SmartPak Welding Controller
WK-MPS-16 *Constant Current*
WESTKEN Electronics Division

Features

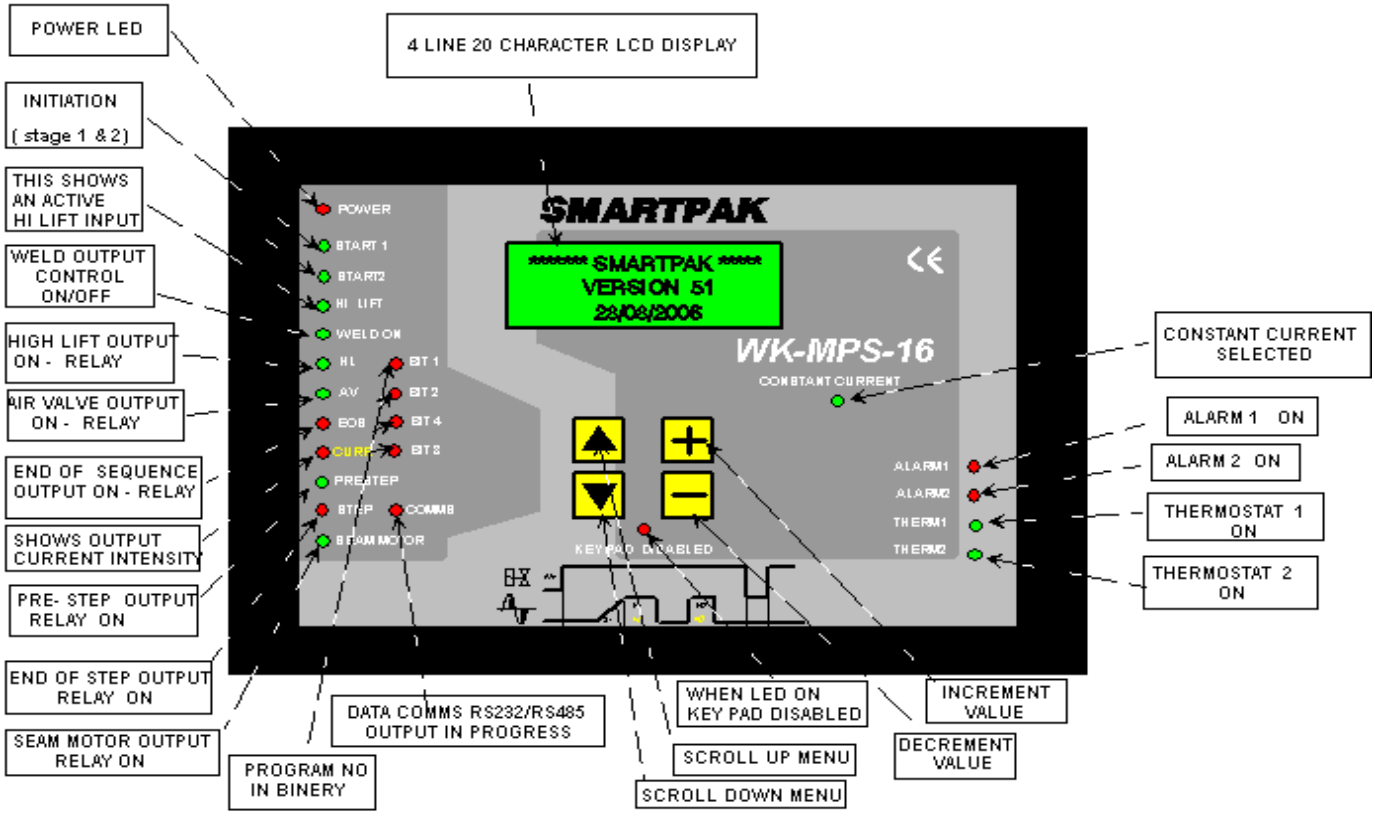
- Latest state of the art ATMEL 8 bit microprocessor technology
- Synchronous digital welding control allows absolute precision
- Up to16 programs available
- Simple to use pushbutton keys
- All inputs optically isolated using +24V DC activation
- All outputs optically isolated
- Memory retention after power-down or mains failure
- Constant Current (Secondary requires Rogowesky feedback coil/Primary CT coil)
- Current readout in Standard Mode & Constant Current
- - Will work up to 100KA
- 4 lines x 20 characters alpha-numeric LCD display
- Front panel LED's for all inputs, outputs & control operations
- Relay contacts for air valve switching – AC or DC.
- End of Sequence pulse (EOS) Relay Contacts – N/O or N/C
- Hi Lift Relay Contacts – AC or DC switching.
- 1st & 2nd Stage Initiation
- ½ Cycle Option Selectable
- Pulsation Option Selectable
- Upslope & Downslope
- Meets European CE standard
- Seam Welding
- Alarm outputs

- Programmable Heat adjustment for tip wear
- Data output (real time information) - RS232 /RS485 / Ethernet
- Variable air pressure valve control with 5 recipes
- Dipswitch selectable menus
- Dual Gun (special output board)
- Pgm sel – External selector or using the keypad
- Machine operation cycle count
- Primary or Secondary Feedback coil possible.

SMARTPAK USER MANUAL

CONTENTS

FRONT PANEL DISPLAY



1. Power Led (red) :- This shows when there is power +12v coming to the Display board.

2. Initiation(green) :- **Start1** & **Start2** . This is used to initiate welding . **Start1** will enable the airvalve while **Start2** will complete the initiation process and allow the welding to start.

Often both start1 & start2 and joined together (they are not used separately).

3. High Lift Input(green) :- This led will come on when the there is a +24v signal on the high lift input.

4. Weld Output On/Off Control(green):- This is enabled/disabled by a+24v signal on the weld on/off input. This will enable or disable the welding output to Scr's of the stack. Therefore one can go

through the welding sequence without any welding taking place by disabling the Weld on/off output. This output can also be controlled by using lcd display /keypad. This control is in the weld menu.

5. High Lift Relay (green):- This led will go on when the High Lift relay is turned on.

6. Air Valve Relay (red):- This led is turned on when the Air valve relay is turned on.

7. End Of Sequence (Red):- This led comes on when the Eos relay is enabled. This signifies the weld cycle is complete and that it is now ready for another initiation. The on Time can be selected using **Eos Delay** in the Miscellaneous Menu

8. Weld Current (red):- This led shows the weld current intensity. The brighter led is the greater the weld current.

9. Pre-Step (green):- This led comes on when the pre-step relay is turned on. This will happen when stepping is enabled in the step menu. Stepping is used to counteract tip wear which results in welding current reduction. On each step the current is increased by the predetermined amount selected in the menu by change. Pre step comes on one weld cycle before the End of Step output.

10. Step (End of Step)(red):- This led comes on when the end of Step relay is turned on. This means that the tip needs replacing . Welding can continue however the end of step relay can be used to stop welding.

11. Seam Motor Relay (red):- This comes on when seam welding is selected in the menu and welding has been initiated at the same time as the air valve. It is used to turn on the seam motor which is used to advance the material being welded.

12. Program Number (in binery – red):- This is the program number which has been selected via a thumbwheel switch or the PLC . The red leds show the number in binary notation.

13. Data Comms Led (red):- This led comes on to data comms output in progress**.** This is the data output which can be selected in RS232 ,RS485 or Ether net mode. The data gives a record of the welding operation and can be used as a record of the welds **.**

14. Scroll Up Key :- This key is used to scroll up through the menu's on the Lcd screen.

15. Scroll Down Key :- This key is used to scroll down through the menu's on the Lcd screen.

16. Keypad Disable Led (red):- This led comes on when the keypad has been disabled.

17. Plus Key (+):- This key is used to increment values selected on the Lcd screen.

18. Minus Key (-):- This key is used to decrement value selected on the Lcd screen.

19. Thermostat 2 (green):- This led comes on when the thermostat 2 input has been enabled ie 0V is present at thermostat 2 input of the output board.

20. Thermostat 1 (green):- This led comes on when the thermostat 1 input has been enabled ie 0V is present at thermostat 1 input of the output board.

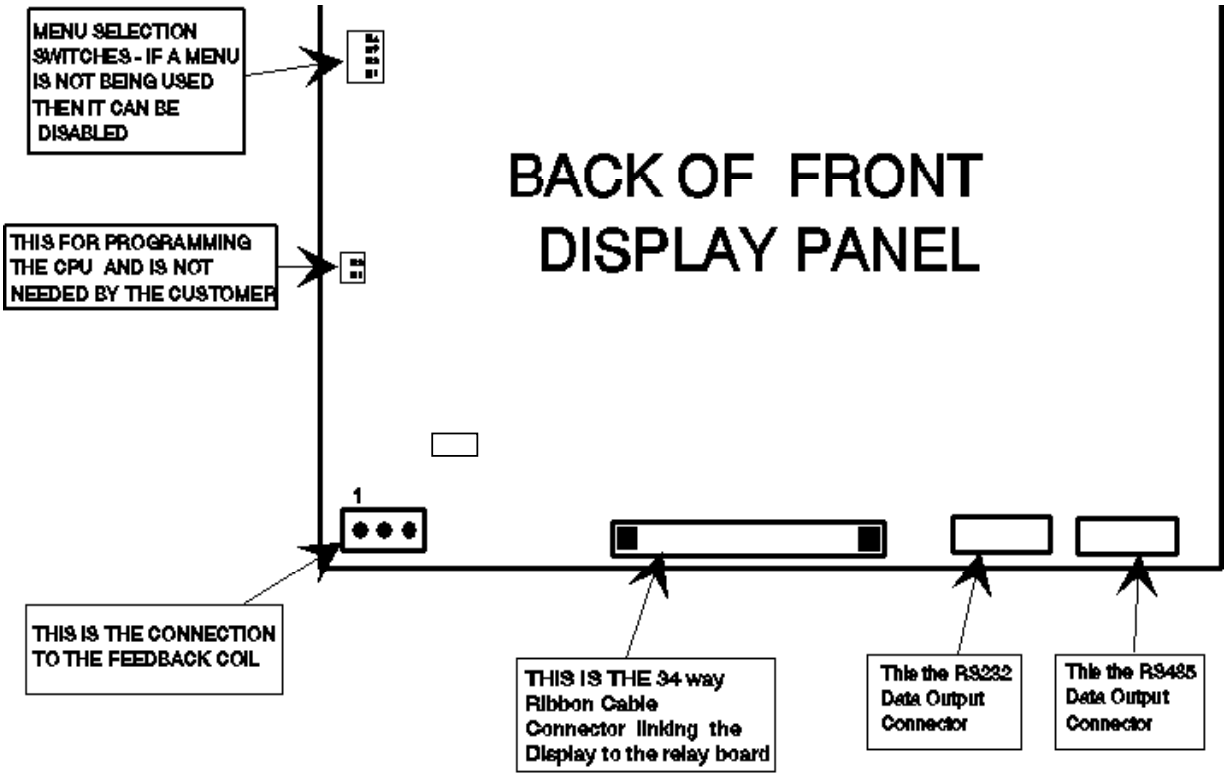
21. Alarm 2 (red) :- The alarm 2 led comes on when the alarm 2 relay has been turned on. Alarm conditions that would cause it to come on are End of Step and Current out of limits (only constant current.)

22. Alarm 1 (red) :- The alarm 1 led comes on when the alarm 1 relay has been turned on. Alarm conditions that would cause it to come on are High Lift not enabled , thermostat alarm and current too low (only constant current).

23. Constant Current Led (green):- This led is turned if constant current has been selected for welding.

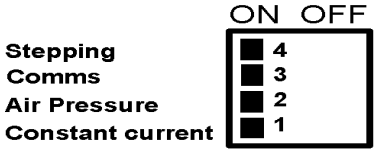
24. LCD DISPLAY :- This is a four by 20 alpha numeric Lcd display which also has backlighting.

BACK OF FRONT PANEL DISPLAY



1. Menu Selection Dip switch :- This is allows menus which are not being used **Step, Data comms , constant current & Air pressure** to be deselected. By switching the dip switches to the on position.

Switch 1 :- Current menu & Restricted Machine Calibrate
Switch 2 :- Air Pressure Menu
Switch 3 :- Data Comms Menu
Switch 4 :- Step Menu Restricted



2. Programming Dip Switch :- This is used to programme the cpu and is not needed by

the customer. Should be in the On position.

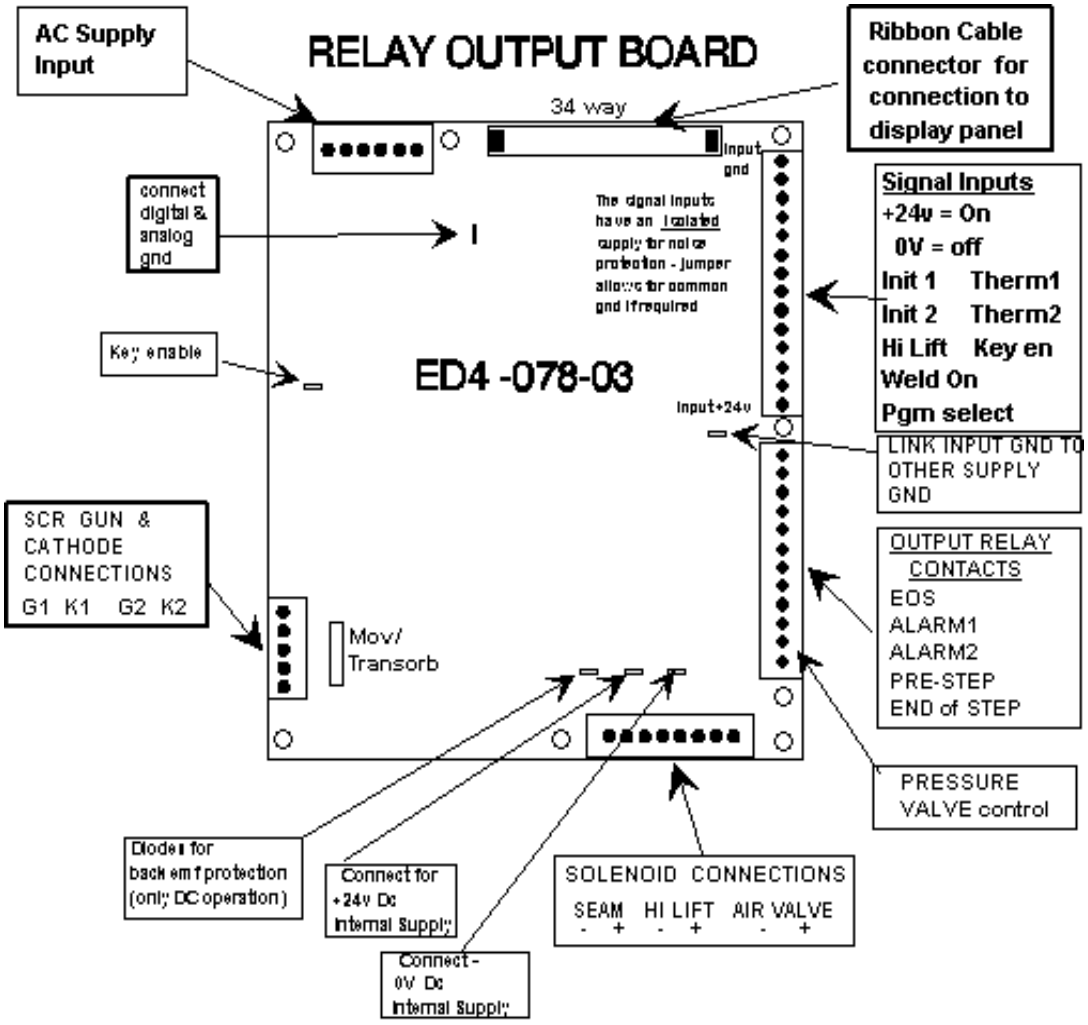
3. Feedback Connector:- This connector is for the feedback coil(Primary/Secondary) . Pin 1 is the hot wire Pin 2 must be connected to gnd and Pin3 is gnd

4. Ribbon Cable Connector:- This a 34 way ribbon cable connector to connect the Front Panel Display to the relay board.

5. RS232 Connector:- This is the RS232 data output connector . Pin 2 is Tx , Pin 3 Rx and Pin 8 is gnd.

6. RS485 Connector:- This is the RS485 data output connector. Pin 2 is Txa , Pin 2 is TXb. Pin 5 is RXa and Pin 6 is RXb. Pin 7 is Gnd.

7. Ethernet Connector:- If fitted is a RJ45 connector . The Ethernet cable plugs into this connector and will allow for Ethernet connectivity for the smartpak.



1. **Ac supply input :-** This is a 19v @10VA ,14v@8VA & 19v@30VA ac supply .
2. **Jumper JP1 :-** This is to connect analog and digital gnd. It should linked for most operating conditions.
3. **Jumper JP2:-** Key enable . This is to enable the keypad and can be used to override the key enable/disable input.
4. **Scr firing connections :-** This is the SCR firing pulses that control the current . These pins are for the gate and cathode of scr1 & scr2. A mov or transorb can be fitted to provide extra protection for the SCR's .
5. **Jumper JP6 :-** This is used to connect the 3 diodes on the Hi Lift , Seam & Air valve.

   For back emf protection generated by the solenoids.*(Not connected for AC solenoids)*
   Connected when using DC solenoids.
5. **Jumper JP4 :-** This the +24v for DC solenoids which are using the relay board's internal supply. (*this jumper is not connected when using*

ac solenoids or an external dc supply)

6. **Jumper JP5 :-** This the internal 0V for DC solenoids which are using the relay board's internal supply. (*this jumper is not connected when using ac solenoids or an external dc supply)*
7. **Solenoids Connection:-** These are the connections for the Seam,Hi Lift & Air valve solenoids
8. **Air Pressure valve control :-** This is the variable air pressure control voltage ouput. This is connected the valve control circuit as well as gnd
9. **Output Relay Contacts :-** These contacts are for EOS,ALARM1,ALARM2,PRE_STEP & End of Step. The N/O contact and the Com are available.
10. **Signal Inputs :-** These are signal inputs +24v is on and 0v is off. (except for thermostats which reversed). The signal +24v is available on the connector as well as the Input gnd. These are isolated from the solenoid 24v supply for noise protection.
11. **Ribbon Cable Connector :-** This is a 34 way ribbon cable connector used to connect the display panel to the relay board.

NOTE : A dual output board is also available - for dual gun operation.

SmartPak Menu's

The WK-MPS-16 welding controller offers up to 16 different programs and is designed for use with single-stage or dual-stage initiated projection & spot welding stations. There are eleven menus which can be scrolled through by pressing the up or down key.

The Menu's are :-

1. **RESTRICTED SETTINGS MENU**
2. **WELD MENU**
3. **DELAY MENU**
4. **MISCELLANEOUS MENU**
5. **RESET COUNT**
6. **CURRENT MENU**
7. **CONSTNT CUR RESTRICT MENU**
8. **COIL SETTINGS RESTRIC MENU**
9. **STEP MENU RESTRICTED**
10. **COMMS SELECTION MENU**
11. **AIR PRESSURE MENU**

Function: MWK-MPS-16 (Projection/Spot)

Restricted Access – Global Settings

Parameter	Minimum	Maximum	Resolution	Global
Power Factor	0	0.99	0.01	Yes
Ext Pgm Select	-	-	On/Off	Yes
Hi Latch	-	-	On/Off	Yes
Default Settings	-	-	On/Off	Yes
Dual Mode	-	-	On/Off	Yes
½ Cycles	-	-	On/Off	No

This is intended for the technician or engineer only

Power Factor or PF :- This is a global setting which in reality advances or retards the firing angle of the SCR firing pulses. Ie increases or reduces the heat. This global setting allows correction needed because of the transformer (each machine needs a slightly different adjustment.

Ext Pgm Select :- This allows program selection either via the external program switch or by the internal keypad.

Hi Latch :- This to enable Hi Lift Latch mode. This enable the hi lift to latched on

with a hi lift input pulse . The next pulse will unlatch it.

Default Settings :- When the plus key is pressed the default settings is enabled and when The plus key is pressed again the default settings will be loaded into all the values.

Dual Mode :- Dual Mode allows the timer to work with two guns and/or two separate welding machines/transformers. A **special dual gun relay board** has been developed should the customer wish to use the dual gun option. See Page 26 for more information.

Weld Menu

Parameter	Minimum	Maximum	Resolution	Global
Weld 1	0	99	1 Cycle	No
Weld 2	0	99	1 Cycle	No
Weld 3	0	99	1 Cycle	No
% Heat 1	10%	99%	1%	No
% Heat 2	10%	99%	1%	No
% Heat 3	10%	99%	1%	No
Weld On/Off	-	-	On/Off	Yes

Default setting for Weld On/Off is on

Three weld procedures are possible at the %heat can be set from 10% to 99% When the number of weld cycles is 0 they will not be used. Ie for Weld2 & Weld3.

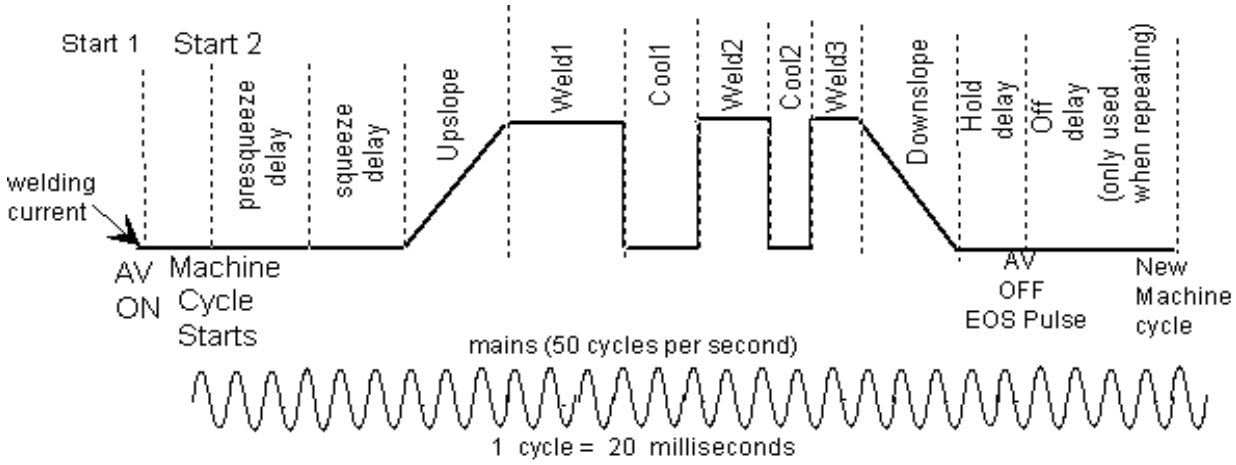
Weld On/Off: This a control available as an external control or internal(keypad) to turn the welding on or off. This will not stop the timer going through the complete cycle the only difference being that there will be no welding current.

Delay Menu

Parameter	Minimum	Maximum	Resolution	Global
Pre-squeeze	0	99	1 Cycle	No
Squeeze	0	99	1 Cycle	No
Cool	0	99	1 Cycle	No
Cool2	0	99	1 Cycle	No
Hold	0	99	1 Cycle	No
Off	0	99	1 Cycle	No

NB Repeat is enabled when Off is set too greater than 0

Delays :- These are delays used to space the welding and to allow time for the welding head to come down and clamp the metals together that are to be welded. Spot welding uses resistance welding so the metals need to clamped together to reduce the resistance and to make sure the material is welded properly. .



Presqueeze Delay :- This is to create a delay of up to 99 cycles of 20msec each

Squeeze Delay :- This is to create a delay of up to 99 cycles of 20msec each and is used to allow the pressure on the metal to be welded to reach its maximum before welding commences.

Cool Delay :- This is also used create a delay of up to 99 cycles of 20msec and is used to allow cooling between weld1 and weld2.

Cool1 Delay :- This is also used create a delay of up to 99 cycles of 20msec and is used to allow cooling between weld1 and weld2.

Hold Delay :- This is also used create a delay of up to 99 cycles of 20msec. This is used to provide time for weld to set and cool before the clamp is released.

Off Delay :- This delay is only brought into effect when there is a repeat welding process. And allows time for the material to be positioned for the next weld.

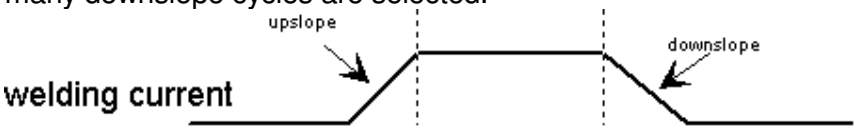
Miscellaneous Menu

Parameter	Minimum	Maximum	Resolution	Global
Upslope	1	10	1	No
Downslope	1	10	1	No
Eos Delay	1	10	1	Yes
Pulsations	1	99	1 pulse	No
W	1	2	1	No
seam			On/Off	Yes

Eos Delay This allows the End of Squence On time to be varied. The Eos ***On time*** effects the total time when in repeat mode that the Air Valve will be off . Therefore by varying the delay time when in repeat mode eg the delay can be set to 0 . This will result in a shorter off time for the AV.

Upslope : This slopes the current from 0 amps up to the welding current selected. This is will be a longer or shorter slope depending on how many upslope cycles are selected.

Downslope: The downslope drops the current from welding current selected to 0 amps. This will only occure on the last weld procedure and will be a longer or shorter slope depending on how many downslope cycles are selected.



Pulsations: -

Is only for **Weld 2 or Weld1** depending on what has been selected in the misc menu.The number of pulsations is selectable between 1 and 99. The pulsation Cycle consists of Weld1/2 & Cool1/2 and will loop around these two until the pulsations are complete. It will then proceed with the rest of the selected cycle.

Weld procedure Select
This is to select whether the pulsations will be on weld procedure 1 or weld procedure 2 . Weld procedure 3 is not used.

Seam: This is for seam welding and will weld on the first weld procedure only. It is activated when start1 and start2 are enabled and will continue welding until start1 or start2 are turned off. The seam motor output will come on at the same time as the air valve. When start1 or start2

are turned off the smartpak turns off the seam motor and air valve and exits the weld routine . It does an EOS and is then ready to start welding again.

(internal) Change Program No ***

Parameter	Minimum	Maximum	Resolution	Global
Prgm Select	0	15	1	Yes

*** only visable when external program select is set to Off

Pgm select: This is used to increment or decrement the Program No using the keypad **+** and **-** keys. (This is when external pgm is set to off in the Restricted Access – Global Settings menu)

Reset Counters

Parameter	Minimum	Maximum	Resolution	Global
Machine Count	0	999	Reset	Yes
Step Count	0	20	Reset	Yes

This is for resetting the counters to zero.

Constant Current

Parameter	Minimum	Maximum	Resolution	Global
Constant Current	-	-	On/Off	No
Target Current 1	1 KVA	60 KVA	100 VA	No
Target Current 2	1 KVA	60 KVA	100 VA	No
Target Current 3	1 KVA	60 KVA	100 VA	No

DIP SWITCH 1(enable menu)

Constant Current :- This is a prime feature of the timer and will using a feedback coil to measure the current will keep the current constant to a pre-selected target . Each welding procedure has a separate target setting. Constant current needs to be selected for a particular program and will show it has been selected by a green led on the faceplate of the Smartpak.

CONSTNT CUR RESTRICT MENU

Parameter	Minimum	Maximum	Resolution	Global
CALABRATI ON VALUE	-	-	1	Yes
Cal Machine	1 - Yes/No	2 - Yes/No	-	Yes
C Limits enable			Yes/No	Yes
U%	4%	25%	1%	Yes
L%	4%	25%	1%	Yes

DIP SWITCH 1 (enable menu)

Cal Machine : or calibrate machine. This needs to be done when the machine is being installed and should not need be done unless the timer is changed or the welding machine is modified. When the calibration is done the "N" will change to a "Y" showing that the calibration has been done. In ***Dual mode*** a 1 & 2 will show as there are now two transformers. The calibration must be done separately for both transformers .

C Limits Enable : (Current Limits enable) Current limits can be set which - when welding in constant current are exceeded will bring up an Alarm (alarm2). The limits are a percentage of the welding current target eg 5% (upper limit) 7% (lower limit). So when the actual current exceeds the limits set the alarm will come on. This will not stop welding how ever the alarm2 output can be used disable welding.

U% : This refers to the ***Upper Limit*** and is set between a minimum of 4% up till 25% maximum.

L% : This refers to the ***Lower Limit*** and is set between a minimum of 4% up till 25% maximum.

COIL SETTINGS RESTRIC MENU (Primary)

Parameter	Minimum	Maximum	Resolution	Global
COIL TYPE	primary	secondary	Either/or	Yes
Transformer KVA	50kVA	400KVA	-	Yes
Turns Ratio	1	100	1	Yes

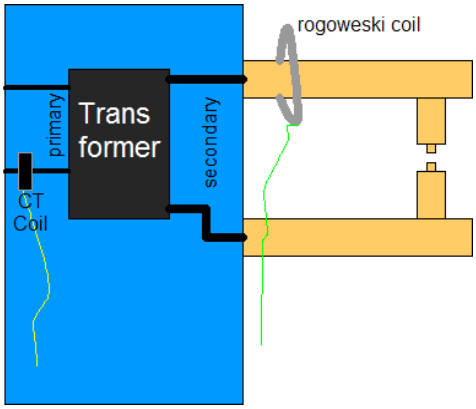
Coil Type: This to select whether you are using a primary or secondary coil for current measurement and feedback. Also remember to select the correct jumper on the display board ***so that the selection in the menu matches the selection on the pcb***.

Transformer Type: This the transformer of the welding machine. It needs to correctly selected and this will occur when the calibration is done. This can still be altered if required. This affects the constant current characteristics of the Smartpak..

Turns Ratio: This is the ratio between the primary and secondary windings . If this is not known then a comparison between the output current (rogowksi coil) using a weld checker and the primary current will give the turns ratio = secondary current/primary current.

COIL SETTINGS RESTRIC MENU (secondary)

Parameter	Minimum	Maximum	Resolution	Global
COIL TYPE	primary	secondary	Either/or	Yes
Transformer KVA	50kVA	400KVA	-	Yes
Coil output	80mV	240mV	1mv	Yes



Coil Type: This to select whether you are using a primary or secondary coil for current measurement and feedback. Also remember to select the correct jumper on the display board so that the selection in the menu matches the selection on the pcb.

Transformer Type: This the transformer of the welding machine. It needs to correctly selected and this will occur when the calibration is done. This can still be altered if required. This affects the constant current characteristics of the Smartpak..

Coil Output : This allows the user to adjust the Smartpak to cater for a feedback coil which does not have 150mV /1000 amps output and make it more or less as required.

Comms Selection Menu

Parameter	Minimum	Maximum	Resolution	Global
Data Output	-	-	On/Off	Yes
RS232/RS485/ Ethernet	-	-	select	Yes

DIPSWITCH 3 (enable menu)

Data Output : The data output provides real time information about the weld and can viewed via RS232 , RS485 or Ethernet.
RS232/RS485/Ethernet : This is select either RS232, RS485 or Ethernet comms .

Air Pressure Menu

Parameter	Minimum	Maximum	Resolution	Global
REF PRESS	0 bar	10 bar	0.1 bar	Yes
RECIPES	0	5	1	No
Air Press P1	0 bar	10 bar	0.1 bar	No
Air Press P2	0 bar	10 bar	0.1 bar	No
Air Press P3	0 bar	10 bar	0.1 bar	No
Air Press P4	0 bar	10 bar	0.1 bar	No
Air Press P5	0 bar	10 bar	0.1 bar	No

DIPSWITCH 2 (enable menu)

See Proportional Air Valve control Pg 17

Step Menu Restricted Global Settings

Parameter	Minimum	Maximum	Resolution	Global
No of Steps	0	20	1	Yes
Counts /Step	0	999	1	Yes
% Heat Change	0	10	1	Yes

DIPSWITCH 4 (enable menu)

This is intended for the technician or engineer only

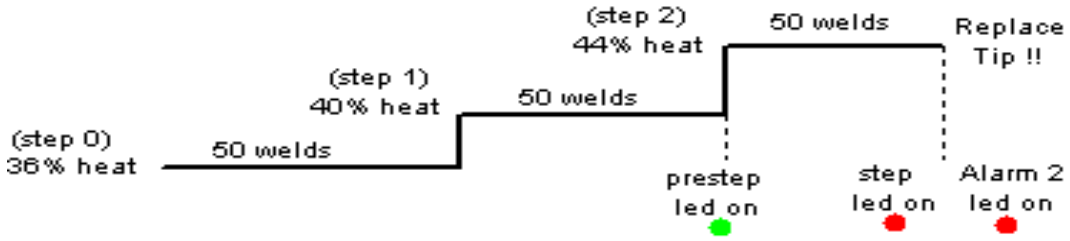
STEPPING

This is used to counteract the wear encounted by the tooling & tips during welding. As the tips lose their sharpness the welding current is produced over a larger area an therefore the heat of the weld is reduced. To counteract this stepping can be used to increase the current by a certain percentage after a set number of welds. After a predefined number of steps determined by the tips being used the operator is told to replace the tips.

No of Steps: This is the number of times you want to step the current up before the tips are replaced.

Counts /Step : This the number of welds done before a step is initiated.

% Heat Change : This is the amount the % heat is increased per step.

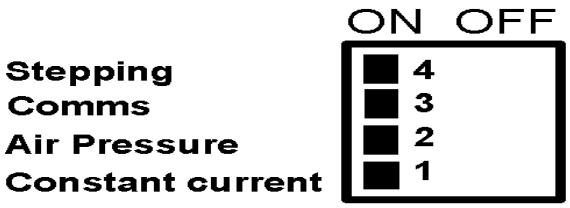


EXAMPLE OF STEPPING

The above parameters are all fully programmable via the push button front panel keys and displayed in English on the 20 characters x 4-line LCD display.

Other languages can be accommodated.

NOTE : 4 dip switches are available on the control pcb which can disable menus not being used.



Push Button Keys Functions

Key	Function
FORWARD ^	Scrolls forward through the Menus & Parameter Settings
BACKWARD v	Scrolls backward through the Menus & Parameter Settings
INCR +	Increments the selected parameter setting
DECR -	Decrements the selected parameter setting
INCR +	Used to select the Adjustment menu to

	change parameters
FORWARD ^ & BACKWARD v	Both Buttons pressed together - to Access The Restricted Global parameters

Changing SmartPak Welding Controllers Settings On Each Program

On Power Up

The message SMARTPAK will be displayed. Provided the KEY ENABLE is enabled and the controller is not welding the Backward and Forward keys will allow scrolling through the Menus. When the required Menu is reached use the **Incr +** to select the menu for adjustment. The **Forward** and **Backward** keys are then used to scroll through the parameters. The screen cursor will indicate the parameter selected and the **Incr +** and **Decr –** keys can then be used to increment or decrement the parameter setting. . Once the new value is seen on LCD screen the value is updated and will be remembered. Use the **Forward** or **Backward** keys to scroll out of the adjustment menu and return to the previous menu.

The following is an example of a typical welding controller program and what could be expected to be seen on the Liquid Crystal Display: -

PGM [02] WELD MENU On
WELD1 10 HEAT1 29%
WELD2 0 HEAT2 18%
WELD3 0 HEAT3 12%

Press the **Incr +** key to enter the **Adjustment Menu.** You have about four seconds once the Menu is selected to proceed to the adjustment menu. The adjustment menu will look similar to This: -

ADJUST : Weld/ON = on
WELD1 10 HEAT1 29%
WELD2 0 HEAT2 18%
WELD3 0 HEAT3 12%

You can by using the backward and forward keys scroll through the parameters. The flashing cursor will indicate the parameter selected. The incr or decr keys can be used to increment or decrement the parameter.

To **exit** the adjustment menu use the backward or forward keys until you return to previous menu.

The Pgm No is selected by the external thumbwheel. The current program number is displayed on the LCD screen.

The Hi-Lift input will disable the welding output if it is not enabled - (Both Key Enable and Hi Lift need to be connected to +24V REG if the features are not used. A jumper on the Relay board is also available to jumper the key enable.)

CALIBRATION

For **Constant Current Operation** the weld unit must be calibrated before it is used for the first time. The Weld Unit should be set up for normal welding operation with no welding material between the bits. ***However where a larger machine(above 15KVA is being used it is better to calibrate it with the welding material that is to be used***. When constant current is selected on the controller the Smartpak controller will ask to do a calibration . Please follow the instructions given. Once the unit has been calibrated there is no need to do it again except in a very large machine where is a big difference between welding materials.

ALARM CONDITIONS: -

TSTAT1: - IF Thermostat (Stack) is over temperature THERMOSTAT ERROR
THERM 1
will be seen on the display and the thermostat led and the Alarm1 led will come on.
The Alarm1 has a relay output**. …….. …- ALARM1**

TSTAT2: - IF Thermostat (Transformer) is over temperature THERMOSTAT ERROR

THERM 2 will be seen on the display and the thermostat led and the Alarm1 led will come on.
The Alarm1 has a relay output. **…… :- ALARM1**

HI LIFT: - If High Lift is off HIGH LIFT OFF will be seen on the display and Alarm1 led will come on. The Alarm1 relay will also come on **:- ALARM1**

NO COIL: - If no Rogowski coil (current feedback) is connected and if **Constant current** has been selected Alarm1 led will be activated – Alarm1 relay will come on and a message of **NO COIL will** be displayed – if it detects less than 400Amps input after 3 weld cycles it will give a **NO CURRENT ALARM Error. …… :- ALARM1**

This would also apply if there was no current going through the welding tips.

LIMITS EXCEEDED :- If during welding in **Constant Current** mode and the **limits** options has been selected an Upper Limit and Lower Limit for each weld will be tested . If any of the limits are exceeded for any of the welds an **ALARM2** led will come on and at the same time the **Alarm2 relay** will come on. This will not stop the unit welding and will go off once there are no limits exceeded.

PRESTEP: - This does not bring up an alarm however it is a warning and the Prestep led and **prestep relay** will come on 1 step before the end step.

STEP: - This step led will come on when the last step is reached. It will bring on **alarm 2** And it will also print the message “END OF STEPS REPLACE TIP” on the LCD screen. The counters will need to be reset before the Machine can continue. However welding can continue with these alarm conditions.

ALL ALARM CONDITIONS CAN ALSO BE SEEN IN THE DATA OUTPUT IF USED. THIS WILL GIVE A RECORD OF WHAT HAS HAPPENED SHOWING THE EXACT AMOUNT THAT THE LIMITS WERE EXCEEDED .

END OF WELD INFORMATION

At the end of the weld the smartpak will display the following information:-

It will show the current for each weld (ie 1,2 & 3)
It will show the conduction angle
It will also show the number of machine cycles that have been done .
(it will not increment when Weld On/Off is off)

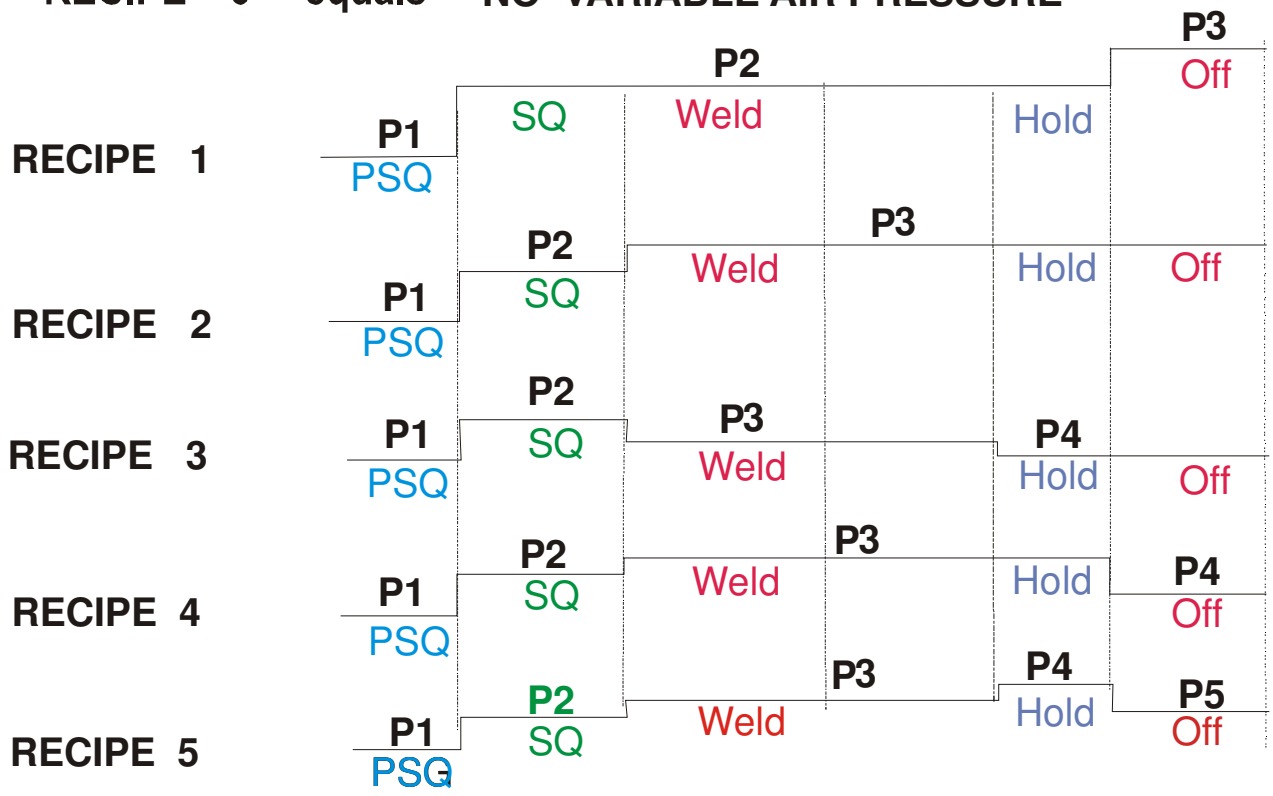
PROPORTIONAL AIR VALVE CONTROL

5 recipes are selectable with 5 different air pressures .
A control voltage of 0 to 10V is outputted to control the air pressure valve.

Each recipe allows a set program of different air pressures for the weld cycle so that during the weld cycle the correct air pressure is used for specific task.

SMARTPAK AIR PRESSURE PROGRAMS

RECIPE 0 equals NO VARIABLE AIR PRESSURE



eg

PGM(0) AIR PRESSURE
Recipe 1 REF 10v
AIR PR: P1 2.2 P2 2.7
P3 3.5 P4 5.5 P5 6.8

AC TRANSFORMER:

The AC supply transformer will be supplied and can run off 220v or 380v AC. It has three separate secondaries 19v ± 10%, 14v ±10%, 19v ± 10%.

Default Values

The default values are loaded in all the 16 programs and will stay at theses value until they have been changed. Once they have been altered they will have the new value.

Default SmartPak Parameters

Function	Value
Pre-Squeeze	25 Cycles
Squeeze	25 Cycles
Weld 1	15 Cycles
% Heat 1	20%
Cool	0 Cycles
Weld 2	0 Cycles
% Heat 2	10%
Cool2	0 Cycles
Weld 3	0 Cycles
Hold	10 Cycles
% Heat 3	10%
Off	00 Cycles
WELD/ON	ON
Dual Mode	Off
Seam	Off
Coil Output	150mV

Machine Calibration	No
Upslope	0 Cycles
Current Limit	5%
½ Cycles	OFF
Power Factor	68%
Function	**Value**
Pulsations	01
High Lift Latch	OFF
Current1	3.0 KVA
Current2	2.0 KVA
Current3	2.0 KVA
Steps	0
Counts per Step	0
% Heat Change Correction	0
Machine Cycle count	0
Step Count	0
Data Output	OFF
RS232	Selected

SMARTPAK DUAL GUN MODE

The Smartpak has a special output board which has been developed for dual gun operation. See diagram below.

Dual Operating Mode :-

There are 2 programs available for each gun
Gun1:
Start 1 = pgm 0
Start 2 = pgm 1

Gun2:
Start1 = pgm 2
Start 2 = pgm 3

Each of the four pgms allows all the settings to be selected.

Output Board :

The output board has provision for either two transformers or one transformer . ie
Gun1 - transformer 1
Gun2 - transformer 2

Or

Gun1 & Gun2 - Transformer 1

This is selected by dip sw6 on the board.

Hi Lift :

Hi Lift can be either on/off normal or it can be latched on/off.
This selection is made on the output board using dip sw5

Feedback coils

For Dual operation there are two feedback coils. Connector Con4 on the output board has the connections for each coil and a connection for the Main Cpu board.

Solenoid Connections

The solenoid contacts available are Air Valve 1 , Air Valve 2 , High Lift 1 ,High Lift 2 & Seam.

Relay Connections

The relay output connections are the same as the standard output board.

Signal Inputs

The signal inputs are same as the standard board.

SMARTPAK DATA OUTPUT

This available in **RS232 ,RS485 & Ethernet**.

RS232 :- This is a serial data stream and can work up to a distance 15meters

RS485 :- This a balanced serial data stream and can work up to 2 km.

Ethernet :- This a **L**ocal **A**rea **N**etwork (LAN) and will contect to a standard industrial **Network.** The data output from the Smartpak is then transmitted via this network

The purpose of the data output is to give a real time record of the welding process which can be used for monitoring , quality control , tip & tool wear and fault analysis by engineer in charge.

There is also a plan to use these data links for remote control & settings changing.

This is an example of the Data output feature of the Smartpak :-

******STANDARD MODE******

Programme No 00 P.F. 0.82

Weld ON/OFF : ON Conduction Angle = 137 deg

Pre-sq 25 squeeze 25
Cool 00 Cool2 00
Hold 10 Off 00

Weld 1 Cycles 16 Heat 53% CURRENT W1: 04.6 KA

Weld 2 Cycles 00 Heat 10%

Weld 3 Cycles 00 Heat 10%

**** ALARMS STATUS ****

NO ALARMS

MACHINE CYCLE 01400

***CONSTANT CURRENT MODE**

Programme No 00 P.F. 0.82

Weld ON/OFF : ON Conduction Angle = 141 deg

Pre-sq 25 squeeze 25
Cool 00 Cool2 00
Hold 10 Off 00

CURRENT TARGET

Weld 1: 16 cycles 04.0 KA 04.0 KA

**** ALARMS STATUS ****

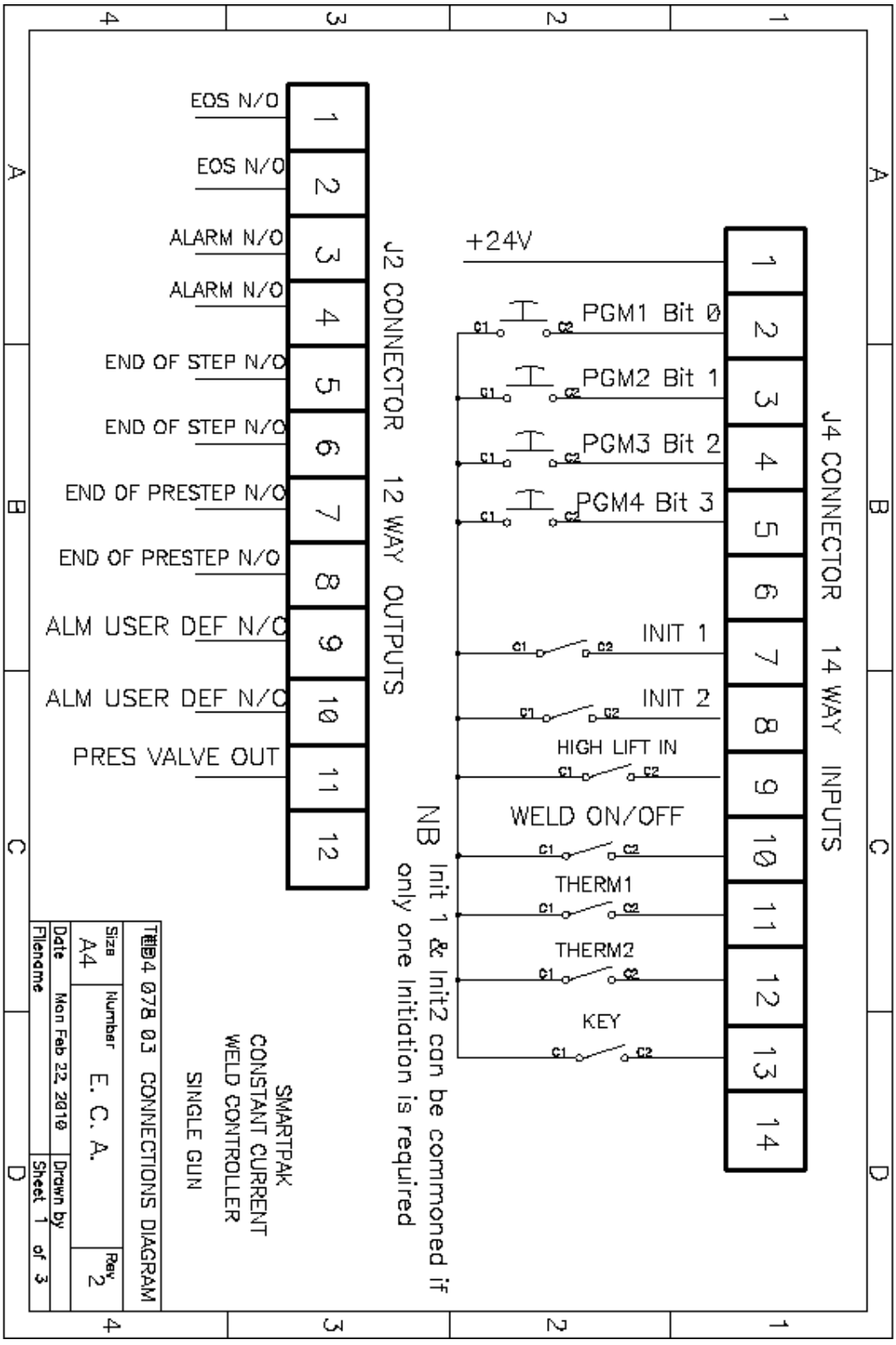
NO ALARMS

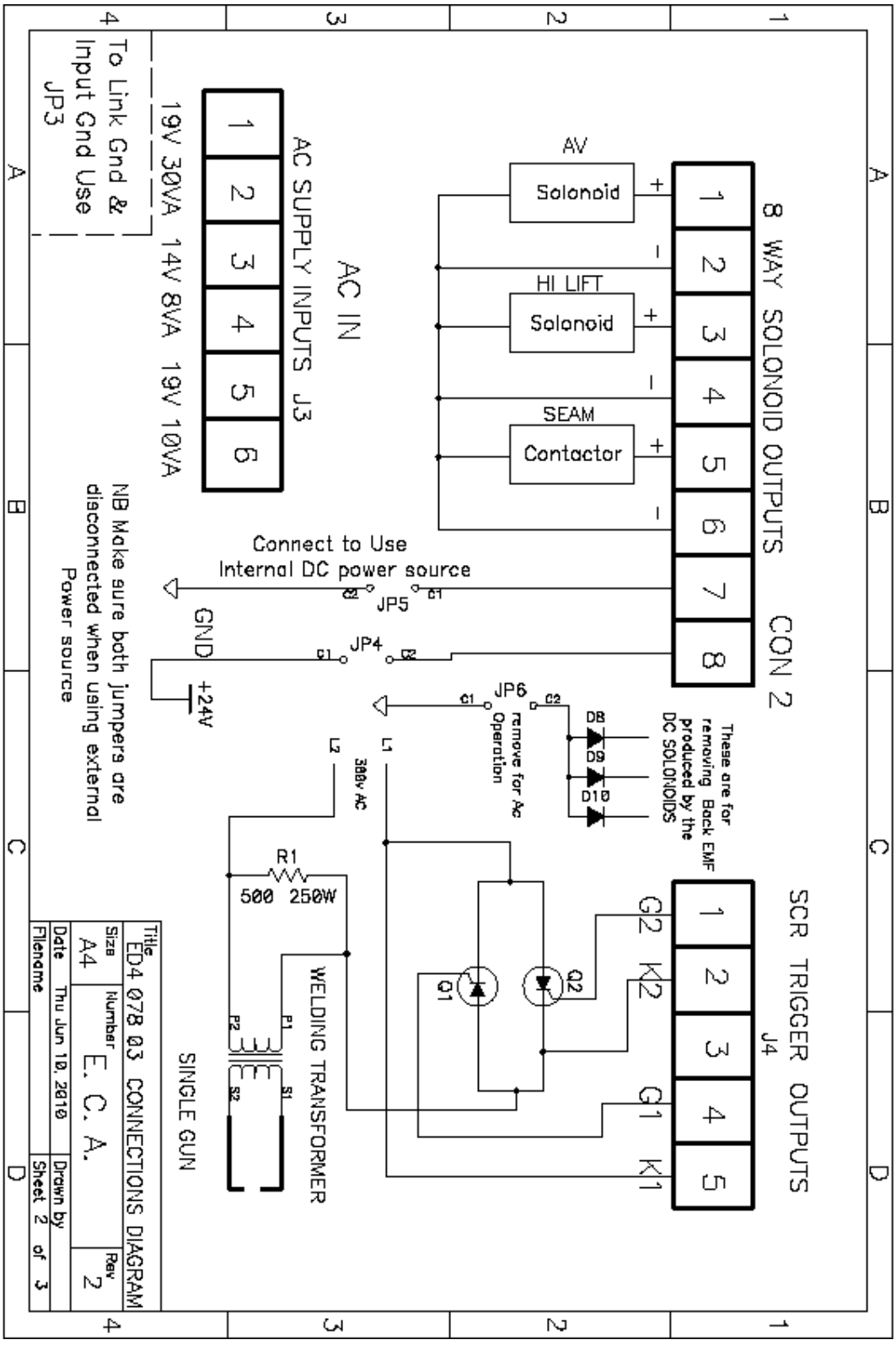
MACHINE CYCLE 01401

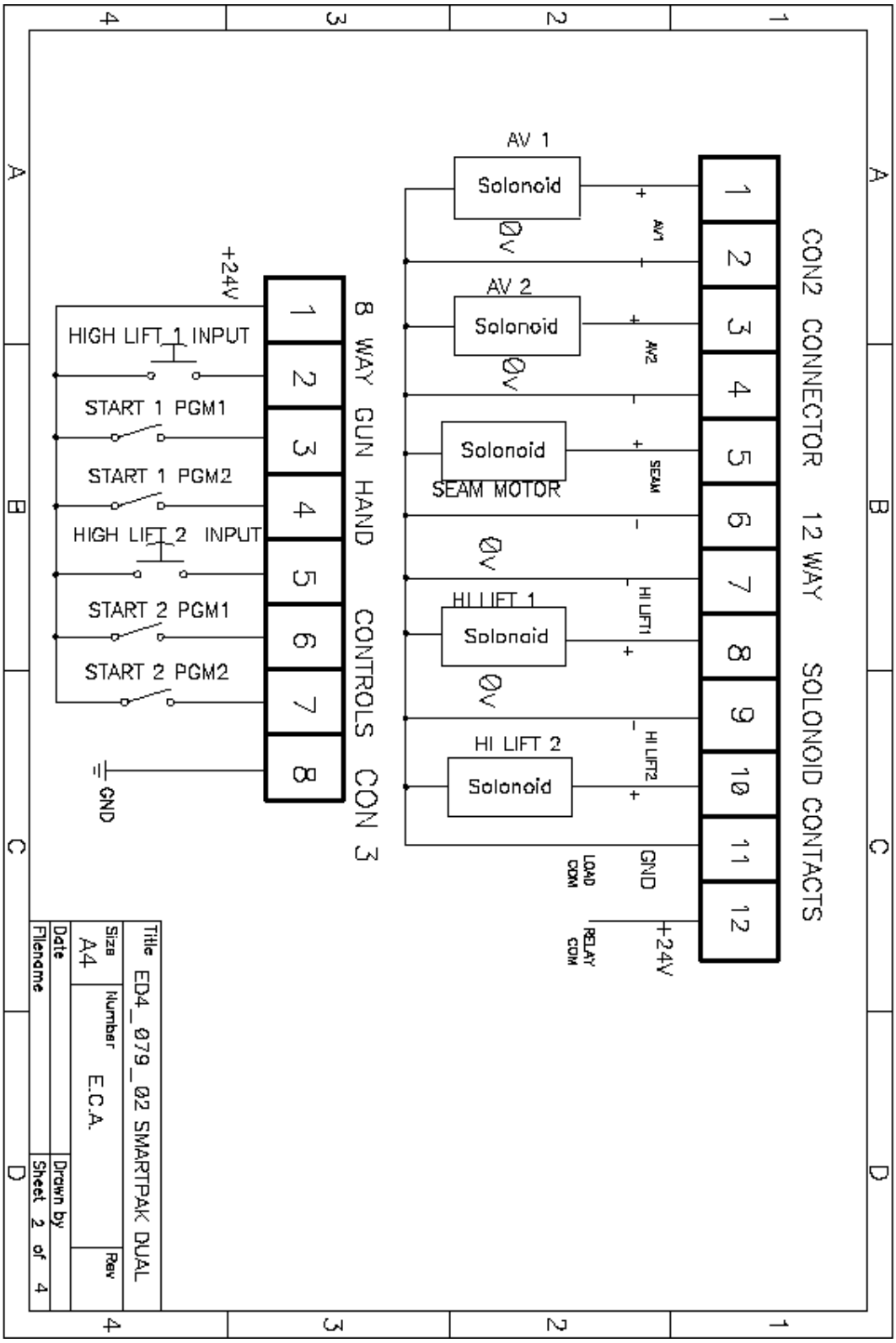
The rated voltages for the air valve solenoids are 24V dc - 1 amp or 110 V ac - 1 amp.

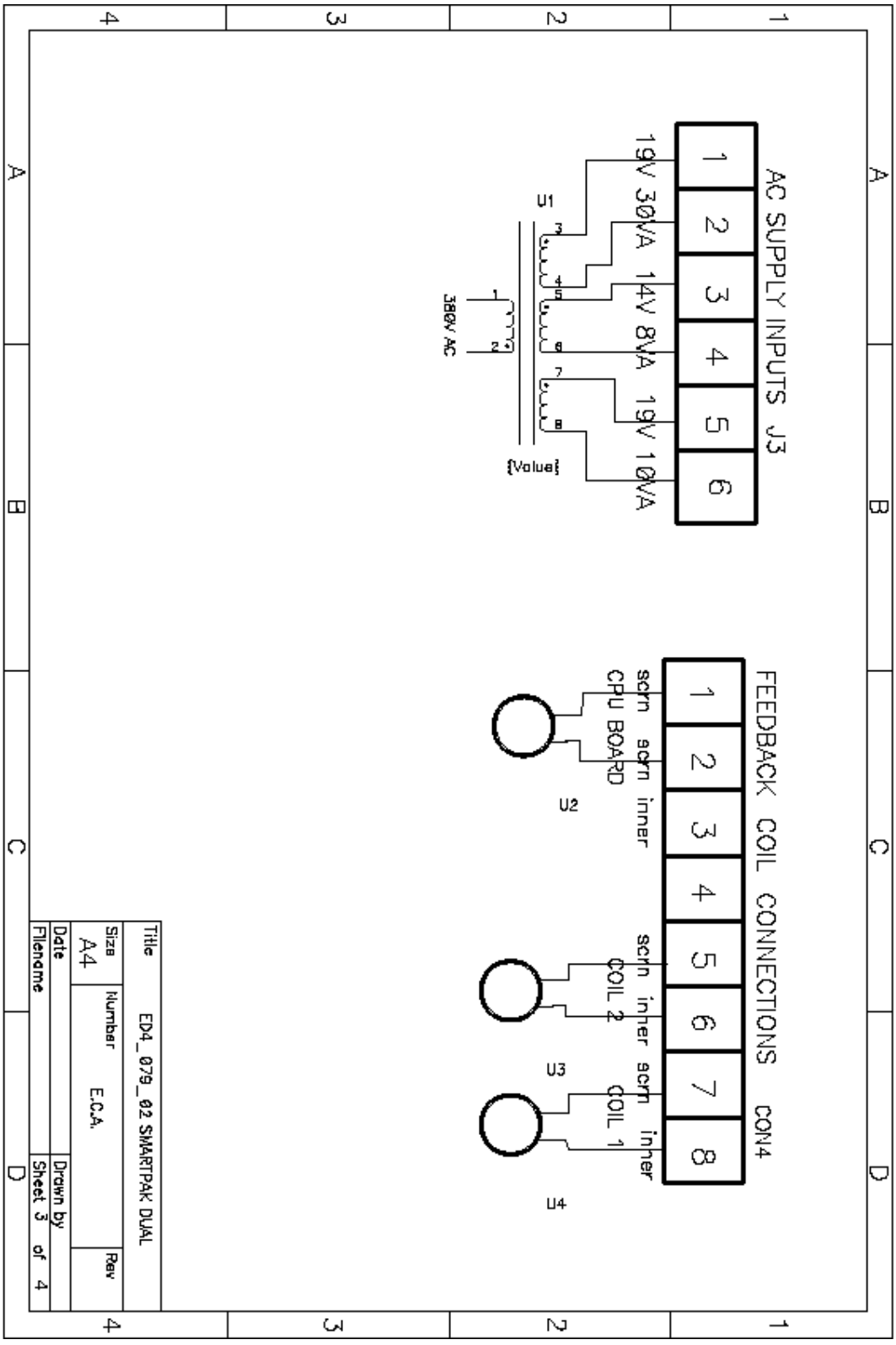
All other connections are provided on the Relay output board.

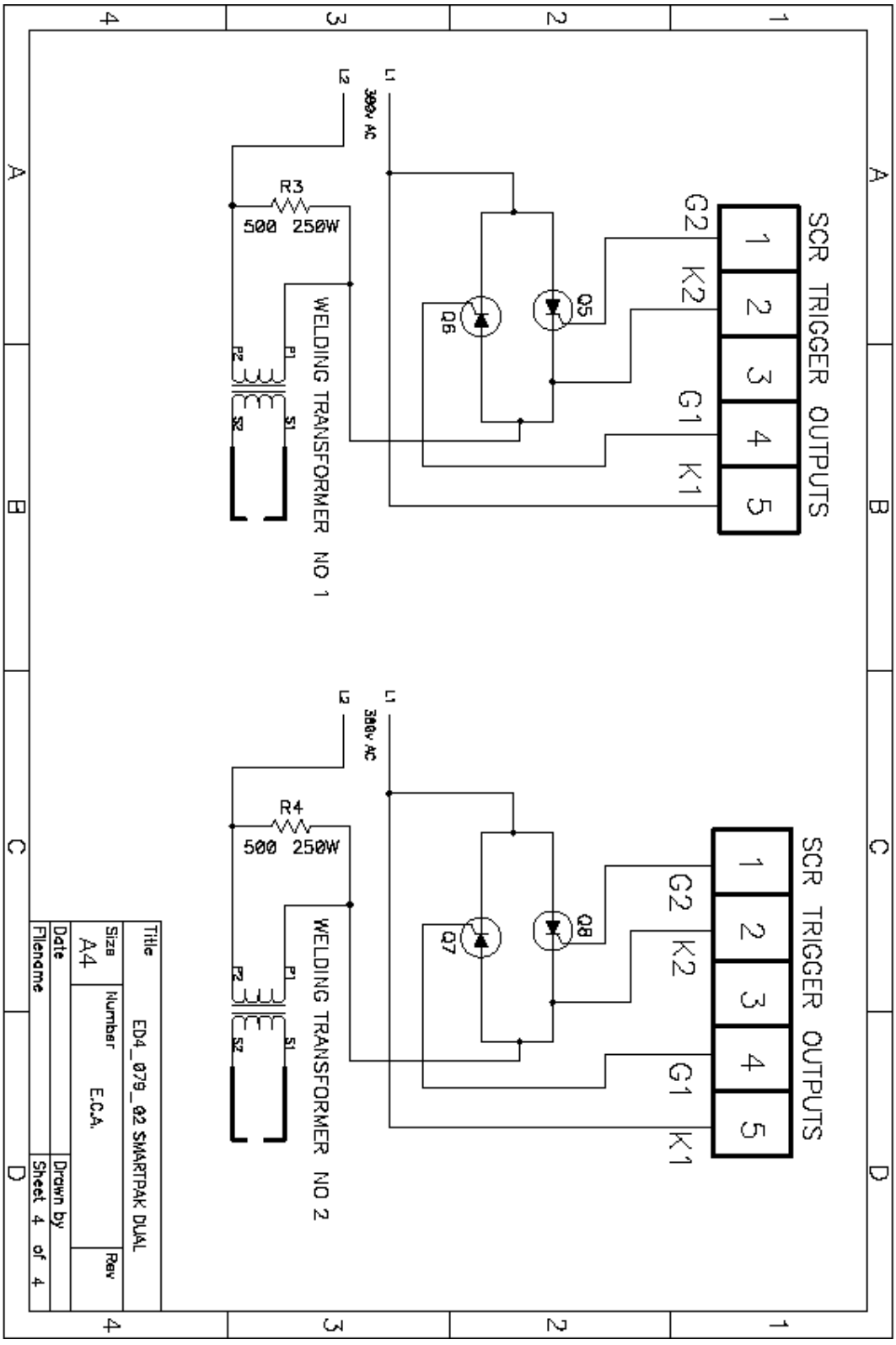
See customer connections.

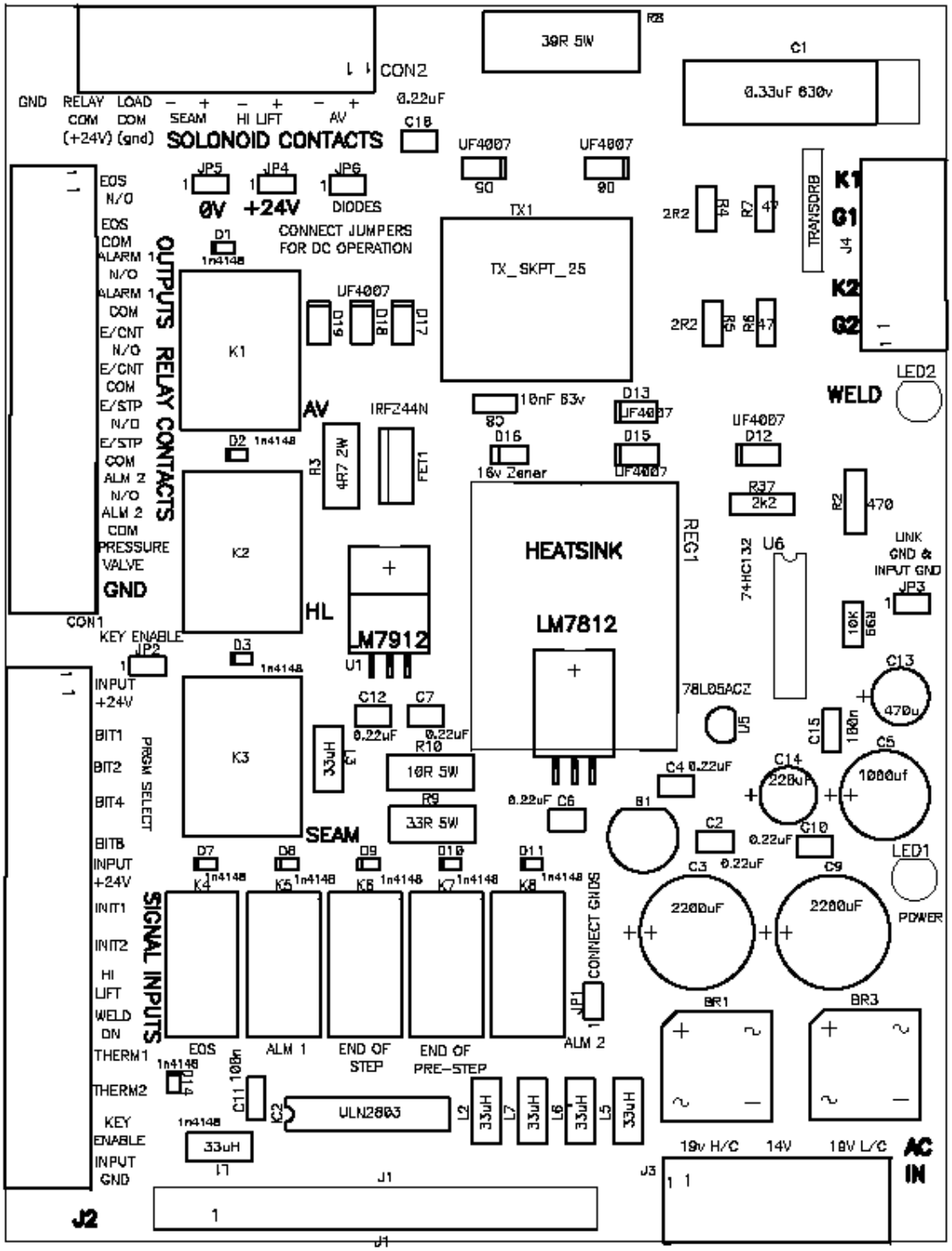

J4 CONNECTOR 14 WAY INPUTS
+24V
PGM1 Bit 0
PGM2 Bit 1
PGM3 Bit 2
PGM4 Bit 3
INIT 1
INIT 2
HIGH LIFT IN
WELD ON/OFF
THERM1
THERM2
KEY
C1
C2
NB Init 1 & Init2 can be commoned if only one Initiation is required
J2 CONNECTOR 12 WAY OUTPUTS
EOS N/O
EOS N/O
ALARM N/O
ALARM N/O
END OF STEP N/O
END OF STEP N/O
END OF PRESTEP N/O
END OF PRESTEP N/O
ALM USER DEF N/O
ALM USER DEF N/O
PRES VALVE OUT
SMARTPAK
CONSTANT CURRENT
WELD CONTROLLER
SINGLE GUN
TEED4 078 03 CONNECTIONS DIAGRAM
Size A4
Number E. C. A.
Rev 2
Date Mon Feb 22, 2010
Drawn by
Filename
Sheet 1 of 3

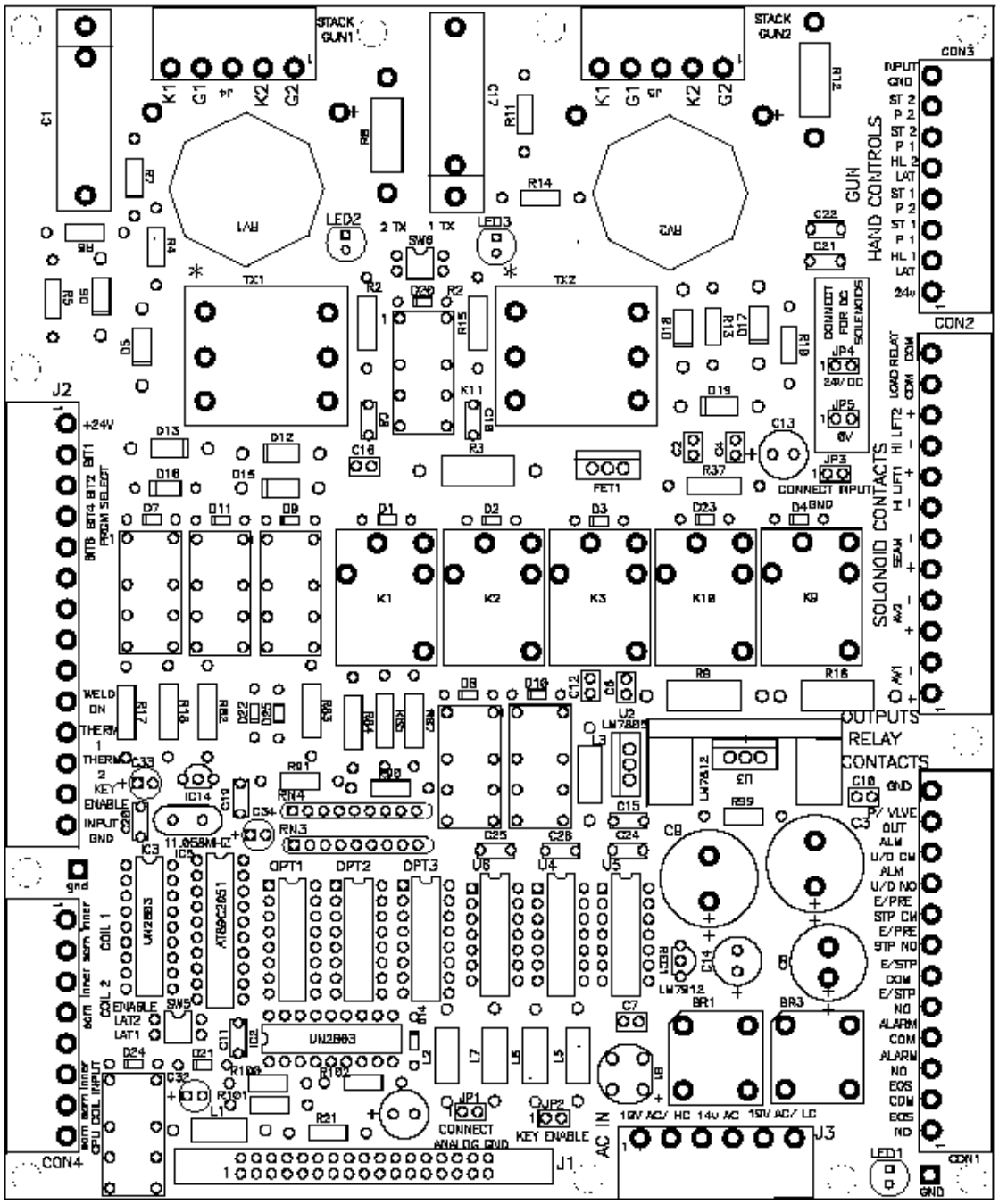

8 WAY SOLONOID OUTPUTS CON 2
AV
Solonoid
HI LIFT
Solonoid
SEAM
Contactor
Connect to Use
Internal DC power source
JP5
JP4
GND
+24V
JP6
remove for Ac Operation
These are for removing Back EMF produced by the DC SOLONOIDS
D8
D9
D10
AC IN
AC SUPPLY INPUTS J3
19V 30VA 14V 8VA 19V 10VA
To Link Gnd & Input Gnd Use JP3
NB Make sure both jumpers are disconnected when using external Power source
L2
L1
380v AC
R1
500 250W
WELDING TRANSFORMER
P1
P2
S1
S2
SINGLE GUN
Q1
Q2
SCR TRIGGER OUTPUTS
J4
G2
K2
G1
K1
Title
ED4 078 03 CONNECTIONS DIAGRAM
Size
A4
Number
E. C. A.
Rev
2
Date
Thu Jun 10, 2010
Drawn by
Filename
Sheet 2 of 3


CON2 CONNECTOR 12 WAY SOLONOID CONTACTS
AV 1
Solonoid
AV1
Øv
AV 2
Solonoid
AV2
Øv
Solonoid
SEAM
SEAM MOTOR
Øv
HI LIFT 1
Solonoid
HI LIFT1
Øv
HI LIFT 2
Solonoid
HI LIFT2
LOAD COM
GND
RELAY COM
+24V
8 WAY GUN HAND CONTROLS CON 3
+24V
HIGH LIFT 1 INPUT
START 1 PGM1
START 1 PGM2
HIGH LIFT 2 INPUT
START 2 PGM1
START 2 PGM2
GND
Title ED4_079_02 SMARTPAK DUAL
Size A4
Number E.C.A.
Rev
Date
Filename
Drawn by
Sheet 2 of 4


AC SUPPLY INPUTS J3
1
2
3
4
5
6
19V 30VA
14V 8VA
19V 10VA
J1
386V AC
{Value}
FEEDBACK COIL CONNECTIONS CON4
1
2
3
4
5
6
7
8
scrn
CPU BOARD
scrn inner
U2
scrn inner
COIL 2
U3
scrn inner
COIL 1
U4
Title ED4_079_02 SMARTPAK DUAL
Size A4
Number E.C.A.
Rev
Date
Drawn by
Filename
Sheet 3 of 4


SCR TRIGGER OUTPUTS
1
2
3
4
5
G2
K2
G1
K1
Q5
Q6
R3
500 250W
WELDING TRANSFORMER NO 1
L1
L2
380v AC
P1
P2
S1
S2
SCR TRIGGER OUTPUTS
1
2
3
4
5
G2
K2
G1
K1
Q7
Q8
R4
500 250W
WELDING TRANSFORMER NO 2
L1
L2
380v AC
P1
P2
S1
S2
Title
ED4_079_02 SMARTPAK DUAL
Size
A4
Number
E.C.A.
Rev
Date
Drawn by
Filename
Sheet 4 of 4


CON2
GND
RELAY COM (+24V)
LOAD COM (gnd)
SEAM
HI LIFT
AV
SOLONOID CONTACTS
0.22uF
C18
39R 5W
R8
C1
0.33uF 630v
UF4007
D5
D0
JP5
JP4
JP6
0V
+24V
DIODES
CONNECT JUMPERS FOR DC OPERATION
TX1
TX_SKPT_25
TRANSDRB
K1
G1
K2
G2
J4
2R2
R4
47
R7
R5
R6
LED2
WELD
EOS N/O
EOS COM
ALARM 1 N/O
ALARM 1 COM
E/CNT N/O
E/CNT COM
E/STP N/O
E/STP COM
ALM 2 N/O
ALM 2 COM
PRESSURE VALVE
GND
OUTPUTS RELAY CONTACTS
D1
1n4148
K1
UF4007
D19
D18
D17
AV
IRFZ44N
FET1
R3
4R7 2W
D2
1n4148
K2
HL
D3
1n4148
K3
CON1
KEY ENABLE
JP2
INPUT +24V
BIT1
BIT2
BIT4
BIT8
PROM SELECT
INPUT +24V
INIT1
INIT2
HI LIFT
WELD ON
THERM1
THERM2
KEY ENABLE
INPUT GND
SIGNAL INPUTS
J2
J1
10nF 63v
C0
D13
UF4007
D16
16v Zener
D15
UF4007
D12
UF4007
R37
2k2
R2
470
HEATSINK
LM7812
REG1
74HC132
U6
LINK GND & INPUT GND
JP3
10K
66R
U1
LM7912
C12
0.22uF
C7
0.22uF
L3
33uH
R10
10R 5W
R9
33R 5W
SEAM
78L05ACZ
U5
C15
100n
C13
470u
C4
0.22uF
C14
220uF
C5
1000uf
B1
C2
0.22uF
C10
0.22uF
C3
0.22uF
C9
2200uF
2200uF
LED1
POWER
D7
D8
D9
D10
D11
1n4148
K4
K5
K6
K7
K8
EOS
ALM 1
END OF STEP
END OF PRE-STEP
ALM 2
CONNECT GNDS
JP1
BR1
BR3
D14
1n4148
C11
100n
K3
ULN2803
L2
L7
L6
L5
33uH
L1
33uH
19v H/C
14V
18V L/C
J3
AC IN


STACK GUN1
STACK GUN2
GUN HAND CONTROLS
SOLENOID CONTACTS
OUTPUTS RELAY CONTACTS
CON1
CON2
CON3
CON4
J1
J2
J3
LED1
LED2
LED3
SW5
SW6
FET1
JP1
JP2
JP3
JP4
JP5
CONNECT INPUT
CONNECT ANALOG GND
KEY ENABLE
CONNECT FOR DC SOLENOIDS
11.0592MHz
AC IN
10V AC/ HC 14V AC 15V AC/ LC
+24V
WELD ON
THERM 1
THERM 2
KEY ENABLE
INPUT GND
ENABLE
LAT2
LAT1
COIL 1
COIL 2
PROGRAM SELECT
BIT8 BIT4 BIT2 BIT1
DPT1
DPT2
DPT3
UN2803
LM7805
LM7812
LM7912
BR1
BR3
K1
K2
K3
K18
K9
RV1
RV2
TX1
TX2
FET1