

## CIRCUIT DESCRIPTION

### EXTERNAL CONNECTIONS TO PCB

42V a.c. from the power source is applied to pins 1 & 2 via input socket SK1 pins A & F.

The torch switch TS connects +24V d.c. from pin 14 on the PCB edge connector to pins 15 or 17 via the 2/4 stroke switch.

The gas purge button closes the circuit to provide 42V to the gas valve GV via pins A and F.

The power source contactor is switched by SK1 pin C.

### WIRE FEED SPEED CONTROL

#### Motor Control

The 42V a.c. supply is connected across bridge circuit V4/S2, V3/S1 to power the motor.

The motor draws power from the supply, the quantity governed by the firing angle of thyristors S1 and S2.

The circuit uses both armature voltage and current feedback control to maintain the preset speed.

At this stage, note that when S3 conducts via R48, the motor is shunted by S3 and effectively 'braked'.

#### Wire feed Speed Reference Level

12V d.c. is applied to series resistor chain R18, RV1, P3. Note that the lower end of the resistor chain is connected not directly to PCB ground, but via motor current measuring resistor RM. Hence the reference voltage at the input to IC3b is not only dependant on the setting of RV1, but also on the average of armature current - increased current creating a more positive reference.

When V9 (brake) releases the reference at the input to IC3b, the reference voltage ramps up (C12 charges via R41, RV1, R18) giving a controlled ramp acceleration to the speed reference.

Armature feedback voltage (via P1, R19) is compared with the reference level at IC3b output provides the threshold input level to IC3c (firing angle comparator).

#### Pulse Generator - For Waveforms see circuit diagram

The full wave rectified signal is applied to the base of T2 - Waveform A. The action of T2/C2/R13 then produces a sawtooth voltage - Waveform B. This is then applied to the inverting input of IC3c.

IC3c compares the falling sawtooth with the level on its non-inverting input. The resultant rectangular waveform (C) which has positive going transition coincident with the intersection of the ramp and the level on its non-inverting input is used to gate S1 and S2 via IC2 (photocoupled triac).

Thyristors S1 and S2 are fired 'early' or 'late' in time, dependant on the reference level set on RV1 plus the armature voltage and armature current feedback.

#### Inching

Pressing the inching button (across pins 20 and 3) grounds the base circuit of T1 causing it to release the dynamic brake.

### 2 WAY AND 4 WAY LATCHING

Under non-operating conditions T4 is off, IC3d output is at 0 volt and T1 conducting.

With T1 conducting, S3 is turned on and the braking/inhibiting circuit is activated (motor, reference voltage and pulsing output shunted). IC1 output (pin 15 Q1) is set low.

### 2 Way (unlatched) Operation

1. Torch switch (TS) pressed.
  - (a) 24 volts applied to Pin 17 of PCB turning on T4, grounding the inhibit signal.
  - (b) This releases the brake and reference circuits, wire feed now commences.
  - (c) IC3d now switches positive energising phototriacs IC4, IC5.
  - (d) Power triacs TK1 & TK2 turn on energising the gas valve and welding contactor.

### WELDING COMMENCES

2. Torch Switch Released.
  - (a) Removal of 24V from pin 17 of PCB causes T4 to turn off.
  - (b) T1 turns on applying the motor brake.
  - (c) After the burn-back time set by C7 in parallel with the burn-back timer potentiometer P2, IC3d switches de-activating the phototriacs IC4 & 5 and hence turning off the gas supply and welding contactor via Triacs TK1 & TK2.

### 4 Way (Latched) Operation

1. Torch Switch Pressed:
  - (a) 24V applied to pin 15 of PCB causing IC1 pin 15 (Q output) to go high. T3 is also turned on inhibiting T4 from turning on.
  - (b) IC4 is energised directly, turning on the gas supply.
2. Torch Switch Released.
  - (a) Removal of 24V from pin 15 turns off T3 and hence T4 turns on supplied from IC1 pin 15.
  - (b) Operation is now as explained in '2 Way (unlatched) Operation Section 1b, c, & d.'

### WELDING NOW COMMENCES

3. Torch Switch Pressed:
  - (a) Application of 24V to PCB pin 15 turns on T3.
  - (b) T4 turns off applying the dynamic brake via T1 and turning off the contactor after the burn-back time.
  - (c) IC4 is held on, supplied directly from 15, hence the gas supply is maintained.
4. Torch Switch Released:

+24V removed from pin 15 hence IC1 pin 15 goes low and the gas supply turns off.

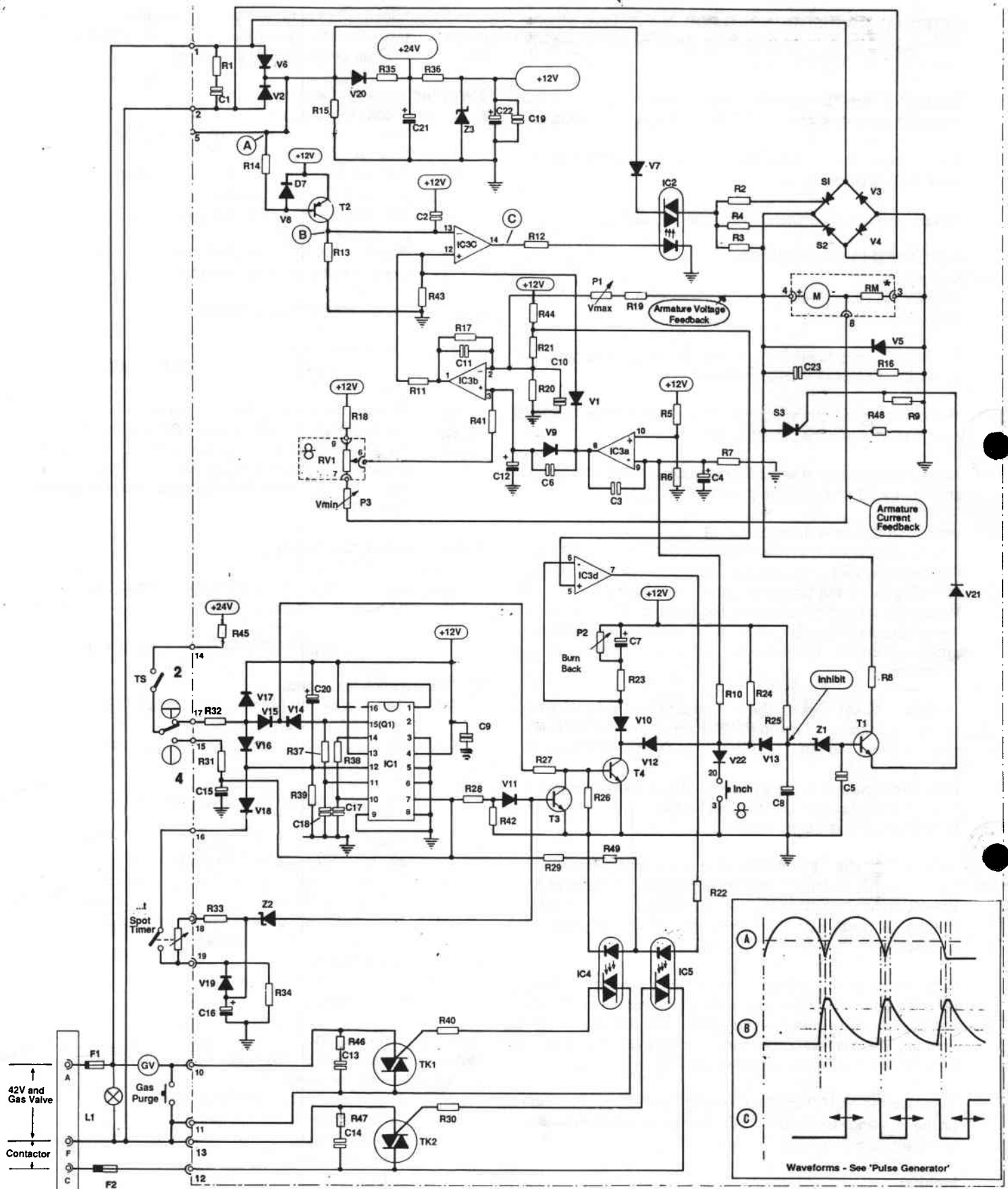
### Spot Timer Operation

**Note:** only usable in 2 stroke (unlatched) mode.

1. Torch Switch Released:
  - (a) 24V applied to pin 17 of PCB turning on T4.
  - (b) T4 in turn energises the gas solenoid and contactor and removes the motor brake/inhibit circuit (as previously described).

### WELDING COMMENCES

- (c) Capacitor C16 commences charging via Timer Control.
  - (d) When threshold voltage reached T3 turns on inhibiting T4 and hence welding ceases.
2. Torch Switch Released:
  - (a) Capacitor C16 discharged via R34 and V19.



\* RM = 500mm of 0.5mm<sup>2</sup> wire

Pt.No. 1413842  
Type W122E



