Clarke®

weld

200A 5KW WELDER GENERATOR

MODEL NO: CWG200

PART NO: 8130536

OPERATION & MAINTENANCE INSTRUCTIONS

ORIGINAL INSTRUCTIONS

DL0725

INTRODUCTION

Thank you for purchasing this CLARKE Welder Generator designed to provide single phase electrical power for power or arc welding. No other appliance other than those indicated should be used with this machine.

Please read through this document and the instruction manuals for the engine and alternator thoroughly before operating the machine. In doing so you will ensure the safety of yourself and that of others around you. This will also ensure that the welder generator will give you long and satisfactory service.

It is important that all accompanying instructions are observed. Clarke International does not accept responsibility for any injury or damage caused through improper use.

Please keep these instructions in a safe place for future reference.

GUARANTEE

This CLARKE product is guaranteed against faulty manufacture for a period of 12 months from the date of purchase. Please keep your receipt as proof of purchase.

This guarantee is invalid if the product is found to have been abused or tampered with in any way, or not used for the purpose for which it was intended.

Faulty goods should be returned to their place of purchase, no product can be returned to us without prior permission. This guarantee does not effect your statutory rights.

ENVIRONMENTAL RECYCLING POLICY

By purchasing this product, the customer is taking on the obligation to deal with its safe disposal in accordance with the Waste Electrical and Electronic Equipment (WEEE).

In effect, this means that this product must not be disposed of with general household waste. It must be disposed of according to the laws governing at a recognised disposal facility.

Please note that the details and specifications contained herein, are correct at the time of going to print. However, CLARKE International reserve the right to change specifications at any time without prior notice. **ALWAYS CONSULT THE MACHINE'S DATA PLATE.**

SAFETY SYMBOLS

	**ALWAYS**: Read this manual and make sure that all warnings and instructions are clear before you use this pressure washer.
	**WARNING**: Generator must be provided with an appropriate earth.
	**DANGER:** Risk of fire or explosion. Stop the engine before you refuel the generator. Keep flammable materials away from the work area.
	**DANGER:** Risk to breathing. Engine exhaust fumes can kill. For outdoor use only. Work in a well ventilated area.
	**WARNING:** Opaque eye protection should be worn at all times while welding.
	**WARNING:** Wear Protective Gloves.
	**WARNING: DO NOT** use in the rain
	**WARNING:** Risk of electrocution.
	**WARNING:** Risk of hot surfaces. Avoid contact with hot engine exhaust components. **DO NOT** allow contact with the engine muffler during or after use.
	WARNING: Loud Noise, risk to hearing.

PREPARATION OF THE WORKING AREA

The working area must be sufficiently spacious, with low humidity and well-ventilated so as to avoid any fumes which develop from the welding process and from incidental material adhering to the pieces to be welded (oils, paints, tars...) which may cause danger to the operator.

Avoid welding by contact with humid parts nearby combustible liquids. Least of all, do not weld upon tanks which may contain inflammable residuals.

WARNING: ELECTRIC SHOCK CAN BE FATAL. A PERSON QUALIFIED IN FIRST AID SHOULD ALWAYS BE PRESENT IN THE WORKING AREA. IF PERSON IS UNCONSCIOUS AND ELECTRIC SHOCK IS SUSPECTED, DO NOT TOUCH THE PERSON IF HE OR SHE IS IN CONTACT WITH THE WELDER OR CABLES. TURN OFF THE GENERATOR AND THEN USE FIRST AID. DRY WOOD, OR OTHER INSULATING MATERIAL CAN BE USED TO MOVE CABLES, IF NECESSARY, AWAY FROM THE PERSON.

FIRE PREVENTION

- **ALWAYS** switch the engine OFF when refuelling.
- **ALWAYS** refuel away from any source of heat.
- **ALWAYS** refuel in a well ventilated area.
- **NEVER** overfill fill the tank, fill to the level specified.
- **NEVER** smoke whilst refuelling and avoid smoking or using a naked flame near the generator.
- **NEVER** start the engine if there is a fuel spill. Any spillage must be wiped clean and the machine allowed to dry before attempting to start the engine.

PREVENTION OF ELECTRIC SHOCK

- **ALWAYS** store the generator undercover when not in use and away from damp or wet conditions.
- **NEVER** use the generator when it is raining or snowing or in wet or damp conditions.
- **NEVER** operate the generator with wet hands.
- **NEVER** use water or any other liquids to clean the generator.

POSITIONING THE MACHINE FOR USE

- **ALWAYS** leave at least a 1 metre gap between the generator and any surrounding building or structure.
- **ALWAYS** ensure the generator is on a solid, flat surface.

- **ALWAYS** ensure the surrounding area is free from any material that could burn or be damaged by heat.
- **NEVER** move or tilt the generator whilst it is switched on.
- **NEVER** cover or enclose the generator whilst it is in use.
- Be aware of the weight of the generator, **DO NOT** attempt to lift or move the generator without assistance or suitable lifting equipment.

EXHAUST GAS PRECAUTIONS

WARNING!: EXHAUST FUMES CAN BE FATAL

- **ALWAYS** ensure that there is adequate ventilation when using the generator.
- **ALWAYS** position the generator so that the exhaust is pointing away from people or animals.
- If the machine is to be used indoors the exhaust **MUST** be piped to atmosphere.

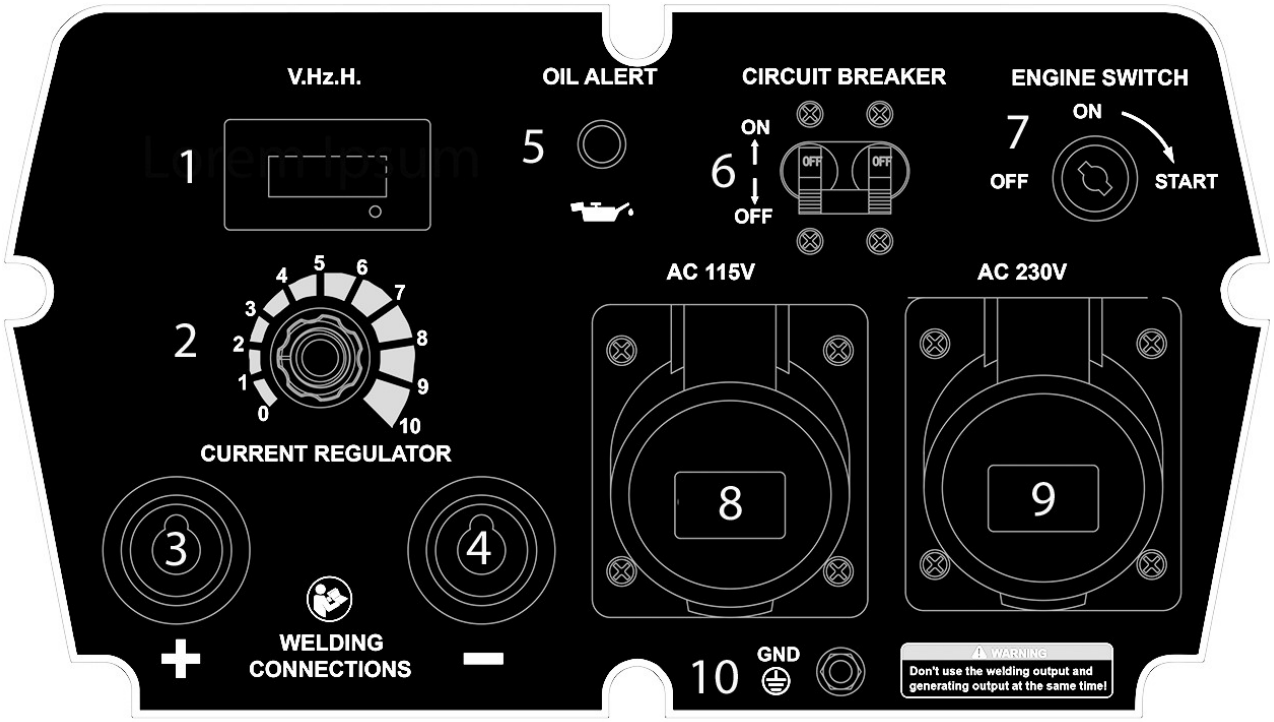
ADDITIONAL SAFETY PRECAUTIONS FOR ARC WELDING

- **NEVER** attempt to remove any of the panels or covers unless the generator is turn off.
- **NEVER** use the generator with any of the panels or covers removed.
- **NEVER** attempt any electrical or mechanical repair unless your are a qualified technician. If you have a problem with the machine contact your local CLARKE dealer.
- **NEVER** use or store in a wet/damp environment. **DO NOT EXPOSE TO RAIN**.
- **NEVER** allow children or animals in the vicinity of a welding operation.
- **ALWAYS** remove all flammable materials from the welding area.
- **ALWAYS** ensure that there is full free air circulating around the outer casing of the generator.
- Welding arc can seriously damage your eyes. Both the operator and any spectators should **ALWAYS** use a proper welding face shield or helmet, with suitable filter lenses. Proper gloves and working clothes should be worn at all times.
- **ALWAYS** wear a pair of safety spectacles/goggles when chipping away slag after welding. Remember, ordinary eye glasses are not safety gases.
- **ALWAYS** ensure there is adequate ventilation or extraction in the work area as the welding process gives off toxic fumes.
- **ALWAYS** ensure there is a fire extinguisher on hand.
- **ALWAYS** ensure that a medical supply is on hand, and that treatment for burns is provided.

GENERAL OVERVIEW

NO	DESCRIPTION	NO	DESCRIPTION
1	Frame	8	Engine Cover
2	Handle	9	Battery
3	Control Panel	10	Support Foot
4	Fuel Tank	11	Oil Dipstick
5	Choke Lever	12	Wheel
6	Air Filter	13	Support Foot
7	Muffler (Exhaust)	14	Fuel Valve

CONTROL PANEL



NO	DESCRIPTION	NO	DESCRIPTION
1	Voltmeter	6	Circuit Breaker
2	Welding Current Regulator	7	Engine Switch/Ignition
3	Welding DIN Socket (Positive)	8	AC 115V Socket
4	Welding DIN Socket (Negative)	9	AC 230V Socket
5	Oil Alert Indicator	10	Earthing Point

ASSEMBLY

WARNING: DUE TO THE WEIGHT OF THIS PRODUCT, IT IS HIGHLY RECOMMENDED THAT THE UNPACKING AND ASSEMBLY IS CARRIED OUT BY TWO PERSONS.

UNPACKING

Unpack your welder generator and check to ensure the following items are present. Contact your CLARKE dealer immediately if any parts are missing or damaged.

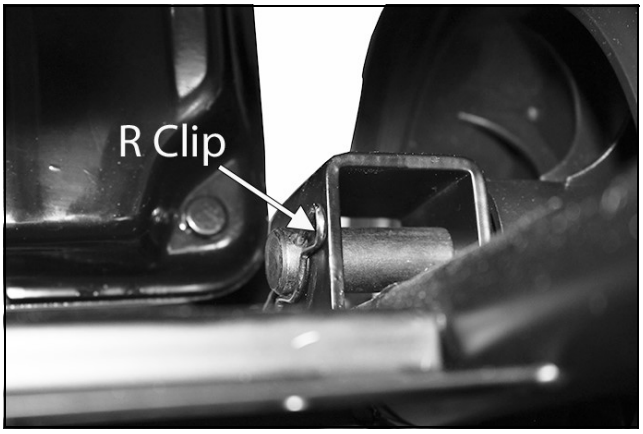
1 x Petrol Welder/Generator	1 x Black Welding Earthing Clamp and Cable
2 x Wheels	1 x Tool Bag
2 x Wheel Axle Rod and Washer	1 x Spark Plug Box Spanner and Arm
2 x 'R' Clips	1 x 8mm/10mm Spanner
2 x U Shaped Frame Feet & Fixings	1 x 5mm Hex Key
1 x Red Welding Torch and Cable	1 x Engine Manual

NOTE: Before assembling the wheels and feet, a protective cover should be placed on the ground and the generator should be placed rear end down onto it. The control panel should be facing upwards.

FITTING THE WHEELS

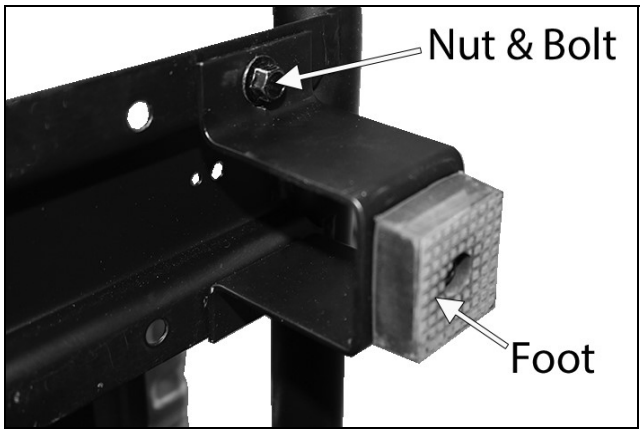
1. On each wheel, slide a washer on to the axle rod and slide it through the centre hole in the wheel and slide another washer onto the axle rod, as shown.

2. Slide each axle rod through the axle supports on the bottom of the frame and secure each wheel with an 'R' clip that are supplied.



FITTING THE FEET

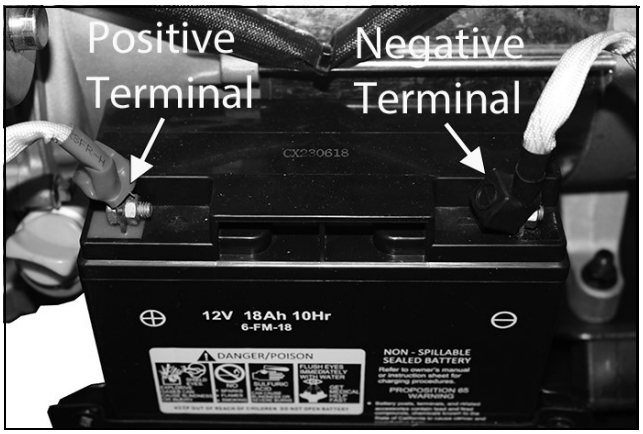
1. Place a foot on the frame strut (one each side of the strut), secure in place with the nut, bolt and washers supplied, using 8mm and 10mm open ended spanners.



CONNECTING THE BATTERY

For safety reasons, the generator battery is not connected when shipped. Follow these steps to connect the battery.

1. Connect the negative wire to the negative terminal on the battery as shown.
2. Connect the positive wire to the positive terminal on the battery as shown.
3. Ensure both terminals are covered by the plastic covers.



BEFORE USE

WARNING: STAND THE GENERATOR ON LEVEL GROUND WITH THE ENGINE SWITCHED OFF.

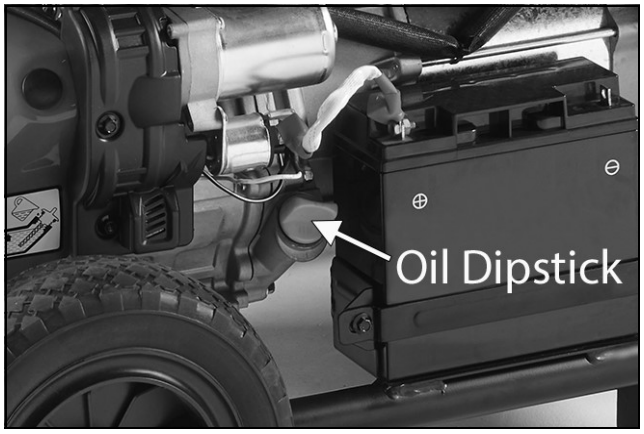
WARNING: THE OIL LEVEL SHOULD ONLY BE CHECKED WITH A COLD ENGINE. A HOT ENGINE WILL GIVE A FALSE READING.

IMPORTANT: The engine is supplied without any oil in it and must be filled to the correct level before starting for the first time, see below.

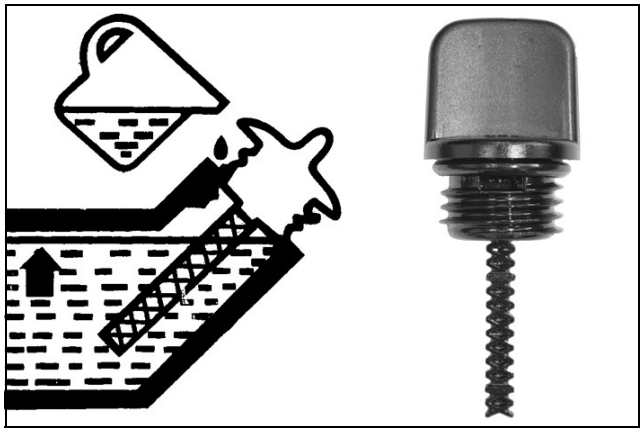
CHECKING THE ENGINE OIL LEVEL

For safety seasons, the generator is shipped without oil in the engine. Follow these steps to check and install engine oil.

1. Turn the dipstick anti-clockwise and remove from the oil fill tube.
2. Wipe the dipstick with a clean cloth.
3. Insert the dipstick back into the oil fill tube and then remove it again. **DO NOT** screw in the oil filler cap/ dipstick when doing this.



4. If the oil level is at or below the 'L' mark on the dipstick, using a funnel, add oil to the crankcase.
   - Fill until the oil reaches the threads in the oil fill tube.
   - Oil capacity (See page 21).
   - We recommend the use of the following oil: CLARKE SAE30 Motor Oil; Part No: 3050852
5. Replace the oil filler cap.



CHECKING THE FUEL LEVEL

WARNING: ALWAYS REFUEL IN A WELL VENTILATED AREA AWAY FROM ANY HEAT SOURCES.

WARNING: ALLOW THE UNIT TO COOL DOWN BEFORE REFUELLING.

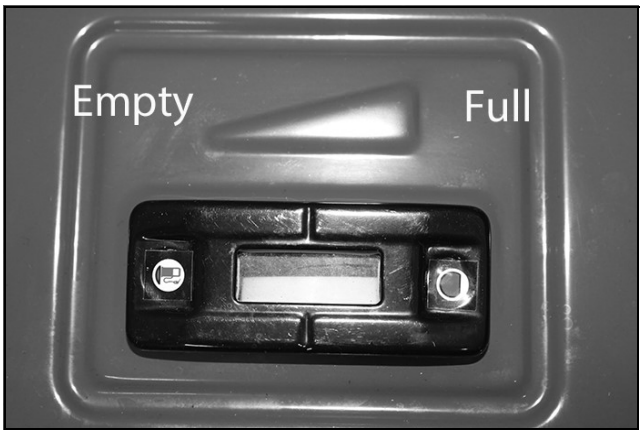
WARNING: DO NOT LEAVE FUEL WITHIN THE REACH OF CHILDREN.

For safety seasons, the generator is shipped without petrol in the tank. Follow these steps to check and install petrol.

RECOMMENDED FUEL

Only use standard unleaded petrol. DO NOT mix oil with the petrol.

1. Check the fuel level on the fuel gauge, located on top of the fuel tank. The fuel gauge will show as red when you have fuel in the tank turning white as the fuel level decreases.



2. To add fuel, open the fuel filler cap.

3. Just inside the fuel tank is a fuel filter which catches any contaminants as you refuel.
4. Slowly add fuel to the fuel tank (maximum 18L) watching the fuel level gauge as you do so.

NOTE: DO NOT overfill the fuel tank.

NOTE: DO NOT fill above the red fuel filter marker.

5. Replace the fuel filler cap securely.

Fuel Filter

EARTH POINT

WARNING: FAILURE TO PROPERLY GROUND THE GENERATOR BEFORE USE CAN RESULT IN ELECTROCUTION

Attach a suitable earth lead to a good earthing point - water pipe, ground spike etc., whenever you use this generator.

1. Ground the generator by connecting a suitable grounding wire to the earth point, as shown, which is located on the control panel.
2. Connect the other end of the grounding wire to a copper or brass grounding rod or suitable grounding point that is driven into the earth.

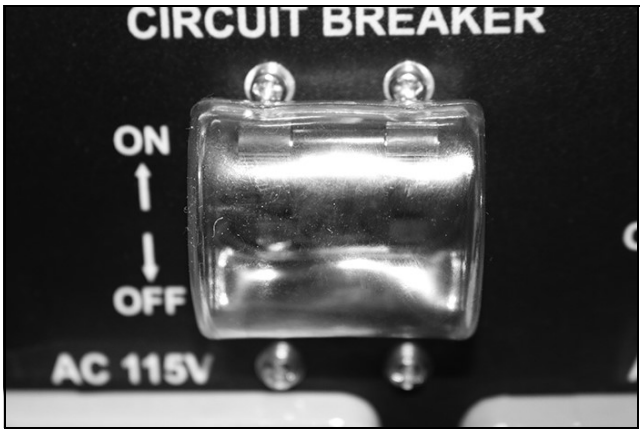
OPERATION - GENERATOR

IMPORTANT: Ensure all precautions are taken, referring to this and the engine manual, before proceeding.

IMPORTANT: Always check the oil and fuel levels before starting the engine, see pages 10-11.

STARTING THE ENGINE

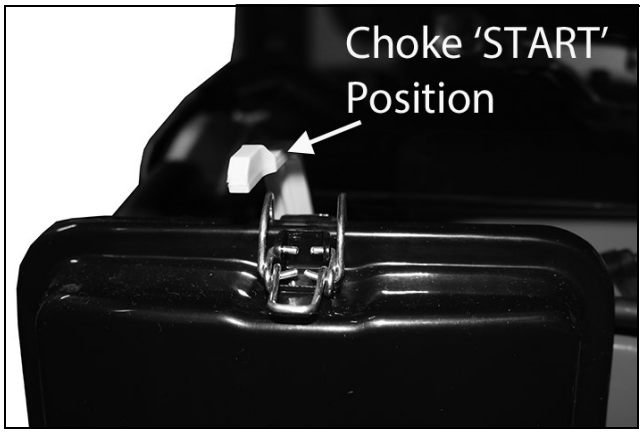
1. Remove all connections from the AC and welding sockets.
2. Switch the AC Circuit Breaker to the 'ON' (Up) position.



3. Set the fuel valve to the 'ON' position as shown.

4. Move the choke lever to the 'START' position.

   NOTE: Move the choke lever to the 'RUN' position if starting the engine in hot condition.



5. Insert the key into the ignition.
6. Turn the key in the 'START' position.

   NOTE: Once the engine starts, the key will return to the 'ON' position.

7. Once the engine has warmed up, set the choke lever to the 'RUN' position.

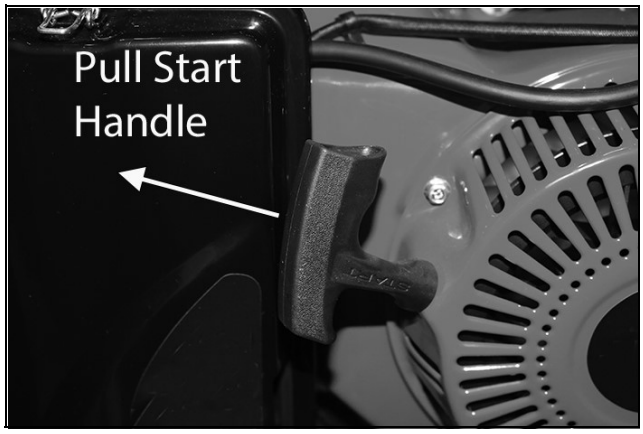
ALTERNATIVELY

1. Turn the key to the 'ON' position.

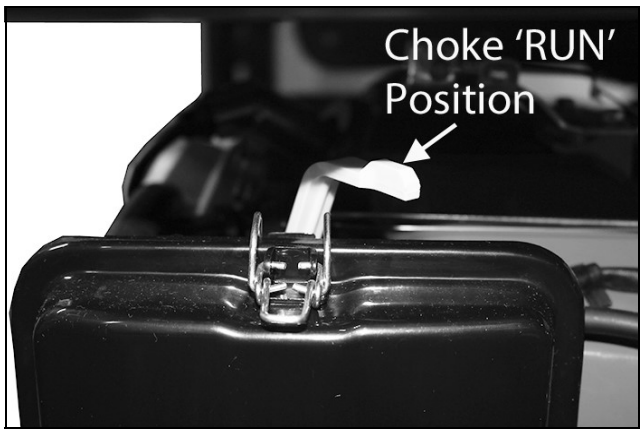
2. Pull the start handle gently until you feel some resistance.
3. Then pull the start handle sharply upwards.

   NOTE: You may have to do this more than once.

   NOTE: NEVER let the handle snap back, as this may cause damage to the generator and injury.



4. Once the engine has warmed up, set the choke lever to the 'RUN' position.



CONNECTING ELECTRICAL DEVICES

The generator can supply both 230V AC and 110V AC.

The sockets are laid out in the following order: (from left to right):

1. 1 x 16amp 115v (Small Yellow)
2. 1 x 13amp 230V (Small Blue)

Follow the steps below to properly connect your device(s) to the generator.

1. Before connecting electrical devices, allow the generator to run for a few minutes to stabilise the speed and voltage output.
2. Select the device with the highest wattage and make sure it is turned off. Plug the device into the generator and then turn the device on. Allow the engine to stabilise.
3. Repeat step 2 to plug in each additional device. **DO NOT** attempt to plug in and start multiple devices at the same time.

GENERATOR CAPACITY

Make sure the generator can supply enough running (rated) and starting (max.) watts for the items you will power at the same time. Follow these simple steps.

1. Select the items you will power at the same time.
2. Total the running (rated) watts of these items. This is the amount of power the generator must produce to keep the items running.
3. Estimate how many starting (max.) watts you will need. Starting wattage is the short burst of power needed to start electric motor driven tools such as a circular saw or refrigerator. Because not all motors start at the same time, total starting (max.) watts can be estimated by adding only the items with the highest additional starting (max.) to the total rated watts.

Example:

Tool/Appliance	Running Watts	Additional Starting Watts
Refrigerator	700	1350
Portable Fan	40	120
Laptop	250	250
46 in. Flat Screen TV	190	190
	1180 Total Running Watts	1275 Highest Starting Watts

Total Running Watts: 1180
Highest Starting Watts: +1275
Total Starting Watts Needed = **2455**

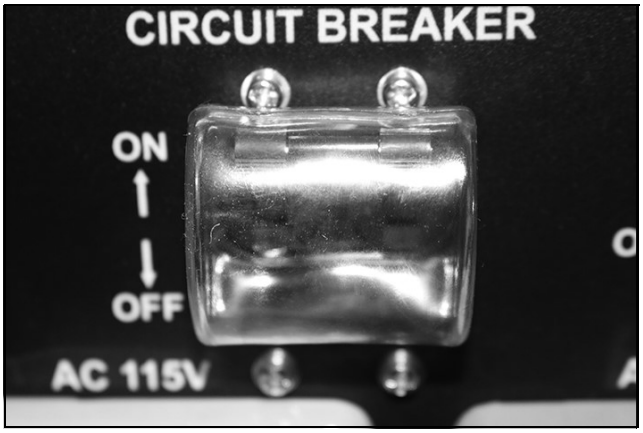
NEVER add more loads than the generator capacity. Take special care to consider surge loads in generator capacity as previously described.

The chart below serves as a reference only for the estimated wattage requirements of common electrical devices. however, **DO NOT** solely reply on this chart, all electronics and appliances are built differently, **ALWAYS** check the wattage listed on the electrical device before consulting this chart:

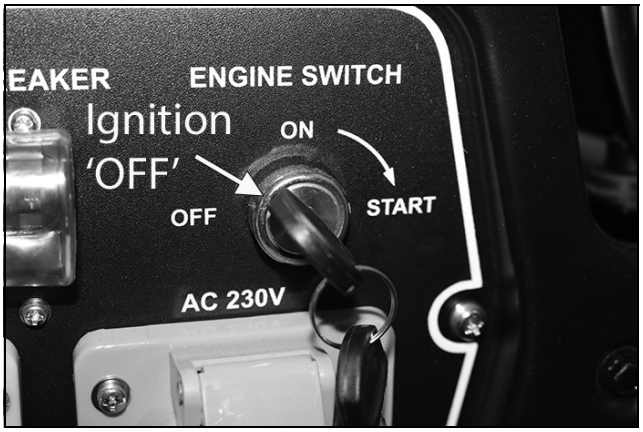
Tool/Appliance	Rated (Running) Watts	Surge (Starting) Watts
Hot Plate	2500	0
Saw - Circular	1500	1500
Saw - Mitre	1200	1200
Microwave	1000	0
Well Water Pump	1000	1000
Sump Pump	800	1200
Refrigerator	800	1200
Computer	800	0
Television	500	0
Box Fan	300	600
Light Bulb	75	0

SHUTTING DOWN THE GENERATOR

1. Disconnect all electrical and welding devices.
2. Make sure that the AC breaker is set to the off (down) position.

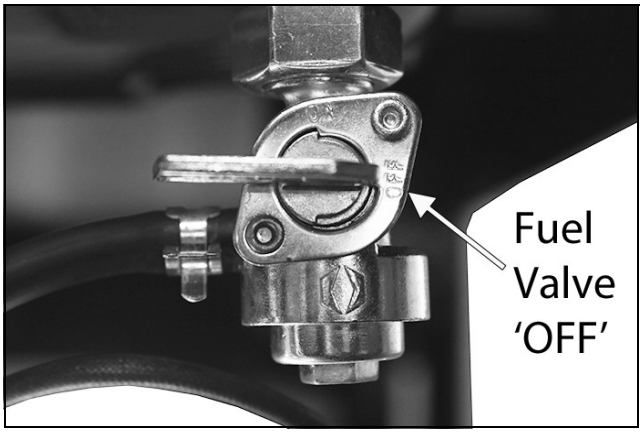


3. Turn the ignition key to the 'OFF' position.



4. Turn the fuel valve to "OFF".

NOTE: To stop the generator in an emergency simply turn the ignition key to the 'OFF' position.



GENERAL SAFETY PRECAUTIONS FOR ALL TYPES OF WELDING

WARNING: AS WITH ALL MACHINERY, THERE ARE CERTAIN HAZARDS INVOLVED WITH THEIR OPERATION AND USE. EXERCISING RESPECT AND CAUTION WILL CONSIDERABLY LESSEN THE RISK OF PERSONAL INJURY. HOWEVER, IF NORMAL SAFETY PRECAUTIONS ARE OVERLOOKED, OR IGNORED, PERSONAL INJURY TO THE OPERATOR MAY RESULT.

FAILURE TO FOLLOW THESE RULES MAY RESULT IN SERIOUS PERSONAL INJURY

GENERAL PRECAUTIONS

A) BURN PREVENTION

Wear protective clothing - gauntlet gloves designed for use in welding, apron, and protective shoes. Button any shirt collar and pocket flaps, and wear cuffless trousers to avoid entry of sparks and slag. Wear a helmet with safety goggles or glasses with side shields underneath, appropriate filter lenses or plates (protected by clear glass). This is a MUST for welding (and chipping) to protect the eyes from radiant energy and spatter. Replace cover glass when broken, pitted, or spattered. Avoid oily greasy clothing. A spark may ignite them. Hot metal should never be handled without gloves. First aid facilities and a qualified first-aid person should be available unless medical facilities are close by, for immediate treatment of flash burns of the eyes and skin burns. Ear plugs should be worn when working overhead or in a confined space. A hard hat should be worn when others are working overhead. Flammable hair preparations should not be used by persons intending to weld or cut.

NOTE: ALL protective wear including masks & head shields MUST comply with PPE Directive 89/686/EEC

B) TOXIC FUME PREVENTION

Severe discomfort, illness or death can result from fumes, vapours, heat, or oxygen enrichment or depletion that welding (or cutting) may produce. Prevent them with adequate ventilation. NEVER ventilate with oxygen. Lead-, cadmium-, zinc-, mercury- and beryllium-bearing materials, when welded (or cut) may produce harmful concentrations of toxic fumes. Adequate local exhaust ventilation must be used, or each person in the area as well as the operator must wear an air-supplied respirator. For beryllium, both must be used. Metals coated with or containing materials that emit toxic fumes should not be heated unless any coating is removed from the work surface, the area is well ventilated, or the operator wears an air-supplied respirator. Only work in a confined space when it is being force ventilated and, if necessary, while wearing an air-supplied respirator. Vapours from chlorinated solvents can be decomposed by the heat of the arc (or flame) to form PHOSGENE, a highly toxic gas, and other lung and eye irritating products. The ultraviolet (radiant) energy of the arc can also decompose trichloroethylene and perchloroethylene vapours to form

phosgene. **DO NOT** weld or cut where solvent vapours can be drawn into the welding or cutting atmosphere or where the radiant energy can penetrate to atmospheres containing even minute amounts of trichloroethylene or perchloroethylene.

C) FIRE AND EXPLOSION PREVENTION

Causes of fire and explosion are:

1. Combustibles reached by the arc, flame, flying sparks, hot slag or heated material;
2. misuse of compressed gases and cylinders
3. short circuits.

BE AWARE that flying sparks or falling slag can pass through cracks, along pipes, through windows or doors, and through wall or floor openings, out of sight of the goggle wearing operator.

To prevent fires and explosion: keep equipment clean and operable, free of oil, grease, and (in electrical parts) of metallic particles that can cause short circuits. If combustibles are in the area, **DO NOT** weld. Move the work if practicable, to an area, free of combustibles.

Avoid working in paint spray rooms, dip tanks, storage areas, ventilators. If the work cannot be moved, move any combustibles away from sparks and heat or protect against ignition with suitable fire- resistant covers or shields.

Walls, ceilings and floors near the work should be protected by heat resistant covers or shields. A 'fire watcher' must be standing by, with suitable fire extinguishing equipment during, and for some time after welding or cutting if:

1. appreciable combustibles are within 10m.
2. appreciable combustibles are further than 10m but can be ignited by sparks.
3. openings (concealed or visible) in floors or walls can expose combustibles to sparks.
4. combustibles adjacent to walls, ceilings, roofs or metal partitions can be ignited by radiant or conducted heat.

After work, check that area is free of sparks, glowing embers and flames. An empty container that held combustibles or that can produce flammable or toxic vapours when heated, must never be welded on or cut, unless the container has first been cleaned. This includes a thorough steam or caustic cleaning (or a solvent or water washing, depending on the combustible's solubility) followed by purging and inerting with nitrogen or carbon dioxide, and using protective equipment.

Water filling just below the working level may substitute for inerting.

A container with unknown contents should be cleaned (see paragraph above). Do NOT depend on sense of smell or sight to determine if it is safe to weld or cut. Hollow castings or containers must be vented before welding or cutting - they can explode.

In explosive atmospheres, **NEVER** weld or cut where the air may contain flammable dust, gas, or liquid vapours.

ELECTRIC ARC WELDING

Comply with the precautions above and this section. Arc welding, properly done, is a safe process, but a careless operator invites trouble. The equipment carries high currents at significant voltages. The arc is very bright and hot. Sparks fly, fumes rise, ultraviolet and infrared energy radiates and work pieces are hot. The wise operator avoids unnecessary risks and protects himself and others from accidents.

A) BURN PROTECTION

The welding arc is intense and visibly bright. It's radiation can damage eyes, penetrate lightweight clothing, reflect from light coloured surfaces and burn the skin and eyes. Skin burns resemble acute sunburn, those from gas - shielded arcs are more severe and painful.

DON'T GET BURNED! FOLLOW ALL SAFETY PRECAUTIONS!

PROTECTIVE CLOTHING

Wear long sleeved clothing (particularly for gas shielded arc) in addition to gloves, apron and strong shoes. As necessary, use additional protective clothing such as leather jacket or sleeves, flameproof apron and fire-resistant leggings. Avoid outer garments of untreated cotton. For bare skin protection wear dark substantial clothing Keep collars closed to protect the chest and neck and button any pockets to prevent entry of sparks.

EYE AND HEAD PROTECTION

Protect your eyes from exposure to arc. **NEVER** look at an electric arc without a welding helmet or shield containing an appropriate filter plate (Please refer to the section 'Welding Shield). Always place over the face before striking an arc. Protect the filter plate with a clear cover plate. Any cracked or broken helmet or shield should NOT be worn; radiation can pass through to cause burns.

Cracked, broken, or loose filter plates must be replaced **IMMEDIATELY**. Replace the clear cover plate when broken, pitted, or spattered. **WE STRONGLY SUGGEST** you wear flash goggles with side shields under the helmet, to give some protection to the eyes should the helmet not be lowered over the face before an arc is struck. Looking at an arc momentarily with unprotected eyes (particularly high intensity gas-shielded arc) can cause a retinal burn that may leave a permanent dark area in the field of vision. Before welding whilst wearing contact lenses, seek advice from your optician.

PROTECTION OF NEARBY PERSONNEL

For production welding, a separate, well vented room or enclosed bay is best. In open areas, surround the operation with low reflection, non- combustible screens or panels. Allow for free air circulation, particularly at floor level. Provide face shields for all

persons who will be looking directly at the weld. Others working in the area should wear flash goggles. Before starting to weld, make sure that screen or bay doors are closed.

B) TOXIC FUME PREVENTION

Comply with all precautions in page 3.

C) FIRE AND EXPLOSION PREVENTION

Do not overload arc welding equipment. It may overheat cables and cause a fire. Loose cable connections may overheat or flash and cause a fire. Never strike an arc on a cylinder or other pressure vessel. It creates a brittle area that can cause a violent rupture or lead to such a rupture later under rough handling.

D) SHOCK PREVENTION

Exposed live conductors or other bare metal in the welding circuit, or in unearthed, electrically-LIVE equipment can fatally shock a person whose body becomes a conductor. **DO NOT STAND, SIT, LIE, LEAN ON, OR TOUCH** a wet surface when welding, without suitable protection.

E) PROTECTION FOR WEARERS OF ELECTRONIC LIFE SUPPORT DEVICES (PACEMAKERS)

Magnetic fields from high currents can affect pacemaker operation. Persons wearing pacemakers should consult with their doctor before going near arc welding or spot welding operations.

F) PROTECTION AGAINST SHOCK

Keep your body and clothing dry. Never work in a damp area without adequate insulation against electric shock. Stay on a dry duckboard or rubber mat when dampness or sweat can not be avoided. Sweat, sea water, or moisture between your body and an electrically LIVE part - or earthed metal - reduces the body surface electrical resistance, enabling dangerous and possibly lethal currents to flow through the body.

1) EARTHING THE EQUIPMENT

When arc welding equipment is earthed according to the National Electrical Code and the workpiece is earthed, a voltage may exist between the electrode and any conducting object.

Examples of conducting objects include, but are not limited to, buildings, electrical tools, work benches, welding power source cases, workpieces, etc. Never touch the electrode and any metal object unless the welding power source is off. When installing, connect the frames of each unit such as the welding power source, control, work table and water circulatory to the building earth. Conductors must be adequate to carry earth currents safely. Equipment made electrically LIVE by stray current may shock, possibly fatally. Do not EARTH to electrical conduit, or to a pipe carrying ANY gas or a flammable liquid such as oil or fuel.

2) TORCH

A fully insulated torch should be used without protruding screws or other damage.

3) CONNECTORS

Fully insulated lock-type connectors should be used to join welding cable.

4) CABLES

Frequently inspect cables for wear, cracks and damage. IMMEDIATELY REPLACE those with excessively worn or damaged insulation to avoid possibly lethal shock from bare cable. Cables with damaged areas may be taped to give resistance equivalent to original cable. Keep the cable dry, free of oil and grease and protected from hot metal and sparks.

5) TERMINALS AND OTHER EXPOSED PARTS

Terminals and other exposed parts of electrical units should have insulating covers secured before operation.

6) ELECTRODE

a) Equipment with output on/off control (contactor)

Welding power sources for use with the gas metal arc welding, gas tungsten arc welding and similar processes normally are equipped with devices hat permit on/off control of the welding power output. When so equipped the electrode wire becomes electrically LIVE when the power source switch is ON and welding gun switch is closed. Never touch the electrode wire or any conducting object in contact with the electrode circuit unless the welding power source is off.

b) Equipment without output on/off control (no contactor)

Welding power sources used with shielded metal arc welding and similar processes may not be equipped with welding power output on/off control devices. With such equipment the electrode is electrically LIVE when the power switch is turned ON. Never touch the electrode unless the welding power source is off.

7) SAFETY DEVICES

Safety devices such as interlocks and circuit breakers should not be disconnected or shunted out. Before installation, inspection, or service of equipment, shut OFF all power and remove line fuses (or lock or red-tag switches) to prevent accidental turning ON of power. Do not open power circuit or change polarity while welding. If, in an emergency, it must be disconnected, guard against shock burns or flash from switch arcing. Always shut OFF and disconnect all power to equipment. A power disconnect switch must be available near the welding power source.

ELECTROMAGNETIC INTERFERENCE (EMC)

Whilst this unit complies with EMC regulations, the user is responsible for installing and using the welding equipment according to the manufacturers instructions. If electromagnetic disturbances are detected then it shall be the responsibility of the user of the welding equipment to resolve the situation. In some cases this remedial action may be as simple as earthing the welding circuit, see 'Note'. In other cases it could involve constructing an electromagnetic screen enclosing the power source and the work complete with associated input filters. In all cases electromagnetic disturbances must be reduced to the point where they are no longer troublesome.

NOTE: ***The welding circuit may or may not be earthed for safety reasons. Changing the earthing arrangements should only be authorised by a person who is competent to assess whether the changes will increase the risk of injury, e.g. by allowing parallel welding current return paths which may damage the earth circuits of other equipment.***

ASSESSMENT OF THE AREA

Before installing welding equipment the user shall make an assessment of potential electromagnetic problems in the surrounding area. Avoid using your inverter in the vicinity of:

- other supply cables, control cables, signaling and telephone cables; above, below and adjacent to the welding equipment;
- radio and television transmitters and receivers;
- computer and other control equipment;
- safety critical equipment, e.g. guarding of industrial equipment;
- pacemakers and hearing aids etc;
- equipment used for calibration or measurement;
- other equipment in the environment. The user shall ensure that other equipment being used in the environment is compatible. This may require additional protection measures;

It may be possible to avoid the above by changing the time of day that welding or other activities are to be carried out.

The size of the surrounding area to be considered will depend on the structure of the building and other activities that are taking place. The surrounding area may extend beyond the boundaries of the premises.

METHODS OF REDUCING EMISSIONS

MAINS SUPPLY

Welding equipment should be connected to the mains supply according to the manufacturers recommendations. If interference occurs, it may be necessary to take additional precautions such as filtering of the mains supply. Consideration should be given to shielding the supply cable of permanently installed welding equipment, in metallic conduit or equivalent. Shielding should be electrically continuous throughout its length. The shielding should be connected to the welding power source so that good electrical contact is maintained between the conduit and the welding power source enclosure.

MAINTENANCE OF THE WELDING EQUIPMENT

The welding equipment should be routinely maintained according to the manufacturers recommendations. All access and service doors and covers should be closed and properly fastened when the welding equipment is in operation. The welding equipment should not be modified in any way except for those changes and adjustments covered in the manufacturers instructions. In particular, the spark gaps of arc striking and stabilizing devices should be adjusted and maintained according to the manufacturers recommendations.

WELDING CABLES

The welding cables should be kept as short as possible and should be positioned close together, running at or close to the floor level.

EQUIPOTENTIAL BONDING

Bonding of all metallic components in the welding installation and adjacent to it should be considered. However, metallic components bonded to the work piece will increase the risk that the operator could receive a shock by touching these metallic components and the electrodes at the same time. The operator should be insulated from all such bonded metallic components.

EARTHING OF THE WORKPIECE

Where the workpiece is not bonded to earth for electrical safety, nor connected to earth because of its size and position, e.g. a ships hull or building steelwork, a connection bonding the workpiece to earth may reduce emissions in some, but not all instances.

Care should be taken to prevent the earthing of the workpiece increasing the risk of injury to users, or damage to other electrical equipment.

Where necessary, the connection of the workpiece to earth should be made by a direct connection to the workpiece, but in some countries where direct connection is not permitted, the bonding should be achieved by suitable capacitance, selected according to national regulations.

SCREENING AND SHIELDING

Selective screening and shielding of other cables and equipment in the surrounding area may alleviate problems of interference. Screening of the entire welding installation may be considered for special applications.

OPERATION - WELDING

The welding capabilities of your welder are given on the data label printed on the rear panel of the machine, and reproduced on page 16. An explanation of markings and symbols appearing on the data label is shown on page 21.

THERMAL OVERLOAD PROTECTION

If the duty cycle of the welder is exceeded (see Specifications), the Overload Protection Device will automatically cut the power to prevent damage to the machine. Should the cut-out operate, you will have to wait until the transformer cools down (approx. 30 minutes), when the overload device will automatically reset itself. Although no harm will be done to the machine if/when the overload device is actuated, its frequent use could eventually result in damage.

PREPARATION FOR WELDING

1. Connect the red welding lead to the appropriate DIN socket (RED, +).
2. Connect the black earth clamp lead to the COM DIN socket (BLACK, -).
3. Make sure that the two welding lead ends **DO NOT** touch while connected to the welder.
4. Ensure the earth clamp is connected to the work piece.

IMPORTANT: Ensure also that the earth clamp is attached to clean, solid metal. If necessary thoroughly clean with a wire brush or similar to guarantee a good connection.

5. Select the appropriate electrode (see page 26 for a full list of CLARKE electrodes), which should be approximately the same thickness as the piece to be welded, for single pass welding.

NOTE: ***With practice you will get a feel for the best current settings for different welding rod thicknesses.***

6. Adjust the Current Regulator to the required level
7. Turn the generator engine on, see pages 13 - 14.
8. To turn the generator engine off, see page 17.

The chart below gives an indication of the thickness of material/welding rod thickness and the corresponding welding current. This is intended as a guide only.

Work Piece Thickness	Welding Rod Diameter	Welding Current	Current Regulator Setting
Up-to 2mm	1.6mm - 2.5mm	40A - 60A	1 - 2
3mm	2.5mm - 3.2mm	60A - 80A	3 - 4
4mm - 5mm	3.2mm - 4mm	90A - 130A	5 -6
6mm - 12mm	4mm - 5mm	160A - 210A	7 - 8
Above 13mm	5mm - 6mm	200A - 270A	9 - 10

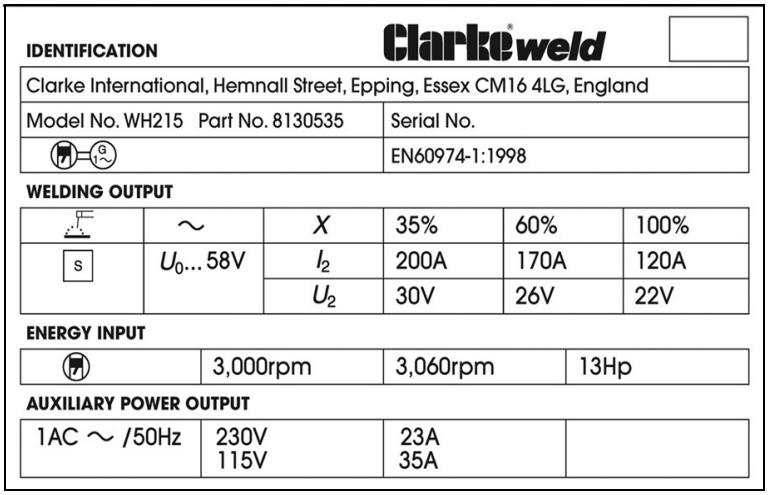
CLARKE ELECTRODES

- 1.6mm x 300mm E6013 Welding Electrodes, 5kg Bulk Pack; Part No: 3050590
- 2.0mm x 300mm E6013 Welding Electrodes, 5kg Bulk Pack; Part No: 3050592
- 2.5mm x 350mm E6013 Welding Electrodes, 5kg Bulk Pack; Part No: 3050594
- 3.25mm x 350mm E6013 Welding Electrodes, 5kg Bulk Pack; Part No: 3050596
- 4.0mm x 400mm E6013 Welding Electrodes, 5kg Bulk Pack; Part No: 3050598
- 1.6mm WC20 Grey Tungsten Welding Electrodes, 10 Pack; Part No: 3050630
- 1.6mm WL20 Sky Blue Tungsten Welding Electrodes, 10 Pack; Part No: 3050640
- 2.4mm WC20 Grey Tungsten Welding Electrodes, 10 Pack; Part No: 3050635
- 2.4mm WL20 Sky Blue Tungsten Welding Electrodes, 10 Pack; Part No: 3050645

DUTY CYCLES

This model is covered by regulations EN 60974-1 and EN 50199, where the Duty Cycle (X) is expressed as a percentage of time the machine may be used in a given period for a specified welding current.

i.e. using the example shown:



IDENTIFICATION	Clarke weld				
Clarke International, Hemnall Street, Epping, Essex CM16 4LG, England					
Model No. WH215 Part No. 8130535			Serial No.		
			EN60974-1:1998		
WELDING OUTPUT					
	~	X	35%	60%	100%
S	U_0... 58V	I_2	200A	170A	120A
		U_2	30V	26V	22V
ENERGY INPUT					
	3,000rpm		3,060rpm		13Hp
AUXILIARY POWER OUTPUT					
1AC ~ /50Hz	230V 115V		23A 35A		

When welding at 170 Amps the machine may be used for 6 minutes (60%) in any 10 minute period, or, the machine may be used continuously, (100%) when welding at 120 Amps.

WELDING TECHNIQUE

1. With the welder correctly connected to the mains supply and the leads attached to the machine, ensure the earth clamp is firmly attached to the workpiece on CLEAN, SOLID metal and as close to the proposed weld as is practical, and the appropriate current setting for the job has been set.
2. Start the engine.

NOTE: ***If the machine stops at any time and the amber light on the front panel illuminates, the thermal cutout has intervened. Wait until the transformer has cooled sufficiently for work to recommence. This could take considerable time and is denoted by the amber light going OUT.***

3. Bring the electrode to the work surface at an angle of approx 70^{o} then, **BEFORE** you strike an arc, bring the face shield up to protect your eyes.

Strike an arc by briefly touching the work surface with the tip of the electrode. Once the arc is struck or primed, raise the electrode slightly and maintain it at a distance of approx 1.5mm (1/16") from the work surface, then proceed to move the electrode along its intended path, keeping the tip in the molten pool at all times. An even crackling noise should be heard, which is an indication of a good weld.

NOTE: This is the most difficult aspect for most beginners. It is recommended that you practice on some scrap material in order to get a feel of the operation.

If the electrode is not withdrawn quickly enough once the arc is primed, there is a possibility that the electrode will weld itself to the workpiece. Should this happen, give it a sharp tug to free it and try again. If this fails to free it, turn OFF the machine immediately as it will quickly overheat.If you withdraw the electrode too far once the arc is primed, you will lose the arc and have to try again.

4. Inspect the job carefully. With a correct combination of electrode size and current setting the area of weld should be complete fusion of the electrode and parent metal/s. Any slag which forms on the surface should be chipped away with a pick/ brush.

If the resultant weld looks messy and irregular, this is an indication of porosity or slag contamination and you have almost certainly failed to achieve the correct combination. This is a common problem, so do not worry as practice will quickly cure this.

WELDING MISTAKES

The following tips should help you improve your welding technique fairly quickly.

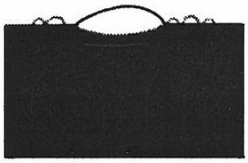
The arc welding technique is an acquired skill and requires considerable practice before perfect results are obtained. The diagrams below will help to explain the pitfalls in your technique and how to overcome them.

1. Arc too short

This causes irregular masses of weld to be deposited, with slag contamination on an uneven surface.

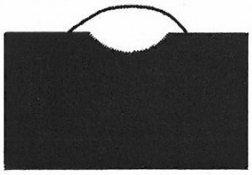
2. Arc too long

This causes poor penetration resulting in a weak weld with excessive spatter and porosity. Surface of the weld is rough and the arc makes a hissing sound



3. Electrode moved too slowly

This causes a very wide and heavy deposit which overlaps at the sides. It is wasteful both in terms of time and electrode use.



4. Electrode moved too quickly

This causes poor penetration with a 'stringy' and incomplete weld deposit. Slag is very hard to remove.

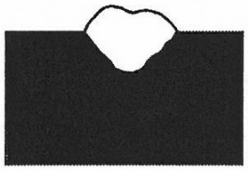
5. Current too low

This causes poor penetration and causes the electrode to stick to the workpiece too readily. Also results in a very irregular and high weld deposit. Slag is very hard to remove.

6. Current too high

This causes excessive penetration with spatter and deep pointed crater. It may also cause holes to be burned in the workpiece.

Burns electrodes very quickly.

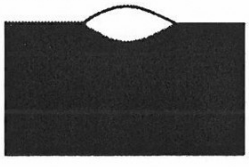


7. The perfect weld

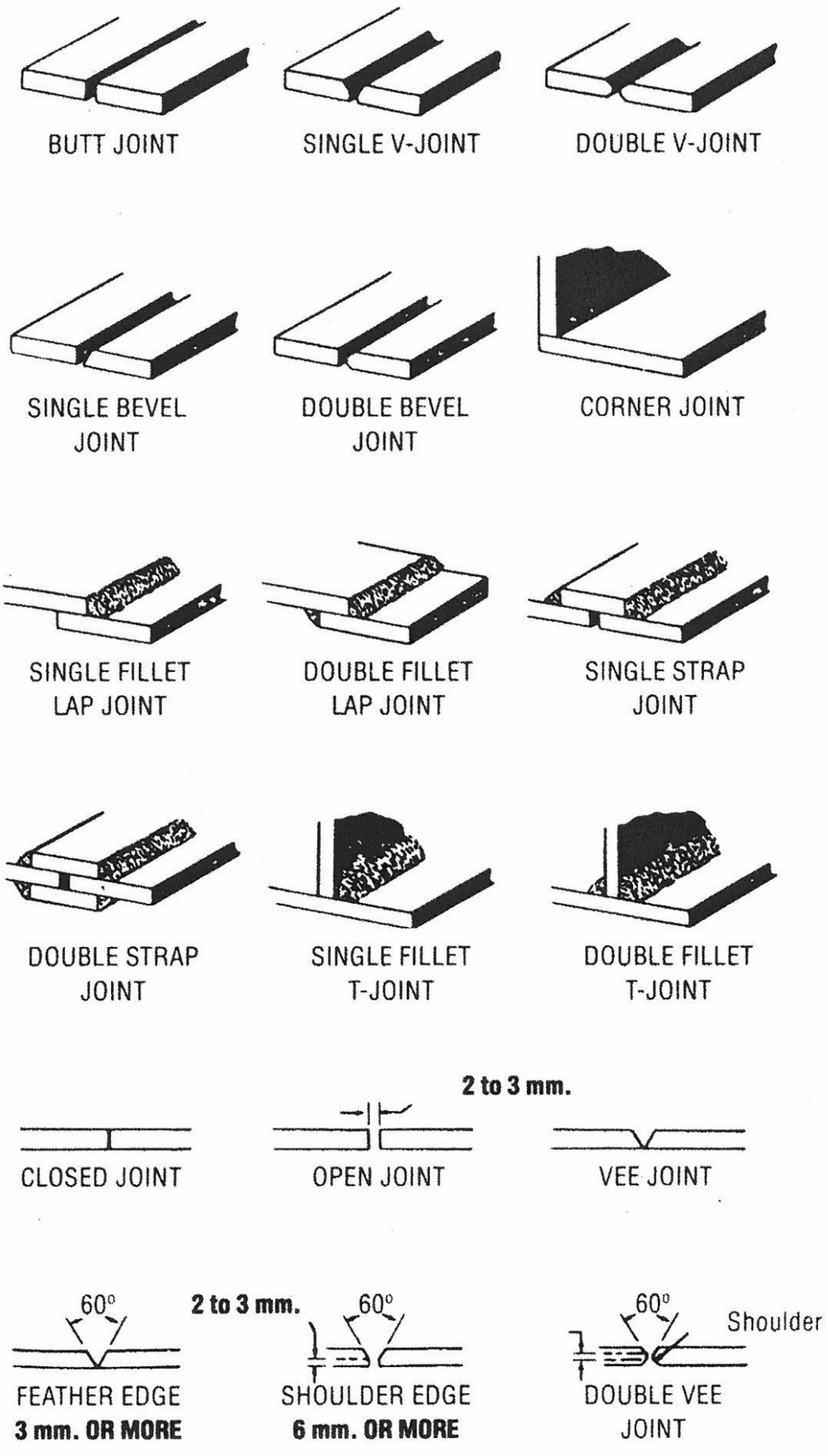
With the correct combination of arc length, current regulation, inclination and speed of the electrode, you will, with practice produce the perfect weld.

This should be regular with uniform ripples and no slag contamination.

The arc will make a steady, even crackling sound.

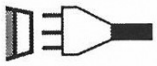


TYPES OF JOINT



ELECTRICAL WELDING SYMBOLS EXPLAINED

The full technical specification for your welder is to be found printed in a table on the rear panel of the machine.
The meaning of the markings and symbols shown in the table are explained as follows.

	Symbol for dropping characteristic
	Symbol for manual arc welding and covered electrodes
	Symbol for the mains supply and No. of phases
X	Duty Cycle, expressed as a % in a 10 min period
1~	Single Phase Transformer
U_0 _ _ — 1~ V	Min. and Max. rated no load voltage
50Hz	Rated frequency for alternating current
I_2 _ _ — _ _ A	Min. and Max. rated value of the welding current
Ø mm	Symbol and dimension for the diameter of reference electrodes
I_2 A	Symbol and dimension for the welding current
n_c	Symbol for the number of reference electrodes capable of being melted with the welding power source, starting from the **cold state** without operation of the thermal cut-out
n_h	Symbol for the No. reference electrodes being melted with the welding power source at the **hot state**, without operation of the thermal cut-out.
E/h	No. Electrodes that can be burned per hour from the cold state
U_1 _ _ _V	Rated value of the supply voltage
_ _A	Size of the necessary main fuse
I_1 max_ _A	Symbol, rated value and dimension of the max. supply current
IP_ _	Degree of protection (e.g. IP21)
H	Code letter for degree of insulation

MAINTENANCE

Some adjustments will need to be made periodically to properly maintain the pressure washer. All service and adjustments should be made at least one time each season. It is important that the maintenance chart below is followed:

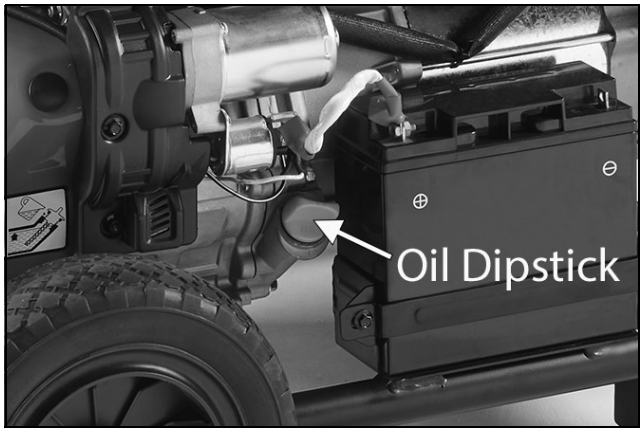
Item	Action	Frequency			
		Each Time of Use	Every 3 Months or 50 Hrs	Every 6 Months or 100 Hrs	Every Year or 300 Hrs
Engine Oil (Page 10 & 32)	Check Level	*			
	Replace			*	
Air Filter (Page 34)	Check	*			
	Clean			**	
	Replace				*
Spark Plug (Page 33)	Clean - Adjust			****	
	Replace				*
Idling	Check - Adjust				***
Valve Clearance	Check - Adjust				***
Fuel Tank (Page 11 & 35)	Check Level	*			
	Clean				***
Fuel Filter (Page 11-12)	Check - Clean		*		
Fuel Supply Line	Check	Every Two Years (Replace if Necessary***)			

- ** = Recommended to be performed more often than in the schedule if operated in a dusty environment.
- *** = Recommended to be performed by a CLARKE service centre as part of a full service.
- **** = Adjust air gap to 0.6 - 0.7 mm, see page 33

CHANGING THE ENGINE OIL

CAUTION: PROLONGED EXPOSURE TO USED ENGINE OIL IS HARMFUL, ALWAYS WASH YOUR HANDS THOROUGHLY AFTER HANDLING USED ENGINE OIL.

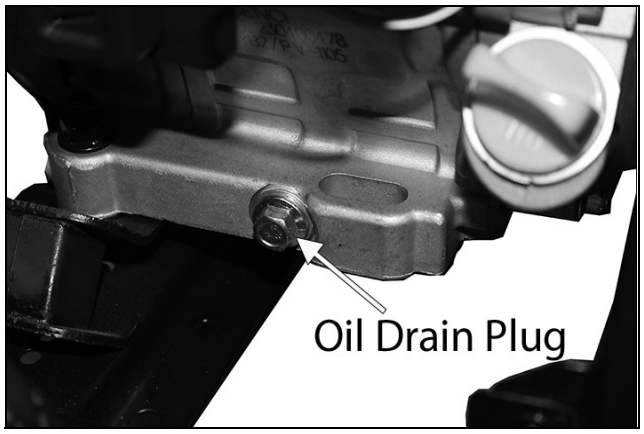
1. Unscrew and remove the oil filler cap/dipstick.
2. Place an oil collection tray under the drain plug.



3. Unscrew the drain plug and allow the used engine oil to drain from the crankcase into the oil collection tray.

   NOTE: Drain the engine oil when the engine is warm, this will ensure the oil flows out faster.

4. Replace the drain plug.
5. Fill the crankcase with new engine oil.



   - Fill until the oil reaches the threads in the oil fill tube.
   - Oil capacity: 1.1 Litre.
   - We recommend the use of the following oil: CLARKE SAE 10W/30 Engine Oil; Part No: 3050845

6. Replace the oil filler cap/dipstick.

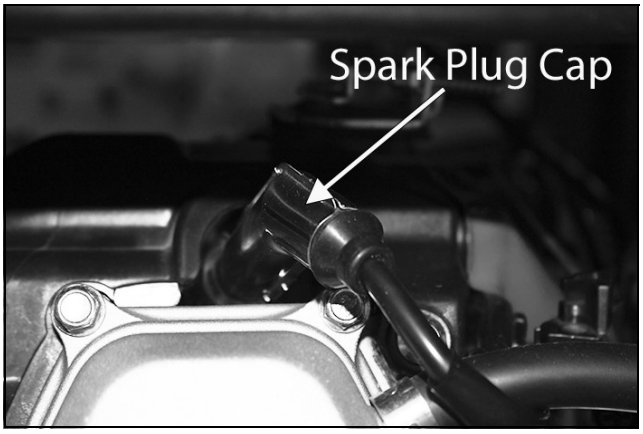
ENVIRONMENTAL PROTECTION

One of the most damaging sources of pollution is oil, **DO NOT** throw away used engine oil in with your domestic rubbish or pour it down drains or sinks. Place it in a leak proof container and take it to your local waste disposal site.

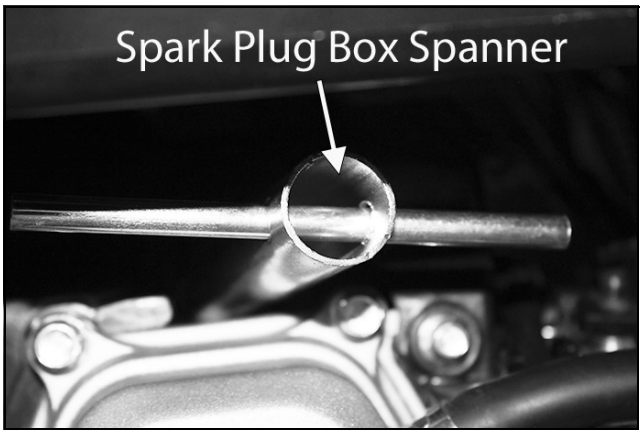
CHANGING THE SPARK PLUG

CAUTION: ALLOW THE ENGINE TO COOL BEFORE REMOVING THE SPARK PLUG.

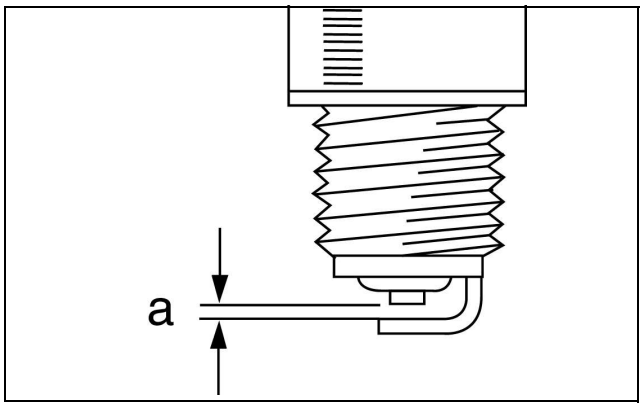
1. Remove the Side Panel bolts and remove the side panel
2. Remove the spark plug cap from the spark plug.



3. Use the spark plug box spanner supplied to remove the spark plug.
4. Remove any carbon that has accumulated around the electrode.



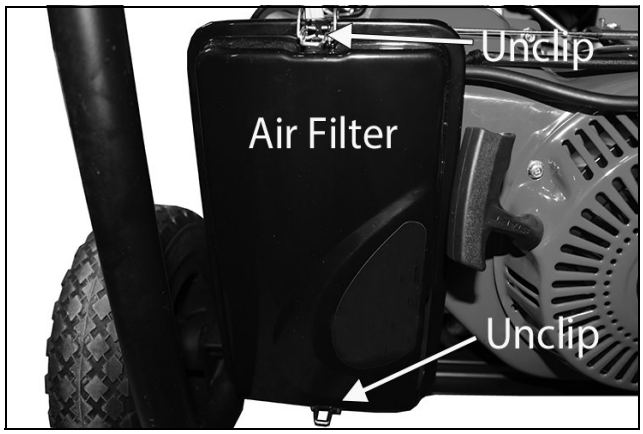
5. Check the spark plug gap (a), it should be between 0.7 and 0.8 mm, adjust if necessary.
6. Check the overall condition of the spark plug for erosion or pitting and replace if necessary.
7. Reinstall the spark plug and replace the spark plug cap.



CHECKING THE AIR FILTER

CAUTION: DO NOT USE THE GENERATOR WITHOUT THE AIR FILTER FITTED, THIS CAN DAMAGE THE GENERATOR.

1. Unclip and remove the air filter cover.



2. Remove the air filter element.
3. Make sure that the air filter is clean and not damaged.
   - If the air filter is damaged contact CLARKE spare parts department for a replacement.
   - If the filter is dirty, wash in a solution of warm water and mild detergent and rinse thoroughly. Leave the filter to dry completely, once it is dry immerse in clean engine oil and squeeze to remove excess oil.

WARNING: DO NOT USE INFLAMMABLE SOLVENTS OR PETROL TO CLEAN THE AIR FILTER.

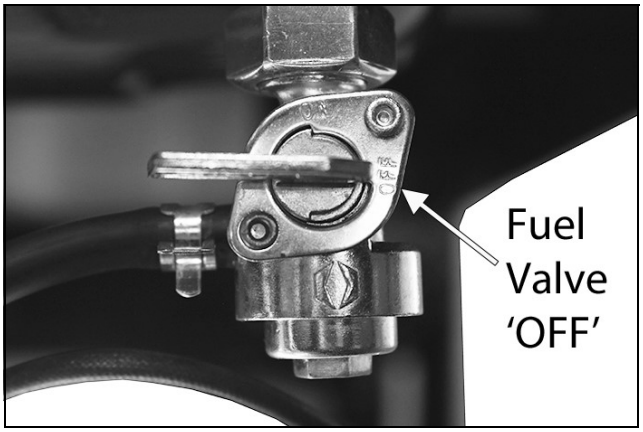
4. Replace the filter to its original position and replace the air filter cover.

CLEANING/DRAINING THE FUEL TANK

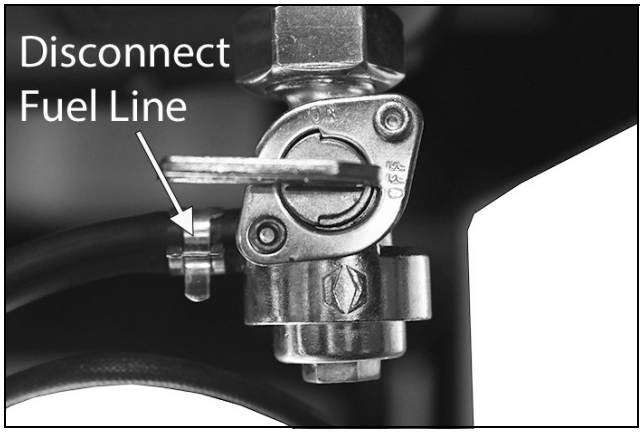
CAUTION: ALWAYS CARRY THIS PROCEDURE OUT IN A WELL VENTILATED AREA AND AWAY FROM ANY NAKED FLAME OR HEAT SOURCE.

- You will need a length of 7mm external diameter tubing.

1. Set the fuel valve to the 'OFF' position.



2. Disconnect the fuel supply line by pinching the tube clip and pulling the supply line off the fuel valve.
3. Attach the 7mm external diameter tubing to the bottom outlet of the fuel valve.
4. Place an approved petrol storage container under the tubing and turn the fuel valve to the 'ON' position.
    - The fuel in the tank will drain into the container.



5. Once the fuel tank is empty turn the fuel valve to the 'OFF' position and reconnect the fuel supply line.

MAINTENANCE RECORD

ENGINE OIL (PAGE 10 & 32)

AIR FILTER (PAGE 34)

SPARK PLUG (PAGE 33)

FUEL FILTER (PAGE 11-12)

BI-ANNUAL SERVICE

STORAGE

1. Disconnect all appliances and welding cables when not in use.
2. Always store in a clean dry place.

LONG TERM STORAGE

For long term storage;

1. The petrol tank should be drained. See page 35.
   - Ensure that the engine is cold before draining the tank.
2. **DO NOT** store petrol for long periods of time.
3. Dispose of excess petrol and oil in an environmentally safe way. Your local recycling centre can advise you on the best method of disposal.
4. After the petrol tank has been drained, start the engine and allow it to use any petrol that may remain in the engine, carburetor or fuel pipe.

TROUBLESHOOTING

If the following does not solve your problem contact the CLARKE service dept.

PROBLEM	CAUSE	SOLUTION
Engine will not start (see engine manual for further engine troubleshooting	Low voltage on the battery	Charge or change the battery
	Fuel valve not open	Open fuel valve
	Chock valve not open	Open choke valve
	Low oil level	Check oil level, add oil if required
	Oil warning system problem	
	Bad fuel	Change fuel
	Oil clogging	Check that the correct oil is being used. If not, drain oil and replace with correct oil
	Ignition system problem	Check and clean spark plug
	Carburetor problem	Clean or repair carburetor
No Output from Generator	Voltage meter broken	Contact CLARKE service centre for repair. **DO NOT** use until repaired
	Alternator leading wire and/or control panel wire not connected	Contact CLARKE service centre for repair. **DO NOT** use until repaired
	Brush and slip ring do not connect well or are disconnected	Clean and/or replace slip ring and brush. Contact CLARKE service centre for repair.
	Control panel broken	Contact CLARKE service centre for repair. **DO NOT** use until repaired
	Short circuit, open circuit or grounded wire	Inspect and repair, or replace alternator winding. Contact CLARKE service centre for repair.
	Circuit breaker not open	Open circuit breaker

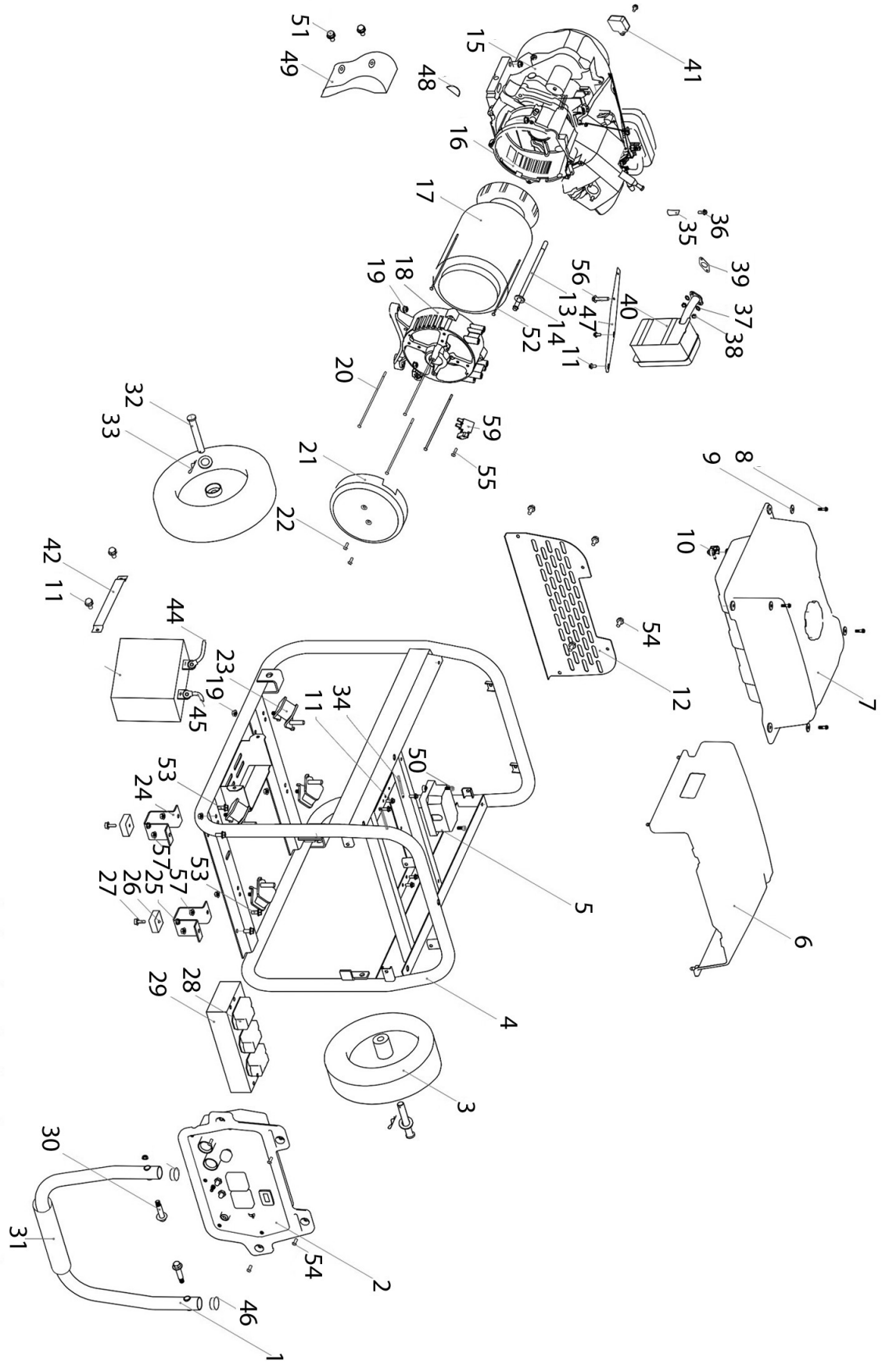
PROBLEM	CAUSE	SOLUTION
Output Voltage High or Low	High or low rotate speed	Have engine speed adjusted. Contact CLARKE service centre
	AVR Problem	Have AVR checked and replaced if needed. Contact CLARKE service centre
Current High or Low or Cant Adjust	High or low rotate speed	Have engine speed adjusted. Contact CLARKE service centre
	Short circuit, open circuit or grounded wire	Inspect and repair, or replace alternator winding. Contact CLARKE service centre for repair.
	MDS or rectifier diode short circuit or grounded	Replace MDS module and/or rectifier diode. Contact CLARKE service centre
	AVR Problem	Replace AVR. Contact CLARKE service centre
Alternator Smoking	Rotor and stator rub	Replace or repair rotor and/or stator.Contact CLARKE service centre
	Overload	Remove some of the load appliances
	Winding short circuit or grounded	Replace alternator winding. Contact CLARKE service centre
	MDS or rectifier diode short circuit or grounded	Replace MDS module and/or rectifier diode. Contact CLARKE service centre

PRODUCT SPECIFICATIONS

Welding Specifications	
Output (Min/Max)	50-200amps
Open Circuit Voltage	22-28V
IP Rating	IP21S
Welding Rod Capacity	1.6 - 4.00mm
Duty Cycle	60%
Ambient Temperature	-10°C~40°C (-14°F~104°F)
Insulation Class	H
Engine Specifications	
Make & Model/Type	Senci SC420/Petrol
Capacity	420cc
Revs Per Minute (RPM)	3600
Engine Power	9.5 kW/14 HP
Fuel Tank Capacity	18 Litres (Safe Capacity)
Oil Capacity/ Grade	1.1 Litres/ SAE10W-30
Spark Plug Type	F7RTC
Battery Type	12 V/18 Ah/Wet Sealed
Fuel Consumption	2.8 L/hr
Run Time @75% Power	6.5 Hours
Cooling System	Air
Choke Type	Manual
Emissions: CO (g/kWh)	278.05
HC (g/kWh)	2.52
NOx (g/kWh)	3.09
HC + NOx (g/kWh)	5.61
Electrical Specifications	
Rated Output Power	5kW
Max Rated Output	5.5kW
Rated Output Current	21.7 A
Max. Rated Output Current	23.9 A
AC Output Voltage	1 x 230V~50Hz, 1 x 110V~50Hz

DC Output Voltage	75V
Operating Temperature	-10°C~40°C (-14°F~104°F)
Number of Sockets	1 x 110V 32A (IP44) & 1 x 230V 32A (IP44)
Noise Emissions	
Sound Pressure Level (dB: LpA)	TBC
Sound Power Level (dB: LwA)	TBC
Guaranteed Sound Power Level (dB: LwA)	TBC
Uncertainty Factor (K)	TBC
Dimension/Weights	
Product (LxWxH)	760mm x 710mm x 690mm
Weight	100kg

EXPLODED DIAGRAM - GENERATOR

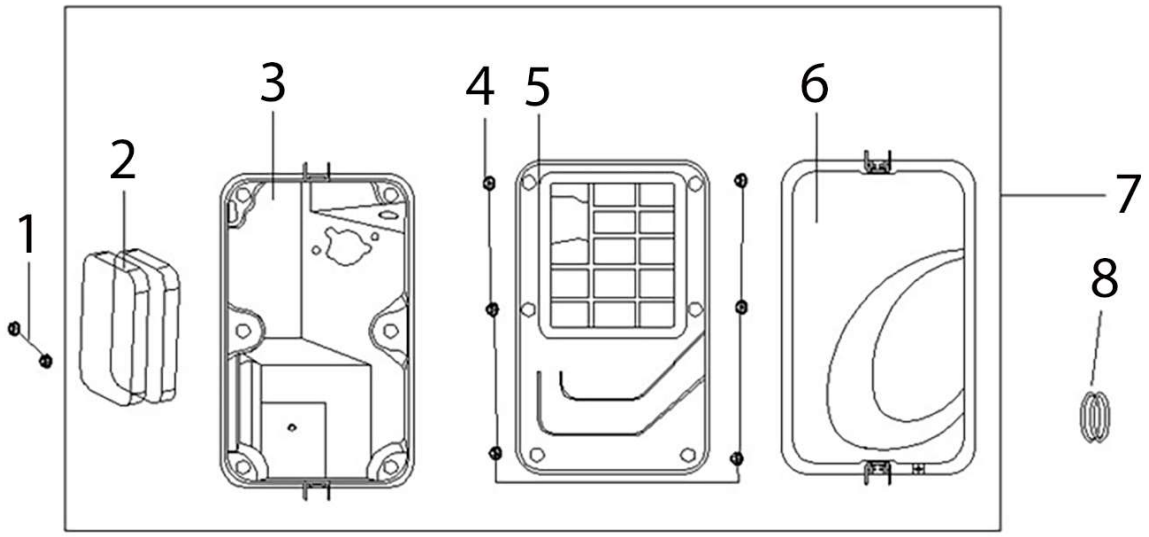


PARTS LIST - GENERATOR

NO	DESCRIPTION
1	Handle
2	Control Panel
3	Wheel x 2
4	Frame
5	Automatic Voltage Regulator
6	Engine Hood
7	Fuel Tank Assembly
8	M6 Flange Bolt x 4
9	Tank Cushion Washer x 4
10	Fuel Cock Assembly
11	M6 Flange Bolt x 10
12	Side Panel
13	M10 Flange Bolt
14	10.5 x 20 x 1.5 Flat Washer
15	Engine Assembly
16	Crankshaft Cover
17	Alternator
18	Alternator Bracket
19	M10 Flange Bolt x 4
20	M6 Flange Bolt x 4
21	Alternator End Cover
22	M5 Flange Bolt x 5
23	Rubber Seat x 4
24	Support x 2
25	M6 Flange Bolt x 5
26	Rubber Seat Support x 2
27	M6 Flange Bolt x 2
28	Rectifier
29	Radiator
30	Handle Dowel Pin x 2

NO	DESCRIPTION
31	Handle Grip
32	Wheel Axle x 2
33	Wheel Clip Pin x 2
34	Wire Clip x 2
35	Crankshaft Dustproof Cover
36	M6 Flange Bolt x 2
37	Spring Washer x 2
38	M8 Hex Bolt x 2
39	Muffler Washer
40	Muffler
41	Charger
42	Battery Tension Plate
43	12V 12Ah Battery
44	Battery Negative Wire
45	Battery Positive Wire
46	Frame Plug x 2
47	Muffler Support
48	Rubber Cap
49	Wire Cover
50	M5 Hex Cap Screw x 2
51	M6 Flange Bolt x 2
52	M5 Flange Bolt x 2
53	M8 Flange Bolt x 4
54	M6 Flange Bolt x 8
55	M5 Flange Bolt
56	M8 Flange Bolt
57	M8 Flange Bolt x 5
58	17 x 30 x 2.5 Flat Washer x 2

EXPLODED DIAGRAM - AIR FILTER

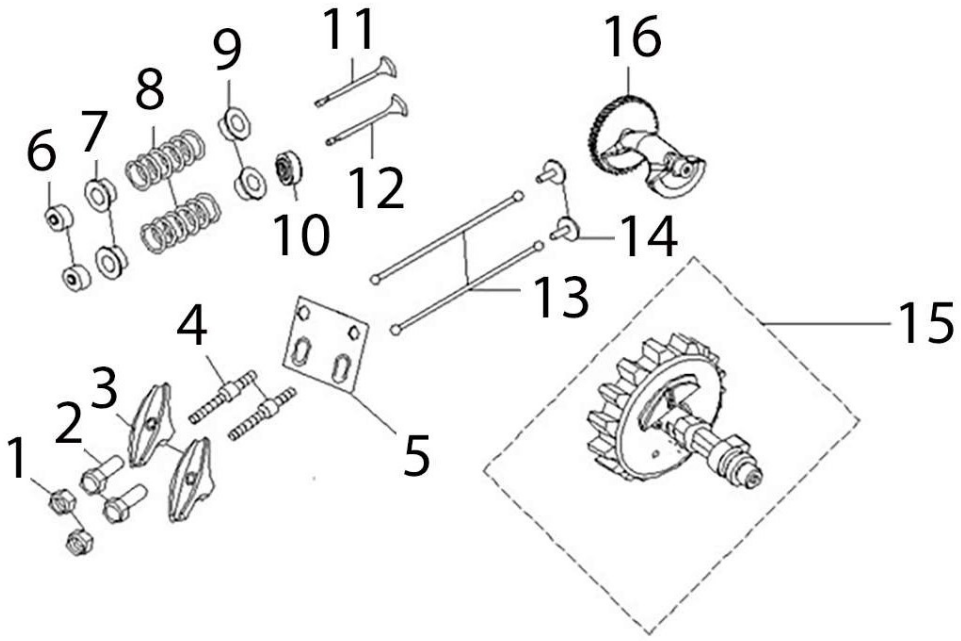


PARTS LIST - AIR FILTER

NO	DESCRIPTION
1	Flange Bolt x 2
2	Air Filter Element Assembly x 2
3	Air Filter Front Cover
4	Flange Bolt x 6

NO	DESCRIPTION
5	Air Filter Element Support
6	Air Filter Back Cover
7	Air Filter Assembly
8	Fuel Pipe Sleeve

EXPLODED DIAGRAM - CAMSHAFT

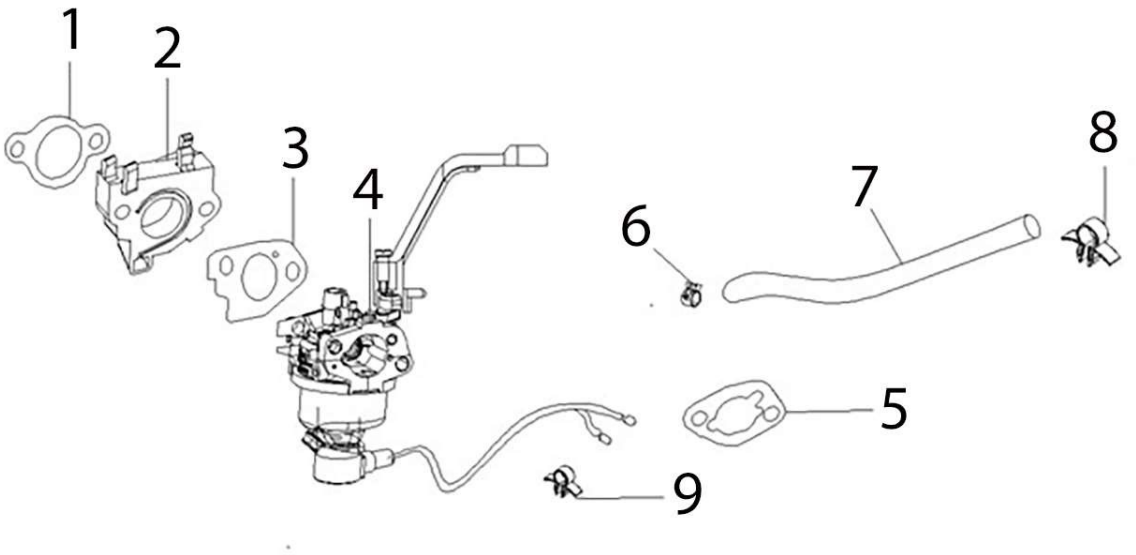


PARTS LIST - CAMSHAFT

NO	DESCRIPTION
1	Valve Adjusting Nut x 2
2	Rocker Shaft x 2
3	Rocker Arm x 2
4	Bolt Valve x 2
5	Push Rod Guide Plate
6	Rotator Valve x 2
7	Retainer Valve Spring x 2
8	Spring Valve x 2

NO	DESCRIPTION
9	Retainer Valve, Bottom x 2
10	Oil Seal x 2
11	Valve, Exhaust
12	Valve, Intake
13	Push Rod x 2
14	Lifter Valve x 2
15	Camshaft Assembly
16	Balance Shaft

EXPLODED DIAGRAM - CARBURETOR

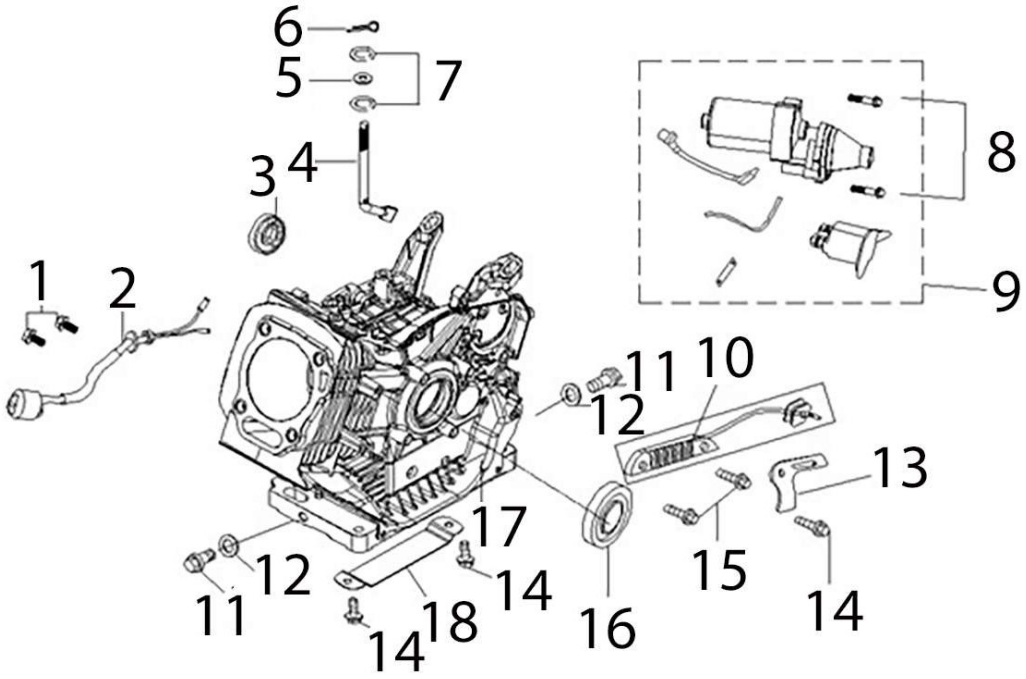


PARTS LIST - CARBURETOR

NO	DESCRIPTION
1	Gasket, Intake
2	Carburetor Insulator
3	Carburetor Gasket
4	Carburetor
5	Air Filter Gasket

NO	DESCRIPTION
6	Fuel Pipe Clip
7	180cm Fuel Pipe
8	Fuel Pipe Clip
9	Fuel Pipe Clip

EXPLODED DIAGRAM - CRANKCASE ASSEMBLY

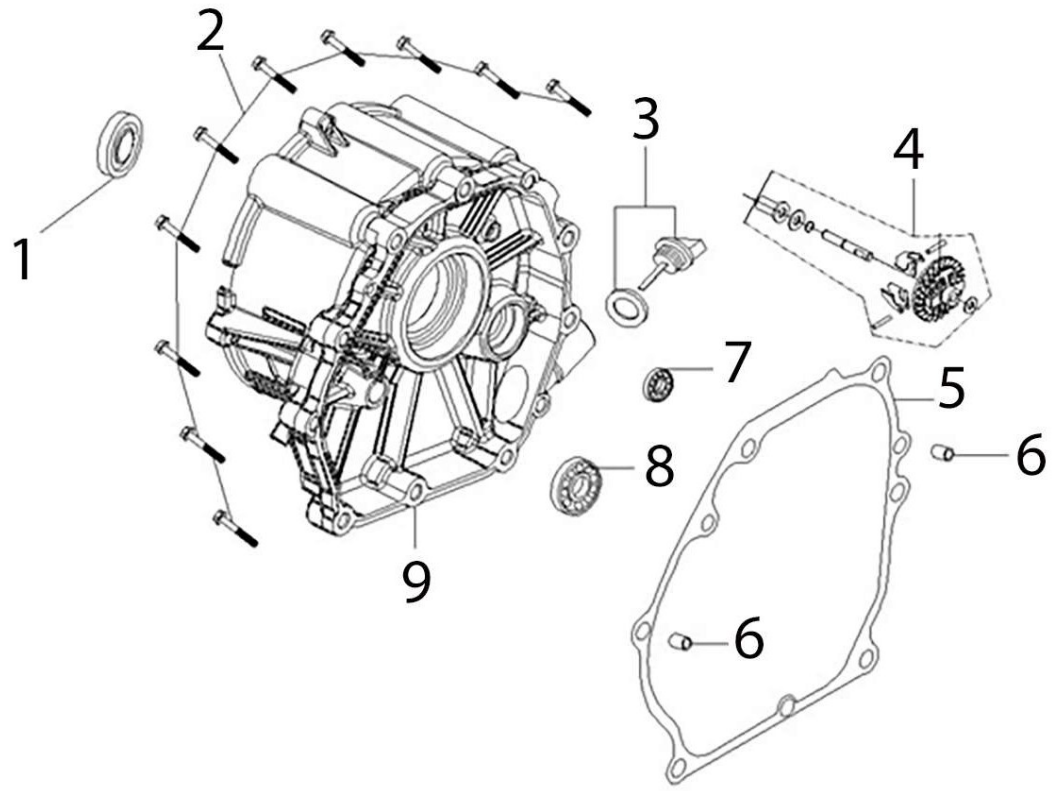


PARTS LIST - CRANKCASE ASSEMBLY

NO	DESCRIPTION
1	Bolt x 2
2	Engine Oil Sensor
3	Bearing
4	Governor Shaft
5	Oil Seal
6	Lock Pin
7	Washer x 2
8	Bolt x 2
9	Starter Motor

NO	DESCRIPTION
10	Charging Coil
11	Bolt x 2
12	Washer x 2
13	Wire Pressing Board
14	Bolt x 3
15	Bolt
16	Oil Seal
17	Crankcase
18	Bracket

EXPLODED DIAGRAM - CRANKCASE COVER

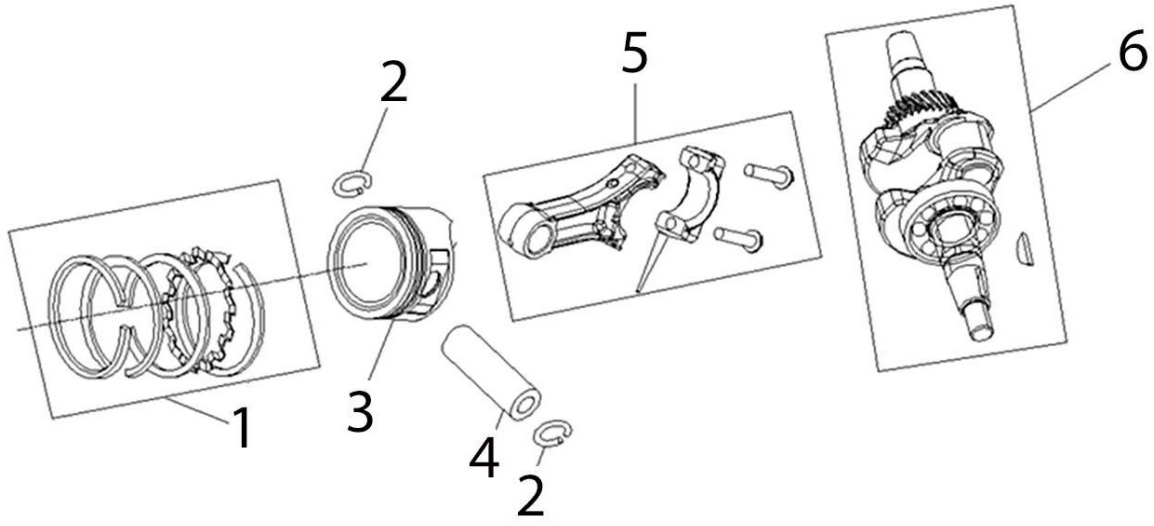


PARTS LIST - CRANKCASE COVER

NO	DESCRIPTION
1	Oil Seal
2	Bolt x 10
3	Dipstick Assembly
4	Governor Gear Kit
5	Gasket, Crankcase Cover

NO	DESCRIPTION
6	Dowel Pin x 2
7	Bearing
8	Bearing
9	Crankcase Cover

EXPLODED DIAGRAM - CRANKSHAFT PISTON

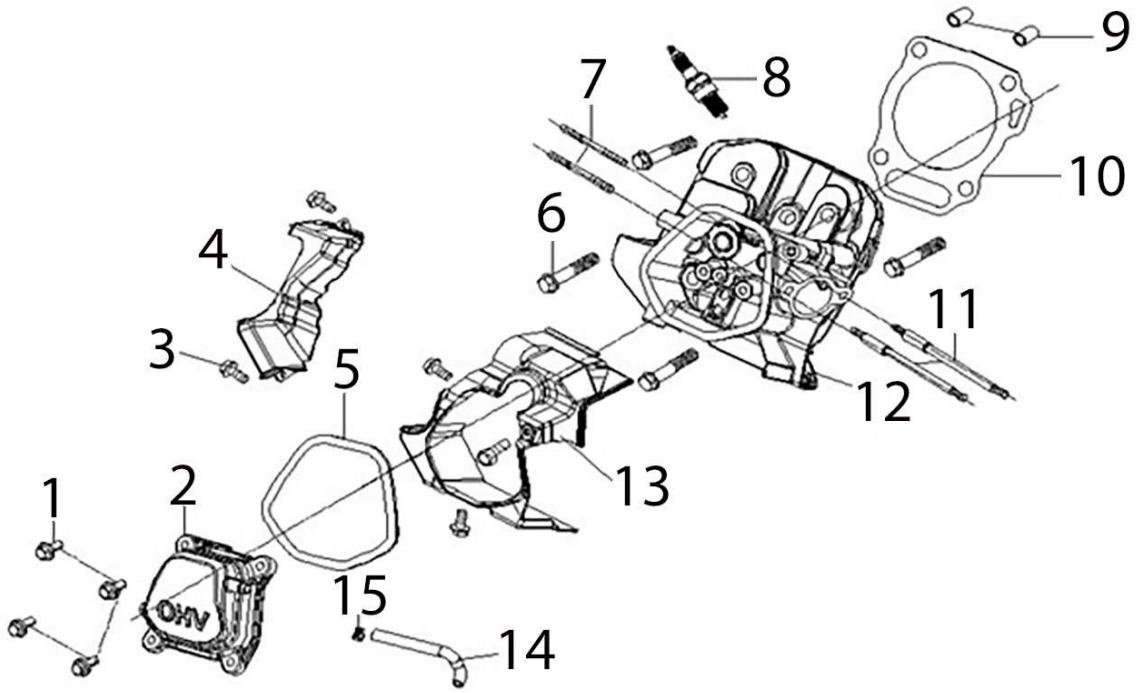


PARTS LIST - CRANKSHAFT PISTON

NO	DESCRIPTION
1	Ring Set, Piston
2	Piston Pin Clip x 2
3	Piston Head

NO	DESCRIPTION
4	Piston Pin
5	Connecting Rod Assembly
6	Crankshaft Assembly

EXPLODED DIAGRAM - CYLINDER HEAD

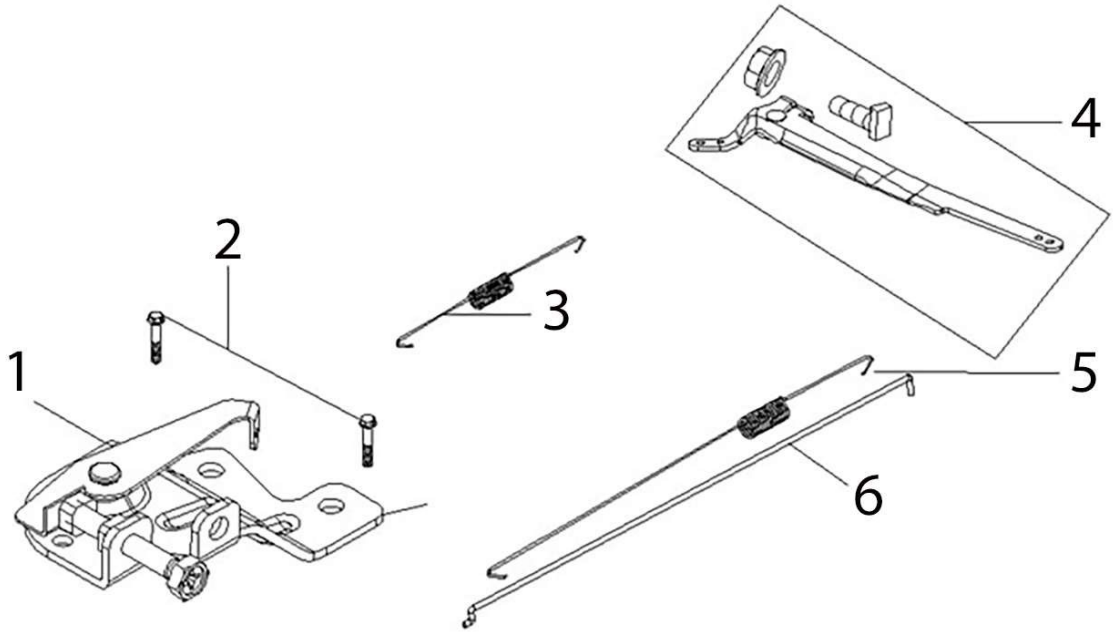


PARTS LIST - CYLINDER HEAD

NO	DESCRIPTION
1	M6 x 20 Bolt x 4
2	Cover
3	M6 x 12 Bolt x 5
4	Wind Guider
5	Gasket Head Cover
6	Bolt x 4
7	Stud Bolt (Exhaust) x 2
8	Spark Plug

NO	DESCRIPTION
9	Dowel Pin x 2
10	Gasket Head Cover
11	Stud Bolt (Intake) x 2
12	Cylinder Head
13	Shroud
14	Breather Tube
15	Fuel Pipe Clip

EXPLODED DIAGRAM - ENGINE CONTROLS

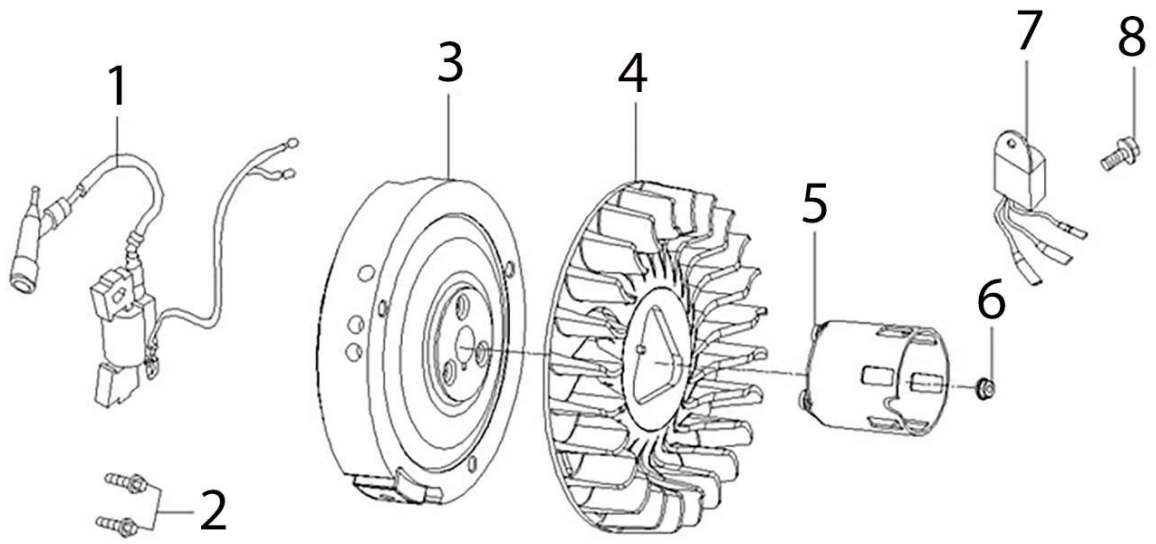


PARTS LIST - ENGINE CONTROLS

NO	DESCRIPTION
1	Speed Control Assembly
2	Bolt x 2
3	Cable Return Spring

NO	DESCRIPTION
4	Speed Control Handle Assembly
5	Throttle Return Spring
6	Governor Rod

EXPLODED DIAGRAM - FLYWHEEL

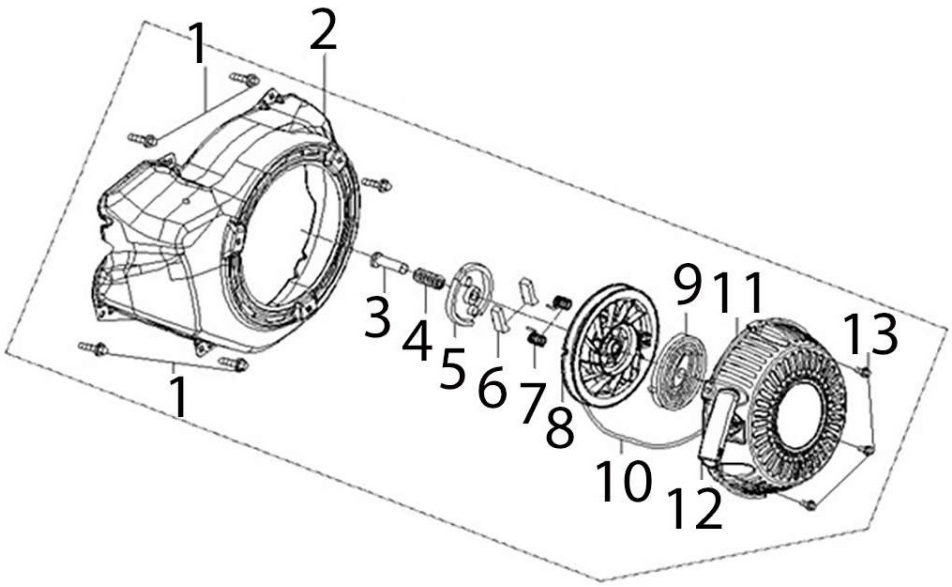


PARTS LIST - FLYWHEEL

NO	DESCRIPTION
1	Engine Switch Wire
2	Flange Bolt x 2
3	Flywheel
4	Cooling Fan

NO	DESCRIPTION
5	Starter Pulley
6	Nut
7	Oil Alarm
8	Flange Bolt

EXPLODED DIAGRAM - RECOIL STARTER

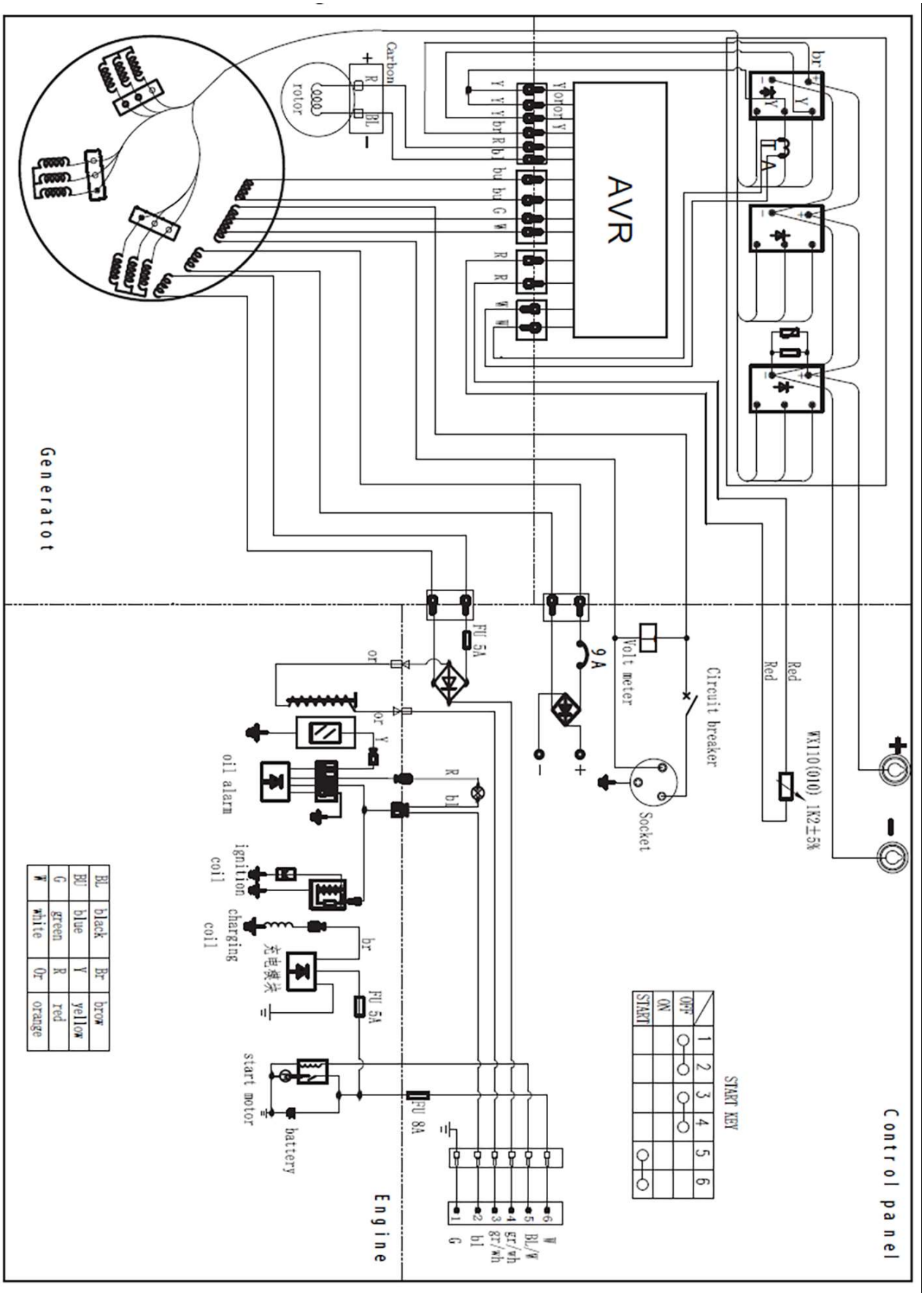


PARTS LIST - RECOIL STARTER

NO	DESCRIPTION
1	M6 x 12 Bolt x 5
2	Recoil Wind Guilder
3	Setting Screw
4	Friction Spring
5	Ratchet Guide
6	Starter Ratchet x 2
7	Return Spring x 2

NO	DESCRIPTION
8	Recoil Starter Reel
9	Recoil Starter Spring
10	Recoil Starter Rope
11	Cover
12	Recoil Starter Handle
13	Flange Bolt x 3

WIRING SCHEMATIC



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Clarke® INTERNATIONAL Hemnall Street, Epping, Essex CM16 4LG
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