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**OWNERS MANUAL**

**VORTEX DX13**

**MODEL VRDX13-1**

**06/96**

**QUALITY WELDING PRODUCTS, SYSTEMS AND SERVICE**



The information contained in this manual is set out to enable you to properly maintain your new equipment and ensure that you obtain maximum operating efficiency.

Please ensure that this information is kept in a safe place for ready reference when required at any future time.

When requesting spare parts, please quote the model and serial number of the machine and part number of the item required. All relevant numbers are shown in lists contained in this manual. Failure to supply this information may result in unnecessary delays in supplying the correct parts.

## SAFETY

Before this equipment is put into operation, the SAFE PRACTICES section at the back of the manual must be read completely. This will help to avoid possible injury due to misuse or improper welding applications.

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## 1. INTRODUCTION

### MMAW

Manual Metal Arc Welding is a process where an arc is struck between a flux-coated consumable electrode and the work piece. The arc and the weld pool are both shielded by gasses generated by the flux coating of the electrode.

The VORTEX DX13 has been designed to be used with 2.0mm, 2.5mm and 3.2mm diameter electrodes. The smaller are used when welding at lower currents, such as sheet metal applications. Increasing the electrode diameter permits higher welding currents to be selected.

WIA manufactures a wide range of mild steel and special purpose electrodes which cater for home workshop, rural, and industrial requirements. Some popular AUSTARC electrodes are listed below. The correctly selected AUSTARC electrode used in conjunction with your new VORTEX DX13 will influence the quality of the weld, and the stability of the arc.

#### **Austarc 12P, Classification E4112.**

A popular general purpose electrode used with ease in all positions, vertical up or down. The smooth forceful arc makes it an ideal electrode for all general mild steel applications.

#### **Austarc 13S, Classification E4113.**

A smooth running electrode with a soft arc, particularly suited to light sheetmetal and smooth mitre fillet welds.

#### **Austarc 16TC, Classification E4816.**

A low hydrogen electrode with good arc stability and out-of-position welding characteristics. This electrode is ideal for medium carbon steels, or steels of unknown analysis.

#### **Unicord**

A high tensile (50tsi), chromium nickel electrode specially formulated for joining all alloy steels and irons, and for tool and die maintenance.

### GTAW

Gas Tungsten Arc Welding is a welding process where the arc is struck between a non-consumable tungsten electrode and the work piece. A ceramic nozzle surrounds the tungsten electrode and directs a flow of inert gas, usually Argon, over the electrode and the weld zone. If filler metal is required, it is hand fed into the welding arc. The DC current of the VORTEX DX13 is suitable for welding most ferrous and non-ferrous metals, but is not suitable for welding Aluminium for which an AC machine is required.

## 2. RECEIVING

Check the equipment received against the shipping invoice to make sure the shipment is complete and undamaged. If any damage has occurred in transit, please immediately notify your supplier.

The VORTEX DX13 package contains:

- Vortex DX13 Inverter Power Source
- Shoulder Strap
- (This) Owners Manual

Optional additional items for VORTEX DX13:

- MMAW Welding Lead Kit - 5m..... AA53-0/5
- 150Amp TIG Torch Assembly ..... BE-17V-4M-R
- TIG Torch Adaptor ..... CKPCA2-4
- TIG Torch Twist Lock Connector ..... DIN25T
- Work Lead - 5m ..... AA53-1/5
- Extension Primary Lead, 15Amp - 10m..... AM259-0/10
- Gas Regulator and Flowgauge ..... HA801-AR

## 3. SPECIFICATIONS

Primary Voltage.....	240 Volts AC, +/- 10%, 50/60 Hz
Maximum Primary Demand .....	23 Amps
Rated Input Current.....	14 Amps
Electrical Efficiency .....	84%
Welding Current Range.....	5 - 130 Amps
Rated Output.....	130 Amps @ 25Volts, 35% Duty Cycle
Open Circuit Voltage .....	65 Volts DC
Dimensions.....	H: 195mm W: 111mm D: 280mm
Mass.....	4.8Kg

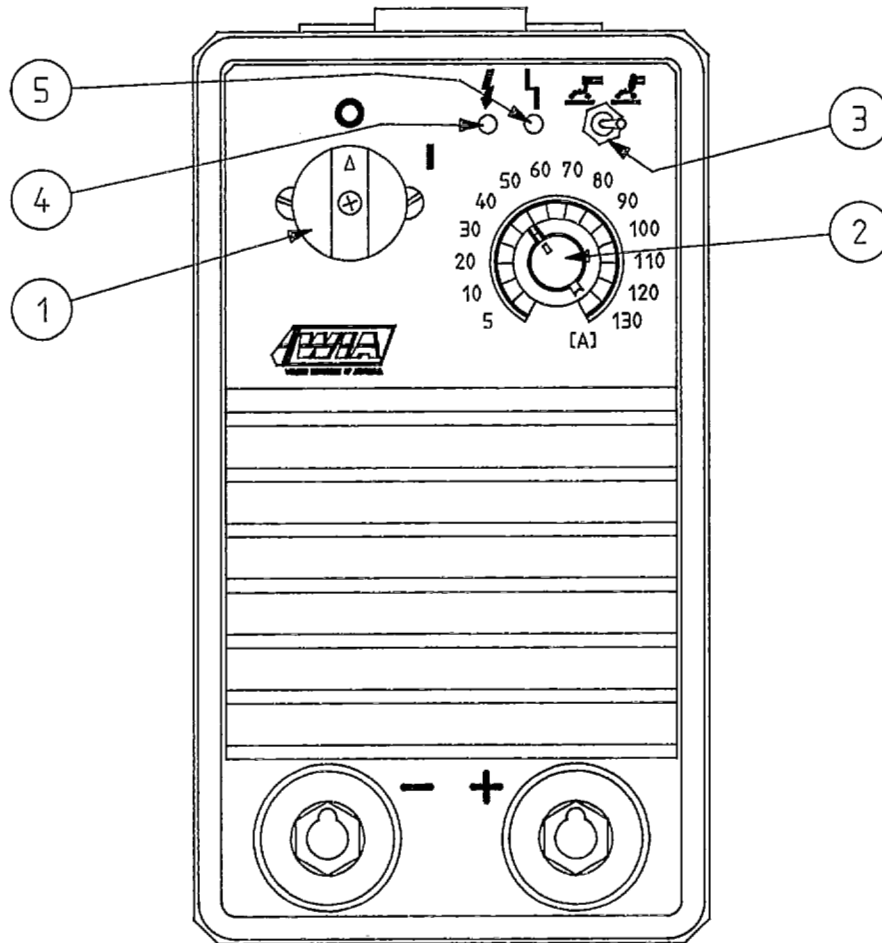
This power source is intended to be connected to a 15Amp mains power outlet.

### IMPORTANT NOTICE

**WARRANTY MAY BE VOIDED IF EQUIPMENT IS POWERED FROM AN ENGINE DRIVEN GENERATOR.**

This equipment may be damaged if it is powered from a low capacity engine driven generator. Generators less than 16kva may have inadequate voltage control in this application.

## 4. POWER SOURCE CONTROLS



**FIGURE 1. POWER SOURCE CONTROLS**

### 1. POWER ON/OFF SWITCH

In the OFF position, this switch isolates the power source from the mains power supply. Rotate the switch clockwise to energise the power source.

### 2. CURRENT CONTROL

This control sets the output current level of the power source within the range 5 - 130 Amps. Rotate the knob clockwise to increase the output current.

### 3. MMAW / GTAW MODE SWITCH

When set to the left, the switch selects welding output dynamic characteristics tailored for Metal Manual Arc Welding. When set to the right, the switch selects GTAW characteristics.

### 4. POWER ON INDICATOR

This yellow LED is illuminated when the machine is energised, that is when electrical mains power is connected to the welder, and the ON / OFF switch is set to ON.

### 5. OVER TEMPERATURE INDICATOR

This red LED is illuminated if any internal thermal protection devices have operated.

## 5. CONNECTION TO ELECTRICAL MAINS POWER SUPPLY

The VORTEX DX13 is supplied with a 3 metre, 15 Amp Heavy Duty (30/0.25) PVC mains power supply cable. This cable must only be connected to a correctly installed 15 Amp GPO (General Purpose Outlet). The plug and GPO are both identified by a wide Earth pin, which is intended to prevent the plug being inserted into a standard 10 Amp GPO. If it becomes necessary to replace the mains power supply cable, use only a cable with equivalent current rating.

The recommended Supply Fuse rating is 15 Amps. Due to peak current requirements, the electrical mains supply to welding machines is best protected by a fuse. If a circuit breaker is used, it should be of the motor start type.

If it is necessary to use an extension power supply cable, ensure that it is rated for a minimum of 15 Amps. Voltage drop which will occur over long lengths of cable will reduce the maximum welding current available from the equipment.

As noted previously, it is not recommended that the VORTEX DX13 be powered from small engine-driven generator sets due to the peaks of supply voltage which can occur with some equipment of this type. Excessive voltage peaks can damage the circuits of the welder.

## 6. MMAW WELDING

### A. CONNECTION FOR MMAW WELDING

It is important to select the electrode polarity in accordance with the manufacturers recommendations for that electrode. Most common electrodes are operated with the electrode at positive polarity, as illustrated in Figure 2.

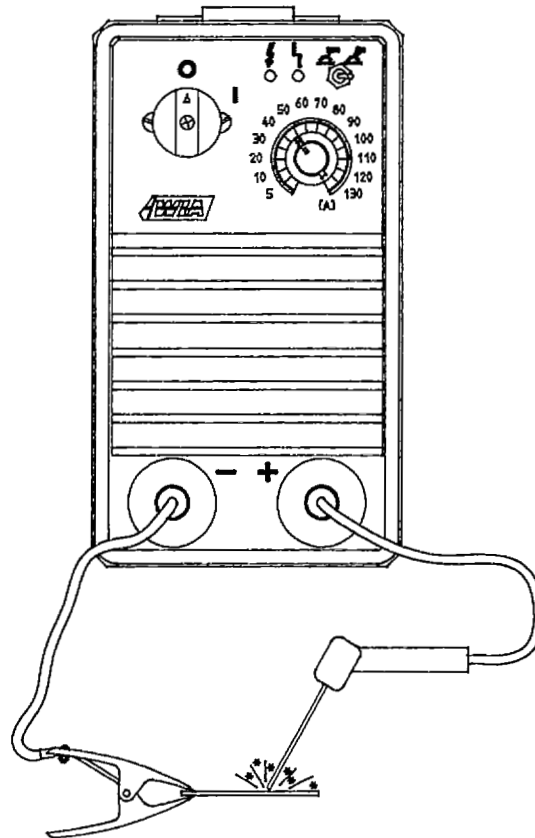


FIGURE 2. CONNECTIONS FOR MMAW, ELECTRODE POSITIVE

## B. MMAW OPERATION

Be certain that you are wearing suitable protective clothing, gloves etc. and that you are working in a non-hazardous area. If necessary, refer again to the SAFE PRACTICES section of this manual.

Connect the Work Clamp to the work piece. Place the desired electrode in the Electrode Holder. Select an appropriate welding current for the electrode diameter by setting the knob on the machine front panel. WIA AUSTARC electrodes will give the best results.

To strike the arc, drag the end of the electrode along the work piece as if striking a match. As the arc initiates, lift the electrode slightly away, aiming to establish an arc length of approximately 3mm.

As the electrode end is consumed, feed the electrode into the arc in order to maintain arc length. As a general rule, the arc should be held as short as possible while still giving stable burn off and good weld appearance. An arc which is too long cause an unwieldy flow of metal with a rough weld appearance and reduced penetration. An arc too short leads to a narrow weld deposit and "stuttery" arc characteristics, and the electrode is liable to freeze onto the work piece.

As the solidified weld deposit forms, move the end of the electrode slowly along the weld path, aiming to maintain a pool of molten weld metal behind the arc. Decreasing this rate of travel will result in a wider weld deposit, and similarly increasing it will narrow the weld deposit.

Always fill the crater which tends to form at the end of a weld deposit, by pausing momentarily before withdrawing the electrode to break the arc. Unfilled craters are a point of weakness, and can lead to weld cracking.

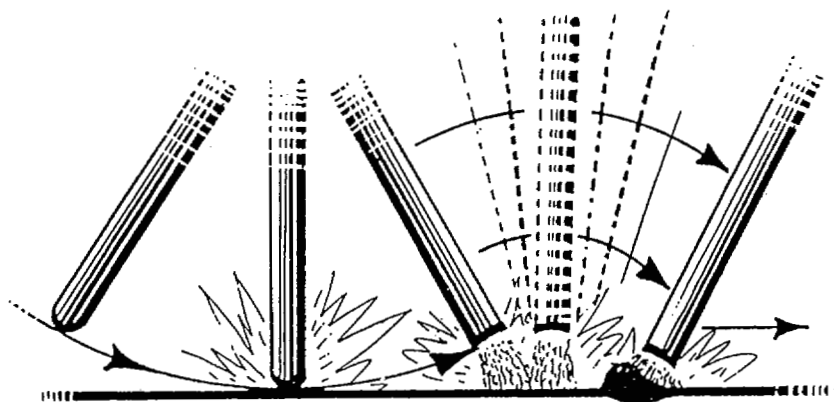


FIGURE 3. STRIKING THE ARC

## 7. GTAW WELDING

### A. CONNECTION FOR GTAW WELDING

For GTAW, the torch is connected electrode negative. Figure 3 illustrates the correct connection of the welding torch and gas supply. Welding grade Argon is the shielding gas most commonly used for DC GTAW welding.

Before initial use of the welding torch, allow gas to purge the torch and hoses for 5 minutes at approximately 10 litres/min. For welding purposes, the gas flow rate should be set in the range 2 - 5 litres/min.

Tungsten electrodes for DC GTAW should be 1 - 2% Thoriated. This type will provide the best arc initiation, arc stability and tip shape retention characteristics. Thoriated electrodes can be recognised by a red coded end. The tungsten electrode is ground to a point, with the grinding marks pointing towards the tip. For welding currents less than 20 amps, the included angle of the point should be 30°, for currents greater than 20 amps, the recommended angle is 60°. When set in the torch, the tungsten should protrude 6mm from the ceramic gas nozzle.

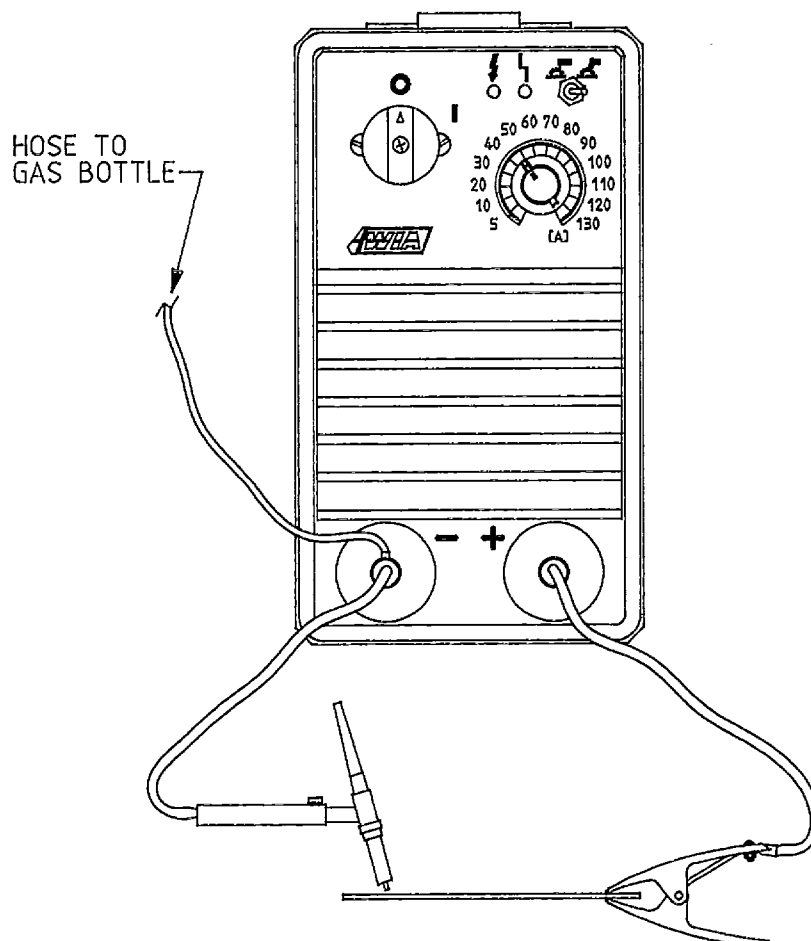


FIGURE 4. CABLE AND HOSE CONNECTIONS FOR GTAW



## B. GTAW OPERATION

To initiate the arc, the tungsten electrode should be touched onto the work piece, then lifted in a smooth movement to establish an arc length slightly larger than the diameter of the electrode. When the arc is stable, it can be transferred to the work piece.

Use of a copper striking plate is recommended to avoid electrode contamination. The electrode can also be contaminated by contact with the filler rod. A contaminated electrode produces an unstable arc.

## 8. GENERAL MAINTENANCE

*Before removing the machine cover, ENSURE that the unit is disconnected from the mains power supply. When the unit is energised LETHAL VOLTAGES are present on the electrical components enclosed.*

Care should be taken to prevent excessive build-up of dust and dirt within the welding power source. It is recommended that at regular intervals, according to the prevailing conditions, the machine covers be removed and any accumulated dust be removed by the use of dry, low pressure compressed air.

## 9. FAULT FINDING, NO WELDING CURRENT

Check that mains supply is available at the VORTEX DX13 power source, ie. that the fan is running and the POWER ON LED is lit. Check for continuity of the welding current circuit, ie. work lead, work clamp and electrode holder.

The VORTEX DX13 welding power source incorporates inbuilt protection devices which will trip if the unit is overloaded. In this event, the machine will not deliver welding current, and the red LED will be illuminated. If the thermal overload protection devices have been tripped, leave the machine energised with the fan running to achieve the maximum cooling rate.

If equipment failure is suspected, forward the unit to your nearest WIA Sales and Service branch, or a qualified service agent.

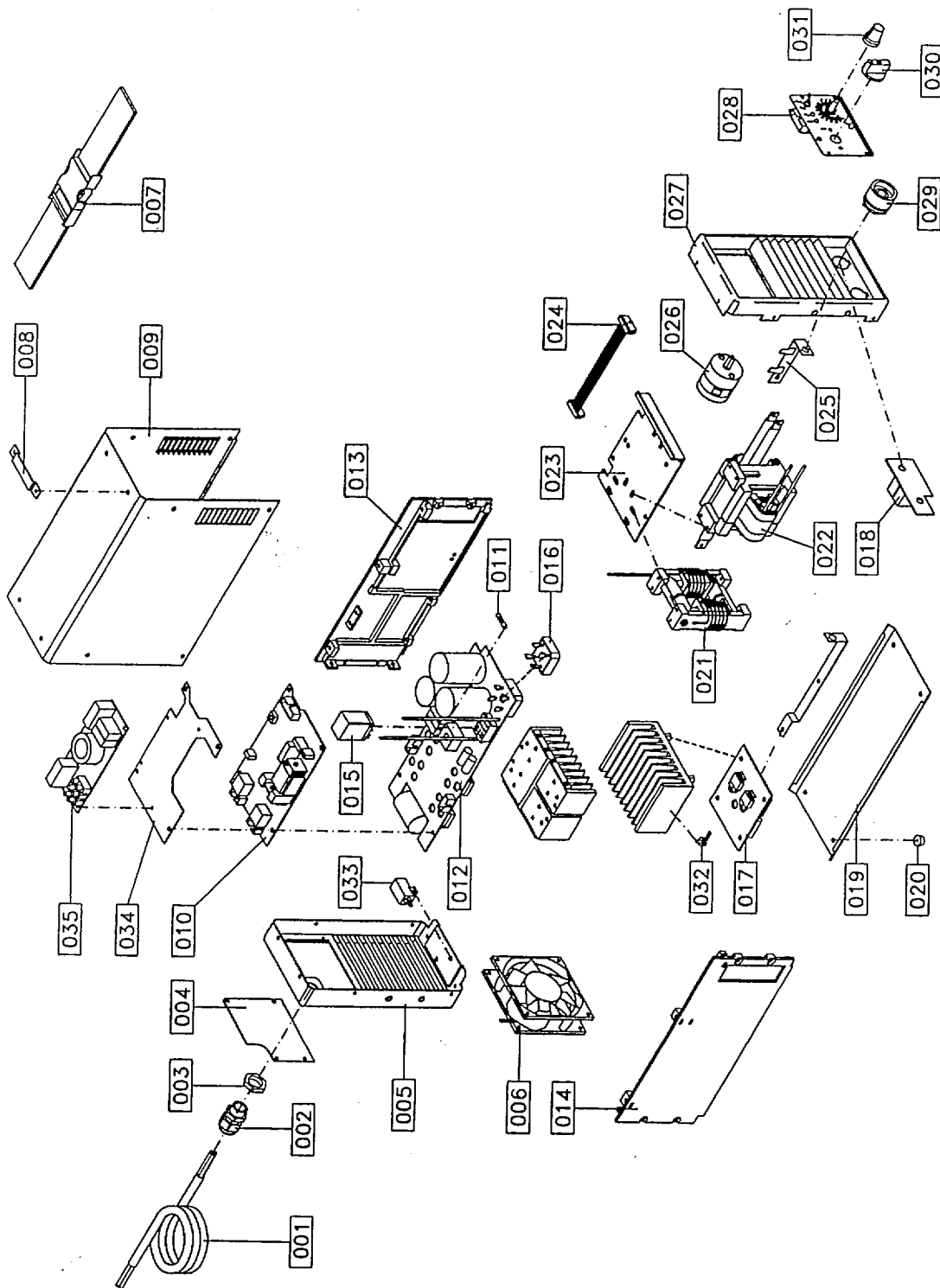


FIGURE 5. VORTEX DX13 PARTS DIAGRAM

**10. PARTS LISTS**

<b>Item #</b>	<b>Part #</b>	<b>Description</b>
001.....	MC66-0/8 .....	Supply Cable & Plug (15 Amp)
002.....	VR08.20.050 .....	Cable Clamp
003.....	VR08.20.051 .....	Nut for Cable Clamp
004.....	VR03.05.268 .....	Technical Specification Plate
005.....	VR01.05.215 .....	Back Panel
006.....	VR14.70.014 .....	Cooling Fan
007.....	VR21.06.002 .....	Strap Handle
008.....	VR01.11.045 .....	Strap Retainer
009.....	VR03.07.031 .....	Sheet Metal Cover
010.....	VR15.14.198 .....	Driver PCB
011.....	VR08.25.053 .....	Fuse
012.....	VR15.18.006 .....	FET Assembly PCB
013.....	VR06.37.072 .....	Left Plastic Panel
014.....	VR06.37.071 .....	Right Plastic Panel
015.....	VR09.09.020 .....	Relay
016.....	VR14.10.150 .....	Diode Bridge (Component of Item 012)
017.....	VR15.18.002 .....	Output Rectifier PCB
018.....	VR12.03.030 .....	Filter Capacitor Board
019.....	VR01.02.033 .....	Lower Cover
020.....	VR21.03.003 .....	Rubber Foot
021.....	VR05.04.206 .....	Primary Inductor
022.....	VR05.02.008 .....	Main Transformer
023.....	VR01.11.050 .....	Inductor Transformer Support
024.....	VR49.02.797 .....	Ribbon Cable Assembly
025.....	VR11.20.053 .....	Shunt
026.....	VR09.01.001 .....	Switch
027.....	VR01.04.247 .....	Front Panel
028.....	VR15.22.035 .....	Front Control Panel PCB and Assembly
029.....	VR10.13.001 .....	Output Socket
030.....	VR09.11.009 .....	Switch Knob
031.....	VR09.11.207 .....	Potentiometer Knob
032.....	VR09.07.004 .....	Thermal Cut-out
033.....	VR11.14.100 .....	Resistor 25W
034.....	VR01.14.170 .....	Filter Board Support
035.....	VR14.70.016 .....	Filter PCB

### 11. SERVICE INFORMATION

*NOTE that the following information is intended for use by Qualified Service Personnel. When the unit is energised LETHAL VOLTAGES are present on the electrical and electronic components. It is not intended that persons without suitable training and knowledge attempt to perform service tasks on the components of this welder.*

The electrical components of the equipment are shown in the circuit diagram below. The VORTEX DX13 is an inverter type design, where the mains supply is first rectified, filtered then chopped to a high frequency before being applied to the welding transformer. The output of this transformer is rectified to form the welding output of the machine.

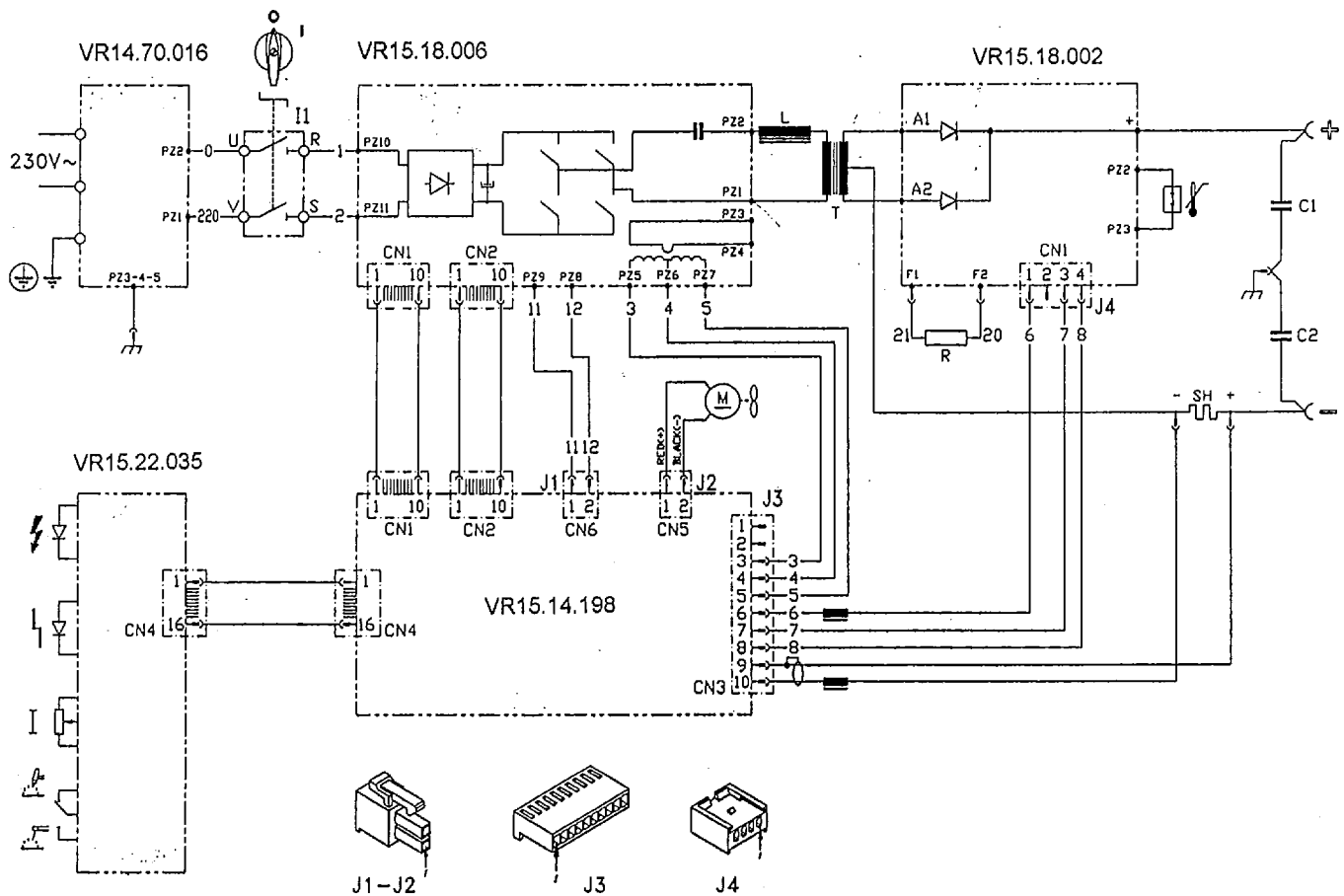


FIGURE 6. VORTEX DX13 CIRCUIT DIAGRAM

## 12. SAFE PRACTICES

These notes are provided in the interests of improving operator safety. They should be considered only as a basic guide to Safe Working Habits. A full list of Standards pertaining to industry is available from the Standards Association of Australia, also various State Electricity Authorities, Departments of Labour and Industry or Mines Department and other Local Health or Safety Inspection Authorities may have additional requirements. WTIA Technical Note TN7-98 also provides a comprehensive guide to safe practices in welding.

### EYE PROTECTION

NEVER LOOK AT AN ARC WITHOUT PROTECTION. Wear a full face helmet, with an appropriate shade filter lens protected by clear cover glass. This is a MUST for any arc process to protect the eyes from radiant energy and flying sparks etc.. Replace the cover glass when it is broken, pitted, or spattered.

#### Recommended shade filter lens.

Amps	TIG	MMAW	MIG	Pulsed MIG
0-100 .....	10 .....	9 .....	10 .....	12-13
100-150 .....	11 .....	10 .....	10 .....	12-13
150-200 .....	12 .....	10-11 .....	11-12 .....	12-13
200-300 .....	13 .....	11 .....	12-13 .....	12-13
300-400 .....	14 .....	12 .....	13 .....	14
400-500 .....	-- .....	13 .....	14 .....	14
500 + .....	-- .....	-- .....	14 .....	14

### BURN PROTECTION.

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. Burns resulting from gas-shielded arcs resemble acute sunburn, but can be more severe and painful.

Wear protective clothing - leather or heat resistant gloves, hat, and safety-toe boots. Button shirt collar and pocket flaps, and wear cuffless trousers to avoid entry of sparks and slag.

Avoid oily or greasy clothing. A spark may ignite them. Hot metal such as electrode stubs and work pieces should never be handled without gloves.

Ear plugs should be worn when welding in overhead positions 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.

**TOXIC FUME PREVENTION.**

Adequate ventilation with air is essential. Severe discomfort, illness or death can result from fumes, vapours, heat, or oxygen depletion that welding or cutting may produce. NEVER ventilate with oxygen.

Lead, cadmium, zinc, mercury, and beryllium bearing and similar 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 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 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 lung and eye irritating products. The ultra-violet (radiant) energy of the arc can also decompose trichlorethylene and perchlorethylene 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 trichlorethylene or perchlorethylene.

**FIRE AND EXPLOSION PREVENTION.**

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 operator. Sparks and slag can travel up to 10 metres from the arc.

Keep equipment clean and operable, free of oil, grease, and (in electrical parts) of metallic particles that can cause short circuits.

If combustibles are present in the work 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 can not be moved, move combustibles at least 10 metres 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.

A person acting as Fire Watcher must be standing by with suitable fire extinguishing equipment during and for some time after welding or cutting if;

- Combustibles (including building construction) are within 10 metres.
- Combustibles are further than 10 metres but can be ignited by sparks.
- Openings (concealed or visible) in floors or walls within 10 metres may 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.

Any tank or drum which has contained combustibles can produce flammable vapours when heated. Such a container must never be welded on or cut, unless it has first been cleaned as described in AS.1674-1974, the S.A.A. Cutting and Welding Safety Code. 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 as recommended in AS.1674-1974. Water-filling just below working level may substitute for inerting.

Hollow castings or containers must be vented before welding or cutting. They can explode. Never weld or cut where the air may contain flammable dust, gas, or liquid vapours.

### **SHOCK PREVENTION.**

Exposed conductors or other bare metal in the welding circuit, or ungrounded electrically alive equipment can fatally shock a person whose body becomes a conductor. Ensure that the machine is correctly connected and earthed. If unsure have machine installed by a qualified electrician. On mobile or portable equipment, regularly inspect condition of trailing power leads and connecting plugs. Repair or replace damaged leads.

Fully insulated electrode holders should be used. Do not use holders with protruding screws. Fully insulated lock-type connectors should be used to join welding cable lengths.

Terminals and other exposed parts of electrical units should have insulated knobs or covers secured before operation.