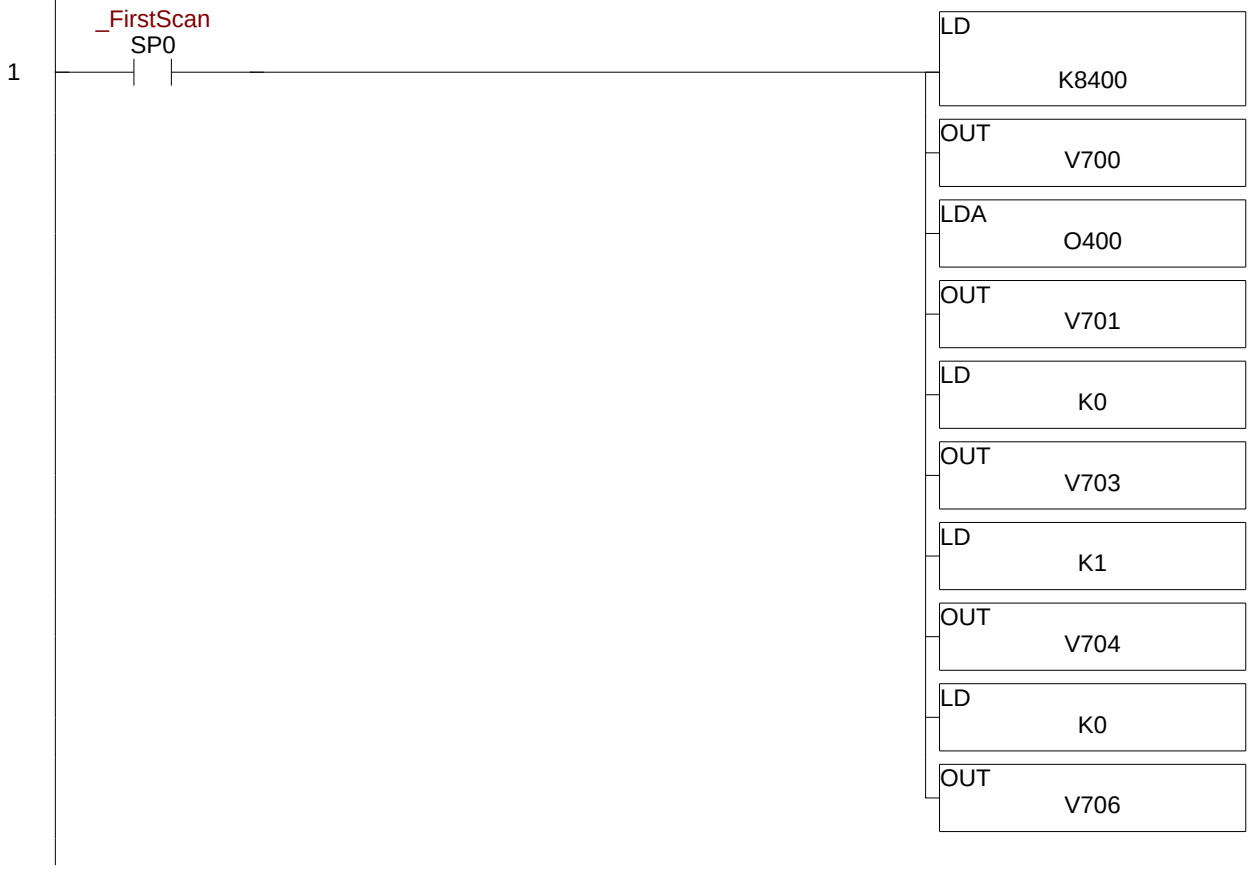
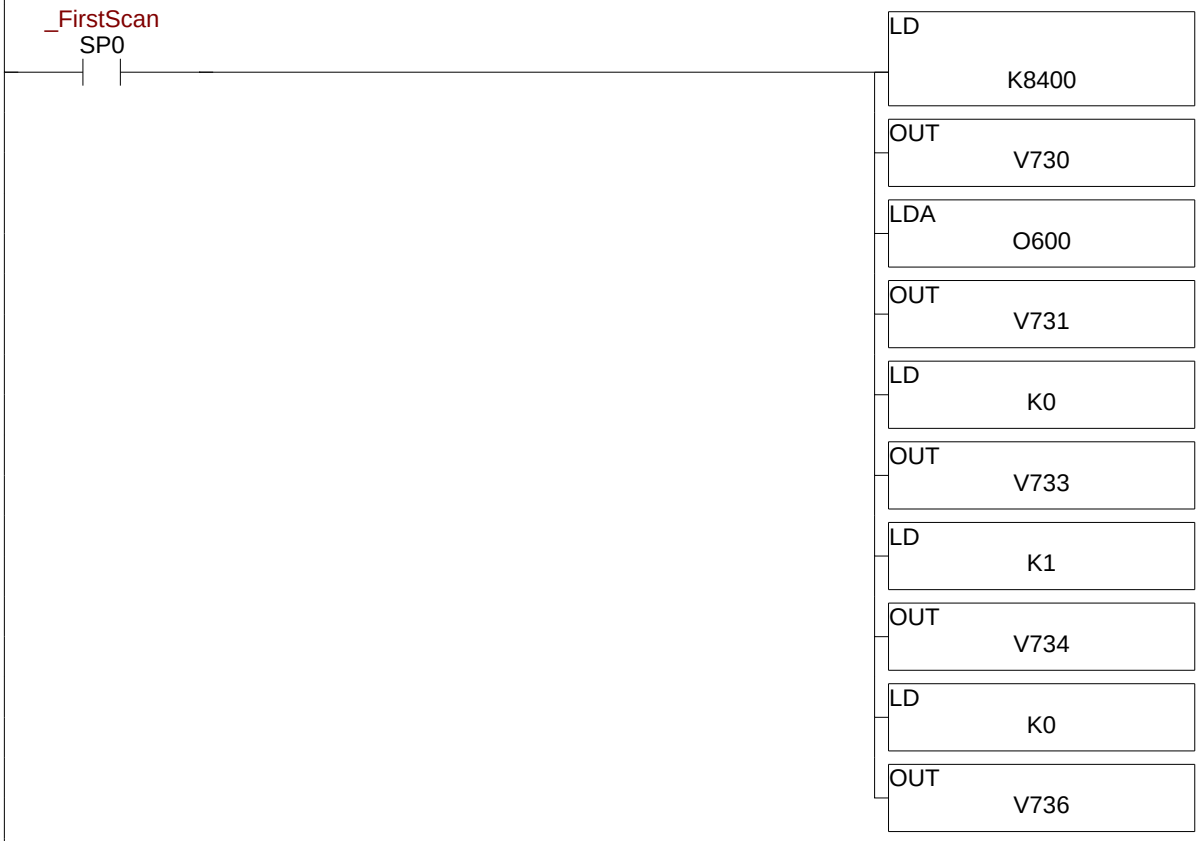
This rung sets up the RTD analog input module in the first expansion slot.
The value of 8400 in V700 enables four channels in binary format.
The value of 400 in V701 sets up the V memory for the temperature data:
  Channel 1 data will be in V400/401
  Channel 2 data will be in V402/403
  Channel 3 data will be in V404/405
  Channel 4 data will be in V406/407
The value of 0 in V703 sets up for Pt100 RTDs (European Curve)
The value of 1 in V704 means the temperature will be in degrees C
The value of 0 in V706 means that the temperature will go to maximum on RTD burnout



This rung sets up the RTD analog input module in the fourth expansion slot.
The value of 8400 in V730 enables four channels in binary format.
The value of 600 in V731 sets up the V memory for the temperature data:
Channel 1 data will be in V600/601
Channel 2 data will be in V602/603
Channel 3 data will be in V604/605
Channel 4 data will be in V606/607
The value of 0 in V733 sets up for Pt100 RTDs (European Curve)
The value of 1 in V734 means the temperature will be in degrees C
The value of 0 in V736 means that the temperature will go to maximum on RTD burnout

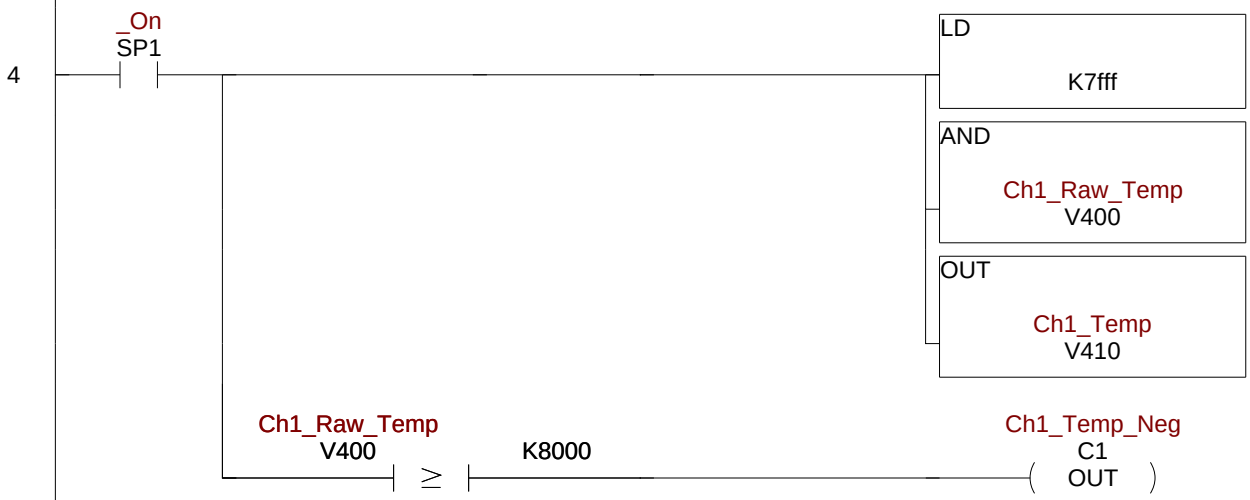
2



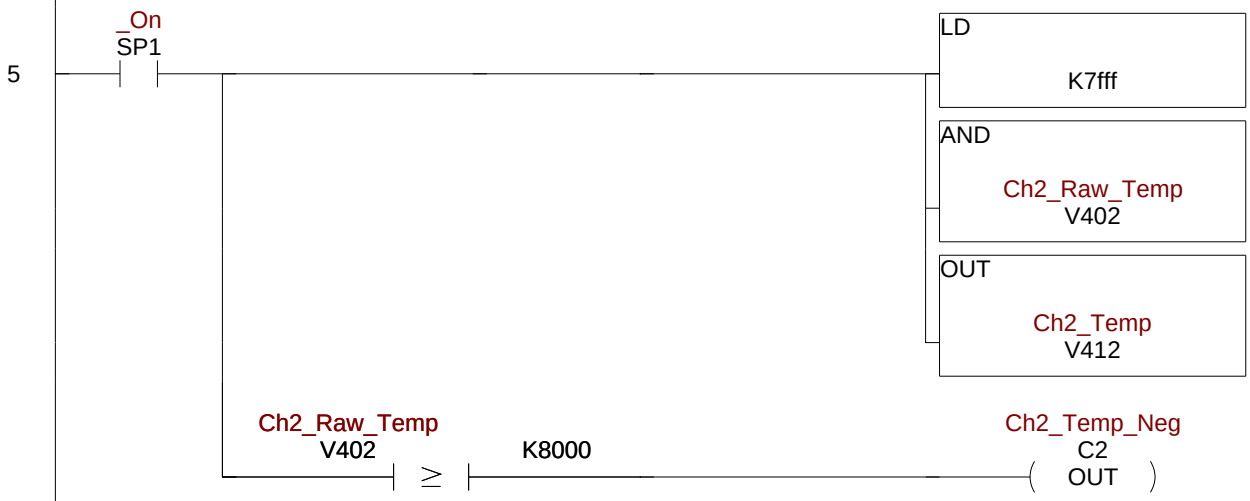
HMI E-Stop Alarm

3

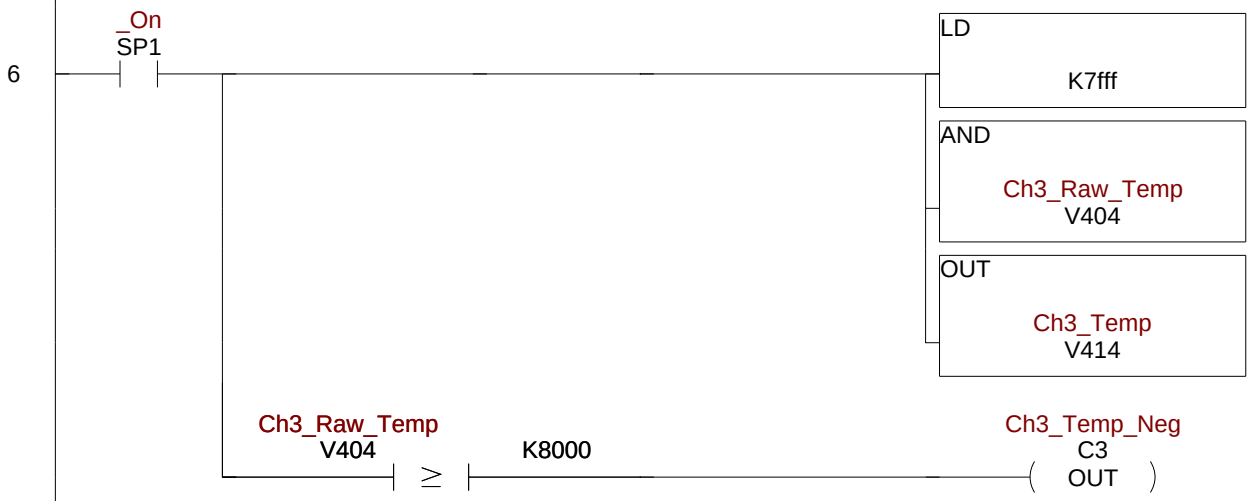
Check Channel 1 for negative temperature value.
The temperature is a signed binary number. ANDing the value with 7FFF strips the sign bit from the raw signal so it can be used in calculations. The discrete bit is set to indicate that the conditioned signal should be interpreted as negative.



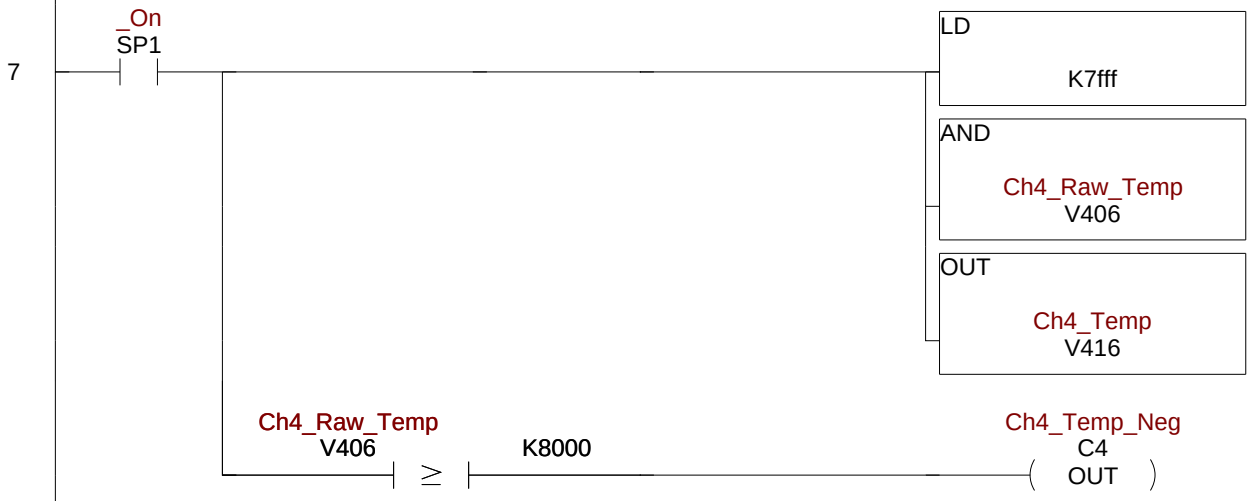
Check Channel 2 for negative temperature value.
The temperature is a signed binary number. ANDing the value with 7FFF strips the sign bit from the raw signal so it can be used in calculations. The discrete bit is set to indicate that the conditioned signal should be interpreted as negative.



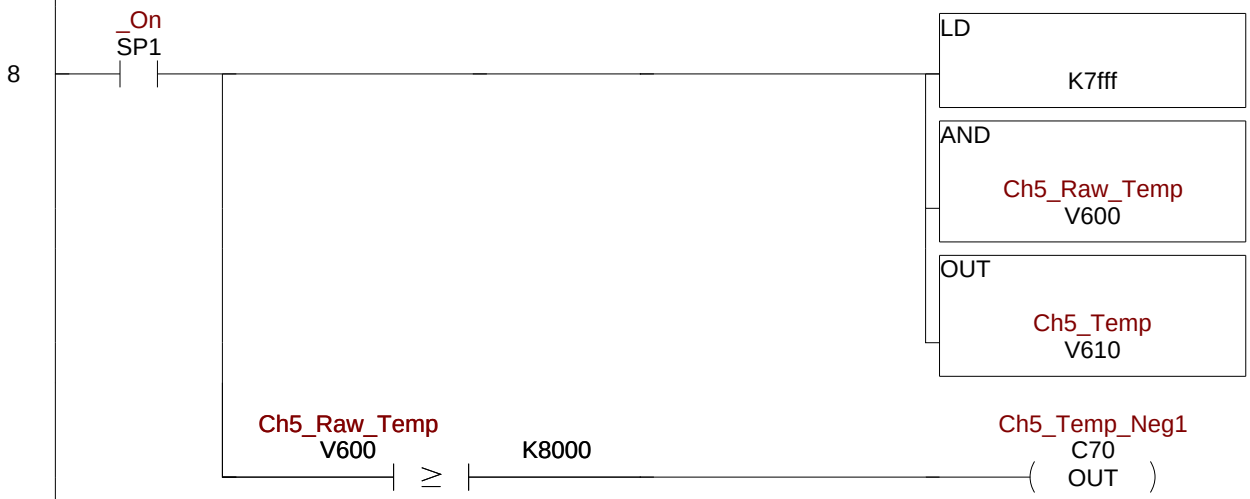
Check Channel 3 for negative temperature value.
The temperature is a signed binary number. ANDing the value with 7FFF strips the sign bit from the raw signal so it can be used in calculations. The discrete bit is set to indicate that the conditioned signal should be interpreted as negative.



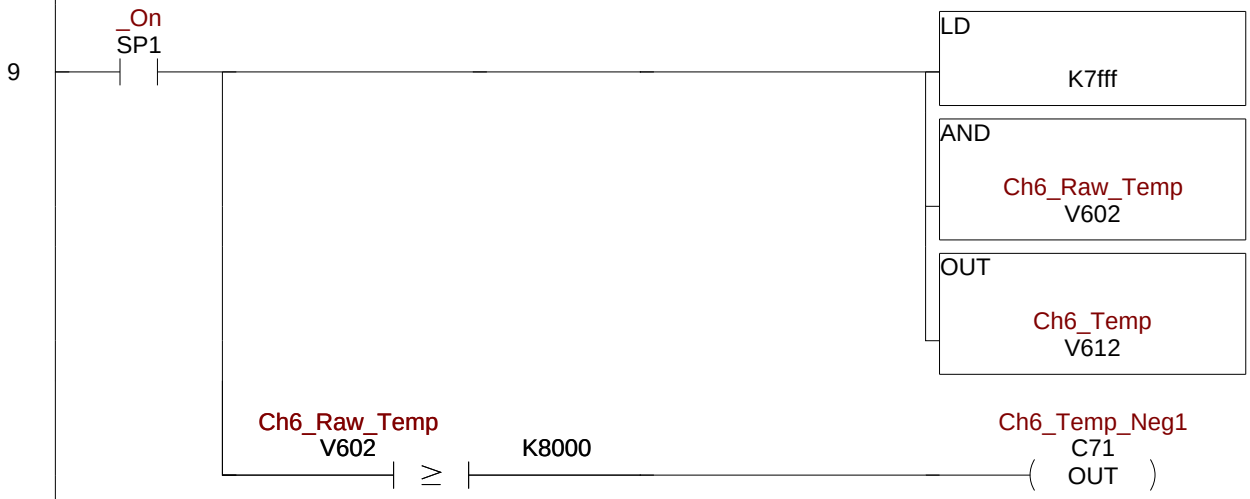
Check Channel 4 for negative temperature value.
The temperature is a signed binary number. ANDing the value with 7FFF strips the sign bit from the raw signal so it can be used in calculations. The discrete bit is set to indicate that the conditioned signal should be interpreted as negative.



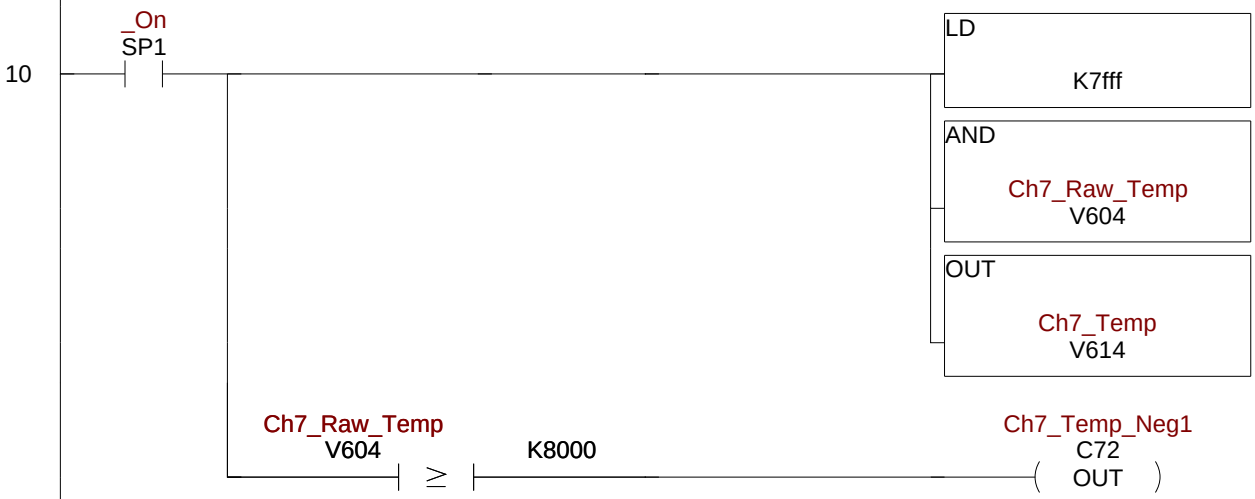
Check Channel 5 for negative temperature value.
The temperature is a signed binary number. ANDing the value with 7FFF strips the sign bit from the raw signal so it can be used in calculations. The discrete bit is set to indicate that the conditioned signal should be interpreted as negative.



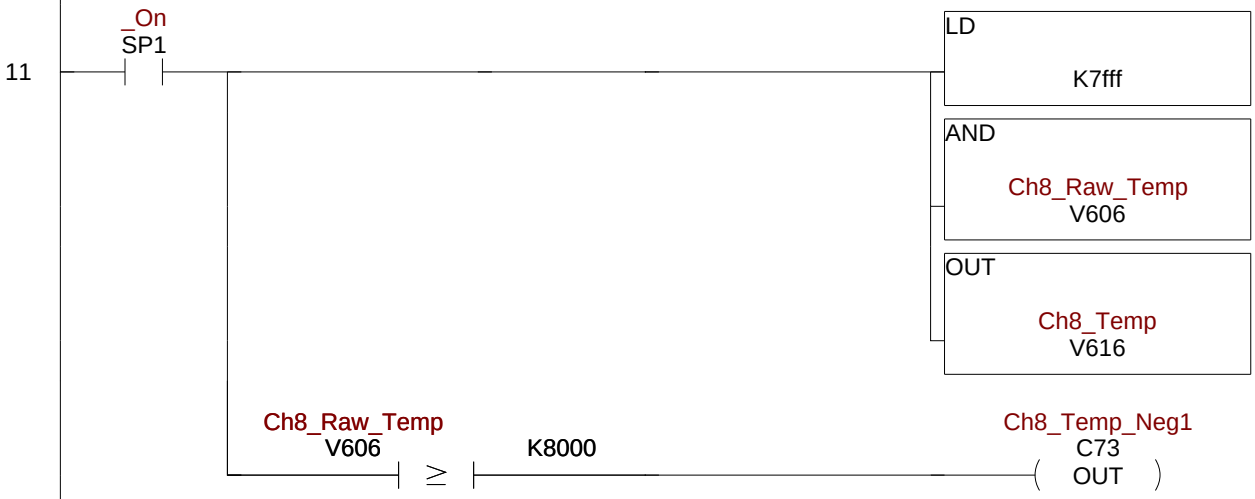
Check Channel 6 for negative temperature value.
The temperature is a signed binary number. ANDing the value with 7FFF strips the sign bit from the raw signal so it can be used in calculations. The discrete bit is set to indicate that the conditioned signal should be interpreted as negative.

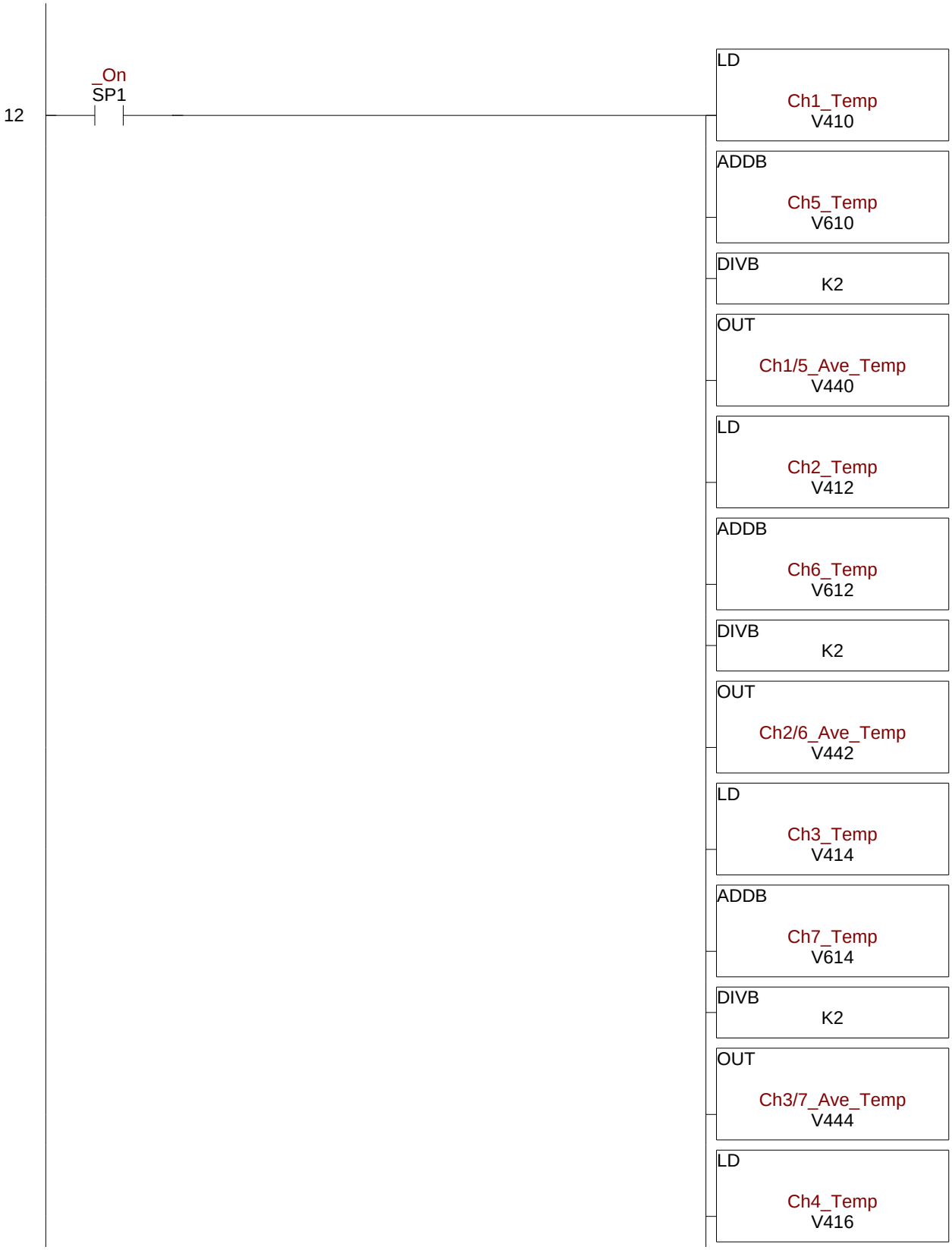


Check Channel 7 for negative temperature value.
The temperature is a signed binary number. ANDing the value with 7FFF strips the sign bit from the raw signal so it can be used in calculations. The discrete bit is set to indicate that the conditioned signal should be interpreted as negative.



Check Channel 8 for negative temperature value.
The temperature is a signed binary number. ANDing the value with 7FFF strips the sign bit from the raw signal so it can be used in calculations. The discrete bit is set to indicate that the conditioned signal should be interpreted as negative.



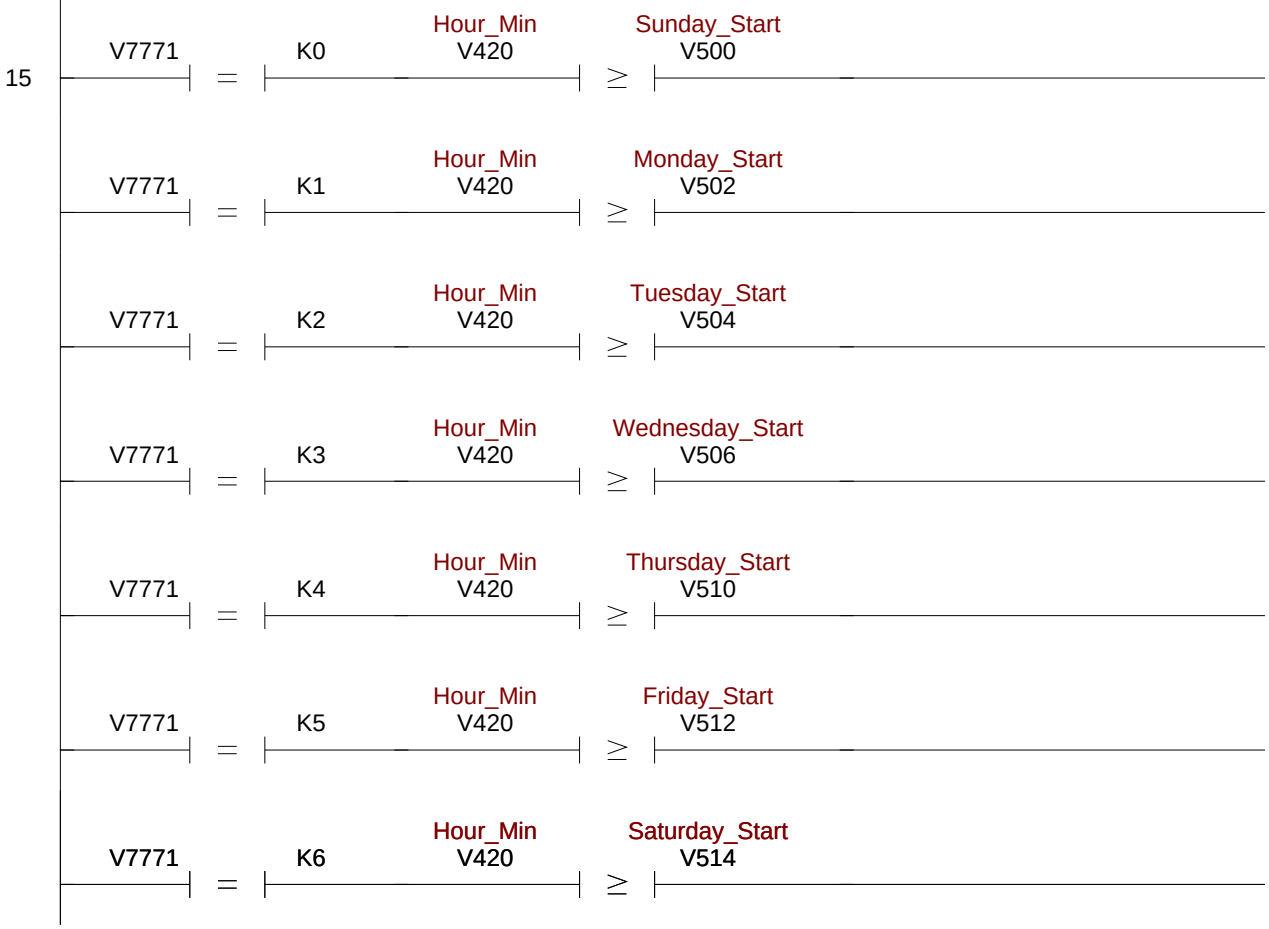

12
_On
SP1
LD
Ch1_Temp
V410
ADDB
Ch5_Temp
V610
DIVB
K2
OUT
Ch1/5_Ave_Temp
V440
LD
Ch2_Temp
V412
ADDB
Ch6_Temp
V612
DIVB
K2
OUT
Ch2/6_Ave_Temp
V442
LD
Ch3_Temp
V414
ADDB
Ch7_Temp
V614
DIVB
K2
OUT
Ch3/7_Ave_Temp
V444
LD
Ch4_Temp
V416

This rung sets up the PLC for four PID loops.
The first loop uses V1200 - V1237
The second loop uses V1240 - V1277
The third loop Uses V1300 - V1337
The fourth loop uses V1340 - V1377

This rung combines the hour and minute from the PLC's clock into a single register for time comparisons.

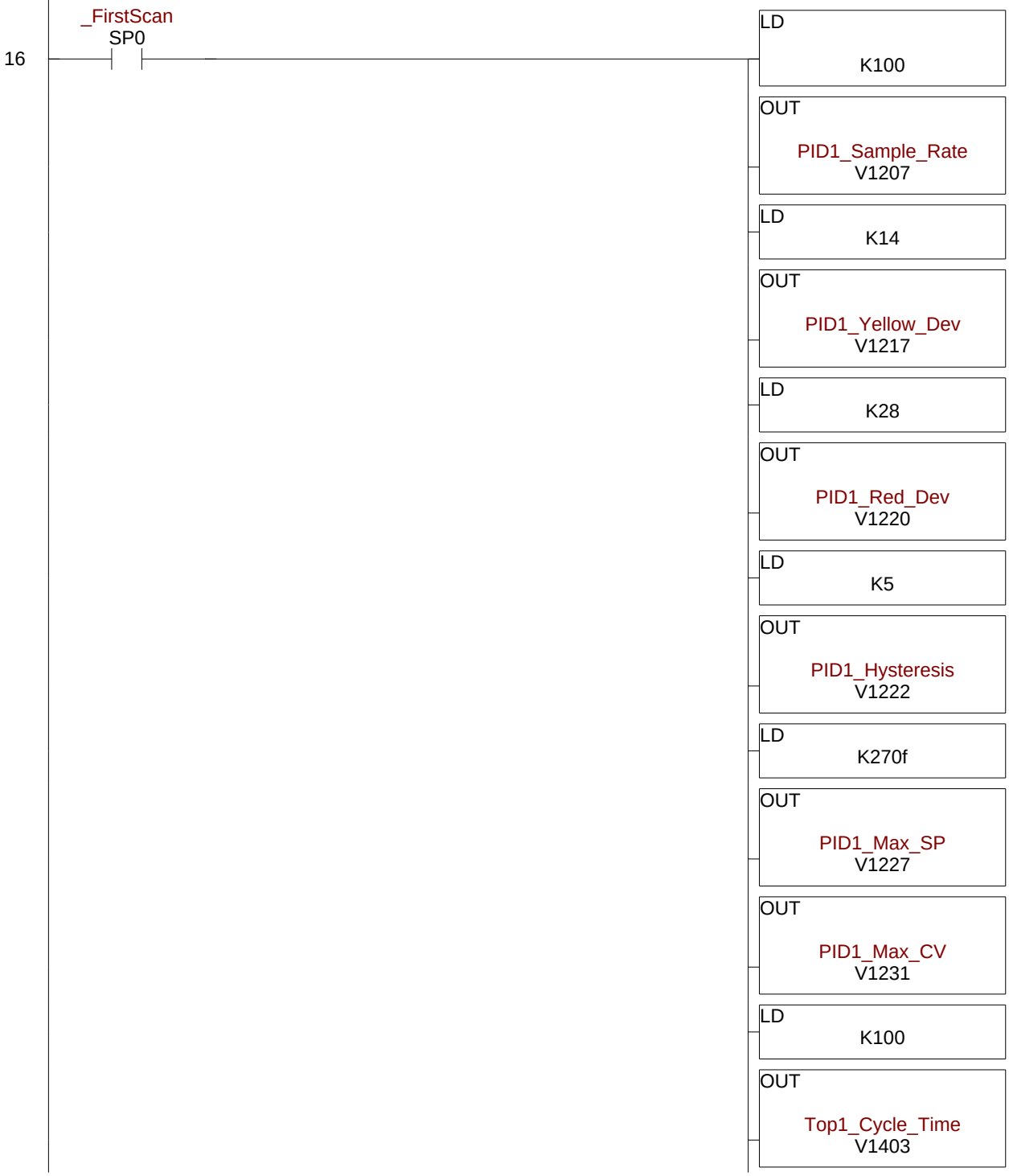
A

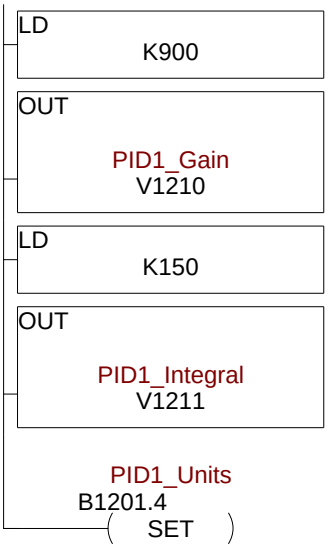
This rung checks the current time agains the auto start and stop times established by the operator and sets the permissive to automatically heat the platens.




Hour_Min
V420
<
Sunday_Stop
V501
Autostart_OK
C5
OUT
Hour_Min
V420
<
Monday_Stop
V503
Hour_Min
V420
<
Tuesday_Stop
V505
Hour_Min
V420
<
Wednesday_Stop
V507
Hour_Min
V420
<
Thursday_Stop
V511
Hour_Min
V420
<
Friday_Stop
V513
Hour_Min
V420
<
Saturday_Stop
V515

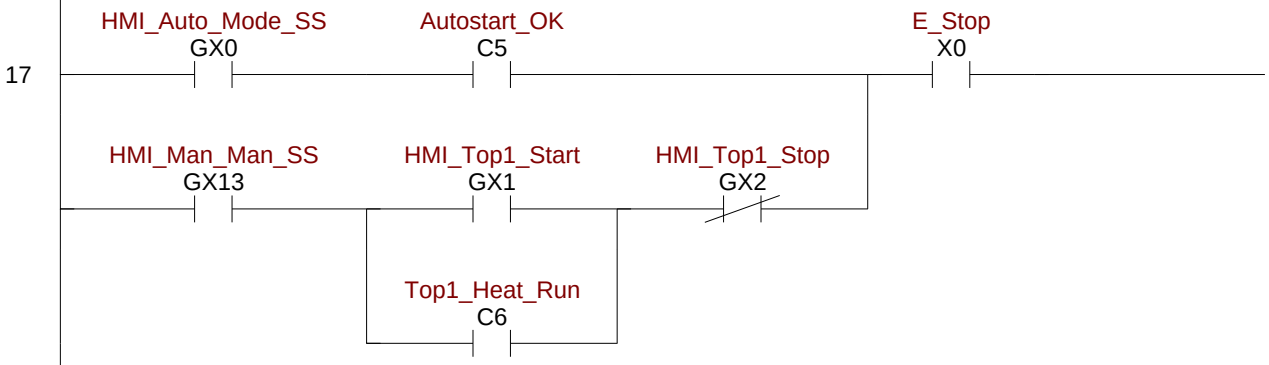
This rung sets up the first PID loop parameters.
V1207 is the loop sample rate in .01 second increments (100 = 1.00 second).
V1210 is the loop proportional gain.
V1217 is the "Yellow" deviation alarm level (Hex 14 = 2.0 degrees)
V1220 is the "Red" deviation alarm level (Hex 28 = 4.0 degrees)
V1222 is the deviation alarm hysteresis (Hex F = 1.5 degrees)
V1227 is the maximum setpoint value (Hex 270F = 9999)
V1231 is the maximum output value (Hex 270F = 9999)
V1403 is the heater duty cycle time in .01 second increments (100 = 1.00 second)





On/Off control of the Top1 platen heater.

A



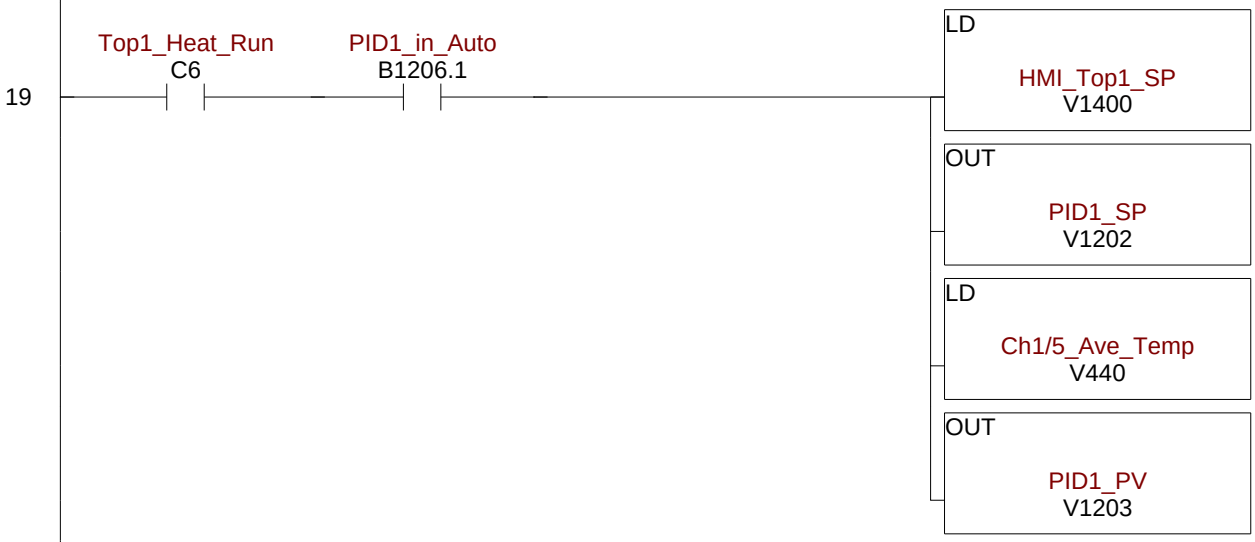
A

This rung commands the PLC to put the first PID loop into auto mode (running).

This is done by turning on bit 1 of the first control word for the loop. The PLC confirms the request by turning on bit 1 of V1206.

At the same time, enable the deviation alarm for the loop.

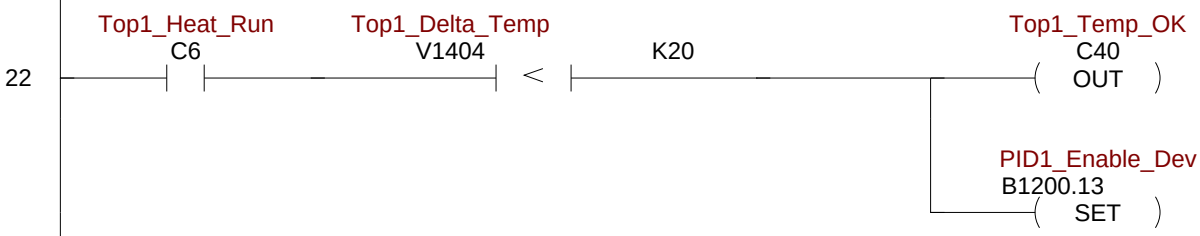
When the PID loop is in auto mode (running), load the setpoint and feedback into the control registers.



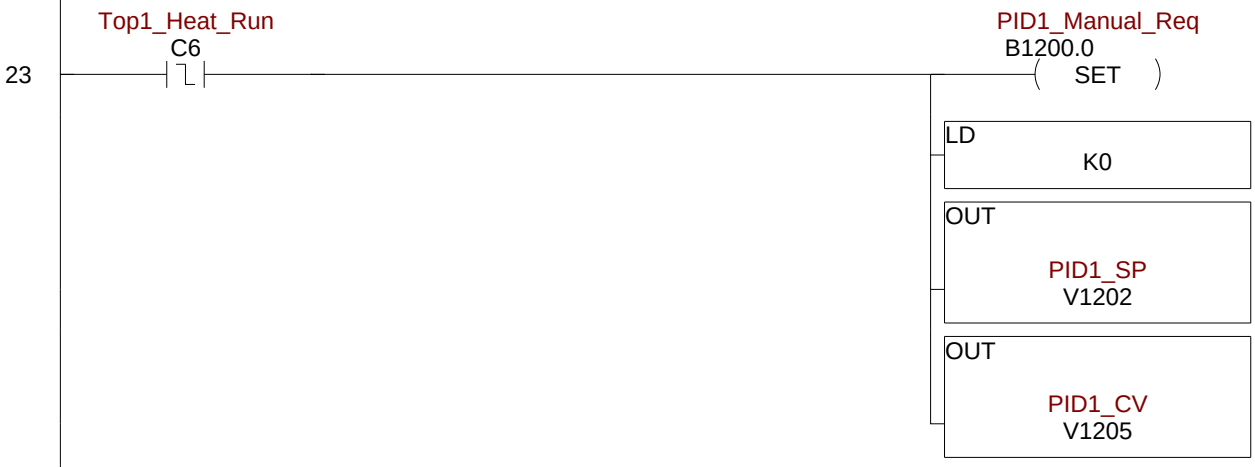
The next three rungs check to see when the temperature is within range.

First, calculate the difference between the setpoint and actual temperatures.

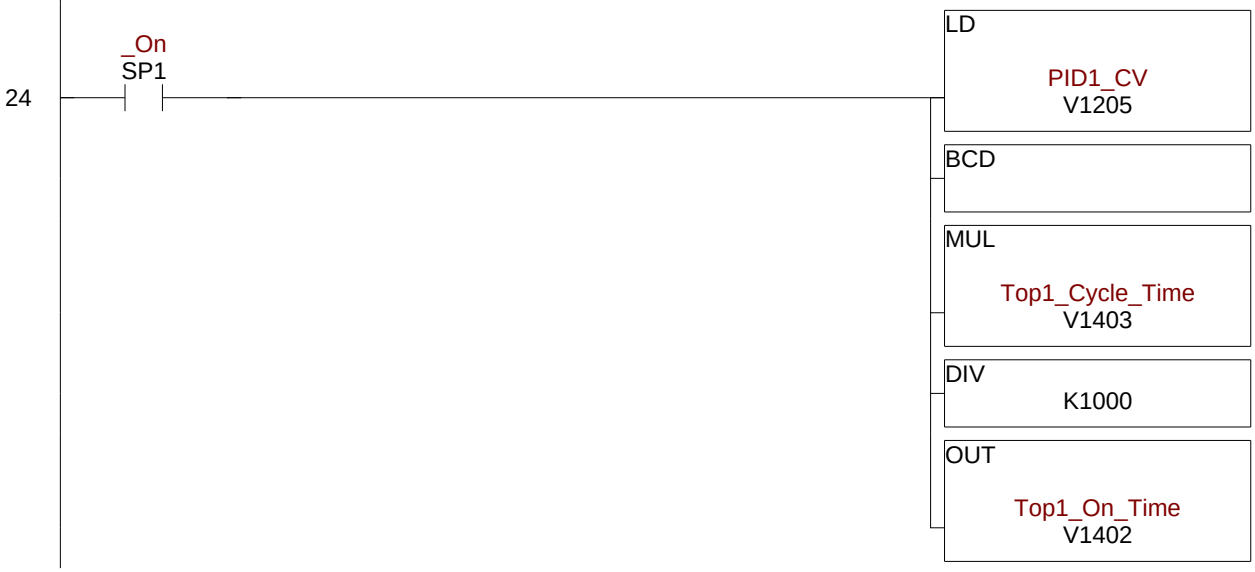
If the temperature is within range, turn on the "Temperature OK" bit.

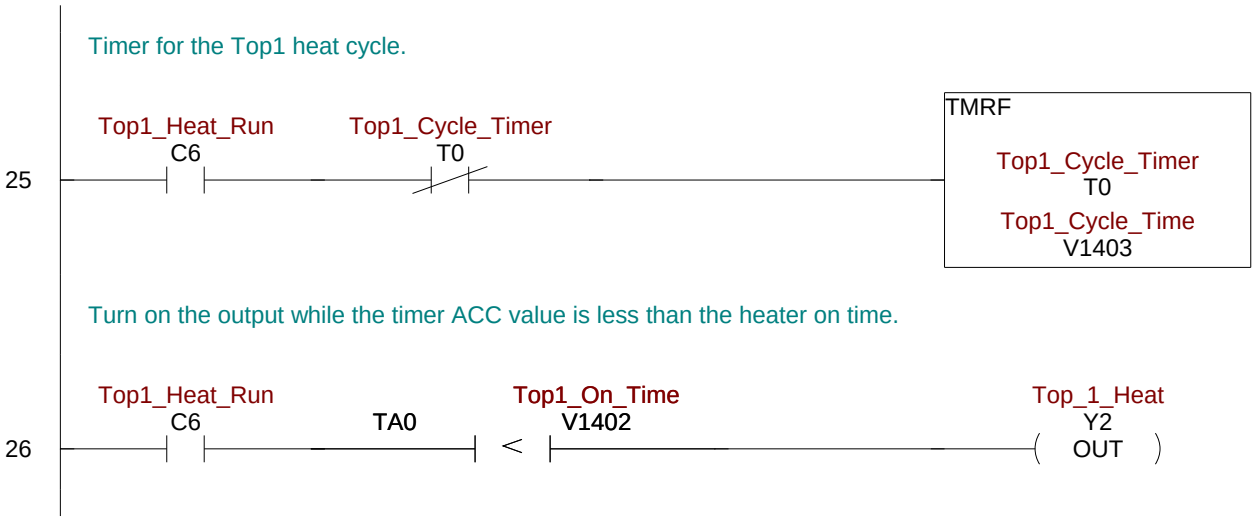


When the PID loop is in manual mode (not running), load zero into the control registers for SP and CV. Also, disable the deviation alarm.

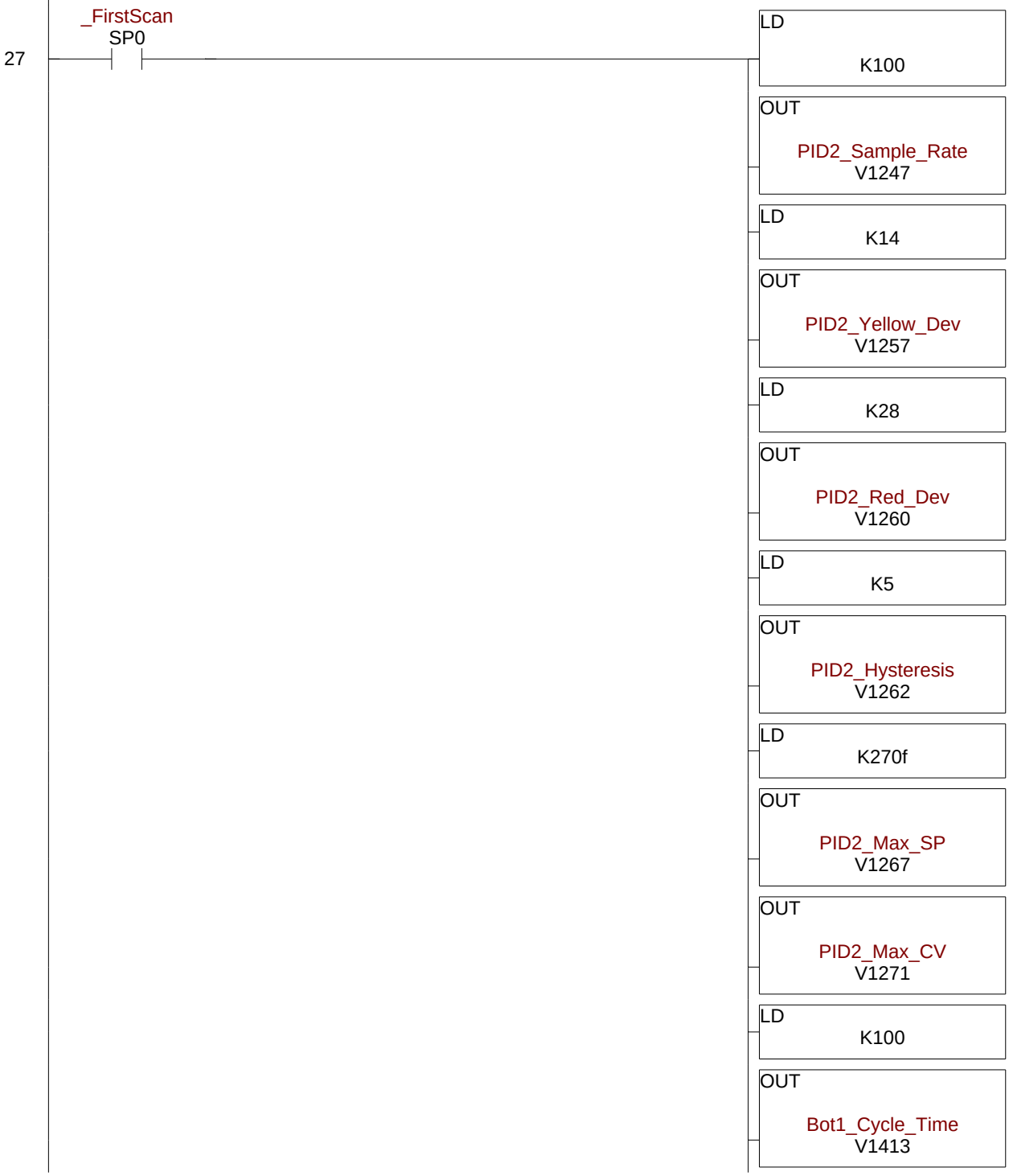


Calculate the percentage of the heater cycle time to turn on the output based on the PID CV.



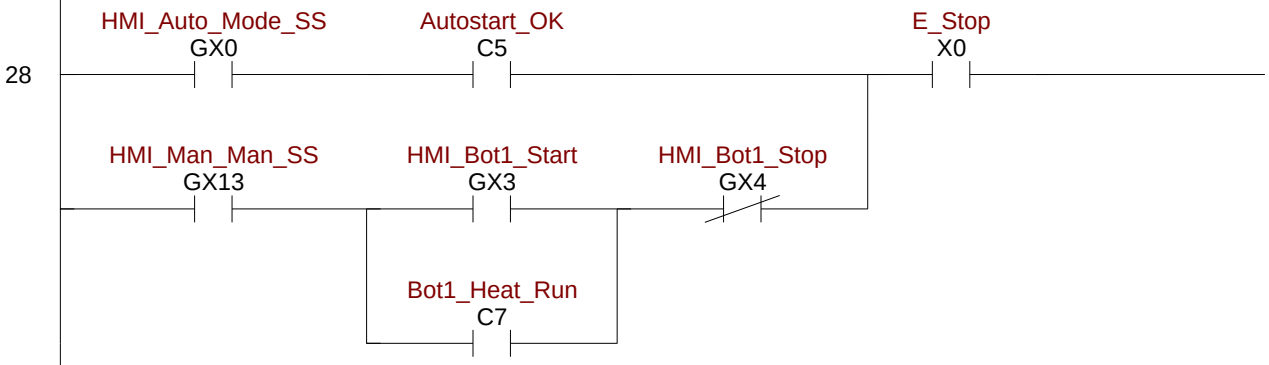

Timer for the Top1 heat cycle.
Top1_Heat_Run
C6
Top1_Cycle_Timer
T0
25
TMRF
Top1_Cycle_Timer
T0
Top1_Cycle_Time
V1403
Turn on the output while the timer ACC value is less than the heater on time.
Top1_Heat_Run
C6
TA0
Top1_On_Time
V1402
<
Top_1_Heat
Y2
OUT
26

This rung sets up the second PID loop parameters.
V1247 is the loop sample rate in .01 second increments (100 = 1.00 second).
V1250 is the loop proportional gain.
V1257 is the "Yellow" deviation alarm level (Hex 14 = 2.0 degrees)
V1260 is the "Red" deviation alarm level (Hex 28 = 4.0 degrees)
V1262 is the deviation alarm hysteresis (Hex F = 1.5 degrees)
V1267 is the maximum setpoint value (Hex 270F = 9999)
V1271 is the maximum output value (Hex 270F = 9999)
V1413 is the heater duty cycle time in .01 second increments (100 = 1.00 second)

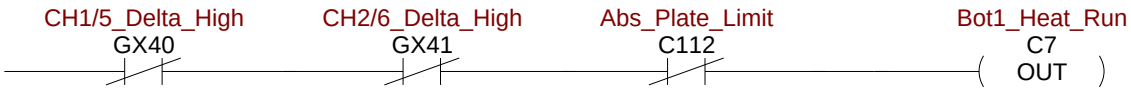


On/Off control of the Bottom1 platen heater.

A



A

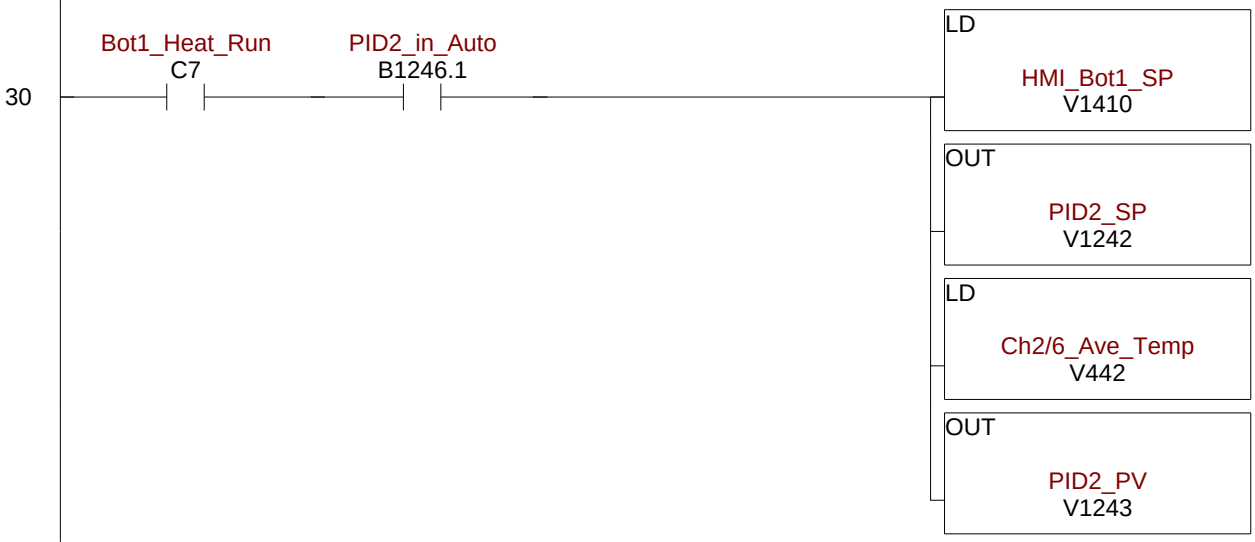


This rung commands the PLC to put the second PID loop into auto mode (running).

This is done by turning on bit 1 of the first control word for the loop. The PLC confirms the request by turning on bit 1 of V1246.

At the same time, enable the deviation alarm for the loop.

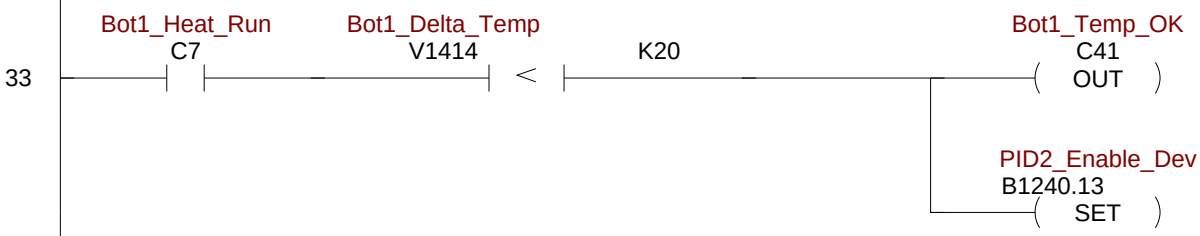
When the PID loop is in auto mode (running), load the setpoint and feedback into the control registers.



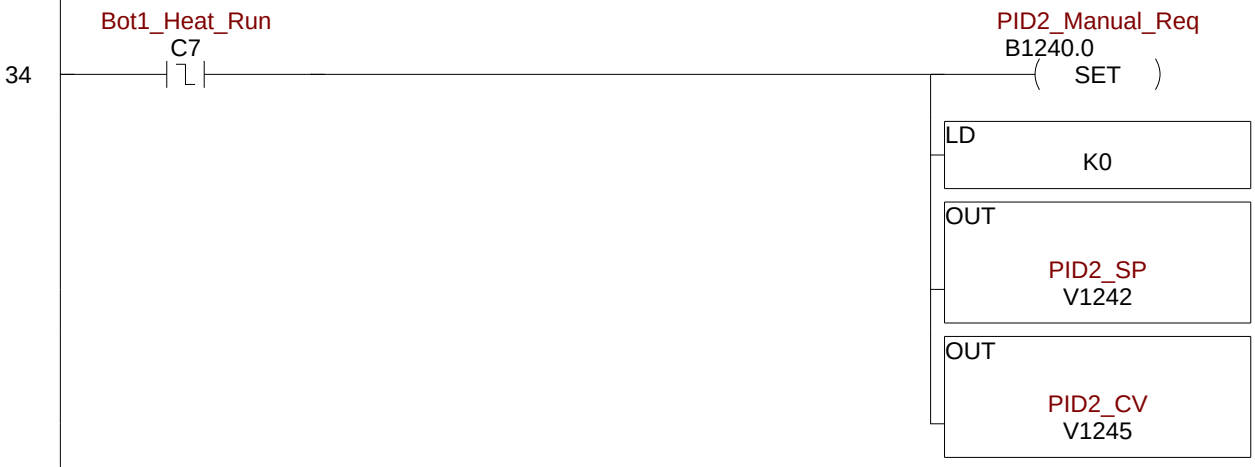
The next three rungs check to see when the temperature is within range.

First, calculate the difference between the setpoint and actual temperatures.

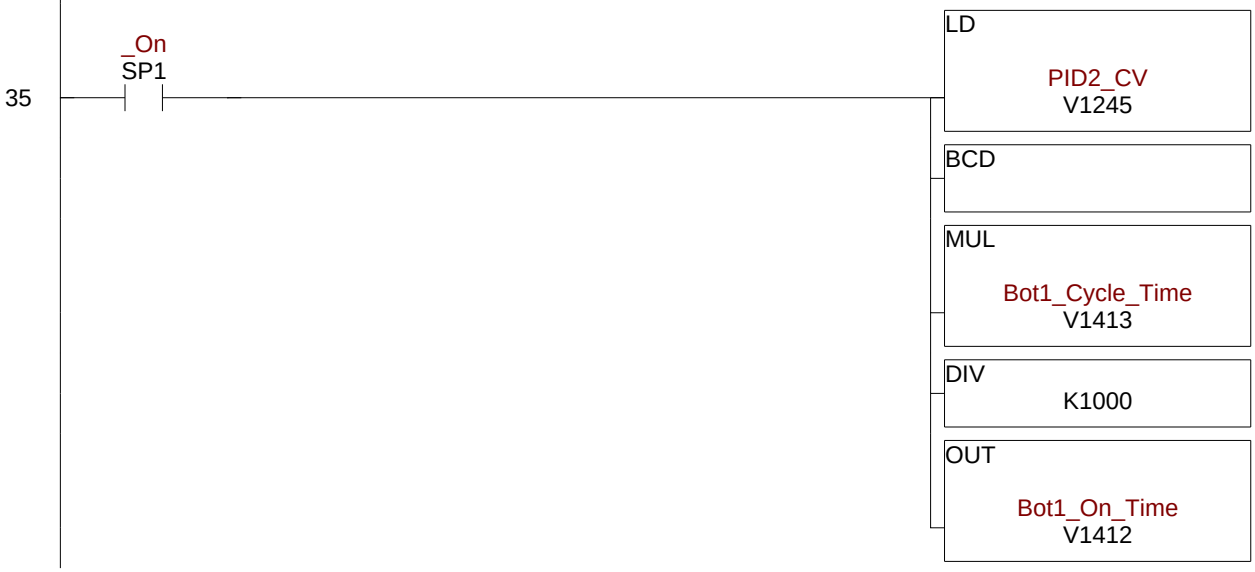
If the temperature is within range, turn on the "Temperature OK" bit.

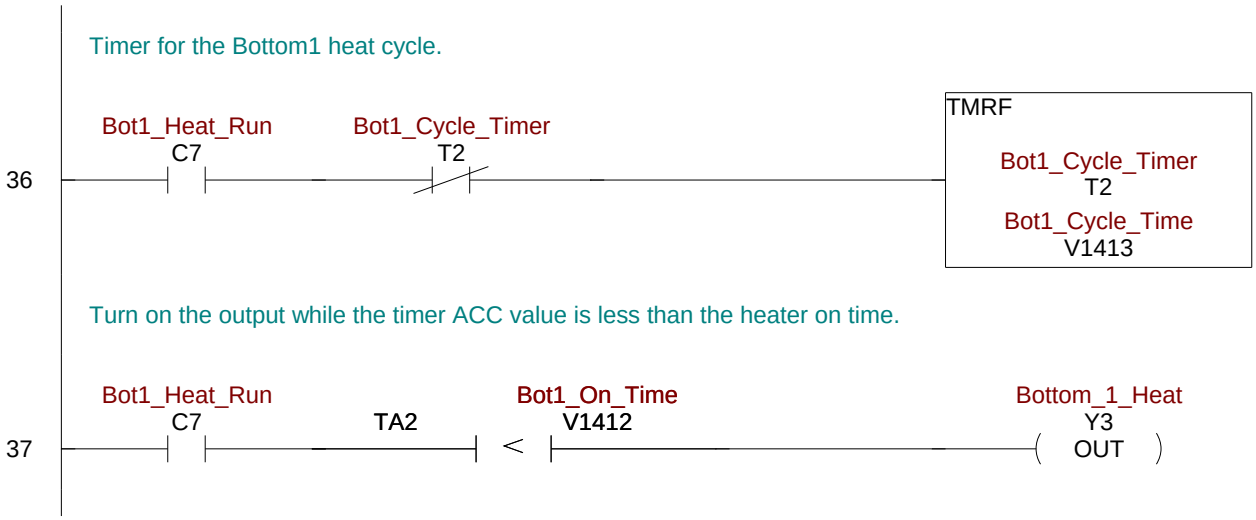


When the PID loop is in manual mode (not running), load zero into the control registers for SP and CV. Also, disable the deviation alarm.

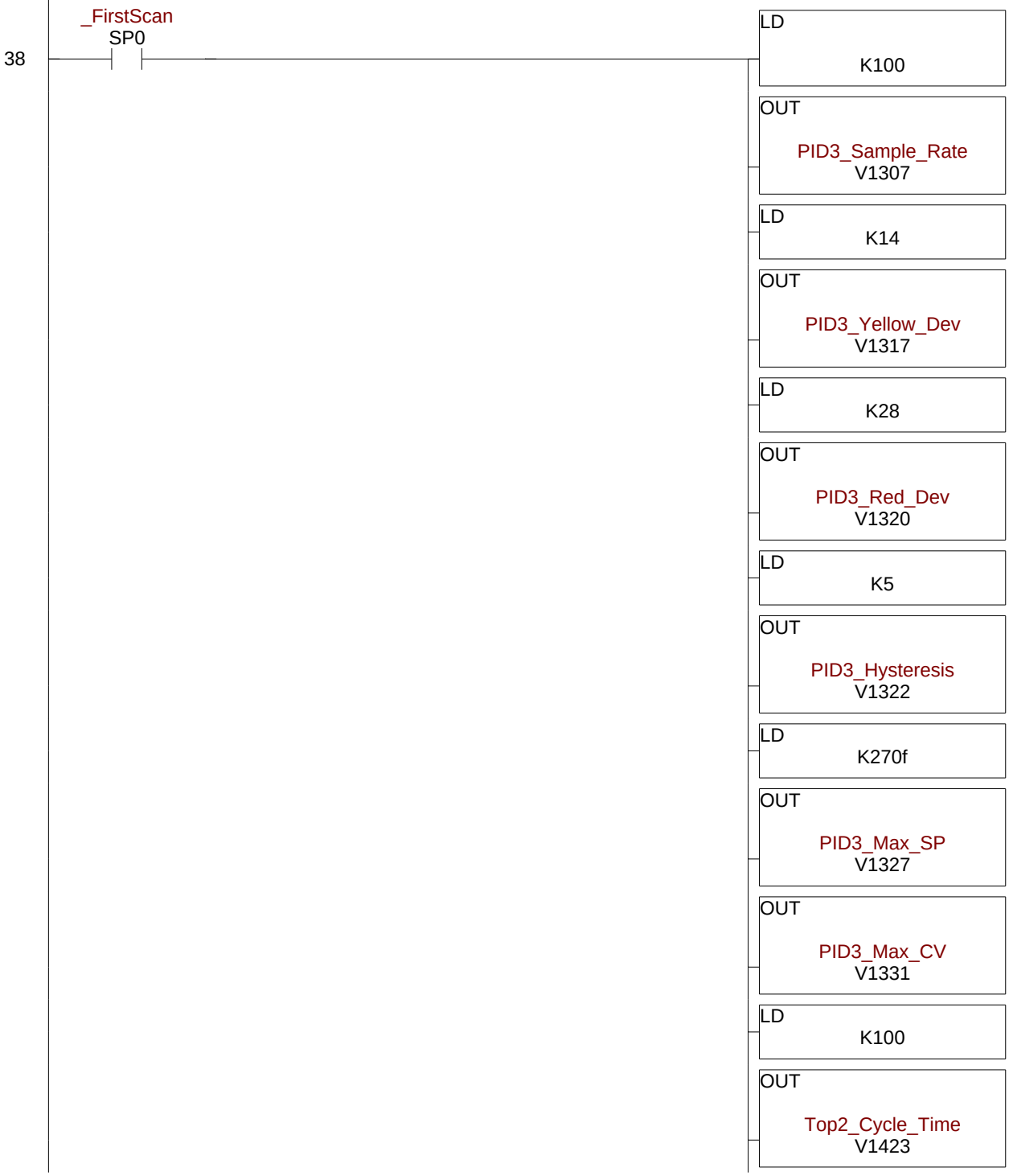


Calculate the percentage of the heater cycle time to turn on the output based on the PID CV.



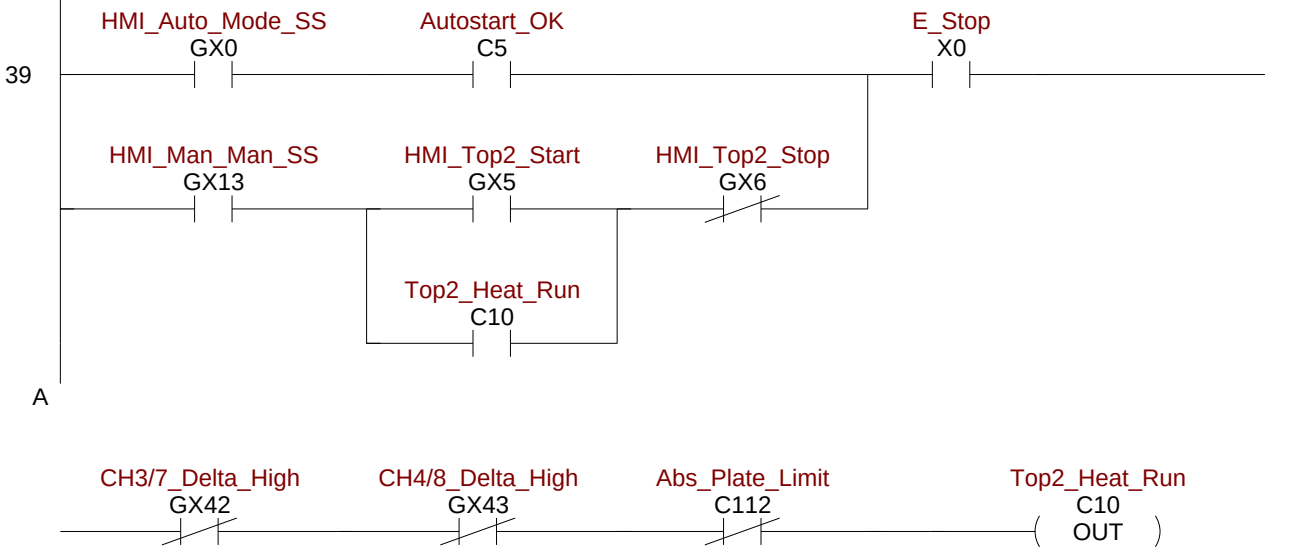

Timer for the Bottom1 heat cycle.
Bot1_Heat_Run
C7
Bot1_Cycle_Timer
T2
36
TMRF
Bot1_Cycle_Timer
T2
Bot1_Cycle_Time
V1413
Turn on the output while the timer ACC value is less than the heater on time.
Bot1_Heat_Run
C7
TA2
Bot1_On_Time
V1412
Bottom_1_Heat
Y3
OUT
37

This rung sets up the third PID loop parameters.
V1307 is the loop sample rate in .01 second increments (100 = 1.00 second).
V1310 is the loop proportional gain.
V1317 is the "Yellow" deviation alarm level (Hex 14 = 2.0 degrees)
V1320 is the "Red" deviation alarm level (Hex 28 = 4.0 degrees)
V1322 is the deviation alarm hysteresis (Hex F = 1.5 degrees)
V1327 is the maximum setpoint value (Hex 270F = 9999)
V1331 is the maximum output value (Hex 270F = 9999)
V1423 is the heater duty cycle time in .01 second increments (100 = 1.00 second)



On/Off control of the Top2 platen heater.

A

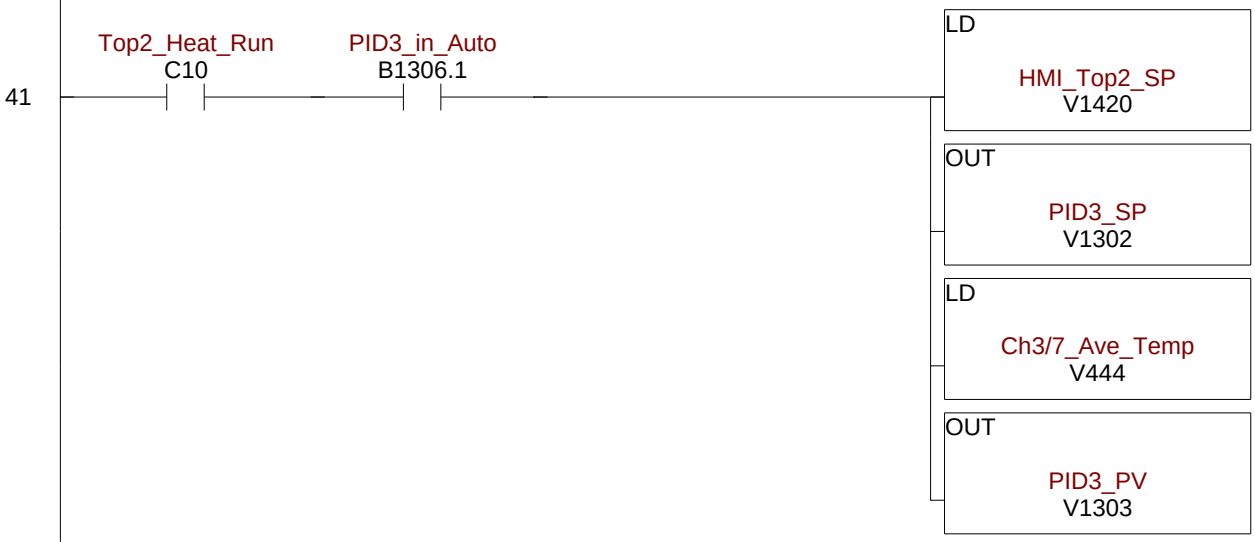


This rung commands the PLC to put the third PID loop into auto mode (running).

This is done by turning on bit 1 of the first control word for the loop. The PLC confirms the request by turning on bit 1 of V1306.

At the same time, enable the deviation alarm for the loop.

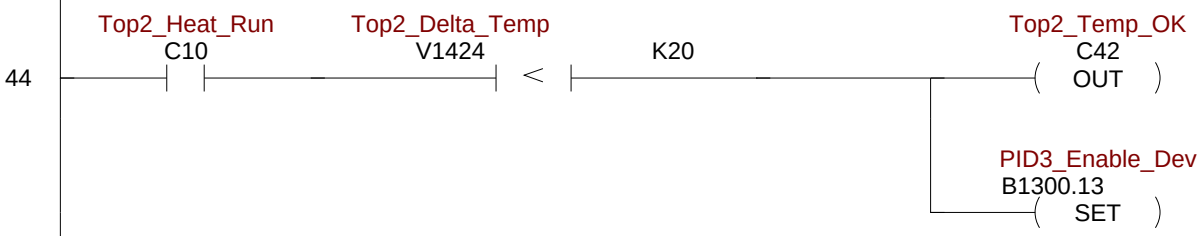
When the PID loop is in auto mode (running), load the setpoint and feedback into the control registers.



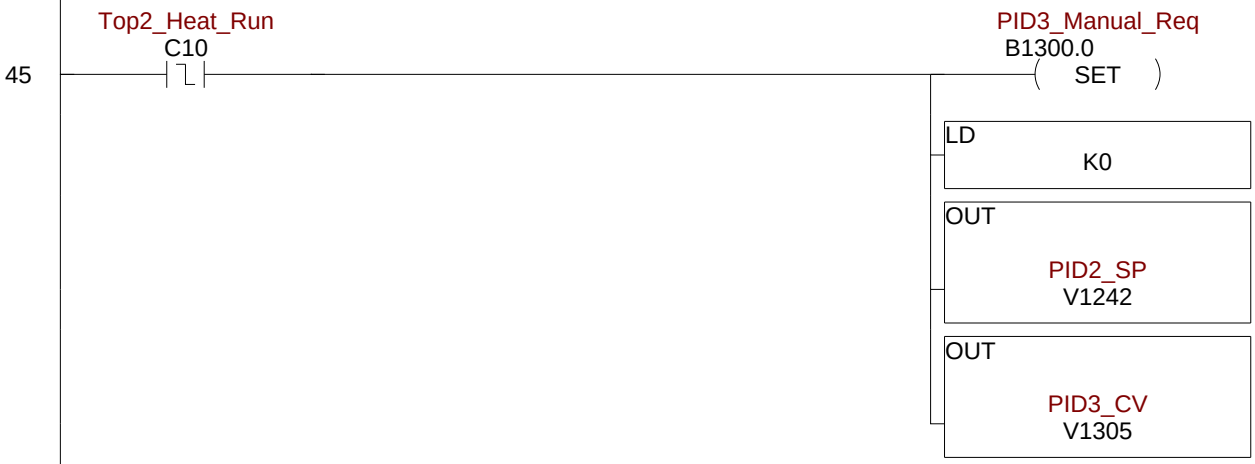
The next three rungs check to see when the temperature is within range.

First, calculate the difference between the setpoint and actual temperatures.

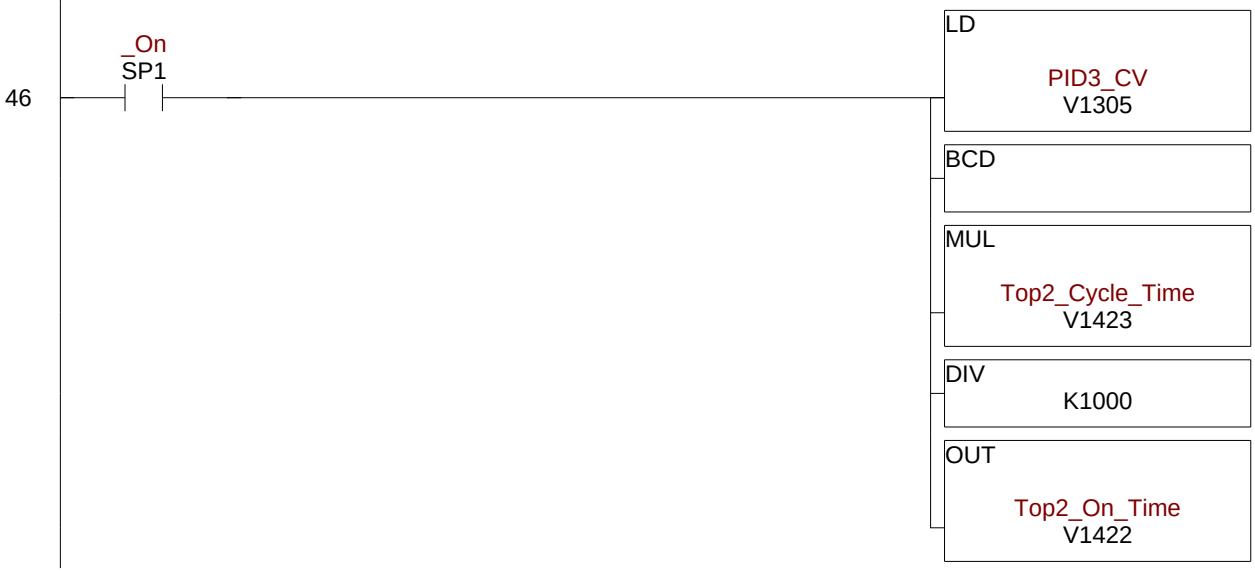
If the temperature is within range, turn on the "Temperature OK" bit.

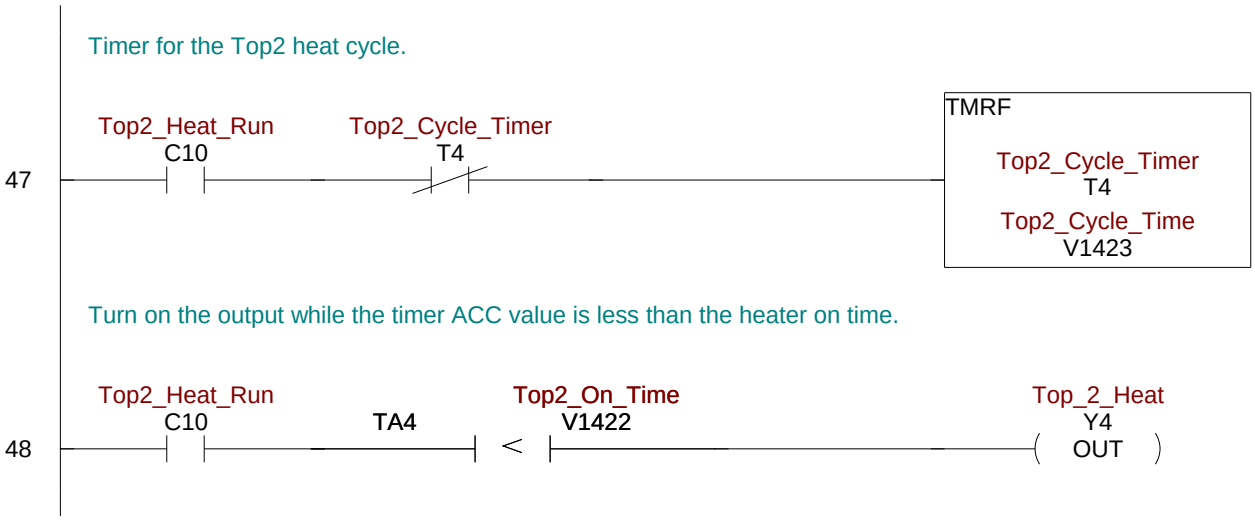


When the PID loop is in manual mode (not running), load zero into the control registers for SP and CV. Also disable the deviation alarm.

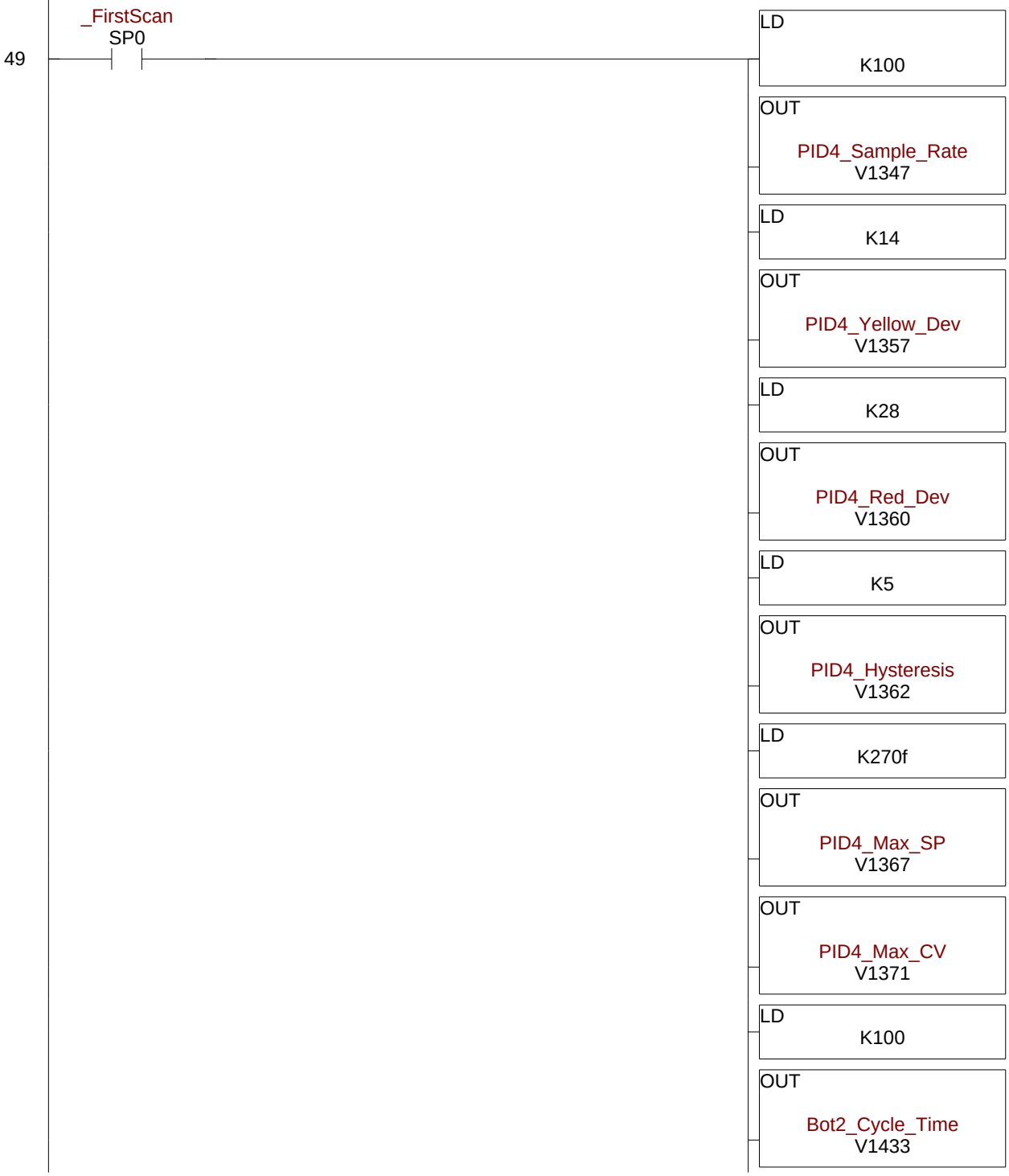


Calculate the percentage of the heater cycle time to turn on the output based on the PID CV.



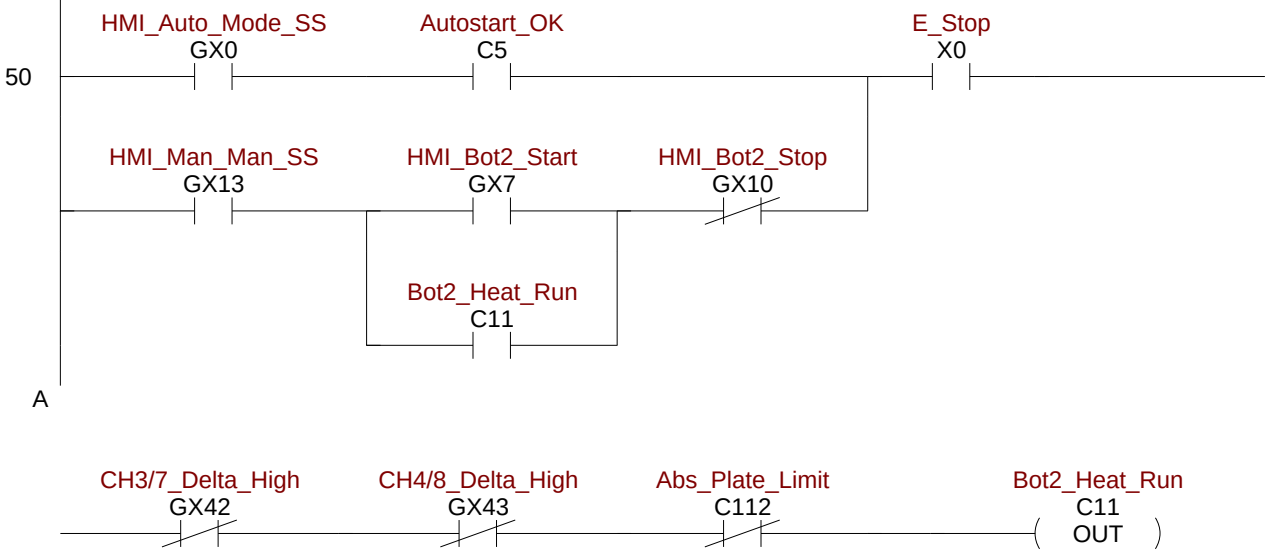

Timer for the Top2 heat cycle.
Top2_Heat_Run
C10
Top2_Cycle_Timer
T4
47
TMRF
Top2_Cycle_Timer
T4
Top2_Cycle_Time
V1423
Turn on the output while the timer ACC value is less than the heater on time.
Top2_Heat_Run
C10
TA4
Top2_On_Time
V1422
<
Top_2_Heat
Y4
OUT
48

This rung sets up the fourth PID loop parameters.
V1347 is the loop sample rate in .01 second increments (100 = 1.00 second).
V1350 is the loop proportional gain.
V1357 is the "Yellow" deviation alarm level (Hex 14 = 2.0 degrees)
V1360 is the "Red" deviation alarm level (Hex 28 = 4.0 degrees)
V1362 is the deviation alarm hysteresis (Hex F = 1.5 degrees)
V1367 is the maximum setpoint value (Hex 270F = 9999)
V1371 is the maximum output value (Hex 270F = 9999)
V1433 is the heater duty cycle time in .01 second increments (100 = 1.00 second)



On/Off control of the Bottom2 platen heater.

A

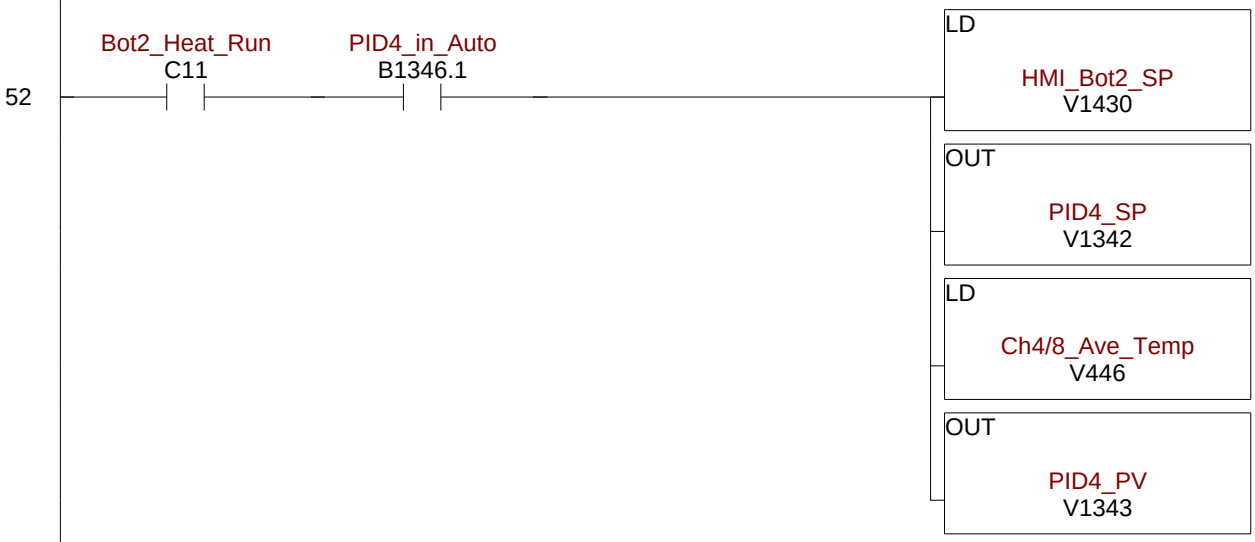


This rung commands the PLC to put the fourth PID loop into auto mode (running).

This is done by turning on bit 1 of the first control word for the loop. The PLC confirms the request by turning on bit 1 of V1346.

At the same time, enable the deviation alarm for the loop.

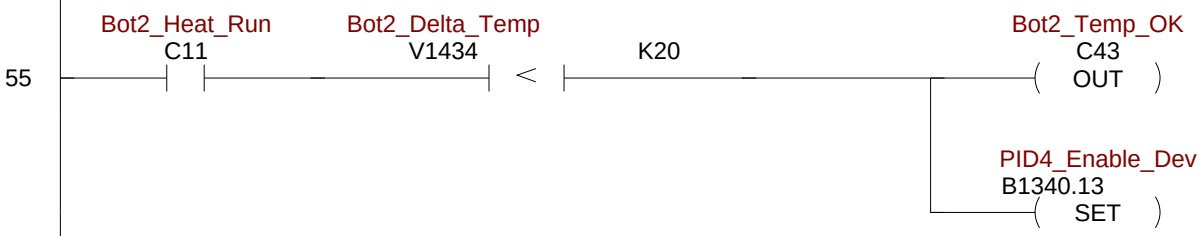
When the PID loop is in auto mode (running), load the setpoint and feedback into the control registers.



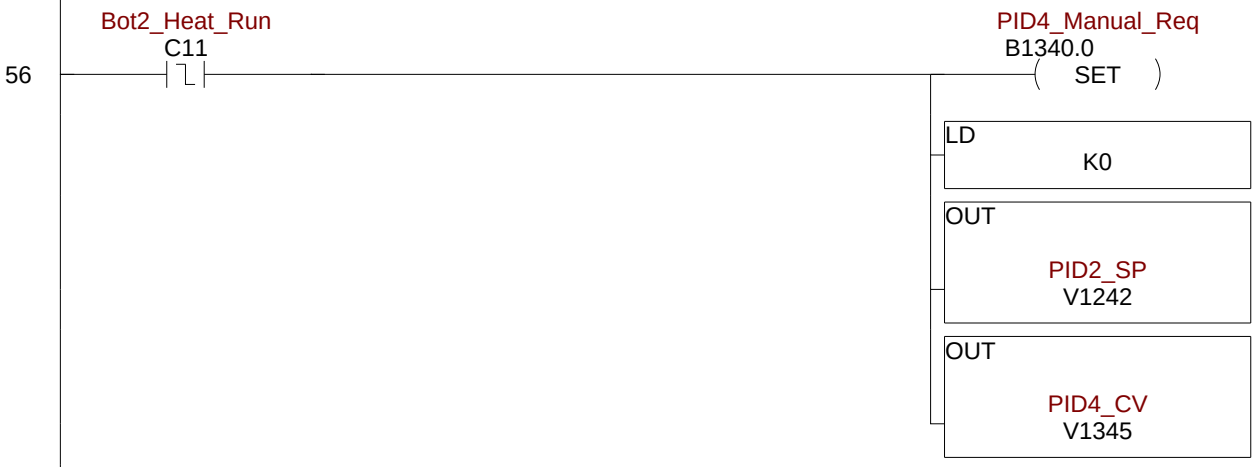
The next three rungs check to see when the temperature is within range.

First, calculate the difference between the setpoint and actual temperatures.

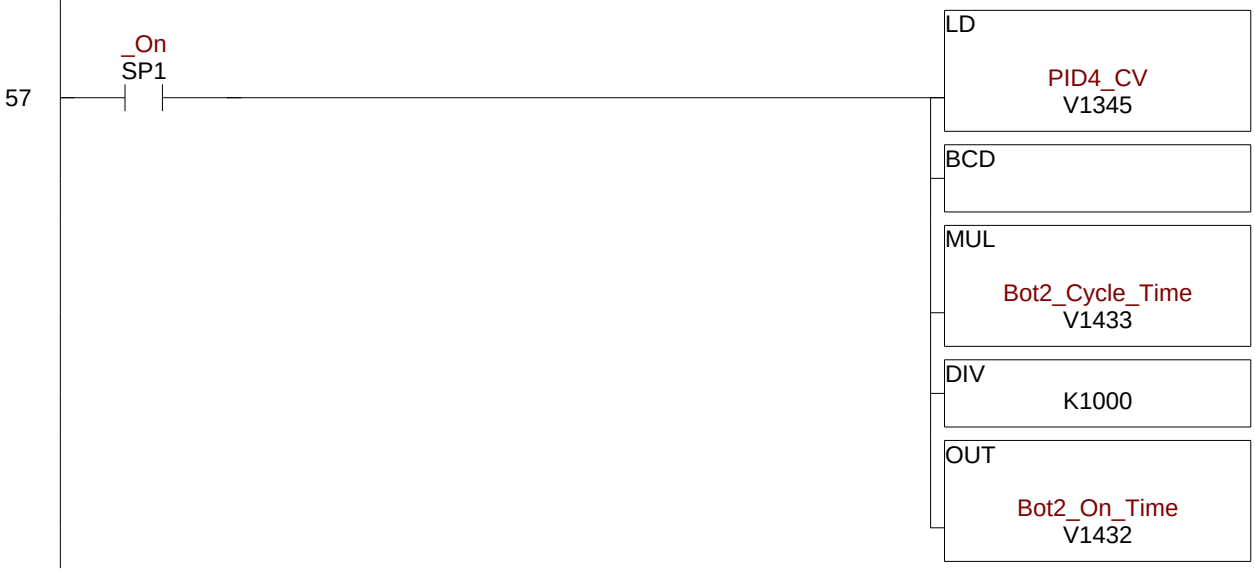
If the temperature is within range, turn on the "Temperature OK" bit.

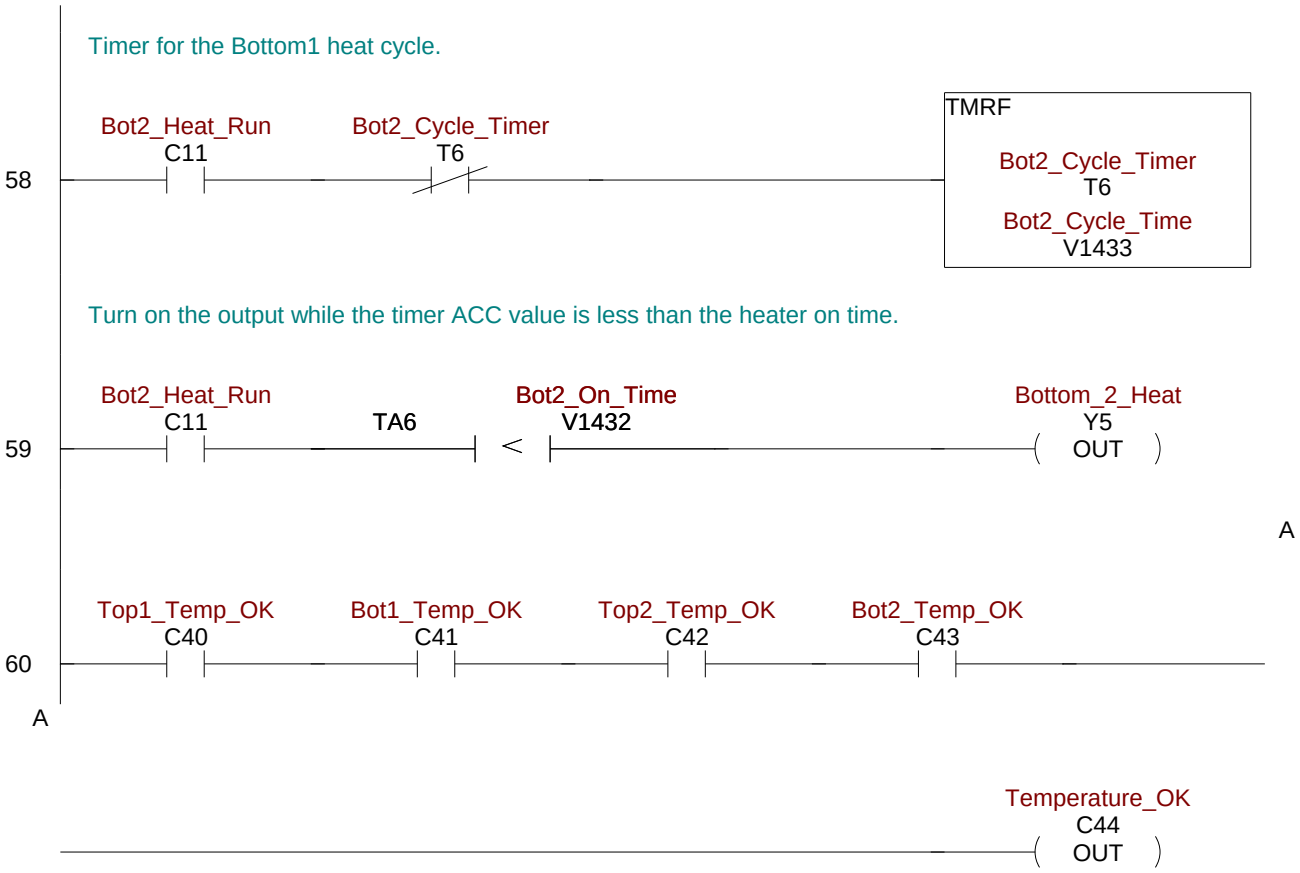


When the PID loop is in manual mode (not running), load zero into the control registers for SP and CV.



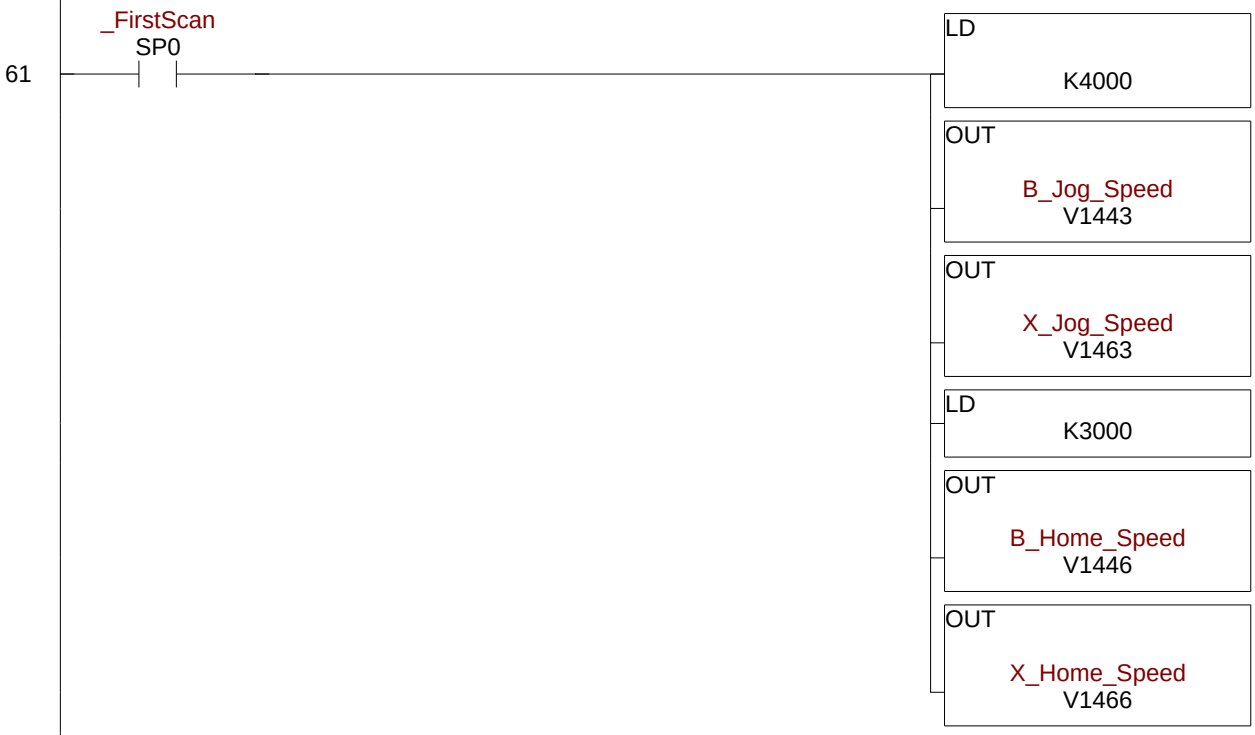
Calculate the percentage of the heater cycle time to turn on the output based on the PID CV.



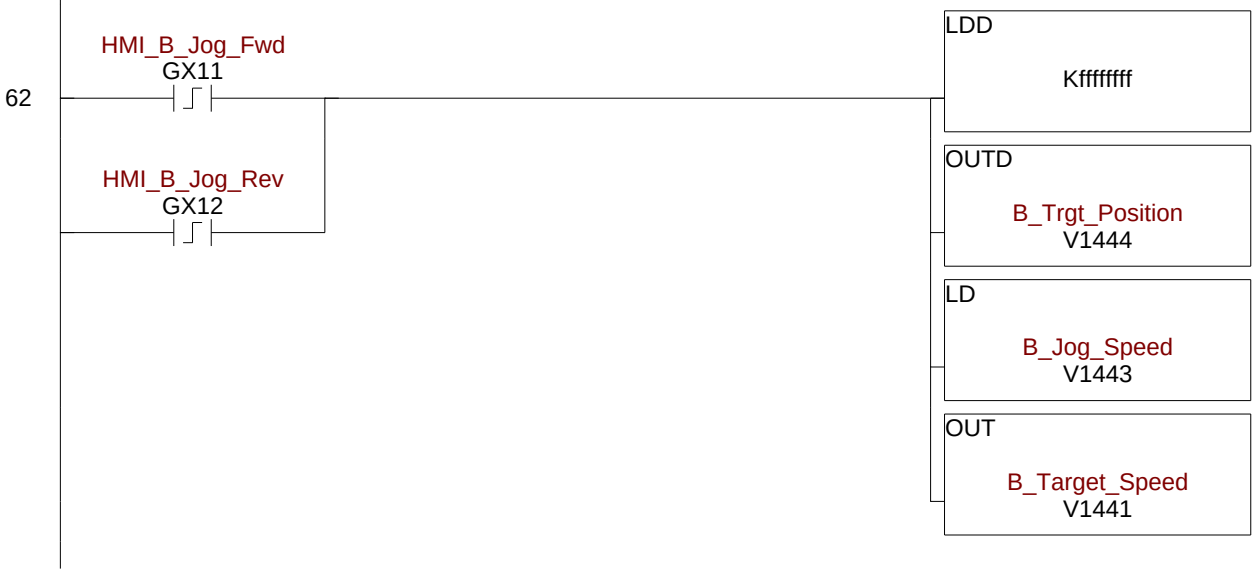

Timer for the Bottom1 heat cycle.
Bot2_Heat_Run
C11
Bot2_Cycle_Timer
T6
58
TMRF
Bot2_Cycle_Timer
T6
Bot2_Cycle_Time
V1433
Turn on the output while the timer ACC value is less than the heater on time.
Bot2_Heat_Run
C11
TA6
Bot2_On_Time
V1432
Bottom_2_Heat
Y5
OUT
59
A
Top1_Temp_OK
C40
Bot1_Temp_OK
C41
Top2_Temp_OK
C42
Bot2_Temp_OK
C43
60
A
Temperature_OK
C44
OUT

Start of axis control.

First, set initial values for jog velocity, return home velocity, and acceleration.

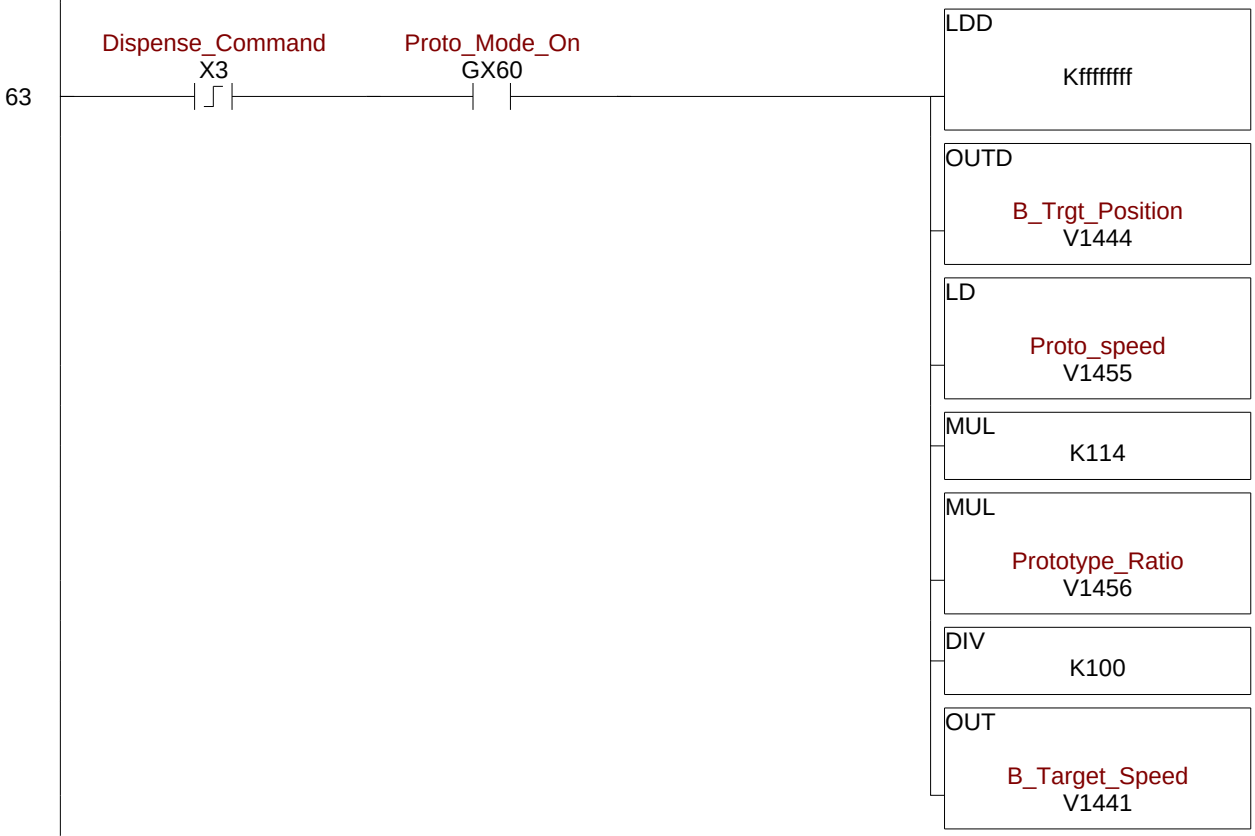


Set up the B axis jog speed and target position. The value Kffffffff indicates continuous running.

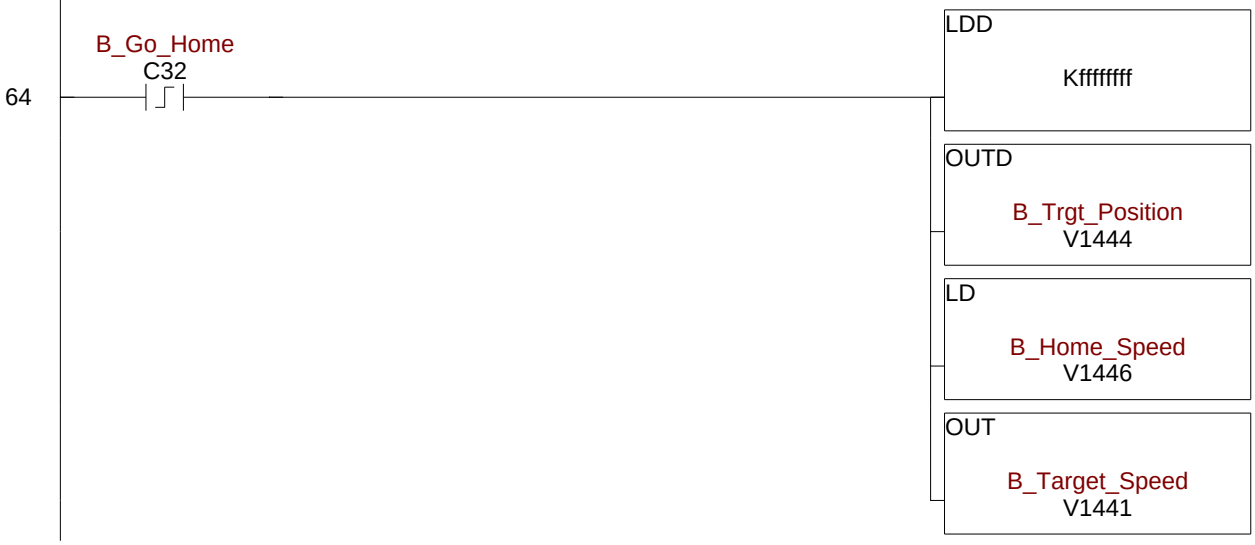


B SPEED FOR PROTOTYPE MODE

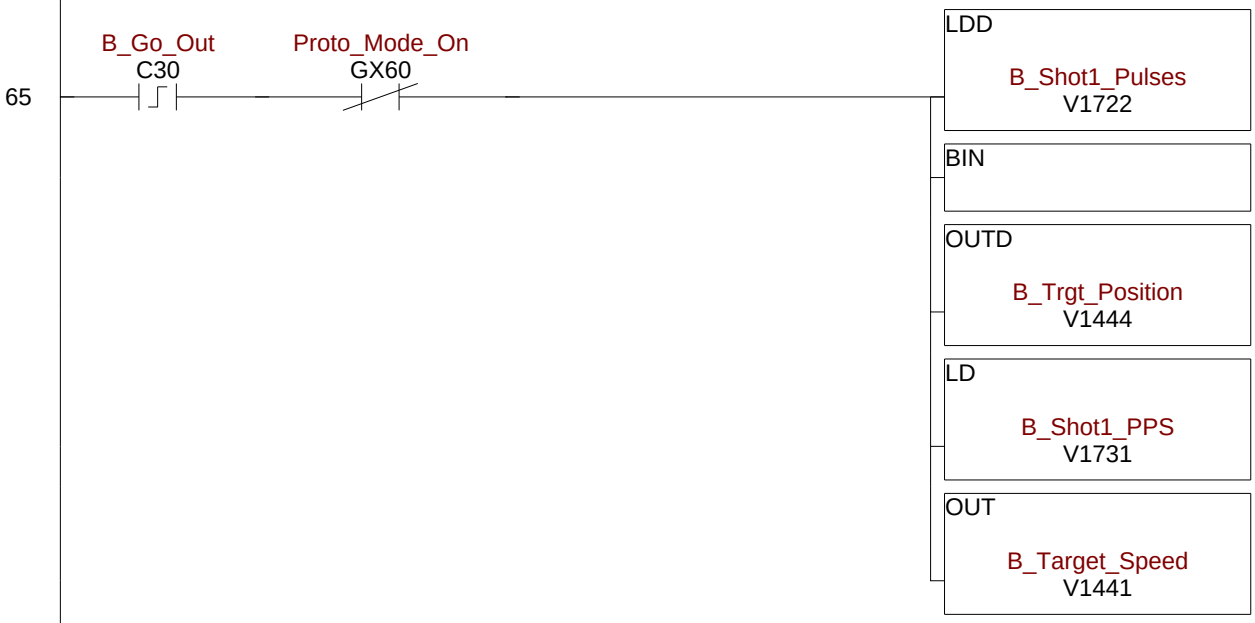
Target speed from the HMI is in grams per second. The conversion to pulses per second is 1138 pulses per gram, which is changed to 113.8 (114) to acccount for the implied decimal place in the HMI.
The shot ratio includes 2 implied decimal places (i.e., .95 on the HMI = 95 in V1456, so multiplying by a constant of 100 is needed



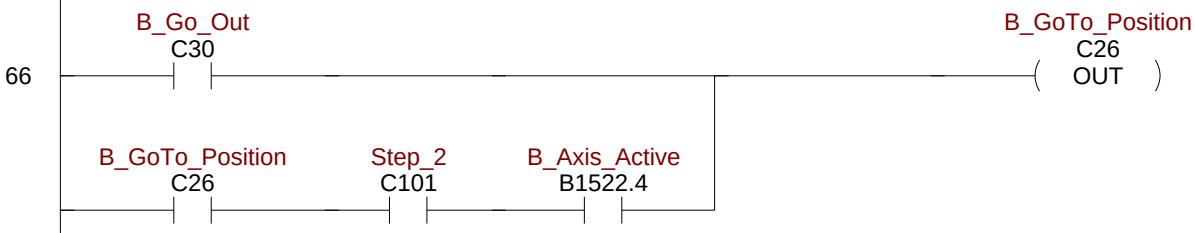
When moving to home, use the home speed for the frequency and FFFFFFFF (continuous motion) for target position.



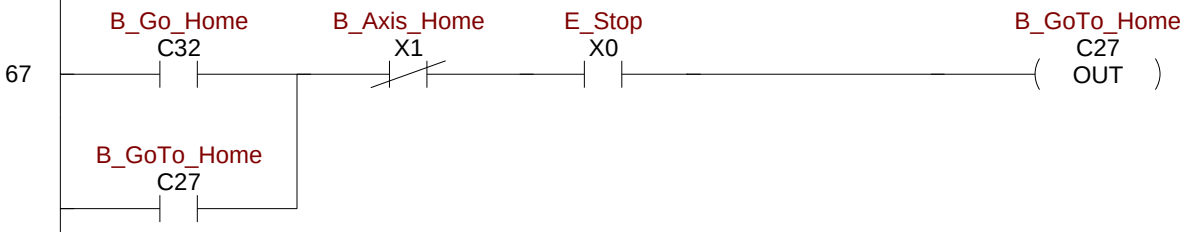
When moving to dispense, use the calculated values for the frequency and target position.



Command to move the B axis to dispense product.

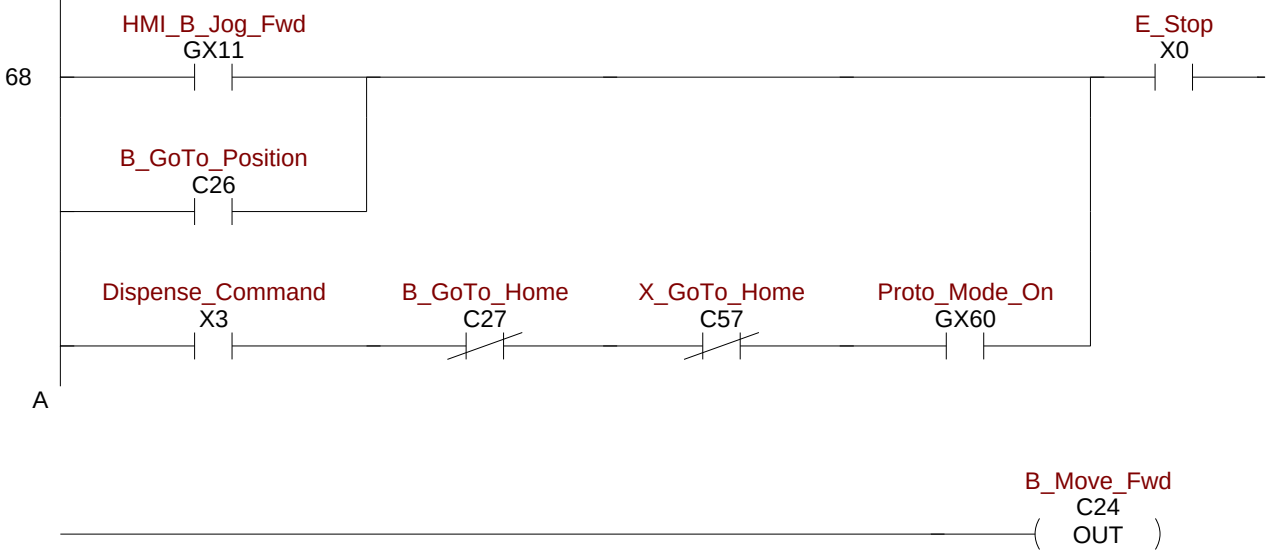


Command to move the B axis to the home limit switch.

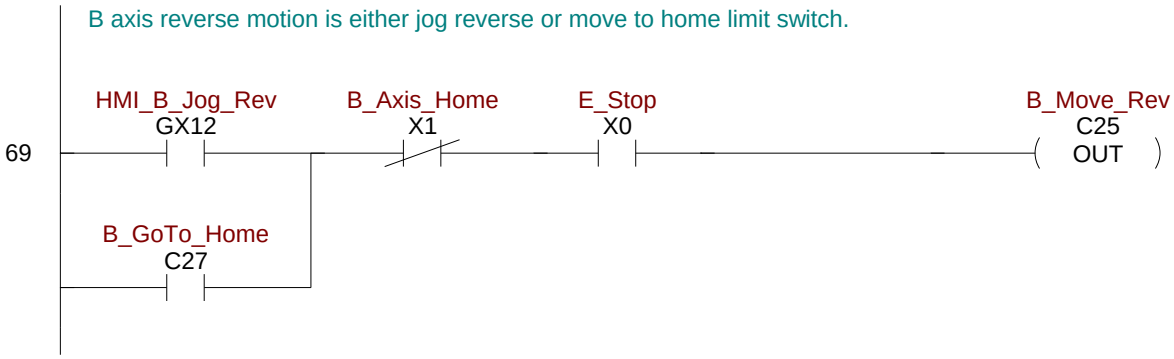


A

B axis forward motion is either jog forward or move to dispense.



B axis reverse motion is either jog reverse or move to home limit switch.

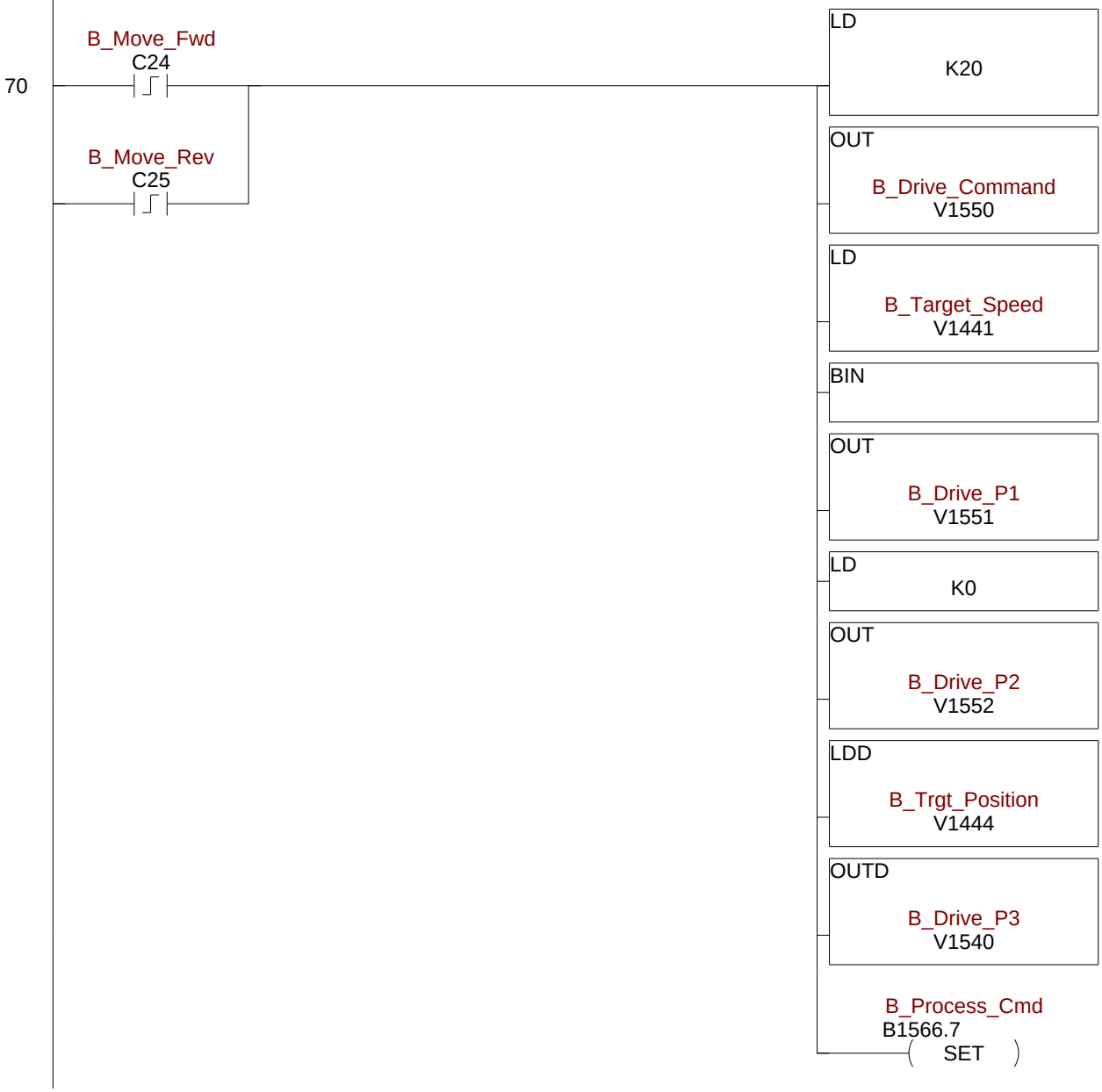


Move forward and reverse for the B axis.

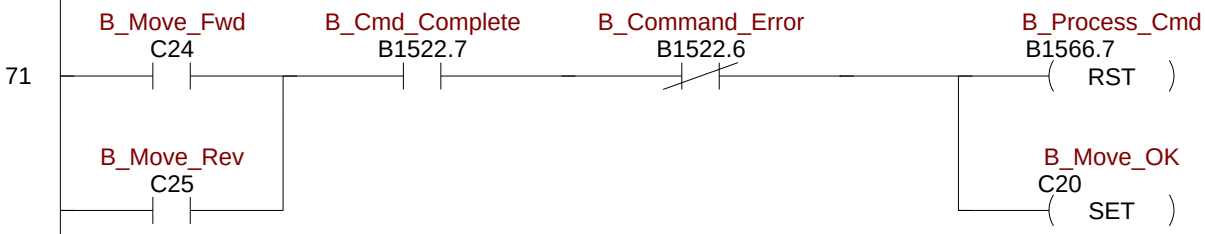
This rung sets up the CTRIO module in slot 2.
The module is configured to report its inputs in V1500 - V1525.
The module is configured to rspond to outputs from V1540 - V1571.

The value of 20 in V1550 is the command code for velocity mode.
The value from V1442 in V1551 (P1) is the running frequency.
The value in V1552 (P2) is the duty cycle. (0 = 50%).
The vaue in V1540 (P3) is the number of pulses to run. FFFFFFFF = continuous run.

When either the move forward or move reverse goes on, send the command block to the CTRIO module.



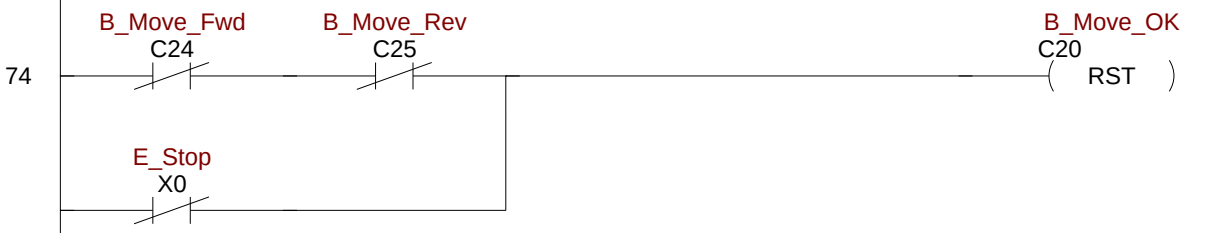
When the CTRIO module acknowledges the move command turn on the "Move_OK" bit.



Turn on the CTRIO "Output Enable" bit.

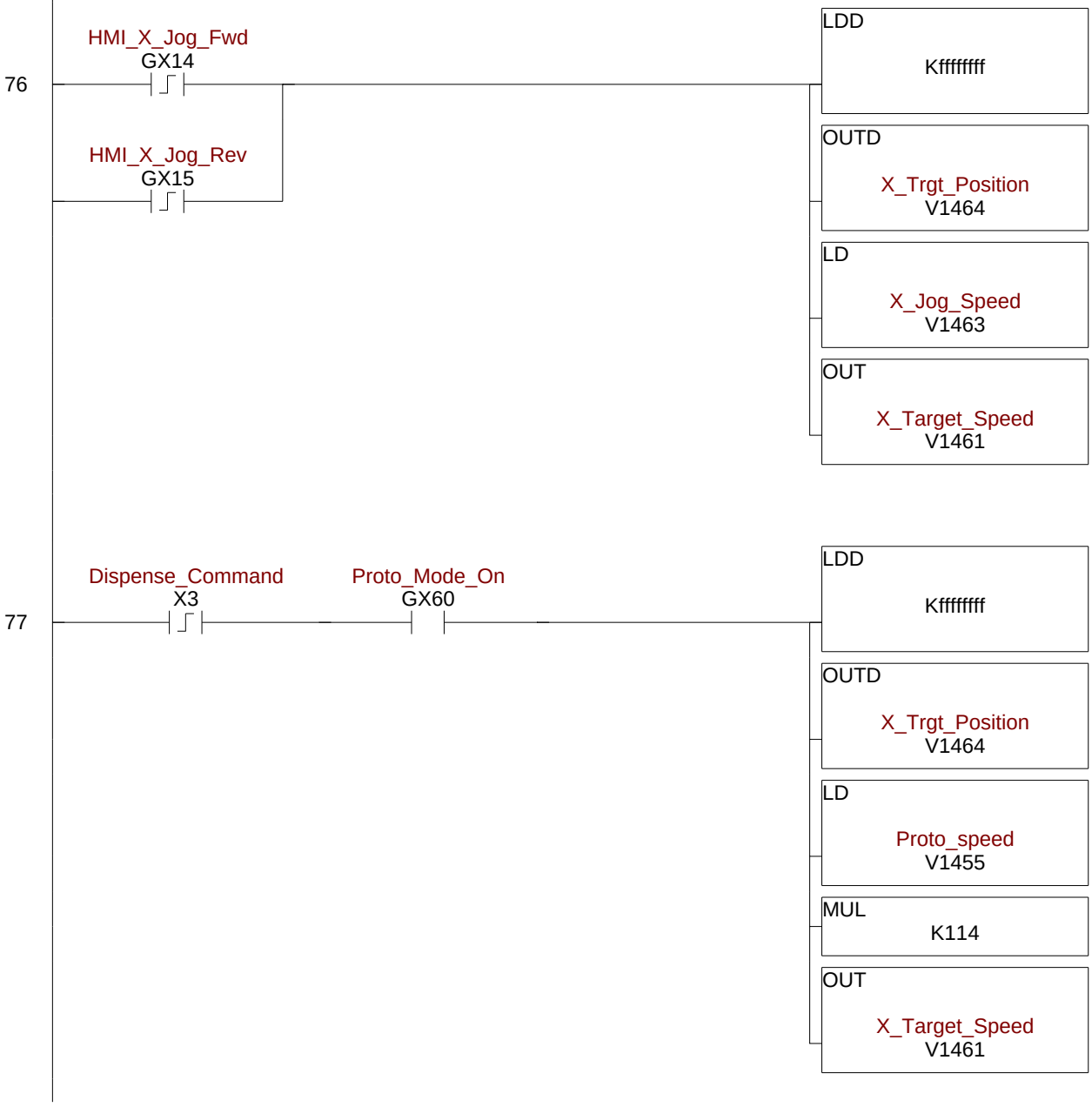
If the command is to move forward turn the the CTRIO direction output.

When no move commands are present, turn off the "Move_OK" bit.



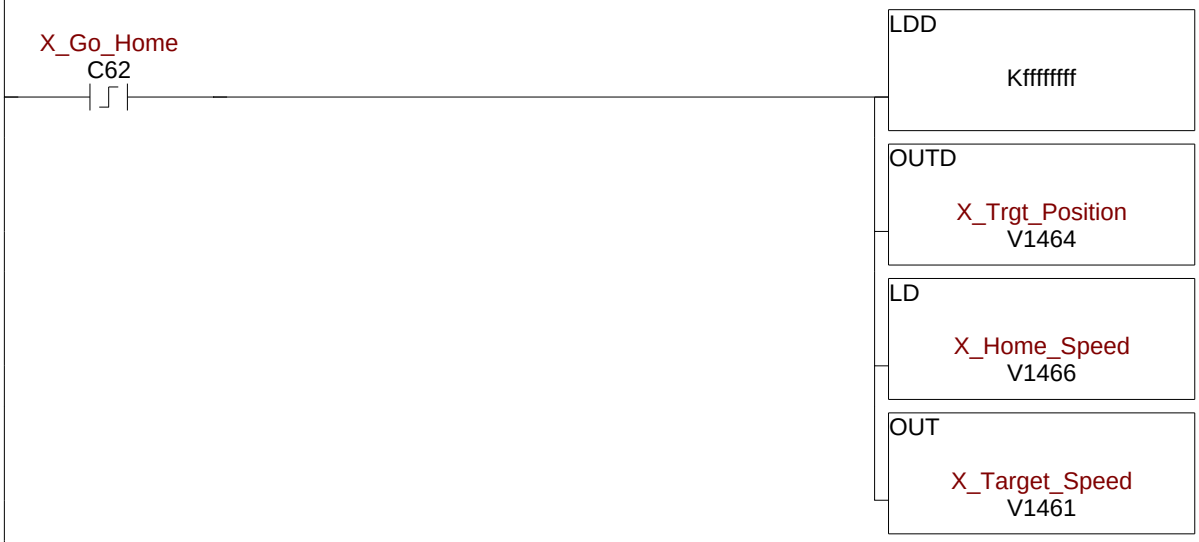
Turn off the direction bit when the move command goes off.

Set up the X axis jog speed and target position. The value Kffffffff indicates continuous running.



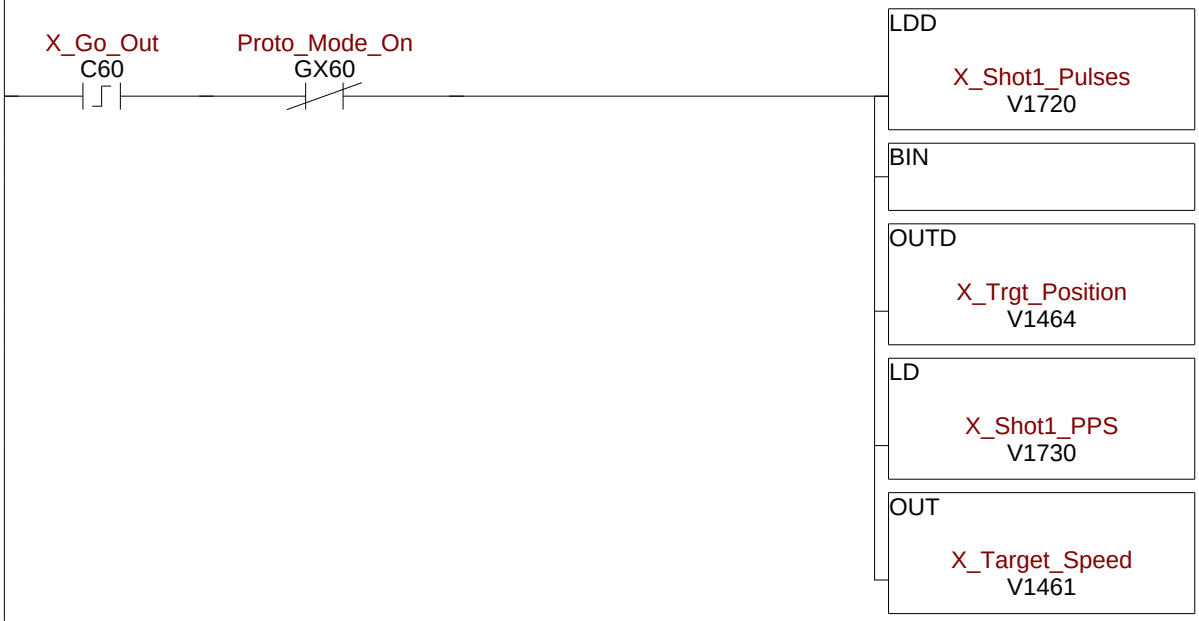
When moving to home, use the home speed for the frequency and FFFFFFFF (continuous motion) for target position.

78



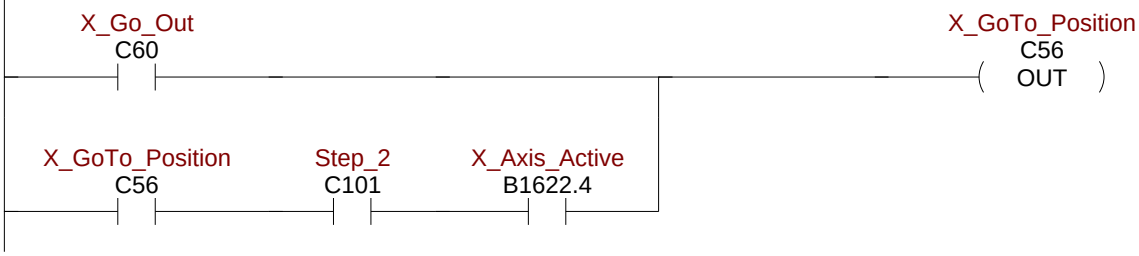
When moving to dispense, use the calculated values for the frequency and target position.

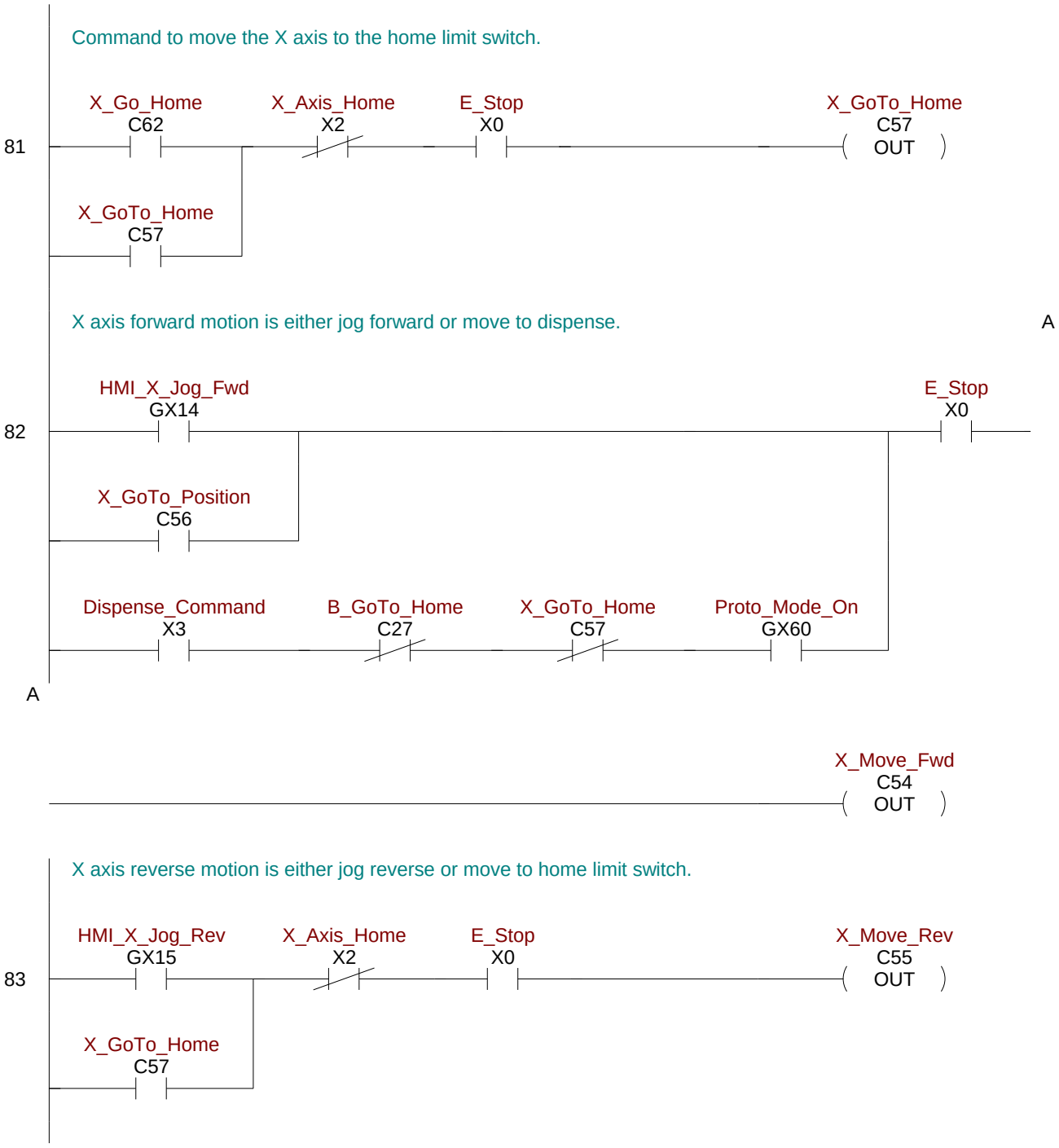
79



Command to move the X axis to dispense product.

80



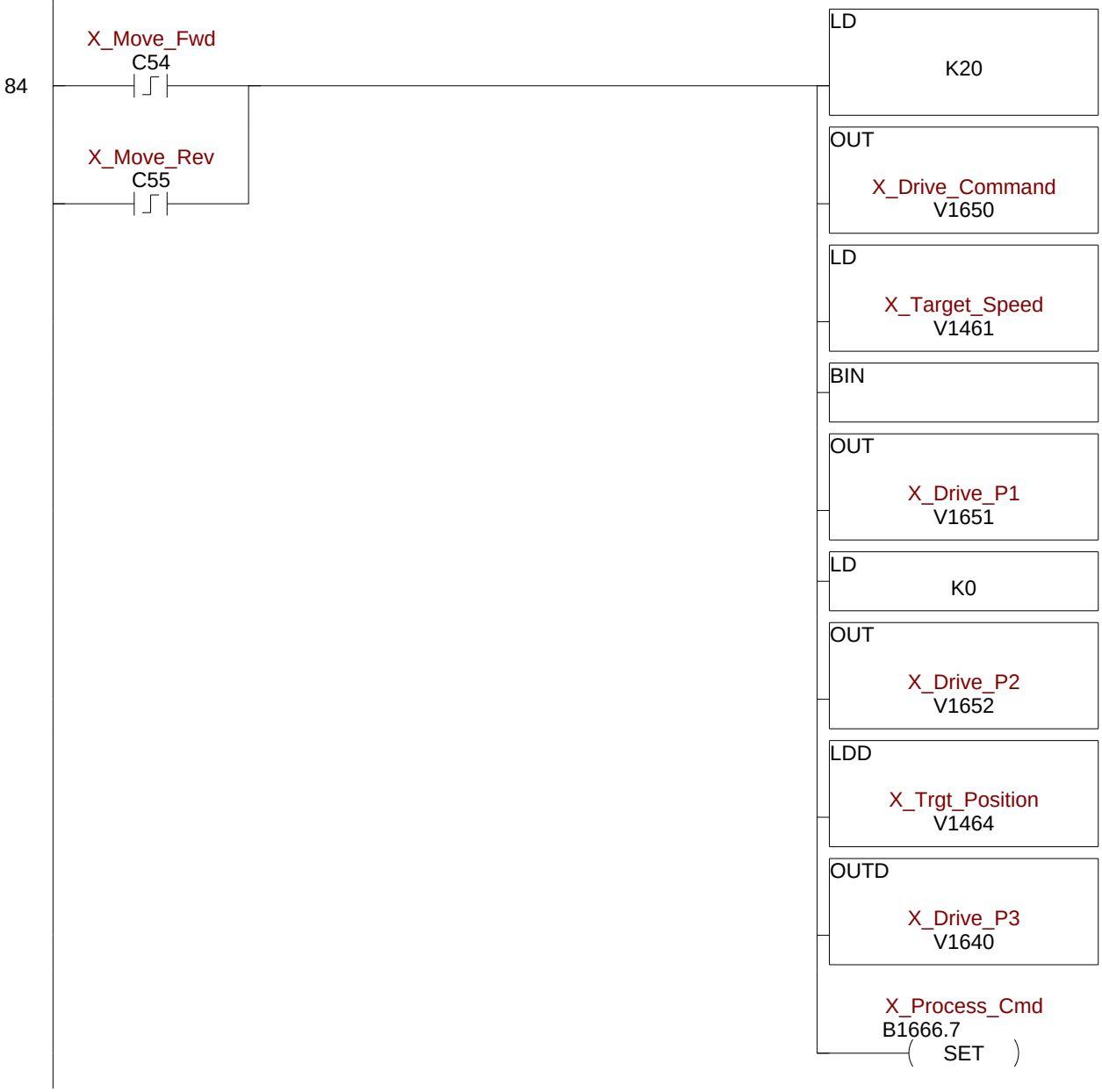

Command to move the X axis to the home limit switch.
X_Go_Home
C62
X_Axis_Home
X2
E_Stop
X0
X_GoTo_Home
C57
OUT
81
X_GoTo_Home
C57
X axis forward motion is either jog forward or move to dispense.
A
HMI_X_Jog_Fwd
GX14
E_Stop
X0
82
X_GoTo_Position
C56
Dispense_Command
X3
B_GoTo_Home
C27
X_GoTo_Home
C57
Proto_Mode_On
GX60
A
X_Move_Fwd
C54
OUT
X axis reverse motion is either jog reverse or move to home limit switch.
HMI_X_Jog_Rev
GX15
X_Axis_Home
X2
E_Stop
X0
X_Move_Rev
C55
OUT
83
X_GoTo_Home
C57

Move forward and reverse for the X axis.

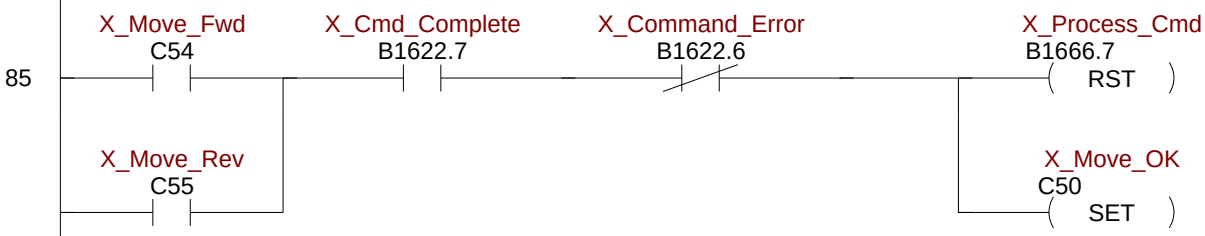
This rung sets up the CTRIO module in slot 3.
The module is configured to report its inputs in V1600 - V1625.
The module is configured to rspond to outputs from V1640 - V1671.

The value of 20 in V1650 is the command code for velocity mode.
The value from V1462 in V1651 (P1) is the running frequency.
The value in V1652 (P2) is the duty cycle. (0 = 50%).
The vaue in V1640 (P3) is the number of pulses to run. FFFFFFFF = continuous run.

When either the move forward or move reverse goes on, send the command block to the CTRIO module.



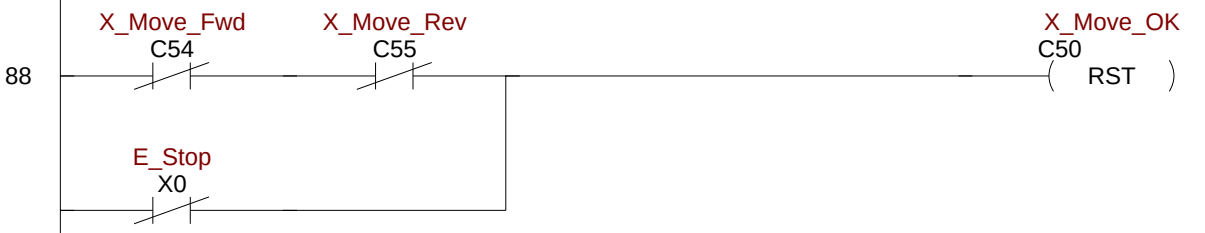
When the CTRIO module acknowledges the move command turn on the "Move_OK" bit.



Turn on the CTRIO "Output Enable" bit.

If the command is to move forward turn the the CTRIO direction output.

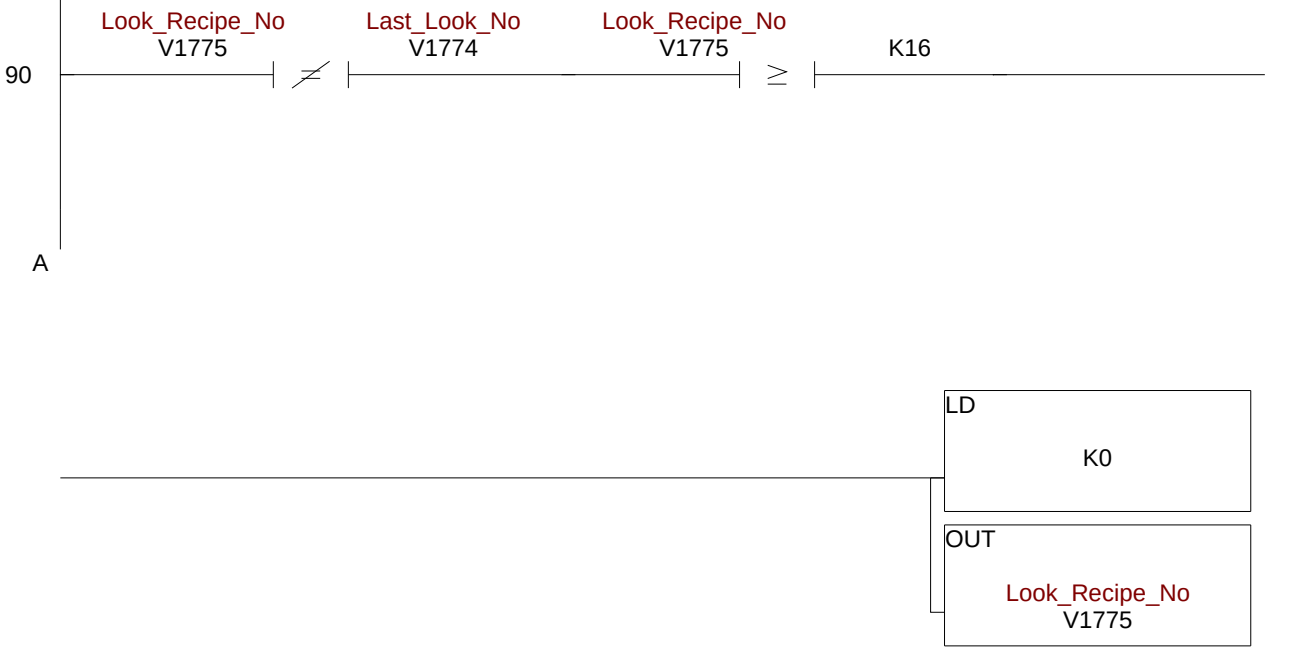
When no move commands are present, turn off the "Move_OK" bit.



Turn off the direction bit when the move command goes off.

Logic to control the display of recipes on the HMI. A

The HMI increments the recipe number in V1775. This rung limits the maximum value to 15.

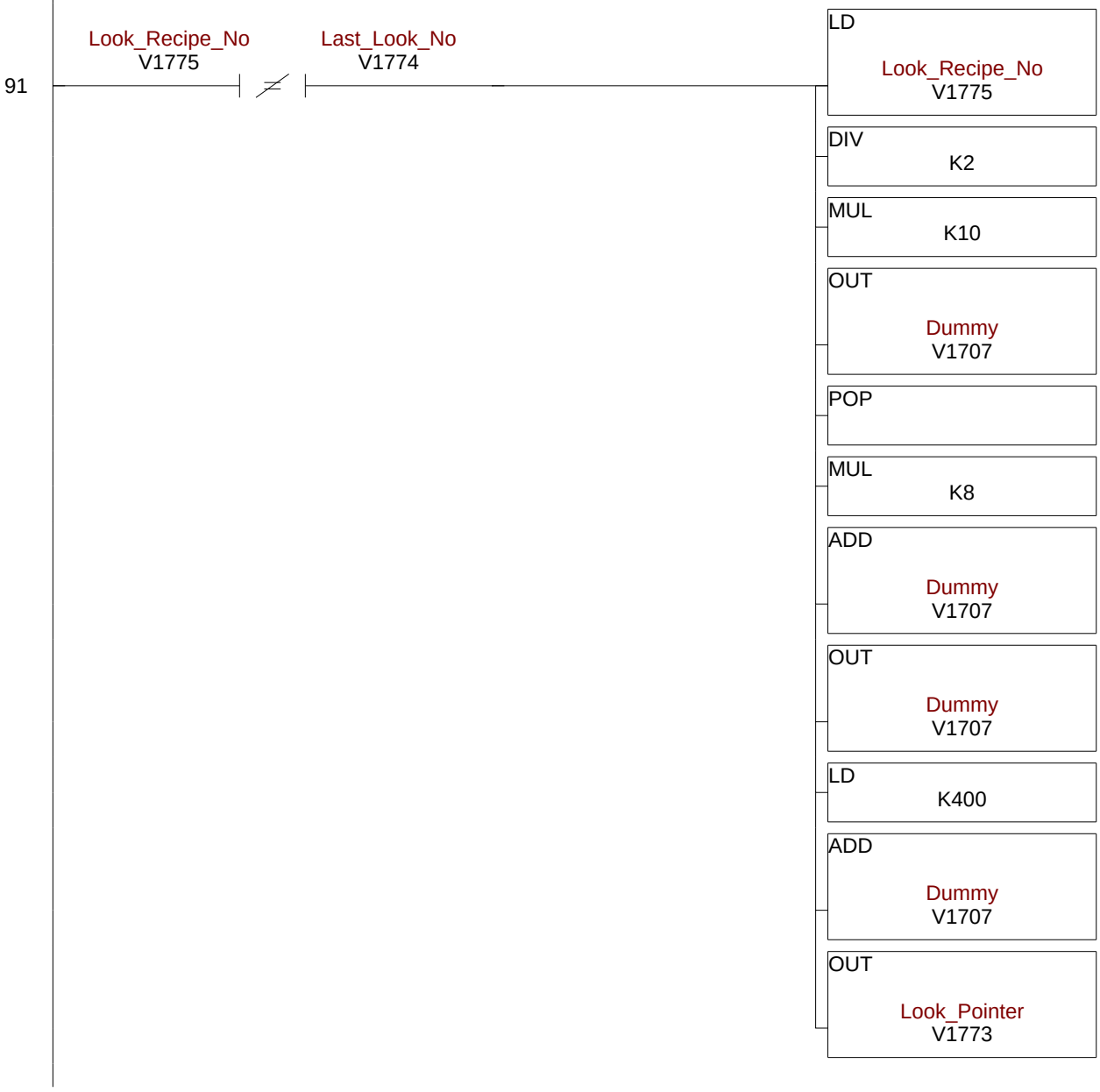


Upon a command from the HMI to look at recipe data, calculate the pointer to the memory location for the data.

Recipes have seven ingredients and are stored starting at V2000. Recipe 0 occupies V2000 - V2006. Recipe 1 occupies V2010 - V2016 etc.

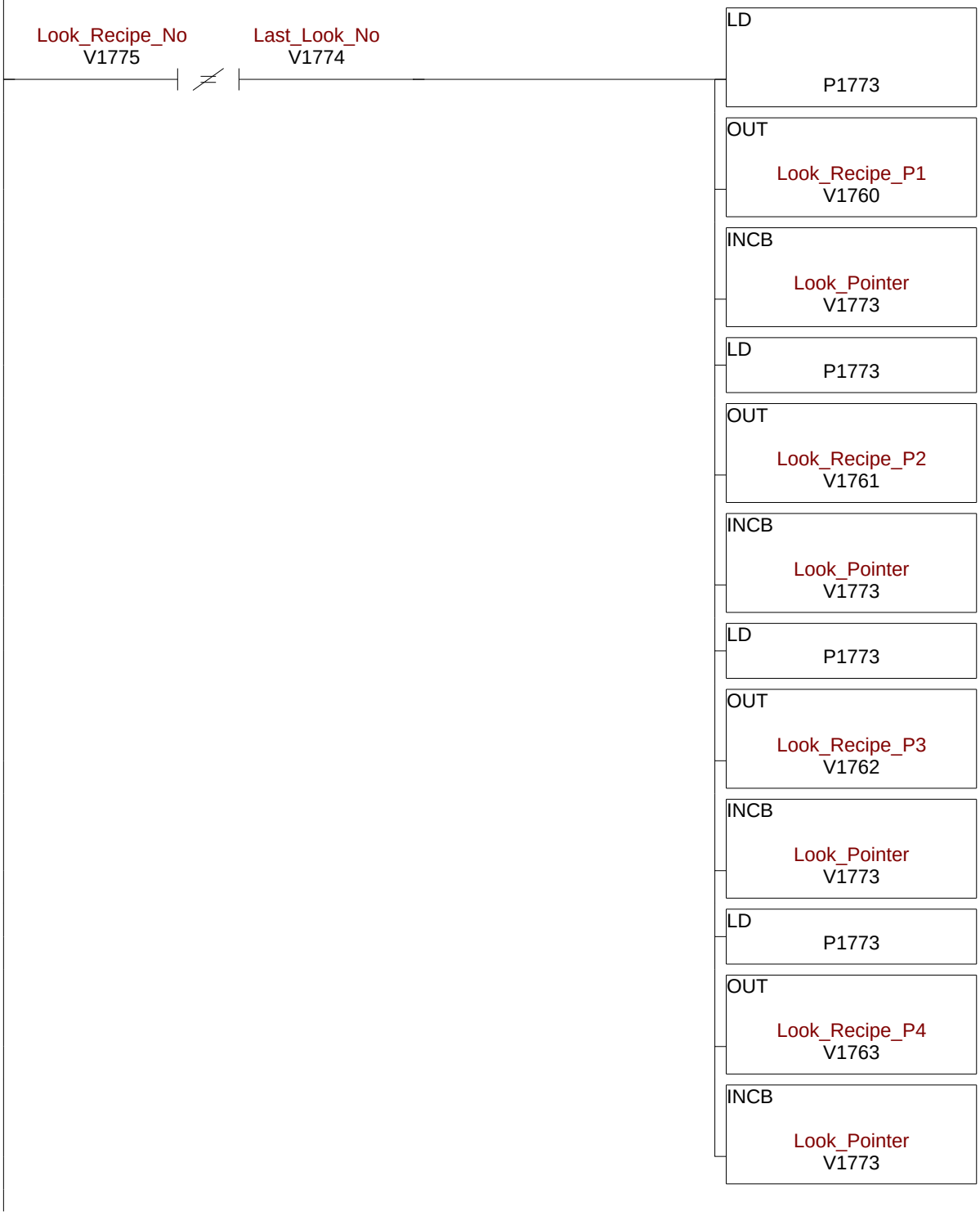
Pointer calculation is ((Recipe number / 2) * 10) + ((Recipe number Mod 2) * 8) + 400

The calculation is not straightforward. Even numbered recipes need to calculate a pointer value of 400, 410, 420, etc. Odd numbered recipes need to calculate a pointer value of 408, 418, 428, etc



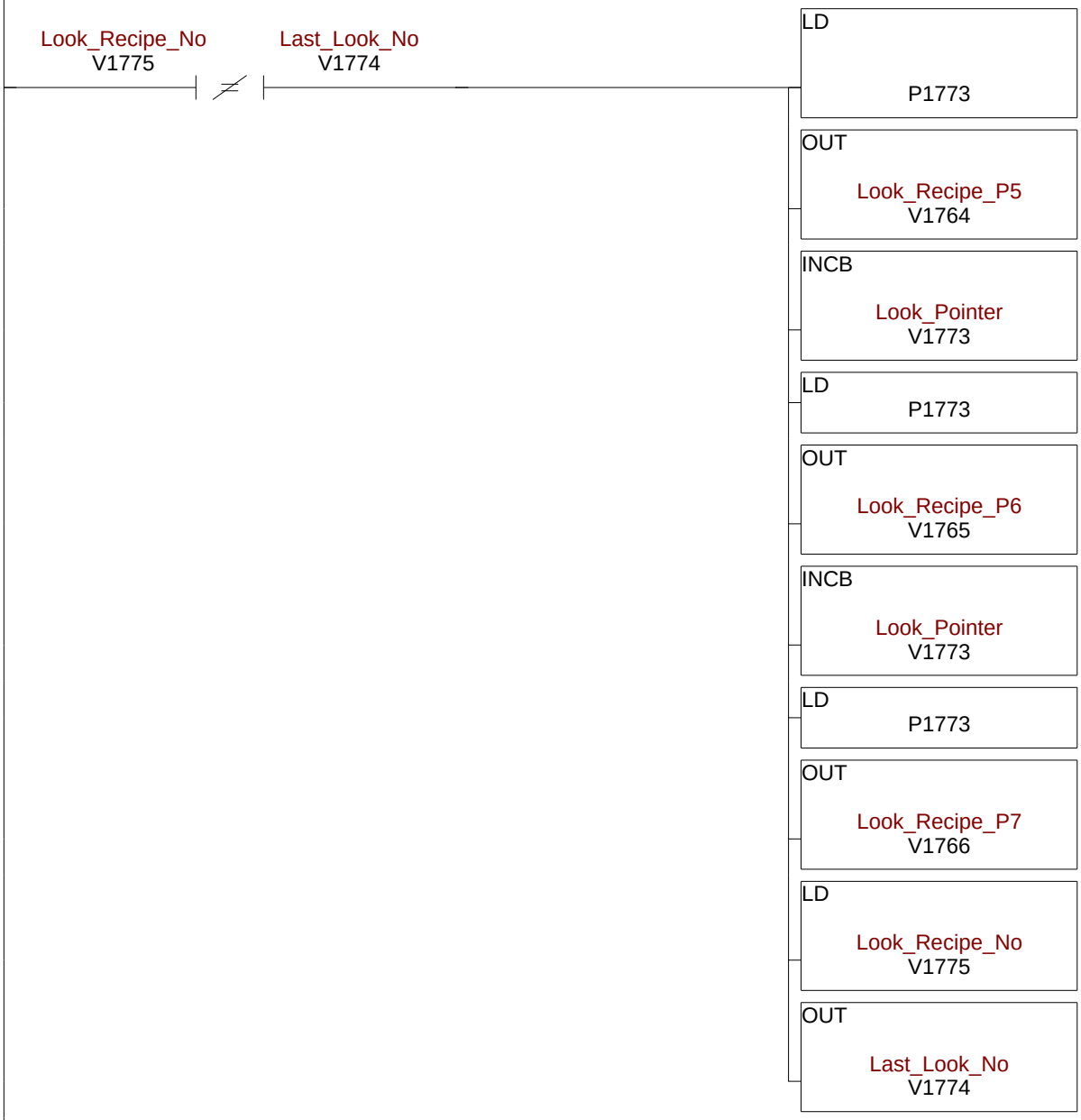
This rung fetches the first four words of recipe data and loads it into working registers V1760 - V1764.

92



This rung fetches the last three words of recipe data and loads it into working registers V1764 - V1766.

93

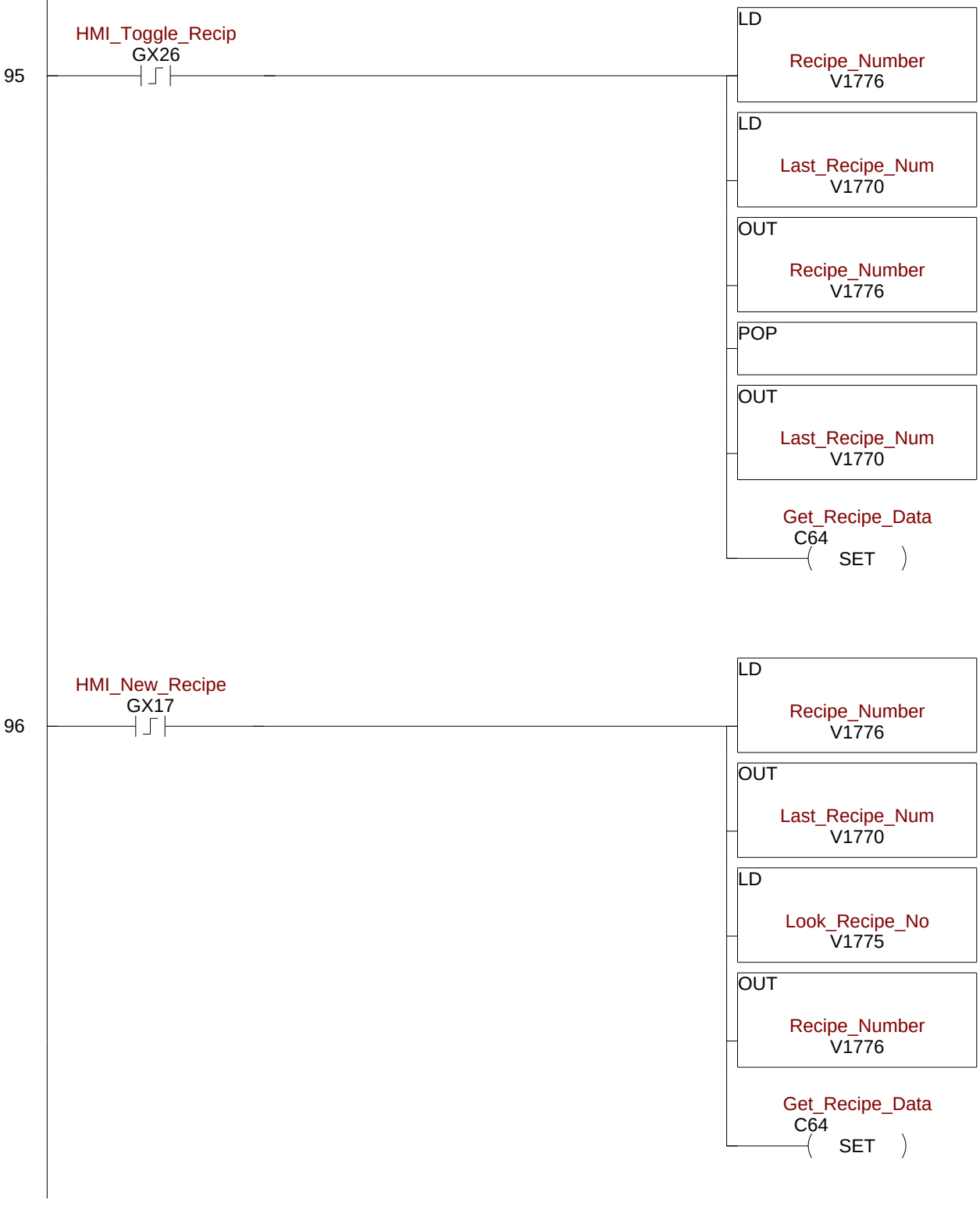


Start of logic to fetch the actual working data from the recipe.

MDR - This rung initializes the last recipe function

94

The following rung toggles between the current recipe and the previous

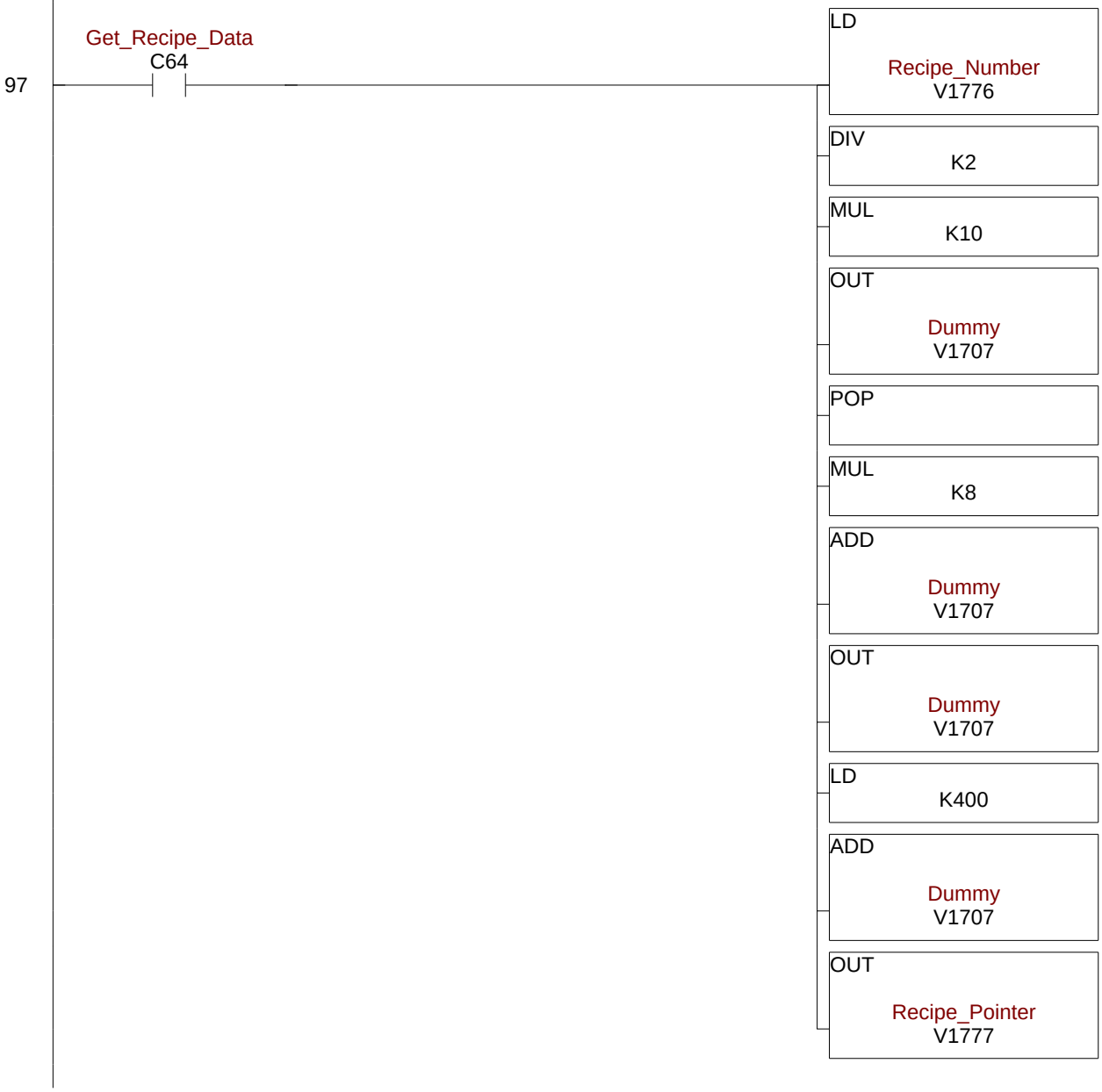


Upon a command to fetch recipe data, calculate the pointer to the memory location for the data.

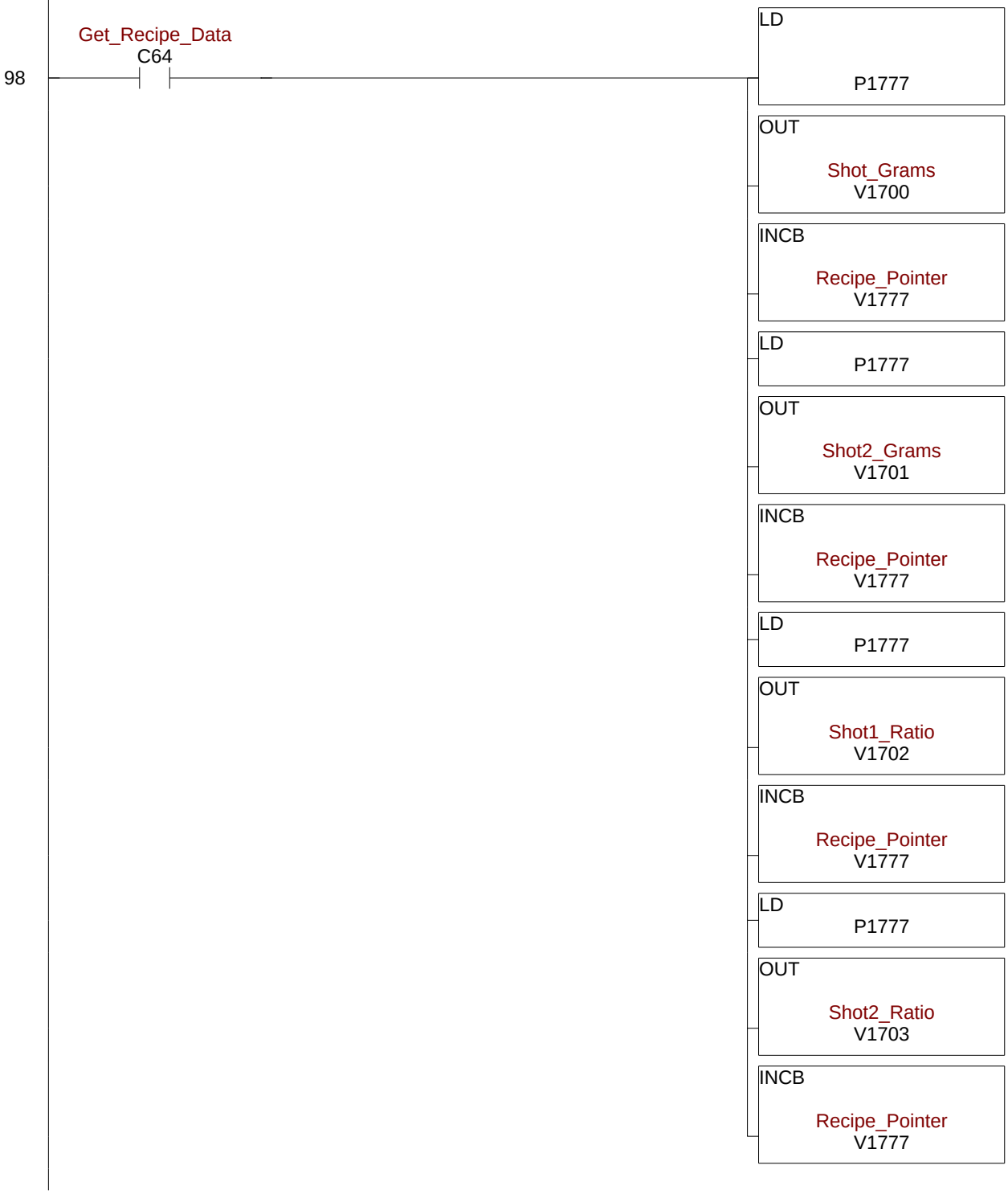
Recipes have seven ingredients and are stored starting at V2000. Recipe 0 occupies V2000 - V2006. Recipe 1 occupies V2010 - V2016 etc.

Pointer calculation is ((Recipe number / 2) * 10) + ((Recipe number Mod 2) * 8) + 400

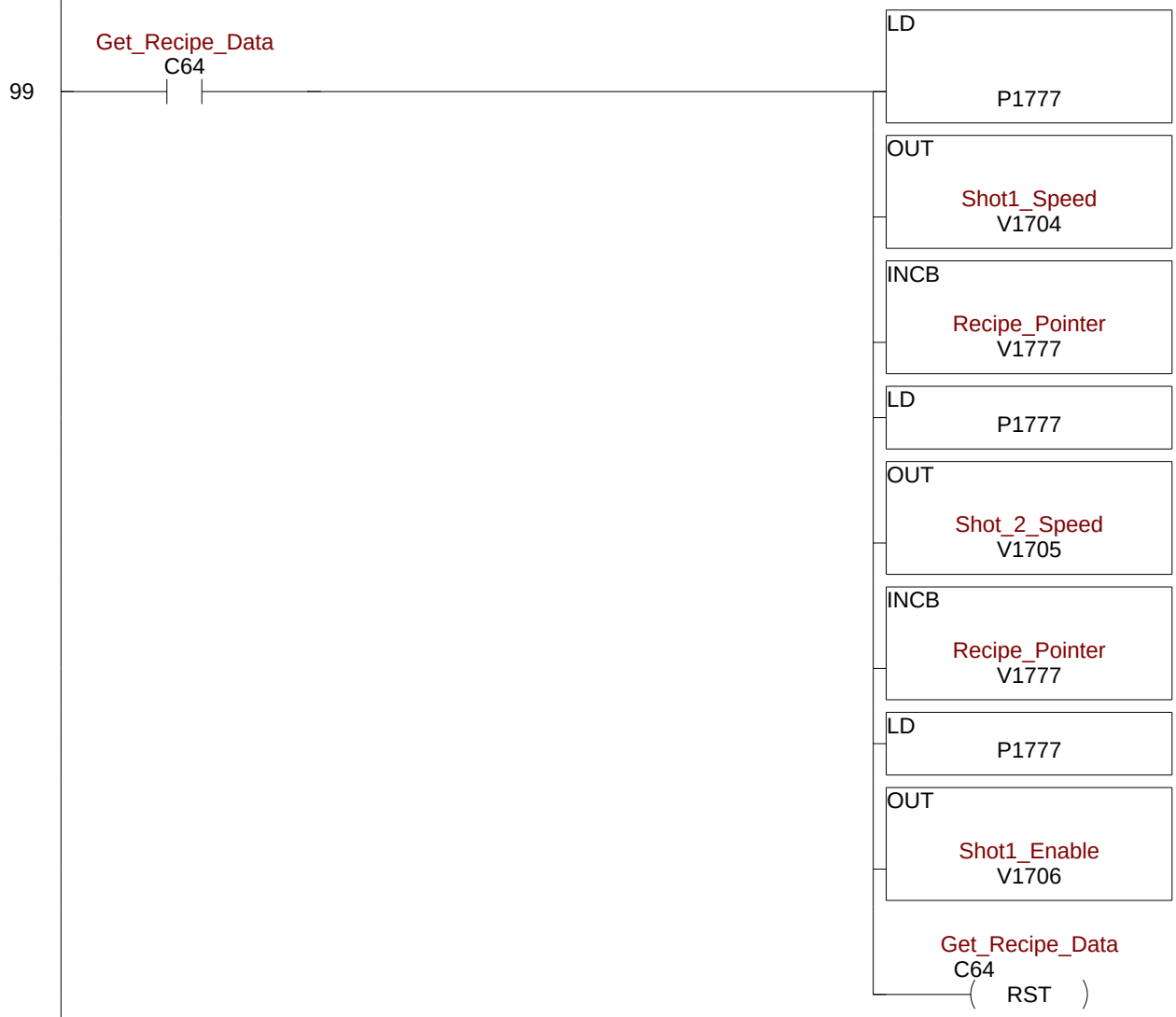
The calculation is not straightforward. Even numbered recipes need to calculate a pointer value of 400, 410, 420, etc. Odd numbered recipes need to calculate a pointer value of 408, 418, 428, etc



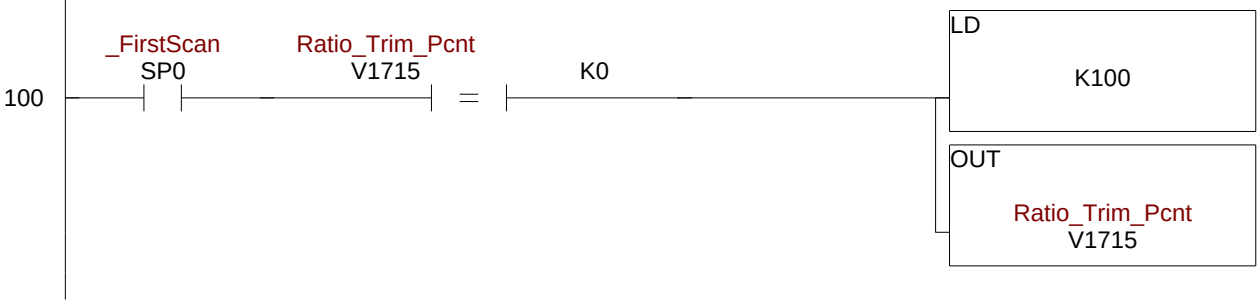
This rung fetches the first four words of recipe data and loads it into working registers V1700 - V1704.



This rung fetches the recipe data and loads it into working registers V1700 - V1706.



Initialize the ratio trim factor.



Apply the trim factor to the first shot ratio.

101

Get_Recipe_Data
C64

LD
Shot1_Ratio
V1702

MUL
Ratio_Trim_Pcnt
V1715

DIV
K100

OUT
Trimmed_Ratio
V1712

Apply The Trim Factor to the Shot Size

102

Get_Recipe_Data
C64

On When Value Is Negative
Shot_Trim_Neg
GX62

LD
Shot_Trim_Grams
V1737

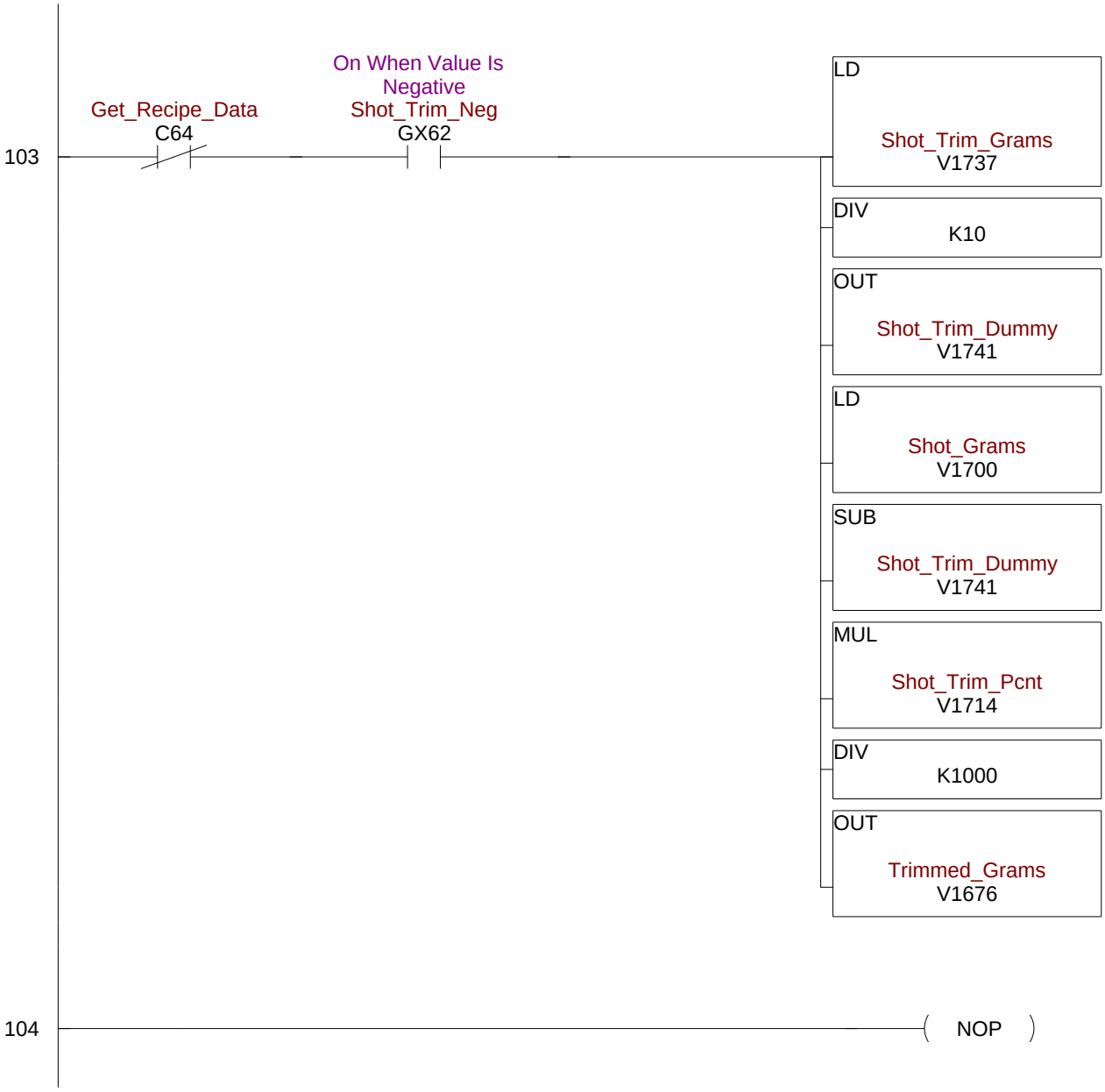
DIV
K10

ADD
Shot_Grams
V1700

MUL
Shot_Trim_Pcnt
V1714

DIV
K1000

OUT
Trimmed_Grams
V1676


103
Get_Recipe_Data
C64
On When Value Is
Negative
Shot_Trim_Neg
GX62
LD
Shot_Trim_Grams
V1737
DIV
K10
OUT
Shot_Trim_Dummy
V1741
LD
Shot_Grams
V1700
SUB
Shot_Trim_Dummy
V1741
MUL
Shot_Trim_Pcnt
V1714
DIV
K1000
OUT
Trimmed_Grams
V1676
104
NOP

Calculate the number of pulses for the shot on the X axis.

Pulses = [Shot Weight / (Trimmed Ratio + 1)] * 1138 Pulses per gram

105

Get_Recipe_Data
C64

LD
K100

ADD
Trimmed_Ratio
V1712

OUT
Dummy
V1707

LD
Trimmed_Grams
V1676

MUL
K1138

DIV
Dummy
V1707

MUL
K10

OUTD
V1740

POP

MUL
K10

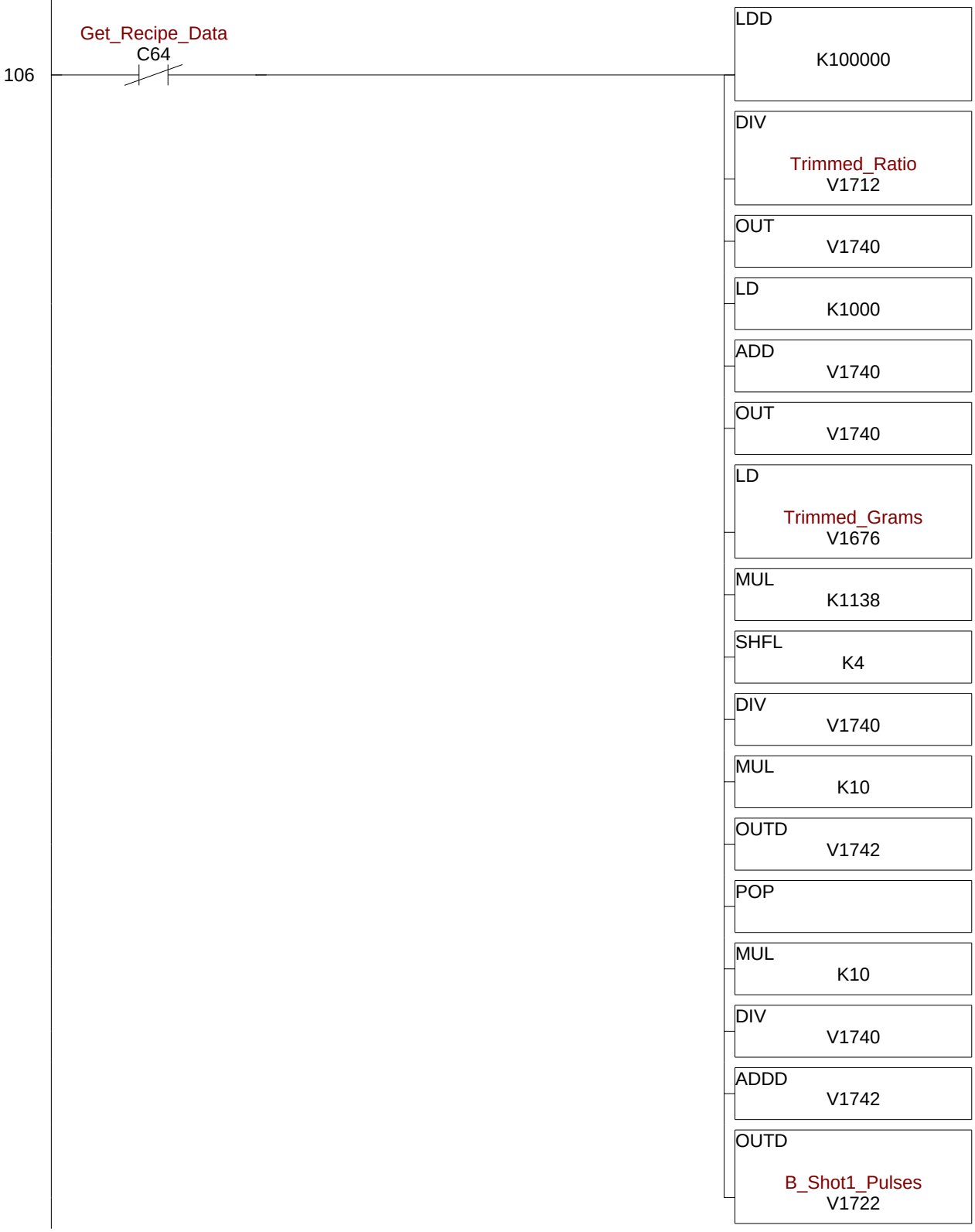
DIV
Dummy
V1707

ADDD
V1740

OUTD
X_Shot1_Pulses
V1720

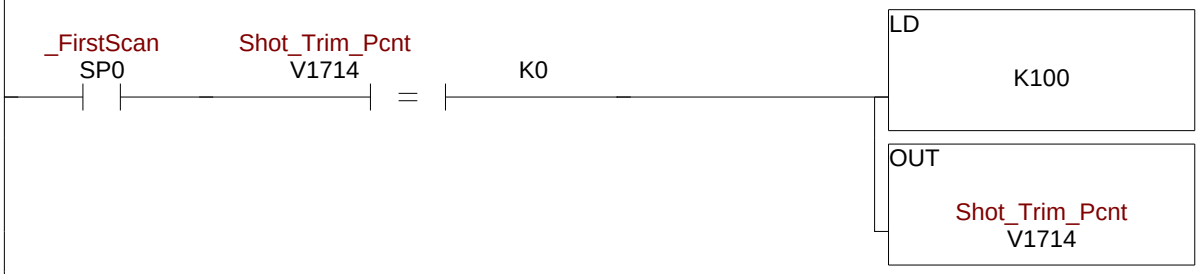
Calculate the number of pulses for the first shot on the B axis.

Pulses = [Shot Weight / (1 + (1 / Trimmed Ratio))] * 1138 Pulses per gram



Initialize the shot trim factor if zero.

107



Calculate the time for the first shot.

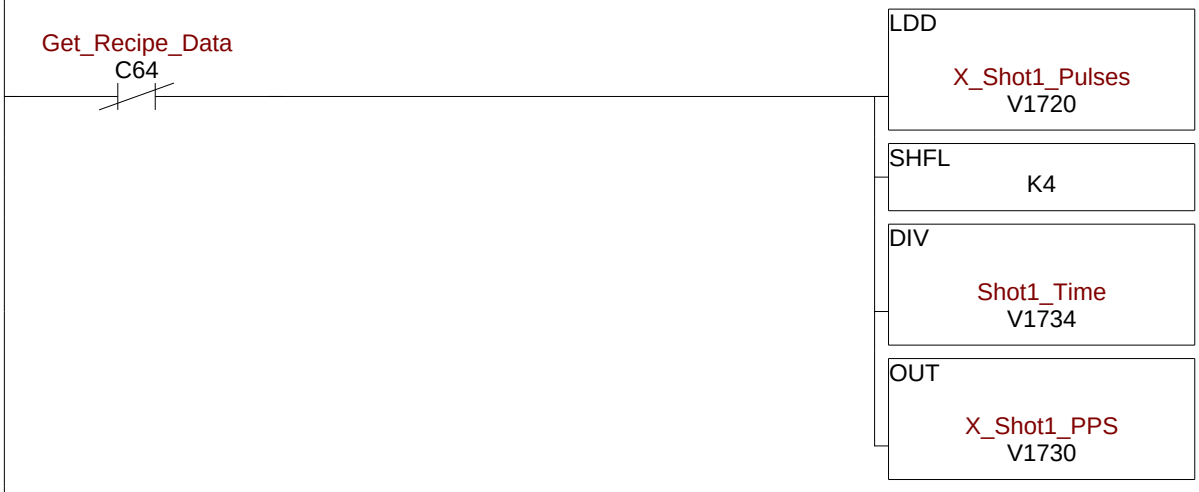
Shot1 Time = Shot1 grams / Shot1 Speed

108

Calculate the X axis speed for the first shot.

X Shot1 Speed = X Shot1 Pulses / Shot1 Time

109

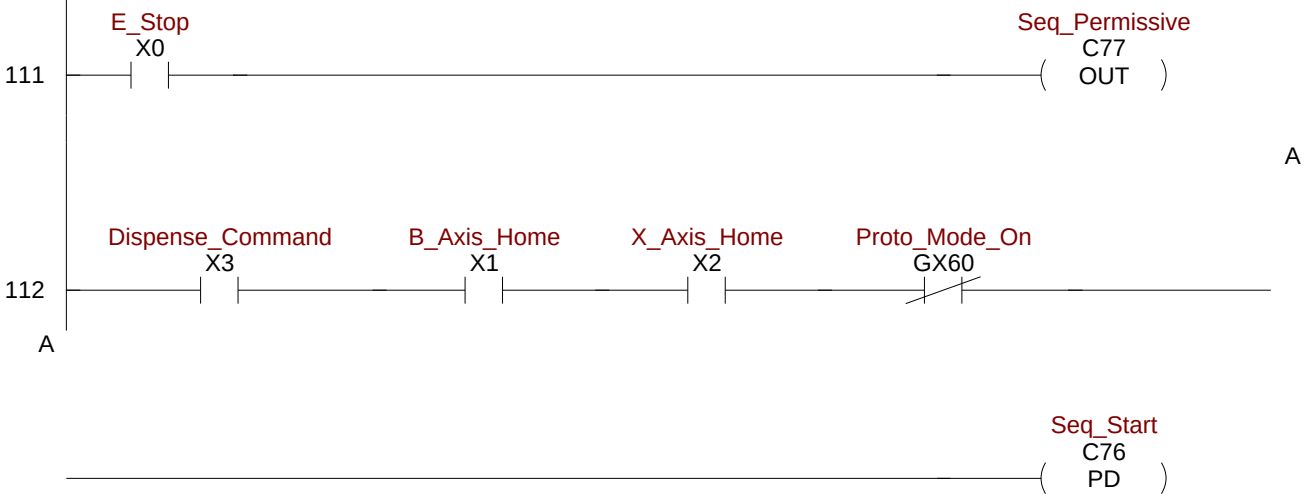


Calculate the B axis speed for the first shot.

B Shot1 Speed = B Shot1 Pulses / Shot1 Time

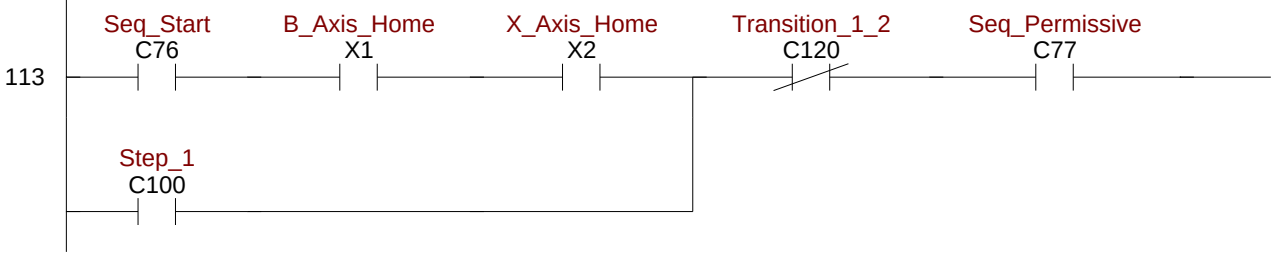
Start of dispense sequence control.

First, a general permissive to remain in the sequence.



Step 1 of the sequence.

In step 1, fire the two piston solenoids and the shot 1 nozzle solenoid.



A

Step_1
C100
OUT

Minimum time to stay in step 1.

114
Step_1
C100
TMR
Step1_Timer
T10
K1

Conditions to transition from step 1 to step 2.

Since there are no sensors to detect operation of the solenoids, simply use a time delay before moving to step 2.

115
Step_1
C100
Step1_Timer
T10
Transition_1_2
C120
OUT

Step 2 of the sequence. A

In step 2, command both axes to move out for the calculated number of pulses.

116
Step_1
C100
Transition_1_2
C120
Transition_2_3
C121
Seq_Permissive
C77
Step_2
C101

A

Step_2
C101
OUT

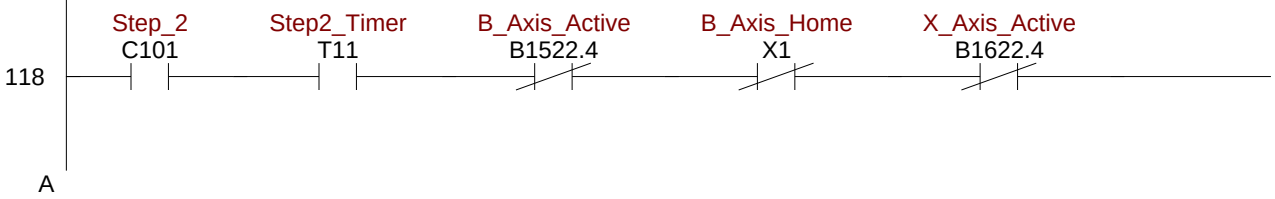
Minimum time to stay in step 2.

117
Step_2
C101
TMR
Step2_Timer
T11
K10

Conditions to transition from step 2 to step 3. A

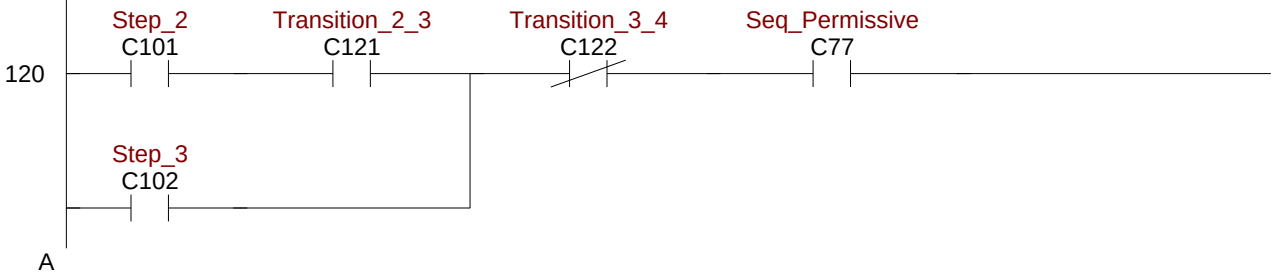
Both axes have to be off their home switches and show a "not moving" state.

MDR-CHANGE T20 FROM K5 TO K1



Step 3 of the sequence. A

In step 3, turn off the solenoid valves.



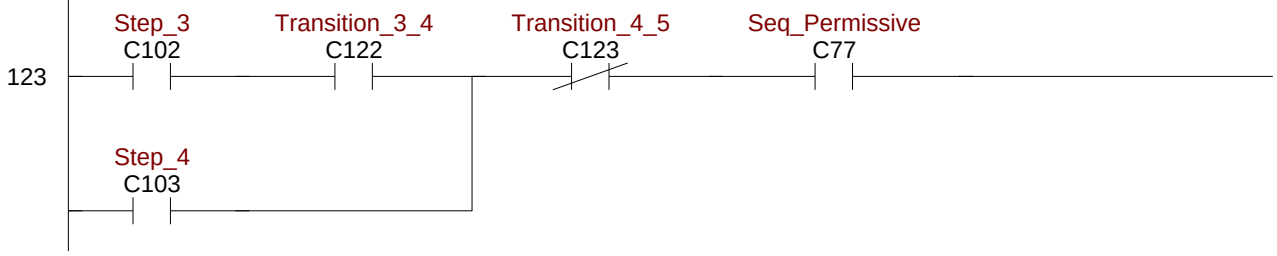
Minimum time to stay in step 3.

Conditions to transition from step 3 to step 4.

Since there are no sensors to detect operation of the solenoids, simply use a time delay before moving to step 4.

Step 4 of the sequence. A

In step 4 command both axes to return to their home switches.



Minimum time to stay in step 4.

Conditions to transition from step 4 to step 5. A

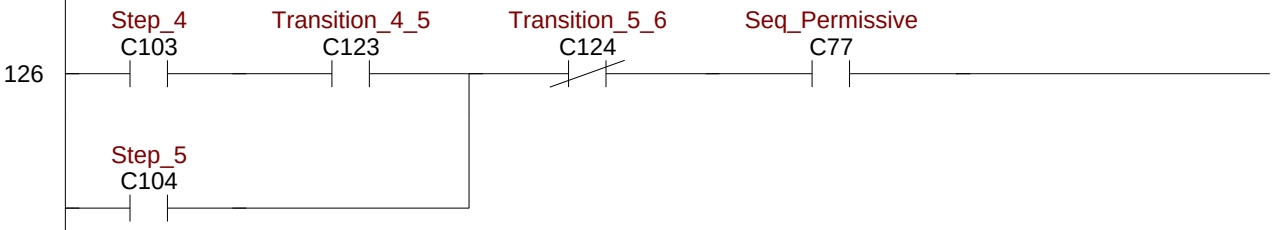
Both axes have to be at their home switches and show a "not moving" state.

A

Step 5 of the sequence.

A

Step 5 is a dummy step in case future enhancements are required.

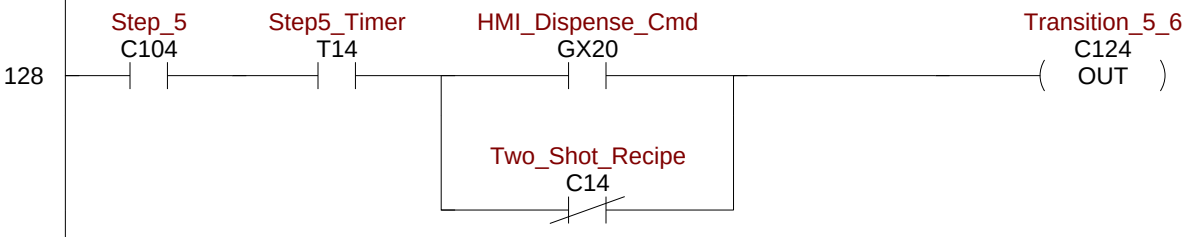


A

Minimum time to stay in step 5.

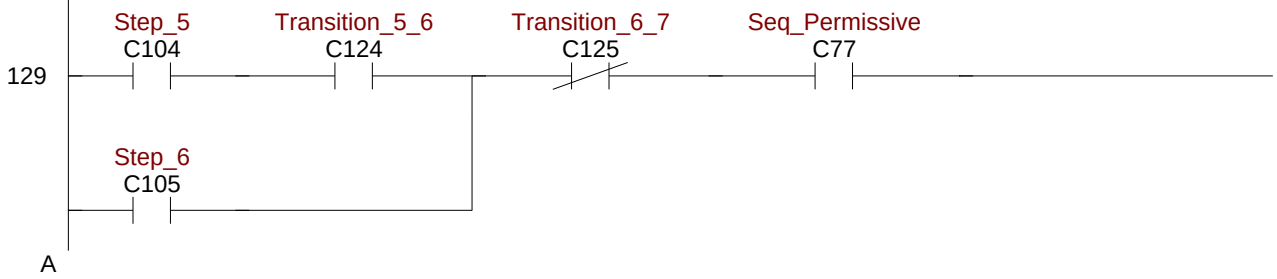
Conditions to transition from step 5 to step 6.

Since step 5 is a dummy step, use the minimum time as the transition out.



Step 6 of the sequence. A

Step 6 is a dummy step in case future enhancements are required.



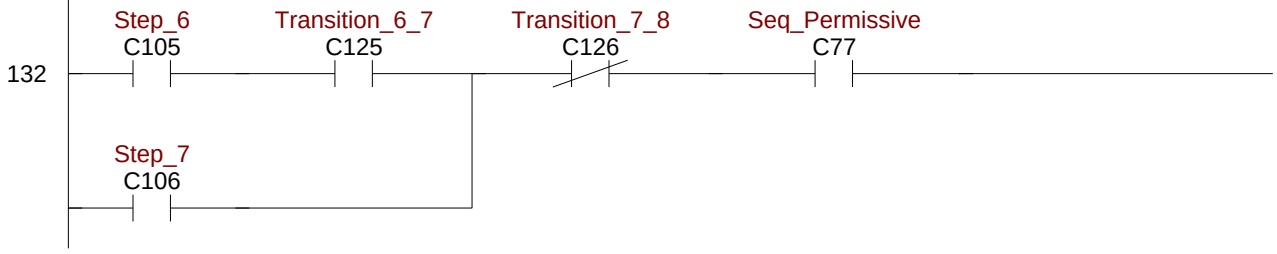
Minimum time to stay in step 6.

Conditions to transition from step 6 to step 7.

Since step 6 is a dummy step, use the minimum time as the transition out.

Step 7 of the sequence. A

Step 7 is a dummy step in case future enhancements are required.

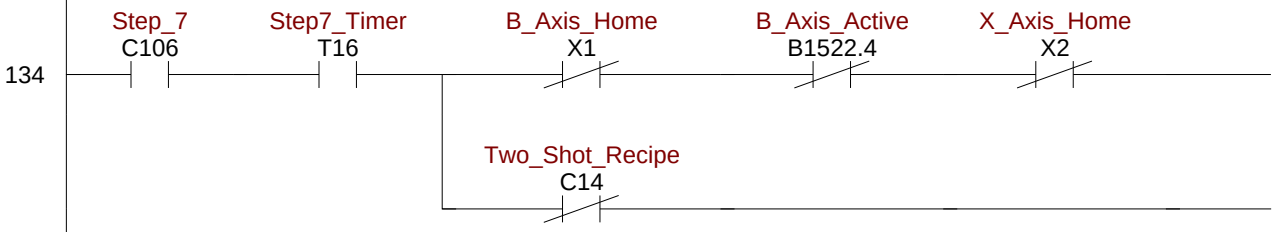


A

Minimum time to stay in step 7.

Conditions to transition from step 7 to step 8. A

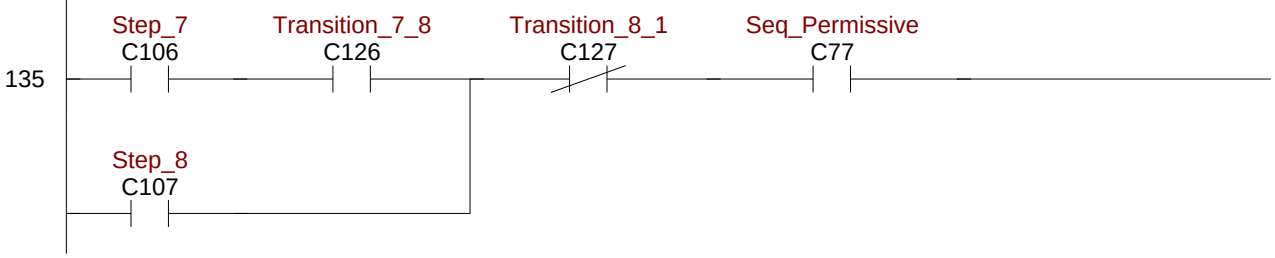
Since step 7 is a dummy step, use the minimum time as the transition out.



A

Step 8 of the sequence. A

Step 8 is a dummy step in case future enhancements are required.



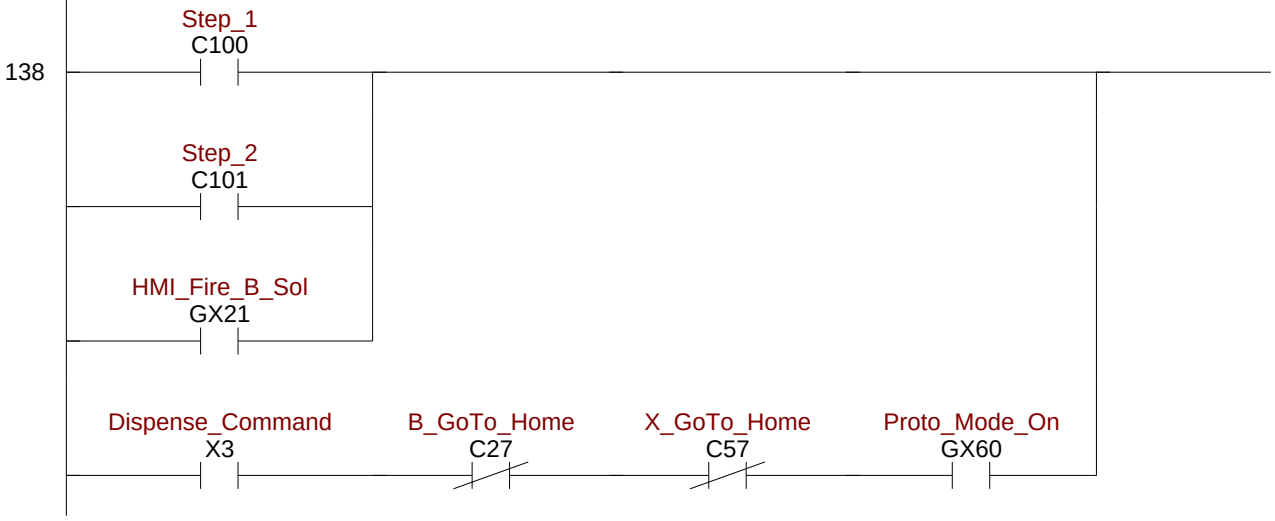
Minimum time to stay in step 8.

Conditions to transition from step 8 to step 9.

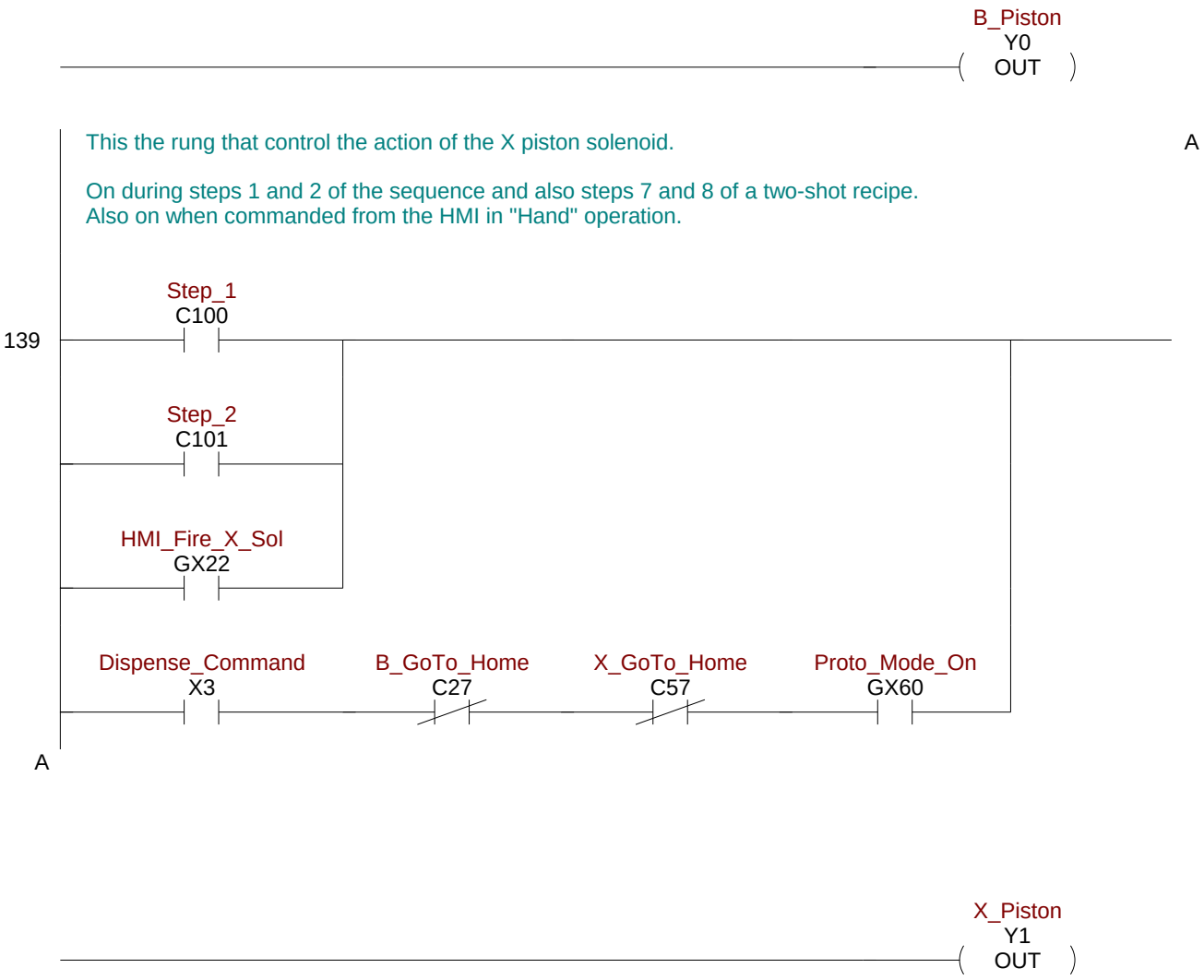
Since step 8 is a dummy step, use the minimum time as the transition out.

This the rung that control the action of the B piston solenoid. A

On during steps 1 and 2 of the sequence. Also on when commanded from the HMI in "Hand" operation.



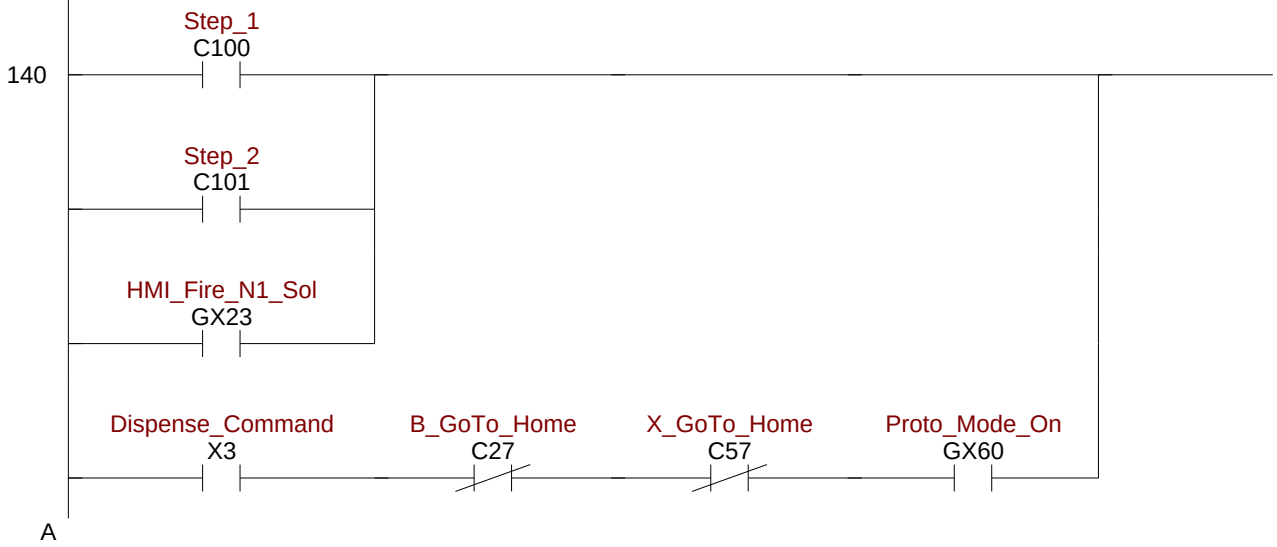
A


B_Piston
Y0
OUT
This the rung that control the action of the X piston solenoid.
A
On during steps 1 and 2 of the sequence and also steps 7 and 8 of a two-shot recipe.
Also on when commanded from the HMI in "Hand" operation.
Step_1
C100
139
Step_2
C101
HMI_Fire_X_Sol
GX22
Dispense_Command
X3
B_GoTo_Home
C27
X_GoTo_Home
C57
Proto_Mode_On
GX60
A
X_Piston
Y1
OUT

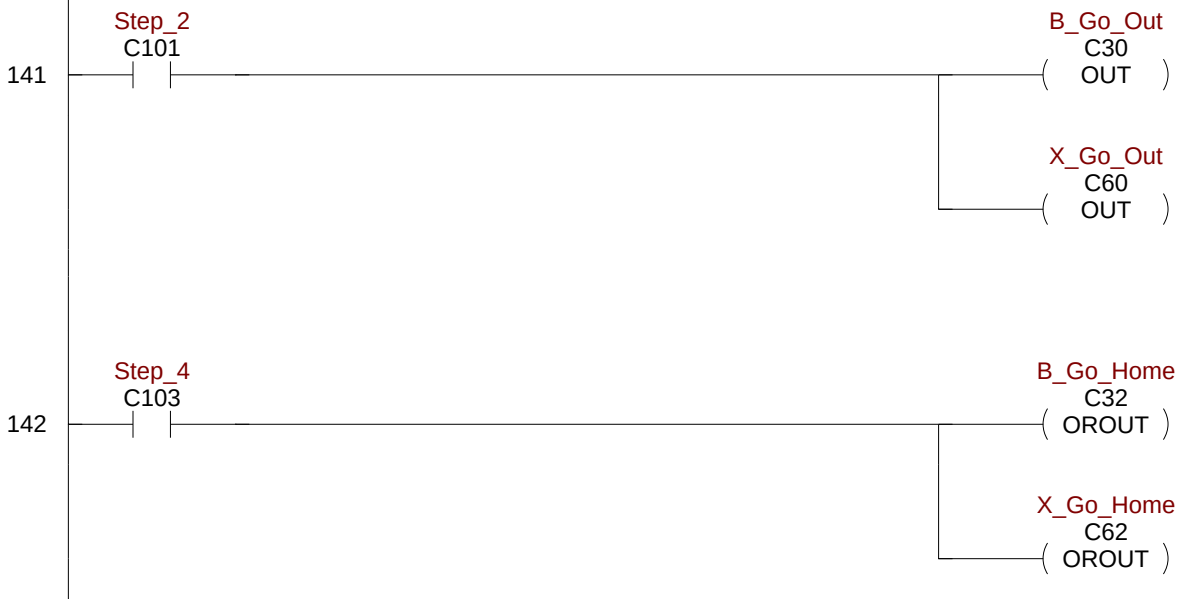
A

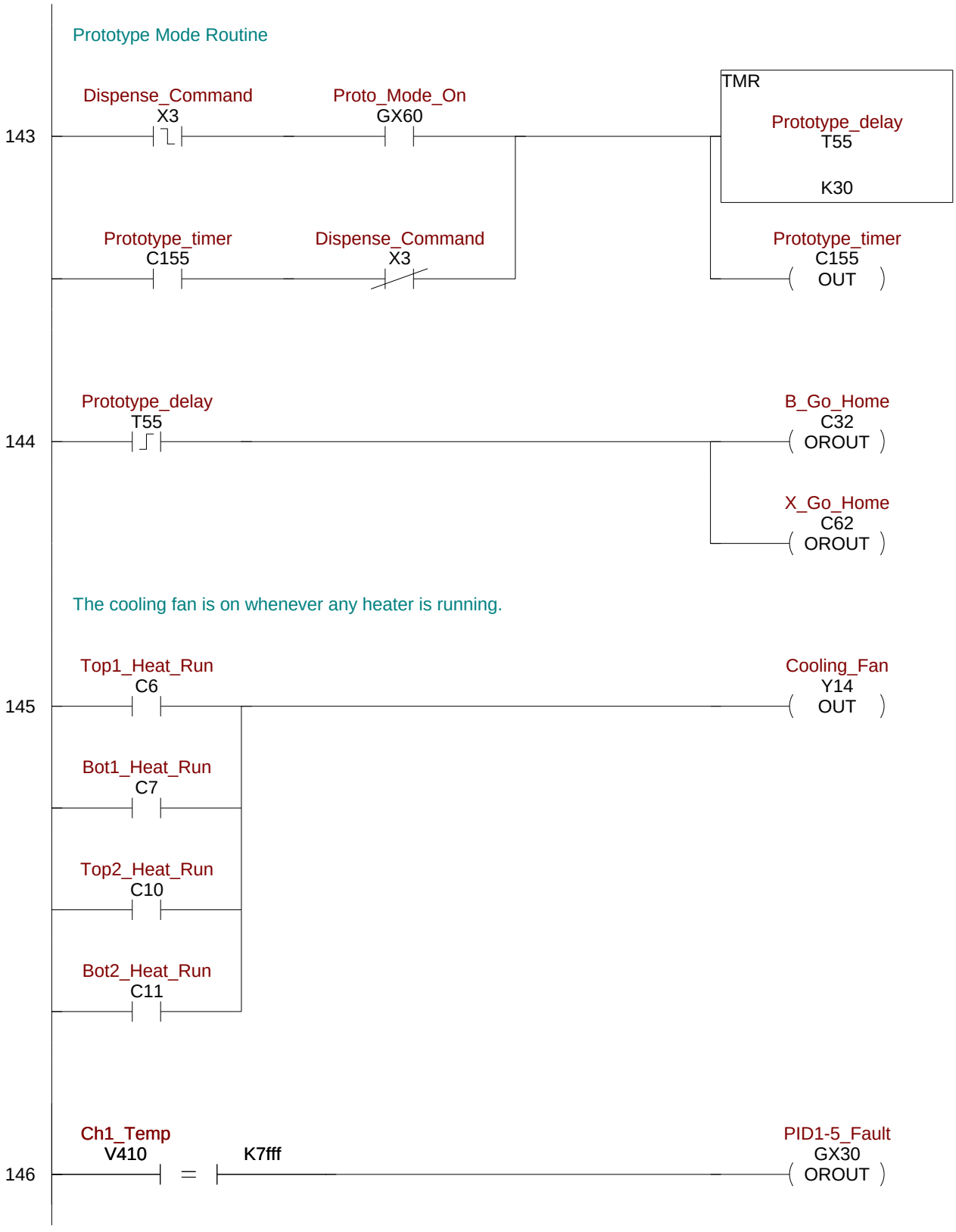
This the rung that control the action of the Shot 1 nozzle solenoid.

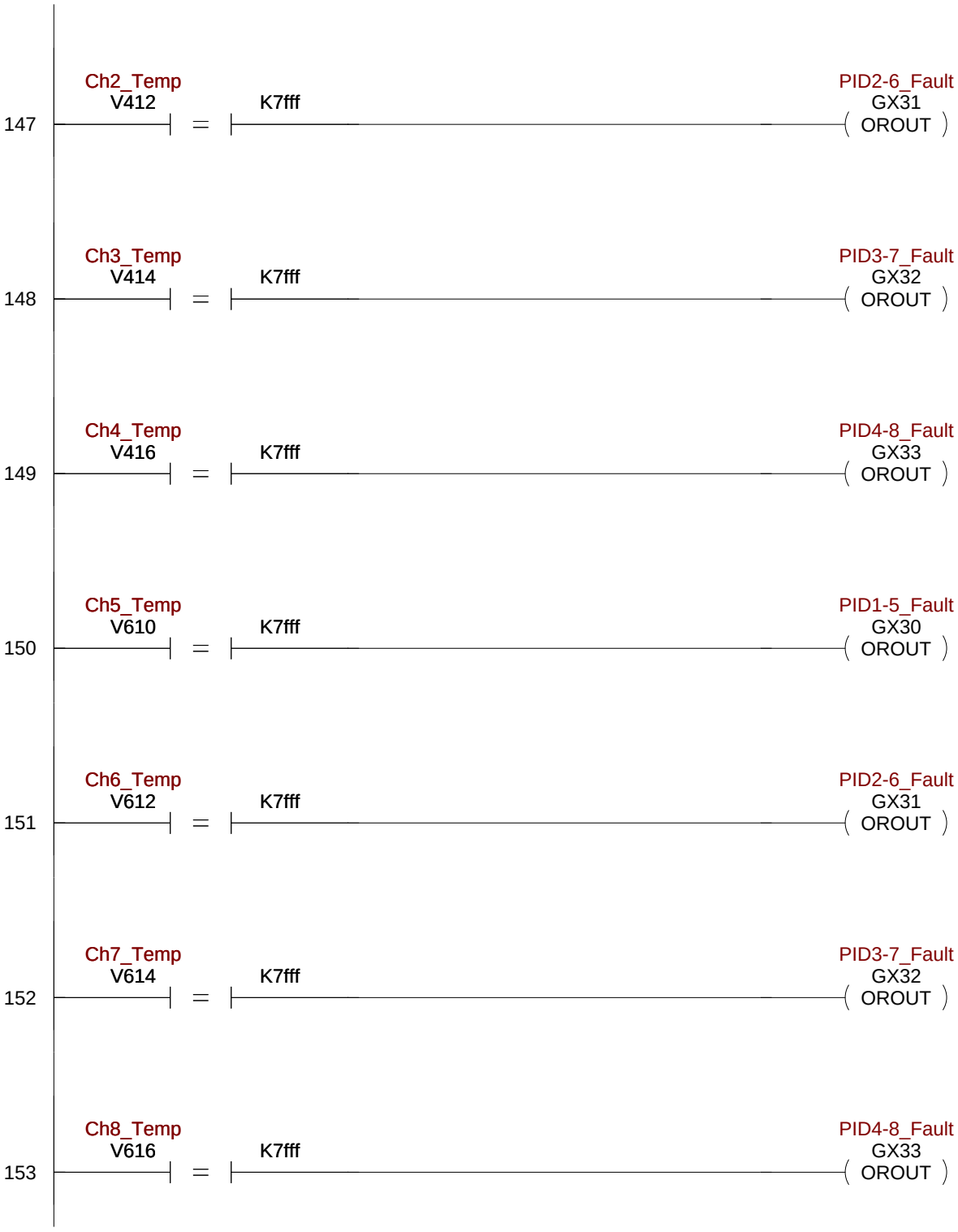
On during steps 1 and 2 of the sequence when the "Shot 1/2 flag is off (Shot1). Also on when commanded from the HMI in "Hand" operation.

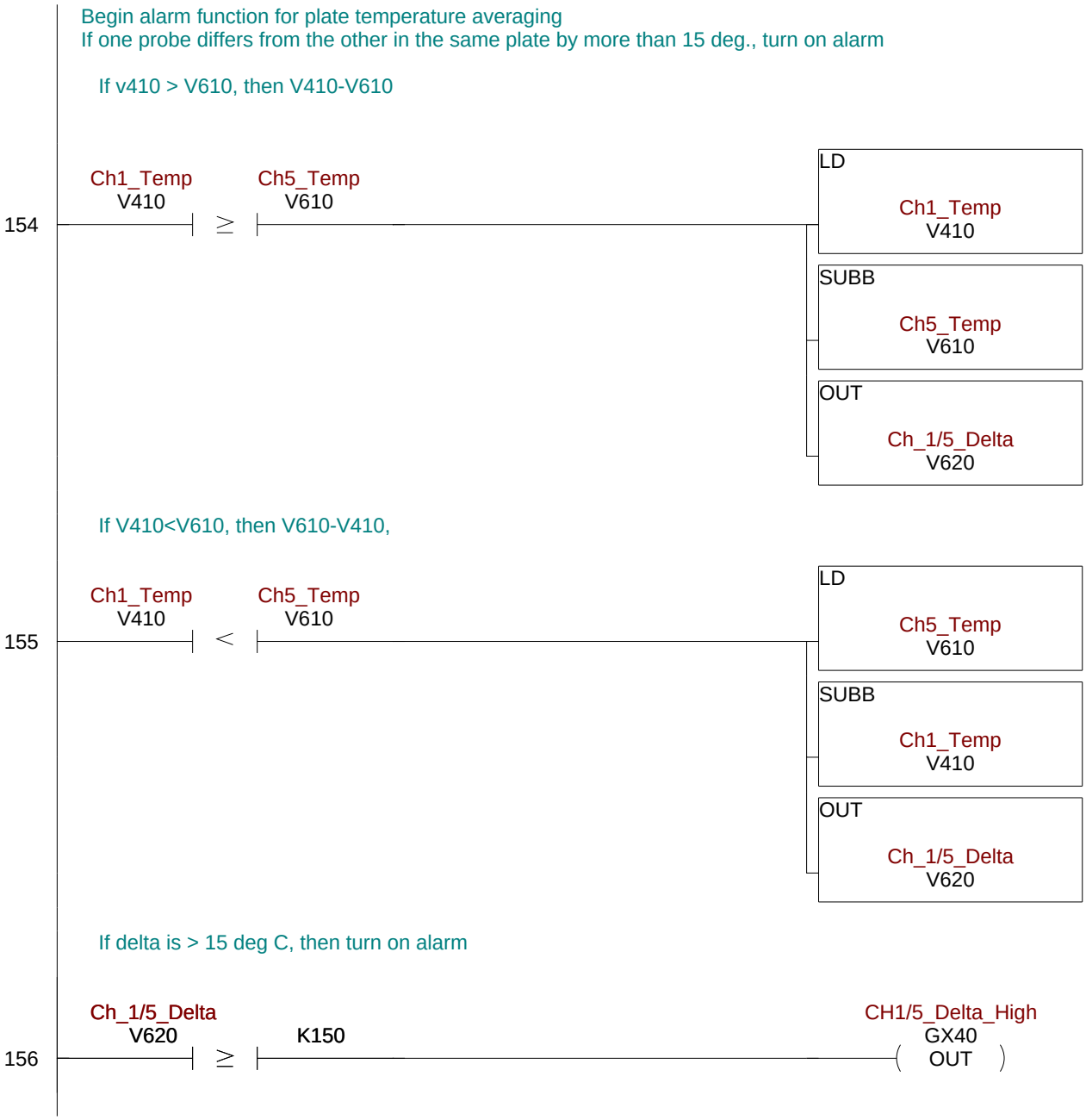


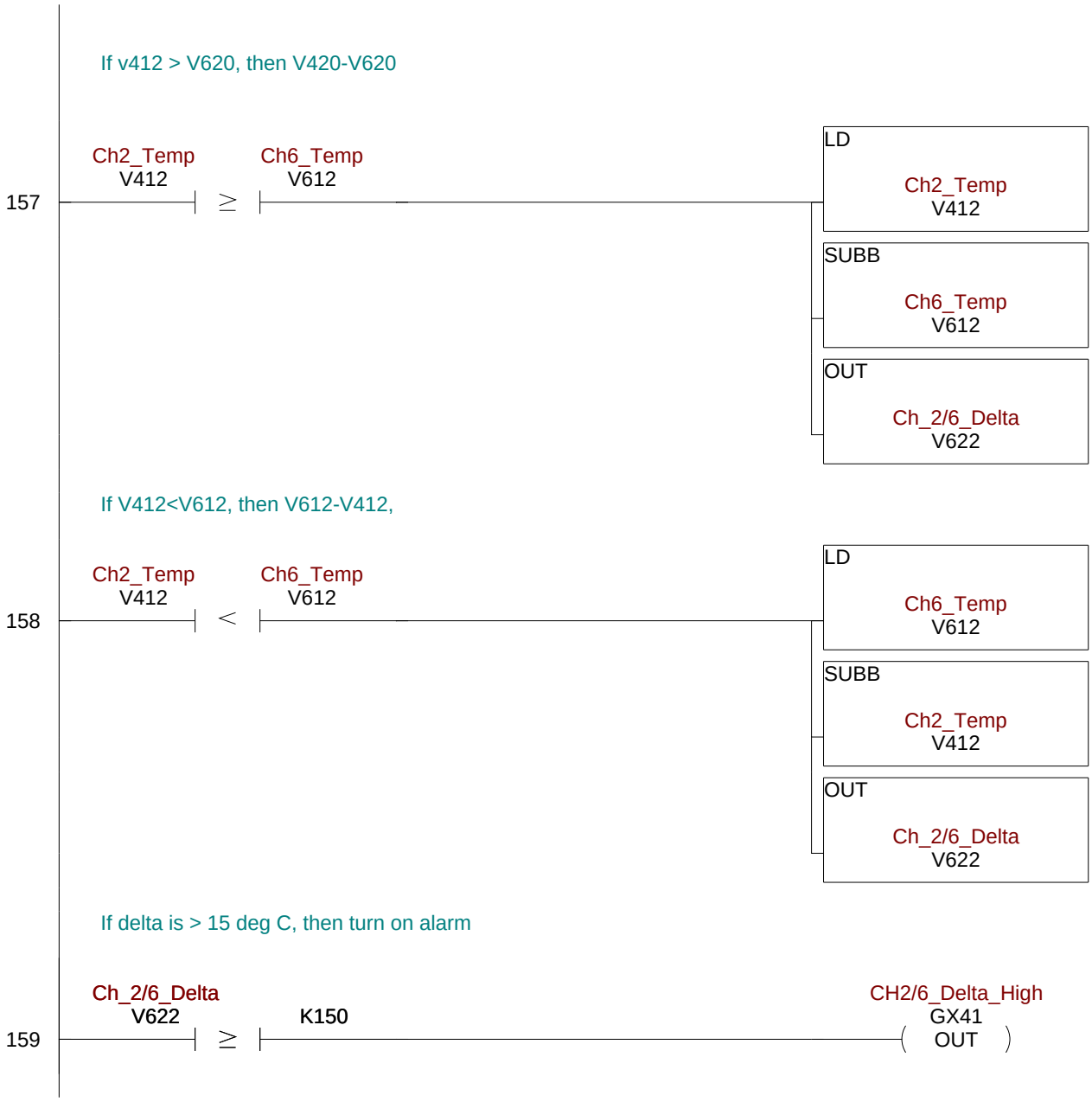
Command to the axes to run to their shot dispense pulses in automatic sequence.




Prototype Mode Routine
143
Dispense_Command
X3
Proto_Mode_On
GX60
TMR
Prototype_delay
T55
K30
Prototype_timer
C155
Dispense_Command
X3
Prototype_timer
C155
OUT
144
Prototype_delay
T55
B_Go_Home
C32
OROUT
X_Go_Home
C62
OROUT
The cooling fan is on whenever any heater is running.
145
Top1_Heat_Run
C6
Cooling_Fan
Y14
OUT
Bot1_Heat_Run
C7
Top2_Heat_Run
C10
Bot2_Heat_Run
C11
146
Ch1_Temp
V410
=
K7fff
PID1-5_Fault
GX30
OROUT


147
Ch2_Temp
V412
=
K7fff
PID2-6_Fault
GX31
OROUT
148
Ch3_Temp
V414
=
K7fff
PID3-7_Fault
GX32
OROUT
149
Ch4_Temp
V416
=
K7fff
PID4-8_Fault
GX33
OROUT
150
Ch5_Temp
V610
=
K7fff
PID1-5_Fault
GX30
OROUT
151
Ch6_Temp
V612
=
K7fff
PID2-6_Fault
GX31
OROUT
152
Ch7_Temp
V614
=
K7fff
PID3-7_Fault
GX32
OROUT
153
Ch8_Temp
V616
=
K7fff
PID4-8_Fault
GX33
OROUT


Begin alarm function for plate temperature averaging
If one probe differs from the other in the same plate by more than 15 deg., turn on alarm
If v410 > V610, then V410-V610
154
Ch1_Temp
V410
≥
Ch5_Temp
V610
LD
Ch1_Temp
V410
SUBB
Ch5_Temp
V610
OUT
Ch_1/5_Delta
V620
If V410<V610, then V610-V410,
155
Ch1_Temp
V410
<
Ch5_Temp
V610
LD
Ch5_Temp
V610
SUBB
Ch1_Temp
V410
OUT
Ch_1/5_Delta
V620
If delta is > 15 deg C, then turn on alarm
156
Ch_1/5_Delta
V620
≥
K150
CH1/5_Delta_High
GX40
OUT


If v412 > V620, then V420-V620
157
Ch2_Temp
V412
≥
Ch6_Temp
V612
LD
Ch2_Temp
V412
SUBB
Ch6_Temp
V612
OUT
Ch_2/6_Delta
V622
If V412<V612, then V612-V412,
158
Ch2_Temp
V412
<
Ch6_Temp
V612
LD
Ch6_Temp
V612
SUBB
Ch2_Temp
V412
OUT
Ch_2/6_Delta
V622
If delta is > 15 deg C, then turn on alarm
159
Ch_2/6_Delta
V622
≥
K150
CH2/6_Delta_High
GX41
OUT

If v414 > V614, then V414-V614

160

If V414<V614, then V614-V414,

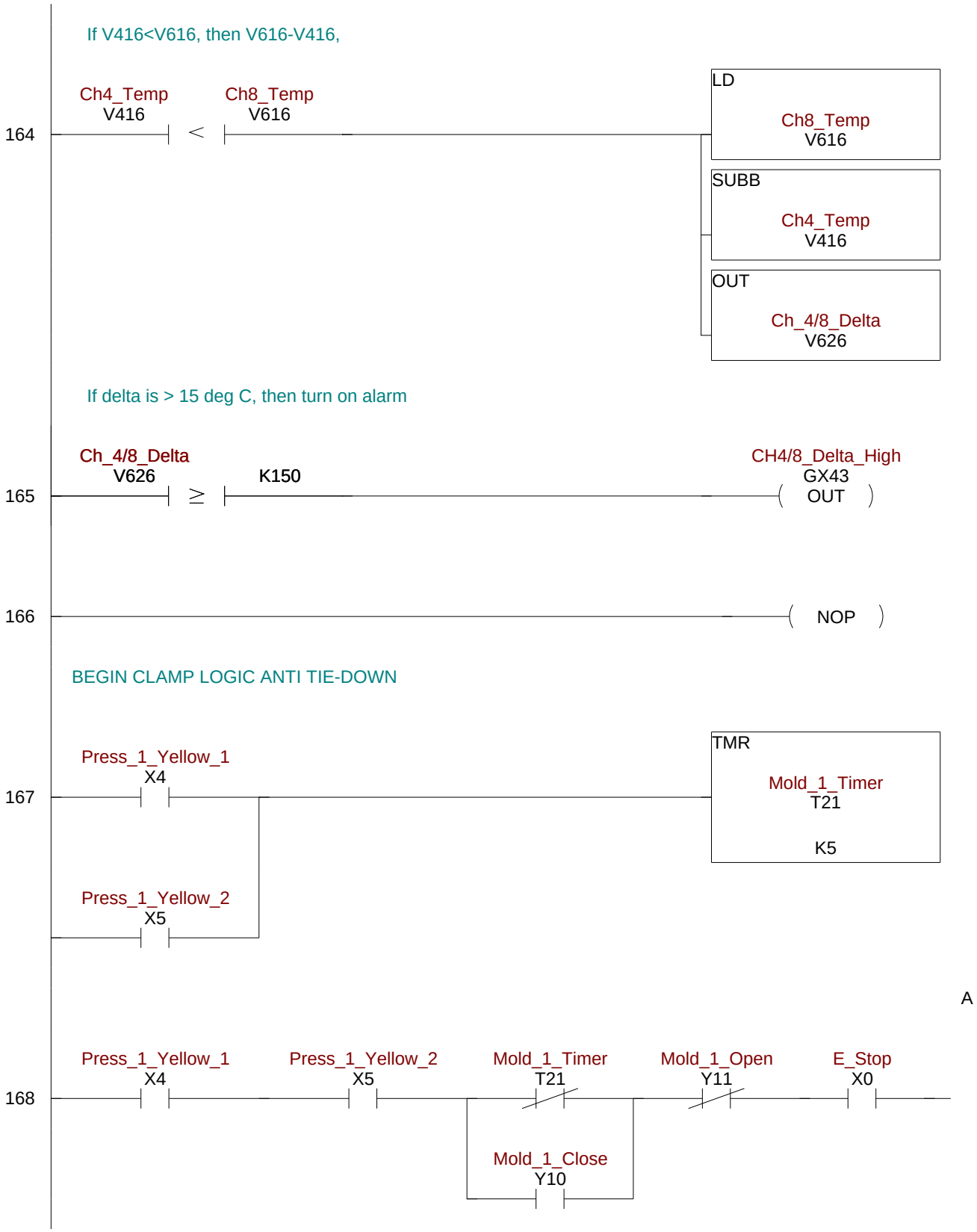
161

If delta is > 15 deg C, then turn on alarm

162

If v416 > V616, then V416-V616

163


If V416<V616, then V616-V416,
164
Ch4_Temp
V416
<
Ch8_Temp
V616
LD
Ch8_Temp
V616
SUBB
Ch4_Temp
V416
OUT
Ch_4/8_Delta
V626
If delta is > 15 deg C, then turn on alarm
165
Ch_4/8_Delta
V626
≥
K150
CH4/8_Delta_High
GX43
OUT
166
NOP
BEGIN CLAMP LOGIC ANTI TIE-DOWN
167
Press_1_Yellow_1
X4
Press_1_Yellow_2
X5
TMR
Mold_1_Timer
T21
K5
A
168
Press_1_Yellow_1
X4
Press_1_Yellow_2
X5
Mold_1_Timer
T21
Mold_1_Open
Y11
E_Stop
X0
Mold_1_Close
Y10

A

Mold_1_Close
Y10
OUT

A

169

Mold_1_Close
Y10

PRESS 1 IN AUTO
C205

PRESS 1 TIMER
T25

E_Stop
X0

PRESS 1 LATCH
C207

A

Press_1_Green
X6

TMR
PRESS 1 TIMER
T25
P1_AUTO_TIME
V460

PRESS 1 LATCH
C207
OUT

A

170

PRESS 1 TIMER
T25

P1 OPEN DURATION
T35

Mold_1_Close
Y10

Mold_1_Open
Y11

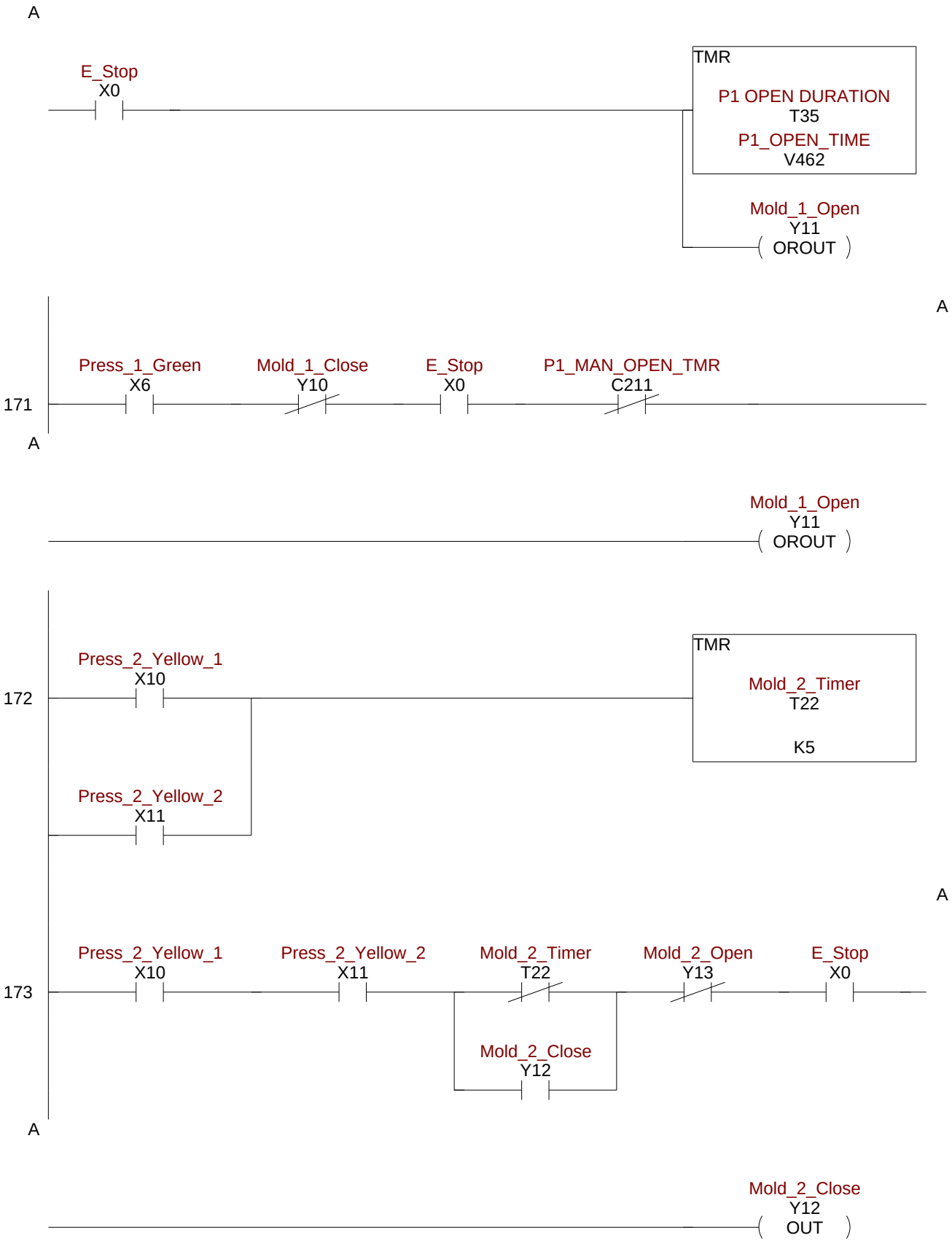
P1_MAN_OPEN_TMR
C211

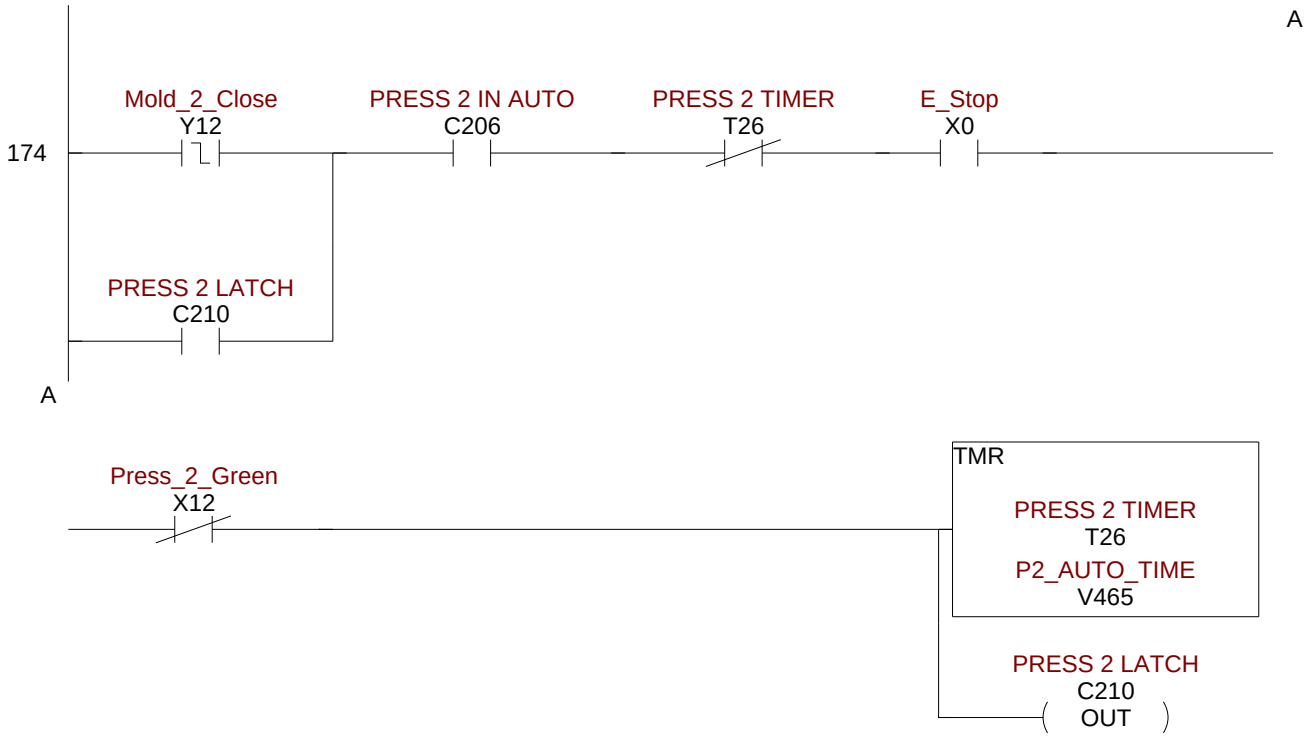
Mold_1_Open
Y11

PRESS 1 IN AUTO
C205

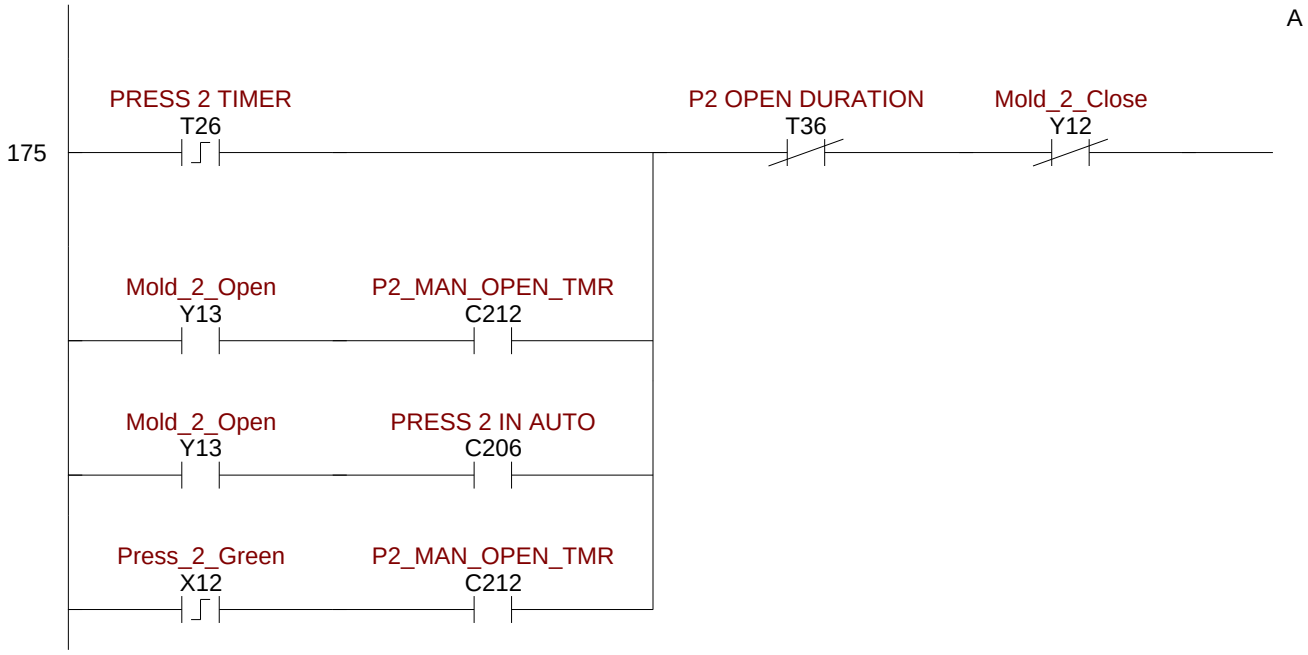
Press_1_Green
X6

P1_MAN_OPEN_TMR
C211


A
E_Stop
X0
TMR
P1 OPEN DURATION
T35
P1_OPEN_TIME
V462
Mold_1_Open
Y11
OROUT
A
171
Press_1_Green
X6
Mold_1_Close
Y10
E_Stop
X0
P1_MAN_OPEN_TMR
C211
A
Mold_1_Open
Y11
OROUT
172
Press_2_Yellow_1
X10
TMR
Mold_2_Timer
T22
K5
Press_2_Yellow_2
X11
A
173
Press_2_Yellow_1
X10
Press_2_Yellow_2
X11
Mold_2_Timer
T22
Mold_2_Open
Y13
E_Stop
X0
Mold_2_Close
Y12
A
Mold_2_Close
Y12
OUT


A
174
Mold_2_Close
Y12
PRESS 2 IN AUTO
C206
PRESS 2 TIMER
T26
E_Stop
X0
PRESS 2 LATCH
C210
A

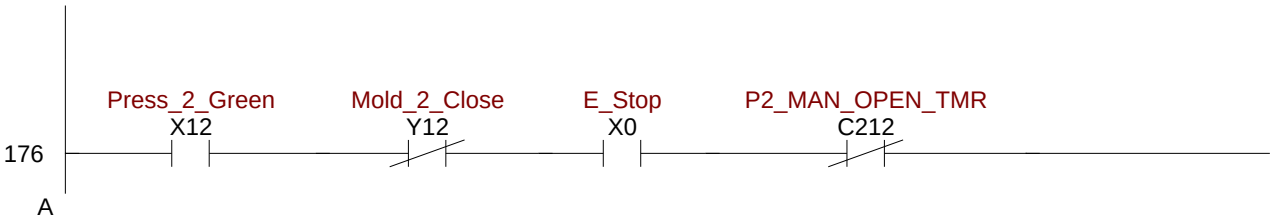
Press_2_Green
X12
TMR
PRESS 2 TIMER
T26
P2_AUTO_TIME
V465
PRESS 2 LATCH
C210
OUT


A
175
PRESS 2 TIMER
T26
P2 OPEN DURATION
T36
Mold_2_Close
Y12
Mold_2_Open
Y13
P2_MAN_OPEN_TMR
C212
Mold_2_Open
Y13
PRESS 2 IN AUTO
C206
Press_2_Green
X12
P2_MAN_OPEN_TMR
C212

A

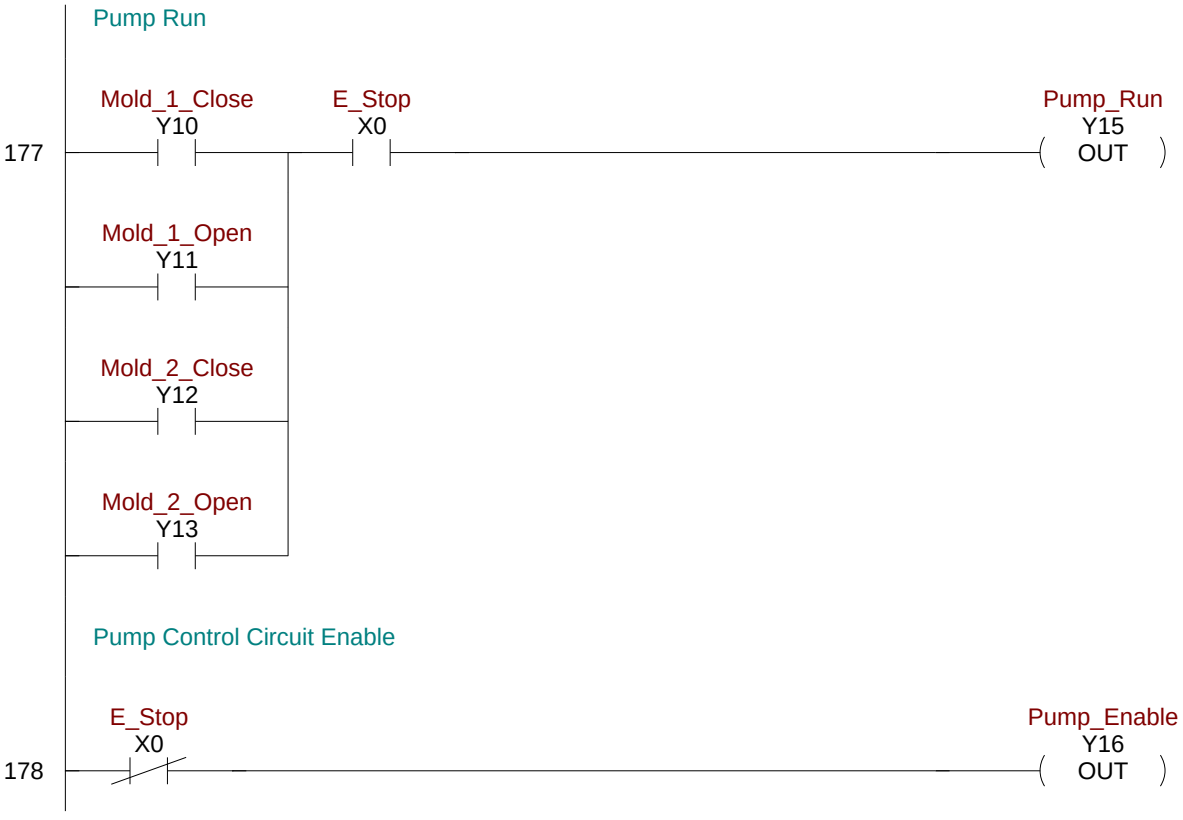

E_Stop
X0
TMR
P2 OPEN DURATION
T36
P2_OPEN_TIME
V463
Mold_2_Open
Y13
OROUT

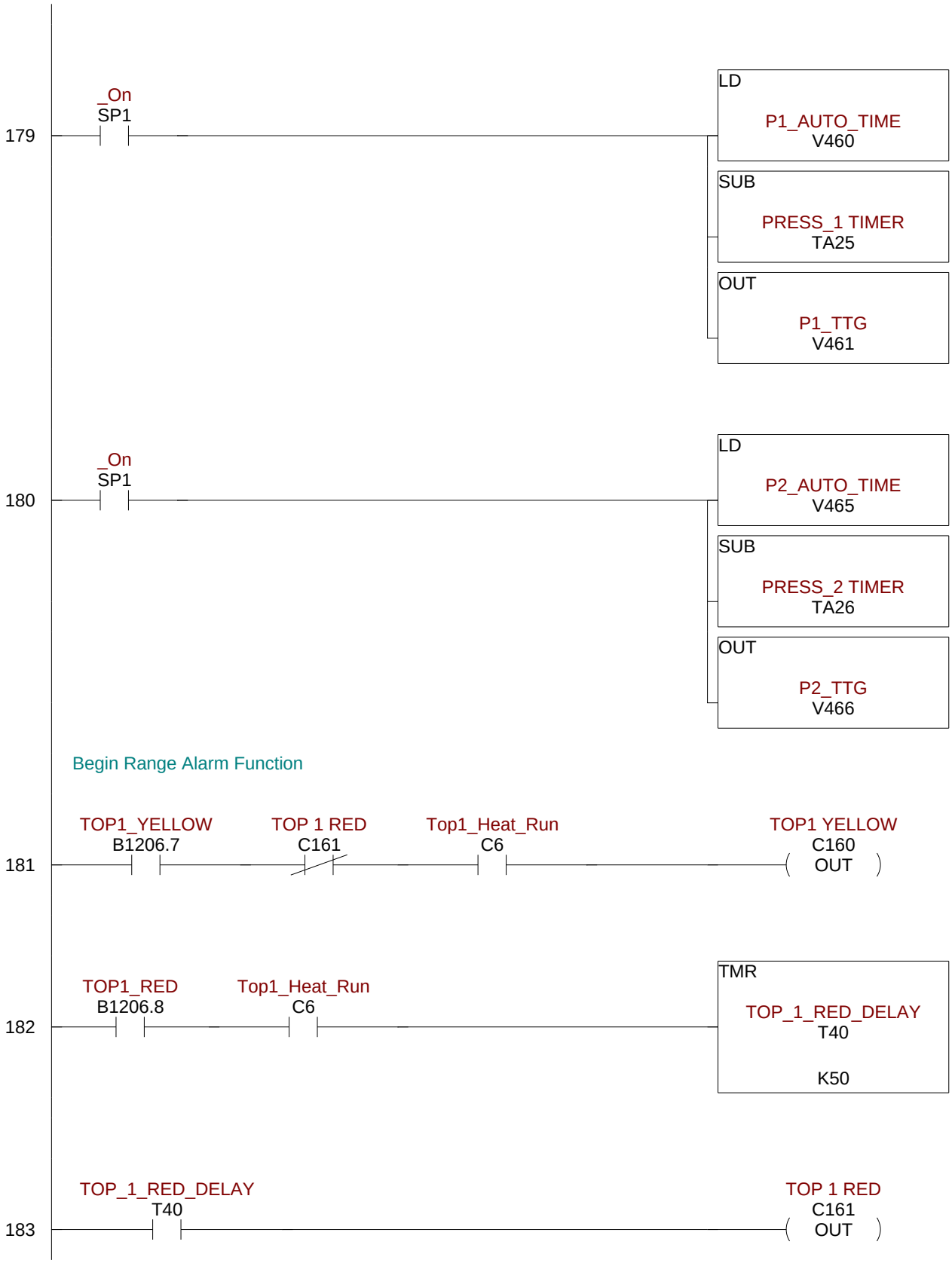
A

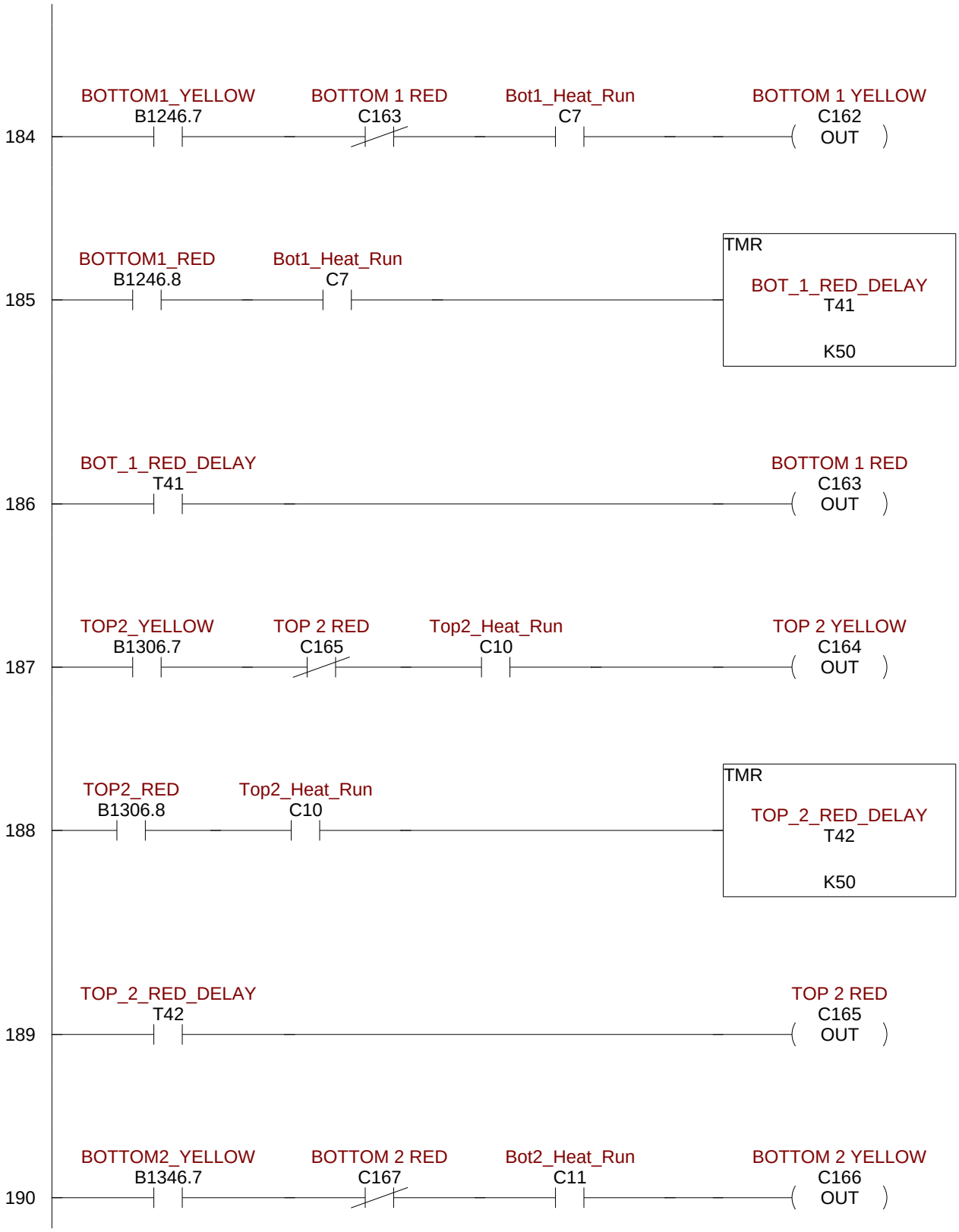

Press_2_Green
X12
Mold_2_Close
Y12
E_Stop
X0
P2_MAN_OPEN_TMR
C212
176

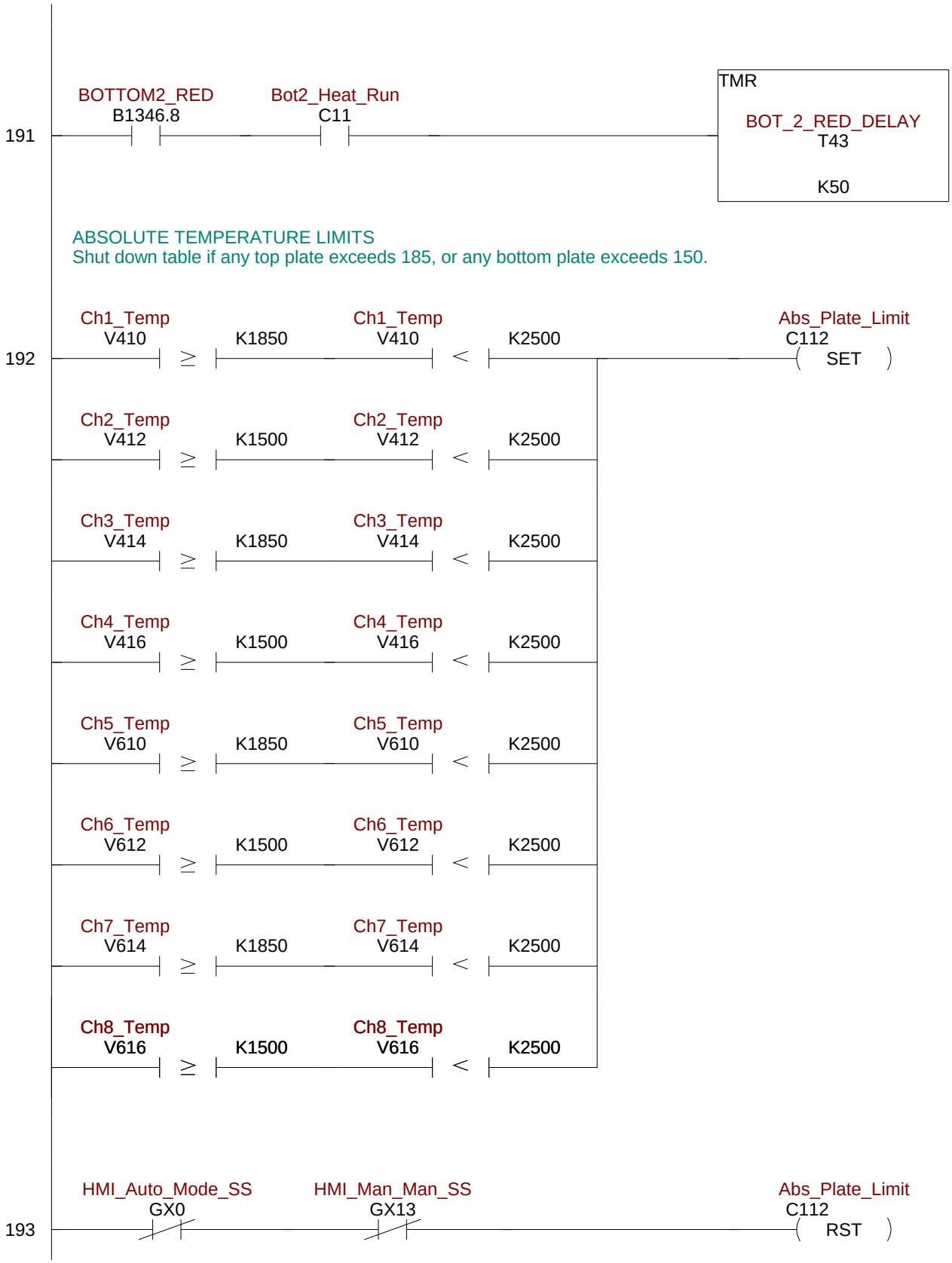
A

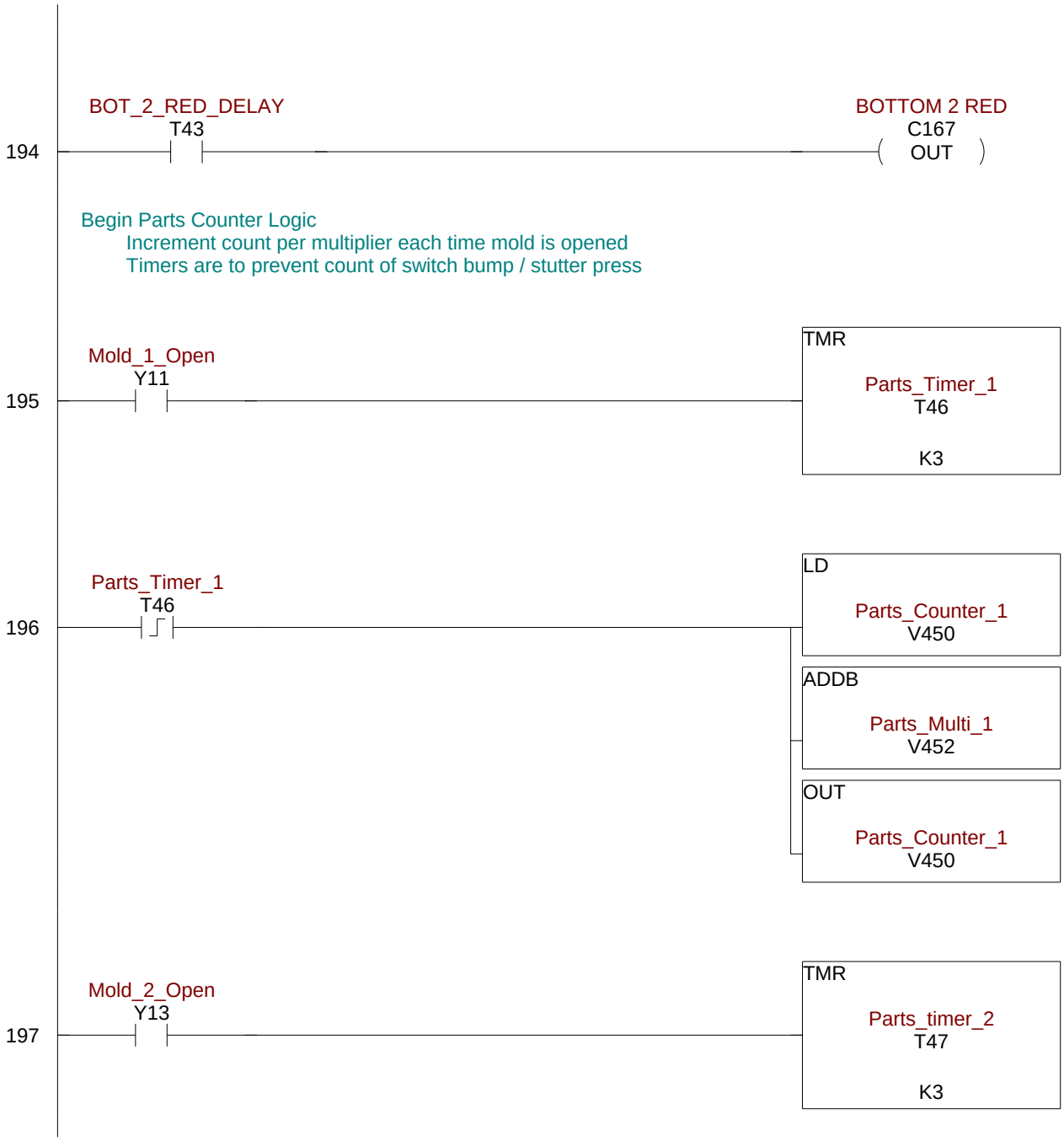

Mold_2_Open
Y13
OROUT

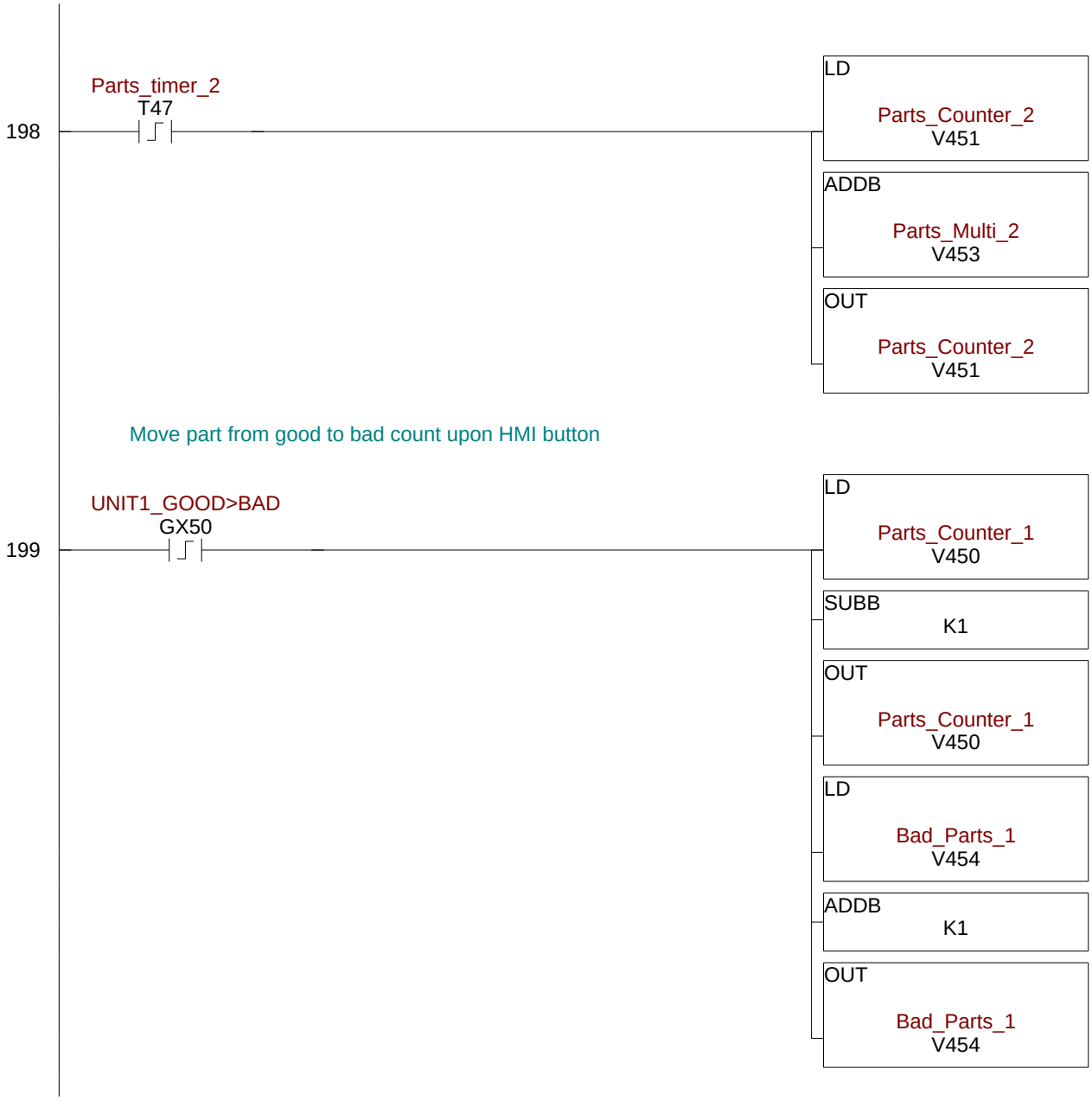

Pump Run
Mold_1_Close
Y10
E_Stop
X0
Pump_Run
Y15
OUT
177
Mold_1_Open
Y11
Mold_2_Close
Y12
Mold_2_Open
Y13
Pump Control Circuit Enable
E_Stop
X0
Pump_Enable
Y16
OUT
178


179
_On
SP1
LD
P1_AUTO_TIME
V460
SUB
PRESS_1 TIMER
TA25
OUT
P1_TTG
V461
180
_On
SP1
LD
P2_AUTO_TIME
V465
SUB
PRESS_2 TIMER
TA26
OUT
P2_TTG
V466
Begin Range Alarm Function
181
TOP1_YELLOW
B1206.7
TOP 1 RED
C161
Top1_Heat_Run
C6
TOP1 YELLOW
C160
OUT
182
TOP1_RED
B1206.8
Top1_Heat_Run
C6
TMR
TOP_1_RED_DELAY
T40
K50
183
TOP_1_RED_DELAY
T40
TOP 1 RED
C161
OUT


184
BOTTOM1_YELLOW
B1246.7
BOTTOM 1 RED
C163
Bot1_Heat_Run
C7
BOTTOM 1 YELLOW
C162
OUT
185
BOTTOM1_RED
B1246.8
Bot1_Heat_Run
C7
TMR
BOT_1_RED_DELAY
T41
K50
186
BOT_1_RED_DELAY
T41
BOTTOM 1 RED
C163
OUT
187
TOP2_YELLOW
B1306.7
TOP 2 RED
C165
Top2_Heat_Run
C10
TOP 2 YELLOW
C164
OUT
188
TOP2_RED
B1306.8
Top2_Heat_Run
C10
TMR
TOP_2_RED_DELAY
T42
K50
189
TOP_2_RED_DELAY
T42
TOP 2 RED
C165
OUT
190
BOTTOM2_YELLOW
B1346.7
BOTTOM 2 RED
C167
Bot2_Heat_Run
C11
BOTTOM 2 YELLOW
C166
OUT


191
BOTTOM2_RED
B1346.8
Bot2_Heat_Run
C11
TMR
BOT_2_RED_DELAY
T43
K50
ABSOLUTE TEMPERATURE LIMITS
Shut down table if any top plate exceeds 185, or any bottom plate exceeds 150.
192
Ch1_Temp V410 ≥ K1850
Ch1_Temp V410 < K2500
Abs_Plate_Limit C112 SET
Ch2_Temp V412 ≥ K1500
Ch2_Temp V412 < K2500
Ch3_Temp V414 ≥ K1850
Ch3_Temp V414 < K2500
Ch4_Temp V416 ≥ K1500
Ch4_Temp V416 < K2500
Ch5_Temp V610 ≥ K1850
Ch5_Temp V610 < K2500
Ch6_Temp V612 ≥ K1500
Ch6_Temp V612 < K2500
Ch7_Temp V614 ≥ K1850
Ch7_Temp V614 < K2500
Ch8_Temp V616 ≥ K1500
Ch8_Temp V616 < K2500
193
HMI_Auto_Mode_SS GX0
HMI_Man_Man_SS GX13
Abs_Plate_Limit C112 RST


194
BOT_2_RED_DELAY
T43
BOTTOM 2 RED
C167
OUT
Begin Parts Counter Logic
Increment count per multiplier each time mold is opened
Timers are to prevent count of switch bump / stutter press
195
Mold_1_Open
Y11
TMR
Parts_Timer_1
T46
K3
196
Parts_Timer_1
T46
LD
Parts_Counter_1
V450
ADDB
Parts_Multi_1
V452
OUT
Parts_Counter_1
V450
197
Mold_2_Open
Y13
TMR
Parts_timer_2
T47
K3


198
Parts_timer_2
T47
LD
Parts_Counter_2
V451
ADDB
Parts_Multi_2
V453
OUT
Parts_Counter_2
V451
Move part from good to bad count upon HMI button
199
UNIT1_GOOD>BAD
GX50
LD
Parts_Counter_1
V450
SUBB
K1
OUT
Parts_Counter_1
V450
LD
Bad_Parts_1
V454
ADDB
K1
OUT
Bad_Parts_1
V454

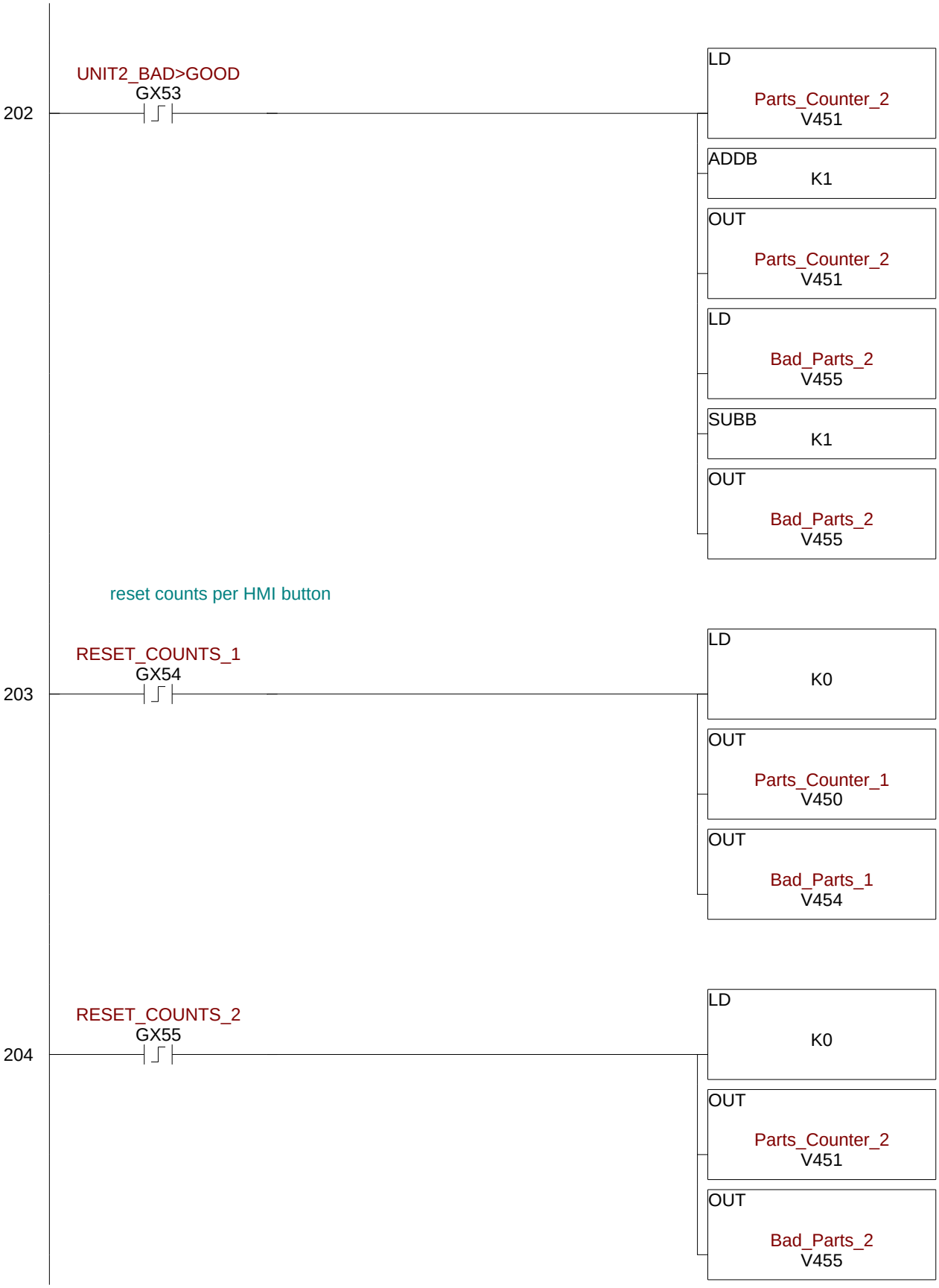
Move part from bad to good count upon HMI button

200 UNIT1_BAD>GOOD
GX51

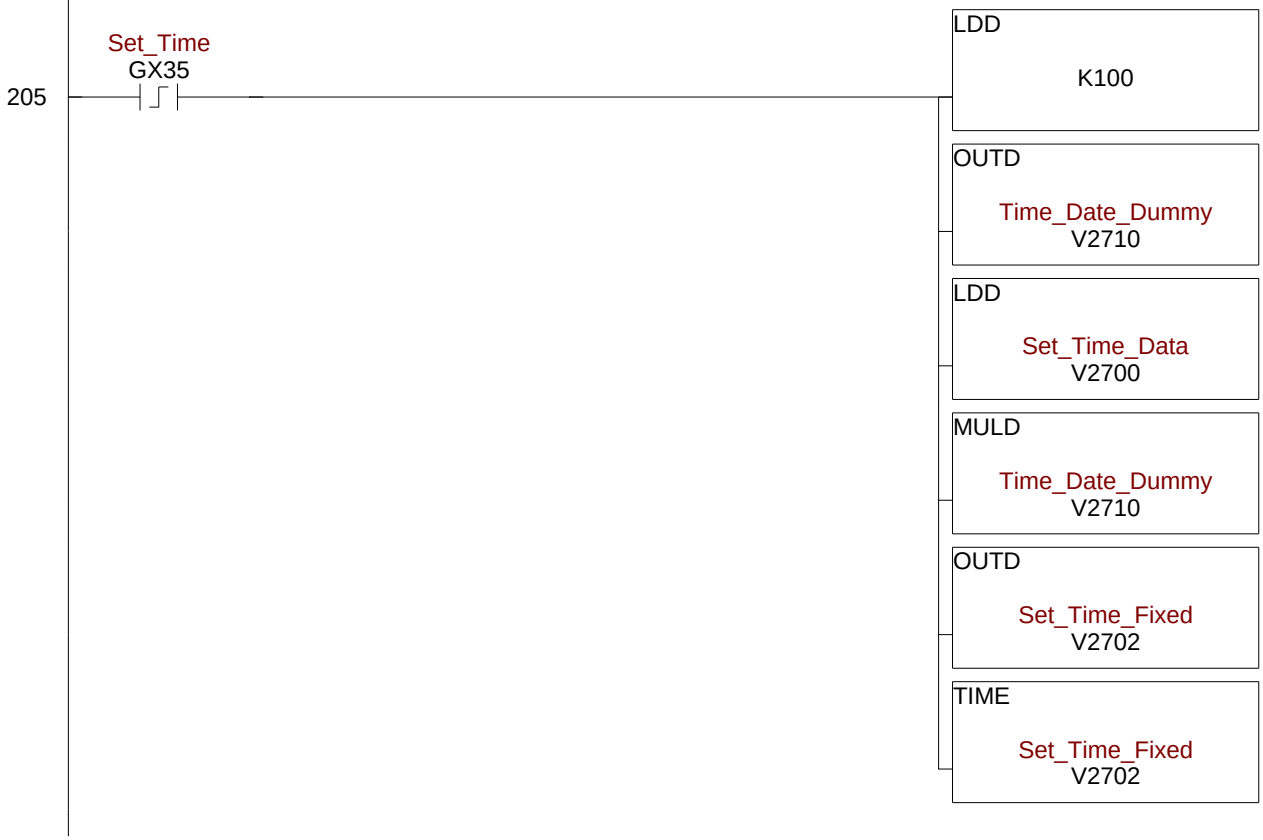
- LD Parts_Counter_1 V450
- ADDB K1
- OUT Parts_Counter_1 V450
- LD Bad_Parts_1 V454
- SUBB K1
- OUT Bad_Parts_1 V454

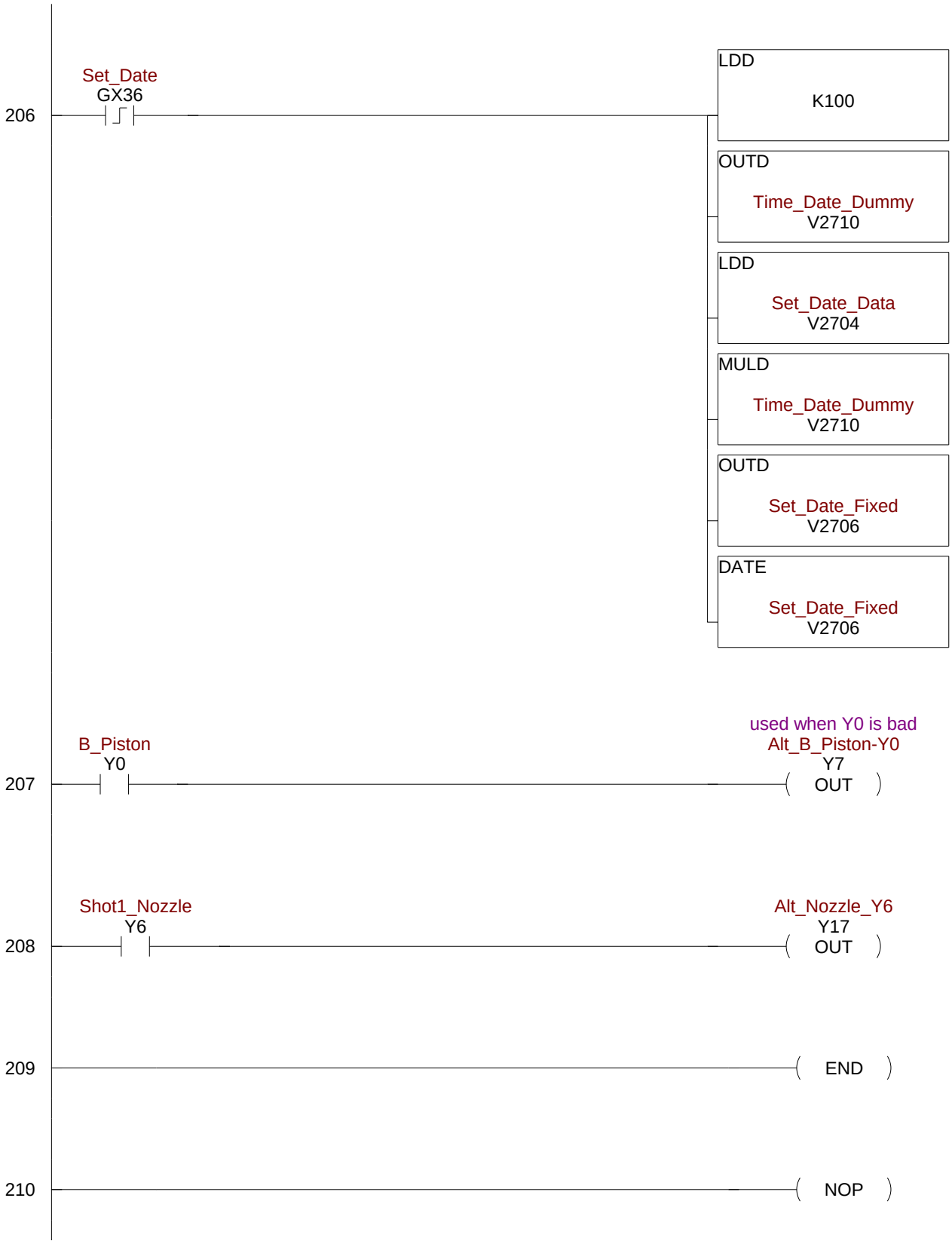
201 UNIT2_GOOD>BAD
GX52

- LD Parts_Counter_2 V451
- SUBB K1
- OUT Parts_Counter_2 V451
- LD Bad_Parts_2 V455
- ADDB K1
- OUT Bad_Parts_2 V455


UNIT2_BAD>GOOD
GX53
202
LD
Parts_Counter_2
V451
ADDB
K1
OUT
Parts_Counter_2
V451
LD
Bad_Parts_2
V455
SUBB
K1
OUT
Bad_Parts_2
V455
reset counts per HMI button
RESET_COUNTS_1
GX54
203
LD
K0
OUT
Parts_Counter_1
V450
OUT
Bad_Parts_1
V454
RESET_COUNTS_2
GX55
204
LD
K0
OUT
Parts_Counter_2
V451
OUT
Bad_Parts_2
V455

Logic to update time & date from HMI.




206
Set_Date
GX36
LDD
K100
OUTD
Time_Date_Dummy
V2710
LDD
Set_Date_Data
V2704
MULD
Time_Date_Dummy
V2710
OUTD
Set_Date_Fixed
V2706
DATE
Set_Date_Fixed
V2706
207
B_Piston
Y0
used when Y0 is bad
Alt_B_Piston-Y0
Y7
OUT
208
Shot1_Nozzle
Y6
Alt_Nozzle_Y6
Y17
OUT
209
END
210
NOP