TRANSTIG AC/DC 250HF

CIRCUIT DESCRIPTION

MMA MODE OF OPERATION:

MMA/TIG switch set to MMA, Local/Remote switch set to local.

12Vac Ov 12Vac Auxiliary voltage supplies are available from the Main Transformer, connections P6-A, B, C on the SCR PCB. Plus and minus 12 Vdc supplies are now available to power all the control circuits on both the SCR and Logic PCB's.

12Vac is now applied via point AC1 on the SCR PCB to zero crossing detector IC2 (pins 12, 13, 14) producing a squarewave output at pin 14, this signal is used to synchronise thyristor firing via D13, Q4 & D14, Q5, and reset the ramps as explained below.

The ramp waveform is produced by the operation of R39. Q2 & C35 and is reset by the operation of the squarewave from IC2 pin 14 and the operation of transistor Q1, this ramp waveform is applied to firing angle comparator IC2 pin 5.

Current Control:

With the TIG/MMA switch in MMA position 24Vac is now applied to the Logic - PCB via the thermal interlocks to connections P4-1 & P4-2. This energises opto IC2 grounding P4-9 which is connected to P3-9 on the SCR - PCB switching off transistor Q3 (inhibit) which was grounding the signal from the firing angle comparator, IC2 (pins 5, 6, 7) the thyristors can now be fired, via Q6, OI1 & OI2.

A signal from the Current Control Potentiometer (note: remote current control (if fitted) is a function of the front panel potentiometer) is applied to IC2 pin 10 resulting in a variable voltage available at pin 6 of the firing angle comparator. When the resultant squarewave at IC2 pin 7 is positive transistor Q6 will be energised operating either opto thyristor OI1 or OI2 (dependant on whether Q4 or Q5 are energised) in turn firing SCR1 or 2.

Current Feedback:

This is achieved via shunt (SH) and the precision rectifier circuit, this producing a negative voltage at both FB(-)A and FB(-)B. This signal is summed together with the ref signal causing the output from IC2 pin 7 to go more positive causing the thyristors to be fired later in their respective half cycles.

Arc Force Control:

This potentiometer connected to J1-1 & J1-2 on the SCR PCB, varies the amount of current feedback summed with the ref signal, thus changing the slope of the machine. Switch SW2 shorts out the effect of the arc force potentiometer. (This should be set in the off (open circuit) position)

TIG MODE OF OPERATION:

TIG/MMA switch set to TIG position.

Current Control:

Closing the Torch Switch in the Tig mode has the same effect as selecting MMA, as the Torch Switch is in parallel with the MMA switch contact. Opto IC2 on the Logic PCB is energised, current control is therefore as explained in the MMA mode.

Balance Control:

Note: With this potentiometer in the 0 position the output is balanced, moving the potentiometer toward the 10 position increases the negative half cycle.

With the Tig switch closed 12Vac is applied to the Balance Control Potentiometer, the output of this being applied to the reference summing point J1-2 on the SCR PCB. The resultant signal being applied to zero crossing detector IC2 pin 2. The output at pin 1 will be modified, and when applied to the firing angle comparator, the intersection with the ramp will now be earlier in the negative half cycle thus firing this thyristor earlier, and later in the positive half cycle, thus firing this thyristor later.

HIGH FREQUENCY

Start Position:

With the Opto IC2 energised, IC3 pin 12 is at OV therefore IC3 pin 10 is now low energising transistor Q1 and hence opto IC4 and IC1 (Opto IC4 controls the Gas Solenoid and will be covered later). With opto IC1 energised current flows via R30, HFS (Start), R1, BR1, IC1, BR1, to energise TR1 which in turn energises relay HFC, the contact on HFC now applies 115V to the HF transformer (HFTR) and High Frequency is now present.

When the arc is struck the open circuit voltage drops switching off Opto IC5, transistor Q2 is now switched on by-passing IC1 causing triac TR1 to turn off de-energising relay HFC and hence the High Frequency.

Continuous Position:

Relay HFC is now energised via the HF switch, therefore when the arc is struck the drop in open circuit voltage has no effect on the HF circuit and HF is continuous.

GAS OPERATION

There is no Pre Flow Gas available, the gas valve is energised at the same time as Power/HF as follows:-

> When the Torch Switch is pressed Opto IC2 on the Logic PCB is energised which energises Opto's IC4 & IC1 as explained in the HF operation.

With opto IC4 energised current flows via 470Ω 2W resistor across the Gas Solenoid, HFS, R18, BR3, IC4, BR3 then energises Triac TR2, voltage is now applied via a contact on the HF switch (this providing HF has been selected) to the Gas Valve.

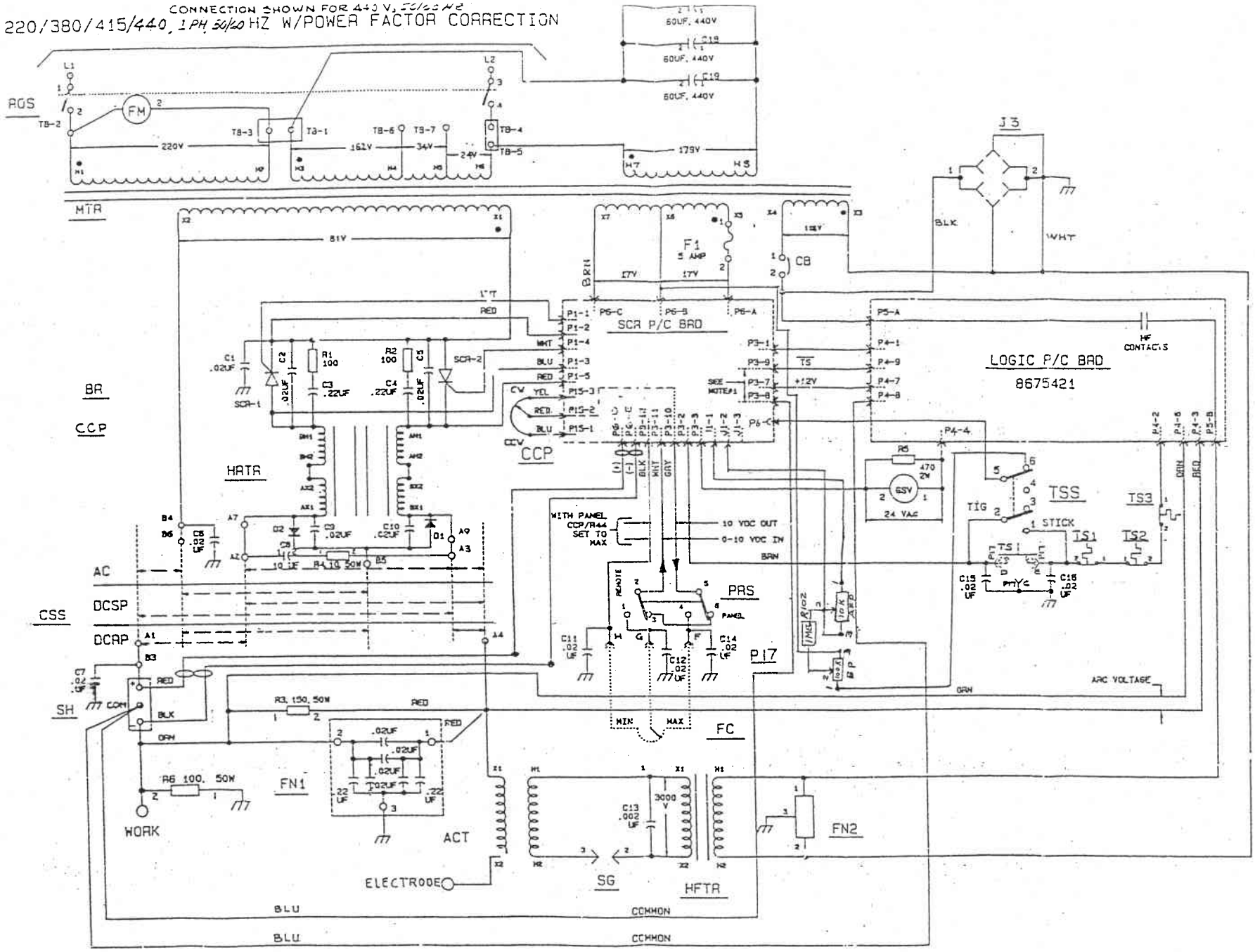
Post Flow Gas:

Torch switch is released.

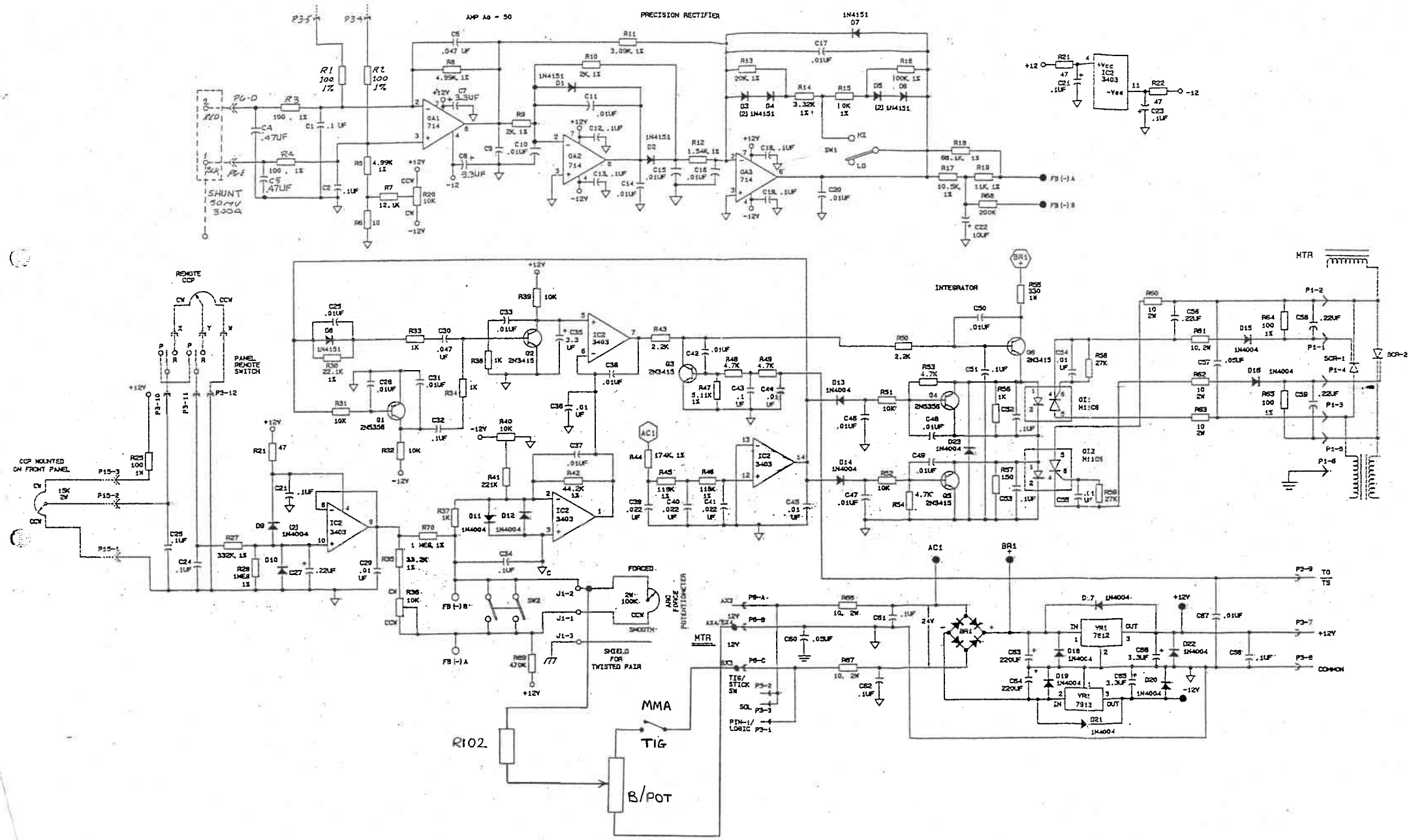
1/ Opto IC2 on the Logic PCB is de-energised, P4-9/P3-9 are no longer grounded and the thyristor inhibit is now on. Power is no longer available.

2/ Relay HFC is de-energised so HF is no longer available.

3/ With the Opto IC2 de-energised the output of IC3 pin 11 goes low, however the input to IC3 pin 8 will remain high ensuring Pin 10 is low and Q1, IC4 & IC1 (if continuous HF selected) remain energised until the Post Flow Time as elapsed as controlled by capacitor C11, R8 and the Post Flow Potentiometer PFP, no HF will be present however because of 2 above.



CIRCUIT DIAGRAM TRANSTIG AC/DC 250HF



SCR CONTROL PCB PART NO. - 1415083