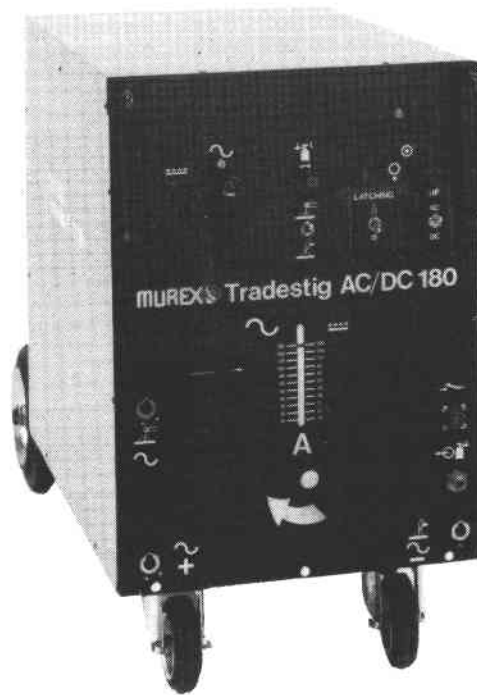




Operating Manual

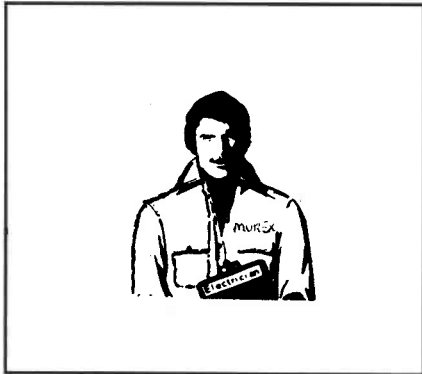
Tradestig AC/DC 180



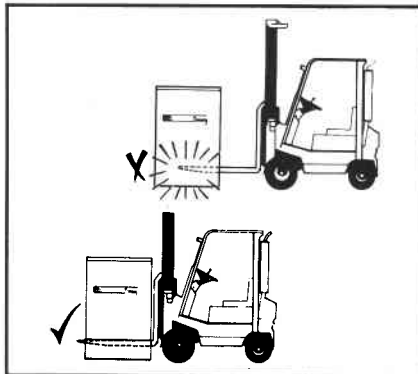
**Please ensure that this manual
is made available to the person
operating the equipment.**

£2.50

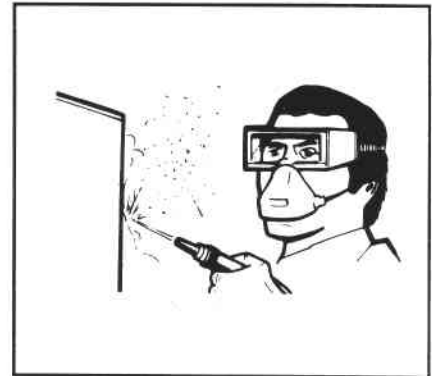
SAFETY - Read safety leaflet D/GN/AA/7.1/1



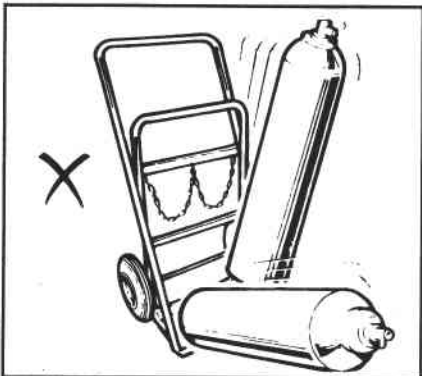
Call in your nearest Murex Service Centre if you don't know what to do.



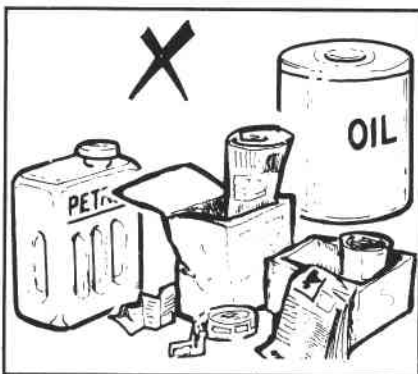
Use forks which are long enough.



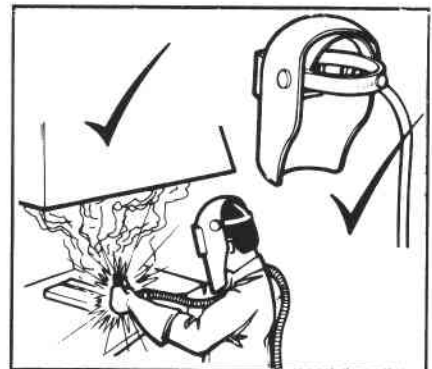
Wear goggles and a mask when removing dust with an airline.



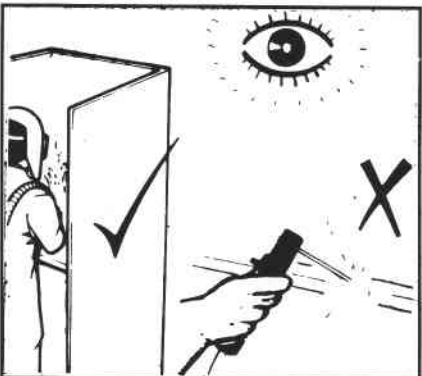
Handle cylinders carefully.



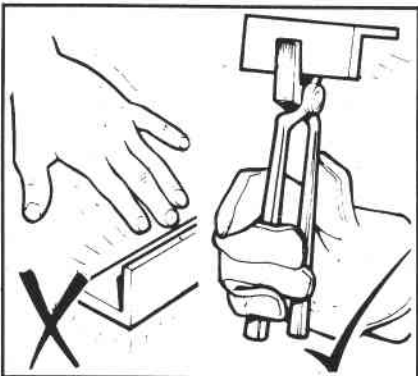
Before commencing welding, clear the area of flammable materials.



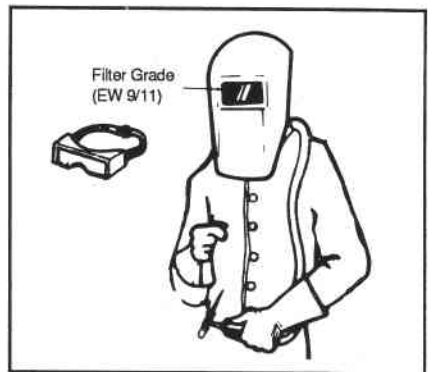
Ventilate the welding area to prevent a build up of gas and fumes.



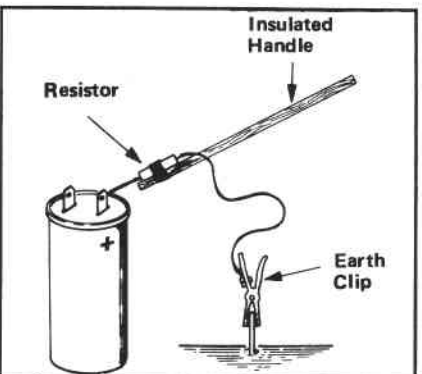
Wear your headshield or facescreen and screen the welding area.



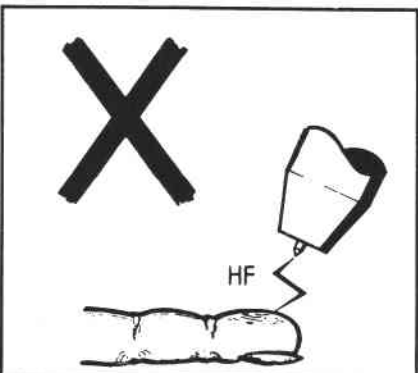
Don't burn yourself! wear gauntlets and use tongs.



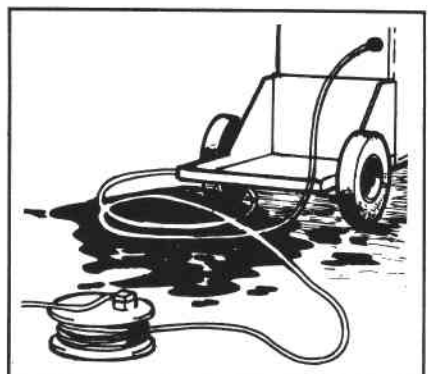
Dress correctly when welding and preparing the weld.



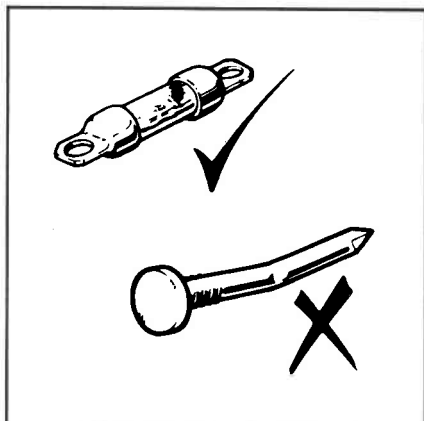
Discharge high voltage capacitors using a suitable discharge stick when working near HF components.



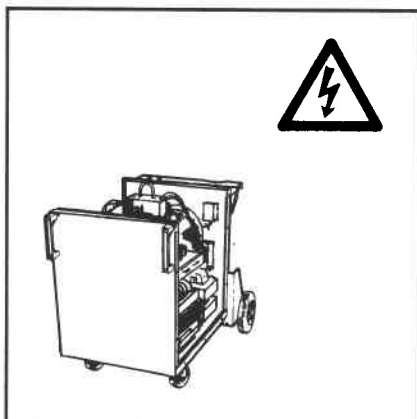
Do not strike the HF on your finger or any other part of the body.



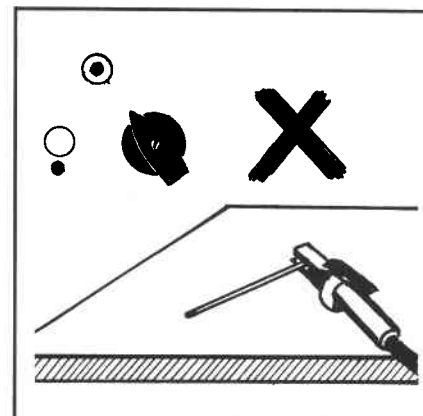
Don't allow leads to lie in oil water or any corrosive liquid. Don't extend the cable fit a longer one.



Don't replace the fuse with the wrong value (especially too high a value). See Tech. Notes.



Don't work with the covers off. Leave it to the experts.



Don't switch on with the electrode touched down on the metal surface.

INTRODUCTION

Unpacking

Immediately upon receipt, the welding machine should be inspected for damage which may have occurred in transit. Notify the supplier of any defects or damage at once.

Remove the packing of the machine with great care, avoiding the use of any tools which might damage it.

Check the container carefully for loose parts which might otherwise be lost.

General

The AC/DC 180 is a fan cooled power source providing both AC and DC current outputs for use in Tungsten Inert Gas (TIG) or Manual Metal Arc (MMA) welding processes.

In the TIG - DC welding mode, the unit may be used to weld stainless steel, copper and its alloys and nickel and its alloys.

In the TIG - AC mode good quality welds may be produced in aluminium and its alloys.

MMA - AC or DC is used for the welding of most ferrous or non-ferrous metals using covered electrodes.

MANUAL METAL ARC ('Stick') WELDING

The set is designed to give AC and DC output for manual metal arc welding of most ferrous or non-ferrous metals.

TUNGSTEN INERT GAS (TIG) WELDING

This process is used to produce high quality of welds in a variety of metals.

Two output modes are available.

Generally speaking, the d.c. mode is used to weld light gauge stainless steel, low carbon steel, copper and its alloys, and nickel and its alloys.

For aluminium, brass and magnesium alloys the a.c. mode is employed.

High Frequency (HF) starting and Maintenance

HF is used to enable arc striking in the DC position, and to maintain the arc during AC crossover transition periods.

(i) DC- HF is present at the welding terminals until the arc is established. It is then automatically switched off until the arc is extinguished.

(ii) AC- HF is held on throughout the welding period. When AC welding, the arc tends to be extinguished during crossover periods, the HF

maintains the arc during these periods.

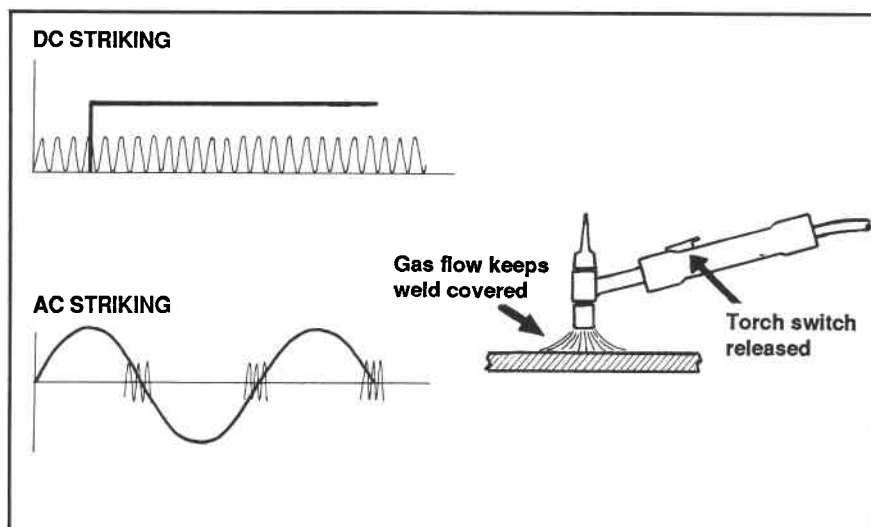
Torch Latching

Torch latching is provided as follows:

- (i) **Latching ON** - When the torch switch is pressed welding commences. Welding services remain on even when torch switch is released. Welding will cease when the switch is pressed and released again
- (ii) **Latching OFF** - Pressing the torch switch activates the welding services. Welding stops when the switch is released.

Gas and post-weld Shielding

When the torch switch is released and the welding arc is extinguished, gas continues to flow for a short time to provide a shield against contamination until the weld cools.



INSTALLATION

Installation must only be undertaken by a qualified or suitably trained engineer.

Location

The Power Source components are cooled by forced air drawn by a fan into the front of the machine and expelled at the rear. The Power Source must therefore be located so that air can circulate freely at the front and rear openings of the cabinet. Select a location at which a minimum of dirt, dust, moisture, or corrosive vapours will be drawn into the machine.

Locate the machine so that the cover can be removed easily for cleaning the inside.

Electrical Connections

WARNING

Take great care in earthing the machine. Good earthing is important for safety, for protection of the machine and also to minimise radio interference caused by the High Frequency. Check that all connections are well tightened and that they have been connected in the correct way.

Before connecting to the main supply, check that the data stated on the machine plate corresponds to the voltage to be used.

The supply cable must be connected to the main contactor situated on the internal shelf, the earth wire must be connected to the earth terminal provided.

The standard machine is designed to

operate on a single-phase supply and it can be connected to a single-phase supply or to two phases of a three phase supply.

The machine should be connected through a separate fused isolator.

The mains cable and earth wires must be at least 6mm² in cross section.

Torch (or remote) Switch

Connect the switch lead to the socket on the front panel using the two pin torch switch plug (marked with a switch symbol).

Interconnections

The proper operation of the machine depends to a great extent on the use of welding cable of adequate size.

If the welding leads are excessively long or have poor or loose connections, the difference between the voltage at the machine and the actual arc voltage may be considerable.

The TIG torch or Stick Electrode holder and the Work Return cable must be connected to the correct output socket; depending upon the process. (See Controls).

The recommended minimum section for the work return cable is 25mm.

If possible, use a cable with a vinylic insulation because this material offers a

good insulation resistance in the presence of high frequency.

Cylinder Mounting

Mount the cylinder on the cylinder tray and secure in position using the chain provided.

CAUTION

Remove the cylinder before attempting to lift or transport the unit.

Gas Connection

The gas hose coming from the regulator is connected to the gas solenoid fitting on the back panel: The gas hose of the TIG torch is connected to the gas outlet which is located on the front panel.

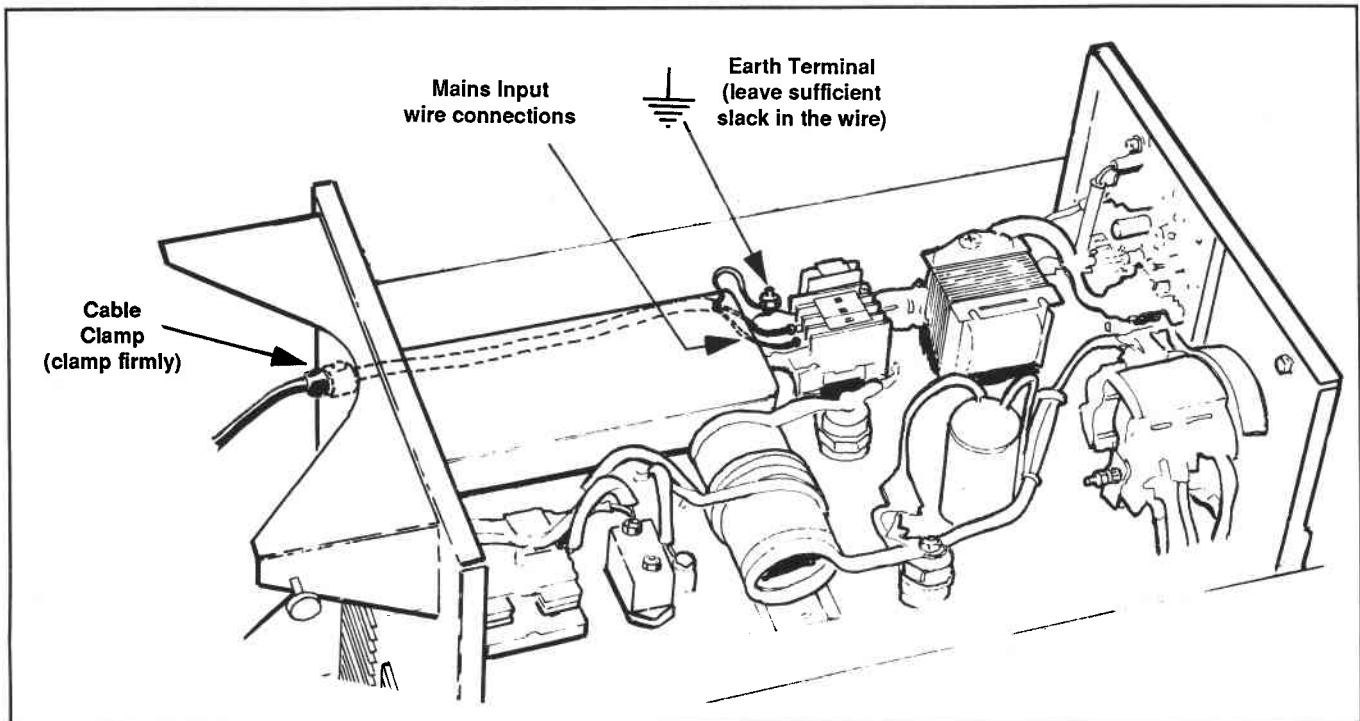
The gas flow used to protect the weld pool depends on application, but is usually between 6 and 15 litres per minute.

WARNING

The ON/OFF switch on this equipment does not isolate the unit from the mains electrical supply. AC POWER IS PRESENT ON THE CONTACTOR TERMINALS, AND OTHER COMPONENTS.

The ON/OFF lamp is an indication that the auxiliary supply is switched on and also does not imply that the unit is isolated from the supply.

BEFORE REMOVING THE COVERS FOR MAINTENANCE, ISOLATE THE UNIT FROM THE MAINS ELECTRICAL SUPPLY.



OPERATION

The AC/DC 180 is simple to operate. The following is an explanation of each control function together with a typical approach to TIG and MMA welding.

CONTROLS

1. AC-DC Polarity Switch

This switch selects either alternating or direct current to the output terminals.

2. Post-Flow Timer Control

In order to protect both tungsten electrode and weld pool from oxidation, it is necessary that the gas from the torch continues flowing after the weld is finished.

The timer is provided for this purpose, and the gas solenoid will allow gas to flow after the weld is finished for a period set by the timer control.

The time is adjustable from 0-30 seconds.

The tungsten electrode must remain bright. Blue or black colouring shows surface oxidation which can contaminate the weld and make striking difficult, in this case increase post-flow time until the discolouration disappears.

3. ON/OFF Lamp

Indicates that the mains supply is switched off and that welding output is off.

CAUTION

Mains supply is still connected to the ON/OFF switch and the unit is 'Live'.

4. ON/OFF Switch

In the ON 'O' position the machine is ready to weld.

When welding is finished, return this switch to the OFF 'O' position.

WARNING

This switch does not isolate the unit from the mains electrical supply. AC mains is connected to the contactor, and other components.

5. High Frequency (HF) Control Switch

D.C.- High Frequency for arc initiation only, for dc TIG welding.

A.C.- Continuous high frequency for ac TIG welding.

6. Latching Switch

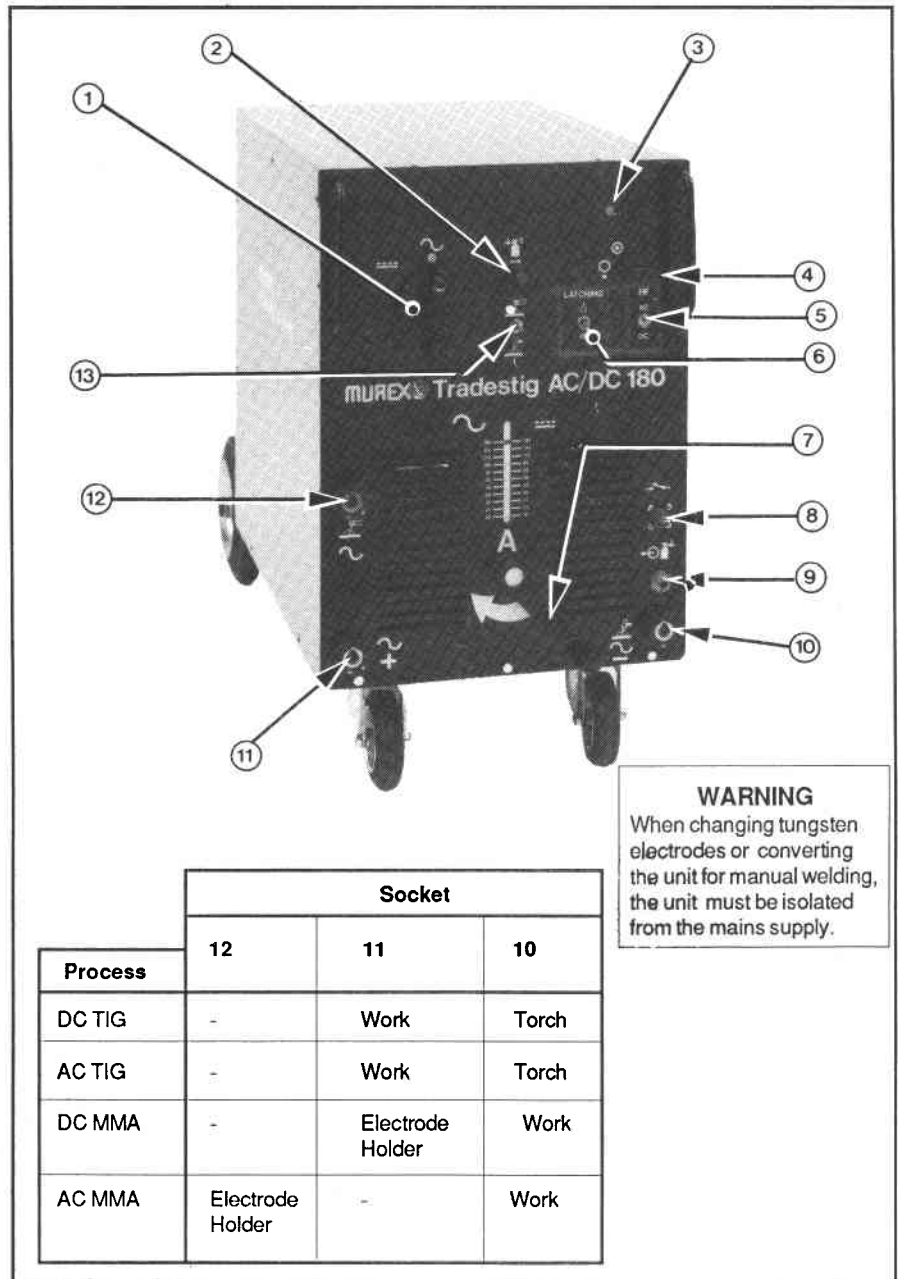
This switch provides self latching of the torch switch i.e.

a. ON position: to begin welding press and immediately release the switch. Welding will continue until the switch is pressed and released again.

b. OFF position: it is necessary to press the torch switch during the whole welding period - on release, welding will stop.

7. Welding Current Adjustment

The required current can be set by rotating the handle and by reading the approximate value on the graduated scale.



Process	Socket		
	12	11	10
DC TIG	-	Work	Torch
AC TIG	-	Work	Torch
DC MMA	-	Electrode Holder	Work
AC MMA	Electrode Holder	-	Work

Controls

8. Torch Switch Socket

Accepts a 2pin control plug from a torch or foot switch.

always closed and therefore the output terminals are always live.

CAUTION

Always switch off when changing electrodes.

9. Gas Connection

Provides gas out to the torch via the gas hose.

13. Welding Process Switch

This switch has two positions:

a. Down - TIG position: all operations are controlled by the torch switch, gas and HF will operate.

b. Up- MMA/Stick position: for when the machine is used for arc welding with coated electrodes. In this case the main contactor is

WARNING

The ON/OFF switch on this equipment does not isolate the unit from the mains electrical supply. AC POWER IS PRESENT ON THE ON/OFF SWITCH TERMINALS. The ON/OFF lamp is an indication that the auxiliary supply is switched on and also does not imply that the unit is isolated from the supply.

BEFORE REMOVING THE COVERS FOR MAINTENANCE, ISOLATE THE UNIT FROM THE MAINS ELECTRICAL SUPPLY.

TIG WELDING

Set the switches on the front panel to the appropriate positions.

WARNING

When changing tungsten electrodes or when converting the unit for manual welding, the unit must be isolated from the mains supply.

Always commence with a last minute check for safety and protection.

Check for correct and secure torch and work return lead connections.

Check for correct position of machine controls.

Using the current control handle set the welding current on the scale.

Check that the electrode tip sticks out by 4 to 7mm and that it is ground as shown. Switch on the mains ON/OFF switch.

Using a cylinder key, turn on the gas and adjust the gas flow for a 6 to 7.5 litres/minute (12-15cu ft/hr) indication on the flowmeter.

Hold the torch and filler rod at the correct angles as shown. Holding the rod and torch at these angles is necessary to ensure satisfactory results.

Position the torch over the welding area (about 25mm above), warn bystanders to shield their eyes and lower your headscreen.

Press the torch switch and slowly lower the torch. **(DO NOT TOUCH THE WORKPIECE WITH THE ELECTRODE.)** The High frequency output will allow the arc to strike without the electrode touching the workpiece.

Wait for a pool to form and, when the edges of the molten material flow together, move the torch from right to left (right handed welder) adding filler wire as necessary. **Keep the filler rod tip inside the gas shroud.**

Adjust the post weld gas flow (if necessary) using the gas timer on the front panel.

Electrode Selection

TIG Electrodes

1. **1% Thoriated:** The introduction of Thorium to pure tungsten gives electrodes longer life by reducing the tendency to melt at high current levels. These electrodes are recommended for D.C. welding of mild steel, stainless steel, copper and rare metals. They can also be used for aluminium.

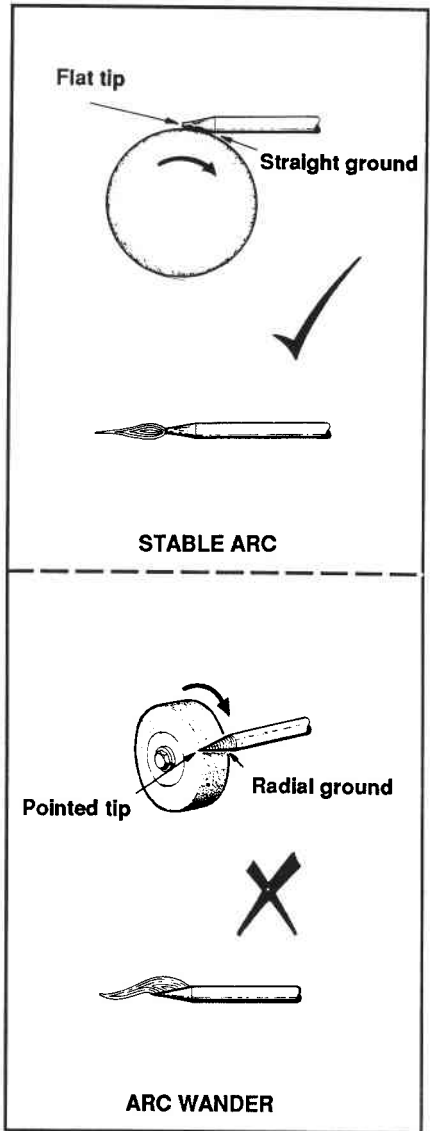
Features:

Long life. Superior arc starting characteristics. High current carrying capacity. Greater arc stability. Colour coded **YELLOW** for easy identification.

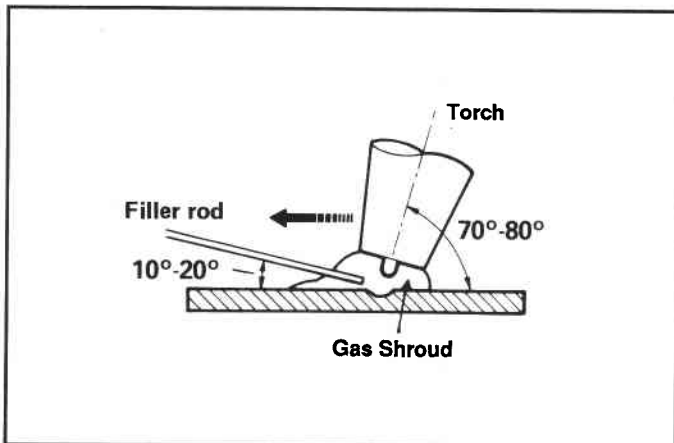
2. **1% Zirconiated:** Tungsten Electrodes containing 1% Zirconium are recommended when it is vital that tungsten contamination of the weld is to be avoided particularly where high quality A.C. welding of aluminium and magnesium and their alloys is called for.

Features:

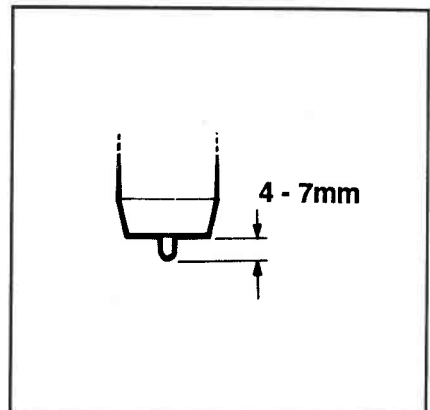
Long life. Self cleaning. Maintains a 'balled' end. High current carrying capacity. Colour coded **WHITE** for easy identification.



1. **Electrode Grinding:** to obtain a stable arc the electrode should be ground as shown.



Filler Rod and Torch angles



Electrode 'Stickout' 4-7mm

Welding Preparation

1. Clean the material to be welded with a wire brush.
2. Clamp the work return cable to a clean area of the workpiece.
3. Keep the gap between pieces to be welded to a minimum.
4. Clear the welding area and check that a fire extinguisher is available.



MMA WELDING

Set the switches on the front panel to their appropriate positions.

WARNING

When changing tungsten electrodes or when converting the unit for manual welding, the unit must be isolated from the mains supply.

Always commence with a last minute check for safety and protection.

Check that the electrode holder and work return lead connections are correct and secure.

Check for correct positioning of the machine controls.

Using the current control handle, set the welding current on the upper scale of the current control.

Hold the electrode away from the work, trailing the welding lead over the shoulder to reduce the weight on the hand doing the welding.

Keeping the electrode clear of any exposed metal surface, switch on the unit.

Position the electrode close to the point where welding is to commence, without actually touching the work.

Cover the eyes with a headsreen or handshield and warn bystanders.

(i) Scrape the electrode on the work surface near the start point (as though striking a match). The arc should strike.

(ii) Carry on scraping the electrode across the surface of the workpiece until the arc is almost continuous, then feed the electrode into the hot pool of molten metal keeping the electrode at approximately 65-80° to the workpiece.

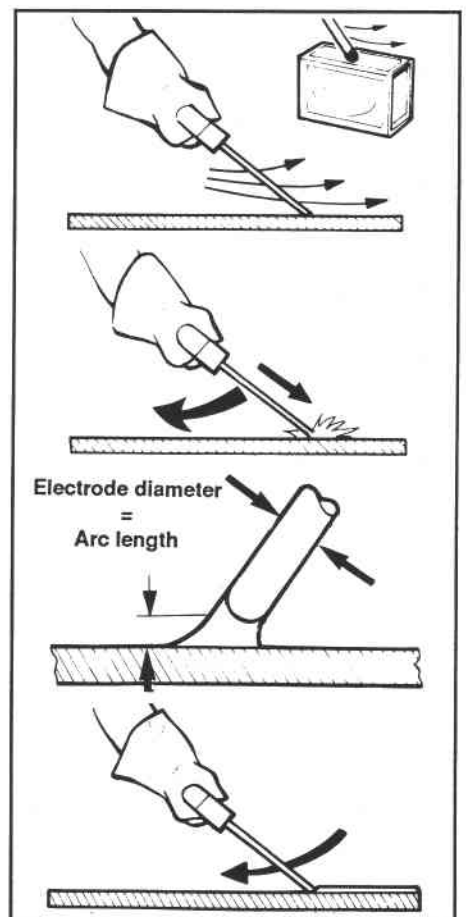
If the electrode 'freezes', i.e. sticks to the workpiece, gently twist the electrode and pull it free. If this is not possible, release the electrode from the holder, switch off the supply and cut the electrode free with a chisel. Freezing will occur if heavy contact is made with the workpiece at too low a current setting.

(iii) Once the arc is successfully struck, adjust the arc length to about the size of the electrode diameter.

(iv) The correct length of arc, (size of weld 'bead') is acquired by feeding the electrode backwards and downwards into the weld.

This combination of backward and downwards movement requires a little skill which will be acquired after a few practice welds.

Switch off the mains supply when welding is completed.





MAINTENANCE

WARNING

The ON/OFF switch on this equipment does not isolate the unit from the mains electrical supply. AC POWER IS PRESENT ON THE ON/OFF SWITCH TERMINALS.

The ON/OFF lamp is an indication that the auxiliary supply is switched on or off and does not imply that the unit is isolated from the supply.

BEFORE REMOVING THE COVERS FOR MAINTENANCE, ISOLATE THE UNIT FROM THE MAINS ELECTRICAL SUPPLY.

Daily (Operator task)

1. Check all welding and electrical cables for signs of cracking or general deterioration.
2. Check that all electrical and gas connections are in good physical condition.
3. Check the torch or electrode holder for damage. Replace any suspect part(s).

3 Monthly (Maintenance department task)

1. Remove the side panel and inspect the spark gaps. The gaps are factory set at 0.2mm (0.008in) max. and may require resetting after extended periods of operation.

To adjust the gap, proceed as follows:

- (a) Remove the top of the machine.
- (b) Loosen the screws of the side contact holders.
- (c) Insert a feeler gauge of the correct thickness (0.2mm) between the contacts.
- (d) Tighten the screw.
- (e) Check that the gauge is held tightly to be certain of the correct gap.

It is not necessary to clean the contacts, they must be replaced when the tungsten layer becomes so thin that they can no longer be correctly adjusted.

6 Monthly (Maintenance department task)

1. Switch off the unit and disconnect from the mains electrical supply.
2. Remove the cover (retain the fixing screws).
3. Grease the current control lead screw with a high temperature melting point grease such as Texaco Thermatex EP-1, Shell Alvania, etc.
4. Using a soft brush, remove any dust or dirt from the interior of the unit. If compressed air is used to clean the unit the pressure must not exceed 2kg/cm² (30lb/in²), and the air must be dry.

WARNING

SUITABLE EYE AND MOUTH PROTECTION SHOULD BE WORN.

4. Carry out an insulation test between all accessible electrical parts and the earth connections.
5. Replace the cover.
6. Reconnect the unit to the mains supply.

FAULT FINDING

Welded Material Faults

	Fault	Remedies
(1) Surface porosity	<ol style="list-style-type: none"> a) Insufficient shielding gas (TIG) b) Bore of nozzle too small (TIG). c) Surplus degreasing agent (MMA&TIG) d) Arc too long (MMA & TIG). e) Incorrect torch or rod angle (TIG). f) Poor quality materials. (MMA & TIG). 	<ol style="list-style-type: none"> a) Check shielding gas flow. b) Fit larger ceramic nozzle. c) Remove degreasing agent and dry. d) Shorten the arc. e) Correct the angles (see TIG WELDING). f) Use better quality materials.
(2) Under-cut (MMA and TIG)	<ol style="list-style-type: none"> a) Incorrect welding technique. b) Current too high. c) Incorrect welding speed. d) Wrong electrode (MMA). 	<ol style="list-style-type: none"> a) Correct rod handling. b) Reduce current setting. c) Increase hand travel speed. d) Change to correct size (type).
(3) Lack of penetration (MMA & TIG)	<ol style="list-style-type: none"> a) Insufficient current. b) Welding too fast. 	<ol style="list-style-type: none"> a) Increase current setting. b) Decrease hand travel speed.
(4) Cracking & Inclusions	These faults are difficult to detect without the use of specialised equipment. If cracking shows, seek the advice of a welding engineer.	



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Part No. 100443
 Issue 3 1/93
 Part 3 of 3



Tradestig AC/DC 180

Technical Notes

Technical Specification

Output			
Open Circuit Voltage DC	50-58V		
Open Circuit Voltage AC	60-67V		
Current Range			
	20-180A	AC/DC TIG	
	20-140A	DC MMA	
	20-180A	AC MMA	
Rated 35% Duty Cycle	} Based on 5 mins.	180A	AC/DC
Rated 60% Duty Cycle		135A	AC/DC
Input			
Nominal Voltage	420V		
Phase	Single		
Frequency	50hz		
Input Current	44A @ 35% Duty		
Dimensions (Overall)			
Height	675mm		
Width	400mm		
Length	1010mm		
Weight (nett)	97Kg		

Circuit Description

The single phase 420V mains supply powers main transformer T1, via the welding contactor MC1, and also the primary of the auxiliary transformer T2 via the power on/off switch S1. The primary of T2 is tapped for various input voltages, i.e. 220/380/415/440V, the 220V tap being used to provide power for the fan and on/off pilot indicator L1. The 24Vac secondary of T2 is used by the control PCB for the various welding sequence control functions.

Main transformer T1 includes a moving shunt, the position of the shunt controlling the magnetic coupling between primary and secondary turns and hence the effective current (or droop) in the secondary welding circuit. The shunt position is adjusted by a handle on the front panel operating a lead screw mechanism.

For d.c. TIG or d.c. MMA welding, with polarity $---$ position, main diodes D1-D4 rectify the a.c. output of the main transformer. Inductor L1, included in positive leg of the d.c. welding circuit smooths the output current waveform. High Frequency coupling transformer T3, in the torch (-ve) leg of the d.c. circuit, provides the HF/HV discharge for arc striking when in TIG mode, depending on the position of the process selector switch S2 and the H.F. a.c./d.c. switch S4. Components R2, C2, C3 provide an 'easy start' and H.F. by-pass network.

For a.c. MMA mode, with switch S3 in the AC ~ position, the a.c. output of the main transformer is used directly, the HF transformer being switched off by the action of process switch S2. Capacitor C4 protects against stray RF leakage etc.

In a.c. TIG mode with switch S3 at AC~, high power resistor diode network R1/D5, balances out the inherent d.c. component of arc current by providing an additional voltage drop during the electrode negative half cycles only. This additional voltage means that the transformer sees balanced load voltage and hence delivers balanced load current. H.F. coupling Transformer T3 is used to inject HF/HV to the welding circuit for arc striking and a.c. maintenance purposes, S2 in the TIG position, S4 in the a.c. position. As before R2, C2, C3 provide improved striking and H.F. bypass.

The PCB and related functional controls i.e. MMA/TIG process selector switch S2, AC/DC mode switch S4, Torch switch latching facility S5 and the post-flow timer-potentiometer VR1, control the overall welding sequence as follows:-

(1) **S2 In TIG mode.** When the torch switch is pressed both gas valve GV and main contactor MC1 are immediately energized by 24Vac signals from the PCB. Hence shielding gas is supplied through the torch and open circuit voltage is applied. At the same instant HF is applied between the torch and work to strike the arc. HF AC/DC switch S4 controls the duration of the HF/HV at the torch. In the DC position HF lasts for a period of approximately 3 seconds sufficient just to strike the arc. In the AC position HF is maintained throughout the whole welding cycle to provide both arc striking and a.c. maintenance.

Latching switch S5 automatically locks the machine in the welding status permitting the torch switch to be immediately released after initial pressure, for long welds.

At the end of welding, when the torch switch is released (or pressed and released with latching switch S5 at the on position), the contactor (and HF if on) is immediately turned off, reducing welding output to zero. The gas valve GV remains held on for a post-flow period whose value is set by RV1.

(2) **S2 in MMA mode.** The main contactor MC1 is continuously energised from the control PCB providing open circuit voltage continuously. In this mode both the gas valve GV and HF generator are disabled and the torch switch will have no effect.

