Tradestig DC 145
Technical Notes

Technical Specification

		MMA	TIG
Output			
Open Circuit Voltage		42V	62V
Current Range		30-130A	10-145A continuous
Rating	20% Duty	130A	145A
	60% Duty	75A	80A
	100% Duty	60A	65A
Gas Post Purge		-	3 secs
Striking System		-	Lift arc
Thermal Protection		Standard	
Input			
Mains Voltage		220/240V	110V
Frequency		50Hz	50z
Phases		1	1
Input Current	20% Duty	30A	61A
	60% Duty	18A	37A
	100% Duty	14A	28A
Recommended Fuse (slow blow)		13A	30A

Length	450mm (incl. Handles)
Width	204mm
Height	370mm
Weight	34Kg Nett
Standard	ISO R700
Insulation Class	H
Protection Class	IP22

Circuit Description

Main Welding Circuit
The mains input is connected to TB1. Links on TB3 select the appropriate primary winding of T1 for 110Va.c. or 220Va.c. The rectified d.c. output across SK2/SK3 is derived from the half-controlled bridge of THY1 THY2, D10 and D11. The firing angle, and hence the value of output current is governed by the current control circuitry (see below.)

Arc Initiation Circuit (Top compartment)
D10 and D11, together with D3 and D4 form a full wave bridge rectifier feeding parallel 'high ripple' capacitors C1 and C2. Hence C1 and C2 are charged to approximately 60Vd.c. (main secondary AC=42V). Resistor R4 acts as a discharge at 'power off'.
When the torch switch TS is pressed, CR1, is energised by the 42Va.c. on pins 3 & 4. At this time the pilot current, approximately 5A, is fed to the load, the value being determined principally by resistor R5-R8 and the load (arc) voltage.

Arc Initiation (TIG Mode)
1. The tungsten is placed in contact with the work.

2. The torch switch is depressed energising CR1 from the 42Va.c. main secondary with current being limited by R9.

3. CR1a closes energising CR3 via R3, and hence the gas valve (GV). The gas valve is supplied from the main 42Va.c. secondary.
Note: *When CR1a closes, C3 is rapidly charged to approximately 60V a.c. current limiting resistor R2.*

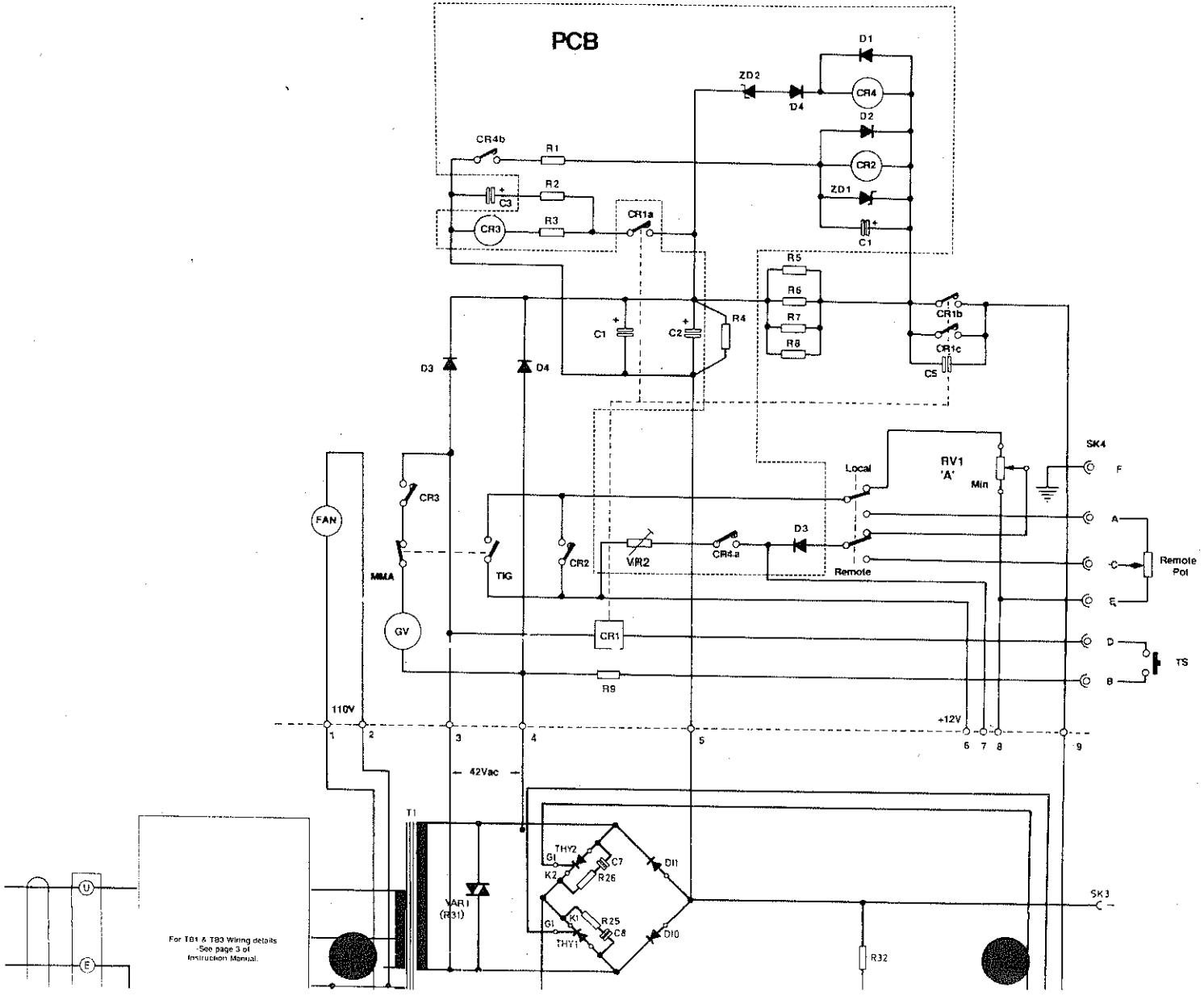
4. CR1b and c also close allowing pilot current to flow around the main welding circuit. Note that if the Tungsten is not in contact with the work no current will flow.

5. CR4 monitors the voltage drop across pilot current setting resistors R5-R8, and hence **pilot current flows.** CR4 will only energise via Z1 **if and only if** pilot current flows (guaranteed by ZD2) CR4 will energise.

6. CR4a contacts close connecting VR2 between the 12V reference on the main thyristor control circuit (TH1/TH2) the main reference input (R6/IC2). This changes the main thyristor phase angle, raising the current flow between tungsten and work to approximately 10Amps. Signal diode D3 blocks the loading effect of RV1 on the main reference input.

7. CR4b contacts now close connecting sensing relay CR2 (in series with limiting resistor R1) effectively between tungsten and work. Note, the tungsten is still in contact with the work and hence 'O' volts exist across CR2 at this instant.

8. The torch is now lifted, drawing a pilot arc of approximately 6-8A. The arc voltage rises immediately to >10V, energising relay CR2. (Capacitor C1 is included to slightly delay CR2 energising



9. CR2 contacts close[illegible]ecting the main 12V reference to the top of RV1 hence a[illegible]g main thyristor/welding current at a value set by RV1.

Welding Commences

10. When the torch switch is released CR1b and c contacts immediately open reducing the resistive pilot current, through R5-R8, to zero. Capacitor C5 snubs the relay contacts.

11. Relay CR4 de-energises and in turn relay CR2, shutting off main welding current. CR3, energising the gas valve which remains held-on until capacitor C3 discharges, approximately 5 seconds after torch switch release.

Welding and Post Purge Stops.

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 level 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.