

**MUREX Sabre-arc 25i/PT-50**  
**Air Plasma Cutting Equipment**

**SERVICE INSTRUCTIONS**

**General**

The Sabre-arc 25i is an inverter based air plasma cutter that operates from a 240V 1 phase supply. For most applications using a 13A plug and fuse. Its cutting current range is 15-28A, note at 28A output the primary current is around 22A. Open circuit voltage is around 230Vdc. Maximum cut thickness is 10mm of mild steel (6mm aluminium).

The 25i is fitted with the Murex PT-50 plasma torch, note that it does not have pilot arc and uses HF type arc initiation. The safety system utilises an air **flow** sensor inside the 25i power source in combination with the valve in the PT-50 torch head. If the heatshield is removed from the torch to access the cutting tip, electrode etc, the air valve in the torch head shuts off air flow. The flow switch in the 25i will not now close and no output is available if the torch switch is accidentally operated. A 2 second air preflow is inbuilt when the torch switch is closed, note this is overridden if air is already flowing. The recommended air pressure setting is 80psi.

When the 25i is first switched on the air will immediately flow for approximately 15 seconds (the post flow time) to purge any moisture or dirt out of the system. A pushbutton on the 25i front panel enables the air to be turned on at any time to check the flow rate etc. A green LED indicates the flow switch is operated. A yellow LED will indicate an overtemperature situation inside the 25i and output will be inhibited until the unit has cooled. Make sure the rear panel fan is running properly.

**Overall Circuit Arrangement see Fig. 1**

The 25i uses 3 printed circuit board assemblies:

- ① The main inverter PCB, electrically very similar to that in the 141i & AC/DC 161i.
- ② The HF generator/Air valve PCB, identical to that in the Tradestig Dual 151i unit.
- ③ The front panel mounted logic/control PCB specific to the Sabre-arc 25i. This receives inputs from the torch switch, flow switch, aircheck pushbutton, current control potentiometer and open circuit/arc voltage etc and provides the correct control sequencing and interlocks.

## **Important Circuit Details see Fig. 2**

The main inverter PCB ❶ rectifies the incoming 240V mains and feeds this to a capacitor bank C3 via softstart circuit comprising relay RL1 and resistors R1/R2. RL1 contacts close roughly ½ second after switch on, shorting out R1/R2. The dc voltage across BR2 is roughly 320Vdc. An auxiliary transformer T2 on the PCB generates 18Vac which is rectified and smoothed creating an unregulated +24Vdc rail. This powers the various circuits on the main inverter, logic/control and HF/GV PCBs, see below.

On the main inverter PCB ❶ the +24Vdc unregulated rail is used to generate +21Vdc and +5Vdc regulated supplies note that the 5V rail is also fed to the logic/control PCB ❷ where it is used for various purposes. The closed loop current control is built into the main inverter PCB. Current feedback being generated by a small current transformer in the primary inverter circuit. The main inverter PCB also carries the main high frequency transformer, secondary rectifiers and output inductor. Its open circuit output voltage (when connected in the Sabre-arc 25i) is around 230Vdc - note this is limited by a voltage control system on the logic/control PCB ❷.

Thermal overload protection is provided by a PTC resistor mounted on the secondary rectifier heatsink. In an overtemperature situation the main inverter is inhibited and a signal sent out to light the yellow LED on the logic/control PCB.

Contact control, enabling or disabling the main inverter, is via a logic signal from the logic/control PCB to the main inverter PCB (CNI-CN4 pin 6). The current reference, up to 5Vdc, is input into the main inverter PCB at CN4 pin 5.

The HF/GV PCB ❸ generates the necessary HF and controls the air solenoid valve. +12V logic signals from the logic/control PCB ❷ energise RL1 and/or RL2 to enable the valve and HF generator circuitry, note these are powered directly by 240V from the mains supply. The HF output from this PCB forms a single turn primary of the HF coupling transformer in the negative output to the plasma torch electrode.

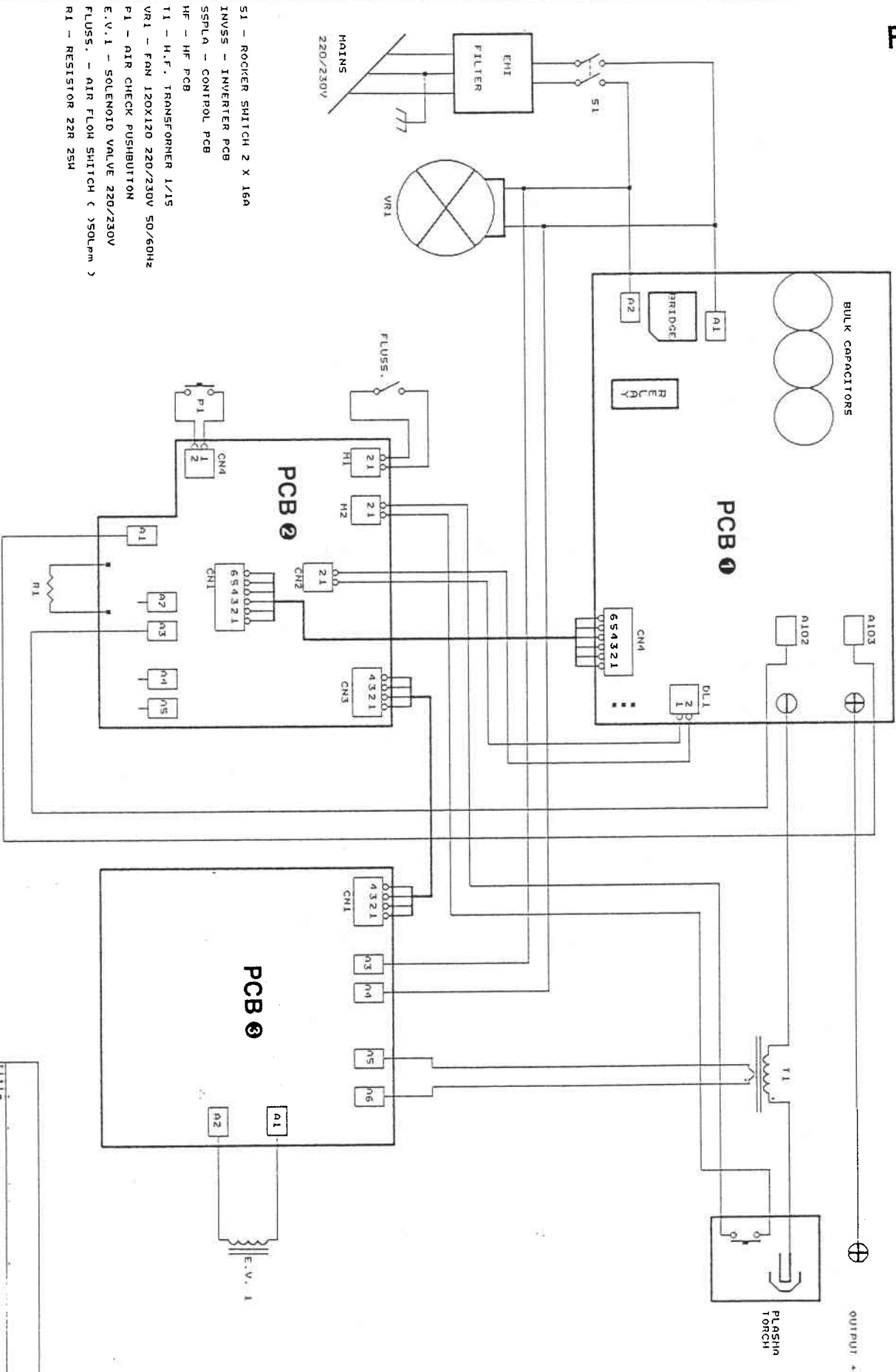
The logic/control PCB ❷ controls the required sequencing and interlocks. OCV/arc voltage (measured at the output of the main inverter PCB ❶) is used to both enable/disable the HF generator and to limit the OCV of the main inverter to around 230Vdc. Operating the air check pushbutton switch energises the air valve and, at the same time, disables cutting output power. The air flow switch prevents cutting power from enabling if no air flows, a green LED is illuminated if the flow switch is operated. Note if the green LED is on and yet no air is flowing, do not use the unit before the fault has been found (? flow switch stuck on).

### **WARNING**

DO NOT DISCONNECT THE LOGIC/CONTROL PCB TO MAIN INVERTER PCB WHILST THE UNIT IS POWERED. DANGEROUSLY HIGH VOLTAGES MAY RESULT AT THE OUTPUT

Fig 1

SABRE ARC 251



- S1 - ROCKER SWITCH 2 X 16A
- INVS5 - INVERTER PCB
- 5SP1A - CONTROL PCB
- HF - HF PCB
- T1 - H.F. TRANSFORMER 1/15
- VR1 - FAN 120X120 220/230V 50/60HZ
- P1 - AIR CHECK PUSHBUTTON
- E.V.1 - SOLENOID VALVE 220/230V
- FLUSS. - AIR FLOW SWITCH ( SOLENOID )
- R1 - RESISTOR 22R 25W

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Fig 2

