



# Contents

<b>1. INTRODUCTION</b> .....	<b>3</b>
<b>2. INDICATORS AND CONTROLS</b> .....	<b>4</b>
<b>2.1 Main Control functions</b> .....	<b>4</b>
<b>2.2 Output Indicators</b> .....	<b>5</b>
<b>3. COMMUNICATIONS PROCEDURES</b> .....	<b>6</b>
<b>4. CIRCUIT DIAGRAM</b> .....	<b>8</b>

## 1. INTRODUCTION

The purpose of the Supervisor's Remote Panel is to allow the diving supervisor to have overall control of the plasma cutting operation. It should be used in conjunction with a suitable communications procedure.

It allows the supervisor to monitor the status of the cutting equipment up to the point at which the diver is able and ready to commence cutting. At this point the diver can indicate his readiness and when the torch is in position press the divers switch. This will be shown on the panel and the supervisor can energise the torch. Either can stop the torch, but to re-start the same procedure must be followed.

The display includes the main fault indicators for the power unit, and a remote reset facility, such that the power unit may be positioned to suit the working position of the torch umbilical, access only being required for switching on and off.

It also displays output status, including cutting current and voltage. With experience these can be used as indicators of cutting speed, stand-off, etc., as well as showing possible fluctuations in the supply.

## 2. INDICATORS AND CONTROLS

### 2.1 Main Control functions

The left hand column of indicator lights shows the machine status. The power light shows that the machine is running. The four red lights repeat the fault indicators on the machine (see main manual) and the reset button has the same function as that on the machine front panel. In addition it resets the supervisors panel after a fault, and will always have to be operated on start up. If no faults are present, the Machine Ready light will show at the top of the second column.

Once the machine is ready, it is then necessary to establish the earth loop with the two earth lead connections to the workpiece. This will be indicated by the second green light, and the diver switch cannot be activated until this is lit.

Once the earth loop is made the communication procedure can be initiated to start cutting.

The brightness of the indicators can be adjusted to compensate for the ambient light level (eg sunlight).

The supervisors switch is labelled "1" (green) to "make it hot" and "0" (red) to "make it cold". A neon indicator on the switch shows that the torch is "hot".



## 2.2 Output Indicators

In addition to the neon indicator showing that power is applied to the torch, two yellow lights show when a pilot arc current and main arc current are present. Note that the pilot current will switch off when the main arc is established.

In addition, the arc voltage and current are shown on meters. With experience these can yield useful information.

The output of the power unit follows a “drooping characteristic” so that as the output current increases the voltage will decrease.

The voltage will increase with cutting thickness, kerf width, working depth, stand-off and reduction in cutting speed. Therefore with a given thickness and depth it can indicate whether the diver is cutting at the correct speed and controlling the torch correctly to avoid excessive kerf width. It can also indicate if the consumables are damaged or worn (low voltage). The characteristic will pass through some nominal output point (say 200A at 150v) but this will be affected by the supply voltage. Thus it can indicate a problem with the supply.



### 3. COMMUNICATIONS PROCEDURES

It was found in early trials that confusion could arise if communications procedures were not clear. In particular, the divers switch light should never be interpreted as a request to "make it hot", since it could have been inadvertently actuated, or even failed. It is probably best to adapt a familiar existing procedure such as may be used for welding and other similar processes. Whilst we give an example of a suitable procedure below, it would be better to base it on an existing familiar procedure where a suitable one already exists.

The main difference will probably be in the dual control (by both Diver and Supervisor) required to energise the torch. Most welding related processes have been used with control on the surface. The dual control has been introduced to maximise safety.

The required sequence of events is:

- a) Establish dual earth connection, and get in position to cut
- b) Diver to operate and hold torch switch, and request supervisor to energise torch.
- c) Supervisor energises torch and diver cuts.
- d) On completion of cut diver releases torch switch, and requests "switch off".

Even though the diver will normally make it cold by releasing the torch switch, it is still good practice to ask the supervisor to "make it cold" in case of switch failure and so that both are clear it remains cold until the start procedure is resumed.

The Supervisor can make it cold at any time, for instance if any of the following situations are recognised:

- Cut in wrong place.
- Operator technique likely to damage torch.
- Consumables expiring/damaged
- A dangerous or damaging situation has arisen.

The following is the procedure adopted by the UK MOD and Royal Navy divers in the early trials:

## SAFE SYSTEM OF WORK FOR PLASMA AIR CUTTING

<b>ACTION</b>	<b>DIVER</b>	<b>SUPERVISOR</b>	<b>RESULT</b>
1. Diver is instructed as per the diving brief to attach the earth leads, either side of the planned cut. When attached he reports to the supervisor.	"Earth leads connected"	Supervisor checks the control board to establish if the earth loop lights illuminated. If no light he instructs the diver reconnect the earth leads. If the light is illuminated he informs the diver :- "Earth is Good Clear to cut"	The diver has correctly attached the earth leads. He then proceeds to establish himself in a comfortable cutting stance, ready to commence cutting.
2. When the diver is settled in his cutting stance he depresses the torch trigger and reports to the supervisor.	"Make it hot"	Supervisor checks that the divers switch light is illuminated and presses the start switch, and reports: "Torch is hot"	Power is applied to the torch and cutting commences.
3. On completion of the cut the diver releases the trigger and reports to the supervisor.	"Make it cold"	Supervisor checks that the torch switch is off and that the output light is off. *	Power is off to the torch
4. If the diver has made it cold to readjust his cutting stance, the sequence for powering up the torch will commence at para. 2.		Supervisor confirms "Torch is cold"	
* Note that if the power does not switch off upon release of the torch switch, this must be investigated before cutting again.			

## 4. CIRCUIT DIAGRAM

PARU01 Supervisors Panel

