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Weld Controller Wiring and programming manual

Welder Programming

To adjust welding parameters:

1. Power up machine

a. "Power On" LED will illuminate

b. Dual Blinking dots indicates **Run Mode** (machine will weld with
previously input weld settings.

Rotate knob to select schedule 0 through 9, and operate welder using a foot switch.

PROGRAMMING

1.   Rotate the control know and select the schedule to be programmed

2.   Quickly depress *Programming Dial* once

3.   Control goes into **Select Mode,** and the **"squeeze time"** LED will illuminate.

4.   Turn *Programming Dial* to select between:

     Squeeze Time

     Impulses

     Cool Time

     Heat Time

     Heat Percent

     Hold Time

     Off Time

5.   Once the selected parameter is highlighted with an LED, push *Programming Dial*
Again. **"Pr"**, followed by **"- -"** will be displayed on the readout for a second indicating programming mode
and ready to change the parameter.

6.   Adjust variable to desired setting by turning the *Programming Dial.*

7.   When adjusted, press the *Programming Dial* to save parameters.
All LEDS will flash once and the controller will be back in run mode.

8. Repeat steps outlined above until all of your parameters are set.

9. To program the Repeat function, in run mode, depress and hold the *Programming Dial* until it reads "rP" or
"no". Once the programming dial is released, the display will toggle between "rP" and no". Press the dial again
while the display indicates "rP". Hold the dial until the two decimal dot's turn on. This indicates that the
schedule has been setup for a repeat function. The controller returns to run mode.

Power limits:

The controller can be set to limit the heat percentage. Make sure the controller is off, and then power on while
depressing the dial knob. The controller LED "squeeze Time" will toggle between flashing (3 times) and off.
Release the dial knob while the led is flashing.

The display will start at 50 and increment to 99, then restart at 00. Depress the dial knob at the desired power
value.

This value will be the top limit used in heat percent regardless of the schedules programmed – For instance, if
the limit is set at 60%, and a user schedule is set for 90%, the power output will be 60%. This function is particularly
helpful when the user has low incoming AC power capacity.

Load Defaults for every schedule

Make sure the controller is off, and then power on while depressing the dial knob. The controller LED "squeeze
Time" will toggle between flashing and off. Release the dial knob while the led is not flashing. This will load
defaults into every schedule.

Factory Voltage Sense record

Depress FS2 then power on – This will cause the system to record the 120VAC input voltage and store it for
future reference. A 15% raise in AC voltage will cause the display to flash the top left segment of the display indicating
 high voltage. Flashing indicates that either the transformer supplying AC volts to the weld controller is applying too much
 voltage - Or the main incoming voltage has increased significantly. Before performing this action, make sure that the AC input
Voltage is measured to be 120VAC. If the top left segment is on permanent, the AC voltage is within range, but has increased
In the past. This is a record of past line voltage.

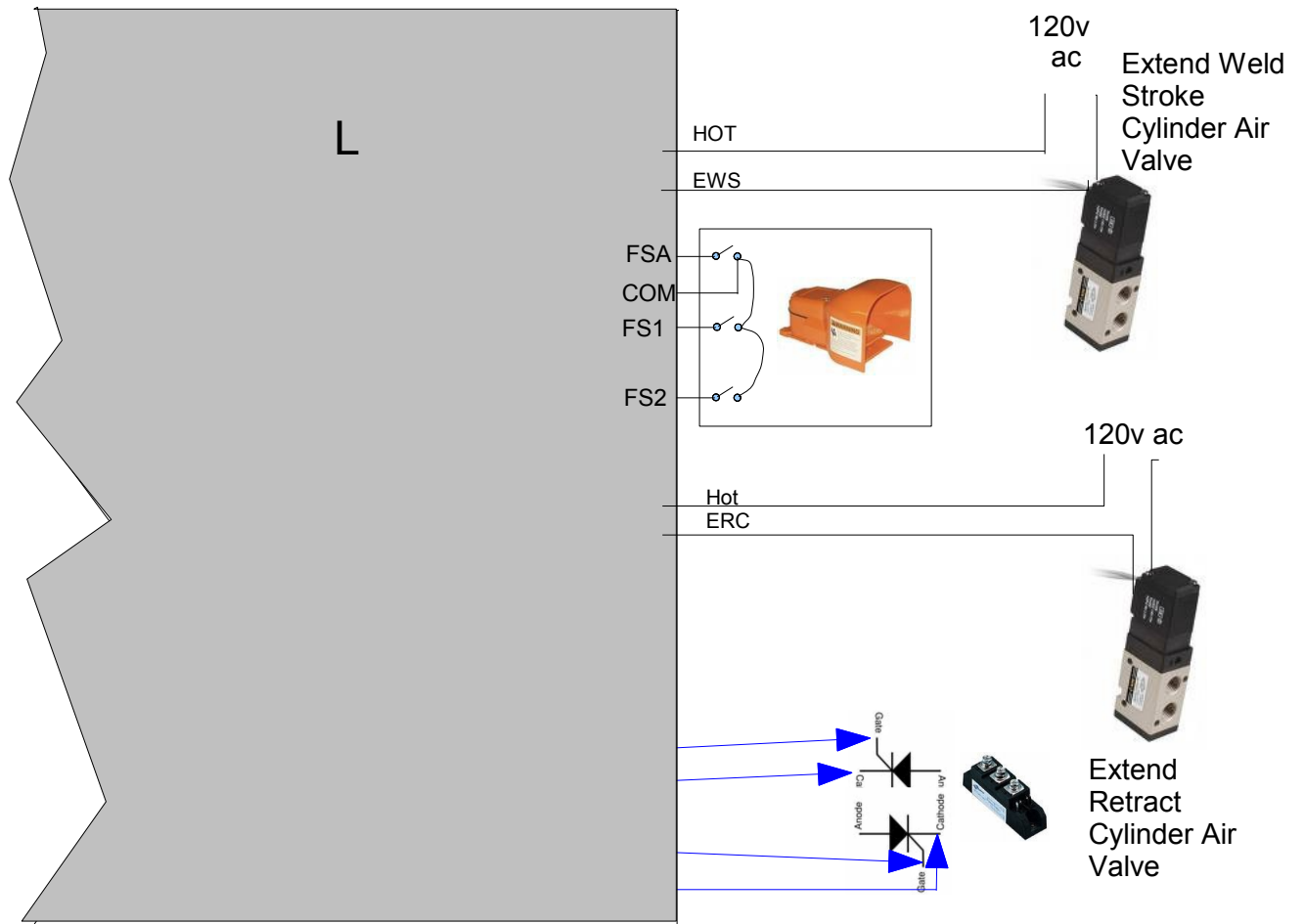# High Voltage Indicator. Top left Segment is flashing

BLINK
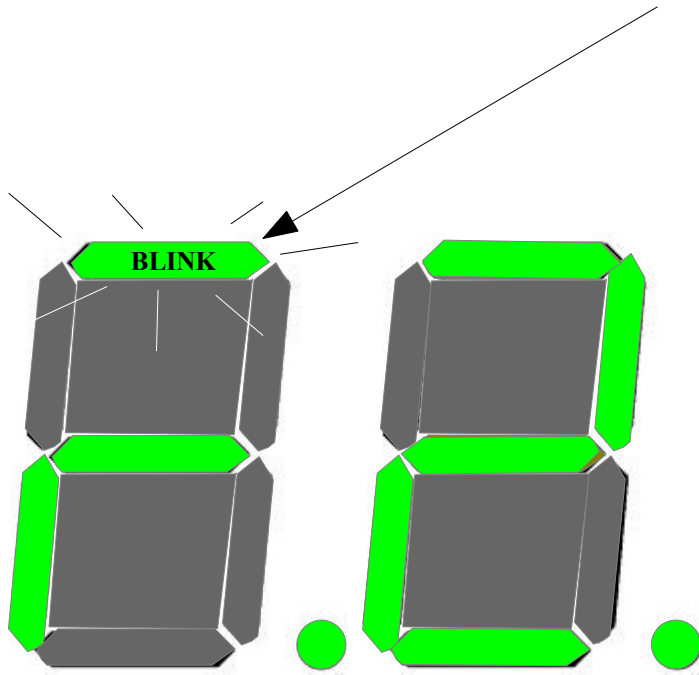
The controller will continue to operate but is indicating that the AC input voltage has exceeded 120 volts AC by more than 15% [138 VAC]. The indicator will continue to flash even after reapplication of power.

Persistent issues require a service technician to resolve the voltage issues.
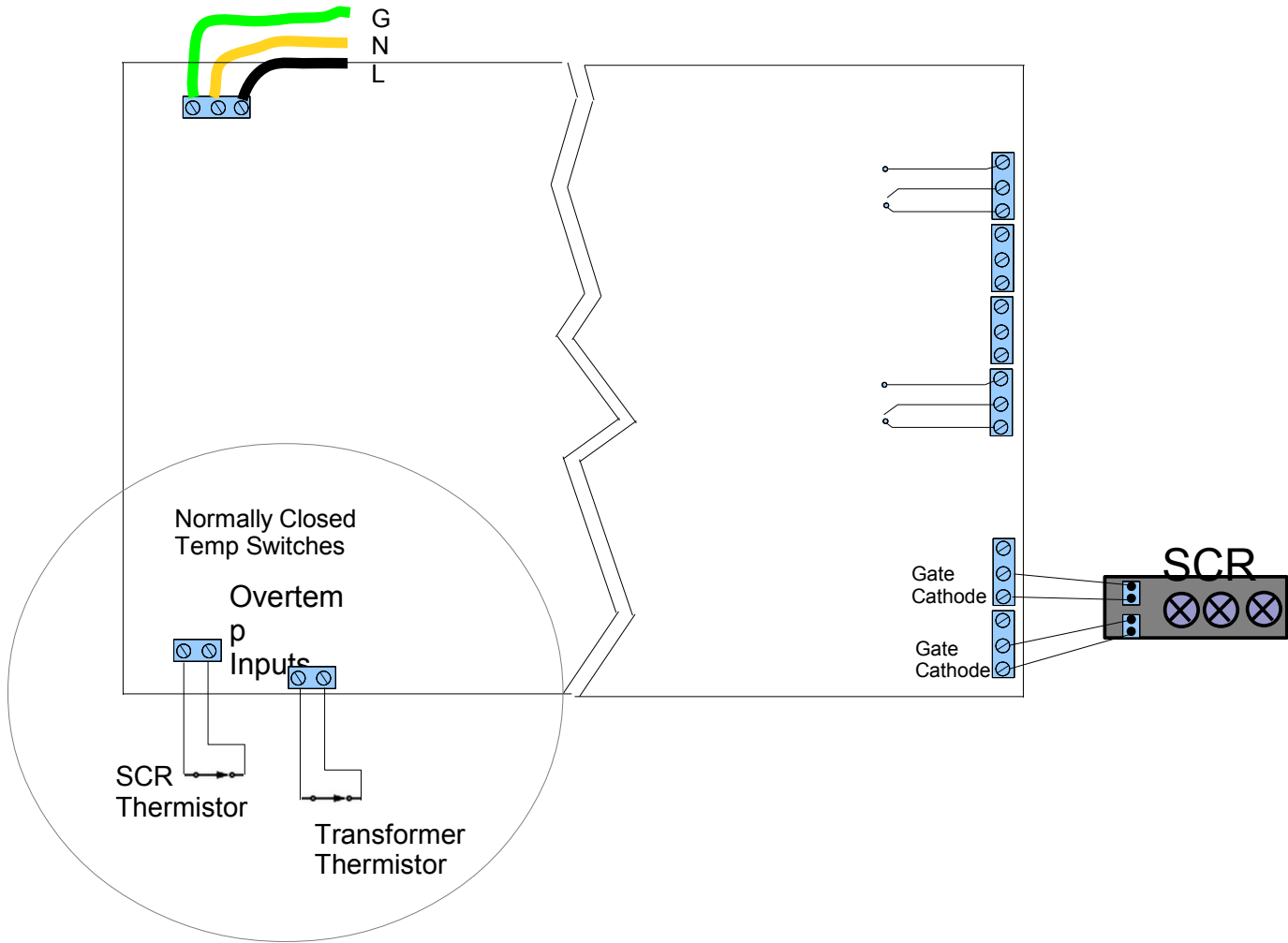
Weld Definitions and Weld Setting Recommendations

Cool Time (cycles)	Cool Time is only used when Impulses is set to 2 or more. Cool time is the amount of time that the weld "cools" in between Impulse welds. If there is a value in Cool Time but Impulses are set to 1, the Cool Time will be ignored. Set Cool Time to 20 cycles or more and then decrease it to improve overall welding time.
Cycles	Cycles are a measurement of time. One cycle is equal to 1/60th of a second. There are 60 cycles in one second. Cycles are to milliseconds what inches are to millimeters.
Heat Percent (%)	Heat Percent is the percentage of output of the capacity of the welder. 99 represents 99%, or the maximum capacity of the resistance welder. Start your weld schedule with a low percent (5% or less), and increase your schedule at 5% increments.
Heat Time (cycles)	Heat Time is the amount of time that the welder will provide current to the weld. Start with a heat time of 5 cycles and work your way up from there.
Hold Time (cycles)	Hold Time represents the time the weld tips stay together after the weld time is complete. In effect, it acts like a forge and allows the weld to cool. Start with a Hold Time of 20 cycles and experiment from there.
Impulses	One Impulse is defined as one complete welding sequence of one weld. Usually set to 1. If welding heavier gauge material, the number of Impulses can be increased to provide double (2 Impulses), triple (3 Impulses), or more (4 and up to 99) multipliers of the weld energy. Use the Cool Time to set the amount of time in between Impulses. Impulses differ from Repeat (see Repeat definition for details.
Off Time (cycles)	Off Time is only utilized when the Repeat function is turned on. The Off Time is the amount of time the welder will wait in between welds. If there is a value in Off Time but Repeat is set to "nO", the Off Time will be ignored.
Rapid Fire	Rapid Fire welding (also known as "Stitch Welding") is when the Repeat function is utilized to weld many welds together in rapid succession (possible to weld up to 60 or 100 welds per minute). Often the welds are "layered" on top of one another, allowing a skilled operator to create a hermetic seal. Note: a special type of welding machine is required for this operation, and not all welding machines can be retro-fit.
Repeat	Repeat is a function that allows an operator to press and hold the footswitch closed while the welder performs multiple welds in a row. This is helpful if welding Rapid Fire, or if placing multiple welds near one another. Repeat differs from Impulses in that the welding tips will open and close in between welds, and that the welder will Repeat for as long as the footswitch is depressed. Use the Off Time to adjust the time in between welds.
Squeeze Time (cycles)	The amount of time it takes for the weld tips to hit the parts and build pressure. The time starts from the moment the footswitch is activated. When the time elapses, the Heat Time (and corresponding Heat Percent setting) will initiate. Start with a long squeeze time (60 cycles or more) and work your way down to minimize the overall welding time.

Wiring detail for 3 position foot switch and 120VAC Valves

L

120v ac

HOT

EWS

Extend Weld Stroke Cylinder Air Valve

FSA
COM
FS1
FS2

120v ac

Hot
ERC

Extend Retract Cylinder Air Valve

Gate
Cat

Anode   Cathode

Gate

Wiring detail for SCR and Transformer Temp Switches

G
N
L

SCR

Gate
Cathode

Gate
Cathode

Normally Closed
Temp Switches

Overtem
p
Inputs

SCR
Thermistor

Transformer
Thermistor

Wiring
detail
August 12 2009

Measured Linearity
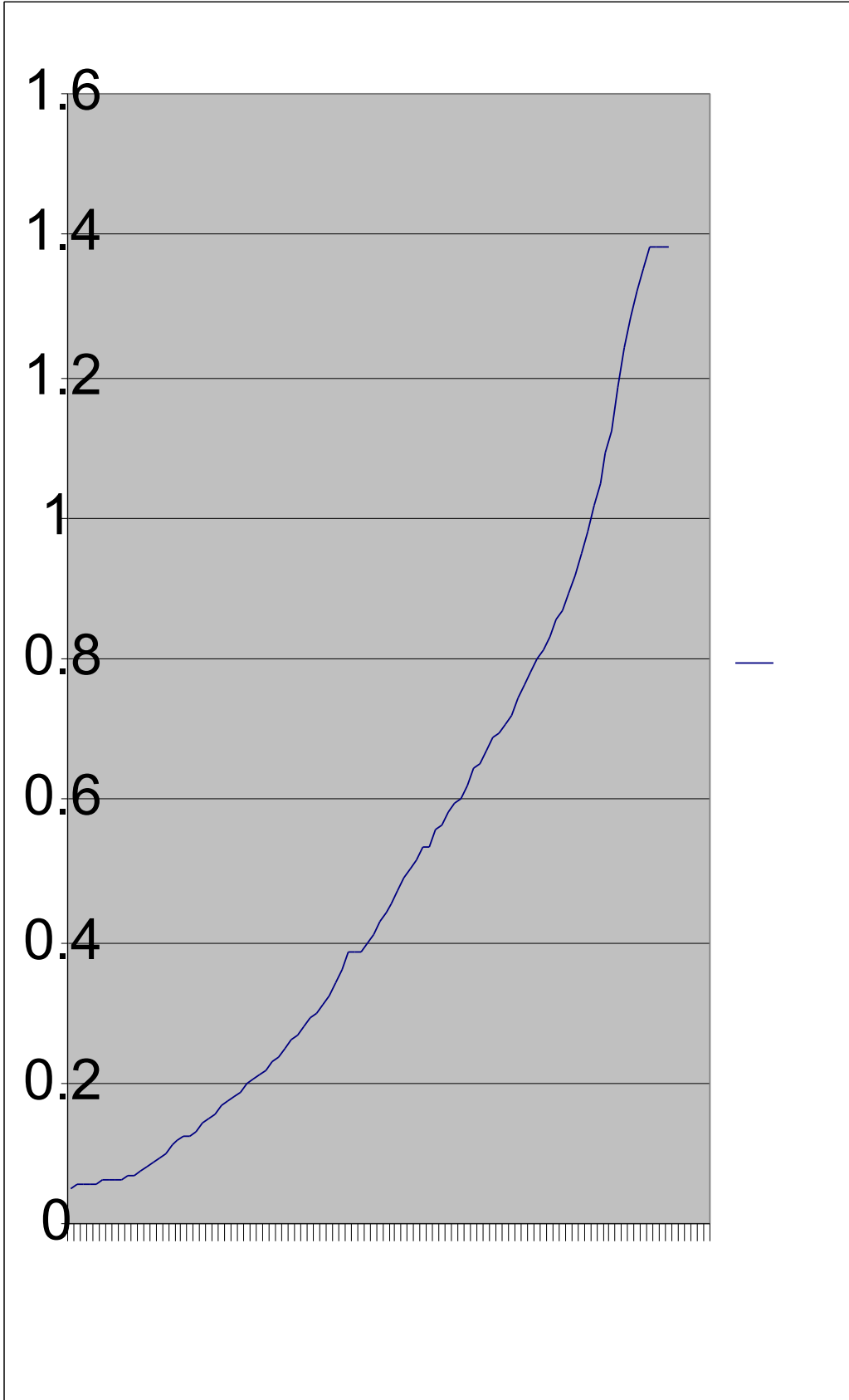
Power[49] = 1295
Power[48] = 1303
Power[47] = 1310
Power[46] = 1310
Power[45] = 1310
Power[44] = 1328
Power[43] = 1345
Power[42] = 1358
Power[41] = 1370
Power[40] = 1375
Power[39] = 1380
Power[38] = 1393
Power[37] = 1405
Power[36] = 1415
Power[35] = 1425
Power[34] = 1438
Power[33] = 1450
Power[32] = 1458
Power[31] = 1465
Power[30] = 1473
Power[29] = 1480
Power[28] = 1495
Power[27] = 1510
Power[26] = 1520
Power[25] = 1530
Power[24] = 1543
Power[23] = 1555
Power[22] = 1570
Power[21] = 1585
Power[20] = 1593
Power[19] = 1600
Power[18] = 1615
Power[17] = 1630
Power[16] = 1645
Power[15] = 1660
Power[14] = 1675
Power[13] = 1690
Power[12] = 1705
Power[11] = 1720
Power[10] = 1730
Power[9] = 1734
Power[8] = 1740
Power[7] = 1745
Power[6] = 1750
Power[5] = 1755
Power[4] = 1760
Power[3] = 1765
Power[2] = 1770
Power[1] = 1785
Power[0] = 1881

Power[99] = 120
Power[98] = 190
Power[97] = 260
Power[96] = 330
Power[95] = 400
Power[94] = 470
Power[93] = 520
Power[92] = 570
Power[91] = 620
Power[90] = 670
Power[89] = 720
Power[88] = 770
Power[87] = 820
Power[86] = 850
Power[85] = 880
Power[84] = 900
Power[83] = 920
Power[82] = 940
Power[81] = 960
Power[80] = 980
Power[79] = 1000
Power[78] = 1010
Power[77] = 1020
Power[76] = 1030
Power[75] = 1040
Power[74] = 1055
Power[73] = 1070
Power[72] = 1080
Power[71] = 1090
Power[70] = 1098
Power[69] = 1105
Power[68] = 1118
Power[67] = 1130
Power[66] = 1135
Power[65] = 1140
Power[64] = 1153
Power[63] = 1165
Power[62] = 1173
Power[61] = 1180
Power[60] = 1190
Power[59] = 1200
Power[58] = 1208
Power[57] = 1215
Power[56] = 1225
Power[55] = 1235
Power[54] = 1243
Power[53] = 1250
Power[52] = 1260
Power[51] = 1270
Power[50] = 1283

Gain	Count	Degrees	Radians	Sine	Averages	Normalized		
	1	0.1	0.001744	0.001744	0.043583	8.21		114 power[99]=120
80	114	11.4	0.198867	0.197558	0.043473	8.19 power[	99]=	162 power[98]=190

Normalized 8.21

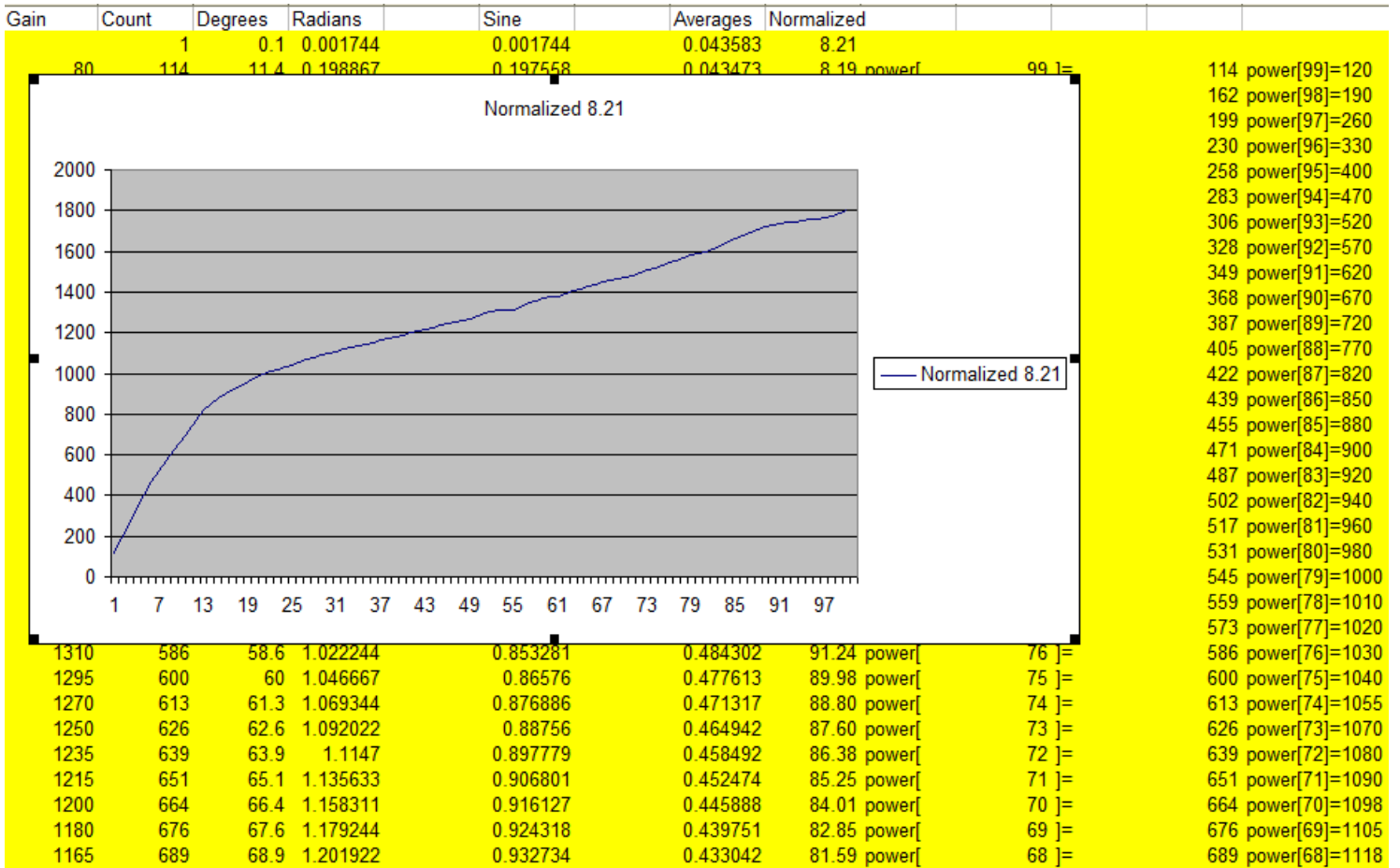| Gain	Count	Degrees	Radians	Sine	Averages	Normalized		
								199 power[97]=260
								230 power[96]=330
								258 power[95]=400
								283 power[94]=470
								306 power[93]=520
								328 power[92]=570
								349 power[91]=620
								368 power[90]=670
								387 power[89]=720
								405 power[88]=770
								422 power[87]=820
								439 power[86]=850
								455 power[85]=880
								471 power[84]=900
								487 power[83]=920
								502 power[82]=940
								517 power[81]=960
								531 power[80]=980
								545 power[79]=1000
								559 power[78]=1010
								573 power[77]=1020
1310	586	58.6	1.022244	0.853281	0.484302	91.24 power[	76]=	586 power[76]=1030
1295	600	60	1.046667	0.86576	0.477613	89.98 power[	75]=	600 power[75]=1040
1270	613	61.3	1.069344	0.876886	0.471317	88.80 power[	74]=	613 power[74]=1055
1250	626	62.6	1.092022	0.88756	0.464942	87.60 power[	73]=	626 power[73]=1070
1235	639	63.9	1.1147	0.897779	0.458492	86.38 power[	72]=	639 power[72]=1080
1215	651	65.1	1.135633	0.906801	0.452474	85.25 power[	71]=	651 power[71]=1090
1200	664	66.4	1.158311	0.916127	0.445888	84.01 power[	70]=	664 power[70]=1098
1180	676	67.6	1.179244	0.924318	0.439751	82.85 power[	69]=	676 power[69]=1105
1165	689	68.9	1.201922	0.932734	0.433042	81.59 power[	68]=	689 power[68]=1118

Figure 6: Linear RPM Output Using Micro-control of TRIAC Phase Angle
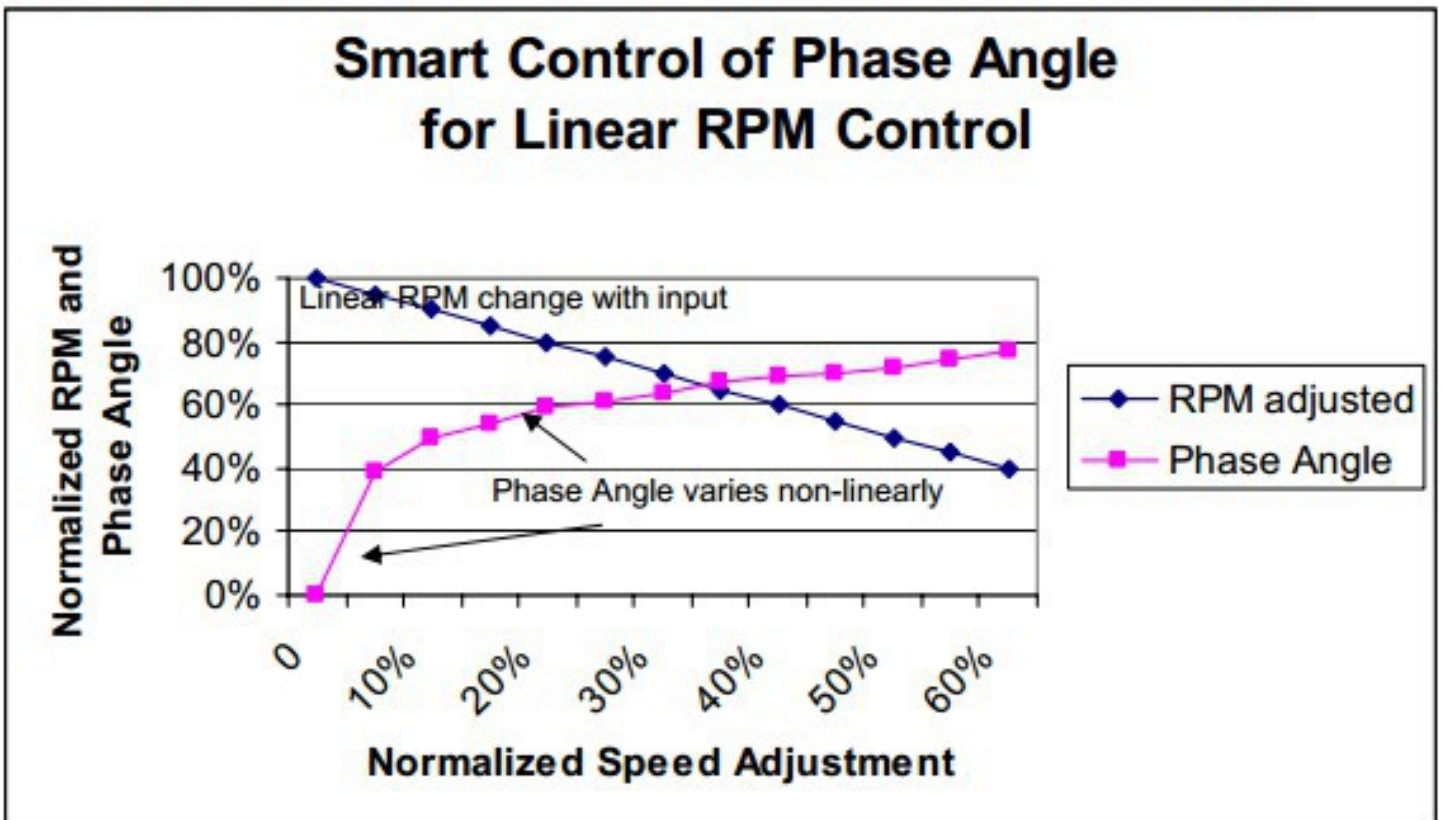
PANEL CUT OUT

Welding Cheat Sheet

Total Time .32 seconds

.016 sec

Cool Time = 2 cycles
no current

Heat Percent (phase angle)

Squeeze Time = 5 cycles

Heat Time = 3 cycles

Impulses = 2

Hold time

Off Time
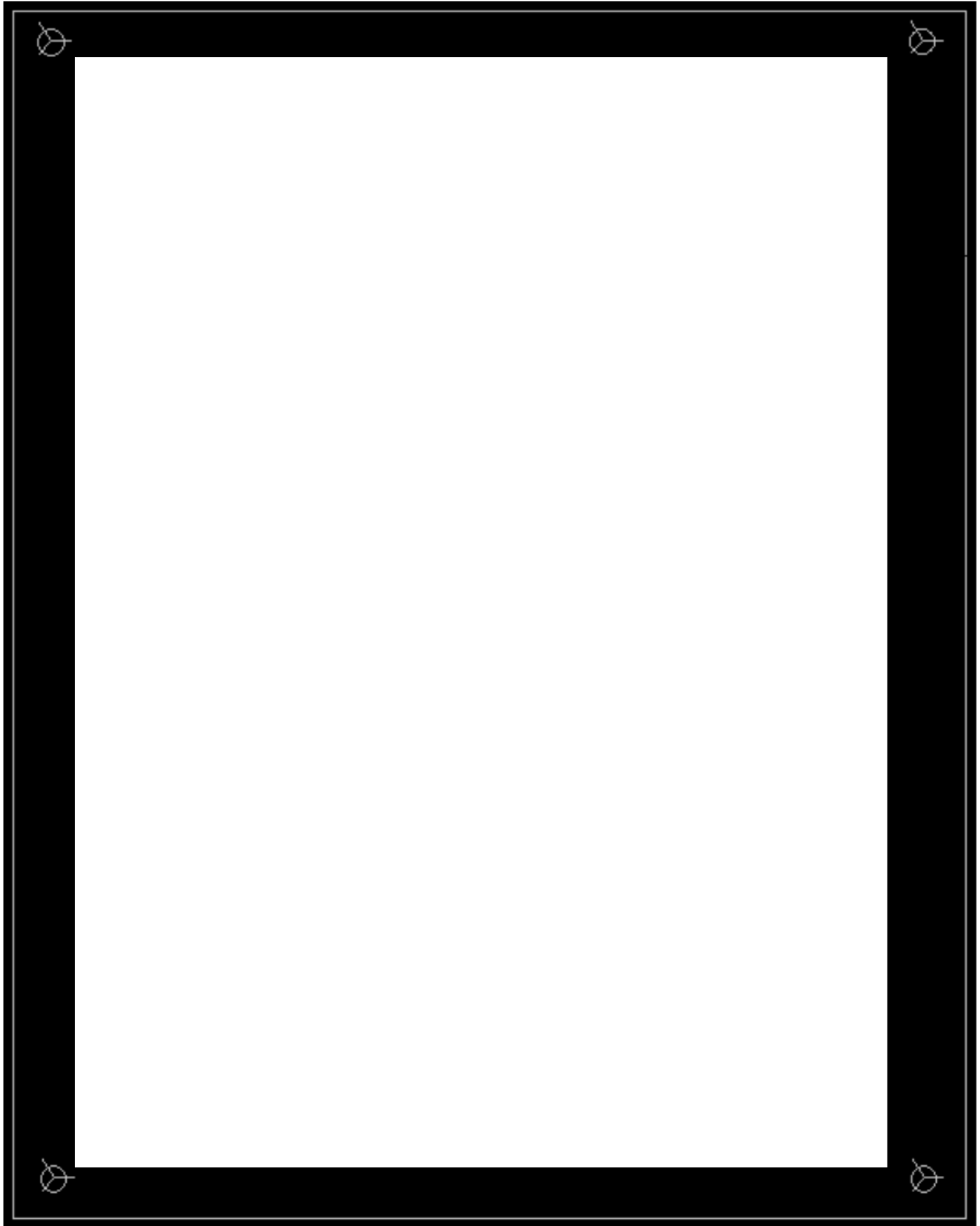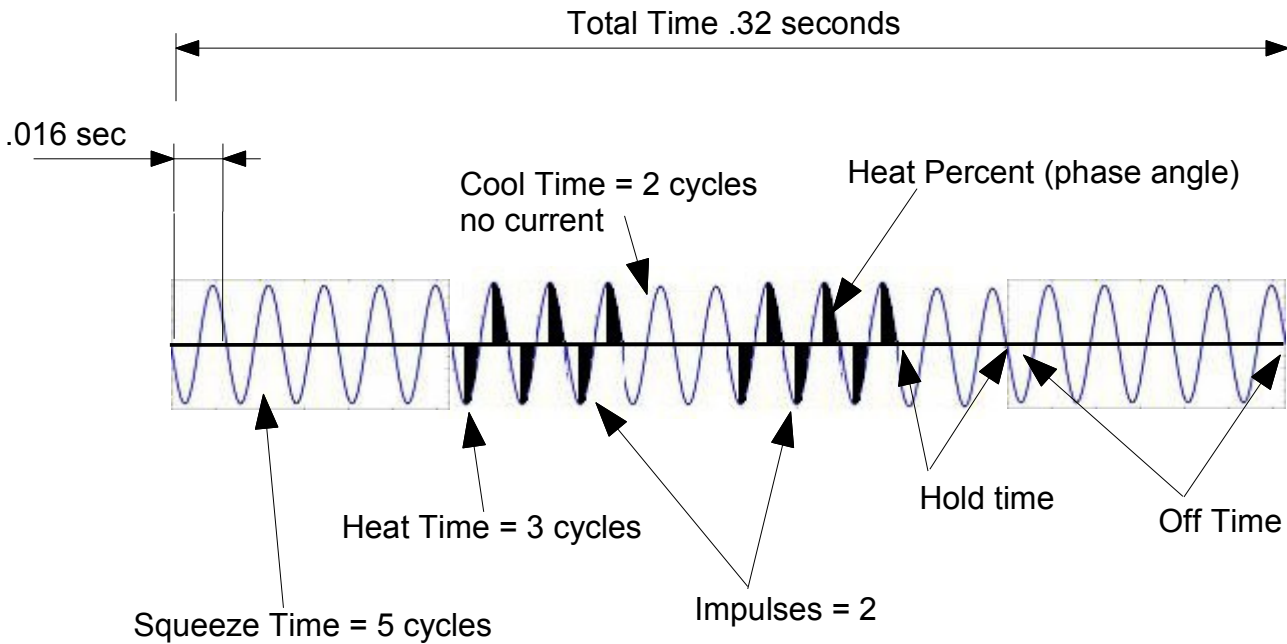
Squeeze Time.
    Time to allow pressure buildup on the part

Impulses
    Quantity of "Heat Time" applications

Cool Time
    Time in between impulses with no current

Heat Time
    Number of cycles providing current

Heat Percent
    Current value obtained by firing angle

Hold Time
    Pressure time, before release, after weld is complete

Off time
    Used in repeat mode only. Dwell time before next weld occurs
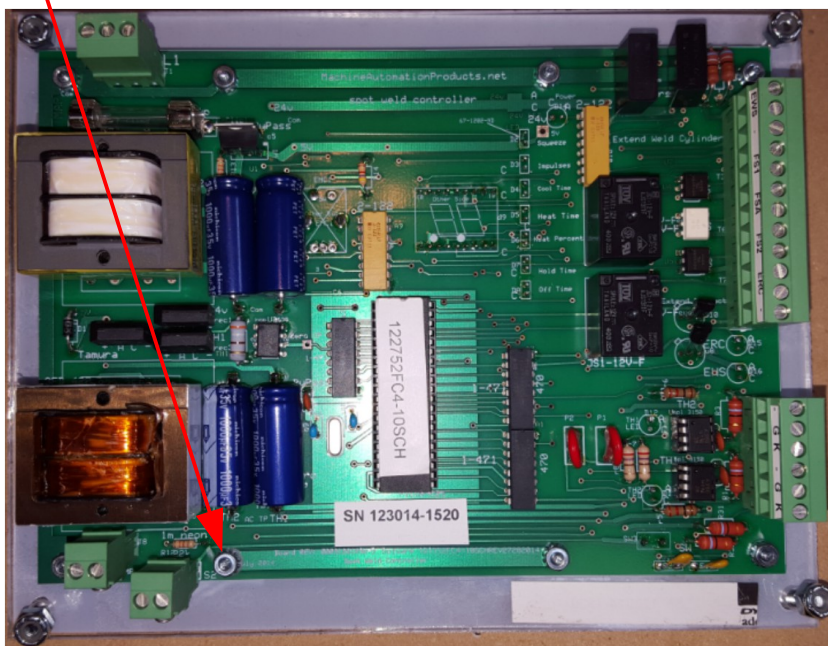
Manufacturing Test Verifications

Serial Example (Build date-Test Date) 123014-012616

Serial Number _____   ✓

1.   Reset unit – Program button on at power up. Release
        while Squeeze LED is off.   ☐

2.   Max setting @ 90% - Reset with Squeeze LED flashing   ☐

3.   AC Volts record at 125V – use FS2 then Powerup   ☐

4.   Check both limits work (Therm and aux input)   ☐

5.   Check for 128Amps with Schedule R1 set at (default)
            Heat 20
            Cool 0
            Impulses 2   ☐
            Heat Time 99
            Hold 30
            Off Time 10

6.   Plastic washer on mount nut located at limit sw area   ☐

Software V Board Versions