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For spare parts and servicing, please contact your nearest dealer, or Clarke International on

020 - 8988 - 7400

e-mail: Parts@clarkeinternational.com e-mail: Service@clarkeinternational.com

Hemnal Street, Epping, Essex CM16 4LG

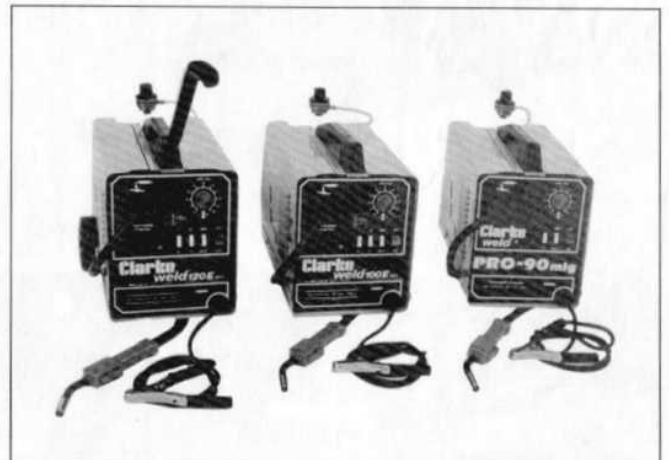
ClarkeTM CE weld

INSTRUCTION MANUAL AND SPARE PARTS LIST FOR

PRO-90mig

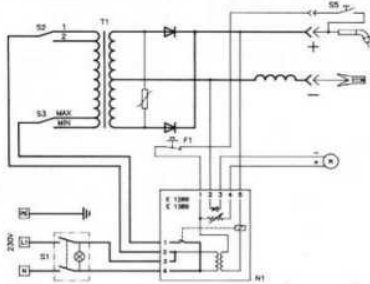
MIG 100E MK2

MIG 120E MK2

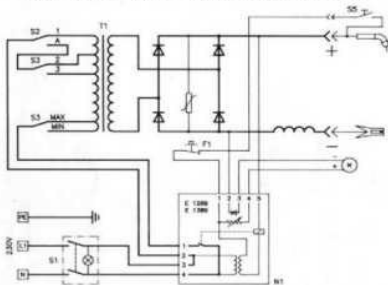


WIRING DIAGRAM

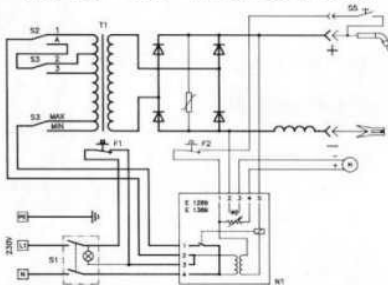
PRO 90 MIG - INPUT 230 V. 50 Hz.



MIG 100E - mk2 - INPUT 230 V. 50 Hz.



MIG 120E - mk2 - INPUT 230 V. 50 Hz.



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Thank you for purchasing this CLARKE MIG WELDER. Before attempting to operate the machine, please read this leaflet thoroughly and follow the instructions carefully. In doing so you will ensure the safety of yourself and that of others around you, and you can look forward to the MIG WELDER giving you long and satisfactory service.

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.

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PARTS AND SERVICING

For spare parts and servicing, please contact your nearest dealer, or Clarke International on one of the following telephone numbers:

PARTS DEPARTMENT
0181-558 6696

SERVICE DEPARTMENT
0181-556 4443

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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.

1. Assessment of area

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

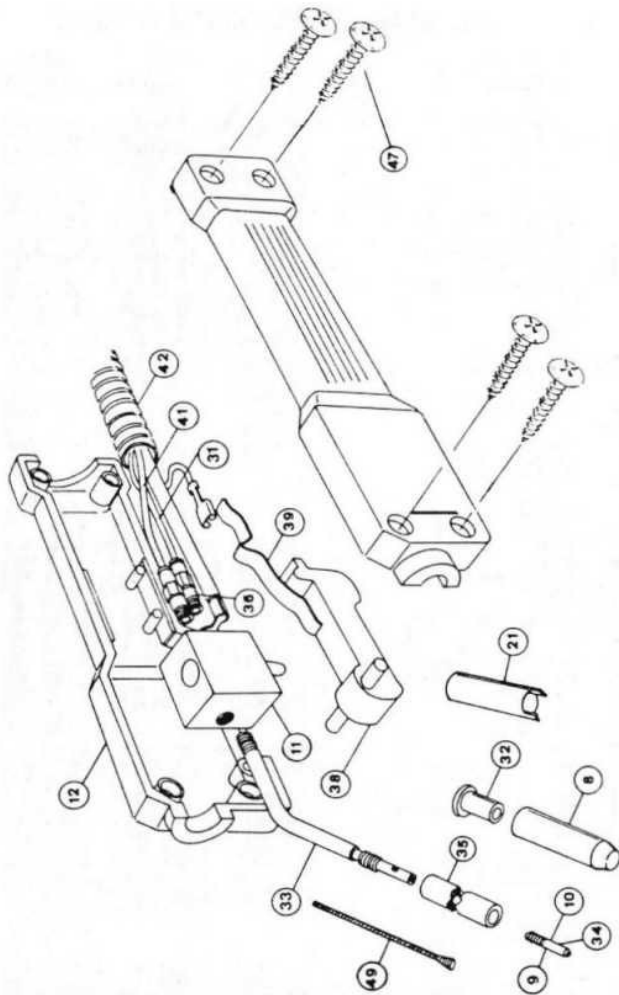
- a) other supply cables, control cables, signalling and telephone cables; above, below and adjacent to the welding equipment;
- b) radio and television transmitters and receivers;
- c) computer and other control equipment;
- d) safety critical equipment, e.g. guarding of industrial equipment;
- e) pacemakers and hearing aids etc;
- f) equipment used for calibration or measurement;
- g) 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.

SPARE PARTS LIST

| ITEM | DESCRIPTION | PRO 90 MIG (230 V) | MIG 100E-MK2 (230 V) | MIG 120E-MK2 (230 V) |
|------|--|-----------------------|-------------------------|-------------------------|
| 1 | Pressure regulator | EM 22905001 | EM 22905001 | EM 22905001 |
| 2A | Gas bottle CO ² | EM 21900001 | EM 21900001 | EM 21900001 |
| 2B | Gas bottle mix | EM 21900003 | EM 21900003 | EM 21900003 |
| 2C | Gas bottle Argon | EM 21900002 | EM 21900002 | EM 21900002 |
| 3 | Back panel | EM 33715015 | EM 33715015 | EM 33715015 |
| 4 | Input cable | EM 20220068 | EM 20220068 | EM 20220068 |
| 5 | Spool holder retaining ring | EM 21690012 | EM 21690012 | EM 21690012 |
| 6 | Spool holder | EM 21690011 | EM 21690011 | EM 21690011 |
| 7 | Wire feeding roll | EM 33805001 | EM 33805001 | EM 33805001 |
| 8 | Torch gas nozzle (shroud) | EM 23005007 | EM 23005007 | EM 23005007 |
| 9 | 0.6 mm contact tip | EM 23005004 | EM 23005004 | EM 23005004 |
| 10 | 0.8 mm contact tip | EM 23005005 | EM 23005005 | EM 23005005 |
| 11 | Torch gas valve | EM 23005009 | EM 23005009 | EM 23005009 |
| 12 | Torch handle | EM 21690027 | EM 21690027 | EM 21690027 |
| 13 | Ground clamp | EM 22110005 | EM 22110005 | EM 22110005 |
| 14 | Lower panel | EM 33700044 | EM 33700044 | EM 33700044 |
| 15 | Front panel | EM 33710033 | EM 33710033 | EM 33710033 |
| 16 | Complete wire feeder in plastic | EM 44000001 | EM 44000001 | EM 44000001 |
| 17 | Left side panel | EM 33705032 | EM 33705032 | EM 33705032 |
| 18 | Central diving panel | EM 33720003 | EM 33720003 | EM 33720003 |
| 19 | Right side panel | EM 33705031 | EM 33705031 | EM 33705031 |
| 20 | P.C. board | EM 22710021 | EM 22710021 | EM 22710014 |
| 21 | Spot welding shroud | EM 23005008 | EM 23005008 | EM 23005008 |
| 22 | Welding current switch | EM 22200006 | EM 22200006 | EM 22200006 |
| 23 | Pilot light switch | EM 22200002 | EM 22200002 | EM 22200002 |
| 24 | Cable clamp | EM 21605010 | EM 21605010 | EM 21605010 |
| 25 | Choke / Inductance | EM 44135001 | EM 44135002 | EM 44135004 |
| 26 | Main transformer | EM 44120067 | EM 44120065 | EM 44120032 |
| 27 | Thermostat (rectifier) | EM 22210013 | EM 22210014 | EM 22210014 |
| 28 | Rectifier | EM 22400001 | EM 22400021 | EM 22400003 |
| 29 | Handle | EM 21600003 | EM 21600003 | EM 21600003 |
| 30 | Torch/Hose assembly | EM 23000001 | EM 23000002 | EM 23000003 |
| 31 | Wire liner | EM 10900001 | EM 10900001 | EM 10900001 |
| 32 | Torch insulator | EM 23005003 | EM 23005003 | EM 23005003 |
| 33 | Torch neck with gas diffuser | EM 23005001 | EM 23005001 | EM 23005001 |
| 34 | 1.0 mm contact tip for 0.8 mm Alum. wire | EM 23005006 | EM 23005006 | EM 23005006 |
| 35 | Torch neck insulator | EM 23005002 | EM 23005002 | EM 23005002 |
| 36 | Fast coupling connector | EM 22910001 | EM 22910001 | EM 22910001 |
| 37 | Handle extension (120E only) | - | - | EM 33725015 |
| 38 | Torch trigger | EM 21690029 | EM 21690029 | EM 21690029 |
| 39 | Contact spring | EM 33800009 | EM 33800009 | EM 33800009 |
| 40 | Wheel (120E only) | - | - | EM 21625013 |
| 41 | Torch gas hose | EM 10900002 | EM 10900002 | EM 10900002 |
| 42 | Outer sleeve | EM 10900005 | EM 10900005 | EM 10900005 |
| 43 | Torch grommet on front panel | EM 21690001 | EM 21690001 | EM 21690001 |
| 44 | Wheel axle (120E only) | - | - | EM 55200014 |
| 45 | Earth cable with clamp | EM 43210001 | EM 43210003 | EM 43210021 |
| 46 | Gas connector adaptor for larger gas bottles | EM 22910011 | EM 22910011 | EM 22910011 |
| 47 | Screw TC 7 x 3/4" | EM 21020013 | EM 21020013 | EM 21020013 |
| 48 | Potentiometer knob | EM 21690018 | EM 21690018 | EM 21690018 |
| 49 | Wire liner in torch neck | EM 23005010 | EM 23005010 | EM 23005010 |
| 50 | Wire feeding motor | EM 22810001 | EM 22810001 | EM 22810002 |
| 51 | Dark glass | EM 21905021 | EM 21905021 | EM 21905021 |
| 52 | Face screen | EM 21905018 | EM 21905018 | EM 21905018 |
| 53 | Handle-extension knob (120E only) | - | - | EM 21600006 |
| 54 | Plastic foot (120E only) | - | - | EM 21610009 |
| 55 | Thermostat (120E only) | - | - | EM 22210016 |
| 56 | Spool holder knob | EM 21800036 | EM 21800036 | EM 21800036 |
| 57 | Spool holder spring | EM 33800004 | EM 33800004 | EM 33800004 |
| 58 | Spool holder pin | EM 33810008 | EM 33810008 | EM 33810008 |



2. Methods of reducing emissions

2.1 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.

2.2 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.

2.3 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.

2.4 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.

2.5 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. 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.

2.6 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.

SAFETY

1 - INTRODUCTION

Read and understand these safe practices before attempting to install, operate, or service the equipment. Comply with these procedures as applicable to the particular equipment used and their instruction manuals, for personal safety and for the safety of others. Failure to observe these safe practices may cause serious injury or death. When safety becomes a habit, the equipment can be used with confidence.

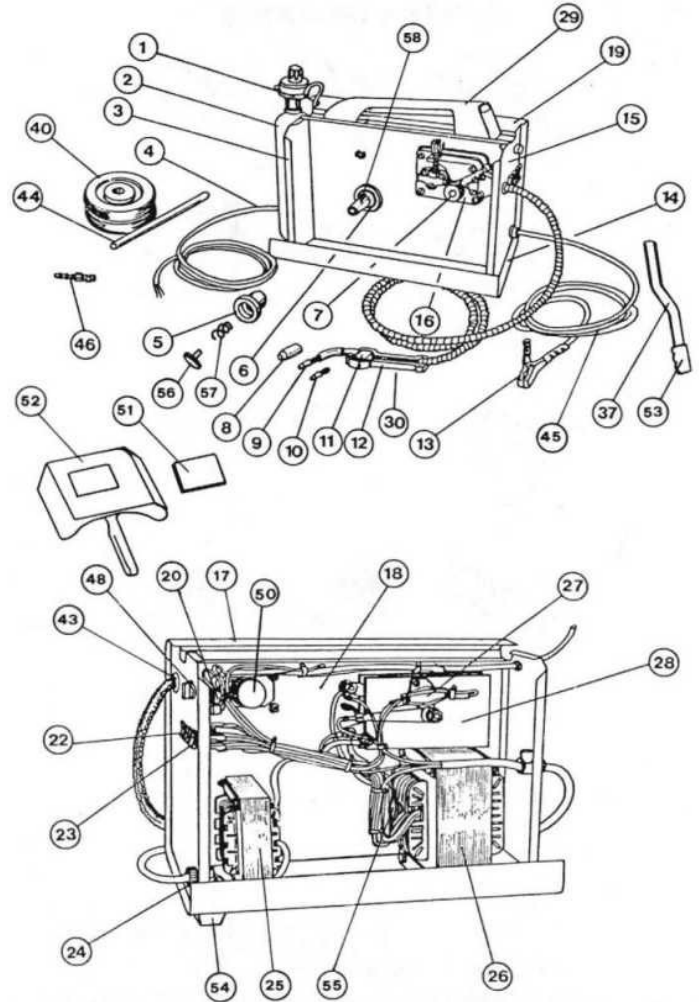
2 - GENERAL PRECAUTIONS

A) Burn prevention

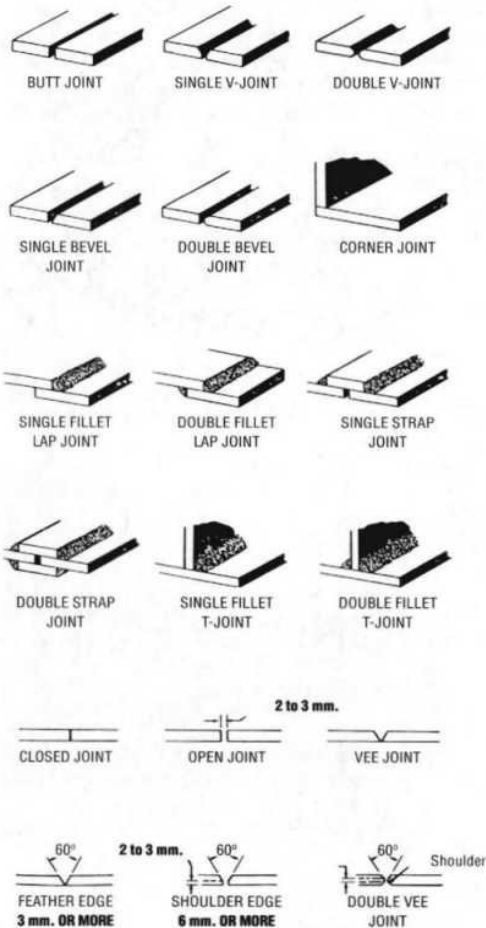
Wear protective clothing - gauntlet gloves designed for use in welding, hat, and protective shoes. Button shirt collar and pocket flaps, and wear cuffless trousers to avoid entry of sparks and slag. Wear helmet with safety goggles or glasses with side shields underneath, appropriate filter lenses or plates (protected by clear cover glass). This is a **MUST** for welding or cutting, (and chipping) to protect the eyes from radiant energy and flying metal. Replace cover glass when broken, pitted, or spattered. Avoid oily greasy clothing. A spark may ignite them. Hot metal such as electrode stubs and workpieces should never be handled without gloves. First aid facilities and a qualified first aid person should be available for each shift 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 work overhead. Flammable hair preparations should not be used by persons intending to weld or cut.

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 coating is removed from the work surface, the area is well ventilated, or the operator wears an air-supplied respirator. Work in a confined space only while it is being 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.



TYPES OF JOINTS



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C) Fire and explosion prevention

Causes of fire and explosion are: combustibles reached by the arc, flame, flying sparks, hot slag or heated material; misuse of compressed gases and cylinders; and 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 goggled operator. Sparks and slag can fly 10m. 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 area, do NOT weld or cut. Move the work if practicable, to an area free of combustibles. Avoid paint spray rooms, dip tanks, storage areas, ventilators. If the work cannot be moved, move combustibles at least 10m. away out of reach of sparks and heat; or protect against ignition with suitable and snug fitting, fire-resistant covers or shields. Walls touching combustibles on opposite sides should not be welded on (or cut). Walls, ceilings, and floor near work should be protected by heat resistant covers or shields. Fire watcher must be standing by with suitable fire extinguishing equipment during and for some time after welding or cutting if:

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

After work is done, 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 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. Waterfilling just below 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 (such as gasoline).

3 - ELECTRIC ARC (MIG, TIG) WELDING

Comply with precautions in 1, 2 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, weldments are hot. The wise operator avoids unnecessary risks and protects himself and others from accidents.

D

3A) BURN PROTECTION

Comply with precautions in 2. The welding arc is intense and visibly bright. Its 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! COMPLY WITH PRECAUTIONS!

1) Protective clothing

Wear long sleeved clothing (particularly for gas shielded arc) in addition to gloves, hat and shoes (2-A). As necessary, use additional protective clothing such as leather jacket or sleeves, flameproof apron, and fire-resistant leggings. Avoid outer garments of untreated cotton. Protect bare skin. Wear dark substantial clothing. Button collar to protect chest and neck and button pockets to prevent entry of sparks.

2) Eye and head protection

Protect eyes from exposure to arc. **NEVER look at an electric arc without protection.** Welding helmet or shield containing a filter plate shade no. 11 or denser must be used when welding. Place over face before striking arc. Protect filter plate with a clear cover plate. 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 clear cover plate when broken, pitted, or spattered. **WE SUGGEST** to 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 a 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.

3) Protection of nearby personnel

For production welding, a separate room or enclosed bay is best. In open areas, surround the operation with low reflective, 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.

3B) TOXIC FUME PREVENTION

Comply with precautions in 2-B. Generator engine exhaust must be vented to the outside air. Carbon monoxide can kill.

3C) FIRE AND EXPLOSION PREVENTION

Comply with precautions in 2-C. Equipment's rated capacity. 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.

REPLACEMENT WELDING WIRE AND GAS BOTTLES

Replacement welding wire and gas bottles are easily available through our **Clarke** national dealer network, motor accessory shops, engineering outlets, chain stores and D.I.Y. shops.

Should you have any difficulty obtaining replacements, telephone **Clarke** on 01992-565 300 (10 lines) for your nearest retail outlet.

WELDING HINTS

- 1) Hold the gun at a 45° angle to the work-piece with the nozzle about 6 mm. from the surface.
- 2) Move the gun smoothly and steadily as you weld.
- 3) Avoid welding in very draughty areas. A weak pitted and porous weld will result due to air blowing away the protecting welding gas.
- 4) Keep wire and wire liner clean. Do not use rusted wire.
- 5) Sharp bends or kinks on the welding hose should be avoided.
- 6) If available, use compressed air to periodically clean the hose liner when changing wire spools.
- 7) Using low pressure air (20-30 PSI), occasionally blow the dust from the inside of the welder. This keeps the machine running cooler.

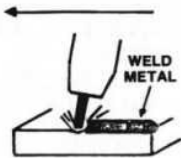
SPOT WELDING

It is possible to spot weld two sheets of up to 0,8 mm. thickness mild steel by replacing the torch gas nozzle with a spot welding nozzle (not supplied), which is available from most welding equipment suppliers as an optional extra.

It is sufficient to place the torch nozzle on the upper sheet and then push the torch, pressing the trigger to spot the first sheet with the second one.

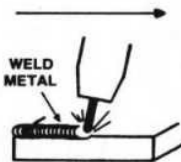
For spot welding the machine must be regulated at the highest welding current and at a high feeding speed. It is advisable to use 0,8 mm. ø wire.

DIRECTION OF TRAVEL



FOREHAND WELDING - A welding technique in which the welding torch or gun is directed toward the progress of welding.

DIRECTION OF TRAVEL



BACKHAND WELDING - A welding technique in which the welding torch or gun is directed opposite to the progress of welding. Sometimes referred to as the "pull technique".

REPLACING THE SPOOL OF WIRE

1) Your MIG welder comes with a mini spool of wire. After it is depleted, you can replace it with either a 0,8 Kg. or 5,0 Kg. spool of wire in either 0,6 mm. diameter mild steel or 0,8 mm. mild steel, stainless steel or aluminium.

0,6 mm. is used for thin metals to 3 mm.
0,8 mm. is used for thick metals to 6 mm.

The wire is pulled by the roller (item L, diagram 2) which is moved by a set of gears. The roller has two grooves. One 0,6 mm. deep and one 0,8 mm. deep. You must use the groove corresponding to the thickness of wire being used, otherwise the wire will not be carried through efficiently, or will flatten; also make sure that the contact tip at the end of the torch corresponds to the diameter of the wire being used. (Except when using aluminium wire - for 0,8 mm. Alum. use 1,0 mm. tip).

TO REPLACE THE USED SPOOL (See diagram 2)

Repeat the procedure outlined on page 9, "Connecting the wire feed".

3D) SHOCK PREVENTION

Exposed hot conductors or other bare metal in the welding circuit, or in ungrounded, electrically-HOT 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.

3E) PROTECTION FOR WEARERS OF ELECTRONIC LIFE SUPPORT DEVICES (PACEMAKERS).

Magnetic fields from high currents can affect pacemaker operation. Persons wearing electronic life support equipment (pacemaker) should consult with their doctor before going near arc welding, gouging, or spot welding operations.

3F) TO PROTECT AGAINST SHOCK:

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

1) Grounding the equipment

When arc welding equipment is grounded according to the National Electrical Code, and the work is grounded, 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 welding power source, control, work table, and water circulator to the building ground. Conductors must be adequate to carry ground currents safely. Equipment made electrically HOT by stray current may shock, possibly fatally. **Do NOT GROUND to electrical conduit,** or to a pipe carrying ANY gas or a flammable liquid such as oil or fuel.

2) Electrode holders

Fully insulated electrode holders should be used. Do NOT use holders with protruding screws or with any form of damage.

3) Connectors

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

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 bared cable. Cables with damaged areas may be taped to give resistance equivalent to original cable. Keep 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 that permit on/off control of the welding power output. When so equipped the electrode wire becomes electrically HOT 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 HOT 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. Power disconnect switch must be available near the welding power source.

PREPARATION OF THE WORKING AREA

The working area must be sufficiently spacious, not humid, and well-ventilated 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 annoyance 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.

SAFETY EQUIPMENT

A comprehensive range of **Clarke** safety equipment for use when welding is available from your local stockist.

TUNING THE WELDER

TO SET VOLTAGE: Use proper "stick out". Wire "stick out" is the distance from the CONTACT TIP to the WORK. Wire "stick out" (sometimes incorrectly called arc length) should be between 5 and 10 mm. to achieve optimum welding conditions (and sound).

- 1) First turn the voltage setting to desired number. Lower settings for light sheet metal, higher settings for thicker metal.
- 2) Next adjust wire feed speed. Start with a piece of scrap metal that is free of paint and rust. Attach the ground clamp to the scrap metal. Turn the wire feed to a high setting. Pull trigger, (Please note that the trigger must be pulled firmly and fully in order to produce its three operations ie gas flow, wire feed, and welding current). Initiate an arc and start to turn the wire feed down slowly. Listen as you continue to decrease the wire feed speed. The sound will go from a sputter to a high pitched buzz (like the sound of bacon frying). This buzz will indicate the proper wire speed setting for the thickness of metal you are welding.

You must retune the wire speed whenever the amperage setting is changed. Always start with a higher wire feed speed setting. This will help to prevent damage to the contact tip during the welder tuning procedure.

As you weld, the gun should be held at approximately a 45 degree angle. Keep the tip of the nozzle 5 to 10 mm. from work.

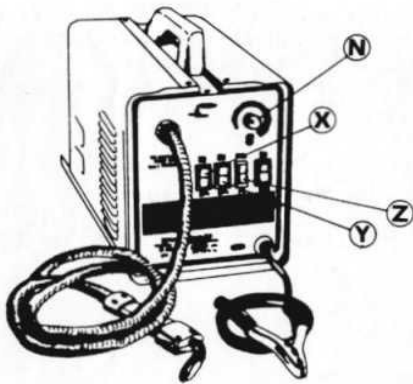
RENEWING THE WIRE LINER

1. Before commencing work, ensure the gas and electrical supplies are disconnected.
2. Open the side cover, and remove the welding wire from the hose and torch assembly. (Refer to Connecting the wire feed section on page 9).
3. Remove the two screws and two bolts securing the Hose Assembly Support Bracket (Item P, diagram 2). Remove the right side panel to allow access to the nuts securing the support bracket bolts.
4. Holding the torch on its side, on a flat surface, carefully remove the five securing screws, and gently prise off the uppermost cover, taking care not to disturb the components within, so that you can take note of the exact manner in which they are located, particularly the contact spring (39).
5. Lift out the gas valve (11), and disconnect the liner from its quick fit coupling by pushing in, and holding the raised lip on the end of the coupling, then pull the liner out.
6. Straighten the hose assembly and pull the liner completely out of the hose.
7. Thread the new liner into the hose from the torch, so that it passes through the Hose Support Bracket Assembly (P) of the wire feed mechanism. Push the end of the liner firmly into the quick fit coupling on the gas valve. Pull on the liner to ensure it is fully engaged.
8. Re-assemble the torch, taking care to ensure that the electrical connection is made, and the contact spring (39), and the gas valve (11) are correctly seated. DO NOT force the two halves of the handle together, ensure that the dowel is lined up before tightening the screws.
9. Offer the Hose Support Bracket Assembly (P), up to its mounting on the wire feed mechanism, but do not tighten down. Measure the amount of protrusion of the liner, and trim it back, using a good pair of side cutters or snips so that there is no more than 2 mm gap between the end of the liner and the feed roller (L, diagram 2) when the bracket is in place. Care must be taken to ensure there are no burrs or sharp edges which may impede the progress of the wire when fitted.
10. Replace the Hose Support Bracket Assembly (P), the welding wire and side panels.

MIG 100E - MK2 MIG 120E - MK2



| X | Y | Z | | |
|---|---|-----|-----|--|
| 1 | 2 | MIN | OFF | |
| A | 3 | MAX | ON | |



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ADDITIONAL SAFETY PRECAUTIONS

Special care is taken during all stages of manufacture to ensure that your **Clarke** MIG Welder arrives with you in good condition. However, before using the machine it is in your own interest to read and pay attention to the following safety rules:

- 1) Do not attempt to remove side panels of the machine unless the mains plug is disconnected.
- 2) Do not use the machine with any of the panels removed.
- 3) Do not try to attempt any electrical or mechanical repair unless you are a qualified technician. If you have a problem with your machine contact your local dealer.
- 4) Remove any flammable materials from the welding area.
- 5) Do not expose gas cylinders to high temperature, and do not strike an arc near or on the gas cylinder.
Caution: Gas cylinders are pressurized containers. Do not pierce or burn, even when empty. Protect from direct sunlight.
- 6) Make sure you have good ventilation in the welding area since toxic gases are released during the MIG welding process.
- 7) Ultra-violet radiation is released by the MIG welding process and it is of the utmost importance that the operator, and any spectators, protect themselves by using welding face-shields or helmets with suitable filter lenses. The wearing of gloves and proper working clothes is also recommended.
- 8) Never use in a wet/damp environment.

BENEFITS OF MIG WELDING

1. 50% faster welding time;
2. Operator training time kept to a minimum;
3. There is no slag removal, thus eliminating almost all post-welding cleaning operations;
4. Minimum waste of welding consumables;
5. Overall, a faster more efficient way of getting the job done;
6. Less heat - less distortion.
7. Ability to weld thin materials.

- 3 -

MIG WELDING - HOW IT WORKS

MIG (Metal Inert Gas) welding is a process in which a power wire electrode is fed continuously into the weld pool at a controlled constant rate.

The wire is connected to the positive side of a rectified voltage supply. The workpiece is connected to the negative side of the supply.

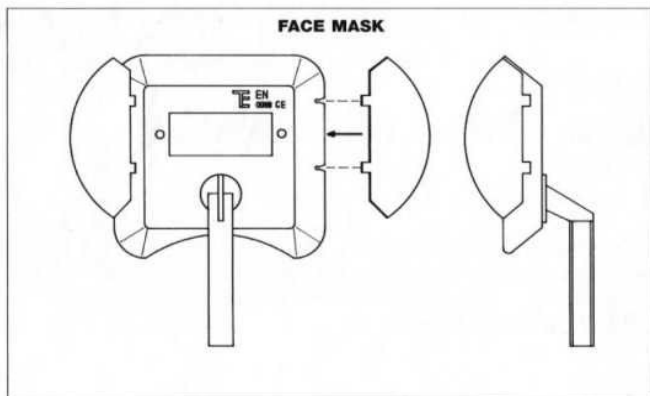
When the wire is fed, it comes into contact with the workpiece and an arc is struck. The arc melts the wire and it is deposited onto the workpiece.

The wire, which is fed by the wire feed motor, is fed into the weld pool, melting itself off at a rate dependent upon the selected wire feed speed.

To protect the weld pool from oxidation and impurities during the welding process, a shielding gas flows over and around the weld pool.

This gas flow must be sufficient to protect the weld, but not wasteful.

NOTE: Poor gas coverage will result in poor welding. Excessive gas coverage is expensive.



MIG 100E-MK2 MIG 120E-MK2

WIRE SIZE SPECIFICATION CHART

STEEL

| Workpiece Thickness (millimetre) | Welding wire 0,6 mm. | | | Wire Spd. Adjust N | Welding wire 0,8 mm. | | | Wire Spd. Adjust N |
|----------------------------------|----------------------|----------|------|--------------------|----------------------|----------|------|--------------------|
| | Welding pos. X | Switch Y | Z | | Welding pos. X | Switch Y | Z | |
| 0,5-0,6 | 1 | 2/3 | Min. | Low | Hard welding | | | |
| 0,6-0,8 | 1 | 2/3 | Max. | Low | A 2 | Min. | Low. | |
| 0,8-1,0 | A | 2 | Min. | Med. | A 3 | Min. | Med. | |
| 1,0-1,2 | A | 3 | Min. | Med. | A 2 | Max. | Med. | |
| 1,2-2,0 | A | 2 | Max. | Med. | A 3 | Max. | Med. | |
| 2,0-3,0 | A | 3 | Max. | High | A 3 | Max. | High | |

N.B. Please note that for position 1, Y switch can be on 2 or 3 position.

ALUMINIUM

| Workpiece Thickness (millimetre) | Welding wire 0,8 mm. | | | Wire Spd. Adjust N |
|----------------------------------|----------------------|----------|------|--------------------|
| | Welding pos. X | Switch Y | Z | |
| 0,8 | 1 | 2/3 | Max. | Med. |
| 1,0-1,5 | 1 | 2 | Min. | Med. |
| 1,5-2,0 | A | 2 | Max. | High |
| 2,0-3,0 | A | 3 | Max. | Med./High |

N.B. Please note that for position 1, Y switch can be on 2 or 3 position.

PRO-90mig

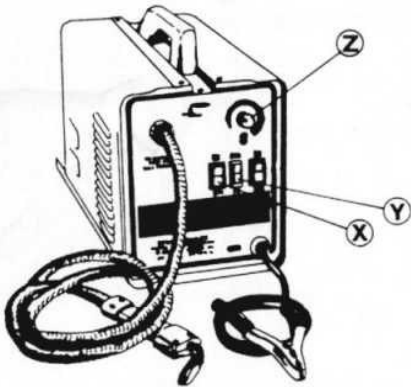
WIRE SIZE SPECIFICATION CHART

STEEL

| Workpiece Thickness (millimetre) | Welding wire 0,6 mm. | | | Welding wire 0,8 mm. | | |
|----------------------------------|----------------------|------------------|-------------------|----------------------|-------------------|-------------------|
| | Welding Pos. Switch | Wire Spd. Adjust | Wire Spd. Adjust. | Welding Pos. Switch | Wire Spd. Adjust. | Wire Spd. Adjust. |
| | X | Y | Z | X | Y | Z |
| 0,6-0,8 | 1 | Min. | Low | 1 | Min. | Low |
| 0,8-1,0 | 2 | Min. | Med. | 2 | Min. | Med. |
| 1,0-2,0 | 1 | Max. | Med. | 2 | Max. | Med. |
| 2,0-3,0 | 2 | Max. | High | 2 | Max. | High |

ALUMINIUM

| Workpiece Thickness (millimetre) | Welding wire 0,8 mm. | | Wire Spd. Adjust |
|----------------------------------|----------------------|-------------------|------------------|
| | Welding Pos. Switch | Wire Spd. Adjust. | |
| | X | Y | Z |
| 0,8 | 2 | Min. | Med. |
| 1,0-2,0 | 1 | Max. | Med. |
| 2,0-3,0 | 2 | Max. | High |



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WELDER SPECIFICATIONS

PRIMARY OR INPUT POWER DATA

| | PRO 90 MIG | MIG 100E - MK2 | MIG 120E - MK2 |
|---------------|------------|----------------|----------------|
| Primary Volts | 230 Volts | 230 Volts | 230 Volts |
| Primary Amps | 9 Amps | 10 Amps | 14 Amps |
| Frequency | 50 Hz | 50 Hz | 50 Hz |

SECONDARY OR OUTPUT POWER DATA

| | PRO 90 MIG | MIG 100E - MK2 | MIG 120E - MK2 |
|-------------------|------------|----------------|----------------|
| Max. Sec. Volts | 26 Volts | 29 Volts | 30 Volts |
| Max. Sec. Amps | 90 Amps | 100 Amps | 120 Amps |
| Duty Cycle at 20% | 60 Amps | 80 Amps | 100 Amps |

DUTY CYCLE

These welders are rated at a 20% duty cycle. This means for example, that when welding with the MIG 100E at a current output of 90 amps over a period of 10 minutes, the total welding time is 2 minutes, and the rest time is 8 minutes.

USABLE WIRE SIZES

| | |
|----------------------|-------------------|
| Mild Steel Wire | - 0,6 and 0,8 mm. |
| Stainless Steel Wire | - 0,8 mm. |
| Aluminium Wire | - 0,8 mm. |

USABLE GASES

| | |
|-------------------------------|--------------------------------------|
| 75% Argon 25% CO ² | - Thin Sheet Metal, Mild Steel |
| 100% Argon | - Welding Aluminium, Stainless Steel |
| 100% CO ² | - Mild Steel. |

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PRO-90mig

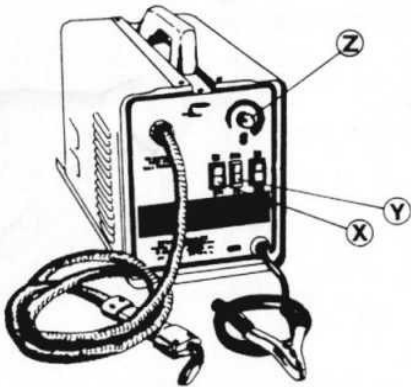
WIRE SIZE SPECIFICATION CHART

STEEL

| Workpiece Thickness (millimetre) | Welding wire 0,6 mm. | | | Welding wire 0,8 mm. | | |
|----------------------------------|----------------------|------------------|-------------------|----------------------|-------------------|-------------------|
| | Welding Pos. Switch | Wire Spd. Adjust | Wire Spd. Adjust. | Welding Pos. Switch | Wire Spd. Adjust. | Wire Spd. Adjust. |
| | X | Y | Z | X | Y | Z |
| 0,6-0,8 | 1 | Min. | Low | 1 | Min. | Low |
| 0,8-1,0 | 2 | Min. | Med. | 2 | Min. | Med. |
| 1,0-2,0 | 1 | Max. | Med. | 2 | Max. | Med. |
| 2,0-3,0 | 2 | Max. | High | 2 | Max. | High |

ALUMINIUM

| Workpiece Thickness (millimetre) | Welding wire 0,8 mm. | | Wire Spd. Adjust |
|----------------------------------|----------------------|-------------------|------------------|
| | Welding Pos. Switch | Wire Spd. Adjust. | |
| | X | Y | Z |
| 0,8 | 2 | Min. | Med. |
| 1,0-2,0 | 1 | Max. | Med. |
| 2,0-3,0 | 2 | Max. | High |



- 12 -

WELDER SPECIFICATIONS

PRIMARY OR INPUT POWER DATA

| | PRO 90 MIG | MIG 100E - MK2 | MIG 120E - MK2 |
|---------------|------------|----------------|----------------|
| Primary Volts | 230 Volts | 230 Volts | 230 Volts |
| Primary Amps | 9 Amps | 10 Amps | 14 Amps |
| Frequency | 50 Hz | 50 Hz | 50 Hz |

SECONDARY OR OUTPUT POWER DATA

| | PRO 90 MIG | MIG 100E - MK2 | MIG 120E - MK2 |
|-------------------|------------|----------------|----------------|
| Max. Sec. Volts | 26 Volts | 29 Volts | 30 Volts |
| Max. Sec. Amps | 90 Amps | 100 Amps | 120 Amps |
| Duty Cycle at 20% | 60 Amps | 80 Amps | 100 Amps |

DUTY CYCLE

These welders are rated at a 20% duty cycle. This means for example, that when welding with the MIG 100E at a current output of 90 amps over a period of 10 minutes, the total welding time is 2 minutes, and the rest time is 8 minutes.

USABLE WIRE SIZES

| | |
|----------------------|-------------------|
| Mild Steel Wire | - 0,6 and 0,8 mm. |
| Stainless Steel Wire | - 0,8 mm. |
| Aluminium Wire | - 0,8 mm. |

USABLE GASES

| | |
|-------------------------------|--------------------------------------|
| 75% Argon 25% CO ² | - Thin Sheet Metal, Mild Steel |
| 100% Argon | - Welding Aluminium, Stainless Steel |
| 100% CO ² | - Mild Steel. |

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WIRING

Connect the mains lead (Diagram 1, Item A) to a suitable, fused 230 Volt, 1 phase electricity supply.

IMPORTANT: The wires in the mains lead of your welder are colour coded as follows: 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 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 \perp or coloured green or green-and-yellow.

The wire which is coloured blue must be connected to the terminal which is marked with the letter N or coloured black.

The wire which is coloured brown must be connected to the terminal which is marked with the letter L or coloured red.

WARNING: This machine must be earthed.

ASSEMBLY (See diagram 1)

1) Remove the side panel by sliding upwards and check that all the accessories listed below are included:

| | |
|--|----------------------|
| 4 Rubber feet with screws and washers | 1 Face Shield body |
| 1 Spool of steel welding wire | 1 Face shield handle |
| 1 Gas bottle | 1 Face shield window |
| 1 Large metal fastening band | 2 Window fasteners |
| 1 Gas regulator | |
| 1 Large gas bottle adaptor (NOT PRO 90 MIG) | |
| 2 Alternative welding tips (1 WITH PRO 90 MIG) | |

Should any parts be missing or damaged contact your local dealer for replacement.

2) Place the welding machine gently on its side and affix the four rubber feet to the underside of the machine using the four screws and washers provided (B).

3) To assemble face shield, first place the darkened glass lens in the recessed window area in the body. Secure in place using the two plastic screw fasteners provided. Locate the handle fixing into the slot in the shield body, press firmly and rotate the handle through 90° until the lug locates into the hole in the shield body.

WARNING: Never look directly at welding arc, it can seriously damage your eyes. Always use the face-shield provided or an approved welding mask or helmet. (Not one intended for oxy-acetylene welding).

WARNING: The torch (Diagram 2, Item T) must be kept straight. When feeding a new wire through the liner, make sure the wire is cut cleanly (no burrs or angles) and at least two inches of the end is straight (no curves).

Failure to follow these instructions could lead to the wire damaging the liner.

PREPARATION FOR WELDING

- 1) Plug the machine into a 230 V. - 50 Hz. outlet.
- 2) Open the gas tap of the regulator. (see gas bottle instructions on page No. 8)
- 3) Attach ground clamp (Diagram 1, Item G) to bare metal to be welded making sure of good contact.
- 4) Make sure that the wire-roller groove (Diagram 2, Item L) corresponds to the diameter of the welding wire being used. Note that each roll has two grooves, one for 0,6 mm. wires and one for 0,8 mm. wires. To change position just unscrew the Allen screw that holds the roller in place, reverse the roller and replace the Allen screw.
- 5) Adjust the gas regulator to the proper setting position (this varies with different metals, thickness and current needed), refer to instructions given on page No. 8.

WELDING PROCEDURES

- 1) Your welding machine has 6 positions (PRO 90 has 4) in which to regulate current for various conditions, obtainable through three (two on PRO 90) two-position switches placed on the front panel.
- 2) The selection of a welding position is determined by the thickness of the metal to be welded. The thicker it is, the higher the current must be.
- 3) According to the thickness to be welded, the amount of gas regulated to the work also varies and must be adjusted to comply.
- 4) For welding adjustments please refer to the wire size specification chart on pages 12 and 13.

DIAGRAM 2

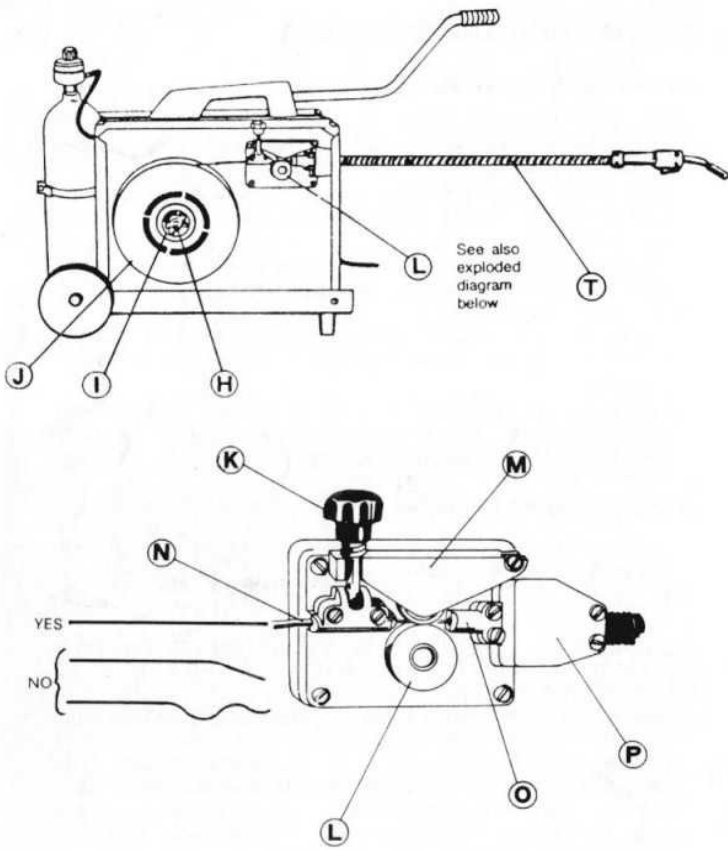
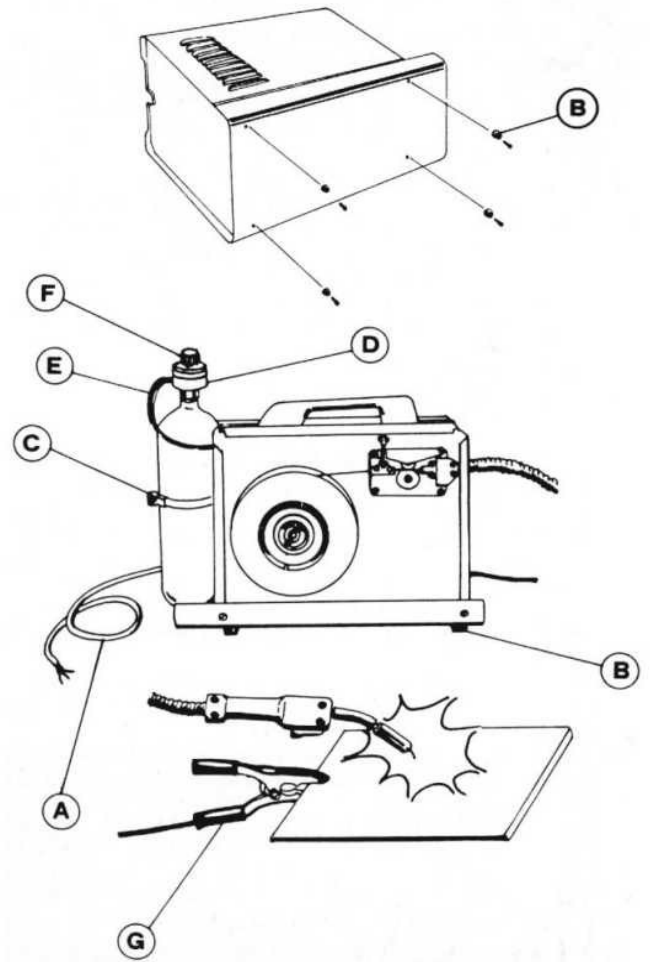


DIAGRAM 1



ATTACHING GAS BOTTLE AND REGULATOR

(See diagram 1)

- 1) Attach the gas bottle to the rear of the welder using the large metal fastening band (C) provided. To do this first open the band fully by raising the hinged tightening screw, then pass the end through the centre slot in the back panel of the machine, around the gas bottle and finally locate back into the band and tighten.
- 2) When using disposable gas bottles (supplied with the machine) remove the protective plastic cap from the threaded top of the bottle and screw the regulator (D) down in a clockwise fashion until tight (be careful not to put too much force on the regulator when tightening).
- 3) Insert the plastic gas tube (E) into the regulator (push all the way in). Note: When changing disposable bottles, push in the outer flange of the regulator orifice to allow easy release of the plastic tube.
- 4) The operation of the pressure regulator, for use with disposable bottles, is based on the action of a needle operated by a knob (F) placed over a graduated dial plate (from "0" to "6"), acting on the valve of the bottle. With the knob turned to position "0" there is no gas flow; before starting to weld bring the knob to position "3" or "4", achieving a gas flow of 2/3 litres/minute. In order to obtain the maximum service from each gas bottle, always maintain a minimum gas flow (2/3 litres per minute) which is sufficient to obtain a good weld without porosity. The pressure regulator is equipped with a safety valve which will automatically operate should the pressure surge.
- 5) For safety and economy, ensure that the regulator is fully closed (turning fully anti-clockwise) when not welding and/or before fitting or removing the gas bottle.
- 6) When using a rechargeable gas bottle (not supplied) you will also need to purchase a large Gas Bottle Adaptor (not supplied). Insert the plastic gas tube (E) into the adaptor and connect the tail end to a length of 1/4" (6 mm) I.D. flexible gas pipe (not supplied). Connect this pipe to a gauged pressure regulator (not supplied) which is then screwed onto the rechargeable bottle. The gauged pressure regulator is then used to control the flow of gas which should be 2/3 litres per minute.

Note: All optional items not supplied with your welder should be easily obtainable from your local welding supplies outlet.

Note: The gas bottle supplied with your welding machine is disposable and should be thrown away when empty. Replacements, and other optional accessories are available from your local **Clarke** dealer.

CONNECTING THE WIRE FEED (See diagram 2)

Your **Clarke** MIG welder is supplied with a 0,8 Kg. spool of 0,6 mm. mild steel welding wire. To connect this wire through the feed system ready for operation, follow the instructions below and refer to diagram 2.

- 1) Unscrew the spool holder (Drum brake) wingnut (H) and remove the washer and spring.
- 2) Pull off the external ring (I) from the spool holder and remove the spool (J).
- 3) Take the wire spool out of its plastic wrapping and replace on the spool holder. Replace the external ring, spring, washer and drum brake wingnut.
Note: Do not overtighten the wingnut. 2-3 turns is normally sufficient for smooth wire feed without allowing the spool to overrun.
- 4) Loosen the plastic knob (K) (turn anti-clockwise) that holds pressure on the wire via the roller (L), then raise the pressure roller (M) and pull out any wire that has been left in the hose.
- 5) Cleanly clip the end of the wire from the spool and straighten if necessary, then feed the wire through the guide tube (N) over the channel on the roller (L) and into the torch sheath (O) about 10 to 15 cm.
- 6) Reposition the pressure roller (M) and the plastic knob (K) and tighten slightly

(TOO TIGHT WILL CRUSH THE WIRE AND DAMAGE THE WIRE FEED MOTOR; TOO LOOSE WILL NOT ALLOW THE WIRE TO BE PULLED BY THE ROLLER).

Pull off the torch shroud (item 8, page 19) and unscrew the contact tip (item 9, page 19).

Replace the side panel of the machine, plug into a 230 V, 50 Hz outlet, switch on the machine and press the trigger. The wire will feed through the hose and when it appears at the torch end, release the trigger, switch off the machine and replace the contact tip and the torch shroud.