MUREX

Operating Manual

Transarc Tradesman DC 130

Please ensure that this Instruction Manual is made available to the user of the equipment.

£2:50

INTRODUCTION

Specially Designed Unit

The Transarc Tradesman is specially designed to run low Hydrogen, Stainless Steel, Cast Iron, Bronze and Aluminium electrodes.
This new product will prove particularly useful in the maintenance and repair workshops.

Good Performances

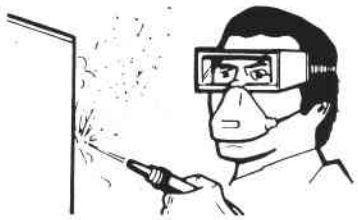
Despite its small size, the Transarc Tradesman is capable of handling electrodes up to 3.25mm (10 gauge) in size giving excellent welding performance even in the hands of a non-professional operator.
With the use of a scratch start kit the Tradesman can be used for TIG welding.

Light and Compact

The Transarc Tradesman weighs a mere 29Kg(64lb), thus making it extremely easy to transport.
With 450mm (17.3/4in.) as its largest diamension it will probably be the smallest welding unit in the workshop.

WARNING

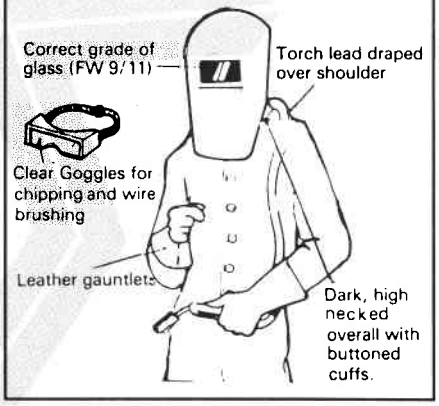
This welding equipment has been designed, manufactured and tested to the highest quality standards to ensure long and trouble free life. However, regular maintenance is an essential part of keeping the machine operating in a reliable and safe manner and your attention is drawn to any maintenance instructions that are contained in this manual.
In general, all welding equipment should be thoroughly inspected, tested and serviced at least annually. More frequent checking will be required when the equipment is heavily used.
Wear and tear, particularly in electro-mechanical and moving components, are gradual processes. Caught in time, repair costs are small and the benefits in performance, reliability and safety are significant. Left alone, they can put the equipment, and you, at risk.
Have this equipment regularly inspected and maintained by an approved service centre.



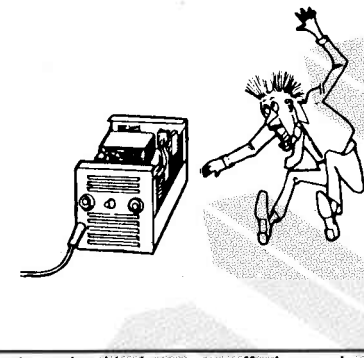
Note: *Use only DRY air.*

Wear goggles and mask when removing dust with an airline

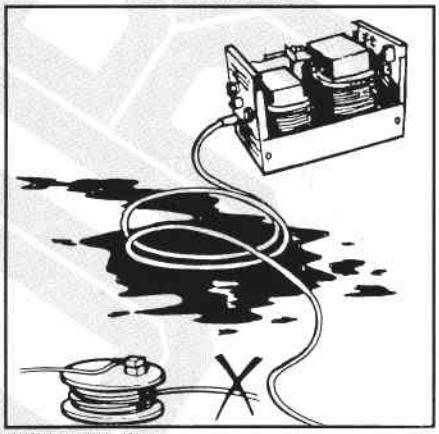
Call in the experts if you don't know what to do.



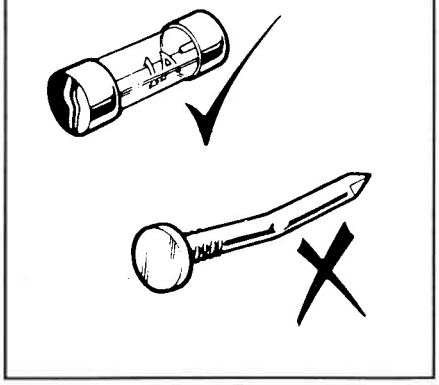
Dress correctly when welding and preparing the weld.



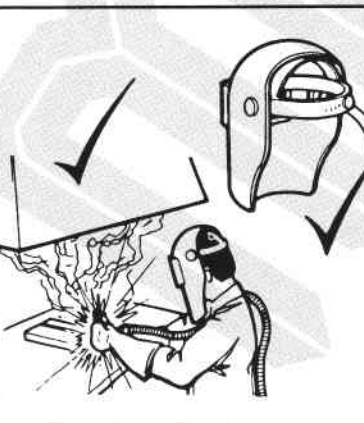
Don't work with the cover off. Leave it to the experts.



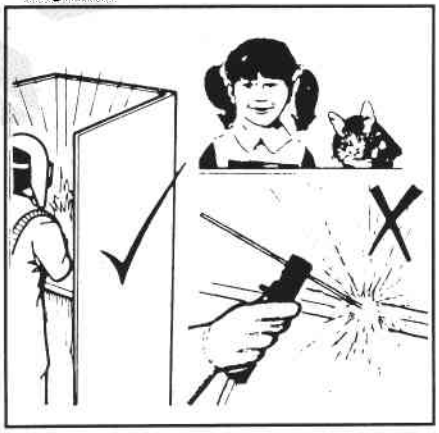
Don't allow leads to lie in oil, water or corrosive liquid or extend them with extension leads - fit a longer cable.



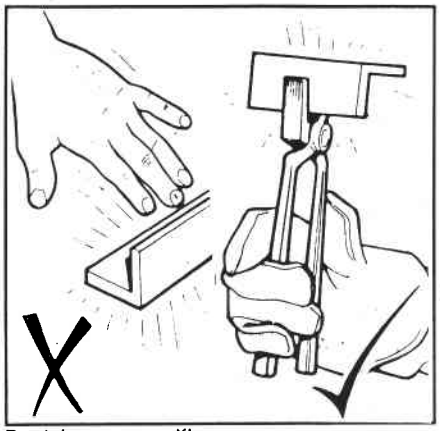
Don't replace a fuse with the wrong value (especially too high a value).



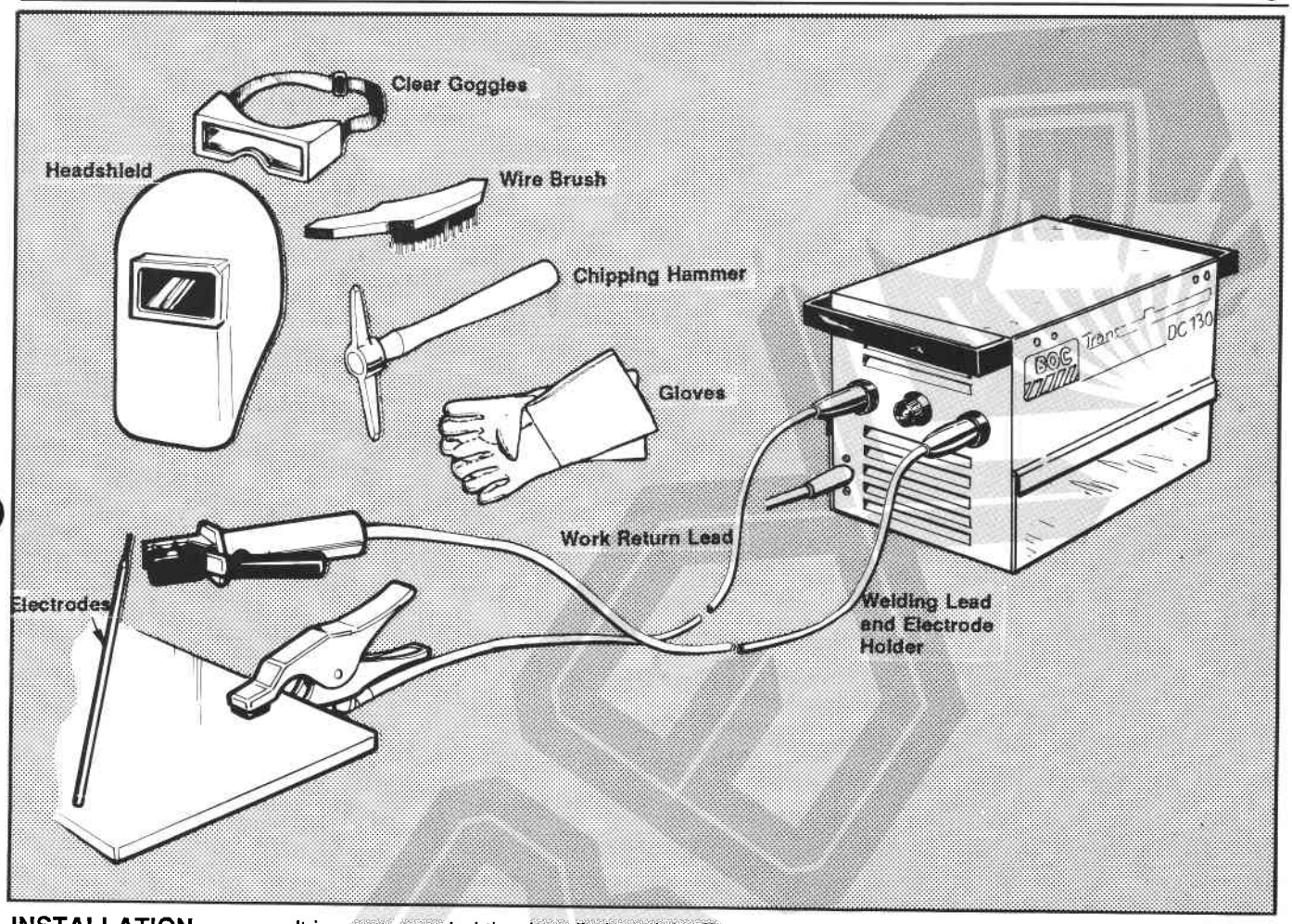
Ventilate the welding area to prevent a build-up of gas and fumes.



Wear your headshield (or face screen and screen the welding area.

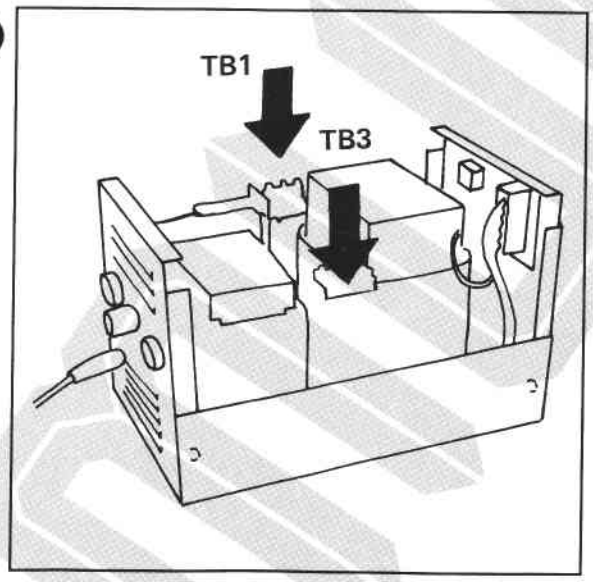


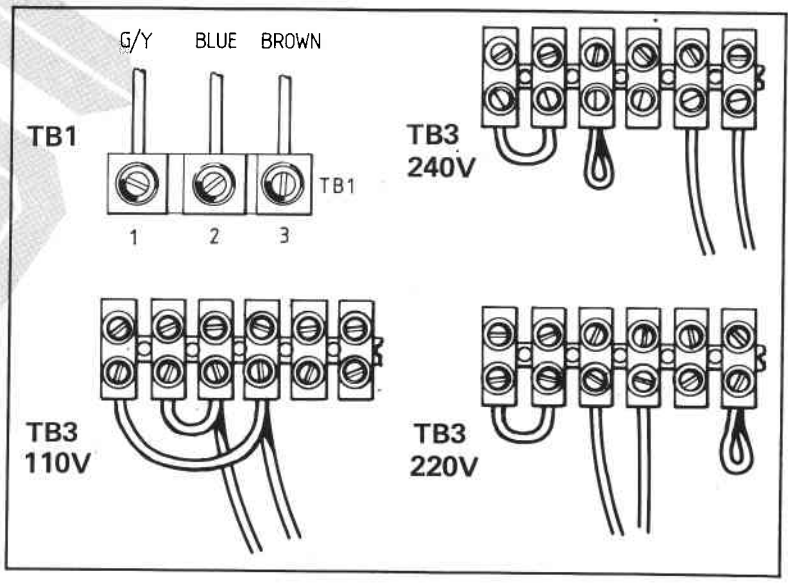
Don't burn yourself!
Wear gauntlets and use tongs.



INSTALLATION

It is recommended that installation of the Transarc Tradesman is undertaken only by a competant electrician or suitable trained person.

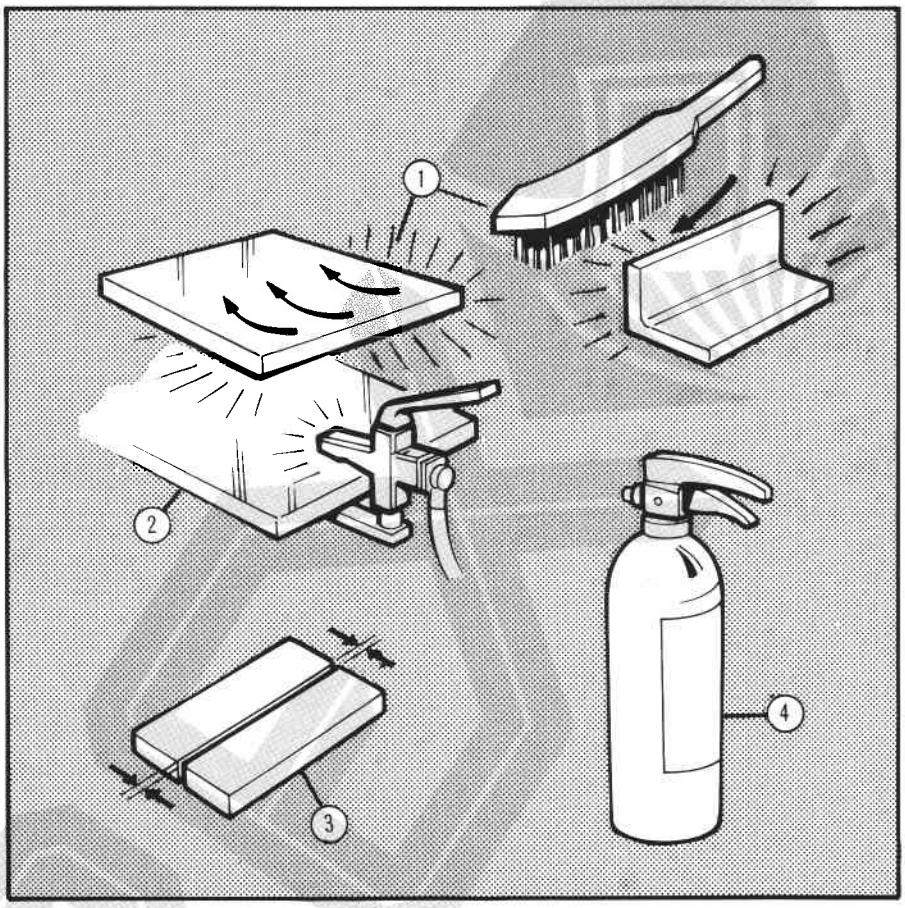




1. Remove the cover and locate TB1 and TB3.
2. Connect the mains cable to TB1.
3. On TB3 connect the two wires and links as shown.
4. Remove all inflammable material from the welding area.
5. Connect the welding leads as shown.

PREPARATION

Read again the safety notes on Page 2.



1. Connect the welding cables to the 'electrode work' terminals (as shown on page 3).

2. Fit an appropriate size electrode (see Manual Metal Arc 'Stick' ELECTRODE SECTION below).

3. Clean the material to be welded with a wire brush.

4. Clamp the work return cable to a clean area of the workpiece.

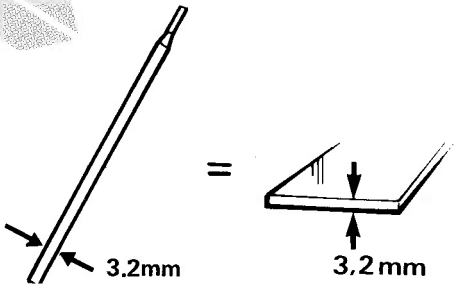
5. Keep the gap between pieces to be welded to a minimum.

6. Clear the welding area and check that a fire extinguisher is available.

MANUAL METAL ARC ('Stick') ELECTRODES

As a rough guide, select the electrode which is approximately the same size as the material thickness.

Start with a 2.5mm electrode (at 70-120A) for satisfactory results.



Electrode Type	dia. (mm)	a.c. (min ocv)	Materials
Zodian Universal or Satinex	2.5 to 6.3	ac (50v) dc +	Mild steel Medium tensile steels and mild steels
Fortrex 7018	2.5 to 6.0	ac (80v) dc +	Carbon and low alloy Mild steel and medium tensile steels
Ferex 7018LT	2.5 to 6.0	dc +/ - (- pre-ferred)	Medium tensile steels and mild steels
Nicrex E316L-16	2.0 to 5.0	ac (60v) dc +	Stainless Steel

Electrode Type	dia. (mm)	a.c. (min ocv)	Materials
Bronzoid 1	2.5-5.0	dc +	Bronzes, Brass & Copper
Armoid 1	2.5 to 6.0	ac (75) dc +	High tensile Stainless Steels Dissimilar metals
Cinex or Ferroloid 3	2.5 to 5 2.5 to 4	ac (80v) dc + ac (60v) dc -	Cast Iron-normal grades Cast Iron-high duty grades
Hardex 800	4.0 & 5.0	ac (70v) dc +	Hardfacing

This chart is given as a general guide to the MUREX electrodes. For more detailed information, contact your local MUREX branch.

WELDING TECHNIQUE

Whilst welding try to adopt a relaxed attitude.

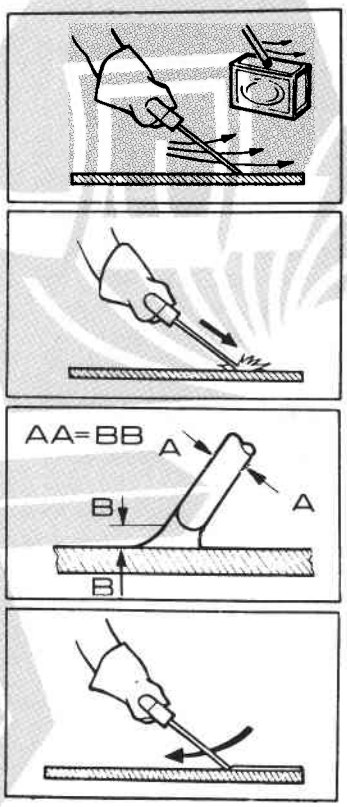
1. **Always** commence with a last minute check for safety and protection.
2. Set the welding current on the scale of the current control (See Table).
3. Hold the electrode away from the work, trailing the welding lead over the shoulder to reduce the weight on the hand doing the welding.
4. Keeping the electrode clear of any exposed metal surface, switch on the unit.
5. Position the electrode close to the point where welding is to commence, without actually touching the work.
6. Cover the eyes with a headscreen or handshield and warn bystanders.
7. a. Scrape the electrode on the work surface near the start point (as though striking a match). The arc should strike.

   b. 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.

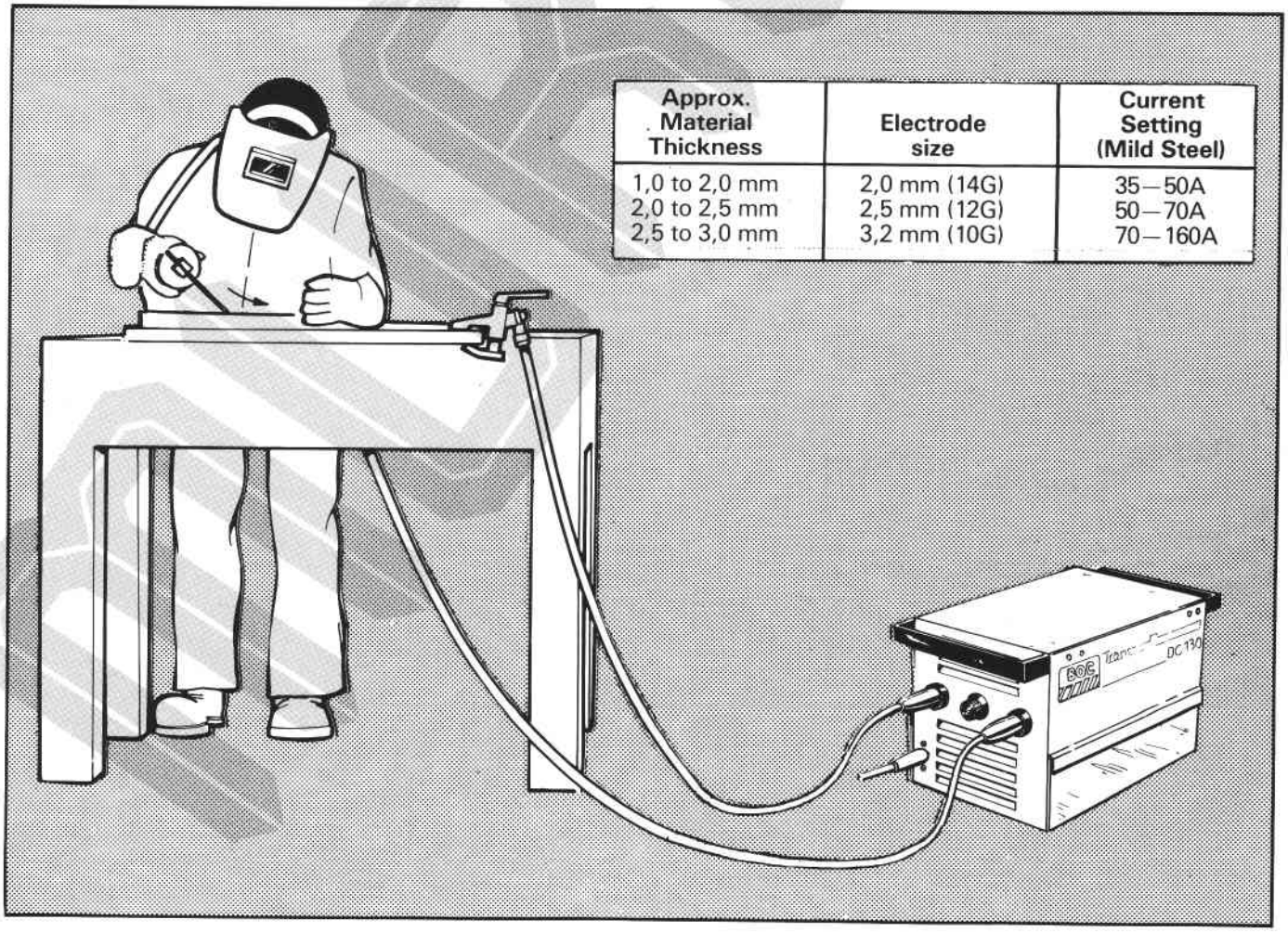
   c. Once the arc is successfully struck adjust the arc length to about the size of the electrode diameter.

   d. 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.



At the end of the weld, switch off the mains supply and allow the weld to cool.



Approx. Material Thickness	Electrode size	Current Setting (Mild Steel)
1,0 to 2,0 mm	2,0 mm (14G)	35—50A
2,0 to 2,5 mm	2,5 mm (12G)	50—70A
2,5 to 3,0 mm	3,2 mm (10G)	70—160A

TUNGSTEN INERT GAS WELDING TECHNIQUE

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

2. Plug the gas/power adaptor into the negative socket and twist it to the right (quarter turn) to lock it.

3. Connect the torch lead to the adaptor. Connect the work return lead to the positive socket (twist to lock). Clamp the work clamp to the cleaned part of the workpiece.

4. Using the current control knob set the welding current on the scale. (See Table).

5. Check that the electrode tip sticks out by 4-7mm and that it is ground as shown.

6. Fit the regulator and gas flow meter to the gas cylinder and, 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.

7. Turn on the torch gas valve (unscrew 1.1/2-2 full turns) to check the gas flow through the torch.

8. Switch on the *mains* ON/OFF switch.

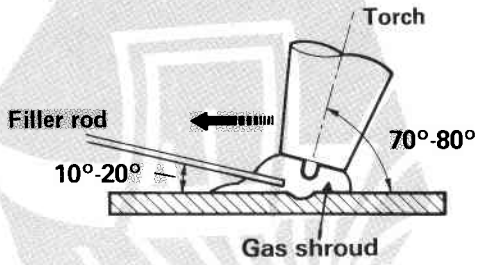
9. Adopt a good welding position and hold the torch and filler rod at the correct angles. Holding the rod and torch at these angles is necessary to ensure satisfactory results.

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

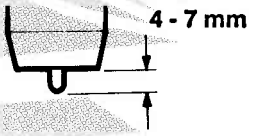
11. Strike the arc by scratching the tungsten electrode on the workpiece in the same manner as that described for manual metal arc. Improved striking will be obtained by striking the arc on a carbon block and then transferring the arc to the workpiece.

12. 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).

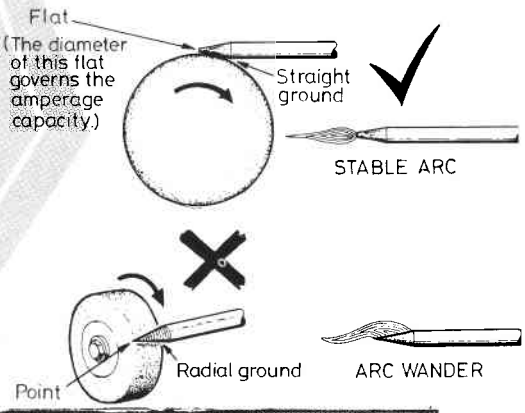
Torch and filler rod angles

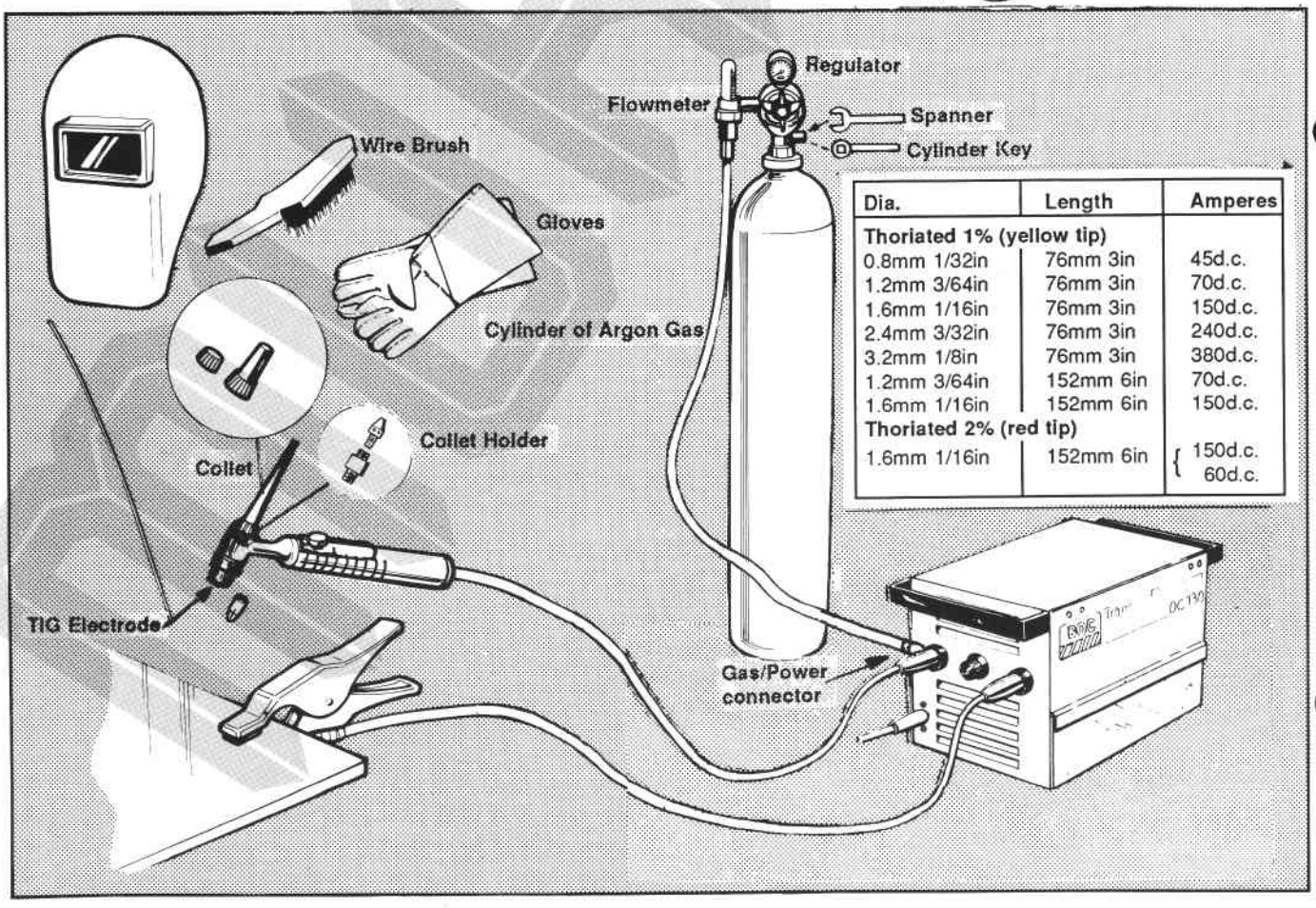


Electrode Stickout



Electrode preparation





Dia.	Length	Amperes
Thoriated 1% (yellow tip)		
0.8mm 1/32in	76mm 3in	45d.c.
1.2mm 3/64in	76mm 3in	70d.c.
1.6mm 1/16in	76mm 3in	150d.c.
2.4mm 3/32in	76mm 3in	240d.c.
3.2mm 1/8in	76mm 3in	380d.c.
1.2mm 3/64in	152mm 6in	70d.c.
1.6mm 1/16in	152mm 6in	150d.c.
Thoriated 2% (red tip)		
1.6mm 1/16in	152mm 6in	150d.c. 60d.c.

MAINTENANCE

Because of its design this unit requires little maintenance. For reasons of safety the following maintenance tasks are suggested:

Switch off and disconnect the unit from the mains supply before undertaking any maintenance tasks.

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).

ALWAYS CHECK THE WELDING AREA DAILY FOR POSSIBLE SAFETY HAZARDS. IF IN DOUBT CONSULT YOUR SAFETY OFFICER.

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. 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/cm$^{2)}$, (30lbs/in^2), and the air must be dry.

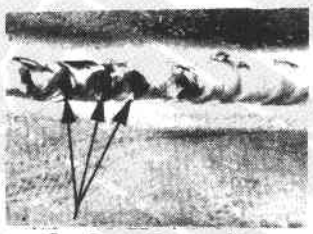
SUITABLE EYE AND MOUTH PROTECTION SHOULD BE WORN.

4. Replace the cover.

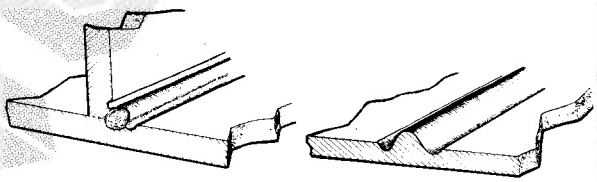
5. Reconnect the unit to the mains supply.

WELDING AND GENERAL FAULTS

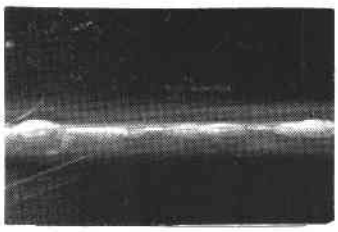
	Fault	Remedies
Surface porosity	a) Insufficient shielding gas (TIG) b) Bore of nozzle too small (TIG) c) Surplus degreasing agent (MMA and TIG) d) Arc too long (MMA and TIG) e) Incorrect torch or rod angle (TIG). f) Poor quality materials. (MMA and TIG)	a) Check shielding gas flow b) Fit larger ceramic nozzle. c) Remove degreasing agent and dry. d) Shorten the arc. e) Correct the angles (see TIG WELDING). f) Use better quality materials.
Undercut (MMA and TIG)	a) Incorrect welding technique. b) Current too high. c) Incorrect welding speed. d) Wrong electrode (MMA).	a) Correct rod handling. b) Reduce current setting. c) Increase hand travel speed. d) Change to correct size (type).
Lack of penetration (MMA and TIG)	a) Insufficient current. b) Welding too fast.	a) Increase current setting. b) Decrease hand travel speed
Cracking and Inclusions	These faults are difficult to detect without the use of specialised equipment. If cracking shows, seek the advice of a welding engineer.	
No welding output	a) Thermostat tripped b) Check mains input fuses.	a) Switch off and allow the unit to cool. Decrease welding duty cycle (welding on to off time) b) Replace with the same value fuse.



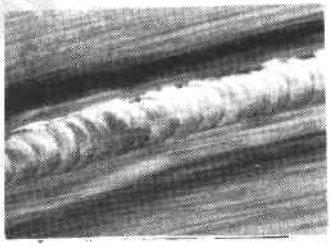
Surface Porosity



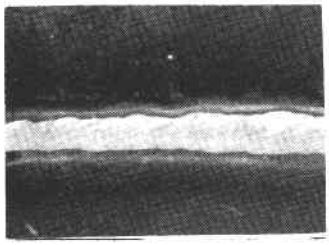
Undercut



Lack of penetration



Good weld TIG



Good penetration TIG

Transarc Tradesman DC 130

Technical Notes

CIRCUIT DESCRIPTION

(See also overleaf)

GENERAL

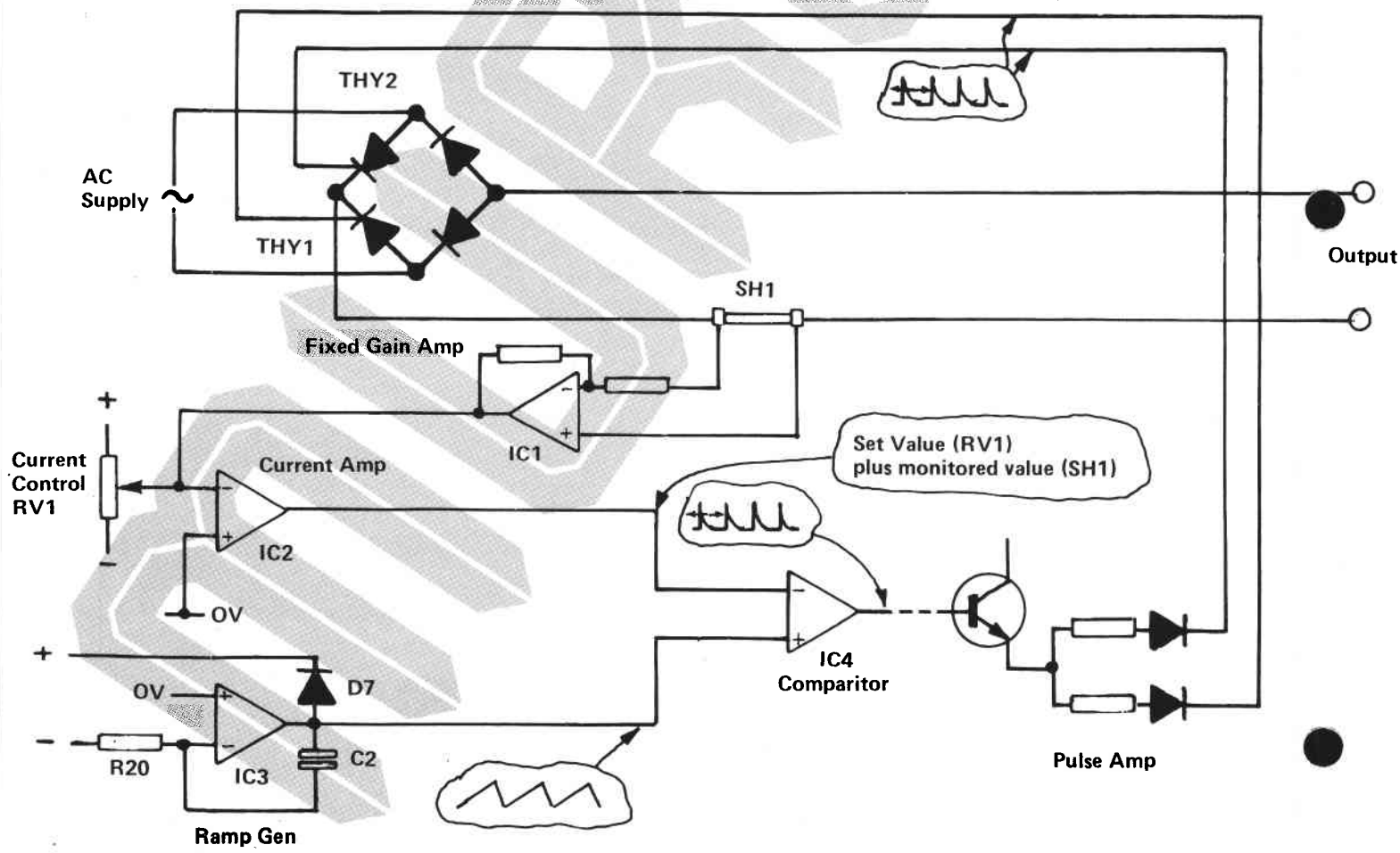
The welding output is derived from the half-controlled thyristor bridge THY1, THY2, D10 & D11. Control of thyristor firing angle results in variation of welding output current.

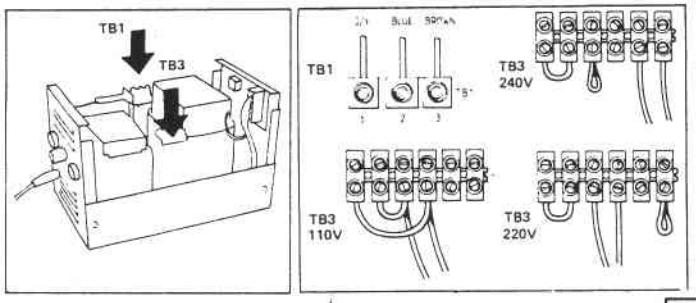
The control circuits are supplied by full-wave rectifier MR1 and associated components R22, D9, C4, ZD1, ZD2, C5 & C6.

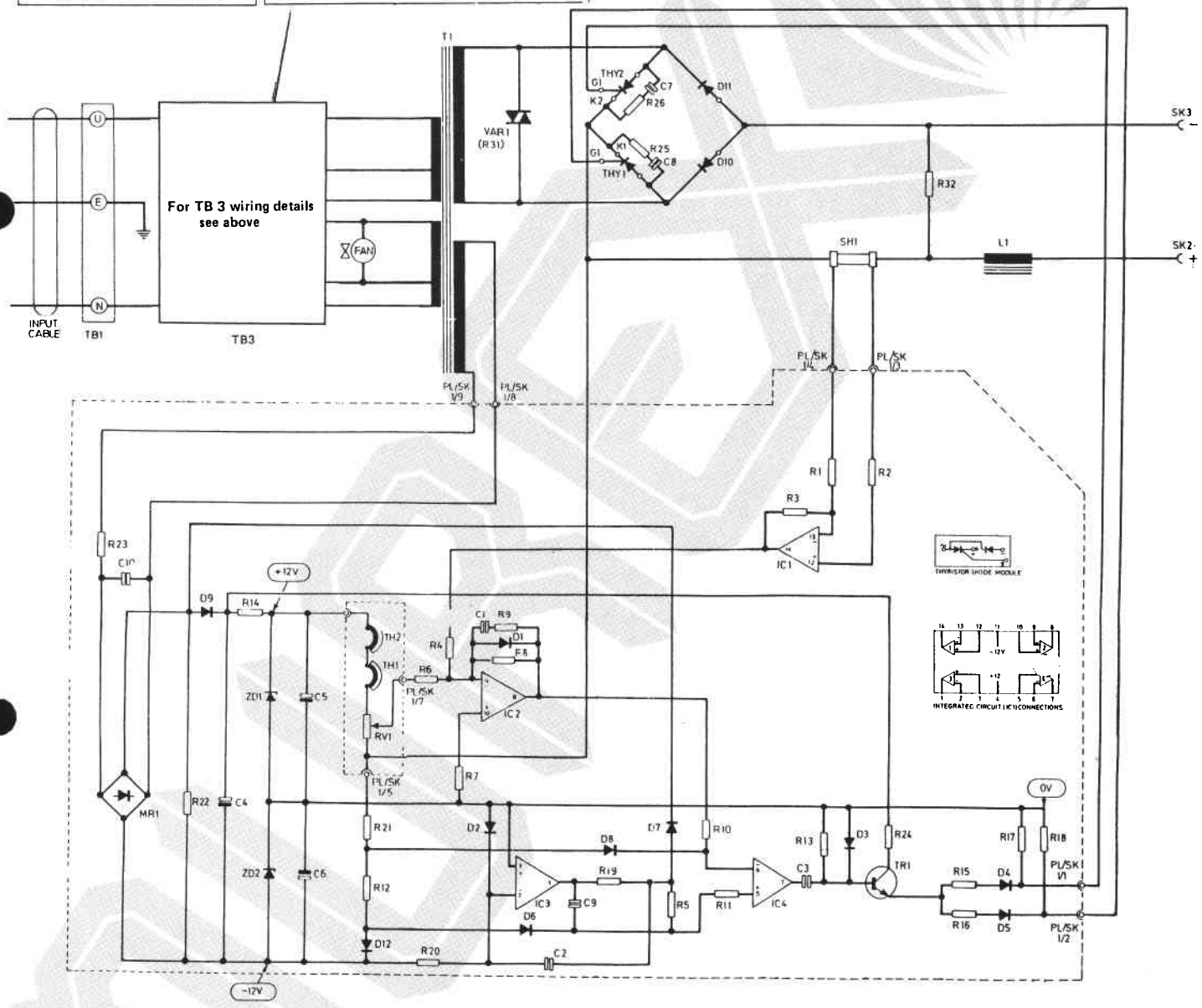
IC3 received a mains synchronising supply via D7. The remaining circuits are supplied from the smoothed d.c. output across ZD1/ZD2 & C5/C4.

A value of welding current is set on RV1 (front panel).

Shunt SH1 'monitors' the level of output current and the control circuits compare the output with that set on the current control knob RV1. The difference between the set and monitored outputs adjusts the firing angle of THY1/TH2 to the correct value.







CURRENT CONTROL

The control circuitry may be conveniently described in five sub-circuits:

(i) Shunt Amplifier (SH1, IC1)
(ii) Current Amplifier circuit (RV1, IC2)
(iii) Ramp Generator (IC3)
(iv) Comparator (IC4)
(v) Pulse Amplifier and Thyristor control.

(i) **Shunt Amplifier** – SH1 'monitors' the output current and applies an input to pins 12 and 13 of IC1 proportional to the current being drawn. Amplifier gain is fixed by the ratio R3:R1. An increase in output current results in a negative going output from pin 14 of IC1.

(ii) **Current Amplifier** – This is a virtual earth summing amplifier comprising of IC2, R4, R6, R8, R9, C1 and D1. R7 is connected to earth. The value set on RV1 is compared with the current feedback from SH1 (via R4, IC1) and the resultant proportional (negative going) output is applied to the inverting input of comparator IC4. Closed loop stability is provided by C1 and R9.

(iii) **Ramp Generator** – Comprises IC3, C2, R20, R19, R5, D2 & D6. A smoothed 12V –ve is applied to the inverting input (pin 2) of IC3 via R20 and C2 begins to charge, providing a positive going ramp at pin 5 of IC4.

At the end of the mains half cycle (zero crossover point) C2 discharges via C7 and the ramp is reset to approximately 12V –ve.

(iv) **Comparator** – This comparator consisting of IC4, R11 and R10, compares the outputs from the current amplifier IC2 (via R10) and the ramp generator IC3 (via R11).

The phase angle of the pulse appearing at pin 7 of IC4 will be varied by the amplitude of the potential applied to pin 6 of IC4. Hence any variation of current control by RV1 or feedback from SH1 with change the phase angle of pulses applied to the base amplifier TR1.

(v) **Pulse Amplifier and Thyristor Control** – TR1, amplifies the firing pulses and drives the thyristor gates via R15/D4 and R16/D5 respectively. Variation of the phase angle of the amplified pulses results in a change in thyristor conduction angle and hence a change in output current level.