EN6001

RWMA®
MEMBER

Important Safety Instructions

READ THIS MANUAL COMPLETELY
BEFORE ATTEMPTING TO INSTALL OR OPERATE THE CONTROL. STORE THIS TECHNICAL INFORMATION IN A PLACE TO WHICH ALL USERS HAVE ACCESS AT ANY TIME

ENTRON Controls follows the practices of the RWMA for precautionary labeling. See RWMA Bulletins #1 and #5 for a complete description. Observe the WARNING, DANGER, and CAUTION labels affixed to control to maintain safe operation. ENTRON Controls, LLC. and its affiliates are not responsible for any harm caused by non-compliance of instructions associated with the aforementioned labels or signal words to follow.

The signal word **DANGER** is used to call attention to immediate or imminent hazards which if not avoided *will result in immediate, serious, or personal injury or loss of life. Examples are: exposed high voltage; exposed fan blades.*

The signal word **WARNING** is used to call attention to potential hazards which *could result in personal injury or loss of life. Examples are: not using proper personal protection; removal of guards.*

The signal word **CAUTION** is used to call attention to hazards which *could result in non-life threatening personal injury or damage to equipment. CAUTION may also be used to alert against unsafe practices.*

The term **NOTICE** is used for making recommendations on use, supplementary information, or helpful suggestions. Non-compliance with these recommendations *may result in damage to control, welding machine, or workpiece.* ENTRON Controls, LLC. and its affiliates are not responsible for damage caused by such non-compliance, and warranties may be voided accordingly at the discretion of ENTRON Controls.

WARNING: Individuals with cardiac devices should maintain a safe distance due to strong magnetic fields arising from resistance welding. The function of cardiac pacemakers and defibrillators may be disturbed, which may cause death or considerable health damages to persons concerned! These persons should avoid the welding system unless authorized by a licensed physician.

My Control Information

Filling out the following information (and keeping it readily available) may allow for future technical service of equipment to be conducted more efficiently:

Model #: _____ EN6001 _____

Serial #: _____

OEM/Distributer: _____

Contact #: _____

Purchase Date: _____

Hardware Connections

P1—2, Foot Switch #1 _____

P1—3, Foot Switch #2 _____

P1—4, Emergency Stop _____

P1—5, No Weld Signal _____

P1—6, Programmable Input #1 _____

P1—7, Programmable Input #2 _____

P1—8, Programmable Input #3 _____

P1—9, Programmable Input #4 _____

P1—10, Programmable Input #5 _____

P1—11, Programmable Input #6 _____

P2—2, Solenoid Valve #1 _____

P2—3, Solenoid Valve #2 _____

P2—4, Solenoid Valve #3 _____

P2—5, Programmable Output #1 _____

P2—6, Programmable Output #2 _____

P2—7, Programmable Output #3 _____

P2—8, Programmable Output #4 _____

P3   Sensing Coil   ☐   ☐   ☐
                     Not Used   Primary   Secondary

Weld Schedule Worksheet

Filling out the following information (and keeping it readily available) may allow for future technical service of equipment to be conducted more efficiently. Please duplicate and complete this page for each utilized schedule:

SCHEDULE #: _____

Squeeze Delay: _____ cycles   _____ KVA   or   _____ %

Squeeze: _____ **cycles**   **Valves:** _____

Weld 1: _____ cycles   _____ KVA   or   _____ %

Cool 1: _____ cycles

Slope: _____ cycles

Weld 2: _____ **cycles**   _____ **KVA or** _____ **%**

Cool 2: _____ cycles

Impulses: _____ cycles

Hold: _____ **cycles**

Off: _____ **cycles**

Cycle Mode: _____

Comments: _____

_____

_____

_____

_____

_____

_____

_____

Tap Setting: _____   Pressure: _____   Machine: _____

Table of Contents

Functions

- Constant current regulation

- Primary or Secondary feedback

- Current Monitoring with high, low, and pre-limits

- Up to 64 programs (internal or external selection)

- On Timer Membrane Keyboard with backlit 128x64 (8 lines) LCD graphic display

- Six (6) inputs and four (4) outputs with output protection on CPU

- Electrode management functions; including stepping, current counting, tip-dressing, and preset curves

- Welding programs may be linked together for complex spot schedules (chained or successive)

- USB-capable firmware refresh

- AC 60/50 Hz welding support

- Spot / Pulsation / Seam welding / Flash or Butt welding / Brazing

- Multiple weld intervals plus pulsation, upslope and downslope

- Air-over-oil gun operation

- Water Saver (contactor timer)

- Head lock function

- Program lockout (key switch) function

- Operation mode switch (program lockout and Weld/No Weld)

- Error reset switch

- Optional plug-in Ethernet card provides PLC compatibility with Modbus and EtherNet/IP
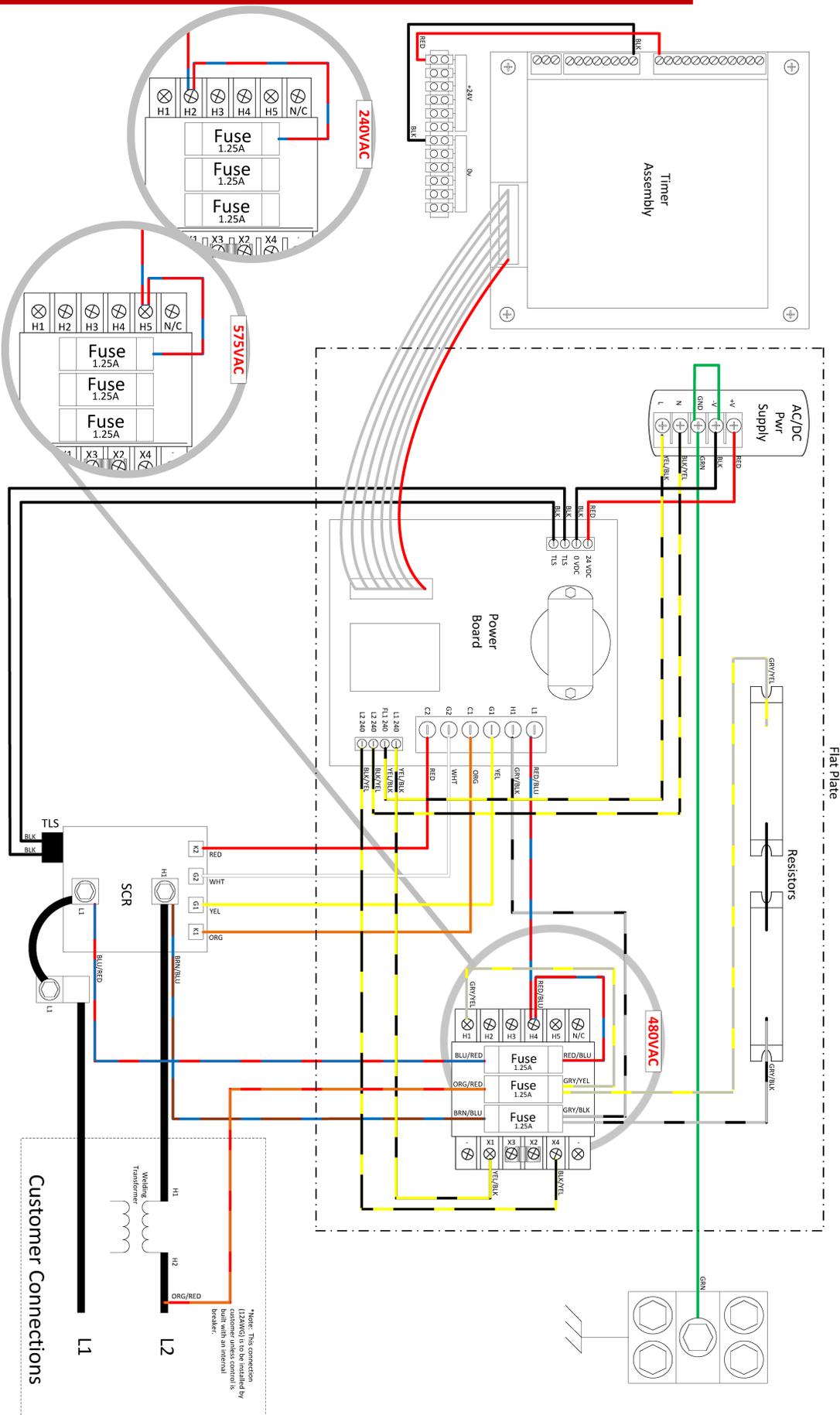
Specifications

Environmental Conditions:

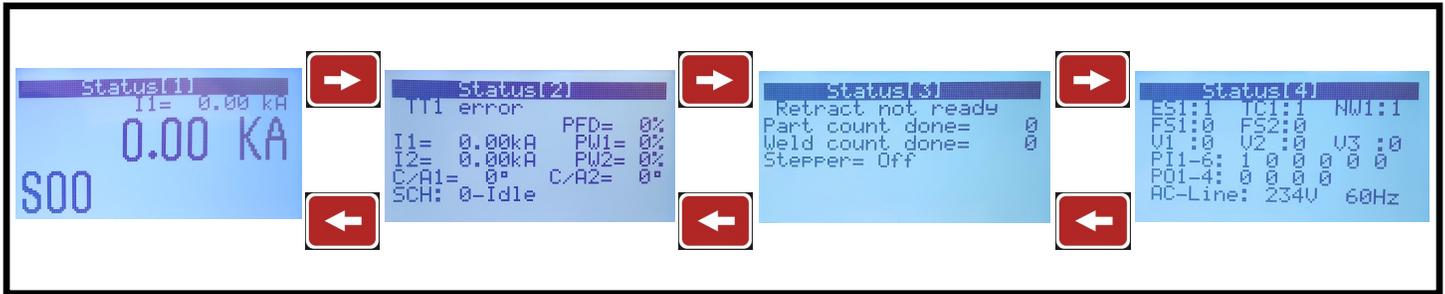|	
Operating Temperature	0°C to 60°C
Storage/Transport Temperature	-25°C to 70°C
Air pressure	0 to 2000m above sea level
Humidity	no dew point excursion allowed
Enclosure Ratings	NEMA 1 and NEMA 12

Electronics Ratings:

CPU operating voltage (without I/O)	24 VDC $\pm$5% at 220 mA
Rated current (without I/O) at 24V	SV1-SV3: ~500 mA
	PO1-PO4: ~500 mA
Discrete I/O:	
Input	+24V $\pm$15%
DC Output	24 VDC, 0.5A max
AC Output	120 VAC, 1A max
Supply I/O:	24 VDC $\pm$5%

240VAC

H1 H2 H3 H4 H5 N/C
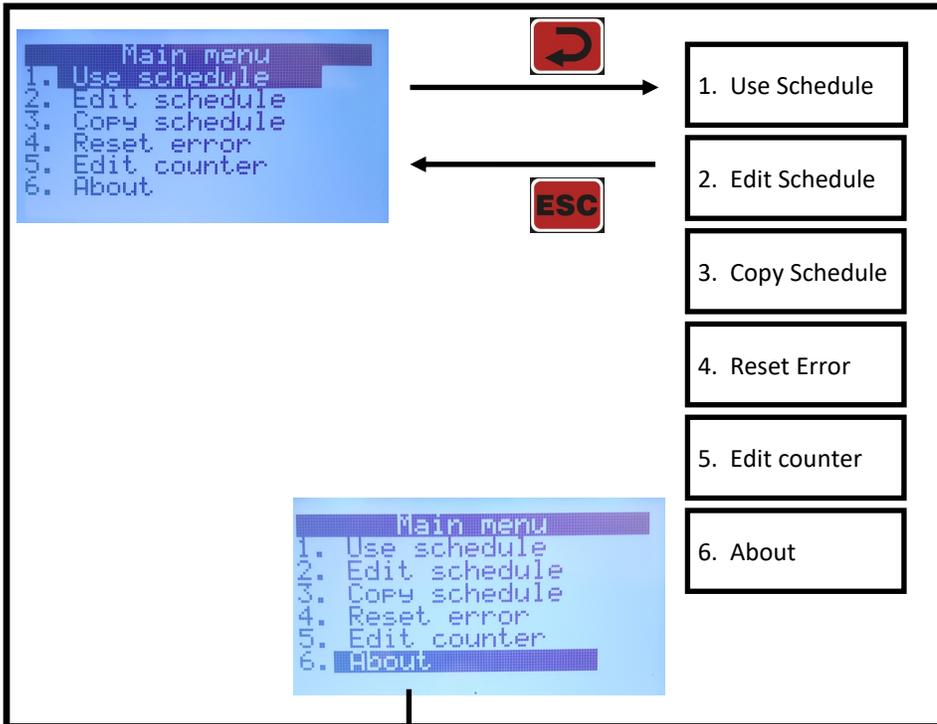
Fuse 1.25A
Fuse 1.25A
Fuse 1.25A

X1 X3 X2 X4

575VAC

H1 H2 H3 H4 H5 N/C

Fuse 1.25A
Fuse 1.25A
Fuse 1.25A

X1 X3 X2 X4

RED
BLK
BLK

Timer Assembly

+24V
0v

AC/DC Pwr Supply

L N GND -V +V

YEL/BLK BLK/YEL GRN RED

BLK BLK RED

TLS TLS 0 VDC 24 VDC

Power Board

L2 240 L1 240 FL1 240 L2 240 C2 G2 C1 G1 H1 L1

BLK/YEL BLK/YEL YEL/BLK RED WHT ORG YEL GRY/BLK RED/BLU

Flat Plate

GRY/YEL

Resistors

GRY/BLK

TLS
BLK
BLK

SCR
H1
L1
L1

BLU/RED
BRN/BLU

K2 RED
G2 WHT
G1 YEL
K1 ORG

480VAC

GRY/YEL RED/BLU

H1 H2 H3 H4 H5 N/C

BLU/RED Fuse 1.25A RED/BLU
ORG/RED Fuse 1.25A GRY/YEL
BRN/BLU Fuse 1.25A GRY/BLK

X1 X3 X2 X4

YEL/BLK BLK/YEL

Customer Connections

Welding Transformer
H1
H2
ORG/RED

L1

L2

*Note: This connection (12AWG) is to be installed by customer unless control is built with an internal breaker.

GRN

Menu Navigation

Status Page List (Default)

Status[1]
I1= 0.00 kA
0.00 KA
S00

Status[2]
TT1 error
I1= 0.00kA   PFD= 0%
I2= 0.00kA   PW1= 0%
C/A1= 0°   PW2= 0%
SCH: 0-Idle   C/A2= 0°

Status[3]
Retract not ready
Part count done=   0
Weld count done=   0
Stepper= Off

Status[4]
ES1:1 TC1:1   NWJ1:1
FS1:0 FS2:0
V1 :0 V2 :0   V3 :0
PI1-6: 1 0 0 0 0 0
PO1-4: 0 0 0 0
AC-Line: 234V   60Hz

Schedule Select

Use Schedule

Schedule= 0

Main Menu

Main menu
1. Use schedule
2. Edit schedule
3. Copy schedule
4. Reset error
5. Edit counter
6. About

1. Use Schedule	
2. Edit Schedule	
3. Copy Schedule	
4. Reset Error	
5. Edit counter	
6. About	

Main menu
1. Use schedule
2. Edit schedule
3. Copy schedule
4. Reset error
5. Edit counter
6. About

Setup Menu

Setup
1. Config
2. Calibration
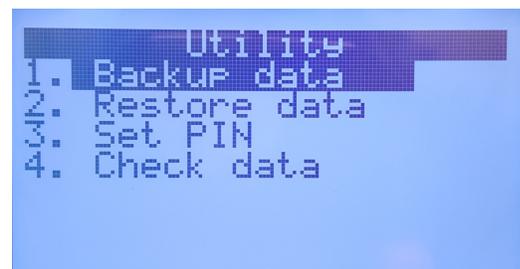3. I/O map
4. Error map
5. Stepper
6. Utility

Saving Weld Schedules

Step 1: Insert a formatted USB drive into USB port on the control panel

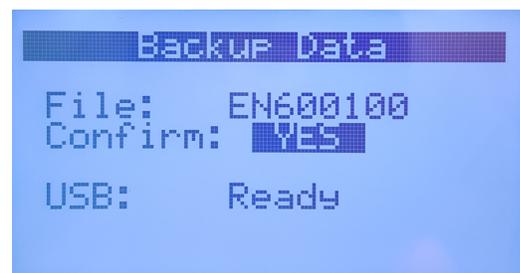Step 2: From the 'Setup Menu' (see Menu Navigation for details) select "Utility".
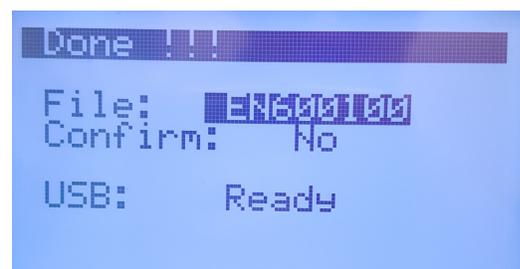
Step 3: Select "Backup data"

Step 4: Rename file (desired) using [+] and [−]

Step 5: Set "Confirm" to "YES" using [+] and [−]

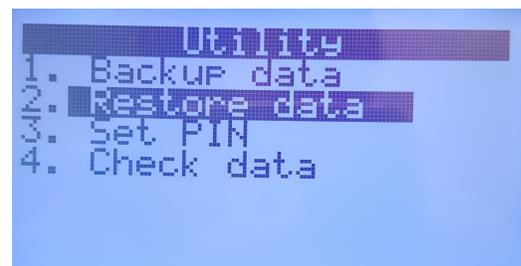Step 6: Press [↰] and verify that "DONE!!!" appears in the top left corner of the title bar.

Loading Weld Schedules

Step 1: Insert USB drive with a previously saved backup file* into the USB port on the control panel.

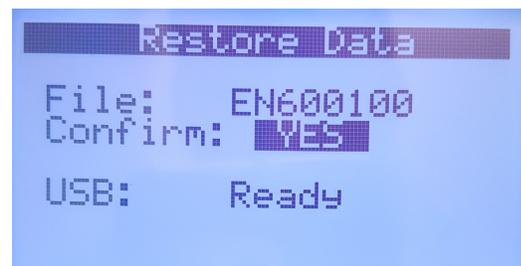Step 2: From the 'Setup Menu' (see Menu Navigation for details) select "Utility".
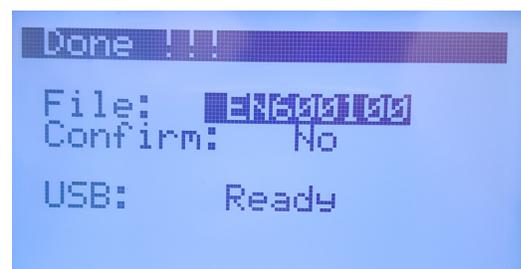
Step 3: Select "Restore data"

Step 4: Select the desired filename* using [+] and [–]

Step 5: Set "Confirm" to "YES" using [+] and [–]

Step 6: Press [↩] and verify that "DONE!!!" appears in the top left corner of the title bar.

*Note: The backup file must be on the root directory of the USB drive. And the filename must be EN6001**00**.EN6 to EN6001**99**.EN6

Updating Firmware

Step 1: Ensure the control is completely powered down.

Step 2: Insert USB drive with EN6001 firmware file into USB port on the control panel.

Step 3: Press and hold [+] and [−]

Step 4: Power on the control. Once the Bootloader Menu (shown right) appears, release [+] and [−]

Step 5: Select "Refresh firmware"

Step 6: Select the desired filename* using [+] and [−]

Step 7: Set "Confirm" to "YES" using [+] and [−]

Step 8: Press and [↵] the control will begin updating.

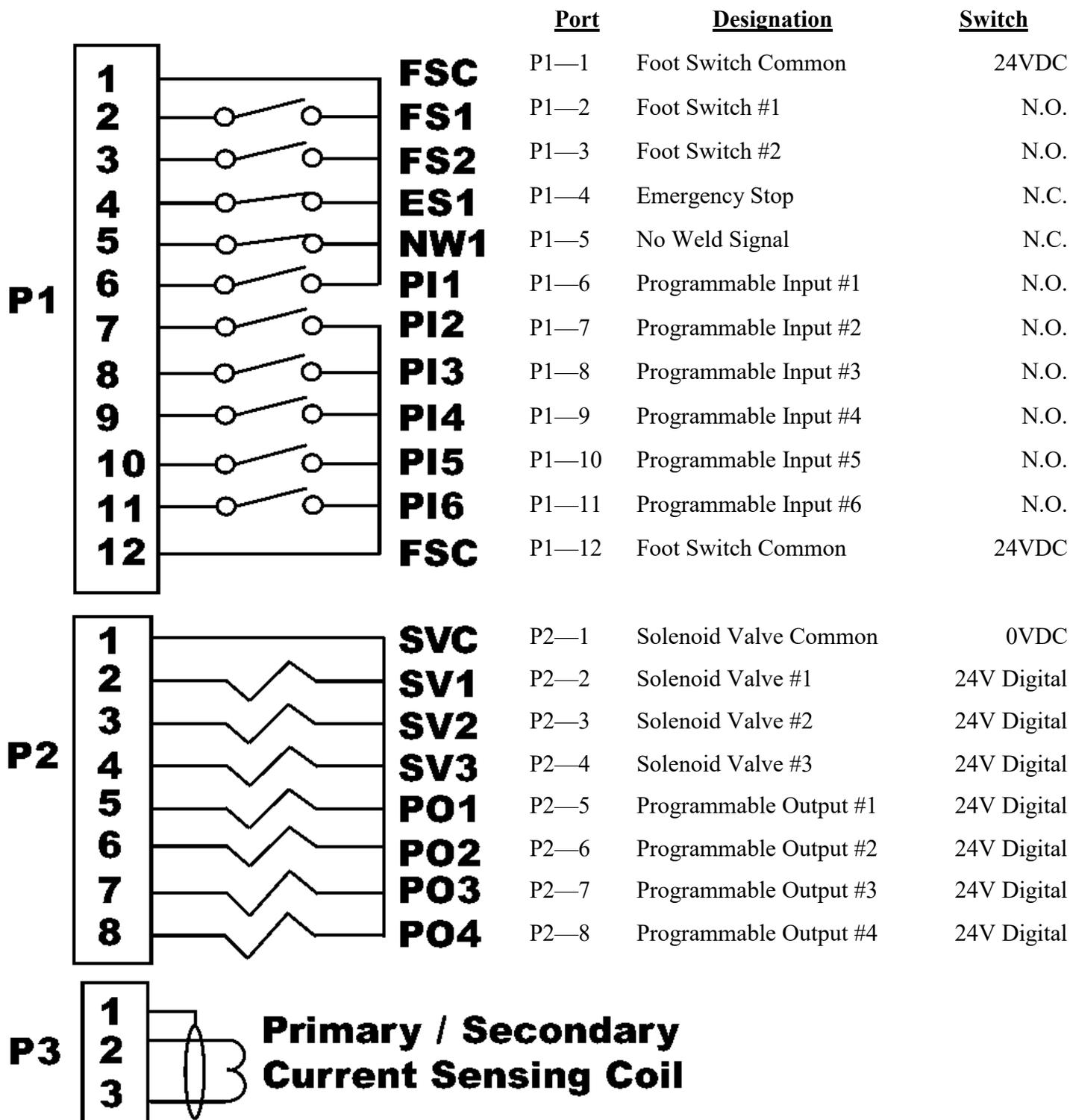Step 9: In order to return to the "Main Menu", either
1. Temporarily power down the control

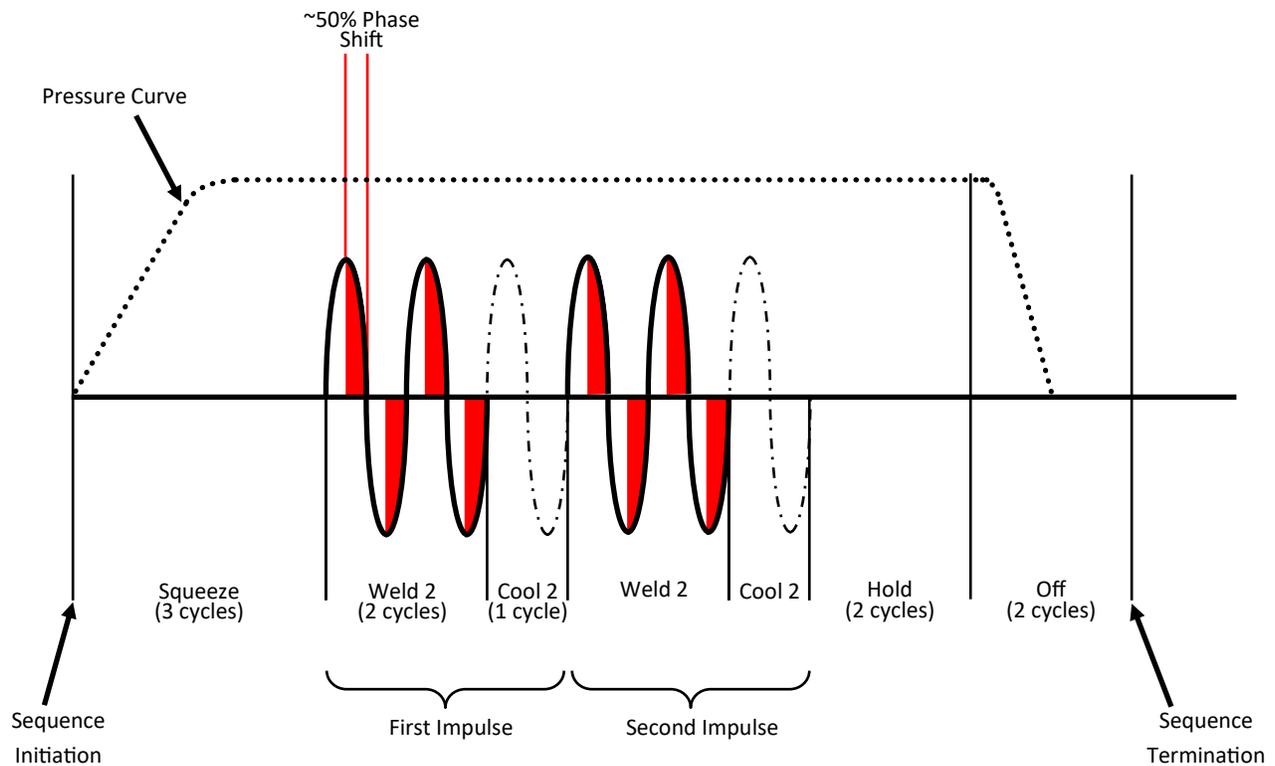2. Go back to "Bootloader Menu" by pressing [ESC] Then, select "Execute firmware", then select "YES".

*Note: The firmware file must be on the root directory of the USB drive, and the filename will be

E061**1001**.BIN to E061**9999**.BIN

(this may requiring the extraction of a zip file)

User Connections

Port	Designation	Switch
P1—1	Foot Switch Common	24VDC
P1—2	Foot Switch #1	N.O.
P1—3	Foot Switch #2	N.O.
P1—4	Emergency Stop	N.C.
P1—5	No Weld Signal	N.C.
P1—6	Programmable Input #1	N.O.
P1—7	Programmable Input #2	N.O.
P1—8	Programmable Input #3	N.O.
P1—9	Programmable Input #4	N.O.
P1—10	Programmable Input #5	N.O.
P1—11	Programmable Input #6	N.O.
P1—12	Foot Switch Common	24VDC
P2—1	Solenoid Valve Common	0VDC
P2—2	Solenoid Valve #1	24V Digital
P2—3	Solenoid Valve #2	24V Digital
P2—4	Solenoid Valve #3	24V Digital
P2—5	Programmable Output #1	24V Digital
P2—6	Programmable Output #2	24V Digital
P2—7	Programmable Output #3	24V Digital
P2—8	Programmable Output #4	24V Digital

P1
1 FSC
2 FS1
3 FS2
4 ES1
5 NW1
6 PI1
7 PI2
8 PI3
9 PI4
10 PI5
11 PI6
12 FSC

P2
1 SVC
2 SV1
3 SV2
4 SV3
5 PO1
6 PO2
7 PO3
8 PO4

P3
1
2
3
Primary / Secondary Current Sensing Coil

Weld Timing Cycle

~50% Phase Shift

Pressure Curve

| Squeeze (3 cycles) | Weld 2 (2 cycles) | Cool 2 (1 cycle) | Weld 2 | Cool 2 | Hold (2 cycles) | Off (2 cycles) |

Sequence Initiation

First Impulse

Second Impulse

Sequence Termination

PARAMETER	SETTING
Squeeze Delay	0 cycles
Squeeze	3 cycles
Weld 1	0 cycles
Cool 1	0 cycles
Slope	0 cycles
Weld 2	2 cycles
>Mode	Phase Shift
>Heat	50 %
Cool 2	1 cycle
Hold	2 cycles
Off	2 cycles
Impulses	2 cycles

The diagram above is intended to demonstrate a resulting welding timing cycle using the attached parameters; it is not recommended as part of a functional weld schedule.

Parameter List

Main Menu

Sub Menu	Parameter	Input Range	Description
1. Use Schedule			
	Schedule	[0-63]	Default = 0
2. Edit Schedule			
	Advance	[0-99] cycles	Default = 0 This option only appears when 'air-over-oil' configuration is selected.
	Intensify	[0-99] cycles	Default = 0 This option only appears when 'air-over-oil' configuration is selected.
	Block Delay	[0-99] cycles	Default = 0 This option only appears when 'air-over-oil' configuration is selected.
	Schedule Number	[0-63]	Default = 0 In order to accept changes made to any field, the button must pressed. It is important to make sure that the correct schedule number is selected AND accepted BEFORE completing all of the corresponding settings to follow.
	Squeeze Delay	[0-99] cycles	Default = 0 Additional time delay to be added to 'Squeeze'. This is usually utilized when 'Cycle Mode' is set to repeat. The squeeze delay will only be applied to the first weld of the repeating cycle.
	Squeeze	[0-99] cycles	Default = 0 Time delay between the signal to the programmed valve(s) and weld initiation.
	>Valve	None 1 2 3 1+2 1+3 2+3 1+2+3	Default = None Selection of valve(s) to be activated
	Weld 1	[0-99] cycles	Default = 0 Also referred to as "pre-heat"
	>Mode	Phase Shift Const Current	Default = Phase Shift
	>Heat	[0-99] %	Phase shift %; does not apply when 'Mode' is set to Const Current
	or		
	>Current	[0.00-60.00] kA	Weld current setting does not apply when Mode is set to Phase Shift
	>I1 Monitor	On Off	Default = Off Must be enabled in order to track/report current errors
	>PW1 Monitor	On Off	Default = Off Must be enabled in order to track/report phase shift abnormalities.
	Cool 1	[0-99] cycles	Default = 0 Time delay between 'Weld 1' and 'Weld 2'. Designed to give an impulse effect.

Main Menu (continued)

Sub Menu	Parameter	Input Range	Description
2. Edit Schedule (continued)			
	Slope	[0-99] cycles	Default = 0 The number of additional cycles between 'Weld 1' and 'Weld 2' in order to transition between the two gradually. A larger 'Weld 1' will result in a downslope; whereas a larger 'Weld 2' will result in an upslope.
	Weld 2	[0-99] cycles	Default = 0
	>Mode	Phase Shift Const Current	Default = Phase Shift
	>Heat	[0-99] %	Phase shift %; does not apply when '>Mode' is set to Const Current
	or		
	>Current	[0.00-60.00] kA	Weld current setting does not apply when Mode is set to Phase Shift
	>I2 Monitor	On Off	Default = Off Must be enabled in order to track/report current errors
	>PW2 Monitor	On Off	Default = Off Must be enabled in order to track/report phase shift abnormalities.
	Cool 2	[0-99] cycles	Default = 0 Primarily used when applying multiple impulses; time delay following each 'Weld 2' impulse.
	Hold	[0-99] cycles	Default = 0 Time delay during which the electrodes remain in contact with the part being welded to allow weld nugget to congeal.
	Off	[0-99] cycles	Default = 0 Time delay following 'Hold' cycle in which the valve(s) release; the next schedule/sequence will not begin until the 'Off' cycle is complete.
	Impulses	[1-99] cycles	Default = 1 Number of times to deliver Weld 2, Cool 2. (Impulses do NOT apply to Weld 1, Cool 1)
	I offset	-1 % 0 % +1 %	Default = 0 Adjustable increase or decrease to total current delivered by a sequence. This is one of the few adjustable parameters when control is locked. Parameter is only visible when 'Max I offset' is not "0".
	>Change all	No Yes	Default = No No – 'I offset' will be applied to the current schedule Yes – 'I offset' will be applied to all schedules'
	Block Delay	[0-99] cycles	Default = 0 This option only appears when 'air-over-oil' configuration is selected.

Parameter List

Main Menu (continued)

Sub Menu	Parameter	Input Range	Description
2. Edit Schedule (continued)			
	Cycle Mode	Non-Repeat Repeat Chained Successive Wait Here	Default = Non-Repeat Non-repeat – Control can be initiated for only one sequence/ schedule even if initiation remains closed. Repeat – Sequences/ schedules will continue if initiation remains closed. Chained – Schedules are chained together so that consecutive schedules can be sequenced from one initiation. Successive – Schedules are chained together so that consecutive schedules will be sequenced from separate initiations. Wait-Here – only applies when 'Weld2' is set to 99 cycles. This allows infinite Weld 2 duration until Escape is trig-
3. Copy Schedule			
	Copy From	[0-63]	Schedule # to be copied
	Copy To	[0-63]	Schedule # to be replaced
	Confirm	Yes No	Must select "Yes" and press the [↵] key to complete the above copy/replace. "DONE!!!" will appear in the title bar once complete.
4. Reset Error			
	Confirm	Yes No	Must select "Yes" and press the [↵] key to complete the above copy/replace. "DONE!!!" will appear in the title bar once complete.
5. Edit Counter			
	Counter	Enable Disable	Default = Disable Enable – 'Weld count done' will increment with each weld delivered. Error "ER25" will be reported when 'Max part count' = 'Part count done'
	Max part Count	[0-60,000]	Default = 60,000 Number at which the 'part count done' reports error "ER25"
	Weld per part	[1-9,999]	Default = 1 The number of welds to increment 'part count done' by one.
	RST Counter	None PCTR WCTR Both	Default = None Resets counter PCTR – part counter WCTR – weld counter

Parameter List
Setup Menu

Sub Menu	Parameter	Input Range	Description
1. Config			
	Weld Mode	Spot Seam1 Seam2	Default = Spot Spot – Standard squeeze, weld, hold and off sequence. Seam1 – When FS1 or FS2 input is toggled, control will run 'schedule' from 'Squeeze Delay' through 'Cool 2'. If FS1 or FS2 input is held, control will repeat 'Weld 2' and 'Cool 2'. Seam2–FS1 initiation implements same function as in Seam1. FS2, schedule 20, schedule 40 and schedule 60 will always initiate "Spot" Weld Mode
	Retraction	Off Maintained Momentary	Default = Off Maintained – Retraction output directly reflects retraction input Momentary – Retraction output changes state with an impulse of retraction input. This parameter is ignored if 'Beat_Mode' is enabled.
	On Error	Continue Head Lock Stop	Default = Continue Continue – Further welds are permitted regardless of previous weld status Head Lock – On error, valve signal(s) are held on. Additional welds are not permitted until Error Reset occurs. Stop – On error, valve signal(s) turn off as normal. Additional welds are not permitted until Error Reset occurs.
	Sch Select	Internal External	Default = Internal Internal – FS1 will initiate the programmed weld schedule number External – FS1 will initiate the weld schedule number according to the binary value represented by PI3, PI4, PI5, and PI6. (FS2 will always initiate weld schedule 20.)
	I-Feedback	Primary Secondary	Default = Secondary This setting should correspond to the physical location of the sensing coil.
	Air-over-oil	Off Mode 1 Mode 2	Default = Off Mode 1: air-over-oil setting without retraction Mode 2: air-over-oil setting with retraction enabled using 'Retract Open' and 'Retract Close' settings
	Retract Open	[0-99] cycles	Default = 0 Time delay to allow for retraction from "pre-weld" position to "fully open" position Sub Menu only appears when 'air-over-oil' is set to "Mode 2"
	Retract Close	[0-99] cycles	Default = 0 Time delay to allow for closure from "fully open" position to "pre-weld" position Sub Menu only appears when 'air-over-oil' is set to "Mode 2"

Setup Menu (continued)

Sub Menu	Parameter	Input Range	Description
1. Config (continued)			
	Beat mode	Off Squeeze Sqz. + Weld Wait-Here	Default = Off Off – Sequence/Schedule will complete with a momentary activation of FS1 or FS2 Squeeze – Sequence/Schedule requires continuous activation of FS1 or FS2 until the squeeze sequence is complete, otherwise the sequence will terminate. Sqz. + Weld – Welding sequence requires continuous activation of FS1 or FS2 until the weld sequence is complete, otherwise the sequence will terminate. Wait-Here – Welding sequence requires continuous activation of FS1 or FS2 until the weld sequence is complete, otherwise the sequence will temporarily pause (retraction will not occur). This setting requires the active schedule's 'Cycle Mode' to also be set to "Wait-Here".
	AVC	Disabled Max [1-10] %	Default = Disabled Automatic Voltage Compensation – Will add additional percentage to phase shift in order to compensate for diminished supply voltage. (only works with schedules using "Phase Shift" Mode to regulate current)
	AVC nom.	[187-633] volts	Default = 480 Supply voltage on which the control is designed to operate. Parameter is only visible when 'AVC' is enabled.
	Voltage monitor	Off On	Default = Off On – High and Low Voltage errors are enabled using the following parameters.
	>High	[160-690] volts	Default = 690 Error "ER23" will be triggered if supply voltage is above the set value Parameter is only visible when 'Voltage Monitor' is "On"
	>Low	[160-690] volts	Default = 160 Error "ER24" will be triggered if supply voltage is below the set value Parameter is only visible when 'Voltage Monitor' is "On"
	Max I offset	[0-15] %	Determines the input range for 'I offset' parameter. For example, if 'Max I offset' is 6%, 'I offset' input range is -6% to +6%
	Water Saver	[0-199] sec	Default = 0 Time duration that the water flow signal will remain on following a weld.
	87° delay	Off On	Default = Off On – The first half cycle is delayed 87degrees (51.6% max) phase shift in order to minimize saturation of the weld transformer
	Half Cycle	Off + - AC	Default = Off + – Only the positive half cycle is output - – Only the positive half cycle is output AC – Alternating positive/negative half cycles are output

Parameter List

Setup Menu (continued)

Sub Menu	Parameter	Input Range	Description
1. Config (continued)			
	Power factor	[0-99] %	Default = 75 0 – "Automatic Power Factor" mode 1-99 – Manual power factor delay. Value must be determined by the Power Factor Delay and will vary for each machine. If a primary or secondary coil is NOT installed, a manual power factor of 80% is recommended. Automatic Power Factor may react abnormally if enabled without a coil.
	Blanking	[0-99] cycles	Default = 0 The number of weld cycles to exclude from measurement and limit testing
	Display return	[0-10] min	Default = 0 0 – Disabled Length of time before the display returns to 'Status Page 1'
	Clear	None I/O Map Calibration Config Stepper Counter Schedule All	Clearing data from this menu does not require a confirmation. "DONE!!!" will appear in the title bar as verification.
2. Calibration			
	Toroid	[135-165] mV/kA	Default = 150 For accurate current monitoring
	Max I	[20-60] kA	Default = 20
	AC line scale	[0.8-1.2]	Default = 1.0 For accurate voltage monitoring
3. I/O Map	(see page 21)		
4. Error Map	(see page 22)		
5. Stepper			
	Stepper	Disable Heat	Default = Disable Heat – Stepper function enabled with current compensation
	Tip dress	[0-9,999]	Default = 9,000 When 'Count Done'='Tip dress', error (ER31) will trigger
	RST stepper	No Yes	Selecting "Yes" and pressing the key will reset the 'Count done' to zero

Parameter List

Setup Menu (continued)

Sub Menu	Parameter	Input Range	Description
5. Stepper (continued)			
	[01-10]:Count	[0-9,999]	Default = 0 The number of welds required to move onto the next step
	>Heat+	[0-99] %	Default = 0 Additional phase shift to be added to Weld 1 and Weld 2 'Heat' settings Only applies when the weld 'Mode' is set to "Phase Shift."
	>Current+	[0.00-99.99] kA	Default = 0 Additional current to be added to Weld 1 and Weld 2 'Current' settings Only applies when the weld 'Mode' is set to "Const Current."
6. Utility			
	Backup Data	(see page 10)	
	Restore Data	(see page 11)	

Input/Output	Options	Description
PI1	TT1 2nd stage Back step PCTR	TT1 – Temperature Limit Switch (also called TLS) 2nd stage – For valve closure before squeeze; to ensure good electrode position Back step – Return to previous schedule in "Successive" Cycle mode PCTR – Part counter reset
PI2	Edit lock PS1 Interlock WCTR Reset	Edit lock – closed = control locked; open = control unlocked PS1 – Pressure switch signal Interlock – Signal to authorize weld; used with PO4 Interlock WCTR – Weld counter reset
PI3	Error reset Sch. Select 1 Stepper reset 2nd Stage	Error reset – Clear error in order resume function Sch. Select 1 – Binary value of "one" for externally selecting schedule Stepper reset – Return stepper to "Zero" position 2nd stage – For valve closure before squeeze; to ensure good electrode position
PI4	Interlock Sch. Select 2 Error Reset (Not Used)	Interlock – Signal to authorize weld; used with PO4 Interlock Sch. Select 2 – Binary value of "two" for externally selecting schedule Error reset – clears error in order resume function
PI5	Back step Sch. Select 4 Retraction (Not Used)	Back step – Return to previous schedule in "Successive" Cycle mode Sch. Select 4 – Binary value of "four" for externally selecting schedule Retraction – Retract input command for release of valves
PI6	Stepper Reset Sch. Select 8 Edit lock Escape	Stepper reset – Return stepper to "Zero" position Sch. Select 8 – Binary value of "eight" for externally selecting schedule Edit lock – closed = control locked; open = control unlocked Escape – command to escape current weld schedule/sequence
PO1	Any Error Retraction Force Error Major Error	Any Error – Major or minor error is detected Retract Output – Command to retract (in addition to programmed valves) Force Error – Pressure switch is not detecting proper electrode force Major Error – Major error detected; determined by "Error Map" settings
PO2	AVC Error Contactor Error Step End EOS	AVC Error – Automated Voltage Compensation is insufficient Contactor Error – Energy is being shunted; (typically set to trip a breaker) Step End – Programmable step has completed its count EOS – 0.5sec signal at the end of each weld sequence
PO3	Current Error Any Error Count end Water Saver	Current Error – Constant Current Control in insufficiently compensating Any Error – Major or minor error is detected Count end – 'Max part count' has been reached Water Saver – signal turns off after a set time following the last weld
PO4	Step End Current Error AVC Error Interlock	Step End – Programmable step has completed its count Current Error – Constant Current Control in insufficiently compensating AVC Error – Automated Voltage Compensation is insufficient Interlock – "Request to weld" signal from external source; used with PI4

Error List

#	Name		#	Name
1	Config error		33	Starts/Retract @ RST
2	Calibration error		34	SYNC error
3	Schedule error		35	PNW error
4	Use Schedule error		36	DC Safety relay err.
5			37	AC Safety relay err.
6	Counter error		38	
7	Stepper error		39	
8	I/O Map error		40	
9	E-stop error		41	
10	TC1 error		42	
11	P1-No weld		43	Pre-high current1
12	PS1 error		44	Pre-low current1
13	SCR short		45	Pre-high current2
14	2nd stage error		46	Pre-low current2
15	TT1 error		47	
16	Interlock error		48	
17			49	
18			50	
19	High current1		51	
20	Low current1		52	
21	High current2		53	
22	Low current2		54	
23	High voltage		55	
24	Low voltage		56	
25	Counter end		57	Retract open error
26	Stepper end		58	
27	High PW1		59	Retract input closed
28	Low PW1		60	PS not ready
29	High PW2		61	Retract not ready
30	Low PW2		62	2nd stage not ready
31	Tip dress pre-warn		63	
32	AVC error		64	Interlock not ready

Note: All error defaults are set to "Minor errors". Error handling should be set under the configurations menu and by utilizing the "Any Error", "Contactor Error", and "Major Error" options available for the programmable outputs in the I/O Map.

Warranty and Service Policy

ENTRON takes great pride in offering its customers a quality product that is built to withstand numerous industrial conditions. The products are built to last, and in return for customer loyalty, we offer a limited warranty on all new control panels.

ENTRON Controls, LLC., warrants that all ENTRON control panels except Mid-frequency Inverter controls, silicon controlled rectifiers (SCRs), insulated gate bipolar transistors (IGBTs), SCR and IGBT assemblies, circuit breakers, and electro-mechanical contactors, are free of manufacturing defects for a period of **TWO YEARS** from the date of original purchase and, in the event of a manufacturing defect, ENTRON will repair or replace, at its discretion, the defective part without any cost for parts or labor.

All SCRs, IGBTs, SCR and IGBT assemblies, circuit breakers, and electro-mechanical contactors in ENTRON control panels are covered by a **limited warranty from the original manufacturer**. If these parts fail because of a manufacturing defect, they will not be repaired or replaced by ENTRON, but will be returned by ENTRON to the original manufacturer in accordance with said manufacturer's warranty.

ENTRON Controls, LLC., warrants that all Mid-frequency Inverter controls are free of manufacturing defects for a period of **ONE YEAR** from the date of original purchase and, in the event of a manufacturing defect, ENTRON will repair or replace, at its discretion, the defective part without any cost for parts or labor.

To obtain repairs or replacement parts under this warranty, the defective part must be returned, prepaid, to ENTRON Controls, LLC., 1402 S. Batesville Road, Greer, South Carolina 29650. Please send your repair to the attention of "Service" with a description of the problem you are experiencing, contact person and phone number.

EXCLUSIONS: This warranty does not cover damage by accident or misuse, unauthorized repair or modification to any control assembly by the customer.

The warranty period is considered from date of shipment and is tracked by ENTRON's serial numbering system.

USE OF OUT OF WARRANTY REPAIR SERVICE: To obtain service for any printed circuit board assembly or welding control after the warranty period, send the assembly or control, prepaid, to ENTRON Controls, LLC., and ENTRON will repair the printed circuit board assembly or control and return it to you without further warranty. Additional service charges will be invoiced at time of shipment.

Thank you for using ENTRON Controls.

> Your ENTRON Controls, LLC., Original Equipment Manufacturers (OEMs), Dealers and Distributors are your first response contact to secure technical assistance on control or welding problems. Should they be unable to assist you, please contact your ENTRON sales representative or the factory directly. Contact the factory at 864-416-0190.