaged.



6) Operation of Model Nos. King 25, King 40 and King 45

(a) Because these models are fitted with a Pilot Arc cutting can commence even on metal which is painted or coated. However, do beware of fumes which may be given off by burning through painted or coated surfaces at very high temperature.

(b) Connect the earth return lead to the workpiece ensuring that good contact is made with bare metal (rust and paint free).

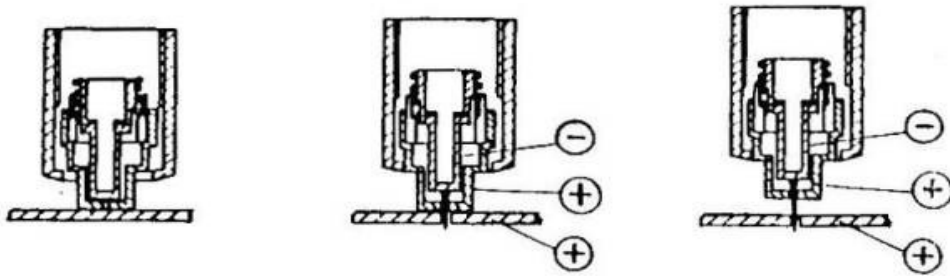
(c) Switch on the machine.

Note: on King 40 and King 45 set to max or min according to thickness of metal to be cut.

(d) To strike the pilot arc firstly push down firmly the trigger on the torch, then whilst holding down the trigger, press the torch tip down firmly on the metal to be cut. (The tip is spring loaded). Slowly release the pressure on the tip and the pilot arc will ignite. Keep the torch as close as possible to the workpiece for best cutting performance.

IMPORTANT WARNING When you lift the torch away from the workpiece the cutting arc will be lost but the pilot arc will remain ignited in the nozzle until the torch trigger is released. NEVER TOUCH The nozzle whilst the pilot arc is ignited as this may result in serious injury.

- e) To stop cutting remove the torch from the workpiece. To extinguish the pilot arc release the trigger on the torch.
Note: When the trigger is released and the arc is extinguished compressed air will continue to flow for a further 60 seconds to cool the torch. Do not switch off the machine until the air has stopped flowing or damage may occur to the torch.
- f) The King 45 can be switched to non-pilot arc for cutting bare metal, or once the cut has been started on coated metal. This will help to reduce wear on the tips.



7) Cutting Technique

- (a) When you have struck an arc with the workpiece a hole will be cut in the metal, if the arc does not penetrate the metal then STOP, as the metal is either too thick for the machine or (King 40 Only) you have selected the wrong power setting.
- (b) When cutting move the torch smoothly and with the torch head at right-angles to the work. If you move the torch too quickly the cut will not be clean, if you move the torch too slowly you may lose the cutting arc.
- (c) Model 25E only - Keep the torch tip in contact with the metal being cut at all times. If you lose contact with the metal then you will lose the arc.
- (d) Models King 25 and King 40 only. Keep the torch tip as close as possible to the metal being cut the pilot arc allows the cutting arc to jump a small gap between the torch tip and the workpiece.
- (e) When cutting thicker metals we strongly suggest that you DO NOT start in the middle of the piece of metal. If at all possible start at the edge on thick metal. If you start at the middle hot metal may blow up onto the torch tip and clog up some of the working parts, or force premature replacement of the electrode and nozzle.
- Note:** The maximum thickness of metal that each machine is designed to cut is as follows:
- 25E - 4 mm
 King 25 - 4 mm
 King 40 - 8 mm (max setting), 4 mm (min. setting).
 King 45 - 8 mm (max setting), 4 mm (min. setting)

8) Special safety features

- (a) A special electronic circuit controls the plasma cutter arc. This arc is only energised if the circuit is completed between the arc electrode and the ground clamp. Unless you press the torch trigger and press down on the torch head at the same time the torch will not ignite (KING 25, KING 40 and KING 45 Models). In the 25E Model the arc is only ignited when a micro switch in the cutting torch is activated by pressure on the torch head.
- (b) When you switch on your machine the green light marked 240V will illuminate. If the green light does not light when you switch on check your power source.
- (c) Your Plasma Cutter is equipped with a solenoid valve that will prevent you from cutting if there is insufficient compressed air. When the unit shuts down through lack of air the red light will come on. The red light will go out automatically once sufficient compressed air is supplied to the machine.

- (d) Your Plasma Cutter is also equipped with an automatic thermostatic overload device. If the machine or any of the components get too hot when you are cutting, this will switch off the cutting power and the other red light will come on. The cooling fan will continue to run to cool down the machine and when the red light goes off automatically you will be able to continue cutting.

9) Cleaning & Replacing Torch Consumables

WARNING Never attempt to do any work on the torch unless the machine is DISCONNECTED FROM at the mains.

- (a) The torch should be kept free of slag at all times to ensure the free passage of air.
- (b) To dismantle the torch:
 I - Unscrew protection nozzle.
 II - Remove plasma nozzle (tip) and insulator.
 III - Unscrew the electrode using a suitable spanner.
- (c) Look at the tip of the electrode. If it has a small "crater" or depression it may have to be replaced.
- (d) Look at the hole in the nozzle. If it is larger than 1 mm. in diameter or if it has become egg shaped replace it. To replace just slip the new nozzle onto the external insulator.
- (e) Check the spring - if it is compressed, bent or burned then replace it. It slips over the plasma electrode.
- (f) The spring insulator should not need replacing unless it gets broken. If this is the case slip a new one into the nozzle when reassembling the torch.
- Note:** These are the only user serviceable parts in your plasma cutter. If you have any other problems consult your local dealer or contact Clarke Group (Tel. 01/9868231).

10) Parts List - Torch Consumables

| Part | 25E Part. No. | King 25, 40, 45 Part. No. |
|-------------------|------------------|------------------------------|
| Protection Nozzle | EM | EM |
| Plasma Nozzle | EM | EM |
| Electrode | EM | EM |
| Insulator | EM | EM |
| Spring | EM | EM |