

WELDARC COMBI

MODEL NO. MC82-1

CAT.  
11/87

THE INFORMATION CONTAINED IN THE FOLDER IS SET OUT TO ENABLE YOU TO PROPERLY MAINTAIN YOUR NEW EQUIPMENT AND ENSURE THAT YOU OBTAIN MAXIMUM OPERATING EFFICIENCY.

PLEASE ENSURE THAT THIS FOLDER IS KEPT IN A SAFE PLACE FOR READY REFERENCE WHEN REQUIRED.

WHEN REQUESTING SPARE PARTS, QUOTE THE MODEL NO. AND SERIAL NO. OF THE MACHINE AND PART NO. OF THE ITEM REQUIRED. FAILURE TO SUPPLY THIS INFORMATION WILL RESULT IN UNNECESSARY DELAYS IN SUPPLYING THE CORRECT PARTS.

**SAFETY**

Before this equipment is put into operation, the SAFETY PRACTICES section at the back of the Manual MUST BE READ COMPLETELY. This will help avoid possible injury due to misuse or improper welding applications.

WELDARC COMBI MODEL No. MC82-1  
 MANUFACTURED BY WELDING INDUSTRIES OF AUSTRALIA PTY LTD

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GENERAL

The WELDARC COMBI is a versatile DC only constant current type welding power supply intended for MMA (Manual Metal Arc) and TIG (Tungsten Inert Gas) welding processes. The design of the unit allows it to be used with minimum ancillary equipment, ie. basic electrode holder or TIG torch, while also supporting full remote control features where required.

A feature of the WELDARC COMBI when in the TIG mode is ELECTRONIC TOUCH starting of the arc which makes the use of high frequency arc starting attachments unnecessary.

The WELDARC COMBI has two welding output characteristics. The first is for general purpose MMA and TIG welding, while the second has specially tailored characteristics to suit Cellulose and Low Hydrogen type MMA electrodes in positional welding.

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## 1. SPECIFICATIONS

### 1.1 TECHNICAL

- |                   |  |
|-------------------|--|
| - Welding Output  | 5 - 350 Amps                           |
| - Duty Cycle      | 350 Amps 34V 30%                       |
| - Output Tappings | 2 (Normal, and Special electrodes)     |
| - Insulation      | Class 'H' - 125oC rise at 40oC ambient |
| - Enclosure       | Drip-proof                             |

### 1.2 STANDARD PACKAGE

- MC82-1 WELDARC COMBI Welding Power Source

### 1.3 OPTIONAL ACCESSORIES

- AM 118 Mobile Kit and Bottle cradle
- Gas Regulator
- Argon elbow
- Electrode Holder
- Tig Torch

## 2. RECEIVING

In general it is a good practice to move the equipment to the site of installation before unpacking. Use care in order to avoid damage to the items enclosed.

Check the equipment received against the shipping invoice to make sure the shipment is complete and undamaged.

If any damage has occurred in transit immediately notify Welding Industries of Australia or their authorized agent.

For all requested information related to this equipment give the correct Model Identification and Serial Number. This is located on a name plate attached to the right-hand lower front of the machine.

### 3. INSTALLATION

#### 3.1 MACHINE LOCATION

Where possible, in choosing a site for any welding power-source, consideration should be given to the following points:-

- Availability of electrical and shielding gas supplies (where required)
- Accessibility for the replacement of consumables, i.e. gas bottles, and for any future maintenance requirements.
- The power-source must be positioned so that the free flow of cooling air through the machine is not impeded, such as by placing the rear of the machine too close to a wall.
- Protection from wind and driven rain - Breezes blowing through an open doorway can result in degradation of the weld shielding gas coverage, which can cause weld porosity. If such a site is unavoidable, consideration should be given to the use of portable welding screens of a suitable material. The outflow of cooling air from the welding power-source can also cause similar problems, and the machine should be positioned with this in mind.
- Airborne dust particles will always accumulate in vented equipment, particularly that with forced air cooling. Excessive internal buildup of dust can often be the cause of premature machine failure. At all times endeavour to position the machine to minimize the intake of contaminated air, particularly that containing metallic particles such as from grinding operations. (See also MAINTENANCE SECTION of this Manual, page 10)

#### 3.2 SUITABLE MAINS VOLTAGES

The WELDARC COMBI is designed for connection to a 3 phase, 50 hertz electrical mains power supply. A 'Neutral' conductor is not required.

The chart below lists the suitable electrical mains voltages (phase to phase) and the appropriate current demand.

MAINS VOLTAGE	RATED CURRENT PER PHASE	MAXIMUM DEMAND
550	14 AMPS	25 AMPS

#### 3.3 CONNECTION TO ELECTRICAL MAINS POWER SUPPLY

All electrical work shall only be undertaken by a qualified electrician.

The WELDARC COMBI is supplied with a 5 metre 4 core 50/0.25 Heavy Duty PVC mains power supply cable. This cable should be correctly connected to a suitable 3 phase plug top or fixed connection.

When making connection to the machine supply terminals, ensure that local codes are adhered to, and that the EARTH connection is securely made.

The mains supply cable should only be replaced with an equivalent size cable to that fitted.

Access to the machine supply terminals, the welding transformer and the control transformer voltage selectors is gained by removing the power-source and side panel adjacent to Amp and Volt meters.

Pass the supply flexible cable through the bushed cable entry in the machine back panel. Fit the supplied cable clamp ensuring that there is sufficient free cable to prevent strain on the electrical connections. The three phases are terminated at the terminal strip as indicated in FIG 1.

FIGURE 1. CONNECTION SUPPLY FLEXIBLE CABLE

3.4 TRANSFORMER VOLTAGE SELECTION TAPS

The Welding and Control Transformer voltage selection taps are as illustrated below:

NOTE:- It is mandatory that the correct electrical mains voltage taps be selected before this equipment is operated, 550V ONLY. Failure to do so may void warranty.

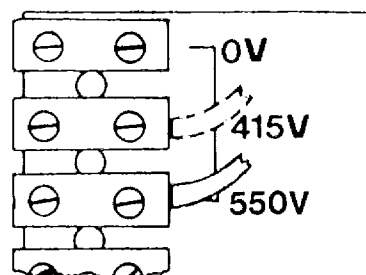
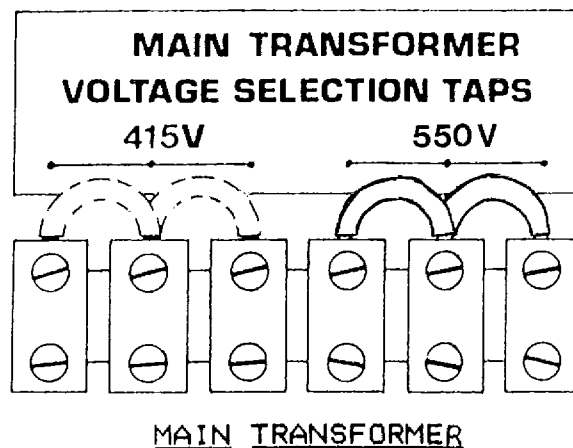


FIGURE 2. TRANSFORMER VOLTAGE SELECTION TAPS

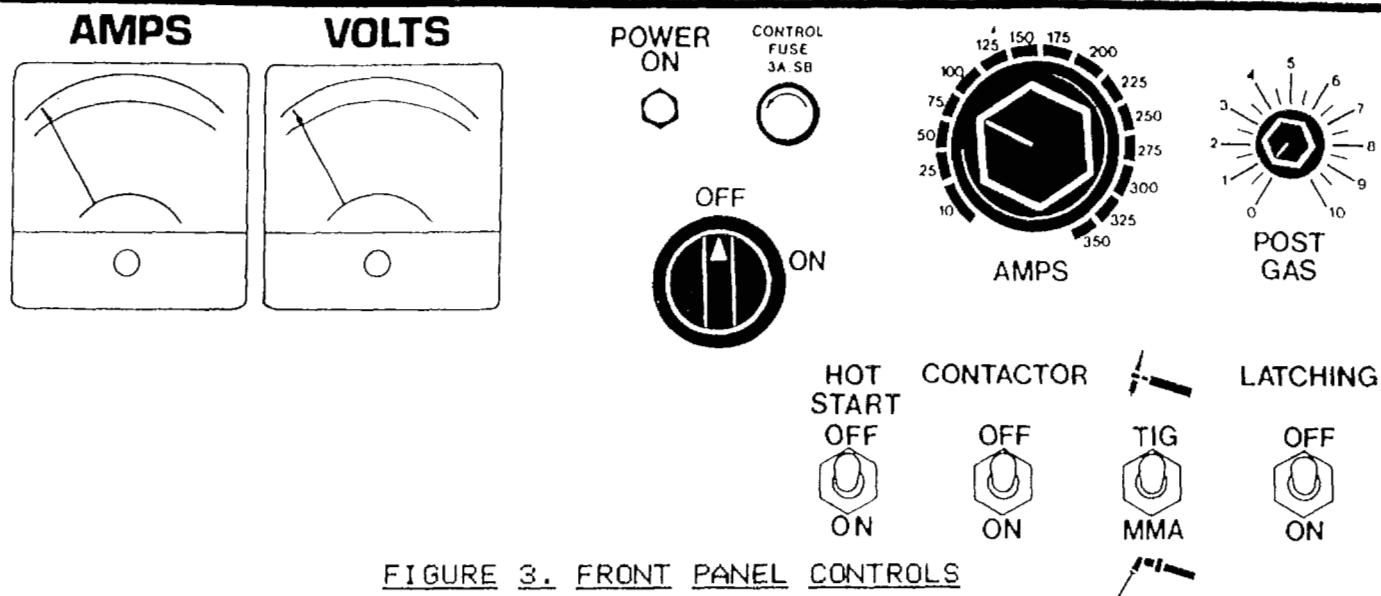
4. FRONT PANEL CONTROLS

FIGURE 3. FRONT PANEL CONTROLS

-POWER OFF/ON:

Use to energise or de-energise the Power-source.

-POWER ON INDICATOR:

This is illuminated when the Power-source is energised, indicating that the control circuits are activated.

-FUSE

3 Amp slow-blow type 3AG which protects the contactor circuit.

-AMMETER:

The Ammeter indicates the welding current (amps average).

-VOLTMETER:

The Voltmeter indicates the welding voltage (volts average).

-MAIN CURRENT CONTROL:

This provides stepless control of the Welding Current over the range of 5 - 350 Amps.

If a remote current control potentiometer is also connected, the main current control sets the maximum welding current, and the remote current control sets the final welding current as a percentage of the main setting. In this way, an operator can be prevented from inadvertently exceeding a desired maximum welding current limit.

-POST GAS CONTROL

This provides stepless adjustment of the period of Post-gas flow following release of the Torch switch. There is no gas flow if the 'STICK' mode is selected.

-TIG / STICK SWITCH-

Set this switch to correspond to the type of welding to be undertaken. In the STICK mode, the welding output characteristics are tailored for MMA welding, and the gas valve is prevented from operating.

-HOT START-

This function can be selected to assist arc initiation, especially for TIG welding at low weld currents. This facility provides a short period of increased weld current immediately following weld initiation which assists in stabilizing the arc.

-LATCHING

This switch selects the mode of operation of the Torch switch.

With Latching OFF, the welding output is ON only while the Torch switch-switch is held closed.

With Latching ON, the welding output is latched ON by a momentary operation of the torch switch, and OFF by a second momentary operation of the torch switch.

The Latching ON mode can be used to reduce operator fatigue during long weld periods.

-CONTACTOR

This switch is used in the absence of a Torch-switch to set the Welding output ON. If a Torch switch is in use, place the Contactor switch in the OFF position.

REMOTE CONTROL SOCKET

Pin 1	Torch switch
Pin 2	Torch switch
Pin 3	(No connection)
Pin 4	Remote Current Control
Pin 5	Remote Current Control
Pin 6	Remote Gas Valve
Pin 7	Remote Gas Valve
Pin 8	(No connection)

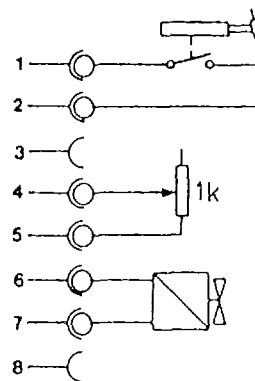


FIGURE 4. REMOTE CONTROL SOCKET CONNECTIONS

5. WELDING SET-UP

The WELDARC COMBI may be connected in several different configurations. The choices available include;

- (MMA) Electrode Negative or Electrode Positive
- With or with-out Torch switch control
- With or without Remote Current Control
- With or without Remote Gas valve

M.M.A. (Stick Electrodes)

- Connect the Electrode and Work leads to the COMBI in the Polarity to suit the Welding Electrode.

Select the appropriate output characteristics. The SPECIAL ELECTRODES output is intended for use with Cellulose, and Low Hydrogen type electrodes for enhanced welding characteristics. (The maximum output of this terminal is limited to 300 Amps, 50% duty cycle).

- Adjust the Welding current to the desired setting.
- Firmly fix the 'work clamp' to the work piece, as close as possible to the welding zone. Ideal welding conditions will only be achieved if all connections are properly secured. It is preferable wherever possible to weld towards the work clamp.
- Turn the Contactor switch ON, and commence welding.

T.I.G. WELDING

- Connect shielding gas supply. The WELDARC COMBI is supplied with a length of gas hose attached through the machine back panel. For TIG welding, this should be connected to the Regulator Flowmeter. An internal gas valve controls gas flow as required.

- Connect the torch and work leads to the WELDARC COMBI welding

output terminals. For TIG welding, use electrode negative polarity. Select the upper (normal) +ve output terminal.

- Set the gas flow rate to suit the welding procedure.
- Select the approximate welding current.
- To set the welding output ON, use either the front panel CONTACTOR switch or the torch switch where fitted. If the LATCHING function is ON, only a momentary closing of the torch switch is required.
- To initiate the arc, touch the tungsten electrode onto the workpiece, and then retract the torch in a smooth movement.
- Extinguish the arc by releasing the torch switch, or where the LATCHING mode is selected, by a momentary closing of the torch switch. Hold the torch steady for the period of post gas flow.

## 6. GENERAL MAINTENANCE

### 6.1 DUST

Care must be taken to prevent excessive build-up of dust and dirt within the welding power-source. It is recommended that at regular intervals, according to the prevailing conditions, the machine covers be removed and any dust accumulation be removed by the use of dry, low pressure compressed air, or a vacuum cleaner.

Ensure that the WELDARC COMBI power source is disconnected from the Mains voltage power supply before any covers are removed.

## 7. TROUBLE SHOOTING

- Lack of one Mains supply phase can either completely disable the WELDARC COMBI power source, or merely adversely affect welding conditions. Have a qualified electrician confirm that 3 phase mains supply is available at the WELDARC COMBI power source, and confirm that the primary voltage taps have been correctly selected for both the welding and control transformers.

### 7.2 NO WELDING CURRENT

- Check that mains supply is available at the WELDARC COMBI power source, i.e., that the fan is running and the indicator light is on.

- Check continuity of the welding current circuit, i.e., work lead, work clamp and electrode holder/Torch connections.

- Inspect, and replace if necessary the fuse on the WELDARC COMBI power source front panel. Replace fuses only with the correct type (3AG) and correct current rating (3 Amp).

- If the foregoing checks have been made and not revealed the fault condition it is possible that a failure has occurred in the electronic control circuits of the WELDARC COMBI.

In this instance, QUALIFIED SERVICE PERSONNEL should refer to the information contained in the following Section.



8. CONTROL PRINTED CIRCUIT BOARDS

8.1 MAIN CONTROL PCB MC82-10

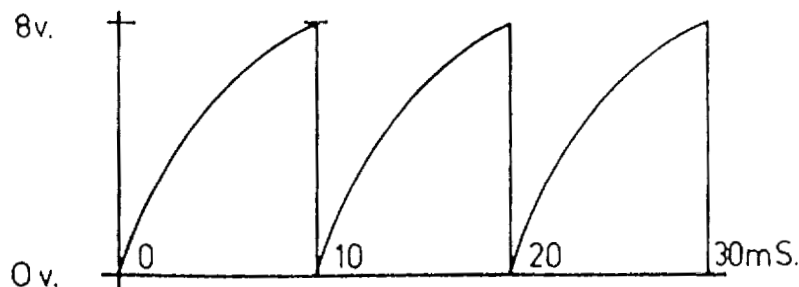
This PCB contains the circuit elements which control the 6 thyristors (SCR's) which form the main welding rectifier.

It incorporates a closed loop control system which acts to maintain the DC output current of the welding rectifier at the desired level as set by the operator 'CURRENT' control.

Figure 5 shows the external connections to the MC82-10, and also the location of the diagnostic LED's and test points. The function of each of these is described in the lists below.

check these	<u>LED #</u>	<u>FUNCTION</u>
	1	-15 VDC REGULATED - CURRENT AMPLIFIER
	2	+15 VDC REGULATED - CURRENT AMPLIFIER
	3	-15 VDC REGULATED - MAIN POWER SUPPLY
	4	+15 VDC REGULATED - MAIN POWER SUPPLY
	5	REMOTE POT. CIRCUIT CONTINUITY
	6	MASTER POT. CIRCUIT CONTINUITY
	7	START MODE - ON:SCRs DISABLED OFF:DURING WELDING
	8	PHASE SENSING VOLTAGE P3 PINS 6,8
	9	PHASE SENSING VOLTAGE P3 PINS 7,8
	10	PHASE SENSING VOLTAGE P3 PINS 6,7
	11	TRIGGER POWER SUPPLY SCR 1
	12	TRIGGER POWER SUPPLY SCR 2
	13	TRIGGER POWER SUPPLY SCR 3
	14	TRIGGER POWER SUPPLY SCR 4
	15	TRIGGER POWER SUPPLY SCR 5
	16	TRIGGER POWER SUPPLY SCR 6

<u>TEST POINT</u>	<u>VOLTAGE LEVEL OR SIGNAL</u>
A	CIRCUIT COMMON
B	RAMP 1
C	RAMP 2
D	RAMP 3
E	CONDUCTION WAVEFORM
F	CONDUCTION WAVEFORM
G	CONDUCTION WAVEFORM



TYPICAL RAMP WAVEFORM (RAMPS 1,2 & 3)

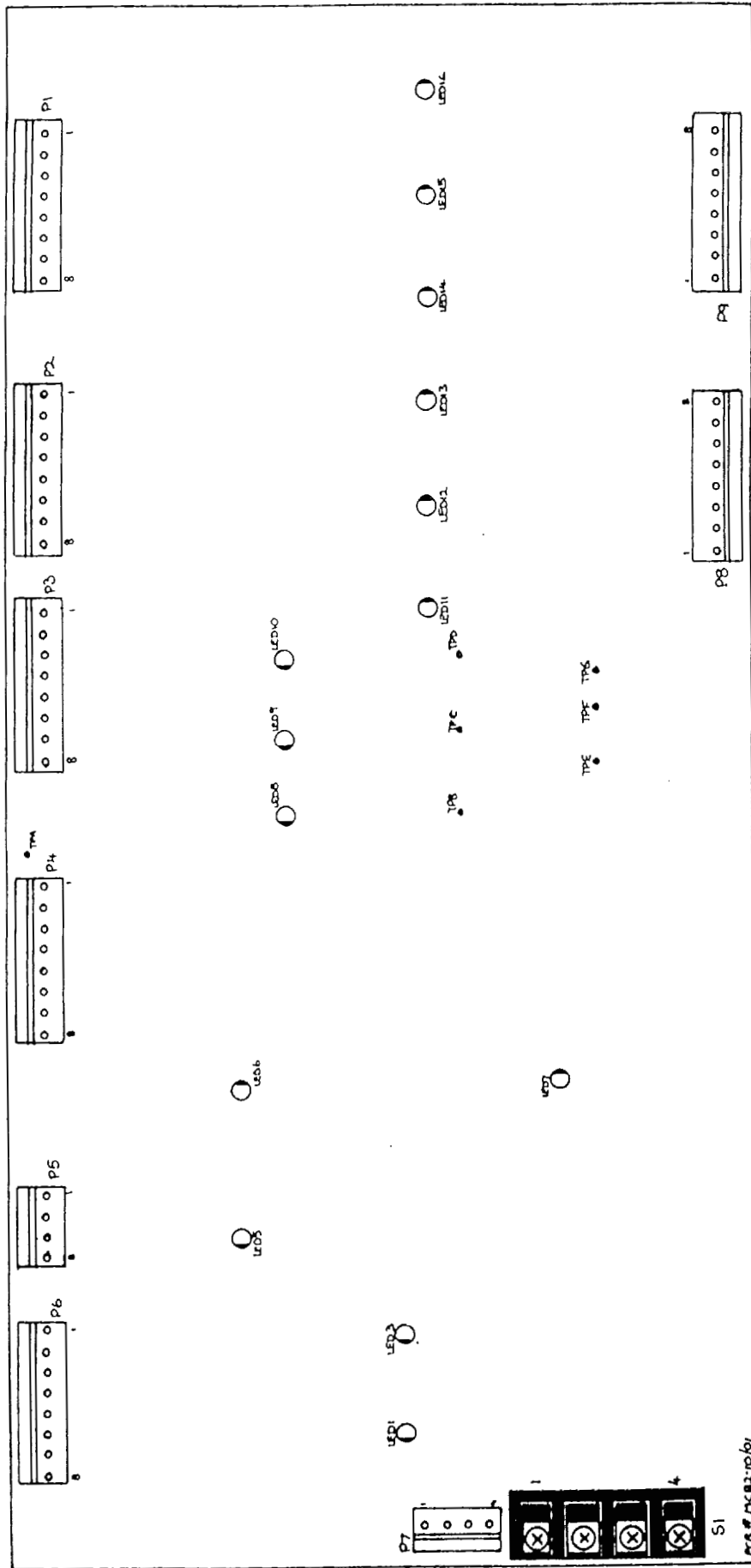
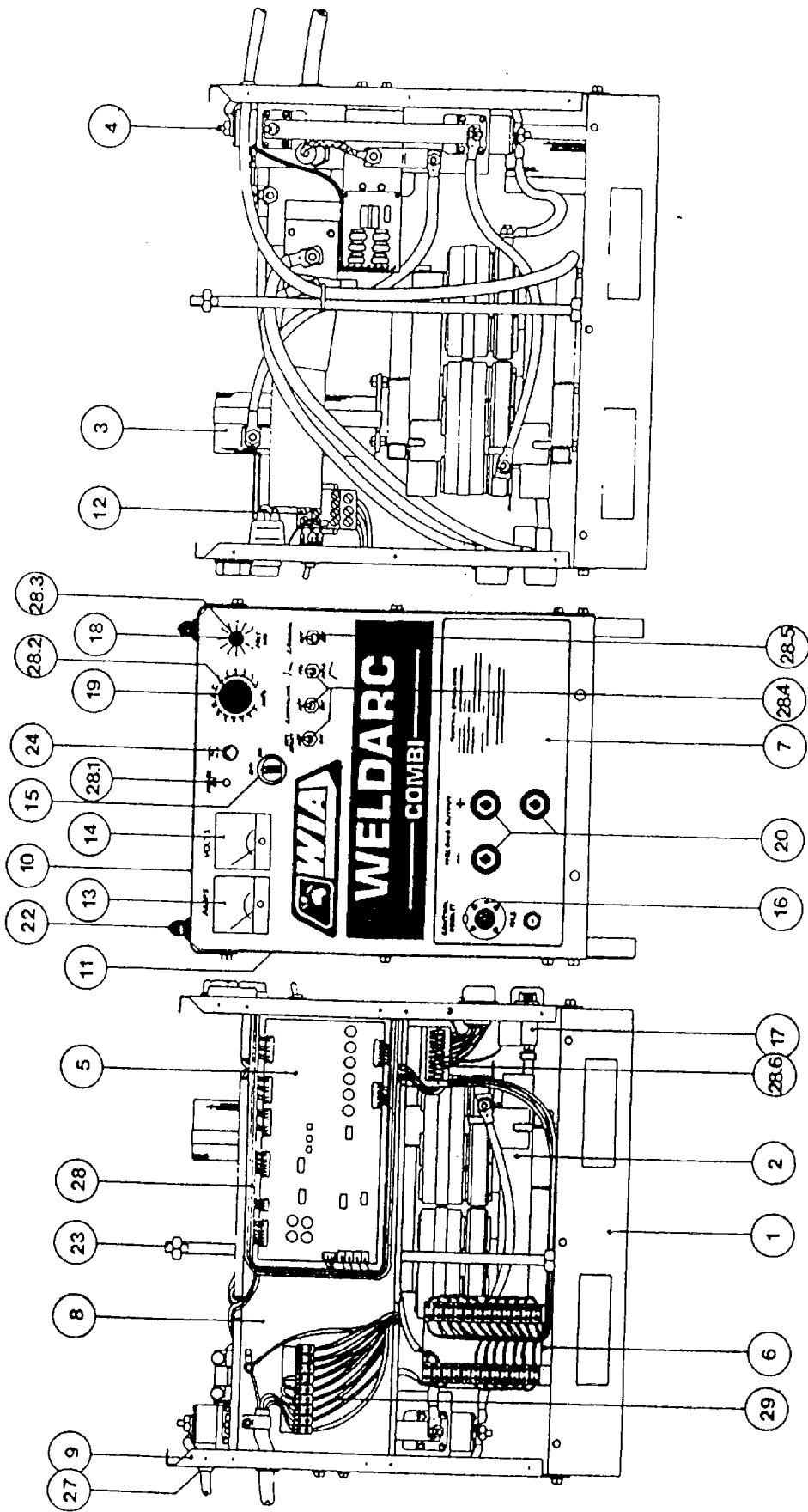


FIGURE 5. MAIN CONTROL PCB OVERLAY MC82-10

## 9. SPARE PARTS LISTS

## 9.1 POWER SOURCE ASSEMBLY

ITEM #	PART #	DESCRIPTION
1	MC82-12	BASE ASSEMBLY
2	MC82-25	TRANSFORMER ASSEMBLY
3	MC82-14	INDUCTANCE ASSEMBLY
4	MC82-15	RECTIFIER ASSEMBLY
5	MC82-10	SCR CONTROL BOARD
6	MC82-1/6	CONTROL TRANSFORMER
7	MC82-11	FRONT PANEL
8	MC82-16	SIDE COMPONENT RAY
9	MC82-20	BACK PANEL
10	MC82-17	TOP COVER
11	CP15-28	SIDE PANEL
12	MC82-0/8	CONTACTOR
13	CP33-0/10	AMMETER
14	MC82-0/11	VOLTMETER
15	MC82-0/15	ON/OFF SWITCH
16	CP34-0/14	PLUG SOCKET
17	W1-33/1	GAS VALVE
18	W5-10/19	KNOB
19	W11-0/16	KNOB
20	AM16	OUTPUT TERMINAL
22	08029F	EYE NUT
23	MC82-0/23	LIFTING ROD
24	W1-23	FUSE HOLDER
27	CP3-0/23	GROMMET
28	MC82-0/28	MAIN LOOM ASSEMBLY
28.1	W17-0/11	INDICATOR LIGHT
28.2	CP34-36/2	POTENTIOMETER
28.3	CP29-0/39	POTENTIOMETER
28.4	W1-20	SWITCH
28.5	W5-10/9	SWITCH
28.6	CP34-44/01	H.F. FILTER BOARD
29	MC82-0/29	HIGH VOLTAGE LOOM



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FIGURE 6. POWER SOURCE ASSEMBLY

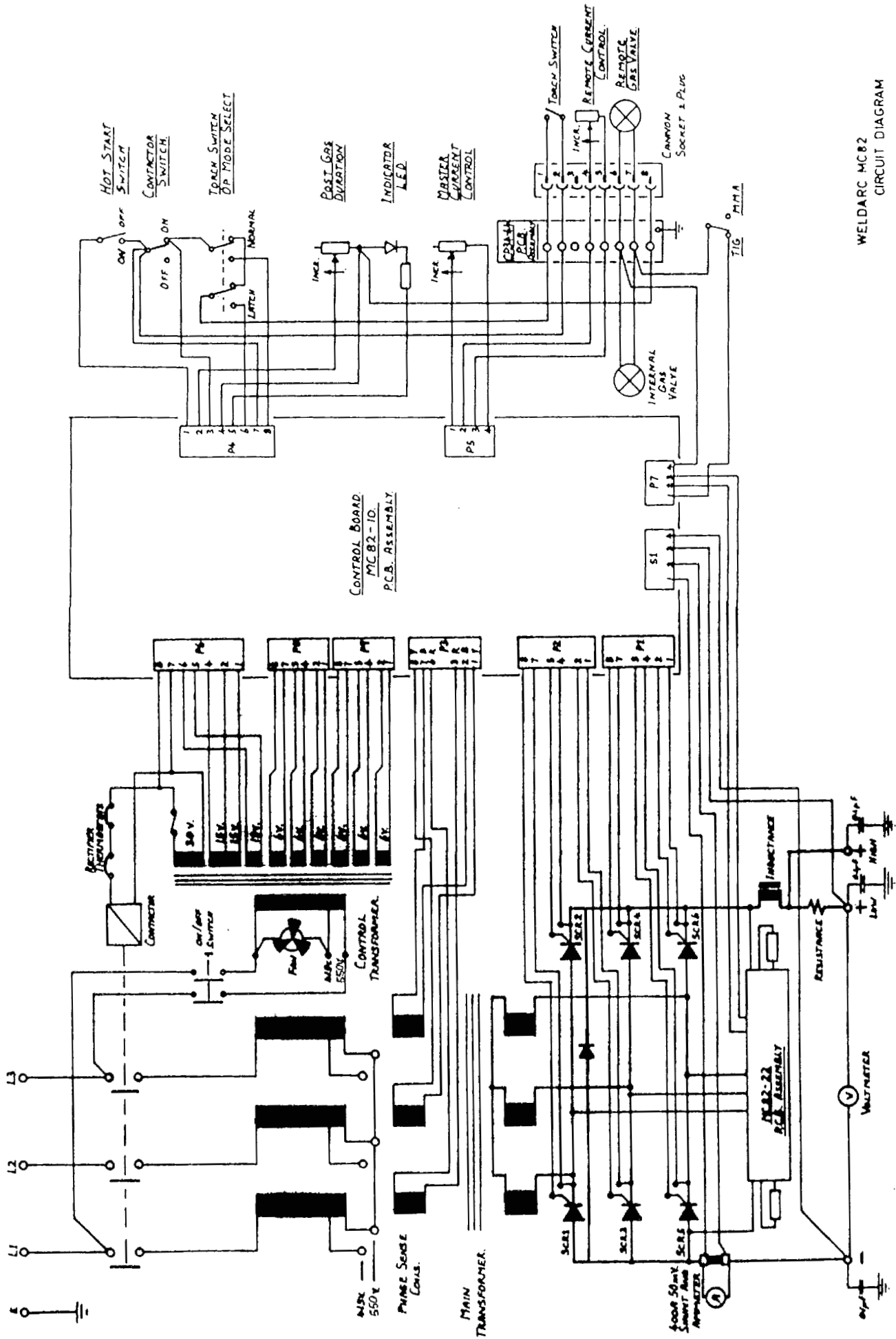


FIGURE 8. WELDARC COMBI CIRCUIT DIAGRAM

WELDARC MCB2  
CIRCUIT DIAGRAM

MCB2-C1

## SAFE PRACTICES IN USING WELDING EQUIPMENT

Produced by Welding Industries of Australia Pty. Ltd. in the interests of improving operator safety. These notes should be considered only as a basic guide to Safe Working Habits. A full list of Standards pertaining to industry is available from the Standards Association of Australia, also various State Electricity Authorities, Departments of Labour and Industry or Mines Department and other Local Health or Safety Inspection Authorities may have additional requirements.

1. A neat uncluttered work area makes for safe working habits.

### 2. Burn Prevention

The welding arc is intense and visibly bright. Its radiation can damage eyes, penetrate lightweight clothing, reflect from light-coloured surfaces, and burn the skin and eyes. Skin burns resemble acute sunburn, those from gas-shielded arcs are more severe and painful.

Wear protective clothing - leather (or asbestos) gauntlet gloves, hat, and safety-toe boots. Button shirt collar and pocket flaps, and wear cuffless trousers to avoid entry of sparks and slag.

NEVER LOOK AT AN ARC WITHOUT PROTECTION.

Wear helmet with safety goggles or glasses with side shields underneath, appropriate filter lenses or plates (protected by clear cover glass). This is a MUST for welding or cutting, (and chipping) to protect the eyes from radiant energy and flying metal. Replace cover glass when broken, pitted, or spattered.

Avoid oily or greasy clothing. A spark may ignite them. Hot metal such as electrode stubs and workpieces should never be handled without gloves.

Ear plugs should be worn when welding in overhead positions or in a confined space. A hard hat should be worn when others work overhead.

Flammable hair preparations should not be used by persons intending to weld or cut.

### 3. Toxic Fume Prevention

Adequate ventilation is essential. Severe discomfort, illness or death can result from fumes, vapors, heat, or oxygen enrichment or depletion that welding (or cutting) may produce. Prevent them with adequate ventilation. NEVER ventilate with oxygen.

Lead, cadmium, zinc, mercury, and beryllium bearing and similar materials when welded (or cut) may produce harmful concentrations of toxic fumes. Adequate local exhaust ventilation must be used, or each person in the area as well as the operator must wear an air-supplied respirator. For beryllium, both must be used. Metals coated with or containing materials that emit fumes should not be heated unless coating is removed from the work surface, the area is well ventilated, or the operator wears an air-supplied respirator.

Work in a confined space only while it is being ventilated and, if necessary, while wearing air-supplied respirator.

Vapors from chlorinated solvents can be decomposed by the heat of the arc (or flame) to form PHOSGENE, a highly toxic gas, and lung and eye irritating products. The ultra-violet (radiant) energy of the arc can also decompose trichlorethylene and perchlorethylene vapors to form phosgene. Do not WELD or cut where solvent vapors can be drawn into the welding or cutting atmosphere or where the radiant energy can penetrate to atmospheres containing even minute amounts of trichlorethylene or perchlorethylene.

#### 4. Fire and Explosion Prevention

Causes of fire and explosion are:- Combustibles reached by the arc, flame, flying sparks, hot slag, or heated material; misuse of compressed gases and cylinders; and short circuits.

Be aware that flying sparks or falling slag can pass through cracks, along pipes, through windows or doors, and through wall or floor openings, out of sight of the goggled operator. Sparks and slag can fly 10 metres.

To prevent fires and explosions:- Keep equipment clean and operable, free of oil, grease, and (in electrical parts) of metallic particles that can cause short circuits.

If combustibles are in area, do NOT weld or cut. Move the work if practicable, to an area free of combustibles. Avoid paint spray rooms, dip tanks, storage areas, ventilators. If the work can not be moved, move combustibles at least 10 metres away out of reach of sparks and heat; or protect against ignition with suitable and snug-fitting fire-resistant covers or shields.

Walls touching combustibles on opposite sides should not be welded on (or cut). Walls, ceilings, and floor near work should be protected by heat-resistant covers or shields.

Fire watcher must be standing by with suitable fire extinguishing equipment during and for some time after welding or cutting if:

- (I) combustibles (including building construction) are within 10 metres.
- (II) combustibles are further than 10 metres but can be ignited by sparks.
- (III) openings (concealed or visible) in floors or walls within 10 metres may expose combustibles to sparks.
- (IV) combustibles adjacent to walls, ceilings, roofs, or metal partitions can be ignited by radiant or conducted heat.

After work is done, check that area is free of sparks, glowing embers, and flames.

An empty container that held combustibles, or can produce flammable vapors when heated, must never be welded on or cut, unless container has first been cleaned as described in AS.1674-1974, the S.A.A. Cutting and Welding Safety Code. This includes: a thorough steam or caustic cleaning (or a solvent or water washing, depending on the combustible's solubility) followed by purging and inerting with nitrogen or carbon dioxide, and using protective equipment as recommended in AS.1674-1974. Water-filling just below working level may substitute for inerting.

Hollow castings or containers must be vented before welding or cutting. They can explode. Never weld or cut where the air may contain flammable dust, gas, or liquid vapors such as petrol).

#### 5. Shock Prevention

Exposed conductors or other bare metal in the welding circuit, or ungrounded electrically alive equipment can fatally shock a person whose body becomes a conductor. Ensure that the machine is correctly connected and earthed. If unsure have machine installed by a qualified electrician. On mobile or portable equipment, regularly inspect condition of trailing power leads and connecting plugs. Repair or replace damaged leads.

#### 6. Electrode Holders and Connectors

Fully insulated electrode holders should be used. Do not use holders with protruding screws. Fully insulated lock-type connectors should be used to join welding cable lengths.

#### 7. Terminals

Terminals and other exposed parts of electrical units should have insulated knobs or covers secured before operation.