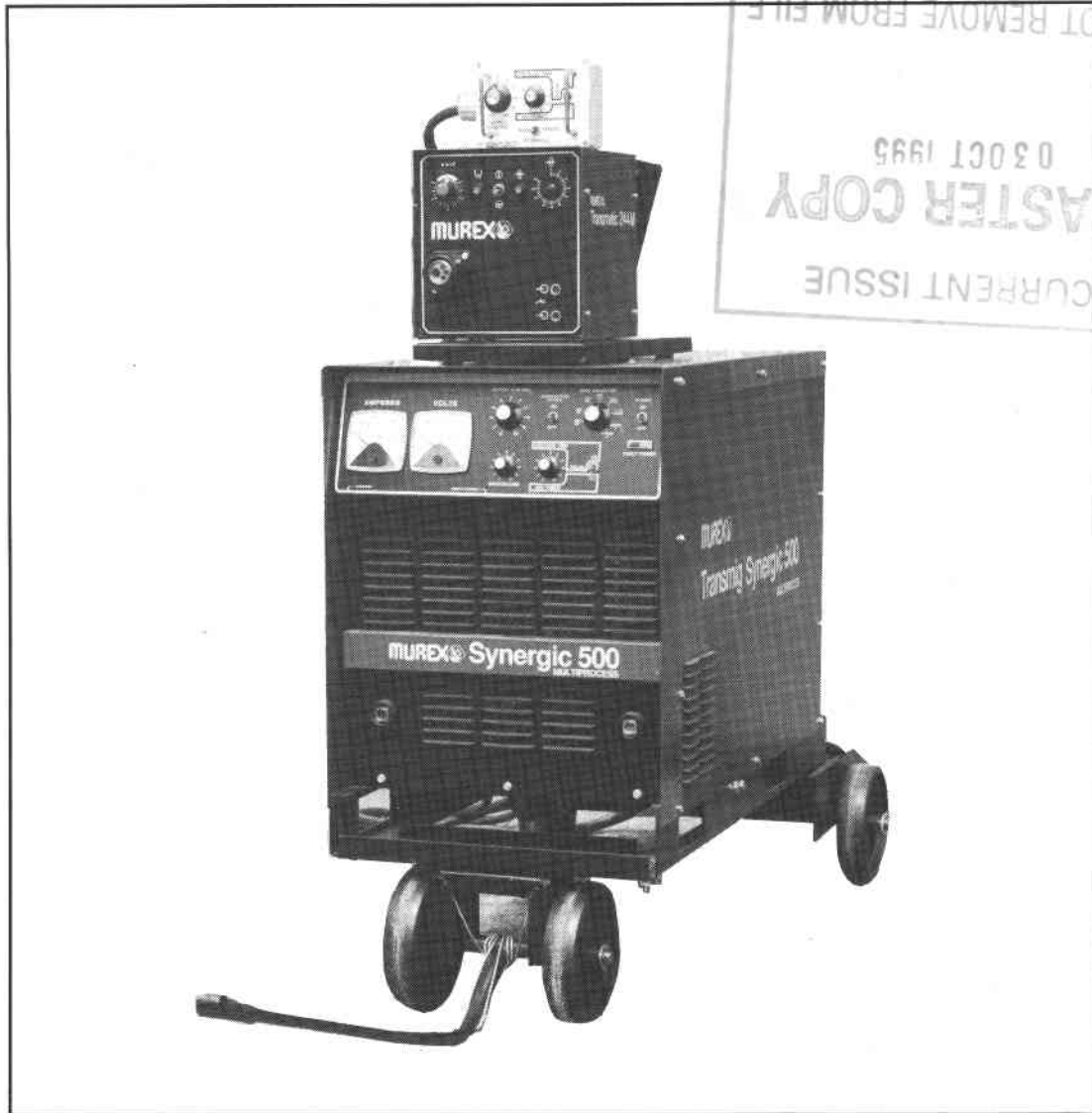




# Operating Manual

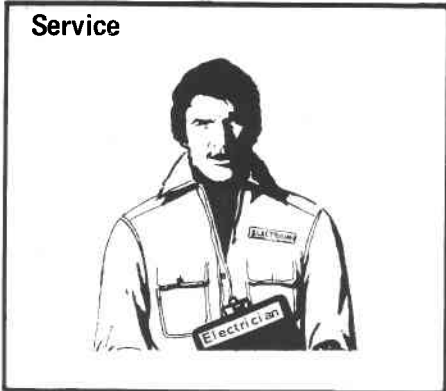
## Transmig Synergic 500 MULTI PROCESS



**Please ensure that this manual is made available to the person operating this equipment**

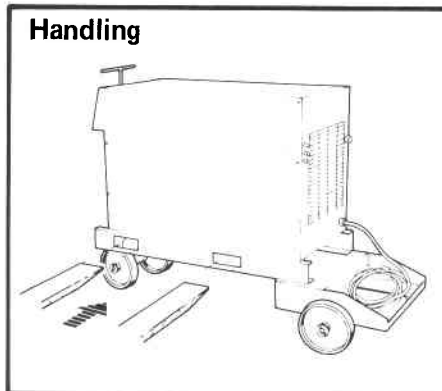
£1.50

**SAFETY** Operators of Electric arc welding equipment must always be aware of the inherent risks involved in the arc welding process. Your attention is therefore drawn to the Safety Leaflets available from the Welding Institute, particularly Publications 236 and 237.



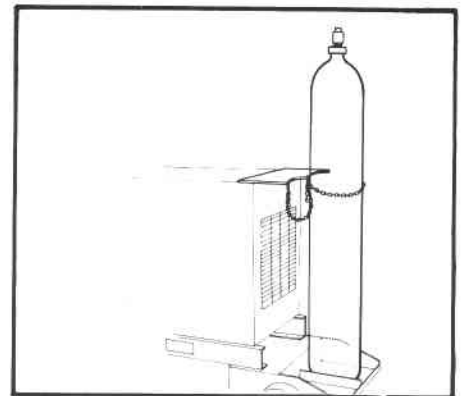
**Service**

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

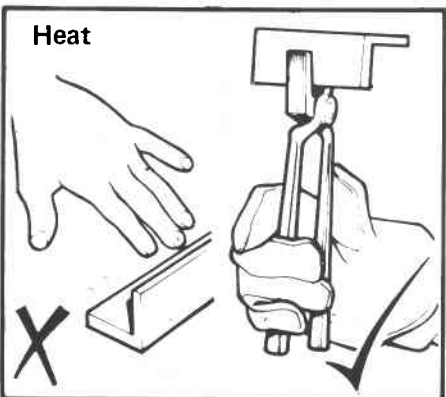


**Handling**

Lift the unit correctly. Use correct size forklift.

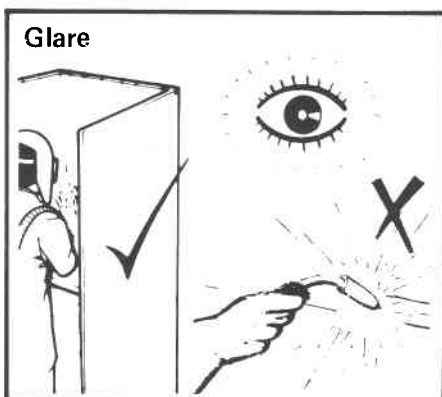


Secure the cylinder in position using the chain provided.



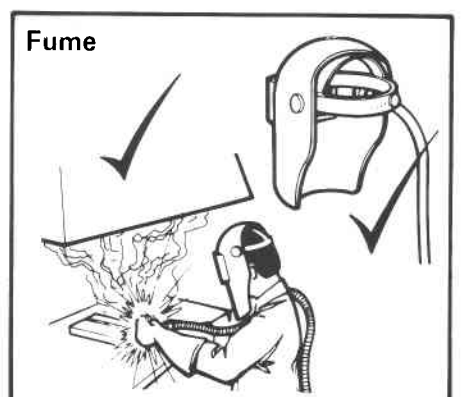
**Heat**

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



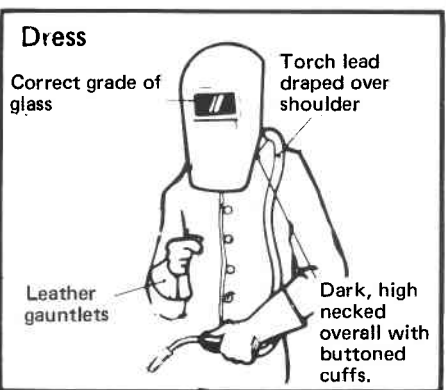
**Glare**

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



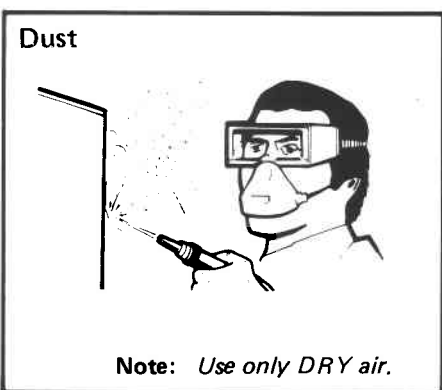
**Fume**

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



**Dress**

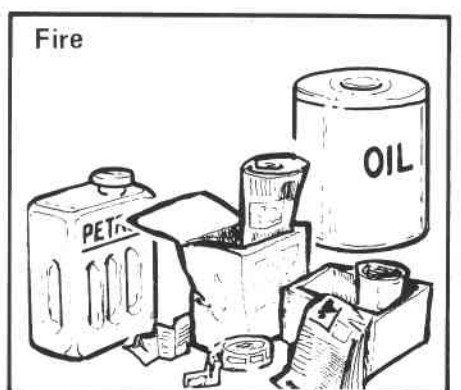
Dress correctly when welding and preparing the weld.



**Dust**

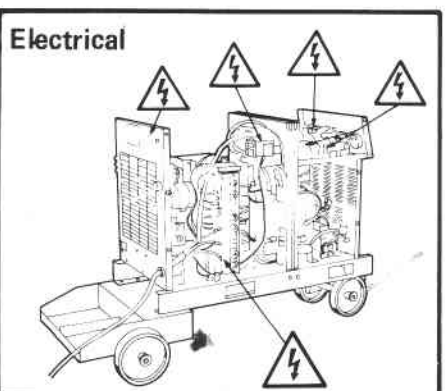
**Note:** Use only DRY air.

Wear goggles and mask when removing dust with an airline.



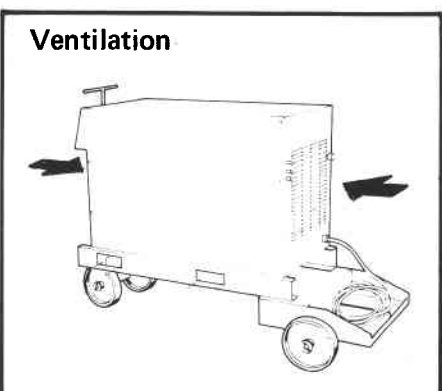
**Fire**

Before commencing welding, clear the area of flammable materials.



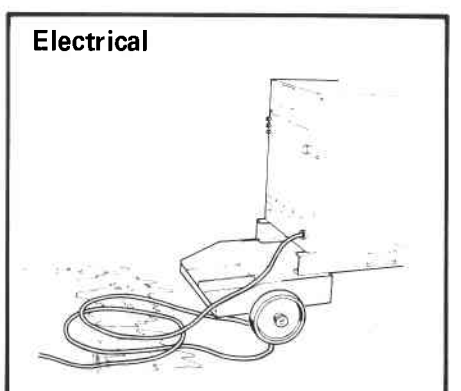
**Electrical**

Don't work with the cover off.



**Ventilation**

Position the unit so that the Louvres are free from obstruction.



**Electrical**

Don't allow leads to lie in oil, water or corrosive liquid.

## INTRODUCTION

The Transmig Synergic 500 is a transistorised multi-process power source that can provide constant current (drooping), Synergic constant voltage (flat) or Synergic Pulsed output characteristics for a wide variety of welding applications. It incorporates full electronic feed-back control permitting accurate setting of welding conditions. A series of simple controls enables the operator to set the operating parameters for the selected welding process.

For MIG/MAG welding applications the Transmig Synergic 500 is used in conjunction with the Transmatic 244M wire feed unit. In the Dip/Spray or Pulsed MIG modes, welding current, voltage, pulse frequency and wire speed are controlled by a single output control on the front panel. A fine voltage trim (arc length) adjustment is provided to precisely tune arc parameters. In addition a background control is fitted to enable puddle fluidity or wetting to be adjusted when Pulsed MIG welding.

Process parameters are directly calibrated for a wide variety of mild, stainless and aluminium wires, see Table 1 below. In addition, the easy-to-access 'option' programme module can be reprogrammed or exchanged to suit other wire material/diameter process combinations including silicon bronze, nickel alloys and cored wire applications.

For MMA or TIG welding applications the Transmig Synergic 500 provides adjustment of both current (output) as well as arc force. Note that arc force should be set to zero for TIG welding. A switch on the front panel permits the welding contactor to be permanently energised for MMA welding.

A useful remote control unit is provided enabling two independant welding conditions or processes to be selected, one local and one remote.



**Transmig Synergic 500  
fitted with Transmatic 244M**

**TABLE 1 - Pre-Programmed MIG / MAG Applications**

Programme	Wire Diameter & Alloy	Process	Shielding Gas	Remarks
Standard	1.0 & 1.2mm Mild Steel	Pulse	Argon with 5-20% CO <sub>2</sub> or Argon + 2% O <sub>2</sub>	Lower CO <sub>2</sub> content gives improved transfer 5% CO <sub>2</sub> for spray, CO <sub>2</sub> for dip only
		Dip - Spray	Argon use with 5 - 25% CO <sub>2</sub> or CO <sub>2</sub>	
	1.0 & 1.2mm Stainless Steels	Pulse	Argon with 2% O <sub>2</sub> or Argon / Helium based mix	Ar/CO <sub>2</sub> - Not to be used with carbon content below 0.06% Note internal switches can be set for Aluminium 5% Silicon alloys, see also Option 1 & 2
		Dip - Spray	Argon with 5% CO <sub>2</sub> or Argon Helium based mix	
	1.2 & 1.6mm Aluminium (5% Mg)	Pulse	Argon	
		Dip - Spray	Argon	
Option 1	1.2mm Aluminium (5% Si)	Pulse	Argon	
	0.8mm Mild Steel	Dip - Spray	Argon with 5 - 25% CO <sub>2</sub> or CO <sub>2</sub>	
Option 2	1.6mm Aluminium (5% Si)	Pulse	Argon	
	1.6mm Mild Steel	Dip - Spray	Argon with 5% CO <sub>2</sub>	

## INSTALLATION

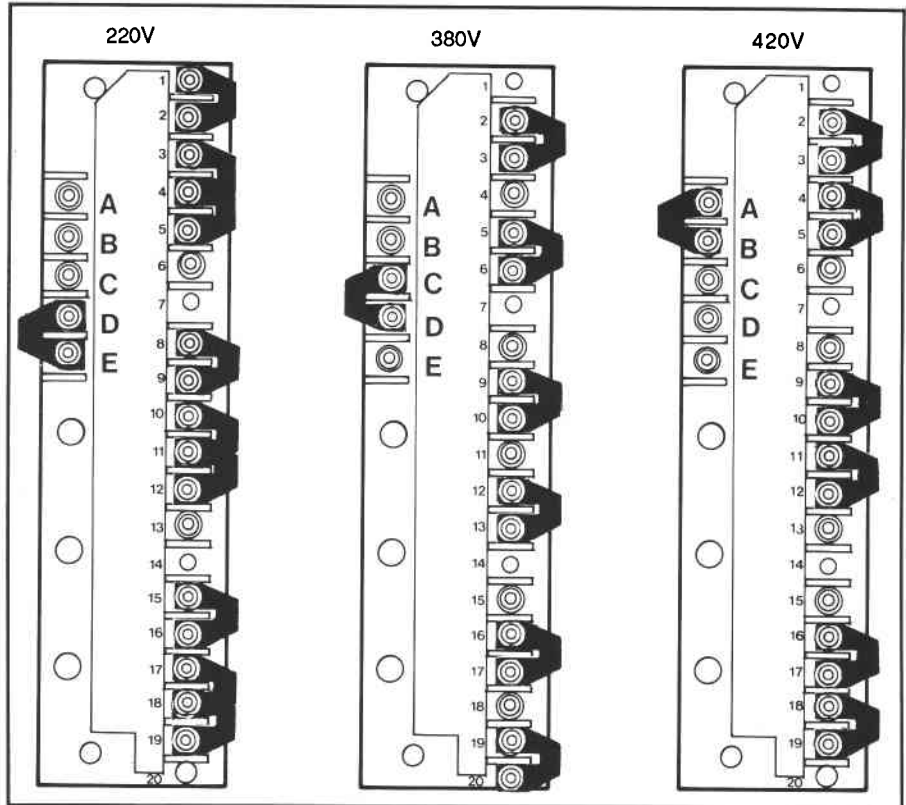
Installation must only be undertaken by a qualified electrician or suitably qualified person.

### Mains Input Selection

Before connecting the unit to the mains supply, set the mains selection links to their appropriate positions as shown.

**Note:** Store the 'unused' links by placing them in parallel with the selection links. Do not place them on 'spare' terminals.

The mains selection terminal block is located behind the lift-up panel on the left hand side of the unit.

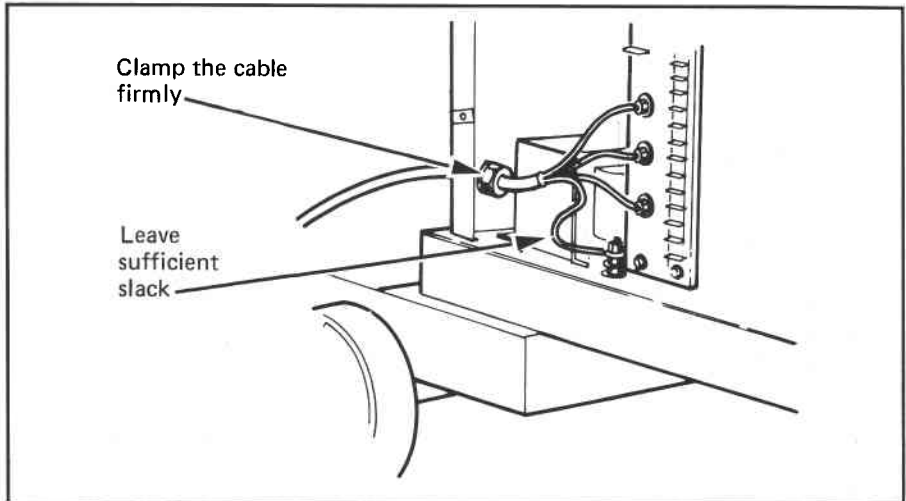


### Mains Cable Connection

Connect the three 'phase' wires to terminals L1, L2 & L3 respectively as shown. Then connect the Green / Yellow earth wire to the GRD terminal.

**Note:** Leave sufficient slack in the earth wire so that, in the event of undue stress, the earth wire is last to come under strain.

Clamp the cable firmly in the cable gland.

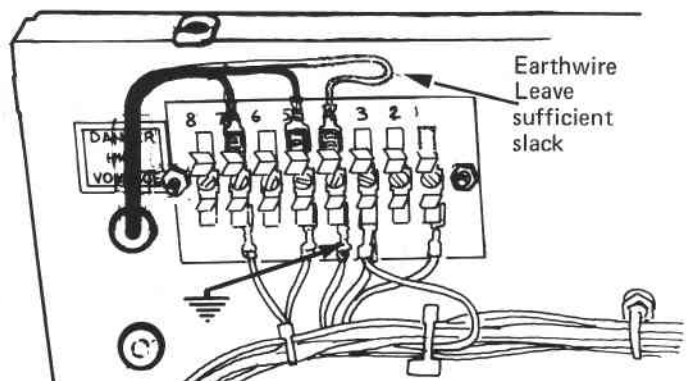


### Water Cooler Connection

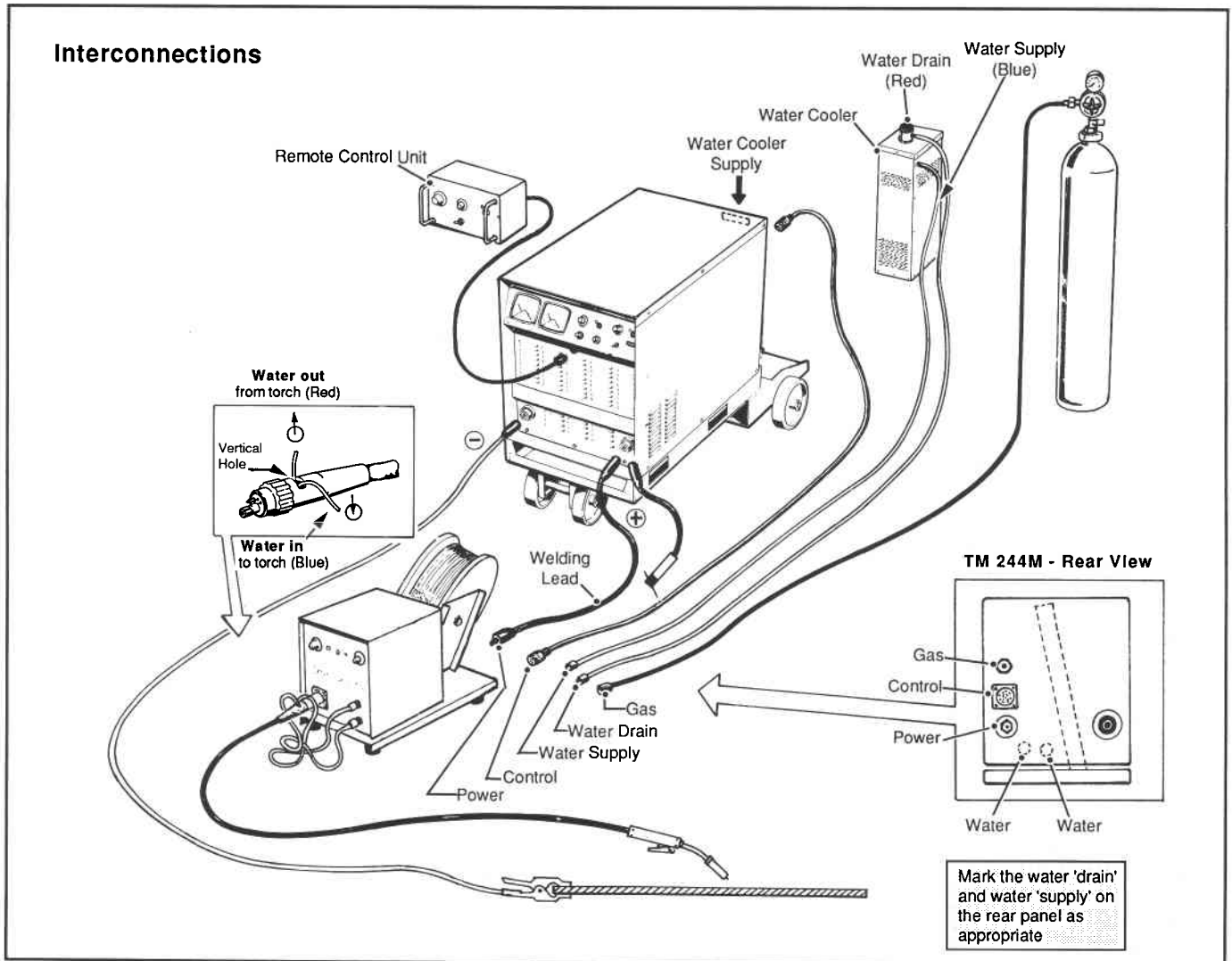
Feed the supply cable through the grommet provided in the back panel and, using crimp-on 'spade' connectors, connect the Live, Neutral and Earth wires to the terminal block as shown.

220 Volts  
Connection  
pins 5 & 7

(42Vac on  
pins 1 & 3)



## INSTALLATION (continued)



### INTERCONNECTIONS

Refer to drawing.

#### Gas (with optional undergear)

1. Mount the gas cylinder on the cylinder tray and secure in position using the chain provided.
2. Protect the eyes and open the cylinder valve to remove any dirt in valve socket.
3. Fit the gas regulator to the cylinder and tighten using the correct size spanner. (A sharp blow with the hand at the end of the spanner will ensure a gas tight seal).
4. Fit the gas hose to the regulator.
5. Fit the gas hose to the 'gas in' connection on the rear of the TM 244M.

6. Open the cylinder valve and check the cylinder pressure. (Must be greater than 10 bar (150 lb/in<sup>2</sup>)).

7. Close the cylinder valve.

#### Water (with optional undergear)

If a water cooler is to be fitted, mount it on the cylinder tray and secure it in position using the chain provided.

Connect the cooler to the auxiliary supply on the terminal block inside the back panel as previously described. The blue water hose (cold) is fitted to the 'water-in' connection on the back of the TM 244M and the red water hose (hot) to the 'water-out' (return) connection.

**Note:** When fitting a 'MXW' torch, ensure that the hoses are correctly fitted to the water-in and water-out connections on the front of the TM 244M - see illustration.

#### Control

Connect the control cable between the 8-pin socket on the power source and the 10-pin socket on the rear of the TM 244M.

#### Power

Connect the the positive output terminal on the power source to the power terminal on the back panel of the TM 244.

#### Work Return Cable

This cable is connected to the negative terminal of the power source and its clamp attached to the work piece.

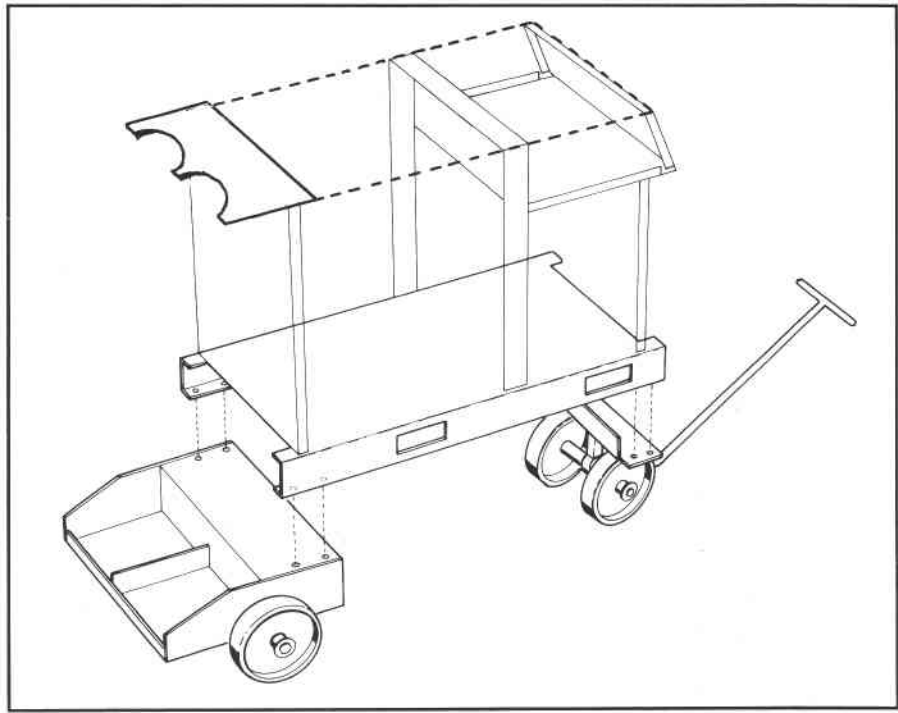
Poor electrical connection of the clamp will result in poor welding characteristics.

#### Remote Control Unit

Screw the connector into its socket on the front panel (centre).

## UNDERGEAR FITTING

1. Assemble the undergear to the unit, using the fittings provided - See drawing.
2. Mount the Cylinder support plate on top cover of the unit. Position the plate to fit with cylinder.



## OPERATION

### 1. Dip/Spray or Pulse Modes

For connections see Page 5.

- (a) Set the Wire Selector switch to the desired material type/diameter position.
- (b) Set the Process Selector switch to the required mode, Dip/Spray or Pulse.
- (c) In Pulse mode set the Background control according to the recommendations in Table 2.
- (d) Set the Voltage Trim to approximately mid scale (5).
- (e) Start welding and adjust the Output control to achieve the required deposition/penetration. Fine tune the voltage trim to obtain the exact arc length needed.
- (f) In Pulse mode re-adjust the Background control if necessary to achieve the desired puddle fluidity and wetting.

### 2. MMA Mode

For connections see Page 5.

- (a) Set the Process Selector switch to MMA/TIG mode.
- (b) Set the Output control to the desired level. The scale 0 - 10 represents 10 - 500A.
- (c) Set the Arc Force control to an initial setting of 3 - 4. When MMA welding, a low setting of 0 - 3 on the Arc Force control will result in a smooth, soft arc. Settings of 4-6 will result in a stiffer, more penetrating arc when the arc length is decreased. Settings of over 6 will give a rough, heavily gouging action.
- (d) Set the Contactor switch to ON to commence welding.

**Note:** If the Remote Control Unit is connected and the Remote/Local Schedule switch is set to Remote then the Contactor switch can be permanently set to ON. Under these conditions the welding output will be energised as soon as the Process switch on the Remote Control Unit is set to the MMA/TIG position.

### 3. TIG Mode - Scratch Start

- (a) Connect the TIG torch to the negative output Dinse socket and a suitable regulated supply of shielding gas (usually Argon).
- (b) Connect the work return lead to the +ve output Dinse socket.
- (c) Set the Process Selector switch to MMA/TIG mode.
- (d) Set the Output control to the desired level. The scale 0 - 10 represents 10 - 500A.
- (e) Set the Arc Force control to '0'.
- (f) Set the Contactor switch to ON to commence welding.

**Note:** If the Remote Control Unit is connected then both current and contactor control are available on the Remote Unit as follows:

1. Set the front panel Contactor Control switch to 'ON'.
  2. Set the 'Remote/Local Schedule switch to Remote.
  3. Set the Remote Arc Force control to '0'.
- Welding current can now be adjusted using the Remote Output control and welding output can be switched on and off by setting the Remote Process Selector to MMA/TIG for 'ON' or either PULSE or DIP/SPRAY modes when the contactor is 'OFF'.

It is also possible to use a Foot Control Unit (or Thumb wheel Control Unit) for TIG welding. A special adaptor is available for this purpose, see Optional Extras.

### 4. MIG Programme Options

A special feature of the Transmig Synergic 500 is that it can be readily reprogrammed to suit wire type/diameter/shielding gas combinations other than those incorporated as standard in the machine, see Table 1 on page 3. Other welding applications could include those using hardfacing alloys, nickels, high strength steels, metal or flux cored wires for example.

A programme pcb module is incorporated in the electronics enclosure and is accessible through a removable cover in the L.H.S. upper front panel. This pcb module, in conjunction with the Option 1 or Option 2 positions of the front panel Wire Selector switch, provides two independent MIG/MAG welding programmes each of which can be used in either Pulse or Dip/Spray modes depending on the selection made on the local or remote Process Selector switch.

As standard the Transmig Synergic 500 is shipped with a programme pcb module fitted which has been preset for the wire/gas combinations shown in Table 1. Depending on application this pcb can be replaced or reprogrammed to meet specific needs, see Parts List.

The Programme pcb module provides for presetting of the following parameters or relationships for each of the two Option channels:-

Mode: PULSE	DIP/SPRAY
Peak Current	Arc Voltage Relationship
Wire Feed Relationship	Wire Feed Relationship
Arc Voltage Relationship	Electronic Inductance
Pulse Waveform	Short Circuit Control

For further information on this facility consult your local distributor or Murex Welding Products Ltd.

## 1. Output Control

Sets the required welding output as follows:  
 (a) Dip/Spray mode - controls wire feed speed (average current) and average arc voltage for the optimum welding condition according to the wire selected.

(b) Pulse mode - controls wire feed speed (average current), average arc voltage, peak current and pulse frequency according to the wire selected.

(c) MMA/TIG mode - controls the welding current.

## 2. Voltmeter

Indicates average welding voltage.

## 3. Ammeter

Indicates average welding current

## 4. Background Control (see Table 2)

Provides for the adjustment of the background current during MIG welding in the Pulse mode. It has no effect in Dip/Spray or MMA/TIG modes.

**TABLE 2**

Recommended Background current settings for Pulse MIG.

Material	Setting Range
Mild Steel	0 - 3
Stainless Steels	0 - 4
Alum. Alloys	4 - 6

## 5. Interface Connection

Used to interface the power source to a robotic or mechanised system. Input and output signals such as current, current detect, arc voltage, start/stop welding, schedule selection etc. are available at this socket.

## 6. Remote Control Unit Connection

The remote control unit supplied with the Transmig Synergic 500 connects to the 13-pin connector. This unit provides the required controls for establishing two independent welding conditions or welding processes.

## 7. Negative Terminal

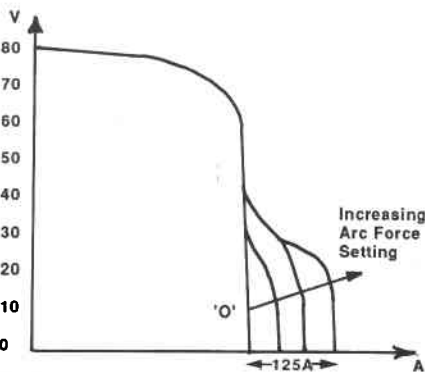
Usually connected to the work return clamp.

## 8. Voltage Trim/Arc Force control

In the Dip/Spray or Pulse modes this control permits the arc length/arc voltage to be adjusted.

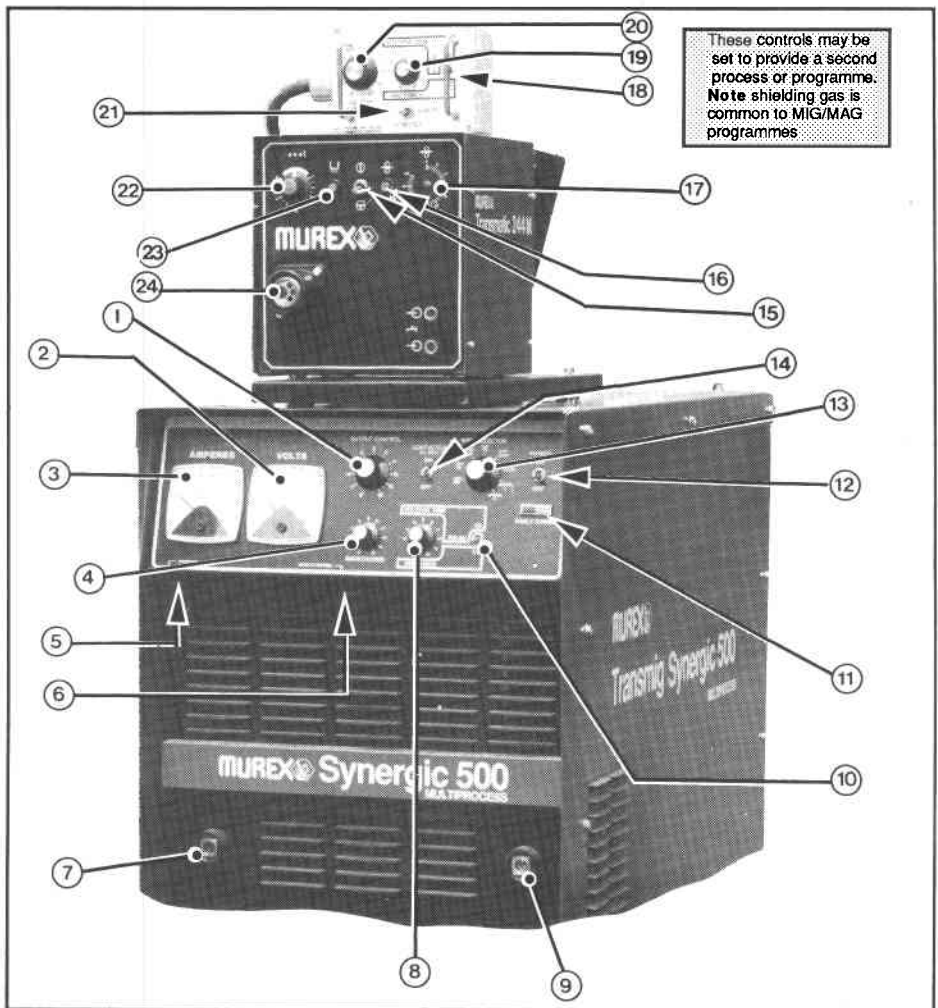
In the MMA/TIG mode this control provides adjustment of the short circuit (tail-out) current, see below.

**Note:** This control should be set to zero for TIG.



## 9. Positive Welding Output

Usually connected to the power terminal on the wire feed unit or to the MMA electrode holder.



## 10. Process Selector Switch

In the 'Up' position selects DIP/SPRAY MIG/MAG welding modes.

In the 'Centre' position selects PULSE MIG welding mode.

In the 'Down' position selects MMA/TIG welding modes.

## 11. On/Off - Fault Lamp

White light indicates power on. Red Light indicates fault or overload condition.

**WARNING:** When White lamp is 'OFF' unit may still be 'LIVE'.

## 12. ON/OFF Switch

**WARNING:** This switch does not isolate the unit from the mains supply. In the OFF position the unit is still 'Live'.

## 13. Wire Selector Switch

This eight position rotary switch selects one of six preprogrammed Dip/Spray or Pulse MIG welding relationships for the wires indicated in Table 1. Two additional switch positions are available for 'Option' MIG programmes. The unit is supplied with a programme module which has been factory preset for the wires also shown in Table 1.

## 14. Contactor Control Switch

In the 'ON' position, selecting MMA/TIG mode at the Process Selector switch causes the

main welding contactor to close and open circuit voltage to be continuously available.

## 15. Torch Switch Latch/Unlatch Switch

## 16. Wire Inch Button

## 17. Wire Feed Speed Control

Not fitted on TM 244M

## 18. Remote Process Selector Switch

See Para. 10 above. Note if the Contactor Control switch is 'ON' and the Schedule switch on the remote control unit is set to Remote then selecting MMA/TIG mode will cause the welding contactor to close.

## 19. Remote Voltage Trim/Arc Force Control - See para 8 above.

## 20. Remote Output Control - see Para. 1 above.

## 21. Remote Schedule Switch

In the Main (Local) position the process and welding conditions are set at the machine front panel. In the Remote position the process and conditions are set on the remote control unit.

## 22. Spot Weld Time Control

## 23. Gas Purge Button

## 24. Torch Connector



## APPLICATIONS

**Mild Steel** - In vertical welding 12.7mm (1/2in.) plate and over, the low heat input obtained with dip-transfer often results in poor fusion. Pulsed-arc welding overcomes this while remaining faster and more economical than manual-arc welding. It is also excellent for root runs where absolutely uniform penetration is required and the joint is accessible from one side only - for example, pipe butt welds. The ability to use lower currents with pulsed-arc welding is also of immense assistance in sheet metal work involving awkward shapes and unsupported butt welds. Pulsed-arc welding is particularly suitable for thicknesses between 2 and 6.3mm (14swg and 1/4in.), falling between

the thickness ranges more suitably covered by dip or spray-transfer. The recommended shielding gas for mild steel is an Argon mixture.

**Alloy Steels** - Pulsed-arc welding gives much better alloy recovery than welding with CO<sub>2</sub>, and the carbon content remains at an acceptable level. This is vital for optimum low-temperature properties, particularly on quenched and tempered steels. The recommended shielding gas is an Argon mixture.

**Stainless Steel** - Pulsed-arc welding gives unequalled results in welding stainless steel. Using an Argon/Oxygen mixture, there is no increase at all in the carbon content of the weld, which can rise to an unacceptable level with CO<sub>2</sub>.

**Aluminium and its alloys** - Because heat input can be controlled with pulsed-arc welding, larger wire diameters can be used on thin sections. The risk of porosity is significantly reduced - particularly on vertical, overhead and horizontal welds.

In addition, the minimum thickness of alloy sheet which can be welded with push-type wire feed equipment is extended. One of the outstanding features of pulsed-arc welding, that is of particular value in aluminium welding, is the ability to make corner and unbacked butt joints which have a very good appearance. The recommended shielding gas is pure argon.

## MAINTENANCE

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 fraying cracking or general deterioration.
2. Check that all electrical connections (Dinse and Amphenol sockets etc.) are in good physical condition.
3. Check the welding torch for damage. Replace any suspect part(s).

**WARNING**  
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 2kgf/cm<sup>2</sup>, (30lbf/in.<sup>2</sup>), and the air must be dry.

**WARNING**  
Suitable eye and mouth protection should be worn.

4. Check the fan blades for rigidity of fitting
5. Inspect all relays and main contactor contacts for signs of pitting and general wear. Replace as necessary.
6. Disconnect the ammeter and voltmeter and check them against a calibration standard for accuracy.
7. Replace the cover.
8. Reconnect the unit to the mains supply.



Murex Welding Products Limited  
Hertford Road, Waltham Cross,  
Herts. EN8 7RP England  
Telephone: Lea Valley (0992) 710000  
Telex: 25743

Pt.No. 100458  
Issue 2



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# Transmig Synergic 500

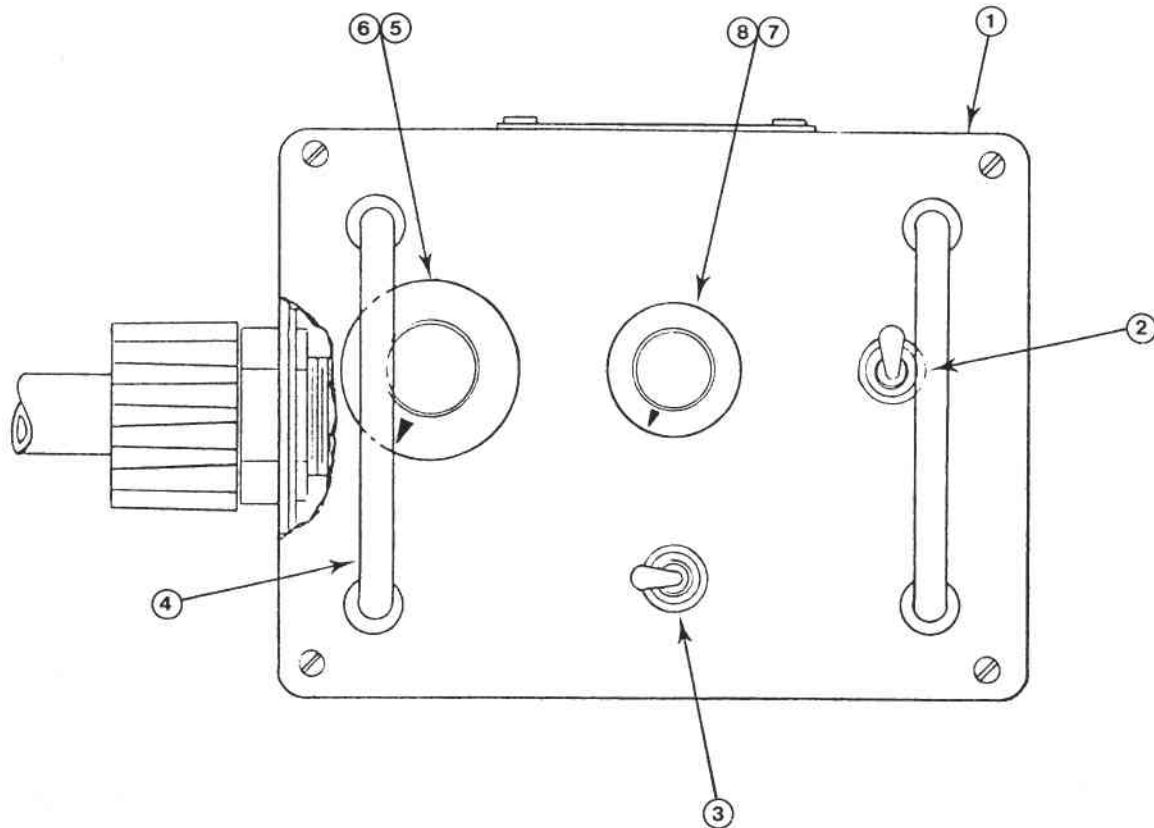
MULTI PROCESS

## Parts List

Issue 2

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**Fig. A - Remote Control Unit**

**Remote Control Unit Complete - Pt.No. 1413313**

Item	Part No.	Description
	1413313	Remote pendant
1	Note 1	Box, remote control
2	1407014	Switch, process, SPDT (centre off)
3	1411867	Switch, schedule SPDT
4	1411897	Handle with hardware (Pack of 2)
5	1407182	Potentiometer, 10K
6	1412201	Knob
7	1407182	Potentiometer, 10K
8	1403189	Knob

**Note 1: Special Order Only**

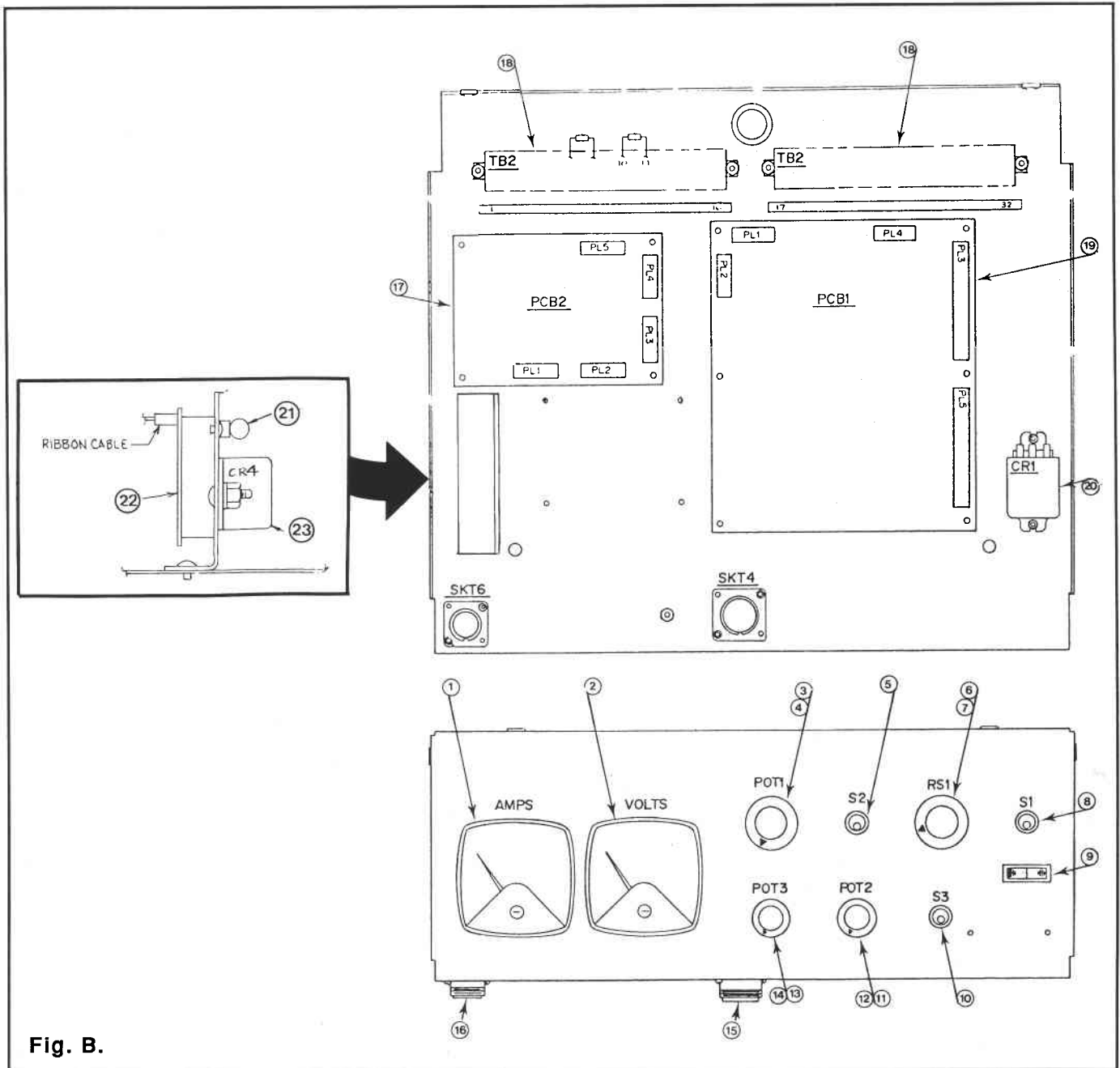


Fig. B.

Item	Part No.	Ref.	Description	Item	Part No.	Ref.	Description
1	1411860	A	Ammeter 500A	14	1403189	-	Knob
2	1411861	V	Voltmeter 50V	15	1411864	SKT 4	Socket (13 pin)
3	1407182	Pot.1	Potentiometer 10K	-	1412198	-	13 pin plug for above
4	1412201	-	Knob	16	1413341	SKT6	Socket (7 pin)
5	1411867	S2	Switch SPDT (Cont. On/Off)	-	1413342	-	7 pin plug for above
6	1413349	RS1	Rotary switch assy.	17	1413345	PCB 2	Interface PCB
7	1412201	-	Knob	18	1412204	TB2	Terminal board (16 way)
8	1411868	S1	Switch 3PST (On/Off)	19	1413344	PCB 1	Main control PCB
9	1413340	W&R	Lamp	20	1413343	CR 1	Relay, 3 PDT, 42VAC
10	1407014	S3	Switch SPDT centre off (Process)	21	1413346	C3	Capacitor assy.
11	1407182	Pot. 2	Potentiometer 10K	22	1413347	-	Program PCB (Preset)
12	1403189	-	Knob	-	1413348	-	Program PCB (Uncal)
13	1410547	Pot. 3	Potentiometer 1K	23	1413350	CR 4	Relay 3PDT, 120VAC

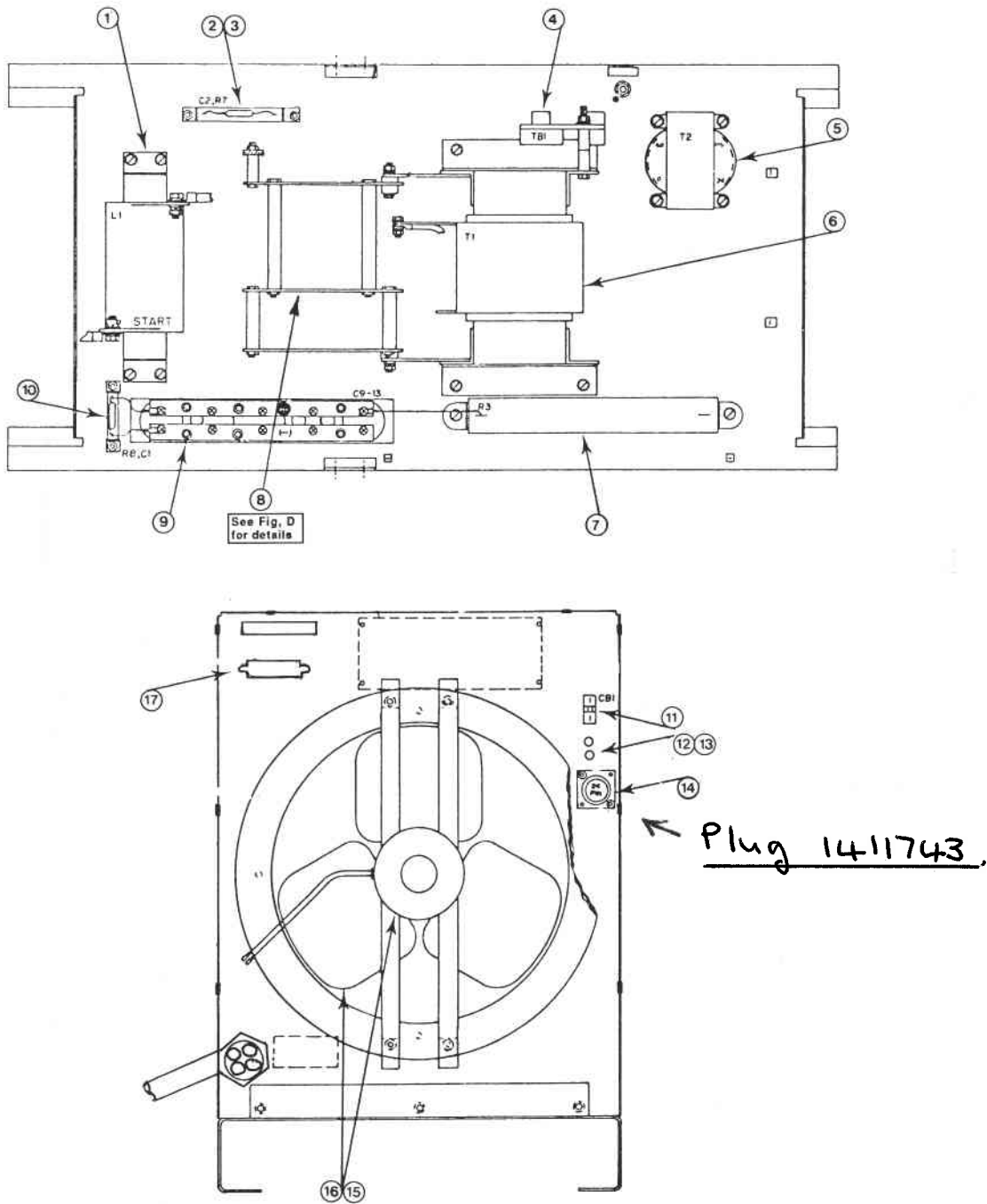


Fig. C.

Item	Part No.	Ref.	Description	Item	Part No.	Ref	Description
1	1413352	L1	Choke	9	1411884	C9-13	Capacitor 7000 $\mu$ F, 100V (7 req.)
2	1411893	R7	Resistor 100 $\Omega$ , 50W	10	1413355	C1	Capacitor 0.1 $\mu$ 600V
3	1413355	C2	Capacitor 0.1 $\mu$ 600V	11	1407758	CB1	Circuit breaker 10A
4	1411890	TB1	Voltage selection panel	12	1411873	-	Fuse holder
-	1411891	-	Voltage change link	13	1412208	FU1,2	Fuse 1A
5	1411889	T2	Control transformer	14	1411895	SKT 6	Socket 8 pin (Wirefeeder)
6	1413351	T1	Main transformer	15	1407032	Fan	Fan motor
7	1413354	R3	Resistor 5 $\Omega$ 550W	16	1407031	-	Fan blade
8	-	-	See Fig. D	17	1412200	TB 3	Terminal strip (8 way)

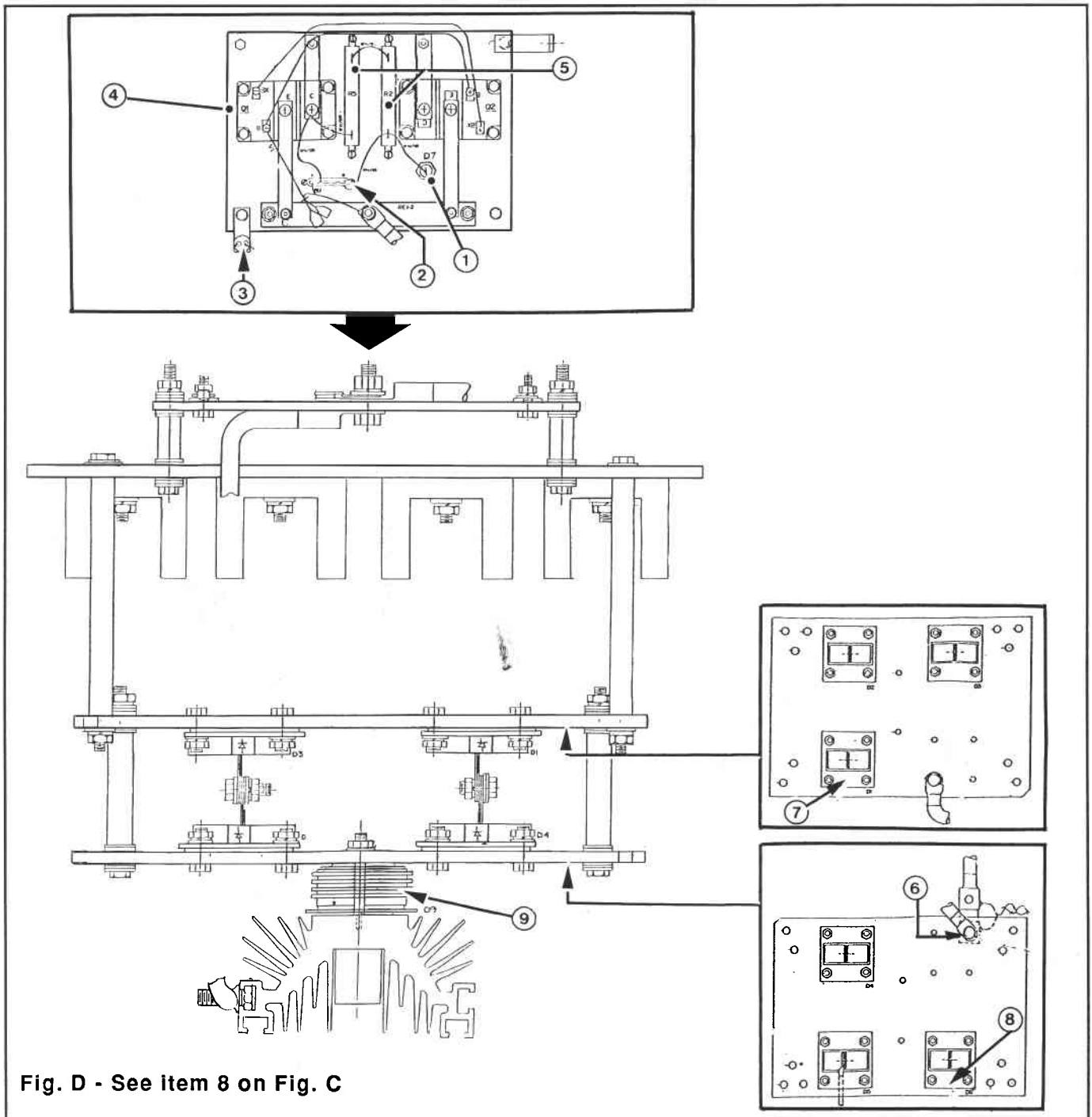


Fig. D - See Item 8 on Fig. C

Item	Part No.	Ref.	Description
1	1413360	D7	Diode 70A, 200V
2	1413363	R1,C4, C7,C8	Snubber assy.
3	1413362	TS	Thermal switch
4	1413358	Q1,2	Transistor 500A, 600V
5	1413361	R2, R5	Resistor 5Ω, 50W
6	1413364	SH1	Shunt 500A, 50mV
7	1413356	D1-3	Diode 250A straight
8	1413357	D4-6	Diode 250A reverse
9	1413359	D9	Diode fast recovery

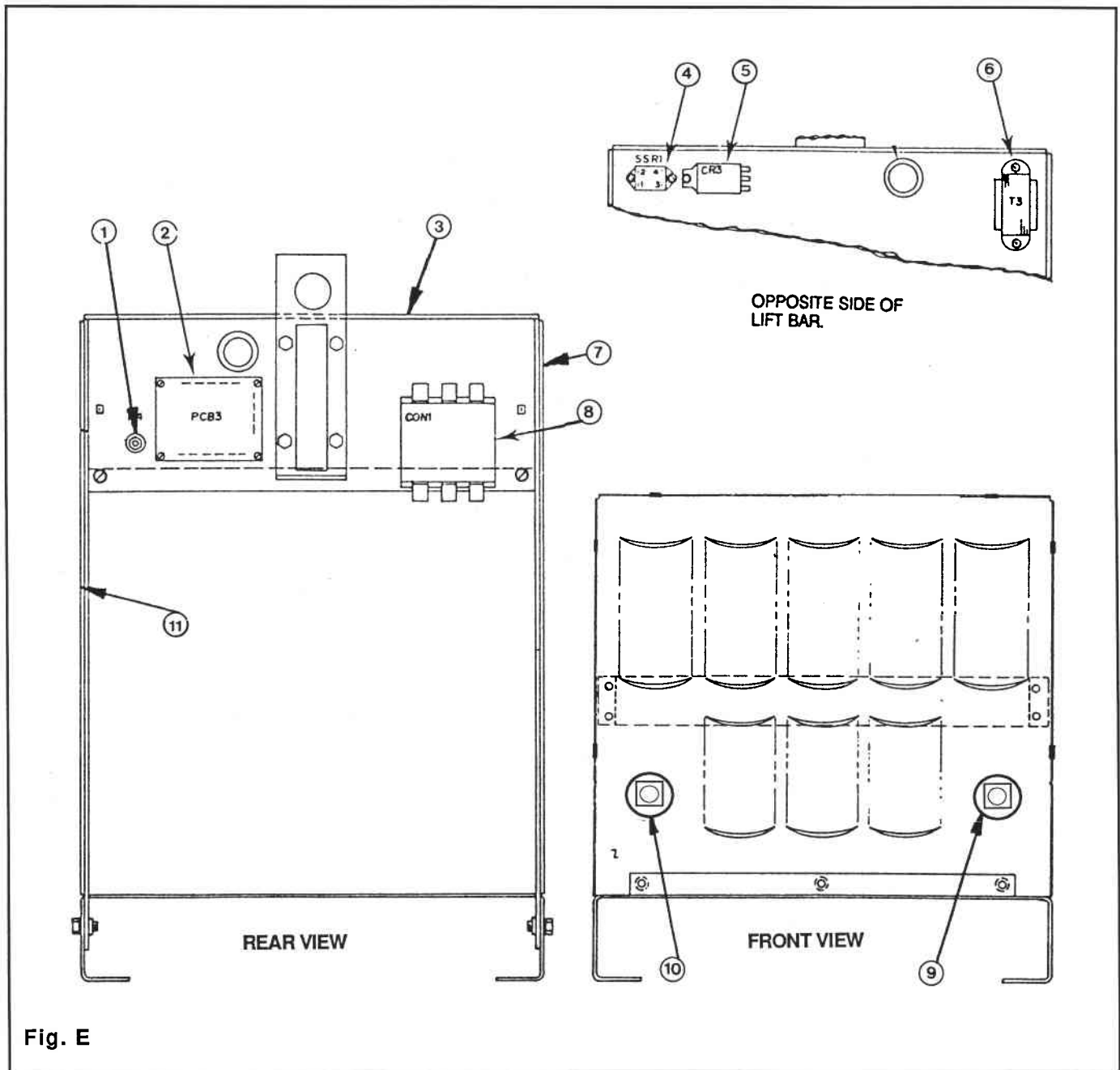


Fig. E

Item	Part No.	Ref	Description
1	1413365	R4	Resistor 25Ω, 50W
2	1413366	PCB 3	Driver PCB
3	1413371	-	Top panel
4	1413368	SSR1	Solid state relay
5	1413369	CR3	Relay DPDT 24VAC
6	1413370	T3	Transformer control
7	1413373	-	L.H.S. Panel
8	1407028	CON 1	Contactors
9	1411881	C5,6	Capacitor 0.047μF, 1600V (2)
10	017242	SK1,2	Dinse sockets (2)
-	1380441	-	Plug for item 10
11	1413372	-	R.H.S. Panel

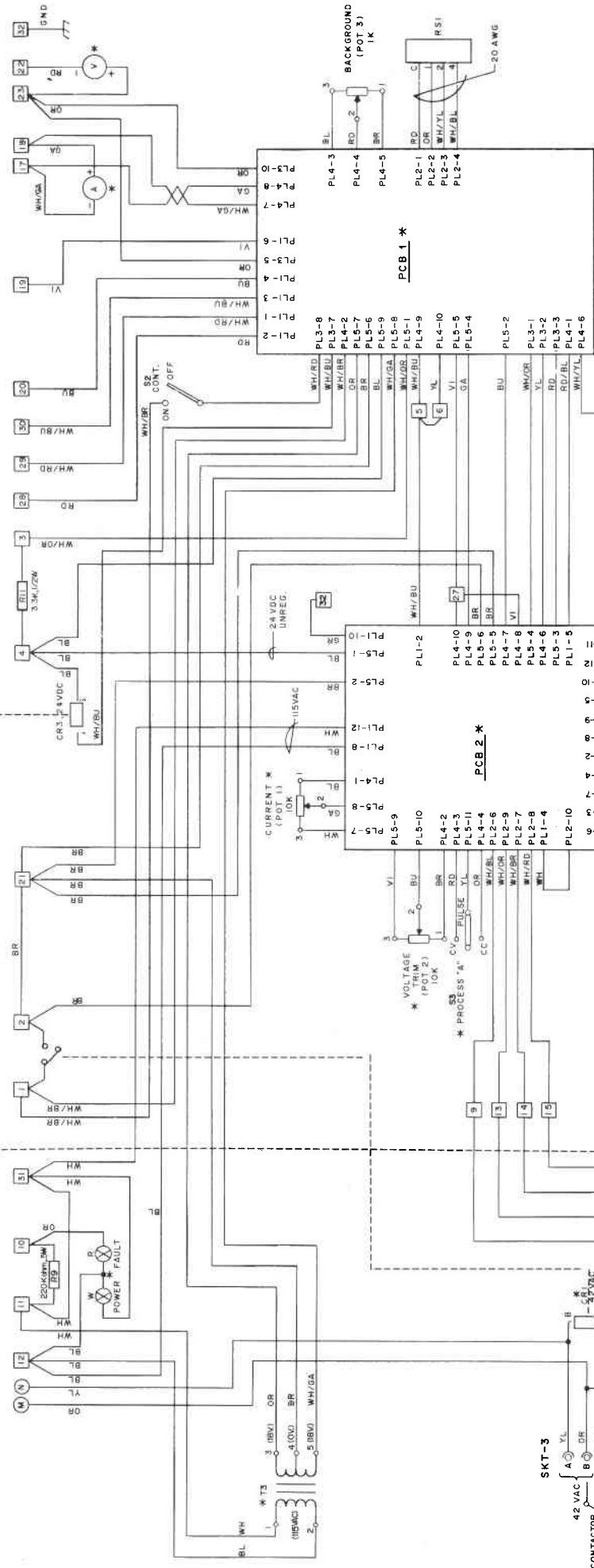
**MUREX** 

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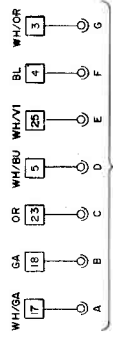




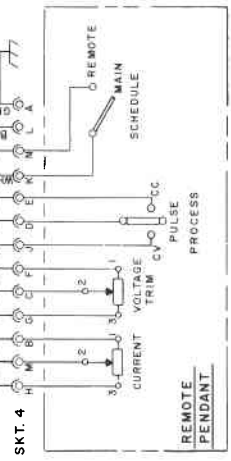
**COLOR LEGEND**

- BL BLACK
- BR BROWN
- RD RED
- OR ORANGE
- YL YELLOW
- GR GREEN
- BU BLUE
- VI VIOLET
- GA GRAY
- WH WHITE

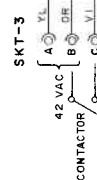
- 1) \* DENOTES PART IS LOCATED ON THE ELECTRONIC MODULE ASSEMBLY.
- 2) 4 DENOTES T82 CONNECTIONS.
- 3) DENOTES SCHEMATIC REF. ONLY.



SKT-6  
INTERFACE RECEPT.



\* SKT-4



SKT-3

## INSTALLATION

Installation must only be undertaken by a qualified electrician or suitably qualified person.

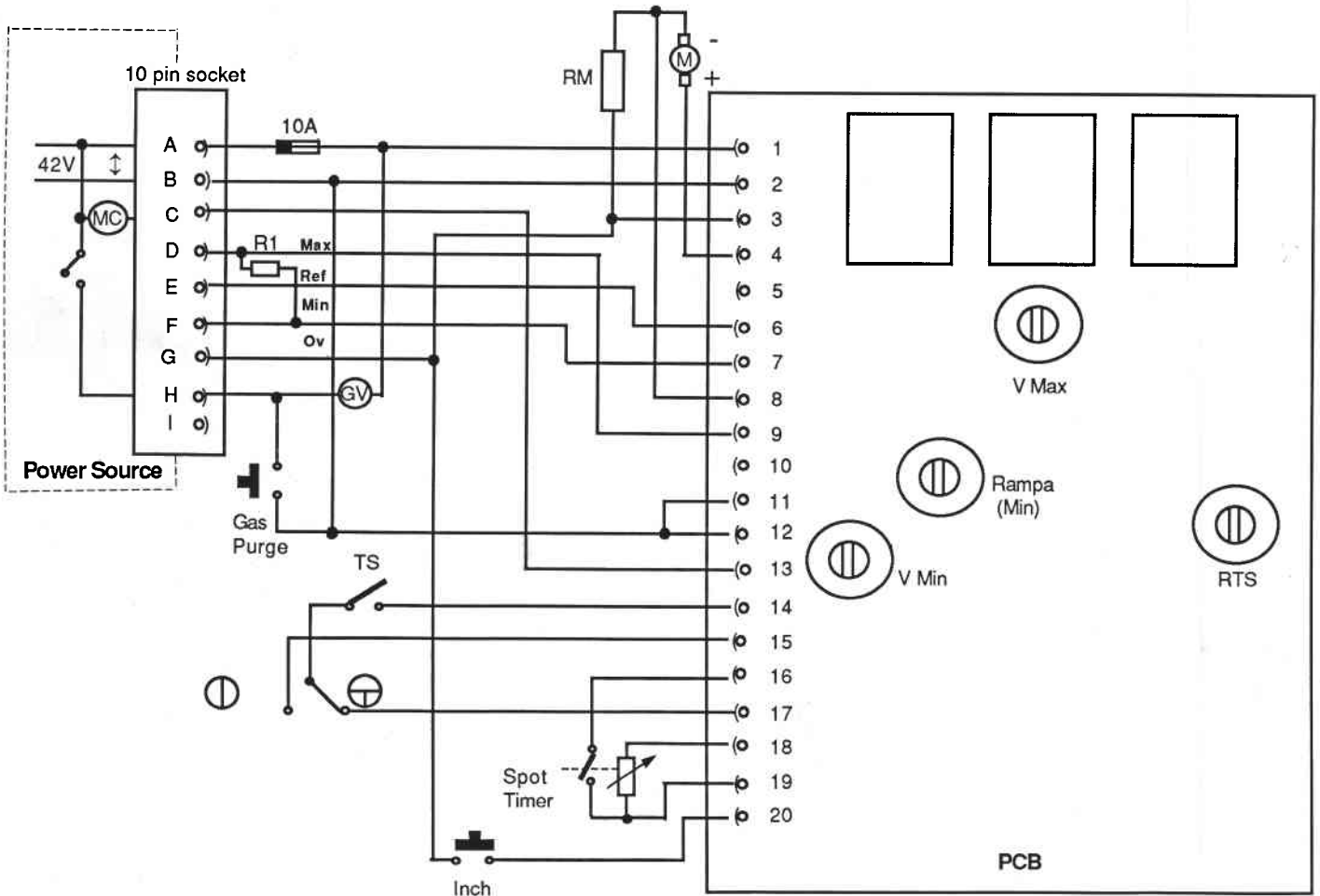
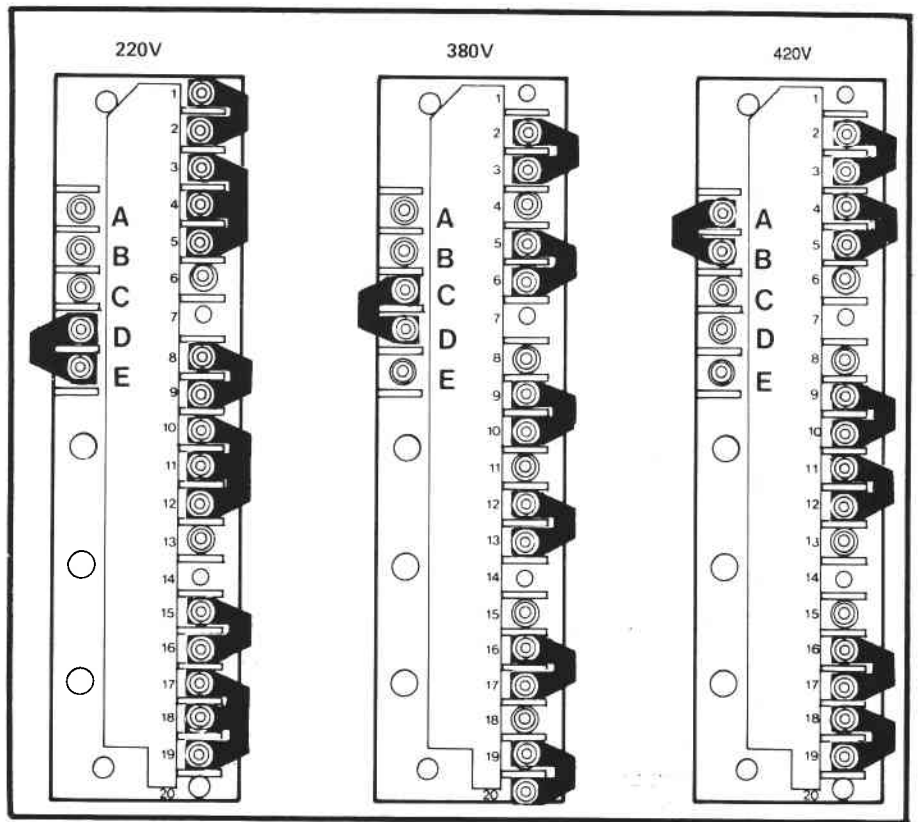
**See also Page 4 of Operating Manual**

### Mains Input Selection

Before connecting the unit to the mains supply, set the mains selection links to their appropriate positions as shown.

**Note:** Store the 'unused' links by placing them in parallel with the selection links. Do not place them on 'spare' terminals.

The mains selection terminal block is located behind the lift-up panel on the left hand side of the unit.



## TRANSMATIC 244M

The TM 244 has been specially adapted for use with the TM 500 Synergic. Refer also to standard TM 244 instruction manual supplied with the unit.